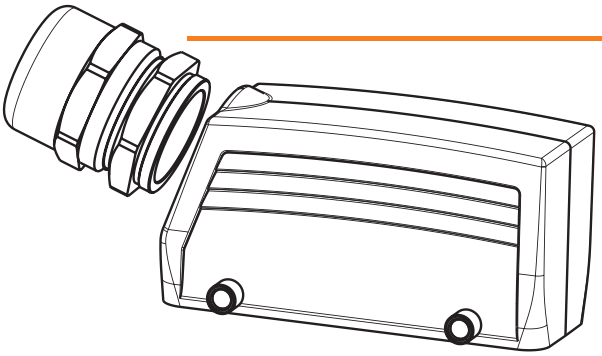
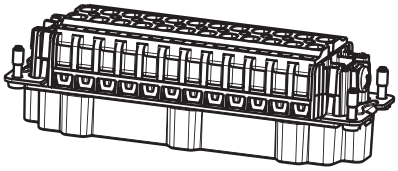
Overview

Construction of heavy-duty connectors – fixed pole

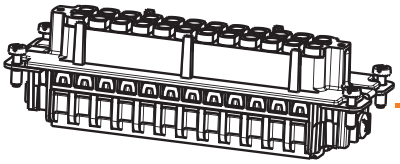


Cable gland

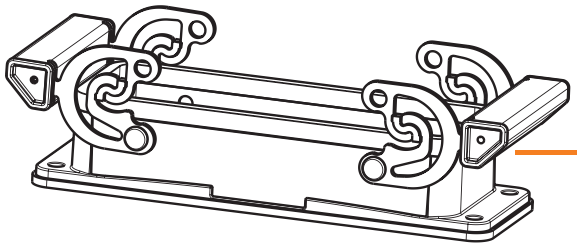
Hood



Male insert

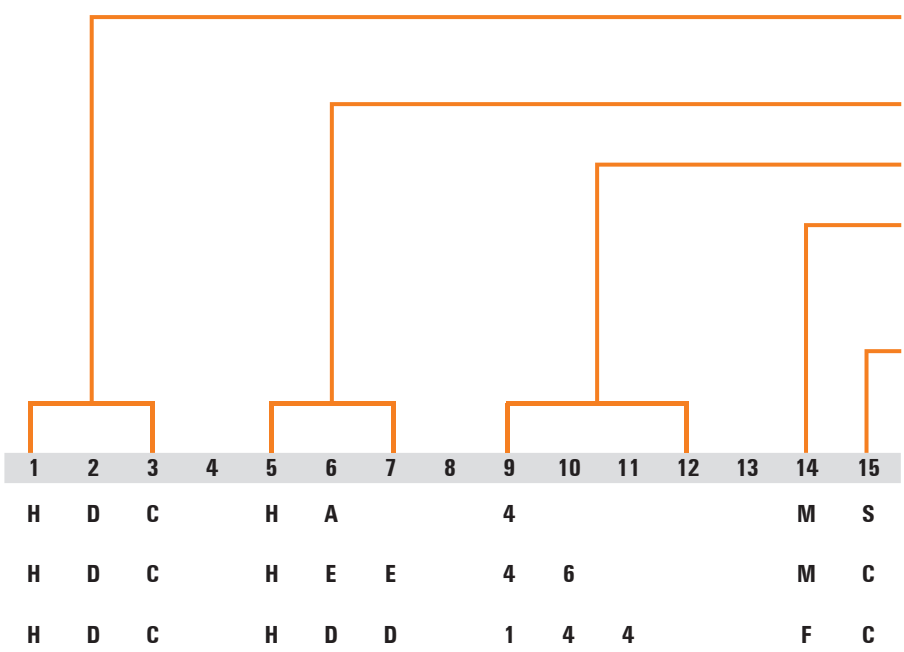


Female insert



Bulkhead housing

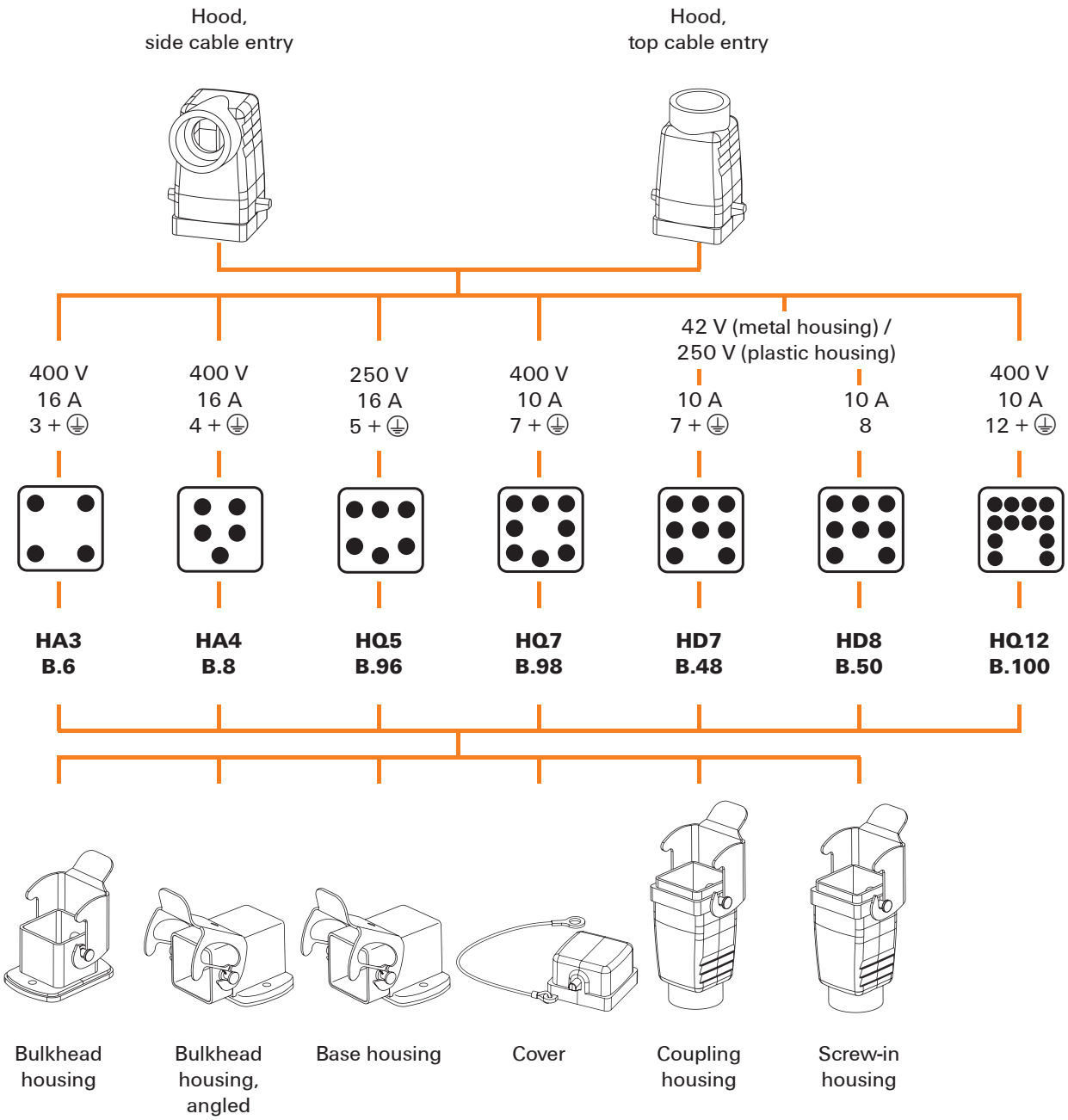
Part codes for inserts



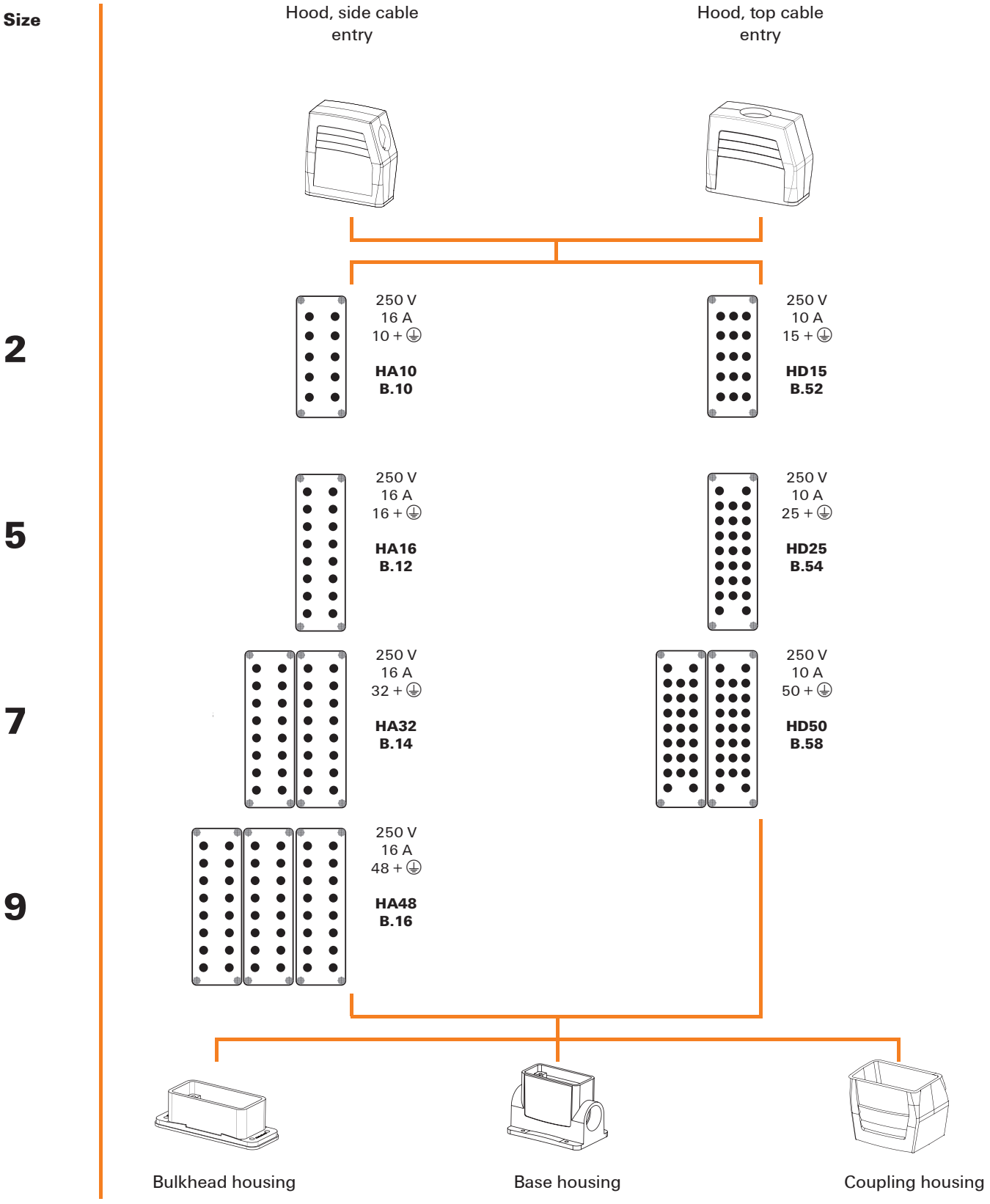
Overview of size 1 – fixed pole

Size

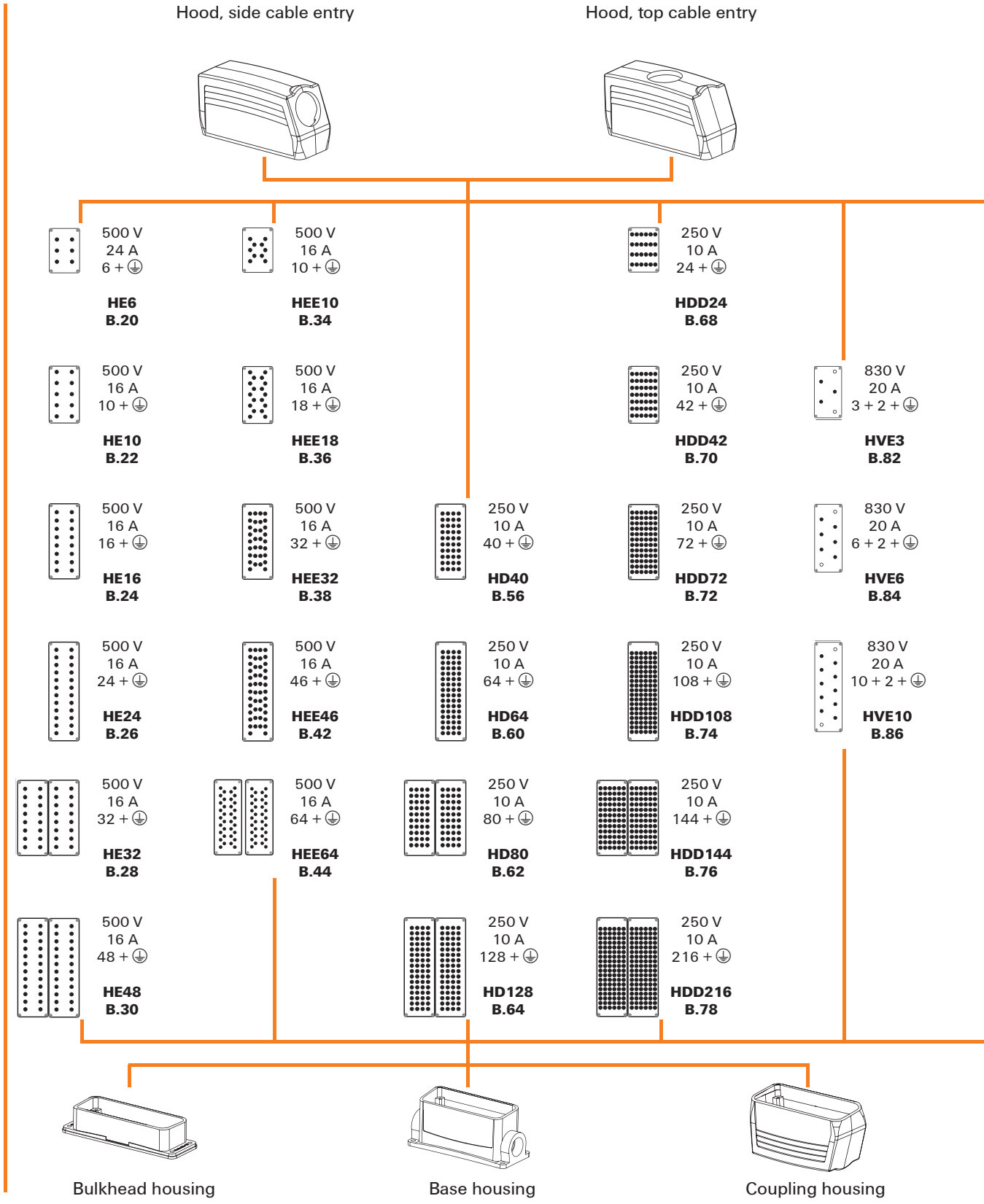
1

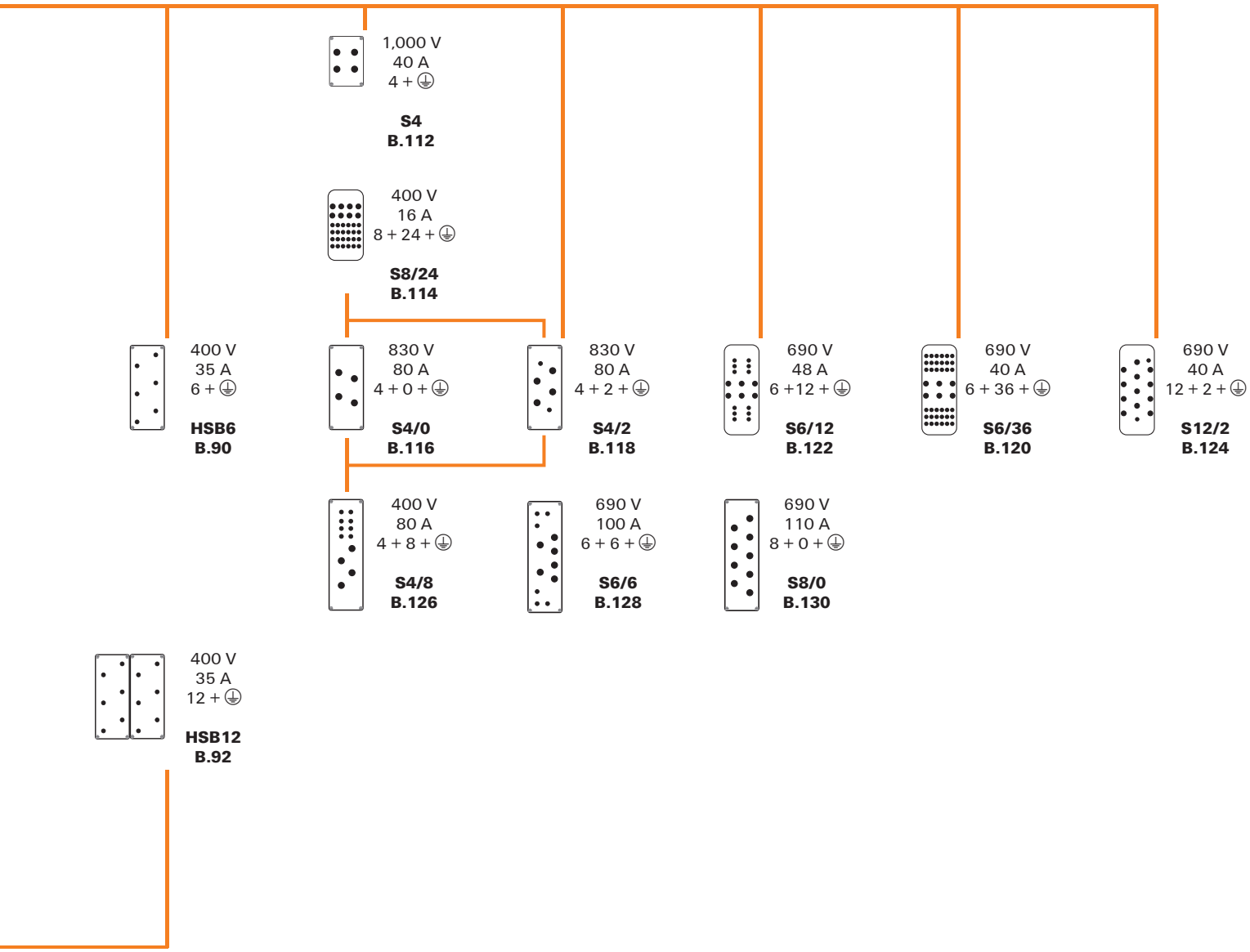


Overview of sizes 2, 5, 7, 9 – fixed pole



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

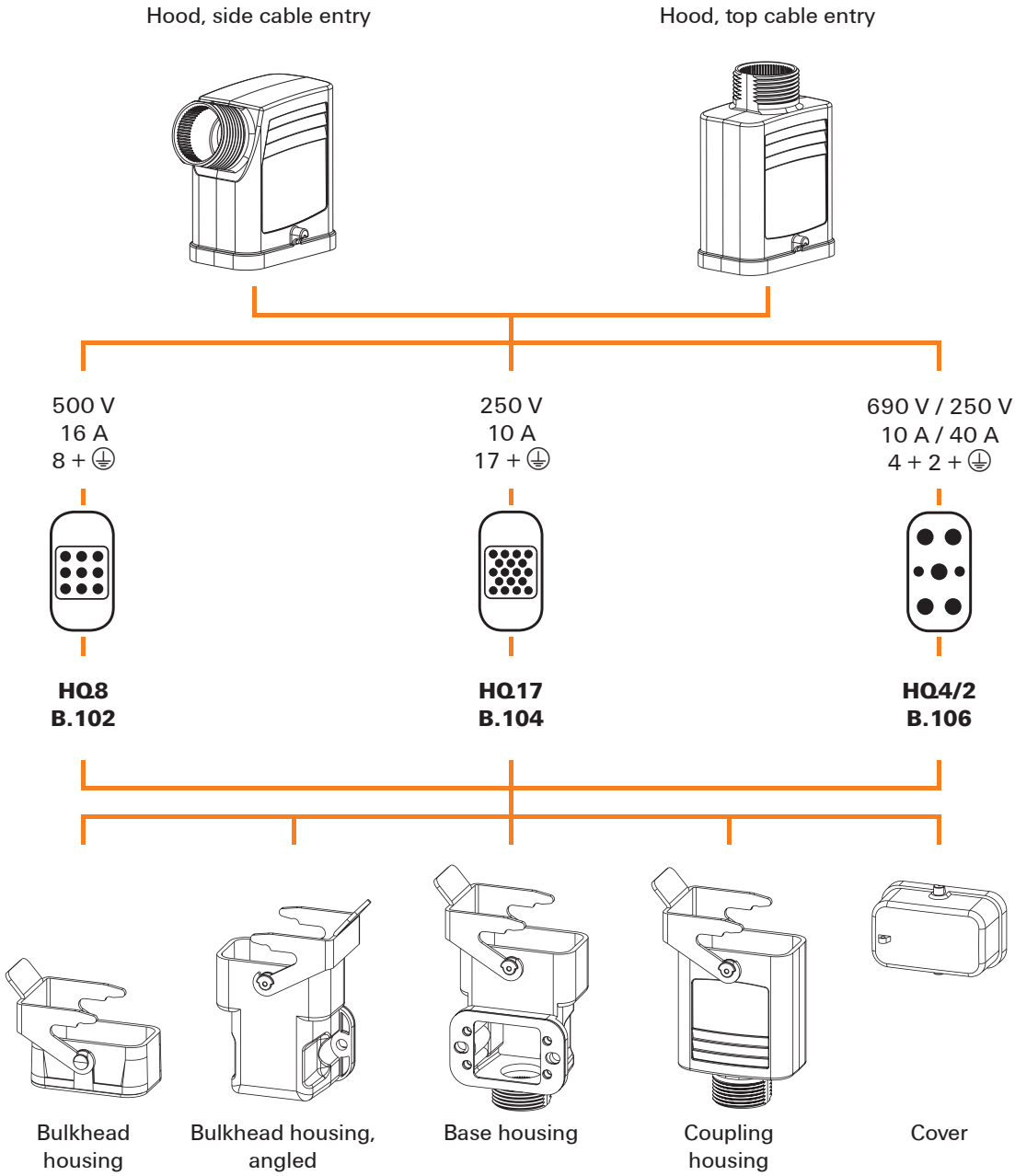



1,000 V
40 A
4 + ⏚
S4
B.112
400 V
16 A
8 + 24 + ⏚
S8/24
B.114
400 V
35 A
6 + ⏚
HSB6
B.90
830 V
80 A
4 + 0 + ⏚
S4/0
B.116
830 V
80 A
4 + 2 + ⏚
S4/2
B.118
690 V
48 A
6 +12 + ⏚
S6/12
B.122
690 V
40 A
6 + 36 + ⏚
S6/36
B.120
690 V
40 A
12 + 2 + ⏚
S12/2
B.124
400 V
80 A
4 + 8 + ⏚
S4/8
B.126
690 V
100 A
6 + 6 + ⏚
S6/6
B.128
690 V
110 A
8 + 0 + ⏚
S8/0
B.130
400 V
35 A
12 + ⏚
HSB12
B.92

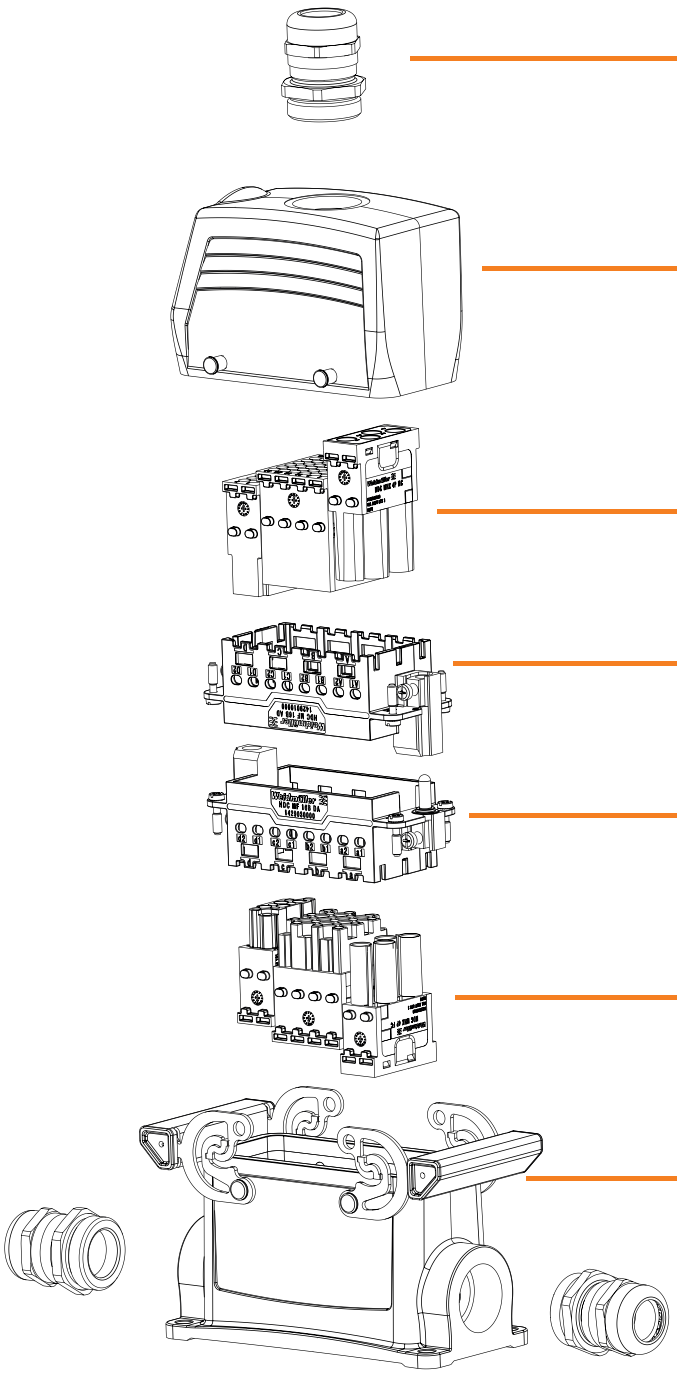
Overview of size HQ – fixed-pole

Size

HQ



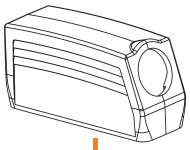
Construction of heavy-duty connectors – modular



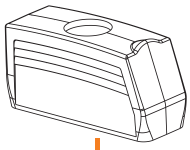
Overview of sizes 3, 4, 6, 8, 10, 12 – modular

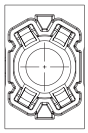
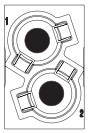
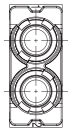
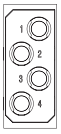
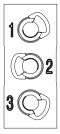
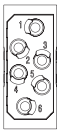
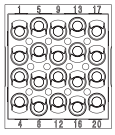
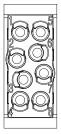
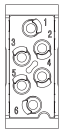
Size

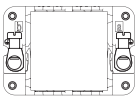
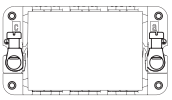
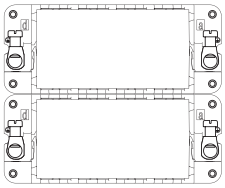
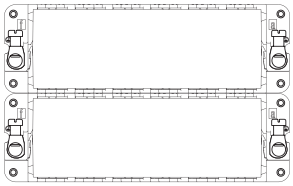
Hood, side cable entry

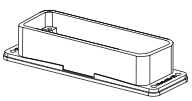


Hood, top cable entry

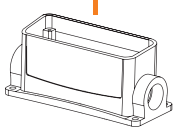


200 A 1,000 V 25 – 70 mm²	100 A 1,000 V 10 – 35 mm²	70 A 1,000 V 6 – 25 mm²	40 A 830 V 1.5 – 6 mm²	40 A 690 V 1.5 – 10 mm²	16 A 830 V 0.5 – 4 mm²	16 A 500 V 0.5 – 4 mm²	16 A 400 V 0.5 – 4 mm²	16 A 500 V 0.5 – 4 mm²	16 A 400 V 0.5 – 2.5 mm²	16 A 400 V 0.5 – 2.5 mm²
										
MHP 200 **C.8**	**MHP 100** **C.9**	**MHP 70** **C.10**	**MHX 4P** **C.11**	**MHX 3** **C.12**	**MHE 6P** **C.13**	**MHE 20** **C.14**	**MHE 8** **C.15**	**MHE 6** **C.16**	**MHE 5** **C.17**	**MHE 4(X)** **C.18**

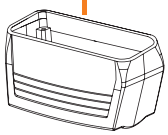
3		MF 6B for 2 modules **C.6**
4		MF 10B for 4 modules **C.6**
6		MF 16B for 4 modules **C.7**
8		MF 24B for 6 modules **C.7**
10		2 x MF 16B for 8 modules **C.7**
12		2 x MF 24B for 12 modules **C.7**



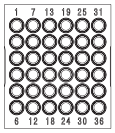
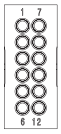
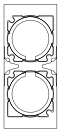
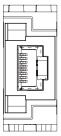
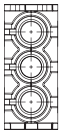
Bulkhead housing



Base housing

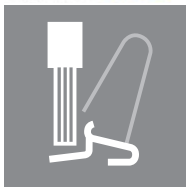


Coupling housing

10 A 250 V 0.14 – 2.5 mm²	10 A 250 V 0.14 – 2.5 mm²	Bus module	Dummy module	RJ45 modules	Pneumatic modules
					
MHD 36 **C.21**	**MHD 12** **C.22**	**MBUS 2** **C.23**	**MDU** **C.24**	**MRJ45** **C.36**	**MPN** **C.38**

The right connection for every application

No matter which type of system you implement for which application — Weidmüller has the right connection for you. Depending on your requirements, we offer inserts with the appropriate connection technology for an optimum connection. Now also with the new, future-proof SNAP IN connection technology.



SNAP IN connection: Connect faster than ever before

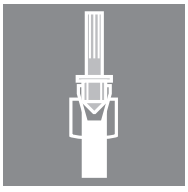
- Significant acceleration of installation and maintenance processes in the field
- Tool-free: Saves material and time, since crimping on of wire end ferrules is unnecessary Insert stripped
- Flexible, stranded wire into open connection point until “click” is audible
- Secure connection that withstands even severe shocks and vibrations reliably

PUSH IN connection

- Easy, vibration-resistant and gas-tight connection
- Simply inserted flexible conductors with crimped wire end ferrules, solid-core conductors or ultrasonicwelded conductors into the terminal point
- Spring and conductor stops ensure optimum connection conditions and a guide for the screwdriver to detach the conductor

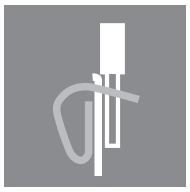
Crimp connection

- Contacts can be crimped on the conductor outside of the connector and then inserted into the connector
- Wires are fed into a metal sleeve, which is then squeezed together with a special tool
- Corrosion and vibration proof connection



Axial screw connection

- Small space taken up by the contact
- Easy to use: To make up the connection, the tool and conductor are held in a line
- Three steps for a secure connection: strip the conductor, insert the wire into the contact chamber, screw in the contact

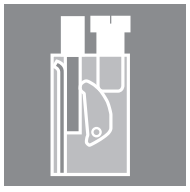


Tension clamp connection

- Low contact resistance and high corrosion resistance
- Tension spring, made from high-quality rustproof and acid-proof steel, pulls the conductor against the tin-plated copper current bar
- Resistant to vibrations and high wire pull-out force

Screw connection

- Excellent contact force even for large cross sections
- Perfectly suited for use in corrosive environments
- Wire-protection frame ensures that finely-stranded wires will not splice off



TOP connection

- Parallelism of conductor entry and screw actuation: Simple wiring, for example with small lateral distances in installation boxes
- The conductor is pressed directly against the conductor rail via the hardened steel pressure clip
- The high contact force guarantees a gas-tight connection

The right connection for every application

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

Products	Tension clamp connection	PUSH IN connection	SNAP IN connection	Axial screw connection	Screw connection	Screw connection with wire protection mechanism	TOP-1.5k connection	Crimp connection
								
HDC HA (3 to 4-pole)					✓		✓	
HDC HA (10 to 48-pole)	✓					✓		✓
HDC HE	✓	✓	✓			✓		✓
HDC HEE								✓
HDC HEEE								✓
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

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.

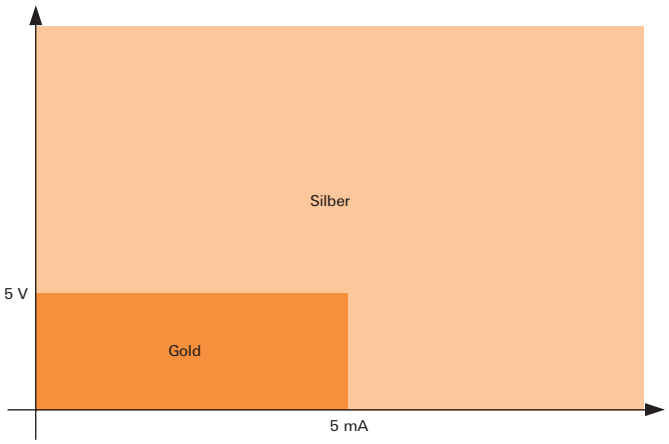
Crimp contacts are available in turned, solid form.

Selection of silver or gold-plated contacts

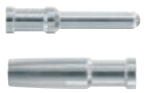
When using plug-in connectors under standard conditions, the resistance between the contacts has little effect. Even heavily corroded silver-coated contact pins and sockets do not exhibit any contact problems.

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
	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
	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	HighPower signal contacts
	MHP 70	Rated current: Cross-section: Surface finish:	70 A 6 – 25 mm² silver-plated	ModuPlug
	MHP contacts	Rated current: Cross-section: Surface finish:	100 A 10 – 35 mm² AWG: 8 – 2 silver-plated	MHP100
	MHP 200	Rated current: Cross-section: Surface finish:	200 A 25 – 70 mm² silver-plated	ModuPlug
	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
M2.5	**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
M2.9 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
M3	**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 to 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
M4	**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
M5	**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 PZ2
	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 PZ2
	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
M6	**Power contacts**		
	S 4/0 (Screw connection)	1.2 (1.5 mm²) / 2 (2.5 mm²) / 3 (4 – 16 mm²)	SD 0.8 x 4 mm
	S 4/2	1.2 (1.5 mm²) / 2 (2.5 mm²) / 3 (4 – 16 mm²)	SD 0.8 x 4 mm
	S 4/8	1.2 (1.5 mm²) / 2 (2.5 mm²) / 3 (4 – 16 mm²)	SD 0.8 x 4 mm
M7 x 0.75	**Power contacts**		
	S 4	1.1 – 1.7	SW 2
	S 6/6 (+ PE)	6 – 8	SW 4
M8 x 0.75	**Power contacts**		
	S 6/12	1.1 – 1.7	SW 2
	S 8/0 (+ PE)	6 (10 – 16 mm²) / 7 (25 mm²)	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.

Torque housing

Series	Size	Version	Number of screws	Thread size	Recommended tightening torque
IP 65	Size 1	Attachment	2	M 3	0.8 ... 1.0 Nm
IP 65	Size 2	Attachment	4	M 3	0.8 ... 1.0 Nm
IP 65	Size 3	Attachment	4	M 4	0.8 ... 1.0 Nm
IP 65	Size 4	Attachment	4	M 4	0.8 ... 1.0 Nm
IP 65	Size 5	Attachment	4	M 3	0.8 ... 1.0 Nm
IP 65	Size 6	Attachment	4	M 4	0.8 ... 1.0 Nm
IP 65	Size 7	Attachment	4	M 4	0.8 ... 1.0 Nm
IP 65	Size 8	Attachment	4	M 4	0.8 ... 1.0 Nm
IP 65	Size 9	Attachment	4	M 5	2.5 Nm
IP 65	Size 10	Attachment	4	M 5	2.5 Nm
IP 65	Size 12	Attachment	4	M 5	2.5 Nm
EMV / IP65	Size 3	Attachment	4	M 4	1.0 Nm
EMV / IP65	Size 4	Attachment	4	M 4	1.0 Nm
EMV / IP65	Size 6	Attachment	4	M 4	1.0 Nm
EMV / IP65	Size 8	Attachment	4	M 4	1.0 Nm
IP 68	Size 1	Attachment	2	M 4	1.0 Nm
IP 68	Size 3	Attachment	4	M 6	3.0 Nm
IP 68	Size 6	Attachment	4	M 6	3.0 Nm
IP 68	Size 8	Attachment	4	M 6	3.0 Nm
IP 68	Size 1	Attachment/socket – plug	2	M 4	1.0 Nm
IP 68	Size 3	Attachment/socket – plug	2	M 6	3.0 Nm
IP 68	Size 6	Attachment/socket – plug	2	M 6	3.0 Nm
IP 68	Size 8	Attachment/socket – plug	2	M 6	3.0 Nm
IP66	Size 3	Flange-mounted housing	2	M 6	3 Nm
IP66	Size 4	Flange-mounted housing	2	M 6	3 Nm
IP66	Size 6	Flange-mounted housing	2	M 6	3 Nm
IP66	Size 8	Flange-mounted housing	2	M 6	3 Nm

RockStar® – Housing types

Housing IP65 / 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 IP65 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
- Process engineering

etc.

Features
- Tightness at least IP65 to IEC 60529
- Tightness NEMA Type 12, 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
- rustproof stainless steel

HQ Series Housings, IP65 / NEMA Type 4X

The HQ connector series has a very compact housing with IP65 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

etc.

Features
- Tightness: at least IP65, acc. to IEC 60529
- Tightness: NEMA Type 12, 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

IP65 EMC housing

In today's industrial environment, machines, plant and devices are becoming more and more complex. At the same time, automation is also on the rise. Lots of sensors and actuators are controlled to transmit or receive sensitive signals. And what's more, reliability and availability are becoming increasingly important quality features of machines and devices. This means that they need to be optimally designed in terms of electromagnetic compatibility (EMC).

Applications
- Machine construction
- Wind energy
- Transportation

Features
- Labyrinth structure on the housing
- FPM seal material
- Conductive surface
- O-ring seal
- IP65 protection class acc. to 60529
- Scratch-proof, corrosion resistant and durable

Design
- Die-cast aluminium, resistant to sea water
- Multi-level surface coating
- Colour: black, similar to RAL 9005
- Four sizes
- Cable outlet is straight or lateral

Interlock system
- Removable clamp lock in different versions
- Clamp system made of polyamide with internal stainless steel spring

Housing IP68

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

RockStar® – Housing types

Flange-mounted housing IP66

Our flange-mounted housings made of plastic have a built-in cable gland and a screw interlock. They seal directly onto the panel wall and can therefore be used without an attachment housing. The housings are impressive with their low weight and optimal protection against contamination, water and vibrations.

Applications:
- Machinery and plant engineering
- Automotive industry
- Panel building
- Wind power plants

Features:
- Impermeability IP66/67 acc. to IEC 60529
- Impermeability NEMA type 12, 4X
- Resistance against impacts acc. to DIN EN 50102
- Robust, durable, corrosion resistant

Design
- Plastic housing made of polyamide
- Colour: black
- Four sizes
- Cable outlet is straight or angled

Interlock system
- Screw connection with hexagon socket
- Material: stainless steel

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 of plastic and rust-free stainless steel

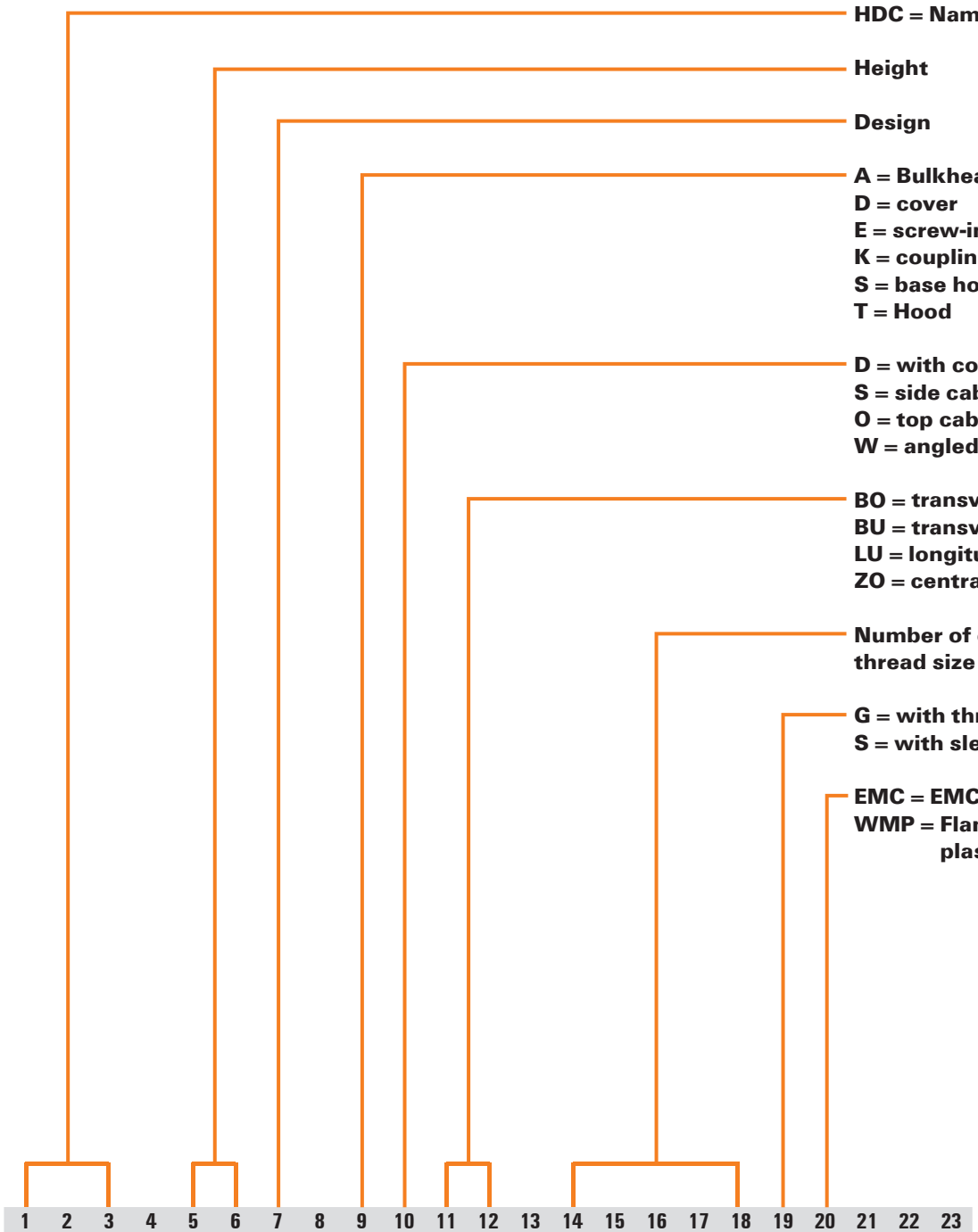
Screw fastening


- 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

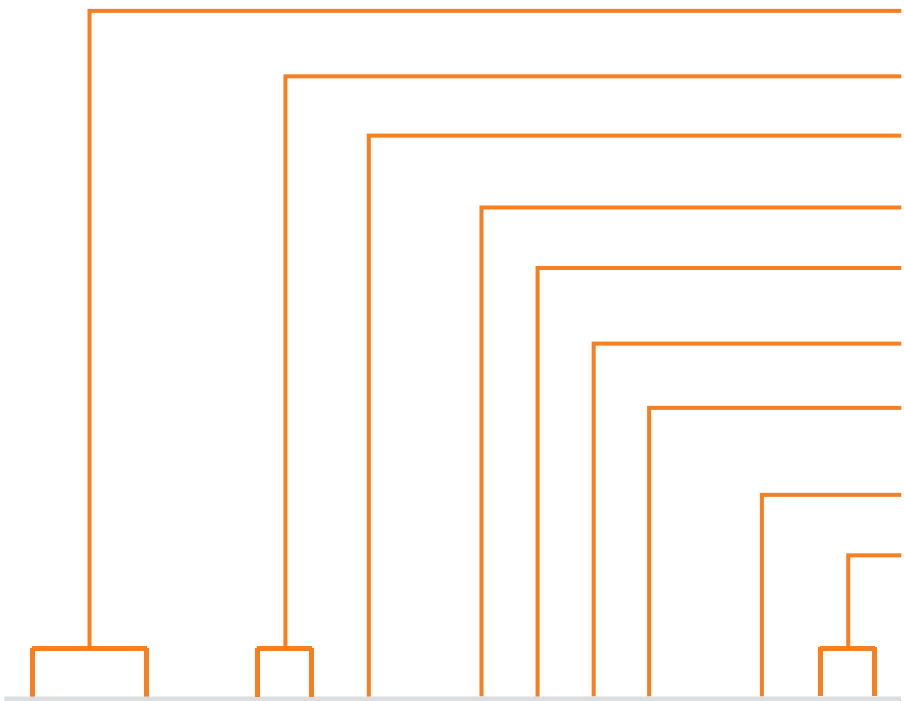
Two transverse locking clamps on housing top


- 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 IP65

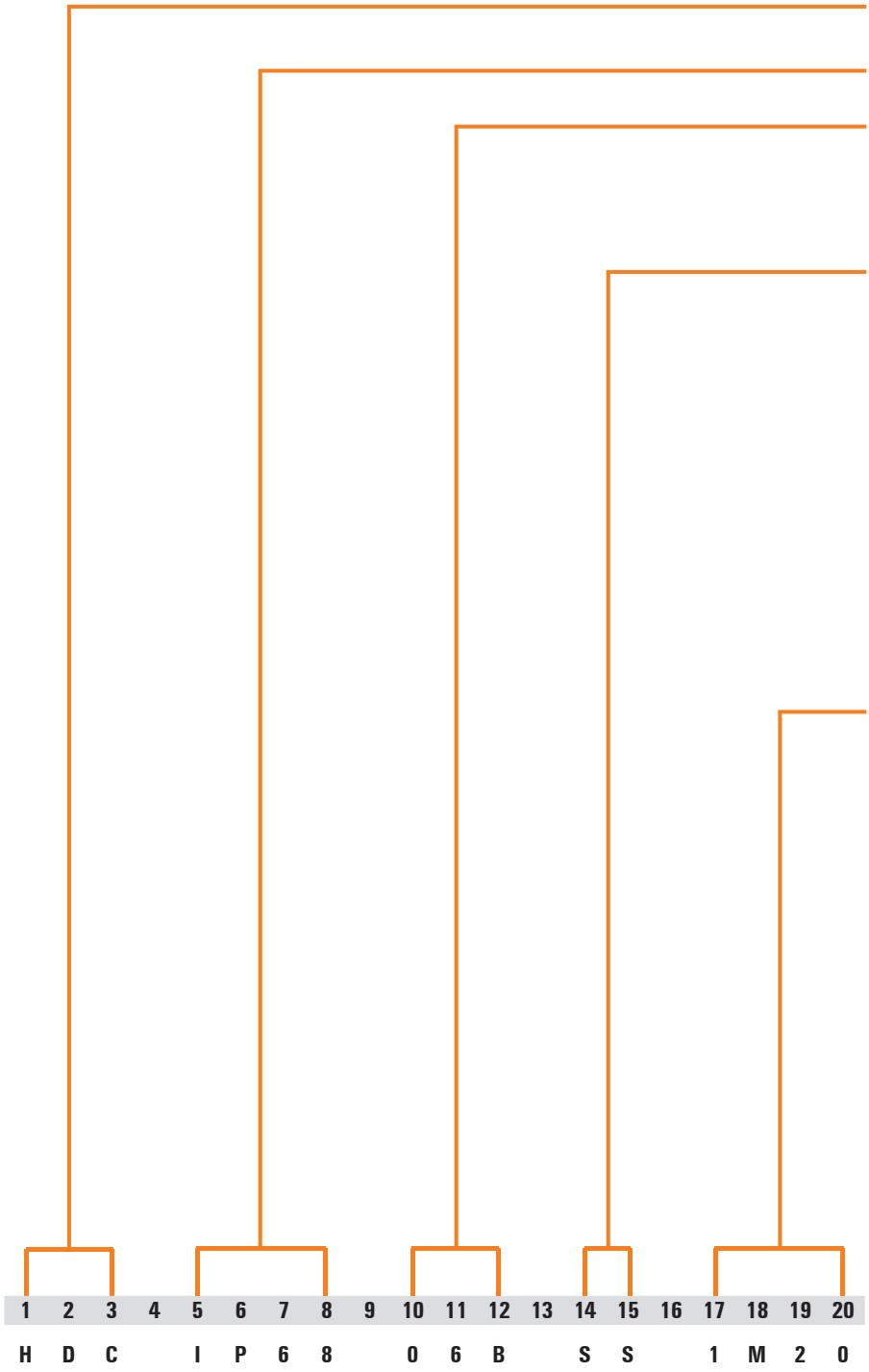


Part codes for covers



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
H	D	C		0	4	A		D	M	D	L		2	B	O
H	D	C		1	0	A		D	O	D	L		1	L	B
H	D	C		1	0	B		D	M	D	Q		2	Q	B

Part codes for housings IP68



HDC = Name of product line

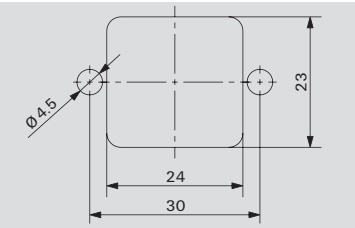
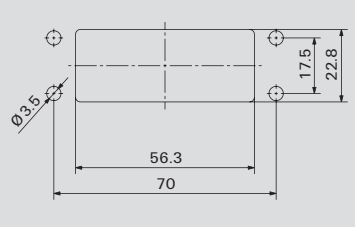
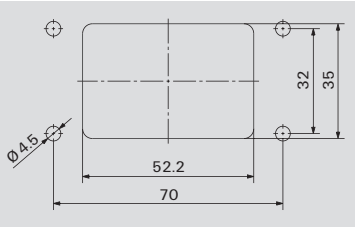
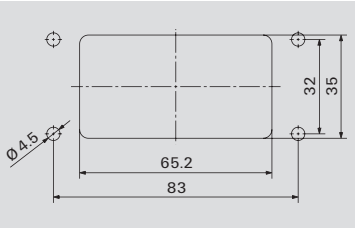
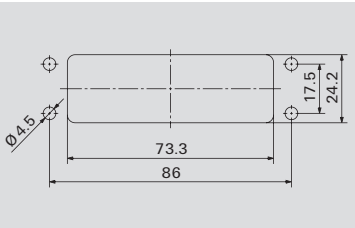
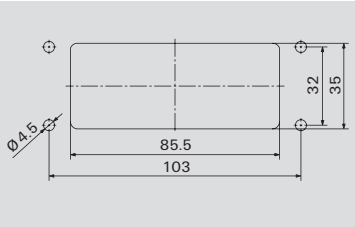
IP68 = Name of product series

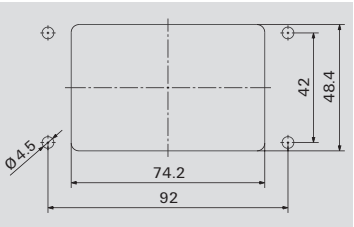
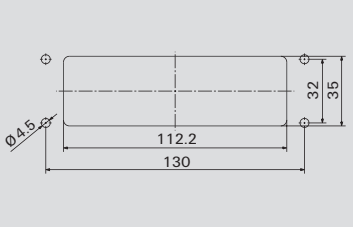
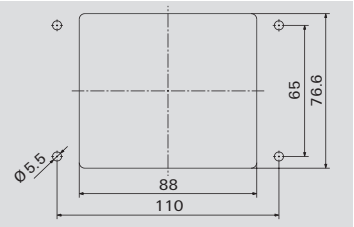
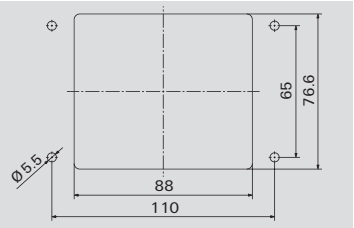
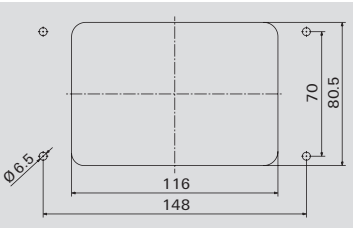
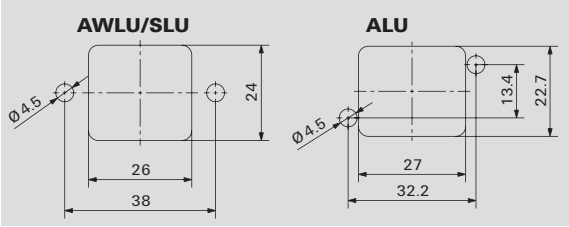
06B = HDC size
10B
16B
24B

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

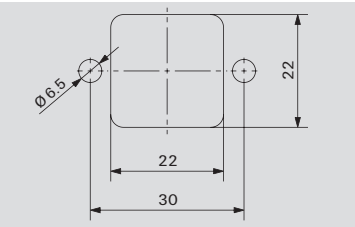
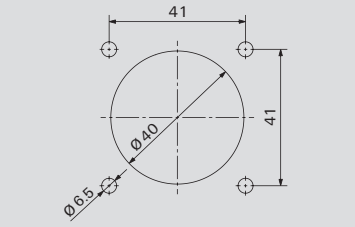
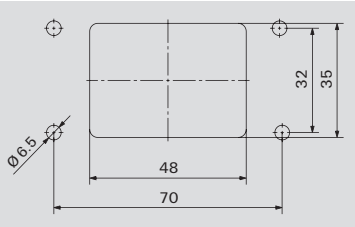
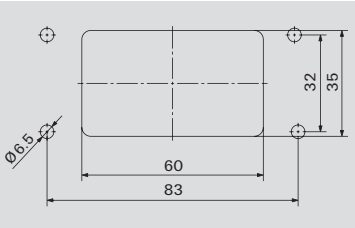
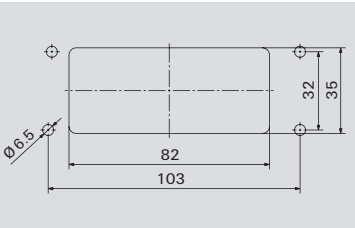
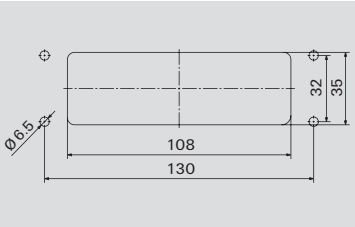
Number and size of the cable entry holes

Panel cut-out
Housings IP65

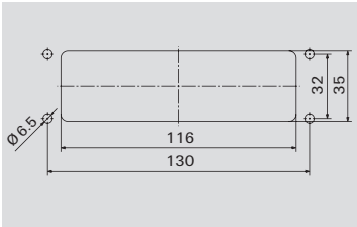
Size	Designation	
BG1	04A/07A	
BG2	10A	
BG3	06B	
BG4	10B	
BG5	16A	
BG6	16B	

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 BG8	24B HP 24B	

XXL Housings in IP68

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.

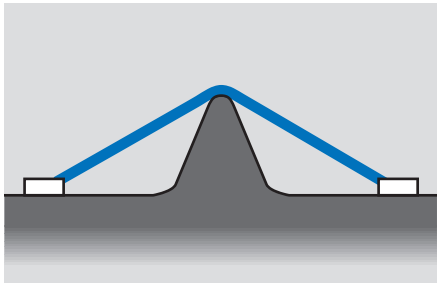
The design data resulting from these provisions is – if applicable – specified in this catalogue for each product.

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:

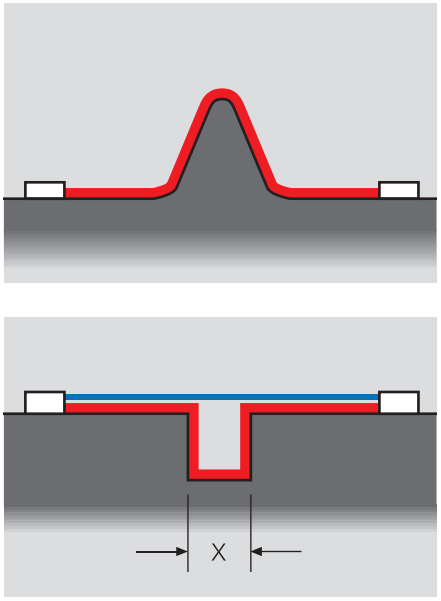
- Anticipated surge:
  rated impulse withstand voltage
- Used
  surge protection precaution
- Measures to prevent pollution:
  pollution severity



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 ⅓ 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	For conductor-cond. insulat.	For conductor-earth isolation	
	all Systems	3-phase 4-conductor systems with earthed neutral cond.	3-phase 4-conductor systems unearthed or cond. 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	1,000	630	1,000
1,000	1,000	-	1,000

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	1,000	500
1,000**)	1,000	-

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	1,000	630	1,000
1,000**)	1,000	-	1,000

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 ≤ CTI
II	400 ≤ CTI < 600
III a	175 ≤ CTI < 400
III b	100 ≤ 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.

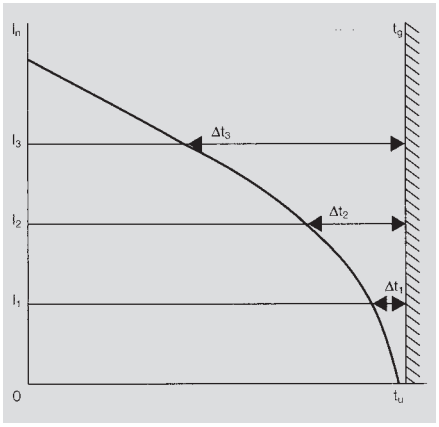
The **derating curve** shows which currents may flow continuously and simultaneously via all possible connections when the component is subjected to various ambient temperatures below its upper limit temperature.

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.

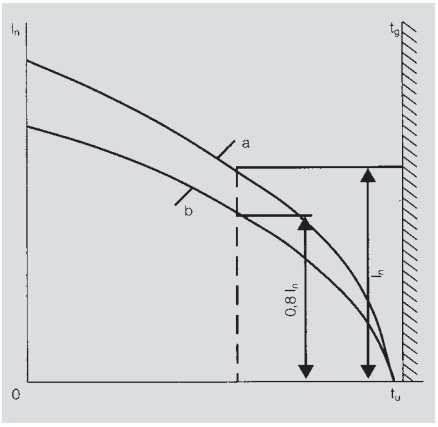
Base curve

upper limit temperature of component



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

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 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, $\Delta t_1 = t_{b1} - t_{u1}$, $\Delta_{t2} = t_{b2} - t_{u2}$, ... 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 percent results in the **"derating curve"** in which 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.

Electromagnetic compatibility (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).

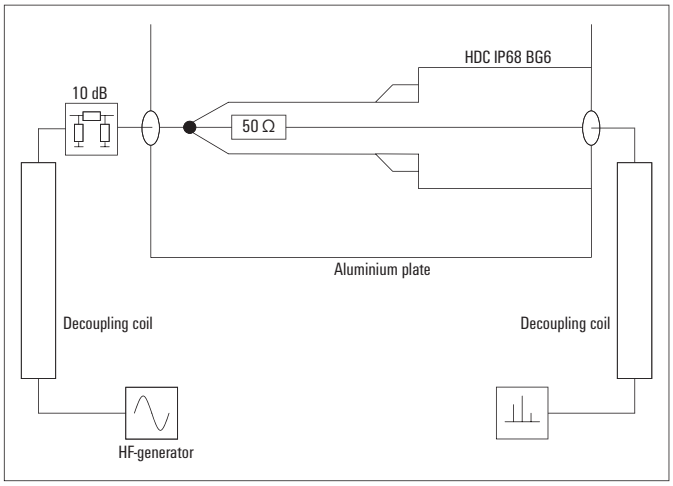
The basics

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

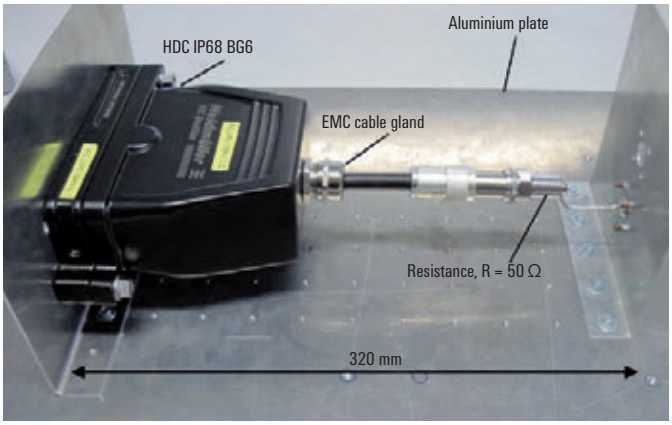


According to VG 95373-41, a frequency range up to 30 MHz is specified for the measurement process. However the range can be extended to about 100 MHz for information purposes.
The insertion loss as of the test object is determined by the relationship between the voltage on the interior wire and the supplied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

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

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

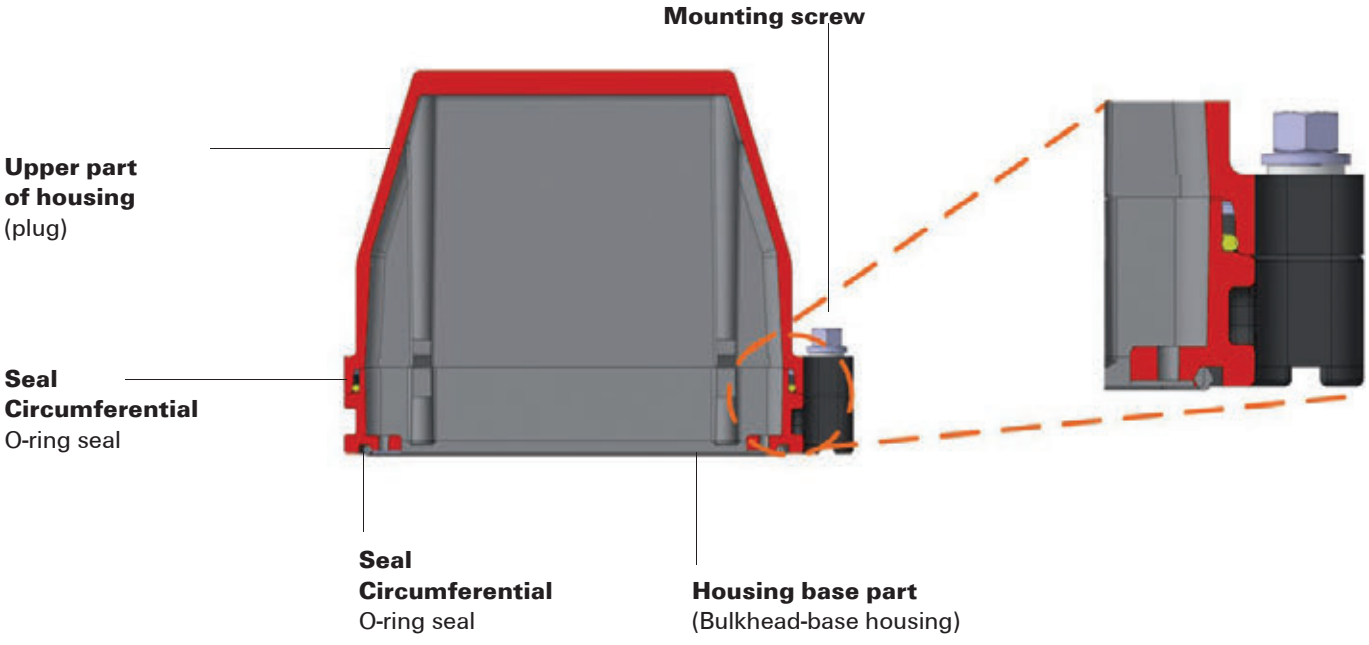
In order to test plug-in connectors, a reference shield cable is used that is separated in the middle. The cable can be connected with a corresponding connector pair and measured as described above. In order to evaluate the shield (the resistance between the cable shield and the reference earth), the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

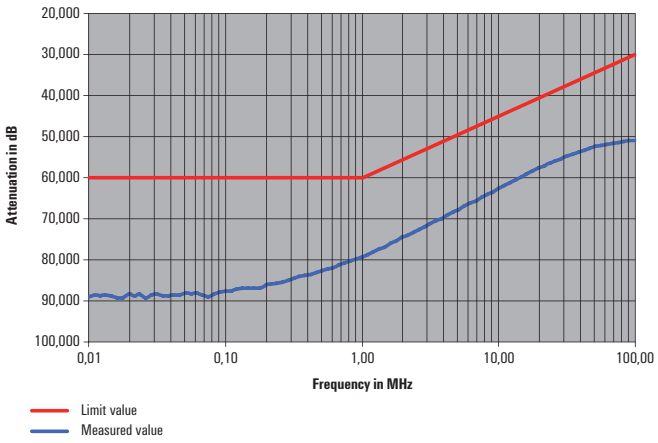
Weidmüller has designed the RockStar® IP68 housing with built-in features that ensure outstanding EMC and resistance to interference.

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.



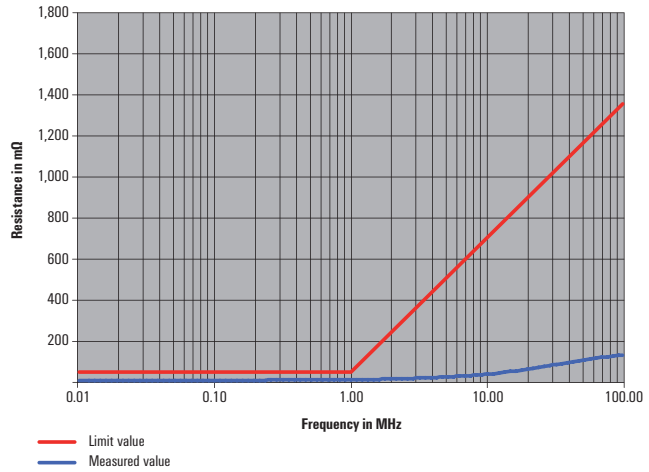
The requirements for an EMC-compliant interface stipulate that the interference immunity level or shield attenuation potential should be rated high enough so that the electromagnetic fields in the vicinity of the transmitted signals cannot exert influence within the connector. The capacity for active 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



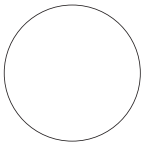
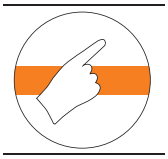
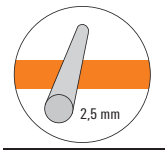
IP classes of protection to IEC 60529

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

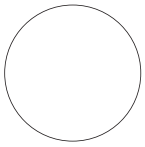
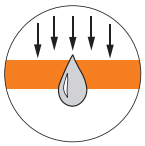
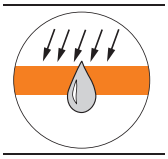
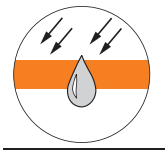
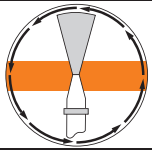
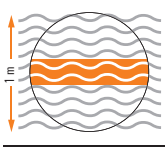
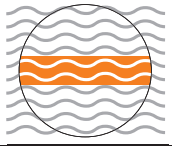
Example: I P 6 5

- 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	
Typ 1	Housing primarily for use in inside rooms. Protects from penetration of solid bodies.
Typ 2	Housing primarily for use in inside rooms. Protects from penetration of solid bodies and water.
Typ 3	Housing primarily for outdoor use. Protection against penetration by rainfall and dust as well as damage due to ice formation.
Typ 3R	Housing primarily for outdoor use. Protection against rain and snow as damage due to ice-formation.
Typ 3S	Housing primarily for outdoor use. Protection against rain, snow and foreign bodies. External mechanisms can be operated despite ice accumulation.
Typ 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.
Typ 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.
Typ 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	
Typ 12	Housing for use in inside rooms. Protects from dust deposits and non-corrosive dripping liquids.
Typ 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	–

+ resistant
– partially resistant

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	o
Ozone	o

+ resistant
– partially resistant
o not resistant

Chemical resistance of inserts (material PA6.6, 20 % GF)

Acetone	+
Ammonia, aqueous	+
Benzine	+
Diesel oil	+
Acetic acid, concentrated	–
Aqueous potassium hydroxide	+
Methanol	+
Engine oil	+
Alkaline solution, diluted	–
Chlorinated hydrocarbons	–
Use in open air	–

+ resistant
– partially resistant

Chemical resistance of silicone seal housing IP68

Acetone	+
Diesel oil	o
Ethyl alcohol	+
Gear oil	–
Hydraulic oil	–
Petrol	o
Sweat	–
High-octane petrol	o
Water	+
UV	+
Ozone	+

+ resistant
– partially resistant
o not resistant

Chemical resistance of FKM seal

Acetone	o
Diesel oil	+
Ethyl alcohol	+
Hydraulic oil	+
Acids	o
Benzine	+
Water	+
UV	+
Ozone	+

+ resistant
o not resistant

Safety information and 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)