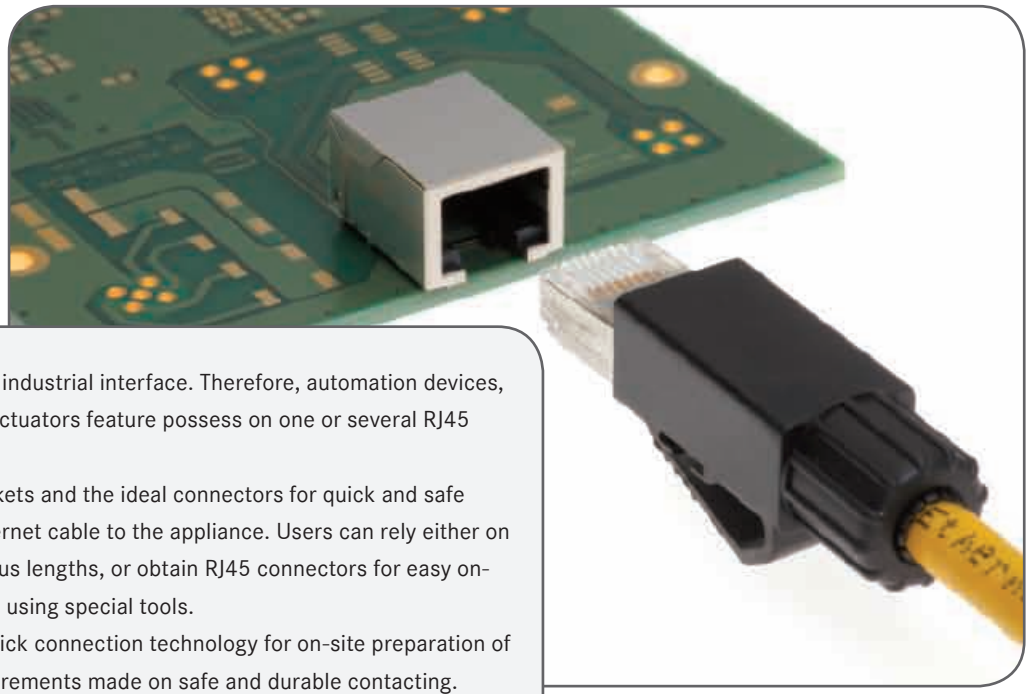

Ethernet is coming up to standard industrial interface. Therefore, automation devices, such as controllers, sensors and actuators feature possess on one or several RJ45 interfaces.

HARTING offers the matching sockets and the ideal connectors for quick and safe connection of the 2- or 4-pair Ethernet cable to the appliance. Users can rely either on ready-to-use patch cables in various lengths, or obtain RJ45 connectors for easy on-site dressing of the cables without using special tools.

HARTING relies on the *HARAX*® quick connection technology for on-site preparation of cables, meeting all industrial requirements made on safe and durable contacting.

The HARTING RJ Industrial® connector family also supports Ethernet automation profiles such as PROFINET, Ethernet/IP, POWERLINK and EtherCAT for the integration of RJ45 connection technology at field levels.

Application profile:

CONNECTION TYPE		ENVIRONMENT		APPLICATION						
Board to Board	Cable/ Wire to Board	IP 20	IP 65 / IP 67	Data	Signal	Power	high performance			
							Data transfer rate	Shielding	Number of contacts, contact density	Voltage, working current
	●	●		●			●	●		

Cable termination

Han-Quick Lock®	*IDC HARAX*®	*Crimp*
●	●	● [1]
Screw	*Cage clamp*	*Axial screw*

PCB termination

THT	*SMC*	*SMT*
●	●	●
Press-in		

Application standard

EtherNet/IP, IEEE 802.3, ISO IEC 24702, ETHERNET POWERLINK, EtherCAT Technology Group

Housing integration

Separate housing	*integrated housing*

[1] Piercing contacts

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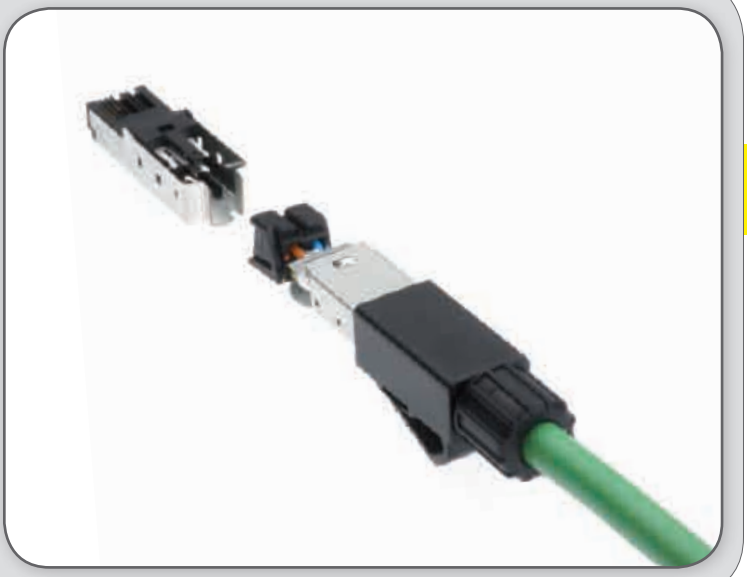
The modular HARTING RJ Industrial® connector family is based on the standard RJ45 pin profile and was developed especially for use in rugged industrial environments.
This technology charts a new course in the wiring of appliances with Ethernet interfaces, enabling the on-site configuration of connectors for many industrial applications, no matter if the product is a power connector or a communications connector.
In the context of the wiring of 4-pole Fast Ethernet networks, HARTING relies consistently on the *HARAX*® quick connection technology which has proved its worth in many industrial applications.
Solid or flexible conductors up to a cross-section of AWG 22 are terminated by IDC technology, without stripping or using any special tool.
HARTING offers the 8-pole data module with piercing connection technology, which meets the high requirements of category 6 for all Gigabit Ethernet networks. The 8-pole adapter of the category 6 data module also matches the screening plates of the 4-wire data module with quick connection technology. This functionality enables the conversion of any 100 MBit Fast Ethernet network into a Gigabit Ethernet network using HARTING RJ Industrial® connectors. This innovative platform strategy also permits the use of the RJ45 data module in combination with the PushPull and Han® 3A connector families.
Based on this innovative data module, HARTING has developed a comprehensive connector family which covers all applications for Fast Ethernet, Gigabit Ethernet, PROFINET, Ethernet/IP and other Ethernet profiles in the industrial environment.
Degree of protection IP 20 is available for the standard RJ45 connectors, either for configuration in the field, or as molded system patch cable.

APPLIANCE INTEGRATION:

HARTING offers various RJ45 jacks for direct mounting on the PCBs of appliances.

RJ45 QUICK CONNECTION WITH HARAX®:

The HARTING *HARAX*® quick connection technology is the ideal solution for dressing RJ45 connectors on-site. In order to produce a gas-proof and vibration resistant Ethernet connection, users only have to strip the cable insulation, insert the conductors, terminate the shielding plates and close the connector.
HARAX® is the most convenient handling standard connection for Fast Ethernet where the emphasis is set on the assembly of connectors in the field.
HARAX® is an ideal quick connection technology which is deployed universally in a very wide range of data, signal and power series.



ASSEMBLED SYSTEM CABLES:

HARTING offers a comprehensive range of ready-to-use RJ45 system cables for the simple and easy connection of Ethernet devices. HARTING also provides assembled and tested system cables for special Ethernet profiles such as PROFINET and Ethernet/IP.
The range of solution comprises star quad, double-pair and four-pair cables of diverse structure, as required in drag chain applications, for example.
Consequently, HARTING system cables can be deployed in all Ethernet applications and all ambient conditions.

PERFORMANCE FOR THE FUTURE:

The HARTING RJ Industrial® portfolio offers a wide range of solutions for Industrial Ethernet, independent of wiring strategies to ISO/IEC 11 801 currently deployed to wire appliances.
HARTING RJ Industrial® provides field connection technology based on 2-pair category 5 variant and on 4-pair category 6 variant.
HARTING RJ Industrial® is ideal for the future-proof planning of appliance interfaces, regardless of whether your future applications will involve Fast or Gigabit Ethernet, or 10 Gigabit Ethernet.

HARTING RJ Industrial®

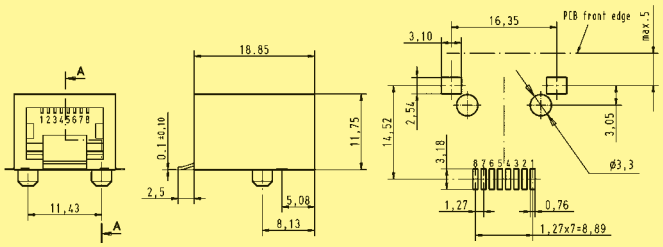
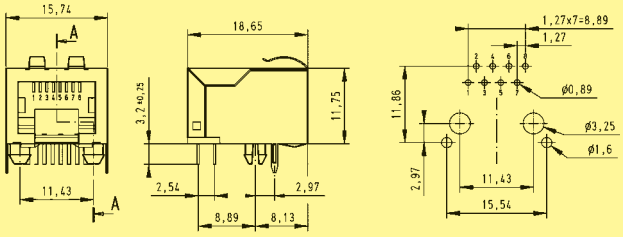
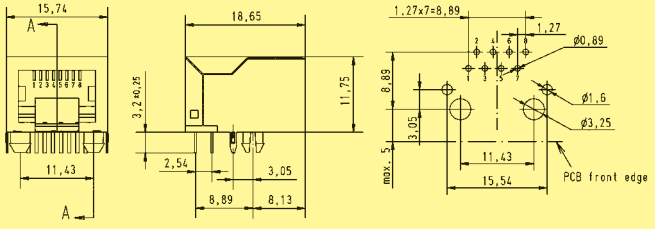
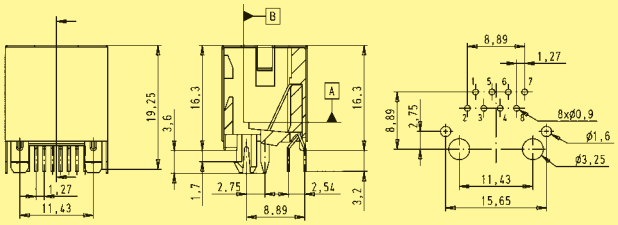
HARTING RJ Industrial® RJ45 jacks for direct device integration

Advantages

- Compact design
- Category of transmission Cat. 5

Technical characteristics

Locking	RJ45 snap acc. to IEC 60 603-7
Number of contacts	8
Degree of protection	IP 20
Mating face	RJ45
Mating cycles	min. 750
	UL approval

Identification	Part No.	Drawing	Dimensions in mm
Components device side			pcb layout
RJ45 female (low profile)			
Solder variant SMD, 90° angled	09 45 551 1100[1] 09 45 551 1110[2]		
Solder variant overmolded, 90° angled with EMC contacts	09 45 551 1101[1]		
Solder variant overmolded, 90° angled	09 45 551 1102[1]		
Solder variant overmolded, vertical	09 45 551 1103[3]		

[1] Packaging: Blister à 120 pieces
[2] Packaging: Tape & Reel à 130 pieces
[2] Packaging: Blister à 80 pieces

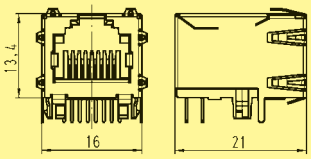
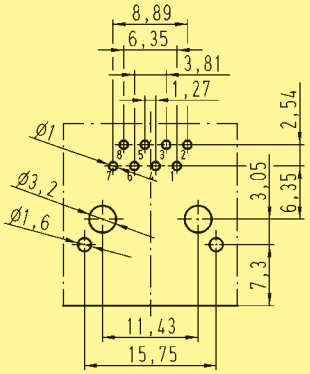
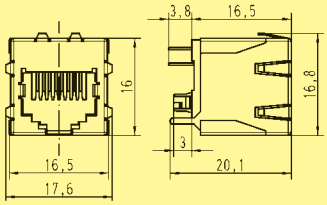
HARTING RJ Industrial® RJ45 jacks for direct device integration

Advantages

- Compact design
- Category of transmission Cat. 6

Technical characteristics

Locking	RJ45 snap acc. to IEC 60 603-7
Number of contacts	8
Degree of protection	IP 20
Mating face	RJ45
Mating cycles	min. 750
	UL approval

Identification	Part No.	Drawing	Dimensions in mm
Components device side			pcb layout
RJ45 female (Standard)			
Solder variant overmolded (THT), 90° angled	09 35 002 2101		
Solder variant overmolded (THT), 180° straight	09 35 002 2102		

HARTING RJ Industrial®

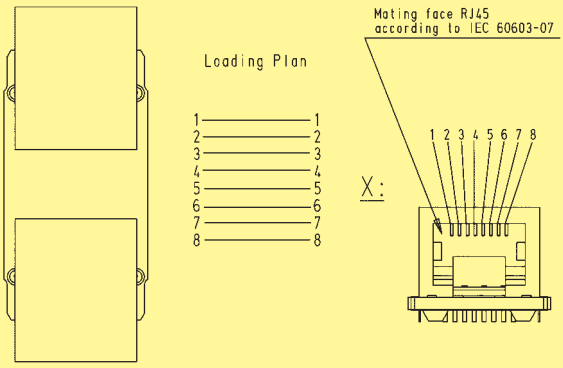
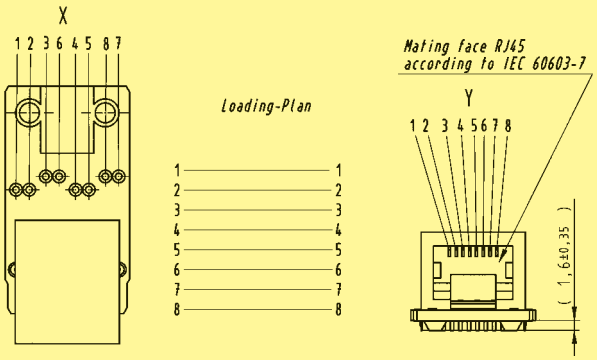
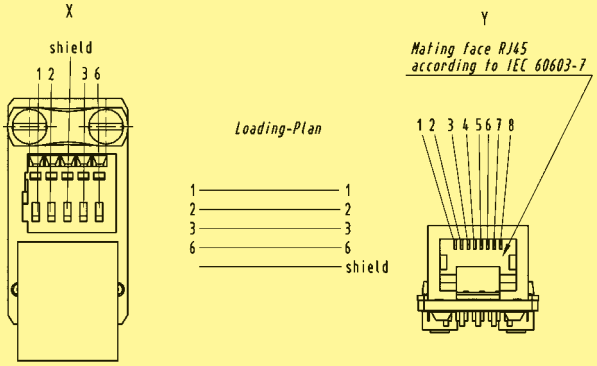
HARTING RJ Industrial® RJ45 – coupler and adapter pcb's

Advantages

- Compatible with Han® 3A[1)] and HARTING PushPull

Technical characteristics

Mating face	RJ45 acc. to IEC 60 603-7
Mating cycles	min. 750

Identification	Part No.	Drawing	Dimensions in mm
Coupler pcb 2x RJ45 8-poles 2 x RJ45 female (09 45 551 1102)	09 45 545 1130		
Adapter pcb 1x RJ45 8-poles to solder points	09 45 545 1134		
Adapter pcb 1x RJ45 8-poles cage clamp, 5-pole, 1.5 mm²	09 45 545 1135		

[1)] with suitable adapter, see page 04.04

HARTING RJ Industrial® connector set RJ45, 4-poles

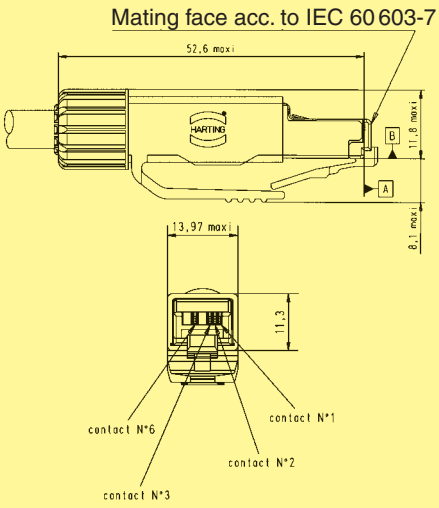
Advantages

- RJ45 Ethernet-Data connector suitable for industry
- Tool-less field-assembly with *HARAX*® rapid termination in IDC technology
- Compact design
- Ergonomical unlocking clip
- Less weight assures shock- and vibration-resisting connection
- Category of transmission Cat. 5
- Suitable for termination of solid and stranded cables
- Up to 10 x reconductable
- PROFINET compatible

Technical characteristics

Connector type	RJ45 connector acc. to IEC 60 603-7
Number of contacts	4
Transmission performance	Category 5 / Class D up to 100MHz acc. to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100 Mbit/s
Shielding	fully shielded, 360° shielding contact
Mounting	Field-assembly
Cable termination	tool-less with IDC contacts
Cable diameter	
stranded	AWG 24/7 - AWG 22/7
solid	AWG 23/1 - AWG 22/1
Cable outer diameter	6.1 mm - 6.9 mm
Mating cycles	min. 750
Degree of protection	IP 20
Temperature range	– 40 °C up to + 70 °C
Housing material	Polycarbonate, UL 94-V0
Colour	black
	UL approval (E102079)

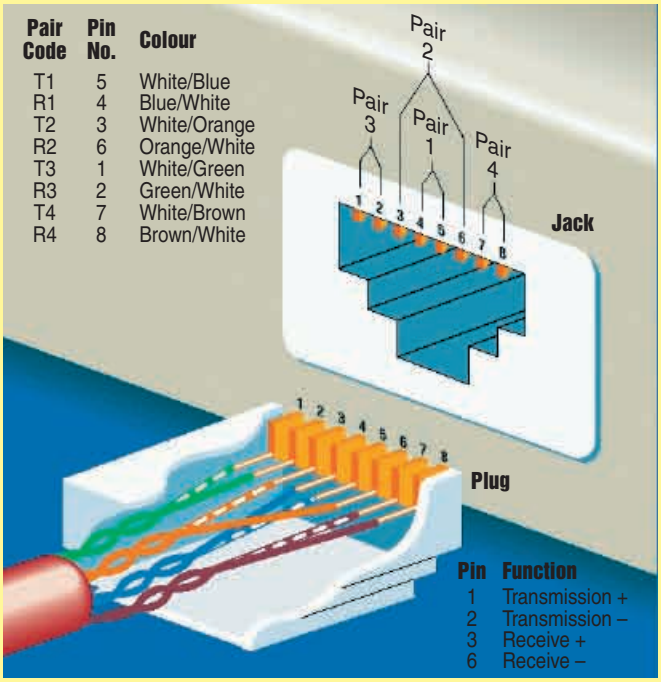
Identification	Part No.	Drawing	Dimensions in mm
HARTING RJ Industrial® connector set RJ45, 4-poles			
incl.: housing with shielding, splicing element, cable gland and instruction manual	09 45 151 1100		
like 09 45 151 1100 but for AWG 26	09 45 151 1109		



Minimising cross-connection through wire management

In Gigabit Ethernet there is no difference between uplink and downlink ports. Any network device automatically recognises whether the connected device is a network card or a switch.
There is no need for cross-connected and through-connected cables found under 100 Mbit Fast Ethernet, where this functionality is not available.

The symmetrical structure of a 1:1 through-wired patch cable results in crossing of the wire pairs 2 and 4. This has a negative effect on the near-end crosstalk of the transmission route. For performance reasons, a symmetrical crossing of the pairs must be realized as near as possible to the connector. This is achieved by the colour-coded wire managers, which leads the conductor pairs in a defined way to the connection points on the RJ45 jack (see figure “Wire manager”). Crossing the cross-connection in the cable manager instead of in the cable itself, so contributing to the high performance of the transmission route.

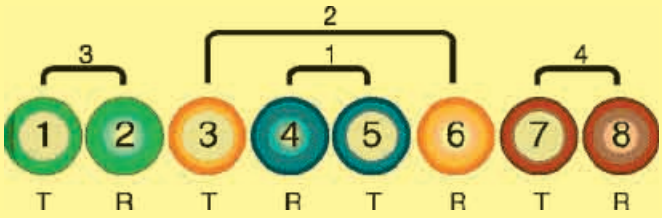


Connection of core pairs

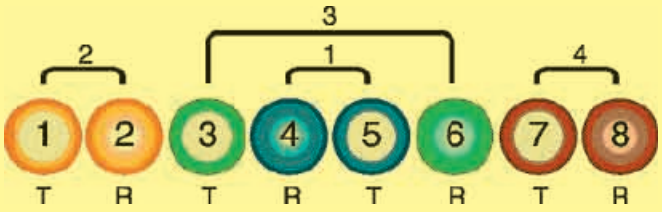
Wiring the data module

For historical reasons, TIA/EIA 568:2002 has two ways to connect the conductors at the connector. These describe which individual colour-coded conductors are to be brought to which contact in the connector.

- EIA/TIA 568:2002 A: This is the recommended connection variant in the EIA/TIA standard.
- EIA/TIA 568:2002 B: This connection variant matches the older AT&T 258 A colour code, which is still the most widely used wiring scheme.



Connection in acc. with TIA/EIA 568A

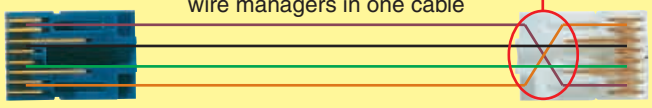


Connection in acc. with TIA/EIA 568B

The RJ45 jack must be connected according to the appropriate scheme, depending on the application. For Gigabit Ethernet the connection is only to be made at the RJ45 jack, not at the plug, since the conductor pairs in the patch leads are symmetrically routed due to the 1:1 auto-crossing.

The usage of different wire managers in a patch cord guarantees a symmetrical crossing of the wire pairs inside the connector. Thereby the Category 6 data transmission performance is assured.

Application of two different wire managers in one cable



wire manager, blue — wire manager, white

Application of the same wire managers in one cable

wire manager, white — wire manager, white

Crossover of the wire pairs leads to a degradation of the data transmission characteristics. The Category 6 performance can possibly not be achieved.

Wire manager

HARTING RJ Industrial® Gigalink, 8-poles

HARTING RJ Industrial® connector set RJ45, 8-poles

Advantages

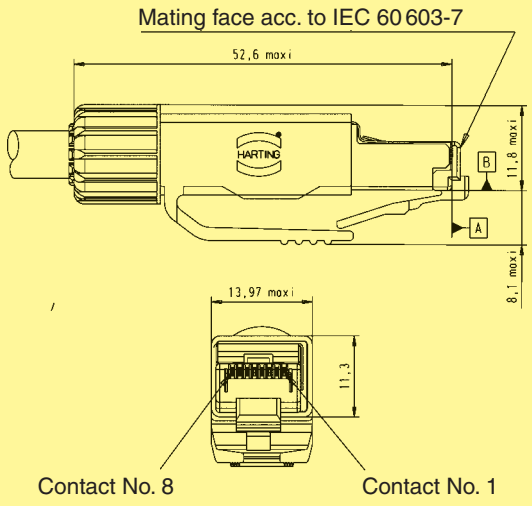
- RJ45 Ethernet-Data connector suitable for indsutry
- Field-assembly with piercing contacts
- Compact design
- Ergonomically unlocking clip
- Less weight assures shock- and vibration resisting connection
- Category of transmission Cat. 5

Reference note:
For cat. 6 patch cords it is recommended to use 1 connector with a white cable manager and one with a blue cable manager, in order to optimise the crosstalk between different signal pairs.

Technical characteristics

Connector type	RJ45 connector acc. to IEC 60 603-7
Number of contacts	8
Transmission performance	Category 6 / Class E up to 250MHz acc. to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100/1000 Mbit/s
Shielding	fully shielded, 360° shielding contact
Mounting	Field-assembly
Cable termination	with piercing contacts
Cable diameter stranded	AWG 24/7 - AWG 22/7
Cable outer diameter	6.1 mm - 6.9 mm
Mating cycles	min. 750
Degree of protection	IP 20
Temperature range	– 40 °C up to + 70 °C
Housing material	Polycarbonate, UL 94-V0
Colour	black
	UL approval (E102079)

Identification	Part No.	Drawing	Dimensions in mm
HARTING RJ Industrial® connector set RJ45, 8-poles			
Wire manager white	09 45 151 1500		
Wire manager blue	09 45 151 1510		
incl.: housing with shielding, cable gland and instruction manual			



Identification	Part No.	
HARTING RJ Industrial® Gigalink Assembly Tool for 8-poles HARTING RJ Industrial® Gigalink connectors	09 45 800 0500	 With the RJ Industrial Gigalink Assembly Tool 4 pair connectors can be connected to flexible cables.
HARTING RJ Industrial® Stripping Tool Stripping Tool incl. blade cassette	09 45 800 0000	 The RJ Industrial Stripping Tool is ready to remove insulation from 2-pair and 4-pair cables for fast mounting with diameters from 2.5 – 8 mm fast and easy. The tool is prepared for a cable diameter of 6.5 mm, it allows to remove cable sheath and shielding braid in one.
Blade cassette	09 45 800 0001	Spare blades for HARTING RJ Industrial® Stripping Tool.

HARTING RJ Industrial® system cable RJ45, 4-wire

RJ45 patch cords for switch cabinet or PLC

Description	Part No. Standard	Part No. Multiport	Technical characteristics
For the cabling of Industrial Ethernet networks (for example in accordance with the PROFINET guideline), based on RJ45 connectors. Wiring: Contacts RJ45 1/2 and 3/6			Transmission properties in accordance with ISO/IEC 11 801:2002: Class D Mating face: 2 x RJ45 in acc. with IEC 60 603-7 Protection level: IP 20 (if mated) Temperature range – 40 °C … + 70 °C **Electrical characteristics at 20 °C** Contact resistance: ≤ 20 mΩ Insulation resistance: ≥ 500 MΩ Dielectric withstanding voltage: contact - contact 1 kV contact - ground 1.5 kV **Electrical characteristics after damp heat cycles** Contact resistance: ≤ 20 mΩ Insulation resistance: ≥ 100 MΩ Dielectric withstanding voltage: contact - contact 1 kV contact - ground 1.5 kV
HARTING RJ Industrial® system cable RJ45, 4-wire Type A 			Cable type: Industrial Ethernet Standard Cable, 2 x 2 x AWG 22/1, double shielding (PROFINET Typ A) Sheath: PVC green, Ø 6.5 mm Connectors: 2 x HARTING RJ Industrial® IP 20 Data with overmolded housings
Length 1.5 m	09 45 771 0023	09 47 343 4006	
Length 3.0 m	09 45 771 0025	09 47 343 4009	
Length 5.0 m	09 45 771 0027	09 47 343 4012	
Length 10.0 m	09 45 771 0051	09 47 343 4018	
Length 20.0 m	09 45 771 0053	09 47 343 4020	
HARTING RJ Industrial® system cable RJ45, 4-wire Type B 			Cable type: Industrial Ethernet Stranded Cable, 2 x 2 x AWG 22/7, double shielding (PROFINET Typ B) Sheath: PVC green, Ø 6.5 mm Connectors: 2 x HARTING RJ Industrial® IP 20 Data with overmolded housings
Length 1.5 m	09 45 771 1123	09 47 343 4034	
Length 3.0 m	09 45 771 1125	09 47 343 4037	
Length 5.0 m	09 45 771 1127	09 47 343 4040	
Length 10.0 m	09 45 771 1151	09 47 343 4046	
Length 20.0 m	09 45 771 1153	09 47 343 4048	
HARTING RJ Industrial® system cable RJ45, 4-wire Type C 			Cable type: Industrial Ethernet Trailing Cable, 2 x 2 x AWG 22/7, double shielding (PROFINET Typ C) Sheath: PUR green, Ø 6.5 mm Connectors: 2 x HARTING RJ Industrial® IP 20 Data with overmolded housings
Length 1.5 m	09 45 771 1164	09 47 343 4090	
Length 3.0 m	09 45 771 1166	09 47 343 4093	
Length 5.0 m	09 45 771 1168	09 47 343 4096	
Length 10.0 m	09 45 771 1173	09 47 343 4102	
Length 20.0 m	09 45 771 1175	09 47 343 4104	

Further system cables see HARTING-catalogue “Ethernet Network Solutions for Industry”

Exit left

Exit right

Exit top

Exit bottom

HARTING RJ Industrial® system cable RJ45 angled, 4-wire

RJ45 connection cable, first end angled, second side open, for control or distributor cabinets or within controllers

Advantages

- Robust industrial design
- For special space-saving cabling
- Exact length can be customised
- Use HARTING RJ45 connector (09 45 151 1100)

Technical characteristics

Mating face:	2 x RJ45 in acc. with IEC 60 603-7
Protecion level:	IP 20 (if mated)
Temperature range	– 40 °C … + 70 °C

Electrical characteristics at 20 °C

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

Electrical characteristics after damp heat cycles

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

Wiring	first end 4-pole, (RJ45 contacts 1/2 and 3/6), other side open
Transmission performance	Category 5 / Class D up to 100 MHz according to ISO/IEC 11 801:2002, EN 50 173-1
Transmission rate	10/100 Mbit/s
Shielding	fully shielded, 360° shielding contact
Standard lengths	0.5 m / 1 m / 1.5 m / 2 m / 3 m / 5 m
Other lengths	available on request

Cable types

PROFINET Cable type	Type A	Type B	Type C	Outdoor
Cables	Copper, solid, shielded	Copper, stranded, shielded	Copper, stranded, shielded, useable as trailing cable	Copper, stranded, shielded
Wire gauge	2 x 2 x AWG 22/1	2 x 2 x AWG 22/7	2 x 2 x AWG 22/7	2 x 2 x AWG 22/7
Sheath material	PVC	PVC	PUR	PVC
Operating temperature range	– 40 °C to + 70 °C	– 40 °C to + 70 °C	– 40 °C to + 70 °C	– 45 °C to + 60 °C
Colour	Green	Green	Green	Black

Further system cables see HARTING-catalogue “Ethernet Network Solutions for Industry”

Identification		Part No. angled left	angled right	angled top	angled bottom
HARTING RJ Industrial® System cable RJ45 angled, 4-wire one side pre-assembled, second side open Type A					
	Length 0.5 m	09 47 050 0001	09 47 060 0001	09 47 030 0001	09 47 040 0001
	Length 1.0 m	09 47 050 0002	09 47 060 0002	09 47 030 0002	09 47 040 0002
	Length 1.5 m	09 47 050 0003	09 47 060 0003	09 47 030 0003	09 47 040 0003
	Length 2.0 m	09 47 050 0004	09 47 060 0004	09 47 030 0004	09 47 040 0004
	Length 3.0 m	09 47 050 0005	09 47 060 0005	09 47 030 0005	09 47 040 0005
	Length 5.0 m	09 47 050 0007	09 47 060 0007	09 47 030 0007	09 47 040 0007
HARTING RJ Industrial® System cable RJ45 angled, 4-wire one side pre-assembled, second side open Type B					
	Length 0.5 m	09 47 050 0023	09 47 060 0023	09 47 030 0023	09 47 040 0023
	Length 1.0 m	09 47 050 0024	09 47 060 0024	09 47 030 0024	09 47 040 0024
	Length 1.5 m	09 47 050 0025	09 47 060 0025	09 47 030 0025	09 47 040 0025
	Length 2.0 m	09 47 050 0026	09 47 060 0026	09 47 030 0026	09 47 040 0026
	Length 3.0 m	09 47 050 0027	09 47 060 0027	09 47 030 0027	09 47 040 0027
	Length 5.0 m	09 47 050 0029	09 47 060 0029	09 47 030 0029	09 47 040 0029
HARTING RJ Industrial® System cable RJ45 angled, 4-wire one side pre-assembled, second side open Type C					
	Length 0.5 m	09 47 050 0045	09 47 060 0045	09 47 030 0045	09 47 040 0045
	Length 1.0 m	09 47 050 0046	09 47 060 0046	09 47 030 0046	09 47 040 0046
	Length 1.5 m	09 47 050 0047	09 47 060 0047	09 47 030 0047	09 47 040 0047
	Length 2.0 m	09 47 050 0048	09 47 060 0048	09 47 030 0048	09 47 040 0048
	Length 3.0 m	09 47 050 0049	09 47 060 0049	09 47 030 0049	09 47 040 0049
	Length 5.0 m	09 47 050 0051	09 47 060 0051	09 47 030 0051	09 47 040 0051
HARTING RJ Industrial® System cable RJ45 angled, 4-wire one side pre-assembled, second side open Outdoor					
	Length 0.5 m	09 47 050 0067	09 47 060 0067	09 47 030 0067	09 47 040 0067
	Length 1.0 m	09 47 050 0068	09 47 060 0068	09 47 030 0068	09 47 040 0068
	Length 1.5 m	09 47 050 0069	09 47 060 0069	09 47 030 0069	09 47 040 0069
	Length 2.0 m	09 47 050 0070	09 47 060 0070	09 47 030 0070	09 47 040 0070
	Length 3.0 m	09 47 050 0071	09 47 060 0071	09 47 030 0071	09 47 040 0071
	Length 5.0 m	09 47 050 0073	09 47 060 0073	09 47 030 0073	09 47 040 0073

Further system cables see HARTING-catalogue “Ethernet Network Solutions for Industry”