Safety Light Curtains
Type XUSLT 14 and 30 mm

Catalog
03

File 9007

CONTENTS

a brand of Schneider Electric

Telemecanique

Safety Light Curtains
XUSLT 14 mm Minimum Object Sensing, DC Solid State Output

XUSLTQ6A●●●●

Features

- Type 4 ESPE (Electro-Sensitive Protective Equipment)
- 0.55 in. (14 mm) resolution, MOS (Minimum Object Sensitivity)
- 24.5 ft (7.5 m) sensing range
- 10.4 - 54.9 in. (263 - 1394 mm) protection heights
- Two Box system (no controller required)
- Blocked Beam Indication
- ECS (Exact Channel Select) / Blanking
- Floating Blanking
- MTS (Machine Test Signal)
- Two PNP safety outputs
- One NPN or PNP non-safety alarm output

Transmitter-Receiver pairs for point of operation finger protection (14 mm) ♦

System supplied with a test rod, 2 sets of mounting brackets with hardware and documentation kit. (No cables provided, see below)

0.3 to 7.5 m (1 to 24.5 ft.) Sensing Range				
Protection Height in. (mm)	**Response Time (milliseconds)**	**Number of Beams**	**Catalog Number ▲**	**System Weight Lb.(Kg.)**
10.3 (263)	20 ms	24	**XUSLTQ6A0260**	10 (4.5)
13.8 (351)	20 ms	32	**XUSLTQ6A0350**	11 (4.8)
17.2 (438)	20 ms	40	**XUSLTQ6A0435**	11 (5.2)
20.6 (523)	25 ms	48	**XUSLTQ6A0520**	12 (5.6)
24.1 (613)	25 ms	56	**XUSLTQ6A0610**	13 (5.9)
27.6 (700)	25 ms	64	**XUSLTQ6A0700**	14 (6.2)
30.9 (785)	30 ms	72	**XUSLTQ6A0785**	15 (6.6)
34.3 (871)	30 ms	80	**XUSLTQ6A0870**	15 (6.9)
37.7 (958)	35 ms	88	**XUSLTQ6A0955**	16 (7.3)
41.2 (1046)	35 ms	96	**XUSLTQ6A1045**	18 (8.2)
44.6 (1133)	35 ms	104	**XUSLTQ6A1130**	19 (8.5)
47.9 (1219)	40 ms	112	**XUSLTQ6A1215**	20 (8.9)
51.4 (1306)	40 ms	120	**XUSLTQ6A1305**	20 (9.2)
54.9 (1394)	40 ms	128	**XUSLTQ6A1390**	21 (9.6)

▲ To order with NPN alarm output replace A with B in the catalog number. Example: XUSLTQ6**A**0700 becomes XUSLTQ6**B**0700.
♦ Transmitter only and Receiver only can be specified from the table on page 7.

Connector cables (required and available separately)

Length	**Transmitter cable**	**Receiver cable**
32.8 ft. (10 m)	**XSZTCT10**	**XSZTCR10**
49.2 ft. (15 m)	**XSZTCT15**	**XSZTCR15**
98.4 ft. (30 m)	**XSZTCT30**	**XSZTCR30**

File E164353
CCN: NKCR

File LR 44087
Class 3211 03

XUSLTR5A●●●●

Features

- Type 4 ESPE (Electro-Sensitive Protective Equipment)
- 30 mm (1.18 in.) resolution, MOS (Minimum Object Sensitivity)
- 29.5 ft (9 m) or 65 ft (20 m) sensing range
- 13.8-82.6 in. (351-2095 mm) protection heights
- Two Box system (no controller required)
- Blocked Beam Indication
- ECS (Exact Channel Select) / Blanking
- Floating Blanking
- MTS (Machine Test Signal)
- Two PNP safety outputs
- One NPN or PNP non-safety alarm output

Transmitter-Receiver pairs for point of operation hand protection (30 mm) ♦

System supplied with a test rod, 2 sets of brackets with hardware and documentation kit. (No cables provided, see below)

1 to 29.5 ft (0.3 – 9 m) Sensing Range				
Protection Height in. (mm)	**Response Time (milliseconds)**	**Number of Beams**	**Catalog Number ▲**	**System Weight Lb.(Kg.)**
13.8 (351)	20 ms	16	**XUSLTR5A0350**	11 (4.8)
20.6 (523)	20 ms	24	**XUSLTR5A0520**	12 (5.6)
27.6 (700)	20 ms	32	**XUSLTR5A0700**	14 (6.2)
34.3 (871)	20 ms	40	**XUSLTR5A0870**	15 (6.9)
41.2 (1046)	25 ms	48	**XUSLTR5A1045**	18 (8.2)
47.9 (1219)	25 ms	56	**XUSLTR5A1215**	20 (8.9)
54.9 (1394)	25 ms	64	**XUSLTR5A1390**	21 (9.6)
61.8 (1570)	30 ms	72	**XUSLTR5A1570**	22 (10.0)
68.7 (1746)	30 ms	80	**XUSLTR5A1745**	23 (10.4)
75.6 (1920)	35 ms	88	**XUSKTR5A1920**	24 (10.9)
82.6 (2095)	35 ms	96	**XUSLTR5A2095**	26 (11.8)
1 to 65 ft (0.3 – 20 m) Sensing Range				
13.8 (351)	20 ms	16	**XUSLTY5A0350**	11 (4.8)
20.6 (523)	20 ms	24	**XUSLTY5A0520**	12 (5.6)
27.6 (700)	20 ms	32	**XUSLTY5A0700**	14 (6.2)
34.3 (871)	20 ms	40	**XUSLTY5A0870**	15 (6.9)
41.2 (1046)	25 ms	48	**XUSLTY5A1045**	18 (8.2)
47.9 (1219)	25 ms	56	**XUSLTY5A1215**	20 (8.9)
54.9 (1394)	25 ms	64	**XUSLTY5A1390**	21 (9.6)
61.8 (1570)	30 ms	72	**XUSLTY5A1570**	22 (10.0)
68.7 (1746)	30 ms	80	**XUSLTY5A1745**	23 (10.4)
75.6 (1920)	35 ms	88	**XUSKTY5A1920**	24 (10.9)
82.6 (2095)	35 ms	96	**XUSLTY5A2095**	26 (11.8)

▲ To order with NPN alarm output replace A with B in catalog number. Example: XUSLTY5**A**0700 becomes XUSLTY5**B**0700.
♦ Transmitter only and Receiver only can be specified from the table on page 7.

Connector cables (required and available separately)

Length	**Transmitter cable**	**Receiver cable**
32.8 ft. (10 m)	**XSZTCT10**	**XSZTCR10**
49.2 ft. (15 m)	**XSZTCT15**	**XSZTCR15**
98.4 ft. (30 m)	**XSZTCT30**	**XSZTCR30**

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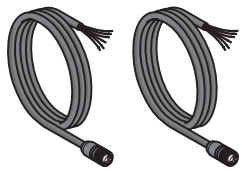
Technical Specifications

		Self-Contained Models		
		XUSLTQ6•••• (14 mm)	**XUSLTR5••••• (30 mm)**	**XUSLTY5••••• (30 mm)**
Conformity/Approvals				
Conforming to standards	IEC 61496-1-2 for TYPE 4 ESPE. ANSI/RIA R15.06, ANSI B11:19-1990, OSHA 1910.217(C), OSHA 1910.212.			
Other approvals	CE, TUV, UL, CSA			
Environment				
Ambient air temperature	°F °C	For operation: 32 to +131 °F, for storage: -13 to +167 °F For operation: 0 to + 55 °C, for storage: -25 to +75 °C		
Relative humidity	%	95% maximum, non-condensing		
Degree of protection		IP65		
Resistance to shock and vibration		According to IEC 61496-1, Shock: 10 g, impulse 16 ms, Vibration: 10 to 55 Hz, amplitude: 0.35 + 0.05 mm		
Materials		Housing: polyester powder painted aluminum (RED color: RAL3000); End caps: poly carbonate; Front face: PMMA.		
Optical Characteristics				
Minimum Object Sensing (MOS) (Use of ECS / Blanking or Floating Blanking will increase this value)	mm (In.)	0.55 in. (14 mm) no floating blanking 0.98 in. (25 mm) 1-beam floating blanking 1.41 in. (36 mm) 2-beam floating blanking	1.18 in. (30 mm) no floating blanking 2.05 in. (52 mm) 1-beam floating blanking 2.91 in. (74 mm) 2-beam floating blanking	
Nominal Range	ft. (m)	1 to 24.6 ft. (0.3 to 7.5 m)	1 to 29.5 ft. (0.3 to 9 m)	1 to 65 ft. (0.3 to 20 m)
Protection heights	in. (mm)	10.3 to 54.9 in. (263 to 1394 mm)	13.8 to 82.5 in. (351 to 2095 mm)	
Effective aperture angle		+2.5° maximum, transmitter and receiver at operating range > 9.8 ft. (3 m)		
Light source		GaAlAs Light Emitting Diode, 850 nm		
Resistance to light		Per IEC 61496-2		
Electrical Characteristics				
Response time	ms	< 20 ms (protected heights: 263,351,438) < 25 ms (protected heights: 523,613,700) < 30 ms (protected heights: 785,871) < 35 ms (protected heights: 958,1046,1133) < 40 ms (protected heights: 1219,1306,1394)	< 20 ms (protected heights: 351,523,700,871) < 25 ms (protected heights: 1046,1219,1394) < 30 ms (protected heights: 1570,1746) < 35 ms (protected heights: 1920,2095)	
Power supply	V	24 V ⎓ +/-20% 2 A. The power supply must meet the requirements of IEC 61496-1 and IEC 60204-1.		
Max. current consumption (no load)	mA	Receiver: 300 mA; Transmitter: 285 mA		
Resistance to interference		Level 3 according to IEC 61496-1		
Input power	A	Transmitter: 285 mA; Receiver: 1.4 A (with maximum load). The power supply must meet the requirements of IEC 60204-1 and IEC 61496-1.		
Safety outputs (OSSD)		2 solid state PNP (NO) outputs, 500 mA @ 24 V ⎓ (short circuit protection). See notes 1 and 2 below.		
Alarm outputs		1 NPN output 100 mA @ 24 V ⎓ or 1 PNP output 100 mA @ 24 V ⎓. See note 1 below.		
MPCE/EDM monitor		50 mA @ 24 V ⎓ steady state		
Signals		Transmitter: 1 LED (power); Receiver: 4 LEDs (stop, run, interlock, floating blanking, or exact channel select / blanking)		
Connections		Transmitter: 5 pin male M12 connector Receiver: 8 pin male M12 connector		
Cable lengths		Extension cables are available separately in lengths of 32.8 ft. (10 m), 49.2 ft. (15 m), and 98.4 ft. (30 m). Maximum cable length of 196.8 ft. (60 m) between heads is dependent on load current and power supply.		
Cable gauge		22 AWG (0.3117 mm^2); 20 AWG (0.4418 mm^2) for power and output safety switching device (OSSD) wires.		
Cable resistance		0.1686 Ω per ft. / 0.05531 Ω per m; 0.01190 Ω per ft. and 0.03903 Ω per m for the power and OSSD wires.		
Tightening torque		Cap screws: 8 lb-in (0.9 N•m)		
Functions				
Functions		- Auto / Manual - Relay monitoring (MPCE / EDM) - Test (MTS) - Blanking (ECS / B) - Floating Blanking (FB) - Alignment aid through visual LED's (blocked beam indicators)		
External relay monitoring (MPCE / EDM)		Machine primary control element (MPCE) / External device monitoring (EDM) Monitors the XUSLT system interface to the guarded machine and checks to ensure that the control elements or external devices are responding correctly to the light curtain.		
Test (MTS)		Machine test signal (MTS) - Simulates a blocked beam state on the system and enters the machine stop state.		
Muting		Possible with an external module (XPSLMS1150)		

Note 1: The total current required by two solid-state outputs and the non-safety alarm output should not exceed 1.1 A.

Note 2: 24 V ⎓ is nominal. Drop out voltage is 2 V.

Specifications are subject to change without notice.



XSZTCT●● XSZTCR●●

Transmitter & Receiver Connector Cables

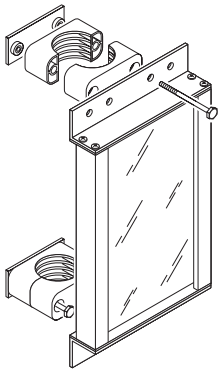
Description	Cable Length	Catalog Number
XUSLT Transmitter cable lengths	32.8 ft. (10 m)	**XSZTCT10**
	49.2 ft. (15 m)	**XSZTCT15**
	98.4 ft. (30 m)	**XSZTCT30**
XUSLT Receiver cable lengths	32.8 ft. (10 m)	**XSZTCR10**
	49.2 ft. (15 m)	**XSZTCR15**
	98.4 ft. (30 m)	**XSZTCR30**

90 Degree Mirrors

Sensing Range using mirrors (percentage of maximum range)

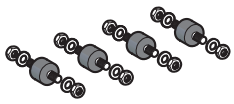
Sensing distance decreases when mirror(s) are used.

Material	No. of Mirrors Used			
	1	2	3	4
Glass	88%	77%	68%	60%
Polished Stainless Steel	82%	67%	55%	45%

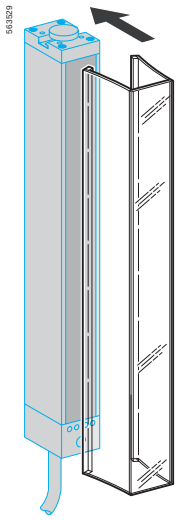


XUSZA●●●● / XUSZM●●●●

Description	For use with light curtains		Catalog Number	Weight Lb. (Kg.)
	Type	Protected Height in. (mm)		
90 Deg. Glass Mirrors with mounting hardware.	XUSLT	12.0 in. (305 mm)	**XUSZM0305**	4.2 (1.9)
	XUSLT	17.9 in. (457 mm)	**XUSZM0457**	5.6 (2.5)
	XUSLT	20.0 in. (508 mm)	**XUSZM0508**	6.1 (2.8)
	XUSLT	24.0 in. (610 mm)	**XUSZM0610**	7.1 (3.2)
	XUSLT	27.9 in. (711 mm)	**XUSZM0711**	8.1 (3.7)
	XUSLT	30.0 in. (762 mm)	**XUSZM0762**	8.5 (3.8)
	XUSLT	32.0 in. (813 mm)	**XUSZM0813**	9.0 (4.0)
	XUSLT	35.9 in. (914 mm)	**XUSZM0914**	9.9 (4.5)
	XUSLT	40.0 in. (1016 mm)	**XUSZM1016**	10.9 (5.0)
	XUSLT	42.0 in. (1067 mm)	**XUSZM1067**	11.4 (5.2)
	XUSLT	47.9 in. (1219 mm)	**XUSZM1219**	12.9 (5.9)
	XUSLT	52.0 in. (1321 mm)	**XUSZM1321**	13.8 (6.3)
	XUSLT	54.0 in. (1372 mm)	**XUSZM1372**	14.3 (6.5)
	XUSLT	55.9 in. (1422 mm)	**XUSZM1422**	14.8 (6.7)
	XUSLT	60.0 in. (1524 mm)	**XUSZM1524**	15.8 (7.2)
	XUSLT	64.0 in. (1626 mm)	**XUSZM1626**	16.8 (7.6)
	XUSLT	72.0 in. (1830 mm)	**XUSZM1830**	18.6 (8.5)
	XUSLT	84.0 in. (2134 mm)	**XUSZM2134**	21.5 (9.8)
90 Deg. Polished Stainless Steel Mirrors with mounting hardware.	XUSLT	12.0 in. (305 mm)	**XUSZA0305**	4.2 (1.9)
	XUSLT	17.9 in. (457 mm)	**XUSZA0457**	5.6 (2.5)
	XUSLT	20.0 in. (508 mm)	**XUSZA0508**	6.1 (2.8)
	XUSLT	24.0 in. (610 mm)	**XUSZA0610**	7.1 (3.2)
	XUSLT	27.9 in. (711 mm)	**XUSZA0711**	8.1 (3.7)
	XUSLT	30.0 in. (762 mm)	**XUSZA0762**	8.5 (3.8)
	XUSLT	32.0 in. (813 mm)	**XUSZA0813**	9.0 (4.0)
	XUSLT	35.9 in. (914 mm)	**XUSZA0914**	9.9 (4.5)
	XUSLT	40.0 in. (1016 mm)	**XUSZA1016**	10.9 (5.0)
	XUSLT	42.0 in. (1067 mm)	**XUSZA1067**	11.4 (5.2)
	XUSLT	47.9 in. (1219 mm)	**XUSZA1219**	12.9 (5.9)
	XUSLT	52.0 in. (1321 mm)	**XUSZA1321**	13.8 (6.3)
	XUSLT	54.0 in. (1372 mm)	**XUSZA1372**	14.3 (6.5)
	XUSLT	55.9 in. (1422 mm)	**XUSZA1422**	14.8 (6.7)
	XUSLT	60.0 in. (1524 mm)	**XUSZA1524**	15.8 (7.2)
	XUSLT	64.0 in. (1626 mm)	**XUSZA1626**	16.8 (7.6)
	XUSLT	72.0 in. (1830 mm)	**XUSZA1830**	18.6 (8.5)
	XUSLT	84.0 in. (2134 mm)	**XUSZA2134**	21.5 (9.8)



XSZSMK



XUSZWS

Shock Mount Kits and Lexan Protection Shields ▲

Description		For use with light curtains		Catalog Number
		Type	Resolution	
Shock mount kits for XUSLT / mirrors		XUSLT	ALL	**XSZSMK**
		XUSLT	ALL	**XSZSMK1**
		XUSLT	ALL	**XSZSMK2**
Lexan Weld Shield	10.2 in. (260 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS0260**
	13.7 in. (350 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS0350**
	17.1 in. (435 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS0435**
	20.4 in. (520 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS0520**
	24.0 in. (610 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS0610**
	27.5 in. (700 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS0700**
	30.9 in. (785 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS0785**
	34.2 in. (870 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS0870**
	37.5 in. (955 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS0955**
	41.1 in. (1045 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS1045**
	44.4 in. (1130 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS1130**
	47.8 in. (1215 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS1215**
	51.3 in. (1305 mm) length	XUSLT	0.55 in. (14 mm)	**XUSZWS1305**
	54.7 in. (1390 mm) length	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSZWS1390**
	61.8 in. (1570 mm) length	XUSLT	1.18 in (30 mm)	**XUSZWS1570**
	68.7 in. (1745 mm) length	XUSLT	1.18 in (30 mm)	**XUSZWS1745**
	75.7 in. (1920 mm) length	XUSLT	1.18 in (30 mm)	**XUSZWS1920**
	82.4 in. (2095 mm) length	XUSLT	1.18 in (30 mm)	**XUSZWS2095**

▲ Detailed information listed on pages 11 - 13.

Additional Spare Parts

Description	For use with light curtains		Catalog Number
	Type	Resolution	
Mounting Brackets w/ hardware	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSLZ213**
Security Cover Screw / Hex security key	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSLZ100**
Receiver End cap w/ Dip switches	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSLZ222**
Arc Suppression kit	XUSLT	0.55 in. / 1.18 in. (14 mm / 30 mm)	**XUSLZ500**

XUSLTQ6

XUSLTQ6 (14 mm) Spare Transmitters and Receivers

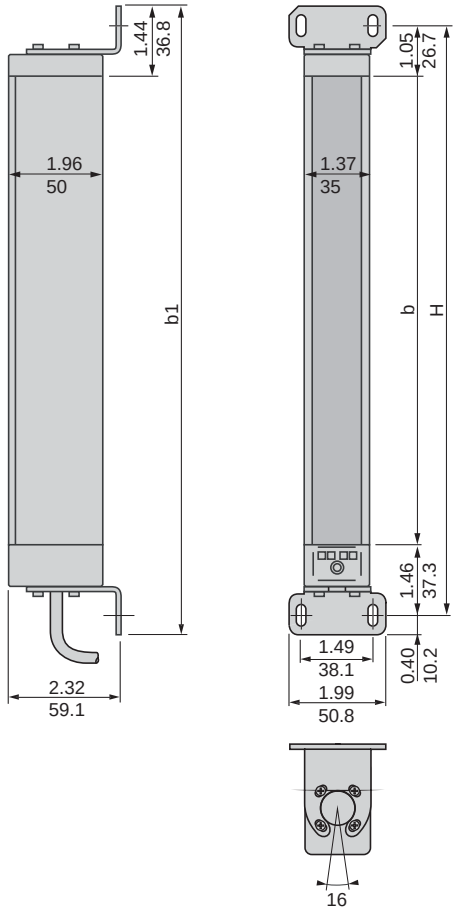
Protected Height in. (mm)	Transmitter Catalog Number	Receiver Catalog Number
10.3 (263)	XUSLTQ6E0260T	XUSLTQ6A0260R
13.8 (351)	XUSLTQ6E0350T	XUSLTQ6A0350R
17.2 (438)	XUSLTQ6E0435T	XUSLTQ6A0435R
20.6 (523)	XUSLTQ6E0520T	XUSLTQ6A0520R
24.1 (613)	XUSLTQ6E0610T	XUSLTQ6A0610R
27.5 (700)	XUSLTQ6E0700T	XUSLTQ6A0700R
30.9 (785)	XUSLTQ6E0785T	XUSLTQ6A0785R
34.3 (871)	XUSLTQ6E0870T	XUSLTQ6A0870R
37.7 (958)	XUSLTQ6E0955T	XUSLTQ6A0955R
41.2 (1046)	XUSLTQ6E1045T	XUSLTQ6A1045R
44.6 (1133)	XUSLTQ6E1130T	XUSLTQ6A1130R
48.0 (1219)	XUSLTQ6E1215T	XUSLTQ6A1215R
51.4 (1306)	XUSLTQ6E1305T	XUSLTQ6A1305R
54.9 (1390)	XUSLTQ6E1390T	XUSLTQ6A1390R
10.3 (263)	XUSLTQ6E0260T	XUSLTQ6B0260R
13.8 (351)	XUSLTQ6E0350T	XUSLTQ6B0350R
17.2 (438)	XUSLTQ6E0435T	XUSLTQ6B0435R
20.6 (523)	XUSLTQ6E0520T	XUSLTQ6B0520R
24.1 (613)	XUSLTQ6E0610T	XUSLTQ6B0610R
27.5 (700)	XUSLTQ6E0700T	XUSLTQ6B0700R
30.9 (785)	XUSLTQ6E0785T	XUSLTQ6B0785R
34.3 (871)	XUSLTQ6E0870T	XUSLTQ6B0870R
37.7 (958)	XUSLTQ6E0955T	XUSLTQ6B0955R
41.2 (1046)	XUSLTQ6E1045T	XUSLTQ6B1045R
44.6 (1133)	XUSLTQ6E1130T	XUSLTQ6B1130R
48.0 (1219)	XUSLTQ6E1215T	XUSLTQ6B1215R
51.4 (1306)	XUSLTQ6E1305T	XUSLTQ6B1305R
54.9 (1390)	XUSLTQ6E1390T	XUSLTQ6B1390R

XUSLT•5

XUSLT•5 (30 mm) Spare Transmitters and Receivers

Protected Height in. (mm)	Transmitter Catalog Number	Receiver Catalog Number	Transmitter Catalog Number	Receiver Catalog Number
13.8 (351)	XUSLTR5E0350T	XUSLTR5A0350R	XUSLTY5E0350T	XUSLTY5A0350R
20.6 (523)	XUSLTR5E0520T	XUSLTR5A0520R	XUSLTY5E0520T	XUSLTY5A0520R
27.5 (700)	XUSLTR5E0700T	XUSLTR5A0700R	XUSLTY5E0700T	XUSLTY5A0700R
34.3 (871)	XUSLTR5E0870T	XUSLTR5A0870R	XUSLTY5E0870T	XUSLTY5A0870R
41.2 (1046)	XUSLTR5E1045T	XUSLTR5A1045R	XUSLTY5E1045T	XUSLTY5A1045R
48.0 (1219)	XUSLTR5E1215T	XUSLTR5A1215R	XUSLTY5E1215T	XUSLTY5A1215R
54.9 (1394)	XUSLTR5E1390T	XUSLTR5A1390R	XUSLTY5E1390T	XUSLTY5A1390R
61.8 (1570)	XUSLTR5E1570T	XUSLTR5A1570R	XUSLTY5E1570T	XUSLTY5A1570R
68.7 (1746)	XUSLTR5E1745T	XUSLTR5A1745R	XUSLTY5E1745T	XUSLTY5A1745R
75.6 (1920)	XUSLTR5E1920T	XUSLTR5A1920R	XUSLTY5E1920T	XUSLTY5A1920R
82.5 (2095)	XUSLTR5E2095T	XUSLTR5A2095R	XUSLTY5E2095T	XUSLTY5A2095R
13.8 (351)	XUSLTR5E0350T	XUSLTR5B0350R	XUSLTY5E0350T	XUSLTY5B0350R
20.6 (523)	XUSLTR5E0520T	XUSLTR5B0520R	XUSLTY5E0520T	XUSLTY5B0520R
27.5 (700)	XUSLTR5E0700T	XUSLTR5B0700R	XUSLTY5E0700T	XUSLTY5B0700R
34.3 (871)	XUSLTR5E0870T	XUSLTR5B0870R	XUSLTY5E0870T	XUSLTY5B0870R
41.2 (1046)	XUSLTR5E1045T	XUSLTR5B1045R	XUSLTY5E1045T	XUSLTY5B1045R
48.0 (1219)	XUSLTR5E1215T	XUSLTR5B1215R	XUSLTY5E1215T	XUSLTY5B1215R
54.9 (1394)	XUSLTR5E1390T	XUSLTR5B1390R	XUSLTY5E1390T	XUSLTY5B1390R
61.8 (1570)	XUSLTR5E1570T	XUSLTR5B1570R	XUSLTY5E1570T	XUSLTY5B1570R
68.7 (1746)	XUSLTR5E1745T	XUSLTR5B1745R	XUSLTY5E1745T	XUSLTY5B1745R
75.6 (1920)	XUSLTR5E1920T	XUSLTR5B1920R	XUSLTY5E1920T	XUSLTY5B1920R
82.5 (2095)	XUSLTR5E2095T	XUSLTR5B2095R	XUSLTY5E2095T	XUSLTY5B2095R

XUSLT●●●●●●●

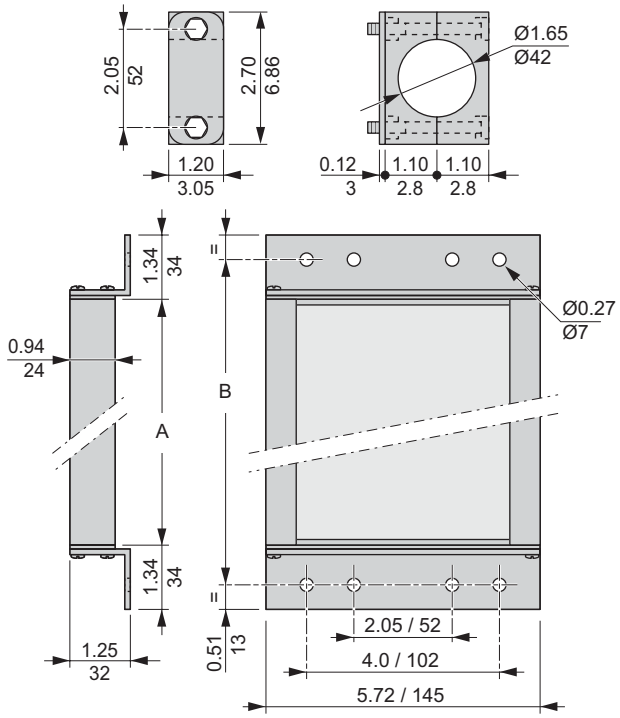


Dual Dimensions: Inches / mm

	b	b1	H	Height
XUSLTQ6●0260	10.35 (263)	13.6 (347.1)	12.8 (327)	10.2 (260)
XUSLTQ6●3050	13.8 (351)	17.1 (435.3)	16.3 (415)	13.7 (350)
XUSLTQ6●0435	17.2 (438)	20.5 (522.3)	19.7 (502)	17.12 (435)
XUSLTQ6●0520	20.6 (523)	23.9 (607.3)	23.1 (587)	20.4 (520)
XUSLTQ6●0610	24.1 (613)	27.4 (697.3)	26.6 (677)	24.0 (610)
XUSLTQ6●0700	27.5 (700)	30.8 (784.3)	30.0 (764)	27.5 (700)
XUSLTQ6●0785	30.9 (785)	34.2 (869.3)	33.4 (849)	30.9 (785)
XUSLTQ6●0870	34.2 (871)	37.6 (955.3)	36.8 (935)	34.2 (870)
XUSLTQ6●0955	37.7 (958)	41.0 (1042.3)	40.2 (1022)	37.5 (955)
XUSLTQ6●1045	41.1 (1046)	44.5 (1130.3)	43.7 (1110)	41.1 (1045)
XUSLTQ6●1130	44.6 (1133)	47.9 (1217.3)	47.1 (1197)	44.4 (1130)
XUSLTQ6●1215	47.9 (1219)	51.3 (1303.3)	50.5 (1283)	47.8 (1215)
XUSLTQ6●1305	51.4 (1306)	54.7 (1390.3)	53.9 (1370)	51.3 (1305)
XUSLTQ6●1390	54.8 (1394)	58.2 (1478.3)	57.4 (1458)	54.7 (1390)

Inches (mm)

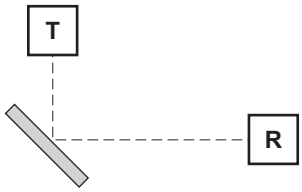
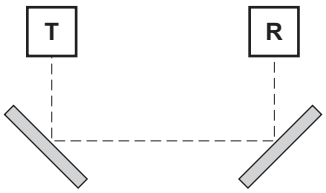
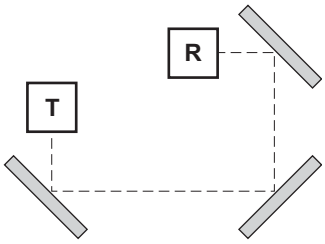
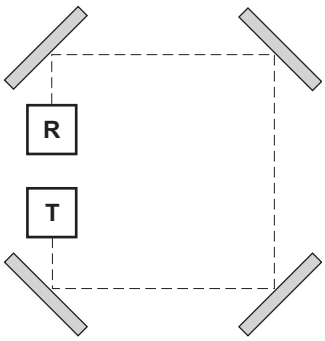
Stainless Steel or Glass Mirror Kit

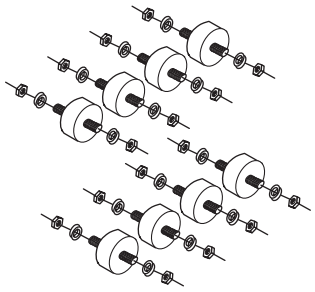


Dual Dimensions: Inches / mm

Catalog Number		Dimension A (in./mm)	Dimension B (in./mm)
Glass	Stainless Steel		
XUSZM0305	XUSZA0305	13.5 (343)	15.18 (386)
XUSZM0457	XUSZA0457	19.5 (495)	21.18 (538)
XUSZM0508	XUSZA0508	21.5 (546)	23.18 (589)
XUSZM0610	XUSZA0610	25.5 (648)	27.18 (690)
XUSZM0711	XUSZA0711	29.5 (749)	31.18 (792)
XUSZM0762	XUSZA0762	31.5 (800)	33.18 (843)
XUSZM0813	XUSZA0813	33.5 (851)	35.18 (894)
XUSZM0914	XUSZA0914	37.5 (953)	39.18 (995)
XUSZM1016	XUSZA1016	41.5 (1054)	43.18 (1097)
XUSZM1067	XUSZA1067	43.5 (1105)	45.18 (1148)
XUSZM1219	XUSZA1219	49.5 (1257)	51.18 (1300)
XUSZM1321	XUSZA1321	53.5 (1359)	55.18 (1402)
XUSZM1372	XUSZA1372	55.5 (1410)	57.18 (1452)
XUSZM1422	XUSZA1422	57.5 (1461)	59.18 (1503)
XUSZM1524	XUSZA1524	61.5 (1562)	63.18 (1605)
XUSZM1626	XUSZA1626	65.5 (1664)	67.18 (1706)
XUSZM1830	XUSZA1830	73.5 (1867)	75.18 (1910)
XUSZM2134	XUSZA2134	85.5 (2172)	87.18 (2214)

Mounting Recommendations

Sn (nominal sensing distance) / # of Mirrors	XUSLTQ6●●●● 24.61 ft. (7.5 m) / no mirrors		XUSLTR5●●●● 29.53 ft. (9 m) / no mirrors		XUSLTY5●●●● 65.62 ft. (20 m) / no mirrors	
	Stainless Steel	**Glass**	**Stainless Steel**	**Glass**	**Stainless Steel**	**Glass**
						
Sn (nominal sensing distance) 1 mirror	20.01 ft. (6.1 m)	21.65 ft. (6.6 m)	24.93 ft. (7.6 m)	25.9 ft. (7.9 m)	53.80 ft. (16.4 m)	57.74 ft. (17.6 m)
						
Sn (nominal sensing distance) 2 mirrors	16.40 ft. (5.0 m)	18.70 ft. (5.7 m)	19.68 ft. (6.0 m)	22.6 ft. (6.9 m)	43.56 ft. (13.4 m)	50.52 ft. (15.4 m)
						
Sn (nominal sensing distance) 3 mirrors	13.45 ft. (4.1 m)	16.73 ft. (5.1 m)	16.07 ft. (4.9 m)	20.01 ft (6.1 m)	36.09 ft. (11 m)	44.62 ft. (13.6 m)
						
Sn (nominal sensing distance) 4 mirrors	12.14 ft. (3.7 m)	14.76 ft. (4.5 m)	13.12 ft. (4.0 m)	17.71 ft. (5.4 m)	29.52 ft. (9 m)	39.37 ft. (12 m)



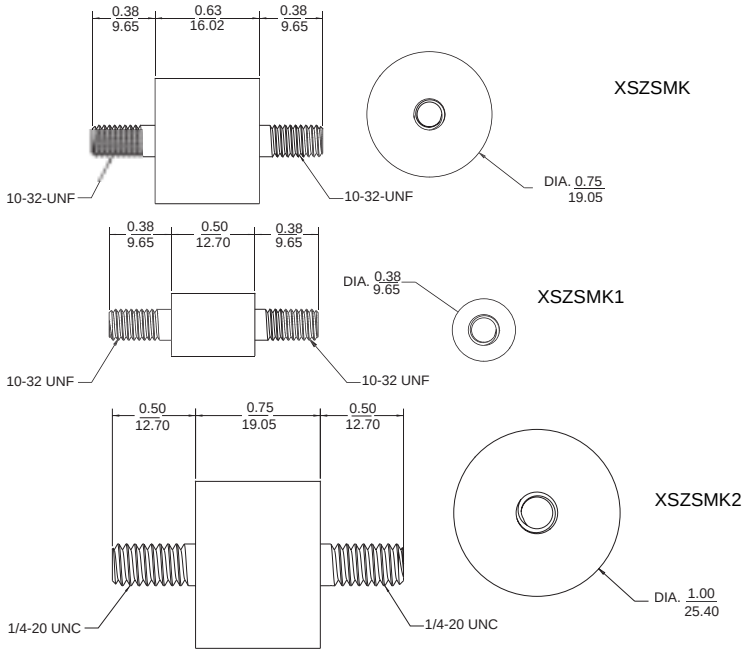
XSZMK/1/2

SHOCK MOUNT KIT

This kit is used to isolate mirrors from possible sources of vibration. It can also be used to shock-mount controllers, power supplies, transmitters, and receivers. Eight shock mounts are included.

Part Number	Description
XSZSMK	XSZSMK and XSZSMK1 shock mounts secured with 10-32 studs
XSZSMK1	
XSZSMK2	XSZSMK2 shock mount secured with 1/4-20 studs

Dimensions (in/mm)



Recommended Mounting Methods

Shock Mount Kit	Compression Mount					Shear Mount				
	Max. Load		Torque (K)		Natural Freq. (Hz)	Max. Load		Torque (K)		Natural Freq. (Hz)
	lb.	kg	lb-in	N•m		lb.	kg	lb-in	N•m	
XSZSMK	18.0	8.16	222.5	25.16	11.0	3.0	1.36	27.7	3.13	9.5
XSZSMK1	4.8	2.177	96.1	10.86	14.0	2.5	1.13	20.7	2.34	9.0
XSZSMK2	55.0	24.94	949.7	107.39	13.0	23.0	10.43	132.2	14.94	7.5

Weight Classes

	Weight Class			
Product (Lengths in mm)	**1**	**2**	**3**	**4**
XUSLTQ, Lengths 260–1045		X		
XUSLTQ, Lengths 1130–1390			X	
XUSLTR/Y, Lengths 350–870		X		
XUSLTR/Y, Lengths 1045–1390		X		
XUSLTR/Y, Lengths 1570–2095			X	
XUSZM, Lengths 305–457		X		
XUSZM, Lengths 508–711			X	
XUSZM, Lengths 762–1016				X
XUSZM, Lengths >1016	Use of shock mount kits is not recommended			
XUSZA, Length 305–1067		X		
XUSZA, Length 1219–1626			X	
XUSZA, Length 1829 –2134				X

Shock Applications [1]

Mounting Method	**Weight Class 1**		**Weight Class 2**		**Weight Class 3**		**Weight Class 4**	
Shear Mounted	XSZSMK	Using two mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using four mounts per head	XSZSMK	Using four mounts per head
	XSZSMK1		XSZSMK1		XSZSMK1		XSZSMK1	
					XSZSMK2	Using two or four mounts per head	XSZSMK2	Using two or four mounts per head
Compression Mounted	Not Recommended				XSZSMK	Using two mounts per head	XSZSMK	Using two mounts per head
			XSZSMK1	Using two mounts per head	XSZSMK1	Using two or four mounts per head	XSZSMK1	Using four mounts per head

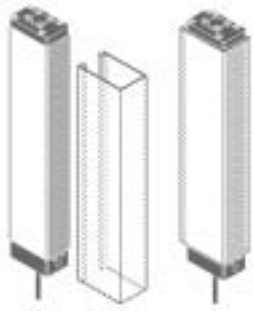
[1] Low frequency, high amplitude applications, such as punch presses, where strong shock can be present.

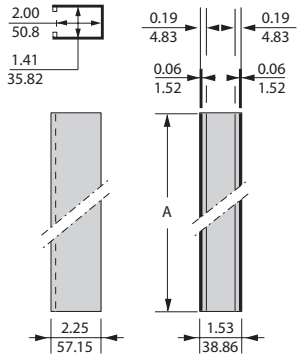
Vibration Applications [1]

Mounting Method	**Weight Class 1**		**Weight Class 2**		**Weight Class 3**		**Weight Class 4**	
Shear Mounted	XSZSMK	Using two or four mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using four mounts per head
	XSZSMK1		XSZSMK1		XSZSMK1	Using four mounts per head	XSZSMK1	
			XSZSMK2	Using two mounts per head	XSZSMK2	Using two or four mounts per head	XSZSMK2	Using two or four mounts per head
Compression Mounted			XSZSMK	Using two mounts per head	XSZSMK	Using two or four mounts per head	XSZSMK	Using two mounts per head
	XSZSMK1	Using two mounts per head	XSZSMK1	Using two or four mounts per head	XSZSMK1	Using four mounts per head	XSZSMK1	Using four mounts per head

[1] High frequency, low amplitude applications, such as offset printing machines, where constant vibration can be present.

Lexan Protection Shield





For Light Curtain:	"A" (in. /mm)	Lexan Protection Part Number
XUSLT…0260	11.0 (279)	**XUSZWS0260**
XUSLT…0350	14.6 (371)	**XUSZWS0350**
XUSLT…0435	17.8 (452)	**XUSZWS0435**
XUSLT…0520	20.8 (528)	**XUSZWS0520**
XUSLT…0610	24.7 (627)	**XUSZWS0610**
XUSLT…0700	28.2 (716)	**XUSZWS0700**
XUSLT…0785	31.5 (800)	**XUSZWS0785**
XUSLT…0870	34.9 (886)	**XUSZWS0870**
XUSLT…0955	38.3 (973)	**XUSZWS0955**
XUSLT…1045	41.8 (1062)	**XUSZWS1045**
XUSLT…1130	45.2 (1148)	**XUSZWS1130**
XUSLT…1215	48.6 (1234)	**XUSZWS1215**
XUSLT…1305	52.0 (1321)	**XUSZWS1305**
XUSLT…1390	55.5 (1410)	**XUSZWS1390**
XUSLT…1570	62.4 (1585)	**XUSZWS1570**
XUSLT…1745	69.2 (1758)	**XUSZWS1745**
XUSLT…1920	76.0 (1930)	**XUSZWS1920**
XUSLT…2095	83.0 (2108)	**XUSZWS2095**

Range Reduction on XUSLT with Lexan Protection Shield

Sn (nominal sensing distance)	XUSLTQ6●●●●● 24.61 ft. (7.5 m)	XUSLTR5●●●●● 29.53 ft. (9 m)	XUSLTY5●●●●● 65.62 ft. (20 m)
Single Lexan Shield (transmitter or receiver only)	22.64 ft. (6.9 m)	27.16 ft. (8.3 m)	60.37 ft. (18.4 m)
Pair Lexan Shields (system)	20.67 ft. (6.3 m)	24.80 ft. (7.5 m)	55.12 ft. (16.8 m)

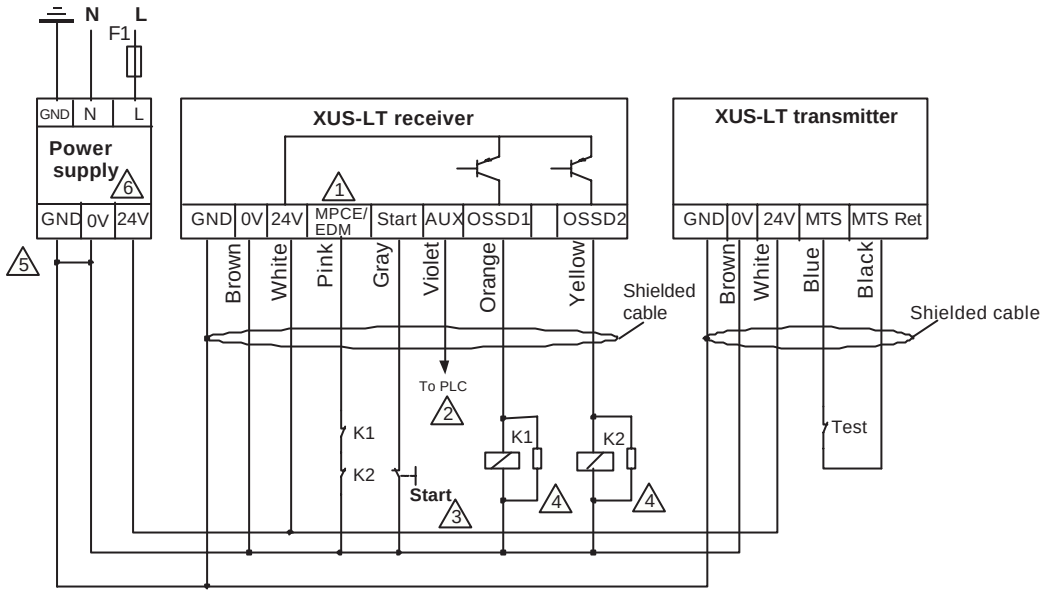
XUSZWS●● Characteristics

Acids	R
Alcohols	LR
Alkalis	LR
Aliphatic Hydrocarbons	R
Amines	NR
Aromatic Hydrocarbons	NR
Detergents and Cleaners	LR
Detergents and Cleaners with Alkaline Materials	NR
Esters	NR
Greases and Oils	LR
Halo generated Hydrocarbons	NR
Ketones	NR
Silicone Oil and Greases	LR
Silicone Oil and Greases with Alkaline Materials	NR

R: Resistant
LR: Limited Resistant
NR: Not Resistant

General Connections

The K1 & K2 control relays must provide force guided relay outputs for machine control. OSSD safety outputs 1 and 2 are connected to the relays and provide the power necessary to energize the relays. See figure below for the preferred connection method using the relays. The auxiliary non-safety output of the XUS-LT system can be used to signal light curtain status to a PLC.



1 For testing prior to installation, the user may select MPCE/EDM OFF (default factory setting). In this case the MPCE/EDM line (pink wire) must be connected to the system 0 V ⎓ line.

2 Auxilary output connect to PLC (optional)

3 If remote start is not used, connect the start line (grey wire) to 0 V ⎓.

4 The MPCE/EDM coils must be suppressed with the arc suppressors provided in the documentation kit.

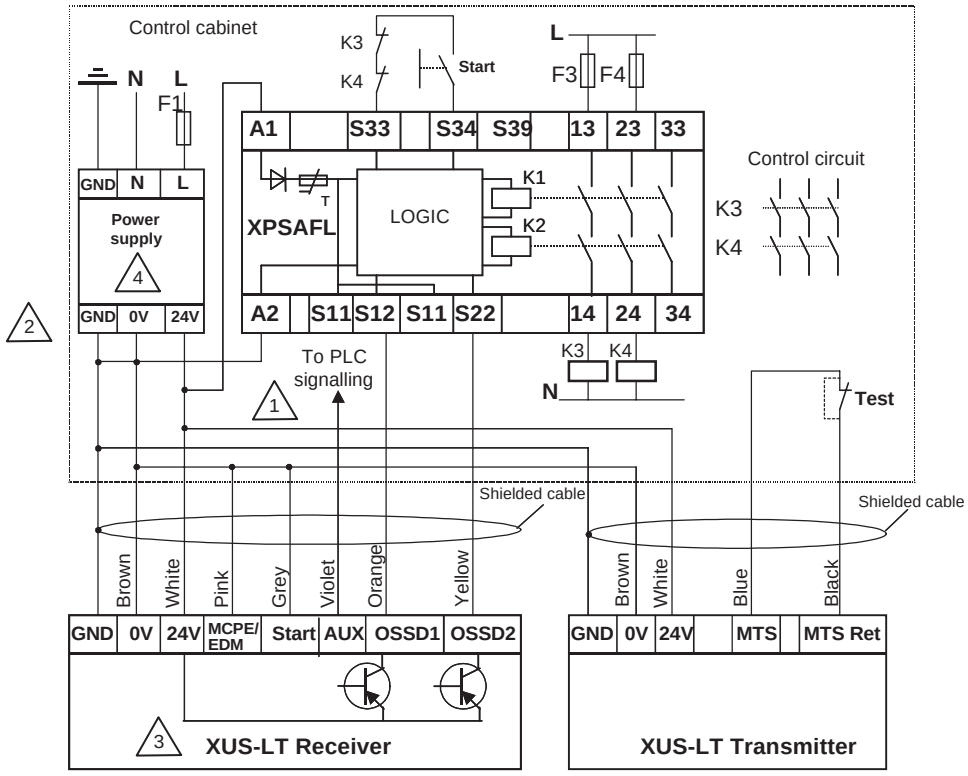
5 Install a wire between the 0 V input and the ground terminals.

6 Power supply 24 Vdc / 2 A, complying with IEC 61496-1 and IEC 60204-1.

NOTE:
There must not be an unshielded link greater than 3.3 ft. (1 m) (start button, auxiliary outputs, power supply, MPCE/EDM, OSSD 1, OSSD 2). The K1 and K2 relays must have force guided contacts.

When used close to a motor driven by a drive controller, verify that all frames (motor, drive controller, light barriers) are tied to the same ground connection.

Connecting Via XPS-AFL (Including Extension Cables XSZ-TCT, XSZ-TCR)



1 Auxiliary output connection to PLC (optional).

2 Install a wire between the 0 V and the ground terminal.

3 The light barrier must be configured with Automatic Start and MPCE/EDM inactive.

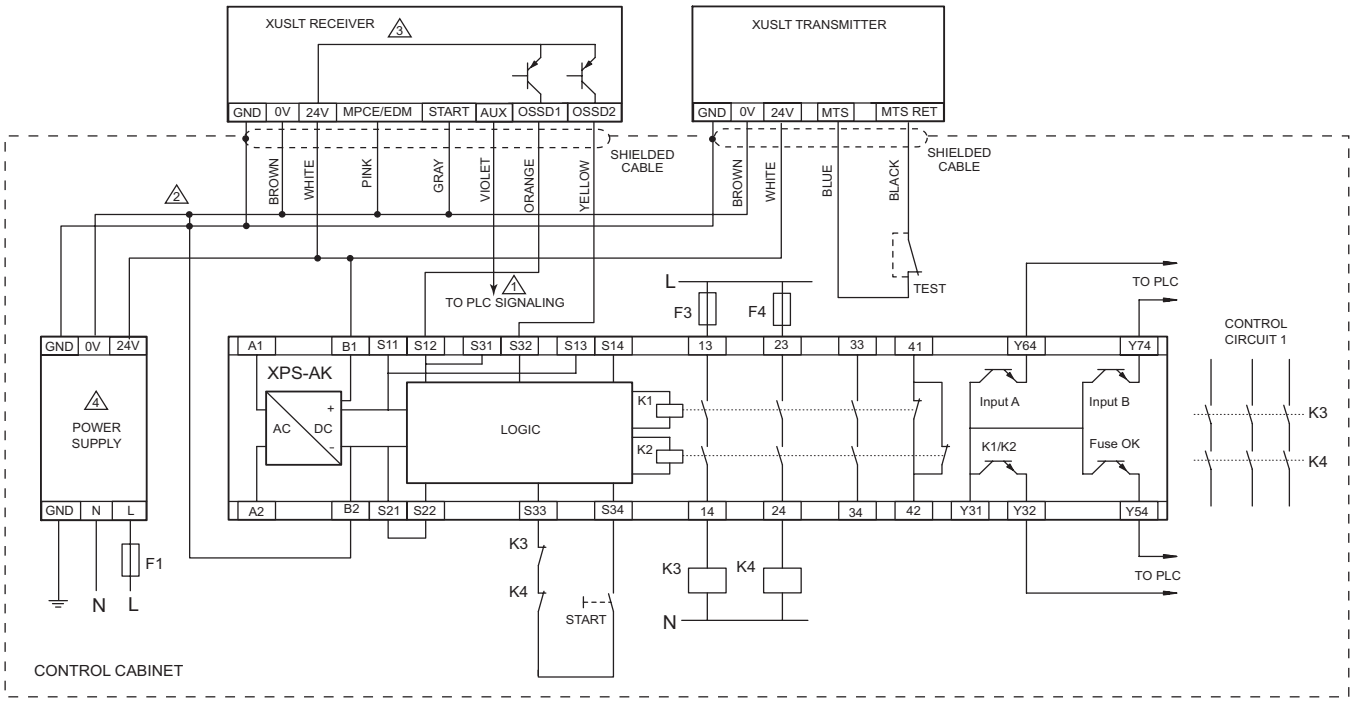
4 Power supply 24 V ⎓ / 2 A complying with IEC 61496-1 and IEC 60204-1.

NOTE: There must not be an unshielded link greater than 3.3 ft. (1 m) (start button, auxiliary outputs, power supply, MPCE/EDM, OSSD 1, OSSD 2). The K3 and K4 relays must have force guided contacts.

NOTE: For automatic start, remove wiring between terminals S33 and S34, and jumper terminals S33 and S39.

Connecting Via XPS-AK (Including Extension Cables XSZ-TCT, XSZ-TCR)

Connect Via XPS-AK (Including Extension Cables XSZ-TCT, XSZ-TCR)



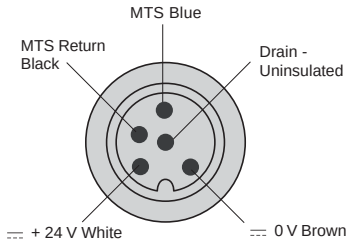
1. Auxiliary Output Connection to PLC (Optional).
2. Install a Wire between the 0V and the Ground Terminal.
3. The Light Barrier must be Configured with Automatic Start and MPCE/EDM Inactive.
4. Power Supply 24V ⎓ /2A Complying with IEC 61496-1 and IEC 60204-1.

NOTE: There must not be an Unshielded Link greater than 1 m (Start Button, Auxiliary Outputs, Power Supply, MPCE/EDM, OSSD1, OSSD2). The K3 and K4 Relays must have Force Guided Contacts.

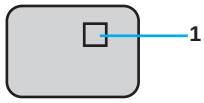
NOTE: For automatic start remove the wiring between terminals S33 and S34, and jumper S13 and S14.

Emitter

Connector of the Transmitter



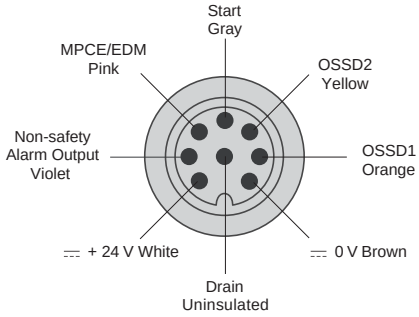
Status Indicator on the Transmitter



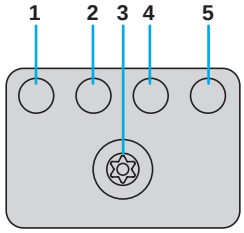
1 Power LED (yellow)

Receiver

Connector of the Receiver

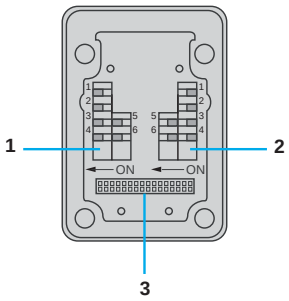


Status Indicator on the Receiver



1 Indicator for selection ECS/ Blanking and Floating Blanking (amber LED)
2 Interlock indicator (yellow LED)
3 Program Button
4 Stop indicator (red LED)
5 Run indicator (green LED)

Configuration Switches



1 Switch A
2 Switch B
3 Connector

Appendix A
Light Curtain Application and Installation

PROTECTION OF PERSONNEL

Safety light curtains are electro-sensitive protective equipment (ESPE) designed for the protection of personnel operating or working around industrial machinery by sending stop signals to the machine control for stopping the hazardous movement as soon as one of the light beams is broken.

In particular, they provide protection for the safety of personnel operating hazardous machinery, but they are equally suitable for use with many other types of machines. They make it possible to protect personnel while allowing free access to machines.

The absence of a door or guard reduces the time required for loading, inspection or adjustment operations, as well as making access easier.

Directives and Standards — These Safety Light Curtains Conform to:

- The essential protection requirements of the Electromagnetic Compatibility (EMC) Directive 89/336/EEC, 92/31/EEC, 93/68/EEC,
- Relevant essential health and safety requirements (EHSR's) of the European Machinery Directive 98/37/EEC,
- Low Voltage Directives 73/23/EEC and 93/68/EEC,
- Standard EN 61496-1 (electro-sensitive protective equipment: ESPE),
- EN 60954-1,
- ANSI B11-19,
- Draft standard EN 999 (installation conditions),
- UL 61496 Type 4 requirements.

Applications — The Main Applications are:

For Type 2 Light Curtains:

- Packaging and Assembly Plant
- Conveyor and Mechanical Handling Systems
- Warehousing and Storage Systems
- Waste Disposal Skips
- Robot Areas

For Type 4 Light Curtains

- Presses (all types), Shears and Trimmers
- Hoisting Equipment
- Saws (all types)
- Machine Tools (lathes, milling machines, machining centers)
- Woodworking Machines (truing, lathes, spindle molding machines, side and face milling cutters)
- Textile Machinery (carding machines, weaving looms, steam rooms)
- Assembly Machines
- Assembly Robots

Safety Requirements — Detection of Faults that may Jeopardize Machine Safety and Stopping

The machine design and its controls must have the same level of safety as that of the safety light curtain so as to ensure that the machine is able to immediately stop its hazardous movement if something enters the zone protected by the safety light curtain.

It must be impossible to enter the protected zone without breaking the protective light beams. The safety light curtain must therefore be installed so that the light curtain cannot be avoided.

Re-starting of the machine must only be possible when there is no hazard present and when there is no one in the hazardous zone.

Appendix A
Light Curtain Application and Installation

Safety Systems

Safety systems are comprised of many components. No one safety component will insure the safety of the system. The design of the complete safety system should be considered before you begin. It is very important to follow applicable safety standards when installing and wiring these components.

Standards to be Followed – United States

Standards referenced below refer to presses and other metal working and general equipment. This is not a complete listing of all applicable standards to be referenced when using light curtains. There may be other OSHA, ANSI, ANSI/RIA, NEC, NFPA, national, state, and local codes that may include requirements for installation of light curtains on machinery.

- OSHA 1910.211
- OSHA 1910.212
- OSHA 1910.217
- ANSI B11.1
- ANSI B11.19
- ANSI B11.20
- ANSI/RIA R15.06

DIRECTIVES AND STANDARDS TO BE FOLLOWED – EUROPE

Standards referenced below refer to general machinery. This is not a complete listing of all applicable standards to be referenced when using light curtains. There may be other European and local codes that may include requirements for installation of light curtains on machinery.

- (NF) E09-010
- DIN 31001
- BS 5304
- EN 294
- EN 811
- EN 999
- EN 954-1
- EN 61496-1

LIGHT CURTAINS IN THE UNITED STATES — BASIC REQUIREMENTS

- This device must be installed, set-up and serviced only by authorized personnel. ANSI defines Authorized Personnel in ANSI B30.2-1983.
- User must follow all applicable codes, standards and regulations. Standards specifically referenced in this document need to be followed: ANSI B11.1 through B11.20, OSHA 29 CFR 1910 standards, and ANSI/RIA R15.06 standard. There may be other national and local standards that may also need to be followed.
- Do not alter or modify this equipment.
- Light curtains must be securely mounted to a rigid surface using the mounting brackets supplied.
- Machine must be capable of stopping immediately at any place in its stroke after receiving a stop signal.
- Light curtain must not be used with single stroke (full revolution clutched) machinery.
- Read and understand Sections on Calculating Minimum Safety Distances of this catalog (see pages 21 through 29) for important details regarding standards, spacings and safe operating distances and stopping times before beginning installation.
- Light curtains must not be used as a lockout device to meet OSHA lock-out/tag-out requirements.
- Light curtain will not protect machine operators and other personnel from liquids, gases, chips, hot surfaces and other debris from point of operation.
- Light curtain must be sized and installed so that machine operator cannot reach over, under or around the sensing field to reach the point of operation.
- Light curtains must be installed so the machine operator cannot position themselves between the hazardous area (pinch point) and the light curtain.
- Light curtains currently cannot be used as PSDI devices to initiate machine movement on mechanical power presses. For PSDI, refer to OSHA 29 CFR 1910.217 (h), the various appendices referenced on PSDI, and OSHA mandatory regulations requiring third party approval.

  Using the light curtain to initiate a machine after an object is removed from the sensing area is called Presence Sensing Device Initiation (PSDI). Use of PSDI places additional requirements on the guarding and safety controls. It can restrict advanced light curtain features such as floating blanking, and Exact Channel Selection (ECS) blanking. Contact your local sales office for further information. Other sources of references for PSDI include: ANSI RIA 15.06-1999, OSHA 1910.217(h), and ANSI B11.2-1995.

MINIMUM SAFETY DISTANCE

Light Curtains in the United States (Vertical Mount)

The basic formulas for calculating minimum safety distances for light curtains mounted vertically are listed below. These formulas apply to ALL light curtains, including perimeter and point of operation light curtains. ANSI B11.1 is listed first, OSHA 29 CFR 1910.217 listed next.

ANSI B11.1:

This formula applies specifically to the guarding of mechanical power presses, but it is typically used on other applications as well.

D_s = $K \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$

D_s = Minimum safe distance between the light curtain sensing area to the nearest point of operation potential hazard.

K = Hand speed constant of 63 inches per second. This is the standard minimum accepted value for both ANSI and OSHA. ANSI recognizes this constant may not be optimal, and that the user should consider all factors before deciding on the value of the K factor to use in the above formula.

T_s = Stop time of the machine (press), as measured from the final control element. It is measured at the maximum velocity of the press, usually at 90° of press rotation on the downstroke.

T_c = Response time of the control circuit to activate the braking system.

NOTE: T_s and T_c are usually measured as one value by a stop time measurement device.

T_r = Response time of the light curtain.

T_{bm} = Additional time allowed for the brake monitor to compensate for wear and variations in the stopping time. Brake monitors will stop the machine (press) when the stop time of the machinery exceeds a pre-set limit.

NOTE: If a brake monitor is not installed on the machine, a factor must to be added to the measured stop time to include brake wear. Generally, brake monitors add approximately 20% to 25% additional stop time. To determine the actual factor to be used, contact machine manufacturer.

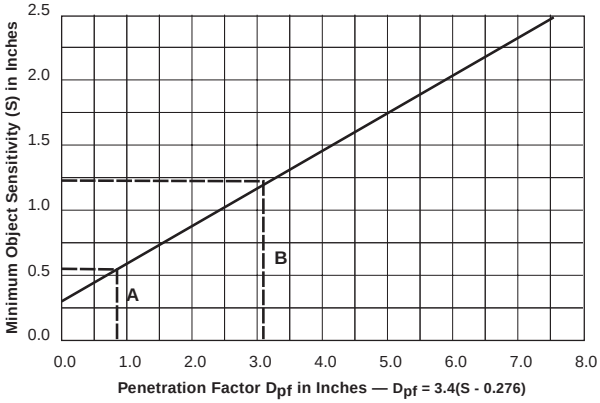
D_{pf} = Penetration depth factor, to provide for possible penetration through the sensing field by fingers or hands before detection occurs. This value is determined by the Penetration Depth Factor Chart from ANSI B11.1 (see Penetration Depth Factor graph below). Alternately, the following ANSI formula can be used: $D_{pf} = 3.4\ (S-0.276)$, where S = minimum object sensitivity.

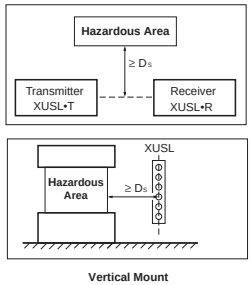
Example: For devices with minimum object sensitivity of 0.55" (14 mm):

$D_{pf} = 3.4 \times (.55-0.276) = 0.94$" (23.88 mm)

For devices with minimum object sensitivity of 1.18" (30 mm):
$D_{pf} = 3.4 \times (1.18-0.276) = 3.07$" (77.98 mm)

Penetration Depth Factor





Vertical Mount

A = Finger Protection 0.55" (14 mm) has a D_{pf} of 0.94" (23.88 mm)
B = Hand Protection 1.18" (30 mm) has a D_{pf} of 3.07" (77.98 mm)

OSHA: CFR 1910.217 (c)(3)(iii)(e)

This formula applies specifically to the guarding of mechanical power presses, but it is typically used on other applications as well.

D_s = 63 in. per second x T_s

Where:

D_s = Minimum safety distance (inches)

63 in. per second = hand speed constant

T_s = Stopping time of the press measured at approximately 90° position of the crankshaft rotation (seconds).

Stop time of the machine (press), as measured from the final control element. It is measured to determine worst case time and maximum velocity of the press. Usually at 90° of press rotation on the downstroke.

In addition to the formula above, we recommend that OSHA 1910.217 Table O-10 be followed. Per OSHA, the table below shows the maximum width of openings allowed for a guard based on the distance from the guard (light curtain) to the point of operation hazard. The maximum width of opening in the table below corresponds to the minimum object sensitivity for a light curtain.

Example:

Using the formula: D_s = 63 in. per second x T_s

if T_s = 0.10 sec

D_s = 63 in. X 0.10 = 6.3 inches

- For an XUSL light curtain with a minimum object sensitivity of 0.55 inches:
- Using the example above, the separation distance from the point of operation hazard to the light curtain would be 6.3" + a minimum distance (from table O-10) of 3.5", for a total separation distance of 9.8".
  The 3.5" was chosen from Table O-10 as the additional distance because the opening (minimum object sensitivity) is 0.55". Since 0.55" is larger than 0.50", the values for 0.50" cannot be used. Therefore the next larger opening, 0.625", must be used and the distance corresponding to the 0.625" opening is 3.5".
- For an XUSL light curtain with a minimum object sensitivity of 1.18 inches:
  Using the example above, the separation distance from the point of operation hazard to the light curtain would be 6.3" + a minimum distance (from table O-10) of 7.5", for a total separation distance of 13.8".

  The 7.5" was chosen from Table O-10 as the additional distance because the opening (minimum object sensitivity) is 1.18". Since 1.18" is larger than 0.875", the values for 0.875" cannot be used. Therefore the next larger opening, 1.25, must be used and the distance corresponding to the1.25 opening is 7.5".

NOTE: 3.5 inches = 89 mm, and 7.5 inches = 191 mm.

OSHA 1910.217 Table O-10

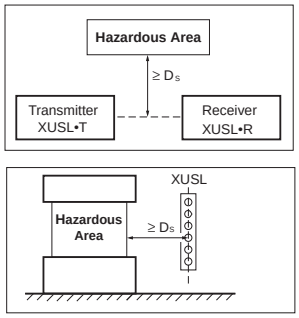
Distance of Opening from Point of Operation Hazard (inches)	Maximum Width of Opening (inches)
1/2 to1-1/2	1/4
1-1/2 to 2-1/2	3/8
2-1/2 to 3-1/2	1/2
3-1/2 to 5-1/2	5/8
5-1/2 to 6-1/2	3/4
6-1/2 to 7-1/2	7/8
7-1/2 to 12-1/2	1-1/4
12-1/2 to 15-1/2	1-1/2
15-1/2 to 17-1/2	1-7/8
17-1/2 to 31-1/2	2-1/8

NOTE: If the light curtain is to be used on machinery that will be standardized throughout North America and Europe, then all minimum distance formulas on Calculating Minimum Safety Distances of this catalog (see pages 21 through 27) must be calculated, and the largest separation distance must be used.

Light Curtains in Europe (Vertical Mount) — Minimum Safety Distance

The minimum safety distance "D_s" must be calculated using the following General Formula:

$D_s \geq K (t_1 + t_2) + C$



Vertical Mount

D_s = Minimum safety (separation) distance between the hazardous area and the light curtain.

K = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63" per second (1600 mm per second).

t_1 = Response time of the light curtain in seconds. This is the total time from detection of a beam broken to the switching of the outputs of the light curtain.

t_2 = The time needed to stop all hazardous movements of the machine in seconds. This information is supplied by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.

C = Additional safety distance. Generally accepted values are:
0" (0 mm) for 0.55" (14 mm) minimum object sensitivity
5.04" (128 mm) for 1.18" (30 mm) minimum object sensitivity

Using Individual Beam Sensors (XPSCM and XU2S Perimeter Light Curtain)

The formula above is modified from a security light curtain where the light beams are all mounted in the same enclosure. Typically, for a system with individual beam sensors up to 4 photoelectric sensors are used.

General Formula: $D_s \geq K (t_1 + t_2) + C$

D_s = Minimum safety (separation) distance between the hazardous area and the light curtain.

K = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63" per second (1600 mm per second).

t_1 = Response time of the light curtain in seconds. This is the total time from detection of a beam broken to the switching of the outputs of the light curtain.

t_2 = The time needed to stop all hazardous movements of the machine in seconds. This information is supplied by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.

C = Additional safety distance. Generally accepted values are:
33.5" (850 mm) when using several individual photoelectric beams
47.3" (1200 mm) when using a single photoelectric beam

Presses and New Machines

For presses and new machines put into service in accordance to EEC European Machine Safety Directive 89/392, the following parameters and formulas must be used:

	K: inches (mm)	C: inches (mm) XUSL: 0.55" (14 mm)	C: Inches (mm) XUSL: 1.18" (30 mm)
EN Standards	78.74" (2000 mm)	0	5.04" (128 mm)

Calculations should be made by using the General Formula and parameters "K" and "C" from the table above that correspond to the light curtain being used.

If "D_s" is calculated to be ≤ 19.69" (500 mm), calculate the distance using values from the table above.

If "D_s" is calculated to be > 19.69" (500 mm), the calculation can be re-done using the **Alternate Formula** below. If this formula is used, the value for "D_s" that may be used must be at least 19.69" (500 mm). The **Alternate Formula** is:

For inches: $D_s \geq 63 (t_1 + t_2) + C$

For millimeters: $D_s \geq 1{,}600 (t_1 + t_2) + C$

D_s must be at least 3.94" (100 mm)

Special Rules for Presses

The European standards specify that only light curtains or mechanical barriers must be used as safety devices so that, if a person enters the protected area while there are hazardous movements, the machine stops as quickly as possible. “Quick Stopping” means stopping of the press ram before the operator can reach the hazardous area, when considering the speed at which an operator can move.

For determining the minimum safety distance for particular machines, refer to the following European standards:

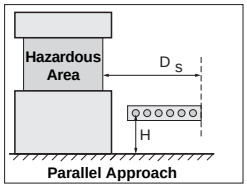
- Mechanical power presses: refer to EN692
- Hydraulic presses, pneumatic folding machines, shears, bending and shaping machines: refer to EN693.

Light Curtains Mounted Horizontally or at an Angle

There are applications which may require the light curtain to be mounted horizontally or at an angle instead of vertically. ANSI and OSHA do not include in their standards requirements when mounting light curtains in the horizontal or angular modes. European Standard EN999 does address this type of application.

When using light curtains at an angle of 30° or greater from horizontal, use the formulas listed in the sections for vertical installations. When using light curtains at an angle of less than 30°, use the formulas below.

Parallel Approach to the Hazardous Area



Parallel Approach

If the direction of approach is parallel to the detection area, the minimum safety distance “D_s” between the hazardous area and the beam furthest away from the hazardous area, depends on the height “H” at which the light curtain is installed. This safety distance “D_s” must be calculated using the following formula:

For in: $D_s \geq K (t_1 + t_2) + 33.5$

For mm: $D_s \geq K (t_1 + t_2) + 850$ If 34.45" (875 mm) < H ≤ 39.39" (1000 mm)

D_s = Minimum safety (separation) distance between the hazardous area and the light curtain.

K = Accepted general approach speed of a body or parts of the body. Generally accepted values are: 63" per second (1600mm per second).

t_1 = Response time of the light curtain in seconds. This is the total time from detection of a beam broken to the switching of the outputs of the light curtain.

t_2 = The time needed to stop all hazardous movements of the machine in seconds. This information is supplied by the machine manufacturer. It is the time between the stop instruction of the light curtain and the actual stop of the hazardous machine components.

H = Height (distance) of light curtain from floor.

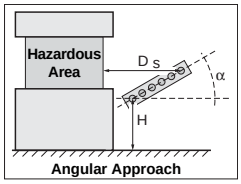
Or the following formula is used:

For in: $D_s \geq 63 (t_1 + t_2) + (47.2 - 0.4H)$

For mm: $D_s \geq 1600 (t_1 + t_2) + (1200 - 0.4H)$ If 0 < H ≤ 34.45" (875 mm)

The maximum allowed height “H” is 39.39" (1000 mm)
Once the height “H” exceeds 11.81" (300 mm), additional protective devices must be used.

Angular Approach to the Hazardous Area

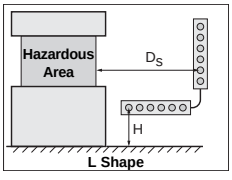


Angular Approach

If the operator’s direction of approach and the detection area form an angle α, then the formulas used to calculate the safety distance “D_s” depends on this angle:

- If the angle α is greater than 30°, the formulas used for perpendicular approach (vertical mounting) to the detection area must be used.
- If the angle α is less than or equal to 30°, then the formulas given for the parallel direction of approach (horizontal mounting) to the detection area must be used.

Installation in “L” Shape

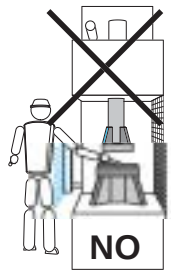


L Shape

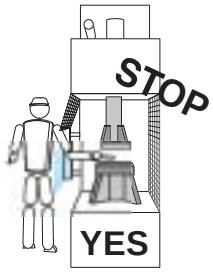
This type of installation uses one light curtain mounted vertically and another light curtain mounted horizontally per the diagram to the left. The maximum allowed height “H” is 39.37" (1000 mm). If height “H” is greater than 11.81" (300 mm) additional protective devices must be used. Distance D_s is calculated from the formulas for light curtains mounted vertically (see page 23).

NOTE: Europe uses the symbol “S” instead of “D_s”. This catalog uses the symbol “D_s” for consistency and for ease of understanding.

Prevention of access over top of light curtain

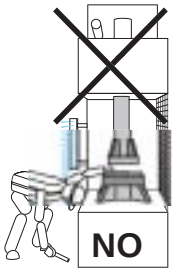


Without additional safety device: insufficient degree of protection

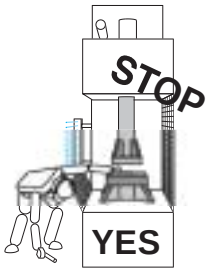


With additional device: light beams broken, the machine stops

Prevention of access from beneath the light curtain

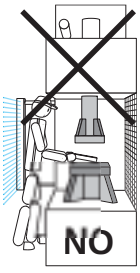


Without additional safety device: insufficient degree of protection

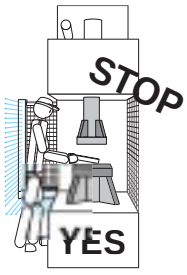


With additional device: light beams broken, the machine stops

Prevention of access from the back of the light curtain



Without additional safety device: insufficient degree of protection



With additional device: light beams broken,the machine stops

PREVENTION OF ACCESS TO HAZARDOUS AREA

Security light curtains can only be used on machines on which the movement of working components may be s*topped at any time during the hazardous operation phase of the machine*.

These light curtains provide a stop signal, not a control instruction. This stop signal must be stored.

Clearing of the light curtain must not result in restarting of moving parts or hazardous operation.

Subsequent restarting must only be possible by means of deliberate operation of the appropriate control device, or start-up procedure after having checked that there is no longer any hazard.

Electrical interfacing between the security light curtain and the machine circuits must meet all applicable codes where the machine will be used.

Where security light curtains do not provide an adequate degree of protection due to their location, additional suitable safety devices, guards, or additional security light curtains must be used to prevent operators from entering the protective light curtain and reaching the hazardous zone (EN 294, EN 811), or from remaining in the area between the hazardous zone and the security light curtain (EN 999).

The position and size of these additional safety devices must be such that it is *impossible for operators to reach the hazardous zone* in any way whatsoever (over the top, from beneath, from behind or from the side) *without breaking the beams of the light curtain*.

These additional safety devices must be:

- Either fixed
  (if possible, screwed or welded to the machine),
- Or moving
  (with continuous monitoring of their position if they have to open).

It must be impossible for operators to disconnect or turn-off the switching circuits for these additional safety devices.

As well as conforming to standards EN 61496 and EN 699, they must also conform to the following European Standards:

— (NF) E 09-010

— DIN 31001

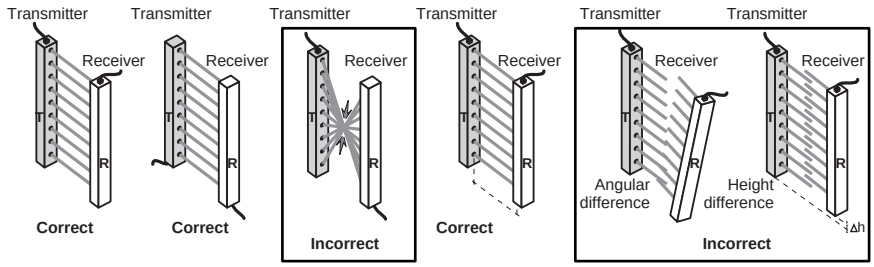
— BS 5304

— EN 294

Appendix A
Light Curtain Application and Installation

LIGHT CURTAIN ALIGNMENT

Light curtains need to be firmly and securely mounted to the machine. The diagrams below show correct and incorrect mounting. Incorrect mounting as shown below will not allow correct alignment.



INSTALLATION NEAR REFLECTIVE SURFACES

The devices must be installed such that the transmitter and associated receiver are mounted facing each other and correctly aligned for both height and angle.

The effective aperture angle of the optics and transmitter/receiver alignment is 2.5° maximum > 3 m (9.8 ft).

Reflective surfaces located near areas protected by light curtains could interfere with the proper operation of the light curtain. Reflective surfaces may include painted metal, shiny sheet metal, stainless steel, or plastic. These reflective surfaces may allow unwanted stray light rays to “go around” objects entering the sensing area of the light curtain. It is necessary to take into account a minimum distance “D” between the axes of the nearest beam and the reflective surface. This distance is measured from the mid-point between the transmitter and receiver.

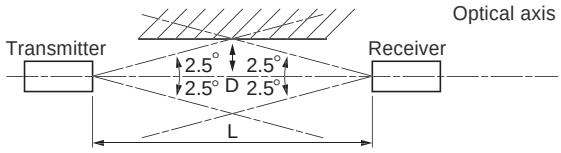
European Standard EN 61496-1 specifies a minimum distance D where:

for 0 < L < 9.84' (3m), D = 5.16" (131 mm)

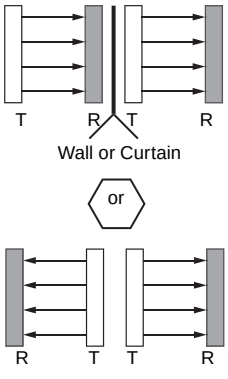
for L > 9.84' (3m), D = (0.035 x L) + 0.2" (5mm), with a minimum value for D of 5.16" (131mm)

D = minimum distance between the light curtain and reflective surface

L = sensing distance of the security light curtain.



Mutual Interference



Certain configurations may require the installation of 2 (or more) security light curtains side by side.

The products in the XUSL range are designed to provide the user with maximum operating safety (coded infra-red light beams).

Setting-up as illustrated to the left is recommended for maximum performance and safety.

Environments Subject to Interference

Industrial applications sometimes place products in extreme operating conditions, due in particular to:

- Electromagnetic interference generated by the close proximity of variable speed controllers, welding machines or walkie-talkies. The products in the XUSL range are designed to be immune to such interference. They conform to:
  - — level 3 conforming to EN 61496-1 (fast transient/burst interference),
  - — resistance to interference caused by variable speed controllers,
  - — resistance to the emissions of walkie-talkies conforming to IEC 61004-3.
- Light interference at a low angle of incidence in relation to the optical axis. The products in the XUSL range are resistant in accordance with IEC 61496-2

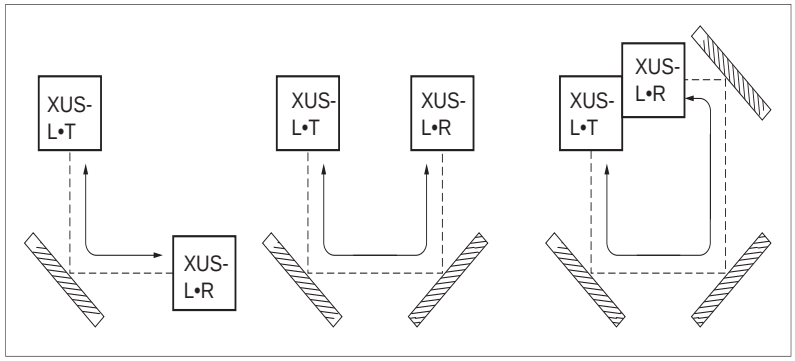
USING MIRRORS

It is important to comply with the minimum safety distances throughout the protected area, and around the perimeter where the light curtain beams are being reflected by the mirrors. The distances relating to reflective surfaces must also be calculated and observed.

The use of mirrors will significantly reduce the sensing distance of any light curtain. Each mirror used will further reduce the sensing distance.

Reminder: any contamination on the mirror surfaces, such and dust or dirt, will further reduce the sensing distance. This should be considered when installing a light curtain with mirrors in an area where there will be dust, dirt or other contaminants. More frequent cleaning of the light curtain lenses and the mirrors may be required.

Mirror Configurations



The total nominal range between the transmitter and the receiver will be reduced according to the number of deflecting mirrors.

Recommended Maximum Range for Glass Mirrors

No. of Mirrors	XUSLTQ6••••	XUSLTR5••••	XUSLTY5••••
1	6.6 m (21.65 ft.)	7.9 m (25.9 ft.)	17.6 m (57.74 ft.)
2	5.7 m (18.70 ft.)	6.9 m (22.6 ft.)	15.4 m (50.52 ft.)
3	5.1 m (16.73 ft.)	6.1 m (20.01 ft.)	13.6 m (44.62 ft.)
4	4.5 m (14.76 ft.)	5.4 m (17.71 ft.)	12 m (39.37 ft.)

Recommended Maximum Range for Stainless Steel Mirrors

No. of Mirrors	XUSLTQ6••••	XUSLTR5••••	XUSLTY5••••
1	6.1 m (20.01 ft.)	7.6 m (24.93 ft.)	16.4 m (53.80 ft.)
2	5.0 m (16.40 ft.)	6.0 m (19.68 ft.)	13.4 m (43.96 ft.)
3	4.1 m (13.45 ft.)	4.9 m (16.07 ft.)	11 m (36.09 ft.)
4	3.7 m (12.14 ft.)	4.0 m (13.12 ft.)	9 m (29.52 ft.)

Recommended Maximum Range for Glass Mirrors

No. of Mirrors	XUSLMN6••••	XUSLMP5••••	XUSLMU5••••
1	3.9 m (12.79 ft.)	6.1 m (20.01 ft.)	12.3 (40.35 ft.)
2	3.4 m (11.15 ft.)	5.3 m (17.38 ft.)	10.7 m (35.10 ft.)
3	3.0 m (9.84 ft.)	4.7 m (15.41 ft.)	9.5 m (31.16 ft.)
4	2.7 m (8.85 ft.)	4.2 m (13.77 ft.)	8.4 m (27.55 ft.)

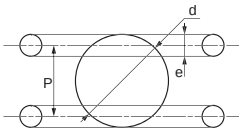
No. of Mirrors	XUSLMSK6••••	XUSLMSP5••••
1	2.6 m (8.53 ft.)	6.1 m (20.01 ft.)
2	2.3 m (7.54 ft.)	5.3 m (17.38 ft.)
3	2.0 m (6.56 ft.)	4.7 m (15.41 ft.)
4	1.8 m (5.90 ft.)‘	4.2 m (13.77 ft.)

Recommended Maximum Range for Stainless Steel Mirrors

No. of Mirrors	XUSLMN6••••	XUSLMP5••••	XUSLMU5••••
1	3.6 m (11.81 ft.)	5.7 m (18.70 ft.)	11.4 m (37.40 ft.)
2	3.0 m (9.84 ft.)	4.6 m (15.09 ft.)	9.3 m (30.51 ft.)
3	2.4 m (7.87 ft.)	3.8 m (12.46 ft.)	7.7 m (25.26 ft.)
4	2.0 m (6.56 ft.)	3.1 m (10.17 ft.)	6.3 m (20.66 ft.)

No. of Mirrors	XUSLMSK6••••	XUSLMSP5••••
1	2.5 m (8.20 ft.)	5.7 m (18.70 ft.)
2	2.0 m (6.56 ft.)	4.6 m (15.09 ft.)
3	1.6 m (5.24 ft.)	3.8 m (12.46 ft.)
4	1.3 m (4.26 ft.)	3.1 m (10.17 ft.)

NOTE: When mirrors are used, the effects of vibration will be more noticeable. Proper alignment may require more time in the set-up of the light curtain and the associated mirrors. The mirrors must be firmly and securely mounted and be protected from shock, vibration, and other physical damage.



MINIMUM OBJECT SENSITIVITY (MOS)

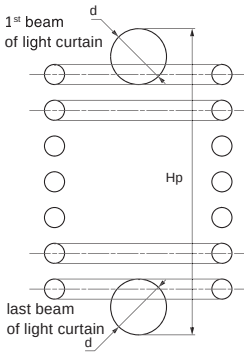
This is the smallest diameter (object) which a Type 4 security light curtain is capable of detecting.

d = P + e d: minimum object sensitivity

P: distance between the axes of 2 adjacent beams

e: diameter of the beams

XUSL range	P in. (mm)	e in. (mm)	d in. (mm)
XUSL•6 Finger protection	0.30" (7.5 mm)	0.26" (6.5 mm)	0.55" (14 mm)
XUSL•5 Hand protection	0.63" (16 mm)	0.59" (15 mm)	1.18" (30 mm)



PROTECTED HEIGHT (HP)

According to EN 61496, this is the zone (or height) within which an object of equal diameter to the minimum object sensitivity d is always detected.

Test Rod

A test rod is supplied with each XUSL light curtain for the purposes of periodically testing the light curtain for proper operation. A test rod is the appropriate diameter for testing the light curtain it was shipped with. The XUSL••6 device has a test rod that is 0.55" (14mm) in diameter. The XUSLL••5 device has a test rod that is 1.18" (30 mm) in diameter.

Sample S and D_{pf} Factors for XUSLTQ6 (14 mm finger detection) System

Total Number of Beams Disabled by ECS/Blanking and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D_{pf} for use with ANSI Formula D_{pf} = 3.4 (S–0.276) in. [1]
None	14 mm (0.55 in.)	0.94 in. (24 mm)
1 Beam	25 mm (0.98 in.)	2.40 in. (61 mm)
2 Beams	36 mm (1.41 in.)	3.89 in. (99 mm)
3 Beams	47 mm (1.85 in.)	5.35 in. (136 mm)
4 Beams	58 mm (2.28 in.)	6.81 in. (173 mm)
5 Beams	69 mm (2.71 in.)	8.30 in. (211 mm)
Etc...		

[1] The ANSI formula for the depth penetration factor, D_{pf}, is for the USA only.

An XUS-LT system with 14 mm (0.55 in.) minimum object resolution and one channel disabled has a minimum object sensitivity of:

14 mm + 11 mm = 25 mm (0.98 in.)

An XUS-LT system with 14 mm (0.55 in.) minimum object resolution and two channels disabled has a minimum object sensitivity of:

14 mm + 11 mm + 11 mm = 36 mm (1.41 in.)

Sample S and D_{pf} Factors for XUSLT•5 (30 mm hand detection) System

Total Number of Beams Disabled by ECS\Blanking and/or Floating Blanking	Minimum Object Resolution S	Depth Penetration Factor, D_{pf} for use with ANSI Formula D_{pf} = 3.4 (S–0.276) in. [1]
None	30 mm (1.18 in.)	3.07 in. (78.0 mm)
1 Beam	52 mm (2.05 in.)	6.03 in. (153.2 mm)
2 Beams	74 mm (2.91 in.)	8.96 in. (227.6 mm)
3 Beams	96 mm (3.78 in.)	11.91 in. (302.5 mm)
4 Beams	118 mm (4.65 in.)	14.87 in. (377.7 mm)
5 Beams	140 mm (5.51 in.)	17.80 in. (452.0 mm)
Etc...		

[1] The ANSI formula for the depth penetration factor, D_{pf}, is for the USA only.

An XUS-LT system with 30 mm (1.18 in.) minimum object resolution and one channel disabled has a minimum object sensitivity of:

30 mm + 22 mm = 52 mm (2.05 in.)

An XUS-LT system with 30 mm (1.18 in.) minimum object resolution and two channels disabled has a minimum object sensitivity of:

30 mm + 22 mm + 22 mm = 74 mm (2.91 in.)

The ANSI standard allows for one exception to ECS (blanking). If the area of the sensing field that is using the ESC (blanking) feature is completely occupied by material, fixtures or hard guarding such that operator intrusion in this area is impossible, then no increase in the minimum safe distance is required. This exception does not pertain to, or is permitted for floating blanking uses.

Hard guarding is a term used for mechanical open barriers like solid metal guards, or fencing. The relationship between any openings or gaps in the barriers and mounting distance of the hardwood is specified in OSHA 1910.217, table 0-10.

ECS (Blanking)

The feature of blanking or Exact Channel Select (ECS) can be used as an option to disable selected beams or channels in the safety light curtains sensing field. This option is accomplished by blocking the beams or channels at fixed locations in the sensing field. Reasons for using this feature are when a stationary object such as fixtures, conveyors, or tooling obstruct fixed areas of the sensing field. Once the specific beams or channels have been blocked and the blanking feature has been activated, the selected beams must remain blocked. If the obstruction is removed, the light curtain will transmit a stop signal to the machine.

Floating Blanking

Floating blanking is an option for use with ECS (blanking) or as a stand alone feature. Floating blanking provides the ability for up to two beams or channels to be disabled at any position in the sensing field. The two beams or channels disabled with this feature are not fixed at a single position, they are allowed to float through the sensing field.

It is important to follow the instruction manual provided with the safety light curtain when using the ECS (blanking) and float blanking optional features together.

If the ECS (blanking) or floating blanking feature is active, the minimum safe distance is affected by an increase in the light curtains minimum object sensitivity (MOS). According to the ANSI safety distance formula, if the object sensitivity of the light curtain increases, the minimum safe distance must increase.

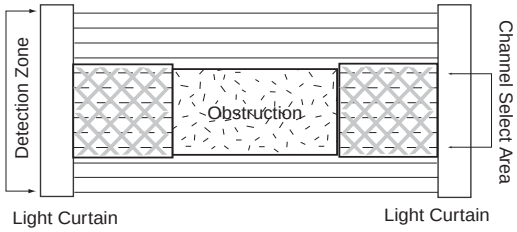
Protection for the Functions of Blanking and Floating Blanking

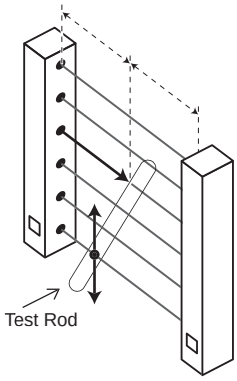
The functions of ECS/blanking and floating blanking create “holes” in the detection zone. These “holes” are required for certain applications. If an obstruction does not completely fill these “holes” one of two actions will be required:

— The safe mounting distance will need to be increased to account for the larger opening in the detection zone.

— The area not filled by an obstruction must be guarded, typically by some method of hard guarding.

Hard guarding refers to mechanical barriers such as sheet or expanded metal.





Testing Protected Area of Light Curtain

TEST PROCEDURE FOR THE UNITED STATES

The tests below must be performed by qualified personnel (per ANSI B30.2 - 1993) at or after the following:

- After installation and before the machine is commissioned,
- At regular inspections determined by the employer,
- After any maintenance, adjustment, or modification to the light curtain or machine,
- After tooling or fixture changes.

We also recommend the following test procedure be performed daily or at each shift change.

Test procedure:

1. Turn off machine. Turn on light curtain.
2. Check machine to make sure all guarding is firmly in place, operates properly, and the only access to the hazardous area is through the area protected by the light curtain.
3. Check that light curtain mounting meets or exceeds the minimum safety distance from the nearest hazardous area (pinch point). Verify the light curtain is mounted securely to a rigid mounting surface.
4. Check for damage to mounting brackets, mounting surface, wiring, or mirrors (if used). If any damage is found, the machine should be locked out▲ until it is repaired.
5. Verify the operator cannot position themselves between the hazardous area (pinch point) and the light curtain. If this is possible, additional guarding must be installed.
6. Check distance between hazardous area and light curtain sensing area to verify it meets or exceeds the minimum safety distance.
7. Insert test rod (round rod supplied with each XUSL light curtain) into the protected (sensing) area and move the test rod throughout the entire protected area (top, bottom, sides, vertically up & down in the middle of the sensing area).
8. Remove the test rod and start up the machine. With the machine running, insert the test rod into the sensing area and verify the machine stops immediately.
9. With the test rod still in the sensing area, verify the machine cannot be re-started.
10. Remove the test rod from the sensing area and verify the machine cannot be re-started except when the proper start-up sequence has been followed.
11. Check the stopping mechanisms (including brakes) to verify proper working condition.
12. If any of the above tests do not give the indicated results, the machine should be locked out▲ until it is repaired. Then run the above tests again.

▲ Follow OSHA 1910.147 for lock-out/tag-out procedures

Safety Light Curtains
Catalog Number Index

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Catalog No. 9007CT0301 August 2003