

Professionalism and experience to promote safety...

"We will make the industrial workplace a safer place"

Honeywell, a world leader in industrial machine safety, offers a range of global solutions backed up with products that comply with the highest standards of safety and reliability. Working from a global perspective, our engineers design safety products which scrupulously adhere to published standards for safety, especially in Europe and North America. Our safety specialists are active members of standards committees in Europe and contribute to the definition of standards and Directives in Europe and the USA.

As a result of our years of experience in industrial safety, we can offer global solutions that meet the constraints of your work environment. In fact, safety choices are not limited to the selection of a safety component. Safety must be integrated within the physical limitations of your machine design and, if necessary, additional forms of protection must be put in place.

This guide should facilitate your understanding of the broad questions relating to safety and show you all that Honeywell has to offer in this area. The information provided here is summary information only. Honeywell advises that you consult relevant legislation, regulations, standards, instruction manuals, technical brochures, etc. for a full understanding of industrial safety.



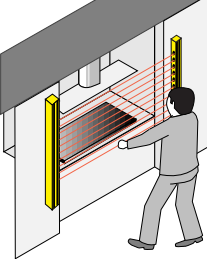


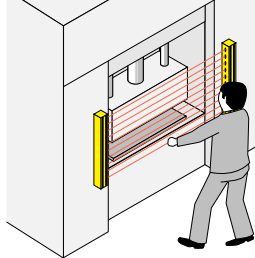


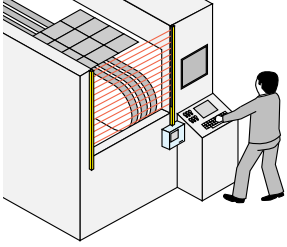


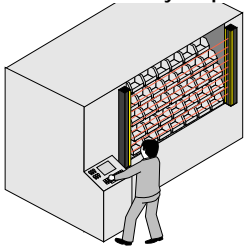

⚠ WARNING

MISUSE OF DOCUMENTATION




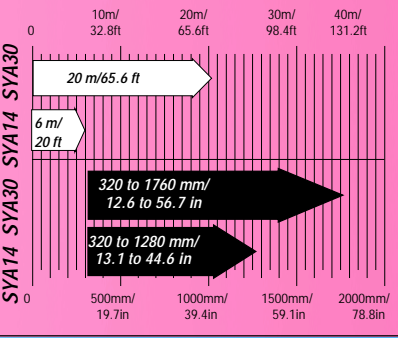





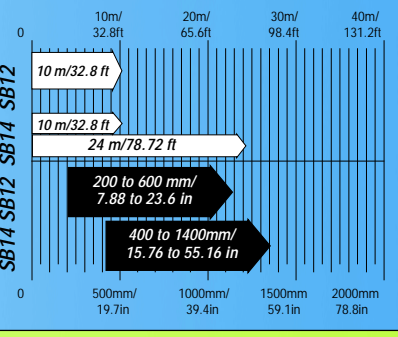





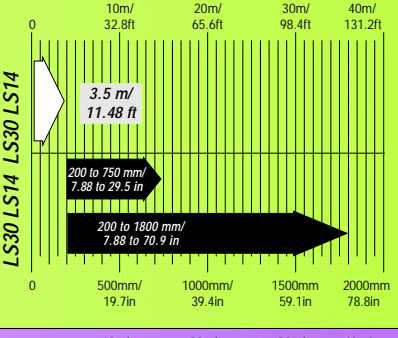
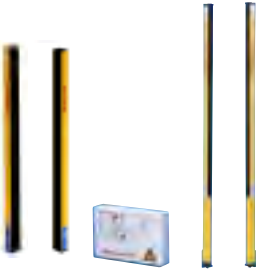



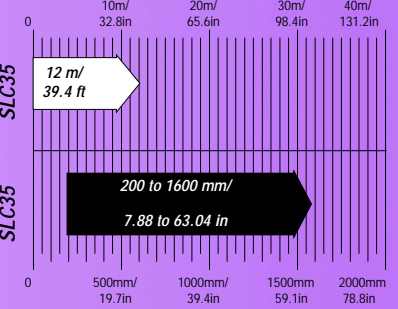


- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Safety Light Curtains for

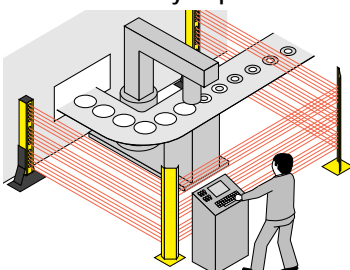
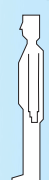
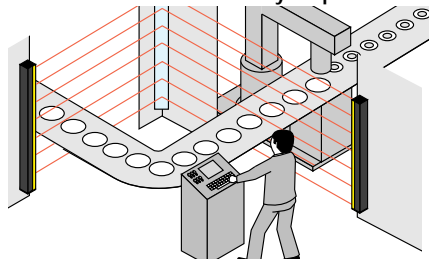
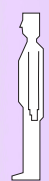
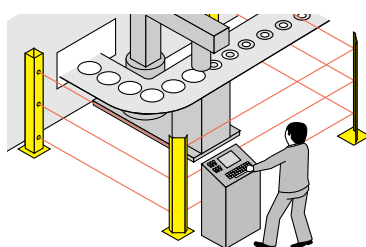
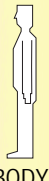
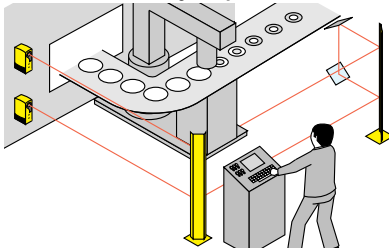
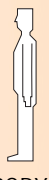
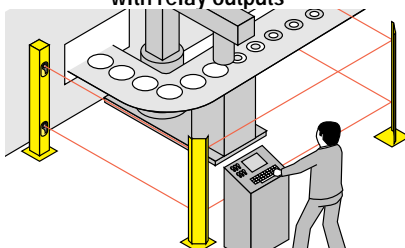
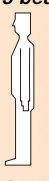
TYPICAL APPLICATIONS		RESOLUTION	VOLTAGE RESPONSE TIME
Compact Type 4 light curtain with failsafe static outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Pressing, moulding and thermoforming machines Conveyors, handling equipment and assembly lines Copying lathes and machining centers Door and gate, lift and hoist technology Stacking machines, transporting and conveyor technology Textile, packaging machines Jigging sieves, sorters and milling machines 	 FINGER DETECTION ø14 mm / 0.6 in  HAND DETECTION ø30 mm / 1.2 in	Voltage: 24 Vdc Response time: SYA14: 14 to 22.5 ms SYA30: 13.5 to 17.5 ms according to models
Harsh-duty Type 4 self-contained light curtain with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Presses and punches for metals, plastics and leather Deep-drawing presses, moulding presses and filter presses Metal forming, milling and drilling machines Spot-welding machines and fine-boring machines 	 FINGER DETECTION ø22 mm / 0.86 in  HAND DETECTION ø35 mm / 1.38 in	Voltage: 120/240 Vac 24 to 48 Vdc Response time: SB12: 25 to 29 ms SB14: 25 to 30 ms according to models
Type 4 light curtain with separate control unit 	Light industry <ul style="list-style-type: none"> Paper cutting machines Pick-and-place robots Light electronic assembly machines Goods lifts Small carousels 	 FINGER DETECTION ø14 mm / 0.55 in  HAND DETECTION ø30 mm / 1.18 in	Voltage: 22 to 30 Vdc or 18 to 25 Vac Response time: LS30: < 50ms LS14: < 50ms
Compact Type 2 light curtain with separate control unit and relay outputs 	Light industry and material conversion, transportation and storage <ul style="list-style-type: none"> Packaging and wrapping machines Automated warehouse Machinery for merchandise handling such as palletising and self-organisers Automated assembly lines Wood and leather industry 	 HAND DETECTION ø35 mm / 1.38 in	Voltage: 24 Vdc Response time: 28 to 32 ms according to models

point of operation protection




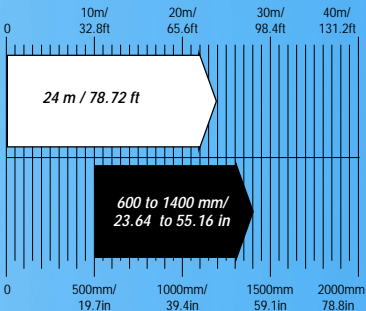





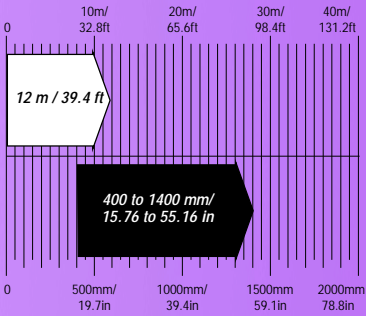




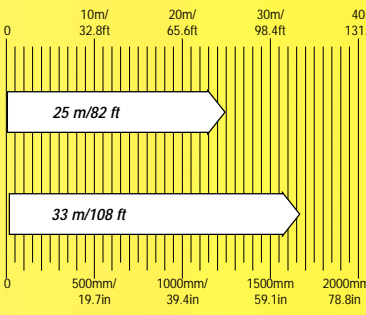
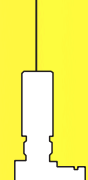





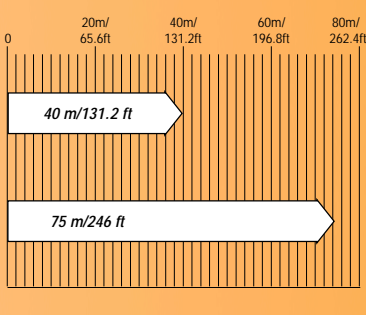
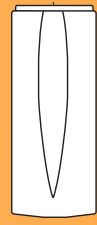





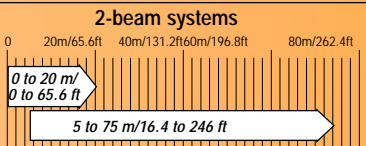
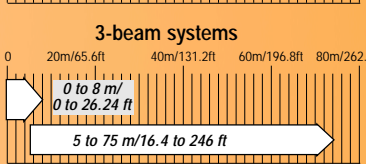
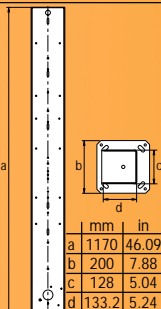

FUNCTIONS		APPROVALS	DIMENSIONS OF THE PROTECTED AREA SCANNING RANGE (m/ft) PROTECTION HEIGHT (mm/in)	DIMENSIONS	
Automatic restart	•	   Approved as Type 4 per IEC/EN 61496-1/2		 60 x 42 mm/ 2.36 x 1.65 in	FF-SYA14 / FF-SYA30 
Start and restart interlock (*)	•				
Test input	•				
FSD monitoring (*)	•				
Cross-talk detection/reduction	•				
Output contacts (static outputs)	2NO				
Output contacts (*)	2NO+1NC				
*through external relay module					
Automatic restart	•	   Approved as Type 4 per pr EN 50100 - 1/2		 116 x 56 mm/ 4.57 x 2.20 in	FF-SB12 / FF-SB14 
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
Automatic restart	•	   Approved as Type 4 per pr EN 50100 - 1/2		LS14 23 x 35 mm/ 0.90 x 1.38 in LS30 19 x 12 mm/ 0.74 x 0.47 in	FF-LS14 / FF-LS30 
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO				
Self-diagnostic LED	•				
Automatic restart	•	   Approved as Type 2 per EN 50100 - 1/2		 70 x 50 mm/ 2.75 x 1.97 in	FF-SLC35 
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	1NO+1NC				
Self-diagnostic LED	•				

Note 1:
for FF-SB14E/□□□-□-2 model only

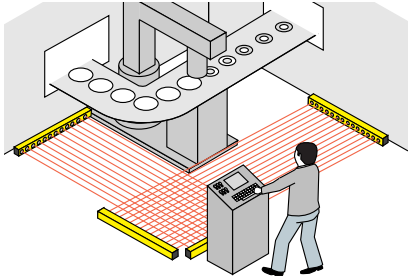

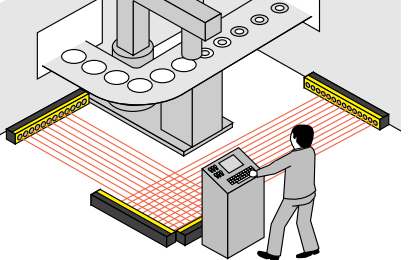

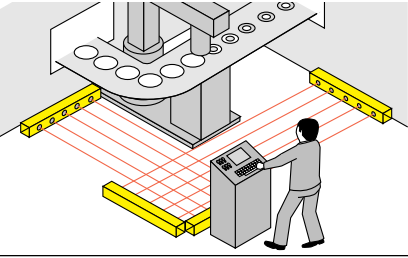

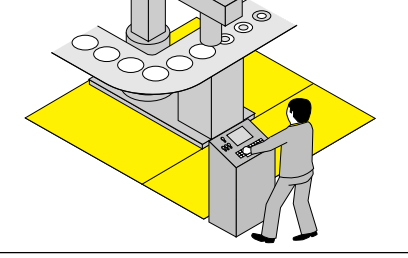

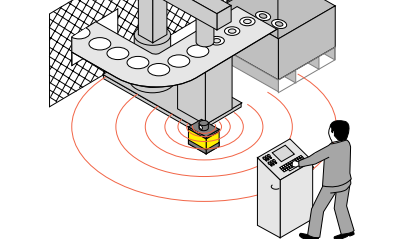

Multiple Light Beams for

TYPICAL APPLICATIONS		RESOLUTION	VOLTAGE RESPONSE TIME
Harsh-duty Type 4 self-contained light curtain with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Access control for: <ul style="list-style-type: none"> Robotic and transfer areas Machinery centers Palletising areas Storage and stacking areas Max. length of a U-shaped perimeter: 19 m/62.32 ft 	2, 3 or 4 beams per EN 999  BODY DETECTION ø235 mm / 9.25 in	Voltage: 120/240 Vac 24 to 48 Vdc Response time: 25 to 29 ms according to models
Compact Type 2 light curtain with separate control unit and relay outputs 	Light industry and material conversion, transportation and storage <ul style="list-style-type: none"> Access control for robotic areas Access control for transfer areas Perimeter protection Max. length of a U-shaped perimeter: 8 m/26.2 ft 	3 to 9 beams  BODY DETECTION ø184 mm / 7.24 in	Voltage: 24 Vdc Response time: 28 to 30 ms according to models
Type 4 modular light curtain with M18 sensors and separate control unit with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Access protection on palletising areas Access control of areas containing robots or automatic machines Detection of automatic guided vehicles Thermoforming, agglomerating and moulding press Max. length of a U-shaped perimeter: 27 m/88.56 ft 	2 to 8 beams  BODY DETECTION According to EN 999	Voltage: 120/240 Vac 24 to 48 Vdc Response time: 30 ms
Compact Type 4 self-contained single beam with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Access control of perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc. Access control at the rear of a press brake Max. length of a U-shaped perimeter: 19 m/62.32 ft 	1 beam  BODY DETECTION According to EN 999	Voltage: 120 or 240 Vac 24 Vdc Response time: 20 ms
Harsh-duty Type 4 access control systems with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> Access control for perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc. Access control at the rear of a press brake Max. length of a U-shaped perimeter: 60 m/196.8 ft 	2 or 3 beams  BODY DETECTION According to EN 999	Voltage: 120 Vac 240 Vac 24 Vdc Response time: 20 ms




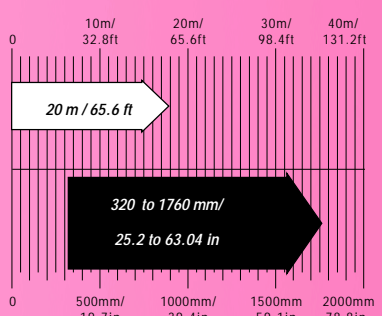





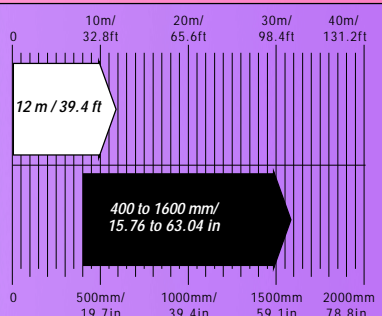




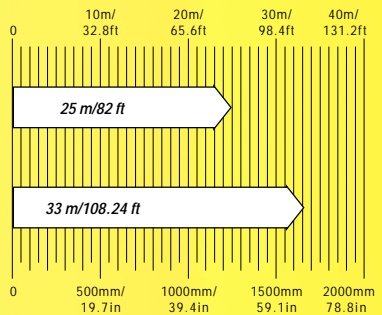
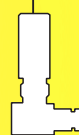



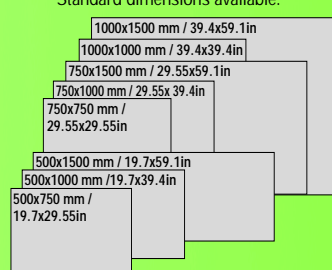
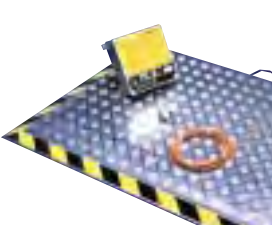



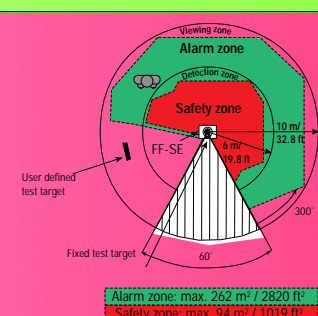
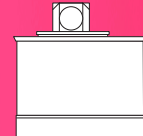

Access Control to Dangerous Areas

FUNCTIONS		APPROVALS	DIMENSIONS OF THE PROTECTED AREA SCANNING RANGE (m/ft) PROTECTION HEIGHT (mm/in)		DIMENSIONS
Automatic restart	•	   <div>Approved as Type 4 per pr EN 50100 - 1/2</div>			 116 x 56 mm/ 4.57 x 2.20 in
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
FF-SB15					
					
FF-SB P. 89					
Automatic restart	•	   <div>Approved as Type 2 per EN 50100 - 1/2</div>			 70 x 50 mm/ 2.75 x 1.97 in
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
Self-diagnostic output	•				
FF-SLC18					
					
FF-SLC P. 109					
Automatic restart	•	  <div>Approved as Type 4 per pr EN 50100 - 1/2</div>			 99 x Ø18 mm/ 3.90 x 0.70 in
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
FF-SCAN					
					
FF-SCAN P. 119					
Automatic restart	•	    <div>Approved as Type 4 per pr EN 50100 - 1/2</div>			 120 x 50 mm/ 4.72 x 0.02 in
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
Optical interference immunity	•				
FF-SPS4					
					
FF-SPS4 P. 127					
Automatic restart	•	    <div>Approved as Type 4 per pr EN 50100 - 1/2</div>	<p>2-beam systems</p>  <p>3-beam systems</p> 		 a 1170 46.09 b 200 7.88 c 128 5.04 d 133.2 5.24
Start and restart interlock	•				
Test input	•				
FSD monitoring	•				
Beam status output	•				
Output contacts	2NO+1NC				
FF-SPS4 systems					
					
FF-SPS4 P. 133					

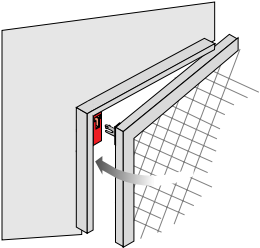
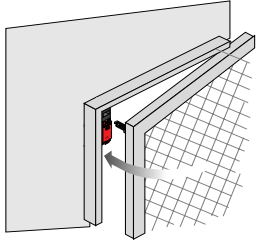
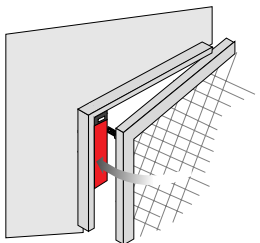
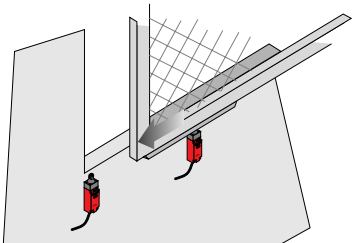
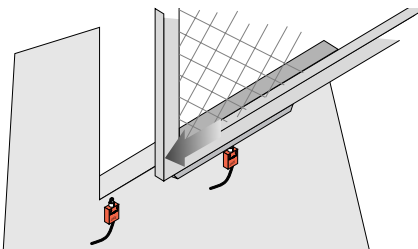
Electro-Sensitive Protective Equipment for

TYPICAL APPLICATIONS		RESOLUTION	VOLTAGE RESPONSE TIME
Compact Type 4 light curtain with fail-safe static outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> • Presence control for: <ul style="list-style-type: none"> - Robotic and transfer areas - Machinery centers - Palletizing areas - Storage and stacking areas 	 BODY DETECTION ø60 mm / 2.4 in	Voltage: 24 Vdc Response time: 13.5 to 17.5 ms according to models
Compact Type 2 light curtain with separate control unit and relay outputs 	Light industry and material conversion, transportation and storage <ul style="list-style-type: none"> • Presence control for robotic areas • Presence control for transfer areas 	 BODY DETECTION ø55 mm / 2.16 in	Voltage: 24 Vdc Response time: 28 to 30 ms according to models
Type 4 modular light curtain with M18 sensors and separate control unit with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> • Protection on palletising areas • Presence control of areas containing robots or automatic machines • Detection of automatic guided vehicles • Thermoforming, agglomerating and moulding presses 	 BODY DETECTION According to EN 999	Voltage: 120/240 Vac 24 to 48 Vdc Response time: 30 ms
Category 3 Pressure sensitive mat and separate control unit with relay outputs 	Heavy industry and material conversion <ul style="list-style-type: none"> • Presence sensing device for the control of dangerous areas such as robot areas, automotive transfer lines • Additional protection for optoelectronic trip devices • Suitable for cutting oils, welding splashes, shavings, etc. 	 BODY DETECTION Sensitivity ≥ 30 kg/66lbs	Voltage: 120 Vac 240 Vac 24 Vdc Response time: 25 ms
Category 3 laser scanner with relay outputs 	Light industry <ul style="list-style-type: none"> • Ground level trip device as an alternative to the safety mat • Industrial robot areas • Automatically guided vehicles • For the control of large areas of any shape • Suitable for relatively clean environments 	 BODY DETECTION ø70 mm / 2.75 in	Voltage: 24 Vdc Response time: 280 ms (including relays)

Presence Control in Dangerous Zones

FUNCTIONS		APPROVALS	DIMENSIONS OF THE PROTECTED AREA SCANNING RANGE PROTECTION HEIGHT	DIMENSIONS		
Automatic restart	•	   Approved as Type 4 per IEC/EN 61496-1/2		 60 x 42 mm/ 2.36 x 1.65 in		FF-SYA P. 79
Start and restart interlock (*)	•					
Test input	•					
FSD monitoring (*)	•					
Cross-talk detection/reduction	•					
Output contacts (static outputs)	2NO					
Output contacts (*)	2NO+1NC					
*through external relay module						
Automatic restart		   Approved as Type 2 per EN 50100 - 1/2		 70 x 50 mm/ 2.75 x 1.97 in		FF-SLC P. 109
Start and restart interlock	•					
Test input	•					
FSD monitoring	•					
Beam status output						
Output contacts	2NO+1NC					
Self-diagnostic output	•					
Automatic restart	•	  Approved as Type 4 per pr EN 50100 - 1/2		 99 x Ø18 mm/ 3.90 x 0.70 in		FF-SCAN P. 119
Start and restart interlock	•					
Test input	•					
FSD monitoring	•					
Beam status output	•					
Output contacts	2NO+1NC					
Automatic restart	•	  INRS EN 1760 MAT: Category 3 EN 954-1 CONTROL UNIT: Category 4 EN 954-1	<p>Standard dimensions available:</p> 	<ul style="list-style-type: none">Max. surface per control unit is: 6 m²/64.5 ft²Thickness: ≤ 20 mm/0.78 inControl unit dimensions: H 211 x W 211 x D 96 mm/ H 8.31 x W 8.31 x D 3.78 in		FF-SM P. 137
Start and restart interlock	•					
Test input	•					
FSD monitoring	•					
Beam status output						
Output contacts	2NO+1NC					
Automatic restart	•	 NRTL/C Pending   Approved as Type 3 per IEC/EN 61496-1		<p>Device dimensions: W 172 x H 176 x D 107 mm/ W 6.77 x H 6.93 x D 4.21 in</p> 		FF-SE P. 143
Start and restart interlock	•					
Test input						
FSD monitoring						
Beam status output	•					
Output contacts	2NO					
Optical interference immunity	•					
Contamination control	•					

Safety Electromechanical

TYPICAL APPLICATIONS		FUNCTIONS	CONTACTS
Miniature Safety Key Interlock Switch 	<ul style="list-style-type: none"> Door control for: <ul style="list-style-type: none"> Electronic assembly Packaging / wrapping Printing 	<ul style="list-style-type: none"> Key operated guard for door interlock 	<ul style="list-style-type: none"> Slow action <ul style="list-style-type: none"> 1NC + 1NO 2NC
Dual Entry Key Operated Safety Interlock Switch 	<ul style="list-style-type: none"> Key operated switch for: <ul style="list-style-type: none"> Sliding guard doors and screens Protective covers or enclosures with hinge, or removable 	<ul style="list-style-type: none"> Key operated guard for door interlock 	<ul style="list-style-type: none"> Slow action <ul style="list-style-type: none"> 1NC + 1NO (BBM)⁽¹⁾ 2NC 2NC + 2NO 3NC + 1NO 4NC Snap action <ul style="list-style-type: none"> 1NC + 1NO
Dual Entry Solenoid Key Operated Safety Interlock Switch 	<ul style="list-style-type: none"> Locking key operated switch for: <ul style="list-style-type: none"> Very dangerous machines Presses Metal working Machine tool Automotive plant floor 	<ul style="list-style-type: none"> Key operated guard with solenoid locking capability 	<ul style="list-style-type: none"> Slow action <ul style="list-style-type: none"> 1NC + 1NO (BBM)⁽¹⁾ 2NC 2NC + 2NO 3NC + 1NO
Global Safety Switch 	<ul style="list-style-type: none"> Door control for: <ul style="list-style-type: none"> Machine tools Wood machinery Automatic assembling machines 	<ul style="list-style-type: none"> Safety switch with forced disconnection 	<ul style="list-style-type: none"> Slow action <ul style="list-style-type: none"> 1NC + 1NO (MBB)⁽²⁾ 2NC 2NC + 1NO (BBM)⁽¹⁾ 2NC + 2NO (BBM)⁽¹⁾ 3NC + 1NO (BBM)⁽¹⁾ 4NC Snap action <ul style="list-style-type: none"> 1NC + 1NO 2NC + 2NO 2NC + 2NO sequential
Miniature Safety Electromechanical Switch 	<ul style="list-style-type: none"> Door control for: <ul style="list-style-type: none"> Material handling equipment Packaging machinery Textile machinery Small construction machinery 	<ul style="list-style-type: none"> Pre-wired switch with positive opening 	<ul style="list-style-type: none"> Slow action <ul style="list-style-type: none"> 1NC 1NC + 1NO (BBM)⁽¹⁾ 1NC + 1NO (MBB)⁽²⁾

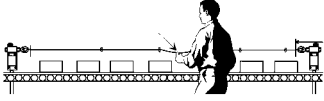
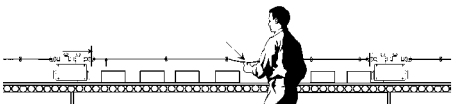
⁽¹⁾ BBM: Break before make

⁽²⁾ MBB: Make before break

Switches for Gate Monitoring

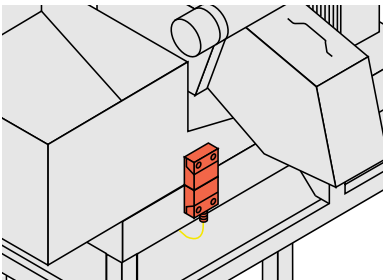
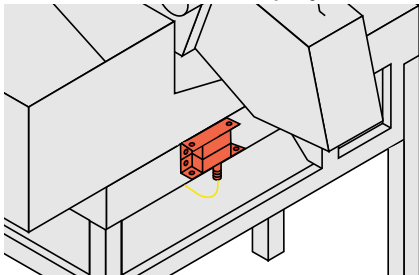
APPROVALS	FEATURES	DIMENSIONS		
 EN 60947-5-1-3 Pending	<ul style="list-style-type: none"> • Compact design • Side or top key entry • Prewired or connectorized • Daisy chain with pin to pin cross monitoring • Positive opening 	 22/0.86 fixing centres	 GKM	GKM P. 167
 EN 60947-5-1-3 Pending	<ul style="list-style-type: none"> • Harsh duty design • Side or top key entry • 4 key styles • Single and dual LED indicator versions • IP 67 - NEMA 4 sealing • -25 to 85 °C / -13 to 185 °F operating temperature • Galvanically isolated contacts • Positive opening 	EN 50041 MOUNTING  30 x 60/1.18 x 2.36 fixing centres (4-off)	 GK	GK P. 171
 EN 60947-5-1-3 Pending	<ul style="list-style-type: none"> • Harsh duty design • Side or top key entry • Separate contact blocks control key entry and solenoid status • Solenoid power to lock or unlock key • IP 68 - NEMA 6 sealing • Dual indicator LED • Wide range of solenoid voltages available • Positive opening 	 2x48.8/2x1.92 110/4.33 110/4.33	 GKR/L	GKR/L P. 175
 EN 60947-5-1-3 Pending	<ul style="list-style-type: none"> • Range of body sizes • Harsh duty design • Modular • Up to IP 67 sealing • -25 to 85 °C / -13 to 185 °F operating temperature • Galvanically isolated contacts • Sequential basic • Positive opening 	EN 50041 MOUNTING  30 x 60 mm / 1.18 x 2.36 in fixing centres (4-off)	 GSS	GSS P. 179
 EN 60947-5-1-3 24CE only	<ul style="list-style-type: none"> • Compact design • Prewired and miniature switch • Stackable • IP 66 or 67 sealing • 0 to 70 °C / 32 to 158 °F operating temperature • 3 mm/ 0.11 in contact spacing • Positive opening 	 25/0.98 mounting centres <i>Dimensions in mm/in</i>	 24CE/924CE	24CE/924CE P. 191

Safety Electromechanical Switches





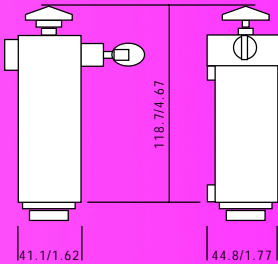





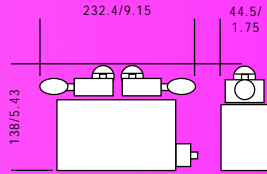

TYPICAL APPLICATIONS		FUNCTIONS	CONTACTS
Cable Pull Safety Switch Single Head 	<ul style="list-style-type: none"> • Cable pull switch for: <ul style="list-style-type: none"> - Conveyors - Packaging machinery - Assembly lines - Process equipment - Transfer lines - Material handling equipment 	<ul style="list-style-type: none"> • Cable actuated safety switch with forced disconnection 	<ul style="list-style-type: none"> • Slow action <ul style="list-style-type: none"> . 1NC + 1NO (BBM)⁽¹⁾ . 2NC . 2NC + 2NO . 3NC + 1NO . 4NC
Cable Pull Safety Switch Dual Head 	<ul style="list-style-type: none"> • Cable pull switch for: <ul style="list-style-type: none"> - Conveyors - Packaging machinery - Assembly lines - Process equipment - Transfer lines - Material handling equipment 	<ul style="list-style-type: none"> • Cable actuated safety switch with forced disconnection 	<p>Primary:</p> <ul style="list-style-type: none"> • Slow action: <ul style="list-style-type: none"> . 1NC + 1NO (BBM)⁽¹⁾ . 2NC <p>Auxiliary:</p> <ul style="list-style-type: none"> • Slow action: <ul style="list-style-type: none"> . 1NC + 1NO (BBM)⁽¹⁾ . 2NC

⁽¹⁾ BBM: Break before make



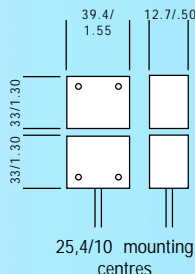



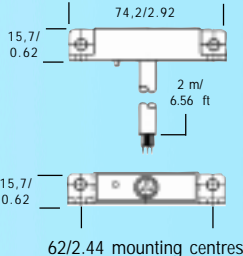

Hall Effect Door Interrupt

Hall Effect Door Interrupt System 	<ul style="list-style-type: none"> • Door control for: <ul style="list-style-type: none"> - Food and beverage machinery - Machine tools - Automotive - Material handling machinery 	<ul style="list-style-type: none"> • Door interrupt system 	<ul style="list-style-type: none"> • 2 NO contacts in series (2 safety relays with guided contacts)
Hall Effect Door Interrupt System 	<ul style="list-style-type: none"> • Door control for: <ul style="list-style-type: none"> - Food and beverage machinery - Material handling machinery - Light industrial equipment - Packaging equipment - Electronic assembly equipment 	<ul style="list-style-type: none"> • Door interrupt system 	<ul style="list-style-type: none"> • Solid state open collector outputs (note: use of FF-SR Series recommended)




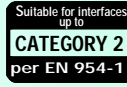



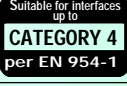

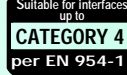
for Perimeter Emergency Stop

APPROVALS	FEATURES	DIMENSIONS	
   EN 60947-5-1-3  Pending	<ul style="list-style-type: none"> • Tension indicator for easy adjustment • Broken/Slackened cable detection • Snap action head • Four conduit thread sizes • -1 to 70 °C / 30 to 158 °F operating temperature • IP 67 - NEMA 1, 3, 4, 13 sealing • Indicator lights available • 60 m / 200 ft maximum cable run • Explosion-proof version available 	 (CLS only)	CLS CLSX 
   EN 60947-5-1-3  Pending	<ul style="list-style-type: none"> • Tension indicator for easy adjustment • Broken/Slackened cable detection • Snap action head • Four conduit thread sizes • -1 to 70 °C / 30 to 158 °F operating temperature • IP 67 - NEMA 1, 3, 4, 13 sealing • Indicator lights available • 120 m / 400 ft maximum cable run 		2CLS 

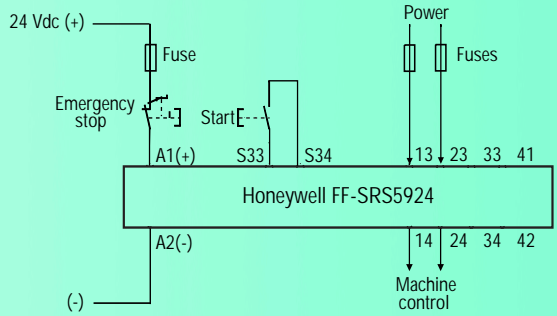
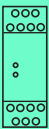

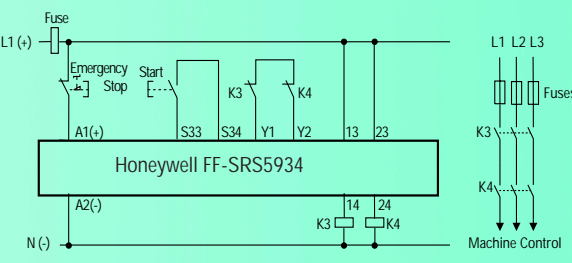


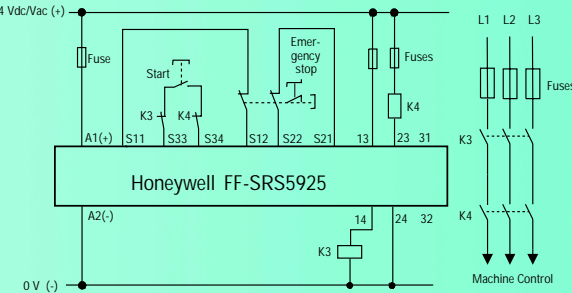


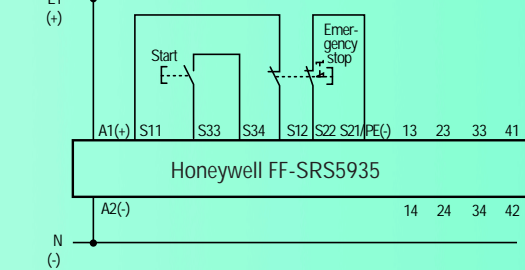


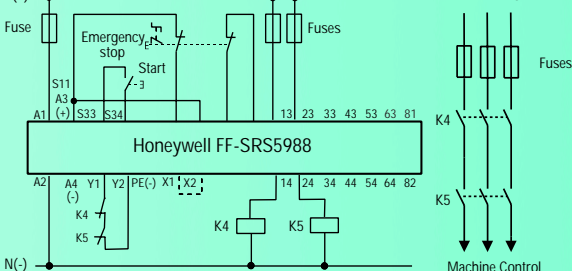
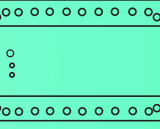

Systems for Gate/Door Monitoring

 CATEGORY 3 EN 954-1  EN 60947-5-1-3	<ul style="list-style-type: none"> • Up to 6 sensors per amplifier • LED indicators • Tamper resistant • Corrosion resistant plastic housing • IP 67 sealing • -40 to 85 °C / -40 to 153 °F operating temperature 		50FY 
 CATEGORY 1 EN 954-1  EN 60947-5-1-3	<ul style="list-style-type: none"> • Compact design • Alignment LED indicator • Tamper resistant • Corrosion resistant plastic housing • Pre-leaded or connectorized • IP 67 sealing, washdown • Wide temperature rating 	 Dimensions in mm/in.	40FY 

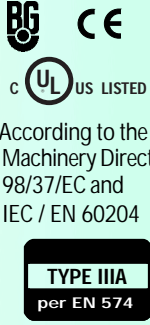
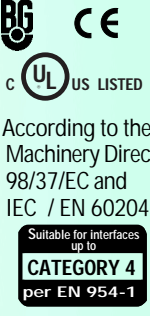
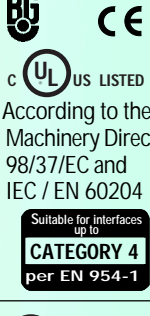
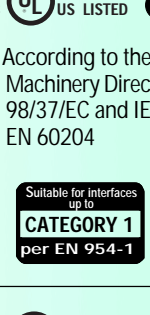
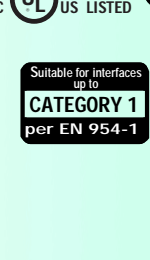
Safety Modules For

TYPICAL APPLICATIONS	FEATURES	VOLTAGES	APPROVAL	CONDITIONS OF USE
Single Channel Emergency Stop Module <ul style="list-style-type: none"> E-Stop circuits up to Category 2 (EN 954-1) Sliding door protection Conveyors/transfer lines 	<ul style="list-style-type: none"> Single channel input Slim 22,5 mm/0.88 in housing Automatic or manual restart FSD monitoring Power and outputs LED indicators Removable terminal strips 	<ul style="list-style-type: none"> Voltage: 24 Vdc 	 <ul style="list-style-type: none"> According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> Switching capacity: 10 mA - 4 A Typical electrical lifespan: 10⁶ operations Response time: 35 ms
Single Channel Emergency Stop Module <ul style="list-style-type: none"> E-Stop circuits up to Category 2 (EN 954-1) Sliding door protection Conveyors/transfer lines 	<ul style="list-style-type: none"> Single channel input Automatic or manual restart FSD monitoring Power and outputs LED indicators 	<ul style="list-style-type: none"> Voltages: 24 Vdc, 120 Vac, 230 Vac Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> Switching capacity: 10 mA - 10 A Typical electrical lifespan: 10⁶ operations Response time: 35 ms
Dual Channel Emergency Stop Module <ul style="list-style-type: none"> E-Stop circuits up to Category 4 (EN 954-1) Point of operation protection Door protection Perimeter guarding Conveyor/transfer lines 	<ul style="list-style-type: none"> Dual channel input Slim 22,5 mm/0.88 in housing Short-circuit detection on start push-button Automatic or manual restart Cross-fault detection FSD monitoring Power and outputs LED indicators Removable terminal strips 	<ul style="list-style-type: none"> Voltage: 24 Vac/Vdc 	 <ul style="list-style-type: none"> According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> Switching capacity: 1 mA - 7 A Typical electrical lifespan: 10⁶ operations Response time: 15 ms Overvoltage and short-circuit protection
Dual Channel Emergency Stop Module <ul style="list-style-type: none"> E-Stop circuits up to Category 4 (EN 954-1) Point of operation protection Door protection Perimeter guarding Conveyor/transfer lines 	<ul style="list-style-type: none"> Dual channel input Short-circuit detection on start push-button Automatic or manual restart Cross-fault detection FSD monitoring Power and outputs LED indicators Removable terminal strips 	<ul style="list-style-type: none"> Voltages: 24 Vdc, 120 Vac, 230 Vac Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> Switching capacity: 1 mA - 10 A Typical electrical lifespan: 10⁶ operations Response time: 25 ms Overvoltage and short-circuit protection
Dual Channel Emergency Stop Module <ul style="list-style-type: none"> E-Stop circuits up to Category 4 (EN 954-1) Point of operation protection Door protection Perimeter guarding Conveyor/transfer lines 	<ul style="list-style-type: none"> Dual channel input Dual voltage device Multiple output contacts Short-circuit detection on start push-button Automatic or manual restart Cross-fault detection FSD monitoring Power and outputs LED indicators Removable terminal strips 	<ul style="list-style-type: none"> Voltages: 120 Vac/24 Vdc, 230 Vac/24 Vdc Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> Switching capacity: 1 mA - 10 A Typical electrical lifespan: 10⁶ operations Response time: 30 ms Overvoltage and short-circuit protection

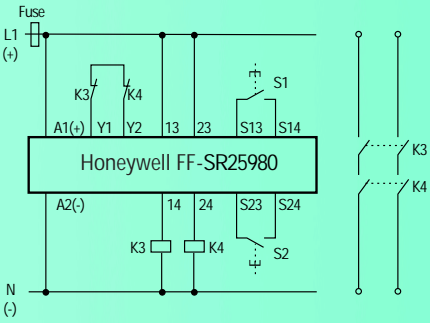
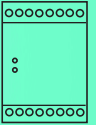

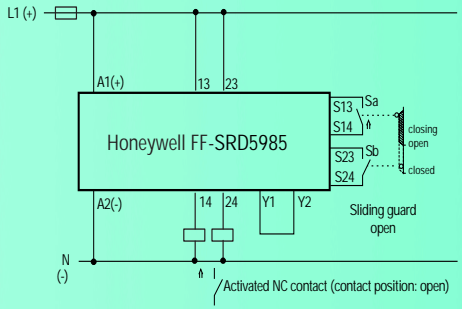
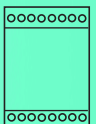

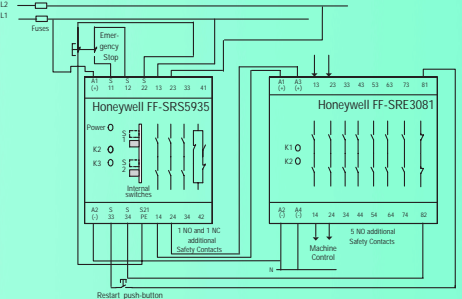
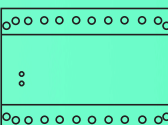

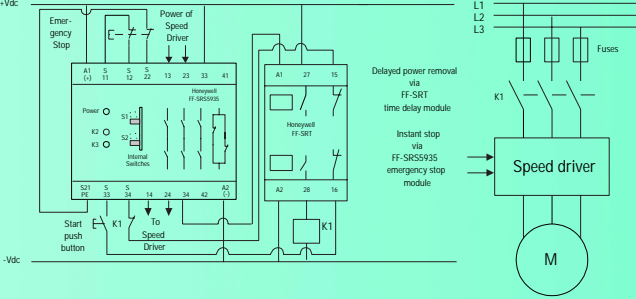
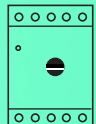

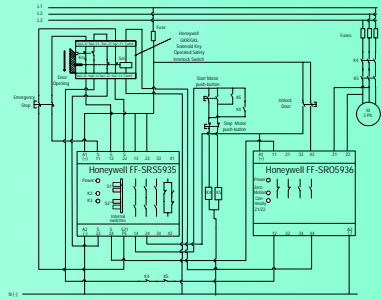
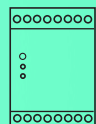

Emergency Stop Circuits

APPLICATION SCHEMATICS	OUTPUT	DIMENSIONS	
	<ul style="list-style-type: none"> • 3 NO contacts • 1 NC contact 	<p>Front view</p>  <p>W 22,5 x D 121 x H 84 mm/ W 0.89 x D 4.77 x H 3.31 in</p>	<p>FF-SRS5924</p> 
	<ul style="list-style-type: none"> • 2 NO contacts 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SRS5934</p> 
	<ul style="list-style-type: none"> • 2 NO contacts • 1 NC contact 	<p>Front view</p>  <p>W 22,5 x D 118 x H 84 mm/ W 0.89 x D 4.65 x H 3.31 in</p>	<p>FF-SRS5925</p> 
	<ul style="list-style-type: none"> • 3 NO contacts • 1 NC contact 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SRS5935</p> 
	<ul style="list-style-type: none"> • 6 NO contacts • 1 NC contact 	<p>Front view</p>  <p>W 100 x D 121 x H 74 mm/ W 3.93 x D 4.76 x H 2.91 in</p>	<p>FF-SRS5988</p> 








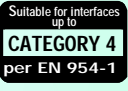



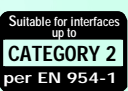
Safety Control Modules

TYPICAL APPLICATIONS	FEATURES	VOLTAGES	APPROVAL	CONDITIONS OF USE
Two hand control <ul style="list-style-type: none"> • Interfaces up to Category 1 (EN 954-1) • Type IIIA (EN 574) • Hand injury protection e.g. due to dangerous machine movement • Robotics • Pick and place machines 	<ul style="list-style-type: none"> • Dual channel input for two hand devices • FSD monitoring • Power and output LED indicators 	<ul style="list-style-type: none"> • Voltages: 24 Vdc, 120 Vac, 230 Vac • Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> • According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> • Switching capacity: 1 mA - 10 A • Typical electrical lifespan: 10⁶ operations • Simultaneity conditions between 2 inputs max. 0.5 s • Response time: 30 ms • Voltage drop and short-circuit protection
Safety door monitor <ul style="list-style-type: none"> • Interfaces up to Category 4 (EN 954-1) • Monitors the status of position switches on a safety door 	<ul style="list-style-type: none"> • Dual channel input • Automatic start • FSD monitoring 	<ul style="list-style-type: none"> • Voltages: 24 Vdc, 120 Vac, 230 Vac • Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> • According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> • Switching capacity: 1 mA - 10 A • Typical electrical lifespan: 10⁶ operations • Simultaneity conditions between 2 inputs max. 3 s • Response time: 30 ms • Voltage drop and short-circuit protection
Expansion module <ul style="list-style-type: none"> • Interfaces up to Category 4 (EN 954-1) • Contact multiplication for: <ul style="list-style-type: none"> - safety control modules - safety light curtains - other safety devices 	<ul style="list-style-type: none"> • Single or dual channel protection • Redundant guided safety contacts • FSD monitoring • Outputs LED indicators • Removable terminal strips 	<ul style="list-style-type: none"> • Voltages: 24 Vdc, 120 Vac, 230 Vac • Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> • According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> • Switching capacity: 10mA - 10 A • Typical electrical lifespan: 10⁶ operations • Response time: 15 ms
Time delay module <ul style="list-style-type: none"> • Time delay before disconnection of safety interface circuits 	<ul style="list-style-type: none"> • 1 or 2 channel outputs • Fixed or adjustable delay on de-energisation: (0.1 s up to 30 s) • Power LED indicator 	<ul style="list-style-type: none"> • Voltages: 24 Vdc, 120 Vac, 230 Vac • Frequency: 50/60 Hz 	 <ul style="list-style-type: none"> • According to the Machinery Directive: 98/37/EC and IEC / EN 60204 	<ul style="list-style-type: none"> • Switching capacity: 30 mA - 8 A • Typical electrical lifespan: 10⁶ operations
Standstill monitor <ul style="list-style-type: none"> • Standstill detection of asynchronous motors. • Example: Allows the opening of a protective door when movement is stopped or applies a brake while movement exists 	<ul style="list-style-type: none"> • Broken wire detection in measuring circuit with LED indicator • Power and outputs LED indicator • Self-checked. • For Category 1 Emergency Stop Interfaces (per EN 418) 	<ul style="list-style-type: none"> • Voltages: 24 Vdc, 120 Vac, 230 Vac • Frequency: 50/60 Hz 		<ul style="list-style-type: none"> • Switching capacity: 30 mA - 8 A • Typical electrical lifespan: 300.000 operations

for Machine Interfacing

APPLICATION SCHEMATICS	OUTPUT	DIMENSIONS	
	<ul style="list-style-type: none"> • 2 NO contacts 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SR25980</p> 
	<ul style="list-style-type: none"> • 2 NO contacts 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SRD5985</p> 
	<ul style="list-style-type: none"> • 7 NO contacts • 1 NC contact 	<p>Front view</p>  <p>W 100 x D 121 x H 74 mm/ W 3.94 x D 4.76 x H 2.91 in</p>	<p>FF-SRE3081</p> 
	<ul style="list-style-type: none"> • 1 NO contact • 1 NC contact 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SRT</p> 
	<ul style="list-style-type: none"> • 2 NO contacts • 2 NC contacts 	<p>Front view</p>  <p>W 45 x D 121 x H 74 mm/ W 1.77 x D 4.76 x H 2.91 in</p>	<p>FF-SR05936</p> 

Safety Control Modules

TYPICAL APPLICATIONS	FEATURES	VOLTAGE	APPROVAL	CONDITIONS OF USE
Category 4 interface control module <i>Compatible with the FF-SYA Series and the FF-SRM muting module ONLY</i>	<ul style="list-style-type: none"> Dual inputs compatible with failsafe solid state outputs of Honeywell electrosensitive protective equipment Selectable start and restart interlock Optional FSD monitoring loop LED indicators for inputs/ outputs status and for restart condition Removable terminal strips 	• 24 Vdc	 Pending   	<ul style="list-style-type: none"> Switching capacity: 1 mA to 6A DIN rail mounting 15 ms response time
Category 4 muting for conveyor or machine applications <i>Compatible with any Honeywell Type 3 or 4 protective equipment</i>	<ul style="list-style-type: none"> Connection of 2 or 4 muting sensors with coincidence monitoring Variable timings Override facility Start & restart interlock facility FSD monitoring loop Optional test input for the control of the ESPE at power up Failure diagnostic output Removable terminal strips 	• 24 Vdc	   	<ul style="list-style-type: none"> Switching capacity: 0.5A / 24 Vdc for connections to the machine control circuit including the muting lamp, 100 mA / 24 Vdc for status outputs Protection against overload, short-circuits and reversed polarity DIN rail mounting 5 ms response time
Category 2 muting for conveyor or machine applications <i>Compatible with the FF-SLC Series ONLY</i>	<ul style="list-style-type: none"> Connection of 2 or 3 muting sensors with coincidence monitoring Override facility Test input for the control of the ESPE at power up and after each actuation FSD monitoring loop Failure diagnostic output Removable terminal strips 	• 24 Vdc	   	<ul style="list-style-type: none"> Switching capacity: 2A / 125 Vac for connections to the machine control circuit, 0.5A / 60 Vdc for the self-diagnostic output, 200 mA / 24 Vdc for the muting lamp DIN rail mounting 15 ms response time

FF-SLM

Type 4 Safety light curtain

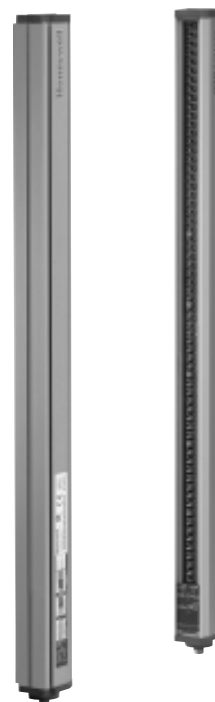
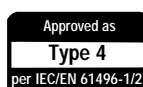
Compact, Universal, Smart and Full-featured

FEATURES

- 1- or 2-beam floating blanking
- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- Input for serial connection of an auxiliary safety device
- Unique patented configuration cards for quick set-up and easy replacement
- Self-contained with optical synchronisation
- 2 static (solid state) safety outputs with short-circuit and cross-fault detection
- Muting lamp/diagnosis output or static (solid state) non safety output for signalling
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes the following indication: signal strength, cross-talk, muting, blanking, restart and failure diagnostic
- Test input with selectable test input type
- Resolutions available:
 - ø14 mm / 0.6 in for finger detection
 - ø30 mm / 1.2 in for hand detection
 - ø50 mm / 1.97 in for leg detection
- Protection height up to 1830 mm / 72 in
- Scanning range up to 20 m / 65 ft
- M12 connectors
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS

- Presses and punches
- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Stacking machines, transporting and conveyor technology; handling equipment and assembly lines
- Palletizing industry



FF-SYB

The Honeywell FF-SYB light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). The CSA marking makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYB de-energizes its two static (solid state) safety outputs to signal the dangerous motion to stop. The FF-SYB is a self-contained light curtain that does not require a separate control unit for operation.

Functions such as floating blanking, muting, external device monitoring, manual restart and serial connection make it a comprehensive product and eliminate the need for additional control modules.

These built-in features, combined with the small size of the housing, help users reduce overall cost by saving space and installation time.

A unique patented configuration card system allows the user to set up the correct operating mode when swapping units, by simplifying and reducing the number of operations.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

□ External Device Monitoring (EDM)

The FF-SYB is fitted with an EDM input which allows users to check the correct state of the final switching devices (relays or contactors with positively guided contacts). After each intrusion into the protection field, the FF-SYB will check that the EDM input loop is closed before switching the outputs back to ON. If the FF-SYB operates in automatic restart mode, it will restart immediately if the EDM loop is closed. If the FF-SYB operates in manual restart mode, it will restart when the restart push-button is pressed and if the EDM loop is closed. If the EDM loop remains open (meaning that the external device has a malfunction) the FF-SYB will keep its outputs open and will not restart.

□ Manual restart

The FF-SYB can be used in automatic or manual restart mode. In automatic mode, the outputs will switch back to ON after an interruption of the protection field, as soon as the field becomes clear again. In manual restart mode, the FF-SYB will not switch back its outputs to ON until a manual restart push-button is pressed and released. The push-button must be a normally open type button. The manual restart will not switch the OSSDs back to ON in case of light curtain lock out (internal failure, optical interference, etc.) or when the protection field is still interrupted.

□ Auxiliary output

An additional non safety output is available to either mimic the safety output status (solid state Normally Closed signalling output) or signal muting sequences and provide diagnostic information (mode selection depending).

□ Muting function

The FF-SYB is fitted with a built-in muting function. Muting is the ability to temporarily inhibit the outputs of a light curtain under certain conditions.

Sensors are connected to the light curtain through the main connector. An optional junction box is available to perform the electrical connections close to the location of the muting sensors.

Muting sensors are used to discriminate authorised materials from people. The muting sensors must be able to detect the passing material (pallets, vehicles, etc.) according to the material's length and speed.

Figure 1 shows an FF-SYB placed on a conveyor, with the corresponding muting sensors. The muting activation sensors temporarily inhibit the FF-SYB light curtain as soon as they detect the object. The outputs of these sensors are connected to the muting inputs of the FF-SYB receiver. Muting sensors must be actuated within a time period of 3 s for a correct muting sequence to start.

Whenever one of the two muting sensors is released, the muting sequence stops. In case of an incorrect muting sequence, a temporary manual muting procedure may be performed to clear the FF-SYB light curtain detection field and revert back to normal operation.

Suitable optoelectronic, mechanical, proximity sensors, etc. can be used as muting sensors.

Inputs for muting sensors accept sensors with relay or static (solid state) outputs (NPN or PNP). 2-wire sensors are also accepted.

A muting lamp output is available on the FF-SYB receiver to drive an external muting indicator that should be installed in a suitable location on the machine.

The following are some configuration examples when using the muting function:

Figure 1 - Bi-directional application with two optoelectronic sensors

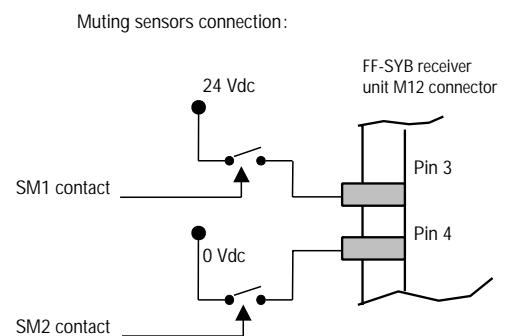
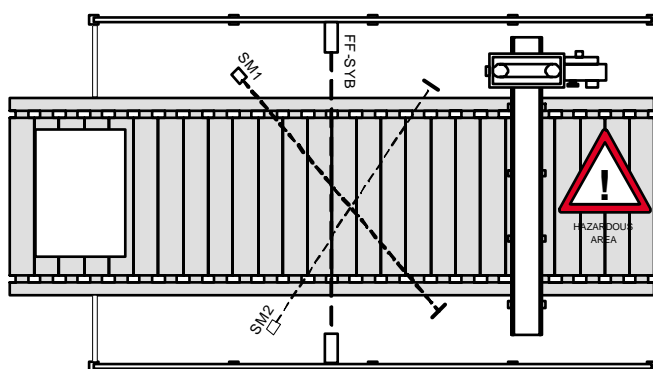
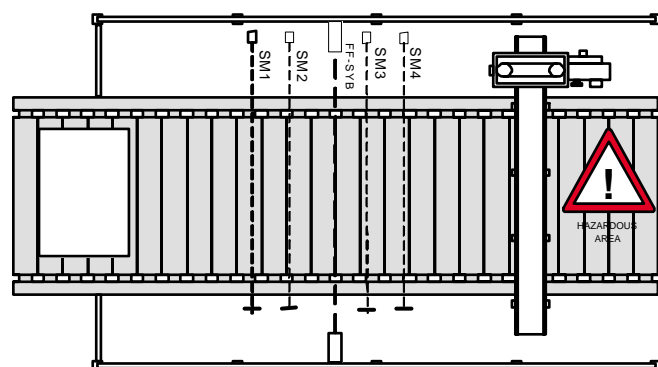


Figure 2 - Bi-directional application with four photoelectric sensors

2 sensors can be wired in parallel on each of the 2 muting inputs of the light curtain, creating a 4 sensor bi-directional muting.



Muting sensors connection:

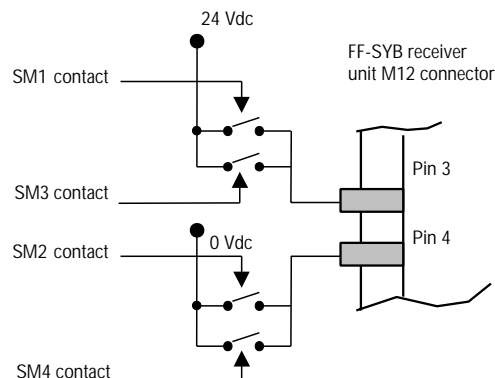
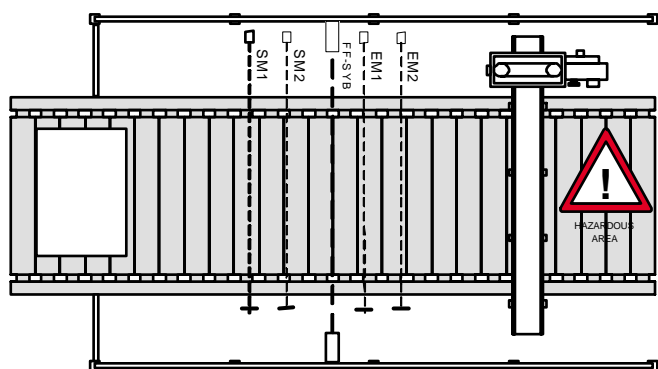
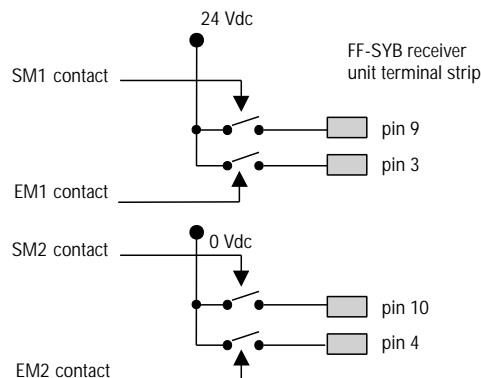


Figure 3 - Uni-directional application with four optoelectronic sensors



Muting sensors connection:

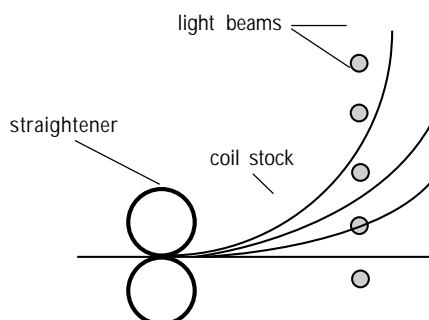


Note: this mode of operation requires direct connections to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

□ Floating blanking function

The FF-SYB is fitted with a selectable floating blanking function which allows users to inhibit 1 or 2 beams anywhere within the protection field, except the bottom beam which is used for synchronisation. If 2 beam floating blanking is selected, the interruption of 1 or 2 beams will not lead to the opening of the outputs. The 2 beams can be adjacent or not. It is useful in those applications where material or air ejected parts randomly travel through or within the sensing field. You can also disable light beams in an area where a fixture penetrates the light field, and you can permit stationary objects to protrude into the light curtain's sensing field.

Figure 4



When using floating blanking, the resolution of the light curtain is altered according to the following table:

Model	Resolution without floating/blanking	Resolution with 1-beam floating blanking	Resolution with 2-beam floating blanking
FF-SYB14	14 mm / 0.55 in	24 mm / 0.94 in	34 mm / 1.33 in
FF-SYB30	30 mm / 1.18 in	50 mm / 1.97 in	70 mm / 2.75 in
FF-SYB50	50 mm / 1.97 in	90 mm / 3.54 in	130 mm / 5.12 in

The maximum size of an undetected object is also affected by floating blanking:

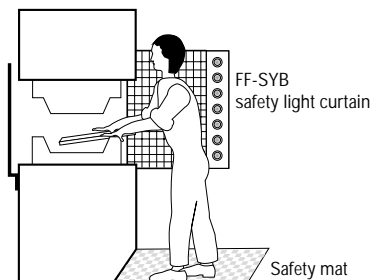
Model	Maximum size of undetected object with 1-beam floating blanking	Maximum size of undetected object with 2-beam floating blanking
FF-SYB14	6 mm / 0.23 in	16 mm / 0.63 in
FF-SYB30	10 mm / 0.39 in	30 mm / 1.18 in
FF-SYB50	30 mm / 1.18 in	70 mm / 2.75 in

Serial connection

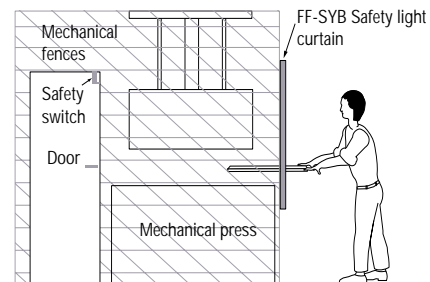
The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the receiver unit. The auxiliary safety device can be an electromechanical safety switch or any other safety device with either relay outputs or solid state outputs (for safety reasons, reversed polarity on these two inputs is mandatory, therefore connection of a second FF-SYB light curtain is not possible through these two inputs). Connection is done through the main connector. An optional junction box is available to perform the electrical connections close to the light curtain.

Figure 5

a) Serial connection of an FF-SYB safety light curtain with a safety mat



b) Serial connection of an FF-SYB safety light curtain with a safety gate switch.

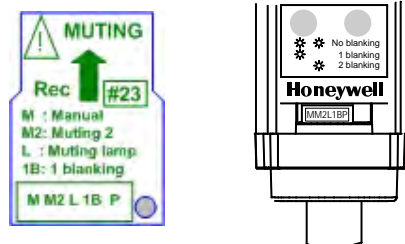


Note: This mode may be combined with the bi-directional muting mode. This combination of modes requires direct connection to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

Configuration cards

The FF-SYB emitter and receiver are set up by the use of configuration cards, similar to the SIM cards used on mobile phones (see figure below). This simple and elegant method eliminates the use of jumpers or dip switches. No computer is required: settings are done on site, using one of the small configuration cards. If the user needs to use a different configuration from the factory settings, he just needs to select the configuration card which corresponds to the desired settings and install it behind the bottom cap of the emitter or receiver. The selected settings are written on the configuration card and are visible through the transparent front window.

Figure 6

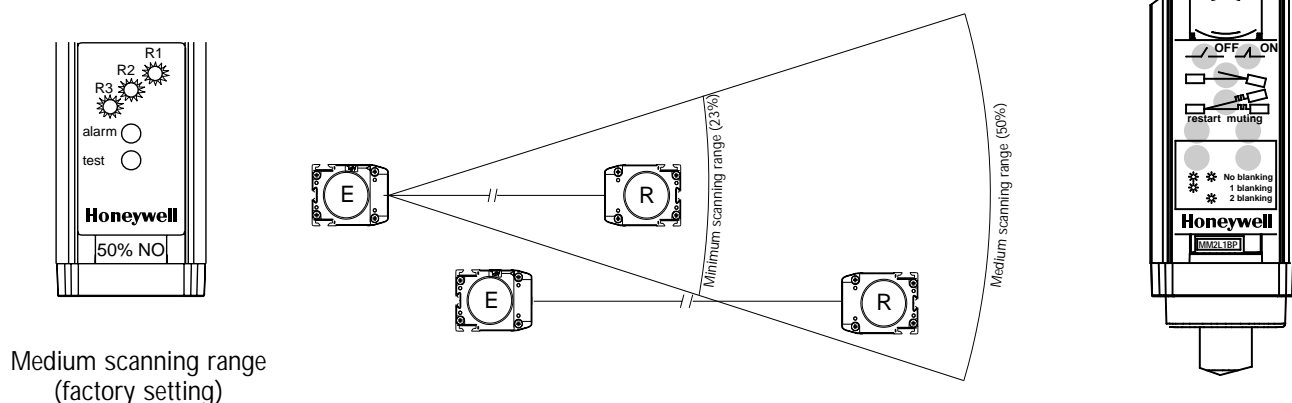


If the FF-SYB needs to be exchanged, the configuration card can be installed in another FF-SYB allowing transfer of settings in a few minutes.

❑ Cross-talk reduction system

The FF-SYB light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.

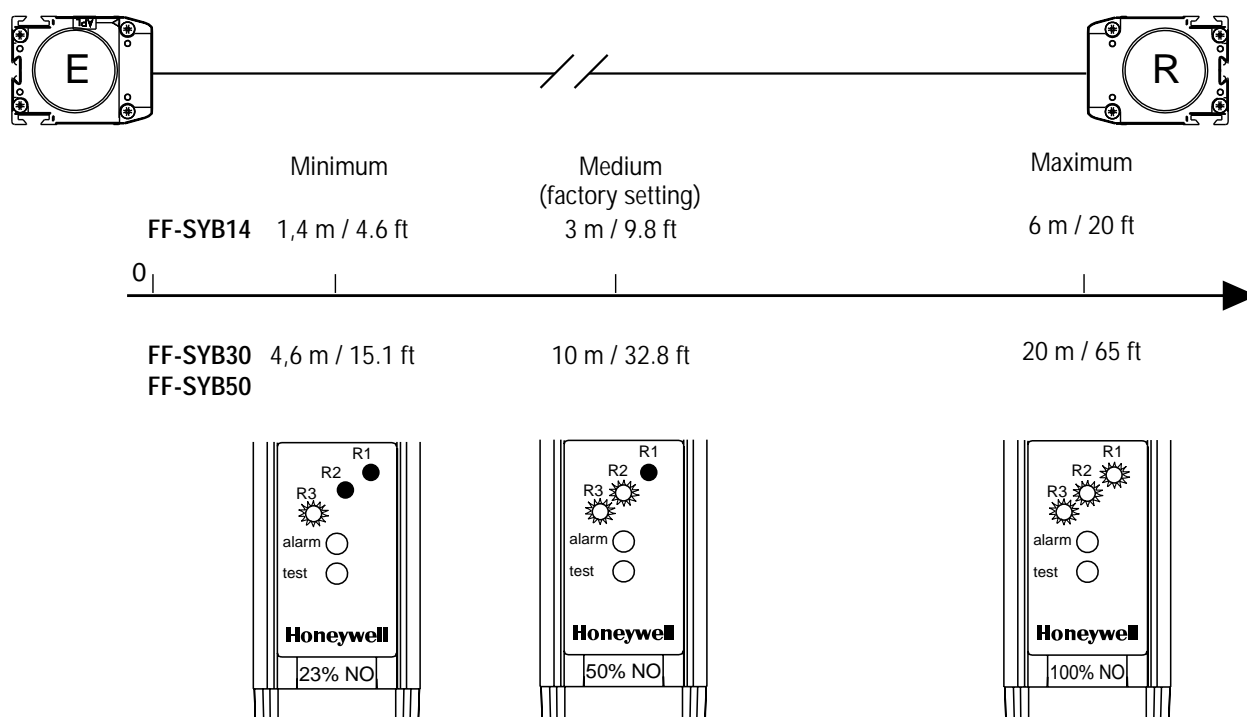
Figure 7



A configuration card is used on the emitter unit for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the scanning range. The end cap can be easily removed to select a different scanning range. Products are delivered with a medium scanning range (middle position) to minimize cross-talk upon installation.

❑ Selectable scanning ranges

Figure 8



Test input type

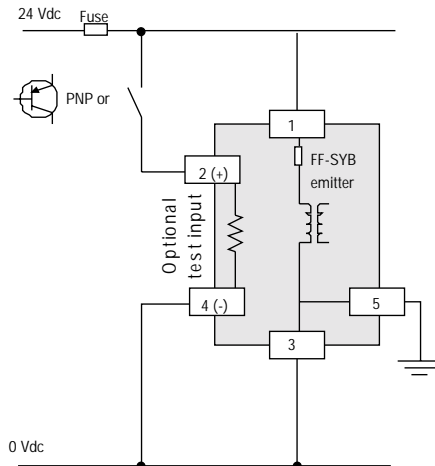
Figure 9

Voltage free contact

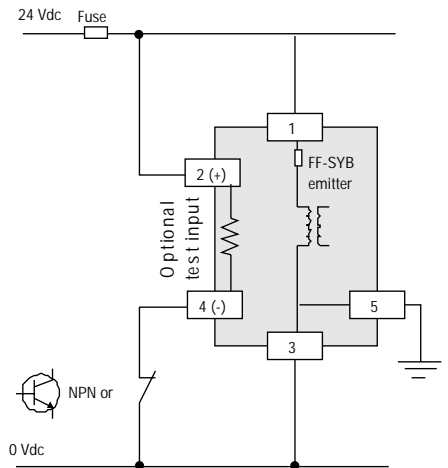
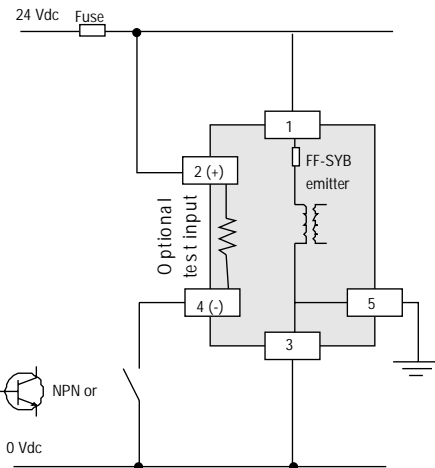
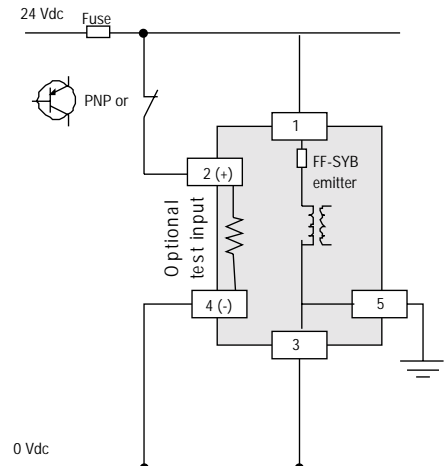
(PNP static (solid state) output and NPN static (solid state) output also connectable)

FF-SYB

Normally open
(factory setting)



Normally closed



Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, floating blanking, inputs for serial connection of an auxiliary device, manual restart and EDM
- Control of the infrared emission source for cross-talk reduction
- Enhanced diagnostic information



FF-SYB

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SYB14	FF-SYB30	FF-SYB50
Nominal scanning range		0 m to 6 m / 0 ft to 20 ft	0 m to 20 m / 0 ft to 65 ft	0 m to 20 m / 0 ft to 65 ft
Object detection size (see chapter "Floating blanking function")		14 mm / 0.55 in	30 mm / 1.18 in	50 mm / 1.97 in
Angle of divergence		±2°, ±25 %		
Emitting light source (immunity)		Infrared, pulsed, 880 nm (<i>Sunlight</i> : 20 000 Lux • <i>Lamplight</i> : 15 000 Lux)		
Supply voltage and power consumption		24 Vdc (±15 %); 5 W max. for the emitter, 5 W max. for the receiver		
Safety outputs (OSSDs)	Output type	2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections		
	Switching capability	350 mA max. at 24 Vdc		
Response time (beam interruption)		22 ms (28 ms for model numbers FF-SYB14128 to FF-SYB14176)		
Response time (Auxiliary Safety Device engaged)		28 ms		
Maximum cable length		100 m / 328 ft (100 nF capacitance)		
Restart time after power up (after beam actuation)		> 1 s (80 ms - without EDM, 150 ms - with EDM)		
Loads impedance		70 Ω min. / 5 kΩ max.		
Voltage drop		< 2 Vdc		
Loads turn-on voltage		5 V min. on resistive loads / 7 V min. on inductive loads		
Protections		Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)		
NC signalling or muting lamp/diagnosis output				
	Output type	1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)		
	Switching capability	100 mA max. at 24 Vdc		
	Protections	Overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)		
Test input (emitter) (1)	Input type	Floating input with selectable NO/NC test logic		
	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)		
Test loop current (resistance)		13 mA typical (750 Ω max.)		
	Protections	3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)		
Restart / EDM input (1)	External contact type	Relay contact (must be activated for at least 150 ms and less than 3 s)		
	Max. voltage	29 Vdc		
Muting or serial connection inputs (1)				
	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)		
	Timing conditions	3 s between (pins 3 and 4)		
	Maximum cable length	100 m / 328 ft (no limitation in capacitance)		
Environmental/physical characteristics				
	Temperature range	Operating: 0 °C to 55° C/32° F to 131 °F (95% relative humidity) • Storage: -20° C to 75 °C/-4° F to 167° F		
	Sealing	NEMA 4, 13 and IP 65		
	Vibrations	IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes		
	Shocks	IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes		
	Bumps	IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes		
	Product dimension	Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2)		
	Connection	Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland (see Figure 10 to determine possible modes of operation for each receiver termination type)		
	Material	Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA)		
Ordering information		Notes:		
Each listing consists of an M12 emitter, an M12 receiver, 2 pairs of right-angle brackets, an end cover equipped with a cable gland, a test rod and a set of configuration cards.		(1) Voltage switching (high/low): ≥ 11 Vdc min. (I > 6 mA) / ≤ 5 Vdc (I > 2 mA); Input current (high/low): 20 mA / 10 mA at 24 Vdc. In compliance with the IEC 61131-2 requirements for type 2 sensors.		
FF-SYB□□ □□□ M2		(2) Refer to emitter and receiver dimensions / weights.		
Model (see Table 2 page 9)				
Resolutions				
14: ø 14 mm / 0.6 in				
30: ø 30 mm / 1.2 in				
50: ø 50 mm / 1.97 in				

Figure 10 - Possible modes of operation and corresponding receiver termination type and connection box

Card (1)	Restart mode	Blanking (2)	Auxiliary Safety Device	Muting (3)	Auxiliary output (4)	Receiver termination (5)	Connection box (6)
#01	Manual				NC signal	M12 plug	
#02	Manual	1-beam			NC signal	M12 plug	
#03	Manual	2-beam			NC signal	M12 plug	
#04	Automatic				NC signal	M12 plug	
#05	Automatic	1-beam			NC signal	M12 plug	
#06	Automatic	2-beam			NC signal	M12 plug	
#07	Automatic		yes		NC signal	M12 plug	FF-SXZBOXS
#08	Automatic	1-beam	yes		NC signal	M12 plug	FF-SXZBOXS
#09	Automatic	2-beam	yes		NC signal	M12 plug	FF-SXZBOXS
#10	Manual		yes		NC signal	M12 plug	FF-SXZBOXS
#11	Automatic			2 inputs	NC signal	M12 plug	FF-SXZBOXM2
#12	Automatic			2 inputs	Muting lamp	M12 plug	FF-SXZBOXM2
#13	Automatic			4 inputs	NC signal	Terminal strip	FF-SXZBOXM4
#14	Automatic			4 inputs	Muting lamp	Terminal strip	FF-SXZBOXM4
#15	Automatic		yes	2 inputs	NC signal	Terminal strip	FF-SXZBOXM2S
#16	Automatic		yes	2 inputs	Muting lamp	Terminal strip	FF-SXZBOXM2S
#17	Manual			2 inputs	NC signal	M12 plug	FF-SXZBOXM2
#18	Manual			2 inputs	Muting lamp	M12 plug	FF-SXZBOXM2
#19	Manual			4 inputs	NC signal	Terminal strip	FF-SXZBOXM4
#20	Manual			4 inputs	Muting lamp	Terminal strip	FF-SXZBOXM4
#21	Manual		yes	2 inputs	NC signal	Terminal strip	FF-SXZBOXM2S
#22	Manual		yes	2 inputs	Muting lamp	Terminal strip	FF-SXZBOXM2S
#23	Manual	1-beam		2 inputs	Muting lamp	M12 plug	FF-SXZBOXM2
#24	Manual	2-beam		2 inputs	Muting lamp	M12 plug	FF-SXZBOXM2
#25	Manual	1-beam		4 inputs	Muting lamp	Terminal strip	FF-SXZBOXM4
#26	Manual	2-beam		4 inputs	Muting lamp	Terminal strip	FF-SXZBOXM4
#27	Manual	1-beam	yes	2 inputs	Muting lamp	Terminal strip	FF-SXZBOXM2S
#28	Manual	2-beam	yes	2 inputs	Muting lamp	Terminal strip	FF-SXZBOXM2S

(1) Factory setting: card #01

(2) Floating blanking

Model	1-beam		2-beam	
	Resolution	Undetected object size	Resolution	Undetected object size
FF-SYB14	24 mm / 0.94 in	6 mm / 0.23 in	34 mm / 1.33 in	16 mm / 0.63 in
FF-SYB30	50 mm / 1.97 in	10 mm / 0.39 in	70 mm / 2.75 in	30 mm / 1.18 in
FF-SYB50	90 mm / 3.54 in	30 mm / 1.18 in	130 mm / 5.12 in	70 mm / 2.75 in

(3) Muting: either 2 inputs available for the connection of 2 or 4 muting sensors to perform a bi-directional muting function (see page 2 and 3), or 4 inputs available for the connection of 4 sensors to perform a uni-directional muting function (see page 3).

(4) Auxiliary output: either a normally closed signalling output of a muting and diagnosis lamp output (see page 2).

(5) Receiver termination: some modes require direct connections to the internal receiver terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

(6) Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).

Table 2

Model	032	048	064	080	096
Protection height (mm / in) (1)					
FF-SYB14	334 / 13.1	494 / 19.4	654 / 25.7	814 / 32.07	974 / 38.3
FF-SYB30	350 / 13.7	510 / 20.09	670 / 26.3	830 / 32.7	990 / 39
FF-SYB50	370 / 14.6	530 / 20.9	690 / 27.2	850 / 33.5	1010 / 39.8
Sensing field height (mm / in)(2)					
FF-SYB14	314 / 12.3	474 / 18.6	634 / 24.9	794 / 31.2	954 / 37.5
FF-SYB30	310 / 12.2	470 / 18.5	630 / 24.8	790 / 31.1	950 / 37.4
FF-SYB50	290 / 11.4	450 / 17.7	610 / 24.03	770 / 30.3	930 / 36.6
Total height (mm / in) (3)					
M12 emitter or receiver	424 / 16.7	584 / 23	744 / 29.3	904 / 35.6	1064 / 41.9
Cable gland receiver only	438 / 12.2	598 / 23.5	758 / 29.8	918 / 36.1	1078 / 42.4
Weight per device (kg / lbs)	0,86 / 1.89	1,14 / 2.5	1,42 / 3.12	1,7 / 3.74	1,98 / 4.35

FF-SYB
Table 2 (continued)

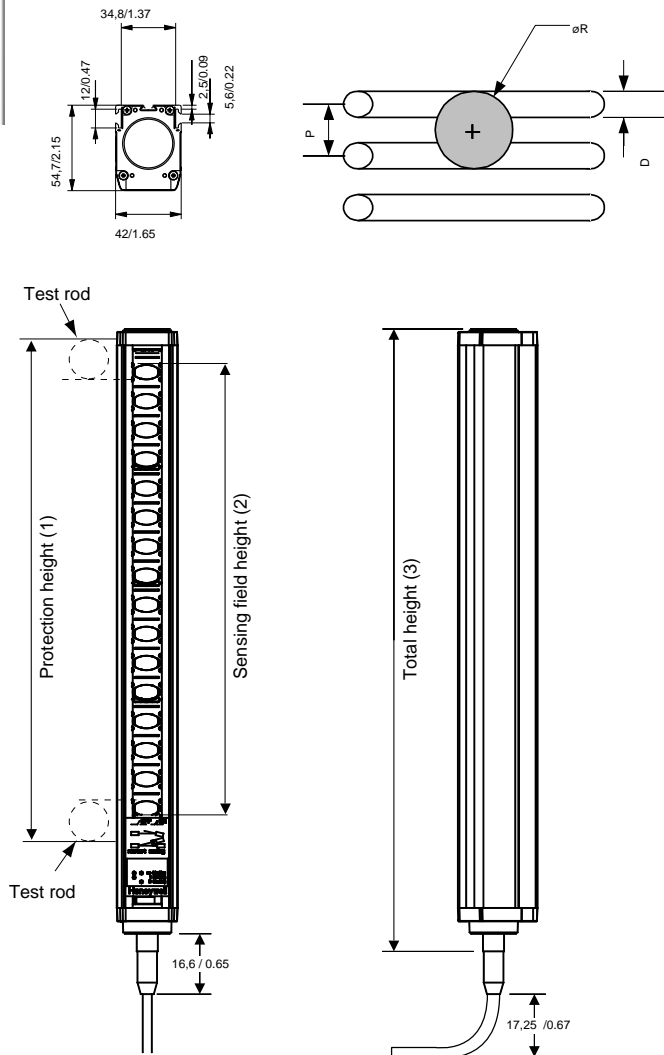
Model	112	128	144	160	176
Protection height (mm / in) (1)					
FF-SYB14	1134 / 44.6	1294 / 50.9	1454 / 57.2	1614 / 63.5	1774 / 69.8
FF-SYB30	1150 / 45.3	1310 / 51.6	1470 / 57.9	1630 / 64.2	1790 / 70.5
FF-SYB50	1170 / 46.0	1330 / 52.4	1490 / 58.7	1650 / 65.0	1810 / 71.2
Sensing field height (mm / in)(2)					
FF-SYB14	1114 / 43.8	1274 / 50.1	1434 / 56.5	1594 / 62.8	1754 / 69.1
FF-SYB30	1110 / 43.7	1270 / 50.03	1430 / 56.3	1590 / 62.6	1750 / 68.9
FF-SYB50	1090 / 42.9	1250 / 49.2	1410 / 55.1	1570 / 61.8	1730 / 68.1
Total height (mm / in) (3)					
M12 emitter or receiver	1224 / 48.2	1384 / 54.5	1544 / 60.8	1704 / 67.1	1864 / 73.4
Cable gland receiver only	1238 / 48.7	1398 / 55	1558 / 61.3	1718 / 67.6	1878 / 73.9
Weight per device (kg / lbs)	2,26 / 4.97	2,54 / 4.97	2,82 / 6.20	3,10 / 6.82	3,38 / 7.43

Figure 11 - Dimensions in mm / in

FF-SYB

M12 emitter or receiver

Cable gland receiver



- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height (including male receptacles or cable gland)

Table 1

(mm / in)	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SYB14	ø 14 / 0.6	10 / 0.4	4 / 0.16	15,2 / 0.60	90,6 / 3.56
FF-SYB30	ø 30 / 1.2	20 / 0.8	10 / 0.4	22,2 / 0.87	87,6 / 3.45
FF-SYB50	ø 50 / 1.97	40 / 1.57	10 / 0.39	42,2 / 1.66	87,6 / 3.45

❑ LED status indicators

Figure 12 - Emitter

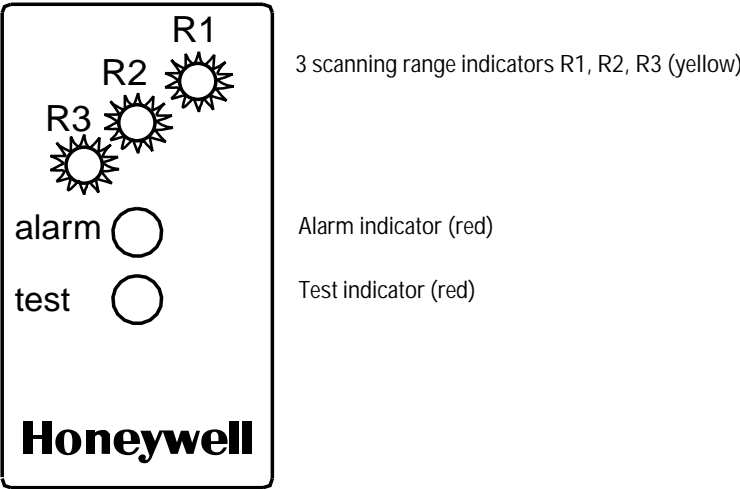
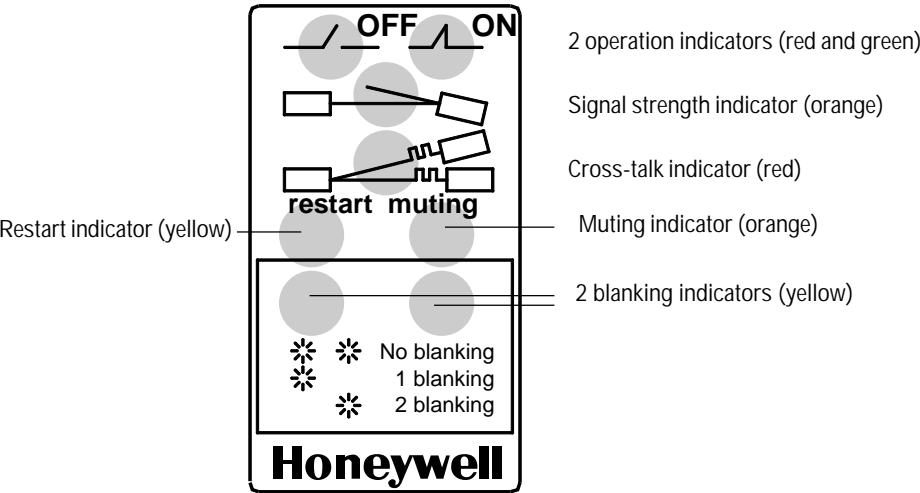


Figure 13 - Receiver



Wiring

FF-SYB

Figure 14 - Recommended wiring diagram for a 2-sensor muting application with automatic restart and Temporary Manual Muting (TMM) (see Figure 1)

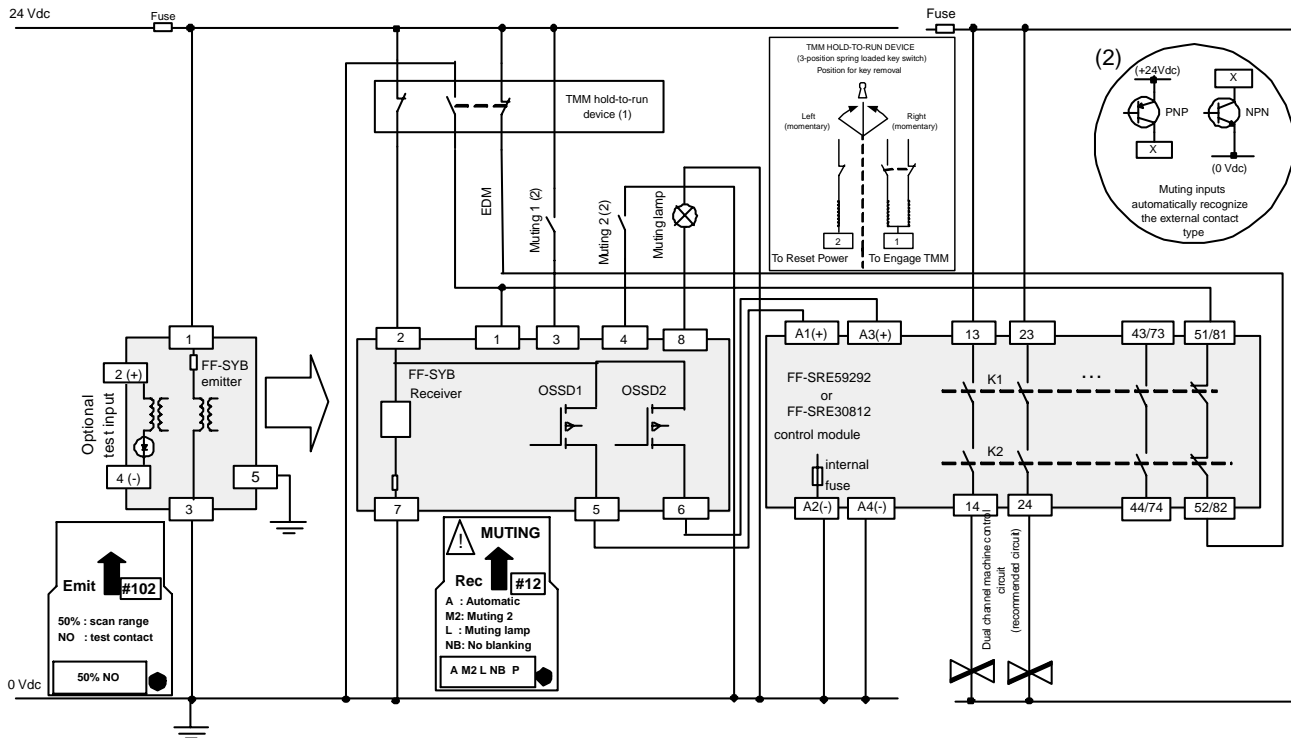
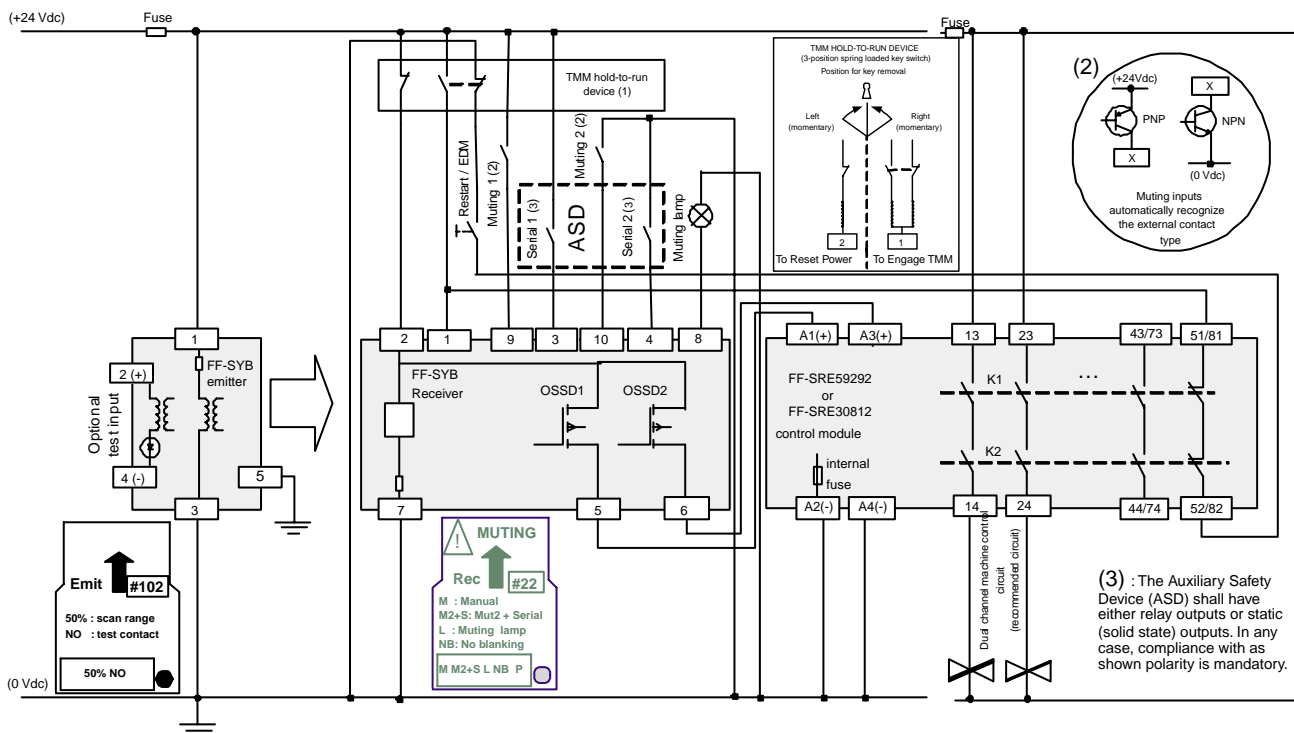


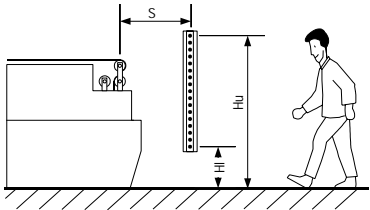
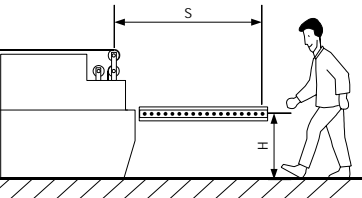
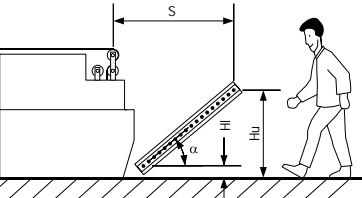
Figure 15 - Recommended wiring diagram for a 2-sensor muting application with an auxiliary safety device, manual restart and Temporary Manual Muting (TMM)



❑ European EN 999 standard

All distances/heights in mm (100 mm = 3.9 in)

FF-SYB

LIGHT CURTAIN MODEL	FF-SYB14 FF-SYB30 without floating/blanking	FF-SYB30 with 1- or 2 beam floating blanking FF-SYB50 with or without blanking
Normal approach 	$S \geq 2000 (t1+t2) + 8 (R-14)$ <p>with $S \geq 100$</p> <p>if $S \geq 500$, then use:</p> $S \geq 1600 (t1+t2) + 8 (R - 14)$ <p>with $S \geq 500$</p>	$S \geq 1600 (t1+t2) + 850$ <p>with $Hu \geq 900$ mm $Hl \leq 300$ mm</p>
Parallel approach 	$S \geq 1600 (t1+t2) + (1200 - 0.4H), \text{ with } H \leq 875$ <p>Or</p> $S \geq 1600 (t1+t2) + 850, \text{ with } 875 \leq H \leq 1000$ <p>with $H \geq 15 (R-50)$:</p> <p>$H \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking. $H \geq 600$ mm for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in parallel approach.</p>	
Angled approach 	<p>if $\alpha \geq 30^\circ$, then use the normal approach formula, with $Hu \geq 900$ mm and $Hl \leq 300$ mm</p> <p>if $\alpha \leq 30^\circ$, then use the parallel approach formula, with $Hu \leq 1000$ mm and $Hl \geq 15 (R-50)$ where R is the light curtain resolution</p> <p>$Hl \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking $Hl \geq 600$ mm for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in angled approach.</p>	

$t1$: light curtain response time (s)

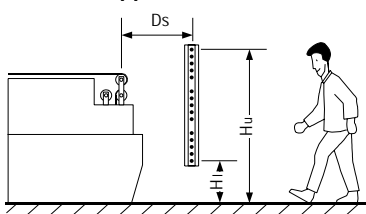
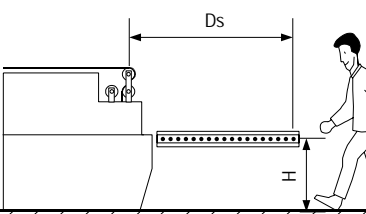
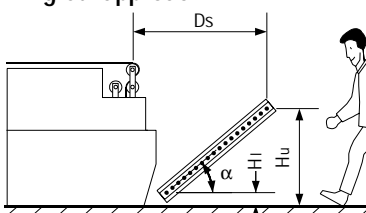
$t2$: machine stopping time (s)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

USA's OSHA/ANSI/RIA standards

All distances/heights in inches (1 in = 25,4 mm)

FF-SYB

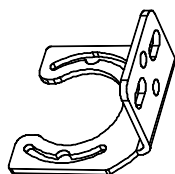
LIGHT CURTAIN MODEL	FF-SYB14, FF-SYB30, FF-SYB50 with or without floating blanking																
<p>Normal approach</p> 	<p>$Ds \geq 63 (Ts+Tc+Tr) + Dpf$</p> <p>If $R \leq 2,5$, $Dpf = 3.4 \times (R - 0.275)$, (see table below) If $Hi \leq 12$ and $Hu \geq 48$ (Typical for Reach Thru), $Dpf = 36$ If $Hi \leq 12$ and $36 \leq Hu \leq 48$ (Typical for Reach Over), $Dpf = 48$ If $Hi > 12$, supplemental safeguarding may be required to detect crawling underneath.</p>																
<p>Parallel approach</p> 	<p>$Ds \geq 63 \times (Ts + Tc + Tr) + 48$</p> <p>$H \geq 15 \times (R-2)$</p> <table><tr><th>Table for H*</th><th>No blanking</th><th>1-beam</th><th>2-beam</th></tr><tr><td>FF-SYB14</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td></tr><tr><td>FF-SYB30</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td><td>$11.3 < H \leq 39$</td></tr><tr><td>FF-SYB50</td><td>$0 < H \leq 39$</td><td>$23.1 < H \leq 39$</td><td>Not allowed</td></tr></table> <p>*If $H > 12$, supplemental safeguarding may be required to detect crawling underneath.</p>	Table for H*	No blanking	1-beam	2-beam	FF-SYB14	$0 < H \leq 39$	$0 < H \leq 39$	$0 < H \leq 39$	FF-SYB30	$0 < H \leq 39$	$0 < H \leq 39$	$11.3 < H \leq 39$	FF-SYB50	$0 < H \leq 39$	$23.1 < H \leq 39$	Not allowed
Table for H*	No blanking	1-beam	2-beam														
FF-SYB14	$0 < H \leq 39$	$0 < H \leq 39$	$0 < H \leq 39$														
FF-SYB30	$0 < H \leq 39$	$0 < H \leq 39$	$11.3 < H \leq 39$														
FF-SYB50	$0 < H \leq 39$	$23.1 < H \leq 39$	Not allowed														
<p>Angled approach</p> 	<p>If $\alpha < 30^\circ$, then use the normal approach formula If $\alpha < 30^\circ$, then use the parallel approach formula</p>																

Ts : worst case stopping time of the machine (s)
 Tc : worst case response time of the machine controls (s)
 Tr : response time of the safety devices (s)
 Dpf : Depth penetration factor (in.)

Table for Dpf	No blanking	1-beam	2-beam
FF-SYB14	0.935	2.261	3.587
FF-SYB30	3.077	5.763	-
FF-SYB50	5.763	-	-

For more information, refer to the ANSI/RIA 15.06 American standard.

Accessories



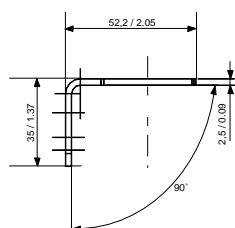
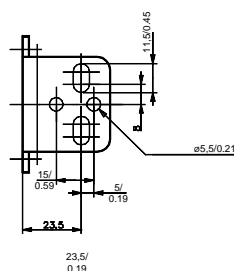
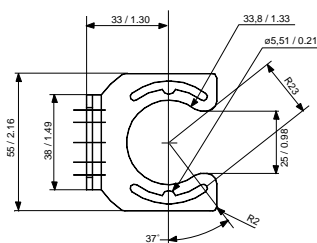
FF-SYZ634178

Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit. Possible mounting positions:

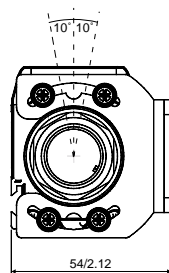
1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

Order 2 kits for a complete set of emitter and receiver.

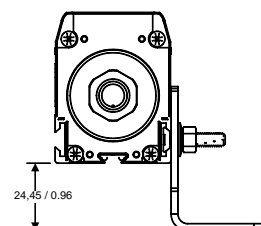
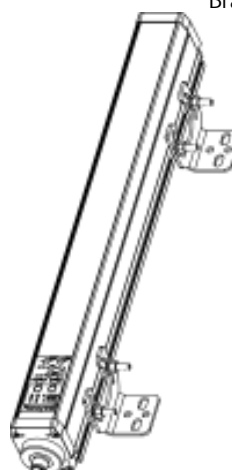
(already included in the FF-SYB package)



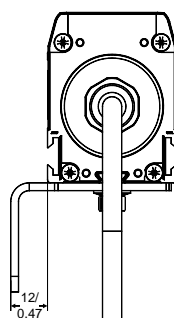
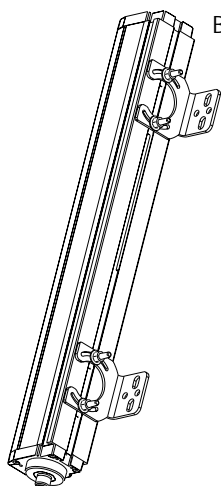
Bracket mounting at the top and the bottom



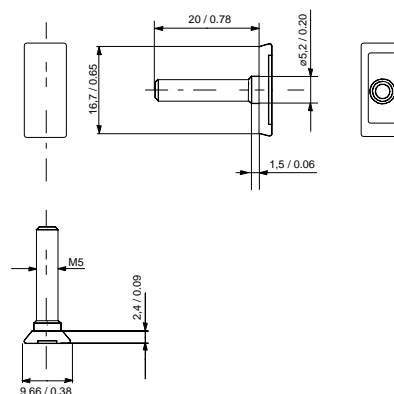
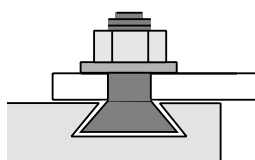
Bracket mounting at the lateral dovetail slots

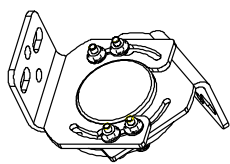


Bracket mounting at the rear dovetail slots



M5 dovetail shape bolt





FF-SYZ634179

Kit of 2 adjustable mounting brackets with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit.

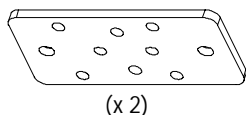
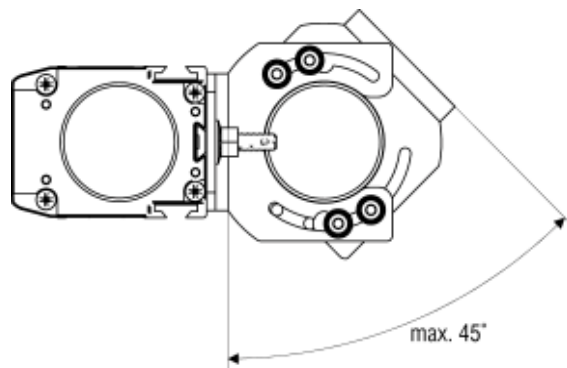
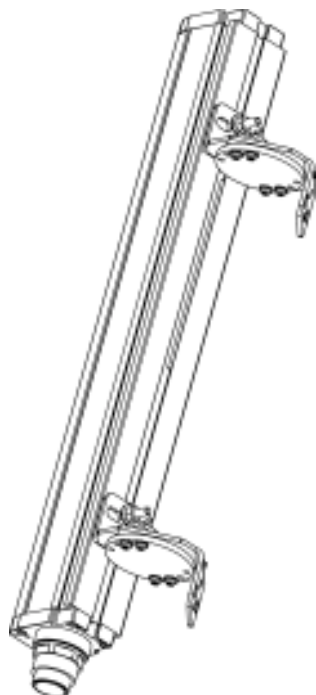
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option, to be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYB package)



(x 2)

FF-SYZAD

Anti-vibration kit

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets delivered with the FF-SYB package.



(x 4)

NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibrations, order:

- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm/ 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm/39.4 in, but less than 1850 mm/72.8in.
- 4 sets of FF-SYZAD kit for light curtain systems with protection height greater than 1850 mm/72.8 in.



FF-SYZPF

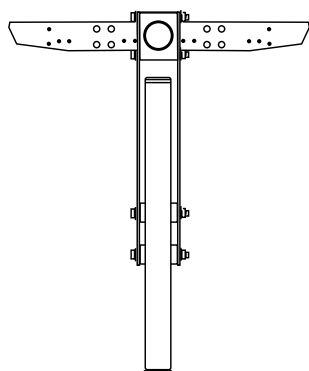
Fixed post for FF-SYB light curtain

Floorstanding post for the installation of the following FF-SYB light curtains:

Light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

Multibeam models: FF-SYB02500, FF-SYB03400, FF-SYB04300

To be ordered separately as an option.

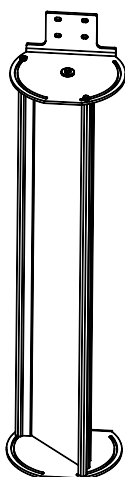


FF-SYZPA

Adjustable floor standing post

- Compatible with all protection heights
- Horizontal, diagonal and vertical adjustment of light curtains possible
- Quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- Fine adjustment of light curtains in azimuth direction of $\pm 11^\circ$ ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- Base plate can be mounted independently
- Finish: RAL 1021 yellow paint

To be ordered separately as an option.



FF-SYZMIR□□□ Deflection mirror

To be ordered separately as an option

Features:

Deflection mirror with 10 % scanning range reduction (FF-SYZMIR0□□)

Deflection mirror with 25 % scanning range reduction (FF-SYZMIR1□□)

Quick mounting and easy mirror adjustment

Mounting brackets included (top / bottom mounting)

Adjustment of mirror in azimuth direction of $\pm 45^\circ$

Material	Aluminium alloy housing
Finish	Gold colour anodisation

Ordering guide:

FF-SYZMIR□04	FF-SY□□032 and FF-SY□□048
FF-SYZMIR□06	FF-SY□□064
FF-SYZMIR□08	FF-SY□□080
FF-SYZMIR□10	FF-SY□□096
FF-SYZMIR□12	FF-SY□□112 and FF-SY□□128
FF-SYZMIR□14	FF-SY□□144
FF-SYZMIR□16	FF-SY□□160
FF-SYZMIR□18	FF-SY□□176



FF-SYZPFM

Fixed post with plain mirror (10 % or 25 % reduction of scanning range)

Floorstanding post with 1 plain mirror (FF-SYZPFM01, 10 % of loss)

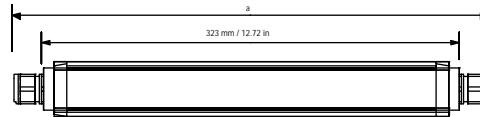
Floorstanding post with 1 plain mirror (FF-SYZPFM11, 25 % of loss)

Suitable for light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

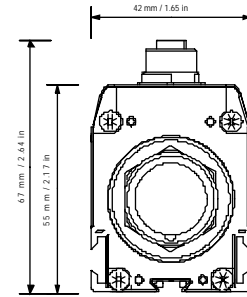
To be ordered separately as an option.

M12 connection boxes

FF-SYB



a = 367 mm [14.45 in] for cable gland versions or
364 mm [14.33 in] for M23 versions







Sealing: IP65

Approvals: cCSAus (pending)

Material: gold anodized aluminium alloy (housing), (conductive)
polycarbonate (end caps), stainless steel (front plate)

Mounting: two right-angle brackets with mounting hardware (FF-SYZ634178
included with the connection box)

<p>FF-SXZBOXM2</p>  <p>Female M12 / 5 pole plug (x8) and removable spring-cage terminal block on each ends (M20 PGs)</p>	<p>Connection box for bi-directional muting applications (see Figure 1 and Figure 2). Allows the connection of aFF-SYB safety light curtain (emitter and receiver), two or four muting sensors, a muting/diagnostic lamp, a restart push-button and the TMM hold-to-run device via M12 connectors.</p>
<p>FF-SXZBOXS</p>  <p>Female M12 / 5 pole plug (x5) and removable spring-cage terminal block on each ends (M20 PGs)</p>	<p>Connection box for connection of an Auxiliary Safety Device (ASD). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), the ASD, a diagnostic lamp and a restart push-button via M12 connectors.</p>
<p>FF-SXZBOXM2S</p>  <p>Female M12 / 5 pole plug (x7), female M23 / 19 poles (x1) and a removable spring-cage terminal block (M20 PG)</p>	<p>Connection box for bi-directional muting applications (see Figure 1 and Figure 2) with an auxiliary safety device (ASD). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), , two muting sensors, a muting lamp, the ASD, a restart push-button and the TMM hold-to-run device via M12 connectors and a M23 connector.</p>
<p>FF-SXZBOXM4</p>  <p>Female M12 / 5 pole plug (x8), female M23 / 19 poles (x1) and a removable spring-cage terminal block (M20 PG)</p>	<p>Connection box for uni-directional muting applications (see Figure 3). Allows the connection of a FF-SYB safety light curtain (emitter and receiver), four muting sensors, a muting lamp, a restart push-button and the TMM hold-to-run device via M12 connectors and a M23 connector.</p>

Cordsets M12/5 pole



- 1: brown
- 2: white
- 3: blue
- 4: black
- 5: green/yellow

Female keyway M12, straight, 5-pin for the emitter

- FF-SXZCAM125U02 2 m / 6.56 ft length
- FF-SXZCAM125U05 5 m / 16.40 ft length
- FF-SXZCAM125U10 10 m / 32.8 ft length

Equivalent to the 805000A09M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

Male keyway M12, 5-pin, straight - for connection boxes

- FF-SXZCAM125UM02 2 m / 6.56 ft length
- FF-SXZCAM125UM05 5 m / 16.40 ft length
- FF-SXZCAM125UM10 10 m / 32.8 ft length

Equivalent to the 805006A09M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

M12/8 pole



- 1: white
- 2: brown
- 3: green
- 4: yellow
- 5: grey
- 6: pink
- 7: blue
- 8: red

Female keyway M12, straight, 8-pin for the receiver

- FF-SXZCAM128U02 2 m / 6.56 ft length
- FF-SXZCAM128U05 5 m / 16.40 ft length
- FF-SXZCAM128U10 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

Male keyway M12, 8-pin, straight - for connection boxes

- FF-SXZCAM128UM02 2 m / 6.56 ft length
- FF-SXZCAM128UM05 5 m / 16.40 ft length
- FF-SXZCAM128UM10 10 m / 32.8 ft length

Equivalent to the 808006P02M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

M23/19 pole



- 1: purple
- 2: red
- 3: grey
- 4: red/blue
- 5: green
- 6: grey/pink
- 7: white/green
- 8: white/green
- 9: white/yellow
- 10: white/grey
- 11: black
- 12: green/yellow
- 13 to 19: unused

Male keyway M23, 19-pin, straight - for connection boxes

- FF-SXZCAM2319UM02 2 m / 6.56 ft length
- FF-SXZCAM2319UM05 5 m / 16.40 ft length
- FF-SXZCAM2319UM10 10 m / 32.8 ft length

Cable connector



FF-SXZCOM128

Receiver plug, Binder single keyway M12 female screw type straight connector. 8 set screws M2,5. Gold plated contacts.

FF-SXZCOM125

Emitter plug, Binder single keyway M12 female screw type straight connector. 5 set screws M2,5. Gold plated contacts.

FF-SXZCOM128M

For connection boxes, Single keyway M12, 8-pin, male, screw type, straight

FF-SXZCOM125M

For connection boxes, Single keyway M12, 5-pin, male, screw type, straight

Safety control modules

FF-SYB



FF-SRE59292

Slim line expansion module

- 24 Vdc
- Safety interface up to Category 4 per EN 954-1
- 4 NO/1 NC safety relay outputs
- 22,5 mm / 0.88 in width

(to be ordered separately as an option).



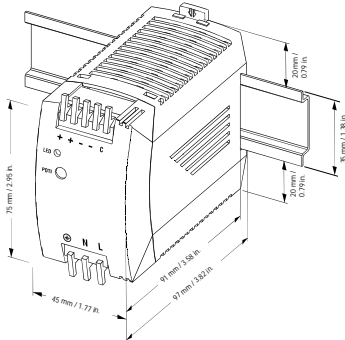
FF-SRE30812

Expansion module

- 24 Vdc, 115 Vac or 230 Vac
- Safety interface up to Category 4 per EN 954-1
- 7 NO/1 NC internally redundant safety relay outputs
- 90 mm / 3.54 in width

(to be ordered separately as an option).

ac to dc power supply



FF-SXZPWR050

ac to dc power supply

(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs

Muting lamp

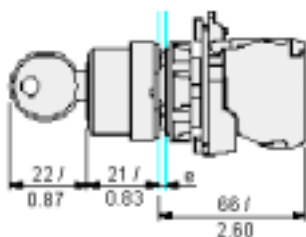


(not contractual)

FF-SXZMLED

Beacon supplied with fixing plate for vertical surface and a LEDs bulb (Telemecanique XVB Series type). To be used as the muting/diagnostic lamp.

3 position spring loaded key switch



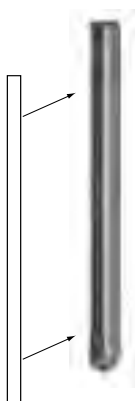
e: panel thickness 1 mm to 6 mm /
0.04 in to 0.24 in

(not contractual)

FF-SXZTMM

ø 22 mm 3-position spring loaded key switch with a Normally Closed contact on the left position and two complementary (Normally Closed and Normally Open) contacts on the right position (Telemecanique ZB5 Series type, fixing collar with screw clamp contact blocks, key # 455).

To be used as the TMM hold-to-run device.



FF-SYZFT000

Kit including two self-adhesive protections to be glued on the front windows of the FF-SYB light curtain. **Order 1 kit per light curtain.**

CAUTION

Make sure the transparent protection is placed on the emitter and the filtered protection is placed on the receiver. Protections cannot be removed once in place.

Failure to comply with these instructions may result in product damage.

Features:	Storage and operating temperatures	-20 °C to 55 °C / -4 °F to 131 °F, high resistance to the ejection of melting particules
	Material	Organic glass
	Prohibited liquids	Sulfuric acid, hydrofluoric acid, ammonia solution
	Scanning range attenuation	36%
	Optical immunity improvement factor	2,5
Ordering guide:		
	FF-SYZFT032	FF-SYB00032
	FF-SYZFT048	FF-SYB00048
	FF-SYZFT064	FF-SYB00064
	FF-SYZFT080	FF-SYB00080
	FF-SYZFT096	FF-SYB00096(*)
	FF-SYZFT128	FF-SYB00128(*)
	FF-SYZFT144	FF-SYB00144(*)
	FF-SYZFT160	FF-SYB00160(*)
	FF-SYZFT176	FF-SYB00176(*)

(*) FF-SYB30 and FF-SYB50 only

Configuration cards

FF-SYZ101085R

Set of 28 configuration cards for FF-SYB receiver

FF-SYZ101092E

Set of 6 configuration cards for FF-SYB emitter

Installation manuals

FF-PK107120-EN

One FF-SYB English installation manual

FF-PK107120-DE

One FF-SYB German installation manual

FF-PK107120-FR

One FF-SYB French installation manual

FF-PK107120-IT

One FF-SYB Italian installation manual

FF-PK107120-SP

One FF-SYB Spanish installation manual

NOTICE

By default, products will be shipped with the installation manual in the language of the country of delivery when available or in English. If any other language is required, it must be ordered separately.

Test rods

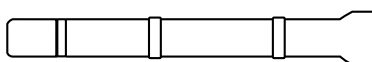


FF-SYZROD14

Test rod for ø14 mm / 0.6 in resolution safety light curtains (already included in the FF-SYB package).

FF-SBZROD30

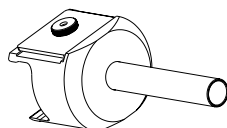
Test rod for ø30 mm / 1.2 in resolution safety light curtains (already included in the FF-SYB package).



FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

To be ordered separately as an option.



FF-SYZ604795

Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYB Series light curtain.

To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing

E-mail: info.sc@honeywell.com

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Fax: +(44) 1698 481676

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USA

GKM Series

MICRO SWITCH™ Safety Key Interlock Switch



DESCRIPTION

Honeywell Sensing and Control (S&C) offers safety switches to meet your needs. Designed with OEMs in mind, we offer safety switches in every size. The MICRO SWITCH™ GKM Series is our miniature product line offering one of the smallest key-op switches available. GKM has daisy-chain capability to reduce installation and down time. Pre-leaded versions allow for rapid fit, easy cable routing and function testing, potentially

cutting costs dramatically in OEM applications. Per safety code EN 954-1, components used alone comply as a Category 1. By using components in conjunction with other safety switches and modules, it is possible to construct a comprehensive protection schemes with Category 2, 3, or 4 compliance. Simple upgrade guarding solutions are available for end-user applications. Order switch and key separately.

FEATURES

- Red body color
- Integrated cable or connector(s)
- Bottom, side, and dual entry cable
- 90° or straight key
- Extremely compact enclosure
- Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
- IP67 enclosure rating
- Design allows side-by-side mounting and daisy-chaining from switch to switch
- Dust cap for unused key entry
- Robust stainless steel keys
- UL listed, CSA certified, CE compliant
- High current switching capabilities
- Small door swing radius allows use down to 160 mm [6.3 in]

POTENTIAL APPLICATIONS

- Small enclosures and compact spaces
- Multiple door modular machinery

BENEFITS

- Immediately identifiable as safety component
- Reduced installation time and costs
- Flexibility in mounting/actuation options
- Switch equipment directly and through safety control modules
- Fits into extremely compact spaces
- Often suitable for wet applications
- Simple mechanical and electrical redundancy
- Easy application to multiple door modular machinery – reduced difficulty in wiring small switch enclosures
- Durable and tough design
- Complies with global requirements

GKM Series

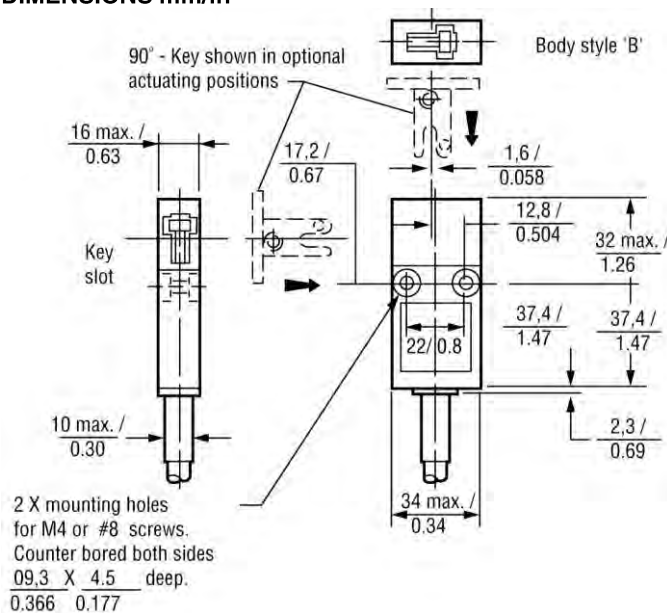
SPECIFICATIONS

Characteristic	Parameter
Expected mechanical life	> 1 million operations
Degree of protection	IP66/67; EN 60529; NEMA 1, 12, 13
Temperature range	-25 °C to 85 °C [-13 °F to 185 °F]
Approvals*	IEC 60947-5-1, EN 60947-5-1, EN 1088, EN 60504, UL508, CSA22-2-14, UL748C utilization category
Ratings	15 ac, B300; 13 dc, Q300 For low energy (gold versions): operating voltage Ue: 1 Vac to 50 Vac or 1 Vdc to 50 Vdc Operating current Ie: 1 A to 100 mA GKME: 30 Vdc and 2 A max.
Cable spec.	SJTP rated P.V.C. type
Vibration	IEC 68-2-6 (BS 2011, Part 2.1 Fc) 10 g
Shock	IEC 68-2-27 (BS 2011, Part 2.1 Ea) 50 g
Door radius	160 mm [6.3 in]

NOTES:

* See standards (<http://content.honeywell.com/sensing/prodinfo/safety/catalog/en/v6si179e.pdf>)

DIMENSIONS mm/in

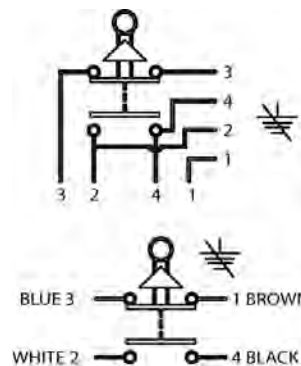


PINOUT

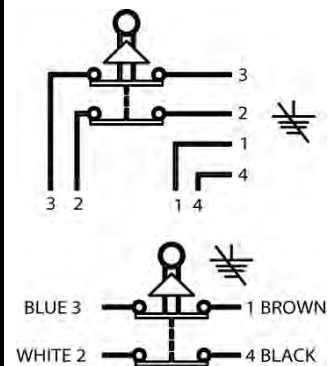


WIRING DIAGRAMS

Switch type 3 (Slow BBM 1NO/1NC) and Switch type 9 (Slow BBM 1NO/1NC gold contacts)



Switch type 6 (Slow 2NC) and Switch type 7 (Switch 2NC gold contacts)



Global Miniature Safety Key Interlock Switch

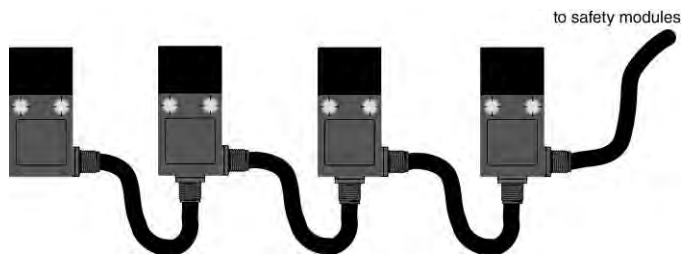
PART NUMBER TREE

Body style	Cable/connector	Switch type (Slow-action contacts)	Key style (sold separately)	Optional key positions
	1 METRE CABLE LENGTH 1 2 METRE CABLE LENGTH 2 3 METRE CABLE LENGTH 3 ZERO INDICATES NO CABLE BUT CONNECTOR 0	1 NORMALLY CLOSED/ 1 NORMALLY OPEN BREAK BEFORE MAKE LOW ENERGY (GOLD) CONTACTS 9* 2 NORMALLY CLOSED LOW ENERGY (GOLD) CONTACTS 7* ▲ GOLD PLATE OVER SILVER	1 Details of straight key (stainless steel) Replacement part number GKZ51M 2 Details of 90° key (stainless steel) Replacement part number GKZ52M 	
	X	X	X + GKZ5	X M
Ordering: GKM Example: GKMD03 + GKZ52M				

△ Micro-change dc Style M12.
4-pin with external threads/male

DAISY-CHAINING CAPABILITY

The GKME modules may be daisy-chained and terminated into either a GKMC or GKMD (as shown) for multi-door modular machinery.



WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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Internet: www.honeywell.com/sensing

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Sensing and Control

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004750-3-EN IL50 GLO Printed in USA
June 2009

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Honeywell

GKM Series (Global Miniature Safety Key Interlock Switch)

FEATURES

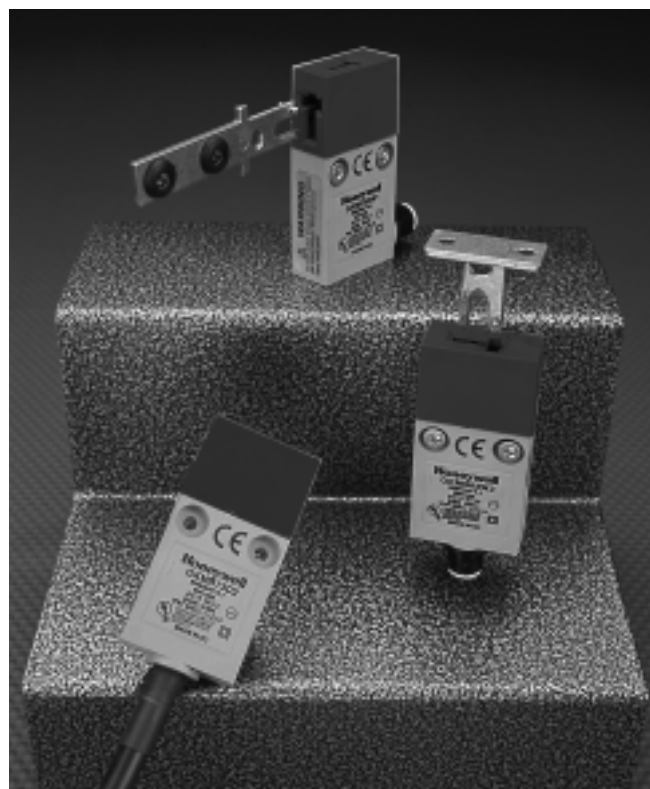
- Red body colour
- Integrated cable or connector(s)
- Bottom or side entry cable
- 90° and straight key
- Top or side key entry
- High switching current capabilities
- Extremely compact enclosure
- Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
- IP 67 Enclosure rating
- Stackable design allows one switch on top of the other
- Through wiring option (dual connector)
- Dust cap for unused key entry
- Robust stainless steel keys
- UL listed; CSA certified, CE approved

BENEFITS

- Immediately recognisable as safety component
- Reduced installation time and costs
- Flexibility in mounting/actuation options
- Switch equipment directly and through safety control modules
- Fits into extremely compact spaces
- Suitable for wet applications
- Extremely simple mechanical redundancy as well as electrical redundancy
- Very easy to apply to multiple door modular machinery - no difficulty in wiring small switch enclosures
- Durable and tough design



(Pending)



Used alone as Category 1 safety components or, in conjunction with other safety switches and our complete range of safety relays, it is possible to construct comprehensive protection schemes with Category 2, 3 or 4 compliance.

The prelead versions allow rapid fit, easy cable routing and function testing which cut costs dramatically in OEM applications. Simple upgrade guarding solution for End User applications.

Low energy basic switches are rated as follows:

Operating Voltage U_e	1 to 50Vac or Vdc
Operating Current I_e	1 microamp to 100mA

Example of catalog listing using a low energy basic switch - GKMA19W1

⚠ WARNING

MISUSE OF DOCUMENTATION

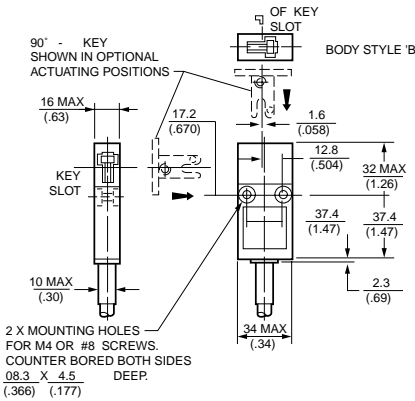
- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

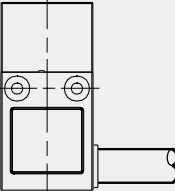
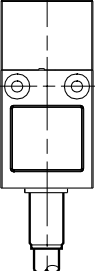
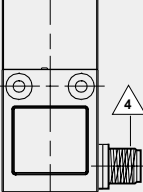
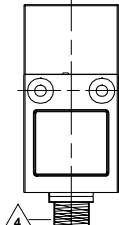
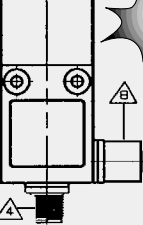
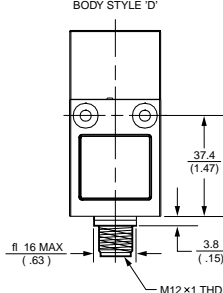
GKM Series
Miniature Safety Key
Interlock Switches

Technical Data

- Mechanical life** >1 Million operations
- Degree of protection** IP 66/67, EN 60529
NEMA 1, 12, 13
- Temperature range** -25 to +85 °C
(-13 to +185 °F)
- Approvals*** IEC 60947-5-1,
EN 60947-5-1, EN 1088,
EN 60204,
UL508,
CSA22-2-14, UL748C
Utilization category
AC15, B300
DC13, Q300
- Vibration** IEC 68-2-6
(BS 2011, Part 2.1 Fc) 10g
- Shock** IEC 68-2-27
(BS 2011, Part 2.1 Ea) 50g
- Minimum Door Radius** 160mm (6.3 in.)
- * See Standards (page 161)



▲ Low Energy Contacts
Note: See page 167

Body Style	Cable/Connector	
	CABLE LENGTHS IN 1 METRE INCREMENTS	1
	CABLE SPEC: SJTO RATED P.V.C. TYPE	2
	3 METRES IS NORMAL MAXIMUM CABLE LENGTH.	3
	ZERO INDICATES NO CABLE BUT CONNECTOR	0
	 BODY STYLE 'D' 37.4 (1.47) 3.8 (.15) M12 x 1 THD. 16 MAX (.63) 4 Micro-change DC Style M12, 4 Pin with external threads/male 8 'F' version also has 4 Pin with internal threads/female	
X		X

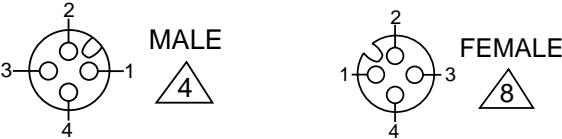
Ordering:



Example: GKMD03W2

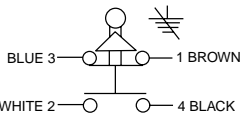
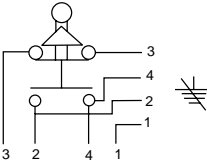
Switch Type

CONNECTOR PIN-OUTS



Key Style

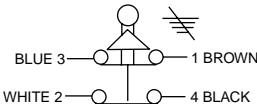
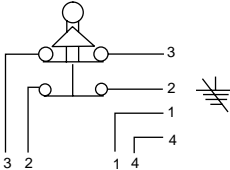
SLOW-ACTION CONTACTS
BREAK BEFORE MAKE
1 NORMALLY CLOSED/1 NORMALLY OPEN



SLOW-ACTION CONTACTS
BREAK BEFORE MAKE
1 NORMALLY CLOSED/1 NORMALLY OPEN
LOW ENERGY CONTACTS

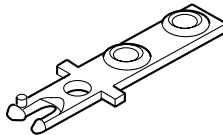


SLOW-ACTION CONTACTS
2 NORMALLY CLOSED

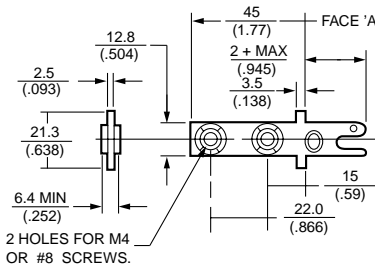


SLOW-ACTION CONTACTS
2 NORMALLY CLOSED
LOW ENERGY CONTACTS

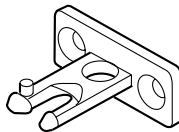
Details of straight key (stainless steel)



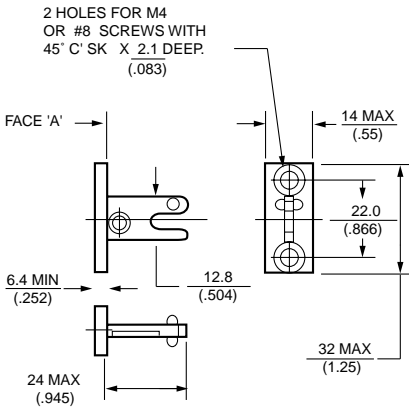
Replacement part number GKZ51M



Details of 90° key (stainless steel)



Replacement part number GKZ52M



3

9⁺

6

7⁺

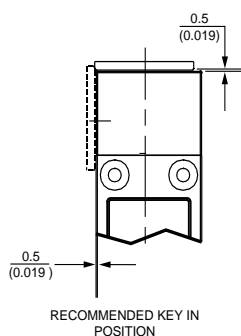
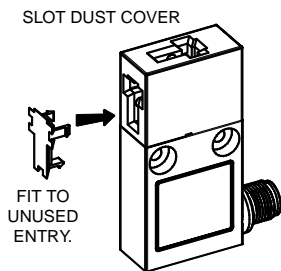
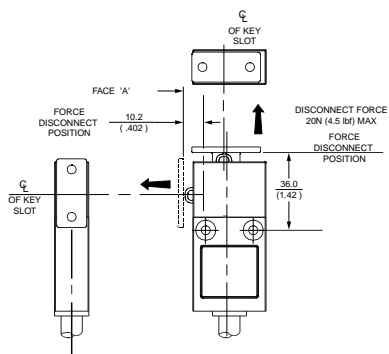
X

W1

W2

WX

Optional Key Positions



GK Series

Dual Entry Key Operated Safety Interlock Switch

FEATURES

- Side or top key entry
- Unique friction feature for key retention
- LED Indicators for status available
- Choice of four heavy duty keys
- Standard mounting per EN 50041
- International conduit offering
- Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
- Available with 1 NC/1 NO, 2 NC, 3 NC/1 NO and low energy contacts positive opening contact options
- UL listed, CSA and CE compliant

BENEFITS

- Allows up to eight different key entry positions
- Door vibration does not trip the safety circuit
- Remote signalling can be achieved easily at the switch
- Key mounting flexibility and security
- Simple mounting
- Machinery can use local termination standards
- Welded contacts will separate - vital for safety applications
- Choice of wiring capabilities (switching inductive and safety relay loads)



GK

The GK Series is designed specifically for use on machines where key removal brings the machine to an immediate safe condition. It provides enhanced operator safety when added to hinged or sliding guard doors, screens and protective covers on enclosures. The GK Series is especially well suited for large door applications, typically in the automotive plant floor environment. Its heavy duty construction withstands harsh industrial environments where rugged, long-term durability is required.

A safety lockout device is also available for use with the GK Series. The lockout device (GKZL2) is specifically designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device can accommodate up to four padlocks to prevent unauthorised removal of the device.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

GKB- Metal Standard

GKC - (w/1 LED)

12...250 Vac/dc

GKD - (w/2 LED)

18...30 Vdc - EN 50041

Technical Data

Mechanical life up to 15 million operations
Degree of protection IP 67
 NEMA/UL type 1, 4, 12, 13

Temperature range
Operating:
 -25 °C to +85 °C /
 -13 °F to +185 °F
Storage:
 -40 °C to +85 °C /
 -40 °F to +185 °F

Approvals* IEC 60947-5-1
 EN 60947-5-1
 ac15 A300/A600
 dc13 Q300
 UL & CSA

Operating forces: Insertion force: 35 N / 8 lb

Extraction force: 28 N / 6 lb

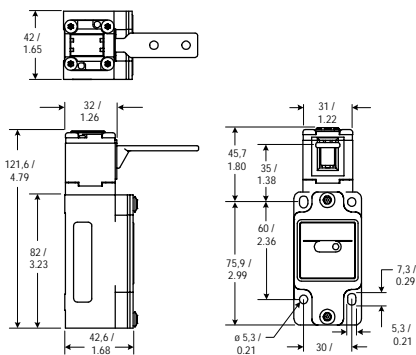
Vibration 10 g conforming to IEC 68-2-6

Shock 50 g conforming to IEC 68-2-27

Terminal marking to EN 50013

* See Standards (page 179)

Dimensions in mm / in



Conduit Thread

Standard = **B** **A** = 1/2" NPT

with 1 LED = **C** **C** = 20 mm

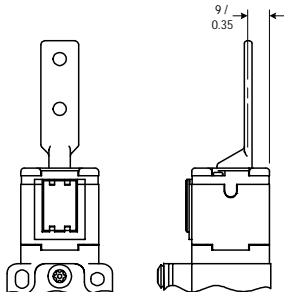
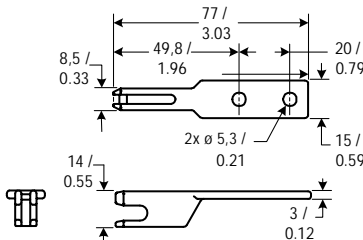
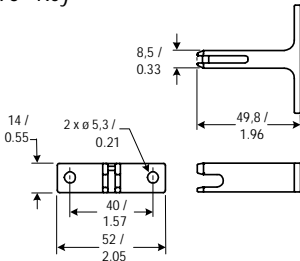
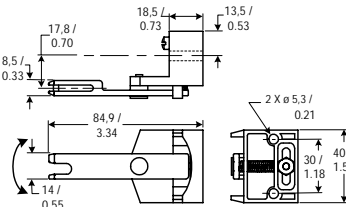
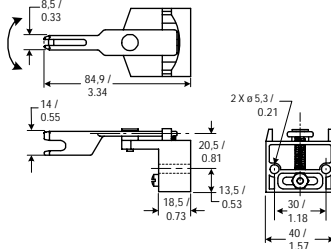
Switch Ordering:

GK **X** **X** **X** OR **XX**

Example: GKBC36LX + GKZ56

• Industrial Safety Products •

GK Series

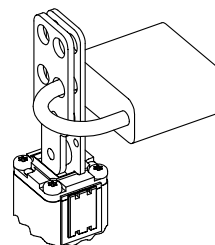
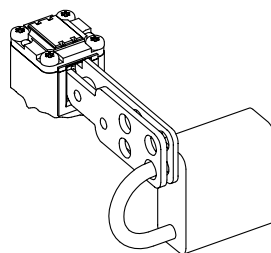
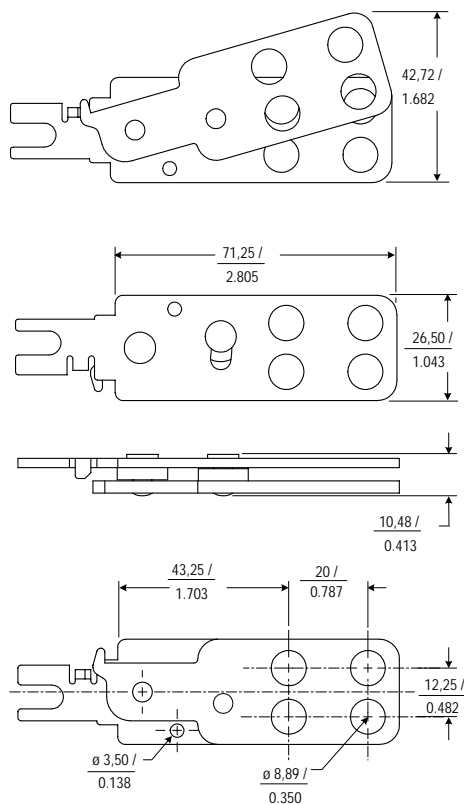
Head Orientation		Key Type (sold separately)		
	<div>L</div>	<div>Straight Key</div>  <div>Door swing radius down to 250 mm / 9.84 in</div>	<div>6</div>	
		<div>90° Key</div>  <div>Door swing radius down to 250 mm / 9.84 in</div>	<div>7</div>	
		<div>Spring-loaded Key: Up/Down</div>  <div>Door swing radius down to 150 mm / 5.9 in</div>	<div>8</div>	
		<div>Spring-loaded Key: Left/Right</div>  <div>Door swing radius down to 150 mm / 5.9 in</div>	<div>9</div>	
		Key Ordering:		
<div>X X</div>		<div>+ GKZ5</div>	<div>X</div>	

GK

Accessories

The GKZL2 lockout device is for use with both the GK and GKR/GKL Series Dual Entry Head products. The lockout device does not activate the switch. It is designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device accommodates up to four padlocks to prevent unauthorized removal of the device.

Mounting dimensional diagram (mm/in):



Ordering:

GKZL2

GKE Series

Dual Entry Safety Interlock Switches



DESCRIPTION

The GKE Series safety key-operated switch provides enhanced reliability for safety hard guarding applications in a compact, cost-effective package.

FEATURES

- Positive opening safety contacts
- Multiple contact configurations
- Rotating head allows actuator engagement from five orientations
- Double insulation per IEC 60947-5-1
- Choice of two standard actuators
- Small size
- Most global approvals: cULus, CE, (CCC applied for)

BENEFITS

- Designed to minimize intentional tampering or defeat
- Designed to meet application-specific needs
- Small-size provides a valuable solution where space is at a premium
- Designed for global acceptance

POTENTIAL APPLICATIONS

- Plastic molding equipment
- Packaging machinery
- Semiconductor manufacturing equipment
- Woodworking machinery
- Metal converting equipment
- Printing/paper finishing equipment

GKE Series

SPECIFICATIONS

Designation and Utilization Category		Rated Operational Current I _e (A) at Rated Operational Voltage U _e (V)						
		24 V	120 V	240 V	380 V	480 V	500 V	600 V
AC15	A500	—	6 A	3 A	1,9 A	1,5 A	1,4 A	—
AC15	A600	—	6 A	3 A	1,9 A	1,5 A	1,4 A	1,2 A
DC13	Q300	2,8 A	0,55 A	0,27 A	—	—	—	—

Rated thermal current (I _{th})	10 A	Sealing	IP66; NEMA 1, 12, 13
Rated impulse withstand (U _{imp})	2500 V	Pollution degree	3
Rated insulation voltage (U _i)	500 V, 600 V	Operating temperature range	-25 °C to 85 °C [-13 °F to 185 °F]
Short-circuit protective device (type/max. rating)	Class J fuse (10 A/600 V)	Mechanical life	1,000,000 operations
Conditional short-circuit current	1000 A	—	—

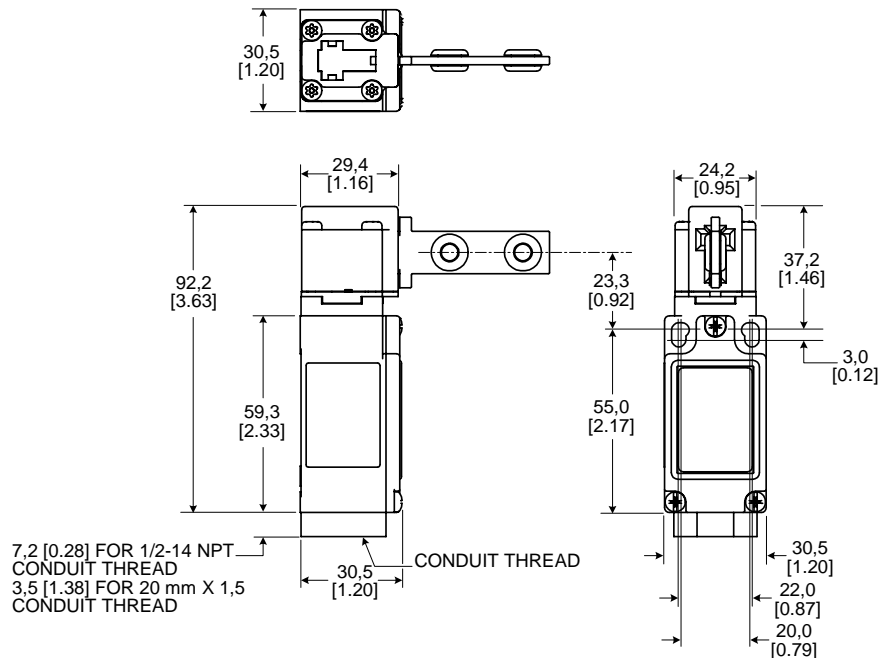
Complies with:

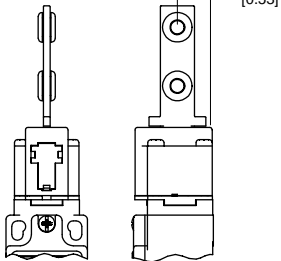
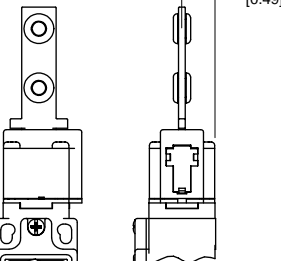
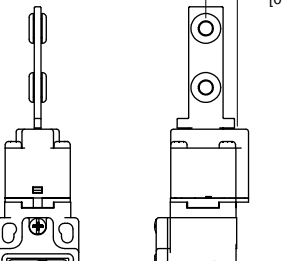
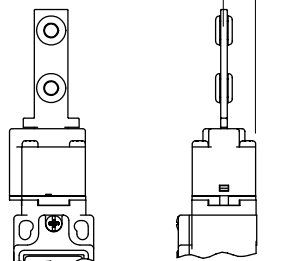
Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.

Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.

IEC/EN60947-5-1.

MOUNTING DIMENSIONS (For reference only mm [in])



Head Code L	Head Code M	Head Code N	Head Code P
			

Safety Door Interlock Switches

KEY MOUNTING DIMENSIONS

GKZ51M	GKZ52M

1. Recommended key position.

CIRCUIT AND TRAVEL DIAGRAMS

Switch Code 01: 1NC/1NO	Switch Code 03: 1NC/1NO (BBM)	Switch Code 06: 2NC

1. Recommended key position.

SWITCH ORDER GUIDE (Not all combinations are active listings.)

Series	GKE	X	X	X	Head Orientation*
Dual Entry Key Operated Safety Limit Switch					L = Front
	Conduit		Contacts		
	A = 1/2 in NPT		01 = 1NC/1NO		
	C = M20 x 1,5		03 = 1NC/1NO (BBM)		
			06 = 2NC		

*Head orientation facing the right, left or back of the switch is available upon request. Minimum order quantities apply.

SWITCH ORDER GUIDE (active listings)

Catalog Listing	Description
GKEA01L	Dual Entry Key Operated Safety Limit Switch, 1/2 in NPT conduit, 1NC/1NO contacts, front head orientation
GKEA03L	Dual Entry Key Operated Safety Limit Switch, 1/2 in NPT conduit, 1NC/1NO (BBM) contacts, front head orientation
GKEA06L	Dual Entry Key Operated Safety Limit Switch, 1/2 in NPT conduit, 2NC contacts, front head orientation
GKEC01L	Dual Entry Key Operated Safety Limit Switch, M20 x 1,5 conduit, 1NC/1NO contacts, front head orientation
GKEC03L	Dual Entry Key Operated Safety Limit Switch, M20 x 1,5 conduit, 1NC/1NO (BBM) contacts, front head orientation
GKEC06L	Dual Entry Key Operated Safety Limit Switch, M20 x 1,5 conduit, 2NC contacts, front head orientation

KEY ORDER GUIDE

Catalog Listing	Description
GKZ51M	Straight Key
GKZ52M	90 Degree Key

⚠ WARNING

IMPROPER INSTALLATION

- Consult with local safety agencies and their requirements when designing a machine-control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

⚠ WARNING

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SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific +65 6355-2828
+65 6445-3033 Fax
Europe +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada +1-800-537-6945
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October 2006

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GKR/GKL Series

Dual Entry Solenoid Key Operated Safety Interlock Switch

FEATURES

- Solenoid power to lock or power to unlock
- Side or top key entry
- Separate switches for key position and solenoid status
- Available with two 1 NC/1 NO snap action, two 3 NC/ 1 NO contact blocks
- 100 mm / 3.94 in x 100 mm / 3.94 in mounting
- Choice of four heavy duty keys
- Key retain force 1000 N max.
- IP 68 (NEMA 6P)
- Two solenoid voltages available
- Dual LEDs
- UL listed / CSA certified / CE compliant
- Red body colour
- Connectorised versions available upon request
- Fluorocarbon sealed enclosure available

BENEFITS

- Allows up to eight different key entry positions
- Flexibility of design
- Switch configuration exactly matches need
- Standard mounting centres
- Key mounting flexibility and security
- Suitable for harsh duty environments
- Operates at standard control voltage
- Use this product anywhere in the world
- Immediately recognisable in the application as a safety component

TYPICAL APPLICATIONS

- Automotive factory floor
- Machine tools sliding doors
- Metalworking machines sliding or hinged doors
- Special purpose machinery cage guarded sliding or hinged doors
- Robotics assembly cells cage guarded sliding or hinged doors
- Plastic moulding machines sliding doors



(Pending)



GKR/GKL

The GKR (head to the right) and GKL (head to the left) products offer the user an unrivalled range of standard options.

The GKR/GKL product is a key actuated device incorporating a key trapping mechanism. The switch is used on machinery where instant stop and access to the machinery is either impossible (due to the momentum of the machine) or impractical (due to tool or machine damage or scrapped product if the current machine cycle is interrupted).

The switch incorporates a manual override feature which allows removal of the key for emergency access.

A safety lockout device is also available for use with the GKR/GKL Series. The lockout device (GKZL2) is specifically designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device can accommodate up to four padlocks to prevent unauthorised removal of the device.

WARNING

MISUSE OF DOCUMENTATION

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Failure to comply with these instructions could result in death or serious injury.

GKR/GKL - Dual Entry Solenoid Key Operated Safety Interlock

Technical data

Mechanical life Up to 1 million operations

Degree of protection IP 68
NEMA/UL
Type 1, 4, 6P, 12, 13
Temperature range Operating: -25 °C to 40 °C /
-13 °F to 104 °F
Approvals* IEC 60947-5-1 EN 60947-5-1
ac15 A300/A600
dc13 Q300

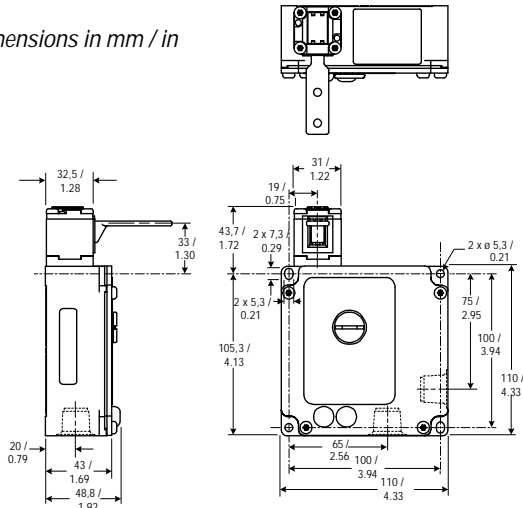
Operating forces: Insertion force: 35 N / 8 lb
Extraction force: 28 N / 6 lb
Max. solenoid locking force:
1000 N / 224 lb

Directives The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3.

Compliance This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

* See Standards (page 179)

Dimensions in mm / in



Head Left or Right

Conduit Thread

Head on Left = **L** **E** = 1/2" NPT

Head on Right = **R** **G** = 20 mm

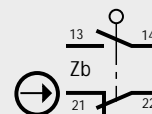
Switch Ordering:

GK **X** **X** **X** OR **XX**

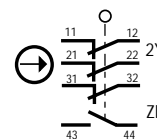
Example: GKLE36PXA2 + GKZ56

Switch Type

Slow Acting,
1 Normally Closed/1 Normally Open
Gate and Solenoid Monitor

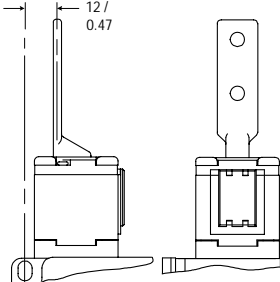
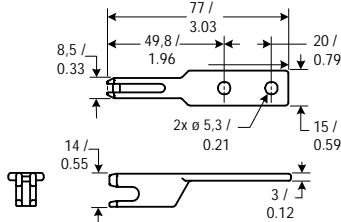
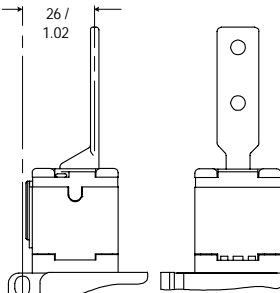
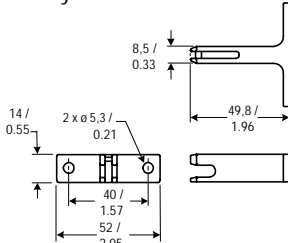
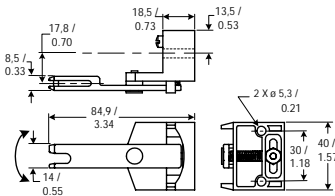
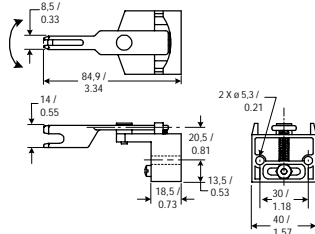


Slow Acting
3 Normally Closed/1 Normally Open
Gate and Solenoid Monitor



3

36

Head Orientation	Latching Mechanism	Solenoid and LED Indicator Voltage	Key Type (sold separately)
<div></div> <div>Only for right oriented head</div> <div>M</div>	Mechanical Latch (Energise solenoid to release key)	24 Vdc	<div></div> <div>Straight Key</div> <div>Door swing radius down to 250 mm / 9.84 in</div> <div>6</div>
<div></div> <div>Only for left oriented head</div> <div>P</div>			<div></div> <div>90° Key</div> <div>Door swing radius down to 250 mm / 9.84 in</div> <div>7</div>
	Solenoid Latch (De-energise solenoid to release key)	120 Vac	<div></div> <div>Spring-loaded Key: Up/Down</div> <div>Door swing radius down to 150 mm / 5.9 in</div> <div>8</div>
			<div></div> <div>Spring-loaded Key: Left/Right</div> <div>Door swing radius down to 150 mm / 5.9 in</div> <div>9</div>
		</	

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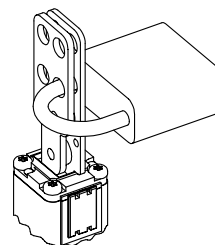
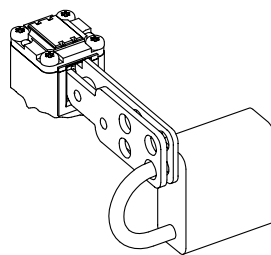
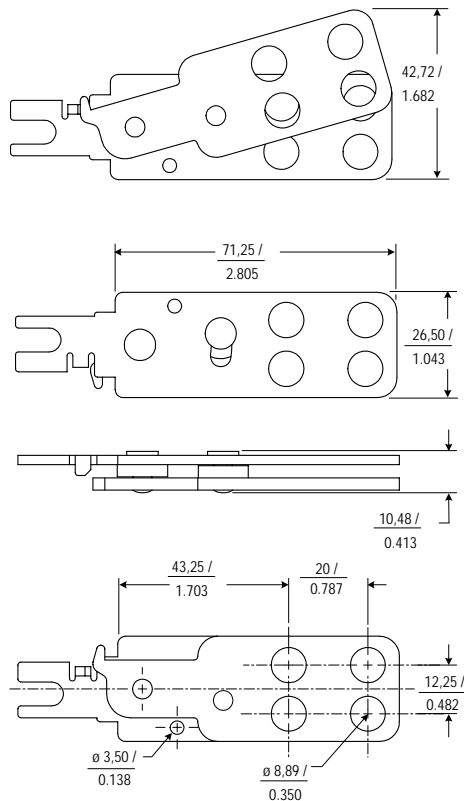
GKR/GKL

Accessories

The GKZL2 lockout device is for use with both the GK and GKR/GKL Series Dual Entry Head products. The lockout device does not activate the switch. It is designed to prevent a key from being inserted either manually, or by the access door being closed while maintenance personnel are working on the machine. When inserted, the lockout device accommodates up to four padlocks to prevent unauthorized removal of the device.

GKR/L

Mounting dimensional diagram (mm/in):



Ordering:

GKZL2

GKN Series

Safety Interlock Switch



DESCRIPTION

The MICRO SWITCH™ GKN Series safety interlock switches provide superior reliability in a compact, cost-effective package size. Six different types of actuator keys are available.

The GKN Series conforms to IEC 60947-5-1 and carries cULus, CE, and CCC approvals.

FEATURES

- Positive opening safety contacts
- Choice of six actuators
- Double insulated per IEC 60947-5-1
- Global approvals (cULus, CE, CCC)
- Three cable entries
- Large wiring cavity
- Large M20 cable entry
- Four-entry head

BENEFITS

- Meets global safety standards
- Wide application coverage
- No additional earthing requirements
- Final equipment may be sold worldwide
- Cable-to-switch orientation flexibility
- Wiring simplified
- No need to reconfigure head orientation

POTENTIAL APPLICATIONS

- Woodworking machinery
- Printing/paper finishing equipment
- Plastic molding equipment
- Packaging machinery
- Bailing and pumping equipment
- Semiconductor manufacturing equipment
- Packaging wrapping
- Specialty equipment

GKN Series

SPECIFICATIONS

Designation and Utilization Category		Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)			
		120 Vac	125 Vdc	240 Vac/250 Vdc	600 Vac
AC15	A600	6 A	—	3 A	1,2 A
DC13	Q300	—	0,55 A	0,27A	—

Rated thermal current (Ith)	10 A
Sealing	IP67; NEMA 1, 4, 12, 13
Rated impulse withstand (Uimp)	2500 V
Pollution degree	2 (micro-environment, inside enclosure); 3 (macro-environment, installation environment)
Rated insulation voltage (Ui)	600 V
Operating temperature range	-25 °C to 70 °C [-13 °F to 158 °F]
Storage temperature range	-40 °C to 85 °C [-40 °F to 185 °F]
Short-circuit protective device (type/maximum rating)	Class J fuse (10 A/690 V)
Expected mechanical life	500,000 cycles
Conditional short-circuit current	1000 A

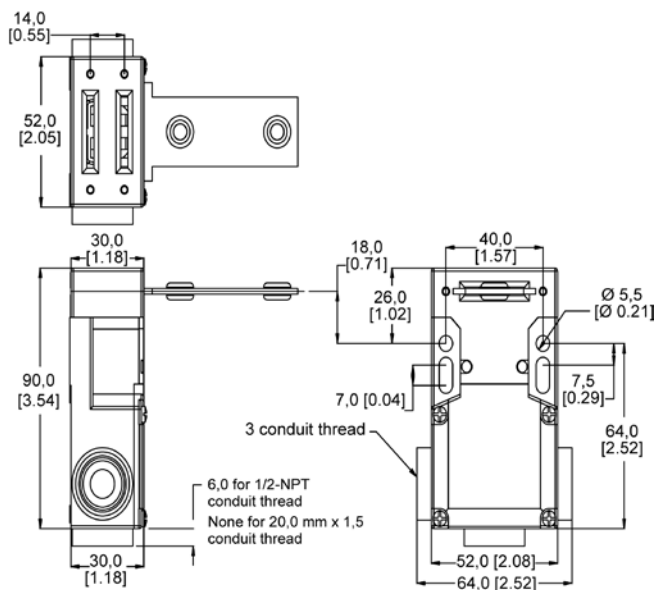
Complies with:

Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.

Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.

IEC/EN60947-5-1.

MOUNTING DIMENSIONS



CIRCUIT AND TRAVEL DIAGRAMS

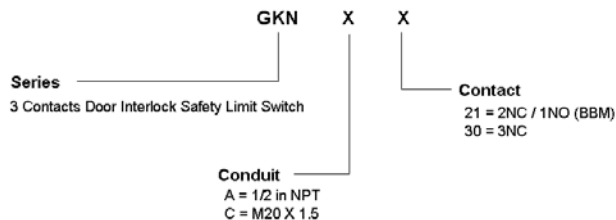
Switch Code 21 – 2NC/1NO (BBM)

11	12	0 mm [0 in]	7 mm [0.28 in]	7,7 mm [0.30 in]	
21	22				11-12
33	34				21-22
					31-32

Switch Code 30 – 3NC

11	12	0 mm [0 in]	7 mm [0.28 in]	
21	22			11-12
31	32			21-22
				33-34

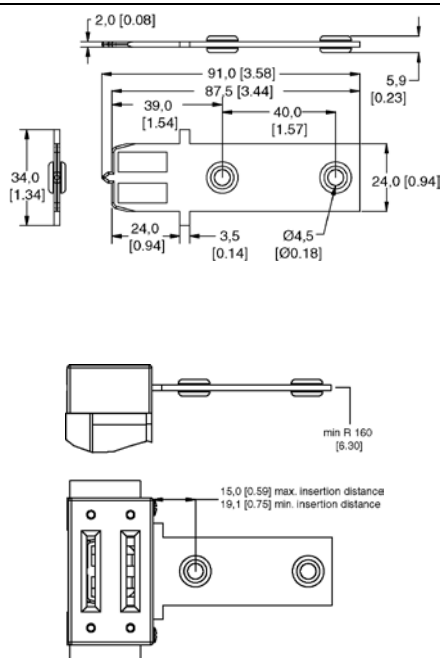
ORDER GUIDE



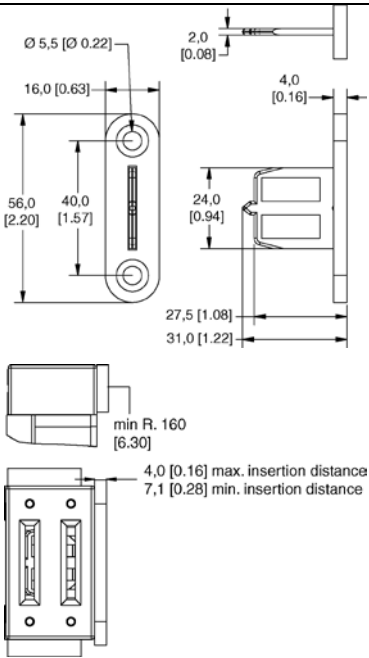
Safety Interlock Switch

KEY DIMENSIONS

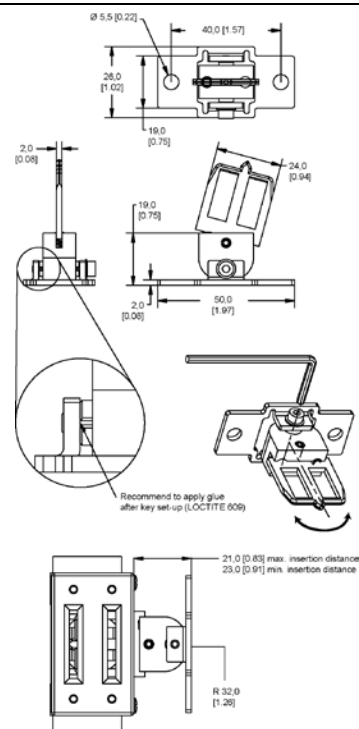
GKZ41 (M4 Screw)



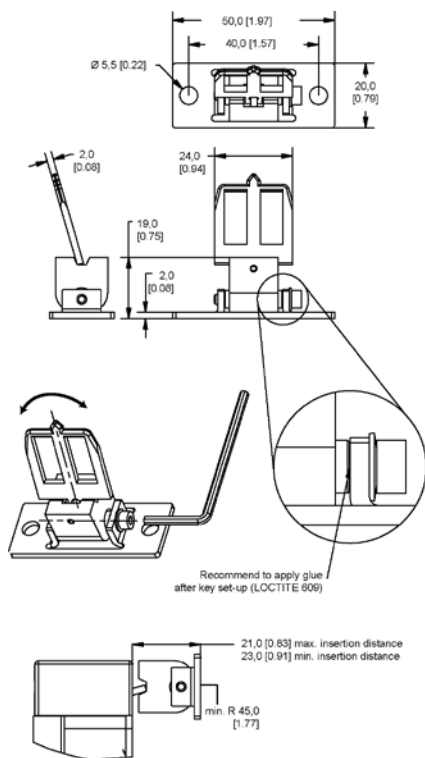
GKZ42 (M5 Screw)



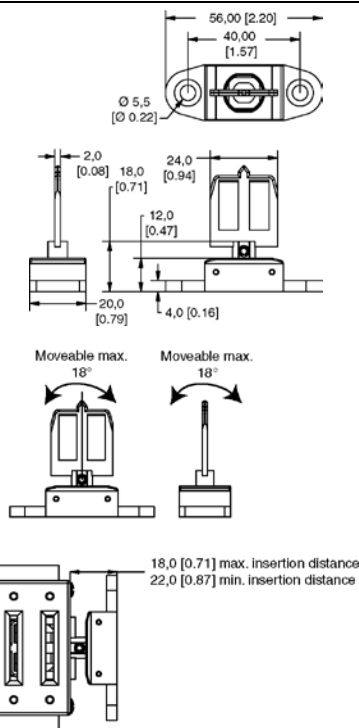
GKZ43 (M5 Screw)



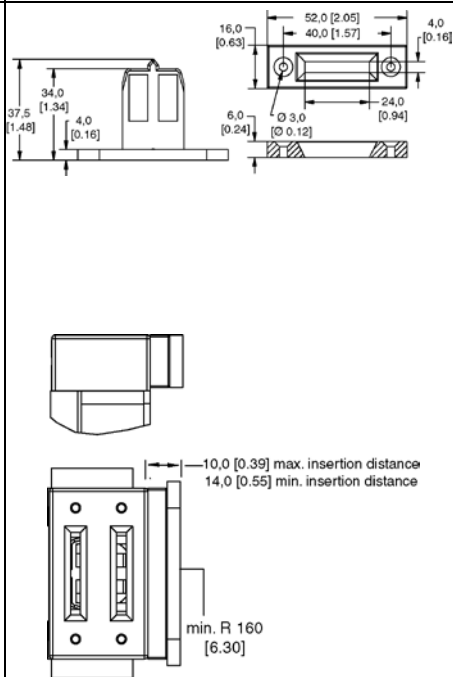
GKZ44 (M5 Screw)



GKZ45 (M5 Screw)



GKZF1 (M5 Screw)



ORDER GUIDE (ACTIVE LISTINGS)

Catalog Listing	Description
GKNA21	3 contact door interlock safety limit switch; 1/2 in NPT conduit; 2NC/1NO (BBM)
GKNA30	3 contact door interlock safety limit switch; 1/2 in NPT conduit; 3NC
GKNC21	3 contact door interlock safety limit switch; M20 x 1.5 conduit; 2NC/1NO (BBM)
GKNC30	3 contact door interlock safety limit switch; M20 x 1.5 conduit; 3NC

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

ORDER GUIDE (ACTIVE LISTINGS)

Catalog Listing	Description
GKZ41	Straight key
GKZ42	90° key
GKZ43	Left-right adjustable key
GKZ44	Up-down adjustable key
GKZ45	Multidirectional key
GKZF1	Funnel key

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828 +65 6445-3033 Fax
Europe	+44 (0) 1698 481481 +44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188 +1-305-883-8257 Fax
USA/Canada	+1-800-537-6945 +1-815-235-6847 +1-815-235-6545 Fax

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Honeywell

GKS Series

Multi-Entry Trapped Key-Operated Safety Interlock Switch



DESCRIPTION

The introduction of the GKS product marks a significant new product class for Honeywell. Honeywell's switching expertise has been applied to a cost-effective, trapped key safety interlock switch. This product allows OEMs to hold a door or gate closed while a hazard still exists. This is particularly important where there is momentum in the machine. In other words, when the machine is signaled to stop, the momentum in

the machine can mean that parts of the machine are still moving and pose an injury risk if the access gate or door is not held closed. Global approvals and standards are important to Honeywell's customers; therefore, the GKS product conform to the requirements of IEC60947-5-1 and carries cULus, CE and CCC approvals.

FEATURES

- Global approvals (CE, cULus, CE, and CCC)
- Glass-filled polyester body
- Power-to-lock and power-to-unlock schemes for key trap
- Flexible switching arrangement
- 24 Vdc, 110 Vac, and 230 Vac coil voltages
- Over-ride mechanism in cover
- Head may be rotated into 4 different positions
- Three conduit openings (knock-out style)
- Switch position provides status

BENEFITS

- Product may be applied to most applications worldwide
- Tough, cost-effective, double-insulated enclosure
- Choice of key trapping methodology
- Four contacts that can be arranged in any configuration¹
- Multiple voltages provide for every geography
- Has a method to open door (in case of power loss, etc.)
- One part number may be used for multiple applications
- Flexible wiring options
- Can diagnose status of gate/door (gate/door closed and locked, gate/door closed and unlocked, gate/door open)

¹ There will be minimum volume requirements for unreleased options.

POTENTIAL APPLICATIONS

- Woodworking machinery
- Printing/paper finishing equipment
- Plastic molding equipment
- Packaging machinery
- Bailing
- Pumping equipment
- Semiconductor manufacturing equipment
- Packaging wrapping
- Specialty equipment
- Machine tool
- Robot cell

GKS Series

SPECIFICATIONS

Designation and Utilization Category		Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)		
		120 Vac	125 Vdc	240 Vac/250 Vdc
AC15	B300	3 A	–	1.5 A
DC13	Q300	–	0,55 A	0,27 A

Rated thermal current (Ith)	5 A
Sealing	IP67; NEMA 1, 4, 12, 13
Rated impulse withstand (Uimp)	2500 V
Pollution degree	3 (macro-environment, installation environment)
Rated insulation voltage (Ui)	600 V
Operating temperature range	-25 °C to 50 °C [-13 °F to 122 °F]
Storage temperature range	-40 °C to 85 °C [-40 °F to 185 °F]
Short-circuit protective device (type/maximum rating)	Class J fuse (5 A/600 Vac)
Expected mechanical life	1,000,000 operations
Conditional short-circuit current	1000 A
Solenoid operating voltage and power	24 Vac: +10 %, -15 %, 4 W 230 Vac: +10 %, -15 %, 9 W 110 Vac: +10 %, -15 %, 8 W 24 Vdc: +10 %, -20 %, 7 W

Complies with:

Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.

Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.

IEC/EN60947-5-1.

PART NUMBER TREE

GKS	X	XX	X	X	X	X
Series	Conduit	Contacts	Head Orientation	Locking Principal	Solenoid Voltage	Additional Function
Door	A - 1/2 NPT	21 - 2NC/1NO/1NO	L - Front	A - Power to unlock	2 - 24 Vac/dc	L - LED
Interlock	C - M20	22 - 2NC/1NO/1NC	N - Back	S - Power to lock	5 - 110 Vac	
Safety Limit		46 - 3NC/1NO	P - Left		6 - 230 Vac	
Switch,		47 - 4NC	M - Right			
Solenoid						

NOTE: The part number tree is provided to demonstrate the potential combinations of components. Actual availability of individual product combinations will depend on the popularity of that type. Please check with your local distributor or Honeywell representative for the available types in your region.

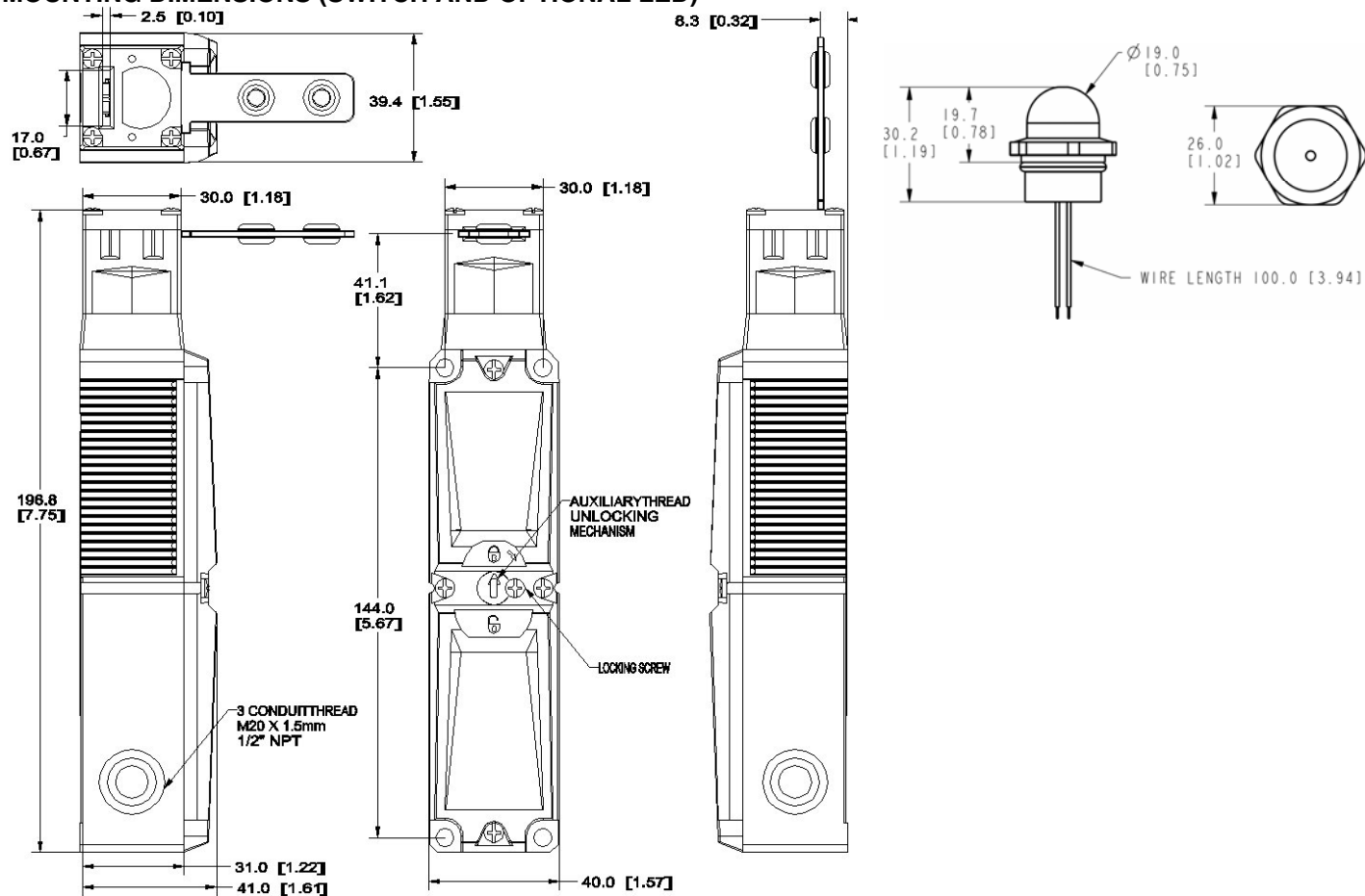
LED OPTION

The built-in LED is suitable for direct installation in the M20 x 1.5/0.5 in NPT thread, one of the three cable entries in the GKS safety switch. The built-in LED can indicate to the user whether the solenoid is unlocked/locked or whether the door is open/closed. The switching element can be wired individually.

Parameter	Value
LED color	Red
Connection	2 connection cables
Screw-in thread	M20 x 1.5/ 0.5 in NPT
Operating voltage/current consumption	24 Vdc/45 Ma 115 Vac/15 mA 230 Vac/15 mA
Degree of protection	IP67

Multi-Entry Trapped Key-Operated Safety Interlock Switch

MOUNTING DIMENSIONS (SWITCH AND OPTIONAL LED)



GKS Series

SWITCH ORDER GUIDE (ACTIVE LISTINGS)

Catalog Listing	Description
GKSA46LA2	0.5 in conduit, 3NC/1NO, head to front, power to unlock, 24 Vdc solenoid
GKSA46LA5	0.5 in conduit, 3NC/1NO, head to front, power to unlock, 110 Vac solenoid
GKSC46LA2	20 mm conduit, 3NC/1NO, head to front, power to unlock, 24 Vdc solenoid
GKSC46LA6	20 mm conduit, 3NC/1NO, head to front, power to unlock, 230 Vac solenoid

KEY ORDER GUIDE (ACTIVE LISTINGS)

Catalog Listing	Description	Min. Actuating Radius
GKZS6	Straight key	min. R 160 [6.30]
GKZS7	90° key	min. R 160 [6.30]
GKZS8	Left-right adjustable key	min. R 32 [1.26]
GKZS4	Up-down adjustable key	min. R 45 [1.77]
GKZS9	Multidirectional key	Moveable max. 18 degrees
GKZSF	Funnel key	min. R 160 [6.30]

CIRCUIT AND TRAVEL DIAGRAMS

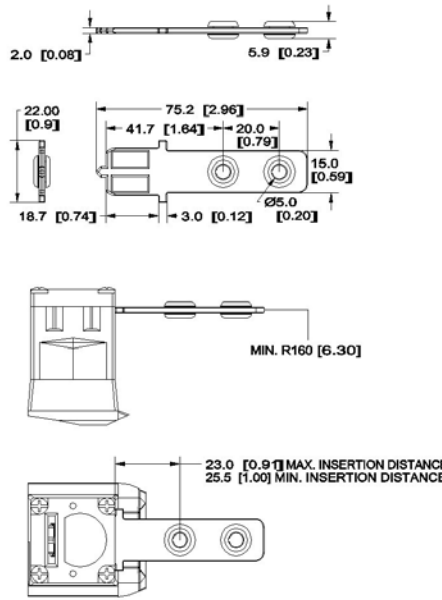
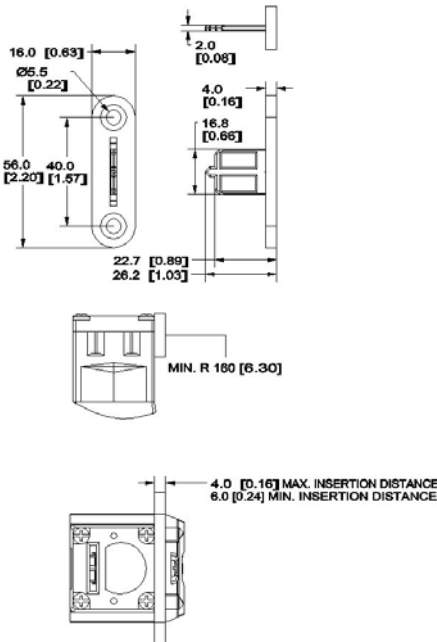
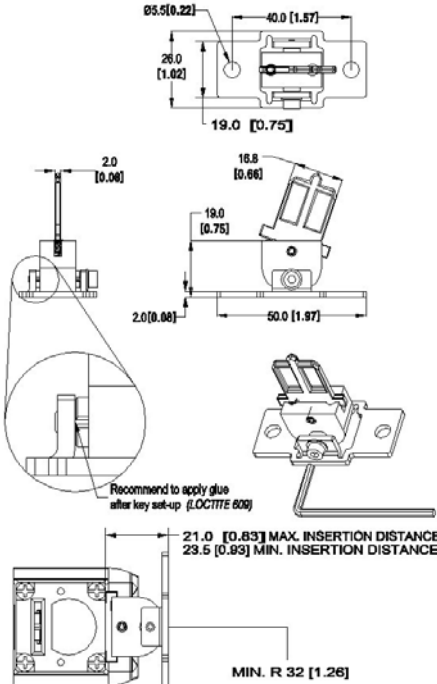
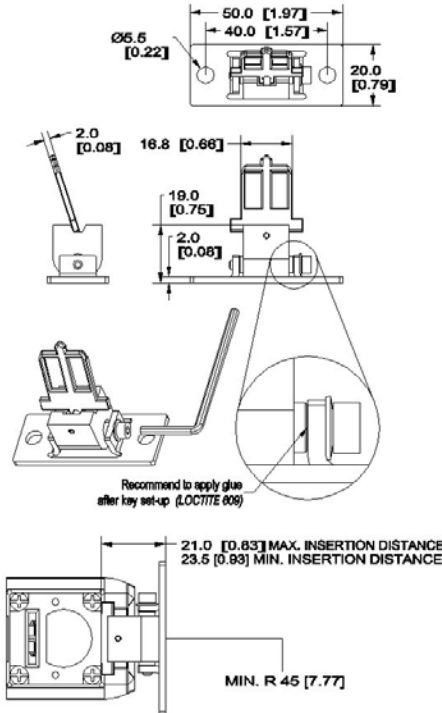
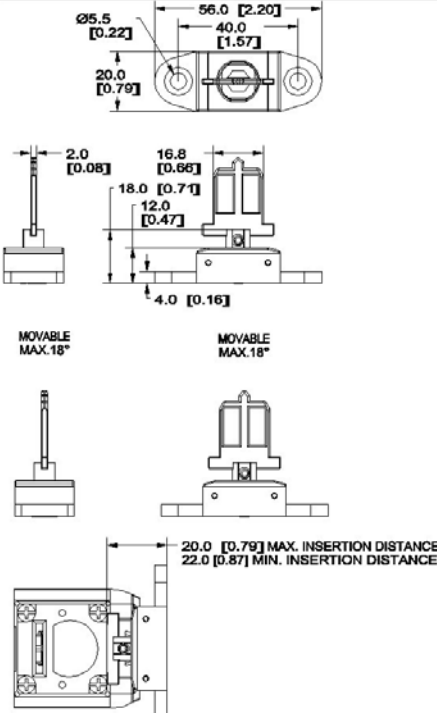
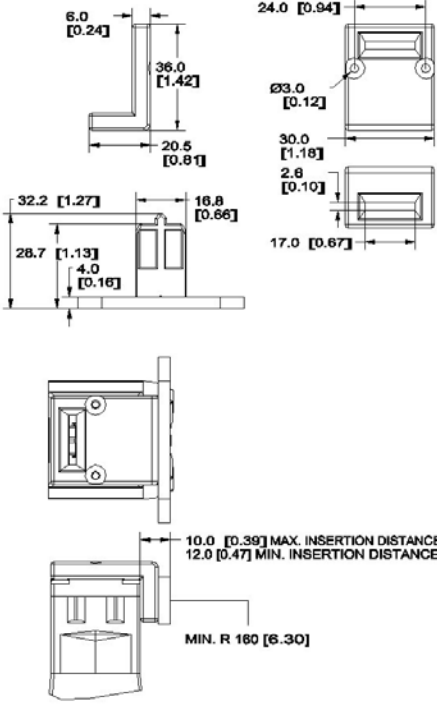
Circuit Drawing	Inserted & Locked	Inserted & Unlocked	Removed & Unlocked
GKS..21..			
GKS..22..			
GKS..46..			
GKS..47..			

NOTE: This 'truth table' shows the switch status in various conditions. In each column, there is a change in switch contact position from the previous column. It is possible to determine the status of the switch by examining the combination against the table. This can be essential for operational reasons. For instance, the machine should not be started until the key is not only in the head, but is also trapped.

The **first column** depicts the key inserted and the key trapped in that position – this would be the typical run position for the machine – all doors closed. The **second column** illustrates the key inserted, but not trapped – this would be the safe-to-open the door position (as determined by the application's safety scheme). The **third column** shows the key extracted or door-open position.

Multi-Entry Trapped Key-Operated Safety Interlock Switch

KEY DIMENSIONS

GKZS6	GKZS7	GKZS8
 <p>2.0 [0.08]</p> <p>5.9 [0.23]</p> <p>22.00 [0.9]</p> <p>75.2 [2.96]</p> <p>41.7 [1.64]</p> <p>20.0 [0.79]</p> <p>15.0 [0.59]</p> <p>18.7 [0.74]</p> <p>3.0 [0.12]</p> <p>Ø5.0 [0.20]</p> <p>MIN. R160 [6.30]</p> <p>23.0 [0.91] MAX. INSERTION DISTANCE 25.5 [1.00] MIN. INSERTION DISTANCE</p>	 <p>16.0 [0.63]</p> <p>Ø6.5 [0.22]</p> <p>56.0 [2.20]</p> <p>40.0 [1.57]</p> <p>2.0 [0.08]</p> <p>4.0 [0.16]</p> <p>16.8 [0.66]</p> <p>22.7 [0.89]</p> <p>26.2 [1.03]</p> <p>MIN. R 160 [6.30]</p> <p>4.0 [0.16] MAX. INSERTION DISTANCE 6.0 [0.24] MIN. INSERTION DISTANCE</p>	 <p>Ø5.5 [0.22]</p> <p>40.0 [1.57]</p> <p>26.0 [1.02]</p> <p>19.0 [0.75]</p> <p>2.0 [0.08]</p> <p>18.8 [0.66]</p> <p>19.0 [0.75]</p> <p>2.0 [0.08]</p> <p>50.0 [1.97]</p> <p>Recommend to apply glue after key set-up (LOCTITE 609)</p> <p>21.0 [0.83] MAX. INSERTION DISTANCE 29.5 [0.93] MIN. INSERTION DISTANCE</p> <p>MIN. R 32 [1.26]</p>
GKZS4	GKZS9	GKZSF
 <p>Ø6.5 [0.22]</p> <p>50.0 [1.97]</p> <p>40.0 [1.57]</p> <p>20.0 [0.79]</p> <p>2.0 [0.08]</p> <p>16.8 [0.66]</p> <p>19.0 [0.75]</p> <p>2.0 [0.08]</p> <p>Recommend to apply glue after key set-up (LOCTITE 609)</p> <p>21.0 [0.83] MAX. INSERTION DISTANCE 23.5 [0.93] MIN. INSERTION DISTANCE</p> <p>MIN. R 45 [7.77]</p>	 <p>Ø5.5 [0.22]</p> <p>56.0 [2.20]</p> <p>40.0 [1.57]</p> <p>20.0 [0.79]</p> <p>2.0 [0.08]</p> <p>16.8 [0.66]</p> <p>18.0 [0.71]</p> <p>12.0 [0.47]</p> <p>4.0 [0.16]</p> <p>MOVABLE MAX.18"</p> <p>MOVABLE MAX.18"</p> <p>20.0 [0.79] MAX. INSERTION DISTANCE 22.0 [0.87] MIN. INSERTION DISTANCE</p>	 <p>6.0 [0.24]</p> <p>36.0 [1.42]</p> <p>24.0 [0.94]</p> <p>Ø3.0 [0.12]</p> <p>30.0 [1.18]</p> <p>2.8 [0.10]</p> <p>17.0 [0.67]</p> <p>32.2 [1.27]</p> <p>28.7 [1.13]</p> <p>4.0 [0.16]</p> <p>16.8 [0.66]</p> <p>10.0 [0.39] MAX. INSERTION DISTANCE 12.0 [0.47] MIN. INSERTION DISTANCE</p> <p>MIN. R 160 [6.30]</p>

WARNING

IMPROPER INSTALLATION

- Consult with local safety agencies and their requirements when designing a machine-control link, interface, and all control elements that affect safety.
- Strictly adhere to all installation instructions

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

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SALES AND SERVICE

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Phone and Fax:

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Honeywell

GSS Series

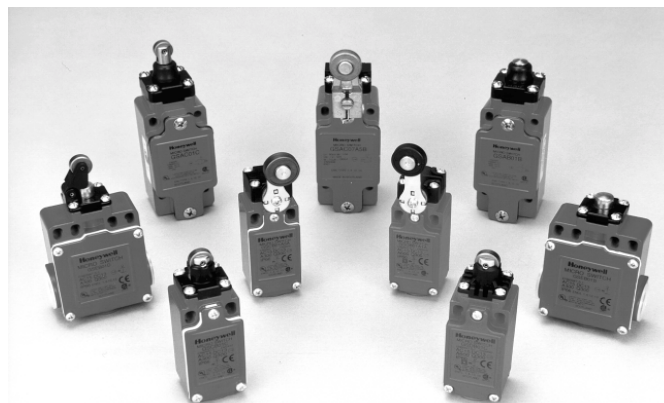
Global Safety Switch

FEATURES

- EN 50041 and EN 50047 mounting and characteristics
- Designed to IEC electrical standard for world-wide use in guarding applications
- Positive opening operation of NC (Normally Closed) contacts conforming to IEC /EN 60947-5-1-3
- Available with a wide range of positive opening contacts
- Rugged housing (Zinc Die-cast)
- Tamper resistant design uses TORX® head security screw
- Full range of actuator heads and levers suitable for safety applications
- Sealing up to IP 67, NEMA 1, 4, 12 & 13
- Snap action and slow action basic switches
- International conduit sizes
- Galvanically isolated contacts
- UL listed; CSA and CE certified, BG approved
- Red body colour for easy safety recognition

BENEFITS

- Standard mounting and characteristics
- Globally available and accepted
- Welded NC contacts will separate - vital security in safety applications
- Range of actuation methods for detecting safety conditions in guarding and machine status applications
- Wiring and body flexibility
- Suitable for inductive switching and safety relay interfaces
- Signalling and power/safety circuits may be different polarities or voltages
- Immediately recognisable in the application as a safety component



GSS Series products may be used alone as Category 1 per EN 954-1 safety component. In conjunction with other safety switches and our complete range of safety control modules, it is possible to construct comprehensive protection schemes with Category 2, 3 or 4 compliance per EN 954-1.

Honeywell's design experience has resulted in a brand new patented concept in safety switching techniques. The sequential safety switch incorporates positive opening on the downward stroke of each NC sequence point. This allows the user to have both a warning signal and a stop signal. With this information a door can be closed before it stops a machine or settings adjusted to stop excessive movement thus avoiding down time.

LOW ENERGY SWITCHING

In today's demanding age of low energy controls, electromechanical switches are frequently used to interface directly with safety relays, PLCs and other low energy devices. To accommodate this requirement GSS offers gold plated contact versions of the standard basic switch. This improves reliability of switching at low currents and voltages, by protecting the contact surfaces from contamination during operation or storage prior to use.

Standard silver contacts have a disadvantage in that the contact surface may tarnish under certain environmental conditions e.g. in the presence of moisture.

Low energy basic switches are rated as follows:

Operating Voltage U_e	1 to 50 Vac or Vdc
Operating Current I_e	1 μ A to 100 mA

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

GSA EN 50041

Safety Metal Standard

Technical Data

Mechanical life up to 15 million operations

Degree of protection IP 67
NEMA/UL type 1, 4, 12, 13

Temperature range *Operating:*
-25 °C to +85 °C /
-13 °F to +185 °F

Storage:
-40 °C to +85 °C /
-40 °F to +185 °F

Approvals* IEC 60947-5-1
EN 60947-5-1
ac15 A300/A600
dc13 Q300
UL & CSA

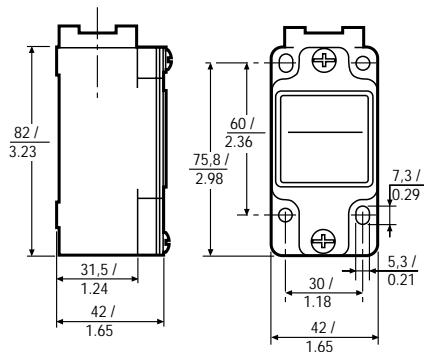
Vibration 10 g conforming to IEC 68-2-6

Shock 50 g conforming to IEC 68-2-27

Terminal marking to EN 50013

*See Standards (page 179)

Dimensions in mm / in



Conduit Thread

A = 1/2" NPT

C = 20 mm

Ordering:

GSA

X

Example: GSA C 01 B

▲ Low Energy Contacts

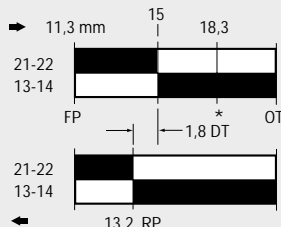
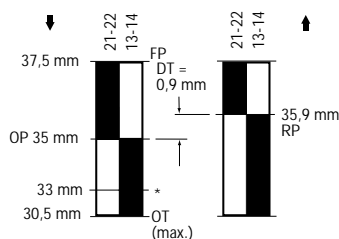
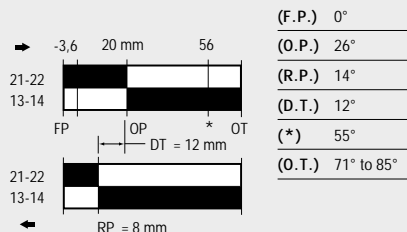
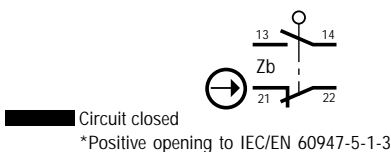
Note: See page 197

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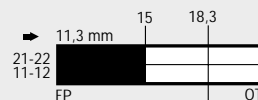
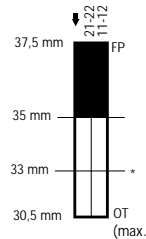
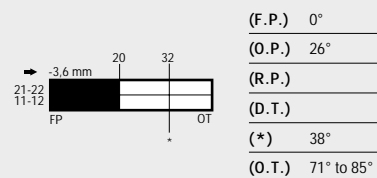
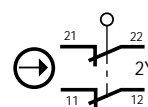
36▲

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Snap-Action Contacts 1 NORMALLY CLOSED/ 1 NORMALLY OPEN



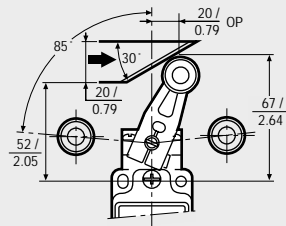
Slow-Action Contacts 2 NORMALLY CLOSED



* Point from which the positive opening is assured

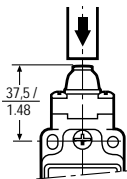
** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2,5 kV, positive opening is assured at*.

Actuator Types

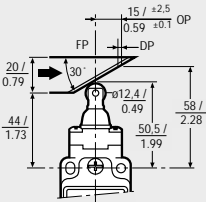


A1B
Additional
levers
available
(see page 208)

Side Rotary, metal roller



Top pin plunger

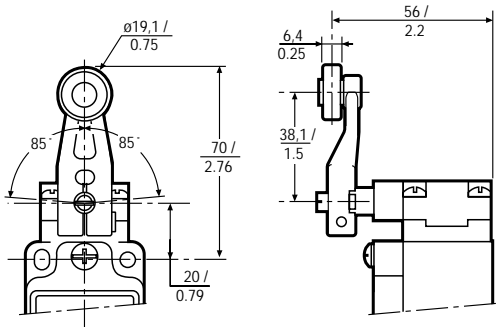


Top roller plunger

Additional Lever Types

For use with all Side Rotary Head Styles.
Figure 1 illustrates standard lever types which conform to EN 50041.
All dimensions are in mm / in

GSA



Side Rotary Roller Lever
A1B Metal Roller

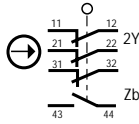
Figure 1

47

XXX

GSS

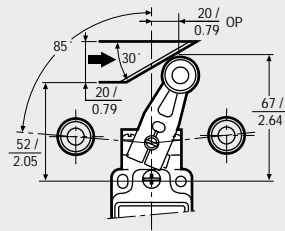
Slow-Action Contacts 3 NORMALLY CLOSED/ 1 NORMALLY OPEN BREAK BEFORE MAKE



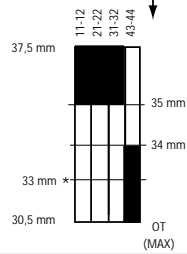
Actuator Types



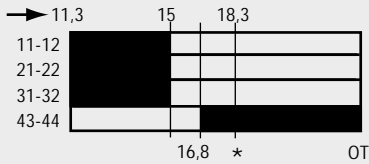
(F.P.)	0°	(R.P.)	
(O.P.1)	26°	(D.T.)	
(O.P.2)	32°	(*)	38°
		(O.T.)	71° to 85°



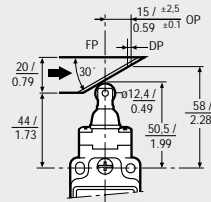
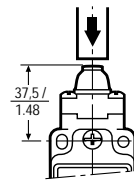
Side Rotary, metal roller



Top pin plunger



Top roller plunger



A1B

B

C

▲ Low Energy Contacts **47**▲

Note: See page 197

GS

XXX



GSC EN 50047

Safety Metal Standard

Technical Data

Mechanical life	up to 15 million operations
Degree of protection	IP 66 NEMA/UL type 1, 4, 12, 13
Temperature range	<i>Operating:</i> -25 °C to +85 °C / -13 °F to +185 °F <i>Storage:</i> -40 °C to +85 °C / -40 °F to +185 °F

Approvals*	IEC 60947-5-1 EN 60947-5-1 ac15 A300 dc13 Q300 BG, UL & CSA
-------------------	---

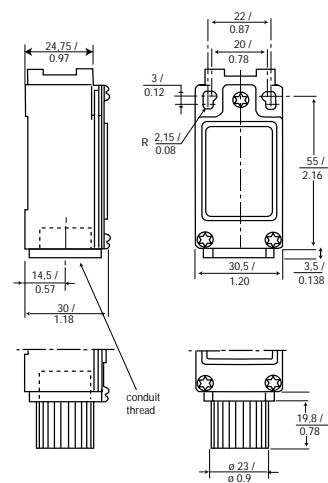
Vibration	10 g conforming to IEC 68-2-6
------------------	-------------------------------

Shock	50 g conforming to IEC 68-2-27
--------------	--------------------------------

Terminal marking to EN 50013

*See Standards (page 179)

Dimensions in mm / in



Note: Incorporates safety screws

Conduit Thread

A = 1/2" NPT

C = 20 mm

Ordering:

GSC

X

Example: GSC C 01 B

▲ Low Energy Contacts

Note: See page 197

01

36▲

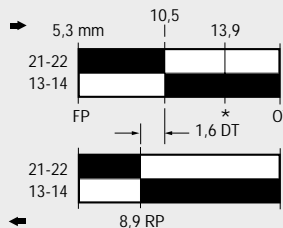
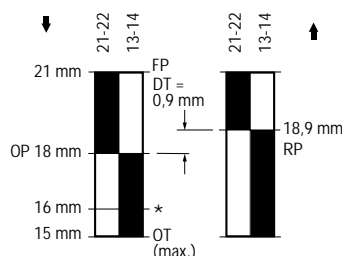
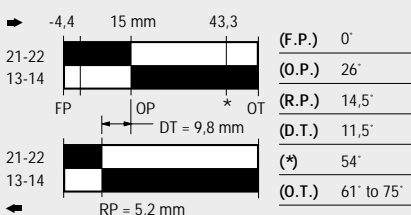
XX

Snap-Action Contacts 1 NORMALLY CLOSED/ 1 NORMALLY OPEN

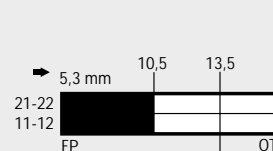
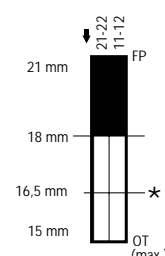
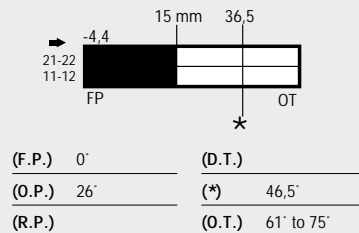
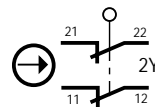


■ Circuit closed

*Positive opening to IEC/EN 60947-5-1-3



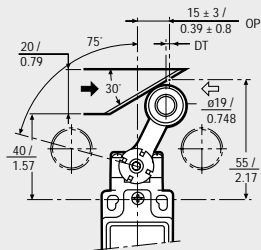
Slow-Action Contacts 2 NORMALLY CLOSED



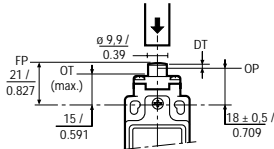
* Point from which the positive opening is assured

** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at*.

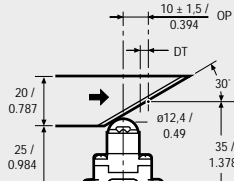
Actuator Types



Side Rotary, metal roller



Top pin plunger



Top roller plunger

A1B

Additional levers available (see page 208)

B

C

XXX

Additional Lever Types

For use with all Side Rotary Head Styles.
All dimensions are in mm / in

Figure 2 illustrates standard lever types which conform to EN 50047.

GSC

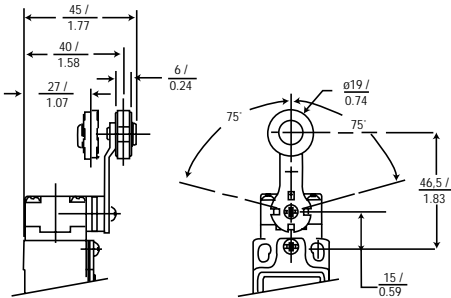


Figure 2

Side Rotary Roller Lever
A1B Metal Roller



GSD EN 50047

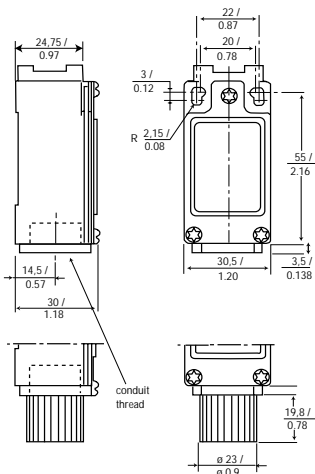
Safety Double Insulated Standard

Technical Data

Mechanical life	up to 15 million operations
Degree of protection	IP66 NEMA/UL type 1, 12, 13
Temperature range	<i>Operating:</i> -25 °C to +85 °C / -13 °F to +185 °F <i>Storage:</i> -40 °C to +85 °C / -40 °F to +185 °F
Approvals*	IEC 60947-5-1 EN 60947-5-1 ac15 A600 dc13 Q300 BG, UL & CSA
Vibration	10 g conforming to IEC 68-2-6
Shock	50 g conforming to IEC 68-2-27
Terminal marking	to EN 50013

*See Standards (page 179)

Dimensions in mm / in



Note: Incorporates safety screws

Conduit Thread

A = 1/2" NPT

C = 20 mm

Ordering:

GSD

X

Example: GSD C 01 B

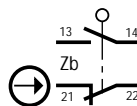
▲ Low Energy Contacts
Note: See page 197

01

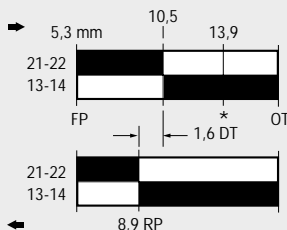
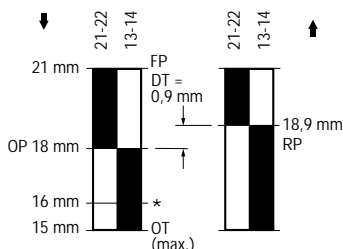
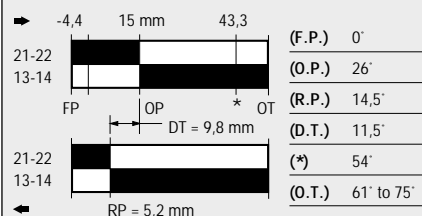
36[▲]

XX

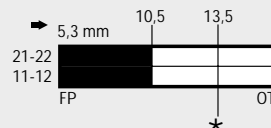
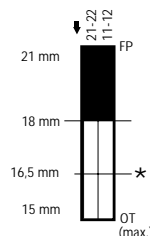
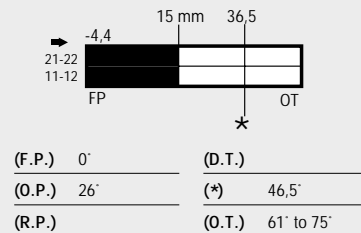
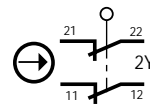
Snap-Action Contacts 1 NORMALLY CLOSED/ 1 NORMALLY OPEN



■ Circuit closed
*Positive opening to IEC/EN 60947-5-1-3



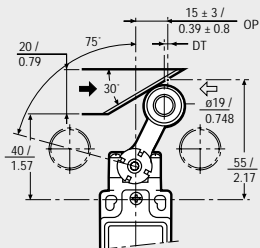
Slow-Action Contacts 2 NORMALLY CLOSED



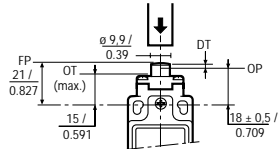
* Point from which the positive opening is assured

** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2,5 kV, positive opening is assured at*.

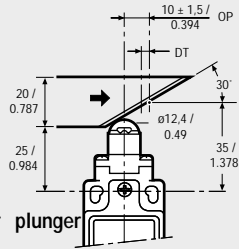
Actuator Types



Side Rotary, metal roller



Top pin plunger



Top roller plunger

A1B

Additional levers available (see page 208)

B

C

XXX

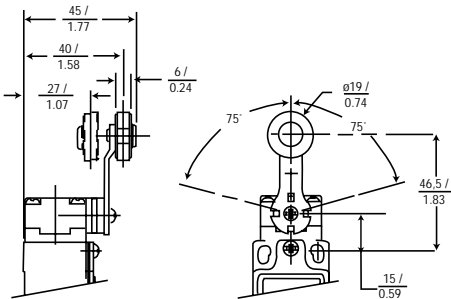
Additional Lever Types

For use with all Side Rotary Head Styles.

All dimensions are in mm / in

Figure 2 illustrates standard lever types which conform to EN 50047.

GSD



Side Rotary Roller Lever A1B Metal Roller

Figure 2



GSE EN 50047 Compatible Safety 3 Conduit Metal Standard

Technical Data

Mechanical life up to 15 million operations

Degree of protection IP66
NEMA/UL type 1, 4, 12, 13

Temperature range
Operating:
-25 °C to +85 °C /
-13 °F to +185 °F
Storage:
-40 °C to +85 °C /
-40 °F to +185 °F

Approvals*
IEC 60947-5-1
EN 60947-5-1
ac15 A300
dc13 Q300
BG, UL & CSA

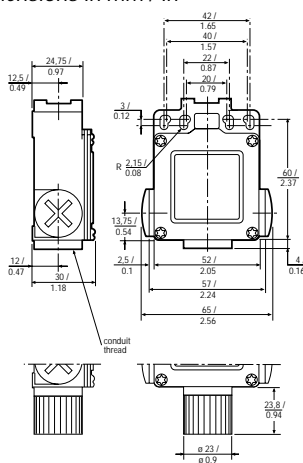
Vibration 10 g conforming to IEC 68-2-6

Shock 50 g conforming to IEC 68-2-27

Terminal marking to EN 50013

*See Standards (page 179)

Dimensions in mm / in



Conduit Thread

A = 1/2" NPT

C = 20 mm

Ordering:

GSE

X

▲ Low Energy Contacts

Note: See page 201

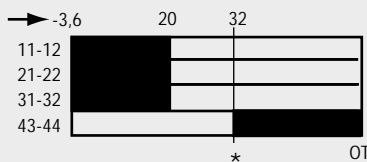
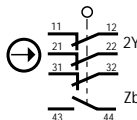
47▲

XX

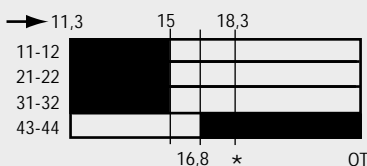
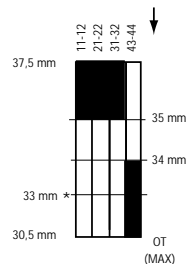
XXX

Example: GSE C 20 B

Slow-Action Contacts
3 NORMALLY CLOSED/
1 NORMALLY OPEN
BREAK BEFORE MAKE



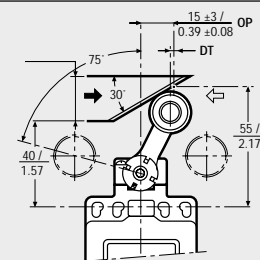
(F.P.)	0°	(R.P.)	
(O.P.1)	26°	(D.T.)	
(O.P.2)	32°	(*)	38°
		(O.T.)	71° to 85°



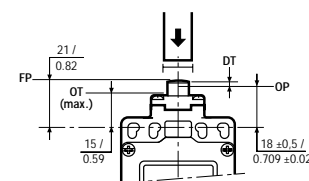
* Point from which the positive opening is assured

** Positive opening occurs at operating position. But to meet IEC/EN 60947-5-3 which requires a dielectric gap of 2.5 kV, positive opening is assured at*.

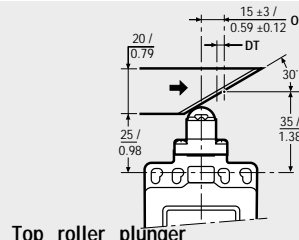
Actuator Types



Side Rotary, metal roller



Top pin plunger



Top roller plunger

A1B

Additional levers available (see page 208)

B

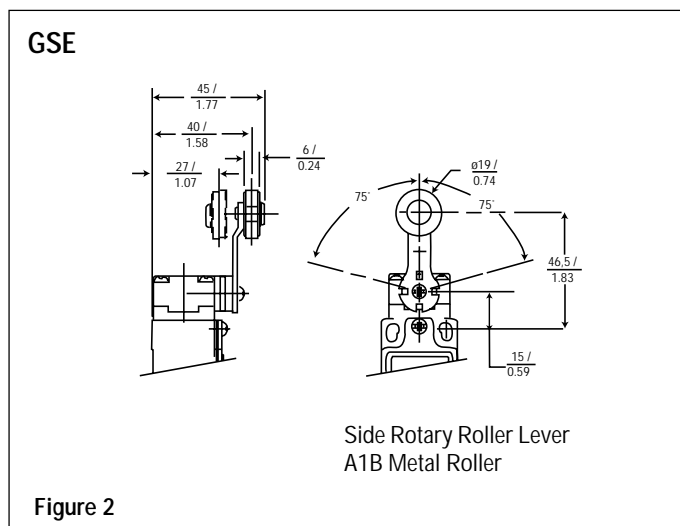
C

Additional Lever Types

For use with all Side Rotary Head Styles.

All dimensions are in mm / in

Figure 2 illustrates standard lever types which conform to EN 50047.





MICRO SWITCH™ GSX Series

Explosion-Proof Safety Switch



DESCRIPTION

Honeywell Sensing and Control MICRO SWITCH™ GSX Series Explosion-Proof Safety Switches combines the world-class MICRO SWITCH™ global safety switch (GSS) with our superior explosion-proof housing from our LSX and BX product lines, offering our customers the best of our engineering expertise.

FEATURES

- Snap-action contacts with positive break
- Positive action push plunger breaks current upon opening of door or aperture
- Explosion-proof housing for hazardous locations
- NEMA 1, 3, 4, 12, 13 and IP67 sealing
- cULus, ATEX, IECEx
- Simple installation
- Positive break feature
- Extensive switching options and actuator styles

BENEFITS

- Designed to ensure that even welded contacts will open and the machine will stop in an emergency
- Breaks current upon opening of door or aperture
- Reduces risk that hazardous gases or dusts could cause an explosion
- Meets IECEx standards
- Designed to provide a safe failure mode, ensuring the machine will not start
- Superior sealing for different applications

The positive break feature is designed to provide a safe failure mode, ensuring the machine will not start, and therefore supporting a safer working environment.

The GSX Series safety switch platform allows for over 10,000 actuator and switching option combinations, enabling our customers to source most of their safety and explosion-proof switch requirements from a single, global supplier.

POTENTIAL APPLICATIONS

Gates, doors, access panels or cages on machinery in:

- Hydrocarbon refining
- Chemical processing
- Agricultural equipment
- Food processing
- Grain elevators

MICRO SWITCH™ GSX Series

SPECIFICATIONS

Designation and Utilization Category		Rated Operational Current Ie (A) at Rated Operational Voltage Ue (V)						
		24 V	120 V	240 V	380 V	480 V	500 V	600 V
AC15	A300	—	6 A	3 A	—	—	—	—
AC15	A500	—	6 A	3 A	1,9 A	1,5 A	1,4 A	—
AC15	A600	—	6 A	3 A	1,9 A	1,5 A	1,4 A	1,2 A
DC13	Q300	2,8 A	0,55 A	0,27 A	—	—	—	—

Rated thermal current (Ith)	10 A	Sealing	IP67; NEMA 1, 3, 4, 12, 13
Rated impulse withstand (Uimp)	2500 V	Pollution degree	3
Rated insulation voltage (Ui)	300 V, 500 V, 600 V	Operating temperature range	-40 °C to 70 °C [-40 °F to 158 °F]
Short-circuit protective device (type/maximum rating)	Class J fuse (10 A/600 V)	Expected mechanical life	1,000,000 operations
Conditional short-circuit current	1000 A	—	—

Complies with:

Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC.

Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function.

IEC/EN60947-1, IEC/EN60947-5-1.

Explosion-Proof Safety Switch

NOMENCLATURE TREE MICRO SWITCH™ GSX Series Nomenclature

GSX	A	16	A	1	B	
Switch type ^(No. 1)	Housing (conduit)	Basic switch	Head	Actuator	Actuator options	Modifications/ Specials
Explosion-proof positive break series	A 0.5 in NPT B PG 13.5 C 20 mm D PF 1/2	01 Snap action, 1NC/1NO 03 Slow acting, 1NC/1NO Break before make 04 Slow acting, 1NC/1NO Make before break 06 Slow acting, 2NC 07 Snap action, 1NC/1NO, gold 20 Snap action, 2NC/2NO 22 Snap action, 2NC/2NO, gold 33 Slow acting, 1NC/1NO Break before make, gold 34 Slow acting, 1NC/1NO Make before break, gold 36 Slow acting 2NC, gold 40 Slow acting, 4NC 41 Slow acting, 4NC, gold 42 Slow acting, 2NC/1NO Break before make 43 Slow acting, 2NC/1NO Break before make, gold 44 Slow acting, 2NC/2NO Break before make 45 Slow acting, 2NC/2NO Break before make, gold 46 Slow acting, 3NC/1NO Break before make 47 Slow acting, 3NC/1NO Break before make, gold	A Side rotary momentary B Top pin plunger C Top roller plunger D Top roller lever	1 Std. fixed length roller 3 Yoke roller 5 Offset roller	A 19 x 6,35 [0.75 x 0.25] nylon roller C 25,4 x 12,7 [1 x 0.5] nylon roller D 38,1 x 6,35 [1.5 x 0.25] nylon roller E 19 x 6,35 [0.75 x 0.25] bronze roller W 38,1 x 12,7 [0.75 x 0.5] rubber roller Y 50,9 x 12,7 [2.0 x 0.5] rubber roller	1 Clockwise rotation 2 Counterclock rotation 3 Head assb. w/ actuator to right side 4 Head assb. w/ actuator to left side 5 Head assb. w/ actuator to mtg. surf. 6 Roller perpendicular to mounting surface C Prelead cable Q Connector

NOTES

(1) Not all possible combinations are available; these are only guidelines.

MICRO SWITCH™ GSX Series

Figure 1. Side rotary head with standard roller

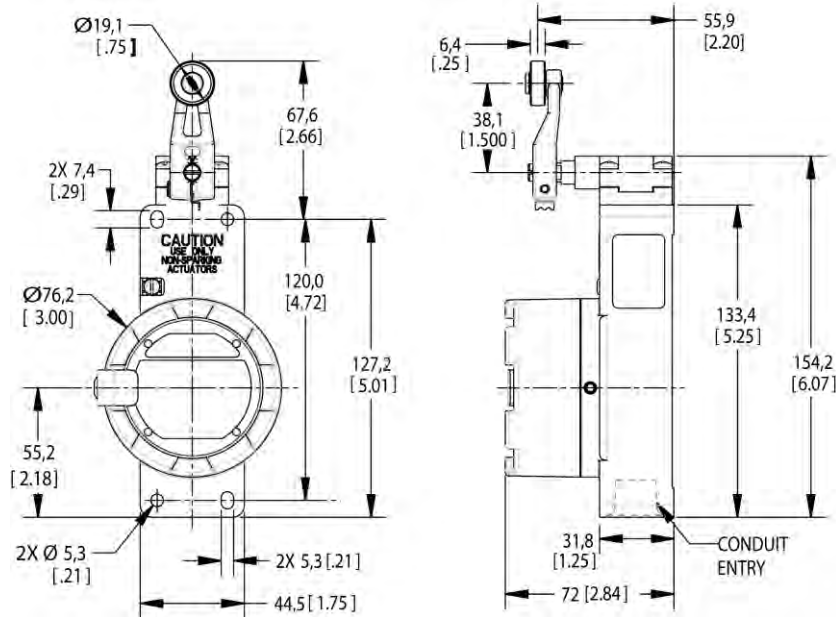


Figure 2. Pin plunger

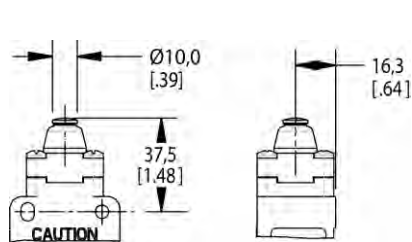


Figure 3. Top roller plunger

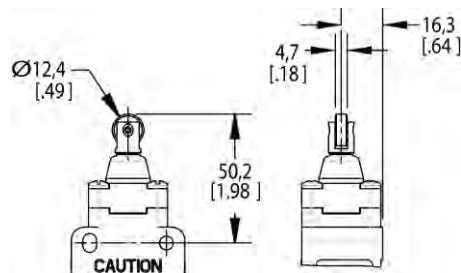
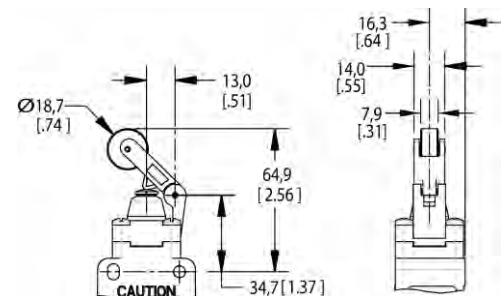


Figure 4. Top roller lever



ORDER GUIDE

Listing	Description
GSXA42A1E	0.5 in NPT housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXA42B	0.5 in NPT housing 2NC/1NO pin plunger
GSXA42C	0.5 in NPT housing 2NC/1NO top roller plunger
GSXA42D	0.5 in NPT housing 2NC/1NO top roller lever
GSXA46A1E	0.5 in NPT housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXA46B	0.5 in NPT housing 3NC/1NO pin plunger
GSXA46C	0.5 in NPT housing 3NC/1NO top roller plunger
GSXA46D	0.5 in NPT housing 3NC/1NO top roller lever
GSXC42A1E	20 mm housing 2NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXC42B	20 mm housing 2NC/1NO pin plunger
GSXC42C	20 mm housing 2NC/1NO top roller plunger
GSXC42D	20 mm housing 2NC/1NO top roller lever
GSXC46A1E	20 mm housing 3NC/1NO side rotary Ø 0.75 in x 0.25 in bronze roller
GSXC46B	20 mm housing 3NC/1NO pin plunger
GSXC46C	20 mm housing 3NC/1NO top roller plunger
GSXC46D	20 mm housing 3NC/1NO top roller lever

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The**

foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Internet: www.honeywell.com/sensing

Phone and Fax:

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+65 6445-3033 Fax

Europe +44 (0) 1698 481481

+44 (0) 1698 481676 Fax

Latin America +1-305-805-8188

+1-305-883-8257 Fax

USA/Canada +1-800-537-6945

+1-815-235-6847

+1-815-235-6545 Fax

Sensing and Control

Honeywell

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www.honeywell.com

004764-2-EN IL50 GLO Printed in USA

June 2009

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Honeywell

24CE/924CE

Miniature Safety Electromechanical Switch

FEATURES

- Positive opening operation of Normally Closed contacts conforming to IEC/EN 60947-5-1-3
- Compact construction
- Pre-wired
- Die-cast Zinc housing
- Wide selection of actuators
- Cable length variations
- Side and bottom exit cable
- Simple two-screw mounting
- IP 65/66/67
- UL recognised; CSA certified (924CE), CE compliant, BG approved (24CE)

BENEFITS

- Suitable for applications where space is at a premium
- Fast and easy to install
- Suitable for difficult operating environments
- Application flexibility
- Enhanced choice for application
- Multiple plunger capability



(924CE Series Only)



(24CE Series Only)



The ranges 24CE and 924CE have been tested and approved to meet the requirements of the Low Voltage directive and positive opening safety contacts per IEC/EN 60947-5-1-3. The devices are CE marked. The red colour clearly differentiates this safety component in the application. The 924CE range also has UL and CSA approval.

It is possible for the end user to enhance the safety level of these switches from Category 1 per EN 954-1 on their own to Categories 2, 3 or 4 per EN 954-1 when the switches are used in conjunction with our wide range of FF-SR safety control modules to form a safety system.

Typical applications for these switches would use the roller plunger 24CE18 style in conjunction with cams on doors with hinges. Also available are a range of panel mounting or top mounting versions to ensure that small space or difficult mounting can be simply achieved.

Several contact arrangements are available.

24CE/924CE

WARNING

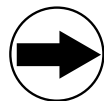
MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

24CE Series

Miniature Safety Electromechanical Switch



Technical Data

Mechanical life 10 million operations.

Degree of protection 24CE
Standard type: IP 66
With boot seal type: IP 67

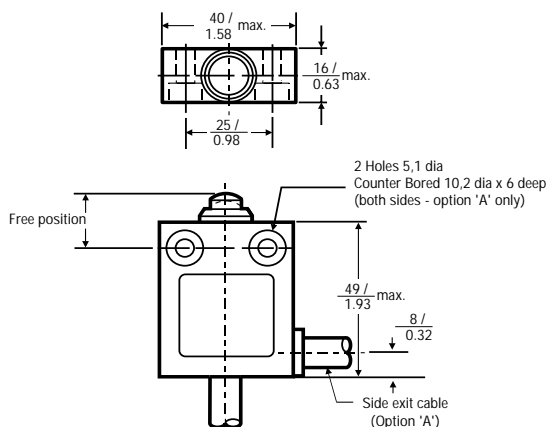
Temperature range *Operating:* 0 °C to +70 °C /
32 °F to +160 °F

Approvals* IEC 60947-5-1
EN 60947-5-1
ac15 B300
dc13 R300

Electrical According to IEC/EN 60947-5-1.
Rated insulation voltage $U_i = 500$ V.
Rated impulse withstand voltage
 $U_{imp} = 2,5$ kV.
Not suitable for isolation.
SCPD, Quick blow fuse to IEC 127
suitable for rated current.

* See Standards (page 179)

Dimensions in mm / in



Cable Type
3 or 5 x 0,75 mm² harmonised CENELEC cable.

Ordering:

24CE

Example: 24CE18-Y1A

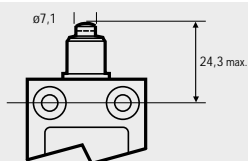
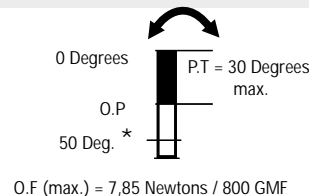
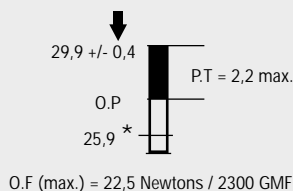
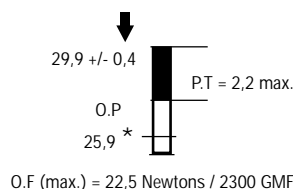
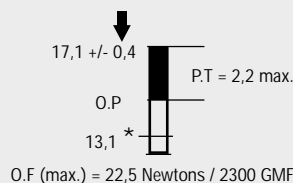
Actuator Types

Slow Action Contacts 1 Normally Closed



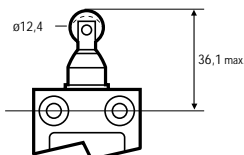
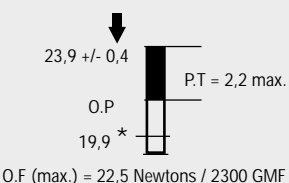
■ Circuit closed

* Positive opening to IEC/EN 60947-5-1-3



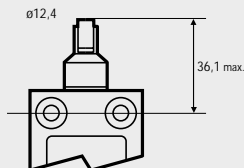
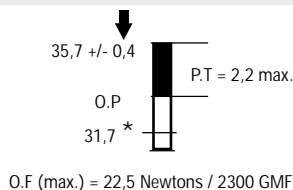
Pin Plunger (Boot Sealed)

18



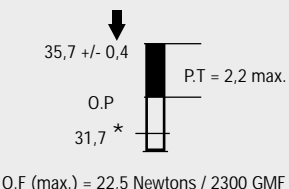
Roller Plunger Parallel (Boot Sealed)

31



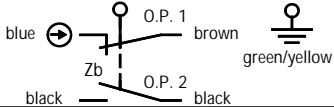
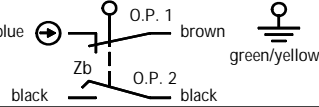
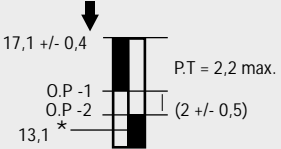
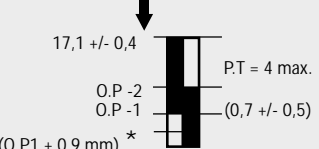
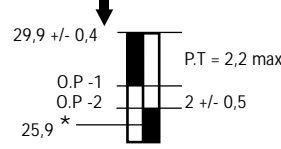
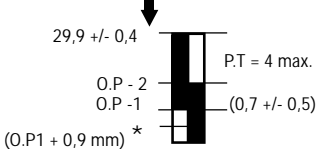
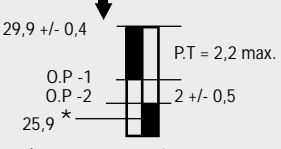
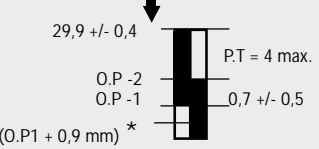
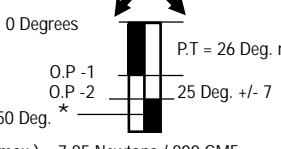
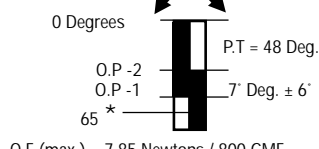
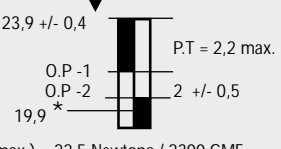
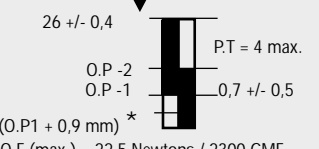
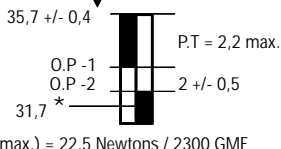
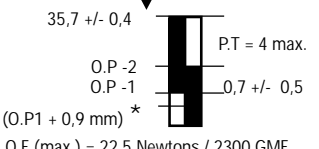
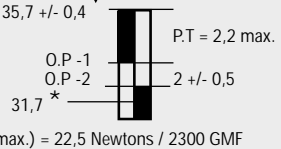
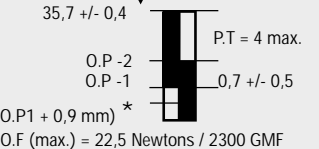
Roller Plunger Perpendicular (Boot Sealed)

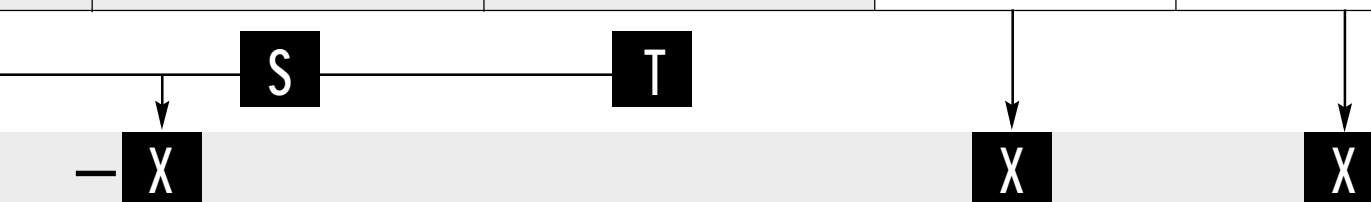
55



Y

X OR XX

Slow Action Contacts 1 Normally Closed/ 1 Normally Open Break before make 	Slow Action Contacts 1 Normally Closed/ 1 Normally Open Make before break 	Cable Length (in metres)	Option Codes Available
		Specify cable length in 1 metre increments e.g. 1 = 1 metre 2 = 2 metre etc.	A: Side Exit Cable.
			
			
			
			
			
			



24CE/924CE

924CE Series

Miniature Safety

Electromechanical

Switch



Technical Data

Mechanical life 10 million operations.

Degree of protection 924CE
Standard type: IP 66
With boot seal type: IP 67

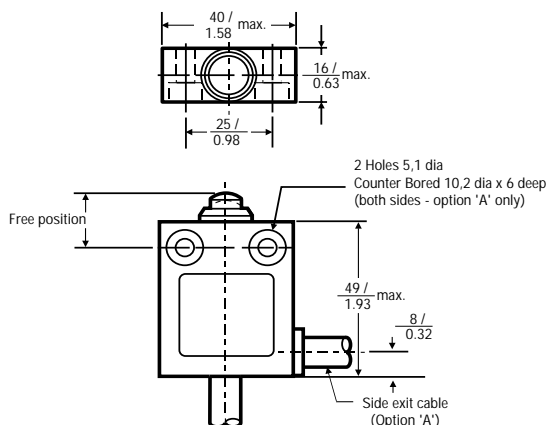
Temperature range *Operating:* 0 °C to +105 °C /
32 °F to +221 °F

Approvals* IEC 60947-5-1
EN 60947-5-1
ac15 B300
dc13 R300
UL, CSA

Electrical According to IEC/EN 60947-5-1.
Rated insulation voltage
Ui = 500 V.
Rated impulse withstand voltage
Uimp = 2,5 kV.
Not suitable for isolation.
SCPD, Quick blow fuse to IEC
127 suitable for rated current.

* See Standards (page 179)

Dimensions in mm / in



Cable Type
3 or 5 x 18 AWG SJTO CABLE

Ordering:

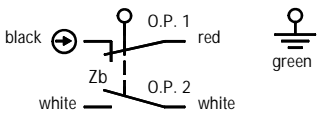
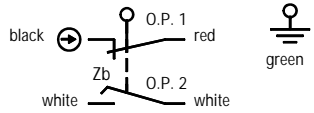
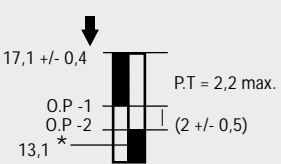
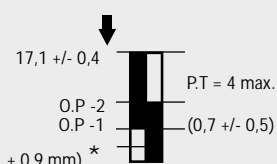
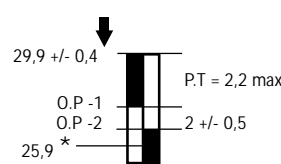
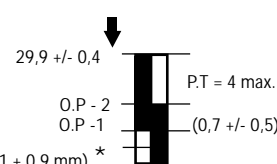
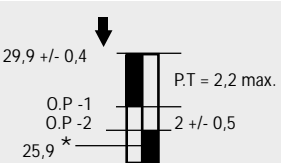
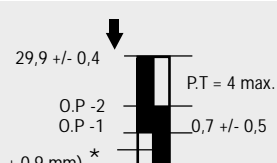
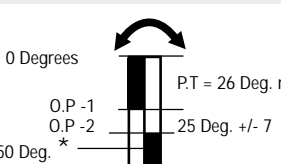
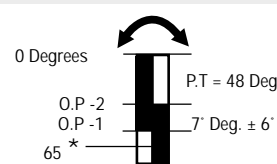
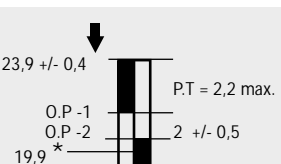
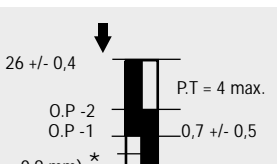
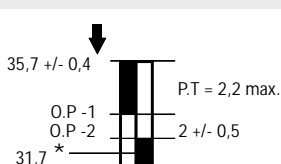
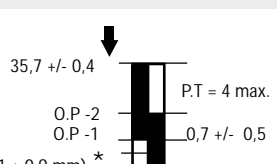
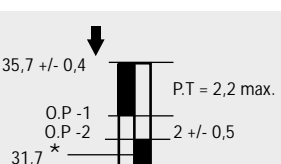
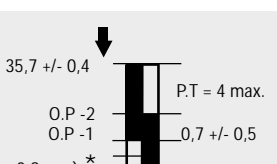
924CE

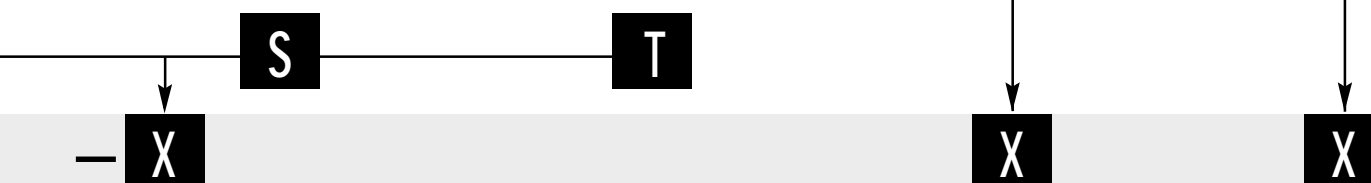
Example: 924CE18-Y3A

Actuator Types	Slow Action Contacts 1 Normally Closed	
 Pin Plunger (Boot Sealed)		18
 Roller Plunger Parallel (Boot Sealed)		31
 Roller Plunger Perpendicular (Boot Sealed)		55

Y

X OR XX

Slow Action Contacts 1 Normally Closed/ Break before make	Slow Action Contacts 1 Normally Closed/ Make before break	Cable Length (in feet)	Option Codes
		Specify cable length in 3 feet increments e.g. 3 = 3 feet 6 = 6 feet etc.	A: Side Exit Cable
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		
 O.F (max.) = 7,85 Newtons / 800 GMF	 O.F (max.) = 7,85 Newtons / 800 GMF		
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		
 O.F (max.) = 22,5 Newtons / 2300 GMF	 O.F (max.) = 22,5 Newtons / 2300 GMF		



24CE/924CE

FFS Series

Electronic Standalone Non-Contact Safety Switch



DESCRIPTION

Honeywell FFS series are designed as tamper-proof, standalone safety switches that can often be used to switch relays, contacts, or safety relays directly. By removing the separate control unit, Honeywell has made it possible to use its electronic switching technology in smaller, simpler safety systems.

The FFS is often suitable for use on its own, for lower category safety systems, providing two volt-free outputs (2NC or 1NC/1NO). It can be used in conjunction with safety relays where a higher category of performance is required. For ease of operation, the fixed switch has a green LED, giving true indication of FFS safety switch contacts.

FEATURES

- Tamper-proof electronic switching
- IP67
- 7 mm to 10 mm [0.28 in to 0.4 in] operating distance
- Guard status indication
- CE, UL approvals

POTENTIAL APPLICATIONS

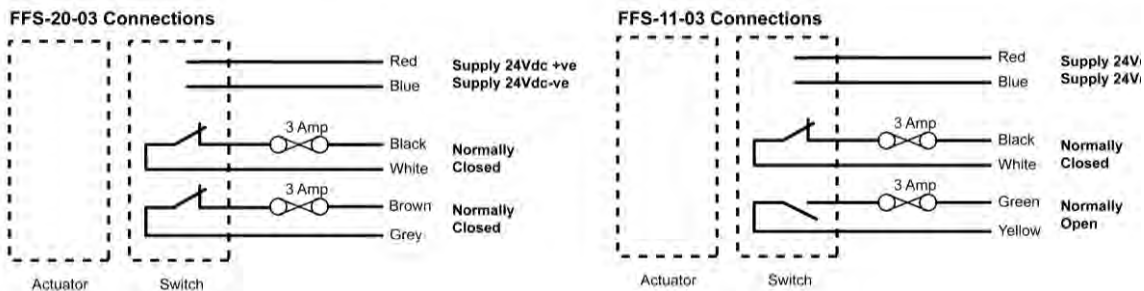
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery

FFS Series

TECHNICAL SPECIFICATIONS

Type	FFS-11-03	FFS-20-03	FFS-11-QD	FFS-20-QD
Contact arrangement	Max: 1NC safety and 1NO auxiliary	Max: 2NC safety	Max: 1NC safety and 1NO auxiliary	Max: 2NC safety
Safety contact rating	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A
Safety contact operating distance	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	15 W/10 VA		15 W/10 VA	
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 12 mm [0.47 in] ON		7 mm [0.28 in] OFF; 12 mm [0.47 in] ON	
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms		0.5 ms/0.3 ms/0.7 ms	
Internal fuse	Not applicable	Not applicable	Not applicable	Not applicable
External fuse (customer supplied)	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc
IP rating	IP67	IP67	IP67	IP67
Supply voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Vibration/shock	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g
Operating temperature	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target
Construction	Blue ABS resin filled	Blue ABS resin filled	Blue ABS resin filled	Blue ABS resin filled

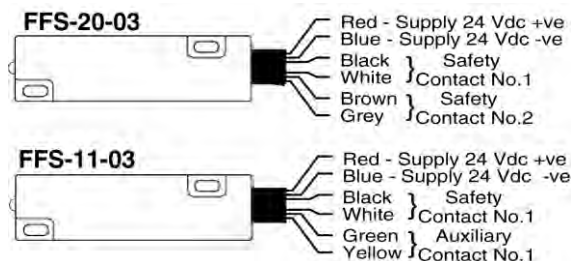
FFS CONTACTS



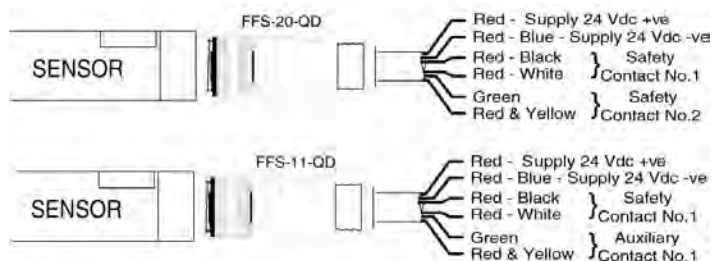
Contact configurations show under closed condition for guard device.

FFS CONNECTIONS

FFS PRE-WIRED CONNECTIONS

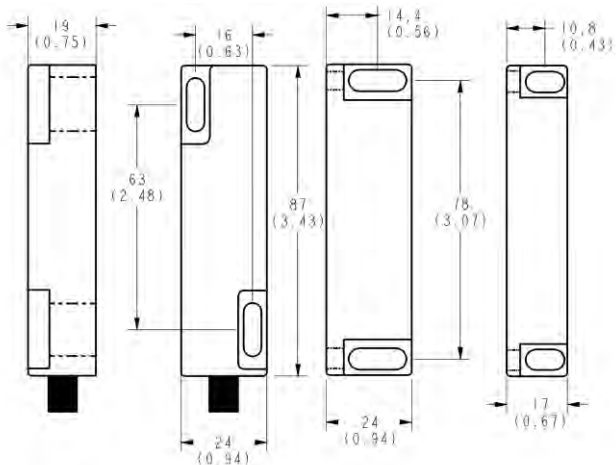
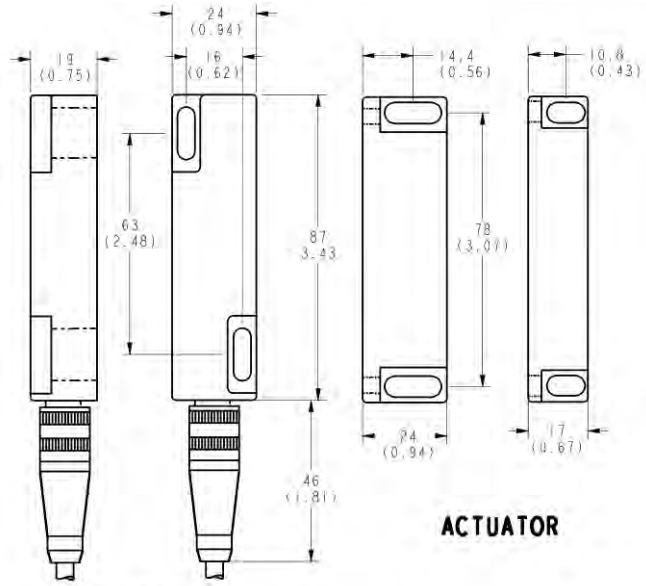


FFS QUICK CONNECT CONNECTIONS



Electronic Standalone Non-Contact Safety Switch

DIMENSIONS

FFS PRE-WIRED mm[in]	FFS QUICK CONNECT mm[in]
 <p>SWITCH ACTUATOR</p>	 <p>SWITCH ACTUATOR</p> <p>(WITH M12 BRAD HARRISON CONNECTOR)</p>

ORDER GUIDE

Catalog Listing	Description
FFS-20-03	Safety switch and actuator, 2NC, dc, 3 m pre-wired
FFS-11-03	Safety switch and actuator, 1NC/1NO, dc, 3 m pre-wired
FFS-20-QD	Safety switch and actuator, 2NC, dc, M12 Brad Harrison connector, no cable
FFS-11-QD	Safety switch and actuator, 1NC/1NO, dc, M12 Brad Harrison connector, no cable
FFS-20-QD05	Safety switch and actuator, 2NC, dc, 5 m cable, M12 Brad Harrison connector
FFS-11-QD05	Safety switch and actuator, 1NC/1NO, dc, 5 m cable, M12 Brad Harrison connector
FFS-20-10	Safety switch and actuator, 2NC, dc, 10 m pre-wired
FFS-11-10	Safety switch and actuator, 1NC/1NO, dc, 10 m pre-wired

WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

Sensing and Control
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www.honeywell.com

Honeywell

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CLS Series (Cable Pull Safety Switch)

FEATURES

- Red body colour
- Single and Dual Head
- Single Head explosion-proof version
- Conformance to IEC 60947-5-1, EN 60947-5-1 (low voltage), EN 418
- Multiple conduit entry/ exit points
- Simple set-up
- Temperature stabiliser spring
- Cable pulled - latch - manual reset
- Broken/slackened cable detection
- Up to 4NC positive opening contacts
- Status indication
- Compact design
- Complete accessories packs
- Connectorised versions available upon request

BENEFITS

- Flexible range of options
- Easy wiring options
- Cost reduced set up time
- Minimal re-adjustment due to cable expansion or contraction
- All cable modes detected (under tension, pulled or broken/slackened)
- Wiring and indication flexibility
- Tripped switch visible from a distance
- Fits simply to available mounting locations on most conveyors



(Pending)



The CLS range of cable (rope) pull switches is designed to provide the conveyor OEM and end user with a cost effective yet robust and simple to set up emergency stop device to protect an exposed conveyor.

The design was developed in the USA in association with some of the world's leading conveyor OEMs. The product and design features of the CLS are the result of the close relationship with these OEMs.

The device is simple to install:

- bring the cable up to tension (using a simple line indicator on the switch)
- actuate and reset the cable (rope) firmly several times (to seat the cable)
- re-adjust tension

...and the switch is ready for use.

Large distribution warehouses are becoming common throughout the world. Conveyors are the connecting transport network through these warehouses. When a CLS is actuated it stops the protected conveyor, ensuring operator safety. This shutdown, however, stops the protected conveyor, causing congestion and delays throughout the rest of the network. The CLS reduces these delays by offering rapid diagnosis via a powerful 6W indicator which is visible from a distance. The tripped device can be quickly located and reset so that the conveyors may be restarted and costly down time minimised.

The CLSX explosion-proof cable pull limit switch is specifically designed to provide emergency stop protection in hazardous atmospheres. It withstands the pressure of an internal explosion and cools the exploding gases below the kindling temperature of the explosive atmosphere. Flame paths are provided by the cover housing threads and an extended plunger between the switch cavity and head. The CLSX satisfies NEMA 7, 9 standards and is UL listed and CSA certified for Class I, Div. 1, Groups B, C, and D; Class II, Div. I, Groups E, F, and G. The CLSX is designed to meet the requirements of EN50014 and EN50018; certification is pending.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

CLS/CLSX/2CLS

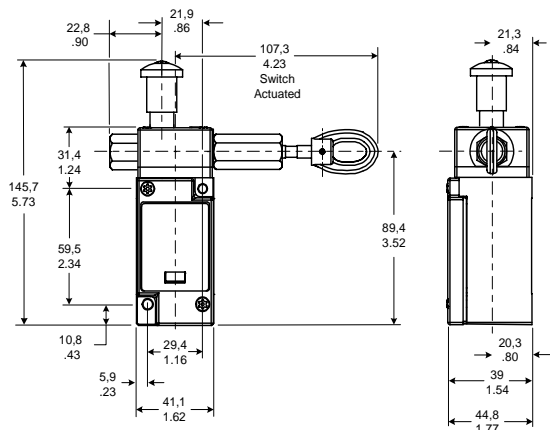
CLS - Metal Body Single Head Cable Pull Safety Switch

Technical Data

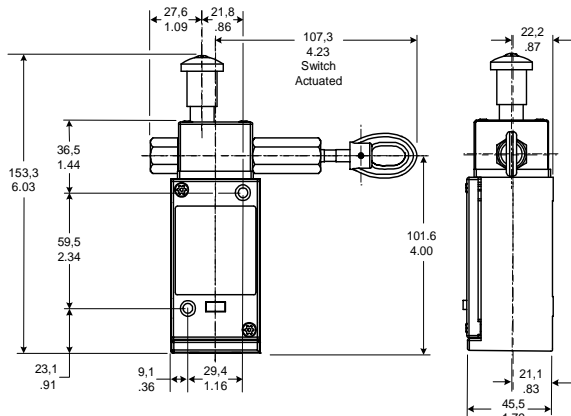
Mechanical life	25,000 operations maximum
Degree of protection	IP 67
	NEMA/UL type 1, 3, 4 and 13
Temperature range	Operating: -1 to +70°C (30 to 158°F)
Approvals and	IEC/EN 60947-5-1 and EN 418 Emergency stop device, UL listed, CSA certified, CE marked.
Operating rating	AC15 U = 600V: I = 1.2A U = 240V: I = 3A U = 120V: I = 6A DC13 U = 250V: I = 0.27A U = 24V: I = 2.8A
Directives Compliance	The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3. This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

* See Standards (page 161)

Standard Body



Switch Type 9 Body



Conduit Thread

A = PG 13.5

B = 1/2" NPT

C = 20 mm

D = PF 1/2"

Ordering:

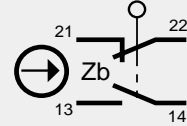
CLS

X

Example: CLSA4T-3

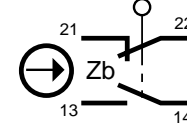
Switch Type

Slow acting, break before make (BBM),
1 Normally Closed/1 Normally Open



4

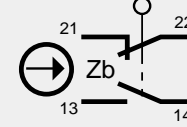
Slow acting, break before make (BBM),
1 Normally Closed/1 Normally Open



5

240V Neon Indicator

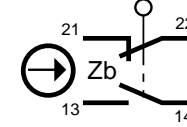
Slow acting, break before make (BBM),
1 Normally Closed/1 Normally Open



6

120V Neon Indicator

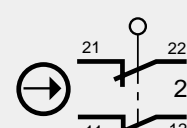
Slow acting, break before make (BBM),
1 Normally Closed/1 Normally Open



7

24V LED Indicator

Direct Acting, 2 Normally Closed



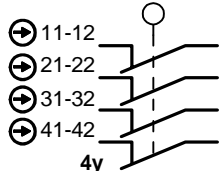
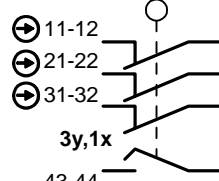
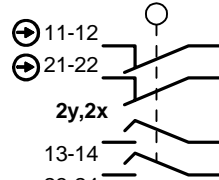
8

4 Circuit Slow Acting

(Must include modification
code A, B or E)

9

X

	Head Code	Modification Code for Contact Configuration When Using a 4 Circuit Slow Acting (Switch Type 9) Only	Modification Code for Indicator Type When Using a 4 Circuit Slow Acting (Switch Type 9) Only	Modification Code for Head Orientation
Courtesy of Steven Engineering, Inc. • 230 Ryan Way, South San Francisco, CA, 94080-6370 • Main Office: (650) 588-9200 • Outside Local Area: (800) 258-9200 • www.stevenengineering.com	T	4 Normally Closed  A	N	1 Head assembled with actuator to the left
		3 Normally Closed/ 1 Normally Open  B	M	2 Head assembled with actuator to the front
		2 Normally Closed/ 2 Normally Open  E	P	3 Head assembled with actuator facing to the back
		Note: Required for Switch Type 9. Leave the modification code blank for other switch types.	Note: Leave the modification code blank if no indicator is needed with Switch Type 9.	Note: Leave the modification code blank if not required. Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.
	Note: • Standard head orientation is with actuator to the right • Unit may be field modified to adjust head orientation	T	X	X

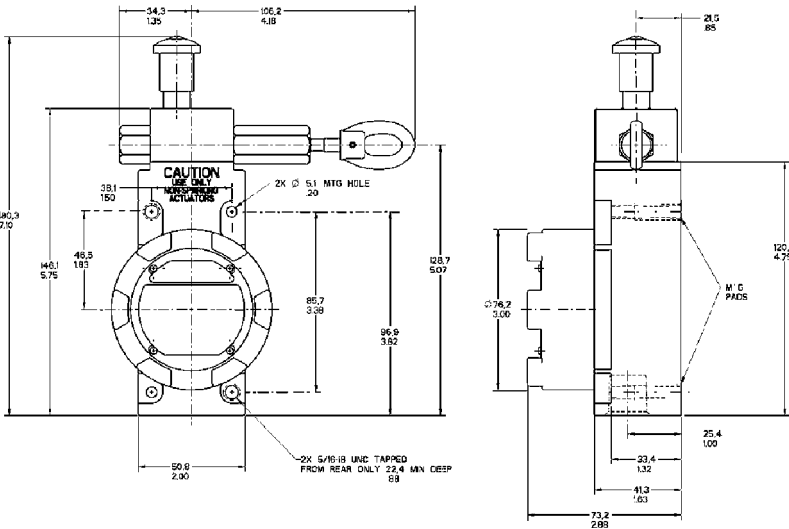
CLS/CLSX/2CLS

CLSX - Metal Body Explosion-proof
Cable Pull Safety Switch

Technical Data

Mechanical life	25,000 operations maximum		
Degree of protection	NEMA/UL 1, 3, 4, 7, 9 and 13		
Temperature range	Operating: -1 to +70°C (30 to 158°F)		
Approvals and	IEC/EN 60947-5-1 and EN 418 Emergency stop device, UL listed, CSA certified: Class I, Div. 1, Groups B, C, D Class II, Div. 1, Groups E, F, G		
Operating rating	AC15	U = 600V:	I = 1.2A
		U = 240V:	I = 3A
		U = 120V:	I = 6A
		U = 250V:	I = 0.27A
	DC13	U = 24V:	I = 2.8A
Directives Compliance	The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3. This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.		

* See Standards (page 161)



- Conduit Thread
- A = PG 13.5
 - B = 1/2" NPT
 - C = 20 mm
 - D = PF 1/2"

Ordering:

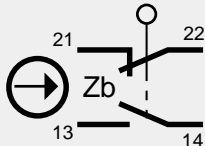
CLSX

Example: CLSXB9T-B

X

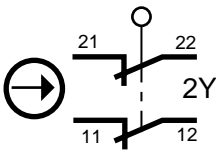
Switch Type

Slow acting, break before make (BBM),
1 Normally Closed/1 Normally Open



4

Direct Acting, 2 Normally Closed



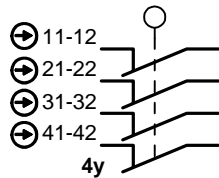
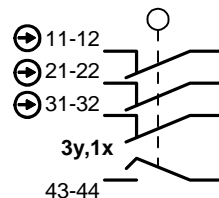
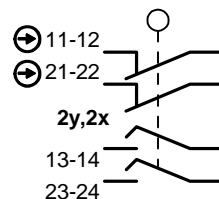
8

4 Circuit Slow Acting

(Must include modification code
A, B or E)

9

X

	Head Code	Modification Code for Contact Configuration When Using a 4 Circuit Slow Acting (Switch Type 9) Only	Modification Code for Head Orientation
	T	4 Normally Closed 	Head assembled with actuator to the left 1
		3 Normally Closed/ 1 Normally Open 	Head assembled with actuator to the front 2
		2 Normally Closed/ 2 Normally Open 	Head assembled with actuator facing to the back 3
		Note: Required for Switch Type 9. Leave the modification code blank for other switch types.	Note: Leave the modification code blank if not required. Standard head orientation is with actuator to the right. Unit may be field modified to adjust head orientation.
Note: • Standard head orientation is with actuator to the right • Unit may be field modified to adjust head orientation		X	X

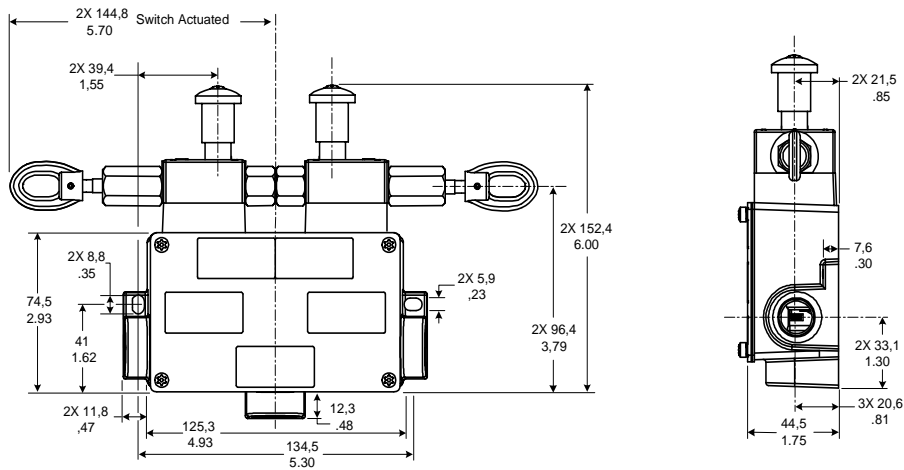
CLS/CLSX/2CLS

2CLS - Metal Body Dual Head
Cable Pull Safety Switch

Technical Data

Mechanical life	25,000 operations maximum
Degree of protection	IP 67 NEMA/UL type 1, 3, 4 and 13
Temperature range	Operating: -1 to +70 °C (30 to 158 °F)
Approvals and	IEC/EN 60947-5-1 and EN 418 Emergency stop device, UL listed, CSA certified CE marked.
Operating rating	AC15 U = 600V: I = 1.2A U = 240V: I = 3A U = 120V: I = 6A DC13 U = 250V: I = 0.27A U = 24V: I = 2.8A
Directives Compliance	The forced disconnect mechanism on normally closed contacts conforms to IEC 60947-5-1-3. This product complies with the Machinery Directive 98/37/EC and complies with EN 60947-5-1.

* See Standards (page 161)



- Conduit Thread
- A = PG 13.5
 - B = 1/2" NPT
 - C = 20 mm
 - D = PF 1/2"

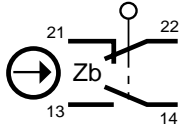
Ordering:

2CLS	X	X
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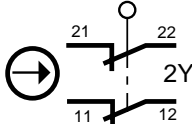
Example: 2CLSA1T1

Primary Switch Type
Located on left hand side
of switch body

Slow Acting,
1 Normally Closed/
1 Normally Open



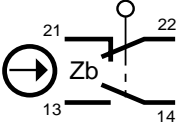
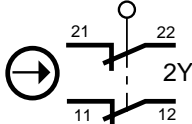
Slow Acting,
2 Normally Closed



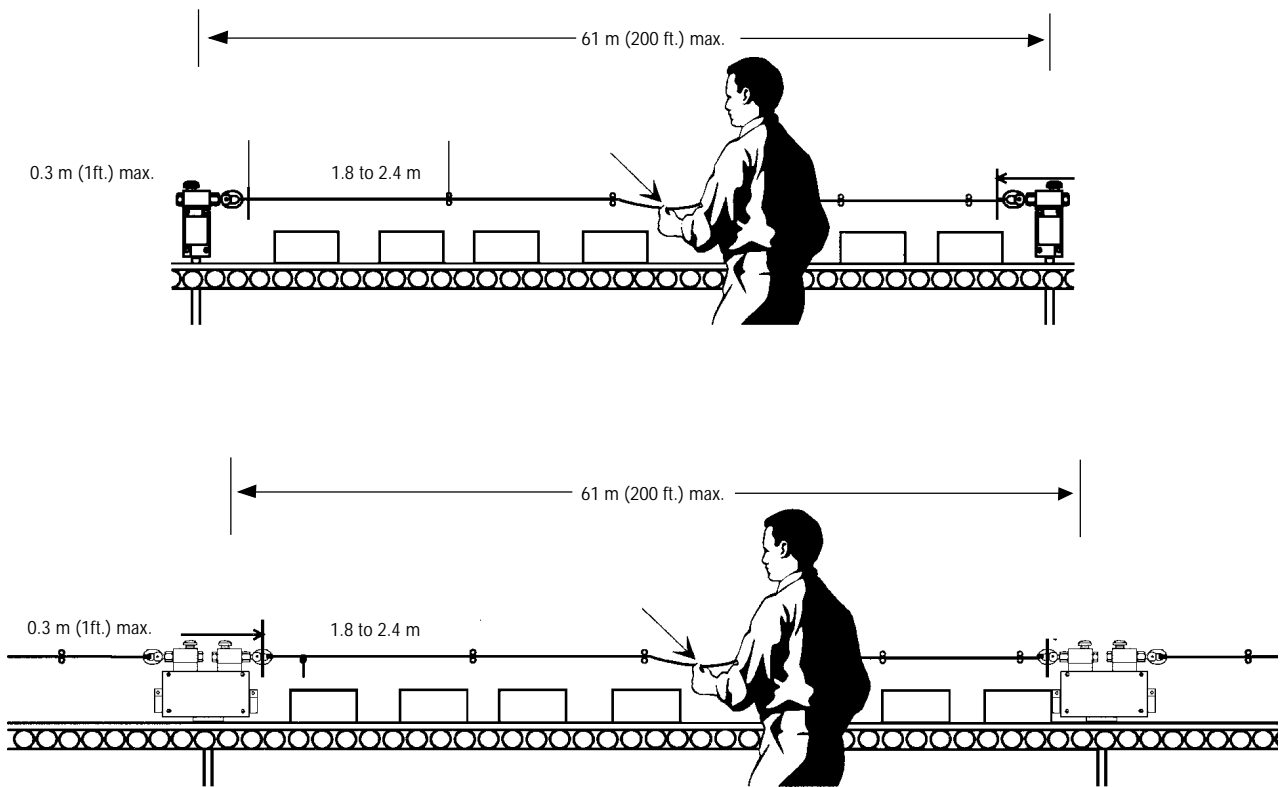
1

2

X

Head Code	Auxiliary Switch Type Located on right hand side of switch body	Indicator Code
T	Slow Acting 1 Normally Closed/1 Normally Open 	120V – 6W incandescent Red Pilot Light A
	Slow Acting 2 Normally Closed 	120V Neon Indicator B
	No switch 9	240V Neon Indicator C
		24V LED Indicator D
Note: Leave the Indicator Code blank if indicator is not required.		
T	X	X

CLS/CLSx/2CLS



Installation hardware

- Aircraft cable precut to 7.5 m (25 ft.), 15 m (50 ft.), 30 m (100 ft.), 45 m (150 ft.), 60 m (200 ft.).
- End springs for long cable spans to compensate for temperature variations
- Installation hardware kit CLSZ00 supports cable installations of up to 15 m (50 ft.)



Installation hardware order guide

Catalog Listing	Description
CLSZC1	7.5 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)
CLSZC2	15 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)
CLSZC3	30 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)
CLSZC4	45 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)
CLSZC5	60 m Red Aircraft Cable, finished cable dia. 4.75 mm (0.187 in)
CLSZ1S	End Spring
CLSZ00	Installation Kit, includes: 4 - thimbles, 8 - wire rope clamps, 1 - turnbuckle (w/lock nuts), 9 - eyebolts (w/hardware), 1 - endspring, 1 conduit fitting

- Notes:
1. CLS/CLSX includes 1 turnbuckle and 1 endspring.
2CLS includes 2 turnbuckles and 2 endsprings.

CPS Series

Cable Pull Safety Switch



FEATURES

- Direct opening action \rightarrow of NC (normally closed) contacts
- 2CPS: 2NO/2NC, 1NO/3NC or 4NC contact configurations
1CPS: 1NO/1NC, 2NO/2NC, 1NO/3NC or 4NC contact configurations
- Typical cable span of 76 m (250 ft) in an environment with a temperature change of $\pm 17^{\circ}\text{C}$ ($\pm 30^{\circ}\text{F}$). Longer spans are possible depending upon temperature change and installation (ref. note on page 6 for more details or Application note - Effect of Temperature on Cable Pull Switch Operation)
- Choice of three actuator configurations (2CPS)
- Removable contact block version available (2CPS)
- Large wiring cavity with straight-through wiring
- 24 Vdc or 120 Vac bright, multicluster LED status indicator light available on 2CPS. Single high intensity LED on 1CPS
- Gold-plated contacts are standard on 2CPS, available on 1CPS
- Die-cast zinc housing
- Optional hardware packs available

TYPICAL APPLICATIONS

- Long conveyor systems found in warehouses and distribution centers
- Conveyor systems having a high amount of vibration
- Conveyor systems that experience wide temperature swings
- Long conveyor systems where easy through wiring, or highly visible trip status is required
- Hose down conditions
- Packaging equipment
- Assembly lines



(Applied for)



CPS Series Cable Pull Safety Switches provide a readily accessible emergency stop signal. This is a cost-effective means compared to using multiple emergency stop push-buttons. (Cable Pull Safety Switches are not, however, to be used as a means of personnel safeguarding. They may be used to prevent further injury or damage to equipment when used for emergency stop signaling.)

The CPS Series Cable Pull Safety switch is designed to provide emergency stop protection for exposed conveyor and assembly lines. The internal mechanism latches on both slackened cable (push) and pulled cable. This capability also enhances productivity by eliminating nuisance stops due to variations in temperature, stretch of cable over time, and other application variables.

The 1CPS is intended for use in applications where the cable span is 76 m (250 ft) or shorter. It is an economical solution for shorter runs or zone protection typical to automated systems. The 2CPS series is intended for use in very long cable runs of 152 m (500 ft) or shorter, such as long conveyor lines found in warehouses.

A line in the midpoint of the cable tension window indicates proper cable tension, providing easy set-up. The direct opening switch contacts are held closed when the actuating cable is under proper tension and the reset knob is set to RUN. When the actuating cable is pulled, slackened or broken, a cam positively opens the NC (Normally Closed) switch contacts. The snap action, trip operation causes the switch contacts to change state and mechanically latch almost simultaneously when the cable is pulled, slackened or broken. The NC switch contacts remain open until the CPS is reset by properly tensioning the cable and manually rotating the reset knob.

When the direct opening switch contacts open, the auxiliary contacts also actuate (open contacts close and closed contacts open). The auxiliary contacts are electrically isolated from the direct opening switch contacts. These NO (Normally Open) contacts may be used for monitoring or signaling.

The CPS complies with: Low Voltage Directive 73/23/EEC, as amended by directive 93/68/EEC; Machinery Directive 98/37/EEC only as the directives relate to the components being used in a safety function; IEC/EN 60947-1; IEC/EN 60947-5-1; IEC/EN 60947-5-5.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

1CPS

Cable Pull Safety Switch

Technical Data

Mechanical life 1 000 000 operations

Degree of protection IP 67
NEMA 1, 4, 12, 13

Temperature range *Operating:*
-25 °C to +80 °C /
-13 °F to +176 °F
without condensation

Approvals IEC/EN 60947-1
IEC/EN 60947-5-1
IEC/EN 60947-5-5
AC15 A300
DC13 Q300
UL & CSA
BG Applied for

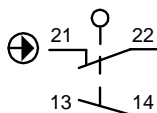
Vibration 10 Hz - 500 Hz, 5 g

Shock 15 g

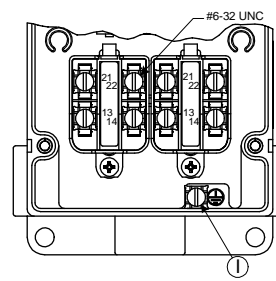
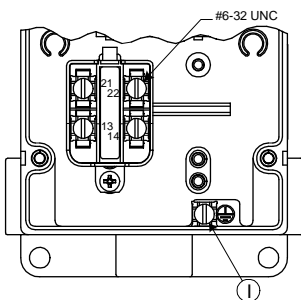
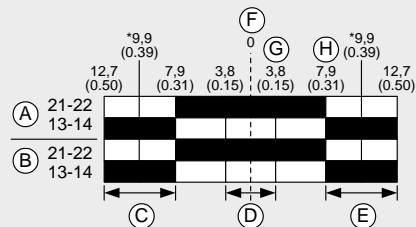
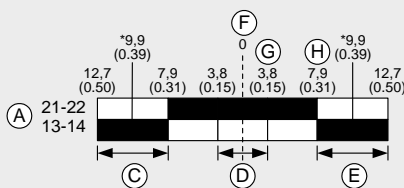
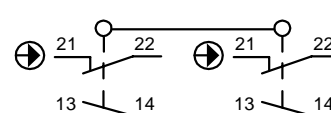
Contact material Silver standard
Gold plated optional

Included accessories None

1 NORMALLY CLOSED/
1 NORMALLY OPEN



2 NORMALLY CLOSED/
2 NORMALLY OPEN



- A Left switch
- B Right switch
- C Slackened cable
- D Proper cable tension
- E Pulled cable
- F Cable tension = 111 N (25 lb)
- G Cable tension = 133 N (30 lb)
- H Cable tension = 178 N (40 lb)
- I Ground screw
- Contact closed
- Contact open

Conduit
Thread

A = 1/2" NPT

C = 20 mm

Ordering:

1CPS

X

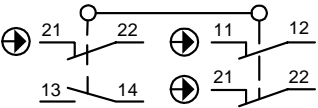
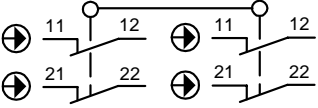
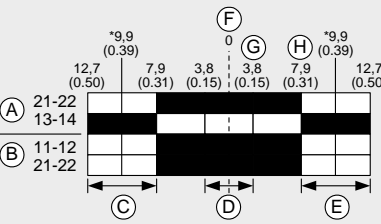
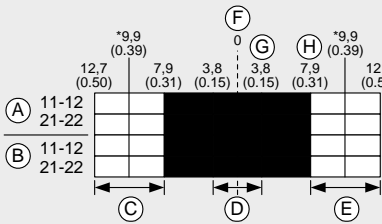
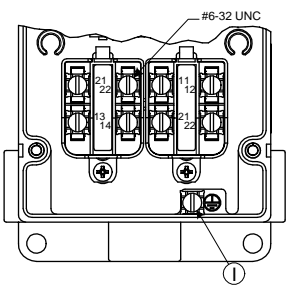
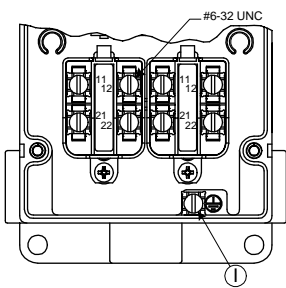
Example: 1CPSA1A

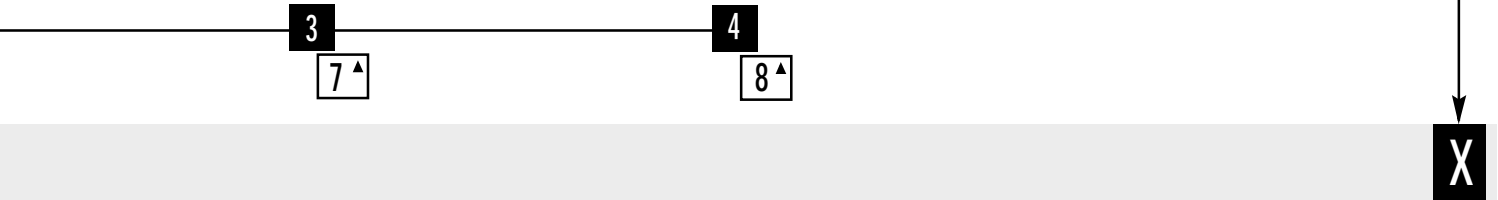
▲ Gold-plated contacts

1 5▲

2 6▲

X

	<p>3 NORMALLY CLOSED/ 1 NORMALLY OPEN</p> 	<p>4 NORMALLY CLOSED</p> 	<p>Indicator-Pilot Light Code</p>
			<p>A : 24 V LED</p>
			<p>B : 120 V LED</p>



2CPS

Cable Pull Safety Switch

Technical Data

Mechanical life 1 000 000 operations

Degree of protection IP 67
NEMA 1, 4, 12, 13

Temperature range *Operating:*
-40 °C to +80 °C /
-40 °F to +176 °F
without condensation

Approvals IEC/EN 60947-1
IEC/EN 60947-5-1
IEC/EN 60947-5-5
AC15 A300
DC13 Q300
UL & CSA
BG

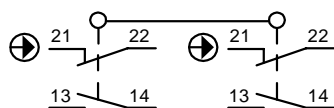
Vibration 10 Hz - 500 Hz, 5 g

Shock 15 g

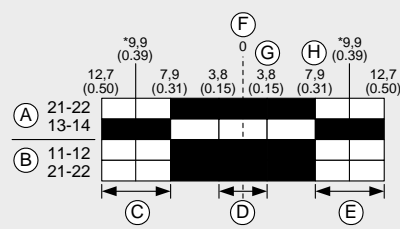
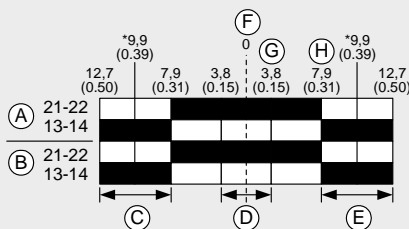
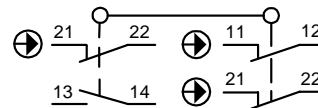
Contact material Gold plate
over silver

Included accessories Turnbuckle(s)

2 NORMALLY CLOSED/
2 NORMALLY OPEN

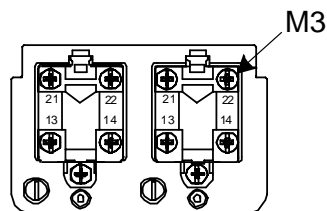
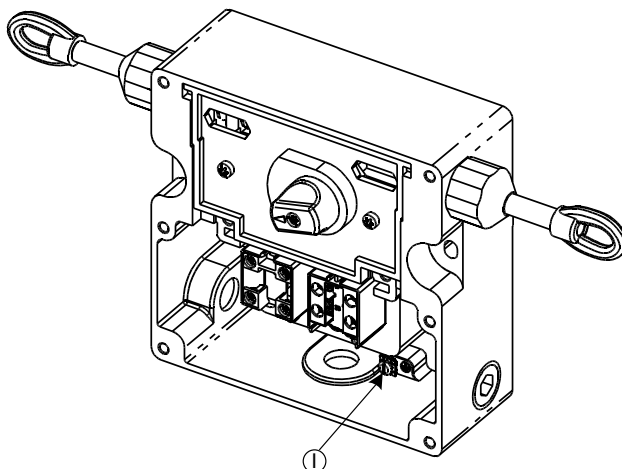


3 NORMALLY CLOSED/
1 NORMALLY OPEN



- A Left switch
 - B Right switch
 - C Slackened cable
 - D Proper cable tension
 - E Pulled cable
 - F Cable tension = 111 N (25 lb)
 - G Cable tension = 133 N (30 lb)
 - H Cable tension = 178 N (40 lb)
 - I Ground screw
- Contact closed
 Contact open

Contact blocks mounted to housing



Conduit Thread
1/2" NPT = **A**
20 mm = **C**

Contact block mounting
1 = to housing
2 = removable with heavy duty terminals

Ordering:

2CPS

X

X

A

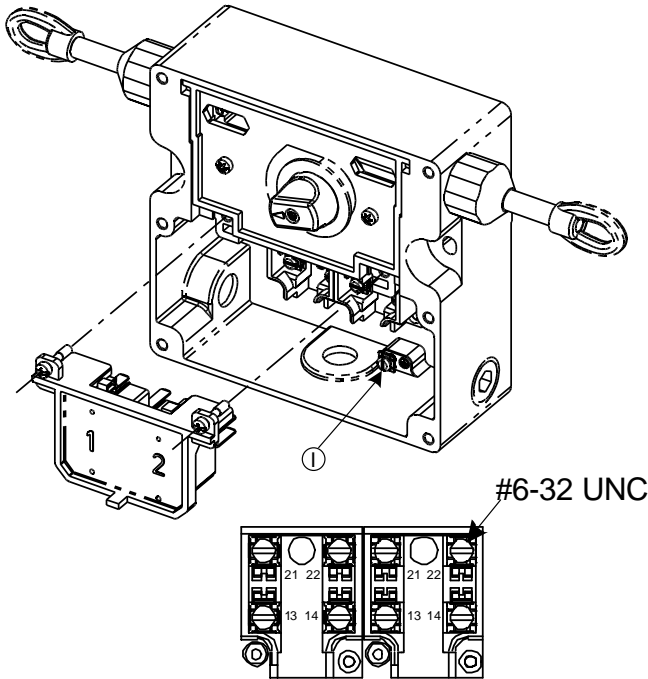
B

X

Example: 2CPSA1A2B

	4 NORMALLY CLOSED	Actuation Code	Indicator Light Code
		<div>1: Maintained both sides</div> <div>2: Maintained left side, no actuation right side</div> <div>3: Maintained right side, no actuation left side</div>	<div>No letter: no indicator provided</div> <div>A: 24 Vdc red multi-cluster LED</div> <div>B: 120 Vac red multi-cluster LED</div>

Removable contact blocks with heavy duty wiring receptacles



D

X

X

CPS

Temperature-Span Distance Application Information

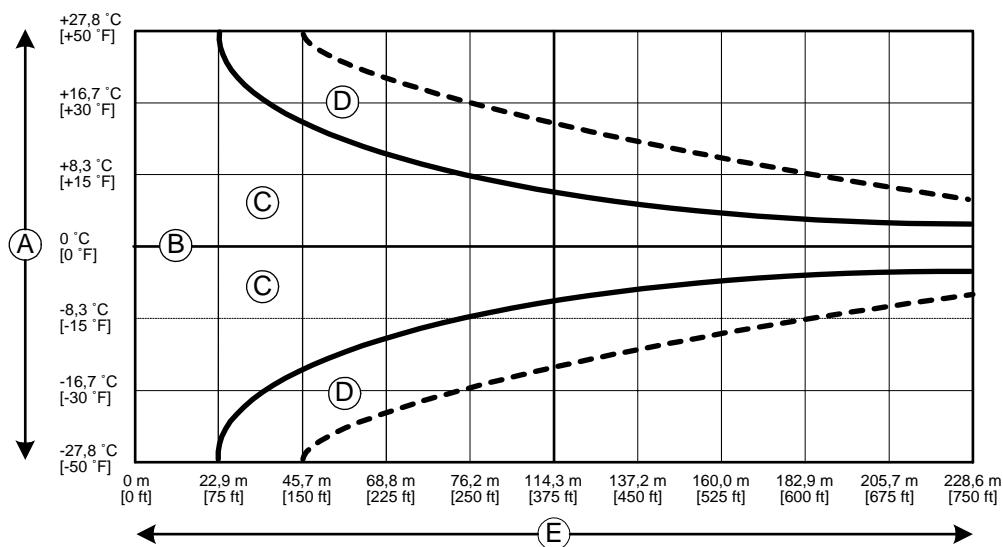
Cable Pull Switches featuring broken cable detection require pre-tensioning in order to enable the RUN condition.

The relative expansion or contraction of the steel actuating cable when the ambient temperature increases or decreases must be taken into account when pre-tensioning a cable pull switch.

The change in cable length with change in temperature can cause significant nuisance shut downs on longer runs.

Install the system when the temperature is at the mid point of the extremes. If a warehouse has a low temperature of 15,6 °C (60 °F) and a high of 32,2 °C (90 °F), set up the system at the midpoint 23,9 °C (75 °F).

Use an endspring or another CPS at the opposite end of the cable span to double the temperature tolerance and to meet the requirements of EN 418.



A = Total temperature variation

B = Setup point - Ideally at middle of temperature extremes

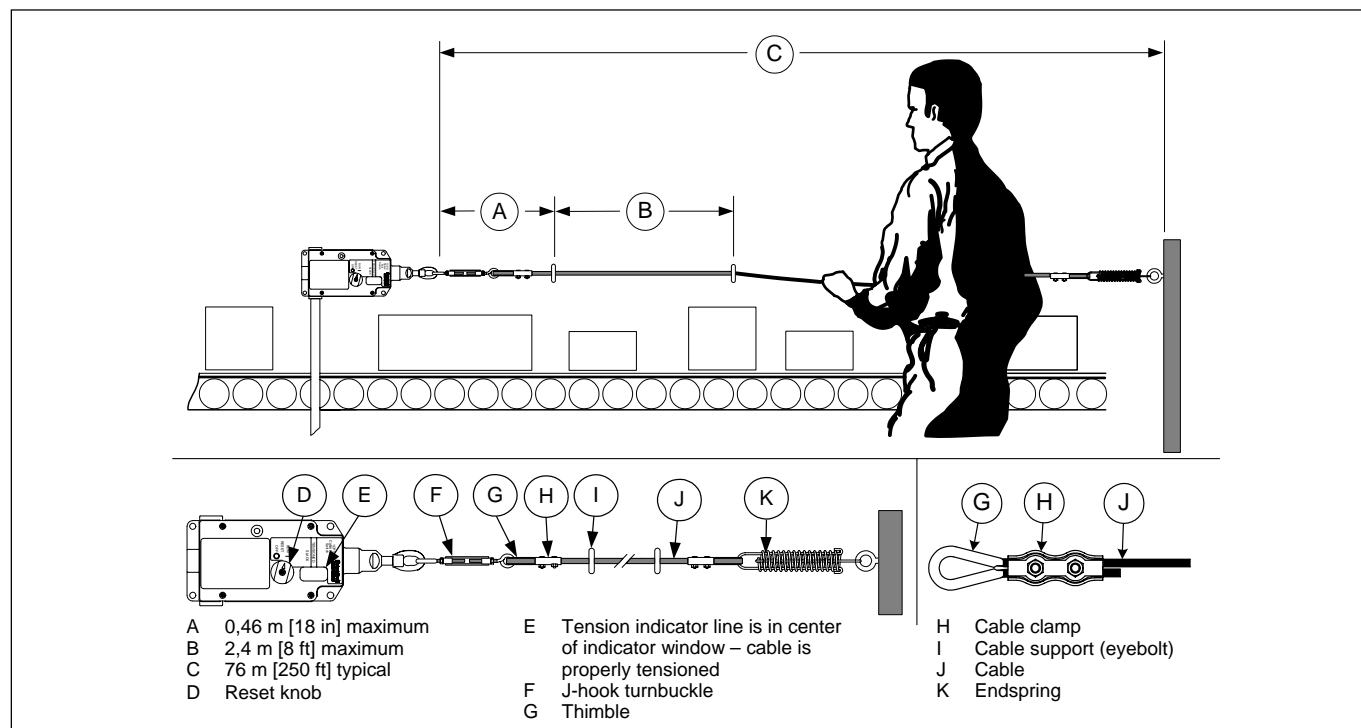
C = Cable Pull Switch usable temperature span without endspring or second CPS

D = Cable Pull Switch usable temperature span with endspring or second CPS

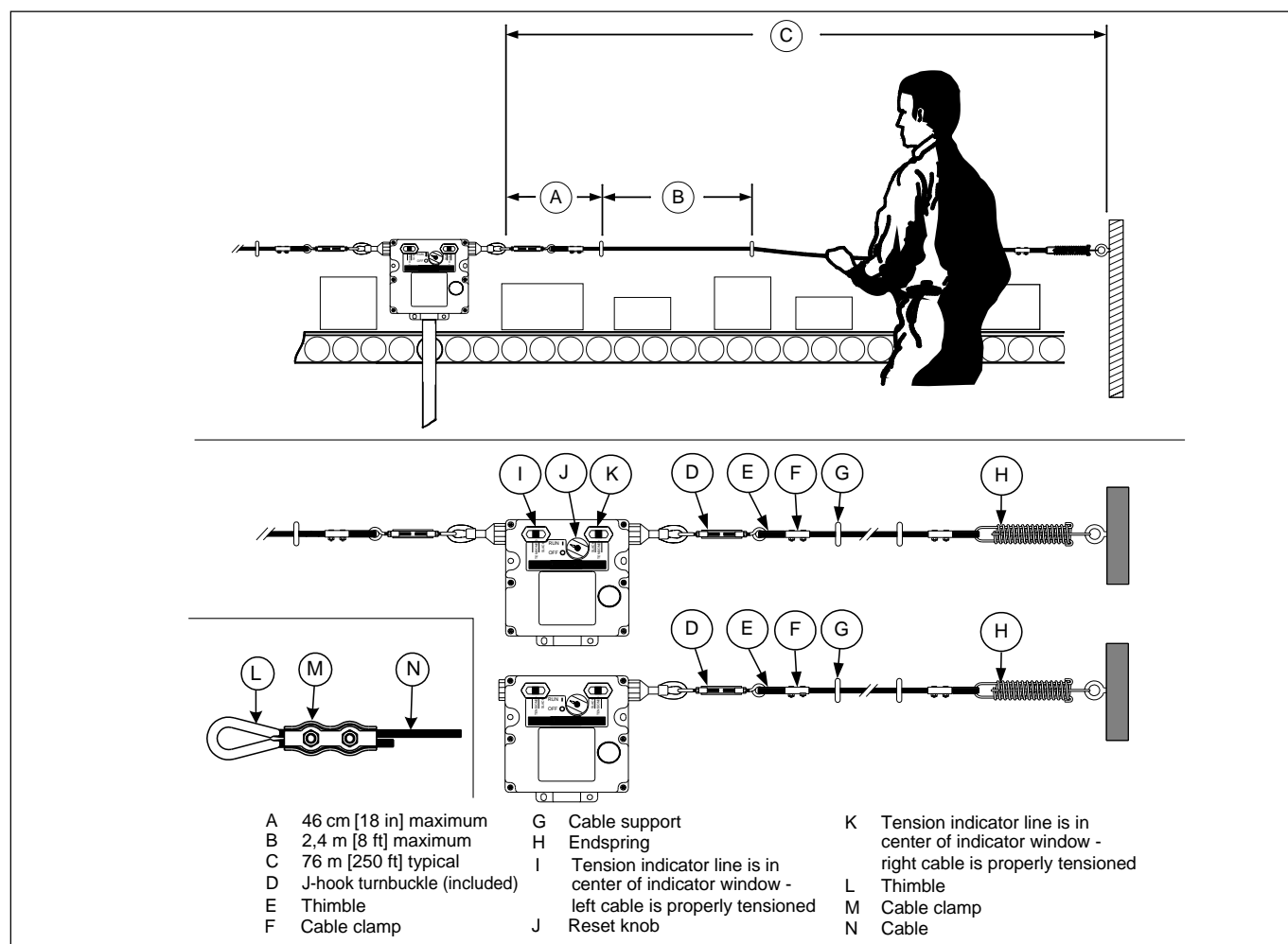
E = Cable span distance

Application information

1CPS



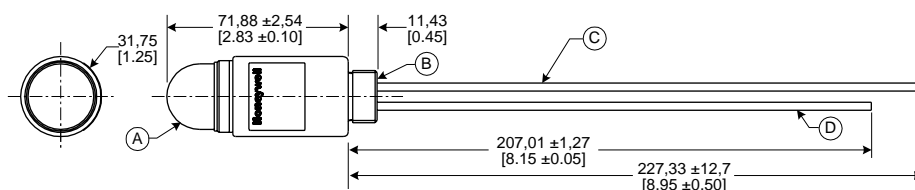
2CPS



Hardware packets (available separately)

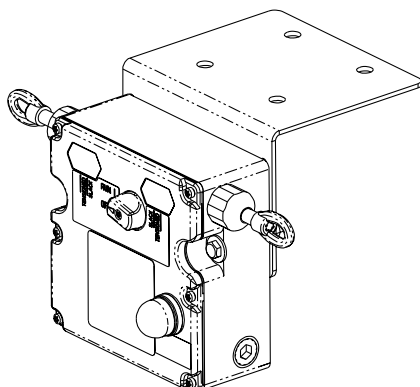
Listing	Accessory
CLSZC1	Cable - 7,6 m (25 ft) length
CLSZC2	Cable - 15,2 m (50 ft) length
CLSZC3	Cable - 30,5 m (100 ft) length
CLSZC4	Cable - 45,7 m (150 ft) length
CLSZC5	Cable - 61 m (200 ft) length
CLSZC7	Cable - 76,2 m (250 ft) length
CLSZTC	(2) Thimbles (2) Low-profile Duplex Cable Clamps
CPSZ1S	(1) Draw-bar Endspring
CPSZK1	(1) J-hook Turnbuckle with Lock Nuts (2) Thimbles (2) Low-profile Duplex Cable Clamps (16) Sets of Cable Supports ((16) 1/4-20 Eye Bolts, (32) 1/4-20 Nuts, (32) Flat Washers, (16) Lock Washers)
CPSLED24	Multicenter LED Accessory - 24 Vdc (conduit mount)
CPSLED120	Multicenter LED Accessory - 120 Vdc (conduit mount)
CPS-BRACKET	Mounting bracket (to be used with 1CPS or 2CPS)
CPSZTB	J-hook turnbuckle with lock nuts (included with 2CPS)

CPSLED



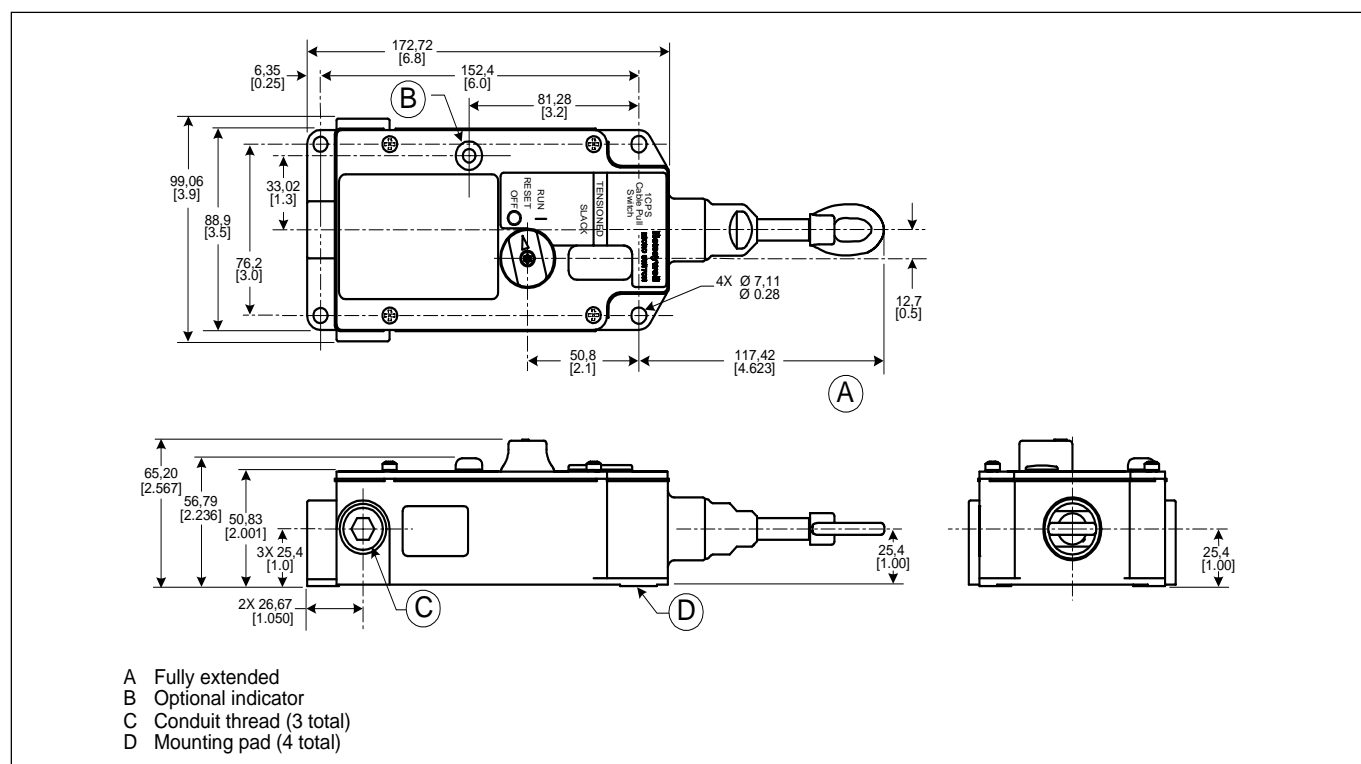
- A Multi-LED red pilot light
- B 1/2-14 NPom Thread
- C 18 AWG red PVC insulation
- D 18 AWG black PVC insulation

CPS-BRACKET

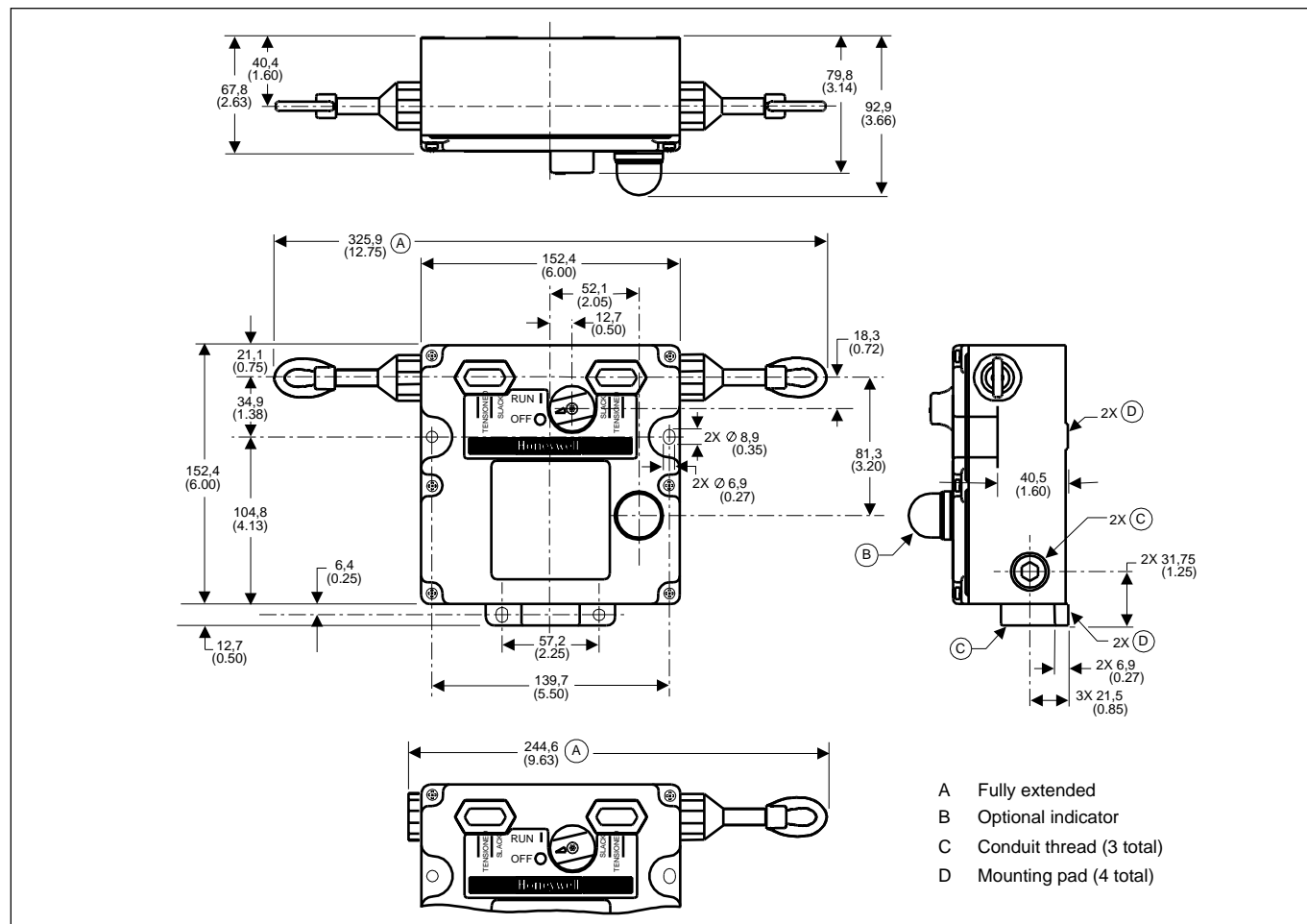


Mounting dimensions (mm/in)

1CPS



2CPS



Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.

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USA

RDI Series

Residential Door Interlock Switch



DESCRIPTION

The RDI Series electromechanical door interlock is designed specifically for swing door applications, which may include residential elevators, dumbwaiters, and platform lifts. The door interlock holds the door in place and prevents it from being opened when not desired (e.g. the elevator/lift car is not present at the door). A number of design features contribute to increase safety, reduce nuisance stoppages and call-backs, and contribute to simplified wiring and installation.

Featuring a custom internal solenoid control, the RDI may reduce complexity of the host controller, reduce power consumption for a “greener” product, extend solenoid life and reduce solenoid “time outs,” reducing customer aggravation. Two Honeywell MICRO SWITCH™ switches are used to indicate door closure, providing an extra level of reliability.

Reliability and smooth operations are also enhanced by use of a metal key, which is less susceptible to bending and breakage. The lack of open or exposed contacts minimizes the possibility of owners making manual adjustments. Finally, the engagement of the key initiates electrical contact.

The snap-action cam mechanism requires less adjustment set-up time and reduces door movement that can cause nuisance shutdown. A Cat 5 connection option is available, simplifying installation. This door interlock is configurable and available in left- and right-hand versions, allowing for simplified customization. It is designed to be easy for the OEM to retrofit into their current design.

FEATURES

- Compliant to ASME A17.1 and UL 104
- Manual override for easy actuation without user hazard
- Two separate mechanical actions to indicate door closure
- Metal key
- Internal solenoid control
- No open or exposed contacts
- Key engagement minimizes nuisance stoppage
- Door closure retention cam to hold door with minimal key-to-interlock play
- Cat 5 connection available
- Configurable product platform
- Universal voltage for ac and dc applications
- 51,44 mm W x 247,65 mm H x 49,23 mm D
[2.025 in W x 9.75 in H x 1.938 in D]

POTENTIAL APPLICATIONS

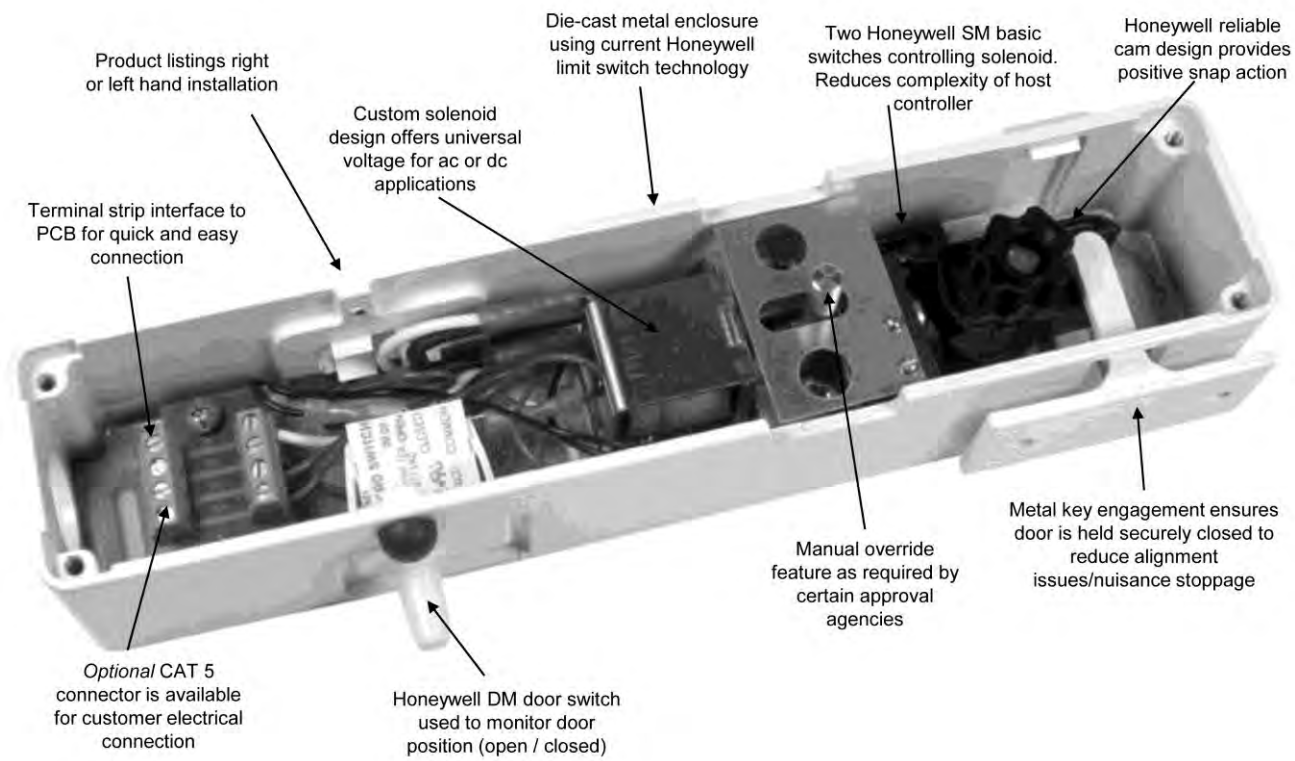
- Residential elevators
- Residential dumbwaiters
- Platform/vertical lifts

BENEFITS

- Meets required safety codes
- Reduces potential for call-backs
- Reliable performance and multiple design features to minimize nuisance stoppage of applications
- Simplified wiring and installation
- Reduced OEM design and manufacturing costs
- Stronger OEM sales message: increased safety, reduced owner aggravation, reduced power consumption
- Honeywell brand quality

RDI Series

DESIGN FEATURES

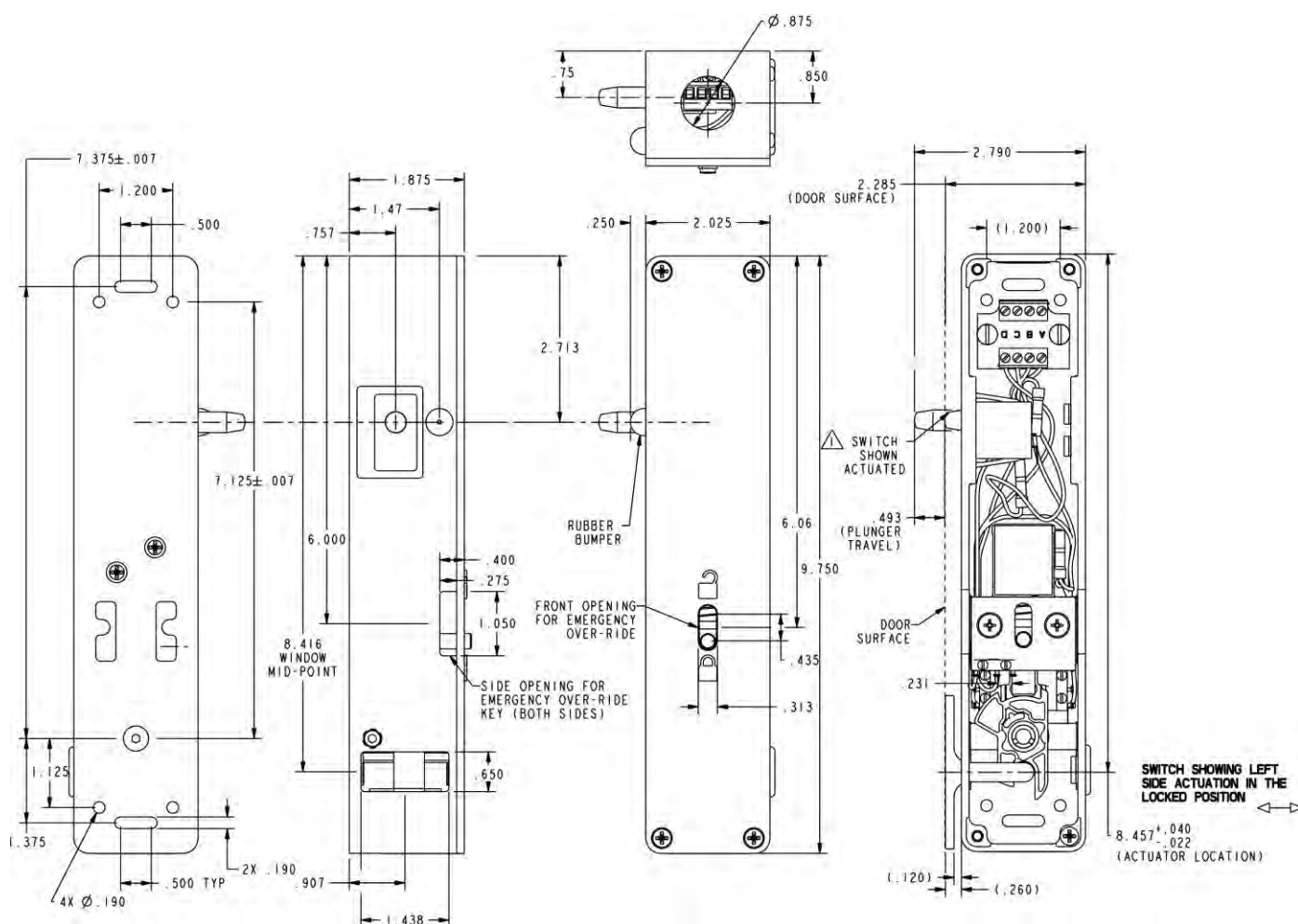


PRODUCT LISTING

Catalog Listings	Description
RDI-G-R	Right-hand door interlock
RDI-G-L	Left-hand door interlock

Door Interlock Switches

DIMENSIONS



WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is property rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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June 2009

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Relialign™ RDI2 Series

Residential Door Interlock Switch



DESCRIPTION

The Relialign™ Series electromechanical door interlock is designed specifically for swing door applications that include residential elevators, dumbwaiters, and platform lifts. The door interlock holds the door in place and prevents it from being opened when not desired (e.g. the elevator/lift car is not present at the door). A number of design features contribute to its enhanced safety, reduction of nuisance stoppages and call-backs, as well as simplified wiring and installation.

The Relialign™ RDI2 Series interlock features a rugged plastic molded housing. Featuring a custom internal solenoid control, Relialign™ interlock can reduce complexity of the host controller, trim down power consumption for a “greener” product, extend solenoid life and reduce solenoid “time outs,” lessening customer aggravation.

FEATURES

- Compliant to ASME A17.1, UL standard 104, and CSA-B44.1
- Manual override for easy actuation without user hazard
- Two separate mechanical actions to indicate door closure
- Rugged plastic molded housing
- Metal key
- Internal solenoid control
- No open or exposed contacts
- Key engagement minimizes nuisance stoppage
- Door closure retention cam to hold door with minimal key-to-interlock play
- Series or parallel wiring option for the door closed and door locked switches
- 6 pin terminal strip or Cat 5 connection options
- Configurable product platform
- Universal voltage for ac and dc applications
- 51,44 mm W x 273,05 mm H x 49,23 mm D
[2.025 in W x 10.75 in H x 1.938 in D]

A Honeywell MICRO SWITCH™ switch is used to indicate door closure, providing an extra level of reliability.

Reliability and smooth operations are also enhanced by use of a metal key that is less susceptible to bending and breakage than plastic. The lack of open or exposed contacts minimizes the possibility of owners making manual adjustments. Finally, the engagement of the key initiates electrical contact.

The snap-action cam mechanism requires less adjustment set-up time and reduces door movement that could lead to a nuisance shutdown. Connection options include a 6-pin terminal strip or a Cat 5 connector, simplifying installation. The Relialign™ Series is designed to be easy for the OEM to retrofit into their current design.

POTENTIAL APPLICATIONS

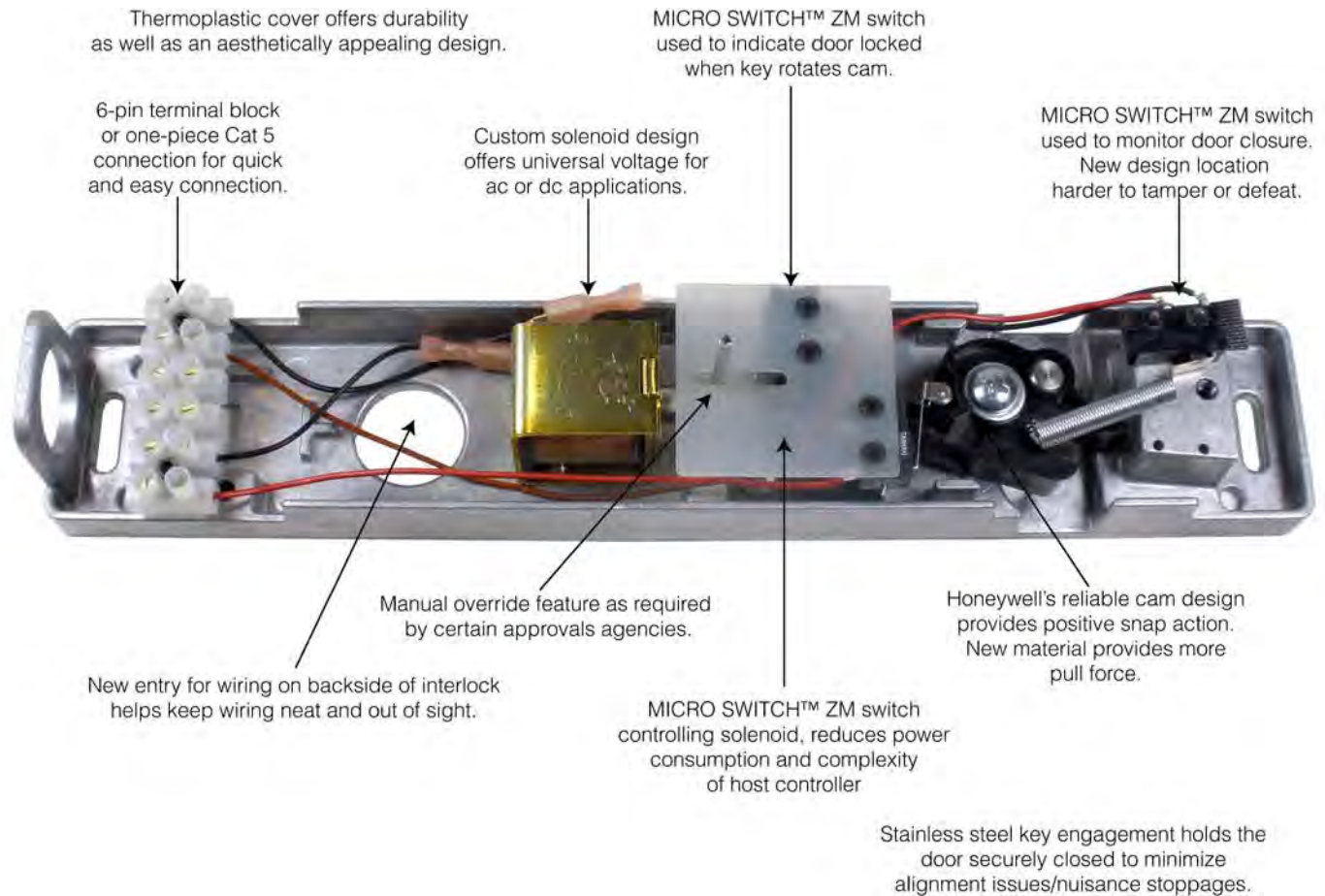
- Residential elevators
- Residential dumbwaiters
- Platform/vertical lifts

BENEFITS

- Meets required safety codes
- Reduced potential for call-backs
- Reliable performance and multiple design features to minimize nuisance stoppage of applications
- Simplified wiring and installation
- Reduced OEM design and manufacturing costs
- Strong OEM sales message: enhanced safety, reduced owner aggravation, reduced power consumption
- Honeywell brand quality

Relialign™ RDI2 Series

DESIGN FEATURES



PRODUCT LISTING

Catalog Listings	Description
RDI2RBS2	Relialign™ Series door interlock, right-hand swing, ac/dc voltage, series wiring, Cat 5 connector
RDI2LBS2	Relialign™ Series door interlock, left-hand swing, ac/dc voltage, series wiring, Cat 5 connector
RDI2RBS1	Relialign™ Series door interlock, right-hand swing, ac/dc voltage, series wiring, 6-pin terminal strip connection
RDI2LBS1	Relialign™ Series door interlock, left-hand swing, ac/dc voltage, series wiring, 6-pin terminal strip connection

ACCESSORIES

Catalog Listing	Description
GKZ91	Relialign™ Series replacement key

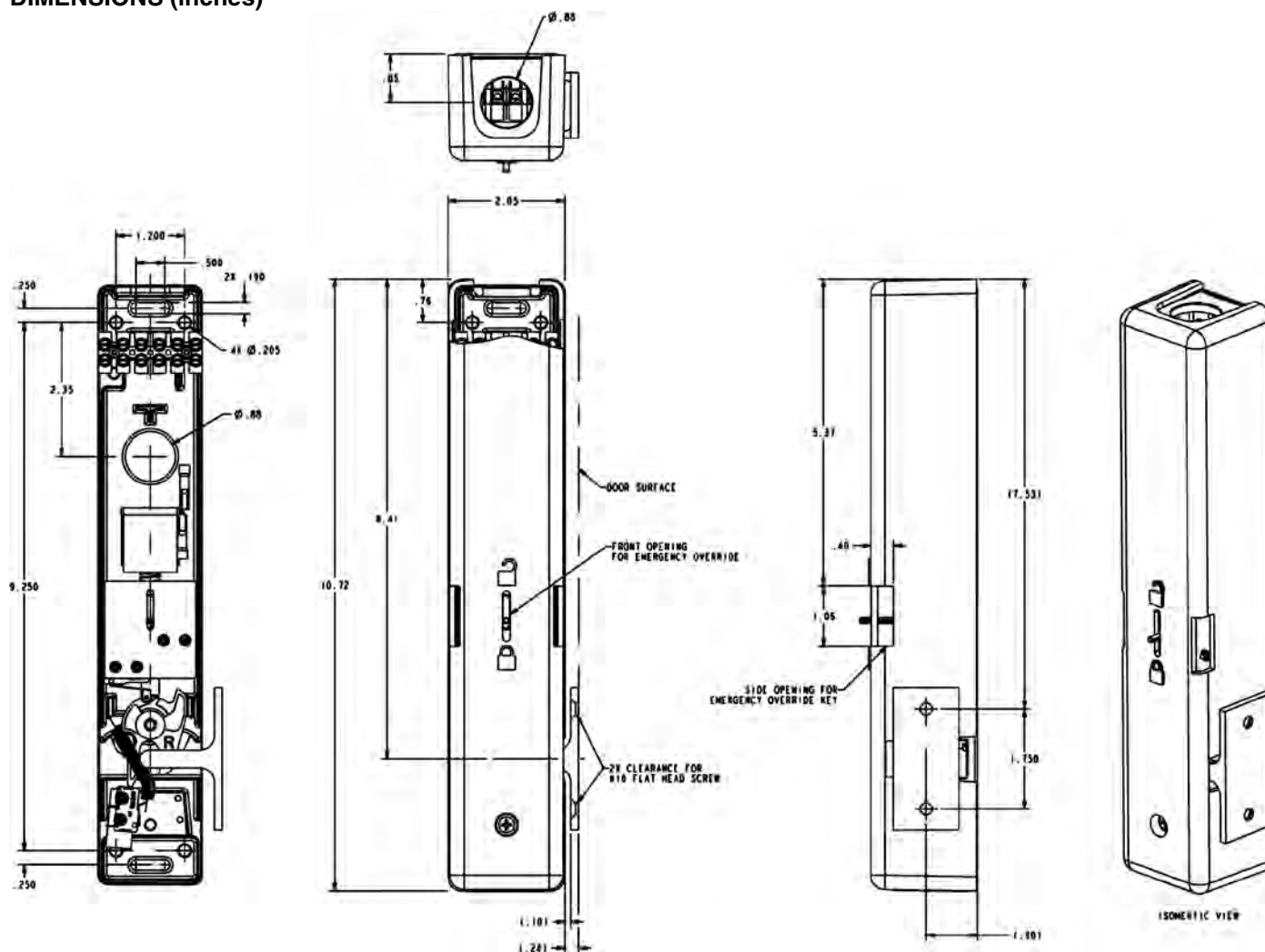
Door Interlock Switches

PRODUCT NOMENCLATURE

RDI2	R	B	S	2	—
Switch type	Key-entry Position	Solenoid Type	Wiring Type	Connector Type	Specials
Relialign™ Series Residential Door Interlock	R Right L Left	A ac D dc B ac/dc	P Parallel S Series	1 6-pin terminal strip 2 Cat5 3 Other	Two characters, letters or numbers to signify customer name or other unique features of the product not covered in the nomenclature. This field is not required.

*Not all combinations are possible.

DIMENSIONS (inches)



WARNING

RISK TO LIFE OR PROPERTY

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June 2010
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Hall Effect Door Interrupt System

For the control of mechanical guards

FEATURES

- Equipment comprising a safety amplifier which can run up to 6 Hall Effect sensors triggered by coded magnet actuators
- Protective equipment in compliance with the essential requirements of the Machinery Directive 98/37/EC and with the technical requirements of the EN 954 standard for Type 3 safety related parts of control systems
- Solid state Hall Effect sensors and magnet actuators for reliability and long life.
- Tamper resistant coded sensors - Special magnet actuators
- Door misalignment monitoring and door chattering sensor (misalignment or vibration causes unit to lock off)
- Self-checking electronic processing with redundant output switching circuitries using two guided contact safety relays
- Sensors sealed to high pressure washdown

APPLICATIONS

Interlocking guard for non locked mechanical screens offering free access:

- Machine door or casing "open/closed" detection
- Guard-in-place detection, gate / access door detection
- Control of mechanical screens used in addition to a safety light curtain
- Food & Beverage, Packaging, Machine Tool, Automotive and Textile



The 50FY Series interlocking guard is a protective equipment comprising a safety amplifier accepting up to six Hall effect sensors operated by coded magnet actuators. This equipment allows to control up to 6 doors/casings of a machine or small production line. When all connected sensors are actuated, the logic circuit which controls the 2 output relays, closes the relay contacts to enable the machine operation. If any sensor is turned off (by opening a door), the logic circuit opens the contacts and the machine movement stops immediately.

Each sensor is equipped with 2 Hall effect integrated circuits. These Hall effect circuits are connected independently so that both must turn on simultaneously to produce an output. Each sensor is equipped with one N.O. output switching circuit and one N.C. output switching circuit in order to avoid common mode failure. An accurate positioning of the magnets is necessary to enable the machine operation, and the magnet actuators are coded. These two features make the 50FY series very difficult to defeat or to create a false closed door condition resulting in a more reliable system.

The Hall effect sensors and magnets are designed to be used in harsh duty. Sealed to IP 67, they meet washdown criteria for Food & Beverage Industry (high pressure 80 bars, high temperature 60 °C / 140 °F and chemical washdown). Their corrosion resistant one-piece plastic housing survives exposure to metal cutting environments. Operating temperature is from -40 °C to 85 °C / -40 °F to 185 °F.

The 50FY series protective equipment is in compliance with the essential requirements of the Machinery Directive 98/37/EC and with the technical requirements of EN 954 standard for Type 3 safety related parts of control system.

The logic circuit is based on a permanent self-checking principle with redundancy. The N.O. contacts of the 2 output relays are internally connected in series. The two relays are cross monitored which guarantees a reliable connection to the machine control circuitry. The control unit must be installed in an IP 54 enclosure. Moreover, the access to the safety amplifier should be limited to the authorised personnel (the use of a special tool is recommended to secure the safety amplifier installation).

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each products.

Failure to comply with these instructions could result in death or serious injury.

50FY

- Type 3 interlocking guard according to EN 954
- Monitor up to 6 doors
- Sensing distance up to 2.5 mm / 0.098 in. depending upon the offset adjustment



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Sensors and magnets	Amplifier
Power supply voltage	10-12 Vdc	100 to 128 Vac, 50/60 Hz
Power consumption	20 mA	3 VA max.
Output switching capacity	-	2 safety relays with guided-contacts (5A/120 Vac, 2 NO in series)
Material	Corrosion resistant plastic	Stainless steel
Dimensions	Sensors & magnets: 12.7x39.4x33/0.50x1.55x1.30	57.9x203.2x135.1/2.28x8x5.32
Operating temperature	-40 to 85°C / -40 to 185°F	-40 to 70°C / -40° to 158°F
Sealing	IP 67 / NEMA , 3, 4, 4X, 12, 13 and washdown	To be installed in an IP 54 enclosure
Status indicators	LED indicators on the amplifier	
Sensing distance	2.5 mm/0.09 in. (offset: 0 mm)	-
	1.3 mm/0.05 in. (offset: 3.8 mm/0.14 in.)	-
	0 mm (offset: 7.5 mm/0.29 in.)	-
Electrical connection	4-leads prewired (2, 4 or 15 m/6.56, 13.12 or 49.2 ft)	Terminal strip

Ordering information ⁽¹⁾

Hall effect sensors:

- 50FY41-6 (cable length 2 m / 6.56 ft)
- 50FY41-12 (cable length 4 m / 13.12 ft)
- 50FY41-50 (cable length 15 m / 49.2 ft)

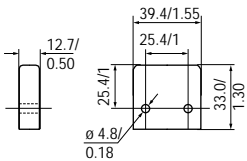
Magnet actuators:

52FY31

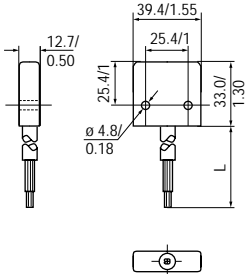
Safety amplifier:

FYQLA1-140R-3

Magnet actuator (52FY31)

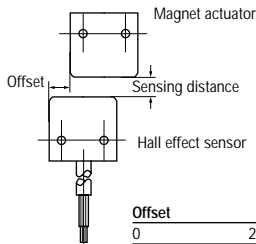


Hall effect sensors (50FY41-□)



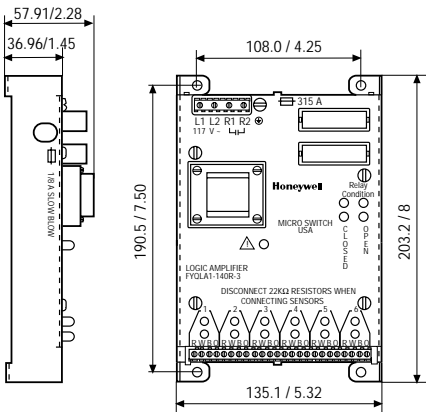
Listing	Cable length
50FY41-6	2 m/ 6.56 ft
50FY41-12	4 m/ 13.12 ft
50FY41-50	15 m/ 49.2 ft

Offset/Sensing distance



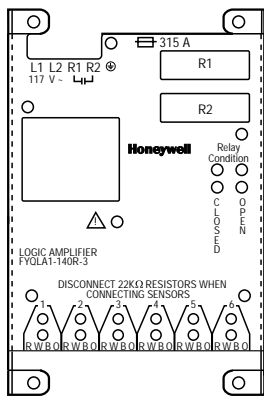
Offset	Sensing distance
0	2.5 mm/0.09 in.
3.8 mm/0.15 in.	1.3 mm/0.05 in.
7.5 mm/0.26 in.	0

Safety amplifier


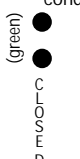


⁽¹⁾ Order one set of sensor and magnet per door, and up to 6 sets per amplifier.

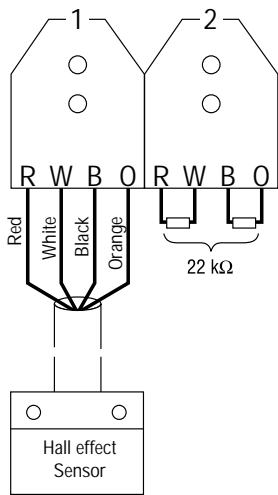
Status indicators



Logic amplifier output status

LED Status	Output Status	Machine operation
	ON	Enable
	OFF	Disable



Wiring instructions






R (+) = Red positive
B (-) = Black negative
W (NO output) = White
O (NC output) = Orange

• If less than six 50FY41 sensors are being used, install 22 kΩ resistors between W and R and a second between O and B for each terminal set unwired. The resistors are necessary for correct operation of the amplifier. Ten 22 kΩ resistors are supplied.

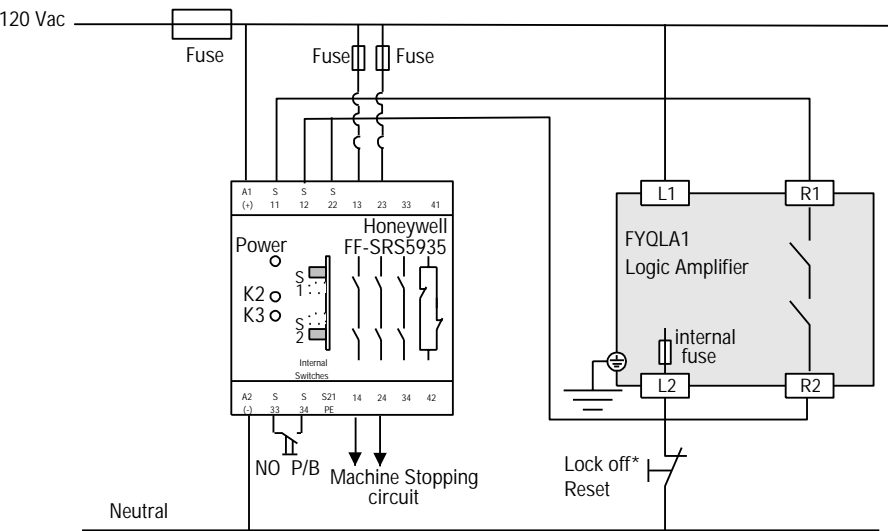
Failure detection

LED Status	System operation
	Normal operation
	Failure detection (or sensor misalignment detected)

Sensor output status (red LEDs number 1 to 6)

LED Status	Sensors operation
	- Normal operation - Each Hall effect sensor produces a signal - The door is closed - The machine operation is enabled
	- Normal operation - None of the Hall effect sensors produce a signal - The door is open - The machine operation is disabled
	- Improper operation - Only one out of two Hall effect sensors produces a signal - Either the door is not correctly closed or the sensor has a failure - The machine operation is disabled

● Light Off ⚙ Light On ⚙ Flickering light



Amplifier supply

- Connect nominal voltage leads to the amplifier terminals labeled L1 (neutral) and L2 (phase).
- The NO output contact R1/R2 must be connected directly to the machine stop command or if necessary to an emergency stop module.

* Reset push-button to use only after control unit lock off when sensor misalignment detected.

** Internal switches FF-SRS5935:
S1: Without cross-fault monitoring
S2: Manual restart

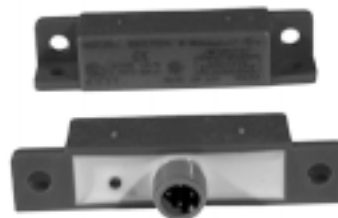
50FY

Category 1 Hall Effect Door Interrupt Proximity Sensors

2-Wire AC, 3-Wire DC types

FEATURES

- Sensors and actuators must be specifically aligned before sensors will produce outputs
- Special magnet actuators required to operate sensors, making unauthorized actuation difficult
- Solid state sensors for reliability and long life
- Sealed to IP 67, NEMA 4, 6, 6P, 13, meets washdown requirements
- LED output indicator
- Preleaded or connector style termination
- 10 to 30 Vdc supply voltage, PNP or NPN outputs
- 93 to 132 Vac supply voltage, N.O., SCR output
- -30 to +85 °C (-22 to +165 °F) temperature range (AC)
- -30 to +70 °C (-13 to +158 °F) (DC)
- Hard to defeat
- Standard and extended range magnetic actuators



The 40FY Series Hall Effect Door Interrupt Sensor is a non-contact, magnetic device consisting of two parts: a sensor and a magnetic actuator. The magnetic actuator has a keyed magnetic field that must match the sensor to operate correctly. When exposed to this keyed magnetic field, the sensor responds with an output. This product cannot be defeated by using an operator's hand, non-magnetic metal, wire or tape and is hard to defeat with standard magnet/target actuator.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each products.

Failure to comply with these instructions could result in death or serious injury.

Category 1 Hall Effect Door Interrupt Proximity Sensors

2-Wire AC, 3-Wire DC types



Specifications

Sensor Type	3-wire DC		2-wire AC	
Sensing Distance	41FY1	41FY2	41FY1	41FY2
Min. Operate	6.35 mm (0.25 in.)	7.6 mm (0.30 in.)	7.6 mm (0.30 in.)	10.2 mm (0.40 in.)
Max. Release	15.24 mm (0.60 in.)	19.05 mm (0.75 in.)	19.05 mm (0.75 in.)	25.4 mm (1.0 in.)
Supply voltage	10 to 30 Vdc		93 to 132 Vac	
Load Current	0 to 200 mA		0 to 500 mA	
Leakage Current	30 μ A		1.5 mA max.	
Voltage Drop, max.	PNP: 2.5 V NPN: 1.5 V		6 V @ 500 mA	
Current Consumption, max.	40 mA		-	
Inrush Current, max.	-		1.2 A/20 msec	
Repeatability*	\pm 3 %		\pm 3 %	
Operating Temperature	-30 to +85 °C (-22 to +185°F)		-25 to +70 °C (-13 to +158 °F)	
Protection Class	IP 67 (Dust tight, temporary immersion) NEMA** 4, 6, 6P, 13			
Materials	Housing: Polycarbonate; Cable: 22 gage PVC			
Circuit Protection	Transients (power and output), incorrect wiring			

* Repeatability is the ability of the sensor to trigger at the same point, plus or minus a given tolerance, after every operation (at constant voltage and temperature) over the entire range of the sensor's specifications.

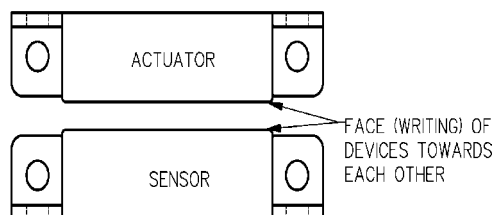
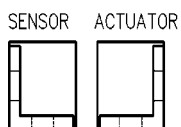
** Application Note: Enclosures are based, in general, on the broad definitions outlined in NEMA standards. Therefore, it will be necessary for the user to determine that a particular enclosure is adequate when exposed to the specific condition that might exist in intended applications. Except as might otherwise be noted, all references to products relative to NEMA enclosure types are based on MICRO SWITCH evaluation only.

ELECTROMAGNETIC COMPATIBILITY

Characteristics	Standard	Level
Impulse Voltage Withstand	IEC 255-5	1 KV
Radiated Electromagnetic Field Immunity	IEC 801-3	3 V/m
Discharge (ESD) Immunity Electrostatic	IEC 1000-4-2	8 KV
Fast Transient Immunity	IEC 1000-4-4	1 KV
Radiated Emissions	CISPR 11	within specified limits
	CISPR 11	within specified limits

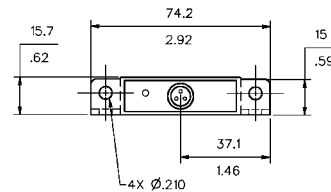
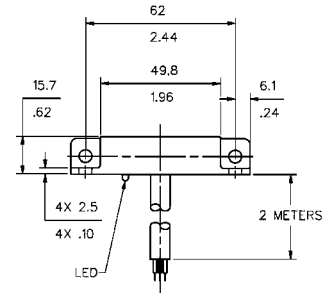
MOUNTING REQUIREMENTS

SENSOR MUST FACE AND LINE UP PROPERLY
IN BOTH AXIS WITH ACTUATOR TO FUNCTION

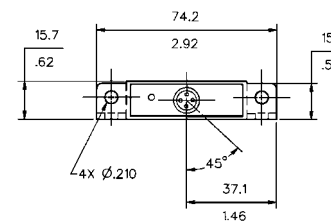
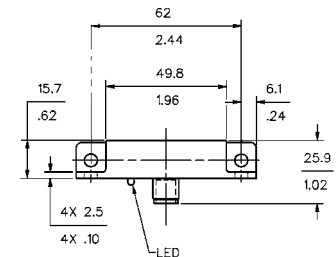


MOUNTING DIMENSIONS (for reference only)

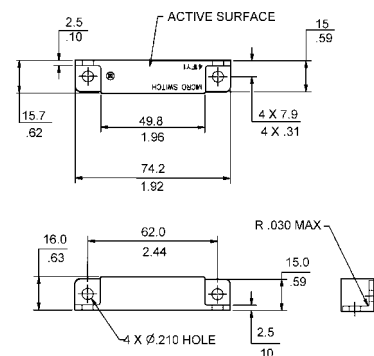
Sensor Pre-leaded Termination (mm/in)



Sensor Connector Termination (mm/in)

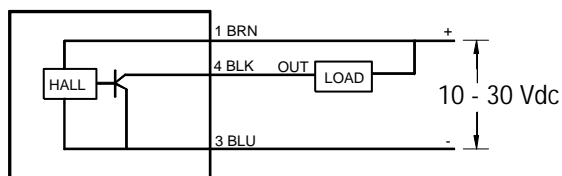


Magnetic Actuator (mm/in)

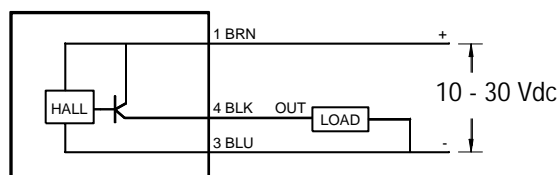


LEADWIRES COLOR CODE AND CONNECTOR PINOUT

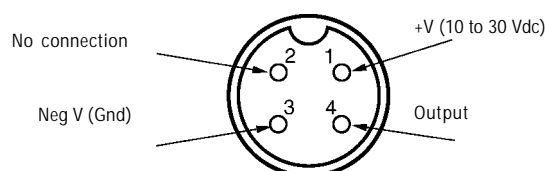
3-wire DC NPN (Sinking)



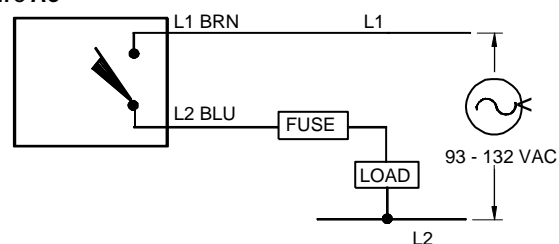
3-wire DC PNP (Sourcing)



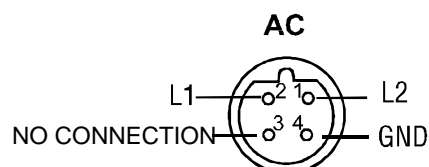
3-wire DC Pinout



2-wire AC

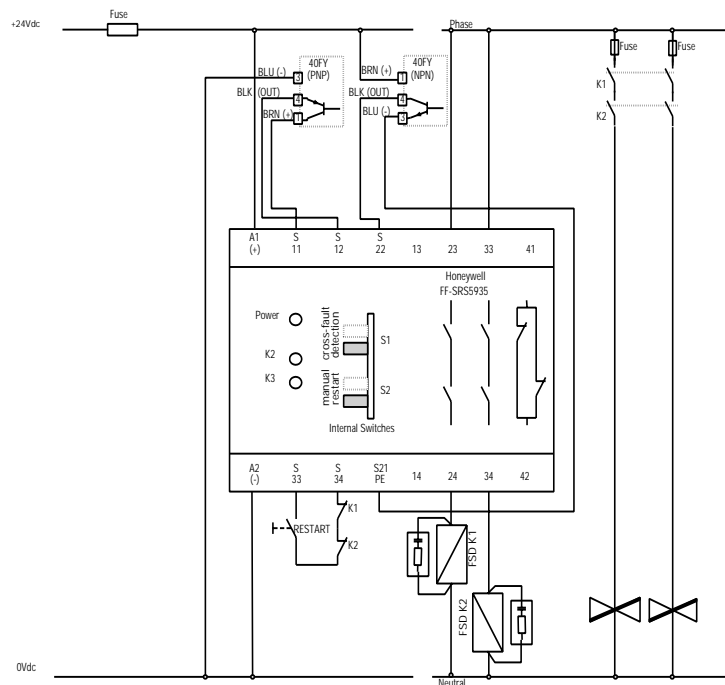


2-wire AC Pinout



Wiring diagram:

The connection of two 40FY Hall effect sensors to the FF-SRS5935 emergency stop module increases the safety level of the whole installation



































FSD: Final Switching Devices

NOTICE:

The cable resistance between terminals S11-S12 and S21-S22 must be less than 68 Ω for correct operation of the emergency stop module

Sensor order guide

Description		Catalog Listing
3-wire DC, PNP N.O. output, connector	  	40FY26-33
3-wire DC, PNP N.C. output, connector	  	40FY22-33
3-wire DC, PNP N.O. output, leadwires	 	40FY26-020
3-wire DC, PNP N.C. output, leadwires	  	40FY22-020
3-wire DC, NPN N.O. output, connector	  	40FY28-33
3-wire DC, NPN N.C. output, connector	  	40FY24-33
3-wire DC, NPN N.O. output, leadwires	  	40FY28-020
3-wire DC, NPN N.C. output, leadwires	  	40FY24-020
2-wire AC, N.O. output, connector		40FY36-33
2-wire AC, N.C. output, connector		40FY32-33
2-wire AC, N.O. output, leadwires		40FY36-020
2-wire AC, N.C. output, leadwires		40FY32-020
Magnet actuator	  	41FY1
Magnet actuator, extended range	 	41FY2

Cables for connector versions

Style	Cable Length	Catalog Listings
4-Pin DC Standard Key (12 mm/0.47 in. Micro)		
Straight	2m (6.56 ft)	803000A09M020
	5m (16.4 ft)	803000A09M050
Right Angle	2m (6.56 ft)	803001A09M020
	5m (16.4 ft)	803001A09M050
Right Angle w/LED, NPN	2m (6.56 ft)	8030N1A09M020
	5m (16.4 ft)	8030N1A09M050
Right Angle w/LED, PNP	2m (6.56 ft)	8030P1A09M020
	5m (16.4 ft)	8030P1A09M050
4-Pin AC Inverted Key (12 mm/0.47 in. Micro)		
Straight	2m (6.56 ft)	B03000A11M020
	5m (16.4 ft)	B03000A11M050
Right angle	2m (6.56 ft)	B03001A11M020
	5m (16.4 ft)	B03001A11M050

Emergency stop module order guide

FF-SRS5935 

Voltage:
2: 24 Vdc
E: 120 Vac
G: 230 vac

Refer to the Safety Control Modules section for product complete specifications

FF2 and FF3 Series

Magnetically Actuated Non-Contact Barrel Safety Switches



DESCRIPTION

The FF2 is an 18 mm barrel (thread) mounting magnetically actuated safety switch with one safety contact and an optional indicator contact, if required. The FF3 is a 30 mm barrel (thread) mounting magnetically actuated safety switch with up to two safety contacts and one indicator contact.

FEATURES

- Options of one or two safety contacts
- Tested to over 1,000,000 operations, full load
- Simple M18 and M30 barrel (thread) mounting
- Guard status indication available
- ac and dc versions
- CE and UL approvals

The barrel, thread, mount design is easy to install into the frame of a machine guard and allows for flush mounting, reducing potential switch damage and space constraint issues. Both the FF2 and FF3 series are sealed to IP67 requirements enabling use in most harsh environments.

POTENTIAL APPLICATIONS

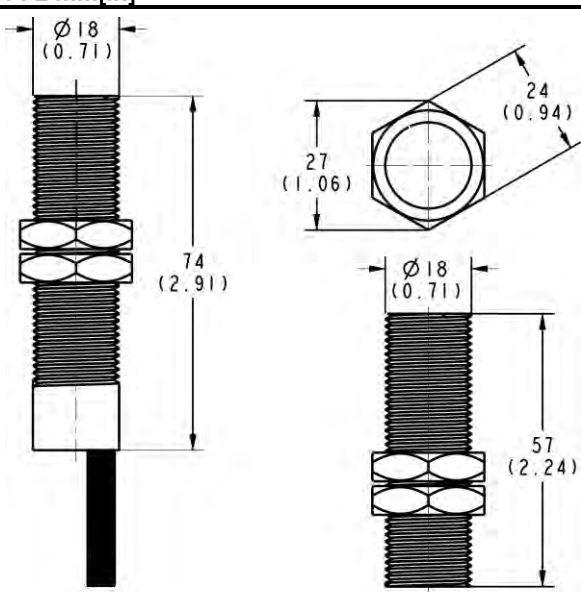
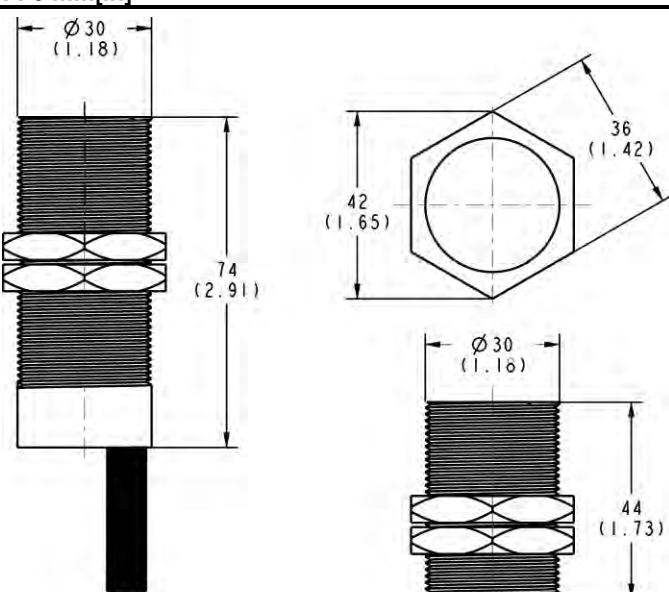
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery

FF2 and FF3 Series

TECHNICAL SPECIFICATIONS

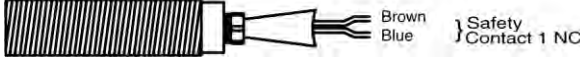
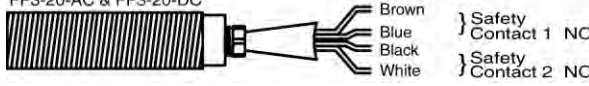
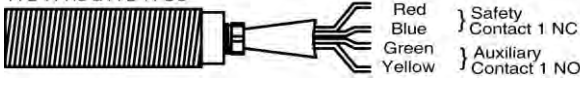
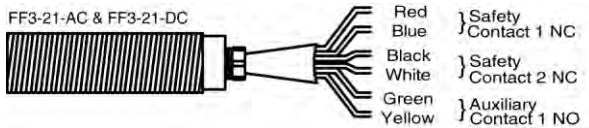
Type	FF2-10-AC FF2-11-AC	FF2-10-DC FF2-11-DC	FF3-20-AC FF3-21-AC	FF3-20-DC FF3-21-DC
Contact arrangement	1NC (FF2-10-AC) 1NC/1NO (FF2-11-AC)	1NC (FF2-10-DC) 1NC/1NO (FF2-11-DC)	2NC (FF3-20-AC) 2NC/1NO (FF3-21-AC)	2NC (FF3-20-DC) 2NC/1NO (FF3-21-DC)
Safety contact rating	230 Vac/2 A	30 Vdc/1 A inductive/ resistive	230 Vac/2A	30 Vdc/1 A inductive/ resistive
Safety contact operating distance	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 35 mm [1.38 in] OFF	10 mm [0.4 in] ON; 35 mm [1.38 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	15 W/10 VA	15 W/10 VA	15 W/10 VA	15 W/10 VA
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms
Internal fuse	ac: 2 A fast acting	dc: 1 A fast acting	ac: 2 A fast acting	dc: 1 A fast acting
External fuse (customer supplied)	ac: 1.6 A fast acting	dc: 0.8 A fast acting	ac: 1.6 A fast acting	dc: 0.8 A fast acting
IP rating	IP67	IP67	IP67	IP67
Vibration/shock	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g
Operating temperature	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target
Construction	Red ABS resin filled	Red ABS resin filled	Red ABS resin filled	Red ABS resin filled

DIMENSIONS

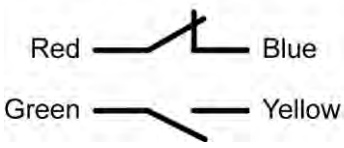

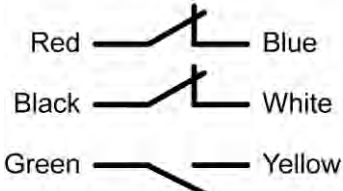
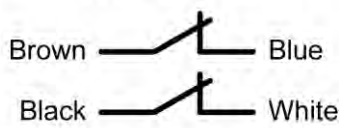
FF2 mm[in]		FF3 mm[in]	
			
SWITCH		SWITCH	
ACTUATOR		ACTUATOR	

Magnetically Actuated Non-Contact Barrel Safety Switches

CONNECTIONS

FF2-10 FF2-10-AC & FF2-10-DC 	FF3-20 FF3-20-AC & FF3-20-DC 
FF2-11 FF2-11-AC & FF2-11-DC 	FF3-21 FF3-21-AC & FF3-21-DC 

CONTACTS

FF2 <div style="display: flex; justify-content: space-around;"> <div> FF2-11-AC-03 FF2-11-DC-03  </div> <div> FF2-10-AC-03 FF2-10-DC-03  </div> </div>	
FF3 <div style="display: flex; justify-content: space-around;"> <div> FF3-21-AC-03 FF3-21-DC-03  </div> <div> FF3-20-AC-03 FF3-20-DC-03  </div> </div>	

NOTE: Contact configurations show under closed condition for guard device.

ORDER GUIDE

Catalog Listing	Description
FF2-10-AC-03	Barrel safety switch, 18 mm [0.70 in], 1NC, ac, 3 m pre-wired
FF2-11-AC-03	Barrel safety switch, 18 mm [0.70 in], 1NC/1NO, ac, 3 m pre-wired
FF2-10-DC-03	Barrel safety switch, 18 mm [0.70 in], 1NC, dc, 3 m pre-wired
FF2-11-DC-03	Barrel safety switch, 18 mm [0.70 in], 1NC/1NO, dc, 3 m pre-wired
FF3-20-AC-03	Barrel safety switch, 30 mm [1.18 in], 2NC, ac, 3 m pre-wired
FF3-21-AC-03	Barrel safety switch, 30 mm [1.18 in], 2NC/1NO, ac, 3 m pre-wired
FF3-20-DC-03	Barrel safety switch, 30 mm [1.18 in], 2NC, dc, 3 m pre-wired
FF3-21-DC-03	Barrel safety switch, 30 mm [1.18 in], 2NC/1NO, dc, 3 m pre-wired

WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

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+65 6445-3033 Fax
Europe +44 (0) 1698 481481
+44 (0) 1698 481676 Fax
Latin America +1-305-805-8188
+1-305-883-8257 Fax
USA/Canada +1-800-537-6945
+1-815-235-6847
+1-815-235-6545 Fax

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Honeywell

FF5 Series

Magnetically Actuated Non-Contact Safety Switches



DESCRIPTION

Honeywell FF5 switches are magnetically operated, non-contact safety switches designed for use in many machine-guarding applications. The FF5 is available in both ABS and 316 grade stainless steel and is capable of switching up to 300 mA at 24 Vdc as per features below. The switch and actuator

are fully sealed to IP67 and can often be used in wet or dusty environments. With correct installation, the FF5 safety switches comply with the guidelines given in EN1088.

FEATURES

- Non-contact safety switches
- Switches can be magnetically actuated from almost any angle
- Compact, rugged design
- Tested to over 1,000,000 operations, full-load
- 6 mm [0.24 in] operating distance
- Up to 300 mA at 24 Vdc switching capability
- IP67
- Stainless steel option
- CE, UL approvals

POTENTIAL APPLICATIONS

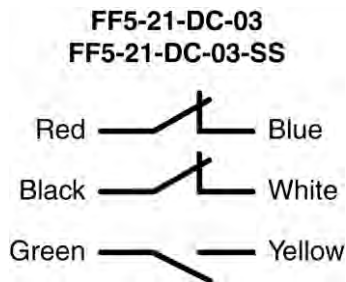
- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery

FF5 Series

TECHNICAL SPECIFICATIONS

Type	FF5	FF5-SS
Contact arrangement	Max: 2NC safety and 1NO auxiliary	Max: 2NC safety and 1NO auxiliary
Safety contact rating	24 Vdc/0.3 A inductive/resistive	24 Vdc/0.3 A inductive/resistive
Safety contact operating distance	6 mm [0.24 in] ON; 17 mm [0.67 in] OFF	6 mm [0.24 in] ON; 17 mm [0.67 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	24 Vdc/0.3 A inductive/resistive	24 Vdc/0.3 A inductive/resistive
Auxiliary contact operating distance	6 mm [0.24 in] OFF; 17 mm [0.67 in] ON	6 mm [0.24 in] OFF; 17 mm [0.67 in] ON
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms
Internal fuse	Not applicable	Not applicable
External fuse (customer supplied)	dc: 0.2 A fast acting	dc: 0.2 A fast acting
IP rating	IP67	IP67
Vibration/shock	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g
Operating temperature	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]
Mounting and fixture	Target to target	Target to target
Construction	Red ABS resin filled	316 grade stainless steel resin filled

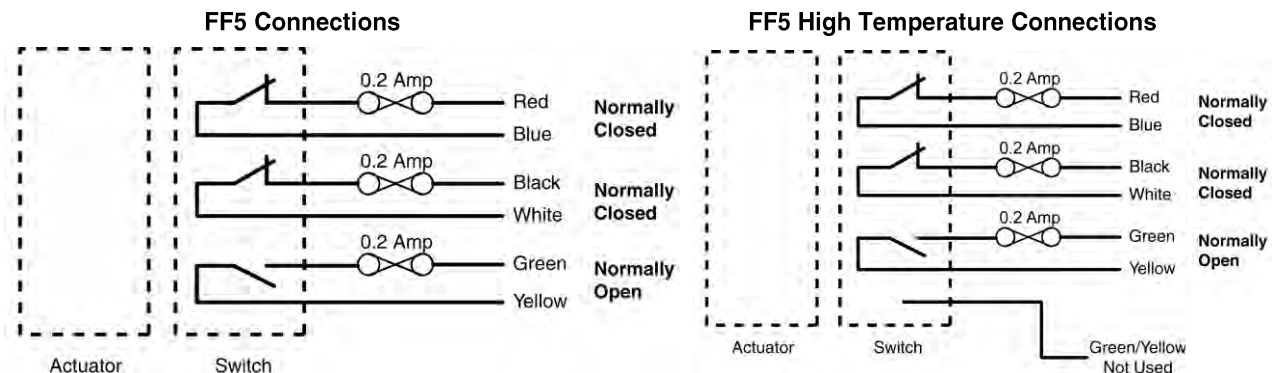
FF5 CONTACTS



NOTE: Contact configurations show under closed condition for guard device.

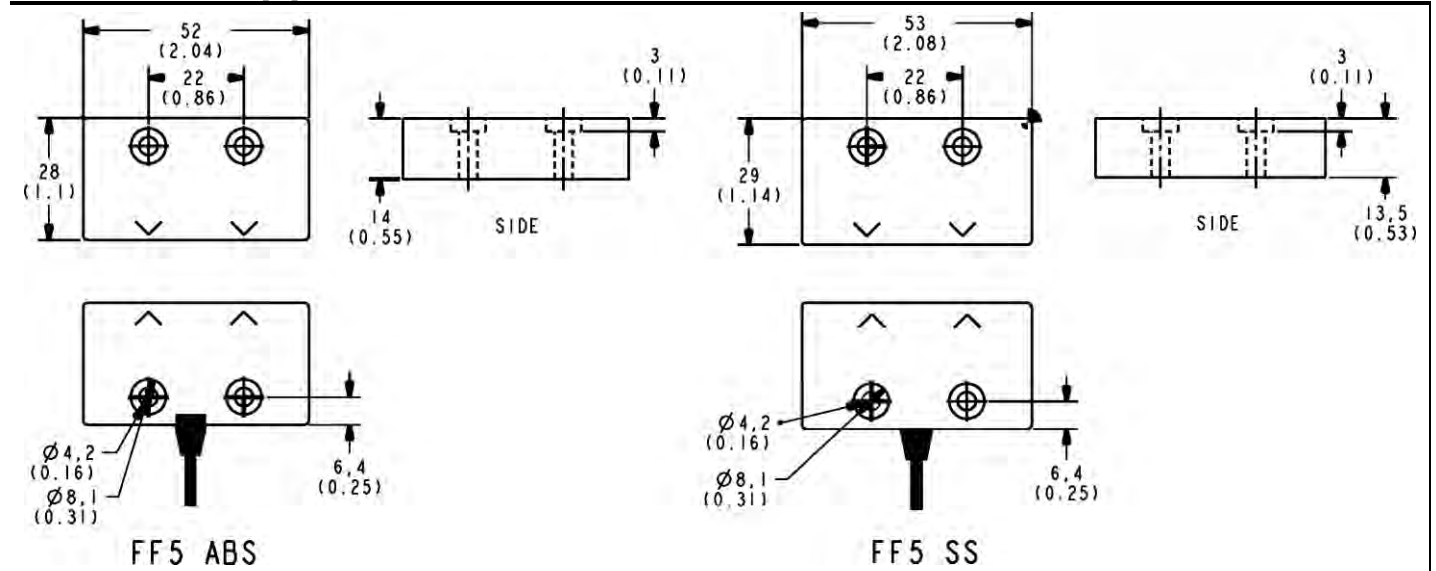
FF5 CONNECTIONS

The safety contact must be fused externally. dc switch – external fuse= 0.2 A fast acting



Magnetically Actuated Non-Contact Safety Switches

FF5 DIMENSIONS mm[in]



ORDER GUIDE

Catalog Listing	Description
FF5-21-DC-03	Safety switch and actuator, red ABS, 2NC/1NO, dc, 3 m pre-wired
FF5-21-DC-03-SS	Safety switch and actuator, stainless steel, 2NC/1NO, dc, 3 m pre-wired
FF5-21-DC-10	Safety switch and actuator, red ABS, 2NC/1NO, dc, 10 m pre-wired
FF5-21-DC-10-SS	Safety switch and actuator, stainless steel, 2NC/1NO, dc, 10 m pre-wired

WARNING

RISK TO LIFE OR PROPERTY

Never use this product for an application involving serious risk to life or property without ensuring that the system as a whole has been designed to address the risks, and that this product is properly rated and installed for the intended use within the overall system.

Failure to comply with these instructions could result in death or serious injury.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

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	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

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Honeywell

FF6 Series

Magnetically Actuated Non-Contact Safety Switches



DESCRIPTION

Honeywell FF6 switches are magnetically operated, non-contact safety switches designed for use in many machine-guarding applications. The FF6 is available in both ABS and 316 grade stainless steel. The switch and actuator are fully

sealed to IP67 and can often be used in wet or dusty environments. With correct installation, the FF6 safety switches comply with the guidelines given in EN1088.

FEATURES

- Non-contact safety switches
- Up to three contacts
- 10 mm [0.4 in] operating distance
- Up to 2 A switching
- IP67
- Stainless steel option
- CE and UL approvals

POTENTIAL APPLICATIONS

- Can forming and filling (aluminum, steel, and plastic)
- Pick and place packaging equipment
- Pick and place/assembly equipment
- Semicon equipment
- Plastic molding equipment
- Woodworking machinery
- Textile machinery
- Printing machinery

FF6 Series

TECHNICAL SPECIFICATIONS

Type	FF6 ac	FF6 dc	FF6-SS ac	FF6-SS dc
Contact arrangement	Max: 2NC safety and 1NO auxiliary	Max: 2NC safety and 1NO auxiliary	1NC safety	Max: 2NC safety and 1NO auxiliary
Safety contact rating	230 Vac/2 A	30 Vdc/1 A inductive/resistive	230 Vac/2A	30 Vdc/1 A inductive/resistive
Safety contact operating distance	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	15 W/10 VA	15 W/10 VA		15 W/10 VA
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON		7 mm [0.28 in] OFF; 20 mm [0.79 in] ON
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms		0.5 ms/0.3 ms/0.7 ms
Internal fuse	ac: 2 A fast acting	dc: 1 A fast acting	ac: 2 A fast acting	dc: 1 A fast acting
External fuse (customer supplied)	ac: 1.6 A fast acting	dc: 0.8 A fast acting	ac: 1.6 A fast acting	dc: 0.8 A fast acting
IP rating	IP67	IP67	IP67	IP67
Vibration/shock	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g	50 Hz to 100 Hz/10 g
Operating temperature	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]	-10 °C to 55 °C [14 °F to 131 °F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target
Construction	Red ABS resin filled	Red ABS resin filled	316 grade stainless steel resin filled	316 grade stainless steel resin filled

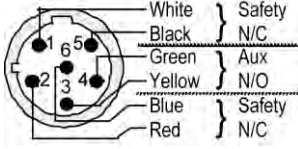
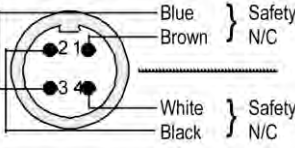
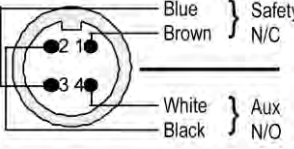
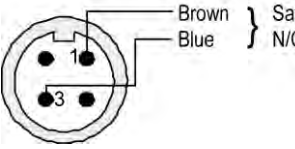
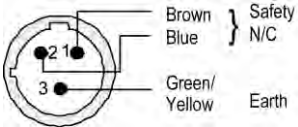
Magnetically Actuated Non-Contact Safety Switches

CONTACTS AND CONNECTIONS: PRE-WIRED SWITCHES

FF6-21-ABS (ac & dc) FF6-21-SS (dc only)	FF6-20 ABS (ac & dc) FF6-20 SS (dc only)	FF6-11 ABS (ac & dc) FF6-11 (dc only)	FF6-10 ABS (ac & dc) FF6-10 SS (ac & dc)
Red — Blue Black — White Green — Yellow	Brown — Blue Black — White	Red — Blue Green — Yellow	Brown — Blue
FF6-10-03-SS			
Brown — Blue Green/Yellow — Ground			

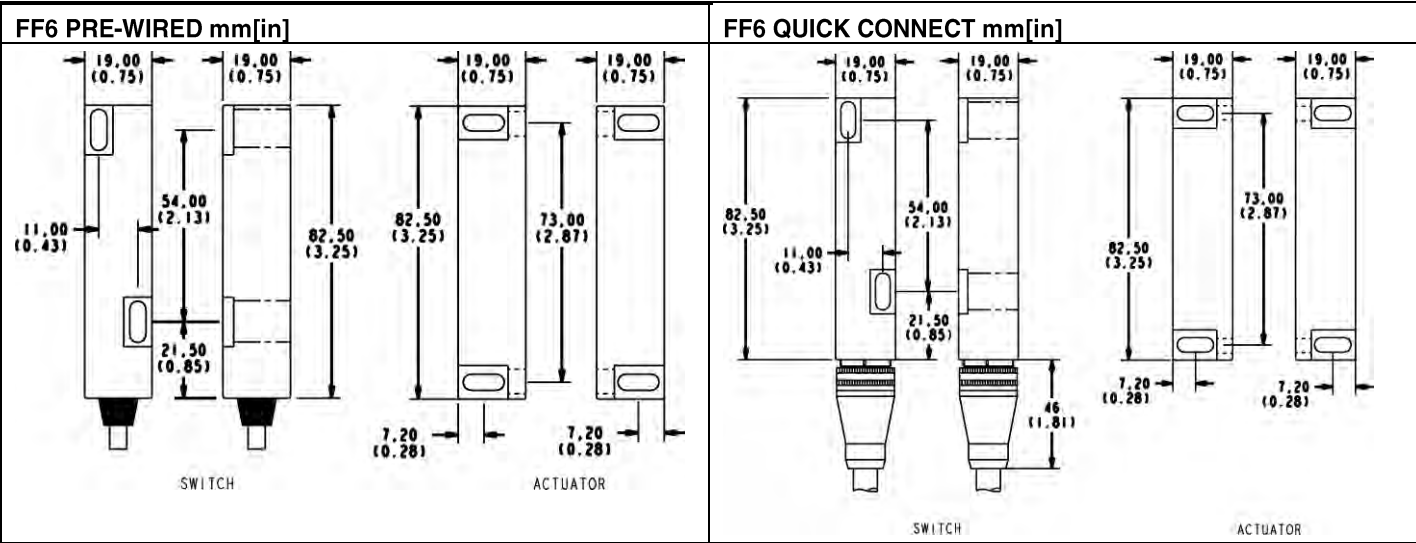
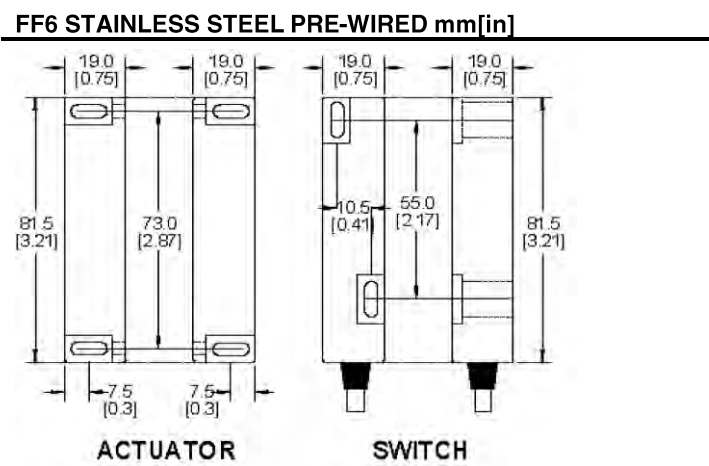
NOTE: Contact configurations show under closed condition for guard device.

CONTACTS AND CONNECTIONS: QUICK DISCONNECT CONNECTIONS

FF6-21-AC-QD05 FF6-21-DC-QD05	FF6-20-AC-QD05 FF6-20-DC-QD05	FF6-11-AC-QD05 FF6-11-DC-QD05	FF6-10-AC-QD05 FF6-10-DC-QD05
			
FF6-10-AC -QD05-SS			
			

FF6 Series

DIMENSIONS



Magnetically Actuated Non-Contact Safety Switches

ORDER GUIDE

Catalog Listing	Description
FF6-10-DC-03-SS	Safety switch and actuator, stainless steel, 1NC safety, dc, 3 m pre-wired
FF6-11-DC-03-SS	Safety switch and actuator, stainless steel, 1NC safety and 1 NO auxiliary, dc, 3 m pre-wired
FF6-20-DC-03-SS	Safety switch and actuator, stainless steel, 2NC safety, dc, 3 m pre-wired
FF6-10-AC-03-SS	Safety switch and actuator, stainless steel, 1NC safety, ac, 3 m pre-wired
FF6-10-AC-QD-SS	Safety switch and actuator, stainless steel, 1NC safety, ac, M12 quick disconnect, no cable
FF6-10-AC-QD05-SS	Safety switch and actuator complete, stainless steel, 1NC safety, ac, M12 quick disconnect, 5 m cable
FF6-10-DC-03	Safety switch and actuator, red ABS, 1NC safety, dc, 3 m pre-wired
FF6-11-DC-03	Safety switch and actuator, red ABS, 1NC safety and 1NO auxiliary, dc, 3 m pre-wired
FF6-20-DC-03	Safety switch and actuator, red ABS, 2NC safety, dc, 3 m pre-wired
FF6-21-DC-03	Safety switch and actuator, red ABS, 2NC safety and 1NO auxiliary, dc, 3 m pre-wired
FF6-10-AC-03	Safety switch and actuator, red ABS, 1NC safety, ac, 3 m pre-wired
FF6-11-AC-03	Safety switch and actuator, red ABS, 1NC safety and 1NO auxiliary, ac, 3 m pre-wired
FF6-20-AC-03	Safety switch and actuator, red ABS, 2NC safety, ac, 3 m pre-wired
FF6-21-AC-03	Safety switch and actuator, red ABS, 2NC safety and 1NO auxiliary, ac, 3 m pre-wired
FF6-10-DC-QD05	Safety switch and actuator, red ABS, 1NC safety, dc, M12 quick disconnect, 5 m cable
FF6-11-DC-QD05	Safety switch and actuator, red ABS, 1NC safety and 1NO auxiliary, dc, M12 quick disconnect, 5 m cable
FF6-20-DC-QD05	Safety switch and actuator, red ABS, 2NC safety and 1NO auxiliary, dc, M12 quick disconnect, 5 m cable
FF6-21-DC-QD05	Safety switch and actuator, red ABS, 2NC safety and 1NO auxiliary, dc, M12 quick disconnect, 5 m cable
FF6-10-AC-QD05	Safety switch and actuator, red ABS, 1NC safety, ac, M12 quick disconnect, 5 m cable
FF6-11-AC-QD05	Safety switch and actuator, red ABS, 1NC safety and 1NO auxiliary, dc, M12 quick disconnect, 5 m cable
FF6-20-AC-QD05	Safety switch and actuator, red ABS, 2NC safety, ac, M12 quick disconnect, 5 m cable
FF6-21-AC-QD05	Safety switch and actuator, red ABS, 2NC safety and 1NO auxiliary, ac, M12 quick disconnect, 5 m cable

WARNING

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Safety Light Curtains for point-of-operation protection

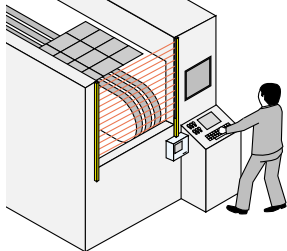







	TYPICAL APPLICATIONS	RESOLUTION	APPROVALS	ELECTRICAL CONNECTION	DIMENSIONS OF THE PROTECTED AREA																			
				DIMENSIONS	SCANNING RANGE (m/ft)	PROTECTION HEIGHT (mm/in)	Automatic restart	Start & Restart Interlock	Test input	FSD monitoring	Response time	Static outputs	Relay outputs	Self-diagnostic indicator	Output status indicator	Cross-talk reduction	Blanking/Reduced resolution	Muting	Cascading	Single/double stroke	Weld splash protection	Sealing		Voltage
TYPE 4	Compact Type 4 light curtain with static safety outputs	Heavy industry and material conversion • Pressing, moulding and thermoforming machines • Conveyors, handling equipment and assembly lines • Copying lathes and machining centers • Door and gate, lift and hoist technology • Stacking machines, transporting and conveyor technology • Textile, packaging machines • Vibrating sieves, sorters and milling machines	 FINGER DETECTION ø14 mm / 0.6 in HAND DETECTION ø30 mm / 1.2 in	 Approved as Type 4 per IEC/EN 61496-1/2	• DIN 43651 plugs • Brad Harrison Mini-Change® plugs • Terminal strips (cable glands)	FF-SYA30 20 m/65.6 ft FF-SYA14 6 m/20 ft	320 mm to 1760 mm/ 12.6 in to 56.7 in	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	14 to 18 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65 NEMA 4 NEMA 13	24 Vdc	FF-SYA14 / FF-SYA30	FF-SYA
	Compact Type 4 light curtain with static safety outputs	Heavy industry and material conversion • Pressing, moulding and thermoforming machines • Electronic assembly • Copying lathes and machining centers • Textile, packaging machines	 FINGER DETECTION ø18 mm / 0.70 in HAND DETECTION ø30 mm / 1.2 in	 Approved as Type 4 per IEC/EN 61496-1/2	• M12 (8 pin) connectors	FF-SG30 3,5 m / 11.48 ft FF-SG18 / FF-SG30 310 mm to 1470 mm/ 12.21 in to 57.91 in 310 mm to 700 mm/ 12.21 in to 27.58 in FF-SG18 FF-SG30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	15 to 21,5 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65 NEMA 4 NEMA 13	24 Vdc	FF-SG18 / FF-SG30	
TYPE 4	Harsh-duty Type 4 self-contained light curtain with relay outputs	Heavy industry and material conversion • Presses and punches for metals, plastics and leather • Deep-drawing presses, moulding presses and filter presses • Metal forming, milling and drilling machines • Spot-welding machines and fine-boring machines	 FINGER DETECTION ø22 mm / 0.86 in HAND DETECTION ø35 mm / 1.4 in	 For ac versions only Approved as Type 4 per pr EN 50100 - 1/2	• Metal connectors DIN 43652	FF-SB12 10 m / 32.8 ft FF-SB14 10 m / 32.8 ft 24 m / 78.72 ft Long range version FF-SB12 FF-SB14	400 mm to 1400 mm/ 15.76 in to 55.16 in 200 mm to 600 mm/ 7.88 in to 23.6 in	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25 to 45 ms	2 NO 1 NC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65 NEMA4 NEMA 13	120 Vac/ 240 Vac 24 Vdc/ 48 Vdc	FF-SB12 / FF-SB14	FF-SB
	Type 4 light curtain with separate control unit and blanking capability	Heavy industry and material conversion • Presses, metalforming, moulding, milling, thermoforming, and assembly machines • Stacking, transporting and handling equipment, conveyors and assembly lines • Copying lathes and machining centers • Door and gate, lift and hoist technology • Robotic, welding, cutting, and sealing • Textile, packaging machines • Jigging sieves, sorters and special machines	 HAND DETECTION ø31,75 mm / 1.25 in	 Approved as Type 4 per IEC/EN 61496-1/2	• Sensors: connectors • Control unit: removable terminal strips	7,6 m / 25 ft 15,3 m / 50 ft Long range version	146 mm to 1822,5 mm/ 5.75 in to 71.75 in	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25 to 35 ms	2 NO 1 NC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65 NEMA 4	120 Vac 240 Vac 24 Vdc	DETECTOR™ 3	

Through external accessory

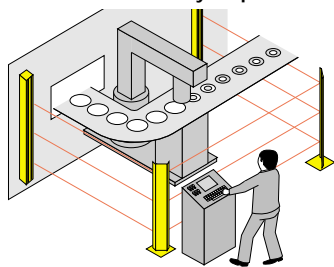
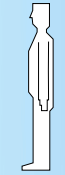







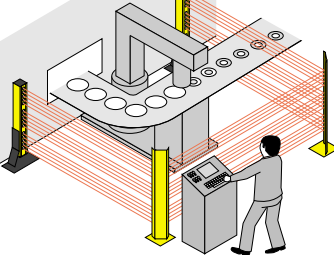
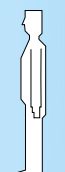





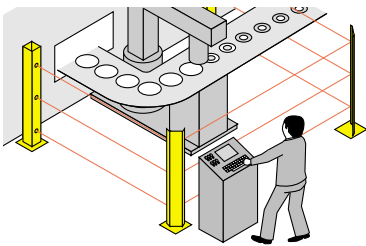
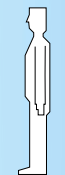


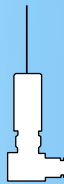

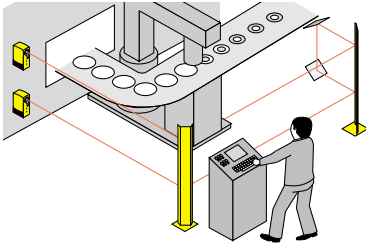
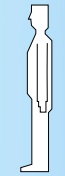




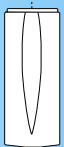

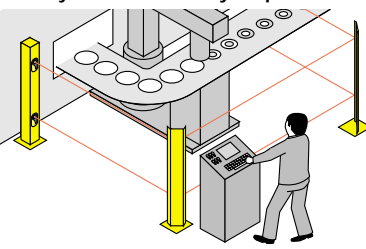
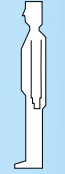





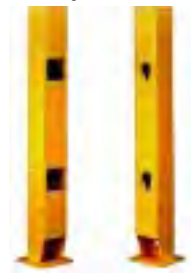
On specific models, with increased response time

☐ Through external accessory ① On specific models, with increased response time

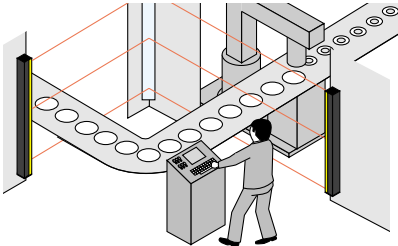





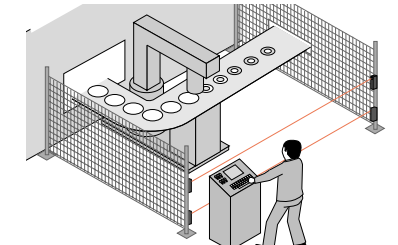
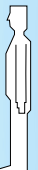



Safety Light Curtains for point-of-operation protection

	TYPICAL APPLICATIONS	RESOLUTION	APPROVALS	ELECTRICAL CONNECTION		DIMENSIONS OF THE PROTECTED AREA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
				DIMENSIONS		SCANNING RANGE (m/ft)	PROTECTION HEIGHT (mm/in)	Automatic restart	Start & Restart Interlock	Test input	FSD monitoring	Response time	Static outputs	Relay outputs	Self-diagnostic Indicator	Output status indicator	Cross-talk detection reduction	Blanking/Reduced resolution	Muting	Cascading	Single/double stroke	Weld splash protection	Sealing	Voltage																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
TYPE 4	<p>Slim line Type 4 light curtain with separate control unit and relay outputs</p> 	<p>Light industry</p> <ul style="list-style-type: none">• Paper cutting machines• Pick-and-place robots• Light electronic assembly machines• Goods lifts• Small carousels	 <p>FINGER DETECTION ø14 mm / 0.55 in</p>  <p>HAND DETECTION ø30 mm / 1.18 in</p>	<div> C US</div> <div></div> <div> TRANSFORMER SACHSEN ANHOLDT</div> <div>Approved as Type 4 per pr EN 50100 - 1/2</div>	• M8 connectors	 <p>3,5 m / 11.48 ft</p> <p>FF-LS14 / FF-LS30</p>	 <p>200 mm to 1800 mm / 7.88 in to 70.9 in</p> <p>200 mm to 750 mm / 7.88 in to 29.5 in</p> <p>FF-LS14 / FF-LS30</p>	■	■	■	■	50 ms	2 NO 1 NC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Multiple Light Beams for Access Detection to Hazardous Areas

	TYPICAL APPLICATIONS		NUMBER OF BEAMS	APPROVALS	ELECTRICAL CONNECTION		DIMENSIONS OF THE PROTECTED AREA																	
					DIMENSIONS	SCANNING RANGE (m/ft)			PROTECTION HEIGHT (mm/in)	Automatic restart	Start & Restart interlock	Test input	FSD monitoring	Response time	Static outputs	Relay outputs	Self-diagnostic indicator	Output status indicator	Cross-talk detection reduction	Muting	Weld splash protection	Sealing		Voltage
TYPE 4	<div>Compact Type 4 multibeam system with static safety outputs</div> 	<div>Heavy industry and material conversion</div> <ul style="list-style-type: none">Access detection for:<ul style="list-style-type: none">- Robotic and transfer areas- Machinery centers- Palletising areas- Storage and stacking areasMax. length of a U-shaped perimeter: 64 m / 210 ft	<div>2, 3 or 4 beams</div>  <div>BODY DETECTION according to EN 999</div>	<div><div>Approved as Type 4 per IEC/EN 61496-1/2</div></div>	<div><ul style="list-style-type: none">• DIN 43651 plugs• Brad Harrison Mini-Change® plugs• Terminal strips (cable glands)<div>60 mm x 42 mm / 2.36 in x 1.65 in</div></div>	<div>0,5 m to 80 m / 1.64 ft to 262.46 ft</div>	<div>500 mm to 900 mm / 19.7 in to 35.46 in</div>	<div>■</div> <div>□</div> <div>■</div> <div>□</div> <div>12 ms</div> <div>■</div> <div>□</div> <div>■</div> <div>■</div> <div>□</div> <div>□</div> <div>IP 65 NEMA 4 NEMA 13</div> <div>24 Vdc</div>																
TYPE 4	<div>Harsh-duty Type 4 self-contained light curtain with relay outputs</div> 	<div>Heavy industry and material conversion</div> <ul style="list-style-type: none">Access detection for:<ul style="list-style-type: none">- Robotic and transfer areas- Machinery centers- Palletising areas- Storage and stacking areasMax. length of a U-shaped perimeter: 19 m / 62.32 ft	<div>2, 3 or 4 beams ø235 mm / 9.25 in</div>  <div>BODY DETECTION according to EN 999</div>	<div><div>Approved as Type 4 per pr EN 50100 - 1/2</div></div>	<div><ul style="list-style-type: none">• Metal connectors DIN 43652<div>116 mm x 56 mm / 4.57 in x 2.20 in</div></div>	<div>3 m to 24 m / 9.84 ft to 78.72 ft</div>	<div>600 mm to 1400 mm / 23.64 in to 55.16 in</div>	<div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>25 to 27 ms</div> <div>2 NO + 1 NC</div> <div>■</div> <div>□</div> <div>■</div> <div>IP 65 NEMA 4</div> <div>120 Vac/ 240 Vac 24 Vdc/ 48 Vdc</div>																
TYPE 4	<div>Type 4 modular light curtain with M18 sensors and separate control unit with relay outputs</div> 	<div>Heavy industry and material conversion</div> <ul style="list-style-type: none">Access protection on palletising areasAccess detection of areas containing robots or automatic machinesDetection of automatic guided vehiclesThermoforming, agglomerating and moulding pressMax. length of a U-shaped perimeter: 27 m / 88.56 ft	<div>2 to 8 beams</div>  <div>BODY DETECTION according to EN 999</div>	<div><div>Approved as Type 4 per pr EN 50100 - 1/2</div></div>	<div><ul style="list-style-type: none">• Connectors Hirschmann ELWIKA<div>99 mm x Ø18 mm / 3.90 in x 0.70 in</div></div>	<div>25 m / 82 ft</div> <div>33 m / 108 ft</div> <div>Long range version</div>	<div>2 to 8 beams</div>	<div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>30 ms</div> <div>2 NO + 1 NC</div> <div>■</div> <div>□</div> <div>Sensors: IP 67 NEMA 6</div> <div>120 Vac 230 Vac 24 to 48 Vdc</div>																
TYPE 4	<div>Compact Type 4 self-contained single beam with relay outputs</div> 	<div>Heavy industry and material conversion</div> <ul style="list-style-type: none">Access detection of perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.Access detection at the rear of a press brakeMax. length of a U-shaped perimeter: 19 m / 62.32 ft	<div>1 beam</div>  <div>BODY DETECTION according to EN 999</div>	<div><div>Approved as Type 4 per pr EN 50100 - 1/2</div></div>	<div><ul style="list-style-type: none">• Metal connector DIN 43652• Terminal strips<div>120 mm x 50 mm / 4.72 in x 0.02 in</div></div>	<div>40 m / 131.2 ft</div> <div>75 m / 246 ft</div> <div>Long range version</div>	<div>1 beam</div>	<div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>20 ms</div> <div>2 NO + 1 NC</div> <div>■</div> <div>■</div> <div>■</div> <div>□</div> <div>IP 67 NEMA 6 ① IP 65 NEMA 4 ②</div> <div>120 Vac 230 Vac 24 Vdc</div>																
TYPE 4	<div>Harsh-duty Type 4 access detection systems with relay outputs</div> 	<div>Heavy industry and material conversion</div> <ul style="list-style-type: none">Access detection for perimeter protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.Access detection at the rear of a press brakeMax. length of a U-shaped perimeter: 60 m / 196.8 ft	<div>2 or 3 beams</div>  <div>BODY DETECTION according to EN 999</div>	<div><div>Approved as Type 4 per pr EN 50100 - 1/2</div></div>	<div><ul style="list-style-type: none">• Metal connector DIN 43652<table><tr><td></td><td>mm</td><td>in</td></tr><tr><td>a</td><td>1170</td><td>46.09</td></tr><tr><td>b</td><td>200</td><td>7.88</td></tr><tr><td>c</td><td>128</td><td>5.04</td></tr><tr><td>d</td><td>133,2</td><td>5.24</td></tr></table></div>		mm	in	a	1170	46.09	b	200	7.88	c	128	5.04	d	133,2	5.24	<div>2-beam systems</div> <div>0 to 20 m / 0 to 65.6 ft</div> <div>5 m to 75 m / 16.4 ft to 246 ft</div> <div>3-beam systems</div> <div>0 to 8 m / 0 to 26.24 ft</div> <div>5 m to 75 m / 16.4 ft to 246 ft</div>	<div>500 mm to 800 mm / 19.7 in to 31.52 in</div>	<div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>20 ms</div> <div>2 NO + 1 NC</div> <div>■</div> <div>■</div> <div>□</div> <div>IP 65 NEMA 4</div>	
							mm	in																
a	1170	46.09																						
b	200	7.88																						
c	128	5.04																						
d	133,2	5.24																						

Multiple Light Beams for Access Detection into Low Risk Areas

	TYPICAL APPLICATIONS		RESOLUTION	APPROVALS	ELECTRICAL CONNECTION	DIMENSIONS OF THE PROTECTED AREA														
					DIMENSIONS			SCANNING RANGE (m/ft)	PROTECTION HEIGHT (mm/in)	Automatic restart	Start & Restart Interlock	Test Input	FSD monitoring	Response time	Static outputs	Relay outputs	Self-diagnostic indicator	Output status indicator	Muting	
TYPE 2	<div>Type 2 light curtain with integrated muting</div> 	<div>Light industry and material conversion, transportation and storage:</div> <ul style="list-style-type: none">• Palletisers• Access detection for robotic areas• Access detection in transfer areas• Perimetric protection• Max. length of a U-shaped perimeter: 36,45 m / 119.58 ft	<div>2, 3, 4 beams</div>  <div>BODY DETECTION ø184 mm/7.24 in</div>	 <div>CE</div> <div>Approved as Type 2 per EN 50100 - 1/2</div>	<div>• M12 (5 pin, 8 pin)</div>  <div>35 mm x 40 mm / 1.38 in x 1.57 in</div>	 <div>0,5 m to 45 m / 1.64 ft to 147.64 ft</div>	<div>500 mm to 900 mm / 19.7 in to 35.46 in</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>28 to 30 ms</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>IP 65 NEMA 4</div>	<div>Sensors: 24 Vdc</div>	<div>FF-SLG234</div> 	FF-SLB
TYPE 2	<div>Type 2 single beam with separate control unit and relay outputs</div> 	<div>Light industry and material conversion, transportation and storage:</div> <ul style="list-style-type: none">• Access detection for robotic areas :• Packaging OEMs• Textile Machinery Industries• Automated industrial warehousing systems• Handling, palletising/de-palletising systems• Assembly lines	<div>1 to 4 beams</div>  <div>BODY DETECTION according to EN 999</div>	 <div>CE</div> <div>Approved as Type 2 according to IEC/EN 61496-1/2</div>	<div>• M8 connector</div>  <div>25 mm x 15 mm / 0.98 in x 0.59 in</div>	 <div>0,8 m to 6 m / 2.6 ft to 16.7 ft</div>	<div>1 to 4 beams</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>■</div>	<div>28 to 30 ms</div>	<div>2 NO + 1 NC</div>	<div>■</div>	<div>■</div>	<div>□</div>	<div>■</div>	<div>IP 65 NEMA 4</div>	<div>Sensors: 24 Vdc</div>	

❑ Through external accessory

FF-SLG234



FF-SLB







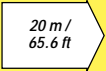





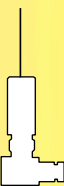
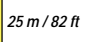
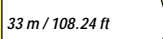

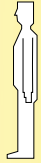



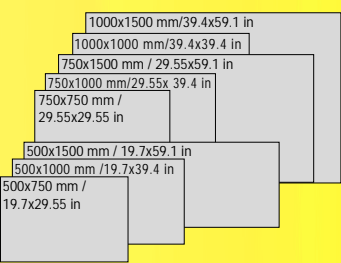





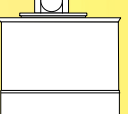
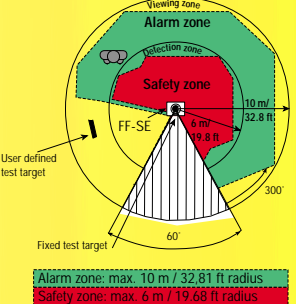



FF-SLG234

FF-SLB


Electro-Sensitive Protective Equipment for Presence Detection

in Hazardous Areas

	TYPICAL APPLICATIONS	RESOLUTION	APPROVALS	ELECTRICAL CONNECTION	DIMENSIONS OF THE PROTECTED AREA																			
					SCANNING RANGE (m/ft)	PROTECTION HEIGHT (mm/in)	Automatic restart	Start & Restart Interlock	Test input	FSD monitoring	Response time	Static outputs	Relay outputs	Self diagnostic indicator	Output status indicator	Cross-talk detection reduction	Muting	Cascading	Weld splash protection	Sealing	Voltage			
TYPE 4	Compact Type 4 light curtain with static safety outputs	Heavy industry and material conversion • Presence detection for: - Robotic and transfer areas - Machinery centers - Palletizing areas - Storage and stacking areas	 BODY DETECTION ø60 mm / 2.36 in	    Approved as Type 4 per IEC/EN 61496-1/2	 60 mm x 42 mm/ 2.36 in x 1.65 in	 20 m / 65.6 ft	 320 mm to 1760 mm / 25.2 in to 63.04 in	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	14 ms to 23 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65 NEMA 4	24 Vdc	 FF-SYA60	FF-SYA
	TYPE 4	Type 4 modular light curtain with M18 sensors and separate control unit with relay outputs	Heavy industry and material conversion • Protection on palletising areas • Presence detection of areas containing robots or automatic machines • Detection of automatic guided vehicles • Thermoforming, agglomerating and moulding presses	 BODY DETECTION according to EN 999	  Approved as Type 4 per pr EN 50100 - 1/2	 99 mm x Ø18 mm/ 3.9 in x 0.7 in	 25 m / 82 ft  33 m / 108.24 ft	2 to 8 beams	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	30 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sensors: IP 67 NEMA 6	120 Vac 230 Vac 24 to 48 Vdc	 FF-SCAN	
CAT.3 / CAT.4	Category 3 Pressure sensitive mat and separate control unit with relay outputs	Heavy industry and material conversion • Presence sensing device for the control of dangerous areas such as robot areas, automotive transfer lines • Additional protection for optoelectronic trip devices • Suitable for cutting oils, welding splashes, shavings, etc.	 BODY DETECTION Sensitivity ≥ 30 kg/66 lbs	  EN 1760 Mat Category 3 EN 954-1 Control unit: Category 4 EN 954-1	 • Terminal strips (cable glands) for control unit • Fiber optic cables for safety mat • Max. surface per control unit: 6 m²/64.5 ft² • Width: ≤ 20 mm/0.78 in • Dimensions of the control unit: 211 x 211 x 96 mm/ 8.31 x 8.31 x 3.78 in	Standard dimensions available:  1000x1500 mm / 39.4x59.1 in 1000x1000 mm / 39.4x39.4 in 750x1500 mm / 29.55x59.1 in 750x1000 mm / 29.55x39.4 in 750x750 mm / 29.55x29.55 in 500x1500 mm / 19.7x59.1 in 500x1000 mm / 19.7x39.4 in 500x750 mm / 19.7x29.55 in		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	25 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sensor: IP 67 Control unit: IP 65	120 Vac 240 Vac 24 Vdc	 FF-SM	FF-SM	
	TYPE 3	Category 3 laser scanner with relay outputs	Light industry • Ground level trip device • Industrial robot areas • Automatically guided vehicles • For the control of large areas of any shape • Suitable for relatively clean environments	 BODY DETECTION ø70 mm / 2.75 in	  1998  Approved as Type 3 according to IEC/EN 61496-1/2	 172 x 176 x 107 mm/ 6.77 x 6.93 x 4.21 in	 Viewing zone Alarm zone Safety zone FF-SE User defined test target Fixed test target Alarm zone: max. 10 m / 32.81 ft radius Safety zone: max. 6 m / 19.68 ft radius		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	280 ms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IP 65	24 Vdc	 FF-SE	FF-SE	

☐ Through external accessory

Safety Sensitive Edges

CATEGORY 4	TYPICAL APPLICATIONS		DETECTION CAPABILITY	APPROVALS	ELECTRICAL CONNECTION	DIMENSIONS OF THE PROTECTED ZONE SCANNING RANGE (m/ft)	FF-SD										
	DIMENSIONS																
	Safety Sensitive Edges	<ul style="list-style-type: none">Industrial doors (sectional doors, sliding doors, etc.)- Machine guards and doors- Auto-Guided vehicle- Automatic handling systems or manipulators (robots, material feeding systems, etc.)	<div><div>FINGER DETECTION</div><div>HAND DETECTION</div><div>BODY DETECTION</div></div>	<div><div>BG</div><div>UL</div><div>CE</div><div>Suitable for interfaces up to CATEGORY 4 per EN 954-1</div></div>	Electrical Connection: 3 wires	<div>0,4 m to 10 m / 1.31 ft to 32.8 ft</div>	<div>Automatic restart</div>	<div>Start & Restart Interlock</div>	<div>FSD monitoring</div>	<div>Response time of the control unit</div>	<div>Auxiliary static outputs</div>	<div>Relay outputs</div>	<div>Muting</div>	<div>Output status indicator</div>	<div>Sealing</div>	<div>Voltage</div>	FF-SD
							<div>■</div>	<div>■</div>	<div>■</div>	<div>32 ms</div>	<div>1</div>	<div>2 NO</div>	<div>■</div>	<div>■</div>	<div>Sensors: IP 68 Control unit: IP 40</div>	<div>24 Vdc</div>	<div></div>

Non Contact Safety Switches

CATEGORY 3	TYPICAL APPLICATIONS		DETECTION CAPABILITY	APPROVALS	ELECTRICAL CONNECTION	FUNCTION												FF-SNC	
					DIMENSIONS														
	Safety magnetic multi-sensor system	<ul style="list-style-type: none">Interlocking guards for non-locked mechanical screens offering free accessMachine door or casing position detectionGuard-in-place detection, gate or access door detectionControl of mechanical screens used in addition to a safety light curtainMeet the requirements of the following industries: Food & Beverage	Operating range: 5 mm - 7 mm / 0.20 in - 0.27 in ON, 8 mm - 12 mm / 0.32 in - 0.47 in OFF	<div>CE</div> <div>UL</div> <div>Suitable for interfaces IEC 61507 Category 3 per EN 954-1</div> <div>TÜV NORD</div>	Electrical Connection: 2 wires	<ul style="list-style-type: none">FF-SNC200R2/ FF-SNC1EXT W: 22,5/0.88 H: 84/3.30 D: 119/4.68FF-SNC400R2/ FF-SNC400RE W: 75/2.95 H: 74/2.91 D: 119/4.68	<ul style="list-style-type: none">Tamper resistant keyed magnetic field actuated sensorsMulti-sensor safety control module	Automatic restart	Start & Restart Interlock	Test input	FSD monitoring	Response time of the control unit	Static outputs	Relay outputs	Output status indicator	Cascading	Sealing	Voltage	<div>FF-SNC</div>



FF-ST2 Series

Type 2 Safety Light Curtains

DESCRIPTION

The FF-ST2 Series is designed for hazardous point-of-operation or access detection industrial machine safeguarding applications. Its enhanced output stage design provides longer cable length through M12 plugs. The Honeywell patented push-pull type OSSD outputs allow for low impedance at any time, while regular open collector type OSSD outputs have high impedance when OFF. As a result, the M12 limited wire section is no longer a constraint.

ASIC technology provides fast response times compared to the micro-processor technology commonly used for safety light curtains. The FF-ST2 light curtain response times are worst-case response times including the sensor and the output stage, and possible OSSD outputs failure modes. Fast response times contribute to shortened safety distances and reduced overall machine size.

The sturdy metal housing (including zamak end caps), and a small window that reduces exposure to the environment, allow the FF-ST2 to operate in most harsh duty applications.

Accessories include mounting kits, connectors, power supply, and relay modules.

FEATURES

- Type 2 per IEC61496-1/2, SIL2 per IEC61508
- Resolutions: 18 mm, 30 mm, 80 mm
- Protection heights: 200 mm to 1400 mm (18 mm resolution) or 200 mm to 1800 mm (30 mm and 80 mm resolutions)
- Scanning range: 0.25 m to 10 m
- Patented, unique solid state safety OSSD outputs allow longer cable length
- M12, 5 pole plugs
- ASIC technology provides fast response times
- Metal housing and reduced window size provide sturdy design
- Optimized overall size with reduced inactive zones
- Different function packages available

⚠ DANGER

IMPROPER SAFETY PRODUCT USE IN THE US

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 do not meet US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution.
- For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and refer to the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

Failure to comply with these instructions will result in death or serious injury.

POTENTIAL APPLICATIONS

- Automotive plant floor industry
- Food and beverage industry
- Handling industry
- Machine tool industry
- Packaging industry
- Paper industry
- Special machines

FF-ST2 Series

SPECIFICATIONS

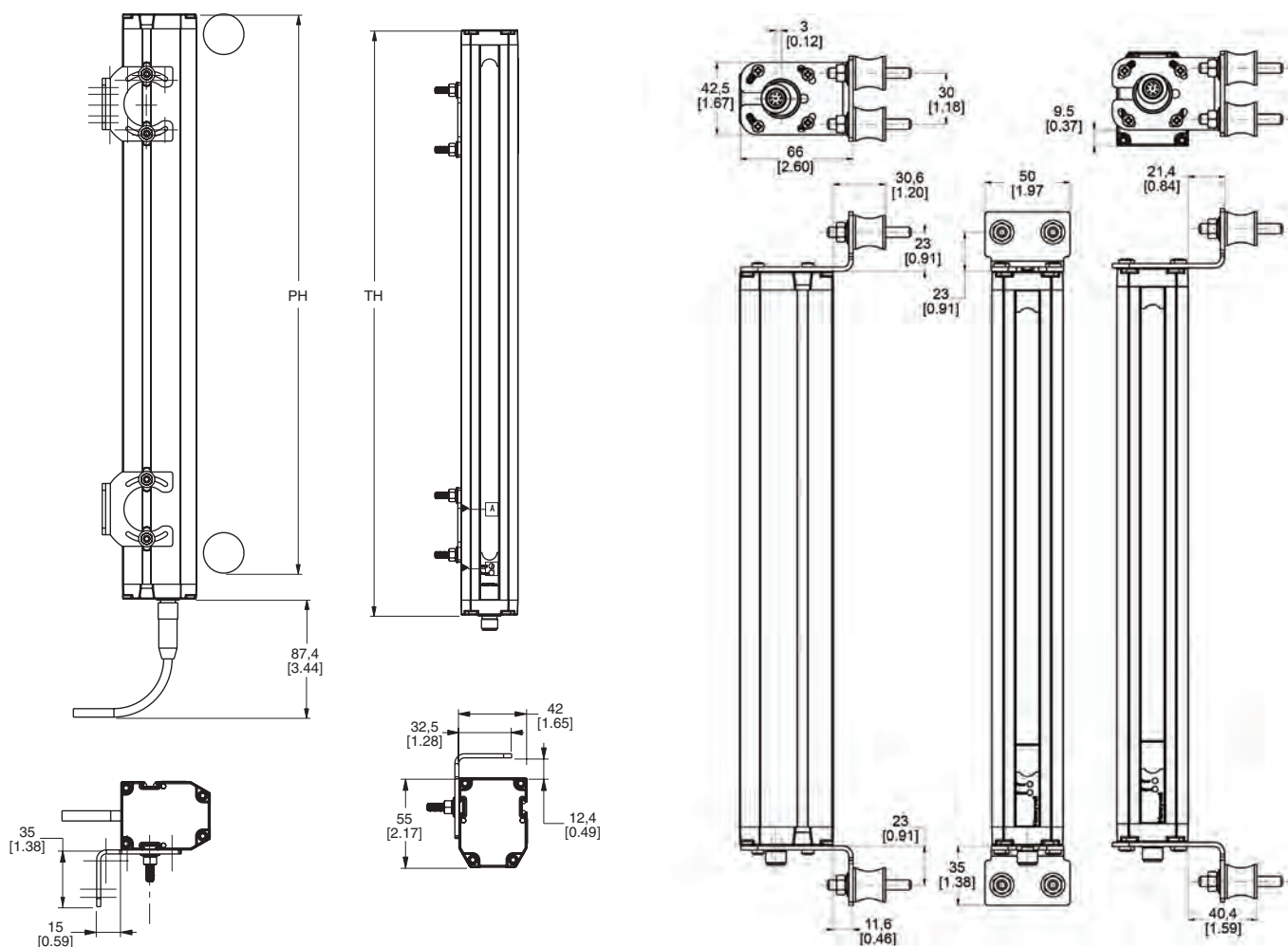
Characteristic	Parameter
Resolution (min. object detection size)	18 mm, 30 mm, 80 mm
Nominal scanning range	0.25 m to 10 m
Angle of divergence	max. $\pm 5^\circ$ above 3 m (as per IEC/EN 61496-2)
Emitting light source	infrared, pulsed, 880 nm
Supply voltage	24 Vdc ($\pm 20\%$) for the emitter and the receiver
Power consumption	5 W max. for the emitter, 5 W max. for the receiver
Output type	2 safety solid state outputs, push-pull/PNP type with Normally Open characteristics
Response time	see mounting dimension drawing
Switching capability	350 mA max. at 24 Vdc
Restart time after power up	>1 s (automatic mode)
Restart time after beam release	80 ms (without EDM), 150 ms (with EDM)
Leakage current	0.25 mA
Load impedance	70 Ohm min., 5 kOhm max.
Voltage drop	<2.3 Vdc
Load turn-on voltage	5 V min. on resistive loads, 7 V min. on inductive loads
Test pulse width/recurrence	2 pulses (width 200 us and 75 us), separated by 300 us, frequency from 3.3 ms to 8 ms (depending on height)
Protections	short-circuits and cross-faults, overloads (0.4 A max./0 Vdc; 0.9 A max./24 Vdc), reversed polarity, micro-cut-off 10 ms (100% voltage breakdown, 10 Hz)
Max. cable length	100 m [328.08 ft] (capacitance: 10 nF)
External contact type	relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition - no push-pull output allowed)
Filtering time	20 ms by default, 150 ms on the EDM input
Voltage switching thresholds (high/low)	14.5 Vdc min., 4.5 Vdc (complies with IEC 61131-2, for type 2 sensors)
Input current (high/low)	20 mA; 10 mA at 24 Vdc
Max. voltage	29 Vdc
Housing material	aluminum alloy
End cap material	zamak
Window material	PMMA (Polymethylmethacrylate)

FUNCTION PACKAGES

Models	External Device Monitoring (EDM)	Automatic Restart (AUTO)	Restart Interlock (RES)
FF-ST2 Standard A	X	X	-
FF-ST2 Standard M	X	-	X

Type 2 Safety Light Curtains

MOUNTING DIMENSIONS (For reference only: mm/[in])



FF-ST2X_XM2	02	03	04	05	06	07	08	09	10	12	14	16	18
Protection Height PH (mm)													
18 mm resolution	210	306	402	498	594	690	786	-	978	1170	1362	NA	NA
30 mm, 80 mm resolution	222	318	414	510	606	702	798	894	990	1182	1374	1566	1758
Total Height TH (mm)	242	338	434	530	626	722	818	914	1010	1202	1394	1586	1778
Response Time (ms)													
18 mm resolution	11	12	12.5	13	14	14.5	15.5	-	16.5	18	19.5	NA	NA
30 mm resolution	11	12	12.5	13	14	14.5	15.5	16	16.5	18	19.5	21	22
80 mm resolution	13.5	14.5	15.5	16	17	18	19	20	21	23	24.5	26.5	28.5

NA: not available

FF-ST2 Series

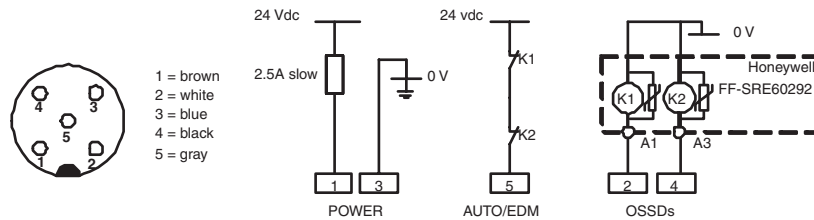
ORDERING INFORMATION

Function package Automatic restart with external device monitoring
Connection types M12, 5 pole on emitter and receiver

FF-ST2 Standard A

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), negating the need for a dedicated interface module.

RECEIVER WIRING DIAGRAM



FINGER DETECTION

Resolution 18 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing
200	FF-ST2B02CM2
300	FF-ST2B03CM2
400	FF-ST2B04CM2
500	FF-ST2B05CM2
600	FF-ST2B06CM2
700	FF-ST2B07CM2
800	FF-ST2B08CM2
1000	FF-ST2B10CM2
1200	FF-ST2B12CM2
1400	FF-ST2B14CM2

HAND, LIMB OR BODY DETECTION

Resolution 30 mm, Scanning Range 0.25 m to 10 m		Resolution 80 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST2C02CM2	200	FF-ST2C02LM2
300	FF-ST2C03CM2	300	FF-ST2C03LM2
400	FF-ST2C04CM2	400	FF-ST2C04LM2
500	FF-ST2C05CM2	500	FF-ST2C05LM2
600	FF-ST2C06CM2	600	FF-ST2C06LM2
700	FF-ST2C07CM2	700	FF-ST2C07LM2
800	FF-ST2C08CM2	800	FF-ST2C08LM2
900	FF-ST2C09CM2	900	FF-ST2C09LM2
1000	FF-ST2C10CM2	1000	FF-ST2C10LM2
1200	FF-ST2C12CM2	1200	FF-ST2C12LM2
1400	FF-ST2C14CM2	1400	FF-ST2C14LM2
1600	FF-ST2C16CM2	1600	FF-ST2C16LM2
1800	FF-ST2C18CM2	1800	FF-ST2C18LM2

Type 2 Safety Light Curtains

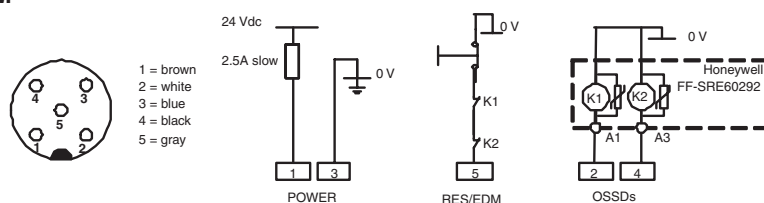
ORDERING INFORMATION

Function package Manual restart interlock with external device monitoring
 Connection types M12, 5 pole on emitter and receiver

FF-ST2 Standard M

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), eliminating the need for a dedicated interface module.

RECEIVER WIRING DIAGRAM



FINGER DETECTION



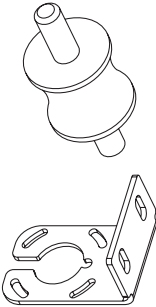


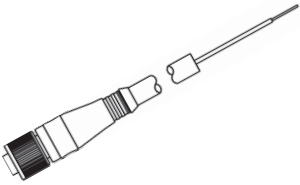
Resolution 18 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing
200	FF-ST2B02BM2
300	FF-ST2B03BM2
400	FF-ST2B04BM2
500	FF-ST2B05BM2
600	FF-ST2B06BM2
700	FF-ST2B07BM2
800	FF-ST2B08BM2
1000	FF-ST2B10BM2
1200	FF-ST2B12BM2
1400	FF-ST2B14BM2

HAND, LIMB OR BODY DETECTION

Resolution 30 mm, Scanning Range 0.25 m to 10 m		Resolution 80 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST2C02BM2	200	FF-ST2C02KM2
300	FF-ST2C03BM2	300	FF-ST2C03KM2
400	FF-ST2C04BM2	400	FF-ST2C04KM2
500	FF-ST2C05BM2	500	FF-ST2C05KM2
600	FF-ST2C06BM2	600	FF-ST2C06KM2
700	FF-ST2C07BM2	700	FF-ST2C07KM2
800	FF-ST2C08BM2	800	FF-ST2C08KM2
900	FF-ST2C09BM2	900	FF-ST2C09KM2
1000	FF-ST2C10BM2	1000	FF-ST2C10KM2
1200	FF-ST2C12BM2	1200	FF-ST2C12KM2
1400	FF-ST2C14BM2	1400	FF-ST2C14KM2
1600	FF-ST2C16BM2	1600	FF-ST2C16KM2
1800	FF-ST2C18BM2	1800	FF-ST2C18KM2

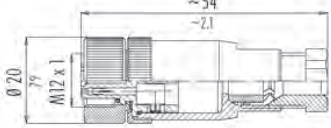
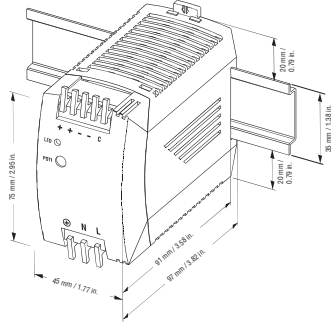


FF-ST2 Series

ACCESSORIES

Catalog Listing	Picture	Description
FF-SGZ001001		Basic mounting kit includes two M5 dovetail shape bolts, two M5 nuts and two rip-lock washers. (These are already included in the FF-ST package.) Order two kits for a complete set to use with emitter and receiver.
FF-SXZ634189		Adjustable bracket kit includes two right angle brackets with four sets of M5 bolts, nuts and washers. Allows adjustments in azimuth directions of $\pm 4^\circ$ with front access of the adjusting screws. Order two kits for a complete set to use with emitter and receiver.
FF-SXZ634190 FF-SXZ634190-1		Kit includes two top/bottom, right angle, rotating brackets and four anti-vibration dampers (mounting hardware included). Allows adjustments in azimuth directions of $\pm 5^\circ$. Order two kits for a complete set to use with emitter and receiver. <ul style="list-style-type: none"> • FF-SXZ634190: with anti-vibration dampers • FF-SXZ634190-1: without anti-vibration dampers
FF-SYZPF FF-SYZPFM11		Floor standing posts. <ul style="list-style-type: none"> • 1300 mm high beam post. (Order two pieces for a complete light curtain set and two FF-SYZ634178 bracket kits.) • 1170 mm high plain mirror post (25% scanning range reduction). Recommended for light curtains with a protection height of up to 1000 mm.
FF-SYZMIR102 FF-SYZMIR104 FF-SYZMIR106 FF-SYZMIR108 FF-SYZMIR110 FF-SYZMIR112 FF-SYZMIR114 FF-SYZMIR116 FF-SYZMIR118		Wall mount plain mirrors (25% scanning range reduction). Top and bottom brackets included ($\pm 45^\circ$ angle adjustment). Suitable for: <ul style="list-style-type: none"> • FF-ST__02_M2 • FF-ST__03_M2 and FF-ST__04_M2 • FF-ST__05_M2 and FF-ST__06_M2 • FF-ST__07_M2 and FF-ST__08_M2 • FF-ST__09_M2 and FF-ST__10_M2 • FF-ST__12_M2 • FF-ST__14_M2 • FF-ST__16_M2 • FF-ST__18_M2
FF-SXZCAM125U02-S FF-SXZCAM125U05-S FF-SXZCAM125U05-90S FF-SXZCAM125U10-S FF-SXZCAM125U10-90S FF-SXZCAM128U02-S FF-SXZCAM128U05-S FF-SXZCAM128U05-90S FF-SXZCAM128U10-S FF-SXZCAM128U10-90S		M12 single-ended cordsets, female, 5 pin. <ul style="list-style-type: none"> • 2 m, straight • 5 m, straight • 5 m, right angle • 10 m, straight • 10 m, right angle M12 single-ended cordsets, female, 8 pin. <ul style="list-style-type: none"> • 2 m, straight • 5 m, straight • 5 m, right angle • 10 m, straight • 10 m, right angle

Type 2 Safety Light Curtains

ACCESSORIES (continued)

Catalog Listing	Picture	Description
FF-SXZCOM125		M12 screw connector, female, straight, 5 pin
FF-SXZPWR050		ac to dc power supply (to be ordered separately as an option) <ul style="list-style-type: none"> UL508 listed, UL1950, cUL/CSA-C22.2 No. 950-M90, EN/IEC 60950, EN 50178 (Class 2 rated for low power Installations) Input voltage: 85 Vac to 264 Vac (43 Hz to 67 Hz) Output voltage: 24 Vdc to 28 Vdc adjustable Rated continuous load (at 60 °C [140 °F] max.): 2.1 A at 24 Vdc/ 1.8 A at 28 Vdc Power: 50 W Dimensions: 75 mm x 45 mm x 97 mm DIN rail mounting Weight: 240 g
FF-SRE60292 FF-SRE30812		Expansion relay modules for the FF-ST2 Standard A and Standard M models <ul style="list-style-type: none"> 22.5 mm width, 4 NO/2 NC safety relay outputs 90 mm width, 7 NO/1 NC safety relay outputs <p>(See separate product data sheet for detailed information.)</p>
FF-SRM200P2		Muting module <ul style="list-style-type: none"> Connection of one or two safety devices Modes of operation: unidirectional or bidirectional muting, mutual exclusion Connection of two or four auxiliary muting sensors 24 Vdc Category 4 per EN 954-1 Programmable max. muting time Crossfault monitoring of inputs Self-monitored muting lamp output 3 NO safety relay outputs Static outputs for output status and diagnostic information 45 mm [1.77 in]



WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details.

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

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Honeywell



FF-ST4 Series

Type 4 Safety Light Curtains

DESCRIPTION

The FF-ST4 Series is designed for hazardous point-of-operation or access detection in industrial machine safeguarding applications. Its enhanced output stage design provides longer cable length through M12 plugs. The Honeywell patented push-pull type OSSD outputs allow for low impedance at any time, while regular open collector type OSSD outputs have high impedance when OFF. As a result, the M12 limited wire section is no longer a constraint.

ASIC technology provides fast response times compared to the micro-processor technology commonly used for safety light curtains. The FF-ST4 light curtain response times are worst-case response times including the sensor and the output stage, the embedded functions processing such as blanking or muting, and possible OSSD output failure modes. Fast response times contribute to shortened safety distances and reduced overall machine size.

Some models offer flexible configuration of different mode of operations through the M12, 8 pole plug. The Honeywell patented inputs with automatic polarity recognition reduce the amount of wiring and increase the number of configurations while keeping the advantages of the pre-wired, off-the shelf M12 cord sets.

The sturdy metal housing (including zamak end caps), and a small window that reduces exposure to the environment, allow the FF-ST4 to operate in most harsh duty applications.

Accessories include mounting kits, connectors, power supply, and relay modules.

FEATURES

- Type 4 per IEC61496-1/2, SIL2 per IEC61508
- Resolutions: 14 mm, 30 mm, 80 mm
- Protection heights: 200 mm to 1400 mm (14 mm and 18 mm resolution) or 200 mm to 1800 mm (30 mm and 80 mm resolution)
- Scanning ranges: 0 m to 3.5 m (14 mm resolution) or 0.25 mm to 10 m (other resolutions)
- Patented, unique solid state safety OSSD outputs allow longer cable lengths
- Patented, automatic polarity recognition inputs provide easy, last minute configuration
- M12, 5 and 8 pole plugs
- ASIC technology provides fast response times
- Metal housing and reduced window size provide sturdy design
- Optimized overall size with reduced inactive zones
- Different function packages available
- Optional AS-i Safe field module

POTENTIAL APPLICATIONS

- Automotive plant floor industry
- Food and beverage industry
- Handling industry
- Machine tool industry
- Packaging industry
- Paper industry
- Special machines

FF-ST4 Series

SPECIFICATIONS

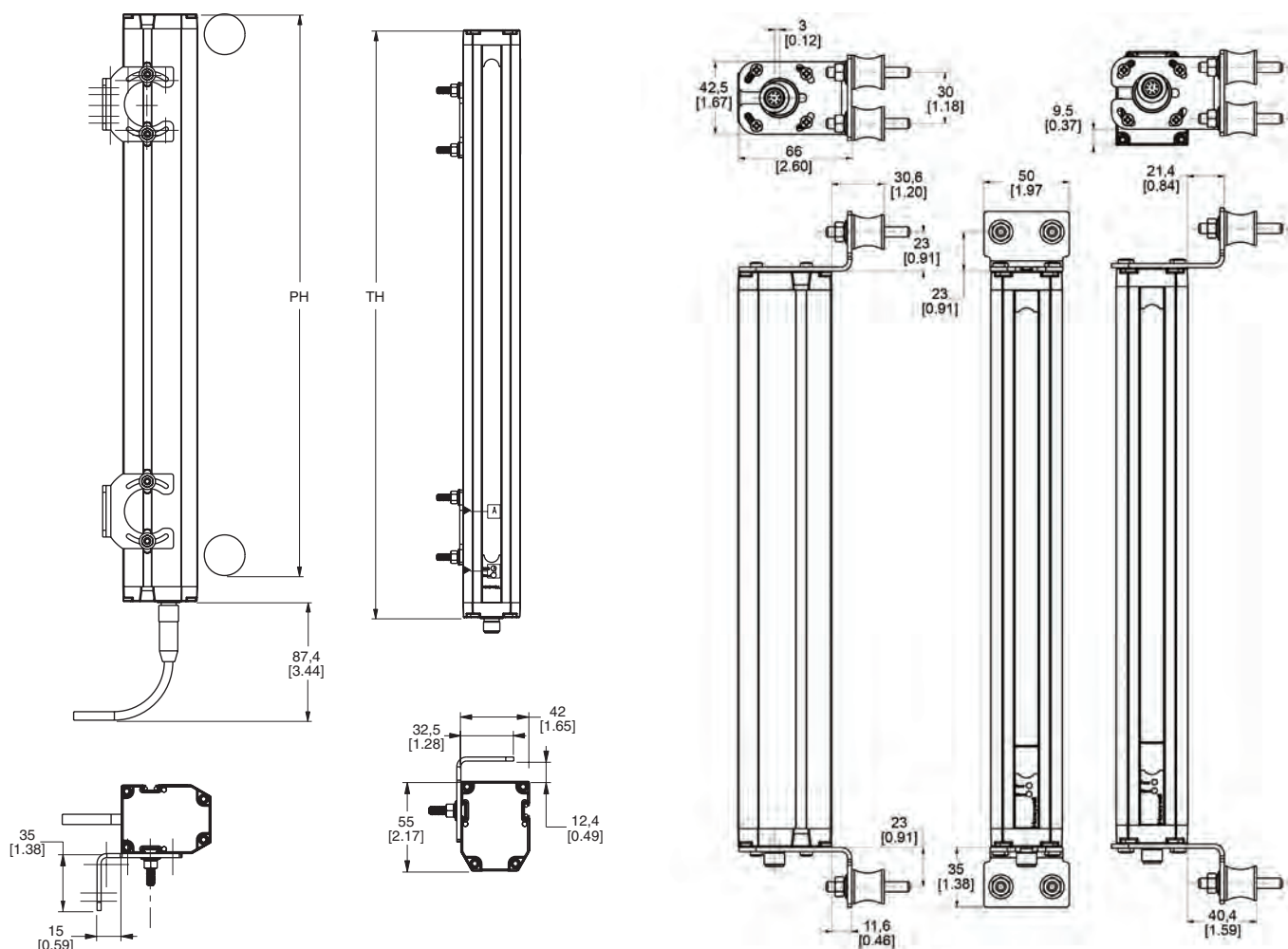
Characteristic	Parameter
Resolution (min. object detection size)	14 mm, 18 mm, 30 mm, 80 mm
Nominal scanning range	0 m to 3.5 m (for 14 mm resolution); 0.25 m to 10 m (for 18 mm, 30 mm, 80 mm resolutions)
Angle of divergence	max. $\pm 5^\circ$ above 3 m (as per IEC/EN 61496-2)
Emitting light source	infrared, pulsed, 880 nm
Supply voltage	24 Vdc ($\pm 20\%$) for the emitter and the receiver
Power consumption	5 W max. for the emitter, 5 W max. for the receiver
Output type	2 safety solid state outputs, push-pull/PNP type with Normally Open characteristics
Response time	see mounting dimensions drawing
Switching capability	350 mA max. at 24 Vdc
Restart time after power up	>1 s (automatic mode)
Restart time after beam release	80 ms (without EDM), 150 ms (with EDM)
Leakage current	0.25 mA
Load impedance	70 Ohm min., 5 kOhm max.
Voltage drop	<2.3 Vdc
Load turn-on voltage	5 V min. on resistive loads, 7 V min. on inductive loads
Test pulse width/recurrence	2 pulses (width 200 us and 75 us), separated by 300 us, frequency from 3.3 ms to 8 ms (depending on height)
Protections	short-circuits and cross-faults, overloads (0.4 A max./0 Vdc; 0.9 A max./24 Vdc), reversed polarity, micro-cut-off 10 ms (100% voltage breakdown, 10 Hz)
Max. cable length	100 m [328.08 ft] (capacitance: 10 nF)
External contact type	relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition - no push-pull output allowed)
Filtering time	20 ms by default, 150 ms on the EDM input
Voltage switching thresholds (high/low)	14.5 Vdc min., 4.5 Vdc (complies with IEC 61131-2, for type 2 sensors)
Input current (high/low)	20 mA; 10 mA at 24 Vdc
Max. voltage	29 Vdc
Housing material	aluminum alloy
End cap material	zamak
Window material	PMMA (Polymethylmethacrylate)

FUNCTION PACKAGES

Model	External Device Monitoring (EDM)	Automatic Restart (AUTO)	Restart Interlock (RES)	Muting (or Bypass)	One or Two Beam Floating Blanking	AS-i Safe
FF-ST4 Basic	-	X	-	-	-	X
FF-ST4 Standard	X	X	X	-	-	-
FF-ST4 Advanced M	X	X	X	X	-	-
FF-ST4 Advanced B	X	X	X	-	X	-

Type 4 Safety Light Curtains

MOUNTING DIMENSIONS (For reference only: mm/[in])



FF-ST4X_XM2	02	03	04	05	06	07	08	09	10	12	14	16	18
Protection Height PH (mm)													
14 mm resolution	206	302	398	494	590	686	782	-	974	1166	1358	NA	NA
18 mm resolution	210	306	402	498	594	690	786	-	978	1170	1362	NA	NA
30 mm, 80 mm resolution	222	318	414	510	606	702	798	894	990	1182	1374	1566	1758
Total Height TH (mm)	242	338	434	530	626	722	818	914	1010	1202	1394	1586	1778
Response Time (ms)*													
14 mm, 18 mm resolution	11	12	12.5	13	14	14.5	15.5	-	16.5	18	19.5	NA	NA
30 mm resolution	11	12	12.5	13	14	14.5	15.5	16	16.5	18	19.5	21	22
80 mm resolution	13.5	14.5	15.5	16	17	18	19	20	21	23	24.5	26.5	28.5

NA: not available

(*) without blanking

FF-ST4 Series

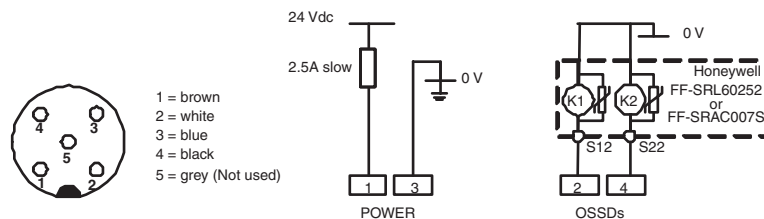
ORDERING INFORMATION

Function package Automatic restart without external device monitoring
 Connection types M12/5 pole on emitter and receiver

FF-ST4 Basic

These on/off sensors are designed for the Honeywell FF-SRL60252 relay module or for the Honeywell FF-SRAC007S AS-i Safe field module.

RECEIVER WIRING DIAGRAM



FINGER DETECTION

Resolution 14 mm, Scanning Range 0 m to 3.5 m		Resolution 18 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4A02AM2	200	FF-ST4B02AM2
300	FF-ST4A03AM2	300	FF-ST4B03AM2
400	FF-ST4A04AM2	400	FF-ST4B04AM2
500	FF-ST4A05AM2	500	FF-ST4B05AM2
600	FF-ST4A06AM2	600	FF-ST4B06AM2
700	FF-ST4A07AM2	700	FF-ST4B07AM2
800	FF-ST4A08AM2	800	FF-ST4B08AM2
1000	FF-ST4A10AM2	1000	FF-ST4B10AM2
1200	FF-ST4A12AM2	1200	FF-ST4B12AM2
1400	FF-ST4A14AM2	1400	FF-ST4B14AM2

HAND, LIMB OR BODY DETECTION

Resolution 30 mm, Scanning Range 0.25 m to 10 m		Resolution 80 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4C02AM2	200	FF-ST4C02JM2
300	FF-ST4C03AM2	300	FF-ST4C03JM2
400	FF-ST4C04AM2	400	FF-ST4C04JM2
500	FF-ST4C05AM2	500	FF-ST4C05JM2
600	FF-ST4C06AM2	600	FF-ST4C06JM2
700	FF-ST4C07AM2	700	FF-ST4C07JM2
800	FF-ST4C08AM2	800	FF-ST4C08JM2
900	FF-ST4C09AM2	900	FF-ST4C09JM2
1000	FF-ST4C10AM2	1000	FF-ST4C10JM2
1200	FF-ST4C12AM2	1200	FF-ST4C12JM2
1400	FF-ST4C14AM2	1400	FF-ST4C14JM2
1600	FF-ST4C16AM2	1600	FF-ST4C16JM2
1800	FF-ST4C18AM2	1800	FF-ST4C18JM2

Type 4 Safety Light Curtains

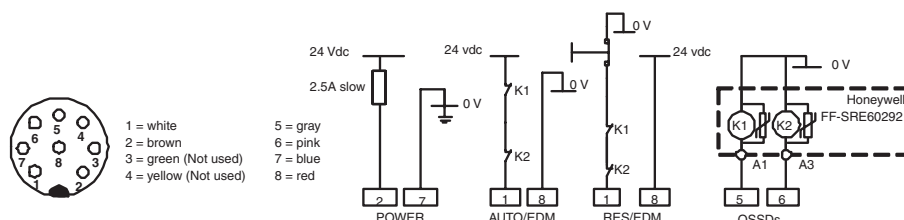
ORDERING INFORMATION

Function package	Selectable automatic or manual restart interlock with external device monitoring
Connection types	M12, 5 pole on emitter and M12, 8 pole on receiver

FF-ST4 Standard

These on/off sensors are designed to be directly interfaced to the machine final switching devices (e.g. contactors), eliminating the need for a dedicated interface module.

RECEIVER WIRING DIAGRAM



FINGER DETECTION

Resolution 14 mm, Scanning Range 0 m to 3.5 m		Resolution 18 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4A02DM2	200	FF-ST4B02DM2
300	FF-ST4A03DM2	300	FF-ST4B03DM2
400	FF-ST4A04DM2	400	FF-ST4B04DM2
500	FF-ST4A05DM2	500	FF-ST4B05DM2
600	FF-ST4A06DM2	600	FF-ST4B06DM2
700	FF-ST4A07DM2	700	FF-ST4B07DM2
800	FF-ST4A08DM2	800	FF-ST4B08DM2
1000	FF-ST4A10DM2	1000	FF-ST4B10DM2
1200	FF-ST4A12DM2	1200	FF-ST4B12DM2
1400	FF-ST4A14DM2	1400	FF-ST4B14DM2

HAND, LIMB OR BODY DETECTION

Resolution 30 mm, Scanning Range 0.25 m to 10 m		Resolution 80 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4C02DM2	200	FF-ST4C02MM2
300	FF-ST4C03DM2	300	FF-ST4C03MM2
400	FF-ST4C04DM2	400	FF-ST4C04MM2
500	FF-ST4C05DM2	500	FF-ST4C05MM2
600	FF-ST4C06DM2	600	FF-ST4C06MM2
700	FF-ST4C07DM2	700	FF-ST4C07MM2
800	FF-ST4C08DM2	800	FF-ST4C08MM2
900	FF-ST4C09DM2	900	FF-ST4C09MM2
1000	FF-ST4C10DM2	1000	FF-ST4C10MM2
1200	FF-ST4C12DM2	1200	FF-ST4C12MM2
1400	FF-ST4C14DM2	1400	FF-ST4C14MM2
1600	FF-ST4C16DM2	1600	FF-ST4C16MM2
1800	FF-ST4C18DM2	1800	FF-ST4C18MM2

Type 4 Safety Light Curtains

ORDERING INFORMATION

FF-ST4 Advanced B

Function package	Selectable automatic or manual restart interlock with external device monitoring and selectable one or two-beam floating blanking
Connection types	M12, 5 pole on emitter and M12, 8 pole on receiver

The built-in floating blanking feature provides a means for the random inhibition of one or two light curtain beams. It is useful in applications where material or air-ejected parts randomly travel through or within the sensing field. Light beams may be disabled in an area where a fixture penetrates the light field, and stationary objects may not be allowed to protrude into the light curtain's sensing field. Any beam within the light curtain detection field may be blanked.

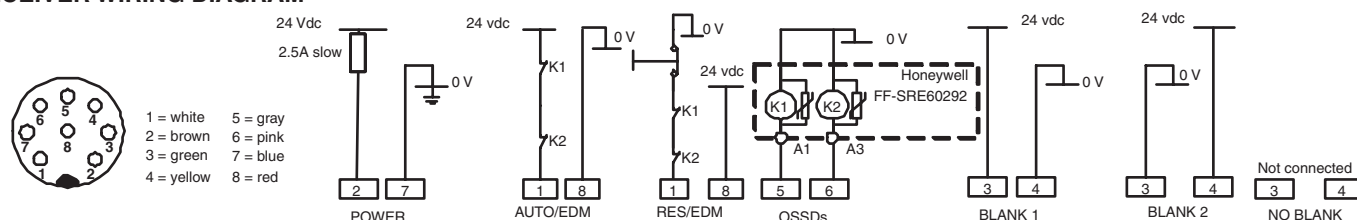
! WARNING

INCORRECT SAFETY DISTANCE WHEN USING FLOATING BLANKING

- Floating blanking increases the light curtain resolution and the response time. Therefore, the safety distance between the light curtain and the hazardous area shall be increased.
- Refer to the installation manual for detailed information on resolution and calculating the safety distance.

Failure to comply with these instructions could result in death or serious injury.

RECEIVER WIRING DIAGRAM



FINGER DETECTION



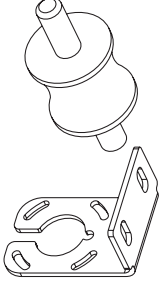


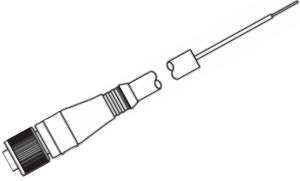
Resolution 14 mm, Scanning Range 0 m to 3.5 m		Resolution 18 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4A02RM2	200	FF-ST4B02RM2
300	FF-ST4A03RM2	300	FF-ST4B03RM2
400	FF-ST4A04RM2	400	FF-ST4B04RM2
500	FF-ST4A05RM2	500	FF-ST4B05RM2
600	FF-ST4A06RM2	600	FF-ST4B06RM2
700	FF-ST4A07RM2	700	FF-ST4B07RM2
800	FF-ST4A08RM2	800	FF-ST4B08RM2
1000	FF-ST4A10RM2	1000	FF-ST4B10RM2
1200	FF-ST4A12RM2	1200	FF-ST4B12RM2
1400	FF-ST4A14RM2	1400	FF-ST4B14RM2

HAND, LIMB OR BODY DETECTION

Resolution 30 mm, Scanning Range 0.25 m to 10 m		Resolution 30 mm, Scanning Range 0.25 m to 10 m	
Protective Height (mm)	Catalog Listing	Protective Height (mm)	Catalog Listing
200	FF-ST4C02RM2	900	FF-ST4C09RM2
300	FF-ST4C03RM2	1000	FF-ST4C10RM2
400	FF-ST4C04RM2	1200	FF-ST4C12RM2
500	FF-ST4C05RM2	1400	FF-ST4C14RM2
600	FF-ST4C06RM2	1600	FF-ST4C16RM2
700	FF-ST4C07RM2	1800	FF-ST4C18RM2
800	FF-ST4C08RM2		

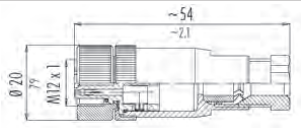
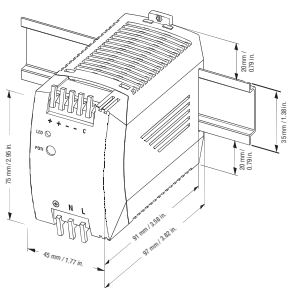





FF-ST4 Series

ACCESSORIES

Catalog Listing	Picture	Description
FF-SGZ001001		Basic mounting kit includes two M5 dovetail shape bolts, two M5 nuts and two rip-lock washers. (These are already included in the FF-ST package.) Order two kits for a complete set to use with emitter and receiver.
FF-SXZ634189		Adjustable bracket kit includes two right angle brackets with four sets of M5 bolts, nuts and washers. Allows adjustments in azimuth directions of $\pm 4^\circ$ with front access of the adjusting screws. Order two kits for a complete set to use with emitter and receiver.
FF-SXZ634190 FF-SXZ634190-1		Kit includes two top/bottom, right angle, rotating brackets and four anti-vibration dampers (mounting hardware included). Allows adjustments in azimuth directions of $\pm 5^\circ$. Order two kits for a complete set to use with emitter and receiver. <ul style="list-style-type: none">• FF-SXZ634190: with anti-vibration dampers• FF-SXZ634190-1: without anti-vibration dampers
FF-SYZPF FF-SYZPFM11		Floor standing posts. <ul style="list-style-type: none">• 1300 mm high beam post. (Order two pieces for a complete light curtain set and two FF-SYZ634178 bracket kits.)• 1170 mm high plain mirror post (25% scanning range reduction). Recommended for light curtains with a protection height of up to 1000 mm.
FF-SYZMIR102 FF-SYZMIR104 FF-SYZMIR106 FF-SYZMIR108 FF-SYZMIR110 FF-SYZMIR112 FF-SYZMIR114 FF-SYZMIR116 FF-SYZMIR118		Wall mount plain mirrors (25% scanning range reduction). Top and bottom brackets included ($\pm 45^\circ$ angle adjustment). Suitable for: <ul style="list-style-type: none">• FF-ST__02__M2• FF-ST__03__M2 and FF-ST__04__M2• FF-ST__05__M2 and FF-ST__06__M2• FF-ST__07__M2 and FF-ST__08__M2• FF-ST__09__M2 and FF-ST__10__M2• FF-ST__12__M2• FF-ST__14__M2• FF-ST__16__M2• FF-ST__18__M2
FF-SXZCAM125U02-S FF-SXZCAM125U05-S FF-SXZCAM125U05-90S FF-SXZCAM125U10-S FF-SXZCAM125U10-90S FF-SXZCAM128U02-S FF-SXZCAM128U05-S FF-SXZCAM128U05-90S FF-SXZCAM128U10-S FF-SXZCAM128U10-90S		M12 single-ended cordsets, female, 5 pin. <ul style="list-style-type: none">• 2 m, straight• 5 m, straight• 5 m, right angle• 10 m, straight• 10 m, right angle M12 single-ended cordsets, female, 8 pin. <ul style="list-style-type: none">• 2 m, straight• 5 m, straight• 5 m, right angle• 10 m, straight• 10 m, right angle

Type 4 Safety Light Curtains

ACCESSORIES (continued)

Catalog Listing	Picture	Description
FF-SXZCOM125 FF-SXZCOM128		M12 screw connector, female, straight, 5 pin M12 screw connector, female, straight, 8 pin
FF-SXZPWR050		ac to dc power supply (ordered separately as an option). <ul style="list-style-type: none"> • UL508 listed, UL1950, cUL/CSA-C22.2 No. 950-M90, EN/IEC 60950, EN 50178 (Class 2 rated for low power installations) • Input voltage: 85 Vac to 264 Vac (43 Hz to 67 Hz) • Output voltage: 24 Vdc to 28 Vdc adjustable • Rated continuous load (at 60 °C [140 °F] max.): 2.1 A at 24 Vdc/ 1.8 A at 28 Vdc • Power: 50 W • Dimensions: 75 mm x 45 mm x 97 mm • DIN rail mounting • Weight: 240 g
FF-SRL60252		Dual channel module for the FF-ST4 Basic models. <ul style="list-style-type: none"> • 22,5 mm width, 3 NO/1 NC internally redundant safety relay outputs (See separate product data sheet for detailed information.)
FF-SRAC007S (input module) FF-SRAC5003 (DIN rail and panel quick mount base for AS-i flat cables) 		AS-i Safe input module for the FF-ST4 basic models. <ul style="list-style-type: none"> • Category 4 per EN954-1 and SIL3 per IEC61508 • Connection of the FF-ST4 emitter and receiver via a pair of M12 sockets • An external power supply is required to power the light curtain through the black flat cable. Order the DIN rail and panel quick mount base for AS-i flat cables: FF-SRAC5003 • Maximum cable length between light curtain and module is 10 m • 31 modules per master module • IP 67 protection rating • Dimensions: 110 mm x 45 mm x 70 mm (with the base) • Material: PA 6 (module), PBT (base) • CE approved, UL/CSA (application approval pending) • AS-i details: versions 2.11 and 3.0, profile S-0.B.E
FF-SRE60292 FF-SRE30812		Expansion relay modules for the FF-ST4 Standard A and Standard M models. <ul style="list-style-type: none"> • 22,5 mm width, 4 NO/2 NC safety relay outputs • 90 mm width, 7 NO/1 NC safety relay outputs (See separate product data sheet for detailed information.)
FF-SRL59022		Presence sensing device initiation module (PSDI) for the automatic machine cycle start to be used with light curtains with a resolution less than or equal to 30 m. (See separate product data sheet for detailed information.)



WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details.

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

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	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
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USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

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Honeywell

Type 4 Safety light curtain

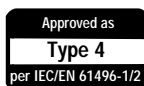
Compact, Universal, Smart and Full-featured

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496 - parts 1 and 2 European norms for Type 4 electrosensitive protective equipment
- Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1.2 and .19; ANSI RIA 15.06 for Control Reliability; CSA standards
- Self-contained with optical synchronisation
- 2 static safety outputs with short-circuit and cross-fault detection
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes: a signal strength indicator, a cross-talk indicator and a failure diagnostic indicator
- Test input with selectable test input type
- Resolutions available:
 - ø14 mm / 0.6 in for finger detection
 - ø30 mm / 1.2 in for hand detection
 - ø60 mm / 2.4 in for leg detection
- Protection height up to 1830 mm / 72 in
- Scanning range up to 20 m / 65 ft
- Electrical connection:
 - Hirschmann N6RFF type connectors,
 - Brad Harrison Mini-Change® connectors
 - Terminal strips
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability or additional features (to be ordered separately).

TYPICAL APPLICATIONS

- Presses and punches
- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Stacking machines, transporting and conveyor technology; handling equipment and assembly lines



FF-SYA

The Honeywell FF-SYA light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). Its CSA mark makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYA de-energizes its two static safety outputs to signal the dangerous motion to stop. The FF-SYA is a self-contained light curtain that does not require a separate control unit for operation. Safety relay modules are available to provide higher current capability and additional functionality. This light curtain has been designed to satisfy the requirements of worldwide machine manufacturers and users: its compact size combined with its universal and smart features makes it full-featured and easy to use.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

The FF-SYA main features are:

- COMPACT SIZE

The cross section of 42 mm² x 55 mm² makes installation possible in tight spaces, especially with the help of the small brackets supplied with the light curtains. The available safety relay modules easily fit inside the machine control panel with its small width DIN rail mount housing.

- UNIVERSAL

The housing dimensions are the same for the 14 mm / 0.6 in, 30 mm / 1.2 in, 60 mm / 2.4 in resolution light curtains. The extended protected heights range from 334 mm to 1830 mm / 13.1 in to 72 in, covering industrial applications. The scanning range makes it possible to use mirrors in system to protect several sides of a machine with only one system.

- SMART

The FF-SYA is equipped with 2 static safety outputs. Compatible safety relay modules are available for a greater output current capability and manual restart functionality. An integrated cross talk reduction system allows the scanning range to be selected for the application distance. A cross-talk

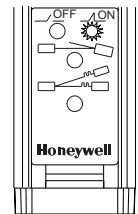
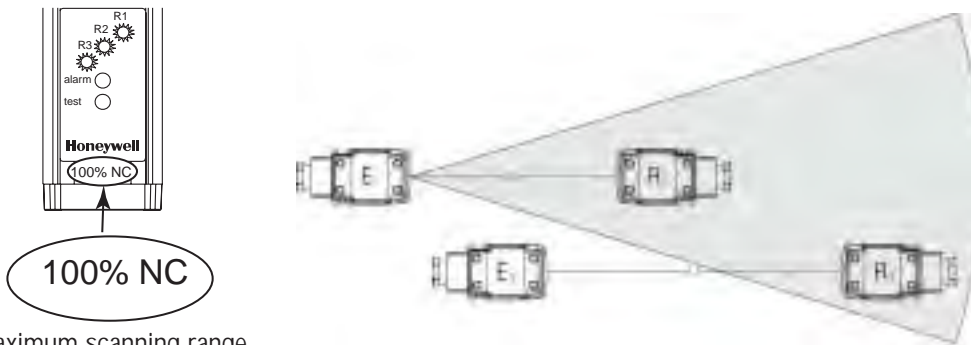
indicator flickers when emission from other systems is detected, indicating that a different selection of the scanning range is needed. The light curtain also has a signal strength indicator which flickers if there is a slight misalignment of the beams or front window contamination. Additional indicators provide information on the outputs status, on the selected scanning range and on failure diagnostic. Standard brackets are delivered with the light curtain to ease the order process. The housing has a T-slot mounting system to adapt brackets anywhere along the lateral sides, the rear sides or at the top and the bottom of the light curtain. Hirschmann connectors are delivered with the FF-SYA□□□□C2 light curtains.

- FULL FEATURED

The integrated test input can be used to test the entire safety chain. The test contact type (NO or NC characteristics) can be selected by internal configuration cards. When connected to the compatible safety relay modules, the FF-SYA provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

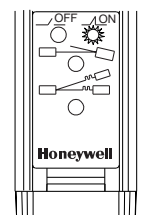
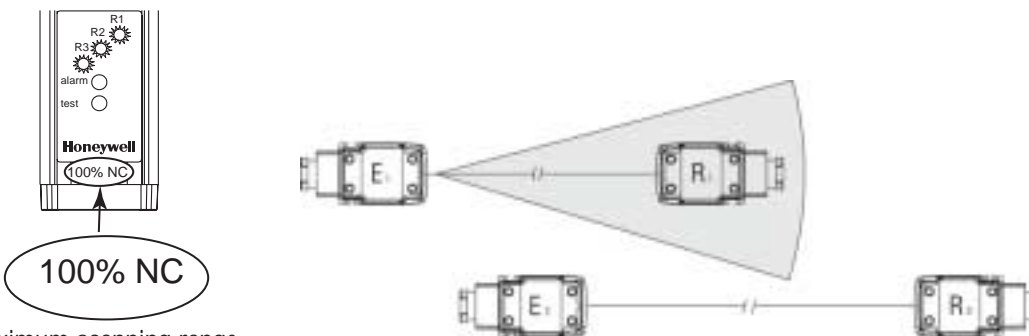
Cross-talk reduction system

The FF-SYA light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.



Maximum scanning range

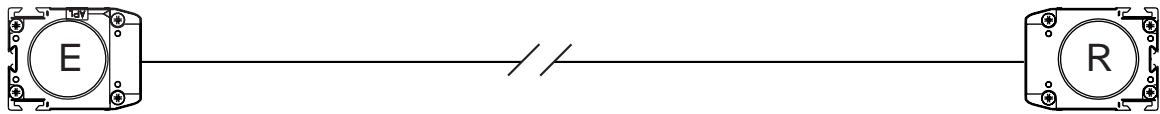
An internal configuration card is available on the emitter units for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the maximum scanning range down to minimum. The end cap can be easily removed, and there is no need to remove the unit from the machinery to select a different scanning range. Products are delivered with a maximum scanning range to ease the alignment process.



Maximum scanning range
(factory setting)

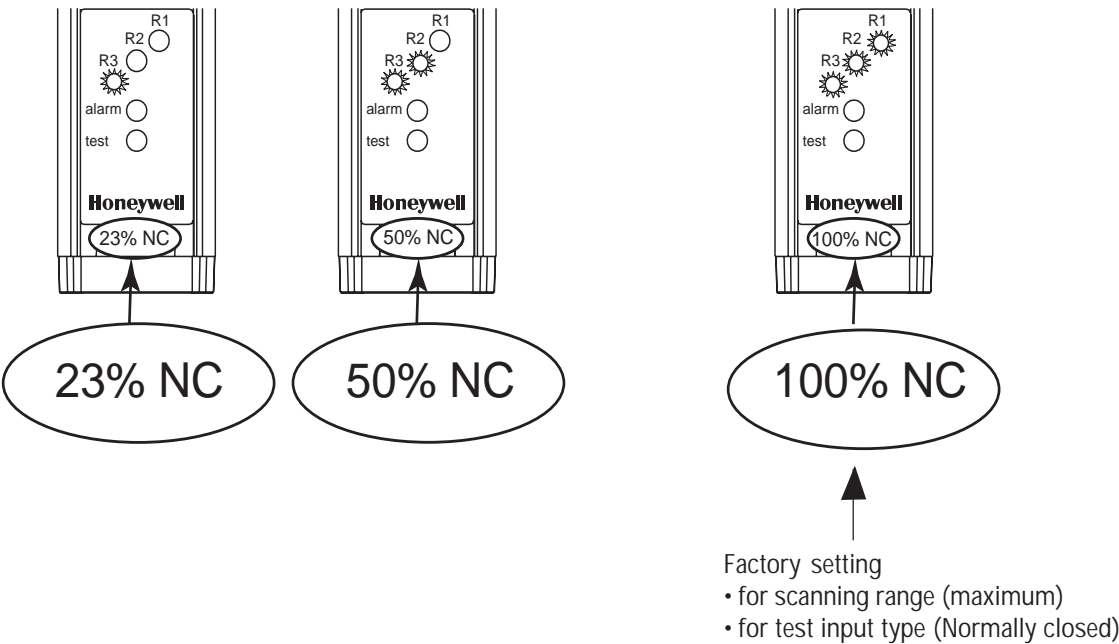
Scanning range selection

Test input type selection



FF-SYA

	Minimum: 23 %	Medium: 50 %	Maximum: 100 %
FF-SYA14	0 m to 1,4 m / 0 ft to 4.6 ft	1 m to 3 m / 3.3 ft to 9.8 ft	2 m to 6 m / 6.6 ft to 19.7 ft
FF-SYA30 / FF-SYA60	0 m to 4,6 m / 0 ft to 15.1 ft	2 m to 10 m / 6.6 ft to 32.8 ft	5 m to 20 m / 16.4 ft to 65.6 ft



Remove the end cap, in order to access to the internal configuration cards.

Emitter configuration card selection



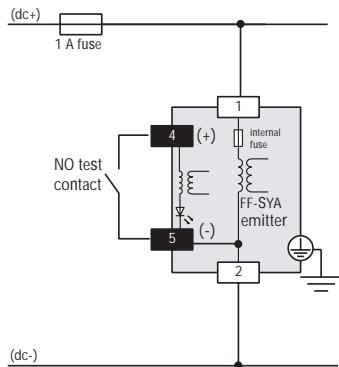
Card number ⁽¹⁾	Card code ⁽¹⁾	Scanning range	Test contact
#101	23 % NO	Minimum	Normally Open
#102	50 % NO	Medium	Normally Open
#103	100 % NO	Maximum	Normally Open
#104	23 % NC	Minimum	Normally Closed
#105	50 % NC	Medium	Normally Closed
#106	100 % NC	Maximum	Normally Closed

⁽¹⁾ Factory setting: card #106 (code «100 % NC»)

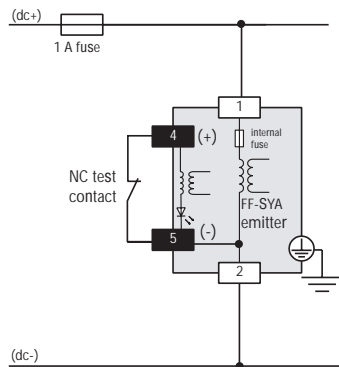
Test input type

FF-SYA

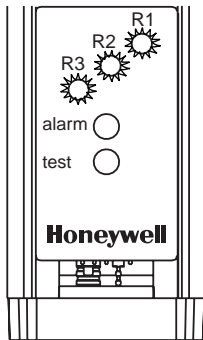
Normally open



Normally closed
(factory setting)



LED status indicators
Emitter



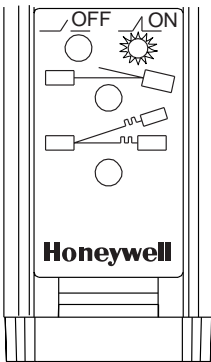
3 scanning range indicators (yellow)

Alarm indicator (red)

Test indicator (red)

R3	R2	R1	Maximum scanning range (yellow) (factory settings)
			Medium scanning range (yellow)
			Minimum scanning range (yellow)
Alarm			Alarm
			Normal operation
			Device failure
Test			Test
			Normal operation
			Device in test mode

Receiver



2 operation indicators (red and green)

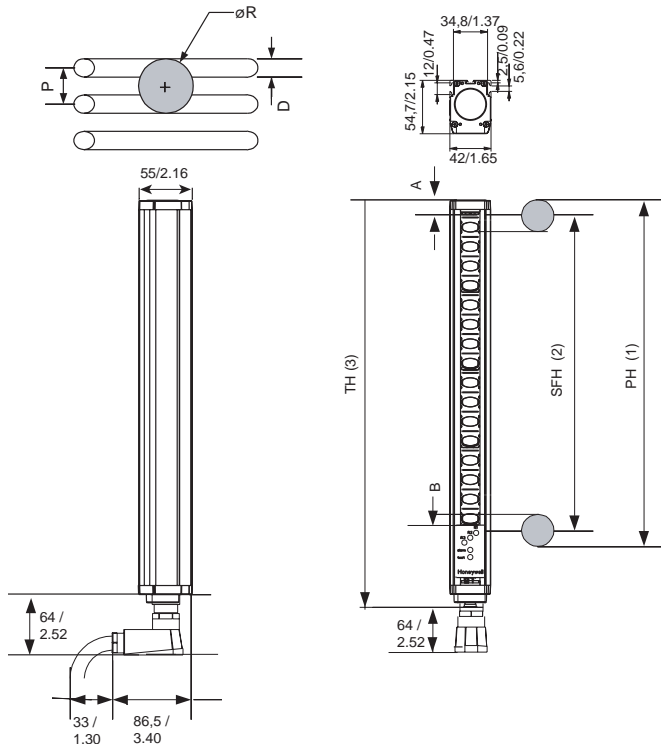
Signal strength indicator (yellow)

Cross-talk indicator (red)

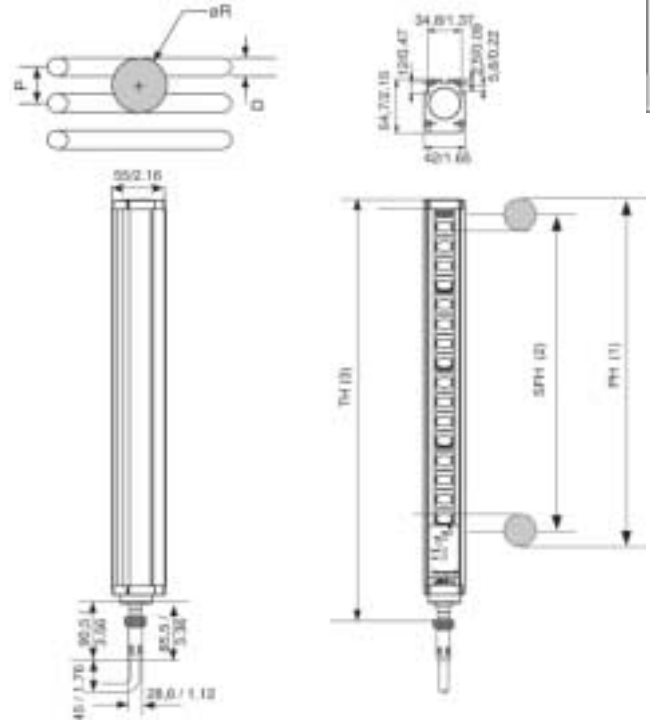
OFF	ON	OFF	ON
Outputs are open		Outputs are closed	
Perfect beam alignment	Slight beam misalignment	Total beam misalignment	
No cross-talk detected		Cross-talk detected	
Light OFF		Light ON	
Flickering light		Flickering light	

Dimensions (mm / in)

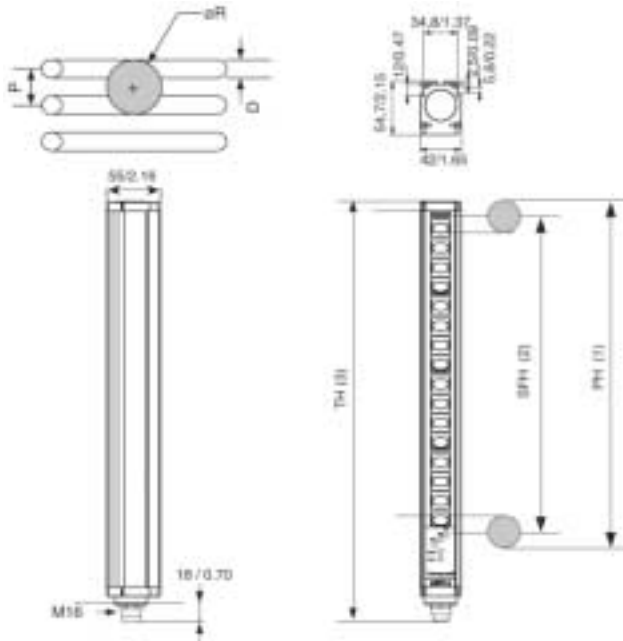
FF-SYA with Hirschmann N6RFF connectors (FF-SYA□□□□□C2)



FF-SYA with Brad Harrison Mini-Change® connectors (FF-SYA□□□□□Q2)



FF-SYA with terminal strips (FF-SYA□□□□□T2)



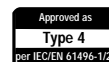
- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height (including plugs for the FF-SYA□□□□□C2, male receptacles for the FF-SYA□□□□□Q2 and cable glands for the FF-SYA□□□□□T2 versions)

Table 1

(mm / in)	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SYA14	ø 14 / 0.6	10 / 0.4	4 / 0.16	15,2 / 0.60	90,6 / 3.56
FF-SYA30	ø 30 / 1.2	20 / 0.8	10 / 0.4	22,2 / 0.87	87,6 / 3.45
FF-SYA60	ø 50 / 1.97	40 / 1.6	10 / 0.4	42,2 / 1.66	87,6 / 3.45

Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Control of the infrared emission source for cross-talk reduction
- 2 static safety outputs with short-circuit and cross-fault detection
- Enhanced diagnostic information



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SYA14	FF-SYA30	FF-SYA60
Resolutions		ø 14 mm / 0.6 in	ø 30 mm / 1.2 in	ø 50 mm / 1.97 in
Protection heights		See Table 2		
Nominal scanning ranges		0 m to 6 m / 0 ft to 20 ft	0 m to 20 m / 0 ft to 65 ft	0 m to 20 m / 0 ft to 65 ft
Supply voltage		24 Vdc (± 15 %)		
Power consumption		Emitter: 5 W max. • Receiver: 7 W max. (see Table 2)		
Outputs		2 PNP safety static outputs (switching capacity: 0,35 A / 24 Vdc)		
Test input		Normally open or Normally closed (Factory setting)		
Response time		13,5 to 22,5 ms (see Table 2)		
Start time at power up		> 1 s		
Restart time after beam release		80 ms		
LED status indicators		Emitter: test mode, failure alarm, selected scanning range		
Test input type		Receiver: outputs status, optical signal margin, cross-talk detection		
Cross sectional area		W 42 mm ² x D 55 mm ² / W 1.65 in ² x D 2.16 in ²		
Emission		Infrared modulated light source (880 nm)		
Effective aperture angle		± 2°, ± 25 % (in compliance with the IEC/EN 61496 - Part 2)		
Light immunity		Sun: 20 000 lux • Lamp: 15 000 lux		
Electrical noise immunity		IEC 61000-4-4: level III / IEC 61000-4-3: level III		
Ambient temperature		Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F		
Vibrations		IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min.sweep rate, 0,35 mm ± 0,05 amplitude, 20 sweeps per axis, for 3 axes		
Sealing		IP 65, NEMA 4, 13		
Material		Housing: aluminium alloy • Front plate: polymethyl metacrylate (PMMA) • End caps: polycarbonate		
Electrical connection		FF-SYA□□□□□□C2: EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann N6RFF type)		
		FF-SYA□□□□□□Q2: 5 and 7 pole straight male receptacles compatible with Brad Harrison Mini-Change® plugs (not included)		
		FF-SYA□□□□□□T2: terminal strip version with M16 cable glands		

Ordering information

Each listing consists of an emitter, a receiver,
2 pairs of right-angle brackets, a test rod and a
pair of Hirschmann N6RFF connector
(FF-SYA□□□□□□C2 version only)

FF-SYA□□ □□□ □2

C: EN 60423 plastic plugs
included

Q: male receptacles
compatible with Brad
Harrison Mini-Change®
plugs (not included)

T: terminal strips
(cable glands included)

Model (see Table 2)

Resolutions

14: ø 14 mm / 0.6 in

30: ø 30 mm / 1.2 in

60: ø 50 mm / 1.97 in

Table 2

Model	032	048	064	080	096
Protection height (mm / in) (1)					
FF-SYA14	334 / 13.1	494 / 19.4	654 / 25.7	814 / 32.07	974 / 38.3
FF-SYA30	350 / 13.7	510 / 20.09	670 / 26.3	830 / 32.7	990 / 39
FF-SYA60	390 / 15.3	550 / 21.6	710 / 27.9	870 / 34.2	1030 / 40.5
Sensing field height (mm / in)(2)					
FF-SYA14	314 / 12.3	474 / 18.6	634 / 24.9	794 / 31.2	954 / 37.5
FF-SYA30	310 / 12.2	470 / 18.5	630 / 24.8	790 / 31.1	950 / 37.4
FF-SYA60	290 / 11.4	450 / 17.7	610 / 24.03	770 / 30.3	930 / 36.6
Total height (mm / in) (3)					
FF-SYA□□□□□C2	483 / 19	643 / 25.3	803 / 31.6	963 / 37.9	1123 / 44.2
FF-SYA□□□□□Q2	443 / 17.4	603 / 23.7	763 / 30	923 / 36.3	1083 / 42.6
FF-SYA□□□□□T2	438 / 12.2	598 / 23.5	758 / 29.8	918 / 36.1	1078 / 42.4
Response time (ms)					
FF-SYA14	14	15	15,5	17,5	19,5
FF-SYA30	13,5	14	14	14,5	15
FF-SYA60	13,5	14	14	14,5	15
Weight per device (kg / lbs)	0,86 / 1.89	1,14 / 2.5	1,42 / 3.12	1,7 / 3.74	1,98 / 4.35
Power consumption (W)	Emitter / Receiver	Emitter / Receiver	Emitter / Receiver	Emitter / Receiver	Emitter / Receiver
FF-SYA14	5 / 3.5	5 / 4	6 / 4	6 / 4.5	6 / 5
FF-SYA30	4 / 3.5	4 / 3.5	5 / 4	5 / 4	5 / 4
FF-SYA60	4 / 3.5	4 / 3.5	5 / 3.5	5 / 4	5 / 4

FF-SYA

Table 2 (continued)

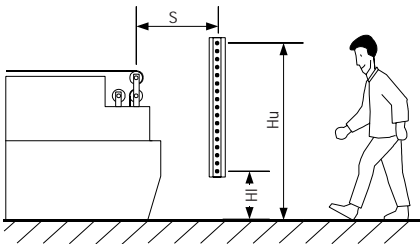
Model	112	128	144	160	176
Protection height (mm / in) (1)					
FF-SYA14	1134 / 44.6	1294 / 50.9	1454 / 57.2	1614 / 63.5	1774 / 69.8
FF-SYA30	1150 / 45.3	1310 / 51.6	1470 / 57.9	1630 / 64.2	1790 / 70.5
FF-SYA60	1190 / 46.8	1350 / 53.1	1510 / 59.4	1670 / 65.7	1830 / 72
Sensing field height (mm / in)(2)					
FF-SYA14	1114 / 43.8	1274 / 50.1	1434 / 56.5	1594 / 62.8	1754 / 69.1
FF-SYA30	1110 / 43.7	1270 / 50.03	1430 / 56.3	1590 / 62.6	1750 / 68.9
FF-SYA60	1090 / 42.9	1250 / 49.2	1410 / 55.1	1570 / 61.8	1730 / 68.1
Total height (mm / in) (3)					
FF-SYA□□□□□C2	1283 / 50.5	1443 / 56.8	1603 / 63.1	1763 / 69.4	1923 / 75.7
FF-SYA□□□□□Q2	1243 / 48.9	1403 / 55.2	1563 / 61.5	1723 / 67.8	1883 / 74.1
FF-SYA□□□□□T2	1238 / 48.7	1398 / 55	1558 / 61.3	1718 / 67.6	1878 / 73.9
Response time (ms)					
FF-SYA14	20,5	22,5	20	21	22.5
FF-SYA30	15	15,5	16	17,5	17,5
FF-SYA60	15	15,5	16	17,5	17,5
Weight per device (kg / lbs)	2,26 / 4.97	2,54 / 4.97	2,82 / 6.20	3,10 / 6.82	3,38 / 7.43
Power consumption (W)	Emitter/Receiver	Emitter/Receiver	Emitter/Receiver	Emitter/Receiver	Emitter/Receiver
FF-SYA14	7 / 5	7 / 5.5	7 / 7	7 / 7	7 / 7
FF-SYA30	6 / 4	6 / 4.5	6 / 4.5	6 / 4.5	6 / 4.5
FF-SYA60	6 / 4	6 / 4	6 / 4.5	6 / 4.5	6 / 4.5

Safety distances (in mm, 100 mm = 3.9 in)

FF-SYA

European EN 999 standard

Normal approach



FF-SYA14

$$S \geq 2000 (t_1 + t_2), \text{ with } S \geq 100$$

$$\text{If } S \geq 500, \text{ then use: } S \geq 1600 (t_1 + t_2), \text{ with } S \geq 500$$

FF-SYA30

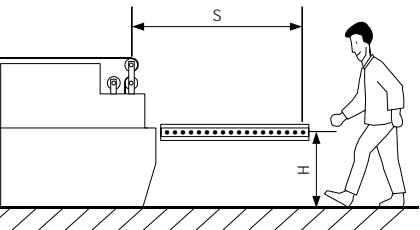
$$S \geq 2000 (t_1 + t_2) + 128, \text{ with } S \geq 100$$

$$\text{If } S \geq 500, \text{ then use: } S \geq 1600 (t_1 + t_2) + 128, \text{ with } S \geq 500$$

FF-SYA60

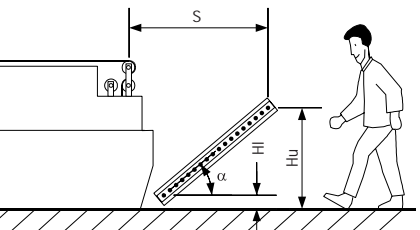
$$S \geq 1600 (t_1 + t_2) + 850, \text{ with } H_u \geq 900, H_l \leq 300 \text{ m}$$

Parallel approach



$$S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H), \text{ with } H \leq 875 \text{ or } S \geq 1600 (t_1 + t_2) + 850, \text{ with } 875 \leq H \leq 1000 \text{ with } H \geq 15 (R-50), \text{ where } R \text{ is the light curtain resolution with } H \geq 150 \text{ for the FF-SYA60 light curtain}$$

Angled approach



$$\text{If } \alpha \geq 30^\circ, \text{ then use one of the formula given for a normal approach, with } H_u \geq 900 \text{ and } H_l \leq 300 \text{ for the FF-SYA60 light curtain}$$

$$\text{If } \alpha \leq 30^\circ, \text{ then use one of the formula given for a parallel approach, with } H_u \leq 1000 \text{ and } H_l \geq 15 (R-50), \text{ where } R \text{ is the light curtain resolution (with } H_l \geq 150 \text{ for the FF-SYA60 light curtain)}$$

With:

S : Minimum safety distance (in mm, 100 mm = 3.9 in)

t_1 : Light curtain response time (s)

t_2 : Machine stopping time (s)

H : Height of the detection plane above the reference floor (in mm)

H_u : Height of the uppermost beam above the reference floor (in mm)

H_l : Height of the lowest beam above the reference floor (in mm)

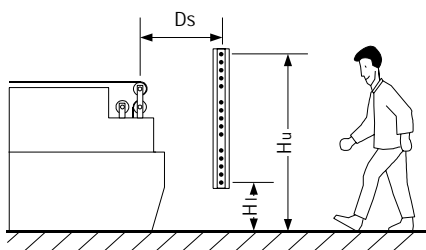
For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

Safety distances (in inches, 1 in = 25,4 mm)

□ US ANSI / OSHA standard

FF-SYA

Normal approach



$$Ds \geq 63 (Ts + Tc + Tr) + 0,94 \quad Ds \geq 63 (Ts + Tc + Tr) + 3,08 \quad Ds \geq 63 (Ts + Tc + Tr) + 7,10$$

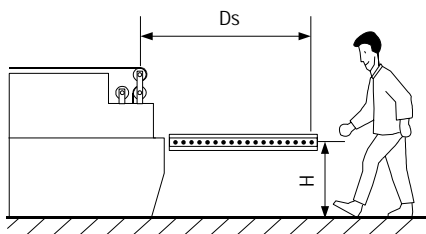
If $H_l \leq 12$ and $H_u > 48$ (Typical for Reach Thru).

$$Ds \geq 63 (Ts + Tc + Tr) + 48 \quad Ds \geq 63 (Ts + Tc + Tr) + 48 \quad Ds \geq 63 (Ts + Tc + Tr) + 48$$

If $H_l \leq 12$ and $36 \leq H_u \leq 48$ (Typical for Reach Over)

If $H_l > 12$, supplemental safeguarding may be required to detect crawling underneath.

Parallel approach



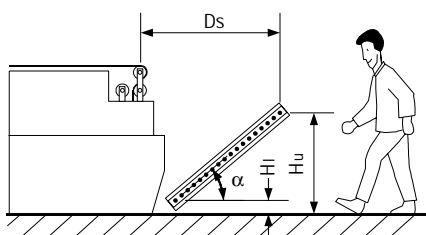
$$Ds \geq 63 (Ts + Tc + Tr) + 48$$

Allowable field heights
(for FF-SYA14 and FF-SYA30):
 $0 \leq H \leq 39$

Allowable field heights
(for FF-SYA60):
 $5,5 \leq H \leq 39$

If $H > 12$, supplemental safeguarding may be required to detect crawling underneath.

Angled approach



If $\alpha \geq 30^\circ$, then use the normal approach formula.

If $\alpha < 30^\circ$, then use the parallel approach formula.

$$Ds = K (Ts + Tc + Tr) + Dpf$$

Where:

Ds : Minimum safety distance (in inches, 1 in = 25,4 mm)

K : Approach speed (in/s)

Ts : Worst case stopping time of the machine (s)

Tc : Worst case response of the machine's control (s)

Tr : Response time of the safety devices (light curtain plus its interface - meaning the response time including the mechanical relay outputs in s)

Dpf : Depth penetration factor (in)

H_u : Height of the uppermost beam above the reference floor (in)

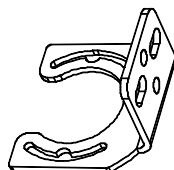
H_l : Height of the lowest beam above the reference floor (in). For normal approach, assumption is that H_l is not greater than 12 in unless the application prevents access even with H_l at a distance greater than 12 in.

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19 and ANSI RIA R15.06).

Figure 1: Connection diagram of the FF-SYA receiver-emitter. The diagram shows the internal components of the FF-SYA receiver-emitter, including the FF-SYA emitter, FF-SYA receiver, and internal fuses. It also shows the connection to the FF-SRL60252 receiver, which has terminals for Power, K1, and K2. The diagram includes a table of terminal connections: A1 (+) to S33, S34, S11, 13, 23, 33, 41; A2 (-) to S21, S22, S12, 14, 24, 34, 42. The diagram is labeled with '0 V' and '24 Vdc'.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

Accessories



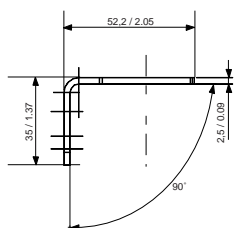
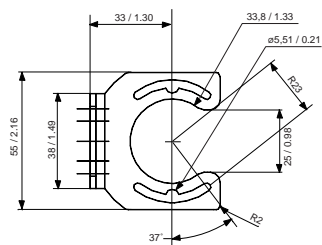
FF-SYZ634178

Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit.

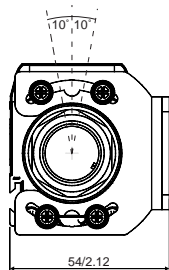
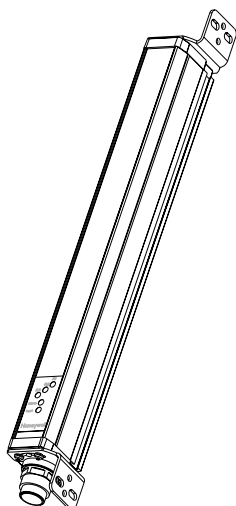
Possible mounting positions:

1. At the top and the bottom of the FF-SYA (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

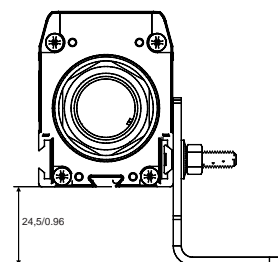
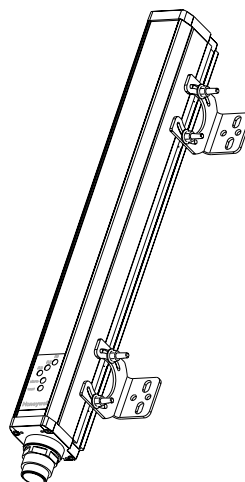
Order 2 kits for a complete set of emitter and receiver
(already included in the FF-SYA package).



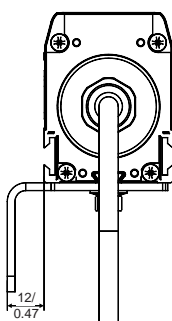
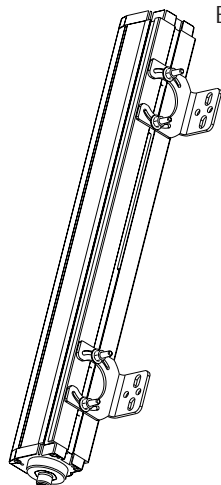
Bracket mounting at the top and the bottom



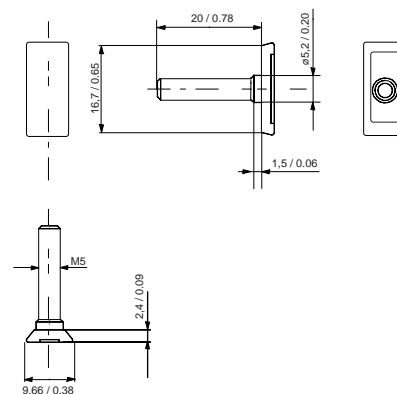
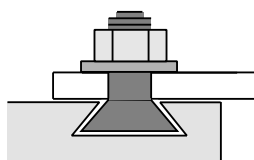
Bracket mounting at the lateral dovetail slots

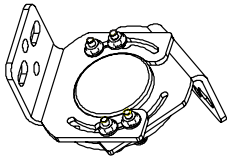


Bracket mounting at the rear dovetail slots



M5 dovetail shape bolt





FF-SYZ634179

Kit of 2 adjustable mounting brackets (FF-SYZ634178 type) with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit. To be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYA package.

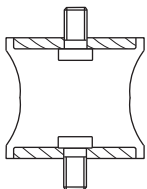
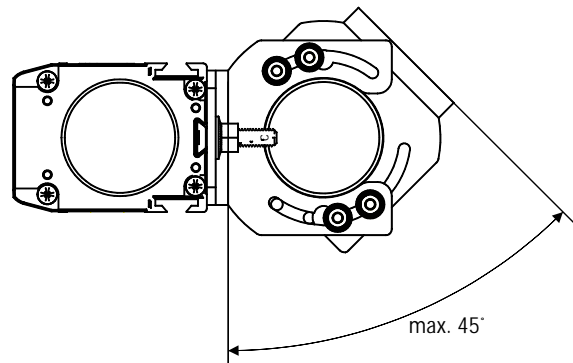
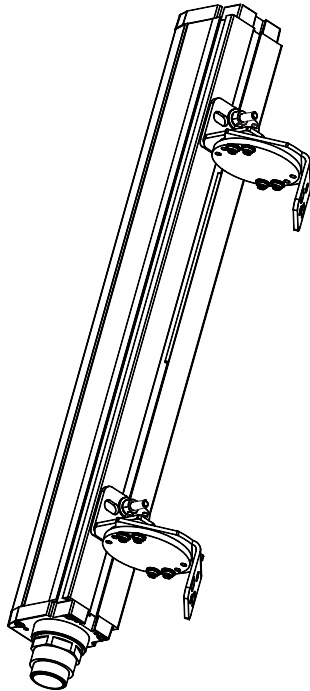
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option)



FF-SYZAD

Kit of 4 antivibration dampers. To be mounted together with the existing mounting brackets. Order 2 kits for a complete set of emitter and receiver.

NOTICE

PROTECTION AGAINST HIGH VIBRATIONS

In case of high vibrations, 3 pairs of brackets must be used for light curtain systems with protection heights, greater or equal to 1000 mm / 39.4 in. You may also use our antivibration damper kit FF-SYZAD.

(The additional bracket kit and the antivibration damper kit must be ordered separately).

Plugs kits



FF-SYZ172113 (for FF-SYA□□□□□C2 light curtains)

Kit of 2 EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann, N6RFF type). Order 1 kit for a complete set emitter and receiver.

Already included in the FF-SYA package.



FF-SYZ172159 (for FF-SYA□□□□□C2 light curtains)

Kit of 2 EN 60423 plastic 7-pin straight plugs with crimping contacts (Hirschmann, N6REF type). Order 1 kit for a complete set emitter and receiver.

To be ordered separately as an option.



FF-SBZ1721136 (for FF-SYA□□□□□C2 light curtains)

Kit of 1 EN 60423 plastic 7-pin right-angle connector with screw contact terminals (Hirschmann, N6RFFS11 type). Order 2 kits for a complete set of emitter and receiver.

To be ordered separately as an option.



Face view

Colour code
leadwires

- 1-White
- 2-Red
- 3-Green
- 4-Orange
- 5-Black

FF-41308 (for FF-SYA□□□□□Q2E emitters)

One 5-pole female straight Brad Harrison Mini-Change® plug 3,66 m / 12 ft cable length. Order one plug for the emitter.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.



Face view

Colour code
leadwires

- 1-White/Black
- 2-Black
- 3-White
- 4-Red
- 5-Orange
- 6-Blue
- 7-Green

FF-41322 (for FF-SYA□□□□□Q2E emitters)

One 5-pole female straight Brad Harrison Mini-Change® plug, 6,10 m / 20 ft cable length. Order one plug for the emitter.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.

Test rods



FF-SYZROD14

Test rod for ø14 mm / 0.6 in resolution safety light curtains

(already included in the FF-SYA package).

FF-SBZROD30

Test rod for ø30 mm / 1.2 in resolution safety light curtains

(already included in the FF-SYA package).

Safety control modules

FF-SYA



New

FF-SRL60252

Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option).

- Compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22,5 mm / 0.89 in width



New

FF-SRL59022

Multi-safety device control module with Presence Sensing Device Initiation (PSDI)

(to be ordered separately as an option)

- Accept up to three safety devices working in a guard-only mode or a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode and FSD monitoring
- Cross-fault monitoring of inputs
- 3 NO safety relay outputs
- Static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in



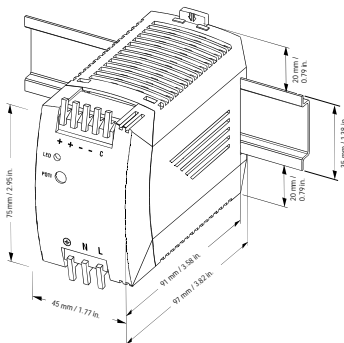
New

FF-SRM200P2

Muting module

(to be ordered separately as an option)

- Connection of 1 or 2 safety devices
- Modes of operation: unidirectional or bidirectional muting, mutual exclusion
- Connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode, FSD monitoring
- Programmable max. muting time
- Cross-fault monitoring of inputs
- Self monitored muting lamp output
- 3 NO safety relay outputs
- Static outputs for output status and diagnostic information
- 45 mm / 1.77 in



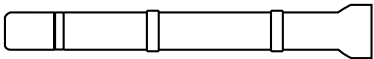
New

FF-SXZPWR050

Ac to dc power supply

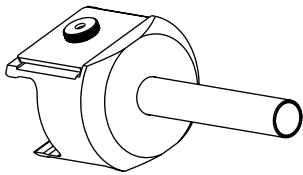
(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs



FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.



FF-SYZ604795

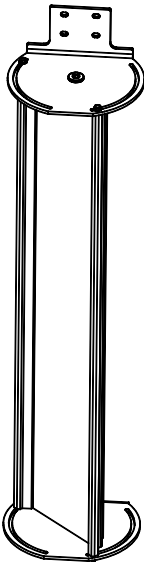
Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYA Series light curtain.



FF-SXZSHL
IP67 enclosure for FF-SYA light curtains

Enclosures	Light curtains
FF-SXZSHL048□	FF-SYA□□032 and 048
FF-SXZSHL096□	FF-SYA□□064 through 096
FF-SXZSHL128□	FF-SYA□□112 and 128
FF-SXZSHLKIT	Brackets and cable gland kit (order one kit per enclosure)

□: "P" for polycarbonate, "G" for glass



FF-SYZMIR□□□ Deflection mirror
To be ordered separately as an option
Deflection mirror for light curtain models

Features:	
Deflection mirror with 10 % scanning range reduction (FF-SYZMIR0□□)	
Deflection mirror with 25 % scanning range reduction (FF-SYZMIR1□□)	
Quick mounting and easy mirror adjustment	
Mounting brackets included (top / bottom mounting)	
Adjustment of mirror in azimuth direction of +/-45°	
Housing compatible with FF-SBSMIR Series	
Material	Aluminium alloy housing
Finish	Gold colour anodisation
Ordering guide:	
FF-SYZMIR□04	FF-SY□□032 and FF-SY□□048
FF-SYZMIR□06	FF-SY□□064
FF-SYZMIR□08	FF-SY□□080
FF-SYZMIR□10	FF-SY□□096
FF-SYZMIR□12	FF-SY□□112 and FF-SY□□128
FF-SYZMIR□14	FF-SY□□144
FF-SYZMIR□16	FF-SY□□160

FF-SYA



FF-SYZPF

Fixed post for FF-SYA light curtain

Floorstanding post for the installation of the following FF-SYA light curtains:

Light curtain models: FF-SYA□□032, FF-SYA□□048, FF-SYA□□080, FF-SYA□□096

Multibeam models: FF-SYA02500, FF-SYA03400, FF-SYA04300

To be ordered separately as an option.



FF-SYZPFM

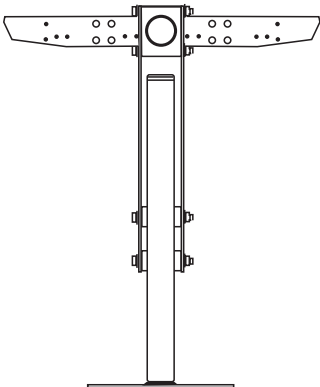
Fixed post with plain mirror (10 % or 25 % reduction of scanning range)

Floorstanding post with 1 plain mirror (FF-SYZPFM01, 10 % of loss)

Floorstanding post with 1 plain mirror (FF-SYZPFM11, 25 % of loss)

Suitable for light curtain models: FF-SYA□□032, FF-SYA□□048, FF-SYA□□080, FF-SYA□□096

To be ordered separately as an option.



FF-SYZPA

Adjustable floor standing post

- Mounting of FF-SYA, FF-SB14 and FF-SLC light curtains
- Compatible with all protection heights
- Horizontal, diagonal and vertical adjustment of light curtains possible
- Quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- Fine adjustment of light curtains in azimuth direction of $\pm 11^\circ$ ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- Base plate can be mounted independently
- Finish: RAL 1021 yellow paint

To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Safety multibeam system for access detection

FF-SYA234 Series

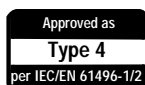
Compact, Universal, Smart and Full-featured

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496 - parts 1 and 2 European norms for Type 4 electrosensitive protective equipment
- Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1.2 and .19; ANSI RIA 15.06 for Control Reliability; CSA standards
- Self-contained with optical synchronisation
- 2 static safety outputs with short-circuit and cross-fault detection
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes: a signal strength indicator, a cross-talk indicator and a failure diagnostic indicator
- Test input with selectable test input type
- Two, three and four beam versions for access and beam detection
- Scanning range up to 80 m / 262.4 ft
- Electrical connection:
 - Hirschmann N6RFF type connectors,
 - Brad Harrison Mini-Change® connectors
 - Terminal strips
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability or additional features (to be ordered separately).

TYPICAL APPLICATIONS

- Access detection to robot areas
- Stacking machines, transporting and conveyor technology
- Handling equipment and assembly lines



FF-SYA

The Honeywell FF-SYA234 multibeam system is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). Its CSA mark makes it a product usable in most parts of the world.

As soon as a person is detected inside the protection field, the FF-SYA de-energizes its two static safety outputs to signal the dangerous motion to stop. The FF-SYA is a self-contained light curtain that does not require a separate control unit for operation. Safety relay modules are available to provide higher current capability and additional functionality. This light curtain has been designed to satisfy the requirements of worldwide machine manufacturers and users: its compact size combined with its universal and smart features makes it full-featured and easy to use.

The long scanning distance ensures that most perimeter guarding applications are covered. The optional FF-SYZPF floor mounting posts with individual mirrors can be used to protect several sides of a machine with only one system.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

The FF-SYA main features are:

- COMPACT SIZE

The cross section of 42 mm² x 55 mm² makes installation possible in tight spaces, especially with the help of the small brackets supplied with the light curtains. The available safety relay modules easily fit inside the machine control panel with its small width DIN rail mount housing.

- UNIVERSAL

The housing dimensions are the same for the whole FF-SYA series. The scanning range makes it possible to use mirrors in order to protect several sides of a machine with only one system.

- SMART

The FF-SYA is equipped with 2 static safety outputs. Compatible safety relay modules are available for a greater output current capability and manual restart functionality. An integrated cross talk reduction system allows the scanning range to be selected for the application distance. A cross talk indicator flickers when emission from other systems is detected, indicating

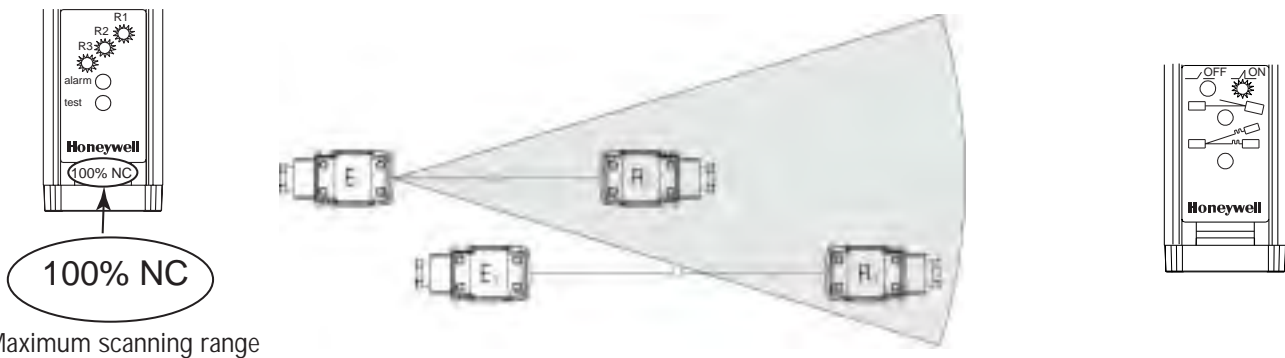
that a different selection of the scanning range is needed. The light curtain also has a signal strength indicator which flickers if there is a slight misalignment of the beams or front window contamination. Additional indicators provide information on the outputs status, on the selected scanning range and on failure diagnostic. Standard brackets are delivered with the light curtain to ease the order process. The housing has a T-slot mounting system to adapt brackets anywhere along the lateral sides, the rear sides or at the top and the bottom of the light curtain. Hirschmann connectors are delivered with the FF-SYA□□□□C2 light curtains.

- FULL FEATURED

The integrated test input can be used to test the entire safety chain. The test contact type (NO or NC characteristics) can be selected by internal configuration cards. When connected to the compatible safety relay modules, the FF-SYA provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

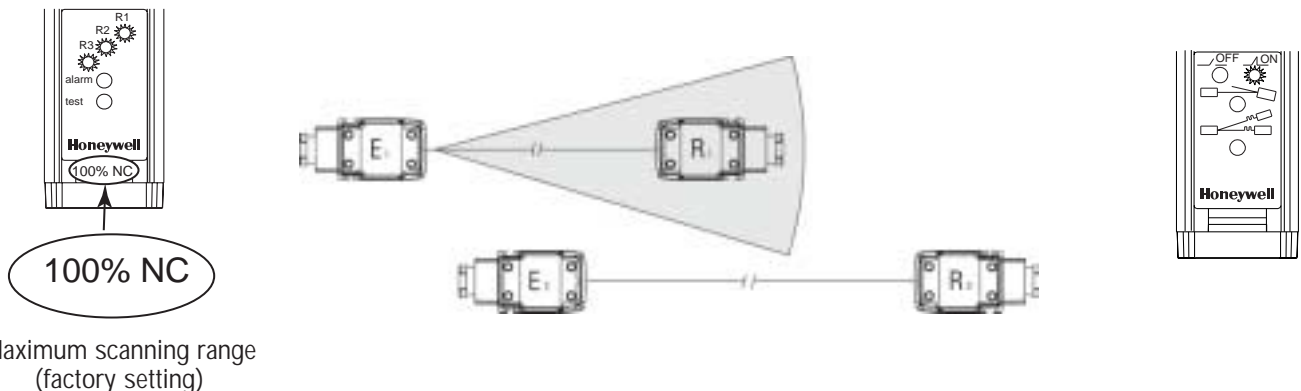
Cross-talk reduction system

The FF-SYA light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.



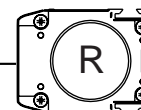
An internal configuration card is available on the emitter units for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the maximum scanning range down to minimum. The end cap can be easily removed, and there is no need to remove the unit from the machinery to select a different scanning range. Products are delivered with a maximum scanning range to ease the alignment process.

LED status indicators



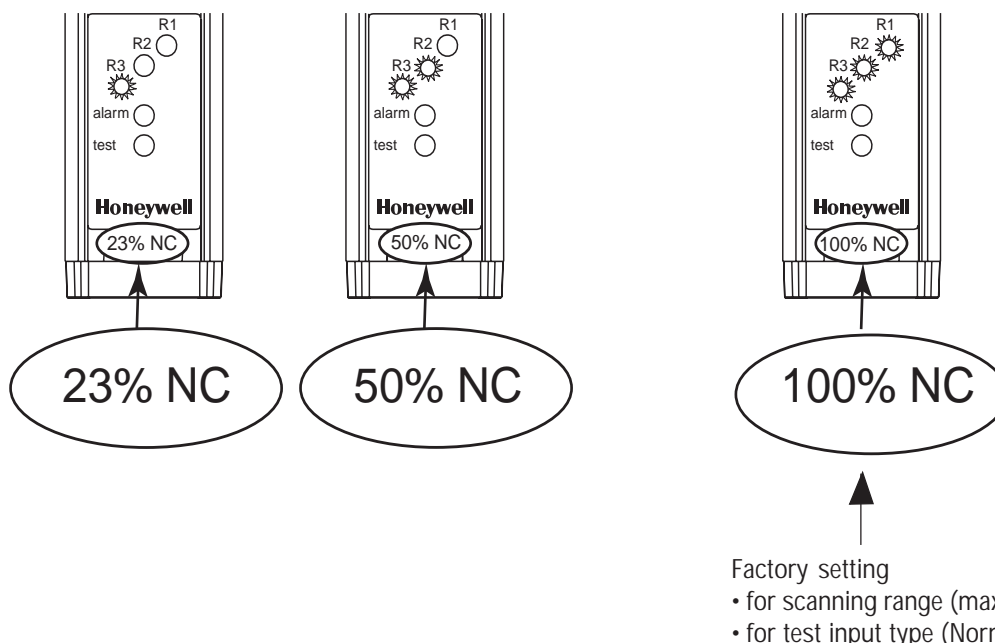
Scanning range selection

Test input type selection



FF-SYA

	Minimum: 23 %	Medium: 50 %	Maximum: 100 %
FF-SYA02 / FF-SYA03 / FF-SYA04 - standard range (-3)	0 m to 7 m / 0 ft to 23.0 ft	4 m to 15 m / 13.1 ft to 49.2 ft	10 m to 30 m / 32.8 ft to 98.4 ft
FF-SYA02 / FF-SYA03 / FF-SYA04 - long range (-8)	5 m to 18 m / 16.4 ft to 59.1 ft	15 m to 40 m / 49.2 ft to 131.2 ft	35 m to 80 m / 114.8 ft to 262.5 ft



Remove the end cap, in order to access to the internal configuration cards.

Emitter configuration card selection



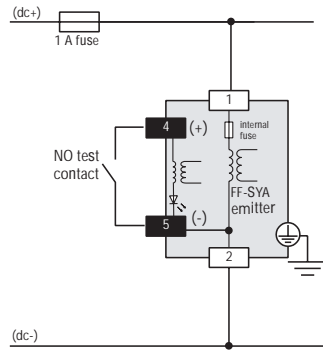
Card number ⁽¹⁾	Card code ⁽¹⁾	Scanning range	Test contact
#101	23 % NO	Minimum	Normally Open
#102	50 % NO	Medium	Normally Open
#103	100 % NO	Maximum	Normally Open
#104	23 % NC	Minimum	Normally Closed
#105	50 % NC	Medium	Normally Closed
#106	100 % NC	Maximum	Normally Closed

⁽¹⁾ Factory setting: card #106 (code «100 % NC»)

Test input type

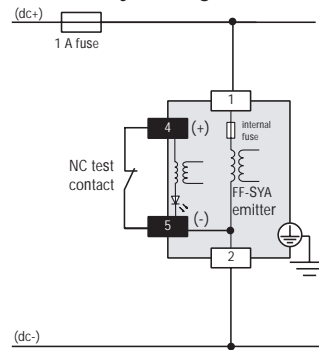
FF-SYA

Normally open



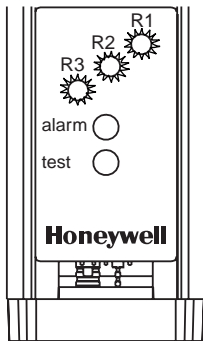
Normally closed

(factory setting)



LED status indicators

Emitter



3 scanning range indicators (yellow)

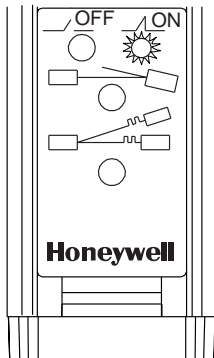
Alarm indicator (red)

Test indicator (red)

R3	R2	R1	Maximum scanning range (yellow) (factory setting)
●	●	●	Medium scanning range (yellow)
●	●	●	Minimum scanning range (yellow)

Alarm	Alarm
● Normal operation	● Device failure
Test	Test
● Normal operation	● Device in test mode

Receiver



2 operation indicators (red and green)

Signal strength indicator (yellow)

Cross-talk indicator (red)

OFF	ON	OFF	ON
●	●	●	●
Outputs are open		Outputs are closed	

Perfect beam alignment	Slight beam misalignment	Total beam misalignment
●	●	●

No cross-talk detected	Cross-talk detected
●	●

Light OFF	Light ON	Flickering light
●	●	●

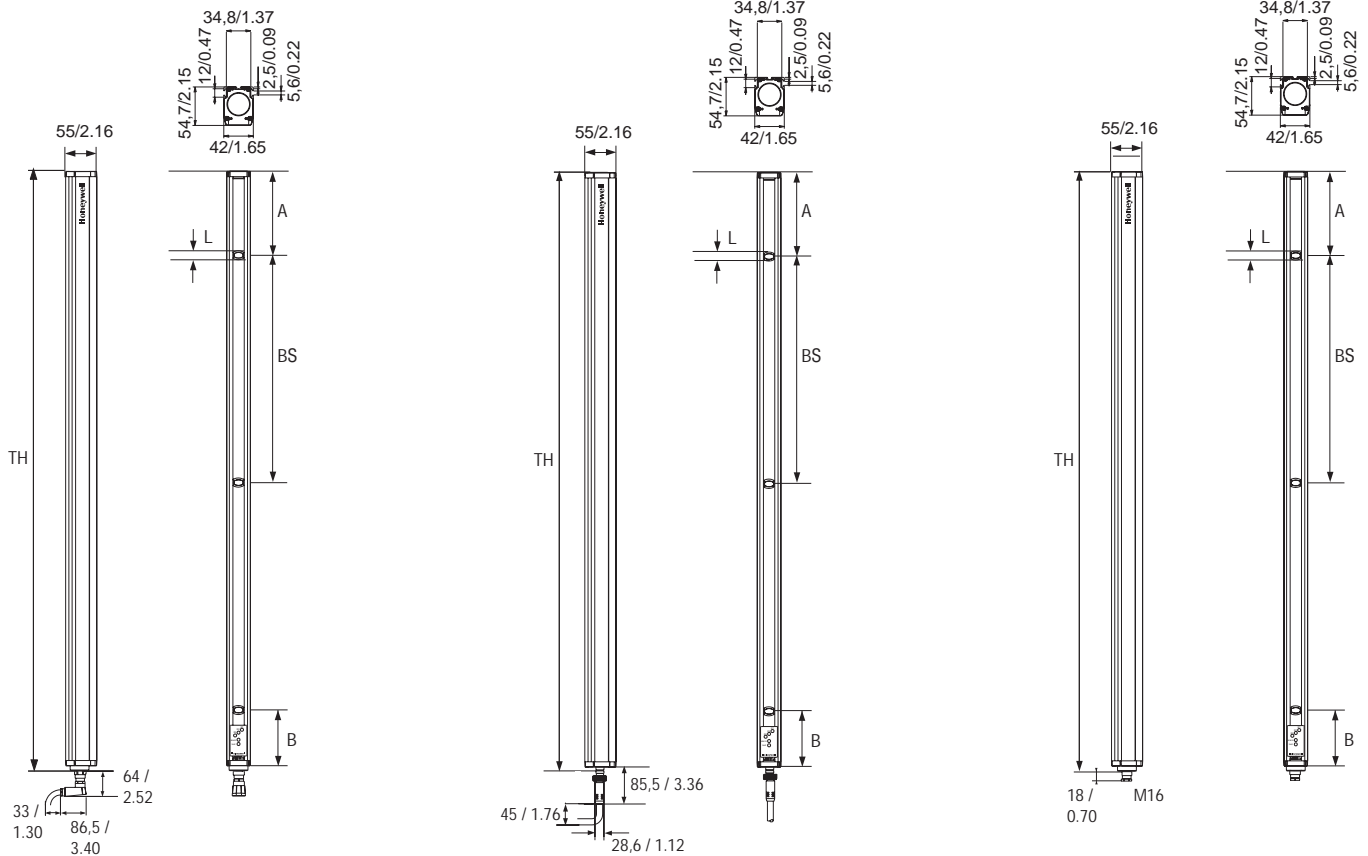
Dimensions (mm / in)

FF-SYA with Hirschmann N6RFF
connectors
(FF-SYA□□□□□C2-3 (-8))

FF-SYA with Brad Harrison
Mini-Change® connectors
(FF-SYA□□□□□Q2-3 (-8))

FF-SYA with terminal strips
(FF-SYA□□□□□T2-3 (-8))

FF-SYA

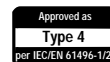


Reference	Number of beams N	Beam Spacing BS	Total Height TH	A	B	Weight per device
		mm / in	mm / in	mm / in	mm / in	kg / lbs
FF-SYA02500C2-3 (-8)	2	500 / 19.70	803 / 31.63	149 / 5.87	87 / 3.42	1,42 / 3.12
FF-SYA02500Q2-3 (-8)	2	500 / 19.70	763 / 30.06	149 / 5.87	87 / 3.42	1,42 / 3.12
FF-SYA02500T2-3 (-8)	2	500 / 19.70	758 / 29.8	149 / 5.87	87 / 3.42	1,42 / 3.12
FF-SYA03400C2-3 (-8)	3	400 / 15.76	1123 / 44.24	169 / 6.65	87 / 3.42	1,98 / 4.35
FF-SYA03400Q2-3 (-8)	3	400 / 15.76	1083 / 42.67	169 / 6.65	87 / 3.42	1,98 / 4.35
FF-SYA03400T2-3 (-8)	3	400 / 15.76	1078 / 42.4	169 / 6.65	87 / 3.42	1,98 / 4.35
FF-SYA04300C2-3 (-8)	4	300 / 11.82	1123 / 44.24	69 / 2.72	87 / 3.42	1,98 / 4.35
FF-SYA04300Q2-3 (-8)	4	300 / 11.82	1083 / 42.67	69 / 2.72	87 / 3.42	1,98 / 4.35
FF-SYA04300T2-3 (-8)	4	300 / 11.82	1078 / 42.4	69 / 2.72	87 / 3.42	1,98 / 4.35

TH: Total Height (including plugs for the FF-SYA□□□□□C2, male receptacles only for the FF-SYA□□□□□Q2 and cable glands for the FF-SYA□□□□□T2 versions)

Safety multibeam system for access detection

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Two, three and four beam systems for access and body detection
- Beam spacing per EN 999 and ANSI/RIA/R15.06-1999 (see notice below)
- Enhanced diagnostic information



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SYA02500	FF-SYA03400	FF-SYA04300
Number of beams		2	3	4
Beam spacing		500 mm / 19.7 in	400 mm / 15.76 in	300 mm / 11.82 in
Nominal scanning ranges		Standard range (-3): 0 m to 30 m / 0 ft to 98.42 ft Long range (-8): 5 m to 80 m / 16.4 ft to 262.4 ft		
Supply voltage		24 Vdc (± 15 %)		
Power consumption		Emitter: 5 W max. • Receiver: 7 W max.		
Outputs		2 PNP safety static outputs (switching capacity: 0.35 A / 24 Vdc)		
Test input		Normally open or Normally closed (Factory setting)		
Response time		22 ms		
LED status indicators		Emitter: test mode, failure alarm, selected scanning range Receiver: outputs status, optical signal margin, cross-talk detection		
Cross sectional area		W 42 mm ² x D 55 mm ² / W 1.65 in ² x D 2.16 in ²		
Emission		Infrared modulated light source (880 nm)		
Effective aperture angle		± 2°, ± 25 % (in compliance with the IEC/EN 61496 - Part 2)		
Light immunity		Sun: 20 000 lux • Lamp: 15 000 lux		
Electrical noise immunity		IEC 61000-4-4: level III / IEC 61000-4-3: level III		
Ambient temperature		Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F		
Vibrations		IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min.sweep rate, 0.35 mm ± 0.05 amplitude, 20 sweeps per axis, for 3 axes		
Sealing		IP 65, NEMA 4, 13		
Material		Housing: aluminium alloy • Front plate: polymethyl metacrylate (PMMA) • End caps: polycarbonate		
Electrical connection		FF-SYA□□□□□C2: EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann N6RFF type) FF-SYA□□□□□Q2: 5 and 7 pole straight male receptacles compatible with Brad Harrison Mini-Change® plugs (not included) FF-SYA□□□□□T2: terminal strip version with M16 cable glands		

Ordering information

Each listing consists of an emitter, a receiver, 2 pairs of right-angle brackets, a test rod and a pair of Hirschmann N6RFF connector (FF-SYA□□□□□C2 version only)

FF-SYA□□□□□□2-□

3: standard range: 0 m to 30 m / 0 ft to 98.42 ft

8: long range: 5 m to 80 m / 16.4 ft to 262.45 ft

C: EN 60423 Hirschmann N6RFF plastic plugs (included)

Q: male receptacles compatible with Brad Harrison Mini-Change® plugs (not included)

T: terminal strips (cable glands included)

Model	Number of beams	Beam spacing mm / in
02500	2	500 / 19.70
03400	3	400 / 15.76
04300	4	300 / 11.82

NOTICE

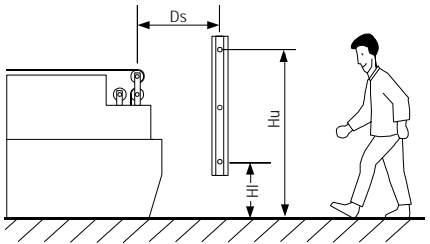
NON COMPLIANCE TO ANSI/RIA 15.6-1999 WITH FF-SYA02500

Only the three beam (FF-SYA03400 Series) and the four beam versions (FF-SYA04300 series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYA02500 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.

Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant Type C machine standard) for Europe.

■ Safety distances

FF-SYA

European EN 999 standard (in mm, 100 mm = 3.9 in)			
Normal approach		FF-SYA234	
		$S \geq 1600 (t1 + t2) + 850$	
		Reference	Number of beams (N)
		Beam heights above the reference floor	
		mm	in
		FF-SYA02500□2	2
		FF-SYA03400□2	3
		FF-SYA04300□2	4
		400 / 900	15.7 / 35.4
		300 / 700 / 1100	11.8 / 27.6 / 43.3
		300 / 600 / 900 / 1200	11.8 / 23.6 / 35.4 / 47.2

Where

S: Minimum safety distance (in mm, 100 mm = 3.9 in)

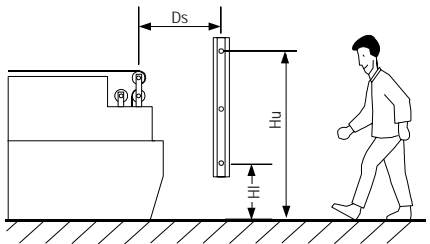
t1: Light curtain response time (s)

t2: Machine stopping time (s)

Hu: Height of the uppermost beam above the reference floor (mm)

Hl: Height of the lowest beam above the reference floor (mm)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

USA ANSI/RIA 15.06 requirements (in inches, 1 in = 25,4 mm)			
Normal approach		FF-SYA234	
		$Ds = 63 (Ts + Tc + Tr) + Dpf$	
		Reference	Number of beams (N)
		Beam heights above the reference floor	
		Dpf	
		FF-SYA02500□2	2
		FF-SYA03400□2	3
		FF-SYA04300□2	4
		1st beam at 300 mm / 12 in max. (Hl) Top beam at 900 mm / 36 in min. (Hu)(1)	1,2 m / 48 in (Reach over)
		1st beam at 300 mm / 12 in max. (Hl) Top beam at 900 / 36 in min. (Hu)	1,2 m / 48 in (Reach over)
		1st beam at 300 mm / 12 in (Hl) Top beam at 1200 mm / 48 in (Hu)	0,9 m / 36 in (Reach thru)

(1) Additional safeguard(s) is (are) required, when using the FF-SYA02500□2 two beam systems, as beam heights do not fully comply to ANSI/RIA 15.06 requirements.

$$Ds = K (Ts + Tc + Tr) + Dpf$$

Where

Ds: Minimum safety distance (in inches, 1 in = 25,4 mm)

K: Approach speed

Ts: Worst case stopping time of the machine (s)

Tc: Worst case response of the machine's control (s)

Tr: Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in s)

Dpf: Depth penetration factor (in)

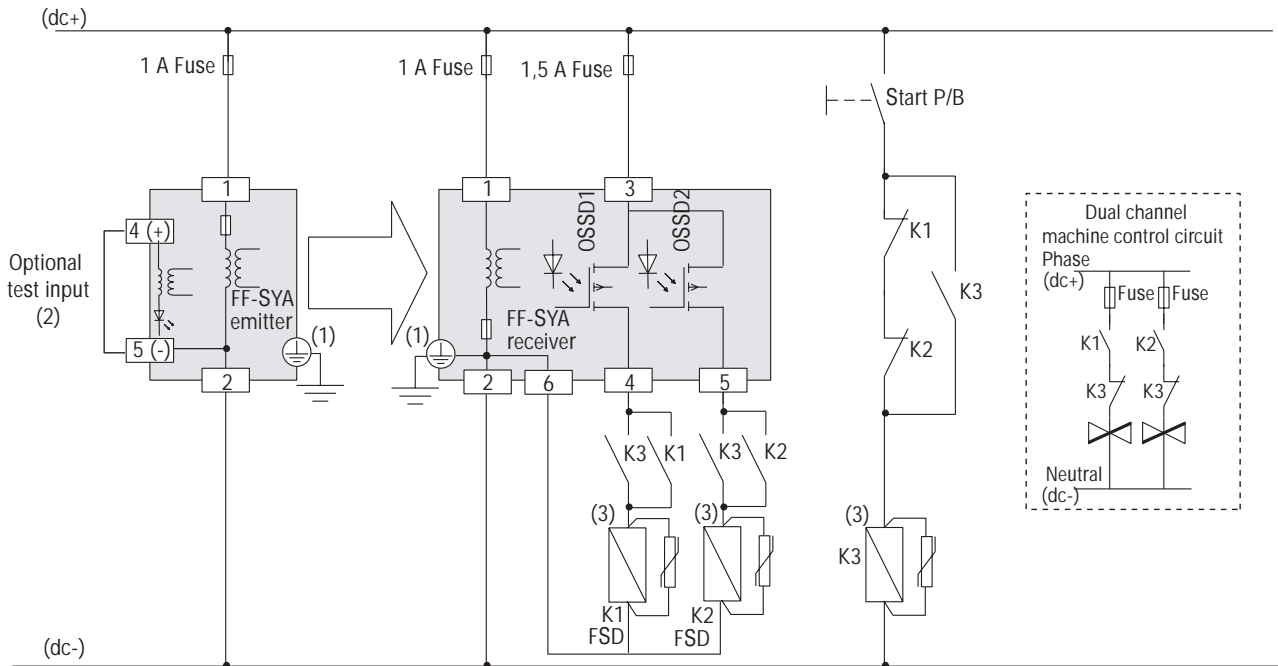
Hu: Height of the uppermost beam above the reference floor (in)

Hl: Height of the lowest beam above the reference floor (in). For Normal approach, assumption is that Hl is not greater than 12 in unless the application prevents access even with Hl at a distance greater than 12 in.

For more information, refer to the US regulations and standards (OSHA 29 CFR 1919.212 and 1910.217, ANSI B11.1, B11.2, B11.19 and ANSI RIA R15.06).

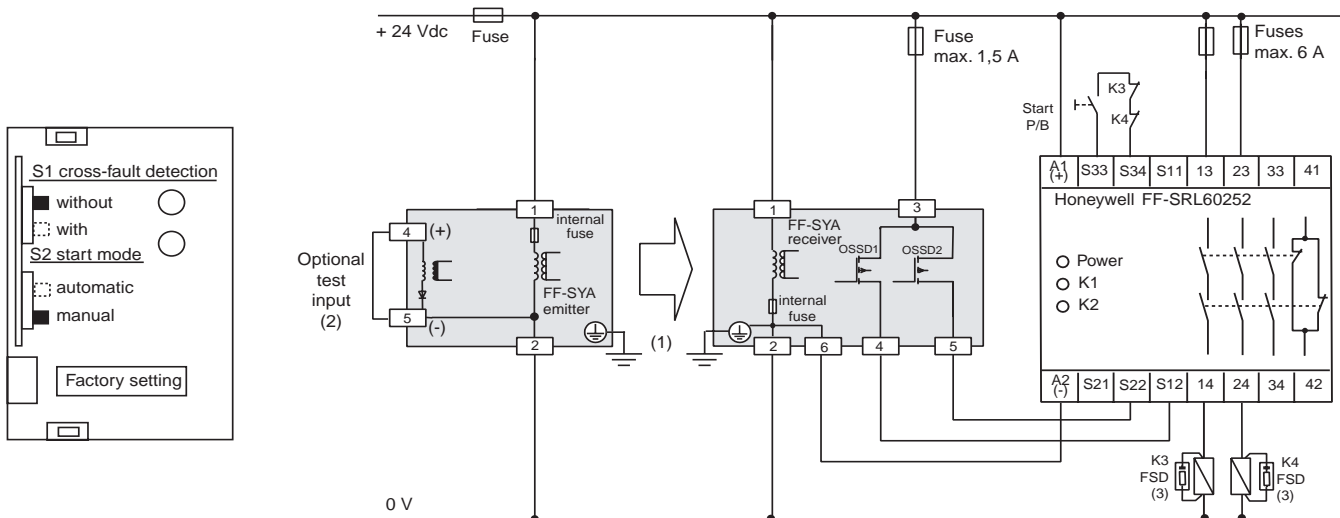
Wiring diagram using external safety relays with guided contacts

FF-SYA



Wiring diagram using the FF-SRL60252

Example: the FF-SRL60252 safety control module is set in the manual mode, without cross-fault monitoring by the module, with FSD monitoring.



NOTICE

IMPROPER USE OF FF-SYA CURTAIN

The cross-monitoring of the FF-SYA static outputs is based upon a self-checking principle which guarantees the detection of an output short-circuit and the detection of a short-circuit between the outputs (cross-fault detection). The FF-SRL60252 interface control module is primarily designed to be interfaced with Honeywell static safety outputs devices.

Compatibility of the FF-SYA with any other emergency stop safety control module is not guaranteed.

(1) Use pin 3 for the FF-SYA□□□□Q2E emitter and pin 7 for the FF-SYA□□□□Q2R receiver

(2) Optional test input jumpered when unused

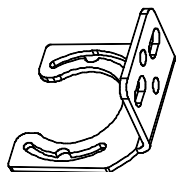
(3) Install arc suppressors (31 Vdc varistors, customer supplied)

OSSD1 and OSSD2: Output Signal Switching Devices (static safety outputs)

FSD: Final Switching Devices (external safety relays with guided contacts)

Start P/B: normally open contact of a start push-button (customer supplied)

Accessories



FF-SYZ634178

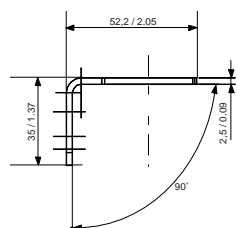
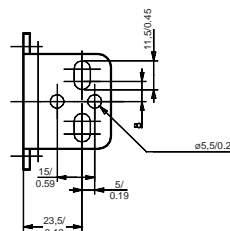
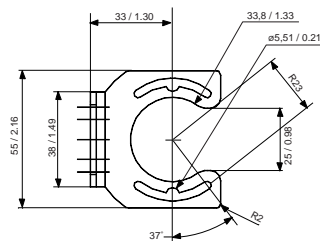
Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit.

Possible mounting positions:

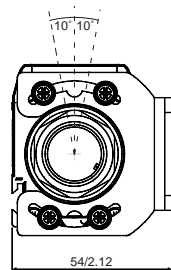
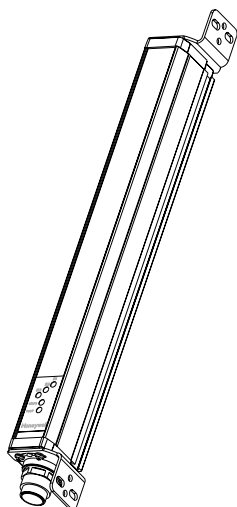
1. At the top and the bottom of the FF-SYA (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

Order 2 kits for a complete set of emitter and receiver

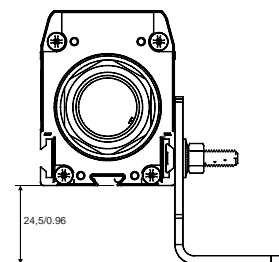
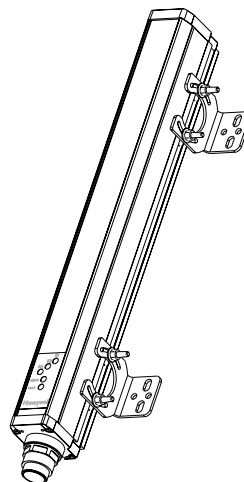
(already included in the FF-SYA package).



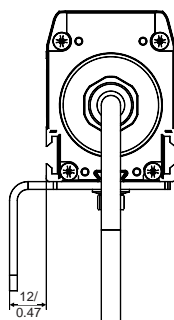
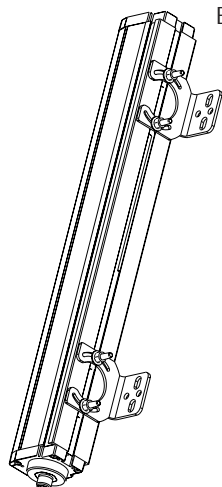
Bracket mounting at the top and the bottom



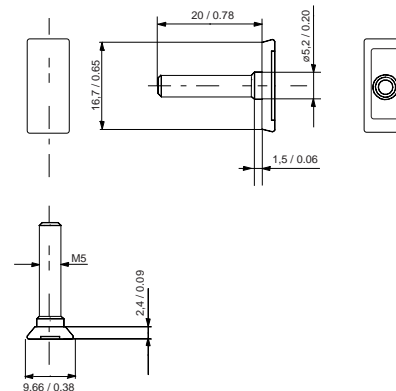
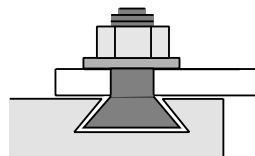
Bracket mounting at the lateral dovetail slots

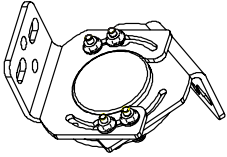


Bracket mounting at the rear dovetail slot



M5 dovetail shape bolt





FF-SYZ634179

Kit of 2 adjustable mounting brackets (FF-SYZ634178 type) with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit. To be mounted together with the FF-SYA package.

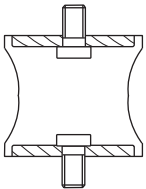
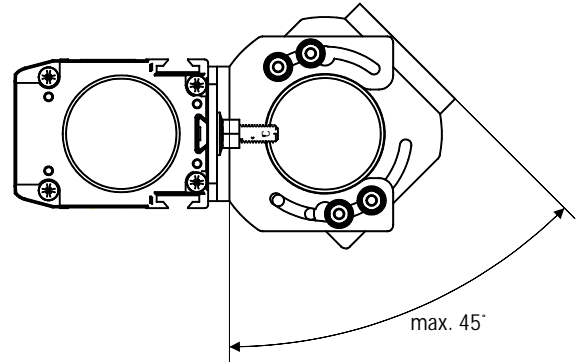
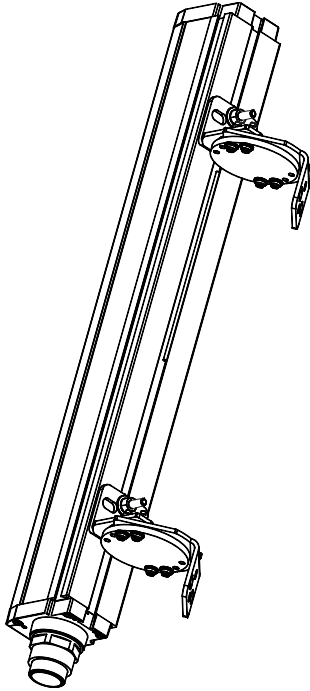
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option)



FF-SYZAD

Kit of 4 antivibration dampers. To be mounted together with the existing mounting brackets. Order 2 kits for a complete set of emitter and receiver.

NOTICE

PROTECTION AGAINST HIGH VIBRATIONS

In case of high vibrations, 3 pairs of brackets must be used for light curtain systems with protection heights, greater or equal to 1000 mm / 39.4 in. You may also use our antivibration damper kit FF-SYZAD.

(The additional bracket kit and the antivibration damper kit must be ordered separately).

Plugs kits



Face view

Colour code
leadwires

- 1-White
- 2-Red
- 3-Green
- 4-Orange
- 5-Black



Face view

Colour code
leadwires

- 1-White/Black
- 2-Black
- 3-White
- 4-Red
- 5-Orange
- 6-Blue
- 7-Green



FF-SYZ172113 (for FF-SYA□□□□□C2 light curtains)

Kit of 2 EN 60423 plastic 7-pin right-angle plugs with crimping contacts (Hirschmann, N6RFF type). Order 1 kit for a complete set emitter and receiver.

Already included in the FF-SYA package.

FF-SYZ172159 (for FF-SYA□□□□□C2 light curtains)

Kit of 2 EN 60423 plastic 7-pin straight plugs with crimping contacts (Hirschmann, N6REF type). Order 1 kit for a complete set emitter and receiver.

To be ordered separately as an option.

FF-SBZ1721136 (for FF-SYA□□□□□C2 light curtains)

Kit of 1 EN 60423 plastic 7-pin right-angle connector with screw contact terminals (Hirschmann, N6RFFS11 type). Order 2 kits for a complete set of emitter and receiver.

To be ordered separately as an option.

FF-41308 (for FF-SYA□□□□□Q2E emitters)

One 5-pole female straight Brad Harrison Mini-Change® plug, 3,66 m / 12 ft cable length. Order one plug for the emitter.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.

FF-41322 (for FF-SYA□□□□□Q2E emitters)

One 5-pole female straight Brad Harrison Mini-Change® plug, 6,10 m / 20 ft cable length. Order one plug for the emitter.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.

FF-42803 (for FF-SYA□□□□□Q2R receivers)

One 7-pole female straight Brad Harrison Mini-Change® plug, 3,66 m / 12 ft cable length. Order one plug for the receiver.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.

FF-42821 (for FF-SYA□□□□□Q2R receivers)

One 7-pole female straight Brad Harrison Mini-Change® plug, 6,10 m / 20 ft cable length. Order one plug for the receiver.

To be ordered separately when using the FF-SYA□□□□□Q2 light curtains.

FF-SYZROD14

Test rod for ø14 mm / 0.6 in resolution safety light curtains
(already included in the FF-SYA package).

FF-SBZROD30

Test rod for ø30 mm / 1.2 in resolution safety light curtains
(already included in the FF-SYA package).

Safety control modules

FF-SYA



FF-SRL60252

Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option).

- Compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22,5 mm / 0.89 in width



FF-SRL59022

Multi-safety device control module with Presence Sensing Device Initiation (PSDI)
(to be ordered separately as an option)

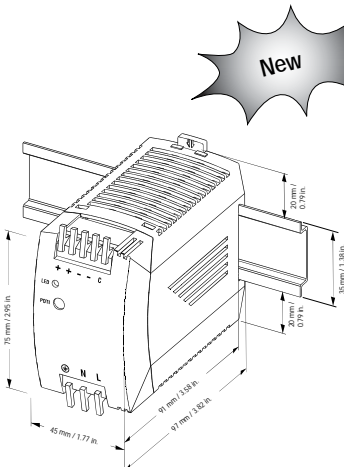
- Accept up to three safety devices working in a guard-only mode or a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode and FSD monitoring
- Cross-fault monitoring of inputs
- 3 NO safety relay outputs
- Static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in



FF-SRM200P2

Muting module
(to be ordered separately as an option)

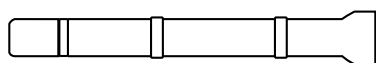
- Connection of 1 or 2 safety devices
- Modes of operation: unidirectional or bidirectional muting, mutual exclusion
- Connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- Category 4 per EN 954-1
- Manual start mode, FSD monitoring
- Programmable max. muting time
- Cross-fault monitoring of inputs
- Self monitored muting lamp output
- 3 NO safety relay outputs
- Static outputs for output status and diagnostic information
- 45 mm / 1.77 in



FF-SXZPWR050

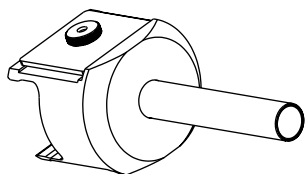
Ac to dc power supply
(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs



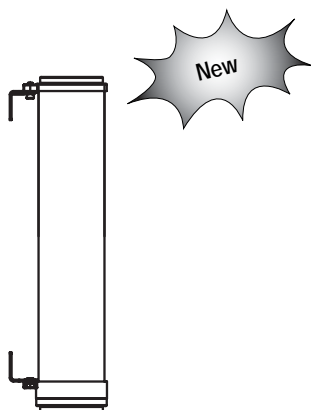
FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.



FF-SYZ604795

Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYA Series light curtain.



FF-SXZSHL

IP67 enclosure for FF-SYA light curtains

Enclosures	Light curtains
FF-SXZSHL048□	FF-SYA□□032 and 048
FF-SXZSHL096□	FF-SYA□□064 through 096
FF-SXZSHL128□	FF-SYA□□112 and 128
FF-SXZSHLKIT	Brackets and cable gland kit (order one kit per enclosure)

□: "P" for polycarbonate, "G" for glass



FF-SYZPF

Fixed post for FF-SYA light curtain

Floorstanding post for the installation of the following FF-SYA light curtains:

Light curtain models: FF-SYA□□032, FF-SYA□□048, FF-SYA□□080, FF-SYA□□096

Multibeam models: FF-SYA02500, FF-SYA03400, FF-SYA04300

(To be ordered separately as an option).

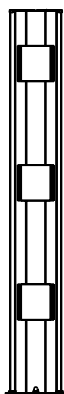
Front covers are available for additional protection of the FF-SYA234 beam access detection systems:

FF-SYZ630184-2: Front cover for 2 beams

FF-SYZ630184-3: Front cover for 3 beams

FF-SYZ630184-4: Front cover for 4 beams

(To be ordered separately as an option).



FF-SYZPF□□

**Fixed post with 2, 3 or 4 individual mirrors (10 % or 25 % reduction of scanning range)
(to be ordered separately as an option)**

FF-SYZPF02	Floorstanding post with 2 individual mirrors with 10 % of loss
FF-SYZPF12	with 25 % of loss Suitable for FF-SYA02500 multibeam system
FF-SYZPF03	Floorstanding post with 3 individual mirrors with 10 % of loss
FF-SYZPF13	with 25 % of loss Suitable for FF-SYA03400 multibeam system
FF-SYZPF04	Floorstanding post with 4 individual mirrors with 10 % of loss
FF-SYZPF14	with 25 % of loss Suitable for FF-SYA04300 multibeam system

Note: The FF-SYZPF□□ fixed posts with individual mirrors are already delivered with the FF-SYZ630184-□ front covers.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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Honeywell

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Honeywell

11 West Spring Street
Freeport, Illinois 61032
USA

Type 4 Safety light curtain

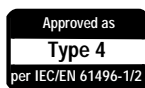
Compact, Universal, Smart and Full-featured

FEATURES

- 1- or 2-beam floating blanking
- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- Manual muting override
- Input for serial connection of an auxiliary safety device
- Unique patented configuration cards for quick set-up and easy replacement
- Self-contained with optical synchronisation
- 2 static (solid state) safety outputs with short-circuit and cross-fault detection
- Muting lamp/diagnosis output or static (solid state) non safety output for signalling
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes the following indication: signal strength, cross-talk, muting, blanking, restart and failure diagnostic
- Test input with selectable test input type
- Resolutions available:
 - ø14 mm / 0.6 in for finger detection
 - ø30 mm / 1.2 in for hand detection
 - ø50 mm / 1.97 in for leg detection
- Protection height up to 1830 mm / 72 in
- Scanning range up to 20 m / 65 ft
- M12 connectors
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS

- Presses and punches
- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Stacking machines, transporting and conveyor technology; handling equipment and assembly lines
- Palletizing industry



The Honeywell FF-SYB light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). The CSA marking makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYB de-energizes its two static (solid state) safety outputs to signal the dangerous motion to stop. The FF-SYB is a self-contained light curtain that does not require a separate control unit for operation.

Functions such as floating blanking, muting, external device monitoring, manual restart and serial connection make it a comprehensive product and eliminate the need for additional control modules.

These built-in features, combined with the small size of the housing, help users reduce overall cost by saving space and installation time.

A unique patented configuration card system allows the user to set up the correct operating mode when swapping units, by simplifying and reducing the number of operations.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

□ External Device Monitoring (EDM)

The FF-SYB is fitted with an EDM input which allows users to check the correct state of the final switching devices (relays or contactors with positively guided contacts). After each intrusion into the protection field, the FF-SYB will check that the EDM input loop is closed before switching the outputs back to ON. If the FF-SYB operates in automatic restart mode, it will restart immediately if the EDM loop is closed. If the FF-SYB operates in manual restart mode, it will restart when the restart push-button is pressed and if the EDM loop is closed. If the EDM loop remains open (meaning that the external device has a malfunction) the FF-SYB will keep its outputs open and will not restart.

□ Manual restart

The FF-SYB can be used in automatic or manual restart mode. In automatic mode, the outputs will switch back to ON after an interruption of the protection field, as soon as the field becomes clear again. In manual restart mode, the FF-SYB will not switch back its outputs to ON until a manual restart push-button is pressed and released. The push-button must be a normally open type button. The manual restart will not switch the OSSDs back to ON in case of light curtain lock out (internal failure, optical interference, etc.) or when the protection field is still interrupted.

□ Auxiliary output

An additional non safety output is available to either mimic the safety output status (solid state Normally Closed signalling output) or signal muting sequences and provide diagnostic information (mode selection depending).

□ Muting function

The FF-SYB is fitted with a built-in muting function. Muting is the ability to temporarily inhibit the outputs of a light curtain under certain conditions.

Sensors are connected to the light curtain through the main connector. An optional junction box is available to perform the electrical connections close to the location of the muting sensors.

Muting sensors are used to discriminate authorised materials from people. The muting sensors must be able to detect the passing material (pallets, vehicles, etc.) according to the material's length and speed.

Figure 1 shows an FF-SYB placed on a conveyor, with the corresponding muting sensors. The muting activation sensors temporarily inhibit the FF-SYB light curtain as soon as they detect the object. The outputs of these sensors are connected to the muting inputs of the FF-SYB receiver. Muting sensors must be successively actuated for a correct muting sequence to start.

Whenever one of the two muting sensors is released, the muting sequence stops. In case of an incorrect muting sequence, a temporary manual muting (override) procedure may be performed to clear the FF-SYB light curtain detection field and revert back to normal operation.

Suitable optoelectronic, mechanical, proximity sensors, etc. can be used as muting sensors.

Inputs for muting sensors accept sensors with relay or static (solid state) outputs (NPN or PNP). 2-wire sensors are also accepted.

A muting lamp output is available on the FF-SYB receiver to drive an external muting indicator that should be installed in a suitable location on the machine.

The following are some configuration examples when using the muting function:

Figure 1 - Bi-directional application with two optoelectronic sensors

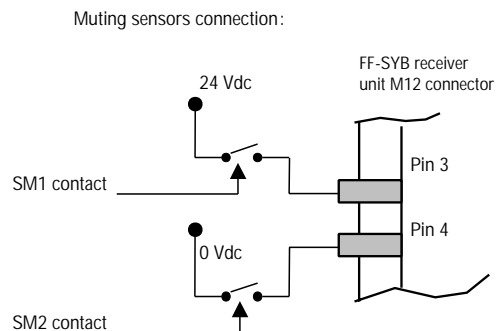
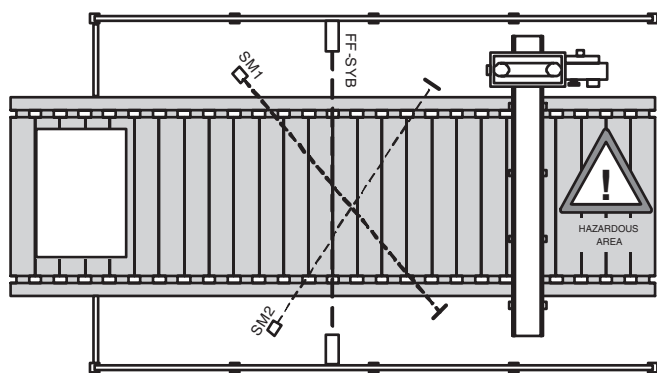
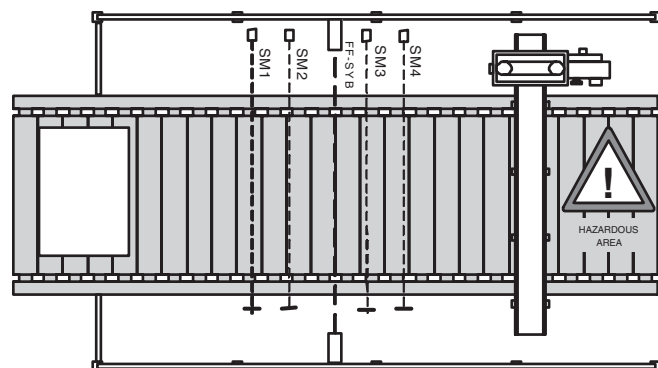


Figure 2 - Bi-directional application with four photoelectric sensors

2 sensors can be wired in parallel on each of the 2 muting inputs of the light curtain, creating a 4 sensor bi-directional muting.



Muting sensors connection:

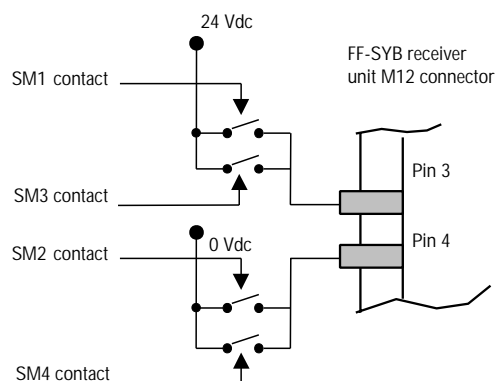
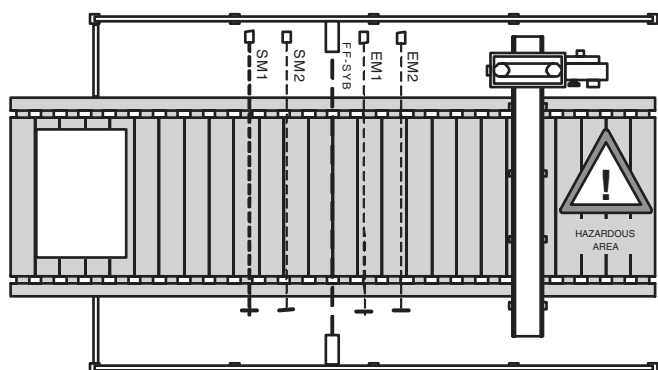
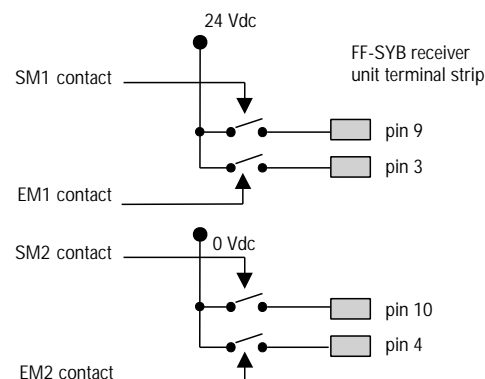


Figure 3 - Uni-directional application with four optoelectronic sensors



Muting sensors connection:

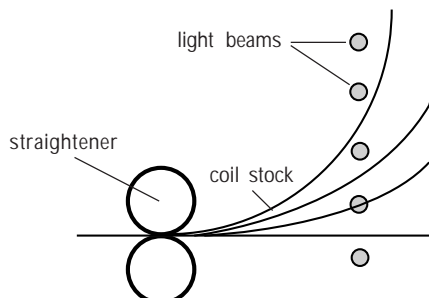


Note: this mode of operation requires direct connections to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

□ Floating blanking function

The FF-SYB is fitted with a selectable floating blanking function which allows users to inhibit 1 or 2 beams anywhere within the protection field, except the bottom beam which is used for synchronisation. If 2 beam floating blanking is selected, the interruption of 1 or 2 beams will not lead to the opening of the outputs. The 2 beams can be adjacent or not. It is useful in those applications where material or air ejected parts randomly travel through or within the sensing field. You can also disable light beams in an area where a fixture penetrates the light field, and you can permit stationary objects to protrude into the light curtain's sensing field.

Figure 4



When using floating blanking, the resolution of the light curtain is altered according to the following table:

Model	Resolution without floating/blanking	Resolution with 1-beam floating blanking	Resolution with 2-beam floating blanking
FF-SYB14	14 mm / 0.55 in	24 mm / 0.94 in	34 mm / 1.33 in
FF-SYB30	30 mm / 1.18 in	50 mm / 1.97 in	70 mm / 2.75 in
FF-SYB50	50 mm / 1.97 in	90 mm / 3.54 in	130 mm / 5.12 in

The maximum size of an undetected object is also affected by floating blanking:

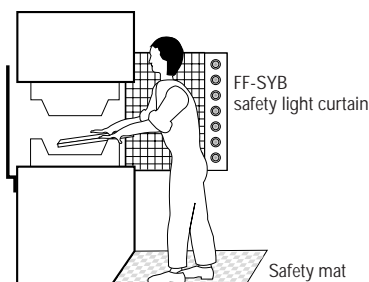
Model	Maximum size of undetected object with 1-beam floating blanking	Maximum size of undetected object with 2-beam floating blanking
FF-SYB14	6 mm / 0.23 in	16 mm / 0.63 in
FF-SYB30	10 mm / 0.39 in	30 mm / 1.18 in
FF-SYB50	30 mm / 1.18 in	70 mm / 2.75 in

Serial connection

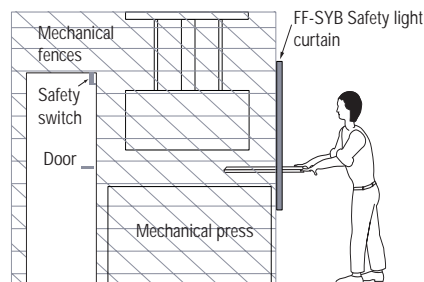
The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the receiver unit. The auxiliary safety device can be an electromechanical safety switch or any other safety device with either relay outputs or solid state outputs (for safety reasons, reversed polarity on these two inputs is mandatory, therefore connection of a second FF-SYB light curtain is not possible through these two inputs). Connection is done through the main connector. An optional junction box is available to perform the electrical connections close to the light curtain.

Figure 5

a) Serial connection of an FF-SYB safety light curtain with a safety mat



b) Serial connection of an FF-SYB safety light curtain with a safety gate switch

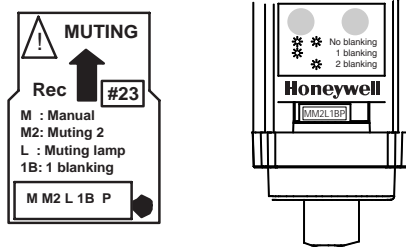


Note: This mode may be combined with the bi-directional muting mode. This combination of modes requires direct connection to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

Configuration cards

The FF-SYB emitter and receiver are set up by the use of configuration cards, similar to the SIM cards used on mobile phones (see figure below). This simple and elegant method eliminates the use of jumpers or dip switches. No computer is required: settings are done on site, using one of the small configuration cards. If the user needs to use a different configuration from the factory settings, he just needs to select the configuration card which corresponds to the desired settings and install it behind the bottom cap of the emitter or receiver. The selected settings are written on the configuration card and are visible through the transparent front window.

Figure 6

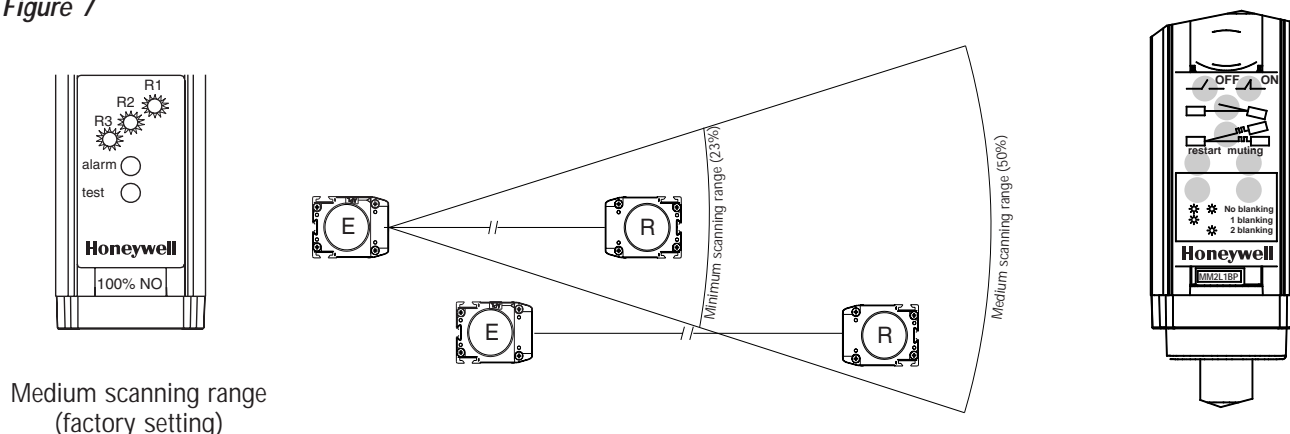


If the FF-SYB needs to be exchanged, the configuration card can be installed in another FF-SYB allowing transfer of settings in a few minutes.

❑ Cross-talk reduction system

The FF-SYB light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.

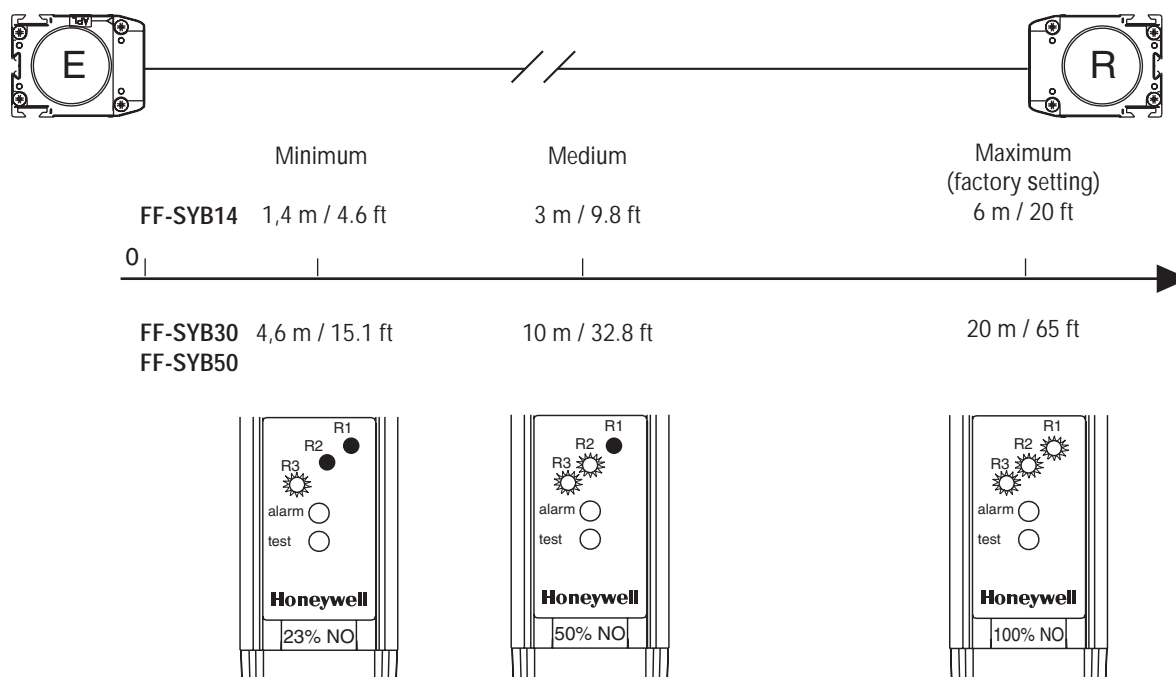
Figure 7



A configuration card is used on the emitter unit for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the scanning range. The end cap can be easily removed to select a different scanning range. Products are delivered with a medium scanning range (middle position) to minimize cross-talk upon installation.

❑ Selectable scanning ranges

Figure 8



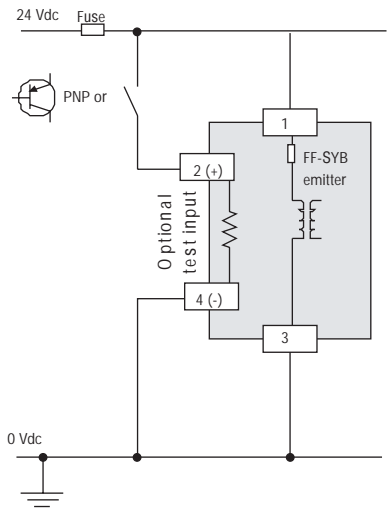
FF-SYB

Test input type

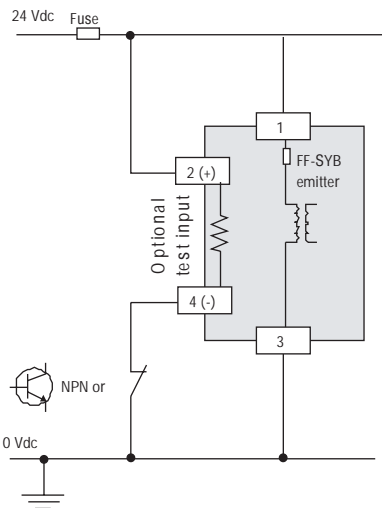
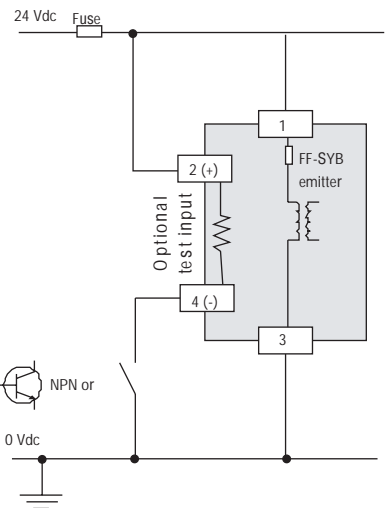
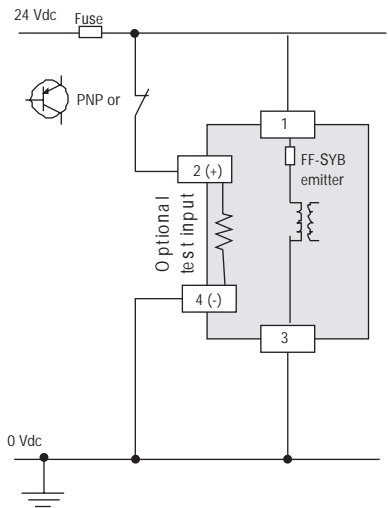
Figure 9

Voltage free contact
(PNP static (solid state) output and NPN static (solid state) output also connectable)

Normally open
(factory setting)

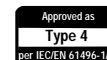


Normally closed



Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, floating blanking, inputs for serial connection of an auxiliary device, manual restart and EDM
- Control of the infrared emission source for cross-talk reduction
- Enhanced diagnostic information



FF-SYB

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SYB14	FF-SYB30	FF-SYB50
Nominal scanning range		0 m to 6 m / 0 ft to 20 ft	0 m to 20 m / 0 ft to 65 ft	0 m to 20 m / 0 ft to 65 ft
Object detection size (see chapter "Floating blanking function")		14 mm / 0.55 in	30 mm / 1.18 in	50 mm / 1.97 in
Angle of divergence		$\pm 2^\circ$, $\pm 25\%$		
Emitting light source (immunity)		Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux)		
Supply voltage and power consumption		24 Vdc ($\pm 20\%$); 5 W max. for the emitter, 5 W max. for the receiver		
Safety outputs (OSSDs)	Output type	2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections		
	Switching capability	350 mA max. at 24 Vdc		
Response time (beam interruption)		22 ms (28 ms for model numbers FF-SYB14128 to FF-SYB14176)		
Response time (Auxiliary Safety Device engaged)		28 ms		
Maximum cable length		100 m / 328 ft (100 nF capacitance)		
Restart time after power up (after beam actuation)		> 1 s (80 ms - without EDM, 150 ms - with EDM)		
Loads impedance		70 Ω min. / 5 k Ω max.		
Voltage drop		< 2 Vdc		
Loads turn-on voltage		5 V min. on resistive loads / 7 V min. on inductive loads		
Protections		Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)		
NC signalling or muting lamp/diagnosis output	Output type	1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)		
	Switching capability	100 mA max. at 24 Vdc		
	Protections	Overloads, reversed polarity, micro-cut-off (10 ms, 100 % voltage drop, 10 Hz)		
Test input (emitter) (1)	Input type	Floating input with selectable NO/NC test logic		
	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)		
Test loop current (resistance)		13 mA typical (750 Ω max.)		
	Protections	3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)		
Restart / EDM input (1)	External contact type	Relay contact (must be activated for at least 150 ms and less than 3 s)		
	Max. voltage	29 Vdc		
Muting or serial connection inputs (1)	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)		
	Maximum cable length	100 m / 328 ft (no limitation in capacitance)		
Environmental/physical characteristics	Temperature range	Operating: 0 °C to 55° C/32° F to 131 °F (95% relative humidity) • Storage: -20° C to 75 °C/-4° F to 167° F		
	Sealing	NEMA 4, 13 and IP 65		
	Vibrations	IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm $\pm 0,05$ amplitude, 20 sweeps per axis, for 3 axes		
	Shocks	IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes		
	Bumps	IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes		
	Product dimension	Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2)		
	Connection	Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland (see Figure 10 to determine possible modes of operation for each receiver termination type)		
	Material	Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA)		
Ordering information		Notes:		
Each listing consists of an M12 emitter, an M12 receiver, 2 pairs of right-angle brackets, an end cover equipped with a cable gland, a test rod and a set of configuration cards.		(1) Voltage switching (high/low): ≥ 11 Vdc min. ($I > 6$ mA) / ≤ 5 Vdc ($I > 2$ mA); Input current (high/low): 20 mA / 10 mA at 24 Vdc. In compliance with the IEC 61131-2 requirements for type 2 sensors.		
		(2) Refer to emitter and receiver dimensions / weights.		
FF-SYB□□ □□□ M2				
		Model (see Table 2 page 9)		
		Resolutions		
		14: \varnothing 14 mm / 0.6 in		
		30: \varnothing 30 mm / 1.2 in		
		50: \varnothing 50 mm / 1.97 in		

Figure 10 - Possible modes of operation and corresponding receiver termination type and connection box

FF-SYB

Card (1)	Restart mode	Blanking (2)	Auxiliary Safety Device	Muting (3)	Auxiliary output (4)	Receiver termination (5)
#01	Manual				NC signal	M12 plug
#02	Manual	1-beam			NC signal	M12 plug
#03	Manual	2-beam			NC signal	M12 plug
#04	Automatic				NC signal	M12 plug
#05	Automatic	1-beam			NC signal	M12 plug
#06	Automatic	2-beam			NC signal	M12 plug
#07	Automatic		yes		NC signal	M12 plug
#08	Automatic	1-beam	yes		NC signal	M12 plug
#09	Automatic	2-beam	yes		NC signal	M12 plug
#10	Manual		yes		NC signal	M12 plug
#11	Automatic			2 inputs (6)	NC signal	M12 plug
#12	Automatic			2 inputs (6)	Muting lamp	M12 plug
#13	Automatic			4 inputs (6)	NC signal	Terminal strip
#14	Automatic			4 inputs (6)	Muting lamp	Terminal strip
#15	Automatic		yes	2 inputs	NC signal	Terminal strip
#16	Automatic		yes	2 inputs	Muting lamp	Terminal strip
#17	Manual			2 inputs (6)	NC signal	M12 plug
#18	Manual			2 inputs (6)	Muting lamp	M12 plug
#19	Manual			4 inputs (6)	NC signal	Terminal strip
#20	Manual			4 inputs (6)	Muting lamp	Terminal strip
#21	Manual		yes	2 inputs	NC signal	Terminal strip
#22	Manual		yes	2 inputs	Muting lamp	Terminal strip
#23	Manual	1-beam		2 inputs (6)	Muting lamp	M12 plug
#24	Manual	2-beam		2 inputs (6)	Muting lamp	M12 plug
#25	Manual	1-beam		4 inputs (6)	Muting lamp	Terminal strip
#26	Manual	2-beam		4 inputs (6)	Muting lamp	Terminal strip
#27	Manual	1-beam	yes	2 inputs	Muting lamp	Terminal strip
#28	Manual	2-beam	yes	2 inputs	Muting lamp	Terminal strip

(1) Factory setting: card #04

(2) Floating blanking

Model	1-beam		2-beam	
	Resolution	Undetected object size	Resolution	Undetected object size
FF-SYB14	24 mm / 0.94 in	6 mm / 0.23 in	34 mm / 1.33 in	16 mm / 0.63 in
FF-SYB30	50 mm / 1.97 in	10 mm / 0.39 in	70 mm / 2.75 in	30 mm / 1.18 in
FF-SYB50	90 mm / 3.54 in	30 mm / 1.18 in	130 mm / 5.12 in	70 mm / 2.75 in

(3) Muting: either 2 inputs available for the connection of 2 or 4 muting sensors to perform a bi-directional muting function (see page 2 and 3), or 4 inputs available for the connection of 4 sensors to perform a uni-directional muting function (see page 3).

(4) Auxiliary output: either a normally closed signalling output of a muting and diagnosis lamp output (see page 2).

(5) Receiver termination: some modes require direct connections to the internal receiver terminal strip. The M20 cable gland (delivered with the package) allows the use of a male M23 cordset.

(6) Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).

Table 2

Model	032	048	064	080	096
Protection height (mm / in) (1)					
FF-SYB14	334 / 13.1	494 / 19.4	654 / 25.7	814 / 32.07	974 / 38.3
FF-SYB30	350 / 13.7	510 / 20.09	670 / 26.3	830 / 32.7	990 / 39
FF-SYB50	370 / 14.6	530 / 20.9	690 / 27.2	850 / 33.5	1010 / 39.8
Sensing field height (mm / in)(2)					
FF-SYB14	314 / 12.3	474 / 18.6	634 / 24.9	794 / 31.2	954 / 37.5
FF-SYB30	310 / 12.2	470 / 18.5	630 / 24.8	790 / 31.1	950 / 37.4
FF-SYB50	290 / 11.4	450 / 17.7	610 / 24.03	770 / 30.3	930 / 36.6
Total height (mm / in) (3)					
M12 emitter or receiver	424 / 16.7	584 / 23	744 / 29.3	904 / 35.6	1064 / 41.9
Cable gland receiver only	438 / 12.2	598 / 23.5	758 / 29.8	918 / 36.1	1078 / 42.4
Weight per device (kg / lbs)	0,86 / 1.89	1,14 / 2.5	1,42 / 3.12	1,7 / 3.74	1,98 / 4.35

Table 2 (continued)

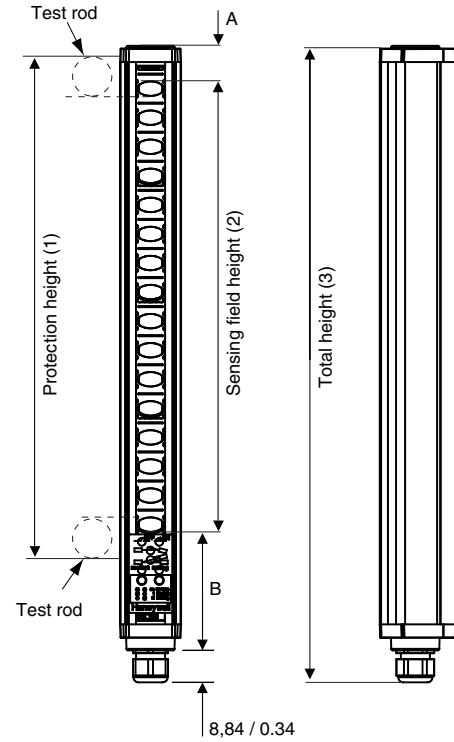
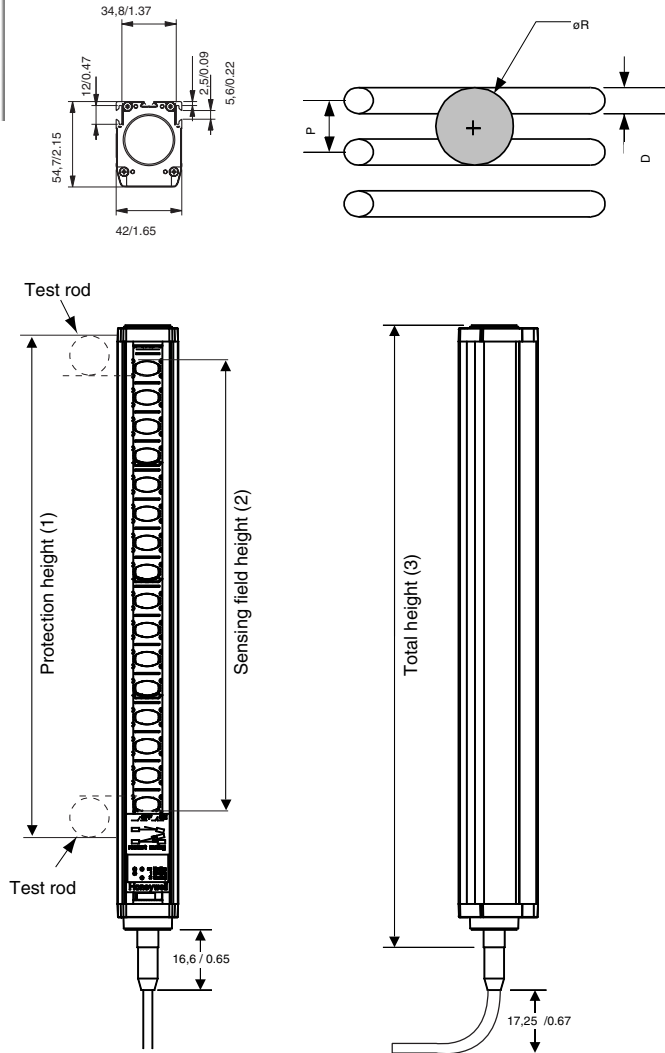
Model	112	128	144	160	176
Protection height (mm / in) (1)					
FF-SYB14	1134 / 44.6	1294 / 50.9	1454 / 57.2	1614 / 63.5	1774 / 69.8
FF-SYB30	1150 / 45.3	1310 / 51.6	1470 / 57.9	1630 / 64.2	1790 / 70.5
FF-SYB50	1170 / 46.0	1330 / 52.4	1490 / 58.7	1650 / 65.0	1810 / 71.2
Sensing field height (mm / in)(2)					
FF-SYB14	1114 / 43.8	1274 / 50.1	1434 / 56.5	1594 / 62.8	1754 / 69.1
FF-SYB30	1110 / 43.7	1270 / 50.03	1430 / 56.3	1590 / 62.6	1750 / 68.9
FF-SYB50	1090 / 42.9	1250 / 49.2	1410 / 55.1	1570 / 61.8	1730 / 68.1
Total height (mm / in) (3)					
M12 emitter or receiver	1224 / 48.2	1384 / 54.5	1544 / 60.8	1704 / 67.1	1864 / 73.4
Cable gland receiver only	1238 / 48.7	1398 / 55	1558 / 61.3	1718 / 67.6	1878 / 73.9
Weight per device (kg / lbs)	2,26 / 4.97	2,54 / 4.97	2,82 / 6.20	3,10 / 6.82	3,38 / 7.43

Figure 11 - Dimensions in mm / in

FF-SYB

M12 emitter or receiver

Cable gland receiver



- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height (including male receptacles or cable gland)

Table 1

(mm / in)	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SYB14	ø 14 / 0.6	10 / 0.4	4 / 0.16	15,2 / 0.60	90,6 / 3.56
FF-SYB30	ø 30 / 1.2	20 / 0.8	10 / 0.4	22,2 / 0.87	87,6 / 3.45
FF-SYB50	ø 50 / 1.97	40 / 1.57	10 / 0.39	42.2 / 1.66	87,6 / 3.45

☐ LED status indicators

Figure 12 - Emitter

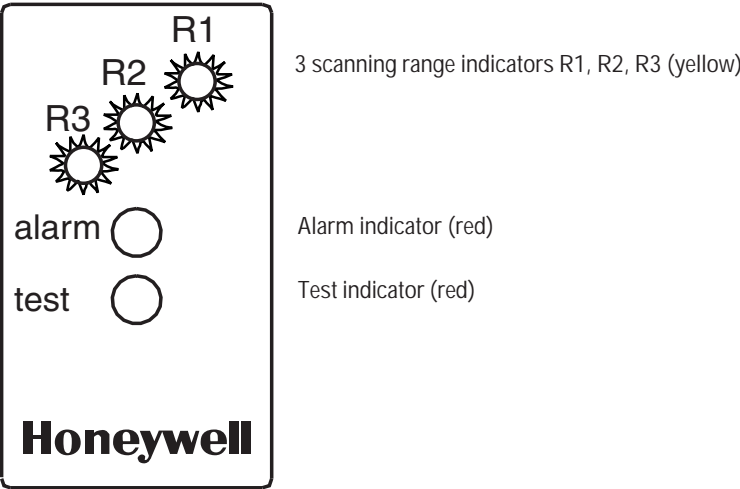


Figure 13 - Receiver

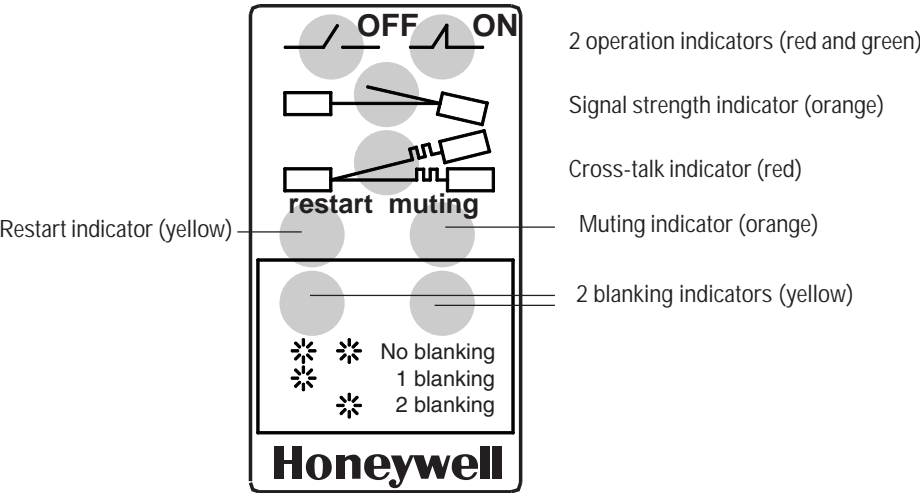
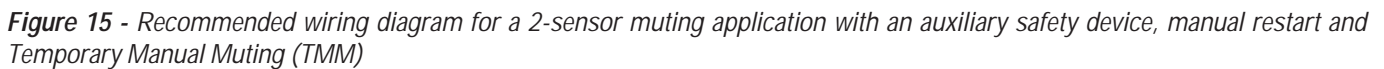


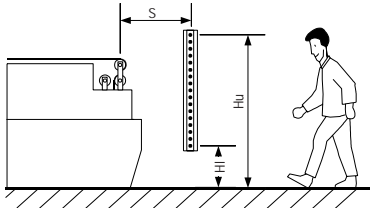
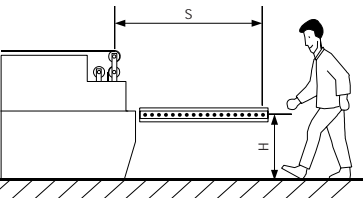
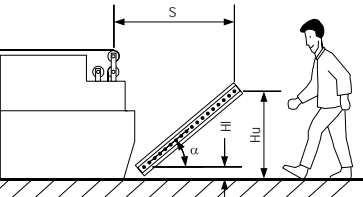
Figure 14 - Recommended wiring diagram for a 2-sensor muting application with automatic restart and Temporary Manual Muting (TMM) (see Figure 1)



❑ European EN 999 standard

All distances/heights in mm (100 mm = 3.9 in)

FF-SYB

LIGHT CURTAIN MODEL	FF-SYB14 FF-SYB30 without floating/blanking	FF-SYB30 with 1- or 2 beam floating blanking FF-SYB50 with or without blanking
Normal approach 	$S \geq 2000 (t1+t2) + 8 (R-14)$ <p>with $S \geq 100$</p> <p>if $S \geq 500$, then use:</p> $S \geq 1600 (t1+t2) + 8 (R - 14)$ <p>with $S \geq 500$</p>	$S \geq 1600 (t1+t2) + 850$ <p>with $Hu \geq 900$ mm $Hi \leq 300$ mm</p>
Parallel approach 	$S \geq 1600 (t1+t2) + (1200 - 0.4H), \text{ with } H \leq 875$ <p>Or</p> $S \geq 1600 (t1+t2) + 850, \text{ with } 875 \leq H \leq 1000$ <p>with $H \geq 15$ (R-50): $H \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking. $H \geq 600$ mm for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in parallel approach.</p>	
Angled approach 	<p>if $\alpha \geq 30^\circ$, then use the normal approach formula, with $Hu \geq 900$ mm and $Hi \leq 300$ mm</p> <p>if $\alpha \leq 30^\circ$, then use the parallel approach formula, with $Hu \leq 1000$ mm and $Hi \geq 15$ (R-50) where R is the light curtain resolution</p> <p>$Hi \geq 300$ mm for the FF-SYB30 with 2-beam floating blanking $Hi \geq 600$ mm for the FF-SYB50 with 1-beam floating blanking FF-SYB50 with 2-beam floating blanking not allowed in angled approach.</p>	

$t1$: light curtain response time (s)

$t2$: machine stopping time (s)

R: light curtain resolution

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

USA's OSHA/ANSI/RIA standards

All distances/heights in inches (1 in = 25,4 mm)

FF-SYB

LIGHT CURTAIN MODEL	FF-SYB14, FF-SYB30, FF-SYB50 with or without floating blanking																
<div>Normal approach</div>	<div>$Ds \geq 63 (Ts+Tc+Tr) + Dpf$</div> <div>If $R \leq 2,5$, $Dpf = 3.4 \times (R - 0.275)$, (see table below) If $Hi \leq 12$ and $Hu \geq 48$ (Typical for Reach Thru), $Dpf = 36$ If $Hi \leq 12$ and $36 \leq Hu \leq 48$ (Typical for Reach Over), $Dpf = 48$ If $Hi > 12$, supplemental safeguarding may be required to detect crawling underneath.</div>																
<div>Parallel approach</div>	<div>$Ds \geq 63 \times (Ts + Tc + Tr) + 48$</div> <div>$H \geq 15 \times (R-2)$</div> <table><tr><th>Table for H*</th><th>No blanking</th><th>1-beam</th><th>2-beam</th></tr><tr><td>FF-SYB14</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td></tr><tr><td>FF-SYB30</td><td>$0 < H \leq 39$</td><td>$0 < H \leq 39$</td><td>$11.3 < H \leq 39$</td></tr><tr><td>FF-SYB50</td><td>$0 < H \leq 39$</td><td>$23.1 < H \leq 39$</td><td>Not allowed</td></tr></table>	Table for H*	No blanking	1-beam	2-beam	FF-SYB14	$0 < H \leq 39$	$0 < H \leq 39$	$0 < H \leq 39$	FF-SYB30	$0 < H \leq 39$	$0 < H \leq 39$	$11.3 < H \leq 39$	FF-SYB50	$0 < H \leq 39$	$23.1 < H \leq 39$	Not allowed
Table for H*	No blanking	1-beam	2-beam														
FF-SYB14	$0 < H \leq 39$	$0 < H \leq 39$	$0 < H \leq 39$														
FF-SYB30	$0 < H \leq 39$	$0 < H \leq 39$	$11.3 < H \leq 39$														
FF-SYB50	$0 < H \leq 39$	$23.1 < H \leq 39$	Not allowed														
<div>Angled approach</div>	<div>If $\alpha < 30^\circ$, then use the normal approach formula If $\alpha < 30^\circ$, then use the parallel approach formula</div>																

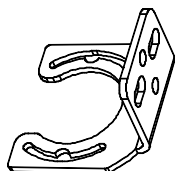
*If $H > 12$, supplemental safeguarding may be required to detect crawling underneath.

Ts: worst case stopping time of the machine (s)
Tc: worst case response time of the machine controls (s)
Tr: response time of the safety devices (s)
Dpf: Depth penetration factor (in.)
R: light curtain resolution

Table for Dpf	No blanking	1-beam	2-beam
FF-SYB14	0.935	2.261	3.587
FF-SYB30	3.077	5.763	-
FF-SYB50	5.763	-	-

For more information, refer to the ANSI/RIA 15.06 American standard.

Accessories



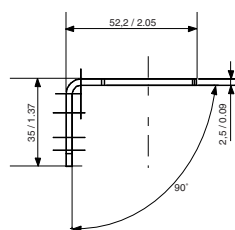
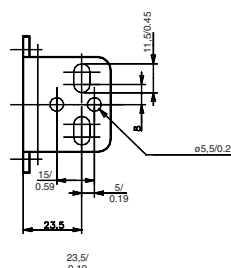
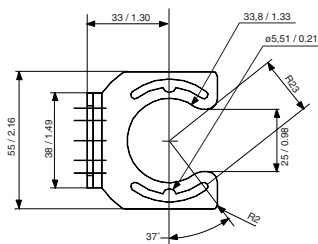
FF-SYZ634178

Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit. Possible mounting positions:

1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

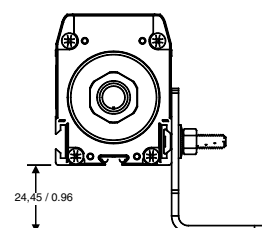
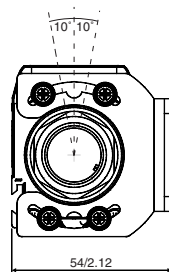
Order 2 kits for a complete set of emitter and receiver.

(already included in the FF-SYB package)



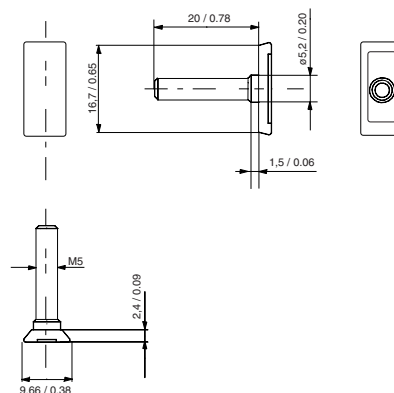
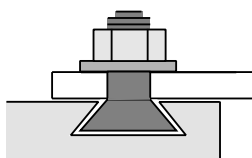
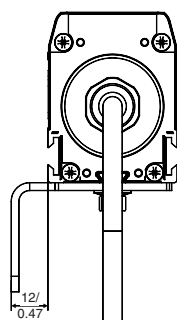
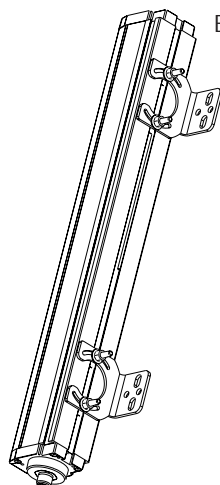
Bracket mounting at the top and the bottom

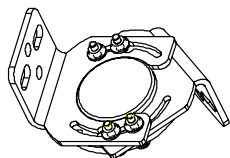
Bracket mounting at the lateral dovetail slots



Bracket mounting at the rear dovetail slots

M5 dovetail shape bolt





FF-SYZ634179

Kit of 2 adjustable mounting brackets with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit.

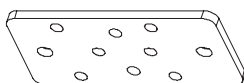
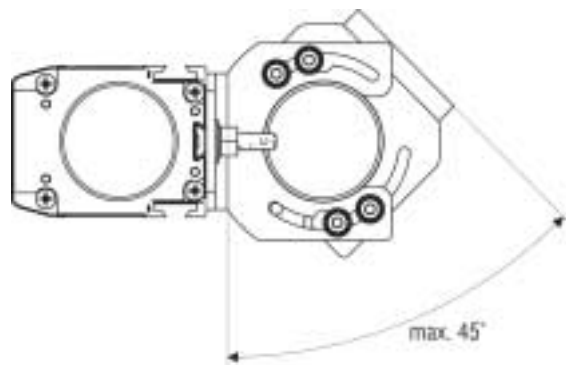
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option, to be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYB package)



(x 2)

FF-SYZAD

Anti-vibration kit

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets delivered with the FF-SYB package.



(x 4)

NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibrations, order:

- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm/ 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm/39.4 in, but less than 1850 mm/72.8in.
- 4 sets of FF-SYZAD kit for light curtain systems with protection height greater than 1850 mm/72.8 in.

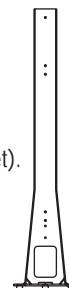
Mechanical fixture for muting application

FF-SXZ630170

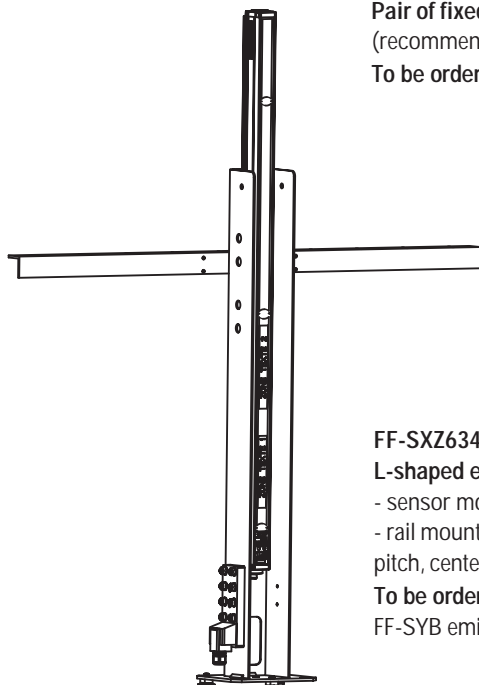
Pair of fixed posts for FF-SYB light curtain

(recommended when mechanical protection of the light curtain is NOT required)

To be ordered separately as an option (order 1 piece for a complete FF-SYB emitter/receiver set).



FF-SYB

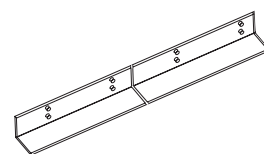


FF-SXZ634186

L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long

- sensor mounting: $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch
- rail mounting: 3 pairs of $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch, centered

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).



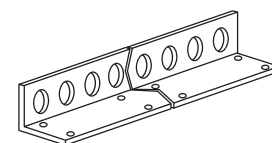
FF-MPZS6018

Muting sensor mounting rails

- sensor mounting: $\varnothing 18$ mm / $\varnothing 0.71$ in mounting holes, 30 mm / 1.18 in distance between centers

- rail mounting: $\varnothing 5$ mm / $\varnothing 1/5$ in fixing holes, 100 mm / 3.94 in pitch

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).



FF-SYZPF

Fixed post for FF-SYB light curtain

(recommended when the mechanical protection of the light curtain is required)

Floorstanding post for the installation of the following FF-SYB light curtains:

Light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

Multibeam models: FF-SYB02500, FF-SYB03400, FF-SYB04300

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).

Front covers are available for additional protection of the FF-SYB234 beam access detection systems:

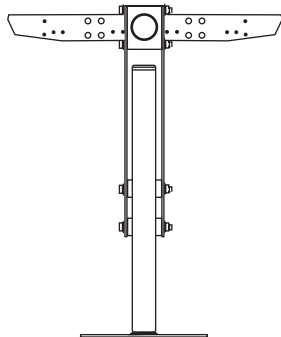
FF-SYZ630184-2: Front cover for 2 beams

FF-SYZ630184-3: Front cover for 3 beams

FF-SYZ630184-4: Front cover for 4 beams

To be ordered separately as an option.

FF-SYB

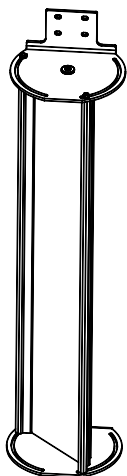


FF-SYZPA

Adjustable floor standing post

- Compatible with all protection heights
- Horizontal, diagonal and vertical adjustment of light curtains possible
- Quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- Fine adjustment of light curtains in azimuth direction of $\pm 11^\circ$ ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- Base plate can be mounted independently
- Finish: RAL 1021 yellow paint

To be ordered separately as an option.



FF-SYZMIR Deflection mirror

To be ordered separately as an option

Features:

- Deflection mirror with 10 % scanning range reduction (FF-SYZMIR004 through 18)
- Deflection mirror with 25 % scanning range reduction (FF-SYZMIR104 through 18)
- Food and Beverage industry: stainless steel deflection mirrors with 45 % scanning range reduction (FF-SYZMIR204 through 14)
- Quick mounting and easy mirror adjustment
- Mounting brackets included (top / bottom mounting)
- Adjustment of mirror in azimuth direction of $\pm 45^\circ$

Material	Aluminium alloy housing
Finish	Gold colour anodisation
Ordering guide:	
FF-SYZMIR004	FF-SY00032 and FF-SY00048
FF-SYZMIR006	FF-SY00064
FF-SYZMIR008	FF-SY00080
FF-SYZMIR010	FF-SY00096
FF-SYZMIR012	FF-SY00112 and FF-SY00128
FF-SYZMIR014	FF-SY00144
FF-SYZMIR016	FF-SY00160
FF-SYZMIR018	FF-SY00176



FF-SYZPFM

Fixed post with plain mirror (10 % or 25 % reduction of scanning range)

- Floorstanding post with 1 plain mirror (FF-SYZPFM01, 10 % of loss)
- Floorstanding post with 1 plain mirror (FF-SYZPFM11, 25 % of loss)
- Suitable for light curtain models: FF-SYB032, FF-SYB048, FF-SYB080, FF-SYB096

To be ordered separately as an option.



FF-SXZSHL

IP67 enclosure for FF-SYB light curtains

Enclosures	Light curtains
FF-SXZSHL048	FF-SYB00032 and 048
FF-SXZSHL096	FF-SYB00064 through 096
FF-SXZSHL128	FF-SYB00112 and 128
FF-SXZSHLKIT	Brackets and cable gland kit (order one kit per enclosure)

□: "P" for polycarbonate, "G" for glass

M12 connection boxes

For the connection of muting sensors, restart and TMM switches and muting lamp to the light curtain

FF-SXZBOX8M12T

IP67 junction box, field-attachable home run cable, M12 8-port configuration.

FF-SXZBOX8M12L02

IP67 junction box, field-attachable home run cable, M12 8-port configuration, prewired with a 2 m/6.56 ft M12 8-pin cordset.

Cordsets

M12/5 pole

- 1: brown
- 2: white
- 3: blue
- 4: black
- 5: green/yellow



M12 single-ended cordset, female / 5-pin straight for the FF-SYB emitter

FF-SXZCAM125U02 2 m / 6.56 ft length

FF-SXZCAM125U05 5 m / 16.40 ft length

FF-SXZCAM125U10 10 m / 32.8 ft length

Equivalent to the 805000A09M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

M12/8 pole

- 1: white
- 2: brown
- 3: green
- 4: yellow
- 5: grey
- 6: pink
- 7: blue
- 8: red



M12 single-ended cordset, female / 8-pin straight for the FF-SYB receiver

FF-SXZCAM128U02 2 m / 6.56 ft length

FF-SXZCAM128U05 5 m / 16.40 ft length

FF-SXZCAM128U10 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison (see vendor catalog for color code)

Cable connector



FF-SXZCOM125 - M12 screw connector, female / 5 pin straight for the FF-SYB emitter

FF-SXZCOM128 - M12 screw connector, female / 8 pin straight for the FF-SYB receiver

Safety control modules



FF-SRE60292

Slim line expansion module

- 24 Vdc

- Safety interface up to Category 4 per EN 954-1

- 4 NO/2 NC safety relay outputs

- 22,5 mm / 0.88 in width

(to be ordered separately as an option).



FF-SRE30812

Expansion module

- 24 Vdc, 115 Vac or 230 Vac

- Safety interface up to Category 4 per EN 954-1

- 7 NO/1 NC internally redundant safety relay outputs

- 90 mm / 3.54 in width

(to be ordered separately as an option).

Safety control modules

FF-SYB



FF-SRM200P2

Mutual exclusion module

(to be ordered separately as an option)

- typical applications: loading/unloading chamber on machining centers or conveyors, crossing of conveyor lines, moving conveyors or AGVs
- connection of 2 safety devices
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode, FSD monitoring
- crossfault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

FF-SRL59022

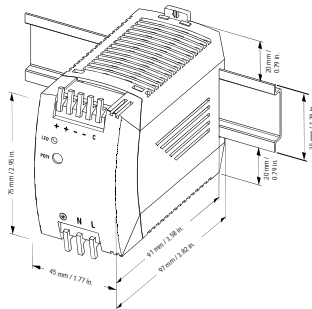
Presence Sensing Device Initiation (PSDI)

(to be ordered separately as an option).

- to be used with FF-SYB14 or FF-SYB30 only
- accept a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode and FSD monitoring
- cross-fault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in



ac to dc power supply



FF-SXZPWR050

ac to dc power supply

(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs

Muting lamp



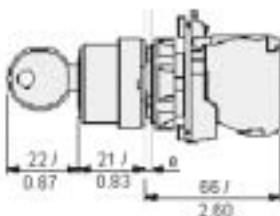
(not contractual)

FF-SXZMLED

Beacon supplied with fixing plate for vertical surface and a LEDs bulb

(Telemecanique XVB Series type). To be used as the muting/diagnostic lamp.

3 position spring loaded key switch



a: panel thickness 1 mm to 6 mm /
0.04 in to 0.24 in

(not contractual)

FF-SXZTMM

ø 22 mm 3-position spring loaded key switch with a Normally Closed contact on the left position and two complementary (Normally Closed and Normally Open) contacts on the right position (Telemecanique ZB5 Series type, fixing collar with screw clamp contact blocks, key # 455).

To be used as the TMM hold-to-run device.

Configuration cards

FF-SYZ101085R

Set of 28 configuration cards for FF-SYB receiver

FF-SYZ101092E

Set of 6 configuration cards for FF-SYB emitter

Installation manuals

FF-PK107120-EN

One FF-SYB English installation manual

FF-PK107120-DE

One FF-SYB German installation manual

FF-PK107120-FR

One FF-SYB French installation manual

FF-PK107120-IT

One FF-SYB Italian installation manual

FF-PK107120-SP

One FF-SYB Spanish installation manual

NOTICE

By default, products will be shipped with the installation manual in the language of the country of delivery when available or in English. If any other language is required, it must be ordered separately.

Test rods



FF-SYZROD14

Test rod for $\varnothing 14$ mm / 0.6 in resolution safety light curtains
(already included in the FF-SYB package).

FF-SBZROD30

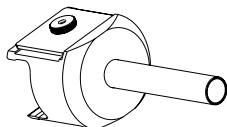
Test rod for $\varnothing 30$ mm / 1.2 in resolution safety light curtains
(already included in the FF-SYB package).



FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

To be ordered separately as an option.



FF-SYZ604795

Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYB Series light curtain.

To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

INTERNET: www.honeywell.com/sensing

E-mail: info.sc@honeywell.com

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Honeywell

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38240 Meylan Cedex
France

Type 4 Safety light curtain

Compact, Universal, Smart and Full-featured

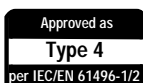
FF-SYB234 Series
FF-SYB

FEATURES

- 1- or 2-beam floating blanking
- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- Manual muting override
- Input for serial connection of an auxiliary safety device
- Unique patented configuration cards for quick set up and easy replacement
- Self-contained with optical synchronisation
- 2 static (solid state) safety outputs with short-circuit and cross-fault detection
- Muting lamp/diagnosis output or static (solid state) non safety output for signalling
- Selection of the infrared emission power allows cross-talk reduction
- Enhanced diagnostic information includes the following indication: signal strength, cross-talk, muting, blanking, restart and failure diagnostic
- Test input with selectable test input type
- Two, three and four beam versions for access and beam detection
- Scanning range up to 80 m / 262.4 ft
- M12 connectors
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability (to be ordered separately).

TYPICAL APPLICATIONS

- Access detection to robot areas
- Stacking machines, transporting and conveyor technology
- Handling equipment and assembly lines
- Palletizing industry



The Honeywell FF-SYB light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). Its CSA mark makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYB de-energizes its two static (solid state) safety outputs to signal the dangerous motion to stop. The FF-SYB is a self-contained light curtain that does not require a separate control unit for operation.

Functions such as floating blanking, muting, external device monitoring, manual restart and serial connection make it a comprehensive product and eliminate the need for additional control modules.

These built-in features, combined with the small size of the housing, help users reducing overall cost by saving space and installation time.

A unique patented configuration card system allows the user to set up the correct operating mode when swapping units, by simplifying and reducing the number of operations.

The long scanning distance ensures that most perimeter guarding applications are covered. The optional FF-SYZPF floor mounting posts with individual mirrors can be used to protect several sides of a machine with only one system.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

External Device Monitoring (EDM)

The FF-SYB is fitted with an EDM input which allows users to check the correct state of the final switching devices (relays or contactors with positively guided contacts). After each intrusion into the protection field, the FF-SYB will check that the EDM input loop is closed before switching the outputs back to ON. If the FF-SYB operates in automatic restart mode, it will restart immediately if the EDM loop is closed. If the FF-SYB operates in manual restart mode, it will restart when the restart push-button is pressed and if the EDM loop is closed. If the EDM loop remains open (meaning that the external device has a malfunction) the FF-SYB will keep its outputs open and will not restart.

Manual restart

The FF-SYB can be used in automatic or manual restart mode. In automatic mode, the outputs will switch back to ON after an interruption of the protection field, as soon as the field becomes clear again. In manual restart mode, the FF-SYB will not switch back its outputs to ON until a manual restart push-button is pressed and released. The push-button must be a normally open type button. The manual restart will not switch the OSSDs back to ON in case of light curtain lock out (internal failure, optical interference, etc.) or when the protection field is still interrupted.

Auxiliary output

An additional non safety output is available to either mimic the safety output status (solid state Normally Closed signalling output) or signal muting sequences and provide diagnostic information (mode selection depending).

Muting function

The FF-SYB is fitted with a built-in muting function. Muting is the ability to temporarily inhibit the outputs of a light curtain under certain conditions. Sensors are connected to the light curtain through the main connector. An optional junction box is available to perform the electrical connections close to the location of the muting sensors.

Muting sensors are used to discriminate authorised materials from people. The muting sensors must be able to detect the passing material (pallets, vehicles, etc.) according to the material's length and speed.

Figure 1 shows an FF-SYB placed on a conveyor, with the corresponding muting sensors.

The muting activation sensors temporarily inhibit the FF-SYB light curtain as soon as they detect the object. The outputs of these sensors are connected to the muting inputs of the FF-SYB receiver. Muting sensors must be successively actuated for a correct muting sequence to start.

Whenever one of the two muting sensors is made free again, the muting sequence stops. In case of an incorrect muting sequence, a temporary manual muting (override) procedure may be performed to clear the FF-SYB light curtain detection field and revert back to normal operation.

Suitable optoelectronic, mechanical, proximity sensors, etc. can be used as muting sensors.

Inputs for muting sensors accept sensors with relay or static (solid state) outputs, NPN or PNP. 2-wire sensors are also accepted.

A muting lamp output is available on the FF-SYB receiver to drive an external muting indicator that should be installed in a suitable location on the machine.

The following are some configuration examples when using the muting function:

Figure 1 - Bi-directional application with two optoelectronic sensors

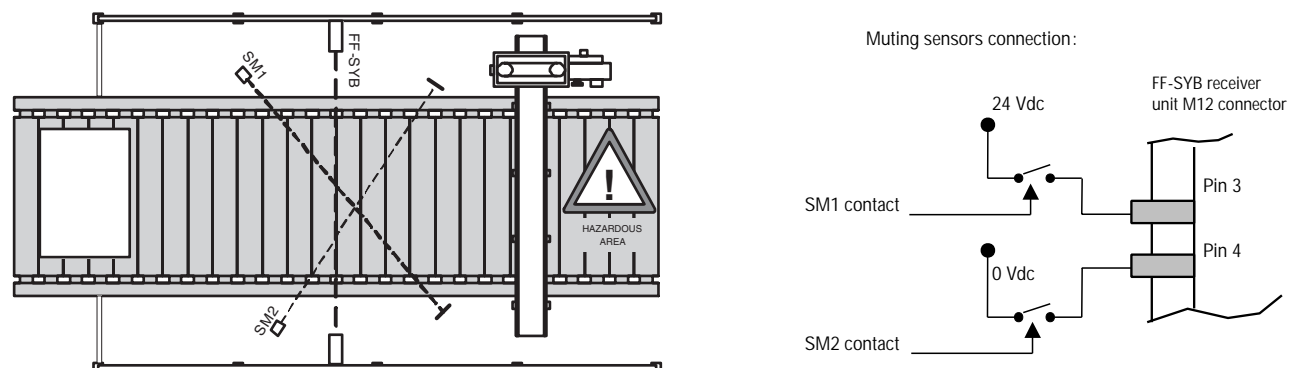
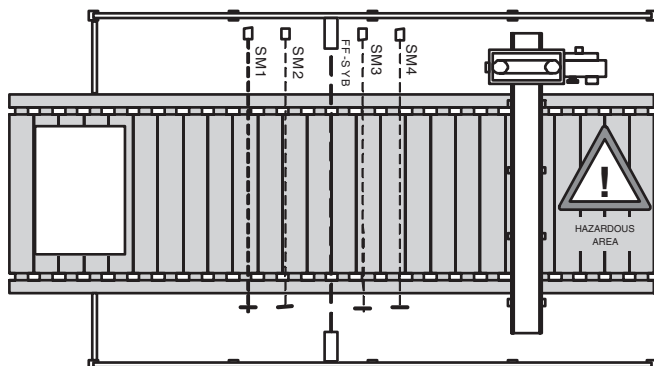


Figure 2 - Bi-directional application with four photoelectric sensors

2 sensors can be wired in parallel on each of the 2 muting inputs of the light curtain, creating a 4 sensor bi-directional muting.



Muting sensors connection:

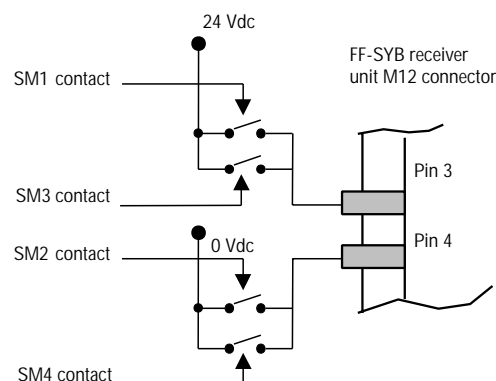
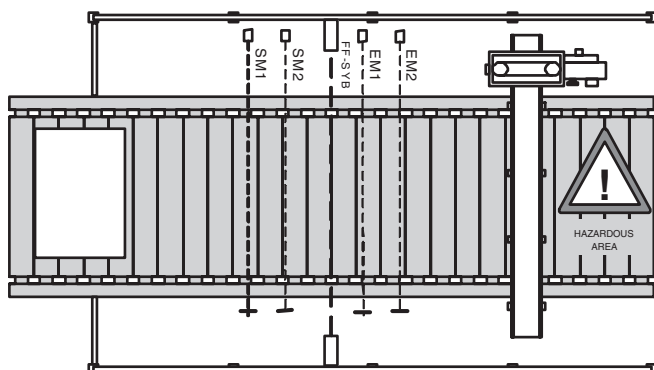
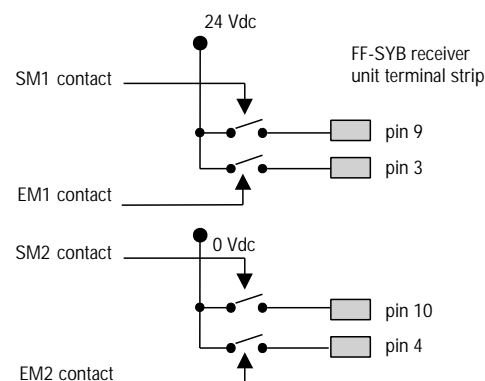


Figure 3 - Uni-directional application with four optoelectronic sensors



Muting sensors connection:

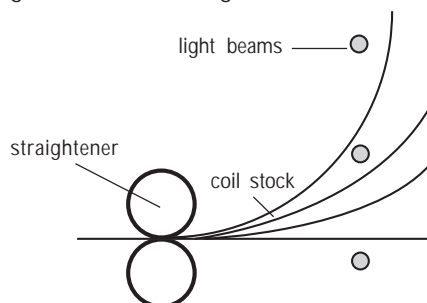


Note: this mode of operation requires direct connections to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

□ Floating blanking function

With the exception of the 2-beam FF-SYB02, the FF-SYB234 systems are fitted with a selectable floating blanking function which allows users to inhibit 1 or 2 beams* anywhere within the protection field, except the bottom beam which is used for synchronisation. If 2 beam floating blanking is selected, the interruption of 1 or 2 beams will not lead to the opening of the outputs. The 2 beams can be adjacent or not. It is useful in those applications where material or air ejected parts randomly travel through or within the sensing field. You can also disable light beams in an area where a fixture penetrates the light field, and you can permit stationary objects to protrude into the light curtain's sensing field.

Figure 4



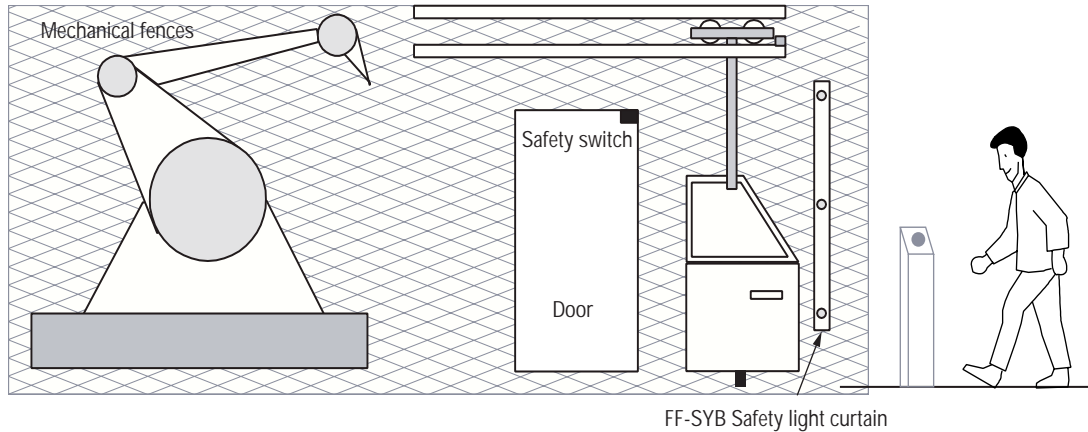
(*): 1 beam only for the 3-beam FF-SYB03 model, 1 or 2 beam for the 4-beam FF-SYB04 model.

Serial connection

The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the receiver unit. The auxiliary safety device can be an electromechanical safety switch or any other safety device with either relay outputs or solid state outputs (for safety reasons, reversed polarity on these two inputs is mandatory, therefore connection of a second FF-SYB light curtain is not possible through these two inputs). Connection is done through the main connector. An optional junction box is available to perform the electrical connections close to the light curtain.

Figure 5

Serial connection of an FF-SYB safety light curtain with a safety gate switch.



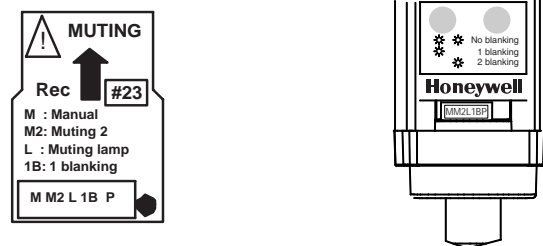
FF-SYB Safety light curtain

Note: This mode may be combined with the bi-directional muting mode. This combination of modes requires direct connection to the receiver internal terminal strip. A M20 cable gland is delivered with the package. Male M23 cordsets are available on option (see "Accessories" section).

Configuration cards

The FF-SYB emitter and receiver are setup in the required configuration through the use of configuration cards, similar to the SIM cards used on mobile phones (see figure below). This simple and elegant method eliminates the use of jumpers or dip switches. No computer is required: settings are done on site, using one of the small configuration cards. If the user needs to use a different configuration from the factory settings, he just needs to select the configuration card which corresponds to the desired settings and install it behind the bottom cap of the emitter or receiver. The selected settings are written on the configuration card and are visible through the transparent front window.

Figure 6

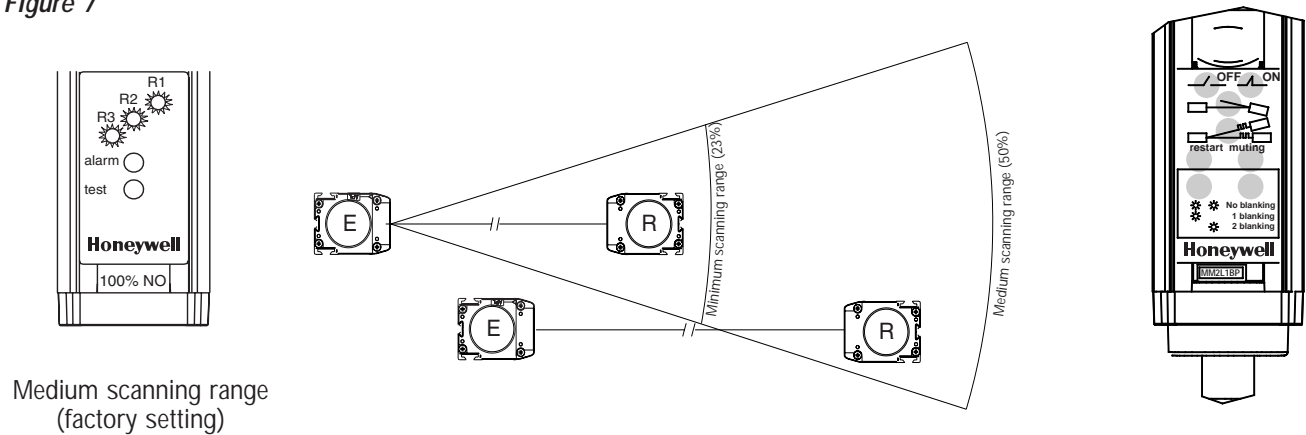


If the FF-SYB needs to be exchanged, the configuration card can be installed in another FF-SYB allowing transfer of settings in a few minutes.

Cross-talk reduction system

The FF-SYB light curtain is based upon an infrared transmission between an emitter unit and a receiver unit. It is a requirement of the IEC/EN 61496-2 standard that if a receiver R2 receives two signals transmitted by two different emitters E1 and E2, the receiver R2 must turn to the alarm state. This happens if the receiver R2 is within the beam aperture angle and within the nominal scanning range of the second emitter E1. The cross-talk detection indicator flickers on the receiver R2 to warn the installer.

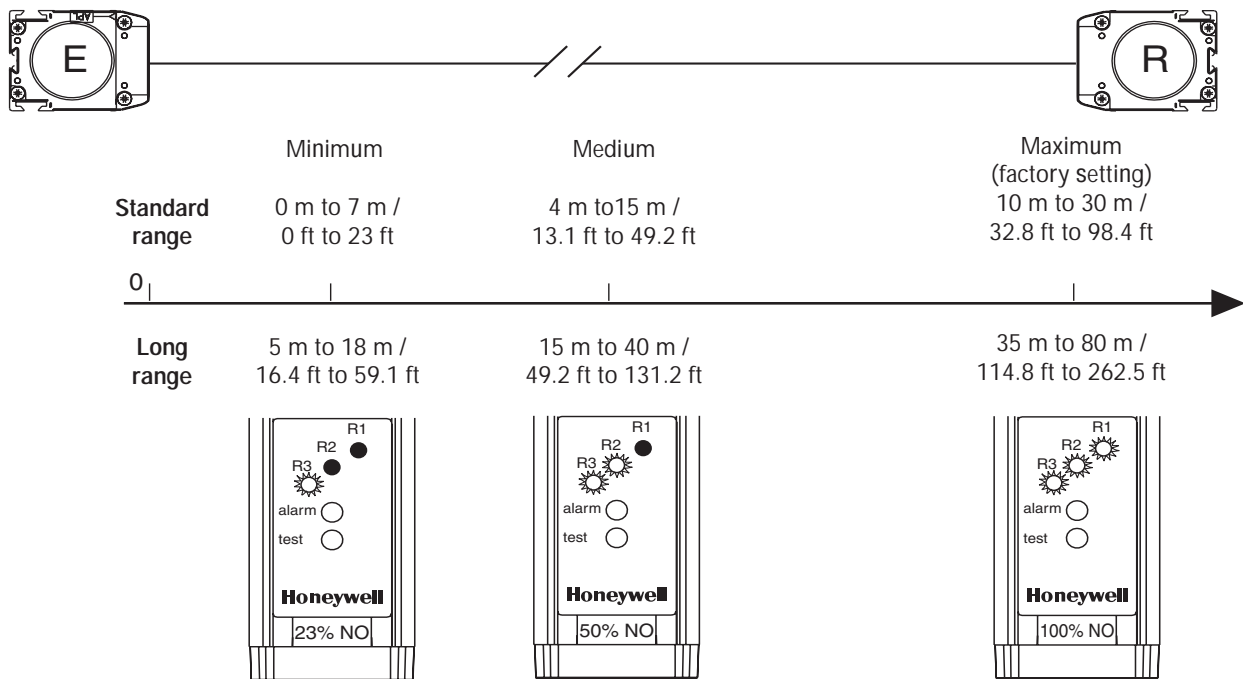
Figure 7



A configuration card is used on the emitter unit for the selection of the adequate emission power. This configuration card can be used to eliminate this cross-talk phenomenon by decreasing the scanning range. The end cap can be easily removed to select a different scanning range. Products are delivered with a medium scanning range (middle position) to minimize cross-talk upon installation.

Selectable scanning ranges

Figure 8

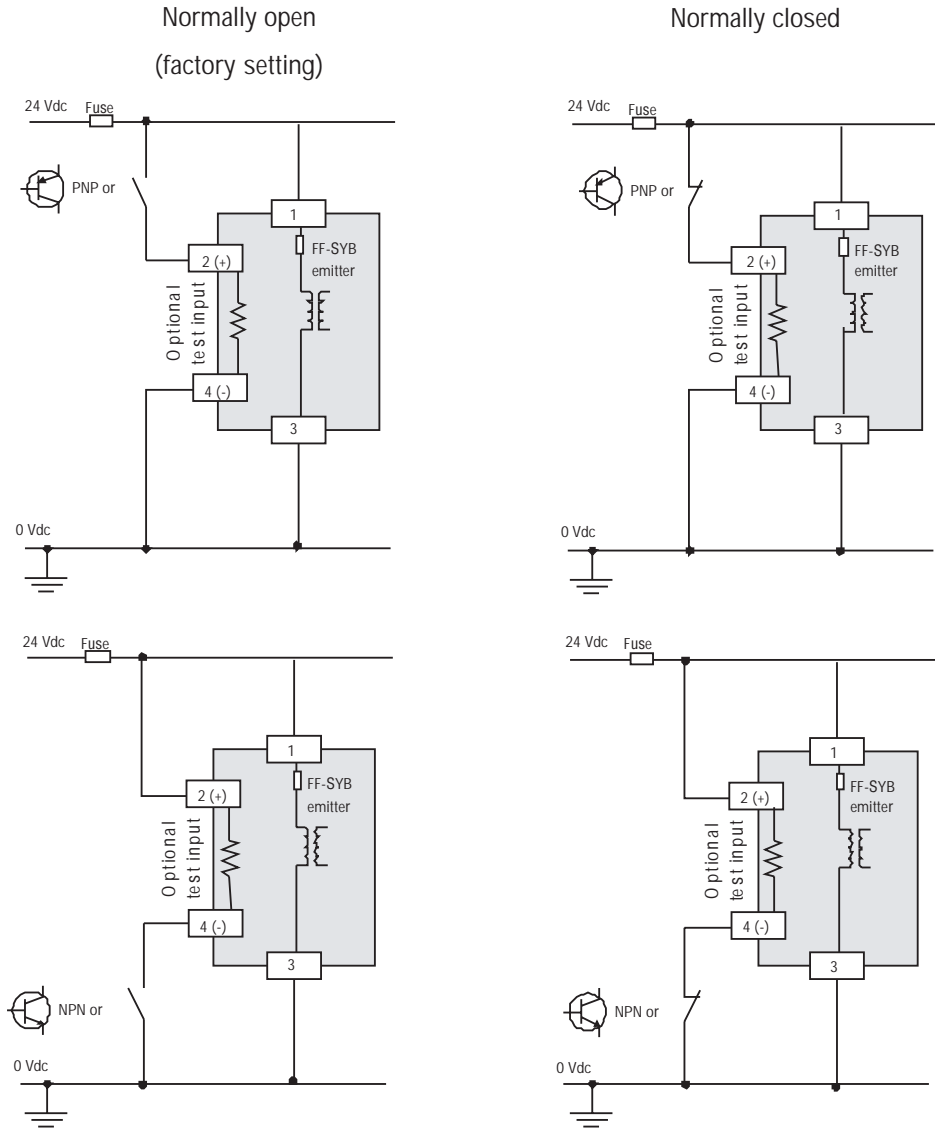


Test input type

Figure 9

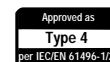
Voltage free contact

(PNP static (solid state) output and NPN static (solid state) output also connectable)



Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, floating blanking, inputs for serial connection of an auxiliary device, manual restart and EDM
- Control of the infrared emission source for cross-talk reduction
- Enhanced diagnostic information



FF-SYB

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SYB02500	FF-SYB03400	FF-SYB04300
Number of beams		2	3	4
Beam spacing		500 mm / 19.7 in	400 mm / 15.76 in	300 mm / 11.82 in
Nominal scanning range		Standard range: 0 to 30 m/0 to 98.4 ft • Long range: 5 to 80 m/16.4 to 262.5 ft		
Angle of divergence		±2°, ±25 %		
Emitting light source (immunity)		Infrared, pulsed, 880 nm (Sunlight: 20 000 Lux • Lamplight: 15 000 Lux)		
Supply voltage and power consumption		24 Vdc (±20 %); 5 W max. for the emitter, 5 W max. for the receiver		
Safety outputs (OSSDs)	Output type	2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections		
	Switching capability	350 mA max. at 24 Vdc		
	Response time	22 ms (beam interruption), 28 ms (Auxiliary Safety Device engaged)		
	Maximum cable length	100 m / 328 ft (100 nF capacitance)		
Restart time after power up (after beam actuation)		> 1 s (80 ms without EDM, 150 ms with EDM)		
	Loads impedance	70 Ω min. / 5 kΩ max.		
	Voltage drop	< 2 Vdc		
	Loads turn-on voltage	5 V min. on resistive loads / 7 V min. on inductive loads		
	Protections	Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)		
NC signalling or muting lamp/diagnosis output				
	Output type	1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)		
	Switching capability	100 mA max. at 24 Vdc		
	Protections	Overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)		
Test input (emitter) (1)	Input type	Floating input with selectable NO/NC test logic		
	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (must be activated for at least 20 ms)		
	Test loop current (resistance)	13 mA typical (750 Ω max.)		
	Protections	3000 Vdc galvanic insulation, reversed polarity, micro-cut-off (14 ms)		
Restart / EDM input (1)	External contact type	Relay contact (must be activated for at least 150 ms, and less than 3 s)		
	Max. voltage	29 Vdc		
Muting or serial connection inputs (1)				
	External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)		
	Maximum cable length	100 m / 328 ft (no limitation in capacitance)		
Environmental/physical characteristics				
	Temperature range	Operating: 0 °C to 55 °C/32 °F to 131 °F (95% relative humidity) • Storage: -20 °C to 75 °C/-4 °F to 167 °F		
	Sealing	NEMA 4, 13 and IP 65		
	Vibrations	IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes		
	Shocks	IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes		
	Bumps	IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes		
Product dimension and weight		Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height (2)		
	Connection	Emitter: M12/5 pole male receptacle • Receiver: M12/8 pole male receptacle or terminal strip with M20 cable gland (see Figure 10 to determine possible modes of operation for each receiver termination type)		
	Material	Housing: aluminium alloy and (conductive) polycarbonate (end caps) • Front plate: polymethylmethacrylate (PMMA)		

Ordering information

Each listing consists of an emitter, a receiver, 2 pairs of right-angle brackets, an end cover equipped with a cable gland and a set of configurations card.

FF-SYB□□□□□M2 - □

- 3: standard range (30 m max.)
- 8: long range (80 m max.)

Model	Number of beams	Beam spacing mm/in
02500	2	500 / 19.70
03400	3	400 / 15.76
04300	4	300 / 11.82

Notes:

- (1) Voltage switching (high/low): ≥ 11 Vdc min. (I > 6 mA) / ≤ 5 Vdc (I > 2 mA); Input current (high/low): 20 mA / 10 mA at 24 Vdc.
In compliance with the IEC 61131-2 requirements for type 2 sensors.
- (2) Refer to emitter and receiver dimensions / weights.

NOTICE

NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500

- Only the three beam (FF-SYB03400 Series) and the four beam versions (FF-SYB04300 Series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYB02500 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.
- Verify compliance with ANSI/RIA R15.06 and possibly implement additional protection when floating blanking is used on the 4-beam FF-SYB234 system.

Figure 10 - Possible modes of operation and corresponding receiver termination type and connexion box

FF-SYB

Card (1)	Restart mode	Blanking (2)	Auxiliary Safety Device	Muting (3)	Auxiliary output (4)	Receiver termination (5)
#01	Manual				NC signal	M12 plug
#02	Manual	1-beam			NC signal	M12 plug
#03	Manual	2-beam			NC signal	M12 plug
#04	Automatic				NC signal	M12 plug
#05	Automatic	1-beam			NC signal	M12 plug
#06	Automatic	2-beam			NC signal	M12 plug
#07	Automatic		yes		NC signal	M12 plug
#08	Automatic	1-beam	yes		NC signal	M12 plug
#09	Automatic	2-beam	yes		NC signal	M12 plug
#10	Manual		yes		NC signal	M12 plug
#11	Automatic			2 inputs(6)	NC signal	M12 plug
#12	Automatic			2 inputs(6)	Muting lamp	M12 plug
#13	Automatic			4 inputs(6)	NC signal	Terminal strip
#14	Automatic			4 inputs(6)	Muting lamp	Terminal strip
#15	Automatic		yes	2 inputs	NC signal	Terminal strip
#16	Automatic		yes	2 inputs	Muting lamp	Terminal strip
#17	Manual			2 inputs(6)	NC signal	M12 plug
#18	Manual			2 inputs(6)	Muting lamp	M12 plug
#19	Manual			4 inputs(6)	NC signal	Terminal strip
#20	Manual			4 inputs(6)	Muting lamp	Terminal strip
#21	Manual		yes	2 inputs	NC signal	Terminal strip
#22	Manual		yes	2 inputs	Muting lamp	Terminal strip
#23	Manual	1-beam		2 inputs(6)	Muting lamp	M12 plug
#24	Manual	2-beam		2 inputs(6)	Muting lamp	M12 plug
#25	Manual	1-beam		4 inputs(6)	Muting lamp	Terminal strip
#26	Manual	2-beam		4 inputs(6)	Muting lamp	Terminal strip
#27	Manual	1-beam	yes	2 inputs	Muting lamp	Terminal strip
#28	Manual	2-beam	yes	2 inputs	Muting lamp	Terminal strip

(1) Factory setting: card #04

(2) Floating blanking

FF-SYB02	Not available
FF-SYB03	1-beam only
FF-SYB04	1 or 2 beam

(3) Muting: either 2 inputs available for the connection of 2 or 4 muting sensors to perform a bi-directional muting function (see page 2 and 3), or 4 inputs available for the connection of 4 sensors to perform a uni-directional muting function (see page 3).

(4) Auxiliary output: either a normally closed signalling output of a muting and diagnosis lamp output (see page 2).

(5) Receiver termination: some modes require direct connections to the internal receiver terminal strip. The M20 cable gland (delivered with the package) allows the use of a male M23 cordset.

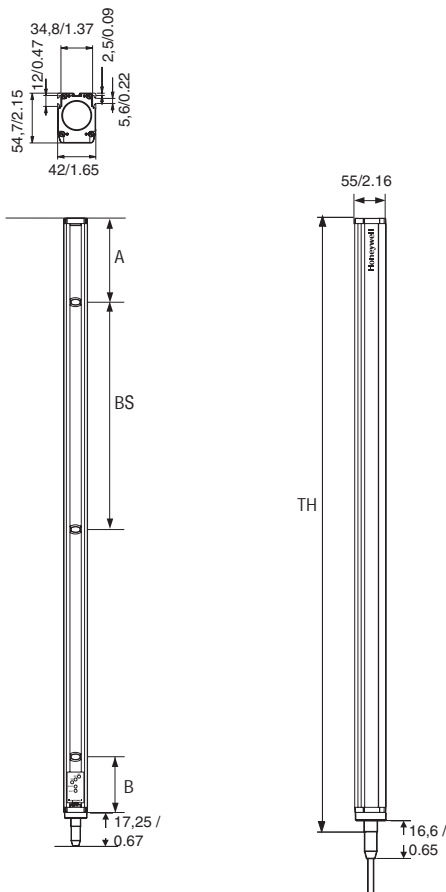
(6) Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).

Table 2

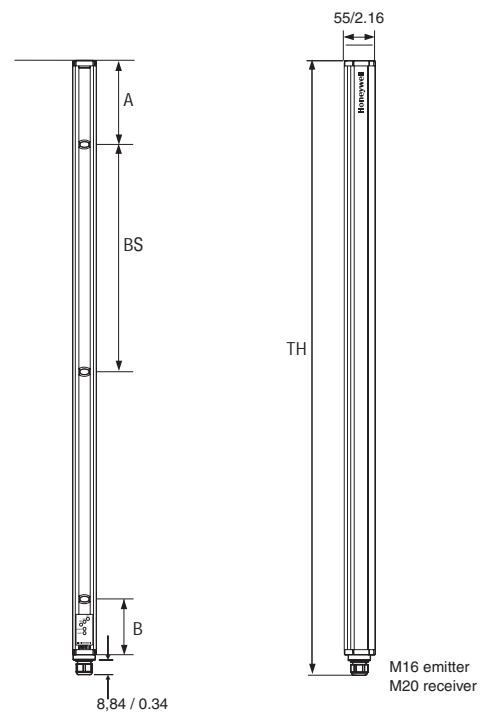
Reference	Number of beams	Beam spacing BS	Total height TH (cable gland version)	A	B	Weight per device
		mm / in	mm / in	mm / in	mm / in	kg / lbs
FF-SYB02500	2	500 / 19.70	744 / 29.3 (758 / 29.8)	149 / 5.87	87 / 3.42	1,42 / 3.12
FF-SYB03400	3	400 / 15.76	1064 / 41.9 (1078 / 42.4)	169 / 6.65	87 / 3.42	1,98 / 4.35
FF-SYB04300	4	300 / 11.82	1064 / 41.9 (1078 / 42.4)	69 / 2.72	87 / 3.42	1,98 / 4.35

Figure 11 - Dimensions in mm / in

3 beam version with M12 connector
(emitter or receiver)



3 beam version with terminal strip
(receiver only)



☐ LED status indicators

Figure 12 - Emitter

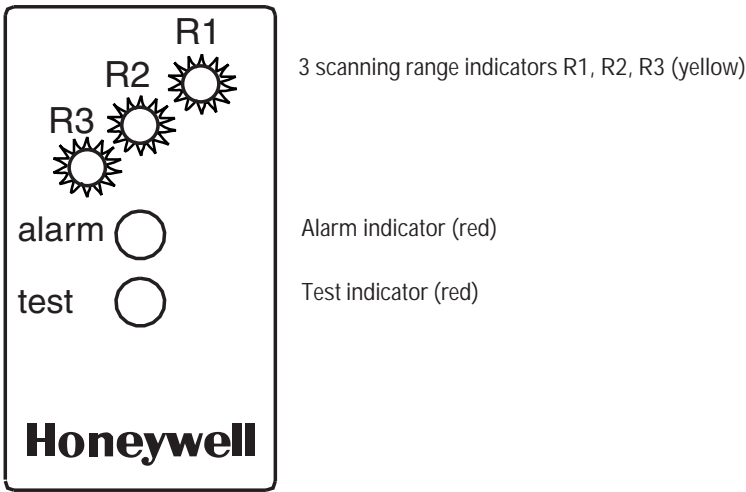


Figure 13 - Receiver

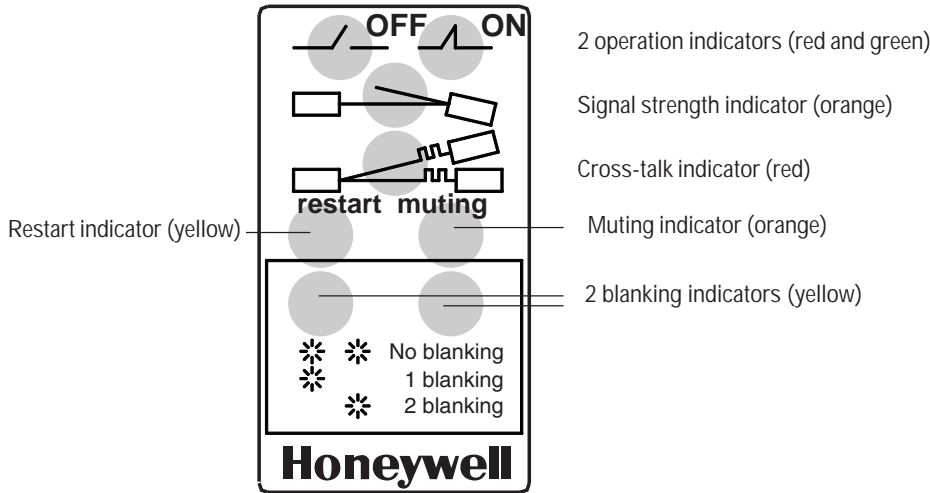


Figure 14 - Recommended wiring diagram for a 2-sensor muting application with automatic restart and Temporary Manual Muting (TMM) (see Figure 1)

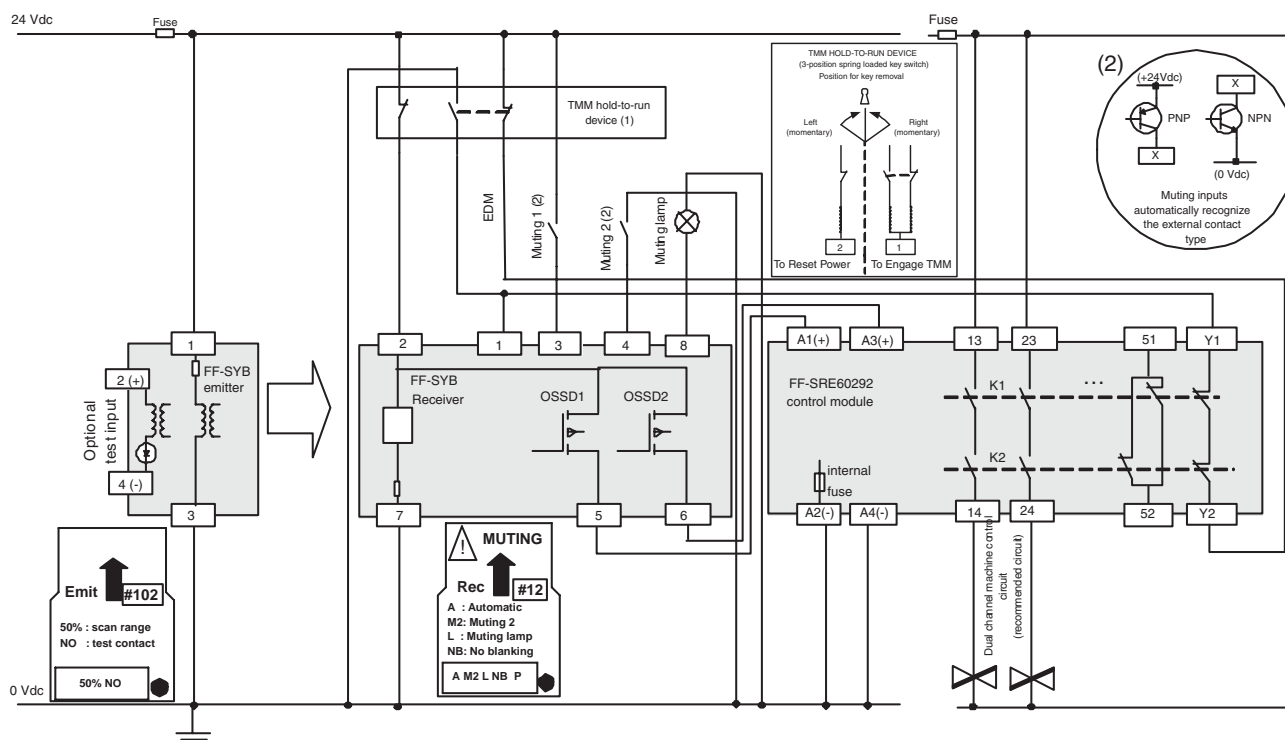
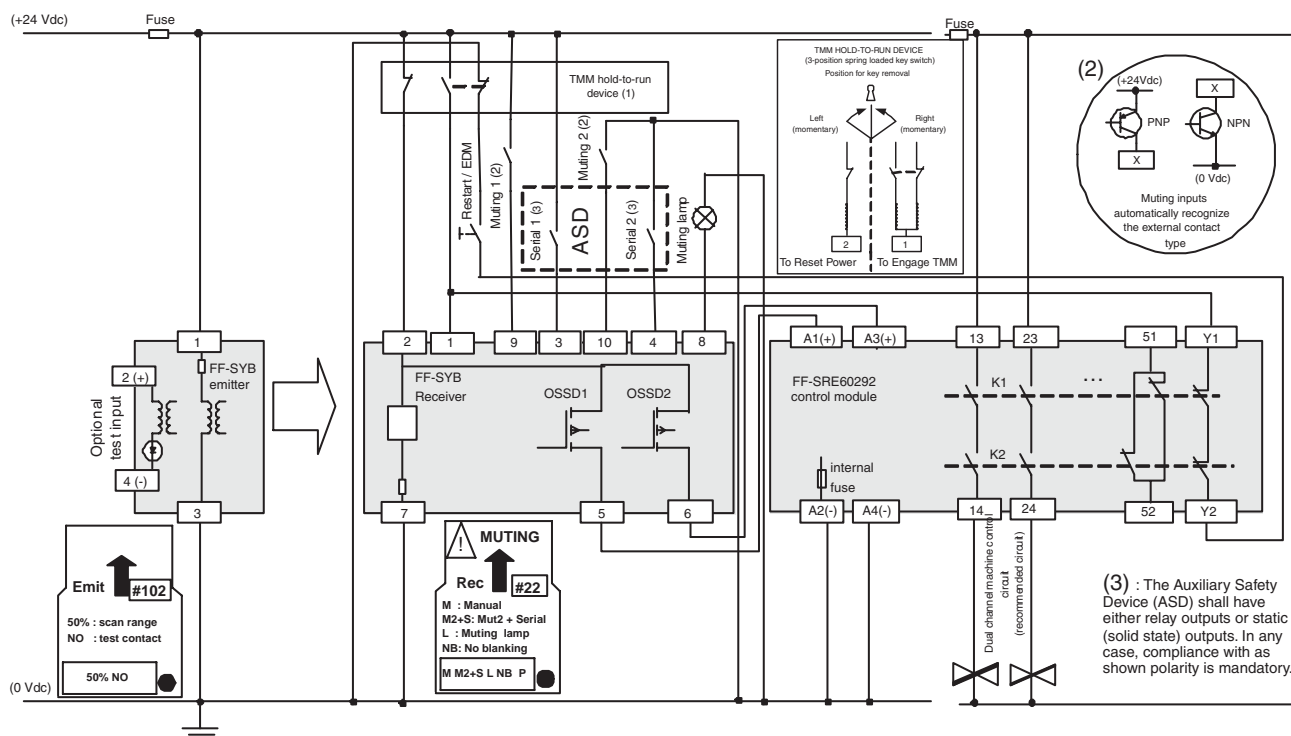


Figure 15 - Recommended wiring diagram for a 2-sensor muting application with an auxiliary safety device, manual restart and Temporary Manual Muting (TMM)

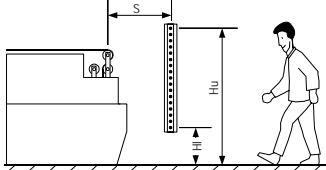


⚠ WARNING**INCREASED SAFETY DISTANCE DUE TO FLOATING BLANKING**

Modify the safety distance between the light curtain and the hazardous area according to the instructions in this chapter.
Failure to comply with these instructions could result in death or serious injury.

❑ European EN 999 standard

All distances/heights in mm (100 mm = 3.9 in)

FF-SYB234 Multibeam System	FF-SYB02500	FF-SYB03400	FF-SYB04300
Number of beams	2	3	4
Beam spacing	500	400	300
Recommended beam heights above the reference plane per EN 999	Hi = 400 (lowest beam) Hu = 900 (uppermost beam)	Hi = 300 (lowest beam) 700 (intermediate beam) Hu = 1100 (uppermost beam)	Hi = 300 (lowest beam) 600 (intermediate beam) 900 (intermediate beam) Hu = 1200 (uppermost beam)
Normal approach 	$S \geq 1600 (t_1 + t_2) + 850$		

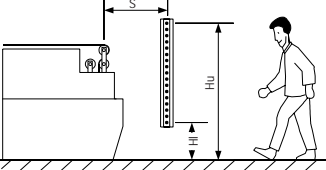
t_1 : light curtain response time (s)

t_2 : machine stopping time (s)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

❑ USA's OSHA/ANSI/RIA standards

All distances/heights in inches (1 in = 25,4 mm)

FF-SYB234 Multibeam System	FF-SYB03400	FF-SYB04300
Number of beams	3	4
Beam spacing	15.76	11.82
Beam heights above the reference plane	11.82 27.58 43.34	11.82 23.64 35.46 47.28
Normal approach 	$Ds \geq 63 (Ts + Tc + Tr) + Dpf$ If $Hi < 12$ and $36 \leq Hu \leq 48$ then $Dpf = 48$ (Reach Over) If $Hi > 12$, supplemental safeguarding may be required to detect crawling underneath.	
	If $Hi \leq 12$ and $Hu > 48$ then $Dpf = 36$ (Reach Thru)	

Ts : worst case stopping time of the machine (s)

Tc : worst case response time of the machine

Tr : response time of the safety devices (s)

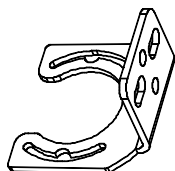
Dpf : Depth penetration factor (in.)

NOTICE**NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500**

- Only the three beam (FF-SYB03400 Series) and the four beam versions (FF-SYB04300 Series) are in compliance with the beam heights, specified in the US Standard ANSI/RIA R15.06-1999 (Industrial Robots and Robot Systems - Safety Requirements). The two beam version (FF-SYB02500 Series) does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.
- Verify compliance with ANSI/RIA R15.06 and possibly implement additional protection when floating blanking is used on the 3-beam or 4-beam FF-SYB234 system.

For more information, refer to the ANSI/RIA 15.06 American standard.

Accessories



FF-SYZ634178

Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one emitter or one receiver unit.

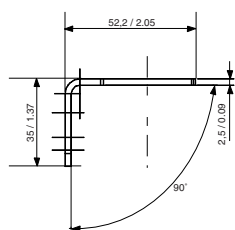
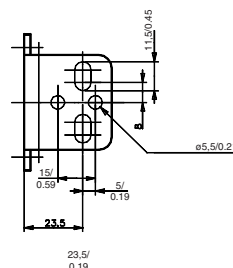
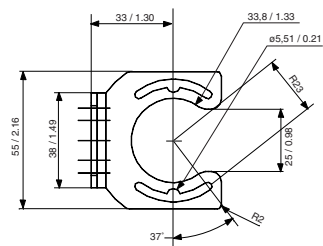
Possible mounting positions:

1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

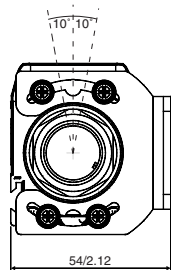
Order 2 kits for a complete set of emitter and receiver

(already included in the FF-SYB package).

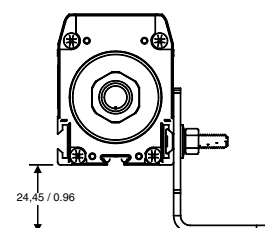
FF-SYB



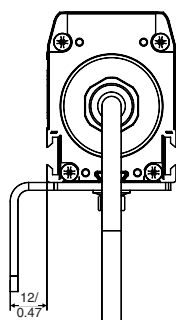
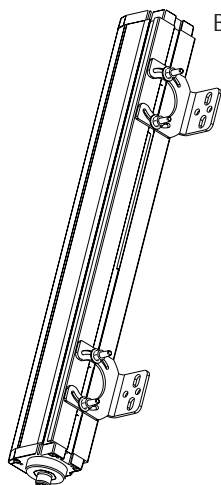
Bracket mounting at the top and the bottom



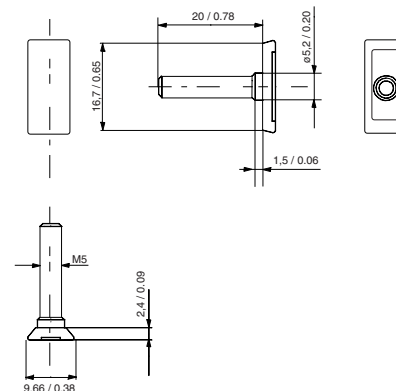
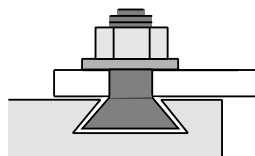
Bracket mounting at the lateral dovetail slots

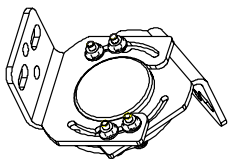


Bracket mounting at the rear dovetail slots



M5 dovetail shape bolt





FF-SYZ634179

Kit of 2 adjustable mounting brackets with rotating plate, screws, bolts, nuts, and washers to mount one emitter or one receiver unit.

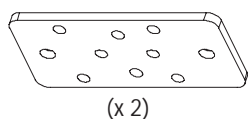
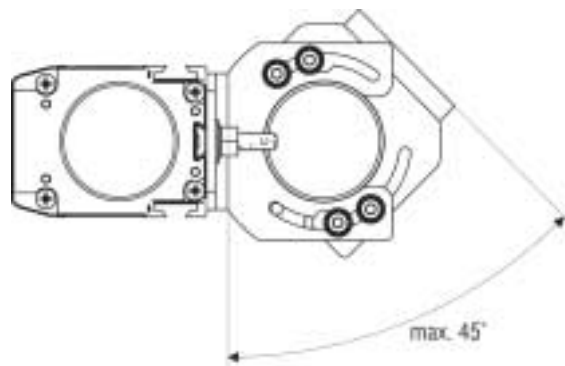
Possible mounting position is:

- at the rear dovetail slot
(allowing adjustments in vertical directions along the slot and in azimuth directions of max. $\pm 45^\circ$)

Order 2 kits for a complete set of emitter and receiver.

Refer to the section FF-SYZ634178 for the detailed dimensions of the brackets.

(to be ordered separately as an option, to be mounted together with the FF-SYZ634178 brackets delivered with the FF-SYB package)



FF-SYZAD

Anti-vibration kit

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets delivered with the FF-SYB package.



NOTICE

PROTECTION AGAINST HIGH VIBRATION

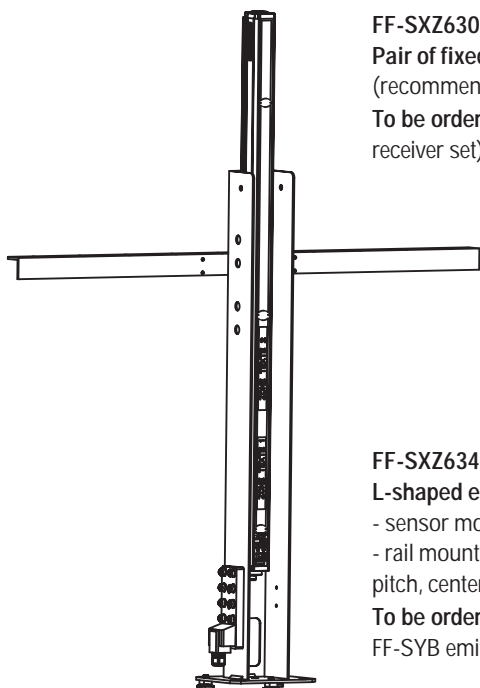
In case of high vibration, order:

- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm/ 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm/39.4 in, but less than 1850 mm/72.8 in.
- 4 sets of FF-SYZAD kit for light curtain systems with protection height greater than 1850 mm/72.8 in.

Mechanical fixture for muting application



FF-SYB



FF-SXZ630170

Pair of fixed posts for FF-SYB light curtain

(recommended when mechanical protection of the light curtain is NOT required)

To be ordered separately as an option (order 1 piece for a complete FF-SYB emitter/receiver set).

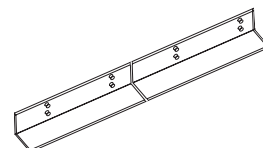
FF-SXZ634186

L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long

- sensor mounting: $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch

- rail mounting: 3 pairs of $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch, centered

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).



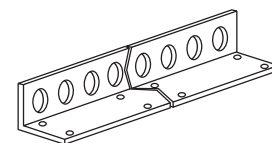
FF-MPZS6018

Muting sensor mounting rails

- sensor mounting: $\varnothing 18$ mm / $\varnothing 0.71$ in mounting holes, 30 mm / 1.18 in distance between centers

- rail mounting: $\varnothing 5$ mm / $\varnothing 1/5$ in fixing holes, 100 mm / 3.94 in pitch

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).



FF-SYZPF

Fixed post for FF-SYB light curtain

(recommended when mechanical protection of the light curtain is required)

Floorstanding post for the installation of the following FF-SYB light curtains:

Light curtain models: FF-SYB032□□, FF-SYB048□□, FF-SYB080□□, FF-SYB096□□

Multibeam models: FF-SYB02500, FF-SYB03400, FF-SYB04300

To be ordered separately as an option (order 2 pieces for a complete FF-SYB emitter/receiver set).

Front covers are available for additional protection of the FF-SYB234 beam access detection systems:

FF-SYZ630184-2: Front cover for 2 beams

FF-SYZ630184-3: Front cover for 3 beams

FF-SYZ630184-4: Front cover for 4 beams

To be ordered separately as an option.

FF-SYB



Part Listings (*)	Description
FF-SYZPF02 FF-SYZPF12	Floorstanding post with 2 individual mirrors for use with the FF-SYB02500 multibeam system (*)
FF-SYZPF03 FF-SYZPF13	Floorstanding post with 3 individual mirrors for use with the FF-SYB03400 multibeam system (*)
FF-SYZPF04 FF-SYZPF14	Floorstanding post with 4 individual mirrors for use with the FF-SYB04300 multibeam system (*)

(*) FF-SYZPF0□: 10 % loss per mirror
 FF-SYZPF1□: 25 % loss per mirror
 (to be ordered separately as an option)

Front covers are available for additional protection of the FF-SYB234 beam access detection systems:
 FF-SYZ630184-2: Front cover for 2 beams
 FF-SYZ630184-3: Front cover for 3 beams
 FF-SYZ630184-4: Front cover for 4 beams
 To be ordered separately as an option.

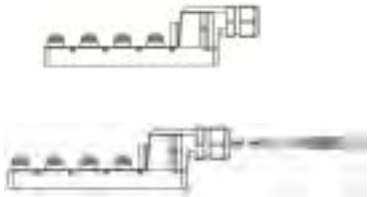


FF-SXZSHL IP67 enclosure for FF-SYB light curtains

Enclosures	Light curtains
FF-SXZSHL096□	FF-SYB234
FF-SXZSHLKIT	Brackets and cable gland kit (order 1 kit per enclosure)

□: "P" for polycarbonate, "G" for glass

M12 connection boxes



For the connection of muting sensors, restart and TMM switches and muting lamp to the light curtain

FF-SXZBOX8M12T
 IP67 junction box, field-attachable home run cable, M12 8-port configuration.

FF-SXZBOX8M12L02
 IP67 junction box, field-attachable home run cable, M12 8-port configuration, prewired with a 2 m/6.56 ft M12 8-pin cordset.

Cordsets M12/5 pole

- 1: brown
- 2: white
- 3: blue
- 4: black
- 5: green/yellow



M12 single-ended cordset, female / 5-pin straight for the FF-SYB emitter

FF-SXZCAM125U02 2 m / 6.56 ft length

FF-SXZCAM125U05 5 m / 16.40 ft length

FF-SXZCAM125U10 10 m / 32.8 ft length

Equivalent to the 805000A09M... Micro-change® Series from Brad Harrison
(see vendor catalog for color code)

M12/8 pole

- 1: white
- 2: brown
- 3: green
- 4: yellow
- 5: grey
- 6: pink
- 7: blue
- 8: red



M12 single-ended cordset, female / 8-pin straight for the FF-SYB receiver

FF-SXZCAM128U02 2 m / 6.56 ft length

FF-SXZCAM128U05 5 m / 16.40 ft length

FF-SXZCAM128U10 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison
(see vendor catalog for color code)

Cable connector



FF-SXZCOM125 - M12 screw connector, female / 5 pin straight for the FF-SYB emitter

FF-SXZCOM128 - M12 screw connector, female / 8 pin straight for the FF-SYB receiver

Safety control modules



FF-SRE60292

Slim line expansion module

- 24 Vdc
- Safety interface up to Category 4 per EN 954-1
- 4 NO/2 NC safety relay outputs
- 22,5 mm / 0.88 in width

(to be ordered separately as an option).



FF-SRE30812

Expansion module

- 24 Vdc, 115 Vac or 230 Vac
- Safety interface up to Category 4 per EN 954-1
- 7 NO/1 NC internally redundant safety relay outputs
- 90 mm / 3.54 in width

(to be ordered separately as an option).



FF-SRM200P2

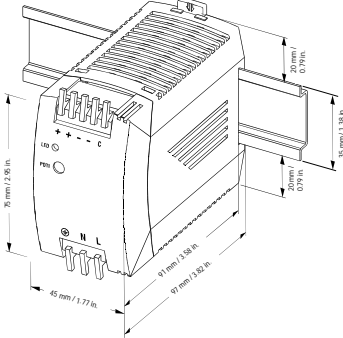
Mutual exclusion module

(to be ordered separately as an option)

- typical applications: loading/unloading chamber on machining centers or conveyors, crossing of conveyor lines, moving conveyors or AGVs
- connection of 2 safety devices
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode, FSD monitoring
- crossfault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply

FF-SYB



FF-SXZPWR050

ac to dc power supply

(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs

Muting lamp

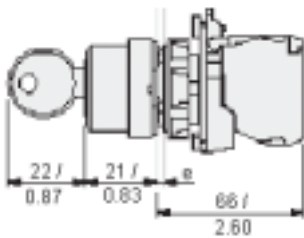


(not contractual)

FF-SXZMLED

Beacon supplied with fixing plate for vertical surface and a LEDs bulb (Telemechanique XVB Series type). To be used as the muting/diagnostic lamp.

3 position spring loaded key switch



e: panel thickness 1 mm to 6 mm / 0.04 in to 0.24 in

(not contractual)

FF-SXZTMM

ø 22 mm 3-position spring loaded key switch with a Normally Closed contact on the left position and two complementary (Normally Closed and Normally Open) contacts on the right position (Telemechanique ZB5 Series type, fixing collar with screw clamp contact blocks, key # 455).

To be used as the TMM hold-to-run device.

Configuration cards

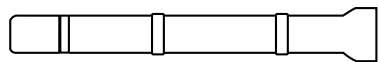
- FF-SYZ101085R
Set of 28 configuration cards for FF-SYB receiver
- FF-SYZ101092E
Set of 6 configuration cards for FF-SYB emitter

Installation manuals

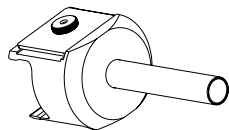
- FF-PK107120-EN One FF-SYB English installation manual
- FF-PK107120-DE One FF-SYB German installation manual
- FF-PK107120-FR One FF-SYB French installation manual
- FF-PK107120-IT One FF-SYB Italian installation manual
- FF-PK107120-SP One FF-SYB Spanish installation manual

NOTICE

By default, products will be shipped with the installation manual in the language of the country of delivery when available or in English. If any other language is required, it must be ordered separately.



FF-SPZLASER
The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.
To be ordered separately as an option.



FF-SYZ604795
Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYB Series light curtain.
To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Honeywell S.A. Pty. Ltd
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Honeywell

21 Chemin du Vieux Chêne
38240 Meylan Cedex
France

Safety 2-beam system for access detection with passive deflecting mirrors

FF-SYB234 Series

FF-SYB

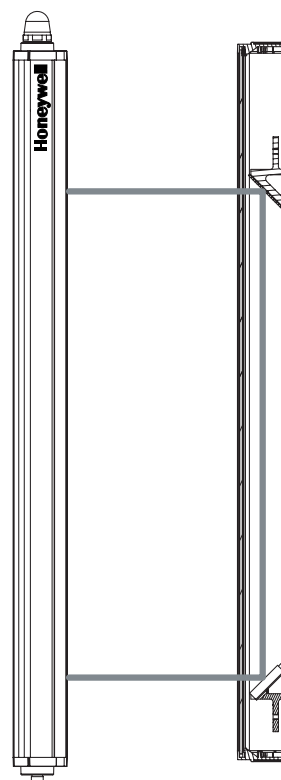
FEATURES

- Manual or automatic restart
- External Device Monitoring (EDM)
- 2 or 4 inputs for muting signals
- Manual muting override
- Input for serial connection of an auxiliary safety device
- Unique patented configuration cards for quick set up and easy replacement
- Self-contained with optical synchronisation
- 2 static (solid state) safety outputs with short-circuit and cross-fault detection
- Muting lamp/diagnosis output or static (solid state) non safety output for signalling
- Model with integrated muting lamp
- Enhanced diagnostic information includes the following indication: cross-talk, muting, restart and failure diagnostic
- Scanning range up to 7 m / 22.9 ft
- M12 connector
- Mounting brackets included allowing multiple mounting positions
- Safety relay modules for more switching capability (to be ordered separately).



TYPICAL APPLICATIONS

- Access detection to robot areas
- Stacking machines, transporting and conveyor technology
- Handling equipment and assembly lines
- Palletizing industry



The Honeywell FF-SYB light curtain is in compliance with IEC/EN 61496 - parts 1 and 2 standard and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the highest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA 1910.212, OSHA 1910.217, ANSI standards including ANSI RIA 15.06 for Control Reliability and CSA Z434). Its CSA mark makes it a product usable in most parts of the world.

As soon as an object is detected inside the protection field, the FF-SYB de-energizes its two static (solid state) safety outputs to signal the dangerous motion to stop. The FF-SYB is a self-contained light curtain that does not require a separate control unit for operation.

Functions such as muting, external device monitoring, manual restart and serial connection make it a comprehensive product and eliminate the need for additional control modules.

These built-in features, combined with the small size of the housing, help users reducing overall cost by saving space and installation time.

A unique patented configuration card system allows the user to set up the correct operating mode when swapping units, by simplifying and reducing the number of operations.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

❑ External Device Monitoring (EDM)

The FF-SYB is fitted with an EDM input which allows users to check the correct state of the final switching devices (relays or contactors with positively guided contacts). After each intrusion into the protection field, the FF-SYB will check that the EDM input loop is closed before switching the outputs back to ON. If the FF-SYB operates in automatic restart mode, it will restart immediately if the EDM loop is closed. If the FF-SYB operates in manual restart mode, it will restart when the restart push-button is pressed and if the EDM loop is closed. If the EDM loop remains open (meaning that the external device has a malfunction) the FF-SYB will keep its outputs open and will not restart.

❑ Manual restart

The FF-SYB can be used in automatic or manual restart mode. In automatic mode, the outputs will switch back to ON after an interruption of the protection field, as soon as the field becomes clear again. In manual restart mode, the FF-SYB will not switch back its outputs to ON until a manual restart push-button is pressed and released. The push-button must be a normally open type button. The manual restart will not switch the OSSDs back to ON in case of light curtain lock out (internal failure, optical interference, etc.) or when the protection field is still interrupted.

❑ Auxiliary output

An additional non safety output is available to either mimic the safety output status (solid state Normally Closed signalling output) or signal muting sequences and provide diagnostic information (mode selection depending).

❑ Muting function

The FF-SYB is fitted with a built-in muting function. Muting is the ability to temporarily inhibit the outputs of a light curtain under certain conditions. Sensors are connected to the light curtain through the main connector. An optional junction box is available to perform the electrical connections close to the location of the muting sensors.

Muting sensors are used to discriminate authorised materials from people. The muting sensors must be able to detect the passing material (pallets, vehicles, etc.) according to the material's length and speed.

Figure 1 shows an FF-SYB placed on a conveyor, with the corresponding muting sensors.

The muting activation sensors temporarily inhibit the FF-SYB light curtain as soon as they detect the object. The outputs of these sensors are connected to the muting inputs of the FF-SYB active unit. Muting sensors must be successively actuated for a correct muting sequence to start.

Whenever one of the two muting sensors is made free again, the muting sequence stops. In case of an incorrect muting sequence, a temporary manual muting (override) procedure may be performed to clear the FF-SYB light curtain detection field and revert back to normal operation.

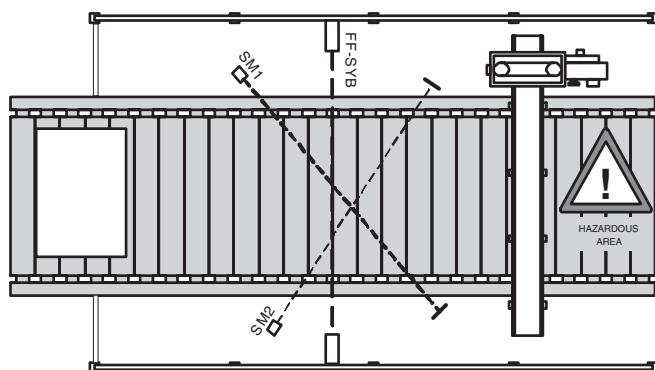
Suitable optoelectronic, mechanical, proximity sensors, etc. can be used as muting sensors.

Inputs for muting sensors accept sensors with relay or static (solid state) outputs, NPN or PNP. 2-wire sensors are also accepted.

A muting lamp output is available on the FF-SYB active unit to drive an external muting indicator that should be installed in a suitable location on the machine. A specific model integrates the muting lamp, reducing time spent on wiring.

The following are some configuration examples when using the muting function:

Figure 1 - Bi-directional application with two optoelectronic sensors



Muting sensors connection:

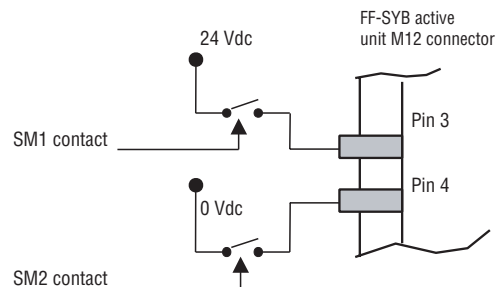
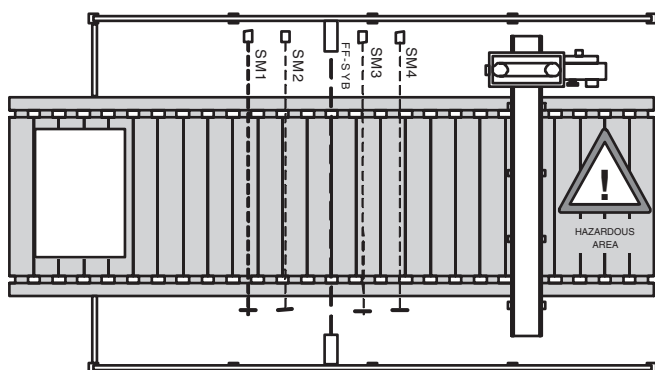


Figure 2 - Bi-directional application with four photoelectric sensors

2 sensors can be wired in parallel on each of the 2 muting inputs of the light curtain, creating a 4 sensor bi-directional muting.



Muting sensors connection:

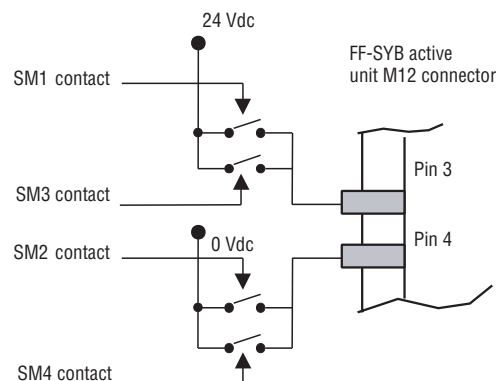
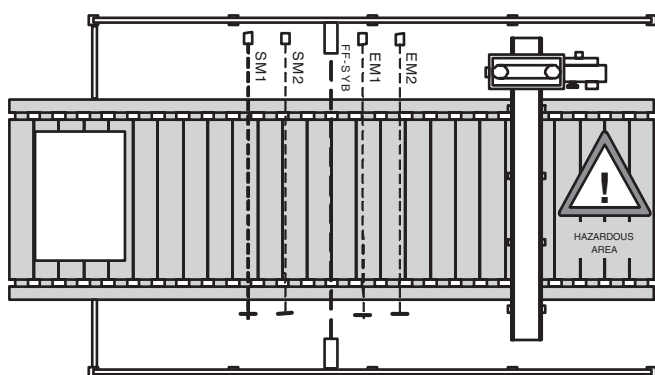
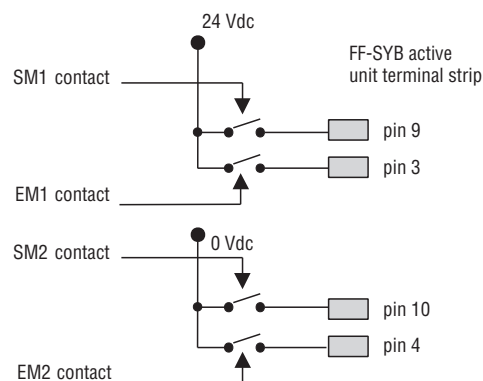


Figure 3 - Uni-directional application with four optoelectronic sensors



Muting sensors connection:



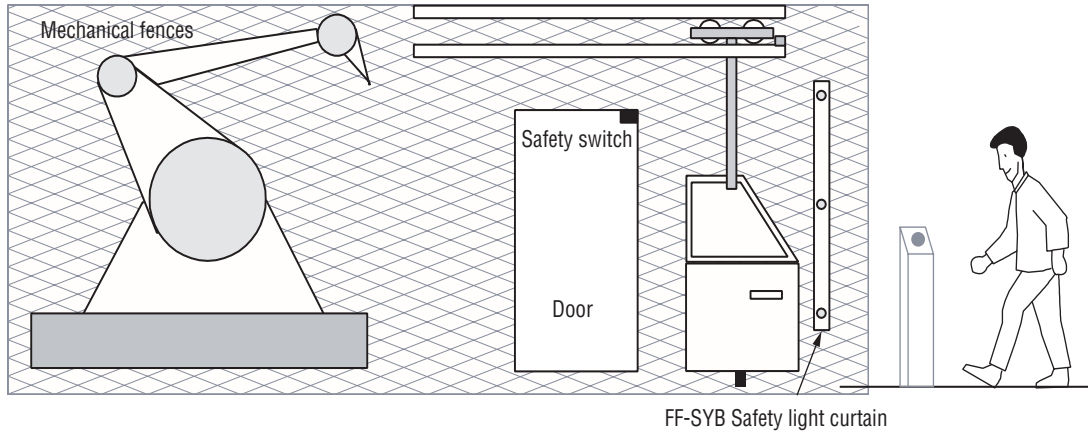
Note: this mode of operation requires direct connections to the active unit internal terminal strip. A M20 cable gland is available as an option.

Serial connection

The FF-SYB safety light curtain allows the connection of another safety device with dual outputs through 2 inputs on the active unit. The auxiliary safety device can be an electromechanical safety switch or any other safety device with either relay outputs or solid state outputs (for safety reasons, reversed polarity on these two inputs is mandatory, therefore connection of a second FF-SYB light curtain is not possible through these two inputs). Connection is done through the main connector. An optional junction box is available to perform the electrical connections close to the light curtain.

Figure 4

Serial connection of an FF-SYB safety light curtain with a safety gate switch.

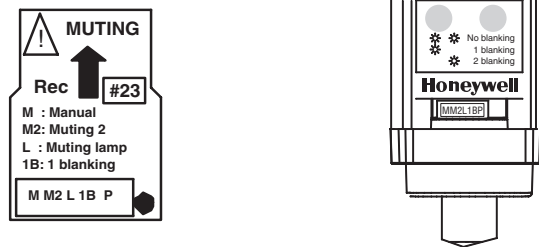


Note: This mode may be combined with the bi-directional muting mode. This combination of modes requires direct connection to the active unit internal terminal strip. A M20 cable gland is available as an option.

Configuration cards

The FF-SYB active unit is setup in the required configuration through the use of a configuration card, similar to the SIM cards used on mobile phones (see figure below). This simple and elegant method eliminates the use of jumpers or dip switches. No computer is required: settings are done on site, using one of the small configuration cards. If the user needs to use a different configuration from the factory settings, he just needs to select the configuration card which corresponds to the desired settings and install it behind the bottom cap of the active unit. The selected settings are written on the configuration card and are visible through the transparent front window.

Figure 5



If the FF-SYB needs to be exchanged, the configuration card can be installed in another FF-SYB allowing transfer of settings in a few minutes.

Type 4 safety light curtain

- Type 4 according to the IEC/EN 61496 - parts 1 and 2 standards
- Built-in muting, inputs for serial connection of an auxiliary device, manual restart and EDM
- Enhanced diagnostic information



FF-SYB

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	
Number of beams	2
Beam spacing	500 mm / 19.7 in
Nominal scanning range	0 to 7 m / 0 to 22.9 ft
Angle of divergence	max. $\pm 2,5^\circ$
Emitting light source (immunity)	Infrared, pulsed, 880 nm (<i>Sunlight</i> : 20 000 Lux • <i>Lamplight</i> : 15 000 Lux)
Supply voltage and power consumption	24 Vdc ($\pm 20\%$); 5,2 W max.
Safety outputs (OSSDs)	
Output type	2 safety static (solid state) outputs (PNP with NO characteristics) with permanent short-circuit and cross-fault detections
Switching capability	350 mA max. at 24 Vdc
Response time	22 ms (beam interruption), 28 ms (Auxiliary Safety Device engaged)
Maximum cable length	100 m / 328 ft (100 nF capacitance)
Restart time after power up (after beam actuation)	> 1 s (80 ms without EDM, 150 ms with EDM)
Loads impedance	70 Ω min. / 5 k Ω max.
Voltage drop	< 2 Vdc
Loads turn-on voltage	5 V min. on resistive loads / 7 V min. on inductive loads
Protections	Short-circuits and cross-faults, overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)
NC signalling or muting lamp/diagnosis output	
Output type	1 PNP non safety output, NC (signalling contact) or NO (muting/diagnostic indication)
Switching capability	100 mA max. at 24 Vdc (50 mA for models integrating the muting lamp)
Protections	Overloads, reversed polarity, micro-cut-off (10 ms, 100% voltage drop, 10 Hz)
Restart / EDM input (1)	
External contact type	Relay contact (must be activated for at least 150 ms, and less than 3 s)
Max. voltage	29 Vdc
Muting or serial connection inputs (1)	
External contact type	Relay contact, or static (solid state) PNP or static (solid state) NPN (automatic recognition)
Maximum cable length	100 m / 328 ft (no limitation in capacitance)
Environmental/physical characteristics	
Temperature range	<i>Operating</i> : 0 °C to 55 °C/32 °F to 131 °F (95% relative humidity) • <i>Storage</i> : -20 °C to 75 °C/-4 °F to 167 °F
Sealing	NEMA 4, 13 and IP 65
Vibrations	IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm $\pm 0,05$ amplitude, 20 sweeps per axis, for 3 axes
Shocks	IEC/EN 61496-1: 15 G - 11 ms - 3 per axis, for 3 axes
Bumps	IEC/EN 61496-1: 10 G - 16 ms - 1000 per axis, for 3 axes
Product dimension and weight	Width: 42 mm (1.65 in); depth: 55 mm (2.16 in); height : see Figure 7
Connection	<i>Active unit</i> : M12/8 pole male receptacle or terminal strip with M20 cable gland on option (see Figure 6 to determine possible modes of operation for each termination type)
Material	<i>Housing</i> : aluminium alloy and (conductive) polycarbonate (end caps) • <i>Front plate</i> : polymethylmethacrylate (PMMA)

Ordering information

Each listing consists of an active unit and a passive unit with mounting kit. Configuration cards and cordsets are available separately.

FF-SYB02500 M2-Z ☐

- blank: no muting lamp
ML: with muting lamp

Notes:

- (1) Voltage switching (high/low): ≥ 11 Vdc min. ($I > 6$ mA) / ≤ 5 Vdc ($I > 2$ mA);
Input current (high/low): 20 mA / 10 mA at 24 Vdc.
In compliance with the IEC 61131-2 requirements for type 2 sensors.

NOTICE

NON COMPLIANCE TO ANSI/RIA 15.06-1999 WITH FF-SYB02500

- This two beam version does NOT comply with ANSI/RIA R15.06 and may require additional protection.
- Refer to applicable standards. In the absence of an applicable standard, ANSI B11.19 and ANSI R15.06 may be used as reference for the USA, as well as EN 999 (or the relevant European Type C machine standard) for Europe.

Figure 6 - Possible modes of operation and corresponding termination type

FF-SYB

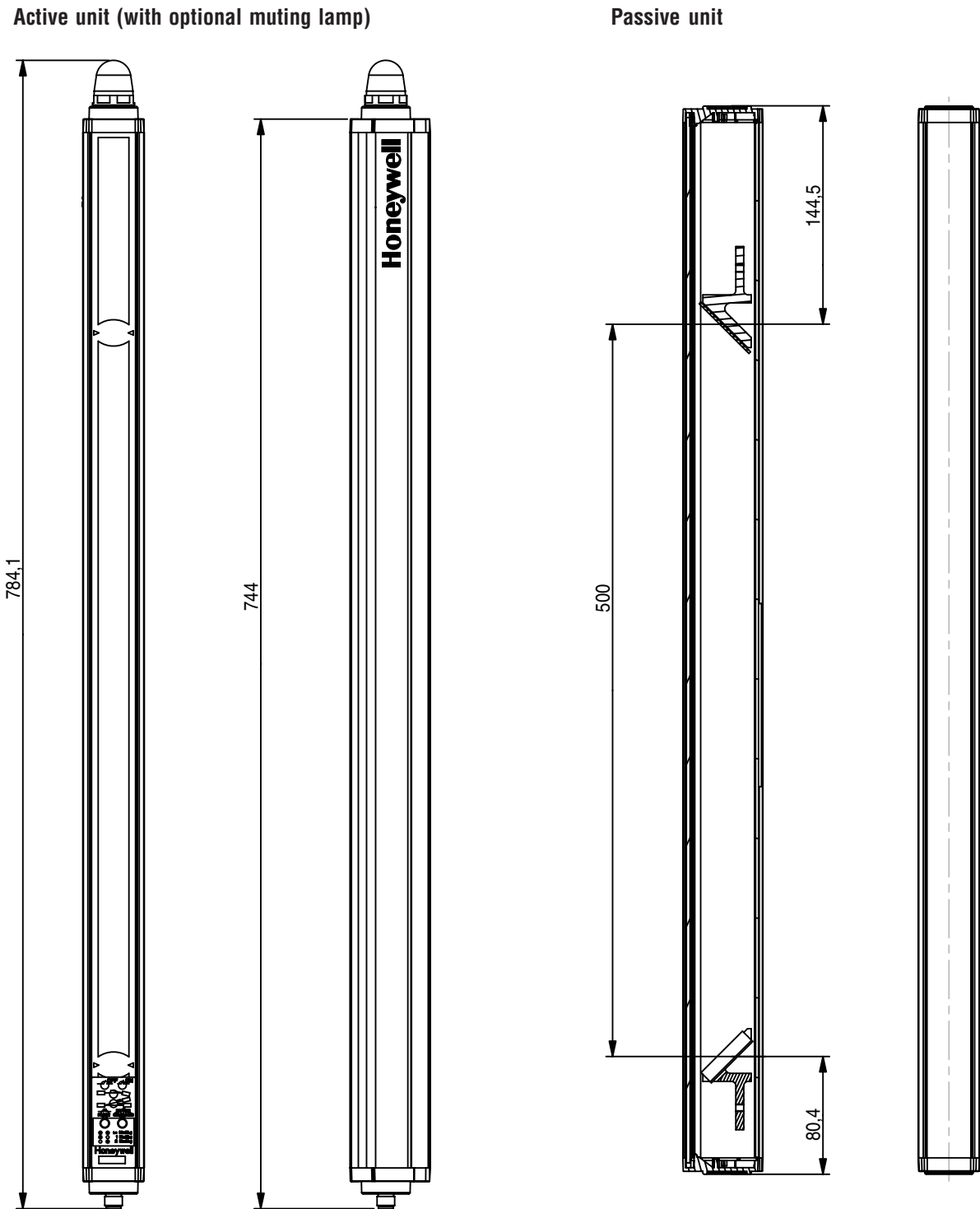
Card (1)	Restart mode	Blanking	Auxiliary Safety Device	Muting (2)	Auxiliary output (3)	Termination (4)
#01	Manual				NC signal	M12 plug
#04	Automatic				NC signal	M12 plug
#07	Automatic		yes		NC signal	M12 plug
#10	Manual		yes		NC signal	M12 plug
#11	Automatic			2 inputs	NC signal	M12 plug
#12	Automatic			2 inputs	Muting lamp	M12 plug
#13	Automatic			4 inputs	NC signal	Terminal strip
#14	Automatic			4 inputs	Muting lamp	Terminal strip
#15	Automatic		yes	2 inputs	NC signal	Terminal strip
#16	Automatic		yes	2 inputs	Muting lamp	Terminal strip
#17	Manual			2 inputs	NC signal	M12 plug
#18	Manual			2 inputs	Muting lamp	M12 plug
#19	Manual			4 inputs	NC signal	Terminal strip
#20	Manual			4 inputs	Muting lamp	Terminal strip
#21	Manual		yes	2 inputs	NC signal	Terminal strip
#22	Manual		yes	2 inputs	Muting lamp	Terminal strip

- (1) Factory setting: card #18. For other modes of operation, the configuration cards must be ordered separately (see Accessories section).
- (2) Muting: either 2 inputs available for the connection of 2 or 4 muting sensors to perform a bi-directional muting function (see page 2 and 3), or 4 inputs available for the connection of 4 sensors to perform a uni-directional muting function (see page 3). Connection boxes are available for the interconnection of all sensors and actuators (see "Accessories" section).
- (3) Auxiliary output: either a normally closed signalling output or a muting and diagnosis lamp output (see page 2).
- (4) Termination: some modes require direct connections to the internal active unit terminal strip. A M20 cable gland (available as an option) allows the use of a male M23 cordset (customer supplied).

Table 2

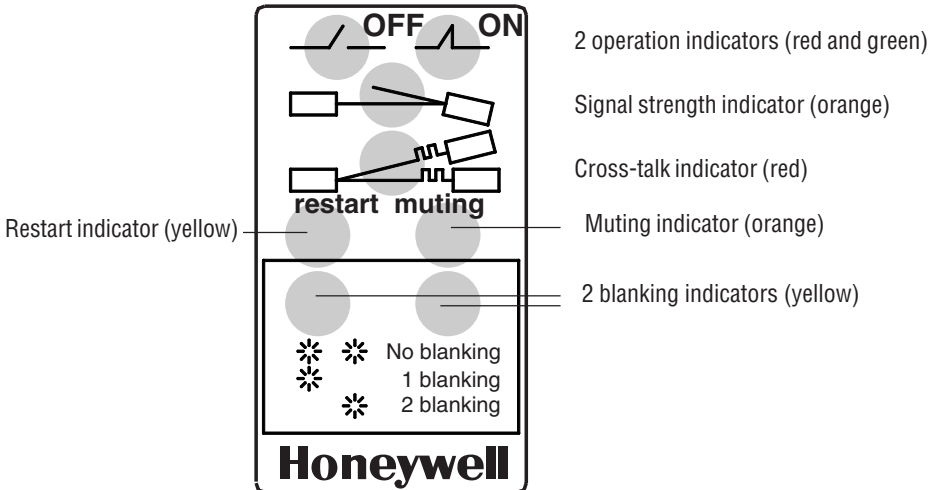
Number of beams	Beam spacing BS	Total height TH (cable gland version)	A	B	Weight per device
	mm / in	mm / in	mm / in	mm / in	kg / lbs
2	500 / 19.70	744 / 29.3 (758 / 29.8)	149 / 5.87	87 / 3.42	1,42 / 3.12

Figure 7 - Dimensions in mm / in



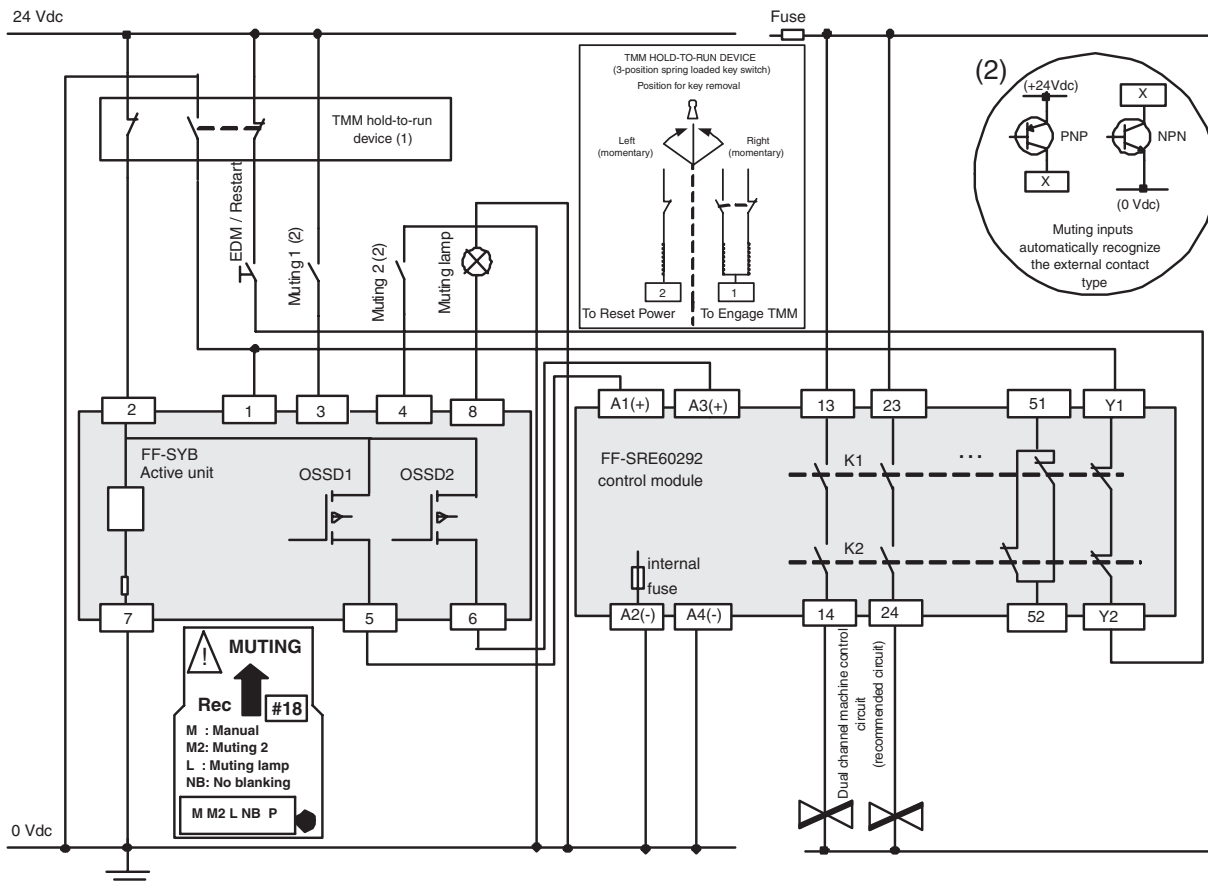
LED status indicators

Figure 8 - Active unit



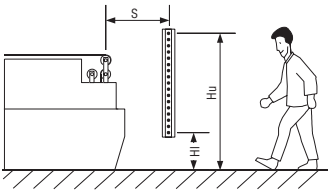
Wiring

Figure 9 - Recommended wiring diagram for a 2-sensor muting application with manual restart and Temporary Manual Muting (TMM) (see Figure 1)



❑ European EN 999 standard

All distances/heights in mm (100 mm = 3.9 in)

Number of beams	2
Beam spacing	500
Recommended beam heights above the reference plane per EN 999	Hi = 400 (lowest beam) Hu = 900 (uppermost beam)
Normal approach	<div></div> <div>$S \geq 1600 (t1 + t2) + 850$</div>

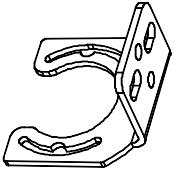
FF-SYB

t1: light curtain response time (s)
t2: machine stopping time (s)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard if existing for the considered machine.

□ Accessories

FF-SYB



FF-SYZ634178

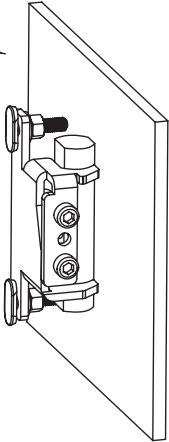
Kit of 2 right angle mounting brackets with screws, bolts, nuts and washers to mount one passive unit or one active unit.

Possible mounting positions:

1. At the top and the bottom of the FF-SYB (allowing adjustments in azimuth directions of $\pm 10^\circ$).
2. At one of the two lateral dovetail slots (allowing adjustments in vertical directions along the slot)
3. At the rear dovetail slot (allowing adjustments in vertical directions along the slot)

Order 2 kits for a complete set of passive and active unit.

(already included in the FF-SYB package).



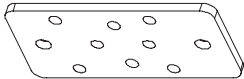
FF-SXZ634188

Kit of 2 adjustable mounting brackets to mount one passive or one active unit, using one of the 2 lateral dovetail slots of the light curtain.

Allows adjustments in azimuth directions of $\pm 5^\circ$ with front access of the 2 adjusting screws.

Order 2 kits for a complete set of passive and active unit.

(to be ordered separately as an option)



(x 2)



(x 4)

FF-SYZAD

Anti-vibration kit

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets.

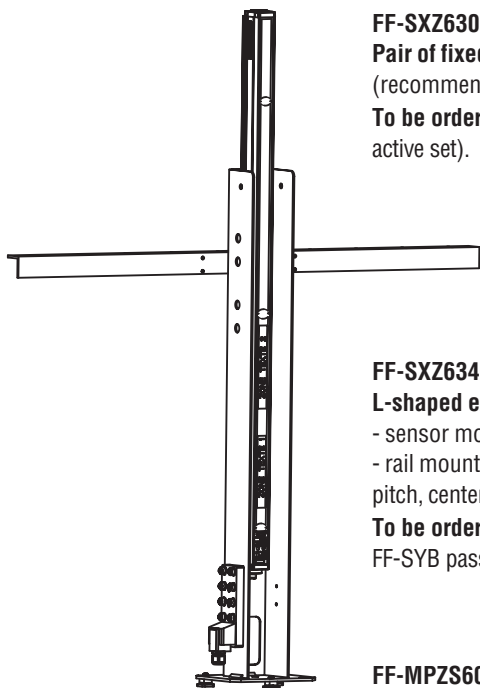
NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibration, order 2 sets of FF-SYZAD for a complete set of passive and active units.

Mechanical fixture for muting application

FF-SYB



FF-SXZ630170

Pair of fixed posts for FF-SYB light curtain

(recommended when mechanical protection of the light curtain is NOT required)

To be ordered separately as an option (order 1 piece for a complete FF-SYB passive / active set).

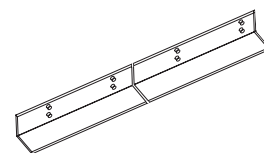


FF-SXZ634186

L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long

- sensor mounting: $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch
- rail mounting: 3 pairs of $\varnothing 5.5$ mm / $\varnothing 1/46$ in fixing holes, 100 mm / 3.94 in pitch, centered

To be ordered separately as an option (order 2 pieces for a complete FF-SYB passive / active set).



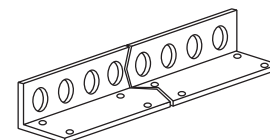
FF-MPZS6018

Muting sensor mounting rails

- sensor mounting: $\varnothing 18$ mm / $\varnothing 0.71$ in mounting holes, 30 mm / 1.18 in distance between centers

- rail mounting: $\varnothing 5$ mm / $\varnothing 1/5$ in fixing holes, 100 mm / 3.94 in pitch

To be ordered separately as an option (order 2 pieces for a complete FF-SYB passive / active set).



FF-SYZPF

Fixed post for FF-SYB light curtain

(recommended when mechanical protection of the light curtain is required)

To be ordered separately as an option (order 2 pieces for a complete FF-SYB passive / active set).

A front cover is available for additional protection:

FF-SYZ630184-2: Front cover for 2 beams

To be ordered separately as an option.

M12 connection boxes

For the connection of muting sensors, restart and TMM switches and muting lamp to the light curtain

FF-SXZBOX8M12T

IP67 junction box, field-attachable home run cable, M12 8-port configuration.



FF-SXZBOX8M12L02

IP67 junction box, field-attachable home run cable, M12 8-port configuration, prewired with a 2 m/6.56 ft M12 8-pin cordset (for bi-directional muting only).



Cordsets M12/8 pole

FF-SYB

- 1: white
- 2: brown
- 3: green
- 4: yellow
- 5: grey
- 6: pink
- 7: blue
- 8: red

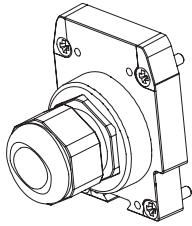


M12 single-ended cordset, female / 8-pin straight for the FF-SYB active unit

- FF-SXZCAM128U02-S 2 m / 6.56 ft length
- FF-SXZCAM128U05-S 5 m / 16.40 ft length
- FF-SXZCAM128U10-S 10 m / 32.8 ft length

Equivalent to the 808000P02M... Micro-change® Series from Brad Harrison
(see vendor catalog for color code)

M20 cable gland

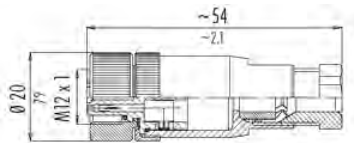


FF-SYZBR015T

Receiver endcap with M20 cable gland.

To be ordered separately as an option (see figure 6).

Cable connector



FF-SXZCOM128

M12 screw connector, female / 8 pin straight for the FF-SYB active unit

Safety control modules



FF-SRE60292

Slim line expansion module

- 24 Vdc
- Safety interface up to Category 4 per EN 954-1
- 4 NO/2 NC safety relay outputs
- 22,5 mm / 0.88 in width

(to be ordered separately as an option).



FF-SRE30812

Expansion module

- 24 Vdc, 115 Vac or 230 Vac
- Safety interface up to Category 4 per EN 954-1
- 7 NO/1 NC internally redundant safety relay outputs
- 90 mm / 3.54 in width

(to be ordered separately as an option).



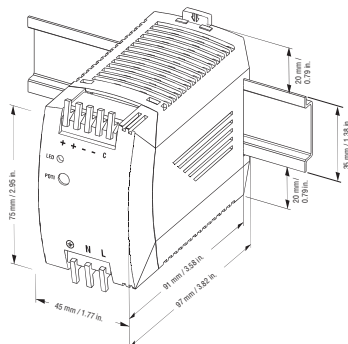
FF-SRM200P2

Mutual exclusion module

(to be ordered separately as an option)

- typical applications: loading/unloading chamber on machining centers or conveyors, crossing of conveyor lines, moving conveyors or AGVs
- connection of 2 safety devices
- 24 Vdc
- Category 4 per EN 954-1
- manual start mode, FSD monitoring
- crossfault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply



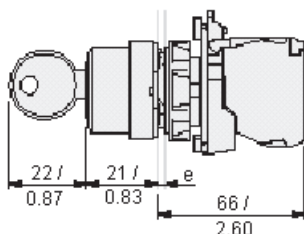
FF-SXZPWR050

ac to dc power supply

(to be ordered separately as an option)

- Approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90, EN/IEC 60950, EN 50178 (Class 2 Rated for low power installations)
- Input voltage: 85-264 Vac (43-67 Hz)
- Output voltage: 24-28 Vdc adjustable
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc
- Power: 50 W
- Dimensions 75 mm x 45 mm x 97 mm / 2.95 in x 1.77 in x 3.82 in
- DIN rail mounting
- Weight: 240 g / 0.52 lbs

3 position spring loaded key switch



e: panel thickness 1 mm to 6 mm /
0.04 in to 0.24 in

(not contractual)

FF-SXZTMM

Ø 22 mm 3-position spring loaded key switch with a Normally Closed contact on the left position and two complementary (Normally Closed and Normally Open) contacts on the right position (Telemecanique ZB5 Series type, fixing collar with screw clamp contact blocks, key # 455).

To be used as the TMM hold-to-run device.

Configuration cards

FF-SYZ101085R

Set of 28 configuration cards for FF-SYB active unit.

Installation manuals

FF-PK107120-EN

One FF-SYB English installation manual

FF-PK107120-DE

One FF-SYB German installation manual

FF-PK107120-FR

One FF-SYB French installation manual

FF-PK107120-IT

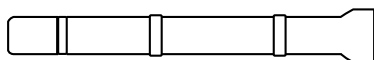
One FF-SYB Italian installation manual

FF-PK107120-SP

One FF-SYB Spanish installation manual

NOTICE

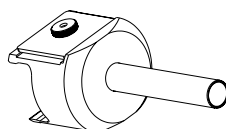
By default, products will be shipped with the installation manual in the language of the country of delivery when available or in English. If any other language is required, it must be ordered separately.



FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its class II conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

To be ordered separately as an option.



FF-SYZ604795

Mechanical adapter for the FF-SPZLASER laser pen to be used with the FF-SYB Series light curtain.

To be ordered separately as an option.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Type 4 self-contained light curtain

For the protection of operators in Industry

FEATURES

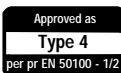
- Meets applicable parts of US OSHA 29CFR 1910.217, 1910.212 and ANSI B11.1, B11.2, B11.19 1990 and RIA 15.06 regulations for Control Reliability
- Through scan active optoelectronic protective equipment
- No-touch safety light curtain with permanent self-checking in compliance with the requirements of the IEC/EN 61496 - Parts 1 and 2 for Type 4 equipment
- No electrical connection necessary between emitter and receiver
- Self-contained and light-weight equipment with the following functions available to the user:
 - . Automatic restart (after each operation)
 - . Start interlock (at power up)
 - . Restart interlock (after each operation)
- Furthermore, in order to monitor the final switching devices (FSDs: relays, contactors, parts of the machine safety related control system) a test input and an FSD monitoring input are provided
- 2 guided-contact safety relay outputs

TYPICAL APPLICATIONS

- Presses and punches for metals, plastics and leather
- Deep-drawing presses, moulding presses and filter presses
- Pressing, moulding and thermoforming machines
- Metal-forming, milling and drilling machines
- Conveyors, handling equipment and assembly lines
- Spot-welding machines and fine-boring machines
- Copying lathes and machining centres
- Door and gate, lift and hoist technology
- Stacking machines, transporting and conveyor technology
- Textile, packaging machines
- Jigging sieves, sorters and milling machines
- For all machines quoted in Annex IV of the Machinery Directive 98/37/EC



FF-SB14E/R/□□K-□-2
ONLY



FF-SB

The FF-SB multibeam industrial safety light curtain is an electrosensitive protective equipment designed to protect operators of power driven machinery.

The design of this device complies with the requirements of the European Directives and Standards as well as with the North American regulations. The German BG (E+ M III) notified body granted the EC type examination certificate according to the essential requirements of the Machinery Directive 98/37/EC and according to the IEC/EN 61496-1/2 standards for the design and construction of Type 4 electrosensitive protective equipment. The Canadian cCSA_{US} gave an approval to this device which meets applicable part of US ANSI B11.1, B11.2, and B11.19, RIA 15.06 and OSHA 29 CFR 1910 217 and 1910.212 regulations for Control Reliability.

Entry into the protection field is detected extremely reliably by the interruption of a single infrared beam. Each interruption or malfunction causes both an alarm and the disabling of the output relays. The high reliability of the equipment results from the permanent self-checking of the electronic switching circuit.

The invisible infrared beams have a high intensity and range up to 24 m / 78.73 ft. The SB Series emitter is optically synchronized with the receiver by a special beam transmitted from the receiver to the emitter (this is a "reverse" beam). **No interconnecting cables are required between emitter and receiver.** Installation time is greatly reduced. The FF-SB offers very high resistance to electrical interference and ambient light. LED indicators on the emitter and the receiver provide information about the reception of the synchronizing beam, protection field status (clear or interrupted), receiver signal strength and test input. The robust, compact housing is made of aluminium alloy with longitudinal T-shaped fixing grooves and three different brackets for rigid or swivel installation, thus simplifying mounting and adjustment.

WARNING

MISUSE OF DOCUMENTATION

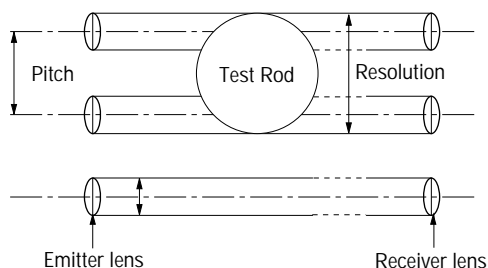
- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Design and operation

The FF-SB industrial safety light curtain forms a grid of parallel infrared beams, which are activated in succession in a multiplexed process, with a high scanning frequency. A beam from the receiver to the emitter provides quartz accurate synchronization.

The nominal protection heights result from the number of beams and the lens pitch. The resolution or minimum detection size is independent of the scanning distance or the environment.

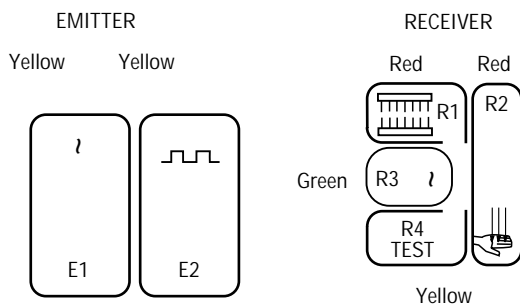


LED Status indicators

The emitter and receiver are fitted with LED status indicators. On the emitter, a yellow LED (E1) signals power on. The second yellow LED (E2) provides information on the synchronisation beam reception.

The receiver has a red contamination indicator R1, which under normal conditions does not light up and which flickers if the receiving level is too low and permanently lights up if no signal is received.

The bright red LED R2 illuminates if the protection field is entered, the green LED R3 if the protection field is clear. In addition, a signalling output is provided. This signal (optocoupler) is ON when the protection field is clear. This NPN output is capable of sinking a current up to 20 mA dc max. under 30 Vdc max. The yellow LED R4 illuminates during a test by means of a fault simulation on the test input of the device. The yellow LED R4 flickers when a restart of the system is necessary.



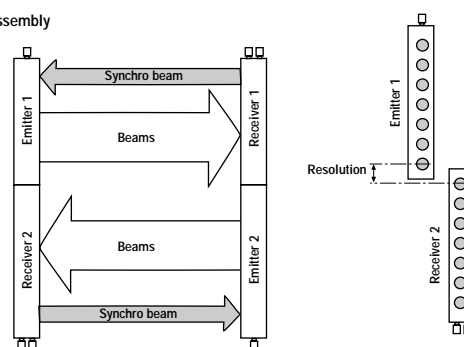
Mounting possibilities

Higher protection field heights can be achieved by means of adjacent rows or more safety light curtains. To prevent mutual interference between devices, the adjacent equipment should be operated in the reverse direction, as shown below. To avoid the less favourable resolution of 60 mm / 2.36 in between neighbouring protection fields, in the linear assembly, it is recommended to use the displaced mounting arrangement shown below with a continuous resolution. In a side by side assembly, the equipment should also be operated in the reverse direction.

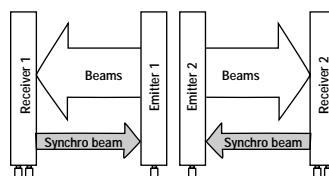
In some applications, the right-angled mounting arrangement shown below offers the best solution.

For special applications, an arrangement with one or two deflection mirrors is possible (scanning distance is decreased by approximately 10% per added mirror).

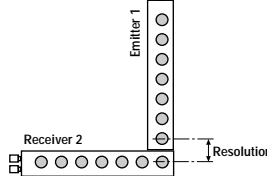
Linear assembly



Side by side



Right-angled



Protection around presses

European regulations apply to the use of photoelectric barriers, grids and curtains with power-operated presses for metal processing. Some specific EN standards classified C type are available:

- EN 692 for mechanical presses
- pr EN 693 for hydraulic presses, press brakes, pneumatic presses, punches for metal, metal forming machines.

These C standards specify a specific formula in order to calculate the minimum installation distance between the safety light curtain and the dangerous zone (refer to C standard for calculation).

These guidelines state that safety light curtains should only be used as safety equipment and if the protection field is entered, the operation of the machinery is immediately interrupted. "Immediate interruption" means that any dangerous movement must stop before the operator can reach the dangerous zone on the basis of the speed of his movement.

The self-checking of the photoelectric barrier is essential. If a malfunction occurs in the safety equipment, dangerous movement of the machine must be automatically interrupted.

It should not be possible to resume machine operation until the malfunction has been rectified.

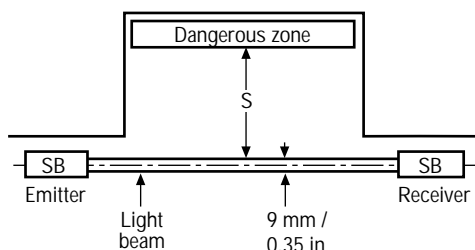
The safety light curtain should only allow the start of a dangerous movement if it is seen to be functioning correctly and if a reset push-button has been reactivated (start interlock). It is for this reason that it is important to refer to EN 954-1 for the design of the electrical interface between the safety barrier and the elements which stop the machine. The stopping time of the machine, the safety distance S and the speed of movement K are the decisive factors in order to ensure the conformity of the installation.

In all cases, the conformity of the installation must be ensured by local organisations and official safety specialists.

Notes

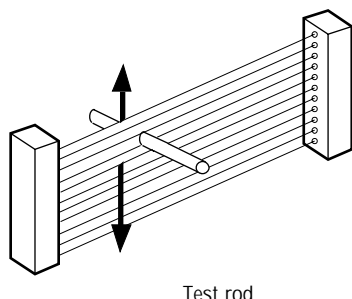
- If the tool can be changed (for instance in a press), calculate the distance "S" for the largest tool.
- It is very important that it must be impossible for the operator to remain undetected between the safety light curtain and the dangerous zone. In addition, the operator should not be able to reach the dangerous zone from above, below or laterally without being detected.

The safety light curtain should be protected against shocks, moving equipment, oil, dust, etc. by positioning it near walls and rigidly fixed on metal bars.

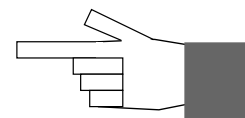
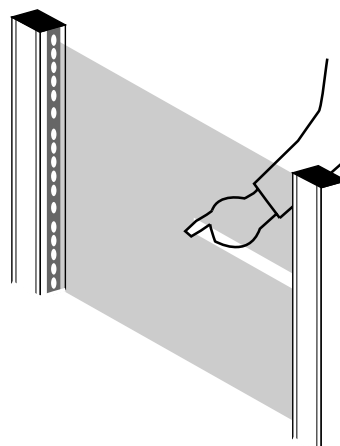


Functional testing

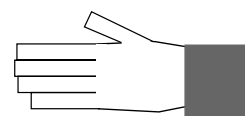
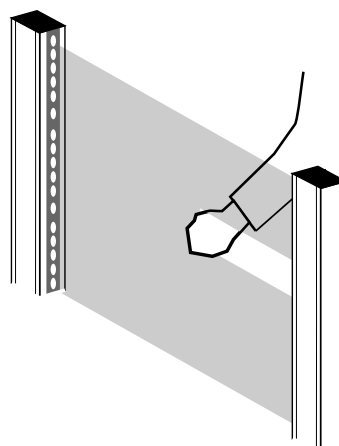
The response of a safety light curtain over the whole protection height should be regularly tested using a test rod with a diameter equal to the safety light curtain resolution. Each time the power-operated machinery is switched on, it should be verified whether an immediate shutdown occurs when any beam is interrupted by an opaque object.



FF-SB12 Finger detection



FF-SB14 Hand / Limb detection



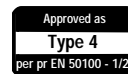
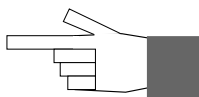
FF-SB15 Body detection



FF-SB

FF-SB12

- Type 4 according to IEC/EN 61496 - 1 / 2 Standards
- Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability
- $\varnothing 22$ mm / 0.86 in detection capability
- Scanning distance up to 10 m / 32.8 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	120/240 Vac (+10%, - 20%) 48 to 62 Hz ⁽¹⁾	24 to 48 Vdc ⁽²⁾ ±15%
	Power consumption	8 VA (120/240 Vac), 8 W (24 to 48 Vdc)	
	Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
	Material	Profile: aluminium alloy yellow painted according to RAL 1021	
		Front face: polycarbonate	
	Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
	Emission	Modulated Light Source, infrared LED (880 nm)	
	Scanning frequency	9,6 kHz	
	Resolution	ø22 mm / 0.86 in min. target size	
	Alignment tolerance	± 2° for emitter and receiver	
	Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
	Sealing	IP 65 / NEMA 4 and 13	
	Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)	
		according to IEC 801-3: level III	
	Resistance to ambient light	Sun: 20 000 Lux • Lamp: 15 000 Lux	
	Output indication	LEDs display on unit front face	
	Scanning distance	Standard: 0 m to 10 m / 0 ft to 32.8 ft	
	Electrical connection	Metal connectors DIN 43652	
	(connectors delivered with the equipment)		

Ordering information (Emitter/Receiver)

FF-SB12E/R□□□-S2

Power supply:

E: 120 Vac (for 200 mm / 7.87 in)
G: 240 Vac (for 200 mm / 7.87 in)
K: 120/240 Vac (Automatic selection)
4: 24 to 48 Vdc ⁽²⁾

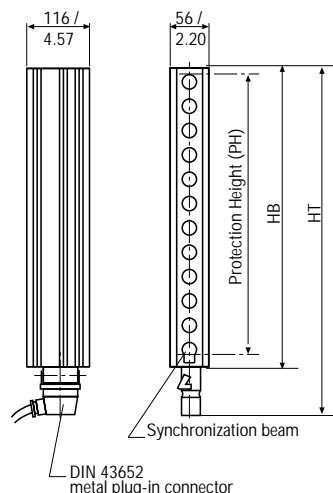
Protection Height (PH) (mm/in):

02: 212,7 / 8.38
04: 415,9 / 16.38
06: 619,1 / 24.39

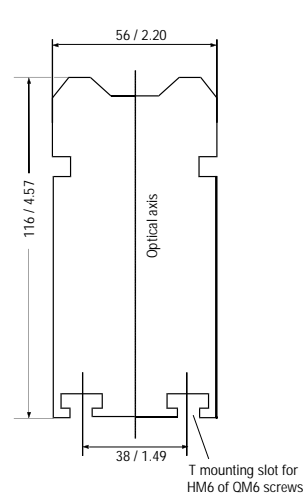
Notes:

- (1) - 120 Vac or 240 Vac for the 200 mm / 7.87 in model.
(2) - The dc version is featured with a galvanic insulation (dc to dc converter) that provides immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment. **Not available on 200 mm / 7.87 in models.**

The emitter and the receiver have the same dimensions

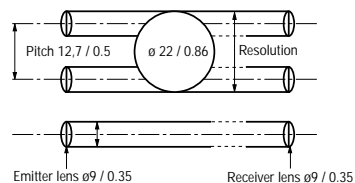
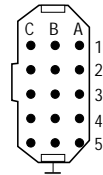


Cross section of the barrier



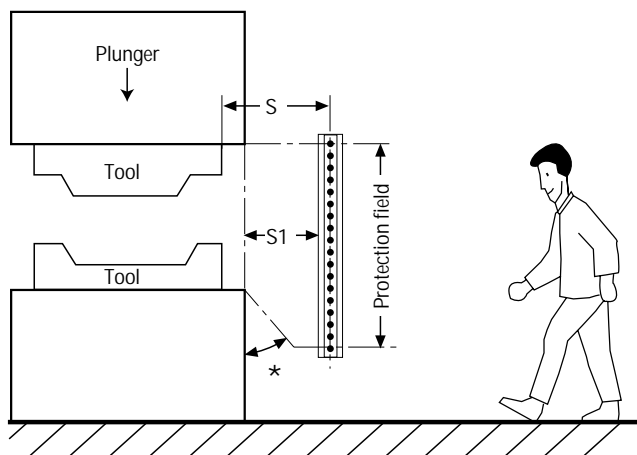
Metal Connector DIN 43652

(Emitter/receiver)



Model		02	04	06
Protection Height	PH	212,7 / 8.38	415,9 / 16.38	619,1 / 24.39
Barrier Height	HB	274,6 / 10.81	477,8 / 18.82	681 / 26.83
Total Height (including connectors)	HT	369 / 14.53	569 / 22.41	769 / 30.29
Number of beams		17	33	49
Response time (10 ⁻³ s)	t1	25	27	29
Mass per device	kg/lbs	2,8 / 6.17	4 / 8.82	5,2 / 11.46

Safety distances



Note: Due to the FF-SB12 resolution, most of the time this equipment will be used in applications where the direction of approach is normal to the detection plane.

* Positioning of the unit should be made to prevent people from reaching the dangerous zone from the bottom or top of the unit (also refer to installation consideration page 75).

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

• Normal Approach

Europe (EN 999)

$$S \geq 2000 (t_1 + t_2) + 64 \text{ (mm)}, \text{ with } S \geq 100 \text{ mm}$$

$$\text{(or } S \geq 78.8 (t_1 + t_2) + 2.5 \text{ (in)}, \text{ with } S \geq 3.9 \text{ in)}$$

If the result of this calculation is greater or equal to 500 mm, then use the following formula:

$$S \geq 1600 (t_1 + t_2) + 64 \text{ (mm)}, \text{ with } S \geq 500 \text{ mm}$$

$$\text{(or } S \geq 63 (t_1 + t_2) + 2.5 \text{ (in)}, \text{ with } S \geq 19.7 \text{ in)}$$

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

$$D_s \geq 63 (t_1 + t_2) + 2.01 \text{ in} \quad D_s = S$$

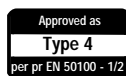
D_s: minimum safety distance (mm / in)

t₁: response time of the light curtain (s)

t₂: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

FF-SB14

- Type 4 according to IEC/EN 61496 - 1 / 2
- Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability
- ø35 mm / 1.38 in detection capability
- Scanning range up to 24 m / 78.72 ft



FF-SB14E/R□□□-□-2 ONLY

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	120/240 Vac (+10%, -20%) 48 to 62 Hz	24 to 48 Vdc ⁽¹⁾ ±15%
	Power consumption	8 VA per unit	8 W per unit
	Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
	Material	Housing: Aluminium alloy yellow painted according to RAL 1021	
		Front face: polycarbonate (filtered versions: shock and welding splash extra resistant)	
	Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
	Emission	Modulated Light Source, infrared (880 nm)	
	Scanning frequency	9,6 kHz	
	Resolution	ø35 mm / 1.38 in min. target size	
	Alignment tolerance	±2° for emitter and receiver	
	Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
	Sealing	IP 65 / NEMA 4 or 13	
	Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc)	
		According to IEC 801-3: level III	
	Resistance to ambient light	Sun: 20 000 Lux / Lamp: 15 000 Lux	
	Output indication	LEDs display on unit front face	
	Scanning distance	Standard: 0 m to 10 m / 0 ft to 32.8 ft • Long range: 3 m to 24 m / 9.84 ft to 78.72 ft ⁽²⁾	
		Filter: 0 m to 6 m / 0 ft to 19.7 ft	
	Electrical connection	Metal connector DIN 43652	
	(connectors delivered with the equipment)		

Ordering information (Emitter/Receiver)

FF-SB14E/R□□□-□-□

- Scanning range:
 - 2: 10 m / 32.8 ft (standard)
 - 2L: 24 m / 78.72 ft (Long range⁽²⁾)
 - 2F: 6 m / 19.7 ft (Filtered version for welding applications)

Connectors:
Metal DIN 43652

Power Supply:
K: 120/240 Vac (automatic selection)
4: 24 to 48 Vdc ⁽¹⁾

Protection Height (PH) (mm/in):

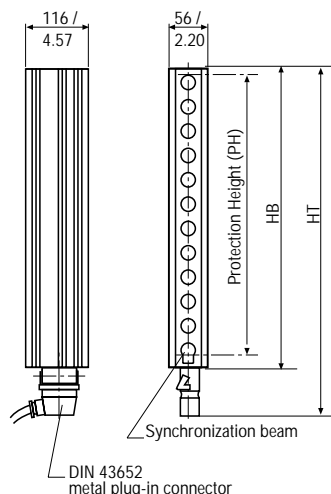
04: 417 / 16.42	10: 1024 / 40.34
06: 620 / 24.42	12: 1230 / 48.46
08: 824 / 32.46	14: 1434 / 56.49

Notes:

(1) - The 24 to 48 Vdc version is featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.

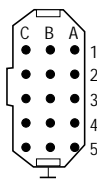
(2) - The safety light curtain, although always operational with scanning distances less than 3 m / 9.84 ft, does not fully comply with certain requirements of the IEC/EN 61496 - 2 standard at distances between 0 and 3 m / 0 to 9.84 ft. In this case, the version 0 to 10 m / 0 to 32.8 ft should be used.

The emitter and the receiver have the same dimensions

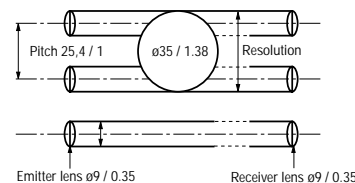
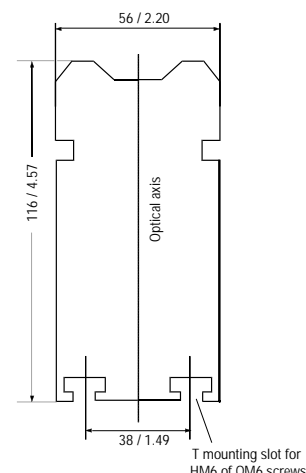


Metal Connector DIN 43652

(Emitter/receiver)

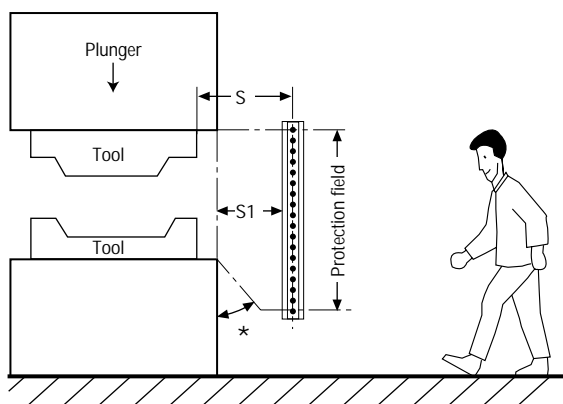


Cross section of the barrier

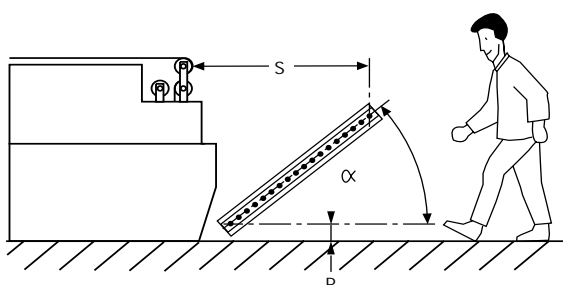
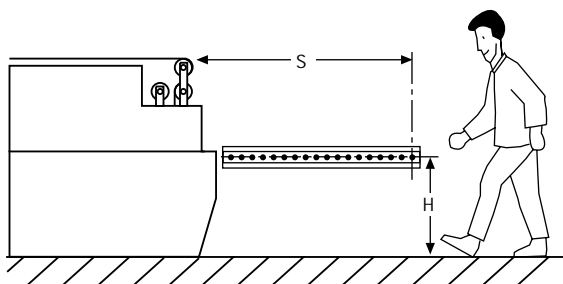


Model		04	06	08	10	12	14
Protection Height	PH	417 / 16.42	620 / 24.42	824 / 32.46	1024 / 40.34	1230 / 48.46	1434 / 56.49
Barrier Height	HB	488 / 19.22	688 / 27.10	888 / 34.98	1088 / 42.86	1288 / 50.74	1488 / 58.62
Total Height (including connectors)	HT	569 / 22.41	769 / 30.29	969 / 38.17	1169 / 46.05	1369 / 53.93	1569 / 61.81
Number of beams		17	25	33	41	49	57
Response time (10 ⁻³ s)	t1	25	26	27	28	29	30
Mass per device	(kg/lbs)	4 / 8.8	5,2 / 11.4	6,4 / 14.1	7,5 / 16.5	8,6 / 18.9	9,8 / 21.6

Safety distances



* Positioning of the unit should be made to prevent people from reaching the dangerous zone from the bottom or top of the unit (also refer to installation consideration page 75).



The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

• Normal Approach

Europe (EN 999)

$$S \geq 2000 (t1 + t2) + 168 \text{ (mm)}, \text{ with } S \geq 100 \text{ mm} \\ \text{(or } S \geq 78.8 (t1+t2) + 6.6 \text{ (in)}, \text{ with } S \geq 3.9 \text{ in)}$$

If the result of this calculation is greater or equal to 500 mm, then use the following formula:

$$S \geq 1600 (t1 + t2) + 168 \text{ (mm)}, \text{ with } S \geq 500 \text{ mm} \\ \text{(or } S \geq 63 (t1+t2) + 6.6 \text{ (in)}, \text{ with } S \geq 19.7 \text{ in)}$$

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

$$Ds \geq 63 (t1 + t2) + 3.75 \text{ in} \quad Ds = S$$

• Parallel approach

Europe (EN 999)

$$S \geq 1600 (t1 + t2) + 1200 - 0.4H \text{ (mm)} \\ \text{where } (1200 - 0.4H) \geq 850 \text{ mm} \\ \text{(or } S \geq 63 (t1+t2) + 47.3 - 0.4H \text{ (in)} \\ \text{where } (47.3 - 0.4H) \geq 33.5 \text{ in)}$$

If H is greater than 300 mm / 11.82 in, the risk of access from below must be taken into account. For this barrier, the minimum height allowed is H min. = 0 mm and the maximum height allowed is H max. = 1 000 mm / 39.4 in.

• Angled approach

Europe (EN 999)

$$30^\circ < \alpha < 90^\circ$$

If the angle is greater than 30°, the approach should be considered as normal, and one of the above-mentioned formulas should be used.

$$0^\circ < \alpha \leq 30^\circ$$

If the angle is less than or equal to 30°, the approach should be considered as parallel, and one of the above-mentioned formulas should be used. In this case the minimum height allowed is P min. = 0 mm and the max. height allowed is H = 1 000 mm / 39.4 in max. However, if P > 300 mm / 11.82 in, the risk of inadvertent access from below must be taken into account.

S: Minimum safety distance (mm / in)

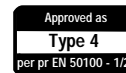
t1: Response time of the light curtain (s)

t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

H: Height of the detection zone above the floor (mm / in)

FF-SB15

- Type 4 according to IEC/EN 61496 - 1 / 2
- Meets applicable parts of ANSI/RIA/OSHA regulations for Control Reliability
- ø235 mm / 9.25 in detection capability
- Scanning range up to 24 m / 78.72 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	120/240 Vac +10% -20%, 48 to 62 Hz	24 to 48 Vdc ⁽¹⁾ ±15%
	Power consumption	8 VA per unit	8 W per unit
	Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
	Material	<i>Housing:</i> aluminium alloy yellow painted according to RAL 1021 <i>Front face:</i> polycarbonate	
	Housing size	56 mm / 2.20 in width, 116 mm / 4.57 in depth, height according to protection height	
	Emission	Modulated Light Source, infrared LED (880 nm)	
	Scanning frequency	9,6 kHz	
	Resolution	ø235 mm / 9.25 in minimum target size	
	Alignment tolerance	± 2° for emitter and receiver	
	Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
	Sealing	IP 65 / NEMA 4 or 13	
	Noise immunity	According to IEC 801-4: level IV (120/240 Vac), level III (24 to 48 Vdc) according to IEC 801-3: level III	
	Resistance to ambient light	<i>Sun:</i> 20 000 Lux • <i>Lamp:</i> 15 000 Lux	
	Output indication	LEDs display on unit front face	
	Scanning distance	3 m to 24 m / 9.84 ft to 78.72 ft	
	Electrical connection	Metal connectors DIN 43652	
(connectors delivered with the equipment)			

Ordering information (Emitter/Receiver)

FF-SB15E/R□□□-S2

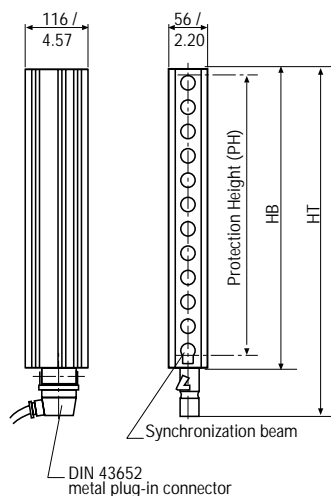
Power supply:

K: 120/240 Vac (Automatic selection)
4: 24 to 48 Vdc ⁽¹⁾

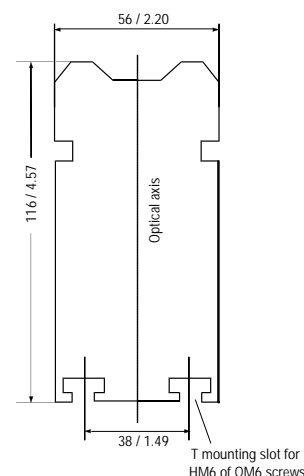
Number of beam sets (PH: mm/in):

06: 2 sets of beams (620 / 24.42)
10: 3 sets of beams (1027 / 40.46)
14: 4 sets of beams (1434 / 56.49)

The emitter and the receiver have the same dimensions

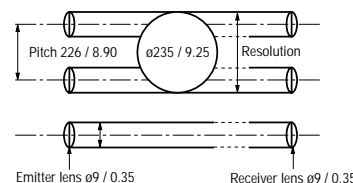
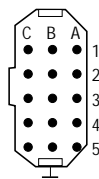


Cross section of the barrier



Metal Connector DIN 43652

(Emitter/receiver)

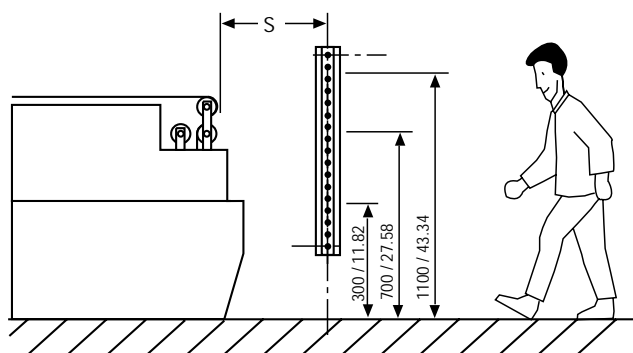


Note:

(1) - The 24 to 48 Vdc version is featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.

Model		06	10	14
Protection Height	PH	620 / 24.42	1027 / 40.46	1434 / 56.49
Barrier Height	HB	688 / 27.10	1088 / 42.86	1488 / 58.62
Total Height (including connectors)	HT	769 / 30.29	1169 / 46.05	1598 / 62.96
Number of beams		2	3	4
Response time (10 ⁻³ s)	t1	25	26	27
Mass per device	kg/lbs	5,2 / 11.4	7,5 / 16.5	9,8 / 21.6

Safety distances



Models	Beam height	
	mm	in
FF-SB15E/R06□-S2	400 / 900	15.76 / 35.46
FF-SB15E/R10□-S2	300 / 700 / 1100	11.82 / 27.58 / 43.34
FF-SB15E/R14□-S2	300 / 700 / 1100 / 1500	11.82 / 27.58 / 43.34 / 59.1

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is interrupted. To determine the safety distance in an application, use the following formula:

• Normal Approach

Europe (EN 999)

$$S \geq 1600 (t1 + t2) + 850 \text{ (mm)}$$

$$\text{(or } S \geq 63 (t1 + t2) + 33.5 \text{ (in))}$$

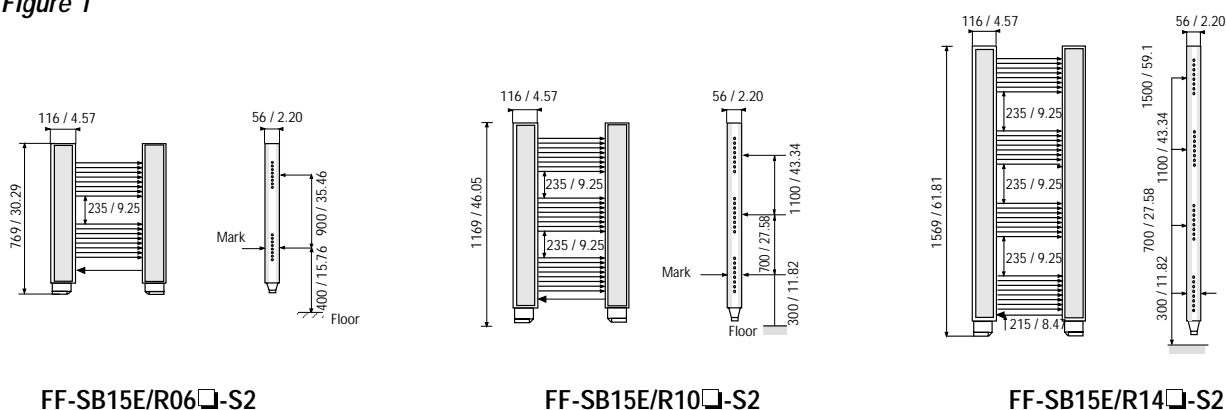
S: Minimum safety distance (mm / in)

t1: Response time of the light curtain (s)

t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)

Mounting: The barrier has a mark on its front plate on the connector side. This mark should be positioned as follows:

Figure 1

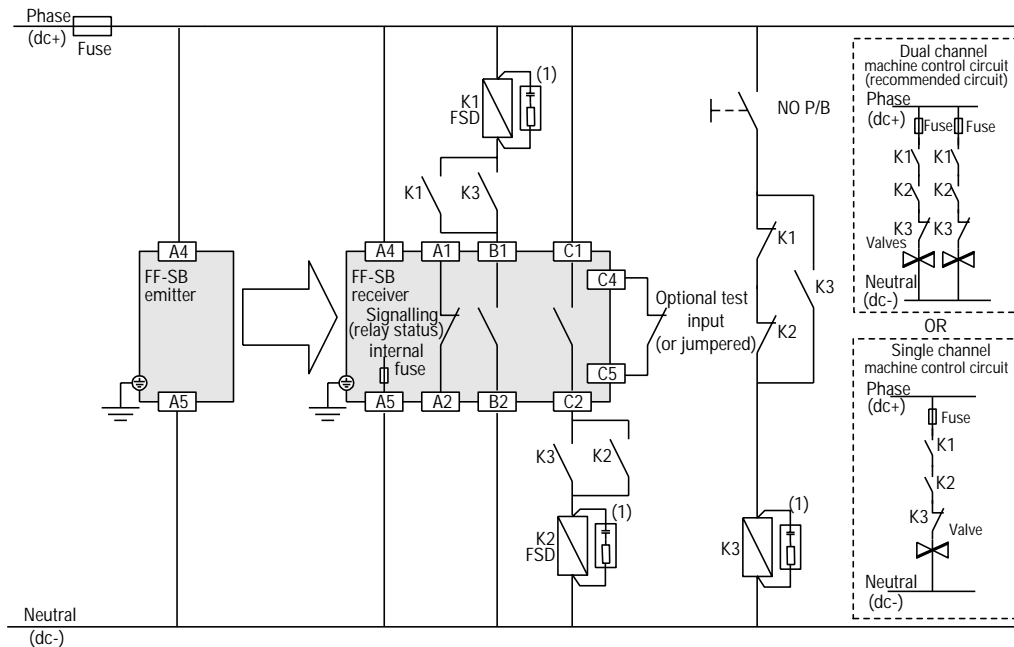


Connection diagrams (Please refer to EN 954 for electrical interface).

(Possible use of Honeywell safety control module to replace K1, K2 and K3 external safety relays and simplify / ease wiring).

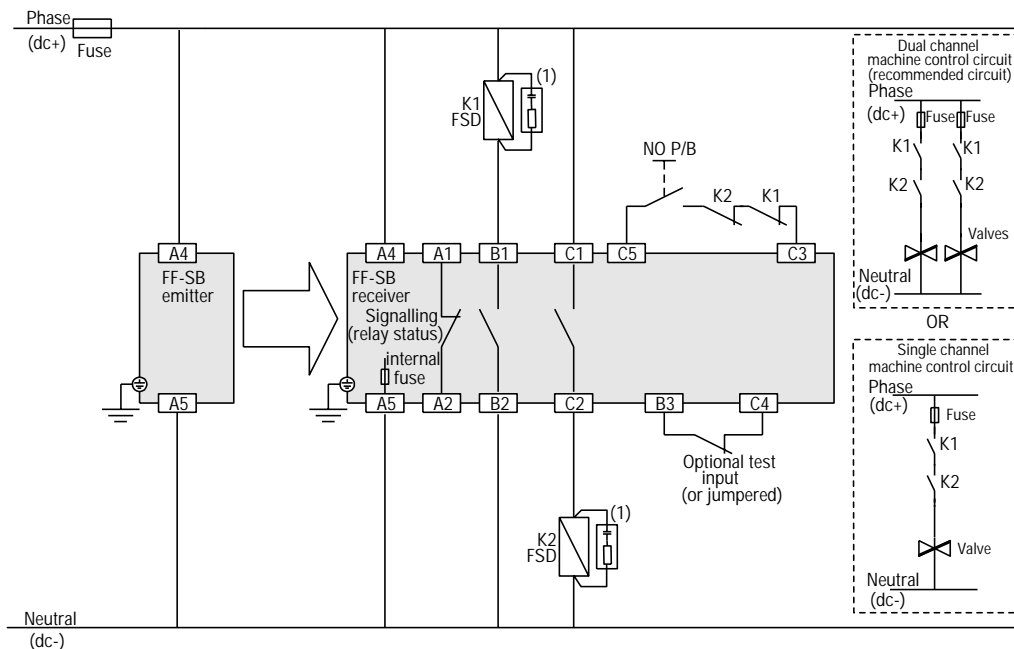
FF-SB12E/R02 ☐ -S2 models (These models provide 2 NO output contacts only)

Figure 1



Other FF-SB models (with exception of the 200 mm / 7.87 in, these models provide 2 NO and 1 NC safety output contacts).

Figure 2



(1): RC (220 Ω + 0.22 μ F) for ac interfaces, varistors for dc interfaces; NO P/B: normally open contact of a push-button; FSD: Final Switching Device

Important

The shutdown of the machine should not be carried out by a programmable controller, but by the power supply. The NC contacts can be used for signalling to the programmable controller. For more information, please refer to the installation and maintenance manual.

Selection of the restart mode

RESTART	WITHOUT FSD(1) MONITORING	WITH FSD(1) MONITORING
AUTOMATIC		
START INTERLOCK		
START & RESTART INTERLOCK		

This equipment is able to operate in any of the following restart modes:

- Automatic: Automatic restart after power up or after any beam interruption.
- Start Interlock: Manual restart after power up and automatic restart after any beam interruption.
- Start & Restart Interlock: Manual restart after power up and after any beam interruption.

The equipment is delivered in the Automatic mode without FSD⁽¹⁾ monitoring. Any other mode can be selected by changing the internal jumper links position. These jumper links are located on the receiver power supply board. The following instructions must be followed to select one of 3 restart modes:

NC: Not Connected.

NC P/B: NC contact of a push-button

NO P/B: NO contact of a push-button.

(1) FSD: Final Switching Device (refer to the connection diagram).

 Position of jumper links on delivery

Spare parts

- Special front plate (recommended for the FF-SB14 Series only in welding applications)

FF-SBZFL40 

1 shock-proof optical filter (improves immunity to light interference. High temperature resistant.

Reduces scanning ranges by 40%). For receiver filter version units only.

Nominal protected height (ex.: FF-SBZFL4006 to be fixed on a FF-SB14R06... receiver)

FF-SBZFL00 

1 shock-proof transparent front plate (high temperature resistant).

Nominal protected height (ex.: FF-SBZFL0006 to be fixed on a FF-SB14E06... emitter)

- DIN 43652 connecting plugs (parts supplied with the equipment)

FF-SBZ1721137

Female supply plug for emitter

FF-SBZ1721202

Female supply and signal plug for receiver

- Accessories

FF-SBZ0130010

Assortment of Torx screws for end covers and internal circuits

FF-SBZ172115

Kit of 100 female crimping contacts for DIN 43652 metal connector

FF-SBZ666144

Kit of reducer and cable glands for metal connectors of a complete set FF-SB14E/-S2 

- Tools

FF-SBZROD22

Ø22 mm / 0.86 in test rod for FF-SB12 series

FF-SBZROD35

Ø35 mm / 1.38 in test rod for FF-SB14 series

FF-SBZ0140010

Torx screw driver ACX 20

FF-SBZCRIMP

Crimping tool for DIN 43652 metal connectors

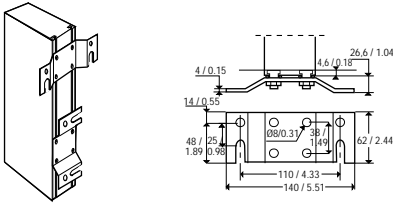
FF-SBZREMOV

Removal tool for DIN 43652 metal connectors

FF-SB accessories

Mounting brackets (brackets are not supplied with light curtains and need to be ordered separately).

FF-SBZS5000 ⁽¹⁾

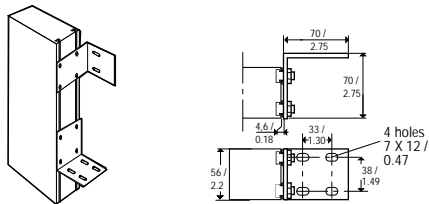


Kit of 2 brackets with anti-vibration inserts

The brackets can be assembled transversally or longitudinally (4 possible positions).

Application: Recommended for vertical or horizontal mountings.

FF-SBZS6000 ⁽¹⁾

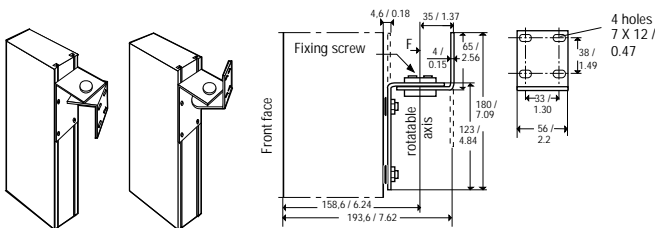


Kit of 2 right angle brackets with anti-vibration inserts

The corner plate can be fitted in 4 different positions at 90° to each other.

Application: Recommended for vertical or horizontal mountings.

FF-SBZS7000 ⁽¹⁾



Kit of 2 rotatable brackets with anti-vibration inserts

The bracket may be reversed.

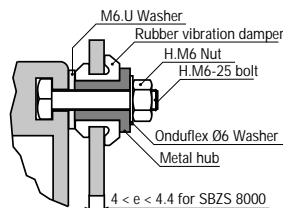
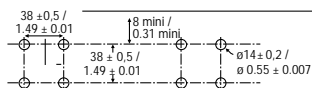
These brackets are strongly recommended for precise optical alignment at max. range.

Application: Recommended for vertical mounting only.

FF-SBZS8000 ⁽¹⁾

Drilling gauge

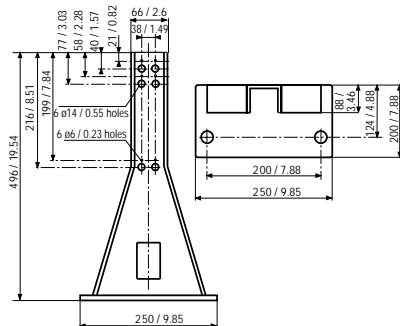
Detail



Kit of accessories for direct mounting

All installations must use this kit (8 bolts, 8 nuts, 16 washers, 8 anti-vibration dampers, 8 metal hubs).

FF-SBZS9010 ⁽¹⁾



Floor mounting column for FF-SB15

Floor mounting column for FF-SB15E/R□□-S2 only.
(black epoxy painting)

06 or 10

⁽¹⁾ Order 2 kits for a complete set (emitter and receiver)

SAFETY SENSITIVE EDGES

FEATURES

- Sensor based on an optoelectronic technology
- Meets the EN 1760-2 standard for Pressure Sensitive Protective Devices
- Permanent self-checking electronics designed in compliance with Category 4 per the EN 954-1 standard
- Protection lengths: from 0.4 to 10 m / 1.31 ft to 32.8 ft
- High resistance to environmental influences
- Robust against mechanical damage
- Sensors sealing: IP68
- Automatic gain control to adjust system to different protection lengths
- Low actuating force and high over-travel
- Supply Voltage: 24 Vdc
- Response Time of the control unit: 32 ms
- Manual or automatic restart
- LED status indicator
- Slim line 22.5 mm / 0.88 in width control unit

TYPICAL APPLICATIONS

- Machine guards, doors and hoods
- Machining centers
- Presses
- Welding machines
- Packaging machines
- Lifting decks, elevating platforms
- Material handling and feeding systems, robots
- Paternoster, theatre stages
- Automatic guided vehicles (AGV)
- Industrial washing machines

FF-SD Series



The Honeywell FF-SD Safety Sensitive Edge is a pressure sensitive protective device designed in compliance with the requirements of the EN 1760 part 2 European Standard for protection of operators exposed to hazardous moving parts.

Each safety edge system is made up of an emitter and a receiver, a rubber profile mounted on an aluminum rail and a control unit. The complete system complies with Category 4 per EN 954-1 European Standard and therefore can be used in high-risk applications.

The sensors mounted inside the hollow rubber profile use a pulsed infrared light beam to achieve a dynamic monitoring concept together with the control unit. If the light beam is attenuated, the control unit de-energizes its safety output relays.

The Safety Sensitive Edges can easily be adapted to different lengths thanks to an automatic gain control system. Thus, environmental influences like vibrations, dust, or profile damage can be compensated. The Safety Sensitive Edge can protect lengths from 0,4 m to 10 m / 1.31 ft to 32.8 ft.

The industrial rubber profile provides generally good chemical or mechanical resistance. A coated version of the rubber profile is available providing good oil resistance. The rubber profile can be replaced easily and quickly. The sensors, with an IP68 sealing, can be used in harsh industrial environments.

The slim line safety control unit easily fits inside the electrical cabinet and can be installed up to 200 meters away from the Safety Sensitive Edge.

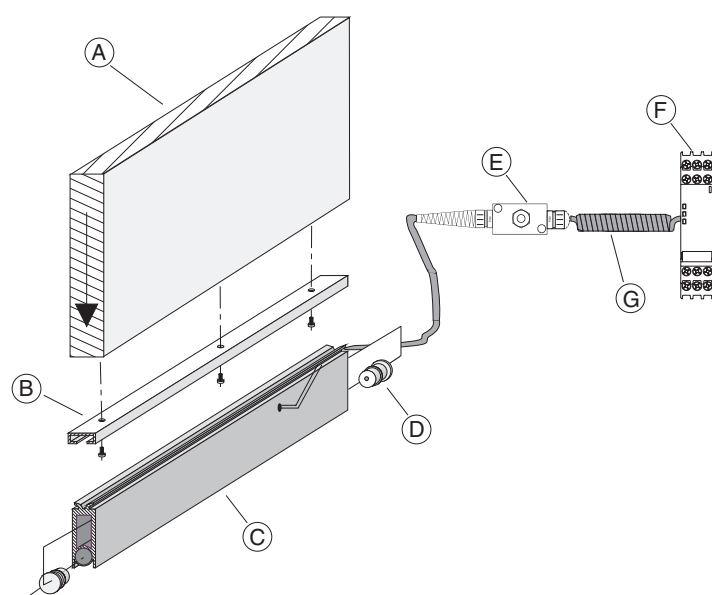
⚠ WARNING

MISUSE OF DOCUMENTATION

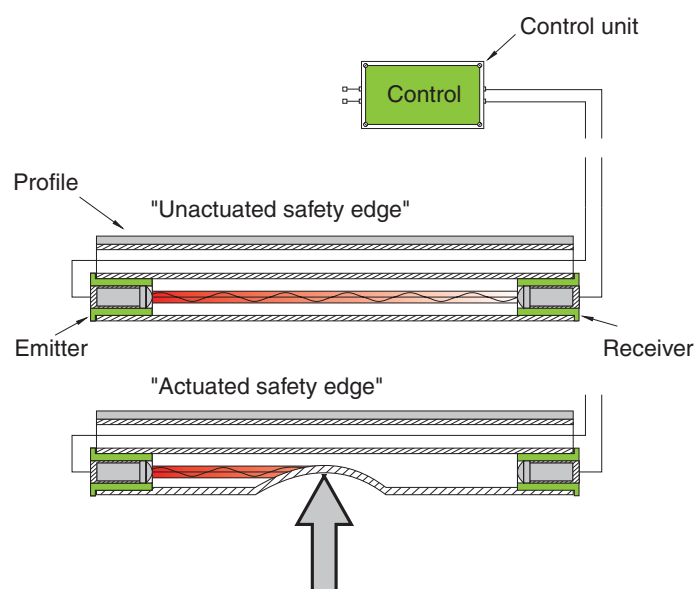
- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Safety Sensitive Edge System



- A: Moving part
 B: Aluminum rail
 C: Rubber Profile
 D: Sensors
 E: Junction Box (Optional)
 F: Control Unit
 G: Coil Cord (Optional)



Selection of a Safety Sensitive Edge

The Safety Sensitive Edge is used to protect people from being injured by a moving part. In order to select the right Safety Sensitive Edge system, several parameters are required:

- Which safety category according to EN 954-1 does your application require?
- What is the maximal speed of the hazardous movement?
- What is the stopping travel of the moving part after a stop signal was sent from the control unit?
- What is the maximal permissible force? (depending on the part of body to be protected, e.g. fingers, hands etc.)
- What are the expected environmental specifications of the profil? (e.g. resistance to chemicals, oils etc.)

The minimum over travel required by the safety edge is determined from the measured or given stopping travel at maximum operating speed. The EN 1760-2 standard recommends a safety factor of at least 1.2 times the minimum distance.

If the application involves extremely frequent actuation, care should be taken to choose a profile that recovers its original shape as quickly as possible. Attention must also be paid to the construction of the opposite edge.

When the stopping travel and speed are known, the force-travel diagrams of the safety edges can be used to select the safety device with the required over travel and the required operating speed.

The stopping response time of the machine may have to be improved if no safety edge with sufficient over travel is available.

Installation of the safety edge

The aluminum rail is mounted on the moving part of the machine. To fix it, drill a hole approximately every 70 mm / 2.76 in distance and fix it to the application with the use of head or countersunk head screws (diameter 3 mm to 6 mm / 0.11 in to 0.23 in). The surface should be plain and clean.

The maximum length of the aluminum rail is 2,5 m / 8.2 ft. For lengths over 2,5 m / 8.2 ft, several units with standard size have to be mounted. Care must be taken that neither misalignment nor bends occur (do not exceed 30°).

Slide or clip the sensor profile into the rail. If the safety sensitive edge is mounted vertically, the profile has to be fixed to avoid slipping off the aluminum rail.

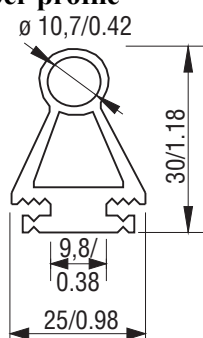
The sensors can be wired to the control unit directly or through the junction box. The coil cord is used when the door's motion can damage the cable. A special version of the sensors offering polyester coated cables for better flexibility can also be used for this type of application.

Ordering Information

Rubber profiles and aluminum rails

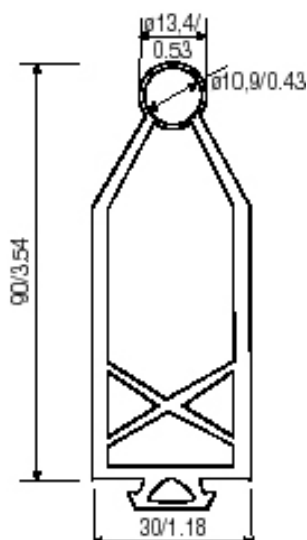
FF-SDZP□2530□□

**30 mm x 25 mm
rubber profile**



FF-SDZP□3090□□

**90 mm x 30 mm
rubber profile**



Profile versions:

FF-SDZP□2530□□

FF-SDZP□3090□□

Available lengths:

FF-SDZP□2530□□

FF-SDZP□3090□□

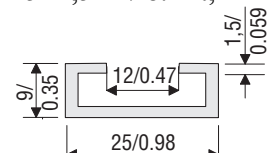
FF-SDZRA2509□□

25 mm aluminum rail

Available lengths: □□

01=1 m, 3.28 ft

25=2,5 m / 8.2 ft,



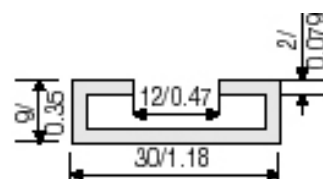
FF-SDZRA3009□□

30 mm aluminum rail

Available lengths: □□

01=1 m, / 3.28 ft

25=2,75 m / 9.0 ft,



R = standard profile

C = special coated profile
(good oil resistance)

01=1 m / 3.28 ft.

25=2.5 m / 8.2 ft.

05= 5 m / 16.4 ft.

10=10 m / 32.8 ft.

00= 25 m / 82.02 ft.

FF-SDER11A2

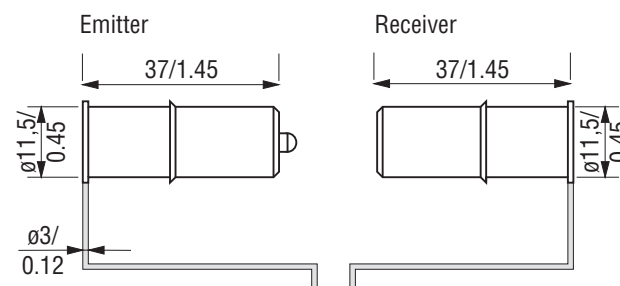
Safety Sensors with standard cable

The FF-SDER11A2 version is recommended when the sensor cable is not in movement.

FF-SDER11B2

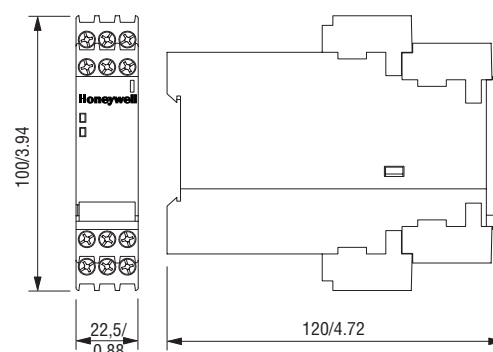
Safety sensor with special flexible cable

The FF-SDER11B2 version has polyester coated wires inside the sensor cable for better flexibility, and is recommended in applications where the sensor cable is in movement.



FF-SDC100R2

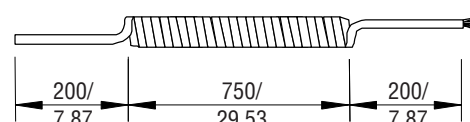
Safety Control Unit



Accessories (optional)

FF-SDZCOILA

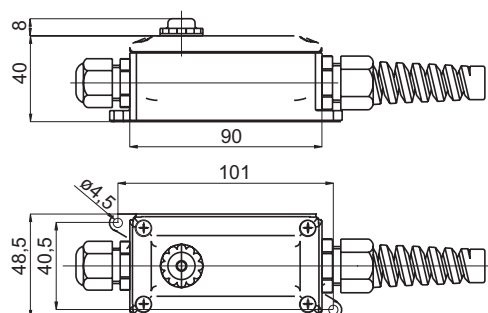
Coil cord



The coil cord is used as a flexible connection between the junction box mounted on the moving part and the control unit. The maximum cable extension is 3 meters.

FF-SDZJUNCA

Junction Box



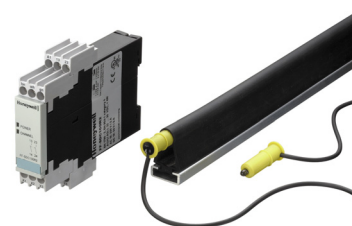
The junction box is used for the cable connection between emitter / receiver and the control unit (sealing: IP 65).

FF-SD

- Pressure sensitive protective device in compliance with the requirements of the EN 1760-2 standard
- Safety Sensitive Edge in compliance with the requirements of the EN 954-1 for Category 4 equipment



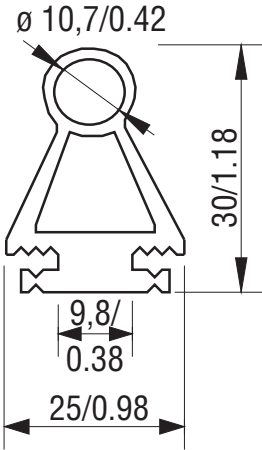
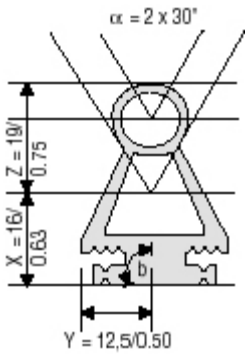
Suitable for interfaces up to
CATEGORY 4
per EN 954-1



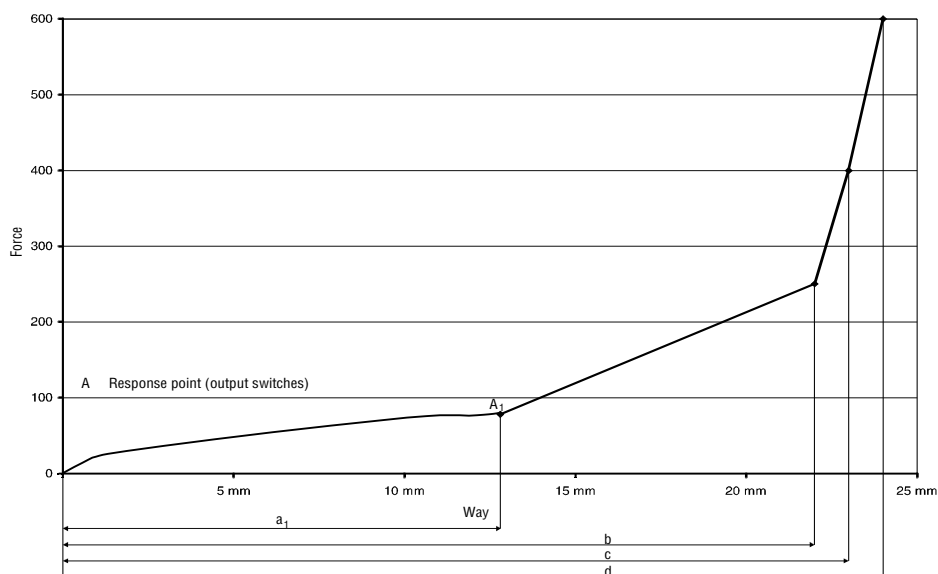
TECHNICAL SPECIFICATIONS

CONTROL UNIT SPECIFICATIONS		FF-SDC100R2 control unit	
Power supply		24 Vdc -10 %, +20 %	
Power consumption		< 4 W	
Response Time		32 ms	
Safety outputs		2 NO safety relay contacts	
Auxiliary outputs		1 NPN static non-safety output (NO characteristics)	
Start modes		Manual or automatic	
Max. operating voltage		250 Vac/dc	
Max. operating current		4 A resistive load	
Mechanical lifetime		3 Million operations	
Safety Category		Category 4 according to EN 954-1	
Operating Temperature		+5 °C to +55 °C / +41 °F to +131 °F	
Sealing		terminal strips: IP 20, housing: IP 40	
Weight		0,2 kg / 0.44 lbs	
PHOTOELECTRIC SENSORS SPECIFICATIONS		FF-SDER11□2 SENSORS	
Material		Polyethylene	
Scanning range		From 0,4 m to 10 m / 1.31 ft to 32.8 ft	
Emission		IR light : 950 nm	
Voltage		12 Vdc (supplied by the control unit)	
Operating Temperature		-20 °C to +75 °C / -4 °F to +167 °F	
Sealing		IP 68	
Length of the sensor cables		Emitter: 10,5 m / 34.44 ft – Receiver: 3 m / 9.84 ft	
Max. cable length		200 m	
Standard cable of FF-SDER11A2 sensors		Polyurethane / polyvinylchloride, 3 x 0,15 mm ² oil proof, cold resistant, notch proof cable	
GENERAL RUBBER PROFILE SPECIFICATIONS		FF-SDZPR Series Standard profiles	FF-SDZPC Series Special coated profiles
Material (Chemical marking)		Ethylen-Propylen-Ter-Polymer EPDM (APTK)	
Operating Temperature		5 °C to 55 °C / 41 °F to 131 °F	
Storage temperature:		-25 °C to +60 °C / -13 °F to 140 °F	
Rebound elasticity at 20 °C / 68 °F		good	
Resistance against permanent deformation		good	
Sealing level		IP 67	
Operating speed		max.: 100 mm/s	
General weatherproofness		excellent	
Ozone resistance		excellent	
Oil resistance		poor	good
Fuel resistance		poor	good
Chemical solvent resistance		poor to satisfying	good
General resistance against acids		good	

SPECIFICATIONS OF THE FF-SDZP□2530□□ RUBBER PROFILE

Technical specifications		Dimensions in mm / in	Effective sensing surface
Hardness	60 Shore A		 <p>The no-detection zone of 2 x 35 mm must be clearly indicated on the rubber profile.</p> <p>The highest total actuating force applied over the effective sensing surface should be less than 500 N.</p>
Height	30 mm		
Width	25 mm		
Finger detection	yes		
Weight	0,3 kg / m		
No-detection zone on the profile edges due to the inserted sensors	2 x 35 mm		
Operating speed	Max. 100 mm / s		
Force	Max 500 N applied over the total effective sensing edge surface		
Temperature range	5 °C to 55 °C / 41 °F to 131 °F		
Sealing level	IP 67		

Force travel relation



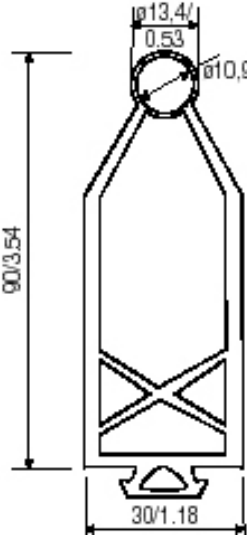
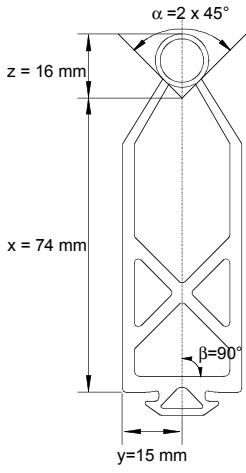
Measuring parameters:

- Temperature: T = 23 °C
- Install position: B (per EN 1760-2)
- Measuring point: C3 (per EN 1760-2)
- Speed : 100 mm/s (from 0 to point A)
10 mm/s (starting from point A)
- Actuation travel: 8 mm

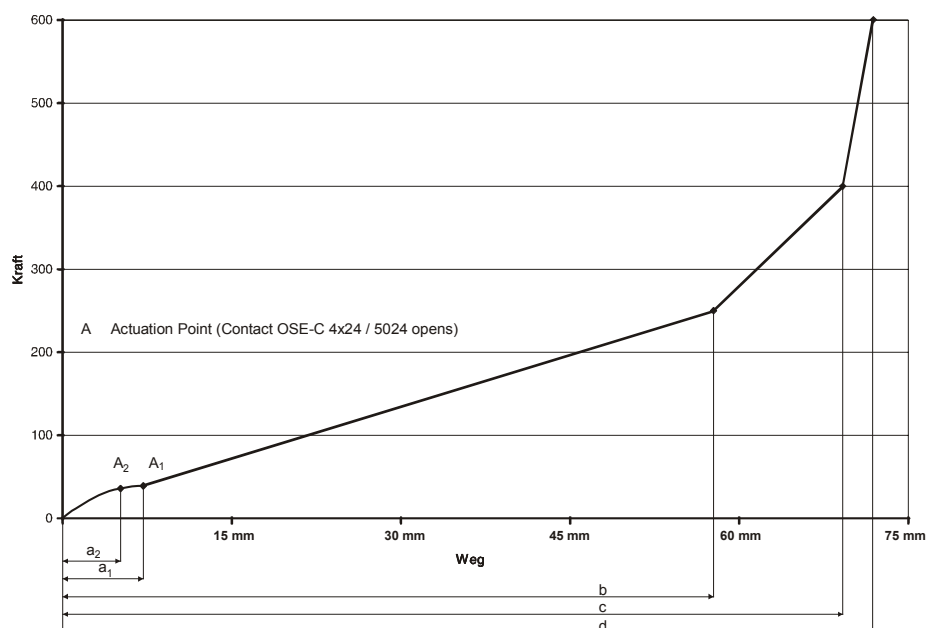
Over travel = Total Travel – Pre-Travel

	Travel	Force
a1= pre travel	13 mm / 0.50 in	80 N
b = total travel at 250 N	22 mm / 0.87 in	250 N
c = total travel at 400 N	23 mm / 0.9 in	400 N
d = total travel at 600 N	24 mm / 0.94 in	600 N

SPECIFICATIONS OF THE FF-SDZP□3090□□ RUBBER PROFILE

Specific profile data		Dimensions in mm / in	Effective sensing surface
Hardness	60 Shore A		 <p>The no-detection zone of 2 x 25mm must be clearly indicated on the rubber profile.</p> <p>The highest total actuating force applied over the effective sensing surface should be less than 400 N.</p>
Height	90 mm		
Width	30 mm		
Finger detection	yes		
Weight	0,9 kg / m		
No-detection zone of on the profile edges due to the inserted sensors	2 x 25 mm		
Operating speed	Max. 100 mm / s		
Force	Max 400 N applied over the total effective sensing edge surface		
Temperature range	5 °C to 55 °C/ 41 °F to 131 °F		
Sealing level	IP 67		

Force travel relation



Measuring parameters:

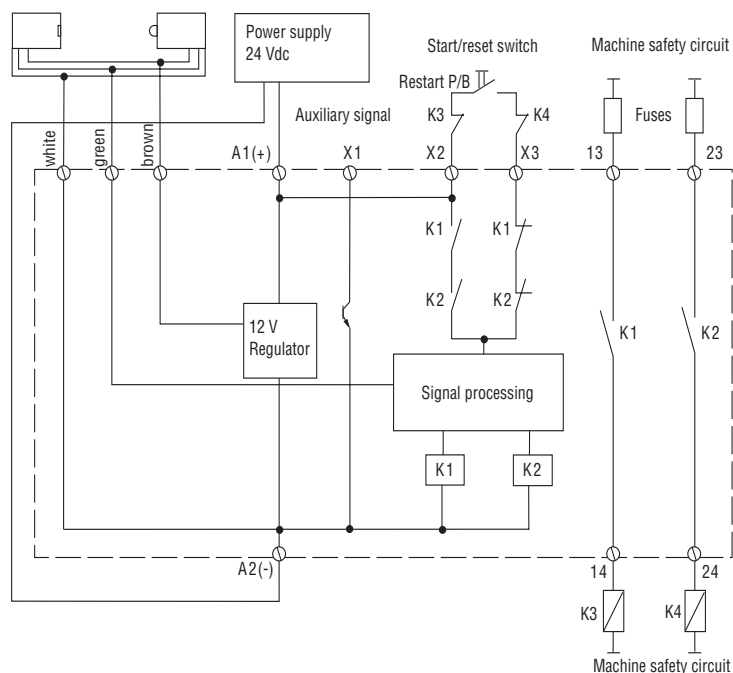
- Temperature: T = 23 °C
- Install position: B (per EN 1760-2)
- Measuring point: C3 (per EN 1760-2)
- Speed : 100 mm/s (from 0 to point A)
10 mm/s (starting from A)

Over Travel = Total travel – Pre Travel

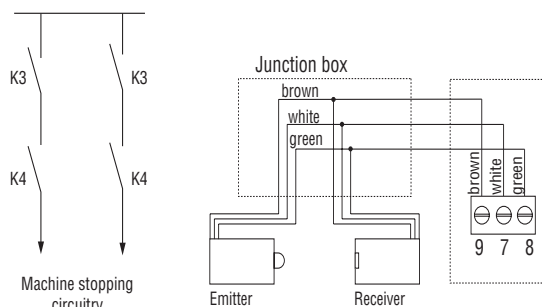
	Travel	Force
a1/2= pre-travel	8.8 mm	40.5 N
b = working travel at 250 N	58.4 mm	250 N
c = working travel at 400 N	70.4 mm	400 N
d = total travel at 600 N	72.8 mm	600 N

Electrical connection

Connection to the FF-SDC100R2 control unit



Connection using the FF-SDZJUNCA junction box



The safety control unit FF-SDC100R2 has a DIN-rail mount housing:

- Connect the power supply to terminals A1(+) and A2 (-).
- Connect the start / reset circuit:
 - **Manual start:** connect a normally open start/reset push-button in series with the normally closed contacts of external contactors K3 and K4 (when used) between X2 and X3.
 - **Automatic start:** connect a jumper between X2 and X3 or connect the normally closed contacts of external contactors K3 and K4 (when used) in series.
- Connect the emitter and receiver sensors as follows: connect the brown, white, green emitter and receiver wires to the brown, white, green terminals of the control unit.
- Connect the safety outputs : connect the normally open contacts 13/14 and 23/24 into the machine safety circuit.
- Use the auxiliary signal output X1 (NPN open collector) for signaling purpose.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, as its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the

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www.honeywell.com/sensing/safety
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Category 3 Safety laser scanner

Two zone programmable area control

FEATURES

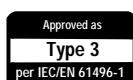
- No touch detection system in compliance with the requirements of IEC/EN 61496 part 1 and pr EN 61496 part 3 for Type 3 equipments
- Meets applicable parts of ANSI B11.19-1990 standard and OSHA 1910.212 regulations for Control Reliability
- Objects and people protection
- Surveillance area size up to 262 m² / 2820 ft²
- Class 1 infrared Laser beam, invisible and harmless to the eye
- Easy to install: a single device, a single cable
- Detection of a unique inner failure per EN 954-1
- Fast and accurate configuration of the surveillance areas around the dangerous zone with a computer and user friendly software
- The shape of the protection zones fits any environment (Teach-in option for zone definition)
- Scanning angle: up to 300°
- Free rotating head, making it a self-cleaning optical system
- Permanent self-checking of the beam status with fixed test target
- External user defined test target possibility to ensure correct positioning of the laser during machine operation
- Response time: 0.280 s
- Surveillance range: 10 m / 32.8 ft
- Detection range: 6 m / 19.7 ft
- Resolution: 70 mm / 2.8 in at 6 m / 19.7 ft

TYPICAL APPLICATIONS

- Horizontal detection (like a sensitive mat) of people or objects
- Anti-collision system for AGVs



(Pending)



The FF-SE laser scanner from Honeywell is a revolutionary product in the world of industrial safety. This device combines radar and laser principles to scan pre-defined zones around dangerous machinery or moving vehicles. In case of intrusion in these zones, output relays are immediately opened, eliminating the danger.

An infrared class 1 laser beam strikes a mirror rotating at 8 Hz, allowing it to sweep a 300° area. Any object with a minimum reflectivity of 1,8% (black target) will be detected in a 6 m / 19.7 ft radius. Two safety levels may be set through two zones that can have any shape:

- "alarm zone", in a 10 m / 32.8 ft radius around the FF-SE
- "safety zone" in a 6 m / 19.7 ft radius

These two zones are defined using the software (ordered separately), running on a computer connected to the FF-SE, which allows the areas to be protected to be displayed on the screen. The two zones correspond to two independent outputs, allowing multiple applications:

- the alarm zone can be used to trigger an acoustic or light signal when a person approaches, which indicates that there is a close danger, allowing the intruder to withdraw without stopping the machine.
- the safety zone is used to trigger the immediate stopping of the machinery (2 safety NO contacts).

Restart is automatic after clearing the zone. Use additional safety control module if manual restart is needed.

This system is unique because of its small resolution (0,5° in angle) and its excellent precision, while covering a wide area (262 m² / 2820 ft²). The FF-SE has been designed in agreement with the pr EN 61496-3 that will soon be brought into effect for this new kind of detecting device.

External and internal surveillance systems make it a Type 3 optoelectronic protective system. Its self-cleaning optical head and its good immunity to pollution guarantee a superior reliability.

WARNING

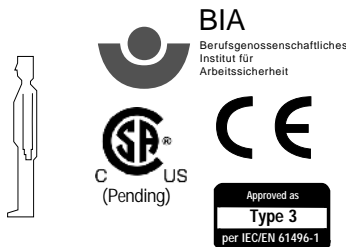
MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SE

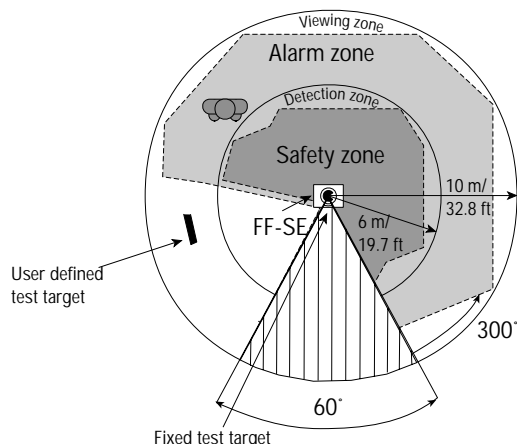
- Objects and people protection
- Scanning angle up to 300°
- Surveillance up to 262 m² / 2820 ft²



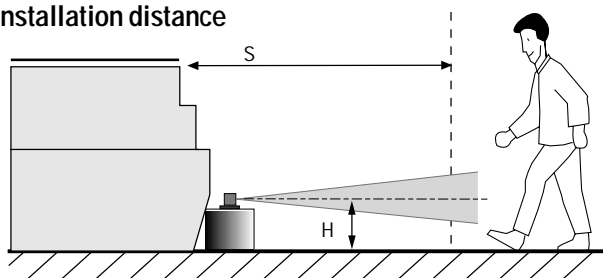
Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Power supply	24 Vdc, ± 15%
Consumption		0,75 A at 24 Vdc, rush at startup: 2 A during 100 ms
Measure and detection angle		300°
Detection distance		Black target (1,8%): 6 m / 19.7 ft
Outputs		3 relay outputs, free of potential: 2 A / 48 V
Head spinning frequency		8 Hz, ± 5%
Status display		Green: safety zone free • Red: safety zone occupied • Yellow: alarm zone occupied - Diagnostic
Emitting source		Infrared laser LED, 905 nm, ± 30 nm
Beam divergence		0,9°
Interface		RS 232, V.24, 19200 Baud
Safety class		Sensor: Type 3 according to IEC/EN 61496-1 ⁽¹⁾ • Laser: Class 1 ⁽²⁾ according to IEC 825-1
Protection class		IP 65 (NEMA 4, 13)
Operating temperature		0 °C to 50 °C / 32 °F to 122 °F
Storage temperature		-20 °C to 70 °C / -4 °F to 158 °F
Shock and vibration resistance		According to IEC 68
Material		Casing: Aluminium • Connector: Steel
Colour		Yellow paint RAL 1021
Ordering information FF-SEEDGE6G2-1 Sensor kit (Sensor + power cable) and FF-SEZ6SOFT2 Software kit (Diskette + PC cable) Accessories: FF-SEZ6BRAC3 Mounting bracket FF-SEZ6PLAT Mounting plate FF-SEZ6POST Post supporting the bracket		
Remarks (1) Category 3 per EN 954-1. (2) No special limitation of use in the USA or in Europe.		
Infrared beam radius		At 6 m / 19.7 ft: 100 mm / 3.9 in • At 10 m / 32.8 ft: 170 mm / 6.7 in
Beam Increment		0,5°
Response time	t1	280 ms (including relays)
Device weight		3 kg / 6.61 lbs

Tolerance and detection distances



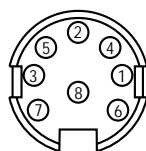
Installation distance



$$S \geq V(t_1 + t_2) + (L - 0.4 H) + E$$

Where:

- *S*: Distance (mm / in)
- *t1*: Response time of the FF-SE (See technical specifications)
- *t2*: Stopping time of the machine (s); i.e. the time interval necessary to stop the machine, after the protection device has emitted the stop signal
- *L*: 1200 mm / 47.28 in
- *H*: Height of the beam from the ground, $300 \leq H \leq 1000$ mm / $11.82 \leq H \leq 39.4$ in
- *V*: Penetration velocity (mm / s or in / s) ($V = 1600$ mm / s in Europe) $V = 63$ in / s in USA
- *E*: Maximum Error in measurement (see technical specifications)



Pin number	Signal	Function
1	24 V	Power 24 Vdc supply
2	GND24	Ground 0 Vdc supply
3 SAFETY 2.1	DETEC2	Safety 2 relay output
4 SAFETY 2.2	DETEC2	Safety 2 relay output
5 SAFETY 1.1	DETEC1	Safety 1 relay output
6 SAFETY 1.2	DETEC1	Safety 1 relay output
7 ALARM1		ALARM relay output
8 ALARM2		ALARM relay output
SHIELD	PE	Protection earth

The protection zone is made up of 600 beams. Each beam receives a signal corresponding to a distance measured using the light time of flight principle, whatever the reflectivity of the target. If this signal goes below a user defined threshold during the surveillance, it means that an object is present in the protection area. Consequently, the corresponding relay is opened.

The surveillance area includes an alarm zone and a safety zone, that are user-defined. Both may have an irregular shape which corresponds to the environment.

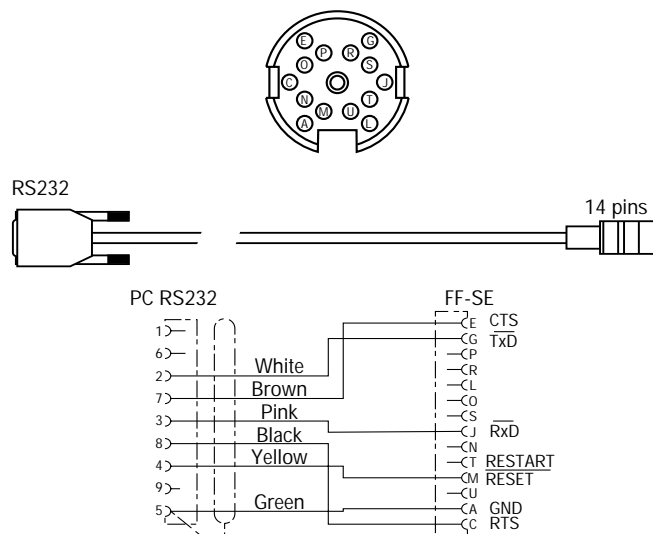
Applications: a greater flexibility

The FF-SE being an optoelectronic detecting device, it has a no touch detection and therefore brings more flexibility on site. Its principle of diffuse reflection simplifies the installation, compared to the traditional emitter/receiver pair of light curtains. The protection zones do not need any additional fixture (wall, fence, door...) since the FF-SE covers a 300° angle and adapts to existing obstacles. Installation costs are reduced to a minimum and the working position is easily accessible since the protection is a no-touch type.

In case of a change in the machine or production floor layout, the FF-SE can adapt very quickly by a re-configuration. The FF-SE is not linked to any particular set up or machine: it is exchangeable just by programming.

Compared to a usual safety device (light curtain, safety mat, door...), the FF-SE includes two protection zones which is a great asset: the alarm zone, used as an early warning zone, allows a signal to an intruder that he is close to a dangerous zone and that his movement is about to stop the machine. There is still time for the individual to change direction and avoid a stoppage of the equipment that can be costly if it occurs often. By avoiding unnecessary stoppage, the FF-SE increases the production lines productivity without decreasing the safety: it protects just what is needed.

Computer connection



Software

The Honeywell software kit allows the protection zones to be easily programmed into the sensor. This software runs under any PC (286 or more), under MS DOS. The FF-SE is linked to the PC through the serial port (RS232 format) and a cable supplied with the software kit. The custom zone definition can be achieved through 3 different methods that can be combined:

- with the mouse, by clicking on end points forming the limit of the protection field;
- with the keyboard, by plotting points with the cursor keys;
- with a text editor in which the end points are defined by their coordinates;

Defining the protection zones is easy since obstacles are displayed on the screen: they are seen in real time.

Using a PC also allows to store several configurations on a disk, that can be retrieved in a few seconds into the sensor. One can therefore define different shapes according to different situations and transmit them into the sensor whenever needed.

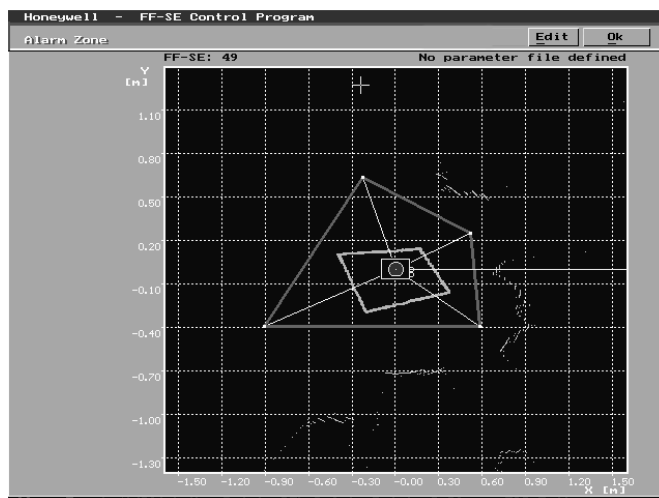
Once the settings are downloaded into the sensor, it is a standalone device that will keep all zone definitions and parameters in a permanent memory, even if the power is cut. Access to this memory and to zone definition is protected by a password. The program also has other features: real time profile measurement, sensor simulation to get familiar with it, surveillance of the zones with intrusion time display.

Self-check

A fixed test target is mounted on top of the housing to ensure the beam self-check: this takes away 60° off the scanning angle to perform various checks: contamination of the lens, accuracy of the distance measurements, status of the beam...

An external test target possibility ensures the correct positioning of the sensor and guarantees the safety if its position is changed since the definition of the zones depend on the position of the sensor. The rotating head is self-cleaning and therefore is much less sensitive to pollution as other fixed-window devices. The internal angular coder is controlled by a "surveillance circuitry", as are the relays.

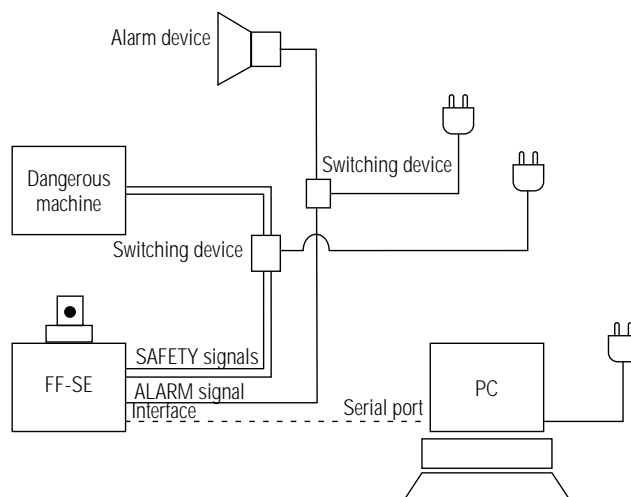
Graphic screen



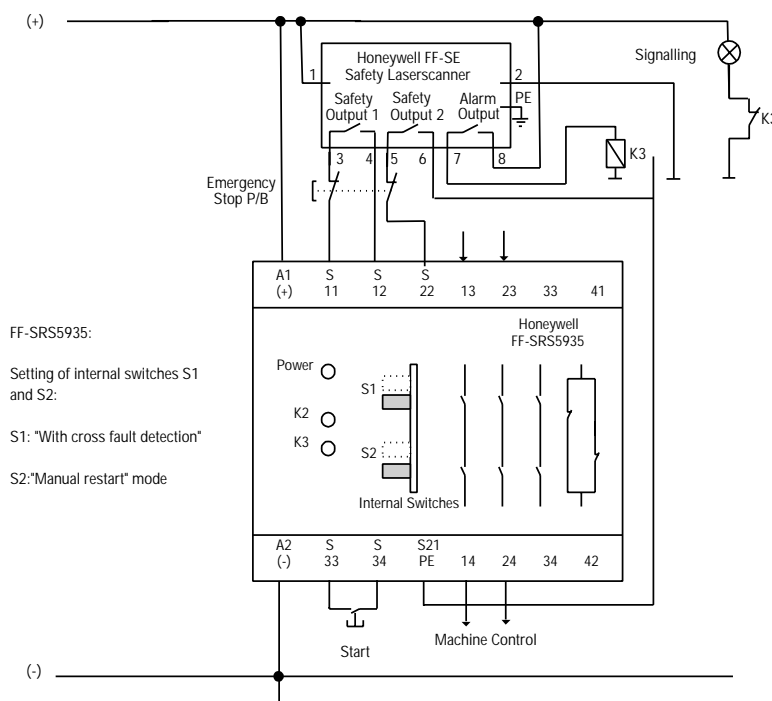
Defining the zones with the editor



Example of electrical connection



Connection diagram



Installation

The FF-SE can be installed in various configurations. It does not need any receiver nor separated reflector. When mounted horizontally, it replaces light curtains or safety mats by offering a better coverage and an increased flexibility. Its small size allows installations in most of existing sites. The laser beam is an invisible Class 1 laser, therefore it is not harmful and does not disturb workers. A unique connector links the sensor to the power supply and the devices connected to the 3 output relays (alarm, safe 1 and safe 2), making connections with the sensor very easy.

For AGVs

Weight and speed of AGVs in industrial environments can represent a certain danger for the workforce. The FF-SE can be installed on these AGVs to ensure people safety: due to its long range, it can stop the AGV before the obstacle, even if its speed is high.

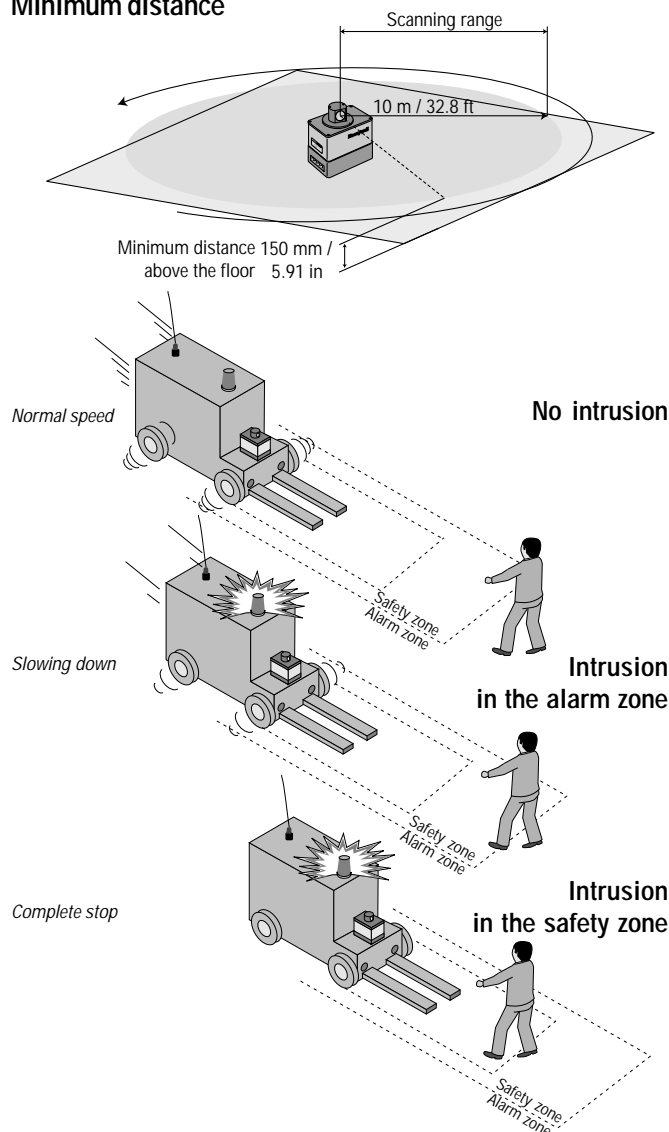
The two distinct zones can be used in an elegant way:

The alarm zone, with its 10 m / 32.8 ft range, acts as a slowing down system: if something is detected in the zone, the AGV will slow down and emit a warning signal to make the way free again.

The safety zone, with its 6 m / 19.7 ft range, acts as an emergency stop: the AGV will immediately be stopped when an object is detected in this zone.

Knowing the AGV stopping distance and the response time of the safety chain, it is possible to calculate the limits of these zones optimally.

Minimum distance

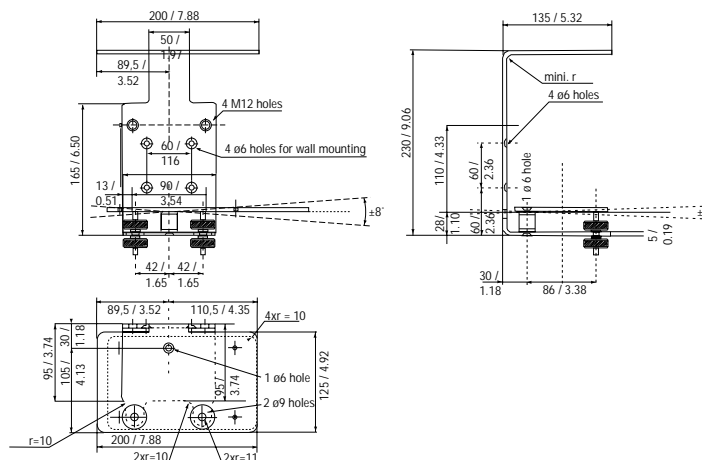


Accessories

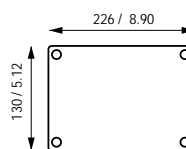
- **FF-SEZ6BRAC3 Mounting bracket:** It reinforces the protection in installations where the sensor could be reached by humans or vehicles. It allows head up or down mounting. The bracket can be mounted on a vertical surface from behind thanks to 4 M6 holes. There are 2 adjustable screws that allow an adjustment of the scanning plane ($\pm 8^\circ$) in X, $\pm 4^\circ$ in Y, so as to allow an accurate placement of the beam, especially in multiple device configurations.



Dimensions in millimeter/inches

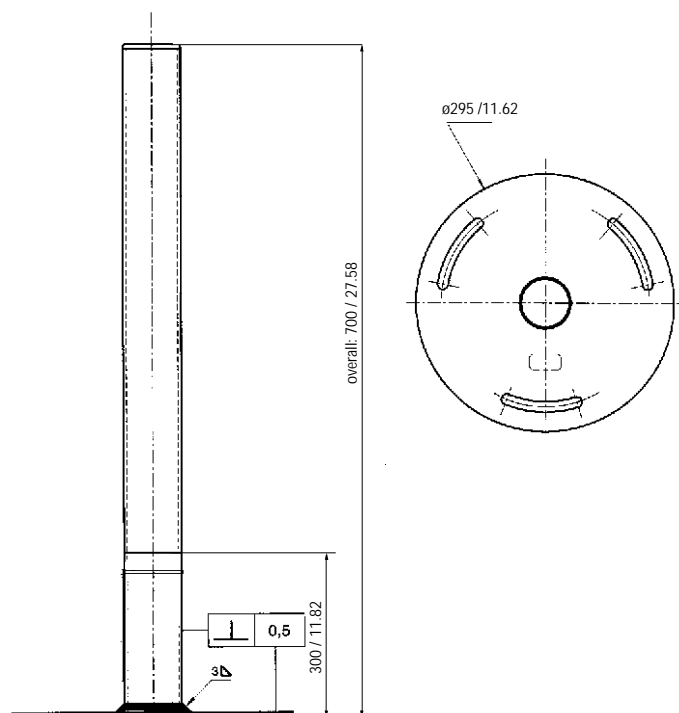
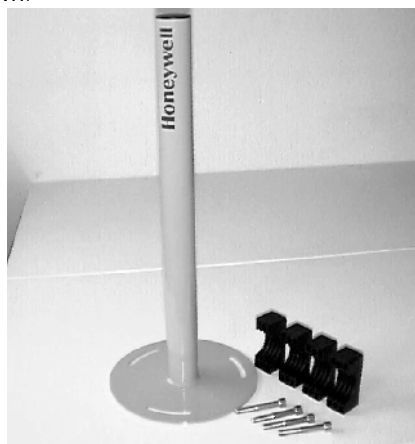


- **FF-SEZ6PLAT Mounting plate:** Mounting plate to mount the scanner on horizontal ground.



- **FF-SEZ6POST:**

This post is designed to support the mounting bracket FF-SEZ6BRAC3. This allows an adjustment of the scanning plane height. The scanning plane can be adjusted from 300 mm up to 700 mm / 11.82 in to 27.58 in. The bracket can also be rotated around the post. A collar holds the bracket to the post and slides on the post. The bracket can be mounted up or down, so that the laser scanner head is either up or down.



- **FF-SEZ6SOFT2:** The Honeywell software kit allows sensor programming and setup. It is supplied with a manual explaining how to use it and an RS232 cable for PC connection.

Safety light curtain

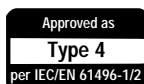
Compact and cost-effective unit

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496-1 and IEC/EN 61496-2 European norms for Type 4 electrosensitive protective equipment
- Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1 series; ANSI RIA 15.06 and CSA
- **Self-contained unit. No electrical connection necessary between emitter and receiver**
- **2 safety static outputs with short-circuit and cross-fault detection**
- Integrated dc to dc converter as per the IEC/EN 61496 Standard
- Resolutions available:
 $\varnothing 18$ mm / 0.7 in for finger detection
 $\varnothing 30$ mm / 1.2 in for hand detection
- Protection height up to 1470 mm / 58 in
- Scanning range up to 3,5 m / 11.48 ft
- Electrical connection: M12 (8 pin) connectors
- Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
- Optional interface control module for more switching capabilities and additional features

TYPICAL APPLICATIONS

- Presses and punches
- Woodworking machines
- Electronic assembly
- Textile machines
- Pressing, moulding and thermoforming machines



The Honeywell FF-SG is a self-contained light curtain that does not require a separate control unit for operation. As soon as an object is detected inside the protection field, the FF-SG opens its two safety static outputs to generate an emergency stop condition that is used to remove dangerous machine motion when properly interfaced with the machine stopping circuitry. When connected to the FF-SRL60252 optional interface control module, the FF-SG provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

The FF-SG is designed in compliance with IEC/EN 61496-1 and IEC/EN 61496-2 standards and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the safest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required in Europe for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA, ANSI and CSA) for light curtains and control reliability and bears the cCSA_{us} listing mark, making it a product usable in all parts of the world.

The cross section of 42 mm² x 55 mm² / 1.65 in² x 2.16 in² makes installation possible in tight spaces, especially with the help of the included mounting hardware. Indicators provide information on the output status and failure diagnostics. The housing has a dovetail slot mounting system to adapt brackets anywhere along the housing. The optional FF-SRL60252 interface control module easily fit inside the machine control panel with its DIN rail mount housing.

The FF-SG does not need a galvanic insulated power supply since it includes its own means of galvanic insulation (dc/dc converter). Compliance with the installation requirements of the IEC/EN 61496-1 standard is therefore built in the design.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

Safety light curtain

Compact and cost-effective unit

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496-1 and IEC/EN 61496-2 European norms for Type 4 electrosensitive protective equipment
- Meets applicable parts of North American standards and regulations OSHA 1910.212 and 217; ANSI B11.1 series; ANSI RIA 15.06 and CSA
- **Self-contained unit. No electrical connection necessary between emitter and receiver**
- **2 safety static outputs with short-circuit and cross-fault detection**
- Resolutions available:
 $\varnothing 18$ mm / 0.7 in for finger detection
 $\varnothing 30$ mm / 1.2 in for hand detection
- Protection height up to 1758 mm / 69.2 in
- Scanning range up to 6 m / 19.7 ft
- Electrical connection: M12 (8 pin) connectors
- Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
- Optional interface control module for more switching capabilities and additional features

TYPICAL APPLICATIONS

- Presses and punches
- Woodworking machines
- Electronic assembly
- Textile machines
- Pressing, moulding and thermoforming machines

The Honeywell FF-SG is a self-contained light curtain that does not require a sepa-



(picture not contractual)

rate control unit for operation. As soon as an object is detected inside the protection field, the FF-SG opens its two safety static outputs to generate an emergency stop condition that is used to remove dangerous machine motion when properly interfaced with the machine stopping circuitry. When connected to the FF-SRL60252 optional interface control module, the FF-SG provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

The FF-SG is designed in compliance with IEC/EN 61496-1 and IEC/EN 61496-2 standards and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the safest level for safety products.

The product received an EC type test certificate from the French INRS notified body, required in Europe for safety equipment as per the 98/37/EC Machinery Directive. It meets the applicable parts of North American standards and regulations (OSHA, ANSI and CSA) for light curtains and control reliability and bears the cCSA_{US} listing mark, making it a product usable in all parts of the world.

The cross section of 42 mm² x 55 mm² / 1.65 in² x 2.16 in² makes installation possible in tight spaces, especially with the help of the included mounting hardware. Indicators provide information on the output status and failure diagnostics. The housing has a dovetail slot mounting system to adapt brackets anywhere along the housing. The optional FF-SRL60252 interface control module easily fit inside the machine control panel with its DIN rail mount housing.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

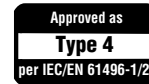
Failure to comply with these instructions could result in death or serious injury.

Compact and cost-effective unit FF-SG

- Type 4 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- Control reliable per OSHA 29 CFR 1910.217 definition
- 2 safety static outputs with short-circuit and cross-fault detection



INRS




Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SG18	FF-SG30
Resolutions		ø 18 mm / 0.7 in	ø 30 mm / 1.2 in
Protection heights		See Table 1	
Nominal scanning ranges		0,3 m to 6 m / 1 ft to 19.67 ft	
Supply voltage		24 Vdc (±15 %)	
Power consumption		Emitter: 5 W max. • Receiver: 5 W max. (see Table 1)	
Outputs		2 safety static outputs (switching capacity: 0,3 A / 24 Vdc)	
Maximum cable length		100 m / 328 ft	
Response time		15 ms to 21,5 ms (see Table 1)	
LED status indicators		Emitter: failure alarm, power Receiver: outputs status, beam status	
Cross sectional area		W 42 mm ² x D 55 mm ² / W 1.65 in ² x D 2.16 in ² (see Table 1 for complete housing dimensions)	
Emission		Infrared modulated light source (925 nm)	
Effective aperture angle		±2°, ±25 % (in compliance with the IEC/EN 61496-2)	
Light immunity		Sun: 20 000 lux • Lamp: 15 000 lux	
Electrical noise immunity		IEC 61000-4-4: level III / IEC 61000-4-3: level III	
Ambient temperature		Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F	
Vibrations		IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min. sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes	
Sealing		IP 65, NEMA 4, 13	
Material		Housing: aluminium alloy • Front plate: polymethyl methacrylate (PMMA) End caps: polycarbonate	
Electrical connection		M12 8 pole connectors	

Ordering information

Each listing consists of an emitter, a receiver, two pairs of brackets and a test rod.

FF-SG  AM2-L
 Model (see Table 1)
 Resolutions
 18: ø 18 mm / 0.7 in
 30: ø 30 mm / 1.2 in

- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height

Dimensions (mm / in)

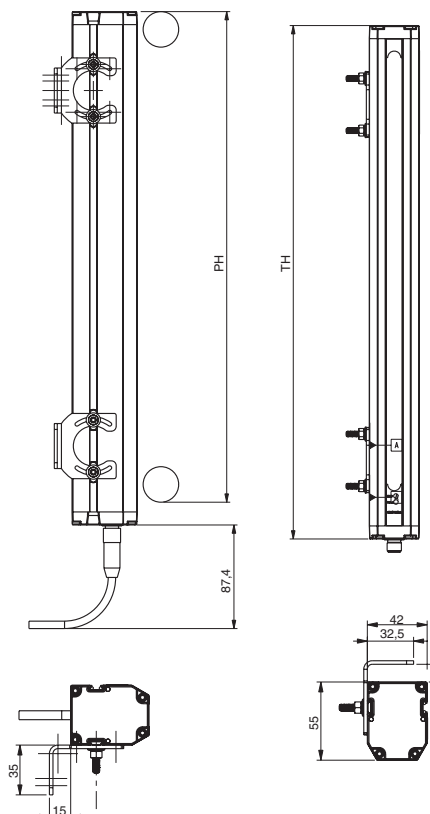
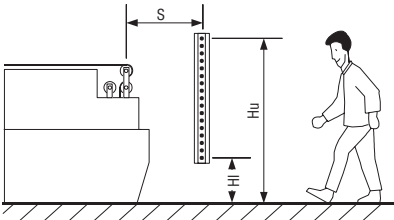
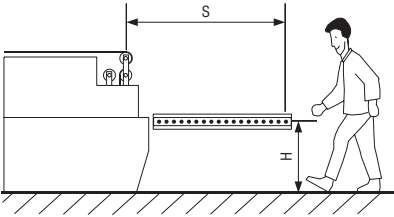
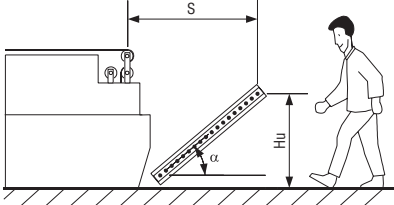


Table 1

Model	031	050	070	089	109	128	147
Protection height (mm)							
FF-SG18	306	498	690	NA	NA	NA	NA
FF-SG30	318	510	702	894	1086	1278	1470
Total height (mm)							
	338	530	722	914	1106	1298	1490
Response time (ms)							
FF-SG18	15	15	15	15,5	17,5	19,5	NA
FF-SG30	15	15	15	15,5	17,5	19,5	21,5

Safety distances

European EN 999 standard (in mm, 100 mm = 3.9 in)	FF-SG18	FF-SG30
Normal approach 	$S \geq 2000 (t_1 + t_2) + 32,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 32,$ <p>with $S \geq 500$</p>	$S \geq 2000 (t_1 + t_2) + 128,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 128,$ <p>with $S \geq 500$</p>
Parallel approach 	$S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H),$ <p>with $H \leq 875$ or</p> $S \geq 1600 (t_1 + t_2) + 850,$ <p>with $875 \leq H \leq 1000$</p>	
Angled approach 	<p>If $\alpha \geq 30^\circ$, then use one of the formula given for a normal approach.</p> <p>If $\alpha \leq 30^\circ$, then use one of the formula given for a parallel approach, with $H_u \leq 1000$.</p>	

Where:

S : Minimum safety distance (mm, 100 mm = 3.9 in)

t_1 : Light curtain response time (s)

t_2 : Machine stopping time (s)

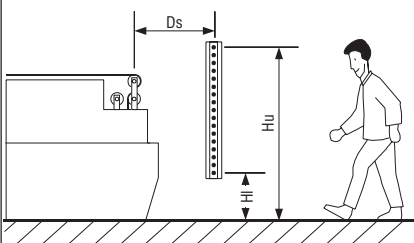
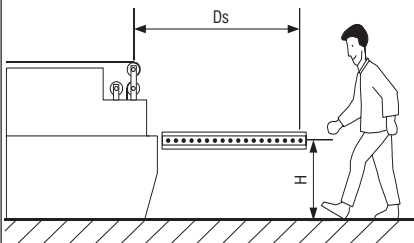
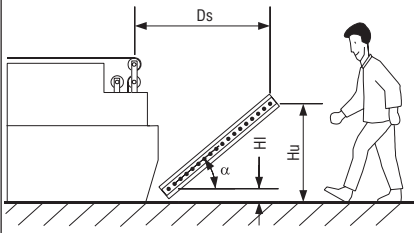
H : Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)

H_u : Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)

H_l : Height of the lowest beam above the reference floor (in mm, 100 mm = 3.9 in)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard (if existing or available) for the considered machine.

Safety distances per USA OSHA/ANSI requirements (in inches, 1 in = 25,4 mm)

$Ds = K \times (Ts + TC + Tr) + Dpf$	FF-SG18: 0.7 in resolution (min. object sensitivity)	FF-SG30: 1.2 in resolution (min. object sensitivity).
Normal approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 1.48 \text{ in}$	$Ds = 63 \times (Ts + Tc + Tr) + 3.08 \text{ in}$
Parallel approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 48$	
Angled approach		
	If $\alpha \geq 30^\circ$ then use a normal approach formula. If $\alpha \leq 30^\circ$ then use a parallel approach formula.	

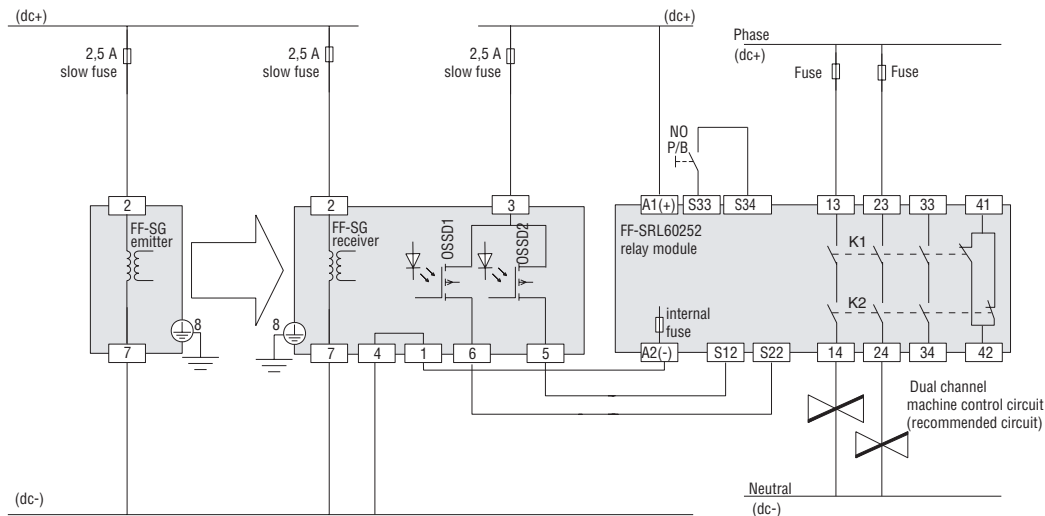
Where

- Ds:* Minimum safety distance
- K:* Approach speed (called “hand speed”) = 63 in / s
- Ts:* Worst case stopping time of the machine (s)
- Tc:* Worst case response of the machine’s control (s)
- Tr:* Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)
- Dpf:* Depth penetration factor (in)
- H:* Height of the detection plane above the reference floor (in)
- Hu:* Height of the uppermost beam above the reference floor (in)
- Hl:* Height of the lowest beam above the reference floor (in). For Normal approach, assumption is that Hl is not greater than 12 in unless the application prevents access even with Hl at a distance greater than 12 in)

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19, B11.20 and R15.06).

Wiring diagram (using the FF-SRL60252 safety control module)

The FF-SRL60252 interface control module is set in the Manual restart mode without FSD monitoring:



OSSD1 and OSSD2: Output Signal Switching Devices (light curtain safety contacts)

N.O. P/B: normally open contact of a push-button

NOTICE

Improper use of the FF-SG light curtain

The cross-monitoring of the FF-SG static outputs is based upon a self-checking principle which guarantees the detection of an output short-circuit and the detection of a short-circuit between the outputs (cross-fault detection). The FF-SRL60252 interface control module is designed to be interfaced with Honeywell safety static outputs devices.

Compatibility of the FF-SG with any other emergency stop safety control module is not guaranteed.

Accessories

Safety control modules



FF-SRL60252

Dual channel relay module for safety light curtains with static safety outputs

(to be ordered separately as an option)

- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22,5 mm / 0.89 in width



FF-SRM200P2

Muting module

(to be ordered separately as an option)

- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in



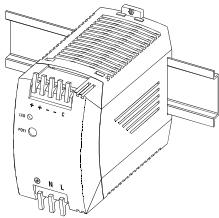
FF-SRL59022

Multi-safety device control module with Presence Sensing Device Initiation (PSDI)

(to be ordered separately as an option)

- accept up to three safety devices working in a guard-only mode or a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- category 4 per EN 954-1
- manual start mode and FSD monitoring
- cross-fault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply



FF-SXZPWR050

ac to dc power supply

Input voltage: 85 to 264 Vac

Output voltage: 24 to 28 Vdc / 2,1 A to 1,8 A

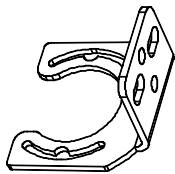
Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in

Mounting: DIN rail

Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178

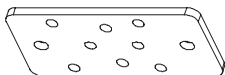
(to be ordered separately as an option).

Mounting bracket kit



FF-SXZ634178
Right angle bracket kit (delivered with the FF-SG)
includes two right angle brackets with four sets of M5 bolts, nuts and washers.

Anti-vibration kit

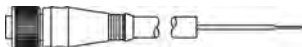


FF-SYZAD
Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the FF-SYZ634178 brackets delivered with the FF-SG package.

NOTICE
PROTECTION AGAINST HIGH VIBRATION

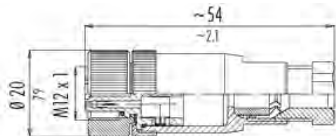
In case of high vibrations, order:
- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm / 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm / 39.4 in.

M12 single-ended cordsets, female, 8-pin



Catalogue listing	Description
FF-SXZCAM128U02-S	2 m length, straight
FF-SXZCAM128U05-S	5 m length, straight
FF-SXZCAM128U05-90S	5 m length, right angle
FF-SXZCAM128U10-S	10 m length, straight
FF-SXZCAM128U10-90S	10 m length, right angle

M12 screw connector, female, straight



FF-SXZCOM128
8 pin

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items if finds defective. The foregoing is the Buyer's sole remedy and **is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application personally, through our literature and the Honeywell Website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and service

Honeywell serves its customers through a world-wide network of sales offices and distributors. For application assistance, current specifications, pricing or the name of the nearest distributor, contact a nearby sales office or call:

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Argentina	54 11 4383 7012
Australia	613 9420 5555
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Denmark	45 20 60 75 05
Finland	358 9 3480 101
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Germany	49 69 80 64 559
India	91 22 641 0897
Japan	81 3 67 6730 7208
Korea	822 799 6114 5
Malaysia	037 958 4988
Mexico	52 5 259 19 66
Netherlands	31 20 5656 911
New Zealand	64 9 623 5050
Poland	48 22 606 09 00
Romania	40 1 211 0076
Singapore	656 355 2828
Slovak Republic	421 7 5824 7403
South Africa (Republic of)	27 11 805 1201
South Korea	82 2 799 6167
Sweden	46 8 775 55 00
Switzerland	41 1 855 24 40
United Kingdom	44 1698 481 000
United States	1 800 537 6945
Thailand	662 693 3099

Internet

<http://www.honeywell.com/sensing/>
info.sc@honeywell.com

Automation and Control Solutions

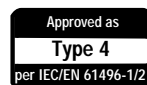
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Honeywell

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Compact and cost-effective unit FF-SG

- Type 4 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- Control reliable per OSHA 29 CFR 1910.217 definition
- 2 safety static outputs with short-circuit and cross-fault detection



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SG18	FF-SG30
Resolutions		ø 18 mm / 0.7 in	ø 30 mm / 1.2 in
Protection heights		See Table 2	
Nominal scanning ranges		0,3 m to 3,5 m / 1 ft to 11.48 ft	
Supply voltage		24 Vdc (±15 %)	
Power consumption		Emitter: 4 W max. • Receiver: 3 W max. (see Table 2)	
Outputs		2 safety static outputs (switching capacity: 0,3 A / 24 Vdc)	
Response time		15 ms	15 ms to 21,5 ms (see Table 2)
LED status indicators		Emitter: failure alarm, power Receiver: outputs status	
Cross sectional area		W 42 mm ² x D 55 mm ² / W 1.65 in ² x D 2.16 in ² (see Tables 1 and 2 for complete housing dimensions)	
Emission		Infrared modulated light source (925 nm)	
Effective aperture angle		±2°, ±25 % (in compliance with the IEC/EN 61496-2)	
Light immunity		Sun: 20 000 lux • Lamp: 15 000 lux	
Electrical noise immunity		IEC 61000-4-4: level III / IEC 61000-4-3: level III	
Ambient temperature		Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F	
Vibrations		IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min.sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes	
Sealing		IP 65, NEMA 4, 13	
Material		Housing: aluminium alloy • Front plate: polymethyl methacrylate (PMMA) End caps: polycarbonate	
Electrical connection		M12 8 pole connectors	

Ordering information

Each listing consists of an emitter, a receiver, 2 pairs of mounting pins, 4 M5 dovetail shape bolts, 4 M5 nuts and 4 rip-lock washers and a test rod.

FF-SG AM2
Model (see Table 2)
Resolutions
18: ø 18 mm / 0.7 in
30: ø 30 mm / 1.2 in

- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height

Dimensions (mm / in)

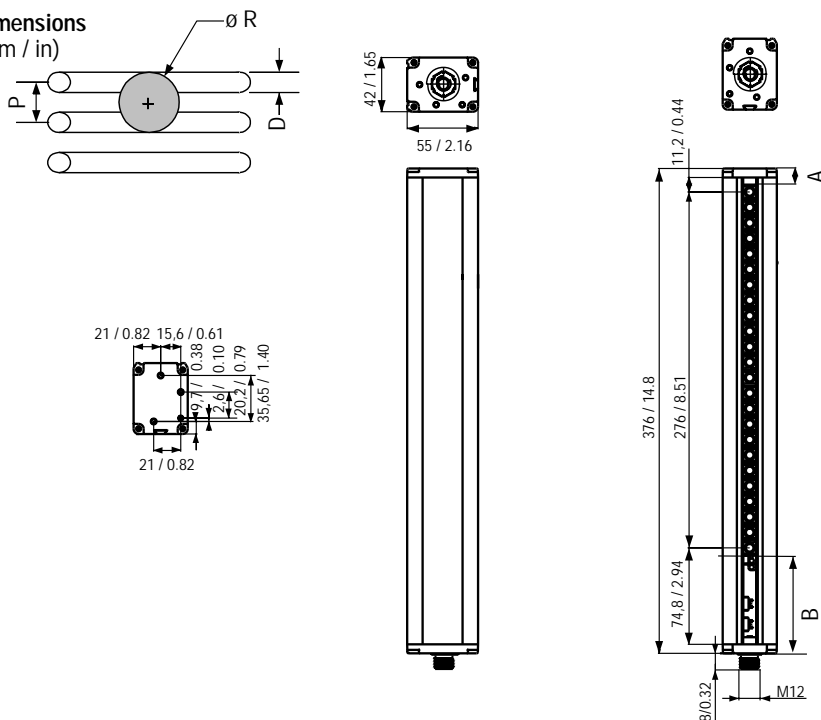


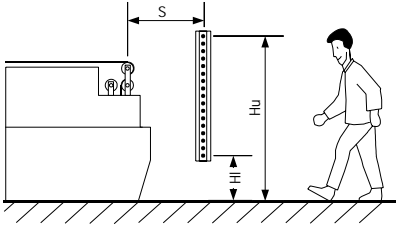
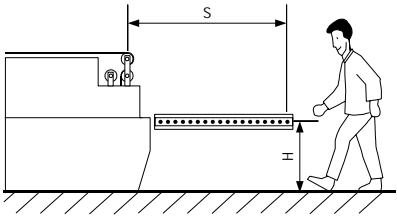
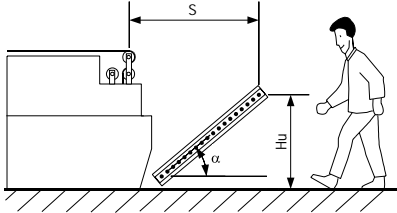
Table 1 (mm / in)

	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SG18	ø 18 / 0.7	12 / 0.47	6 / 0.23	15,2 / 0.60	78,8 / 3.10
FF-SG30	ø 30 / 1.2	24 / 0.94	6 / 0.23	27,2 / 1.07	78,8 / 3.10

Table 2

Model	031		050		070		089		109		128		147	
Protection height (mm / in) (1)														
FF-SG18	306 / 12.05		498 / 19.62		690 / 27.18		-		-		-		-	
FF-SG30	318 / 12.52		510 / 20.09		702 / 27.65		894 / 35.22		1086 / 42.78		1278 / 50.35		1470 / 57.91	
Sensing field height (mm / in) (2)														
FF-SG18	282 / 11.11		474 / 18.6		666 / 26.24		-		-		-		-	
FF-SG30	270 / 10.63		462 / 18.2		654 / 25.76		846 / 33.33		1038 / 40.89		1230 / 48.46		1422 / 56.02	
Total height (mm / in) (3)														
FF-SG18	376 / 14.8		568 / 22.36		760 / 29.92		-		-		-		-	
FF-SG30	376 / 14.8		568 / 22.36		760 / 29.92		952 / 37.48		1144 / 45.03		1336 / 52.6		1528 / 60.15	
Response time (ms)														
FF-SG18	15		15		15		-		-		-		-	
FF-SG30	15		15		15		15,5		17,5		19,5		21,5	
	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.
Weight per device (kg / lbs)	1,1/2.4	1,2/2.6	1,5/3.3	1,6/3.5	1,8/3.9	1,9/4.2	2,2/4.8	2,3/5	2,5/5.5	2,6/5.7	2,9/6.3	3/6.6	3,2/7	3,3/7.2
Power consumption (W) FF-SG18	4	3	4	3	4	3	-	-	-	-	-	-	-	-
(Emitter/receiver) FF-SG30	4	3	4	3	4	3	4	3	4	3	4	3	4	3

Safety distances

European EN 999 standard (in mm, 100 mm = 3.9 in)	FF-SG18	FF-SG30
Normal approach 	$S \geq 2000 (t_1 + t_2) + 32,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 32,$ <p>with $S \geq 500$</p>	$S \geq 2000 (t_1 + t_2) + 128,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 128,$ <p>with $S \geq 500$</p>
Parallel approach 	$S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H),$ <p>with $H \leq 875$ or</p> $S \geq 1600 (t_1 + t_2) + 850,$ <p>with $875 \leq H \leq 1000$</p>	
Angled approach 	<p>If $\alpha \geq 30^\circ$, then use one of the formula given for a normal approach.</p> <p>If $\alpha \leq 30^\circ$, then use one of the formula given for a parallel approach, with $H_u \leq 1000$.</p>	

Where:

S: Minimum safety distance (mm, 100 mm = 3.9 in)

t1: Light curtain response time (s)

t2: Machine stopping time (s)

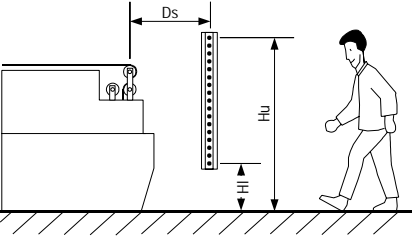
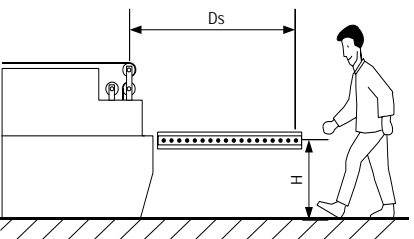
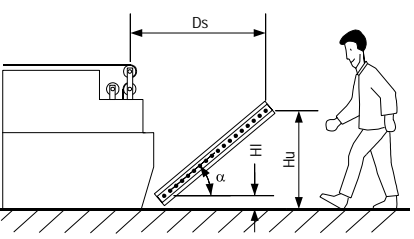
H: Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)

Hu: Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)

Hl: Height of the lowest beam above the reference floor (in mm, 100 mm = 3.9 in)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard (if existing or available) for the considered machine.

Safety distances per USA OSHA/ANSI requirements (in inches, 1 in = 25,4 mm)

$Ds = K \times (Ts + Tc + Tr) + Dpf$	FF-SG18: 0.7 in resolution (min. object sensitivity)	FF-SG30: 1.2 in resolution (min. object sensitivity).
Normal approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 1.48 \text{ in}$	$Ds = 63 \times (Ts + Tc + Tr) + 3.08 \text{ in}$ <p>Note: If Hu is less than 48", then $Dpf = 48"$ (reach over).</p>
Parallel approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 48$	
Angled approach		
	<p>If $\alpha \geq 30^\circ$ then use a normal approach formula.</p> <p>If $\alpha \leq 30^\circ$ then use a parallel approach formula.</p>	

Where

Ds : Minimum safety distance

K : Approach speed (called "hand speed") = 63 in / s

Ts : Worst case stopping time of the machine (s)

Tc : Worst case response of the machine's control (s)

Tr : Response time of the safety devices (light curtain plus its interface - meaning the response time including the mechanical relay outputs in seconds)

Dpf : Depth penetration factor (in)

H : Height of the detection plane above the reference floor (in)

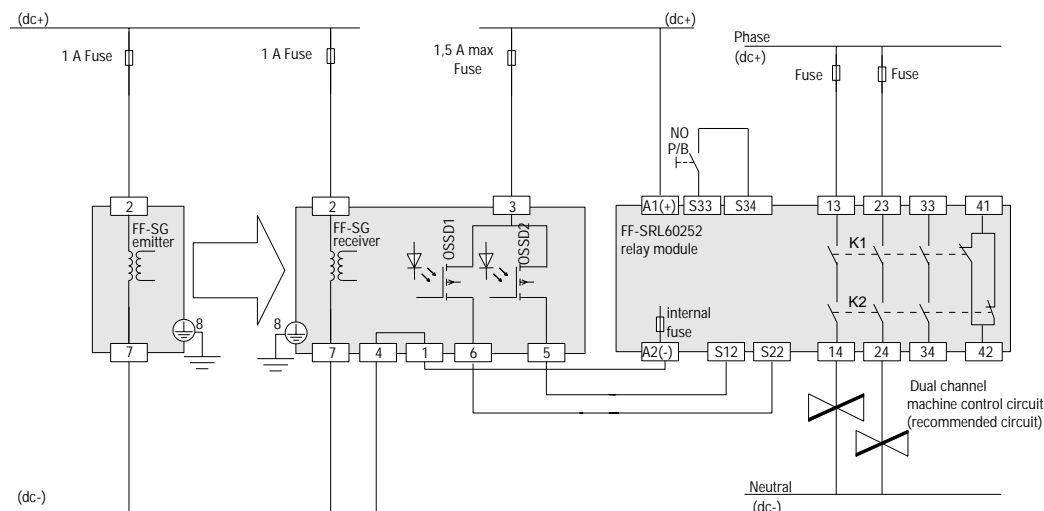
Hu : Height of the uppermost beam above the reference floor (in)

Hl : Height of the lowest beam above the reference floor (in). For Normal approach, assumption is that Hl is not greater than 12 in unless the application prevents access even with Hl at a distance greater than 12 in)

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19, B11.20 and R15.06).

Wiring diagram (using the FF-SRL60252 safety control module)

The FF-SRL60252 interface control module is set in the Manual restart mode without FSD monitoring:



OSSD1 and OSSD2: Output Signal Switching Devices (light curtain safety contacts)

N.O. P/B: normally open contact of a push-button

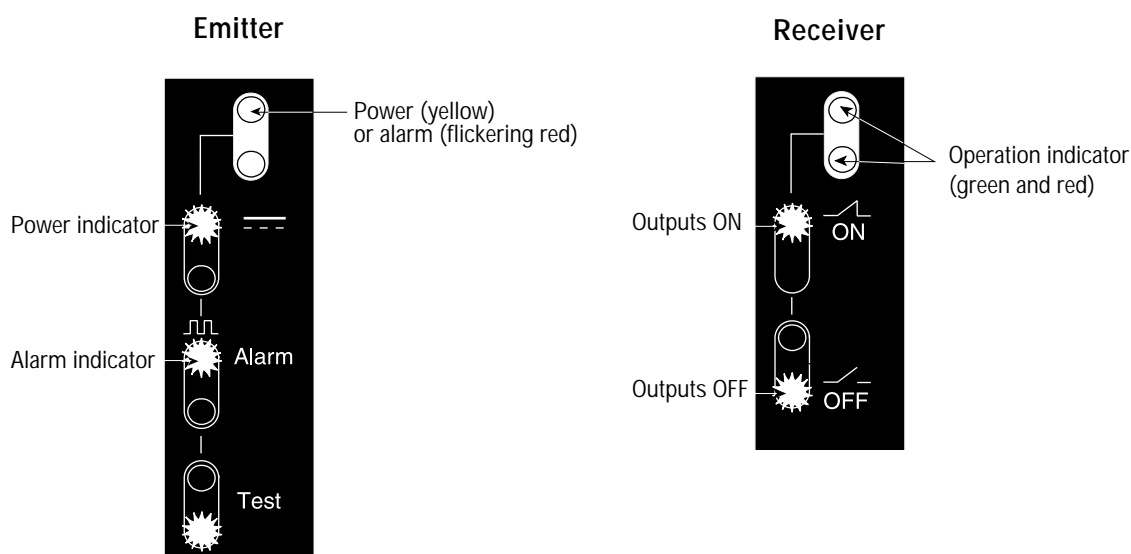
NOTICE

Improper use of the FF-SG light curtain

The cross-monitoring of the FF-SG static outputs is based upon a self-checking principle which guarantees the detection of an output short-circuit and the detection of a short-circuit between the outputs (cross-fault detection). The FF-SRL60252 interface control module is designed to be interfaced with Honeywell safety static outputs devices.

Compatibility of the FF-SG with any other emergency stop safety control module is not guaranteed.

LED status indicators



Accessories

Safety control modules



FF-SRL60252

Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option)

- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22,5 mm / 0.89 in width



FF-SRM200P2

Muting module

(to be ordered separately as an option)

- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in



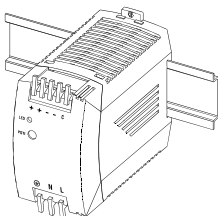
FF-SRL59022

Multi-safety device control module with Presence Sensing Device Initiation (PSDI)

(to be ordered separately as an option)

- accept up to three safety devices working in a guard-only mode or a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- category 4 per EN 954-1
- manual start mode and FSD monitoring
- cross-fault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply



FF-SXZPWR050

ac to dc power supply

Input voltage: 85 to 264 Vac

Output voltage: 24 to 28 Vdc / 2,1 A to 1,8 A

Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in

Mounting: DIN rail

Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178

(to be ordered separately as an option).

Deflection mirror



FF-SYZMIR□□□
To be ordered separately as an option

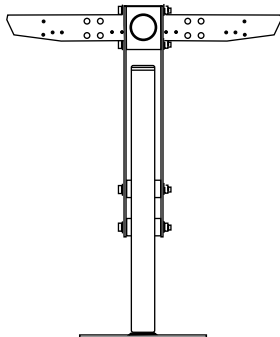
Features:	
Deflection mirror with 10 % scanning range reduction (FF-SYZMIR0□□)	
Deflection mirror with 25 % scanning range reduction (FF-SYZMIR1□□)	
Quick mounting and easy mirror adjustment	
Mounting brackets included (top / bottom mounting)	
Adjustment of mirror in azimuth direction of ±45°	
Housing compatible with FF-SBSMIR Series	
Material	Aluminium alloy housing
Finish	Gold colour anodisation
Ordering guide:	
FF-SYZMIR□04	FF-SG□□031
FF-SYZMIR□06	FF-SG□□050
FF-SYZMIR□08	FF-SG□□070
FF-SYZMIR□10	FF-SG□□089
FF-SYZMIR□12	FF-SG□□109
FF-SYZMIR□14	FF-SG□□128 and FF-SG□□147

Floorstanding post



FF-SYZPF
To be ordered separately as an option
Floorstanding post for the installation of the following FF-SG light curtains:
FF-SG□□031 to FF-SG□□109.

Adjustable floorstanding post



FF-SYZPA
To be ordered separately as an option

- horizontal, diagonal and vertical adjustment of light curtains possible
- quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- fine adjustment of light curtains in azimuth direction of ±11° ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- base plate can be mounted independently
- finish: RAL 1021 yellow paint.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Honeywell

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France

Honeywell

11 West Spring Street
Freeport, Illinois 61032
USA

Type 4 miniature light curtain, 30 mm / 1.18 in resolution

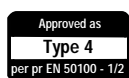
Designed for the protection of operators work stations

FEATURES

- Meets applicable parts of US OSHA 29 CFR 1910.217, 1910.212 and ANSI B11.1, B11.2, B11.19 1990 and RIA 15.06 regulations for Control Reliability
- EC type examination certificate granted by the TÜV
- Designed in compliance with the IEC/EN 61496 - parts 1 & 2 for Type 4 Electrosensitive Protective Equipment (permanent self-checking equipment)
- Through-scan small profile sensing unit with separate control unit
- Minimum object detection capability: $\varnothing 30$ mm / 1.18 in suitable for hands detection
- Scanning range: from 0,2 m up to 3,5 m / 0.65 ft to 11.48 ft
- Protection heights: from 236 mm up to 1804 mm / 9.29 in up to 71.07 in
- Global response time: less than 50 ms
- Power supply voltage: 24 Vac/dc
- Outputs: 2 guided contacts safety relays
- Test input
- Automatic restart or start & restart interlock
- Sealing: IP 65 (sensing units and control unit)
- Immunity to ambient light: 50 000 Lux max.

TYPICAL APPLICATIONS

- Paper-cutting machines
- Pick-and-place robots
- Light electronic assembling machines
- Good lifts
- Small carousels



The FF-LS equipment is an infrared multibeam device designed to protect operators working on dangerous machines. The FF-LS equipment features are ideal for the protection of work stations on small machines such as paper-cutting machines or pick-and-place robots.

The permanent self-checking electronic process is based upon a microprocessor technology and meets the requirement of the IEC/EN 61496- parts 1 & 2 European standards for Type 4 electrosensitive protective equipment.

It has been examined by the TÜV who granted the EC type examination certificate.

The equipment consist of a pair of sensing units connected to a separate control unit via a RS-485 connection.

Each sensing unit is made of a row of emitting circuits alternating with receiving circuits. These circuits are housed in an extremely small aluminium extruded profile: the cross section is only 12 mm x 19,7 mm / 0.47 in x 0.77 in.

The two sensors are matched to each other by individual coding to reduce risk of cross talk with other light curtains and to improve immunity to welding splashes.

The control unit supplies the sensing units, controls the correct operation of the scanning circuits and transmits the resulting commands to the machine control circuitry through its two relay outputs.

The equipment can operate according to two different mode: the automatic mode, the start & restart interlock mode.

In addition, the control unit is featured with a test input to trigger the output relays switching and thus check the correct operation of the final switching devices whenever needed. In case of failure, the control unit provides optical and acoustic signals to ease failure diagnostic.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

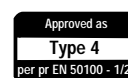
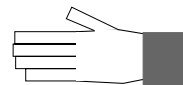
Failure to comply with these instructions could result in death or serious injury.

FF-LS30

FF-LS30

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- $\varnothing 30$ mm / 1.18 in object detection capability
- Reduced dimensions (12 mm x 19,7 mm / 0.47 in x 0.77 in cross section)

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs



Specifications	Supply voltage	22 to 30 Vdc or 18 to 25 Vac
	Current consumption	< 300mA
	Output switching capacity	Main out 1 & out 2: 4 A/250 Vac/Lamp: 4 A/42 V
	Material	Sensor: Aluminium profile / Control unit: Polycarbonate
	Housing Size	Sensors: 12 mm x 19,7 mm x PH mm / 0.47 in x 0.77 in x PH in Control unit: 60 mm x 160 mm x 240 mm / 2.36 in x 6.30 in x 9.45 in
	Emission	Modulated infrared light (880 nm)
	Resolution	$\varnothing 30$ mm / 1.18 in
	Alignment tolerance	According to IEC/EN 61496 - 2 standard
	Operating temperature	0 °C to 55° C / 32 °F to 131° F
	Sealing	Sensors and control unit: IP 65
	Electromagnetic immunity	According to IEC 801-4: level IV/According to IEC 801-3 level III
	Light immunity	50 000 Lux
	Status indicators	Lamps to be connected to outputs available on control units
	Range	0,2 m to 3,5 m / 0.65 ft to 11.48 ft
	Electrical wiring (delivered with the unit)	Sensors: RS-485 cable / Pre-wired connectors (10 m / 32.8 ft) Control unit: Screw terminal

Ordering information (1)

FF-LS□□28□□□2

Number of beams	Model	Protection height (PH) (mm / in)
08	0236	236 / 09.29
16	0460	460 / 18.12
24	0684	684 / 26.94
32	0908	908 / 35.77
40	1132	1132 / 44.60
48	1356	1356 / 53.42
56	1580	1580 / 62.25
64	1804	1804 / 71.07

Notes:

(1) Each reference corresponds to the delivery of a complete set: A/B sensors, control unit, 2 RS-485 cables (pre-wired 10 m / 32.8 ft), brackets, 8 cable glands and a $\varnothing 30$ mm / 1.18 in test rod.

(2) Power supply: The use of one of these supplies brings the galvanic isolation which is necessary for the system to be in compliance with IEC/EN 61496-1 standard.

FF-LSZUS0605 (230 Vac / 24 Vdc)

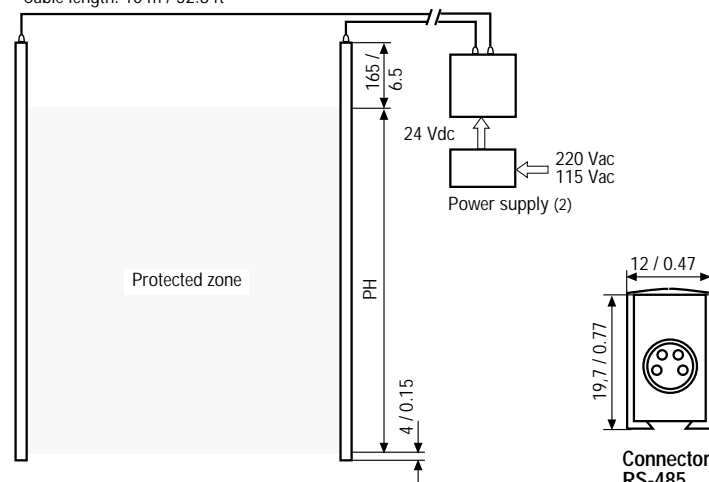
FF-LSZUS0606 (115 Vac / 24 Vdc)

These power supplies must be ordered separately.

(3) Control unit and sensors.

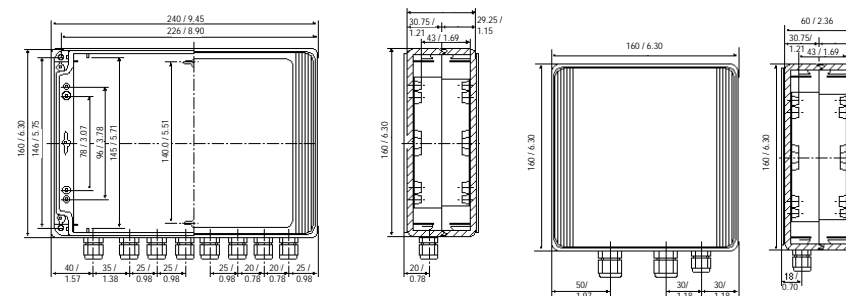
Sensors A and B have the same dimensions.

Cable length: 10 m / 32.8 ft



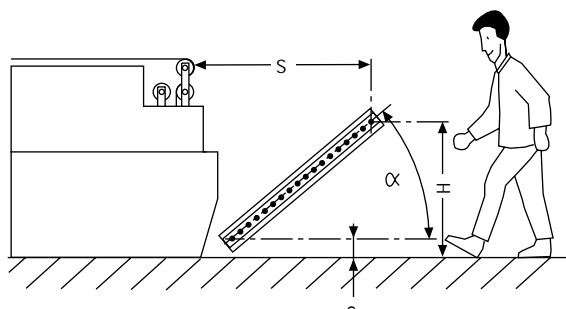
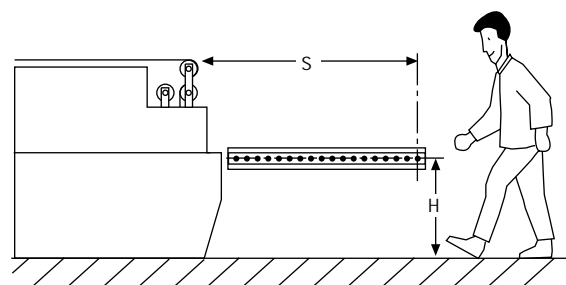
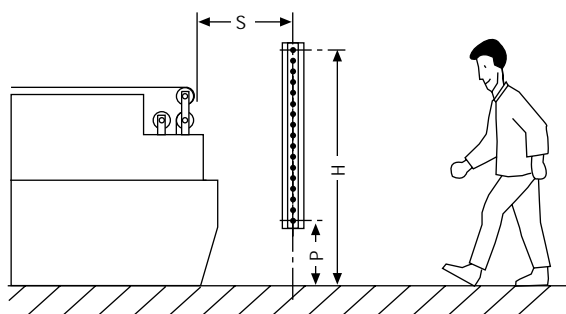
Control unit (4 mounting M4 holes)

Power supplies (2)



Nominal Protection Height	mm / in	PH	236 / 9.29	460 / 18.12	684 / 26.94	908 / 35.77	1132 / 44.60	1356 / 53.42	1580 / 62.25	1804 / 71.07
Number of beams			8	16	24	32	40	48	56	64
Response time		t1	< 50 ms	< 50 ms	< 50 ms	< 50 ms	< 50 ms	< 50 ms	< 50 ms	< 50 ms
Weight of the device (3)		kg / lbs	1,75 / 3.85	1,86 / 4.1	1,97 / 4.34	2,08 / 4.58	2,19 / 4.82	2,30 / 5.07	2,41 / 5.31	2,52 / 5.55

Safety distance



- S: Minimum safety distance (mm / in)
 t1: Response time of the light curtain (s)
 t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts (s)
 H: Height of the detection zone above the floor (mm / in)

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is arrested. For the safety distance, the following formula applies:

• Normal approach

Europe (EN 999)

$$S \geq 2000 (t_1 + t_2) + 128 \text{ (mm)}, \text{ with } S \geq 100 \text{ mm} \\ \text{(or } S \geq 78.8 (t_1 + t_2) + 5 \text{ (in), with } S \geq 3.9 \text{ in)}$$

If the result of this calculation is greater or equal to 500 mm / 19.7 in, then use the following formula:

$$S \geq 1600 (t_1 + t_2 + 128 \text{ (mm)}), \text{ with } S \geq 500 \text{ mm} \\ \text{(or } S \geq 63 (t_1 + t_2) + 5 \text{ (in), with } S \geq 19.7 \text{ in)}$$

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

$$Ds \geq 63 (t_1 + t_2) + 3.08 \text{ (in)} \quad Ds = S$$

• Parallel approach

Europe (EN 999)

$$S \geq 1600 (t_1 + t_2) + (1200 - 0.5H) \text{ (mm)} \\ \text{where } (1200 - 0.4H) \geq 850 \text{ mm} \\ \text{(or } S \geq 63 (t_1 + t_2) + 47.3 - 0.4H \text{ (in)} \\ \text{where } (47.3 - 0.4) \geq 33.5 \text{ in)}$$

If H is greater than 300 mm / 11.82 in, the risk of access from below must be taken into account. For this barrier, the minimum height allowed is H min. = 0 mm and the maximum height allowed is H max. = 1 000 mm / 39.4 in.

• Angled approach

Europe (EN 999)

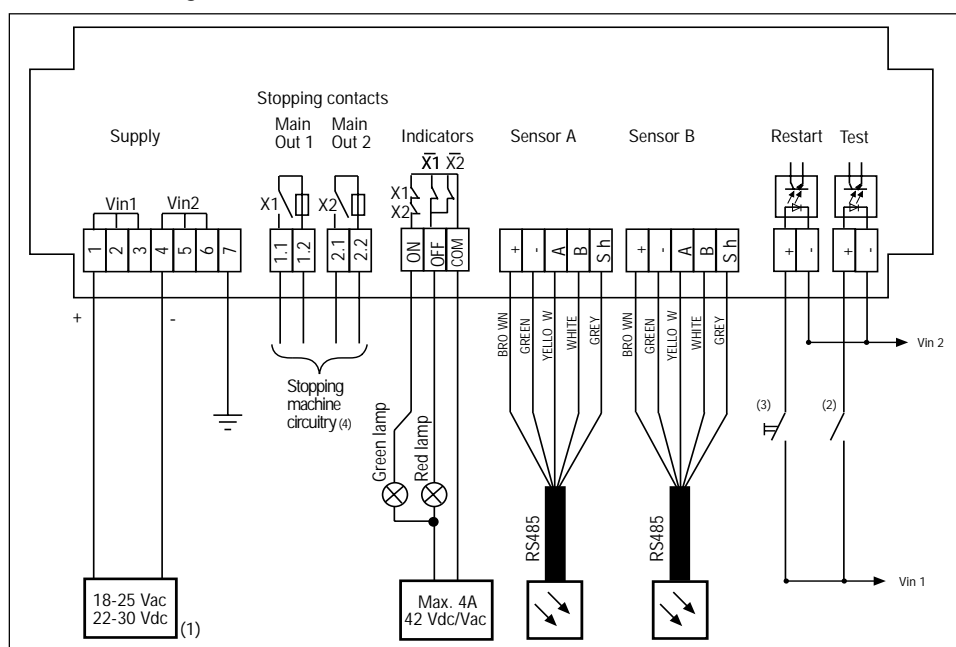
$$30^\circ < \alpha < 90^\circ$$

If the angle is greater than 30°, the approach should be considered as normal, and one of the above-mentioned formulas should be used.

$$0^\circ < \alpha \leq 30^\circ$$

If the angle is less than or equal to 30°, the approach should be considered as parallel and one of the above-mentioned formulas should be used. In this case the minimum height allowed is P min. = 0 mm and the max. height allowed is H = 1 000 mm / 39.4 in max. However, if P > 300 mm / 11.82 in, the risk of inadvertent access from below must be taken into account.

Connection diagram



(1) - Supply (to be ordered separately): The use of one of these supplies brings the galvanic isolation which is necessary to the system for a use conform to IEC/EN 61496 - 1 standard.

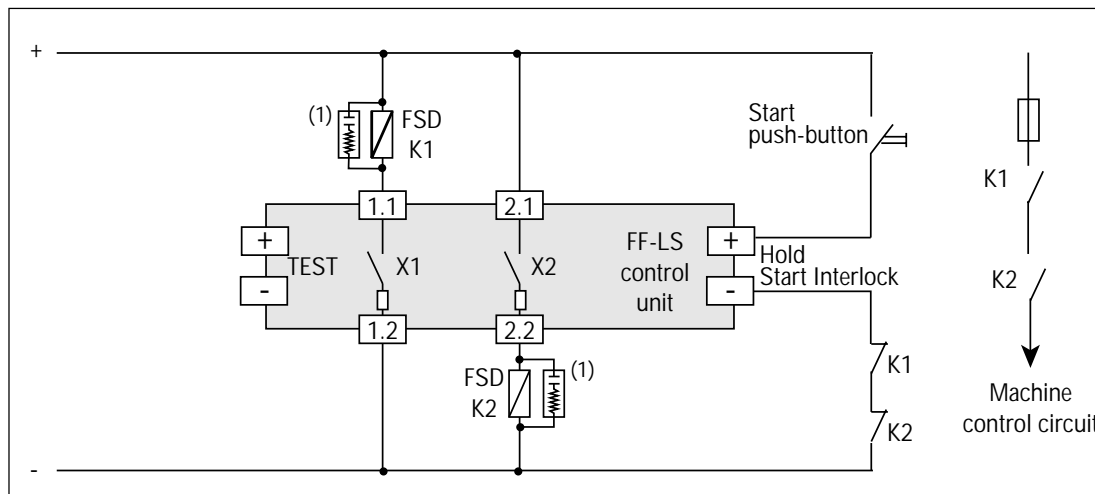
FF-LSZUS0605 (230 Vac / 24 Vdc),
 FF-LSZUS0606 (115 Vac / 24 Vdc)

(2) - Test duration: The contact must be closed during 100 ms as a minimum.

(3) - The push-button must remain closed during 200 ms at least. It takes 500 ms for the system to restart after releasing the push-button.

(4) - If additional contacts are needed or if the switching capacity must be increased, use the connection diagram given or an example.

Connection diagram example: Start/Restart interlock/Final Switching Device (FSD) monitoring
(please refer to EN 954 for electrical interface)

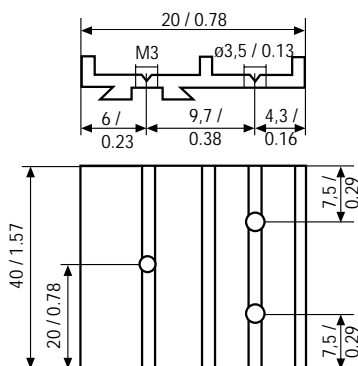


Accessories

FF-LSZKA0611: Connecting cable

One 10 m / 32.8 ft RS485 prewired cable for the connection of one sensing unit to the control unit.

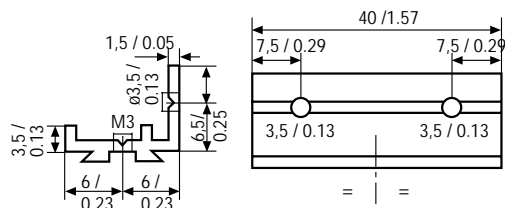
FF-LSZMS660



Straight bracket

Kit of 2 straight brackets for an installation parallel to the sliding rail.

FF-LSZMS690

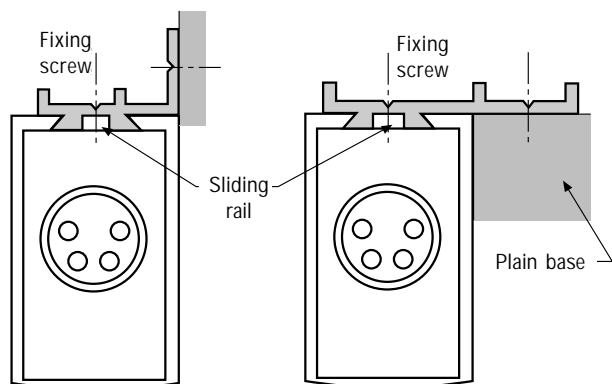


Right-angle bracket

Kit of 2 right-angle brackets for an installation perpendicular to the sliding rail.

Note: All FF-LS equipment is delivered with both types of brackets. The number of brackets available allows to fix one bracket every 500 mm / 19.7 in along the profile.

Examples



Example of installation

For a correct installation, brackets must be fixed on a plain base in order to avoid profile deformation.

Type 4 miniature light curtain, 14 mm/0.55 in resolution

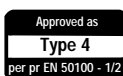
Designed for the protection of operators work stations

FEATURES

- Meets applicable parts of US OSHA 29CFR 1910.217, 1910.212 and ANSI B11.1, B11.2, B11.19 1990 and RIA 15.06 regulations for Control reliability
- EC type examination certificate granted by the TÜV
- Designed in compliance with the IEC/EN 61496 - parts 1 & 2 for Type 4 Electrosensitive Protective Equipment (permanent self-checking equipment)
- Through-scan small profile sensing units with separate control unit
- Minimum object detection capability: $\varnothing 14$ mm / 0.55 in suitable for fingers detection
- Scanning range from 0,2 m up to 3,5 m / 0.65 ft up to 11.48 ft.
- Protection heights: from 196 mm up to 744 mm / 7.72 in up to 29.31 in
- Global response time: less than 50 ms
- Power supply voltage: 24 Vac/dc
- Outputs: 2 guided contacts safety relays
- Test input
- Automatic restart or start & restart interlock
- Sealing: IP 65 (sensing units and control unit)
- Immunity to ambient light: 50 000 Lux max.

TYPICAL APPLICATIONS

- Paper-cutting machines
- Pick-and-place robots
- Light electronic assembling machines
- Textile machines
- Leather presses
- Matching centres



FF-LS14

The FF-LS14 equipment is an ultra-compact infrared multibeam device designed to protect operators working on dangerous machines. The FF-LS14 equipment features are ideal for the protection of work stations where space is critical such as paper-cutting machines or pick-and-place robots. Thanks to a small resolution, it will spring into action even if a finger gets too close: any intrusion will lead to the immediate stoppage of the moving part of the machine.

Each sensing unit is made up of a row of emitting circuits alternating with receiving circuits. These circuits are housed in an extremely small aluminium extruded profile: the cross section is only 23 mm x 35 mm / 0.90 in x 1.38 in, the smallest available on the market in its class. These ultra-compact dimensions, backed by in-line connectors, allow the FF-LS14 to be mounted on small machines or in other applications where light curtains were previously too large. Its small resolution - the smallest on the market - allows the closest installation to the dangerous area, thanks to no additional safety distance in the safety distance calculation formula (EN 999).

The permanent self-checking electronic process is based on a microprocessor technology and meets the requirements of the IEC/EN 61496 - parts 1 & 2 European standards for Type 4 electrosensitive protective equipment. It has been granted the EC type examination certificate by the TÜV.

The equipment consists of a pair of identical length sensing units, a separate control unit and a pair of RS-485 connection cables. It is supplied with mounting brackets, a test rod and cable glands for the terminal strip connections.

The two sensors are matched to each other by individual coding to reduce risk of cross talk with other light curtains and to improve immunity to welding splashes.

The control unit supplies the sensing units, controls the correct operation of the scanning circuits and transmits the resulting commands to the machine control circuitry through its two relay outputs.

The equipment can operate according to two different modes selected with an internal selector: the automatic mode or the start & restart interlock mode.

In addition, the control unit is featured with a test input to trigger the output relays switching and thus check the correct operation of the final switching devices whenever needed.

In case of failure, the control unit provides an acoustic signal and 6 different optical signals to ease failure diagnostic.

WARNING

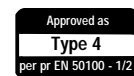
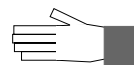
MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-LS14

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- $\varnothing 14$ mm / 0.55 in object detection capability
- Reduced dimensions (23 mm x 35 mm / 0.90 in x 1.38 in cross section)



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	22 to 30 Vdc or 18 to 25 Vac
	Current consumption	< 300 mA
	Output switching capacity	Main out 1 & out 2: 4 A/250 Vac / Lamp: 4 A/42 V
	Material	Sensors: Aluminium profile • Control unit: Polycarbonate
	Housing Size	Sensors: 23 mm x 35 mm x PH mm / 0.90 in x 1.38 in x PH in Control unit: 50 mm x 160 mm x 240 mm / 2.36 in x 6.30 in x 9.45 in
	Emission	Modulated infrared light (880 nm)
	Resolution	$\varnothing 14$ mm / 0.55 in
	Alignment tolerance	According to IEC/EN 61496 - 2 standard
	Operating temperature	0 °C to 55 °C / 32 °F to 131 °F
	Sealing	Sensors and control unit: IP 65
	Electromagnetic immunity	According to IEC 801-4: level IV/According to IEC 801-3 level III
	Light immunity	50,000 Lux
	Status indicators	Lamps to be connected to outputs available on control units
	Range	0,2 m to 3,5 m / 0.65 ft to 11.48 ft
	Electrical wiring (delivered with the unit)	Sensors: RS-485 cable/Pre-wired connectors (10 m / 32.8 ft) Control unit: Screw terminal

Ordering information (1)

FF-LS□□14□□□2

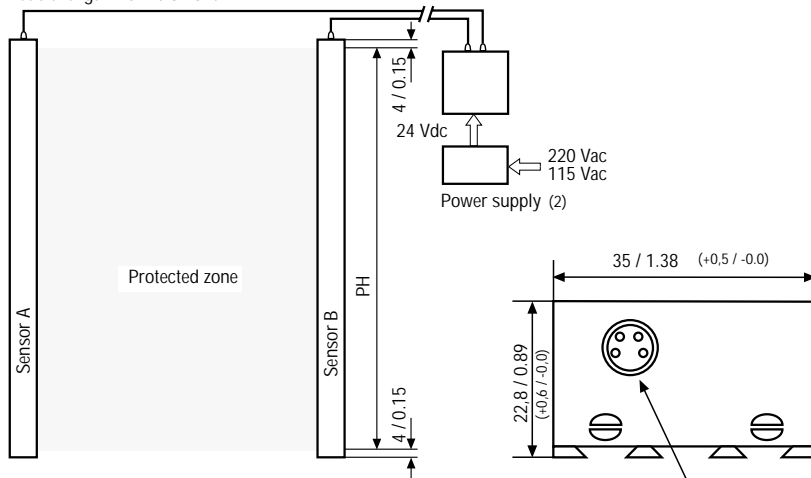
Number of beams	Model	Protection height (PH) (mm / in)
16	196	196 / 7.72
32	378	378 / 14.89
48	561	561 / 22.10
64	744	744 / 29.31

Notes:

- (1) Each reference corresponds to the delivery of a complete set: A/B sensors, control unit, 2 RS-485 cables (pre-wired 10 m / 32.8 in), brackets, 8 cable glands and a $\varnothing 14$ mm / 0.55 in test rod.
- (2) Power supply: The use of one of these supplies brings the galvanic isolation which is necessary for the system to be in compliance with IEC/EN 61496-1 standard.
FF-LSZUS0605 (230 Vac / 24 Vdc)
FF-LSZUS0606 (115 Vac / 24 Vdc)
These power supplies must be ordered separately.
- (3) Control unit and sensors.

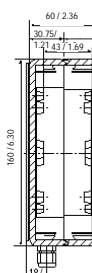
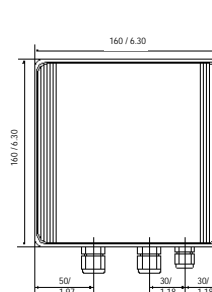
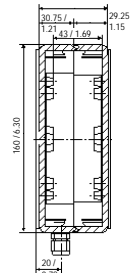
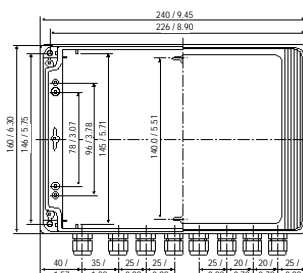
Sensors A and B have the same dimensions.

Cable length: 10 m / 32.8 ft



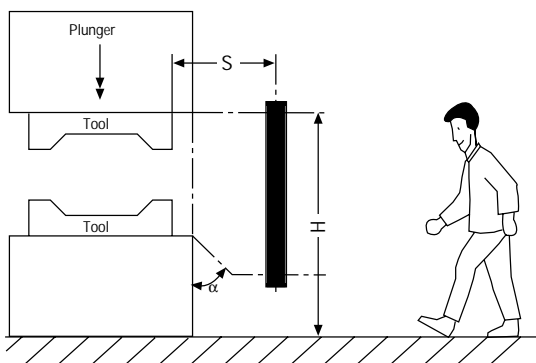
Control unit (4 mounting M4 holes)

Power supplies (2)



Nominal Protection Height	mm / in	PH	196 / 7.72	378 / 14.89	561 / 22.10	744 / 29.31
Number of beams			16	32	48	64
Response time		t1	< 50 ms	< 50 ms	< 50 ms	< 50 ms
Weight of the device (3)		kg / lbs	1,85 / 4.07	2,06 / 4.53	2,26 / 4.97	2,48 / 5.45

Safety distance



S: Minimum safety distance (mm / in)

t1: Response time of the light curtain (s)

t2: Stopping time of the equipment guarded by the light curtain, including all mechanical, electromechanical and electronic parts. (s)

H: Height of the detection zone above the floor (mm / in)

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is arrested. For the safety distance, the following formula applies:

• Normal Approach

Europe (EN 999)

$$S \geq 2000 (t1 + t2) \text{ (mm)}, \text{ with } S \geq 100 \text{ mm}$$

$$(\text{or } S \geq 78.8 (t1 + t2), \text{ with } S \geq 3.9 \text{ in})$$

If the result of this calculation is greater or equal to 500 mm / 19.7 in, then use the following formula:

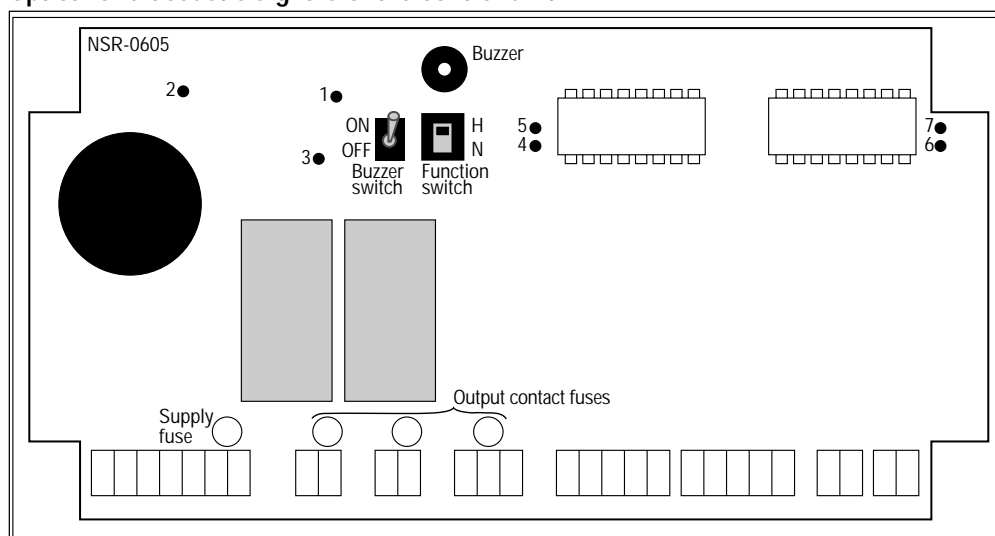
$$S \geq 1600 (t1 + t2) \text{ (mm)}, \text{ with } S \geq 500 \text{ mm}$$

$$(\text{or } S \geq 63 (t1 + t2) \text{ (in)}, \text{ with } S \geq 19.7 \text{ in})$$

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

$$Ds \geq (t1 + t2) + 0.9315 \text{ (in)} \quad Ds = S$$

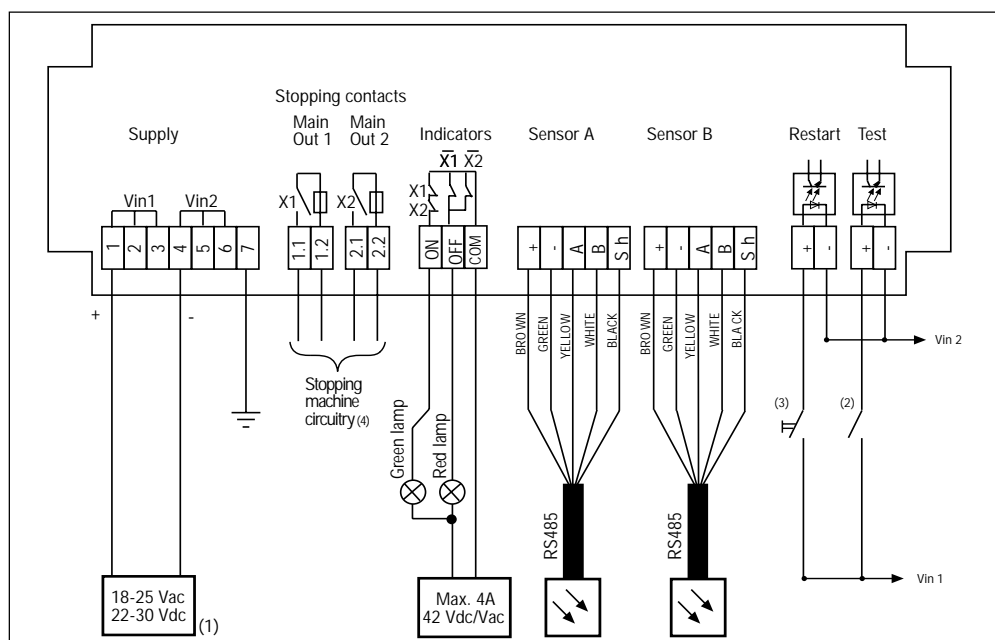
Optical and acoustic signals of the control unit



As shown in the figure here below, there are 7 LEDs on the control unit. The green LEDs 1, 2 and 3 are constantly alight when the supply voltage is present. The system condition is indicated by the yellow LEDs 4 and 6, the red LEDs 5 and 7 and an acoustic signal. This signal can be switched on or off by the buzzer switch on the PC-board.

FF-LS14

Connection diagram



(1) - Supply (to be ordered separately): The use of one of these supplies brings the galvanic isolation which is necessary to the system for a use conform to IEC/EN 61496 - 1 standard.

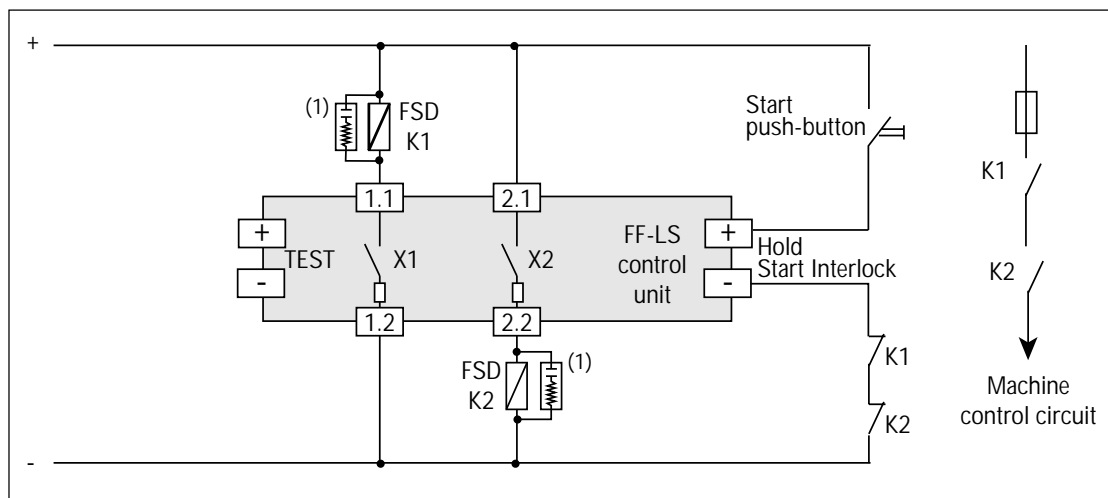
FF-LSZUS0605 (230 Vac / 24 Vdc),
FF-LSZUS0606 (115 Vac / 24 Vdc)

(2) - Test duration: The contact must be closed during 100 ms as a minimum.

(3) - The push-button must remain closed during 200 ms at least. It takes 500 ms for the system to restart after releasing the push-button.

(4) - If additional contacts are needed or if the switching capacity must be increased, use the connection diagram given or an example.

Connection diagram example: Start/Restart interlock/Final Switching Device (FSD) monitoring
(please refer to EN 954 for electrical interface)

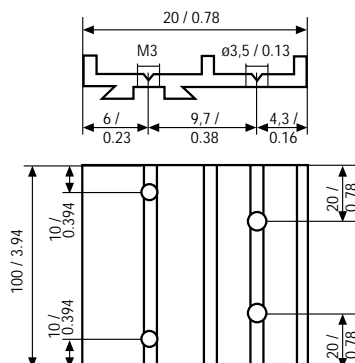


Accessories

FF-LSZKA0611: Connecting cable

One 10 m / 32.8 ft RS485 prewired cable for the connection of one sensing unit to the control unit.

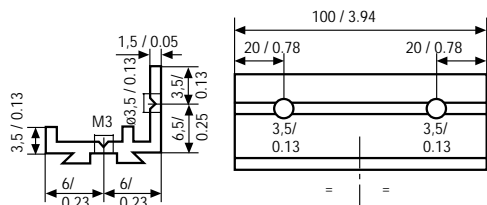
FF-LSZMS720



Straight bracket

Kit of 2 straight brackets for an installation parallel to the sliding rail.

FF-LSZMS730

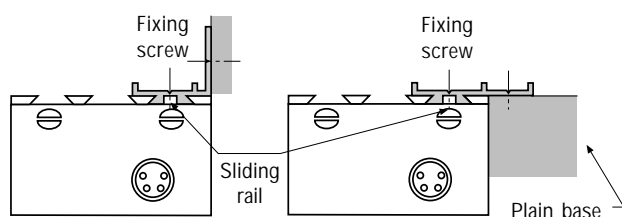


Right-angle bracket

Kit of 2 right-angle brackets for an installation perpendicular to the sliding rail.

Note: All FF-LS equipment is delivered with both types of brackets. The number of brackets available allows to fix one bracket every 500 mm / 19.7 in along the profile.

Examples



Example of Installation

For a correct installation, brackets must be fixed on a plain base in order to avoid profile deformation.

Type 2 light curtain with separate control unit

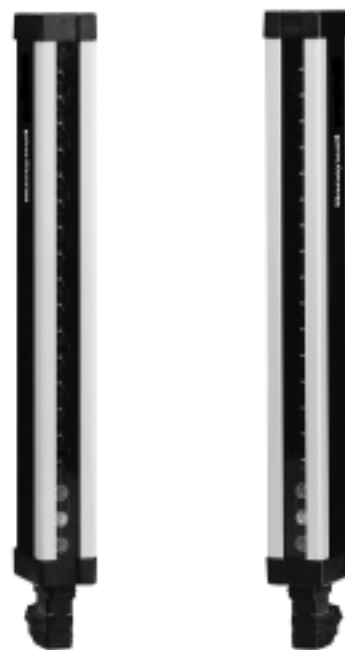
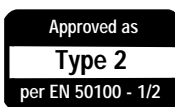
For the protection of operators in Industry

FEATURES

- Through scan detection system with separate control unit for ease of connection to the machine controls
- Safeguarding function based on a periodic performance test in compliance with Type 2 defined by the norm IEC/EN 61496 - parts 1 & 2 (Safety of machinery - Electrosensitive protective systems)
- Output: 2 guided contact safety relays
- Operating temperature: 0 to 55°C/32 to 131°F
- Resolution: $\varnothing 35, \varnothing 55, \varnothing 184$ mm/
 $\varnothing 1.38, \varnothing 2.16, \varnothing 7.24$ in
- Response time < 0.032 sec
- Supply voltage: 24 Vdc
- Protection height of 230 to 1600 mm/9.06 to 63.04 in

APPLICATIONS

- Packaging and wrapping devices
- Automated warehouses
- Protection of working zone instead of sensitive mats
- Machinery for merchandise handling such as palletizing and self-organisers
- Automated assembly lines



FF-SLC

The FF-SLC curtain is a no-touch safety device designed to protect operators of dangerous machinery. The safety light curtain detects any opaque object which interrupts the protected zone, the result being immediate arrest of the moving parts of the machine. The FF-SLC series is an excellent alternative to traditional mechanical barriers, providing many benefits such as unobstructed working area, improved productivity, simple installation and maintenance.

The FF-SLC curtain is a multibeam photoelectric barrier made up of an emitter, a receiver and a separate control unit. The three units are combined to provide a Type 2 fail-safe system, the safeguarding function of which is based upon a periodic performance test, as defined by the norm IEC/EN 61496 - parts 1 & 2. The performance test is initiated by the machine and the control unit is provided with a test input that guarantees a safe connection between emitter and receiver and the machinery control circuit. Via a specific feedback monitor, the control unit is preset to check the reaction times and the electrical connections of the external contactors used in the machine control circuitry.

The control unit is equipped with a self-diagnostic output giving information on the internal relays status.

WARNING

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Failure to comply with these instructions could result in death or serious injury.

If the feedback monitor is set, this output can also give some information on the external relays status.

Both the emitter and the receiver are built in a modular design. This design permits rapid and simple maintenance of barrier from 230 up to 1600 mm / 9.06 to 63.04 in detection heights. Three different object detection capabilities are available:

- FF-SLC35 versions with a 35 mm / 1.38 in object detection capability, ideal for detecting the hands of the operator.
- FF-SLC55 versions with a 55 mm / 2.16 in object detection capability for arms, legs or the whole body detection.
- FF-SLC18 versions with a 184 mm / 7.24 in object detection capability for the whole body detection.

With a scanning range of up to 12 m / 39.4 ft, the FF-SLC barrier can be used for most industrial applications.

Due to its specific mechanical concept combined with micro-electronics technology, the modular system minimises the size, making it possible to install the system in confined spaces.

The control unit is powered on 24 Vdc. The control unit box (IP 40) can be integrated into the machine control panel at a distance from the barrier of up to 100 m / 328 ft. This control unit is designed for rapid mounting on an Omega rail (EN 50 022). Moreover, the separate control unit makes first level maintenance easier for the customer: it is not necessary to dismantle the receiver to change relays for instance.

The emitter and receiver are optically synchronised, and can be easily mounted using the right-angle brackets which are provided with the system.

The $\pm 4^\circ$ opening angle of the beams complies with IEC/EN 61496 - 2, enabling simple alignment between emitter and receiver.

LED indicators displayed on the front panel of the emitter, receiver and control units, indicate the status of the system, aiding optical alignment and failure diagnoses.

Design and operation

IEC/EN 61496 requires that a Type 2 electrosensitive protective device maintains its protective function, if an emergency-stop signal is generated after detection of the failure of the protective device due to the cyclic performance test.

The control unit of the FF-SLC barrier is set with a test signal input which allows the machine to generate a periodic test (before each machine cycle for instance). At power up and after any interruption of the detection field, the test command is systematically activated when the safety system is reset. Only a positive response to the test enables the start function, energising the output relays. When a test gives a negative response the output relays de-energise. The control unit remains permanently de-energised until the fault condition is removed (it is not possible to reset the safety system). Reset is activated by external control conditions. Both emitter and receiver columns have integral self-check circuits to control the emission and reception of the infrared light scan. Any failure is immediately detected within the scanning time.

The control unit checks the correct function of the output circuitry of the receiver column, the reaction time of the two internal relays, the electrical connections of the test/start command and the connections with auxiliary external relays (checking the reaction time via the feedback monitor).

The self-diagnostic output provides information on failures of the control unit. When the system detects a drop in synchronisation between the two internal relays A and B, the self-diagnostic output switches off. If the feedback connection is set, a drop in synchronisation between the outer relays K1 and K2 can also be detected. After each switching of the self-diagnostic output, the following should be carried out:

- Switch off the power.
- Remove the failure cause.
- Switch on the power.
- Reset the system (test command).

Installation precautions

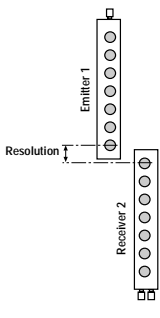
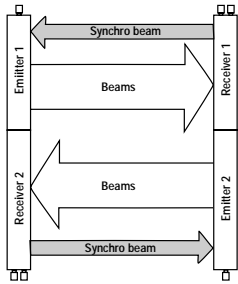
The FF-SLC curtain should be protected against moving equipment, oil, dust, etc. The emitter and receiver columns should be rigidly mounted on the same plane.

The control unit should be installed in an IP 54 enclosure.

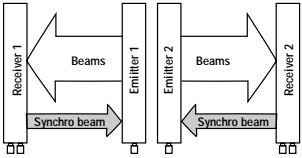
Protection heights above 1600 mm / 63.04 in can be achieved by means of adjacent rows of two or more photoelectric barriers. To prevent mutual interference between the devices, the adjacent devices should be operated in the opposite direction, as shown in the diagram below. To avoid the less favorable resolution of 70 mm / 2.75 in between adjacent protection fields, it is recommended to use the displaced mounting arrangement shown on the right of the diagram following, with a continuous resolution of 35 mm / 1.38 in or 55 mm / 2.16 in. In a side-by-side assembly, the barriers should also be operated in the opposite direction.

In some applications, the right-angled mounting arrangement shown below offers the best solution. For perimeteric protection, an arrangement with one, two, or three mirrors is possible.

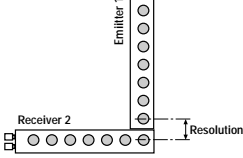
Linear assembly



Side by side



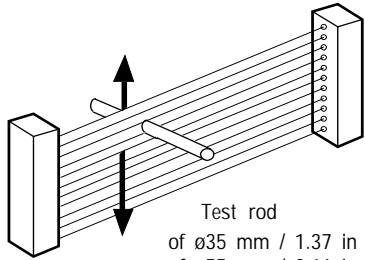
Right-angled



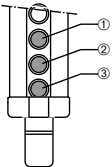
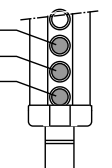
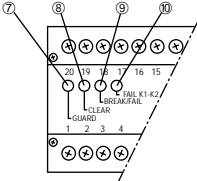
Functional test

The response of the photoelectric safety curtain over the whole protection height should be regularly tested using a $\varnothing 35\text{ mm}$ / 1.38 in test rod for the FF-SLC35 and a $\varnothing 55\text{ mm}$ /

2.16 in test rod for the FF-SLC55. Each time the machinery is powered up, an immediate shutdown of the machine should occur when any of the beams are interrupted by an opaque object.



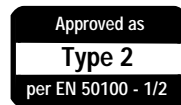
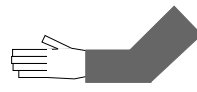
LED status indicators

UNIT	LED Nr	COLOUR	STATE	INDICATIONS
	①	Green	On	Reception of the synchronisation beam
	②	Yellow	On	Misalignment of the synchronisation beam
	③	Red	Flickering	Failure on the emitter unit ⁽¹⁾
	④	Green	On	Protection field is clear/NO outputs are closed
	⑤	Yellow	On	Protection field is clear/NO outputs are open
	⑥	Red	On	Protection field is entered/NO outputs are open
			On	Failure on the receiver unit ⁽¹⁾
	⑦ (Guard)	Green	On	Protection field is clear/NO outputs are closed
	⑧ (Clear)	Yellow	On	Protection field is clear/NO outputs are open
	⑨ (Break/Fail)	Red	On	Protection field is entered/NO outputs are open
			Flickering	Failure on the control unit
	⑩ (Fail K1-K2)	Red	Flickering	Failure on the external relays K1 & K2 ⁽²⁾

⁽¹⁾ The red LED and the yellow LED flicker alternately - ⁽²⁾ The 2 red LED flicker simultaneously.

FF-SLC35

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- ø35 mm / 1.38 in object detection capability
- Scanning range up to 12 m / 39.4 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	24 Vdc ± 20 %
	Output	2 safety relays with guided contacts (2 A / 125 Vac): 2 NO contacts and 1 NC contact
	Resolution	ø35 mm / 1.37 in
	Alignment tolerance	±4° for both emitter and receiver, in compliance with norm IEC/EN 61496 - 2
	Temperatures	Operating: 0 to 55° C / 32 to 131° F • Storage: -20 to 70° C / -4 to 158° F
	Resistance to ambient light	> 50 000 Lux
	Sealing	Emitter and receiver: IP 65 / Control unit: IP 40
	Electrical noise immunity according to	Norm IEC 801-4 Level IV
	Mechanical mounting	Right-angle brackets
		Control unit: Rail mounting in accordance with EN 50 022-35
	Dimensions of control unit	100 mm / 3.94 in x 73 mm / 2.87 in x 118 mm / 4.64 in
	Weight of control unit	500 g / 1.1 lb
	Lens diameter	ø12 mm / 0.47 in
	Scanning range	0 to 12 m / 0 to 39.4 ft
	Electrical connections	Emitter and receiver: 7-pin plastic plugs type GO 610WF, Nr 932 484-100 (Hirschmann)
		Control unit: Plugable terminal blocks / Max. connection length: 100 m/328 ft
		Cable specifications: ø0.5 to 1 mm ² (max. allowable line resistance: 4Ω)

Ordering information

FF-SLC35□□2

Protection height (PH) mm/in

02:	230 / 9.06
04:	400 / 15.76
06:	570 / 22.45
07:	745 / 29.35
09:	915 / 36.05
11:	1 090 / 42.94
13:	1 260 / 49.64
14:	1 435 / 56.53
16:	1 605 / 63.23

Control units

FF-SLU100R2 (Normal control unit)

or

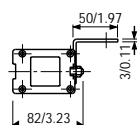
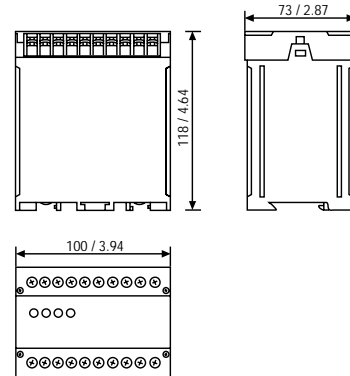
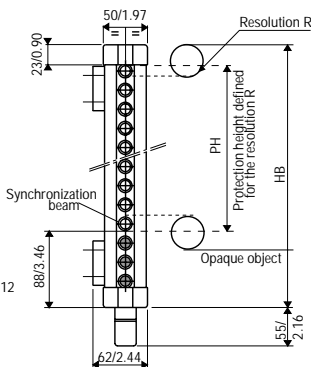
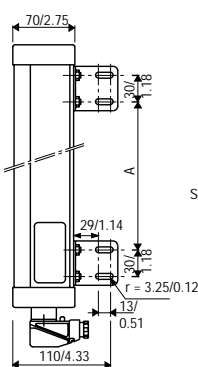
FF-SLM200R2 (with muting function)

Note

Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). **For a complete set be sure to order the control unit.** In case of significant vibrations, order separately 2 kits of vibration dampers.

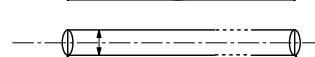
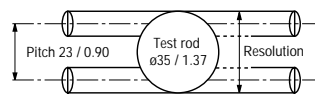
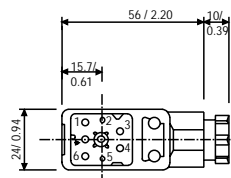
The emitter and the receiver have the same dimensions

Control unit



Plastic Connector

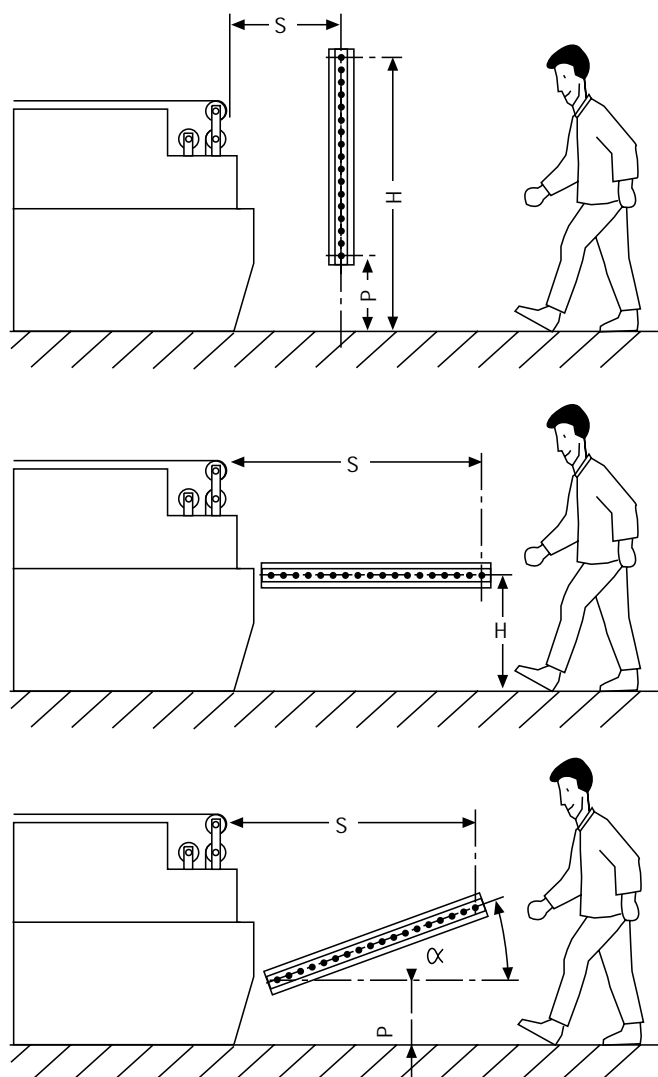
GO 610WF (7 pins) no. 932 484-100 Hirschmann



Protection height	mm / in	PH	230/9.06	400/15.76	570/22.45	745/29.35	915/36.05	1090/42.94	1260/49.64	1435/56.53	1605/63.23
Height of the barrier	mm / in	HB	300/11.82	470/18.51	645/25.41	815/32.11	990/39	1160/45.70	1335/52.59	1505/59.29	1675/65.99
Dimensions height	mm / in	HT	355/13.98	525/20.68	700/27.58	870/34.27	1045/41.17	1215/47.87	1390/54.76	1560/61.46	1730/68.16
Number of beams			9	17	25	33	41	49	57	65	73
Response time (with control unit, See Note) t1	(ms)		28	29	29	30	30	30	31	32	32
Weight	kg / lbs		2.5/5.5	3.7/8.15	4.8/10.58	6/13.22	7.4/16.31	8.6/18.95	9.7/21.38	10.8/23.8	12.5/27.55
Power consumption	W		14.3	15.6	17	18.4	19.8	21.1	22.5	23.9	25.3
Mounting brackets pitch	mm / in	A max.	165/6.5	340/13.39	510/20.09	685/26.98	855/33.68	1030/40.58	1200/47.28	1370/53.97	1540/60.67
		A mini.					20/0.78				

Note: (with SLU100R2 or SLM200R2 control unit)

Safety distances



The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement has ended or is interrupted. For the safety distance S, the EN 999 European project norm defines the following formula:

Normal approach

Europe

$$S \geq 2000 (t_1 + t_2) + 168 \text{ mm}, S \geq 100 \text{ mm}$$

$$(\text{or } S \geq 78.74 (t_1 + t_2) + 6.61 \text{ in}, S \geq 3.9 \text{ in})$$

This formula applies for all safety distances of S up to and including 500 mm/19.7 in. If S is found to be greater than 500 mm/19.7 in. using the above-mentioned formula, then the distance may be reduced using the following formula:

$$S \geq 1600 (t_1 + t_2) + 168 \text{ mm}, S \geq 500 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + 6.61 \text{ in}, S \geq 19.7 \text{ in})$$

US (OSHA 29 CFR 1910.217, ANSI B11.19 1990)

$$D_s \geq 63 (t_1 + t_2) + 3.75 \text{ in} \quad D_s = S$$

Parallel approach

$$S \geq 1600 (t_1 + t_2) + 850 \text{ mm with } 875 < H \leq 1000 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + 33.5 \text{ in with } 875 < H \leq 19.7 \text{ in})$$

OR

$$S \geq 1600 (t_1 + t_2) + (1200 - 0.4H) \text{ mm with } 0 < H \leq 875 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + (47.3 - 0.4H) \text{ in with } 0 < H \leq 34.47 \text{ in})$$

The height H should be a maximum of H max. = 1000 mm/39.4 in from the ground and the lowest allowable height of the device H min. = 0 from the ground. However, if the installation height H is greater than 300 mm/11.82 in, there is a risk of inadvertent undetected access beneath the curtain, and this must be taken into account in the risk assessment.

t1: Response time of the barrier and control unit (sec)

t2: Stopping time of the machine (sec)

H: Height of the plane of detection (mm/in)

Angled approach

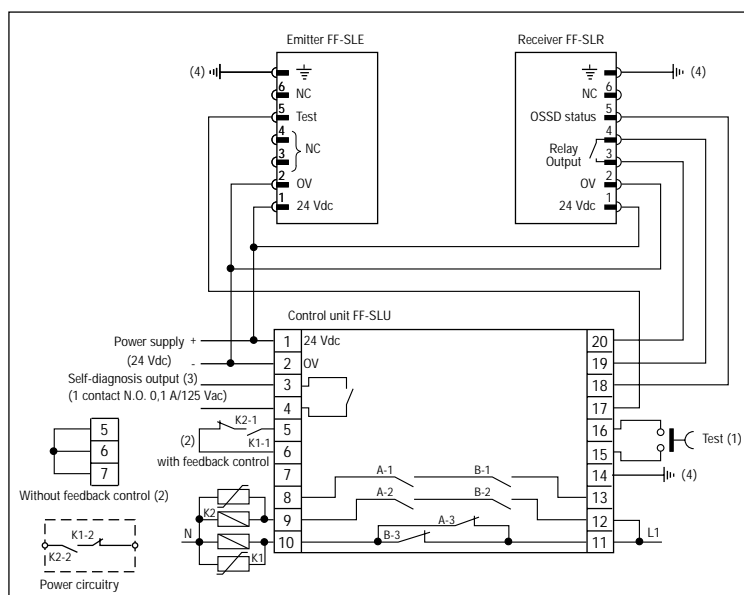
$$30^\circ < \alpha < 90^\circ$$

If the angle is greater than 30°, the approach should be considered as normal, and one of the above-mentioned formulas should be used.

$$0^\circ < \alpha \leq 30^\circ$$

If the angle is less than or equal to 30°, the approach should be considered as parallel, and one of the above-mentioned formulas should be used. In this case the min. height allowed is P min. = 0 and the max. height allowed is H max. = 1000 mm/39.4 in. However, if P > 300 mm/11.82 in, the risk of inadvertent access from below must be taken into account.

Connection diagram



(1) Test input: The safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system after each power on or intrusion in the detection field (the contact should be maintained during 10 msec/test duration: 150 msec).

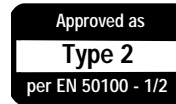
(2) Feedback control: The setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.

(3) Self-diagnosis output: This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.

FF-SLC55

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- ø55 mm / 2.16 in object detection capability
- Scanning range up to 12 m / 39.4 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	24 Vdc ± 20 %
Output	2 safety relays with guided contacts (2 A / 125 Vac): 2 NO contacts and 1 NC contact	
Resolution	ø55 mm / ø2.16 in	
Alignment tolerance	±4° for both emitter and receiver, in compliance with norm IEC/EN 61496 - 2	
Temperatures	Operating: 0 to 55° C / 32 to 131° F • Storage: -20 to 70° C / -4 to 158° F	
Resistance to ambient light	> 50 000 Lux	
Sealing	Emitter and receiver: IP 65 / Control unit: IP 40	
Electrical noise immunity according to	Norm IEC 801-4 Level IV	
Mechanical mounting	Right-angle brackets	
Dimensions of control unit	Control unit: Rail mounting in accordance with EN 50 022-35	
Weight of control unit	100 mm / 3.94 in x 73 mm / 2.87 in x 118 mm / 4.64 in	
Lens diameter	500 g / 1.1 lb	
Scanning range	ø12 mm / 0.47 in	
Electrical connections	0 to 12 m / 0 to 39.36 ft	
	Emitter and receiver: 7-pin plastic plugs type GO 610WF, Nb 932 484-100 (Hirschmann)	
	Control unit: Pluggable terminal blocks / Max. connection length: 100 m / 328 ft	
	Cable specifications: ø0.5 to 1 mm ² (max. allowable line resistance: 4 Ω)	

Ordering information

FF-SLC55□□2

Protection height (PH) mm/in

04:	440/17.33
06:	610/24.03
08:	785/30.92
09:	955/37.62
11:	1130/44.52
13:	1300/51.22
15:	1475/58.11
16:	1645/64.81

Control units

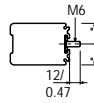
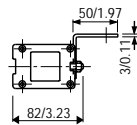
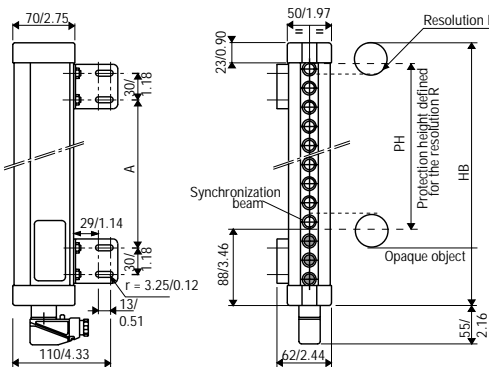
FF-SLU100R2 (Normal control unit)
or
FF-SLM200R2 (with muting function)

Note

Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). For a complete set be sure to order the control unit. In case of significant vibrations, order separately 2 kits of vibration dampers.

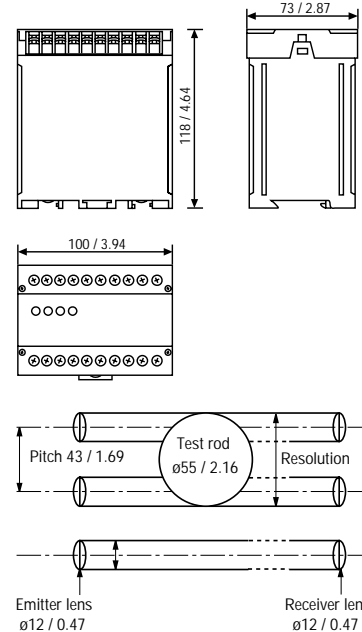
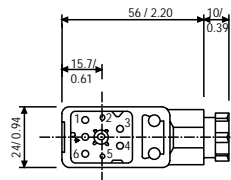
The emitter and the receiver have the same dimensions

Control unit



Plastic Connector

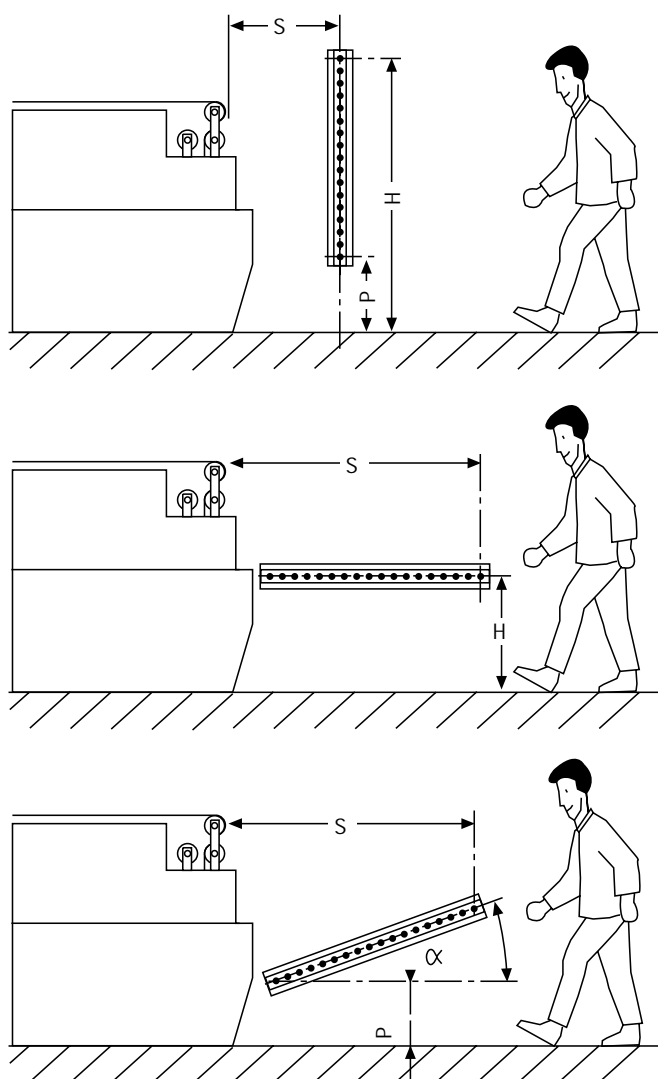
GO 610WF (7 pins) no. 932 484-100 Hirschmann



Protection height	mm / in	PH	440 / 17.33	610 / 24.03	785 / 30.92	955 / 37.62	1130 / 44.52	1300 / 51.22	1475 / 58.11	1645 / 64.81
Height of the barrier	mm / in	HB	470 / 18.51	645 / 25.41	815 / 32.11	990 / 39	1160 / 45.70	1335 / 52.59	1505 / 59.29	1675 / 65.99
Dimensions height	mm / in	HT	525 / 20.68	700 / 27.58	870 / 34.27	1045 / 41.17	1215 / 47.87	1390 / 54.76	1560 / 61.46	1560 / 61.46
Number of beams			9	13	17	21	25	29	33	37
Response time (with control unit, See Note) t1	(ms)		28	28	29	29	29	30	30	30
Weight	kg / lbs		3.7 / 8.14	4.8 / 10.56	6 / 13.2	7.4 / 16.28	8.6 / 18.92	9.7 / 21.34	10.8 / 23.76	12.5 / 27.5
Power consumption	W		14.3	15	15.6	16.3	17	17.7	18.4	19.3
Mounting brackets pitch	mm / in	A max.	340 / 13.4	510 / 20.10	685 / 27	855 / 33.68	1030 / 40.58	1200 / 47.28	1370 / 54	1375 / 54.17
		A mini.					20 / 0.78			

Note: (with SLU100R2 or SLM200R2 control unit)

Safety distances



The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement has ended or is interrupted. For the safety distance S , EN 999 defines the following formula:

Normal approach

$$S \geq 1600 (t_1 + t_2) + 850 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + 33.49 \text{ in})$$

The risk of inadvertent access should be taken into account during the risk assessment stage, but in all cases, the height H of the uppermost beam should be greater or equal to 900 mm/35.46 in, and the height P of the lowest beam should be lower or equal to 300 mm/11.82 in.

Parallel approach

$$S \geq 1600 (t_1 + t_2) + 850 \text{ mm with } 875 < H \leq 1\,000 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + 47.28 \text{ with } 875 < H \leq 1\,000)$$

OR

$$S \geq 1600 (t_1 + t_2) + (1200 - 0.4H) \text{ in. with } 0 < H \leq 875 \text{ mm}$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + (47.28 - 0.4H) \text{ in with } 0 < H \leq 34.47 \text{ in})$$

The height H should be a maximum of $H_{\text{max}} = 1\,000 \text{ mm}/39.4 \text{ in}$ from the ground and the lowest allowable height of the device $H_{\text{min}} = 75 \text{ mm}/2.95 \text{ in}$ from the ground. However, if the installation height H is greater than 300 mm/11.82 in there is a risk of inadvertent undetected access beneath the curtain, and this must be taken into account in the risk assessment.

t_1 : Response time of the barrier and control unit (sec)

t_2 : Stopping time of the machine (sec)

H : Height of the plane of detection (mm / in)

Angled approach

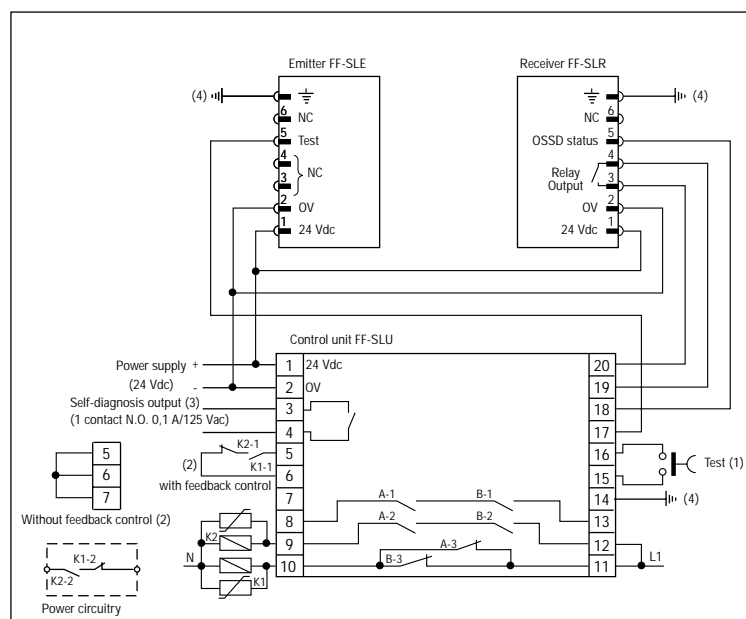
$$30^\circ < \alpha < 90^\circ$$

If the angle is greater than 30° , the approach should be considered as normal, and one of the above-mentioned formulas should be used.

$$0^\circ < \alpha \leq 30^\circ$$

If the angle is less than or equal to 30° , the approach should be considered as parallel, and one of the above-mentioned formulas should be used. In this case the min. height allowed is $P_{\text{min}} = 75 \text{ mm}/2.95 \text{ in}$ and the max. height allowed is $H_{\text{max}} = 1\,000 \text{ mm}/39.4 \text{ in}$. However, if $P > 300 \text{ mm}/11.82 \text{ in}$, the risk of inadvertent access from below must be taken into account.

Connection diagram



(1) Test input: The safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system after each power on or intrusion in the detection field (the contact should be maintained during 10 msec/test duration: 150 msec).

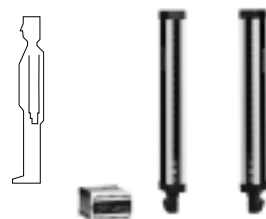
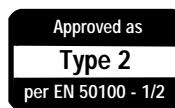
(2) Feedback control: The setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.

(3) Self-diagnosis output: This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.

FF-SLC18

- Type 2 according to IEC/EN 61496 - parts 1 & 2
- ø184 mm / 7.24 in object detection capability
- Scanning range up to 12 m / 39.4 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Supply voltage	24 Vdc ± 20 %
	Output	2 safety relays with guided contacts (2 A / 125 Vac) : 2 NO contacts and 1 NC contact
	Resolution	ø184 mm / 7.24 in
	Alignment tolerance	±4° for both emitter and receiver, in compliance with norm IEC/EN 61496 -2
	Temperatures	Operating: 0 to 55° C / 32 to 131° F • Storage: -20 to 70° C / -4 to 158° F
	Resistance to ambient light	> 50 000 Lux
	Sealing	Emitter and receiver: IP 65 / Control unit: IP 40
	Electrical noise immunity according to	Norm IEC 801-4 Level IV
	Mechanical mounting	Right-angle brackets
	Dimensions of control unit	Control unit: Rail mounting in accordance with EN 50 022-35
	Weight of control unit	100 mm / 3.94 in x 73 mm / 2.87 in x 118 mm / 4.64 in
	Lens diameter	500 g / 1.1 lb
	Scanning range	ø12 mm / 0.47 in
	Electrical connections	0 to 12 m / 0 to 39.4 ft
		Emitter and receiver: 7-pin plastic plugs type GO 610WF, Nb 932 484-100 (Hirschmann)
		Control unit: Plugable terminal blocks / Max. connection length: 100 m / 328 ft
		Cable specifications: ø0.5 to 1 mm² (max. allowable line resistance: 4 Ω)

Ordering information

FF-SLC18□□2

Protection height (PH) mm/in
04: 355/13.98
06: 525/20.68
07: 700/27.58
09: 870/34.27
11: 1045/41.17
13: 1215/47.87
14: 1390/54.76

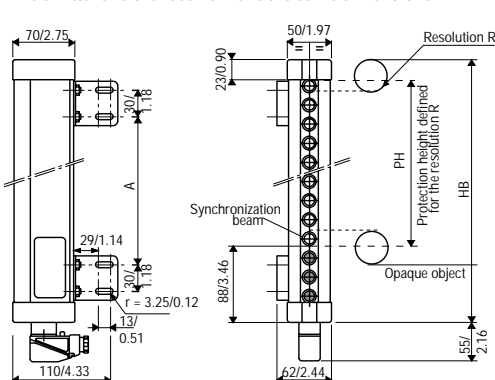
Control units

FF-SLU100R2 (Normal control unit)
or
FF-SLM200R2 (with muting function)

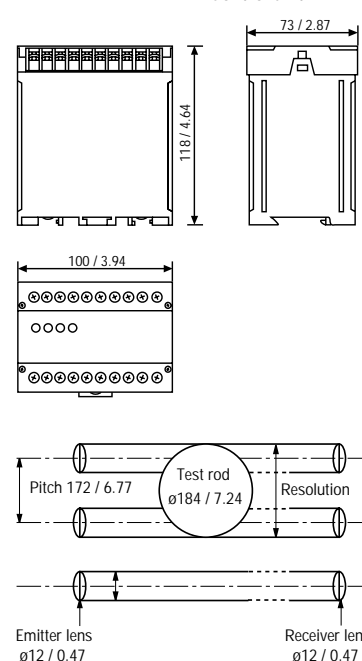
Note

Each barrier consists of an emitter and a receiver, and is delivered with 4 brackets and 2 connectors (cable is not provided). For a complete set be sure to order the control unit. In case of significant vibrations, order separately 2 kits of vibration dampers.

The emitter and the receiver have the same dimensions

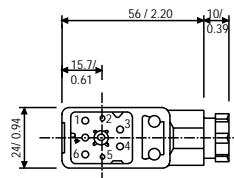


Control unit



Plastic Connector

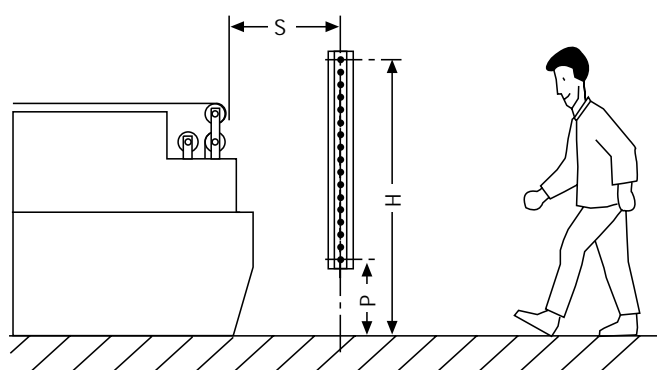
GO 610WF (7 pins) no. 932 484-100 Hirschmann



Protection height	mm / in	PH	355 / 13.98	525 / 20.68	700 / 27.58	870 / 34.27	1045 / 41.17	1215 / 47.87	1390 / 54.76
Height of the barrier	mm / in	HB	470 / 18.51	645 / 25.41	815 / 32.11	990 / 39	1160 / 45.70	1335 / 52.59	1505 / 59.29
Dimensions height	mm / in	HT	525 / 20.68	700 / 27.58	870 / 34.27	1045 / 41.17	1215 / 47.87	1390 / 54.76	1560 / 61.46
Number of beams			3	4	5	6	7	8	9
Response time (with control unit, See Note) t1	(ms)		28	28	29	29	29	30	30
Weight	kg / lbs		3.7 / 8.15	4.8 / 10.58	6 / 13.22	7.4 / 16.31	8.6 / 18.95	9.7 / 21.38	10.8 / 23.80
Power consumption	W		15.6	17	18.4	19.8	21.1	22.5	23.9
Mounting brackets pitch	mm / in	A max.	420 / 16.54	590 / 23.24	765 / 30.14	935 / 36.83	1110 / 43.73	1218 / 47.98	1450 / 57.13
		A mini.				20 / 0.78			

Note: (with SLU100R2 or SLM200R2 control unit)

Safety distances



The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement has ended or is interrupted. For the safety distance S , EN 999 defines the following formula:

Normal approach

$$S \geq 1600 (t_1 + t_2) + (850 \text{ mm})$$

$$(\text{or } S \geq 63.04 (t_1 + t_2) + (33.5 \text{ in}))$$

t_1 : Response time of the barrier and control unit

t_2 : Stopping time of the machine (sec)

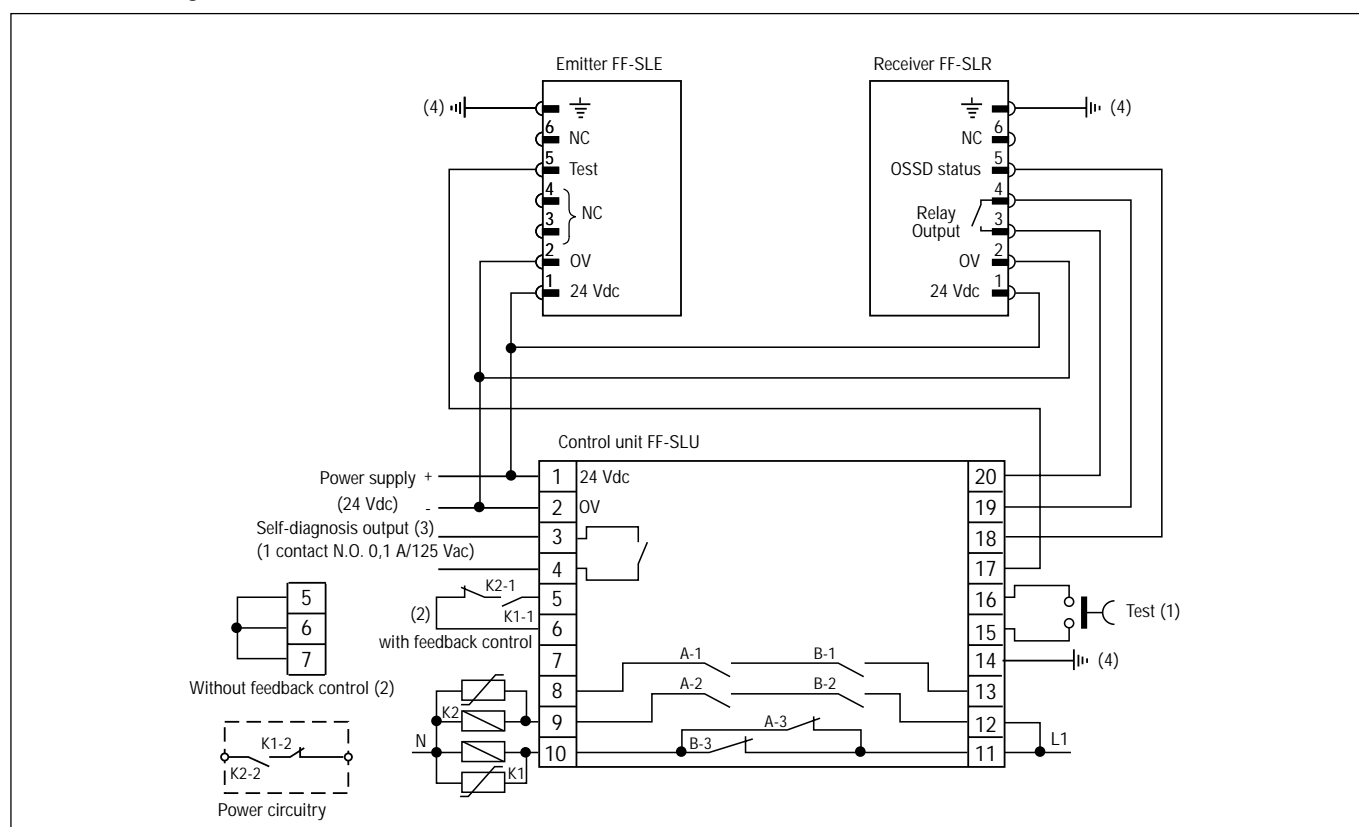
Recommendations:

Models	Beam Heights	
	P (mm/in)	H (mm/in)
FF-SLC18042 ⁽¹⁾	578 / 22.77	922 / 36.32
FF-SLC18062 ⁽²⁾	400 / 15.76	916 / 36.09
FF-SLC18072	300 / 11.82	988 / 38.92
FF-SLC18092	300 / 11.82	1 160 / 45.70
FF-SLC18112	300 / 11.82	1 332 / 52.48
FF-SLC18132	200 / 7.88	1 404 / 55.31
FF-SLC18142	200 / 7.88	1 576 / 62.09

⁽¹⁾ This equipment may be installed at a height similar to the one mentioned in the EN 999 for single safety beams.

⁽²⁾ This risk of inadvertent access beneath the light curtain must be taken into account during the risk assessment step.

Connection diagram



(1) Test input: The safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system after each power on or intrusion in the detection field (the contact should be maintained during 10 msec/test duration: 150 msec).

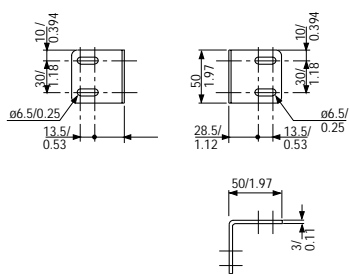
(2) Feedback control: The setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.

(3) Self-diagnosis output: This output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of a drop of synchronism between the two external relays K1 and K2).

(4) All the ground terminals must be connected to the same potential.

FF-SLC accessories (Brackets/connectors are provided with light curtains)

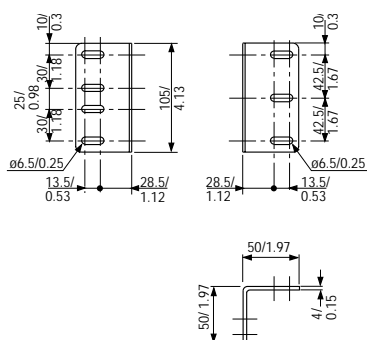
7200037



Single mounting bracket (HP < 1 000 mm / 39.4 in)

Mounting bracket for one mounting pin, supplied with screws and nuts (order 2 brackets per emitter or receiver with a protection height lower than 1 000 mm / 39.4 in).

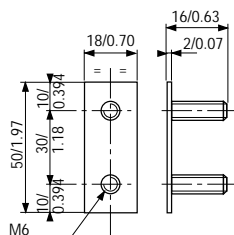
7200081



Double mounting bracket (HP ≥ 1 000 mm / 39.4 in)

Mounting bracket for two mounting pins, supplied with screws and nuts (order 2 brackets per emitter or receiver with a protection height greater or equal to 1 000 mm / 39.4 in).

7200038



Mounting pin

Mounting pin (order one mounting pin for the 7200037 bracket and 2 mounting pins for the 7200081 bracket).

1200084



Kit of 4 anti-vibration dampers

In case of significant vibrations, use one kit of 4 anti-vibration dampers for two 7200037 brackets (supplied with screws and nuts)

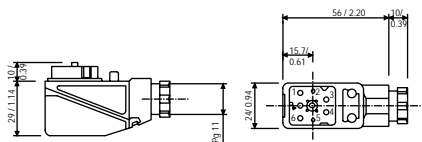
1200085



Kit of 6 anti-vibration dampers

In case of very significant vibrations, use one kit of 6 anti-vibration dampers for two 7200081 brackets (supplied with screws and nuts).

7200062

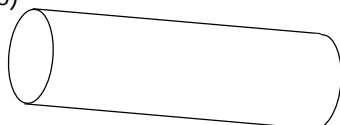


Plastic connector

Mobile female supply plug for emitter and receiver, Hirschmann 7 pin GO 610WF, no. 932 484-100 (order one plug per emitter and receiver).

8010587 (Ø35)

8010588 (Ø55)



Test rods

Test rods of Ø35 mm / 1.37 in for FF-SLC35 barrier and Ø55 mm/2.16 in for FF-SLC55 barrier.

Type 2 safety light curtain

Compact and cost-effective unit

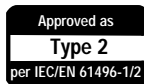
FF-SLG Series

FEATURES

- Active Optoelectronic Protective Device compliant with the requirements of the IEC/EN 61496-1 and IEC/EN 61496-2 European norms for Type 2 electrosensitive protective equipment
- **Self-contained unit. No electrical connection necessary between emitter and receiver**
- **2 safety static outputs with short-circuit and cross-fault detection**
- Resolutions available:
 - ø18 mm / 0.7 in for finger detection
 - ø30 mm / 1.2 in for hand detection
- Protection height up to 1470 mm / 58 in
- Scanning range up to 3,5 m / 11.48 ft
- Electrical connection: M12 8 pole connectors
- Compact size: only 42 mm² x 55 mm² / 1.65 in² x 2.16 in² cross sectional area
- Optional interface control module for more switching capability and additional features

TYPICAL APPLICATIONS

- Woodworking machines
- Electronic assembly
- Textile machines



The Honeywell FF-SLG is a self-contained light curtain that does not require a separate control unit for operation. As soon as an object is detected inside the protection field, the FF-SLG opens its two safety static outputs to generate an emergency stop condition that is used to remove dangerous machine motion when properly interfaced with the machine stopping circuitry. When connected to the FF-SRL60252 optional interface control module, the FF-SLG provides a wide variety of advanced functions: cross-monitored relays, final switching devices monitoring for the control of external contactors or relays, choice between automatic restart or start and restart interlock as well as relay status indicators.

The FF-SLG is designed in compliance with IEC/EN 61496-1 and IEC/EN 61496-2 standards and meets the requirements for a Type 2 Active Optoelectronic Protective Device. It can be used on low to medium danger machines.

The product received an EC type test certificate from the French INRS notified body, required for safety equipment as per the 98/37/EC Machinery Directive.

The cross section of 42 mm x 55 mm / 1.65 in x 2.16 in makes installation possible in tight spaces, especially with the help of the T-shape bolts supplied with the light curtains. Indicators provide information on the output status and on failure diagnostic. Optional right angle brackets allow for bottom and top mounting. The optional FF-SRL60252 interface control module easily fits inside the machine control panel with its 22,5 mm / 0.89 in width DIN rail mount housing.

A test input on the emitter allows for a cyclical test of the system, as per the requirements of IEC/EN 61496-1 and IEC/EN 61496-2.

⚠ DANGER

IMPROPER SAFETY PRODUCT USE IN THE US

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 **do not meet** US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution. For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

Failure to comply with these instructions will result in death or serious injury.

⚠ WARNING

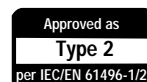
MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

Type 2 compact and cost-effective unit FF-SLG

- Type 2 according to the IEC/EN 61496-1 and IEC/EN 61496-2 standards
- 2 safety static outputs with short-circuit and cross-fault detection



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Type	FF-SLG18	FF-SLG30
Resolutions		ø 18 mm / 0.7 in	ø 30 mm / 1.2 in
Protection heights		See Table 2	
Nominal scanning ranges		0,3 m to 3,5 m / 1 ft to 11.48 ft	
Supply voltage		24 Vdc (±15 %)	
Power consumption		Emitter: 4 W max. • Receiver: 3 W max. (see Table 2)	
Outputs		2 safety static outputs (switching capacity: 0,3 A / 24 Vdc)	
Maximum cable length		25 m / 82 ft when connected on the relevant Honeywell control module	
Test input		Voltage free (normally closed contact)	
Response time		15 ms	15 ms to 21,5 ms (see Table 2)
LED status indicators		Emitter: failure alarm / power, test Receiver: outputs status	
Cross sectional area		W 42 mm ² x D 55 mm ² / W 1.65 in ² x D 2.16 in ² (see Tables 1 and 2 for complete housing dimensions)	
Emission		Infrared modulated light source (925 nm)	
Effective aperture angle		±4°, ±25 % (in compliance with the IEC/EN 61496-2)	
Light immunity		Sun: 20 000 lux • Lamp: 15 000 lux	
Electrical noise immunity		IEC 61000-4-4: level III / IEC 61000-4-3: level III	
Ambient temperature		Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F Storage temperature: -20 °C to 75 °C / -4 °F to 167 °F	
Vibrations		IEC/EN 61496-1: 10 to 55 Hz frequency range, 1 octave/min.sweep rate, 0,35 mm ±0,05 amplitude, 20 sweeps per axis, for 3 axes	
Sealing		IP 65, NEMA 4, 13	
Material		Housing: black anodised aluminium alloy • Front plate: polymethyl methacrylate (PMMA) End caps: polycarbonate	
Electrical connection		M12 8 pole connectors	

Ordering information

Each listing consists of an emitter, a receiver, 2 pairs of mounting pins, 4 M5 dovetail shape bolts, 4 M5 nuts and 4 rip-lock washers, and a test rod.

FF-SLG BM2
Model (see Table 2)
Resolutions
18: ø 18 mm / 0.7 in
30: ø 30 mm / 1.2 in

- (1) Protection Height for the minimum detected object size or resolution
- (2) Sensing Field Height (full screen height)
- (3) Total Height

Dimensions (mm / in)

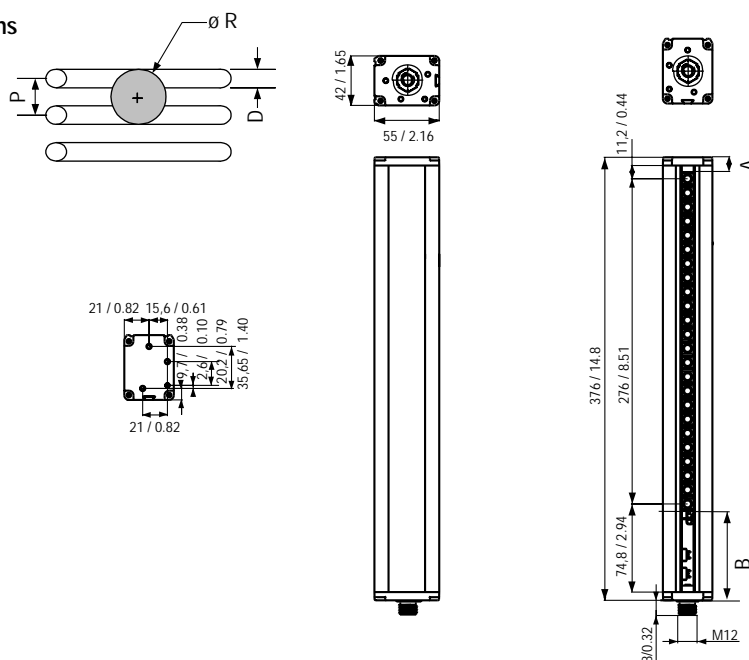
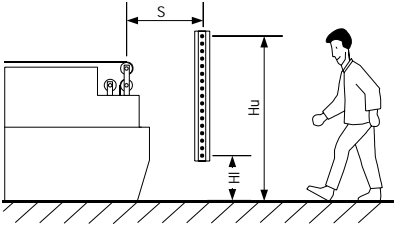
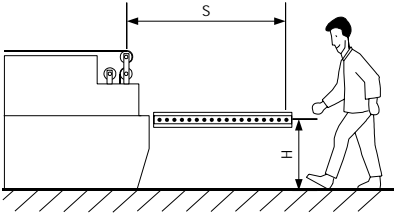
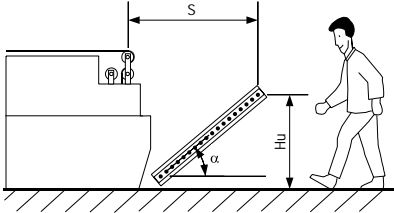


Table 1 (mm / in)	øR (resolution)	P (lens pitch)	D (lens diameter)	A (inactive zone)	B (inactive zone)
FF-SLG18	ø 18 / 0.7	12 / 0.47	6 / 0.23	15,2 / 0.60	78,8 / 3.10
FF-SLG30	ø 30 / 1.2	24 / 0.94	6 / 0.23	27,2 / 1.07	78,8 / 3.10

Table 2

Model	031		050		070		089		109		128		147	
Protection height (mm / in) (1)														
FF-SLG18	306 / 12.05		498 / 19.62		690 / 27.18		-		-		-		-	
FF-SLG30	318 / 12.52		510 / 20.09		702 / 27.65		894 / 35.22		1086 / 42.78		1278 / 50.35		1470 / 57.91	
Sensing field height (mm/in)(2)														
FF-SLG18	282 / 11.11		474 / 18.6		666 / 26.24		-		-		-		-	
FF-SLG30	270 / 10.63		462 / 18.2		654 / 25.76		846 / 33.33		1038 / 40.89		1230 / 48.46		1422 / 56.02	
Total height (mm / in) (3)														
FF-SLG18	376 / 14.8		568 / 22.36		760 / 29.92		-		-		-		-	
FF-SLG30	376 / 14.8		568 / 22.36		760 / 29.92		952 / 37.48		1144 / 45.03		1336 / 52.6		1528 / 60.15	
Response time (ms)														
FF-SLG18	15		15		15		-		-		-		-	
FF-SLG30	15		15		15		15,5		17,5		19,5		21,5	
	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.	Em.	Rec.
Weight per device (kg / lbs)	1,1/2.4	1,2/2.6	1,5/3.3	1,6/3.5	1,8/3.9	1,9/4.2	2,2/4.8	2,3/5	2,5/5.5	2,6/5.7	2,9/6.3	3/6.6	3,2/7	3,3/7.2
Power consumption (W) FF-SLG18	4	3	4	3	4	3	-	-	-	-	-	-	-	-
(Emitter/receiver) FF-SLG30	4	3	4	3	4	3	4	3	4	3	4	3	4	3

Safety distances (North American information not provided due to limited applicability)

European EN 999 standard (in mm, 100 mm = 3.9 in)	FF-SLG18	FF-SLG30
Normal approach 	$S \geq 2000 (t_1 + t_2) + 32,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 32,$ <p>with $S \geq 500$</p>	$S \geq 2000 (t_1 + t_2) + 128,$ <p>with $S \geq 100$</p> <p>If $S \geq 500$, then use:</p> $S \geq 1600 (t_1 + t_2) + 128,$ <p>with $S \geq 500$</p>
Parallel approach 	$S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H),$ <p>with $H \leq 875$ or</p> $S \geq 1600 (t_1 + t_2) + 850,$ <p>with $875 \leq H \leq 1000$</p>	
Angled approach 	<p>If $\alpha \geq 30^\circ$, then use one of the formula given for a normal approach.</p> <p>If $\alpha \leq 30^\circ$, then use one of the formula given for a parallel approach, with $H_u \leq 1000$.</p>	

Where:

S: Minimum safety distance (mm, 100 mm = 3.9 in)

t1: Light curtain response time (s)

t2: Machine stopping time (s)

H: Height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)

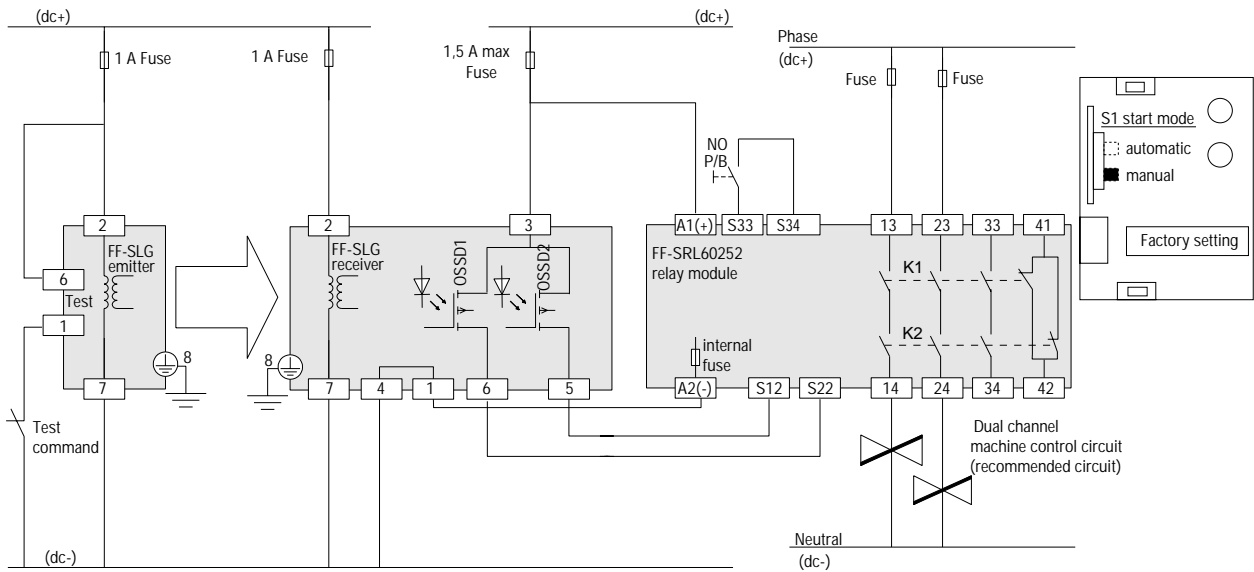
Hu: Height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)

Hl: Height of the lowest beam above the reference floor (in mm, 100 mm = 3.9 in)

For more information, refer to the EN 999 European standard or comply with the requirements on safety distances given by the type C European standard (if existing or available) for the considered machine.

Wiring diagram (using the FF-SRL60252 safety control module)

The FF-SRL60252 interface control module is set in the Manual restart mode:



OSSD1 and OSSD2: Output Signal Switching Devices (light curtain safety contacts)

N.O. P/B: normally open contact of a push-button

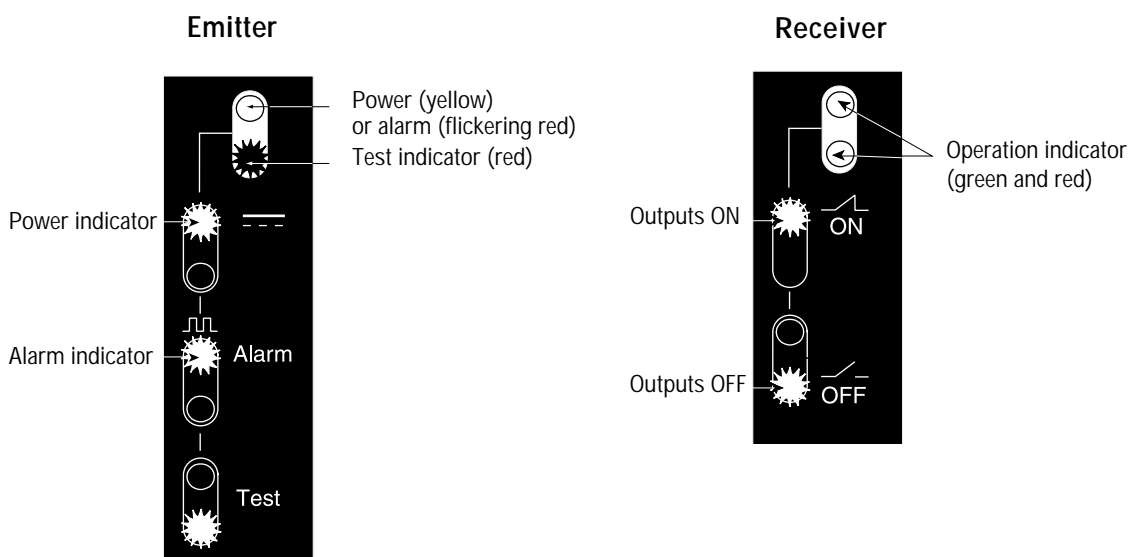
NOTICE

Improper use of the FF-SLG light curtain

The cross-monitoring of the FF-SLG static outputs is based upon a self-checking principle which guarantees the detection of an output short-circuit and the detection of a short-circuit between the outputs (cross-fault detection). The FF-SRL60252 interface control module is primarily designed to be interfaced with Honeywell safety static outputs devices.

Compatibility of the FF-SLG with any other emergency stop safety control module is not guaranteed.

LED status indicators



Accessories

Safety control modules



FF-SRL60252

Dual channel relay module for safety light curtains with static safety outputs
(to be ordered separately as an option)

- compatible with safety light curtains with static outputs only
- 24 Vdc
- Category 4 per EN 954-1
- Selectable start mode and FSD monitoring
- 3 NO, 1 NC internally redundant safety relay outputs
- 22,5 mm / 0.89 in width



FF-SRM200P2

Muting module

(to be ordered separately as an option)

- connection of 1 or 2 safety devices
- modes of operation: unidirectional or bidirectional muting, mutual exclusion
- connection of 2 or 4 auxiliary muting sensors
- 24 Vdc
- category 4 per EN 954-1
- manual start mode, FSD monitoring
- programmable max. muting time
- crossfault monitoring of inputs
- self monitored muting lamp output
- 3 NO safety relay outputs
- static outputs for output status and diagnostic information
- 45 mm / 1.77 in

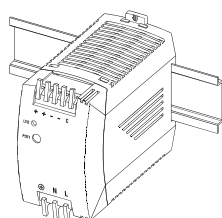


FF-SRL59022

Multi-safety device control module with Presence Sensing Device Initiation (PSDI)

- accept up to three safety devices working in a guard-only mode or a single safety light curtain working in a single stroke/dual stroke mode
- 24 Vdc
- category 4 per EN 954-1
- manual start mode and FSD monitoring
- cross-fault monitoring of inputs
- 3 NO safety relay outputs
- static outputs for relay output status and diagnostic information
- 45 mm / 1.77 in

ac to dc power supply



FF-SXZPWR050

ac to dc power supply

Input voltage: 85 to 264 Vac

Output voltage: 24 to 28 Vdc / 2,1 A to 1,8 A

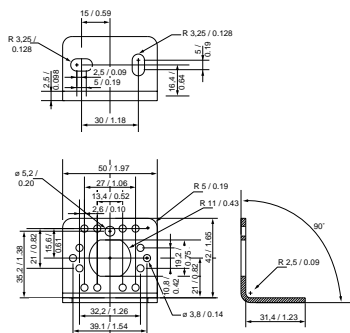
Dimensions: 97 mm x 75 mm x 45 mm / 3.82 in x 2.95 in x 1.77 in

Mounting: DIN rail

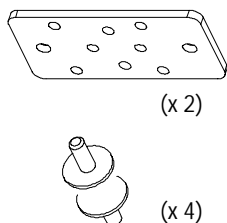
Approvals: UL508 listed, UL1950, cUL/CSA-C22.2, EN/IEC 60950, EN 50178

(to be ordered separately as an option).

Right-angle bracket kit



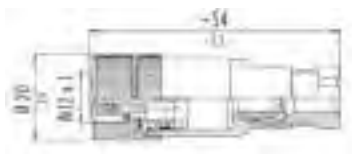
Anti-vibration kit



Cordsets



Cable connector



FF-SGZ001002

One kit includes 2 brackets and 8 M3,5 x 8 screws. Order one bracket kit per emitter or receiver element, 2 kits for an emitter/receiver system. The 8 screws are used if the bracket is fixed on the top and bottom caps of the FF-SLG.

(to be ordered separately as an option).

NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibration, 3 pairs of brackets must be used for light curtain systems with protection heights greater or equal to 1000 mm / 39.4 in (an additional bracket kit must be ordered).

FF-SYZAD

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included).

NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibrations, order:

- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm / 39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm / 39.4 in, but less than 1470 mm / 57.91 in.

Lumberg single keyway M12, female straight (to be ordered separately)

Order 2 cordsets for emitter + receiver.

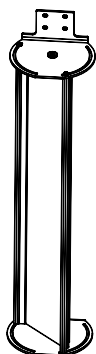
Emitter (FF-SLG□□□□BM2E) or receiver (FF-SLG□□□□BM2R)

Catalogue listing	Description
FF-SXZCAM128U02	2 m / 6.56 ft length
FF-SXZCAM128U05	5 m / 16.40 ft length
FF-SXZCAM128U10	10 m / 32.80 ft length

FF-SXZCOM128

Binder single keyway M12 female screw type straight connector. 8 set screws M2,5. Gold plated contacts. Pin configuration according to IEC 61076-2-101.

Deflection mirror



FF-SYZMIR□□□□

To be ordered separately as an option

Features:	
Deflection mirror with 10 % scanning range reduction (FF-SYZMIR0□□□)	
Deflection mirror with 25 % scanning range reduction (FF-SYZMIR1□□□)	
Quick mounting and easy mirror adjustment	
Mounting brackets included (top / bottom mounting)	
Adjustment of mirror in azimuth direction of $\pm 45^\circ$	
Housing compatible with FF-SBSMIR Series	
Material	Aluminium alloy housing
Finish	Gold colour anodisation
Ordering guide:	
FF-SYZMIR□04	FF-SLG□□031
FF-SYZMIR□06	FF-SLG□□050
FF-SYZMIR□08	FF-SLG□□070
FF-SYZMIR□10	FF-SLG□□089
FF-SYZMIR□12	FF-SLG□□109
FF-SYZMIR□14	FF-SLG□□128 and FF-SLG□□147

Floorstanding post



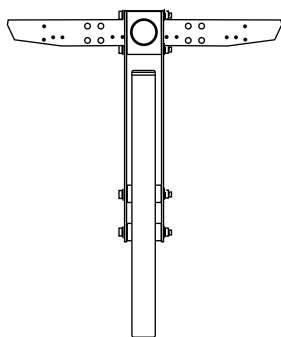
FF-SYZPF

To be ordered separately as an option

Floorstanding post for the installation of the following FF-SLG light curtains:

FF-SLG□□031 to FF-SLG□□109.

Adjustable floorstanding post



FF-SYZPA

To be ordered separately as an option

- horizontal, diagonal and vertical adjustment of light curtains possible
- quick mounting and easy light curtain adjustment
- 360° rotation of light curtain possible
- fine adjustment of light curtains in azimuth direction of $\pm 11^\circ$ ensures an easy alignment
- 700 mm / 27.58 in corner protection for light curtain included
- base plate can be mounted independently
- finish: RAL 1021 yellow paint.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Honeywell

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Freeport, Illinois 61032
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Type 4 modular light curtain with separate control unit

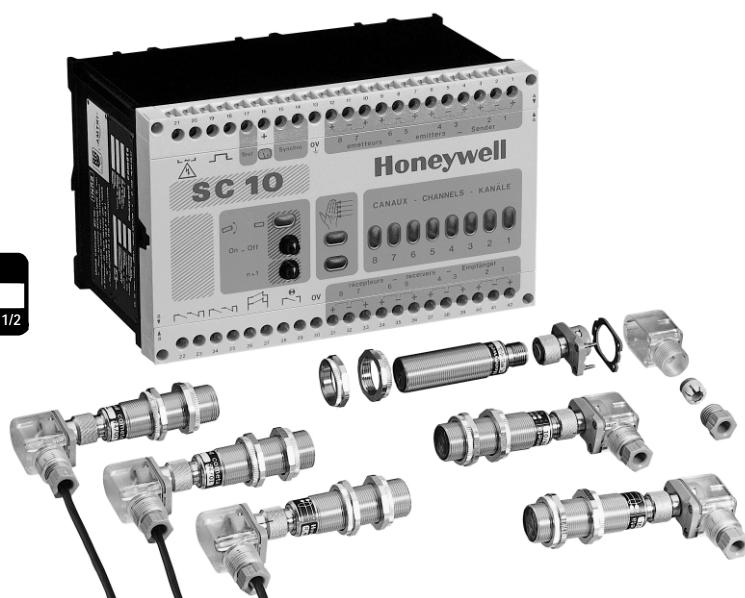
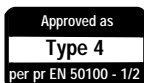
Designed to enhance application flexibility

FEATURES

- Meets applicable parts of US OSHA 29CFR 1910.212 and RIA 15.06 regulations for Control Reliability
- Through scan detection system
- Complete system, ready for installation (amplifier, sensors, plug and cable)
- Safety amplifier with permanent self-checking, Type 4 according to IEC/EN 61496 - parts 1 & 2
- EC type examination certificate delivered by the German BG E+M III
- Can drive from 2 to 8 multiplexed photoelectric beams
- Two guided contact output relays
- Resolution: $\varnothing 40$ mm to 400 mm / 1.57 in to 15.76 in in compliance with EC regulations (EN 999 standard)
- Built-in individual beam alignment aid
- Restart modes available:
 - automatic restart
 - start and restart interlock after power on and any beam interruption; in this mode the FSD monitoring facility is available
- Test input for FSD monitoring

TYPICAL APPLICATIONS

- Access protection on palletising areas
- Access control of areas containing robots or automatic machines
- Detection of automatic guided vehicles
- Ejection control
- Tool control
- Reliability of the detection information
- Thermoforming, agglomerating and moulding presses
- Door control



The FF-SCAN system uses an invisible, modulated infrared curtain. Due to its flexibility, it offers a customised solution for the protection of personnel working on dangerous machinery.

The system contains a positive-safety self-checking amplifier, M18 photoelectric sensors, connectors and one or two rolls of cable (1 shielded pair). Optional accessories are available (mounting brackets, deflection mirrors, multibeam post) to make the installation easy.

The sensors used to analyse an access area operate in through scan mode. The distance separating emitters and receivers can be as high as 33 m / 108.24 ft. Receivers are fitted with a line impedance adaptor allowing cabling connections of up to 50 m / 164 ft.

The amplifier drives from 2 to 8 sensors, that can provide a resolution of 40 mm to 400 mm / 1.57 in to 15.76 in (see sensors installation).

A built-in individual beam alignment aid provides visual information, which helps optimise optical adjustments when installing sensors. This alignment aid is helpful for any protection and any scanning ranges up to 33 m / 108.24 ft. Accessories are designed to ease sensors installation and a laser pen designed for alignment purposes can be used for perimetric protections involving one or several mirrors.

The dynamic electronic processing and the permanent self-checking of circuits provide a high level of intrinsic safety. The start and restart interlock allows reliable access control of dangerous areas surrounded by the infrared beam. The use of a test input facility provides a reliable control of the electrical interface which connects the FF-SCAN to the machine control circuits.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SCAN

Sensors installation

The safety distance between the protection field and the dangerous zone should be large enough to ensure that if the protection field is entered, the dangerous zone cannot be reached before the hazardous movement is ended or interrupted. The safety distance "S" (or D) is calculated according to the following formula:

$$S \geq K (t_1 + t_2) + C$$

S: Minimum safety distance (mm / in)

K: Approach speed of the operator (mm / s)

*t*₁: Response time of the photoelectric curtain (30 ms)

*t*₂: Stopping time of the machine (ms)

C: Additional guarding space depending on the curtain sensitivity (mm / in)

Resolution of the photoelectric curtain

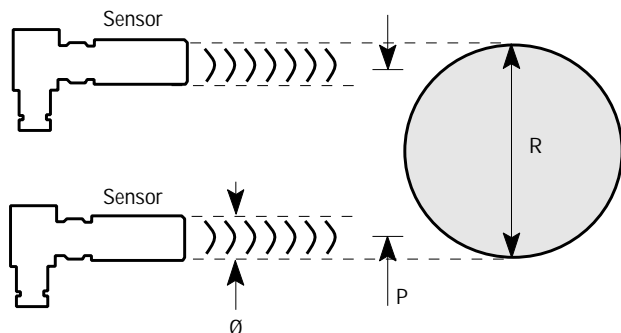
Parameter C depends on the maximum resolution of the photoelectric curtain. This resolution is determined by the sensing width of two adjacent beams as follows:

$$R = P + \emptyset$$

R: Maximum resolution of the curtain (mm / in)

P: Maximum distance separating the centers of two adjacent sensors (mm / in)

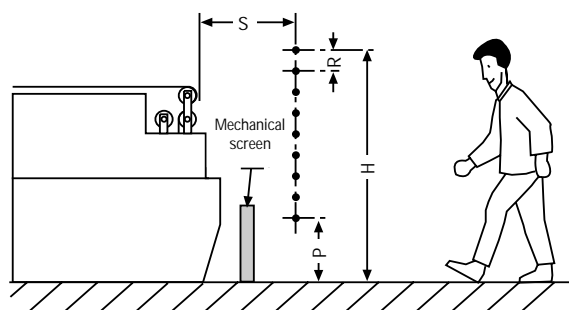
\emptyset : Lens diameter (15 mm / 0.59 in)



Values of K and C parameters according to the European EN 999 standard

The approach speed "K" depends upon the position of the curtain, and the guarding space "C" depends upon the resolution of the curtain.

Normal approach



Safety curtain with a resolution greater than ø40 mm / 1.57 in and less than ø 70 mm / 2.75 in

Protective devices with such a resolution are considered by the EN 999 European project norm to be sets of multiple independent beams. They will not detect intrusion of the hands, and therefore shall only be used where the risk assessment indicates that detection of intrusion of the hands is inappropriate. When the resolution of the FF-SCAN system is set between ø40 mm / 1.57 in and ø70 mm / 2.75 in, the sensing field will detect arms, legs or the whole body of the operator.

In that case, the minimum allowable safety distance "S" from the dangerous zone to the vertical detection plane shall be calculated using the following formula:

$$S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}$$

$$\text{(or } S \geq 63 (t_1 + t_2) + 33.5 \text{ (in))}$$

S: Minimum safety distance (mm / in)

*t*₂: Stopping time of the machine (s)

*t*₁: 30 ms (response time of the FF-SCAN curtain)

The risk of inadvertent access shall be taken into account during the risk assessment stage, and if it is the case, the height "H" of the uppermost beam shall be greater or equal to 900 mm / 35.46 in, and the height "P" of the lowest beam shall be lower or equal to 300 mm / 11.82 in.

Where the photoelectric safety curtain may not offer sufficient protection, additional safety devices or further photoelectric controls are required in order to prevent the operator from entering the dangerous zone without being detected, and from staying between the dangerous zone and the photoelectric safety grid.

Multiple individual beam devices (resolution > 70 mm / 2.75 in)

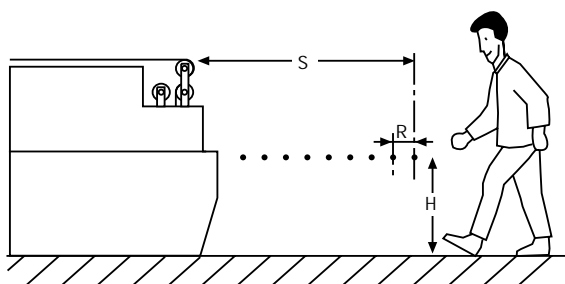
When the resolution of the photoelectric safety curtain is greater than 70 mm / 2.75 in, the EN 999 project norm recommends the number of beams and their heights above the floor as follows:

Note

Number of beams	Heights	
	mm	in
2	400 / 900	15.76 / 35.46
3	300 / 700 / 1100	11.82 / 27.58 / 43.34
4	300 / 600 / 900 / 1200	11.82 / 23.64 / 35.46 / 47.28

Multiple individual beam devices may not necessarily detect intrusion of the body or parts of the body towards the dangerous zone. If it is the case, additional safety devices are required.

Parallel approach



The minimum safety distance "S" from the dangerous zone to the outer beam is dependent on the part of the body detected, which sets the height "H" of the curtain above the floor and the resolution "R" of the curtain. This safety distance shall be calculated using the following formula:

$$S \geq 1600 (t_1 + t_2) + 1200 - 0.4H \text{ (mm)}$$

where $(1200 - 0.4 H) \geq 850 \text{ mm}$

$$\text{(or } S \geq 63 (t_1 + t_2) + 47.3 - 0.4H \text{ (in))}$$

where $(47.3 - 0.4 H) \geq 33.5 \text{ in}$

*t*₁: 30 ms (response time of the FF-SCAN curtain)

*t*₂: Stopping time of the machine (s)

H: Height (mm / in) of the curtain above the floor

R: Resolution of the curtain (mm / in)

Note

The height "H" shall be a maximum of 1000 mm / 39.4 in. However if the installation height "H" is greater than 300 mm / 11.82 in, there is a risk of inadvertent undetected access beneath the curtain and this must be taken into account in the risk assessment.

The height "H" of the detection plane above the floor is related to the maximum allowable resolution "R" of the curtain.

$$H = 15 (R - 50)$$

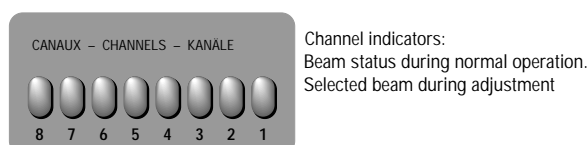
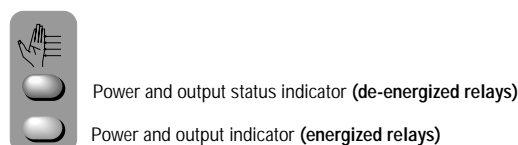
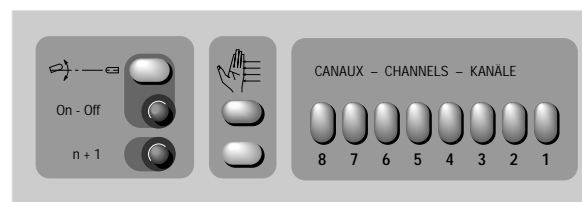
H: Height (mm / in) of the curtain

R: Resolution of the curtain (in mm)

In this way, where the height "H" of the curtain is known or fixed, a maximum allowable resolution can be calculated according to the above mentioned formula:

$$R = H/15 + 50$$

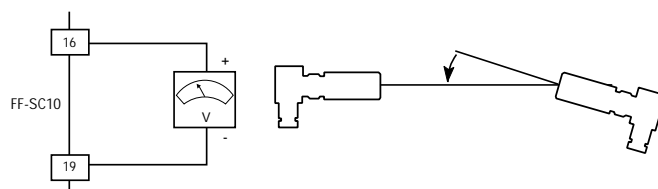
The above mentioned mountings are given as possible mountings. For any other kind of mounting, or for more information, please refer to EN 999 or get in touch with us.



Light indicators located on the front panel of the FF-SC10

Sensors alignment procedure

- Connect a voltmeter between terminals 16 and 19 of the FF-SC10 amplifier (scale: 20 Vdc).
- Select the tuning mode with the "On - Off" push-button.
- Select channel number 1 with the "n + 1" push-button (the first channel indicator must light up).
- Adjust the mechanical position of the sensors connected on the first channel until the voltage reaches a maximum on the voltmeter.

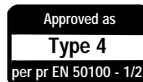


- Repeat these operations for each channel and go back to the normal mode of operation.

FF-SCAN

FF-SCAN

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- Meets applicable parts of OSHA and RIA regulations for Control Reliability
- Modular photoelectric safety curtain
- Scanning range up to 33 m / 108 ft



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs



Specifications	Supply voltage	120/240 Vac, +10% -20 %, 48 to 62 Hz	24 to 48 Vdc(1) ±15 %
	Power consumption	20 VA	15 W
	Switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (50 mA min.)	
	Material	Sensors: Aluminium alloy housing and glass lens • Amplifier: polycarbonate housing	
	Response time	0.03 s (Output switching frequency = 10 Hz)	
	Housing size	Sensors: M18 x 99 mm (with connectors) • Amplifier: 20 mm x 128,5 mm x 120 mm (Ω rail mounting according EN 50 022)	
		Sensors: M18 x 3.90 in (with connectors) • Amplifier: 0.78 in x 5.06 in x 4.72 in (Ω rail mounting according EN 50 022)	
	Emission	Modulated Light Source, infrared LED (875 nm)	
	Resolution	From ø40 mm to ø400 mm / 1.57 in to 15.76 in (in compliance with EN 999)	
	Alignment tolerance	±2° for emitters and receivers	
	Ambient temperature	0 °C to 55 °C / 32 °F to 131 °F	
	Sealing	Sensors: IP 67 / (NEMA 6) • Amplifier: IP 20 (need to be installed in an IP 54 enclosure)	
	Electrical noise immunity	IEC 801-4: level III	
	Resistance to ambient light	Sun: 20 000 Lux • Lamp: 15 000 Lux	
	Indications	LED displays on unit front panel and signalling contacts (output and beams status)	
	Scanning distance	Standard: 0 m to 25 m / 0 ft to 82 ft • Long range: 15 m to 33 m / 49.2 ft to 108.2 ft	
	Electrical connections	Sensors: Plastic plug-in connectors (Type Hirschmann ELWIK 4012) Amplifier: 2 plug-in terminal strips	

Ordering information⁽²⁾

FF-SCAN□18□-□

Nominal scanning range:

Blank: 0 m to 25 m /
0 ft to 82 ft (standard)
L: 15 m to 33 m /
49.2 ft to 108.2 ft (lg range)

Supply voltage:

E: 120 Vac
G: 240 Vac
4: 24 to 48 Vdc⁽¹⁾

Number of beams:

2 to 8 ⁽³⁾

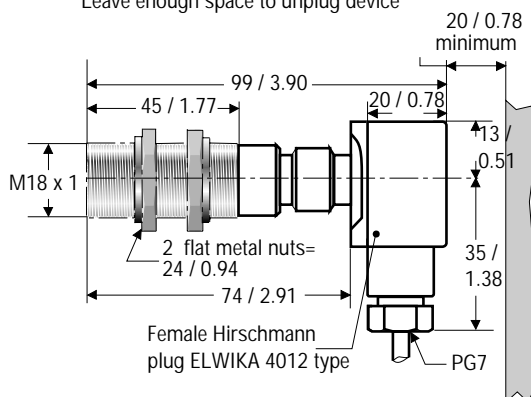
Note

- (1) - Dc versions are featured with a galvanic insulation (dc to dc converter) that provides the immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.
- (2) - A complete set includes: a number of sensors, relevant connectors and cable, the FF-SC10 amplifier.
- (3) - For 2 to 4 beams: cable length is 100 m / 328 ft
For 5 to 8 beams: cable length is 200 m / 656 ft

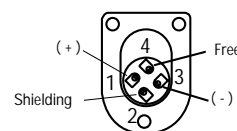
The 2 beam programming must be done by the manufacturer and cannot be modified by the user.

Sensor FF-MPF with connector FF-MPFCONN

Leave enough space to unplug device



Female connector back view



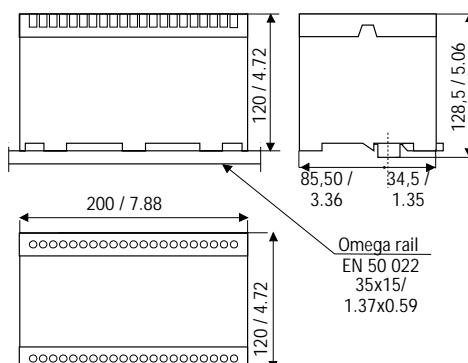
FF-MPF□18A1-CS□

Scanning range:

Blank: 0 m to 25 m / 0 ft to 82 ft (standard)
L: 15 m to 33 m / 49.2 ft to 108.2 ft (long range)

E: Emitter
R: Receiver

Control unit (amplifier FF-SC10)



FF-SC10M08□

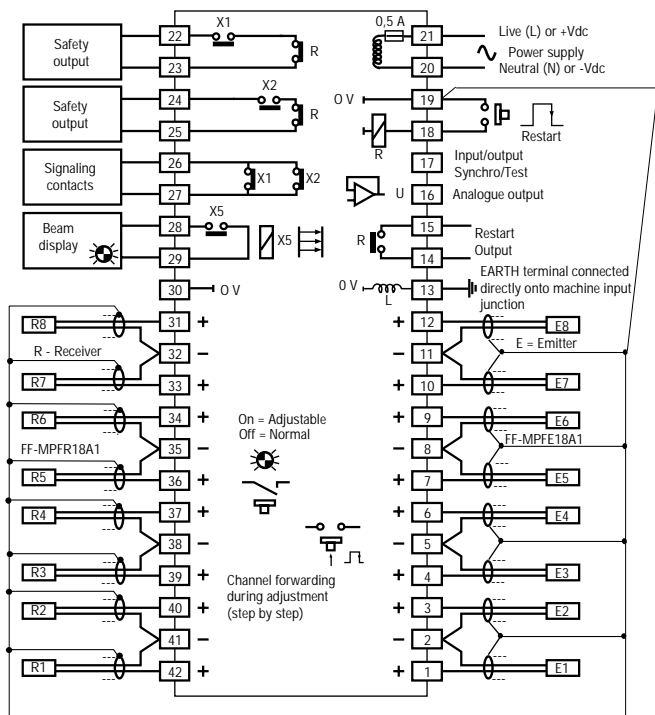
Supply voltage:

E: 120 Vac
G: 240 Vac
4: 24 Vdc to 48 Vdc ⁽¹⁾

Connection diagram

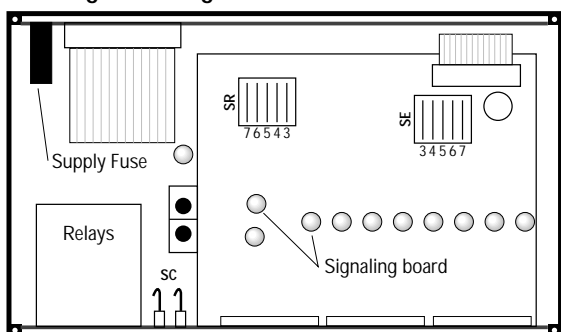
FF-SC10

Amplifier



Notice: Other devices should not be connected to internally generated supply. Vdc versions are protected against reversed polarity due to a rectifier.

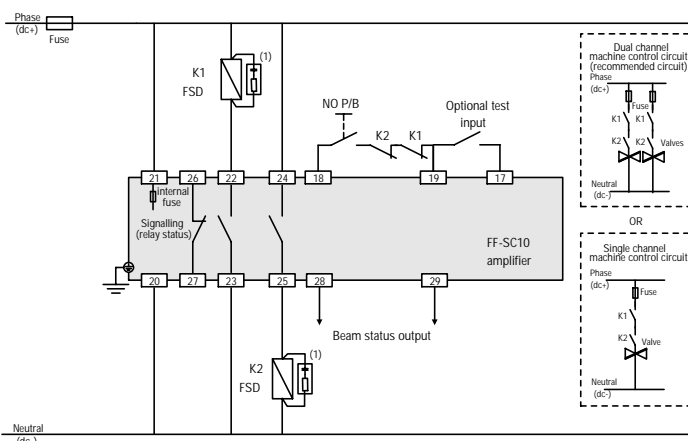
Locating the configuration devices



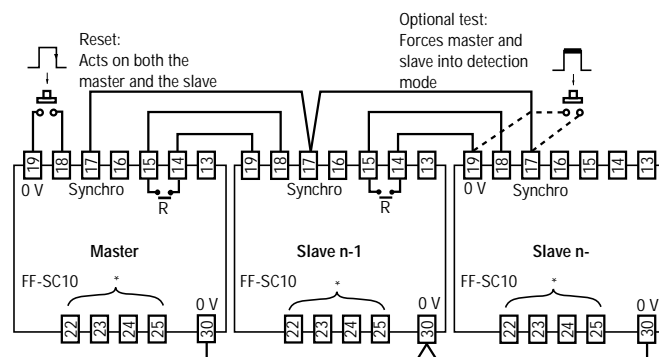
Position "0": Open



Position "1": Closed



Multiple amplifier connection



SR and SE switches positions:

Number of channels	Number of beams used	Position SR					Position SE				
		7	6	5	4	3	3	4	5	6	7
3	1 to 3	1	1	1	1	1	0	0	0	0	0
4	1 to 4	1	1	1	1	0	1	0	0	0	0
5	1 to 5	1	1	1	0	0	1	1	0	0	0
6	1 to 6	1	1	0	0	0	1	1	1	0	0
7	1 to 7	1	0	0	0	0	1	1	1	1	0
8	1 to 8	0	0	0	0	0	1	1	1	1	1

The 2 beam programming must be done by the manufacturer and cannot be modified by the user.

Restart mode:

SC in position 1 - 1: Automatic mode

SC in position 0 - 0: Start and restart mode

Connection diagram

(please refer to EN 954 for electrical interface)

Example with start and restart interlock / FSD monitoring.

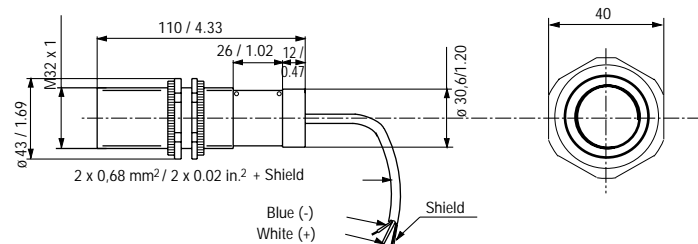
NO P/B: normally open contact of a push-button;
FSD: Final Switching Device.(1): RC (220 Ω + 0.22 μ F)
for ac interfaces, or varistors for dc interfaces.

FF-SCAN accessories

Explosion-proof photoelectric sensor

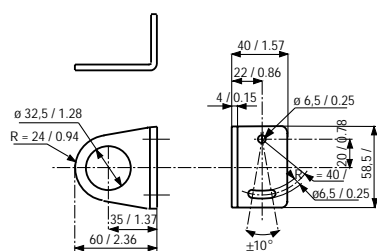
FF-MPFE/R32EX-□

(emitter and receiver) Cable length 2 m, 3 m, 5 m, 10 m /
6.56 ft, 9.84 ft, 16.4 ft, 32.8 ft



FF-MPZS32EX

Mounting bracket with adjustment
of $\pm 10^\circ$

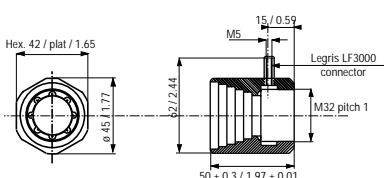


Order 2 mountings FF-MPZS32XP for
one beam.

FF-MPZT32EX

Protective hood

Connection on compressed air:
P = 0.3 Bar approximately

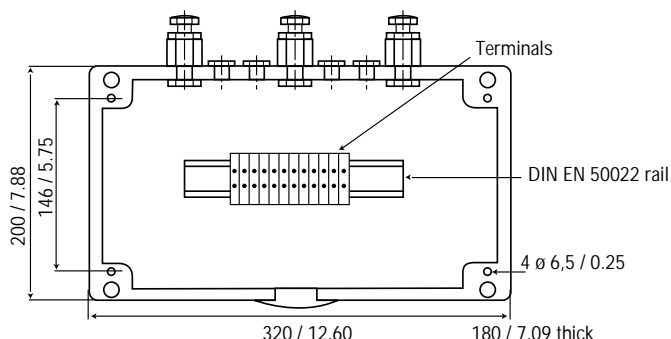


Order 2 hoods FF-MPZT32EX for
one beam to keep dust/paint
away from sensor lens.

Sensor

- Infrared through-scan detection
- Certified by the L.C.I.E. no. 91C6094.
- In accordance with CENELEC European standard EN 50014 and EN 50018.
- Group EEX "d" II CT6.
- Detection up to 15 m / 49.2 ft with the FF-SC10 amplifier.
- Max. response time: 30 ms
- Diameter of glass lens: $\varnothing 12$ mm / 0.47 in
- Sealing: IP 67 / NEMA 6.
- Aperture angle: $\pm 2^\circ$
- Operating temperature: 0 °C to 55 °C / 32 °F to 131 °F
- Material of the protective covering: Nickel-plated brass
- Explosion-proof cord extension: FF-MP1750EX (100 m / 328 ft of shielded cable, to be ordered separately)

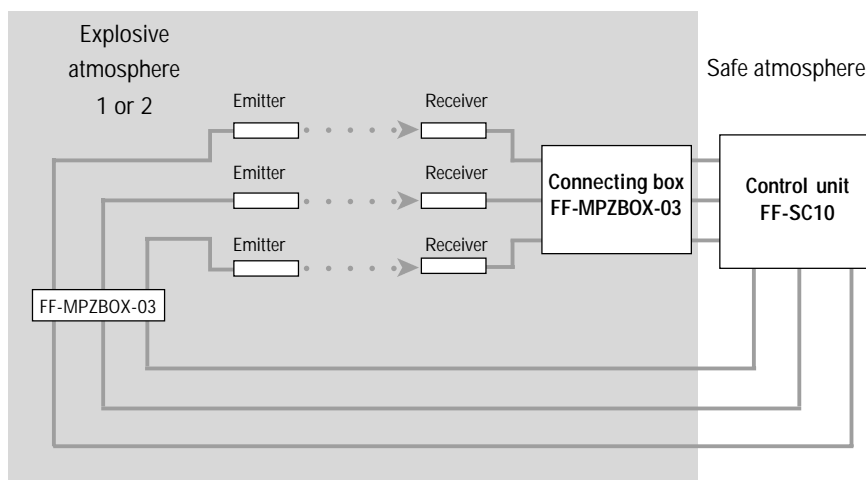
FF-MPZBOX-03



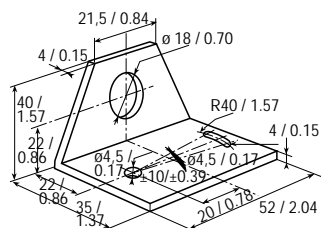
Connecting box

Box for the connection of 3 sensors max.

Application



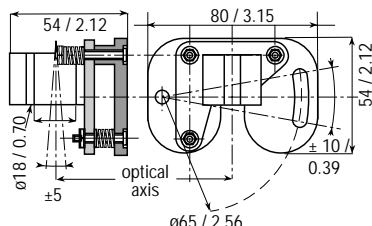
FF-MPZS1018



Basic bracket

- Suitable for detection distances up to 6 m / 19.7 ft
- Sturdy construction from 4 mm / 0.16 in aluminium alloy
- Black anodized finish
- Adjustable ($\pm 10^\circ$ azimuth)
- Mounting with 4 mm / 0.16 in screws

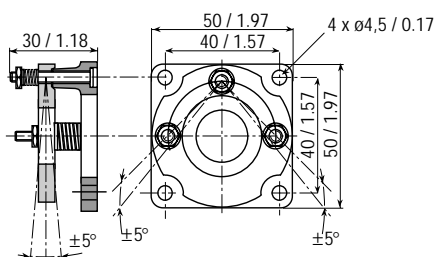
FF-MPZS2018



Adjustable sensor mounting bracket (parallel to optical axis)

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment ($\pm 5^\circ$: site / $\pm 10^\circ$: azimuth)
- Mounting with 4 mm / 0.16 in screws

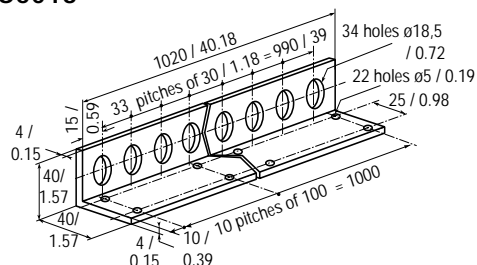
FF-MPZS3018



Adjustable sensor mounting bracket (perpendicular to optical axis)

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- Black anodized finish
- Adjustment springs
- Easy adjustment ($\pm 5^\circ$: site / $\pm 10^\circ$: azimuth)
- Mounting with 4 mm / 0.16 in screws

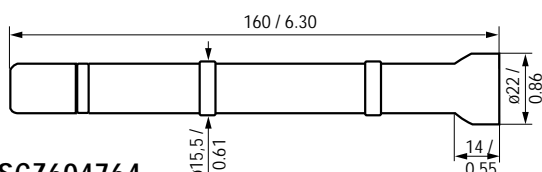
FF-MPZS6018



Sensor mounting rail

- Suitable for detection distances up to 33 m / 108.3 ft
- Sturdy construction from 4 mm / 0.16 in aluminium
- L-shaped extrusion 40 mm x 40 mm / 1.57 in x 1.57 in, 1 m / 3.28 ft long
- 18 mm / 0.70 in diameter sensor mounting holes, 30 mm / 1.18 in distance between centers
- Can be easily cut to any desired length
- Mounting with 5 mm / 0.19 in screws

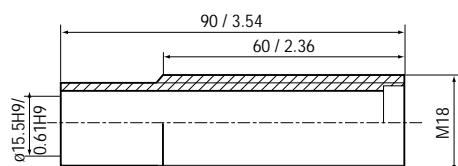
FF-SPZLASER



Laser pen

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its Ila class conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

FF-SCZ604764



Mechanical adapter M18x90

To be used with the laser pen (to be installed on the FF-MPZS4018 brackets).

FF-MP175090 and FF-MP1750EX



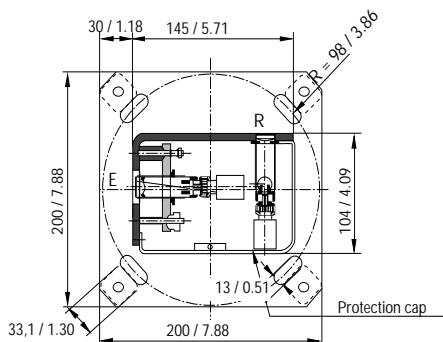
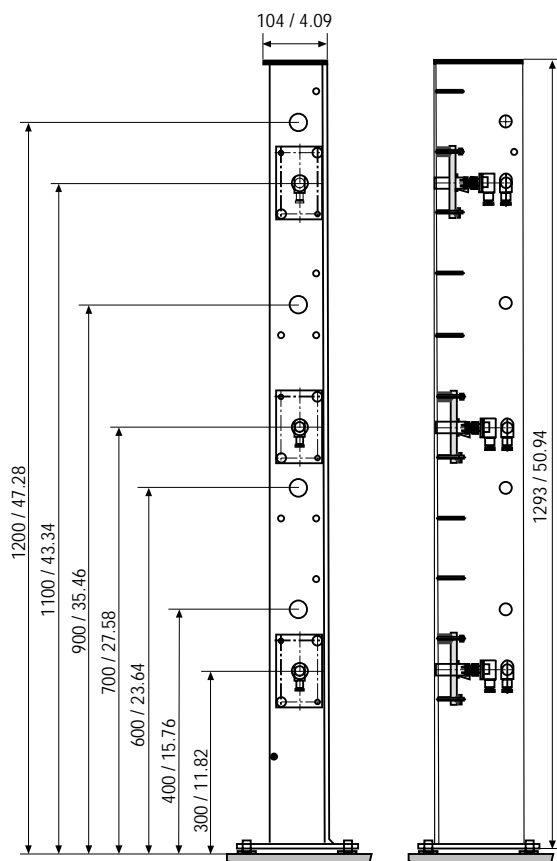
Shielded cable

FF-MP175090 100 m / 328 ft shielded cable (2 x 0,22 mm² / AWG32).

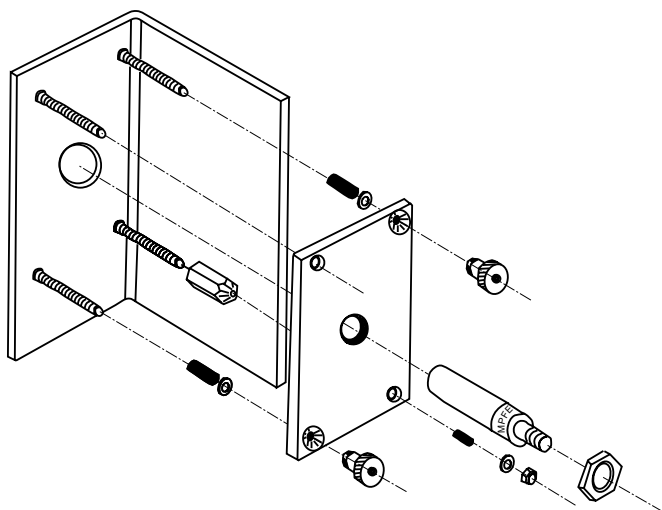
FF-MP1750EX 100 m / 328 ft shielded cable (2 x 0,68 mm² / AWG24) for explosive atmospheres.

FF-SCAN

FF-SCZS1218



FF-MPZS4018



Multibeam safety column for access control

- Floor mounting column for the FF-SCAN M18 sensor
- Mounting positions for sensors in compliance with European norm requirements for 2, 3, or 4 safety beams (EN 999)
- Optical alignment:
Vertical and angular column position easily adjusted
Separate mounting brackets FF-MPZS4018 for optimum adjustment of the emitters
- Emitters and receivers can be mounted together for fully closed areas
- Finish: RAL 1021 yellow paint
- Weight: 21 kg / 46.2 lbs

European norm (EN 999) specifies beam heights as follows:

Number of beams	Heights	
	mm	in
2	400 / 900	15.76 / 35.46
3	300 / 700 / 1100	11.82 / 27.58 / 43.34
4	300 / 600 / 900 / 1200	11.82 / 23.64 / 35.46 / 47.28

Typical applications

Access control for dangerous zones: robotic areas, automatic machinery, transporting and conveyor systems, punching and shearing machines, etc.

The FF-SCZS1218 safety column provides a full area trip protection when used with FF-SCZO...MIR deflection mirrors and the FF-SCAN modular safety curtain.

Bracket for FF-MPF emitter

The FF-MPZS4018 brackets allow optimum adjustments. They must be ordered separately and are not supplied with the FF-SCZS1218 column.

Order one bracket per emitter.

For alignment operation, the FF-SPZLASER laser pen can be installed on the emitter bracket with the FF-SCZ604764 mechanical adapter.

Type 4 self-contained single beam

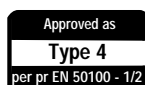
For access control

FEATURES

- Meets applicable parts of US OSHA 1910.212, ANSI B11.19 and RIA 15.06 for Control Reliability
- Active optoelectronic protective equipment, Type 4 according to the norm IEC/EN 61496 - parts 1 & 2
- **Protection against mutual interference by selection of the emission frequency**
- Through scan device with permanent self-checking ensuring the highest level of safety
- Power supplies: 120 Vac, 240 Vac and 24 Vdc
- Response time: 0.020 s
- Scanning range:
0,5 m to 40 m / 1.6 ft to 131.2 ft (*standard*)
0,5 m to 20 m / 1.6 ft to 65.6 ft (*lens heating*)
30 m to 75 m / 98.4 ft to 246 ft (*long range*)
- Beam aperture angle: $\pm 2^\circ$ in compliance with the norm IEC/EN 61496 - 2
- Connection: terminal strips or connectors
- Outputs: 2 safety relays with guided contacts
- Sealing: IP 67 / NEMA 6 (terminal) or IP 65 / NEMA 4 (connector)
- Available restart modes:
 - automatic restart
 - start interlock (at power up only)
 - start & restart interlock (at power up and after any beam interruption)
- Final Switching Devices monitoring input
- Test input
- Numerous LED status indicators
- Accessories: individual and adjustable beam deflection mirror, floor mounting deflection mirrors for 2, 3 or 4 beams
- Alignment aid kit: compact and self-contained laser pen, signal margin LED indicator

TYPICAL APPLICATIONS

Access control: perimetric protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.

INRS


The FF-SPS4 Active Optoelectronic Protective Device is a single through scan infrared beam designed to detect the body of an operator on approach to a dangerous zone.

The interruption of the beam de-energizes the output contacts which in turn de-energizes the machine stop circuitry.

The emission source is modulated infrared which makes the operation almost completely independent of ambient light conditions. Moreover, the device is equipped with an emission frequency selector to avoid possible mutual interference between sets.

The processing is a permanent dynamic self-checking principle meeting the requirements of the norm IEC/EN 61496 - parts 1 & 2 for Type 4 Electrosensitive Protective Equipment. Any internal failure will be immediately detected and disable the output relays.

The Canadian cCSA_{us} gave an approval to this device which meets applicable parts of US ANSI, RIA 15.06 standards and OSHA 29 CFR and 1910.212 regulations for Control Reliability.

The FF-SPS4 is preset with the start and restart interlock mode on delivery. The start and restart interlock guarantees that the equipment remains in alarm at power up or after an interruption of the beam. The operator must press a push-button to restart the protective equipment. However, an automatic restart can be easily programmed by internal switches.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SPS4

The receiver unit is equipped with 2 safety relays with guided contacts which can be directly used to stop the dangerous movement. However, most of the time, additional relaying (or Final Switching Devices) between the equipment outputs and the machine circuitry is necessary. For this reason, the FF-SPS4 has a Final Switching Device monitoring input to negate the use of a self-checking relay module. A test input is also available. The use of the test input sets the equipment in an alarm condition. When used in conjunction with the monitoring input, the test input facility provides the ability to regularly check the correct operation of interface relays.

A lens heating system is available on some models to prevent condensation where conditions of use may require such an equipment. These models can operate down to -25 °C / -13 °F ambient temperature.

LED indicators provide useful visual information on the equipment status during installation and operation. They ease beam adjustment and warn the operator about a lens contamination or misalignment before an unexpected emergency stop signal is generated.

The equipment is delivered with a pair of standard adjustable brackets for ease of installation. The use of deflection mirrors is a cost effective solution for designing multiple separate beam trip devices or perimetric protections around a dangerous area.

A laser pen is available as an accessory. It helps a single person adjust rapidly and easily the infrared beams even if deflection mirrors are used.

The device features the highest level of safety and can be used for a wide range of dangerous machines.

Multiple separate beams

Multiple separate beams are often used to detect the intrusion of the whole body rather than parts of the body.

The installation of a multiple separate beam arrangement has to be carried out in such a way that access to the dangerous moving parts is impossible without breaking the beams.

The EN 999 European standard gives the following formula for the calculation of the minimum safety distance between the dangerous zone and the detection plane. Compliance to this formula will ensure reliable detection of an operator and stop the dangerous motion before the operator reaches the danger:

$$S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}$$

$$\text{(or } Ds \geq 63 (t_1 + t_2) + 33.5 \text{ (in))} \quad Ds = S$$

S: Minimum safety distance (mm / in)

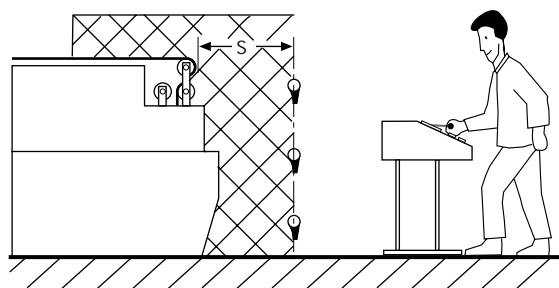
t1: Response time of the FF-SPS4 equipment (0.02 s)

t2: Response time of the machine (s), i.e. time required to stop the machine or remove the risk after receiving the output signal from the protective equipment

Recommended beam heights

EN 999 recommends the following heights which have been found to be the most practical in application for multiple separate beams.

Number of beams	Beam heights above the reference floor	
	mm	in
2	400 / 900	15.7 / 35.4
3	300 / 700 / 1100	11.8 / 27.6 / 43.3
4	300 / 600 / 900 / 1200	11.8 / 23.6 / 35.4 / 47.2



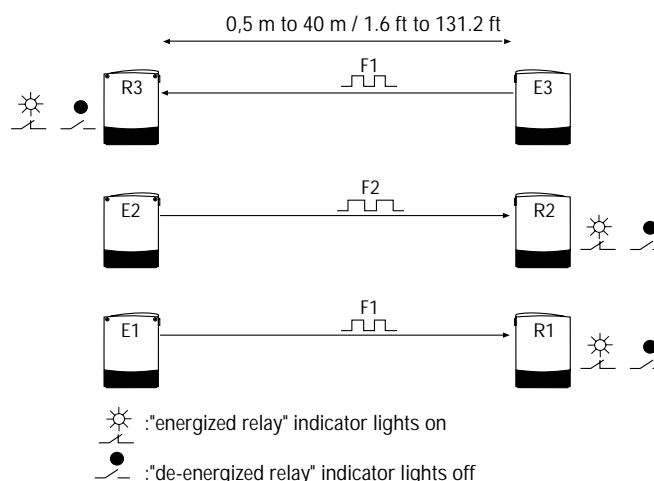
The number of beams to be used needs to be defined according to the risk assessment and to the importance for the machine operator to pass undetected. Particularly, during risk assessment, methods of defeating the safety equipment shall be taken into account before selecting the correct configuration.

Protection against mutual interference

When more than one FF-SPS4 is used, mutual interference may occur between sets.

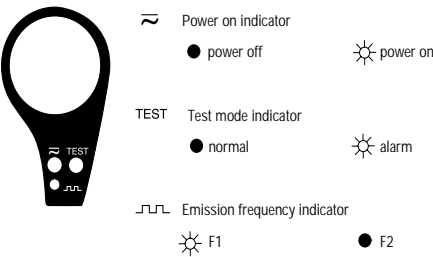
To avoid these undesirable disturbances, the device is equipped with internal switches designed to select the emission frequency F1 or F2 of the infrared modulated light. The position of these switches can be changed to avoid mutual interference between two systems.

In some cases, mutual interference can be cancelled by using two different emission frequencies and by reversing the transmission direction of the through scan beams. This would be the case for a three beam trip device for instance:

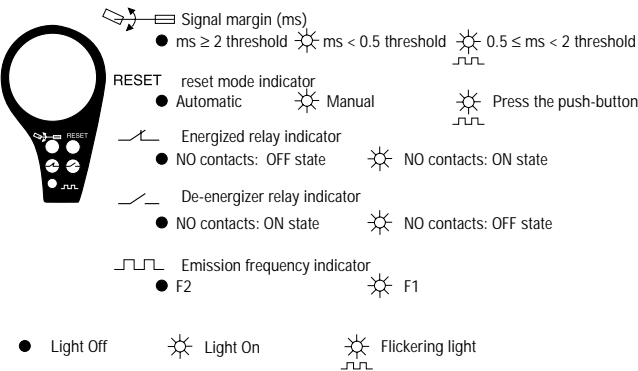


Status indicators

Emitter

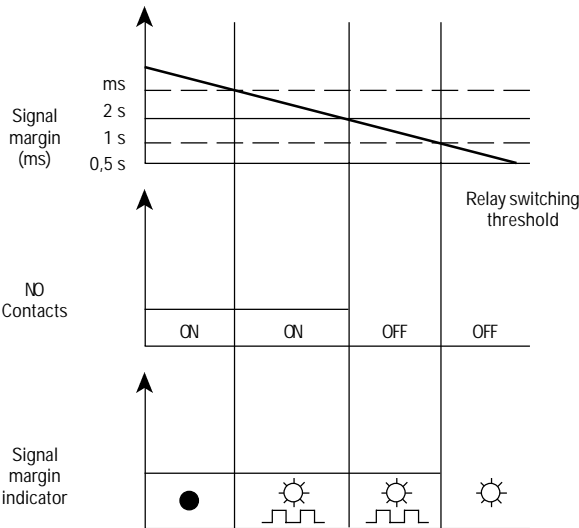


Receiver



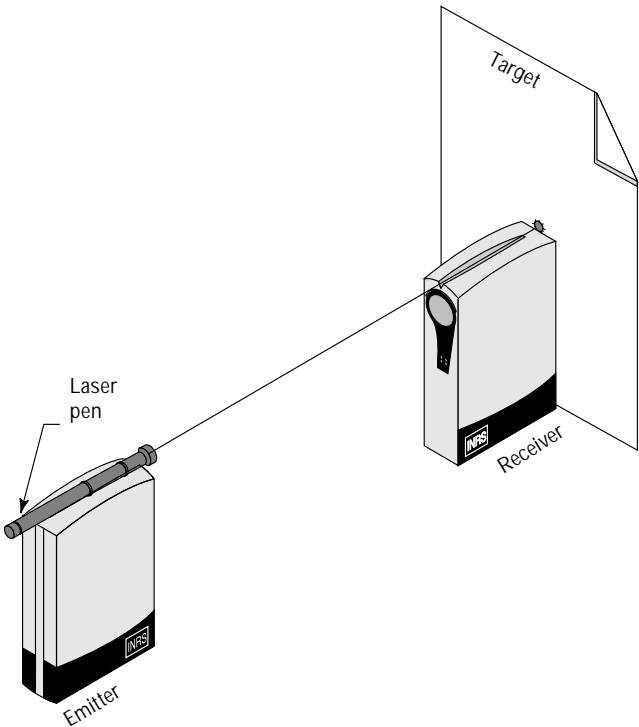
Operating diagram

(Output status/Reception signal)



Laser alignment procedure

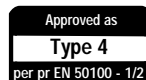
The use of the FF-SPZLASER pen is recommended to perform easy and fast beam alignment, particularly if the scanning distance is greater than 10 m / 32.8 ft. The FF-SPS4 equipment housing is designed to support the laser pen without any additional mechanical adapter. A location notch found on the top of the housing is designed to support the laser pen which should be used in conjunction with a target (such as a white sheet of paper) as shown below. However, in the absence of the laser pen, the notch can be used as a “backsight notch” to ease alignment operations.



FF-SPS4

FF-SPS4

- Type 4 according to IEC/EN 61496 - parts 1 & 2
- Scanning range up to 75 m / 246 ft without adjustment
- ø35 mm / 1.4 in detection capability
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Specifications	Power supply voltage	120 Vac or 240 Vac (+10%, -20%) 24 Vdc, ±15% ⁽¹⁾
	Power consumption	Standard: 8 • Long range: E = 4 VA / 3 W, R = 6 VA / 5 W • Lens heating: E = 7 VA, R = 9 VA
	Output switching capacity	2 A/250 Vac, 2 safety relays with guided contacts (10 mA min.)
	Material	Housing: Aluminium alloy, yellow painted according to RAL 1021 (polyurethane) Front face: polycarbonate
	Dimensions	Terminal: 187 mm x 120 mm x 50 mm / 7.4 in x 4.7 in x 2 in Connector: 277 mm x 120 mm x 50 mm / 10.9 in x 4.7 in x 2 in Lens emitter: ø35 mm / 1.4 in • Lens receiver: ø35 mm / 1.4 in
	Emission	Modulated infrared (880 nm), 2 selectable emission frequencies (50 Hz and 40 Hz)
	Power supply frequency	48 to 62 Hz (for the power supplies 120 Vac or 240 Vac)
	Resolution	ø35 mm / 1.4 in
	Alignment tolerance	± 2° in compliance with IEC/EN 61496 - 2 requirements
	Ambient temperature	Standard: 0 °C to 55 °C / 32 °F to 131 °F • Lens heating: -25 °C to 55 °C / -13 °F to 131 °F
	Sealing	Terminal: IP 67 or NEMA 6 • Connector: IP 65 or NEMA 4 and 13
	Noise immunity	Electrical: IEC 801-4, level IV • Electromagnetic: IEC 801-3, level IV
	Immunity to ambient light	Sun: 20 000 Lux • Lamp: 15 000 Lux
	Status indicator	LEDs display on unit front face
	Scanning range	Standard: 0,5 m to 40 m / 1.6 ft to 131.2 ft • Lens heating: 0,5 m to 20 m / 1.6 ft to 65.6 ft • Long range: 30 m to 75 m / 98.4 ft to 246 ft
	Electrical connection	Connecting terminals: snap-in clips or DIN 43652 connector model

Ordering information (Emitter/Receiver) ⁽²⁾

FF-SPS4 □ □ R □

Power supply voltage:

E: 120 Vac
G: 240 Vac
2: 24 Vdc ⁽¹⁾

With test input

Electrical wiring:
T: Terminal strip (snap-in-clip)
C: DIN 43652 connector

Scanning range:

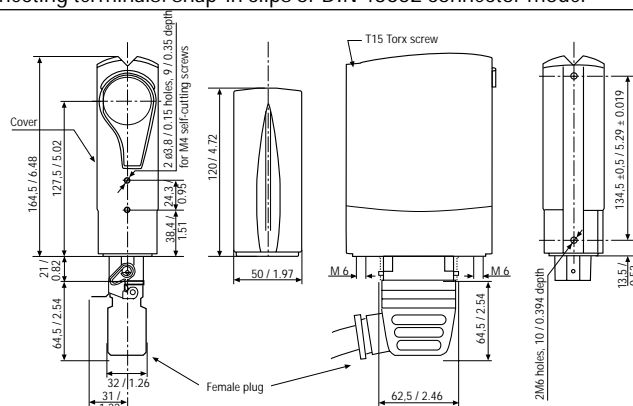
4: 0,5 m to 40 m / 1.6 ft to 131.2 ft (standard model)
2: 0,5 m to 20 m / 1.6 ft to 65.6 ft (lens heating model, available with terminal strip and Vac supply only)
7: 30 m to 75 m / 98.4 ft to 246 ft (long range)

Note

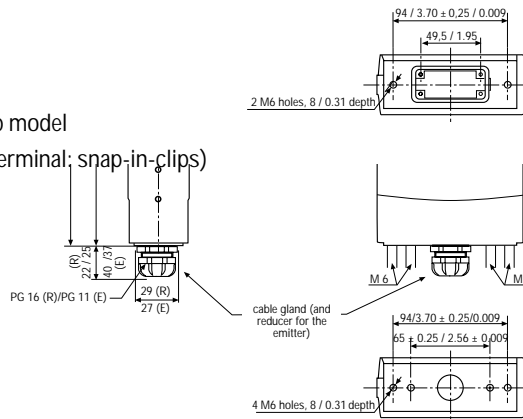
(1) - Dc versions are featured with a galvanic insulation (dc to dc converter) that provides immunity to external disturbances; this is essential to guarantee the safety integrity of the equipment.

(2) - The equipment is delivered with two standard brackets and two separate plugs (for the FF-SPS4□C□□ models) or two cable glands and one reducer (for the FF-SPS4□T□□ models).

DIN 43652 connector model



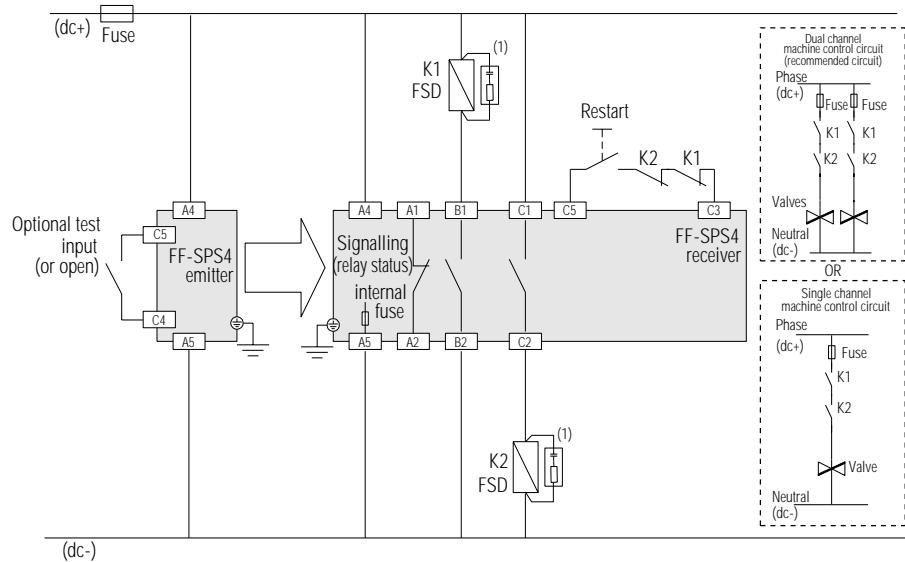
Terminal strip model (connecting terminal: snap-in-clips)



		Emitter	Receiver
Response time (10 ⁻³ s)	t1	20	
Mass per device	kg / lbs	1,15 / 2.5	1,35 / 3

Connection diagram

The FF-SPS4 can be easily connected to the machine control circuitry due to the FSD monitoring and start and restart interlock facilities:

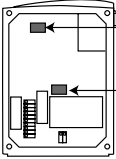
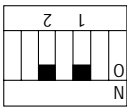
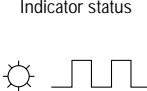
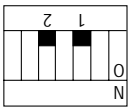
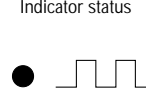
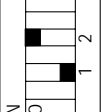
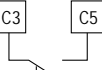
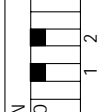
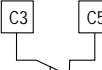
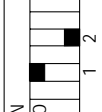
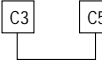
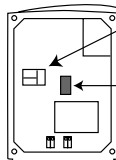

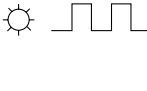

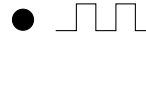

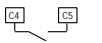

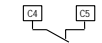


⁽¹⁾ RC (220 Ω + 0.22 µF) for ac interfaces or varistors for dc interfaces.
FSD: Final Switching Device.

Frequency switches and restart mode selectors

The position of the emission frequency switches must be changed on both the emitter and the receiver units otherwise the system remains permanently in alarm.

It is recommended to use the start and restart interlock facility when using the equipment as a trip device to control access to a dangerous zone. The restart push-button should be installed outside the dangerous zone. However, if the application does not require this facility, it can be removed using the following indications:

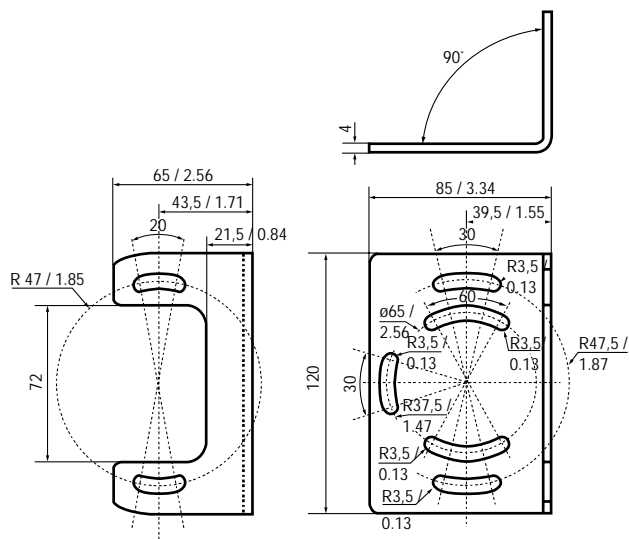
Position of the switches (see *)	Frequency F1 (50 kHz)	Frequency F2 (40 kHz)	Start & restart interlock	Start interlock	Automatic
Receiver 	 Indicator status 	 Indicator status 	 	 	 
Emitter 	 Indicator status 	 Indicator status 	Test input setting		
			Position of the jumper  NO test contact 	Position of the jumper  NC test contact 	

*Factory settings: the equipment is preset on the emission frequency F1 (50 kHz), Start & Restart interlock and a NO test contacts.

FF-SPS4

Accessories FF-SPS4

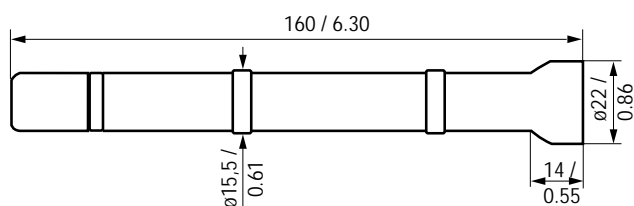
FF-SPZSPX001



Mounting bracket (already included in the FF-SPS4 package)

Mounting bracket for fixing a unit onto a wall (tool: Allen key no. 5).

FF-SPZLASER



Laser pen

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments. Its IIa class conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

Laser	Red visible light diode
Classification	Class II
Optical power	Max. 1 mW
Wavelength	635 nm
Beam diameter.	4 mm / 0.15 in
Beam spread	Less than 0,7 mrad
Supply	2 AAA batteries (1,5 V)
Endurance time	Typically 20 hours continuous
Lifetime	MTBF greater than 10 000 hours
Material	Aluminium
Weight	Approx. 80 gr / 0.17 lb (2.8 oz)

Tools

FF-SPZSCREW

Torx T15 screwdriver for FF-SPS4 cover.

FF-SBZCRIMP

Crimping tool for female contacts (for connector version).

FF-SBZREMOV

Removal tool for female contacts (for connector version).

Access control systems

FF-SPS4 Series

MAIN FEATURES

- Meets applicable parts of US OSHA 1910.212, ANSI B11.19 and RIA 15.06 for Control Reliability
- 2 or 3-beam electrosensitive protective devices designed in compliance with the IEC 61496-1/2 standard for Type 4 protective equipment
- Easy and quick installation
- Beam height in compliance with the EN 999 European standard
- Different models available with scanning ranges from 8 m to 75 m / 26.24 ft to 246 ft
- Supply voltages: 24 Vdc, 120 Vac, 240 Vac
- Selectable restart modes (automatic or manual restart)
- Final Switching Devices monitoring loop
- Mutual interference immunity
- Wiring: terminal strips, connectors or 10 m / 32.8 ft cable
- Laser pen for beam alignment

TYPICAL APPLICATIONS

Access control: perimetric protection around a robot zone, trip device at the entrance and the exit of a paint shop, etc.



The FF-SPS4 access control systems are protective equipment designed for the control of dangerous zones in Industry. The intrusion of a person inside the zone is detected by the interruption of one or several infrared beams permanently self-checked by an electronic circuitry which outputs an alarm signal toward the machine control circuitry. The opening of the output contacts due to the detection immediately stops the dangerous movement.

These systems offer different solutions which fit any need. Each system consists of two columns which support one or several FF-SPS4 single safety beams and 45° deflection mirrors for some of them. The nominal scanning distance of the beam allows to cover distances from 8 m to 75 m / 26.24 ft to 246 ft with or without mirrors, offering a cost effective solution. The installation of beams and mirrors is done on delivery to shorten time spent on setting up the system. The mechanics of both column and mirrors is designed to fulfill the requirements of the optics, and eases beam alignment adjustment. Moreover, a laser pen can be used to adjust beam alignment quickly.

The integrated functions simplify the electrical interfacing of the machine control circuits while saving cost: the restart input and the final switching device monitoring loop reduce the number of components used in the interface with two relays (with guided contacts). Prewired models are also available and add flexibility to the application.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

2-beam access control systems

- Scanning ranges: 0 m to 20 m / 0 ft to 65.6 ft, 5 m to 75 m / 16.4 ft to 246 ft⁽¹⁾
- Terminal strips or connector option
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability, and IEC/EN 61496 - parts 1 & 2 requirements for Type 4 protective equipment

INRS


Approved as
Type 4
per pr EN 50100 - 1/2

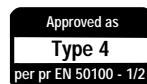

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Range	0 m to 20 m / 0 ft to 65.6 ft	5 m to 75 m / 16.4 ft to 246 ft ⁽¹⁾
Beam heights		400 mm and 900 mm / 15.76 in and 35.4 in	
Supply voltages		120 Vac (+10 %, -20 %), 240 Vac (+10%, -20%), 24 Vdc (±15%) ⁽²⁾	
Consumption		10 VA or 8 W per system 20 VA or 16 W per system	
Outputs		Contacts: 2 NO + 1 NC • Switching capacity: 2 A/250 Vac (10 mA min.)	
Response time		0.02 s	
Inputs		Manual or automatic restart / FSD monitoring loop ⁽³⁾	
Material		Column: steel (4 mm / 0.15 in in thickness), yellow painted according to RAL 1021 (epoxy)	
Dimensions		1170 mm x 133 mm x 128 mm / 46.09 in x 5.24 in x 5.04 in Base plate: 200 mm x 200 mm / 7.88 in x 7.88 in	
Emission		Modulated infrared LED (880 nm), 2 emission frequencies: 40 kHz or 50 kHz	
Effective aperture angle		≤ 1,6°	≤ 2,5°
Ambient temperature		0 °C to 55 °C / 32 °F to 131 °F	
Sealing		FF-SPS4 single beam: IP 67 or NEMA 6 • Connector: IP 65 / Rewired: IP 54	
Electrical immunity		IEC 801-4 (level IV), IEC 801-3 (level III)	
Optical immunity		Sun: 20 000 Lux • Lamp: 15 000 Lux	
Indicators		Front panel LEDs	
Connecting terminals		Terminal strips located on each FF-SPS4 units connectors located at the bottom of each column	Connectors located at the bottom of each column
Tools (refer to the accessories section) FF-SPZLASER Laser pen for beam alignment FF-SCZ604764 Mechanical adapter for laser pen For safety distances see Type 4 self-contained single beam section			
Notes (1) This system does not fully comply with certain requirement of the IEC 61496-2 standard for distances below 5 m / 16.4 ft. If necessary, use models with a smaller nominal scanning range. (2) The 24 Vdc models are featured with a galvanic insulation (dc/dc converter) that provides the immunity to external disturbances: this is essential to guarantee the safety integrity of the equipment (per IEC 61496-1 standard) (3) Final Switching Devices (4) Order each of the two listings for a complete system. Each column is delivered with a protective cover (refer to the accessories section).		Ordering information⁽⁴⁾ FF-SPS4ERX□-□ — Connection blank: individual terminal strips 1: intermediary connector — Supply voltage E: 120 Vac G: 240 Vac 2: 24 Vdc ⁽²⁾ FF-SPZ12MIR	
		Ordering information⁽⁴⁾ FF-SPS4□□X□-1 — Supply voltage E: 120 Vac G: 240 Vac 2: 24 Vdc ⁽²⁾ — Columns ⁽⁴⁾ EE: emitting column RR: receiving column	

FF-SPS4

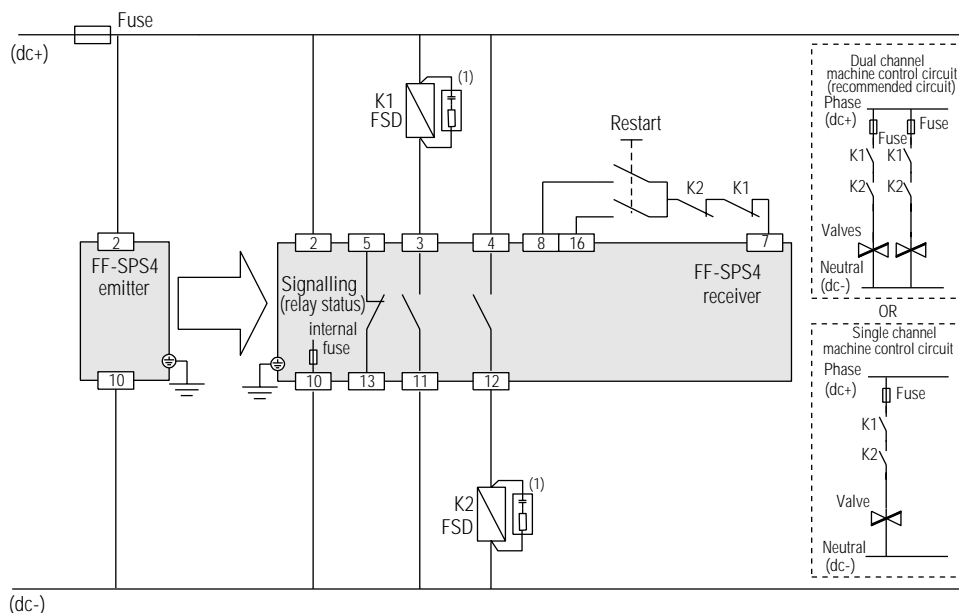
3-beam access control systems

- Scanning ranges 0 m to 8 m / 0 ft to 26.24 ft, 5 m to 75 m / 16.4 ft to 246 ft
- Terminal strips or connector option
- Meets applicable parts of US OSHA, ANSI and RIA for Control Reliability, and IEC/EN 61496 - parts 1 & 2 requirements for Type 4 protective equipment



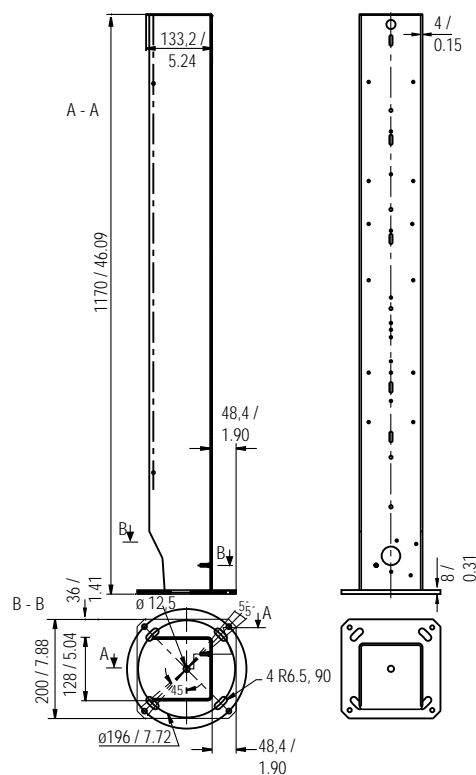
Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Features	Range	0 m to 8 m / 0 ft to 26.24 ft	5 m to 75 m / 16.4 ft to 246 ft
Beam heights		300 mm, 700 mm and 1100 mm / 11.82 in, 27.58 in and 43.34 in	
Supply voltages		120 Vac (+10 %, -20 %), 240 Vac (+10%, -20%), 24 Vdc (±15%) ⁽¹⁾	
Consumption		10 VA or 8 W per system	30 VA or 24 W per system
Outputs		Contacts: 2 NO + 1 NC / switching capacity : 2 A/250 Vac (10 mA min.)	
Response time		0.02 s	
Inputs		Manual or automatic restart / FSD monitoring loop ⁽²⁾	
Material		Column: steel (4 mm / 0.15 in thickness), yellow painted according to RAL 1021 (epoxy)	
Dimensions		1170 mm x 133 mm x 128 mm / 46.09 in x 5.24 in x 5.04 in, base plate: 200 mm x 200 mm / 7.88 in x 7.88 in	
Emission		Modulated infrared LED (880 nm), 2 emission frequencies: 40 kHz or 50 kHz	
Effective aperture angle		≤ 1,6°	≤ 2,5°
Ambient temperature		0 °C to 55 °C / 32 °F to 131 °F	
Sealing		FF-SPS4 single beam: IP 67 or NEMA 6 • Connector: IP 65 / Prewired: IP 54	
Electrical immunity		IEC 801-4 (level IV), IEC 801-3 (level III)	
Optical immunity		Sun: 20 000 Lux • Lamp: 15 Lux	
Indicators		Front panel LED's	
Connecting terminals		Terminal strips located on each FF-SPS4 unit Connectors located on each FF-SPS4 unit	Connectors located at the bottom of each column
Tools (refer to the accessories section) FF-SPZLASER Laser pen for beam alignment FF-SCZ604764 Mechanical adapter for laser pen For safety distances see Type 4 self-contained single beam section			
Notes (1) The 24 Vdc models are featured with a galvanic insulation (dc/dc converter) that provides the immunity to external disturbances: this is essential to guarantee the safety integrity of the equipment (per IEC 61496-1 standard) (2) Final Switching Devices (3) Order each of the two listings for a complete system. Each column is delivered with a protective cover (refer to the accessories section).		Ordering information ⁽³⁾ FF-SPS4□M1□□ Connection blank: individual terminal strips 2: individual connector Supply voltage E: 120 Vac G: 240 Vac 2: 24 Vdc ⁽¹⁾ Columns ⁽³⁾ E: emitting column R: receiving column	
		Ordering information ⁽³⁾ FF-SPS4□□□□-1 Supply voltage E: 120 Vac G: 240 Vac 2: 24 Vdc ⁽²⁾ Columns ⁽³⁾ RER: emitting and receiving column ERE: emitting and receiving column	



(1): RC ($200\ \Omega + 0.22\ \mu\text{F}$) for ac interfaces, or varistors for dc interfaces.

Dimensions (in mm / in)



• Tools (to be ordered separately)

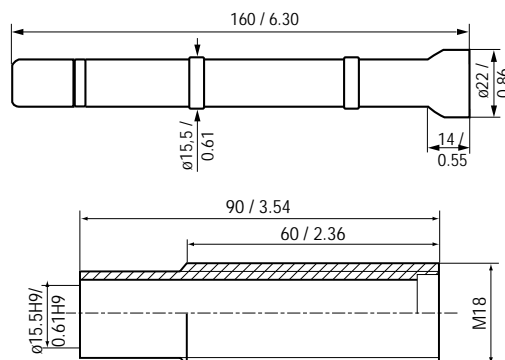
FF-SPZLASER

The laser pen FF-SPZLASER is a self-contained and compact laser device designed to ease infrared beam alignments; its II class conforms to the EN 60825 European standard and the US 21 CFR 1040 American standard.

FF-SCZ604764

Mechanical adapter M18 x 90.

To be used for the installation of the laser pen on the columns.



Safety Products

Detector™ 3 Series

Safety Light Curtain Detector™ 3

Blanking capability: fixed and floating

FEATURES

- Meets applicable parts of US OSHA 29CFR 1910.212, 1910.217 and ANSI B11.1, B11.2, B11.19, B11.20 and R15.06
- Independent testing and certification by Canadian Standards (NRTL/C) per CSA 22.2-0.8 and 22.2-14
- Safety outputs: two relays with force-guided contacts
- Floating blanking (1 beam)
- Fixed blanking capability using optional external blanking windows (up to 5 contiguous beams)
- Easy to install and mount
- Adaptable and versatile controller - one or two emitter/receiver pairs can share the same controller

APPLICATIONS

- Area guarding
- Automated assembly
- Automatic sand blasters
- Component insertion
- Die casting machines
- Encapsulated machines
- Filter presses
- Hydraulic presses
- Injection molding
- Load/unload stations
- Packaging/converting
- Robotic systems
- Special machine guarding
- Weld lines



Honeywell's Detector™3 safety light curtain is a compact, state-of-the-art, 3-box light curtain system used to protect personnel from hazardous equipment. It provides dependable personnel protection without the interference of mechanical guards. The light curtain produces an array of invisible infrared light beams between an emitter and a receiver. If a person or object interrupts the detection field, the Detector™3 controller activates its output relays, sending a stop signal.

Detector™3 complies with OSHA 29CFR 1910.212 "General Machine Guarding" and 1910.217 "Mechanical Power Presses", ANSI B11.1 "Mechanical Power Presses", B11.2 "Hydraulic Power Presses", B11.19 "Performance Criteria for Safeguarding"; B11.20 "Manufacturing Systems/Cells"; and R15.06 "Industrial Robots and Robot Systems".

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information
 - Complete installation, operation and maintenance information is to be referenced for each product.
- Failure to comply with these instructions could result in death or serious injury.

Safety Products

Safety Light Curtain Detector™ 3



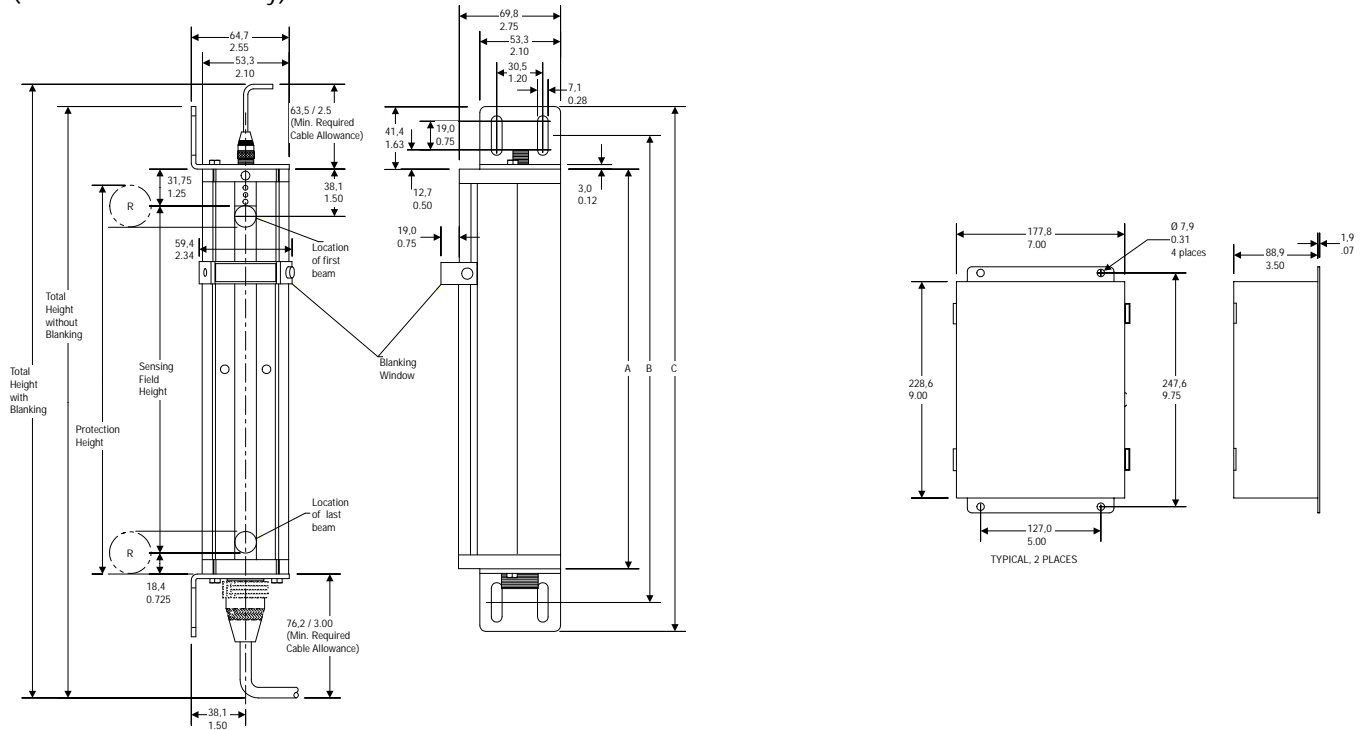
- Blanking capability: fixed and floating

Dimensions in inches / millimeters, feet / meters, weights in lbs / kg

Specifications		General
	Protection heights (in/mm)	184 to 1860 mm / 7.25 to 73.25 in - See Table 1
	Scanning range (ft/m)	Standard: 0 to 7,6 m / 0 to 25 ft Extended: 0 to 15,3 m / 0 to 50 ft
	Resolution (min. object sensitivity)	31,75 mm / 1.25 in - See Table 2
	Effective aperture angle	± 3.5° for emitter and receiver
	Emission	Pulsed infrared light (880 nm)
	Blanking/Floating	Fixed: external blanking window required (for first beam, master blanking window required; for each additional beam, 1 slave blanking window is required, up to 4 slaves) Floating: 1 beam floating capability standard via switch inside the controller
	Response time	30 ms to 40 ms - See Table 1 75 ms max. - for the weld controllers
	Outputs	2 stop relays with force-guided contacts; plus 1 auxiliary relay and 4 solid state indicator outputs
	Switching capacity	4 A/240 Vac or DC resistive; selectable NO or NC contact available with all outputs relays
	Indicator outputs	4 open collector NPN, opto-isolated 70 Vdc/2 mA maximum when "ON"
	Inputs	
	Supply voltage	24 Vdc +10%, -20%; 120/240 Vac ± 10% selectable 50/60 Hz
	Power consumption	27 VA maximum, 27 watts maximum
	Emitter/Receiver sets	2 sets (any height) can be connected to same control box
	FSDs/MPCEs Monitoring input	Dry contacts rated 20 mA when contacts are closed and 20 Vdc when open;
	Selectable restart interlock (reset required after detection field interruption)	Closure to ground. Max. on voltage 20 V/2 mA when "ON"
	Selectable start interlock (reset required at power up)	Closure to ground. Max. on voltage 20 V/2 mA when "ON"
	Indicators	Emitter: Amber (Power ON) Receiver: Green (unobstructed), Red (obstructed), and flashing amber (floating enabled) Control box: Green (unobstructed/output relays energized), Red (stop signaled/output relays de-energized), Yellow (reset required), flashing amber (floating enabled)
	Material	
	Emitter and receiver Housing	Extruded aluminium 0.12 in/3 mm wall minimum
	End caps	Black nylon, glass reinforced
	Window	Polymethyl methacrylate (PMMA)
	Control box (dimensions)	14 gauge (0.075 in / 1.9 mm) welded steel with keylock included: enclosure 17,8 x 22,9 x 8,9 cm / 7 x 9 x 3.5 in
	Cables (dimensions)	1,5; 4,6; 9,1; 15,2 and 30,5 m / 5, 15, 30, 50 and 100 ft / with connector on one end
	Environmental	
	Emitter, Receiver Sealing	NEMA 4 / IP 65
	Control Box Sealing	(See Order Guide)
	Cable Sealing	NEMA 4 / IP 65 connector; oil-resistant PVC cable
	Operating temperature	0 to 50° C / 32° to 122° F
	Humidity	30 - 95% relative humidity, non condensing
	Vibration	10 g, 0.03 inch displacement, 10-150 Hz frequency (3 axes):
	Shock testing	50 g, 11 ms pulse per MIL-STD-810 C, Method 516, Procedure 1 (applies to all 3 axes)
	Weight	
	Emitter or receiver	0,64 to 5,17 kg / From 1.4 to 11.3 lbs - See Table 1
	Control box	4 kg / 9 lbs

○ Mounting dimensions

(mm/in for reference only)



○ Table 1: Safety light curtain characteristics

Dimensions in mm/in, weights in kg/lbs, response times in ms

Model	06	12	18	24	30	36	42	48	60	72
Protection height (mm/in) (1)	184,2 7.25	336,6 13.25	489 19.25	641,4 25.25	793,8 31.25	946,2 37.25	1098,6 43.25	1251 49.25	1555,8 61.25	1860,6 73.25
Sensing field height (mm/in)	146,1 5.75	298,5 11.75	450,9 17.75	603,3 23.75	755,7 29.75	908,1 35.75	1060,5 41.75	1212,9 47.75	1517,7 59.75	1822,5 71.75
Total height without blanking (in/mm) (2)	314,3 12.38	466,7 18.38	619,1 24.38	771,5 30.38	923,9 36.38	1076,3 42.38	1228,7 48.38	1381,1 54.38	1685,9 66.38	1990,7 78.38
Total height with blanking (mm/min) (3)	336,6 13.25	489 19.25	641,4 25.25	793,8 31.25	946,2 37.25	1076,3 43.25	1251 49.25	1403,4 55.25	1708,2 67.25	2013 79.25
Response time with stand. controller (ms)	30	30	30	30	35	35	35	35	40	40
Response time with weld controller (ms)	75	75	75	75	75	75	75	75	75	75
Weight per device (kg / lbs)	0,64 1.4	1,05 2.3	1,46 3.2	1,87 4.1	2,29 5	2,7 5.9	3,11 6.8	3,52 7.7	4,34 9.5	5,17 11.3
A	196,9 7.75	349,3 13.75	501,7 19.75	654,1 25.75	806,5 31.75	958,9 37.75	1111,3 43.75	1263,7 49.75	1568,5 61.75	1873,3 73.75
B	241,3 9.50	393,7 15.50	546,1 21.50	698,5 27.50	850,9 33.50	1003,3 39.50	1155,7 45.50	1308,1 51.50	1612,9 63.50	1917,7 75.50
C	279,4 11.00	431,8 17.00	584,2 23.00	736,6 29.00	889 35.00	1041,4 41.00	1193,8 47.00	1346,2 53.00	1651 65.00	1955,8 77.00

(1) Protection height for the min. object sensitivity or resolution

(2) Total height including bracket and connector

(3) Total height including connectors when a blanking window is used

○ Table 2: Safety light curtain blanking characteristics

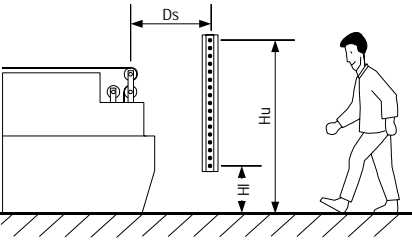
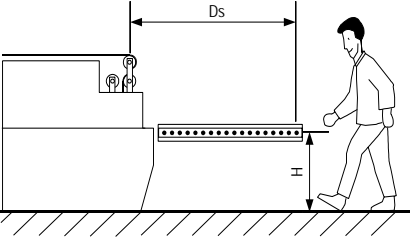
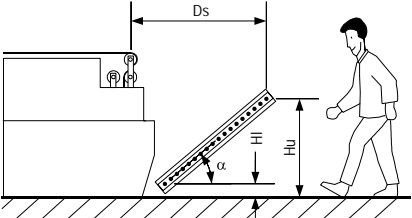
	Without blanking		1 beam blanking		2 beam blanking		3 beam blanking		4 beam blanking		5 beam blanking	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
Resolution R*	31,75	1.25	50,80	2	69,85	2.75	88,90	3.50	107,95	4.25	127	5
Beam spacing	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75	19,05	0.75
Beam diameter	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50	12,70	0.50

*Minimum object sensitivity

For application help: call 1-800-537-6945

Honeywell Sensing and Control 3

○ Safety distances per USA's OSHA/ANSI requirements (in inches, 1 in = 25.4 mm)

$Ds = K \times (Ts + Tc + Tr) + Dpf$	Without blanking 1.25 in resolution (Minimum object sensitivity)	1-beam blanking* 2 in resolution Minimum object sensitivity
Normal approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 3.3$ Note: If Hu is less than 48", then $Dpf = 48"$ (reach over).	$Ds = 63 \times (Ts + Tc + Tr) + 5.9$ for 1 beam blanked (2.0" resolution) Note: If more than one contiguous beam is blanked, the resolution (minimum object sensitivity) becomes greater than 2.5", then : - $Dpf = 36"$ if Hu is greater or equal to 48" (reach through) or, - $Dpf = 48"$ if Hu is less than 48" (reach over).
Parallel approach		
	$Ds = 63 \times (Ts + Tc + Tr) + 48$	$Ds = 63 \times (Ts + Tc + Tr) + 48$ Note: H is to be not greater than 39 inches. if the blanked area is not entirely obstructed, H is not to be less than : - 7" for 2 contiguous blanked beams (2.75" resolution) or, - 15" for 3 contiguous blanked beams (3.5" resolution) or, - 30" for 4 contiguous blanked beams (4.25" resolution) or, - 39" for 5 contiguous blanked beams (5" resolution).
Angled approach		
	If $\alpha \geq 30^\circ$ then use a normal approach formula. If $\alpha \leq 30^\circ$ then use a parallel approach formula.	

Where:

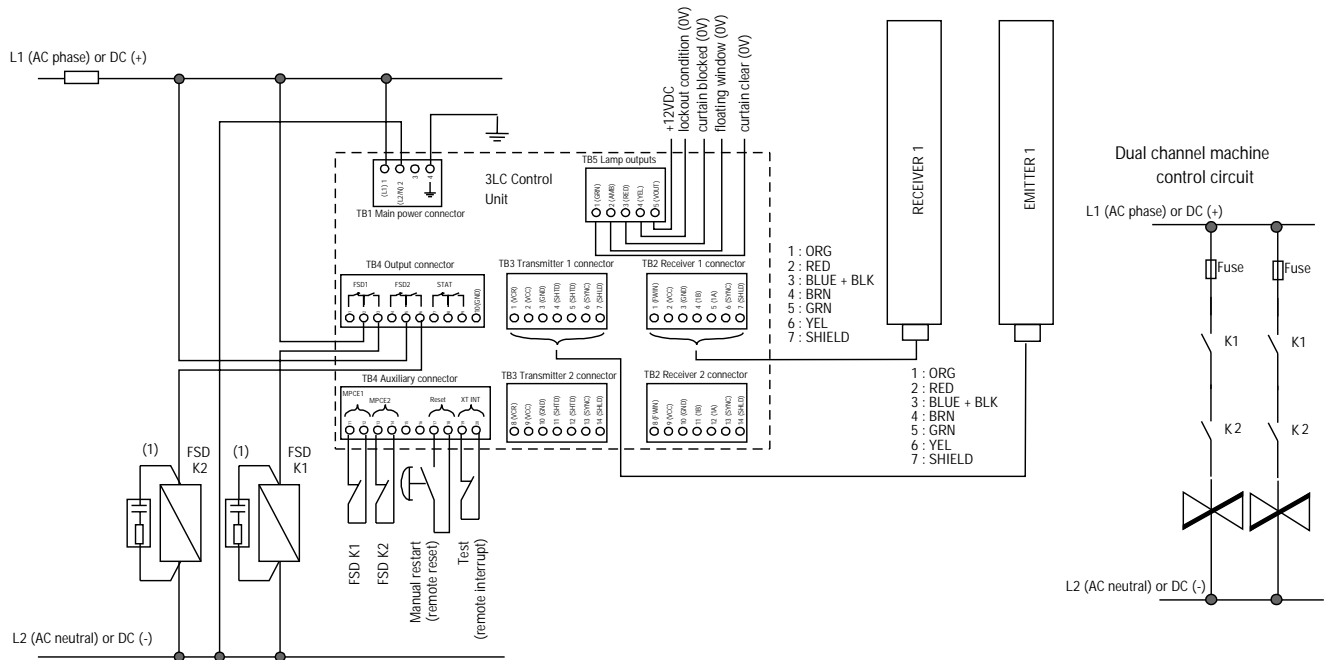
Ds Minimum safety distance
 K Approach speed (called "hand speed") = 63 in/sec
 Ts Worst case stopping time of the machine (seconds)
 Tc Worst case response of the machine's control (seconds)
 Tr Response time of the safety devices (light curtain plus its interface – meaning the response time including the mechanical relay outputs in seconds)
 Dpf Depth penetration factor (inches)
 H height of the detection plane above the reference floor (inches)
 Hu height of the uppermost beam above the reference floor (inches)
 Hl height of the lowest beam above the reference floor (inches). For Normal approach, assumption is that Hl is not greater than 12 inches unless the application prevents access even with Hl at a distance greater than 12 inches)

(*) Floating or fixed blanking windows affect safety distance

USA's OSHA and ANSI safety distance formulas state that if the resolution (minimum object sensitivity) increases, the safety distance must also increase. If the blanked area is not completely physically obstructed, use of blanking windows requires moving the light curtain farther back from the hazardous area. The rule for increasing the safety distance is to add 2.6 in. to the safety distance for one beam blanked if the blanked area is not obstructed physically. If two or more contiguous beams are blanked then the Depth penetration factor (Dpf) is at least 36" when Hu is greater or equal to 48" (personnel are detected while reaching through the light curtain field). However Dpf is at least 48" if the Hu is less than 48" (personnel are detected reaching over the light curtain field). The light curtain must be sized and installed such that a stop would be signaled and the hazard cease prior to a person accessing the hazard. If the blanked area is entirely blocked by a fixture, the safety distance remains unchanged. Blanking two beams or more can create a large unprotected area through the light curtain. If this passageway is not completely filled by a fixture, personnel would be subject to a dangerous working environment.

For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 and 1910.217, ANSI B11.1, B11.2, B11.19, B11.20 and R15.06).

○ Wiring diagram example using external relaying and manual restart (remote reset)



(1) RC (220 Ω + 0.22 mF) for ac interfaces, varistors (31 Vdc) for dc interfaces

For other configurations and capabilities, see the product installation manual.

Detector safety light curtain

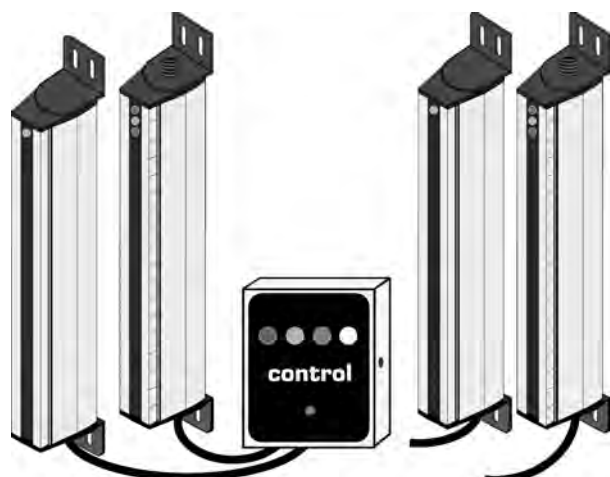
Detector™3 provides excellent protection. Once properly installed, Detector does not require additional adjustment, and no maintenance is required.

Detector™3's controller is both adaptable and versatile. One or two emitter/receiver pairs can use the same controller. The controller contains a power supply, light curtain logic, relays outputs, and configuration switches. These switches are used to configure the system: one or two sets of emitter/receiver pairs and other options.

After installation, access to the controller interior is not necessary. To secure the installation and configuration, close and lock the controller.

For added security and to comply with supervisory control requirements, the controller is equipped with a keyed reset switch. To reset, turn the keyed reset switch to the right (clockwise).

○ Ordering a system



System:
1 or 2 emitter / receiver pairs,
2 or 4 cables and control box

1. Select the appropriate control box.
2. Determine the protected height requirements.
3. Select the appropriate emitter/receiver pair to match the application requirements.
4. Select the appropriate cable length(s) to match the installation requirements.

○ Control box order guide

Catalog Listing	Description
3LC-B	NEMA 2 and IP 52 enclosure, 120/240 Vac (selectable)
3LC-BW	NEMA 2 and IP 52 enclosure with 75 ms response for welding applications, 120/240 Vac (selectable)
3LC-B24	NEMA 2 and IP 52 enclosure, 24 Vdc
3LC-B4	NEMA 4 and IP 65 enclosure with 120/240 Vac (selectable)

Note: cable glands are not included (customer supplied)

○ Emitter/receiver pair order guide

Standard Range - up to 25 ft (7.6 m) scanning range		
Catalog Listing	Protection Height	
	(mm)	(in)
3LC06	184,2	7.25
3LC12	336,6	13.25
3LC18	489	19.25
3LC24	641,4	25.25
3LC30	793,8	31.25
3LC36	946,2	37.25
3LC42	1098,6	43.25
3LC48	1251	49.25
3LC60	1555,8	61.25
3LC72	1860,6	73.25

Extended Range - up to 50 ft (15.3 m) scanning range		
Catalog Listing	Protection Height	
	(mm)	(in)
3LC06X	184,2	7.25
3LC12X	336,6	13.25
3LC18X	489	19.25
3LC24X	641,4	25.25
3LC30X	793,8	31.25
3LC36X	946,2	37.25
3LC42X	1098,6	43.25
3LC48X	1251	49.25
3LC60X	1555,8	61.25
3LC72X	1860,6	73.25

○ Cables* order guide

Catalog Listing	Description	
	(m)	(ft)
3LC-C05	1,52	5
3LC-C15	4,57	15
3LC-C30	9,14	30
3LC-C50	15,24	50
3LC-C100	30,48	100

*Order two cables for a complete emitter and receiver pair.

○ Blanking window* order guide

Catalog Listing	Description
3DBWM-24	Master, 0,61 m / 24 in cable length
3DBWM-48	Master, 1,22 m / 48 in cable length
3DBWM-72	Master, 1,83 m / 72 in cable length
3DBW-S	Slave for any size
*Order 1 master and up to 4 slaves	

Maximum of five beams may be blanked; this does not include the floating blanking window.

Fixed blanking windows can be used with floating blanking window.

Master fixed blanking windows have cables that connect to the top of the receiver.

Slave fixed blanking windows look like a master window, but have no cable.

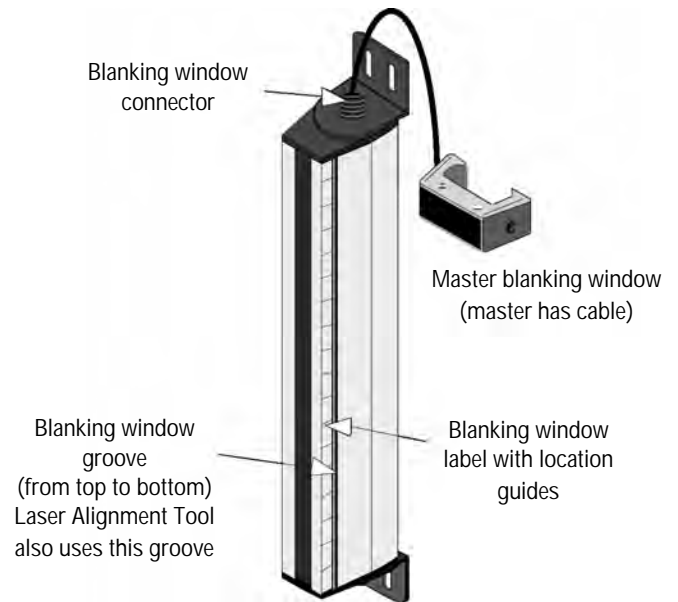
Slave fixed blanking windows snap on top of Master – no jumpers are required.

○ Weld shield kits** order guide

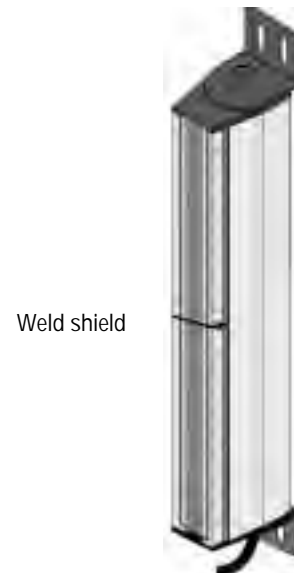
Catalog Listing	Protection Heights	
	(mm)	(in)
3WS06	184,2	7.25
3WS12	336,6	13.25
3WS18	489	19.25
3WS24	641,4	25.25
3WS30	793,8	31.25
3WS36	946,2	37.25
3WS42	1098,6	43.25
3WS48	1251	49.25
3WS60	1555,8	61.25
3WS72	1860,6	73.25
**Weld shield kit; 1 clear acrylic (plastic) shield with mechanical clips that attach to blanking window grooves		

○ Other accessories order guide

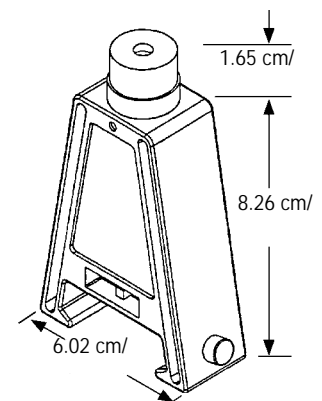
Catalog Listing	Description
3LC-LAT	Laser alignment tool, 3V lithium battery, 20-hour life



○ Weld shields (external)



○ Laser alignment tool



Safety Light Curtain Detector™ 3

Detector™ 3 Series

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA

1-800-737-3360 Canada

1-815-235-6847 International

FAX

1-815-235-6545 USA

INTERNET

www.honeywell.com/sensing

info.sc@honeywell.com

Honeywell

Sensing and Control
Honeywell
11 West Spring Street
Freeport, Illinois 61032



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www.honeywell.com/sensing/

Safety Mat

based on a fiber optic technology

FEATURES

- Meets applicable parts of US ANSI B11.19.1990, ANSI/RIA 15.06-1992 standards, OSHA 1910.212, 1910.217 regulations and European EN 1760-1 standard for Pressure Sensitive Protective Devices
- Permanent self-checking electronic designed in compliance with the requirements of the EN 954-1 standard for **Category 4 Electrosensitive Protective Devices**
- Sensor based on a fiber optic technology for a positive light operating mode and designed in compliance with the requirements of the EN 954 - 1 standard for Category 3 protective devices
- Standard sizes in mm (and ft): 500x750 (1.64x2.46), 500x1000 (1.64x3.28), 500x1500 (1.64x4.92), 750x750 (2.46x2.46), 750x1000 (2.46x3.28), 750x1500 (2.46x4.92), 1000x1000 (3.28x3.28), 1000x1500 (3.28x4.92)
- Several safety mats can be connected in series
- Number of operations > 10 million
- Shock and overload resistance
- Sensor: IP 67 / NEMA 6 control unit: IP 65 / NEMA 4
- Highly resistant to chemical agent and oils
- Supply voltage: 120 Vac, 240 Vac & 24 Vdc
- Response time: 0.025 sec
- Test input
- LED status indicators

APPLICATIONS

- Presence sensing device for the control of dangerous areas such as robot areas, automotive transfer lines
- Additional protection for optoelectronic trip devices

INRS



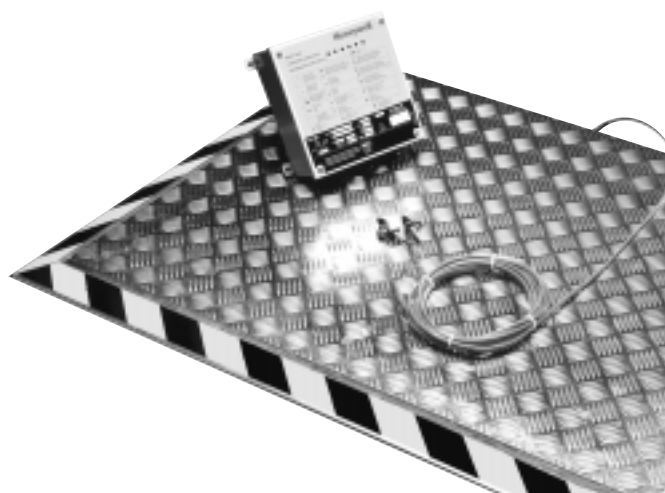
NRTL/C

Category 3
EN 954-1

Mat

Category 4
EN 954-1

Control unit



The FF-SM safety mat is a pressure sensitive protective device designed in compliance with the requirements of the EN 1760 - part 1 European standard for the detection of operators inside a dangerous zone. The sensor uses an infrared modulated light source spread by a fiber optic cable and operates in the light operated mode for a positive safety: the presence of a load greater than the 30 kg / 66.14 lbs detection capability causes a bending of the fiber optic cable on the whole of the sensing surface. The loss in signal resulting from this bending de-energizes the output relays of the control unit and stops the dangerous movement of the machine. The fiber optic technology is totally immune to electromagnetic disturbances and it allows longer connections than electrical wires. Several safety mats can be connected in series and monitored by one single control unit.

The sensor is designed in compliance with the requirements of the EN 954 - 1 European standard for Category 3 Pressure Sensitive Protective Devices. A load distributor forms part of the sensor mechanics and protects the sensing surface from damage caused by the falling of heavy objects (such as a 5 kg / 11 lbs steel sphere being dropped from a 1 m / 3.3 ft height). Due to the mechanical structure of the sensor, the safety mat is resistant to occasional overloads caused by fork lift trucks, and features an exceptional life expectancy when used in normal conditions.

The available industrial coatings provide excellent chemical resistance and sealing Sensor: IP 67 / NEMA 6, and control unit: IP 65 / NEMA 4.

(1) Note: The 30 kg / 66.14 lbs sensitivity is suitable for adult detection only (15 kg / 33.07 lbs is the sensitivity for children detection).

WARNING

MISUSE OF DOCUMENTATION

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- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SM

The control unit complies with the requirements of the EN 954-1 European Standard for Category 4 safety related parts of control systems and is based on a permanent self-checking principle.

The control unit is equipped with 2 safety relays with guided contacts which can be directly used to stop the dangerous movement. However, most of the time, additional relaying (or «Final Switching Devices» - FSD) between the control unit outputs and the machine control circuitry is necessary.

For this reason, the use of an emergency stop relay module is recommended. This relay module must integrate a start and re-start interlock facility for a correct installation of the safety mat as required by the EN 1760-1 European standard.

A test input is also available on the control unit. The test input is used to set the equipment in an alarm condition. It provides the ability to regularly check the correct operation of the interface relays.

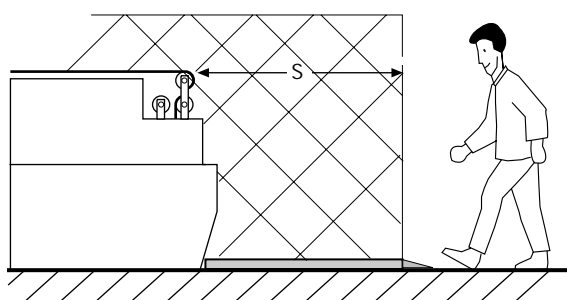
LED indicators provide useful information on the equipment status during installation and operation.

Safety Distances

The safety mat must be dimensioned and positioned so access to the dangerous zone is impossible without actuating the sensing zone. The EN 999 standard or ANSI B11.19 1990 provides a formula for calculating the minimum distance between the dangerous zone and the edge of the safety mat for ground level trip devices.

To prevent access to dangerous sides of machinery not protected by safety mats, install additional hard guarding and/or safety protection type products.

Floor Mounting safety distance formula:



Ensure hard guarding protection is installed on the rear face and on both sides.

Europe (EN 999)

$$S \geq 1600 (t_1 + t_2) + 1200 \text{ (mm)}$$

$$\text{or } S \geq 63 (t_1 + t_2) + 47.3 \text{ (in)}$$

US (ANSI B11.19 1990)

$$Ds \geq 63 (t_1 + t_2) + C \text{ (in)} \quad S = Ds$$

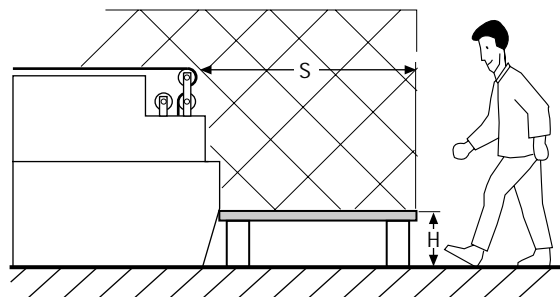
where C is an additional safety distance (see local Health and Safety Regulations for this value).

Ds: minimum safety distance (mm/in)

t1: Global response time of the safety mat (0.025 sec)

t2: Stopping time of the machine, application dependent (sec)

Step mounting safety distance formula:



Ensure hard guarding protection is installed on the rear face and on both sides.

Europe (EN 999)

$$S \geq 1600 (t_1 + t_2) + (1200 - 0.4 H) \text{ (mm)}$$

$$\text{or } Ds \geq 63 (t_1 + t_2) + (47.3 - 0.4 H) \text{ (in)} \quad S = Ds$$

S: minimum safety distance (mm/in)

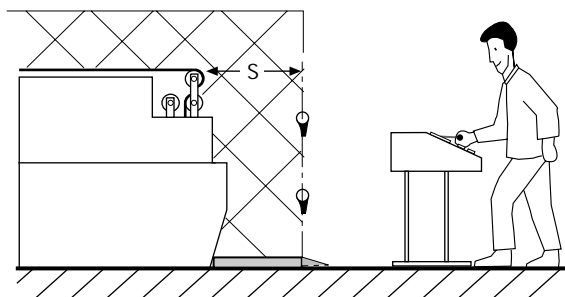
t1: global response time of the safety mat (0.025 sec)

t2: stopping time of the machine, application dependent (sec)

H: height of the platform (mm/in)

Combined protective devices

If a safety mat is used with a safety light curtain or multiple safety single beam devices, the minimum safety distance between the dangerous zone and the safety beams or the edge of the safety mat should be calculated using the following formula:



Ensure hard guarding protection is installed on the rear face and on both sides.

Europe (EN 999)

$$S \geq 1600 (t_1 + t_2) + 850 \text{ (mm)}$$

$$\text{or } S \geq 63 (t_1 + t_2) + 33.5 \text{ (in)}$$









S: minimum safety distance (mm/in)



t1: response time of the multiple safety single beam device (sec)

t2: stopping time of the machine, application dependent (sec)

LED status indicators

The 4 LED's available on the front panel have the following meaning:

 Output status	 Machine operation enabled	 Machine operation disabled
TEST Test	 Normal operation	 Device in test condition
 Power supply	 Power off	 Power on

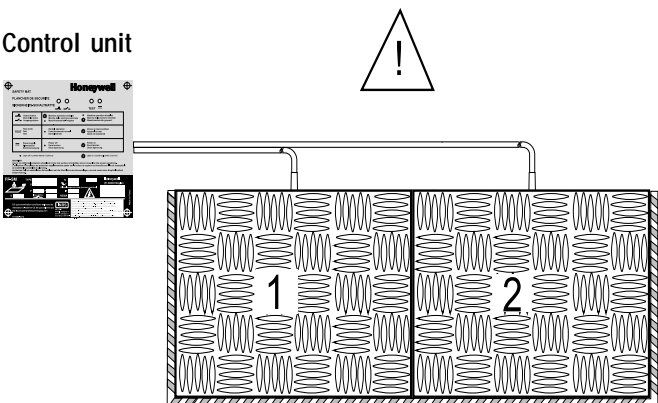
 Light off  Light on

Area controlled by several safety mats run by a single control unit

The fiber optic technology allows the connection in series of up to **4 mats** to cover a larger detection zone while using a single channel control unit. The following applications can be performed:

- Protection of a single zone with several mats run by a single control unit:

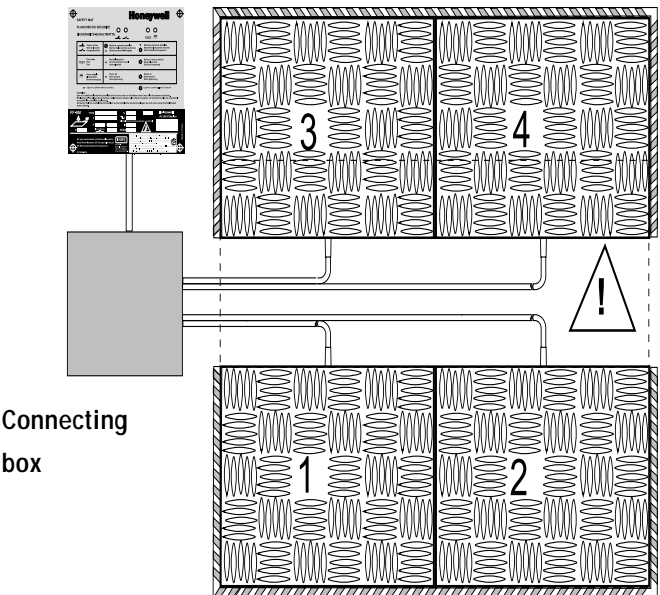
Control unit



Connection in series of 2 safety mats can be done inside the control unit box.

- Protection of several zones with several mats run by a single control unit:

Control unit



Connecting box

Connection in series of more than 2 safety mats must be done inside an additional connecting box.

Resistance to chemical materials

Coatings	Aluminium sheet metal		
	Nitrile checker		
Fluids resistance	Hydrocarbons	■	■
	Aromatic solvents	▲	■
	Chlorinated solvents	▲	▲
	Aliphatic hydrocarbons	■	■
	Acetone	●	■
	Animal oils	■	■
	Vegetable oils	■	■
	Water (absorption)	■	■
	Dilute acid	▲	■
	Concentrated acid	▲	▲
	Bases	■	■

■ excellent resistance

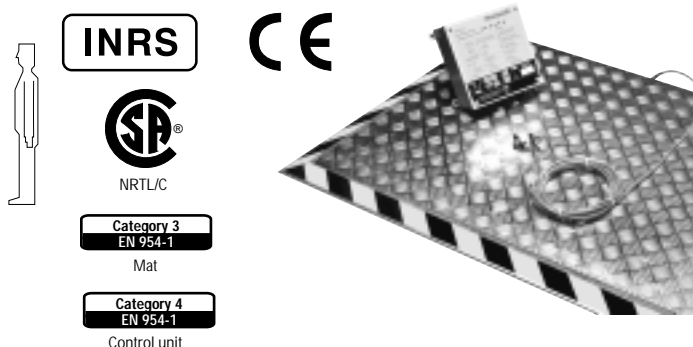
▲ poor resistance

● bad resistance

FF-SM

- Pressure sensitive device in compliance with the requirements of the EN 1760-1 standard
- Control unit in compliance with the requirements of the EN 954-1 standard for Category 4 equipment
- Sensor unit based on a fiber optic technology and designed in compliance with the requirements of the EN 954-1 standard for Category 3 equipment
- Meets applicable parts of ANSI/RIA/OSHA regulations

Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

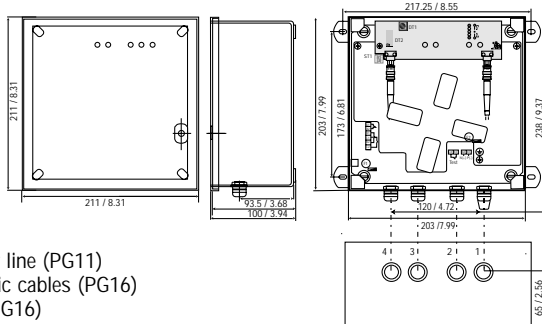
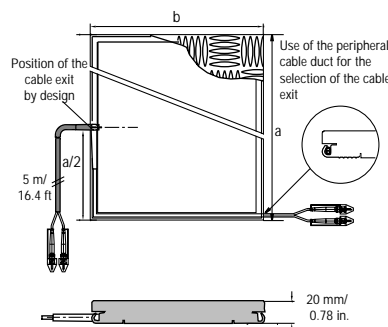


Features		Compliance
Sensor unit	Category	Europe: Compliance with EN 1760-1 standard US: ANSI B11.19.1990, ANSI/RIA 15.06-1992 standards, OSHA 1910.212, 1910.217 regulations
	Detection sensitivity	Category 3 according to EN 954-1 standard
	Number of operations	≥ 30 kg / 66.14 lbs
	Shock resistance	Tested up to 10 million with a ø80 mm / 75 kg (3.15 in / 165 lbs) stamp applied on 1 point
	Overload resistance	50 Joules (energy released by the falling of a 5 kg/11 lbs sphere dropped from 1 m / 3.28 ft)
	Quality of coating	Max. static load: 1000 N/cm ² (resist to fork lift trucks)
		Aluminium bulb plate: welding splash resistant (3 mm / 0.11 in thickness)
		Nitrile checker: oil resistant (5 mm / 0.2 in thickness)
	Chemical resistance	Oils / Diluted bases / Usual cleaning liquids
	Operating temperature	0 to 55°C / 32 to 131°F
	Connection to the control unit	A fiber optic cable equipped with 2 ST connectors (5 m / 16.4 ft) cable length, PVC sheath
	Connection in series	Up to 4 mats per control unit
	Sealing	IP 67 / NEMA 6
	Fixing on the reference floor	Laid on the reference floor and maintained by edges, or embedded in the reference floor
	Weight	Aluminium: 27 kg/m ² / 5.5 lbs/ft ² / Nitrile: 23 kg/m ² / 4.6 lbs/ft ²
Control unit	Category	Category 4 according to EN 954-1 standard
	Supply voltage	120 Vac (+ 10%, - 20%), 240 Vac (+10%, -20%), 24 Vdc (±15%)
	Frequency	50 to 60 Hz
	Power consumption	6 VA / 9 W
	Global response time	0.025 sec. (safety mat included)
	Connection	Snap-in clips for electrical wires - ST connectors for fiber optic cables
	Electrical noise immunity	according to IEC 801-4: level IV (Vac) or level III (Vdc)
		according to IEC 801-3: level III (Vac & Vdc)
	Outputs	2NO+1NC (2 safety relays with guided contacts, 2A/250 Vac, 10 mA mini.)
	Functions	Test input
	Sealing	IP 65 / NEMA 4
	Fixing	4 M5 screws
	Weight	3.6 kg / 7.93 lbs

Ordering information	
• SAFETY MAT	
FF-SM	Coating: 1: aluminium 2: nitrile
Dimensions:	
.075050: 0750x0500 mm ² / 2.46x1.64 ft ²	
.100050: 1000x0500 mm ² / 3.28x1.64 ft ²	
.150050: 1500x0500 mm ² / 4.92x1.64 ft ²	
.075075: 0750x0750 mm ² / 2.46x2.46 ft ²	
.100075: 1000x0750 mm ² / 3.28x2.46 ft ²	
.150075: 1500x0750 mm ² / 4.92x2.46 ft ²	
.100100: 1000x1000 mm ² / 3.28x3.28 ft ²	
.150100: 1500x1000 mm ² / 4.92x3.28 ft ²	

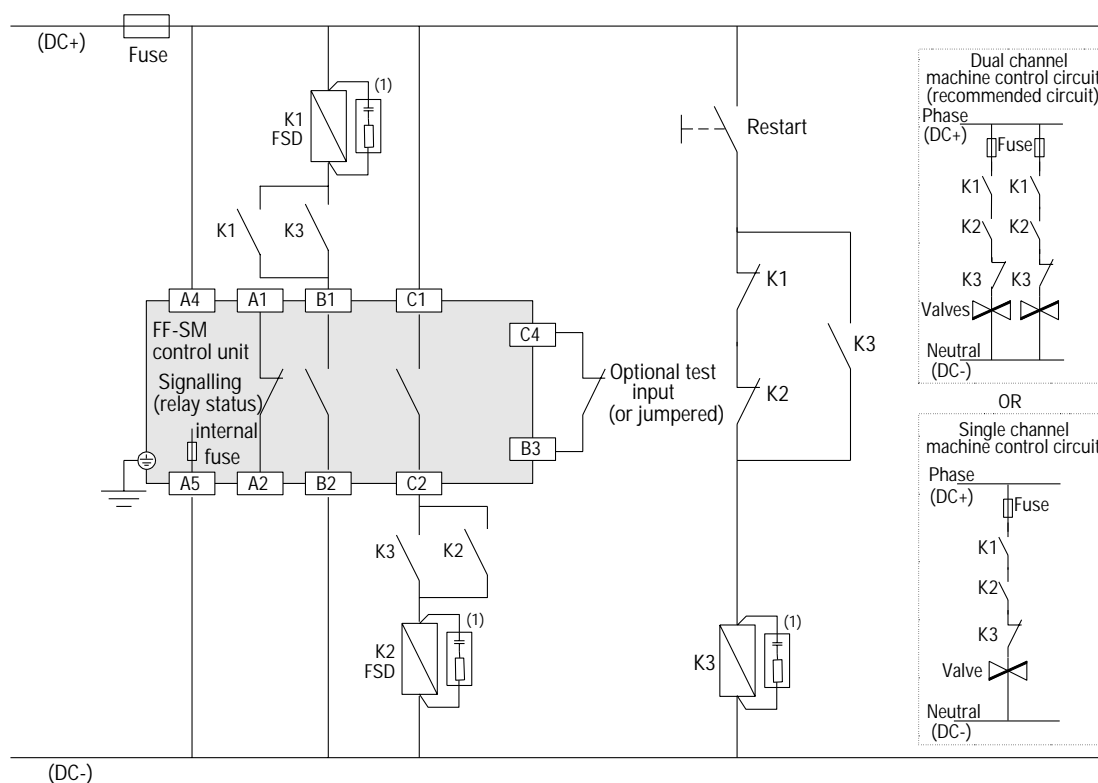
Sensor unit	
References	a (mm ² / ft ²) b (mm ² / ft ²)
FF-SM075050-□05	750 / 2.46 500 / 1.64
FF-SM100050-□05	1000 / 3.28 500 / 1.64
FF-SM150050-□05	1500 / 4.92 500 / 1.64
FF-SM075075-□05	750 / 2.46 750 / 2.46
FF-SM100075-□05	1000 / 3.28 750 / 2.46
FF-SM150075-□05	1500 / 4.92 750 / 2.46
FF-SM100100-□05	1000 / 3.28 1000 / 3.28
FF-SM150100-□05	1500 / 4.92 1000 / 3.28

Control unit	
FF-SMC100T □	
Supply voltage:	E:120Vac/ G:240Vac/ 2:24Vdc
- If the control unit is installed on a flexible structure submitted to vibrations, the use of anti-vibration dampers FF-SMZ646095 is necessary.	
- Secure the installation by fixing the safety mat with the recommended FF-SMZTAPE double-sided adhesive tape.	
Also refer to the accessory section.	

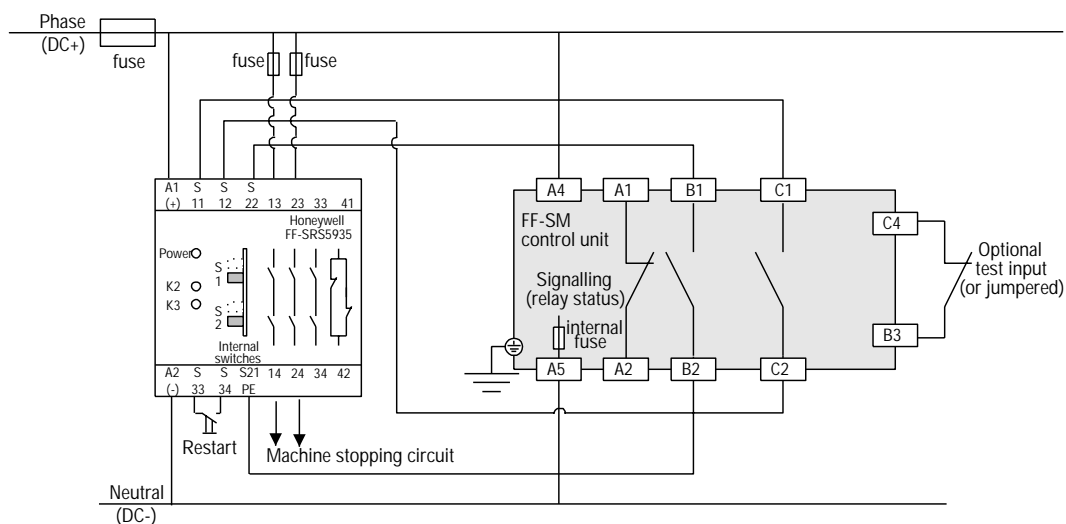


- 1 : Cable gland for the power line (PG11)
- 2 and 3 : Cable glands for fiber optic cables (PG16)
- 4 : Cable gland for signals (PG16)

Wiring diagram with safety relays



Wiring diagram with Honeywell safety module



(1) RC (220 Ω + 0.22 μ F) for AC interfaces or varistors for DC interfaces
FSD: Final Switching Device

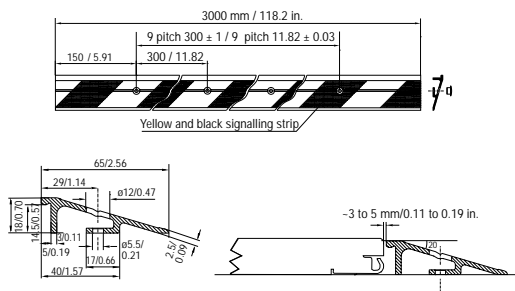
Note: The start and restart interlock facility and the cross-monitored Final Switching Devices may be provided by a safety relay module from the FF-SR Series.

FF-SM

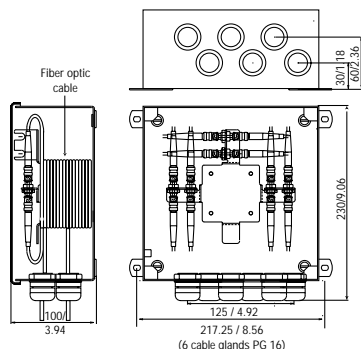
Accessories FF-SM

Dimensions in millimeters / inches, meters / feet

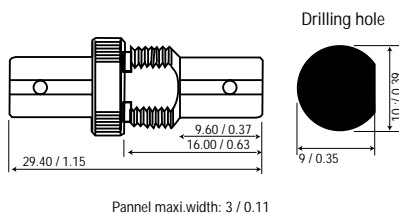
• FF-PSZS1030



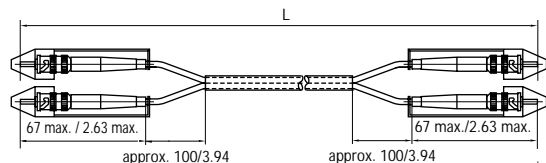
• FF-SMZBOX:



• FF-SMZ175196:

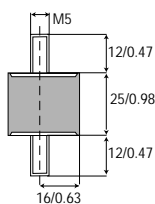


• FF-SMZFOC□□:



Reference	L (m / ft)
FF-SMZFOC02	2 / 6.56
FF-SMZFOC05	5 / 16.4
FF-SMZFOC10	10 / 32.8
FF-SMZFOC20	20 / 65.6

• FF-SMZ646095



• FF-SMZTAPE

Edges

If the safety mat is laid on the reference floor, then the EN 1760-1 standard makes the use of edges all around the accessible periphery of the sensing zone mandatory. They prevent people from stumbling over the safety mats and keep them in position. The edges are delivered per 3 m / 9.84 ft and must be cut to the right length according to the application.

Connecting box (delivered without cable-to-cable connector)

For a reliable installation, it is recommended to use the connecting box for the connection in series of several mats. It allows the connection in series of 2 to 4 mats to the control unit via a cable extension. The connecting box is equipped with a cable drum to absorb the excess cable, it improves the IP sealing of connectors (dust proof - IP 60) and protects them from mechanical damages.

Notes:

- Connection in series of 2 safety mats can be made inside the control unit box if no cable extension is required.

Kit of 2 cable-to-cable connectors

This kit of 2 ST cable-to-cable connectors must be used for the interconnection of optical cables. 2 cable-to-cable connectors are necessary for the connection of a mat to the control unit via a cable extension, and one cable-to-cable connector is necessary for the connection in series of 2 mats to the control unit. (Example: Order 2 kits of cable-to-cable connectors for the connection in series of 3 mats to the control unit via a cable extension).

Cable extensions (delivered without cable-to-cable connector)

Each mat is pre-wired with a fiber optic cable. If the control unit is installed at a greater distance, the use of a cable extension is necessary.

Kit of 4 antivibration dampers with 8 HM5 nuts for the control unit

Sellotape 0485 double-sided adhesive tape:

0.4 mm/0.016 in thickness and 30 m / 98.36 ft length, to secure the mats installation

Safety Non Contact Switch

Based on Magnetic Coded Technology

FF-SNC Series



FEATURES

- Meets applicable parts of European EN 1088 standard for Interlocking devices associated with guards
- Permanent self-checking electronic designed in compliance with the requirements of the EN 954-1 standard for **Category 3 protective Devices**
- Operating range:
5 mm - 7 mm / 0.20 in - 0.27 in ON,
8 mm - 12 mm / 0.32 in - 0.47 in OFF
- High resistance to environmental influences
- ABS and Stainless Steel housings sensors available
- Sensors sealing: IP 67
- Prewired or M8 plug termination
- Supply voltage: 24 Vdc/Vac $\pm 15\%$;
110 Vac $\pm 15\%$ (only available for the 4-sensor control unit)
- Response time of the control unit:
15 ms
- Manual or automatic restart
- LED status indicator
- 2-sensor control unit: (DIN rail mount 22,5 mm / 0.89 in width)
- 4-sensor control unit: (DIN rail mount 75 mm / 2.95 in width)
- 5-sensor extension module: (DIN rail mount 22,5 / 0.89 in width)

TYPICAL APPLICATIONS

Interlocking guard for non locked mechanical screens offering free access (machines must achieve instant stop):

- Machine door or casting "open/closed" detection
- Guard-in-place detection, gate/access door detection
- Control of mechanical screens used in addition to a safety light curtain
- Food & Beverage, Packaging, Machine Tool, Automotive and Textile.



*New: M8 plug model now available

The FF-SNC Honeywell safety non contact switch is a tamper resistant safety system for monitoring machine guards. The actuator being a passive component, the safety switch is the only component that needs to be wired to the control unit and cannot be defeated by regular magnet.

Each system is made up of one or several safety switches, actuators and a control unit. The Honeywell FF-SNC safety non contact switches are designed in compliance with the requirements of the EN 954-1 European Standard for Category 3 Protective Devices.

The FF-SNC is especially suited for applications where perfect door alignment can not be obtained. The FF-SNC Series can be mounted on sliding, hinged or removable machine guards. The output of the control unit is triggered as soon as the distance between the safety switch and the actuator is greater or equal to 8 mm / 0.32 in. This switching distance compensates for the machine vibration or any issue with the installation alignment.

The sensor and actuator small size makes it usable under tight space requirements.

The safety switches and the actuators provide excellent chemical and mechanical resistance. Stainless steel housing versions fulfil the requirements of the Food and Beverage industry.

The FF-SNC400 safety control unit comes in a 75 mm / 2.95 in package and can monitor up to 4 sensors.

The FF-SNC200R2 safety control unit with its 22,5 mm / 0.89 in width will easily find a place in the electrical cabinet and can monitor 2 sensors. Both control units can be placed up to 100 m / 328 ft away from the safety non contact switches. The indicators located on the front cover of both control units provide individual door status information.

The FF-SNC1EXT extension module can be added to the FF-SNC400 or FF-SNC200 control unit and allows the connection of 5 additional sensors.

WARNING

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Safety Non Contact Switch FF-SNC

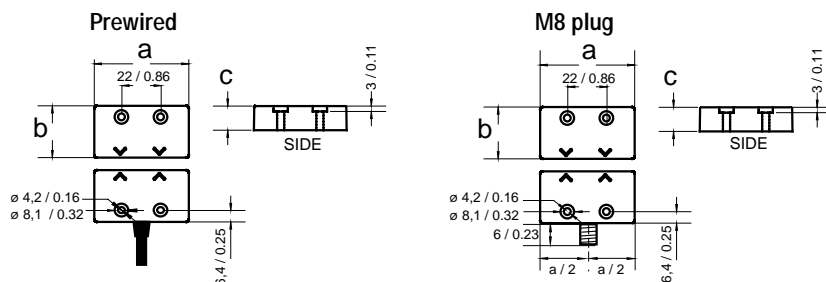
- Complies with the requirements of the EN 954-1 for Category 3 equipment
- Meets applicable parts of ANSI/RIA/OSHA regulations



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

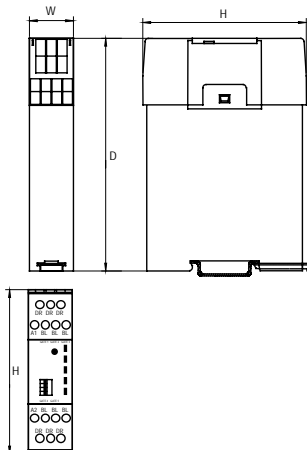
Features	
Switch	
Material	ABS (FF-SNC1SA□□PA-□) or Stainless Steel 316 and Resin filled (FF-SNC1SA□□PS)
Sensing range	5 mm - 7 mm / 0.20 in - 0.27 in ON • 8 mm - 12 mm / 0.32 in - 0.47 in OFF allowable misalignment: ±4mm / ±1/6 in
Minimum gap	1 mm
Standard cable length	Prewired 3 m / 9.84 ft or 5 m / 16.4 ft (ABS only) - M8 plug: 5 mm / 16.4 ft (ABS only)
Temperature	Operating: -10 °C to +55 °C / 14 °F to 131 °F • Storage: -20 °C to +60 °C / -4 °F to 140 °F
Connection to the control unit	Max. cable length: 100 m / 328 ft
Sealing	IP 67 prewired or M8 plug
Fixing	2 x (M4 x 20 mm) Tamper proof screws (supplied with the product)
Control unit / extension module	
Category	Category 3 according to EN 954-1
Supply voltage	24 Vdc/Vac ±15 % • 110 Vac ±15 % (FF-SNC400RE only)
Response time of the control unit	15 ms (with or without extension module)
Power consumption (including sensors)	6 VA (with or without ext. module): FF-SNC400 • 3 VA (with or without ext. module) : FF-SNC200
Temperature	Operating: -10 °C to +55 °C / 14 °F to 131 °F • Storage: -20 °C to 60 °C / -4 °F to 140 °F
Output	2 NO + 1 NC relay contact
Output Contact Rating	Max.: 4 A / 230 Vac; 2 A / 24 Vdc (Res.) @Cos = 1 • Min.: 10 V / 10 mA
Restart	Manual or automatic
Sealing	IP 40 Housing, Terminals IP 20
Mounting	35 mm / 1.37 in DIN rail
LED indicators	FF-SNC200R2 control unit: Power, Run and 2 guard status indicators FF-SNC400RE control unit: 4 guard status indicators and deselect indicators
Material	Polycarbonate, red

■ Dimensions (mm/in)



	a	b	c
ABS	52 / 2.04	28 / 1.10	14 / 0.55
SS316	53 / 2.8	29 / 1.14	13.5 / 0.53

M4 x 20 mm Torx screws are supplied with the switches.







	FF-SNC200R2	FF-SNC1EXT	FF-SNC400R2	FF-SNC400RE
W	22,5 / 0.88	75 / 2.95		
H	84 / 3.30	74 / 2.91		
D	119 / 4.68	119 / 4.68		

(mm/in)

■ Safety Distance Calculations per EN 294 European standard

The dimensions of openings correspond to the narrowest dimension of a slot opening (for openings greater than 120 mm / 4.72 in, refer to the EN 294 standard).

Safety distances s_r for regular openings for persons of 14 years of age and above:

Part of body	Illustration	Opening size	Safety distance s_r
			Slot
Fingertip		$e \leq 4$	≥ 2
		$4 < e \leq 6$	≥ 10
Finger up to knuckle joint Or hand	 	$6 < e \leq 8$	≥ 20
		$8 < e \leq 10$	≥ 80
		$10 < e \leq 12$	≥ 100
		$12 < e \leq 20$	≥ 120
		$20 < e \leq 30$	$\geq 850^*$
Arm up to junction with shoulder		$30 < e \leq 40$	≥ 850
		$40 < e \leq 120$	≥ 850

* If the length of the slot opening is ≤ 65 mm / 2.56 in, the thumb will act as a stop and the safety distance can be reduced to 200 mm / 7.88 in).

For more information on the guards installation, refer to the European standards: EN 811, EN 953, EN 294

■ Safety Distance Calculations per US ANSI / OSHA standard

$$Ds = K(Ts + Tc + Tr) + Dpf$$

With:

Ds = minimum safe distance between safeguarding device and hazard

K = speed constant: 1,6 m/sec (63 in/sec) minimum based on the movement being the hand/arm only and the body being stationary (a greater value may be required in specific applications and when body motion must also be considered)

Ts = worst stopping time of the machine/equipment

Tc = worst stopping time of the control system

Tr = response time of the safeguarding device including its interface (Tr for interlocked barrier may include a delay due to actuation. This delay may result in Tr being a deduct- negative value).

Dpf = the "Depth penetration factor" is the maximum travel towards the hazard if the guard can be opened a certain width or amount before a stop is signaled.

Dpf values from OSHA O-10 Table:

If the maximum width or diameter of the opening is less than or equal to (mm/in)	Dpf equals (mm/in)
6,4 / 0.25	12,7 / 0.5
9,5 / 0.375	38,1 / 1.5
12,7 / 0.5	63,5 / 2.5
15,9 / 0.625	88,9 / 3.5
19,1 / 0.75	139,7 / 5.5
22,2 / 0.875	165,1 / 6.5
31,8 / 1.25	190,5 / 7.5
38,1 / 1.5	317,5 / 12.5
47,6 / 1.875	393,7 / 15.5
54 / 2.125	444,5 / 17.5

Note: Over 54 mm / 2.125 in, the Dpf equals 800 mm / 31.5 in, with a maximum allowable opening of 152,4 mm / 6 in.

Example: $Dpf = 0$ when the guard can be opened up to, but less than 6,4 mm / 0.25 in before issuing a stop command.

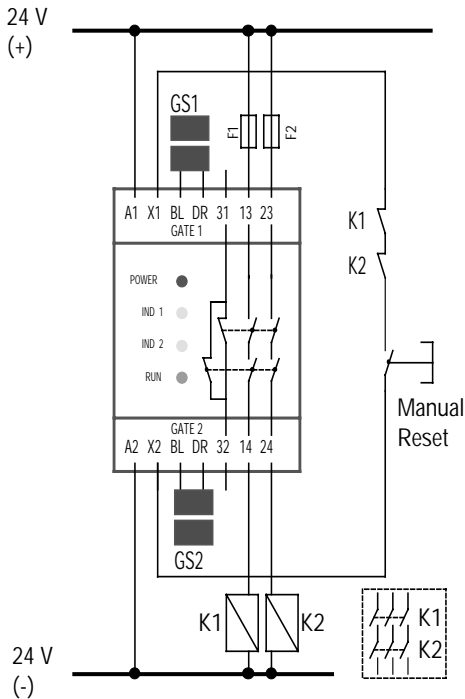
$Dpf = 444,5$ mm / 17.5 in if the guard can be opened 54,0 mm / 2.125 in.

At no time can the opening be greater than 152,4 mm / 6 in before issuing a stop command.

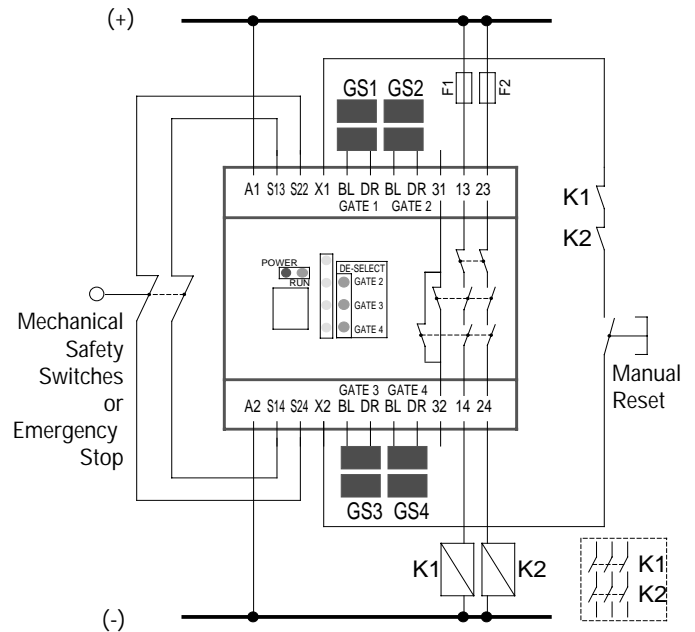
For more information, refer to the US regulations and standards (OSHA 29 CFR 1910.212 & 1910.217, ANSI B11.19 and ANSI/RIA R15.06).

■ Connection diagram:

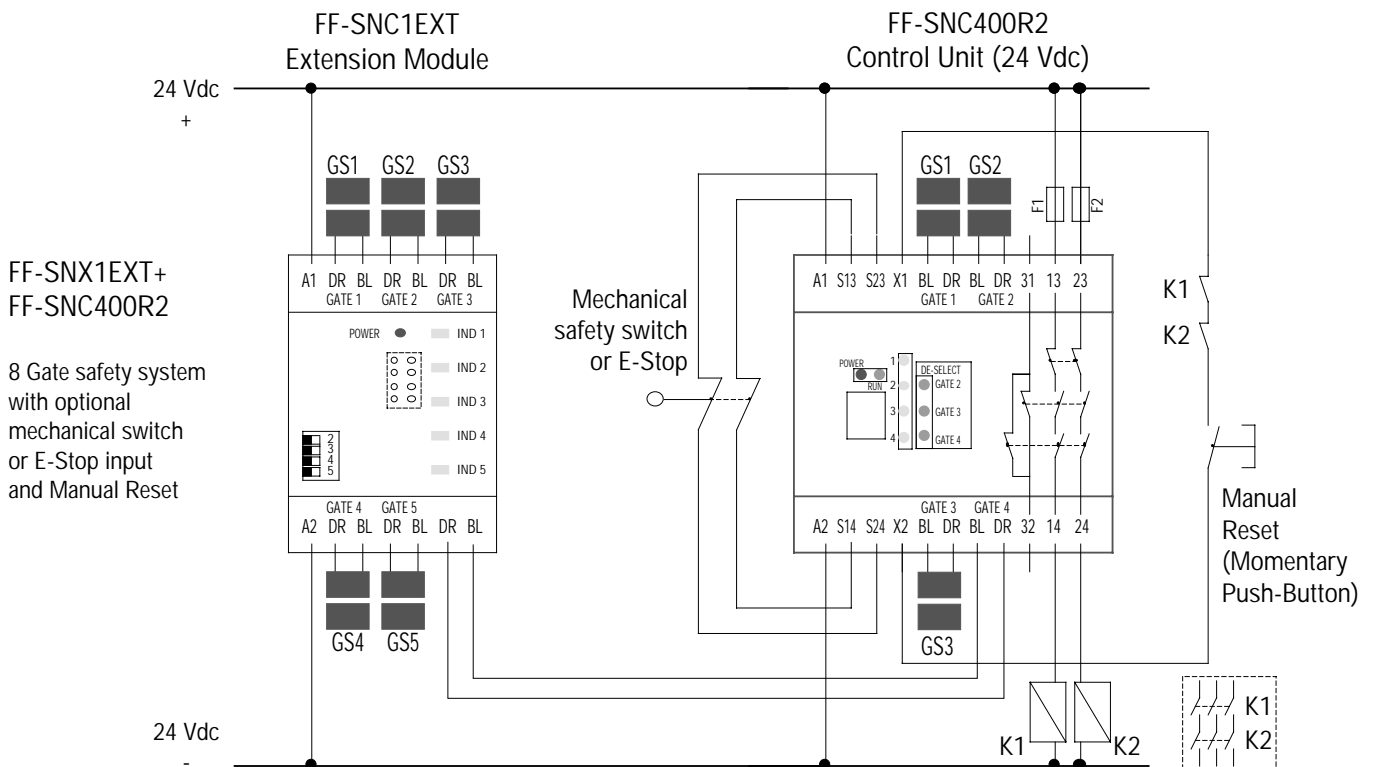
**FF-SNC200R2 Control Unit
(Manual reset option)**



**FF-SNC400R2/FF-SNC400RE Control Unit
(Manual reset option)**



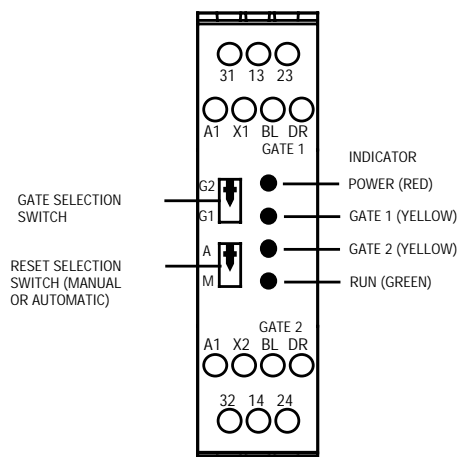
**FF-SNC1EXT Extension Module
(can be used with FF-SNC400 or FF-SNC200 Series, 24 Vac/dc only)**



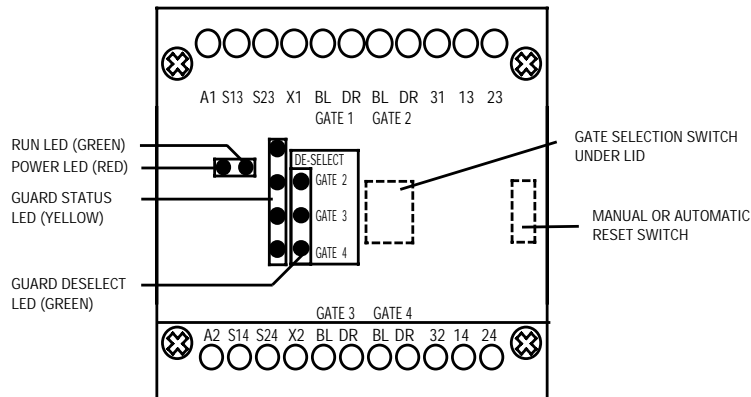
Up to 28 gates can be monitored using 6 extension modules with the FF-SNC400R2. The extension module can only be used with the 24 Vac/dc control units.

■ LED indicators:

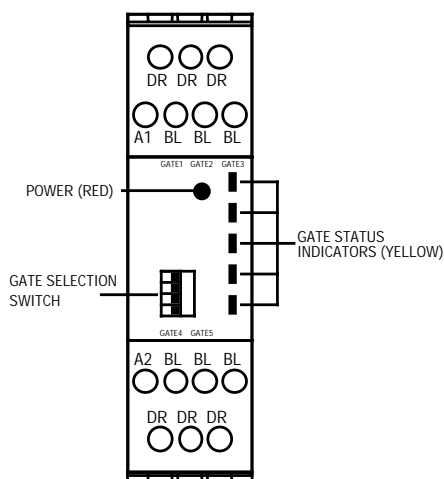
FF-SNC200R2 Control Unit



FF-SNC400R2/FF-SNC400RE Control Unit



FF-SNC1EXT Control Unit



■ Ordering information

Part number	Description	Weight
FF-SNC200R2	24 Vdc/Vac Control unit for monitoring up to 2 gates	Max. 183 g / 0.403 lb
FF-SNC400R2	24 Vdc/Vac Control unit for monitoring up to 4 gates	Max. 575 g / 1.26 lb
FF-SNC400RE	110 Vac Control unit for monitoring up to 4 gates	Max. 575 g / 1.26 lb
FF-SNC1EXT	Extension module	Max. 135 g / 0.297 lb
FF-SNC1SA03PA	Safety switch + actuator, 3 m / 9.84 ft cable, ABS housing	Max. 150 g / 0.330 lb
FF-SNC1SA05PA	Safety switch + actuator, 5 m / 16.40 ft cable, ABS housing	Max. 200 g / 0.441 lb
FF-SNC1SA03PS	Safety switch + actuator, 3 m / 9.84 ft cable, stainless steel 316 housing	Max. 250 g / 0.551 lb
FF-SNC1SA05PS	Safety switch + actuator, 5 m / 16.40 ft cable, stainless steel 316 housing	Max. 300 g / 0.662 lb
FF-SNC1SA05PA-QD	Safety switch + actuator + M8 cordset, 5 m / 16.40 ft cable, ABS housing	Max. 350 g / 0.771 lb
FF-SNC1SA05PS-QD	Safety switch + actuator + M8 cordset, 5 m / 16.40 ft cable, stainless steel 316 housing	Max. 450 g / 0.992 lb
FF-SNC1SA-050-CBL	Single core cable, 50 m / 164 ft roll	Max. 1.5 kg / 3.307 lbs

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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Honeywell

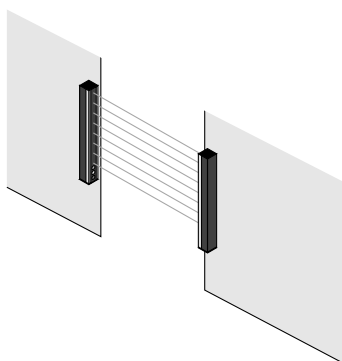
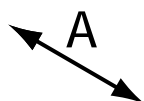
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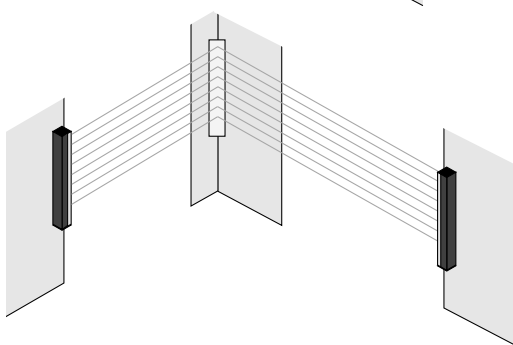
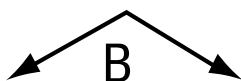
This section contains information about the Honeywell deflection mirrors which can be used with safety light curtains to perform the following perimeter protections:

Applications

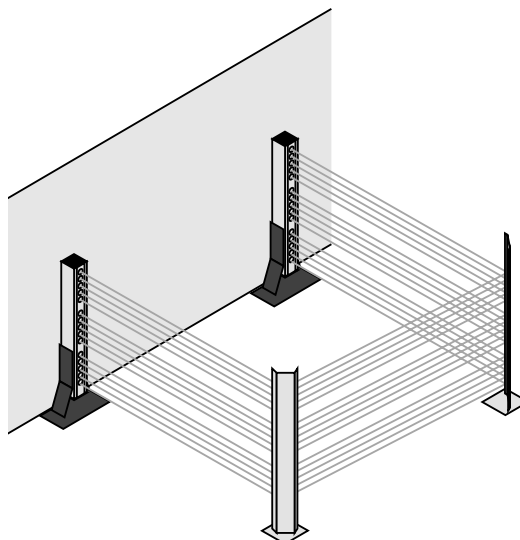
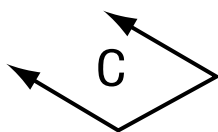
Without mirror



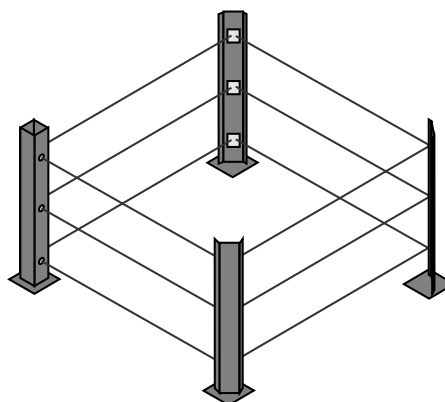
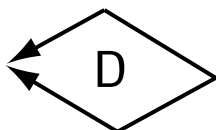
With 1 mirror



With 2 mirrors

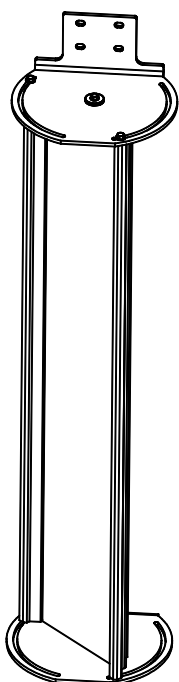


With 3 mirrors



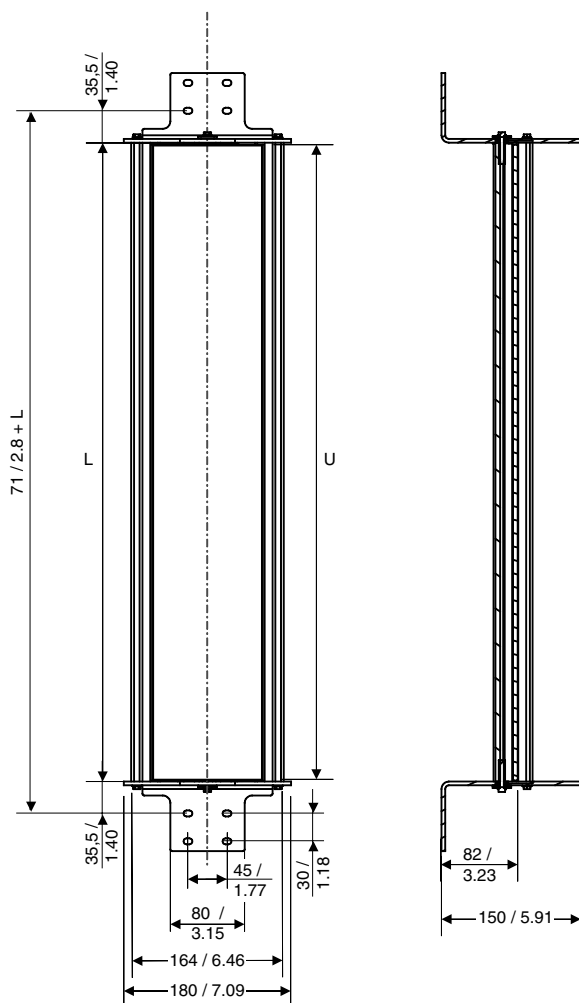
WALL MOUNTING DEFLECTION MIRRORS - 1

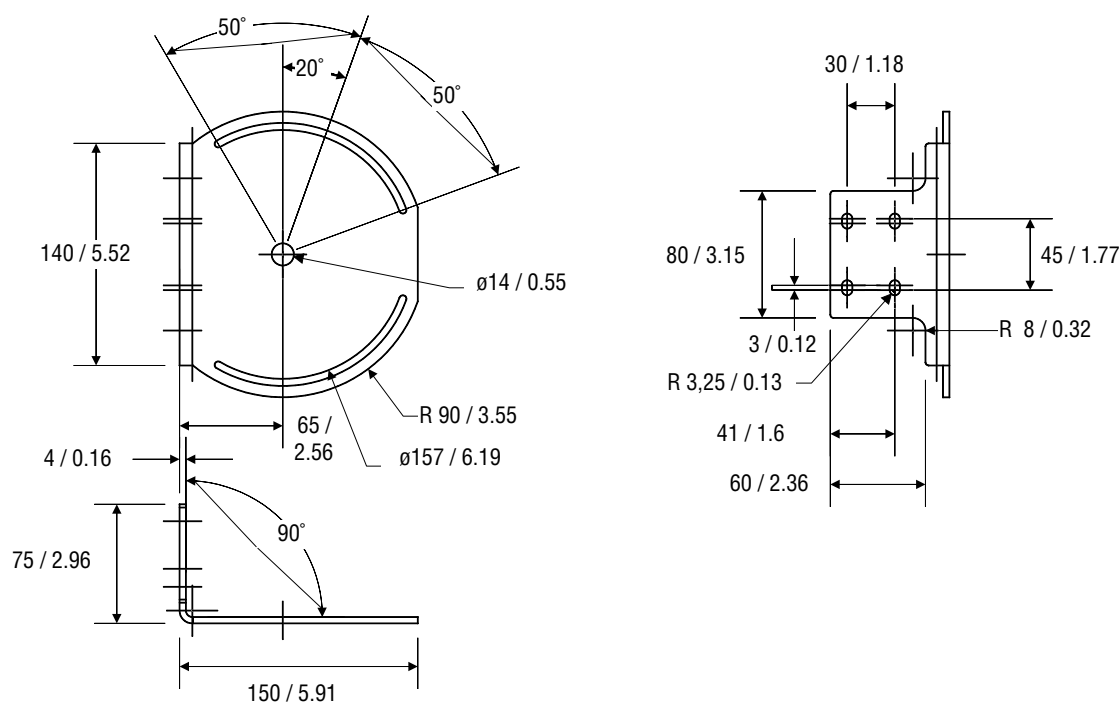
- Wall mounting deflection mirrors for FF-SB, FF-SY, FF-LS, FF-SG, FF-SLG, FF-SLC, Detector™3 :



- Deflection mirrors (for arms and body detection).
- Design for perimetric protections with small resolution.
- Material: Aluminium alloy housing
25% scanning range reduction: silver reflecting material laid on the back of an ordinary glass protected by a vernish.
10% scanning range reduction: copper reflecting material laid on the back of a white glass protected by a vernish.
- Finish: anodized gold colour.
- Provided with 2 adjustable brackets for easy adjustment.

Dimensions mirror profile (mm/in)



Dimensions of the right-angle mounting brackets (mm/in)

MIRRORS
Dimensions, weights and part numbers

Mirror type	Scanning range loss per mirror	Total height (mm/in) L	Reflecting surface (mm/in) U	Weight (kg/lbs)
FF-SYZMIR002 FF-SYZMIR102	10% 25%	282 / 11.1	272 / 10.7	4,4 / 9.70
FF-SYZMIR004 FF-SYZMIR104	10% 25%	485 / 19.11	475 / 17.7	6 / 13.23
FF-SYZMIR006 FF-SYZMIR106	10% 25%	688 / 27.11	678 / 26.7	7,5 / 16.53
FF-SYZMIR008 FF-SYZMIR108	10% 25%	893 / 35.18	883 / 34.8	8,9 / 19.62
FF-SYZMIR010 FF-SYZMIR110	10% 25%	1096 / 43.18	1086 / 42.8	10,5 / 23.15
FF-SYZMIR012 FF-SYZMIR112	10% 25%	1299 / 51.18	1289 / 50.8	13,6 / 29.98
FF-SYZMIR014 FF-SYZMIR114	10% 25%	1504 / 59.26	1494 / 58.9	15,2 / 33.51
FF-SYZMIR016 FF-SYZMIR116	10% 25%	1707 / 67.26	1697 / 66.9	17,1 / 37.70
FF-SYZMIR018 FF-SYZMIR118	10% 25%	1910 / 67.26	1900 / 74.9	18,8 / 41.45

Compatibility

MIRRORS

Mirror type	Safety light curtain					
	FF-SB Series	FF-SY Series	FF-SG Series FF-SLG Series	FF-LS Series	FF-SLC Series	Detector 3™ Series
FF-SYZMIR□02	FF-SB12E/R02-S2			FF-LS082802362 FF-LS16141962	FF-SLC35022	3LCE06
FF-SYZMIR□04	FF-SB□□E/R04-S2□	FF-SY□□□032□2	FF-SG□□031□□2 FF-SLG□□031□□2	FF-LS32143782	FF-SLC□□042	3LCE12
FF-SYZMIR□06	FF-SB□□E/R06-S2□	FF-SY□□□048□2	FF-SG□□050□□2 FF-SLG□□050□□2	FF-LS162804602 FF-LS48145612	FF-SLC□□062	3LCE18
FF-SYZMIR□08	FF-SB□□E/R08-S2□	FF-SY□□□064□2 FF-SY□□□080□2	FF-SG□□070□□2 FF-SLG□□070□□2	FF-LS242806842 FF-LS64147442	FF-SLC□□072 FF-SLC55082	3LCE24 3LCE30
FF-SYZMIR□10	FF-SB□□E/R10-S2□	FF-SY□□□096□2	FF-SG□□089□□2 FF-SLG□□089□□2	FF-LS322809082	FF-SLC□□092	3LCE36
FF-SYZMIR□12	FF-SB□□E/R12-S2□	FF-SY□□□112□2	FF-SG□□109□□2 FF-SLG□□109□□2	FF-LS402811322	FF-SLC□□112 FF-SLC35132 FF-SLC18132	3LCE42
FF-SYZMIR□14	FF-SB□□E/R14-S2□	FF-SY□□□128□2 FF-SY□□□144□2	FF-SG□□128□□2 FF-SLG□□128□□2 FF-SG□□147□□2 FF-SLG□□147□□2	FF-LS482813562	FF-SLC□□142 FF-SLC55132 FF-SLC55152	3LCE48
FF-SYZMIR□16		FF-SY□□□160□2		FF-LS562815802	FF-SLC35162 FF-SLC55162	3LCE60
FF-SYZMIR□18		FF-SY□□□176□2				3LCE72

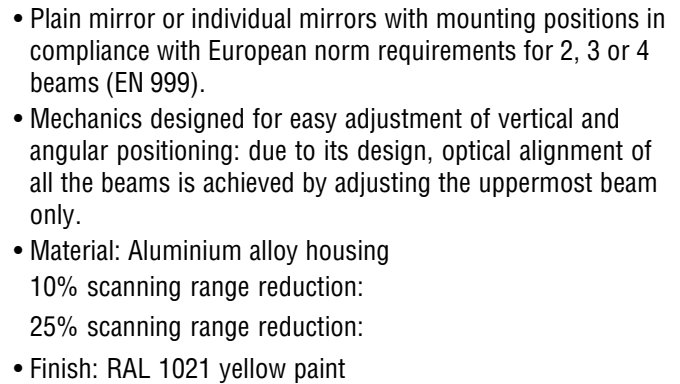
Scanning distance (in m / ft) using FF-SYZMIR1□□ (10 % loss per mirror)

Safety light curtain	Max. range without mirror (A)	Max. range with 1 mirror (B)	Max. range with 2 mirrors (C)	Max. range with 3 mirrors (D)
FF-SY□14 FF-SB14 filtered	6 / 19.7	5,4 / 17.7	4,9 / 16	4,4 / 14.4
other FF-SY□□□	20 / 65.6	18 / 59	16,2 / 53.1	14,6 / 47.8
FF-SG18, FF-SG30, FF-LS14, FF-LS30	3,5 / 11.5	3,2 / 10.5	2,8 / 9.2	2,6 / 8.5
FF-SLG18, FF-SLG30	4 / 13.12	3,6 / 11.8	3,2 / 10.5	2,9 / 9.51
FF-SB12, FF-SB14 standard	10 / 32.8	9 / 29.5	8,1 / 26.6	7,3 / 23.9
FF-SB14 long range, FF-SB15	24 / 78.8	21.6 / 70.9	19,4 / 63.8	17,5 / 57.4
FF-SLC35, FF-SLC55, FF-SLC18	12 / 39.4	10,8 / 35.5	9,7 / 31.9	8,7 / 28.7
Detector™ 3 standard range	7,6 / 25	6,8 / 18.7	6,2 / 20.3	5,5 / 18
Detector™ 3 long range	15,3 / 50	13,8 / 45.3	12,4 / 40.7	11,2 / 36.7

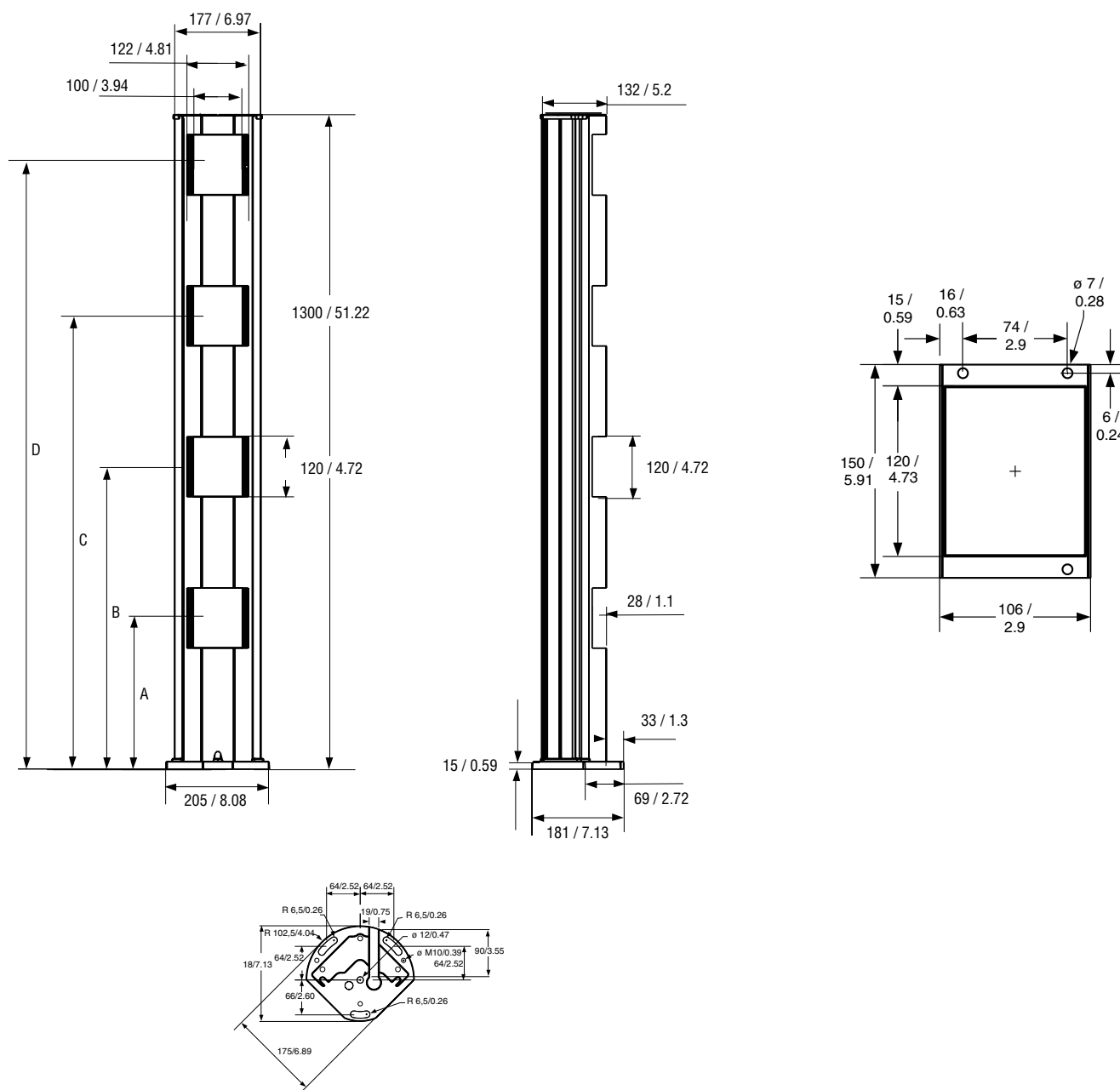
MIRRORS
Scanning distance (in m / ft) using FF-SYZMIR1□□ (25 % loss per mirror)

Safety light curtain	Max. range without mirror (A)	Max. range with 1 mirror (B)	Max. range with 2 mirrors (C)	Max. range with 3 mirrors (D)
FF-SY□14 FF-SB14 filtered	6 / 19.7	4,5 / 14.8	3,4 / 11.1	2,5 / 8.3
Other FF-SY□□□	20 / 65.6	15 / 49.2	11,3 / 36.9	8,4 / 27.7
FF-SG18, FF-SG30, FF-LS14, FF-LS30	3,5 / 11.5	2,6 / 8.6	2 / 6.5	1,5 / 4.8
FF-SLG18, FF-SLG30	4 / 13.12	3 / 9.8	2,3 / 7.6	1,7 / 5.6
FF-SB12, FF-SB14 standard	10 / 32.8	7,5 / 24.6	5,6 / 18.5	4,2 / 13.8
FF-SB14 long range, FF-SB15	24 / 78.8	18 / 59.1	13,5 / 44.3	10,1 / 33.2
FF-SLC35, FF-SLC55, FF-SLC18	12 / 39.4	9 / 29.5	6,8 / 22.1	5,1 / 16.6
Detector™ 3 standard range	7,6 / 25	5,7 / 18.7	4,3 / 14.1	3,2 / 10.5
Detector™ 3 long range	15,3 / 50	11,5 / 37.7	8,6 / 28.2	6,5 / 21.3

■ Floor mounting deflection mirrors FF-SYZPF□□□ for FF-SY, FF-SB, FF-SG, FF-SLG

[illegible]

FF-SYZPF posts with individual mirrors



Beam heights, weights and part numbers

Part listings	Scanning range loss per mirror	Beam heights above the reference plane per EN 999 mm (A / B / C / D)	Weight (kg/lbs)
FF-SYZPF□12 FF-SYZPF12	10% 25%	400 / 900	15.76 / 35.46 9,7 / 21.4
FF-SYZPF□13 FF-SYZPF13	10% 25%	300 / 700 / 1100	11.82 / 27.58 / 43.34 10 / 22.1
FF-SYZPF□14 FF-SYZPF14	10% 25%	300 / 600 / 900 / 1200	11.82 / 23.64 / 35.46 / 47.28 10,2 / 22.5
FF-SYZPFM01 FF-SYZPFM11	10% 25%	Lower beam: 106 Upper beam: 1168	Lower beam: 40.2 Upper beam: 46 11,1 / 24.4

Compatibility

MIRRORS

	FF-SB Series	FF-SY□ Series	FF-SG Series FF-SLG Series	FF-LS Series
FF-SYZPFM01 FF-SYZPFM11	FF-SB12E/R02 to 06 FF-SB14E/R04 to 10 FF-SB15E/R06 to 10	FF-SY□14032 to 096 FF-SY□30032 to 096 FF-SY□60032 to 096 FF-SY□02 to 04	FF-SG18031 to 070 FF-SG30031 to 109 FF-SLG18031 to 070 FF-SLG30031 to 109 FF-SLG02 to 04	FF-LS1614 to FF-LS6414 FF-LS0828 to FF-LS0832
FF-SYZPF02 FF-SYZPF12	Not applicable	FF-SY□02	FF-SLG02	Not applicable
FF-SYZPF03 FF-SYZPF13	Not applicable	FF-SY□03	FF-SLG03	Not applicable
FF-SYZPF04 FF-SYZPF14	Not applicable	FF-SY□04	FF-SLG02 to 04	Not applicable

	FF-SLC Series	Detector 3™ Series	FF-SCAN Series	FF-SPS4 Series
FF-SYZPFM01 FF-SYZPFM11	FF-SLC3502 to FF-SLC3511 FF-SLC5504 to FF-SLC5509 FF-SLC1804 to FF-SLC1811	3LCE06 to 3LCE42	FF-SCAN2 to FF-SCAN8	FF-SPS4 (x2 to x4)
FF-SYZPF02 FF-SYZPF12	Not applicable	Not applicable	FF-SCAN2	FF-SPS4 (x2)
FF-SYZPF03 FF-SYZPF13	Not applicable	Not applicable	FF-SCAN3	FF-SPS4 (x3)
FF-SYZPF04 FF-SYZPF14	Not applicable	Not applicable	FF-SCAN4	FF-SPS4 (x4)

Scanning distance (in m/ft) using FF-SYZMIR0□□ (10% loss per mirror)

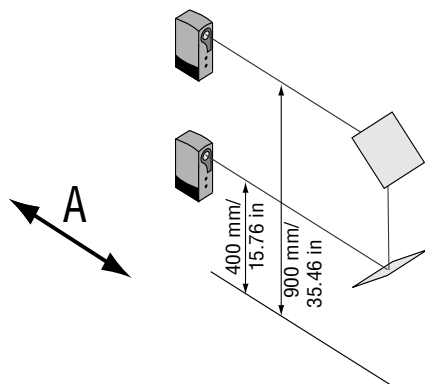
Safety light curtain	Max. range without mirror (A)	Max. range with 1 mirror (B)	Max. range with 2 mirrors (C)	Max. range with 3 mirrors (D)
FF-SY□14 FF-SB14 filtered	6 / 19.7	5,4 / 17.7	4,9 / 16	4,4 / 14.4
Other FF-SY□□□	20 / 65.6	18 / 59	16,2 / 53.1	14,6 / 47.8
FF-SG18, FF-SG30, FF-LS14, FF-LS30	3,5 / 11.5	3,2 / 10.5	2,8 / 9.2	2,6 / 8.5
FF-SLG18, FF-SLG30	4 / 13.12	3,6 / 11.8	3,2 / 10.5	2,9 / 9.51
FF-SB12, FF-SB14 standard	10 / 32.8	9 / 29.5	8,1 / 26.6	7,3 / 23.9
FF-SB14 long range FF-SB15	24 / 78.8	21,6 / 70.9	19,4 / 63.8	17,5 / 57.4
FF-SLC35, FF-SLC55 FF-SLC18	12 / 39.4	10,8 / 35.5	9,7 / 31.9	8,7 / 28.7
Detector 3™ standard range	7,6 / 25	6,8 / 22.3	6,2 / 20.3	5,5 / 18
Detector 3™ long range	15,3 / 50	13,8 / 45.3	12,4 / 40.7	11,2 / 36.7
FF-SCAN	25 / 82.1	22,5 / 73.9	20,3 / 66.5	18,2 / 59.8
FF-SCAN long range	33 / 108,3	29,7 / 97.5	26,7 / 87.7	24,1 / 79
FF-SPS4	40 / 131.3	36 / 118.2	32,4 / 106.3	29,2 / 95.7
FF-SPS4 long range	75 / 246,1	67,5 / 221.5	60,8 / 199.4	54,7 / 179.4

MIRRORS
Scanning distance (in m/ft) using FF-SYZMIR0□□ (25% loss per mirror)

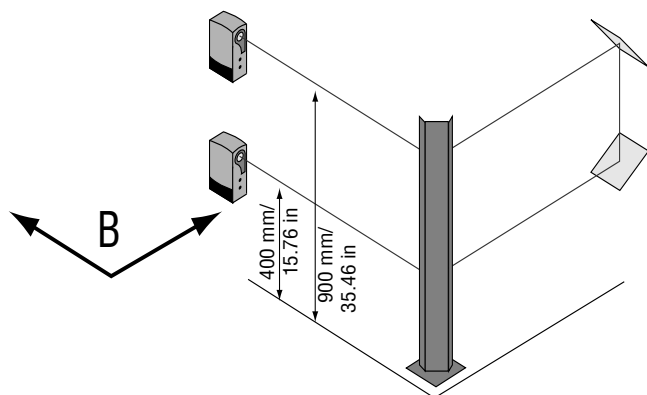
Safety light curtain	Max. range without mirror (A)	Max. range with 1 mirror (B)	Max. range with 2 mirrors (C)	Max. range with 3 mirrors (D)
FF-SY□14 FF-SB14 filtered	6 / 19.7	4,5 / 14.8	3,4 / 11.1	2,5 / 8.3
Other FF-SY□□□	20 / 65.6	15 / 49.2	11,3 / 36.9	8,4 / 27.7
FF-SG18, FF-SG30, FF-LS14, FF-LS30	3,5 / 11.5	2,6 / 8.6	2 / 6.5	1,5 / 4.8
FF-SLG18, FF-SLG30	4 / 13.12	3 / 9.8	2,3 / 7.6	1,7 / 5.6
FF-SB12, FF-SB14 standard	10 / 32.8	7,5 / 24.6	5,6 / 18.5	4,2 / 13.8
FF-SB14 long range FF-SB15	24 / 78.8	18 / 59.1	13,5 / 44.3	10,1 / 33.2
FF-SLC35, FF-SLC55 FF-SLC18	12 / 39.4	9 / 29.5	6,8 / 22.1	5,1 / 16.6
Detector 3™ standard range	7,6 / 25	5,7 / 18.7	4,3 / 14.1	3,2 / 10.5
Detector 3™ long range	15,3 / 50	11,5 / 37.7	8,6 / 28.2	6,5 / 21.3
FF-SCAN	25 / 82.1	18,8 / 61.6	14,1 / 46.2	10,5 / 34.7
FF-SCAN long range	33 / 108,3	24,8 / 81.3	18,6 / 61	13,9 / 45.7
FF-SPS4	40 / 131.3	30 / 98.5	22,5 / 73.9	16,9 / 55.4
FF-SPS4 long range	75 / 246,1	56,3 / 184.6	42,2 / 138.5	31,6 / 103.9

Applications

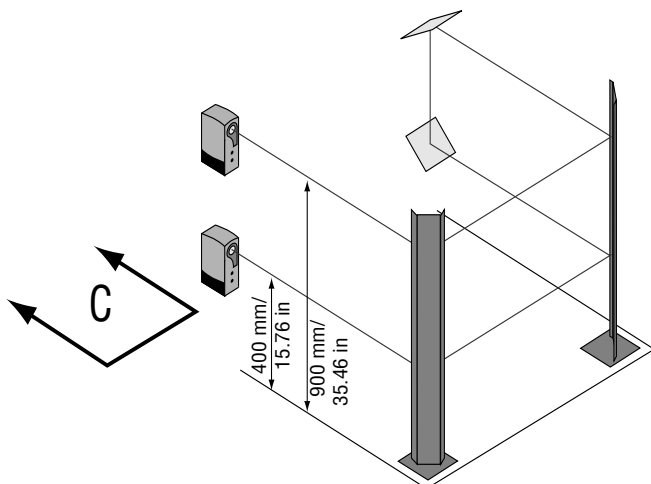
With 2 individual mirrors



With 1 floor mounting mirror and 2 individual mirrors



With 2 floor mounting mirrors and 2 individual mirrors



Perimeter A Mirrors

FF-SPZ01MIR or FF-MSK2	FF-SPS44□□□	FF-SPS47□□□
	16 / 52.3	30,1 / 98.8
	FF-SCAN□18	FF-SCAN□18□L
	9,9 / 32.4	13,1 / 43
FF-SPZ11MIR	FF-SPS44□□□	FF-SPS47□□□
	11 / 36.1	20,8 / 68.3
	FF-SCAN□18	FF-SCAN□18□L
	6,8 / 22.2	9 / 29.6

Dimensions in m / ft

Also refer to the access detection systems FF-SPZ12MIR post.

Perimeter B Mirrors

FF-SPZ01MIR or FF-MSK2 (x2) and FF-SCZ02MIR (x1)	FF-SPS44□□□	FF-SPS47□□□
	12,9 / 42.2	24,4 / 79.8
	FF-SCAN□18	FF-SCAN□18□L
	8 / 26.1	10,6 / 34.7
FF-SPZ11MIR (x2) and FF-SCZ02MIR (x1)	FF-SPS44□□□	FF-SPS47□□□
	8,9 / 29.1	16,8 / 55.2
	FF-SCAN□18	FF-SCAN□18□L
	5,4 / 17.9	7,3 / 23.8

Dimensions in m / ft

Also refer to the access detection systems FF-SPZ12MIR post.

Perimeter C Mirrors

FF-SPZ01MIR or FF-MSK2 (x2) and FF-SCZ02MIR (x2)	FF-SPS44□□□	FF-SPS47□□□
	10,4 / 34	19,7 / 64.5
	FF-SCAN□18	FF-SCAN□18□L
	6,4 / 21	8,5 / 27.9
FF-SPZ11MIR (x2) and FF-SCZ02MIR (x2)	FF-SPS44□□□	FF-SPS47□□□
	7,1 / 23.4	13,6 / 44.6
	FF-SCAN□18	FF-SCAN□18□L
	4,4 / 14.3	5,8 / 19.1

Dimensions in m / ft

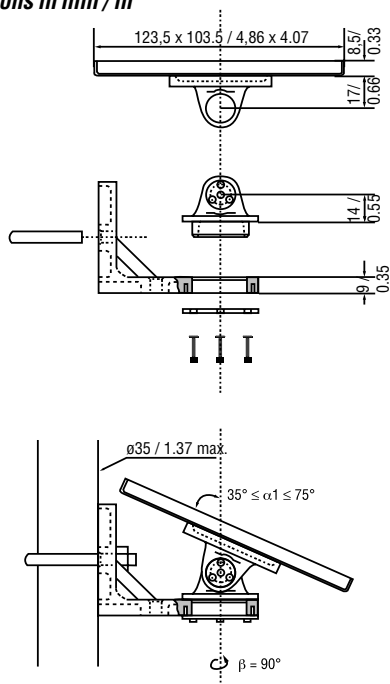
Also refer to the access detection systems FF-SPZ12MIR post.

Note: The use of deflection mirrors is not recommended with the lens heating model FF-SPS42□□□.

INDIVIDUAL MIRRORS

Individual and adjustable mirrors FF-SPZ□□MIR for FF-SCAN and FF-SPS4

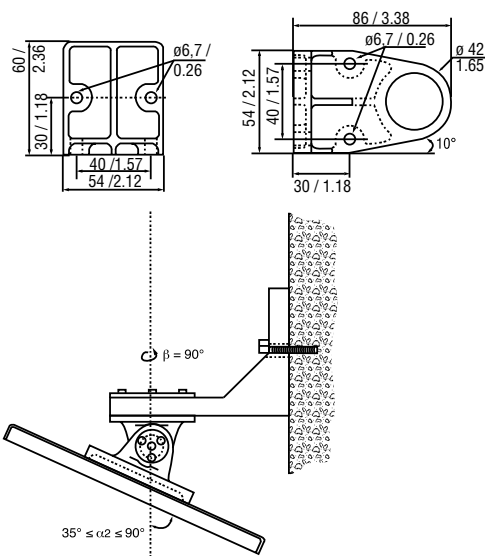
Dimensions in mm / in



Note: $-35^\circ \leq \alpha_1 \leq 35^\circ$ if $\beta = 0^\circ$ or 180°

The adjustable mirror is mounted on a pivoting base which can be fixed on a wall or on a $\varnothing 35$ mm/1.37 in. tube with a clamping ring.

Each mirror is delivered with a target drawn on an adhesive paper (the electrostatic process guarantees the cleanliness of the mirror). This target eases quick infrared beam alignment.



Note: $-45^\circ \leq \alpha_2 \leq 45^\circ$ if $\beta = 0^\circ$ or 180°

Mirror listings	Scanning range attenuations	Material
FF-SPZ01MIR	10 % per mirror	Aluminium alloy housing
FF-SPZ11MIR	25 % per mirror	Aluminium alloy housing

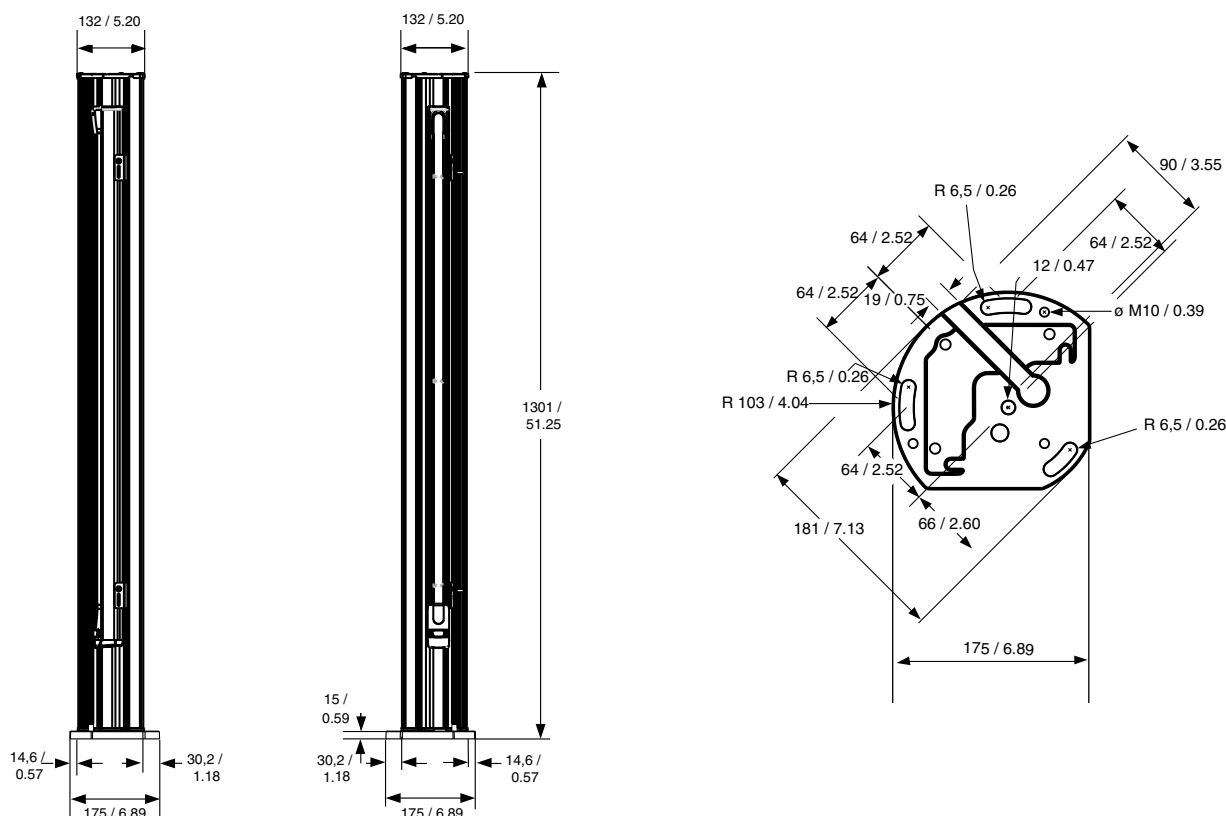
FLOOR MOUNTING POST FOR SAFETY LIGHT CURTAINS - FF-SYZPF

□ Floor mounting post for FF-SY□, FF-SG, FF-SLG safety light curtains



- Designed for vertical installation of a safety light curtain with protection heights of up to 1100 mm (43.30 in)
- T-slot mounting system allowing quick installation and easy height adjustment
- Material: Aluminium alloy housing
- Use of straight connectors recommended

Dimensions (mm/in)

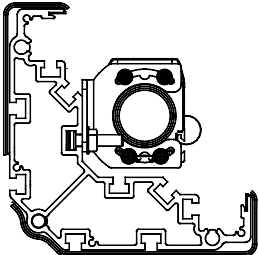
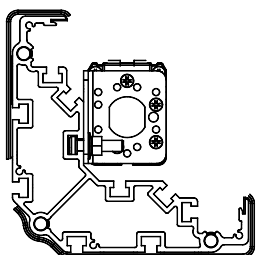
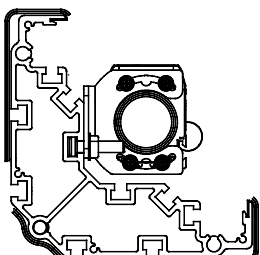
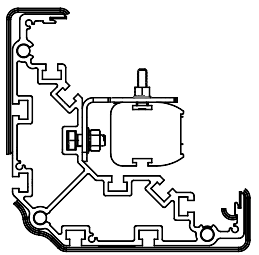


Compatibility

POSTS

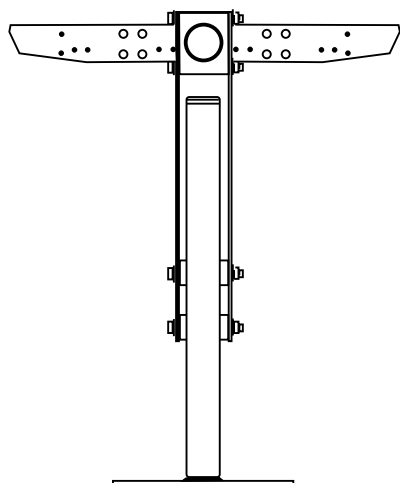
NOTICE

Use of straight connectors is necessary when installing the safety light curtain on the FF-SYZPF fixed floor mounting post (see product datasheet).

	FF-SY□14/30/50/60 Series (finger/hand/ arm detection)	FF-SG18/30 Series FF-SLG18/30 Series (finger & hand detection)	FF-SY□234 Series (body detection)	FF-SLG234 Series (body detection)
FF-SYZPF	FF-SYA14032 to 096 FF-SYA30032 to 096 FF-SYA60032 to 096 FF-SYA02 to 04	FF-SG18031 to 070 FF-SG30031 to 109 FF-SLG18031 to 070 FF-SLG30031 to 109	FF-SYA02 to 04	FF-SLG02 to 04
Recommended bracket kits	FF-SYZ634178 (delivered with the safety light curtain)	FF-SGZ001002 (to be ordered separately)	FF-SYZ634178 (delivered with the safety light curtain)	FF-SLGZ634178) (to be ordered separately)
Front cover	Not available	Not available	FF-SYZ630184-2 (2-beam) FF-SYZ630184-3 (3-beam) FF-SYZ630184-4 (4-beam)	FF-SYZ630184-2 (2-beam) FF-SYZ630184-3 (3-beam) FF-SYZ630184-4 (4-beam)
Mounting top view				

ADJUSTABLE FLOOR MOUNTING POST FOR FF-SB, FF-SYA, FF-SG & FF-SLG

Adjustable floor standing post



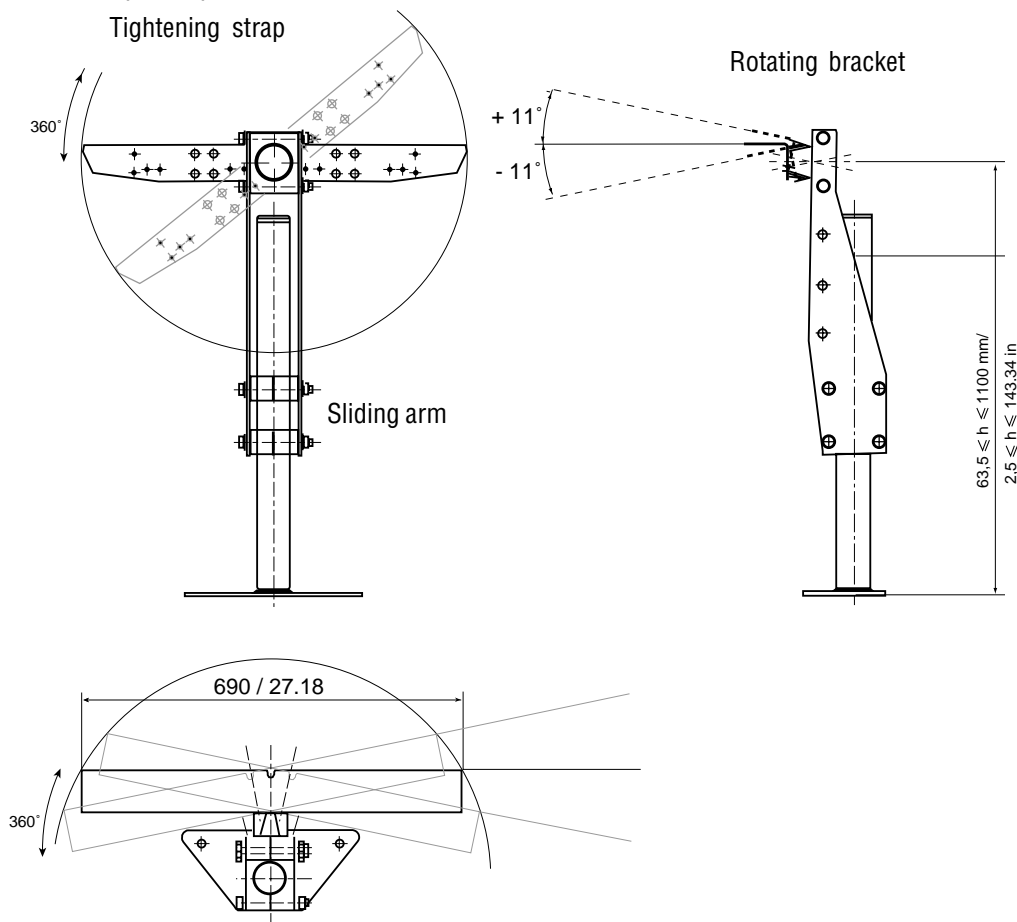
- Designed for horizontal, vertical or inclined installation of a safety light curtain
- Allows quick installation and easy alignment
- 360° rotating arm with adjustments in azimuth directions ($\pm 11^\circ$)
- Installation heights from 63,5 mm (2,5 in) up to 1100 mm (43.31 in).

WARNING

IMPROPER USE OF THE FF-SYZPA FLOOR MOUNTING POST

- Do NOT use the FF-SYZPA adjustable floor mounting post for horizontal or inclined installation of the following access detection systems: FF-SY□234, FF-SLG234, FF-SB15.
 - Prefer the FF-SYZPF fixed floor mounting post for installing vertically the FF-SY□234 or FF-SLG234 access detection systems.
- Failure to comply with these instructions could result in death or serious injury.**

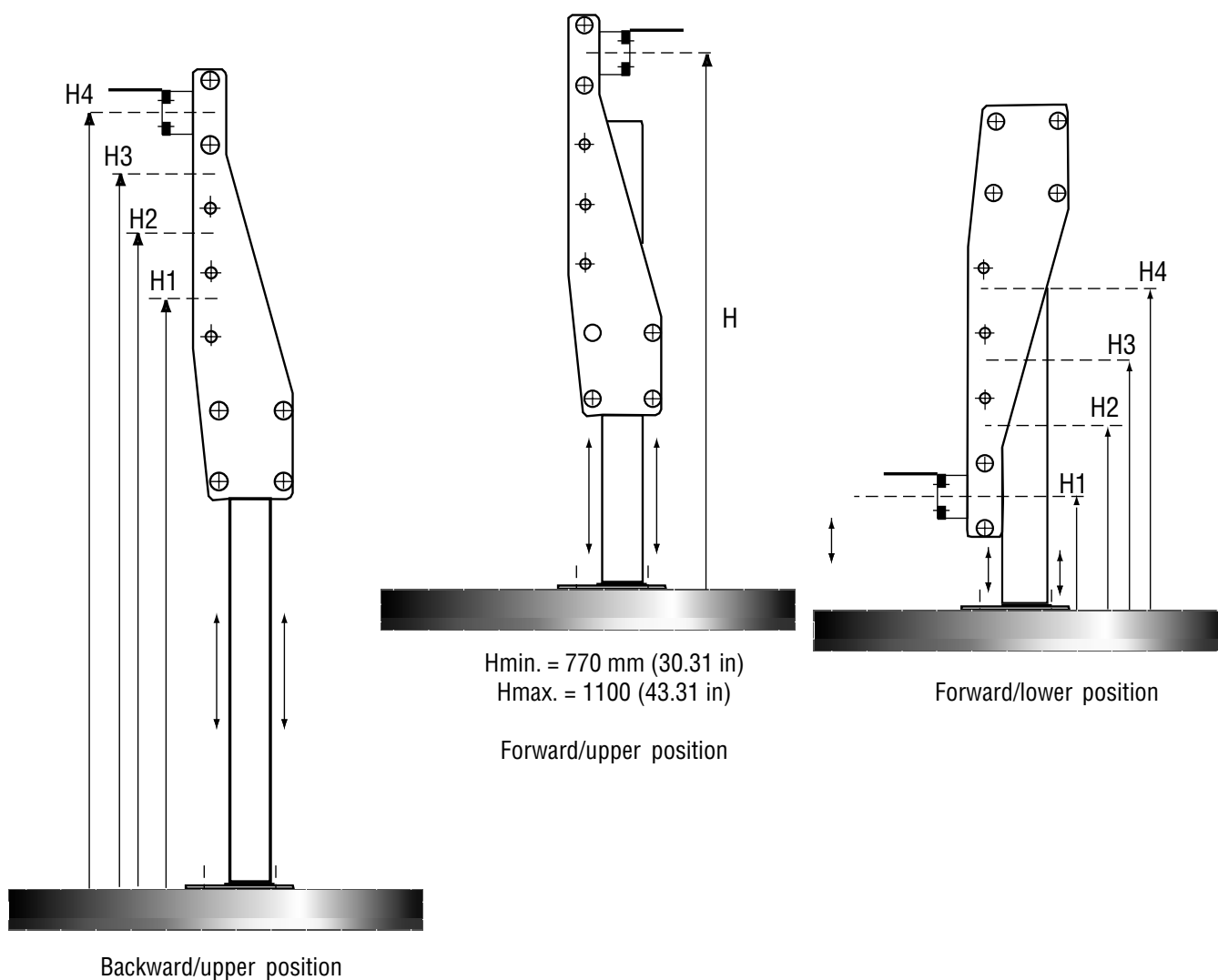
Dimensions (mm/in)



Recommended brackets

	FF-SB Series	FF-SY□ Series	FF-SG18/30 Series FF-SLG18/30 Series	FF-SLG234 Series
Recommended bracket kits	FF-SBZS5000 (to be ordered separately)	FF-SGZ001001 (delivered with the safety light curtain)	FF-SGZ001001 (delivered with the safety light curtain)	FF-SGZ001001 (delivered with the safety light curtain)

Installation heights (mm/in)



H min. / max.	Lower position	Upper position
H4	333,5 mm / 425,5 mm [13.13 in / 16.75 in]	546,5 mm / 1100 mm [21.51 in / 43.31 in]
H3	243,5 mm / 335,5 mm [9.58 in / 13.21 in]	456,5 mm / 1010 mm [17.97 in / 39.76 in]
H2	153,5 mm / 245,5 mm [6.04 in / 9.66 in]	366,5 mm / 920 mm [14.43 in / 36.22 in]
H1	63,5 mm / 155,5 mm [2.5 in / 6.12 in]	276,5 mm / 830 mm [10.88 in / 32.68 in]

Anti-vibration kit

Kit of 2 straight brackets and 4 anti-vibration dampers (mounting hardware included) - to substitute for the standard brackets delivered with the FF-SY□ or FF-SG□ light curtain.



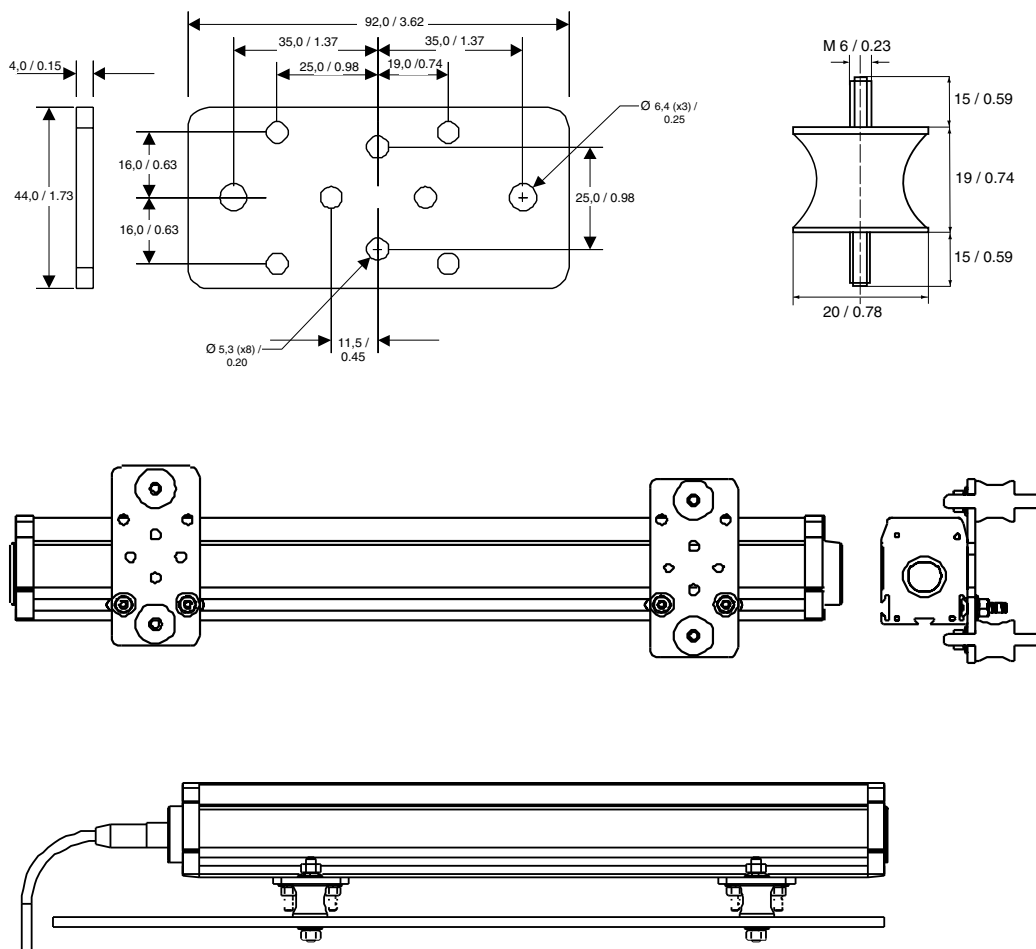
NOTICE

PROTECTION AGAINST HIGH VIBRATION

In case of high vibration, order:

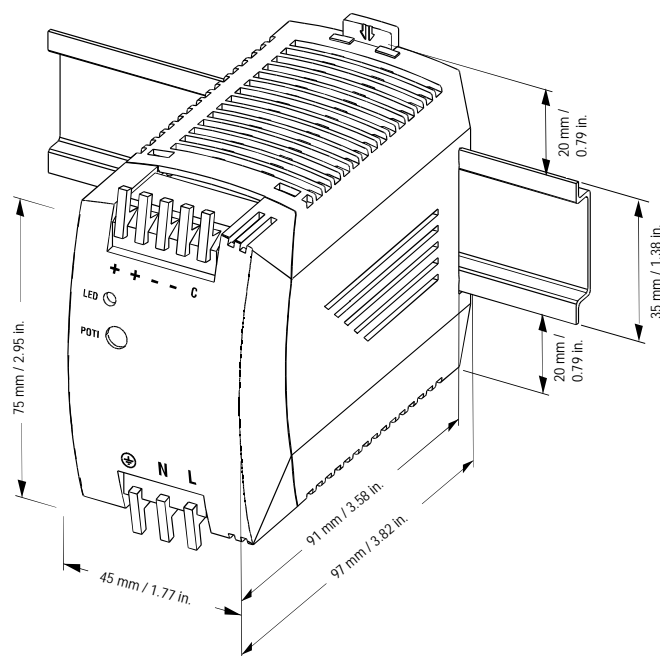
- 2 sets of FF-SYZAD kit for light curtain systems with protection height below 1000 mm/39.4 in.
- 3 sets of FF-SYZAD kit for light curtain systems with protection height greater or equal to 1000 mm/39.4 in, but less than 1850 mm/72.8 in.
- 4 sets of FF-SYZAD kit for light curtain systems with protection height greater than 1850 mm/72.8 in.

Dimensions (mm/in)



Rear mount

ac to dc power supply



FF-SXZPWR050

- Worldwide approvals: UL508 listed, UL1950, cUL/CSA-C22.2 No.950-M90), EN/IEC 60 950, EN 50178 (Class 2 Rated for low power installations).
- Input voltage: 85-264 Vac (43-67 Hz).
- Output voltage: 24-28 Vdc adjustable.
- Rated continuous load (at 60 °C/140 °F max.): 2,1 A @ 24 Vdc / 1,8A @ 28 Vdc.
- No external fuse required (the unit provides T3A internal fuse - not accessible).
- Special industrial overload design: the unit does not switch off at overload but delivers up to 1,5 time nominal current at reduced voltage.
- dc signal output and LED indicator (ON when output voltage exceeds 20 V ±4 %).
- Hold up time: >17 ms @ 100 Vac or >170 ms @ 230 Vac.
- Sealing: IP 20 (EN 60529), Protection class 1 (IEC 536).
- Operational temperature range: -10 ° to +70 °C (14 °F to 158 °F); storage temperature: -25 °C to 85°C (-13 °F to 185 °F).
- DIN rail mounting.
- Connection by spring clamp terminals with integrated lever for wire fixing (2 terminals per outputs).
- Weight: 240 g / 0.52 lbs



UL 508



UL 1950



cUL/
CSA-C22.2



89/336/EC
EMC &
73/23/EC
Low Voltage
Directives

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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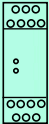





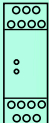


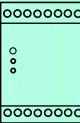


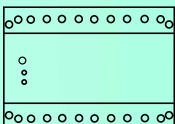
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Safety Control Modules for Emergency Stop Circuits

TYPICAL APPLICATIONS	APPROVALS	DIMENSIONS	Category per EN 954-1	Input channels	Safety contacts	Auxiliary contacts	Switching Capacity
Single Channel Emergency Stop Module <ul style="list-style-type: none">E-Stop circuits up to Category 2 (EN 954-1)Sliding door protectionConveyors / transfer lines	 According to the Machinery Directive: 98/37/EC and IEC/EN 60204 	Front view  22,5 mm x 121 mm x 84 mm / 0.89 in x 4.77 in x 3.31 in	2	1	3 NO 1 NC		4 A
Single Channel Emergency Stop Module <ul style="list-style-type: none">E-Stop circuits up to Category 2 (EN 954-1)Sliding door protectionConveyors / transfer lines	 According to the Machinery Directive: 98/37/EC and IEC/EN 60204 	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	2	1	2 NO		10 A
Dual Channel Emergency Stop Module <ul style="list-style-type: none">E-Stop circuits up to Category 4 (EN 954-1)Door protectionConveyor / transfer lines	 According to the Machinery Directive: 98/37/EC and IEC/EN 60204 	Front view  22,5 mm x 118 mm x 84 mm / 0.89 in x 4.65 in x 3.31 in	4	2	2 NO 1 NC		7 A
Dual Channel Emergency Stop Module <ul style="list-style-type: none">E-Stop circuits up to Category 4 (EN 954-1)Door protectionConveyor / transfer lines	 According to the Machinery Directive: 98/37/EC and IEC/EN 60204 	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	4	2	3 NO 1 NC		10 A
Dual Channel Emergency Stop Module <ul style="list-style-type: none">E-Stop circuits up to Category 4 (EN 954-1)Door protectionConveyor / transfer lines	 According to the Machinery Directive: 98/37/EC and IEC/EN 60204 	Front view  100 mm x 121 mm x 74 mm / 3.93 in x 4.76 in x 2.91 in	4	2	6 NO 1 NC		10 A

Response time	Automatic restart	Manual restart	Restart P/B monitoring	FSD monitoring	Power status indicator	Outputs status indicator	Cross-fault detection	Typical electrical lifespan (number of operations)	Sealing	Voltage	Removable terminal strips	DIN rail mounting	
35 ms	■	■		■	■	■		10 ⁶	IP 20	24 Vdc	■	■	FF-SRS5924 
35 ms	■	■		■	■	■		10 ⁶	IP 20	24 Vdc 120 Vac 230 Vac		■	FF-SRS5934 
15 ms	■	■	■	■	■	■	■	0,75 x 10 ⁶	IP 20	24 Vac/dc	■	■	FF-SRS5925 
25 ms	■	■	■	■	■	■	■	10 ⁶	IP 20	24 Vdc 120 Vac 230 Vac	■	■	FF-SRS5935 
30 ms	■	■	■	■	■	■	■	10 ⁶	IP 20	120 Vac 24 Vdc 230 Vac	■	■	FF-SRS5988 

FF-SRS5924

FF-SRS5934

FF-SRS5925

FF-SRS5935

FF-SRS5988

Safety Control Modules for Machine Interfacing

TYPICAL APPLICATIONS	APPROVALS	DIMENSIONS	Category per EN 954-1	Input channels	Safety contacts	Switching capacity
Two Hand Control <ul style="list-style-type: none">• Interfaces up to Category 1 (EN 954-1)• Category IIIA (EN 574)• Hand injury protection e.g. due to dangerous machine movement• Robotics• Pick and place machines	 According to Machinery Directive 98/37/EC and IEC/EN 60204 	Front view 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	1	2	2 NO	10 A
Safety Door Monitor <ul style="list-style-type: none">• Interfaces up to Category 4 (EN 954-1)• Monitors the status of limit switches on a safety door	 According to Machinery Directive 98/37/EC and IEC/EN 60204 	Front view 45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	4	2	2 NO	10 A
Extension Module <ul style="list-style-type: none">• Interfaces up to Category 4 (EN 954-1)• Contact multiplication:<ul style="list-style-type: none">- safety control modules- safety light curtains with relay outputs- other safety devices	 (pending) According to Machinery Directive 98/37/EC and IEC/EN 60204 	Front view 22.5 mm x 121 mm x 74 mm / 0.89 in x 4.77 in x 2.91 in	③ 1	2	4 NO 1 NC	5 A
Extension Module <ul style="list-style-type: none">• Interfaces up to Category 4 (EN 954-1)• Contact multiplication:<ul style="list-style-type: none">- safety control modules- safety light curtains with relay outputs- other safety devices	 According to Machinery Directive 98/37/EC and IEC/EN 60204 	Front view 100 mm x 121 mm x 74 mm / 3.94 in x 4.76 in x 2.91 in	③ 1	2	7 NO 1 NC	10 A

③ The overall safety category depends on the category of the main safety control module, therefore a higher safety category may be reached.

Response time	Automatic restart	FSD monitoring	Power status indicator	Outputs status indicator	Cross-fault detection	Typical electrical lifespan (number of operations)	Simultaneity of 2 input channels	Sealing	Voltage	Removable terminal strips	DIN rail mount	
30 ms	■	■	■	■	10 ⁶	0,5 s	IP 20	24 Vdc	■	■		FF-SR25980
30 ms	■	■		■	10 ⁶	3 s	IP 20	24 Vdc 120 Vac 230 Vac	■	■		FF-SRD5985
35 ms			■	■	10 ⁶		IP 20	24 Vac/dc	■	■		FF-SRE59292
15 ms			■	■	10 ⁶		IP 20	24 Vac/dc 120 Vac 230 Vac	■	■		FF-SRE3081



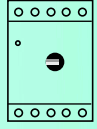



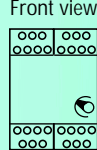


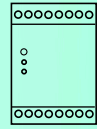


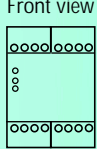
FF-SR25980

FF-SRD5985





FF-SRE59292

FF-SRE3081

Safety Control Modules for Machine Interfacing




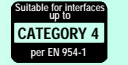
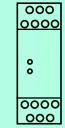









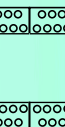
TYPICAL APPLICATIONS	APPROVALS	DIMENSIONS	Category per EN 954-1			
			Input channels	Safety contacts	Switching capacity	
Time Delay Module <ul style="list-style-type: none">Time delay before disconnection of safety interface circuits	 According to Machinery Directive 98/37/EC and IEC/EN 60204  Suitable for interfaces up to CATEGORY 1 per EN 954-1	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	③ 1	1 or 2	1 NO 1 NC	8 A
Emergency Stop Module with Timer <ul style="list-style-type: none">Time delay before disconnection of safety interface circuitsDoor protection: delayed opening of an interlocked protective gate	 (Pending) According to Machinery Directive 98/37/EC and IEC/EN 60204  Suitable for interfaces up to Category 3 per EN 954-1 (direct safety contacts)  Suitable for interfaces up to Category 4 per EN 954-1 (delayed safety contacts)	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	⑤ 4 ④ 3	2	2 NO 1 NC	5 A ④ ⑤
Standstill Monitor <ul style="list-style-type: none">Standstill detection of induction motorsUsed to unlock a safety door guarding a rotating machine only when the hazardous movement is stoppedUsed to activate an emergency brake when a e-stop signal is received and while the motion is still present.	  Suitable for interfaces up to CATEGORY 1 per EN 954-1	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	③ 1	1	2 NO 2 NC	8 A
Standstill and Low Speed Monitor <ul style="list-style-type: none">Standstill monitor / low speed monitor for any kind of rotating devicesUsed to unlock a safety door guarding a rotating machine only when the hazardous movement is stoppedUsed to activate an emergency brake when an e-stop signal is received and while the motion is still present	 (Pending) According to Machinery Directive 98/37/CE and IEC/EN 60204  Suitable for interfaces up to Category 3 per EN 954-1	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	③ 3	2	2 NO 1 NC	4 A

③ The overall safety category depends on the category of the main safety control module, therefore a higher safety category may be reached. ④ Direct contacts ⑤ Delayed contacts




Response time	Automatic restart	Manual restart	Start P/B monitoring	FSD monitoring	Power status indicator	Stopped motor indicator	Outputs status indicator	Cross-fault detection	Typical electrical lifespan (Number of operations)	Simultaneity of 2 input channels	Sealing	Voltage	Removable terminal strips	DIN rail mounting	
									3 x 10 ⁶	IP 20		24 Vdc 120 Vac 230 Vac			FF-SRT 
15 ms ⑥									10 ⁶	IP 20		24 Vac/dc			FF-SRST 
2 s									10 ⁶	IP 20		24 Vdc 120 Vac 230 Vac			FF-SR05936 
3,2 ms / 8,3 s									10 ⁶	0,5 s IP 20		24 Vac/dc 120 Vac 230 Vac			FF-SR05932 

⑥ Broken wire detection in measuring inputs

Relay Control Modules to be used with ESPE equipment

TYPICAL APPLICATIONS	APPROVALS	DIMENSIONS	Category per EN 954-1	Input channels	ESPE static outputs compatibility	Safety contacts	Switching current
Dual channel control module (for ESPE with static safety outputs) Compatible with Honeywell ESPE FF-SYA, FF-SG, FF-SLG Series	   	Front view  22,5 mm x 118 mm x 84 mm / 0.89 in x 4.65 in x 3.31 in	4	2	■	2 NO 1 NC	7 A
Dual channel control module (for ESPE with static safety outputs) Compatible with Honeywell ESPE FF-SYA, FF-SG, FF-SLG Series	   	Front view  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	4	2	■	⑦ 2 NO 1 NC	6 A
Dual channel control module (for ESPE with static safety outputs) Compatible with Honeywell ESPE FF-SYA, FF-SG, FF-SLG Series	   	Front view  45 mm x 118 mm x 84 mm / 1.77 in x 4.64 in x 3.30 in	4	2	■	3 NO 1 NC	6 A

⑦ Single, not internally redundant contacts

Response time	Automatic restart	Manual restart	Start P/B monitoring	FSD monitoring	Power status indicator	Inputs status indicator	Outputs status indicator	Restart conditions indicator	Cross-fault detection	Typical electrical lifespan (Number of operations)	Simultaneity of 2 input channels	Sealing	Voltage	Removable terminal strips	DIN rail mounting	
15 ms	■	■	■	■	■	■	■	⑧	7,5 x 10 ⁶	IP 20	24 Vdc	■	■			FF-SRL59252 
15 ms	■	■	■	■	■	■	■	⑧	10 ⁶	30 ms	IP 20	24 Vdc	■	■		FF-SRS59392 
15 ms	■	■	■	■	■	■	■	⑧	10 ⁶		IP 20	24 Vdc	■	■		FF-SRL59192 



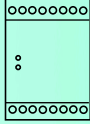
⑧ Cross-fault detection between inputs must be performed by the connected ESPE (Electrosensitive Protective Equipment).

FF-SRL59252

FF-SRS59392


FF-SRL59192

Safety Control Modules to be used with ESPE equipment

TYPICAL APPLICATIONS	APPROVALS	DIMENSIONS	Category per EN 954-1	Input channels	ESPE static outputs compatibility	Safety contacts	Switching current	Switching voltage
Category 4 Muting for Conveyor or Machine Applications <i>Compatible with any Honeywell Type 2, Type 3 or Type 4 electrosensitive protective equipment*</i> <i>Accept one muted safety device and one auxiliary safety device (muted or non muted)</i> <i>*with some restrictions (see product installation manual)</i>	  <small>Suitable for interfaces up to</small> CATEGORY 4 <small>per EN 954-1</small>	<p>Front view</p>  45 mm x 121 mm x 74 mm / 1.77 in x 4.76 in x 2.91 in	4	2 x 2	■	3 NO	5 A	24 Vdc

Response time	Automatic restart	Manual restart	FSD monitoring	Override function	Test output	Power status indicator/output	Muting indicator/output	Outputs status indicator/output	Restart status indicator/output	Failure condition indicator/output	Failure diagnostic indicator/output	Cross-fault detection	Typical electrical lifespan	Simultaneity of start muting inputs	Voltage	Removable terminal strips	DIN rail mounting
25 ms	■	■	■	■	■	■	■	■	■	■	■	2 x 10 ⁶ (1 A)	10 s	24 Vdc	■	■	

FF-SRM200P2



New

FF-SRS5924 Single Channel Emergency Stop Module

FF-SR Series

FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113 and UL 508
- Single channel input
- Output: three NO contacts and one NC contact
- Automatic start or manual start modes
- LED indicates power and internal relays status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Removable terminal strips for ease of maintenance
- Slim housing 22,5 mm / 0.89 in width

TYPICAL APPLICATIONS

- Emergency stop circuits on machines
- Sliding door protection
- Conveyors/transfer lines
- Use with Type 2 Electro-sensitive Protective Equipment (ESPE) for:
 - Point-of operation protection
 - Perimeter/zone guarding protection



FF-SRS5924

The FF-SRS5924 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This slim housing device has two safety relays with positive-guided contacts to ensure redundancy.

In the **manual start mode**, the module accepts input from the safety device (Type 2 safety light curtain, safety limit or interlock switch, etc.) at A1(+) after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14...33/34) will close and the normally closed contact (41/42) will open.

In the **automatic start mode**, the module accepts immediate input from the safety device at A1(+); if S33/S34 is jumpered the normally open safety contacts (13/14...33/34) will close and the normally closed contact (41/42) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The FF-SRS5924 is a single channel device and relies on a single safety input. If a single safety input does not provide the level of safety required, use one of the dual channel safety control modules (FF-SRS5925, FF-SRS5935, FF-SRS5988).

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRS5924 Single Channel Emergency Stop Module

FF-SRS5924

SPECIFICATIONS

- Single channel Emergency Stop circuits



Input	Nominal voltage	24 Vdc (-10%, +10%)
	Nominal consumption	1,2 W
Output	Contact complement	Three NO contacts, one NC contact
	Contact type	Safety relay, positive-guided
	Response time	Opening in supply circuit (A1 (+)): 35 ms
	Start time	Manual/automatic START function: 100 ms
	Switching capability	Power factor = 1 with resistive load
	Current range (min. to max.)	10 mA to 4 A
	Voltage range (min. to max.)	10 to 250 Vac/dc
	Switching capability per ac15	NO contact: 3 A / 250 V
	(EN 60947-5-1)	NC contact: 2 A / 250 V
	Typical electrical life expectancy	Power factor = 1 at 230 Vac/dc (See Note 1)
	2 A	1 000 000 operations
	3 A	500 000 operations
	4 A	300 000 operations
	Typical power factor (cos φ)	Limitation factor (See Note 2)
	0,3	0,45
	0,5	0,7
	0,7	0,85
	1	1
General	Output contact fuse rating	Time delay 4 A (max.)
	Mechanical life	Ten million switching operations
	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Wire / conductor connection	1 x 2,5 mm ² solid (max.) [14 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Wire / conductor attachment	Removable terminals strips with M3,5 screws; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in
	Weight	210 g / 0.46 lb

ORDERING INFORMATION

FF-SRS5924□

□ 2 = 24 Vdc (only)

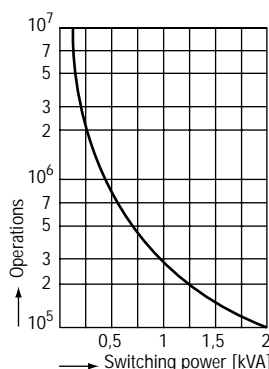
Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

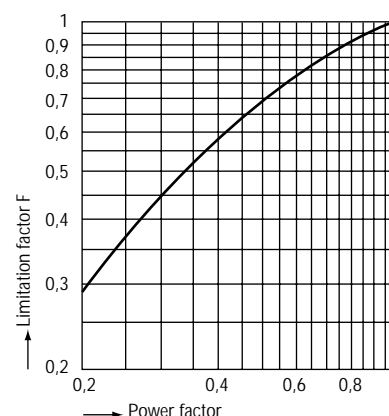
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Note 1) Power factor = 1 (cos φ)

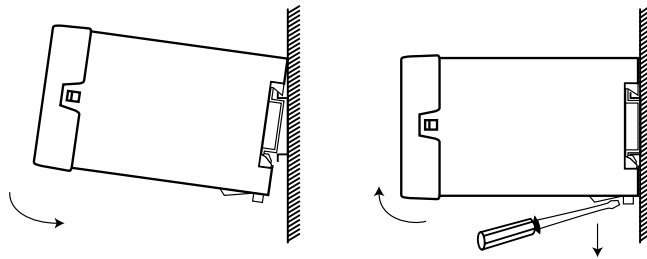


LIMITATION FACTOR FOR INDUCTIVE LOADS

(Note 2) Power factor < 1 (cos φ)

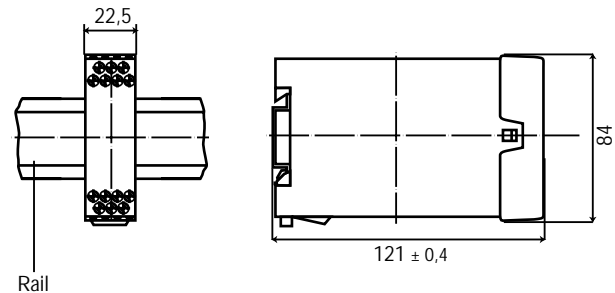


INSTALLATION DIAGRAM

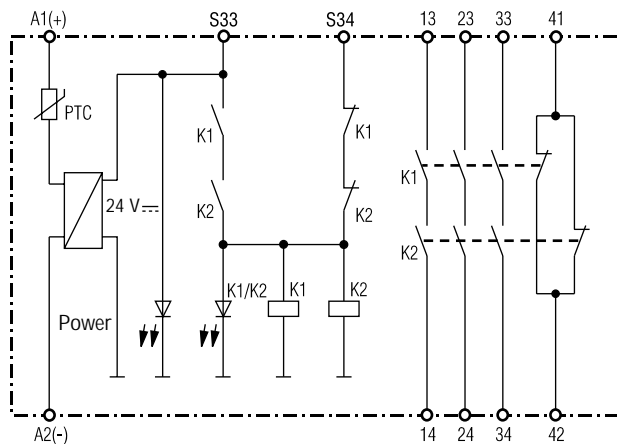


MOUNTING DIMENSIONS

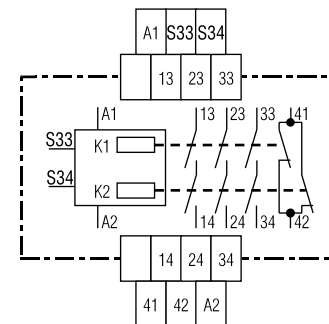
Width: 22,5 mm / 0.89 in; Height: 84 mm / 3.31 in;
Depth: 121 mm / 4.76 in



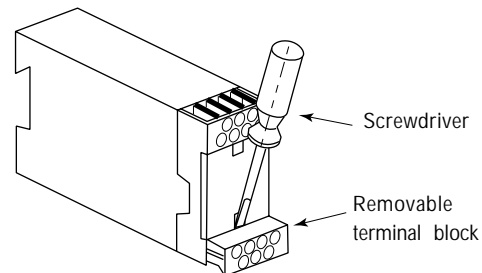
INTERNAL CIRCUITRY



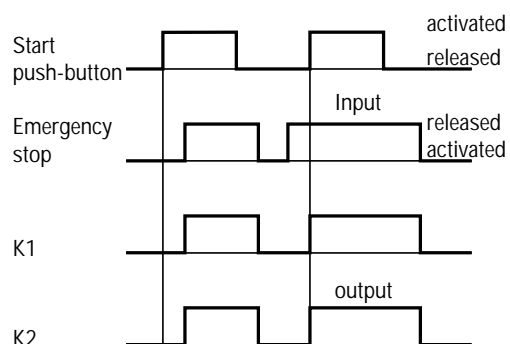
FRONT PANEL



REMOVABLE TERMINAL BLOCKS



FUNCTIONAL DIAGRAM



Functional description

After activation of the safety device (emergency stop condition occurred), the K1/K2 LED will turn OFF, indicating that the two internal safety relays K1 and K2 are de-energized. The normally open safety outputs 13/14... 33/34 will open and the normally closed contact 41/42 will close.

There exist two different start modes:

Manual start mode:

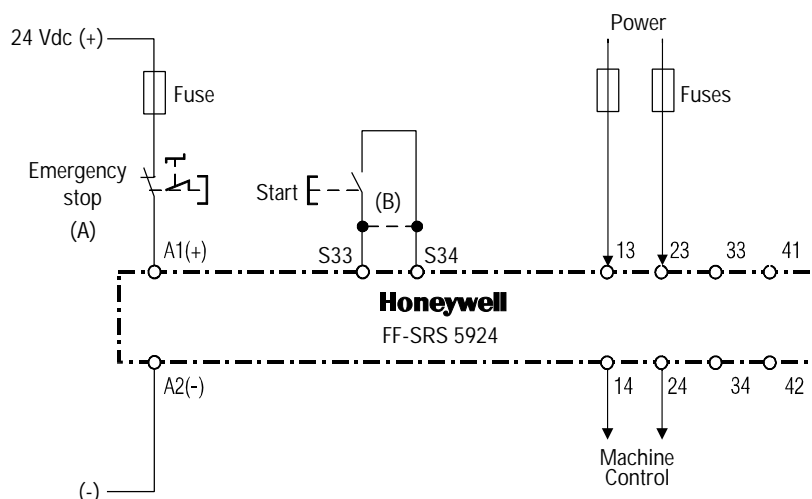
1. After removing the emergency stop condition, press the START push-button to start the safety control module.
2. The K1/K2 LED will turn ON indicating that the internal safety relays K1 and K2 are energized. The three normally open safety contacts will close allowing the machine to operate.

Automatic start mode:

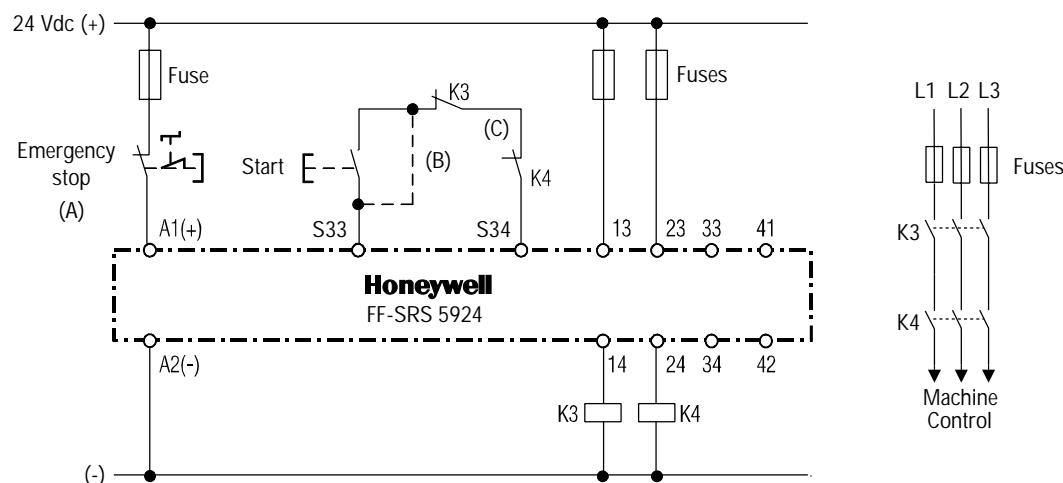
1. After removing the stop condition, the safety control module will immediately reset.
2. The K1/K2 LED will turn ON indicating that the safety relays K1 and K2 are energized. The three normally open safety contacts will close allowing the machine to operate.

APPLICATION EXAMPLES

Single channel emergency stop connection



Single channel emergency stop connection (with external contactors)



Application notes

Note (A): Single channel safety devices:

This may be an emergency stop push-button with a single output safety device in series such as safety limit or interlock switches (for example: CLS, GK and GSS).

Note (B): Start modes:

Manual start mode: Insert start push-button; the jumper in the start loop S33/S34 is omitted; Automatic start mode: Insert jumper in the start loop S33/S34.

Note (C): External contactors:

With switching currents higher than 4 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4). The proper operation of the external contactors must be monitored by looping their normally closed contacts into the Start loop between terminals S33/S34 (Final Switching Device (FSD) monitoring).

FF-SRS5934 Single Channel Emergency Stop Module

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 204 part 1 (09.92), EN 60204 part 1 (06.93) and UL 508
- Output: two NO contacts, for 250 Vac
- Single channel connection
- Automatic restart
- Start/restart interlock operation is possible with the addition of a push-button (see application examples).
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- LED display for power and internal relay status
- Short circuit protection
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS

- One channel emergency stop circuits
- Sliding door protection
- Conveyors/transfer lines



FF-SRS5934

The FF-SRS5934 Emergency Stop Modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device has two safety relays with positive-guided contacts to ensure redundancy. To ensure proper operation, the module's internal components are monitored once every restart cycle. If your application requires a higher level of safety, use the FF-SRS5935 module.

In an **automatic restart** configuration, the module accepts immediate input from the safety device (emergency stop push-button or safety switch) between L1/A1 (see application example). If S33/S34 and Y1/Y2 are jumpered (or closed), the normally open safety contacts (13/14 and 23/24) will close.

In a **start/restart interlock** configuration (restart push-button is between S33/S34), the module accepts input from the safety device (emergency stop push-button or safety switch) between L1/A1 after activation of the restart push-button (see application example). If Y1/Y2 are jumpered (or closed) when the restart push-button closes, the normally open safety contacts (13/14 and 23/24) will close.

In either configuration, if the safety device is actuated (emergency stop condition occurs), the normally open contacts will open immediately. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

WARNING

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FF-SRS5934 Single Channel Emergency Stop Module

SPECIFICATIONS

- Single channel Emergency Stop circuits



Input	Nominal voltage	120 Vac (-15 %, +10 %), 230 Vac (-15 %, +10 %), 24 Vdc (-10 %, +10 %)
	Nominal consumption	24 Vdc: 1,6 W
	Start time	Manual/automatic START function: 100ms
Output	Contact complement	2 NO contacts
	Contact type	Safety relay, positive-guided
	Response time	35 ms
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	10 mA to 6 A
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability per ac15 (EN 60947-5.1)	NO contact: 5 A / 250 Vac - NC contact: 2 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 1)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 2)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Mechanical life	Ten million switching operations
	Fuse Rating	6 A time delayed
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90 % humidity
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Conductor attachment	M 3,5 screws terminals; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Weight	450 g / 0.99 lb

ORDERING INFORMATION

FF-SRS5934 □

Voltage:

2 = 24 Vdc

E = 120 Vac

G = 230 Vac

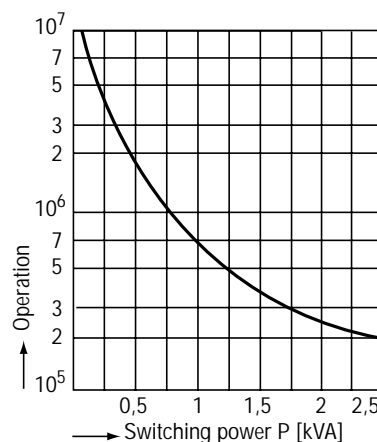
Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

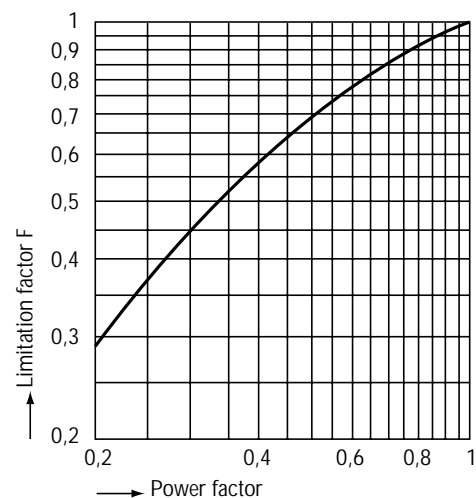
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

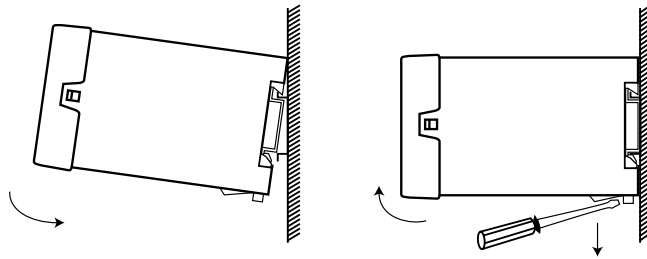


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

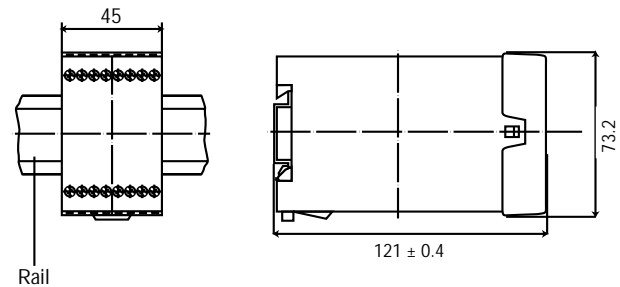


INSTALLATION DIAGRAM

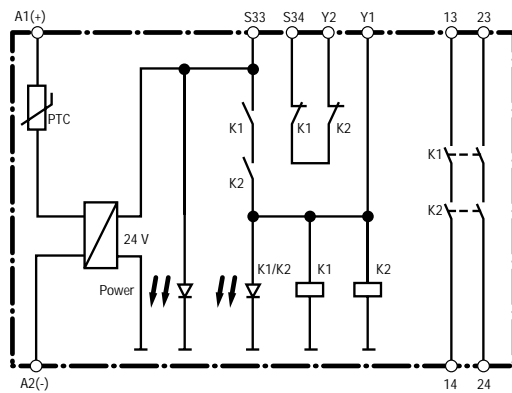


MOUNTING DIMENSIONS

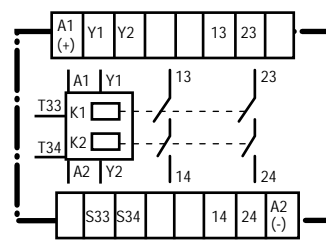
Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



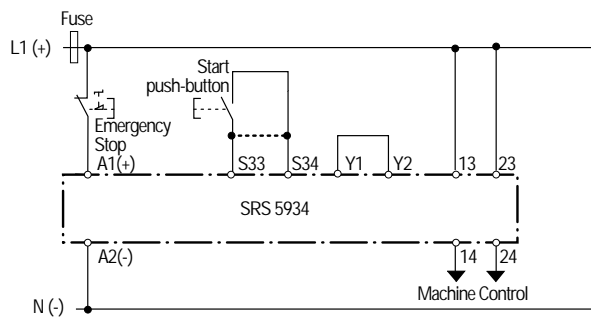
INTERNAL CIRCUITRY



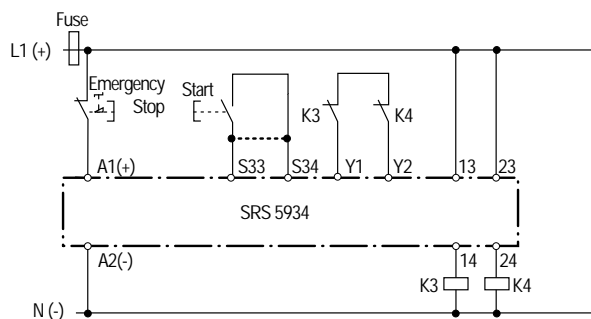
WIRING DIAGRAM



APPLICATION EXAMPLES

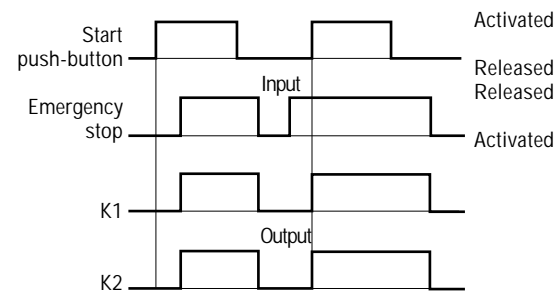


One-channel emergency stop connection (Y1-Y2, connected), optional automatic or manual start. For automatic restart, set the connection S33 - S34.



Contact reinforcement through external relays (K3, K4). For currents > 10 A, the output contacts can be reinforced by external guided relays. The status of the external relays will be monitored through their NC contacts in the Y1-Y2 loop.

FUNCTIONAL DIAGRAM



FF-SRS5925 Dual channel Emergency Stop Module

FF-SRS5925

FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
- Dual channel input
- Output: two NO contacts and one NC contact
- Switching current from 1 mA to 7 A (5 µm gold plated contacts allow low current)
- Automatic start or manual start modes
- Line fault detection and detection of blocked start push button
- Selectable cross fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- Slim housing 22,5 mm / 0.89 in width

TYPICAL APPLICATIONS

- Emergency-stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Use with Type 3 or Type 4 Electro-sensitive Protective Equipment for:
 - Point-of operation protection
 - Perimeter/zone guarding protection



The FF-SRS5925 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This slim housing device has two safety relays with positive-guided contacts to ensure redundancy.

In the **manual start mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc) between S11/S12 and S21/S22 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14, 23/24) will close and the normally closed contact (31/32) will open.

In the **automatic start mode**, the module accepts immediate input from the safety device (light curtain, mat, safety switches, etc) between S11/S12 and S21/S22; if S33/S34 are jumpered, the normally open safety contacts (13/14, 23/24) will close and the normally closed contact (31/32) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring must be used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

WARNING

MISUSE OF DOCUMENTATION

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Failure to comply with these instructions could result in death or serious injury.

FF-SRS5925 Dual channel Emergency Stop Module

SPECIFICATIONS

- Dual channel Emergency Stop circuits



Input	Nominal voltage	24 Vac/dc (-5 %, +10 %)
	Nominal power consumption	Dc: 2 W (approximately)
	Nominal frequency	50 to 60 Hz
	Start time	Manual START function: 40 ms Automatic START function: 500 ms
	Nominal voltage at S11	23 Vdc (provided by control module)
	Input current between S11/S12 and S21/S22	40 mA
	Minimum voltage at S12	21 Vdc when activated
	Cable resistance between S11/S12 and S21/S22	68 Ω (max.)
Output	Contact complement	2 NO contacts, 1 NC contact
	Response time	Opening of inputs (S11/12; S21/22): 15 ms Opening in supply circuit (24 Vac/dc(+)/A1): 50 ms
	Contact type	Safety relay, positive-guided
	Current Range (min. to max.)	1 mA to 7 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching Capability per ac15 (EN 60947-5-1)	NO contacts: 3 A / 230 V; NC contact: 2 A / 230 V
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 2)
	2 A	1 000 000 operations
	5 A	220 000 operations
	7 A	110 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,7
	0,7	0,85
	1	1
	Operating frequency	1200 switching cycles/hour (max.)
	Output contact fuse rating	Time delay 6 A (max.)
	Mechanical life	Ten million switching operations
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Wire/conductor connection	1 x 2,5 mm ² solid (max.) [14 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Wire/conductor attachment	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in
	Weight	220 g / 0.49 lb

ORDERING INFORMATION

FF-SRS5925□

□ = 24 Vdc (only)

Note 1: Contact damage

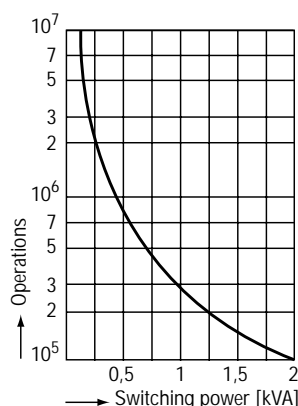
To ensure the 1 mA capability during the life-time of the contact, never exceed 300 mA or 60 V.

Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 2 A (750 000 operations), the limitation factor is 0,70. 750 000 x 0,70 = 525 000 total operations.

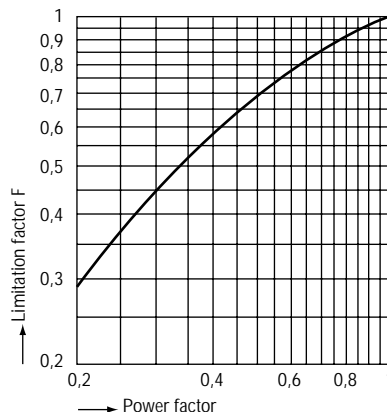
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Note 2) Power factor = 1 (cos φ)

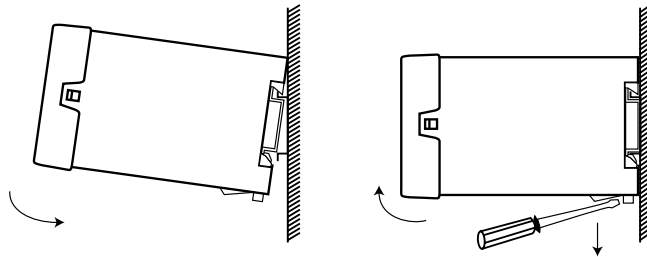


LIMITATION FACTOR FOR INDUCTIVE LOADS

(Note 3) Power factor < 1 (cos φ)

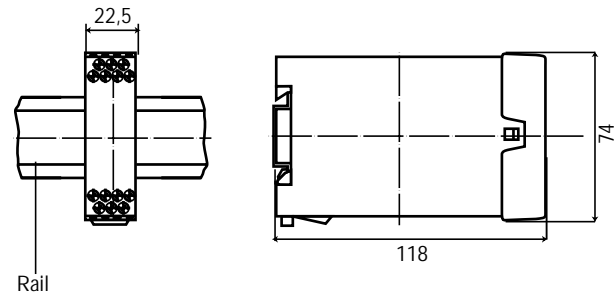


INSTALLATION DIAGRAM



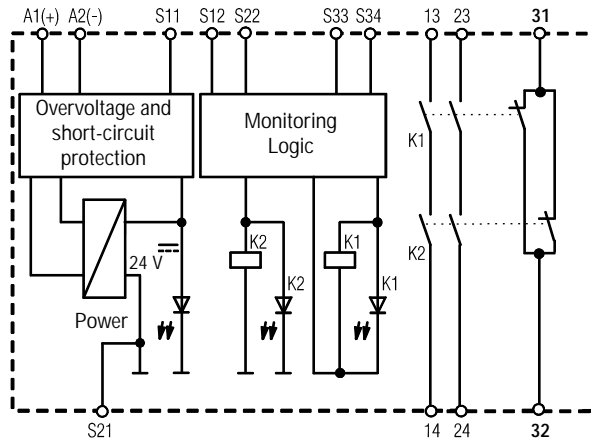
MOUNTING DIMENSIONS

Width: 22,5 mm / 0.89 in; Height: 74 mm / 2.91 in;
Depth: 118 mm / 4.65 in

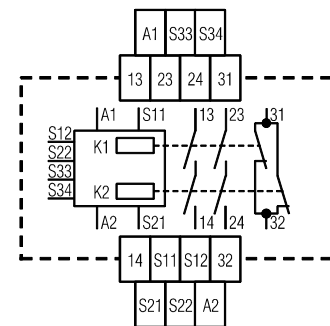


FF-SRS5925

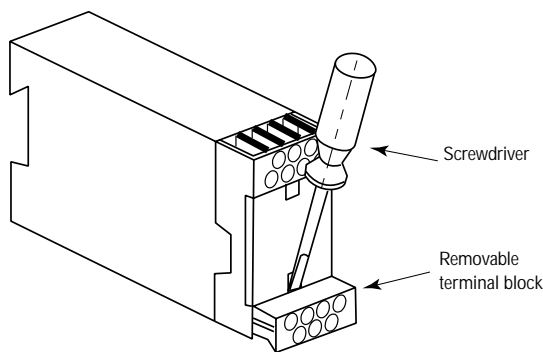
INTERNAL CIRCUITRY



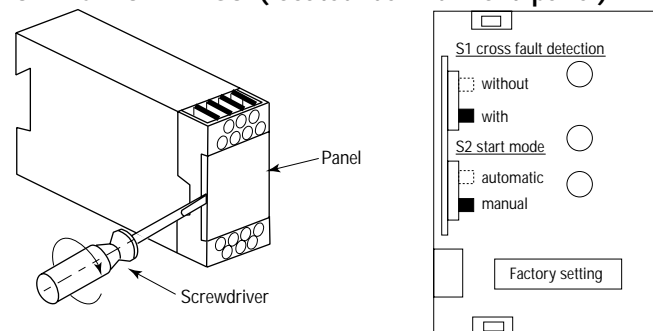
FRONT PANEL



REMOVABLE TERMINAL BLOCKS



SWITCH SETTINGS (located behind front panel)



Two switches S1 and S2 are used to select the restart mode and the operating mode for cross fault detection. These switches are located behind the front panel.

Switch S1 is used to select an operating mode for cross fault detection between the two input channels (S11/S12 and S21/S22).

Switch S2 is used to select automatic or manual restart mode. In the automatic restart mode, an additional jumper must be set into the restart loop (S33/S34, see Application Examples).

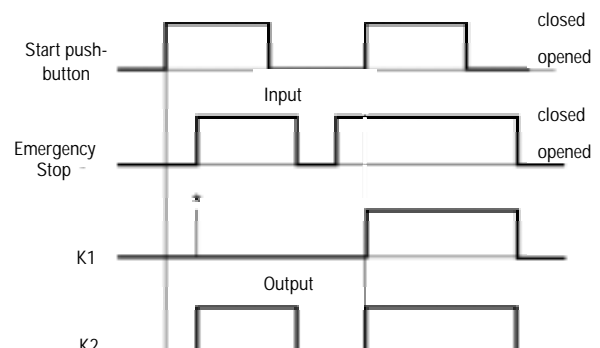
FUNCTIONAL DIAGRAM

Functional description

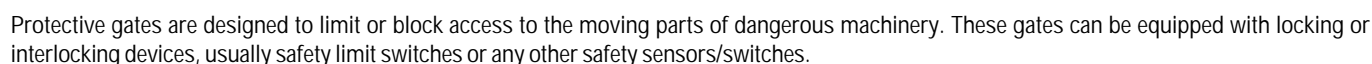
If the safety device is actuated (emergency stop condition occurs), the internal relays K1 and K2 de-energize, the normally open safety contacts 13/14, 23/24 will open immediately and the normally closed safety contact 31/32 will close. This emergency stop condition is relayed via the contacts of the module (and optional external contactors K3/K4) to the machine control circuitry to arrest dangerous motion and/or remove power.

*Line fault Detection on Start push-button

If the start push button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.



Dual-channel emergency stop circuitry (with cross fault monitoring, external contactors)



The FF-SRS5925 Emergency Stop module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating an external manual restart sequence.

After opening the door, the two external safety switch contacts Sa and Sb will open and the two internal safety relays K1 and K2 will de-energize. The normally open safety outputs 13/14 and 23/24 will open relaying the stop condition to the machine control circuitry. After closing the door, Sa and Sb close and the internal relays K1 and K2 will energize automatically. The two normally open safety contacts will close and an external manual restart sequence may then be initiated (allowing the machine to operate).

Application notes:

Note (A): Start modes:

Manual start mode: Insert start push-button into the start loop S33/S34 and select internal switch to manual start mode

Automatic start mode: Insert jumper into the start loop S33/S34 and select internal switch S2 to automatic start mode

Note (B): Dual channel safety devices:

This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as: safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtains (FF-SCAN), safety laser scanner (FF-SE), safety mats (FF-SM), dual output safety limit or interlock switches (for example, CLS and GK).

Note (C): External contactors:

With switching currents higher than 7 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4). The proper operation of the external contactors must be monitored by looping their normally closed contacts in series into the Start loop between S33/S34 (Final Switching Device (FSD) monitoring).

FF-SRS5935 Dual Channel Emergency Stop Module

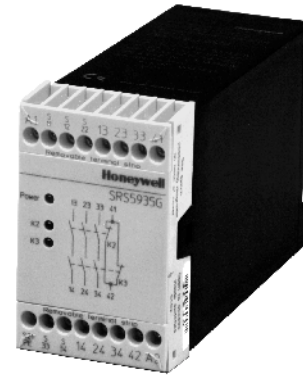
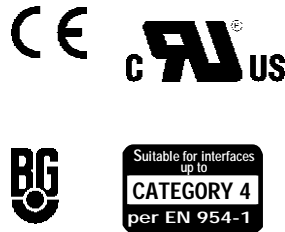
FF-SRS5935

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113 and UL 508
- Output: three NO contacts and one NC contact for ac 250 V
- Gold plated, 5 μ m contacts allow accurate low current to PLC (PLC is NOT to be used as a safety function)
- Dual channel connection
- Line fault detection and detection of blocked start push-button
- Automatic restart or start/restart interlock modes of operation
- Selectable cross fault detection in emergency stop control circuit
- Operating status display
- LED indicates power and channels one and two (internal relays) status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS

- Two channel emergency stop circuits on machines
- Point-of operation protection
- Door protection
- Perimeter/zone guarding protection
- Conveyors/transfer lines



The FF-SRS5935 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device has two safety relays with positive-guided contacts to ensure redundancy.

This module contains two internal switches (S1 and S2) that are used to set various modes of operation. This feature ensures application flexibility. In the **start/restart interlock mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc.) between S11/S12 and S21/S22 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open.

In the **automatic restart mode**, the module accepts immediate input from the safety device (light curtain, mat, safety switches, etc.) between S11/S12 and S21/S22 (S33 and S34 are jumpered if external relay monitoring is not needed); then normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring must be used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

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FF-SRS5935 Dual Channel Emergency Stop Module

SPECIFICATIONS

- Dual channel Emergency Stop circuits



Input	Nominal voltage	120 Vac (-15%, +10%), 230 Vac (-15%, +10%), 24 Vdc (-10%, +20%)
	Nominal power consumption	24 Vdc: 2 W; 230 Vac: 4 VA
	Nominal frequency	50 to 60 Hz
	Start time	Manual START function: 50 ms (-25%, +50%); Automatic START function: 1 s (-25%, +50%)
	Nominal voltage between S11/S12 and S21/S22	24 Vdc with 35 mA current \pm 25% (provided by control module)
	Minimum voltage between S11/S12 and S21/S22	21 Vdc when activated
	Cable resistance between S11/S12 and S21/S22	68 Ω (max.)
Output	Contact complement	3 NO contacts, 1 NC contacts
	Response time	After opening of input S12/11 or S21/22): 25 ms; Opening in supply circuit (L1(+)/A1): 50 ms
	Contact type	Safety relay, positive-guided
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 10 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability per ac15 (EN 60947-5.1)	NO contact: 5 A / 250 Vac - NC contact: 2 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac (See Note 2)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos ϕ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Operating frequency	600 switching cycles/h
	Fuse Rating	6 A time delayed
	Mechanical life	Ten million switching operations
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max) [16 AWG] stranded wire with sleeve DIN 46288
	Conductor attachment	Removable block terminals with M 3,5 screws; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Weight	450 g / 0.99 lb

ORDERING INFORMATION

FF-SRS5935 □

Voltage:

2 = 24 Vdc

E = 120 Vac

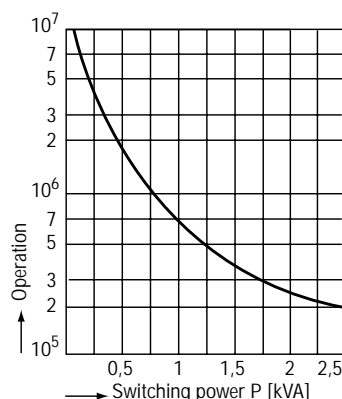
G = 230 Vac

Note 1: To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

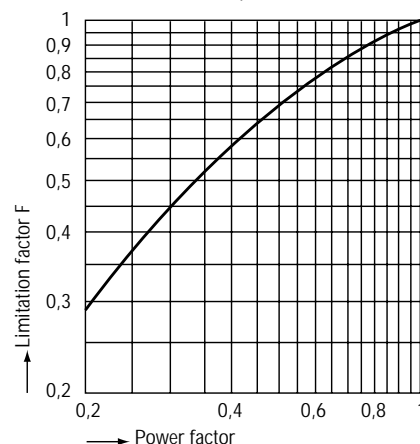
Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70. 1 000 000 x 0,70 = 700 000 total operations.

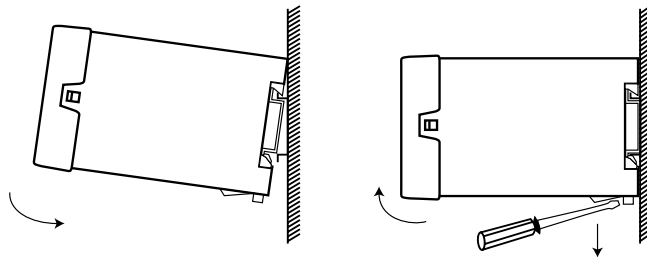
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos ϕ)


LIMITATION FACTOR FOR INDUCTIVE LOADS

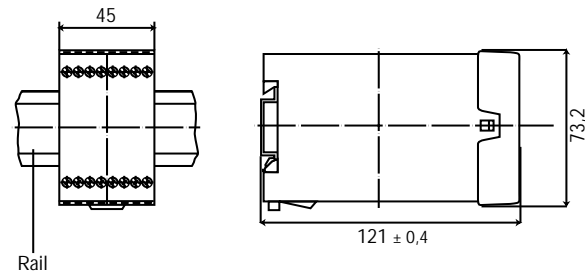
Power factor < 1 (cos ϕ)


INSTALLATION DIAGRAM

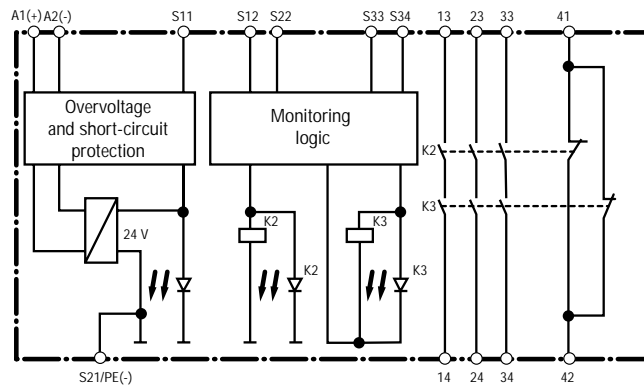


MOUNTING DIMENSIONS

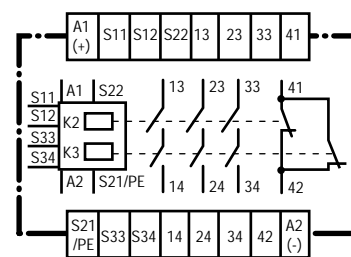
Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



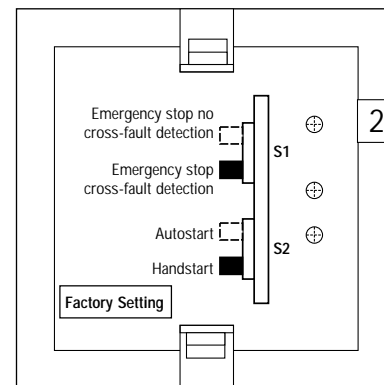
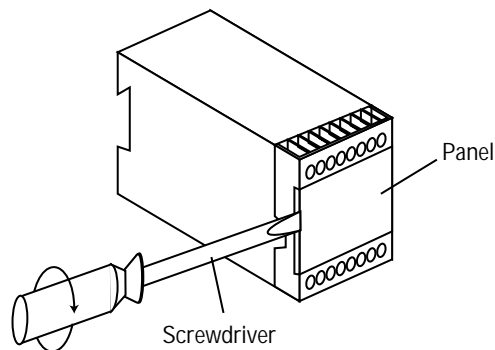
INTERNAL CIRCUITRY



WIRING DIAGRAM



FF-SRS5935 PROGRAMMING: Switch Settings



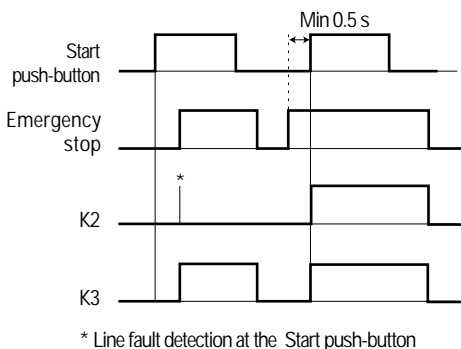
Switches S1 and S2 are used to select **automatic start**, **manual start** and emergency stop with or without **cross fault detection**. These switches are located behind the front cover panel.

Switch S2 is used to select automatic or manual start. In addition, terminals S33 and S34 must be shunted for automatic start to function.

Switch S1 is used to select an operating mode for cross fault detection between the two inputs and push-button failure.

The emergency stop module must be connected as illustrated in the following application examples.

FUNCTIONAL DIAGRAM



* Line fault detection at the Start push-button

FUNCTIONAL DESCRIPTION

If the start push-button is closed before voltage is applied to S12 and S22 (also, if a line fault occurs via the start push-button), the output contacts cannot be switched to START.

The module's PE testing terminal allows insulation monitoring on IT networks. This terminal serves as a reference point for checking the control voltage and provides a connection contact during an emergency stop with cross fault detection.

Notice that connecting the PE terminal to ground on dc versions implies the deactivation of the internal short-circuit protection.

One or more FF-SRE3081 Extension Modules or external contactors with positively driven contacts can be used to multiply the number of contacts of the FF-SRS5935 Emergency Stop Module. If multiple safety contacts are used in parallel with one load, the maximum admissible current can be increased.

Dual-channel emergency stop circuit with cross fault detection (recommended interface)



This circuit has no redundancy in the emergency stop circuit.

With switching current >10 A, the output contacts should be reinforced by external contactors (K4 and K5) with positive-guided contacts. The proper operation of the external contactors is monitored by looping NC contacts into the restart circuit (terminals S33-S34).

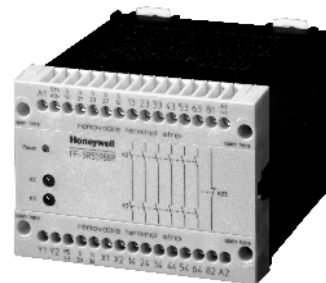
FF-SRS5988 Dual Channel Emergency Stop Module

FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204-1, DIN VDE 0113
- Dual channel input
- Output: six NO contacts and one NC contact
- Dual voltage device 24 Vdc/120 Vac or 24 Vdc/230 Vac
- Switching current from 1 mA to 10 A (5 µm gold plated contacts allow low current)
- Line fault detection and detection of blocked start push-button
- Automatic start or manual start modes
- Selectable cross fault detection in emergency stop control circuit
- LED indicates power and the status of the two output channels (internal relays)
- Mechanical life up to thirty million operations
- Electrical life up to one million operations
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- 100 mm / 3.94 in width

TYPICAL APPLICATIONS

- Emergency stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Use with Type 3 or Type 4 Electro-sensitive Protective Equipment for:
 - Point-of operation protection
 - Perimeter/zone guarding protection



FF-SRS5988

The FF-SRS5988 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device offering six NO and one NC output contacts has two safety relays with positive-guided contacts to ensure redundancy.

In the **manual start mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc.) between S11/S12 and S21/S23 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In the **automatic start mode**, the module accepts input from the safety device (light curtain, mat, safety switches, etc.) between S11/S12 and S21/S23 (Y1 and Y2 are jumpered if external relay monitoring is not needed); then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring is used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

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FF-SRS5988 Dual Channel Emergency Stop Module

SPECIFICATIONS

- Dual channel Emergency Stop circuits



Input	Nominal voltage	120 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %)
	(Dual voltage device)	230 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %)
	Nominal power consumption	Dc: 3 W / ac: 6 VA
	Nominal frequency	50 to 60 Hz
	Start time	Manual START function: 30 ms Automatic START function: 1 s
	Nominal voltage at S11 / at S21	23 Vdc (provided by control module) / 0 V
	Input current between S11/S12 and S21/S23	110 mA dc
	Minimum voltage at S12/A4 and at S22/A4	21 Vdc when activated
	Cable resistance between S11/S12 and S21/S23	68 Ω (max.)
Output	Contact complement	6 NO contacts, 1 NC contact
	Response time	Opening of inputs (S11/12; S21/23): 30 ms Opening in supply circuit: 50 ms
	Contact type	Safety relay, positive-guided
	Switching capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 10 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching Capability per ac15 (EN 60947-5-1)	NO contacts: 5 A / 230 V; NC contact: 2 A / 230 V
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 2)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos ϕ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,7
	0,7	0,85
	1	1
	Operating frequency	600 switching cycles/hour (max.)
	Output contact fuse rating	Time delay 6 A (max.)
	Mechanical life	Thirty million switching operations
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Wire/conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Wire/conductor attachment	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in
	Weight	840 g / 1.85 lbs

ORDERING INFORMATION

FF-SRS5988□

P = 120 Vac / 24 Vdc
R = 230 Vac / 24 Vdc

Note 1: Contact damage

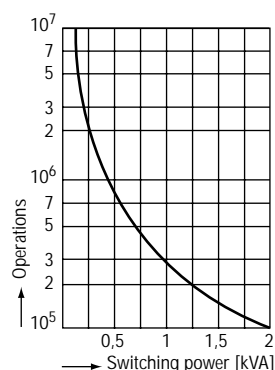
To ensure the 1 mA capability during the life-time of the contact, never exceed 300 mA or 60 V.

Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70. 1 000 000 x 0,70 = 700 000 total operations.

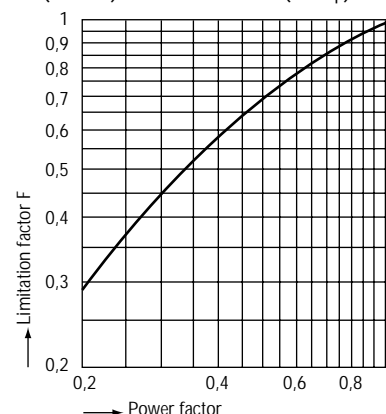
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Note 2) Power factor = 1 (cos ϕ)

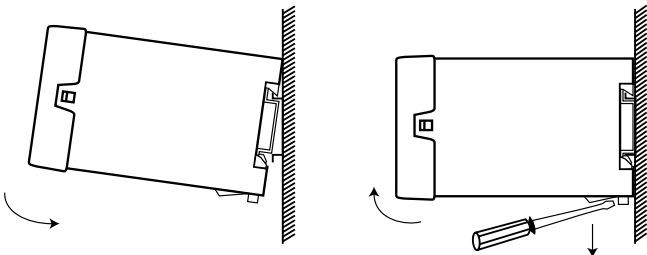


LIMITATION FACTOR FOR INDUCTIVE LOADS

(Note 3) Power factor < 1 (cos ϕ)

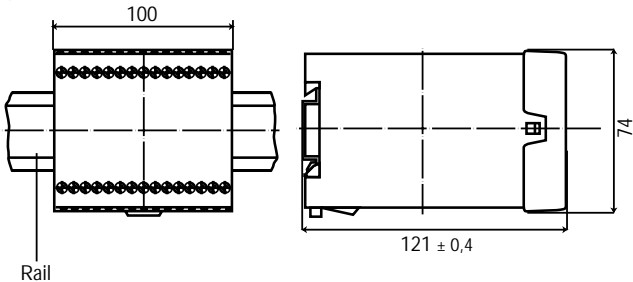


INSTALLATION DIAGRAM



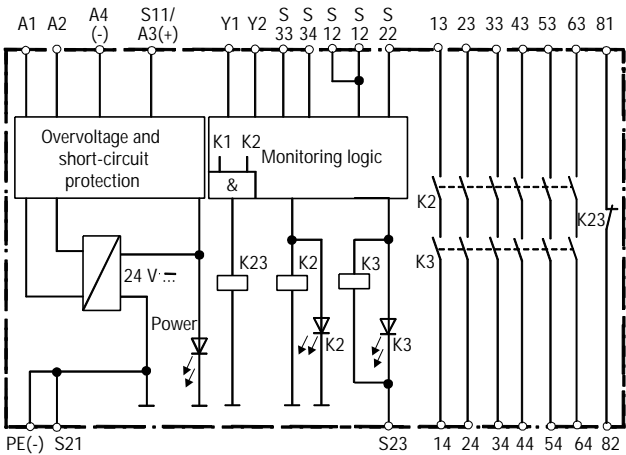
MOUNTING DIMENSIONS

Width: 100 mm / 3.94 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in

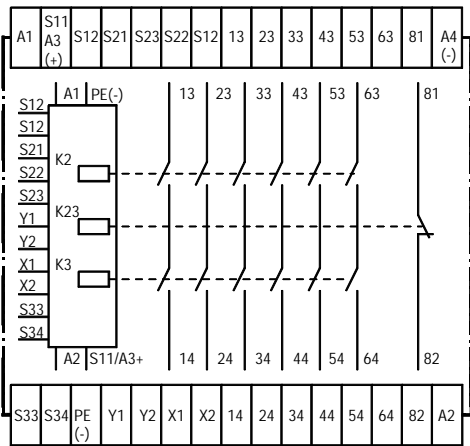


FF-SRS5988

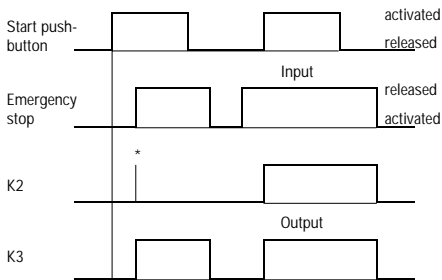
INTERNAL CIRCUITRY



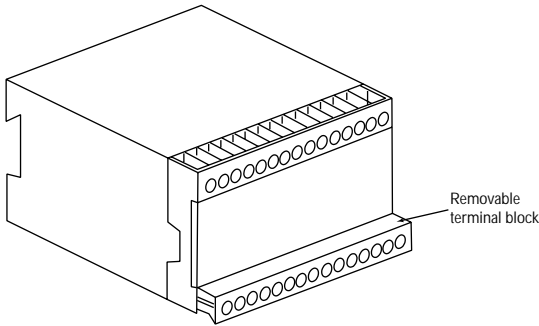
WIRING DIAGRAMS



FUNCTIONAL DIAGRAM



REMOVABLE TERMINAL BLOCKS



Functional description

If the safety device is actuated (emergency stop condition occurs), the internal relays K2 and K3 de-energize, the normally open safety contacts 13/14... 63/64 will open immediately and the normally closed monitoring contact 81/82 will close. This emergency stop condition is relayed via the safety contacts of the module (and optional external safety contactors K4 and K5) to the machine control circuitry to arrest dangerous motion and/or remove power.

* Line fault Detection on Start push-button:

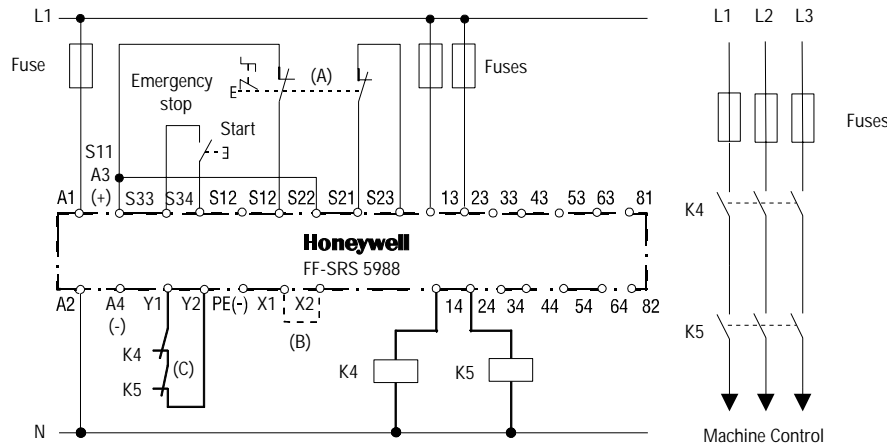
If the start push button is closed before voltage is applied to S12 and S23 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.

SETTING OF START MODE

Start Mode	Jumper between X1/X2	Start push-button between S33/S34	
Manual start mode	not connected		Insert the start push-button between terminals S33/S34 for manual start mode.
Automatic start mode	connected		Insert a jumper between X1/X2 for automatic start mode to function

APPLICATION EXAMPLES

Dual-channel emergency stop circuitry (with cross fault monitoring, manual start mode, external contactors)

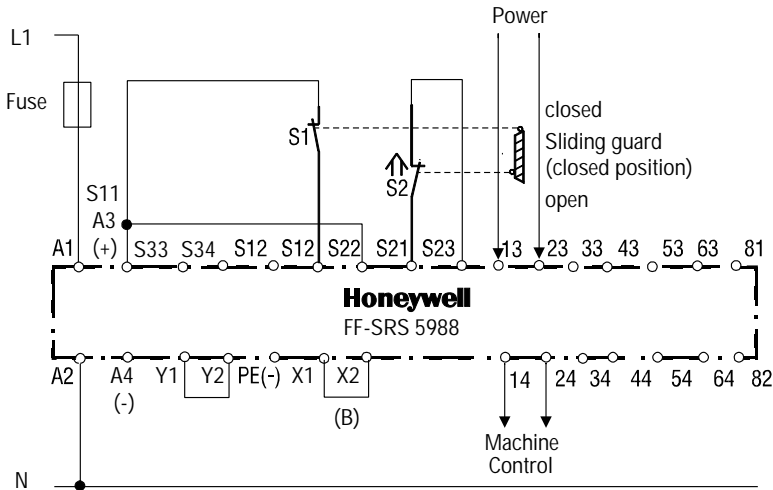


Dual-channel safety door monitoring (with cross fault monitoring, automatic start mode)

Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually safety limit switches or any other safety sensors/switches.

The FF-SRS5988 Emergency Stop module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating an external manual restart sequence.

After opening the door, the two external safety switch contacts S1 and S2 will open (as illustrated above) and the two internal safety relays K2 and K3 will de-energize. The normally open safety outputs 13/14... 63/64 will open relaying the stop condition to the machine control circuitry. After closing the door, S1 and S2 close and the internal relays K2 and K3 will energize. The six normally open safety contacts will close and an external manual restart sequence may then be initiated (allowing the machine to operate).



APPLICATION NOTES

Note (A): Dual channel safety devices:

This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtain (FF-SCAN), safety mat (FF-SM), safety laser scanner (FF-SE), or safety limit switches (i.e. 2CLS, GK).

Note (B): Start modes:

Manual start mode: Insert start push-button between S33/S34; no jumper must be set between X1/X2

Automatic start mode: Insert jumper between X1/X2

Note (C): External contactors:

With switching currents higher than 10 A, the output contacts should be reinforced by external contactors with positive guided contacts (K4 and K5). The proper operation of the external contactors must be monitored by looping their normally closed contacts into the Final Switching Device (FSD) monitoring loop (Y1/Y2). If no external contactors are used, Y1/Y2 has to be jumpered to let the module function.

FF-SRS59392 Dual Channel Interface Control Module

for Electrosensitive Protective Equipment

FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
- Supply voltage: 24 Vdc
- Dual input compatible with the safety static outputs of Honeywell Electrosensitive protective Equipment
- Two cross-monitored relays with guided contacts delivering two N.O. contacts and one N.C. contact
- Switching current from 1 mA to 6 A (gold plated 5 µm contacts allow low current)
- Response time: 15 ms
- Selectable automatic or manual restart modes (with permanent short-circuit detection)
- Selectable Final Switching Devices monitoring loop for the control of external relays or contactors
- LEDs indicates inputs and outputs status, and restart condition
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width housing

TYPICAL APPLICATIONS

To be used with the FF-SYA safety light curtain in point-of operation protection or zone guarding protection such as:

- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Conveyors/transfer lines



The FF-SRS59392 Interface Control Module is designed to be used with the FF-SYA Safety Light Curtain in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm / 1.77 in width housing is ideal for space restricted areas. This module provides a Control Reliable interface between the FF-SYA Light Curtain and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 2 NO and 1 NC output contacts. These output contacts are also gold plated to ensure compatibility with very low current requirements (such as a monitoring circuit).

The FF-SRS59392 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external switching devices. The FF-SRS59392 is equipped with LED indicators that provide diagnostic information and is equipped with removable wiring strips to make replacement fast and easy.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

MISUSE OF PRODUCT

- The FF-SRS59392 module is designed to be used with the Honeywell FF-SYA safety light curtain equipped with fail-safe solid state outputs. The FF-SYA performs cross-fault detection between its outputs. The FF-SRS59392 module does not perform the cross-fault detection between its inputs. To ensure the highest safety category, do NOT use the FF-SRS59392 with any other equipment. For other equipment, use the FF-SRS5935 or FF-SRS5925 dual channel emergency stop module. Both modules perform the cross-fault detection between the safety device outputs.

Failure to comply with these instructions could result in death or serious injury.

FF-SRS59392

FF-SRS59392

• Dual Channel Interface Control Module - Electrical interface
for Electrosensitive protective equipment



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Supply voltage	
Nominal voltage (A1/A2)	24 Vdc (-15 %, +15 %)
Power consumption	3,5 W
Fuse protection	315 mA, time delayed
Restart functions	
Restart push-button input (S33/S34)	For the connection of a N.O. contact, 0,1 to 1,5 s closing time, permanent short-circuit detection, 20 Vdc min. voltage (without pressing the push-button), 10 mA/24 Vdc min. current, 470 Ω max. cable resistance
Restart mode input (X1/X3)	For setting the manual or automatic restart mode, voltage presence
Restart time	100 ms after the ESPE inputs are energized (automatic restart) or push-button release (manual restart)
FSD monitoring loop	
FSD contacts input (Y1/Y2)	For the connection in series of the FSDs N.C. contacts (FSDs reaction time: 250 ms), permanent short-circuit detection, 20 Vdc min. voltage, 30 mA/24 Vdc min. current, 150 Ω max. cable resistance
FSD monitoring input (X1/X2)	For setting the FSD monitoring loop, voltage presence
ESPE inputs	
Input current	30 mA/24 Vdc (relays energized), 5 mA/24 Vdc (relays de-energized)
Input voltage	19 to 27,6 Vdc
Protection	Reversed polarity, over-voltages up to 32 Vdc
Outputs	
Contacts available	2 N.O., 1 N.C. (2 safety relays with guided contacts)
Response time	15 ms max. (See timing diagrams)
Start time at power up	100 ms (automatic restart mode)
Current range	1 mA min., 6 A max. (See Note 1)
Voltage range	0,1 Vac/dc min., 250 Vac/dc max.
Switching capability per ac15 (EN 60947-5-1)	N.O. contact: 3 A / 230 Vac, N.C. contact: 2 A / 230 Vac
Typical electrical life expectancy	Power factor = 1 at 230 Vac (See Figure 1, Note 3) 1 A : > 2 000 000 ac / > 400 000 dc ; 3 A : > 500 000 ac / > 300 000 dc 5 A : > 300 000 ac / > 200 000 dc ; 6 A : > 200 000 ac / > 150 000 dc
Typical power factor (See Fig. 2, Note 2 and 3)	Limitation factor: 0,45 (cos φ = 0,3), 0,70 (cos φ = 0,5), 0,85 (cos φ = 0,7), 1 (cos φ = 1)
Operating frequency	1200 switching cycles / h (max.)
External fuse rating	6 A max. time delayed
Mechanical life	10 million switching operations
Environmental specifications	
Temperature range	Operation: 0 °C to 55 °C / 32 °F to 131 °F Storage: -20 °C to 70 °C / -4 °F to 170 °F, at 90 % humidity max.
Sealing	Housing: IP 40 • Terminals: IP 20
Housing material	Thermoplastic
Vibration resistance	Amplitude 0,35 mm, frequency 10 to 55 Hz
Connection	Removable terminal strips, one \varnothing 2,5 mm ² (14 AWG) or two \varnothing 1,5 mm ² (16 AWG) stranded wires per terminal
Mounting	Quick install rail mounting EN 50022-35, 35 x 15 mm / 1.38 x 0.59 in size
Weight	280 g / 0.61 lb

Ordering information

FF-SRS59392 (24 Vdc)

NOTE 1: To ensure the 1 mA capability during the life-time of the contact, NEVER exceed 300 mA and 60 V.

NOTE 2: Install arc suppression device across loads to avoid module contact arcing and ensure specified relay life expectancy.

NOTE 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 3 A/230 Vac, the limitation factor is 0,70 and the number of operations is 500 000 x 0,70 = 350 000.

Figure 1 - Contacts life for a 100 % resistive load

(typical) - Note 1

Power factor = 1 (cos φ)

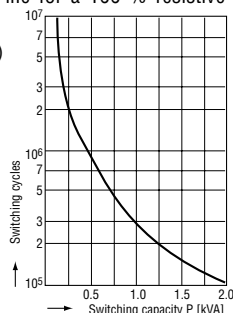
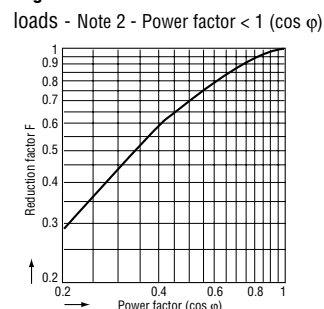
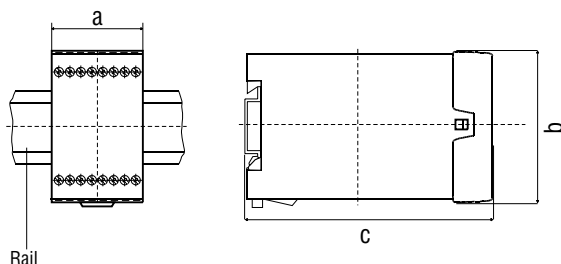


Figure 2 - Limitation factor inductive loads - Note 2 - Power factor < 1 (cos φ)

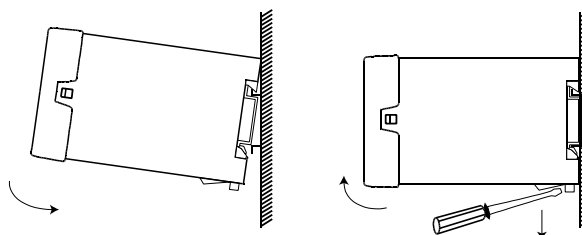


Mounting dimensions

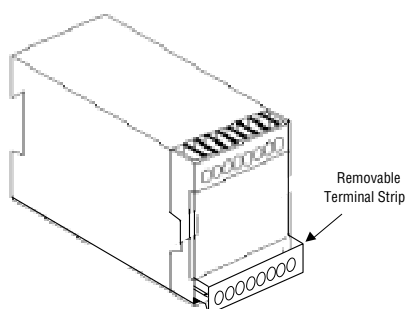
- a Width: 45 mm / 1.77 in
- b Height: 74 mm / 2.91 in
- c Depth: 121 mm / 4.76 in



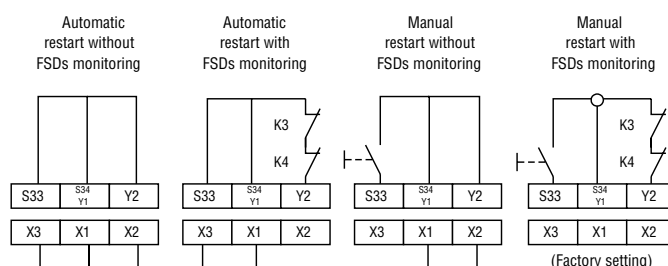
Mounting procedure



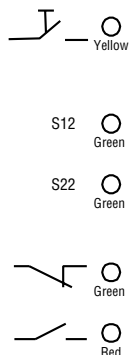
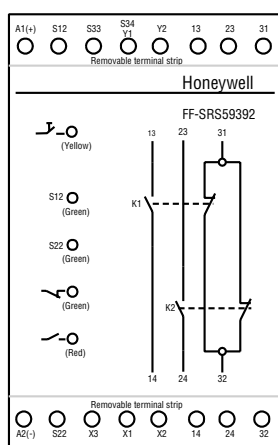
Removable terminal strips



Jumper links setting diagram



Module front panel



Selected Restart Mode

- ☐ Automatic restart selected
- ☒ Manual restart selected
- ☐ Press and release the restart push-button

ESPE Inputs Status

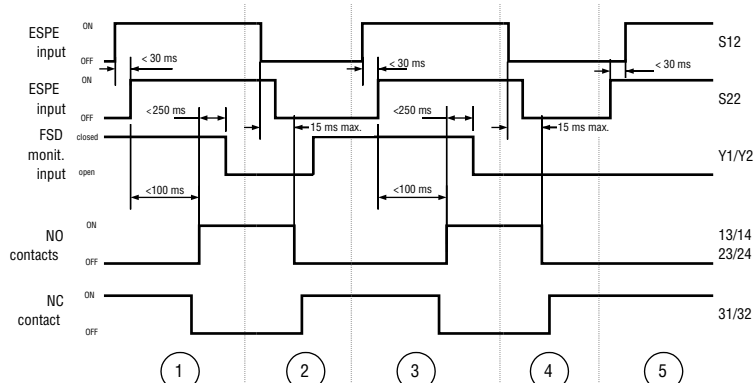
- ☒ Both safety device outputs are closed
- ☐ Both safety device outputs are open

Relay Outputs Status

- ☒ Internal relays are energized, NO contacts are closed, NC contact is open.
- ☐ Internal relays are de-energized, NO contacts are open, NC contact is closed.

- ☐ light off
- ☒ light on
- ☒ blinking light

Automatic restart functional diagram (with Final Switching Devices monitoring)

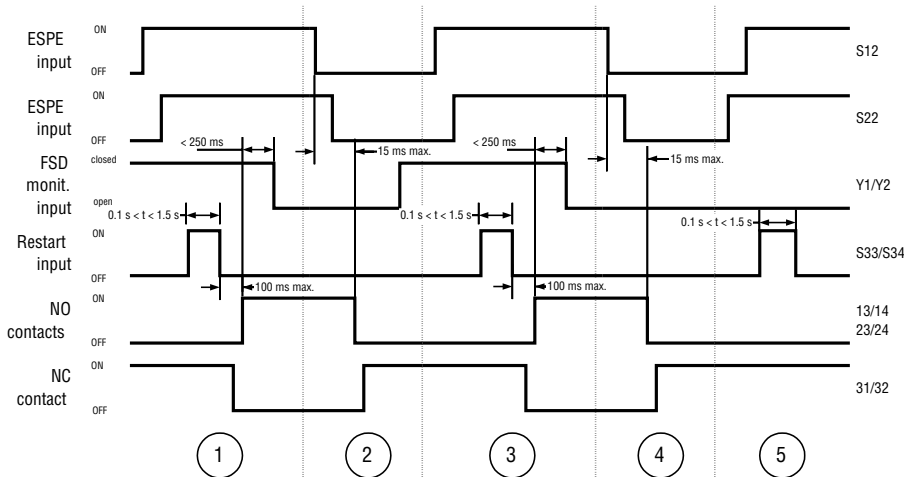


1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring loops opens.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart.

In the automatic restart mode, the Normally Open (N.O.) contacts (13/14, 23/24) will close and the Normally Closed (N.C.) contact (31/32) will open if the two input signals from the FF-SYA light curtain are present, provided these signals are coincident and the external relays reaction time is within the specification (if the Final Switching Devices monitoring loop is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This

emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power. The module will not restart if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

Manual restart functional diagram (with Final Switching Devices monitoring)



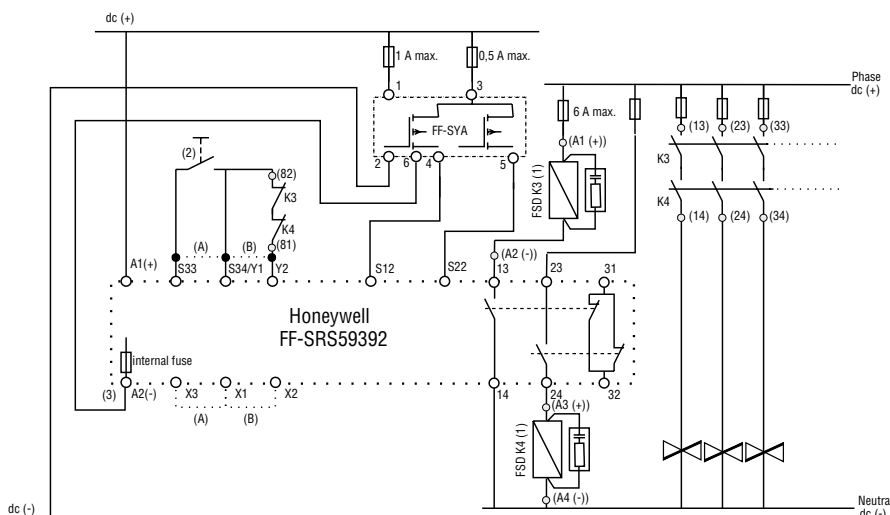
1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens after the push-button is pressed and released.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring opens after the push-button is pressed and released.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart after the push-button is pressed and released.

In the manual restart mode, the N.O. contacts (13/14, 23/24) will close and the N.C. contact (31/32) will open after the push-button is pressed and released, provided the two input signals are available and provided the Final Switching Devices monitoring loop is closed (if is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The module will not restart:

- if the push-button is actuated for more than 1,5 s, or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

Wiring diagram (using 2 N.O. contacts): Manual restart with FSD monitoring



- (1) Always install arc suppressors across the coils of external safety relays (these arc suppressors are not necessary, if the FSDs relays K3 & K4 are supplied by the FF-SRE3081 extension module for which correct wiring is also indicated).
 - (2) Use a 120 or 230 Vac electrically insulated push-button.
 - (3) The module and the ESPE must be connected to the same 0 V.
ESPE: Electrosensitive Protective Equipment.
FSD: Final Switching Device.
- (A) Jumpered if the manual restart mode is not used.
(B) Jumpered if the FSDs K3 and K4 are not used.

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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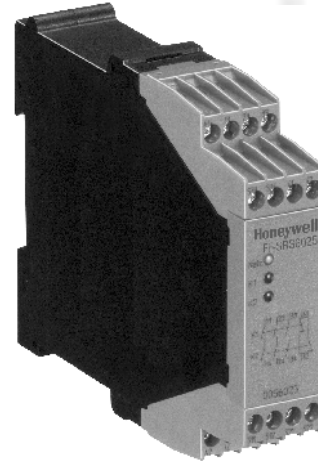
FF-SRS6025 Dual Channel Emergency Stop Module

FEATURES

- Complies with EU Directive for machines 98/37/EC
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Category 4 as per the EN 954-1 European standard
- Dual channel input
- Output: three NO contacts and one NC contact
- Switching current from 10 mA to 5 A
- Automatic start or manual start modes
- Detection of blocked start push-button
- Selectable cross-fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Very high mechanical and electrical lifetime
- Overvoltage and short-circuit protection
- Slim housing 22,5 mm / 0.89 in width

TYPICAL APPLICATIONS

- Emergency-stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Monitoring of safety devices like:
 - emergency stop push-buttons
 - safety light curtains
 - safety switches
 - safety mats



FF-SRS6025

The FF-SRS6025 dual channel emergency stop modules are designed for use in emergency stop circuits when danger to personnel or machinery is present.

The FF-SRS6025 safety control module monitors the outputs of safety devices (e.g. emergency stop push-buttons, safety light curtains, safety mats, safety switches, etc.). If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the safety control module to the machine control circuitry to stop the hazard and to remove power.

The FF-SRS6025 helps to create a control reliable safety solution by providing redundancy and self-checking circuitry.

This device offers two channel inputs and two internal safety relay outputs with positive-guided contacts. This ensures redundancy in its in-and outputs.

The slim housing of only 22,5 mm (0.89 in.) width allows this safety control module to fit into every cabinet or even helps to reduce the overall cabinet size.

Other features include high current capability, an automatic start and manual start mode, cross-fault monitoring and external relays monitoring.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRS6025 Dual channel Emergency Stop Module

SPECIFICATIONS

• Dual channel Emergency Stop circuits



Input		
Nominal voltage		24 Vdc (-10 %, +10 %)
Nominal power consumption		1.3 W
Nominal voltage at S11		22 Vdc (provided by control module)
Input current between S11/S12 and S21/S22		25 mA
Minimum voltage at S12		20 Vdc when activated
Start time		Manual START function: 20 ms (falling signal edge) Automatic START function: 350 ms
Output		
Contact complement		3 NO contacts, 1 NC contact
Response time		Opening of inputs (S11/12; S21/22): 65 ms Opening in supply circuit (24 Vac/dc(+)/A1): 65 ms
Contact type		Safety relay, positive-guided
Current Range (min. to max.)		10 mA to 5 A
Voltage Range (min. to max.)		0,1 to 250 Vac
Switching Capability per AC15 (EN 60947-5-1)		NO contacts: 3 A / 230 Vac ; NC contact: 2 A / 230 Vac
Typical Electrical Life Expectancy		Power factor = 1 at 230 Vac (See Note 1)
0,5 A		5.500.000 operations
1 A		2 000 000 operations
2 A		1 000 000 operations
5 A		250 000 operations
Typical Power Factor (cos φ)		Limitation Factor (See Note 2)
0,3		0,45
0,5		0,7
0,7		0,85
1		1
Operating frequency		1200 switching cycles/hour (max.)
Output contact fuse rating		Time delay 6 A (max.)
Mechanical life		Twenty million switching operations
General		
Temperature range		-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
Sealing		Housing: IP 40 • Terminals: IP 20
Housing material		Thermoplastic
Vibration resistance		Amplitude 0,35 mm; Frequency 10 to 55 Hz (per IEC/EN 60068-2-6)
Wire/conductor connection		Solid wire: 1 x 4 mm ² [12 AWG] or 2 x 2,5 mm ² [14 AWG] Stranded wire with sleeve: 1 x 2,5 mm ² [14 AWG] or 2 x 1,5 mm ² (max.) [16 AWG]
Wire/conductor attachment		M 3,5 screw terminals
Mounting		Quick install rail mounting IEC/EN 60715, width: 35 mm / 1.38 in
Weight		220 g / 0.49 lb

ORDERING INFORMATION

FF-SRS6025□

□ = 24 Vdc (only)

Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = operations (power factor 1) x limitation factor F.

Example:

U = 230 Vac, I = 1 A, power factor cos φ = 0,5

Switching power P = U x I = 230 VA

Contact life (cos φ = 1, P = 230 VA) =

2 000 000 operations

Limitation factor F (cos φ = 0,5) = 0,7

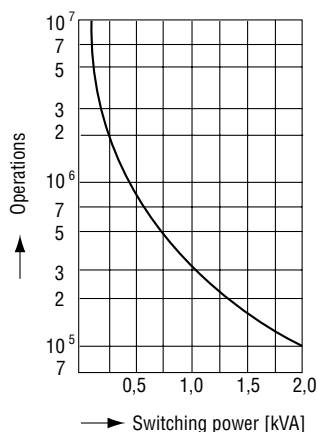
Contact life (cos φ = 0,5, P = 230 VA) =

F x contact life (cos φ = 1, P = 230 VA) =

2 000 000 x 0,7 = 1 400 000 operations.

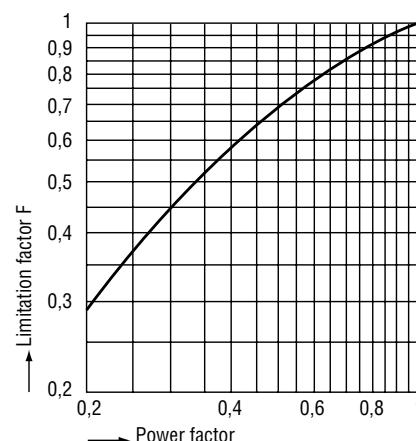
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Power factor (cos φ) = 1, see Note 1)

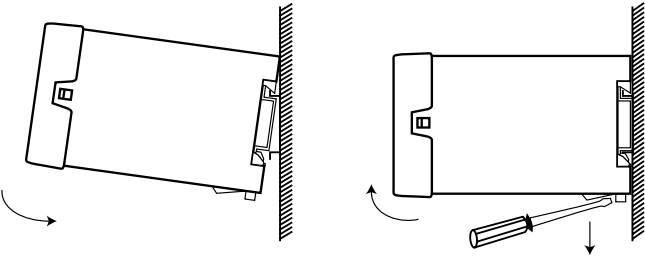


LIMITATION FACTOR F FOR INDUCTIVE LOADS

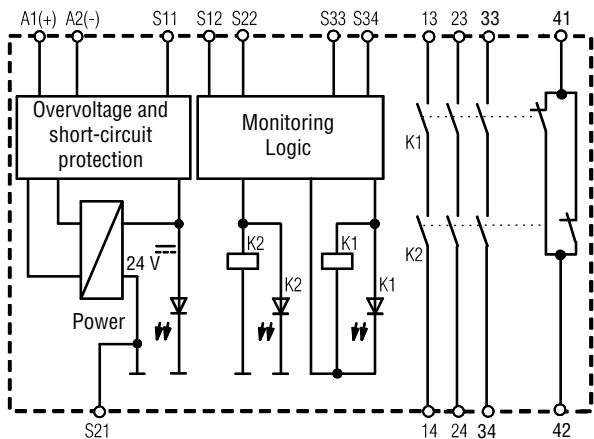
(Power factor (cos φ) < 1 See Note 2)



INSTALLATION DIAGRAM



INTERNAL CIRCUITRY



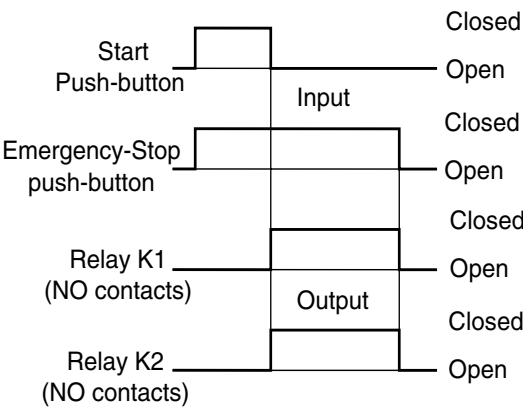
FUNCTIONAL DESCRIPTION

The FF-SRS56025 safety control monitors dual channel outputs of safety devices (e.g. emergency stop push-buttons, light curtains, mats, switches, etc.).

If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and to remove power.

In the manual start mode, a push-button needs to be pushed and released, to re-energise the internal safety relays KA and K2. In the automatic start mode, the internal safety relays K1 and K2 re-energise automatically.

Both relays K1 and K2 must be energised to have the normally open contacts 13/14, 23/24 and 33/34 in a closed position.

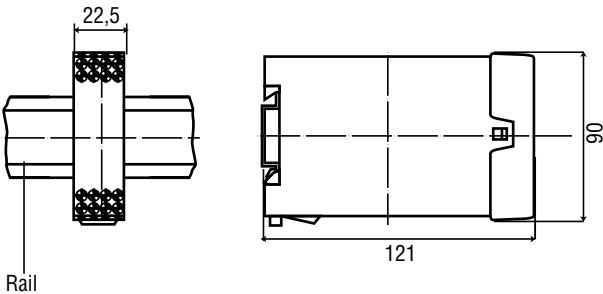


Line fault Detection on Start push-button

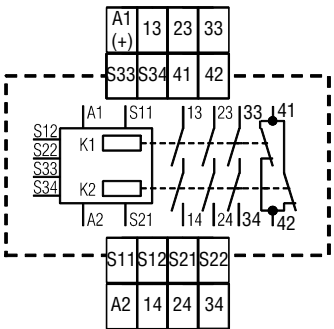
If the start push-button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.

MOUNTING DIMENSIONS

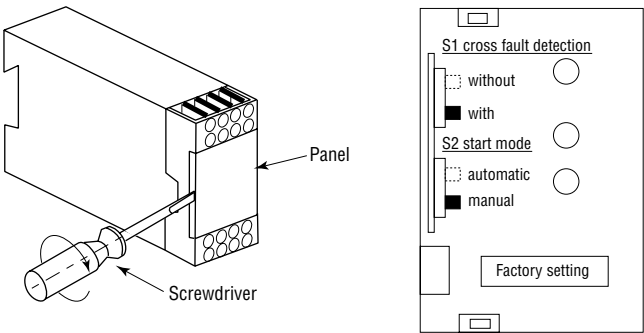
Width: 22,5 mm / 0.89 in; Height: 90 mm / 3.55 in; Depth: 121 mm / 4.77 in



FRONT PANEL



MODE SETTING



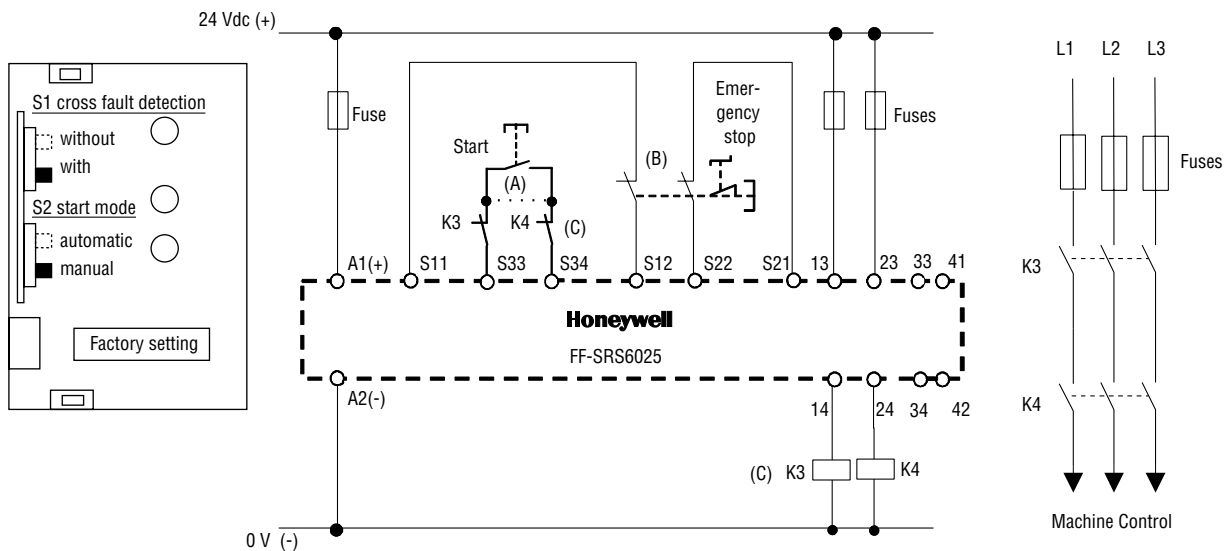
The FF-SRS6025 emergency stop module contains two internal switches (S1 and S2) for the mode settings. To access to these switches, remove the front panel using a screwdriver.

Switch S1 is used to select an operating mode for cross-fault detection between the two inputs. Cross-fault monitoring must be used when two independent safety inputs are provided to this module to achieve the overall level of the solution.

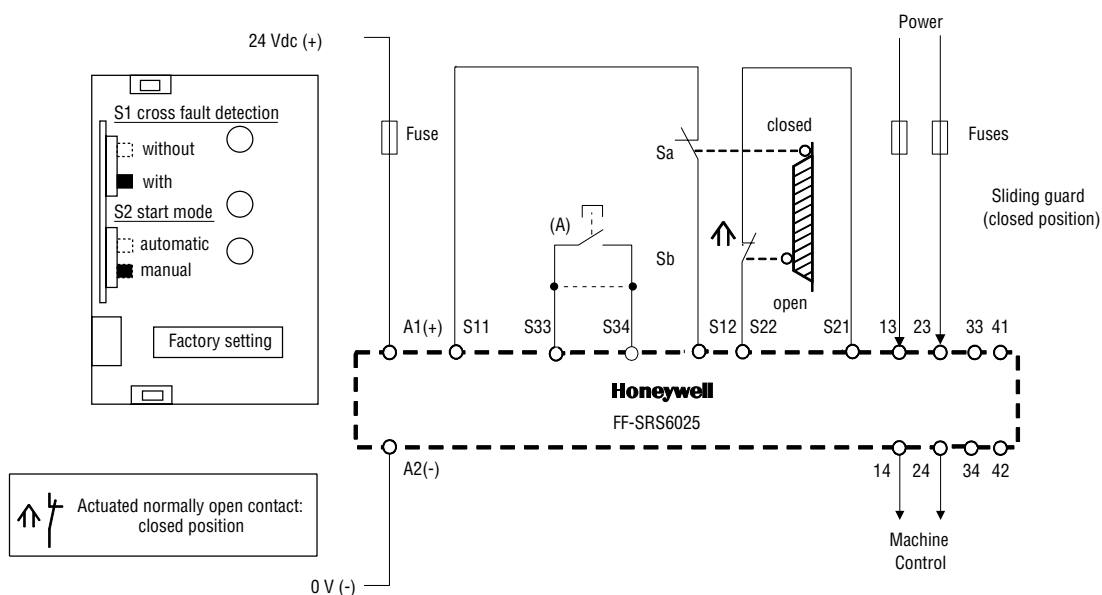
Switch S2 is used to select the start/restart modes. In the manual start/restart mode, a start push-button needs to be pushed and released to energise the safety relay contacts. In the automatic start mode, the safety relay contacts energise automatically, after releasing the connected safety device.

APPLICATION EXAMPLES

Dual-channel emergency stop circuitry (with cross fault monitoring, external contactors)



Dual-channel safety door monitoring (with cross fault monitoring, without external contactors)



FUNCTIONAL DESCRIPTION

In the case of an **emergency stop condition**, the safety device (see "Application note B") is actuated and opens its normally closed contacts connected to the dual input channels S11/S12 and S21/S22. The internal safety relays K1 and K2 de-energise. The normally open safety relay contacts (13/14, 23/24, 33/34) will open and the normally closed contact (41/42) will close. The emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard. When removing the emergency stop condition, the normally closed safety device contacts close again and the module is ready to be restarted.

In the **manual start mode**, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2. The normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open, allowing the machine to operate. In the **automatic start mode**, the internal safety relays K1 and K2 energise automatically.

Application notes:

Note (A): Start modes:

Manual start mode: Insert start push-button into the start loop S33/S34 and select internal switch to manual start mode

Automatic start mode: Insert jumper into the start loop S33/S34 and select internal switch S2 to automatic start mode

Note (B): Dual channel safety devices:

Emergency stop push-buttons, safety light curtains, safety mats, safety limit or interlock switches.

Note (C): External contactors:

The proper operation of external safety contactors and FF-SRE extension modules must be monitored by using the External Device Monitoring (EDM) function of the FF-SRS6025 module. Connect one normally closed contact of each safety contactor (or the FF-SRE Extension module) into the start loop between S33/S34.

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FF-SR25933 Two-hand Safety Control Module

FEATURES

- Complies with the Machinery Directive 98/37/EC and UL 508
- Type III C per EN 574, Category 4 per EN 954-1
- Inputs for two dual-contact push-buttons
- 0,5 s simultaneity check between inputs
- 45 mm / 1.77 in width (120 Vac or 230 Vac versions) with 3 NO and 1 NC outputs
- 22,5 mm / 0.88 in width (24 V version) with 2 NO and 1 NC outputs
- Gold plated, 5 µm contacts allow low current down to 1 mA
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 5 A
- Voltage drop protection
- Overvoltage and short-circuit protection
- Final switching device monitoring loop
- LED indicators for power and outputs

TYPICAL APPLICATIONS

- Manual load or unload stations for machines
- Designed for press two-hands safety controls



FF-SR25933

Two-hand safety controls ensure protection against injury due to machine movement. They are cost effective solutions for machine guarding, when the upper limbs of a single operator are exposed to a hazard. A two-hand safety control system is made of two elements: a control panel and a safety control module. The control panel has two push-buttons which force the operator to use both hands. The safety control module is a device like the FF-SR25933 module which controls the simultaneity of action between both push-buttons.

The module accepts input from two NO and NC contacts delivered by each of the two push-buttons. When both push-buttons are activated within half a second and maintained, the normally open safety contacts of the module switch on. Otherwise an other activation is required.

When one of the push-buttons is released, the normally open safety contacts of the FF-SR25933 module switch off immediately.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SR25933 Two-hand Safety Control Module

SPECIFICATIONS

- Two-hand Safety Control for single operation protection



Suitable for interfaces
up to
CATEGORY 4
per EN 954-1

TYPE IIIC
per EN 574



Input	Nominal voltage	120 Vac (-15 %, +10 %), 230 Vac (-15 %, +10 %), 24 Vdc (-10 %, +10 %) and 24 Vac (-15 %, +10 %)
	Nominal consumption	120 Vac or 230 Vac: 4 VA; 24 V: 2,3 W
	Nominal frequency	50 Hz to 60 Hz
	Nominal input current through S11/S12, S11/S13, S21/S22 and S21/S23	50 mA (NO contact), 20 mA (NC contact) (cable length must not exceed 30 m / 98 ft and must be routed separately from power cables)
	Time required for simultaneous contact closure S11/S12 and S21/S22	0,5 s
	Recovery time	1 s
Output	Contact complement	2 NO, 1 NC contacts (24 Vdc version); 3 NO, 1 NC contacts (120 Vac or 230 Vac versions)
	Contact type	Safety relay, positive-guided
	ON response time	40 ms (to energize relays)
	OFF response time	15 ms (to de-energize relays)
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 5 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability (per AC15: EN 60947-5-1)	NO contact: 5 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac (See Note 2)
	1 A	2 000 000 operations
	2 A	1 000 000 operations
	5 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Mechanical life	Ten million switching operations
	Fuse Rating	6 A time delayed
	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90 % humidity
General	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 Hz to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] Stranded wire with sleeve DIN 46288
	Conductor attachment	M 3,5 screws terminals; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Indication	LED "power supply": ON when operating voltage applied LED K1: ON when relay K1 active LED K2: ON when relay K2 active
	Weight	200 g / 0.44 lb (24 V version) ; 400 g / 0.88 lb (120 Vac or 230 Vac versions)

ORDERING INFORMATION

FF-SR25933 □

Voltage:

2 = 24 Vdc/24 Vac

E = 120 Vac

G = 230 Vac

Note 1: To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA and 60 V.

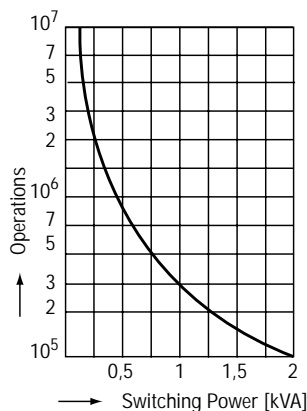
Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0,70.

Total operations: 1 000 000 x 0,70 = 700 000.

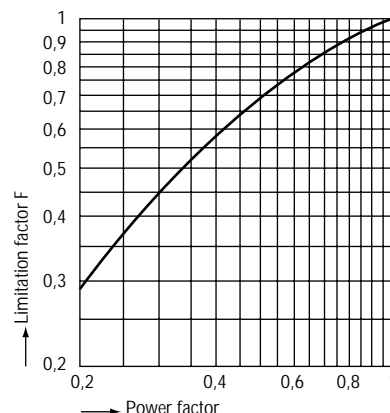
CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

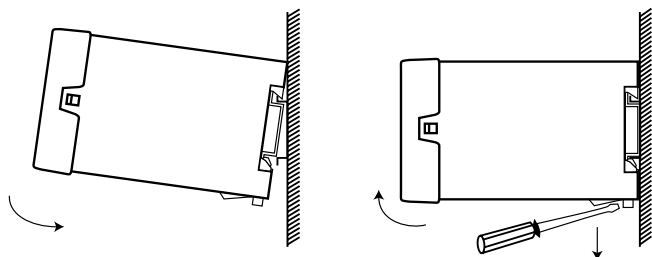


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

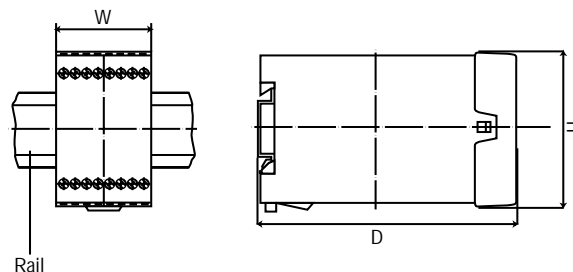


INSTALLATION DIAGRAM

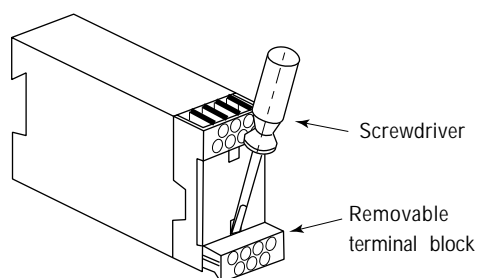


MOUNTING DIMENSIONS

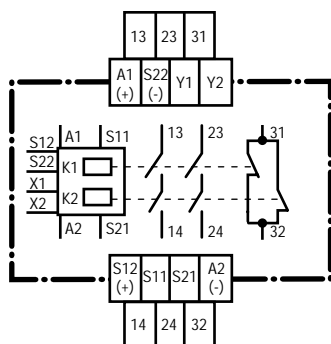
Width (W): 45 mm / 1.77 in (120 Vac or 230 Vac version) or 22,5 mm / 0.88 in (24 V version); Height (H): 84 mm / 3.3 in; Depth (D): 118 mm / 4.64 in



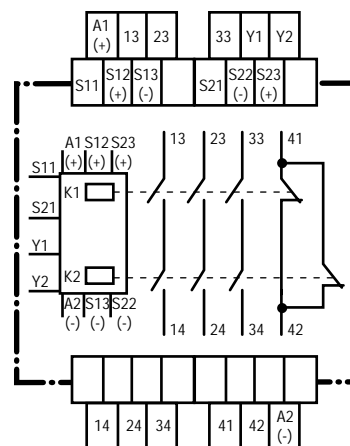
REMOVABLE TERMINAL BLOCKS



TERMINAL BLOCK CONFIGURATION



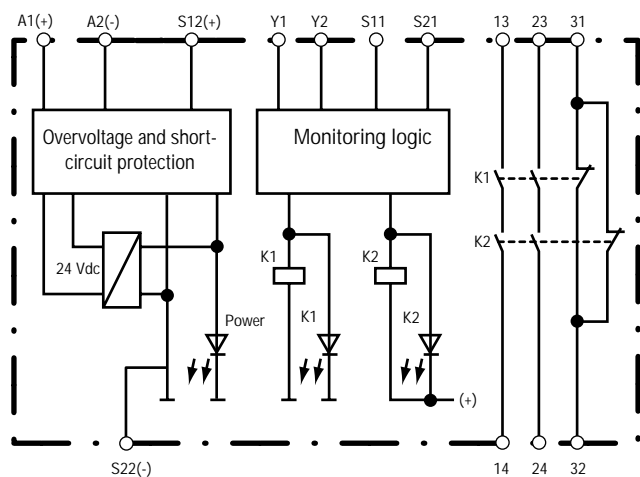
FF-SR259332 (24 V version)



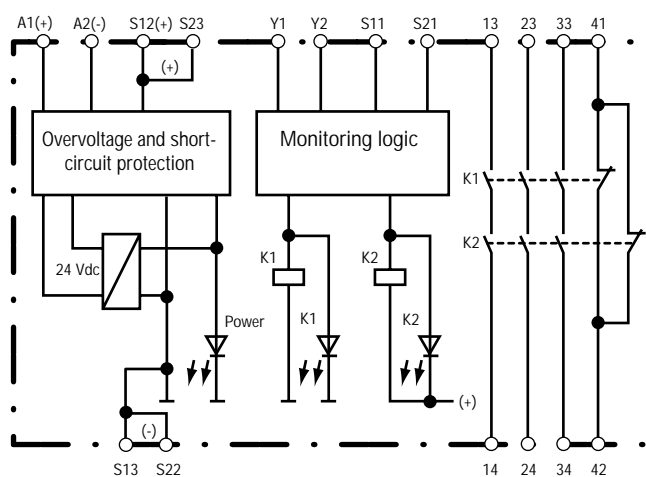
FF-SR25933E (120 Vac version)

FF-SR25933G (230 Vac version)

INTERNAL CIRCUITRY



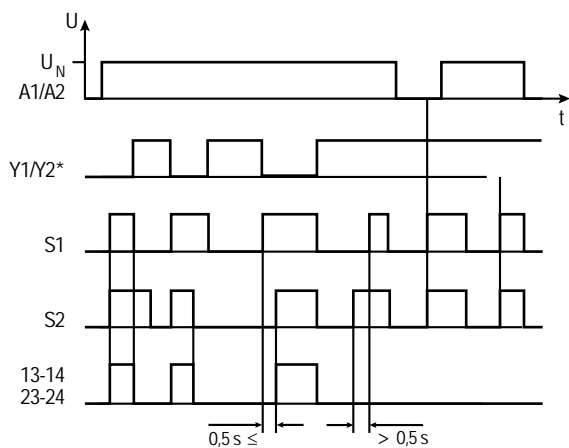
FF-SR259332 (24 V version)



FF-SR25933E (120 Vac version)

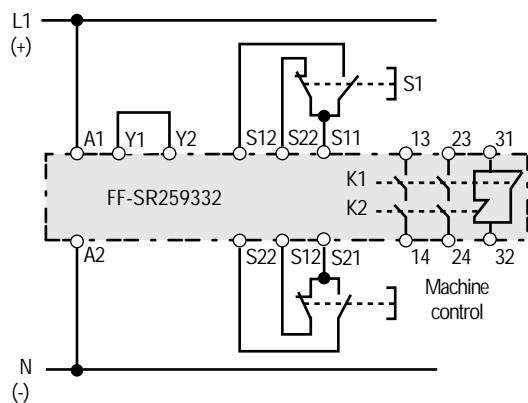
FF-SR25933G (230 Vac version)

FUNCTIONAL DIAGRAM

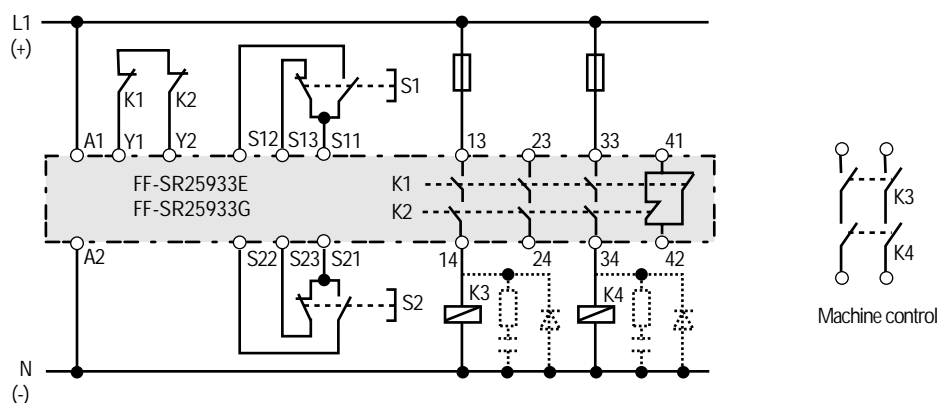


*when final switching devices are connected to Y1/Y2

TYPICAL WIRING DIAGRAMS



Two-hand control (24 V version)



Two-hand control with contact reinforcement via external positive guided safety contacts (120 Vac or 230 Vac versions)

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorised Distributor, contact a nearby sales office or:

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FF-SR25980 Two-hand Safety Module

FEATURES

- Complies with the Machinery Directive 98/37/EC and UL 508
- Type 3 A per EN 574
- Gold plated, 5 µm contacts 3 A allow low current
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS

- Secondary protection for robotics



FF-SR25980

Two-hand safety controls ensure protection against hand injury due to dangerous machine movement. A two-hand safety control system is made up of two elements: a control board and a safety control module. The control board has two control devices that force the use of two-hand activation simultaneously. The safety control element is a device like the FF-SR25980 two-hand safety module. This control module relay is linked to the control board and is located in an enclosure.

The module will accept input from the two control devices (between S13/S14 and S23/S24) if Y1/Y2 are jumpered (or closed). When both input contacts close within half a second and remain closed, the two normally open safety contacts (13/14 and 23/24) will close. If these input contacts fail to close within half a second, or if power has been removed, another activation is required.

When one of the input contacts opens, the two normally open safety contacts of the FF-SR25980 module will open immediately.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SR25980 Two-hand Safety Module

SPECIFICATIONS

- Two-hand Safety Control for hand injury protection



FF-SR25980

Input	Nominal voltage	120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +10%)
	Nominal consumption	120 and 230 Vac: 4 VA; 24 Vdc: 2,5 W
	Nominal frequency	50 to 60 Hz
	Nominal voltage between S13/S14 and S23/S24	24 Vdc with 35 mA current; control line length must not exceed 30 m / 98 ft and must be routed separately from power cables
	Time required for simultaneous contact closure S13/S14 and S23/S24	0,5 s
Output	Contact complement	2 NO contacts
	Contact type	Safety relay, positive-guided
	Response time	Activation/deactivation by inputs S13/S14 and S23/S24: 30 ms
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 10 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability (per ac15: EN 60947-5.1)	NO contact: 5 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 2)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Mechanical life	Ten million switching operations
	Fuse Rating	6 A time delayed
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Conductor attachment	M 3,5 screws terminals; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Weight	410 g / 0.90 lb

ORDERING INFORMATION

FF-SR25980 □

Voltage:
2 = 24 Vdc
E = 120 Vac
G = 230 Vac

Note 1: To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

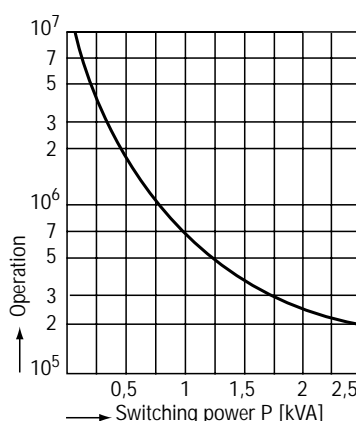
Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

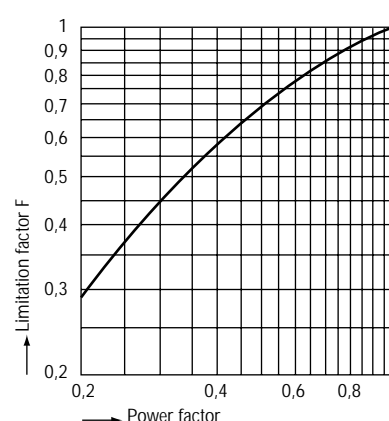
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

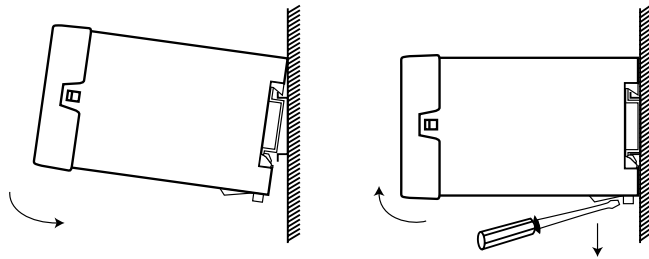


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

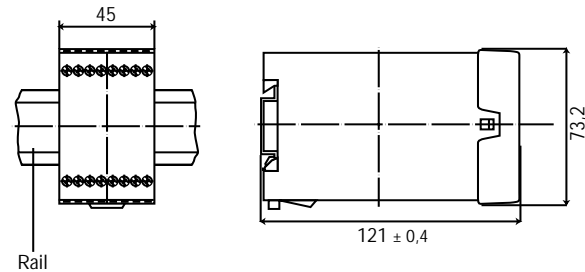


INSTALLATION DIAGRAM



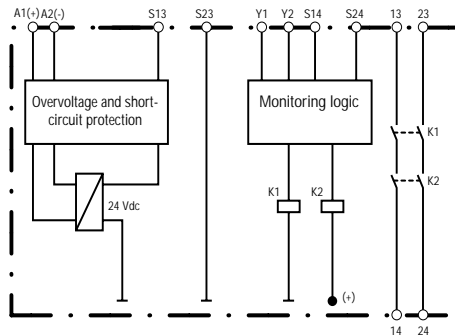
MOUNTING DIMENSIONS

Width: 45 mm / 1.77 in; Height: 74 mm / 2.9 in; Depth: 121 mm / 4.76 in

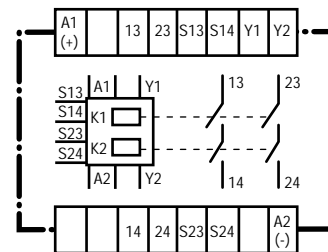


FF-SR25980

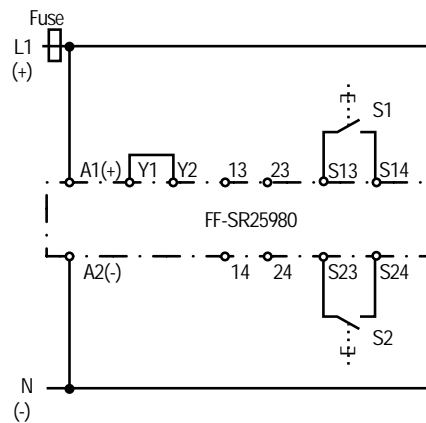
INTERNAL CIRCUITRY



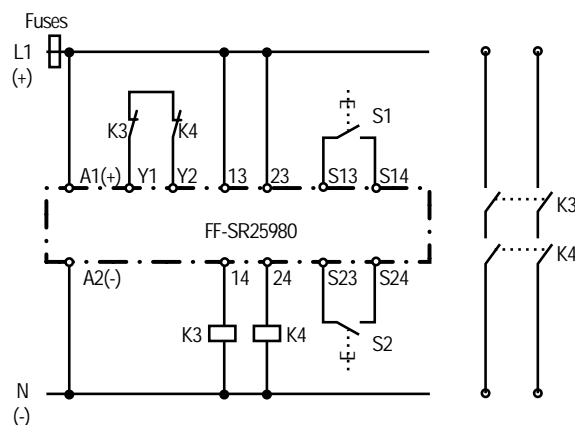
WIRING DIAGRAM



TYPICAL APPLICATION SCHEMATICS

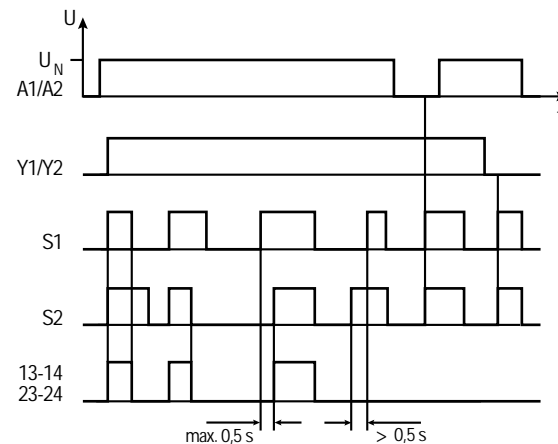


Two-hand control



Two-hand control with contact reinforcement via external positive guided safety contacts

FUNCTIONAL DIAGRAM



FF-SR05932 Standstill and Low Speed Monitor

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN 0113 and UL 508
- Category 3 per EN 954-1
- Control reliable
- Designed for Category 1 Emergency Stop functions per EN 418 and NFPA79
- Inputs for two 3-wire proximity sensors (with PNP or NPN solid state output)
- Compatible with motors driven by frequency variators, soft starters etc.
- Rotation frequency threshold adjustable via DIP switches
- Positive-guided output contacts: two NO, one NC for 250 Vac
- Switching current up to 4 A
- Green LED for power status, green LED for rotation frequency on channel 1 and channel 2 below programmed detection level
- 45 mm / 1.77 in width housing
- Removable terminal blocks

TYPICAL APPLICATIONS

- Stopped motor monitor or low speed monitor for any kind of rotating devices
- Used to unlock a door guarding a rotating machine only when the hazardous movement is stopped
- Used in conjunction with emergency stop modules to activate an emergency brake when an e-stop signal is received and while motion is still present



(Pending)



FF-SR05932

The FF-SR05932 standstill / low speed monitor module measures the rotation frequency of rotating devices using two external proximity sensors.

When the rotation frequency falls below a programmable threshold level, the FF-SR05932 standstill / low speed monitor module will energise its safety relay outputs. Then, the two normally open contacts (13/14, 23/24) of the module will close and the normally closed contact 31/32 will open.

The detection threshold of the rotation frequency is programmable in four ranges using internal DIP switches. A fine adjustment selector helps to fine adjust the threshold frequency within the selected frequency range.

The FF-SR05932 standstill / low speed monitor module is designed to be connected to proximity sensors with PNP or NPN static outputs. Both proximity sensors must detect that rotation frequency is below the programmed frequency threshold, in order to energise both internal safety relays. Both internal safety relays K1 and K2 need to be energised to close the normally closed contacts (13/14, 23/24) of the module and to open the normally open contact 31/32.

The sensors are powered by the module. Two sensors must be connected to the module in order to have redundant inputs.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SR05932 Standstill and Low Speed Monitor

SPECIFICATIONS

- Safety low speed monitor for rotating devices



Supply voltage	Nominal voltage	24 Vdc/ac (ac: -20 %, +10 %; dc: -10 %, +10 %), 120 Vac (-20 %, +10 %), 230 Vac (-20 %, +10 %)	
	Nominal power consumption	ac: approx. 4 VA; dc: approx. 4 W	
	Nominal frequency	50 Hz to 60 Hz	
Proximity sensors (see Note 1)	Nominal voltage	24 Vdc (provided by the module)	
	Sensor type	3-wire type, PNP 0 V NPN solid state output	
	Current consumption	max. 20 mA per sensor	
	Switching frequency	max. 20 kHz per sensor	
	Pulse duration	min. 2 ms	
	Simultaneity condition (between two proximity sensor outputs)	max. 0,5 s (falling edge)	
	Selectable detection frequency	0,12 Hz - 312,5 Hz (DIP switch selectable in four ranges)	
Relay outputs	Response time tv	Detection frequency fd	tv=1/ fd
	Examples:	0,25 Hz	4 s
		0,5 Hz	2 s
		1 Hz	1 s
		2 Hz	0,5 s
		40 Hz	0,25 s
	Relay type	Safety relay with positive-guided contacts	
	Contact complement	2 NO contacts, 1 NC contact	
	Current range (min. to max.)	1 mA to 4 A (see Caution)	
	Voltage range (min. to max.)	0,1 to 250 Vac/dc	
	Switching capability per AC15 (EN 60947-5-1)	3 A / 250 V for NO contact • 2 A / 250 V for NC contact	
	Typical electrical life expectancy	Power factor = 1 at 230 Vac (see Note 2)	
	1 A	2 000 000 operations	
	2 A	1 000 000 operations	
	4 A	300 000 operations	
	Typical power factor (cos φ)	Limitation factor (see Note 3)	
	0,3	0,45	
	0,5	0,70	
	0,7	0,85	
	1	1	
	Fuse rating	4 A time delayed	
	Mechanical life	50 000 000 switching operations	
General	Temperature range	-25 °C to 60 °C / -13 °F to 140 °F	
	Sealing	Housing: IP 40 • Terminals: IP 20	
	Housing material	Thermoplastic	
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz	
	Connector connection (max.)	2 x 2,5 mm ² solid wire [14 AWG]	
	Connector attachment	1 x 2,5 mm ² [14 AWG] / 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288	
	Mounting	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock	
	Weight	Quick install rail mounting EN 50022-35, width: 35 mm x 15 mm / 1.38 in x 0.59 in size 410 g / 0.9 lb	

ORDERING INFORMATION

FF-SR05932□ - □

Proximity sensor output
Blank = PNP output
N = NPN output

Voltage: 2 = 24 Vdc
E = 120 Vac
G = 230 Vac

Note 1: Ensure the selected proximity sensors comply with the specified proximity sensor features.

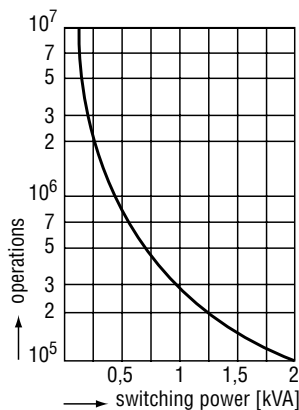
Note 2: Install arc suppressors across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0,70.

Total operations: 1 000 000 x 0,70 = 700 000.

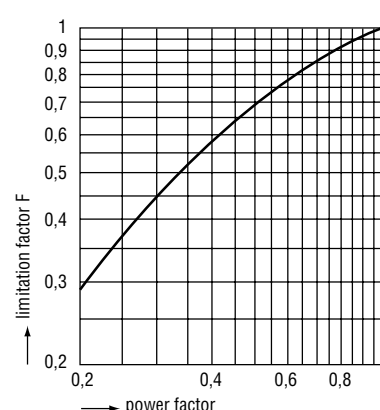
CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ) (see Note 2)

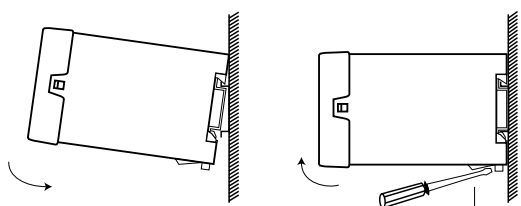


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ) (see Note 3)

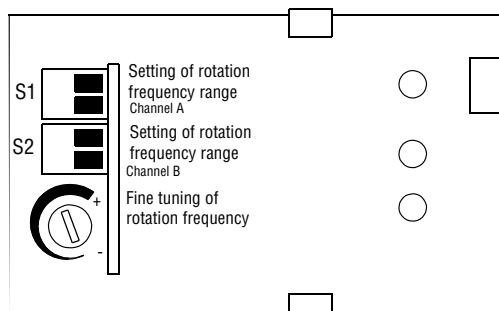


INSTALLATION DIAGRAM



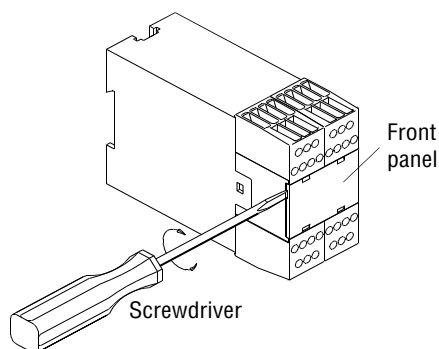
SETTING OF DETECTION FREQUENCY

Two DIP switches are used to select one of the four different ranges for the detection frequency. The fine tuning can be done using the fine adjustment selector. The DIP switches and the fine selectors are located behind the front panel.

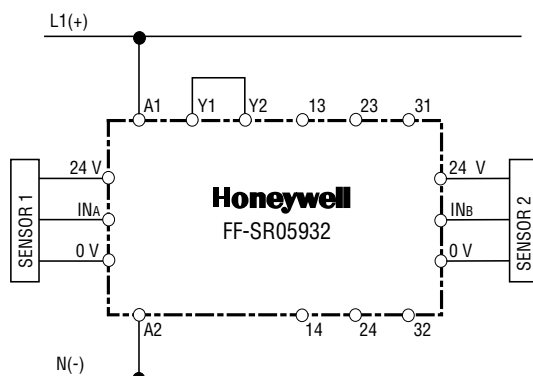


Range Hz	0.12-1.2	1.0-9.7	7.8-78	31-312
S1				
S2				

FRONT PANEL REMOVAL

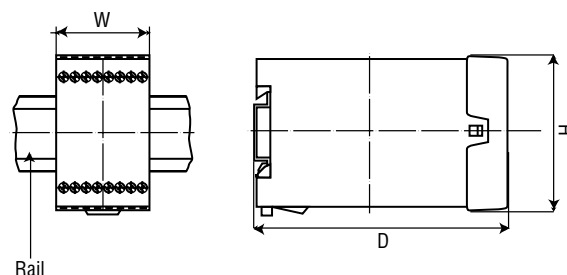


APPLICATION EXAMPLES

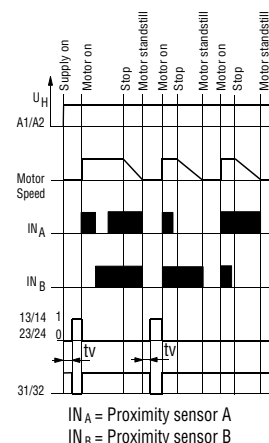


MOUNTING DIMENSIONS

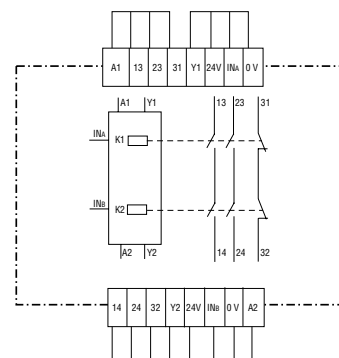
Width: 45 mm / 1.8 in; Height: 85 mm / 3.3 in; Depth: 118 mm / 4.6 in



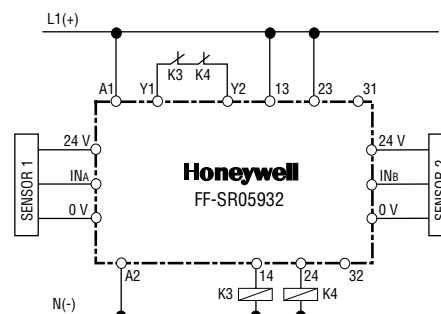
FUNCTIONAL DIAGRAM



WIRING DIAGRAM



APPLICATION EXAMPLES (with external contactors)

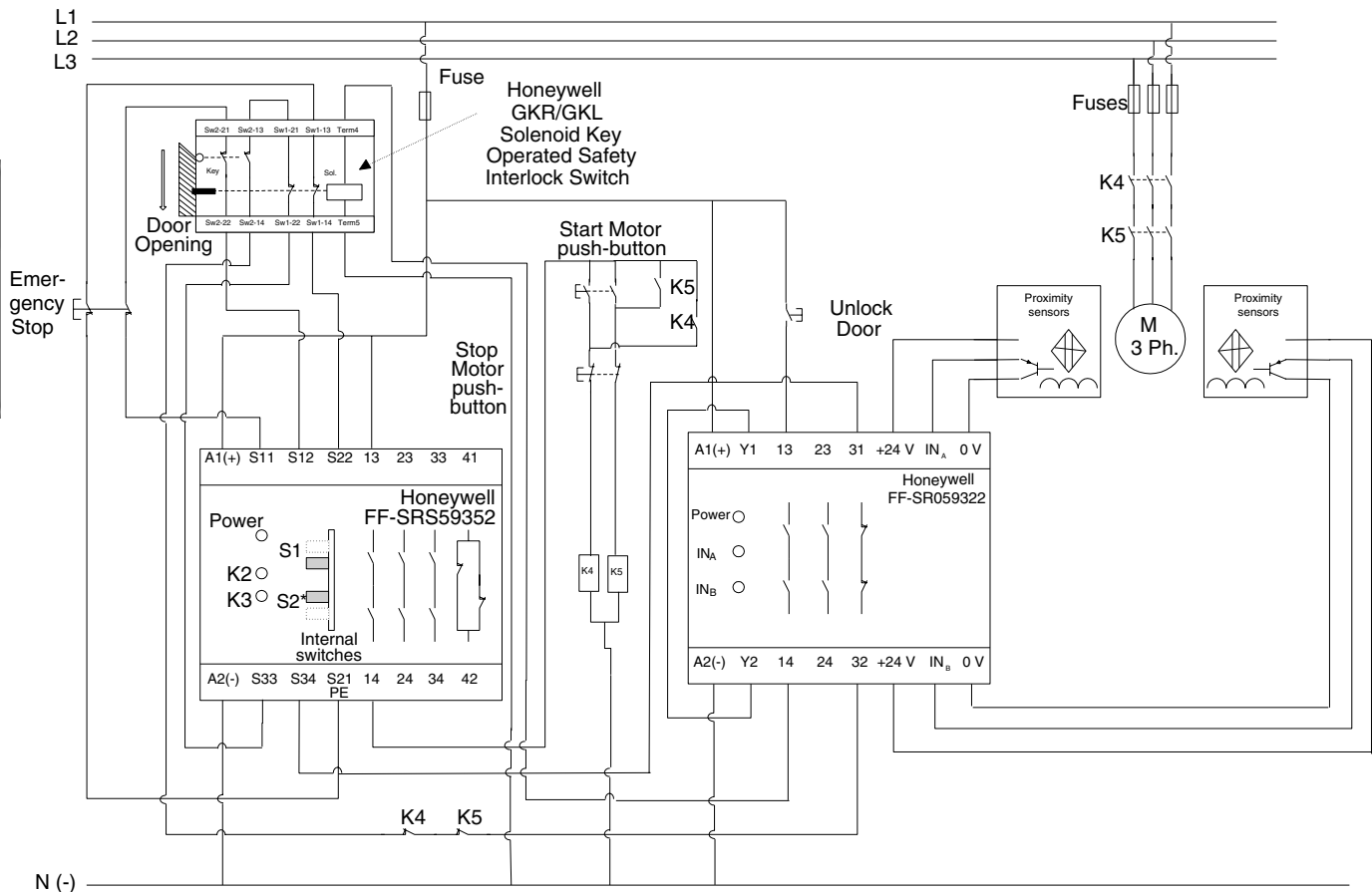


External contactors: When switching currents are higher than 4 A, the output contacts should be reinforced by external contactors with positive guided contacts (K3 and K4).

The proper operation of the external contactors must be monitored by looping their normally closed contacts into the FSD-loop between terminals Y1/Y2 (FSD = Final Switching Device monitoring). If K3 or K4 is welded, the FSD loop will not close, preventing further operation of the module.

APPLICATION EXAMPLE

Door protection using a solenoid key operated safety interlock switch (GKR/GKL Series) and a standstill / low speed monitor module FF-SR05932



FUNCTIONAL DESCRIPTION

Start sequence

Initially, the motor is not operating and the door is open. To initiate the start sequence, close the door. This action will close the two normally closed contacts of the key operated interlock switch. It will also automatically restart the FF-SRS5935 emergency stop module. As the Unlock push-button is not actuated, the solenoid coil of the key operated interlock switch is de-energized and the door is locked.

The motor may now be started. To start the motor, press the Start Motor push-button. This action will energize the self-maintained external relays K4 and K5, and will start the motor.

Stop Sequence

Initially, the motor is operating and the door is closed and locked. To initiate the stop sequence, press the Stop push-button. This action will de-energize the external safety relays K4 and K5 and stop the motor. When the FF-SR05932 standstill / speed monitor detects the rotation frequency is below the programmed threshold level, it is possible to unlock the door. The threshold levels can be programmed by internal DIP switches and a selector for fine tuning.

In order to unlock the door, press the Unlock push-button. This action will energize the coil of the solenoid of the GKL/GKR key operated interlock switch and unlock the door. The door may now be opened. No hazardous motor motion is present anymore.

Emergency Stop Sequence

In case of an emergency stop situation, the two channel inputs of the FF-SRS5935 emergency stop control module will open. This action de-energizes the external safety relays K4 and K5, stopping the motor. All other steps remain the same as described above (Stop Sequence).

APPLICATION NOTE:

Proximity sensors with the following specifications are compatible with the FF-SR05932 standstill / low speed monitor module:

- 3-wire 24 Vdc
- PNP solid state output (for FF-SR05932□ version)
- NPN solid state output (for FF-SR05932□-N version)
- Current consumption < 20 mA.
- Maximum switching frequency: 20 kHz
- Minimum pulse duration: 2 ms

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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USA

FF-SRD5985 Safety Door Monitor

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113, ZH1-457 and UL 508
- Input for two position switches
- Output for two NO contacts ac 250 V
- Gold plated, 5 µm contacts allow low current input
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- Monitors external contactors for contact multiplication and reinforcement via feedback circuit
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS

- Dual channel safety door monitoring



FF-SRD5985

Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually limit switches or any other safety sensors.

The FF-SRD5985 Safety Door Monitor module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating a manual restart sequence.

If the module receives input (between S13/S14 and S23/S24) from two safety position switches that are monitoring door closure, and this occurs in less than three seconds (assuming the external monitoring loop circuitry (Y1/Y2) is closed), the two normally open contacts of the module (13/14 and 23/24) will close.

When the door opens, the two normally open contacts (13/14 and 23/24) will open relaying the emergency stop condition to the machine control circuitry.

WARNING

MISUSE OF DOCUMENTATION

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Failure to comply with these instructions could result in death or serious injury.

FF-SRD5985 Safety Door Monitor

SPECIFICATIONS

- Dual channel monitoring of a safety door



Input	Nominal voltage	120 Vac (-15%, +10%); 230 Vac (-20%, +10%), 24 Vdc (-10%, +20%)
	Nominal consumption	120 Vac, 230 Vac: 4 VA; 24 Vdc: 2.5 W
	Nominal frequency	50 to 60 Hz
	Control contacts	Two NO contacts
	Nominal voltage between S13/S14 and S23/S24	24 Vdc with 35 mA current (ensure 10 mA switching capability with sensors connected to two inputs)
	Time required for simultaneous contact closure S13/S14 and S23/S24	3 s (max)
Output	Contact complement	2 NO contacts
	Contact type	Safety relay, positive-guided
	Response time	Activation/deactivation by inputs S13/S14 and S23/S24: 30 ms
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 10 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capacity per ac15 (EN 60947-5.1)	NO contact: 5A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 2)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Fuse Rating	6 A, time delayed
	Mechanical life	Ten million switching operations
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max.) [16 AWG] stranded wire with sleeve DIN 46288
	Conductor attachment	M 3,5 screws terminals; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Weight	450 g / 0.99 lb

ORDERING INFORMATION

FF-SRD5985 □

Voltage:

2 = 24 Vdc
E = 120 Vac
G = 230 Vac

Note 1: To ensure the 1 mA capability during the lifetime of the contact, NEVER exceed 300 mA or 60 V.

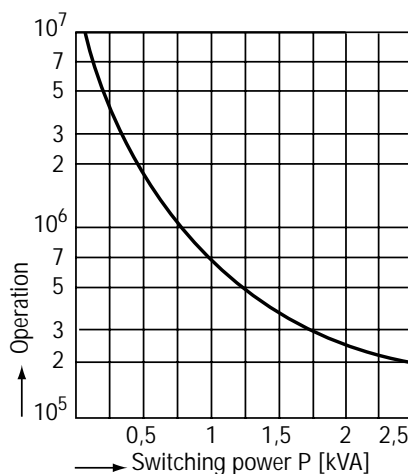
Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

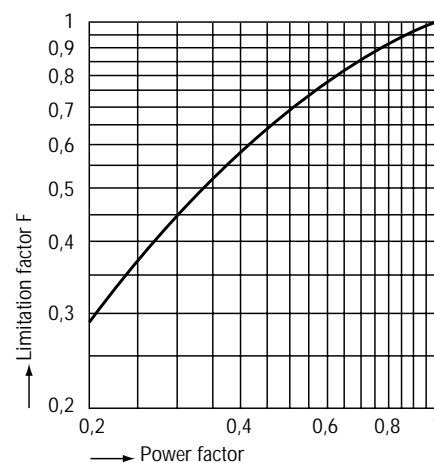
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

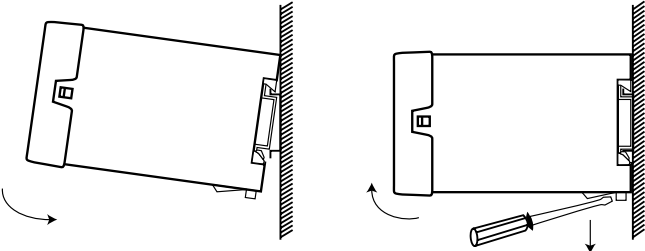


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

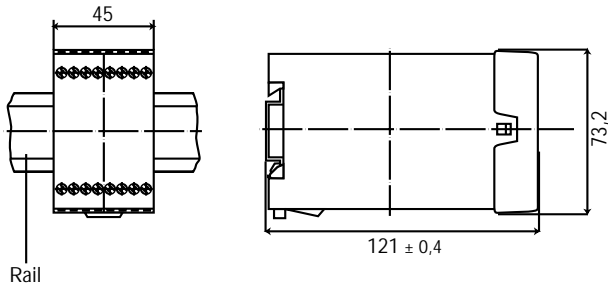


INSTALLATION DIAGRAM

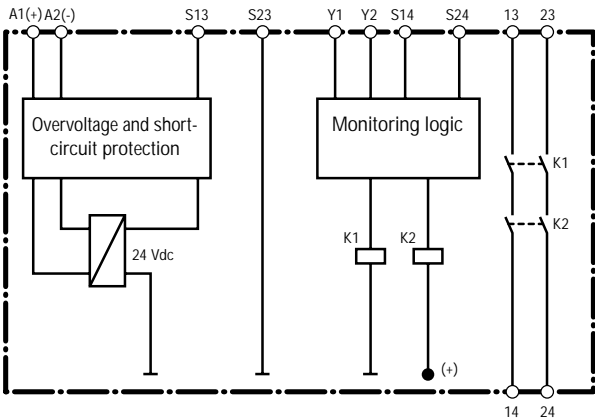


MOUNTING DIMENSIONS

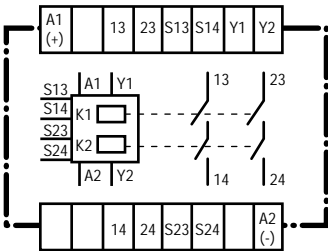
Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



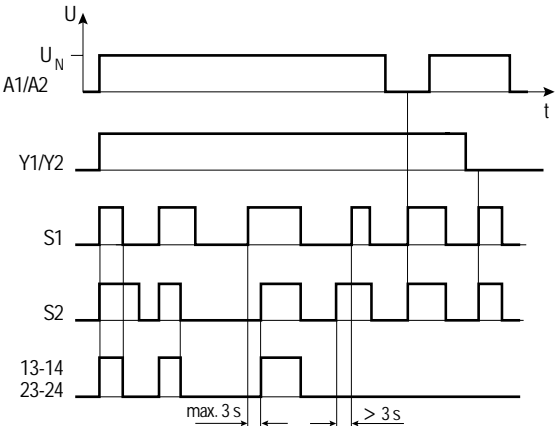
INTERNAL CIRCUITRY



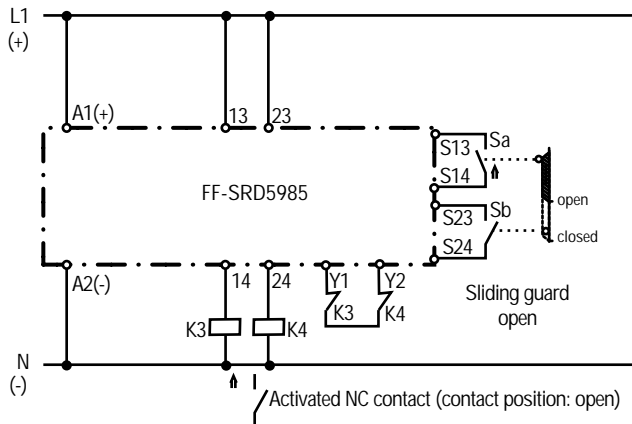
WIRING DIAGRAM



FUNCTIONAL DIAGRAM



APPLICATION SCHEMATICS



Dual channel safety door monitoring

FF-SRD5985

FF-SRE3081 Extension Module

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 204, EN 60204, DIN VDE 0113, and UL 508
- Redundant and positive-guided contacts
- Output: seven NO contacts and one NC contact
- LEDs indicate channel one and two status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Removable terminal strips for easy maintenance
- 100 mm / 3.94 in width

TYPICAL APPLICATIONS

Extension for:

- Emergency stop modules
- Safety door monitors
- Safety light curtains
- Other safety devices



The FF-SRE3081 Extension Module provides contact multiplication of emergency stop modules, safety door modules and other safety devices with external relay monitoring capability (safety light curtain, safety mat, etc.).

This module receives two safety inputs between A1/A2 and A3/A4 from a connected safety device.

Immediately, the normally open safety contacts (13...73/14...74) will close and the normally closed safety contacts (81/82) will open.

If a safety device is actuated (an emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close.

This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The normally closed contact of the extension module (81/82) must be connected to the external loop monitoring circuit of the connected safety device. This configuration will ensure that the two safety relays in the extension module are operating correctly.

FF-SRE3081

⚠ WARNING

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- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRE3081 Extension Module

SPECIFICATIONS

- Contact multiplication of safety modules and safety devices



Input	Nominal voltage	120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +20%)
	Nominal consumption	24 Vdc: 2,8 W; 230 Vac: 5 VA
	Nominal frequency	50 to 60 Hz
Output	Contacts	7 NO, 1 NC contacts
	Contact type	Safety relay, positive-guided
	Response time	15 ms
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 10 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability per ac15 (EN 60947-5.1)	NO contact: 5 A / 250 Vac - NC contact: 2A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 2)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Operating frequency	6000 operating cycles/h
	Fuse Rating	10 A time delayed
	Mechanical life	Ten million operating cycles
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm / Frequency 10 to 55 Hz
	Wire connection	2 x 2,5 mm ² [14 AWG] solid or 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
	Wire attachment	Removable terminal strip: flat terminals with self-lifting wire clamp; DIN 46206 and DIN 57609/ VDE 0609
	Mounting	Quick install rail mounting EN 50022-35
	Weight	510 g / 1.12 lb

ORDERING INFORMATION

FF-SRE3081 □

Voltage:

2 = 24 Vdc
E = 120 Vac
G = 230 Vac

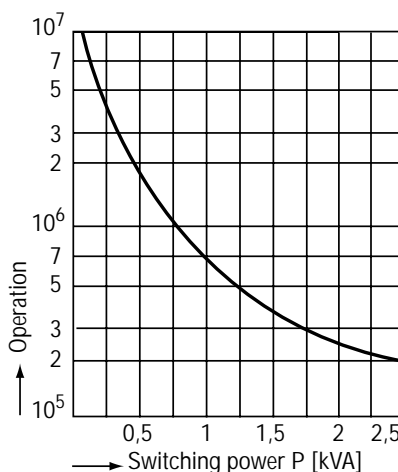
Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

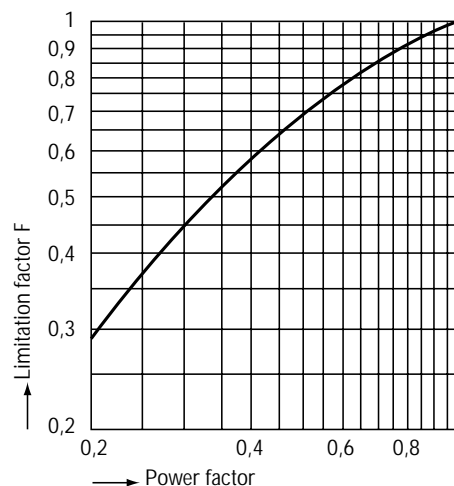
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

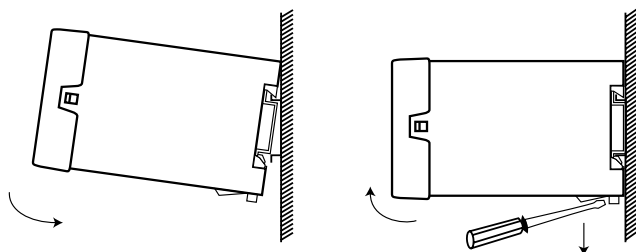


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

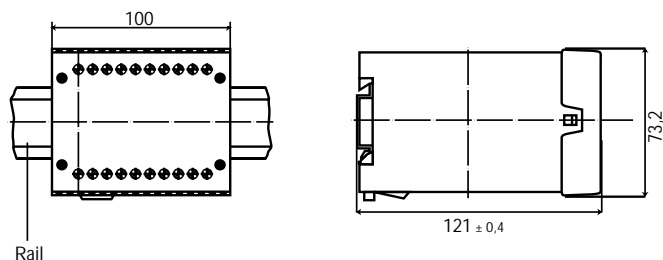


INSTALLATION DIAGRAM

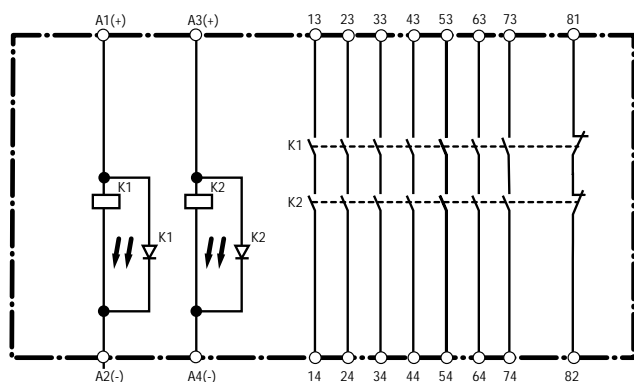


MOUNTING DIMENSIONS

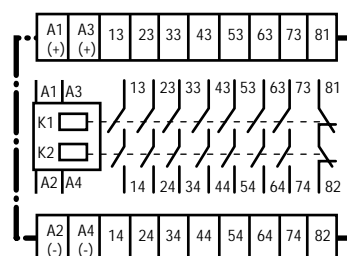
Width: 100 mm / 3.94 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



INTERNAL CIRCUITRY



WIRING DIAGRAM



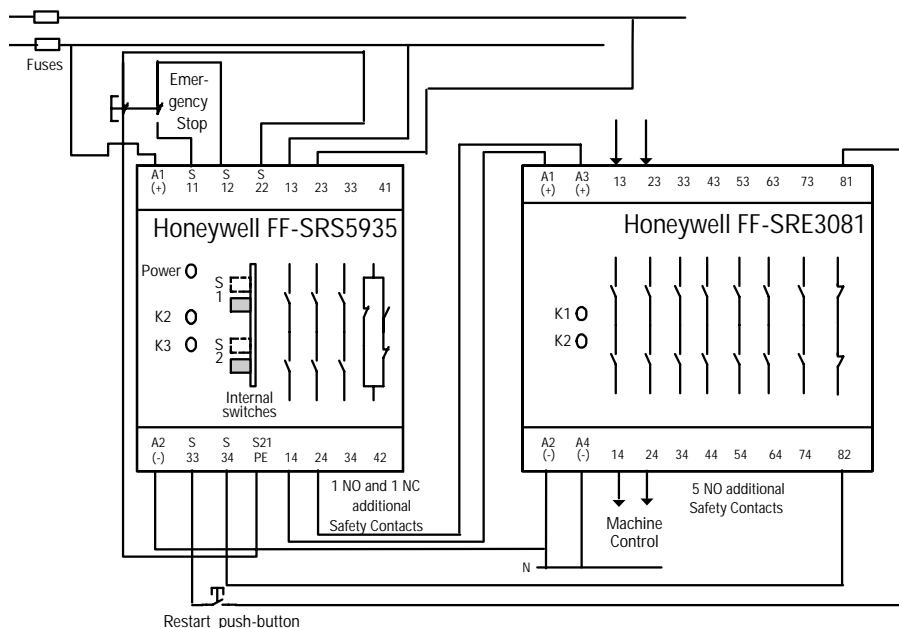
APPLICATION EXAMPLE

The FF-SRE3081 application example above illustrates contact multiplication of an emergency stop module FF-SRS5935 using a two-channel connection. A single-channel connection of a FF-SRE3081 to an emergency stop module is also possible.

One failure in an extension module that is connected to a safety control circuit will switch off all the modules in a control system due to redundant interfacing.

Multiple contacts of FF-SRE, used to switch one load, reduce the current of each contact and improve the life of the device.

When incorporating a FF-SRE3081 device into an installation, observe the applicable local safety regulations.



FF-SRE3081

FF-SRE5929 Extension Module

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC/EN 60204, UL 508 and NFPA 79
- Redundant and positive-guided contacts
- Output: four NO contacts and one NC contact
- LEDs indication for channel one and two status
- High electrical lifetime
- Switching current up to 5 A
- Removable terminal strips for easy maintenance
- 22,5 mm / 0.89 in slim housing

TYPICAL APPLICATIONS

Contact multiplication:

- Emergency stop modules
- Safety door monitors
- Safety light curtains
- Other safety sensors



(pending)



(pending)



The FF-SRE5929 Extension Module provides, in a slim housing, contact multiplication of emergency stop modules, safety door modules and other safety sensors with external relay monitoring capability (FF-SB, FF-LS, FF-SCAN, FF-SPS4 or Detector™ 3 safety light curtains).

This module receives two safety inputs between A1/A2 and A3/A4 from dual channel safety sensors.

On actuation of the inputs, the normally open safety contacts (13...43/14...44) will close and the normally closed safety contacts (51/52) will open.

For example: a safety sensor is actuated or an emergency stop condition occurs, the normally open contacts will open immediately and the normally closed contact will close.

When wired correctly to a proper machine control, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop dangerous motion and/or remove power.

The normally closed contact of the extension module (51/52) must be connected to the final switching device monitoring circuit of the connected safety device. This configuration will ensure that the two safety relays in the extension module are checked by the safety sensor.

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FF-SRE5929 Extension Module

SPECIFICATIONS

- Contact multiplication for safety control modules and safety sensors



Input	Nominal voltage	24 Vac (-20 %, + 10 %), 24 Vdc (-10 %, +10 %)
	Nominal consumption	ac: 2,1 VA • dc: 1,5 W
	Nominal frequency	50 Hz to 60 Hz
Output	Contacts	4 NO, 1 NC contacts
	Contact type	Safety relay, positive-guided
	Response time	max. 35 ms
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	1 mA to 5 A (See Note 1)
	Voltage Range (min. to max.)	0,1 to 250 Vac/dc
	Switching capability per AC15 (EN 60947-5-1)	NO contact: 3 A / 250 Vac - NC contact: 2 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac (See Note 2)
	1 A	2 000 000 operations
	2 A	1 000 000 operations
	5 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 3)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
	Operating frequency	1200 operating cycles/h
	Fuse Rating	4 A time delayed (max.)
	Mechanical life	Ten million operating cycles
General	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at 90 % humidity (max.)
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm / Frequency 10 to 55 Hz
	Wire connection	1 x 2,5 mm ² [14 AWG] solid or 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
	Wire attachment	Removable terminal strip; with M 3,5 screws; wire contacts are enclosed to prevent from electrical shock
	Mounting	Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in
	Weight	180 g / 0.39 lb

ORDERING INFORMATION

FF-SRE5929 □

Voltage:
2 = 24 Vac/dc
(only)

Note 1: Contact damage

To ensure the 1 mA capability during the life time of the contact, never exceed 300 mA or 60 V.

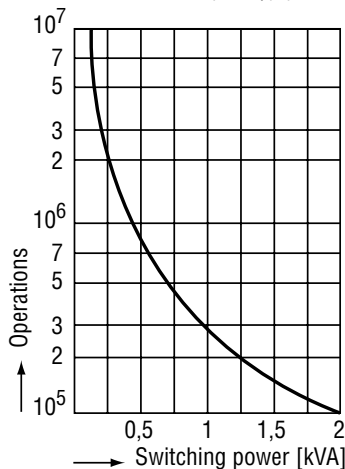
Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0,70.

Total operations = 1 000 000 x 0,70 = 700 000.

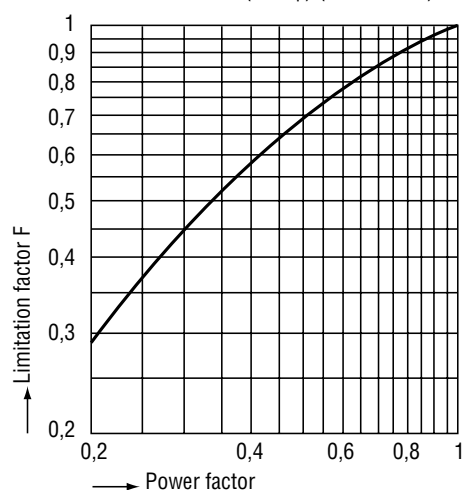
CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ) (See Note 3)

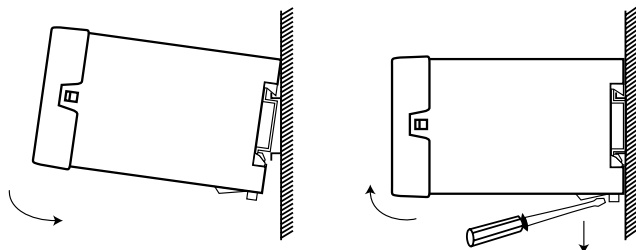


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ) (See Note 3)

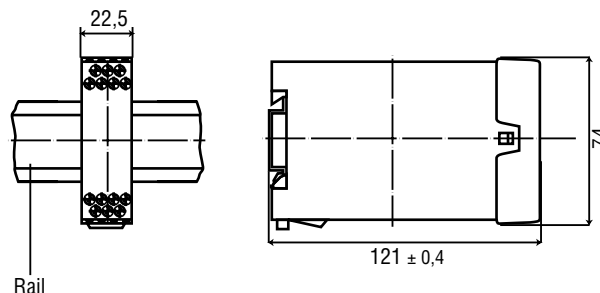


INSTALLATION DIAGRAM

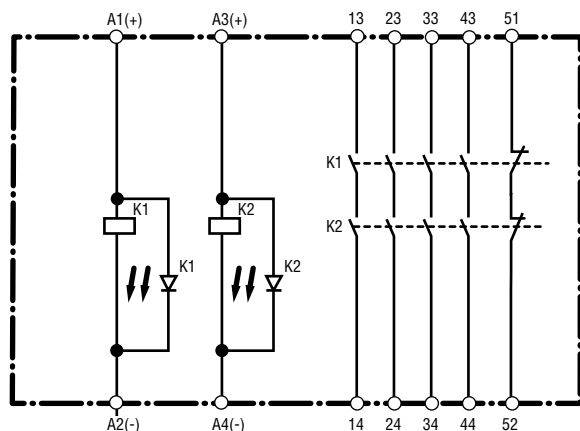


MOUNTING DIMENSIONS

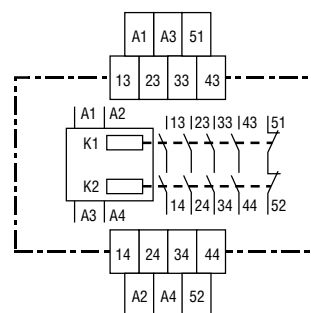
Width: 22,5 mm / 0.89 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



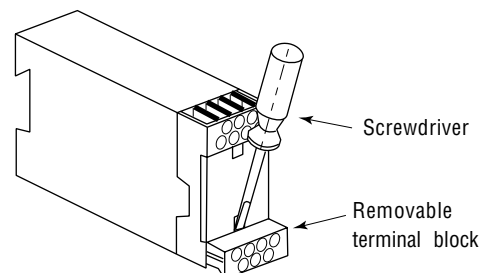
INTERNAL CIRCUITRY



TERMINAL ARRANGEMENT



REMOVABLE TERMINAL BLOCKS



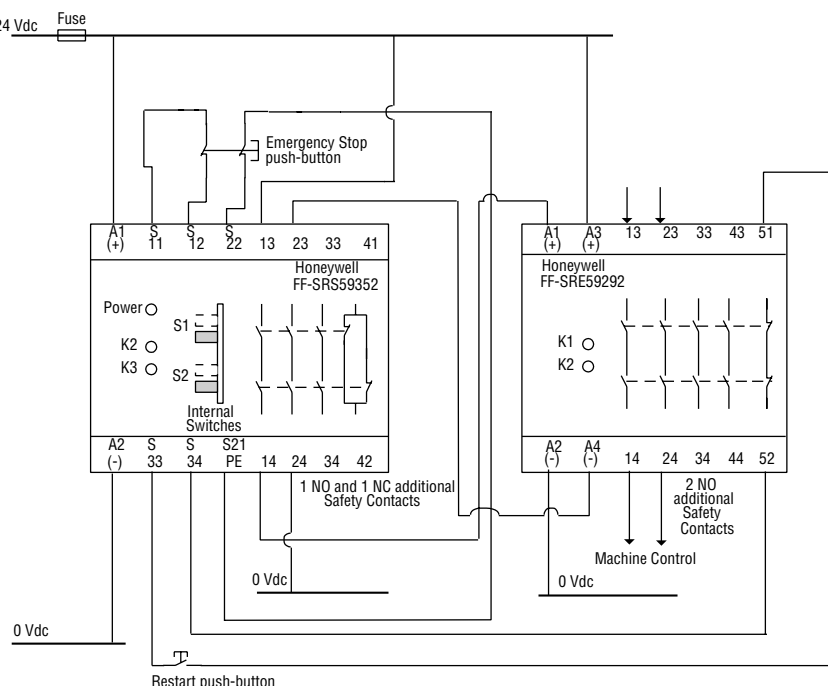
APPLICATION EXAMPLE

This application example shows a FF-SRE59292 Extension Module providing contact multiplication to a FF-SRS59352 Emergency Stop Module. The Extension Module is connected to the Emergency Stop Module with two redundant channels powered with different polarities. A cross-fault between both channels can therefore be detected.

The relay contacts of the Extension module must be monitored looping its normally closed contact into the restart circuit of the emergency stop module (Final Switching Device monitoring). A welded relay contact can therefore be detected at the next cycle preventing the emergency stop module from being restarted.

Connecting multiple safety contacts in parallel with one load increases the maximum admissible current and the lifetime of the contacts.

When incorporating a FF-SRE59292 Extension Module into an electrical interface, observe the applicable local safety regulations.



Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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FF-SRE6029 Extension Module



FEATURES

- Complies with the Machinery Directive 98/37/EC
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Redundant and positive-guided contacts
- Output: four NO contacts and two NC contacts
- LED indicates status of internal relays
- Very high mechanical and electrical lifetime
- Switching current from 10 mA to 5 A
- Slim housing width 22,5 mm / 0.89 in

TYPICAL APPLICATIONS

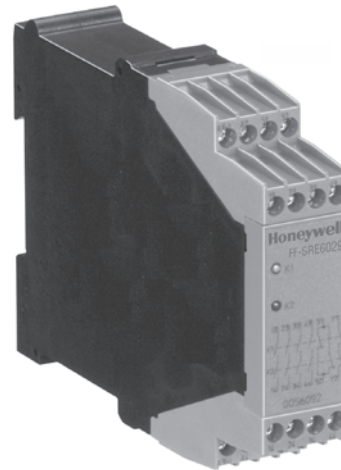
- Contact multiplication of safety devices with the External Device Monitoring capability, like
 - FF-SYB and FF-SB safety light curtains
 - FF-SR safety control modules
 - FF-SM safety mats



(pending)



(pending)



The FF-SRE6029 Extension Module provides contact multiplication for safety devices with External Device Monitoring (EDM) capability (e.g. FF-SRS e-stop modules, FF-SYB, and FF-SB light curtains, FF-SM safety mats).

This product has two safety relays with positive-guided contacts to ensure redundancy and offers four NO and one NC safety contact.

Its slim housing of only 22,5 mm (0.89 in) width allows this safety control module to fit into most cabinets and even helps to keep the overall cabinet size small.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRE6029 Extension Module

SPECIFICATIONS

- Contact multiplication of safety devices with EDM capability



Input	Nominal voltage	24 Vdc (-10 %, +10 %)			
	Nominal consumption	dc: 1,5 W			
Output	Contacts	4 NO, 1 NC (plus 1 NC for External Device Monitoring Loop)			
	Contact type	Safety relay, positive-guided			
	Response time	max. 15 ms (delay on de-energisation)			
	Delay on energisation	Typ. 25 ms			
	Switching capability	Power factor = 1 with resistive load			
	Current range (min. to max.)	10 mA to 5 A			
	Voltage range (min. to max.)	0,1 to 250 Vac			
	Switching capability per EN 60947-5-1	AC15: NO contact: 3 A / 230 Vac, NC contact: 2 A / 250 Vac			
	Typical Electrical Life Expectancy	DC13: NO contact, NC contact: 8 A/24 Vdc			
		Power factor = 1 at 230 Vac (see Figure 1, note 1)			
	Typical Power Factor (cos φ)	Current	Operations	Current	Operations
		0,5 A	5 500 000	2 A	1 000 000
		1 A	2 000 000	5 A	250 000
		Limitation factor F (see Figure 2, note 2)			
		Cos φ	F	Cos	F
		0,3	0,45	0,7	0,85
		0,5	0,7	1	1
	Operating frequency	1200 operating cycles/h			
	Fuse rating	6 A time delayed (max.)			
	Mechanical life	20 000 000 operating cycles			
General					
	Temperature range	- 15° C to + 55° C (5° F to 131° F) at 90% humidity (max.)			
	Sealing	Housing: IP 40 • Terminals: IP 20			
	Housing material	Thermoplastic			
	Vibration resistance (IEC/EN 60 068-2-6)	Amplitude: 0,35 mm • Frequency: 10 to 55 Hz			
	Wire connection	Solid wire: 1 x 4 mm² [12 AWG] or 2 x 2,5 mm² [14 AWG]			
		Stranded wire with sleeve: 1 x 2,5 mm² [14 AWG] or 2 x 1,5 mm² [16 AWG]			
	Wire/conductor attachment	M3,5 screw terminals			
	Mounting	Quick install rail mounting IEC/EN 60715 (width: 35 mm/1.38 in)			
	Weight	205 g / 0.45 lb			

ORDERING INFORMATION

FF-SRE6029 □

□ 2 = 24 Vac/dc

Note 1: Install arc suppressors across load to avoid module contact arcing and ensure specified contact life expectancy.

Note 2: Total operations = operations (power factor 1) x limitation factor F.

Example:

U = 230 Vac, I = 1 A, power factor cos φ = 0,5

Switching power P = U x I = 230 Vac

Contact life (cos φ = 1, P = 230 VA) = 2 000 000 operations (see Figure 1)

Limitation factor F (cos φ = 0,5) = 0,7 (see Figure 2)

Contact life (cos φ = 0,5, P = 230 VA) =

F x contact life (cos φ = 0,5, P = 230 VA) =

2 000 000 x 0,7 = 1 400 000 operations.

FIGURE 1. TYPICAL CONTACT LIFE FOR 100 % RESISTIVE LOAD

(power factor cos φ = 1, note 1)

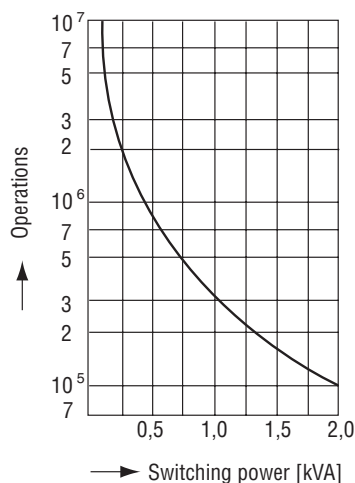
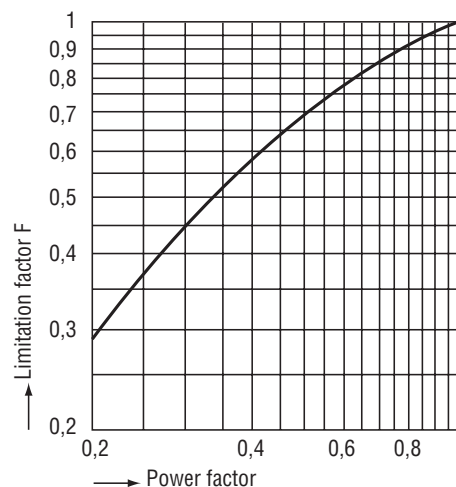
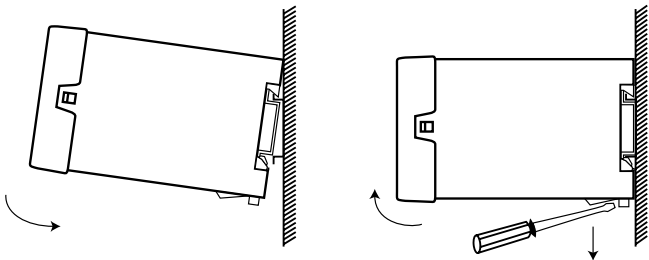


FIGURE 2. LIMITATION FACTOR FOR INDUCTIVE LOADS

(power factor cos φ < 1, note 2)

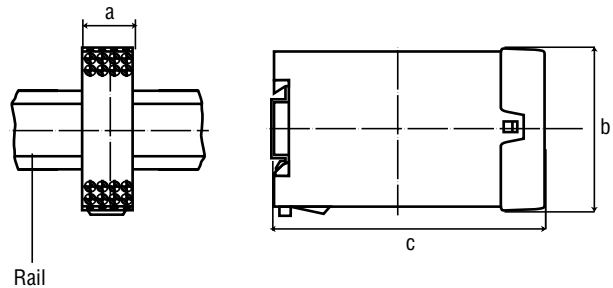


INSTALLATION DIAGRAM

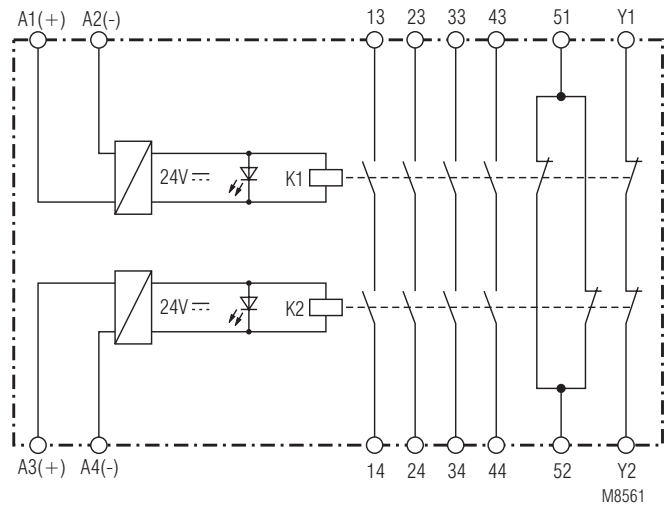


MOUNTING DIMENSIONS

Width: 22,5 mm / 0.89 in;
Height: 90 mm / 3.55 in
Depth: 121 mm / 4.76 in



INTERNAL CIRCUITRY

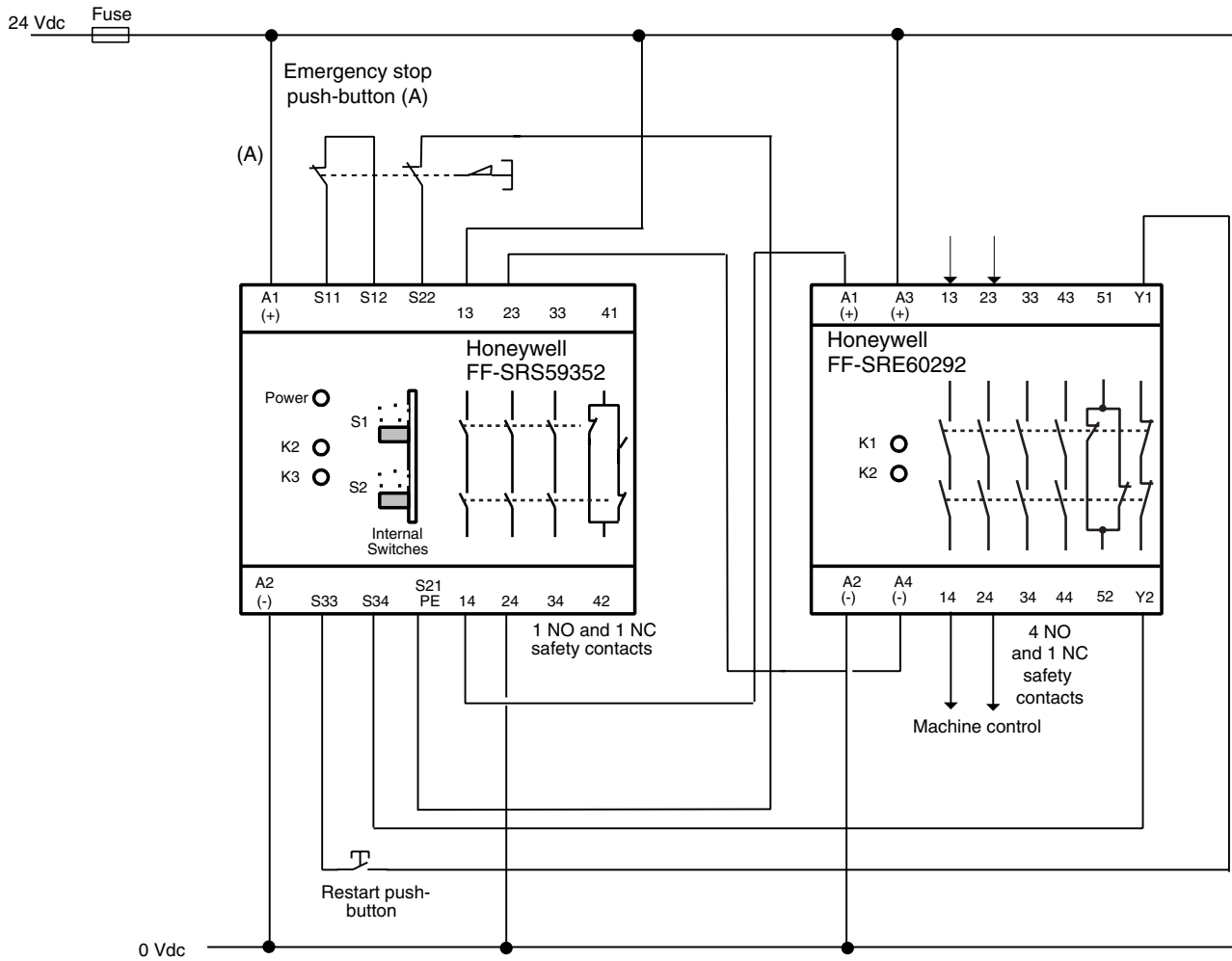


TERMINAL ARRANGEMENT

13	23	33	43
A1 (+)	A2 (-)	51	52
Honeywell FF-SRE60292			
13	23	33	43
14	24	34	44
A3 (+)	A4 (-)	Y1	Y2
14	24	34	44

APPLICATION EXAMPLES

Connection of an FF-SRS59352 emergency stop module



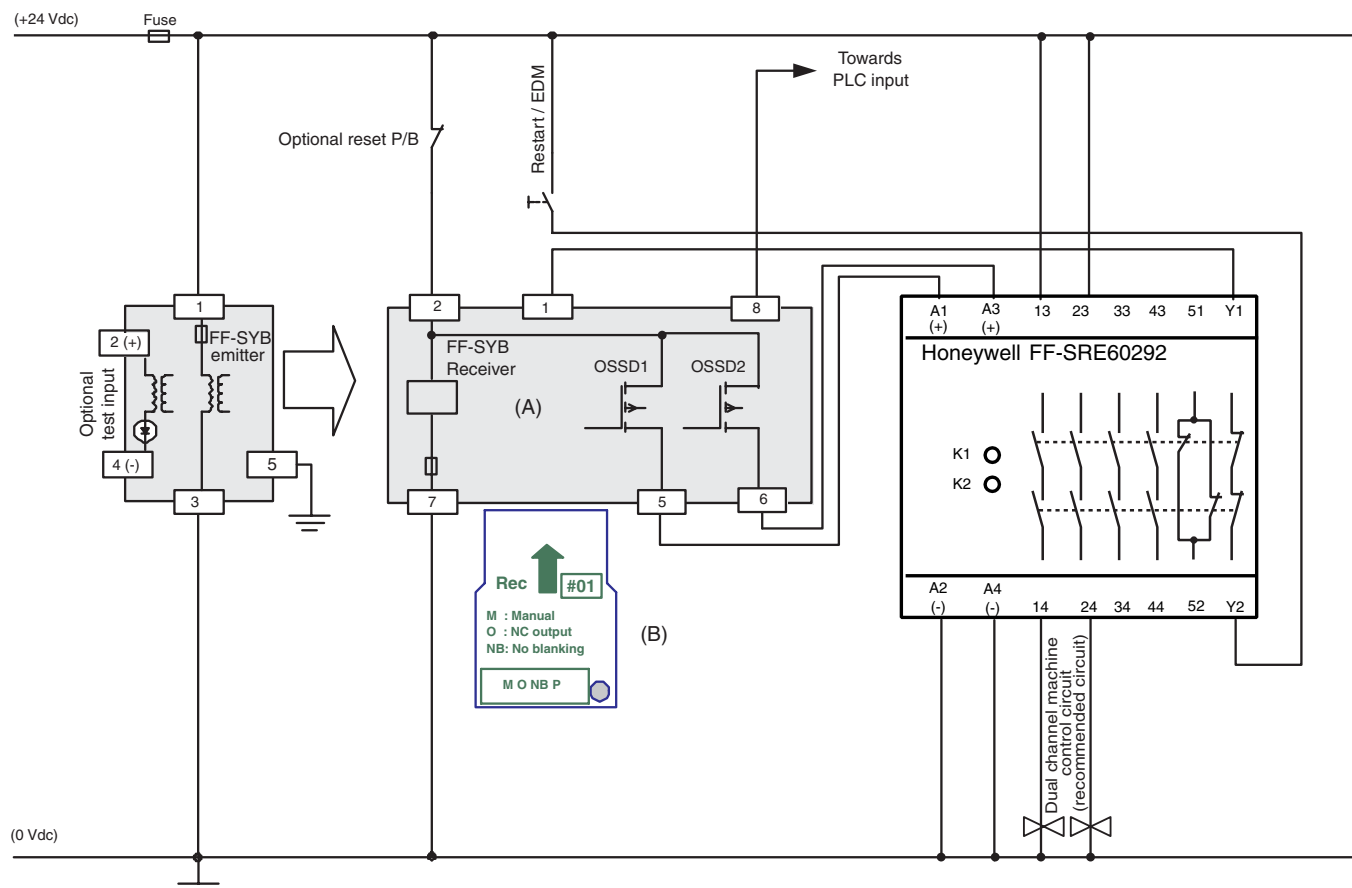
After activation of the safety device (see application note (A)), the normally open safety contacts of the FF-SRS59352 dual channel emergency stop module (13/14 to 33/34) and the connected FF-SRE6029 extension module (13/14, 23/24, 33/34, 43/44) will open. The normally closed contacts (41/42, 51/52) will close. The LED relay output indicators (K2, K3 and K1, K2) of both modules go off indicating that the internal safety relays are de-energized. After removing the emergency stop condition, press and release the restart push-button to restart the FF-SRS59352 emergency stop module. If the FF-SRE6029 extension module is operating properly, the normally closed contact (Y1/Y2) for the External Device Monitoring is closed and both safety modules are energising their internal safety relays. The normally open contacts will close and the normally closed contacts will open. The LED relay output indicators all illuminate. This action will allow the machine to operate.

APPLICATION NOTES:

Note (A): Dual channel output safety devices with relay outputs or safety switches (examples)

- emergency stop push-button
- safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtains (FF-SCAN),
- safety mats (FF-SM)
- safety limit or interlock switches (e.g. CPS, GK, GSS)

Connection of an FF-SYB type 4 safety light curtain



After interrupting the sensing field of the FF-SYB safety light curtain, both static safety outputs (5, 6) of the receiver switch off. Then, the normally open contacts of the connected FF-SRE6029 extension module (13/14, 23/24, 33/34, 43/44) will open and the normally closed contacts (51/52, Y1/Y2) will close. The LED relay output indicators (K1, K2) of the module go off indicating that the internal safety relays K1 and K2 are de-energized.

After clearing the sensing field of the FF-SYB safety light curtain, press and release the restart push-button to restart the receiver. If the FF-SRE6029 extension module is operating properly, the normally closed contact (Y1/Y2) for the External Device Monitoring (EDM) is closed and the static safety outputs of the FF-SYB receiver are energising. The normally open contacts of the FF-SRE6029 module will close and the normally closed contacts will open. The LED relay output indicators K1 and K2 illuminate. This action will allow the machine to operate.

APPLICATION NOTES:

Note (A): Dual channel output safety devices with static safety outputs AND External Device Monitoring (EDM) function (e.g. FF-SYB safety light curtains).

Note (B): CONFIGURATION CARDS

Various mode settings are possible with the FF-SYB safety light curtain (e. g. start / restart, muting, floating blanking) using configuration cards. The example above uses the factory setting configuration card for the receiver (#1: manual start, no muting, no blanking). Refer to the FF-SYB installation manual for more information.

Warranty and remedy

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FF-SRT Time Delay Module

FEATURES

- Complies with the Machinery Directive 98/37/EC, IEC 255, VDE 0435, and UL 508
- Provides a delay after module is de-energized
- Output: one NC, one NO positive-guided contacts
- Available with one or two time delay circuits (channels)
- Available with fixed or selectable delay up to 30 seconds
- LED status indication
- Mechanical life up to ten million operations
- Electrical life up to 300,000 operations
- Switching current up to 8A
- Voltage drop protection
- 45 mm (1.77 in.) width

APPLICATIONS

- Time delay required before disconnection of safety interface circuit



The FF-SRT Time Delay module provides a time delay before safety contacts are opened.

If a two-channel version is used, the output contacts of the two time delay circuits are connected in series. When the displayed time has elapsed, the safety contacts within the module open safely, even if one of the other contacts is welded.

When power is applied to the module (A1/A2), the normally closed contact (15/16) will open immediately and the normally open contact (27/28) will close.

After power is removed from the module (A1/A2), the normally closed contact (15/16) will close and the normally open contact (27/28) will open after the fixed or set time has elapsed.

For example, this module may be used with an emergency stop module. The emergency stop module will immediately forward the emergency stop condition to the machine control circuitry. The time delay module can be used to keep some non-safety related machinery operating (door locked) for a short period of time to avoid an unsafe condition or simplify the machine startup cycle.

FF-SRT

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRT Time Delay Module

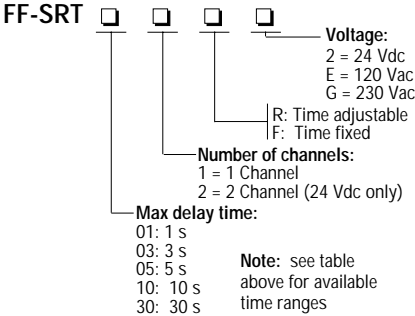
SPECIFICATIONS

- Time delay before disconnection of safety interface circuits



General technical data	
Available time ranges	Adjustable 1 channel: SRT __ 1R: 0.1 to 1 sec; 0.3 to 3 sec; 0.5 to 5 sec; 1 to 10 sec; 3 to 30 sec. Fixed 1 channel: SRT __ 1F: 1; 5, 10, and 30 sec. Adjustable 2 channels: SRT __ 2R: 0.1 - 1 sec, 0.5 - 5 sec, 1 - 10 sec. Fixed 2 channels: SRT __ 2F: 1, 5, 10 sec ± 15 % from selected value
Repeatability precision	
Input	Nominal voltage 120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-10%, +20%) Nominal consumption One channel model: 0.85 W, 4.5 VA; Two channel model: 1.7 W, 4.5 VA Nominal frequency 50 to 60 Hz
Output	Contact complement 1 NO contact, 1 NC contact Contact type Safety relay, positive-guided Switching Capability Power factor = 1 with resistive load Current Range (min. to max.) 30 mA to 8A Voltage Range (min. to max.) DC 10 to 110 Vdc AC 10 to 250 Vac
Switching capability (per AC15: EN 60947-5.1)	NO contact: 3A / 250 Vac - NC contact: 1 A / 250 Vac
Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc
3A	300,000 operations
5A	150,000 operations
10A	100,000 operations
Typical Power Factor (cos φ)	Limitation Factor (Note 1, Note 2)
0.3	0.45
0.5	0.70
0.7	0.85
1.0	1.00
Operating frequency	2000 switching cycles/hour (max.)
Fuse rating	6 A time delayed
Mechanical life	Ten million switching operations
General	
Temperature range	-20°C to +60°C (-4°F to 140°F) at max. 90% humidity
Sealing	Housing IP 40; Terminals IP 20
Housing material	Thermoplastic
Vibration resistance	Amplitude 0.35 mm; Frequency 10 to 55 Hz
Conductor connection	2 x 2.5 mm² solid (max.) [12 AWG] or 2 x 1.5 mm² [16 AWG] (max.) stranded wire with sleeve DIN 46288
Conductor attachment	Flat terminal according to DIN 46206 and DIN 57609/VDE
Mounting	Quick install rail mounting EN 50022-35
Weight	200 g (0.44 lb.) for Vdc / 350 g (0.77 lb) for Vac

ORDERING INFORMATION

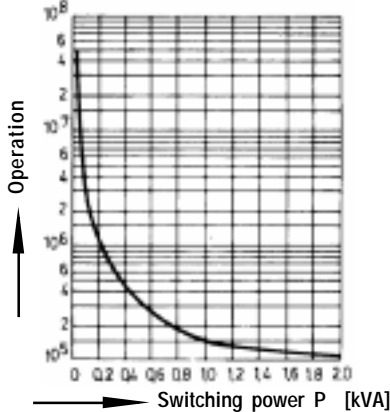


Note 1: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 230 Vac, 2A (300,000 operations), the limitation factor is 0.70. 300,000 x 0.70 = 210,000 total operations.

Note 2: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

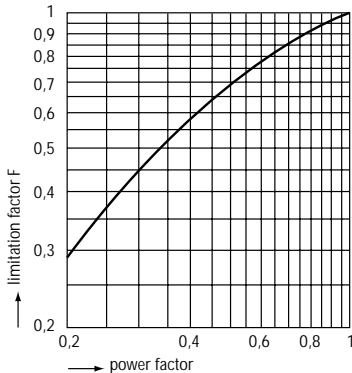
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

power factor = 1 (cos φ)

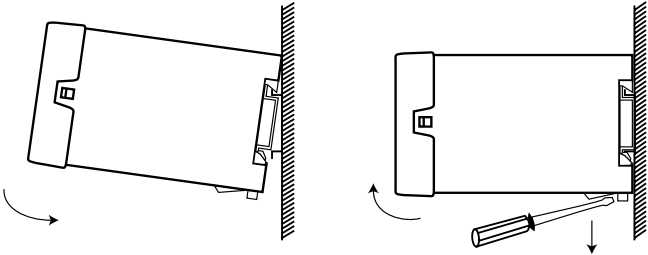


LIMITATION FACTOR FOR INDUCTIVE LOADS

power factor < 1 (cos φ)

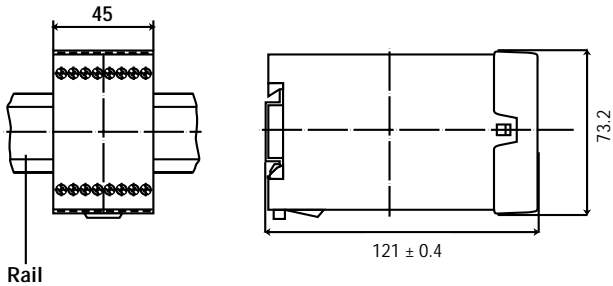


INSTALLATION DIAGRAM



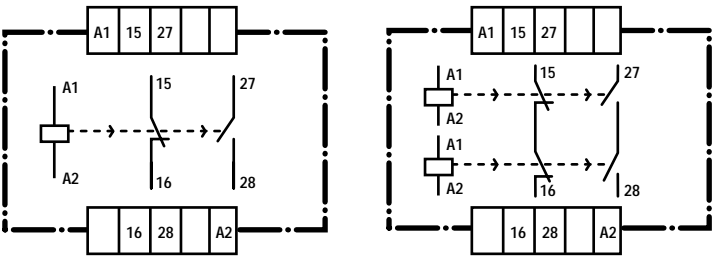
MOUNTING DIMENSIONS

Width: 45 mm/1.77 in; Height: 74 mm/2.91 in; Depth: 121 mm/4.76 in

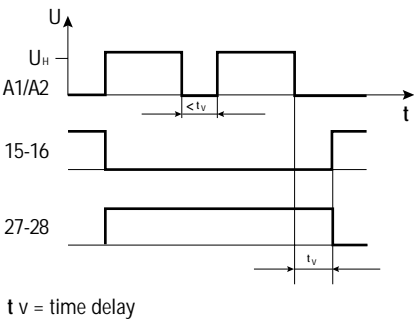


WIRING DIAGRAM

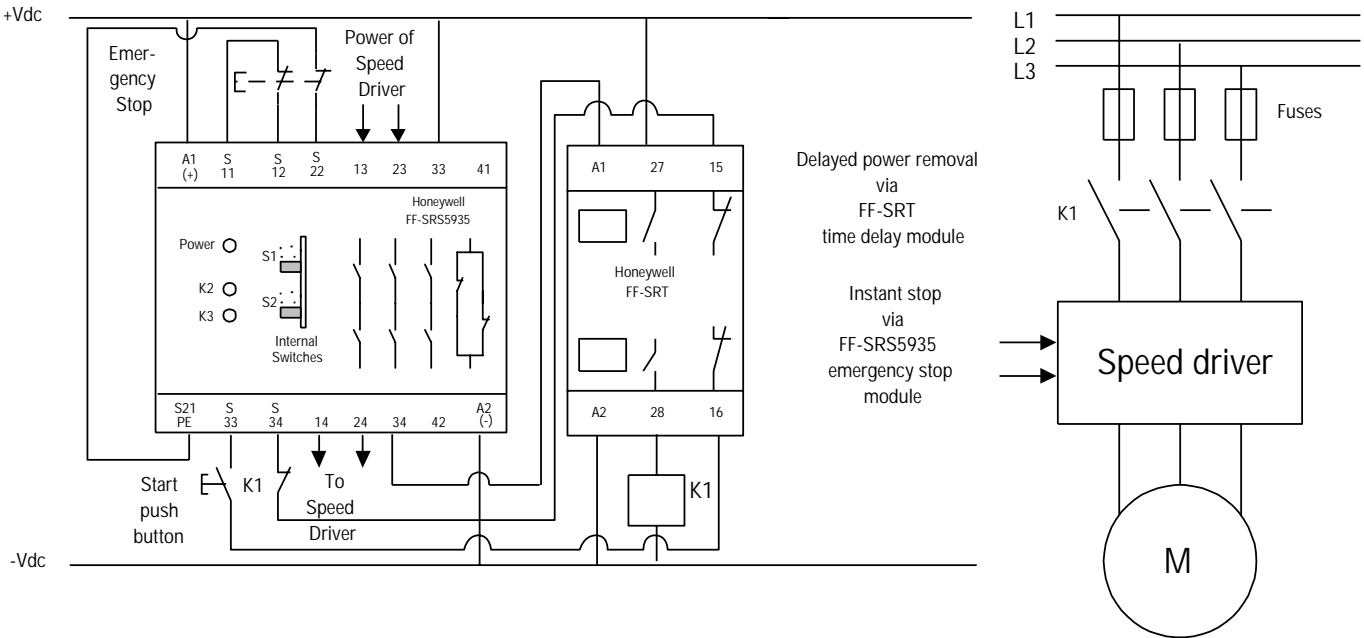
ONE CHANNEL (FF-SRT_1_) TWO CHANNEL (FF-SRT_2_)



FUNCTIONAL DIAGRAM



APPLICATION EXAMPLE



The example shows an emergency stop circuit with a motor using a speed driver. When an emergency stop condition occurs (e. g. the emergency push-button is pressed), the speed driver is shut down immediately via the emergency stop module FF-SRS5935 and the dangerous movement of the motor is stopped. When the delay time has elapsed, the power will be removed via the FF-SRT time delay module. External, positive guided relays have to be monitored in the S33/S34 loop by its normally closed contacts.

FF-SRST Emergency Stop Module with Timer

FEATURES

- Complies with the Machinery Directive for 98/37/EC, IEC 204, EN 60204, DIN VDE 0113 and UL 508
- Dual channel input
- Safety outputs: two direct NO contacts, one direct NC contact, two NO delayed contacts and one NC delayed contact
- Wide range of fixed and adjustable delay times
- Switching current from 1 mA to 5 A
- Automatic start or manual start mode with short-circuit detection on the push-button input
- Selectable cross-fault detection in emergency stop control circuit
- LEDs indicate power and internal relays status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Overvoltage and short-circuit protection
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width

APPLICATIONS

- Emergency stop circuits on machines
- Category 1 emergency stop circuits per EN 418 and NFPA79: delayed isolation of power after machine stoppage
- Door protection: delayed opening of an interlocked protective gate



(Direct safety contacts)



(Delayed safety contacts)



The FF-SRST Emergency Stop modules with Timer are designed to be used in emergency stop circuits where danger to personnel or machinery is present. This device has four internal standard safety relays with positive-guided contacts, of which two of these safety relays are delayed.

In the **manual start mode**, the module accepts input from the safety device (safety light curtain, safety mat, safety switches, etc.) between S21/S22 and S31/S32 after activation of the push-button between S33 and S34.

In the **automatic start mode**, the module accepts immediate input from the safety device between S21/S22 and S31/S32.

After restart, the normally open safety contacts (13/14, 23/24, 47/48, 57/58) will close and the normally closed contacts (31/32, 65/66) will open. If an emergency stop condition occurs (safety device is actuated), the normally open contacts (13/14, 23/24) will open and the normally closed contact (31/32) will close immediately. After the selected delay time has elapsed the normally open contacts (47/48, 57/58) will open and the normally closed contact (65/66) will close.

This emergency stop condition is signalled by the direct safety contacts (13/14, 23/24, 31/32) for the machine control circuitry to first stop the dangerous motion and then to remove power after a certain time by the delayed contacts (57/58, 65/66).

WARNING

MISUSE OF DOCUMENTATION

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Failure to comply with these instructions could result in death or serious injury.

FF-SRST Emergency Stop Module with Timer

SPECIFICATIONS

• Dual channel Emergency Stop circuits with time delayed contacts



Supply voltage	
Nominal voltage	24 Vac/dc (ac: $\pm 10\%$, dc: -20% , $+10\%$)
Nominal power consumption	dc: 3,5 W • ac: 3,5 VA (or dc)
Nominal frequency	50 Hz to 60 Hz
Fuse protection	Internal PTC
Restart input	Manual start mode: 40 ms; automatic start mode: 500 ms
Restart delay time	
Emergency stop inputs	
Input voltage at S11	23 Vdc at nominal voltage (provided by control module)
Minimum voltage at S12, S22, S32	21 Vdc at nominal voltage
Input current between S11/S12 and S21/S22	40 mA at nominal voltage
Cable resistance between S11/S12, S21/S22, S31/S32	50 Ω (max.)
Relay outputs	
Relay type	Safety relay with positive guided contacts
Safety contacts	2 NO, 1 NC, 2 NO off-delayed, 1 NC off-delayed (if Y39/Y40 is jumpered)
Time delay on de-energisation	Adjustable: FF-SRST□□□R2: 0,06 s to 0,3 s; 0,1 s to 1 s; 0,3 s to 3 s; 0,5 s to 5 s; 1 s to 10 s; 3 s to 30 s; 30 s to 300 s / Fixed: FF-SRST□□□F2: 0,5 s; 1 s; 3 s; 5 s; 10 s; 30 s; 300 s $\pm 1\%$ of set value
Repeat accuracy of time delay	
Response time	Opening of inputs (S11/S12, S21/S22, S31/S32): 15 ms; Opening in supply circuit (A1(+)/A2(-)): 40 ms
Switching capability	Power factor = 1 with resistive load
Current range (min. to max.)	1 mA to 5 A (see Note 1)
Voltage range (min. to max.)	0,1 Vac/dc to 250 Vac/dc
Typical electrical life expectancy	Power factor = 1 Vac/dc at 230 Vac (see Note 2)
2 A	1 000 000 operations
5 A	220 000 operations
Typical power factor (cos ϕ)	Limitation factor (see Note 3)
0,3	0,45
0,5	0,70
0,7	0,85
1	1
Operating frequency	1200 switching cycles/h (max.)
Fuse rating (external)	6 A time delayed (max.)
Mechanical life	10 million switching operations
General	
Temperature range	$-15\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$ / $5\text{ }^{\circ}\text{F}$ to $131\text{ }^{\circ}\text{F}$
Sealing	Housing: IP 40, Terminals: IP 20
Housing material	Thermoplastic
Vibration resistance	Amplitude: 0,35 mm; frequency: 10 Hz to 55 Hz
Connector connection (max.)	1 x 4 mm ² solid [12 AWG], 1 x 2,5 mm ² [14 AWG], 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
Connector attachment	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
Mounting	Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in size
Weight	400 g / 0.88 lb

ORDERING INFORMATION

FF-SRST□□□□2

Max. delay time □ □ □ □
D30: 0,3 s (adj. only)
D50: 0,5 s (fixed only)
001: 1 s
003: 3 s
005: 5 s
010: 10 s
030: 30 s
300: 300 s

Voltage
2 = 24 Vac/dc

R: Time adjustable
F: Time fixed

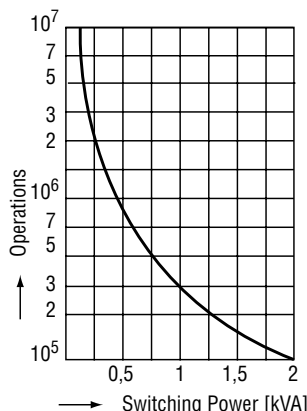
Note 1: Contact damage - To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

Note 2: Install arc suppressors across load to avoid module contact arcing and ensure specified contact life expectancy.

Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac and 2 A (1 000 000 operations), the limitation factor is 0,70. 1 000 000 x 0,70 = 700 000 total operations.

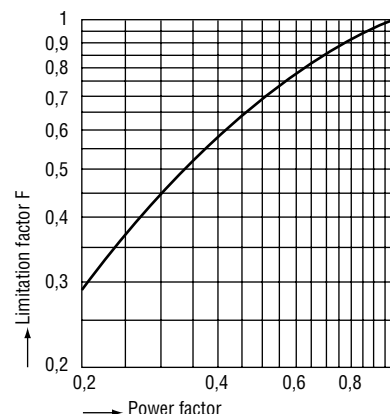
CONTACT LIFE FOR 100 % RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos ϕ) (see Note 3)

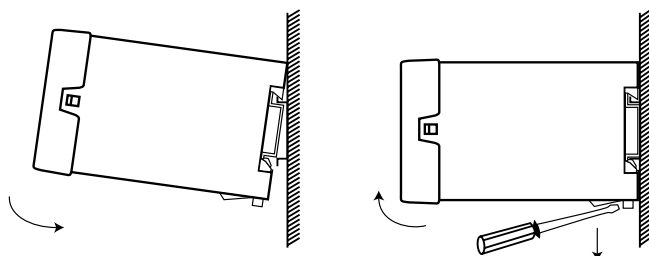


LIMITATION FACTOR FOR INDUCTIVE LOADS

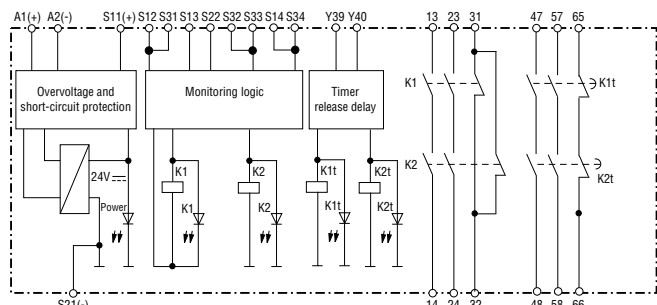
Power factor < 1 (cos ϕ) (see Note 3)



INSTALLATION DIAGRAM

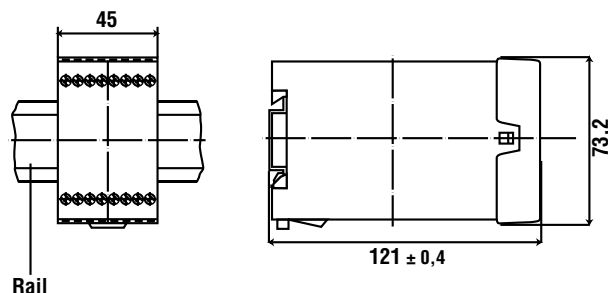


INTERNAL CIRCUITRY

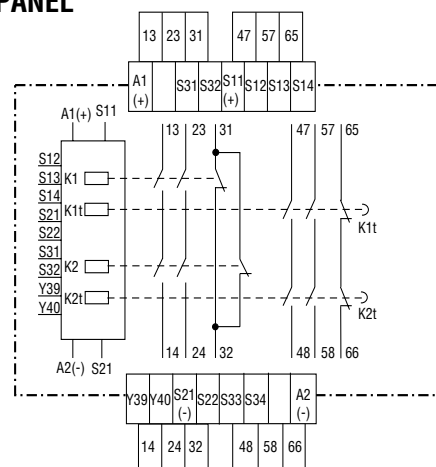


MOUNTING DIMENSIONS

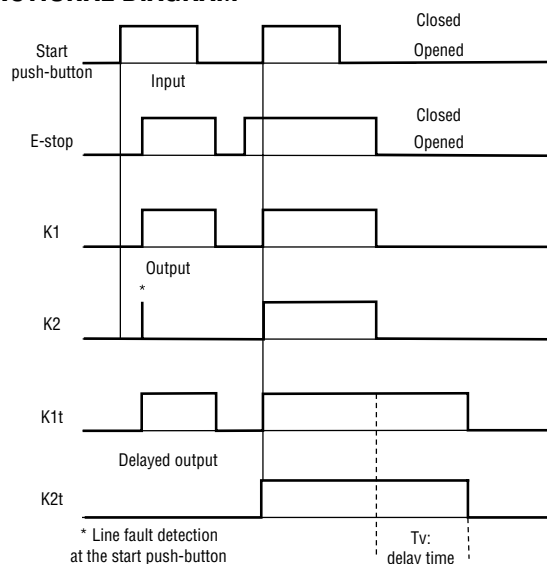
Width: 45 mm/1.7 in; Height: 74 mm/2.91 in; Depth: 121 mm/4.76 in



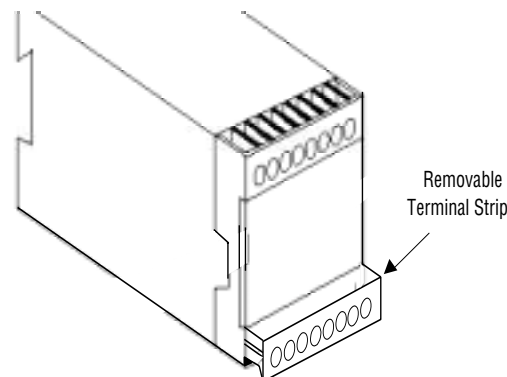
FRONT PANEL



FUNCTIONAL DIAGRAM



REMOVABLE TERMINAL BLOCKS



SETTING OF START MODE

Start Mode	Jumper between S13/S14	Start push-button between S33/S34	This module offers the possibility to function in the automatic start mode or manual start mode.
Manual start mode	• not connected •		Insert the start push-button between terminals S33/S34 for manual start mode .
Automatic start mode	• connected •	• •	Insert a jumper between S13/S14 for automatic start mode to function.

SETTING OF THE DELAYED CONTACTS

The off-delayed safety relays K1t and K2t (safety contacts 47/48 to 65/66) are only operational, if a jumper is set between Y39/Y40.

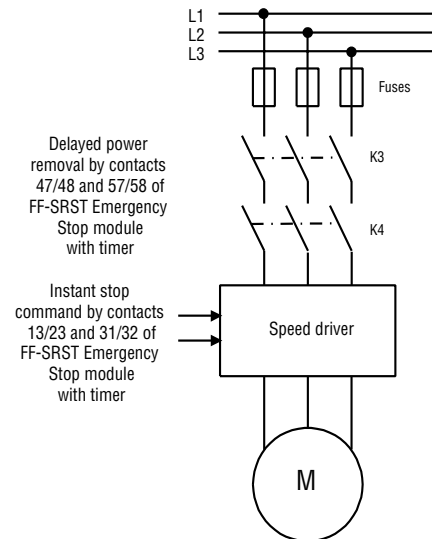
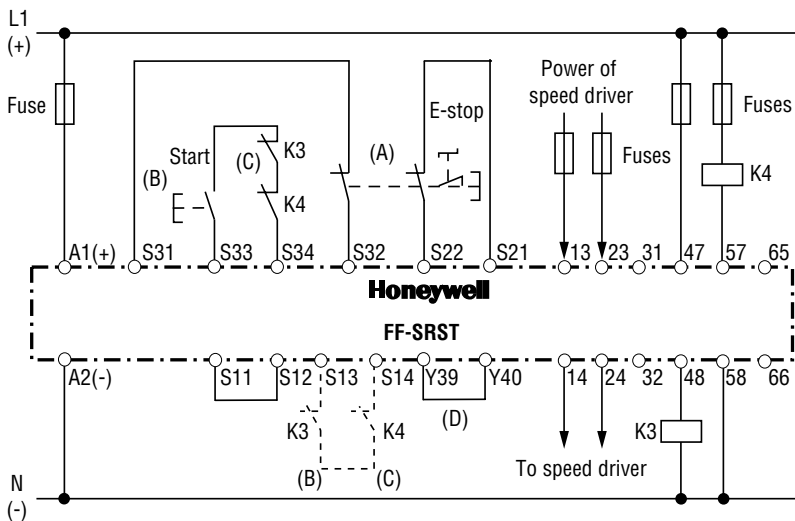
APPLICATION EXAMPLES

Dual channel emergency stop circuitry (with cross-fault monitoring, manual start mode, external contactors)

If an emergency stop condition occurs (emergency push-button or another safety device is actuated), the internal relays K1 and K2 de-energize immediately. The normally open contacts (13/14, 23/24) will open and the normally closed contact (31/32) will close. This emergency stop condition is signalled by these safety contacts for the machine control circuitry (e.g. a speed driver) to stop hazard.

The internal relays K1t and K2t will de-energize after the selected delay time has elapsed, leading to the opening of the normally open contacts (47/48, 57/58) and the closure of the normally closed contacts (65/66) (see note (D)). These contacts may be used to remove the main power of the stopped machine (category 1 emergency stop per EN 418) and NFPA79.

The emergency-stop condition can be reset while de-activating and activating the connected safety devices (inputs: S22 and S32). After restarting the module (manual or automatic restart: see note (B)), all internal safety relays K1, K2, K1t and K2t will energize immediately. All normally open contacts (13/14, 23/24, 47/48, 57/58) will close and the normally closed contacts (31/32, 65/66) will open, allowing the machine to operate (see note (D)).

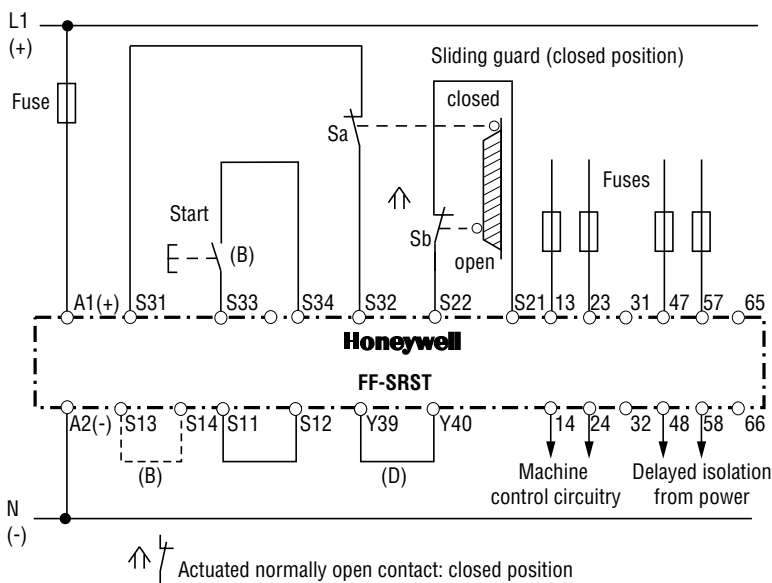


Dual-channel safety door monitoring (with cross-fault monitoring, manual start mode)

The FF-SRST Emergency Stop module may also monitor the status of locking or interlocking devices (usually safety switches) of protective gates. When the protective gate is open, the initiation of the hazardous motion is inhibited. When the door is closed again, the next machine cycle can start, but only after initiating a manual restart sequence.

After opening the door, the two external safety switch contacts Sa and Sb will open and two internal safety relays K1 and K2 will de-energize. The normally open safety contacts (13/14, 23/24) will open and the normally closed contact (31/32) will close relaying the stop condition to the machine control circuitry. The off-delayed safety relays K1t and K2t will de-energize, the normally open safety contacts (47/48, 57/58) will open and the normally closed contact (65/66) will close after the specified time delay has elapsed (see note (D)). These delayed safety contacts may be used to isolate the machine from power (category 1 stop per EN 418) and NFPA79.

When closing the door, Sa and Sb will close and the module is ready to be restarted (see note (B)). Then, the four internal relays K1, K2, K1t and K2t will energize immediately. (see note (D)). All normally open safety contacts (13/14, 23/24, 47/48, 57/58) will close and the normally closed contacts (31/32, 65/66) will open, allowing the machine to operate.



APPLICATION NOTES

Note (A): DUAL CHANNEL SAFETY DEVICES:

This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtain (FF-SCAN), safety mat (FF-SM), safety laser scanner (FF-SE), or safety limit switches (i.e. 2CLS, GK).

Note (B): START MODES:

Manual start mode: Insert start push-button between S33/S34; no jumper must be set between S13/S14.

Automatic start mode: Insert jumper between S13/S14; the start push-button is omitted.

Note (C): EXTERNAL CONTACTORS:

If contact reinforcement via external safety contactors with positive-guided contacts is necessary, the proper operation of the external contactors must be monitored by looping their normally closed contacts into the restart loop (manual start mode: S33/S34; automatic start mode: S13/S14).

Note (D): DELAYED CONTACTS:

The off-delayed safety relays K1t and K2t (safety contacts 47/48, 57/58, 65/66) are only operational, if a jumper is set between Y39/Y40.

Warranty and remedy

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FF-SR05936 Standstill Monitor

FEATURES

- Designed for Category 1 Emergency Stop functions per EN 418
- Monitors back EMF generated by 3-phase and single phase inductive motors
- No motor impedance limit
- Broken wire detection on monitoring circuit
- Positive-guided output contacts: two NO, two NC for ac 250 V
- Green LED's indicate stopped motor and power status
- Red LED indicates Z1-Z2 line breakage status
- Mechanical life up to ten million operations
- Electrical life up to one million operations
- Switching current up to 10 A
- Voltage drop protection
- 45 mm / 1.77 in width

TYPICAL APPLICATIONS

- Stopped motor monitor for three phase and single phase asynchronous motors
- Used to unlock a door which is guarding a rotating machine only when the movement is stopped
- Used to activate an emergency brake



If the stopping time of the machinery is unpredictable, use the FF-SR05936 Standstill Monitor.

This module measures (between Z1/Z2) the back EMF of the connected motor from the terminals of one stator winding. When the EMF has decreased near zero, the FF-SR05936 detects that the motor has stopped and energizes its output relays.

In addition, FF-SR05936 monitors the connections to the motor for broken wires on terminals Z1, Z2.

If an open (line break) is detected, the output relay contacts latch in the de-energized position as if the motor was running. After the break has been repaired, the module is reset by removing power to the module momentarily.

WARNING

MISUSE OF DOCUMENTATION

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Failure to comply with these instructions could result in death or serious injury.

FF-SR05936 Standstill Monitor



SPECIFICATIONS

- Stopped motor monitor for asynchronous motors

Input	Nominal voltage	120 Vac (-15%, +10%), 230 Vac (-20%, +10%), 24 Vdc (-20%, +10%)
	Nominal consumption	120 or 230 Vac: 4 VA; 24 Vdc: 2,5 W
	Nominal frequency	50 to 60 Hz
	Measuring input protection	690 Vac
	Engaging voltage	40 mV
	Release voltage	20 mV
Output	Contact complement	2 NO contacts, 2 NC contacts
	Contact type	Safety relay, positive-guided
	Response time	2 s after EMF drops below 20 mV
	Switching Capability	Power factor = 1 with resistive load
	Current Range (min. to max.)	10 mA to 10 A
	Voltage Range (min. to max.)	10 to 250 Vac/dc
	Switching capability per ac15 (EN 60 947-5.1)	NO contact: 3 A / 250 Vac - NC contact: 1 A / 250 Vac
	Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (See Note 1)
	3 A	1 000 000 operations
	5 A	500 000 operations
	10 A	220 000 operations
	Typical Power Factor (cos φ)	Limitation Factor (See Note 2)
	0,3	0,45
	0,5	0,70
	0,7	0,85
	1	1
General	Fuse Rating	6 A time delayed
	Mechanical life	Ten million switching operations
	Temperature range	-15 °C to +55 °C / 5 °F to 131 °F at max. 90% humidity
	Sealing	Housing: IP 40 • Terminals: IP 20
	Housing material	Thermoplastic
	Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
	Conductor connection	1 x 4 mm ² solid (max.) [12 AWG] or 2 x 1,5 mm ² (max) [16 AWG] stranded wire with sleeve DIN 46288
	Conductor attachment	M 3,5 screw terminals; wire contacts are enclosed to prevent electrical shock
	Mounting	Quick install rail mounting EN 50022-35
	Weight	325 g / 0.72 lb

ORDERING INFORMATION

FF-SR05936 □

Voltage:

2 = 24 Vdc

E = 120 Vac

G = 230 Vac

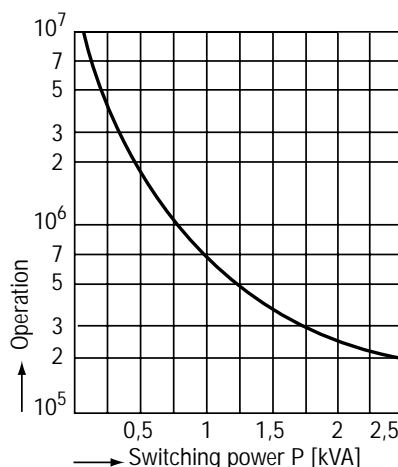
Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70.

1 000 000 x 0,70 = 700 000 total operations.

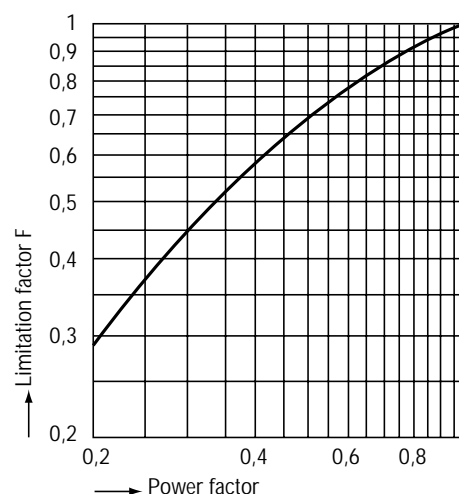
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ)

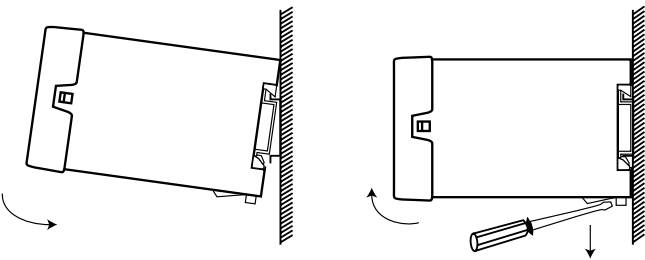


LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ)

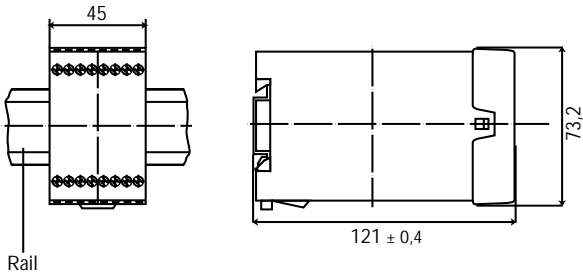


INSTALLATION DIAGRAM

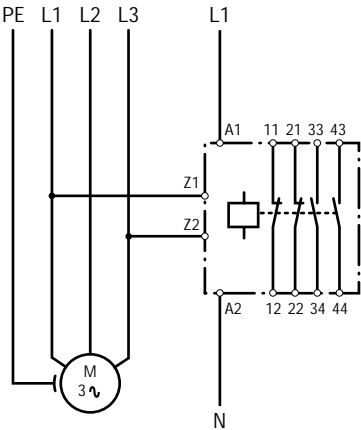


MOUNTING DIMENSIONS

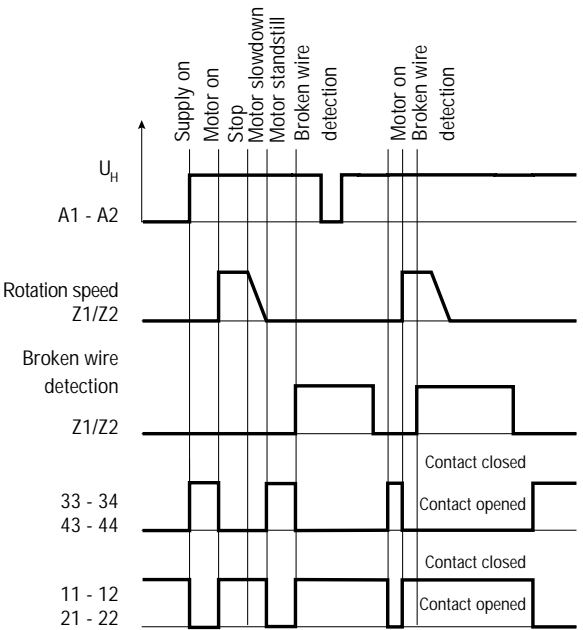
Width: 45 mm / 1.77 in; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



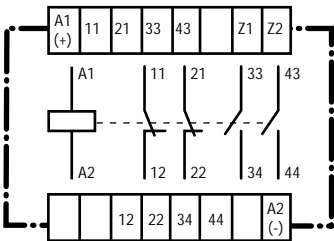
TYPICAL CONNECTION DIAGRAM



FUNCTIONAL DIAGRAM

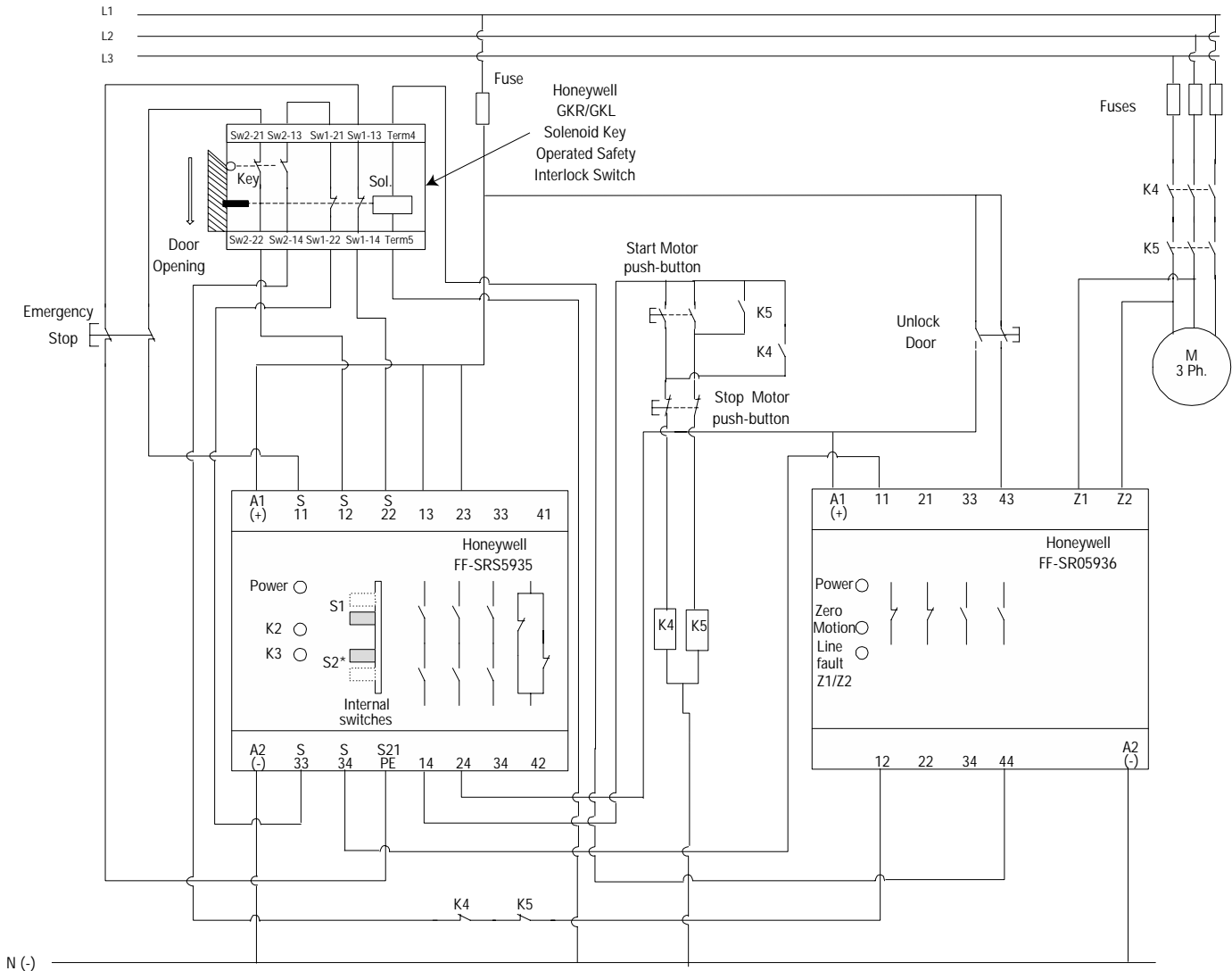


WIRING DIAGRAM



APPLICATION EXAMPLE

Door protection using key operated interlock switch (GKR/GKL Series) and standstill monitor module (FF-SR05936)



FUNCTIONAL DESCRIPTION

Start Sequence

Initially, the motor is not operating and the door is open. To initiate the start sequence, close the door. This action will close the two normally closed contacts of the key operated interlock switch. It will also automatically restart the emergency stop modules. As the Unlock push-button is open, the solenoid coil of the key operated interlock switch is de-energized and the door is locked.

The motor may now be started.

To start the motor, press the Start push-button. This action will energize the self-maintained external relays K4 and K5, and will start the motor.

Stop Sequence

Initially, the motor is operating and the door is closed and locked.

To initiate the stop sequence, press the Stop push-button. This action will de-energize the external safety relays K4 and K5 and immediately stop the motor.

To unlock the door when the motor has reached zero motion, press the Unlock push-button. This action will energize the coil of the solenoid of the key operated interlock switch and unlock the door. The door may now be opened safely. No hazardous motor motion is present.

Emergency stop Sequence

In case of an emergency stop situation, the two channel inputs of the FF-SRS5935 emergency stop control module will open. This action de-energizes the external safety relays K4 and K5, stopping the motor. All other steps remain the same as described above (Stop Sequence).

FF-SRS5939 Dual Channel Interface Control Module for Electrosensitive Protective Equipment

FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204, DIN VDE 0113
- Supply voltage: 24 Vdc
- Dual input compatible with the fail-safe solid state outputs of Honeywell Electrosensitive protective Equipment
- Two cross-monitored relays with guided contacts delivering two N.O. contacts and one N.C. contact
- Switching current from 1 mA to 6 A (gold plated 5 µm contacts allow low current)
- Response time: 15 ms
- Selectable automatic or manual restart modes (with permanent short-circuit detection)
- Selectable Final Switching Devices monitoring loop for the control of external relays or contactors
- LEDs indicates inputs and outputs status, and restart condition
- Removable terminal strips for ease of maintenance
- 45 mm/1.77 in. width housing

APPLICATIONS

To be used with the FF-SYA safety light curtain in point-of operation protection or zone guarding protection such as:

- Metal-forming, milling and drilling machines
- Spot-welding machines and fine-boring machines
- Pressing, moulding and thermoforming machines
- Conveyors/transfer lines



The FF-SRS5939 Interface Control Module is designed to be used with the FF-SYA Safety Light Curtain in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm/1.77 in. width housing is ideal for space restricted areas. This module provides a Control Reliable interface between the FF-SYA Light Curtain and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 2 NO and 1 NC output contacts. These output contacts are also gold plated to ensure compatibility with very low current requirements (such as a monitoring circuit).

The FF-SRS5939 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external switching devices. The FF-SRS5939 is equipped with LED indicators that provide diagnostic information and is equipped with removable wiring strips to make replacement fast and easy.

WARNING

MISUSE OF DOCUMENTATION

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- Complete installation, operation and maintenance information is to be referenced for each product.

MISUSE OF PRODUCT

- The FF-SRS5939 module is designed to be used with the Honeywell FF-SYA safety light curtain equipped with fail-safe solid state outputs. The FF-SYA performs cross-fault detection between its outputs. The FF-SRS5939 module does not perform the cross-fault detection between its inputs. To ensure the highest safety category, do NOT use the FF-SRS5939 with any other equipment. For other equipment, use the FF-SRS5935 or FF-SRS5925 dual channel emergency stop module. Both modules perform the cross-fault detection between the safety device outputs.

Failure to comply with these instructions could result in death or serious injury.

FF-SRS5939

FF-SRS5939

• Dual Channel Interface Control Module - Electrical interface
for Electrosensitive protective equipment



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Supply voltage	
Nominal voltage (A1/A2)	24 Vdc (-15 %, +15 %)
Power consumption	3.5 W
Fuse protection	315 mA, time delayed
Restart functions	
Restart push-button input (S33/S34)	For the connection of a N.O. contact, 0.1 to 1.5 s closing time, permanent short-circuit detection, 20 Vdc min. voltage (without pressing the push-button), 10 mA/24 Vdc min. current, 470 Ω max. cable resistance
Restart mode input (X1/X3)	For setting the manual or automatic restart mode, voltage presence
Restart time	100 ms after the ESPE inputs are energized (automatic restart) or push-button release (manual restart)
FSD monitoring loop	
FSD contacts input (Y1/Y2)	For the connection in series of the FSDs N.C. contacts (FSDs reaction time: 250 ms), permanent short-circuit detection, 20 Vdc min. voltage, 30 mA/24 Vdc min. current, 150 Ω max. cable resistance
FSD monitoring input (X1/X2)	For setting the FSD monitoring loop, voltage presence
ESPE inputs	
Input current	30 mA/24 Vdc (relays energized), 5 mA/24 Vdc (relays de-energized)
Input voltage	19 to 27.6 Vdc
Protection	Reversed polarity, over-voltages up to 32 Vdc
Outputs	
Contacts available	2 N.O., 1 N.C. (2 safety relays with guided contacts)
Response time	15 ms max. (see timing diagrams)
Start time at power up	100 ms (automatic restart mode)
Current range	1 mA min., 6 A max. (see note 1)
Voltage range	0.1 Vac/dc min., 250 Vac/dc max.
Switching capability per AC15 (EN 60947-5-1)	N.O. contact: 3 A / 230 Vac, N.C. contact: 2 A / 230 Vac
Typical electrical life expectancy	
	Power factor = 1 at 230 Vac (see fig. 1, note 3)
	1A : > 2.000.000 AC / > 400.000 DC ; 3A : > 500.000 AC / > 300.000 DC
	5A : > 300.000 AC / > 200.000 DC ; 6A : > 200.000 AC / > 150.000 DC
Typical power factor (see fig. 2, note 2 and 3)	Limitation factor: 0.45 (cos ϕ = 0.3), 0.70 (cos ϕ = 0.5), 0.85 (cos ϕ = 0.7), 1.00 (cos ϕ = 1.0)
Operating frequency	1200 switching cycles / h (max.)
External fuse rating	6 A max. time delayed
Mechanical life	10 million switching operations
Environmental specifications	
Temperature range	Operation: 0 to 55°C/32 to 131°F / Storage: -20 to 70°C/-4 to 170°F, at 90 % humidity max.
Sealing	Housing IP 40, Terminals IP 20
Housing material	Thermoplastic
Vibration resistance	Amplitude 0.35 mm/0.014 in., frequency 10 to 55 Hz
Connection	Removable terminal strips, one $\varnothing 2.5$ mm ² (14 AWG) or two $\varnothing 1.5$ mm ² (16 AWG) stranded wires per terminal
Mounting	Quick install rail mounting EN 50022-35, 35 x 15 mm/1.38 x 0.59 in. size
Weight	280 g/0.61 lb

Ordering information

FF-SRS59392 (24 Vdc)

NOTE 1: To ensure the 1 mA capability during the life-time of the contact, NEVER exceed 300 mA and 60 V.

NOTE 2: Install arc suppression device across loads to avoid module contact arcing and ensure specified relay life expectancy.

NOTE 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0.5 at 3 A/230 Vac, the limitation factor is 0.70 and the number of operations is 500,000 x 0.70 = 350,000.

Figure 1 - Contacts life for a 100 % resistive load

(typical) - note 1
power factor = 1 (cos ϕ)

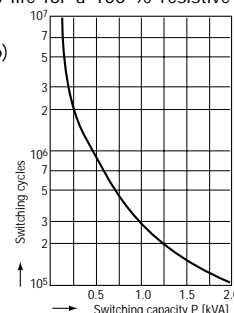
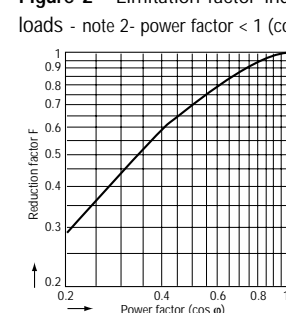
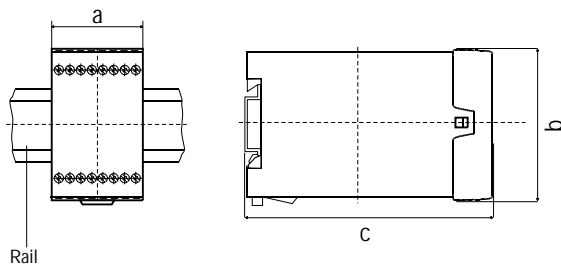


Figure 2 - Limitation factor inductive loads - note 2- power factor < 1 (cos ϕ)

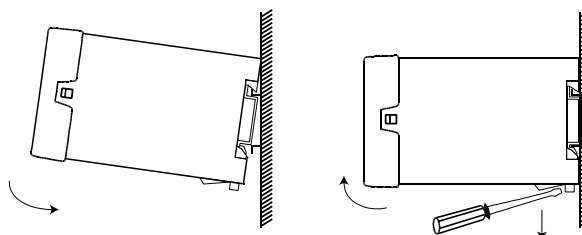


Mounting dimensions

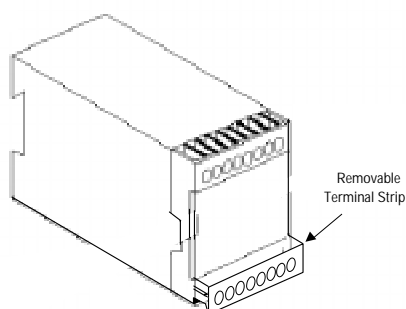
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- b Height: 74 mm / 2.91 in
- c Depth: 121 mm / 4.76 in



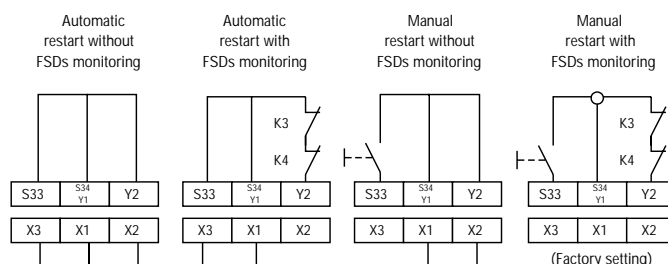
Mounting procedure



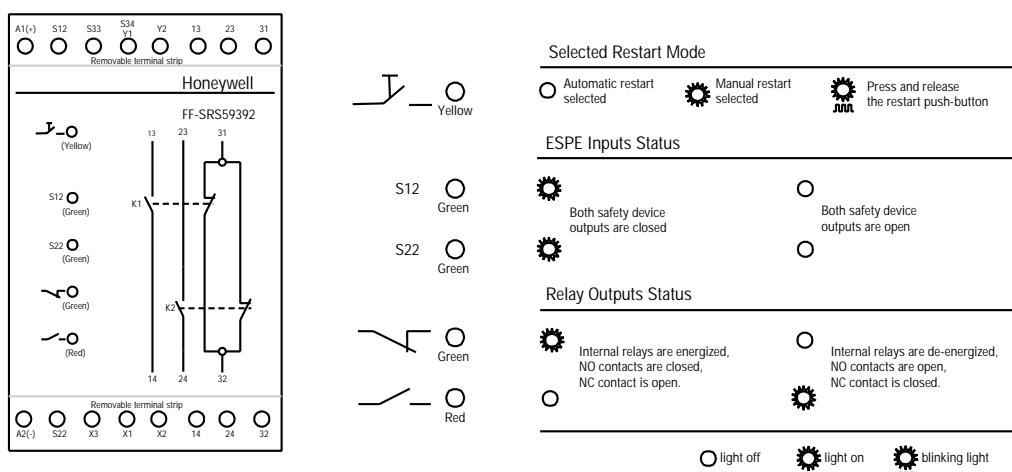
Removable terminal strips



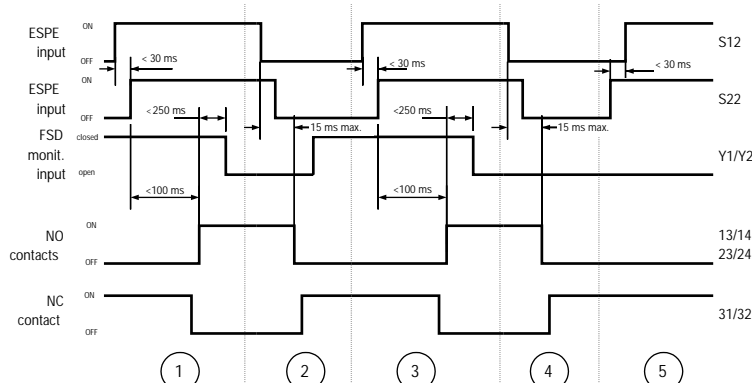
Jumper links setting diagram



Module front panel



Automatic restart functional diagram (with Final Switching Devices monitoring)

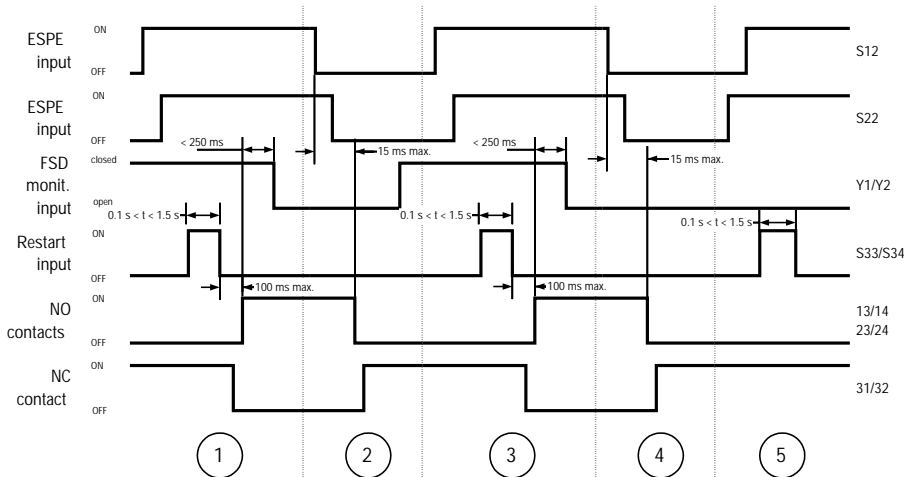


1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring loops opens.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart.

In the automatic restart mode, the Normally Open (N.O.) contacts (13/14, 23/24) will close and the Normally Closed (N.C.) contact (31/32) will open if the two input signals from the FF-SYA light curtain are present, provided these signals are coincident and the external relays reaction time is within the specification (if the Final Switching Devices monitoring loop is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This

emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power. The module will not restart if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

Manual restart functional diagram (with Final Switching Devices monitoring)



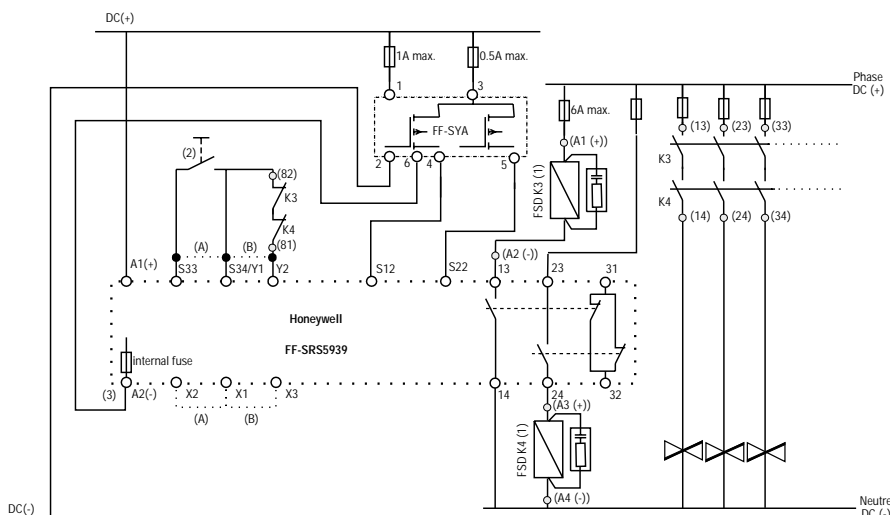
1. Normal operation: emergency stop condition is removed and the FSDs monitoring loop opens after the push-button is pressed and released.
2. Normal operation: emergency stop condition occurs and the FSDs monitoring loop closes.
3. Normal operation: emergency stop condition is removed and the FSDs monitoring opens after the push-button is pressed and released.
4. Failure on the FSDs: emergency stop condition occurs and the FSDs monitoring loop remains open.
5. Failure on the FSDs: emergency stop condition is removed but the machine cannot restart after the push-button is pressed and released.

In the manual restart mode, the N.O. contacts (13/14, 23/24) will close and the N.C. contact (31/32) will open after the push-button is pressed and released, provided the two input signals are available and provided the Final Switching Devices monitoring loop is closed (if is set). If the emergency stop condition occurs the N.O. contacts will open within the 15 ms response time and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

The module will not restart:

- if the push-button is actuated for more than 1.5 s, or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open, or remains closed for more than 250 ms or permanently.

Wiring diagram (using 2 N.O. contacts): Manual restart with FSD monitoring



- (1) Always install arc suppressors across the coils of external safety relays (these arc suppressors are not necessary, if the FSDs relays K3 & K4 are supplied by the FF-SRE3081 extension module for which correct wiring is also indicated).
- (2) Use a 120 or 230 Vac electrically insulated push-button.
- (3) The module and the ESPE must be connected to the same 0 V.
ESPE: Electrosensitive Protective Equipment.
FSD: Final Switching Device.
- (A) Jumpered if the manual restart mode is not used.
- (B) Jumpered if the FSDs K3 and K4 are not used.

FF-SRM100P2 muting module for safety light curtains

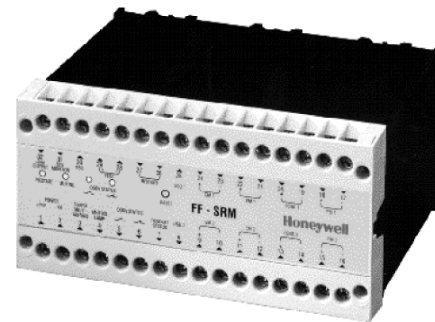
FF-SRM Series

FEATURES

- Category 4 muting module as per the EN 954-1 European standard
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Response time: 5 ms
- 2 fail-safe static outputs to be connected to the machine control system
- Alarm static output to be connected to the machine secondary control element; maintains the muting module in a lock-out condition after an internal fault detection
- Static output for the muting lamp permanently monitored as requested by the IEC/EN 61496-1 standard
- Inputs for 2 or 4 auxiliary sensors used to start and interrupt the muting sequences
- Override facility to evacuate an object after it accidentally came to a stop in the protective equipment sensing field
- Integrated start and restart interlock facility preventing the automatic machine start after a man intrusion beyond muting sequences
- FSDs monitoring loop for the control of Final Switching Devices

TYPICAL APPLICATIONS

- Any machines automatically fed by a conveyor belt: palletizers and depalletizers, automotive transfer lines, packaging and wrapping machines
- Any machines where manual operations must be carried out beyond dangerous phases of the machine cycle: mechanical or hydraulic presses, press-brakes, welding robots



The FF-SRM module is an interface between a safety device (i.e. light curtain, laser scanner, mat...) and the control circuitry of a dangerous machine on which the muting of the protective equipment outputs is necessary at certain steps of the process. On a machine automatically fed by a conveyor, parts must often be fed through the detection field of the safety light curtain towards the dangerous zone without causing the machine to stop. Similarly, manual loading and unloading of a mechanical or hydraulic press may be required during the opening stroke of the press. In these applications, it is necessary to safely "mute" or deactivate the safety device during a controlled sequence. The FF-SRM100P2 module will accomplish this.

The FF-SRM module is a permanently self-checked electrical interface which complies with the requirements of the EN 954-1 European standard for Category 4 protective devices: any failure is immediately detected and prevents any muting sequence from being activated. Connected with any of the safety light curtains from the Honeywell range, the FF-SRM module reliably controls muting sequences.

When the protective equipment is not muted, the FF-SRM module output status are identical to the light curtain output status, and the intrusion of an object or a person in the light curtain detection field immediately stops the machine. The machine can only restart after pressing a restart push-button connected to the FF-SRM module terminals.

⚠ WARNING

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FF-SRM

The muting sequence is controlled by two or four sensors (such as photoelectric controls, limit switches or inductive proximity sensors) which reliably identify the events initiating and interrupting the muting sequence. When muting conditions are achieved, the FF-SRM module allows the machine to operate during the muting sequence without taking into account the signal delivered by the light curtain. Correct operation of the sensors is controlled at each muting sequence and any sensor failure prevents the muting from being performed.

When used in the "conveyor" mode of operation, two push-buttons allow the override of the light curtain if manufactured parts remain in the light curtain detection field during a muting sequence. Restart of the machine is then easily achieved.

A Final Switching Device monitoring loop is available for the control of the two relays commanded by the two fail-safe static outputs of the module. The module also integrates an alarm output (or "Secondary Switching Device - SSD") which switches off in case of internal failure. This SSD output can be connected to the machine secondary control element to shutdown the machine and performs a back-up safety function.

A white lamp informs the operator of each muting sequence. Correct operation of this lamp is monitored by the module in accordance with IEC/EN 61496-1 European standard, and any muting lamp failure prevents the muting from being performed. The muting module is equipped with additional static outputs providing remote information given by LEDs status indicators located on the module cover. These LEDs status indicators provide the operator with information on the output status, on a possible internal failure and when a manual restart of the module is necessary.

Applications

In the "conveyor" mode of operation, the muting solution operates as follows: the intrusion of an authorized object in the protective equipment sensing field is not taken into account at any time of the working cycle of a machine fed by a conveyor. When set in this mode, the FF-SRM muting module eases the integration of a safety light curtain on the following types of machines:

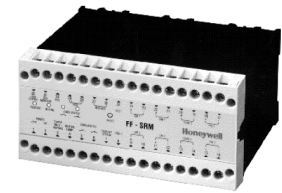
- Palletisers / depalletisers,
- Handling, wrapping and packaging machines,
- Robotic zones on a automotive transfer line,
- Automotive paint-shops.

In the "press" mode of operation, the muting solution operates as follows: the intrusion of an operator in the protective equipment sensing field is not taken into account during non dangerous phases of the machine working cycle. When set in this mode, the FF-SRM muting module eases the integration of a safety light curtain on the following types of machines:

- Work stations where the operator needs to load parts as soon as the tool starts rising such as on a mechanical or hydraulic presses,
- Work stations where the operator needs to carry out manual operations while the machine is working such as on a press-brakes,
- Dual work stations where the operator loads parts on one station while the robot works on the other station such as on welding robots.

FF-SRM

- Category 4 muting module as per the EN 954-1 European standard
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Suitable for machines fed by a conveyor or for machines with working cycle including manual operations

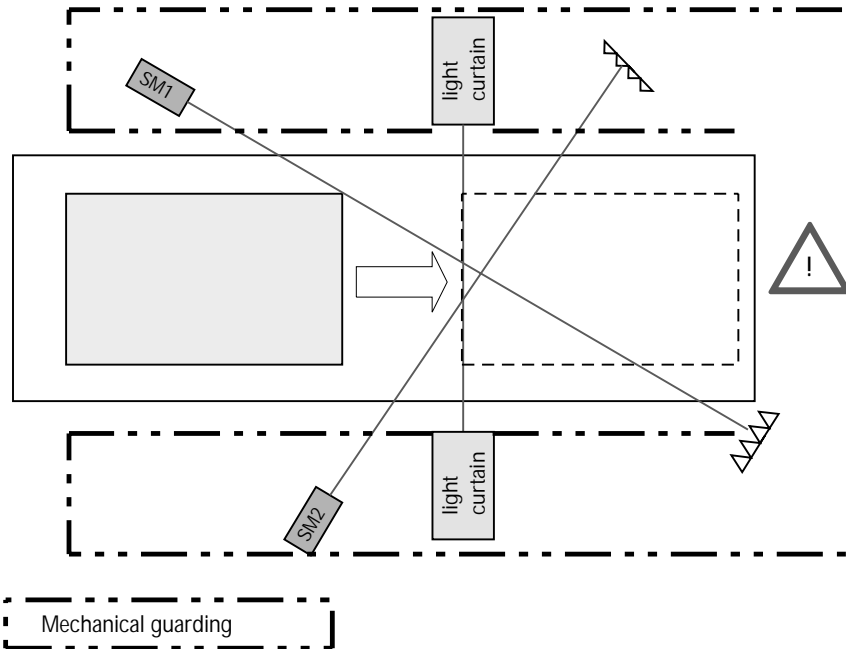


Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

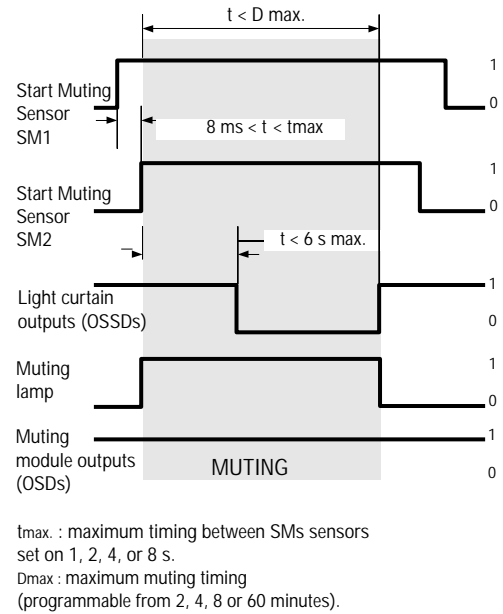
Features	Power supply voltage	24 Vdc, $\pm 15\%$
	Power consumptions	6 W for the module and all inputs, 6 to 60 W for the module and all outputs
	Response time	0.005 s
	Operating temperature	0 °C to 55 °C / 32 °F to 131 °F
	Relative humidity	25 to 75 %
	Sealing	IP 20 (needs to be installed in IP 54 enclosure)
Outputs	OSDs ⁽¹⁾	For machine shutdown: 2 fail-safe static outputs (switching capacity: 0,5 A/24 Vdc)
	SSD ⁽²⁾	For failure alarm: 1 static output tested at power up (switching capacity: 0,5 A/24 Vdc)
	MUTING LAMP	For the muting lamp: 1 self-checked static output (switching capacity: 0,5 A/ 24 Vdc)
	TEST	For testing the light curtain connection: 1 programmable N.O./N.C. static output (switching capacity: 16 mA/24 Vdc)
Inputs	OSSDs ⁽³⁾	For the light curtain N.O. contacts: 2 inputs with optocoupler (consumption: 30 mA/24 Vdc)
	SMs & EMs ⁽⁴⁾	For the sensors N.O/N.C. contacts: 4 inputs with optocoupler (consumption 10 mA/24 Vdc)
	P/Bs ⁽⁵⁾	Push-button N.O. contacts: 2 inputs with optocoupler (consumption: 10 mA/24 Vdc)
	RESTART	For the module restart and the FSDs monitoring ⁽⁷⁾ : 1 input with optocoupler (50 mA current pic)
	SSD MONITOR ⁽⁶⁾	For the SSD monitoring: 1 input with optocoupler (consumption: 10 mA/24 Vc)
	LEDs status	OSDs output status, restart condition muting sequence, unwanted condition
	Connection	Removable terminal strips (2 \varnothing 1,5 mm ² / AWG 16 wires per screw terminal)
	Mounting	Omega rail DIN 50 0022-35 (35 mm x 15 mm / 1.38 in x 0.59 in)
	Dimensions	152 mm x 118,2 mm x 73,2 mm / 5.98 in x 4.65 in x 2.88 in (overall size)
	Weight	600 gr / 1.32 lb without packaging • 1,10 kg / 2.42 lbs with packaging
Ordering information FF-SRM100P2 Note Honeywell provides a wide range of sensors such as photoelectric controls, ultrasonic sensors, limit switches and inductive proximity sensors which can be used to control the muting sequences. Also refer to the enclosed components lists.		Dimensions (mm/in)
⁽¹⁾ Output Switching Devices ⁽²⁾ Secondary Switching Devices ⁽³⁾ Output Signal Switching Devices ⁽⁴⁾ Start Muting and End Muting Sensors ⁽⁵⁾ Override Push-Buttons ⁽⁶⁾ Secondary Switching Devices monitoring loop ⁽⁷⁾ Final Switching Devices monitoring loop		

Example 1: Conveyor mode, two-direction muting

Application sketch



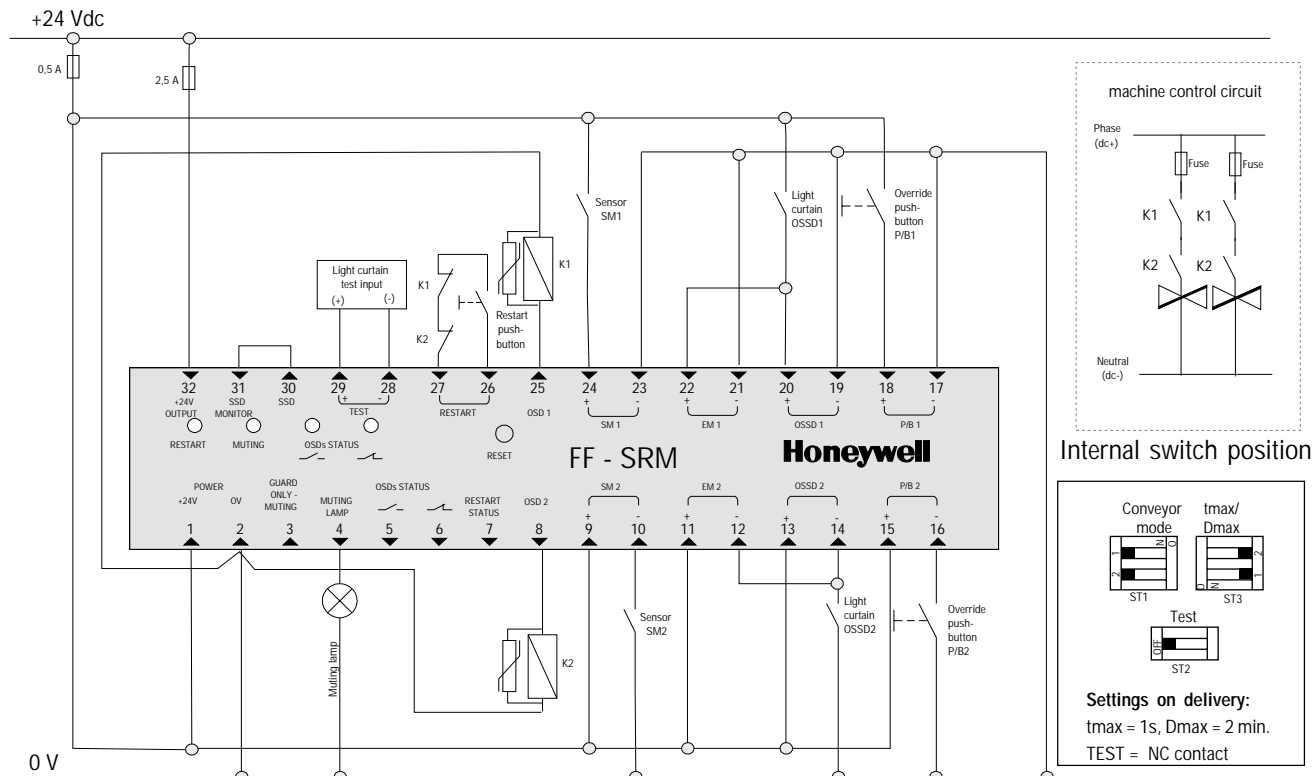
Timing diagram



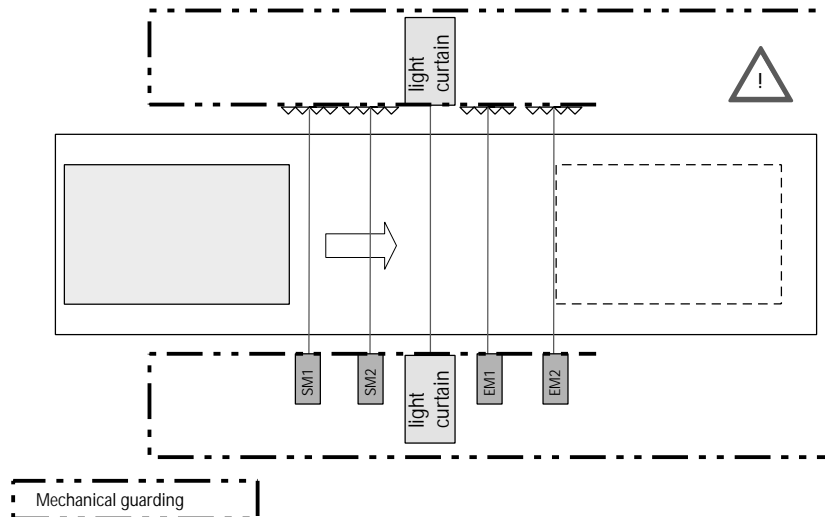
Description

Two through-scan or retro-polarised photoelectric controls SM1 & SM2 can be used to start and end the muting sequence (correct operation of these photoelectric controls is monitored by the muting module). The interruption of the photoelectric control beams starts the muting sequence while the release of the safety light curtain beams stops the muting sequence. **This installation is recommended on applications where the entry and exit points of the material into the dangerous zone are the same.** The whole muting sequence shall not last more than 60 minutes.

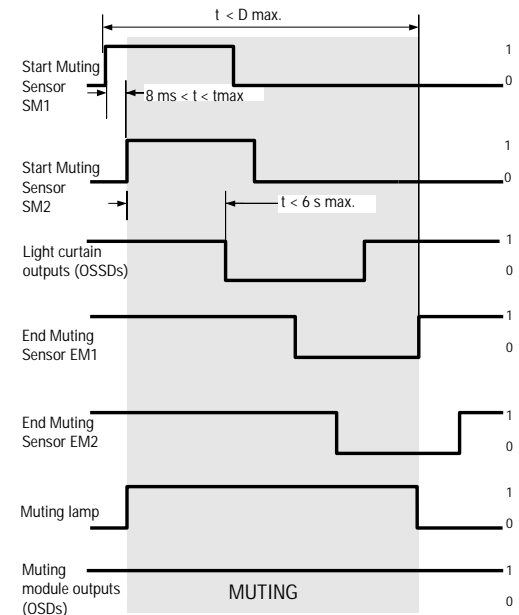
Wiring diagram



Example 2: Conveyor mode, one-direction muting Application sketch



Timing diagram

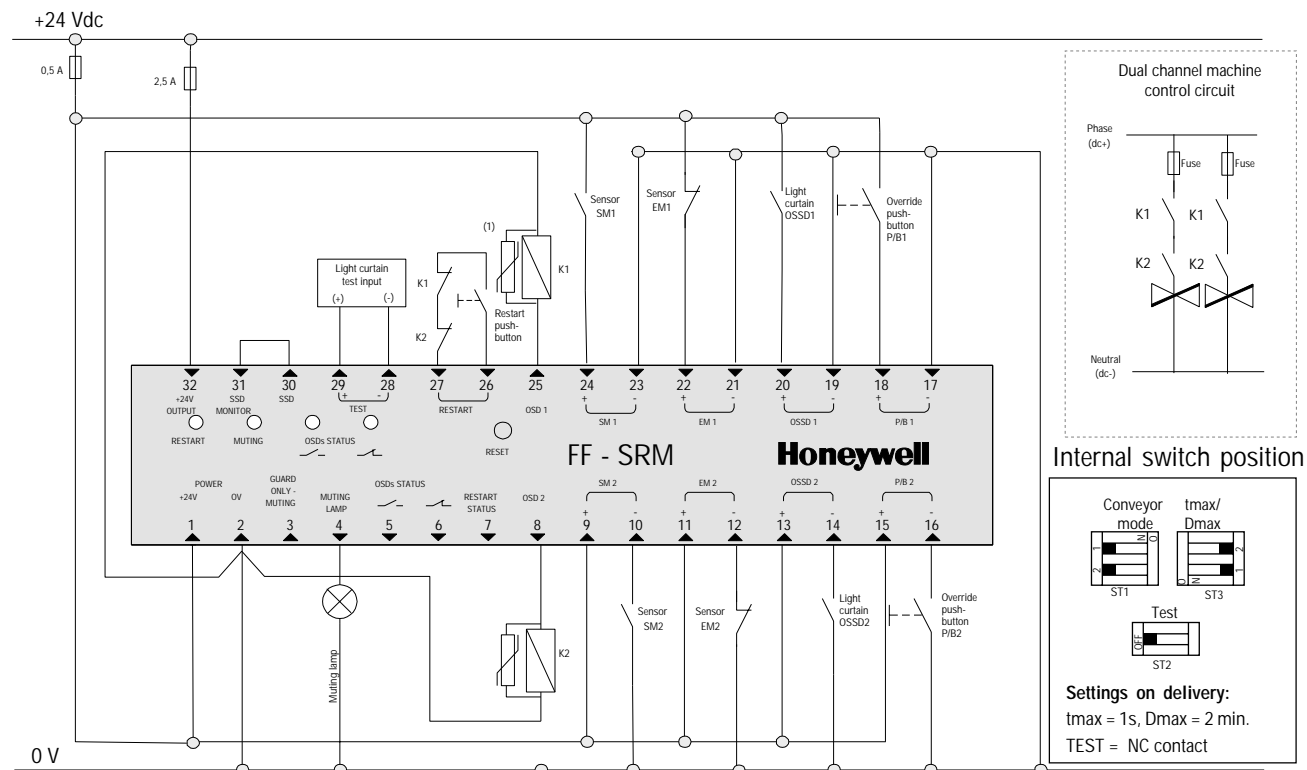


tmax : maximum timing between SMs sensors
set on 1, 2, 4, or 8 s.
Dmax : maximum muting timing
(programmable from 2, 4, 8, or 60 minutes).

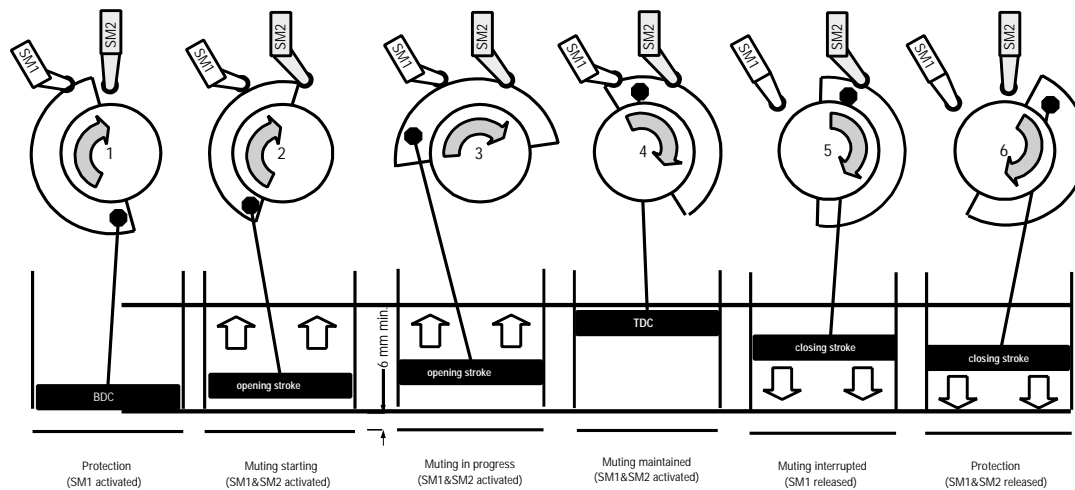
Description

Two sensors SM1 & SM2 are used to start the muting sequence, and two additional sensors EM1 & EM2 are used to stop it. These sensors may be inductive proximity sensors, photoelectric controls or limit switches (correct operation of these sensors is monitored by the muting module). This installation enables the muting of the protective equipment in one direction only. **This installation is recommended on applications where entry and exit points of the material into the dangerous zone are different.** The use of 4 sensors to perform a muting sequence provides a high level of safety. The whole muting sequence shall not last more than 60 minutes.

Wiring diagram



Example 3: Press mode, muting on a mechanical press



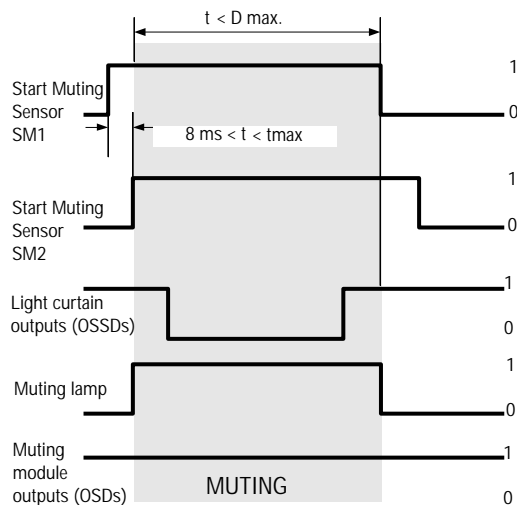
- SM1 Start muting 1
- SM2 Start muting 2
- EM1 End muting 1
- EM2 End muting 2

Application sketch

BDC (Bottom Dead Center) point at which the tool is closest to the die.

TDC (Top Dead Center) point at which the tool is furthest to the die.

Timing diagram

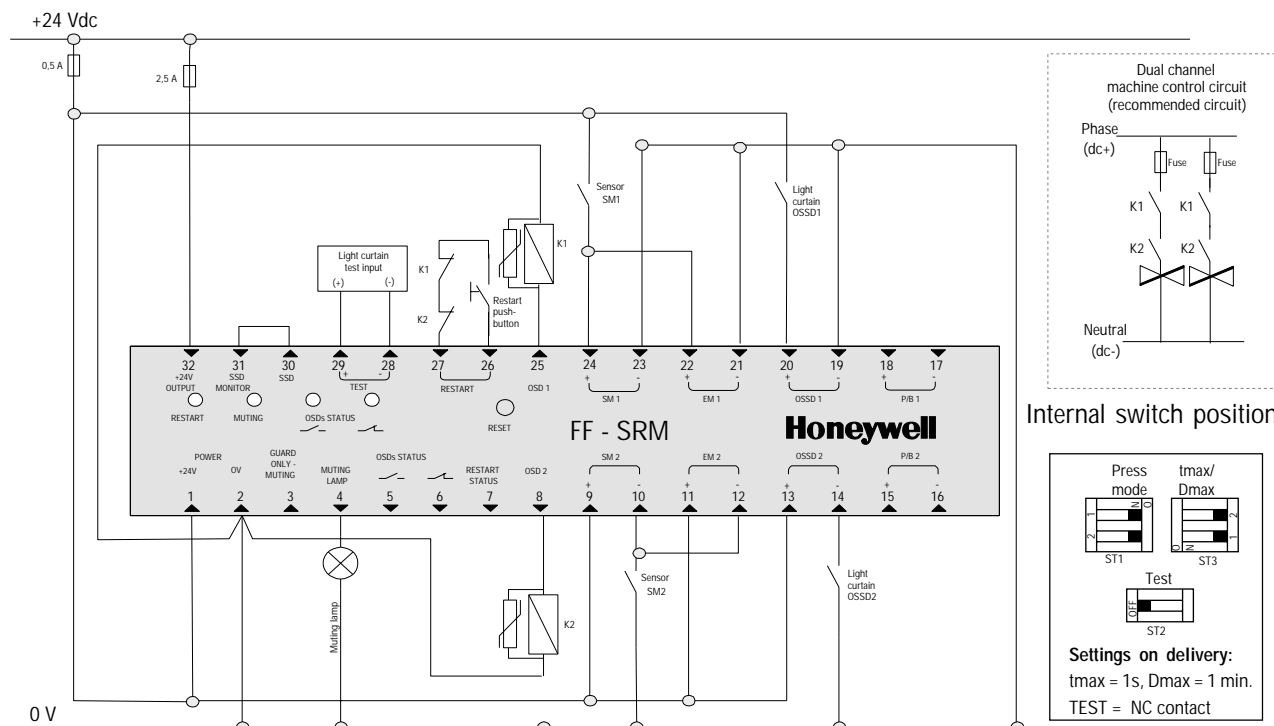


Description

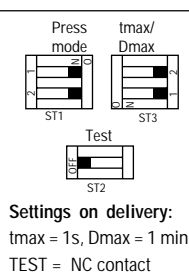
Two limit switches SM1 & SM2 are used to start and stop a muting sequence. As soon as the press tool reaches its lowest position, the SM sensors are actuated by the rotation of the rotating disk cam and start the muting sequence (correct operation of these sensors is monitored by the module muting). The limit switches keep their position until the press tool reaches its uppermost position. The rotation of the rotating disk cam releases both limit switches and interrupt the muting sequence. The muting sequence must last 60 minutes maximum.

dmax.: maximum muting timing (programmable from 1, 2, 4 or 60 minutes.)
tmax.: maximum timing between SMs sensors set on 1, 2, 4 or 8 seconds.

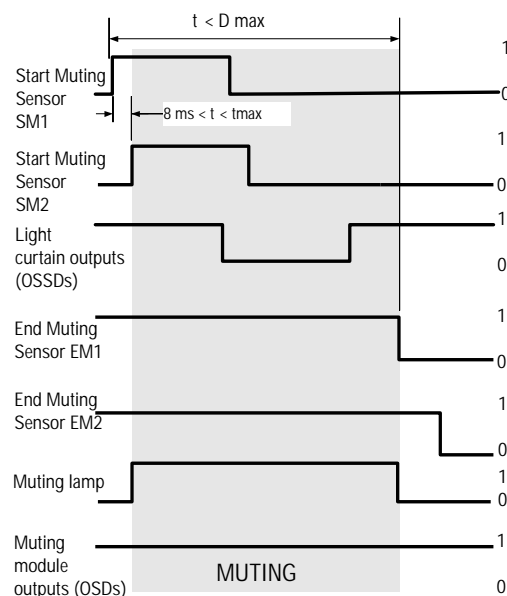
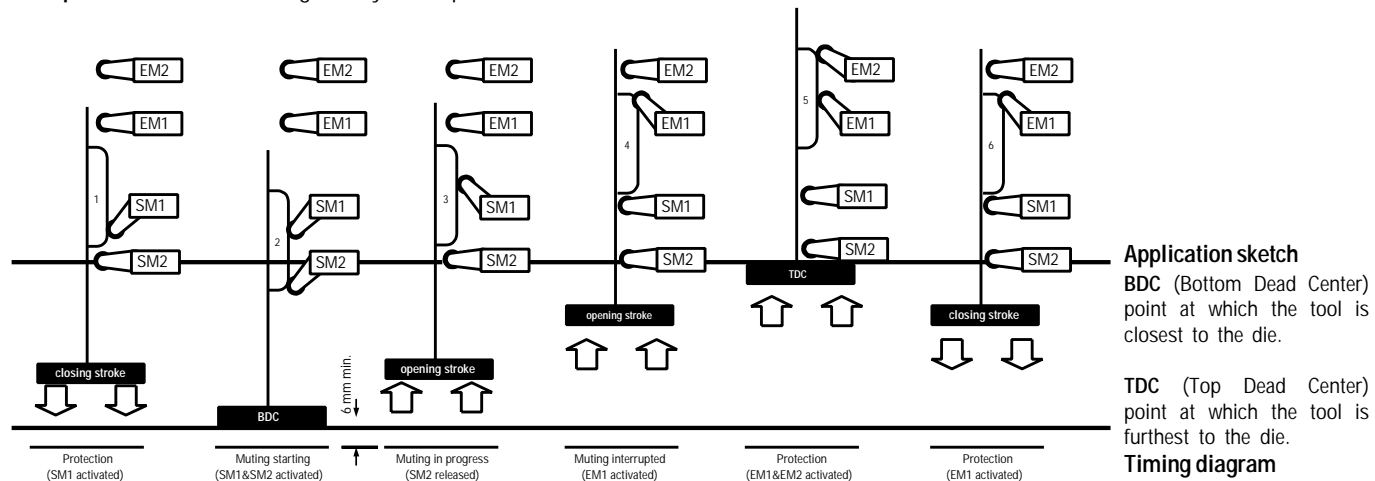
Wiring diagram



Internal switch position



Example 4: Press mode, muting on a hydraulic press

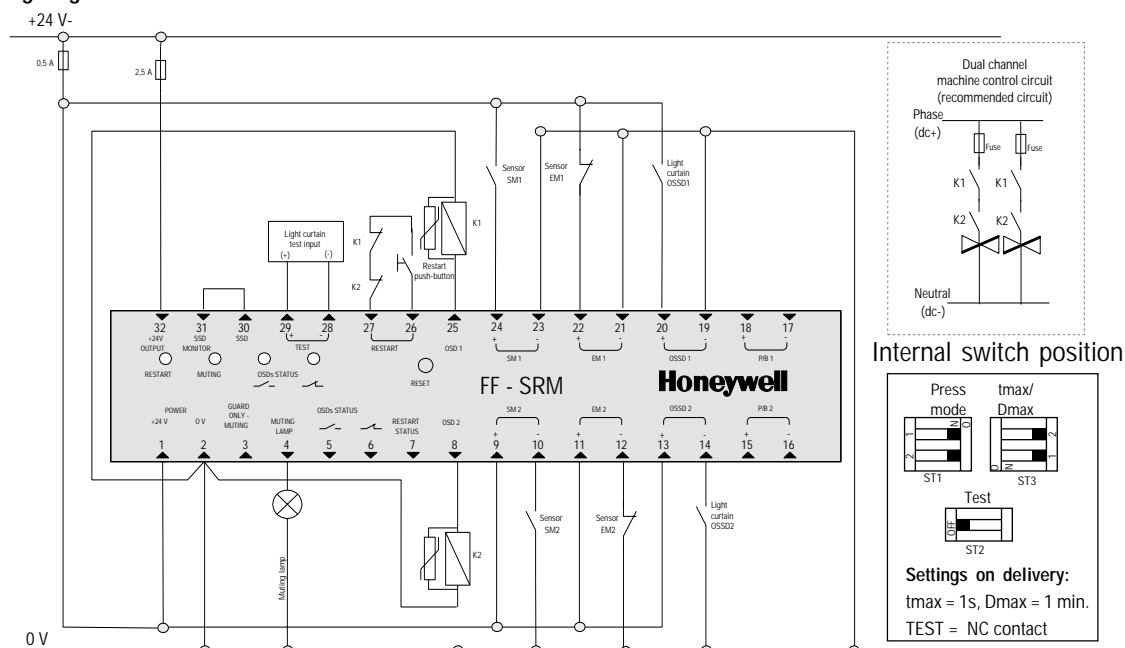


Description

A pair of sensors SM1 & SM2 is used start the muting sequence, and another pair of sensors EM1 & EM2 is used to stop the muting sequence (correct operation of these sensors is monitored by the module muting). The sensors used to detect the tool position should be either limit switches or inductive proximity sensors. The muting sequence must last 60 minutes maximum.

dmax.: maximum muting timing (programmable from 1, 2, 4 or 60 minutes)
 tmax.: maximum timing between SMs sensors set on 1, 2, 4 or 8 seconds.

Wiring diagram



Components list

Components	Typical supplies	Conveyor	Press
ESPE Protective equipment	Safety light curtain (1) or Modular light curtain (1) or Single safety beam or access control systems (1) or Safety laser scanner (1)	• • • •	•
Sensors (choose 2 to 4 sensors among the following) <i>Photoelectric control</i>	Through-scan, LO/DO, relay SPDT or static PNP/NPN (2) Retro-polarized, LO/DO, relay SPDT or static PNP/NPN (2) Diffuse, LO/DO, relay SPDT or static PNP/NPN (2)	• • •	
<i>Ultrasonic sensor</i>	NO/NC contact, static PNP/NPN (3)	•	
<i>Limit switches</i>	NO/NC limit switch (4) or (1)	•	•
<i>Inductive proximity sensor</i>	NO/NC contact, static PNP/NPN (5)	•	•
FSD relays	2 safety relays with guided contacts	•	•
SSD relays	1 safety relay with guided contacts	•	•
Arc suppressors	3 varistors 31 Vdc (recommended for cable length longer than 1 m)	•	•
Muting lamp	Colourless incandescent filament lamp	•	•
Restart visual indicator	Yellow indicator	•	•
OSDs status visual indicators	Red and green indicators	•	•
Restart push-button	Key selector switch (1 position with return movement)	•	•
Override push-button	Key selector switch (2 positions, 1 with return movement)	•	•
Guard only mode selector	Key selector switch (2 fixed positions)	•	•
Power supply 24 Vdc	Power supply (power greater than 120 W)	•	•
Power section switch	Selector switch (2 fixed positions)	•	•

- (1) refer to the Honeywell Industrial Safety Products catalog
 (2) refer to the Honeywell Photoelectric Products catalog
 (3) refer to the Honeywell Ultrasonic Distance Sensors catalog
 (4) refer to the Honeywell Switches catalog
 (5) refer to the Honeywell Proximity Sensors catalog
 or Honeywell Consolidated Sensors Catalog

FF-SRM

FF-SRM200P2 muting module

FEATURES

- Category 4 muting module as per the EN 954-1 and EN 61496-1 European standards
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Multi-functional module programmable through internal selectors : muting functions, mutual exclusion mode
- Compatible with many type 2, type 3 or type 4 safety devices (safety light curtains, safety mats, safety switches) and muting sensors
- Works with safety devices and muting sensors with static outputs or relay outputs
- Inputs for 1 mutable safety device and 1 non-mutable safety device or up to 2 mutable safety devices
- Inputs for 2 or 4 sensors to start and end the muting sequence
- Uni-directional or bi-directional muting
- Max. muting time programmable in wide ranges (10 s to unlimited)
- Safety relay outputs: 3 NO
- Auxiliary static outputs for the muting lamp, diagnostic information and output relay status
- Response time : 25 ms
- Integrated start and restart interlock capability
- Monitored start push-button
- Test output for safety device testing
- External Device Monitoring (EDM) loop for the control of external contactors
- 45 mm / 1.77 in slim housing
- Detailed diagnostic information for easy troubleshooting via external and internal indicators
- LED indicators for relay status and diagnostic information

TYPICAL APPLICATIONS

- Conveyor lines, palletizers and depalletizers, automotive transfer lines
- Packaging and wrapping machines
- Machines where manual operations must be carried out outside of hazardous phases of the machine cycle: mechanical or hydraulic presses, press-brakes, welding robots, double transfer lines
- Hazardous areas being mutually accessed by material handling robots or operators carrying out manual operations (mutual exclusion mode)



The **FF-SRM200P2** is a programmable safety control module offering **various muting modes** and an **mutual exclusion mode** in one device.

The FF-SRM200P2 is permanently self-checked and complies with the requirements of the EN 954-1 European standard for **Category 4** safety devices and EN 61496-1. Any internal failure is detected and leads to the de-energisation of its safety relay outputs.

Mode depending, **up to two safety devices** (e.g. light curtains, safety mats, safety switches etc.) protecting a hazardous area and **up to four sensors** (e.g. for starting or ending a muting sequence) can be connected to this module. If needed, the correct functioning of the connected safety devices may be monitored by the module through its **test output**.

The FF-SRM200P2 module offers an **extensive diagnostic** through indicators, which allow for an easy troubleshooting in muting applications.

In the **muting mode**, the module is an interface between one or two safety devices (i.e. light curtains, safety mats, safety switches, etc.) and the control circuitry of a hazardous machine for which it is necessary to mute the safety device(s) at certain steps of the process.

In the **mutual exclusion mode**, the module can monitor up to two safety devices (typically light curtains, switches) protecting hazardous areas accessible by operators and machines. The operators access to the area is only allowed during the safe period of the machine cycle without stopping the hazardous movement.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

Applications

Muting means that the safety outputs of a mutable safety device are "muted" **during the non-hazardous portion of a machine cycle**. In a conveyor fed machine area, for example, an object is allowed to enter the machine area even when intruding the sensing field of the mutable safety device. However, the machine must stop when an operator is intruding the sensing field of the safety device. In order to distinguish an operator from an object the muting module evaluates the validity of a muting sequence via auxiliary start and end muting sensors.

Common applications:

- Palletisers / depalletisers,
- Handling, wrapping and packaging machines,
- Robotic zones on automotive transfer lines,
- Automotive paint-shops.

Muting may also be used on workstations manually loaded or unloaded by an operator. The intrusion of an operator in the sensing field of the safety device is not taken into account **during the non-hazardous portion** of the machine cycle (e.g. the opening stroke of a press).

Common applications:

- Mechanical or hydraulic presses,
- Press brakes,
- Dual work stations where the operator loads parts on one station while a robot works on the other station.

Mutual exclusion may be used in hazardous areas that can be accessed by a machine (e.g. a handling robot) and an operator carrying out operations. The mutual exclusion principle consists in **avoiding that the operator and the machine are entering or are located together inside the hazardous area at the same time**. Every time the operator is leaving the hazardous area, he needs to acknowledge his exit with a push-button, allowing the handling robot to enter the area again.

Common applications:

- Palletisers
- Handling / Welding robots

Product description

The **muting** sequence is controlled by two or four sensors (like photoelectric sensors, limit switches or proximity sensors) and the muting module. The sensors must be installed so that only an object is able to validate a muting sequence but not a person.

When a start muting sequence is valid, the output relay contacts of the FF-SRM200P2 remain energised even if the protection field of the muted safety devices is intruded by an object. An external white muting lamp indicates that the safety device is actually muted. Correct operation of this lamp is monitored by the module in accordance with the IEC/EN 61496-1 European standard.

The following **muting modes** can be programmed using internal selectors of the FF-SRM200P2:

- Bi-directional or uni-directional muting,
- With 2 start muting sensors and up to 2 muted safety devices,
- With 4 start / end muting sensors and 1 muted safety device.

When a program for one muted and one non-muted safety device is selected, intruding the non-muted safety device will always de-energise the module's safety relay outputs.

The **maximum time for muting** the connected safety devices is programmable in a wide range (10 s to unlimited) and can therefore be adapted to the application.

External indicators provide information on the relay output status, restart status, muting phase status and on diagnostics.

After power up of the module or after the intrusion of the safety device outside a valid muting sequence, the module can be restarted manually via a **restart push-button**.

When necessary, the connected safety devices can be tested using the **test** output of the FF-SRM200P2.

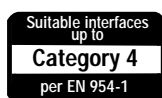
The **inputs** of the safety devices and the auxiliary sensors are floating allowing the connection of devices with static outputs (PNP or NPN) or relay outputs.

An **External Device monitoring (EDM)** loop is available in order to monitor external safety contactors driven by the safety relay outputs of the module.

Trouble shooting an application using the FF-SRM200P2 muting module is easy through internal and external diagnostic indicators. The connected muting lamp starts to flicker when an error has been detected.

FF-SRM200P2 Muting module

SPECIFICATIONS



Dimensions in millimeters / inches, meters / feet, weights in kg / lbs

Nominal supply voltage (A1(+), A2(-))	24 Vdc (±15 %, power line disturbance: max. 5 ms)
Nominal power consumption	4,1 W
Fuse protection	Internal PTC
Inputs	
Safety devices	1 or 2 redundant floating inputs with optocoupler (S11/S12, S13/S14) and (S21/S22, S23/S24)
Auxiliary sensors	2 or 4 floating inputs with optocoupler (S21/S22, S23/S24, S31/S32, S33/S34)
Restart input type (S43/S44)	Normally open (restart on push-button release within max. 3 s)
Restart loop and External Device Monitoring (EDM)	Modes 20 to 79 (muting modes): 1 common input (S43/S44)
	Modes 90 to 93 (mutual exclusion modes): 2 separate inputs (restart: S43/S44, EDM: S41/S42)
Restart delay time	Manual start: 65 ms
Input voltage at S12,S14,S22,S24,S32,S34	23 Vdc at nominal voltage
Switching on min. voltage / off max. voltage at S12,S14,S22,S24,S32,S34,S44	16 Vdc / 7 Vdc
Input current at S12,S14,S22,S24,S32,S34,S44	4,5 mA at nominal voltage
Coincidence time between safety device inputs S12/S14 and S22/S24 (if muting with 2 sensors is selected)	max. 2,5 s
Coincidence time between start muting inputs S32/S34	max. 10 s
Max. muting time (selector programmable)	10 s, 20 s, 30 s, 1 mn, 5 mn, 10 mn, 30 mn, 1 h, 3 h, unlimited (> 3 days)
Safety outputs	
Contact type	Internally redundant positive guided safety relay contacts
Contact complement	3 NO (13/14, 23/24, 33/34)
Response time	25 ms (between safety device input and module relay outputs)
Switching capability	Power factor = 1 (see Note 1 and Figure 1)
Output Current (min. to max.)	1 mA to 5 A (see Note 1)
Output Voltage (min. to max.)	0,1 to 230 Vac/dc
Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac (see Note 2 and Figure 1)
	1 A: 2 000 000 operations; 2 A: 1 000 000 operations; 5 A: 300 000 operations; 6 A: 200 000 operations
Typical Power Factor (cos φ)	Limitation Factor (see Note 3 and Figure 2)
0,3	0,45
0,5	0,70
0,7	0,85
1	1
Operating frequency	1200 switching cycles/h (max.)
Fuse rating	6 A time delayed (max.)
Mechanical life	Ten million switching operations
Auxiliary outputs	
Relay status / test output	PNP static output (58) (23 Vdc / max. 100 mA)
Test output	Normally closed characteristics (test active: 0 Vdc, test inactive: 24 Vdc)
	response of safety device on test signal < 200 ms
Muting lamp / diagnostic output	PNP static output (48) (23 Vdc / max. 100 mA / min. 10 mA)
General	
Temperature range	0 °C to +50 °C / 32 °F to 122 °F
Sealing	Housing IP 40; Terminals IP 20
Housing material	Thermoplastic
Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz
Connector connection (max.)	1 x 4 mm ² solid [12 AWG], 1 x 2,5 mm ² [14 AWG], 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
Connector attachment	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
Mounting	Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in. size
Weight	320 g / 0.70 lb

ORDERING INFORMATION

FF-SRM200P2

Note 1: Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

Note 2: Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor.

Example: U = 230 Vac, I = 2 A, power factor cos φ = 0,7
Switching power P = U x I = 460 Vac
Contact life (cos φ = 1, P = 460 Vac) = 1 000 000 operations (see Figure 1)

Limitation factor F (cos φ = 0,5) = 0,7 (see Figure 2)
Contact life (cos φ = 0,5, P = 460 Vac) = F x contact life (cos φ = 1, P = 460 Vac) = 700 000 operations.

FIG. 1 CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ) (see Note 3)

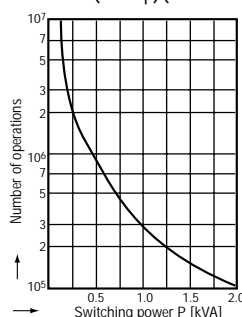
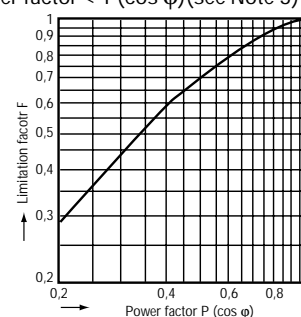
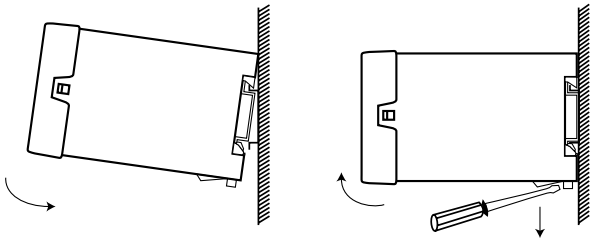


FIG. 2 LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ) (see Note 3)

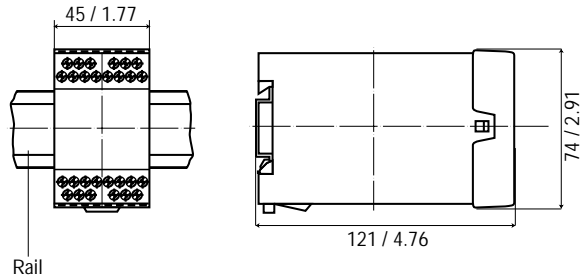


Installation diagram

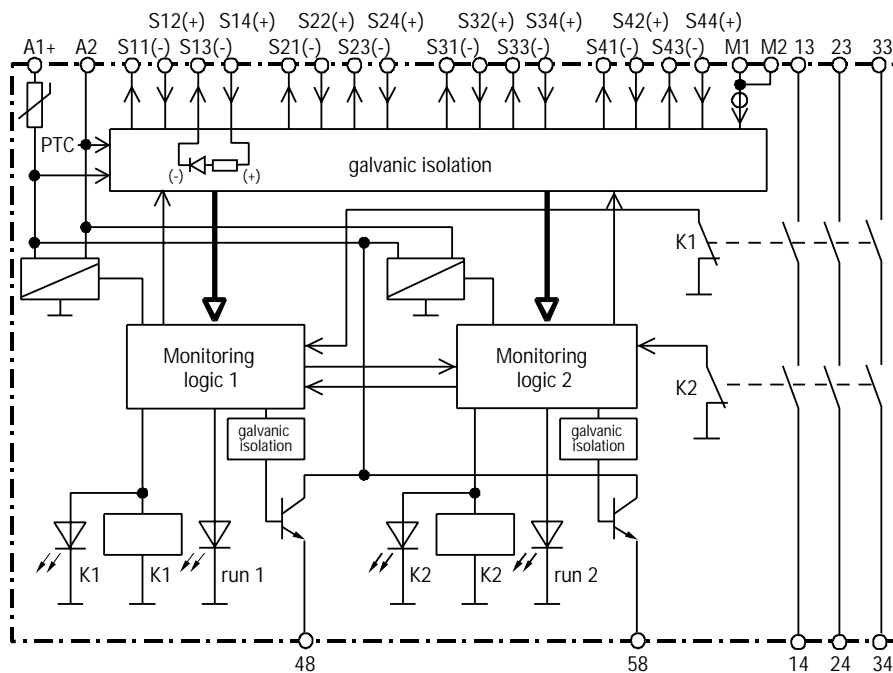


Mounting Dimensions

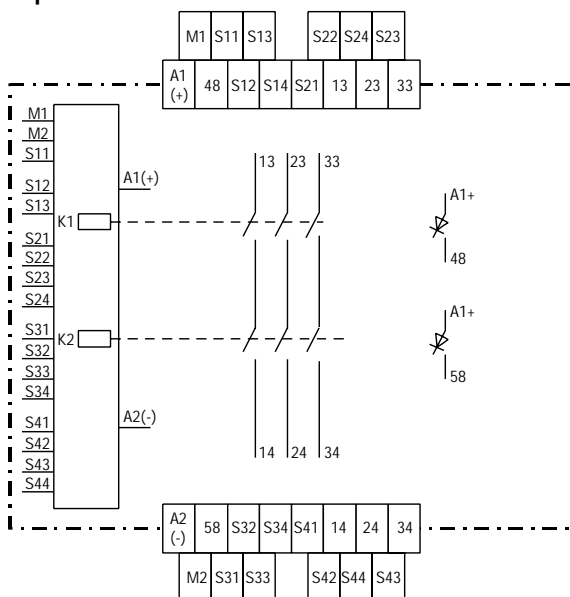
Width: 45 mm / 1.77 in ; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



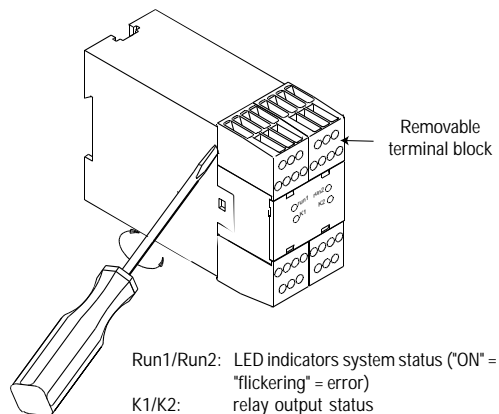
Internal circuitry



Front panel



Removable terminal blocks



Mode setting

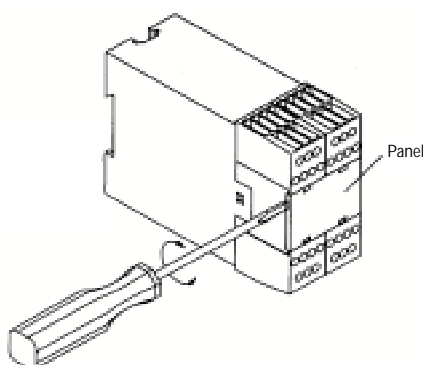
The operating modes of the FF-SRM200P2 module are set using 4 selectors located behind the removable front panel.

60 different programs are available allowing to adapt the muting mode and the max. muting time to the application.

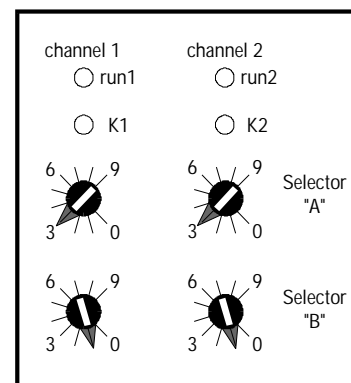
The FF-SRM200P2 module has two redundant microprocessor channels. The mode setting of each channel is done by two selectors "A" and "B".

The position of the corresponding selector "A" or "B" for channel 1 and channel 2 must be identical (see example).

Front panel removal



Mode selector "A" and "B" for channel 1 and channel 2



Internal view

► example "31"

Example: Selecting mode "31"

Selector	Channel 1	Channel 2	Description
"A"	3	3	Muting with 2 auxiliary sensors
"B"	1	1	Maximum muting time: 20 s

MUTING MODES

MUTING MODES			Inputs	Selector "B": Max. muting time										
				0	1	2	3	4	5	6	7	8	9	
Selector "A": Muting modes	Safety device without test input	1	Not valid (<i>Note (3)</i>)	Not valid										
		2	- 2 muting sensors SM1, SM2 - 1 mutable safety device - No or 1 non-mutable safety device <i>Note: (1)</i> <i>Application examples: 1A, 1B, 3B</i>	(S31/S32) (S33/S34) (S11/S12, S13/S14) (S21/S22, S23/S24)	10 s	20 s	30 s	1 mn	5 mn	10 mn	30 mn	1 h	3 h	> 3 days
		3	- 2 muting sensors SM1, SM2 - 1 or 2 mutable safety devices <i>Notes: (1), (4)</i> <i>Application examples: 3A</i>	(S31/S32) (S33/S34) (S11/S12, S13/S14) (S21/S22, S23/S24)										
		4	- 2 start muting sensors SM1, SM2 - 2 end muting sensors EM1, EM2 - 1 mutable safety device <i>Note: (1)</i> <i>Application examples: 2, 5</i>	(S31/S32) (S33/S34) (S21/S22) (S23/S24) (S11/S12, S13/S14)										
	5	- 2 muting sensors SM1, SM2 - 1 mutable safety device - No or 1 non-mutable safety device <i>Note: (2)</i> <i>Test Input example</i>	(S31/S32) (S33/S34) (S11/S12, S13/S14) (S21/S22, S23/S24)											
	Safety device with test input	6	- 2 muting sensors SM1, SM2 - 1 or 2 mutable safety devices <i>Notes: (1), (4)</i> <i>Test Input example</i>	(S31/S32) (S33/S34) (S11/S12, S13/S14) (S21/S22, S23/S24)										
		7	- 2 start muting sensors SM1, SM2 - 2 end muting sensors EM1, EM2 - 1 mutable safety device <i>Note: (1)</i> <i>Test Input example</i>	(S31/S32) (S33/S34) (S21/S22) (S23/S24) (S11/S12, S13/S14)										

Note (1): Activation of the mutable safety device(s) is (are) NOT necessary during muting sequence.

Note (2): Activation of the mutable safety device is necessary during muting sequence.

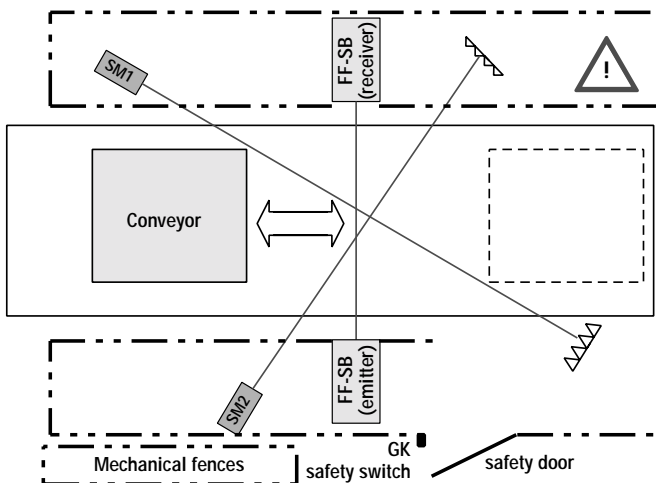
Note (3): If a not valid mode has been selected, fatal error 5 is displayed (see "Diagnostic Information" for details).

Note (4): The 2 mutable safety devices are muted simultaneously.

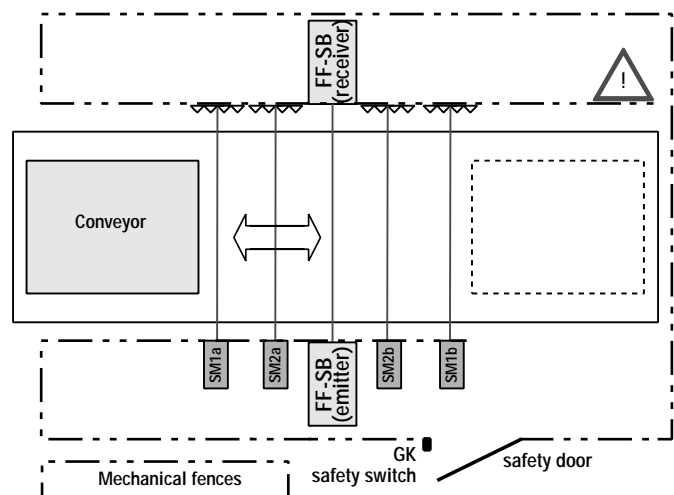
MUTUAL EXCLUSION MODES		Inputs			Selector "B": Test input and External Device Monitoring (EDM) functions									
		Robot detection	Operator detection	Position sensor	Safety device without test input		Safety device with test input							
					0	1	2	3	4	5	6	7	8	9
Selector "A": Mutual exclusion	9	(S11/S12, S13/S14)	(S21/S22, S23/S24)	(S31/S32)	With EDM	Without EDM	With EDM	Without EDM	Not valid					

Application example 1: Bi-directional muting on a conveyor

1A - Bi-directional muting with 2 muting sensors, 1 mutable and 1 non-mutable safety device



1B - Bi-directional muting with 4 muting sensors, 1 mutable and 1 non-mutable safety device



Description

A conveyor is loading and unloading a hazardous zone protected by one or two safety devices (e.g. safety light curtain, safety key interlock switch). As the conveyor enters and exits the zone passing by the same point, the movement is bi-directional.

The muting system is composed of the following elements:

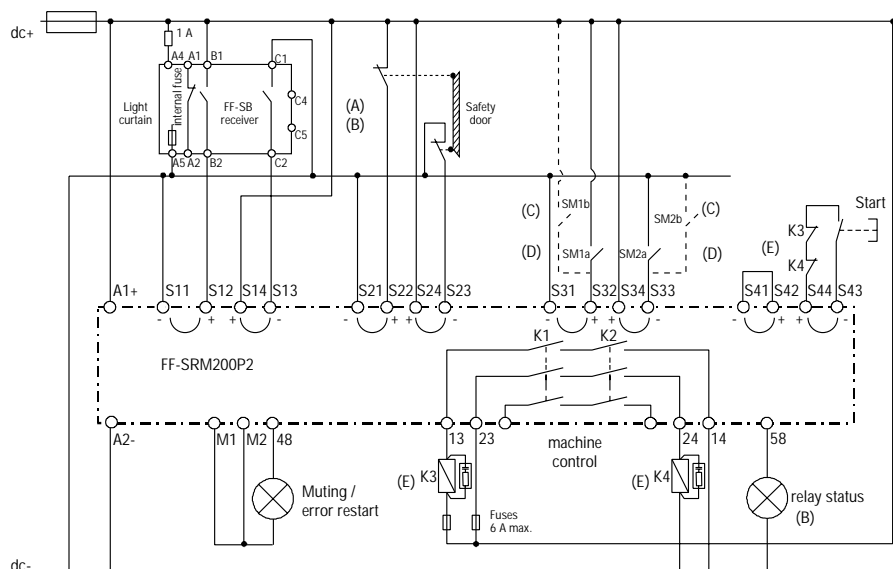
- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. FF-SB safety light curtain) detecting access through the opening for the conveyor,
- 1 non-mutable safety device (e.g. GK safety key interlock) to monitor the safety door ("guard only"),
- example 1A: 2 auxiliary muting sensors SM1 and SM2 to start and end the muting sequence (crossed through scan or retro-reflective-polarised photoelectric sensors),
- example 1B: 4 auxiliary muting sensors SM1a, SM2a, SM1b and SM2b to start and end the muting sequence (e.g. limit switches, proximity sensors, through scan or retro-reflective-polarised photoelectric sensors).

The use of the second non-mutable safety device connectable to the same FF-SRM200P2 module is optional.

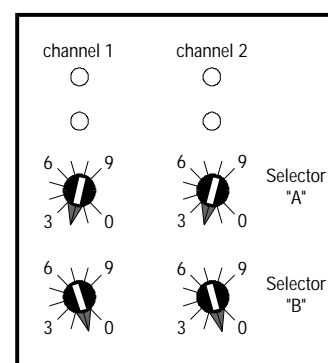
In order to start a **muting sequence**, the muting sensors SM1 and SM2 must be activated within a time frame of maximum 10 s. The muting sequence is stopped after de-activating the first of the two muting sensors.

In any case, the muting sequence will be interrupted after the **maximum selected muting time** has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.

Wiring diagram



Mode selector

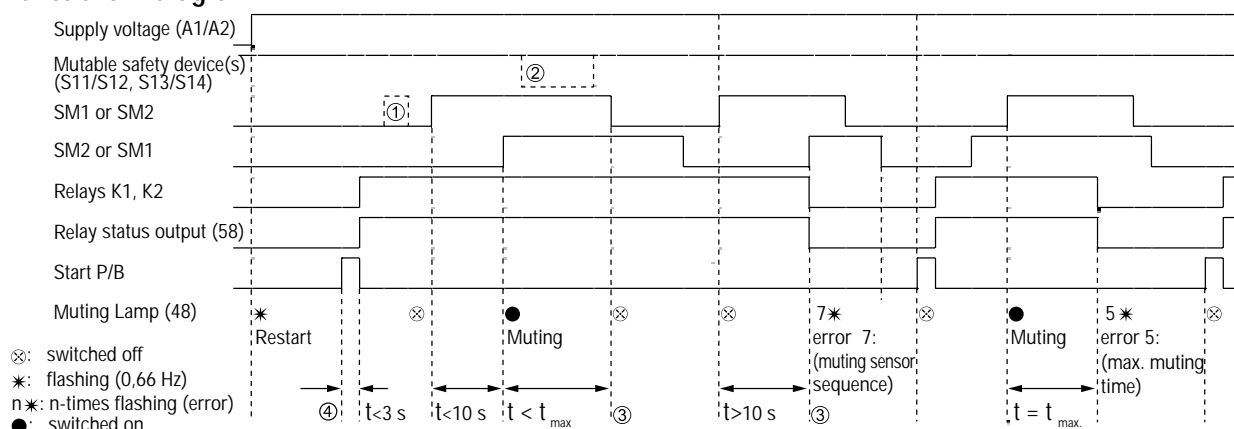


Internal view

Mode 20 to 29: muting with 2 muting sensors, 1 mutable and 1 non-mutable safety device (not tested).
Example: mode 21: max. muting time: 20 s.

- Note (A):** Connect mutable safety device to S11/S12 and S13/S14. Connect non-mutable safety device to S21/S22 and S23/S24. Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2,5 s.
Modes 20 to 39: muting using safety devices without test input: unused safety device inputs must be connected to power: S21 and S23 to (dc-); S22 and S24 to (dc+).
- Note (B): Modes 20 to 69: muting using safety devices with test input:** terminal 58 is used as test output that must be connected to the test input of each safety device. Unused safety device inputs must be connected to power and to the test output: S21 and S23 to (dc-); S22 and S24 to 58 (refer to Chapter "Test input").
Modes 50 to 59 (only): 1 non-mutable and 1 mutable safety device AND safety devices with test input: the mutable safety device needs to be activated during the muting sequence.
- Note (C): Bi-directional muting with 4 SM muting sensors (example 1B):** connect SM1b and SM2b as shown in parallel to SM1a and SM2a.
- Note (D): Sensors contact type:** this can be voltage free dry contacts or static outputs. When using sensors with static outputs, use 1 PNP and 1 NPN sensor to allow cross fault detection between the input channels.
- Note (E): External contactors:** when external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the combined restart loop and External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.

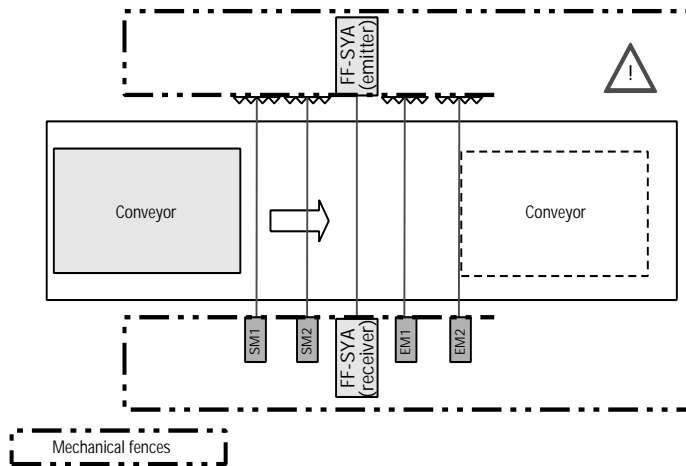
Functional diagram



Notes:

- Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).
- Muting sensors can be activated in any order (SM1 then SM2 or SM2 then SM1).
- All muting sensors SM1 and SM2 must remain activated during a muting sequence. In the case of 2 pairs of muting sensors at least one of each parallel sensor (SM1a or SM1b, SM2a or SM2b) must remain activated.
- The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taken into account). In the case of 2 pairs of muting sensors, the de-activation of the first muting sensor group (SM1a / SM1b or SM2a / SM2b) will stop the muting sequence.
- t_{max}: max. muting time programmable with the internal selector "B".
- The activation of only one sensor SM is ignored (see ①).
- The activation of the mutable safety device is not necessary during a muting sequence (except modes 50 to 59) (see ②).
- Muting sensors SM1 and SM2 must be inactive before starting a new muting sequence (see ③).
- The restart push-button must be pushed AND released within 3 s to start the module (see ④).
- Activating the non mutable safety device leads to the de-energisation of the safety relay outputs of the module.

Application example 2: Uni-directional muting with 1 mutable safety device and 4 muting sensors



Description

A conveyor is loading and unloading a hazardous zone protected by one mutable safety device (e.g. safety light curtain). As the conveyor enters and exits the zone at two different points, the movement is uni-directional.

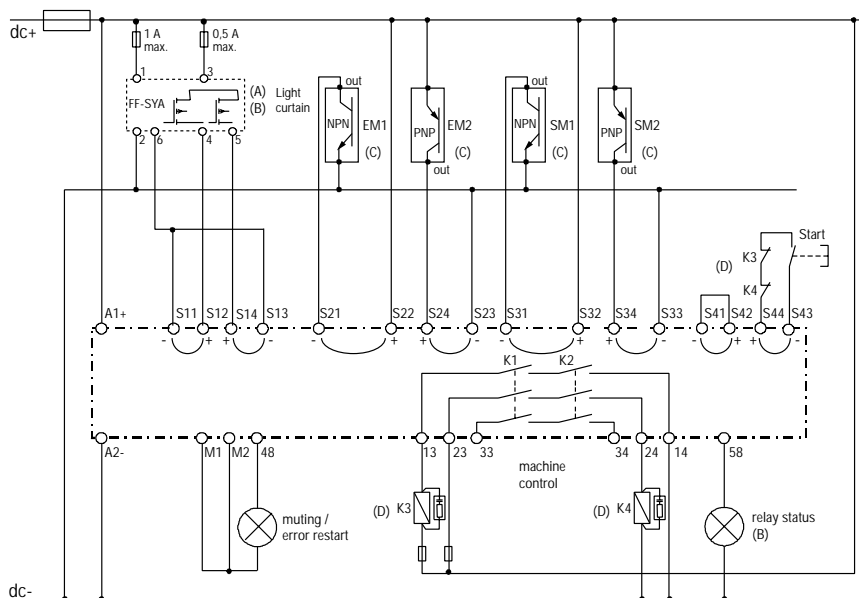
The muting system is composed of the following elements:

- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. FF-SYA safety light curtain) detecting access through the opening for the conveyor,
- 2 start muting sensors SM1, SM2 and 2 end muting sensors EM1, EM2 (e.g. limit switches, proximity sensors, through scan or retro-reflective-polarised photoelectric sensors).

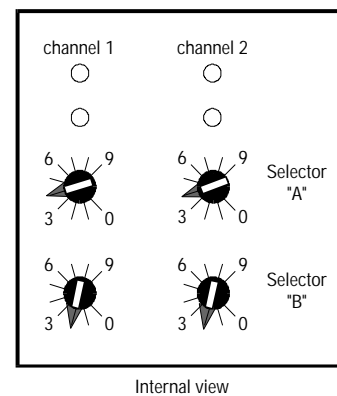
In order to start a **muting sequence**, the muting sensors SM1 and SM2 must be activated within a time frame of maximum 10 s. The muting sequence is stopped after de-activating the first of the two end muting sensors EM1 or EM2.

In any case, the muting sequence will be interrupted after the **maximum selected muting time** has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.

Wiring diagram



Mode selector



Modes 40 to 49: muting with 2 start muting sensors SM1, SM2, 2 end muting sensors EM1, EM2 and 1 mutable safety device without test input.
Example: mode 42: max. muting time 30 s.

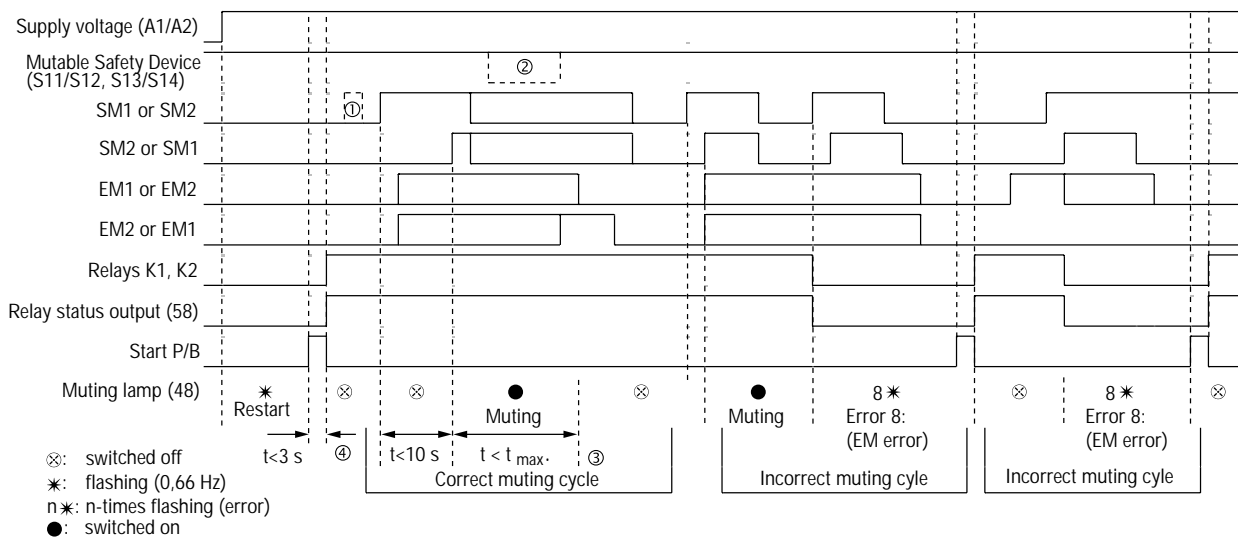
Note (A): Signals between redundant safety device inputs S11 to S14 must be applied within a max. time of 2.5 s.

Note (B): Modes 70 to 79: muting using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of the safety device (refer to chapter "Test input").

Note (C): Sensors contact type: this could be voltage free dry contacts or static contacts. When using sensors with static outputs, use 1 PNP and 1 NPN sensor to allow cross fault detection between the input channels. Use sensors with open outputs when no object is detected.

Note (D): External contactors: When external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the combined restart loop and External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.

Functional diagram

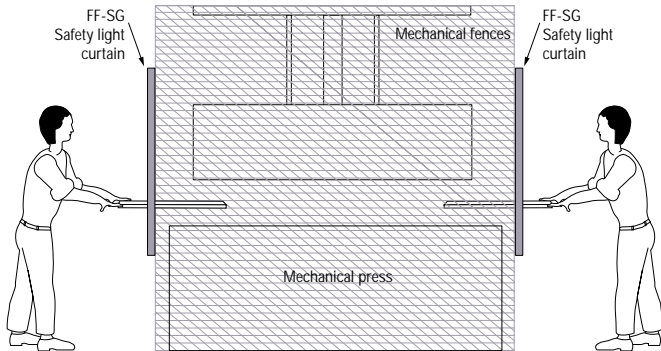


Notes:

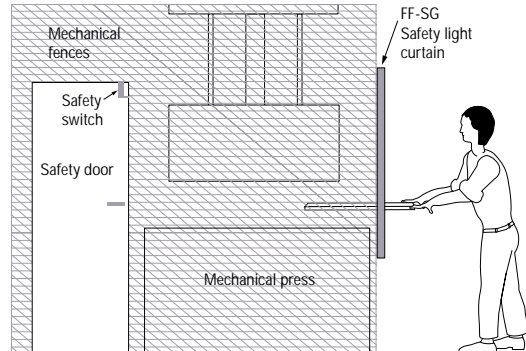
- Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).
- No timing constraints between EM1 / EM2.
- Muting sensors can be activated in any order within the pair (SM1 then SM2 or vice-versa, EM1 then EM2 or vice-versa).
- Once a valid muting sequence is started, both muting sensors SM1 and SM2 may be de-activated the muting sequence without stopping the muting sequence in progress.
- The de-activation of the first end muting sensor EM1 or EM2 will stop the muting sequence (only the falling signal edge is taking into account).
- t_{max} : max. muting time programmable with the internal selector "B".
- The activation of only one sensor SM is ignored (see ①).
- The activation of the mutable safety device is not necessary during a muting sequence (except modes 50 to 59) (see ②).
- All SM and EM sensors must be inactive before starting a new muting sequence (see ③).
- The restart push-button must be pushed AND released within 3 s to start the module (see ④).
- Activating the not mutable safety device leads to the de-energisation of the safety relay output of the module.

Application example 3: Muting on a mechanical press

3A - Muting on a mechanical press with 2 muting sensors and 2 mutable safety devices



3B - Muting on a mechanical press with 2 muting sensors, 1 mutable and 1 non-mutable safety device



Description

On a mechanical press, the mutable safety device(s) (e.g. safety light curtain) can be muted as soon as the press tool reaches the bottom dead centre (BDC), allowing the operator to unload the press during the opening stroke without stopping the press movement.

As soon as the press tool reaches the BDC, muting sensors SM1 and SM2 are activated by the rotating disk cam. A **muting sequence** will be started, when muting sensors SM1 and SM2 are activated within a time frame of 10 s.

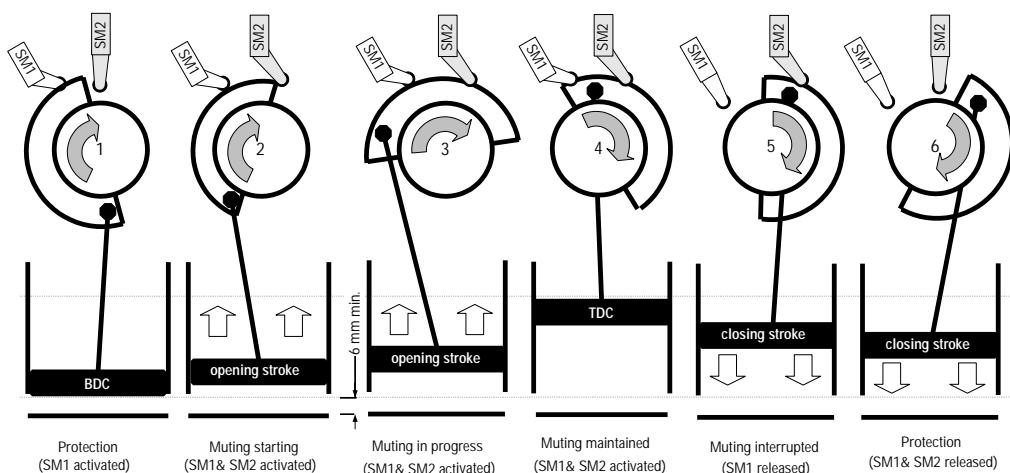
The muting sensors must remain activated till the press tool initiates its closing stroke. When the first of the two muting sensors is de-activated by the rotating disk cam, the muting sequence will be stopped.

The muting system is composed of the following elements:

- the FF-SRM200P2 muting module,
- example 3A: up to 2 mutable safety devices (e.g. FF-SG safety light curtains),
- example 3B: 1 mutable (e.g. FF-SG safety light curtain) and up to 1 non-mutable safety device (e.g. GK safety key interlock) to monitor the safety door ("guard only"),
- 2 muting sensors SM1 and SM2 to start and end the muting sequence.

The use of the second mutable or non-mutable safety device connectable to the same FF-SRM200P2 module is optional.

In any case, the muting sequence will be interrupted after the **maximum selected muting time** has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) must be used to evacuate the detection field.



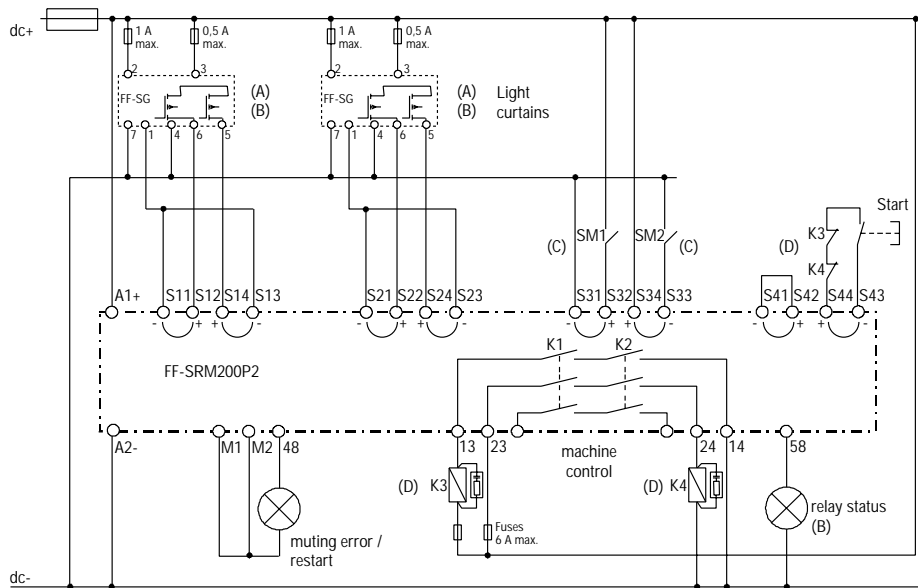
SM1: muting sensor 1

SM2: muting sensor 2

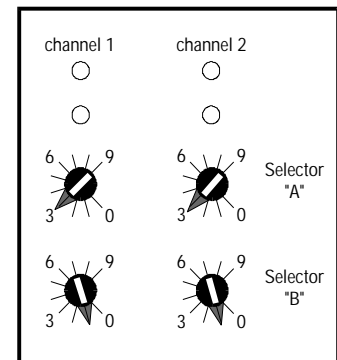
BDC (Bottom Dead Center):
point at which the tool is closest to the die.

TDC (Top Dead Center):
point at which the tool is furthest to the die.

Typical wiring diagram application example 3A



Mode selector



Internal view

Modes 30 to 39: muting with 2 muting sensors and 2 mutable safety devices.

Example: mode 31: max. muting time 20 s.

Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2.5 s.

Modes 20 to 39: muting using safety devices without test input: Unused safety device inputs must be connected to power: S21 and S23 to (dc-); S22 and S24 to (dc+).

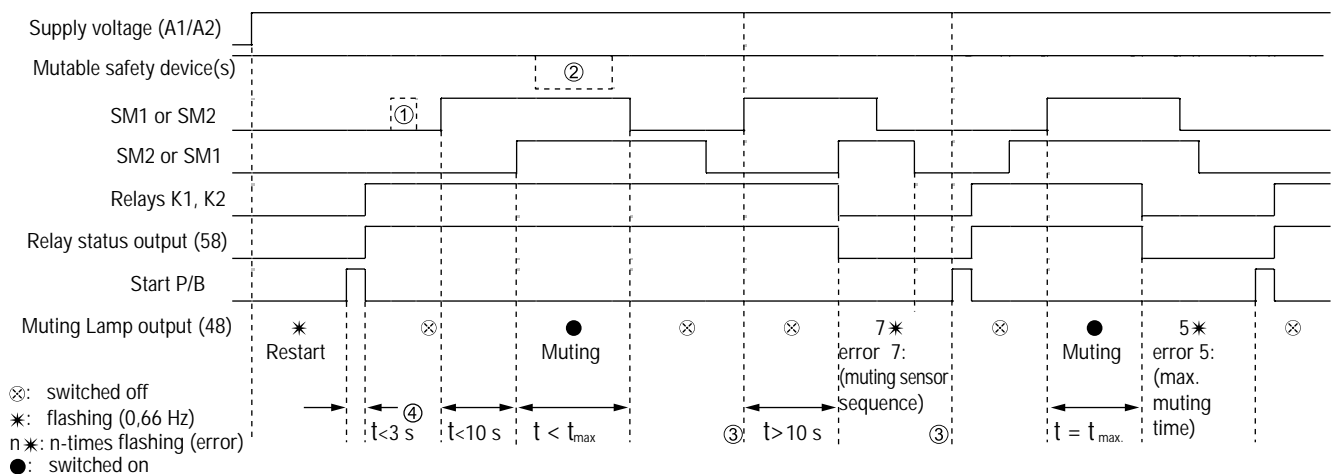
Note (B): Modes 50 to 69: muting using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of each safety device (refer to chapter "Test input").

Modes 50 to 59 (only): 1 non-mutable and 1 mutable safety device AND safety devices with test input: the mutable safety device needs to be activated during the muting sequence.

Note (C): Sensors contact type: Safety switch contacts are preferred for press applications.

Note (D): External contactors: when external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the combined restart loop and External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.

Functional diagram

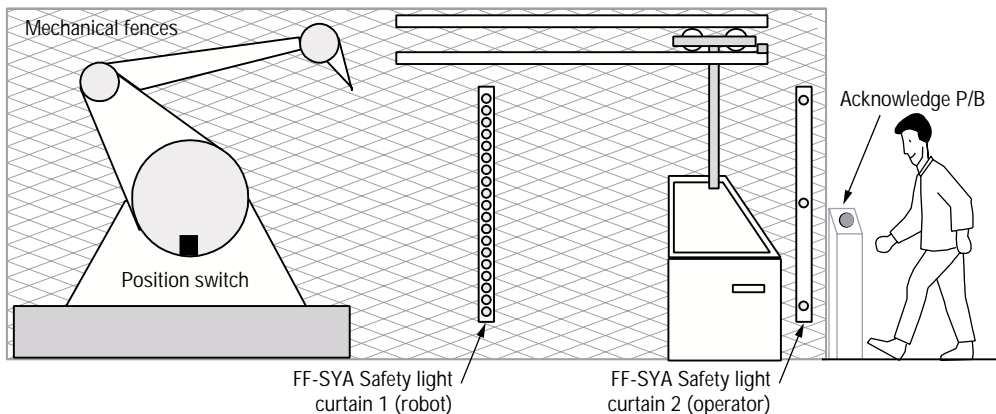


Notes:

- Maximum coincidence time between activation of muting sensors SM1 / SM2: 10 s (only the raising signal edge is taken into account).
- Muting sensors can be activated in any order (SM1 then SM2 or SM2 then SM1).
- All muting sensors SM1 and SM2 must remain activated during a muting sequence.
- The de-activation of the first muting sensor SM1 or SM2 will stop the muting sequence (only the falling signal edge is taking into account).
- t_{max}: max. muting time programmable with the internal selector "B".
- The activation of only one sensor SM is ignored (see ①).
- The activation of the mutable safety device is not necessary during a muting sequence (except for modes 50 to 59) (see ②).
- Muting sensors SM1 and SM2 must be inactive before starting a new muting sequence (see ③).
- The restart push-button must be pushed AND released within 3 s to start the module (see ④).
- Activating the not mutable safety device leads to the de-energisation of the safety relay output of the module.

Application example 4: Mutual exclusion function in a robot area

Mutual exclusion function with 2 safety devices and an enabling contact



Description

A robot and an operator regularly access the same hazardous area in order to carry out operations.

The **mutual exclusion principle** consists in:

- allowing the operator access to the hazardous area only when the robot is outside of it,
- allowing the robot access to the hazardous area only when the operator is outside of it and has acknowledged exiting the area.

The **mutual exclusion system** is composed of the following elements:

- the FF-SRM200P2 muting module,
- safety device 1 (e.g. FF-SYA safety light curtain 1) monitoring the access of the robot into the area,
- safety device 2 (e.g. FF-SYA safety light curtain 2) monitoring the access of the operator into the area,
- an optional safety device (e.g. safety switch) monitoring the robot position, before it is detected by safety light curtain 1,
- an acknowledge push-button located outside of the area.

The functional principle of the mutual exclusion consists in not allowing the activation of the safety devices for the operator and the robot at the same time. When the operator is entering the area activating safety light curtain 2, the access is memorised in the module. After leaving the area the operator needs to push the acknowledge push-button to confirm his exit. This push-button must be located outside the area with a clear view to the hazard.

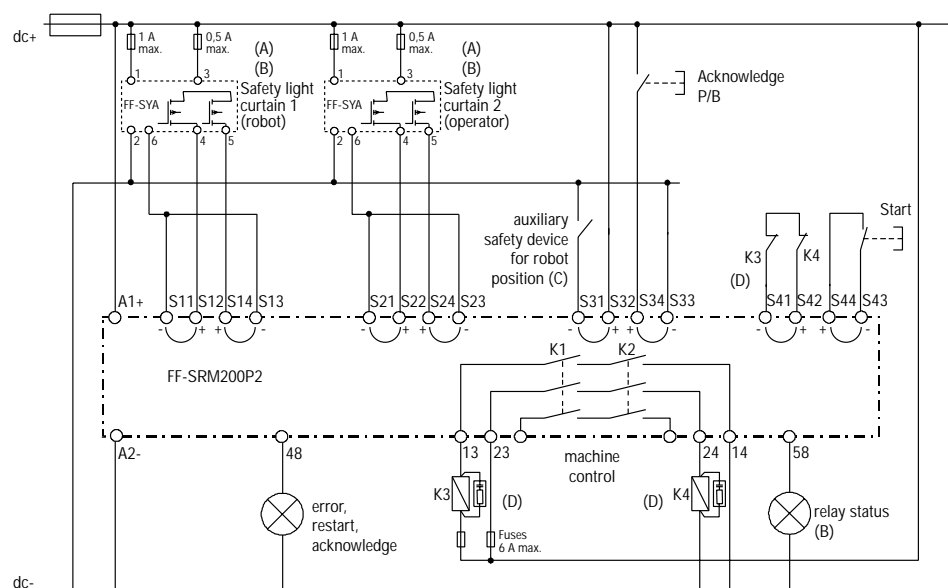
If the robot activates safety light curtain 1 before the operator has pushed the acknowledge push-button, the hazard will be stopped through the safety relay outputs of the FF-SRM200P2 muting module.

The hazard will also be stopped if safety light curtain 1 is activated and the operator attempts to enter the area actuating safety light curtain 2.

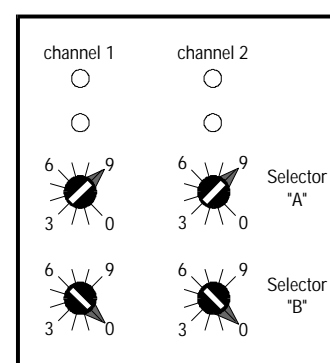
In order to increase safety (especially when the operator is likely to work close to safety light curtain 1 (robot) without keeping the required safety distance), safety may be increased by installing an additional safety sensor (e.g. safety switch) to monitor and anticipate the robot position.

If used, both the auxiliary safety device AND the safety light curtain 1 must have their sensing fields free (= voltage is applied to the module inputs S11 to S14, S31 and S32), in order to allow the operator to enter the hazardous area. As soon as the robot is detected by AT LEAST ONE of the robots safety devices (light curtain 1 or additional safety switch), the operator is not allowed to enter the hazardous area without stopping the hazard.

Typical wiring diagram



Mode selector



Internal view

Modes 90 to 93: mutual exclusion.

Example: mode 90 (safety device without test input and with EDM).

Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 must be applied within a max. time of 2.5 s.

Note (B): Modes 92 and 93: mutual exclusion using safety devices with test input: Terminal 58 is used as test output that must be connected to the test input of each safety device (included auxiliary safety device, see chapter "Test input").

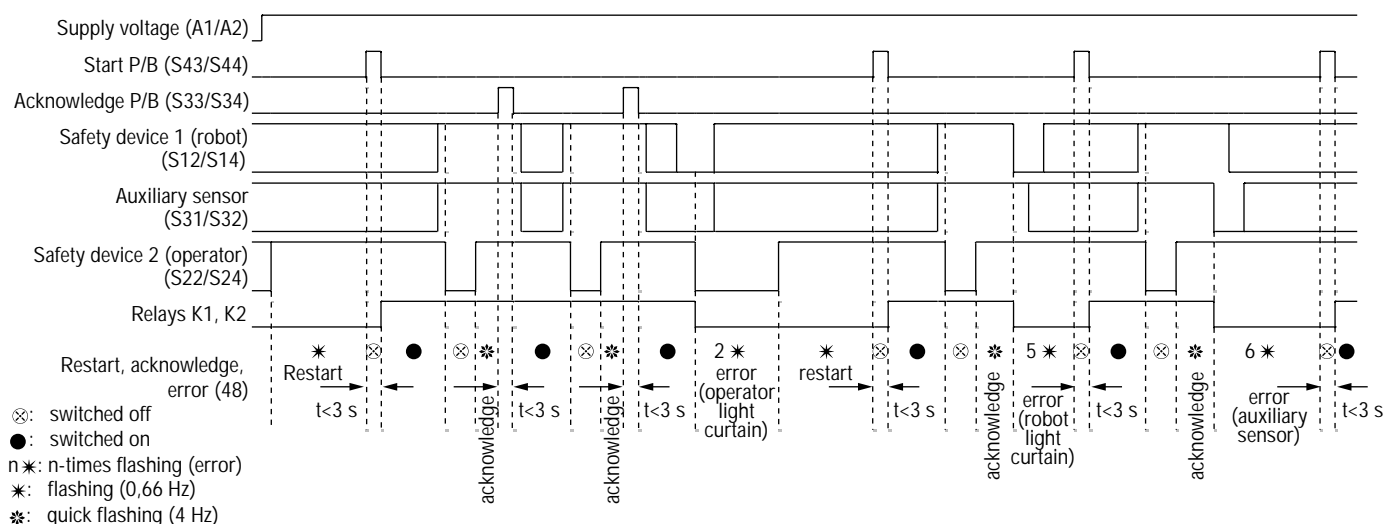
Note (C): Auxiliary safety device for robot position (use is application depending and optional):

Modes 90 to 91: mutual exclusion using safety devices without test input: if used, connect the auxiliary safety device between (dc-) and S31 and S32 to (dc+). Unused robot position inputs must be connected to power: S31 to (dc-) and S32 to (dc+).

Modes 92 to 93: mutual exclusion using safety devices with test input: terminal 58 is used as test output that must be connected to the test input of each safety device (including the auxiliary safety device, see chapter "Test input").

Note (D): External contactors: when external contactors are used, connect one normally closed contact of each contact (or the normally closed contact of the FF-SRE extension module) in series into the External Device Monitoring (EDM) loop S41/S42 and select the modes with EDM (modes 90 or 92). In these modes, the muting module also checks, whether the normally closed contacts of the external safety relays have opened max. 250 ms after energising the internal safety relays K1 and K2. Install arc suppressors across the coils of external safety relays.

Functional diagram



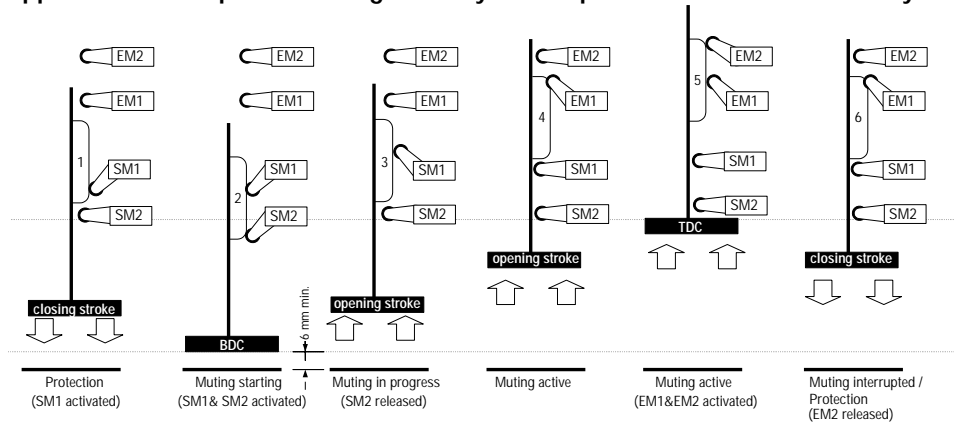
Notes:

- Safety device 1 (robot) and the auxiliary safety device for the robot position are permanently muted (allowing the robot to enter the hazardous area):
 - If safety device 2 (operator) is not activated
 - OR
 - If safety device 2 has been activated, but the operator has pushed the acknowledge push-button, to confirm that he has left the hazardous area.
- The start push-button must be pushed AND released within 3 s, to energise the safety output contact of the module.
- The acknowledge push-button must be pushed for acknowledgment during less than 3 s. The module de-energises its safety output contacts, when the push-button is pushed longer than 3 s.
- Pushing the start push-button with one or both of the robot's safety devices activated leads to the energisation of the module output contacts:
 - If safety device 2 (operator) is not activated
 - OR
 - If safety device 2 has been activated, but the operator has pushed the acknowledge push-button, to confirm that he has left the hazardous area.

OTHER EXAMPLES

The following application examples are detailed in the installation manual of the FF-SRM200P2 muting module.

Application example 5: Muting on a hydraulic press with 1 mutable safety device and 4 muting sensors



SM1 Start muting sensor 1
SM2 Start muting sensor 2
EM1 End muting sensor 1
EM2 End muting sensor 2

BDC (Bottom Dead Center):
point at which the tool is
closest to the die.

TDC (Top Dead Center):
point at which the tool is fur-
thest to the die.

Description

On a hydraulic press, the safety device (e.g. safety light curtain) can be muted as soon as the press tool reaches the bottom dead centre (BDC), allowing the operator to unload the press during the opening stroke without stopping the movement of the press.

The muting system is composed of the following elements:

- the FF-SRM200P2 muting module,
- 1 mutable safety device (e.g. a safety light curtain)
- 2 start muting sensors and 2 end muting sensors (e.g. cam operated safety switches)

As soon as the press tool reaches the BDC, the start muting sensors SM1 and SM2 are activated. When activated within a time frame of maximum 10 s, a new muting sequence will be started. The end muting sensors EM1 and EM2 must get de-activated when the press tool starts its closing stroke. The muting sequence gets terminated as soon as the first of the end muting sensors is de-activated.

In any case, the muting sequence will be interrupted after the maximum selected muting time has elapsed. If an object remains accidentally in the detection field of the muted safety device and the muting time has elapsed, an external Temporary Manual Muting (TMM, customer supplied) may be used to evacuate the detection field.

TEST INPUT EXAMPLE

Muting using one FF-SLG18/FF-SLG30 type 2 safety light curtain with test input (modes 50 to 69)

⚠ DANGER

IMPROPER SAFETY PRODUCT USE IN THE US

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 **do not meet** US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution. For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

Failure to comply with these instructions will result in death or serious injury.

When connecting type 2 safety devices to the FF-SRM200P2 muting module, the test function normally must be used to check the safety integrity of the safety device.

However, the type 2 safety light curtains of the FF-SLG18 and FF-SLG30 Series are permanently self-checked internally making the use of the test input NOT compulsory and optional.

Safety devices compatible with the FF-SRM200P2 test output

- FF-SLG18 and FF-SLG30 type 2 safety light curtains (all models with the exception of FF-SLG18147B2 and FF-SLG30147B2)
- Safety switches (e.g. for safety door monitoring).

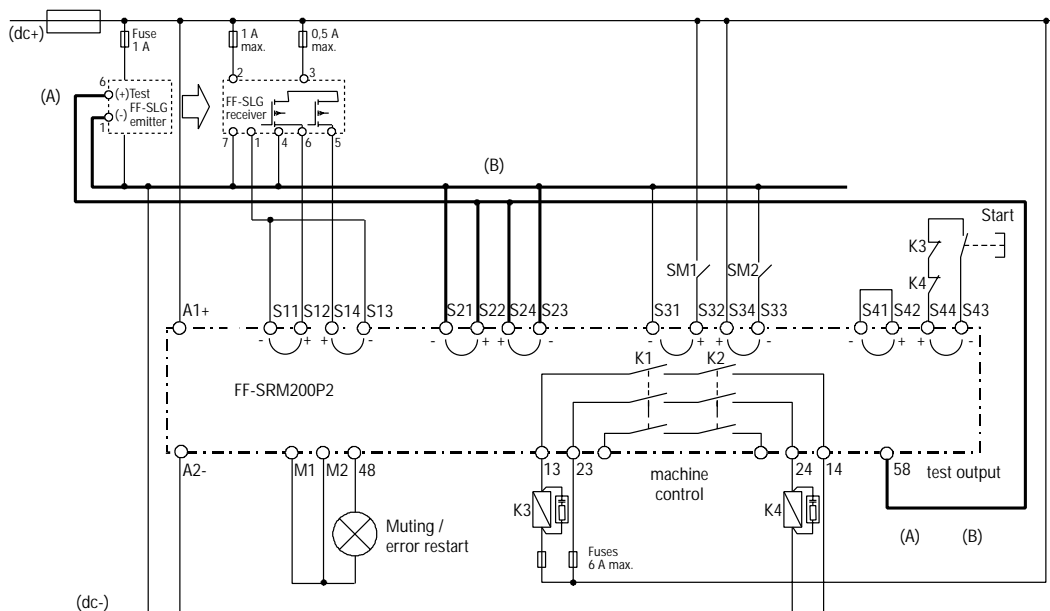
Modes with test

- Muting modes 50 to 79
- Mutual exclusion modes 92 to 93.

In these modes the output terminal 58 is used as test output and it must be connected to the test inputs of **all** connected safety devices, that are tested simultaneously.

A test signal is generated

- At each activation of the start push-button and each activation of the acknowledge push-button
- At each new and valid muting sequence (muting lamp light on).



Note (A): Connect test output terminal 58 to the test input of each FF-SLG18/FF-SLG30 emitter as shown in the wiring diagram above while respecting the polarity of the test input terminals (test input (+) = terminal 6, test input (-) = terminal 1).

Note (B): Unused safety device inputs must be connected to power and to the test output: S21 and S23 to (dc-); S22 and S24 to 58.

Modes 50 to 59 (only): 1 non-mutable and 1 mutable safety device AND safety devices with test input: the mutable safety device needs to be activated during the muting sequence.

TEMPORARY MANUAL MUTING EXAMPLE

Uni-directional muting with 1 mutable safety device and 4 muting sensors

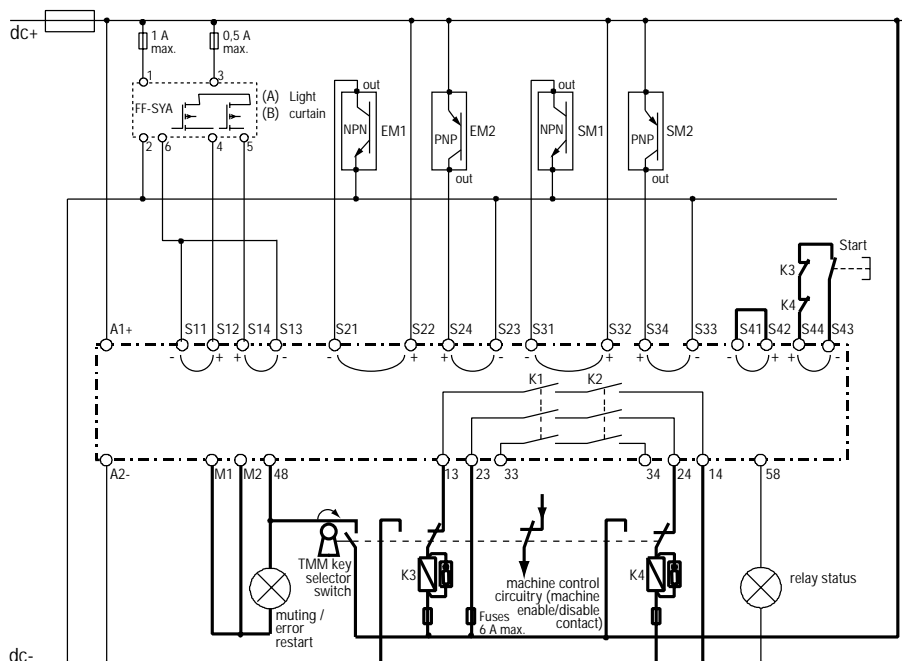
An external Temporary Manual Muting (TMM) may be necessary, in order to evacuate an object (e.g. a palette with goods in a conveyor application) accidentally remaining in the detection field of a safety device.

The use of a TMM may be necessary in the following cases:

- An object remains in the detection field of a safety device.
- The selected maximum muting time has elapsed.
- Loss of power.
- An application error or a fatal error occurred on the module (e.g. muting lamp failure).

The external TMM system shall be composed by the following components (customer supplied):

- One dual contact key selector switch with two positions or two separate key selector switches with two positions (alternative: two-hand control).
- Two external safety contactors (with mechanically guided contacts and a normally closed EDM monitoring contact).
- The muting lamp (already connected to terminal 48 of the module).



Diagnostic informations

Detailed diagnostic information for an easy troubleshooting of your muting application is available using the following indicators:

- internal indicators: LED "RUN1" and "RUN2" located on the module front panel,
- external indicators: muting lamp connected to terminals 48.

In the case of a failure the indicators are indicating a flashing code. There exist two types of errors:

- **FATAL ERRORS** are only indicated by flashing internal LED's "RUN1" and /or "RUN2". The muting lamp connected to terminal 48 remains permanently off.

The normally open safety contacts (13/14, 23/24, 33/34) are de-energised and the module needs to be reset by taking the power off and on after resolving the error cause.

- **APPLICATION AND INSTALLATION ERRORS** are indicated by flashing internal LED "RUN1" and the muting lamp connected to terminal 48. LED "RUN2" is permanently on.

The normally open safety contacts (13/14, 23/24, 33/34) are de-energised, but the module can be restarted pushing the start push-button after resolving the error cause.

FATAL ERRORS				Error type
Error code	LED RUN 1	LED RUN 2	Muting lamp (48)	
0	⊗	⊗	⊗	Internal module error
5	5 ✱ (1)	5 ✱ (1)	⊗	Mode selector error
6	6 ✱	⊗	⊗	Under-voltage error
	⊗	6 ✱	⊗	Over-voltage error
7	7 ✱ (1)	7 ✱ (1)	⊗	Input error
8	8 ✱ (1)	8 ✱ (1)	⊗	Internal relay contact error
9 10 11 12 13	9-13 ✱ (1)	9-13 ✱ (1)	⊗	Internal module error

Note (1): It is possible that

- LED "RUN1" and "RUN2" are indicating different error codes or,
- only one LED "RUN1" or "RUN2" is indicating an error code and the second LED "RUN1" or "RUN2" is switched off.

APPLICATION AND INSTALLATION ERRORS				Error type
Error code	LED RUN 1	LED RUN 2	Muting lamp (48)	
1	1 ✱	●	1 ✱	Safety device error
2	2 ✱	●	2 ✱	Safety device activated (e.g. beam interruption of a safety device light curtain)
3	3 ✱	●	3 ✱	Restart P/B error, external device monitoring (EDM) error
4	4 ✱	●	4 ✱	External device monitoring (EDM) error (mutual exclusion mode only)
5	5 ✱	●	5 ✱	Max. muting time error (muting modes)
				Safety device 1 (robot) error (mutual exclusion modes)
6	6 ✱	●	6 ✱	Muting lamp error (muting modes)
				Robot position sensor error (mutual exclusion modes)
7	7 ✱	●	7 ✱	Start muting sensor (SM) error
8	8 ✱	●	8 ✱	End muting sensor (EM) error

⊗ : switched off

n ✱ : n-times flashing

● : switched on

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to

determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Type 2 muting interface

For personnel/material discrimination in dangerous zones

FEATURES

- Muting interface with safeguarding function based on a cyclic performance test
- Approved as a Type 2 safety control unit per IEC/EN 61496-1 when used with a light curtain from the FF-SLC range (FF-SLC35, FF-SLC55 or FF-SLC18)
- Replaces the FF-SLU100R2 control unit
- Input: 3 muting sensors: 2 start muting, 1 end muting (optional)
- Output: 2 safety relays with guided contacts (2 A / 125 Vac)
- Response time 0,015 s
- Supply voltage 24 Vdc

TYPICAL APPLICATIONS

- Automatic palletizing / depalletizing systems
- Material handling and storage systems
- Packaging and wrapping machines
- Assembly lines



The FF-SLM200R2 muting interface is a module designed to work with the light curtains from the FF-SLC range. It replaces the FF-SLU100R2 as the system's control unit to build a Type 2 electrosensitive protective equipment (ESPE) in compliance with the International standard IEC/EN 61496-1. When combined with an FF-SLC light curtain and connected to specific muting sensors that complete the system for this type of application, the FF-SLM200R2 control unit provides an efficient solution to the problem of personnel/material discrimination at dangerous access points characterised by transit of pallets.

The FF-SLM200R2 control unit checks safe functioning of the sensing device by sending a test signal and assessing its response time. Correct functioning of external auxiliary relays or contactors is also checked at each test cycle, with permanent automatic monitoring of the muting and override function circuits. Control unit status is provided continuously through LEDs while the self-diagnostic output permits remote management of information regarding correct functioning of the device.

According to safety regulations, the muting function can be activated only if two signals are present. Muting sensors are therefore required, which provide the control unit with information (muting signals) regarding transit of the material "authorised" to access the dangerous zone. The FF-SLM200R2 control unit manages the muting function using 2 or 3 inputs to which sensors with relay output or sensors with PNP static type output can be connected. In particular, switching must be of the DARK ON type.

The control unit activates and de-activates the muting function only with the correct muting sequence, characterised by a specific signal timing, at its inputs. To activate the muting function, the material that passes through the dangerous access point must be detected by both sensor 1 or sensor 2 (within four seconds). During the period in which the function is active, the FF-SLM200R2 control unit is in muting status, indicated externally by a white indicator light located close to the dangerous zone and which is permanently checked by the unit.

An end-muting sensor (sensor 3) can be used to check the distance between two consecutive pallets.

If the machine stops with the material in the area controlled by the light curtain, a manual operation is required to restart the system: the override function. This function, which sets the control unit to override status, must be carried out through simultaneous activation of two manual controls.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SLM

FF-SLM Type 2 muting interface

- Type 2 according to IEC/EN 61496-1
- 3 inputs: 2 start muting, 1 end muting (optional)
- Replaces the FF-SLU100R2 control unit when used with FF-SLC light curtains

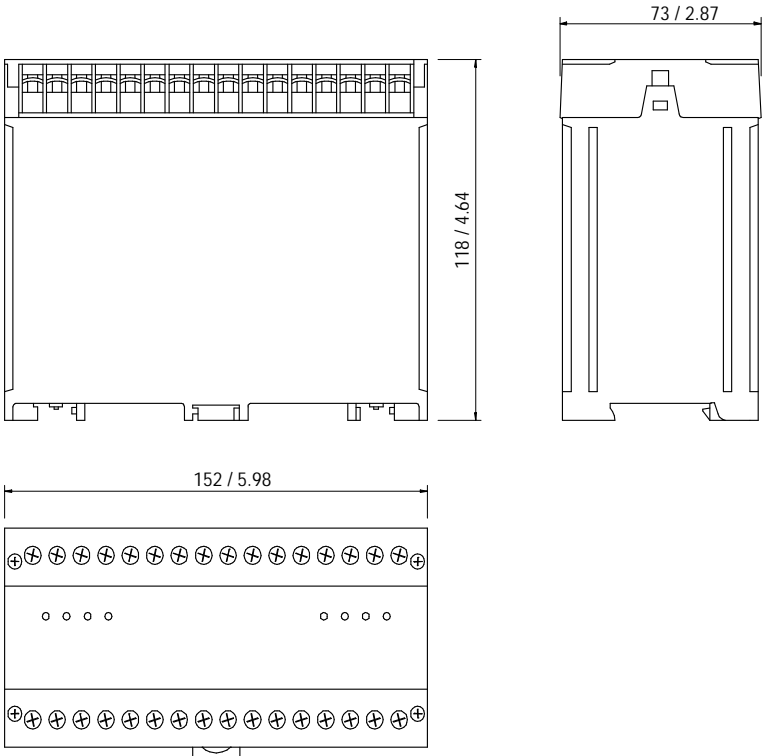


Dimensions in meters / feet, millimeters / inches, weights in kg / lbs

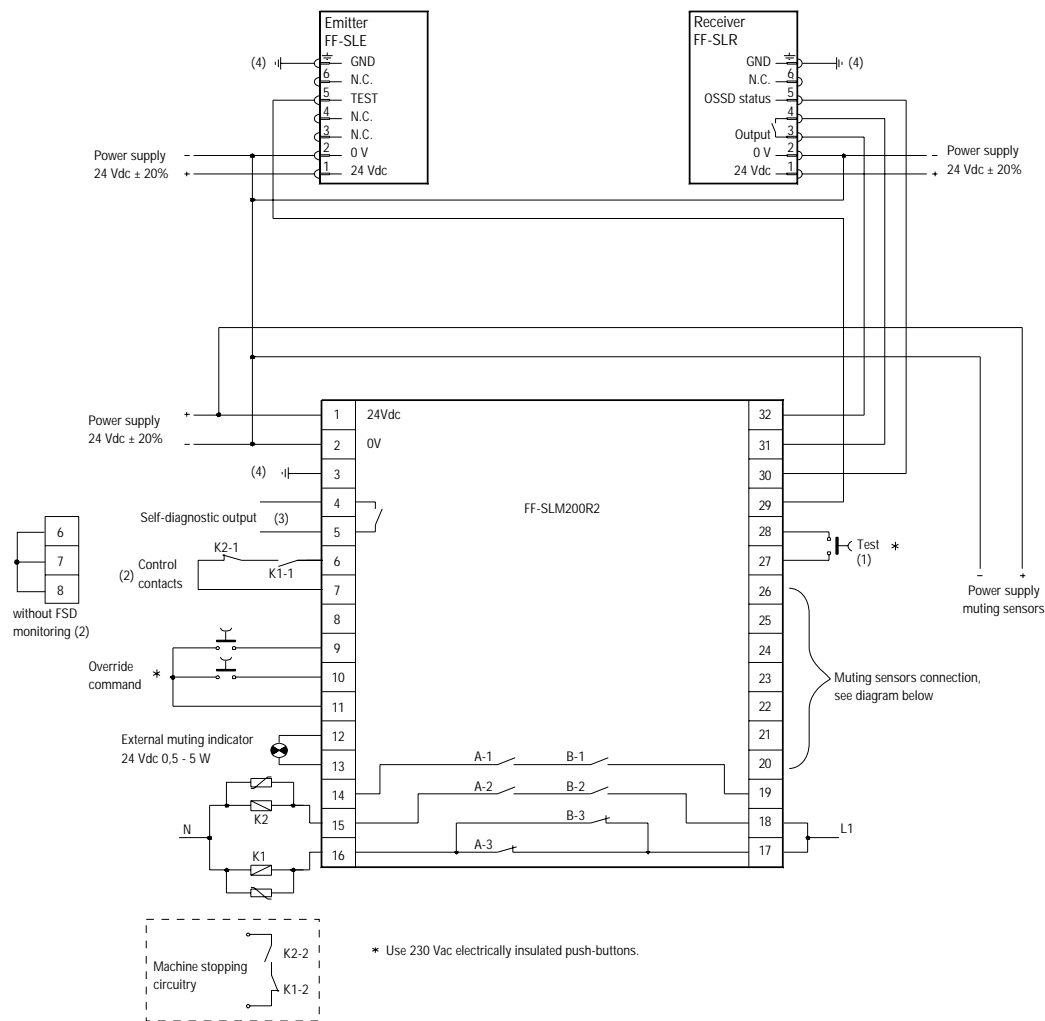
Features	Power supply	24 Vdc ± 20%
	Power consumption	8 W
	Output relays	2 N.O. contacts 2 A, 125 Vac / 1 N.C. contact 2 A, 125 Vac
	Self-diagnostic output	1 N.O. contact 0,5 A, 25 Vac - 60 Vdc / contact open in case of faulty operation
	Muting sensors	DARK ON, relay output 1 N.O. contact or PNP static output
	Muting sensors output feature	100 mA, 24 Vdc
	Muting signaling external lamp	24 Vdc, 0,5...5 W
	Response time (1)	≤15 ms
	Minimum duration of the test command	10 ms
	Reset time from start of the test	150 ms
	Muting signal response time	300 ms
	Electrical connections (2)	Terminal blocks
	Cable length (3)	100 m max. / 328 ft max.
	Operating temperature	0 °C to 55 °C / 32 °F to 131 °F
	Sealing (housing)	IP 40
	Sealing (terminal blocks)	IP 20
	Mechanical mounting	Quick mounting on rail according to EN 50022-35
	Dimensions	152 mm x 73 mm x 118 mm / 5.98 in x 2.87 in x 4.64 in
	Weight	800 g / 1.76 lb

Ordering information:
FF-SLM200R2

- Notice:
- (1) Output circuit de-energization delay in case of field interrupted.
 - (2) Use isolating plugs.
 - (3) We recommend shielded cable where the level of electrical disturbances is higher than the specified IEC 801-4 level IV.

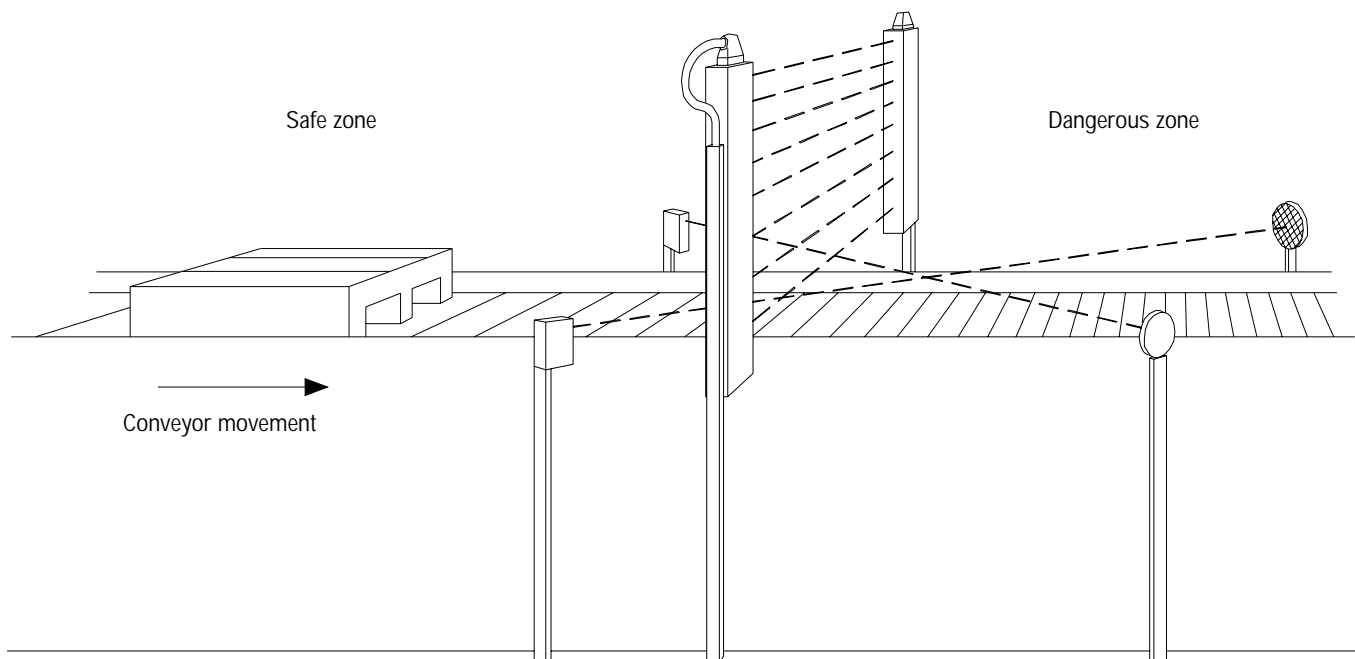


Connection diagram

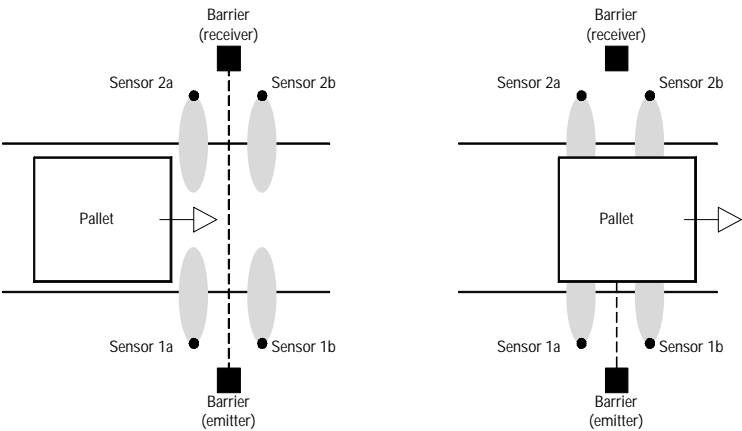


- (1) Test input: the safeguarding function of the system relies on the use of this input. This input enables the cyclic activation of the test and the reset of the system at power on or after each intrusion in the detection field (the contact should be maintained during 10 ms/test duration: 150 ms).
- (2) FSD monitoring: the setting of this feedback control allows the monitoring of the external relays K1 and K2. In case of failure of one relay, the control unit remains in a stop condition until the failure cause is removed.
- (3) Self-diagnostic output: this output provides an alarm signal when a drop of synchronism is detected between the two inner relays A and B (if the feedback connection is set, the alarm signal is also provided in case of drop of synchronism between the two external relays K1 and K2).
- (4) All the ground terminals must be connected to the same potential.

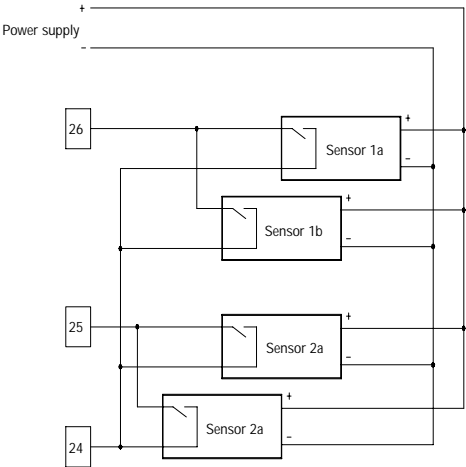
Muting sensors and light curtain positioning



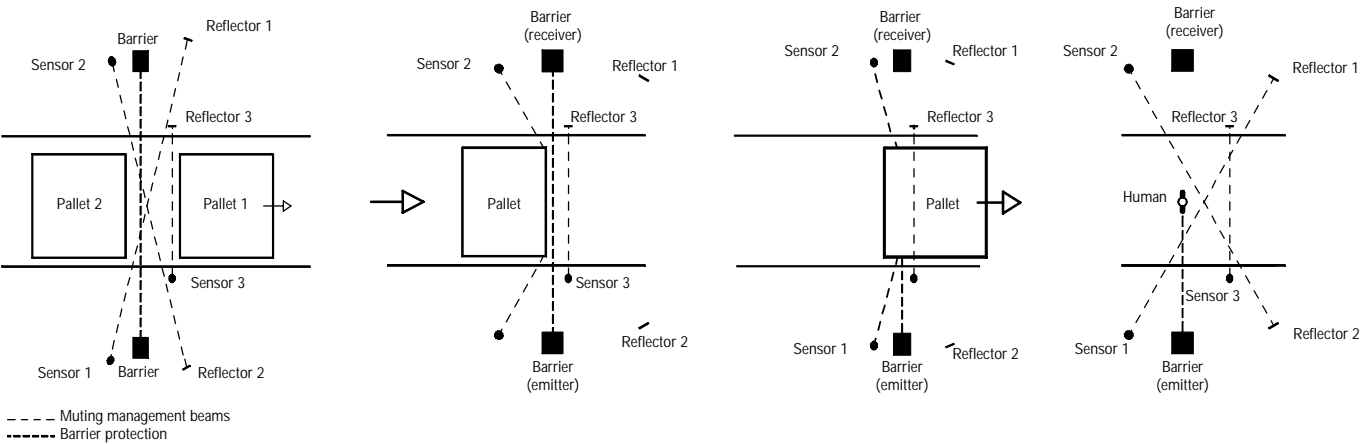
Muting sensor positioning when using inductive sensors



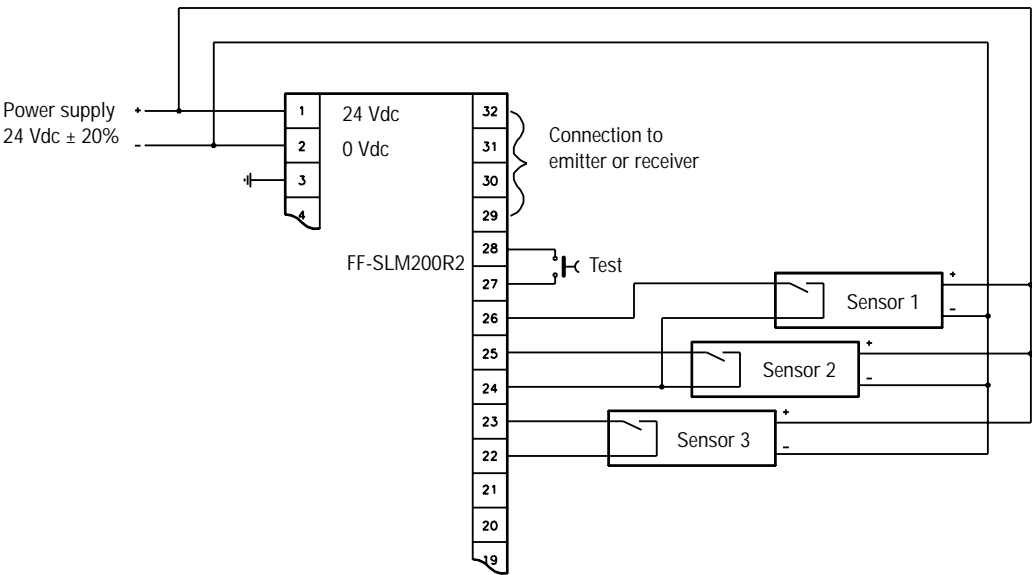
Corresponding connection diagram



Muting sensor positioning when using photoelectric sensors



Corresponding connection diagram



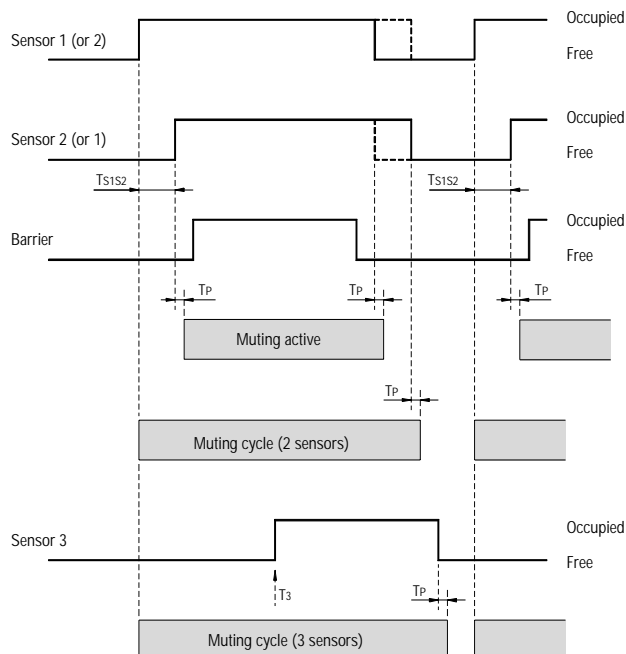
FF-SLM

Status tables

		FF-SLM200R2 control unit status						
		GUARD	CLEAR	BREAK	FAIL		FAIL (FAIL K1-K2)	
Barrier output					area free	area occupied	area free	area occupied
FF-SLM200R2 output	14-19							
	15-18							
	16-17							
Self-diagnostic output								
Relay K1	K1-1							
	K1-2							
Relay K2	K2-1							
	K2-2							

		Sensor status	
		Object presence	Object absence
Sensor 1			
Sensor 2			
Sensor 3			
		Control unit in MUTING status	
		Area controlled free	Area controlled occupied
Barrier output			
FF-SLM200R2 outputs	14-19		
	15-18		
	16-17		
Relay K1	K1-1		
	K1-2		
Relay K2	K2-1		
	K2-2		

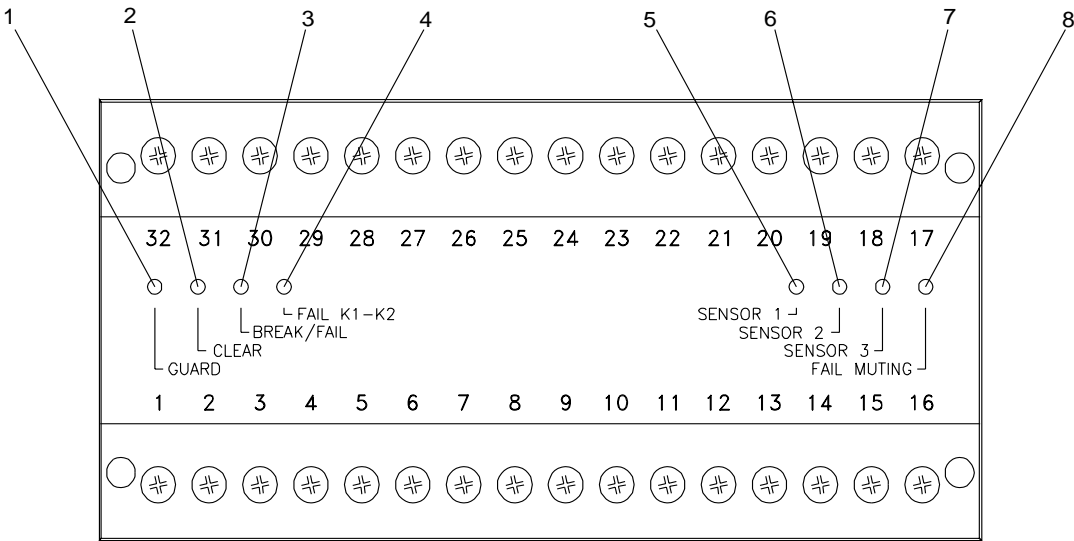
Muting sequence



Note: The signals represent the voltage logical levels at the inputs of the control unit. TS1S2 is the time between detection of the material in transit by sensor 1 (or 2) and detection by sensor 2 (or 1). If TS1S2 is less than 4 seconds, the FF-SLM200R2 activates muting. TP = 300ms is the response time of the control unit on switching of the muting signals. Delay time introduced by the unit to filter switching bounce-back. T3 is the moment of occupation of sensor 3. Interception may take place when the muting function is active or after de-activation of this.

LED indicators

LED N°	Colour	State	Indications	FF-SLM200R2
1	Green	On	Barrier free FF-SLM200R2 output relays energised	GUARD
2	Yellow	On	Barrier free FF-SLM200R2 output relays de-energised	CLEAR
3	Red	On	Barrier occupied FF-SLM200R2 output relays de-energised	BREAK
3	Red	Alternately flickering	Failure of the external relays K1 and K2, FF-SLM200R2 output relays de-energised	FAIL (FAIL K1-K2)
4	Red			
5	Yellow	On	Muting function, Sensor 1 occupied	
6	Yellow	On	Muting function, Sensor 2 occupied	
7	Yellow	On	Muting function, Sensor 3 occupied	
3	Red	Flickering	Incorrect muting sequence	FAIL MUTING
8	Red	On	FF-SLM200R2 output relays de-energised	
1	Green	On	Muting function active	MUTING
External indicator		On	FF-SLM200R2 output relays energised	



FF-SRL59022 multi-safety device relay module with PSDI

FEATURES

- Category 4 control module per EN 954-1
- Complies with IEC 61508 and EN 61496-1 European standards
- Meets the applicable parts of the US & Canadian regulations and standards
- Multi-functional module programmable through internal selectors: serial modes, Presence Sensing Device Initiation mode (PSDI or single / double intrusion)
- Compatible with many type 2, type 3 or type 4 safety devices with static outputs or relay outputs (safety light curtains, single beams, laser scanners, safety mats, safety switches)
- Safety relay outputs: 3 NO contacts
- Response time: 26 ms
- Integrated start and restart interlock facility
- Monitored start push-button
- Test output for safety device testing
- External Device Monitoring (EDM) loop for the control of external contactors
- 45 mm / 1.77 in slim housing
- Detailed diagnostic information for easy troubleshooting via external and internal indicators
- LED indicators for relay status and diagnostic information

SERIAL MODES

- Inputs for up to 3 safety devices

PRESENCE SENSING DEVICE INITIATION MODES (PSDI)

- Single and double intrusion applications
- Input for 1 safety light curtain
- Input for external key operated switch for selection of number of intrusions and intrusion time

TYPICAL APPLICATIONS

- Safeguarding of machines with up to 3 safety devices (serial modes: cascading, L-shape safe-guarding, with light curtains)
- Manual loading / unloading of presses requiring single or double Intrusion of the safety device (PSDI modes)
- Conveyor lines, transfer lines, robots
- Presses, press-brakes
- Rubber and plastic machines, woodworking machines
- Material handling, rotating working tables



The **FF-SRL59022** is a programmable safety relay module offering various serial modes (L-shape protection) and Presence Sensing Device Initiation modes (PSDI with single / double intrusion) in one device.

The FF-SRL59022 is permanently self-checked and complies with the requirements of the EN 954-1 European standard for **Category 4** safety devices, IEC 61508 and EN 61496-1. Any internal failure is detected and leads to the de-energisation of its safety relay outputs.

If needed, the correct functioning of the connected safety devices may be monitored by the module through its **test output**. The FF-SRL59022 module offers an **extensive diagnostic** through indicator that allow for an easy troubleshooting of the application.

In the **serial modes safety devices** (e.g. light curtains, laser scanners, safety mats, safety switches, etc.) protecting a hazardous area can be connected to this module. In the serial modes up to three safety devices can be connected to the same module.

In the **Presence Sensing Device Initiation modes (PSDI) or single intrusion / double intrusion modes**, the FF-SRL59022 module simplifies a semi-automatic machine process requiring periodic manual interventions of an operator during the machine cycle. Typically, an operator needs to load or unload the machine intruding the connected safety light curtain once or twice. After the programmed number of intrusions have been performed, the machine restarts automatically.

⚠ DANGER

IMPROPER PSDI USE IN NORTH AMERICA

Presence Sensing Device Initiation (PSDI) is NOT allowed for use with some applications in North America. Do not use PSDI in North America if the applicable standard(s) prohibit its use. Consult with local safety agencies before installing a PSDI capability.

Failure to comply with these instructions will result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is to be referenced for each product.

Failure to comply with these instructions could result in death or serious injury.

Product description and applications

In the **serial modes** up to three safety devices can be monitored by a single FF-SRL59022 safety relay module. As soon as one of the connected safety device is actuated (e.g. an object is detected inside the sensing field of a safety light curtain), the normally open safety relays contacts (13/14, 23/24 and 33/34) of the module will open. Different start/restart modes can be set on the module independently for each safety device input. Depending on the mode settings, the module need to be started or restarted using the start push-button or it restarts automatically each time the safety device has been de-activated.

Common applications:

- L-shape safeguarding of presses with vertically and horizontally mounted light curtains for access detection and additional presence detection to avoid an operator being undetected in front of the machine.
- Safeguarding access to a hazardous area on two sides with one safety light curtain on each side and a third side access with a maintenance door monitored by 2 safety switches.

In **single intrusion / double intrusion applications (Presence Sensing Device Initiation (PSDI) modes)**, an operator needs to intrude a safety light curtain once or twice during the non-hazardous portion of a machine cycle, in order to carry out manual operations on the machine.

A **machine contact** (e.g. a safety switch) monitors the machine cycle and authorizes the intrusions to take place during the non-hazardous phase only.

The **number of intrusions** (1 or 2) and the **maximum intrusion time** (15 s, 30 s) can be selected by the user using an external key switch, in order to adapt the settings to the machine process.

Material loading and unloading operations typically require 2 intrusions of the safety device, whereas **loading operations** require one intrusion only.

The module closes its normally closed safety relay contacts (13/14, 23/24 and 33/34) and the machine starts again automatically, after the selected number of intrusions have been performed during the max. allowed time.

Common applications:

- Loading and unloading of presses, carousels, rotating plates, robot areas.

External indicators provide information on safety relay output status, restart status, intrusion phase status and diagnostics.

After power up of the module or after the intrusion of the safety device, the module can be restarted manually via a **restart push-button**.

When necessary, the connected safety devices can be tested using the **test** output of the FF-SRL59022.

The **inputs** of the safety devices are floating allowing the connection of devices with static outputs (PNP or NPN) or safety relay outputs.

An **External Device Monitoring (EDM)** loop is available in order to monitor external safety contactors driven by the safety relay outputs of the module.

Troubleshooting an application using the FF-SRL59022 module is easy through internal and external diagnostic indicators.

FF-SRL59022 multi-safety device relay module with PSDI

SPECIFICATIONS

Dimensions in millimeters/inches, meters/feet, weights in kg/lbs



(pending)



Nominal supply voltage (A1(+), A2(-))	24 Vdc ($\pm 15\%$, power line disturbance: max. 5 ms)
Nominal power consumption	4,1 W
Fuse protection	Internal PTC
Inputs	1, 2 or 3 redundant floating inputs with optocoupler (S11/S12, S13/S14), (S21/S22, S23/S24), (S31/S32, S33/S34)
Key switch selector inputs (PSDI modes)	3 floating inputs with optocoupler (S21/S22), (S23/S24), (S31/S32)
Machine contact input (PSDI modes)	1 floating input with optocoupler (S33/S34)
Restart input (S43/S44)	Normally open (restart on push-button release within max. 3 s)
External Device Monitoring (EDM) (S41/S42)	Normally closed contacts (monitored opening time at restart: max. 230 ms)
Restart delay time	Manual start: 65 ms / Automatic start: 71 ms (cascading modes), 58 ms (PSDI modes)
Input voltage at S12, S14, S22, S24, S32, S34	23 Vdc at nominal voltage
Switching on min. voltage / off max. voltage at S12, S14, S22, S24, S32, S34, S44	16 Vdc / 10 Vdc
Input current at S12, S14, S22, S24, S32, S34, S44	4,5 mA at nominal voltage
Coincidence time between redundant safety device inputs (S12/S14), (S22/S24, S32/S34 cascading modes only)	max. 2,5 s
Max. intrusion time (PSDI, key switch programmable)	1 or 2 intrusions: 15 s or 30 s
Safety outputs	Internally redundant positive guided safety relay contacts
Contact complement	3 NO (13/14, 23/24, 33/34)
Response time	26 ms (between safety device input and module relay outputs)
Switching capability	Power factor = 1 (see Note 1 and Figure 1)
Output Current (min. to max.)	1 mA to 5 A (see Note 1)
Output Voltage (min. to max.)	0,1 to 230 Vac/dc
Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac (see Note 2 and Figure 1)
Typical Power Factor (cos ϕ)	1 A: 2 000 000 operations; 2 A: 1 000 000 operations; 5 A: 300 000 operations; 6 A: 200 000 operations
0,3	Limitation Factor (see Note 3 and Figure 2)
0,5	0,45
0,7	0,70
1	0,85
Operating frequency	1200 switching cycles/h (max.)
Fuse rating	6 A time delayed (max.)
Mechanical life	Ten million switching operations
Auxiliary outputs	Relay status / test output
Test output	PNP static output (58) (23 Vdc/thermal current: max. 100 mA/peak current (max. 0.5 s): 400 mA)
External indicator / diagnostic output	Normally closed characteristics (test active: 0 Vdc, test inactive: 24 Vdc)
General	response of safety device on test signal < 200 ms
Temperature range	PNP static output (48) (23 Vdc/thermal current: max. 100 mA/peak current (max. 0.5 s): 400 mA)
Sealing	0 °C to +50 °C / 32 °F to 122 °F
Housing material	Housing IP 40; Terminals IP 20
Vibration resistance	Thermoplastic
Connector connection (max.)	Amplitude 0,35 mm; Frequency 10 to 55 Hz
Connector attachment	1 x 4 mm ² solid [12 AWG], 1 x 2,5 mm ² [14 AWG], 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
Mounting	Removable block terminals with M3,5 screws; wire contacts are enclosed to prevent electrical shock
Weight	Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in size
	320 g / 0.70 lb

ORDERING INFORMATION

FF-SRL59022

Note 1: Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

Note 2: Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor.
 Example: $U = 230 \text{ Vac}$, $I = 2 \text{ A}$, power factor $\cos \phi = 0,7$
 Switching power $P = U \times I = 460 \text{ Vac}$
 Contact life ($\cos \phi = 1$, $P = 460 \text{ Vac}$) = 1 000 000 operations (see Figure 1)
 Limitation factor F ($\cos \phi = 0,5$) = 0,7 (see Figure 2)
 Contact life ($\cos \phi = 0,5$, $P = 460 \text{ Vac}$) = $F \times$ contact life ($\cos \phi = 1$, $P = 460 \text{ Vac}$) = 700 000 operations.

Fig. 1 Contact life for 100% resistive load (typical)

Power factor = 1 ($\cos \phi$) (see Note 3)

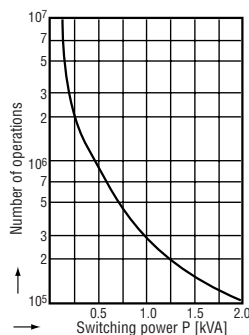
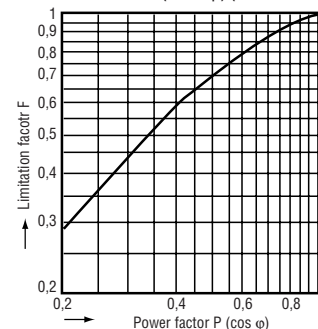
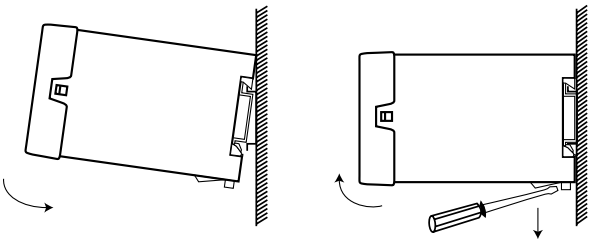


Fig. 2 Limitation factor for inductive loads

Power factor < 1 ($\cos \phi$) (see Note 3)

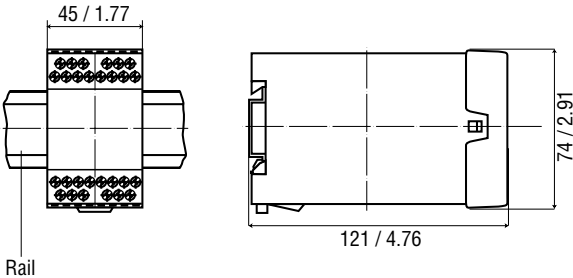


Installation diagram

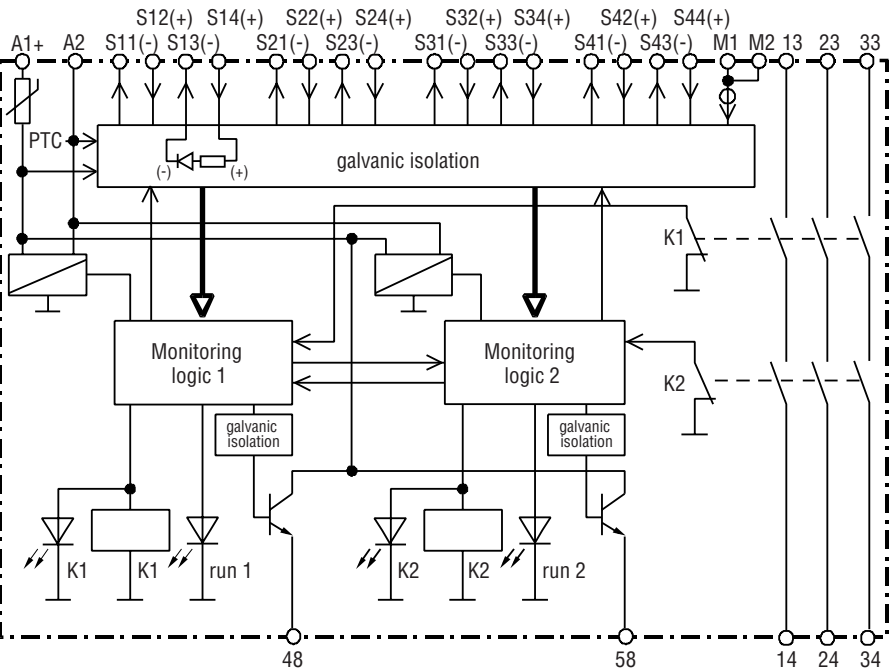


Mounting Dimensions

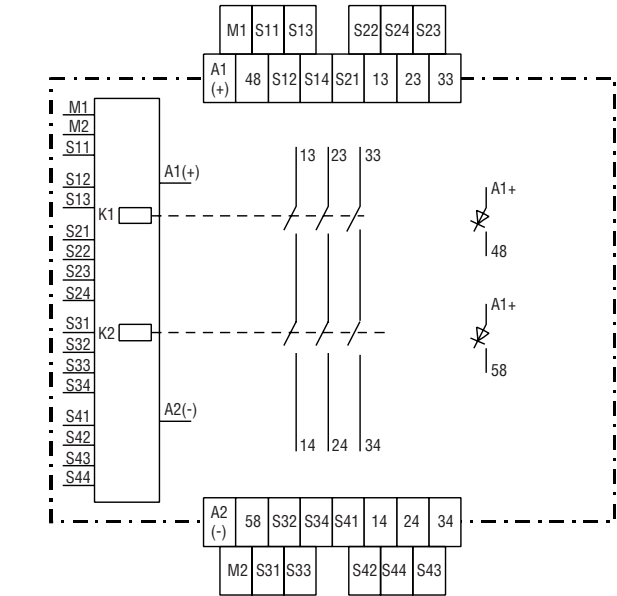
Width: 45 mm / 1.77 in ; Height: 74 mm / 2.91 in;
Depth: 121 mm / 4.76 in



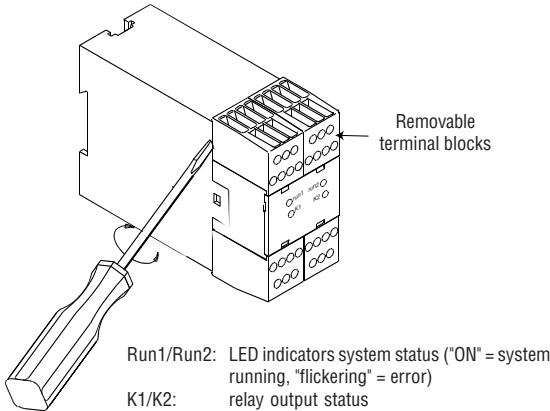
Internal circuitry



Front panel



Removable terminal blocks



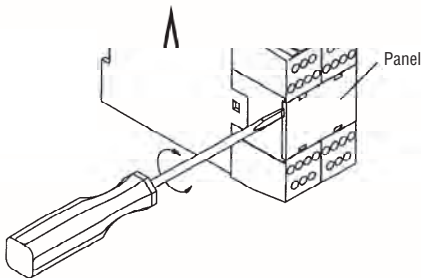
FF-SRL

Mode setting

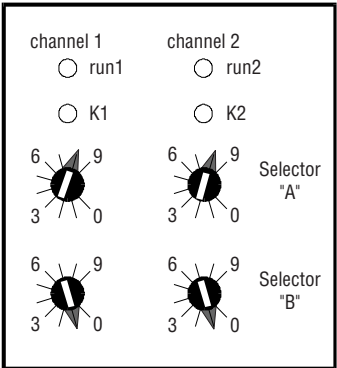
The operating modes of the FF-SRL59022 module are set using 4 selectors located behind the removable front panel. 28 different programs are available allowing to adapt the serial modes and the Presence Sensing Device Initiation (PSDI, single / double intrusion) modes to the application. The FF-SRL59022 module has two redundant microprocessor channels. The mode setting of each channel is done by two selectors "A" and "B".

The position of the corresponding selector "A" or "B" for channel 1 and channel 2 must be identical (see example).

Front panel removal



Mode selector "A" and "B" for channel 1 and channel 2



Internal view

► example "81"

Example: Selecting mode "81"

Selector	Channel 1	Channel 2	Description
"A"	8	8	single / double intrusion mode
"B"	1	1	without EDM and without test input

SERIAL MODES

			Selector "B": Start and test input modes										
			Safety device without test input					Safety device with test input					
			0	1	2	3	4	5	6	7	8	9	
Selector "A": External Device Monitoring (EDM) modes	0	with EDM	(S11/S12, S13/S14)	SD1 start/restart interlock	SD1 automatic restart	SD1 automatic restart	SD1 automatic restart	Not valid	SD1 start/restart interlock	SD1 automatic restart	SD1 automatic restart	SD1 automatic restart	Not valid
			(S21/S22, S23/S24)	SD2 start/restart interlock	SD2 start/restart interlock	SD2 automatic restart	SD2 automatic restart		SD2 start/restart interlock	SD2 start/restart interlock	SD2 automatic restart	SD2 automatic restart	
	1	without EDM	(S31/S32, S33/S34)	SD3 start/restart interlock	SD3 start/restart interlock	SD3 start/restart interlock	SD3 automatic restart		SD3 start/restart interlock	SD3 start/restart interlock	SD3 start/restart interlock	SD3 automatic restart	

Note:

Safety device (SD) in "start/restart interlock" means that the module must be restarted using the start push-button after activating and releasing this safety device.
Safety device (SD) is in "automatic restart" means that the module restarts again automatically after releasing all safety devices assigned to automatic start. If a not valid mode has been selected, fatal error 5 is displayed (see chapter "Diagnostic Information" for details).

PSDI (SINGLE / DOUBLE INTRUSION) MODES			Selector "B": External Device Monitoring (EDM)									
Selector "A": PSDI modes		Safety device Inputs	Safety device without test input		Safety device with test input							
			0	1	2	3	4	5	6	7	8	9
	8	(S11/S12, S13/S14)	with EDM	without EDM	with EDM	without EDM	Not valid					

Note:
The **number of intrusions** (1 or 2) and the **maximum intrusion time** (15 s or 30 s) can be selected by the operator using an **external key selector** connected to module inputs (S21/S22, S23/S24, S31/S32). For details, see application example 2.

LED indicators

The FF-SRL59022 module has 4 LED indicators: two green LED relay status indicators (K1, K2) and two yellow LED status indicator (Run 1, Run 2) on the front panel.

Relay outputs status (K1, K2)

- ☒ Internal relays are de-energized
NO contacts are open
- ☒ NC contact is closed
- ☐ Internal relays are energized
NO contacts are closed
- ☐ NC contact is open

Diagnostic information (Run 1, Run 2)

- Run 1

●

●

✱

n ✱

n ✱
- Run 2

●

✱

●

⊗ or n ✱
- Normal operating

Waiting for restart

Application error

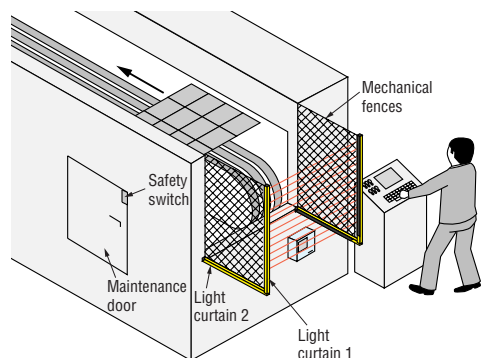
Fatal error
- ⊗ light off

● light on

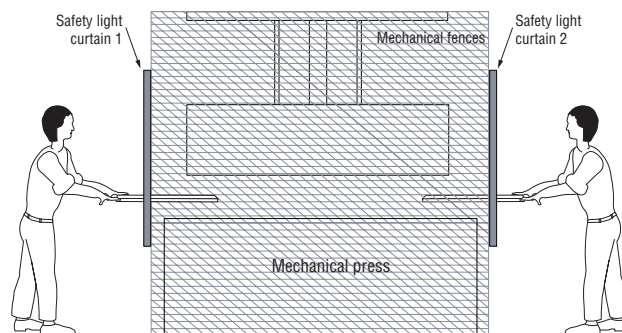
✱ flashing (0,66 Hz)
- n ✱ n-times flashing (error)

Application example 1: Serial modes

1A - Safeguarding with 2 FF-SYA safety light curtains and 1 maintenance door



1B - Safeguarding of double work station with 2 FF-SG safety light curtains



Description

Example 1A: an operator carries out manual operations on a machine work station safeguarded by light curtains and a maintenance door. When a gap between the vertical safety light curtain and the hazardous zone allows the operator to stand in between without being detected, an additional safety device for presence detection (e.g. a horizontal safety light curtain) shall be installed to ensure proper detection. An access through a door monitored by a safety switch is possible for maintenance or machine settings.

The serial mode system of this example is composed of the following elements:

- FF-SRL59022 safety relay module,
- 2 FF-SYA safety light curtains,
- 1 safety switch (e.g. GK Series).

Example 1B: two operators carry out operations on the same machine work station through two different openings safeguarded by two safety light curtains.

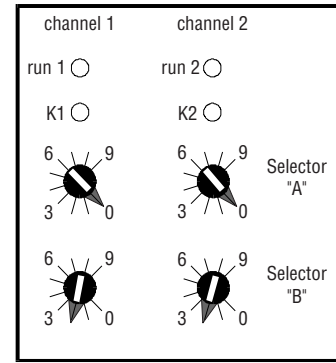
The serial mode system of this example is composed of the following elements:

- FF-SRL59022 safety relay module,
- 2 FF-SG safety light curtains.

Depending on the selected start/restart mode for the three safety device inputs (see chapter "Mode setting"), the module may start/restart automatically or need to be started/restarted manually using the start push-button after the safety device has been released. In these examples, the module inputs for safety light curtain 1 and safety light curtain 2 are assigned to "automatic start/restart mode" and those for safety device 3 (safety switch, example 1A only) are assigned to "start/restart interlock mode". This means, that the module closes its normally open safety relay outputs (13/14, 23/24, 33/34) automatically, as soon as both safety light curtains have been released. However, the start push-button needs to be pushed, after the maintenance door has been opened and closed.

Wiring diagram application example 1A

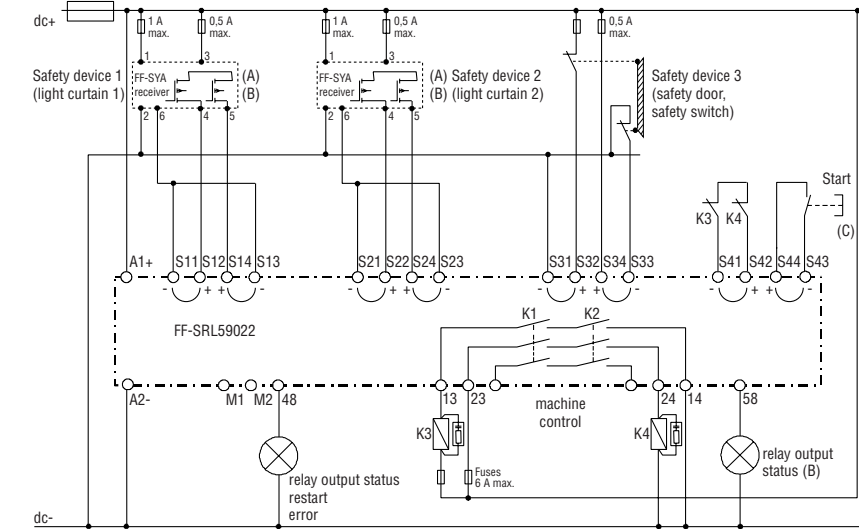
Mode selector



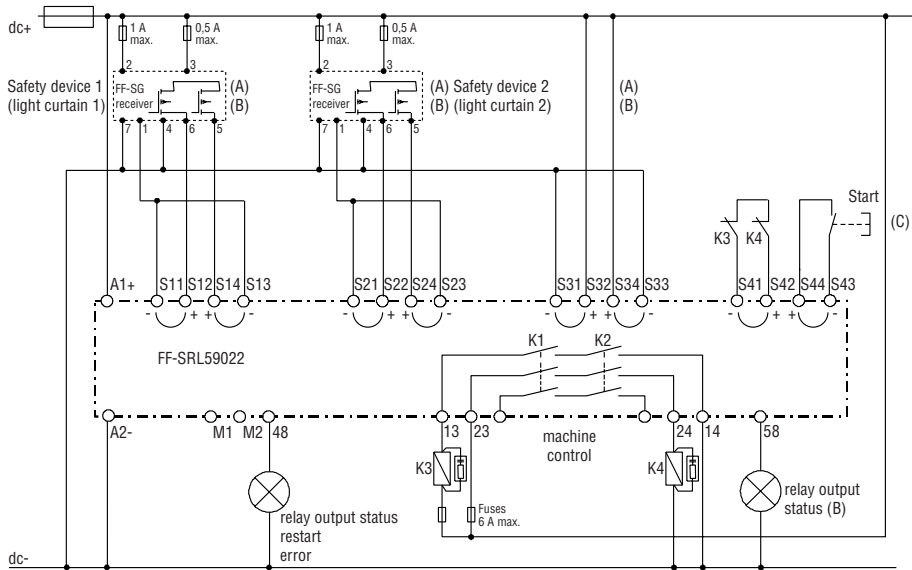
Internal view

Mode "02":

safety devices 1 and 2 in automatic restart mode,
safety device 3 in start/restart interlock mode,
with EDM.



Wiring diagram application example 1B



Note (A): Signals between redundant safety device inputs S11 to S14 or S21 to S24 or S31 to S34 must be applied within a max. time of 2,5 s.

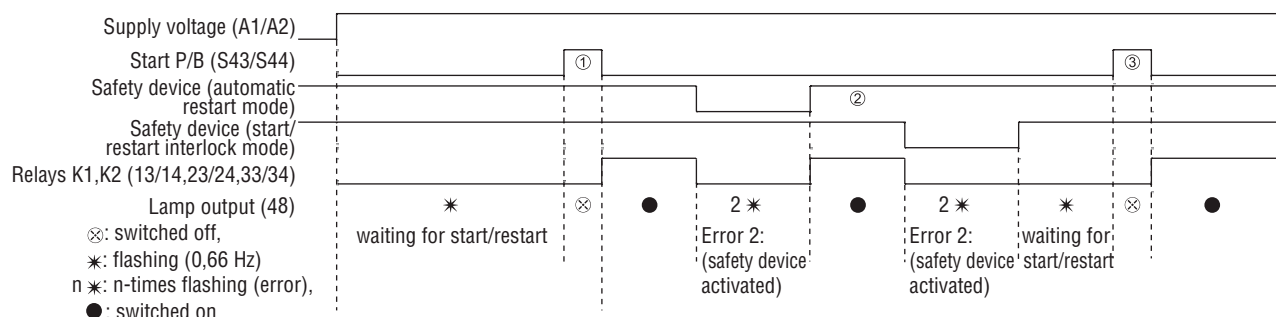
Modes 00 to 03 and 10 to 13: safety devices without test input: unused safety device inputs must be connected to power: S11, S13, S21, S23, S31, S33 to (dc-); S12, S14, S22, S24, S32, S34 to (dc+).

Note (B): Modes 05 to 08 and 15 to 18: safety devices with test input: terminal 58 is used as test output that must be connected to the test input of each safety device. Unused safety device inputs must be connected to power and to the test output: S11, S13, S21, S23, S31, S33 to (dc-); S12, S14, S22, S24, S32, S34 to 58 (refer to chapter "Test input").

Note (C): A start push-button needs to be connected for all modes (even if all safety devices are assigned to automatic start/restart modes), in order to reset an error (e.g. a safety device in automatic mode is activated at power-up, the start push-button is pushed with a safety device activated).

FF-SRL

Functional diagram



Notes:

Safety device(s) in start/restart interlock mode

The module must be started / restarted using the the start push-button:

- at power-up, if at least one safety device is in start/restart interlock mode (see ①)
- after activation of a safety device in start/restart interlock mode (see ③)
- if an error has been detected or if the test of a safety device has failed

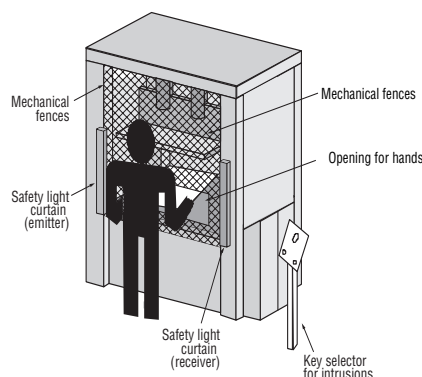
Safety device(s) in automatic start/restart mode

The module starts/restarts automatically:

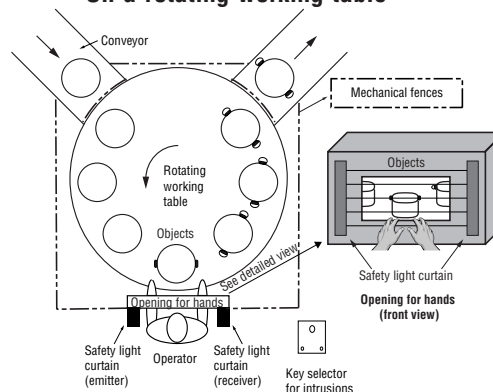
- at power-up, if all safety devices are in automatic start mode and released
- after activation and release of the last safety device in automatic start/restart mode, if no safety device in start/restart mode has been activated or if no safety device in start/restart interlock mode is existing (see ②).

Application example 2: Presence Sensing Device Initiation (PSDI with single / double intrusion)

On a hydraulic press



On a rotating working table



⚠ DANGER

IMPROPER PSDI USE IN NORTH AMERICA

Presence Sensing Device Initiation (PSDI) is NOT allowed for use with some applications in North America. Do not use PSDI in North America if the applicable standard(s) prohibit its use. Consult with local safety agencies before installing a PSDI capability.

Failure to comply with these instructions will result in death or serious injury.

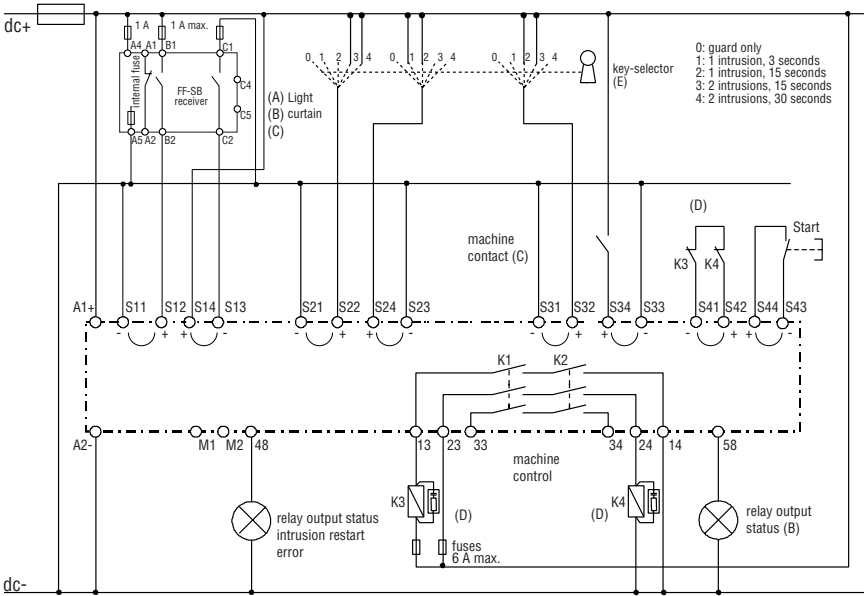
Description

An operator carries out manual loading / unloading operations on a machine work station (e.g. a hydraulic press or a rotating working table) safeguarded by a safety light curtain. Therefore, the operator needs to intrude the safety light curtain once or twice during the non-hazardous portion of a machine cycle. The machine restarts automatically after the programmed number of intrusions have been effectuated. This allows the operator to work continuously.

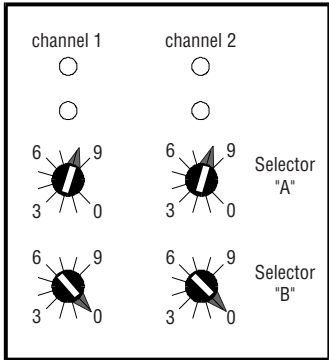
A PSDI system is composed of the following elements:

- the FF-SRL59022 safety relay module,
- a safety light curtain (e.g. FF-SB safety light curtain),
- a safety switch as machine contact,
- an external key operated selector for setting of
 - number of intrusions (1 or 2) and
 - maximum intrusion time (15 s or 30 s),
- an external indicator (connected to terminal 48) for safety relay outputs status (on/off), waiting for start push-button status (slow flickering), waiting for intrusion status (quick flickering).

Wiring diagram



Mode selector



Internal view

Mode 80:
PSDI for safety light curtains without test input and with External Device Monitoring (EDM).

- Note (A):** Signals between redundant safety device inputs S11 to S14 must be applied within a max. time of 2,5 s.
- Note (B):** **Modes 82 to 83: PSDI using safety devices with test input:** terminal 58 is used as test output that must be connected to the test input of the safety device (refer to chapter "Test input").
- Note (C):** **Safety device and machine contact type:** this can be voltage free dry contacts or static outputs.
- Note (D):** **External contactors:** when external contactors are used, connect one normally closed contact of each contactor (or the normally closed contact of the FF-SRE extension module) in series into the External Device Monitoring (EDM) loop S43/S44. Install arc suppressors across the coils of external safety relays.
- Note (E):** **External key selector:** The position of the external key selector for the selection of the number of intrusions and the max. intrusion time can be changed at any moment of the working cycle. However, the changes are only taken into account, when the machine is stopped (normally open safety relay contacts 13/14, 23/24, 33/3 are open). A successful start sequence must be performed then in order to validate the changes.

External key selector

Key selector position	Modes	Max. intrusion time	Number of intrusions		Max. intrusion time	Inputs			
			External key selector inputs						
			S21/S22	S23/S24	S31/S32	S11/S12, S13/14	S33/S34	S41/S42	S43/S44
0	Guard only (0 intrusion)	not applicable	0	0	0 or 1	Safety device	Machine contact	EDM loop	Start P/B
1	1 intrusion	30 seconds	0	1	0				
2	1 intrusion	15 seconds	0	1	1				
3	2 intrusions	15 seconds	1	0	1				
4	2 intrusions	30 seconds	1	0	0				
	Not valid	not applicable	1	1	0 or 1				

0: contact opened
1: contact closed

TEST INPUT EXAMPLE

Serial mode using one FF-SLG18/FF-SLG30 type 2 safety light curtain with test input and two safety switches

⚠ DANGER

IMPROPER SAFETY PRODUCT USE IN THE US

- Type 2 safety light curtains as defined by IEC/EN 61496-1 and IEC/EN 61496-2 **do not meet** US OSHA 1910.217, US ANSI B11.1, B11.2, B11.19 and B11.20 requirements. Although Type 2 safety products are acceptable for certain applications outside the US, they are not generally acceptable in the US due to current US regulations and standards.
- In the US, Type 2 safety light curtains may be used under limited circumstances as defined by the ANSI/R15.06-1999 standard. In Canada, IEC/EN 61496-1 and IEC/EN 61496-2 are recognised as product standards, however application standards do not typically allow Type 2 light curtain use.
- Do not use Type 2 safety products in the US if the applicable standard requires a control reliable solution. For Risk Assessment, refer to ANSI TR3 and ANSI/R15.06-1999 for the USA and the Ministry of Labour for Canada.
- Consult with local safety agencies before installing a Type 2 safety light curtain product.

Failure to comply with these instructions will result in death or serious injury.

When connecting type 2 safety devices to the FF-SRL59022 module, the test function normally must be used to check the safety integrity of the safety device.

However, the type 2 safety light curtains of the FF-SLG18 and FF-SLG30 Series are permanently self-checked internally making the use of the test input NOT compulsory and optional.

Safety devices compatible with the FF-SRL59022 test output

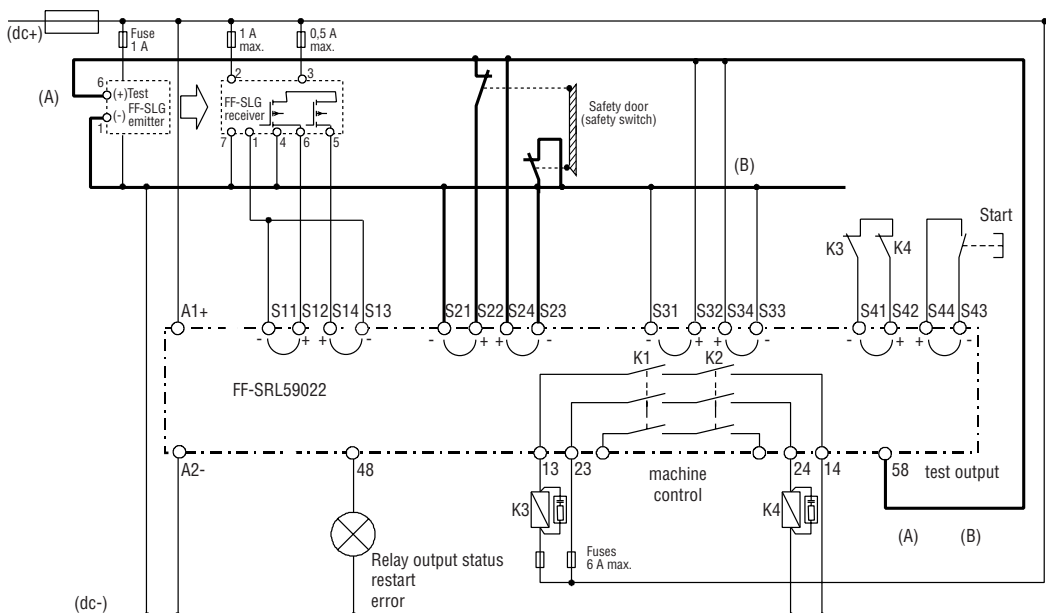
- FF-SLG18 and FF-SLG30 type 2 safety light curtains (all models with the exception of FF-SLG18147B2 and FF-SLG30147B2)
- Safety switches (e.g. for safety door monitoring).

Modes with test

- Serial modes 05 to 08 and 15 to 18.
- PSDI modes 82 to 83.

In these modes the output terminal 58 is used as test output and it must be connected to the test inputs of **all** connected safety devices, that are tested simultaneously.

A test signal is generated before each activation of the internal safety relays K1, K2 (safety contacts 13/14, 23/24, 33/34).



Note (A): Connect test output terminal 58 to the test input of each FF-SLG18/FF-SLG30 emitter as shown in the wiring diagram above while respecting the polarity of the test input terminals (test input (+) = terminal 6, test input (-) = terminal 1).

Note (B): Unused safety device inputs must be connected to power and to the test output: S31 and S33 to (dc-); S32 and S34 to 58.

Diagnostic informations

Detailed diagnostic information for an easy troubleshooting of your application is available using the following indicators:

- internal indicators: LED "RUN1" and "RUN2" located on the module front panel,
- external indicators connected to terminal 48.

In the case of a failure the indicators are indicating a flashing code. There exist two types of errors:

- **FATAL ERRORS** are indicated by flashing internal LED's "RUN1" and /or "RUN2". The external indicator (48) remains permanently off. The normally open safety contacts (13/14, 23/24, 33/34) are de-energised and the module needs to be reset by taking the power off and on after resolving the error cause.
- **APPLICATION AND INSTALLATION ERRORS** are indicated by flashing internal LED "RUN1" and the external indicator (48). LED "RUN2" is permanently on. The normally open safety contacts (13/14, 23/24, 33/34) are de-energised, but the module can be restarted pushing the start push-button after resolving the error cause.

FATAL ERRORS				Error type
Error code	LED RUN 1	LED RUN 2	External indicator (48)	
0	⊗	⊗	⊗	Internal module error, no power
5	5 ✱ (1)	5 ✱ (1)	⊗	Mode selector error
6	6 ✱	⊗	⊗	Under-voltage error
	⊗	6 ✱	⊗	Over-voltage error
7	7 ✱ (1)	7 ✱ (1)	⊗	Input error
8	8 ✱ (1)	8 ✱ (1)	⊗	Internal relay error
9 10 11 12 13	9-13 ✱ (1)	9-13 ✱ (1)	⊗	Internal module error

Note (1): It is possible that

- LED "RUN1" and "RUN2" are indicating different error codes or,
- only one LED "RUN1" or "RUN2" is indicating an error code and the second LED "RUN1" or "RUN2" is switched off.

APPLICATION AND INSTALLATION ERRORS				Error type
Error code	LED RUN 1	LED RUN 2	External indicator (48)	
1	1 ✱	●	1 ✱	Safety device error
2	2 ✱	●	2 ✱	Safety device activated (e.g. beam interruption of a safety device light curtain)
3	3 ✱	●	3 ✱	Restart P/B error
4	4 ✱	●	4 ✱	External device monitoring (EDM) error
5	5 ✱	●	5 ✱	Intrusion error (PSDI modes)
6	6 ✱	●	6 ✱	Machine contact error (PSDI modes)
7	7 ✱	●	7 ✱	Key switch selector error (PSDI modes)
8	8 ✱	●	8 ✱	Not allowed position of key switch selector error (PSDI modes)

⊗: switched off n ✱: n-times flashing ●: switched on

Warranty and remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. **The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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FF-SRL59192 Dual Channel Relay Module



FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC/EN 60204, DIN VDE 0113, EN 954-1
- Supply voltage: 24 Vdc
- Dual input compatible with Honeywell Electrosensitive Protective Equipment with static safety outputs (FF-SYA, FF-SLG and FF-SG Series)
- Dual input compatible with safety devices with relay outputs, e-stop push-buttons and safety switches
- Two cross-monitored relays with guided contacts (internally redundant): three NO contacts and one NC contact
- Switching current from 1 mA to 6 A (gold plated 5 µm contacts allow low current)
- Response time: 15 ms
- Selectable automatic or manual restart modes (with permanent short-circuit detection)
- Selectable Final Switching Devices monitoring loop for the control of external relays or contactors
- LED indicators for power inputs and outputs status, and restart condition
- Removable terminal strips for ease of maintenance
- 45 mm / 1.77 in width housing



Pending



Pending



The FF-SRL59192 Dual Channel Relay Module is designed to be used with Honeywell Electrosensitive Protective Equipments (ESPE) with static safety outputs, e-stops push-buttons or safety switches in emergency stop circuits when danger to personnel or machinery is present. Its slim 45 mm / 1.77 in width housing is ideal for space restricted areas. When correctly installed, this module provides a Control Reliable interface between the safety device and the machine control circuitry. A single fault does not prevent the normal stopping action from taking place but will prevent the next machine cycle to start until the fault is corrected. This is accomplished by the use of redundant circuitry, self-checking capability and positive guided safety relay outputs. These redundant safety relay outputs are rated for 6 amps to directly operate with the machine control actuators using 3 NO and 1 NC output contacts. These 3 NO output contacts are internally redundant (two contacts in series) allowing to control up to 3 separate single channels. In addition, the contacts are gold plated to ensure compatibility with very low current loads (such as PLC inputs).

The FF-SRL59192 Module can be wired for either Automatic or Manual Restart modes of operation and also provides Final Switching Device (FSD) monitoring if interfaced with external relaying devices. The FF-SRL59192 is equipped with LED indicators that provide diagnostic information and has removable wiring strips to make replacement fast and easy.

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRL59192 Dual Channel Relay Module



(pending)



(pending)



SPECIFICATIONS

Dimensions in millimeters/inches, meters / feet, weights in kg / lbs

Supply voltage		
Nominal voltage		24 Vdc (± 15 %)
Nominal power consumption		2,3 W
Fuse protection		Internal PTC
Restart input	Restart delay time	Manual start mode: 25 ms; Automatic start mode: 250 ms
Emergency stop inputs		
Input voltage at S11		22,5 Vdc at nominal voltage (provided by Relay Module)
Switching on min./max. voltage at in S12 and at S32		19 Vdc / 27,6 Vdc
Switching off min. voltage at S12 and at S32		7 Vdc
Input current at S12 / S32		35 mA / 55 mA at nominal voltage
Relay outputs		
Relay type		Safety relay with positive-guided contacts (internally redundant)
Safety contacts		3 NO, 1 NC
Switching capability		Power factor = 1 (see Note 1 and Fig. 1)
Current range (min. to max.)		1 mA to 6 A (see Note 1)
Voltage range (min. to max.)		0,1 to 250 Vac/dc
Typical Electrical Life Expectancy		Power factor = 1 at 230 Vac (see Note 2 and Fig. 1) 1 A: 2 000 000 operations ; 2 A: 1 000 000 operations 4 A: 300 000 operations ; 6 A: 200 000 operations
Typical Power Factor (cos φ)		Limitation Factor (see Note 3 and Fig. 2)
0,3		0,45
0,5		0,70
0,7		0,85
1		1
Operating frequency		1200 switching cycles /h (max)
Fuse rating		6 A time delayed (max.)
Mechanical life		Ten million switching operations
General		
Temperature range		-15 °C to + 55 °C (5 °F to 131 °F)
Sealing		Housing IP 40; Terminals IP 20
Housing material		Thermoplastic
Vibration resistance		Amplitude 0,35 mm; Frequency 10 to 55 Hz
Connector connection (max.)		1 x 4 mm ² solid [12 AWG], 1 x 2,5 mm ² [14 AWG] 2 x 1,5 mm ² [16 AWG] stranded wire with sleeve DIN 46288
Connector attachment		Removable block terminals with M3.5 screws; wire contacts are enclosed to prevent electrical shock
Mounting		Quick install rail mounting EN 50022-35, 35 mm x 15 mm / 1.38 in x 0.59 in. size
Weight		470 g / 1,02 lb

ORDERING INFORMATION

FF-SRL59192

2: 24 Vdc

Note 1: Contact damage: To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V

Note 2: Install arc suppression devices across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 3: Total operations = operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 2 A (1 000 000 operations), the limitation factor is 0,70. The number of total operations is:
1000000 x 0,70 = 700.000.

Figure 1
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

Power factor = 1 (cos φ) (see Note 3)

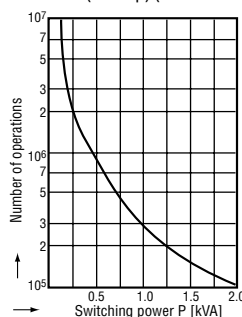
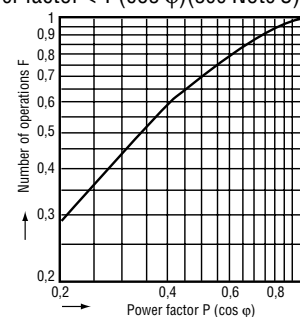
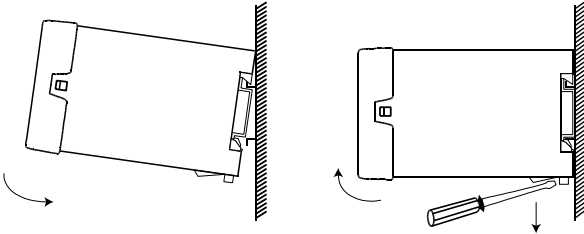


Figure 2
LIMITATION FACTOR FOR INDUCTIVE LOADS

Power factor < 1 (cos φ) (see Note 3)

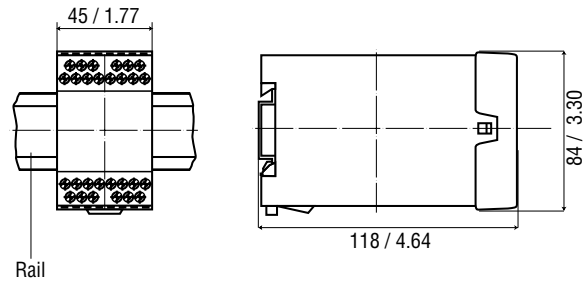


INSTALLATION DIAGRAM

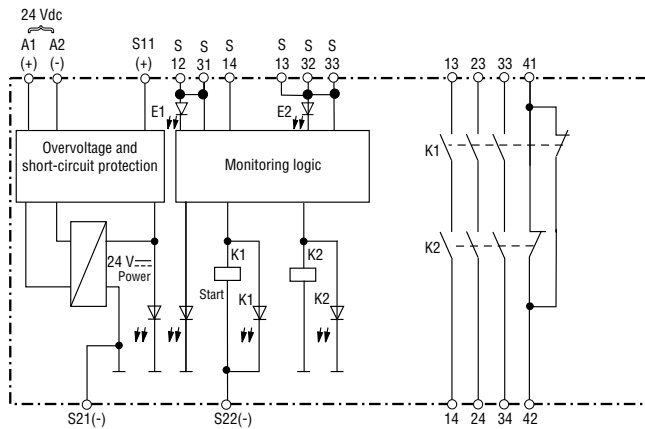


MOUNTING DIMENSIONS

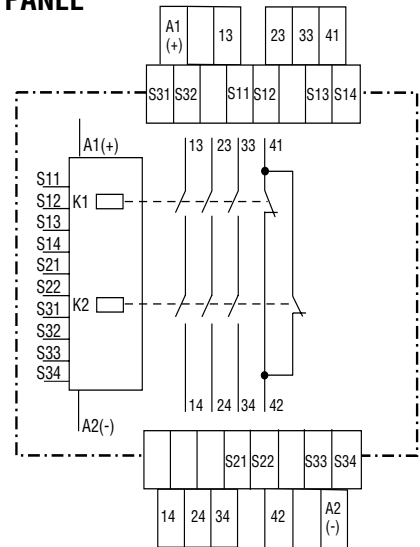
Width: 45 mm/1.77 in ; Height: 84 mm/3.30 in;
Depth: 118 mm/4.64 in



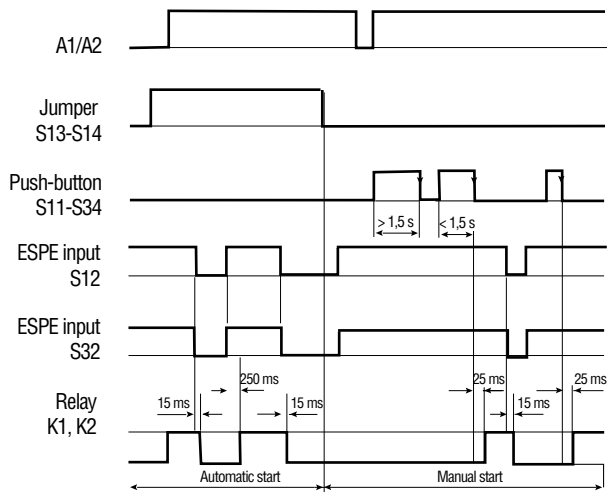
INTERNAL CIRCUITRY



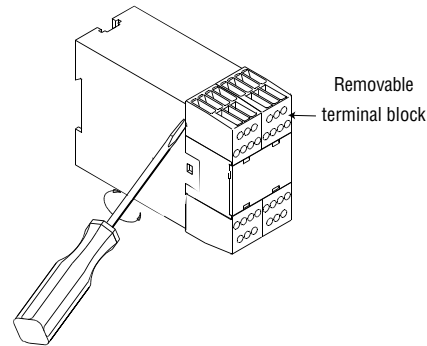
FRONT PANEL



FUNCTIONAL DIAGRAM



REMOVABLE TERMINAL BLOCKS



SETTING OF START MODE AND FSD MONITORING MODE

Start mode	Jumper between S13/S14	Start push-button between S11/S34
Manual (without FSD monitoring)	Not connected • •	
Automatic (without FSD monitoring)	Connected • — •	
Manual (with FSD monitoring)	Not connected • •	
Automatic (with FSD monitoring)	Connected 	

*FSD: NC contacts of external safety contactors or an extension module of the FF-SRE Series.

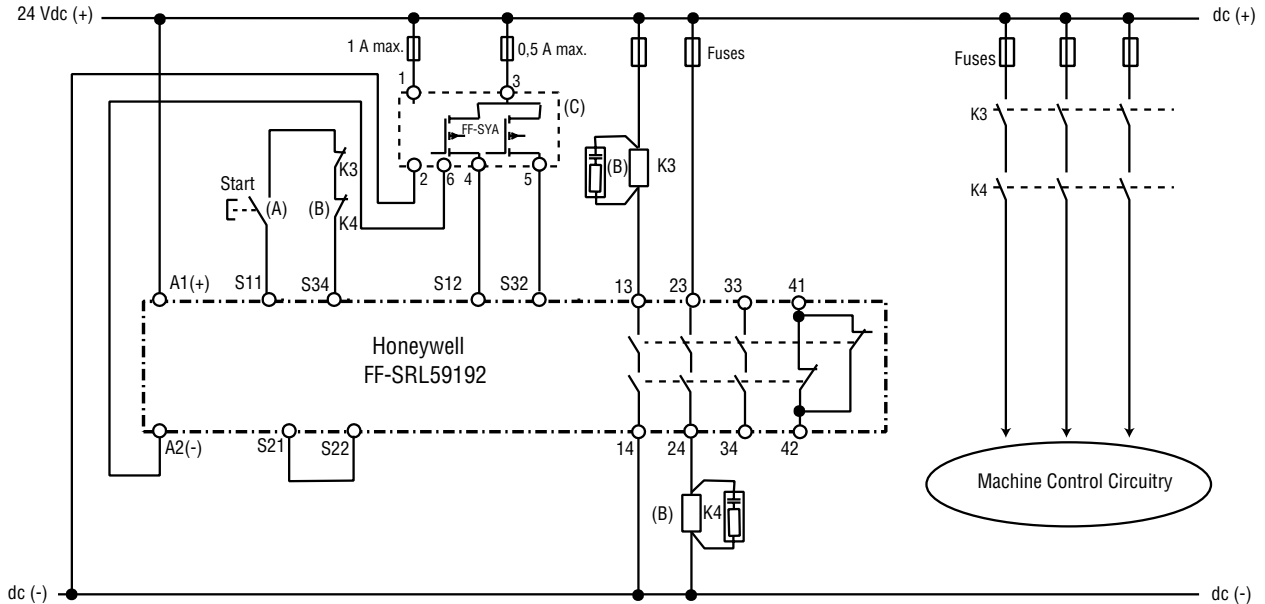
APPLICATION EXAMPLES:

1/ Manual restart mode with FSD monitoring: Connection of a FF-SYA safety light curtain (cross-fault monitoring by the safety light curtain)

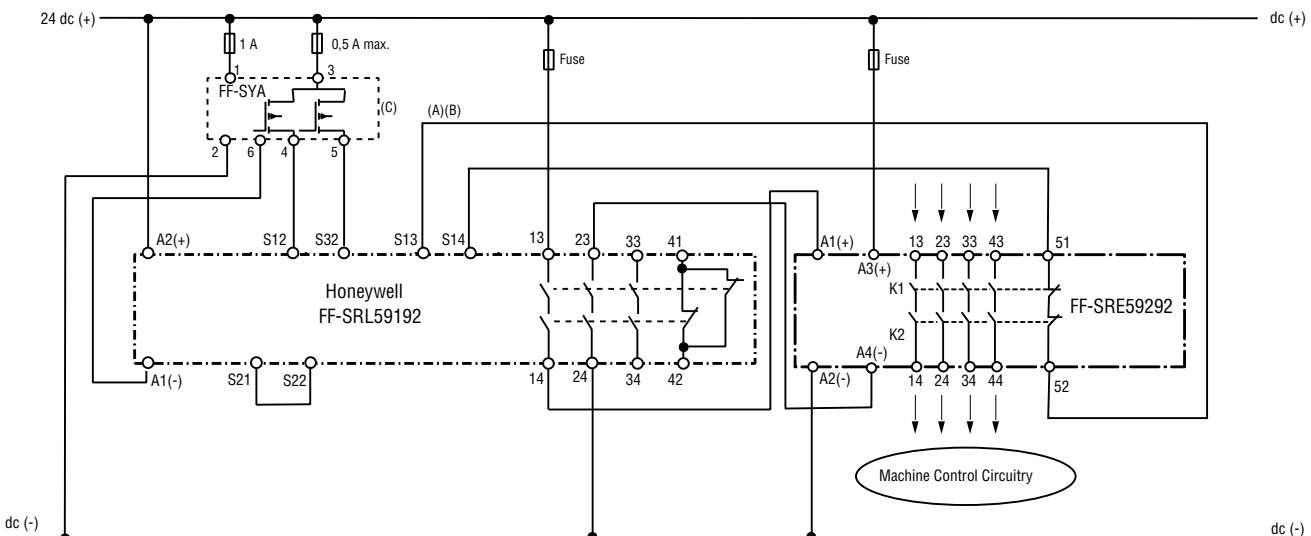
In the manual restart mode, the NO contacts (13/14, 23/24, 33/34) will close and the NC contact 41/42 will open after the push-button is pressed and released, provided the two input signals (E1, E2) are available and provided the Final Switching Device (FSD) monitoring loop is closed (when using external safety contactors). If an emergency stop condition occurs the NO contacts will open within the 15 ms response time and the NC contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop dangerous motion and/or remove power.

When correctly installed, the module will not restart:

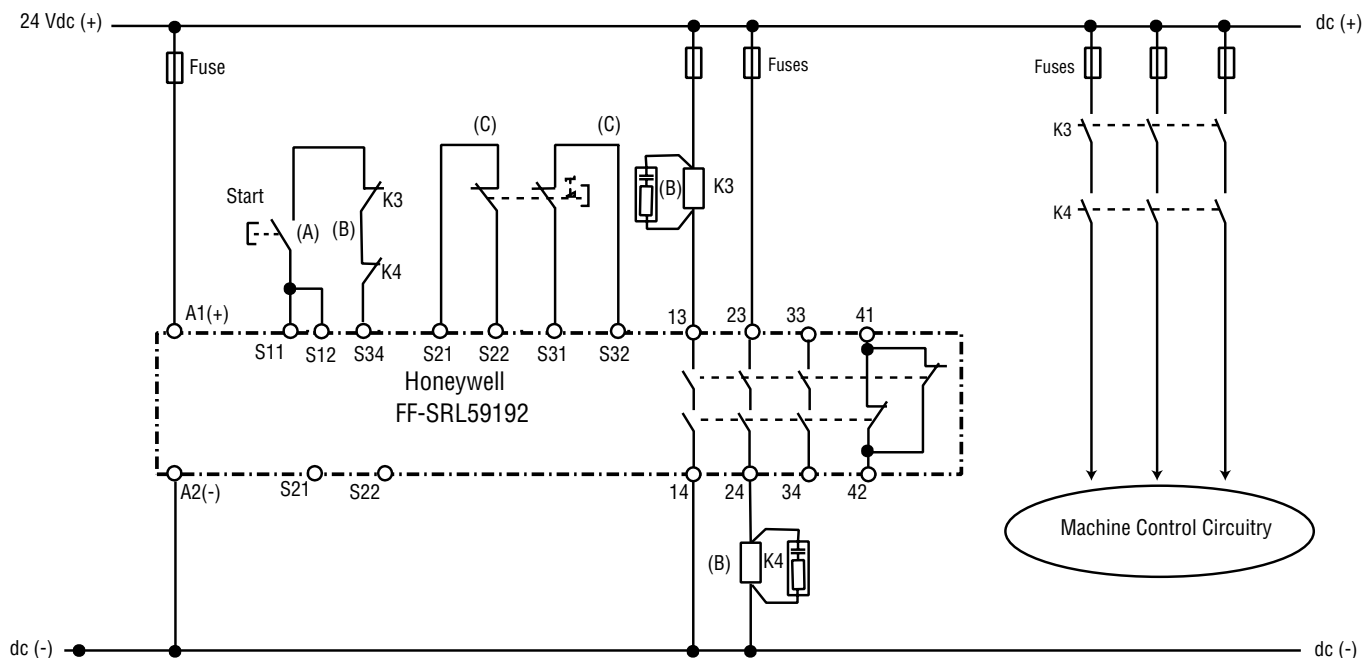
- if the push-button is actuated for more than 1,5 s or if a permanent short-circuit of the restart push-button input occurs,
- if the FSD monitoring loop remains permanently open (failure of an external contactor).



2/ Automatic restart mode with FSD monitoring: Connection of a FF-SYA safety light curtain (cross-fault monitoring by the safety light curtain)



3/ Manual restart: Connection of an emergency stop push-button



APPLICATION NOTES

NOTE (A): Start modes

Manual start mode: Insert start push-button between S11/S34; no jumper must be set between S13/S14.

Automatic start mode: Insert jumper between S13/S14. The start push-button between S11/S34 is omitted.

NOTE (B): External contactors

If contact reinforcement via external safety contactors (or the FF-SRE Extension module) is necessary, their proper operation must be monitored looping their normally closed contacts into the restart loop (manual start mode: S11/S34; automatic start mode: S13/S14).

Install arc suppressors across the coils of external relays (these arc suppressors are not necessary, if the FSDs relays K3 and K4 are supplied by one of the FF-SRE extension modules).

NOTE (C): Dual channel safety devices

Application example 1/ and 2/: Safety light curtains with static safety outputs (FF-SYA, FF-SG or FF-SLG Series) may be connected. Cross-fault is not monitored by the FF-SRL59192.

Application example 3/: Safety devices with relay outputs (e.g. FF-SB, FF-LS, FF-SM, FF-SE), emergency stop push-buttons or safety switches may be connected. Cross-fault is monitored by the FF-SRL59192.

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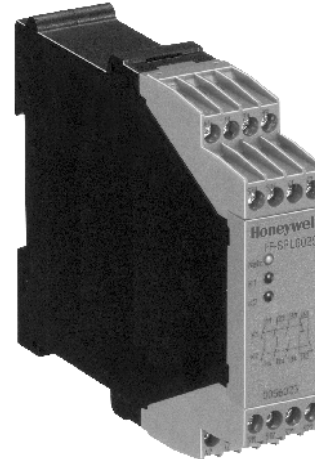
FF-SRL6025 Dual Channel Relay Module for safety devices with safety static outputs

FEATURES

- Complies with EU Directive for machines 98/37/EC
- Meets the applicable parts of the US & Canadian regulations and standards ANSI/RIA/OSHA
- Category 4 as per the EN 954-1 European standard
- Dual channel input
- Output: three NO contacts and one NC contact
- Switching current from 10 mA to 5 A
- Automatic start or manual start modes
- Detection of blocked start push-button
- Selectable cross-fault detection in emergency stop control circuit
- LED indicates power and the status of both internal relays
- Very high mechanical and electrical lifetime
- Overvoltage and short-circuit protection
- Slim housing 22,5 mm / 0.89 in width

TYPICAL APPLICATIONS

- Emergency-stop circuits on machines
- Monitoring of safety devices with safety static outputs, like the safety light curtains of the series
 - FF-SYA
 - FF-SG18, FF-SG30
 - FF-SLG18, FF-SLG30



FF-SRL6025

The FF-SRL6025 module is designed to be used with safety devices with safety static outputs when danger to personnel or machinery is present. This safety control module provides an emergency stop signal to the machine control circuitry.

FF-SRL6025 helps to create a control reliable safety solution by providing redundancy and self-checking circuitry.

This device offers two channel inputs and two internal safety relay outputs with positive-guided contacts. This ensures redundancy in its inputs and outputs.

The slim housing of only 22.5 mm (0.89 in.) width allows this safety control module to fit into almost every cabinet or even helps to reduce the overall cabinet size.

Other features include high current capability, an automatic start and manual start mode and external relays monitoring.

⚠ WARNING

MISUSE OF DOCUMENTATION

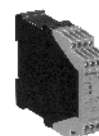
- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

FF-SRL6025 Dual channel Relay Module

SPECIFICATIONS

• Dual channel Emergency Stop circuits



Input		
Nominal voltage		24 Vdc (-10 %, +10 %)
Nominal power consumption		1.3 W
Nominal voltage at S11		22 Vdc (provided by control module)
Input current between S11/S12 and S21/S22		25 mA
Minimum voltage at S12		20 Vdc when activated
Start time		Manual START function: 40 ms (falling signal edge) Automatic START function: 300 ms
Output		
Contact complement		3 NO contacts, 1 NC contact
Response time		Opening of inputs (S11/12; S21/22): 20 ms Opening in supply circuit (24 Vac/dc(+)/A1): 25 ms
Contact type		Safety relay, positive-guided
Current Range (min. to max.)		10 mA to 5 A
Voltage Range (min. to max.)		0,1 to 250 Vac
Switching Capability per AC15 (EN 60947-5-1)		NO contacts: 3 A / 230 Vac ; NC contact: 2 A / 230 Vac
Typical Electrical Life Expectancy		Power factor = 1 at 230 Vac (See Note 1)
0,5 A		5.500.000 operations
1 A		2 000 000 operations
2 A		1 000 000 operations
5 A		250 000 operations
Typical Power Factor (cos φ)		Limitation Factor (See Note 2)
0,3		0,45
0,5		0,7
0,7		0,85
1		1
Operating frequency		1200 switching cycles/hour (max.)
Output contact fuse rating		Time delay 6 A (max.)
Mechanical life		Twenty million switching operations
General		
Temperature range		-15 °C to +55 °C / 5 °F to 131 °F at 90% humidity (max.)
Sealing		Housing: IP 40 • Terminals: IP 20
Housing material		Thermoplastic
Vibration resistance		Amplitude 0,35 mm; Frequency 10 to 55 Hz (per IEC/EN 60068-2-6)
Wire/conductor connection		Solid wire: 1 x 4 mm ² [12 AWG] or 2 x 2,5 mm ² [14 AWG] Stranded wire with sleeve: 1 x 2,5 mm ² [14 AWG] or 2 x 1,5 mm ² (max.) [16 AWG]
Wire/conductor attachment		M 3,5 screw terminals
Mounting		Quick install rail mounting IEC/EN 60715, width: 35 mm / 1.38 in
Weight		220 g / 0.49 lb

ORDERING INFORMATION

FF-SRL6025□

□ = 24 Vdc (only)

Note 1: Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

Note 2: Total operations = operations (power factor 1) x limitation factor F.

Example:

U = 230 Vac, I = 1 A, power factor cos φ = 0,5

Switching power P = U x I = 230 VA

Contact life (cos φ = 1, P = 230 VA) =

2 000 000 operations

Limitation factor F (cos φ = 0,5) = 0,7

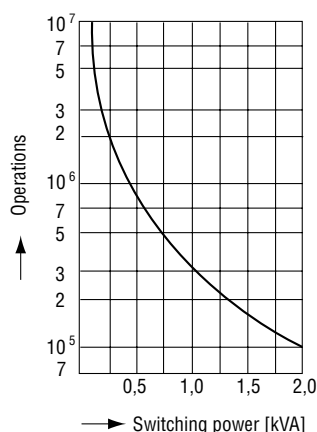
Contact life (cos φ = 0,5, P = 230 VA) =

F x contact life (cos φ = 1, P = 230 VA) =

2 000 000 x 0,7 = 1 400 000 operations.

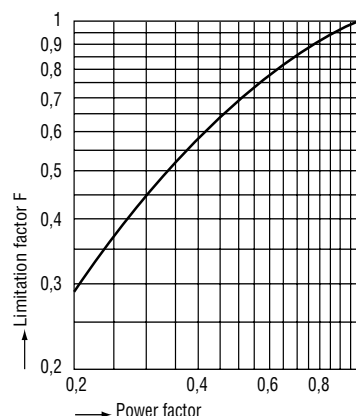
CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(Power factor (cos φ) = 1, see Note 1)

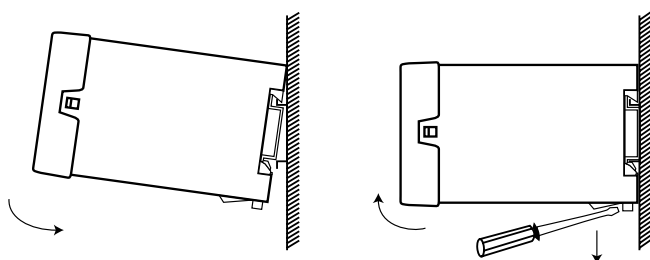


LIMITATION FACTOR F FOR INDUCTIVE LOADS

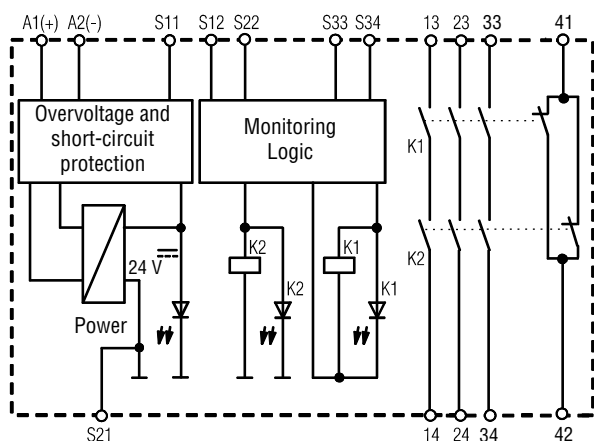
(Power factor (cos φ) < 1, see Note 2)



INSTALLATION DIAGRAM



INTERNAL CIRCUITRY



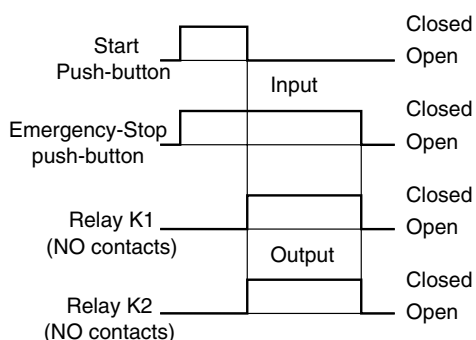
FUNCTIONAL DESCRIPTION

The FF-SRL6025 module is designed to be used with safety light curtains with PNP safety static outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18, FF-SLG30).

If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and to remove power.

In the manual start mode, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2. In the automatic start mode, the internal safety relays K1 and K2 energise automatically.

Both relays K1 and K2 must be energized to have the normally open contacts 13/14, 23/24 and 33/34 in a closed position.

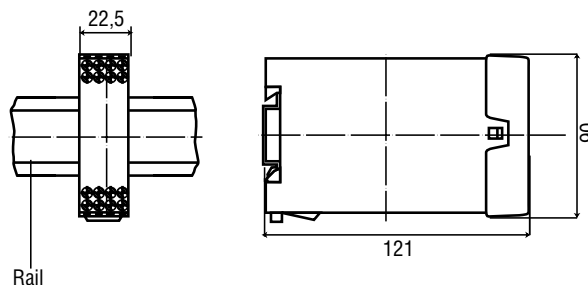


Line fault Detection on Start push-button

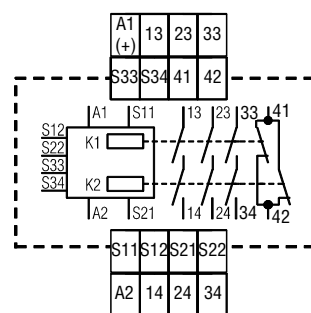
If the start push-button is closed before voltage is applied to S12 and S22 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push-button. In case of a push-button failure the module can not be restarted.

MOUNTING DIMENSIONS

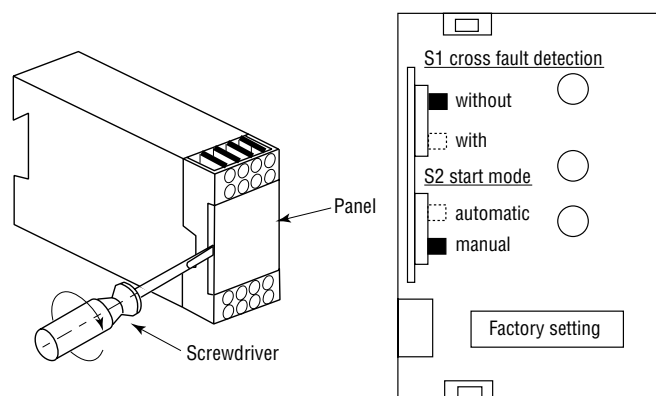
Width: 22,5 mm / 0.89 in; Height: 90 mm / 3.55 in;
Depth: 121 mm / 4.77 in



FRONT PANEL



MODE SETTING



The FF-SRL6025 emergency stop module contains two internal switches (S1 and S2) for the mode settings. To access to these switches, remove the front panel using a screwdriver.

Switch S1 is used to select an operating mode for cross fault detection between the two inputs.

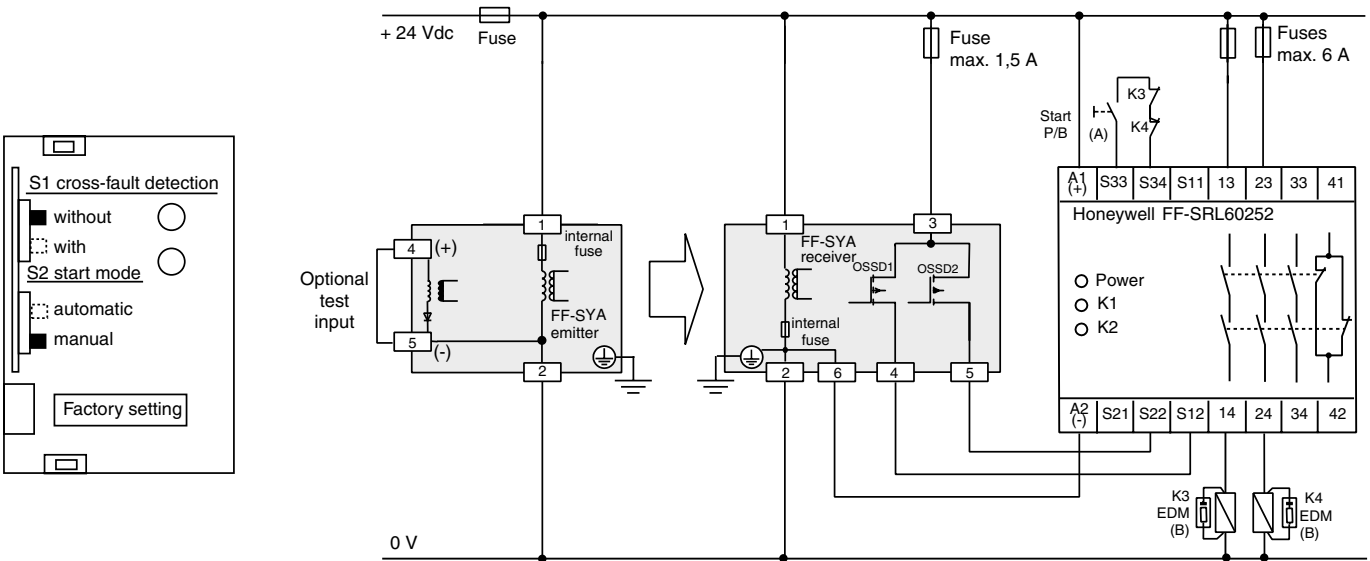
When connecting safety light curtains with PNP static safety outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18, FF-SLG30), leave the switch S1 on position "without cross-fault detection" (factory setting), as cross-faults are detected by the light curtain.

Switch S2 is used to select the start /restart modes. In the manual start /restart mode, a start push-button needs to be pushed and released to energise the safety relay contacts. In the automatic start mode, the safety relay contacts energise automatically, after releasing the connected safety device.

APPLICATION EXAMPLES

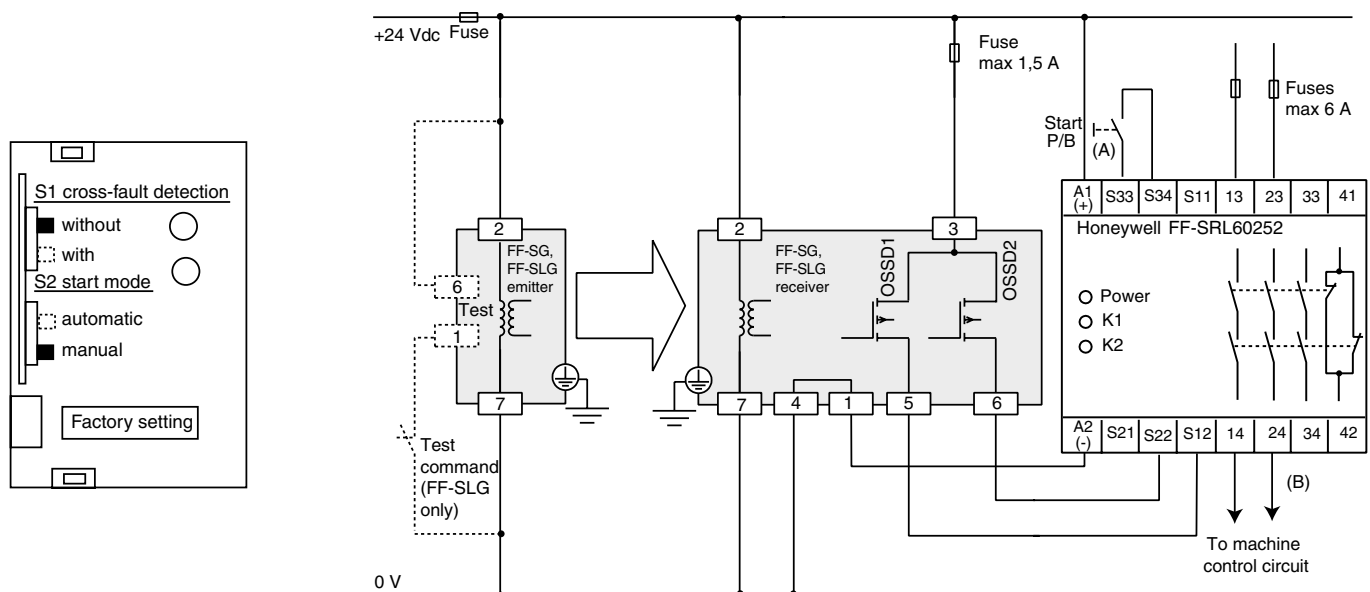
CONNECTION OF AN FF-SYA TYPE 4 SAFETY LIGHT CURTAIN

(WITHOUT CROSS-FAULT MONITORING BY THE MODULE, WITH EXTERNAL CONTACTORS)



CONNECTION OF AN FF-SG TYPE 4 OR FF-SLG18/FF-SLG30 TYPE 2 SAFETY LIGHT CURTAIN

(WITHOUT CROSS-FAULT MONITORING BY THE MODULE, WITHOUT EXTERNAL CONTACTORS)



FUNCTIONAL DESCRIPTION

The FF-SRL6025 safety control module is designed to be used with safety devices with static safety outputs (e.g. FF-SYA, FF-SYB, FF-SG, FF-SLG18 or FF-SLG30 safety light curtains).

In the case of an **emergency stop condition**, the safety device is actuated and opens its normally closed contacts connected to the dual input channels S11/S12 and S21/S22. The internal safety relays K1 and K2 de-energise, indicated by the turned off LED indicators K1 and K2. The normally open safety relay contacts (13/14, 23/24, 33/34) will open and the normally closed contact (41/42) will close. The emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to stop the hazard and remove the electrical power. When removing the emergency stop condition, the normally closed safety device contacts close again and the module is ready to be restarted.

Two start / restart modes can be set: In the **manual start mode**, a push-button needs to be pushed and released, to energise the internal safety relays K1 and K2 and to illuminate LED indicators K1 and K2. The normally open safety contacts (13/14, 23/24, 33/34) will close and the normally closed contact (41/42) will open, allowing the machine to operate. In the **automatic start mode**, the internal safety relays K1 and K2 energise automatically.

APPLICATION NOTES

Note (A): Manual start mode: Insert start push-button between S33/S34 and select internal switch S2 as illustrated above.

Automatic start mode: Insert jumper between S33/S34 and select internal switch S2 to automatic start mode.

Note (B): External contactors

The proper operation of external safety contactors and FF-SRE extension modules must be monitored by using the External Device Monitoring (EDM) function of the FF-SRL6025 module. In order to do so, connect one normally closed contact of each safety contactor (or the FF-SRE Extension module) into the start loop.

Warranty and remedy

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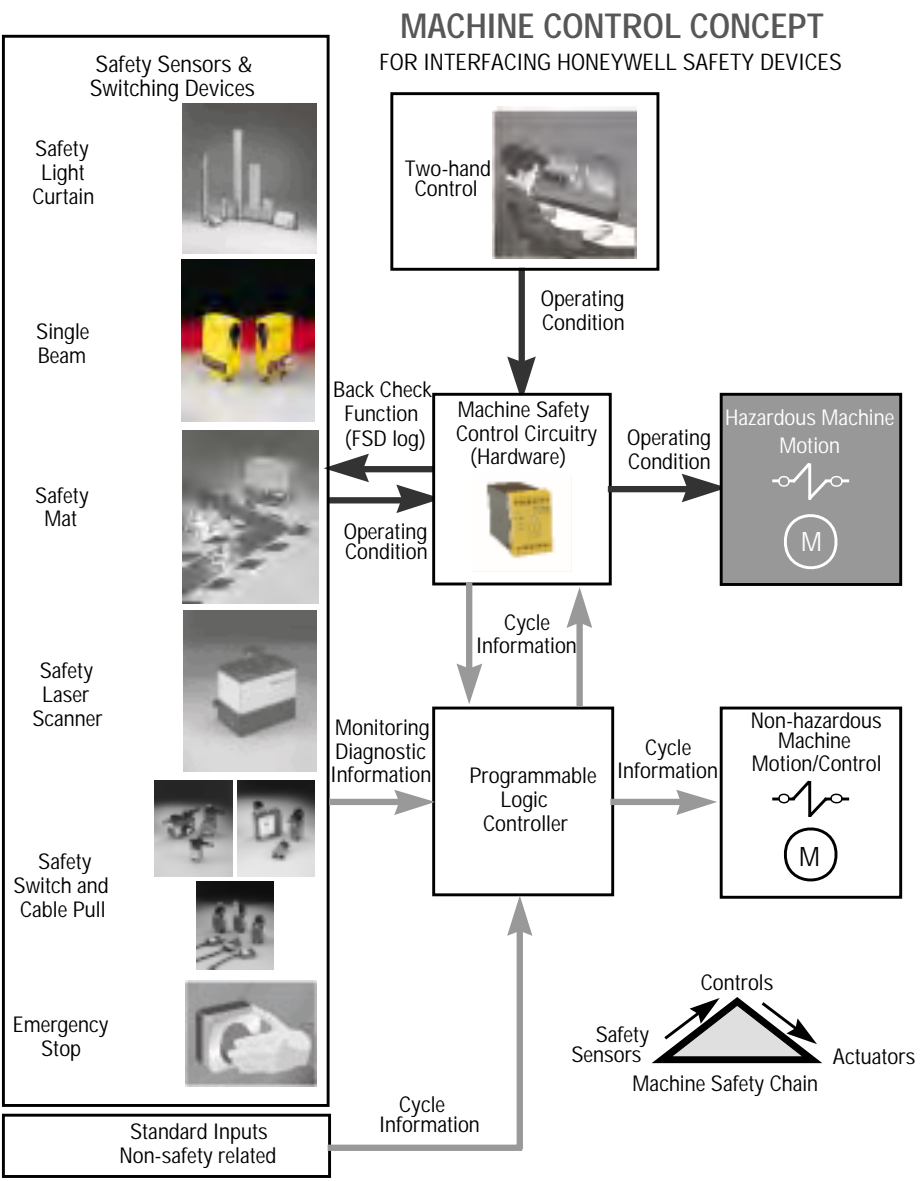
Safety Control Modules

Safety control modules are used to interface safety devices such as safety light curtains, safety mats, safety laser scanners, safety switches, Hall-effect sensors etc. in a safe and reliable manner. The machine safety is not limited to the use of safety sensors alone, but especially relies on the correct design of the safety interface.

The weakest part in the safety chain will determine the overall safety category.



Providing an interface between safety sensors and machine control circuitry is a critical and important part of a control reliable safety solution. Using safety control modules will help you in this task.

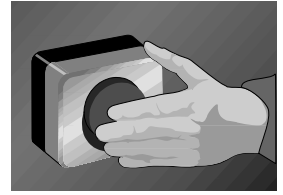


Please refer to the compatibility table page 221, in order to determine which safety device may be connected to which safety control module.

Emergency Stop modules

Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present.

An emergency stop circuit is made up of one actuator part (Emergency Stop push-button or another safety device) and one control part (emergency stop module). The emergency stop module serves as a logical control unit in an emergency stop circuit. If the safety device is actuated, the emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.



An emergency stop module accepts input from **safety devices** such as

- Emergency stop push-buttons
- Electrosensitive Protective Equipment (ESPE) with relay outputs (according IEC/EN 61496 parts 1 & 2),
- Safety mats with relay outputs
- Safety limit switches

Based on the number of safety device input channels, two types of Emergency stop modules are available:

- Single channel Emergency Stop modules (for interfaces up to Category 2 per EN 954-1)
- Dual channel Emergency Stop modules (for interfaces up to Category 4 per EN 954-1, control reliable per OSHA & ANSI).

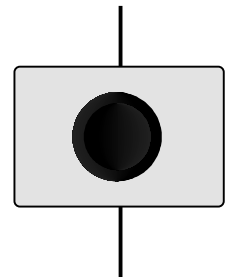
The safety category per EN 954-1 ("Safety related parts of control circuits"), which can be achieved in safety control interfaces, is partly depending on the type of Emergency Stop module used.

⇒ Single channel Emergency Stop modules:

This kind of Emergency stop module offers a single channel input only and are designed to be connected to safety devices with a single channel output. However, there is no redundancy in a single channel input and cross faults in the emergency stop input circuits cannot be detected.

Moreover the detection of a line fault at the start push-button or of a blocked start push-button is not available on this kind of module.

These faults may lead to a dangerous situation and safety may not be maintained.



Single channel Emergency stop modules are suitable for interfaces up to Category 2 per EN 954-1.

The following safety devices can be connected to single channel emergency stop modules:

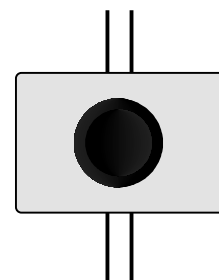
- Single channel emergency stop push-buttons
- Safety limit switches

If a single channel Emergency stop module does not provide the level of safety required, use one of the dual channel safety control modules.

⇒ Dual channel Emergency Stop modules:

Emergency stop modules with two channel input are designed to be connected to safety devices with two channel outputs.

These two channels being powered with a different potential, **any cross faults in the input loop** will be detected and not allow to restart the module.



A line fault at the start push-button or a **blocked start-button** will be detected and the module cannot be restarted: If the Start push-button is already closed before energizing the inputs, it is impossible to energize the output contacts. If a line fault in the start push-button occurs after the machine starts, it will be detected at the next cycle and the output contact will not be energized.

Dual channel Emergency stop modules are suitable to be used for interfaces up to Category 4 per EN 954-1 and meet control reliability per OSHA & ANSI.

It is possible to connect safety devices such as

- Emergency stop push-buttons
- Electrosensitive protective equipment ESPE with relay outputs (following IEC/EN 61496 parts 1 & 2)
- Safety mats with relay outputs
- Safety limit switches

Two-hand safety module

Two-hand safety control systems ensure protection against hand injury due to dangerous movements of machines.

A two-hand safety control system is made up of two parts:

- A control board with two hand control devices
- A two-hand safety module (or command circuit) connected to the control board

The two-hand safety device must be activated simultaneously with both hands in order to make the two hand safety module close his outputs. The two hand safety module is relaying the output signal to the machine control circuit, allowing the machine to work.

The two hand safety device must be located outside the dangerous area, so that the operator cannot reach the dangerous area before the machine has completely stopped. Releasing of one or both of the two hand device gives an immediate stop command of the machine. If only one two hand device has been released, the machine can only be restarted after releasing the other device and reactivation of both devices.

Different types of two-hand controls (Type per EN 574: Two-hand controls)

Features	Type I	Type II	Type IIIA	Type III B	Type IIIC
Use of both hands to initiate cycle	●	●	●	●	●
Both two hand devices need to be activated during the whole dangerous cycle	●	●	●	●	●
Relation between input/output signal	●	●	●	●	●
Release of one or both two hand devices stops the dangerous movement	●	●	●	●	●
Hazardous operation	●	●	●	●	●
Tamper resistant	●	●	●	●	●
Release of both two hand devices for restart		●	●	●	●
Synchronous action (0.5 s max. between signals)			●	●	●
Steps to ensure maintain of safety functions:					
Well tried components following Cat.1 per EN 954-1	●	●	●	●	●
Single fault detection following Cat.3 per EN 954-1		●		●	
Permanent self check Cat.4 per EN 954-1					●
Category according EN 954-1	1	3	1	3	4

Restart the output signal: releasing of one or both safety devices will stop the dangerous movement. Restart is only possible after both safety devices have been released.

Safety on single fault: After a fault, the two-hand system must neither become a one hand system, nor lead to hazardous start. Faults are not all detected and their accumulation can lead to the loss of the safety function.

Automatic self-check: The system will detect the first fault in the circuit and will stop the dangerous movement. Faults will be detected before they could lead to the loss of the safety function.

Safety door monitors

Mechanical doors prevent the access to dangerous zones. These doors are designed to limit or block the access to hazardous motion of machinery.

They can be equipped with locking or interlocking devices, usually limit switches, micro switches or any other sensors.

When the locking device is triggered by means of moving the protective door, 2 types of information are created:

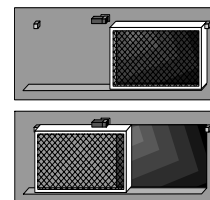
- **Door open:** The locking device triggers a stop command.
- **Door closed:** The locking device allows machine restart, but will not trigger the restart by itself.

EN 60204 9.3.1

Closing the protective door shall not initiate a movement or an operation that could create a dangerous situation.

Low safety level (Category 1 or 2 per EN 954-1)

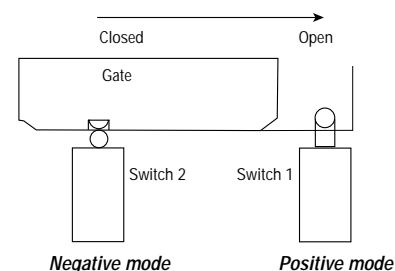
The safety standards require a locking device made up of only one mechanical position switch, triggered in positive mode and with positive opening contact.



High safety level (Category 3 or 4 per EN 954-1)

The safety standard demands a locking device made up of two mechanical position switches, usually working in opposite mode (see figure aside):

- One switch with normally closed contacts triggered by the door according to the positive mode
- One switch with normally open contacts triggered by the door according to the negative mode.



Extension module

The Extension Module provides contact multiplication for safety control modules or other safety devices offering the external relay (FSD) monitoring capability.

The correct operation of the FF-SRE3081 is monitored by the FSD loop of the main safety device.

Time delay modules

The time delay modules may be used together with emergency stop modules. The emergency stop module will immediately signal the emergency stop condition to the machine control circuitry.

The time delay module can be used to keep some non-safety related machinery operating for a short period of time to avoid an unsafe condition or simplify the machine run-down & start-up cycle. This is referred to as a Category 1 emergency stop per EN 418.



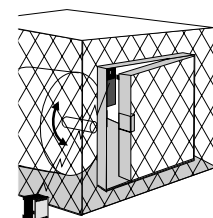
Typical Applications:

- Allowing the opening of a safety door after an elapsed time
- Signals a brake to stop the dangerous movement
- Disconnection of main power from the safety interface circuit after stopping the dangerous movement

Standstill monitors

The Standstill monitor module is detecting the stopping of single or three phase asynchronous motors by measuring the back e.m.f. generated in the stator of the motor. They are often used in conjunction with solenoid key operated switches to latch a door until the dangerous movement has stopped.

Moreover, a broken wire in the measuring circuit can also be detected (by means of DC current injection).



Typical applications:

- Stopped motor monitor for three or single phase asynchronous motors
- Used to unlock a door guarding a rotating machine only when the movement is stopped
- Used to apply an emergency brake

Notice: If the stopping time of the machinery is unpredictable, the use of a time delay module is not advisable. Use the standstill monitor module in order to determine the exact stopping moment.

Specifications FF-SR Series	Single Channel Emergency stop Modules		Dual Channel Emergency stop Modules			Safety module for FF-SYA Safety Light Curtain	Two-hand Safety Module	Safety Door Monitor	Extension Module	Time delay Module	Standstill Monitor Module
Reference	FF-SRS5924	FF-SRS5934	FF-SRS5925	FF-SRS5935	FF-SRS5988	FF-SRS5939	FF-SR25980	FF-SRD5985	FF-SRE3081	FF-SRT	FF-SR05936
Approvals	BG UL/CSA	BG UL/CSA	BG UL/CSA (pending)	BG UL/CSA	BG UL/CSA	BG UL/CSA (pending)	BG UL/CSA	BG UL/CSA	BG UL/CSA	UL/CSA	UL/CSA
Safety Interfaces up to Category ... (per EN 954-1)	2	2	4	4	4	4	1	4	4 ⁽¹⁾	1 ⁽²⁾	1 ⁽²⁾
Input Channels	1	1	2	2	2	2	2	2	2	1 or 2	1
Voltages	24 Vdc	24 Vdc 120 Vac 230 Vac	24 Vac/dc	24 Vdc 120 Vac 230 Vac	24 Vdc/120 Vac 24 Vdc/230 Vac	24 Vdc	24 Vdc 120 Vac 230 Vac	24 Vdc 120 Vac 230 Vac	24 Vdc 120 Vac 230 Vac	24 Vdc 120 Vac 230 Vac	24 Vdc 120 Vac 230 Vac
Safety Contacts	3 NO	2 NO	2 NO	3 NO	6 NO	2 NO	2 NO	2 NO	7 NO 1 NC	1 NO 1 NC	2 NO 2 NC
Auxiliary Contacts	1 NC	-	1 NC	1 NC	1 NC	1 NC	-	-	-	-	-
Switching Current	10 mA to 4 A	10 mA to 10 A	1 mA to 7 A	1 mA to 10 A	1 mA to 10 A	1 mA to 6 A	1 mA to 10 A	1 mA to 10 A	1 mA to 10 A	30 mA to 8 A	10 mA to 10 A
Response Time	35 ms	35 ms	15 ms	25 ms	30 ms	15 ms	30 ms	30 ms	15 ms	-	2 s (after voltage is < 20 mV)
Simultaneity of two Input Signals	-	-	none	none	none	< 30 ms	< 500 ms	< 3 s	-	-	-
Cross fault detection between Input Channels	no	no	yes	yes	yes	no ⁽³⁾	yes	yes	yes ⁽⁴⁾	-	Broken wire detection in measuring input
FSD-Monitoring	yes	yes	yes	yes	yes	yes	yes	yes	-	-	-
Monitoring of Start Push-button	no	no	yes	yes	yes	yes		Automatic start only	-	-	-
Removable Terminal Strips	yes	no	yes	yes	yes	yes	no	no	yes	no	no
Width	22,5 mm / 0.89 in	45 mm / 1.77 in	22,5 mm / 0.89 in	45 mm / 1.77 in	100 mm / 3.93 in	45 mm / 1.77 in	45 mm / 1.77 in	45 mm / 1.77 in	100 mm / 3.93 in	45 mm / 1.77 in	45 mm / 1.77 in

(1) The safety category depends on the category of the main safety control module

(2) A higher safety category may be reached (depending on the interface)

(3) Cross faults between the inputs of the FF-SRS5939 will be detected by the fail safe static outputs of the FF-SYA safety light curtain

(4) Depends on the connection of the FF-SRE

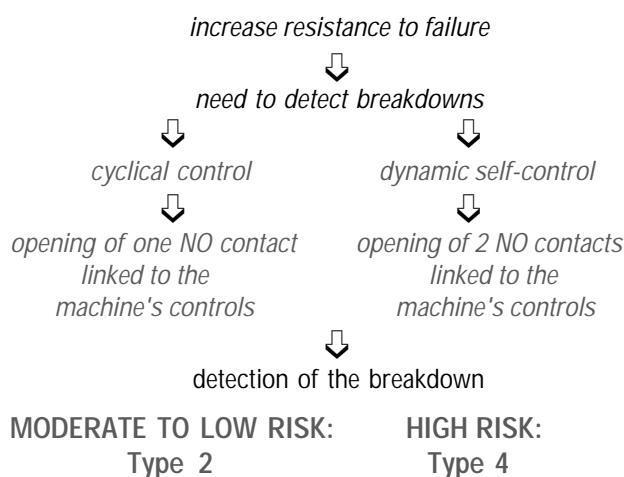
Compatibility between Honeywell Safety Devices and Safety Control Modules	Single Channel Emergency stop Modules		Dual Channel Emergency stop Modules			Safety module for FF-SYA Safety Light Curtain	Two-hand Safety Module	Safety Door Monitor	Extension Module	Time delay Module	Standstill Monitor Module	Category 2 Muting Module	Category 4 Muting Module
Reference	FF-SRS5924	FF-SRS5934	FF-SRS5925	FF-SRS5935	FF-SRS5988	FF-SRS5939	FF-SR25980	FF-SRD5985	FF-SRE3081	FF-SRT	FF-SR05936	FF-SLM	FF-SRM100P2
Safety Interfaces up to Category ... (per EN 614-1)	2	2	4	4	4	4	1	4	4 ⁽¹⁾	1 ⁽²⁾	1 ⁽²⁾	2	4
FF-SYA: Type 4 Light Curtains						●							●
FF-SB, FF-LS: Type 4 Light Curtains			●	●	●				● ⁽³⁾				●
FF-SLC: Type 2 Light curtains									●			●	
FF-SM: Safety Mat			●	●	●								●
FF-SE: Safety Laser Scanner			●	●	●								●
GKM, GK: Key operated Safety Switches	●	●	●	●	●			●					
GKR/L: Solenoid Key Operated Safety Switches	●	●	●	●	●			●		●	●		
GSS: Global Safety Switch 24CE/924CE: Miniature Safety Switch	●	●	●	●	●			●					
40FY: Hall Effect Sensors	●			●				●					
FF-SRE3081: Extension Module	●	●	●	●	●	●	●	●	●			●	●
FF-SRT: Time Delay Module	●	●	●	●	●	●	●	●				●	●
FF-SR05936: Standstill Monitor Module	●	●	●	●	●	●	●	●				●	●

● Interconnection possible

⁽¹⁾ The safety category depends on the category of the main safety control module⁽²⁾ A higher safety category may be reached (depending on the interface)⁽³⁾ Except the FF-SB1 and R02□-S2 (no FSD-loop)

Use of electrosensitive protective equipment: What you must know...

Part 1 of standard IEC / EN 61496:



Standard IEC / EN 61496:

Minimum requirements for design, manufacturing and evaluation of electrosensitive protective equipment for the detection of the human body, whatever technology is used for body part detection.

Part 2 of standard IEC / EN 61496:

Some requirements specific to the technology used by the sensor for the detection of human body parts are covered by either another standard (like EN 1760-1 for safety mats) or by another part of standard IEC/EN 61496 (*laser scanners will be covered by: pr IEC / EN 61496-3*).

This is the case for all protective equipment using optoelectronic devices for the detection of human body parts.

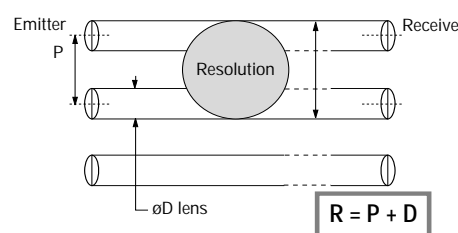
The second part of standard IEC/EN 61496 defines the **characteristics specific to optoelectronic devices**, composed of emitters and receivers detecting the interruption of an optic signal generated by the device itself. Light curtains and multiple individual beams are part of this equipment and are referred to as "active optoelectronic protective devices" (AOPD).

Resolution:

The resolution of an optoelectronic protective device is defined as being the minimum diameter of the object always detected in any location within the controlled field.

Honeywell defines it as the sum of the center-to-center distances between 2 consecutive beams and the diameter of the optics used at transmission and reception.

Thus, the resolution of the **Honeywell** safety light curtains does not depend on the distance between the transmitter and the receiver, nor on environmental pollution, but only on the **geometry of the sensors**.

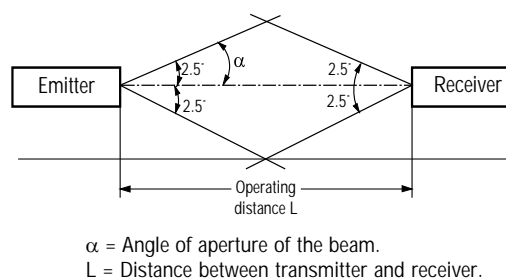


Angles of aperture and reflective surfaces:

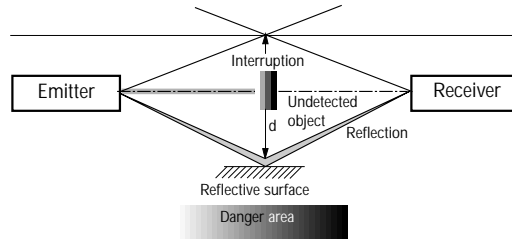
Optics used on optoelectronic devices define a cone within which beams are emitted by emitters and received by receivers.

This cone has an aperture angle α formed between the optical axis and the beams located on the edge of the optic cone.

The presence of reflective surfaces between the sensing field



and the dangerous zone can bring about false reflections of the beams farthest from the optical axis and thus delay the detection of an object entering the dangerous zone.



In order to limit any risk posed by this, standard IEC/EN 61496 - 2 voluntarily limits the angle of aperture of the optoelectronic devices within the following values:

For Type 2 equipment:

The angle of aperture α cannot exceed 5° in relationship to the optical angle for any distance between emitter and receiver greater than 3 m. For distances between 0.5 m and 3 m, the angle of aperture must obey the rule:

$$L \times \tan(\alpha) \leq 262 \text{ mm}$$

where L is the distance between the emitter and the receiver.

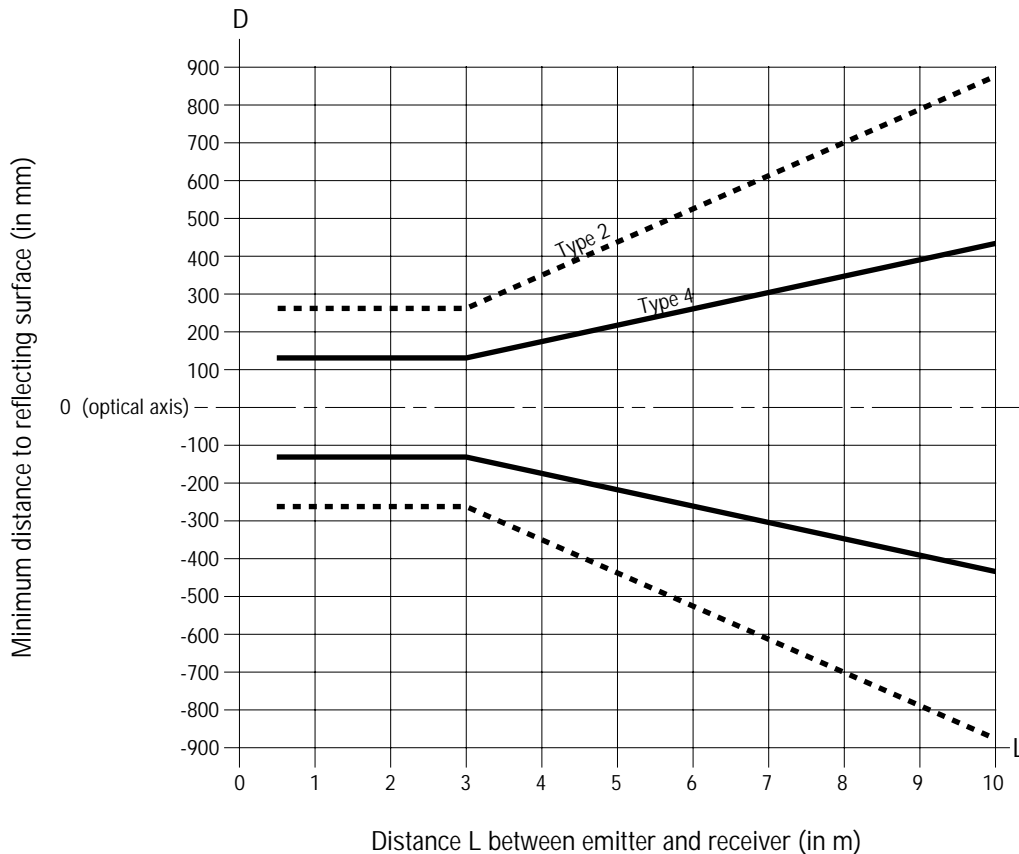
For Type 4 equipment:

The angle of aperture α cannot exceed 2.5° in relationship to the optical angle for any distance between transmitter and receiver greater than 3 m. For distances between 0.5 m and 3 m, the angle of aperture must obey the rule:

$$L \times \tan(\alpha) \leq 131 \text{ mm}$$

where L is the distance between the transmitter and the receiver.

In addition to the design requirement, there is an installation requirement. The minimum distance for installing an optoelectronic protective device in relation to a reflective surface can be determined from the following table:



Distance L between emitter and receiver (in m)

General rules for installation

The selection of a safety solution is not limited to the simple selection of equipment according to the estimated level of safety, the type of machine to protect or the cost of installation. Some rules about installation will help you choose.

Three primary rules:

1 - Your machines can stop only after a certain length of time and the proposed safety equipment has a response time that you must take into account, even if it is small. You will thus be required to put your equipment at a minimum "safety distance".

Standard **EN 999** supplies the formulae to calculate this distance.

2 - You may be required to add additional protective devices in order to prevent individuals from entering the "non detection zone". Between the detection zone covered by sensors and the dangerous zone, there may be sufficient space to let an arm through, for example.

These devices are regulated by standards **EN 294**, **EN 811** and **ANSI B11.19**.

3 - You cannot be satisfied just by designing or installing equipment achieving the required safety level. The control circuit of the machine also requires an equivalent safety level. Standards **EN 954-1**, **IEC / EN 61496 - 1**, **ANSI B11.19** and type **C** standards explain these requirements.

Observe a sufficient safety distance:

The distance between the safety equipment and the dangerous zone is an inviolable safety element. If no type C standard specific to the machine exists, standard **EN 999** is applicable.

This standard supplies the necessary elements to compute the minimum distance to be respected between the equipment and the machine.

The formula takes the following general form:

$$S = K (t_1 + t_2) + C$$

S: Minimum safety distance between the detection field and the dangerous zone (in mm)

K: Approach speed of the parts of the human body directly exposed (in mm/sec). Depending on the type of approach and the type of protective device used, *K* takes 2 values: 1.6 or 2 mm/msec.

t1: Response time of the protective equipment (in sec)

t2: Time necessary for the machine to stop the dangerous motion (in sec)

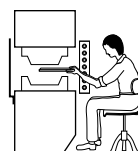
C: Safety zone depending on the sensing ability of the protective equipment (in mm)

The **EN 999** standard supplies the values for the **K** and **C** parameters for each of the three groups of safety devices being considered.

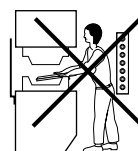
Installation examples



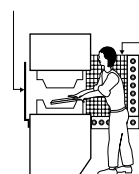
Penetration in danger zone under the barrier



Penetration in danger zone over the barrier



Penetration between the barrier and the danger zone

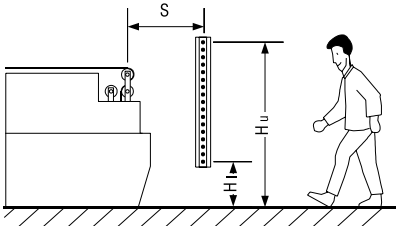
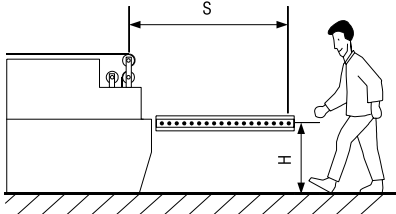
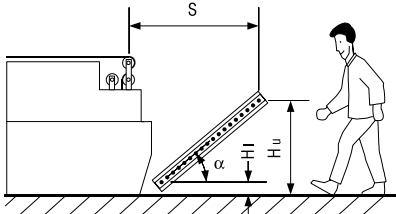


Mechanical protective on the back and sides

C is computed as a function of **R (resolution of the equipment)** and is therefore a function of each type of equipment and type of approach. Thus, depending on the case, C takes the following values:

- For light curtains with resolution $14\text{ mm} \leq R \leq 40\text{ mm}$:
 $C = 8(R-14)$, in normal approach, and for an approach angle greater than or equal to 30°
- For light curtains with resolution $R > 40\text{ mm}$: $C = 850$, in normal approach, and for an approach angle greater than or equal to 30°
- For systems with single beams: $C = 1200$
- For safety floors, barriers or for multiple individual beams, with a parallel approach or floors: $C = 1200 - 0.4 H$, H being the height of the detection plane from the ground (in mm)
- For two-hand controls: $C = 250$
- For safety laser scanners: $C = (1200 - 0.4 H) + E$, E being the additional error margin and H the height of the detection plane from the ground (in mm)

Safety distances (in mm, 100 mm = 3.9 in)

European EN 999 standard	$R \leq 40$	$R > 40$	Single beam
Perpendicular approach			
	$S \geq 2000(t_1+t_2) + 8(R-14)$ with $S \geq 100$ If $S \geq 500$, then use: $S \geq 1600(t_1 + t_2) + 8(R-14)$ with $S \geq 500$	$S \geq 1600(t_1+t_2) + 850$, with $H_u \geq 900$ $H_l \leq 300\text{ mm}$	$S \geq 1600(t_1+t_2) + 1200$
Parallel approach			
	$S \geq 1600(t_1+t_2) + (1200 - 0.4 H)$, with $H \leq 875$ or $S \geq 1600(t_1 + t_2) + 850$, with $875 \leq H \leq 1000$ with $H \geq 15(R-50)$ where R is the light curtain resolution		
Angled approach			
	$\text{if } \alpha \geq 30^\circ$, then use one of the formula given for a perpendicular approach, with $H_u \geq 900$ and $H_l \leq 300$ if $R > 40$ $\text{if } \alpha \leq 30^\circ$, then use one of the formula given for a parallel approach, with $H_u \leq 1000$ and $H_l \geq 15(R-50)$ where R is the light curtain resolution		

- S minimum safety distance (in mm, 100 mm = 3.9 in)
t1 light curtain response time (in sec.)
t2 machine stopping time (in sec.)
H height of the detection plane above the reference floor (in mm, 100 mm = 3.9 in)
Hu height of the uppermost beam above the reference floor (in mm, 100 mm = 3.9 in)
Hl height of the lowest beam above the reference floor (in mm, 100 mm = 3.9 in)