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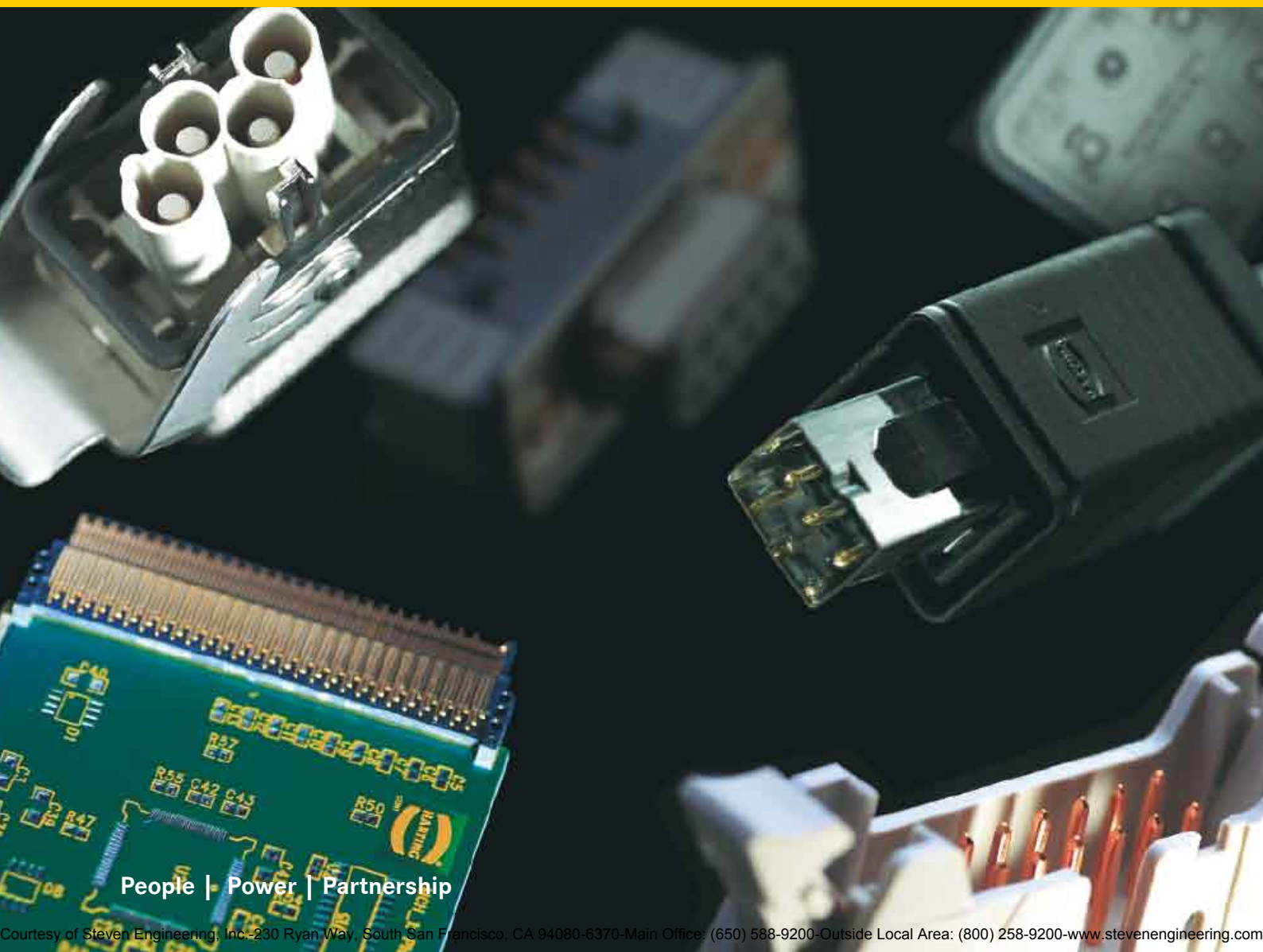
Pushing Performance

HARTING News 2008



HARTING Pushing Performance

Quality Connections Worldwide

HARTING was founded in 1945 by the family that still owns the company. Its headquarters are situated in Espelkamp, in Eastern Westphalia.

Today, HARTING employs approximate 3,000 people worldwide, including 300 engineers and scientists. Over 500 technical specialists are available to implement customer requirements.

With subsidiaries in 27 countries and ten production plants, the company is one of the leading manufacturers of electrical and electronic connectors. The global HARTING network means that the company is always in close touch with the market and ideally placed to work together with its customers.

As the market leader HARTING offers the benefits of just-in-time service and maintains close business relations with all of its key customers in the global marketplace. In more than one of its product areas, HARTING leads the field.

HARTING products are manufactured using advanced, automated techniques, with CAD systems employed both in research and development and in tool-making.

In matters of quality, HARTING is convinced that zero-defect production can only be achieved through fully automated processes. Our quality assurance organization and procedures are documented in accordance with EN ISO 9001 in a quality assurance manual. In 2006 HARTING became the first company worldwide to receive the new IRIS quality certificate (the International Railway Industry Standard).

HARTING employs around 60 staff in quality assurance alone. The majority of these engineers and technicians are trained and qualified to standards laid down by the DGQ (German Association of Quality) or SAQ (Swiss Association of Quality).

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Han® 4 A Quick Lock

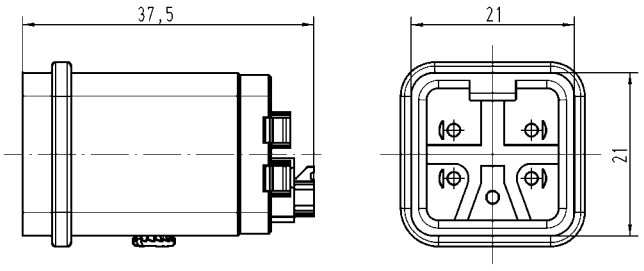
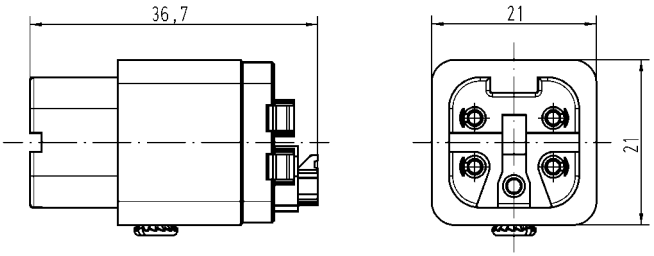
Han-**Quick Lock**®

Features

- Innovative Han-Quick Lock® termination technology
- Field assembly without special tools
- Compatible to Han® 4 A standard inserts
- Reduced wiring times
- Insert suitable for all metal and plastic hoods and housings of the sizes Han® 3 A
- Vibration resistant

Technical characteristics

Protection degree	IP 65 / IP 67
Number of contacts	4 + PE
Electrical data acc. to DIN EN 61 984	10 A 230/400 V 4 kV 3
Rated current	10 A
Rated voltage conductor-ground	230 V
Rated voltage conductor-conductor	400 V
Rated impulse voltage	4 kV
Pollution degree	3
Termination	Han-Quick Lock®
Wire gauge	0.5 bis 2.5 mm² (AWG 20–14)
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

Identification	Part-Number	Drawing	Dimensions in mm
Han® 4 A Quick Lock			
Male insert	09 20 004 2633		
Female insert	09 20 004 2733		

Han® Q 5/0 Quick Lock

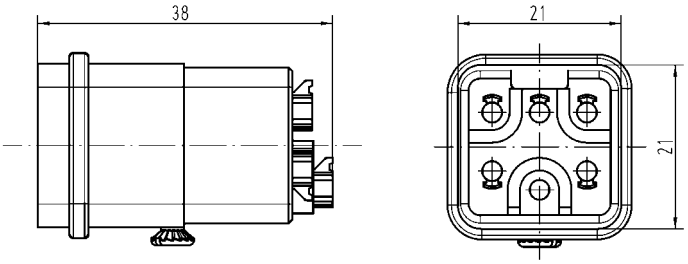
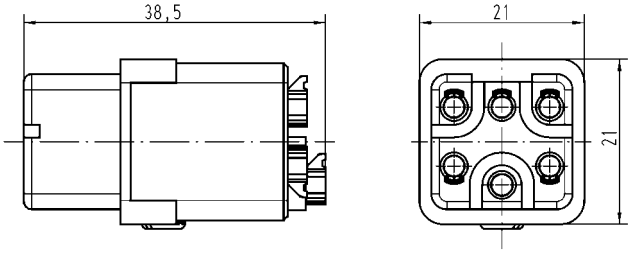
Han-**Quick Lock**®

Features

- Innovative Han-Quick Lock® termination technology
- Field assembly without special tools
- Compatible with Han® Q 5/0 standard inserts
- Reduced wiring times
- Insert suitable for all metal and plastic hoods and housings of the sizes Han® 3 A
- Vibration resistant

Technical characteristics

Protection degree	IP 65 / IP 67
Number of contacts	5 + PE
Electrical data acc. to DIN EN 61 984	16 A 230/400 V 4 kV 3
Rated current	16 A
Rated voltage conductor-ground	230 V
Rated voltage conductor-conductor	400 V
Rated impulse voltage	4 kV
Pollution degree	3
Termination	Han-Quick Lock®
Wire gauge	0.5 bis 2.5 mm² (AWG 20–14)
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

Identification	Part-Number	Drawing	Dimensions in mm
Han® Q 5/0 Quick Lock			
Male insert	09 12 005 2633		
Female insert	09 12 005 2733		

Han® EE Module Quick Lock

Han-Quick Lock®

HARTING

Samples available by November 2008

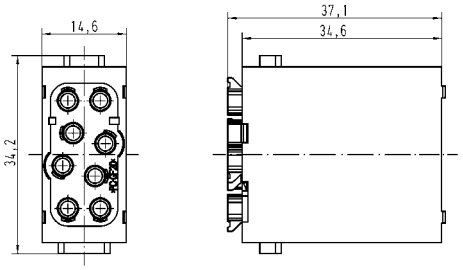
Features

- Innovative Han-Quick Lock® termination technology
- Field assembly without special tools
- Compatible to standard Han® EE module with crimp termination
- Reduced wiring times

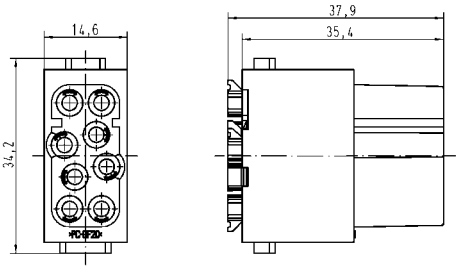
Technical characteristics

Number of contacts	8
Electrical data acc. to DIN EN 61 984	16 A 400 V 6 kV 3
Rated current	16 A
Rated voltage	400 V
Rated impulse voltage	6 kV
Pollution degree	3
Termination	Han-Quick Lock®
Wire gauge	0.5 bis 2.5 mm² (AWG 20–14)
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

Bezeichnung	Bestell-Nummer	Zeichnung	Maße in mm
Han® EE module Quick Lock			
Male insert	09 14 008 2633		



Female insert	09 14 008 2733		

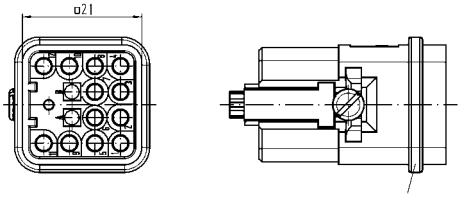
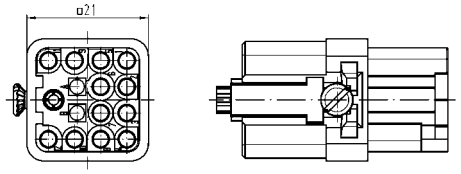


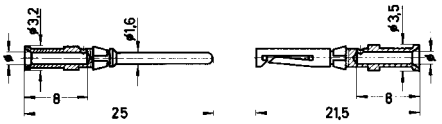
Notes

Number of contacts

12 + ⏚

Inserts

Identification	Part Number Male insert	Part Number Female insert	Dimensions in mm
Han® Q 12/0 	09 12 012 3001		
		09 12 012 3101	
Coding pins order separately 1 unit à 20 pieces 	09 12 000 9924	09 12 000 9924	

Identification	Wire gauge mm²	Part Number Male contacts	Part Number Female contacts	Dimensions in mm
Han D® crimp contacts				
silver plated 	0.14-0.37	09 15 000 6104	09 15 000 6204	
	0.5	09 15 000 6103	09 15 000 6203	
	0.75	09 15 000 6105	09 15 000 6205	
	1.0	09 15 000 6102	09 15 000 6202	
	1.5	09 15 000 6101	09 15 000 6201	
	2.5	09 15 000 6106	09 15 000 6206	
gold plated 	0.14-0.37	09 15 000 6124	09 15 000 6224	
	0.5	09 15 000 6123	09 15 000 6223	
	0.75	09 15 000 6125	09 15 000 6225	
	1.0	09 15 000 6122	09 15 000 6222	
	1.5	09 15 000 6121	09 15 000 6221	
	2.5	09 15 000 6126	09 15 000 6226	

Wire gauge		ø	Stripping length
0.14-0.37 mm²	AWG 26-22	0.90 mm	8 mm
0.5 mm²	AWG 20	1.10 mm	8 mm
0.75 mm²	AWG 18	1.30 mm	8 mm
1.0 mm²	AWG 18	1.45 mm	8 mm
1.5 mm²	AWG 16	1.75 mm	8 mm
2.5 mm²	AWG 14	2.25 mm	6 mm

Features

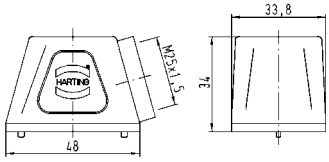
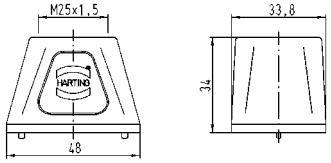
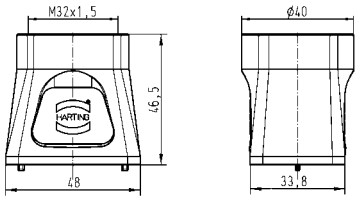
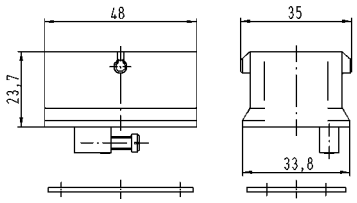
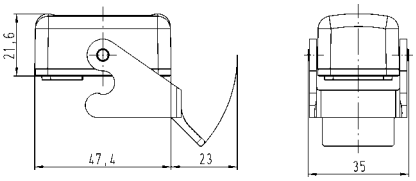
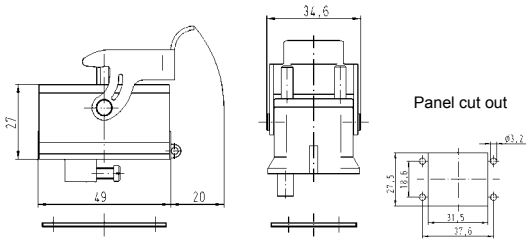
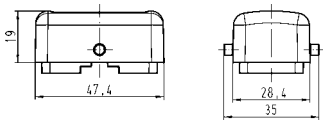
- 12 contact chambers taking the control contacts of the series Han D® with crimp termination
- 1 PE contact with innovative Han-Quick Lock® termination technology
- 2 coding pins offering 16 coding possibilities
- Insert suitable for metal and plastic hoods and housings of the series Han® 3 A

Technical characteristics

Specifications	DIN VDE 0627 DIN VDE 0110 DIN EN 61 984
Inserts	
Number of contacts	12 + PE
Electrical data acc. to DIN EN 61 984	10 A 400 V 6 kV 3
Rated current	10 A
Rated voltage	400 V
Rated impulse voltage	4 kV
Pollution degree	3
Pollution degree 2 also	10 A 400/690 V 6 kV 2
Termination Han D® contacts	Crimp
Termination PE contact	Han-Quick Lock®
Wire gauge PE contact	0.5 – 2.5 mm² AWG 20 – 14
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles
Contacts	
Material	Copper alloy
Surface	
- hard silver plated	3 µm Ag
- hard gold plated	2 µm Au over 3 µm Ni
Contact resistance	≤ 3 mΩ
Crimp termination	
- mm²	0.14 – 2.5 mm²
- AWG	26 – 14
Maximum insilation cross section	
- power contacts	ø = 5 mm
Plastic hoods/ housings	
Material	Polycarbonate
Locking element	Polyamide
Flammability acc. to UL 94	V 0
Hoods/ housings seal	NBR
Limiting temperatures	-40 °C ... +125 °C
Degree of protection acc. to DIN EN 60 529 in locked position	IP 67
Metal hoods/ housings	
Material	Die cast zinc alloy
Locking element	Steel galvanized
Hoods/ housings seal	NBR
Limiting temperatures	-40 °C ... +125 °C
Degree of protection acc. to DIN EN 60 529 in locked position	IP 44 IP 67 with sealing screw 09 20 000 9918

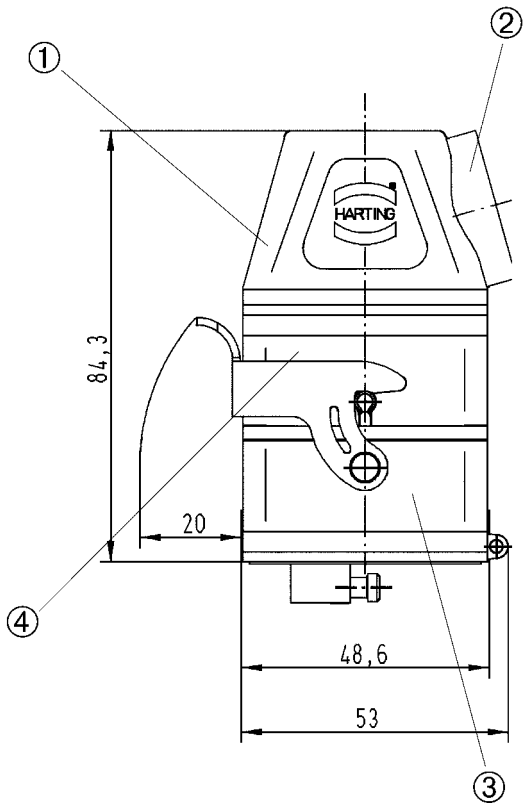
*Available by May 2008

Hoods and housings M25 and M32

Identification	Part number	Drawing	Dimensions in mm
Hood side entry M25	19 14 01 0501		 4 screws are included in delivery range
Hood top entry M25	19 14 001 0401		 4 screws are included in delivery range
Hood* top entry M32 screws are added separately	19 14 001 0402		 4 screws are included in delivery range
Carrier hood	09 14 001 0311		
Protection cover with lever and seal	09 14 001 5402		
Housing bulkhead mounting	09 14 001 0301		
Protection cover	09 14 001 5401		

Features

- Compact design saves space
- Modular structure increases flexibility
- Simple and quick assembly
- Robust design
- Two part grommet housing



① Hood with side entry
② Thread M25
③ Bulkhead mounted housing with locking lever
④ Carrier hood

Technical characteristics

Hoods/Housings

Material	Zinc die-cast
Surface	Nickel plated
Locking element	Stainless steel
Hoods/housings sealing	NBR
Limiting temperatures	-40 °C ... 125 °C
Degree of protection acc. to DIN EN 60 529 for coupled connectors	IP 65
Mechanical working life	≥ 500 mating cycles
PE contact Wire gauge	10 mm² / 8 AWG
Stripping length	10 mm
Tightening torque	1 Nm

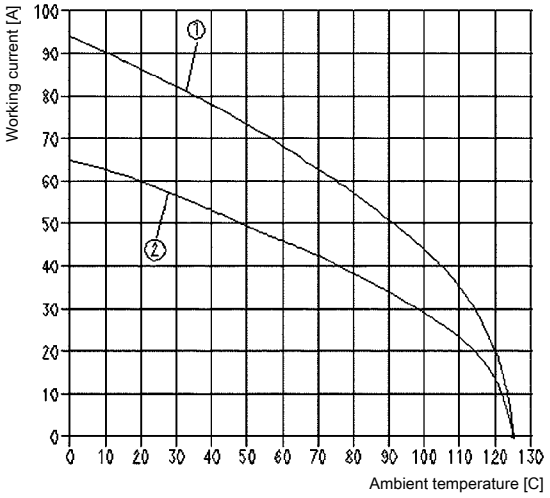
Protection covers

Material	Polycarbonate
Locking element	Polyamide
Hoods/housings sealing	NBR
Limiting temperatures	-40 °C ... 125 °C
Degree of protection acc. to DIN EN 60 529 for coupled connectors	IP 65
Flammability acc. to UL 94	V 0

Current carrying capacity

The current carrying capacity of the connectors is limited by the thermal load capability of the contact element material including the connections and the insulating parts. The derating curve is therefore valid for currents which flow constantly (non-intermittent) through each contact element of the connector evenly, without exceeding the allowed maximum temperature.

Measuring and testing techniques acc. to DIN EN 60 512-5



1 = Han® Axial screw module, Wire gauge: 10 mm²
2 = Han® C module, Wire gauge: 6 mm²

Han-Elisa®

Flexibles I/O system
integrated inside the connector

Features

- Signal pre-processing and conversion do fit into the connector
- Individual combination of input and output modules for optimal signal pre-processing
- Minimum size for integration in Han® industrial connectors (Han-Modular® and Han-Snap®)
- Economy of space by reduction the number of terminal blocks and interface modules in the switch cabinet

General description

The Han-Elisa® modules are a flexible I/O system - directly in the connector.

The In- and Output modules are developed for 1 or 2 channels and can be combined variously and flexible for optimal signal pre-processing. Within the product family modules are available for current/voltage conversion, temperature, relay and timer.

Due to the minimized size these modules can be integrated into the Han-Modular® and Han-Snap® system.

Signal pre-processing and conversion do fit into the connector and this will reduce installation space for terminal blocks and the number of interface modules. So the switch cabinets can be made smaller.

General technical characteristics

Environmental conditions

Operation	-20 °C ... +65 °C
Storage	-40 °C ... +85 °C

Mechanical data

Dimensions (WxDxH)	30.3 x 53 x 14.7 mm
Material	Polycarbonate / LCP
Mating face	• Input module: male • Output module: female
Degree of protection acc. to DIN 60 529	• IP 20 • IP 65 within mated connector (e.g. Han® B housing, high construction)
Cage clamp terminal	0.14 - 1.5 mm²

Power supply (combination input and output module)

Supply voltage	24 V (-10% ... +25%)
Current consumption	< 0.08 A
Power consumption	< 2 W
Total transmission error	< 0.2 %

Product matrix and possible combinations of Han-Elisa® modules

Output modules / Input modules	Relay Different version	Optocoupler Different versions	Output current 4 ... 20 mA galvanically isolated	Output voltage 0 ... 10 V galvanically isolated
Timing	X	X		
Connecting 1:1	X	X		
Temperature Pt100 Different temperature ranges			●	●
Temperature thermo element type J, K Different temperature ranges			X	X
Input current 4 ... 20 mA			X	X
Input voltage 0 ... 10 V			X	X

X = on request
● = available

Available by August 2008

Pt100 Input module

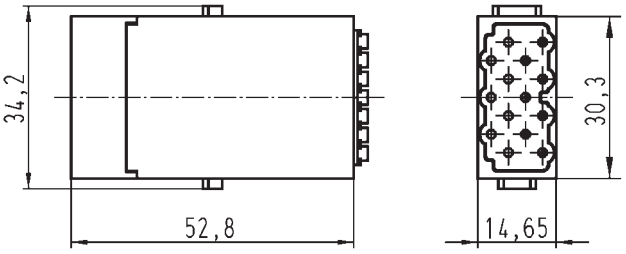
Features

- Minimum size for integration in Han® industrial connectors (Han-Modular® and Han-Snap®)
- Economy of space by reduction the number of terminal blocks and interface modules in the switch cabinet
- Male module for signal output

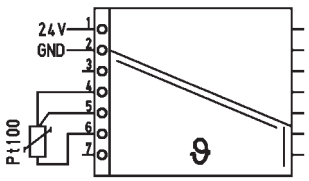
Technical characteristics

Sensor	Pt100 acc. to IEC 751
Termination technology	2, 3, 4 wire technology
Sensor input current	0.8 mA, constant
Max. permissible conductor resistance	10 Ω per conductor
Min. measuring range	100 °C
Open circuit detection	integrated
Type of connection	
- cage clamp termination	0.14 - 1.5 mm²
Power diagnostic	LED (green)

Identification	Part number	Drawing	Dimensions in mm
Temperature module Pt100			
Measuring range:			
0 ... 100 °C	20 75 108 1001		
0 ... 200 °C	20 75 108 1003		
additional measuring ranges on request			



Input



Available by August 2008

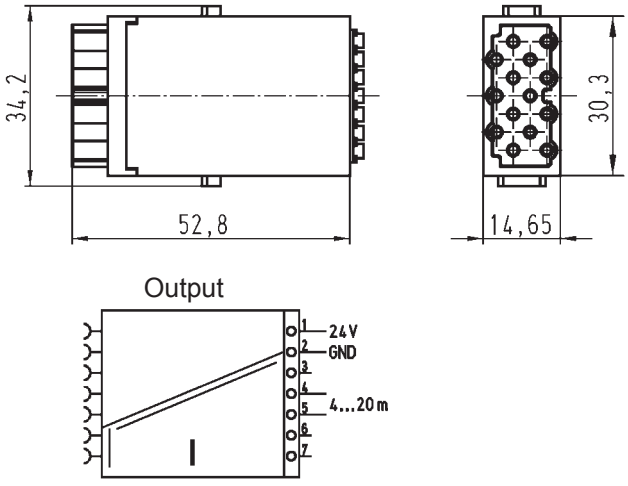
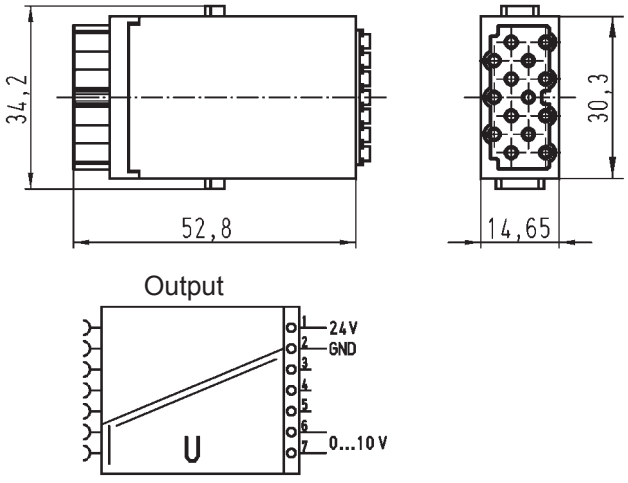
Output module

Features

- Minimum size for integration in Han® industrial connectors (Han-Modular® and Han-Snap®)
- Economy of space by reduction the number of terminal blocks and interface modules in the switch cabinet
- Female module for signal input

Technical characteristics

Supply voltage	24 V DC (-10 % ... +25 %)
Load I_{out}	< 500 Ω
Load U_{out}	≥ 10 kΩ
Residual ripple	< 20 mV (500 Ω)
Step response (0 ... 99 %)	< 30 ms
Type of connection	
- cage clamp termination	0.14 - 1.5 mm²
Power diagnostic	LED (green)

Identification	Part number	Drawing	Dimensions in mm
Output module, current 3-ways-isolating amplifier galvanically isolated Output signal 4 ... 20 mA	20 75 104 2201		
Output module, voltage 3-ways-isolating amplifier galvanically isolated Output signal 0 ... 10 V Additional output signals on request	20 75 105 2201		

Han-Power® T Modular Twin

Samples available by September 2008

with Han-Modular® Twin
Part-Number: 09 12 008 4760

Features Han-Power® T

- 1 connection for power input and output each
- 1 T-connection to device
- 3 power contacts
- 5 signal contacts
- Metal hood
- Locking lever Han-Easy Lock®

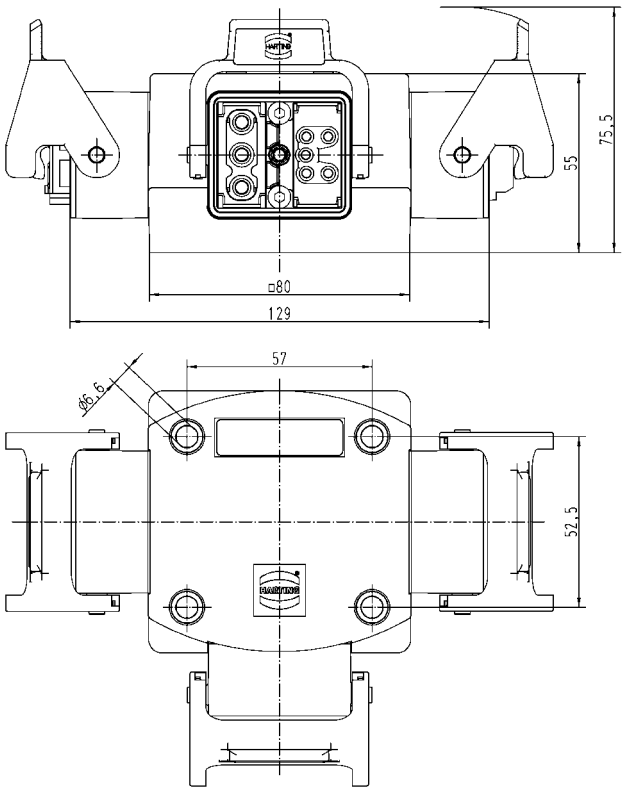
Technical characteristics

Han-Power® T Modular Twin hood

Rated voltage	400 V
Rated current	40 A
Number of contacts	3 power contacts + PE max. 6 mm² 5 signal contacts max. 2.5 mm²
Surface	powder coated RAL 7037
Sealing	NBR
Temperature range	-40 °C ... +125 °C
Protection degree acc. to DIN 60 529	IP 65

Han-Modular® Twin Hoods

Dimensions in mm



Suitable inserts

Han® C module with crimp termination

Number of contacts	3
Rated current	40 A
Rated voltage	
Conductor - Ground	400 V
Conductor - Conductor	690 V
Rated impulse voltage	6 kV
Pollution degree	3

Han® ES module with cage clamp termination

Number of contacts	5
Rated current	16 A
Rated voltage	400 V
Rated impulse voltage	6 kV
Pollution degree	3
Material	Polycarbonate
Insulation resistance	≥ 10^{10} Ω
Temperature range	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	≥ mating cycles

For more Han-Modular® inserts see chapter 6 in the main catalogue of HARTING Electric GmbH & Co. KG

Han® 3 A Hood with integrated Cable gland

Features

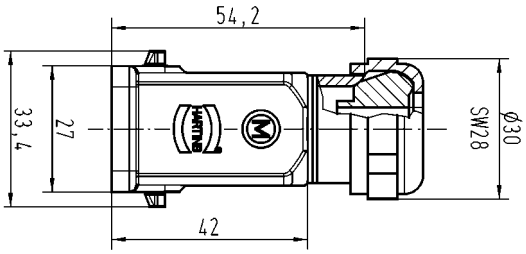
- Installation height reduced by 25 % compared with existing standard solutions
- Large clamping range of 6 –17 mm
- Reduction of logistic complexitiy by integration of cable gland

Technical characteristics

Material	Zinc die-cast
Surface	Powder-coated RAL 7037 (grey)
Cable gland	Brass, nickel-plated with high quality rubber sealing element
Clamping range	6 - 17 mm
Limiting temperatures	-40 °C ... 125 °C
Degree of protection accd. to EN 60 529 in locked position	IP 44 IP 67 with use of sealing screw 09 20 000 9918

Identification	Part Number
Without glued sealing	
Clamping range	
6 - 12 mm	19 20 003 1421
11 - 17 mm	19 20 003 1422
With glued sealing	
Clamping range	
6 - 12 mm	19 20 003 1425

Drawing — Dimensions in mm



Assembly instructions

For small cable diameter

Pull identification tab outwards or remove

For large cable diameter

Remove blue insert: place the screw driver vertically into the separation seam and lift out the blue insert

Available by June 2008

Stainless steel hoods and housings

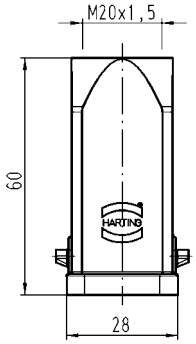
Features

- Hoods and housings as well as locking elements out of stainless steel
- Resistant against aggressive detergents
- Fields of application
  - Food and beverage industry
  - Water and sewage industry
  - Pharmaceutical industry
  - Chemical industry
  - Offshore and shipbuilding
- Available in the size 3 A
- Suitable for all standard inserts that fit into sizes Han® 3 A

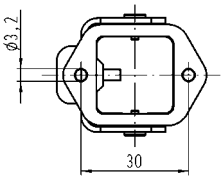
Technical characteristics

Material	Stainless steel
Sealing	NBR
Limiting temperatures	-40 °C ... +125 °C
Protection degree in locked position	IP 65
Locking lever	Stainless steel

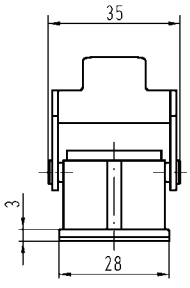
Identification	Part-Number	M	Drawing	Dimensions in mm
Hood Han® 3 A				
top entry	19 44 003 1440	20		
with glued sealing	19 44 003 1443	20		

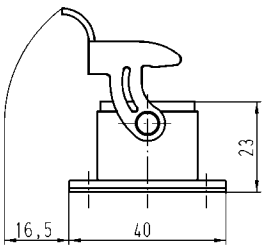


Panel cut out
22 x 22 mm



Bulkhead mounted housing Han® 3 A				
with 1 metal locking lever	19 44 003 0301	–		





Han® A Gasket

Han® A standard hoods and housings with gasket

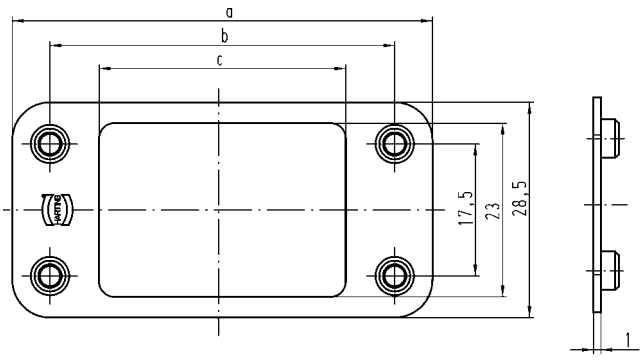
Features

- Is included in the delivery range
- Smart handling
- Fast panel mounting
- Long life time
- Suitable for rough environments
- Avoid loosing panel mounting screws

Technical characteristics

Material	NBR
Surface	black
Limiting temperatures	-40 °C ... 125 °C
Degree of protection acc. to EN 60 529	IP 65

Identification	Part Number	Drawing	Dimensions in mm
Han® gasket size 10 A *	09 20 000 9998		
Han® gasket size 16 A *	09 20 000 9999		



Size	Length in mm		
	a	b	c
10 A	80	70	57
16 A	96	86	73

* ... only for the use in combination with bulk-head mounting housings including blind hole

Han® 16 HPR

Size B

Bulkhead mounted housing with cover

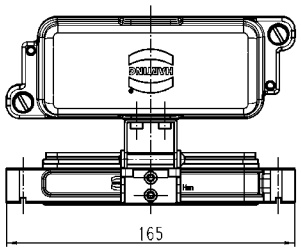
Features

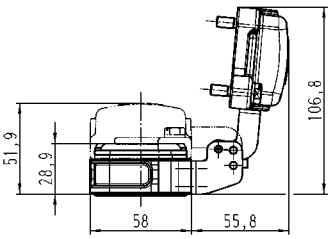
- HPR cover cap included
- Pressure tight design
- Highly EMI resistant
- Captive screws
- Corrosion resistant

Technical characteristics

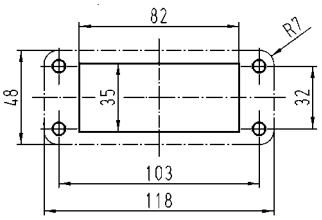
Material	Corrosion resistant die cast aluminium alloy
Surface - Top Coat	Epoxy powder paint (black)
Limiting temperatures	-40 °C ... +85 °C
Degree of protection acc. to DIN 60 529	IP 65

Identification	Part number	Size	Drawing	Dimensions in mm
Han® 16 HPR bulkhead mounting with cover	09 40 016 0317	16 B		





Panel cut out



Notes

Han® Q 4/2 inserts with PCB adapter

Features

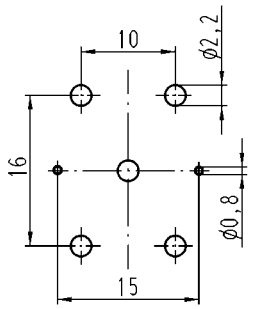
- Robust Design
- Suitable for Han-Compact® hoods and housings
- Low wiring costs
- High contact density

Technical characteristics

Number of contacts	4/2 + PE
Electrical data accd. to DIN EN 61 984	
Power area	30 A 400/690 V 6 kV 2
Rated current	30 A
Rated voltage	
conductor - ground	400 V
conductor - conductor	690 V
Rated impulse voltage	6 kV
Pollution degree	2
Signal area	7.5 A 250 V 4 kV 2
Rated current	7.5 A
Rated voltage	250 V
Rated impulse voltage	4 kV
Pollution degree	2
Insulation resistance	≥ 10^{10} Ω
Material	LCP
Limiting temperatures	-40 °C ... +125 °C
Flammability accd. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

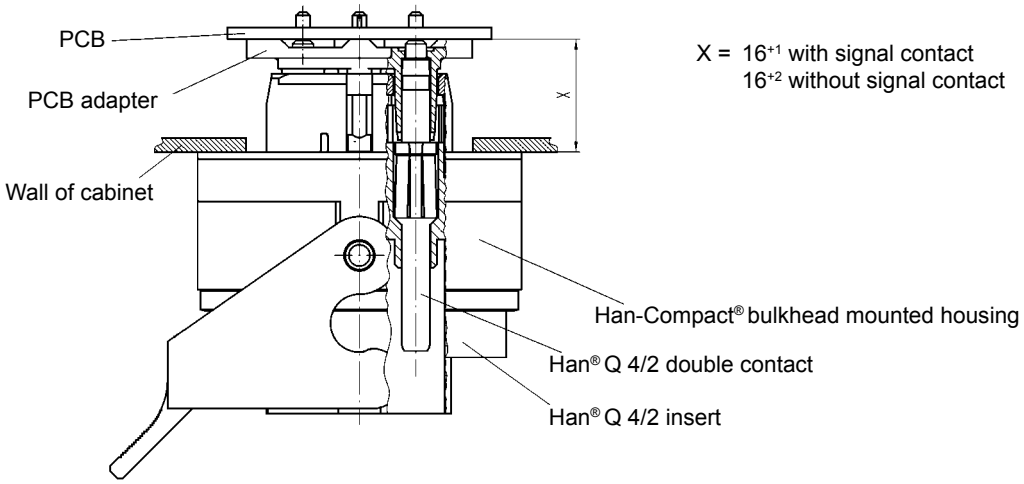
Layout of printed circuit boards

Dimensions in mm

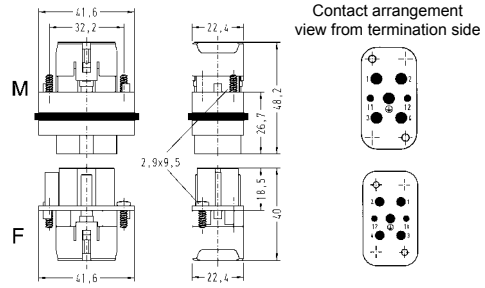


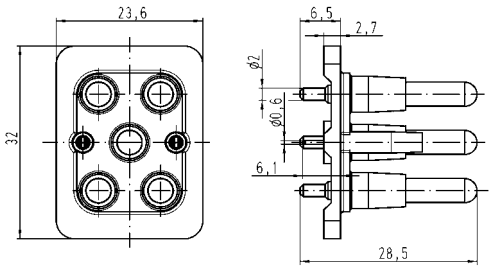
Assembly details

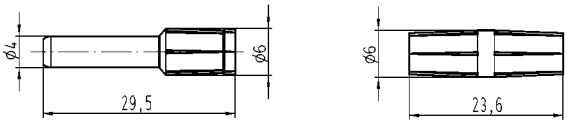
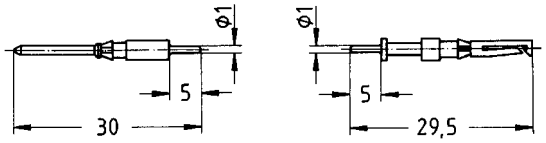
Dimensions in mm

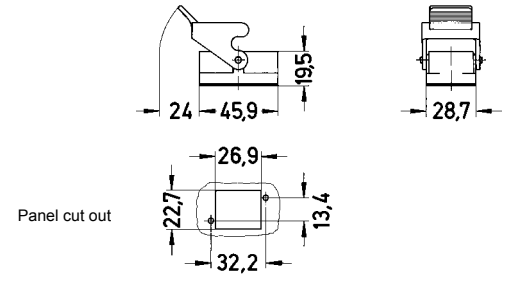


Han® Q 4/2 inserts with PCB adapter

Inserts	Part-Number Male insert (M)	Part-Number Female insert (F)	Drawings	Dimensions in mm
order contacts separately 	09 12 006 3041	09 12 006 3141		

PCB adapter	Part-Number	Drawings	Dimensions in mm
for PCBs up to 2.4 mm 	09 12 006 9901		

Han® Q 4/2 double contacts	Part-Number Male contact (M)	Part-Number Female contact (F)	Drawings	Dimensions in mm
to connect the PCB adapter power contact 	09 32 000 6180	09 32 000 6280		
signal contact 	09 15 000 6191	09 15 000 6293		

Housing bulkhead mounting	Part-Number	Drawings	Dimensions in mm
plastic 	09 12 008 0327		

Mating connector

crimp terminal			see chapter 13.21 in main catalogue 02 3 Industrial Connectors Han®

Han® Q 8/0 inserts with PCB adapter

230/400 V 16 A

Features

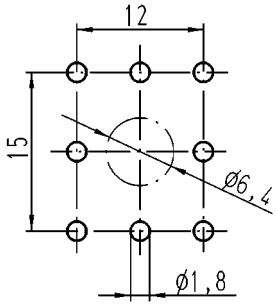
- Robust Design
- Suitable for Han-Compact® hoods and housings
- Low wiring costs
- High contact density

Technical characteristics

Number of contacts	8
Electrical data accd. to DIN EN 61 984	16 A 230/400 V 4 kV 2
Rated current	16 A
Rated voltage	
conductor - ground	230 V
conductor - conductor	400 V
Rated impulse voltage	4 kV
Pollution degree	2
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Limiting temperatures	-40 °C ... +125 °C
Flammability accd. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

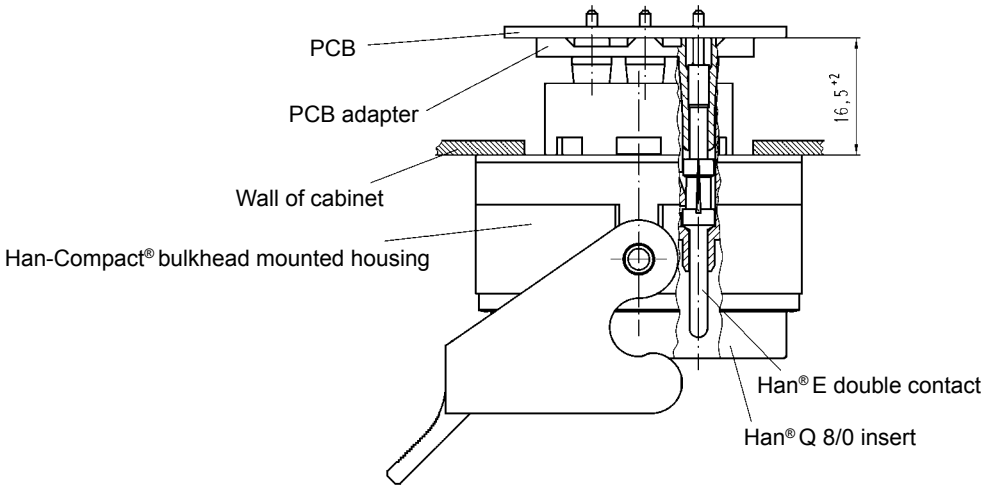
Layout of printed circuit boards

Dimensions in mm



Assembly details

Dimensions in mm

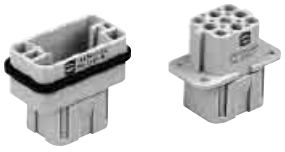
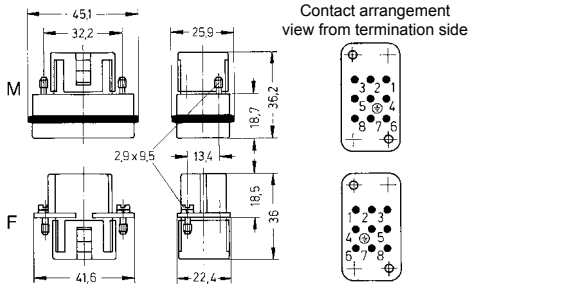


Han® Q 8/0 inserts with PCB adapter

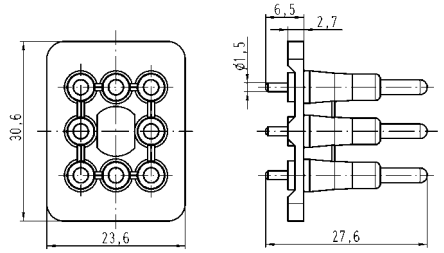
230/400 V 16 A

Inserts

Part-Number

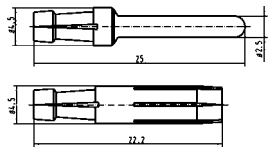
	Male insert (M)	Female insert (F)	Drawings	Dimensions in mm
order contacts separately 	09 12 008 3001	09 12 008 3101		

PCB adapter

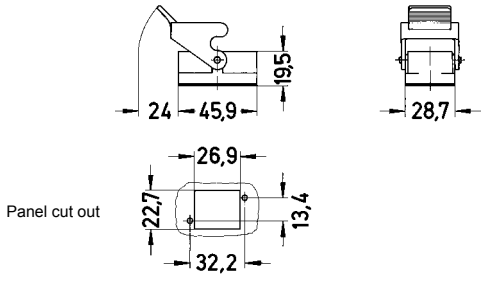
	Part-Number	Drawings	Dimensions in mm
for PCBs up to 1.6 mm 	09 12 008 9901		

Han E® double contacts

Part-Number

	Male contact (M)	Female contact (F)	Drawings	Dimensions in mm
to connect the PCB adapter 	09 33 000 6180	09 33 000 6280		

Housing bulkhead mounting

	Part-Number	Drawings	Dimensions in mm
plastic 	09 12 008 0327		

Mating connector

crimp terminal			see chapter 13.17 in main catalogue 02 3 Industrial Connectors Han®

Han® PushPull Power 4/0 Metal

Features

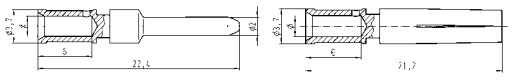
- HARTING Push Pull Technology
- Compact design
- Finger protected
- Cable side; female insert
  - crimp termination
  - fast termination technology Han-Quick Lock®
- Panel feed through
  - crimp termination
  - fast termination technology Han-Quick Lock®
  - solder termination

Technical characteristics

Number of contacts	4 + PE
Electrical data acc. to DIN EN 61 984	
Rated current	16 A
Rated voltage	
- solder termination	230/400 V
- crimp termination	690 V
- Han-Quick Lock® termination	690 V
Degree of pollution	3
Locking system	PushPull
Degree of protection	IP 65 / IP 67
Max. cable diameter	13 mm
Wire gauge	2.5 mm²
Flammability acc. to UL 94	V0
Material of housing	Metal

Acessories

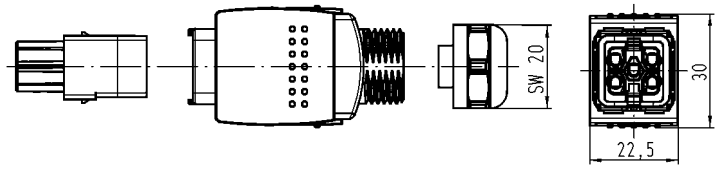
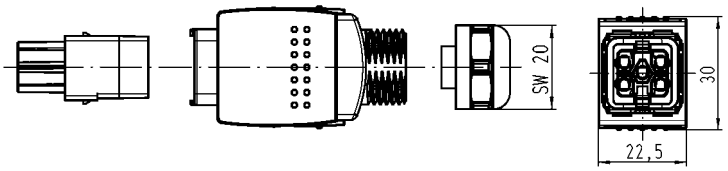
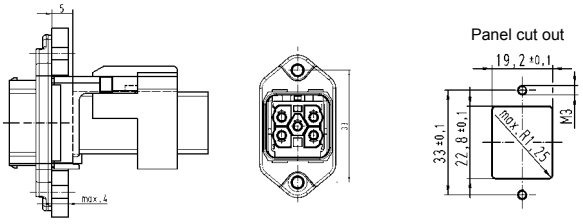
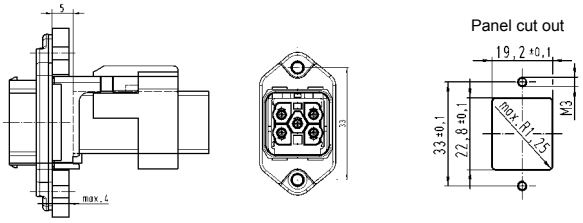
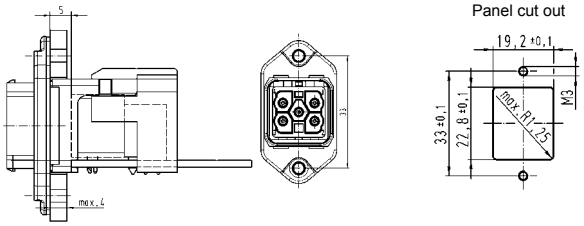
	Part number	Drawing	Dimensions in mm
Han® PushPull dust protection cover for device side	09 35 002 5401		
Han® PushPull Power for cable side	09 35 002 5412		
Han® PushPull IP 65 for cable side	09 35 002 5411		

Identification	Part number Male contact	Part number Female contact	Drawing	Dimensions in mm
Crimp contacts Han® P silver plated				
for 0.5 mm²	09 35 000 6103	09 35 000 6203		
for 0.75 mm²	09 35 000 6104	09 35 000 6204		
for 1.0 mm²	09 35 000 6105	09 35 000 6205		
for 1.5 mm²	09 35 000 6106	09 35 000 6206		
for 2.5 mm²	09 35 000 6107	09 35 000 6207		

Wire gauge		Ø	Stripping length
for 0.5 mm²	AWG 20	1.15 mm	6 mm
for 0.75 mm²	AWG 18	1.30 mm	6 mm
for 1.0 mm²	AWG 18	1.45 mm	6 mm
for 1.5 mm²	AWG 16	1.75 mm	6 mm
for 2.5 mm²	AWG 14	2.25 mm	6 mm

Han® PushPull Power 4/0 Metal

Connector for device termination

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull Power 4/0			
Cable side including hood and female insert 16 A, 690 V with crimp termination please order crimp contacts separately	09 35 231 0401	Total length assembled approx. 71.5 mm 	
Cable side including hood and female insert 16 A, 690 V with Han-Quick Lock® termination	09 35 232 0401	Total length assembled approx. 71.5 mm 	
Panel feed through including housing and male insert 16 A, 690 V with crimp termination please order crimp contacts separately	09 35 231 0313		
Panel feed through including hood and male insert 16 A, 690 V with Han-Quick Lock® termination	09 35 232 0313		
Panel feed through including hood and male insert 16 A, 230/400 V on PCB with solder termination	09 35 233 0313		

Han® PushPull Power 4/0 Plastic

Features

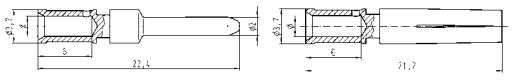
- HARTING Push Pull Technology
- Compact design
- Finger protected
- Cable side; female insert
  - crimp termination
  - fast termination technology Han-Quick Lock®
- Panel feed through
  - crimp termination
  - fast termination technology Han-Quick Lock®
  - solder termination

Technical characteristics

Number of contacts	4 + PE
Electrical data acc. to DIN EN 61 984	
Rated current	16 A
Rated voltage	
- solder termination	230/400 V
- crimp termination	690 V
- Han-Quick Lock® termination	690 V
Degree of pollution	3
Locking system	PushPull
Degree of protection	IP 65 / IP 67
Max. cable diameter	13 mm
Wire gauge	2.5 mm²
Flammability acc. to UL 94	V0
Material of housing	Plastic

Acessories

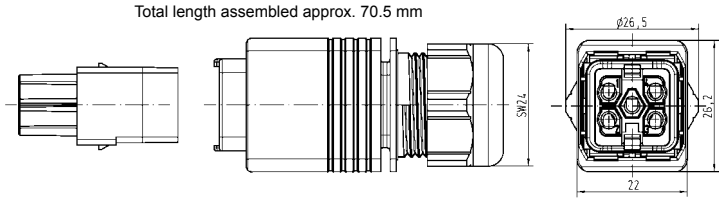
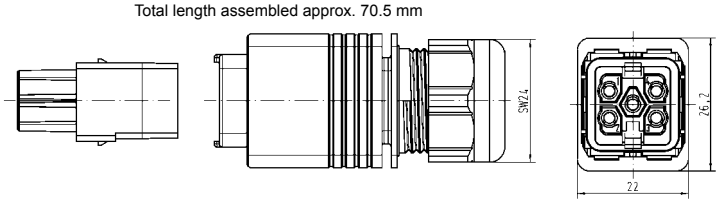
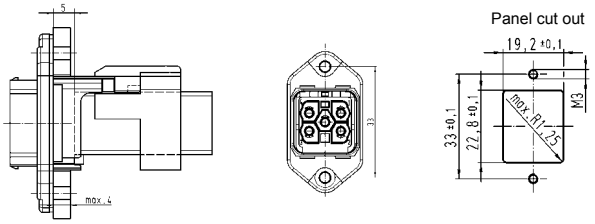
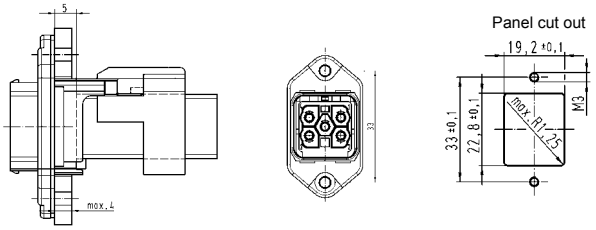
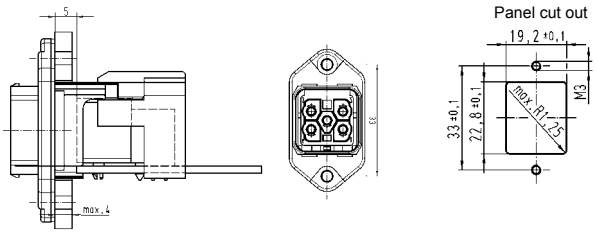
	Part number	Drawing	Dimensions in mm
Han® PushPull dust protection cover for device side	09 35 002 5401		
Han® PushPull Power for cable side	09 35 002 5412		
Han® PushPull IP 65 for cable side	09 35 002 5411		

Identification	Part number Male contact	Part number Female contact	Drawing	Dimensions in mm
Crimp contacts Han® P silver plated				
for 0.5 mm²	09 35 000 6103	09 35 000 6203		
for 0.75 mm²	09 35 000 6104	09 35 000 6204		
for 1.0 mm²	09 35 000 6105	09 35 000 6205		
for 1.5 mm²	09 35 000 6106	09 35 000 6206		
for 2.5 mm²	09 35 000 6107	09 35 000 6207		

Wire gauge		Ø	Stripping length
for 0.5 mm²	AWG 20	1.15 mm	6 mm
for 0.75 mm²	AWG 18	1.30 mm	6 mm
for 1.0 mm²	AWG 18	1.45 mm	6 mm
for 1.5 mm²	AWG 16	1.75 mm	6 mm
for 2.5 mm²	AWG 14	2.25 mm	6 mm

Han® PushPull Power 4/0 Plastic

Connector for device power supply

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull Power 4/0 Cable side including hood and female insert 16 A 690 V with crimp termination please order crimp contacts separately	09 35 231 0423		
Cable side including hood and female insert 16 A 690 V with Han-Quick Lock® termination	09 35 232 0421		
Panel feed through including housing and male insert 16 A 690 V with crimp termination please order crimp contacts separately	09 35 231 0333		
Panel feed through including housing and male insert 16 A 690 V with Han-Quick Lock® termination	09 35 232 0333		
Panel feed through including housing and male insert 16 A, 230/400 V on PCB with solder termination	09 35 233 0333		

Han® PushPull RJ45 Metal

Features

- HARTING PushPull Technology
- Compact design
- High density
- Fast termination technique without tools
- PC board connection for device integration
- Panel feed through with different termination possibilities

Technical characteristics

Number of contacts	4, shielded
Locking system	PushPull
Degree of protection	IP 65 / IP 67
Max. cable diameter	9 mm
Wire gauge	AWG 24 - 22 flexible AWG 23 - 22 solid
Transmission characteristic	Cat 5e
Flammability acc. to UL 94	V0
Material of housing	Metal

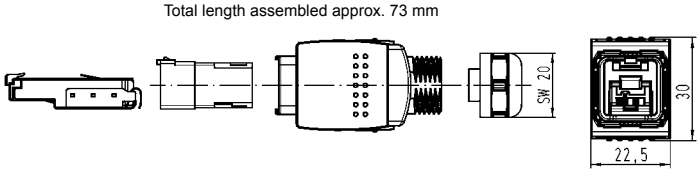
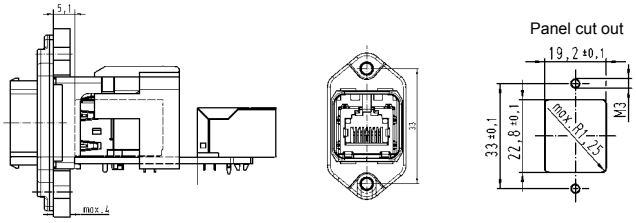
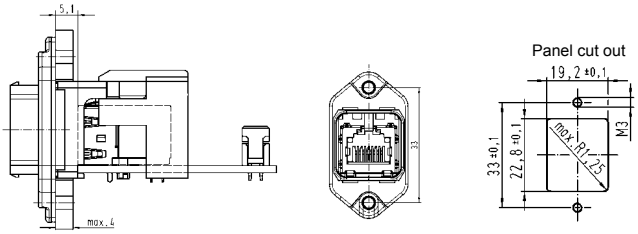
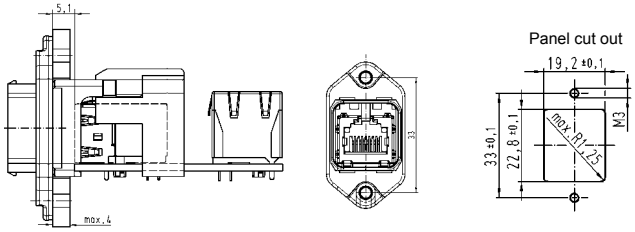
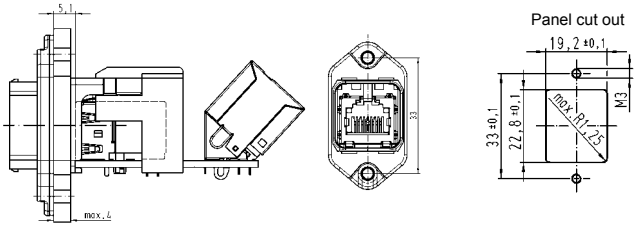
Acessories

	Part number	Drawing	Dimensions in mm
Han® PushPull dust protection cover for device side	09 35 002 5401		
Han® PushPull Power for cable side	09 35 002 5412		
Han® PushPull IP 65 for cable side	09 35 002 5411		

Han® PushPull RJ45 Metal

Ethernet connector
based on RJ45

Automation **I**nitiative German **D**omestic **A**utomobile Manufacturers

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull RJ45 Metal PROFINET Identification: PROFINET O-Plug RJ45 Cable side including hood and male insert HARTING RJ Industrial®	09 35 221 0401		
Han® PushPull RJ45 Metal Panel feed through including housing and printed board with 2 x RJ45 jack horizontally mounted	09 35 221 0311		
Panel feed through including housing and printed board with RJ45 jack and SEK board	09 35 222 0311		
Panel feed through including housing and printed board with RJ45 jack and RJ45 jack vertically mounted in the IP20 range	09 35 223 0311		
Panel feed through including housing and printed board with RJ45 jack and 47° jack vertically mounted in the IP20 range Recommendation for female insert and assembly manual on request.	09 35 224 0311		

Han® PushPull RJ45 Plastic

Features

- HARTING PushPull Technology
- Compact design
- High density
- Fast termination technique without tools
- PC board connection for device integration
- Panel feed through with different termination possibilities

Technical characteristics

Number of contacts	4, shielded
Locking system	PushPull
Degree of protection	IP 65 / IP 67
Max. cable diameter	9 mm
Wire gauge	AWG 24 - 22 flexible AWG 23 - 22 solid
Transmission characteristic	Cat 5e
Flammability acc. to UL 94	V0
Material of housing	Plastic

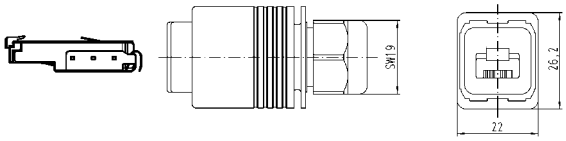
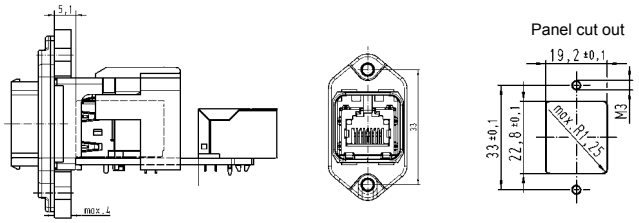
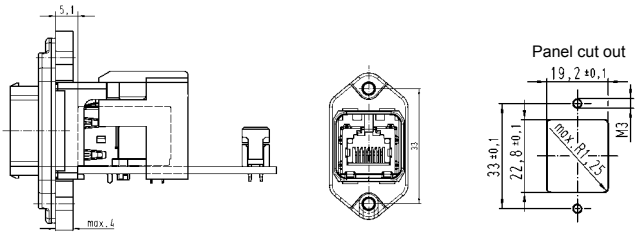
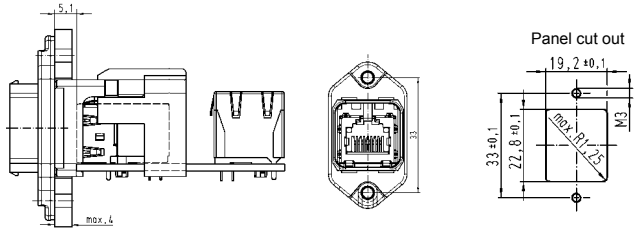
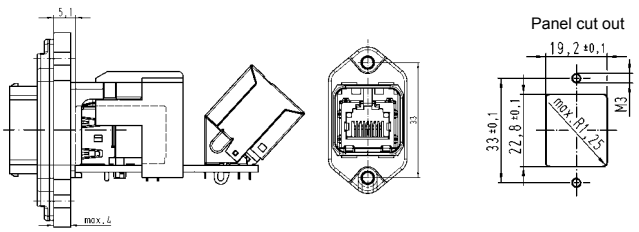
Acessories

	Part number	Drawing	Dimensions in mm
Han® PushPull dust protection cover for device side	09 35 002 5401		
Han® PushPull Power for cable side	09 35 002 5412		
Han® PushPull IP 65 for cable side	09 35 002 5411		

Han® PushPull RJ45 Plastic

Ethernet connector
based on RJ45

Automation **I**nitiative German **D**omestic **A**utomobile Manufacturers

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull RJ45 Plastic PROFINET Identification: PROFINET O-Plug RJ45 Cable side including hood and male insert HARTING RJ Industrial® Cable diameter 5.0 - 8.0 mm Cable diameter 6.5 - 9.5 mm	 09 35 222 0421 09 35 221 0421	Total length assembled approx. 67 mm 	
Han® PushPull RJ45 Plastic Panel feed through including housing and printed board with 2 x RJ45 jack horizontally mounted	09 35 221 0331		
Panel feed through including housing and printed board with RJ45 jack and SEK board	09 35 222 0331		
Panel feed through including housing and printed board with RJ45 jack and RJ45 jack vertically mounted in the IP20 range	09 35 223 0331		
Panel feed through including housing and printed board with RJ45 jack and 47° jack vertically mounted in the IP20 range	09 35 224 0331		
Recommendation for female insert and assembly manual on request.			

Han® PushPull SCRJ Metal

Optical connector
based on SCRJ

Automation **I**nitiative German **D**omestic **A**utomobile Manufacturers

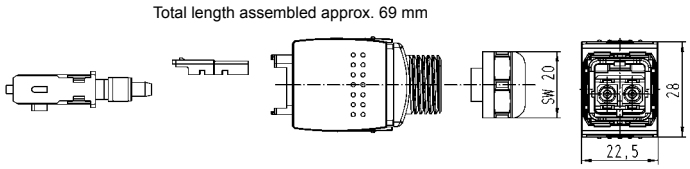
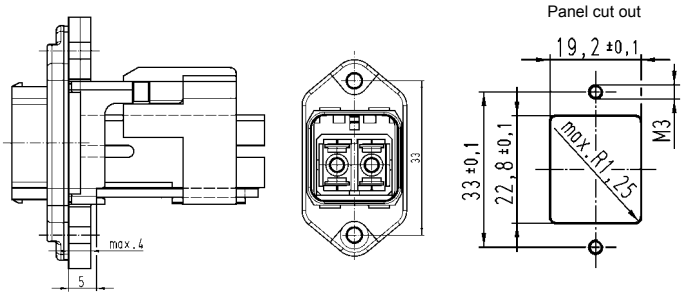
Advantages

- HARTING Push Pull Technology
- Compact design
- High density
- Transceiver for device integration

[1] HCS® = Hard Clad Silica (is registered trade mark of the SpecTran Corporation)
[2] POF = Polymer-Optical Fibre

General Description

Locking system	Push Pull
Degree of protection	IP 65 / IP 67
Mating face	SCRJ acc. to IEC 50377-3-6
Fibre types	Optical fibre MM 50 µm / 125 µm MM 62.5 µm /125 µm SM 10 µm / 125 µm HCS®[1] 200 µm / 230 µm POF[2] 1 mm
Material of housing	Metal
Flammability according to UL 94	V0

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull SCRJ Metal PROFINET Identification: PROFINET O-Plug SCRJ Cable side including hood and insert SCRJ order SC contacts separately	09 35 241 0402		
Han® PushPull SCRJ Panel feed through Available by August 2008	09 35 242 0313		

Contacts

	Part number
SC POF contact, 1 mm	20 10 001 5217
SC 125 GI contact	20 10 125 5211
SC 230 HCS contact	20 10 230 5211

Han® PushPull SCRJ Plastic

Optical connector
based on SCRJ

Automation **I**nitiative German **D**omestic **A**utomobile Manufacturers

Advantages

- HARTING Push Pull Technology
- Compact design
- High density
- Transceiver for device integration

[1] HCS® = Hard Clad Silica (is registered trade mark of the SpecTran Corporation)
[2] POF = Polymer-Optical Fibre

General Description

Locking system	Push Pull
Degree of protection	IP 65 / IP 67
Mating face	SCRJ acc. to IEC 50377-3-6
Fibre types	Optical fibre MM 50 µm / 125 µm MM 62.5 µm /125 µm SM 10 µm / 125 µm HCS®[1] 200 µm / 230 µm POF[2] 1 mm
Material of housing	Plastic
Flammability according to UL 94	V0

Identification	Part number	Drawing	Dimensions in mm
Han® PushPull SCRJ PROFINET Identification: PROFINET O-Plug SCRJ Cable side including hood and insert SCRJ order SC contacts separately	09 35 241 0422	Total length assembled approx. 69 mm	
Han® PushPull SCRJ Panel feed through Available by August 2008	09 35 242 0333	Panel cut out	

Contacts

	Part number
SC POF contact, 1 mm	20 10 001 5217
SC 125 GI contact	20 10 125 5211
SC 230 HCS contact	20 10 230 5211

Technical characteristics

Specifications IEC 60 352-4
IEC 60 947-5-2

Approvals

	***HARAX*® M8-S**	***HARAX*® M8-S (0.08 mm²)**	***HARAX*® M12-S**
	21 02 151 1305 / 2305 21 02 151 1405 / 2405	21 02 159 1305	21 03 111 1405 / 2405
Rated voltage	32 V	32 V	32 V
Rated current (see current carrying capacity)	4 A	2 A	4 A
wire gauge	0.14 - 0.34 mm²	0.08 - 0.14 mm²	0.14 - 0.34 mm²
	AWG 26 - 22	AWG 28 - 26	AWG 26 - 22
Diameter of individual strands	≥ 0.1 mm	≥ 0.05 mm	≥ 0.1 mm
Conductor insulation material	PVC, PP, TPE	PVC, PP, TPE	PVC, PP, TPE
Conductor diameter	1.0 - 1.6 mm	0.6 - 1.0 mm	1.0 - 1.6 mm
Cable diameter	2.5 - 5.1 mm	1.9 - 2.5 mm (transparent)	2.5 - 4.0 mm (transparent)
	3 seals	2.5 - 3.5 mm (grey)	4.0 - 5.1 mm (black)
Limiting temperatures	-25 °C ... +85 °C	-25 °C ... +85 °C	-25 °C ... +85 °C
Temperature during connection	-5 °C ... +50 °C	-5 °C ... +50 °C	-5 °C ... +50 °C
Degree of protection	IP 67	IP 67	IP 67
Termination cycles with the same cross section	10	10	10
Recommended tightening torque / width across flats	0.4 Nm / 9	0.4 Nm / 9	0.6 Nm / 13

	***HARAX*® M12-L Profibus**	**Han® M12**	
		HARAX*® *IDC terminal	**Crimp terminal**
	21 03 241 1301 / 2301	21 03 321 1425 / 2425 21 03 381 2425	21 03 822 1425 / 2425 21 03 882 2425
Rated voltage	32 V	50 V	50 V
Rated current (see current carrying capacity)	4 A	4 A	4 A
wire gauge	0.25 - 0.34 mm²	0.14 - 0.34 mm²	0.34 - 0.5 mm²
	AWG 24 - 22	AWG 26 - 22	AWG 22 - 20
Diameter of individual strands	≥ 0.1 mm	≥ 0.1 mm	–
Conductor insulation material	PVC, cell PE	PVC, PE	PVC, PE
Conductor diameter	2.0 - 2.6 mm	1.0 - 1.6 mm	2.0 - 2.3 mm
Cable diameter	7.0 - 8.8 mm	4.0 - 5.1 mm (black)	7.0 - 8.8 mm
		7.0 - 8.8 mm (beige)	
Limiting temperatures	-25 °C ... +85 °C	-25 °C ... +85 °C	-25 °C ... +85 °C
Temperature during connection	-5 °C ... +50 °C	-5 °C ... +50 °C	-5 °C ... +50 °C
Degree of protection	IP 67	IP 67	IP 67
Termination cycles with the same cross section	10	10	–
Coding	B	A, D	A, D
Recommended tightening torque / width across flats	0.6 Nm / 17	0.6 Nm / 17	0.6 Nm / 17

Features

***HARAX*® M8-S, 3 pins**
- Less single parts
- 3 seals in one frame
- Corresponding seals are easy to assign

***HARAX*® M8-S for 0.08 - 0.14 mm², 3 pins**
- Well-known and proven *HARAX*® IDC termination
- Short and robust design
- Wider range of suitable wire gauges for *HARAX*® M8-S

***HARAX*® M12-S, 4 pins**
- Hexagon flat on male and female connector
- More comfortable handling
- Easy maintenance

***HARAX*® M12-L Profibus**
- HARAX IDC termination
- Easy termination of the shielding
- No special tools necessary for assembly

Panel feed through Han® M12 with *HARAX*® and crimp termination
- Short and robust design for harsh environments
- Available with *HARAX*® and with crimp termination
- Field assembly possible
- Suitable for different types of shielded cables

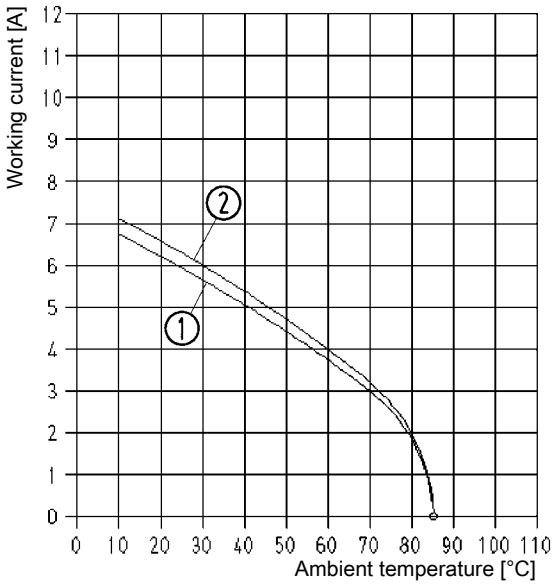
Current carrying capacity

The current carrying capacity of the connectors is limited by the thermal load capability of the contact element material including the connections and the insulating parts. The de-rating curve is therefore valid for currents which flow constantly (non-intermittent) through each contact element of the connector evenly, without exceeding the allowed maximum temperature.

Measuring and testing techniques acc. to DIN EN 60 512-5

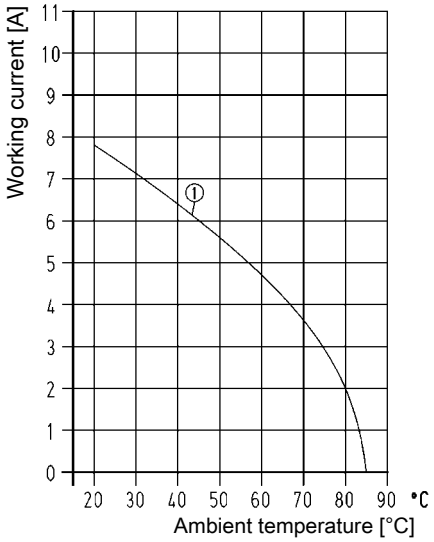
M8-S, 4 pins
M12-S, 4 pins

1 = wire gauge 0.25 mm²
2 = wire gauge 0.34 mm²



M12, Crimp

1 = wire gauge 0.34 mm² / 0.5 mm²

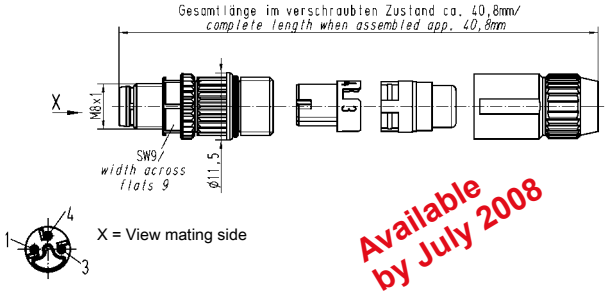


Identification	Part-Number	Drawing	Dimensions in mm

HARAX® M8-S, 0.08 mm²

Male, straight version, 3 pins

21 02 159 1305



Available by July 2008

Set of 3 seals for *HARAX*® M8-S

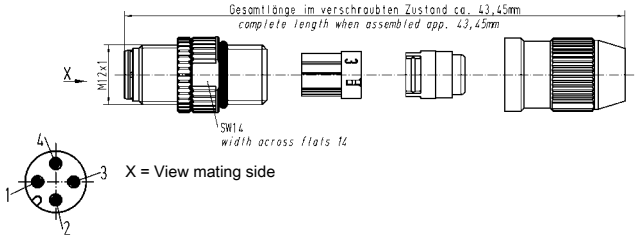
for cable outer diameter
- 2.5 - 3.2 mm
- 3.2 - 4.0 mm
- 4.0 - 5.1 mm

21 01 010 2013

HARAX® M12-S

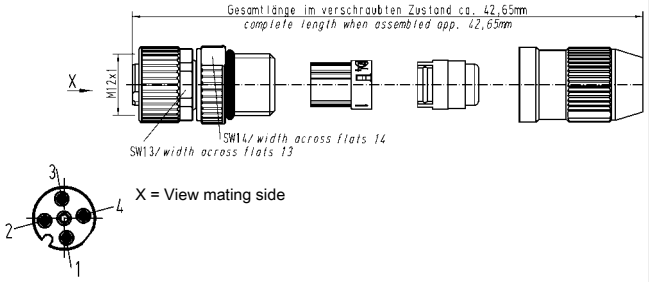
Male, straight version, 4 pins

21 03 111 1405



Female, straight version, 4 pins

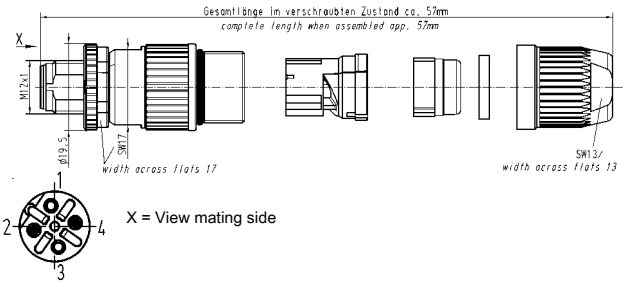
21 03 111 2405



HARAX® M12-L, screened

Male, 2 pins, B-coding
Profibus version

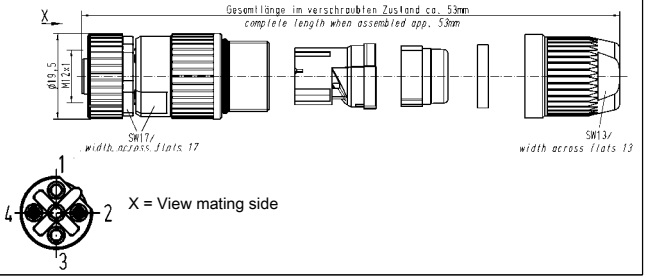
21 03 241 1301

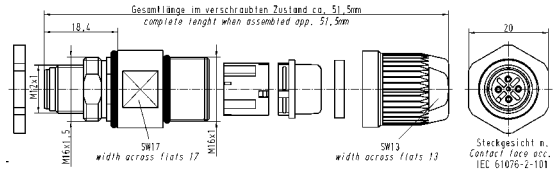
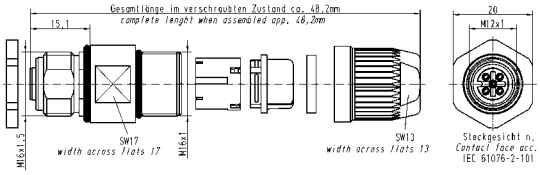
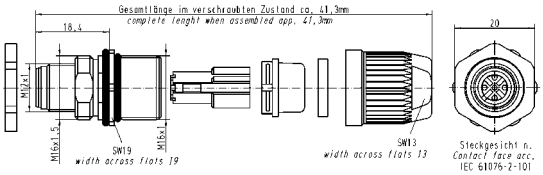
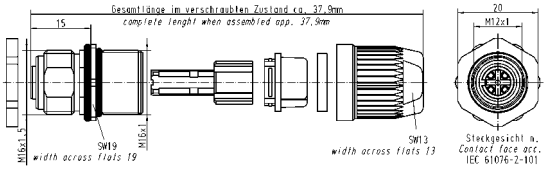
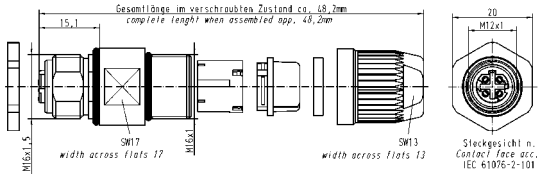
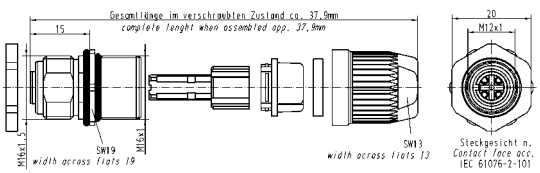


HARAX® M12-L, screened

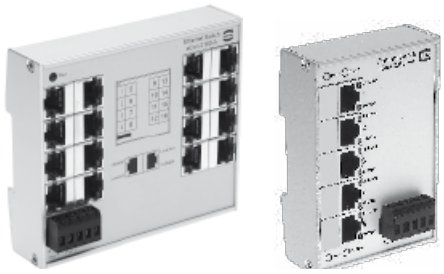
Female, 2 pins, B-coding
Profibus version

21 03 241 2301



Identification	Part-Number	Drawing	Dimensions in mm
***HARAX*® panel feed through** Male, A-coding Wire gauge 0.14 – 0.34 mm² AWG: 26 - 22 Cable outer diameter: 7 - 8.8 mm 	21 03 321 1425		
Female, A-coding Wire gauge 0.14 – 0.34 mm² AWG: 26 - 22 Cable outer diameter: 7 - 8.8 mm 	21 03 321 2425		
Han® M12 panel feed through crimp Male, A-coding Cable outer diameter: 7 - 8.8 mm 	21 03 822 1425		
Female, A-coding Cable outer diameter: 7 - 8.8 mm 	21 03 822 2425		
***HARAX*® panel feed through** Female, D-coding Wire gauge 0.14 – 0.34 mm² AWG: 26 - 22 Cable outer diameter: 7 - 8.8 mm 	21 03 381 2425		
***HARAX*® panel feed through** Female, D-coding Cable outer diameter: 7 - 8.8 mm 	21 03 882 2425		

HARTING eCon 2000 – Introduction and features



Ethernet Switch
HARTING eCon 2000

Ethernet Switches, unmanaged,
for flat mounting onto top-hat mounting rail
in control cabinets

General Description

The Ethernet Switches of the product family HARTING eCon 2000 are suitable for industrial applications and support Ethernet (10 Mbit/s), Fast Ethernet (100 Mbit/s) and Gigabit Ethernet (1000 Mbit/s). The product family enables the connection of up to 16 network devices (according to type) over shielded Twisted Pair cables.

Through its flat mounting and the clearly laid out integrated LEDs on each port, the eCon 2000 Ethernet Switch family supports fast and easy network diagnosis. The eCon Ethernet Switch operates as an Unmanaged Switch in Store and Forward Switching Mode and supports Auto-crossing, Auto-negotiation and Auto-polarity.

Due to their mechanical attachment, the eCon 2000 Ethernet Switches can be mounted on or dismounted from standard 35 mm top-hat rails without tools.

Features

- Auto-crossing
- Auto-negotiation
- Auto-polarity
- Store and Forward Switching Mode

For Ethernet Switch eCon 2050-AA only:

- complete designed for Gigabit Ethernet
- Jumbo Frames up to 9728 Bytes
- 4 K MAC addresses

Advantages

- Flat housing design
- Robust metal housing
- Adapted for mounting onto top-hat mounting rail 35 mm according to EN 60 715
- RoHS compliant

Application fields

- Industrial automation
- Automotive industry
- Wind power
- Power distribution systems

Technical characteristics eCon 2160-A

Ethernet interface RJ45

Number of ports	3x / 4x / 5x / 16x 10/100Base-T(X)
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5
Data rate	10 Mbit/s or 100 Mbit/s (RJ45)
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	RJ45 (Twisted Pair)
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Data transfer rate (Speed) – 100 Mbit/s: Yellow 10 Mbit/s: OFF
Topology	Line, Star or mixed

Power supply

Input voltage	24 V DC (12 to 48 V DC)
Termination	5-pole pluggable screw contact (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Diagnostics (via LED)	Power supply - Green

Design features

Housing material	Aluminium, anodised
Dimensions (W x H x D)	120 x 105 x 25.5 mm (without connectors)
Degree of protection acc. to DIN 60 529	IP 30
Mounting	35 mm top-hat rail acc. to EN 60 715
Weight	approx. 0.4 kg

Environmental conditions

Operating temperature	–10 °C to +70 °C
Storage temperature	–40 °C to +85 °C
Relative humidity	10 % to 95 % (non-condensing)

Technical characteristics eCon 2050-AA

Ethernet interface RJ45

Number of ports	5x 10/100/1000Base-T(X)
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5
Data rate	10, 100 or 1000 Mbit/s (RJ45)
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	RJ45 (Twisted Pair)
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Data transfer rate (Speed) – 1000 Mbit/s: Green 100 Mbit/s: Yellow 10 Mbit/s: OFF
Topology	Line, Star or mixed

Power supply

Input voltage	24 V DC (12 to 48 V DC) - redundant
Termination	5-pole pluggable screw contact (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Diagnostics (via LED)	Power supply (PWR1; PWR2) - Green

Design features

Housing material	Aluminium, anodised
Dimensions (W x H x D)	70 x 105 x 25.5 mm (without connectors)
Degree of protection acc. to DIN 60 529	IP 30
Mounting	35 mm top-hat rail acc. to EN 60 715
Weight	approx. 0.4 kg

Environmental conditions

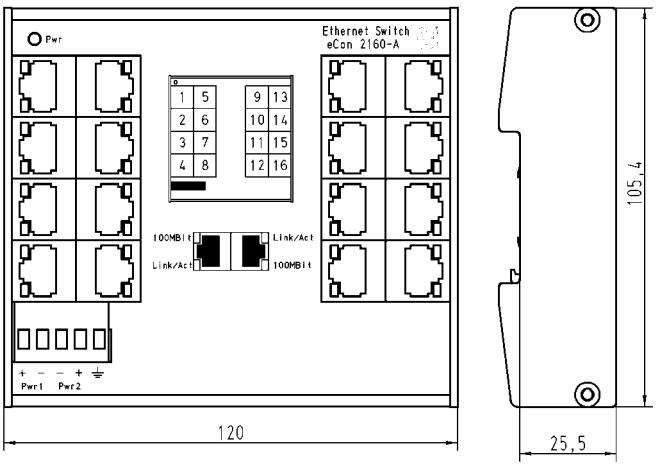
Operating temperature	–10 °C to +70 °C
Storage temperature	–40 °C to +85 °C
Relative humidity	10 % to 95 % (non-condensing)

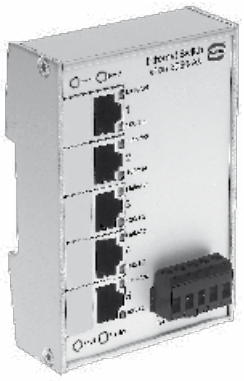
Ethernet Switch
HARTING eCon 2160-A

16-port Ethernet Switch for flat mounting onto top-hat mounting rail in control cabinets

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	16x 10/100Base-T(X) / RJ45 (Twisted Pair)
Input voltage / Termination	24 V DC / 5-pole pluggable screw contact (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Permissible range (min/max)	12 V to 48 V DC
Input current	approx. 220 mA (at 24 V DC)
Housing material	Aluminium, anodised
Dimensions (W x H x D)	120 x 105 x 25.5 mm (without connectors)
Weight	approx. 0.4 kg
Operating temperature	–10 °C to +70 °C
Approvals	cUL (in preparation)

Identification	Part number	Drawing	Dimensions in mm
HARTING eCon 2160-A Ethernet Switch with 16 RJ45 ports	20 76 116 3000		

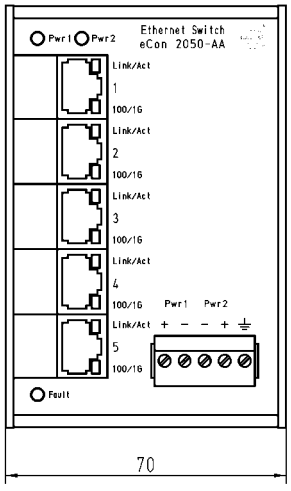
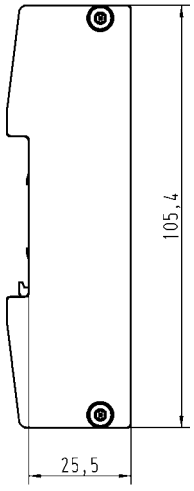


Ethernet Switch
HARTING eCon 2050-AA

5-port Gigabit Ethernet Switch for flat mounting onto top-hat mounting rail in control cabinets

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	5x 10/100/1000Base-T(X) / RJ45 (Twisted Pair)
Input voltage / Termination	24 V DC / 5-pole pluggable screw contact (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Permissible range (min/max)	12 V to 48 V DC
Input current	approx. 250 mA (at 24 V DC)
Housing material	Aluminium, anodised
Dimensions (W x H x D)	70 x 105 x 25.5 mm (without connectors)
Weight	approx. 0.4 kg
Operating temperature	–10 °C to +70 °C
Approvals	cUL (in preparation)

Identification	Part number	Drawing	Dimensions in mm
HARTING eCon 2050-AA Gigabit Ethernet Switch with 5 RJ45 ports	20 76 105 3001		

Ethernet Mediaconverter
HARTING eCon 3011

Ethernet Mediaconverter, unmanaged,
for installation in control cabinets

General Description

The Fast Ethernet Mediaconverter eCon3011 of the product family HARTING eCon 3000 is suitable for industrial applications and support both Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s). The Mediaconverter enables the conversion from shielded Twisted Pair cables to fiber-optic cables (Multimode and Singlemode).

The eCon 3011 Mediaconverter is configurable via Dip Switch and offers a variety of control functions.

The Mediaconverter has two operating modes:

In the **switch mode**, it operates as an unmanaged Ethernet Switch with Store and Forward Switching which supports asynchronous data communication, Auto-crossing and Auto-negotiation.

In the **converter mode**, it works with a data rate of 100 Mbit/s (Full duplex). The latency is very low in this operation mode.

Features

- Converter Mode with a very low latency
- Store and Forward switch mode
- Link Fault Path Through (LFP)
- Power over Ethernet (Power Source Equipment)
- 9 kByte Jumbo Frames in converter mode
- 2 kByte Frames in switch mode

Advantages

- Power over Ethernet (IEEE 802.3af)

Configuration via Dip Switch

- Small and robust metal housing
- Adapted for mounting onto top-hat mounting rail 35 mm according to EN 60 715

Application fields

- Industrial automation
- Automotive industry
- Wind power
- Power distribution systems

Technical characteristics Media converter

Ethernet interface RJ45

Number of ports	1x 10/100Base-T(X)
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5
Data rate	10 Mbit/s or 100 Mbit/s (RJ45)
Repeater class	Class II (latency 860 ns in converter mode)
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	RJ45 (Twisted Pair)
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Data transfer rate (Speed) – 100 Mbit/s: Yellow / 10 Mbit/s: OFF • Duplex – Full duplex: Yellow / Half duplex: OFF • PoE (Power Source Equipment) (PSE) – Green
Topology	Line

Power supply

Input voltage	24 V DC (12 to 30 V DC)
Input voltage, mode PoE	48 V DC (46 to 57 V DC)
Termination	5-pole pluggable screw contact (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Diagnostics (via LED)	Power supply - Green

C**onfiguration**	via DIP switches: Mode, Auto-negotiation, Data rate, Duplex TP, Duplex FX, Link Fault Path Through, PoE (PSE)

Design features

Housing material	Metal (powder coated)
Dimensions (W x H x D)	23 x 130 x 100 mm (without connectors)
Degree of protection acc. to DIN 60 529	IP 30
Mounting	35 mm top-hat rail acc. to EN 60 715
Weight	approx. 0.6 kg

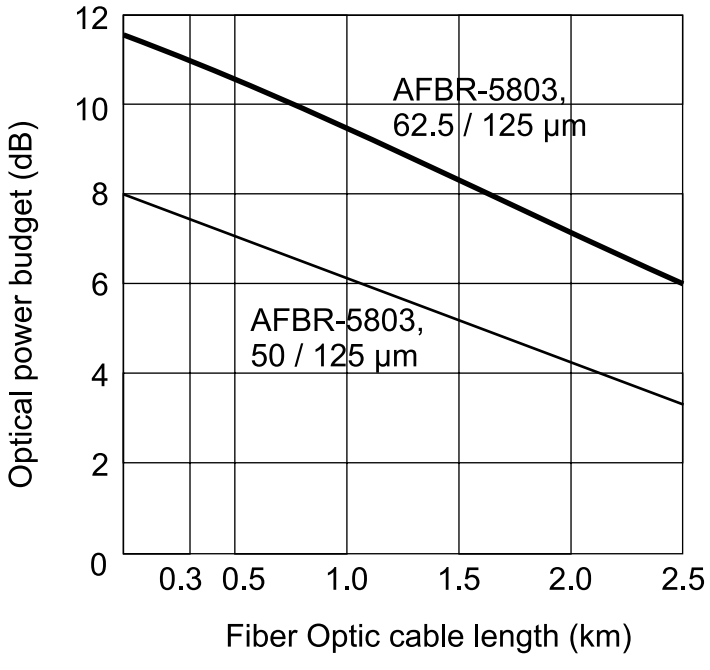
Environmental conditions

Operating temperature	–40 °C to +70 °C
Storage temperature	–40 °C to +85 °C
Relative humidity	10 % to 95 % (non-condensing)

Technical characteristics Media converter - F.O. termination

Ethernet interface – F.O.

Number of ports	1x 100Base-FX
Cable types according to IEEE 802.3	Multimode fibre, 1300 nm; 50 / 125 µm or 62.5 / 125 µm
Data rate	100 Mbit/s
Link monitoring	Link Fault Path Through (LFP)
Maximum cable length	2000 m (Multimode)
Termination	SC-D female
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Duplex – Full duplex: Yellow / Half duplex: OFF
Wavelength	1300 nm
Transceive power T(X) max. (dynamic)	• -14 dBm (50 / 125 µm) • -14 dBm (62.5 / 125 µm)
Transmission power T(X) min.	• -23.5 dBm (50 / 125 µm) • -20 dBm (62.5 / 125 µm)
Receive power RX typical (dynamic)	• -33.9 dBm (window) • -35.2 dBm (centre)
Receive power RX max. (dynamic)	-14 dBm
Signal detection (dynamic)	-33 dBm
Topology	Line

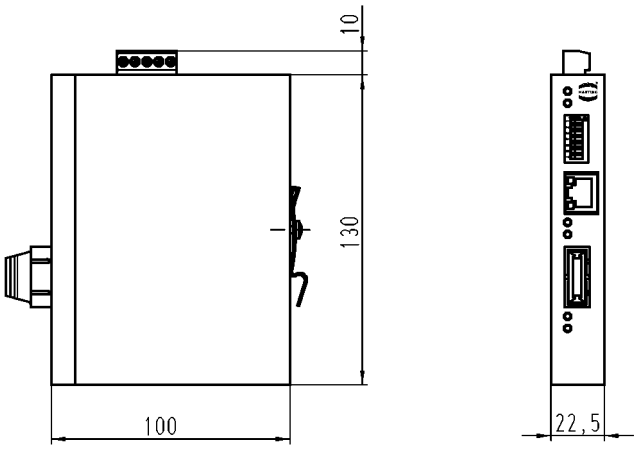


Ethernet Media converter
HARTING eCon 3011-AD

2-port Ethernet Media converter for vertical installation
in control cabinets including 1 F.O. port (SC, MM)

Unmanaged	IP 30	PROFINET compatible [X]	EtherNet/IP compatible [ ]

Number of ports, Copper / Termination	1x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100Base-FX / SC-D female
Input voltage / Termination	24 V DC / 5-pole pluggable screw contact, redundancy (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Permissible range (min/max)	12 V to 48 V DC
Input voltage mode PoE	48 V DC when using as PSE
Permissible range (min/max)	46 V to 57 V DC
Input current	approx. 100 mA (at 24 V DC) approx. 100 mA to 400 mA (at 48 V DC with PoE)
Housing material	Metal (powder coated)
Dimensions (W x H x D)	23 x 130 x 100 mm (without connectors)
Weight	approx. 0.6 kg
Operating temperature	–40 °C to +70 °C
Approvals	cUL (in preparation)

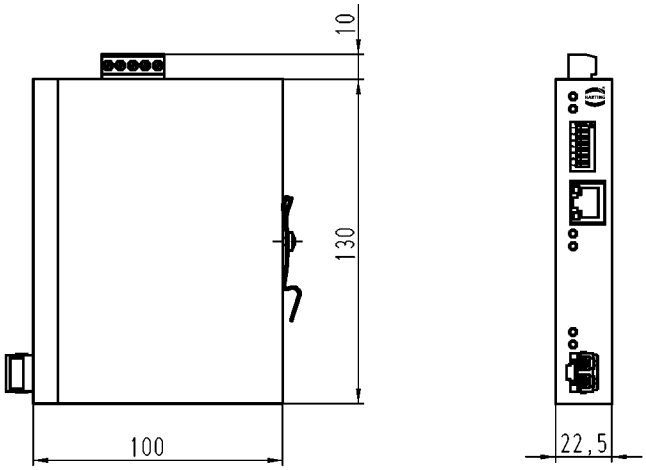
Identification	Part number	Drawing	Dimensions in mm
HARTING eCon 3011-AD Ethernet Media converter with 1 RJ45 port 1 F.O. port	20 76 102 3100		

Ethernet Media converter
HARTING eCon 3011-ASFP

2-port Ethernet Media converter for vertical installation
in control cabinets including 1 F.O. port (SFP)

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	1x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100 Mbit/s SFP module slot
Input voltage / Termination	24 V DC / 5-pole pluggable screw contact, redundant (PRW1 + / PWR1 - / PWR2 + / PWR2 - / PE)
Permissible range (min/max)	12 V to 48 V DC
Input voltage mode PoE	48 V DC when using as PSE
Permissible range (min/max)	46 V to 57 V DC
Input current	approx. 100 mA (at 24 V DC) approx. 100 mA to 400 mA (at 48 V DC with PoE)
Housing material	Metal (powder coated)
Dimensions (W x H x D)	23 x 130 x 100 mm (without connectors)
Weight	approx. 0.6 kg
Operating temperature	–40 °C to +70 °C
Approvals	cUL (in preparation)

Identification	Part number	Drawing	Dimensions in mm
HARTING eCon 3011-ASFP Ethernet Media converter with 1 RJ45 port 1 port SFP module slot Optional accessories: SFP modules (see page 78)	20 76 102 3101		

Introduction

For the user, HARTING's innovative solution opens up new, more convenient and extensive options for configuring unmanaged Ethernet switches. The solutions available to date offered only very limited or simple options for making alterations to different settings on an Ethernet switch.

Now for the first time, HARTING's sCon solution makes it possible for the user to implement many more configurations than have been previously possible. Ease of handling and operation has been designed in for real-life applications. The goal of this solution is to enable simple and fast configuration. All Ethernet switches in HARTING's sCon x000 product series can be configured via a USB connection cable.

At first sight, these Ethernet switches do not differ from Ethernet switches available to date. The possibilities that sCon has to offer first become apparent to the user when the Ethernet switch is connected to a PC, laptop or hand-held PC via its front-panel USB port.

Once the sCon Ethernet switch has been connected to a PC, it displays in the same manner as a commercially available USB stick (refer to Figure 1: The start-up menu).

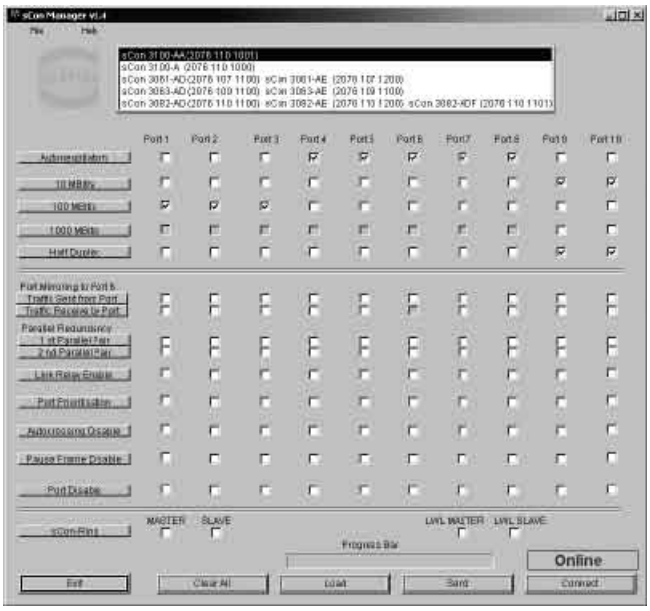


Figure 1 The start-up menu

The user needs only to copy the sCon software in advance onto the respective PC. No administrator rights are required.

Configuration by means of DIP switches may appear to be uncomplicated. However, accidentally initiating a change in the configuration can happen more quickly than one would think possible, and in so doing make considerable changes to the previously-set procedures. The sCon product family prevents these inadvertent alterations to the configuration. No alteration can be made to the configuration without a USB connection and the software.

The previous ring solutions on the market were proprietary or based on IEEE 802.3-standard software solutions of the Rapid Spanning Tree Protocol (RSTP). For field-level applications, these solutions were often unacceptable because of their high costs. The ring redundancy of the sCon product family, based on unmanaged switches, is better suited to user requirements.

With previous solutions, functions such as port mirroring, port redundancy, port prioritization or ring redundancy were reserved for managed Ethernet switches. HARTING's sCon product family has the advantage that it is adaptable to the specific requirements of many applications. If the conditions at a facility change on-site, the Ethernet switch can be quickly and easily adapted to new circumstances by changing the configuration. In this way a configuration can be transferred to the Ethernet switch in seconds and the configured Ethernet switch can be started up. Without a configuration, the Ethernet switch function functions as a plug-and-play switch with its standard parameters.

While sCon is a solution for unmanaged Ethernet switches, it does comes very close to the functionality of a managed Ethernet switch.

HARTING sCon 3000 – Introduction and features

Ethernet Switch
HARTING sCon 3000
Ethernet Switch family, unmanaged,
for mounting onto top-hat mounting rail
in control cabinets including sCon functions

General Description

The Fast Ethernet Switches of the product family HARTING sCon 3000 can be configured via a USB port for special or more performance-oriented industrial usages. There are almost no limits to the different possibilities.

Activation of parallel and / or ring redundancy or port prioritisation will clearly increase the availability and reliability of data communications through the sCon 3000.

Features

- Ethernet Switch acc. to IEEE 802.3
- Store and Forward Switching Mode, non-blocking, unmanaged
- Auto-crossing, Auto-negotiation, Auto-polarity
- Diagnostic LEDs (Link status, Act, Power, Data transmission rate, Error)
- Following settings are available via USB port:
  - Alarm signalling contact
  - Auto-negotiation
  - 10/100/1000 Mbit/s
  - Full/Half Duplex
  - Ring and/or parallel redundancy
  - Port enable / disable
  - Port priority
  - Port mirroring

Advantages

- Individually configurable via USB port
- Metal housing
- EMC, temperature range and mechanical stability meet the toughest demands
- Ring and/or parallel redundancy

Application fields

- Industrial automation
- Railway applications
- Power distribution systems
- Automotive industry
- Mechanical engineering

Technical characteristics

Ethernet interface RJ45

Number of ports	6x / 8x / 10x 10/100Base-T(X), 2x 10/100/1000Base-T(X)
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5
Data rate	10 Mbit/s, 100 Mbit/s or 1000 Mbit/s (RJ45)
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	RJ45 (Twisted Pair)
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Data transfer rate (Speed) – 1000 Mbit/s: Green 100 Mbit/s: Yellow 10 Mbit/s: OFF
Topology	Line, Ring, Star or mixed

Power supply

Input voltage	24 V DC
Termination	5-pole screw terminal, pluggable for redundant power supply
Diagnostics (via LED)	Power supply

Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact

Design features

Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Degree of protection acc. to DIN 60 529	IP 30
sCon xxxx-AE	IP 20
Mounting	• 35 mm top-hat rail acc. to EN 60 715 • Panel mounting, vertical assembly
Weight	approx. 0.6 kg

Environmental conditions

Operating temperature	0 °C to +70 °C
Storage temperature	–40 °C to +85 °C
Relative humidity	10 % to 95 % (non-condensing)

Technical characteristics - F.O. termination

Ethernet interface – F.O.

Number of ports	1x / 2x / 3x 100Base-FX
Cable types according to IEEE 802.3	• Multimode fibre, 1300 nm; 50 / 125 µm or 62.5 / 125 µm • Singlemode fibre, 1300 nm; 9 µm
Data rate	100 Mbit/s
Maximum cable length	• 2000 m (Multimode) • 15 km (Singlemode)
Termination	SC-D female / ST female
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing
Wavelength	1300 nm
Transceive power T(X) max. (dynamic)	• -14 dBm (50 / 125 µm) • -14 dBm (62.5 / 125 µm)
Transmission power T(X) min.	• -23.5 dBm (50 / 125 µm) • -20 dBm (62.5 / 125 µm)
Receive power RX typical (dynamic)	• -33.9 dBm (window) • -35.2 dBm (centre)
Receive power RX max. (dynamic)	-14 dBm
Signal detection (dynamic)	-33 dBm
Topology	Line, Ring, Star or mixed

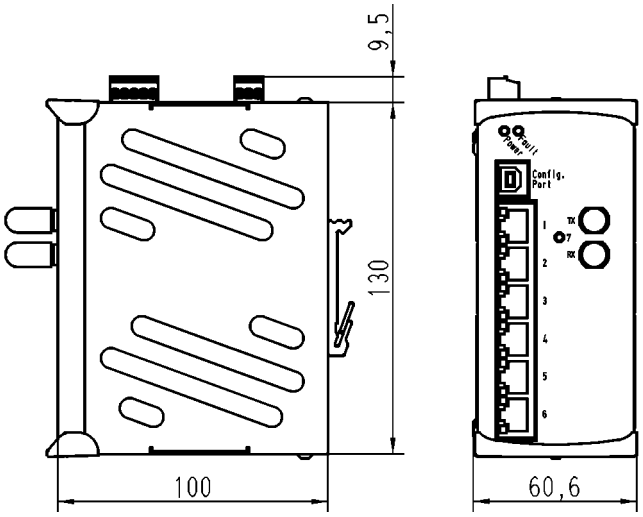
HARTING sCon 3000

Ethernet Switch
HARTING sCon 3061-AE

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 1 F.O. port (ST, MM) and sCon functions

Unmanaged	IP 20	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 240 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	660 000 h

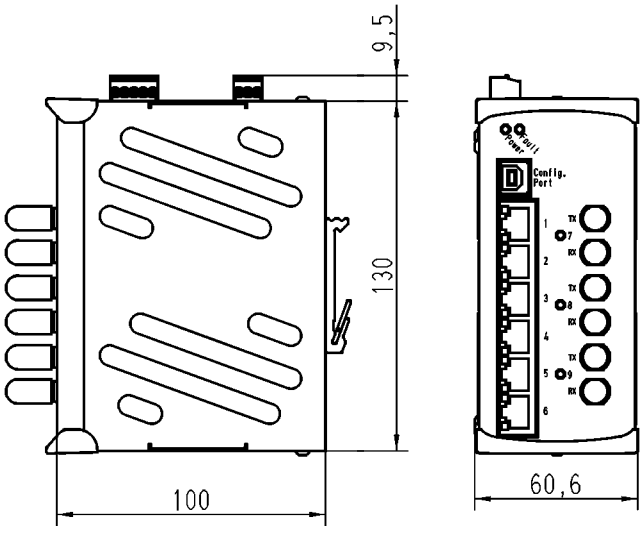
Identification	Part number	Drawing	Dimensions in mm
HARTING sCon 3061-AE Ethernet Switch 6 RJ45 ports 1 ST port including Set for assembly on standard rail	20 76 107 1200		

Ethernet Switch
HARTING sCon 3063-AE

9-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 3 F.O. ports (ST, MM) and sCon functions

Unmanaged	IP 20	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	3x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	660 000 h

Identification	Part number	Drawing	Dimensions in mm
HARTING sCon 3063-AE Ethernet Switch 6 RJ45 ports 3 ST ports including Set for assembly on standard rail	20 76 109 1200		

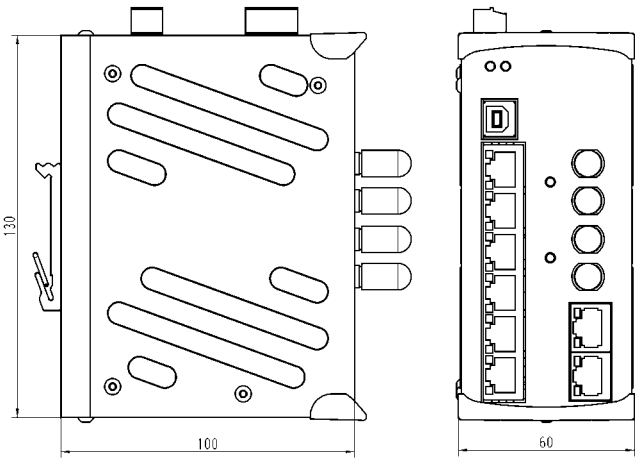
HARTING sCon 3000

Ethernet Switch
HARTING sCon 3082-AE

10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 F.O. ports (ST, MM) and sCon functions

Unmanaged	IP 20	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	8x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	2x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 260 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	585 000 h

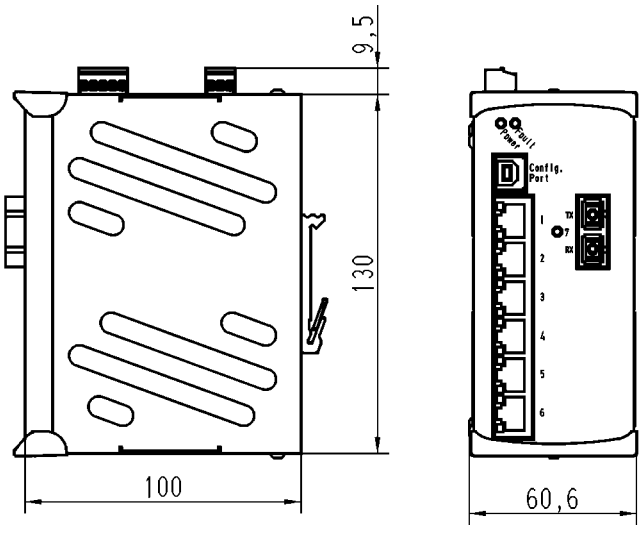
Identification	Part number	Drawing	Dimensions in mm
HARTING sCon 3082-AE Ethernet Switch 8 RJ45 ports 2 ST ports including Set for assembly on standard rail	20 76 110 1200		

Ethernet Switch
HARTING sCon 3061-AF

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 1 F.O. port (SC, SM) and sCon functions

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100Base-FX / SC-D female (Singlemode)
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 240 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	cUL (in preparation)

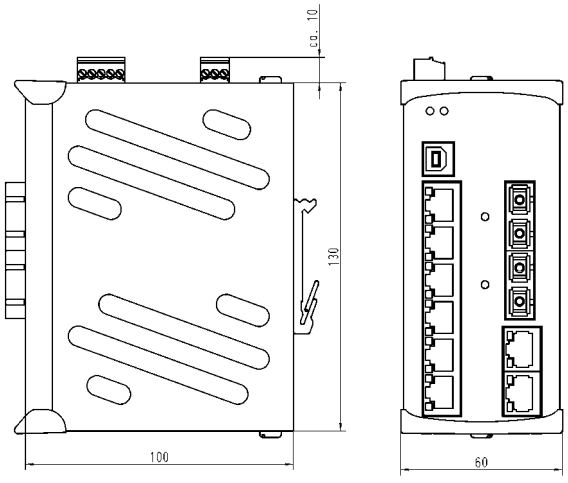
Identification	Part number	Drawing	Dimensions in mm
HARTING sCon 3061-AF Ethernet Switch 6 RJ45 ports 1 SC port including Set for assembly on standard rail	20 76 107 1102		

Ethernet Switch
HARTING sCon 3082-AF

10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 F.O. ports (SC, SM) and sCon functions

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

Number of ports, Copper / Termination	8x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	2x 100Base-FX / SC-D female (Singlemode)
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 260 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	cUL (in preparation)

Identification	Part number	Drawing	Dimensions in mm
HARTING sCon 3082-AF Ethernet Switch 8 RJ45 ports 2 SC ports including Set for assembly on standard rail	20 76 110 1102		

HARTING mCon 3000 – Introduction and features

Ethernet Switch
HARTING mCon 3000
Ethernet Switches, managed,
for mounting onto top-hat mounting rail
in control cabinets

General Description

The fully Managed Ethernet Switches of the product family HARTING mCon 3000 enable the connection of up to 10 network devices (according to type) over shielded Twisted Pair cables and fibre-optic cables (Multi- and Singlemode). The mCon 3000 Ethernet Switch family, with its integrated LEDs on each port, supports fast and easy network diagnosis.

The mCon 3000 Ethernet Switches are designed for an effective, industrial and individual use. They support both SNMP and an easy Web interface for management functions.

Features

- Ethernet Switch acc. to IEEE 802.3
- Store and Forward Switching Mode
- up to 10 ports, managed, non-blocking
- Auto-crossing, Auto-negotiation, Auto-polarity

Advantages

- Metal housing
- EMC, temperature range and mechanical stability meet the highest demands
- Integrated management functions

Application fields

- Industrial automation
- Automotive industry
- Wind power
- Power distribution systems

Technical characteristics

Ethernet interface RJ45

Number of ports	6x / 8x / 10x 10/100Base-T(X), 2x 10/100/1000Base-T(X)
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5
Data rate	10 Mbit/s, 100 Mbit/s or 1000 Mbit/s (RJ45)
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	RJ45 (Twisted Pair)
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing • Data transfer rate (Speed) – 1000 Mbit/s: Green 100 Mbit/s: Yellow 10 Mbit/s: OFF
Topology	Ring, Line, Star or mixed

Power supply

Input voltage	24 V DC
Termination	5-pole screw terminal, pluggable for redundant power supply
Diagnostics (via LED)	Power supply

Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact

Design features

Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Degree of protection acc. to DIN 60 529	
mCon xxxx-AE	IP 30 IP 20
Mounting	• 35 mm top-hat rail acc. to EN 60 715 • Panel mounting, vertical assembly
Weight	approx. 0.6 kg

Environmental conditions

Operating temperature	0 °C to +70 °C
Storage temperature	–40 °C to +85 °C
Relative humidity	10 % to 95 % (non-condensing)

Technical characteristics - F.O. termination

Ethernet interface – F.O.

Number of ports	1x / 2x / 3x 100Base-FX
Cable types according to IEEE 802.3	Multimode fibre, 1300 nm; 50 / 125 µm or 62.5 / 125 µm
Data rate	100 Mbit/s
Maximum cable length	2000 m (Multimode)
Termination	SC-D female / ST female
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing
Wavelength	1300 nm
Transceive power T(X) max. (dynamic)	• -14 dBm (50 / 125 µm) • -14 dBm (62.5 / 125 µm)
Transmission power T(X) min.	• -23.5 dBm (50 / 125 µm) • -20 dBm (62.5 / 125 µm)
Receive power RX typical (dynamic)	• -33.9 dBm (window) • -35.2 dBm (centre)
Receive power RX max. (dynamic)	-14 dBm
Signal detection (dynamic)	-33 dBm
Topology	Ring, Line, Star or mixed

Management functions

Basic functions

- Store and Forward Switching Mode (IEEE 802.3)
- Multicast filtering and bandwidth limiting
- IGMP Snooping and Querier (IEEE 802.1)
- VLAN (IEEE 802.1Q)
- Spanning Tree Protocol (STP) (IEEE 802.1D)
- Rapid Spanning Tree (RSTP) (IEEE 802.1W)
- QoS (IEEE 802.1P)
- DHCP Client

SNMP

- SNMP V1 and SNMP V3
- Enterprise (HARTING MIB)
- MIB II
  - RMON (statistics, history, alarm, events)
  - Dot1Bridge
  - SnmpDot3mauMIB
  - PtopoMIB
  - EntityMIB
  - RstpMIB
  - System
  - ifMIB
  - ICMP
  - IP
  - TCP
  - at
  - UDP
  - SNMP
  - transmission

Web-based access (password protection)

- Status overview
- Port settings
- Network configuration
- Password settings
- Alarm settings
- Diagnostics
- Parameter Import / Export
- Firmware Import / Export

Additional services

- SMTP
- Parameter and firmware import and export via TFTP
- System time via SNTP
- Service Mode via port 1

Diagnostics

- LEDs for Power, Link, Status, Data transmission and Fault
- Port diagnostic
- Port Mirroring
- History
- Alarms via E-mail and SNMP Traps
- Signalling contact for low voltage detection and Link break

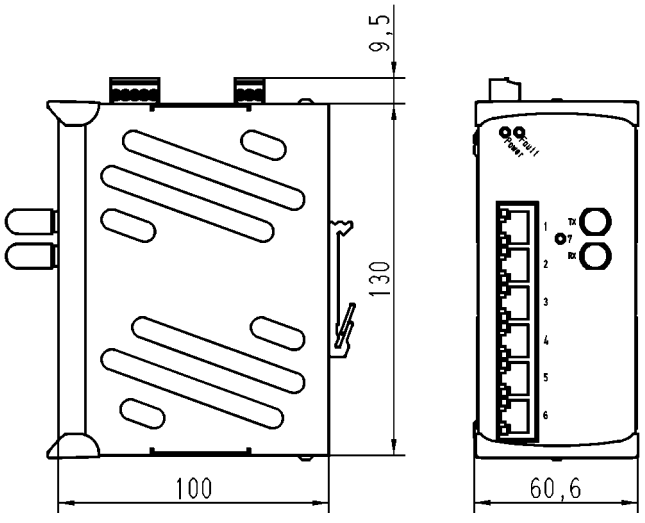
Additional information about Management functions and Firmware updates can be found on our Web server.

Ethernet Switch
HARTING mCon 3061-AE

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 1 F.O. port (ST, MM)

Managed	IP 20	PROFINET compatible [X]	EtherNet/IP compatible [X]

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 270 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	710 000 h
Management	fully Managed via Web interface and SNMP Functions see page 64

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 3061-AE Ethernet Switch, managed 6 RJ45 ports 1 ST port including Set for assembly on standard rail	20 76 107 4200		

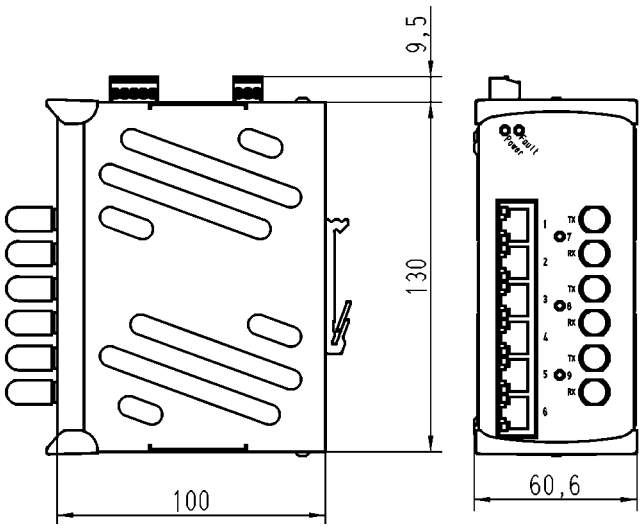
HARTING mCon 3000

Ethernet Switch
HARTING mCon 3063-AE

9-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 3 F.O. ports (ST, MM)

Managed	IP 20	PROFINET compatible [X]	EtherNet/IP compatible [X]

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	3x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 320 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	710 000 h
Management	fully Managed via Web interface and SNMP Functions see page 64

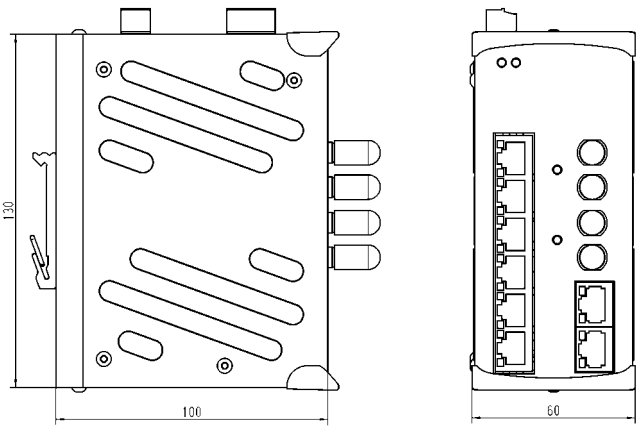
Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 3063-AE Ethernet Switch, managed 6 RJ45 ports 3 ST ports including Set for assembly on standard rail	20 76 109 4200		

Ethernet Switch
HARTING mCon 3082-AE

10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 F.O. ports (ST, MM)

Managed	IP 20	PROFINET compatible [X]	EtherNet/IP compatible [X]

Number of ports, Copper / Termination	8x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	2x 100Base-FX / ST female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V to 36 V DC
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	Change-over contact, potential-free, 24 V DC / 0.5 A 3-pole pluggable screw contact
Housing material	Metal (powder coated)
Dimensions (W x H x D)	60 x 132 x 104 mm (incl. cap, without connectors)
Weight	approx. 0.6 kg
Operating temperature	0 °C to +70 °C
Approvals	UL 508
MTBF	560 000 h
Management	fully Managed via Web interface and SNMP Functions see page 64

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 3082-AE Ethernet Switch, managed 8 RJ45 ports 2 ST ports including Set for assembly on standard rail	20 76 110 4200		

HARTING mCon 1000 – Introduction and features

Ethernet Switch
HARTING mCon 1000

Ethernet Switches, managed,
for mounting onto top-hat mounting rail in control cabinets

General Description

Supporting Ethernet (10 Mbit/s), Fast Ethernet (100 Mbit/s) and Gigabit Ethernet (1000 Mbit/s), HARTING's manageable Fast Ethernet Switch product family mCon 1000 is suitable for use in industrial environments.

The product family mCon 1000 is particularly well suited for communications networks in power distribution stations, wind turbine facilities, or similar applications.

Selected Ethernet Switchs of this product family conform to the demands of the IEC 61 850-3.

Up to 10 Ethernet stations can be connected to the Ethernet Switchs via shielded twisted-pair cable and fibre-optical cables.

The protection class, temperature range and mechanical stability ensure a high level of operational security and suitability for the most demanding industrial requirements.

Features

- Protocol-transparent transmission
- Store-and-forward switching mode, self-learning
- Automatic back-pressure flow control in half-duplex mode (HDX)
- Flow Control according to IEEE 802.3x in full-duplex mode (FDX)
- High performance non-blocking switching fabric
- Ring, star and line topologies, can be implemented in any way

Advantages

- Robust metal housing
- EMC, temperature range and mechanical stability meet the highest demands
- Management functions are integrated

Application fields

- Railway applications
- Industrial automation
- Automotive industry
- Wind power

Technical characteristics

Ethernet interface RJ45

Number of ports	5x / 6x / 7x 10/100/1000Base-T(X) 1x 10/100/1000Base-T(X) (mCon 1082-AD and mCon 1083-ASFP only)		
Cable types according to IEEE 802.3	Shielded Twisted Pair (STP) or Unshielded Twisted Pair (UTP), Category 5		
Data rate	10 Mbit/s, 100 Mbit/s or 1000 Mbit/s (RJ45)		
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)		
Termination	RJ45 (Twisted Pair)		
Diagnostics (via LED)	• Status Link	active:	Green
		Data transfer (Act):	Green flashing
	• Transmission mode (FDX)	Full duplex:	Yellow
		Half duplex:	Yellow flashing
	• Management (State)	active:	Green
Topology	Ring, Line, Star or mixed		

Power supply

Input voltage	24 V DC (18 to 36 V DC) 48 V DC (44 to 57 V DC)	
Termination	4-pole screw terminal, pluggable for redundant power supply	
Diagnostics (via LED)	• Power supply S1 present	Green
	• Power supply S2 present	Green
	• Power supply S4/S5 present	Green
	• Operating state (Run)	Green

Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact	
Diagnostics (via LED)	• Alarm signalling contact M1 active:	Red
	• Alarm signalling contact M2 active:	Red

Design features

Housing material	Metal (coated)
Dimensions (W x H x D)	
mCon 1052 / 1061 / 1070	75 x 105 x 106 mm (without connectors)
mCon 1082 / 1083	85 x 105 x 106 mm (without connectors)
Degree of protection acc. to DIN 60 529	IP 30
Mounting	• 35 mm top-hat rail acc. to EN 60 715 • Panel mounting, vertical assembly
Weight	approx. 0.8 kg

Environmental conditions

Operating temperature	-10 °C to +60 °C -40 °C to +70 °C on request
Storage temperature	-20 °C to +85 °C
Relative humidity	20 % to 90 % (non-condensing)

Technical characteristics F.O. terminations

Ethernet interface – F.O.

Number of ports	1x/2x 100Base-FX (AD variants only) 2x 1000Base-FX (mCon 1082-AD only)
Cable types according to IEEE 802.3	• Multimode fibre, 1300 nm; 50 / 125 µm or 62.5 / 125 µm
Data rate	100 Mbit/s or 1000 Mbit/s
Maximum cable length	• 2000 m (Multimode)
Termination	SC-D female
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing
Wavelength	1300 nm
Transceive power T(X) max.	• -14 dBm (50 / 125 µm) • -14 dBm (62.5 / 125 µm)
Transmission power T(X) min.	• -23.5 dBm (50 / 125 µm) • -20 dBm (62.5 / 125 µm)
Receive power RX max	-8 dBm
Receive power RX min	-31 dBm
Topology	Ring, Line, Star or mixed

Management functions

Basic functions

- Store and Forward Switching Mode (IEEE 802.3)
- Multicast filtering and bandwidth limiting
- IGMP Snooping and Querier (IEEE 802.1)
- VLAN (IEEE 802.1Q)
- Spanning Tree Protocol (STP) (IEEE 802.1D)
- Rapid Spanning Tree (RSTP) (IEEE 802.1W)
- QoS (IEEE 802.1P)
- DHCP Client, BootP
- Port based Network Access control (IEEE 802.1x)
- RADIUS

SNMP

- SNMP V1 and SNMP V2
- Enterprise (HARTING MIB)
- MIB II
  - RMON (statistics, history, alarm, events)
  - Dot1Bridge
  - DHCP Options
  - ICMP
  - IP
  - TCP
  - UDP
  - SNMP

Web-based access (password protection)

- Status overview
- Port settings
- Network configuration
- Password settings
- Alarm settings
- Diagnostics

Additional services

- SYSLOG
- Parameter and firmware import and export via TFTP
- System time via SNTP

Diagnostics

- LEDs for Power, Link, Status, Data transmission and Fault
- Port diagnostic
- Port Mirroring
- History
- Alarms via SYSLOG and SNMP Traps

Additional information about Management functions and Firmware updates can be found on our Web server.

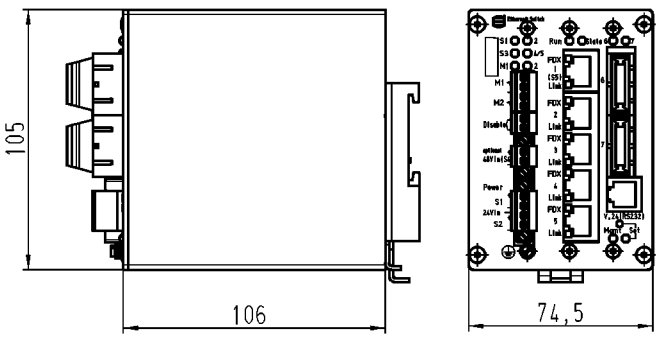
HARTING mCon 1000

Ethernet Switch
HARTING mCon 1052-AD

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 F.O. ports (SC, MM)

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	5x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	2x 100Base-FX / SC-Duplex female
Input voltage / Termination	24 V DC / 4-pole screw terminal, pluggable redundant power supply
	48 V DC / 2-pole screw terminal, pluggable
Permissible range (min/max)	18 V to 36 V DC (at 24 V DC) / 44 V to 57 V DC (at 48 V DC)
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	75 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C
MTBF	863 500 h (20 °C according to SN 29 500-1:1995)
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

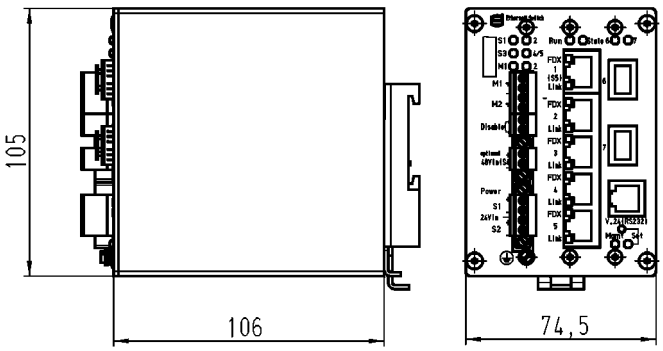
Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1052-AD Ethernet Switch, managed, with 5 ports RJ45 and 2 ports F.O. (SC-Duplex) including Set for assembly on standard rail	20 76 107 6101		

Ethernet Switch
HARTING mCon 1052-ASFP

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 ports for SFP modules
IEC 61 850-3 compliant

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	5x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of other ports	2x plug-in slot for SFP modules (100 MB, see Accessories)
Input voltage / Termination	24 / 48 V DC / 4-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	21 V to 57 V DC
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	75 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C -40 °C to +70 °C on request
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1052-ASFP Ethernet Switch, managed, with 5 ports RJ45 and 2 ports for SFP modules including Set for assembly on standard rail	20 76 107 6300		

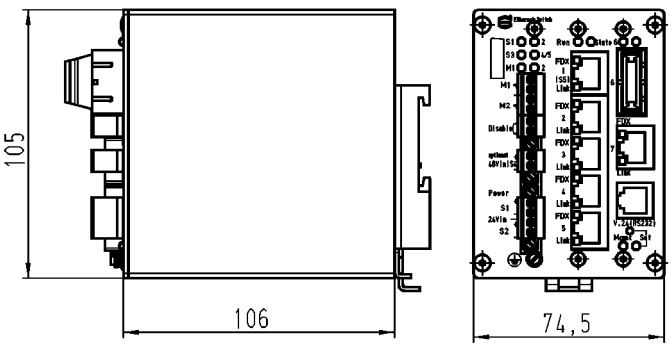
HARTING mCon 1000

Ethernet Switch
HARTING mCon 1061-AD

7-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 1 F.O. port (SC, MM)

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	6x 10/100Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	1x 100Base-FX / SC-Duplex female
Input voltage / Termination	24 V DC / 4-pole screw terminal, pluggable redundant power supply
	48 V DC / 2-pole screw terminal, pluggable
Permissible range (min/max)	18 V to 36 V DC (at 24 V DC) / 44 V to 57 V DC (at 48 V DC)
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	75 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C
MTBF	863 500 h (20 °C according to SN 29 500-1:1995)
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1061-AD Ethernet Switch, managed, with 6 ports RJ45 and 1 port F.O. (SC-Duplex) including Set for assembly on standard rail	20 76 107 6100		

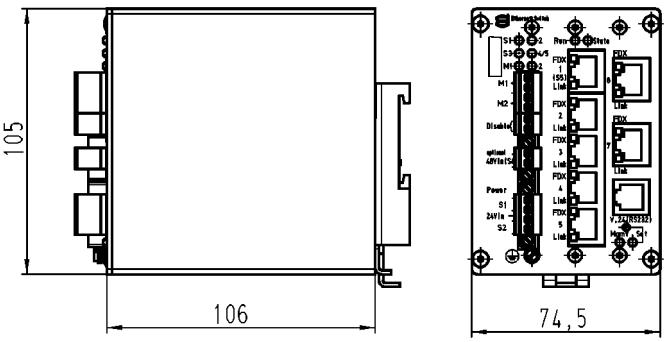
HARTING mCon 1000

Ethernet Switch
HARTING mCon 1070-A

7-port Ethernet Switch for mounting onto top-hat mounting rail in control cabinets

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	7x 10/100Base-T(X) / RJ45 (Twisted Pair)
Input voltage / Termination	24 V DC / 4-pole screw terminal, pluggable redundant power supply
	48 V DC / 2-pole screw terminal, pluggable
Permissible range (min/max)	18 V to 36 V DC (at 24 V DC) / 44 V to 57 V DC (at 48 V DC)
Input current	approx. 290 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	75 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C
MTBF	863 500 h (20 °C according to SN 29 500-1:1995)
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1070-A Ethernet Switch, managed, with 7 ports RJ45 including Set for assembly on standard rail	20 76 107 6000		

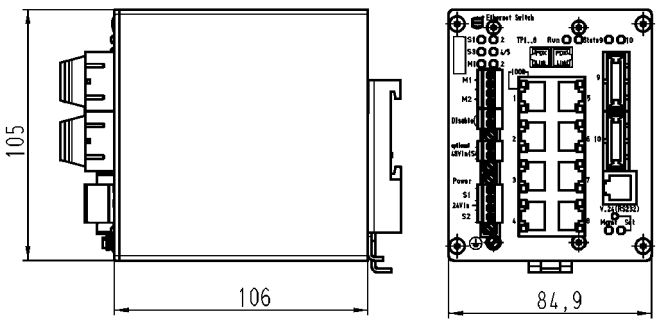
HARTING mCon 1000

Ethernet Switch
HARTING mCon 1082-AD

10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 F.O. ports (SC, MM)
IEC 61 850-3 compliant

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	7x 10/100Base-T(X) / RJ45 (Twisted Pair) 1x 10/100/1000Base-T(X) / RJ45 (Twisted Pair)
Number of ports, F.O. / Termination	2x 1000Base-FX / SC-Duplex female
Input voltage / Termination	24 / 48 V DC / 4-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	21 V to 57 V DC
Input current	approx. 500 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	85 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C -40 °C to +70 °C on request
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

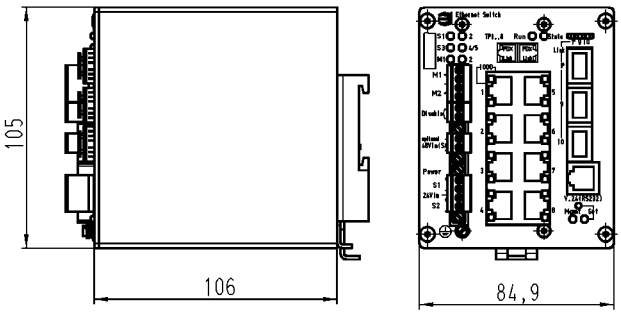
Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1082-AD Ethernet Switch, managed, with 8 ports RJ45 and 2 ports F.O. (SC-Duplex) including Set for assembly on standard rail	20 76 110 6100		

Ethernet Switch
HARTING mCon 1083-ASFP

10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 3 ports for SFP modules
IEC 61 850-3 compliant

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	7x 10/100Base-T(X) / RJ45 (Twisted Pair) 1x 10/100/1000Base-T(X) / RJ45 (Twisted Pair)
Number of other ports	3x plug-in slots for SFP modules (see Accessories)
Input voltage / Termination	24 / 48 V DC / 4-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	21 V to 57 V DC
Input current	approx. 500 mA (at 24 V DC)
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal
Dimensions (W x H x D)	85 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-10 °C to +60 °C -40 °C to +70 °C on request
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 71

Identification	Part number	Drawing	Dimensions in mm
HARTING mCon 1083-ASFP Ethernet Switch, managed, with 8 ports RJ45 and 3 ports for SFP modules including Set for assembly on standard rail	20 76 111 6300		

Accessories
Ethernet Switch HARTING mCon 1000
· SFP modules
· MMC memory card

General Description

HARTING's mCon 1000 Ethernet Switch product family is designed for data transmission via fibre-optic cables with SFP transceivers.

SFPs (**S**mall **F**orm-factor **P**luggable) are small standardized modules for network connections.

These modules are a specification for a new generation of modular optical transceivers. The devices are constructed as connecting plugs for extremely quick network connections.

The SFPs are available in a variety of models, depending on the cable type (multi-mode or single-mode), the wave length (850 nm, 1300 nm, 1550 nm or CWDM), data rate or range. Copper-based SFP are also available.

The MMC memory cards increase flexibility for the user and also serve to store the Ethernet switch's configuration data.

Note:

The MMC memory cards are different from the commercial types, and therefore not compatible.

Features

SFP modules

- Highly flexible
- Easily swapped out in event of malfunction
- Hot swappable
- Variants:

	SM fibre	MM fibre
100 Mbit/s	X	X
1000 Mbit/s	X	X

Advantages

- SFP used as connecting plug for extremely quick network connections
- Standardized modules for network connections
- MMC memory cards for storing configuration data

Application fields

- Railway applications
- Industrial automation
- Automotive industry
- Wind power

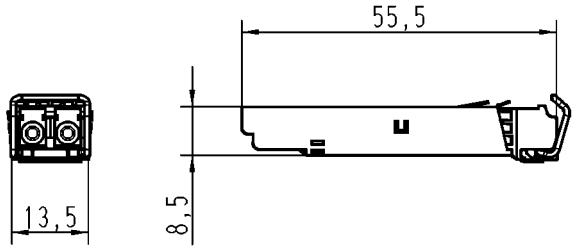
Accessories
- SFP modules
- MMC Memory Card

SFP:

Type	SFP 100 Transceiver GI(LC)	SFP 100 Transceiver SM(LC)	SFP 1000 Transceiver GI(LC)	SFP 1000 Transceiver SM(LC)
Wave length	1300 nm	1300 nm	850 nm	1300 nm
Fiber	50 / 125 µm or 62.5 / 125 µm	9 / 125 µm	50 / 125 µm or 62.5 / 125 µm	9 / 125 µm
Typ. cable length*	5 km	8 km	500 m (50 / 125) 300 m (62.5 / 125)	3 km
Connector	LC connector duplex	LC connector duplex	LC connector duplex	LC connector duplex
Optical budget	min. 10 dB	min. 7 dB	min. 9 dB	min. 9.5 dB
Data rate	100 Mbit/s	100 Mbit/s	1000 Mbit/s	1000 Mbit/s

* Typical cable length depending on attenuation of each specific application.

Identification	Part number	Drawing	Dimensions in mm
MMC Memory Card			
MMC Memory Card for i-System with MAC address	20 89 900 4999		
SFP modules			
SFP 100 Transceiver GI(LC)	20 76 000 0300		
SFP 100 Transceiver SM(LC)	20 76 020 0300		
SFP 1000 Transceiver GI(LC)	20 76 010 0300		
SFP 1000 Transceiver SM(LC)	20 76 030 0300		
other types on request			



HARTING pCon 2000 – Industrial Power supply

Industrial Power supplies
Serial HARTING pCon 2000

for centralised power supply
in control cabinets with degree of protection IP 20

General Description

The power supplies of the product family HARTING pCon 2000 are designed for power supply solutions for control units, Ethernet and other automation components. With their wide range of input voltage, the units are suitable for world-wide use.

The quick connection technique guarantees easy installation.

Features

- Wide range input for world-wide use
- High efficiency of up to 92 %
- Easy installation and toolless connection
- Range of operating temperature of up to 70 °C without derating

Advantages

- Wide operating temperature range
- Compact design and high power density
- Proof against sustained short-circuits, overloads and no-load operation
- International approvals
- Protection class II (no earth connection necessary)
- Proof against dynamic overload (150% rated current for up to 2.5 seconds)

Application fields

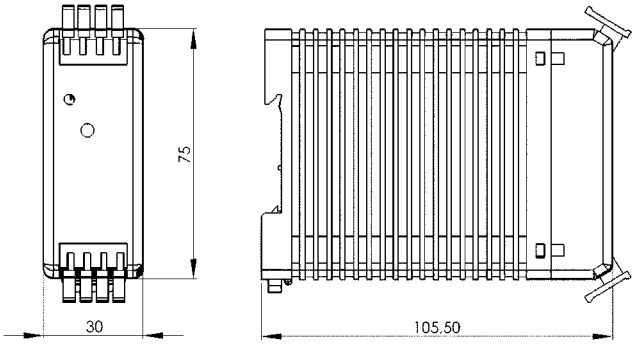
- Industrial automation
- Automotive industry
- Power generation and distribution

Industrial Power supply
HARTING pCon 2035-24

for centralised power supply in control cabinets
with degree of protection IP 20

2x spring-type terminals	IP 20	24 V DC	34 W

Input		**Output**	
Rated voltage	100 to 240 V AC (Wide range input)	Output voltage	24 V DC ± 1% (setting range 23 - 29 V)
Input voltage range	85 to 264 V AC (100 to 375 V DC)	Output current	1.4 A
Input rated current	< 0.4 A at 230 V < 0.8 A at 100 V	Max. output power	34 W
Input current	< 40 A (active limiting)	Mains buffering time	> 100 ms (at 230 V AC) > 15 ms (at 115 V AC)
Input frequency	47 to 63 Hz	Remaining ripple	< 40 mVss (at rated values)
Input fuse	internal T 4 A	Sensibility	< 2%
Recommended backup fuse	B 16 A (EN 60 898)	Protection function	Proof against sustained short-circuits, overloads and no-load operation
Protection class	II (no earth connection necessary)	Overload behavior	Limiting current 2.5 A
		Output voltage indication	LED Green
General data			
Termination Power / Load	Spring-type terminal 0.3 - 2.5 mm² / AWG 28 - 12 (solid) / 0.3 - 4 mm² / AWG 28 - 12 (stranded)		
Product standards	EN 60 950 (SELV)	Efficiency	89% (230 V) / 87% (115 V)
Approvals	CE, GS, $cCSA_{us}$ (UL 60 950, UL 508)	Weight	approx. 160 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 2035-24 Industrial Power supply for mounting onto 35 mm top-hat mounting rail according to DIN EN 60 715	20 80 000 3123		

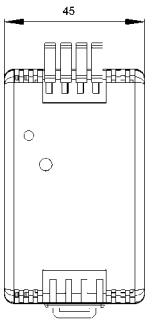
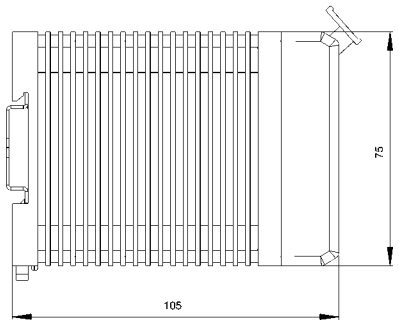
HARTING pCon 2000

Industrial Power supply
HARTING pCon 2060-24

for centralised power supply in control cabinets
with degree of protection IP 20

2x spring-type terminals	IP 20	24 V DC	60 W

Input		**Output**	
Rated voltage	100 to 240 V AC (Wide range input)	Output voltage	24 V DC ± 1% (setting range 23 - 29 V)
Input voltage range	85 to 264 V AC (100 to 375 V DC)	Output current	2.5 A
Input rated current	< 0.7 A at 230 V < 1.3 A at 100 V	Max. output power	60 W
Input current	< 40 A (active limiting)	Mains buffering time	> 100 ms (at 230 V AC) > 15 ms (at 115 V AC)
Input frequency	47 to 63 Hz	Remaining ripple	< 40 mVss (at rated values)
Input fuse	internal T 4 A	Sensibility	< 2%
Recommended backup fuse	B 16 A (EN 60 898)	Protection function	Proof against sustained short-circuits, overloads and no-load operation
Protection class	II (no earth connection necessary)	Overload behavior	Limiting current 2.7 A (static) / 5.0 A (dynamic)
		Output voltage indication	LED Green
General data			
Termination Power / Load	Spring-type terminal 0.3 - 2.5 mm² / AWG 28 - 12 (solid) / 0.3 - 4 mm² / AWG 28 - 12 (stranded)		
Product standards	EN 60 950 (SELV)	Efficiency	91.5% (230 V) / 90% (115 V)
Approvals	CE, GS, $cCSA_{us}$ (UL 60 950, UL 508)	Weight	approx. 250 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 2060-24 Industrial Power supply for mounting onto 35 mm top-hat mounting rail according to DIN EN 60 715	20 80 000 3121	 	

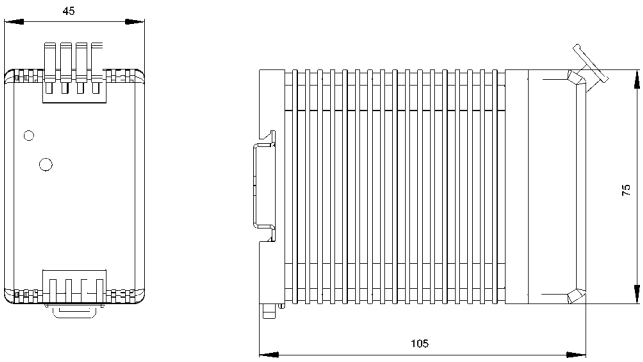
HARTING pCon 2000

Industrial Power supply
HARTING pCon 2060-48

for centralised power supply in control cabinets
with degree of protection IP 20

2x spring-type terminals	IP 20	48 V DC	60 W

Input		**Output**	
Rated voltage	100 to 240 V AC (Wide range input)	Output voltage	48 V DC ± 1% (setting range 48 - 52 V)
Input voltage range	85 to 264 V AC (100 to 375 V DC)	Output current	1.25 A
Input rated current	< 0.7 A at 230 V < 1.3 A at 100 V	Max. output power	60 W
Input current	< 40 A (active limiting)	Mains buffering time	> 100 ms (at 230 V AC) > 15 ms (at 115 V AC)
Input frequency	47 to 63 Hz	Remaining ripple	< 40 mVss (at rated values)
Input fuse	internal T 4 A	Sensibility	< 2%
Recommended backup fuse	B 16 A (EN 60 898)	Protection function	Proof against sustained short-circuits, overloads and no-load operation
Protection class	II (no earth connection necessary)	Overload behavior	Limiting current 1.5 A (static) / 2.5 A (dynamic)
		Output voltage indication	LED Green
General data			
Termination Power / Load	Spring-type terminal 0.3 - 2.5 mm² / AWG 28 - 12 (solid) / 0.3 - 4 mm² / AWG 28 - 12 (stranded)		
Product standards	EN 60 950 (SELV)	Efficiency	92% (230 V) / 90% (115 V)
Approvals	CE, GS, $cCSA_{us}$ (UL 60 950, UL 508)	Weight	approx. 250 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 2060-48 Industrial Power supply for mounting onto 35 mm top-hat mounting rail according to DIN EN 60 715	20 80 000 3122		

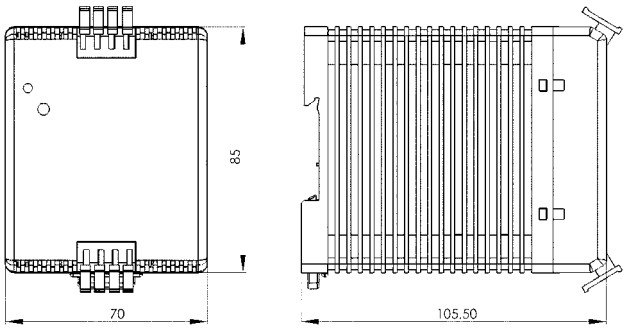
HARTING pCon 2000

Industrial Power supply
HARTING pCon 2120-24

for centralised power supply in control cabinets
with degree of protection IP 20

2x spring-type terminals	IP 20	24 V DC	120 W

Input		**Output**	
Rated voltage	100 to 240 V AC (Wide range input)	Output voltage	24 V DC ± 1% (setting range 23 - 29 V)
Input voltage range	85 to 264 V AC (100 to 375 V DC)	Output current	5 A
Input rated current	< 1.4 A at 230 V < 2.6 A at 100 V	Max. output power	120 W
Input current	< 40 A (active limiting)	Mains buffering time	> 100 ms (at 230 V AC) > 15 ms (at 115 V AC)
Input frequency	47 to 63 Hz	Remaining ripple	< 40 mVss (at rated values)
Input fuse	internal T 6.3 A	Sensibility	< 2%
Recommended backup fuse	B 16 A (EN 60 898)	Protection function	Proof against sustained short-circuits, overloads and no-load operation
Protection class	II (no earth connection necessary)	Overload behavior	Limiting current 5 A (static) / 10 A (dynamic)
		Output voltage indication	LED Green
General data			
Termination Power / Load	Spring-type terminal 0.3 - 2.5 mm² / AWG 28 - 12 (solid) / 0.3 - 4 mm² / AWG 28 - 12 (stranded)		
Product standards	EN 60 950 (SELV)	Efficiency	92% (230 V) / 90.5% (115 V)
Approvals	CE, GS, $cCSA_{us}$ (UL 60 950, UL 508)	Weight	approx. 500 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 2120-24 Industrial Power supply for mounting onto 35 mm top-hat mounting rail according to DIN EN 60 715	20 80 000 3124		

Cables

Industrial Cat. 6 cable, stranded, 8-wire, PVC
to make up flexible connections
(one- or two-sided assembled system cables)

IP 20	IP 65 / IP 67	PVC	Cat. 5	Cat. 6
☒	☒		☐	☒

Cable structure	4 x 2, Twisted Pair, shielded, PIMF
Core structure	Cord, 4 x 2 x AWG 27/7
Sheath material	PVC
Cable sheath diameter	6.7 mm
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	paired shielded with additional cable shield
Operating temperature range	– 10 °C to + 80 °C
Standard lengths	20 m / 50 m / 100 m / 500 m
Colour	Yellow

Advantages

Robust design suitable for industry
Optimal performance reserves
flame retardant
best usable for all 8-wire HARTING RJ45 connectors

Identification	Part number	Drawing	Dimensions in mm
Industrial Cat. 6 cable, stranded, 8-wire PVC			
20 m ring	09 45 600 0532		
50 m ring	09 45 600 0542		
100 m ring	09 45 600 0502		
500 m drum	09 45 600 0522		

Cables

Industrial Cat. 6 cable, stranded, 8-wire, PUR

to make up flexible connections
(one- or two-sided assembled system cables)

IP 20 ☒	IP 65 / IP 67 ☒	PUR	Cat. 5 ☐	Cat. 6 ☒

Cable structure	4 x 2, Twisted Pair, shielded, PIMF
Core structure	Cord, 4 x 2 x AWG 27/7
Sheath material	PUR
Cable sheath diameter	6.7 mm
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	paired shielded with additional cable shield
Operating temperature range	– 40 °C to + 70 °C
Standard lengths	20 m / 50 m / 100 m / 500 m
Colour	Yellow

Advantages

Robust design suitable for industry
Optimal performance reserves
halogen free
flame retardant sheath material

Identification	Part number	Drawing	Dimensions in mm
Industrial Cat. 6 cable, stranded, 8-wire PUR			
20 m ring	09 45 600 0630		
50 m ring	09 45 600 0640		
100 m ring	09 45 600 0600		
500 m drum	09 45 600 0620		

Cables

Industrial Cat. 6 cable, stranded, 8-wire, PVC, Outdoor

to make up flexible connections
(one- or two-sided assembled system cables)

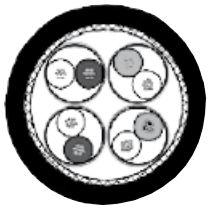
IP 20	IP 65 / IP 67	PVC	Cat. 5	Cat. 6
☒	☒		☐	☒

Cable structure	4 x 2, Twisted Pair, shielded, PIMF
Core structure	Cord, 4 x 2 x AWG 27/7
Sheath material	PVC
Cable sheath diameter	6.6 mm
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	paired shielded with additional cable shield
Operating temperature range	– 10 °C to + 80 °C
Standard lengths	20 m / 50 m / 100 m / 500 m
Colour	Black

Advantages

- Robust design suitable for industry
- Optimal performance reserves
- Usable for outdoor applications
- UL recognised

Identification	Part number	Drawing	Dimensions in mm
Industrial Cat. 6 cable, stranded, 8-wire PVC			
20 m ring	09 45 600 0531		
50 m ring	09 45 600 0541		
100 m ring	09 45 600 0501		
500 m drum	09 45 600 0521		



Cables

Industrial Cat. 6_A installation cable, 8-wire, FRNC
to fixed laying in industrial environments

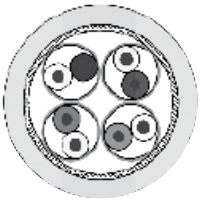
IP 20	IP 65 / IP 67	FRNC	Cat. 5	Cat. 6
X	X		☐	X

Cable structure	4 x 2, Twisted Pair, shielded, PIMF
Core structure	4 x 2 x AWG 23/1, solid
Sheath material	FRNC
Cable sheath diameter	7.4 mm
Transmission performance	Category 6_A / Class E_A up to 500 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100 Mbit/s and 1/10 Gbit/s
Shielding	paired shielded with additional cable shield
Operating temperature range	– 20 °C to + 60 °C
Supply lengths	500 m / 1000 m
Colour	Black

Advantages

Robust design suitable for industry
Optimal performance reserves
Usable for transfer rate up to 10 Gigabit Ethernet
non-halogene

Identification	Part number	Drawing	Dimensions in mm
Industrial Cat. 6_A installation cable, 8-wire FRNC			
500 m drum	09 45 600 0650		
1000 m drum	09 45 600 0660		



Cables

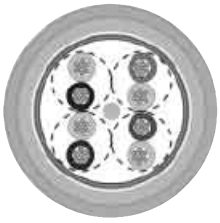
Industrial Cat. 5 cable, stranded, 8-wire, PUR

to make up flexible connections
(one- or two-sided assembled system cables)

IP 20	IP 65 / IP 67	PUR	Cat. 5	Cat. 6
☒	☒		☒	☐

Cable structure	4 x 2, Twisted Pair, shielded
Core structure	Cord, 4 x 2 x AWG 26/7
Sheath material	PUR
Cable sheath diameter	6.7 mm
Transmission performance	Category 5 / Class D up to 100 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	Foil screen and additional plaited cable
Operating temperature range	– 10 °C to + 60 °C
Standard lengths	20 m / 50 m / 100 m / 500 m
Colour	Yellow
Advantages	Robust design suitable for industry non-halogene UL recognised flame retardant oil proof with Fast Connect inside sheath

Identification	Part number	Drawing	Dimensions in mm
Industrial Cat. 5 stranded cable, 8-wire PUR			
20 m ring	09 45 600 0430		
50 m ring	09 45 600 0440		
100 m ring	09 45 600 0400		
500 m drum	09 45 600 0420		



System cables

HARTING RJ Industrial® System cable RJ45, 8-wire

RJ45 connection cable for control or distributor cabinets or within controllers

IP 20	IP 65 / IP 67	IP 65 / IP 67 to IP 20	Cat. 5	Cat. 6
☒	☐	☐	☐	☒

Connector types	RJ45
Cable types	4 x 2, Twisted Pair, shielded, PIMF
Sheath material	PVC / PUR
Wiring	8-pole, 1:1
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	fully shielded, 360° shielding contact
Operating temperature range	– 10 °C to + 70 °C
Standard lengths	1.5 m / 3 m / 5 m / 10 m / 20 m other lengths available on request
Colour	Yellow
Advantages	Robust industrial design High operational reliability in vibration-prone locations

Identification	Part number PVC	Part number PUR	Drawing	Dimensions in mm
HARTING RJ Industrial System cable RJ45, 8-wire	Yellow	Yellow		
Length 1.5 m	09 45 751 1523	09 45 751 1563		
Length 3.0 m	09 45 751 1525	09 45 751 1565		
Length 5.0 m	09 45 751 1527	09 45 751 1567		
Length 10.0 m	09 45 751 1551	09 45 751 1572		
Length 20.0 m	09 45 751 1553	09 45 751 1574		

System cables

HARTING PushPull System cable RJ45, 8-wire

RJ45 connection cable HARTING PushPull for IP 65 / IP 67 applications

IP 20 ☐	IP 65 / IP 67 ☒	IP 65 / IP 67 to IP 20 ☐	Cat. 5 ☐	Cat. 6 ☒

Connector types	HARTING PushPull
Cable types	4 x 2, Twisted Pair, shielded, PIMF
Sheath material	PVC / PUR
Wiring	8-pole, 1:1
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	fully shielded, 360° shielding contact
Operating temperature range	– 10 °C to + 70 °C
Standard lengths	1.5 m / 3 m / 5 m / 10 m / 20 m other lengths available on request
Colour	Yellow
Advantages	Standardised PushPull interface for IP 65 / IP 67 according to ISO/IEC 24 702 Easy and safe operation Especially space-saving

Identification	Part number PVC	Part number PUR	Drawing	Dimensions in mm
HARTING PushPull System cable RJ45, 8-wire	Yellow	Yellow		
Length 1.5 m	09 45 745 1523	09 45 744 1523		
Length 3.0 m	09 45 745 1525	09 45 744 1525		
Length 5.0 m	09 45 745 1527	09 45 744 1527		
Length 10.0 m	09 45 745 1551	09 45 744 1532		
Length 20.0 m	09 45 745 1553	09 45 744 1534		

System cables

HARTING PushPull System cable RJ45, 8-wire
connection cable HARTING PushPull to RJ45 (IP 20)

IP 20 ☐	IP 65 / IP 67 ☐	IP 65 / IP 67 to IP 20 ☒	Cat. 5 ☐	Cat. 6 ☒

Connector types	HARTING PushPull and RJ45 (IP 20)
Cable types	4 x 2, Twisted Pair, shielded, PIMF
Sheath material	PVC / PUR
Wiring	8-pole, 1:1
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	fully shielded, 360° shielding contact
Operating temperature range	– 10 °C to + 70 °C
Standard lengths	1.5 m / 3 m / 5 m / 10 m / 20 m other lengths available on request
Colour	Yellow

Advantages

Standardised PushPull interface for IP 65 / IP 67 according to ISO/IEC 24 702

Easy transition from harsh industrial environment into saved IP 20 environment

Identification	Part number PVC	Drawing	Dimensions in mm
HARTING PushPull System cable RJ45, 8-wire	Yellow		
Length 1.5 m	09 45 701 1509		
Length 3.0 m	09 45 701 1510		
Length 5.0 m	09 45 701 1511		
Length 10.0 m	09 45 701 1512		
Length 20.0 m	09 45 701 1514		

System cables

Han® 3 A System cable RJ45, 8-wire

RJ45 connector cable Han® 3 A for IP 65 / IP 67 applications to RJ45 (IP 20)

IP 20 ☐	IP 65 / IP 67 ☐	IP 65 / IP 67 to IP 20 ☒	Cat. 5 ☐	Cat. 6 ☒

Connector types	Han® 3 A RJ45 (IP 65 / IP 67) RJ45 (IP 20)
Cable types	4 x 2, Twisted Pair, shielded
Sheath material	PVC
Wiring	8-pole, 1:1
Transmission performance	Category 6 / Class E up to 250 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	fully shielded, 360° shielding contact
Operating temperature range	– 10 °C to + 70 °C
Standard lengths	1.5 m / 3 m / 5 m / 10 m / 20 m other lengths available on request
Colour	Yellow

Advantages

- Very robust metal housing Han® 3 A for IP 65 / IP 67
- Additional locking
- Easy change-over from harsh industrial environment to protected IP 20 environment
- Easy handling for all applications

Identification	Part number PVC	Drawing	Dimensions in mm
Han® 3 A System cable RJ45, IP 65 / IP 67 to IP 20 8-wire	Yellow		
Length 1.5 m	09 45 701 1564		
Length 3.0 m	09 45 701 1566		
Length 5.0 m	09 45 701 1568		
Length 10.0 m	09 45 701 1573		
Length 20.0 m	09 45 701 1575		

System cables

Han® PushPull System cable RJ45, 4-wire

RJ45 connection cable, Han® PushPull, for IP 65 / IP 67 applications

IP 20 ☐	IP 65 / IP 67 ☒	IP 65 / IP 67 to IP 20 ☐	Cat. 5 ☒	Cat. 6 ☐

Connector types: RJ45 Han® PushPull

Cable types

PROFINET Cable type	Type A	Type B	Type C	Outdoor
Cables	Copper, solid, shielded	Copper, stranded, shielded	Copper, stranded, shielded, useable as trailing cable	Copper, stranded, shielded
Wire gauge	4 x AWG 22/1	4 x AWG 22/7	4 x AWG 22/7	4 x AWG 22/7
Sheath material	PVC	PVC	PUR	PVC
Operating temperature range	– 40 °C to +70 °C	– 40 °C to +70 °C	– 40 °C to +70 °C	– 45 °C to +60 °C
Colour	Green	Green	Green	Black

Wiring: 4-pole (RJ45 contacts 1/2 and 3/6)

Transmission performance: Category 5 / Class D up to 100 MHz according to ISO/IEC 11 801:2002, EN 50 173-1

Transmission rate: 10/100 Mbit/s

Shielding: fully shielded, 360° shielding contact

Standard lengths: 1.5 m / 3 m / 5 m / 10 m / 20 m
other lengths available on request

Advantages

- Space-saving IP 65 / IP 67 interface
- AIDA compliant
- PROFINET compliant
- Easy handling

Identification	Part number Plastic version	Part number Metal version
Han® PushPull System cable RJ45, 4-wire Type A		
Length 1,5 m	09 47 555 5003	09 47 565 6003
Length 3,0 m	09 47 555 5005	09 47 565 6005
Length 5,0 m	09 47 555 5007	09 47 565 6007
Length 10,0 m	09 47 555 5012	09 47 565 6012
Length 20,0 m	09 47 555 5014	09 47 565 6014
Han® PushPull System cable RJ45, 4-wire Type B		
Length 1,5 m	09 47 555 5033	09 47 565 6033
Length 3,0 m	09 47 555 5035	09 47 565 6035
Length 5,0 m	09 47 555 5037	09 47 565 6037
Length 10,0 m	09 47 555 5042	09 47 565 6042
Length 20,0 m	09 47 555 5044	09 47 565 6044
Han® PushPull System cable RJ45, 4-wire Type C		
Length 1,5 m	09 47 555 5063	09 47 565 6063
Length 3,0 m	09 47 555 5065	09 47 565 6065
Length 5,0 m	09 47 555 5067	09 47 565 6067
Length 10,0 m	09 47 555 5072	09 47 565 6072
Length 20,0 m	09 47 555 5074	09 47 565 6074
Han® PushPull System cable RJ45, 4-wire Outdoor		
Length 1,5 m	09 47 555 5093	09 47 565 6093
Length 3,0 m	09 47 555 5095	09 47 565 6095
Length 5,0 m	09 47 555 5097	09 47 565 6097
Length 10,0 m	09 47 555 5102	09 47 565 6102
Length 20,0 m	09 47 555 5104	09 47 565 6104

System cables

Additional technical information about overmoulded System cables

IP 20	☒	IP 65 / IP 67	☒	IP 65 / IP 67 to IP 20	☒	Cat. 5	☒	Cat. 6	☐

Electrical characteristics at 20 °C

Contact resistance:	≤ 20 mΩ
Insulation resistance:	≥ 500 MΩ
Dielectric withstand voltage:	
contact - contact	1 kV
contact - ground	1.5 kV

Electrical characteristics after damp heat cycles

Contact resistance:	≤ 20 mΩ
Insulation resistance:	≥ 100 MΩ
Dielectric withstand voltage:	
contact - contact	1 kV
contact - ground	1.5 kV

HARTING PushPull Hybrid

HARTING PushPull Hybrid
type acc. to IEC 61 076-3-106 variant 4

Advantages

HARTING PushPull Hybrid

In the future all new machine generations will be equipped with Fast Ethernet, no matter if PROFINET, Ethernet/IP, Powerlink, Ethercat, Varan or other Ethernetprofiles.

With the change of the communication technology also the possibility is offered of simplifying the machine installation and of introducing an innovative Hybrid installation concept. This simplification will unite by data and 24V (5A)-supply in a Hybrid cable, at least with the space requirement of a M12-connector.

For this new installation solution HARTING with the HARTING PushPull Hybrid offers the trend-setting installation technology.

Everything is halved: the number of pluggings, the number of cables and the space requirement for the connection technology. Everything becomes simpler: the installation, attaching and safe plugging.

The Hybrid connectors were developed particular under the criteria of simple attaching in the field and the particular safe data communication with the patented omega screen concept. As contacts D-Sub and HDD Sub contacts worked world-wide are used. This socket pin contact system ensures highest reliability and optimal shock and vibration stability.

With the optional available coding pins 6 different codings can be realized.

This connector is available in the variants straight or angled as well as for field assembling or overmolded.

Technical characteristics

Advantages

- Compact, space-saving design
- Very compact housing with high degree of protection
- Polarisation with nose
- Sixfold codable

Typical application areas

- Factory and building automation
- Industrial electronics
- Telecommunication and wireless networks
- Transportation
- Industrial monitoring and camera systems
- Lighting and display technology
- Access control systems

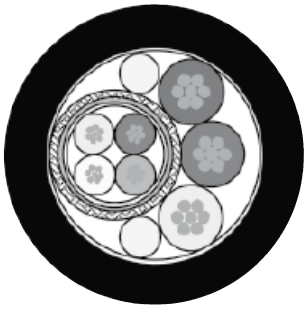
Recommended pin assignment

- Power contacts

Contact	Function	Conductor colour
1	V +	Red
2	Ground	Brown
3	V + (switched)	Yellow

- Data contacts

Contact	Signal	Function	Conductor colour
4	RD –	Receiver Data –	Blue
5	RD +	Receiver Data +	White
6	TD –	Transmission Data –	Orange
7	TD +	Transmission Data +	Yellow



Structure Hybrid cable
Data: 4x AWG26/7
Power: 3x AWG20/7

HARTING PushPull Hybrid

HARTING PushPull Hybrid, type acc. to IEC 61 076-3-106 variant 4
device side

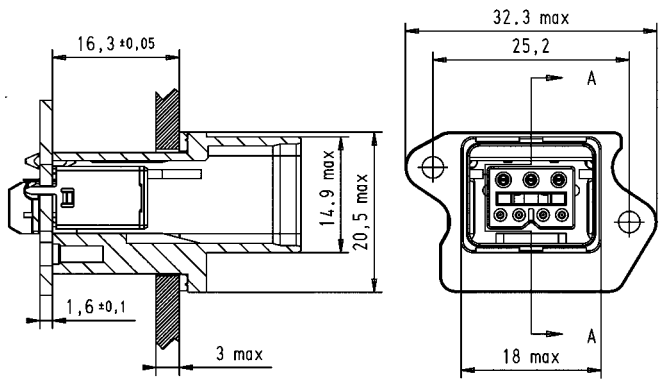
Advantages

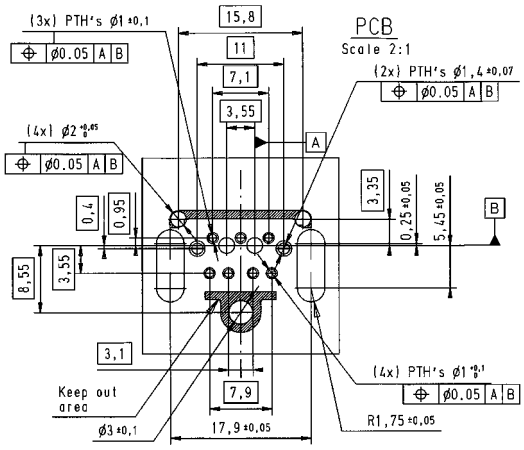
- Combined data- and power-supply up to 5A / 32V included to one connector
- HARTING PushPull technology
- Compact design
- High packing density
- Sixfold codable
- Suitable for all Fast-Ethernet variants

Technical characteristics

Locking	PushPull Technology acc. to IEC 61 076-3-106 variant 4
Degree of protection	IP 65 / IP 67
Termination	Solder pins
Transmission performance	Category 5 / Class D up to 100 MHz acc. to ISO/IEC 11 801:2002, EN ISO 50 173-1
Transmission rate	10 / 100 Mbit/s
Number of contacts	Data: 4, shielded (Ethernet) Power: 3, (5A / 32V)
Housing material	Plastic, black
Flammability acc. to UL 94	V 0

Identification	Part No.	Drawing	Dimensions in mm
Components device side			
Set straight HARTING PushPull Hybrid housing bulkhead mounting and pcbs female shielded, IP 65 / IP 67, black, 180° straight	09 45 245 1300		
Set angled HARTING PushPull Hybrid housing bulkhead mounting and pcbs female shielded, IP 65 / IP 67, black, 90° angled	09 45 245 1310 (in preparation)		
Female insert			
PCB jack shielded 180° straight	09 45 545 1300		
PCB jack shielded 90° angled	09 45 545 1305 (in preparation)		
Housing bulkhead mounting			
for female insert straight	09 45 545 1320		
for female insert angled	09 45 545 1325 (in preparation)		
Panel feed-through 1 x Hybrid female IP 65 / IP 67 on 1 x RJ45 female and 3 pcb clamps, board drillings for M2.5	09 45 245 1320		





HARTING PushPull Hybrid

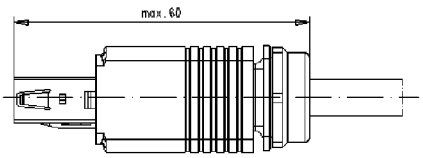
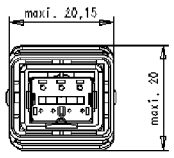
HARTING PushPull Hybrid, type acc. to IEC 61 076-3-106 variant 4
Hybrid connector

Advantages

- Combined data- and power-supply up to 5A / 32V included to one connector
- HARTING PushPull technology
- Compact design
- High packing density
- Sixfold condable
- Suitable for all Fast-Ethernet variants

Technical characteristics

Locking	PushPull Technology acc. to IEC 61 076-3-106 variant 4
Degree of protection	IP 65 / IP 67
Termination	Crimp
Cable diameter	AWG 26 for Ethernet AWG 20 for Power
Transmission performance	Category 5 / Class D up to 100 MHz acc. to ISO/IEC 11 801:2002, EN ISO 50 173-1
Number of contacts	Data: 4, shielded (Ethernet) Power: 3, (5A / 32V)
Housing material	Plastic, black
Flammability acc. to UL 94	V 0

Identification	Part No.	Drawing	Dimensions in mm
Connector HARTING PushPull Hybrid connector, IP 65/ 67, black, with cable gland and crimp contacts			
straight	09 45 145 1300		
angled	09 45 145 1310 (in preparation)		
Accessories – Coding pin set to avoid accidental incorrect mating a coding system is required. This coding pins are inserted without loss of contact.	09 45 845 1300		
Tools			
Crimping tool for data contacts	09 99 000 0596		
Crimping tool for power contacts	09 99 000 0175		
Insertion and removal tool			
for data contacts	09 99 000 0513		
for power contacts	09 99 000 0171		

HARTING PushPull Hybrid

HARTING PushPull Hybrid, type acc. to IEC 61 076-3-106 variant 4
overmoulded Hybrid system cables

Advantages

- Combined data- and power-supply up to 5A / 32V included to one connector
- HARTING PushPull technology
- Robust design, suitable for industrial applications
- High packing density
- Sixfold codable
- Suitable for all Fast-Ethernet variants

Technical characteristics

Cable construction:	Twisted Pair shielded + 3 Power cables
Core structure	Data: 4x AWG 26/7 Power: 3x AWG 20/7
Transmission performance	Category 5 / Class D up to 100 MHz acc. to ISO/IEC 11 801:2002, EN ISO 50 173-1
Sheath material	FRNC
Cable-outer diameter	ø (7.0 ±0.4) mm
Shielding	Shielding foil and shielding braid
Temperature range	- 40 up to + 80 °C
Colour	black

Identification		Part No.
System cables 2x HARTING PushPull Hybrid		
Length	0,5 m	09 47 616 1005
	1 m	09 47 616 1010
	2 m	09 47 616 1020
	3 m	09 47 616 1030
	5 m	09 47 616 1050
	10 m	09 47 616 1100
	20 m	09 47 616 1200
System cables 1x HARTING PushPull Hybrid, second side open		
Length	0,5 m	09 47 610 0005
	1 m	09 47 610 0010
	2 m	09 47 610 0020
	3 m	09 47 610 0030
	5 m	09 47 610 0050
	10 m	09 47 610 0100
	20 m	09 47 610 0200
Hybrid cable		
Ring	20 m	09 45 600 0331
Ring	50 m	09 45 600 0341
Ring	100 m	09 45 600 0301
Trommel	500 m	09 45 600 0321

Drawing — Dimensions in mm

Structure Hybrid cable

Number of contacts	9, 15*, 25*
Working current	5 A
Test voltage $U_{r.m.s.}$	1 kV
Clearance and creepage	≥ 1.0 mm
Contact resistance	< 25 mΩ
Insulation resistance	< 5 GΩ
Temperature range	as per profile JEDEC 020 D
Terminations	Solder pins for P.C.B. pads

Materials

Mouldings	LCP black UL 94-V0
Contacts	Phosphorus bronze
Grounding die	Zamac
Shell	Steel

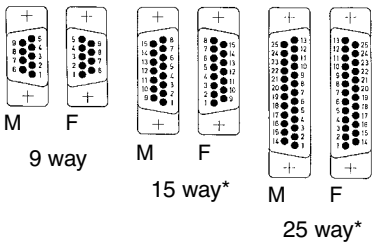
Contact surface

Contact zone	selectively gold-plated according to performance level[1)]
Grounding die	Pure tin
Shell	Nickel plated

Insertion and withdrawal force

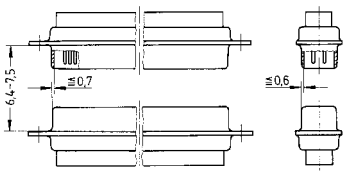
– insertion max. per connector: 30 N
– withdrawal min. per connector: 3.3 N

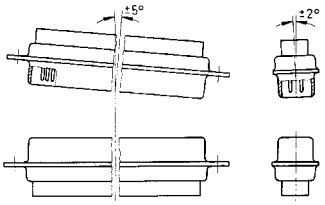
Contact arrangement View from termination side



M = Male connector
F = Female connector

Mating conditions as per DIN 41 652



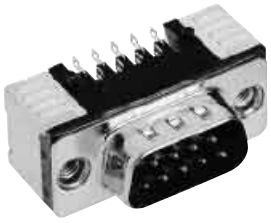


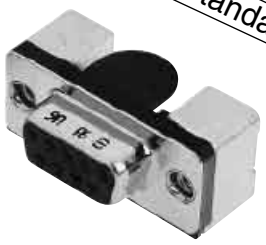
[1)] Performance level 3, 50 mating cycles, no gas test
Performance level 2 as per CECC 75 301-802, 250 mating cycles, 4 days 4 mixed gas test – IEC 60 512
Performance level 1 as per CECC 75 301-802, 500 mating cycles, 10 days 4 mixed gas test – IEC 60 512

* Available on request

Number of contacts

9*





Standard Versions

SMT stamped solder pins, angled with grounding board locks

Identification	No. of contacts	Part No.		
Performance levels Explanations see page 101 Other performance levels on request ▶		Performance level 3	Performance level 2	Performance level 1
Male connector metal shell with dimples	9	09 55 166 78 .. 741	09 55 166 68 .. 741	09 55 166 38 .. 741
Female connector metal shell	9	09 55 156 76 .. 741	09 55 156 66 .. 741	09 55 156 36 .. 741

Please insert digit for flange thread or fitted female screw locks

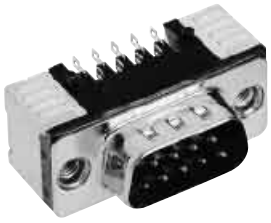
M3 ▶	11
4-40 UNC ▶	12
fitted screw locks M3 ▶	33
fitted screw locks 4-40 UNC ▶	13

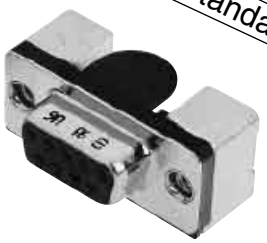
* 15 and 25 way connectors are available on request

Connector dimensions see page 103. Mating conditions see page 101.

Number of contacts

9*

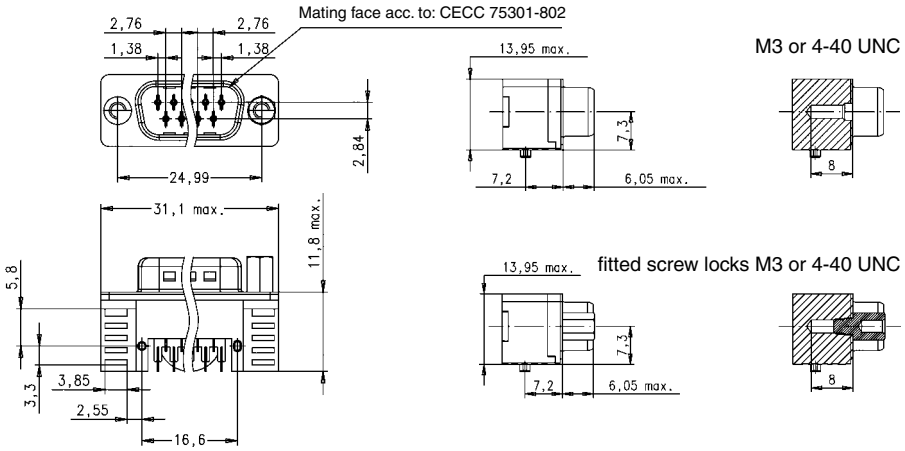


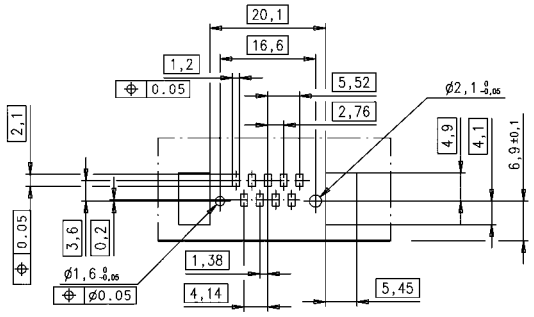


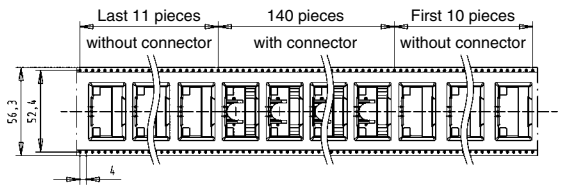
Standard Versions

SMT stamped solder pins, angled with grounding board locks

Identification	Drawing	Dimensions in mm
Male connector	M3 or 4-40 UNC / fitted screw locks M3 or 4-40 UNC	
Female connector	M3 or 4-40 UNC / fitted screw locks M3 or 4-40 UNC	
pcb layout		
Packaging (1 reel = 140 pieces) Reel diameter = 330 mm		

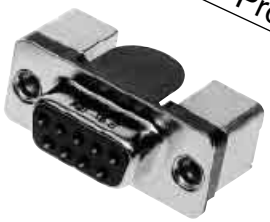






Number of contacts

9*



Low-Profile Versions

SMT stamped solder pins, angled with grounding board locks

Identification	No. of contacts	Part No.		
Performance levels Explanations see page 101 Other performance levels on request ▶		Performance level 3	Performance level 2	Performance level 1
Male connector metal shell with dimples	9	09 55 166 78 .. 741	09 55 166 68 .. 741	09 55 166 38 .. 741
Female connector metal shell	9	09 55 156 76 .. 741	09 55 156 66 .. 741	09 55 156 36 .. 741

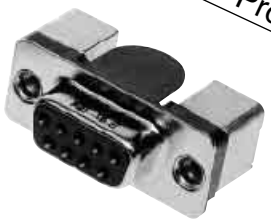
Please insert digit for flange thread or fitted female screw locks

- M3 ▶ 15
- 4-40 UNC ▶ 16
- fitted screw locks M3 ▶ 18
- fitted screw locks 4-40 UNC ▶ 17

* 15 and 25 way connectors are available on request
Connector dimensions see page 105. Mating conditions see page 101.

Number of contacts

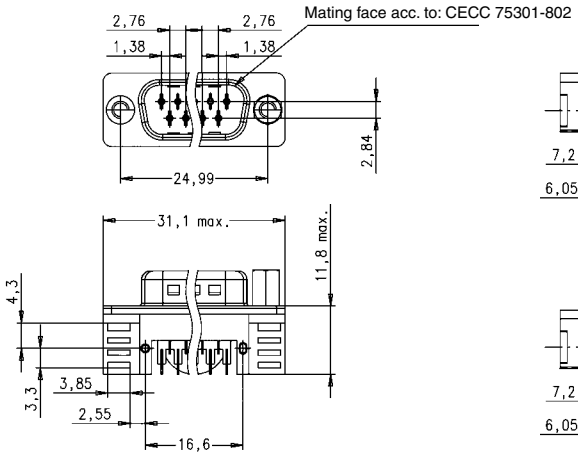
9*

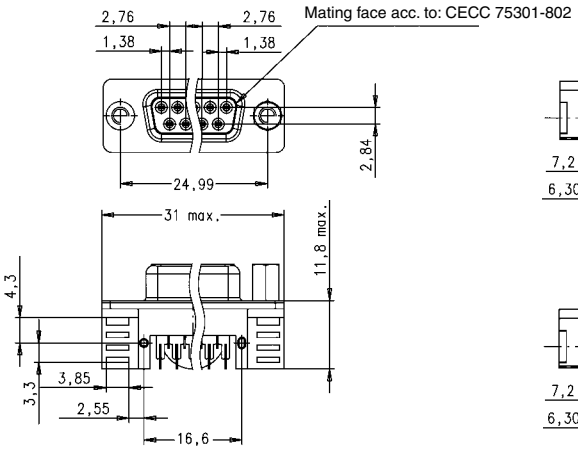


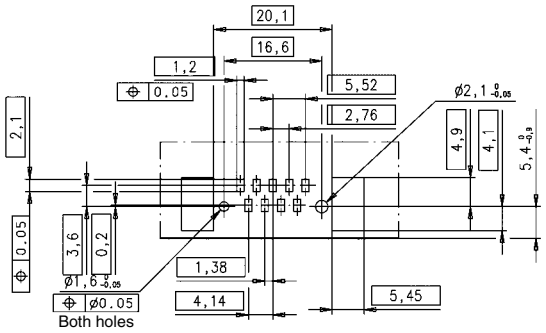
Low-Profile Versions

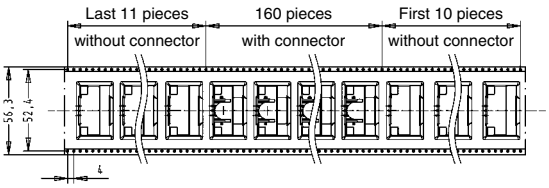
SMT stamped solder pins, angled with grounding board locks

Identification	Drawing	Dimensions in mm
Male connector	M3 or 4-40 UNC fitted screw locks M3 or 4-40 UNC	
Female connector	M3 or 4-40 UNC fitted screw locks M3 or 4-40 UNC	
pcb layout		
Packaging (1 reel = 160 pieces) Reel diameter = 330 mm		









Number of contacts	9, 15, 25, 37
Working current	6.5 A max.
Working voltage	100 V max. for standard capacitance values – higher working voltages are available as specific.
Dielectric withstanding voltage	250 V DC max. – higher dielectric withstanding voltages are available as specific.
Contact resistance	≤ 10 mΩ
Insulation resistance	≥ 1000 MΩ
Temperature range	-20 °C … + 125 °C
Materials	
Insulation	PCT, glass-fibre filled, flame retardant acc. to UL 94-V0
Contacts	Copper alloy Male and female contacts are turned
Contact surface	
Contact zone	Selectively plated according to performance level
Performance level	Performance level 2, as per CECC 75 301-802, 250 mating cycles, 4 days 4 mixed gas test – IEC 60 512
Metal shell	Steel

Number of contacts

9–37

Filter adapters

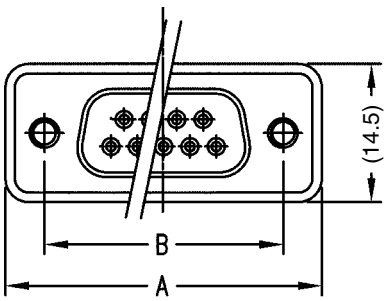
Identification	No. of contacts	Part No.
Male / female filter adapters with C filter		
	9	09 64 100 72
	15	09 64 200 72
	25	09 64 300 72
	37	09 64 400 72

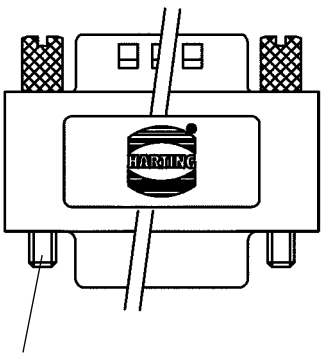
Please insert digit for capacitance

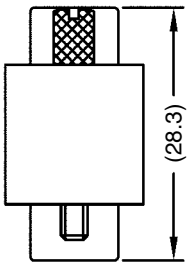
47 pF ▶	10
470 pF ▶	20
1000 pF ▶	30
3900 pF ▶	40

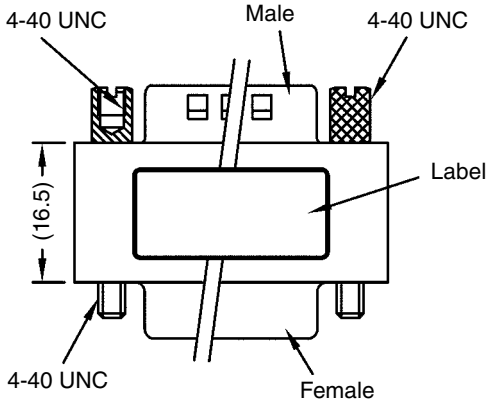
Dimensions

	A	B
9	32.8	24.99
15	41.1	33.32
25	55.0	47.04
37	71.3	63.50





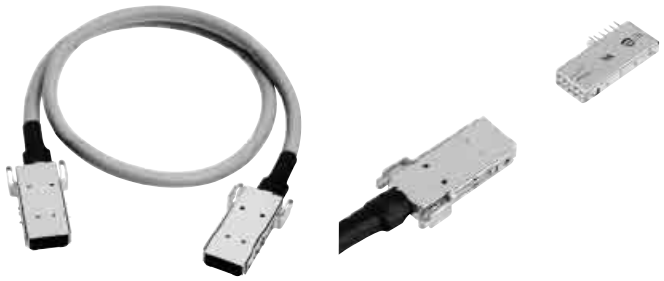




Screws are not pre-mounted to allow mounting from any ends

Dimensions in mm

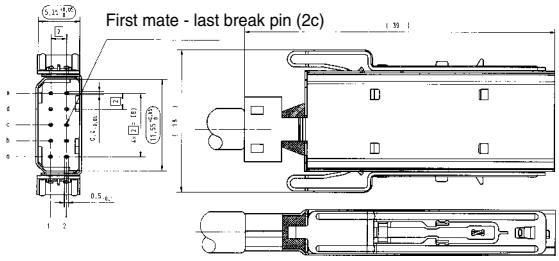
Number of contacts	10
Approvals	IEC 61 076-4-107 UL recognized: E102079
Contact pitch Connector pitch	2 mm 6 mm
Working current	1.5 A at 70 °C
Test voltage $U_{r.m.s.}$	750 V
Contact resistance Insulation resistance	≤ 30 mΩ ≥ 10^{10} Ω
Temperature range during reflow soldering	-55 °C … + 125 °C female: max. + 260 °C for 60 s
Mating cycles	250, performance level 2
Terminations	Insulation displacement (male), AWG 28/7 - 30/7, AWG 30 solid Solder pins for ø 0.6 mm min. (female)
Insertion force Withdrawal force	10 N max. / module 2 N min. / module (without locking levers)
Latching system	Locking levers
Materials	
Mouldings	Male connector: Polyester, UL 94-V0 Female connector: High temperature plastic material, UL 94-V0
Contacts	Copper alloy
Shells	Male connector: Stainless steel Female connector: Silver nickel
Contact surface	
Contact zone	Selectively gold-plated



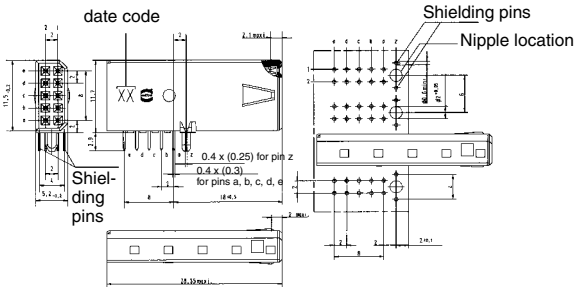
Male connectors, straight
Female connectors, angled
Cable assemblies

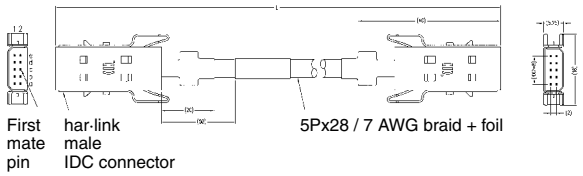
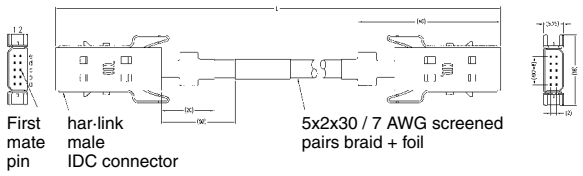
Identification	No. of contacts	Colour	Part No.
Male connector for insulation displacement	10	Black	27 11 161 8001
Female connector with solder pins	10	Beige (standard)	27 21 121 8000
	10	Red	27 21 121 8002
	10	Yellow	27 21 121 8004
	10	Green	27 21 121 8005
	10	Blue	27 21 121 8006
	10	Black	27 21 121 8010

Male connector



Female connector



Identification	Part No.	
Standard cable assembly with ***single*** shielding and 1:1 wiring Length: L = 0.5 m L = 1.0 m L = 2.0 m	33 27 243 0500 001 33 27 243 1000 002 33 27 243 2000 003	
High end cable assembly with ***double*** shielding and 1:1 wiring suitable for HF applications Length: L = 0.5 m L = 1.0 m L = 2.0 m	33 27 243 0500 006 33 27 243 1000 007 33 27 243 2000 008	

Dimensions [mm]

Notes

Number of contacts	10, 14, 16, 20, 26, 34, 40, 50, 60, 64
Contact arrangement	straight
Contact length	4.5 mm
Approvals	IEC 60 603-13
Design acc. to	D 2632 BT 224 BS 9525 NFC 93-428 (HE 10) MIL DTL 83 503
Pitch	2.54 mm [0.100“]
Working current	1 A
Working voltage	350 V DC or AC peak
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 20 mΩ
Insulation resistance	≥ 10^9 Ω
Temperature range The maximum temperature includes heating of contacts and ambient temperature	-55 °C … + 125 °C
Materials	
Moulding	PBT UL 94-V0
Contacts	Phosphor bronze
Contact surface	
Contact zone	gold-plated according to performance level[1)]

Terminations

Recommended PCB through holes

Tin-lead plated PCB	Hole	1.15±0.025
	Cu	min. 25 µm
	Sn	max. 15 µm
	Plated hole	0.94-1.09 mm
Chemical tin-plated PCB	Hole	1.15±0.025
	Cu	min. 25 µm
	Sn	min. 0.8 µm
	Plated hole	1.00-1.10 mm
Au / Ni plated PCB	Hole	1.15±0.025
	Cu	min. 25 µm
	Ni	3-7 µm
	Au	0.05-0.12 µm
	Plated hole	1.00-1.10 mm
Silver plated PCB	Hole	1.15±0.025
	Cu	min. 25 µm
	Ag	0.1-0.3 µm
	Plated hole	1.00-1.10 mm
OSP copper plated PCB	Hole	1.15±0.025
	Cu	min. 25 µm
	Plated hole	1.00-1.10 mm
PCB board thickness: ≥ 1.6 mm		

Insertion and withdrawal forces

Number of contacts	Maximum force [N]
	Performance level 1
10	20
14	28
16	32
20	40
26	52
34	68
40	80
50	100
60	120
64	128

[1)] Performance level 1 as per IEC 60 603-13, ≥ 500 mating cycles, 10 days gas test

Number of contacts

10–64

Male header, straight press-in pins

Identification	No. of contacts	Part No. Without levers	With short levers	With long levers
Male header with straight press-in terminations Length: 4.5 mm	10	09 18 510 5929	09 18 510 5919	09 18 510 5909
	14	09 18 514 5929	09 18 514 5919	09 18 514 5909
	16	09 18 516 5929	09 18 516 5919	09 18 516 5909
	20	09 18 520 5929	09 18 520 5919	09 18 520 5909
	26	09 18 526 5929	09 18 526 5919	09 18 526 5909
	34	09 18 534 5929	09 18 534 5919	09 18 534 5909
	40	09 18 540 5929	09 18 540 5919	09 18 540 5909
	50	09 18 550 5929	09 18 550 5919	09 18 550 5909
	60	09 18 560 5929	09 18 560 5919	09 18 560 5909
	64	09 18 564 5929	09 18 564 5919	09 18 564 5909

For dimensions see page 113

Performance level 1 as per IEC 60 603-13, other performance levels on request

Number of contacts

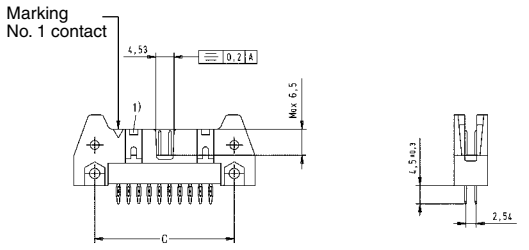
10–64

Male header, straight press-in pins

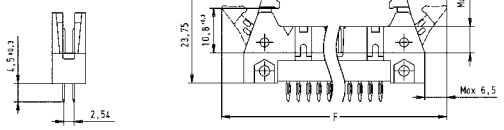
Identification | Drawing | Dimensions in mm

Male header

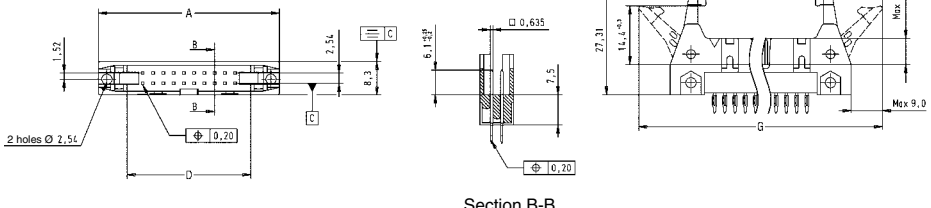
No. of contacts	A	C	D	E	F	G
10	32.11	21.84	17.91	2.54 x 4 = 10.16	45.11	50.11
14	37.19	26.92	22.99	2.54 x 6 = 15.24	50.19	55.19
16	39.73	29.46	25.53	2.54 x 7 = 17.78	52.73	57.73
20	44.81	34.54	30.61	2.54 x 9 = 22.86	57.81	62.81
26	52.43	42.16	38.23	2.54 x 12 = 30.48	65.43	70.43
34	62.59	52.32	48.39	2.54 x 16 = 40.64	75.59	80.59
40	70.21	59.94	56.01	2.54 x 19 = 48.26	83.21	88.21
50	82.91	72.64	68.71	2.54 x 24 = 60.96	95.91	100.91
60	95.61	85.34	81.41	2.54 x 29 = 73.66	108.61	113.61
64	100.69	90.42	86.49	2.54 x 31 = 78.74	113.69	118.69



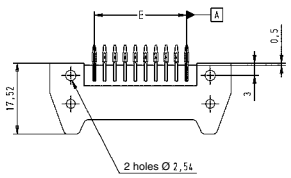
Short levers



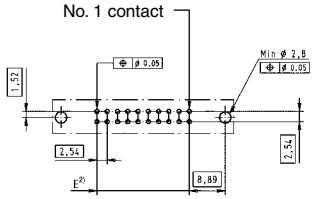
Long levers



Section B-B



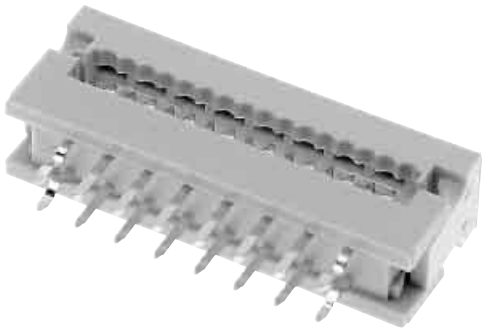
Board drillings

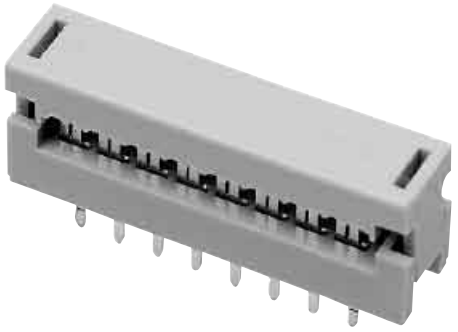


1) No polarization slot for 10 or 14 way male header

2) Pitch tolerance: ± 0.1

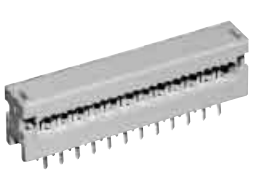
Number of contacts	6, 8, 10, 14, 16, 20, 24, 26, 30, 34, 40, 50, 60, 64
Pitch	On pcb side: 2.54 mm [0.100“] On cable side: 1.27 mm [0.050“]
Working current	1 A
Test voltage $U_{r.m.s.}$	1 kV AC – 1 minute
Contact resistance	35 mΩ max.
Insulation resistance	≥ 10^9 Ω
Temperature range	-55 °C … + 105 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	Solder pins: 0.635 mm x 0.3 mm Dimensions for pcb hole: Standard version: Ø $0.9^{\pm 0.10}$ mm Kinked version: Ø $1.0^{\pm 0.05}$ mm Diagonal: 0.71 mm IDC flat cable 1.27 mm [0.050“] pitch: AWG 28/7
Materials	
Moulding	Thermoplastic resin (PBT) UL 94-V0

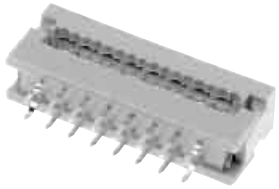




Number of contacts

6–64



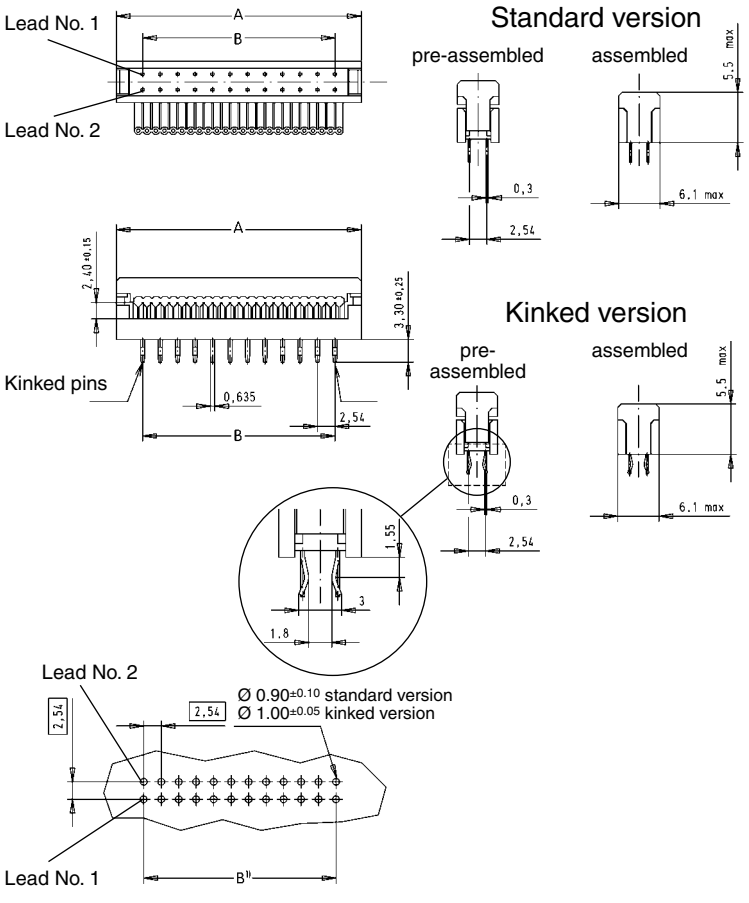


Pcb transition connector, 2 rows, low-profile with 5.5 mm height

Identification	No. of contacts	Part No.
Pcb transition connector		
2 rows Standard low-profile version	6	09 18 106 9622
	8	09 18 108 9622
	10	09 18 110 9622
	14	09 18 114 9622
	16	09 18 116 9622
	20	09 18 120 9622
	24	09 18 124 9622
	26	09 18 126 9622
	30	09 18 130 9622
	34	09 18 134 9622
	40	09 18 140 9622
	50	09 18 150 9622
	60	09 18 160 9622
	64	09 18 164 9622
Pcb transition connector		
2 rows Kinked low-profile version 2 kinked pins at each extremity	6	09 18 106 9422
	8	09 18 108 9422
	10	09 18 110 9422
	14	09 18 114 9422
	16	09 18 116 9422
	20	09 18 120 9422
	24	09 18 124 9422
	26	09 18 126 9422
	30	09 18 130 9422
	34	09 18 134 9422
	40	09 18 140 9422
	50	09 18 150 9422
	60	09 18 160 9422
	64	09 18 164 9422
Board drillings		

Dimensions in mm

No. of contacts	$A^{\pm 0,38}$	$B^{\pm 0,10}$
6	12.92	2.54 x 2 = 5.08
8	15.46	2.54 x 3 = 7.62
10	18.00	2.54 x 4 = 10.16
14	23.08	2.54 x 6 = 15.24
16	25.62	2.54 x 7 = 17.78
20	30.74	2.54 x 9 = 22.86
24	35.78	2.54 x 11 = 27.94
26	38.32	2.54 x 12 = 30.48
30	43.40	2.54 x 14 = 35.56
34	48.48	2.54 x 16 = 40.64
40	56.10	2.54 x 19 = 48.26
50	68.80	2.54 x 24 = 60.96
60	81.50	2.54 x 29 = 73.66
64	86.58	2.54 x 31 = 78.74



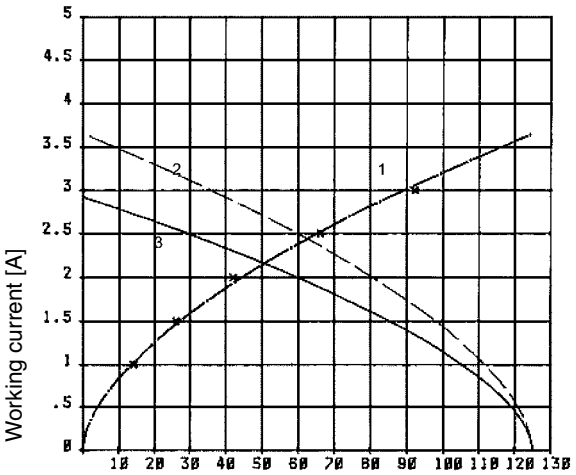
1) Pitch tolerance: ± 0.05

Number of contacts	6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64
Approvals	IEC 60 603-13 DIN EN 60 603-13 D 2632 BT 224 NFC 93-428 (HE 10) UL recognized: E102079 comply with MIL DTL 83 503
Pitch	2.54 mm [0.100“]
Working current	1 A
Working voltage	320 V for pollution degree 1
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance Insulation resistance	≤ 20 mΩ ≥ 10^9 Ω
Temperature range	-55 °C … + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	IDC flat cable 1.27 mm [0.050”] pitch: AWG 26/7 – AWG 28/7
Materials Moulding	 Thermoplastic resin (PBTP) UL 94-V0
Contact surface Contact zone	 gold-plated according to performance level[1)]

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals.
The current capacity-curve is valid for continuous, not interrupted current-loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512.



Example: 50 way connector

① Temperature rise

② Derating

③ Derating curve at $I_{max.}$ x 0.8 (IEC 60 512-2)

Insertion and withdrawal forces

Number of contacts	Maximum force [N]	
	Performance level 1 and 2	Performance level 3
6	12	18
10	20	30
14	28	42
16	32	48
20	40	60
26	52	78
30	60	90
34	68	102
40	80	120
50	100	150
60	120	180
64	128	192

[1)] Performance level 3 as per IEC 60 603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 60 603-13, ≥ 250 mating cycles, 4 days gas test
as per MIL DTL 83 503, > 0.76 µm Au (30 µ inch), other performance levels on request

* on request

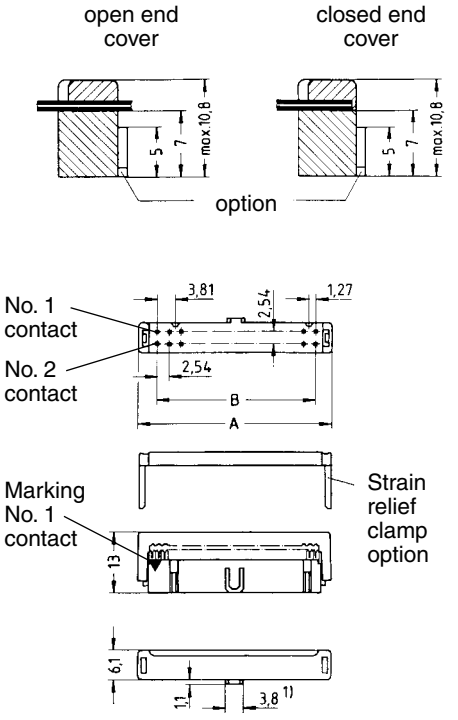
Number of contacts

6–64

Female connector

Identification	No. of contacts	Part No. open end cover	Part No. closed end cover
Female connector with central polarization			
without strain relief clamp	6	09 18 506 ⌴ 803	09 18 506 ⌴ 804
	10	09 18 510 ⌴ 803	09 18 510 ⌴ 804
	14	09 18 514 ⌴ 803	09 18 514 ⌴ 804
	16	09 18 516 ⌴ 803	09 18 516 ⌴ 804
	20	09 18 520 ⌴ 803	09 18 520 ⌴ 804
	26	09 18 526 ⌴ 803	09 18 526 ⌴ 804
	34	09 18 534 ⌴ 803	09 18 534 ⌴ 804
	40	09 18 540 ⌴ 803	09 18 540 ⌴ 804
	50	09 18 550 ⌴ 803	09 18 550 ⌴ 804
	60	09 18 560 ⌴ 803	09 18 560 ⌴ 804
	64	09 18 564 ⌴ 803	09 18 564 ⌴ 804
without strain relief clamp with bulk packaging	6	09 18 506 ⌴ 803 58U[2)]	
	10	09 18 510 ⌴ 803 58U[2)]	
	14	09 18 514 ⌴ 803 58U[2)]	
	16	09 18 516 ⌴ 803 58U[2)]	
	20	09 18 520 ⌴ 803 58U[2)]	
	26	09 18 526 ⌴ 803 58U[2)]	
	34	09 18 534 ⌴ 803 58U[3)]	
	40	09 18 540 ⌴ 803 58U[3)]	
with strain relief clamp	6	09 18 506 ⌴ 813	09 18 506 ⌴ 814*
	10	09 18 510 ⌴ 813	09 18 510 ⌴ 814*
	14	09 18 514 ⌴ 813	09 18 514 ⌴ 814*
	16	09 18 516 ⌴ 813	09 18 516 ⌴ 814*
	20	09 18 520 ⌴ 813	09 18 520 ⌴ 814*
	26	09 18 526 ⌴ 813	09 18 526 ⌴ 814*
	34	09 18 534 ⌴ 813	09 18 534 ⌴ 814*
	40	09 18 540 ⌴ 813	09 18 540 ⌴ 814*
	50	09 18 550 ⌴ 813	09 18 550 ⌴ 814*
	60	09 18 560 ⌴ 813	09 18 560 ⌴ 814*
	64	09 18 564 ⌴ 813	09 18 564 ⌴ 814*

Drawing — Dimensions in mm



No. of contacts	6	10	14	16	20	26
A	12.20	17.30	22.40	24.90	30.00	37.60
B	5.08	10.16	15.24	17.78	22.86	30.48

No. of contacts	34	40	50	60	64
A	47.80	55.40	68.10	80.80	85.90
B	40.64	48.26	60.96	73.66	78.74

[2)] Packaging unit 5,000 pieces
[3)] Packaging unit 3,000 pieces

30 contacts on request

For performance level 3 please specify digit ⌴ 7 ⌴ — ⌴ 7 ⌴ *
For performance level 2 please specify digit ⌴ 6 ⌴ — ⌴ 6 ⌴
> 0.76 µm Au (30 µinch) on request ⌴ 5 ⌴ * — ⌴ 5 ⌴ *

[1)] Pitch tolerance: ± 0.1
* Not normally kept in stock

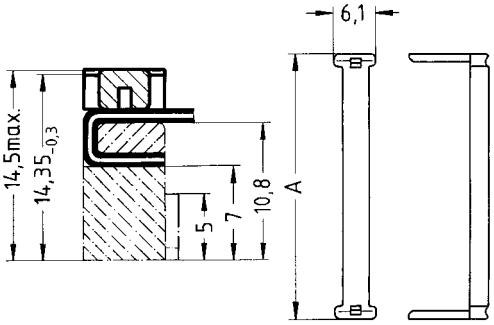
Number of contacts

6–64

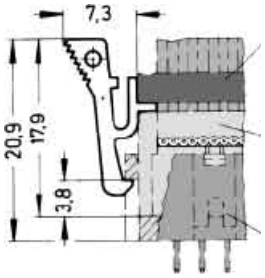
Strain relief clamp/Locking lever

Identification	No. of contacts	Part No.	Drawing / Dimensions in mm
Strain relief clamp	6	09 18 506 9002	
	10	09 18 510 9002	
	14	09 18 514 9002	
	16	09 18 516 9002	
	20	09 18 520 9002	
	26	09 18 526 9002	
	34	09 18 534 9002	
	40	09 18 540 9002	
	50	09 18 550 9002	
	60	09 18 560 9002	
	64	09 18 564 9002	
with bulk packaging	6	09 18 506 9002 58U[3]	
	10	09 18 510 9002 58U[3]	
	14	09 18 514 9002 58U[3]	
	16	09 18 516 9002 58U[3]	
	20	09 18 520 9002 58U[3]	
	26	09 18 526 9002 58U[3]	
	34	09 18 534 9002 58U[4]	
	40	09 18 540 9002 58U[4]	
[3] Packaging unit 5,000 pieces [4] Packaging unit 3,000 pieces			
30 contacts on request			

No. of contacts	A
6	12.2
10	17.3
14	22.4
16	24.9
20	30.0
26	37.6
34	47.8
40	55.4
50	68.1
60	80.8
64	85.9



Locking lever for female connector Only in conjunction with low-profile male header and strain relief		09 18 000 9905[1]



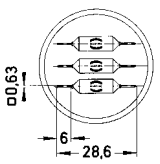
Strain relief clamp

Female connector

Low-profile male header

When the security of latching is required and space is a premium, these locking levers can be fitted onto the strain relief of the HARTING female connector. This can then be used in conjunction with male low-profile headers.

Coding system with loss of contact Code pin		09 18 000 9901[2]
Removal tool for male contacts		09 99 000 0133



To avoid cross-plugging adjacent connectors a coding system is required. A code pin is inserted into the appropriate cavity in the female connector. The corresponding male contact is removed by a special removal tool.

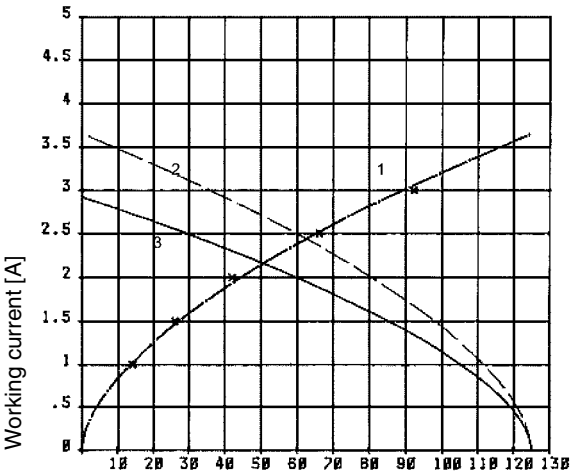
[1] Order 2 per female connector
[2] Part No. comprises 6 code pins

Number of contacts	6, 10, 14, 16, 20, 26, 30*, 34, 40, 50, 60, 64
Contact arrangement	straight
Contact length	2.9 mm
Approvals	IEC 60603-13 DIN EN 60603-13 D 2632 BT 224 NFC 93-428 (HE 10) UL recognized: E102079 comply with MIL DTL 83503
Pitch	2.54 mm [0.100“]
Working current	1 A
Working voltage	500 V for pollution degree 1
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance Insulation resistance	≤ 20 mΩ ≥ 10^9 Ω
Temperature range	-55 °C … + 125 °C The maximum temperature includes heating of contacts and ambient temperature
Terminations	For pcb hole Ø 1 ± 0.1 mm DIN IEC 52141 Diagonal: 0.79 mm
Materials Moulding	 Thermoplastic resin (PBTP) UL 94-V0
Contact surface Contact zone	 gold-plated according to performance level[1)]

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals.
The current capacity-curve is valid for continuous, not interrupted current-loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60512.



Example: 50 way connector
① Temperature rise
② Derating
③ Derating curve at $I_{max.}$ x 0.8 (IEC 60512-2)

Insertion and withdrawal forces

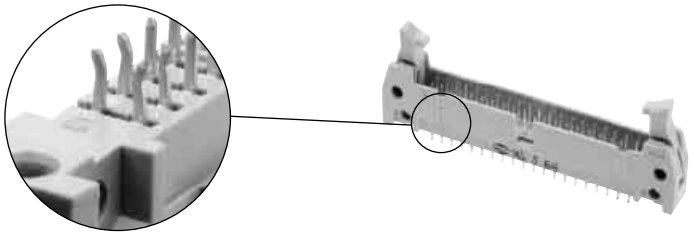
Number of contacts	Maximum force [N]	
	Performance level 1 and 2	Performance level 3
6	12	18
10	20	30
14	28	42
16	32	48
20	40	60
26	52	78
30	60	90
34	68	102
40	80	120
50	100	150
60	120	180
64	128	192

[1)] Performance level 3 as per IEC 60603-13, ≥ 50 mating cycles, no gas test
Performance level 2 as per IEC 60603-13, ≥ 250 mating cycles, 4 days gas test
as per MIL DTL 83503, > 0.76 µm Au (30 µ inch), other performance levels on request

* on request

Number of contacts

6–64



Male header with straight solder pins, kinked

Identification	No. of contacts	Part No. Without levers	With short levers	With long levers
Male header with straight solder pins, kinked Length: 2.9 mm	6	09 18 506 ⌴ 024	09 18 506 ⌴ 014	09 18 506 ⌴ 004
	10	09 18 510 ⌴ 024	09 18 510 ⌴ 014	09 18 510 ⌴ 004
	14	09 18 514 ⌴ 024	09 18 514 ⌴ 014	09 18 514 ⌴ 004
	16	09 18 516 ⌴ 024	09 18 516 ⌴ 014	09 18 516 ⌴ 004
	20	09 18 520 ⌴ 024	09 18 520 ⌴ 014	09 18 520 ⌴ 004
	26	09 18 526 ⌴ 024	09 18 526 ⌴ 014	09 18 526 ⌴ 004
	34	09 18 534 ⌴ 024	09 18 534 ⌴ 014	09 18 534 ⌴ 004
	40	09 18 540 ⌴ 024	09 18 540 ⌴ 014	09 18 540 ⌴ 004
	50	09 18 550 ⌴ 024	09 18 550 ⌴ 014	09 18 550 ⌴ 004
	60	09 18 560 ⌴ 024	09 18 560 ⌴ 014	09 18 560 ⌴ 004
	64	09 18 564 ⌴ 024	09 18 564 ⌴ 014	09 18 564 ⌴ 004

30 contacts on request

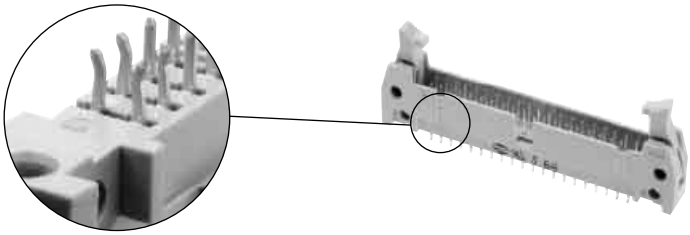
* Not normally kept in stock

For dimensions see page 121

For performance level 3 please specify digit ⌴7⌴ * ⌴7⌴ ⌴7⌴
For performance level 2 please specify digit ⌴6⌴ ⌴6⌴ ⌴6⌴
> 0.76 µm Au (30 µinch) on request ⌴5⌴ * ⌴5⌴ * ⌴5⌴ *

Number of contacts

6–64



Male header with straight solder pins, kinked

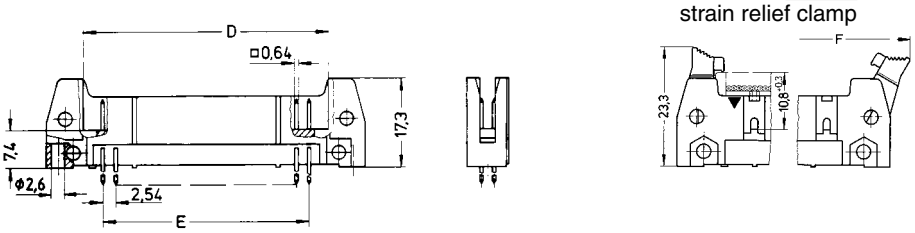
Identification | Drawing | Dimensions in mm

Male header

No. of contacts	A	C	D	E	F	G
6	26.9	22.86	12.45	2.54 x 2 = 5.08	36.9	40.3
10	32.0	27.94	17.53	2.54 x 4 = 10.16	42.0	45.4
14	37.1	33.02	22.61	2.54 x 6 = 15.24	47.1	50.4
16	39.6	35.56	25.15	2.54 x 7 = 17.78	49.6	53.0
20	44.7	40.64	30.23	2.54 x 9 = 22.86	54.7	58.1
26	52.3	48.26	37.85	2.54 x 12 = 30.48	62.3	65.7
34	62.5	58.42	48.01	2.54 x 16 = 40.64	72.5	75.8
40	70.1	66.04	55.63	2.54 x 19 = 48.26	80.1	83.5
50	82.8	78.74	68.33	2.54 x 24 = 60.96	92.8	96.2
60	95.5	91.44	81.03	2.54 x 29 = 73.66	105.5	108.9
64	100.6	96.52	86.11	2.54 x 31 = 78.74	110.6	113.9

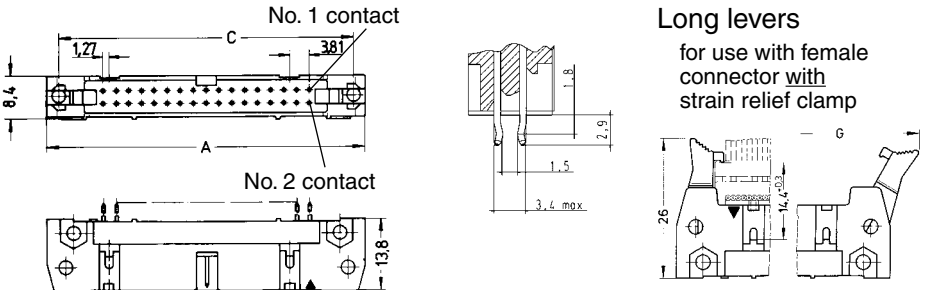
Short levers

for use with female connector without strain relief clamp

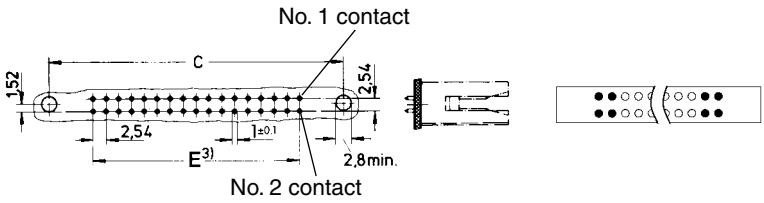


Long levers

for use with female connector with strain relief clamp



Board drillings



● Kinked contact: pcb thickness from 1.50 to 1.94 mm after Cu + Sn plating with non-remelted through holes ø 0.80 to ø 0.95 mm. Max. insertion force = 125 N. Min. retention force = 6 N.

○ Non-kinked contact: Solder pins for pcb connections ø 1 ± 0.1 mm as per IEC 60 603-13.

1) No polarization slot for 6, 10 or 14 way male header

2) No polarization slot for 6 way male header

3) Pitch tolerance: ± 0.1

PICMG, formally known as the PCI Industrial ComputingManufacturing Group – is an industry consortium of over 450 companies. PICMG's purpose is to define standard architectures in an effort to reduce system costs and development cycles and since its 1994 foundation, PICMG has been responsible for the establishment of several of successfully implemented, open, industrial standards. Open standards have proven themselves to be very advantageous for system manufacturers and end-user, because they create multiple vendors of similar parts, low prices at high volumes, and a shortened time-to-market.

Historically, PICMG has created several successful standards.

- PICMG 1.x Series – a passive backplane PCI specification
- PICMG 2.x Series – the CompactPCI® standard

AdvancedTCA®

Today, the AdvancedTCA® series of specifications (PICMG 3.x) targets the requirements of the next generation of carrier grade telecommunications equipment. AdvancedTCA®, short for Advanced Telecom Computing Architecture and sometimes simply abbreviated ATCA®, incorporates an impressive suite of recent technological advancements including the latest trends in high speed interconnect technologies.

Features of AdvancedTCA® include optimization for high-capacity, high-performance telecom and industrial applications, improved reliability, manageability, redundability, and serviceability. Encompassing a technological growth path valid for up to ten years, AdvancedTCA® has earned a solid position within the telecom systems market.

The rack or chassis, is responsible for housing the backplane and the daughtercards, as well as cooling and powering the system. HARTING offers the ATCA® power connector that energises the blades, both the straight backplane and the right angled daughtercard connector.

AdvancedTCA® chassis with backplane

The backplane, said to be passive, is merely a medium for the daughtercards to communicate with each other. And, the daughtercards, sometimes called blades or boards, provide the system with its functionality and allow for an easy, hot-swappable module exchange from the front of the system.

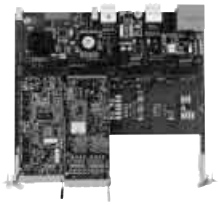
Initially, many blades were designed with a fixed functionality, and they had to be replaced once their functionality became obsolete or the demands of the system changed. With the continuation of exponential technological growth, concept proved to be a costly endeavour for the end-user.

AdvancedMC™

To extend the functionality and modularity of AdvancedTCA®, blade manufacturers conceived the idea of upgradeable daughtercards, and began to insert mezzanine cards onto the blades when needed. To achieve a common mezzanine concept, PICMG developed the Advanced Mezzanine Card (AdvancedMC™) standard AMC.0.

AdvancedMC™ modules for different applications

For the use of Advanced Mezzanine Cards, as well called AdvancedMC™ modules, a carrier is necessary. A carrier is an ATCA® blade with only little functionality beyond AdvancedMC™ management. It contains the mechanical environment for the AdvancedMC™ modules. Depending on their size, up to eight AdvancedMC™ modules can be hot-swapped in and out of a carrier, this enabled the creation of extremely scalable and upgradeable systems.



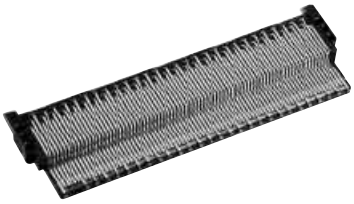
AdvancedTCA® carrier board with AdvancedMC™ modules

To connect AdvancedMC™ modules to carrier boards PICMG defined a new high-speed mezzanine connector: the AdvancedMC™ connector – a card edge connector mounted on the carrier board. It contacts directly with the module's PCB gold pads. Although PICMG defined four AdvancedMC™ connector types (B, B+, AB and A+B+), current market developments focus on type B+.

The HARTING AdvancedMC™ B+ connector features a new design element that supplements the standard – the GuideSpring. The GuideSpring significantly increases the mating reliability and prevents contact interruptions and surface wear when subjected to shocks or vibrations.

The press-fit termination technology provides significant cost and durability advantages over other termination technologies. The connector design allows for the use of a standard flat rock die. For more press-in process control, HARTING offers a special top and bottom tool (see page 140).

The HARTING AdvancedMC™ Plug Connector can replace the module´s PCB gold pads and increase the contact reliability from the module side. Please find more information about the HARTING AdvancedMC™ Plug Connector on page 135.



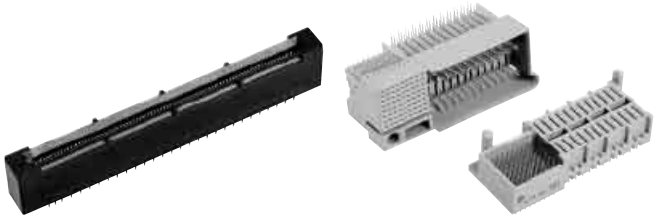
µTCA™

This revolutionary AdvancedMC™-based design concept has led to the recent development of a completely mezzanine-based system – MicroTCA™. MicroTCA™, short for Micro Telecom Computing Architecture, is a more cost-efficient platform than AdvancedTCA® when dealing with smaller applications, yet powerful enough to address the needs of telecom, enterprise and medical applications.

This newly-implemented PICMG standard, outlined in the MTCA.0 specification, presents a design-concept whereby AdvancedMC™s – the same kind used in ATCA® systems – plug directly into a passive backplane; this eliminates the need for carrier boards.

MicroTCA™ double cube system

Naturally the mating face of the AdvancedMC™ connector for MicroTCA™ is the same as for ATCA®, but with a right angled mating direction. It contains the new GuideSpring and is available in press-in termination. PICMG members voted HARTING's MicroTCA™ connector footprint as the new MicroTCA™ standard connector for press-fit termination technology.



AdvancedMC™ and power connectors for MicroTCA™

The MicroTCA™ backplane is typically powered by special, field replaceable, hot-swapable, redundant Power Supply Units (PSU). The PSU connects to the backplane through a MicroTCA™ power connector (press-fit termination) also available from HARTING.

MicroTCA™ backplane

The module management is performed by a MicroTCA™ Carrier Hub, or MCH. An MCH is connected to the backplane by up to four adjacent card-edge connectors. One MCH can control up to 12 AdvancedMC™ modules, thus depending on redundancy requirements, workload, or both, one or two MCHs may be used within a single system.

For a precise mechnical alignment of the mating tongues HARTING offers the special Plug Connectors according to MTCA.0. (see page 138).

*What is **con:**card**+**?*

con:card**+** is a quality seal for AdvancedMC™ connectors that helps to deliver a significant increase in the reliability of MicroTCA™ and AdvancedTCA® systems. In order to reach the target availability of 99.999 %, all system components must be carefully coordinated, and they must function reliably. The selection of suitable connectors is an essential, decisive factor here, as today it is virtually impossible for series production to meet the strict tolerances for the AdvancedMC™ modules as defined in the respective specifications. The so-called GuideSpring is ideally suited for compensating here, and represents just one of a total of five key advantages of the **con:**card**+** philosophy. All the advantages are introduced in the following. Please find further information also on the internet at www.concardplus.com.

Special contact material

*Unlike conventional mating systems with male and female connectors, the AdvancedMC™ has only one, not two, contact tongues per contact. In order to ensure a permanently reliable contact, this single contact tongue must press against the gold pad with sufficient force throughout the entire lifetime. In addition, the thickness of the AdvancedMC™ modules may fluctuate by ±10 %. To meet this challenge, HARTING utilizes a special alloy with very low relaxation as the contact material for the **con:**card**+** connector.*

PdNi contact coating

In order better to meet the high requirements placed on the connectors, a palladium-nickel surface (PdNi) with additional gold flash is used. As a result, wear resistance is increased by roughly 30 %. Even when applied very thinly, PdNi surfaces offer a quality and corrosion-resistant coating that meets the high requirements placed on the connection far better than pure gold.

Smooth contact surface

The specification for the AdvancedMC™ entails 200 mating cycles for a module. On the PCB, the nickel/hard gold layer on the relatively soft copper can only stand up to this high load if the contact surface is absolutely smooth.
This is the case with the ***con:****card****+*** *connector. With years of experience in stamping techniques and the utilization of high-performance stamping tools with special process components, HARTING is actively involved in minimizing gold pad wear.*

GuideSpring

PCB manufacturers are not capable of meeting the AdvancedMC™ modules' tight tolerances with certainty in the series process today. Just a single card with tolerances slightly larger than allowed by the specifications can lead to a system breakdown.
The ***con:****card****+*** *GuideSpring offsets these tolerance deviations by constantly pressing the module against the opposite wall. As this is displaced somewhat towards the middle, the slot is optimally designed for the AdvancedMC™ module, and the mating reliability increases tremendously.*
In addition, the GuideSpring secures the module position in the case of shocks and vibrations. This prevents loss of contact and surface wear.

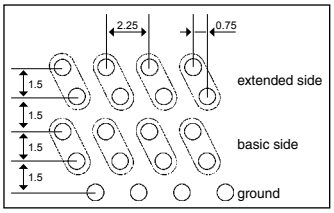
Press-fit technology

Press-fit technology results in a gas-tight, corrosion-resistant, low-ohm quality mechanical connection between the pin and the through contacting of the PCB. This remains reliably in contact and stable, even under conditions of high mechanical and thermal loads, such as vibration, bending and frequent temperature changes. This technology represents a tremendous advantage over other processing techniques. Measurements substantiate that the required transmission rates are easily attained.

Technical characteristics

Design according	PICMG AMC.0 (RoHS compliance)
Number of contacts	170
Contact spacing	0.75 mm
Clearance and creepage distance between contacts	0.1 mm min.
Working current of power contacts as defined in AMC.0 spec.	1.52 A @ 70 °C max. 30 °C temp. rise
Test voltage	80 $V_{r.m.s.}$
Initial contact resistance	
ground contacts	60 mΩ max.
signal, power, general purpose contacts	90 mΩ max.
Initial insulation resistance	100 MΩ min.
Nominal differential impedance	100 Ω±10 %

Max. crosstalk @ 25 ps risetime	Bottom route
Adjacent	0.55 %
Basic-to-extended (diagonal)	0.68 %
Basic-to-extended (opposite)	0.39 %
Multiline (five multi-aggressor differential pairs)	2.74 % max.



PCB library on request (PADS/Dx-Designer)

SPICE models and S-Parameter on request

Differential propagation delay	Basic side:	125 ps
	Extended side:	145 ps
Differential skew	Between basic and extended side:	20 ps
	Within basic and extended side:	±2 ps

Temperature range	-55 °C … +105 °C
Durability as per AMC.0 specification	200 mating cycles
Termination technique	Press-in termination
Mating force	100 N max.
Withdrawal force	65 N max.

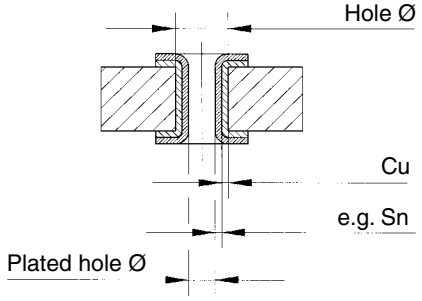
Materials

Moulded parts	Liquid Crystal Polymer (LCP), UL 94-V0
Contacts	Copper Alloy
Contact surface	Palladium nickel plated
Packaging	Cardboard box (other packaging on request)

Recommended plated through hole specification

Tin plated PCB (HAL)	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Sn	5 – 15 µm
	Plated hole Ø	0.53 – 0.60 mm
Au / Ni plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Ni	3 – 7 µm
	Au	0.05 – 0.12 µm
	Plated hole Ø	0.55 – 0.60 mm
Chemical tin plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Sn	0.8 – 1.5 µm
	Plated hole Ø	0.56 – 0.60 mm
Silver plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Ag	0.1 – 0.3 µm
	Plated hole Ø	0.56 – 0.60 mm
OSP copper plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Plated hole Ø	0.56 – 0.60 mm

The press-in zone of the AdvancedMC™ connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of $0.55^{\pm 0.05}$ mm (drilled hole $0.64^{\pm 0.01}$ mm).
Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of $0.64^{\pm 0.01}$ mm to your PCB supplier.
For drillings use e.g. drill bit # 72 (0.025" ≈ 0.64 mm).

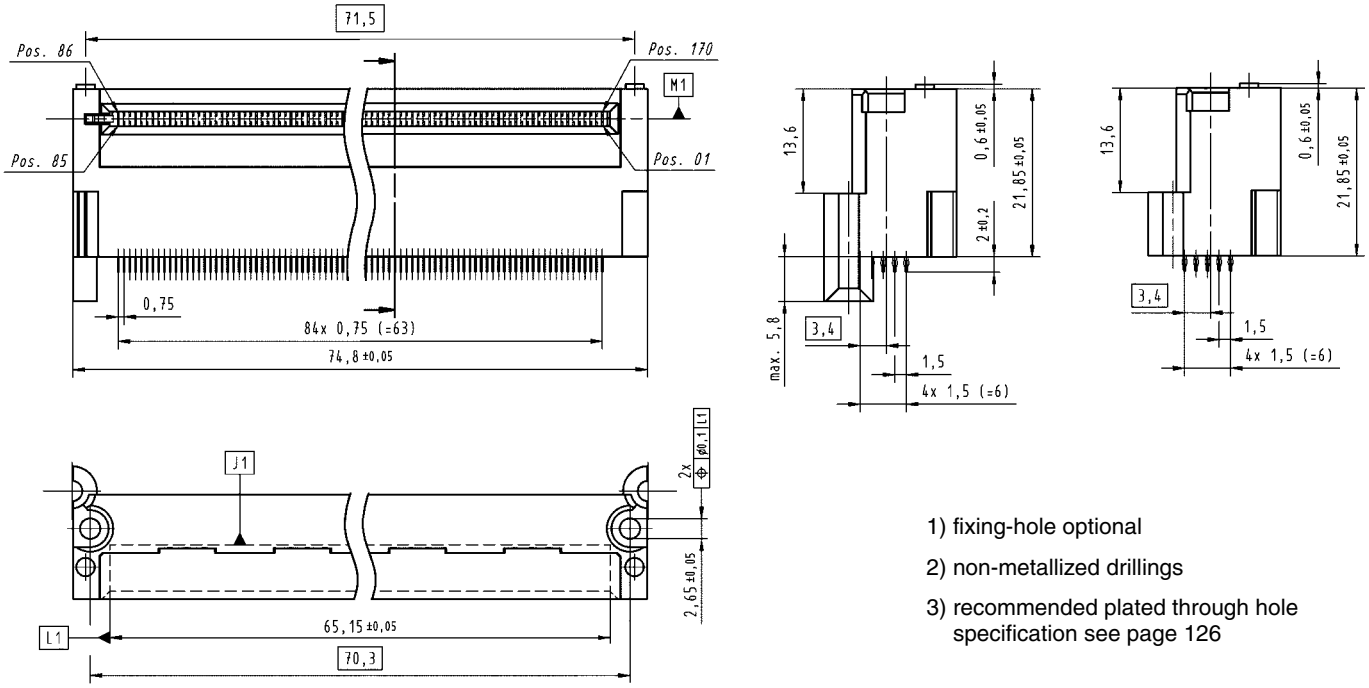


con:card+

Card edge connectors, angled

Identification	No. of contacts	Contact length [mm] termination side	Part number
AdvancedMC™ connector for ATCA®, type B+ with peg and with GuideSpring	170	2.0	16 04 170 5104 000
AdvancedMC™ connector for ATCA®, type B+ without peg and with GuideSpring	170	2.0	16 04 170 5106 000

With peg Without peg With peg Without peg

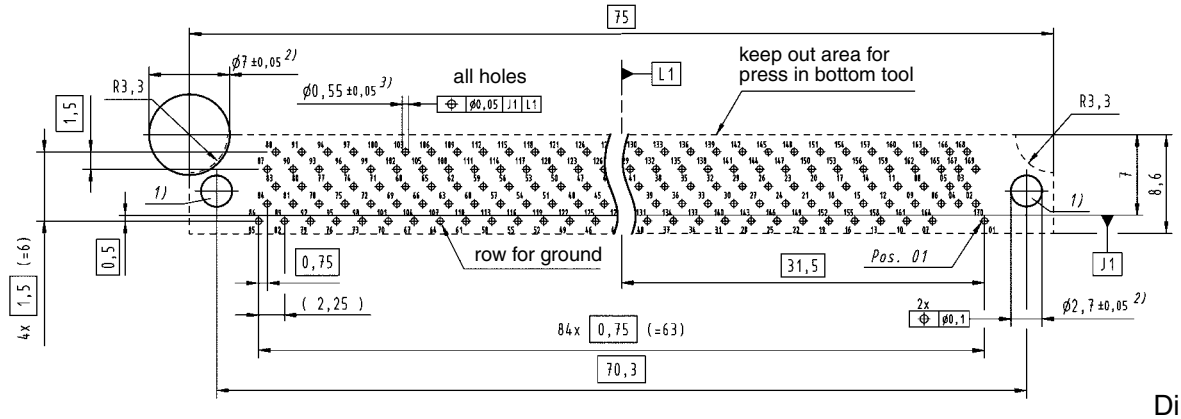


1) fixing-hole optional

2) non-metallized drillings

3) recommended plated through hole specification see page 126

Board drillings (view magnified)

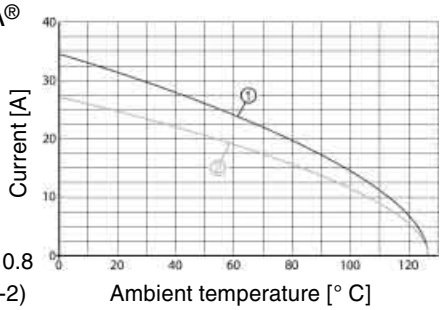


Dimensions [mm]

Technical characteristics

Design according	PICMG 3.0 R2.0
Total number of contacts	30, max. 34
Power contacts	8
Signal contacts	22, max. 26
Clearance and creepage distance between contacts	
Within group 5–16	0.7 mm min.
Within group 17–24	2.5 mm min.
25 to 26	5.5 mm min.
Within group 27–34	1.4 mm min.
13–16 to 17–20	3.0 mm min.
21–24 to 25–26	4.0 mm min.
25–26 to 27–29	2.0 mm min.
Sequential contact engagement	
1st	25, 26, 28, 29, 30, 31
2nd	33
3rd	5–24, 34
4th	27, 32
Working current	
Power contacts	16 A
Signal contacts	1 A
Test voltage	
Contacts 1–16	1000 $V_{r.m.s.}$
Contacts 17–34	2000 $V_{r.m.s.}$
Initial contact resistance	
Power contacts	≤ 2.2 mΩ
Signal contacts	≤ 8.5 mΩ
Insulation resistance	≥ 10^{10} Ω
Temperature range	-55 °C … +125 °C
Durability	250 mating cycles
Termination technique	Press-in termination
Mating force	67 N max.
Withdrawal force	67 N max.

Derating for ATCA® power contacts
Contact loading acc. PICMG 3.0



① Derating
② Derating @ $I_{max.}$ x 0.8 (acc. IEC 60512-5-2)

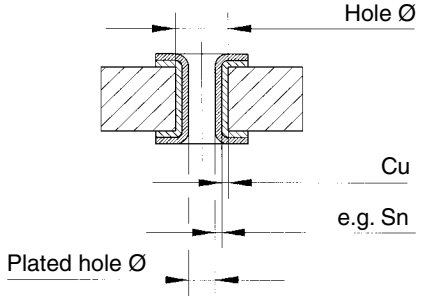
Materials

Moulded parts	PBT, glass-fibre filled, UL 94-V0
Contacts	Copper Alloy
Contact surface	Selectively gold plated
Packaging	Tray packaging (other packaging on request)

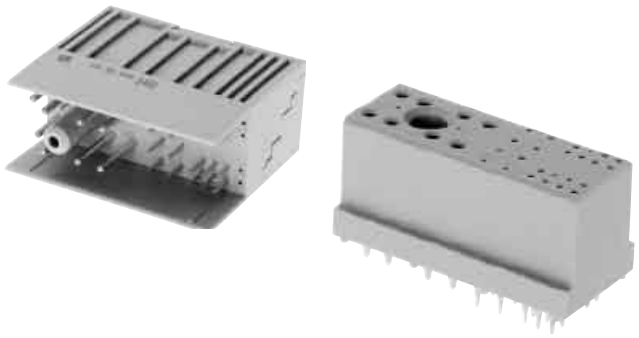
Recommended plated through hole specification

		Signal contacts	Power contacts
Tin plated PCB (HAL)	Hole Ø	$1.15^{\pm 0.025}$ mm	$1.75^{\pm 0.025}$ mm
	Cu	25 – 35 µm	25 – 35 µm
	Sn	5 – 15 µm	5 – 15 µm
	Plated hole Ø	1.00 – 1.10 mm	1.60 – 1.70 mm
Au / Ni plated PCB	Hole Ø	$1.15^{\pm 0.025}$ mm	$1.75^{\pm 0.025}$ mm
	Cu	25 – 35 µm	25 – 35 µm
	Ni	3 – 7 µm	3 – 7 µm
	Au	0.05 – 0.12 µm	0.05 – 0.12 µm
	Plated hole Ø	1.00 – 1.10 mm	1.60 – 1.70 mm
Chemical tin plated PCB	Hole Ø	$1.15^{\pm 0.025}$ mm	$1.75^{\pm 0.025}$ mm
	Cu	25 – 35 µm	25 – 35 µm
	Sn	0.8 – 1.5 µm	0.8 – 1.5 µm
	Plated hole Ø	1.00 – 1.10 mm	1.60 – 1.70 mm
Silver plated PCB	Hole Ø	$1.15^{\pm 0.025}$ mm	$1.75^{\pm 0.025}$ mm
	Cu	25 – 35 µm	25 – 35 µm
	Ag	0.1 – 0.3 µm	0.1 – 0.3 µm
	Plated hole Ø	1.00 – 1.10 mm	1.60 – 1.70 mm
OSP copper plated PCB	Hole Ø	$1.15^{\pm 0.025}$ mm	$1.75^{\pm 0.025}$ mm
	Cu	25 – 35 µm	25 – 35 µm
	Plated hole Ø	1.00 – 1.10 mm	1.60 – 1.70 mm

The press-in zone of the AdvancedTCA® power connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of $1.00^{+0.09}_{-0.06}$ mm for signal contacts and $1.60^{+0.09}_{-0.06}$ mm for power contacts (drilled hole $1.15^{\pm 0.025}$ mm resp. $1.75^{\pm 0.025}$ mm).
Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of $1.15^{\pm 0.025}$ mm resp. $1.75^{\pm 0.025}$ mm to your PCB supplier.

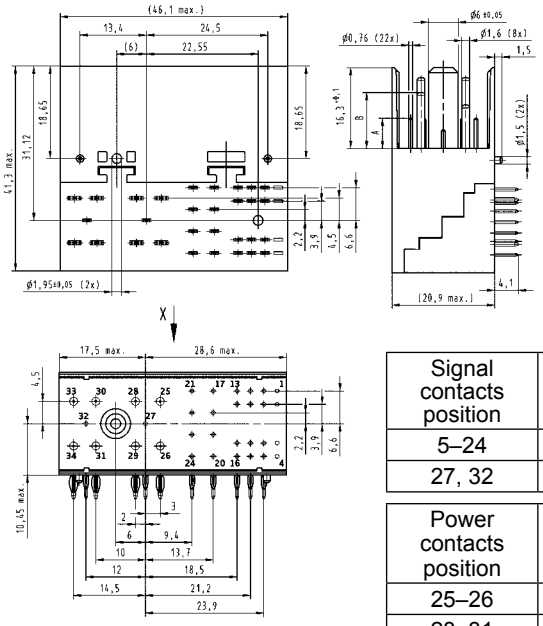


Power connectors for AdvancedTCA®



Identification	No. of contacts	Contact length [mm] termination side	Part number
Power connector for AdvancedTCA®, male	30	4.1	16 32 030 1101 000
	34	4.1	16 32 034 1101 000
Power connector for AdvancedTCA®, female	30	5.3	16 31 030 1201 000
	34	5.3	16 31 034 1201 000

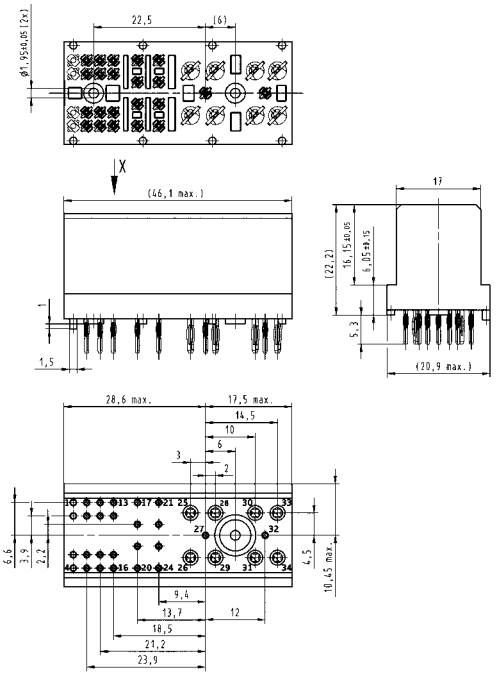
Male connector with 30 contacts



Signal contacts position	Dimension A
5–24	6.1
27, 32	3.8

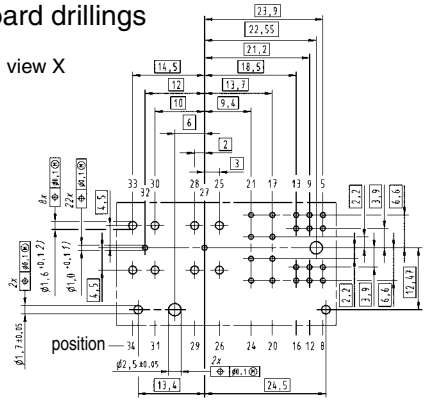
Power contacts position	Dimension B
25–26	14.3
28–31	14.3
33	11.3
34	8.8

Female connector with 30 contacts

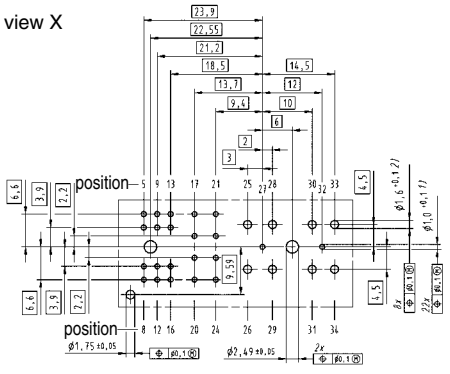


Board drillings

view X



view X



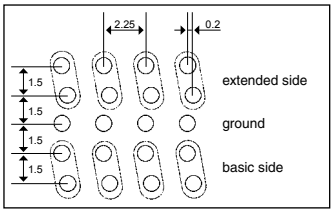
1) + 2) recommended plated through hole specification
see page 128

Dimensions [mm]

Technical characteristics

Design according	PICMG MTCA.0 R1.0 (RoHS compliance)
Number of contacts	170
Contact spacing	0.75 mm
Clearance and creepage distance between contacts	0.1 mm min.
Working current of power contacts as defined in MTCA.0 spec.	1.52 A @ 70 °C max. 30 °C temp. rise
Test voltage	80 $V_{r.m.s.}$
Initial contact resistance	25 mΩ max.
Initial insulation resistance	100 MΩ min.
Nominal differential impedance	100 Ω±10 %

Max. crosstalk @ 25 ps risetime	Bottom route
Adjacent	0.58 %
Basic-to-extended (diagonal)	0.30 %
Basic-to-extended (opposite)	0.38 %
Multiline (five multi-aggressor differential pairs)	1.91 % max.



PCB library on request (PADS/Dx-Designer)

SPICE models and S-Parameter on request

Differential propagation delay	Basic side:	75 ps
	Extended side:	75 ps
Differential skew	Between basic and extended side:	±2 ps
	Within basic and extended side:	±2 ps
Temperature range	-55 °C … +105 °C	
Durability as per MTCA.0 spec.	200 mating cycles	
Termination technique	Press-in termination	
Mating force	100 N max.	
Withdrawal force	65 N max.	

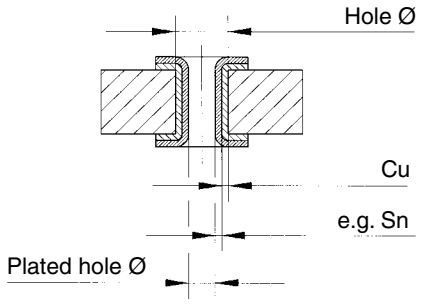
Materials

Moulded parts	Liquid Crystal Polymer (LCP), UL 94-V0
Contacts	Copper Alloy
Contact surface	Palladium nickel plated
Packaging	Cardboard box (other packaging on request)

Recommended plated through hole specification

Tin plated PCB (HAL)	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Sn	5 – 15 µm
	Plated hole Ø	0.53 – 0.60 mm
Au / Ni plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Ni	3 – 7 µm
	Au	0.05 – 0.12 µm
	Plated hole Ø	0.55 – 0.60 mm
Chemical tin plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Sn	0.8 – 1.5 µm
	Plated hole Ø	0.56 – 0.60 mm
Silver plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Ag	0.1 – 0.3 µm
	Plated hole Ø	0.56 – 0.60 mm
OSP copper plated PCB	Hole Ø	$0.64^{\pm 0.01}$ mm
	Cu	25 – 35 µm
	Plated hole Ø	0.56 – 0.60 mm

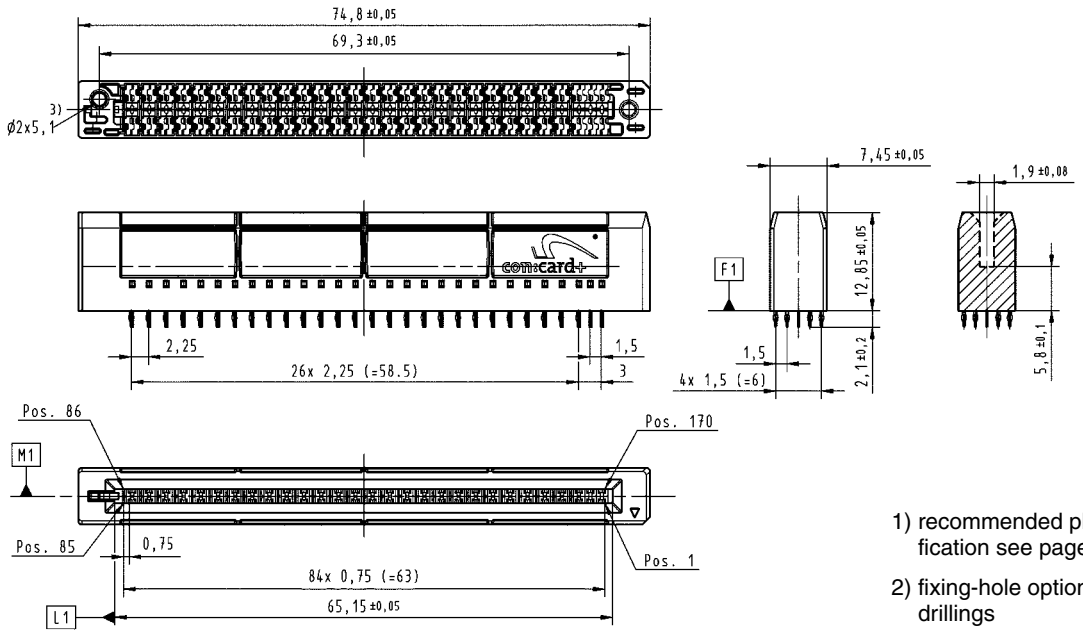
The press-in zone of the AdvancedMC™ connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of $0.55^{\pm 0.05}$ mm (drilled hole $0.64^{\pm 0.01}$ mm).
Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of $0.64^{\pm 0.01}$ mm to your PCB supplier.
For drillings use e.g. drill bit # 72 (0.025" ≈ 0.64 mm).



con:card+

Card edge connector, straight

Identification	No. of contacts	Contact length [mm] termination side	Part number
AdvancedMC™ connector for MicroTCA™ with GuideSpring	170	2.1	16 11 170 5202 000

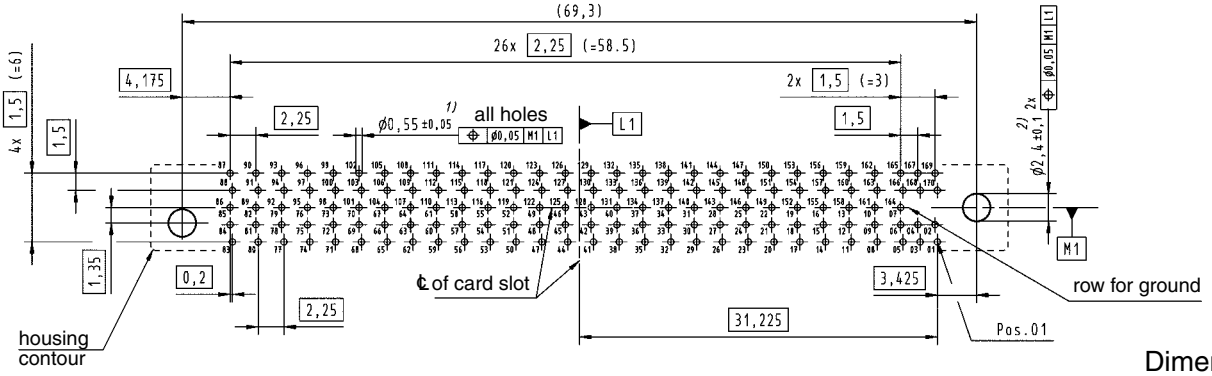


1) recommended plated through hole specification see page 130

2) fixing-hole optional non-metallized drillings

3) optional: use fillister-head tapping screws 2.2 x length, shape C, acc. to ISO 7049 (length = PCB thickness + min. 4 mm)

Board drillings (view magnified)



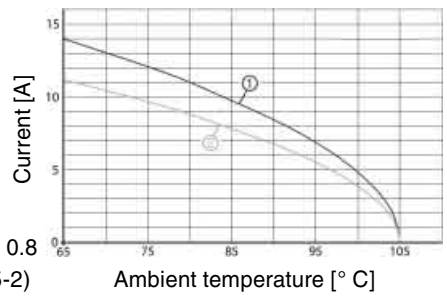
Dimensions [mm]

Technical characteristics

Design according	PICMG MTCA.0 R1.0 (RoHS compliance)
Total number of contacts	96
Power contacts	24
Signal contacts	72
Sequential contact engagement	
1st	Power 4–11
2nd	Power 1–3, power 12–24
3rd	Signal A2–H9
4th	Signal A1
Working current	
Power contacts	9.3 A @ 80 % derating acc. IEC 60512 and 70 °C ambient temperature and 30 °C temperature rise
Signal contacts	1 A @ 80 % derating acc. IEC 60512 and 70 °C ambient temperature
Initial contact resistance	
Power contacts	≤ 5 mΩ
Signal contacts	≤ 25 mΩ
Initial insulation resistance	≥ 100 MΩ min.
Temperature range	-55 °C … +105 °C
Durability	200 mating cycles
Termination technique	Press-in termination
Mating force	145 N max.
Withdrawal force	110 N max.

Derating for MicroTCA™ power contacts

Contact loading acc. MTCA.0



① Derating

② Derating @ $I_{max.}$ x 0.8 (acc. IEC 60512-5-2)

Ambient temperature [° C]

Materials

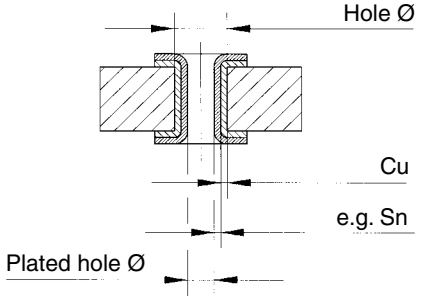
Moulded parts	PBT, glass-fibre filled, UL 94-V0
Contacts	Copper Alloy
Contact surface	
Power contacts:	selectively gold plated
Signal contacts:	selectively palladium nickel plated
Packaging	Tray packaging (other packaging on request)

Recommended plated through hole specification

Tin plated PCB (HAL)	Hole Ø	$0.7^{\pm 0.02}$ mm
	Cu	25 – 35 µm
	Sn	5 – 15 µm
	Plated hole Ø	0.60 – 0.65 mm
Au / Ni plated PCB	Hole Ø	$0.7^{\pm 0.02}$ mm
	Cu	25 – 35 µm
	Ni	3 – 7 µm
	Au	0.05 – 0.12 µm
	Plated hole Ø	0.60 – 0.65 mm
Chemical tin plated PCB	Hole Ø	$0.7^{\pm 0.02}$ mm
	Cu	25 – 35 µm
	Sn	0.8 – 1.5 µm
	Plated hole Ø	0.60 – 0.65 mm
Silver plated PCB	Hole Ø	$0.7^{\pm 0.02}$ mm
	Cu	25 – 35 µm
	Ag	0.1 – 0.3 µm
	Plated hole Ø	0.60 – 0.65 mm
OSP copper plated PCB	Hole Ø	$0.7^{\pm 0.02}$ mm
	Cu	25 – 35 µm
	Plated hole Ø	0.60 – 0.65 mm
	PCB board thickness: ≥ 1.4 mm	

The press-in zone of the MicroTCA™ power connector is tested according to Telcordia/Bellcore GR 1217CORE Part7. It is approved to be used with a plated through hole according IEC 60352-5 with a diameter of $0.60^{+0.05}$ mm (drilled hole $0.70^{\pm 0.02}$ mm).

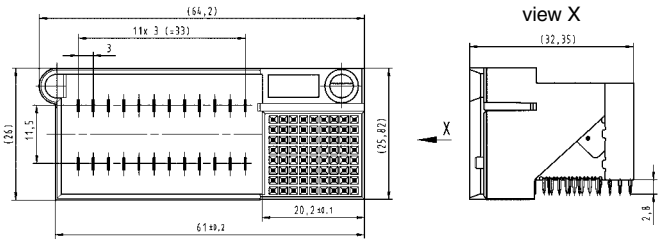
Based on our experiences regarding the production process of the PCB manufacturer we recommend a plated through hole configuration like shown in the above spreadsheet. To achieve the recommended plated through hole diameter, it is important to specify especially the drilled hole diameter of $0.70^{\pm 0.02}$ mm to your PCB supplier.



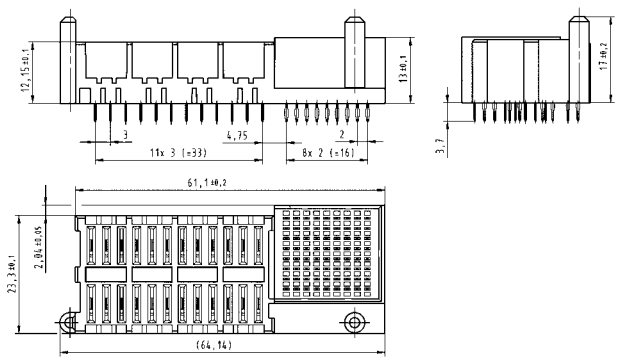
Power output connectors for MicroTCA™

Identification	No. of contacts	Contact length [mm] termination side	Part number
Power output connectors for MicroTCA™			
module version	96	2.8	16 34 096 1101 000
backplane version	96	3.7	16 33 096 1201 000

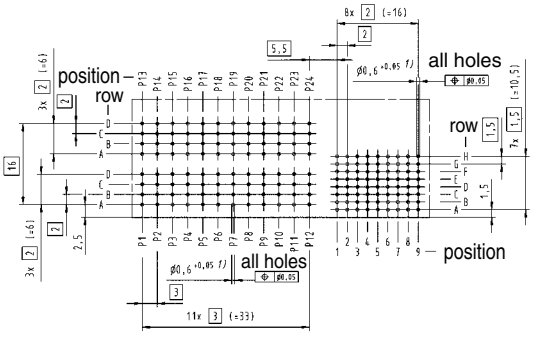
Module version

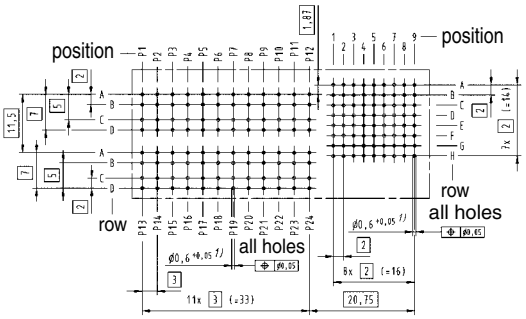


Backplane version



Board drillings

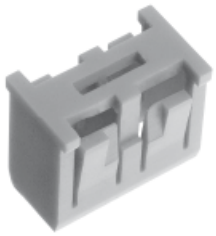




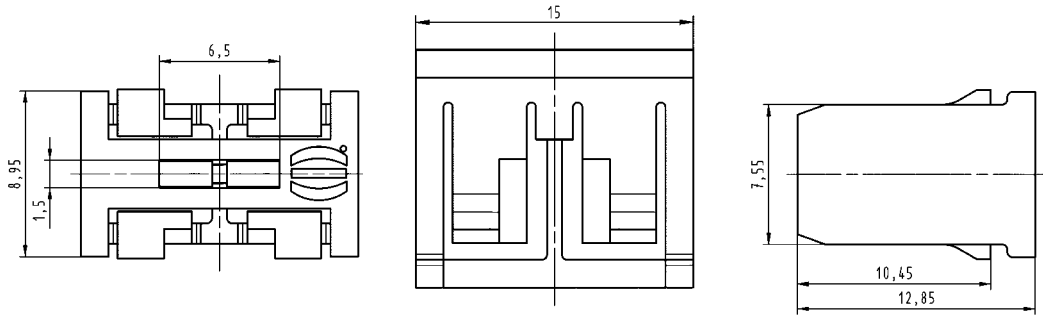
1) recommended plated through hole specification see page 132

Dimensions [mm]

Protection Block for MicroTCA™ backplanes



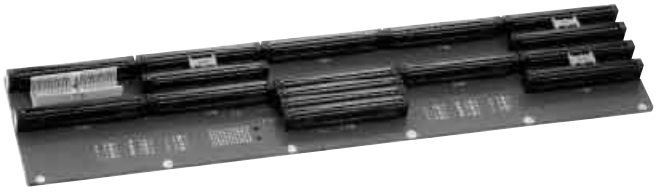
Identification	Part number
MicroTCA™ Protection Block	16 79 000 0010 000



The MicroTCA™ specification defines modules with the option of multiple mating interfaces like the MCH module for system management and switching. There are four different pitches defined for the module interfaces and the backplane connectors respectively, the basic unit is called horizontal pitch (HP) and is 5.08 mm (0.2 inch).

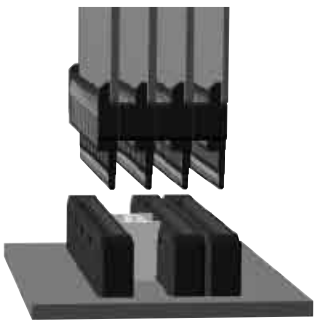
Compact-Size	3 HP	15.24 mm
Mid-Size	4 HP	20.32 mm
Full-Size	6 HP	30.48 mm
MCH	1.5 HP	7.62 mm

Any MCH (or other multiple mating interface modules) with more than two mating interfaces (2x MCH-pitch 1.5 HP = Compact-Size pitch 3 HP) could unintentional mate with connectors of the adjacent slot or could be plugged into the wrong slot. Even though the pin-assignment and e-keying for the MCH is defined, it can cause system failures or even destroy hardware if a MCH is inserted into two adjacent AMC Compact-Size slots. For other multiple mating interface modules, this situation is even worse, because neither e-keying nor pin assignment is specified in MTCA.0.



MicroTCA™ backplane with protection blocks

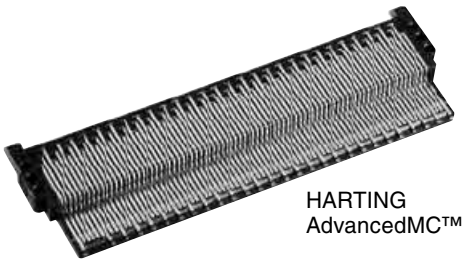
To prevent errors in case of misinsertion, MTCA.0 R1.0 chapter 2.13 outlines protection blocks that occupy the space between two adjacent connectors in a Compact-Size slot. Furthermore this protection block can be used for keying functions of multiple mating interface modules.



The free space between the backplane connectors is occupied by the protection block

HARTING designed a protection block fully independent of the backplane and sub rack design. The HARTING protection block is clipped between two connectors, hence no fixing features (holes, clips...) need to be designed into the backplane or the sub rack mechanics. The assembly is done quick and easy by hand. It can even be installed easily after the backplane is mounted with a simple flat-head screwdriver, an easy removal is possible in a similar way. The keying block can be placed into four different positions, hence a keying of multitongue modules by using tongues with a cutout is possible.

As already explained in the chapter „**con:**card**+**“, it is very difficult for a PCB manufacturer to produce the tight tolerances of the AdvancedMC™ module card edge in a consistent process. Furthermore the quality of the card edge gold pads is not well defined in detail by the specification. With the introduction of the **con:**card**+** connectors, HARTING supports the reliable operation of AdvancedMC™ by the different **con:**card**+** features. But some disadvantages of a card edge connection can only be eliminated by a mating half connector.

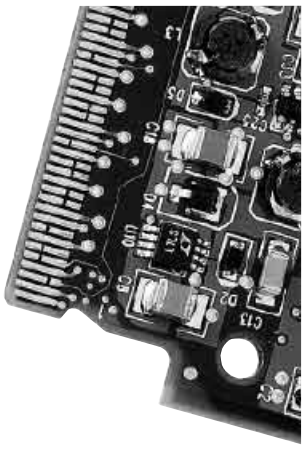


HARTING
AdvancedMC™ Plug

The most important advantages of the HARTING AdvancedMC™ Plug Connector are the low module insertion forces and enhanced contact surfaces resulting in higher mating cycles with much tighter two piece connector tolerances.

The AdvancedMC™ Plug Connector replaces the gold pads of the module card edge. The AdvancedMC™ module with a Plug Connector is still within the module envelope of the PICMG AMC.0 specification and is fully mating compatible with AdvancedMC™ card edge connectors. Consequently the Plug Connector can be used in both MicroTCA™ and ATCA® environments.

The PICMG standard AMC.0 defines hard gold for the card edge interface. But a common and unique definition of hard gold does not exist today. As a result the quality of the gold pads in terms of hardness and roughness is highly unsteady. Additionally, the gaps between the pre and functional pad (which are necessary for the hot-swap ability) require a selective hard gold process which is more complicated than a standard process. This can lead to exposed copper and sharp pad edges.



The contacts of the HARTING AdvancedMC™ Plug Connector are plated all-around and are manufactured in a defined band plating process with controlled quality. There are different performance levels possible as the noble finish thickness can be easily adapted to customer demands.

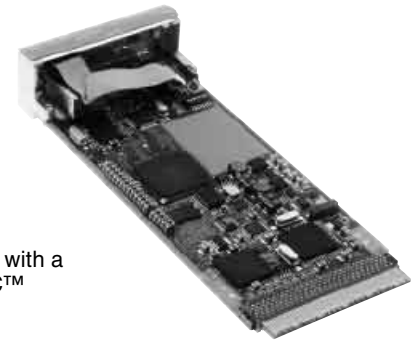
By using a HARTING AdvancedMC™ Plug Connector, the mating interface of the module is defined by the connector instead of the PCB. This fact leads to decisive advantages and provides a wide scope for the module development.

For the module card egde, the prepads of lagging contacts are required by the Telcordia/Bellcore specification to avoid wearing of the connector contact when sliding on the FR4 base material. The Plug Connector does not need prepads. The four mating steps are realized as real lagging contacts. The sophisticated design of the insulator reduces the mating forces of the module significantly.

The card edge chamfer is important to reduce mating forces and to avoid wearing and damage of the backplane connector. But also the PCB milling process of the chamfer is critical. In contrast to the PCB the Plug Connector has a moulded chamfer with a smooth surface protecting the backplane connector contacts.

As the Plug Connector defines the mating tongue, the restriction of the PCB thickness of 1.6 mm ±10% does not need to be considered anymore. The maximum PCB thickness is only limited by the card guide for the AMC modules. The Plug Connector itself has a thickness of $1.5^{\pm 0.04}$ mm to reduce the mating force. The width of the Plug Connector is near the maximum width of the specification to support high mating reliability when the module is plugged into a connector without the GuideSpring **con:**card**+** feature.

The connector is mounted to the PCB with the „pin-in-hole-reflow“ solder technology (PIHR) and is „pick-and-place“ compatible. Another advantages of this efficient and mechanically stable technology, is that the connector can be replaced. This can avoid the scrapping cost of a module if the mating interface is damaged during handling.



AdvancedMC™ module with a HARTING AdvancedMC™ Plug Connector

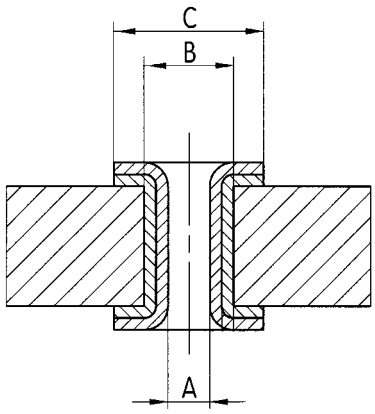
Depending on the application, the additional cost of the connector can be compensated by several savings during the production process of the AdvancedMC™ module. Please contact our local sales office for further information about the advantages of the HARTING AdvancedMC™ Plug Connector.

Design according	PICMG MicroTCA.0 R1.0 PICMG AMC.0 R2.0 (RoHS compliance)
Number of contacts	170
Contact spacing	0.75 mm
Clearance and creepage distance between contacts	0.1 mm min.
Working current	min. 1.52 A @ 70 °C max. 30 °C temp. rise acc. to pin configuration in AMC.0 spec.
Working current tested with HARTING MicroTCA™ backplane connector	2 A min.
Test voltage	80 $V_{r.m.s.}$
Initial contact resistance	25 mΩ max.
Initial insulation resistance	100 MΩ min.
Nominal differential impedance	100 Ω±10 %
Temperature range	-55 °C … +105 °C
during reflow soldering	220 °C for 2 minutes 270 °C max. short-term
Durability as per AMC.0 specification	200 mating cycles in total
Termination technique	Solder termination (Pin in Hole Intrusive Reflow)
Pick-and-place-weight	< 7 g
Mating force	100 N max.
Withdrawal force	65 N max.

The mating and withdrawal force is highly depending on the mating half connector, but typically only 50 % to 70 % of the mating force of a PCB card edge.

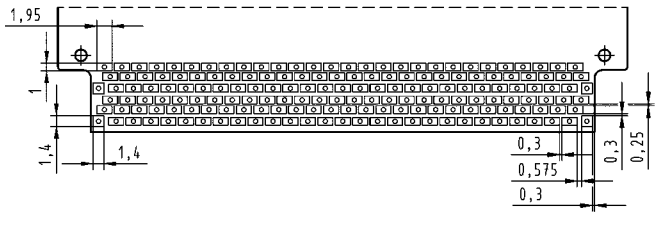
Materials

Moulded parts	Liquid Crystal Polymer (LCP), UL 94-V0
Contacts	Copper alloy
Contact surface	Au over Ni
Packaging	Tray packaging (other packaging on request)



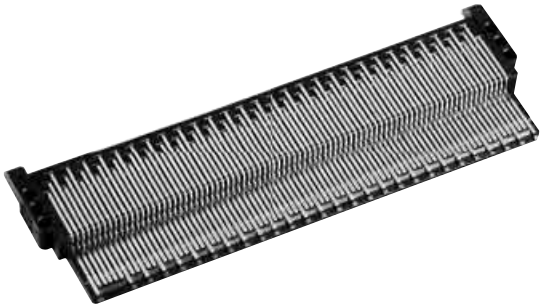
Plated through hole recommendations		
A	Plated hole-Ø	$0.55^{+0.08}_{-0.02}$ mm
B	Hole-Ø	$0.65^{\pm 0.01}$ mm
C	Remaining pad	0.95 mm

Stencil recommendation



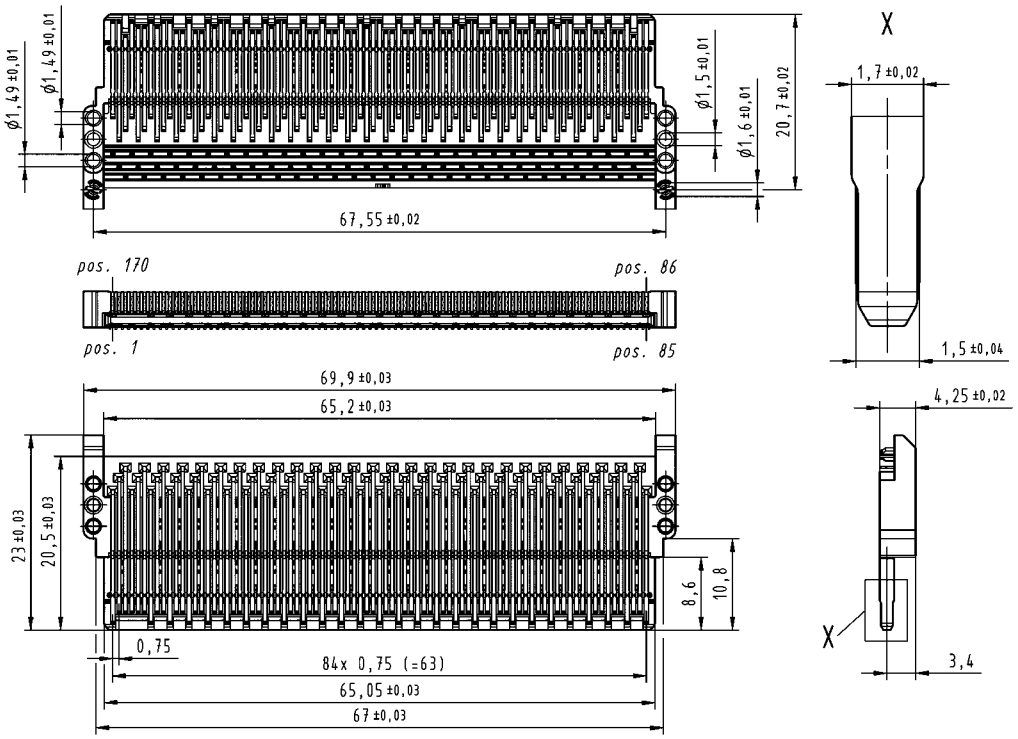
Each termination requires a solder paste volume of 0.57 mm³. Since the stencil can only provide fractions of this volume (0.29 mm³ at 0.15 mm stencil thickness), the remaining solder paste must be pressed into the plated through hole. For a nominal AMC card (1.6 mm PCB thickness, 0.55 mm plated hole diameter) the paste must penetrate the hole by 0.7 mm.

AdvancedMC™ Plug Connector for MicroTCA™ and AdvancedTCA®

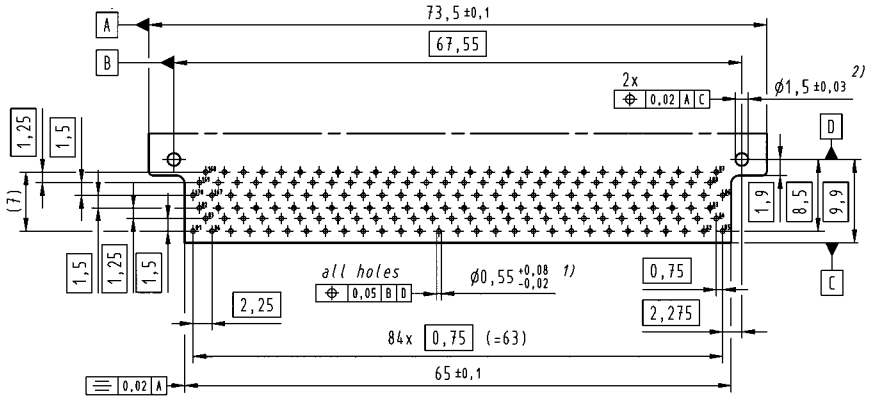


Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector	170	16 21 170 1301 000
AdvancedMC™ Plug Connector with nozzle pad for pick and place assembly	170	16 21 170 1302 000

AdvancedMC™ Plug Connector



Board drillings

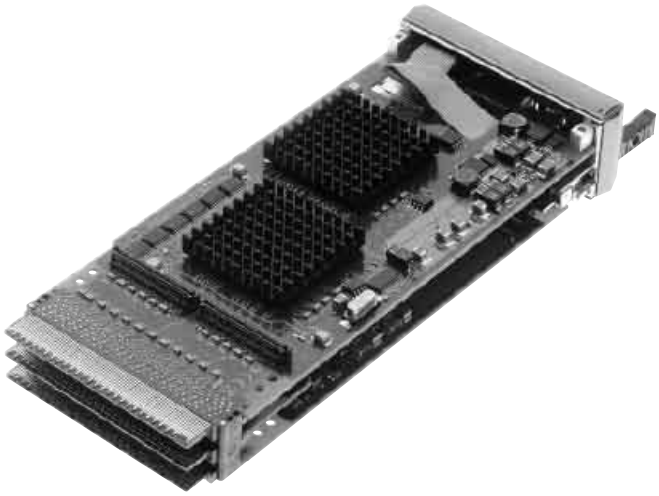


1) Plated holes, plating recommendations see page 136

2) Non-metallized drillings

Dimensions [mm]

One important component of a MicroTCA™ system is the so called „MicroTCA™ Carrier Hub“, abbreviated MCH. The main functions of an MCH module are the hardware platform management and the management of the fabric connectivity. As the MCH module needs many more connections than a standard AdvancedMC™ module, an MCH can have up to 4 mating tongues each with 170 contacts.

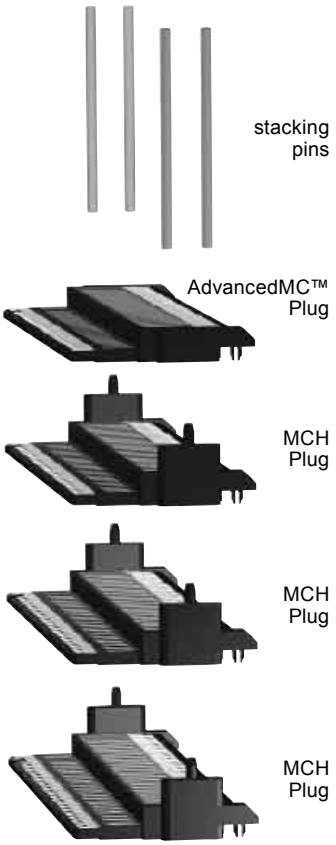


The MTCA.0 specification recommends the use of a special Plug Connector to reduce the insertion force of the module and to solve the tolerance stack-up problem between the multiple tongues and the backplane connectors.

The HARTING Plug Connector system consists of a configuration with two different Plug Connectors. The AdvancedMC™ Plug Connector is mated with the backplane MCH connector. MCH connector 1 is needed for the base function of the system. Furthermore it can be used for any conventional AdvancedMC™ module to replace the PCB gold pads.

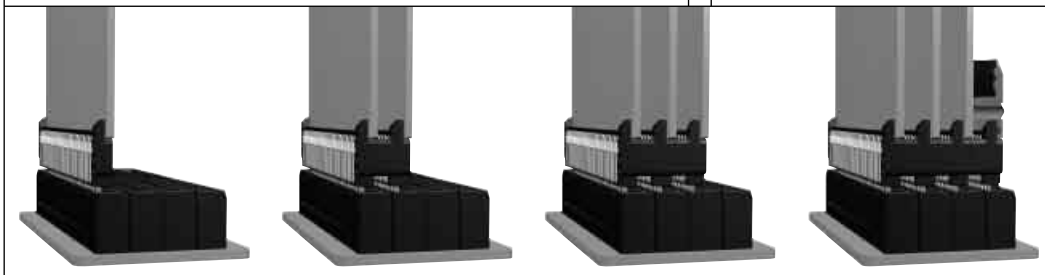
The MCH Plug Connector is mated with the backplane MCH connectors 2, 3, 4 depending on the MicroTCA™ configuration. Compared to the AdvancedMC™ Plug, the MCH Plug insulator has standoffs securing the right distance for the slot width between two tongues or backplane connectors respectively. The MCH and AdvancedMC™ Plugs have different contact staggering on the basic side, the extended side is equal.

To build a connector stack for two, three or four mating tongues, the HARTING Plug Connectors are mounted like building blocks via pegs and holes of the adjacent Plugs. For additional mechanical stability, the connector stack is fixed by up to four metal stacking pins. The complete connector stack can be easily installed without any special tooling by only handling three different parts (AdvancedMC™ Plug Connector, MCH Plug Connector and the corresponding stacking pins).



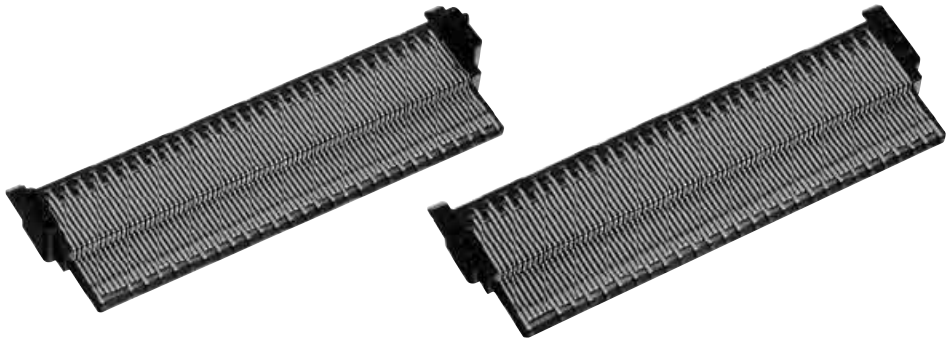
For a MicroTCA™ system with more than 6 AdvancedMC™ modules using the switched fabric fat pipe, an MCH module with 4 mating tongues has to be used. Depending on the application, the switched fabric is located only on the third board, so a high speed connection is needed between the mating tongue 4 and the PCB 3.

For this purpose, HARTING offers a special high speed adapter. The MCH Flex Adapter offers high speed characteristics with mechanical flexibility. HARTING delivers the complete assembly consisting of one MCH Plug and a mezzanine connector soldered to a flexible PCB. The mating half of the mezzanine connector can be delivered by HARTING also.



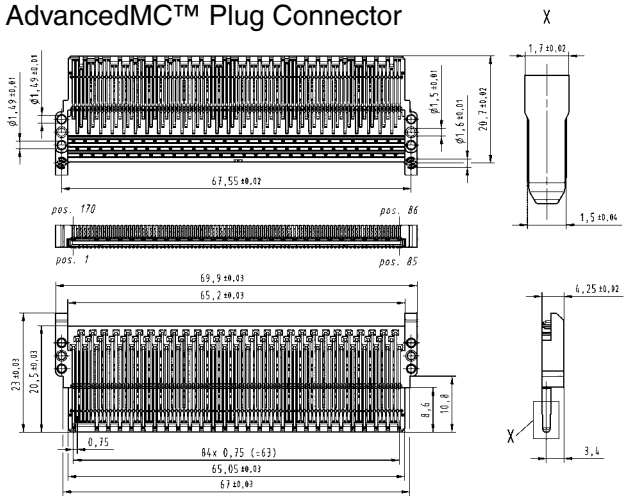
MCH modules can have up to 4 mating tongues. HARTING offers two versions of the Plug and a special Flex Adapter.

Plug Connectors for MCH modules

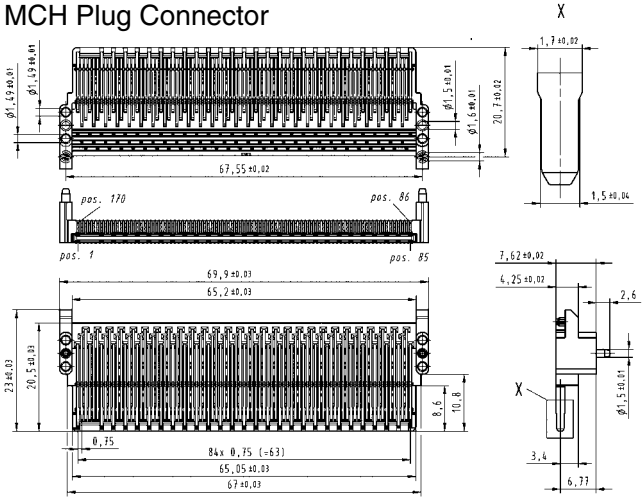


Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector	170	16 21 170 1301 000
AdvancedMC™ Plug Connector with nozzle pad for pick and place assembly	170	16 21 170 1302 000
MCH Plug Connector	170	16 22 170 1301 000
MCH Plug Connector with nozzle pad for pick and place assembly	170	16 22 170 1302 000
AdvancedMC™ – MCH Plug stacking-pin		
double, length 11.84 mm		16 79 000 0006 000
triple, length 19.46 mm		16 79 000 0007 000
quad, length 27.08 mm		16 79 000 0008 000
MCH Flex Adapter	165	16 29 165 1001 000

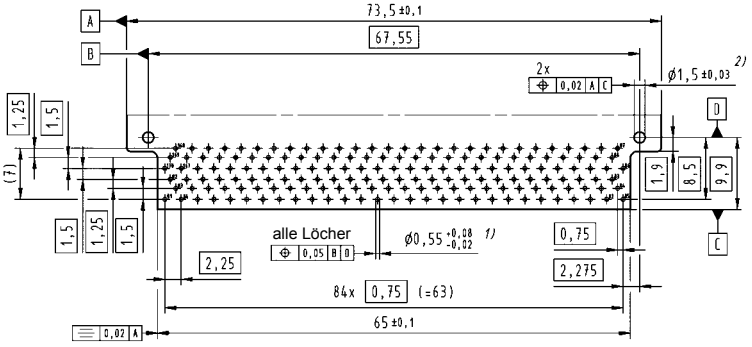
AdvancedMC™ Plug Connector



MCH Plug Connector



Board drillings (view magnified)



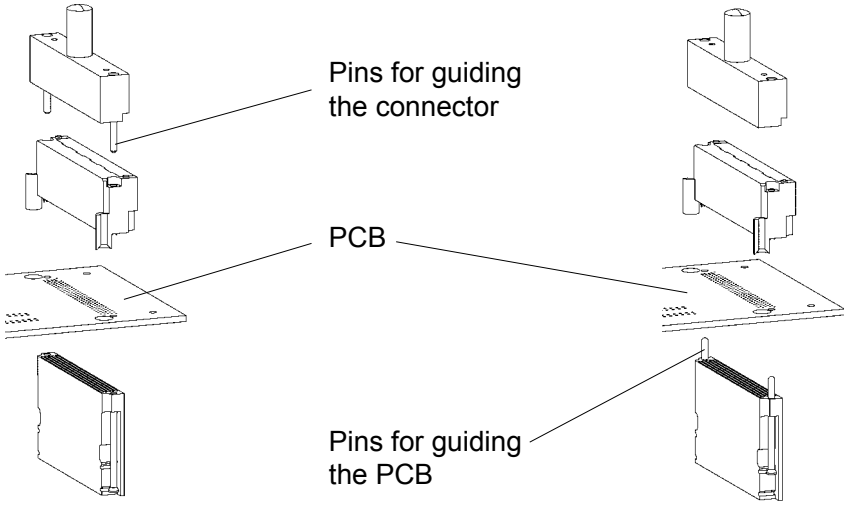
1) Plated holes, plating recommendations see page 136

2) Non-metallized drillings

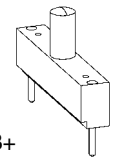
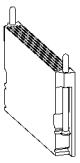
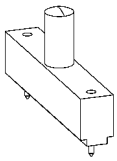
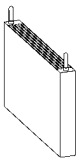
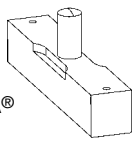
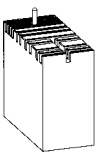
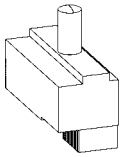
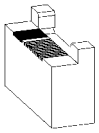
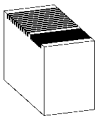
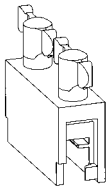
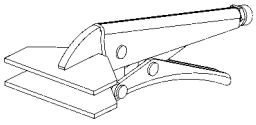
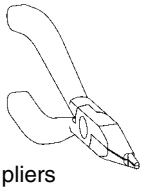
Dimensions [mm]

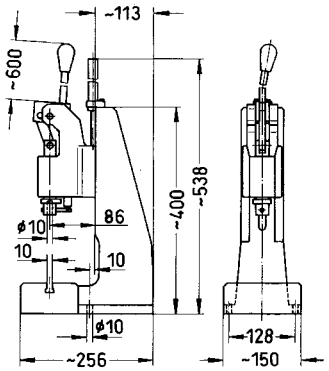
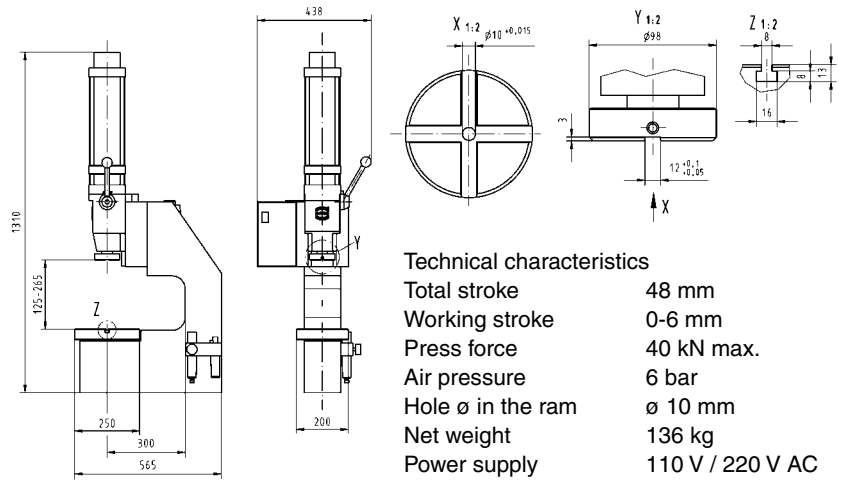
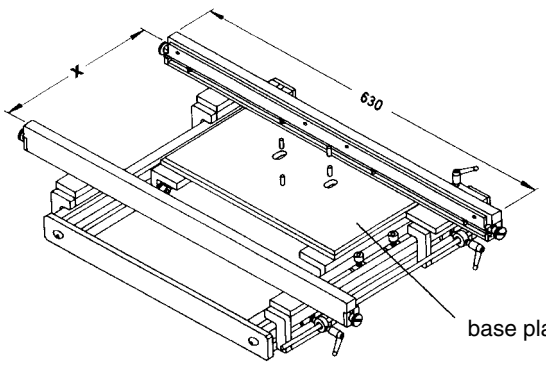
For a reliable and safe press-in process HARTING has developed a special tooling system.
Each tooling is adapted to the special requirements of the individual connector range, thus a good handling and quick adjustment is guaranteed.
The different demands of the system designs will be covered from the highly adaptable tooling system for AdvancedTCA® or MicroTCA™ with the following options:

- Guiding of the connector and alignment of the top and the bottom tool
- Guiding of the PCB and alignment of the top and the bottom tool



Example for different options to guide connector or PCB.

Identification	Part No.	Drawing
Top tool for AdvancedTCA® B+	16 99 000 0001 000	Top tool for AdvancedTCA® B+  Bottom tool for AdvancedTCA® B+ 
Bottom tool for AdvancedTCA® B+	16 99 000 0002 000	
Top tool for MicroTCA™	16 99 000 0003 000	Top tool for MicroTCA™  Bottom tool for MicroTCA™ 
Bottom tool for MicroTCA™	16 99 000 0004 000	
Top tool for AdvancedTCA® Power Male and female connector	02 99 000 0002	Top tool for AdvancedTCA® Power and MicroTCA™ Power, module version  Bottom tool for AdvancedTCA® Power 
Bottom tool for AdvancedTCA® Power Male and female connector	16 99 000 0011 000	
Top tool for MicroTCA™ Power Module version Backplane version	02 99 000 0002 16 99 000 0008 000	Top tool for MicroTCA™ Power, backplane version  Bottom tool for MicroTCA™ Power, module version  Bottom tool for MicroTCA™ Power, backplane version 
Bottom tool for MicroTCA™ Power Module version Backplane version	16 99 000 0010 000 16 99 000 0009 000	
Removal tool for AdvancedTCA® B+	16 99 000 0005 000	Removal tool for AdvancedTCA® B+  Removal tool for MicroTCA™  Repair pliers for MicroTCA™ 
Removal tool for MicroTCA™	16 99 000 0007 000	
Repair pliers for MicroTCA™	16 99 000 0006 000	

Identification	Part No.	Drawing	Dimensions in mm
Hand bench press	09 99 000 0201		Technical characteristics Working stroke 25 mm Press force 15 kN max. Hole ø in the ram ø 10 mm Net weight approx. 23 kg
Pneumatic press **40 kN**	09 99 000 0282		Technical characteristics Total stroke 48 mm Working stroke 0-6 mm Press force 40 kN max. Air pressure 6 bar Hole ø in the ram ø 10 mm Net weight 136 kg Power supply 110 V / 220 V AC
CPM *prestige*	09 89 040 0000		Technical characteristics Drive electro-mechanical, servo Press-in force 100 kN max. PCB dimensions 600 x 1000 mm Floor space 1200 x 1150 mm Weight 980 kg Power supply 208 / 380 / 400 / 415 V Consumption < 1 kW Colour on request
Adaptor for height compensation[1)]	09 99 000 0279		
Guide frame with base plate Standard type for PCB size x = 123,5 - 309,5 mm Long type[2)] for PCB size x = 123,5 - 668,5 mm Base plate	09 99 000 0244 09 99 000 0261 09 99 000 0255		

[1)] suitable for 09 99 000 0282 and all CPM machines
[2)] not suitable for hand bench press

Signal integrity support – Introduction

HARTING offers signal integrity support to the end customers. We provide simulation models and evaluation kits with our products for signal integrity investigations. The evaluation kits are assembled with SMA's to connect them directly with the measurement instruments. The benefit is that the customer saves time and costs for pre-evaluation of the connector. We offer test boards suitable for the connector evaluation itself and have built reference backplanes and test cards for measurements within applications like VME, CompactPCI®, AdvancedTCA® and MicroTCA™. Reference structures and well established measurement techniques allow a full de-embedding of the propagation characteristics of the interconnect itself for test and verification. Furthermore we developed several high-speed test backplane with different connector areas and PCB design topologies. We can provide footprint and routing recommendations for our products. A variety of testboards, simulation models and further technical data for different products are available on request.

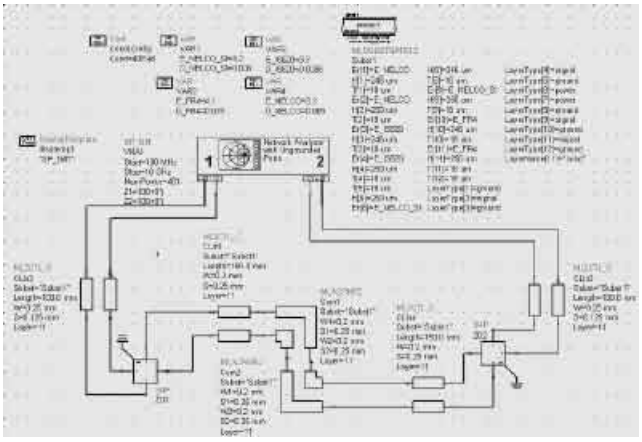
HARTING is also an active member in standardization groups like VITA, PICMG, OBSAI and supports sub-committees for new interconnect solutions. We are in close cooperation with customers, universities and industrial partners for research activities.

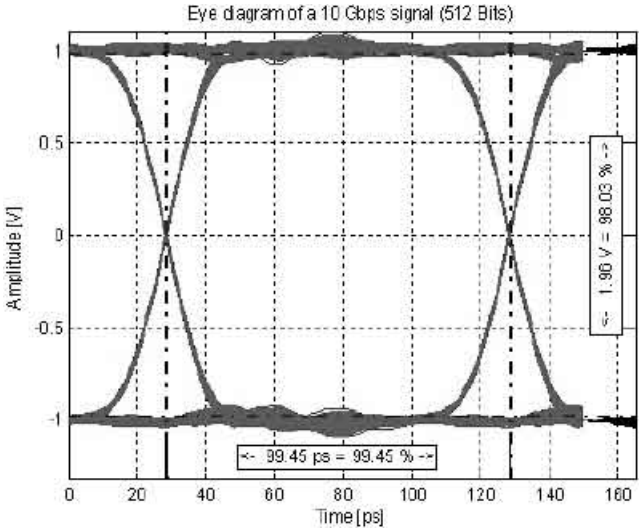
Signal integrity capabilities

- Simulation and modeling
- Measurement and verification
- Test fixture & reference backplane design
- Design-in support

Simulation and modeling

Capability to perform full 3D-FEM simulations of the CAD-geometry with different well established tools like CST Microwave Studio and Ansoft HFSS. Post-processing of the data for field-distribution and full S-parameter and time-domain analysis within the software packages themselves and additional Matlab tools.

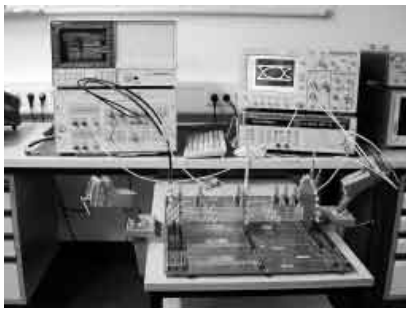


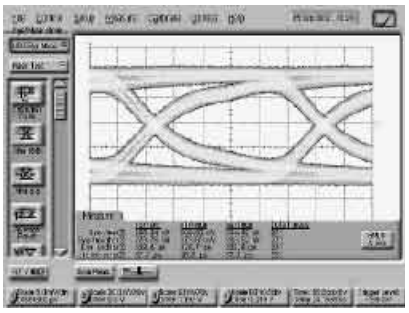


For SPICE-modeling, impedance calculation and field distribution analysis of the geometry S-parameter models are used in combination with static 3D-FEM, 2D-FEM and planar field solvers depending on the desired bandwidth of the signal. These models are used as library parts for channel simulations including particular chip, trace, vias and connector subcircuits. Eye-diagram, S-parameter and waveform analysis of the entire channel are performed with tools like HSPICE and ADS (Advanced Design System).

Signal integrity support – Measurement and verification

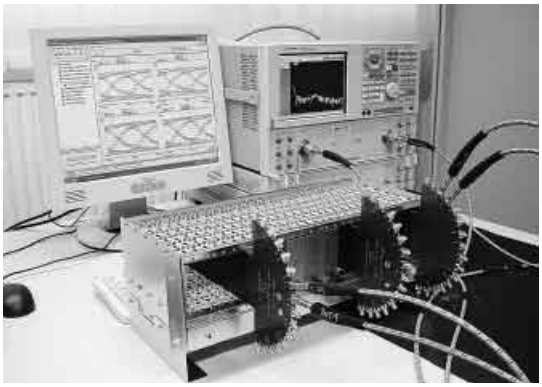
Time-domain measurements





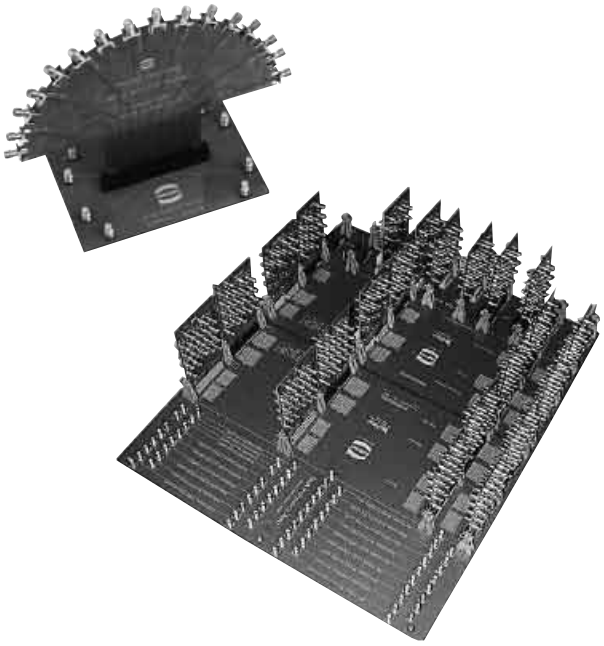
Parameters:
- Characteristic impedance
- Propagation delay
- Rise time degradation
- Reflection
- Crosstalk
- Eye-diagram and mask-test
- Bit-error rate testing (BERT) up to 12.5 Gbps per differential line

Frequency-domain measurements



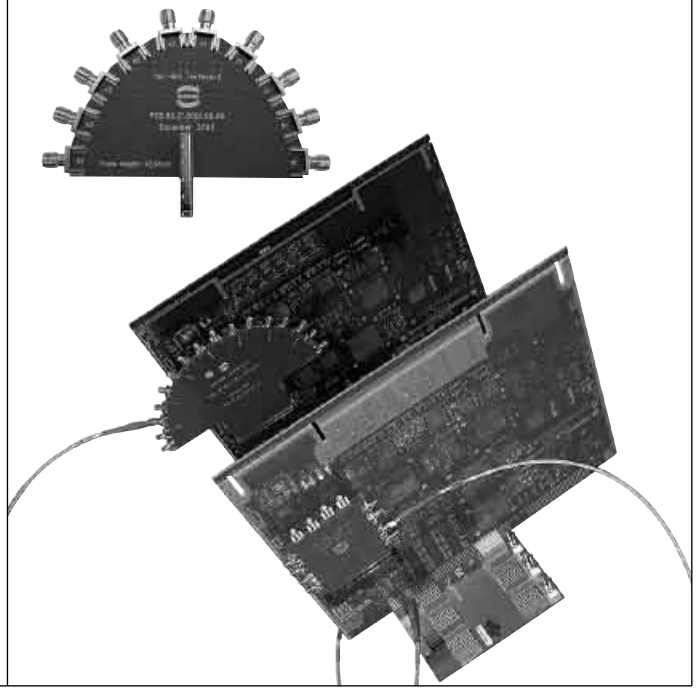
Parameters:
- 4 port S-parameter analysis (up to 40 GHz)
- Insertion- and return loss, crosstalk, VSWR
- Fourier-transformation, gating, error-location
- PLTS software to calculated time-domain data, eye-diagrams, etc.

Test fixture & reference backplane design



Design-in support

- Customized PCB design close to the real application
- Footprint and routing recommendations
- Full measurement characterization and test report
- Simulation models



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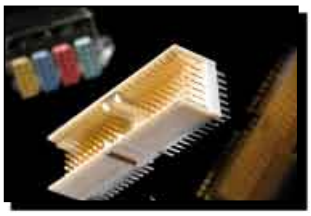
☐ 

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TCA Connectors

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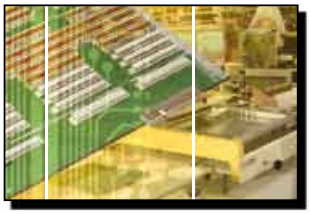
☐ 

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