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HARTING

Pushing Performance

HARTING News 2010

People | Power | Partnership

Transforming customer wishes into concrete solutions

The HARTING Technology Group is skilled in the fields of electrical, electronic and optical connection, transmission and networking, as well as in manufacturing, mechatronics and software creation.
The Group uses these skills to develop customized solutions and products such as connectors for energy and data transmission applications including, for example, mechanical engineering, rail technology, wind energy plants, factory automation and the telecommunications sector. In addition, HARTING also produces electromagnetic components for the automobile industry and offers solutions in the field of Enclosures and Shop Systems.
The HARTING Group currently comprises 32 subsidiary companies and worldwide distributors employing a total of approximately 3,000 staff.

ALWAYS AT HAND, WHEREVER OUR CUSTOMERS MAY BE.

Increasing industrialization is creating growing markets characterized by widely diverging demands and requirements. The search for perfection, increasingly efficient processes and reliable technologies is a common factor in all sectors across the globe. HARTING is providing these technologies – in Europe, America and Asia. The HARTING professionals at our international subsidiaries engage in close, partnership based interaction with our customers, right from the very early product development phases, in order to realize customer demands and requirements in the best possible manner.

Our people on location form the interface to the centrally coordinated development and production departments. In this way, our customers can rely on consistently high, superior product quality – worldwide.

OUR CLAIM: PUSHING PERFORMANCE.

HARTING provides more than optimally attuned components. In order to serve our customers with the best possible solutions, HARTING is able to contribute a great deal more and play a closely integrative role in the value creation process.

From ready assembled cables through to control racks or ready-to-go control desks: Our aim is to generate the maximum benefits for our customers – without compromise!

WE ASPIRE TO TOP PERFORMANCE.

Connectors ensure functionality. As core elements of electrical and optical wiring, connection and infrastructure technologies, they are essential in enabling the modular construction of devices, machines and systems across a very wide range of industrial applications. Their reliability is a crucial factor guaranteeing smooth functioning in the manufacturing area, in telecommunications, applications in medical technology – in fact, connectors are at work in virtually every conceivable application area. Thanks to the consistent further development of our technologies, customers enjoy investment security and benefit from durable, long term functionality.

QUALITY CREATES RELIABILITY – AND WARRANTS TRUST.

The HARTING brand stands for superior quality and reliability – worldwide. The standards we set are the result of consistent, stringent quality management that is subject to regular certifications and audits.

EN ISO 9001, the EU Eco-Audit and ISO 14001:2004 are key elements here. We take a proactive stance to new requirements, which is why HARTING ranks among the first companies worldwide to have obtained the new IRIS quality certificate for rail vehicles.

HARTING TECHNOLOGY CREATES ADDED VALUE FOR CUSTOMERS.

Technologies by HARTING are at work worldwide. HARTING's presence stands for smoothly functioning systems, powered by intelligent connectors, smart infrastructure solutions and mature network systems. In the course of many years of close, trust-based cooperation with its customers, the HARTING Technology Group has advanced to one of the worldwide leading specialists for connector technology. Extending beyond the basic functionalities demanded, we offer individual customers specific and innovative solutions. These tailored solutions deliver sustained effects, provide investment security and enable customers to achieve strong added value.

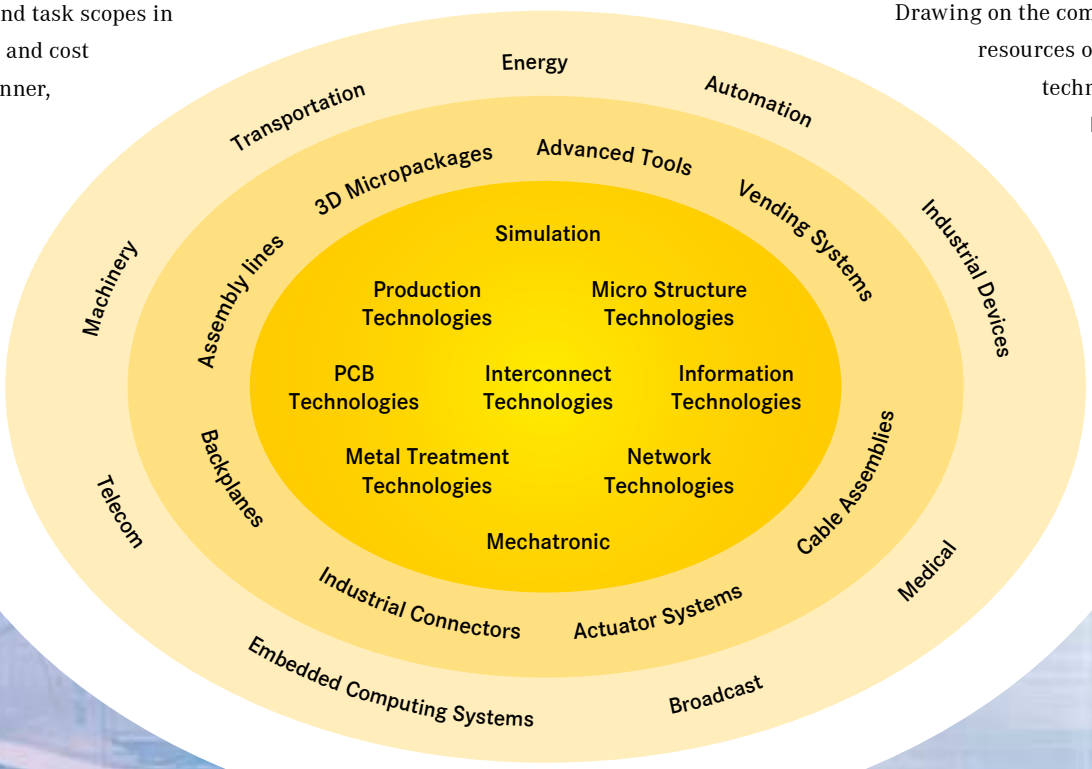
OPTING FOR HARTING OPENS UP AN INNOVATIVE, COMPLEX WORLD OF CONCEPTS AND IDEAS.

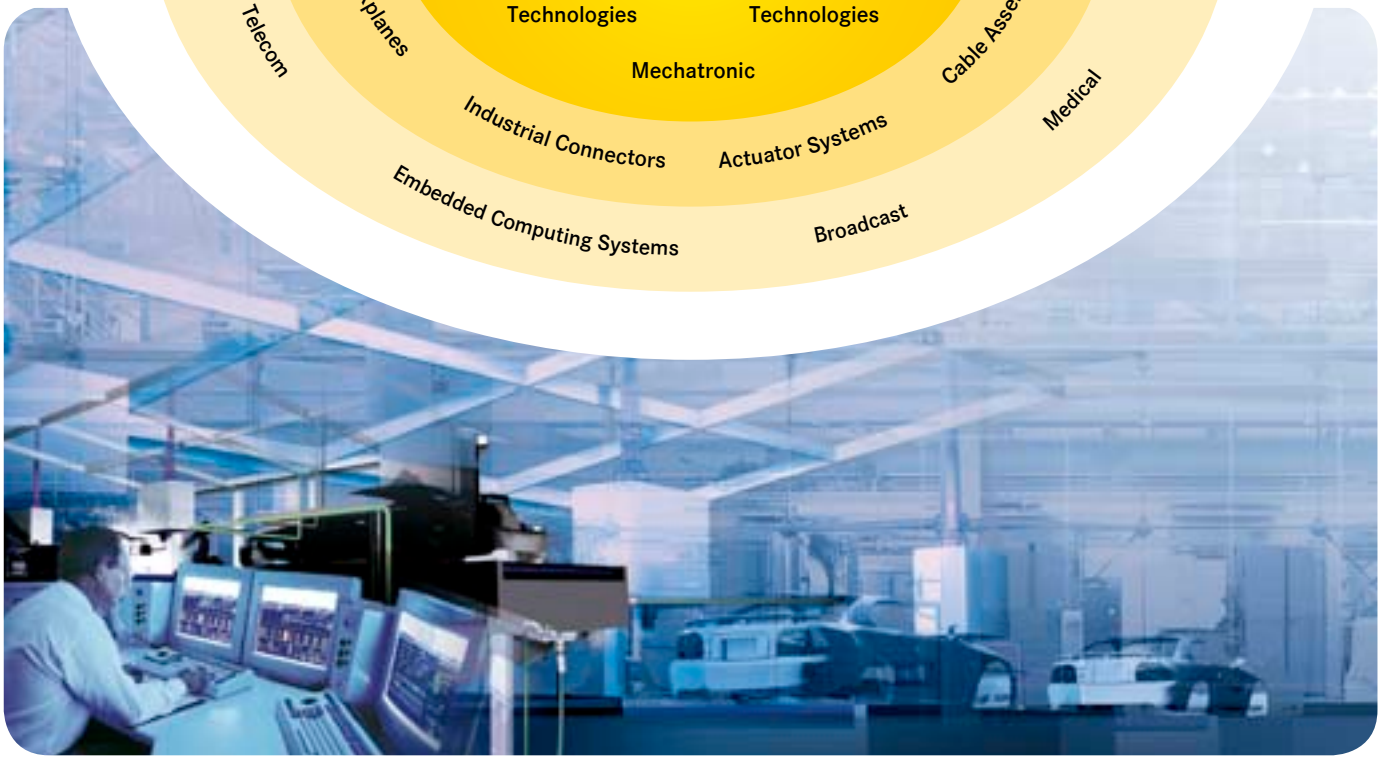
In order to develop connectivity and network solutions serving an exceptionally wide range of connector applications and task scopes in a professional and cost optimized manner, HARTING not only commands the full array of conventional tools and basic technologies. Over and beyond these capabilities, HARTING is constantly harnessing and refining its broad base of knowledge and experience to create new solutions that ensure continuity at the same time. In securing this know-how lead, HARTING draws on a wealth of sources from both in-house research and the world of applications alike.

Salient examples of these sources of innovative knowledge include microstructure technologies, 3D design and construction technology, as well as high temperature or ultrahigh frequency applications that are finding use in telecommunications or automation networks, in the automotive industry, or in industrial sensor and actuator applications, RFID and wireless technologies, in addition to packaging and housing made of plastics, aluminum or stainless steel.

HARTING SOLUTIONS EXTEND ACROSS TECHNOLOGY BOUNDARIES.

Drawing on the comprehensive resources of the group's technology pool, HARTING devises





practical solutions for its customers. Whether this involves industrial networks for manufacturing automation, or hybrid interface solutions for wireless telecommunication infrastructures, 3D circuit carriers with microstructures, or cable assemblies for high-temperature applications in the automotive industry - HARTING technologies offer far more than components, and represent mature, comprehensive solutions attuned to individual customer requirements and wishes. The range covers ready-to-use cable configurations, completely assembled backplanes and board system carriers, as well as fully wired and tested control panels.

In order to ensure the future proof design of RF- and EMC-compatible interface solutions, the central HARTING laboratory (certified to EN 45001) provides simulation tools, as well as experimental, testing and diagnostics facilities all the way through to scanning electron microscopes. In the selection of materials and processes, lifecycle and environmental aspects play a key role, in addition to product and process capability considerations.

HARTING KNOWLEDGE IS PRACTICAL KNOW-HOW GENERATING SYNERGY EFFECTS.

HARTING commands decades of experience with regard to the applications conditions of connectors in telecommunications, computer and network technologies and medical technologies, as well as industrial automation technologies, such as the mechanical engineering and plant engineering areas, in addition to the power generation industry or the transportation sector. HARTING is highly conversant with the specific application areas in all of these technology fields.

The key focus is on applications in every solution approach. In this context, uncompromising, superior quality is our hallmark. Every new solution found will invariably flow back into the HARTING technology pool, thereby enriching our resources. And every new solution we go on to create will draw on this wealth of resources in order to optimize each and every individual solution. In this way, HARTING is synergy in action.

Contents

Contents

Contents

Contents

Contents

Description of the Han-*Yellock*® system

The Han-*Yellock*® - a special Han® connector

Han-*Yellock*® is a new product series which retains the core functionality but differs significantly from current size and shape formats. The approach of this series makes many new functions possible, for example:

- An internal, latched locking mechanism on the hood
- Multiplies the potentials in the connector with Han-*Yellock*® modules
- Usage of Han-Modular® modules with adapter frames
- Insulators can snap into the front or back walls of the housing
- Protected Earth contact (PE) in crimp or Quick Lock termination

These new technical features encourage sustained and effective improvements:

When purchasing products –

- Less article numbers and less inventory,

When planning for the electrical and mechanical layout –

- Less wiring work within a machine,

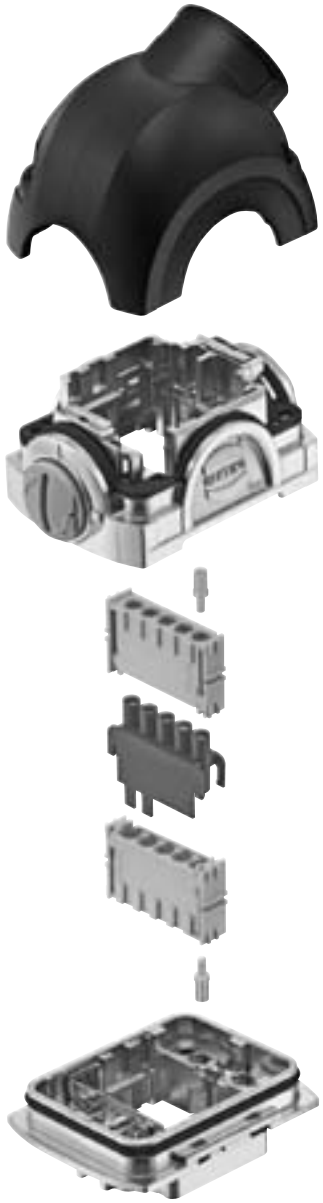
During the work flow –

- Less steps in the work flow and quicker assembly,

And during the after-sales stage –

- Reduced down times because of the latched locking mechanism and maintenance-friendly design

Thus, the Han-*Yellock*® offers improved functionality in the form of increased variability, multiplied potential, simplified handling, reduced incidence of errors and maximized safety.



Assembly details

Design overview

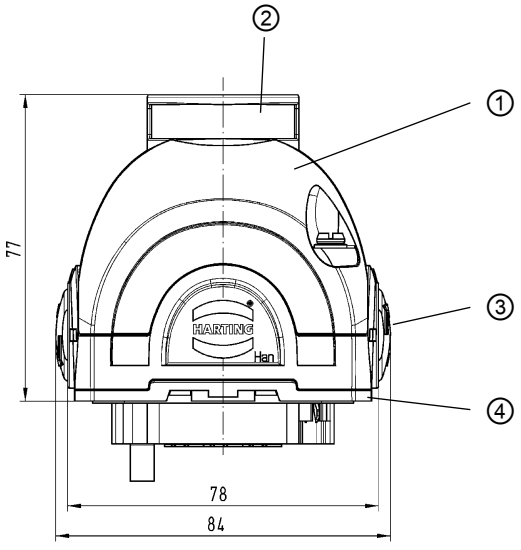
The Han-*Yellock*® interface consists of a housing, bulkhead mounting, on the housing side and a carrier hood with cover on the cable side.
Han-*Yellock*® offers the following features when assembling components:

- Han-*Yellock*® modules require only male crimp contacts.
- The PE is contacted on the housing; it can be connected with crimp and/or Quick Lock contacts.
- The Han-*Yellock*® hoods/housing are not plug-compatible with all other Han® hood/housing series.

The Han-*Yellock*® system can be used with a variety of insulators and contact inserts in order to establish an interface.

Features

- Two-part hoods for easy wiring and testing
- High robustness via an internal locking mechanism
- Earthed contacts PE in crimped or Quick Lock termination technique
- Protection cover retrofit on housing side



① Shell with top entry
② cable entry M25
③ Carrier hood with push button release
④ Housing, bulkhead mounting

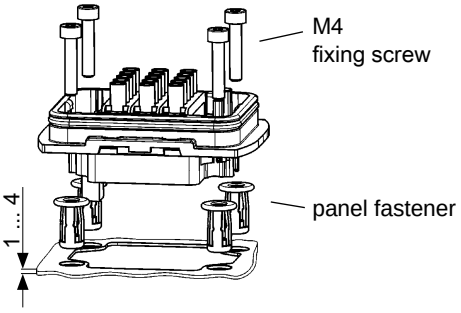
Technical Characteristics

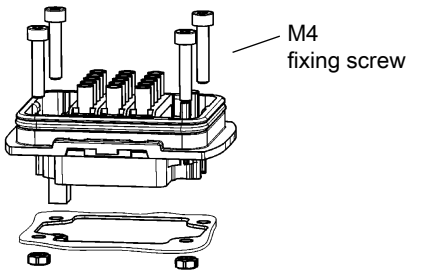
Shell

Material	aluminium
Surface	powder-coated
Locking element	
Limiting temperatures	-40 °C ... +125 °C
Degree of protection acc. to DIN EN 60 529 when locking	IP 67
Tightening tourque	
M4 fixing screw	1.2 Nm

Carrier hoods and Housings, bulkhead mounting

Number of Han-*Yellock*® modules	
Han-*Yellock*® 30	3
Han-*Yellock*® 60	6
Material	Zinc die-cast
Surface	
Locking element	PA / stainless steel
Hoods/Housings sealing	NBR
Limiting temperatures	-40 °C ... +125 °C
Un-/Locking temperature	-10 °C .... +85 °C
Degree of protection acc. to DIN EN 60 529 when locking	IP 67
Mechanical working life - mating cycles	500
PE wire termination gauge	≤ 4 mm²
Tightening tourque	
M4 fixing screw	≥ 1 Nm
panel fastener	2.3 Nm

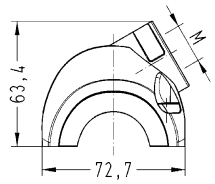
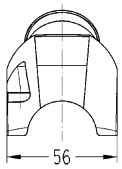
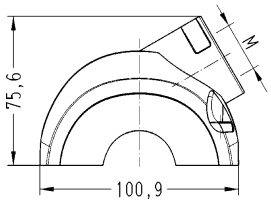
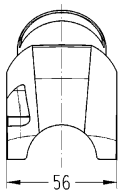
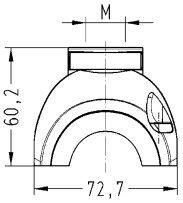
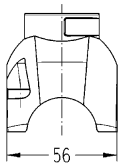
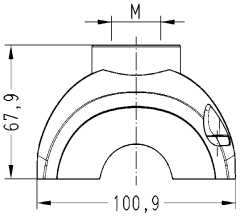
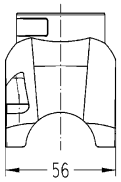




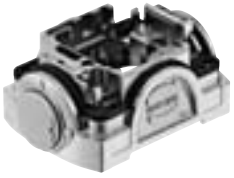
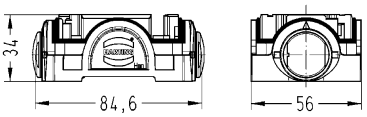
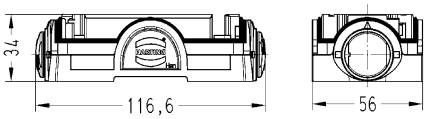
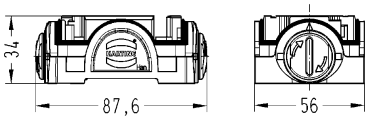
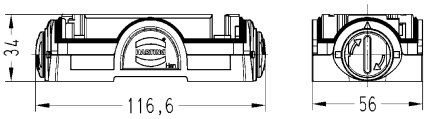
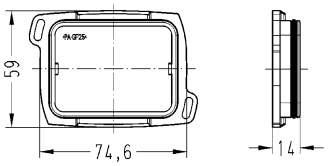
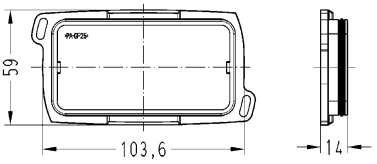
Protection covers

Material	PA
Hoods/Housings sealing	NBR
Degree of protection acc. to DIN EN 60 529 when locking	IP 67
Flammability acc. to UL 94	V0

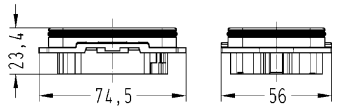
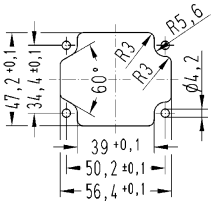
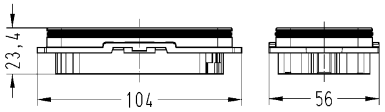
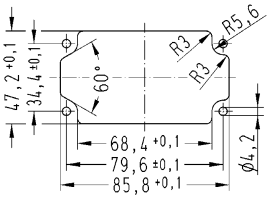
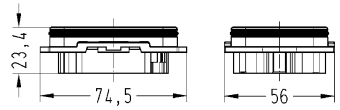
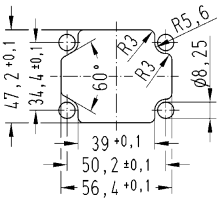
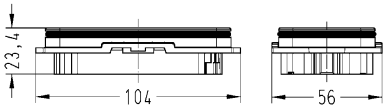
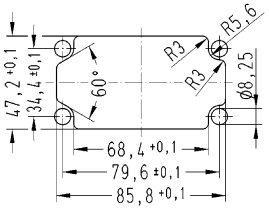
Han-*Yellock*® Hoods

Identification	Part number	Cable entry metric	Drawing	Dimensions in mm
Shell side entry				
Han-*Yellock*® 30	11 12 300 1500	M20		
	11 12 300 1501	M25		
Available by May 2010	11 12 300 1502	M32		
Han-*Yellock*® 60	11 12 600 1501	M25		
	11 12 600 1502	M32		
Available by August 2010	11 12 600 1503	M40		
Shell top entry				
Han-*Yellock*® 30	11 12 300 1400	M20		
	11 12 300 1401	M25		
Available by May 2010	11 12 300 1402	M32		
Han-*Yellock*® 60	11 12 600 1401	M25		
	11 12 600 1402	M32		
Available by August 2010	11 12 600 1403	M40		

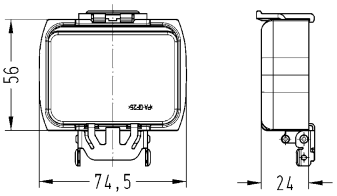
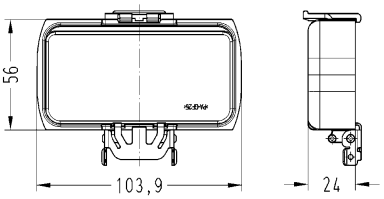
Han-*Yellock*® Hoods

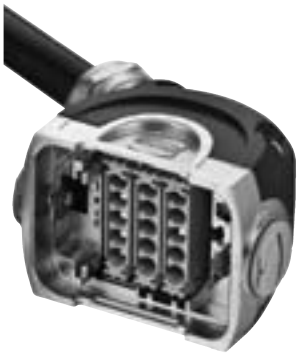
Identification	Part number	Cable entry metric	Drawing	Dimensions in mm
Carrier hood plain push button  Han-*Yellock*® 30 Available by May 2010	11 12 300 0100	-		
Han-*Yellock*® 60 Available by August 2010	11 12 600 0101	-		
Carrier hood push button, slot  Han-*Yellock*® 30 Available by May 2010	11 12 300 0110	-		
Han-*Yellock*® 60 Available by August 2010	11 12 600 0100			
Protection cover for carrier hoods with cord  Han-*Yellock*® 30 Available by August 2010	11 12 300 5451			
Han-*Yellock*® 60 Available by September 2010	11 12 600 5451			

Han-*Yellock*® Housings

Identification	Part number	Cable entry metric	Drawing	Dimensions in mm
Housing, bulkhead mounting 				
Han-*Yellock*® 30 Available by May 2010	11 12 300 0301			
				
Han-*Yellock*® 60 Available by August 2010	11 12 600 0301			
Housing, bulkhead mounting 				
Han-*Yellock*® 30 Set consists of Han-*Yellock*® 30 housing, bulkhead mounting and panel fastener Available by May 2010	11 12 300 0302			
				
Han-*Yellock*® 60 Set consists of Han-*Yellock*® 60 housing, bulkhead mounting and panel fastener Available by August 2010	11 12 600 0302			

Han-*Yellock*® Housings

Identification	Part number	Cable entry metric	Drawing	Dimensions in mm
Protection cover for housings, bulkhead mounting  Han-*Yellock*® 30 Set consists of protection cover and bearing pedestal Available by September 2010	11 12 300 5401			
Han-*Yellock*® 60 Set consists of protection cover and bearing pedestal Available by September 2010	11 12 600 5401			

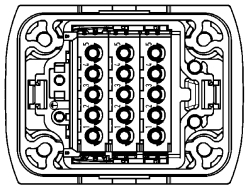


Features

- Snap-in assembly from mating side and from termination side
- Wiring with male contacts only
- Bus bar within bridge attachements
- Finger safe design
- Fast and tool-less assembly

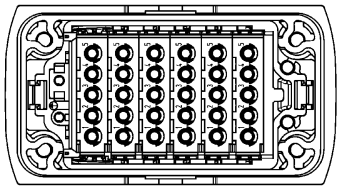
Placement for Han-*Yellock*® 30

with 3 Han-*Yellock*® modules



Placement for Han-*Yellock*® 60

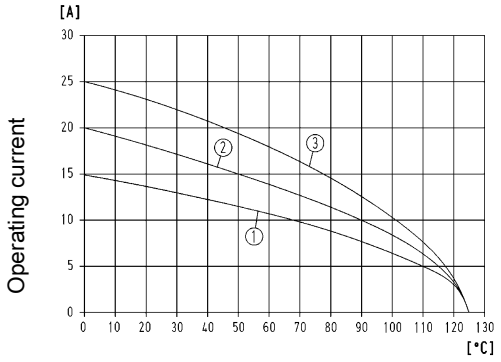
with 6 Han-*Yellock*® modules



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 according to DIN EN 60 512-5



Ambient temperature

① Wire gauge: 1.5 mm²

② Wire gauge: 2.5 mm²

③ Wire gauge: 4.0 mm²

for connector with 3 Han-*Yellock*® modules, fully loaded (multiplier 1:1)

Technical Characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984

Modules

Electrical data	
acc. to DIN EN 61 984	**20 A 500 V 6 kV 3**
Rated current	20 A
Rated voltage	500 V
Rated impulse voltage	6 kV
Pollution degree	3
Pollution degree 2 also	20 A 690 V 8 kV 2
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V0
Mechanical working life	
- mating cycles	≥ 500

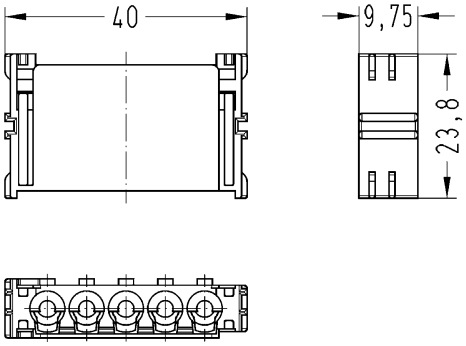
Contacts

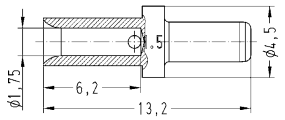
Material	copper alloy
Surface	
- hart-silver plated	3 µm Ag
Contact resistance	≤ 2 mΩ
Crimp terminal	
- wire gauge [1)]	0.14 ... 4 mm²
- AWG	26 ... 12
- Stripping length	6.5 mm

[1)] ... other wire gauges on request

Number of contacts

5

Identification	Part number	Drawing	Dimensions in mm
Han-*Yellock*® module Available by May 2010	11 05 105 3001		

Identification	Wire gauge (mm²)	Part number	Drawing	Dimensions in mm
Han-*Yellock*® Crimp contacts male contact Han-*Yellock*® TC20 silver-plated  Available by May 2010	0.14-0.37 0.5 0.75 1.0 1.5 2.5 3.0 4.0	11 05 000 6101 11 05 000 6102 11 05 000 6103 11 05 000 6104 11 05 000 6105 11 05 000 6106 11 05 000 6107 11 05 000 6108		

Wire gauge			Stripping length
0.14 - 0.37	mm²	AWG 26-22	6.5 mm
0.5	mm²	AWG 20	6.5 mm
0.75	mm²	AWG 18	6.5 mm
1	mm²	AWG 18	6.5 mm
1.5	mm²	AWG 16	6.5 mm
2.5	mm²	AWG 14	6.5 mm
3	mm²	AWG 12	6.5 mm
4	mm²	AWG 12	6.5 mm

Identification	Wire gauge (mm²)	Part number	Drawing	Dimensions in mm
Removal tool for crimp contacts		09 99 000 0319		

Features

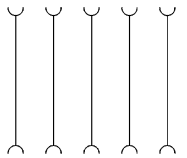
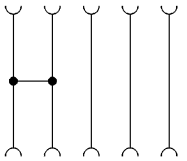
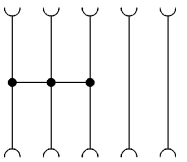
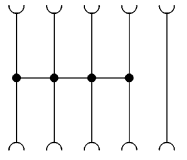
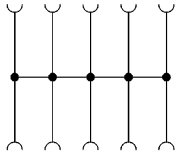
- Visible bridge position from mating side and from termination side
- Multiplier can be placed on the housing side or on the cable side
- Bus bar functionality for 1 up to 5 contacts
- Fast and easy exchange

Technical Characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984

Multiplier

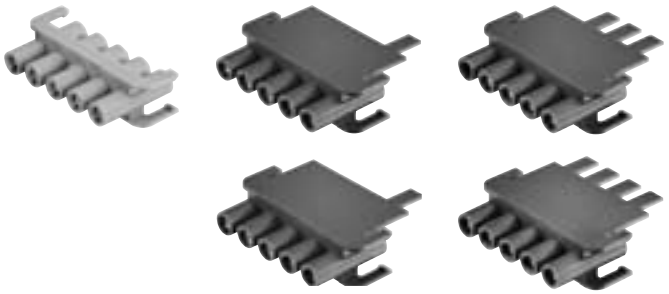
Number of contacts	5
Material	Polycarbonate
Flammability acc. to UL 94	V0
Mechanical working life	
- mating cycles	≥ 500

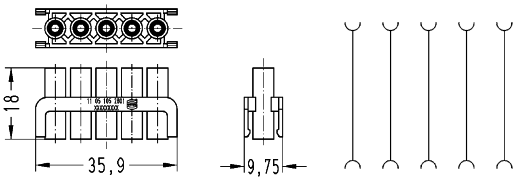
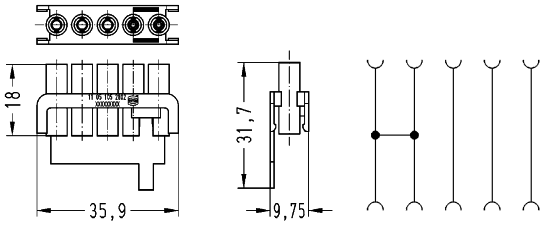
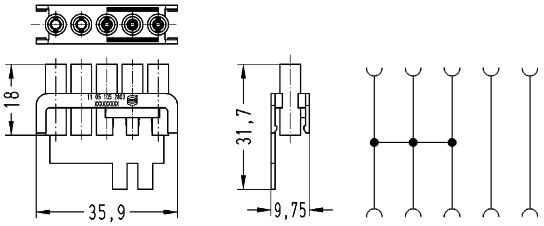
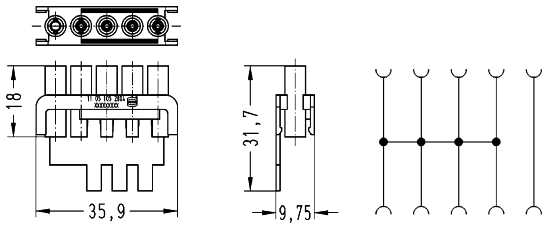
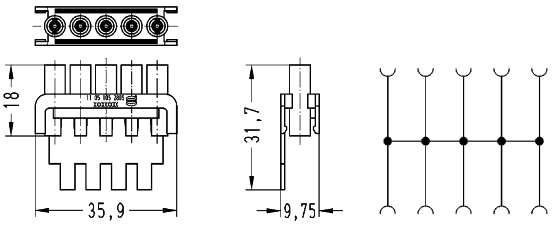
	Bus bar contacts	Single contacts	Circuit diagram
multiplier 1:1	0	5	
multiplier 2:3	2	3	
multiplier 3:2	3	2	
multiplier 4:1	4	1	
multiplier 5:0	5	0	

Number of contacts

5

Available by May 2010



Identification	Part number	Drawing	Dimensions in mm
Han-*Yellock*® multiplier			
multiplier 1:1 	11 05 105 2801		
multiplier 2:3 	11 05 105 2802		
multiplier 3:2 	11 05 105 2803		
multiplier 4:1 	11 05 105 2804		
multiplier 5:0 	11 05 105 2805		

Han-*Yellock*® Adapter frames

Features

- Suitable for Han-Modular® modules up to 4 mm²
- Snap-in functionality from mating side and from termination side

Technical Characteristics

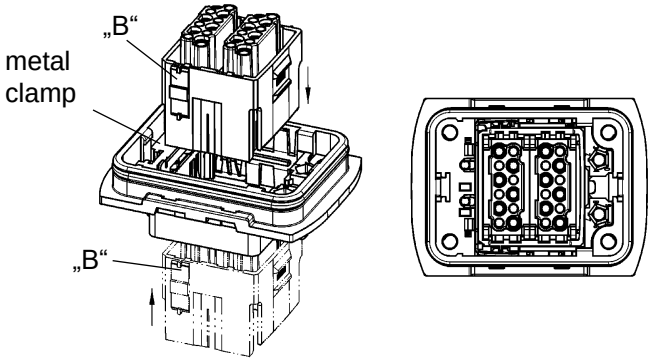
Specifications	DIN EN 60 664-1 DIN EN 61 984

Adapter frames

Number of modules	max. 2
Material	Polycarbonate
Flammability acc. to UL 94	V0

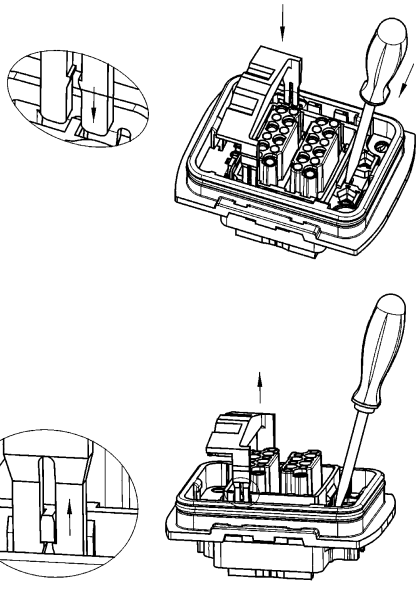
Mounting

- The adapter frame can be snapped into the housing, bulkhead mounting, on the connection side and the plug-in side (refer to the illustration).
- The lateral plastic tabs („B“) are pressed into the metal clamps on the housing.
- The adapter frame then snaps in with a distinctly audible click.



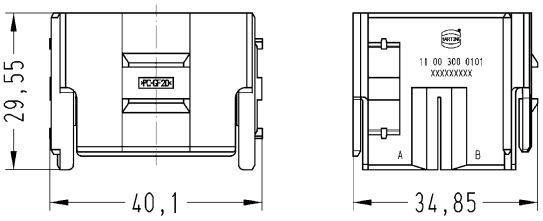
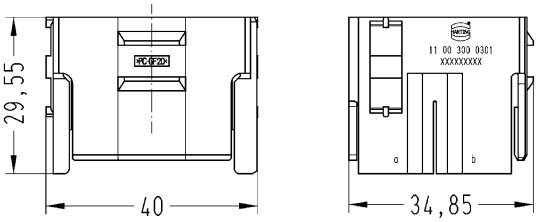
Removal

- The removal tool part no. 09 99 000 0001 is required for removal.
- The removal tool is inserted into the metal clamp and pressed down as shown in the following illustration. A screw-driver can also be placed into the notch in the housing.
- The removal tool should then be pulled outwards to remove the adapter frame from the housing.
- The removal can be made from the connection side as well as from the plug-in side.
- The process is identical for both housings, bulkhead mounting, and carrier hoods.

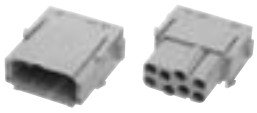


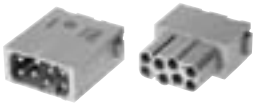
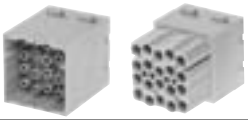
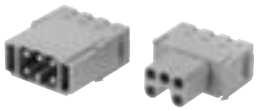
Han-*Yellock*® Adapter frames

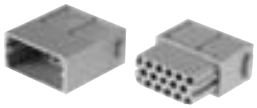
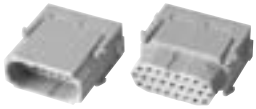
Available by May 2010

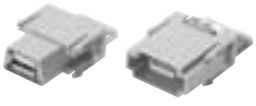
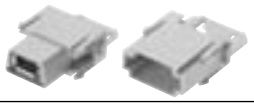
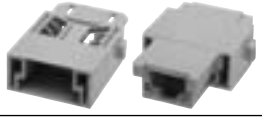
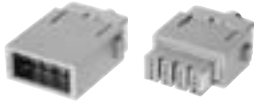
Identification	Part number	Drawing	Dimensions in mm
Han-*Yellock*® Adapter frame			
for carrier hoods 	11 00 300 0101		
for housings, bulkhead mounting 	11 00 300 0301		

Summary Han-Modular®

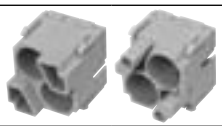
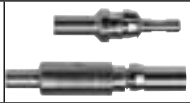
Modules	Han® CC Protected module	Han® CD module	Han E® module	Han® EE module
Number of contacts	4	3 / 4	6	8
Termination	Crimp terminal	Crimp terminal	Crimp terminal	Crimp terminal
				
Rated current Rated voltage Wire gauge	40 A 830 V 1.5 - 6 mm²	40 A / 10 A 830 V / 830 V 1.5 - 6 mm² / 0.14 - 2.5 mm²	16 A 500 V 0.5 - 4 mm²	16 A 400 V 0.5 - 4 mm²

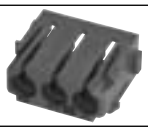
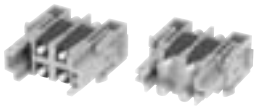
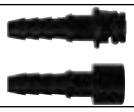
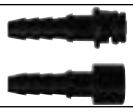
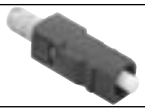
Modules	Han® EE module	Han E® Protected module	Han® EEE module	Han® ES module
Number of contacts	8	6	20	5
Termination	Quick Lock terminal	Crimp terminal	Crimp terminal	Cage-clamp terminal
				
Rated current Rated voltage Wire gauge	16 A 400 V 0.5 - 2.5 mm²	16 A 830 V 0.5 - 4 mm²	16 A 500 V 0.5 - 4 mm²	16 A 400 V 0.14 - 2.5 mm²

Modules	Han DD® module	Han® DDD module	Han® High Density module	Han® D-Sub module
Number of contacts	12	17	25	9
Termination	Crimp terminal	Crimp terminal	Crimp terminal	Crimp terminal
				
Rated current Rated voltage Wire gauge	10 A 250 V 0.14 - 2.5 mm²	10 A 160 V 0.14 - 2.5 mm²	4 A 50 V 0.08 - 0.52 mm²	5 A 50 V 0.08 - 0.52 mm²

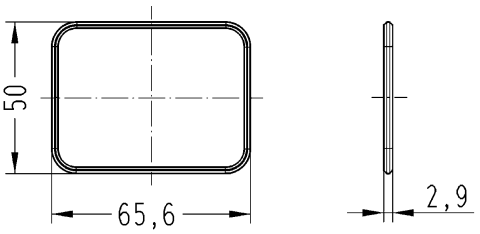
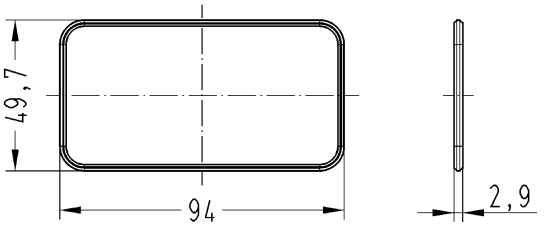
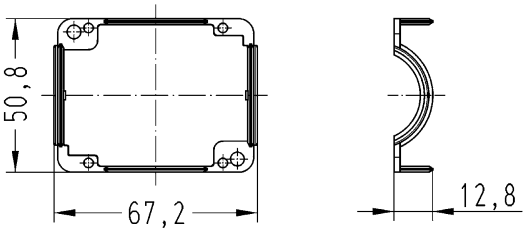
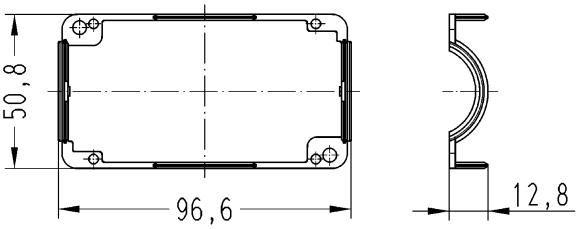
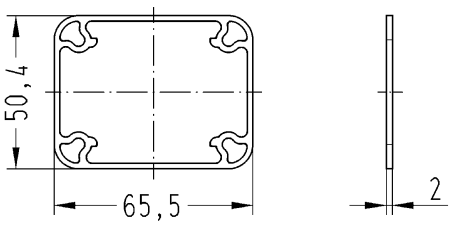
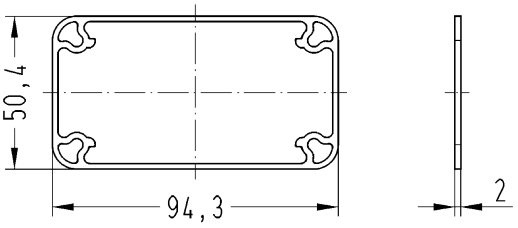
Modules	Han® USB module	Han® FireWire module	Han® RJ45 module	Han® GigaBit module
Number of contacts	4	6	8	8
Termination	USB 2.0	IEEE 1394	Ethernet Cat. 5e	Ethernet Cat. 6
				

Summary Han-Modular®

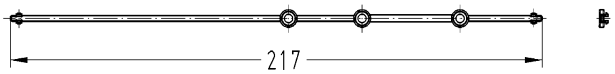
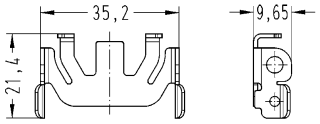
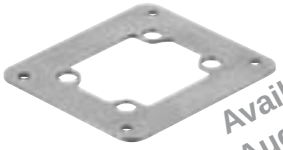
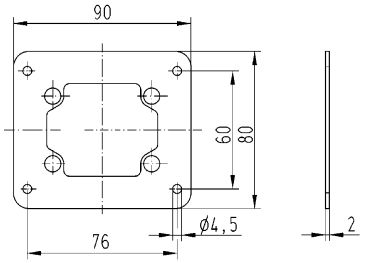
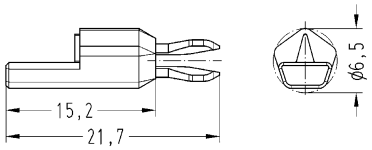
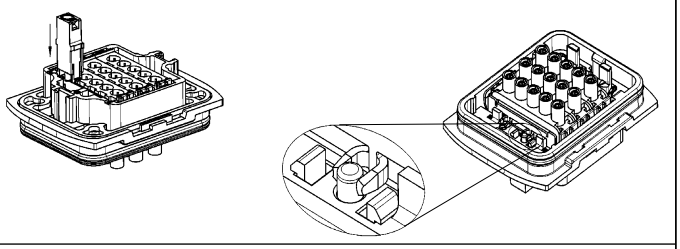
Modules	Han-Quintax® module				Han® Multi Contact module	
Number of contacts	2				4	
						
Contacts	Quintax contact 4 + shielding	High Density Quintax contact 8 + shielding	Han D® Coax contact 1 + shielding	Han E® Coax contact 1 + shielding	F.O. contact	Coaxial contact
						
			75 Ω	50 Ω	Multimode F.O. HCS®*/PCF F.O. 1 mm POF	50 Ω RG 174 75 Ω RG 179 50 Ω RG 58

Modules	Han® Pneumatic module		Han® SC module		
Number of contacts	2	3	4		
					
Contacts	Pneumatic contacts		SC contact		
					
	∅ 6.0 mm	∅ 1.6 mm ∅ 3.0 mm ∅ 4.0 mm			

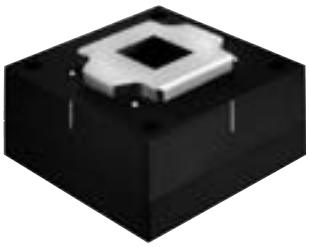
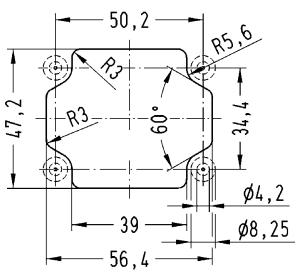
* HCS®=Hard Clad Silica (is registered trade mark of SpecTran Corporation)

Identification	Part number	Drawing	Dimensions in mm
Han-*Yellock*® Profile seal			
 for Han-*Yellock*® 30	11 00 300 9501		
Available by May 2010			
for Han-*Yellock*® 60	11 00 600 9501		
Available by August 2010			
Han-*Yellock*® Seal for carrier hoods			
 for Han-*Yellock*® 30	11 00 300 9502		
Available by May 2010			
for Han-*Yellock*® 60	11 00 600 9502		
Available by August 2010			
Han-*Yellock*® Gasket			
 for Han-*Yellock*® 30	11 00 300 9503		
Available by May 2010			
for Han-*Yellock*® 60	11 00 600 9503		
Available by August 2010			

Han-*Yellock*® - Accessoires

Identification	Part number	Drawing	Dimensions in mm
Han-*Yellock*® Fixing cord for protection cover cable side  Available by August 2010	11 00 000 9507		
Han-*Yellock*® Bearing pedestal  Available by September 2010	11 00 000 9506		
Han-*Yellock*® 30 Adapter plate circular 68 mm punch to Han-*Yellock*® panel cut out  Available by August 2010	11 00 300 9601		
Han-*Yellock*® Identification sticks Available by May 2010	11 00 000 9601		
Han-*Yellock*® Coding pins Set of 8 coding pins  Available by May 2010	11 00 000 9501		
PE Contact chamber with Quick Lock temination  Available by May 2010	11 05 001 2601		

Tools for contacts Han-*Yellock*® (11 05 ...)

Identification	Part number	Drawing	Dimensions in mm
BUCHANAN crimping tool	**09 99 000 0001**	Wire gauge 0.14 ... 4 mm²	
Locator Han-*Yellock*® Available by May 2010	**09 99 000 0342**		
Multiple crimping tool depth adjustment gauge	**09 99 000 0379**	Wire gauge 0.14 ... 0.37 mm² Ø 1.00 0.5 ... 1.0 mm² Ø 1.55 1.5 ... 2.5 mm² Ø 1.80 3.0 ... 4.0 mm² Ø 2.00	 order separately
HARTING crimping tool Han D®, Han E®, Han® C locator included	**09 99 000 0110**	Wire gauge 0.5 ... 4 mm²	
Locator Han-*Yellock*® Available by May 2010	**09 99 000 0341**		
HARTING Service crimping tool Han D®, Han E® locator included	**09 99 000 0021**	Wire gauge 0.14 ... 1.5 mm²	
Locator Han-*Yellock*® Available by May 2010	**09 99 000 0343**		
Removal tool for Han-*Yellock*® modules and frames Available by May 2010	**11 99 000 0001**		
Removal tool for crimp contacts	09 99 000 0319		 This removal tool is necessary if contacts are to be replaced in the insert. The tool is inserted from the wiring side until a stop is noticeable. The wire with the crimp contact can then be pulled out from the same side of the insert.
Panel Punch panel cut out tool panel thickness steel: ≤ 2.5 mm stainless steel: ≤ 2.0 mm for hydraulic pump punch force: ≥ 60 kN thread: 3/4“ UNF	**11 99 300 0001**		 
for Han-*Yellock*® 30 Available by May 2010			

Description of the Han®-Eco series

Han®-Eco – a new hoods and housings series made of thermoplastic material.

Han®-Eco is the ideal solution for applications that do not require the full range of product features offered by the Han® B series of hoods and housings, and users want to take advantage of the weight and cost advantages.

Like the Han® B standard series, the Han®-Eco series is available in the following sizes: 6 B, 10 B, 16 B and 24 B. Depending on size, versions of the hoods with straight or angled cable exit as well as housings, bulkhead mounting, can be supplied. The cable exits are available with metric threading, a cable gland is implemented. For hoods/housing sizes 6 B and 10 B size of the cable gland is M 32, for 16 B and 24 B the size of cable gland is M 40.

Han®-Eco hoods and housings are made of high-performance plastic that is highly resistant to environmental stress and – in combination with the design - provides very good mechanical stability. When the connector is closed and locked, it provides IP 65 protection as defined in DIN EN 60 529. The material also meets demanding flammability requirements of UL 94 Class V 0.

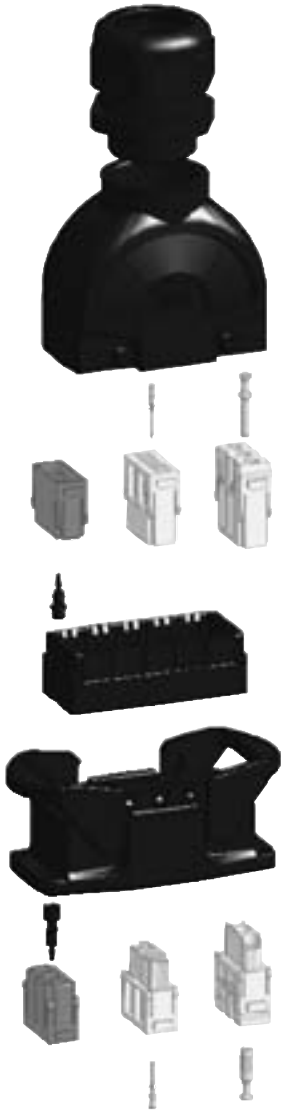
Fast, simple assembly is another outstanding product feature. Click-and-mate design totally eliminates the need for tools during assembly of the Han®-Eco hoods and housings.

The Han®-Eco hoods and housings are compatible with the full range of modules from the Han-Modular® series. One extra module fits into the Han®-Eco hoods and housings compared to the equivalent product in the Han® B Standard series. This special feature applies to all four sizes.

A optional PE contact module with screw terminal has been developed specifically for the Han®-Eco hoods and housings to hold the protective ground conductor.

Advantages:

- ❑ weight reduction combined with mechanical strength
- ❑ fast assembly process without tools
- ❑ complete range of modules from Han-Modular® series usable



Assembly details

Features

- New hoods/housings series made of thermoplastic material with excellent mechanical properties and high resistance against environmental influence
- Weight and cost optimised
- Quick assembly without screws and tools („click and mate“)
- Capable for applications according protection class II
- Available in sizes 6 B, 10 B, 16 B and 24 B
- integrated cable glands
- Complete range of modules of series Han-Modular® is usable
- One extra module fits into the Han®-Eco hoods/ housings compared to equivalent size of Han® B series
- Optional PE contact module for hold the protective ground conductor
- Same panel cut out as Han® B housings, bulkhead mounting
- Not mating compatible with series Han® B

Technical characteristics

Specifications

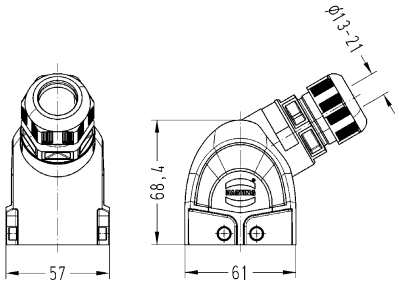
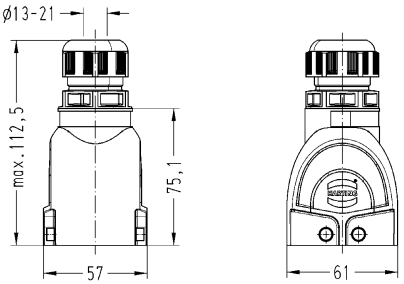
	DIN EN 61 984

Hoods/Housings

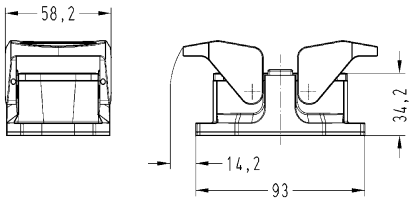
Material	Polyamide, fibre-glass reinforced
Locking element	PA
Hoods/Housings sealing	NBR
Limiting temperatures	-40 °C ... +125 °C
Degree of protection acc. to DIN EN 60 529 for coupled connector	IP 65
Flammability acc. to UL 94	V0

Han®-Eco Hoods/Housings Size 6 B

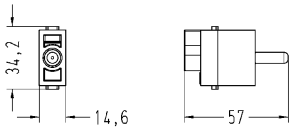
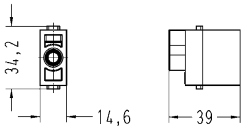
Plastic hoods for industrial applications / 2 lever locking system

Identification	Part number	Cable entry	Drawing	Dimensions in mm
Hoods side entry 	19 41 106 0522	M32		
Hoods top entry 	19 41 106 0422	M32		

Plastic housings for industrial applications / 2 lever locking system

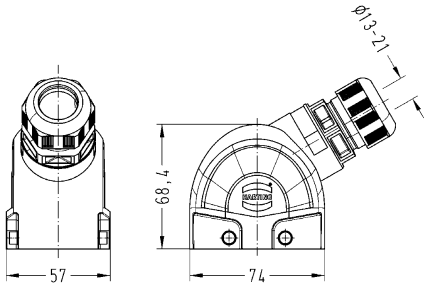
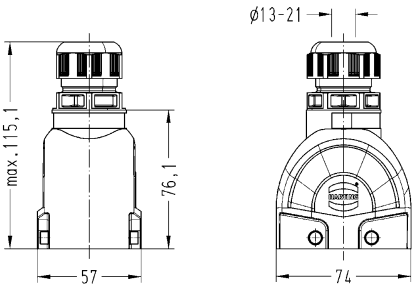
Identification	Part number	Cable entry	Drawing	Dimensions in mm
Housings, bulkhead mounting 	19 41 006 0301			

PE contact modules

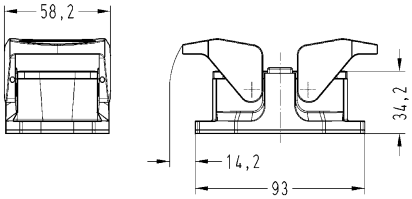
Identification	Part number	Drawing	Dimensions in mm
Han®-Eco PE contact module with screw terminal wire gauge 1.5 mm² ... 16 mm² male module	19 41 001 2600		
female module	19 41 001 2700		

Han®-Eco Hoods/Housings Size 10 B

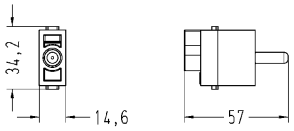
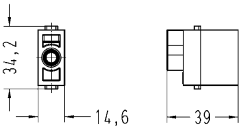
Plastic hoods for industrial applications / 2 lever locking system

Identification		Part number	Cable entry	Drawing	Dimensions in mm
Hoods side entry		19 41 110 0522	M32		
Hoods top entry		19 41 110 0422	M32		

Plastic housings for industrial applications / 2 lever locking system

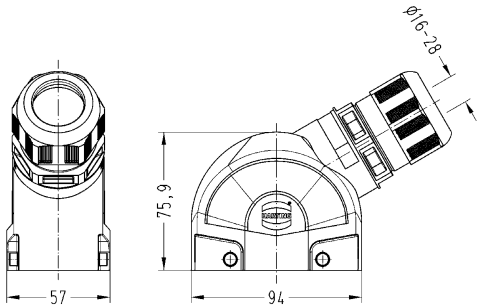
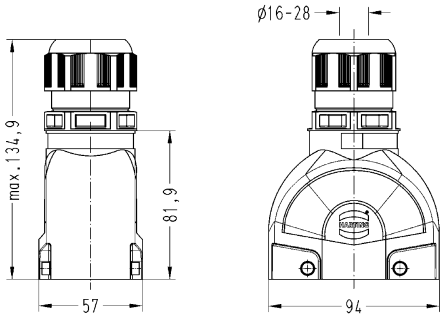
Identification		Part number	Cable entry	Drawing	Dimensions in mm
Housings, bulkhead mounting		19 41 010 0301			

PE contact modules

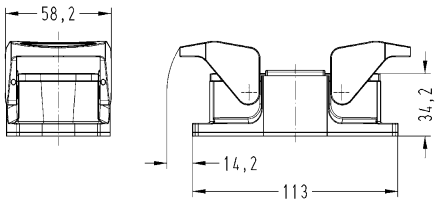
Identification	Part number	Drawing	Dimensions in mm
Han®-Eco PE contact module with screw terminal wire gauge 1.5 mm² ... 16 mm² male module	19 41 001 2600		
female module	19 41 001 2700		

Han®-Eco Hoods/Housings Size 16 B

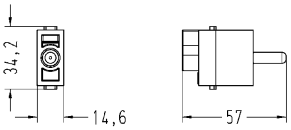
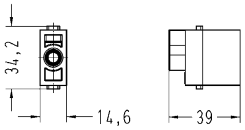
Plastic hoods for industrial applications / 2 lever locking system

Identification		Part number	Cable entry	Drawing	Dimensions in mm
Hoods side entry		19 41 116 0523	M40		
Hoods top entry		19 41 116 0423	M40		

Plastic housings for industrial applications / 2 lever locking system

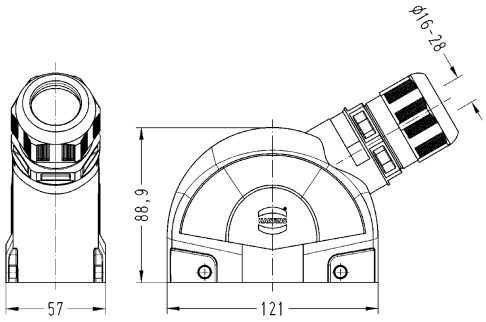
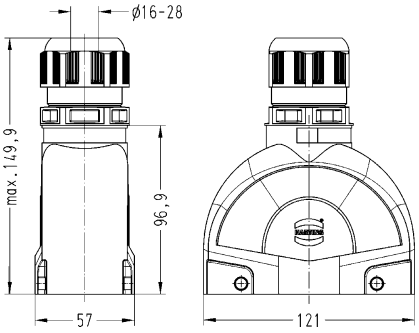
Identification		Part number	Cable entry	Drawing	Dimensions in mm
Housings, bulkhead mounting		19 41 016 0301			

PE contact modules

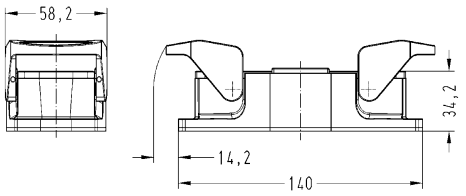
Identification	Part number	Drawing	Dimensions in mm
Han®-Eco PE contact module with screw terminal wire gauge 1.5 mm² ... 16 mm² male module	19 41 001 2600		
female module	19 41 001 2700		

Han®-Eco Hoods/Housings Size 24 B

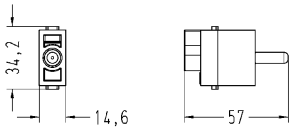
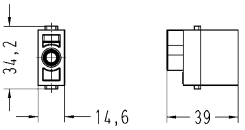
Plastic hoods for industrial applications / 2 lever locking system

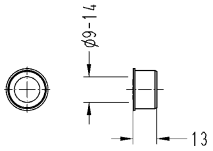
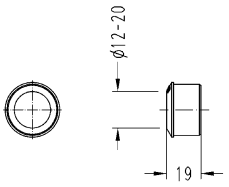
Identification		Part number	Cable entry	Drawing	Dimensions in mm
Hoods side entry		19 41 124 0523	M40		
Hoods top entry		19 41 124 0423	M40		

Plastic housings for industrial applications / 2 lever locking system

Identification		Part number	Cable entry	Drawing	Dimensions in mm
Housings, bulkhead mounting		19 41 024 0301			

PE contact modules

Identification	Part number	Drawing	Dimensions in mm
Han®-Eco PE contact module with screw terminal wire gauge 1.5 mm² ... 16 mm² male module	19 41 001 2600		
female module	19 41 001 2700		

Identification	Part number	Drawing	Dimensions in mm
Han®-Eco Reduction sealing insert			
size of cable gland: M32	19 41 000 5132		
size of cable gland: M40	19 41 000 5142		

Han® RJ45 Module

Features

- Single module with standard shielded RJ45 plug and jack
- Cat. 5e for all data pairs (all 8 pins)
- RoHS compliant
- The RJ45 inserts are protected by means of a rugged plastic insulator
- Patch cables are assembled/removed without tools within the module
- RJ Industrial connectors: field assembly possible

Technical characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984 IEC 60 603-7

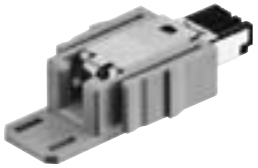
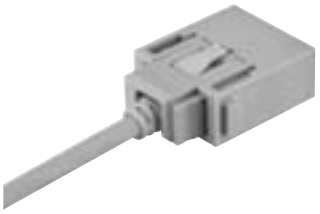
Inserts

Number of contacts	8
Transmission performance	Cat. 5/class D up to 100 MHz acc. to ISO/IEC 11 801:2002 and EN 50 173-1
Transmission rate	10/100 Mbit/s
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Limiting temperatures	-40 °C ... +85 °C
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

Han® RJ45 Module

Number of contacts

8


Identification	Part-Number Male insert (M)	Female insert (F)	Drawings	Dimensions in mm
Gender Changer for patch cable		09 14 001 4721	F	
Male module for patch cable	09 14 001 4623		M	
Adapter for HARTING patch cable	09 14 000 9966			
HARTING RJ Industrial	09 14 000 9967			

Features

- RoHS compliant
- 360° shielded contact

Han-Modular® RJ Industrial RJ 45 connector set (4 pins, and 10G, 8 pins)

- field assembly without tools possible by means of *HARAX*® rapid termination in IDC technology
- suitable for termination of massive and flexible wires

Han-Modular® RJ Industrial Gigalink RJ 45 connector set,

- field assembly by means of piercing contacts
- suitable for termination of flexible wires

Technical characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984 IEC 60 603-7

Inserts

HARTING RJ Industrial® 4 pins

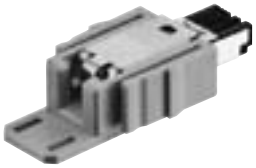
Number of contacts	4
Transmission performance	Cat. 5/class D up to 100 MHz acc. to ISO/IEC 11 801:2002 and EN 50 173-1
Transmission rate	10/100 Mbit/s
Termination	without tools by means of IDC contacts
Terminated cable	
- wire gauge	
flexible	AWG 24/7 ... AWG 22/7
massive	AWG 23/1 ... AWG 22/1
- outer wire diameter	max. 1.6 mm
Material insert	Polyamide, UL 94 V0
Limiting temperatures	-40 °C ... +70 °C

HARTING RJ Industrial® Gigalink, 8 pins

Number of contacts	8
Transmission performance	Cat. 6/class E up to 250 MHz acc. to ISO/IEC 11 801:2002 and EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Termination	by means of piercing contacts
Terminated cable	
- wire gauge	AWG 28/7 ... AWG 24/7 (flexible)
- outer wire diameter	max. 1.05 mm
Material insert	Polyamide, UL 94 V0
Limiting temperatures	-40 °C ... +70 °C

HARTING RJ Industrial® 10G, 8 pins

Number of contacts	8
Transmission performance	Cat. 6/class E_A up to 250 MHz acc. to ISO/IEC 11 801:2002 and EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Termination	without tools by means of IDC contacts
Terminated cable	
- wire gauge	
flexible	AWG 27/7 ... AWG 22/7
massive	AWG 27/1 ... AWG 22/1
- outer wire diameter	max. 1.5 mm
Material insert	Polyamide, UL 94 V0
Limiting temperatures	-40 °C ... +70 °C

Identification	Part-Number	Drawings	Dimensions in mm
Han-Modular® RJ Industrial RJ45 connector set			
			
Cat. 5			
4 pins for AWG 24 ... 22	09 45 400 1100		
4 pins for AWG 26	09 45 400 1109		
Cat. 6			
Gigalink, 8 pins with cable manager white	09 45 400 1500		
Gigalink, 8 pins with cable manager blue	09 45 400 1510		
Cat. 6			
10G, 8 pins	09 45 400 1560	Set consists of the relevant RJ45 insert and the suitable adapter for Han® RJ45 male module 09 14 001 4623	
HARTING RJ Industrial® Gigalink assembly tool	09 45 800 0500		

Features

- Locking lever protection for RJ45 connector latch
- Very short plug design
  in combination with robust bend protection
- RoHS compliant

Technical characteristics

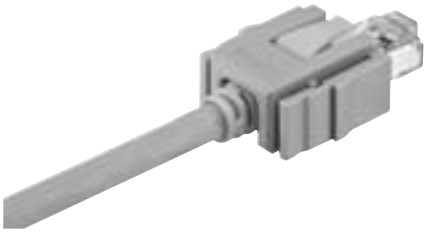
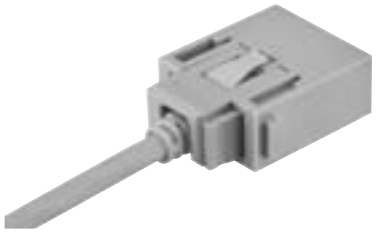
Specifications	ISO/IEC 24 702 ISO/IEC 11801 ISO/IEC 61 935-2

Cat. 5e RJ45 patch cable

Transmission performance	Cat. 5/ Class D acc. to ISO/IEC 24 702 resp. ISO/IEC 11801 Cat. 5e acc. to ISO/IEC 61 935-2
Transmission rate	1 Gigabit Ethernet 1000 Mbit/s
Wiring	1:1 TIA/EIA 568 B, 8-pole
Material cable	SF/UTP, PUR jacket, yellow
Operating temperatures	
mobile	0 °C ... +60 °C
stationary	-40 °C ... +80 °C
Flammability	flame retardant, halogen-free
Protection class	IP 20

Cat. 6 RJ45 patch cable

Transmission performance	Cat. 6/ Class E acc. to ISO/IEC 24 702 resp. ISO/IEC 11801 Cat. 6 acc. to ISO/IEC 61 935-2
Transmission rate	1 Gigabit Ethernet 1000 Mbit/s
Wiring	1:1 TIA/EIA 568 B, 8-pole
Material cable	S/FTP, PUR jacket, yellow
Operating temperatures	
mobile	0 °C ... +60 °C
stationary	-20 °C ... +80 °C
Flammability	flame retardant, halogen-free
Protection class	IP 20

Identification		Part-Number Male insert (M)
Cat 5e RJ45		
patch cable		
Length	0.2 m	09 47 474 7001
	0.3 m	09 47 474 7002
	0.4 m	09 47 474 7003
	0.5 m	**09 47 474 7004**
	0.6 m	09 47 474 7005
	0.7 m	09 47 474 7006
	0.8 m	09 47 474 7007
	0.9 m	09 47 474 7008
	1.0 m	**09 47 474 7009**
	1.5 m	09 47 474 7010
	2.0 m	**09 47 474 7011**
	2.5 m	09 47 474 7012
	3.0 m	**09 47 474 7013**
	4.0 m	09 47 474 7014
	5.0 m	**09 47 474 7015**
	6.0 m	09 47 474 7016
	7.0 m	09 47 474 7017
	7.5 m	09 47 474 7018
	8.0 m	09 47 474 7019
	9.0 m	09 47 474 7020
	10.0 m	**09 47 474 7021**
	15.0 m	09 47 474 7022
	20.0 m	09 47 474 7023

Drawings / Dimensions in mm

Identification		Part-Number Male insert (M)
Cat 6 RJ45		
patch cable		
Length	0.2 m	09 47 474 7101
	0.3 m	09 47 474 7102
	0.4 m	09 47 474 7103
	0.5 m	**09 47 474 7104**
	0.6 m	09 47 474 7105
	0.7 m	09 47 474 7106
	0.8 m	09 47 474 7107
	0.9 m	09 47 474 7108
	1.0 m	**09 47 474 7109**
	1.5 m	09 47 474 7110
	2.0 m	**09 47 474 7111**
	2.5 m	09 47 474 7112
	3.0 m	**09 47 474 7113**
	4.0 m	09 47 474 7114
	5.0 m	**09 47 474 7115**
	6.0 m	09 47 474 7116
	7.0 m	09 47 474 7117
	7.5 m	**09 47 474 7118**
	8.0 m	09 47 474 7119
	9.0 m	09 47 474 7120
	10.0 m	09 47 474 7121
	15.0 m	09 47 474 7122
	20.0 m	09 47 474 7123

Stock items in bold type

Han® USB Module

Features

- According to USB 2.0 specification
- Screw terminal for max. 1.5 mm²
- T functionality as an option

Technical characteristics

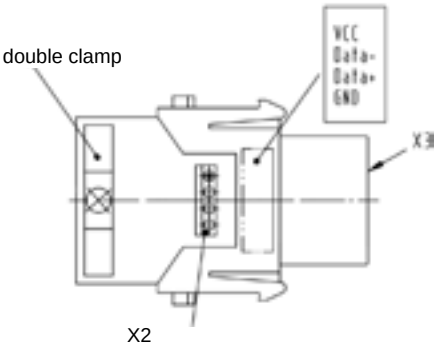
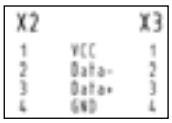
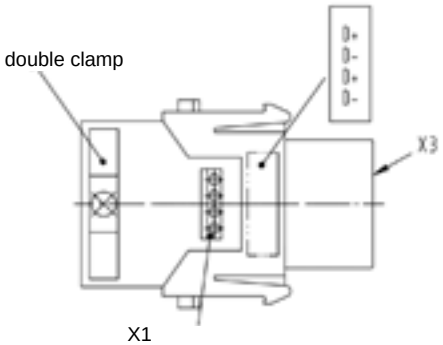
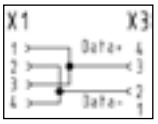
Specifications	DIN EN 60 664-1 DIN EN 61 984
Inserts	
Number of contacts	4
Electrical data acc. to DIN EN 61 984	**1 A 50 V 0.8 kV 3**
Rated current	1 A
Rated voltage	50 V
Rated impulse voltage	0.8 kV
Pollution degree	3
Insulation resistance	≥ 10^{10} Ω
Material	Polycarbonate
Limiting temperatures	-40 °C ... +85 °C
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles

Han® USB Module

Number of contacts

4

USB module with screw termination

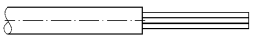
Identification	Part-Number Female insert (F)	Drawings	Dimensions in mm
Han® USB module with screw termination 	61 04 301 0538	View termination side  double clamp  X2 clamp 4 pins max. 1.5 mm² wiring plan  	
Han® USB module with screw termination and T functionality 	61 04 301 0573	View termination side  double clamp  X1 clamp 4 pins max. 1.5 mm² wiring plan  	

Han® 70 A Crimp Module

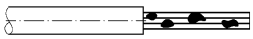
Features

- Crimp termination
- Compatible with Han® 70 A module with axial screw termination

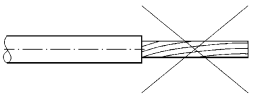
Assembly Details



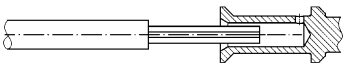
Cut the cable square and strip the insulation



The copper strands must be cleaned from dirt and oxide film



Copper strands must not be twisted



Insert the cable strand completely into the crimp ferrule.
Check insertion via inspection hole

Technical characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984 EN 50 124-1

Inserts

Number of contacts	2
Electrical data acc. to DIN EN 61 984	
Rated current	70 A
Rated voltage conductor - ground	1000 V
Rated voltage conductor - conductor	1000 V
Rated impulse voltage	8 kV
Pollution degree	3
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

Power contacts	
Material	Copper alloy
Surface	
- hard-silver plated	3 µm Ag
Contact resistance	≤ 0.5 mΩ
Crimp terminal	
- mm²	10 - 25 mm²
Max. insulation diameter	11 mm
Stripping length	15.5 mm

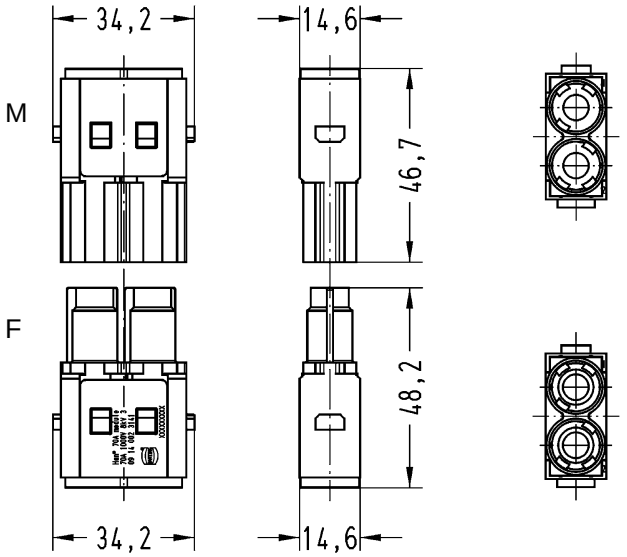
Han® 70 A Crimp Module

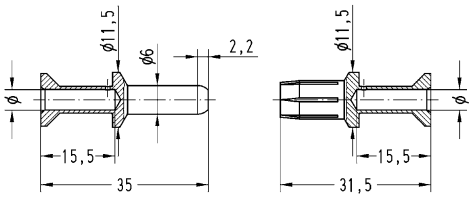
1000 V 70 A

Number of contacts

2

Available by September 2010

Identification	Part-Number Male insert (M)	Female insert (F)	Drawings	Dimensions in mm
Han® 70 A module Crimp terminal	09 14 002 3041	09 14 002 3141		

Identification	Wire gauge mm²	Part-Number Male contacts (M)	Female contacts (F)	Drawings	Dimensions in mm
Crimp contacts* Silver plated	10	09 11 000 6131	09 11 000 6231		
	16	09 11 000 6132	09 11 000 6232		
	25	09 11 000 6133	09 11 000 6233		

Wire gauge	Ø	Stripping length
10 mm²	4.3	15.5 mm
16 mm²	5.5	15.5 mm
25 mm²	7.0	15.5 mm
for stranded wires acc. to IEC 60 228 class 5		

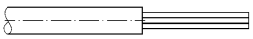
* Crimp zone acc. to DIN EN 46 235

Han® 200 A Crimp Module

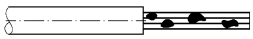
Features

- Crimp termination
- Contacts can be unlocked from the mating side
- Compatible with Han® 200 A module with axial screw termination

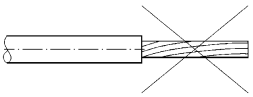
Assembly Details



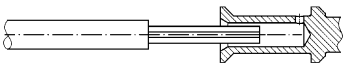
Cut the cable square and strip the insulation



The copper strands must be cleaned from dirt and oxide film



Copper strands must not be twisted



Insert the cable strand completely into the crimp ferrule.
Check insertion via inspection hole

Technical characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984 EN 50 124-1

Inserts

Number of contacts	1
Electrical data acc. to DIN EN 61 984	
Rated current	200 A
Rated voltage conductor - ground	1000 V
Rated voltage conductor - conductor	1000 V
Rated impulse voltage	8 kV
Pollution degree	3
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

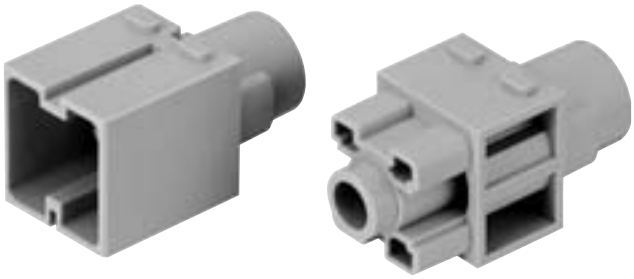
Contacts

Power contacts	
Material	Copper alloy
Surface	
- hard-silver plated	3 µm Ag
Contact resistance	≤ 0.3 mΩ
Crimp terminal	
- mm²	25 - 70 mm²
Max. insulation diameter	18 mm
Stripping length	22.5 mm

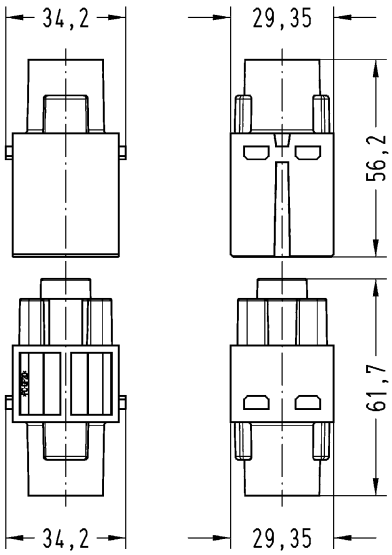
Han® 200 A Crimp Module 1000 V 200 A

Number of contacts

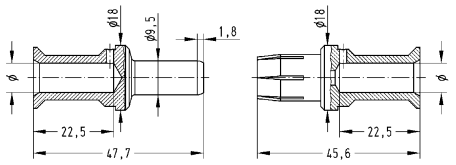
1



Identification	Part-Number Male insert (M)	Female insert (F)	Drawings	Dimensions in mm
Han® 200 A module Crimp terminal	09 14 001 3001	09 14 001 3101	M F	Contact arrangement: view from termination side



Identification	Wire gauge mm²	Part-Number Male contacts (M)	Female contacts (F)	Drawings	Dimensions in mm
Crimp contacts* Silver plated	25	09 11 000 6120	09 11 000 6220		
	35	09 11 000 6121	09 11 000 6221		
	50	09 11 000 6122	09 11 000 6222		
	70	09 11 000 6123	09 11 000 6223		



Wire gauge	Ø	Stripping length
25 mm²	7.0	22.5 mm
35 mm²	8.2	22.5 mm
50 mm²	10.0	22.5 mm
70 mm²	11.5	22.5 mm
for stranded wires acc. to IEC 60 228 class 5		

* Crimp zone acc. to DIN EN 46 235

Features

- Innovative Han-Quick Lock® termination technology
- Field assembly without special tools
- Compatible with Han® 3 A standard inserts
- Reduced wiring times
- Insert suitable for all hoods and housings using the Han® 3 A size
- Vibration resistant

Technical characteristics

Specifications	DIN EN 60 644-1 DIN EN 61 984
Inserts	
Number of contacts	3 + 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
- conductor - conductor	400 V
Rated impulse voltage	4 kV
Pollution degree	3
Termination	Han-Quick Lock®
Insulation resistance	≥ 10^{10} Ω
Material insert	Polycarbonate
Material seal	NBR
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
Contact resistance	≤ 1 mΩ
Han-Quick Lock®	
- mm²	0.5 – 2.5 mm²
- AWG	20 – 14
Maximum insilation cross section	ø = 3.6 mm
Plastic hoods/ housings	
Material	Polycarbonate RAL 7032
Locking element	Polyamide RAL 7032
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 65 / 67
Metal hoods/ housings	
Material	Die cast zinc alloy
Locking element	Stainless steel
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 44 IP 65/67 with sealing screw 09 20 000 9918

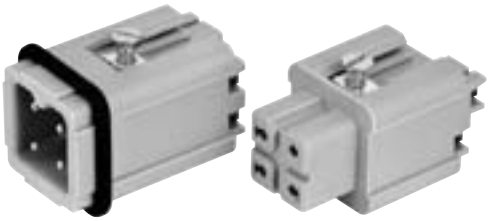
Han® 3 A Quick Lock

Han-Quick Lock®

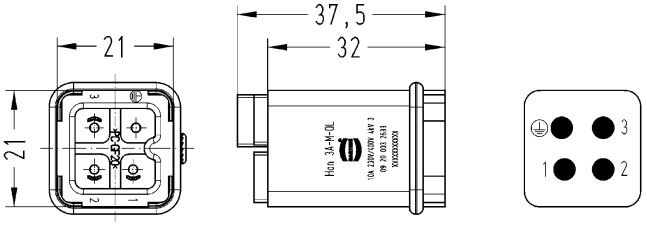
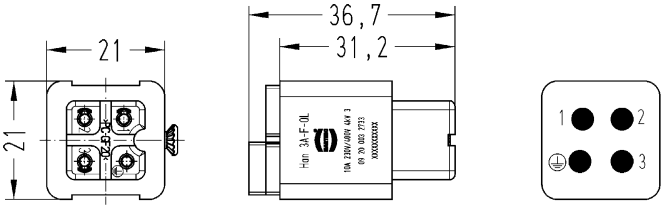
Number of contacts

3 + ⏚

Available by June 2010

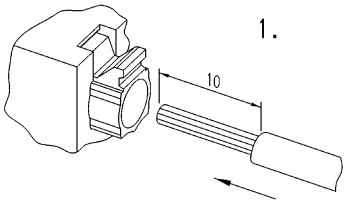


Inserts with Han-Quick Lock® Termination

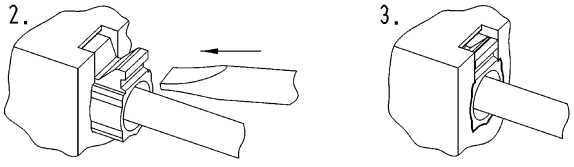
Identification	Part Number	Drawing	Dimensions in mm
Han® 3 A Quick Lock male insert	09 20 003 2633		
Han® 3 A Quick Lock female insert	09 20 003 2733		

Assembly Manual

Remove cable jacket and strip the fine stranded wires

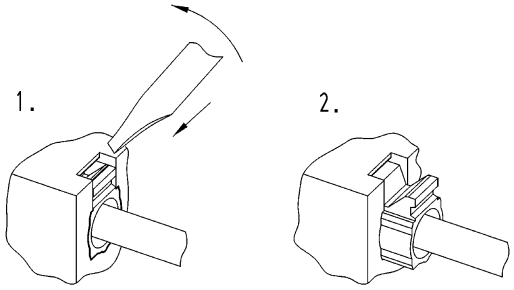


Push fine stranded wires into the Han-Quick Lock® contact and push the slide with a screw driver[1] until it comes to a stop



Removal Manual

Please insert the screw driver[1] at an angle of 45° into the opening and lever the slide out



[1] Screw driver: 0.4 x 2.5 mm

Han® 3 A Cable to Cable Housing

Available by August 2010

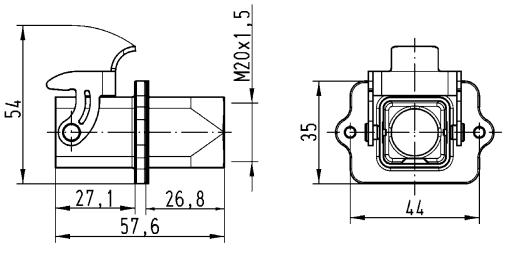
Features

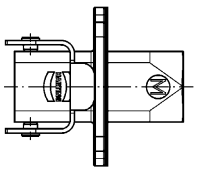
- Allows assembly from both sides within the cabinet
- Excellent electro magnetic compatibility

Technical characteristics

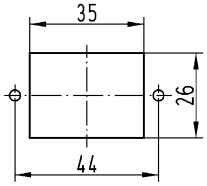
Material		Zinc die-cast
Surface	standard version	Powder-coated RAL 7037 (grey)
	EMC version	non coated, electrically conductive
Limiting temperatures		-40 °C ... 125 °C
Degree of protection acc. to EN 60 529 in locked position		IP 44
		IP 65/67 with use of sealing screw 09 20 000 9918
Seal		NBR

Identification	Part Number	M	Drawing	Dimensions in mm
Cable to cable housing	19 20 003 1120	M20		
Cable to cable housing for higher EMC requirements	19 62 003 1120	M20		





Panel cut out



Han® 3 A Angled Bulkhead Mounted Housing

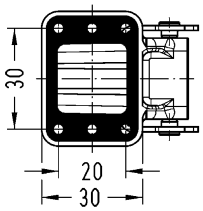
Features

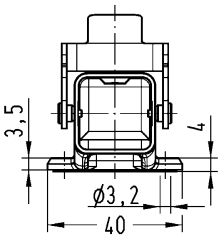
- Fixing with 4 screws for maximum security
- Large cabling space
- Excellent electro magnetic compatibility

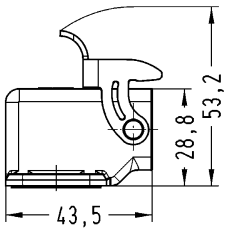
Technical characteristics

Material		Zinc die-cast
Surface	standard version	Powder-coated RAL 7037 (grey)
	EMC version	non coated, electrically conductive
Limiting temperatures		-40 °C ... 125 °C
Degree of protection acc. to EN 60 529 in locked position		IP 44
		IP 65/67 with use of sealing screw 09 20 000 9918
Seal		NBR

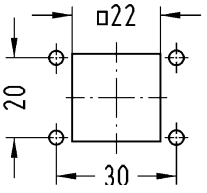
Identification	Part Number	Drawing	Dimensions in mm
Angled bulkhead mounted housing	09 20 003 0810		
Angled bulkhead mounted housing for higher EMC requirements	09 62 003 0810		







Panel cut out



Han® 3 HPR

Available by April 2010

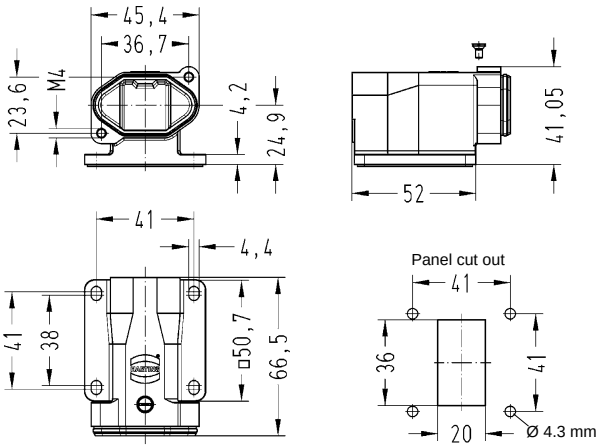
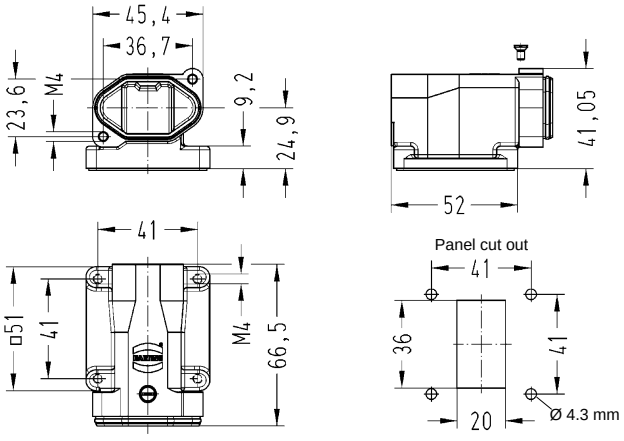
Angled bulkhead mounted housing,
long construction

Features

- Long construction, therefore large cabling space
- Also suitable for Han-Quintax® inserts
- Suitable for extreme environmental conditions
- Highly EMC resistant
- For interfaces, that have to be protected and shielded

Technical characteristics

Material		Zinc die-cast
Surface:	Powder-coated	RAL 9005 (black) RoHS conform
	Black chromate	not RoHS conform
Tightening torque for Fixing screws (M4)		min. 1 Nm
Limiting temperatures		-40 °C ... 125 °C
Degree of protection acc. to EN 60 529 in locked position		IP 68

Identification	Part-Number	Drawing	Dimensions in mm
Angled bulkhead mounted housing, long construction			
With open bottom and feed through hole for fixing screws			
 black chromate	09 40 003 0951		
powder-coated	09 40 703 0951		
With open bottom and tapped blind hole for fixing screws			
 black chromate	09 40 003 0953		
powder-coated	09 40 703 0953		

Han® 3 HPR

Available by April 2010

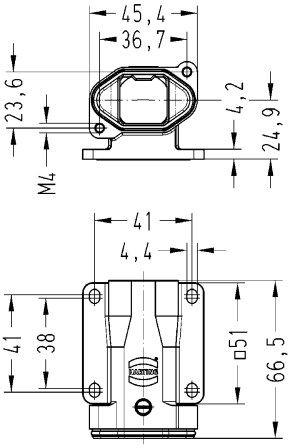
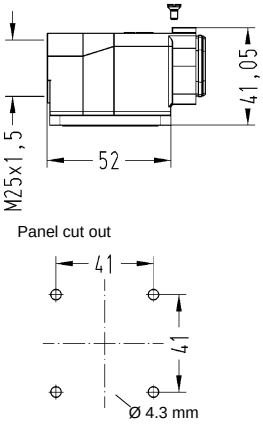
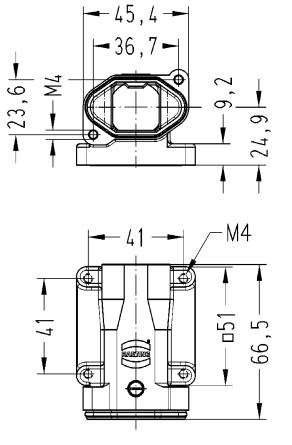
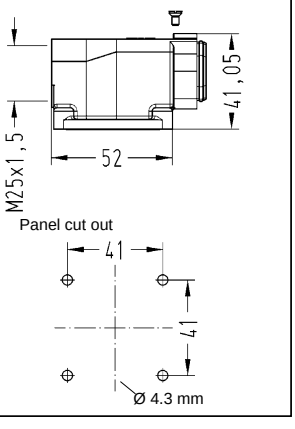
Surface mounted housing
with top entry, long construction

Features

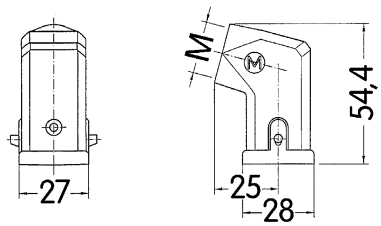
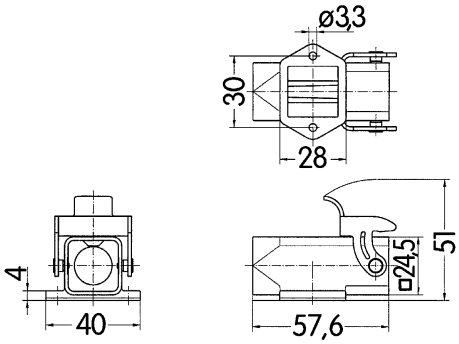
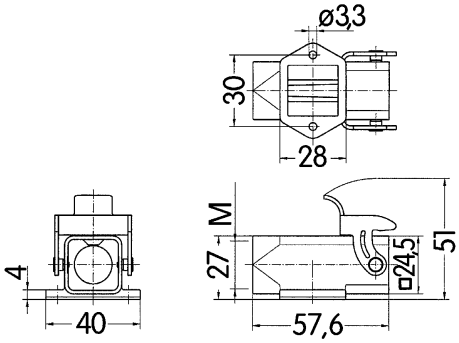
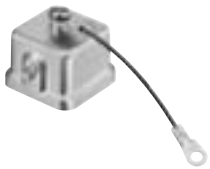
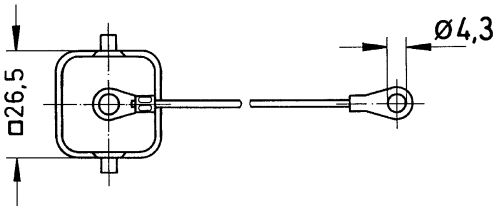
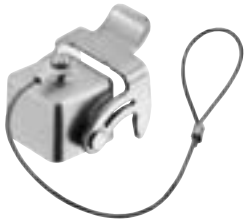
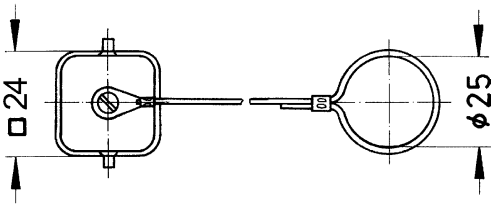
- Long construction, therefore large cabling space
- Also suitable for Han-Quintax® inserts
- M25 cable entry
- Suitable for extreme environmental conditions
- Highly EMC resistant
- For interfaces, that have to be protected and shielded

Technical characteristics

Material		Zinc die-cast
Surface:	Powder-coated	RAL 9005 (black) RoHS conform
	Black chromate	not RoHS conform
Tightening torque for Fixing screws (M4)		min. 1 Nm
Limiting temperatures		-40 °C ... 125 °C
Degree of protection acc. to EN 60 529 in locked position		IP 68

Identification	Part-Number	M	Drawing	Dimensions in mm
Surface mounted housing with top entry long construction				
With closed bottom and feed through hole for fixing screws				
 black chromate	19 40 003 0951	25		
powder-coated	19 40 703 0951	25		
With closed bottom and tapped blind hole for fixing screws				
 black chromate	19 40 003 0953	25		
powder-coated	19 40 703 0953	25		

Available by July 2010

Identification	Part-Number	M	Drawing	Dimensions in mm
Hood				
side entry	19 44 003 1640	20		
with glued seal	19 44 003 1643	20		
				
Bulkhead mounted housing	19 44 003 0801	–		
			 Panel cut out 22 x 22 mm	
Surface mounted housing	19 44 003 1250	20		
side entry				
				
Cover	19 44 003 5426[2]	–		
for housings	19 44 003 5425[1]	–		
				
Cover	19 44 003 5422[2]	–		
for hoods	19 44 003 5421[1]	–		
				

[2] for mounted female insert, [1] for mounted male insert

Han-INOX® 3 A

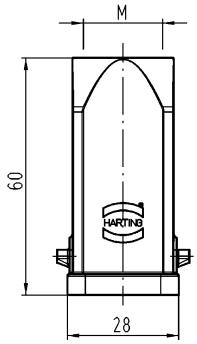
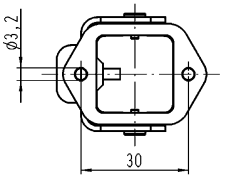
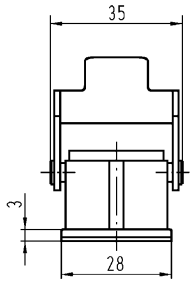
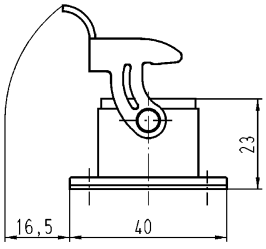
Stainless steel hoods and housings

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
- Suitable for all standard inserts that fit into size Han® 3 A

Technical characteristics

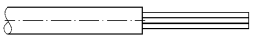
Material	Stainless steel
Seal	NBR
Limiting temperatures	-40 °C ... +125 °C
Protection degree acc. to DIN EN 60 529 in locked position	IP 44 IP 65 / IP 67 with use of sealing screw 09 20 000 9918
Locking lever	Stainless steel

Identification	Part-Number	M	Drawing	Dimensions in mm
Hood				
top entry	19 44 003 1440	20		Panel cut out 22 x 22 mm 
with glued seal	19 44 003 1443	20		
				
Bulkhead mounted housing				
with 1 metal locking lever	19 44 003 0301	–		
				

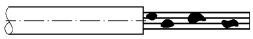
Features

- Crimp termination
- Designed for thick cable insulations
- For crimp dies acc. to DIN 46 235
- For crimping tools with 13 t pressing force

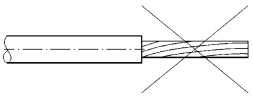
Assembly Details



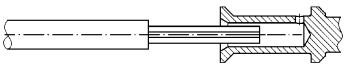
Cut the cable square and strip the insulation



The copper strands must be cleaned from dirt and oxide film



Copper strands must not be twisted



Insert the cable strand completely into the crimp ferrule.
Check insertion via inspection hole

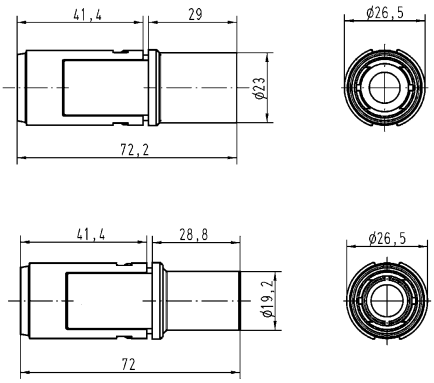
Technical characteristics

Specifications	DIN EN 60 664-1 DIN EN 61 984 EN 50 124-1
Inserts	
Electrical data acc. to DIN EN 61 984	
Rated current	250 A
Rated voltage	2000 V
Rated impulse voltage	12 kV
Pollution degree	3
Insulation resistance	≥ 10^{10} Ω
Material	PC
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	≥ 500 mating cycles
Contacts	
Power contacts	
Material	Copper alloy
Surface	
- hard-silver plated	3 µm Ag
Contact resistance	≤ 0.3 mΩ
Crimp terminal	
- mm²	35 - 70 mm²
Max. insulation diameter	18 mm
Crimp dies	acc. to DIN 46 325
Pressing force requirement	130 kN

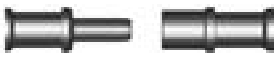
For more information to create different contact arrangements please refer to main catalogue HARTING Industrial Connectors Han® chapter 14, from page 06 on.

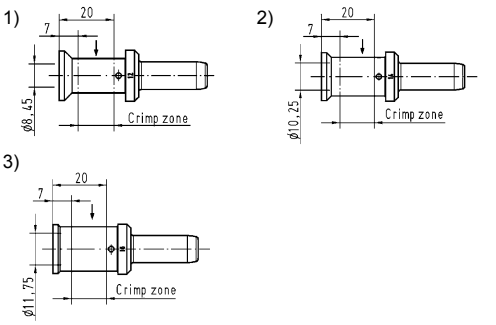
Available by August 2010

Identification	Part-Number Male insert (M)	Female insert (F)	Drawings	Dimensions in mm
Han® HC Modular 250 Crimp terminal	09 11 001 3021	09 11 001 3121	M F	



Identification	Wire gauge mm²	Part-Number Male contacts (M)	Female contacts (F)	Drawings	Dimensions in mm
Crimp contacts* Silver plated	35[1)]	09 11 000 6127	09 11 000 6227	1)	
	50[2)]	09 11 000 6128	09 11 000 6228	2)	
	70[3)]	09 11 000 6129	09 11 000 6229	3)	
Frames for 24 HPR hoods/housings		09 11 000 9925	09 11 000 9926		
Tools		09 11 000 9925	09 11 000 9926		





Wire gauge	Tool identification	Stripping length
35 mm² 50 mm² 70 mm²	12 14 16	22 mm 22 mm 22 mm

* for stranded wire acc. to IEC 60 228 class 5

* Crimp zone acc. to DIN EN 46 235

Han-Power® S with 1x Han® Q 4/2 with Power Supply 24 V

Features

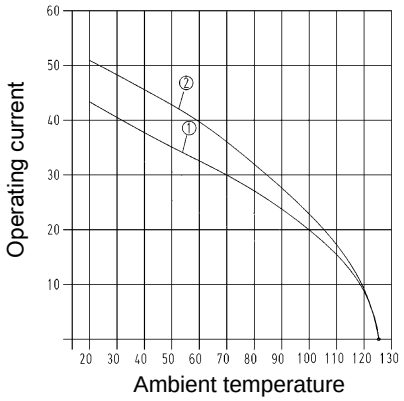
- 6 IDC's + PE for 4.0 mm² to 6.0 mm² wires
- No interruption of the energy supply
- Space-saving and compact design
- Leading protective ground within the insert
- Assembly with standard tools
- 24 V power supply integrated
- Secondary connection 2 x M12

Assembly Details

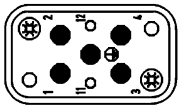
The Han-Power® S connector is suitable for the assembly of serial power bus. Having assembled the energy supply Han-Power® S can be inserted at any place of the power cable. The cable mantle has to be removed, the conductor is placed without interruption in the IDC.
Han-Power® S is suitable for cables with single strands manufactured acc. to DIN VDE 0281/ DIN EN 60 228 with wire gauges of 4.0 mm² up to 6 mm². For the distribution of the device Han-Compact® hoods or cable to cable housings are used. This power supply can be used with Han-Compact® hood.

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 according to DIN EN 60 512-5



① Han® Q 4/2 Wire gauge: 4 mm²
② Han® Q 4/2 Wire gauge: 6 mm²



Han® Q 4/2 fully loaded
with wire gauge 4 x 6 mm²

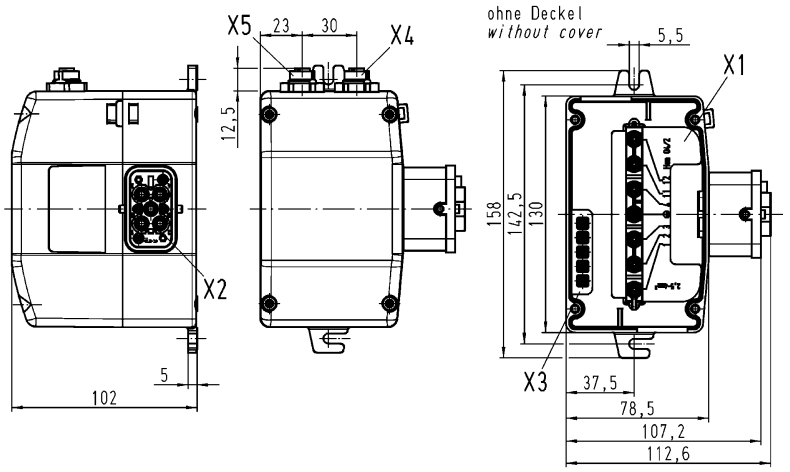
Technical characteristics

Specifications	DIN EN 61 984 DIN EN 60 664-1
Han-Power® S	
Number of contacts	
- Power contacts	4 + PE
- Signal contacts	2
Electrical data acc. to EN 61 984	
Power side	**40 A 400/690 V 6 kV 3**
Rated current	40 A
Rated voltage conductor - ground	400 V
Rated voltage conductor - conductor	690 V
Rated impulse voltage	6 kV
Pollution degree	3
Signal side	**10 A 250 V 4 kV 3**
Rated current	10 A
Rated voltage	250 V
Rated impulse voltage	4 kV
Pollution degree	3
Rated voltage acc. to UL/CSA	600 / 250 V
Insulation resistance	≥ 10^{10} kΩ
Material	polycarbonate
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	
- mating cycles	≥ 500
Degree of protection acc. to DIN EN 60 529	IP 65

Cables	
Design of conductor acc. to	DIN VDE 0281 DIN EN 60 228
Wire gauge	4 mm²
- Number of single strands	56 x 0.3 mm ∅
- Outer diameter	4.2 mm
Wire gauge	6 mm²
- Number of single strands	84 x 0.3 mm ∅
- Outer diameter	4.8 mm
Technical data power supply	
Input data	90 V ... 264 V AC (50 Hz / 60Hz) 100 V … 300 V DC
Output data	24 V DC / 2 A (adjustable from 23 V ... 29 V) Pre-setting: 24.5 V ± 0,5 %
Max. operating temperature	-20°C ... 85°C
Efficiency	>86% (at 230 V AC)
Reverse voltage	max 32 V
Tide overtime for power-fail	>20 ms
Low voltage system	SELV / PELV
Additionally features	short-circuit proof open-circuit proof automatic switch off in the case of short-circuit

Green LED marks normal operating condition.

Han-Power® S 1x Han® Q 4/2 with Power Supply 24 V

Identification	Part-Number	Drawings	Dimensions in mm
Han-Power® S with 1 x Han® Q 4/2 with power supply 24 V	09 12 008 4610		

Han-Power® S with 1 x Han® Q 4/2 with Maintenance Switch

Features

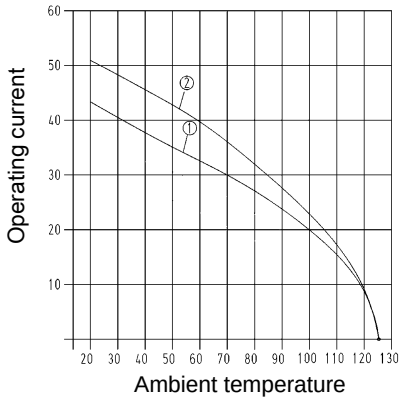
- 6 IDC's + PE for 4.0 mm² to 6.0 mm² wires
- No interruption of the energy supply
- Space-saving and compact design
- Leading protective ground within the insert
- Assembly with standard tools
- Line breakout switch

Assembly Details

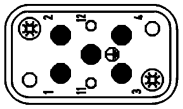
The Han-Power® S connector is suitable for the assembly of serial power bus. Having assembled the energy supply Han-Power® S can be inserted at any place along the power cable. The cable outer sheath has to be removed, the conductor is placed without interruption in the IDC.
Han-Power® S is suitable for cables with single strands manufactured acc. to DIN VDE 0281/ DIN EN 60 228 with wire gauges of 4.0 mm² to 6.0 mm². For the distribution of the device Han-Compact® hoods or cable to cable housings are used.
This power supply can be used with Han-Compact® hood.

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 according to DIN EN 60 512-5



① Han® Q 4/2 Wire gauge: 4 mm²
② Han® Q 4/2 Wire gauge: 6 mm²

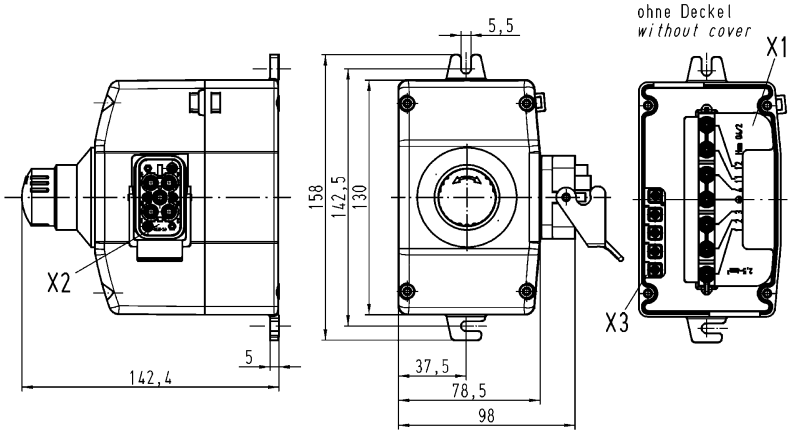


Han® Q 4/2 fully loaded
with wire gauge 4 x 6 mm²

Technical characteristics

Specifications	DIN EN 61 984 DIN EN 60 664-1
Han-Power® S	
Number of contacts	
- Power contacts	4 + PE
- Signal contacts	2
Electrical data acc. to EN 61 984	
Power side	**40 A 400/690 V 6 kV 3**
Rated current	40 A
Rated voltage conductor - ground	400 V
Rated voltage conductor - conductor	690 V
Rated impulse voltage	6 kV
Pollution degree	3
Signal side	**10 A 250 V 4 kV 3**
Rated current	10 A
Rated voltage	250 V
Rated impulse voltage	4 kV
Pollution degree	3
Rated voltage acc. to UL/CSA	600 / 250 V
Insulation resistance	≥ 10^{10} kΩ
Material	polycarbonate
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	
- mating cycles	≥ 500
Degree of protection acc. to DIN EN 60 529	IP 65
Cables	
Design of conductor acc. to	DIN VDE 0281 DIN EN 60 228
Wire gauge	4 mm²
- Number of single strands	56 x 0.3 mm ∅
- Outer diameter	4.2 mm
Wire gauge	6 mm²
- Number of single strands	84 x 0.3 mm ∅
- Outer diameter	4.8 mm
Technical data of switches	
Max. operating temperature	-25°C … 55°C
Mechanical life	50000 operations
Electrical life	50000 operations
Positive opening NC contact	acc. to EN60947-5-1, appendix. K
Electrical data acc. to IEC/EN 60947-5-1 (VDE 0660 sect. 200) for emergency stop switches	
Alternating current	
Utilisation category	AC15 A600
Rated insulation voltage	600 V
Rated operating voltage	240 V / 380 V
Rated operating current	3 A / 1.9 A
Direct current	
Utilisation category	DC13 Q300
Rated insulation voltage	400 V
Rated operating voltage	250 V / 125 V / 60 V / 24 V
Rated operating current	0.27 A / 0.55 A / 1 A / 2 A
Electrical data acc. to IEC/EN 61058-1 (VDE 0630 sect. 1) for switch-disconnectors	
Rated voltage	250 V~ / 400 V~
Rated current	16 (10) A / 10 (5) A

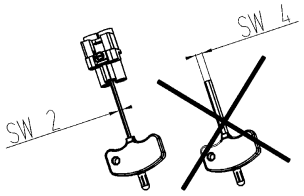
Han-Power® S 1 x Han® Q 4/2 with Maintenance Switch

Identification	Part-Number	Drawings	Dimensions in mm
Han-Power® S with 1 x Han® Q 4/2 with maintenance switch	09 12 008 4620		

Features

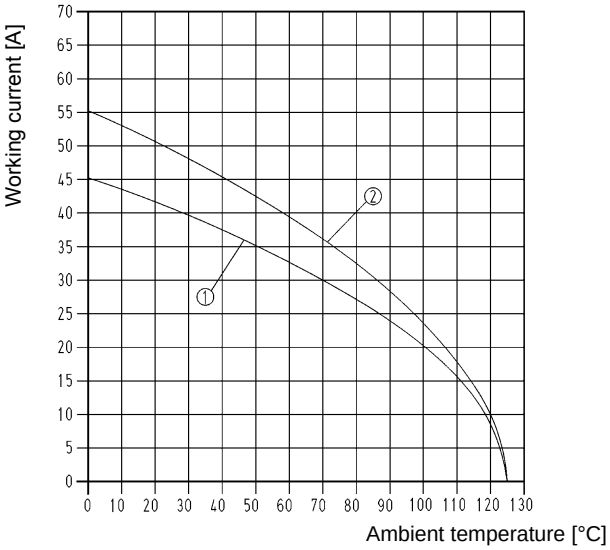
- Field assembly without special tools
- Compatible with Han® Q 4/2 standard inserts with crimp terminations
- Reduced wiring times
- Inserts suitable for standard plastic and metal hoods/housings with additional PE contact from the Han-Compact® size
- Space-saving and compact design
- With or without Han-Quick Lock® signal contacts as an option

Attention
- For termination please use only hexagonal screw driver with wrench size SW 2.
- If PE contact is not used:
  Please screw the PE contact maximal on both sides clockwise with a hexagonal screwdriver, wrench size SW 2.



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 according to DIN EN 60 512-5.



① Wire gauge: 4 mm²
② Wire gauge: 6 mm²

Technical characteristics

Specifications	DIN EN 60 644-1 DIN EN 61 984
Inserts	
Number of contacts	4/2 + PE
Electrical data acc. to DIN EN 61 984	
Power area	**40 A 400/690 V 6 kV 3**
Rated current	40 A
Rated voltage conductor - ground	400 V
Rated voltage conductor - conductor	690 V
Rated impulse voltage	6 kV
Pollution degree	3
Signal area	**10 A 250 V 4 kV 3**
Rated current	10 A
Rated voltage	250 V
Rated impulse voltage	4 kV
Pollution degree	3
Insulation resistance	≥ 10^{10} Ω
Material insert	Polycarbonate
Material seal	NBR
Limiting temperatures	-40 °C ... +125 °C
Flammability acc. to UL 94	V 0
Mechanical working life	
- mating cycles	≥ 500
Contacts	
Material	Copper alloy
Surface	
- hard silver plated	3 µm Ag
Power contacts	
Contact resistance	≤ 0.3 mΩ
Axial screw termination	
- mm²	4 ... 10 mm²
- AWG	12 ... 8
max. Insulation cross section	5 mm
Stripping length	8 mm^{+1}
max. Tightening tourque	1.8 Nm
Signal contacts	
Contact resistance	≤ 3 mΩ
Han-Quick Lock®	
- mm²	0.25 ... 1.5 mm²
- AWG	23 ... 16
max. Insulation cross section	3 mm
Stripping length	10 mm^{+1}
Hoods / housings	
Material plastic	Polycarbonate
Material metal	Zinc die-cast
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 65

Han® Q 4/2 Axial screw

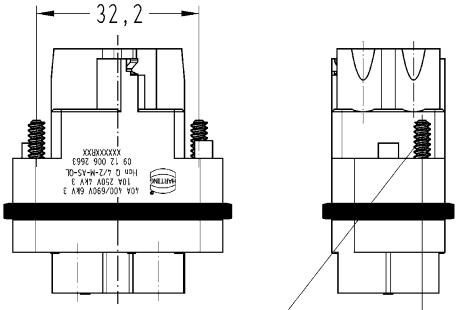
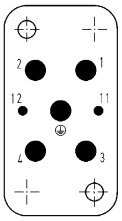
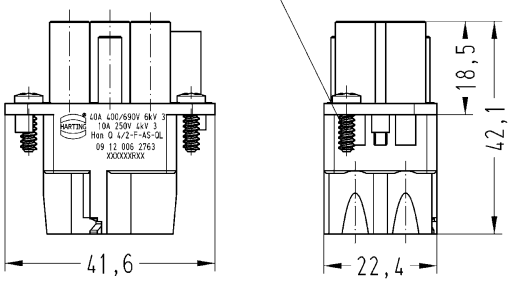
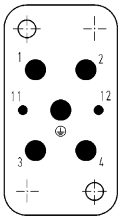
Han-Quick Lock®

Number of contacts

4/2 + ⏚

Available by August 2010

Inserts with axial screw termination
Signal contacts with Han-Quick Lock® termination

Identification	Part-Number	Drawing	Dimensions in mm
Han® Q 4/2 Quick Lock			
Male insert	09 12 006 2663		contact arrangement view termination side 
Male insert without Han-Quick Lock® signal contacts	09 12 006 2666		
Female insert	09 12 006 2763		
Female insert without Han-Quick Lock® signal contacts	09 12 006 2766		

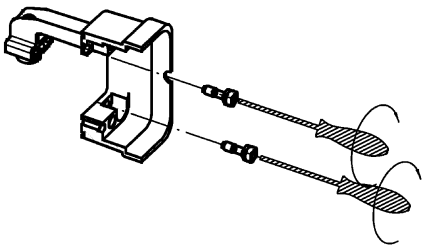
Features

- Metal hood in compact and space saving design
- High degree of flexibility due to two-part construction
- Additional and separate PE contact on the hood
- Suitable for all inserts as used in the Han-Compact® series
- Standard and EMC version

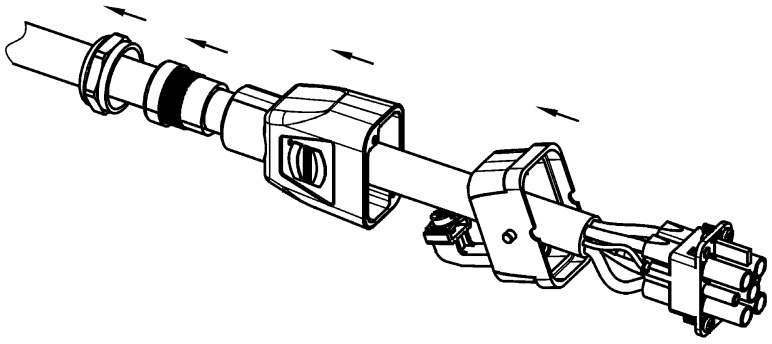
Technical characteristics

Material	Zinc die cast
Surface	black powder coated matt nickel plated black chromate
Hoods/housings seal	NBR
Limiting temperatures	-40 °C ... +125 °C
Protection degree in locked position	IP 65
Mechanical working life	≥ 500 mating cycles
Wire gauge PE conductor	10 mm² / AWG 8
Tightening torque PE contact	1.2 Nm

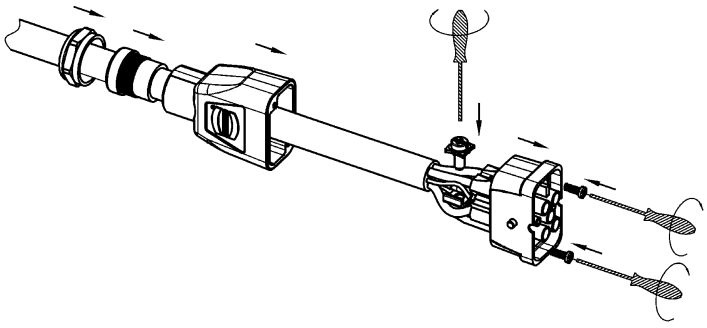
Assembly Manual



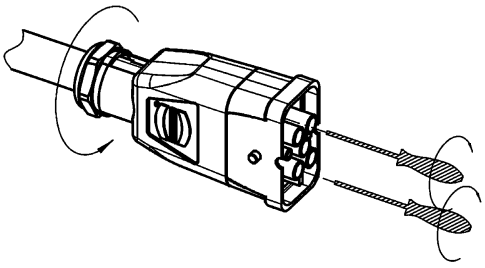
1. Pre-assemble fixing screws in the lower part



2. Push cable gland and two-part hood onto the cable, prepare the conductor and assemble the insert

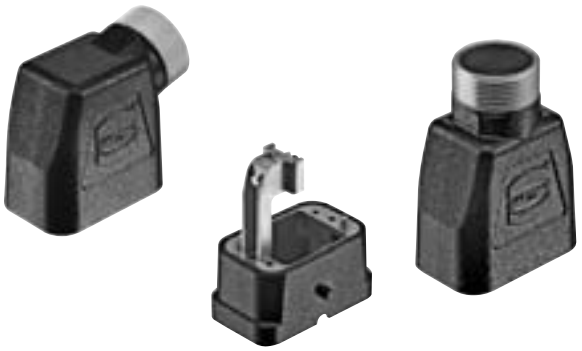


3. Connect PE conductor to the separate PE contact
Fix insert with 2 screws within the lower part of the hood
Push upper part of the hood together with the cable gland

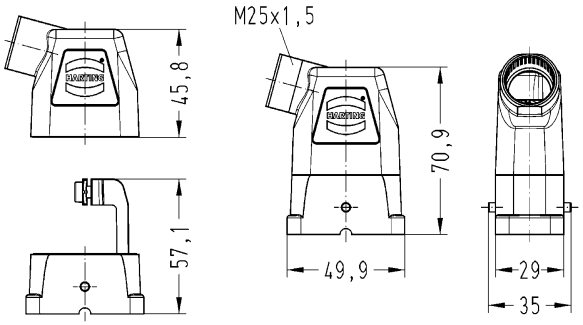
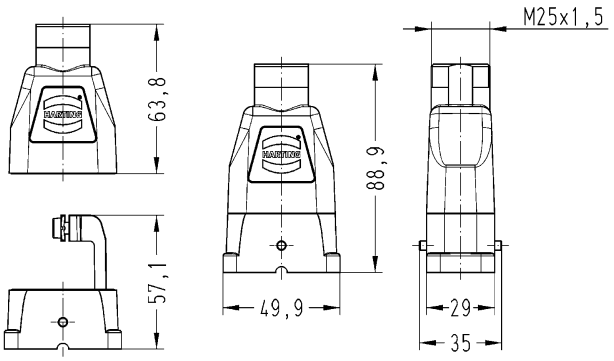


4. Fix the two parts of the hood with the pre-assembled screws and screw the cable gland

Available by August 2010



Metal hoods in straight and angled version

Identification	Part-Number	M	Drawing	Dimensions in mm
Hood side entry 	black powder coated 19 12 708 0511	25		
	matt nickel plated 19 12 008 0512	25		
	black chromate 19 12 008 0511	25		
Hood top entry 	black powder coated 19 12 708 0411	25		
	matt nickel plated 19 12 008 0412	25		
	black chromate 19 12 008 0411	25		

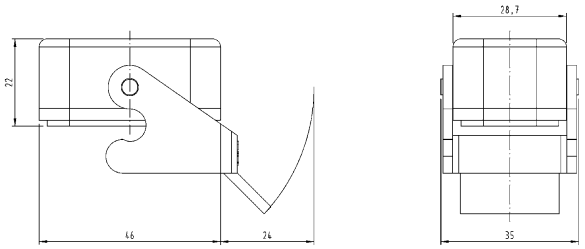
Thermoplastic Protection Cover

Features

- Suitable for Han-Compact® plastic hoods and Han-Power® S with female insert

Technical characteristics

Material	Polycarbonate
Locking lever	Polyamide
Hood/housing seal	NBR
Limiting temperatures	-40 °C ... 125 °C
Protection degree acc. to DIN EN 60 529 in locked position	IP 65
Flammability acc. to UL 94	V 0

Identification	Part-Number	Drawing	Dimensions in mm
Protection cover for plastic hoods 	61 83 401 0070		

Crimping Tool CP 600

Pneumatic cimping tool

Features

- Pneumatic crimping tool for Han D®, Han E® and Han® C contacts for wire gauges of 0.14 mm² up to 10 mm²
- Hexagonal crimp
- Easy handling with snap closing crimp dies
- Foot switch and table fixing as an option
- RoHS conforming

Technical characteristics

Specification	IEC 60 352-2
Dimensions:	280 mm x 65 mm (length x diameter)
Pneumatic pressure:	6 - 8 bar (For crimping of Han® C contacts 8 bar is necessary)

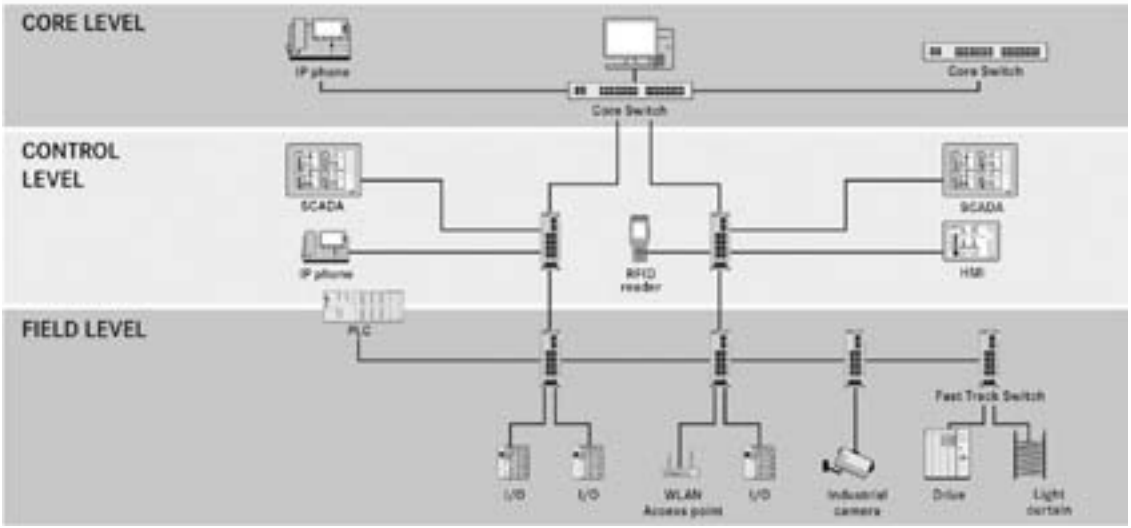
Identification	Part-Number	Depiction
Crimping tool CP 600 for Han D®, Han E®, Han® C	09 99 000 0810	
Crimp dies 0.14 - 4 mm² for Han D®, Han E®, Han® C	09 99 000 0813	
Crimp dies 6 mm² / 10 mm² for Han® C	09 99 000 0814	
Foot switch	09 99 000 0811	
Table fixing	09 99 000 0812	

Introduction

Fast Track Switching

Automation IT is a communication platform that serves all applications within an industrial manufacturing firm. By connecting all applications, the uniform platform network increases the efficiency of company workflows.
Automation IT supports Standard Ethernet at all levels – including the office, management and control levels, and also in the field.

Automation IT – the platform for all applications



The currently available switching technology used in IEEE 802.3 Ethernet, however, does not offer the level of determinism required for automation applications. That is why automation solutions that only implement standard (unchanged) Ethernet require a restricted network design in order to match automation performance levels. Thus there are limited options for the network topology or segmentation – to the extent that IT communications are not allowed within the automation environment.

Automation requires for Industrial Ethernet:

- top performance
- safety
- flexible topology
- and above all determinism

Standard Ethernet switching is based on store-and-forward switching and this introduces long latency times for the frames. But even more serious is the tight dependency on the degree of network traffic: if only automation frames are present in the network, then these frames can be transmitted with no problems. But additional data traffic on the network will compete with the automation frames for forwarding and can thus delay these frames.

Standard switching uses the QoS (Quality of Service) option to influence this. If multiple frames are located in the switch queue, then the frames with the highest priority are forwarded first. But it is still possible for other data frames with priorities equal to or greater than the automation frames to be present. And even when the automation frame has the highest priority, if a data frame is in the process of being sent, the next automation frame must wait until 1522 bytes have been completely sent. Only then is the path open for the automation frame. The same delay could then happen on the next network switch once more. So these wait delays can quickly add up to times which are critical for automation applications. This behaviour can be seen as stochastically random. Most of the time the transfer times will be sufficient. But it only takes one delayed frame to trigger a problem.

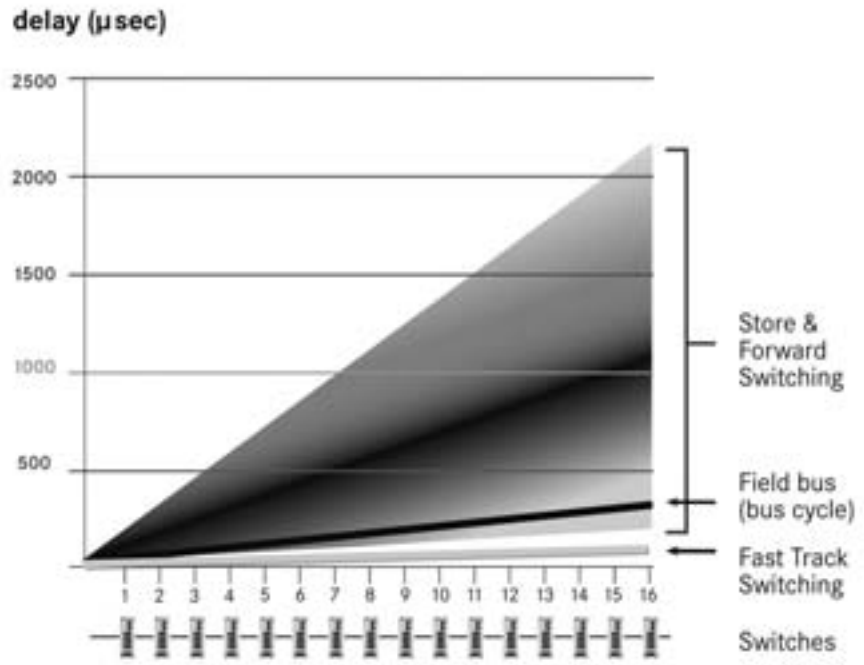
Several Ethernet-based methods have identified this problem and eliminated it. However such methods require each network node to implement specialized hardware for communication.

With the development of Fast Track Switching (FTS), HARTING has found a new path. FTS switches solve the performance and deterministic problems while all other nodes require only the standard Ethernet interfaces.

Fast Track Switching uses three key features to achieve this:

1. Preferred frames (such as automation frames) are detected first. The switch can focus on any specific part of the Ethernet header for special properties. For example, PROFINET frames are Ethertype 8892. This type is then monitored and evaluated if the application needs to accelerate their transmission.
2. These key frames get fast-track forwarding – a cut-through process instead of store-and-forwarding. As a result, the switch latency time is minimized.
3. If the switch port needed for the forwarding is busy at that moment sending a data frame, then the data frame is buffered and the forwarding is aborted so that the automation frame can be forwarded immediately. Only after the automation frame is sent is a second attempt made to send the data frame.

A simple example serves to illustrate the superior performance of this Fast Track Switching:



An automation frame must travel on a path through 16 switches. The transmission time for the Ethernet frames under standard switching rules is tightly dependent on the network load. Thus the transmission time for the frames can vary widely according to the network load: a few arrive quite quickly, the majority have an average time, and a few frames travel quite slowly.

As a reference point, a comparable cycle for one of the Field bus protocols used widely in automation applications is shown in black. This protocol has state-of-the-art levels of determinism and transfer speeds. Sometimes the data arrives just as fast at its destination when standard switching is used – but only sometimes.

Fast Track Switching, on the contrary, exhibits excellent results and is deterministic.

Now it has finally become possible to setup a universal **Automation IT** communications platform that reaches into the field level. And finally automation protocols which rely on standard unchanged Ethernet (such as PROFINET RT or EtherNet/IP) can deliver the high performance needed for automation applications.

HARTING has also integrated this groundbreaking technology into production models available for the user:
The configurable FTS 3100 model offers an easy-to-configure FTS solution for users. Many switch options can be customized to fit your application – even by those who are not trained network administrators.

And with the fully managed switches from the FTS 3000 line, HARTING combines FTS technology with all of the well-known functions of modern managed industrial Ethernet Switches.

Ha-VIS FTS 3000

Ethernet Switch
Ha-VIS FTS 3100s-A

10-port Ethernet Switch with Fast Track Technology configurable via USB

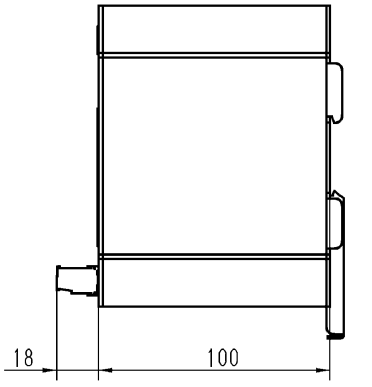
Advantages

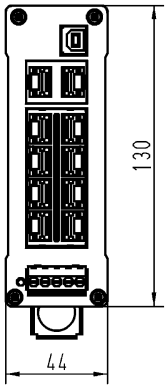
- Identification, acceleration and preference for automation frames
- Deterministic data transfer for selected profiles
- Ethernet Switch acc. IEEE 802.3, individually configurable via USB
- Fast Track Switching Mode, Store and Forward Switching mode
- Robust metal housing, RoHS compliant

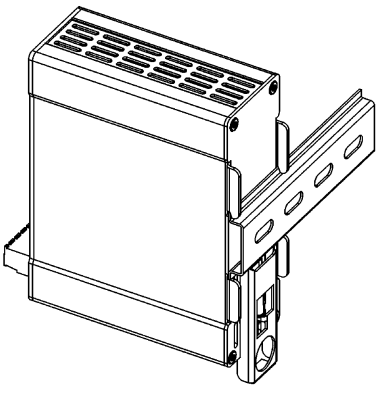
General Description

The Fast Ethernet Switches of the product family Ha-VIS FTS 3000 can identifiy automation profiles (e.g PROFINET, EtherNet/IP, Modbus TCP and customized profiles), accelerate their data transmission and prefer them. They are suitable for industrial applications.
The product family enables the connection of up to 10 network devices over shielded Twisted Pair. It supports Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s).
The Ethernet Switch works as an unmanaged switch and can work in Fast Track Switching mode and in Store and Forward mode. It supports Auto-crossing, Auto-negotiation and Auto-polarity.

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS FTS 3100s-A			
FTS Ethernet Switch with 10 ports RJ45	20 78 110 1000		
for top-hat mounting rail			







Technical characteristics

Features

- Auto-crossing
- Auto-negotiation
- Auto-polarity
- Store and Forward Switching mode
- Fast Track Switching mode

Ethernet Interface

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

Parameterisation via USB

- Auto-negotiation
- 10/100 Mbit/s
- Full/Half Duplex
- Port enable/disable
- Port mirroring
- Flow Control
- FTS Port enable/disable
- Industrial Profile (PROFINET, EtherNet/IP, Modbus TCP, customized)
- NRT Bandwidth Control

Power Supply

Power supply	24 V DC
Permissible range	12 V ... 48 V
Current consumption	270 mA (at 24 V DC)
Diagnostics (via LED)	• Power supply in permissible range: Green • Undervoltage: Red
Terminating Power supply	5-pole pluggable screw contact, for redundant power supply

Design features

Material of housing	Aluminium, anodized
Dimensions (W x H x D)	44 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 • Panel mounting, vertical assembly
Weight	approx. 0.5 kg

Environmental conditions

Operating temperature	0 °C ... +55 °C
Storage temperature	-40 °C ... +85 °C
Relative humidity	30 % ... 95 % (non-condensing)

Ha-VIS FTS 3000

Available by September 2010

Ethernet Switch
Ha-VIS FTS 3100-A

10-port Ethernet Switch with Fast Track Technology managed

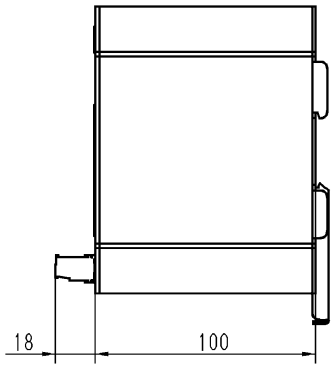
Advantages

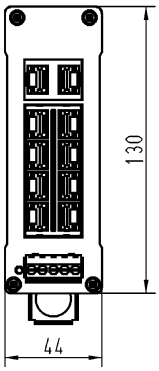
- Identification, acceleration and prefe-rence for automation frames
- Deterministic data transfer for selected profiles
- Managed Ethernet Switch
- Fast Track Switching Mode, Store and Forward Switching mode
- Robust metal housing, RoHS compliant

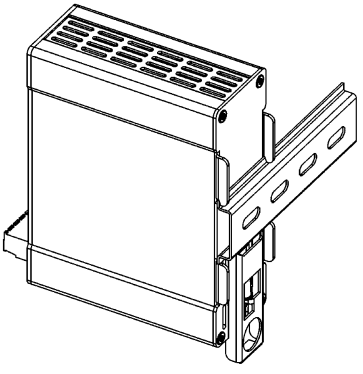
General Description

The Fast Ethernet Switches of the product family Ha-VIS FTS 3000 can identifiy automation profiles (e.g PROFINET, EtherNet/IP, Modbus TCP and customized profiles), accelerate their data transmission and prefer them. They are suitable for industrial applications.
The product family enables the connection of up to 10 network devices over shielded Twisted Pair. It supports Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s).
The Ethernet Switch works as a managed switch and can work in Fast Track Switching Mode and in Store and Forward mode. It supports Auto-crossing, Auto-negotiation and Auto-polarity.

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS FTS 3100-A			
FTS Ethernet Switch with 10 ports RJ45	20 78 110 4000		
for top-hat mounting rail			







Technical characteristics

Features
- Auto-crossing
- Auto-negotiation
- Auto-polarity
- Store and Forward Switching mode
- Fast Track Switching mode

Ethernet Interface

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

Basic functions

Parameterisation via USB	• 10/100 Mbit/s • Full/Half Duplex • Port enable/disable • Port mirroring • Flow Control • Industrial Profile (PROFINET, EtherNet/IP, Modbus TCP, customized) • NRT Bandwidth Control
Management functions	• STP, RSTP • IGMP Snooping with support for querier • Port Based VLANs • Alarm via email, SNMP traps • PROFINET diagnosis • DHCP Option 82 • Plugable Memory Card

Power Supply

Power supply	24 V DC
Permissible range	12 V ... 48 V
Current consumption	270 mA (at 24 V DC)
Diagnostics (via LED)	• Power supply in permissible range: Green • Undervoltage: Red
Terminating Power supply	5-pole pluggable screw contact, for redundant power supply

Design features

Material of housing	Aluminium, anodized
Dimensions (W x H x D)	44 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 • Panel mounting, vertical assembly
Weight	approx. 0.5 kg

Environmental conditions

Operating temperature	0 °C ... +55 °C
Storage temperature	-40 °C ... +85 °C
Relative humidity	30 % ... 95 % (non-condensing)

Ha-VIS eCon 4000 – Introduction and features

Ethernet Switch
Ha-VIS eCon 4000

Ethernet Switches, unmanaged,
for flat wall mounting

General Description

The Fast Ethernet Switches of the product family Ha-VIS eCon 4000 are recommended for use in the widest range of industrial applications and support both Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s). The product family enables the connection of up to 8 network devices over Twisted Pair cables.

The robust M12 interface shows its adantages especially in applications at risk of vibrations.

The Ha-VIS eCon 4000 Ethernet Switch product family, with its integrated LEDs, supports fast and easy network diagnosis. The Ha-VIS eCon Ethernet Switch operates as an Unmanaged Switch in Store and Forward Switching Mode and supports Auto-crossing, Auto-negotiation and Auto-polarity.

Features

- Ethernet Switch according to IEEE 802.3
- Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s)
- Auto-crossing
- Auto-negotiation
- Auto-polarity
- Store and Forward Switching Mode, non blocking
- Diagnostic LEDs (Link status, Data, Power)
- Mounting onto wall,
  optionally onto top-hat mounting rail

Advantages

- Robust metal housing and flat housing style
- EMC, temperature range and mechanical stability meet the highest demands
- Wide range for power supply input
- Wide range for type test according to EN 50 155 and EN 50 121-3-2

Application fields

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

Technical characteristics

Ethernet interface

Number of ports	8x 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
Maximum cable length	100 m (Twisted Pair; with Category 5 cable acc. to DIN EN 50 173-1)
Termination	M12 D-coding
Diagnostics (via LED)	
Link (per port)	• Status Link – ON • Data transfer (Act) – flashing • Data transfer rate (Speed) – 100 Mbit/s: Yellow / 10 Mbit/s: Green
PoE (per port)	• no PoE device – OFF • PoE device connected – Green • PoE device with failure – Red
Topology	Line, Star or mixed

Power supply

Input voltage		
Ha-VIS eCon 4080-BPoE1		
mode PoE	48 V DC (46 ... 55 V DC)	
mode non PoE	24 / 48 V DC (12 … 55 V DC)	
Termination	M12 A-coding, male, for redundant power supply	
Diagnostics (via LED)	Pwr X9 (switch) Power supply – Green	Pwr PoE (mode PoE) > 46 V DC – Green < 46 V DC – Red

Design features

Housing material	Metal (powder coated)
Dimensions (W x H x D)	130 x 166 x 50 mm
Degree of protection acc. to DIN 60 529	IP 40 / IP 30 (Ha-VIS eCon 4080-BPoE1 only)
Mounting	Wall mounting, flat
Weight	approx. 0.85 kg

Environmental conditions

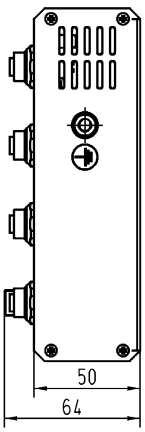
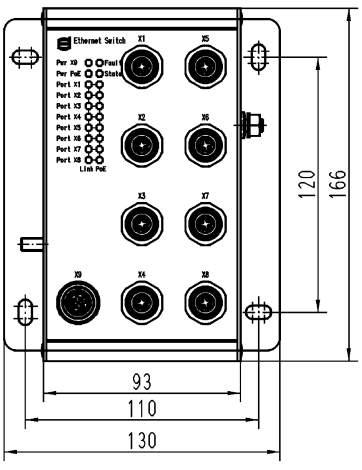
Operating temperature	–40 °C … +70 °C
Storage temperature	–40 °C … +85 °C
Relative humidity	10 % … 95 % (non-condensing)

Ha-VIS eCon 4000

Ethernet Switch
Ha-VIS eCon 4080-BPoE1
8-port PoE Ethernet Switch for flat installation

Unmanaged	IP 30	PROFINET compatible ☒	EtherNet/IP compatible ☐

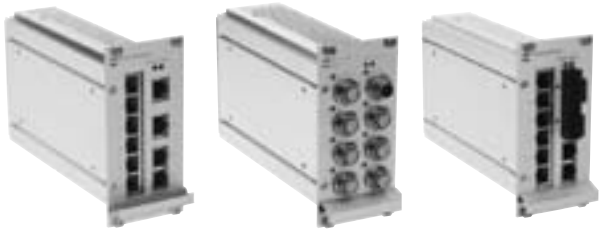
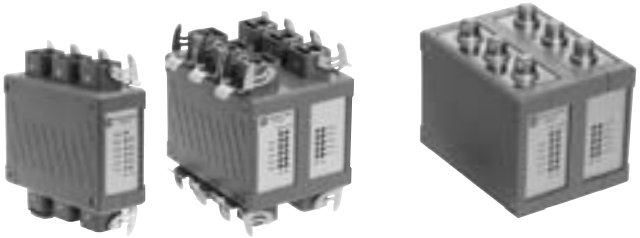
Number of ports, Copper / Termination	8x 10/100Base-T(X) / M12 D-coding / PoE supports 8 ports
Mode PoE	
Input voltage / Termination	48 V DC / M12 A-coding, male
Permissible range (min/max)	46 V … 55 V DC
Input current	max. 3.0 A (at 48 V DC, load 350 mA per port)
Mode Non-PoE	
Input voltage / Termination	24 / 48 V DC / M12 A-coding, male, for redundant power supply
Permissible range (min/max)	12 V … 55 V DC
Input current	approx. 150 mA (at 24 V DC)
Housing material	Metal (powder coated)
Dimensions (W x H x D)	130 x 166 x 50 mm
Weight	approx. 0.85 kg
Operating temperature	–40 °C … +70 °C
Approvals	cUL (in preparation)

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS eCon 4080-BPoE1 PoE Ethernet Switch with 8 ports M12 D-coding for wall mounting	20 77 208 3009		

Ha-VIS mCon Management Functions

Overview

The following management functions are available for these managed Ethernet Switches from HARTING:

Family	Type	Part number
Ha-VIS mCon 3000 	Ha-VIS mCon 3100-AV	20 76 110 4002
	Ha-VIS mCon 3100-AAV	20 76 110 4003
	Ha-VIS mCon 3061-ADV	20 76 107 4101
	Ha-VIS mCon 3063-ADV	20 76 109 4101
	Ha-VIS mCon 3082-ADV	20 76 110 4101
	Ha-VIS mCon 3061-AEV	20 76 107 4201
	Ha-VIS mCon 3063-AEV	20 76 109 4201
	Ha-VIS mCon 3082-AEV	20 76 110 4201
	Ha-VIS mCon 3082-AFV	20 76 110 4102
Ha-VIS mCon 4000 	Ha-VIS mCon 4080-B1V	20 77 208 4001
	Ha-VIS mCon 4080-B3V	20 77 208 4003
Ha-VIS mCon 9000 	Ha-VIS mCon 9100-AAV	20 76 110 7002
	Ha-VIS mCon 9082-ADV	20 76 110 7101
	Ha-VIS mCon 9082-AEV	20 76 110 7201
	Ha-VIS mCon 9070-BV	20 76 207 7002
	Ha-VIS mCon 9080-BV	20 76 208 7002
Ha-VIS mCon 7000 	Ha-VIS mCon 7050-A1V	20 70 305 4923
	Ha-VIS mCon 7050-B1V	20 70 305 4943
	Ha-VIS mCon 7100-A1V	20 70 310 4925
	Ha-VIS mCon 7100-B1V	20 70 310 4945
	Ha-VIS mCon 7100-AAV	20 70 310 4924

Please find descriptions and technical details for these Ethernet Switches in the HARTING catalogue „Ethernet Network Solutions Automation IT“.

NOTE:
The Ethernet Switch family Ha-VIS mCon 1000 includes management functions, which are partially different from the above-mentioned table.

Management functions

Basic Functions		
	Store and Forward Switching Mode	IEEE 802.3
	Manual and Dynamic IP Address Assignment	
Port-Settings	Auto-negotiation on / off	
	Port Speed 10 Mbit/s / 100 Mbit/s / 1000 Mbit/s	
	Half / Full duplex	
	Port disable / enable	
	Link Up/Down Trap disable / enable	
	Flow Control disable / enable	
Network Discovery	Link Layer Discovery Protocol (LLDP)	802.1AB, 2005
Protocols	IPv4	RFC 791, 903, 951, 1293, 1519
	TCP	RFC 793, 896
	UDP	RFC 768
	Ethernet ARP	RFC 826
	ICMP	RFC 2521, 1191, 1788, 792
File Transfer	Firmware import and export via TFTP	
	Configuration import and export via TFTP	
Time Settings	Manual time setting	
	Simple Network Time Protocol (SNTP)	RFC 1305, RFC 4330
User Management	Admin, Guest and Service Level	
Service	Service Mode via port 1	
QoS		
	Quality of Service (QoS)	IEEE 802.1p
	Differentiated services (DiffServ)	RFC 2474
VLAN		
	Port protocol based VLANs	IEEE 802.1Q Rev D5.0, 2005
Redundancy		
	Spanning Tree (STP)	IEEE 802.1D (2004)
	Rapid Spanning Tree (RSTP)	IEEE 802.1D (2004)
Security		
	IP authorized manager	
Link Aggregation		
	Link Aggregation (LACP)	ISO/IEC 8802-3:2005 (E), IEEE 802.3-2005 Edition Clause 43 (IEEE 802.3ad)
Multicast		
	IGMP Snooping (v1, v2, v3) with support for querier	RFC 1112, 2236, 3376
DHCP		
	DHCP Client	RFC 2131
	DHCP relay agent	RFC 2131
	DHCP Option 82	RFC 3046
Alarm		
	Alarms via E-mail (SMTP) and SNMP Traps	
	Signalling contact for low voltage detection or Link break	

Management functions

Diagnostic		
	Port diagnostic	
	Port Mirroring	
	Switch History	
	MAC Address Table	
	RMON (1,2,3 & 9 groups)	RFC 2819
Management		
	Password protected Web-Management interface	
	SNMP (v1, v2c, v3) agent & MIB support	RFC 1155, 1157, 1212, 1213, 1215, 2089, 2578, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3584
MIB Support		
	Enterprise (HARTING MIB)	
	MIB II	
	MIB II for SNMPv1, SNMPv2, SNMPv3	
	Interface group MIB	
	Bridge MIB	
	MIB for Ethernet-like interfaces (requires support in hardware)	
	VLAN MIB	
	Spanning Tree Protocol MIB	
	Rapid STP MIB	
	Port-based Network Authentication Control MIB	
	Definitions of managed objects for LLDP	
	802.1/LLDP extension MIB	
	802.3/LLDP extension MIB	
	Radius Client MIB	
	IPv4 MIB	
	IGMP MIB	
	DHCP	

The management functions described above are supported by all Ethernet Switches with the name Ha-VIS mCon xxxx-..V

Exclusion: All Ethernet Switches of the family Ha-VIS mCon 1000.

Ha-VIS mCon 3000 – Introduction and features

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

The Ha-VIS 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	8x 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	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	IP 30
Mounting	• 35 mm top-hat rail acc. to EN 60 715 • Panel mounting, vertical assembly
Weight	approx. 0.6 kg

Environmental conditions

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

Technical characteristics - F.O. termination

Ethernet interface – F.O.

Number of ports	2x 100Base-FX
Cable types according to IEEE 802.3	Singlemode fibre, 1300 nm; 9 µm
Data rate	100 Mbit/s
Maximum cable length	15 km
Termination	SC-D female
Diagnostics (via LED)	• Status Link – Green • Data transfer (Act) – Green flashing
Wavelength	1300 nm
Transceive power T(X) max. (dynamic)	• -14 dBm
Transmission power T(X) min.	• -23.5 dBm
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

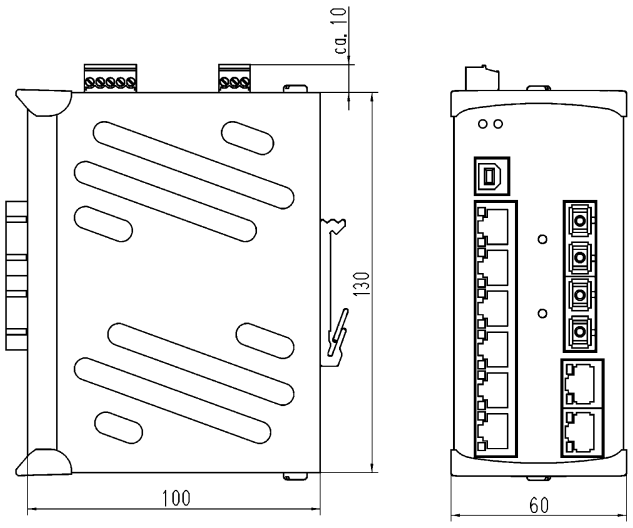
Ha-VIS mCon 3082-AFV

Ethernet Switch
Ha-VIS mCon 3082-AFV

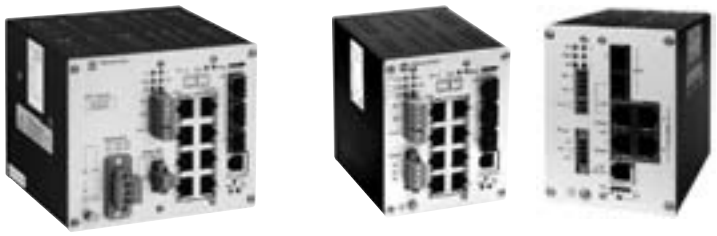
10-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets; including 2 F.O. ports (SC, SM)

Managed	IP 30	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 / SC-D female
Input voltage / Termination	24 V DC / 5-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	9.6 V … 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	–10 °C … +70 °C
Approvals	cUL (in preparation)
Management	fully Managed via Web interface and SNMP Functions see page 79

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS mCon 3082-AFV Ethernet Switch, managed 8 RJ45 ports 2 SC ports including Set for assembly on standard rail	20 76 110 4102		

Ha-VIS mCon 1000 – Introduction and features



Ethernet Switch
Ha-VIS 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 Ha-VIS mCon 1000 is suitable for use in industrial environments.

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

Selected Ethernet Switches 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 Switches 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			
Ha-VIS mCon 1042	3x 10/100/1000Base-T(X) 1x 10/100/1000Base-T(X) (port 1 - combo port with SFP-Port 1)		
Ha-VIS mCon 1083	7x 10/100Base-T(X) 1x 10/100/1000Base-T(X) (port 1 - combo port with SFP-Port 1)		
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 Cat. 5 cable acc. to DIN EN 50 173-1)		
Termination	RJ45 (Twisted Pair)		
Diagnostics (via LED)	• Status Link	active: Data transfer (Act):	Green Green flashing
	• Transmission mode (FDX)	Full duplex: Half duplex:	Yellow Yellow flashing
	• Management (State)	active:	Green
Topology	Ring, Line, Star or mixed		

Ethernet interface – F.O.

Number of ports	
Ha-VIS mCon 1042	2x for SFP modules
Ha-VIS mCon 1083	3x for SFP modules
Data rate	100 Mbit/s or 1000 Mbit/s
Ha-VIS mCon 1042	1 port 100 Mbit/s or 1000 Mbit/s (port 1* - combo port with RJ45 port 1) 1 port 1000 Mbit/s
Ha-VIS mCon 1083	1 port 100 Mbit/s or 1000 Mbit/s (port 1* - combo port with RJ45 port 1) 2 ports 1000 Mbit/s
Termination	SFP module (see catalogue „HARTING Ethernet Network Solutions Automation IT“)
Diagnostics (via LED)	• Status Link – Green
	• Data transfer (Act) – Green flashing
Topology	Ring, Line, Star or mixed

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

Technical characteristics

Design features

Housing material	Metal (coated)
Dimensions (W x H x D)	
Ha-VIS mCon 1042-AASFP	75 x 105 x 106 mm (without connectors)
Ha-VIS mCon 1083-ASFP-PoE	85 x 105 x 106 mm (without connectors)
Ha-VIS mCon 1083-ASFP4	126 x 105 x 106 mm (without connectors)
Degree of protection acc. to DIN 60529	IP 30
Mounting	• 35 mm top-hat rail acc. to EN 60715 • Panel mounting, vertical assembly
Weight	
Ha-VIS mCon 1042-AASFP	approx. 0.7 kg
Ha-VIS mCon 1083-ASFP-PoE	approx. 0.8 kg
Ha-VIS mCon 1083-ASFP4	approx. 1.25 kg

Environmental conditions

Operating temperature	–40 °C ... +70 °C
	–25 °C ... +70 °C (Ha-VIS mCon 1042 AASFP only)
Storage temperature	–40 °C ... +85 °C
Relative humidity	20 % ... 90 % (non-condensing)

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
- LLDP (IEEE 802.1AB)
- CDP (Cisco Discovery Protocol)

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
- Cable diagnostic for all RJ45 ports
- SFP diagnostic
- Temperature monitoring

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

Ha-VIS mCon 1042-AASFP

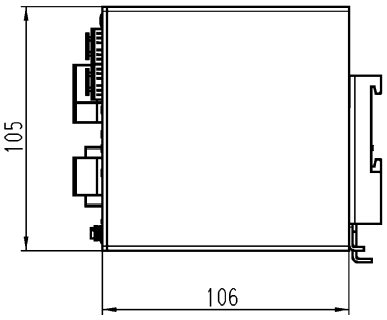
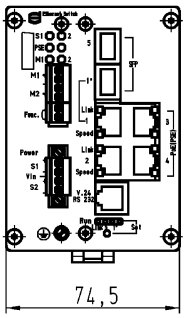
Ethernet Switch
Ha-VIS mCon 1042-AASFP

6-port Ethernet Switch for mounting onto top-hat mounting rail
in control cabinets including 2 ports for SFP modules

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	4x 10/100/1000Base-T(X) / RJ45 (Twisted Pair) (3x 10/100/1000Base-T(X), if both SFP ports are used)
Number of ports, F.O. / Termination	2x plug-in slot for SFP modules / SFP module
Number of ports, V.24 / Termination	1x V.24 / RS 232 (interface for Telnet)
Input voltage / Termination	24 / 48 V DC / 4-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	21 V ... 57 V DC
Input current	approx. 350 mA (at 24 V DC)
Diagnostics (via LED)	• Power supply S1 present Green • Power supply S2 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
Function contact	2-pole pluggable screw contact An openend/closed function contact will activate the operation sequence as configured in the management.
Housing material	Metal (coated)
Dimensions (W x H x D)	75 x 105 x 106 mm (without connectors)
Weight	approx. 0.7 kg
Operating temperature	-25 °C ... +70 °C
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 88

Ha-VIS mCon 1042-AASFP

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS mCon 1042-AASFP Ethernet Switch, managed, with 4 ports RJ45 2 ports SFP 1 port V.24 (RS 232) including Set for assembly on standard rail	20 76 106 6303		

Ha-VIS mCon 1083-ASFP-PoE

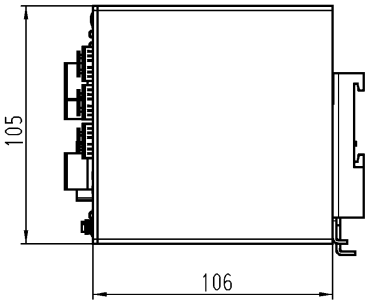
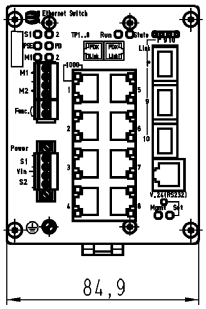
Ethernet Switch
Ha-VIS mCon 1083-ASFP-PoE

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 [X]	EtherNet/IP compatible [X]

Number of ports, Copper / Termination	7x 10/100Base-T(X) 1x 10/100/1000Base-T(X) (port 1 - combo port with SFP port 1)
Number of other ports	3x plug-in slot for SFP modules / SFP module
Power supply	
Standard	
Input voltage / Termination	24 V DC / 4-pole screw terminal, pluggable redundant power supply
Permissible range (min/max)	21 V ... 57 V DC
Input current	approx. 470 mA (at 24 V DC)
PoE	
Input voltage / Termination	48 V DC / 4-pole screw terminal, pluggable
Permissible range (min/max)	44 ... 57 V DC
Output current	approx. 1800 mA (at 48 V DC)
Output voltage	48 V DC (46 ... 57 V DC)
Output power	15.4 W per port (1 ... 4)
Output current	0.35 A
Type	Mode A
Diagnostics (via LED)	• Power supply S1 present Green • Power supply S2 present Green • Operating state (Run) Green • PoE power supply present: PSE Green • PD power supply present: PD Green
Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Housing material	Metal (coated)
Dimensions (W x H x D)	85 x 105 x 106 mm (without connectors)
Weight	approx. 0.8 kg
Operating temperature	-40 °C ... +70 °C
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 88

Ha-VIS mCon 1083-ASFP-PoE

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS mCon 1083-ASFP-PoE Ethernet Switch, managed, with 8 ports RJ45 3 ports for SFP modules including Set for assembly on standard rail	20 76 111 6303		

Ha-VIS mCon 1083-ASFP4

Ethernet Switch
Ha-VIS mCon 1083-ASFP4

10-port Ethernet Switch for mounting onto top-hat mounting rail in control cabinets; including 3 ports for SFP modules

Managed	IP 30	PROFINET compatible ☐	EtherNet/IP compatible ☒

Number of ports, Copper / Termination	7x 10/100Base-T(X) 1x 10/100/1000Base-T(X) (port 1 - combo port with SFP port 1)		
Number of other ports	3x plug-in slot for SFP modules / SFP module		
Diagnostics (via LED / RJ45)			
Port 1 (Gigabit)	• Status Link	active:	Green
		Data transfer (Act):	Green flashing
	• Transmission mode (FDX)		
		flash short ON, long OFF:	10 Mbit/s
		flash ON / OFF:	100 Mbit/s
		flash long ON, short OFF:	1000 Mbit/s
Ports 2 ... 8	• Status Link	active:	Green
		Data transfer (Act):	Green flashing
	• Transmission mode (FDX)		
		Half duplex:	OFF
		Half duplex - collisions:	Yellow flashing
		Full duplex:	Yellow
Diagnostics (via LED / SFP)			
SFP Link 1*, 9, 10	Status Link	active:	Green
		Data transfer (Act):	Green flashing

Power supply

S1

Input voltage DC	110 / 220 V DC (88 ... 370 V DC)
Input voltage AC	110 / 230 V AC (100 ... 240 V DC)
Input current	max. 0.55 A
Termination	3-pole screw terminal, pluggable (AC: L / N / PE; DC: + / - / PE)

S2

Input voltage	24 / 48 V DC (21 ... 57 V DC)
Input current	ca. 500 mA (at 24 V DC)
Termination	2pole screw terminal, pluggable

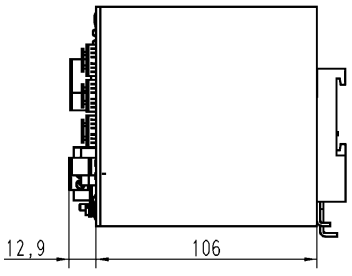
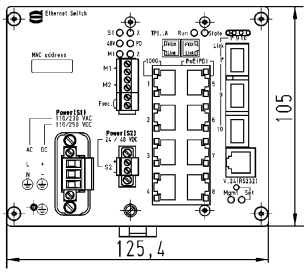
PoE(PD)

Input voltage	48 V DC (44 ... 57 V DC)
Input current	according to IEEE 802.3af Class 3(0)
Termination	via port 5 (mode A or mode B)

Diagnostics (via LED)			
LED **S1**; **2**	Power supply S1 (internal) / S2 (external) > 21 V DC:		Green
LED **48V**	Power supply S1 (internal) / S2 (external) > 46 V DC:		Green
LED **PD**	external power supply via PoE(PD) ON:		Green
LED **Run**	Operating state:		Green
LED **State**	State MMC Memory Card	active:	Green

Ha-VIS mCon 1083-ASFP4

Alarm signalling contact	2 change-over contacts, potential-free, 30 V DC / 1 A 4-pole pluggable screw contact
Function contact	4-pole pluggable screw contact The function bridge changes the system state into „Active“ to activate a function sequence which is configured in the Management area.
Housing material	Metal
Dimensions (W x H x D)	126 x 105 x 106 mm (without connectors)
Weight	approx. 1.25 kg
Operating temperature	-40 °C ... +70 °C
Management	fully Managed via Web interface, SNMP, Telnet and V.24 (RS 232) Functions see page 88

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS mCon 1083-ASFP4 Ethernet Switch, managed, with 8 ports RJ45 3 ports for SFP modules including Set for assembly on standard rail	20 76 111 6304		

Ha-VIS pCon 7000 – Industrial DC/DC Converters

Industrial DC/DC converter
Serial Ha-VIS pCon 7000

for centralised power supply
with degree of protection IP 20 / IP 65

General Description

These primary switched DC/DC converters of the product family Ha-VIS pCon 7000 are designed for the decentralised supply of control units, Ethernet components or automation devices in industrial areas and harsh environments.

With their wide range of input voltage, the units are suitable for world-wide use. The converters need no ground load and are short-circuit protected by primary and secondary power limitation.

The converters are maintenance free, vacuum potted and prepared for the use in devices with Protection Class I or II, depending on the type of the converter.

Features

- Wide input range
- Easy installation
- Galvanically seperated
- Short circuit protected
- Ambient Temperature up to 70 °C

Advantages

- Wide input range for world-wide use
- Wide operating temperature range
- Mechanical stability for highest demands
- Can be used directly in industrial and railway environments
- Compact design and high power density
- Proofed against short-circuits, overloads and no-load operation
- International approvals

Application fields

- Industrial automation
- Automotive industry
- Railway applications

DC/DC converter
HARTING pCon 7150-110/48

for centralised power supply
with degree of protection IP 65

Han® 3 A / M12 A-coding	IP 65	110 V DC	48 V DC

Input

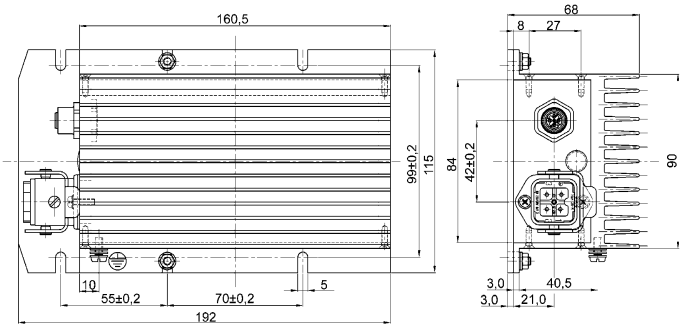
Input voltage	50.4 ... 154 V DC (wide range input)
Inrush current	< 7 x $I_{in\ nom}$
Switching frequency	approx. 70 kHz
Efficiency	≥ 88 %
Input filter	two-step filter
Reverse polarity protection	by means of connector with coding
Termination	Han® 3 A
Protection class	I

Output

Output voltage	48 V DC -1 % / +2 %
Ripple	≤ 1 % p-p
Noise	≤ 2 % p-p
Starting time	≤ 200 ms
No load characteristics	no ground load
Current limiting	105 ... 130 % stabilised current
Termination	M12 A-coding

General data

Operating temperature	-40 °C ... +70 °C
MTBF	tbd
Cooling	free convection
Weight	approx. 1400 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 7150-110/48 DC/DC converter	20 80 300 3026		

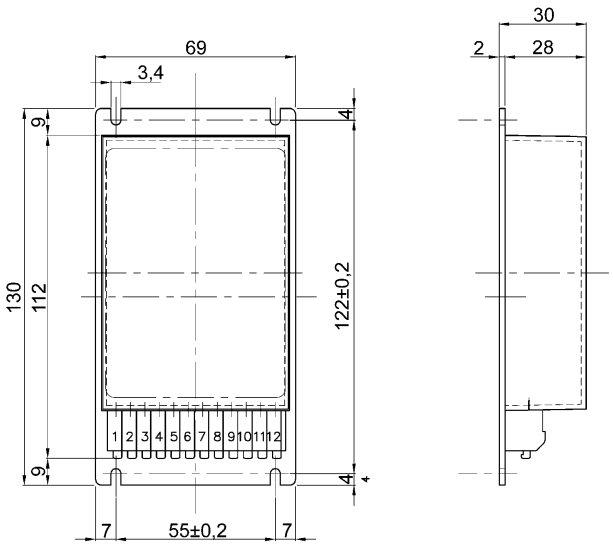
DC/DC converter
HARTING pCon 7060-110/24

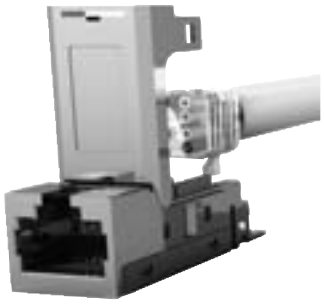
for centralised power supply
with degree of protection IP 20

2x spring-type terminals	IP 20	110 V DC	24 V DC

Input		**Output**	
Input voltage	43.2 ... 154 V DC (wide range input)	Output voltage	24 V DC ±2 %
Switching frequency	approx. 70 kHz	Ripple	≤ 1.5 % p-p
Efficiency	≥ 85 %	Noise	≤ 2 % p-p
Input filter	LC filter	Starting time	≤ 200 ms
Transient protection	1.8 kV / 5/50 µs	No load characteristics	no ground load
Reverse polarity protection	cross diode (together with external fuse)	Current limiting	105 ... 130 % stabilised current
Termination	Spring clamps	Termination	Spring clamps
Protection class	II (no earth connection necessary)		

General data	
Operating temperature	-40 °C ... +70 °C
MTBF	> 1,400,000 h
Cooling	mounting on heat sink with R_{th} < 2.5 K/W, thermal coupling with Al base plate
Weight	approx. 400 g

Identification	Part number	Drawing	Dimensions in mm
HARTING pCon 7060-110/24 DC/DC converter	20 80 300 3025		



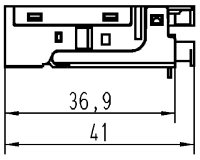
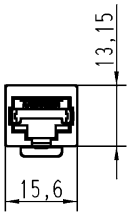
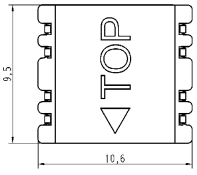
Ha-VIS preLink®
RJ45 jack module

Advantages

- Consistent connection technology in the cabling system
- Quick and easy assembling of data cables
- Small size, suitable for Hoods and Housings of series Han® 3 A and HARTING PushPull connetors RJ45 according to ISO/IEC 24 702, Variant 4
- Future proof, Cat. 6 Class E_A 500 MHz transmission performance, transmission rate up to 10 Gbit/s

Application fields

- Structured cabling for industrial premises
- For applications in IP20 and IP 65 / IP 67 environment

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS preLink® set RJ45 jack AWG 22/23 consists of: • 1x Ha-VIS preLink® module RJ45 jack • 1x Ha-VIS preLink® terminal module • 1x cable tie	20 82 001 0001		
Ha-VIS preLink® module RJ45 jack Termination: RJ45 No. of contacts: 8 Transmission performance: Category 6, for Class E_A Transmission rate: 10 Gbit/s Shielding: fully shielded 360° flexible shielding termination Cable sheath diameter: 5 ... 9 mm Housing material: zink die-cast, nickel-plated	20 82 000 0002	 	
Ha-VIS preLink® terminal module AWG 22/23 Contact block with IDC termination No. of contacts: 8 Wire gauge: AWG 22/7 ... AWG 23/1 (0.25 ... 0.34 mm²) solid and stranded Strand sheath diameter (incl. insulation): 1.3 ... 1.6 mm	20 82 000 0001		

Available by September 2010

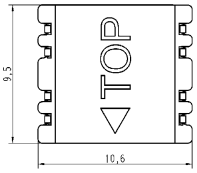
Ha-VIS preLink®
M12 connector module, male

Advantages

- Consistent connection technology in the cabling system
- Quick and easy assembling of data cables
- Easy to upgrade from 10 / 100 Mbit/s to 1 / 10 Gbit/s
- Compact design

Application fields

- Structured cabling for industrial premises
- Safety engineering, observation cameras, monitors and displays
- Next generation of factory automation

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS preLink® set* M12 connector, male, 4-poles Termination: M12 D-coding No. of contacts: 4 Transmission performance: Category 5, Class D Transmission rate: 10 / 100 Mbit/s Shielding: yes Cable diameter: 5 ... 9 mm Housing material: zink die-cast, nickel-plated	20 82 005 0001	 mating face	
Ha-VIS preLink® set* M12 connector, male, 8-poles Termination: M12, shielding cross No. of contacts: 8 Transmission performance: Category 6, for Class E_A Transmission rate: 1 / 10 Gbit/s Shielding: yes Cable sheath diameter: 5 ... 9 mm Housing material: zink die-cast, nickel-plated	20 82 006 0001	 mating face	
Ha-VIS preLink® terminal module AWG 22/23 Contact block with IDC termination No. of contacts: 8 Wire gauge: AWG 22/7 ... AWG 23/1 (0.25 ... 0.34 mm²) solid and stranded Strand sheath diameter (incl. insulation): 1.3 ... 1.6 mm	20 82 000 0001		

* ... Set consists of 1x M12 connector, male / 1x terminal module

Ha-VIS preLink®

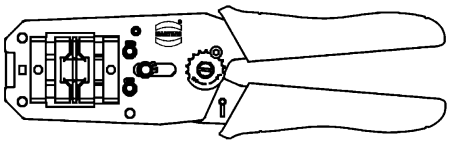
Ha-VIS preLink®
assembly tool

Advantages

- IDC-bonding and wire cutting in one step

Application fields

- Professional assembly tool for Ha-VIS preLink® terminal modul

Identification	Part number	Drawing	Dimensions in mm
HARTING assembly tool for Ha-VIS PreLink® terminal module	20 82 000 9901		

HARTING Ethernet Cabling – 8-poles

HARTING Han® 3 A RJ45 Cat. 6 Hybrid 4x1.5

Advantages

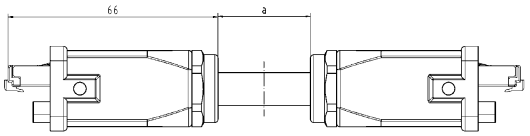
- Reduction of installation time up to 50 %
- 10 Gigabit Ethernet and high power connection for 48 V DC / 16 A
- Space saving at the devices for the connections
- Cost reduction

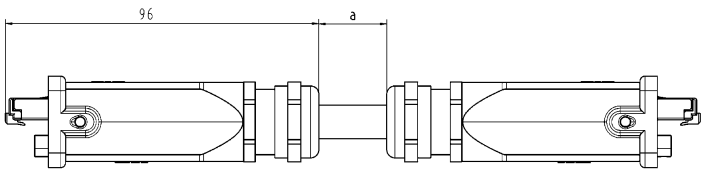
General Description

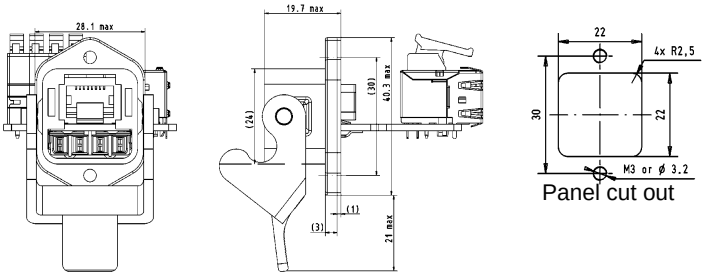
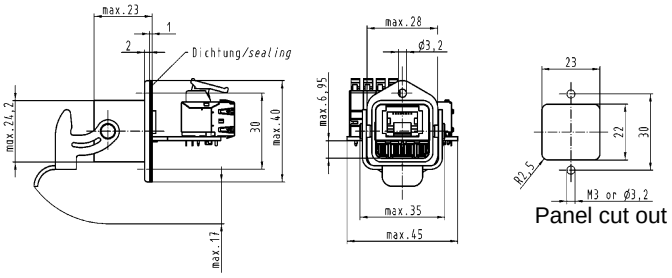
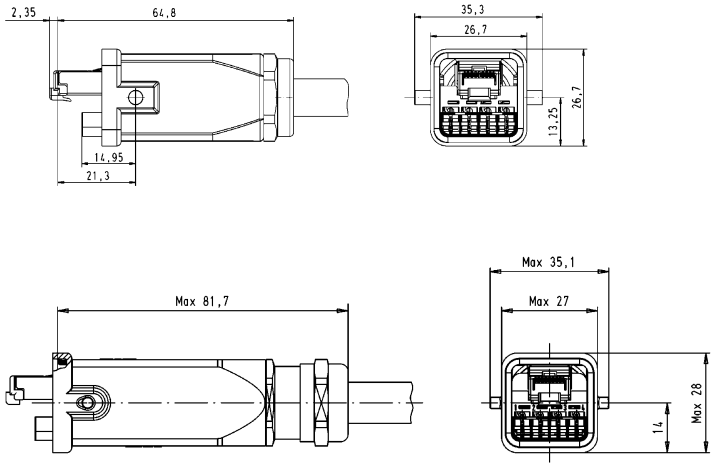
This products offers the possibility to connect different applications with one combinated connection for data communication and power supply instead of the two connections. Typical applications for this hybrid connection are:

- Broadcast applications, like video walls
- Traffic control systems
- Applications for decentral automation, like DC servo drives or industrial W-LAN access points

Identification		Part number	Drawing	Dimensions in mm
System cable 4x2x AWG 28/7 / 4x 1.5 mm² PUR, black 2x Han® 3 A Cat. 6 Hybrid Plastic version, short				
length (a)	1.5 m	09 45 725 1503		
	3.0 m	09 45 725 1505		
	5.0 m	09 45 725 1507		
	10.0 m	09 45 725 1512		
	20.0 m	09 45 725 1514		
System cable 4x2xA WG 28/7 / 4x 1.5 mm² PUR, black 2x Han® 3 A Cat. 6 Hybrid Metal version				
length (a)	1.5 m	09 45 725 1533		
	3.0 m	09 45 725 1535		
	5.0 m	09 45 725 1537		
	10.0 m	09 45 725 1542		
	20.0 m	09 45 725 1544		





Identification	Part number	Drawing	Dimensions in mm
Device side **Hybrid panel feed through**			
Plastic version, black	09 45 225 1300		
Metal version, grey	10 12 005 1002		
Metal version, Han® M, black	09 45 215 1301		
Cable side **Hybrid connector sets** including Cable manager (CM)			
Plastic version, black, CM white	09 45 125 1700		
Plastic version, black, CM blue	09 45 125 1710		
Metal version, grey, CM white	09 45 115 1700		
Metal version, grey, CM blue	09 45 115 1710		
Metal version, Han® M, black, CM white	09 45 115 1701		
Metal version, Han® M, black, CM blue	09 45 115 1711		
Hybrid cable, 8-wire, Cat. 6 4x2xAWG 28/7 4x1.5mm² PUR			
Ring, 20 m	09 45 600 0332		
Ring, 50 m	09 45 600 0342		
Reel, 100 m	09 45 600 0302		

Ha-VIS Smart Patch Cable IP 20 Cat. 6

Advantages

- Easy and fast illuminated detection of patch cables
- Easy to use
- Transmission performance in acc. with Cat. 6 ISO/IEC 11 801
- Compact and space saving plug by dual boot design
- Capable for Multiport applications
- Very robust locking lever protection and unlocking latch
- Good shielding against EMC influence
- Flame retardant and halogen-free
- Colour coding option

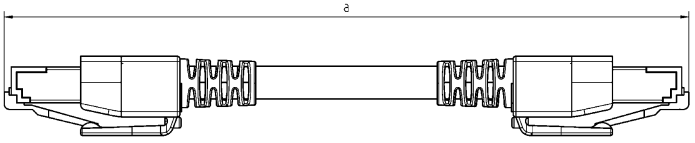
General Description

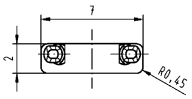
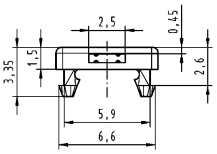
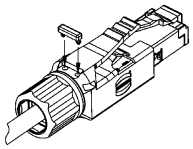
This RJ45 patch cable comes with illuminated RJ45 Ethernet plugs. The plugs are very easy and comfortable to identify each other over distances up to 100 meters, e.g. in Clusters of Racks in data centres facilitate enormous the allocation of ports.

Each RJ45 connector has an integrated LED which is illuminated by a detector. It works in anyway if the connectors are pluged in or not.

That function has no influence to the Ethernet data transmission.

Identification	Part number	Drawing	Dimensions in mm
Ha-VIS Smart Patch Cable IP 20 Cat. 6 RJ45 according to IEC 60 603-7 Boot grey Locking lever protection and unlocking latch Cable: S/FTP AWG 27 LSZH cable jacket, yellow Wiring: 1:1 TIA/EIA-568-B, 8-wire, shielded 100 % electrical tested			
1.0 m	09 47 474 7201		
2.0 m	09 47 474 7203		
5.0 m	09 47 474 7206		
7.0 m	09 47 474 7208		
10.0 m	09 47 474 7211		
further lengths on request			



Identification	Part number	Drawing	Dimensions in mm
Ha-VIS Smart Patch Cable detector	09 47 900 0001		
HARTING RJ Industrial® NG6 Colour clips			
White	09 45 850 0001	  	
Grey	09 45 850 0002		
Yellow	09 45 850 0003		
Magenta	09 45 850 0005		
Red	09 45 850 0007		
Blue	09 45 850 0008		
Green	09 45 850 0009		
Brown	09 45 850 0010		

Cabling products and Components
for SERCOS III

Advantages

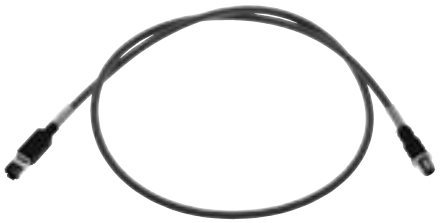
- Robust and Industrial Design
- Long life Ethernet connecting hardware
- Widely resistant cables
- Easy and rugged installation concept
- Guarantees best Cat. 5 resp. Cat. 5e performance
- Good EMC characteristics

General Description

Security and reliability are important requirements for an automation cabling system. To support SERCOS III applications in the field, HARTING offers a programme of cabling components to build the passive infrastructure for industrial and automation facilities. All components are especially designed for use in cabinets with IP 20 level as well as installation in harsh environments requiring IP 65 / IP 67 protection. The robust and completely shielded M12 D-coding connector is commonly used, well known, proven and tested in the area of automation. The product programme also covers industrial outlets, distribution modules, feed-through connectors and bulk heads as well as preassembled system cords, connect - or sets for on-site assembly and cables for fixed and flexible installation.

Identification	Part number	Drawing	Dimensions in mm
Flexible system cable in fix lengths (total length)			
1.5 m	09 47 020 2003 018		
3.0 m	09 47 020 2005 018		
5.0 m	09 47 020 2007 018		
10.0 m	09 47 020 2012 018		
20.0 m	09 47 020 2014 018		
Trailing system cable in fix lengths (total length)			
1.5 m	09 47 020 2023 018		
3.0 m	09 47 020 2025 018		
5.0 m	09 47 020 2027 018		
10.0 m	09 47 020 2032 018		
20.0 m	09 47 020 2034 018		

HARTING Ethernet Cabling – 8-poles

Identification		Part number	Drawing	Dimensions in mm
Flexible system cable				
HARTING PushPull to HARTING PushPull				
in fix lengths (total length)				
	1.5 m	09 47 363 6025 018		
	3.0 m	09 47 363 6027 018		
	5.0 m	09 47 363 6029 018		
	10.0 m	09 47 363 6034 018		
	20.0 m	09 47 363 6036 018		
Trailing system cable				
HARTING PushPull to HARTING PushPull				
in fix lengths (total length)				
	1.5 m	09 47 363 6047 018		
	3.0 m	09 47 363 6049 018		
	5.0 m	09 47 363 6051 018		
	10.0 m	09 47 363 6056 018		
	20.0 m	09 47 363 6058 018		
SERCOS III 4-pole				
M12 D-coding to M12 D-coding				
in fix lengths (total length)				
	1.5 m	09 47 222 2003 018		
	3.0 m	09 47 222 2005 018		
	5.0 m	09 47 222 2007 018		
	10.0 m	09 47 222 2012 018		
	20.0 m	09 47 222 2014 018		
SERCOS III 4-pole				
M12 D-coding to RJ45				
in fix lengths (total length)				
	1.5 m	09 47 220 2004 018		
	3.0 m	09 47 220 2005 018		
	5.0 m	09 47 220 2007 018		
	10.0 m	09 47 220 2012 018		
	20.0 m	09 47 220 2014 018		
SERCOS III flexible cable				
4-pole, shielded SF/UTQ, type B				
	ring 20 m	09 45 600 0134		
	ring 50 m	09 45 600 0144		
	ring 100 m	09 45 600 0104		
	reell 500 m	09 45 600 0114		
SERCOS III trailing cable				
4-pole, shielded SF/UTQ, type C				
	ring 20 m	09 45 600 0137		
	ring 50 m	09 45 600 0147		
	ring 100 m	09 45 600 0107		
	reell 500 m	09 45 600 0117		

Ha-VIS EtherRail
highly elastic data cable, 4-poles, Cat. 5 / 5e

Advantages

- Transmission of Fast Ethernet 100Base-T acc. IEEE 802.3
- Suitable for data cabling in rail vehicle and between coaches
- Design according EN 45 545-1 and TS EN 45 545-5, flame-retardant and heat resistant acc. DIN 5510 (1-4) and EN 50264-1
- Temperature range from –40 °C up to +90 °C
- LSZH and RoHS compliant

General Description

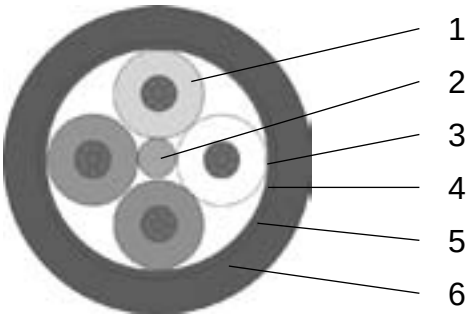
This data cable was especially designed for the cabling connection between coaches but also for installation within rail vehicles and busses. The cable fulfils the actual safety and fire protection requirements acc. international standards.
The robust star quad cable construction guaranties a reliable data transmission up to 100 Mbit/sec.
The cable was designed in accordance with HARTING connecting hardware components like Han-Quintax® and Han® M12 crimp series.

Identification	Part number	Drawing	Dimensions in mm

Ha-VIS EtherRail
highly elastic data cable,
star quad 1x4xAWG22/19, Cat. 5 / 5e

Sheath material:	Elastomer, electron beam cross-linked
Colour:	Black
Cable sheath diameter:	(7.4 +/- 1) mm
Transmission performance:	Category 5 / 5e transmission class D up to 100MHz acc. to ISO/IEC 11 801 and EN 50 173-1
Transmission rate:	10/100 Mbit/sec.
Operating temperature range:	-40 °C ... +90 °C
Cable weight:	77 kg/km

ring 100 m	09 45 600 0138
reel 500 m	09 45 600 0148
reel 1000 m	09 45 600 0158



1. **Conductor**
   4x stranded copper wire, tin-plated AWG 22 19 x 0,16 mm
   Isolation: PE, Comp. 655
   colours: Blue, Yellow, White, Orange
2. **Filler**
3. **Interlayer**
   Aluminium foil-clad polyester
4. **Screening**
   Double shield, copper braid and foil
5. **Banding**
   Textile braid ribbon
6. **Jacket**
   Elastomer electron beam cross-linked Comp 603

The next generation of the first field installable RJ45 connector

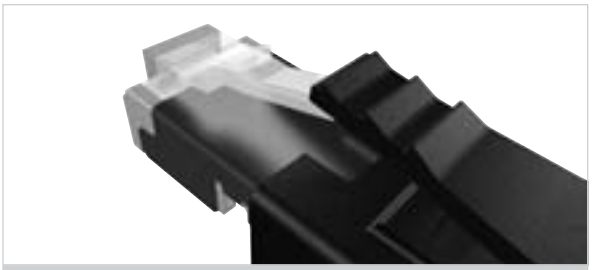
In 2004 under the product name HARTING RJ Industrial® – HARTING launched the RJ45 connector (plug) for Fast Ethernet onto the market and thus set a new benchmark for industrial Ethernet cabling. The innovative connector is equipped with vibration proof *HARAX*® insulation displacement connector technology and allows the connection of twisted pair industrial Ethernet cables with solid or stranded wires and a wire-section of up to AWG 22.

The next generation of HARTING RJ Industrial® 10G RJ45 connectors now combines the experiences of 100.000-fold application of this global first, without special tools, lockable RJ45 connector with market demands of 1 and 10 Gigabit Ethernet. It is equipped for all commercially 2 or 4 twisted pair Ethernet cables and allows an 8-pole cable connection with solid or stranded wire section of AWG 27 to AWG 22. A newly developed cable clamp ensures a secure fixing in a range from 4.5 – 9 mm.

And so the connector can be attached to almost all cable types used in office and the industry, even the usual solid cables installed in buildings.

For this reason the HARTING RJ Industrial® 10G RJ45 connector can be used in a wide range of cables and consistently fulfills customer demands for simple, safe and rapid cabling. In particular, the captive cable manager, with the clear circuit plan on the connector, enables optimum and timesaving cabling.

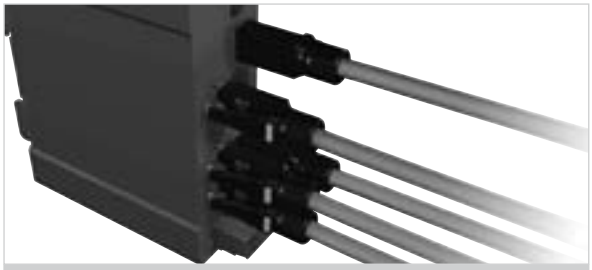
The HARTING RJ Industrial® 10G RJ45 connector suits industrial needs, is robust and nonetheless lightly constructed and optimized for use in multi-port sockets. Colour clips for colour coding are optional and if required can be equipped with an RFID chip for saving patch cable-ID and parameters.



Industrial strength actuator with a locking lever protection

Optional colour coding with colour clips

Ethernet furiously fast



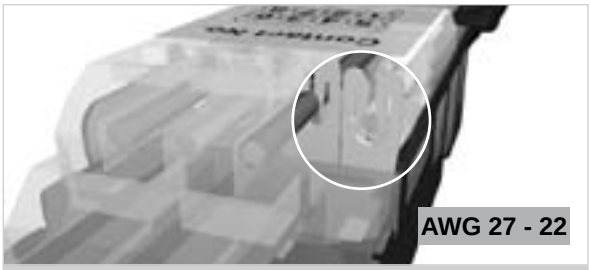
Light, small and multi-port capable

The universal connector for Automation IT

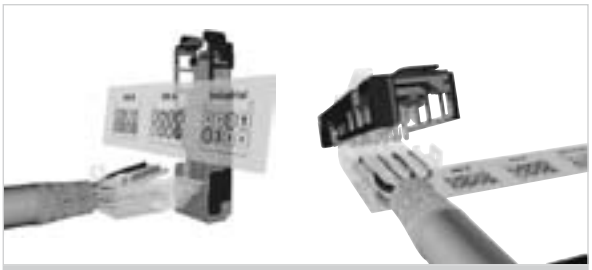
The HARTING RJ Industrial® 10G RJ45 connector with its outstanding product characteristics can be used in office networks as well as in all industrial applications. Through the integration of RJ45 functions container in all HARTING IP 65/67 series from Han® 3 A to PushPull this innovative connector technology is well suited to rough industrial application as well as for outdoor uses and offers the user universal and secure connector technology in all fields of Automation IT cabling.

The HARTING RJ Industrial® 10G RJ45 connector is the innovative and future proof platform for Fast Ethernet, 1 Gigabit or 10 Gigabit Ethernet: It can be universally applied – from Office IT to industrial automation or also in outdoor applications. HARTING RJ Industrial® 10G – the new standard RJ45 connector for Automation IT.

- **Double connector friendly for wire sections of AWG 27 / 7 to AWG 22 / 1 and cable diameter from 4.5 to 9 mm for all usual Ethernet cable types in industry and Office IT**
- **Safe and rapid tool free cabling with captive wire manager**
- **Cat. 6, transfer class E_A, suitable for 1 and 10 Gigabit Ethernet**
- **Small and multi-port capable**
- **Suitable for industry, robust yet light**
- **The same installation technology for all connector types from IP 20 to PushPull**

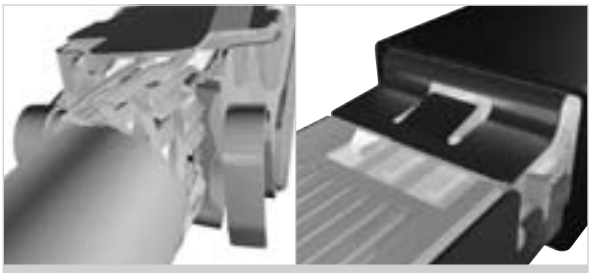


Tool free IDC connector clamps



Tool free cabling with captive wire manager

Secure cable fixing



360° shielding concept

Container principle for universal use

HARTING offers the most comprehensive product range for IP 65/67 protected Ethernet connectors on the market. The outstanding characteristic of all connector types is the universal connector technology and the use of the unchanging RJ45 function container in all series. The big advantage for the user: The basic steps of the connector cabling is always identical, regardless whether it is installed in the office environment IP 20 connector or the robust industrial IP 65/67 connector. Thereby, additional training effort is not required, it saves time and cost. For all Automation IT applications a universal, safe and rapid connector technology can be implemented with the HARTING installation technology.

The HARTING range currently consists of the following types:

- HARTING RJ Industrial® 10G – Connector for IP 20
- Han-Max® RJ45 10G – Connector for IP 65/67 (Variant 1 according to IEC 61076-3-106, preferred type for EtherNet/IP™ according to ODVA specification)
- HARTING PushPull RJ45 10G – Connector for IP 65/67 (Variant 4 according to IEC 61076-3-106, preferred type for industrial construction cabling)
- Han® 3 A RJ45 10G – Connector for IP 65/67 (Variant 5 according to IEC 61076-3-106, preferred type for PROFINET)
- Han® 3 A RJ45 Hybrid 10G – Connector for IP 65/67 (Variant 5 according to IEC 61076-3-106, preferred type for PROFINET)
- Han® PushPull RJ45 10G – Connector for IP 65/67 (Variant 14 according to IEC/PAS 61076-3-117, preferred type for PROFINET and AIDA [Automation Initiative of German Domestic Automobile manufacturers])

Alongside the available range, the integration of this RJ45 function container in further HARTING series, such as the Han-Modular® is possible and currently in preparation.

Universal installation technology for all connector types

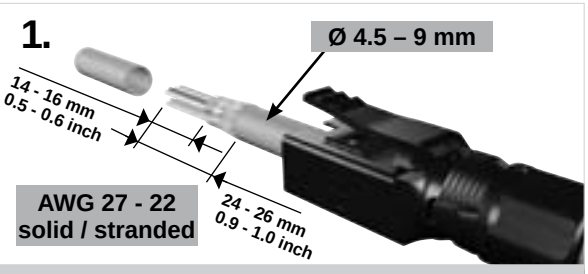
The cabling
Simple, safe and fast

Connectors must allow a reliable cable connection with few parts and minimal effort.

With the development of the new HARTING RJ Industrial® 10G RJ45 connector these customer requirements were paramount. The connector housing with the novel cable clamp is delivered with pre-assembled connecting nut. The RJ45 insert comprises of only two parts. The moveable cable manager mounted on the connector body allows the simple insertion of wires and always guarantees a fault free circuit of the insulation displacement connector. For rapid identification of the correct position of the coloured individual wires, the cable manager has been furnished with a label containing a circuit plan. This circuit label displays the universally used wire colours according to EIA/TIA-568/A and B and for 4-wire industrial Fast Ethernet applications indicating the relative contact allocation.

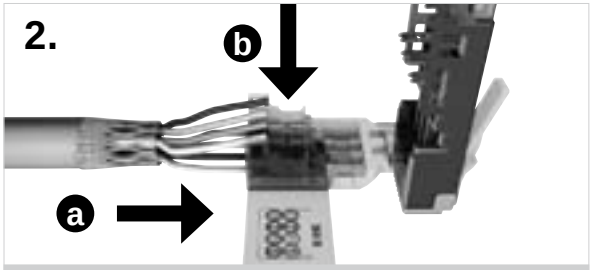
After wiring the connector a portion of the label remains on the plug thus allowing simple recognition of the relative contact position in the cable manager on re-wiring the plug. All these details permit – in only six steps – a rapid and safe local assembly, whereby a time saving of up to 30 % can be realized.

1.



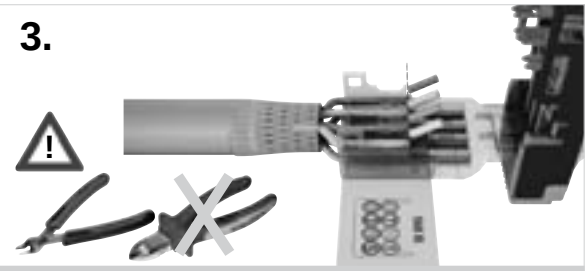
Slide connector housings with a pre-assembled screw over the cable, then cut and strip the cable

2.



Insert wires according to selected colour coding into the cable manager

3.

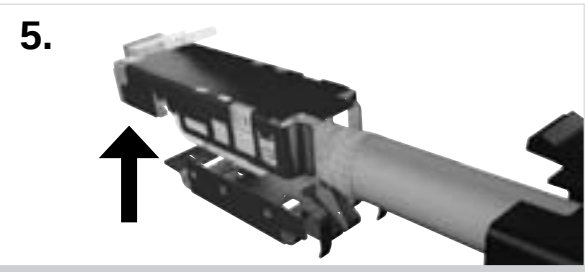


Cut wires to correct length with side cutters

4.

Close cable manager and lock with an audible “click“

5.

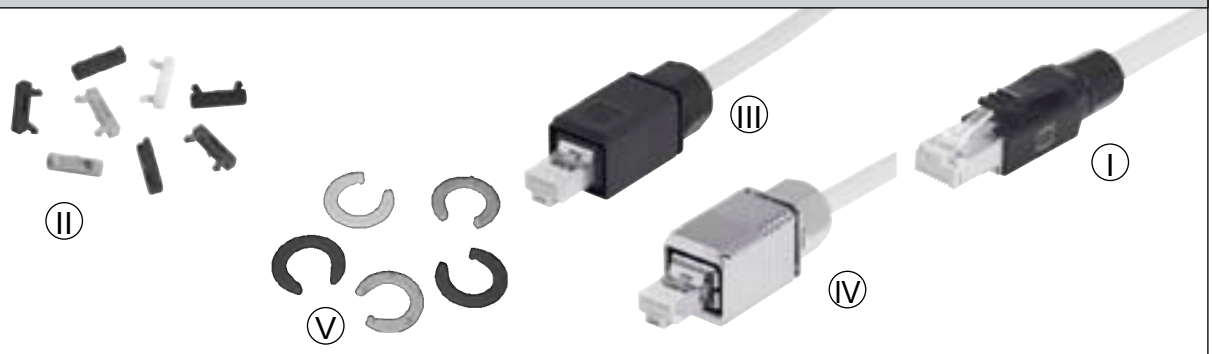


Lock the shield sheet with an audible “click”

6.

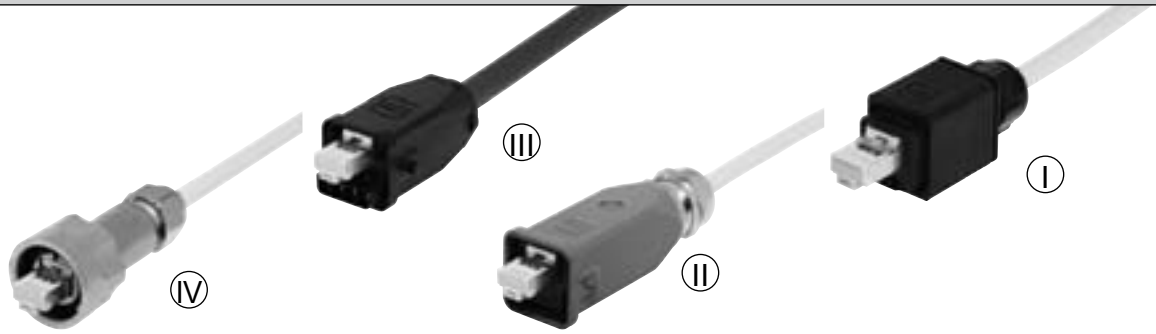
**Slide the RJ45 insert into the connector housing and lock with an audible “click”.
Tighten the cable screw nut by hand**

HARTING RJ Industrial® 10G – Connectors



Identification		Part No.	Description
HARTING RJ Industrial® 10G connector (I)		09 45 151 1560	• Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 20 • Cable diameter 4.5 – 9 mm
HARTING RJ Industrial® 10G colour clips (II)	White Grey Yellow Magenta Red Blue Green Brown	09 45 850 0001 09 45 850 0002 09 45 850 0003 09 45 850 0005 09 45 850 0007 09 45 850 0008 09 45 850 0009 09 45 850 0010	Colour clips for colour coding the HARTING RJ Industrial® 10G connector If required the colour clips can be equipped with an RFID-chip for automatic patch cable-ID recognition and storage. Each order number equates to a packing unit of 50 pieces.
HARTING PushPull RJ45 10G connector, plastic (III)		09 45 145 1560	• Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 65 / IP 67 • Cable diameter 4.9 – 8.6 mm
HARTING PushPull RJ45 10G connector, metal (IV)		09 45 195 1560	
HARTING PushPull colour clips (V)	White Yellow Red Blue Green	09 45 840 0011 09 45 840 0013 09 45 840 0017 09 45 840 0018 09 45 840 0019	Colour clips for colour coding the HARTING PushPull connectors Each order number equates to a packing unit of 10 pieces.

HARTING RJ Industrial® 10G – Connectors



Identification	Part No.	Description
Han® PushPull RJ45 10G connector, plastic Ⅰ Han® PushPull RJ45 10G connector, metal	09 35 225 0421 09 35 225 0401	• PROFINET standard solution according to the demands of the German automobile industry (AIDA) • Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 65 / IP 67 • Cable diameter: Plastic: 6.5 – 9.5 mm Metal: 4 – 11 mm
Han® 3A RJ45 10G connector, plastic Han® 3A RJ45 10G connector, metal Ⅱ Han® 3A RJ45 10G connector insert	09 45 125 1560 09 45 115 1560 09 45 100 1560	• Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 65 / IP 67 • Cable diameter 5 – 9 mm
Han® 3A RJ45 Hybrid 10G connector, plastic Ⅲ Han® 3A RJ45 Hybrid 10G connector, metal	09 45 125 1760 09 45 115 1760	• PROFINET data and 24 volt power supply in one connector • 4 power contacts with max. 48 V / 16 A • Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 65 / IP 67 • Cable diameter 6 – 12 mm
Han-Max® RJ45 10G connector Ⅳ	09 15 300 0431	• Field installable using IDC-technology • For solid and stranded wire AWG 27 to AWG 22 • Cat. 6, transfer class E_A, suitable for 1/10 Gigabit Ethernet • Temperature range –40 °C to +70 °C • Degree of protection IP 65 / IP 67 • Cable diameter 4 – 8 mm

The innovative solution

With *har*-speed M12 HARTING bases the Ethernet network on a sustainable M12 foundation. The *har*-speed M12 differs significantly from today's M12 connectors for Ethernet because it is based on a 4-pair connector face with paired shielding. This allows *har*-speed M12 to be used for Ethernet transfer rates up to 10 Gigabit. The new HARTING *har*-speed M12 connector is, therefore, capable of complying with the high requirements of the transfer class E_A, respectively the Cat. 6_A. For the first time an M12 cabling system can be used for relevantly high data performance and permanent sustainability.

The *har*-speed M12 connectors can be optimally used for applications with bandwidths in machine and facility engineering, but also for the IP 67 infrastructure. The basis for the new development is the new PAS 61076-2-109 that defines a uniform connector face for 8-pole M12 connectors.

The new connector face complies with the following requirements:

- Maximum data rates through the configuration of the contacts in conformance with Ethernet technology.
- Minimal interaction and perfect shielding through paired shielding of the contacts.
- Fault proof connection through coding of the connector face. A connection error with other 8-pole M12's is impossible.

Overmolded versions in different lengths and a crimp connector for the local cabling are the first system components for a comprehensive cabling infrastructure solution by HARTING.

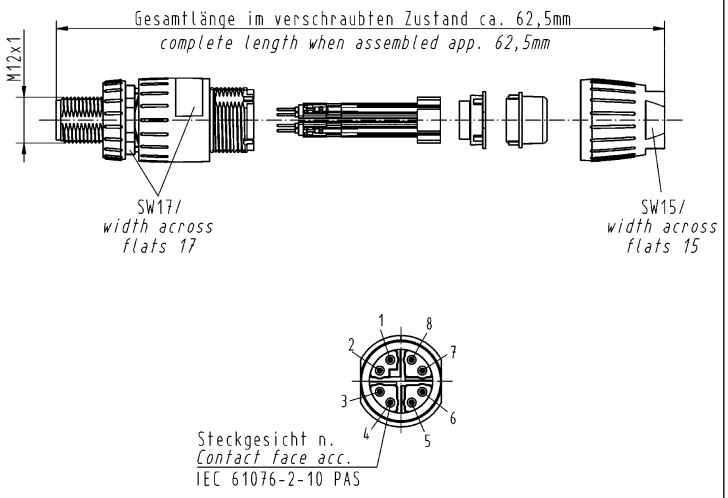
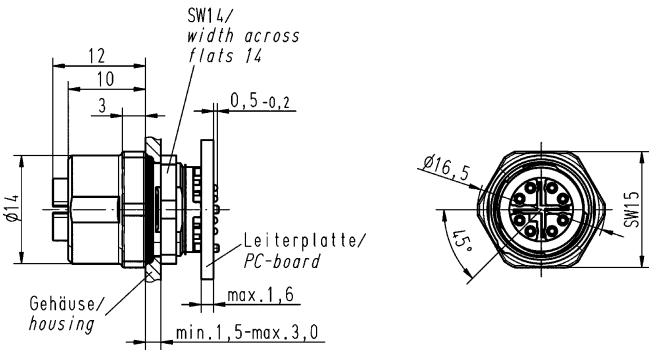
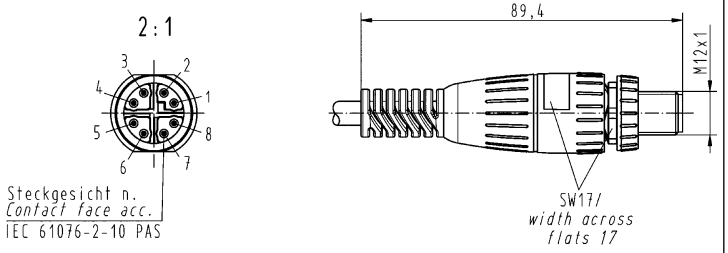
Technical Data

har-speed M12 connector

- Cabling with crimp technology
- Compact, robust design
- Fully shielded
- Transfer class E_A for 1 and 10 Gigabit Ethernet
- AWG 28 to AWG 24
- Temperature range -40 °C to 85 °C
- Protection class IP 65 / IP 67

har-speed M12 PCB receptacle

- Stable, industrial standard design
- Fully shielded
- Transfer class E_A for 1 and 10 Gigabit Ethernet
- Temperature range -40 °C to 70 °C
- Protection class IP 65 / IP 67

Identification	Part No.	Drawing	Dimensions in mm
har-speed M12 connector	21 03 881 5805		
har-speed M12 PCB receptacle 	21 03 381 2801		
har-speed M12 single ended overmoulded system cable Length: 1 m 3 m 5 m 7 m 10 m	21 03 483 1801 21 03 483 1803 21 03 483 1805 21 03 483 1807 21 03 483 1810		

Interference – Yesterdays problem!

In a fast developing technological environment the management of electromagnetic interference is becoming more challenging.

Therefore HARTING developed a range of filter solutions to help designers of electronic equipments to achieve the demanding goal of electromagnetic compatibility.

HARTING offers a wide range of solutions by the integration of a filter inside one of the most standard I/O ports on the market; the D-Sub.

From standard simple ferrite-filter solution to complex customized high performance filters, you will be able to find in the HARTING filter D-Sub range the adequate solution to protect your application from any introduction or radiation of noise through D-Sub port apertures.

Advantages

Wide range:

- 9, 15, 25 and 37 contact versions
- Various terminations such as solder buckets, straight and right angled solder pins
- A large range of accessories
- High performance (C-filter) as well as simple, quick and cost effective solutions (ferrite-filter)

Compatible with standard wave and lead-free reflow soldering (C-filter)

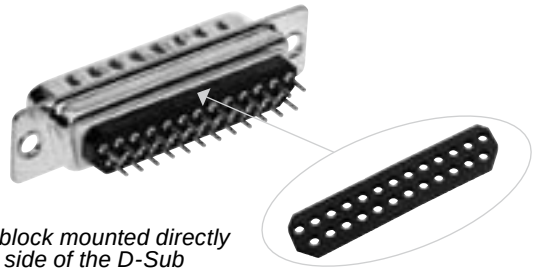
Same layout and shell dimensions as standard D-Sub connectors, no modification of PCB design necessary

Elimination of ringing, crosstalk phenomenon thanks to specific multilayer PCB used in C-filter design.

Flexible filter structure allowing a wide range of customization:

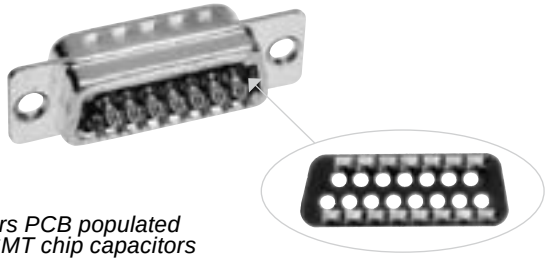
- Filter value (even pin by pin approach)
- Pi-filter
- Dielectric withstanding and working voltage
- Specific ESD / lightening protection

HARTINGs broad Filter range



Ferrite block mounted directly on rear side of the D-Sub

Ferrite-filter
Ferrite-filter D-Subs providing a low level of filtering thanks to simple blocks of inductive ferrite attached to the back end of the connectors.
Providing a few dB attenuation only at high frequencies HARTING ferrite-filter D-Subs represent a cost effective solution in applications where the emission level is close to the limit.



4 layers PCB populated with SMT chip capacitors

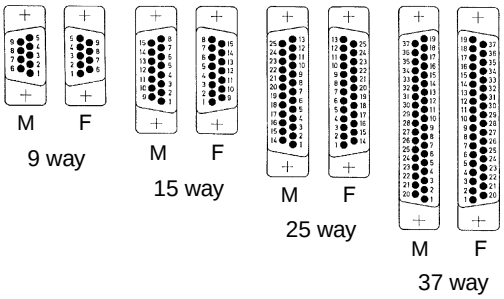
C-filter
To address higher EMI disturbances HARTING propose a comprehensive range of C-filter D-Sub connectors. HARTING C-filter D-Sub integrates a patented 4 layer printed circuit board equipped with chip capacitors. This patented solution provides complete protection of the I/O port due to the filtering performance of the capacitors and the screening effect of the PCB. Further more the 4 layers PCB also limits the ability of interference to enter the equipment through the D-Sub aperture. Available in 4 standard filter values 47, 470, 1000 and 3900 pF HARTING C-filter D-Subs represent for all designers a smart filtering solution allowing replacement of a “defective” port by a filtered one without any change of the PCB design.

Filter adapter
To support engineers in the diagnosis of EMI disturbances HARTING has developed, in addition to its filter series a range of male/female filter D-Sub adapters.
These back-to-back adapters can be used as testing tools and replaced later on in production directly by a filtered D-Sub connector.

Number of contacts	9, 15, 25, 37
Working current	7.5 A max.
Working voltage	250 V AC max.
Dielectric withstanding voltage	500 V AC for 1 minute
Contact resistance	≤ 15 mΩ
Insulation resistance	≥ 1000 MΩ
Temperature range	-55 °C … + 105 °C
Terminations	a) Solder buckets AWG 20 b) Solder pins for P.C.B. holes Ø 1 ± 0.05 mm c) Solder pins, angled 90° for P.C.B. holes Ø 1 ± 0.05 mm
Materials	
Insulation	PBT, flame retardant acc. to UL 94-V0
Contacts	Copper alloy
Contact surface	
Performance level	Performance level 3, as per IEC 60807-2, IEC 60512-25-2
Metal shell	Steel (tin-plated)

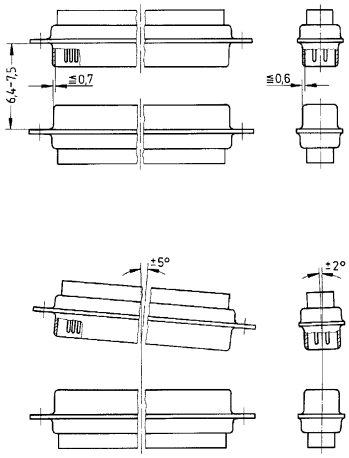
Contact arrangement

View from termination side



M = Male connector
F = Female connector

Mating conditions as per CECC 75301

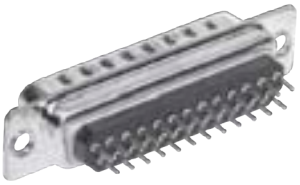


Minimum insertion loss

Frequency [MHz]	Attenuation [dB]
1	0.5
10	1.0
50	2.5
100	3.0
500	3.5
1000	4.0

Number of contacts

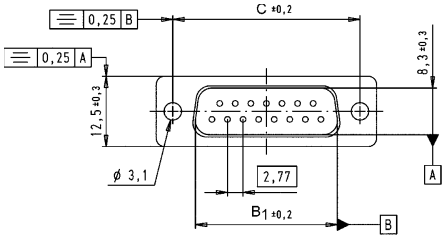
9–25

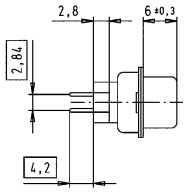


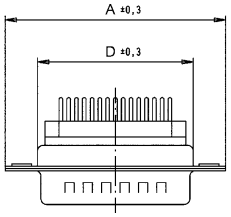
Solder pins, straight, through hole

Identification	No. of contacts	Part No. male connectors	Part No. female connectors
Connectors with ferrite-filter	9	09 64 122 7800	09 64 112 7800
	15	09 64 222 7800	09 64 212 7800
	25	09 64 322 7800	09 64 312 7800

Male connector

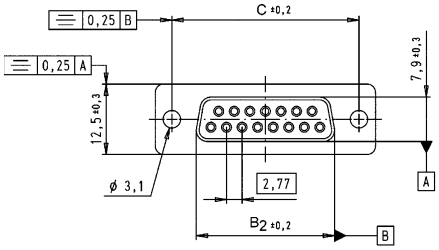


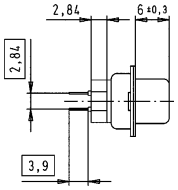


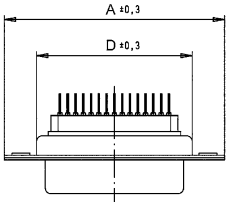


No. of contacts	A	B_1	B_2	C	D
9	30.8	16.92	16.3	25.0	19.2
15	39.2	25.25	24.6	33.3	27.7
25	53.1	38.96	38.3	47.1	41.1

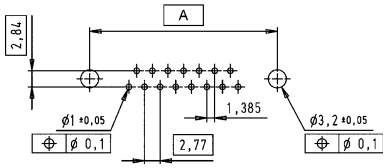
Female connector







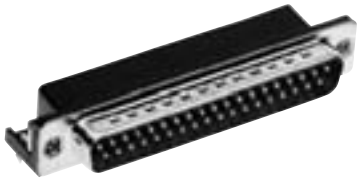
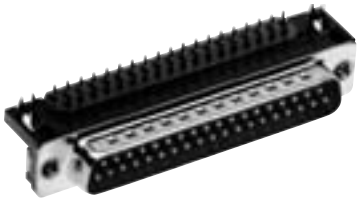
Board drillings



Dimensions in mm

Number of contacts

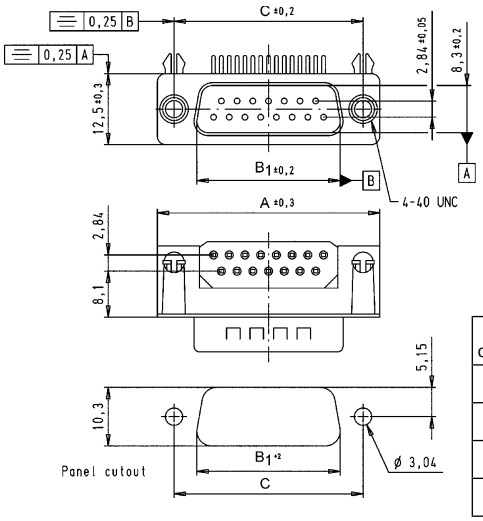
9–37


Solder pins, right angled, board lock and clinch nut

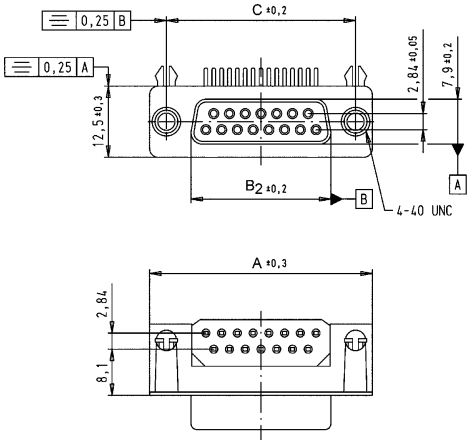
Identification	No. of contacts	male connectors	female connectors
Connectors with ferrite-filter	9	09 64 123 7802	09 64 113 7802
	15	09 64 223 7802	09 64 213 7802
	25	09 64 323 7802	09 64 313 7802
	37	09 64 423 7802	09 64 413 7802

Male connector

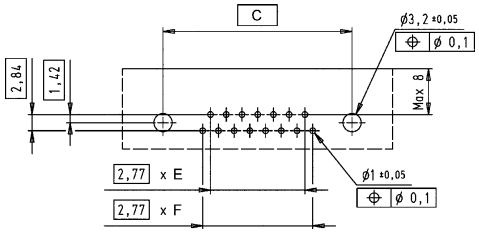


No. of contacts	A	B_1	B_2	C	E	F
9	30.8	16.92	16.3	25.0	3	4
15	39.2	25.25	24.6	33.3	6	7
25	53.1	38.96	38.3	47.1	11	12
37	69.4	55.42	54.8	63.5	17	18

Female connector



Board drillings



Dimensions in mm

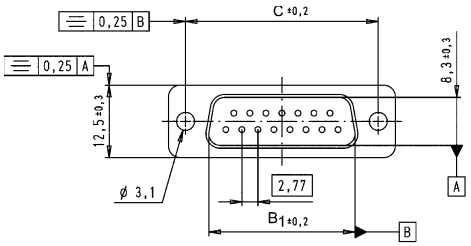
Number of contacts

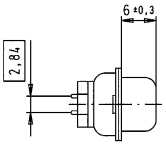
9–37

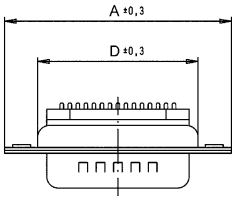
Solder buckets, through hole

Identification	No. of contacts	Part No. male connectors	Part No. female connectors
Connectors with ferrite-filter	9	09 64 121 7800	09 64 111 7800
	15	09 64 221 7800	09 64 211 7800
	25	09 64 321 7800	09 64 311 7800
	37	09 64 421 7800	09 64 411 7800

Male connector

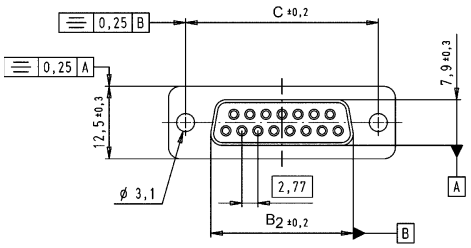


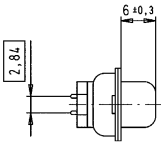


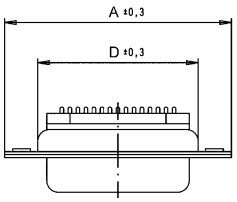


No. of contacts	A	B_1	B_2	C	D
9	30.8	16.92	16.3	25.0	19.2
15	39.2	25.25	24.6	33.3	27.7
25	53.1	38.96	38.3	47.1	41.1
37	69.4	55.42	54.8	63.5	57.3

Female connector



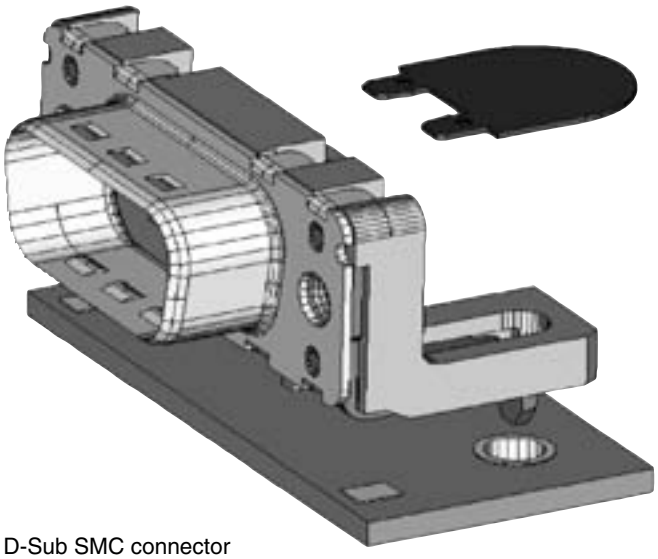




Dimensions in mm

The continuing trend towards miniaturisation has revolutionised the assembly of electronic components. For the past 15 years, most components have been secured directly to the pcb surface by means of Surface Mount Technology (SMT). By dispensing with drilled holes on the pcb, a space saving of up to 70 percent is achieved.

Today, typical components such as ICs, resistors, capacitors, inductors, and connectors with straight terminal pins are almost exclusively fitted using SMD (Surface Mount Device) technology in mass production. In contrast, angled SMD connectors at the edge of the board have not been successful because of tolerance problems (co-planarity) and stresses during mating.



D-Sub SMC connector

“Pin in Hole Intrusive Reflow*”

In this process, the connector is inserted into plated through holes in a comparable way to conventional component mounting. All other components can be assembled on the pcb surface.

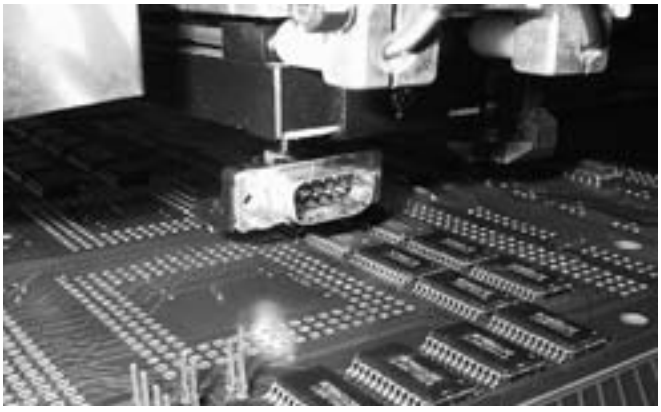
The components are positioned using pick-and-place machines. These automatic assembly machines differ according to whether the components are small, lightweight or bulky. Connectors, compared to ICs, are considered bulky (odd form). They are more difficult to grip, due to their comparatively heavy weight and larger size. But machines for odd form components, provide the higher insertion power, necessary to fit the components into pcb holes, which are filled with solder paste. Generally modern SMC production lines are equipped with both types of machine. Therefore the "Pin in Hole Intrusive Reflow" process entails no extra investment costs for the user.

Conventional assembly process:

1. Application of solder paste
2. Positioning the components
3. Positioning odd form components
4. Reflow soldering
5. Pressing in or partially dip soldering the connector at the board edge
6. Quality inspection

“Pin in Hole Intrusive Reflow” assembly:

1. Application of solder paste
2. Positioning the components
3. Positioning odd form components
4. Reflow soldering
5. ~~Pressing in or partially dip soldering the connector at the board edge~~
6. Quality inspection



D-Sub in pick and place machine equipped with vacuum nozzle

* Also known as Pin-in-Paste or Through Hole Reflow (THR)

Interface connectors were designed for Pin in Hole Intrusive Reflow with features like an inspection friendly black colour, tape and reel packaging for automated handling and it is self retaining on pcb via kinked pin. The open design – moulded from high temperature resistant material – ensures good heat distribution, so that current solder temperature profiles can be used. The special material of the insulation body withstands also the higher temperatures of lead free soldering.

Advantages for using interface connectors are:

- Partial dip soldering or press-in is no longer required
- High mechanical stability
- Complete compatibility with Surface Mount Technology
- Savings through integration into the automated assembly process
- Reduced floor space in the production plant

Application of solder paste

Before the components are assembled, solder paste is applied to all the solder pads and the plated through holes. Usually a screen printing process is used for this purpose. A squeegee moves across the pcb, which is masked with screens and presses the solder paste into all unmasked areas. A good solder joint is basically determined by the amount of the applied solder paste. Only a few parameters (illustrated on the right) will lead to the right quantity.

As an alternative to screen printing, the solder paste can be applied by means of a dispenser. A high-precision robot moves the dispenser to all required positions on the pcb. The dispensing method is particularly suitable for small pcb's or applications which demand high precision and flexibility in dispensing volumes.

Dispenser in operation

Solder paste volume

There are numerous scientific studies dealing with calculation of the required quantity of solder paste. These studies use various parameters, e.g. the shrinking factor of the paste during soldering or the thickness of the screens used for masking the pcb. Since such calculation methods are complicated to apply, the following rule of thumb has proved valuable in practice:

$$V_{Paste} = 2(V_H - V_P)$$

in which:

V_{Paste} = Required volume of solder paste

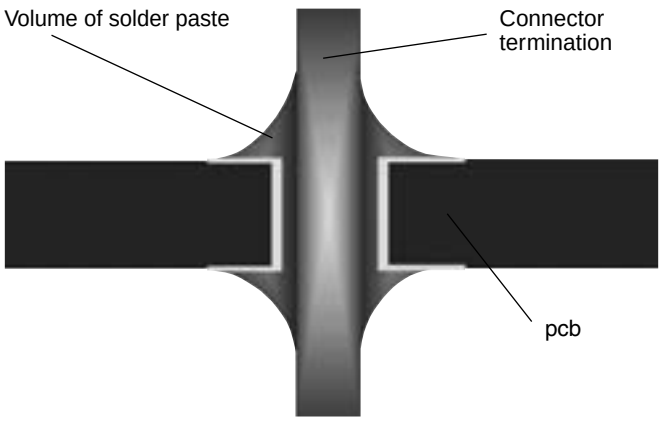
V_H = Volume of the plated through hole

V_P = Volume of the connector termination in the hole

Comment: the multiplier "2" compensates for solder paste shrinkage during soldering. For this purpose, it was assumed that 50 % of the paste consists of the actual solder, the other 50 % being soldering aids.

Requirements for the solder connection

At the beginning of a new production batch, the process parameters, such as quantity of solder paste and soldering temperature, can be set by interpreting simple cross-sections of the soldered connection. A reliable measure for achieving optimum parameters is the quantity of solder required to fill the hole. In soldered connections of high quality, the holes are filled to between 75 % and 100 %.



Plated through hole with connector termination

SMC connectors

SMC (Surface Mount Compatible) connectors have to withstand temperatures of up to 225°C in the reflow oven for 10 to 15 seconds. Therefore, the moulding must be made from a dimensionally stable plastic which expands at the same rate as the pcb material when subjected to heat.

The length of the connector contacts should be such that they protrude by no more than 1.5 millimetres after insertion to the pcb. Each contact collects solder on its tip as it penetrates the solder paste in the hole. So if the contact was too long, this solder would no longer be able to reflow back into the plated through hole by capillary action during the soldering process, therefore the quality of the soldered connection would suffer as a result.

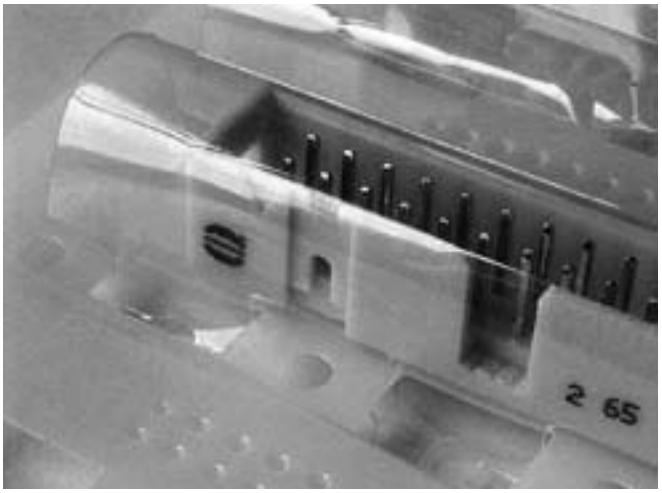
Connector design must permit both automatic assembly with pick-and-place machines and manual positioning for test and pre-production batches. It is also important for the packaging of the connectors to be suitable for automated assembly. Experience shows that deep-drawn film and reel packaging fed into the pick-and-place machines with the aid of a conveyor system is particularly suitable.

HARTING SMC technology

HARTING offers its customers a complete system concept for integrating SMC technology into existing production lines. We manufacture a wide range of SMC connectors (3 and 5 row) in compliance with IEC 60 603-2, D-Sub connectors in compliance with CECC 75 301-802 and connectors from the har-mik® series with contact spacing of 1.27 millimetres. In addition, HARTING supports the market with packaging and processing concepts, which have been developed in collaboration with renowned manufacturers of SMC soldering and assembly plants.

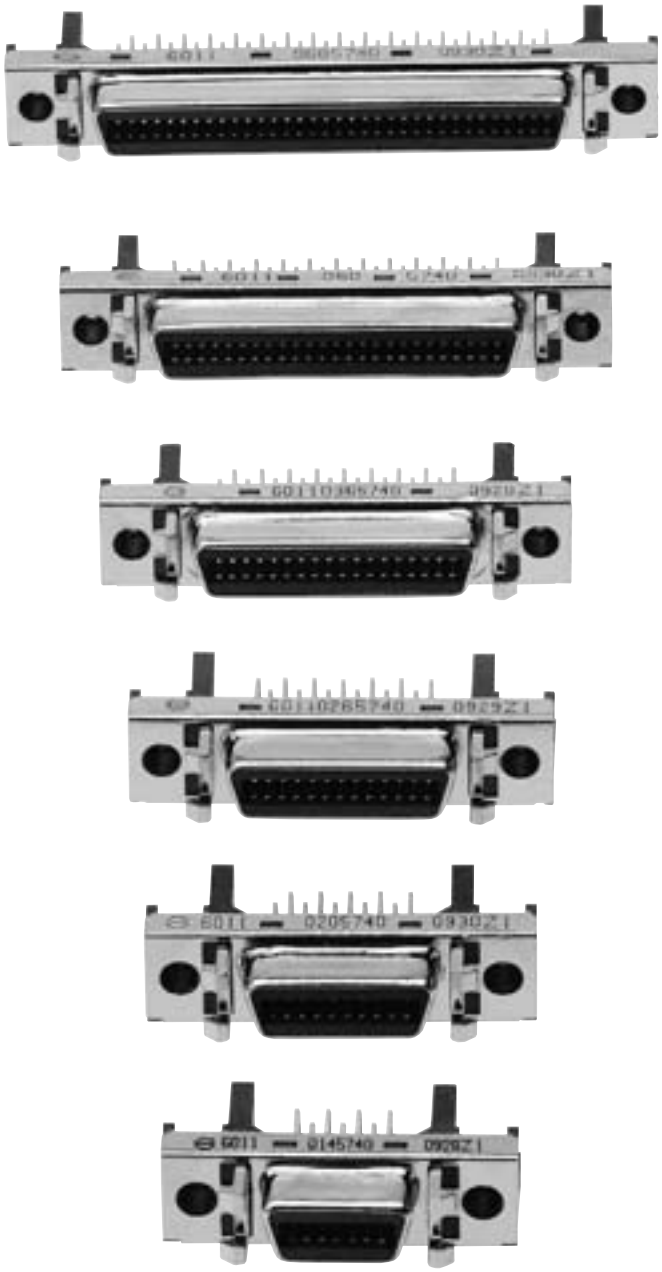
Advantages of the "Pin in Hole Intrusive Reflow" process:

- Partial dip soldering or press-in is no longer required
- Complete compatibility with Surface Mount Technology
- Complete integration into the automated assembly process
- Reduced floor space in the production plant
- As a rule, no additional investment costs



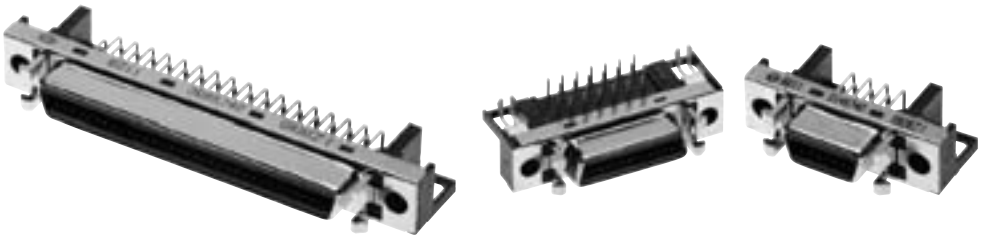
SEK connector mounted in a tape ready for placement using an odd form assembly station.

Number of contacts	14, 20, 26, 36, 50, 68
Pitch	1.27 mm
Working current	1 A
Working voltage	240 V ~
Test voltage $U_{r.m.s.}$	500 V
Contact resistance	≤ 45 mΩ
Insulation resistance	≥ 10^3 MΩ
Temperature range reflow soldering	-55 °C … + 105 °C according to ICP/JEDEC J-STD-020 Revision D
Terminations	
Solder pins	Angled for pcb holes min. Ø 0.62 mm
Materials	
Moulding	Thermoplastic resin glass-fibre filled UL 94-V0 Liquid Christal Polymer (LCP)
Contacts	Copper alloy
Contact surface	
Contact zone	Selectively gold plated according to performance level
Metal shell	Die cast zamac or stamped steel, nickel-plated



Number of contacts

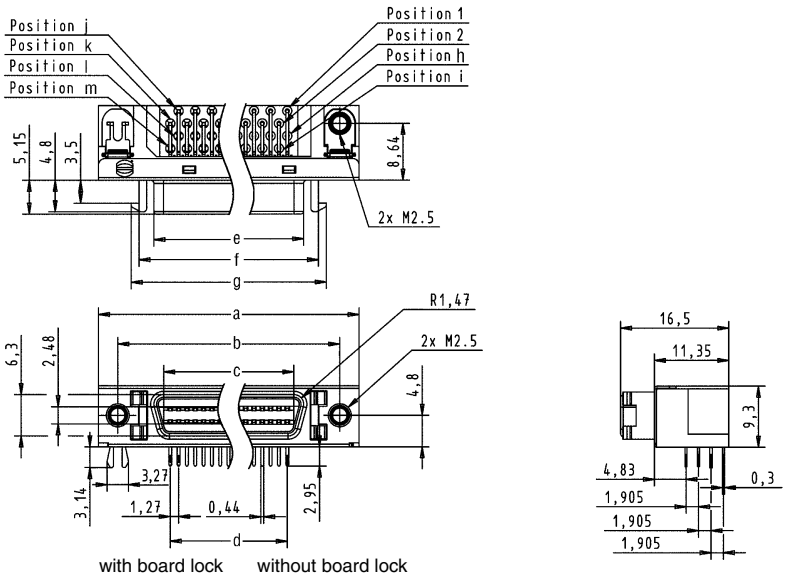
14–68



SMC female connectors, angled

Identification	No. of contacts	Part No. for one reel (300 pieces)	Part No. standard tray packaging
SMC female connectors with angled solder pins	14	60 11 014 57 . . 710	60 11 014 57 . .
	20	60 11 020 57 . . 710	60 11 020 57 . .
	26	60 11 026 57 . . 710	60 11 026 57 . .
	36	60 11 036 57 . . 710	60 11 036 57 . .
	50	60 11 050 57 . . 710	60 11 050 57 . .
	68	60 11 068 57 . . 710	60 11 068 57 . .
Without board lock	32		
With board lock	40		

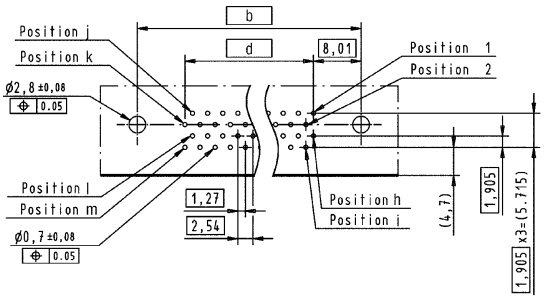
Dimensions



	a	b	c	d	e	f	g	h	i	j	k	l	m	n
14	29.54	23.64	9.62	7.62	12.62	17.14	19.54	8	9	7	6	14	13	44.0
20	33.35	27.45	13.43	11.43	16.43	20.95	23.35	11	12	9	10	19	20	56.5
26	37.16	31.26	17.24	15.24	20.24	24.76	27.16	14	15	13	12	26	25	56.0
36	43.51	37.61	23.59	21.59	26.59	31.11	33.51	19	20	17	18	35	36	56.0
50	52.40	46.50	32.48	30.48	35.48	40.00	42.40	26	27	25	24	50	49	72.5
68	63.83	57.93	43.91	41.91	46.91	51.43	53.83	35	36	33	34	67	68	88.5

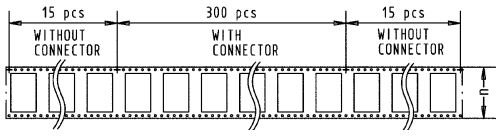
Board drillings

(Components side)



Packaging

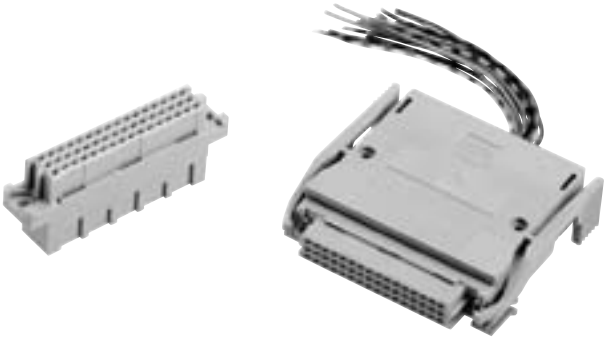
(1 reel = 300 pieces)
Reel diameter = 380 mm



Dimensions in mm

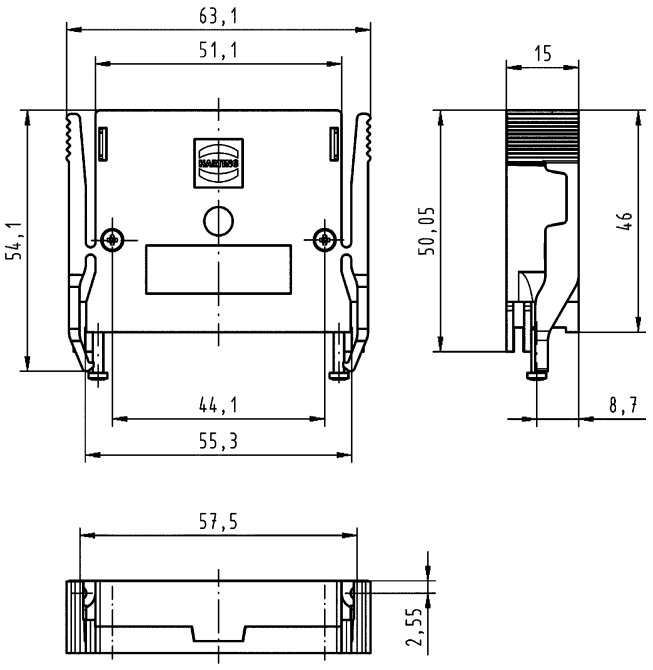
Number of contacts

max. 48



Female connectors, shell housings

Identification	Number of contacts	Part No.	Drawing type C	Dimensions in mm
Female connector for crimp contacts Order contacts separately				
Type 2C	48	09 23 048 3214[f)]		
Shell housing 2C for female connectors type 2C		09 23 048 0501[f)]		
Supplied with: Shell 1x Blinding plate 1x Cable tie 1x Screw 2.2 x 9.5 4x (09 06 001 9974)				



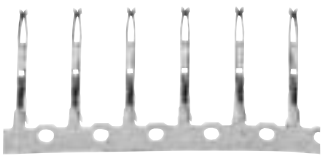
Identification	Part No. 2	Performance levels according to IEC 60 603-2. 1
Female crimp contacts BC		
Bandoliered contacts (approx. 5 ,000 pieces)	09 02 000 6484	09 02 000 6474
Bandoliered contacts (approx. 500 pieces)	09 02 000 8434	09 02 000 8444
Individual contacts[1)]	09 02 000 8484	09 02 000 8474

Wire gauge mm²	AWG	Insulation ø mm
0.09 - 0.5	28 - 20	0.7 - 1.5

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

For the fabrication in line with the specification please use exclusively crimp tools approved by HARTING (see DIN EN 60352-2)

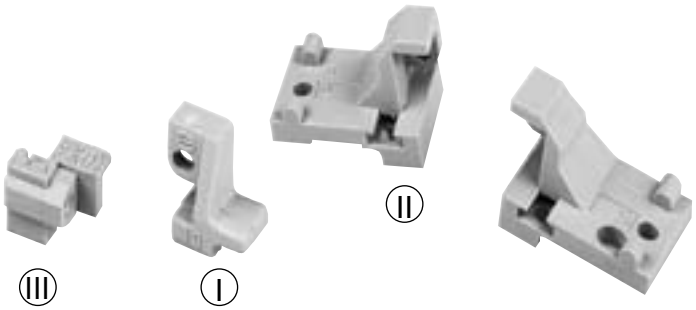
Bandoliered contacts

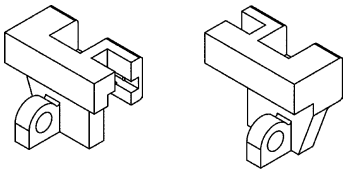
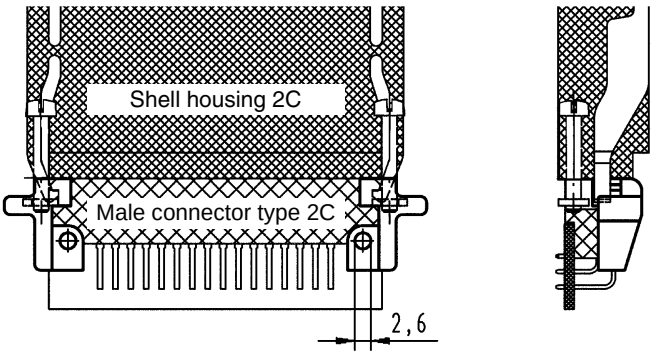
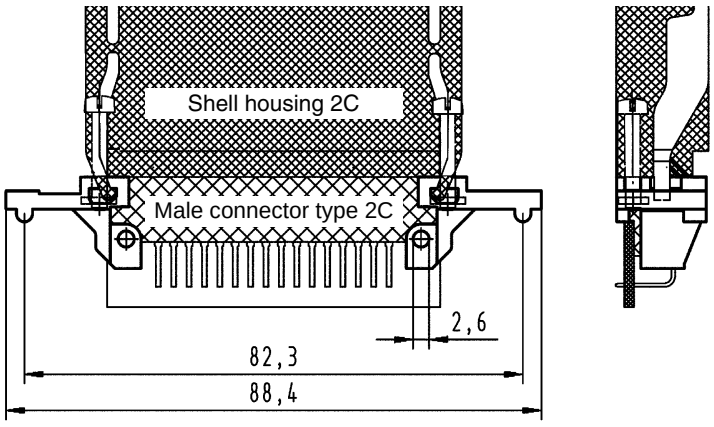
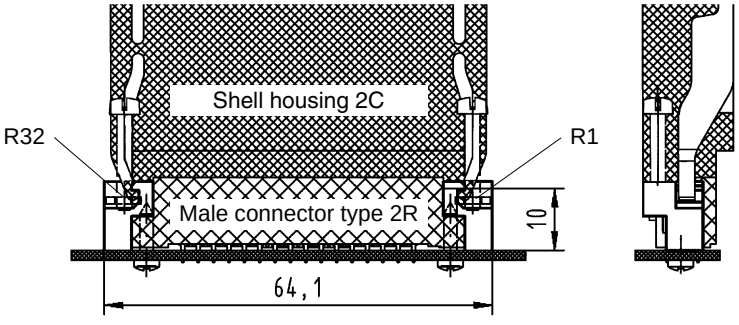


Individual contacts

[1)] Packaging unit 1,000 pieces
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Accessories for shell housing 2C

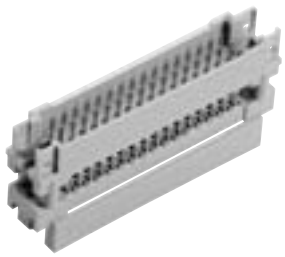


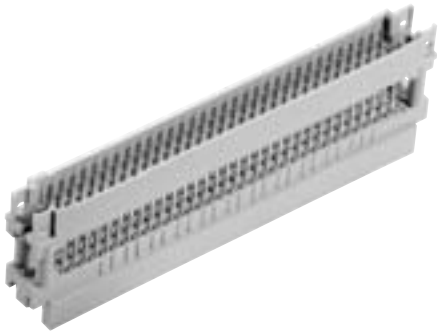
Identification	Part No.	Drawing	Dimensions in mm
Fixing brackets C for angled male connectors on pcb without fixing possibility in 19" racks	left 09 02 000 9926 right 09 02 000 9927		
Fixing brackets C for male connectors for 19“ racks according to DIN EN 60 297, part 3-101 Multiple fixing (I)	left 09 02 000 9919 right 09 02 000 9920		
Single fixing (II)	left 09 02 000 9921 right 09 02 000 9922		
Fixing brackets R for inverse male connectors on pcb's (III)	R 1 09 02 000 9953 R 32 09 02 000 9954		

Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

Number of contacts

96, 48

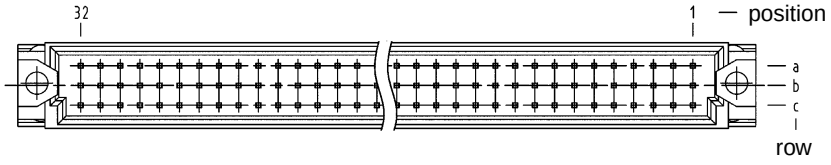


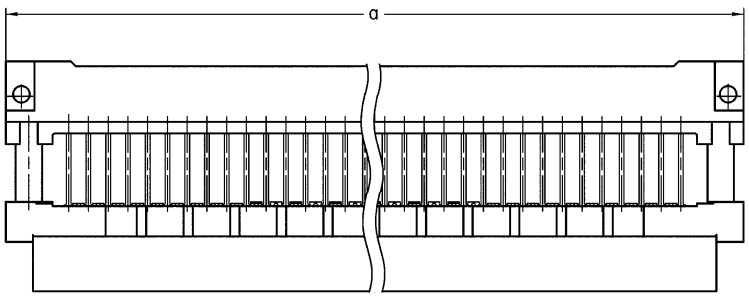


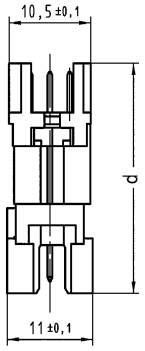
Mezzanine Adapter

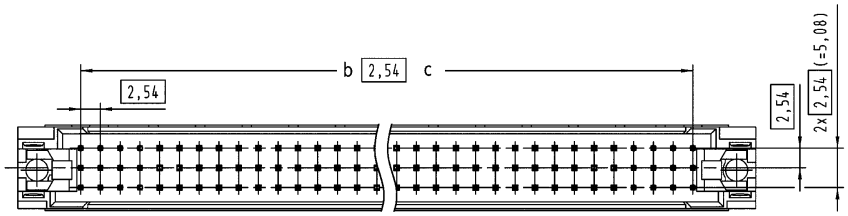
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to IEC 60 603-2. 2	1
Male connector type R with pin shroud for pcb distance 41.0 mm	96		Performance level 3 on request		09 73 196 5531
Male connector type 2R with pin shroud for pcb distance 41.0 mm	48				09 28 148 5531
37.5 mm				09 28 148 6532	

Dimensions





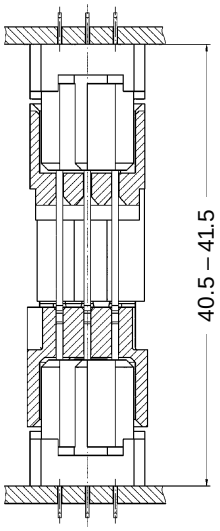


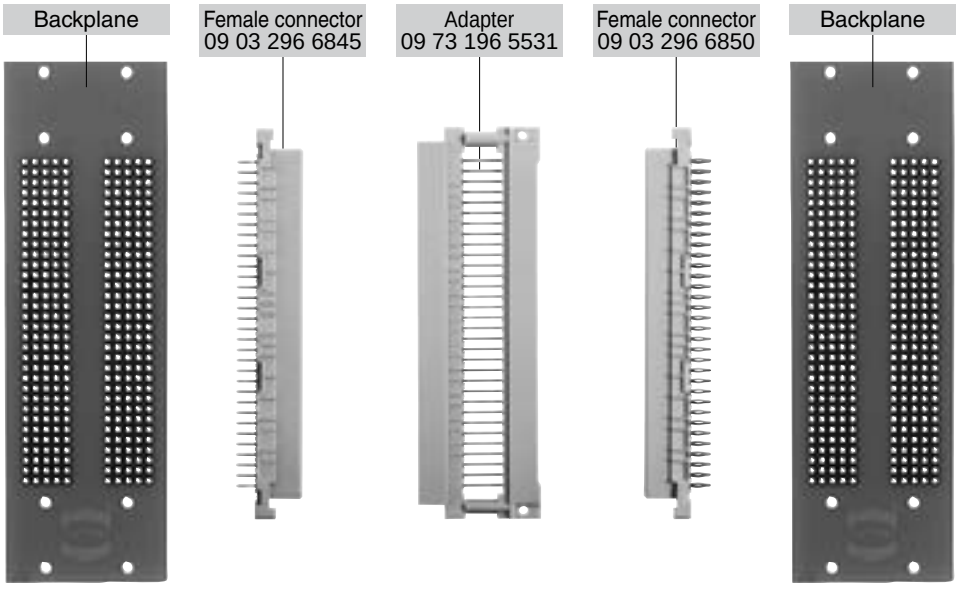


	a	b	c	d
09 73 148 5531	94.9 ± 0.1	31	78.74	29.6 ± 0.3
09 28 148 5531	54.9 ± 0.1	15	38.1	29.6 ± 0.3
09 28 148 6532	54.9 ± 0.1	15	38.1	26.15 ± 0.3

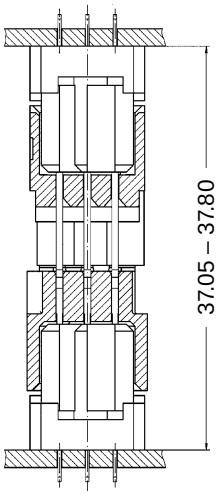
Dimensions in mm

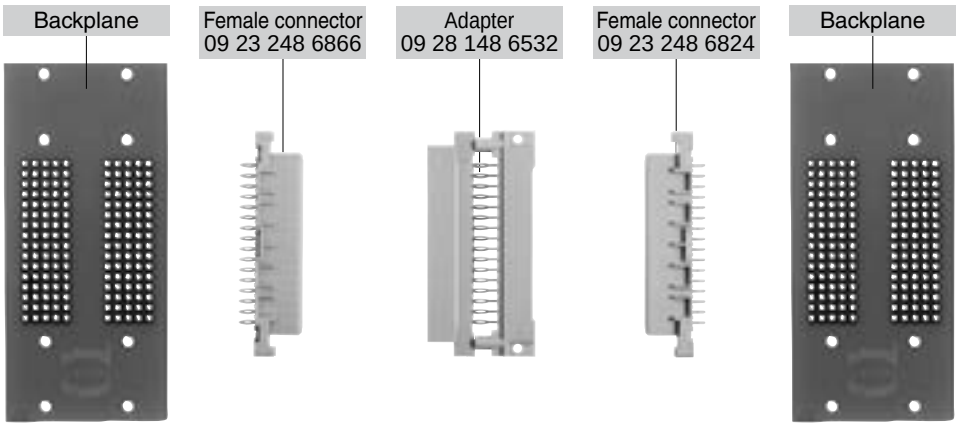
Application 1



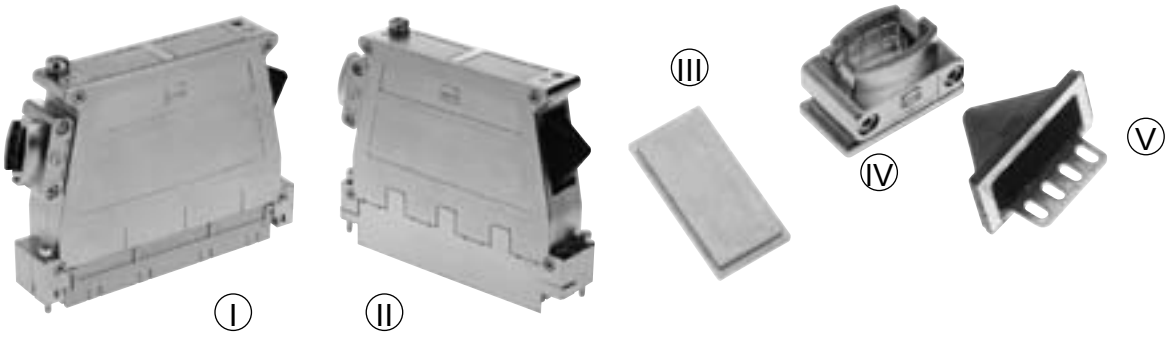


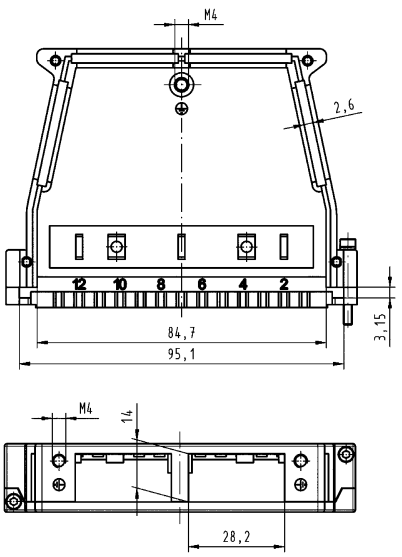
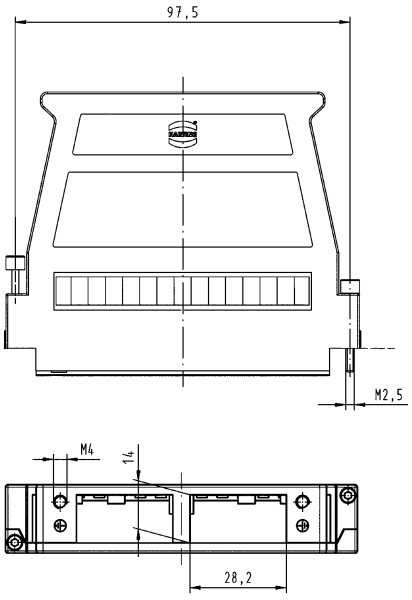
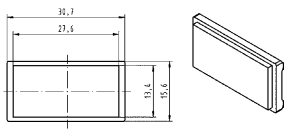
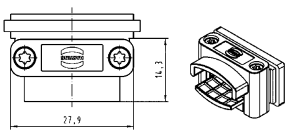
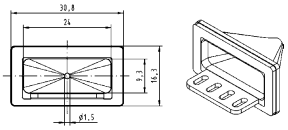
Application 2



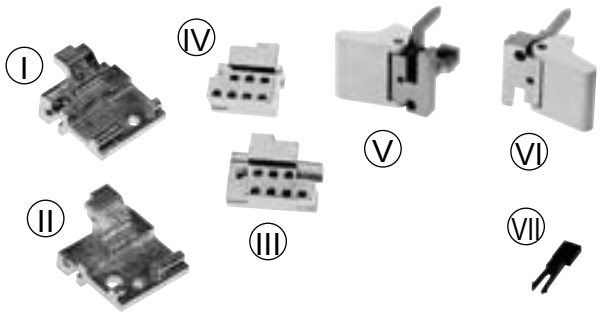


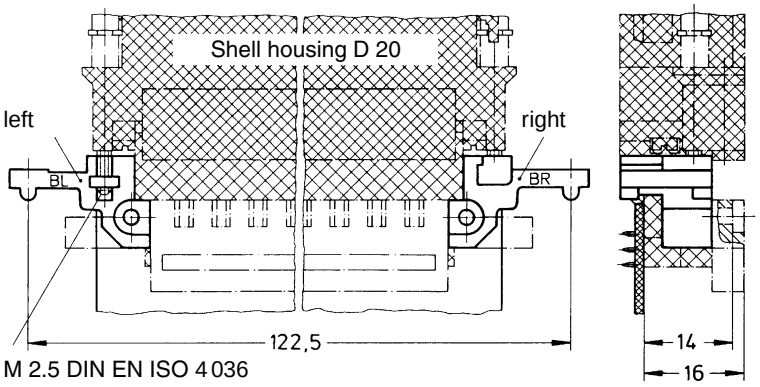
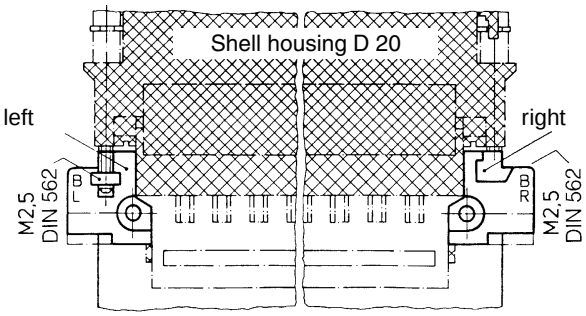
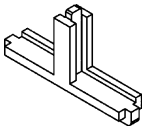
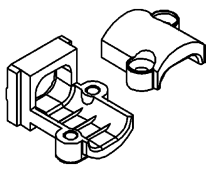
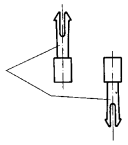
Shell housing D 20 metal for types F, H and MH



Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 20 metal Ⅰ Supplied with: Shell with coding 1x Cover 1x Locking screw (hexagonal) M2.5 x 22 2x Screw (torx) M2.5 x 10 4x Earth screw M4 x 8 2x	09 06 848 0550		
Shell housing D 20 metal HF with nickel-plated surface Ⅱ Supplied with: Shell with coding and HF-sealing spring 1x Cover with shielding plate 1x Locking screw (hexagonal) M2.5 x 22 2x Screw (torx) M2.5 x 10 4x Earth screw M4 x 8 2x	09 06 848 0551		
Blinding piece Ⅲ	09 06 800 9951		
Cable clamp Ⅳ	09 06 800 9955		
Cable grommet with strain relief Ⅴ	09 06 800 9950		

Shell housing D 20 metal HF for types F, H and MH



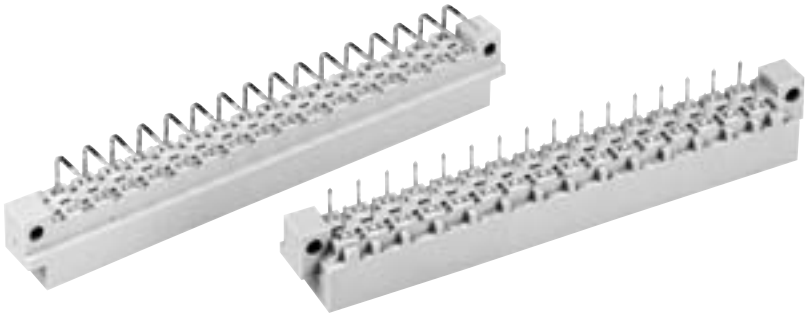
Identification	Part No.	Drawing	Dimensions in mm
Fixing brackets B metallised for male connectors for 19" racks according to DIN EN 60 297, part 3-101 (I) Single fixing with nut M 2.5 DIN EN ISO 4 036 (II)	left 20 mm 09 06 901 9924[f] right 20 mm 09 06 901 9925[f]		
Multiple fixing with coding at fixing bracket with nut M 2.5 DIN 562 (III) (IV)	left 20 mm 09 06 900 9997[f] right 15 mm 09 06 900 9996[f]		
Fixing brackets B metal for male connectors for 19" racks according to DIN EN 60 297, part 3-101 (V) Single fixing with ejector handle (VI)	**left** **09 06 800 9943** **right** **09 06 800 9944**		
Crimp flange insert	**09 06 800 9952**		
Cable clamp cable-Ø appr. 5- 7 mm cable-Ø appr. 7-10 mm cable-Ø appr. 10-12 mm	**61 03 000 0141** **61 03 000 0044** **61 03 000 0143**		
Blanking piece for hoods	**61 03 000 0042**		
Code pin (VII)	09 06 001 9905		Order 13 pieces per code comb
Earth screw	09 06 800 9958		

[f] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

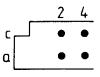
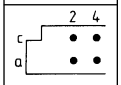
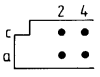
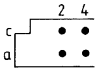
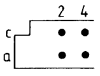
Number of contacts

32

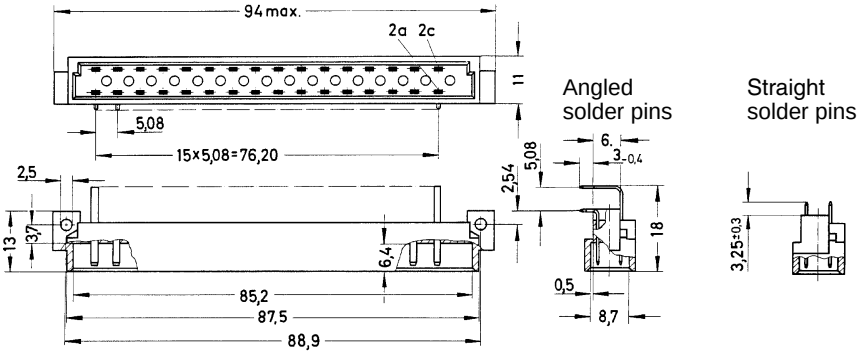
New
SMC
NFF F1/I2



Male connectors

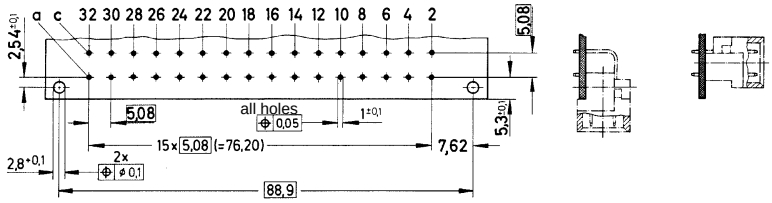
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to IEC 60 603-2. 2	1
Male connector with angled solder pins	32		09 04 132 7921	09 04 132 6921 **09 04 132 6921 222**[f] 09 04 332 6921[b] 09 04 632 6921[c]	09 04 132 2921 **09 04 132 2921 222**[f]
SMC	32			**09 04 332 6919**[b][d]	
	30 + 2▲			09 04 132 6951 09 04 632 6951[c]	09 04 632 2951[c]
Male connector with straight solder pins	32			09 04 132 6922	
	30 + 2▲			09 04 132 6952	

Dimensions



Board drillings

Mounting side



Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a2 and a32]
Other contact arrangements on request

b) Connectors with snap-in clips

c) Connectors with coding

d) **CTI > 400**

f) **Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2**

Number of contacts

48

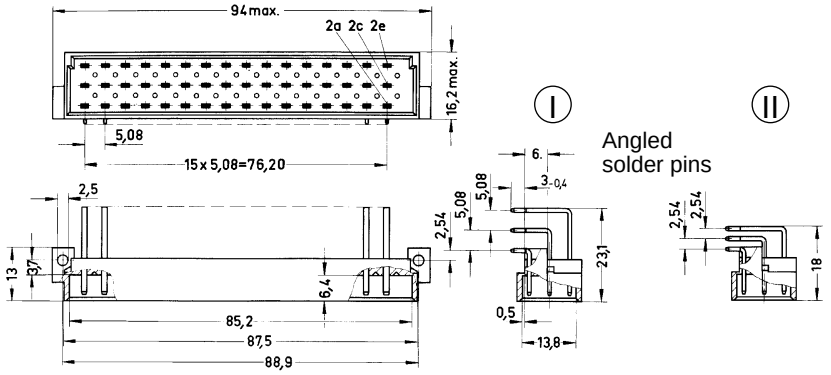
New
SMC
NFF F1/I2

Ⅱ Ⅰ

Male connectors

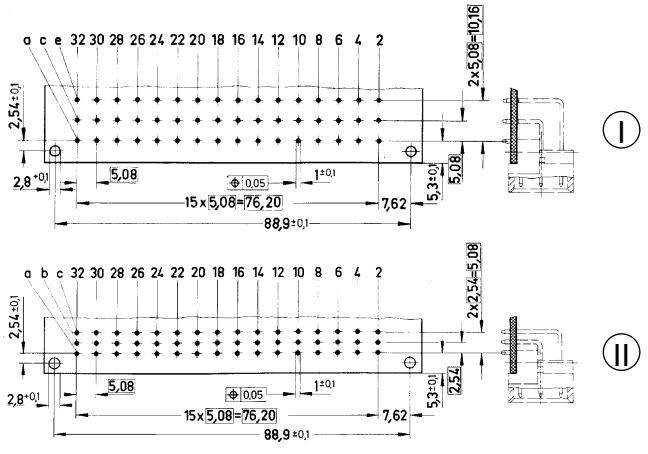
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to IEC 60 603-2. 2	1
Male connector with angled solder pins					
Row separation termination side 5.08 mm Ⅰ	48		09 05 148 7921	09 05 148 6921 **09 05 148 6921 222**[f] 09 05 348 6921[b] 09 05 648 6921[c]	09 05 148 2921 **09 05 148 2921 222**[f] 09 05 648 2921[c]
	46 + 2▲			09 05 148 6951	
Row separation termination side 2.54 mm Ⅱ	48		09 05 148 7931	09 05 148 6931	09 05 148 2931
SMC	48			**09 05 148 6920**[d]	
	46 + 2▲			09 05 148 6961	

Dimensions



Board drillings

Mounting side



Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a2 and a32]
Other contact arrangements on request

[b] Connectors with snap-in clips

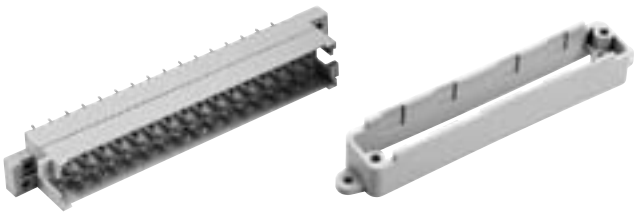
[c] Connectors with coding

[d] **CTI > 400**

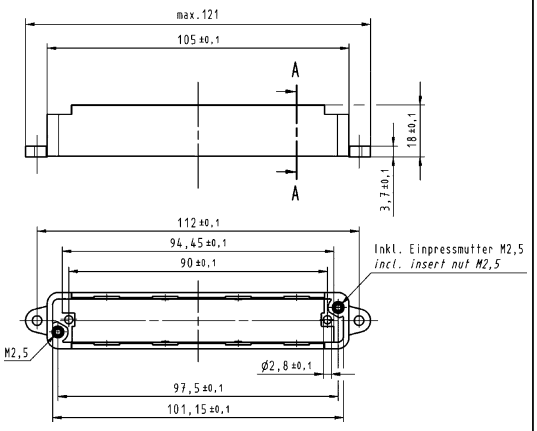
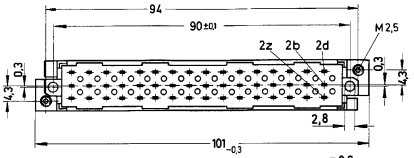
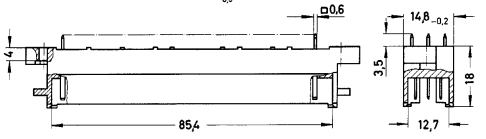
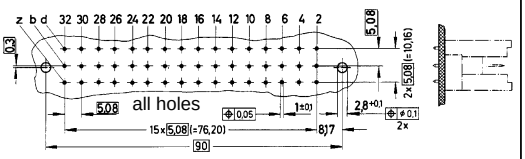
[f] **Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2**

Number of contacts

48, 32



Interface connector I

Identification	Number of contacts	Contact arrangement	Part No.	Drawing	Dimensions in mm
Shroud[1)] for screw-fixing of shell housing D20 plastic or D20 metallised . The shroud is assembled onto the Interface connector I and is screwfixed onto the pcb or to the rack.			**09 06 001 9964**		
Interface connector I with solder pins[1)] 0.6 x 0.6 mm	48		09 06 048 2905[f)]		
	32		09 06 032 2905[f)]		
	32		09 06 032 2941[f)]		
Board drillings Mounting side					

* Acc. to IEC 60 603-2, performance level 2 on request
[1)] With shroud coding
[f)] Railway classification NFF 16-101, Smoke index: F1, Flammability class: I2

The cabling represents the backbone of an application. Mistakes during the selection and laying of cables may lead to serious errors in data transfer, data loss and even total network failure. Especially in the industrial environment, reliable and fully functional cables are an

D-Sub

important element in planning and implementing high-performance networks ensuring a high degree of availability.

HARTING offers a wide range of cable assemblies, which are specially designed for use in different environment. Data transfer in the Categories 5, 6 and 7 according to ISO/IEC 11801 is supported.

Additionally options like solid, stranded, or trailing cable are provided. Oil resistance, high mechanical stability and halogen-free are only a few of the features HARTING demands from on its cables.

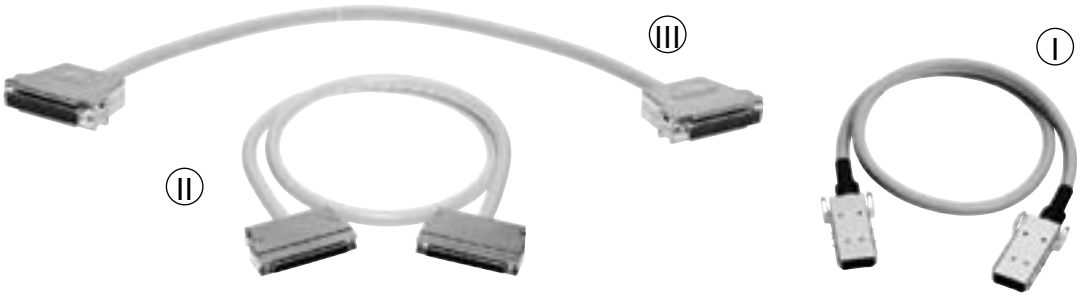
The range of HARTING cable assemblies uses these upscale cables combined with high-grade connectors. All of them use different types of connectors like har-mik®, har-link®, HARTING PushPull, fibre optic and many more.

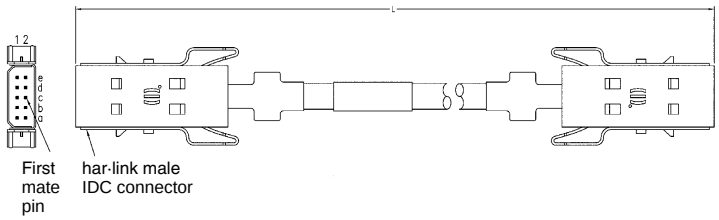
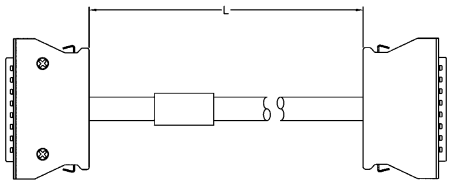
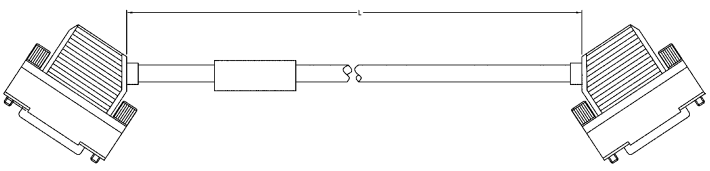
All HARTING cable assemblies provide an optimized electrical and mechanical support. Since these products are tested 100 % a stable quality on a high level can be assured. Without having any assembly work the application can “play” by “unpacking and plug”, so that “plug and play” becomes reality.

By covering various lengths and supporting customized solutions, including overmoulding, a wide range of applications can be served. For the overmoulding solutions we offer different materials like PVC, PUR and more. The overmoulding solution can be used with inner shielding or without. HARTING offers both standard cable assemblies and customer specific versions for small and high volumes!

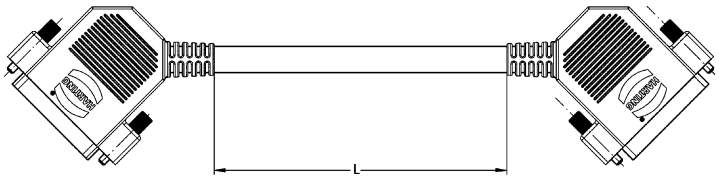
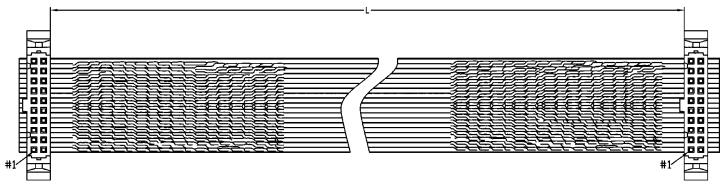
Han® 3 A

Cable assemblies

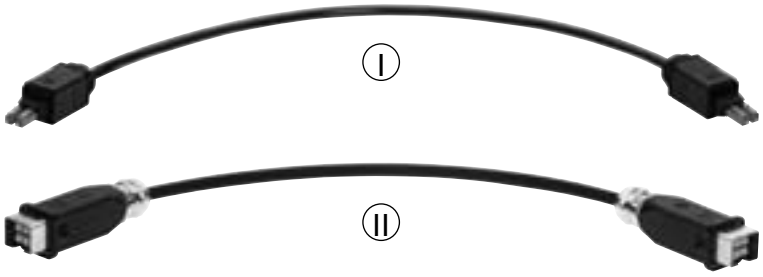


Identification	Part No.	Drawing	Dimensions [mm]
High end cable assembly har-link® 10 pole Cable: 5 twisted pairs, AWG 30, double shielded, PVC Wiring: 1:1 (I)			
Length: L = 0.5 m	33 27 243 0500 006		
L = 1.0 m	33 27 243 1000 007		
L = 2.0 m	33 27 243 2000 008		
Cable assembly har-mik® pin and socket, 68 pole Hood: metal hood with top entry Cable: 34 twisted pairs, AWG 28, shielded, PVC Wiring: 1:1 (II)			
Length: L = 0.5 m	33 60 214 5000 102		
L = 1.0 m	33 60 213 1000 103		
L = 2.0 m	33 60 213 2000 104		
L = 5.0 m	33 60 213 5000 105		
L = 10.0 m	33 60 212 1000 106		
L = 15.0 m	33 60 212 1500 107		
L = 20.0 m	33 60 212 2000 108		
Cable assembly D-Sub HD 78 pole Hood: shielded plastic hood with side entry, screw 4-40 UNC Cable: 39 twisted pairs, AWG 26, double shielded, PVC Wiring: 1:1 (III)			
Length: L = 0.5 m	33 56 212 0050 028		
L = 1.0 m	33 56 213 1000 002		
L = 2.0 m	33 56 213 2000 016		
L = 5.0 m	33 56 212 0500 029		
L = 10.0 m	33 56 212 1000 030		
L = 20.0 m	33 56 212 2000 031		

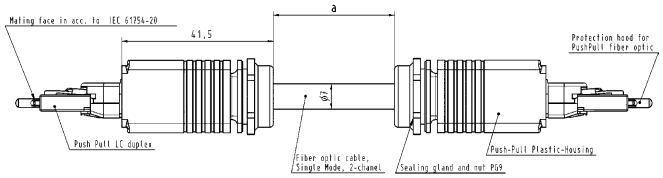
Further cable lengths are available on request

Identification		Part No.	Drawing	Dimensions [mm]
Cable assembly D-Sub HD 44 pole Hood: overmoulded with side entry Cable: 24 twisted pairs, solid wires, AWG 26, shielded, halogen free Wiring: 1:1				
I	Length: L = 0.5 m	33 56 224 5000 001		
	L = 1.0 m	33 56 221 0010 001		
	L = 2.0 m	33 56 221 0020 001		
	L = 5.0 m	33 56 221 0050 001		
Cable assembly SEK 20 pole Cable: Flat cable, 10 twisted pairs, AWG 28/7, 1.27 mm pitch Wiring: 1:1				
II				
	Length: L = 0.5 m	33 18 243 0500 060		
	L = 1.0 m	33 18 243 1000 062		
	L = 1.5 m	33 18 243 1500 068		

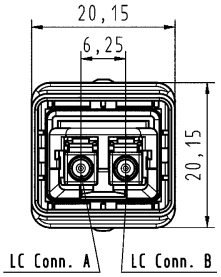
Further cable lengths are available on request

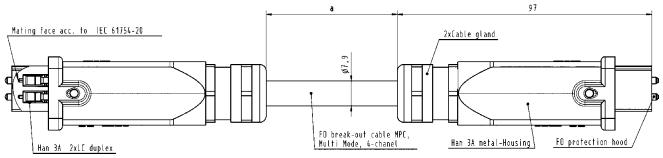


Identification	Part No.	Drawing	Dimensions in mm
Fibre optic cable, double ended, single mode **2 x HARTING PushPull LC duplex**			
Length: a = 1 m	33 58 211 0010 002		
a = 5 m	33 58 211 0050 002		
a = 10 m	33 58 211 0100 002		
a = 20 m	33 58 211 0200 002		
I a = 40 m	33 58 211 0400 002		
a = 50 m	33 58 211 0500 002		
a = 100 m	33 58 211 1000 002		
Fibre optic cable, double ended, multi mode, metal, 50 µm **2 x Han® 3 A, 2 x LC duplex**			
Length: a = 1 m	33 54 211 0010 002		
a = 5 m	33 54 211 0050 002		
a = 10 m	33 54 211 0100 002		
a = 20 m	33 54 211 0200 002		
II a = 40 m	33 54 211 0400 002		
a = 50 m	33 54 211 0500 002		
a = 100 m	33 54 211 1000 002		

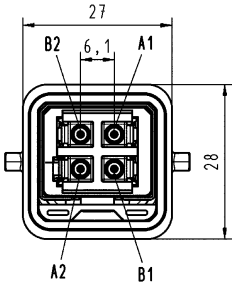


a = length

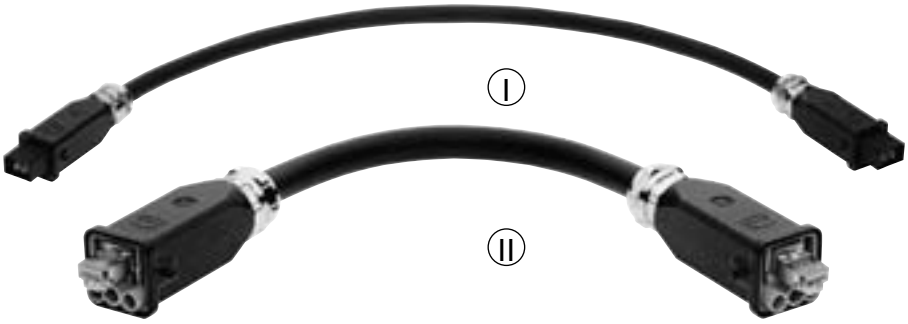


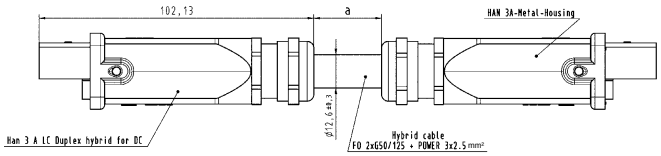
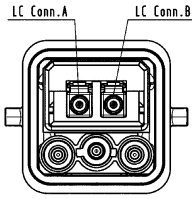
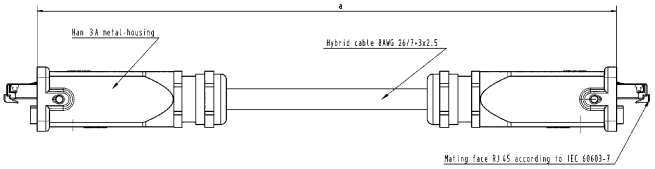
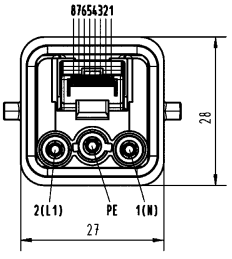


a = length



Further cable lengths are available on request



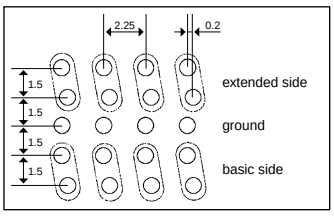
Identification			Part No.	Drawing	Dimensions in mm
Hybrid fibre optic cable, multi mode, double ended, LC duplex 2 x G50/125 + 3 x 2.5 mm²					
Length:	a = 1 m	AC version	33 57 211 0015 001		
		DC version	33 57 211 0015 002		
	a = 5 m	AC version	33 57 211 0055 001	a = length	
		DC version	33 57 211 0055 002		
I	a = 10 m	AC version	33 57 211 0105 001		
		DC version	33 57 211 0105 002		
	a = 20 m	AC version	33 57 211 0205 001		
		DC version	33 57 211 0205 002		
	a = 40 m	AC version	33 57 211 0405 001		
		DC version	33 57 211 0405 002		
	a = 50 m	AC version	33 57 211 0505 001		
		DC version	33 57 211 0505 002		
	a = 100 m	AC version	33 57 211 1005 001		
		DC version	33 57 211 1005 002		
Hybrid cable, double ended, 4 x 2 x AWG 26/7 + 3 x 2.5 mm²					
Length:	a = 1 m	AC version	33 57 211 0010 001		
		DC version	33 57 211 0010 002		
	a = 5 m	AC version	33 57 211 0050 001	a = length	
		DC version	33 57 211 0050 002		
II	a = 10 m	AC version	33 57 211 0100 001		
		DC version	33 57 211 0100 002		
	a = 20 m	AC version	33 57 211 0200 001		
		DC version	33 57 211 0200 002		

Further cable lengths are available on request

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.	~ 2.3 A @ 70 °C max. 30 °C temp. rise (PICMG requirement min. 1.52 A)
Test voltage	80 $V_{r.m.s.}$
Working voltage typically	3.3 V; 5.0 V; 12.0 V
Initial contact resistance	25 mΩ max.
Initial insulation resistance	100 MΩ min.
Nominal differential impedance	100 Ω±10 %

Max. NEXT @ 25 ps risetime	Bottom route
Adjacent	0.65 %
Basic-to-extended (diagonal)	0.60 %
Basic-to-extended (opposite)	0.73 %
Multiline (five multi-aggressor differential pairs)	2.88 % max.



PCB library on request (PADS/Dx-Designer)

SPICE models and S-Parameter on request

Differential propagation delay	Basic side:	70 ps ± 5 ps
	Extended side:	70 ps ± 5 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., typically 60 - 80 N (depending on AdvancedMC™)	
Withdrawal force	65 N max., typically 40 - 60 N (depending on AdvancedMC™)	

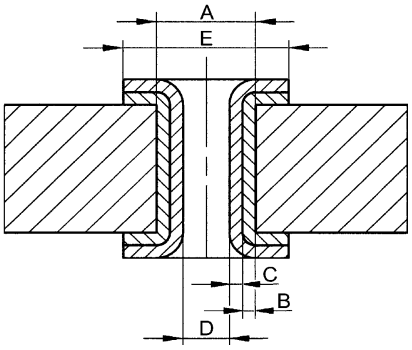
Materials

Moulded parts	Liquid Crystal Polymer (LCP), UL 94-V0
Contacts	Copper Alloy
Contact surface	Pd/Ni with Au flash Au over Ni on request
Packaging	Cardboard box (other packaging on request)

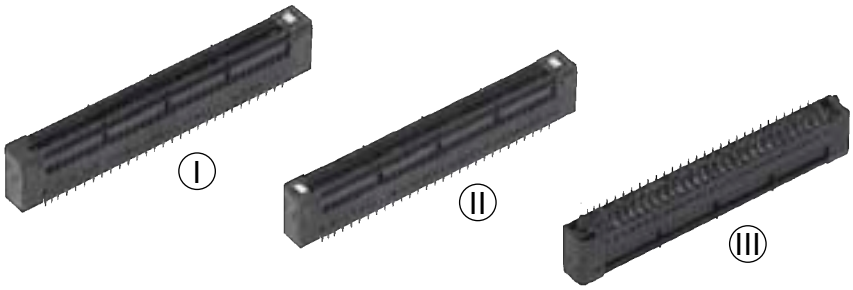
Recommended plated through hole specification

	A	Drill hole-Ø	$0.64^{\pm 0.01}$ mm
	B	Cu	25 - 35 µm
Tin plated PCB (HAL)	C	Sn	5 - 15 µm
	D	Hole-Ø	0.53 - 0.60 mm
Au / Ni plated PCB	C	Ni	3 - 7 µm
		Au	0.05 - 0.12 µm
	D	Hole-Ø	0.55 - 0.60 mm
Chemical tin plated PCB	C	Sn	0.8 - 1.5 µm
	D	Hole-Ø	0.56 - 0.60 mm
Silver plated PCB	C	Ag	0.1 - 0.3 µm
	D	Hole-Ø	0.56 - 0.60 mm
OSP copper plated PCB	C	---	---
	D	Hole-Ø	0.56 - 0.60 mm
	E	Pad size	min. 0.95 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).

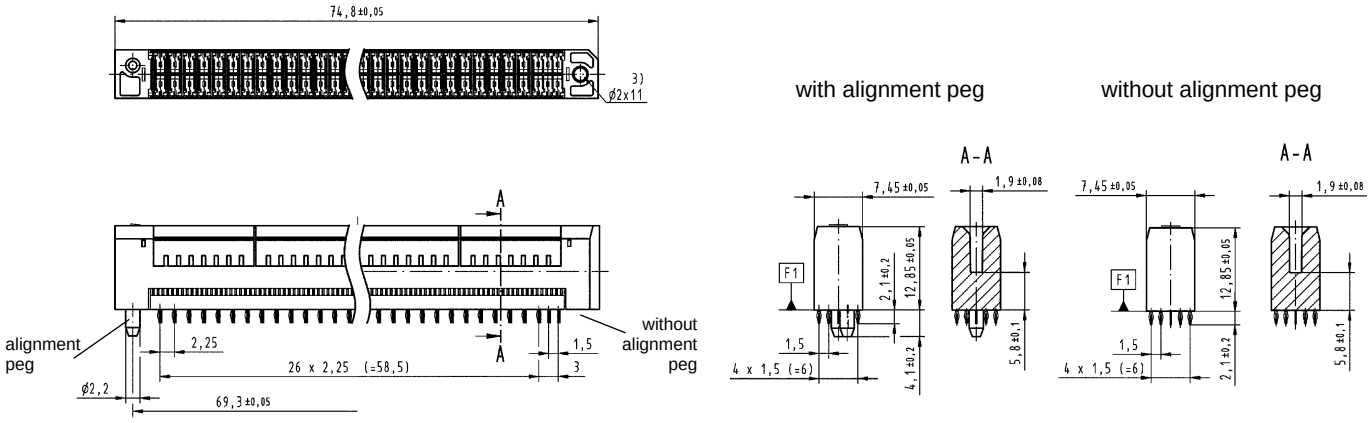


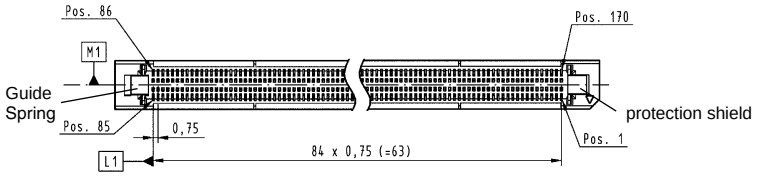
con:card+



Card edge connectors, straight

Identification	No. of contacts	Contact length [mm] termination side	Part number
AdvancedMC™ connectors for MicroTCA™			
with GuideSpring (I)	170	2.1	16 11 170 5202 000
with GuideSpring and protection shield (II)	170	2.1	16 11 170 5205 000
with GuideSpring and alignment peg (III)	170	2.1	16 11 170 5206 000
with GuideSpring, protection shield and alignment peg	170	2.1	16 11 170 5207 000



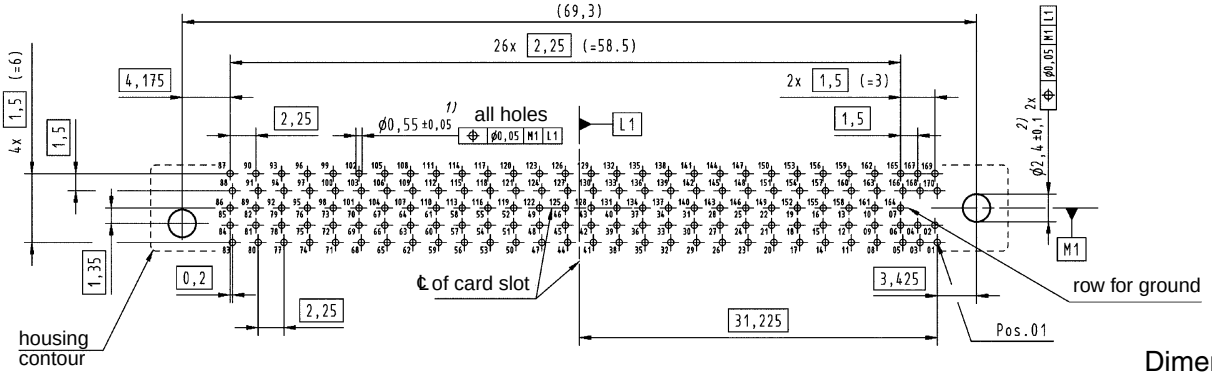


1) recommended plated through hole specification see page 140

2) non-metallized drillings
optional: for part numbers 16 11 170 5202 000 and 16 11 170 5205 000
mandatory: for part numbers 16 11 170 5206 000 and 16 11 170 5207 000

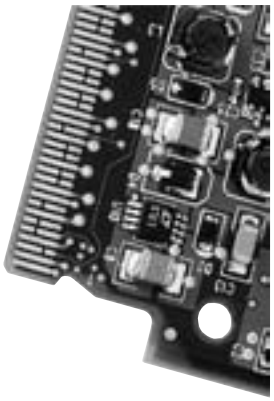
3) for optional fixing: use self-tapping screws for plastic, 2.2 x length
(length = PCB thickness + min. 6.5 mm to max. 10 mm)
e.g. HARTING part number 09 06 001 9974
Screwing torque references:
PCB + 6.5 mm: 20 cNm
PCB + 10 mm: 40 cNm

Board drillings (view magnified)



Dimensions [mm]

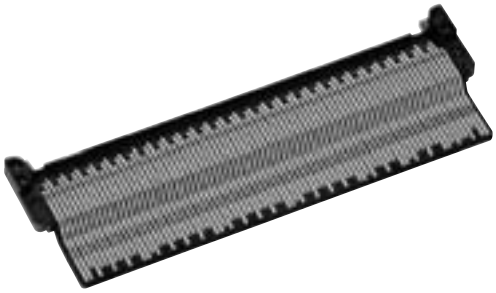
The PICMG specification AMC.0 defined a card edge with gold pads as the mating interface for the



AdvancedMC™ module. As already explained in the chapter "**con:**card**+**", it is very difficult for a PCB manufacturer to produce the tight tolerances required for the AdvancedMC™ module card edge in a consistent process. Furthermore, the quality of the gold pads is only specified in general terms.

Replacing the PCB gold pads with a connector eliminates certain drawbacks of the card edge connection. The HARTING Plug Connector offers the following advantages:

- **Controlled quality of both mating sides**
- **Small dimensional tolerances**
- **Defined hard gold surface**
- **Reduced mating forces**
- **Allows use of thicker PCBs**
- **Standard reflow solder process**
- **Cost savings are possible**



Controlled quality of both mating sides
The major advantage is that a solid contact with a band plated surface mates with the backplane connector. The connection is no longer made directly from the card edge to the backplane connector but instead indirectly via a module connector approved from one source. The AdvancedMC™ module with a Plug Connector is still within the dimensional range 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.

Small dimensional tolerances
The injection moulding process is much more precise than the PCB production process. While the AMC.0 specification defines a PCB width tolerance of 0.1 mm, the moulding process has a dimensional tolerance less than 0.03 mm. The lead-in chamfer is milled for the PCB but is realized in the connector as a smooth moulded plastic chamfer. Compared with the rough surface of a PCB chamfer with exposed glass fibre, the smooth Plug chamfer avoids abrasion of the backplane connector contact surface.

Defined hard gold surface
The AMC.0 specification defines hard gold to be on the PCB pads. However a common and unique definition of hard gold does not exist today. Additionally, the interruptions of the gold pads (which are necessary for the hot-swap ability) require a selective hard gold process. This is a complex process which is relatively expensive, so commonly just chemical gold with insufficient surface thickness is used. As a result, there are significant differences in the durability of the gold and the surface structure on the modules which are currently available.
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 adapted easily to meet customer demands.

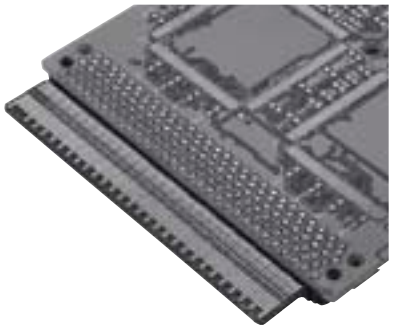
Reduced mating forces
For the module card edge, the prepads of lagging contacts are required by the Telcordia/Bellcore specification to avoid stress of the connector contact when sliding on the FR4 base material. The Plug Connector does not need prepads. The four mating steps are realized with true lagging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

Allows use of thicker PCBs
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 clear advantages and provides a wider scope for the module development. The restriction of the PCB thickness of 1.6 mm +/-10% is no longer a limiting factor. A PCB

thickness of e.g. 2 mm can be used as this fits in the mechanical environment.

Standard reflow solder process

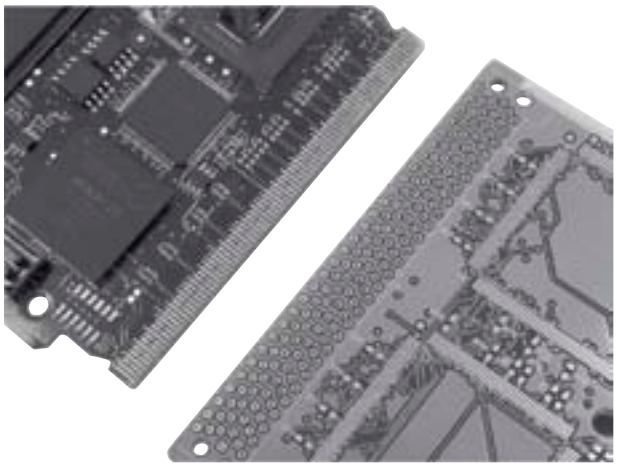
For backplanes press-fit termination is the first choice, however solder termination offers advantages for module cards. The Plug Connector is mounted to the PCB through “pin-in-hole-reflow” solder technology (PIHR). It can be soldered in the same production process as the other semi finished components on the AdvancedMC™ module. Optionally, the Plug Connector can be delivered with a pick-and-place-pad for automatic assembly.



Another advantage of this mechanically stable technology is, that the connector can be replaced. This can avoid the cost of scrapping a module if the mating interface is damaged during handling.

Cost savings are possible

By offering so many different advantages during the manufacturing process, the use of HARTING Plug Connectors also contributes to keeping costs down. Selective plating increases the cost of producing gold pads. Tight tolerance specifications also cause a large number of rejects. The beveled PCB edge is another critical area, because damage can occur to the contact pads.



A simple board layout with through-holes is sufficient for the HARTING Plug, and these boards can be produced inexpensively and with excellent quality control, thus reducing the number of rejects. Furthermore the cost of a reject can be high if a defective PCB edge is not detected until the board is populated with expensive components. A HARTING Plug on a module can be replaced easily, reducing scrapping costs.

Mounting direction

The HARTING Plug Connector is available in two versions. The difference is the mounting direction, i. e. the side of the AdvancedMC™ module PCB on which the Plug Connector is assembled.

Basic side

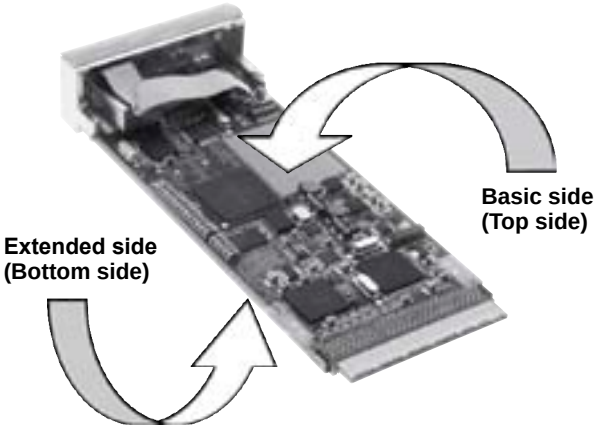
The so called basic side refers to the component side 1 as defined in the AMC.0 specification (pins 1 to 85). The main components are mounted on the basic side (sometimes also called top side).

During the manufacturing process, a Plug Connector that is mounted from the basic side can be soldered in the same assembly step as the other large components.

Extended side

The so called extended side refers to the component side 2 as defined in the AMC.0 specification (pins 86 to 170).

A Plug Connector mounted on the extended side is “hanging” at the bottom side of the AdvancedMC™ module.



This picture shows an AdvancedMC™ module with a Plug Connector mounted on the extended side.

The footprint of a Plug Connector for the basic side is different than that for the extended side. The connectors are not interchangeable. Due to advantages in the assembly of the connector, the basic side version is preferable.

For an MCH stack, only connectors having the same mounting direction can be stacked.

Technical characteristics for Plug Connectors

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 of power contacts as defined in AMC.0 spec., tested with HARTING MicroTCA™ backplane connector	~ 2.4 A @ 70 °C max. 30 °C temp. rise (PICMG requirement min. 1.52 A)
Test voltage	80 $V_{r.m.s.}$
Working voltage typically	3.3 V; 5.0 V; 12.0 V
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	0.5 %
Basic-to-extended (diagonal)	0.2 %
Basic-to-extended (opposite)	0.7 %
Multiline (five multi-aggressor differential pairs)	2.1 % max.

Propagation delay
- Long contact side: 152 ps / 147 ps
- Short contact side: 121 ps / 129 ps

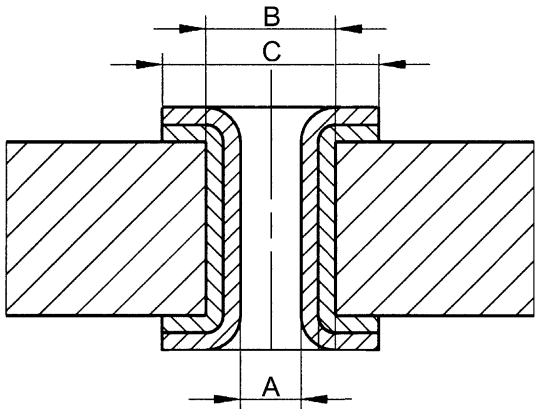
Skew within differential pairs
- Long contact side: 5 ps
- Short contact side: 8 ps

Temperature range during reflow soldering	-55 °C … +105 °C 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., typically 40 - 70 N (depending on backplane connector)
Withdrawal force	65 N max., typically 30 - 50 N (depending on backplane connector)

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.

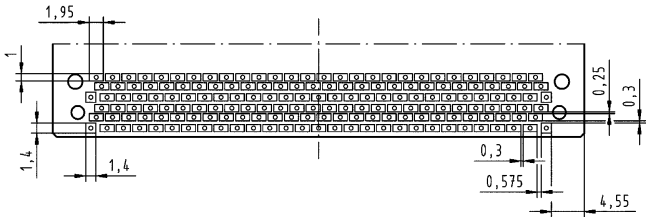
Materials

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



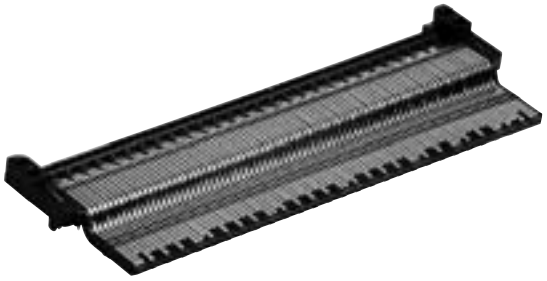
Plated through hole recommendations		
A	Plated hole-Ø	$0.55^{\pm 0.05}$ mm
B	Drill hole-Ø	$0.65^{\pm 0.01}$ mm
C	Pad size	0.95 mm

Stencil recommendation



Each termination requires a solder paste volume of 0.5 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 0.9 mm.

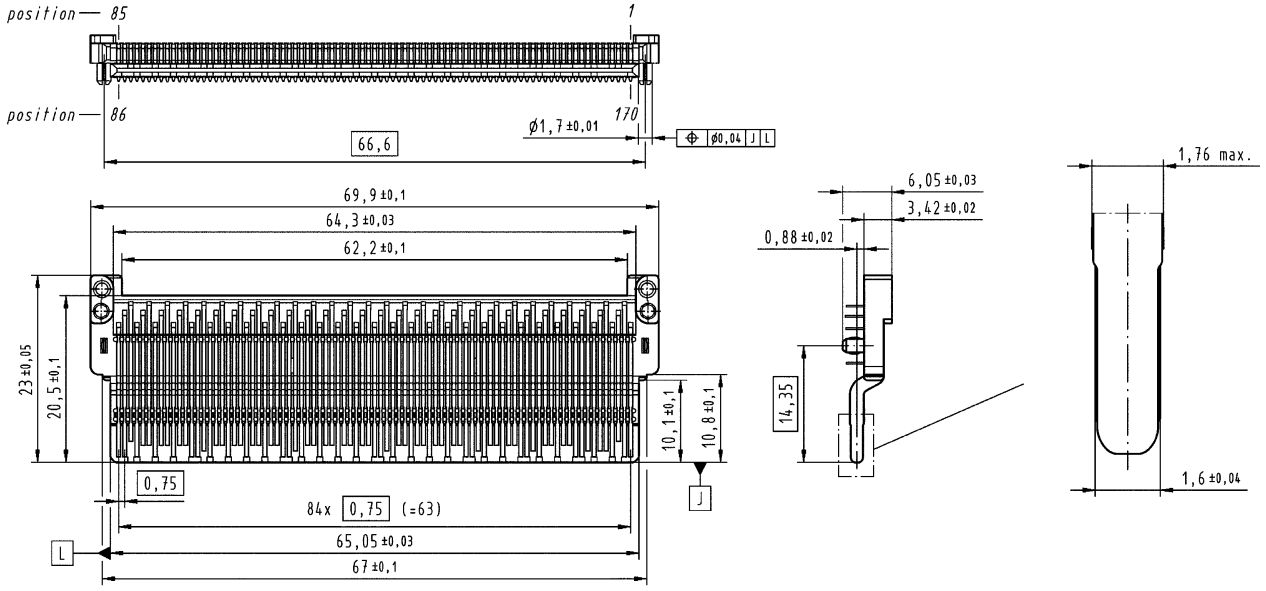
Plug Connector for AdvancedMC™ modules



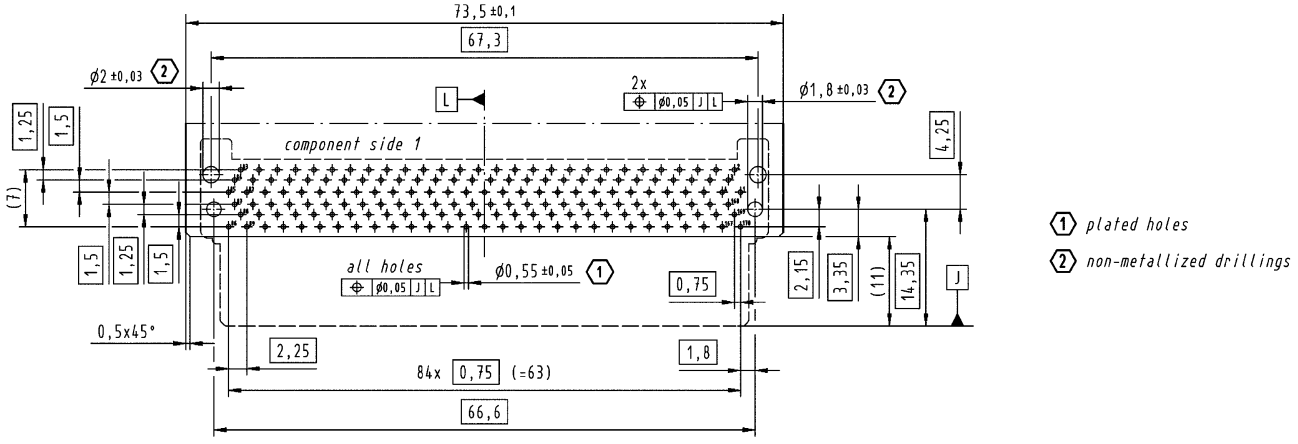
For mounting on basic side

Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector for basic side mounting	170	16 23 170 1301 000
AdvancedMC™ Plug Connector for basic side mounting with nozzle pad for pick and place assembly	170	16 23 170 1302 000

AdvancedMC™ Plug Connector for basic side mounting

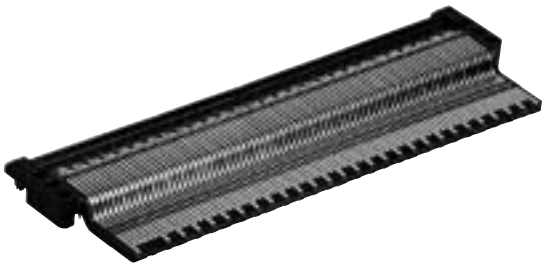


Board drillings (view of the basic side / component side 1)



Dimensions [mm]

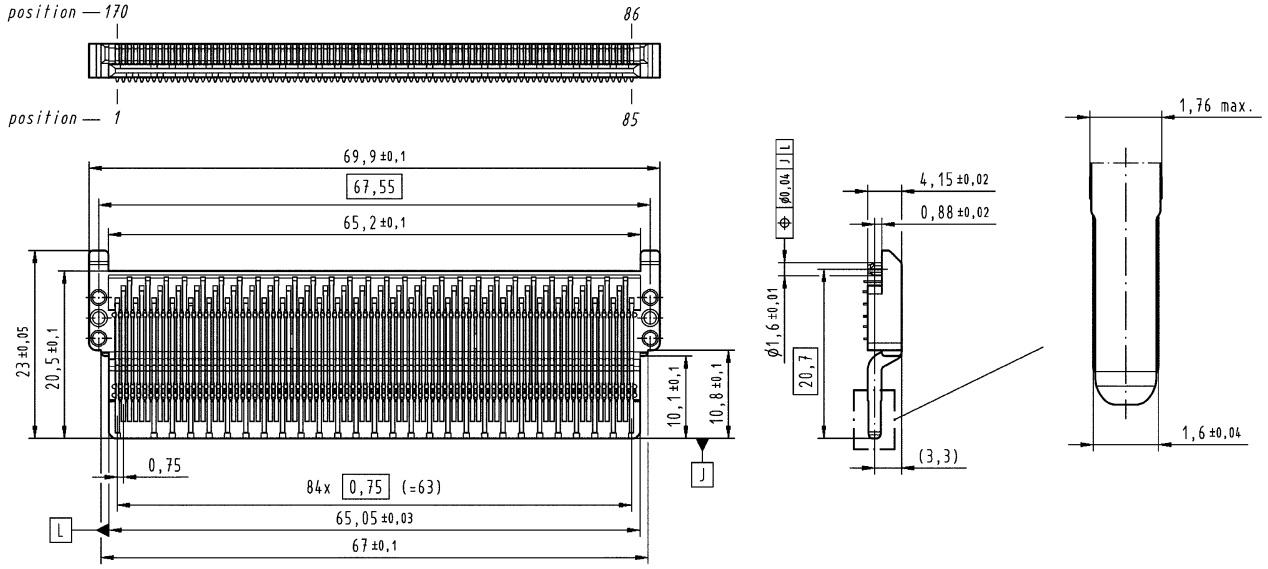
Plug Connector for AdvancedMC™ modules



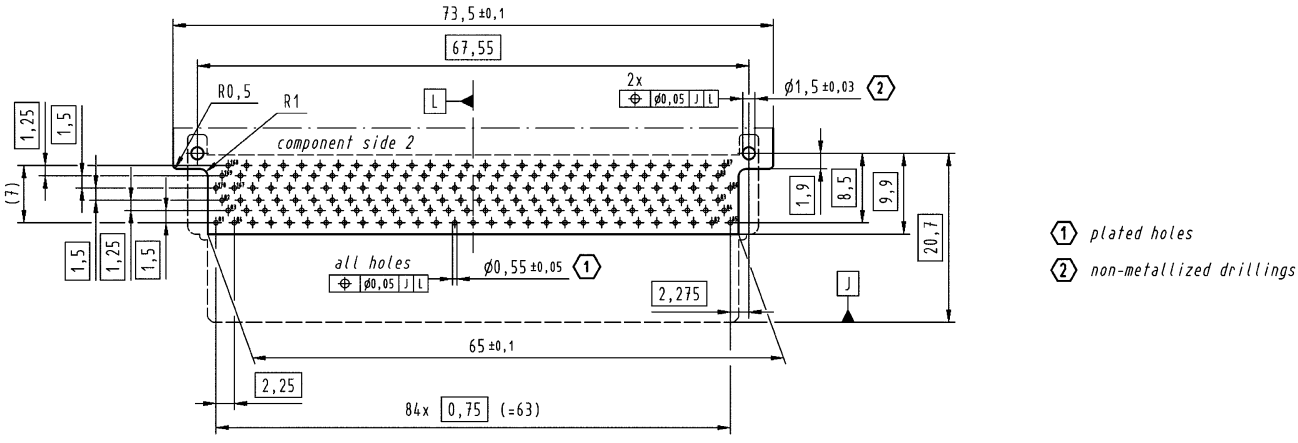
For mounting on extended side

Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector for extended side mounting replacement of former part number 16 21 170 1301 000	170	16 21 170 1303 000
AdvancedMC™ Plug Connector for extended side mounting with nozzle pad for pick and place assembly replacement of former part number 16 21 170 1302 000	170	16 21 170 1304 000

AdvancedMC™ Plug Connector for extended side mounting



Board drillings (view of the extended side / component side 2)



Dimensions [mm]

An important component of a MicroTCA™ system is the “MicroTCA™ Carrier Hub”, abbreviated MCH. The main functions of an MCH module are hardware platform management and the management of the fabric connectivity. Since the MCH module requires many more connections than a standard AdvancedMC™ module, an MCH may 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.

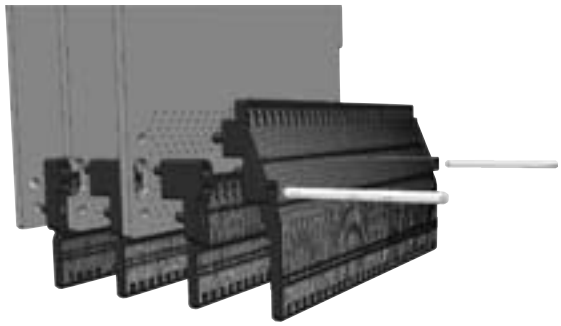
The HARTING Plug Connector system consists of three different Plug Connectors. The **AdvancedMC™ Plug** is required for an MCH module and is always used in the MCH1-slot. Furthermore it can be used for any conventional AdvancedMC™ module to replace the pcb gold pads.

AdvancedMC™ Plug, MCH Plug, Piggyback Plug

If more than one mating tongue is needed, the **MCH Plug Connector** is mated with the backplane MCH connectors 2 and 3 depending on the MicroTCA™ configuration. Compared to the AdvancedMC™ Plug, the MCH Plug insulator has standoffs ensuring the correct 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.

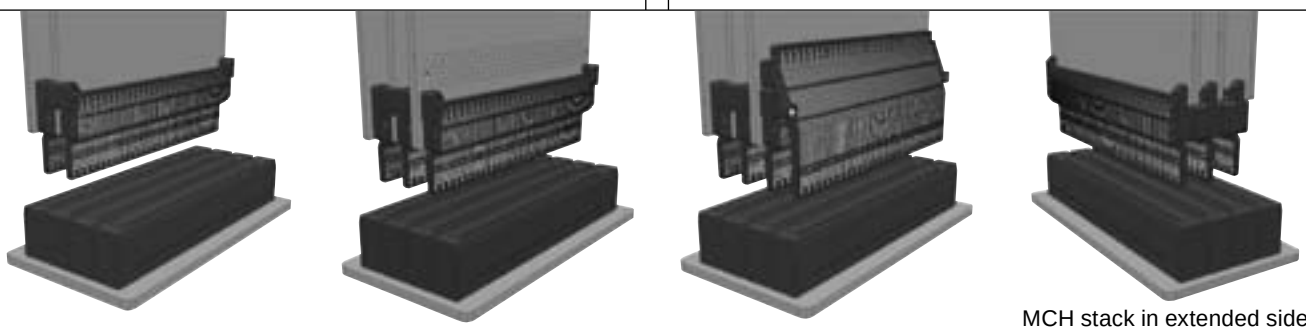
The **Piggyback Plug Connector** is designed for the MCH4 slot, but the connector itself is soldered on the PCB3. For a MicroTCA™ system with more than 6 AdvancedMC™ modules using the switched fabric fat pipe, an MCH module with 4 mating tongues must be used. In general the switched fabric is located only on the PCB3, so a high-speed connection is needed between the MCH4 slot and the PCB3.

To build a connector stack for two, three or four mating tongues, the HARTING Plug Connectors are mounted like building blocks via pegs and the holes on the adjacent Plugs. For additional mechanical stability, the connector stack is fixed using metal stacking pins. The complete connector stack can be installed easily without any special tooling.



Exploded view of an MCH stack with four tongues including Piggyback Plug

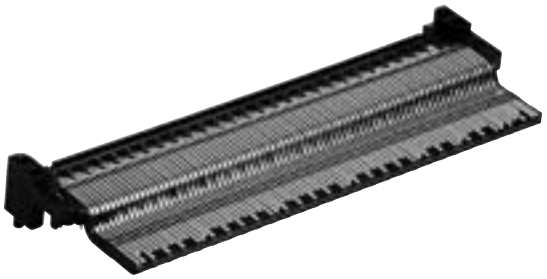
As with the AdvancedMC™ Plug, HARTING offers the Plug Connectors for MCH modules in versions for basic side or extended side mounting. Only connectors with the same mounting direction can be stacked together. The Piggyback Plug is only available as basic side version, therefore for a MCH module with four tongues, the basic side version is preferred.



MCH stacks in basic side version with 2, 3 and 4 tongues

MCH stack in extended side version

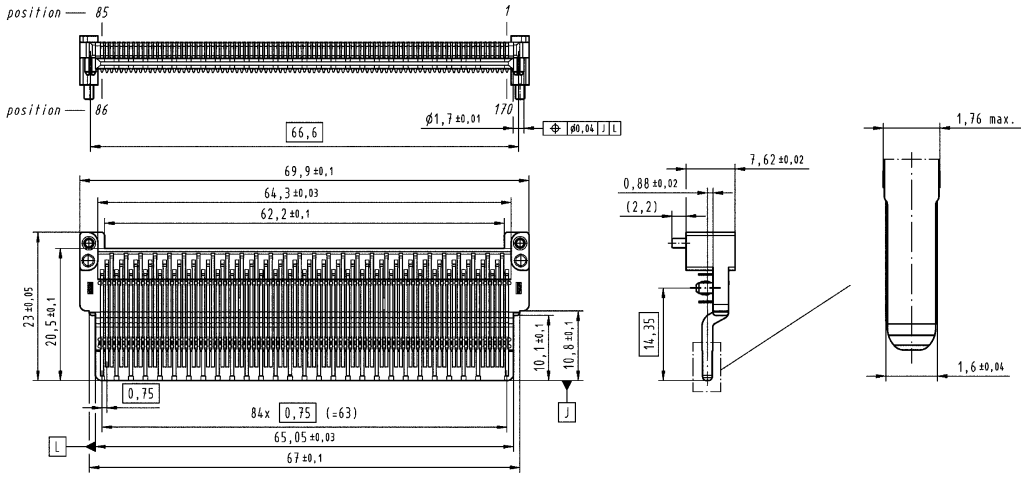
Plug Connectors for MCH modules



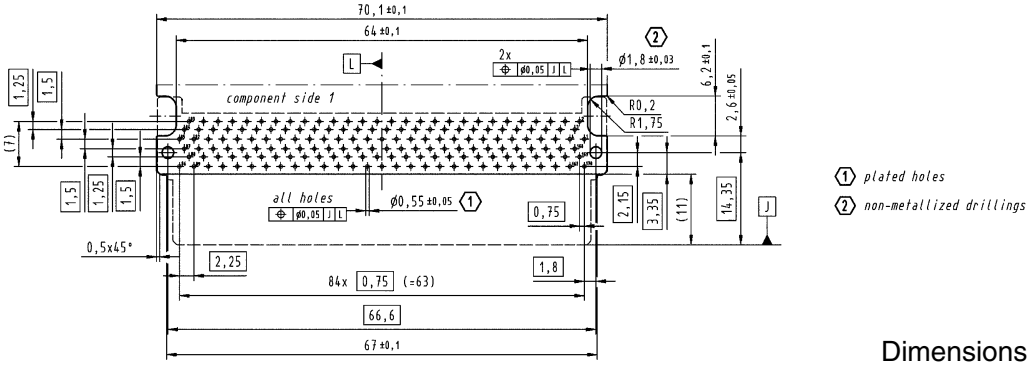
For mounting on basic side

Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector for basic side mounting	170	16 23 170 1301 000
AdvancedMC™ Plug Connector for basic side mounting with nozzle pad for pick and place assembly	170	16 23 170 1302 000
MCH Plug Connector for basic side mounting	170	16 24 170 1301 000
MCH Plug Connector for basic side mounting with nozzle pad for pick and place assembly	170	16 24 170 1302 000
AdvancedMC™ – MCH Plug stacking-pin for basic side mounting		
double length (for two stacked plugs) 11 mm		16 79 000 0017 000
triple length (for three stacked plugs) 18.5 mm		16 79 000 0019 000
quad length (for four stacked plugs) 22.5 mm		16 79 000 0020 000

MCH Plug Connector
for basic side mounting



Board drillings
(view of the
basic side /
component side 1)



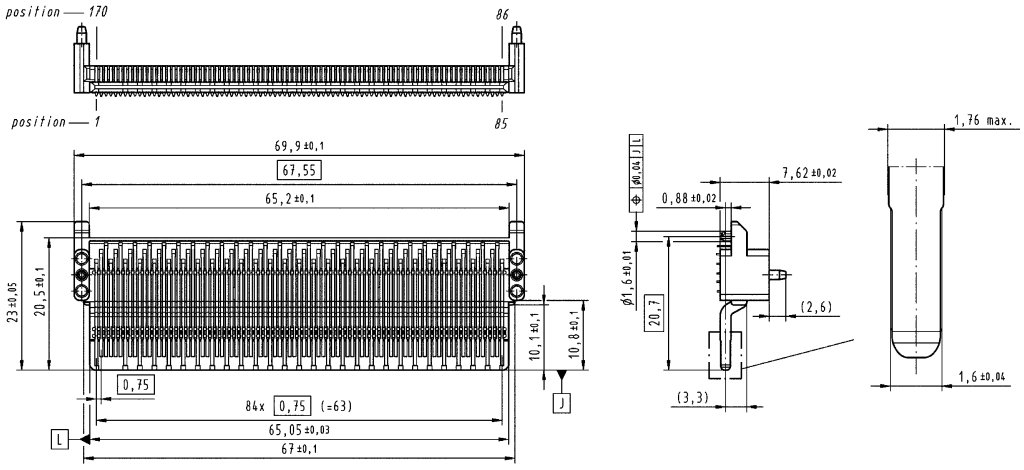
Dimensions [mm]

Dimensions for AdvancedMC™ Plug Connector for basic side mounting see page 145.

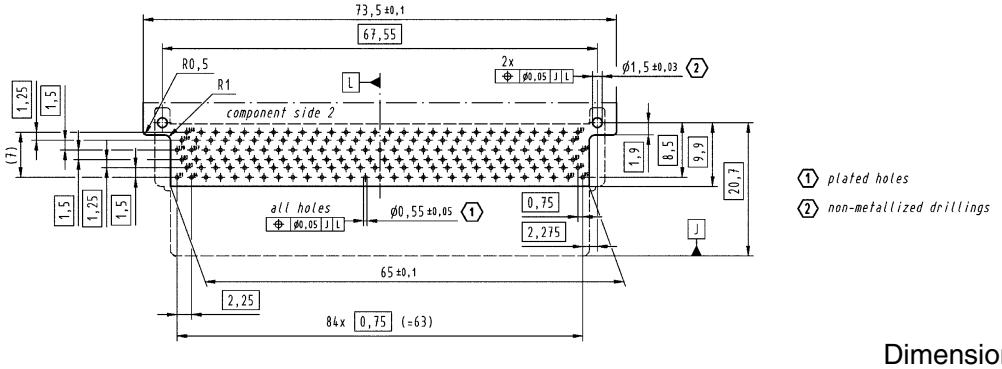
For mounting on extended side

Identification	No. of contacts	Part number
AdvancedMC™ Plug Connector for extended side mounting replacement of former part number 16 21 170 1301 000	170	16 21 170 1303 000
AdvancedMC™ Plug Connector for extended side mounting with nozzle pad for pick and place assembly replacement of former part number 16 21 170 1302 000	170	16 21 170 1304 000
MCH Plug Connector for extended side mounting replacement of former part number 16 22 170 1301 000	170	16 22 170 1303 000
MCH Plug Connector for extended side mounting with nozzle pad for pick and place assembly replacement of former part number 16 22 170 1302 000	170	16 22 170 1304 000
AdvancedMC™ – MCH Plug stacking-pin for extended side mounting		
double length (for two stacked plugs) 11.5 mm		16 79 000 0006 000
triple length (for three stacked plugs) 19 mm		16 79 000 0007 000
quad length (for four stacked plugs) 26.5 mm		16 79 000 0008 000

MCH Plug Connector
for extended side mounting



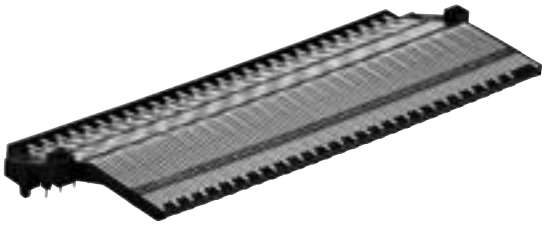
Board drillings
(view of the
extended side /
component side 2)



Dimensions [mm]

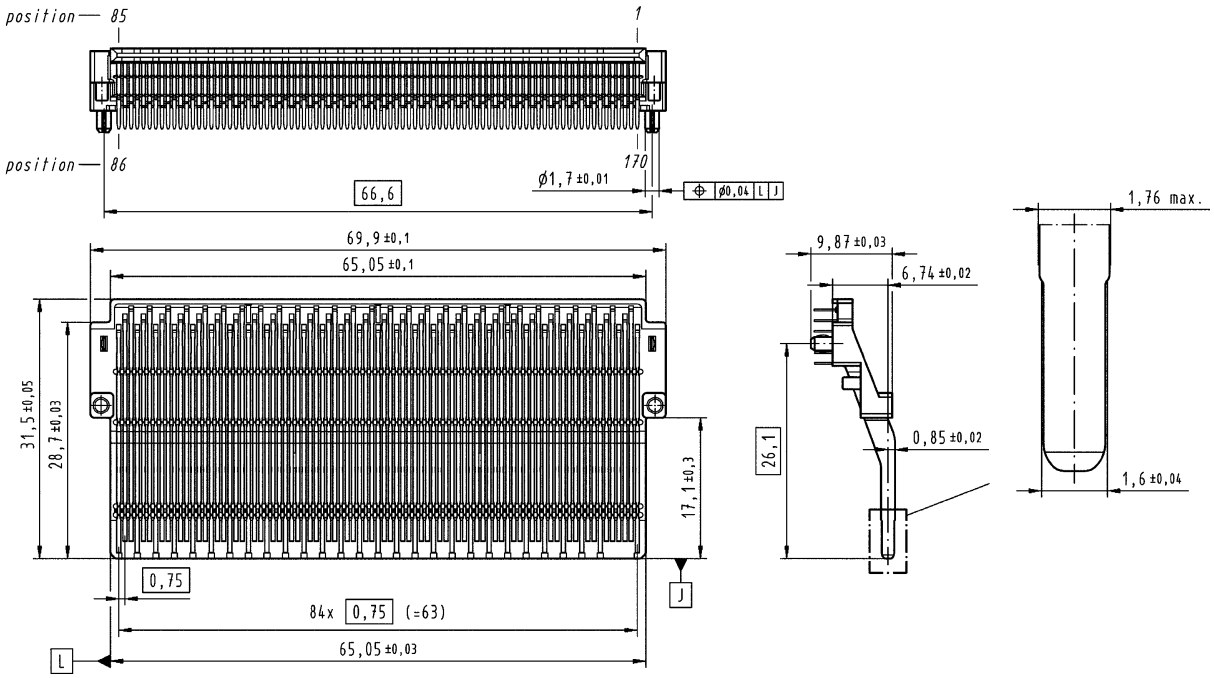
Dimensions for AdvancedMC™ Plug Connector for extended side mounting see page 146.

Plug Connectors for MCH modules – Piggyback connector

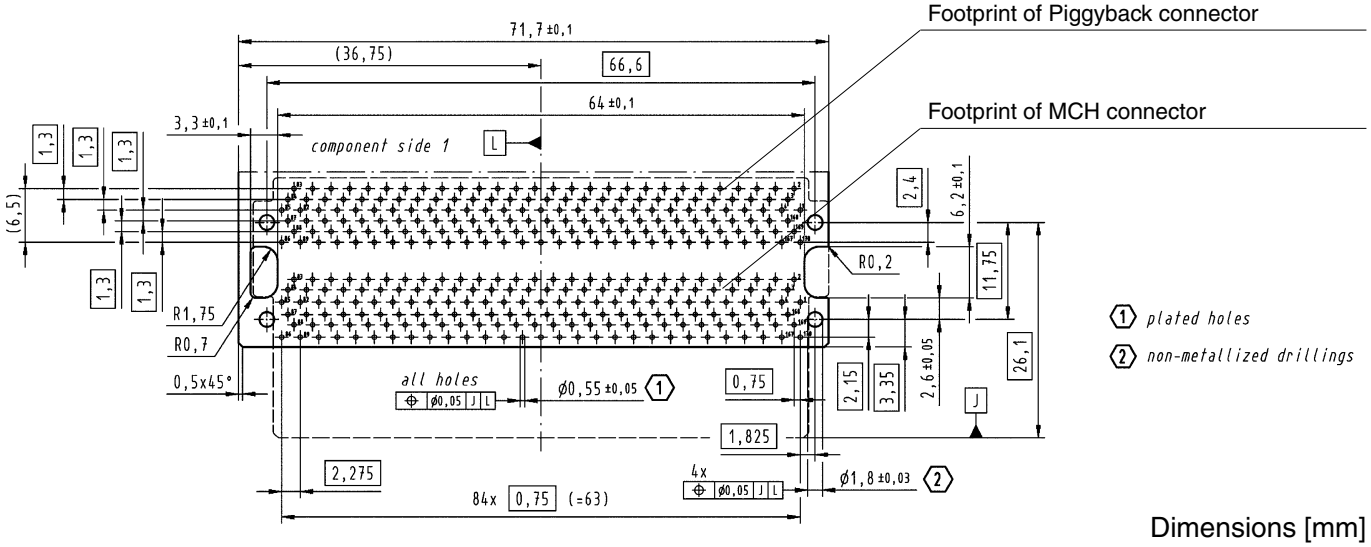


Identification	No. of contacts	Part number
MCH Piggyback Plug Connector applicable only in basic side mounting configuration	170	16 25 170 1301 000

MCH Piggyback Plug Connector



Board drillings (view of the basic side / component side 1)



Dimensions [mm]

Notes

Catalogue order information

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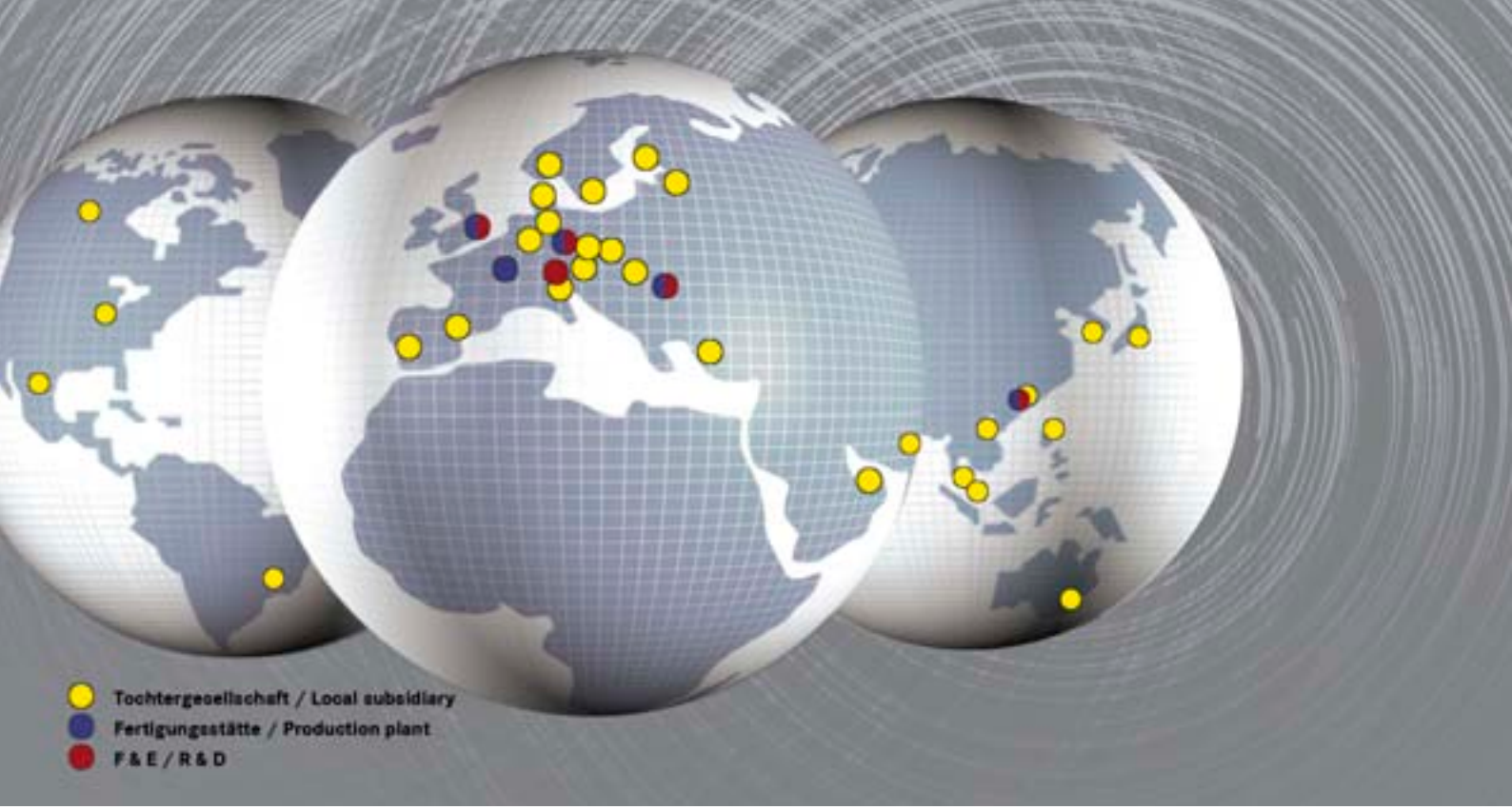
Please send it by post or fax to your local HARTING representatives (see page addresses) or visit us under www.HARTING.com.



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It is the customer's responsibility to check whether the components illustrated in this catalogue comply with different regulations from those stated in special fields of application which we are unable to foresee.

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