PROFIBUS

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P00 General information about PROFIBUS

PROFIBUS is a multi-vendor, open fieldbus standard for diverse applications in manufacturing, process and building automation. Manufacturer independence and openness are guaranteed by the international standard EN 50 170. PROFIBUS makes it possible for devices from different manufacturers to communicate, without special adaptation of the interfaces. PROFIBUS is suitable for both fast, time-critical data transmissions as well extensive and complex communication tasks.

Amongst others, PROFIBUS is based on the following standards:

Standard / guidelines	*Designation*
EN 50 170	PROFIBUS specification
IEC 61 158	Digital data communication for measurement and control – fieldbus for use in industrial control systems
IEC 61 784	Profile sets for continuous and discrete manufacturing
PROFIBUS guideline	PROFIBUS Data Link Layer
PROFIBUS guideline	PROFIBUS Application Layer
PROFIBUS guideline 2.021	Fibre optical data transfer for PROFIBUS
PROFIBUS guideline 2.111	Installation Guideline for PROFIBUS-DP/FMS
PROFIBUS guideline 2.122	GSD Specification (Device Database Files)
PROFIBUS guideline 2.142	PROFIBUS Interconnection Technology

PROFIBUS-FMS

PROFIBUS-FMS (Fieldbus Message Specification) is the universal solution for communication tasks on the cell level. The powerful FMS services open up a wide range of applications as well as providing greater flexibility. FMS is also suitable for extensive communication tasks. From an historical point of view, PROFIBUS-FMS is the forerunner to PROFIBUS-DP.

PROFIBUS-DP

PROFIBUS-DP (Decentralized Peripherals) has been optimised for speed and low connection costs. This variant of PROFIBUS has been specially tailored for communication between automation systems and remote periphery devices on the field level. PROFIBUS-DP is a suitable substitute for the conventional, parallel transmission of signals via 24 V DC or 0/4 … 20 mA.

In contrast to PROFIBUS-FMS, a special characteristic boasted by PROFIBUS-DP is that it does not use layer 7 of the OSI Reference Model.

P00.1 Data transmission

PROFIBUS fieldbus works according to the master-slave process. That means there is only ever one active master within the entire bus structure regulating all of the communication across the bus. All other stations function as slaves.

Network configurations in which several stations can be configured as masters are possible. In this case, the network functions according to the 'token passing procedure'. That means when a predefined time elapses the currently active master passes on transmission rights (the token) to the next master before becoming inactive, remaining so until it in turn receives the token again. In such a network, all masters are connected in a logical ring structure that determines the order in which the masters receive the token.

Transmission technologies

Essentially, PROFIBUS uses the following transmission technologies:

- RS 485
- Fibre-optic cable

RS 485 is the most prevalent. This transmission technology uses twisted and shielded two-wire cables.

The following table offers a comparison of the two transmission technologies:

	RS485	*Fibre-optic cable*
Data transmission	• Digital • Differential signals to RS485	• Optical • Digital
Transmission rate	9.6 to 12000 Kbit/s	
Data security	• Hamming distance = 4 • Parity bit • Start and end delimiter	
Cable	Twisted and shielded two-wire cable, type A	• Glass fibre • Polymer optical fibre (POF)
Remote powering	Possible via additional wires (hybrid cable)	
Topology	Line topology with termination	• Star and ring topologies are typical • Line topology possible
Number of stations	• Up to 32 stations per segment without repeaters • Up to 126 stations per network with repeaters	Up to 126 stations per network
Number of repeaters	Maximum of 9 repeaters with signal regeneration	Unlimited with signal regeneration (signal propagation time must be observed)

Address configuration for the fieldbus

Each station on the network is assigned a unique address within the range 000 to 125 (PROFIBUS-DP) or between 000 and 126 (PROFIBUS-FMS). Each address must be assigned only once within the entire bus structure.

The address **127** must not be assigned. It is reserved as the global address for 'broadcast' and 'multicast' messages.

Device database files (DDBF)

Device database files (also known by the German abbreviation GSD) contain characteristics, parameters and configuration data of each station on a PROFIBUS network. Each active station on a PROFIBUS network has its own DDB file (GSD).

The structure and content of the DDB file (GSD) must comply with the PROFIBUS guideline 2.122. This is essentially made up of three sections:

- General definitions
  This section contains general information such as manufacturer and device name, version number, and date of manufacture, supported transmission rates as well as signal assignment for the bus connector.
- Master definitions
  All parameters applicable only to master devices are entered into this section. These include, amongst others, the maximum possible number of slaves that can be connected as well as the possible upload and download options available.
- Slave definitions
  This section contains all relevant slave details. These include, amongst others, the number of I/O channels, the definition of diagnostic, configuration and parameter texts as well as the number of possible modules for modular devices.

Each manufacturer must present his DDB file(s) (GSD) to the PROFIBUS User Organisation when certifying his device.

P00.2 Topology

PROFIBUS networks can be set up as either a line or a tree topology. Passive branch lines should be avoided.

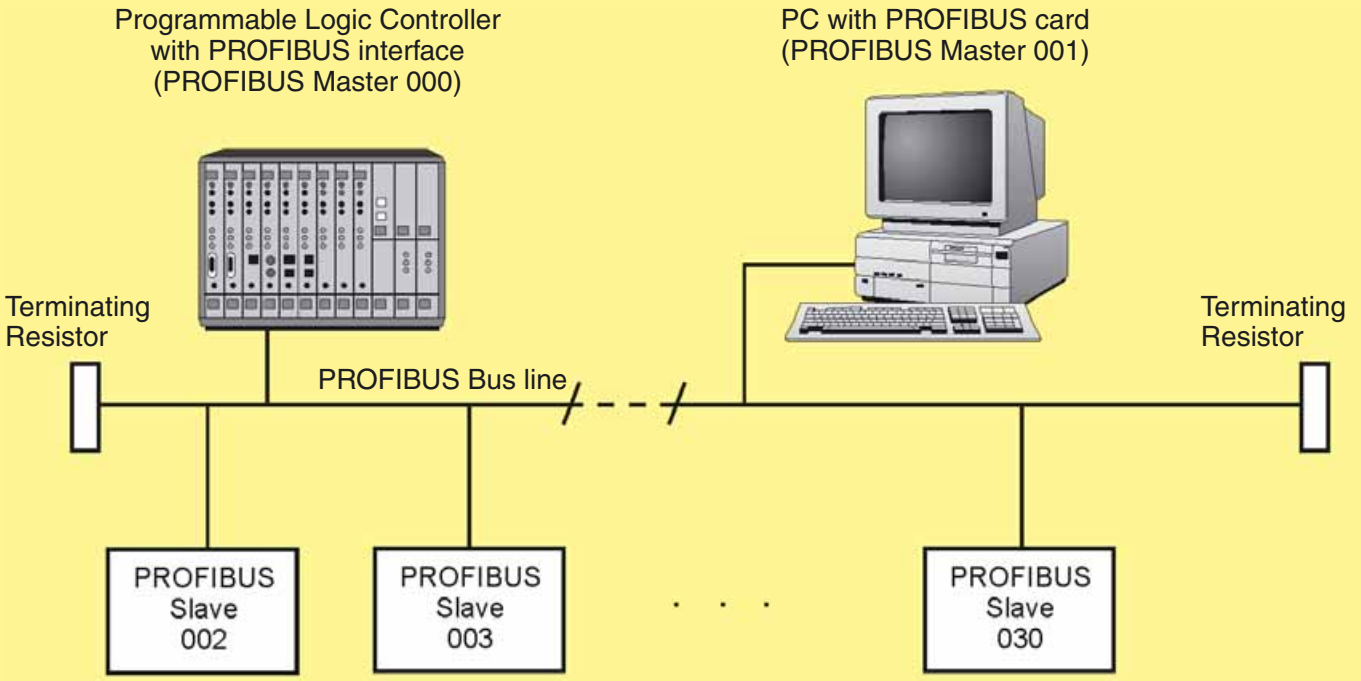
If a device is used as the first or last station, it is necessary to terminate the PROFIBUS network with an active terminating resistor (integrated or switchable) in order to guarantee an error-free communication across the whole bus.

Maximum system extension

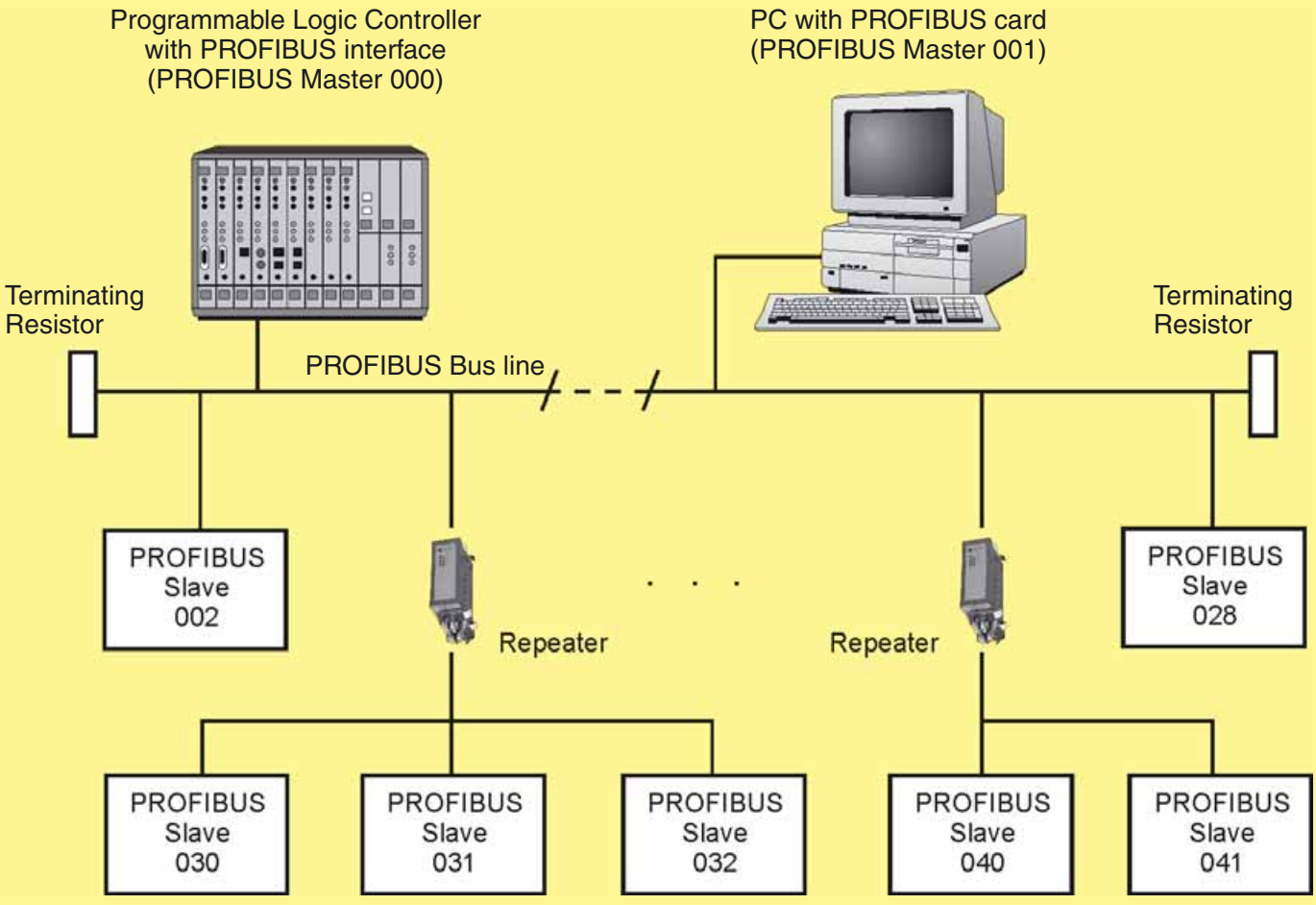
A maximum of 32 stations (1 master and 31 slaves) can be connected in a PROFIBUS network.

If more than 32 stations are required, repeaters must be used to create appropriate segments. It is recommended that no more than 4 repeaters be used within a network, because these cause signal delays.

When used, repeaters count as stations on the bus, although they do not require an address of their own.



Maximum system extension without repeater



Maximum system extension with repeater

Maximum length of the bus

The required transmission rate plays a decisive role in deciding the maximum length of the bus. The following table provides an overview of the individual transmission rates and the corresponding maximum bus lengths for RS 485:

Transmission rate	*Maximum length per segment*
9.6 Kbit/s	1200 m
19.2 Kbit/s	1200 m
45.45 Kbit/s	1200 m
93.75 Kbit/s	1200 m
187.5 Kbit/s	1000 m
500 Kbit/s	400 m
1500 Kbit/s	200 m
3000 Kbit/s	100 m
6000 Kbit/s	100 m
12000 Kbit/s	100 m

Furthermore, it should be observed that the set transmission rate applies to the entire bus network and must be supported by all stations (master and slaves).

P00.3 Types of cables

Transmission in accordance with RS 485

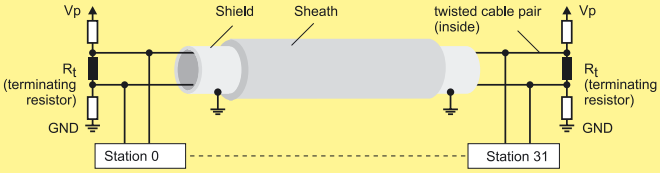
Transmissions according to RS 485 specifications require that the cables used have the following characteristics:

Parameter	*Cable Type A acc. to DIN 19245 part 3*
Characteristic impedance	135 to 165 Ω (3 to 20 MHz)
Capacitance per unit length	< 30 nF/km
Loop resistance	< 110 Ω/km
Wire diameter	> 0.64 mm
Wire cross-section	> 0.34 mm²
Terminating resistors	220 Ω

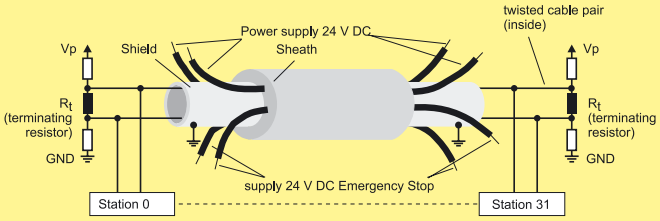
The following cables with RS 485 connectors can be used for PROFIBUS:

- Twisted and shielded two-wire cables
- Twisted and shielded hybrid cables

As well as the actual PROFIBUS cable, hybrid cables also carry integrated wiring for the 24 V DC power supply.



Schematic view of PROFIBUS cable, two-wire RS485



Schematic view of PROFIBUS cable, Hybrid cable RS485

Transmissions with fibre-optic cables

The following cables are used for transmissions with fibre-optics:

- POF[1] 980/1000 µm
- HCS®[2] 200/230 µm
- POF[1] 980/1000 µm, hybrid cables
- HCS®[2] 200/230 µm, hybrid cables

As well as the actual PROFIBUS fibre-optic cable, hybrid cables also carry integrated wiring for the 24 V DC power supply.

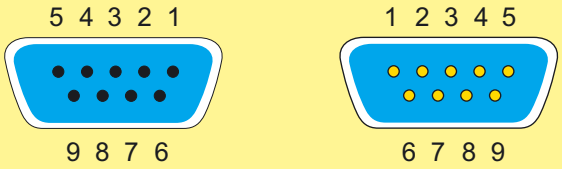
[1] POF = Polymer optical fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

P00.4 Connectors

Differences between connectors for RS 485 interfaces are based on their protection class:

- In protection class IP 20, a 9-pole D-Sub plug-in connector is predominantly used.
- In protection class IP 65 / IP 67, the following alternatives are recommended:
  - M12 circular connectors according to IEC 61 072-2-101
  - Han-Brid® connectors in accordance with DESINA recommendations

The following figure depicts the pin assignment for a female socket and a male connector with protection class IP 20.



Pin assignment for female socket and male socket RS 485

Pin	Signal	Description
1	-	not assigned
2	-	not assigned
3	RxD/TxD-P	Receive/transmission-data cable A
4	-	not assigned
5	DGND	Data reference potential
6	VP	+ 5 V DC for external bus termination
7	-	not assigned
8	RxD/TxD-N	Receive/transmission-data cable B
9	-	not assigned

Pin assignment for D-SUB

A terminating resistor is necessary for the first or last station of a section of PROFIBUS network. As a rule, a connector with an integrated or switchable terminating resistor is used.

When using fibre-optic cables, a distinction is made between crimped or crimpless contacts. Crimpless contacts are generally only used for test purposes or within a confined space. As a rule, Han-Brid® connectors are used for hybrid cables with integrated fibre-optics.

Connection options in the Han-Brid® connector for fibre-optics

PROFIBUS Repeater PRC 67-10

General description

The PROFIBUS Repeater PRC 67-10 with automatic transmission rate detection offers a high degree of protection due to a robust metal housing. It can be used directly in industrial environments. Thus it is possible to reduce termination time to set up PROFIBUS networks.

All terminals are connectorized, thus a secure and quick assembly is guaranteed.

All interfaces are protected against overvoltages.

Advantages

- High protection degree IP 67
- Suitable for the use directly in industrial environments
- All terminals are connectorized
- Hybrid wiring possible
- Signal regeneration
- Plug & Play installation
- T-functionality

Technical characteristics

Housing and Assembly

Housing	robust metal housing of zinc die cast
Dimensions	45 x 120 x 87 (W x D x H in mm, without connector)
Assembly	35 mm standard rail acc. to DIN EN 60 715 panel mounting fixation for upright assembly panel mounting fixation for flat assembly

Power Supply

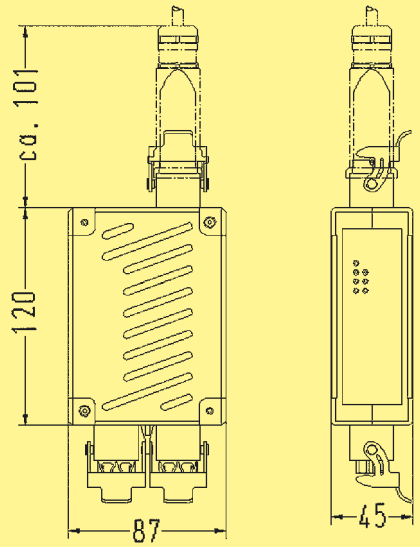
Input voltage	24 V DC (18 … 30 V DC)
Current consumption	typical 250 mA (at 24 V DC)

PROFIBUS Interface

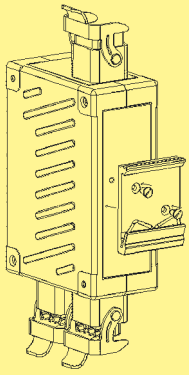
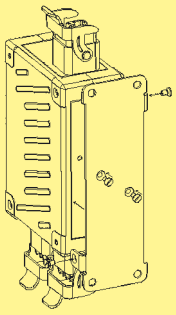
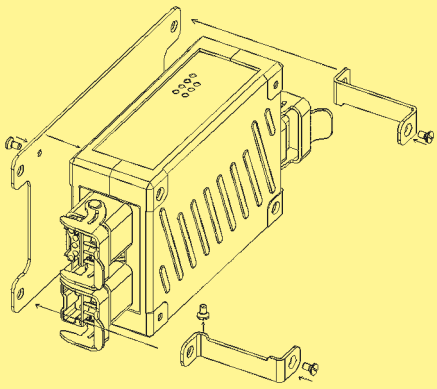
Supported bus structures	point to point, star topology, line topology
Data transmission rate	automatic transmission rate detection, max. 12 MBit/s
Cable	acc. to DIN EN 50 170
Terminals	all connectorized with Han-Brid® Cu connector
Maximum cable length	acc. to DIN EN 50 170

Environmental conditions

Degree of protection	IP 67
Operating temperature	0 °C to +55 °C
Operating humidity	30% to 95%, not condensing

Identification	Part No.	Drawing	Dimensions in mm
PRC 67-10 PROFIBUS Repeater for star and line topology Han-Brid® Cu: male, female, female	**20 70 304 3641**		

Accessories

	Part No.	Drawing	Dimensions in mm
Set for assembly on standard rail acc. to DIN EN 60 715	**20 80 000 0003**		
Set for panel mounting upright assembly	**20 80 024 0001**		
Set for panel mounting flat assembly	**20 80 024 0002**		

Stock items in bold type

Connectors for Han-Brid® Cu

Identification		Part No.
Han-Brid® Cu-female	Female insert Han-Brid® Cu	**09 12 006 3111**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® Cu-male	Male insert Han-Brid® Cu	**09 12 006 3001**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3A, metal, with glued sealing	**09 20 003 5425**

Crimp contacts

Contacts	Wire gauge [mm²]	Wire gauge AWG	Diameter	Stripping length	Part No.
Han D® Cu male contacts for Han-Brid® Cu-male					
silver plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6104**
	0.5	20	1.10 mm	8 mm	**09 15 000 6103**
	0.75	18	1.30 mm	8 mm	**09 15 000 6105**
	1	18	1.45 mm	8 mm	**09 15 000 6102**
	1.5	16	1.75 mm	8 mm	**09 15 000 6101**
	2.5	14	2.25 mm	6 mm	**09 15 000 6106**
gold plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6124**
	0.5	20	1.10 mm	8 mm	**09 15 000 6123**
	0.75	18	1.30 mm	8 mm	**09 15 000 6125**
	1	18	1.45 mm	8 mm	**09 15 000 6122**
	1.5	16	1.75 mm	8 mm	**09 15 000 6121**
	2.5	14	2.25 mm	6 mm	**09 15 000 6126**
Han D® Cu female contacts for Han-Brid® Cu-female					
silver plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6204**
	0.5	20	1.10 mm	8 mm	**09 15 000 6203**
	0.75	18	1.30 mm	8 mm	**09 15 000 6205**
	1	18	1.45 mm	8 mm	**09 15 000 6202**
	1.5	16	1.75 mm	8 mm	**09 15 000 6201**
	2.5	14	2.25 mm	6 mm	**09 15 000 6206**
gold plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6224**
	0.5	20	1.10 mm	8 mm	**09 15 000 6223**
	0.75	18	1.30 mm	8 mm	**09 15 000 6225**
	1	18	1.45 mm	8 mm	**09 15 000 6222**
	1.5	16	1.75 mm	8 mm	**09 15 000 6221**
	2.5	14	2.25 mm	6 mm	**09 15 000 6226**

Cables for Cu-Connection

Type of fibre	Drawing	Cable length*	Part No.
Hybrid cable Cu-Cu 4 x 1.5 mm², contacts silver plated 2 x 0.3 mm², contacts silver plated pre-assembled on both sides, metal hood, top entry	 Cable length*	1.5 m	**20 88 651 0015**
		3.0 m	**20 88 651 0030**
		5.0 m	**20 88 651 0050**
		10 m	**20 88 651 0100**
		15 m	**20 88 651 0150**
		30 m	**20 88 651 0300**

* Other cable lengths and configurations on request

Accessories for Cu assembly

Tool	Accessories	Wire gauge	Part No.
HARTING Service Crimping tool	–	0.14 to 2.5 mm²	**09 99 000 0021**
HARTING Crimping tool			**09 99 000 0110**
	Locator		**09 99 000 0111**

Stock items in bold type

PROFIBUS Converter PCF 67-10 PF660

General description

The PROFIBUS Converter PCF 67-10 PF660 offers a high degree of protection due to a robust metal housing. It can be used directly in industrial environments.

All terminals are connectorized, thus a secure and quick assembly is guaranteed. The PCF 67-10 PF660 is suitable for star as well as for line topology.

All interfaces are protected against overvoltages.

Advantages

- High protection degree IP 67
- Suitable for the use directly in the industrial environments
- All terminals are connectorized
- Possibility to set up optical bus systems for PROFIBUS-FMS/DP
- Plug & Play installation
- T-functionality

Technical characteristics

Housing and Assembly

Housing	robust metal housing of zinc die cast
Dimensions	45 x 120 x 87 (W x D x H in mm, without connector)
Assembly	35 mm standard rail acc. to DIN EN 60 715 panel mounting fixation for upright assembly panel mounting fixation for flat assembly

Power Supply

Input voltage	24 V DC (18 … 30 V DC)
Current consumption	typical 250 mA (at 24 V DC)

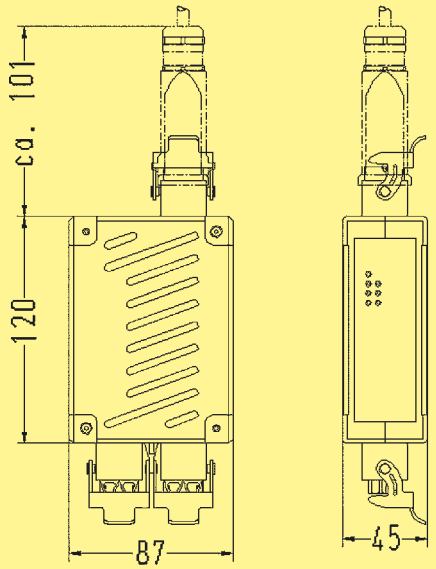
PROFIBUS/F.O. Interface

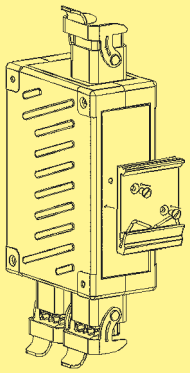
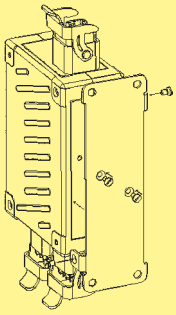
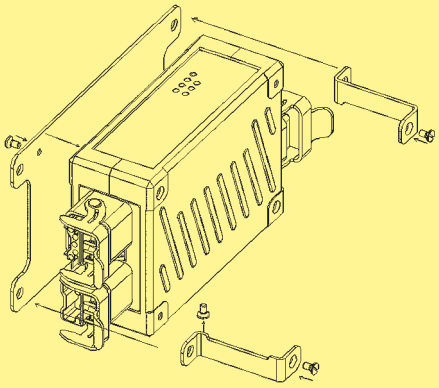
Supported bus structures	point to point, star topology, line topology
Data transmission rate	automatic transmission rate detection, max. 12 MBit/s
Terminals	all connectorized with Han-Brid® Cu and Han-Brid® F.O. connector
Suitable fibre types 660 nm	POF[1] 980/1000 µm, max. transmission distance 50 m HCS®[2] 200/230 µm, max. transmission distance 300 m

Environmental conditions

Degree of protection	IP 67
Operating temperature	0 °C to +55 °C
Operating humidity	30% to 95%, not condensing

[1] POF = Polymer optical fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Identification	Part No.	Drawing	Dimensions in mm
PCF 67-10 PF660 PROFIBUS Converter for star topology Han-Brid® Cu: male Han-Brid® F.O.: female, female	**20 42 304 3641**		
PCF 67-10 PF660 PROFIBUS Converter for line topology Han-Brid® Cu: female Han-Brid® F.O.: male, female	**20 42 304 3642**		

Accessories	Part No.	Drawing	Dimensions in mm
Set for assembly on standard rail acc. to DIN EN 60 715	**20 80 000 0003**		
Set for panel mounting upright assembly	**20 80 024 0001**		
Set for panel mounting flat assembly	**20 80 024 0002**		

Stock items in bold type

Connectors for Han-Brid® Cu

Identification		Part No.
Han-Brid® Cu-female	Female insert Han-Brid® Cu	**09 12 006 3111**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**

Connectors for Han-Brid® F.O.

Identification		Part No.
Han-Brid® F.O.-male Crimp contact	Male insert Han-Brid® F.O.	**09 12 004 2601**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® F.O.-male Crimpless contact	Male insert Han-Brid® F.O.	**09 12 004 2603**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® F.O.-male HCS®[1)]	Male insert Han-Brid® F.O.	**09 12 004 2606**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® F.O.-female Crimp contact	Female insert Han-Brid® F.O.	**09 12 004 2711**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® F.O.-female Crimpless	Female insert Han-Brid® F.O.	**09 12 004 2713**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**
Han-Brid® F.O.-female HCS®[1)]	Female insert Han-Brid® F.O.	**09 12 004 2716**
	Hood, metal, top entry, metric, with glued sealing	**19 20 003 1443**
	Sealing screw for hood	**09 20 000 9918**
	Cable gland metric M20, metal, IP65, for cable diameter 6 to 12 mm	**19 00 000 5082**
	Protection cover Han® 3 A, metal, with glued sealing	**09 20 003 5425**

Crimp contacts

Contacts	Wire gauge [mm²]	Wire gauge AWG	Diameter	Stripping length	Part No.
Han D® male contacts for Han-Brid® Cu-male / Han-Brid® F.O.-male*					
silver plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6104**
	0.5	20	1.10 mm	8 mm	**09 15 000 6103**
	0.75	18	1.30 mm	8 mm	**09 15 000 6105**
	1	18	1.45 mm	8 mm	**09 15 000 6102**
	1.5	16	1.75 mm	8 mm	**09 15 000 6101**
	2.5	14	2.25 mm	6 mm	**09 15 000 6106**
gold plated	0.14-0.37	26 - 22	0.90 mm	8 mm	**09 15 000 6124**
	0.5	20	1.10 mm	8 mm	**09 15 000 6123**
	0.75	18	1.30 mm	8 mm	**09 15 000 6125**
	1	18	1.45 mm	8 mm	**09 15 000 6122**
	1.5	16	1.75 mm	8 mm	**09 15 000 6121**
	2.5	14	2.25 mm	6 mm	**09 15 000 6126**

* for Han-Brid® F.O. the 24 V DC-contacts only

[1)] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

Crimp contacts

Contacts	Wire gauge [mm²]	Wire gauge AWG	Diameter	Stripping length	Part No.
Han D® female contacts for Han-Brid® Cu-female / Han-Brid® F.O.-female*					
silver plated	0.14-0.37	26 - 22	0.90 mm	8 mm	09 15 000 6204
	0.5	20	1.10 mm	8 mm	09 15 000 6203
	0.75	18	1.30 mm	8 mm	09 15 000 6205
	1	18	1.45 mm	8 mm	09 15 000 6202
	1.5	16	1.75 mm	8 mm	09 15 000 6201
	2.5	14	2.25 mm	6 mm	09 15 000 6206
gold plated	0.14-0.37	26 - 22	0.90 mm	8 mm	09 15 000 6224
	0.5	20	1.10 mm	8 mm	09 15 000 6223
	0.75	18	1.30 mm	8 mm	09 15 000 6225
	1	18	1.45 mm	8 mm	09 15 000 6222
	1.5	16	1.75 mm	8 mm	09 15 000 6221
	2.5	14	2.25 mm	6 mm	09 15 000 6226

* for Han-Brid® F.O. the 24 V DC-contacts only

F.O. contacts

Connector	Contact	Part No.
Han-Brid® F.O. – Crimp contact	Hewlett Packard Versatile Link Crimp contacts	20 10 001 7111
Han-Brid® F.O. – Crimpless contact	Hewlett Packard Versatile Link Crimpless contacts	20 10 001 7112
Han-Brid® F.O. – HCS®[1)]	HCS®[1)]	20 10 230 7111

Cables for Cu connection

Type of fibre	Drawing	Cable length*	Part No.
Hybrid cable Cu-Cu 4 x 1.5 mm², contacts silver plated 2 x 0.3 mm², contacts silver plated pre-assembled on both sides, metal hood, top entry		1.5 m	20 88 651 0015
		3.0 m	20 88 651 0030
		5.0 m	20 88 651 0050
		10 m	20 88 651 0100
		15 m	20 88 651 0150
		30 m	20 88 651 0300

* Other cable lengths and configurations on request

Cables for F.O. connection

Type of fibre	Drawing	Cable length*	Part No.
Hybrid cable Cu-F.O. 4 x 1.5 mm², contacts silver plated 2 x POF 980/1000 µm pre-assembled on both sides, metal hood, top entry		1.5 m	20 88 451 0015
		3.0 m	20 88 451 0030
		5.0 m	20 88 451 0050
		10 m	20 88 451 0100
		15 m	20 88 451 0150
		30 m	20 88 451 0300

* Other cable lengths and configurations on request

Accessories for Cu assembly

Tool	Accessories	Wire gauge	Part No.
HARTING Service Crimping tool	–	0.14 to 2.5 mm²	09 99 000 0021
HARTING Crimping tool			09 99 000 0110
	Locator	0.14 to 1.5 mm²	09 99 000 0111
	Locator	0.5 to 2.5 mm²	09 99 000 0112

Accessories for F.O. assembly

Identification	Part No.
Han-Brid®-Crimping tool	09 99 000 0362
Polishing set	20 80 001 9914
Abrasive paper in grit size 1000µ	**20 80 001 9911**

[1)] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

PROFIBUS Converter PCF 20-10 PF660

General description

The PROFIBUS Converter PCF 20-10 PF660 allows to set up PROFIBUS networks with POF[1] or HCS®[2] fibres (λ = 660 nm).

PCF 20-10 PF660 is suitable for the assembly on standard rail as well as for the assembly directly on the panel within switch cabinets and termination boxes.

All interfaces are protected against overvoltages.

Advantages

- Possibility to set up optical bus systems for PROFIBUS-FMS/DP
- Signal regeneration
- Plug & Play installation
- T-functionality

Technical characteristics

Housing and Assembly

Housing	robust metal housing of zinc die cast
Dimensions	45 x 120 x 87 (W x D x H in mm, without connector)
Assembly	35 mm standard rail acc. to DIN EN 60 715 panel mounting fixation for upright assembly panel mounting fixation for flat assembly

Power Supply

Input voltage	24 V DC (18 … 30 V DC)
Current consumption	typical 250 mA (at 24 V DC)
Interface	4 pole screw terminal connectorized for redundant power supply

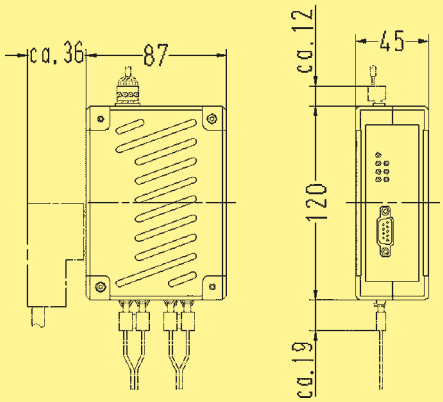
PROFIBUS/F.O. Interface

Supported bus structures	point to point, star topology, line topology
Data transmission rate	automatic transmission rate detection, max. 12 MBit/s
Terminals	2 optical ports 660 nm: HP Versatile Link PROFIBUS: D-Sub 9pin female
Suitable fibre types 660 nm	POF[1] 980/1000 µm, max. transmission distance 50 m HCS®[2] 200/230 µm, max. transmission distance 300 m

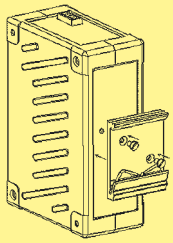
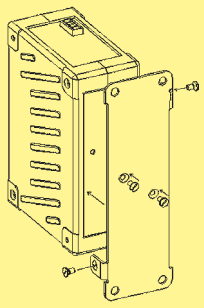
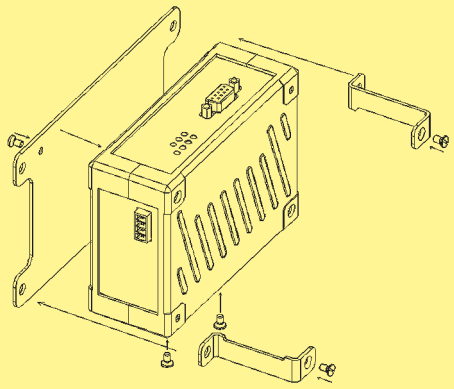
Environmental conditions

Degree of protection	IP 20
Operating temperature	0 °C to +55 °C
Operating humidity	30% to 95%, not condensing

[1] POF = Polymer optical fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Identification	Part No.	Drawing	Dimensions in mm
PCF 20-10 PF660 PROFIBUS Converter 2 optical ports 660 nm, POF[1]/HCS®[2]	**20 42 004 3646**		

Accessories

	Part No.	Drawing	Dimensions in mm
Set for assembly on standard rail acc. to DIN EN 60 715	**20 80 000 0003**		
Set for panel mounting upright assembly	**20 80 024 0001**		
Set for panel mounting flat assembly	**20 80 024 0002**		
Hewlett Packard Versatile Link Crimp contacts	20 10 001 7111		
Hewlett Packard Versatile Link Crimpless contacts	20 10 001 7112		
HCS®[2]	**20 10 230 7111**		

[1] POF = Polymer optical fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

Connectors for Fibre Optic POF[1)]

Identification	Part No.
Hewlett Packard Versatile Link Crimp contacts	20 10 001 7111
Hewlett Packard Versatile Link Crimpless contacts	20 10 001 7112
HCS®[2)]	**20 10 230 7111**

Accessories for F.O. assembly

Identification	Part No.
Han-Brid®-Crimping tool	09 99 000 0362
Polishing set	20 80 001 9914
Abrasive paper in grit size 1000 µm	**20 80 001 9911**

[1)] POF = Polymer optical fibre
[2)] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

PROFIBUS Converter PCF 20-10 GF850

General description

The PROFIBUS Converter PCF 20-10 GF850 allows to set up PROFIBUS networks with glass fibres (λ = 850 nm).

PCF 20-10 GF850 is suitable for the assembly on standard rail as well as for the assembly directly on the panel within switch cabinets and termination boxes.

All interfaces are protected against overvoltages.

Advantages

- Possibility to set up optical bus systems for PROFIBUS FMS/DP
- Signal regeneration
- Plug & Play installation
- T-functionality

Technical characteristics

Housing and Assembly

Housing	robust metal housing of zinc die cast
Dimensions	45 x 120 x 87 (W x D x H in mm, without connector)
Assembly	35 mm standard rail acc. to DIN EN 60 715 panel mounting fixation for upright assembly panel mounting fixation for flat assembly

Power Supply

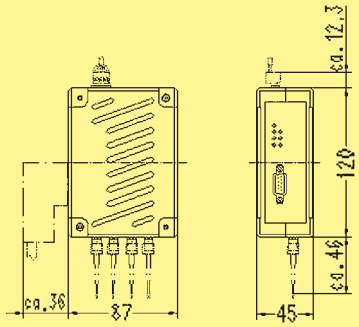
Input voltage	24 V DC (18 … 30 V DC)
Current consumption	typical 250 mA (at 24 V DC)
Interface	4-pole screw terminal connectorized for redundant power supply

PROFIBUS/F.O. Interface

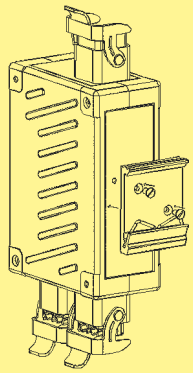
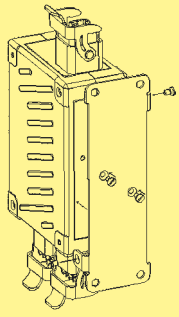
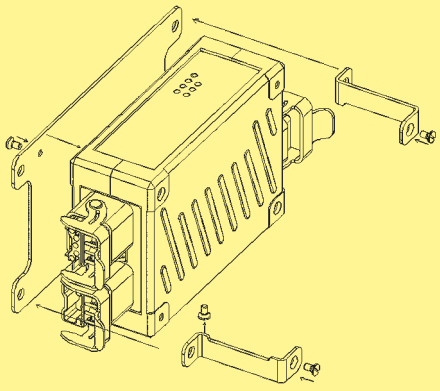
Supported bus structures	point to point, star topology, line topology
Data transmission rate	automatic transmission rate detection, max. 12 MBit/s
Terminals	2 optical ports 850 nm: F-ST PROFIBUS: D-Sub 9pin female
Suitable fibre types 850 nm	GI 50 µm / 125 µm, max. transmission distance 2500 m

Environmental conditions

Degree of protection	IP 20
Operating temperature	0 °C to +55 °C
Operating humidity	30% to 95%, not condensing

Identification	Part No.	Drawing	Dimensions in mm
PCF 20-10 GF850 PROFIBUS Converter 2 optical ports 850 nm	**20 52 004 3626**		

Accessories

	Part No.	Drawing	Dimensions in mm
Set for assembly on standard rail acc. to DIN EN 60 715	**20 80 000 0003**		
Set for panel mounting upright assembly	**20 80 024 0001**		
Set for panel mounting flat assembly	**20 80 024 0002**		

Stock items in bold type

Connectors for Fibre optic Glass fibres

Identification	Part No.
F.O. connector type F-ST for cables Ø 2.8 mm	20 10 125 2212

Accessories for F.O. assembly

Identification	Part No.
Fibre stripper 0.3 mm	20 99 000 1046
Fibre stripper 0.18 mm	20 99 000 1046
Epoxy adhesive for glass fibre	20 80 001 9902
Han-Brid®-Crimping tool	20 99 000 1031
Polishing tool	20 99 000 1095
Polishing paper 9 µ-grain size	20 80 001 9912
Polishing paper 1 µ-grain size	20 80 001 9913
Tool kit GI-fibre	20 99 000 3015

Han-InduNet® Cabling System

Cabling system Han-Brid® Cu
Electrical field-bus transmission

Features

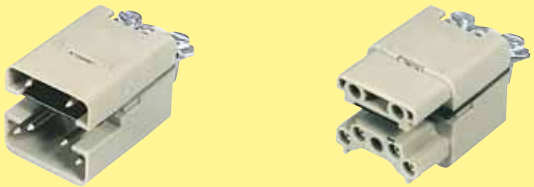
Hood

Han® 3 A hood[1)]	with glued sealing
Plastic version	polycarbonate
Metal version	zinc die cast

Components

Insert

Han-Brid® Cu male and female are available with standard crimp contacts Han D®, silver (optional gold) plated



Hybrid cable Cu-Cu

Outside diameter D		< 12 mm
Material outside jacket		PUR
Construction:	– electrical (power supply)	4 x 1.5 mm²
	– electrical (bus)	2 x 0.3 mm² twisted + shielded

Technical characteristics

Temperature range	
– little movements	- 40 °C … + 90 °C
– permanent movements	- 20 °C … + 70 °C
Degree of protection	IP 65 / IP 67
Operating rated voltage [DC]	24 V
Operating rated current	10 A

Features

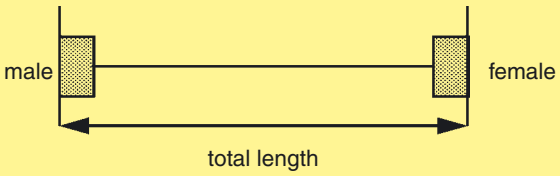
- Chemical application conditions:
  very resistant to oil and chemicals
- Mechanical features:
  suitable for cable chains, if carried out by experts

1) Hood with glued sealing, incl. cable gland

Cabling system in fixed lengths

		Part No.
Cable lengths in m (total length) pre-assembled on both sides, plastic hood, black, top entry	1.5	**20 88 611 0015**
	3	**20 88 611 0030**
	5	**20 88 611 0050**
	10	**20 88 611 0100**
	15	**20 88 611 0150**
	30	**20 88 611 0300**
Cable lengths in m (total length) pre-assembled on both sides, metal hood, top entry	1.5	**20 88 651 0015**
	3	**20 88 651 0030**
	5	**20 88 651 0050**
	10	**20 88 651 0100**
	15	**20 88 651 0150**
	30	**20 88 651 0300**

Drawing



Other cable lengths and configurations on request

Stock items in bold type

Han-InduNet® Cabling System

DESINA® conforming product
More information conc. DESINA: www.desina.de

PROFIBUS

Cabling system Han-Brid® F.O.
Optical field-bus transmission

Features

Hoods / housings

Han® 3 A hood[1)]	with glued sealing
Plastic version	polycarbonate
Metal version	zinc die cast

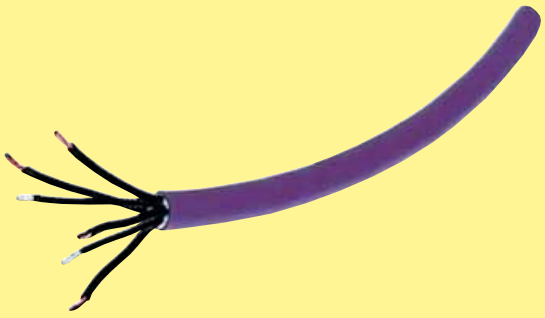
Components

Insert

Han-Brid® F.O. male and female are available with standard crimp contacts Han D®, silver (optional gold) plated

Hybrid cable Cu-F.O.

Outside diameter D		< 12 mm
Material outside jacket		PUR
Construction:	– electrical (power supply)	4 x 1.5 mm²
	– optical	2 x POF[2)]
Bending radius minimum		> 12 x D[3)]



Technical characteristics

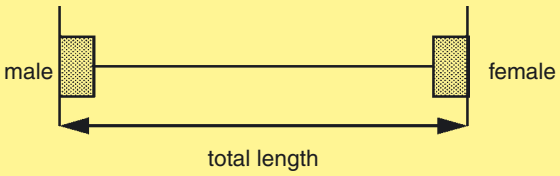
Temperature range	
– little movements	- 40 °C … + 90 °C
– permanent movements	- 20 °C … + 70 °C
Degree of protection	IP 65 / IP 67
Operating rated voltage [DC]	24 V
Operating rated current	10 A

Features

- Chemical application conditions:
  very resistant to oil and chemicals
- Mechanical features:
  suitable for cable chains, if carried out by experts

[1)] Hood with glued sealing, incl. cable gland
[2)] POF = Polymer Optical Fibre
[3)] D = outer diameter

Cabling system in fixed lengths		Part No.	Drawing
Cable lengths in m (total length) pre-assembled on both sides, plastic hood, black, top entry	1.5	**20 88 411 0015**	
	3	**20 88 411 0030**	
	5	**20 88 411 0050**	
	10	**20 88 411 0100**	
	15	**20 88 411 0150**	
	30	**20 88 411 0300**	
Cable lengths in m (total length) pre-assembled on both sides, metal hood, top entry	1.5	**20 88 451 0015**	
	3	**20 88 451 0030**	
	5	**20 88 451 0050**	
	10	**20 88 451 0100**	
	15	**20 88 451 0150**	
	30	**20 88 451 0300**	



Other cable lengths and configurations on request

Stock items in bold type

Description

The components offered by HARTING in the field of fibre optical data transmission are suitable in combination with different types of FOC. With view to the optical transmission characteristics we differentiate between the following types of fibre:

Cables with Multimode-Gradient-Fibres (GI-Fibres)

- Suitable for transmission distances up to approx. 2 km (850 nm), approx. 5 km (1300 nm)
- Typical F.O. connector termination: adhesive technique
- Typical wave length: 850/1300 nm

Cable with HCS®[1]-Step-Index-Fibres (HCS®[1]-Fibres)

- Suitable for transmission distances up to approx. 2 km (850 nm), approx. 400 m (660 nm)
- Typical F.O. connector termination: Crimp termination
- Typical wave length: 660/850 nm

Cable with Plastic-Optical-Fibres (POF[2])

- Suitable for transmission distances up to approx. 100 m
- Typical F.O. connector termination: Crimp termination, or HARTING quick assembly technique, no special too necessary
- Typical wave length: 660 nm

Fibre types (typical characteristics)

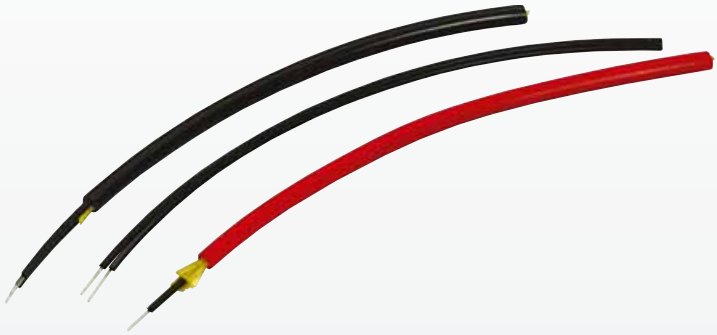
	Plastic-Optical Fibre	HCS-Optical Fibre	Glass-Optical Fibre	
Fibre type	SI	SI	GI	GI
Core / jacket Ø (µm)	980/1000	200/230	62.5/125	50/125
Attenuation coefficient (dB / km)				
at 660 nm	200	10	–	–
at 850 nm	2000	8	≤ 3.5	≤ 3.0
at 1300 nm	–	–	≤ 0.80	≤ 0.70
typ. wave length	660 nm	660/850 nm	850/1300 nm	850/1300 nm
Bandwidth (MHz*km)				
at 660 nm	10	–	–	–
at 850 nm	–	≥ 17	≥ 200	≥ 400

Cable plastic materials

Material designation		Polymers (Low Smoke Zero Halogen)	Polyvinyl-chloride	Poly-ethylene	Poly-urethane	Polyamide
Abbreviation		LSOH	PVC	PE	PUR	PA
Halogen free		yes	no	yes	yes	yes
Fire behaviour		self-extinguishing	self-extinguishing	combustible	self-extinguishing	combustible
Re-sistance	to UV radiation	fair - good	fair	good	fair - good	good
	to oil	poor	fair	fair	fair - good	good
	with hydrolysis	fair	good	good	poor - fair	fair
Abrasion resistance		good	fair	good	excellent	good
Mechanical resistance		good	fair	good	good	good

[1] HCS® = Hard Clad Silica, registered trademark of SpecTran Corporation
[2] POF = Polymer-Optical Fibre

FO-Cables

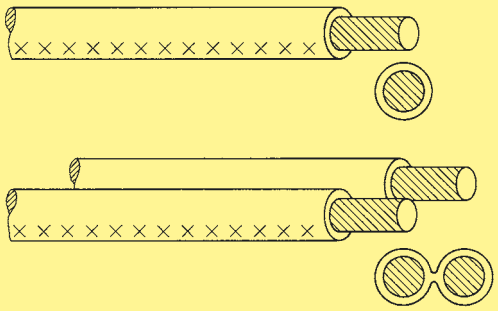
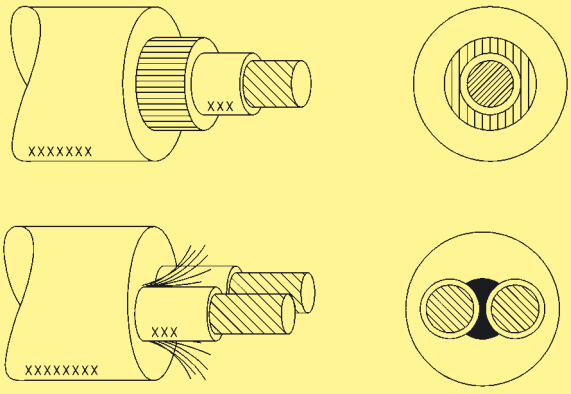
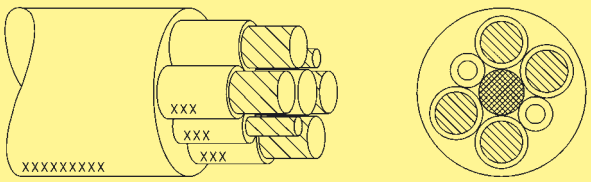


for internal and external applications
with polymer fibres (POF[1])

Description

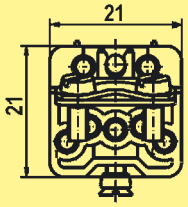
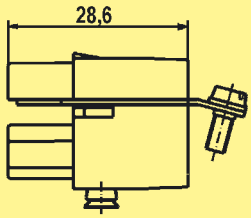
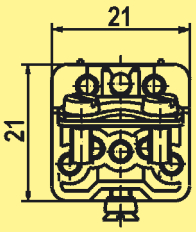
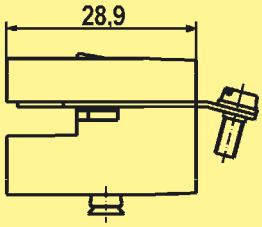
- Robust and cost-effective alternative to standard glass fibres
- SI-fibre with 980 µm PMMA-core
- For short distance transmission up to 100 m
- Operating wave length 660 nm
- Easy mechanical crimp technology

PROFIBUS

Identification	Part No.	Drawing	Dimensions in mm
F.O. cable POF[1] Standard cable			Technical characteristics: PMMA-Fibre: 980/1000 µm Temperature range: -40 °C . . . + 85 °C Bending radius min.: 30 mm
Simplex ø 2.2 mm PE fibre coating	20 20 001 1011		
Duplex ø 2.2 x 4.4 mm PE fibre coating	20 20 001 1021		
Special cable with strain relief suitable for SERCOS-applications			When ordering please specify cable length in metres.
Simplex ø 6.0 mm PE fibre coating PUR cable coating	20 21 001 1011		
Simplex ø 3.6 mm PE fibre coating PUR cable coating	20 21 001 1012		
Duplex round ø 5.5 mm PE fibre coating PUR cable coating	20 21 001 1021		
Hybrid-cable suitable for *DESINA*®-applications			
PUR cable coating 2 x POF[1] PA fibre coating 4 x 1.5 mm² 300/300 V ø 10.6 mm	20 23 041 1023		

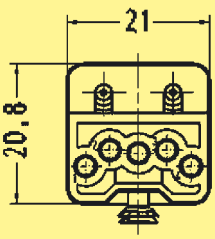
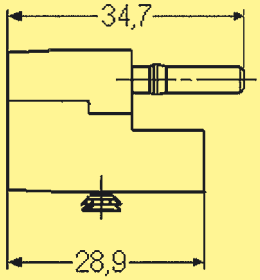
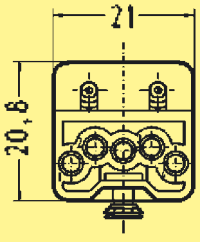
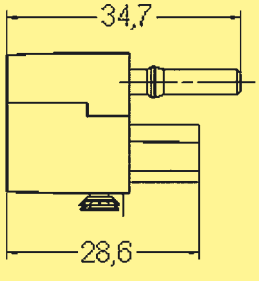
[1] POF = Polymer Optical Fibre

Han-Brid® Cu

Inserts (cable side)		Part No.	Drawing	Dimensions in mm
Available combinations				
	Cu-female + Han D® female	**09 12 006 3111**	 View termination side	
	Cu-male + Han D® male	**09 12 006 3001**	 View termination side	

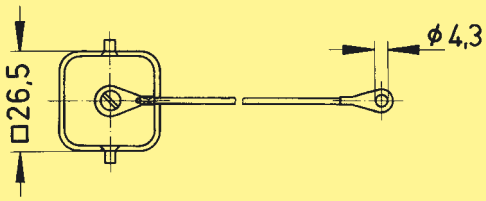
PROFIBUS

Han-Brid® F.O.

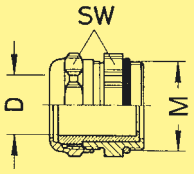
Inserts (cable side)		Part No.	Drawing	Dimensions in mm
Available combinations				
	F.O.-male + Han D® male	for POF[1] 09 12 004 2601 for POF[1] crimpless **09 12 004 2603** for HCS®[2]-fibre 09 12 004 2606	 View termination side	
	F.O.-male + Han D® female	for POF[1] 09 12 004 2711 for POF[1] crimpless **09 12 004 2713** for HCS®[2]-fibre **09 12 004 2716**	 View termination side	

[1] POF = Polymer Optical Fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

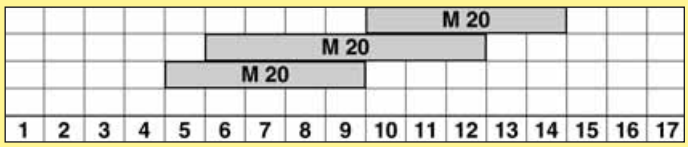
Stock items in bold type

Identification	Part No.	Drawing	Dimensions in mm
Hood Han® 3 A metal top entry, metric with glued sealing 	**19 20 003 1443**		
Protection cover for housings metal	**09 20 003 5425**		
Cable gland metric metal 	**19 00 000 5080** **19 00 000 5082** **19 00 000 5084**		

Thread M	Cable diameter D	SW
M 20	5 - 9 mm	22
M 20	6 - 12 mm	22
M 20	10 - 14 mm	24



Below is shown the cable range of metric glands:



Stock items in bold type

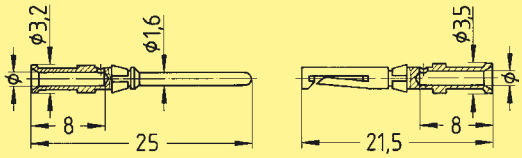
Contacts

Crimp contacts Han D®

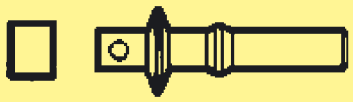
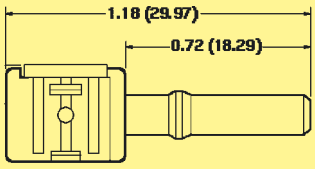
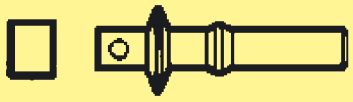
order separately

	Wire gauge (mm²)	Part No. Male contacts	Part No. Female contacts
silver plated	0.14-0.37	**09 15 000 6104**	**09 15 000 6204**
	0.5	**09 15 000 6103**	**09 15 000 6203**
	0.75	**09 15 000 6105**	**09 15 000 6205**
	1.0	**09 15 000 6102**	**09 15 000 6202**
	1.5	**09 15 000 6101**	**09 15 000 6201**
	2.5	**09 15 000 6106**	**09 15 000 6206**
gold plated	0.14-0.37	**09 15 000 6124**	**09 15 000 6224**
	0.5	**09 15 000 6123**	**09 15 000 6223**
	0.75	**09 15 000 6125**	**09 15 000 6225**
	1.0	**09 15 000 6122**	**09 15 000 6222**
	1.5	**09 15 000 6121**	**09 15 000 6221**
	2.5	**09 15 000 6126**	**09 15 000 6226**

Drawing / Dimensions in mm



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

Identification	Part No.	Drawing / Dimensions in mm
Single connector for Han-Brid® F.O.	Crimp POF[1] 20 10 001 7111	
	Crimpless POF[1] 20 10 001 7112	
	HCS®[2] **20 10 230 7111**	

[1] POF = Polymer Optical Fibre
[2] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

Termination connector Han-Brid® Cu

Termination connector
for PROFIBUS devices with Han-Brid® Cu interface

Technical description / application

Active bus terminator IP 65 / 67 for PROFIBUS devices with Han-Brid® Cu interface

Application: termination of a network device acc. PROFIBUS specification

Protection degree: IP 65 / IP 67 (locked)

Identification	Part No. Male insert	Part No. Female insert
IP 67 Bus terminator Han-Brid® Cu for PROFIBUS		
plastic version (black)	**09 12 006 2691**	09 12 006 2791
metal version (grey)	09 12 006 2692	09 12 006 2792

Stock items in bold type

4 contacts + screening
+ 2 power contacts
For use in Han® 3 A hoods with metric cable gland

Description

The Han-Brid® series combines a data and power interface for industrial communication in the smallest possible space.

The components in this hybrid connector family all contain the facility to load power contacts rated at 50 V 10 A to provide a power supply for distributed devices. This means that a power supply can be provided to all devices in a bus structure via a single connector.

Han-Brid® Quintax 3 A for 4-wire bus systems with continuous screen connection.

The contact inserts can be used either in the standard plastic housing or the metal housing from the Han® 3 A series. The protection level of the housings corresponds to DIN EN 60 529, IP 65.

Power supply

- Standard Han D® male and female crimp contacts
- Rated current: 10 A
- Rated voltage: 50 V
- Connection range: 0.14 to 2.5 mm² stranded
- Approval: UL

Data interface

- Can be connected to screened 4-wire cables
- Can be used for all 4-wire bus systems
- Accepts screened cable with a diameter from 3 to 9.5 mm
- Continuity of screen is independent of housing potential
- Cable connection in accordance with DIN EN 50 173, Category 5

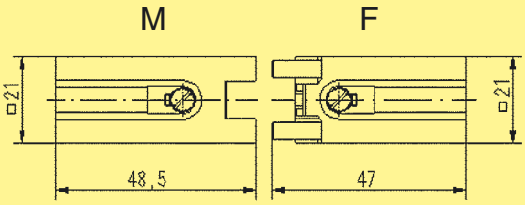
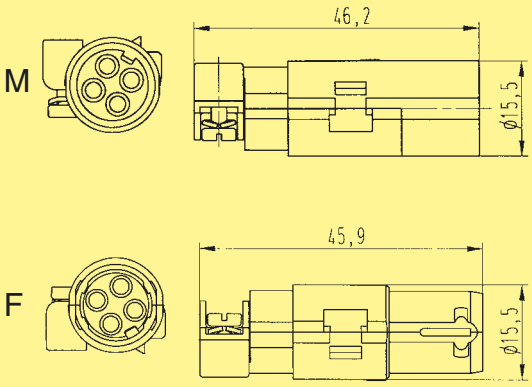
Technical characteristics

Transmission properties in accordance with Category 5 ISO/IEC 11 801:2002 and EN 50173-1

Protection level:	IP 65 / IP 67
Wire gauge data:	0.14 - 2.5 mm² stranded AWG 26 - 14
Wire gauge power supply:	0.14 - 2.5 mm² stranded AWG 26 - 14
Temperature range:	-40° C ... +70° C
Cable sheath diameter:	3 mm - 9.5 mm
Mating cycles:	≥ 500

Han-Brid® Quintax 3 A

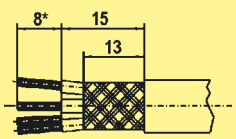
4 contacts + shielding
+ 2 power contacts
Suitable for Han® 3 A metric hoods and housings

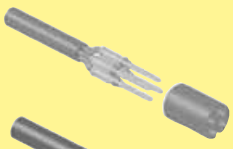
Identification	Cable Ø mm	Part No. Male insert (M)	Part No. Female insert (F)	Drawing	Dimensions in mm
Quintax-Insert 	–	**09 15 003 3001**	**09 15 003 3101**		
Quintax-Z-Contact Zinc alloy Crimp contacts order separately see page P70.03  Special clamp for cable diameter 3 - 6 and 6 - 9.5 mm included in delivery range	3 - 9.5	**09 15 004 3013**	**09 15 004 3113**		

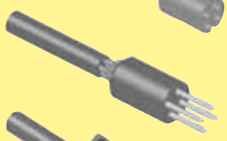
Assembly Manual

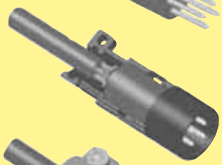
Quintax-Z-contact

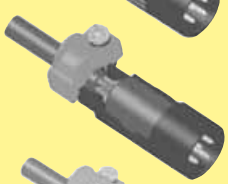
1. Strip cable acc. to drawing 1 and fold the shielding over the cable.
2. Crimp Han D® contacts onto the wires.
3. Insert Han D® contacts into corresponding cavaties of insulator until they are snapped in.
4. Fit the insert including the cable into the opened shielded bushing. The coding pin of the shielded bushing has to meet the groove of the insulator.
5. Clamp the tilt over the shielding onto the cable by means of the special clamp (small opening for cable diameter of 3 - 6 mm, large opening for cable diameter of 6 - 9.5 mm).
6. Check the wiring.
7. Close the shielded bushing with the cover and insert it into the corresponding cavity of the Quintax Module as usual.

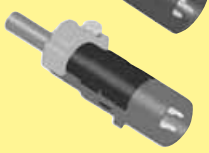
1. 

2. 

3. 

4. 

5. 

6. 

Stock items in bold type




Hoods

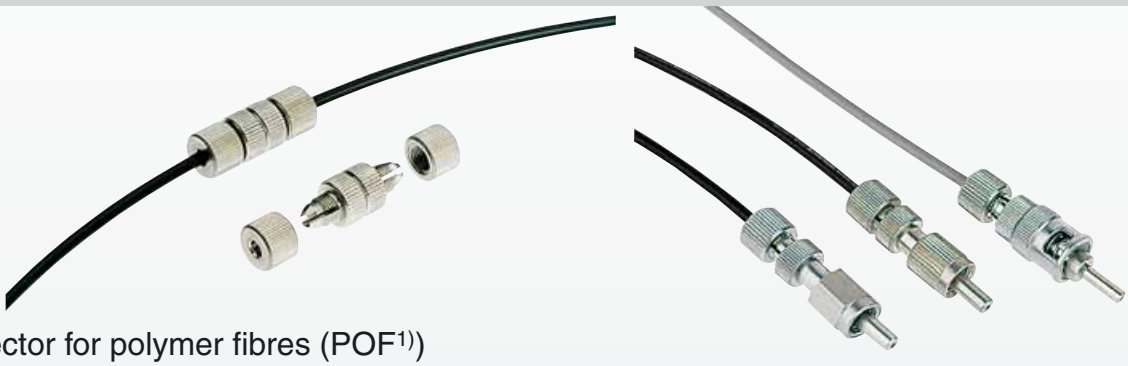
- Han® 3 A hood with integral sealing – Protection level: IP 65
  IP 67
- Plastic versions
- Metal versions
- EMC versions
- Han® HPR (pressure tight and EMI protected) – Protection level: IP 68
- Han-Brid® Quintax cab be fitted exclusively in hoods (Protection level: IP 65 / 67) with metric threads

Further information please find in our catalogue “Heavy Duty Han® connectors”

Identification		Part No.	Drawing	Dimensions in mm
Hood				
top entry, metric	Plastic grey	**19 20 003 0423**[1)]		
	Plastic black	**19 20 003 0426**[1)]		
	Metal	**19 20 003 1443**[1)]		
Housing				
	Plastic grey	**09 20 003 0320**		
	Plastic black	**09 20 003 0327**		
	Metal	**09 20 003 0301**		
Cable to cable hood				
metric	Plastic grey	**19 20 003 0720**		
	Plastic black	19 20 003 0727		
	Metal	**19 20 003 1750**		
Cable gland				
metric, M20,				
cable-Ø 5 - 9 mm	Plastic grey, IP 65	**19 00 000 5180**		
cable-Ø 5 - 9 mm	Metal, IP 65	**19 00 000 5080**		
cable-Ø 6 - 12 mm	Plastic black, IP 65	19 00 000 5132		
Protection cover Han® 3 A				
	Plastic black	09 20 003 5409[1)]		
	Metal	**09 20 003 5425**[1)]		

[1)] with integral sealing

Stock items in bold type



Single connector for polymer fibres (POF[1])

Description

Advantages of the HARTING quick-assembly technique:

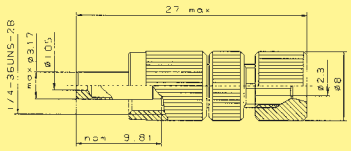
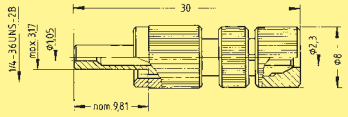
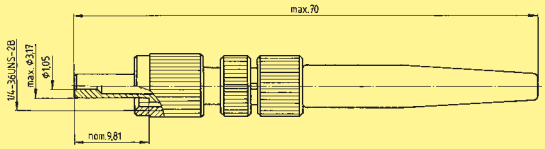
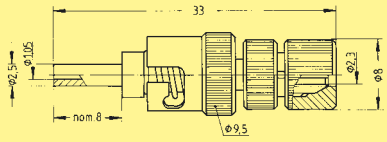
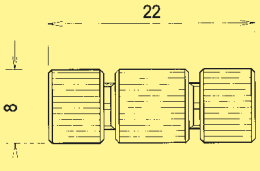
- No special tools necessary
- Quick, cost-effective assembly
- No crimping, no glueing
- Fixed connection due to metallic type
- Suitable for 1 mm polymer fibre 2.2 mm jacket

Assembly of the single connectors:

- Cut the cable, strip the jacket, insert of the fibre, tighten the sleeve nut and polish the connector's tip

Assembly of the coupling sleeve:

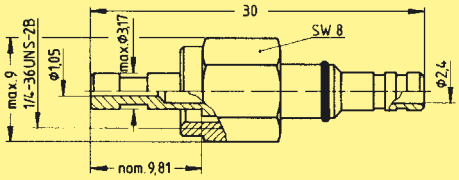
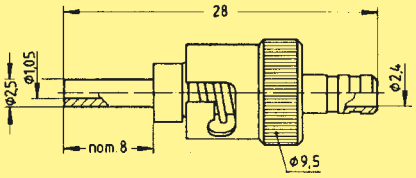
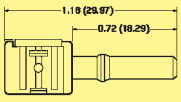
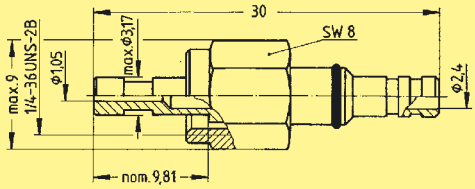
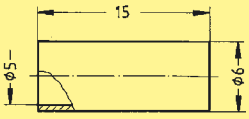
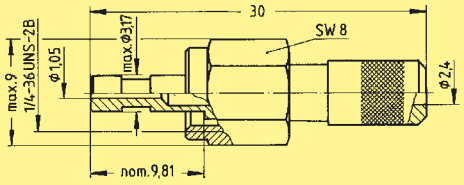
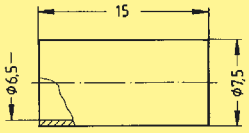
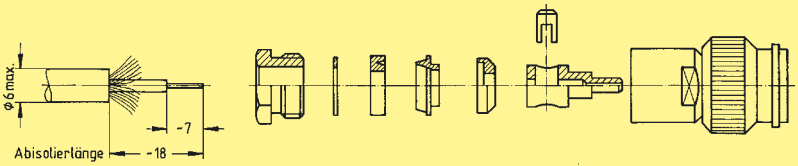
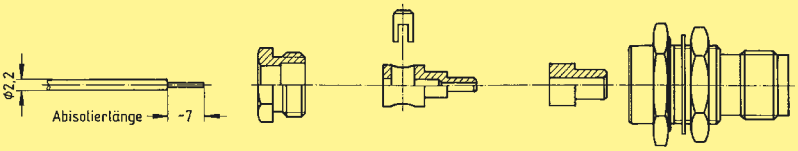
- Cut the cable's ends, insert in the coupling sleeve and tighten the sleeve nut

Identification	Part No.	Drawing	Dimensions in mm
Quick-assembly connector for 1 mm polymer fibre ø 2.2 mm			
F-SMA type with hexagonal nut bending – without protection	**20 10 001 1212**		
with knurled nut bending – without protection	**20 10 001 1215**		
– with bend protection sleeve	**20 10 001 1217**		
F-ST type – without protection	**20 10 001 2212**		
Coupling sleeve for 1 mm polymer fibre cable ø 2.2 mm			
Standard-Set	20 80 000 1065	Delivery range: 4 x quick-assembly cable coupler 1 x cutter	
Set consisting of 10 pcs	**20 80 000 1066**	10 x quick-assembly cable coupler	

[1] POF = Polymer Optical Fibre

Stock items in bold type

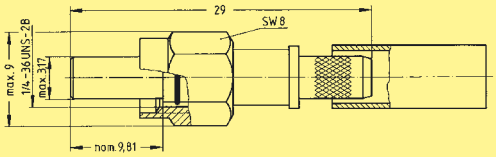
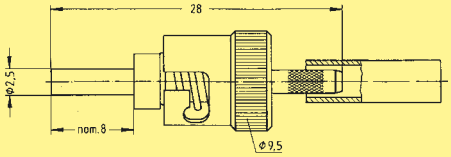
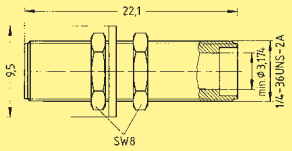
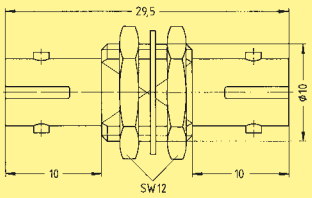
Single connectors for fibre optical cables (POF[1])

Identification	Part No.	Drawing	Dimensions in mm
F.O. connectors			The connector for 1 mm POF[1] may be directly attached to the fibre by crimping, glueing or by using a „hot plate“. Insertion loss: POF[1] < 2.5 dB
for 1 mm polymer fibre cable ø 2.2 mm F-SMA type with hexagonal nut	**20 10 001 1211**		
F-ST type	20 10 001 2211		
Versatile Link type Crimp	20 10 001 7111		
Crimpless	20 10 001 7112		
for 1 mm polymer fibre cable 3.6 mm SERCOS[2] F-SMA type with hexagonal nut	20 10 001 1241		
for 1 mm polymer fibre cable 6 mm SERCOS[2] F-SMA type with hexagonal nut	**20 10 001 1221**		
F-TNC (IP 65)			
Male cable connector for 1 mm polymer fibre cable-type SERCOS[2] ø 6 mm	**20 10 001 6211**		
Female cable connector for 1 mm polymer fibre cable-type ø 2.2 mm	**20 10 001 6233**		

[1] POF = Polymer Optical Fibre
[2] SERCOS = **SE**riell **R**ealtime **CO**mmunication **S**ystem

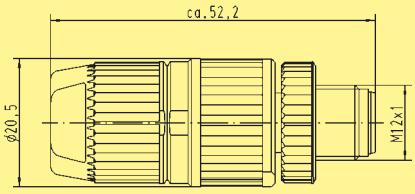
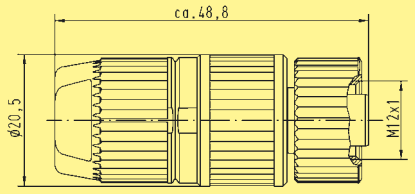
Stock items in bold type

F.O. single connectors with glass fibres

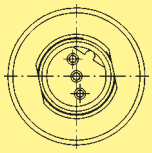
Identification	Part No.	Drawing	Dimensions in mm
F.O. connectors			
for GI-fibre 50-62.5/125 µm		F-SMA type	
F-SMA type for cable ø 2.8 mm	20 10 125 1212		The ferrule of the F.O. connector for GI-fibre is ceramic
F-ST type for cable ø 2.8 mm	20 10 125 2212		
for SI-fibre (HCS)[1] 200/230 µm		F-ST type	
F-SMA type for cable ø 2.8 mm	**20 10 230 1212**		Insertion loss: F-SMA GI/SI < 1,0 dB F-ST GI/SI < 0.5 dB
F-ST type for cable ø 2.8 mm	20 10 230 2212		
Versatile Link type for cable ø 2.2 mm	**20 10 230 7111**		
Coupling sleeve			
F-SMA type	**20 80 000 1071**		F-SMA connector and coupling sleeve acc. to IEC 874-2
F-ST type	20 80 000 1021		F-ST connector and coupling sleeve acc. to IEC 874-10 CECC 86123-801

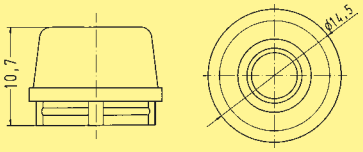
[1] HCS® = Hard Clad Silica (registered trademark of SpecTran Corporation)

Stock items in bold type

Identification	Part No. Male	Part No. Female	Drawing	Dimensions in mm
***HARAX*® M12-L, screened**				
PROFIBUS version, 3 poles 	**21 03 241 1300**			M
PROFIBUS version, 3 poles 		**21 03 241 2300**		F

View mating side, male version:
HARAX® M12-L, screened
3 poles, PROFIBUS
B coded



Sealings	Part No.	Drawing	Dimensions in mm
Sealing M12-L 	21 01 010 2006		

Stock items in bold type

Technical characteristics

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

Type	***HARAX*® M12-L screened PROFIBUS**
Rated voltage	32 V
Rated current (see current carrying capacity)	4 A
Conductor cross section	0.25 - 0.34 mm² AWG 24- 22
Diameter of individual strand	≥ 0.1 mm
Conductor isolation material	PVC
Conductor diameter	1.2 - 2.6 mm
Cable diameter	7 - 8.8 mm
Working temperature	- 25 °C … + 85 °C
Temperature during connection[1)]	- 5 °C … + 50 °C
Protection degree	IP 67
Number of terminations with same cable cross section	10

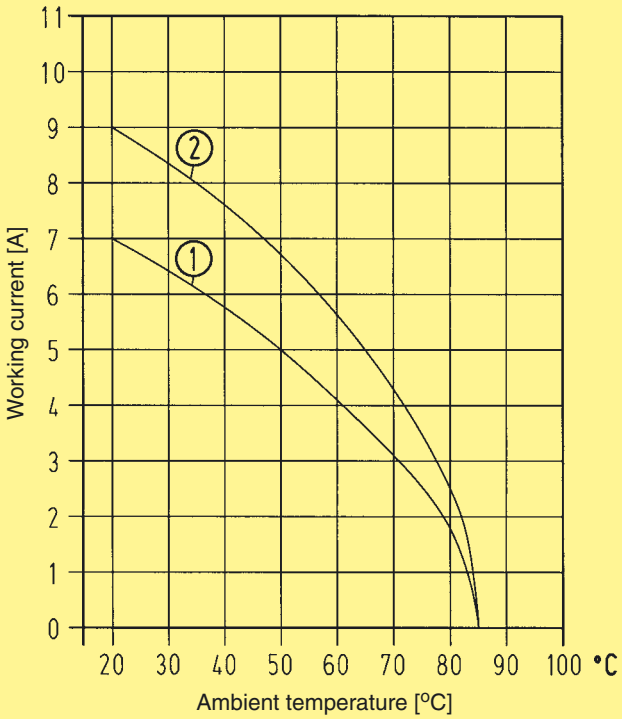
[1)] Please respect the manufacturer's recommandation

Current carrying capacity

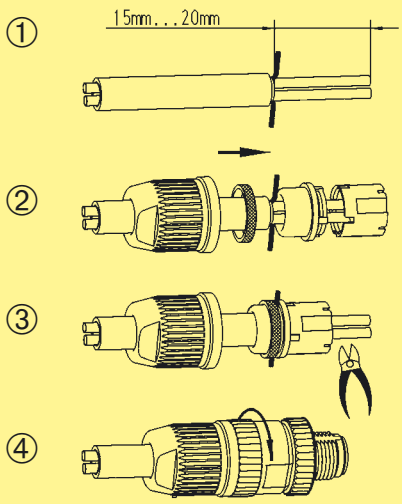
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity-curve is valid for continuous, not interrupted current-loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the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

Control and test procedures according to DIN IEC 60 512-3.

M12-L, 4 poles
M12-L, screened
1 = Wire gauge 0.34 mm²
2 = Wire gauge 0.75 mm²



Assembly manual *HARAX*® screened version



1. Strip cable
2. Assemble *HARAX*® elements

   twist screening braid and push it into the sealing slot
3. Slide ring over the sealing

   cut off cable ends and the screening braid
4. Screw the connector

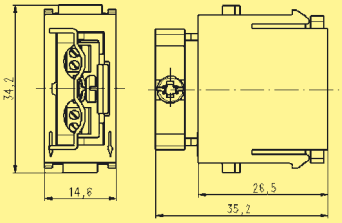
Note! For reconnection cut off the used cable ends and repeat steps 1 to 4.

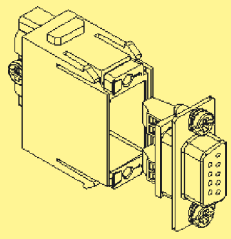
Han® D-Sub Module

Number of contacts

9

Identification	Part No. Male insert (M)	Female insert (F)	Drawing	Dimensions in mm
D-Sub Module Crimp insert 1 cable output Crimp contacts order separately	**09 14 009 3001**		M	
		09 14 009 3101	F	
Adapter Module without D-Sub insert for one cable	**09 14 000 9930**		M	
		09 14 000 9931	F	
D-Sub Module for PROFIBUS T-function Screw termination 2 cable outputs		09 14 009 3151	F	

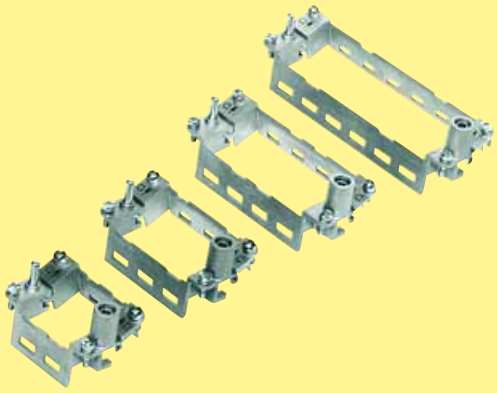
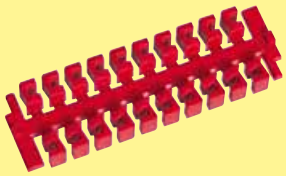
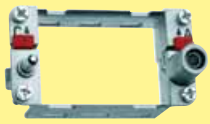
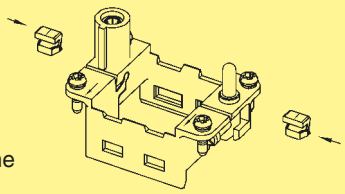




PROFIBUS

P 70 · 13

Stock items in bold type

Identification	Size	Part No. Male insert (M)	Part No. Female insert (F)	Drawing	Dimensions in mm
Hinged Frames*	6 B	**09 14 006 0303**	**09 14 006 0313**		
	10 B	**09 14 010 0303**	**09 14 010 0313**		
	16 B	**09 14 016 0303**	**09 14 016 0313**		
	24 B	**09 14 024 0303**	**09 14 024 0313**		
Locking element for hinged frame  20 pieces on block please order separately	–	**09 14 000 9960**	**09 14 000 9960**	  Ideal to pre-assemble the hinged frame	

* other hinged frames, hoods and accessories for Han-Modular® please find in chapter “connectors”

Stock items in bold type

Identification	Part No.	Drawing	Dimensions in mm
HARTING Crimping tool Locator 0.14 to 1.5 mm² Crimping tool 09 99 000 0021 can be used alternatively	**09 99 000 0110** **09 99 000 0111**	 order separately	
HARTING Service Crimping tool with Locator Crimping tool 09 99 000 0110 can be used alternatively	**09 99 000 0021**		
Crimping tool for Han-Brid® Cu-F.O. 1.5 mm²	09 99 000 0362		
HARTING Crimping tool for F.O. connectors (glass fibre) SW 4.3 mm 3.8 mm 4.95 mm	20 99 000 1031		
HARTING Crimping tool for F.O. connectors (plastic fibre) SW 6.95, 4.95 and 3.0 mm	**20 99 000 1033**	For crimping the strain relief to the connector … 1031 F.O. cable for glass fibre … 1033 POF[1] and SERCOS-cable Ø 6.0 und 3.6	
Fibre stripper 1 mm POF[1]	20 99 000 1041 **20 99 000 1045** 20 99 000 1046	0.3 mm 1 mm 0.18/0.3 mm 	
Exposy adhesive glass fibre	20 80 001 9902	2 ml EPO-TEK 360 with hardener (10:1), 4 g foil pack	

[1] POF = Polymer Optical Fibre

Stock items in bold type

for assembly and control of cables

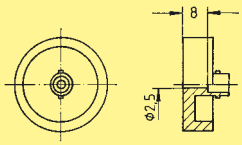
Description

The tools of the HARTING F.O. tool kit are suitable for the installation of F.O. connectors in site conditions.

Detailed instructions for assembling the different connector-types are included.

Identification	Part No.	Drawing	Dimensions in mm
Tool kit POF[1] without optical measurement devices	20 99 000 3016		Height : 170 mm Width : 470 mm Depth : 360 mm Tool kit for F.O. connector assembly to all POF[1] cables, without optical measuring instruments.
Tool kit POF[1] with optical measurement devices	20 99 000 3013		Height : 170 mm Width : 470 mm Depth : 360 mm Tool kit for F.O. connector assembly and control of the F.O. transmission links for 1 mm polymer-optical fibres (POF[1]). When applying these tools, F.O. connector types F-SMA, F-ST and other F.O. contacts can be assembled without adhesive and grinding. The measuring instruments are easy to handle and suitable for service and maintenance. The tool kit contains a complete set of tools and test equipment.
Tool kit GI-fibre	20 99 000 3015		Height : 170 mm Width : 470 mm Depth : 360 mm Tool kit for connector mounting of glass fibres, using adhesive e.g. GI 50/125 µm.

[1] POF = Polymer-Optical Fibre

Identification	Part No.	Drawing	Dimensions in mm
Polishing set Versatile Link	20 80 001 9914	Delivery range: Polishing tool 2 x polish paper	
Polishing tool for connector type:			
F-ST	20 99 000 1095		
Polishing paper			
for POF[1)]-grain size 1000	**20 80 001 9911**	Delivery range: Each part number ordered comprises 5 pieces	
for GI 9µ-grain size	20 80 001 9912		
for GI 1µ-grain size	20 80 001 9913		

[1)] POF = Polymer-Optical Fibre

Stock items in bold type

Power Supply

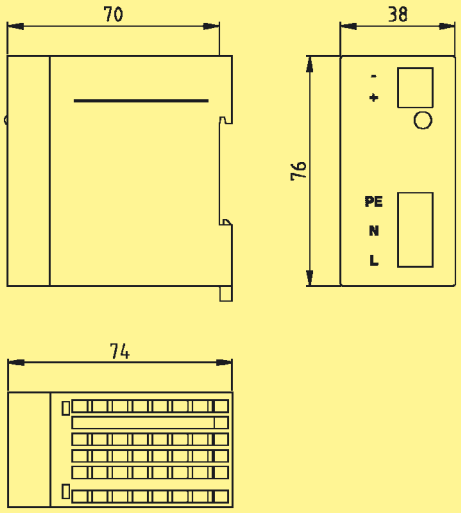
Identification	Part No.	Drawing	Dimensions in mm

PROFIBUS

Power Supply

for mounting on 35 mm
standard rails
acc. to DIN 50 022

20 80 000 3023



Termination:	screw
Mounting:	standard rail 35 mm acc. to DIN 50 022
Input voltage:	AC 94-264 V, 50 - 60 Hz
Output voltage:	DC 24 V / 1,25 A
Terminal assignment:	clamp two fold DC 24 V / 0 V, max. 2.5 mm² clamp three fold AC 94-264 V / N / ground wire PE max. 2.5 mm²