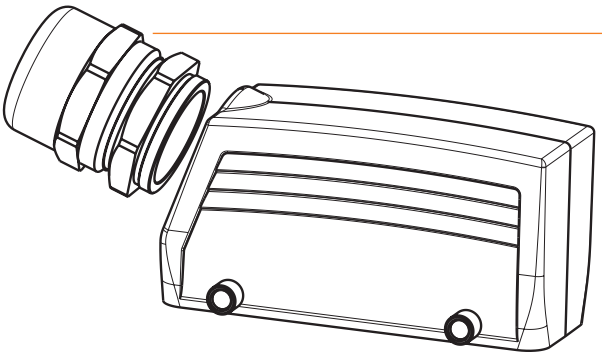
Overview HDC

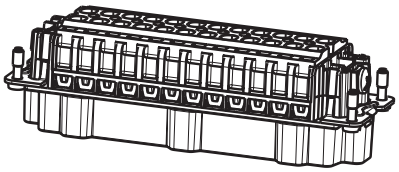
Overview HDC

Construction of heavy-duty connectors – fixed pole

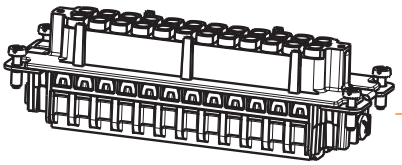


Cable gland

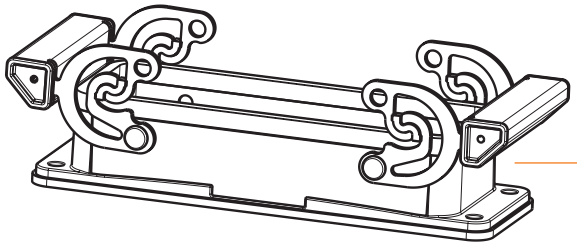
Hood



Male insert

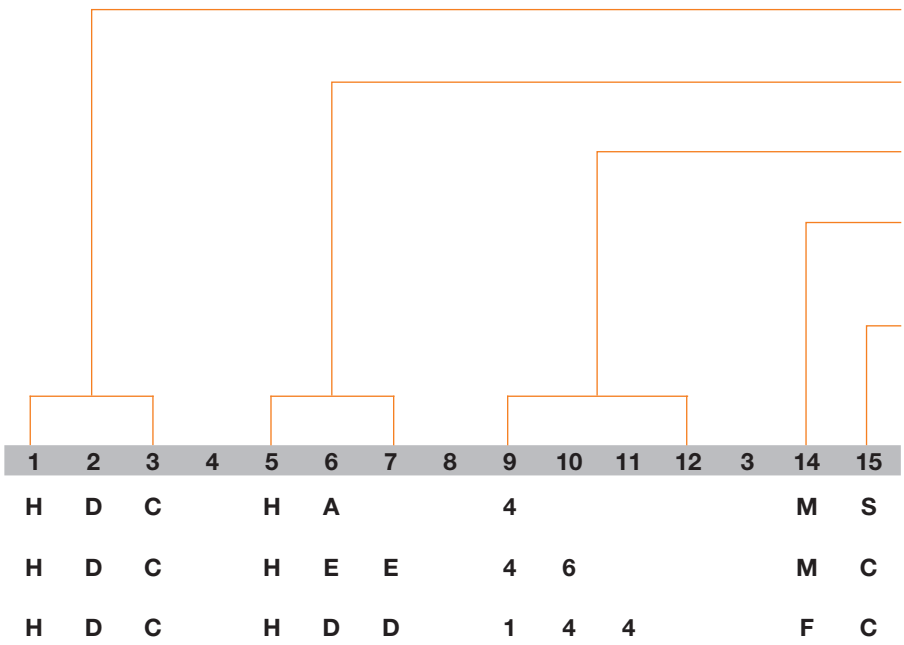


Female insert



Bulkhead housing

Part codes for inserts



HDC = Name of product line

Type

No. of poles

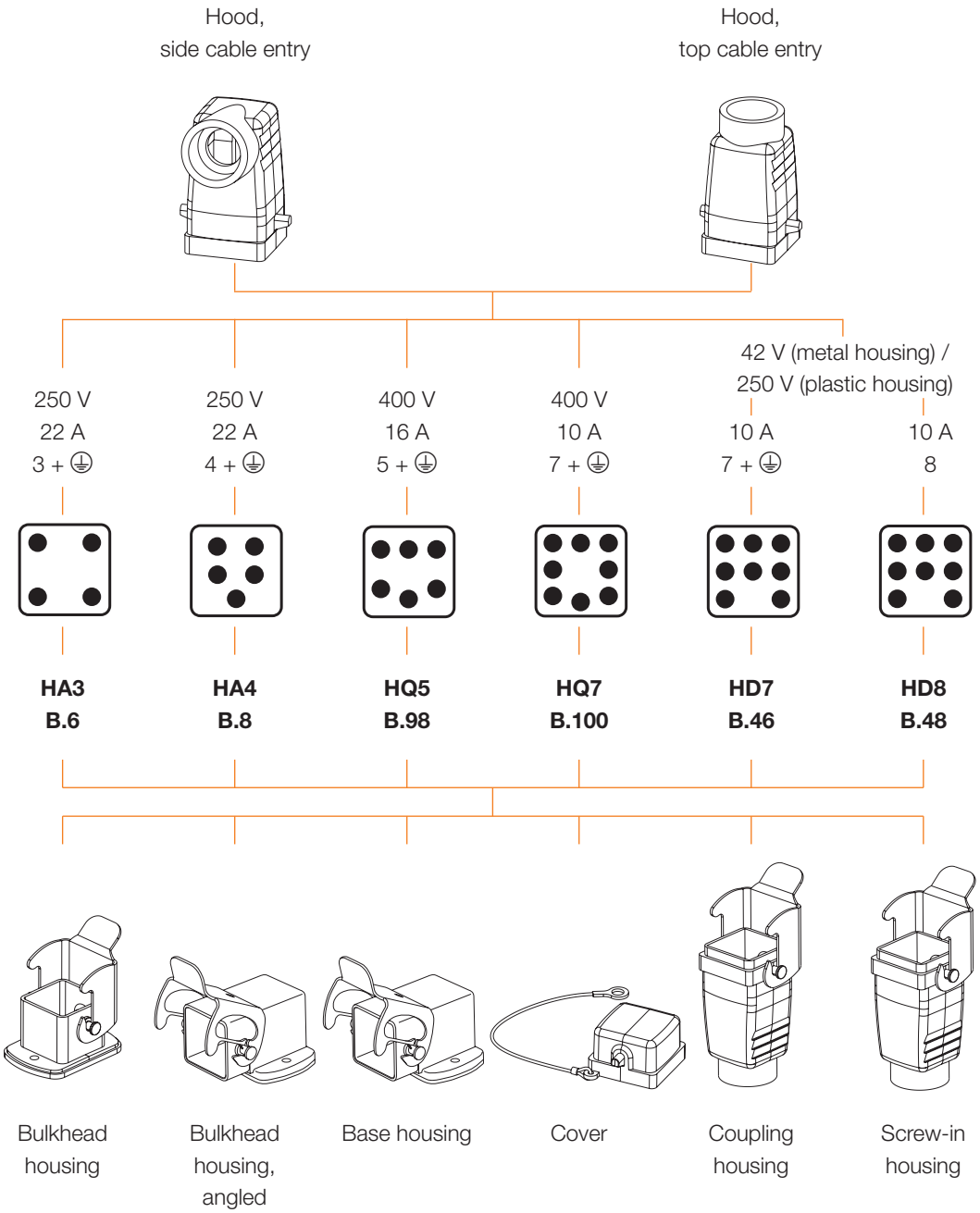
F = Female
M = Male

S = Screw connection
T = Tension clamp connection
P = Push In connection
C = Crimp connection

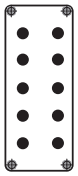
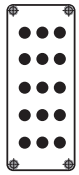
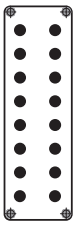
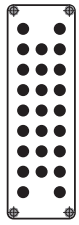
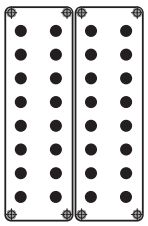
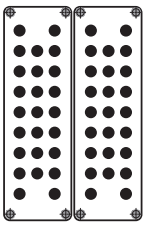
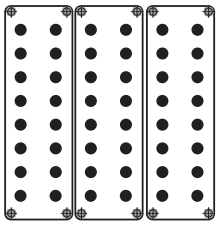
Overview of size 1 – fixed pole

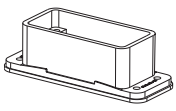
Size

1

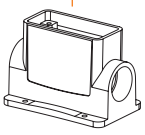


Overview of sizes 2, 5, 7, 9 – fixed pole

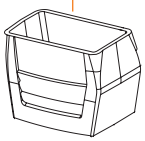
Size	Hood, side cable entry	Hood, top cable entry
2	 250 V 22 A 10 + ⏚ **HA10 B.10**	 250 V 10 A 15 + ⏚ **HD15 B.50**
5	 250 V 22 A 16 + ⏚ **HA16 B.12**	 250 V 10 A 25 + ⏚ **HD25 B.56**
7	 250 V 16 A 32 + ⏚ **HA32 B.14**	 250 V 10 A 50 + ⏚ **HD50 B.60**
9	 250 V 16 A 48 + ⏚ **HA48 B.16**	



Bulkhead housing

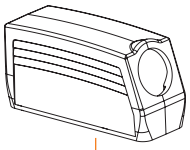
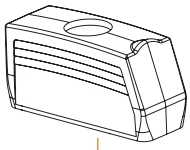


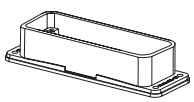
Base housing



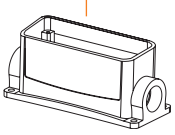
Coupling housing

Overview of sizes 3, 4, 6, 8, 10, 12 – fixed pole

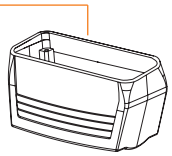
Size	Hood, side cable entry	Hood, top cable entry			
					
3	500 V 24 A 6 + ⏚ **HE6** **B.20**	500 V 16 A 10 + ⏚ **HEE10** **B.34**	250 V 10 A 16 + ⏚ **HD16** **B.52**	250 V 10 A 24 + ⏚ **HDD24** **B.70**	
4	500 V 16 A 10 + ⏚ **HE10** **B.22**	500 V 16 A 18 + ⏚ **HEE18** **B.36**	250 V 10 A 24 + ⏚ **HD24** **B.54**	250 V 10 A 42 + ⏚ **HDD42** **B.72**	830 V 20 A 3+2+⏚ **HVE3** **B.84**
6	500 V 16 A 16 + ⏚ **HE16** **B.24**	500 V 16 A 32 + ⏚ **HEE32** **B.38**	250 V 10 A 40 + ⏚ **HD40** **B.58**	250 V 10 A 72 + ⏚ **HDD72** **B.74**	830 V 20 A 6+2+⏚ **HVE6** **B.86**
8	500 V 16 A 24 + ⏚ **HE24** **B.26**	500 V 16 A 46 + ⏚ **HEE46** **B.40**	250 V 10 A 64 + ⏚ **HD64** **B.62**	250 V 10 A 108 + ⏚ **HDD108** **B.76**	830 V 20 A 10+2+⏚ **HVE10** **B.88**
10	500 V 16 A 32 + ⏚ **HE32** **B.28**	500 V 16 A 64 + ⏚ **HEE64** **B.42**	250 V 10 A 80 + ⏚ **HD80** **B.64**	250 V 10 A 144 + ⏚ **HDD144** **B.78**	
12	500 V 16 A 48 + ⏚ **HE48** **B.30**		250 V 10 A 128+⏚ **HD128** **B.66**	250 V 10 A 216 + ⏚ **HDD216** **B.80**	



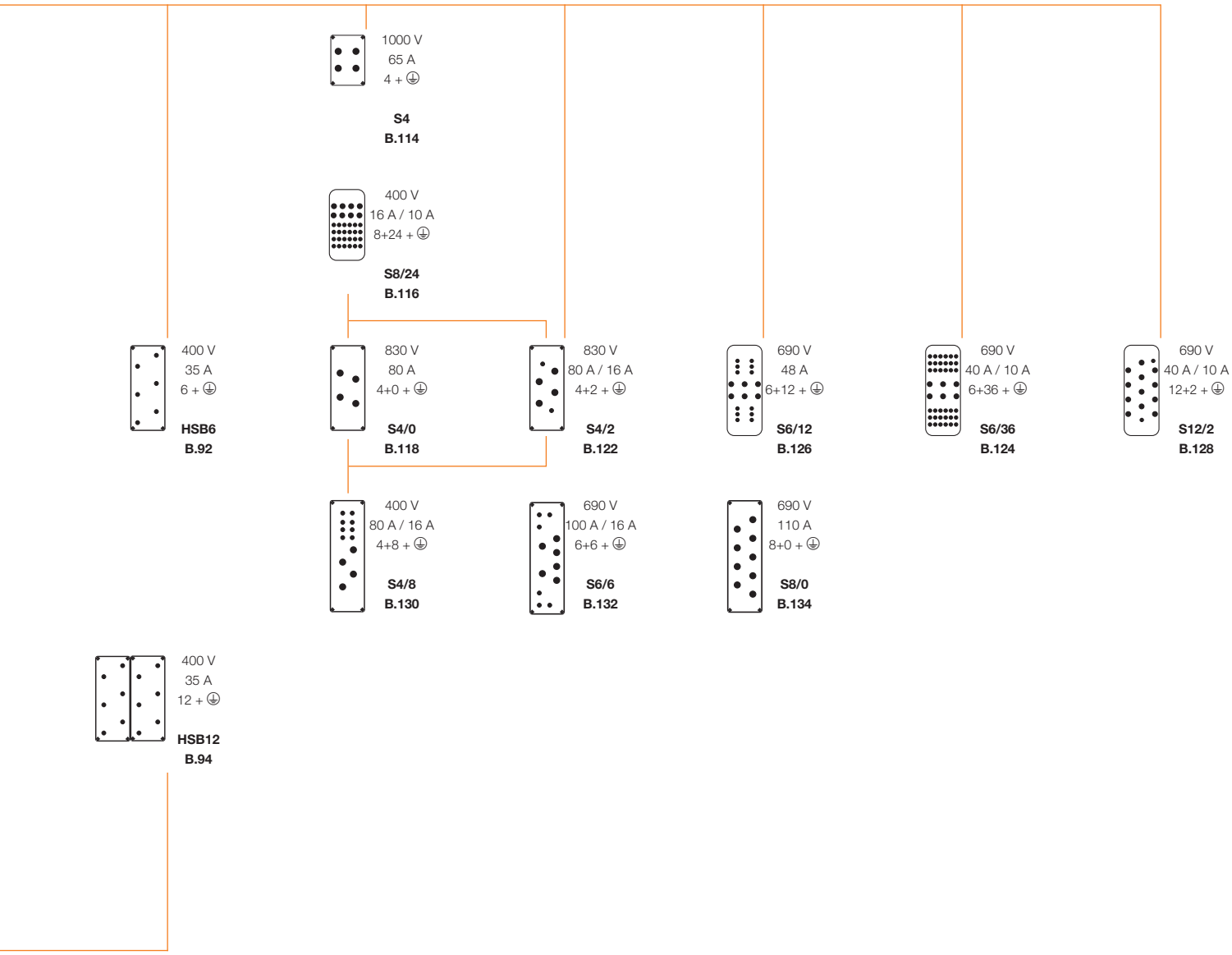
Bulkhead housing



Base housing



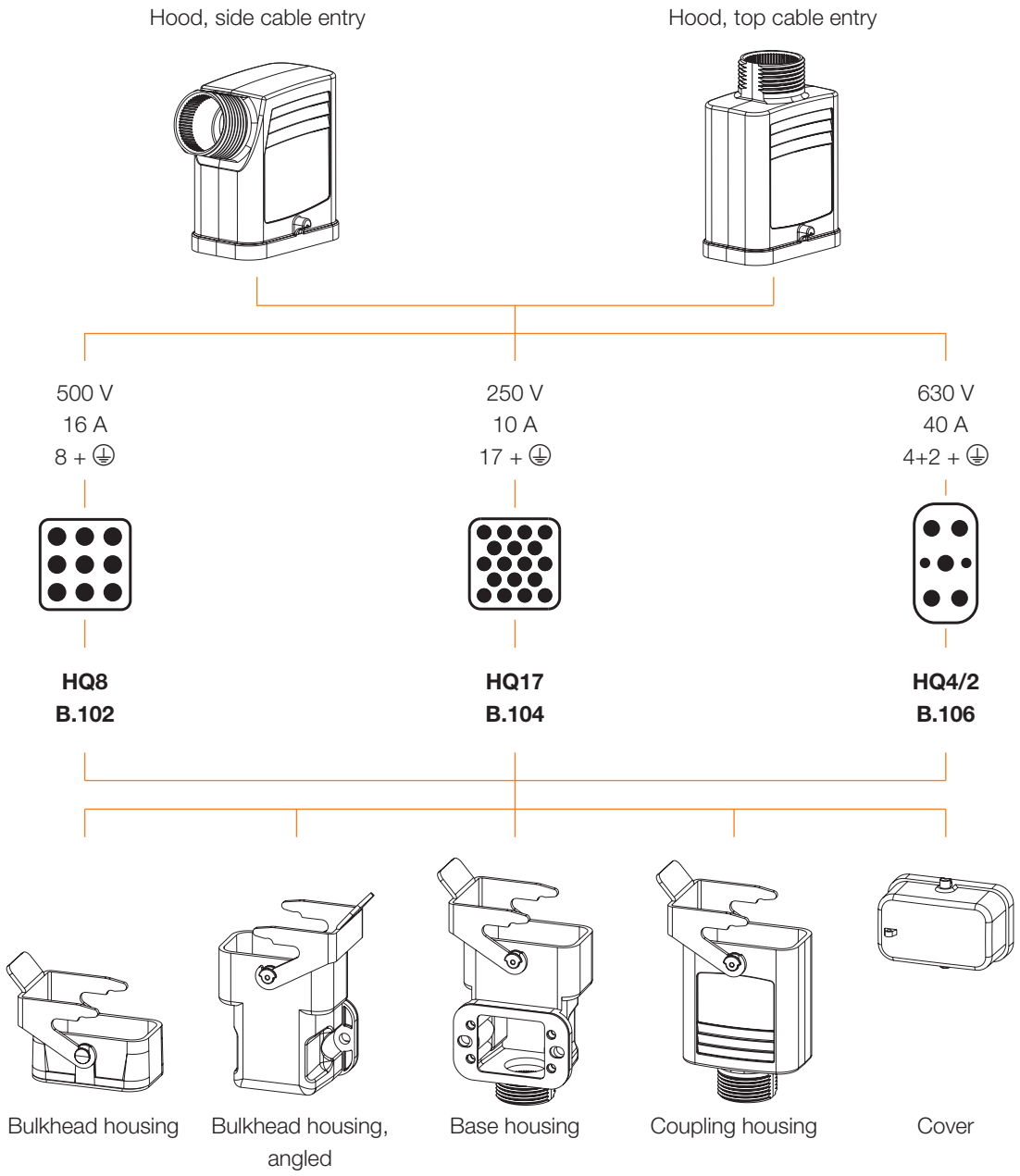
Coupling housing


1000 V
65 A
4 + ⏚
S4
B.114
400 V
16 A / 10 A
8+24 + ⏚
S8/24
B.116
400 V
35 A
6 + ⏚
HSB6
B.92
830 V
80 A
4+0 + ⏚
S4/0
B.118
830 V
80 A / 16 A
4+2 + ⏚
S4/2
B.122
690 V
48 A
6+12 + ⏚
S6/12
B.126
690 V
40 A / 10 A
6+36 + ⏚
S6/36
B.124
690 V
40 A / 10 A
12+2 + ⏚
S12/2
B.128
400 V
80 A / 16 A
4+8 + ⏚
S4/8
B.130
690 V
100 A / 16 A
6+6 + ⏚
S6/6
B.132
690 V
110 A
8+0 + ⏚
S8/0
B.134
400 V
35 A
12 + ⏚
HSB12
B.94

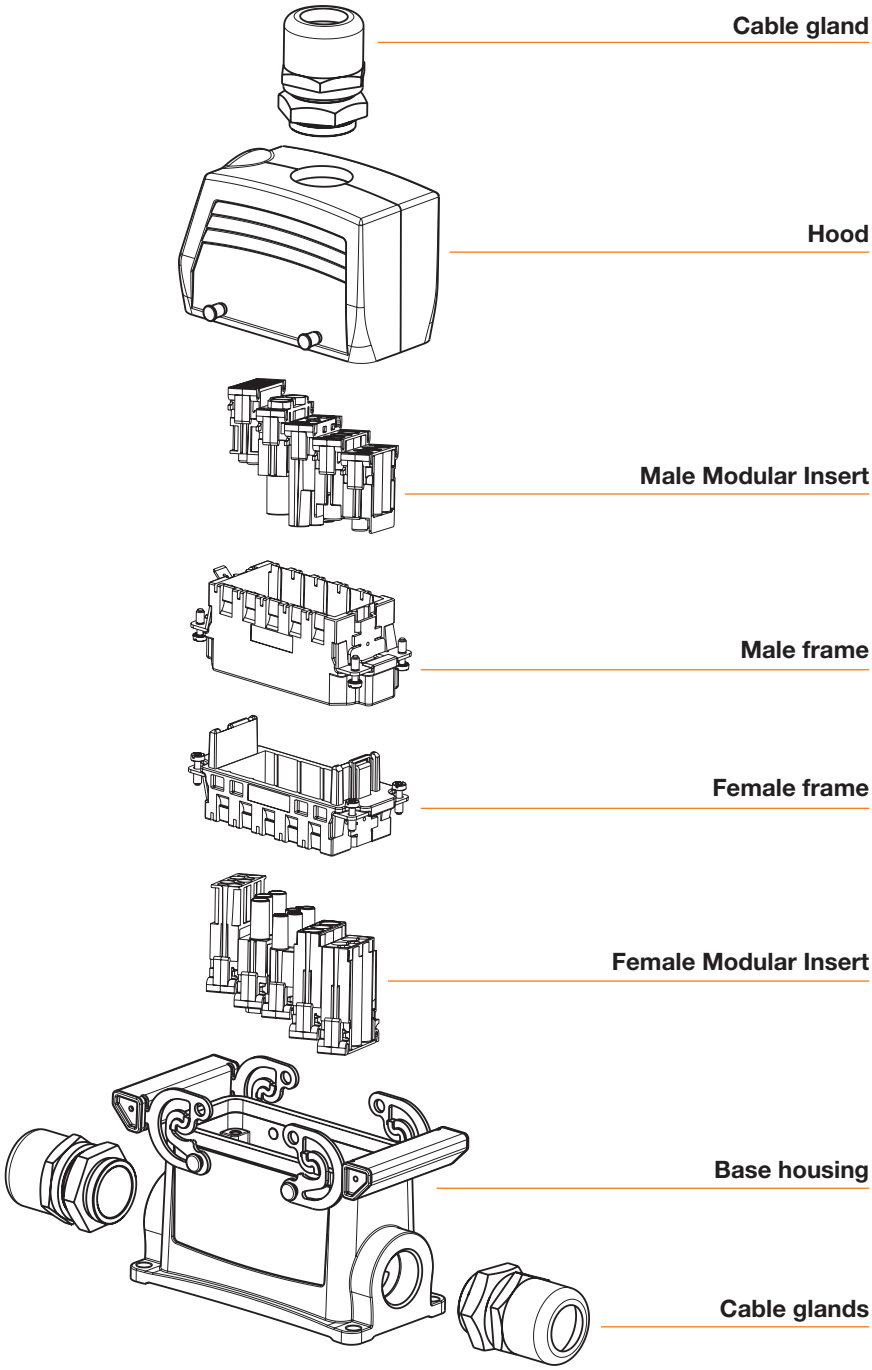
Overview of size HQ – fixed-pole

Size

HQ

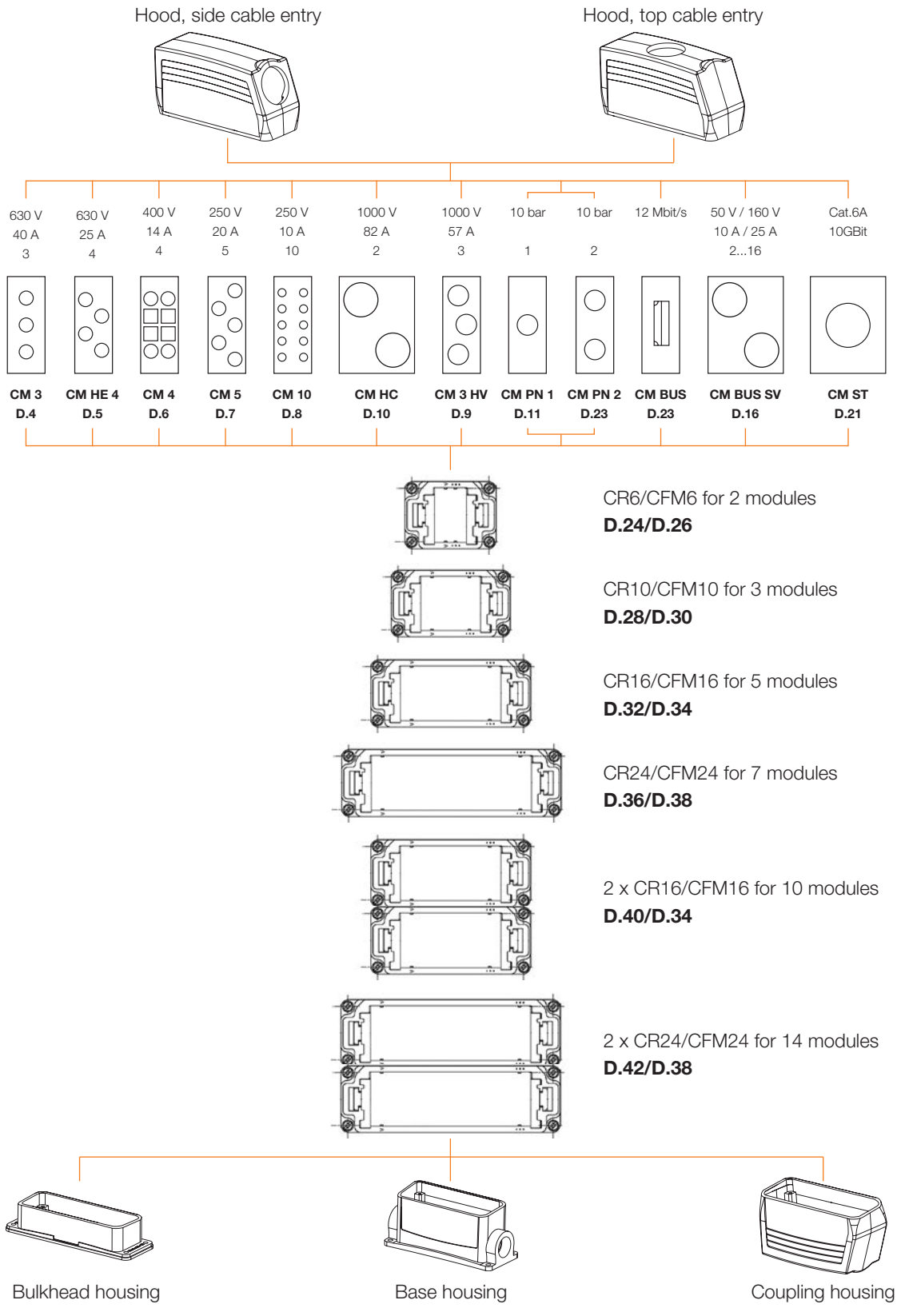


Construction of heavy-duty connectors – modular



Overview of sizes 3, 4, 6, 8, 10, 12 – modular

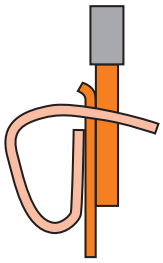
Size



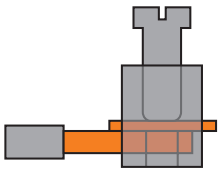
Connection systems

Weidmüller offers RockStar® connectors with five different connection systems:

Tension clamp, screw, crimp, axial screw and PUSH IN wire connections

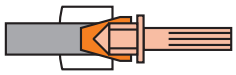


Tension clamp connection
The **Weidmüller tension clamp system** functions similarly to the tried-and-tested clamping yoke. Here again, the mechanical and electrical functions are kept separate. The tension spring, made from high-quality rustproof and acid-proof steel, pulls the conductor against the tin-plated copper current bar. Treating the copper in this way ensures low contact resistance and high corrosion resistance. The compensating effect of the tension spring ensures a secure contact for the lifetime of the terminal. The tension-clamp wire connections are resistant to vibrations and have a high wire pull-out force.



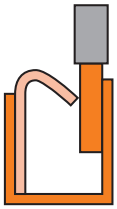
Screw connection
Screw connection systems are easy to handle and are known worldwide; this is an important point to consider for mounting and maintenance tasks which are spread throughout the world. Screw connections which are based on a clamping-type body offer a gas-tight, vibration-proof connection for connected wires. They also feature excellent contact force. This system is therefore perfectly suited for use in corrosive environments. The passivated silver surfaces ensure even more resistance against corrosion. The Weidmüller clamping-style body is perfectly suited for connecting solid-core and flexible stranded conductors. A wire-protection frame ensures that finely-stranded wires will not splice off.

In the **crimping** method, the wires are fed into a metal sleeve, which is then squeezed together with a special tool. This means the connection is now corrosion and vibration proof. The contacts can be crimped on the conductor outside of the connector and then inserted into the connector.



The advantage of the **axial screw connection** is the small space taken up by the contact. The axial screw connection is also extremely easy to use. To make up the connection, the tool and conductor are held in a line. Just three steps are needed for a secure connection: strip the conductor, insert the wire into the contact chamber, screw in the contact – that's all!

PUSH IN



PUSH IN connection technology
With the **PUSH IN connection system,** the stripped solid-core conductor is simply inserted into the terminal point until it butts against the end stop. And then it is ready. No tool is required and the result is a reliable, vibration-resistant and gas-tight connection. Even flexible conductors with crimped wire end ferrules or ultrasonic-welded conductors can be connected without any problems. A stainless steel compression spring, which is fitted in a separate housing, guarantees a high contact force between the conductor and the current bar (tin-plated copper). The pull-out force for this system is even higher than that for the tension clamp system. Spring and conductor stops in a steel housing ensure optimum connection conditions and a guide for the screwdriver needed to detach the conductor.

An overview of the wire connection types for our fixed-pole connector inserts

Products	Tension clamp connection 	PUSH IN connection 	Axial screw connection 	Screw connection 	Screw connection with wire protection mechanism 	Crimp connection 
HDC HA (3-4 pole)				✓		
HDC HA (10-48 pole)	✓				✓	✓
HDC HE	✓	✓			✓	✓
HDC HEE						✓
HDC HD						✓
HDC HDD						✓
HDC HVE	✓				✓	
HDC HSB					✓	
HDC HQ						✓
HDC S4			✓			
HDC S4/0			✓	✓		
HDC S4/2				✓		
HDC S6/12			✓			
HDC S4/8				✓		
HDC S3/36						✓
HDC S8/24						✓
HDC S12/2						✓
HDC S6/6			✓			
HDC S8/0			✓			
HDC HighPower 250 A						✓
HDC HighPower 550 A						✓

Crimp contacts

Crimp contacts

Whereas the contacts for screw, axial screw, tension clamp and PUSH IN connections are already built in, you can choose the appropriate contact for a crimp connection.

The heart of a connector is its contacts. They make up the actual connection between two conductors. Two types of contacts make this possible: pins and sockets (male and female). The pin conducts the electrical current on its outer surface and is introduced into the socket, which conducts the electrical current on its inner surface. Heavy-duty connectors have copper alloy contacts and the contact surfaces are plated with gold or silver: silver improves conductivity, gold is corrosion-proof.

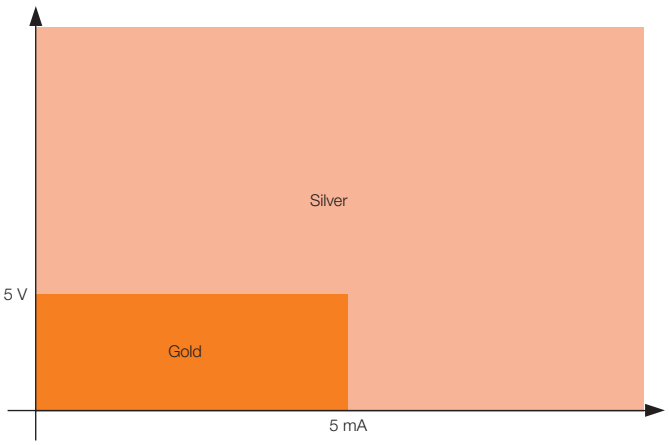
Crimp contacts are available in turned, solid form.

Selection of silver or gold-plated contacts

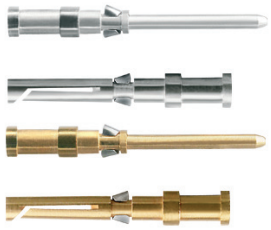
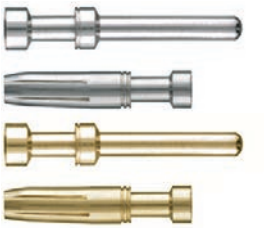
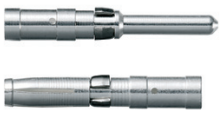
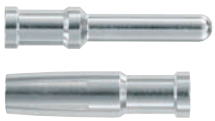
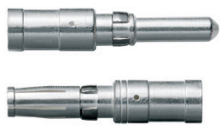
When using plug-in connectors under standard conditions, the resistance between the contacts has little effect. Even heavily corroded silver-coated contact pins and sockets do not exhibit any contact problems.

The situation is different where there are very small currents in extreme applications such as those in electroplating shops, tunnels or in cellulose processing. The silver oxide layer on the surface of the contacts forms an electrical resistance with capacitive, inductive and ohmic components. As a result, the original signal is distorted so much that the recipient is unable to detect it properly and interprets it incorrectly. This results in faults and, indirectly, to damage to machines and processes. Gold-plated contacts should be used in such cases.

The rule of thumb is: use gold-coated contacts for currents < 5 mA and voltages of up to 5 V.



Overview of crimp contacts

	Article	Properties		Usage
	HD-, HDD contacts	Rated current: Cross-section: Surface finish:	10 A 0.14-2.50 mm² AWG: 26…14 gold-plated silver-plated	HD Series HDD Series CM 10 CM BUS SV
	HE-, HEE contacts	Rated current: Cross-section: Surface finish:	16 A 0.5-4.00 mm² AWG: 20…12 gold-plated silver-plated	HA Series HE Series HEE Series HQ - Series MixMate Series CM HE 4 CM BUS SV
	CM-5 contacts	Rated current: Cross-section: Surface finish:	20 A 0.75-4.00 mm² AWG: 20…12 silver-plated	CM 5
	HX contacts	Rated current: Cross-section: Surface finish:	40 A 1.5-6.00 mm² AWG: 16…10 silver-plated	HQ Series MixMate Series
	CM-3 contacts	Rated current: Cross-section: Surface finish:	57 A 1.5-10.00 mm² AWG: 16…7 silver-plated	CM 3 CM 3 HV
	HP contacts	Rated current: Cross-section: Surface finish:	250 A / 550 A 25-240 mm² silver-plated	HighPower Series

Using wire-end ferrules

Type of connection	Series	HA	HE	HVE	HSB
Screw	Clamping range [mm²]	0.5 – 2.5	0.5 – 2.5	0.5 – 2.5	–
	Clamping range [AWG]	20 – 12	20 – 14 (12) [1]	20 – 14 (12) [1]	–
	Ferrules with collars	H0.5/14 – H2.5/14 H0.5/16 – H2.5/16	H0.5/14 – H2.5/14 [2] H0.5/16 – H2.5/16 [2]	H0.5/14 – H2.5/14 [2] H0.5/16 – H2.5/16 [2]	–
	Ferrules without collars	H0.5/10 – H2.5/10	H0.5/10 – H2.5/10	H0.5/10 – H2.5/10	–
	Twin wire-end ferrules with collars	H0.5/16.5 (ZH) H0.5/18.5 (ZH) H0.75/17 (ZH) H1.0/20 (ZH) H1.5/20 (ZH)	H0.5/18.5 (ZH) H1.0/20 (ZH) [3] H1.5/20 (ZH) [3]	–	H0.5/15 (ZH) H0.5/16.5 (ZH) H0.5/18.5 (ZH) H0.75/15 (ZH) H0.75/17 (ZH) H1.0/15 (ZH) H1.0/20 (ZH) H1.5/16 (ZH) H1.5/20 (ZH) H2.5/18.5 (ZH)
	Crimp tool	PZ4 [2], PZ6, PZ6/5	PZ4 [2], PZ6, PZ6/5 PZ6 Hex [2]	PZ4 [2], PZ6, PZ6/5 PZ6 Hex [2]	–
	Screwdriver	SDK PH0 SD 0.5x 3.0	SDK PH0 SD 0.5x 3.0	SDK PH0 SD 0.5x 3.0	–
	Tightening torque	0.5 Nm	0.5 Nm	0.5 Nm	–
Tension clamp	Clamping range [mm²]	0.25 – 1.5 2.5 solid core	0.25 – 2.5	0.25 – 2.5	–
	Clamping range [AWG]	24 – 14 [4]	24 – 14	24 – 14	–
	Ferrules with collars	H0.5/14 – H1.5/14 [4] H0.5/16 – H1.5/16 [4]	H0.5/14 – H2.5/14 [2]	H0.5/14 – H2.5/14 [2]	–
	Ferrules without collars	H0.5/10 – H1.5/10 [4]	–	–	–
	Twin wire-end ferrules with collars	–	H0.5/15 (ZH) [5] or [6] H0.75/15 (ZH) [5] or [6] H1.0/15 (ZH) [5] or [6] H1.5/16 (ZH) [5] or [6]	–	–
	Crimp tool	PZ4, PZ6, PZ6/5	PZ4 [7], PZ6, PZ6/5	PZ4 [7], PZ6, PZ6/5	–
	Screwdriver	SD 0.5x 3.0	SD 0.6x 3.5	SD 0.6x 3.5	–
PUSH IN	Clamping range [mm²]	–	solid 0.5 – 4 mm² flexible with ferrule 0.5 – 2.5 mm²	–	–
	Clamping range [mm²]	–	20 – 12	–	–
	Ferrules with collars	– – –	H0.5/14 – H1.5/14 H0.5/16 – H1.5/16 H0.75/18 – H2.5/18 [2]	– – –	– – –
	Ferrules without collars	– –	H0.5/10 – H2.5/10 [2] H1.5/12 – H2.5/12 [2]	– –	– –
	Twin wire-end ferrules with collars	–	H0.5/18.4 ZH 500 V / 6 kV / 3 H1/20 ZH 400 V / 6 kV / 3 500 V / 6 kV / 3 only with protection degree of at least IP54 H1.5/20 ZH 400 V / 6 kV / 3 500 V / 6 kV / 3 only with protection degree of at least IP54	–	–
	Ferrules crimped with	–	PZ4. PZ6. PZ6/5. PZ6 Hex	–	–
PE contact	Clamping range [mm²]	0.5 – 4.0 0.5 – 2.5 flexible	0.5 – 4	0.5 – 4	–
	Clamping range [AWG]	20 – 12	20 – 12	20 – 12	–
	Ferrules with collars	H0.5/16 – H2.5/16	H0.5/16 – H4/16	H0.5/16 – H4/16	–
	Ferrules without collars	H0.5/10 – H2.5/10	H0.5/10 – H4/10	H0.5/10 – H4/10	–
	Ferrules crimped with	PZ4 [2], PZ6, PZ6/5	PZ4, PZ6, PZ6/5, PZ6 Hex	PZ4, PZ6, PZ6/5, PZ6 Hex	–
	Screwdriver	PH 1	PH 1	PH 1	–
	Tightening torque	1.2 Nm	1.2 Nm	1.2 Nm	–

[1] Depending on the diameter of the insulation, the max. AWG wire may need to be pushed in with some force.
[2] The 2.5mm² wire must be inserted with some force.
[3] When the rated voltage is reduced to 400 V / 6 kV / 3 or with a protection degree of at least IP54.
[4] Only by tilting the screwdriver can the clamping point be opened all the way.
[5] Wire-end ferrules may be used when the rated voltage is reduced to 400 V / 6 kV / 3.
[6] When the protection degree is at least IP54, the creepage and clearance distances within the encapsulation may be rated for a lower pollution degree. (DIN EN 61984) For this encapsulation, the use of wire-end ferrules is possible with 500 V / 6 kV / 3.
[7] The PZ4 crimping tool should not be used with the max. wire size.

The connector inserts can be combined with wire-end ferrules in other ways depending on the available clamping range and the type of cable being used. We would be happy to take a look at the technical feasibility of your specific application.

Tightening torques and screwing tools

Screw size	Connector type	Dia. tightening torque in Nm	Recommended blade inserts and AF size for hexagon socket
M 2.5	**Signal contacts**		
	S 6/6	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	S 6/12	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
M 2.9 x 0.5	**Fastening screws**		
	HQ 4/2	0.8 (plastic) / 1.1 (metal)	SD 0.6 x 3.5 mm or PH0
	HQ 8	0.8 (plastic) / 1.1 (metal)	SD 0.6 x 3.5 mm or PH0
	HQ 17	0.8 (plastic) / 1.1 (metal)	SD 0.6 x 3.5 mm or PH0
M 3	**Contact screws**		
	HA 3	0.5 - 0.55	SD 0.5 x 3.0 mm
	HA 4	0.5 - 0.55	SD 0.5 x 3.0 mm
	HA 10 bis HA 48	0.5 - 0.55	SD 0.6 x 3.5 mm or PH0
	HE	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	HVE	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	Signal contacts:		
	S 4/2	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	S 4/8	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	PE connection via female contact		
	S 4	0.5 - 0.8	SD 0.6 x 3.5 mm
	ConCept modular frame, metal	0.5 - 0.55	SD 0.6 x 3.5 mm
	PE terminal		
	HQ 5	0.5 - 0.55	SD 0.6 x 3.5 or 0.8 x 4 mm
	HQ 7	0.5 - 0.55	SD 0.6 x 3.5 or 0.8 x 4 mm
	Fastening screws	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	Guide pin	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	Guide bush	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
	Coding pins	0.5 - 0.55	SD 0.6 x 3.5 mm or PZ0
M 4	**Contact screws**		
	HSB	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PZ1
	PE connection via male contact		
	S 4	0.5 - 0.8	SD 0.6 x 3.5 mm
	ConCept modular frame, metal	1.2 - 1.5	SD 0.6 x 3.5 mm
	PE terminal		
	HA	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PH1
	HE	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PH1
	HEE	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PH1
	HVE	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PH1
	HD	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PZ1
	HDD	1.2 - 1.5	SD 0.6 x 3.5 or 0.8 x 4 mm or PZ1
	S 6/6 (for signal contacts)	1.2 - 1.5	0.8 x 4 mm or PZ1
	ConCept modular frame, plastic	1.2 - 1.5	0.8 x 4 mm or PZ1
M 5	**PE terminal**		
	HSB	2 - 2.5	SD 1 x 5.5 mm or PZ2
	S 4/0 (Screw connection)	2 - 2.5	SD 1.2 x 6.5 mm or PH2
	S 4/0 (Axial screw connection)	2 - 2.5	SD 0.8 x 4 mm or PZ 2
	S 4/2	2 - 2.5	SD 1.2 x 6.5 mm or PH2
	S 4/8	2 - 2.5	SD 1.2 x 6.5 mm or PH2
	S 6/12	2 - 2.5	SD 0.8 x 4 mm or PZ 2
	S 6/36	2 - 2.5	SD 1.2 x 6.5 mm or PH2
	S 8/24	2 - 2.5	SD 1.2 x 6.5 mm or PH2
	S 12/2	2 - 2.5	SD 1.2 x 6.5 mm or PH2
M 6	**Power contacts**		
	S 4/0 (Screw connection)	1.2 (1.5 mm^2) / 2 (2.5 mm^2) / 3 (4-16 mm^2)	SD 0.8 x 4 mm
	S 4/2	1.2 (1.5 mm^2) / 2 (2.5 mm^2) / 3 (4-16 mm^2)	SD 0.8 x 4 mm
	S 4/8	1.2 (1.5 mm^2) / 2 (2.5 mm^2) / 3 (4-16 mm^2)	SD 0.8 x 4 mm
M 7 x 0.75	**Power contacts**		
	S 4	1.1 – 1.7	SW 2
	S 6/6 (+ PE)	6 – 8	SW 4
M 8 x 0.75	**Power contacts**		
	S 6/12	1.1 – 1.7	SW 2
	S 8/0 (+ PE)	6 (10-16 mm^2) - 7 (25 mm^2)	SW 4
M10 x 1	**Power contacts**		
	S 4/0 (Axial connection)	2 – 3	SW 3

Increasing the tightening torque does not improve the contact resistance. The stated torque settings offer optimal mechanical, thermal and electrical conditions. Exceeding the recommended values may even damage the conductor and terminal.

RockStar® Housing types

Housing IP66 / NEMA Type 4X

The housing and the interlock mechanism on a connector protect the contacts from exterior mechanical influences (ie. shock, contamination, dust, accidental touching, moisture penetration, water and liquids such as cleaning solvents, coolants and oils). The durable RockStar® housings are produced with the highest quality standards; they provide IP66 protection and are resistant to corrosion and impacts. All housings come standard with a stainless steel interlock. A special die-cast alloy and the multi-level surface finish combine to deliver the ultimate protection against extreme conditions and ensure that the housings keep their visual appeal.

Applications:
- General mechanical engineering
- Materials handling and factory construction
- Packaging machines
- Transport and traffic engineering
- Energy technology
- Lighting and stage equipment
- Fairground rides
- Process engineering

Features:
- Tightness at least IP66 to IEC 60529
- Tightness NEMA Type 4X
- Scratch-resistant, corrosion-proof, long-lasting

Design:
- Cast aluminium alloy
- Multistage surface coating
- Colour: grey, similar to RAL 9006
- 2 versions, standard and high
- 11 sizes

Interlock system
- Clamp lock in different versions of rustproof stainless steel

HQ Series Housings, IP66 / NEMA Type 4X

The HQ connector series has a very compact housing with IP66 protection. It is available in either plastic or metal. The full industrial capability of these products makes them a perfect match for the main usage in materials handling applications. The HQ housing series is particularly important for connecting motor starters and frequency converters. It is also the ideal extension for setting up a decentralised power distribution system based on FieldPower®.

Applications:
- General machine construction
- Materials handling and factory construction
- Decentralised automation

Features:
- Tightness: at least IP66, acc. to IEC 60529
- Tightness: NEMA Type 4X
- Complies with VDE and ISO 23570 (DESINA)
- Scratch-proof, corrosion resistant and durable

Design:
- Plastic housing: polycarbonate, glass-fibre reinforced; Colour: grey, similar to RAL 7032
- Metal housing: die-cast zinc, nickel-plated, multi-level surface coating, EMC properties
- Cable outlet is straight or angled

Interlock system
- Clamp interlock made from rust-free stainless steel

Housing IP68 – the highest degree of sealing

The IP68 housings have been developed for use under extreme environmental conditions. The high degree of protection (IP68 and IP69K) and the excellent resistance to vibration and shock guarantee fail-safe operation when heavy-duty connectors are used in vehicles and under tough climatic conditions. If you want to protect your delicate interfaces from EMC emissions, these connectors are the right choice for you.

Applications:
- Transport and traffic engineering
- Energy technology
- Applications with extreme protection class requirements

Features:
- Tightness IP68 / 5 bar to IEC 60529
- IP69K impermeability according to DIN 40050-9
- Scratch-proof, corrosion resistant, impact resistant and durable

Design:
- Cast aluminium alloy
- Multistage surface coating
- Optimised construction for high impact resistance and EMC
- Colour: black RAL 9005
- 5 sizes; size 8 also in XXL

Interlock system
- Screw cap with internal/external hex drive

Locking systems

One longitudinal locking clamp on housing bottom


- Manual operation – no tools required
- 2 locking points – along the longitudinal axis
- Good for lengthwise alignment
- Interlock system made from rust-free stainless steel

One central locking clamp on housing top


- Manual operation – no tools required
- 2 locking points along the transverse axis
- Easily accessible from above where space is limited
- Made from rust-free stainless steel

Two transverse locking clamps on housing bottom


- Manual operation – no tools required
- 4 locking points – good sealing effect
- Easily accessible when the cable inlet is in the plugging direction
- Good for aligning side by side
- Made from rust-free stainless steel

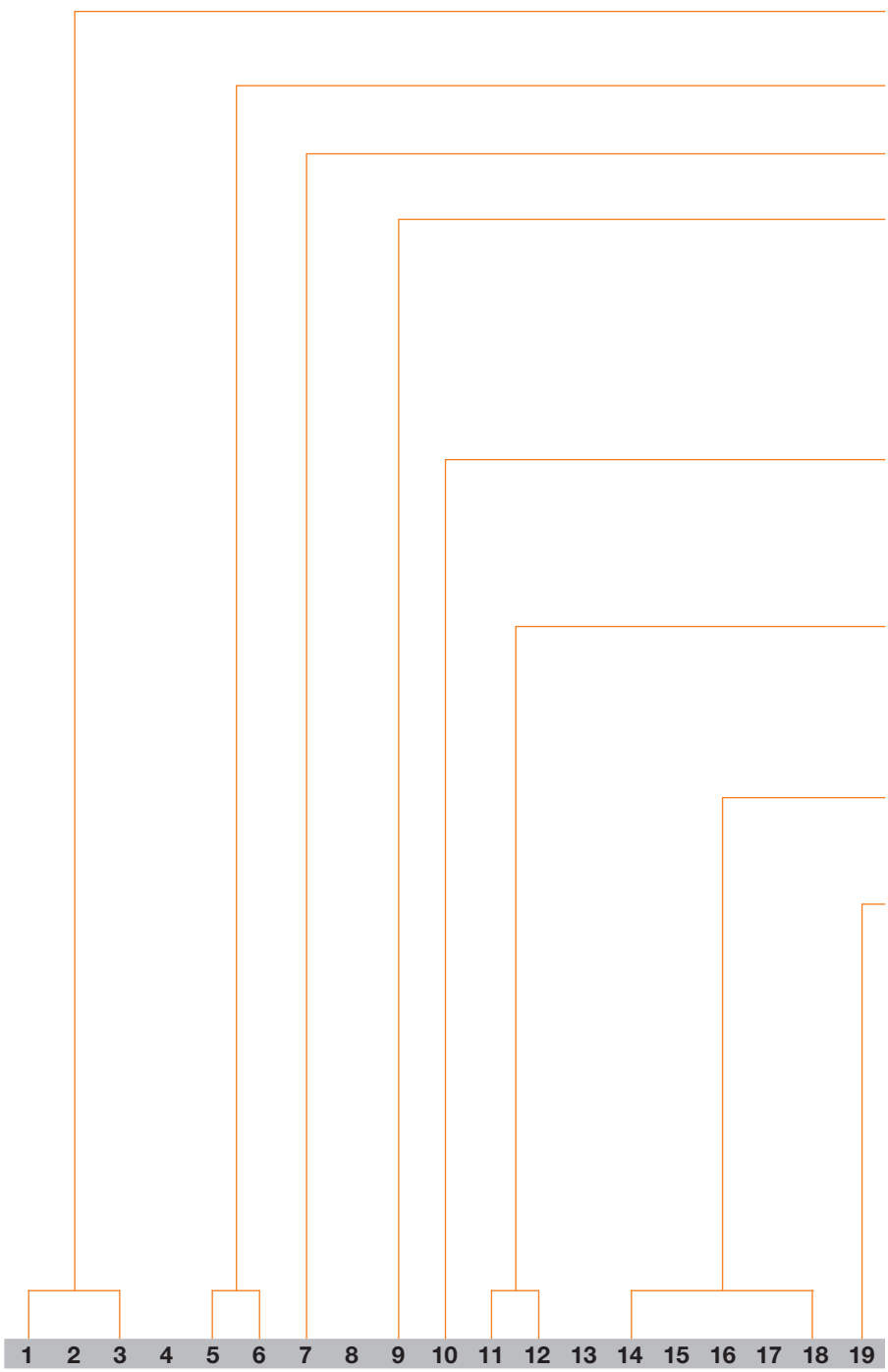
Screw fastening


- Uses internal/external hex drive
- Most effective seal
- The two interlock points are arranged diagonally
- Easily accessible when space is tight
- Screws made from rust-free stainless steel

Two transverse locking clamps on housing top


- Manual operation – no tools required
- 4 locking points – good sealing effect
- Easily accessible when the cable inlet is in the plugging direction
- Good for aligning side by side
- Interlock system made from rust-free stainless steel

Part codes for housings IP66



HDC = Name of product line

Height

Design

A = Bulkhead housing
D = cover
E = screw-in housing
K = coupling housing
S = base housing
T = Hood

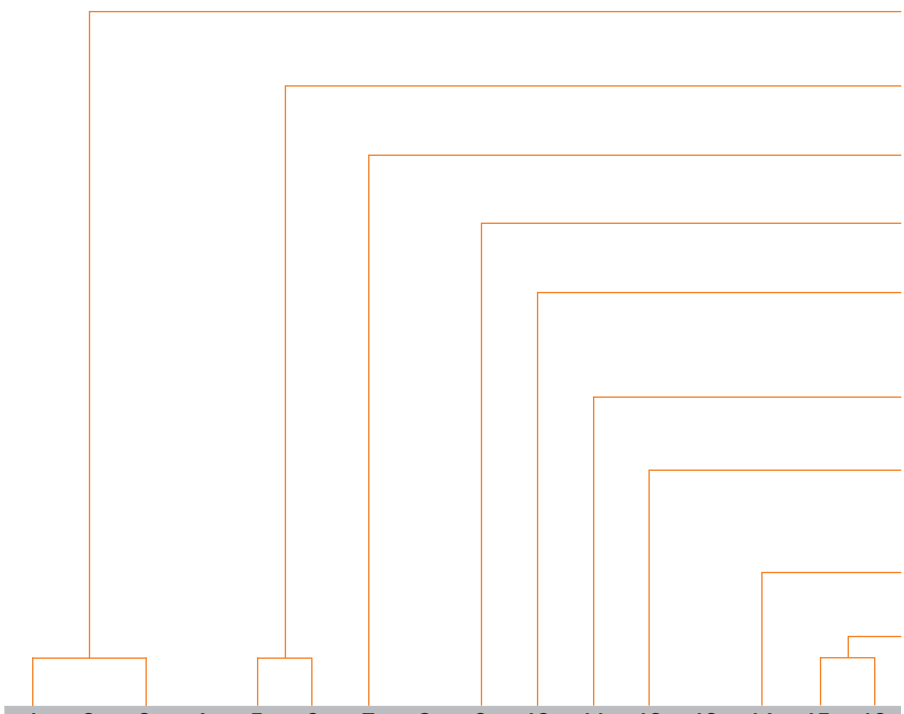
D = with cover
S = side cable entry
O = top cable entry
W = angled

BO = transverse clamp on top
BU = transverse clamp on bottom
LU = longitudinal clamp
ZO = central clamp

Number of cable entries and thread size

G = with thread
S = with sleev

Part codes for covers



HDC = Name of product line

Height

B = Design

D = Cover

M = with Gasket
O = without Gasket

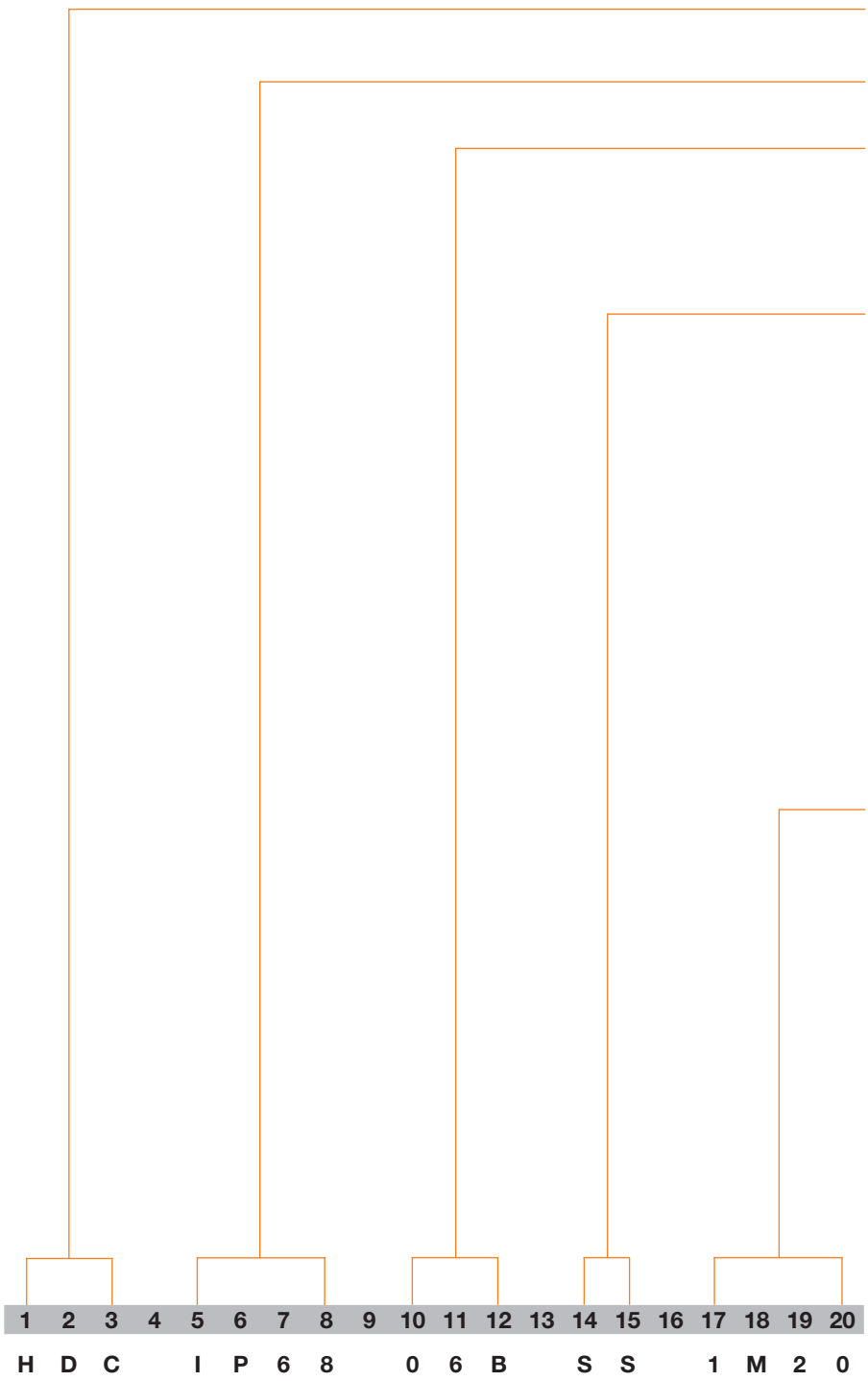
Gasket

L = End locking
Q = Side locking

No.

BO = Bolt
LB = Longitudinal clamp
QB = Transversal clamp

Part codes for housings IP68



HDC = Name of product line

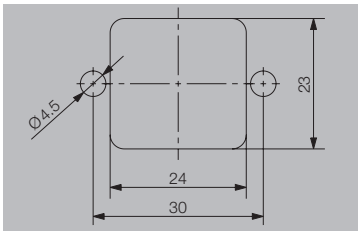
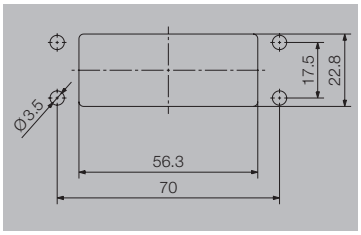
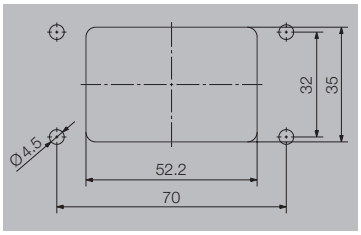
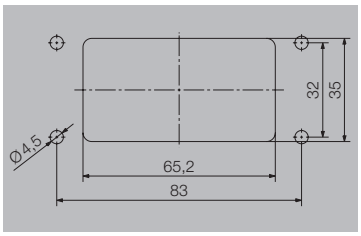
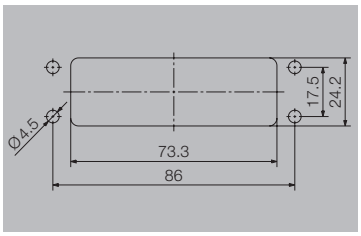
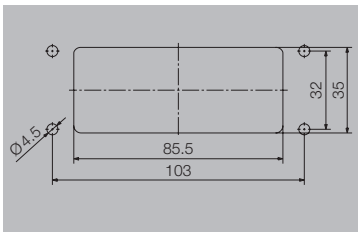
IP68 = Name of product series

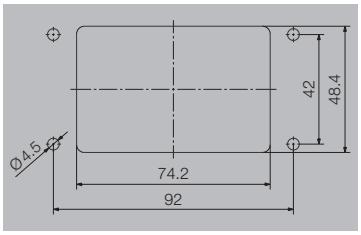
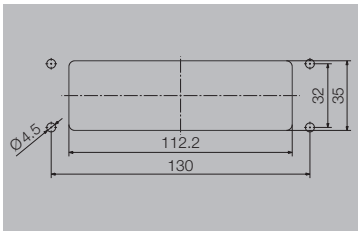
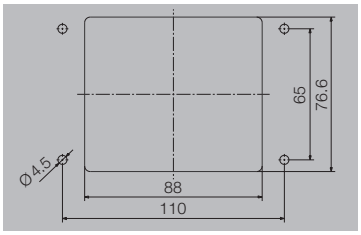
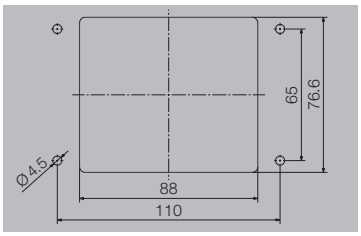
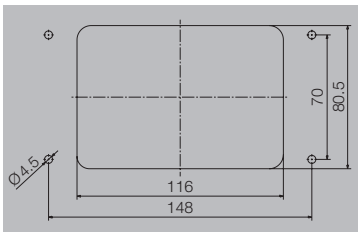
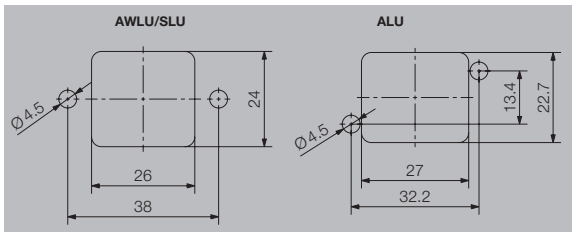
06B = HDC size
10B
16B
24B

Version:
SS = Base housing
AS = Bulkhead housing
AWS = Bulkhead housing, angled
ADS = Adapter to mount bulkhead housing at an angle
TOS = Plug housing, cable outlet at top
TSS = Plug housing, cable outlet sideways
FRAME = Counter-frame
COVER = Cover

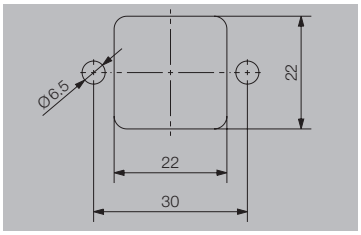
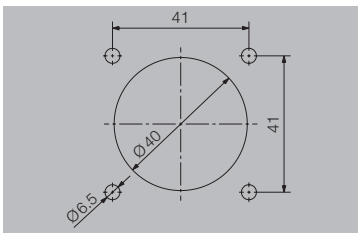
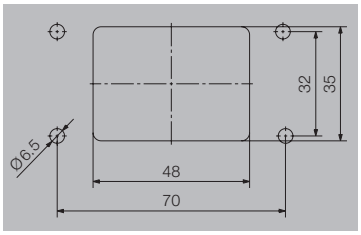
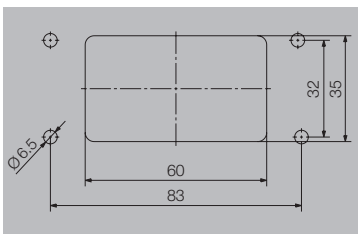
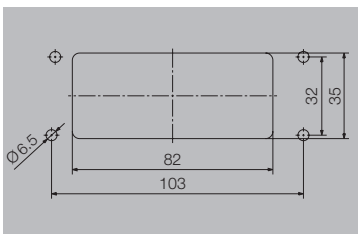
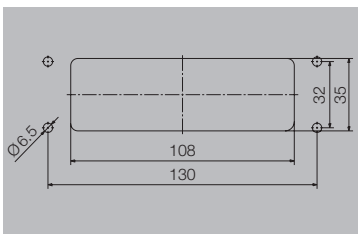
Number and size of the cable entry holes

Panel cut-out
Housings IP66

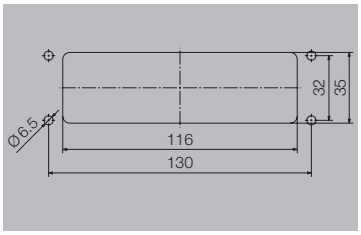
Size	Designation	
BG1	04A/07A	
BG2	10A	
BG3	06B	
BG4	10B	
BG5	16A	
BG6	16B	

Size	Designation	
BG7	32A	
BG8	24B	
BG9	48A	
BG10	32B	
BG12	48B	
HQ		

Panel cut-out
Housings IP68

Size	Designation	
BG1	04A	
BG1	04A AWS	
BG3	06B	
BG4	10B	
BG6	16B	
BG8	24B	

Housings IP68 XXL

Size	Designation	
BG8	HB24	

Electrical data

Design of clearances and creepage distances in electrical equipment

General

Since April 2003, the rules of DIN EN 60664-1 / 11.03 in conjunction with DIN 61984 / 09.02 apply to the dimensioning of clearances and creepage distances.

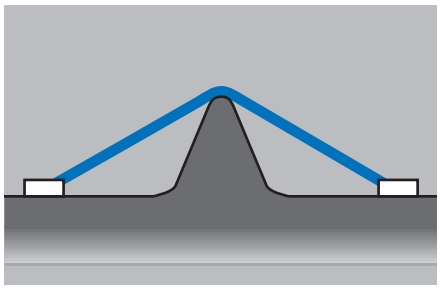
The design data resulting from these provisions is – if applicable – specified in this catalogue for each product.

For the design of clearances and creepage distances, application of the regulations for insulation coordination produces the following interrelationships:

Clearances

Clearances are rated in accordance with the following factors:

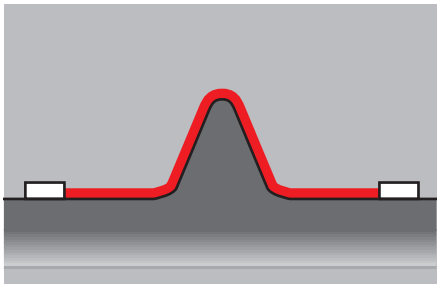
- Anticipated surge
  rated impulse withstand voltage
- Used
  surge protection precaution
- Measures to prevent pollution
  pollution severity

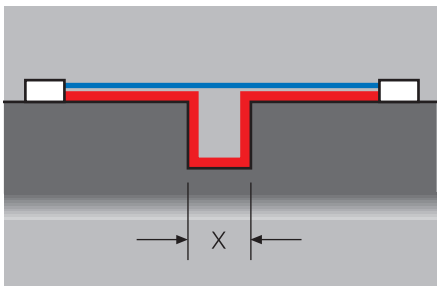


Creepage distances

Creepage distances are rated in accordance with the following factors:

- Planned
  rated voltage
- Insulation materials used
  insulation group
- Measures to prevent pollution
  pollution severity





Slots are taken into account when measuring creepage distances if their minimum width X is dimensioned according to the following table:

Pollution severity	Minimum width X in mm
1	0.25
2	1.0
3	1.5
4	2.5

If the associated clearance in air is less than 3 mm, the minimum slot width can be reduced to 1/3 of the clearance.

Influencing factors:

Rated impulse withstand voltage
The rated impulse withstand voltage is derived from:

- **Phase-to-earth voltage** (the nominal voltage of the network, taking all networks into account)
- **Surge category**

The surge categories are defined
in accordance with international standard DIN EN 60664-1 (for electrical equipment fed directly from the low voltage network).

Surge category I

- Equipment that is intended to be connected to the permanent electrical installation of a building. Measures to limit transient surges to the specific level are taken outside the equipment, either in the permanent installation or between the permanent installation and the equipment.

Surge category II

- equipment to be connected to the permanent electrical installation of a building e.g. household appliances, portable tools and similar loads.

Surge category III

- equipment that is part of the permanent electrical installation and other equipment where a higher degree of availability is expected e.g. distribution boards, circuit-breakers, wiring systems (IEV 826-06-01, including cables, busbars, junction boxes, switches, power sockets) in the permanent installation, and equipment for industrial use and some other equipment, e.g. stationary motors with permanent connections to the permanent installation.

Surge category IV

- Equiment for use at or in the proximity of the incoming supply point of the electrical installations of buildings upstream of the main distribution board e.g. electricity meters, circuit-breakers and ripple control units.

Pollution severity categories:

Pollution severity category 1

- No pollution, or only dry, non-conductive pollution that has no influence.

Pollution severity category 2

- Non-conductive pollution only; occasional condensation may cause temporary conductivity.

Pollution severity category 3

- Conductive pollution, or dry, non-conductive pollution that is liable to be rendered conductive through condensation.

Pollution severity category 4

- Contamination results in constant conductivity, e.g. caused by conductive dust, rain or snow.

The dimensioning of clearances and creepage distances, and hence the rating data for electromechanical products (terminals, terminal strips, PCB terminals and plug-in connectors) is based on pollution severity 3 and surge category III, taking account of all network types.

Table 1: Three-phase 4 or 3-conductor a.c. systems

Nominal voltage of power supply systems **[V]**	for conductor-cond. insulat.	for conductor-earth insulation	
	all Systems **[V]**	3-phase 4-conductor systems with earthed neutral cond. **[V]**	3-phase 4-conductor systems un-earthed or cond. earthed **[V]**
60	63	32	63
110 120 127	125	80	125
150	160	–	160
208	200	125	200
220 230 240	250	160	250
300	320	–	320
380 400 415	400	250	400
440	500	250	500
480 500	500	320	500
575	630	400	630
600	630	–	630
660 690	630	400	630
720 830	800	500	800
960	1000	630	1000
1000	1000	–	1000

Electrical data

Design of clearances and creepage distances in electrical equipment, influencing factors:

Rated voltage

The rated voltage is derived from the nominal voltage of the power supply and the corresponding network type.

Single-phase
2- or 3-wire AC or DC systems

Rated voltage of the power supply (mains) *)	Voltages for table 4	
	For insulation phase-to-phase [1]	For insulation phase-to-earth [1]
	All systems	3-wire systems neutr. point earthing
V	V	V
12.5	12.5	–
24 / 25	25	–
30	32	–
42 / 48 / 50**)	50	–
60	63	–
30–60	63	32
100**)	100	–
110 / 120	125	–
150**)	160	–
220	250	–
110–220	250	125
120–240		
300**)	320	–
220–440	500	250
600**)	630	–
480–960	1000	500
1000**)	1000	–

3-phase
3- or 4-wire AC systems

Rated voltage of the power supply (mains) *)	Voltages for table 4		
	For insulation phase-to-phase	For insulation phase-to-earth	
	All systems	3-phase 4-wire systems with earthed-neutral wire[2]	3-phase 3-wire systems unearthed[1] or phase-earthed
V	V	V	V
60	63	32	63
110/120/127	125	80	125
150**)	160	–	160
208	200	125	200
220/230/240	250	160	250
300**)	320	–	320
380/400/415	400	250	400
440	500	250	500
480/500	500	320	500
575	630	400	630
600**)	630	–	630
660/690	630	400	630
720/830	800	500	800
960	1000	630	1000
1000**)	1000	–	1000

1) Phase-to-earth insulation levels for unearthed or impedance-earthed systems are equal to those of phase-to-phase because the operating voltage to earth of any phase can, in practice, reach full phase-to-phase voltage. This is because the actual voltage to earth is determined by the insulation resistance and capacitive reactance of each phase to earth; thus, a low (but acceptable) insulation resistance of one phase can earth it and raise the other two to full phase-to-phase voltage to earth.

2) For electrical equipment for use in both 3-phase 4-wire and 3-phase 3-wire supplies, earthed and unearthed, use the values for 3-wire systems only.

*) It is assumed that the rated voltage of the electrical equipment is not lower than the nominal voltage of the power supply.

**) Because of the common changes, the meaning of the ** symbol has not been used in table 1; i.e. the / symbol indicates a 4-wire 3-phase distribution system. The lower value is the phase-to-neutral voltage, while the higher value is the phase-to-phase voltage. Where only one value is indicated, it refers to 3-wire 3-phase systems and specifies the value phase-to-phase. The values given in table 1 are still taken into account in tables 3a and 3b by the ** symbol.

Insulating material

The insulating materials are subdivided into four groups according to their CTI (Comparative Tracking Index):

Insulating material	
I	$600 \leq CTI$
II	$400 \leq CTI < 600$
III a	$175 \leq CTI < 400$
III b	$100 \leq CTI < 175$

The comparative tracking index must be determined according to DIN IEC 112/ VDE 0303 part 1 on the basis of specially prepared samples with test solution A

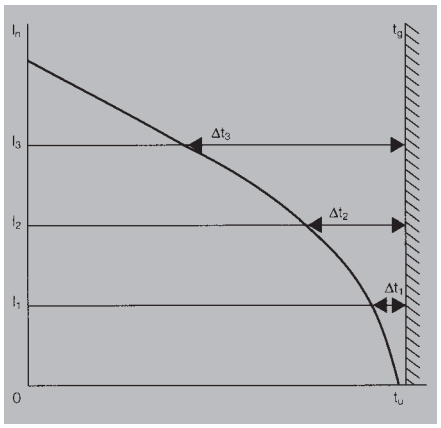
The **derating curve** shows which currents may flow continuously and simultaneously via all possible connections when the component is subjected to various ambient temperatures below its upper limit temperature.

The **upper limit temperature** of a component is the rated value determined by the materials used. The total of the ambient temperature plus the temperature rise caused by the current load (power loss at contact resistance) may not exceed the upper limit temperature of the component, otherwise it will be damaged or even completely ruined. The current-carrying capacity is hence not a constant value, but rather decreases as the component ambient temperature increases. Furthermore, the current-carrying capacity is influenced by the geometry of the component, the number of poles and the conductor(s) connected to it.

The current-carrying capacity is determined empirically according to DIN IEC 60512-3. To do this, the resulting component temperatures t_{b1}, t_{b2} … and the ambient temperatures t_{u1}, t_{u2} are measured for three different currents I_1, I_2, I_3 ….
The values are entered on a graph with a system of linear coordinates to illustrate the relationships between the currents, the ambient temperatures and the temperature rise in the component.

Base curve

upper limit temperature of component

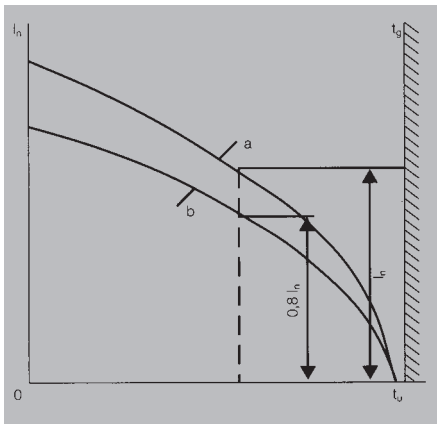


t_g = upper limit temperature of component
t_u = ambient temperature
I_n = current

The loading currents are plotted on the y-axis, the **component ambient temperatures** on the x-axis. A line drawn perpendicular to the x-axis at the upper limit temperature t_g of the component completes the system of coordinates. The associated average values of the temperature rise in the component, $\Delta t_1 = t_{b1}-t_{u1}$, $\Delta t_2 = t_{b2}-t_{u2}$,... are plotted for every current I_1, I_2, … to the left of the perpendicular line. The points generated in this way are joined to form a roughly parabolic curve.

As it is practically impossible to choose components with the maximum permissible contact resistances for the measurements, the base curve must be reduced. Reducing the currents to 80% results in the **"derating curve"** in which

Derating curve



t_g = upper limit temperature of component
t_u = ambient temperature
I_n = current
a = Base curve
b = Reduced base curve (derating curve)

the maximum permissible contact resistances and the measuring uncertainties in the temperature measurements are taken into account in such a way that they are suitable for practical applications, as experience has shown. If the derating curve exceeds the currents in the low ambient temperature zone, which is given by the current-carrying capacity of the conductor cross-sections to be connected, then the derating curve should be limited to the smaller current in this zone.

EMC

Many interfaces require the use of a connector that is EMC-compliant.

What is meant by the phrase EMC-compliant?

Electro-magnetic compatibility (EMC) refers to the ability of electrical equipment to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment. (DIN VDE 0870). An electrical component or electrical equipment is considered to be compatible when their emissions and sensitivity levels are within a tolerable range (i.e., when there is sufficient interference immunity).

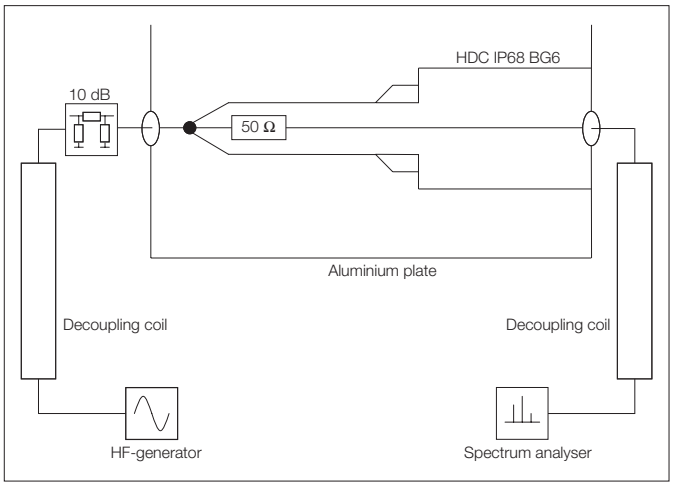
The basics

There are several types of measurements that can be used to determine the effectiveness of a cable shield. The method used here is the KS 04 B measurement from VG 95 373-41 “Electromagnetic compatibility of devices – methods for measuring shielded cable and shielded protective cable hoses”. This method enables the quality of the shield to be evaluated. It also assesses the influence of the contact points of the shielding braid as well as the male and female plug components.
A standardised test cable with a length of one metre is used. This, and the fact that this measurement is carried out in a 50-ohm system which does not take the actual line impedance into account, leads to characteristic resonance effects. This means that this measurement process only delivers meaningful results up to a frequency of 30 to 100 MHz. It is, however, well suited for evaluating and comparing the effectiveness of various shielding and shield-contacting methods. It does not deliver an absolute value that would enable the limiting of voltages coupled in a cable, using an imposed HF electromagnetic field. The user should always consider the measurement results relative to the laboratory operational situation. Your actual, real-world shield attenuation values will normally be less than the values achieved in the lab because of different cable lengths, impedance behaviour and non-optimal earthing.

Testing methods

The method applied does not use the normative tri-axial measuring platform, but instead uses an aluminium plate (with dimensions 500 x 380 x 10 mm). This plate serves as the test’s reference earth. HF sockets (N-standard) are mounted on two standing angular panels and are used to connect the measuring device. The flange along with the plug are mounted to one of the angular panels.

The limit value of the shield attenuation Sa is
f < 1 MHz: 60 dB
1 MHz < f < 100 MHz: 60 – 30 dB with15 dB per decreasing decade f = 100 MHz: 30 dB

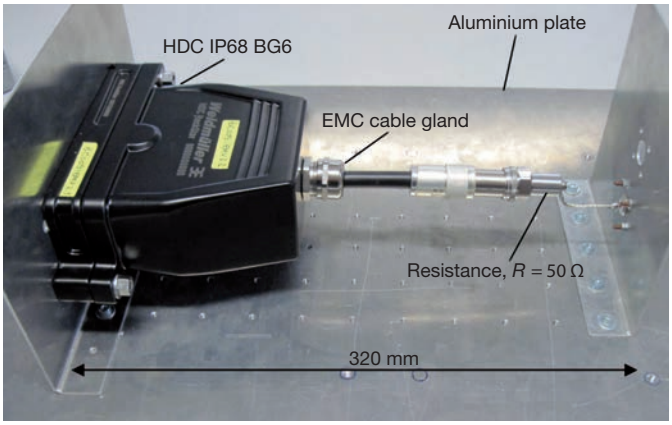


According to VG 95373-41, a frequency range up to 30 MHz is specified for the measurement process. However the range can be extended to about 100 MHz for information purposes.
The insertion loss a_s of the test object is determined by the relationship between the voltage on the interior wire and the supplied voltage. The VG95373-41 also refers to the insertion loss as the shield attenuation factor. The relationship between insertion loss a_s and coupling resistance Z_k is characterised as follows:

Insertion loss: $a_s \approx 20 \lg 50\ \Omega / |Z_k|$ in dB
Coupling resistance: $Z_k \approx 50\ \Omega \times 10$ as / 20 in Ω

According to VG 95373-41, this relationship has sufficient precision when $Z_k < 500\ m\Omega$.

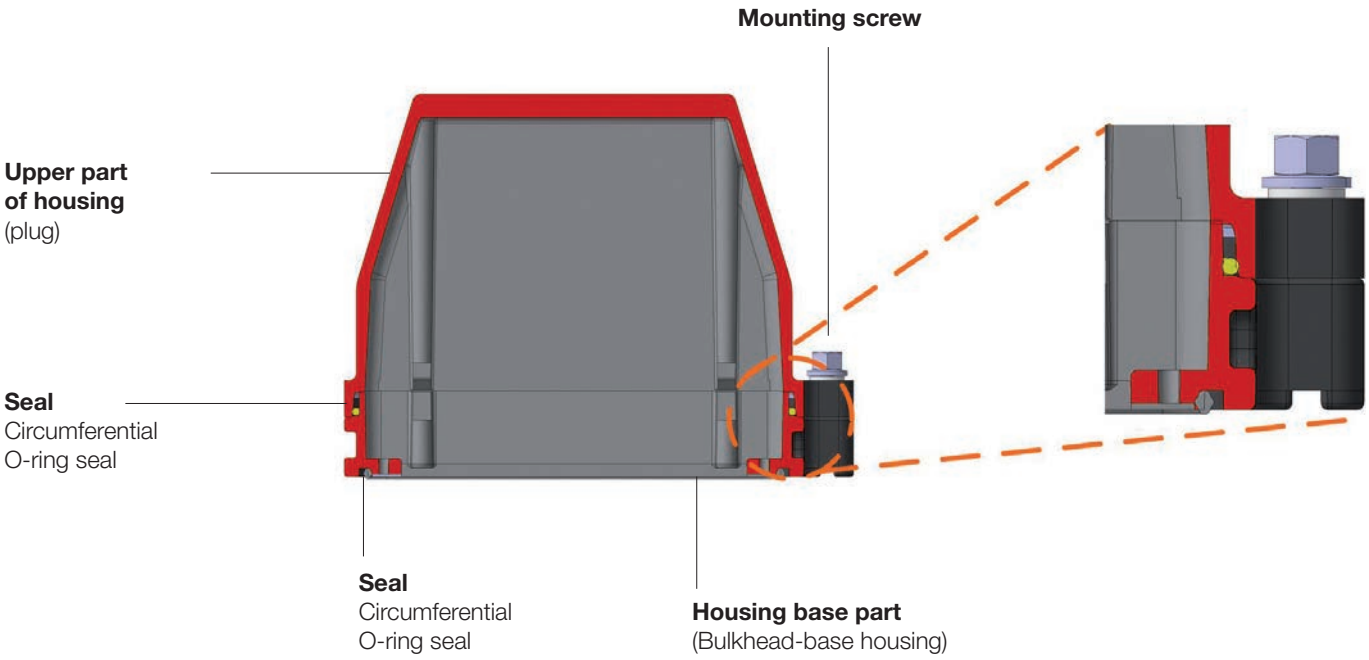
In order to test plug-in connectors, a reference shield cable is used that is separated in the middle. The cable can be connected with a corresponding connector pair and measured as described above. In order to evaluate the shield (the resistance between the cable shield and the reference earth), the connector frame and its reference earth are mounted directly to the cover of the testing equipment.



Housing must have very good EMC characteristics in order to meet these requirements.

Weidmüller has designed the RockStar® IP68 housing with built-in features that ensure outstanding EMC and resistance to interference.

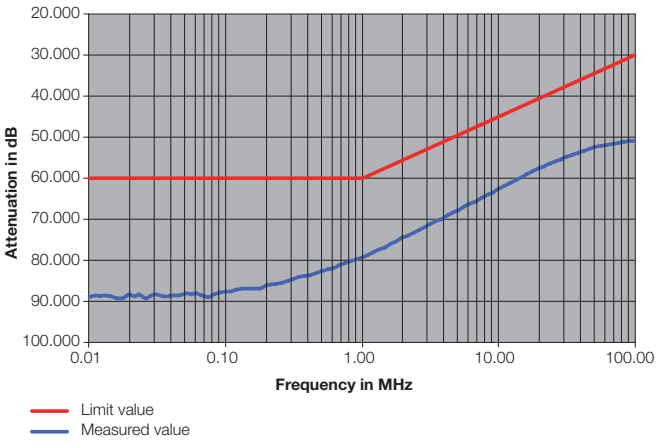
The bulkhead or base housing, combined with the plug housing, produces a labyrinth structure which ensures high EMC shield attenuation. In addition to providing the required EMC protection, this housing series features IP68/IP69K protection and excellent resistance to impacts and vibration. This combination of features permits the RockStar® IP68 housing to be used anywhere.



Technical data

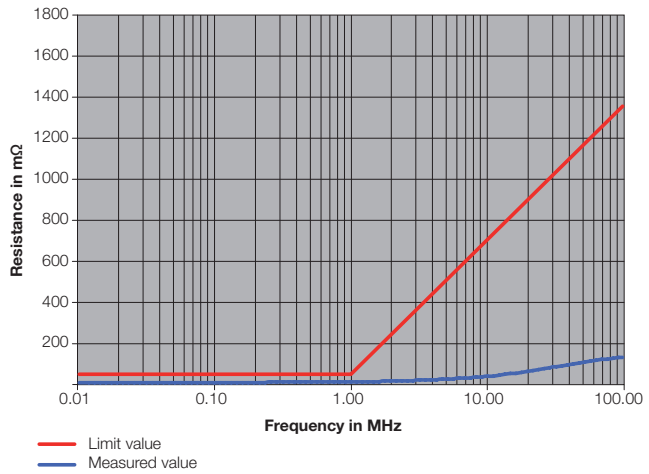
The requirements for an EMC-compliant interface stipulate that the interference immunity level or shield attenuation potential should be rated high enough so that the electromagnetic fields in the vicinity of the transmitted signals cannot exert influence within the connector. The capacity for active interference must be low enough to ensure that surrounding devices or components are not affected by interference. The following diagrams illustrate the insertion loss and the coupling impedance for the adjacent housing.

Insertion loss



HDC IP68 16B TSS 1M50

Coupling impedance



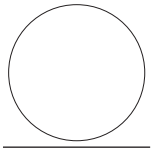
IP class of protection to IEC 60529

The class of protection is indicated by a code consisting of the two letters IP and two digits representing the class of protection.

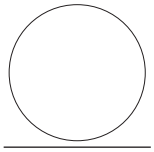
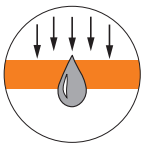
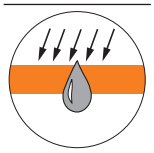
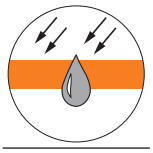
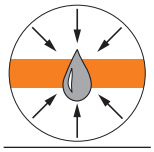
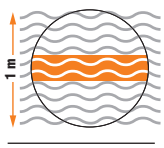
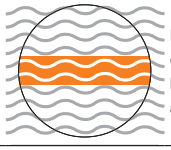
Example: **I P 6 6**

- 2nd digit: protection from liquids
- 1st digit: protection from solid bodies

Protection against intrusion of external particle matter (1st digit)

Digit		
0		No protection
1		Protection against ingress of large solid bodies with diameter > 50 mm. (Protection to prevent dangerous parts being touched with the back of the hand.)
2		Protection against ingress of large solid bodies with diameter > 12.5 mm. (Protection to prevent dangerous parts being touched with the fingers.)
3		Protection against ingress of large solid bodies with diameter > 2.5 mm. (Protection to prevent dangerous parts being touched with a tool.)
4		Protection against ingress of large solid bodies with diameter > 1 mm. (Protection to prevent dangerous parts being touched with a piece of wire.)
5		Protection against harmful deposits of dust, which cannot enter in an amount sufficient to interfere with satisfactory operation.
6		Complete protection against ingress of dust.

Protection against penetration of liquids (2nd digit)

Digit		
0		No protection
1		Protection against drops of condensed water falling vertically.
2		Protection against drops of liquid falling at an angle of 15° with respect to the vertical.
3		Protection against drops of liquid falling at an angle of 60° with respect to the vertical.
4		Protection against liquids splashed from any direction.
5		Protection against water jets projected by a nozzle from any direction.
6		Protection against water from heavy sea on ships' decks.
7		Protection against immersion in water under defined conditions of pressure and time.
8		Protection against indefinite immersion in water under defined conditions of pressure (which must be agreed between manufacturer and user and must be more adverse than number 7).

Class of protection to NEMA

National Electrical Manufacturers Association NEMA 250-1991

Digit	
Type 1	Housing primarily for use in inside rooms. Protects from penetration of solid bodies.
Type 2	Housing primarily for use in inside rooms. Protects from penetration of solid bodies and water.
Type 3	Housing primarily for outdoor use. Protection against penetration by rainfall and dust as well as damage due to ice formation.
Type 3R	Housing primarily for outdoor use. Protection against rain and snow as damage due to ice-formation.
Type 3S	Housing primarily for outdoor use. Protection against rain, snow and foreign bodies. External mechanisms can be operated despite ice accumulation.
Type 4	Housing for inside and outside rooms. Protects from rain, foreign bodies, water spray and water jets as well as damage through ice formation on the outside of the housing.
Type 4X	Housing for inside and outside rooms. Protects from corrosion, rain, foreign bodies, water spray and water jets as well as damage through ice formation on the outside of the housing.
Type 6	Housing for inside and outside rooms. Protects from water jets as well as penetration of water when submerged; protects from damage through ice formation on the outside of the housing.

Digit	
Type 12	Housing for use in inside rooms. Protects from dust deposits and non-corrosive dripping liquids.
Type 13	Housing for use in inside rooms. Protects from dust deposits, water spray, oil and non-corrosive coolants.

Chemical resistance

Chemical resistance of inserts (material PC, 20 % GF)	
Acetone	+
Ammonia, aqueous	–
Petrol	+
Benzine	+
Diesel oil	–
Acetic acid, concentrated	+
Aqueous potassium hydroxide	–
Methanol	–
Engine oil	–
Alkaline solution, diluted	+
Chlorinated hydrocarbons	–
Use in open air	–

Chemical resistance of standard housing seal (material NBR)	
Acetone	–
Drilling oil	+
Diesel oil	+
Ethyl alcohol	+
Gear oil	+
Hydraulic oil	+
Cooling lubricant	+
Petrol	+
Sweat	+
High-octane petrol	–
Water	+
UV	–
Ozone	–

+ resistant
– partially resistant
o not resistant

Safety information / standards

Please note the following safety information:

- Never plug or unplug connectors under load or during operations.
- We can only guarantee the technical and electro-technical characteristics promised in this catalogue if all the components were supplied by Weidmüller.

The following standards apply in the vicinity of heavy-duty connectors:

- DIN EN 60664-1 or IEC 60664-1: Insulation coordination for equipment within low-voltage systems; principles, requirements and tests (replaces DIN VDE 0110-1)
- DIN EN 61984 or IEC 61984:
  Plug-in connectors – safety requirements and tests
- DIN EN 175301-801:
  Detail Specification: High-density rectangular plug-in connectors, round removable crimp contacts; (replaces DIN 43652)
- DIN EN 60352 or IEC 60352:
  Solderless connections
- DIN EN 60529 or IEC 60529:
  Classes of protection provided by enclosures (IP code)
- DIN VDE 0870:
  Electromagnetic influence
- DIN EN 60999-1:
  Connecting devices, safety requirements for screw terminal connections and screwless terminal connections for electrical copper conductors
- DIN 40050-9:
  Road vehicles; classes of protection (IP-code)