

HARTING



Push Pull Power Connectors

HARTING offers with the Push Pull Power connector an universal solution for the power supply in compact and robust applications. It is in its element wherever small dimensions are combined with a high protection class.

The connector is available in a 4 pole 48 V and a 3 pole 250 V version. The newly designed power contacts can carry up to 12 resp. 16 A each (see deratings). In spite of this high current carrying capacity the connector gets by with minimal dimensions and fulfils the industrial requirements for clearances and creepage distances at the same time.

Additionally the Push Pull Power connector offers the protection class of IP 67 and 65. Beside numerous industrial use cases it is thereby suited for diverse applications in the fields of transportation and telecommunication.

The cable side of the Push Pull Power is terminated with crimping technology. For the receptacle several solutions with different termination technologies are offered.

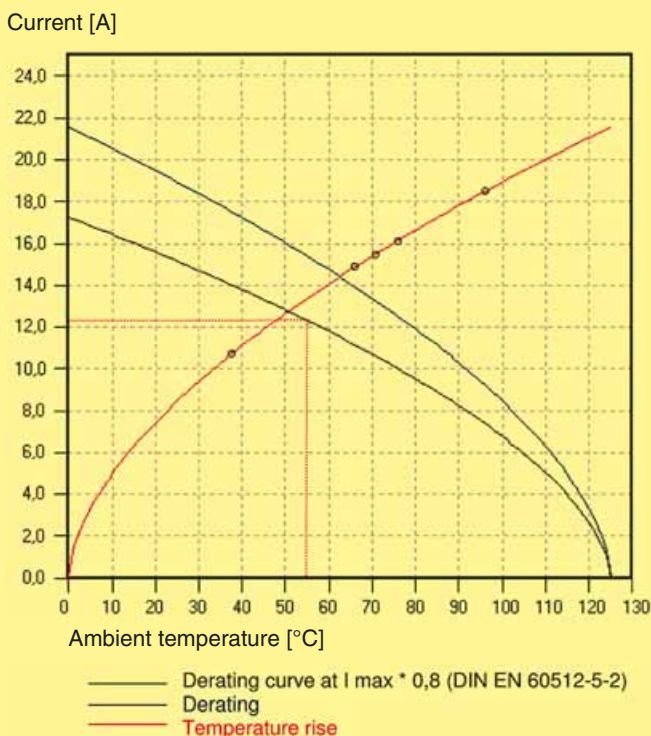
The innovative locking mechanism of the connector enables an easy plugging and pulling with just one hand. The mechanism is based on the same housing which is already established for the HARTING RJ Industrial® product family.

Benefits

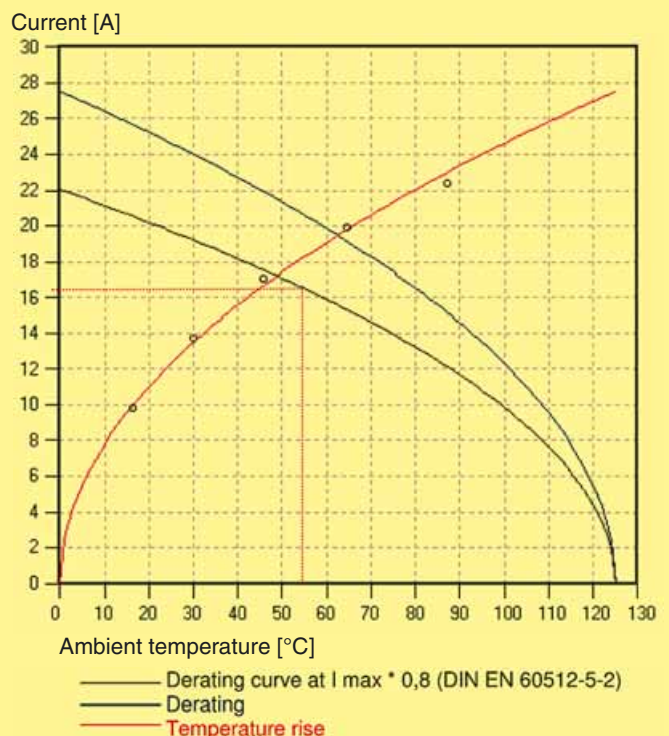
- Minimum space requirements in spite of high current carrying capacity
- Very compact housing in a high protection class
- Innovative Push Pull locking mechanism
- Protection against contact on plug AND receptacle side enables an easy and safe installation
- For low voltage (48 V) and for power supply (250 V) available
- Codeable without losing contacts
- Different termination technologies for individual device integration

Typical application areas

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



2 Derating diagram "low voltage, 48 V"; 4 contacts loaded



Derating diagram "power supply, 250 V"; 2 contacts loaded

Overvoltage category

The overvoltage category is dependent on the mains voltage and the location at which the equipment is installed. It describes the maximum overvoltage resistance of a device in the event of a power supply system fault, e. g. in the event of a lightning strike.

The overvoltage category affects the dimensioning of components in that it determines the clearance air gap. Pursuant to the relevant standards, there are 4 overvoltage categories.

Equipment for industrial use, all HARTING industrial connectors fall into Overvoltage Category III.

Extract from DIN VDE 0110-1 and IEC 60664-1, Para. 2.2.2.1.1

Equipment of overvoltage category III is equipment in fixed installations and for cases where the reliability and the availability of the equipment is subject to special requirements.

Note: Examples of such equipment are switches in the fixed installation and equipment for industrial use with permanent connection to the fixed installation.

Pollution degree

The dimensioning of operating equipment is dependent on environmental conditions. Any pollution or contamination may give rise to conductivity that, in combination with moisture, may affect the insulating properties of the surface on which it is deposited. The pollution degree influences the design of components in terms of the creepage distance.

The pollution degree is defined for exposed, unprotected insulation on the basis of environmental conditions.

HARTING industrial connectors are designed as standard for Pollution Degree 3.

Pollution degree 3 in industrial, commercial and agricultural premises, unheated storage premises, workshops or boiler rooms, also for the electrical components of assembly or mounting equipment and machine tools.

Extract from DIN VDE 0110-1 and IEC 60664-1, Para. 2.5.1

Pollution degree 3: Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be excepted.

Current carrying capacity

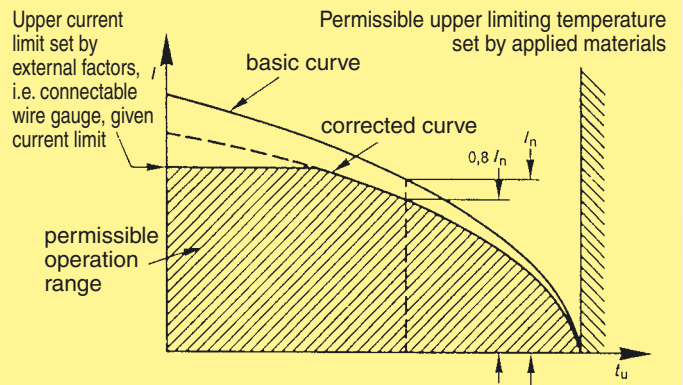
The current carrying capacity is determined in tests which are conducted on the basis of the DIN IEC 60512 part 3. The current carrying capacity is limited by the thermal properties of materials which are used for inserts as well as by the insulating materials. These components have a limiting temperature which should not be exceeded.

The relationship between the current, the temperature rise (loss at the contact resistance) and the ambient temperature of the connector is represented by a curve. On a linear co-ordinate system the current lies on the vertical line (ordinate) and the ambient temperature on the horizontal line (abscissa) which ends at the upper limiting temperature.

In another measurement the self-heating (Δt) at different currents is determined.

At least 3 points are determined which are connected to a parabolic curve, the basic curve.

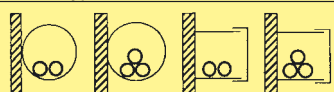
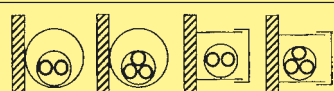

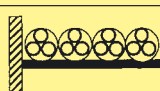
The corrected current carrying capacity curve is derived from this basic curve. The reasons for the correction are external factors that bring an additional limitation to the current carrying capacity, i.e. connectable wire gauge or an unequal dispersion of current.



Example of a current capacity curve

Definition: The rated current is the continuous, not interrupted current a connector can take when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Current carrying capacity of copper wires

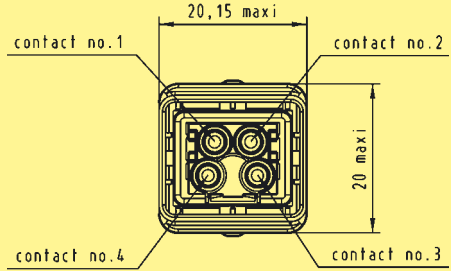
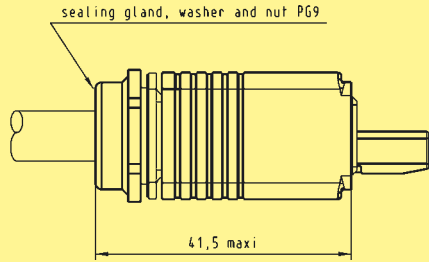
Diameter [mm ²] of single wires in a three-phase system	0.75	1	1.5	2.5
Type of installation				
 B1 Wires in protective tubes and installation conduits	7.6	10.4	13.5	18.3
 B2 Cables and wires in protective tubes and installation conduits	–	9.6	12	16.5
 C Cables and wires at walls	–	11.7	15.2	21
 D Cables and wires on a bed	–	11.5	16.1	22

Depiction in accordance with DIN EN 60204 for PVC-insulated copper wires in an ambient temperature of + 40 °C under permanent operating conditions.

For different conditions and temperatures, installations, insulation materials or conductors the relevant corrections have to be carried out.



IP 67 Push Pull Power connectors for low voltage (48 V) applications

Identification	Part No.	Drawing	Dimensions in mm
Connector set incl. 4 turned crimp contacts (male), insulator body (grey), housing, cable gland	09 46 145 4400		
Set of coding pins To avoid accidental incorrect mating a coding system is required. The coding pins are inserted without loss of contacts.	09 46 840 0000		
IP 67 / 65 protective cap with cord	09 45 845 0001		

Technical characteristics

Working voltage	48 V
Working current per contact ¹⁾	12 A @ 55 °C
Rated impulse voltage	1.5 kV (DIN EN 61 984)
Overvoltage category	III (DIN VDE 0110 and IEC 60 664-1)
Pollution degree	3 (DIN VDE 0110 and IEC 60 664-1)
No. of current carrying contacts	4
Pre-leading PE contact	–
Contact resistance	max. 5 mΩ
Protection against contact	acc. to IEC DIN EN 60 529
Wire gauge	1.5 ... 2.5 mm ² (AWG 16 ... 14) ²⁾ , stranded
Cable sheath diameter	6.9 - 8.6 mm
Protection class – mated	IP 67 / 65 (IEC DIN EN 60 529)
– unmated	IP 20 (IEC DIN EN 60 529)
Vibration and shock resistance	acc. to EN 50 155
Ambient temperature	– 40 ... + 70 °C
Mating security	Polarisation with polarisation nose, no mating of different connector variants possible
Coding	4 different possibilities, without losing contacts
Mating cycles	min. 750
Strain relief	min. 100 N
Housing material	Polycarbonate, UL 94 V-0, UV resistant acc. to UL 746c
Approvals	VDE

Available
Q4/2005

IP 67 Push Pull Power connector for (250 V) power supply

Identification	Part No.	Drawing	Dimensions in mm
Connector set incl. 3 turned crimp contacts (male) insulator body (black), housing, cable gland	09 46 145 4410		
Set of coding pins To avoid accidental incorrect mating a coding system is required. The coding pins are inserted without loss of contacts.	09 46 840 0000		
IP 67 / 65 protective cap with cord	09 45 845 0001		

Technical characteristics

Working voltage	250 V
Working current per contact ¹⁾	16 A @ 55 °C
Rated impulse voltage	4.0 kV (DIN EN 61 984)
Overvoltage category	III (DIN VDE 0110 and IEC 60 664-1)
Pollution degree	3 (DIN VDE 0110 and IEC 60 664-1)
No. of current carrying contacts	2
Pre-leading PE contact	1
Contact resistance	max. 5 mΩ
Protection against contact	acc. to IEC DIN EN 60 529
Wire gauge	1.5 ... 2.5 mm ² (AWG 16 ... 14) ²⁾ , stranded
Cable sheath diameter	6.9 - 8.6 mm
Protection class – mated	IP 67 / 65 (IEC DIN EN 60 529)
– unmated	IP 20 (IEC DIN EN 60 529)
Vibration and shock resistance	acc. to EN 50 155
Ambient temperature	– 40 ... + 70 °C
Mating security	Polarisation with polarisation nose, no mating of different connector variants possible
Coding	4 different possibilities, without losing contacts
Mating cycles	min. 750
Strain relief	min. 100 N
Housing material	Polycarbonate, UL 94 V-0, UV resistant acc. to UL 746c
Approvals	VDE

¹⁾ see derating diagram on page 2

²⁾ others on request



IP 67 Push Pull Power panel feed through for low voltage (48 V) applications

Identification	Part No.	Drawing	Dimensions in mm
Panel feed through set incl. 4 turned female contacts, insulator body (grey), receptacle housing for crimp termination with 90° solder pins (lead free acc. to RoHS) to be soldered onto a PCB, Pick-and-Place compatible, with Zero-Insertion-Force with cage clamp termination	09 46 245 4400 09 46 245 4000 09 46 245 4001		
Set of coding pins To avoid accidental incorrect mating a coding system is required. The coding pins are inserted without loss of contacts.	09 46 840 0000		
IP 67 / 65 protective cap with cord	09 45 845 0004		

Technical characteristics

Working voltage	48 V
Working current per contact ¹⁾	12 A @ 55 °C
Rated impulse voltage	1.5 kV (DIN EN 61 984)
Overtoltage category	III (DIN VDE 0110 and IEC 60 664-1)
Pollution degree	3 (DIN VDE 0110 and IEC 60 664-1)
No. of current carrying contacts	4
PE contact	–
Contact resistance	max. 5 mΩ
Protection against contact	acc. to IEC DIN EN 60 529
Wire gauge	– crimp 4 x 1.5 ... 2.5 mm² (AWG 16 ... 14)²⁾, stranded – cage clamp 4 x 0.5 ... 2.5 mm² (AWG 20 ... 12)²⁾, solid and stranded
Protection class	– mated IP 67 / 65 (IEC DIN EN 60 529) – unmated IP 20 (IEC DIN EN 60 529)
Vibration and shock resistance	acc. to EN 50 155
Ambient temperature	– 40 ... + 70 °C
Mating security	Polarisation with polarisation nose, no mating of different connector variants possible
Coding	4 different possibilities, without losing contacts
Mating cycles	min. 750
Strain relief	min. 100 N
Housing material	Polycarbonate, UL 94 V-0, UV resistant acc. to UL 746c
Approvals	VDE

Available
Q4/2005

IP 67 Push Pull Power panel feed through for (250 V) power supply



Identification	Part No.	Drawing	Dimensions in mm
<p>Panel feed through set incl. 3 turned female contacts, insulator body (black), receptacle housing</p> <p>for crimp termination</p>	09 46 245 4410		
<p>Set of coding pins To avoid accidental incorrect mating a coding system is required. The coding pins are inserted without loss of contacts.</p>	09 46 840 0000		
<p>IP 67 / 65 protective cap with cord</p>	09 45 845 0004		

Technical characteristics

Working voltage	250 V
Working current per contact ¹⁾	16 A @ 55 °C
Rated impulse voltage	4.0 kV (DIN EN 61 984)
Overvoltage category	III (DIN VDE 0110 and IEC 60 664-1)
Pollution degree	3 (DIN VDE 0110 and IEC 60 664-1)
No. of current carrying contacts	2
PE contact	1
Contact resistance	max. 5 mΩ
Protection against contact	acc. to IEC DIN EN 60 529
Wire gauge	4 x 1.5 ... 2.5 mm ² (AWG 16 ... 14) ²⁾ , stranded
Protection class	– mated – unmated
	IP 67 / 65 (IEC DIN EN 60 529) IP 20 (IEC DIN EN 60 529)
Vibration and shock resistance	acc. to EN 50 155
Ambient temperature	– 40 ... + 70 °C
Mating security	Polarisation with polarisation nose, no mating of different connector variants possible
Coding	4 different possibilities, without losing contacts
Mating cycles	min. 750
Strain relief	min. 100 N
Housing material	Polycarbonate, UL 94 V-0, UV resistant acc. to UL 746c
Approvals	VDE

¹⁾ see derating diagram on page 2

²⁾ others on request

Identification	Part No.																																																							
Push Pull Power 8-indent crimping tool	09 46 800 0000	 <p>For wire gauges 0.08 ... 4.0 mm² (AWG 28 ... 12).</p>																																																						
Crimping tool depth adjustment gauge		For the fine adjustment of the crimping depth of the Push Pull Power 8-indent crimping tool.																																																						
Ø 1.02 mm	09 46 800 0002																																																							
Ø 1.15 mm	09 46 800 0003																																																							
Insertion tool	09 46 800 0098	 <p>For an easy insertion and extraction of the male and female crimp contacts into / out of the insulator body.</p>																																																						
Extraction tool	09 46 800 0098																																																							
Buchanan- 4-indent crimping tool	09 99 000 0001	For wire gauges 0.14 ... 4.0 mm ² (AWG 25 ... 12).																																																						
Locator	09 46 800 0010	For the positioning of Push Pull Power male and female contacts inside the Buchanan crimping tool.																																																						
Crimping tool depth adjustment gauge		For the fine adjustment of the crimping depth of the Buchanan crimping tool.																																																						
Ø 1.30 mm	09 99 000 0125																																																							
Insertion tool	09 99 000 0059	For an easy insertion of the male and female contacts into the moulding.																																																						
Crimp connection		Tensile strength of crimped connections																																																						
<p>A perfect crimp connection is gastight, therefore corrosion free and amounts to a cold weld of the parts being connected. For this reason, major features in achieving high quality crimp connections are the design of the contact crimping parts and of course the crimping tool itself. Wires to be connected must be carefully matched with the correct size of crimp contacts. If these basic requirements are met, users will be assured of highly reliable connections with low contact resistance and high resistance to corrosive attack.</p> <p>The economic and technical advantages are:</p> <ul style="list-style-type: none"> ● Constant contact resistance as a result of precisely repeated crimp connection quality ● Corrosion free connections as a result of cold weld action ● Pre-preparation of cable forms with crimp contacts fitted ● Optimum cost cable connection <p>Requirements for crimp connectors are laid down in DIN IEC 60 352-2, Amend. 2, as illustrated in the table.</p> <p>Pull out force of stranded wire</p> <p>The main criterion by which to judge the quality of a crimp connection is the retention force achieved by the wire conductor in the terminal section of the contact. DIN IEC 60 352, part 2, defines the extraction force in relation to the cross-section of the conductor. When fitted using HARTING crimping tools and subject to their utilization in an approved manner, our crimp connectors comply with the required extraction forces.</p>		<table border="1"> <thead> <tr> <th colspan="2">Conductor cross-section</th> <th>Tensile strength</th> </tr> <tr> <th>mm²</th> <th>AWG</th> <th>N</th> </tr> </thead> <tbody> <tr><td>0.08</td><td>28</td><td>11</td></tr> <tr><td>0.12</td><td>26</td><td>15</td></tr> <tr><td>0.14</td><td></td><td>18</td></tr> <tr><td>0.22</td><td>24</td><td>28</td></tr> <tr><td>0.25</td><td></td><td>32</td></tr> <tr><td>0.32</td><td>22</td><td>40</td></tr> <tr><td>0.5</td><td>20</td><td>60</td></tr> <tr><td>0.75</td><td></td><td>85</td></tr> <tr><td>0.82</td><td>18</td><td>90</td></tr> <tr><td>1.0</td><td></td><td>108</td></tr> <tr><td>1.3</td><td>16</td><td>135</td></tr> <tr><td>1.5</td><td></td><td>150</td></tr> <tr><td>2.1</td><td>14</td><td>200</td></tr> <tr><td>2.5</td><td></td><td>230</td></tr> <tr><td>3.3</td><td>12</td><td>275</td></tr> <tr><td>4.0</td><td></td><td>310</td></tr> </tbody> </table> <p>Extract from DIN IEC 60 352-2, Amend. 2, Table IV</p>	Conductor cross-section		Tensile strength	mm ²	AWG	N	0.08	28	11	0.12	26	15	0.14		18	0.22	24	28	0.25		32	0.32	22	40	0.5	20	60	0.75		85	0.82	18	90	1.0		108	1.3	16	135	1.5		150	2.1	14	200	2.5		230	3.3	12	275	4.0		310
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Production plants – worldwide



Representatives – worldwide



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Espelkamp / Germany – Plant 2



Espelkamp / Germany – Plant 3



Espelkamp / Germany – Plant 4



Espelkamp / Germany – Plant 5

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