ODU DOCK and ODU ROB

A perfect alliance.

Connectors for Docking and Robot Systems

www.odu.de

Robust Circular Connectors
ODU DOCK and ROB

Applications

– Industrial robots
– Tool change and depot systems
– Cable connections for robot systems
– Test equipment

Features

– Good safeguarding against failure
– Best guidance features
– Robust design
– High quality standards
– Easy handling during servicing
– Easy to use
– High number of mating cycles / long lifetime
– Flexible insert configuration
– Best electrical features

All shown connectors are according to DIN EN 61984:2009 connectors without breaking capacity (COC).

All dimensions in mm.
Most of the pictures are illustrations.
All data and specifications subject to change without notice.

Issue: 2014-02

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Connectors for Docking and Robot Systems – a Special Kind of Connector

Connectors for Docking and Robot Systems are connectors that have restricted guidance and that can be inserted automatically. The force can be applied manually, electrically or pneumatically.
Connectors for Docking and Robot Systems require simple constructed connectors with very different contacts. Often a large number of mating cycles are called for. The docking system stands or falls on the guide and the contact system that are selected.

Following are some of the features that are critical when connectors for Docking and Robot Systems are used:

– Good safeguarding against failure
– Best guidance features
– Robust design
– High quality standards
– Easy handling during servicing
– Easy to use
– High number of mating cycles / long lifetime
– Flexible insert configuration
– Best electrical features.

Connectors for Docking and Robot Systems are ideally suited for such use and satisfy these requirements.

From simple standard connectors for Docking and Robot Systems to the complex docking unit – ODU supplies the complete range.

Application of Connectors for Docking and Robot Systems

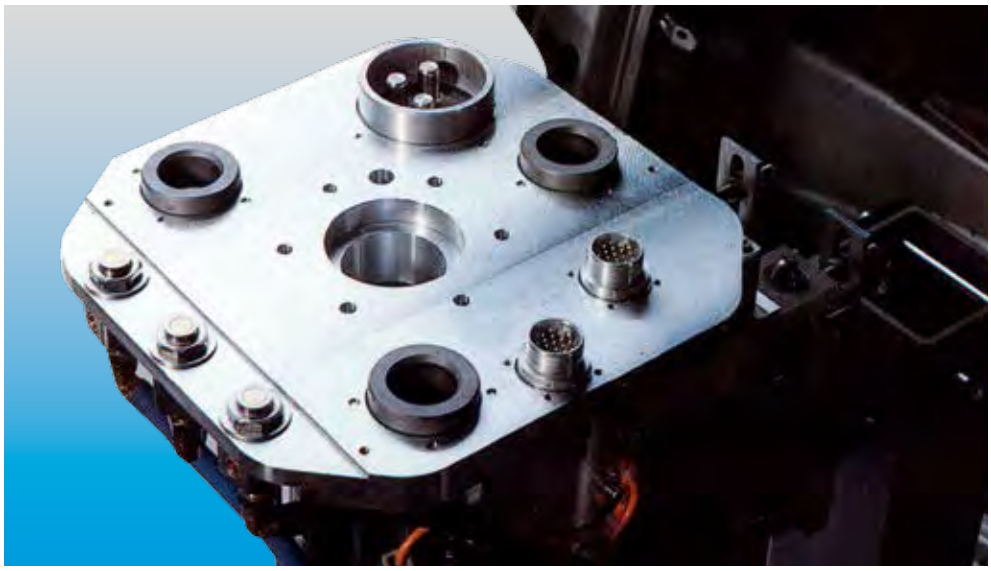
Connectors for Docking and Robot Systems have become indispensable in automation engineering.
Industrial robots, tool change and depot systems, cable connections and test equipment are just a few examples of the applications for these systems.
ODU docking systems are built into combined quick coupling systems (electrical/pneumatic) where they enable the greatest possible flexibility.

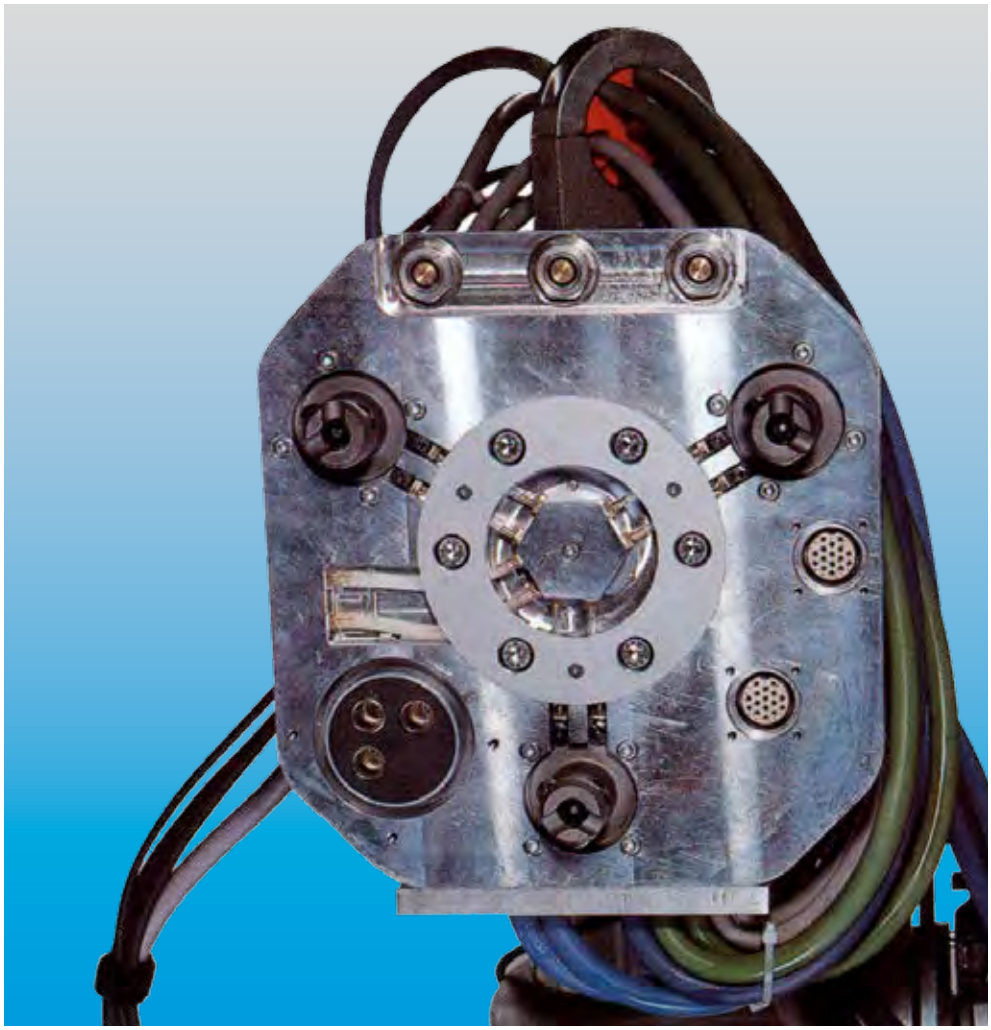
Product Description
ODU DOCK

ODU Docking and Robot Systems

ODU DOCK systems are mostly used for the following applications:

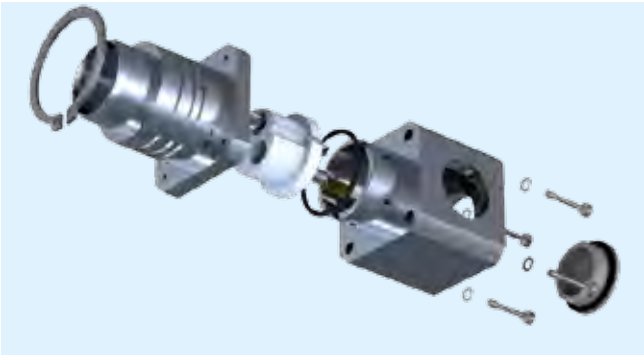
– Tool change and depot systems
– Test equipment
– Industrial robot systems.





Advantages of the ODU DOCK Connectors

- Easy assembly
- Temperature range: – 40° C up to +100° C
- Robust housing made out of aluminium or plastic
- Housing with EMC protection available
- 3 sizes
- Contacts with crimp and solder termination available
- Exchange of crimp contact within a few seconds
- Positions: 2 + PE up to 36 + PE, mixed inserts, power inserts
- Protection class: up to IP 65 available
- Straight and right-angled cable exit possible
- High contact reliability due to the established ODU SPRINGTAC contacts
- High number of mating cycles – up to 100,000
- Versions with quick-change head available for mating cycles of more than 1 million
- Floating mounting on docking plates
- Easy assembly of the insulator – anti-rotation
- High density with small contact diameter (e.g. 31 x ∅ 0.76 mm in size 1)
- High variety of contact inserts.



The ODU DOCK connection system consists of housing, insulator and contacts. These three components can be combined in a multitude of ways. In the crimp version, the contacts can be installed into and removed from the insulator in just a few seconds. The appropriate tools are available for this.
In the solder version the contacts are permanently mounted in the insulator and cannot be removed.

Housing Versions for ODU DOCK

There are three housing versions available:
– Plastic housing
– Aluminium housing, nickel-plated
– Aluminium housing, black anodized.

Plastic housing
– Material: POM, black
– Protection class: IP 65 in mated condition
– Operating temperature: – 40° C up to +100° C
– 3 housing sizes
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing
– More than 100,000 mating cycles[1)]

Aluminium housing, nickel-plated
– Material: aluminium, nickel-plated
– Protection class: IP 65 in mated condition (depends on version)
– Operating temperature: – 40° C up to +100° C
– 3 housing sizes
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing
– Available with and without EMC protection
– More than 100,000 mating cycles[1)]

Aluminium housing, black anodized
– Material: aluminium, black anodized
– Protection class: IP 40
– Operating temperature: – 40° C up to +100 °C
– 3 housing sizes
– Mountable from front of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing
– More than 100,000 mating cycles[1)]


Plastic housing


Aluminium housing nickel-plated


Aluminium housing black anodized

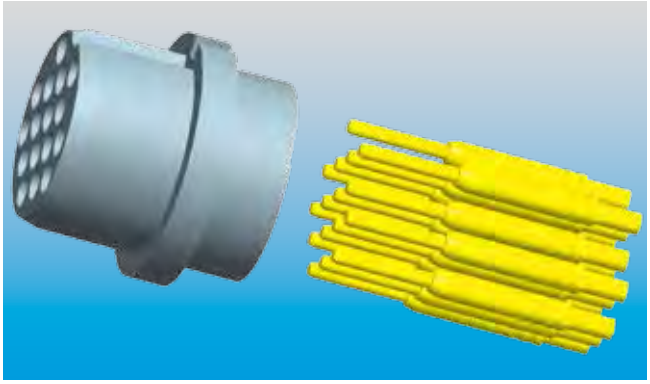
[1] Housing without shielding and without o-ring: min. 100,000 mating cycles.
Housing with shielding and without o-ring: min. 50,000 mating cycles.
It is recommended to change the front parts of the housing after 50,000 mating cycles, both socket and pin side.
Housing with o-ring: min. 25,000 mating cycles without maintenance and min. 100,000 mating cycles with maintenance.

Contact Inserts for ODU DOCK

Pin and socket inserts with crimp termination
The contact inserts consist of an insulator (contact carrier) and the associated number of pin or socket contacts.
In the crimped model, the insulator and contacts must be ordered separately. This flexible design allows the contact insert to be equipped individually. Crimp contacts can be installed and removed very quickly.

Material

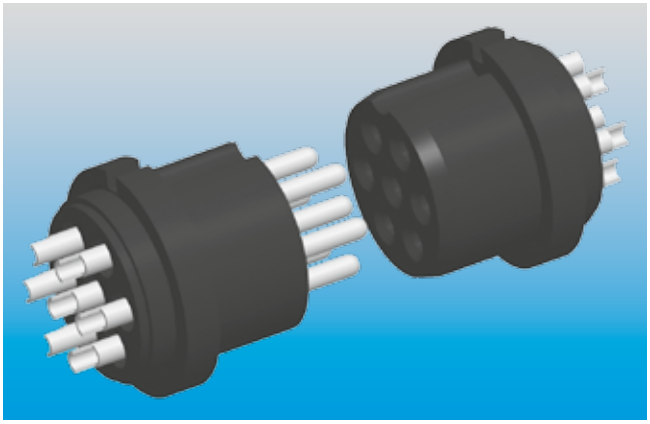
Insulator	PBT-GF (UL 94V-0)
Contacts	Cu-alloy surface contact from ⌀ 1.0 mm Au surface contact from ⌀ 1.5 mm Ag



Pin and Socket inserts with solder termination
The contact inserts consist of an insulator (contact carrier) and the associated number of pin or socket contacts.
Our solder inserts can cover a larger connection range.
The contacts in the solder version are already mounted in the insulator, which means that the delivered contact insert is already completely equipped.

Material

Insulator	fibre-glass reinforced polyester resin (UL 94V-0)
Contacts	surface Ag

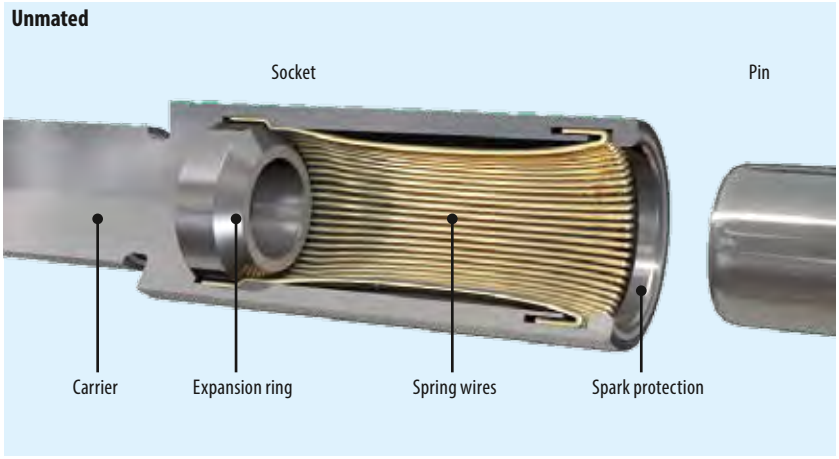


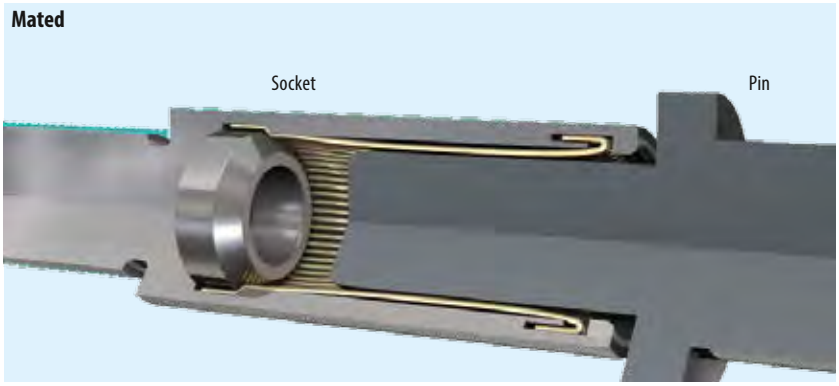
ODU SPRINGTAC® (Contacts with Springwire Technology)

The springwire contact is the inspired invention of Otto Dunkel. It offers the highest number of contact surfaces. The springwires are mounted individually and joined optimally to a turned carrier. The individual springwires contact and cushion independently of one another.

Advantages

– More than 100,000 mating cycles
– Low contact resistances
– Large number of independently cushioning contact springs
– Low insertion forces
– Extremely secure contacting
– High resistance to vibrations and impacts
– Long life span due to premium materials and surfaces.

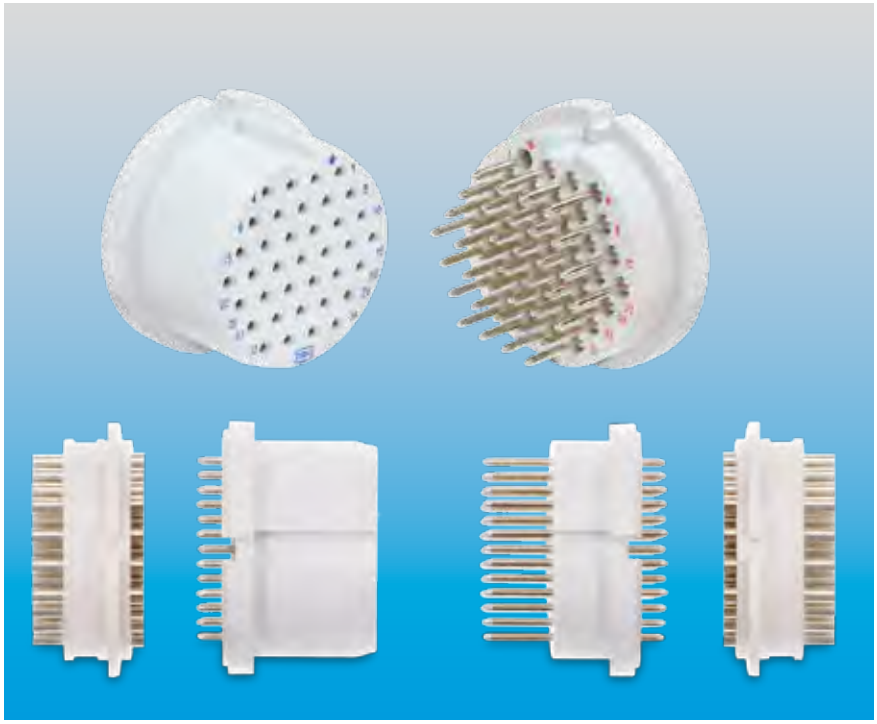




Inserts with Quick-Change Head Technology (QCH)

for an extremely high number of mating cycles

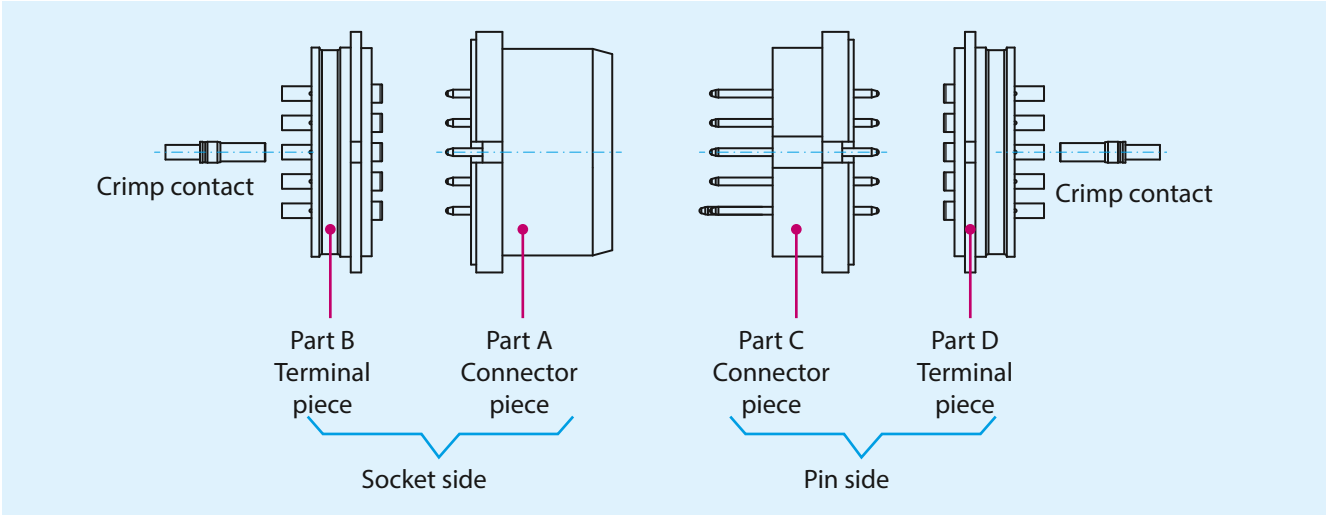
Die ODU SPRINGTAC contacts offer contact stability for up to 100,000 mating cycles. The ODU DOCK quick-change head is suitable for applications that require even more mating cycles.



Principle behind the quick-change head
The connection system consists of an interchangeable front part (connector piece) and a back part (terminal piece). When the contacts suffer from wear, the front part is exchanged in a very short time without it being necessary to separate the connections that are made with the contacts of the back part.

Material

Insulator	PBT-GF (UL 94V-0)
Contacts	Cu-alloy



Terminal pieces stay wired.
Connector pieces are exchanged in the Docking System.
Contacts at the Terminal piece B and D are respectively crimp contacts.

Order Information ODU DOCK

Order example with crimp insert
Housing, insulator and contacts must be ordered separately when crimp contacts are used.

– ODU DOCK, size 2
– Housing: Aluminium, black anodized
– 6 positions with earthing pin.

Picture for example only.

	Socket piece	Pin piece
Housing	1 × 656.162.051.000.000	1 × 656.162.052.000.000
Cable clamp	1 × 027.825.090.170.007	1 × 027.825.090.170.007
Insulator	1 × 208.703.004.007.000	1 × 208.803.004.007.000
Contacts	7 × 170.382.000.201.000	6 × 180.334.000.301.000
Earthing contact		1 × 180.335.000.301.000

Order example with solder insert
Housing and insert must be ordered separately when the solder version is used. The contacts are already fixed in the insulator and don't need to be ordered separately.

– ODU DOCK, size 1
– Housing: aluminium, black anodized
– 4 positions.

Picture for example only.

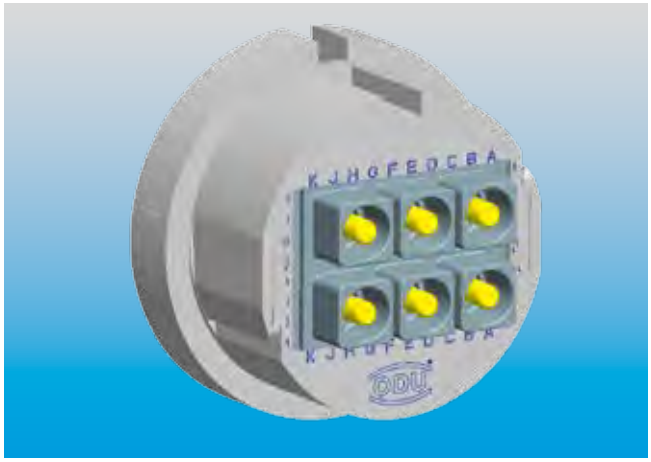
	Socket part	Pin part
Housing	1 × 656.164.051.000.000	1 × 656.164.052.000.000
Cable clamp	1 × 027.820.070.130.007	1 × 027.820.070.130.007
Insert	1 × 656.164.802.150.004	1 × 656.164.702.150.004

Order example with flexible insert
With the flexible inserts, the housing, insulator and the flexibly interchangeable modules must be ordered separately. The insulator must be completely filled with modules.

– ODU DOCK, size 3

– Housing: aluminium, black anodized

– 2 × power modules from the ODU-MAC program for AWG 14.



	Socket part	Pin part
Housing	1 × 656.163.051.000.000	1 × 656.163.052.000.000
Cable clamp	1 × 027.832.070.150.007	1 × 027.832.070.150.007
Flexible insert	1 × 209.610.000.000.000	1 × 209.611.000.000.000
ODU-MAC modules*	2 × 610.162.103.923.000	2 × 611.162.103.923.000
Contacts*	6 × 172.582.100.201.000	6 × 182.582.000.301.000

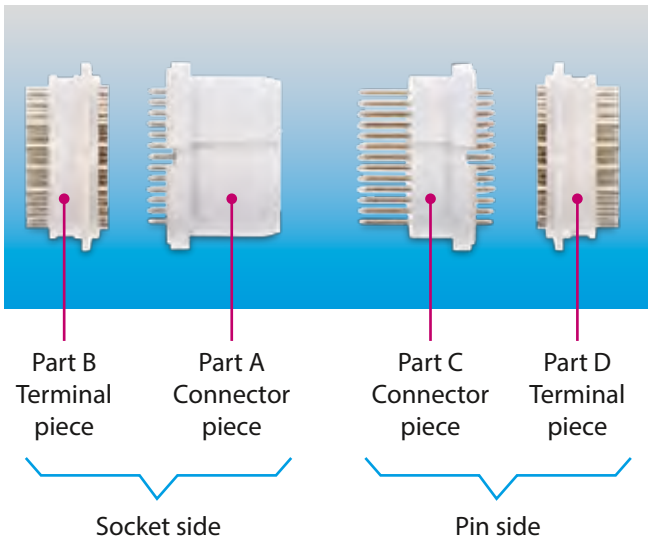
* Order information and technical data see from page 59, as well as the ODU-MAC product catalogue.

Order example for the quick-change head
The housing and inserts must be ordered separately for the quick-change head version.
The contacts for the inserts are included in the delivery.

– ODU DOCK QCH, size 3

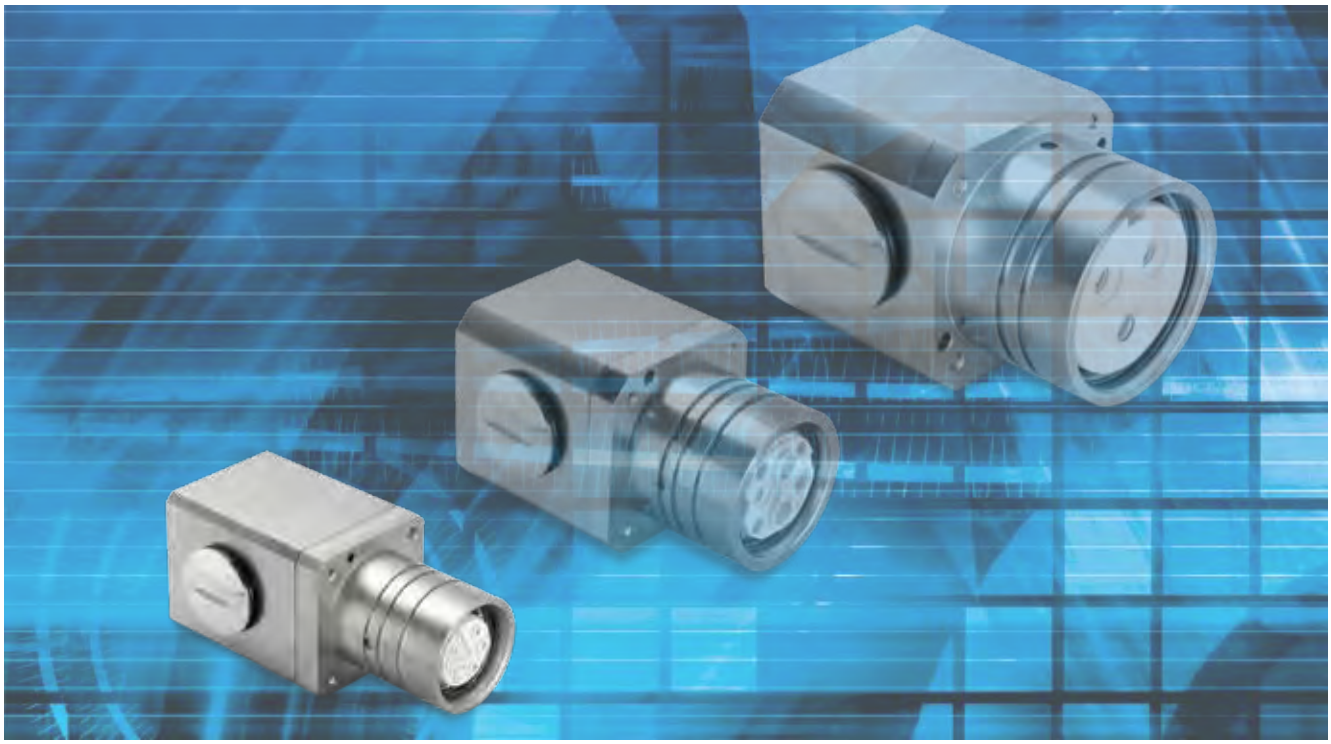
– Housing: plastic

– 36 positions with earthing pin.



		Socket part	Pin part
Housing		1 × 656.163.011.000.000	1 × 656.163.012.000.000
Cable clamp		1 × 027.832.070.150.007	1 × 027.832.070.150.007
Insert QCH	A	1 × 252.058.001.037.000	C 1 × 252.059.001.037.000
	B	1 × 252.061.001.037.000	D 1 × 252.061.002.037.000

ODU DOCK
Size 1



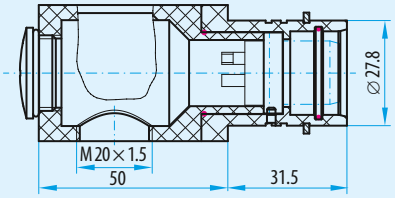
Housing

Plastic

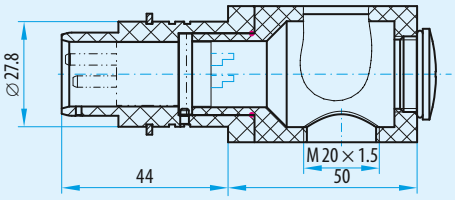
– Material: POM, black
– Protection class: IP 65 in mated condition
– Operating temperature: – 40° C up to +100° C
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing

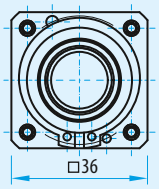
Description	Part number			
Socket piece	656.164.011.000.000			
Pin piece	656.164.012.000.000			

Socket piece



Pin piece



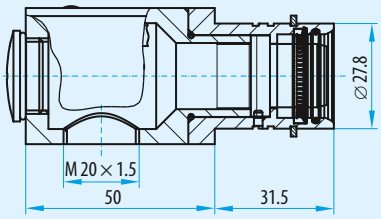


Aluminium, nickel-plated

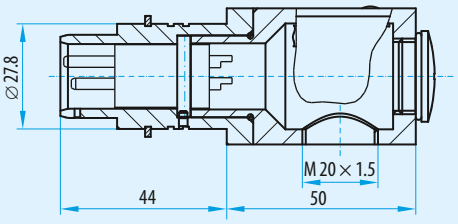
– Material: aluminium, nickel-plated
– Protection class: IP 65 in mated condition (depends on version)
– Operating temperature: – 40° C up to +100° C
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing
– Available with and without EMC protection

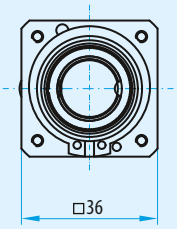
Description	Part number	IP 40	IP 65	EMC protection
Socket piece	656.164.021.000.000		•	•
	656.164.023.000.000	•		
	656.164.024.000.000	•		•
	656.164.025.000.000		•	
Pin piece	656.164.022.000.000	•	•	•

Socket piece



Pin piece



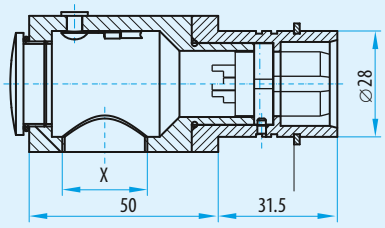


Aluminium, black anodized

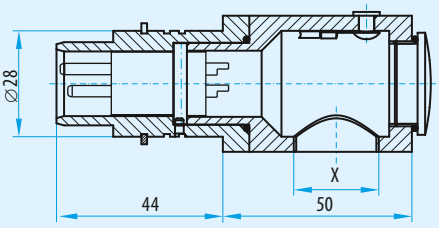
- Material: aluminium, black-anodized
- Protection class: IP 40 in mated condition
- Operating temperature: –40° C up to +100° C
- Mountable from front of panel
- Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
- Two-part housing

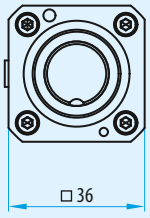
Description	Part number	Thread X
Socket piece	656.164.051.000.000	M 20 × 1.5
	656.164.001.000.000	PG 16
Pin piece	656.164.052.000.000	M 20 × 1.5
	656.164.002.000.000	PG 16

Socket piece

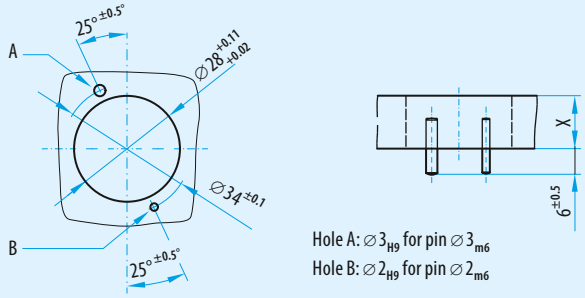


Pin piece





Assembly drilling for all size 1 versions

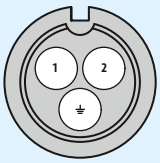


Board spacing
in mated position:
61 ± 0.5 mm

Board thickness "X"
20 mm: ± 0.1
14 mm: ± 0.1
10 mm: ± 0.1

Pin and Socket Inserts with Crimp Termination

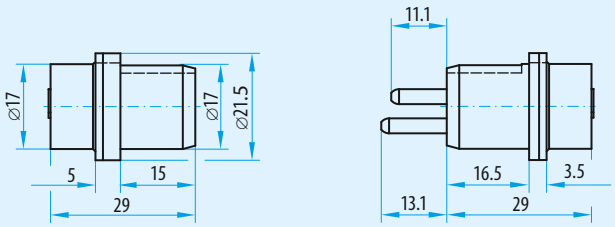
2 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	207.703.004.003.000					
			Insulator pin	207.803.004.003.000					
			Sealing plug	021.341.136.304.000					
			Socket contact	170.382.000.201.000					
			Pin contact	180.334.000.301.000	30	3.0	2.5	31 ± 10	29 ± 10
			Earthing pin contact	180.335.000.301.000					
			Socket contact	170.499.100.201.000					
			Pin contact	180.374.000.301.000	25	3.0	1.5	31 ± 10	
			Earthing pin contact	180.375.000.301.000					

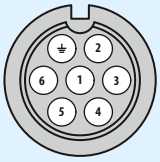
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	630 V	250 V
Rated impulse voltage	3 kV		4 kV	
Pollution degree	2	3	2	3

Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



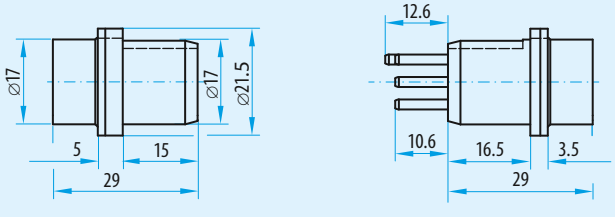
6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	207.702.004.007.000					
			Insulator pin	207.802.004.007.000					
			Sealing plug	021.341.135.923.000					
			Socket contact	170.381.000.201.000					
			Pin contact	180.332.000.301.000	25	2.0	1.5	40 ± 13	37 ± 13
			Earthing pin contact	180.333.000.301.000					
			Socket contact	170.827.100.201.000					
			Pin contact	180.827.000.301.000	20	2.0	1.0	40 ± 13	
			Earthing pin contact	180.828.000.301.000					

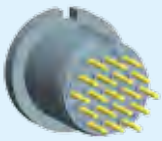
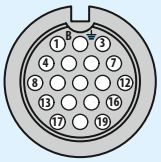
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	160 V	500 V	200 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



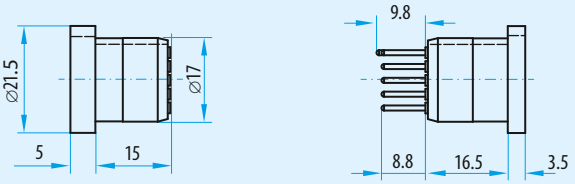
18 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket Insulator pin Sealing plug	207.701.001.019.000 207.801.001.019.000 021.341.124.300.000					
			Socket contact Pin contact	170.362.700.207.000 182.970.000.307.000	12	1.02	0.38 0.50	20 ± 7	18 ± 6

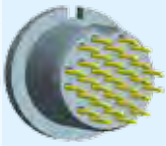
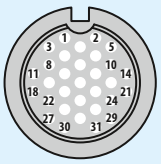
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	400 V	160 V	630 V	250 V
Rated impulse voltage	2.5 kV		3 kV	
Pollution degree	2	3	2	3

No extra earth contact necessary. Earthing is provided via the insulator geometry.
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



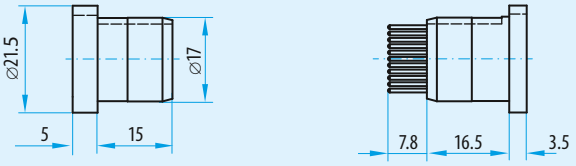
31 positions

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket Insulator pin Sealing plug	207.742.001.031.000 207.842.001.031.000 021.341.123.923.000					
			Socket contact Pin contact	170.361.700.207.000 180.381.000.307.000	10	0.76	0.38	30 ± 10	28 ± 10
			Socket contact Pin contact	170.540.700.207.000 180.570.000.307.000	8	0.76	0.08 0.25	30 ± 10	

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	250 V	50 V	320 V	80 V
Rated impulse voltage	2 kV		2.5 kV	
Pollution degree	2	3	2	3

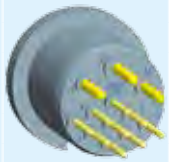
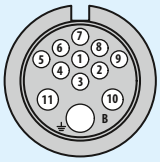
Without earthing contact. Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



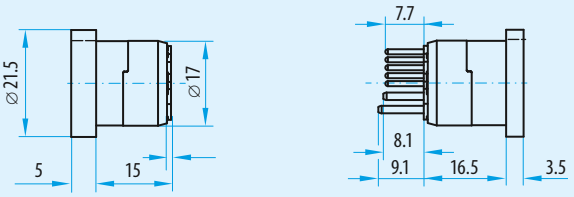
Pin- and Socket Inserts with **Crimp Termination**

2 positions with earthing and 9 pilot contacts

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	207.700.001.012.000					
			Insulator pin	207.800.001.012.000					
			Sealing plug	021.341.125.923.000		1.5			
			Sealing plug	021.341.124.300.000		1.02			
			Socket contact (10, 11, E)	170.363.100.201.001	25	1.5	1.5	20 ± 7	18 ± 6
			Socket contact (1 to 9)	170.362.700.207.000	12	1.02	0.38 / 0.5		
			Pin contact (10, 11, E)	180.383.000.301.000	25	1.5	1.5		
			Pin contact (1 to 9)	180.382.000.307.000	12	1.02	0.38 / 0.5		

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
for contact diameter 1.5				
Rated voltage	630 V	250 V	800 V	320 V
Rated impulse voltage	3 kV		4 kV	
Pollution degree	2	3	2	3
for contact diameter 1.02				
Rated voltage	400 V	160 V	630 V	250 V
Rated impulse voltage	2.5 kV		3 kV	
Pollution degree	2	3	2	3

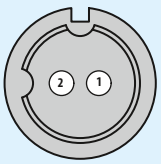
Dimensions insulator (socket piece/pin piece)



No extra earth contact necessary. Earthing is provided via the insulator geometry.
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Pin and Socket Inserts with Solder Termination

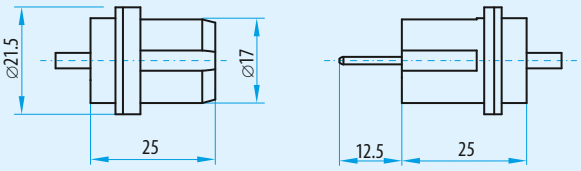
2 positions

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.745.751.002 656.164.845.751.002	25	1.5	2.5	10 ± 3	8 ± 3

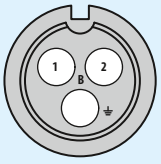
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	400 V	160 V	400 V	160 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



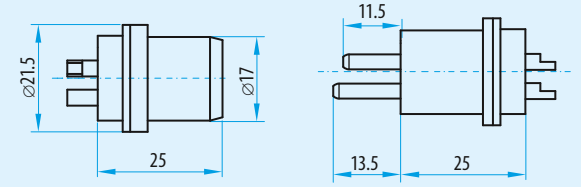
2 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.703.152.003 656.164.803.152.003	30	3.0	2.5	30 ± 10	25 ± 8

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	630 V	200 V	630 V	200 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

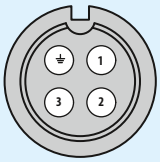
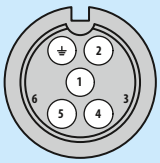
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Solder Termination

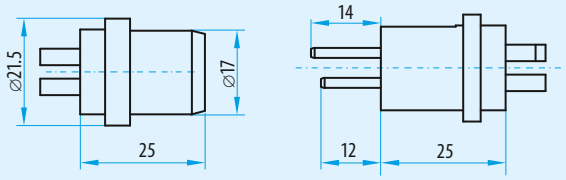
3 positions with earthing / 4 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.702.150.004 656.164.802.150.004	30	2.0	2.5	25 ± 8	20 ± 7
			Socket insert Pin insert	656.164.702.150.005 656.164.802.150.005	25	2.0	1.5	30 ± 10	25 ± 8

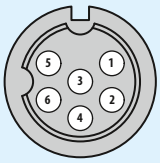
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	500 V	200 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



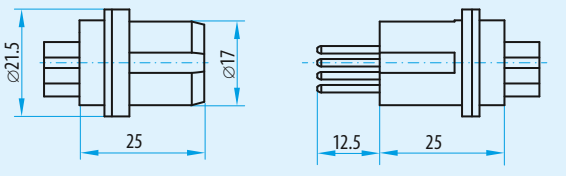
6 positions

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.745.751.006 656.164.845.751.006	25	1.5	2.5	25 ± 8	20 ± 7

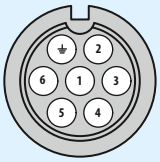
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	800 V	250 V	1,000 V	250 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



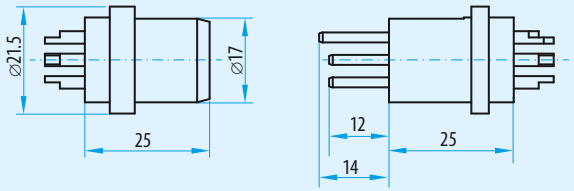
6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.702.150.007 656.164.802.150.007	25	2.0	1.5	40 ± 12	30 ± 10

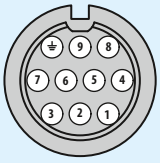
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	500 V	200 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



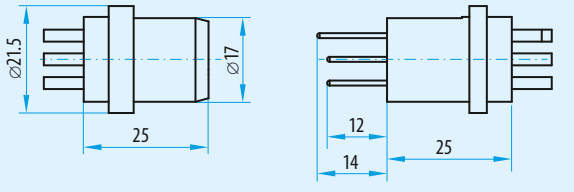
9 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.164.701.150.010 656.164.801.150.010	12	1.0	1.0	20 ± 7	18 ± 6

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	250 V	32 V	320 V	63 V
Rated impulse voltage	2 kV		2.5 kV	
Pollution degree	2	3	2	3

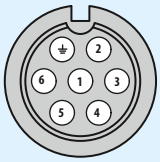
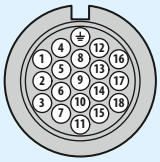
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



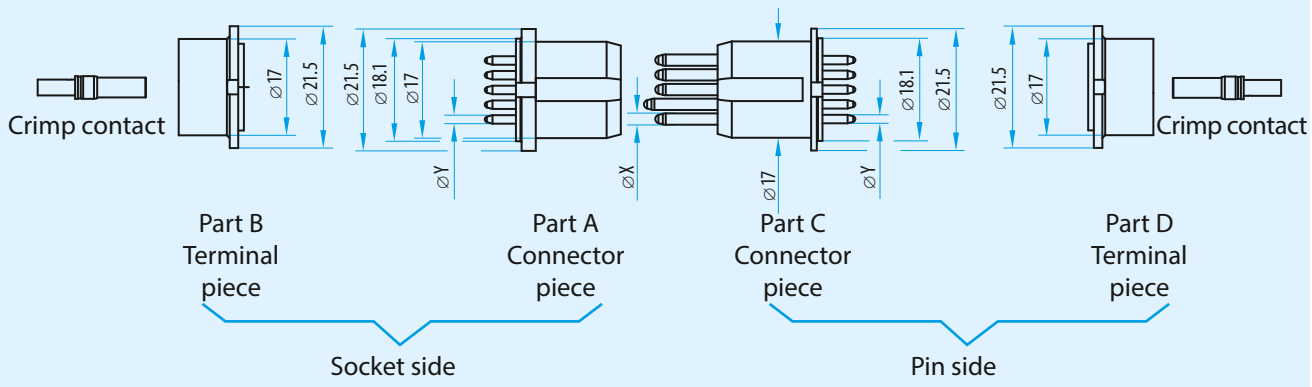
Quick-Change Head System (QCH) with Crimp Termination

6 positions with grounding / 18 positions with grounding

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter X in mm	Termination diameter Y in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator part A Insulator part B Insulator part C Insulator part D	252.087.001.007.000 252.089.001.007.000 252.088.001.007.000 252.089.002.007.000	18	2.0	1.5	0.5 to 1.5	40 ± 13	37 ± 13
			Insulator part A Insulator part B Insulator part C Insulator part D	252.087.001.019.000 252.089.011.019.000 252.088.001.019.000 252.089.012.019.000	12	1.0	0.9	0.5 to 1.0	20 ± 7	18 ± 16

Crimping tools from page 73.
Operating voltage in the metal housing: 50 V / 2.5 kV / 3

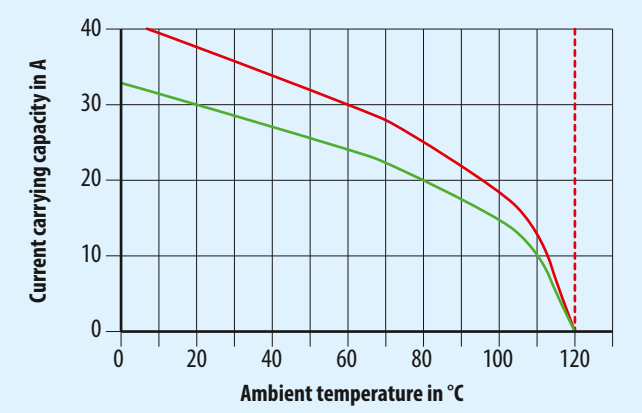
Dimensions insulator



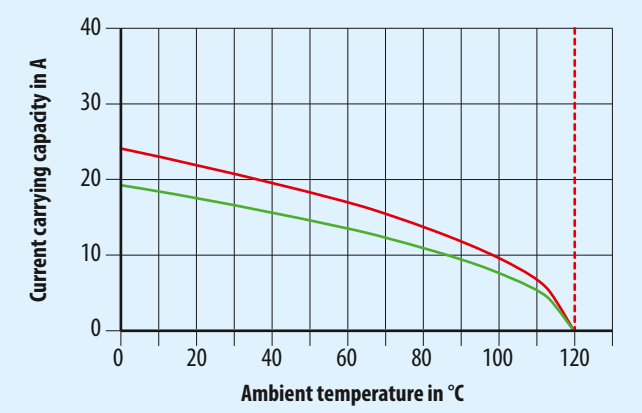
Terminal pieces stay wired.
Connector pieces are exchanged in the Docking System.
Contacts at the Terminal piece B and D are respectively crimp contacts.

Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

Derating curves for crimp inserts

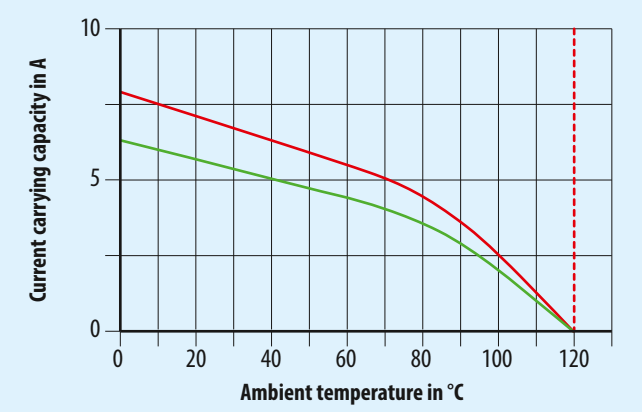


Insert 207.703.004.003.000 with 207.803.004.003.000
equipped with contact diameter 3.0 mm
(cable cross-section 2.5 mm²).

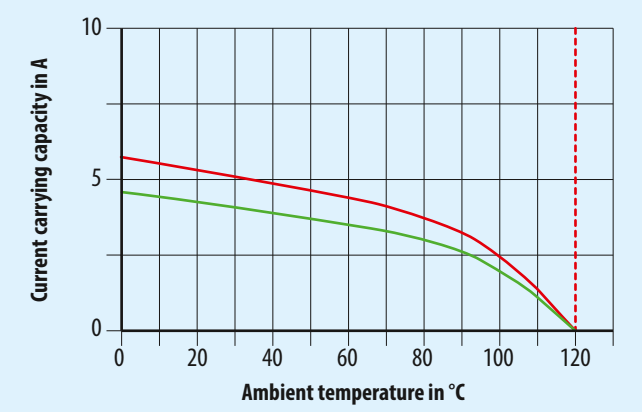


Insert 207.702.004.007.000 with 207.802.004.007.000
equipped with contact diameter 2.0 mm
(cable cross section 1.5 mm²).

Derating curves for crimp inserts



Insert 207.701.001.019.000 with 207.801.001.019.000
equipped with contact diameter 1.02 mm
(cable cross-section 0.50 mm²).



Insert 207.742.001.031.000 with 207.842.001.031.000
equipped with contact diameter 0.76 mm
(cable cross-section 0.38 mm²).

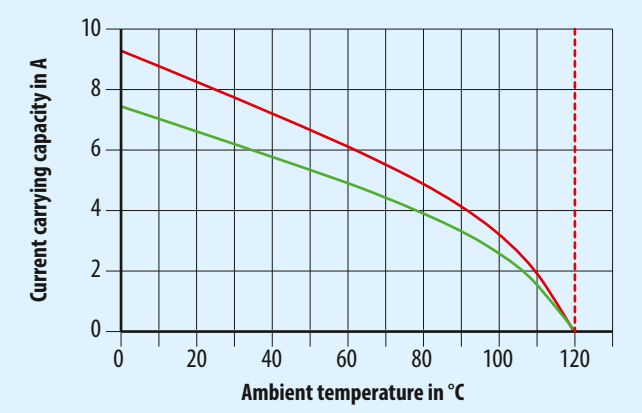
Legend of diagrams

- Max. temperature of contact material
- Basis curve
- Corrected curve

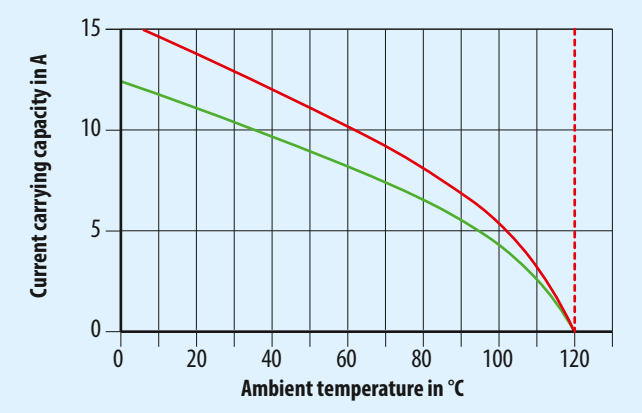
Further derating curves see next page.

Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

Derating curves for crimp inserts with mixed insert



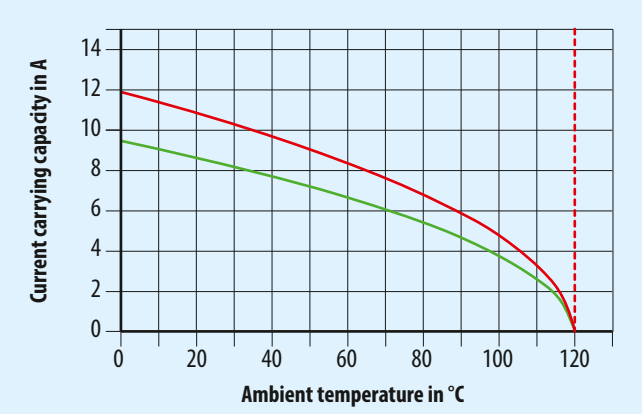
Contact diameter **1.02 mm**



Contact diameter **1.5 mm**

Mixed insert: Insert 207.700.001.012.000 with 207.800.001.012.000 equipped with contact diameter 1.5 mm (cable cross-section 1.5 mm^2) and contact diameter 1.02 mm (cable cross-section 0.50 mm^2).

Derating curve for quick-change head system



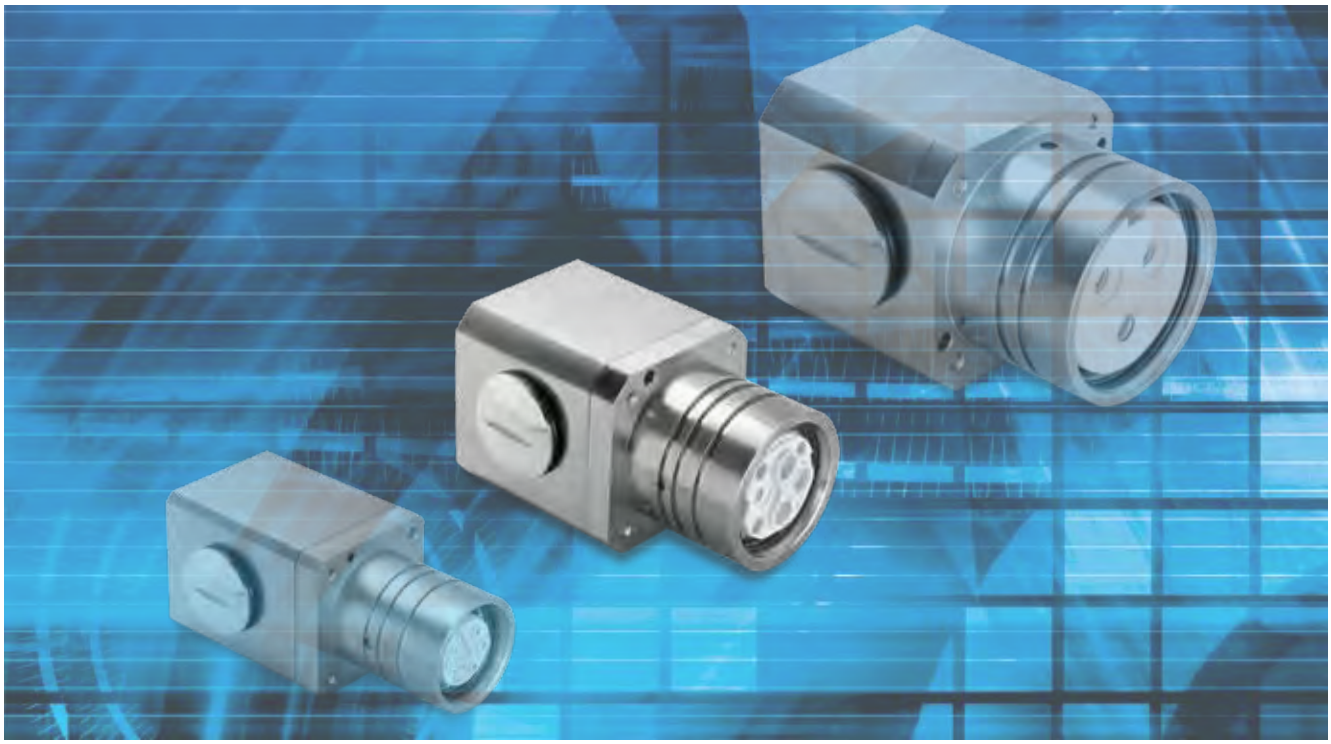
Insert 252.087.001.019.000 / 252.089.011.019.000
with 252.088.001.019.000 / 252.089.012.019.000
equipped with contact diameter 1.0 mm
(cable cross-section 1 mm^2).

Legend of diagrams

- Max. temperature of contact material
- Basis curve
- Corrected curve

Further derating curves on request.

ODU DOCK
Size 2



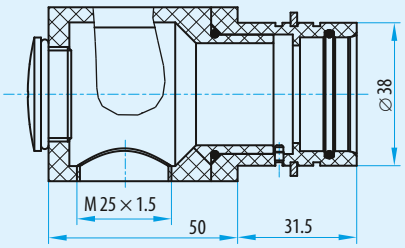
Housing

Plastic

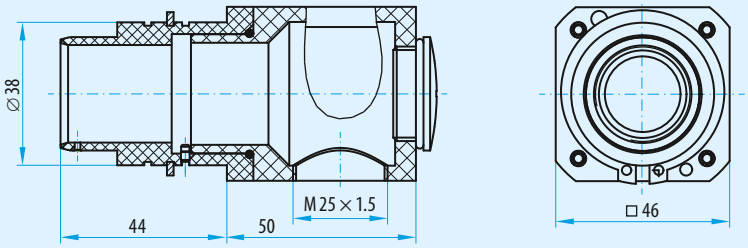
- Material: POM, black
- Protection class: IP 65 in mated condition
- Operating temperature: –40° C up to +100° C
- Easy Assembly from rear of panel
- Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
- Two-part housing

Description	Part number			
Socket piece	656.162.011.000.000			
Pin piece	656.162.012.000.000			

Socket piece



Pin piece

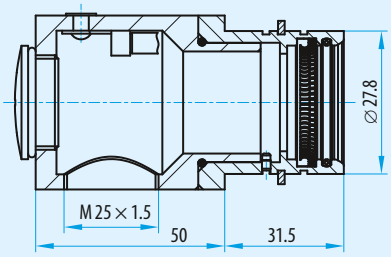


Aluminium, nickel-plated

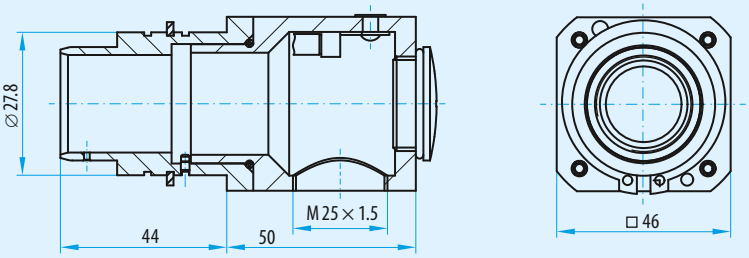
- Material: aluminium, nickel-plated
- Protection class: IP 65 in mated condition (depends on version)
- Operating temperature: –40° C up to +100° C
- Easy Assembly from rear of panel
- Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
- Two-part housing
- Available with and without EMC protection

Description	Part number	IP 40	IP 65	EMC protection
Socket piece	656.162.021.000.000		•	•
	656.162.023.000.000	•		
	656.162.024.000.000	•		•
	656.162.025.000.000		•	
Pin piece	656.162.022.000.000	•	•	•

Socket piece



Pin piece

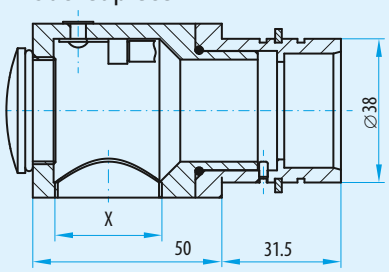


Aluminium, black anodized

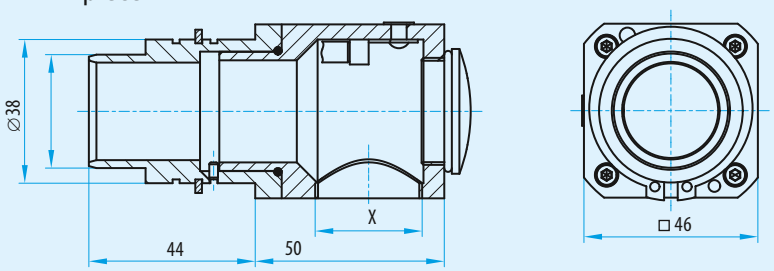
- Material: aluminium, black anodized
- Protection class: IP 40
- Operating temperature: – 40° C up to +100° C
- Mountable from front of panel
- Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
- Two-part housing

Description	Part number	Thread X
Socket piece	656.162.051.000.000	M 25 × 1.5
	656.162.001.000.000	PG 21
Pin piece	656.162.052.000.000	M 25 × 1.5
	656.162.002.000.000	PG 21

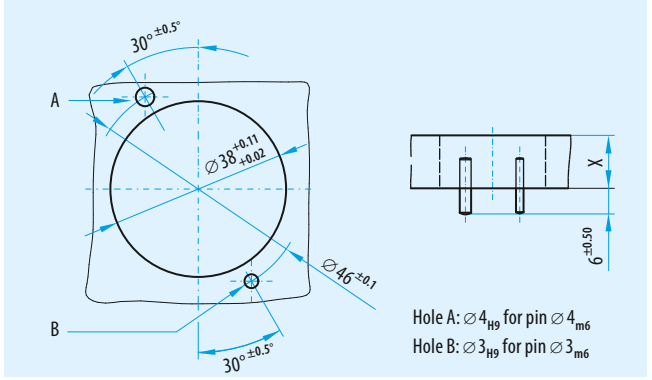
Socket piece



Pin piece



Assembly drilling for all size 2 versions

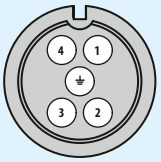
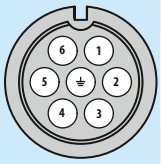


Board spacing
in mated condition:
61 ± 0.5 mm

Board thickness "X"
20 mm: ± 0.1
14 mm: ± 0.1
10 mm: ± 0.1

Pin and Socket Inserts with Crimp Termination

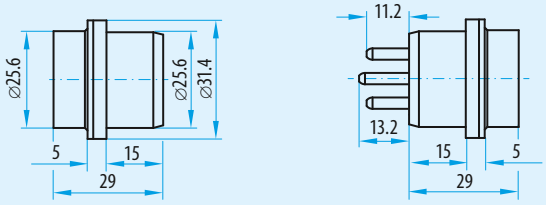
4 positions with earthing / 6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket Insulator pin Sealing plug	208.703.004.005.000 208.803.004.005.000 021.341.136.304.000					
			Socket contact Pin contact Earthing pin contact	170.382.000.201.000 180.334.000.301.000 180.335.000.301.000	30	3.0	2.5	50 ± 15	45 ± 15
			Socket contact Pin contact Earthing pin contact	170.499.100.201.000 180.374.000.301.000 180.375.000.301.000	25	3.0	1.5		
			Insulator socket Insulator pin Sealing plug	208.703.004.007.000 208.803.004.007.000 021.341.136.304.000					
			Socket contact Pin contact Earthing pin contact	170.382.000.201.000 180.334.000.301.000 180.335.000.301.000	30	3.0	2.5	70 ± 20	60 ± 20
			Socket contact Pin contact Earthing pin contact	170.499.100.201.000 180.374.000.301.000 180.375.000.301.000	25	3.0	1.5		

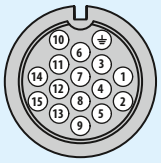
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	800 V	320 V	800 V	320 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



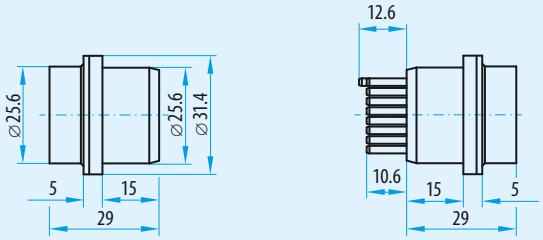
15 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	208.702.004.016.000					
			Insulator pin	208.802.004.016.000					
			Sealing plug	021.341.135.924.000					
			Socket contact	170.381.000.201.000					
			Pin contact	180.332.000.301.000	25	2.0	1.5		
			Earthing pin contact	180.333.000.301.000					
			Socket contact	170.827.100.201.000				90 ± 30	80 ± 25
			Pin contact	180.827.000.301.000	20	2.0	1.0		
			Earthing pin contact	180.828.000.301.000					

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	400 V	160 V	400 V	160 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

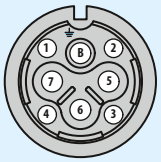
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



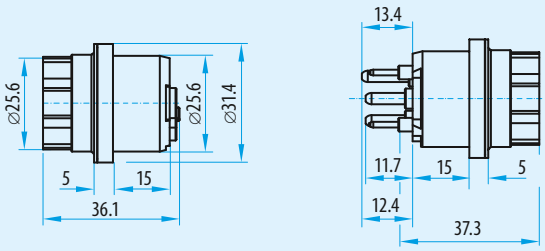
Pin and Socket Inserts with Crimp Termination

3 positions with earthing and 4 pilot contacts

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	208.700.001.008.000					
			Insulator pin	208.800.001.008.000					
			Sealing plug socket/pin	021.341.136.924.000		3.0			
			Sealing plug socket	021.341.131.923.000		1.5			
			Sealing plug pin	021.341.132.923.000		1.5			
			Socket contact	172.085.100.201.000	35	3.0	4	50 ± 15	45 ± 15
			Socket contact	170.363.100.201.001	25	1.5	1.5		
			Pin contact	182.085.000.301.000	35	3.0	4		
			Pin contact	181.135.000.301.000	25	1.5	1.5		
			Socket contact Pin contact	170.382.000.201.000 180.335.000.301.000	30	3.0	2.5		
			Socket contact Pin contact	170.499.100.201.000 180.375.000.301.000	25	3.0	1.5		

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
for contact diameter 3.0				
Rated voltage	1600 V	800 V	1600 V	800 V
Rated impulse voltage	6 kV		8 kV	
Pollution degree	2	3	2	3
for contact diameter 1.5				
Rated voltage	630 V	250 V	1600 V	800 V
Rated impulse voltage	4 kV		8 kV	
Pollution degree	2	3	2	3

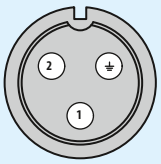
Dimensions insulator (socket piece/pin piece)



No extra earth contact necessary. Earthing is provided via the insulator geometry.
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Pin and Socket Inserts with Solder Termination

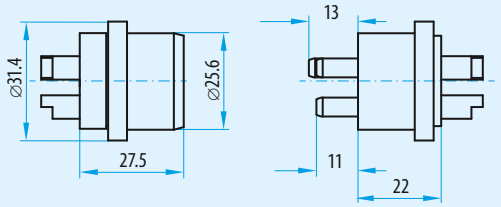
2 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.162.705.150.003 656.162.805.150.003	85	5.0	10	50 ± 15	45 ± 15

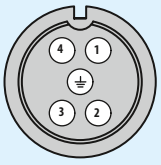
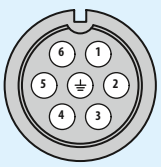
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	630 V	250 V	800 V	320 V
Rated impulse voltage	4 kV		5 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



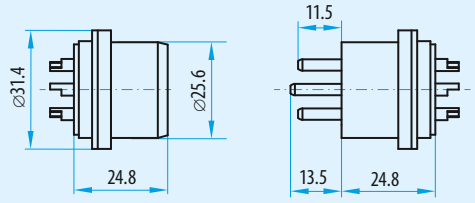
4 positions with earthing / 6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.162.703.152.005 656.162.803.152.005	30	3.0	2.5	50 ± 15	45 ± 15
			Socket insert Pin insert	656.162.703.161.007 656.162.803.161.007	30	3.0	2.5	70 ± 20	60 ± 20

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	630 V	250 V	800 V	250 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

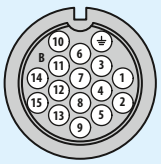
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Solder Termination

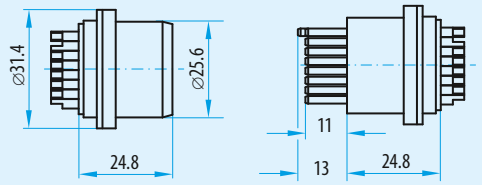
15 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.162.702.153.016 656.162.802.152.016	25	2.0	1.5	90 ± 30	80 ± 25

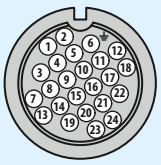
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	320 V	63 V	320 V	63 V
Rated impulse voltage	2.5 kV		2.5 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



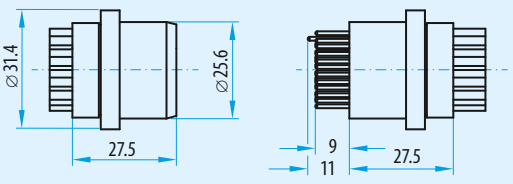
23 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.162.701.150.024 656.162.801.150.024	12	1.0	1.5	35 ± 12	30 ± 10

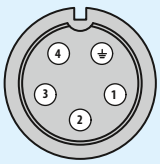
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	320 V	63 V	320 V	63 V
Rated impulse voltage	2.5 kV		2.5 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



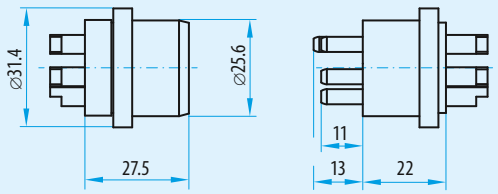
4 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.162.704.150.005 656.162.804.150.005	55	4.0	6.0	60 ± 20	50 ± 15

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	400 V	160 V	400 V	160 V
Rated impulse voltage	2.5 kV		2.5 kV	
Pollution degree	2	3	2	3

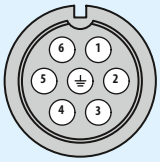
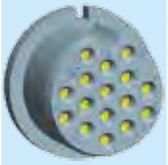
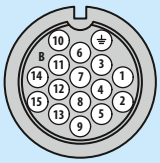
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



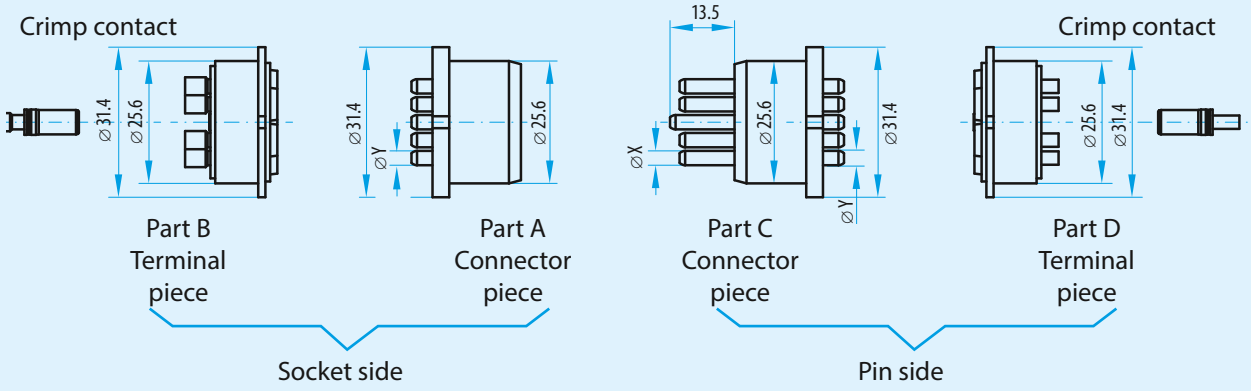
Quick-Change Head System (QCH) with Crimp Termination

6 positions with earthing / 15 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator part A Insulator part B Insulator part C Insulator part D	252.080.001.007.000 252.082.011.107.150 252.081.001.007.000 252.082.012.107.150	18	3.0	3.0	0.5 to 1.5	70 ± 20	60 ± 20
			Insulator part A Insulator part B Insulator part C Insulator part D	252.080.001.016.000 252.082.001.016.000 252.081.001.016.000 252.082.002.016.000	18	2.0	1.5	0.5 to 1.5	90 ± 30	80 ± 25

Crimping tools from page 73.
Operating voltage 6 positions with earthing in metal housing: 250 V / 4 kV / 3
Operating voltage 15 positions with earthing in metal housing: 40 V / 2.5 kV / 3

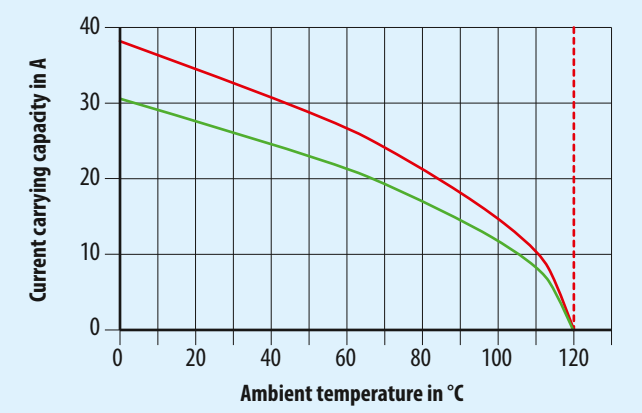
Dimensions insulator



Terminal pieces stay wired.
Connector pieces are exchanged in the Docking System.
Contacts at the Terminal piece B and D are respectively crimp contacts.

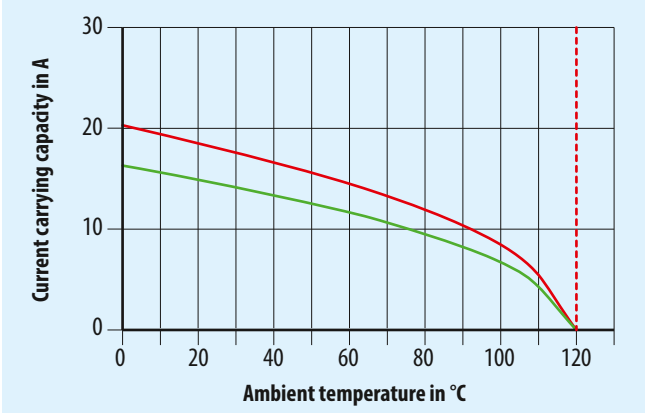
Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

Derating curves for crimp inserts



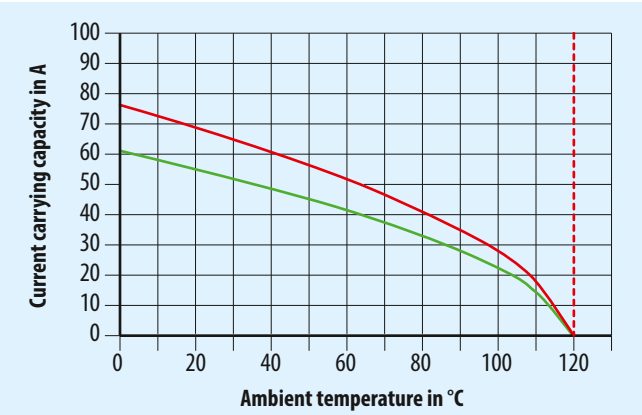
Insert 208.703.004.007.000 with 208.803.004.007.000 equipped with contact diameter 3.0 mm (cable cross-section 2.5 mm²).

For insert 208.803.004.005.000 equipped with contact diameter 3.0 mm (cable cross-section 2.5 mm²) the derating curve from 208.803.004.007.000 can be used.



Insert 208.702.004.016.000 with 208.802.004.016.000 equipped with contact diameter 2.0 mm (cable cross-section 1.5 mm²).

Derating curves for solder inserts



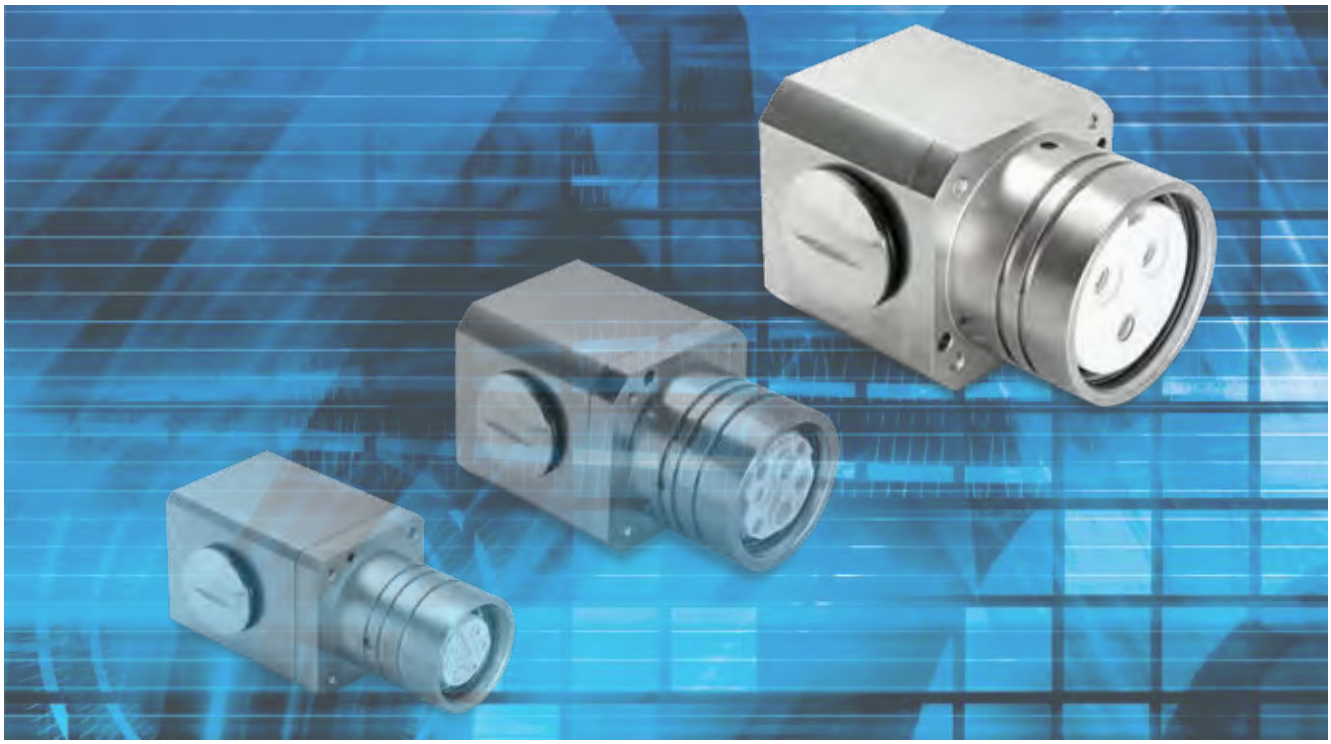
Insert 656.162.704.150.005 with 656.162.804.150.005 equipped with contact diameter 4.0 mm (cable cross-section 6.0 mm²).

Legend of diagrams

- Max. temperature of contact material
- Basis curve
- Corrected curve

Further derating curves on request.

ODU DOCK
Size 3

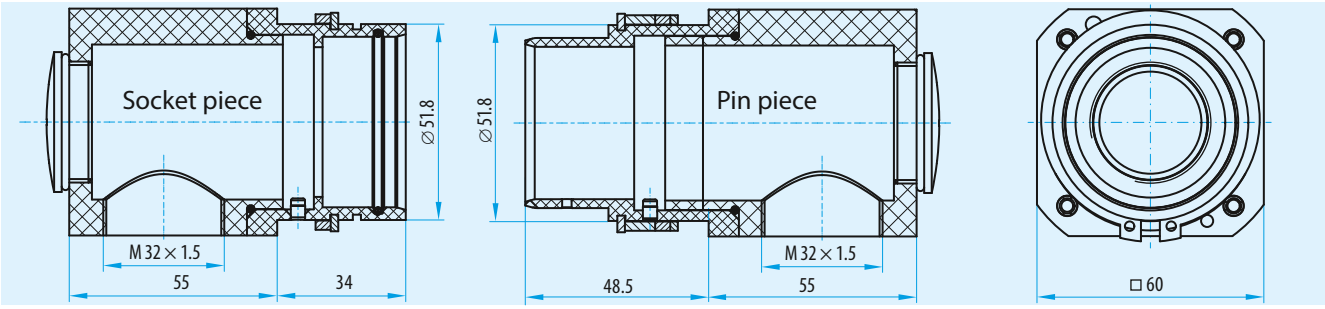


Housing

Plastic

– Material: POM, black
– Protection class: IP 65 in mated condition
– Operating temperature: – 40° C up to +100° C
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing

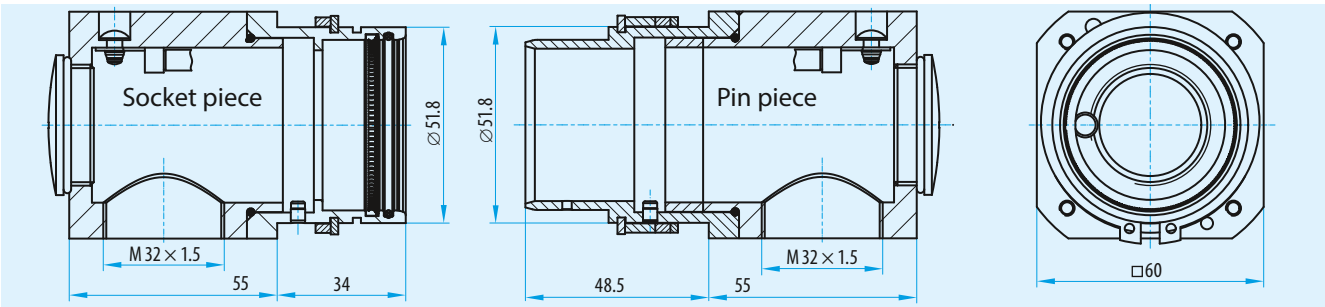
Description	Part number			
Socket piece	656.163.011.000.000			
Pin piece	656.163.012.000.000			



Aluminium, nickel-plated

– Material: aluminium, nickel-plated
– Protection class: IP 65 in mated condition (depends on version)
– Operating temperature: – 40° C up to +100° C
– Easy assembly from rear of panel
– Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
– Two-part housing
– Available with and without EMC protection

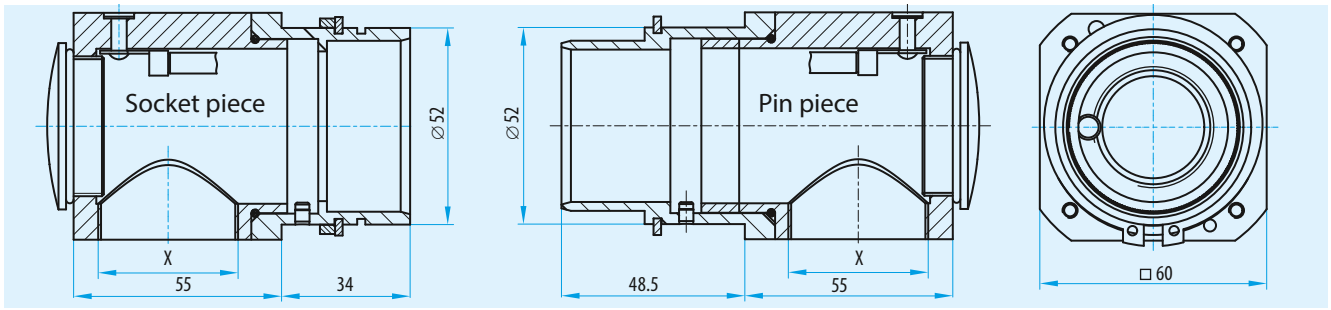
Description	Part number	IP 40	IP 65	EMC protection
Socket piece	656.163.021.000.000		•	•
	656.163.023.000.000	•		
	656.163.024.000.000	•		•
	656.163.025.000.000		•	
Pin piece	656.163.022.000.000	•	•	•



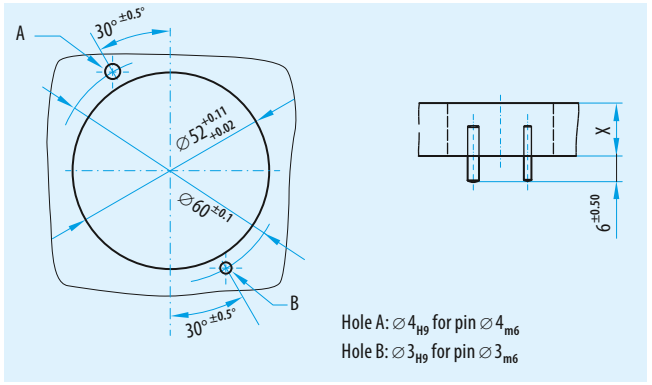
Aluminium, black anodized

- Material: aluminium, black anodized
- Protection class: IP 40
- Operating temperature: – 40° C up to +100° C
- Mountable from front of panel
- Straight and right-angled cable exit possible, sealing plug for unused cable exit is included in the delivery
- Two-part housing

Description	Part number	Thread X
Socket piece	656.163.051.000.000	M 32 × 1.5
	656.163.001.000.000	PG 29
Pin piece	656.163.052.000.000	M 32 × 1.5
	656.163.002.000.000	PG 29



Assembly drilling for all size 3 versions

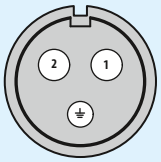


Board spacing
in mated position:
61 ± 0.5 mm

Board thickness "X"
20 mm: ± 0.1
14 mm: ± 0.1
10 mm: ± 0.1

Pin and Socket Inserts with Crimp Termination

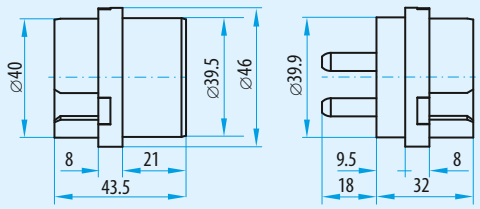
2 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.706.004.003.000					
			Insulator pin	209.806.004.003.000					
			Socket contact	172.929.100.201.000					
			Pin contact	181.146.000.301.000	95	6.0	16.0	60 ± 20	
			Earthing socket	172.930.100.201.000					
			Socket contact	172.927.100.201.000					
			Pin contact	181.144.000.301.000	55	6.0	6.0	60 ± 20	55 ± 20
			Earthing socket	172.928.100.201.000					
			Socket contact	172.925.100.201.000					
			Pin contact	181.142.000.301.000	30	6.0	2.5	60 ± 20	
			Earthing socket	172.926.100.201.000					

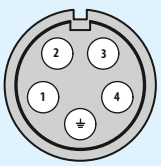
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,000 V	400 V	1,600 V	800 V
Rated impulse voltage	5 kV		6 kV	
Pollution degree	2	3	2	3

Insulator without holding clip – contacts are inserted from the side.
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



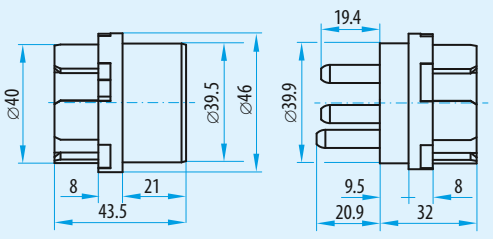
4 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.706.004.005.000					
			Insulator pin	209.806.004.005.000	95	6.0	16	100± 35	90 ± 30
			Socket contact	172.650.100.201.000					
			Pin contact	182.504.000.301.000					

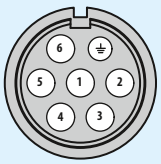
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,000 V	400 V	1,250 V	500 V
Rated impulse voltage	5 kV		6 kV	
Pollution degree	2	3	2	3

No extra earth contact necessary. Earthing is provided via the insulator geometry.
Insulator without holding clip – contacts are inserted from the side.
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



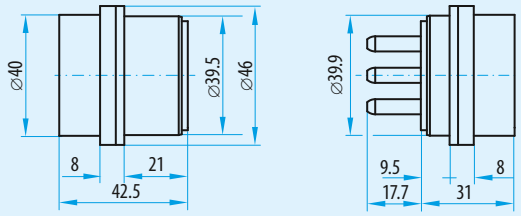
6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.705.004.007.000					
			Insulator pin	209.805.004.007.000					
			Sealing plug socket	021.341.141.924.000					
			Sealing plug pin	021.341.142.924.000					
			Socket contact	170.633.100.201.000					
			Earthing socket contact	170.634.100.201.000	85	5.0	10		
			Pin contact	180.633.000.301.000					
			Socket contact	170.452.100.201.000					
			Earthing socket contact	170.453.100.201.000	55	5.0	6		
			Pink contact	180.452.000.301.000					
			Socket contact	172.931.100.201.000				130± 40	120± 40
			Earthing socket contact	172.932.100.201.000	35	5.0	4		
			Pin contact	181.140.000.301.000					
			Socket contact	170.492.100.201.000					
			Earthing socket contact	170.493.100.201.000	25	5.0	1.5		
			Pin contact	180.492.000.301.000					

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,600 V	630 V	1,600 V	630 V
Rated impulse voltage	6 kV		6 kV	
Pollution degree	2	3	2	3

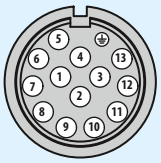
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Crimp Termination

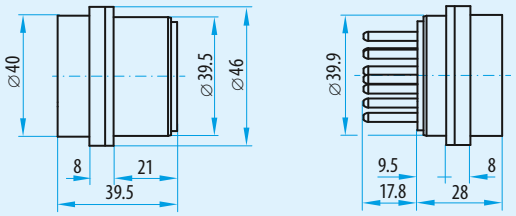
13 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.703.004.014.000					
			Insulator pin	209.803.004.014.000					
			Sealing plug socket	021.341.137.300.000					
			Sealing plug pin	021.341.138.300.000					
			Socket contact	172.160.100.201.000					
			Earthing socket contact	172.161.100.201.000	35	3.0	4.0		
			Pin contact	181.160.000.301.000					
			Socket contact	172.918.100.201.000					
			Earthing socket contact	172.919.100.201.000	30	3.0	2.5	130 ± 40	120 ± 40
			Pin contact	181.138.000.301.000					
			Socket contact	172.916.100.201.000					
			Earthing socket contact	172.917.100.201.000	25	3.0	1.5		
			Pin contact	181.136.000.301.000					

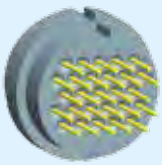
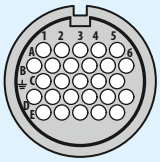
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,600 V	630 V	1,600 V	630 V
Rated impulse voltage	5 kV		5 kV	
Pollution degree	2	3	2	3

Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



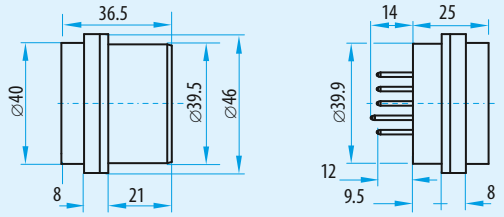
26 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.745.004.027.000					
			Insulator pin	209.845.004.027.000					
			Sealing plug socket	021.341.131.923.000					
			Sealing plug pin	021.341.132.923.000					
			Socket contact	170.370.000.201.000					
			Pin contact	181.134.000.301.000	25	1.5	1.5		
			Earthing pin contact	181.135.000.301.000					
			Socket contact	172.912.100.201.000				90 ± 30	80 ± 25
			Pin contact	181.132.000.301.000	12	1.5	0.38 / 0.61		
			Earthing pin contact	181.133.000.301.000					

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	800 V	320 V	800 V	320 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

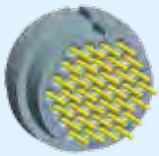
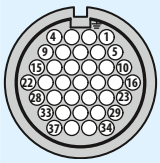
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Crimp Termination

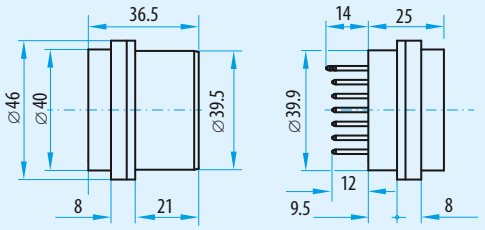
36 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator socket	209.745.004.037.000					
			Insulator pin	209.845.004.037.000					
			Sealing plug socket	021.341.131.923.000					
			Sealing plug pin	021.341.132.923.000					
			Socket contact	170.370.000.201.000					
			Pin contact	181.134.000.301.000	25	1.5	1.5		
			Earthing pin contact	181.135.000.301.000					
			Socket contact	172.912.100.201.000				120 ± 40	110 ± 35
			Pin contact	181.132.000.301.000	12	1.5	0.38 / 0.61		
			Earthing pin contact	181.133.000.301.000					

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	800 V	320 V	800 V	320 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

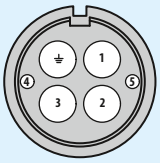
Crimping tools from page 73.
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



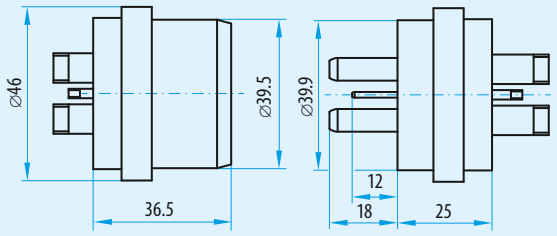
Pin and Socket Inserts with Solder Termination

3 positions with earthing and 2 pilot contacts

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket contact Pin contact	656.163.700.150.006 656.163.800.150.006	95 25	6.0 1.5	4 × 16 2 × 1.5	100 ± 30	90 ± 30

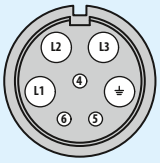
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
for contact diameter 6.0				
Rated voltage	1,250 V	500 V	1,250 V	500 V
Rated impulse voltage	5 kV		5 kV	
Pollution degree	2	3	2	3
for contact diameter 1.5				
Rated voltage	630 V	250 V	1,600 V	630 V
Rated impulse voltage	4 kV		6 kV	
Pollution degree	2	3	2	3

Dimensions insulator (socket piece/pin piece)



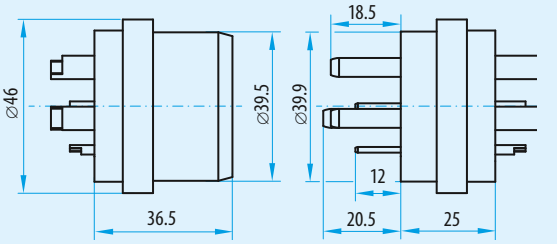
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

3 positions with earthing und 3 pilot contacts

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket contact Pin contact	656.163.700.151.007 656.163.800.151.007	85 25	5.0 1.5	4 × 10 3 × 1.5	80 ± 25	70 ± 25

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
for contact diameter 5.0				
Rated voltage	1,250 V	500 V	1,600 V	630 V
Rated impulse voltage	5 kV		6 kV	
Pollution degree	2	3	2	3
for contact diameter 1.5				
Rated voltage	1,250 V	500 V	1,250 V	500 V
Rated impulse voltage	6 kV		6 kV	
Pollution degree	2	3	2	3

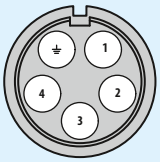
Dimensions insulator (socket piece/pin piece)



*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Pin and Socket Inserts with Solder Termination

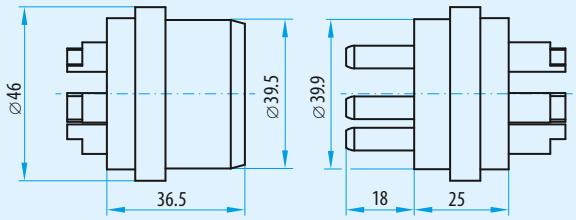
4 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.706.152.005 656.163.806.150.005	95	6.0	16	110 ± 35	100 ± 35

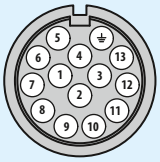
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,250 V	500 V	1,250 V	500 V
Rated impulse voltage	5 kV		6 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



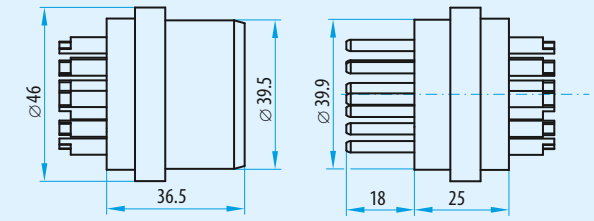
13 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.703.154.014 656.163.803.154.014	35	3.0	4	130 ± 40	120 ± 40

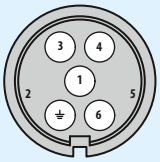
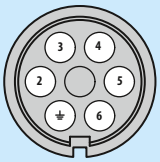
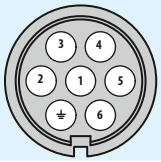
Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,000 V	400 V	1,250 V	500 V
Rated impulse voltage	4 kV		5 kV	
Pollution degree	2	3	2	3

*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



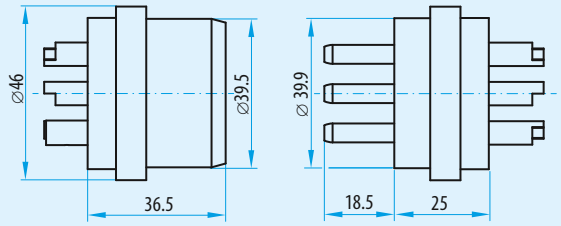
4 positions with earthing / 5 positions with earthing / 6 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.705.150.005 656.163.805.150.005	85	5.0	10	100 ± 35	90 ± 30
			Socket insert Pin insert	656.163.705.150.006 656.163.805.150.006	85	5.0	10	120 ± 40	110 ± 35
			Socket insert Pin insert	656.163.705.150.007 656.163.805.150.007	85	5.0	10	130 ± 40	120 ± 40

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	1,000 V	400 V	1,000 V	400 V
Rated impulse voltage	5 kV		5 kV	
Pollution degree	2	3	2	3

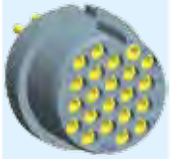
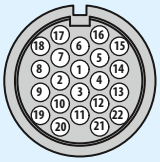
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Solder Termination

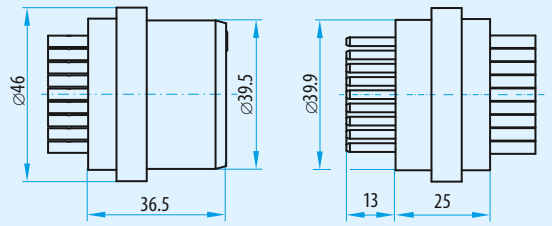
21 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.746.150.022 656.163.846.150.022	30	2.3	2.5	115 ± 40	105 ± 30

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	500 V	200 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

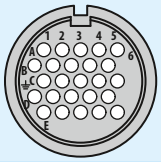
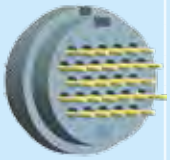
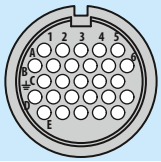
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Solder Termination

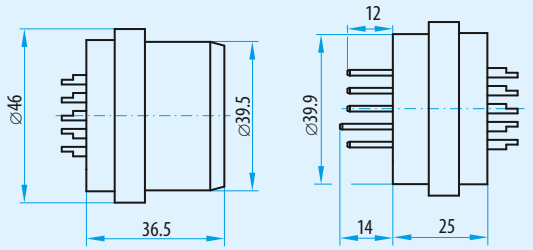
24 positions with earthing / 26 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.745.150.025 656.163.845.150.025	25	1.5	1.5	85 ± 30	75 ± 25
			Socket insert Pin insert	656.163.745.150.027 656.163.845.150.027	25	1.5	1.5	90 ± 30	80 ± 25

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	500 V	200 V
Rated impulse voltage	4 kV		4 kV	
Pollution degree	2	3	2	3

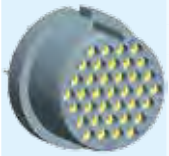
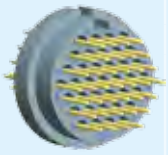
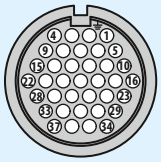
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



Pin and Socket Inserts with Solder Termination

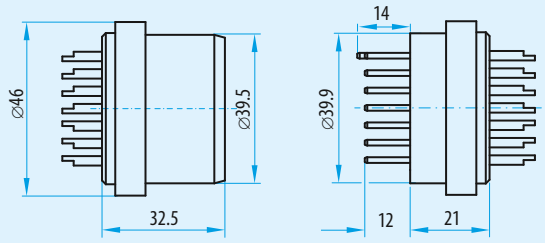
36 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Socket insert Pin insert	656.163.745.152.037 656.163.845.152.037	25	1.5	1.5	120 ± 40	110 ± 35

Voltage information acc. DIN EN*)	Metal housing		Plastic housing	
Rated voltage	500 V	200 V	500 V	200 V
Rated impulse voltage	3 kV		3 kV	
Pollution degree	2	3	2	3

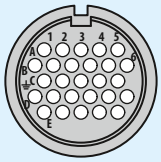
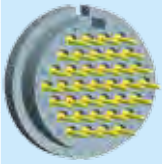
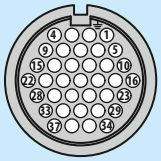
*DIN EN 60664-1 (VDE 0110-1) : 2008-01

Dimensions insulator (socket piece/pin piece)



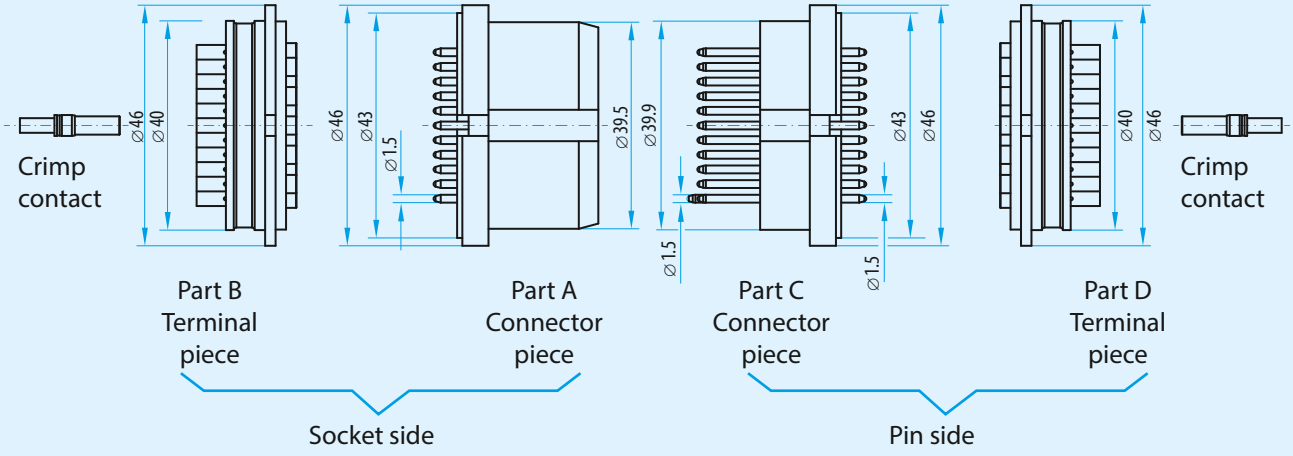
Quick-Change Head System (QCH) with Crimp Termination

26 positions with earthing / 36 positions with earthing

Socket	Pin	Contact configuration Socket View on the mating side	Description	Part number	Current in A nominal single contact current load	Current in A Kompletter Einsatz	Contact diameter in mm	Termination cross-section in mm²	Mating force in N	Demating force in N
			Insulator part A Insulator part B Insulator part C Insulator part D	252.058.002.027.000 252.061.002.027.000 252.059.002.027.000 252.061.003.027.000	16		1.5	0.5 to 1.5	90 ± 30	80 ± 25
			Insulator part A Insulator part B Insulator part C Insulator part D	252.058.001.037.000 252.061.001.037.000 252.059.001.037.000 252.061.002.037.000	16		1.5	0.5 to 1.5	120 ± 40	110 ± 35

Crimping tools from page 73.
Operating voltage 26 positions with earthing in the metal housing: 100 V / 2.5 kV / 3
Operating voltage 36 positions with earthing in the metal housing: 63 V / 2.5 kV / 3

Dimensions insulator

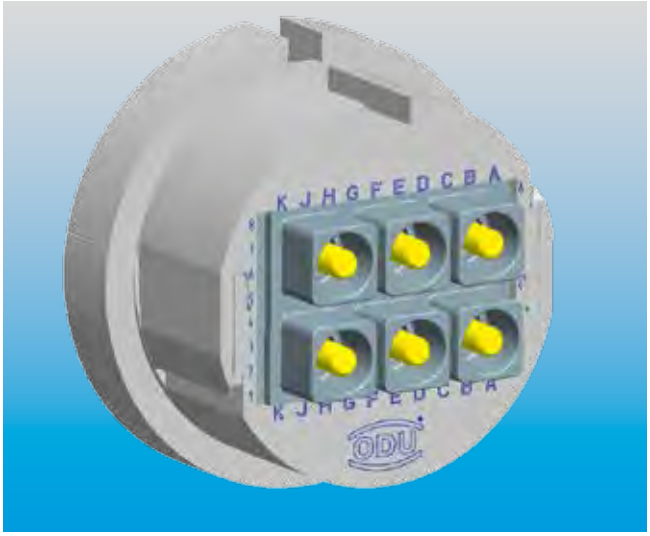


Terminal pieces stay wired.
Connector pieces are exchanged in the Docking System.
Contacts at the Terminal piece B and D are respectively crimp contacts.

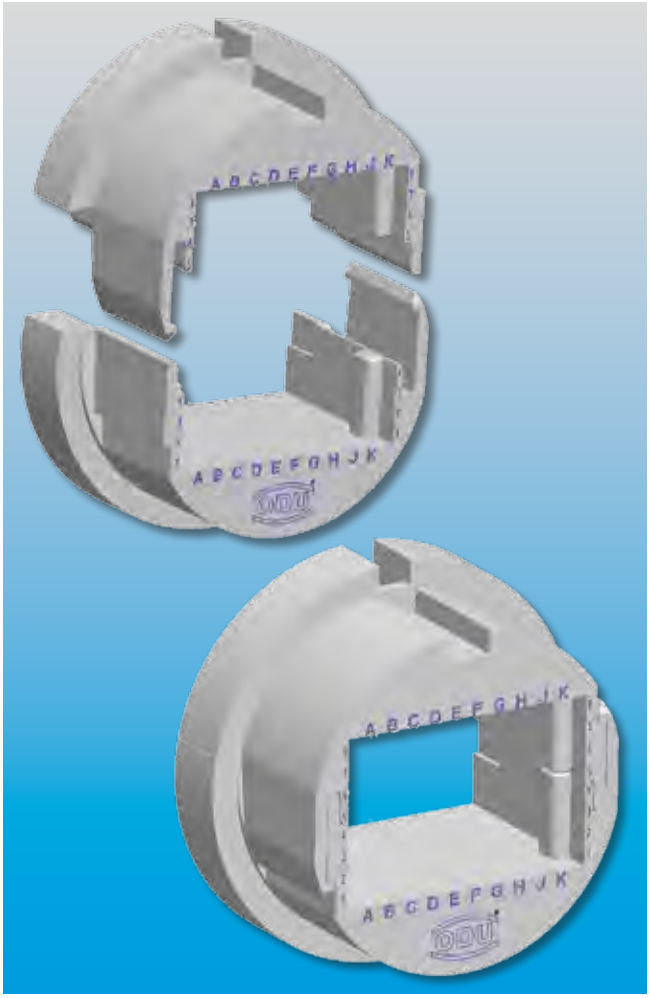
ODU DOCK Insert with Modular Construction

The combination of two proven ODU product series allows flexible use of the inserts. You get what you want:

– Combination of ODU DOCK inserts with integrated modules from the ODU-MAC (modular rectangular connector) program
– Room for 8 units (1 unit = 2.54 mm)
– Modules for signals, power, high power, high voltage, fluid, compressed air, fibre-optic and shielded implementation / high-speed-connector can be integrated
– Suitable for housing size 3
– Insulator material: PBT.

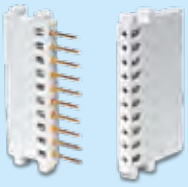
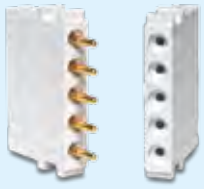
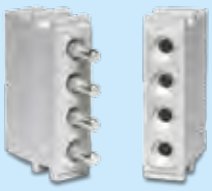


The two-part insulator makes it possible to assemble the ODU-MAC modules without large time expenditures. The modules are simply slide into the insulator and then clipped together after the assembly has been completed.

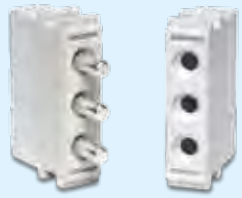


	Part number
Insulator socket	209.610.000.000.000
Insulator pin	209.611.000.000.000

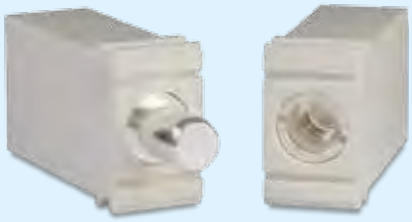
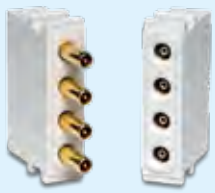
Modules from the ODU-MAC® Program for a Flexible Construction of the ODU DOCK Inserts

Modules	Description	Units/width	Electrical properties	
	10 positions for turned contacts contact ∅: 0.76 mm	1 unit (2.54 mm)	Operating voltage: [1] 250 V Rated impulse voltage: [1] 1,500 V Continuous current max.: [2] 11 A at 0.38 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	10 positions for stamped contacts	1 unit (2.54 mm)	Operating voltage: [1] 32 V Rated impulse voltage: [1] 1,500 V Continuous current max.: [2] 6 A at 0.38 mm² Pollution degree: [1] 2 Mating cycles: min. 5,000	
	6 positions for turned contacts contact ∅: 1.02 mm	2 units (5.08 mm)	Operating voltage: [1] 400 V Rated impulse voltage: [1] 3,000 V Continuous current max.: [2] 13.5 A at 0.5 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	14 positions for turned contacts contact ∅: 1.02 mm	3 units (7.62 mm)	Operating voltage: [1] 320 V Rated impulse voltage: [1] 2,500 V Continuous current max.: [2] 13.5 A at 0.5 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	5 positions for turned contacts contact ∅: 1.5 mm	2 units (5.08 mm)	Operating voltage: [1] 500 V Rated impulse voltage: [1] 2,500 V Continuous current max.: [2] 27 A at 1.5 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	4 positions for turned contacts contact ∅: 2.41 mm	3 units (7.62 mm)	Operating voltage: [1] 500 V Rated impulse voltage: [1] 3,000 V Rated current: [2] 28 A at AWG 12 Pollution degree: [1] 2 Mating cycles: min. 100,000	

[1] According to DIN EN 60664.1: 2007 (VDE 0110 part 1).
[2] Definition continuous current see page 114.

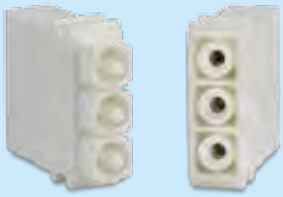
Modules	Description	Units/width	Electrical properties	
	3 positions for turned contacts contact ∅: 3.0 mm	3 units (7.62 mm)	Operating voltage: [1] 500 V Rated impulse voltage: [1] 3,000 V Continuous current max.: [2] 58 A at 6 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	2 positions for turned contacts contact ∅: 5.0 mm	5 units (12.7 mm)	Operating voltage: [1] 1,000 V Rated impulse voltage: [1] 4,000 V Continuous current max.: [2] 119 A at 16 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	4 positions high voltage module with turned contacts contact ∅: 1.5 mm	3 units (7.62 mm)	Operating voltage: [1] 2,500 V Rated impulse voltage: [1] 10,000 V Continuous current max.: [2] 27 A at 1.5 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	3 positions power module with turned contacts contact ∅: 3.0 mm	4 units (10.16 mm)	Operating voltage: [1] 2,500 V Rated impulse voltage: [1] 10,000 V Continuous current max.: [2] 58 A at 6 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	
	2 positions for power contacts ODU LAMTAC® (contacts with lamella technology) with turned contacts contact ∅: 8.0 mm	6 units (15.24 mm)	Operating voltage: [1] 500 V Rated impulse voltage: [1] 3,000 V Continuous current max.: [2] 154 A at 25 mm² Pollution degree: [1] 2 Mating cycles: min. 10,000	
	2 positions for power contacts ODU SPRINGTAC® (contacts with springwire technology) with turned contacts contact ∅: 8.0 mm	6 units (15.24 mm)	Operating voltage: [1] 500 V Rated impulse voltage: [1] 3,000 V Continuous current max.: [2] 142 A at 25 mm² Pollution degree: [1] 2 Mating cycles: min. 100,000	

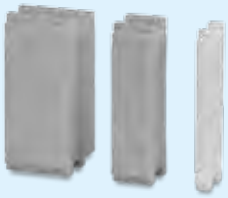
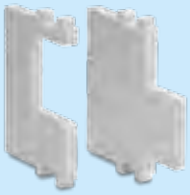
[1] According to DIN EN 60664.1: 2007 (VDE 0110 part 1).
[2] Definition continuous current see page 114.

Modules	Description	Units/width	Electrical properties		
	1 position for power contacts ODU LAMTAC® (contacts with lamella technology) contact ∅ 10 mm or contact ∅ 12 mm	7 units (17.78 mm) at both versions	Version: Operating voltage: [1] Rated impulse voltage: [1] Continuous current max.: [2] Pollution degree: [1] Mating cycles:	10 mm 250 V 4,000 V 179 A at 35 mm² 2 min. 10,000	12 mm 200 V 3,000 V 220 A at 50 mm² 2 min. 10,000
	1 position for high voltage contacts	8 units (20.32 mm)	Operating voltage: [1] Rated impulse voltage: [1] Pollution degree: [1] Mating cycles:	6,300 V 20,000 V 2 min. 10,000	
	4 positions for 50 Ω coaxial contacts non-magnetic	3 units (7.62 mm)	Frequency range: Mating cycles:	0 to 1.2 GHz min. 60,000	
	2 positions for 50 Ω coaxial contacts	5 units (12.7 mm)	Frequency range: Mating cycles:	0 to 2.2 GHz min. 100,000	
	2 positions for 50 Ω coaxial contacts SMA termination	5 units (12.7 mm)	Frequency range: Mating cycles:	0 to 9.0 GHz min. 100,000	
	2 positions for 50 Ω coaxial contacts high voltage non-magnetic	5 units (12.7 mm)	Frequency range: Mating cycles:	0 to 0.25 GHz min. 100,000	

[1] According to DIN EN 60664.1: 2007 (VDE 0110 part 1).
[2] Definition continuous current see page 114.

Modules	Description	Units/width	Electrical properties	
	2 positions for 75 Ω coaxial contacts	5 units (12.7 mm)	Frequency range: Mating cycles:	0 to 2 GHz min. 100,000
	Module 2 positions for compressed air valves	5 units (12.7 mm)	Tube diameter: Mating cycles:	max. 4 mm min. 5,000
	Module 1 position for compressed air valve	8 units (20.32 mm)	Tube diameter: Mating cycles:	max. 6 mm min. 5,000
	Module 2 positions for compressed air valves	16 units (40.64 mm)	Tube diameter: Mating cycles:	max. 6 mm min. 5,000
	Module for fluid coupling plug	5 units (12.7 mm)	Mating cycles:	min. 15,000
	2 positions for fibre-optic contacts for plastic fibre	5 units (12.7 mm)	Insertion loss typical: Mating cycles:	1.5 dB at 670 nm min. 100,000

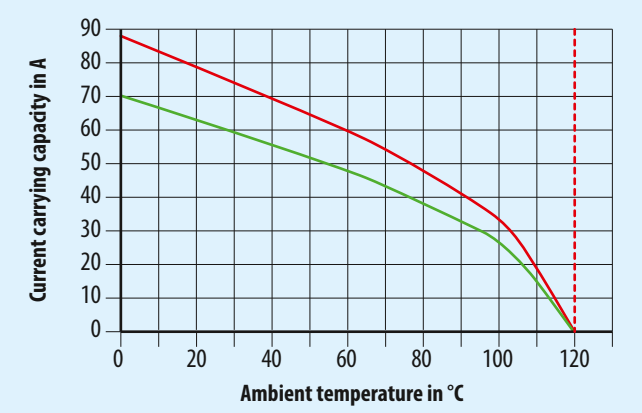
Modules	Description	Units/width	Electrical properties	
	5 positions for fibre-optic contacts for plastic fibre POF	2 units (5.08 mm)	Insertion loss typical: 1.5 dB at 670 nm Mating cycles: min. 40,000	
	3 positions for fibre-optic contacts for fibre-glass	4 units (10.16 mm)	Insertion loss typical: 1.0 dB at 670 nm Mating cycles: min. 100,000	
	2 to 10 positions, shielded implementation / high-speed-connector insert size 0	5 units (12.7 mm)	Mating cycles: min. 5,000 suitable for all common bus systems	
	2 to 14 positions, shielded implementation / high-speed-connector insert size 1	6 units (15.24 mm)	Mating cycles: min. 5,000 With springwire: min. 60,000 suitable for all common bus systems	
	4 to 8 positions, shielded implementation / high-speed-connector insert size 2	7 units (17.78 mm)	Mating cycles: min. 5,000 With springwire: min. 60,000 suitable for all common bus systems	
	10 to 30 positions, shielded implementation / high-speed-connector insert size 3	8 units (20.32 mm)	Mating cycles: min. 5,000 suitable for all common bus systems	

Modules	Description	Units/width	Electrical properties	
	Empty modules	1 unit (2.54 mm) 3 units (7.62 mm) 5 units (12.7 mm)		
	Coding modules	1 unit (2.54 mm)		
	Pin protection modules	1 unit (2.54 mm)		

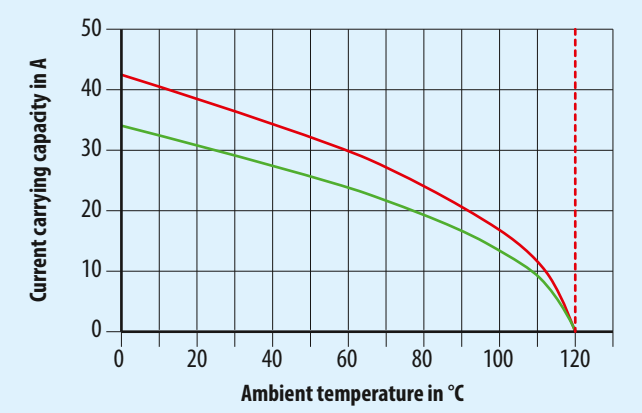
You can find further information in the catalogue ODU-MAC.

Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

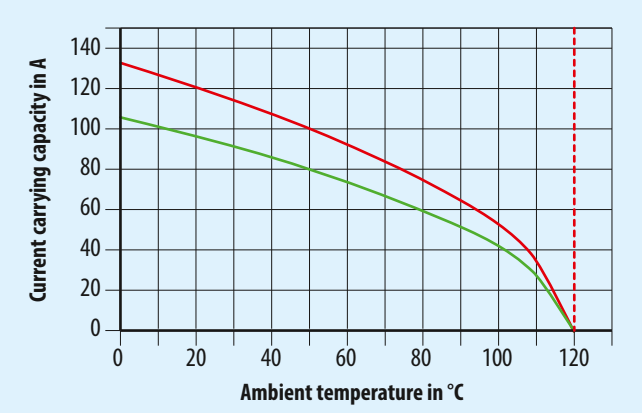
Derating curves for crimp inserts



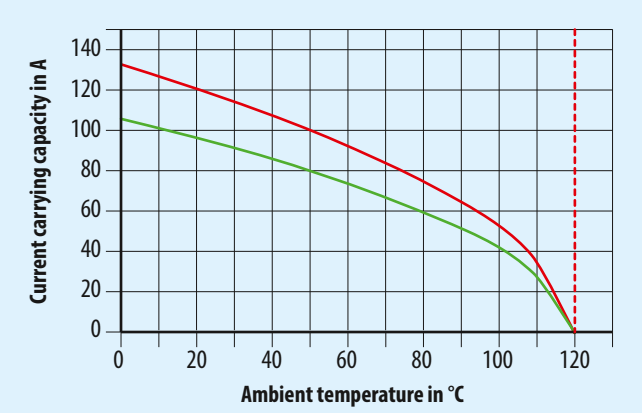
Insert 209.705.004.007.000 with 209.805.004.007.000
equipped with contact diameter 5.0 mm
(cable cross-section 10 mm²).



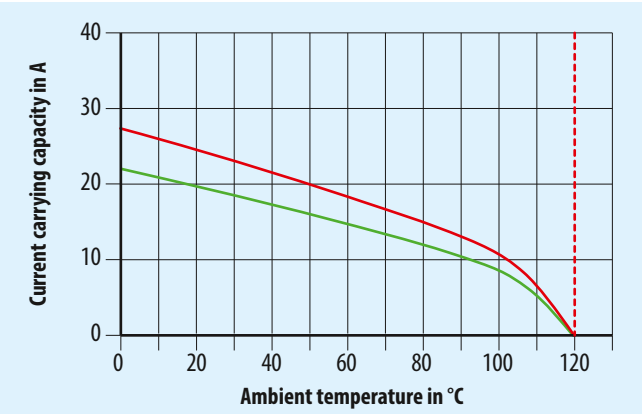
Insert 209.703.004.014.000 with 209.803.004.014.000
equipped with contact diameter 3.0 mm
(cable cross-section 4 mm²).



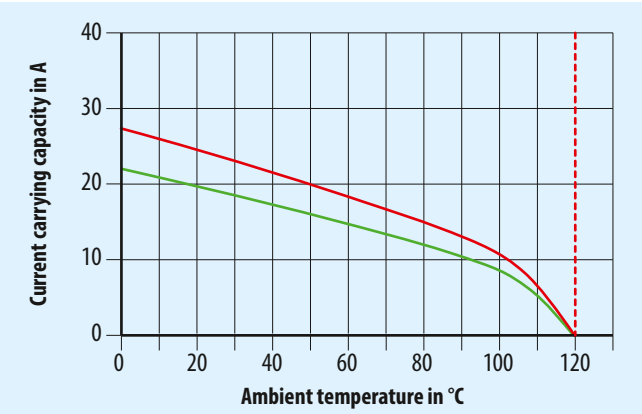
Insert 209.706.004.005.000 with 209.806.004.005.000
equipped with contact diameter 6.0 mm
(cable cross-section 16 mm²).



Insert 209.706.004.003.000 with 209.806.004.003.000
equipped with contact diameter 6.0 mm
(cable cross-section 16 mm²).



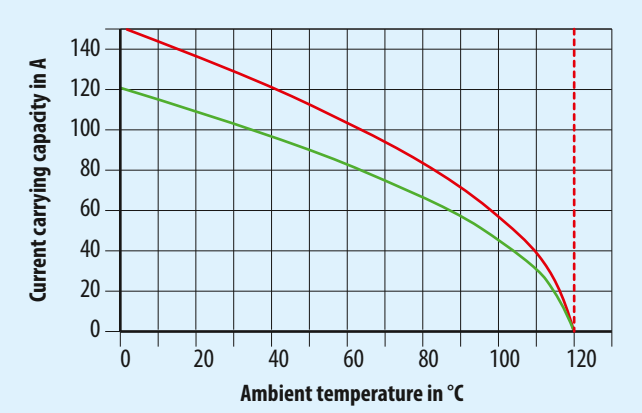
Insert 209.745.004.037.000 with 209.845.004.037.000
equipped with contact diameter 1.5 mm
(cable cross-section 1.5 mm²).



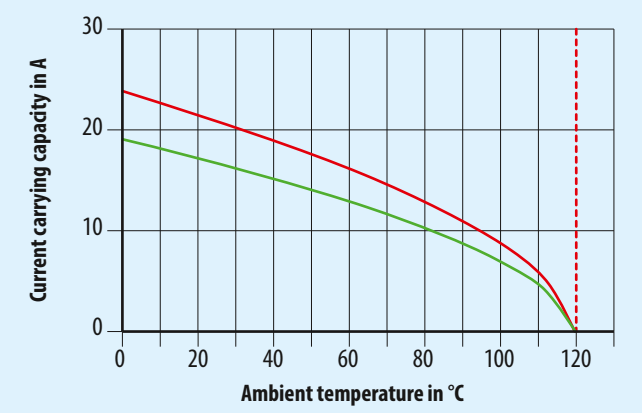
Insert 209.745.004.027.000 with 209.845.004.027.000
equipped with contact diameter 1.5 mm
(cable cross-section 1.5 mm²).

Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

Derating curves for solder inserts with mixed inserts

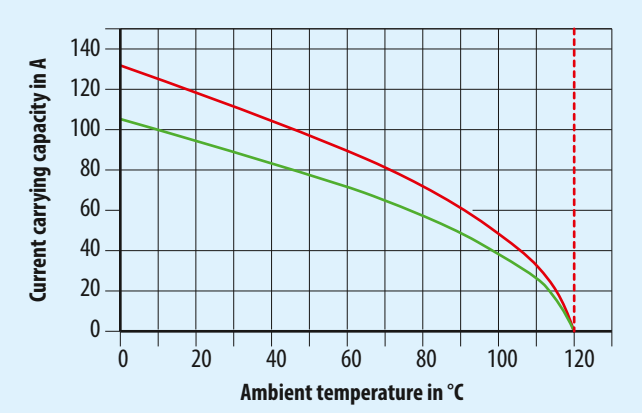


Contact diameter **6.0 mm**

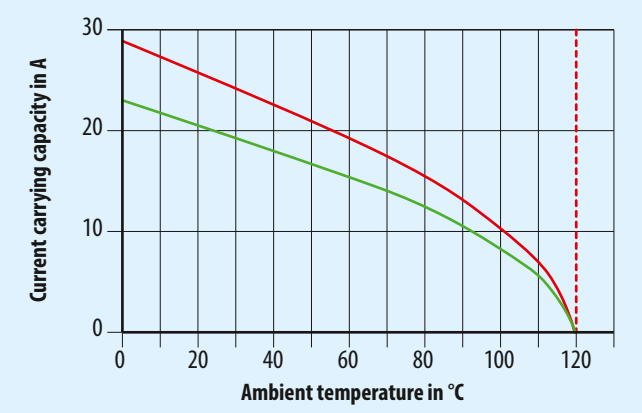


Contact diameter **1.5 mm**

Mixed inserts: Insert 656.163.700.150.006 with 656.163.800.150.006 equipped with contact diameter 6.0 mm (cable cross-section 4 × 16 mm²) and contact diameter 1.5 mm (cable cross-section 2 × 1.5 mm²).



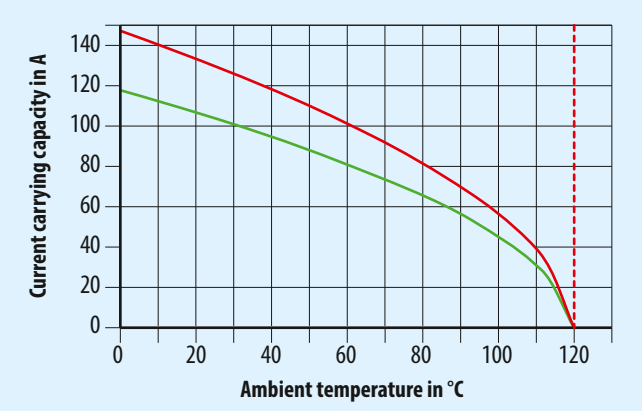
Contact diameter **5.0 mm**



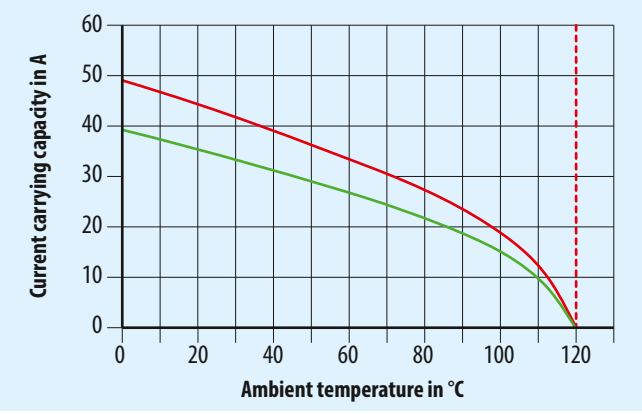
Contact diameter **1.5 mm**

Mixed inserts: Insert 656.163.700.151.007 with 656.163.800.151.007 equipped with contact diameter 5.0 mm (cable cross-section 4 × 10 mm²) and contact diameter 1.5 mm (cable cross-section 3 × 1.5 mm²).

Derating curves for solder inserts



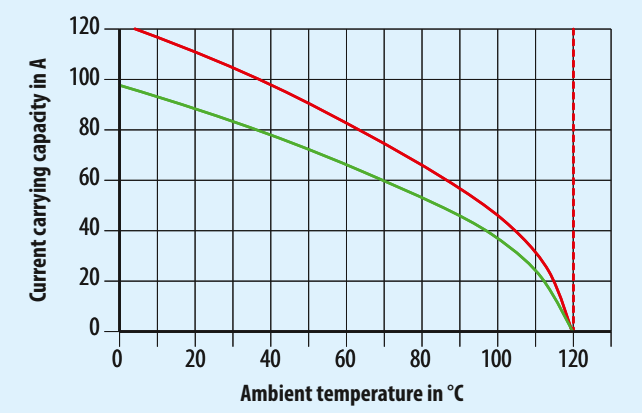
Insert 656.163.706.152.005 with 656.163.806.152.005 equipped with contact diameter 6.0 mm (cable cross-section 16 mm²).



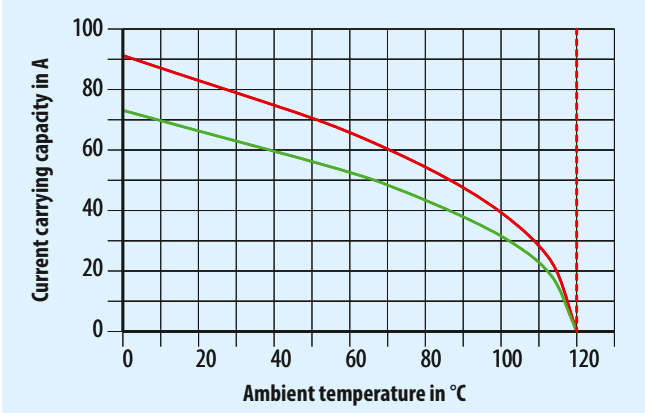
Insert 656.163.703.154.014 with 656.163.803.154.014 equipped with contact diameter 3.0 mm (cable cross-section 4 mm²).

Current Carrying Capacity for Fully Equipped Inserts (Excerpt)

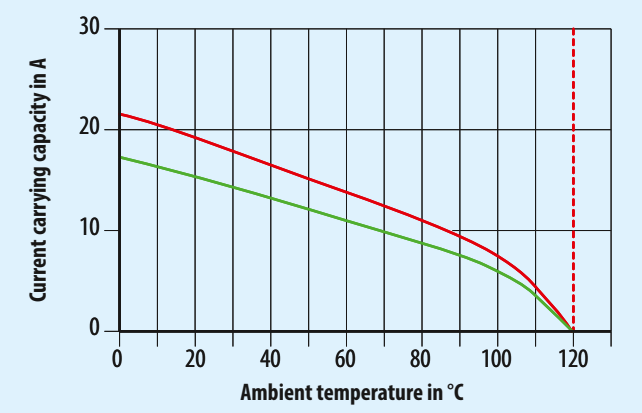
Derating curves for solder inserts



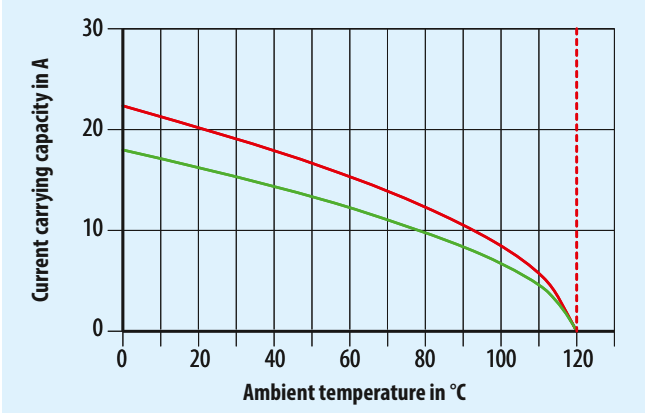
Insert 656.163.705.150.005 with 656.163.805.150.005 equipped with contact diameter 5.0 mm (cable cross-section 10 mm²).



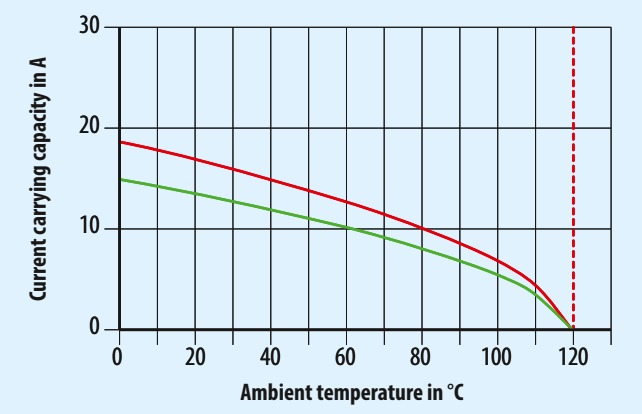
Insert 656.163.705.150.007 with 656.163.805.150.007 equipped with contact diameter 5.0 mm (cable cross-section 10 mm²).



Insert 656.163.746.150.022 with 656.163.846.150.022 equipped with contact diameter 2.3 mm (cable cross-section 2.5 mm²).



Insert 656.163.745.150.027 with 656.163.845.150.027*) equipped with contact diameter 1.5 mm (cable cross-section 1.5 mm²).



Insert 656.163.745.152.037 with 656.163.845.152.037 equipped with contact diameter 1.5 mm (cable cross-section 1.5 mm²).

* For insert 656.163.745.150.025 with 656.163.845.150.025 equipped with contact diameter 1.5 mm (cable cross-section 1.5 mm²) the derating curve 656.163.745.150.027 with 656.163.845.150.027 can be used.

Legend of diagrams

- Max. temperature of contact material
- Basis curve
- Corrected curve

Further derating curves on request.

ODU DOCK
Accessories

Accessories

Recommended cable clamp

Size	Part number	Cable diameter in mm	Plastic	Metal	For EMC housing	M	PG	Colour
1	026.616.079.169.000	7.9 to 16.9		•			16	brass
	026.616.054.134.000	5.4 to 13.4		•			16	brass
	027.820.070.130.007	7.0 to 13.0	•			20 × 1.5		grey
	028.620.070.125.007	7.0 to 12.5		•	•	20 × 1.5		brass
2	026.621.119.219.000	11.9 to 21.9		•			21	brass
	026.621.054.134.000	5.4 to 13.4		•			21	brass
	027.825.090.170.007	9.0 to 16.5	•			25 × 1.5		grey
	027.825.060.130.007	6.0 to 13.0	•			25 × 1.5		grey
	028.625.090.165.000	9.0 to 16.5		•	•	25 × 1.5		brass
	028.625.070.125.000	7.0 to 12.5		•	•	25 × 1.5		brass
3	026.629.178.298.000	17.8 to 29.8		•			29	brass
	026.629.119.219.000	11.9 to 21.9		•			29	brass
	026.629.070.150.000	7.0 to 15.0		•			29	brass
	027.832.070.150.007	7.0 to 15.0	•			32 × 1.5		grey
	027.832.110.210.007	11.0 to 21.0	•			32 × 1.5		grey
	028.632.110.210.000	11.0 to 21.0		•	•	32 × 1.5		brass
	028.632.090.165.000	9.0 to 16.5		•	•	32 × 1.5		brass

Material: PA, grey respectively brass, nickel-plated for EMC protection.

Metric thread cable clamp

PG cable clamp

Maintenance kit for ODU SPRINGTAC® and ODU LAMTAC® contacts

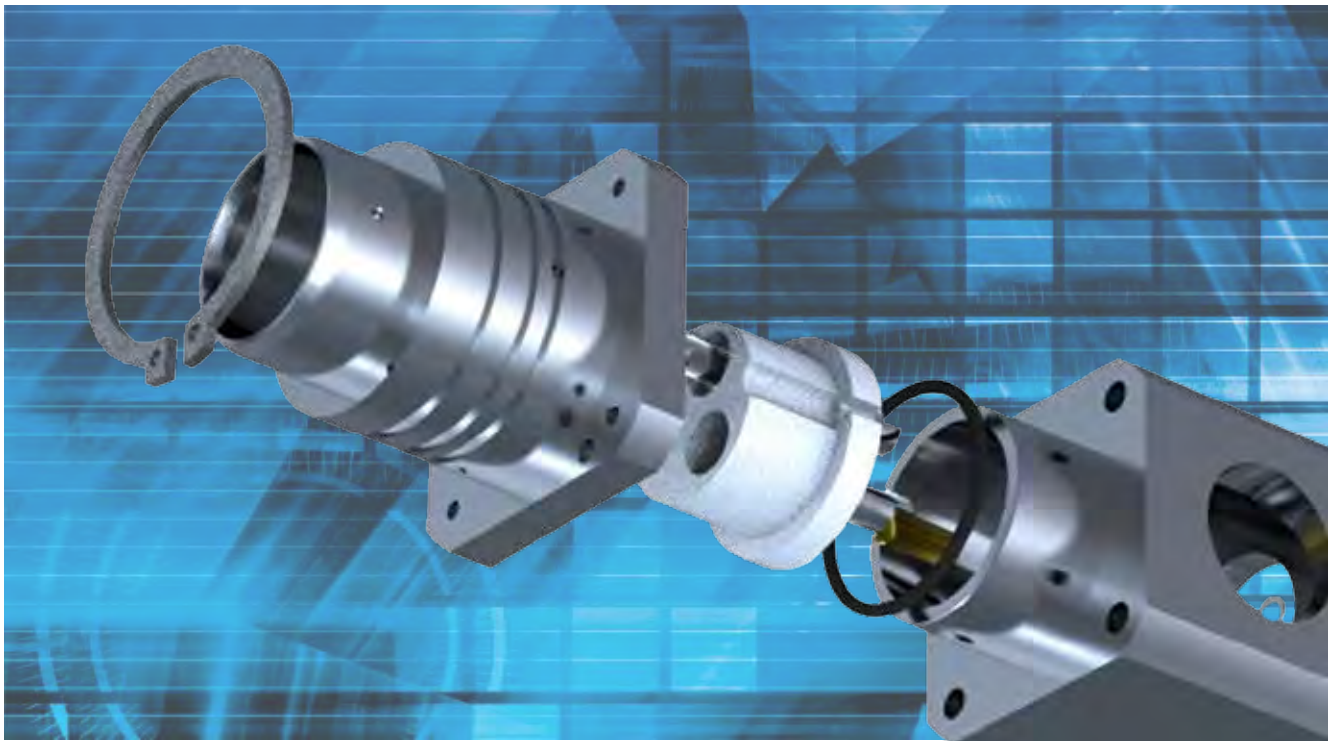
Contact lubrication improves the mechanical characteristics of contact systems. We recommend that the contact surfaces also be cleaned before being lubricated in order to remove impurities. With proper care, it is possible to minimize significantly the wear caused by frequent matings and reduce the insertion forces. The cleaning and lubrication interval must be adapted individually to the conditions, and these steps should be carried out only with products recommended by the contact manufacturer.

ODU has put together a maintenance kit for this step so that lubrication can be carried out directly at your site. A cleaning brush and a special cleaning towel, together with precise instructions, allow optimal care of the contacts. The maintenance kit can be used for all ODU contacts and connectors as long as no other specifications apply.

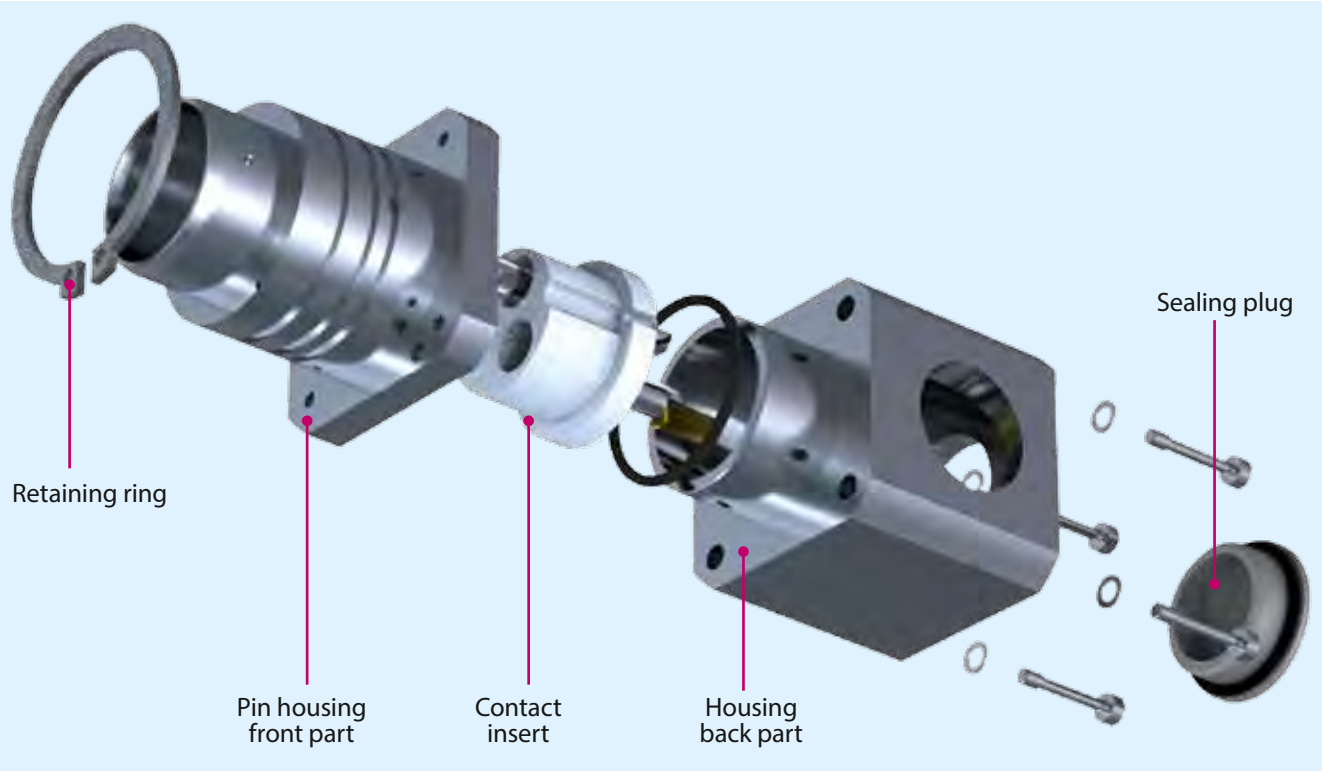
Part number: 170.000.000.000.100

The technical characteristics of the maintenance kit are given on our website:
http://www.odu.de/fileadmin/downloadcenter/anleitungen/170-000-000-000-100.pdf

ODU DOCK
Assembly Instruction and Crimp Information



Assembly Instruction



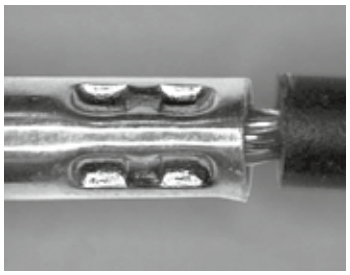
1. Slide the cable clamp and the cables, one after the other, through the back part of the housing.
2. Connect the stripped line to the contacts. If the housing is made of metal, earth the housings earthing wire.
3. Screw the front and back parts of the housing together and tighten the cable clamp.
4. Slide the complete housing into the docking plate and fix in place with retaining ring.

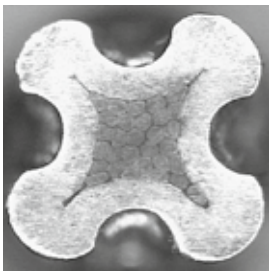
Tightening torque:
Size I und II = 0.8 N
Size III = 2 N

Crimping Tools and Contact Preparation

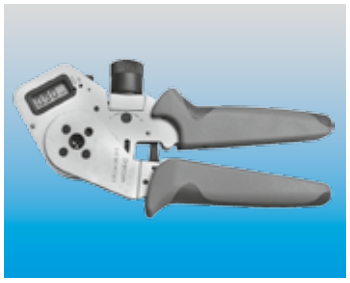
Contact processing for the production of connecting cables via crimping creates a secure, durable and corrosion-free contact. It requires little skill and can be performed by non-experts.

The cold pressing operation compresses the conductor and contact material, creating a gas-tight connection between contact and conductor. A stiffening of the conductor at the connection, as it is possible with soldering, cannot occur.

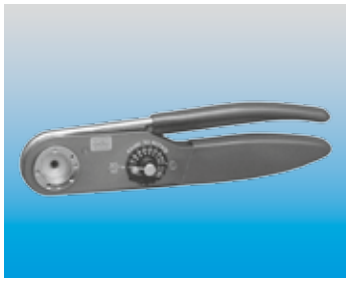




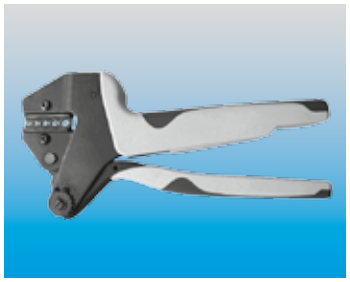
8-point crimping tool
For cross-sections from 0.08 to 2.5 mm² (AWG 28 to AWG 12)*.
The crimping tool has an internal ratchet which opens only after the crimp process has been completed.
With user-friendly digital display.
Part number: 080.000.051.000.000



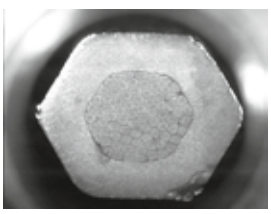
8-point crimping tool
For cross-sections from 0.38 to 2.5 mm² (AWG 22 to AWG 12)*.
The crimping tool has an internal ratchet which opens only after the crimp process has been completed.
Part number: 080.000.038.000.000



Hexagonal crimping tool
For cross-sections of 1.5 mm², 2.5 mm², 4.0 mm² and 6.0 mm².
The crimping tool has an internal ratchet which opens only after the crimp process has been completed.
Part number: 080.000.062.000.000



Hydraulic crimping tool
For cross-sections of 10 mm² und 16 mm²*. The crimping tool has an internal ratchet which opens only after the crimp process has been completed. With safety valve for automatic release when correct pressure is reached.
Part number: 080.000.026.000.000



Microsection
hexagonal crimping

*Table of adjustment and positioner see next page.

Crimp information size 1

Termination cross-section		Contact diameter	Stripping length	8-point crimping tool 080.000.051.000.000	Hexagonal crimping tool 080.000.062.000.000
				Setting ∅"Y" positioner 080.000.051.103.000	Profile no. Check gauge "X"
mm^2	AWG	mm	mm		
0.08/0.25	24/28	0.76	4.5	0.67 Pos. position 1	
0.38	22	0.76	4.5	0.67 Pos. position 1	
0.38/0.50	20/22	1.02	5	0.92 Pos. position 2	
		2	6	0.92 Pos. position 4	
1.0		1.02	5	1.12 Pos. position 2	
		2	7	1.12 Pos. position4	
1.5	16/15/14*	1.5	5	1.42 Pos. position 3	
		2	7	1.42 Pos. position 4	
		3	8	1.42 Pos. position 5	
2.5	14/13/10*	3	9	1.62 Pos. position 5	2 2.8±0.05

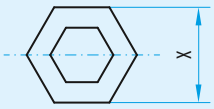
* Use only according to conductor design specifications!

Crimp information quick-change head

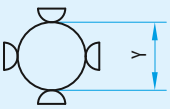
Termination cross-section		Contact diameter termination area	Stripping length	8-point crimping tool 080.000.051.000.000	8-point crimping tool 080.000.038.000.000
				Setting ∅"Y" positioner 080.000.051.103.000	Position-no. contact holder
mm^2	AWG	mm	mm		
0.5 to 1.0	18 to 20	0.9	4+0.5	1.12 Pos. position 4	
0.5	20	1.5	6+.5	1.07 Pos. position 4	
0.75				1.12 Pos. position 4	
1	18			1.12 Pos. position 4	
1.5	14			1.42 Pos. position 4	
0.5	20	3	4+0.5		4
0.75					5
1	18				
1.5	14				6

Crimp information size 2

Termination cross-section		Contact diameter	Stripping length	8-point crimping tool 080.000.051.000.000	Hexagonal crimping tool 080.000.062.000.000
				Setting ∅ "Y" positioner 080.000.051.103.000	Profile no. Check gauge "X"
mm^2	AWG	mm	mm		
1.0		2	7	1.12 Pos. position 4	
1.5		1.5 socket	5	1.42 Pos. position 3	
		1.5 pin	8	1.42 Pos. position 6	
		2	7	1.42 Pos. position 4	
		3	8	1.42 Pos. position 5	
2.5		3	9	1.62 Pos. positiong 5	2 2.8±0.05
4.0		3	9		3 3.5±0.05



Check gauge (contact)
for hexagonal crimping tools

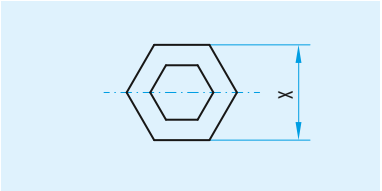


Adjustment dimension (tool)
for 8-point crimping tools

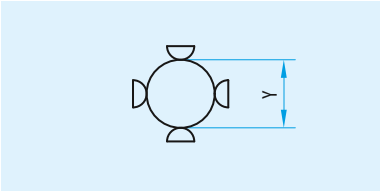
Crimp information size 3

Termination cross-section		Contact diameter	Stripping length	8-point crimping tool *	8-point crimping tool	Hexagonal crimping tool	Hexagonal crimping tool
				080.000.014.000.000	080.000.051.000.000	080.000.062.000.000	080.000.026.000.000
mm²	AWG	mm	mm	Setting ∅ "Y" positioner	Setting ∅ "Y" positioner 080.000.051.104.000 Positioning setting (socket/PE socket/pin)	Profile no. Check gauge "X"	Check gauge "X" crimping jaws
0.08 to 0.25	28/24	1.5	8	0.65 < Y <0.70 021.345.197.300.000	0.67 (1 / .. / 2)		
0.38 to 0.61		1.5	8	0.90 < Y < 0.95 021.345.197.300.000	0.92 (1 / .. / 2)		
				021.345.202.300.000 **	(6 / .. / 7) **		
1.5	16/15/14*	1.5	8	1.40 <Y < 1.45 021.345.197.300.000	1.42 (1 /.. / 2)		
		3		1.40 <Y < 1.45 021.345.197.300.000	1.42 (3 / 8 / 5)		
		5	10			1 2.15 ± 0.05	
2.5	14/13/12*	3	9		1.62 (3 / 8 / 5)	2 2.8 ± 0.05	
		6	10				
4		3	10			3 3.5 ± 0.05	
		5					
6		5	10			3 3.5 ± 0.05	
		6				4 4.2 ± 0.05	
10		5	11				080.000.026.110.000
16		6	13				6.5± 0.05 080.000.026.116.000
		11					

* Use only according to conductor design specifications!
** Longitudinally watertight



Check gauge (contact)
for hexagonal crimping tools

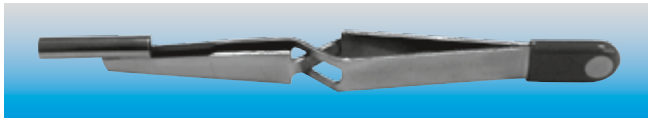


Adjustment dimension (tool)
for 8-point crimping tools

Removal Tools for Crimp Contacts

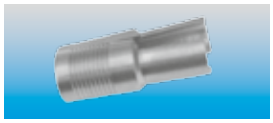
Removal of the already assembled contact (including cable)

Contact diameter mm	Straight model	Right-angle model	Half-shells
0.76	------	087.170.361.000.000	
1.02	------	087.170.362.000.000	
1.5	087.170.138.000.000	087.170.363.000.000	
2.0	------	087.170.364.000.000	
3.0	087.170.136.000.000	087.170.366.000.000	
5.0	-----	-----	087.170.391.000.000



Straight model

Right-angle model



Half-shells

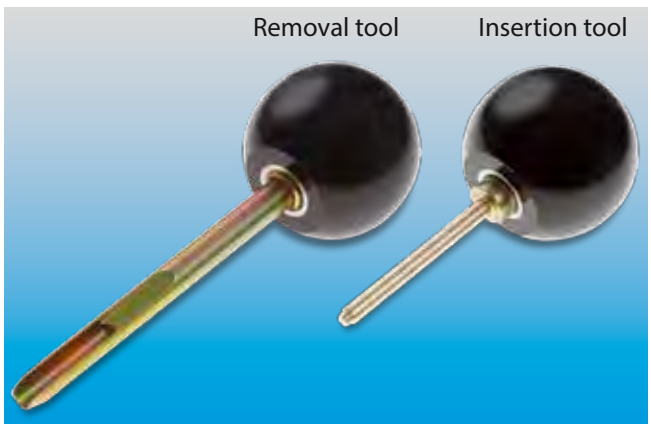
Removal of the contact that has not yet been assembled

Contact diameter mm	Straight model		
0.76	087.611.001.001.000		
1.02			
1.5			
3.0			

Without cable – may have to be cut.

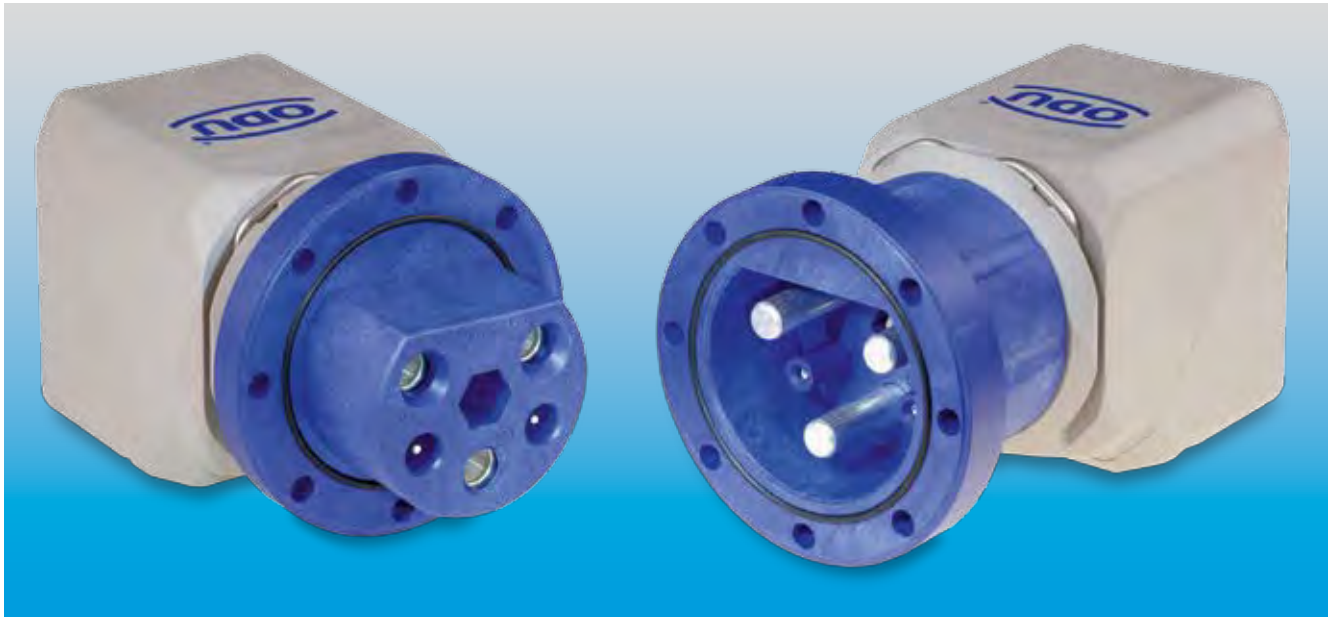
Tool for crimp contacts in the quick-change head version

Contact diameter mm	Insertion tool	Removal tool
1.5 und 2.0	085.170.323.000.000	087.170.323.000.000
3.0	085.178.069.000.000	087.178.057.000.000



Product Description
ODU ROB

ODU ROB

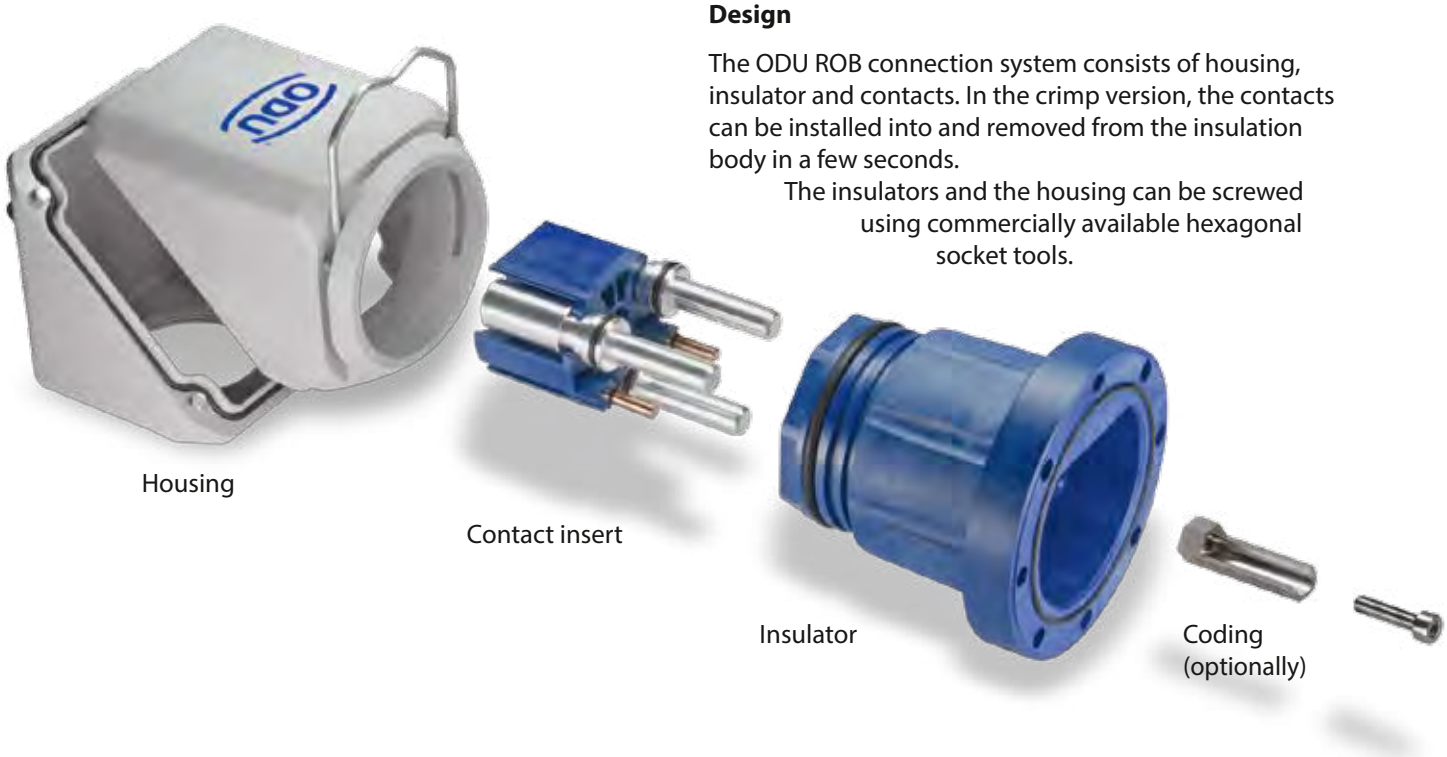


- Economical and simple assembly because the contacts lock into place with standard tools
- 2 sizes
- Protection class: IP 67
- Flammability class min. UL 94V-0
- Additional reliability thanks to patented "double-bellied lamella"!
- Pilot contacts are possible
- Very good electric characteristics (Operating voltage up to 800 VAC)
- Cable exit can be rotated in any direction – straight or right-angled cable exits are available
- Number of contact positions: 2 + PE + 2 pilot contacts
- Operating temperature: – 40° C up to +120° C.

Design

The ODU ROB connection system consists of housing, insulator and contacts. In the crimp version, the contacts can be installed into and removed from the insulation body in a few seconds.

The insulators and the housing can be screwed using commercially available hexagonal socket tools.



Main application area for the ODU ROB

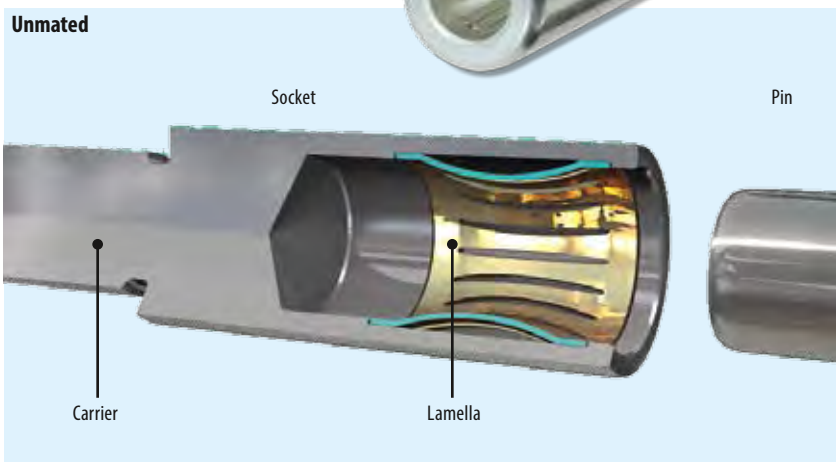
The cable sets between the switch cabinet and the electrode holders, which in some cases are subjected to high mechanical loads, can be modularly constructed by using connectors. In case of damage, the tube packages can consequently be partially and quickly exchanged. ODU ROB is particularly suited to this purpose.
The simple installation and flexible design make rapid setup or exchange possible and so reduce the operating costs.

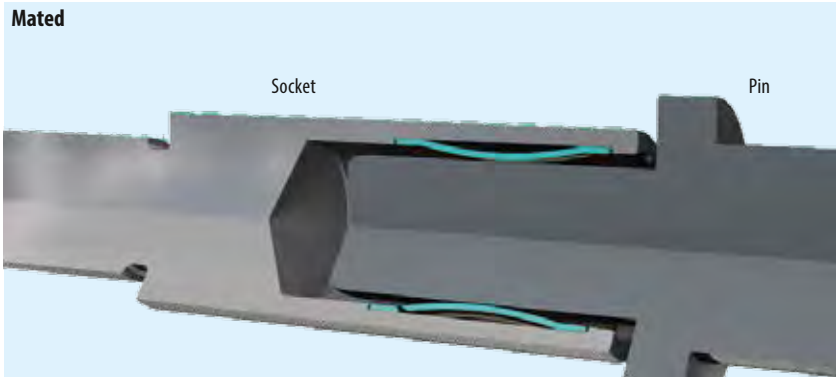
ODU LAMTAC® (contacts with lamella technology)

The lamella contact offers fewer contact surfaces than the ODU SPRINGTAC® contact. One or more stamped lamellas are mounted in a turned carrier. Usually 10,000 mating cycles are possible.

Advantages

- More than 10,000 mating cycles
- High current carrying capacity
- Low contact resistances
- Low insertion forces
- Secure contacting
- High resistance to vibrations and impacts
- Long life due to premium materials and surfaces
- Many styles and termination types are on hand or feasible
- Economical alternative to springwire contacts.





Order Information ODU ROB

Housing, inserts and if applicable cable clamps must be ordered separately for the ODU ROB.

Order example:
– ODU ROB, size 2
– 150 A, for wire 35 mm², extra fine wire
– 3 positions with earthing and pilot contacts
– Insulator with fixing screws
– Cable clamp.

	Socket piece	Pin piece
Housing	656.424.012.006.000	656.424.012.006.000
Insert	656.424.001.002.000	656.424.002.002.000
Contacts	3 × 178.864.100.201.001	3 × 181.864.000.201.001
Pilot contacts	182.557.000.201.000	178.556.100.201.000
Cable clamp	027.840.190.280.003	027.840.190.280.003

ODU ROB
Size 1

Up to max. 135 A

ODU ROB – Size 1, up to Max. 135 A

Technical data

Operating frequency	50 up to 60 Hz
Contact diameter	6 mm
Termination	Crimp
Designation	135 A / 800 V / 6 kV / 3
Protection class	IP 67 (coupled and screwed)

The ODU ROB connection system consists of housing and inserts. The inserts are arranged of an insulator and contact pins.

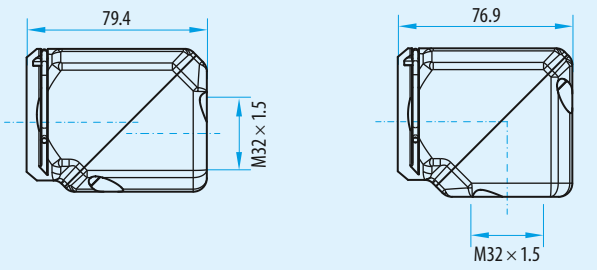
Housing for pin and socket piece

– Material: PBT, grey

– Straight and right-angled cable exit

Straight or right-angled cable exit are possible with one and the same housing. Thanks to the patented two-piece housing, it takes only a few steps to change between straight and right-angled execution.

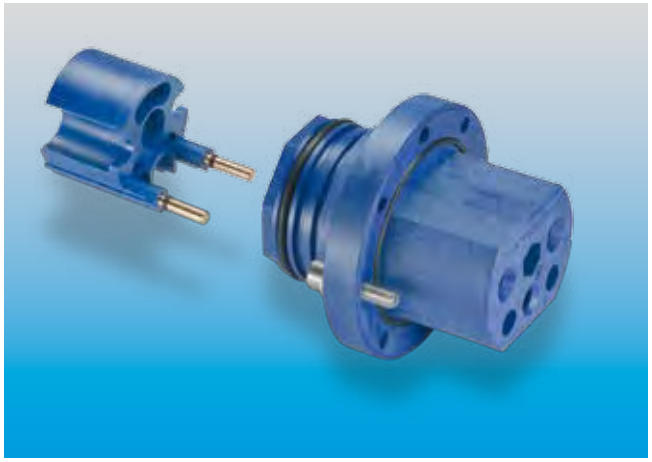
Cable exit	Part number
Straigth and right-angled	656.325.012.006.000

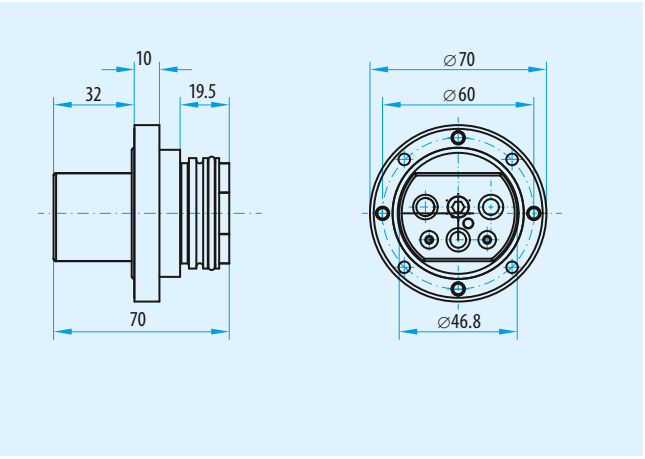


Straight cable exit

Right-angled cable exit

Contact insert – socket piece





Picture without contacts Sealing plug

Material

Insulator	PBT, blue
Contacts	Cu-alloy, surface Ag

Order information socket insert in single parts

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with screws	656.425.001.002.000			
Insulator without screws	656.425.001.001.000			
Socket contact	*178.857.100.201.00X*	*up to 55*	*6*	6
	178.858.100.201.00X	*up to 80*	*10*	
	178.859.100.201.00X	up to 110	16	
	178.860.100.201.00X	up to 135	25	
Sealing plug	656.425.001.006.000			
Pilot contact pin	182.556.000.201.000		1.5	2

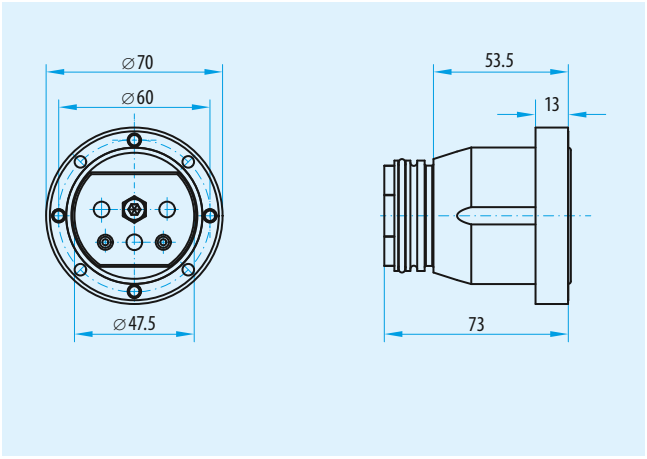
X = 0 Line according to VDE 0295 – extra fine – class 6
X = 1 Line according to VDE 0295 – fine – class 5

Grey = on request!

Order information socket insert as set

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with contacts and sealing plugs (conductor design extra fine)	*656.425.001.001.006*	*55*	*6*	6
	656.425.001.001.010	*80*	*10*	
	656.425.001.001.016	110	16	
	656.425.001.001.025	135	25	
Insulator with contacts and pilot contacts (conductor design extra fine)	*656.425.001.001.106*	*55*	*6*	
	656.425.001.001.110	*80*	*10*	
	656.425.001.001.116	110	16	
	656.425.001.001.125	135	25	

Contact inserts – pin piece



Material

Insulator	PBT, blue
Contacts	Cu-alloy, surface Ag

Order information pin insert in single parts

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with screws	656.425.002.002.000			
Insulator without screws	656.425.002.001.000			
Pin contact	*181.857.000.201.00X*	*up to 55*	*6*	6
	181.858.000.201.00X	*up to 80*	10	
	181.859.000.201.00X	up to 110	16	
	181.860.000.201.00X	up to 135	25	
Sealing plug	656.425.001.006.000			
Pilot contact socket	178.556.100.201.000		1.5	2

X = 0 Line according to VDE 0295 – extra fine – Class 6
X = 1 Line according to VDE 0295 – fine – Class 5

Grey = on request!

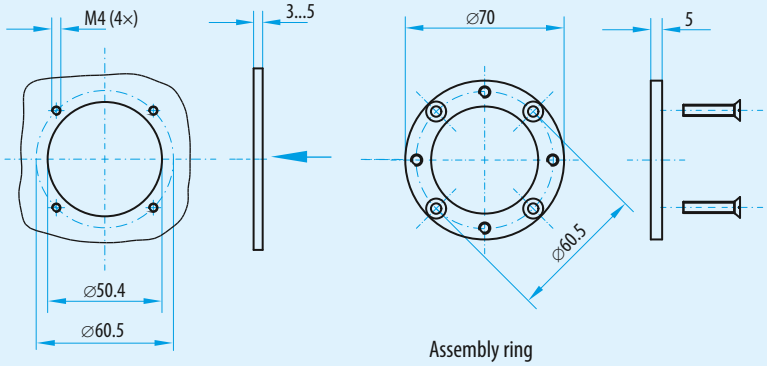
Order information pin insert as set

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with contacts and sealing plugs (conductor design extra fine)	*656.425.002.001.006*	*up to 55*	*6*	6
	656.425.002.001.010	*up to 80*	*10*	
	656.425.002.001.016	up to 110	16	
	656.425.002.001.025	up to 135	25	
Insulator with contacts and pilot contacts (conductor design extra fine)	*656.425.002.001.106*	*up to 55*	*6*	
	656.425.002.001.110	*up to 80*	*10*	
	656.425.002.001.116	up to 110	16	
	656.425.002.001.125	up to 135	25	

Accessories Size 1 – on Request

Assembly set for installation in metal sheet

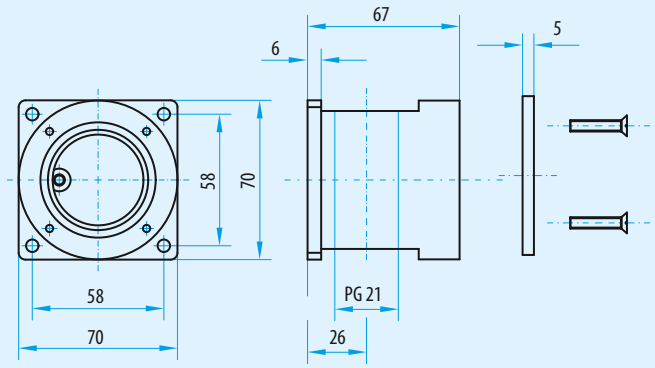
Part number: 656.425.001.003.000



Assembly instruction and possibilities see from page 97.

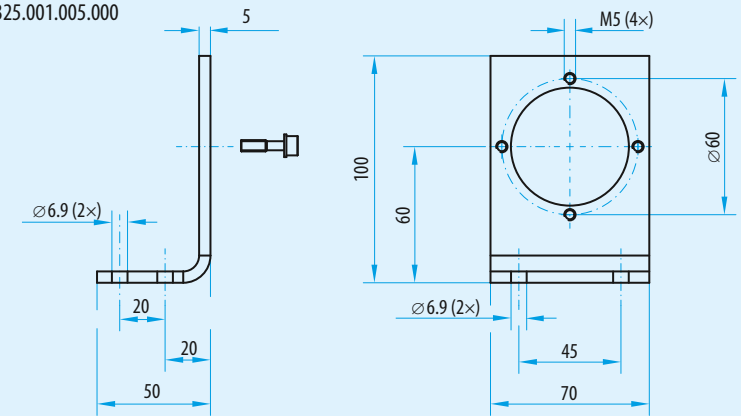
Surface mounted housing with assembly ring

Part number: 656.325.001.002.000



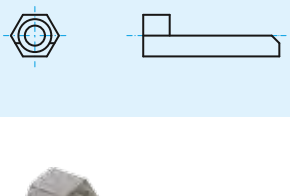
Assembly bracket

Part number:
656.325.001.005.000

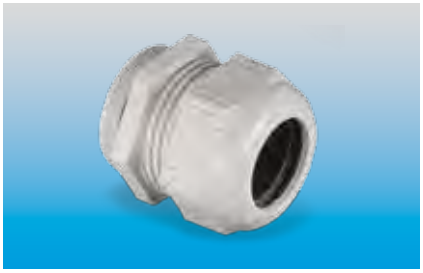


Hexagonal keying

Part number: 656.425.001.103.000



Cable clamp M 32



Material

Cable diameter	11 up to 21 mm
Colour	grey Part number: 027.832.110.210.007 white Part number: 027.832.110.210.003

ODU ROB
Size 2

Up to max. 180 A

ODU ROB – Size 2 up to Max. 180 A

Technical data

Operating frequency	50 up to 60 Hz
Contact diameter	8 mm
Termination	Crimp
Designation	180 A / 800 V / 6 kV / 3
Protection class	IP 67 (coupled and screwed)

The ODU ROB connection system consists of housing and inserts. The inserts are arranged of an insulator and contact pins.

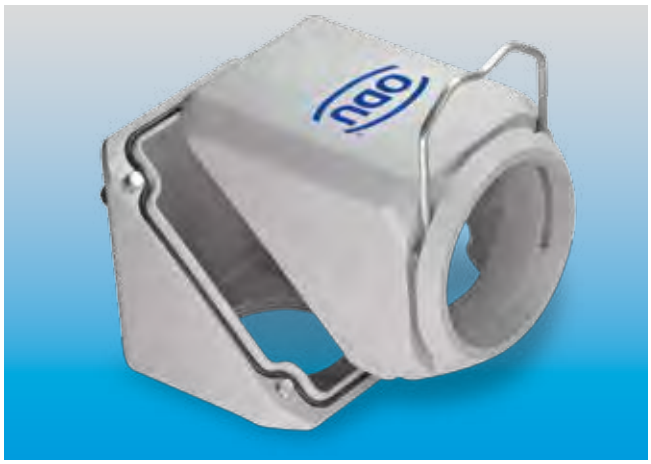
Housing for pin and socket piece

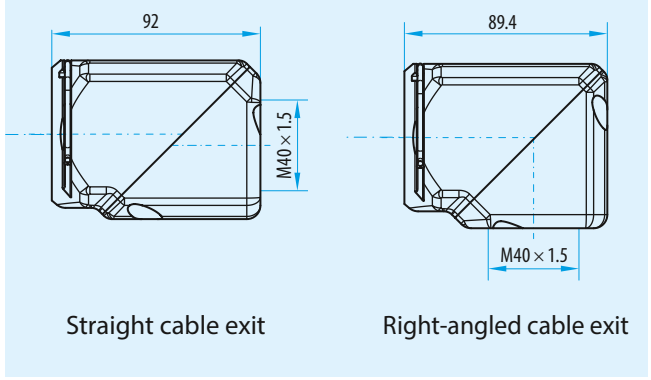
– Material: PBT, grey

– Straight and right-angled cable exit

Straight or right-angled cable exit are possible with one and the same housing. Thanks to the patented two-piece housing, it takes only a few steps to change between straight and right-angled execution.

Cable exit	Part number
Straight and right-angled	656.424.012.006.000

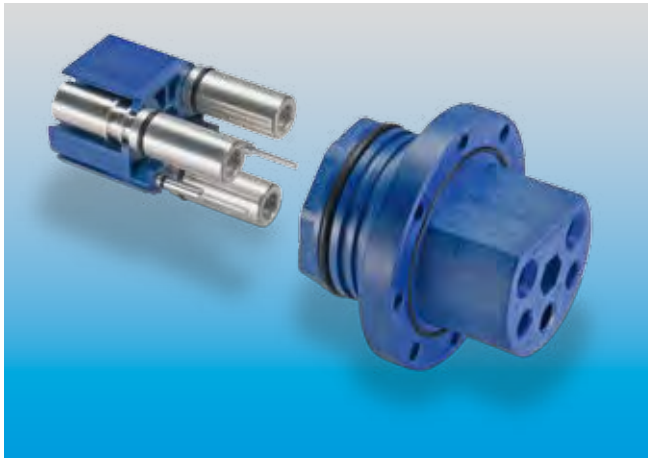


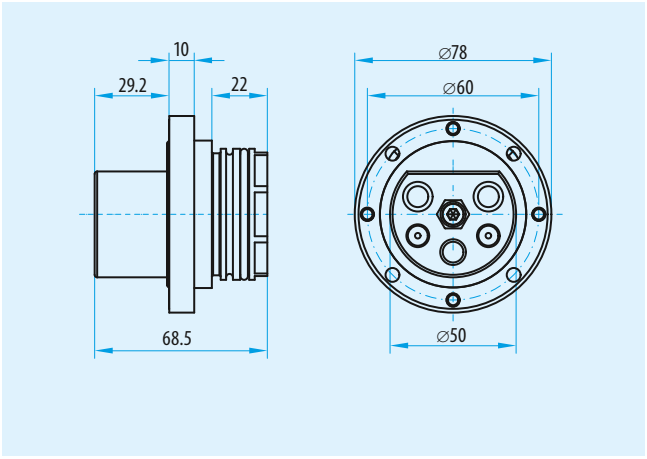


Straight cable exit

Right-angled cable exit

Contact inserts – socket piece





Picture with contacts.

Material

Insulator	PBT, blue
Contacts	Cu-alloy, surface Ag

Order information socket insert in single parts

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with screws	656.424.001.002.000			
Insulator without screws	656.424.001.001.000			
Socket contact	*178.862.100.201.00X*	*up to 110*	*16*	8
	178.863.100.201.00X	up to 135	25	
	178.864.100.201.00X	up to 150	35	
	178.865.100.201.00X	*up to 180*	*50*	
Sealing plug	656.425.001.006.000			
Pilot contact pin	182.557.000.201.000		1.5	2

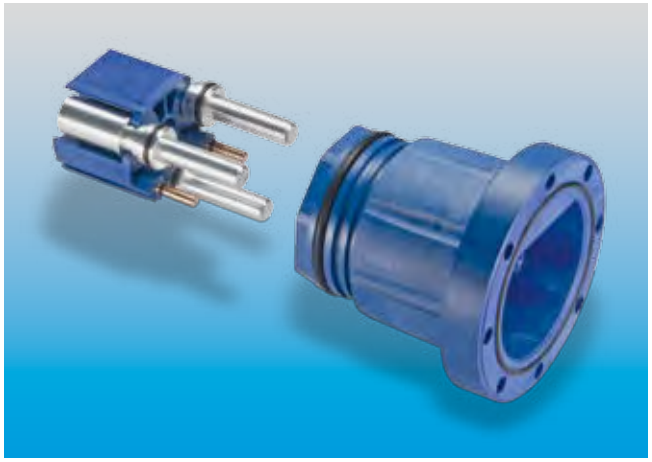
X = 0 Line according to VDE 0295 – extra fine – Class 6
X = 1 Line according to VDE 0295 – fine – Class 5

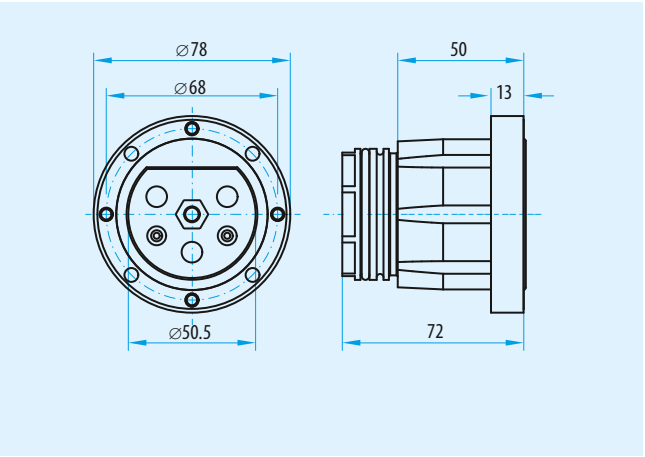
Grey = on request!

Order information socket insert as set

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with contacts and sealing plugs (conductor design extra fine)	*656.424.001.001.016*	*up to 110*	*16*	8
	656.424.001.001.025	up to 135	25	
	656.424.001.001.035	up to 150	35	
	656.424.001.001.050	*up to 180*	*50*	
Insulator with contacts and sealing plugs (conductor design extra fine)	*656.424.001.001.116*	*up to 110*	*16*	
	656.424.001.001.125	up to 135	25	
	656.424.001.001.135	up to 150	35	
	656.424.001.001.150	*up to 180*	*50*	

Contact inserts – pin piece





Material

Insulator	PBT, blue
Contacts	Cu-alloy, surface Ag

Order information pin insert in single parts

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with screws	656.424.002.002.000			
Insulator without screws	656.424.002.001.000			
Pin contact	*181.862.000.201.00X*	*up to 110*	*16*	8
	181.863.000.201.00X	up to 135	25	
	181.864.000.201.00X	up to 150	35	
	181.865.000.201.00X	*up to 180*	*50*	
Sealing plug	656.425.001.006.000			
Pilot contact socket	178.556.100.201.000		1.5	2

X = 0 Line according to VDE 0295 – extra fine – Class 6
X = 1 Line according to VDE 0295 – fine – Class 5

Grey = on request!

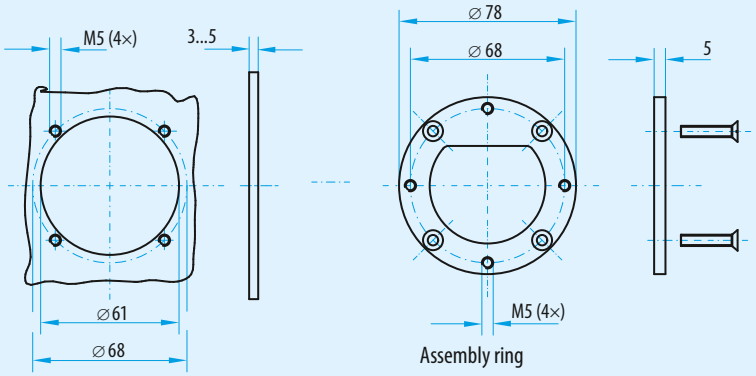
Order information pin insert as set

	Part number	Current load A	Termination cross section mm²	Contact diameter mm
Insulator with contacts and sealing plugs (conductor design extra fine)	*656.424.002.001.016*	*up to 110*	*16*	8
	656.424.002.001.025	up to 135	25	
	656.424.002.001.035	up to 150	35	
	656.424.002.001.050	*up to 180*	*50*	
Insulator with contacts an sealing plugs (conductor design extra fine)	*656.424.002.001.116*	*up to 110*	*16*	
	656.424.002.001.125	up to 135	25	
	656.424.002.001.135	up to 150	35	
	656.424.002.001.150	*up to 180*	*50*	

Accessories Size 2 – on Request

Assembly set for installation in metal sheet

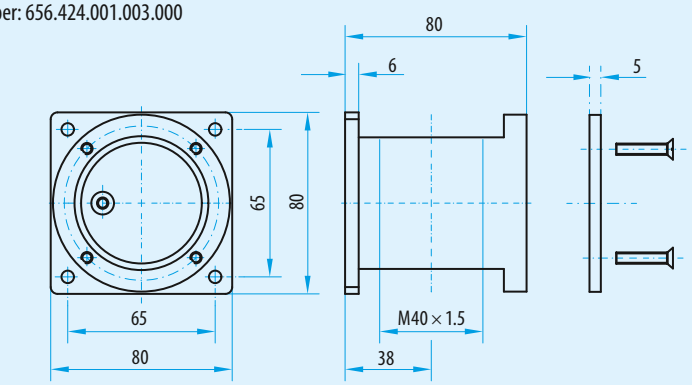
Part number: 656.424.001.004.000



Assembly instruction and possibilities see from page 98.

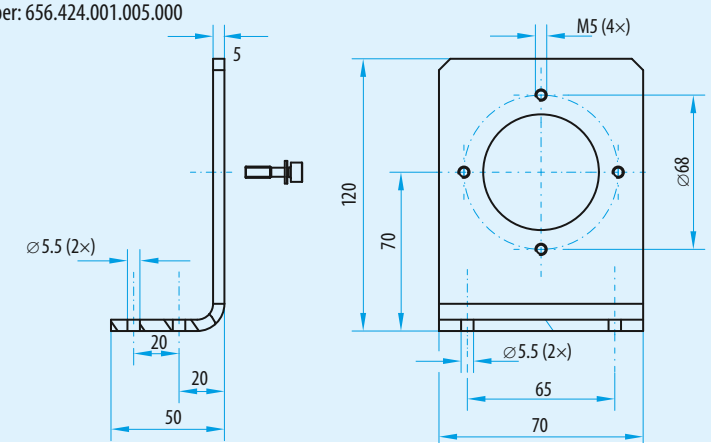
Mounting case with assembly ring

Part number: 656.424.001.003.000



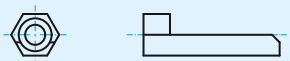
Assembly bracket

Part number: 656.424.001.005.000



Hexagonal coding

Part number: 656.424.001.103.000



Cable clamp M 40

Material

Cable diameter	19 up to 28 mm
Colour	white

Part number: 027.840.190.280.003

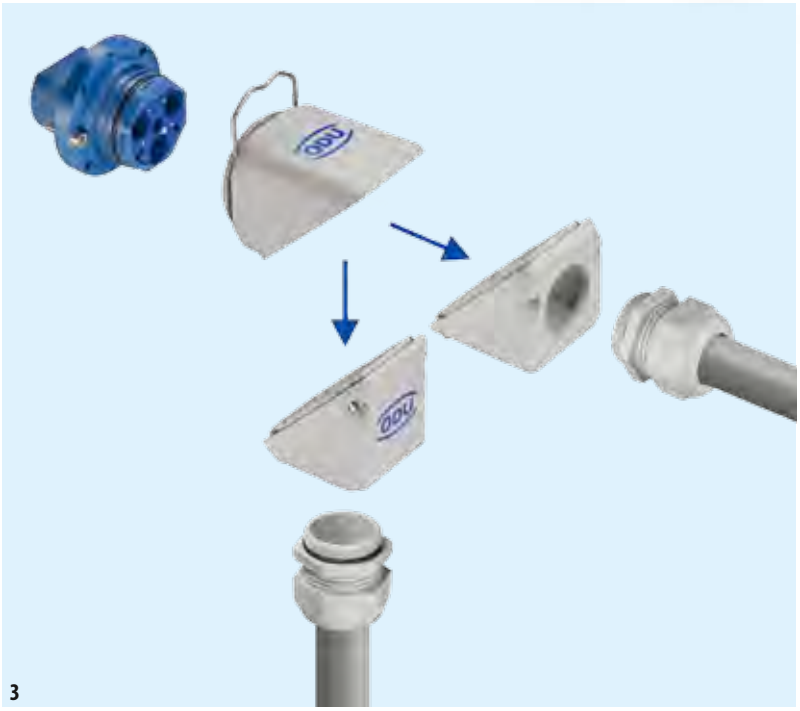
ODU ROB
Assembly Instruction and Crimp Information

Assembly Instruction Size 1 and 2

1

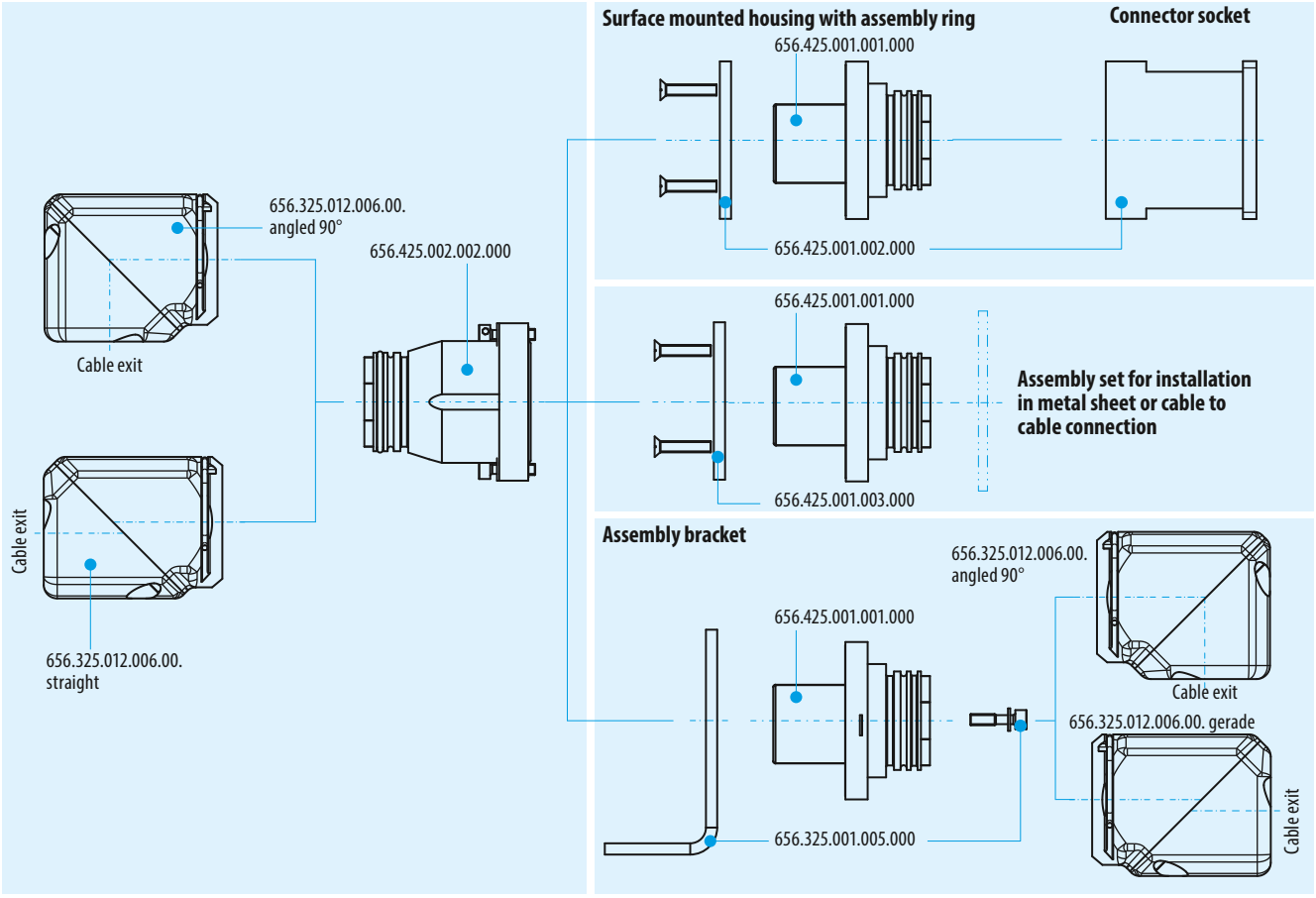
1. Lock crimped contacts into place in the insulator insert.
2. Slide equipped insert into the insulator and screw it down.
3. Slide front part of housing onto the insulator in the right position and select the required cable exit (straight or right-angle).
   Do this by rotating the rear part of the housing into the required position.
   Both cable exits are possible with one and the same housing.
   Screw down the housing parts correspondingly.

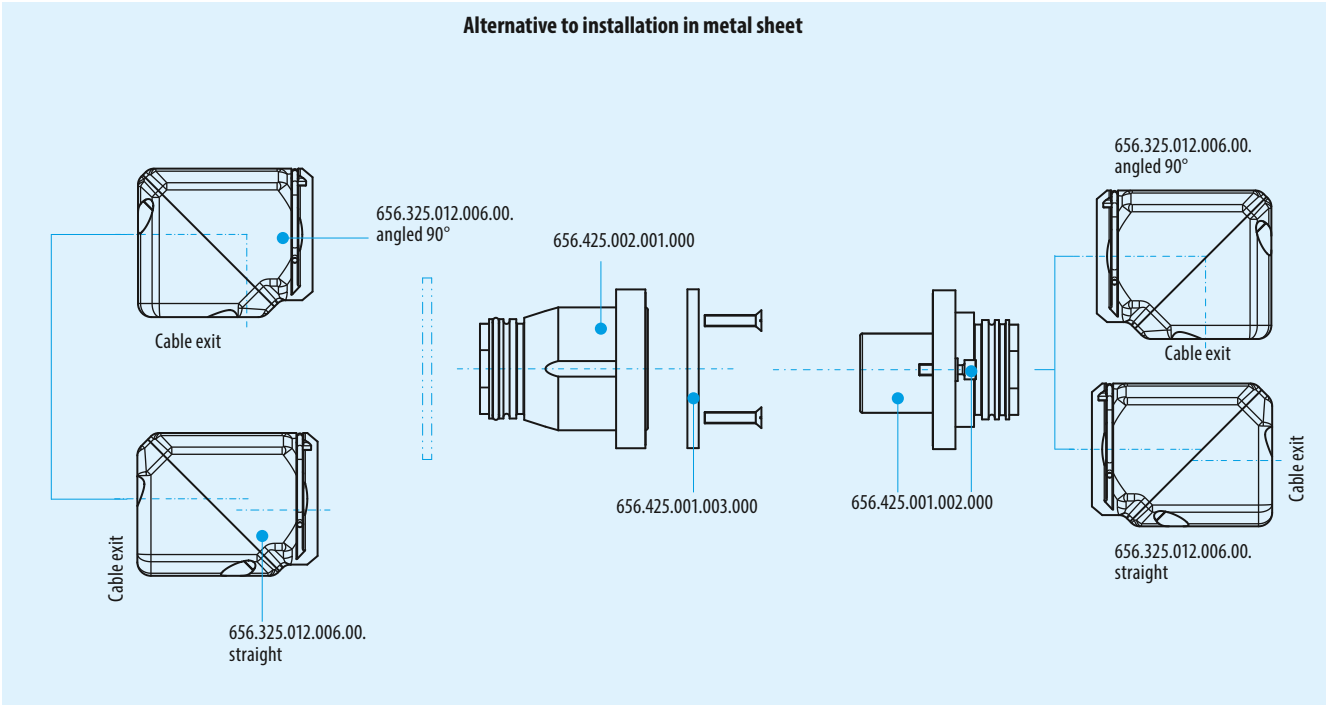
2



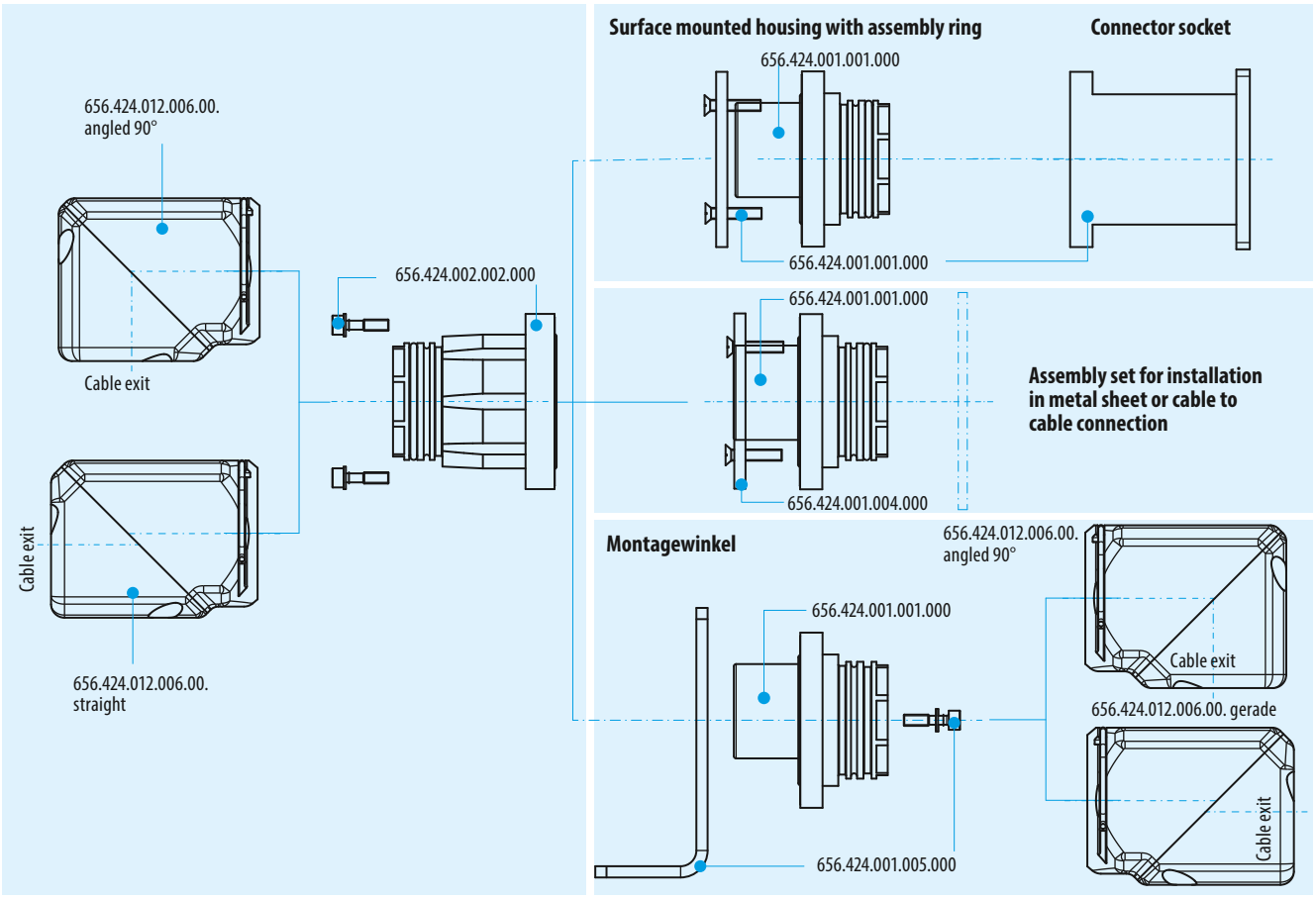
3

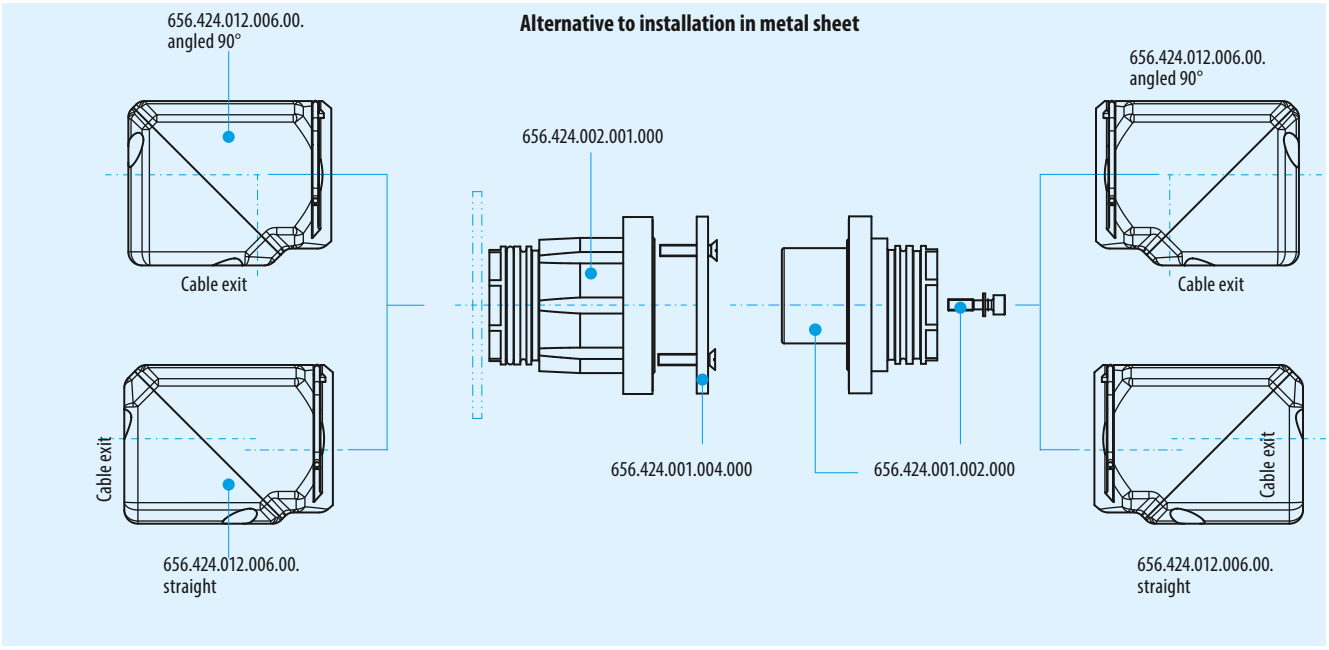
Assembly Possibilities Size 1





Assembly Possibilities Size 2

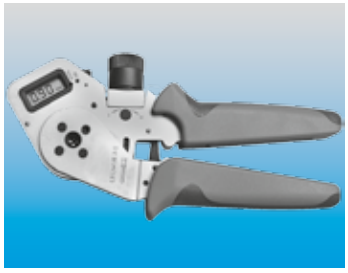




Crimping Tools

Termination cross-section mm²	Contact diameter mm	8-point crimping tool	Hexagonal crimping tool	Crimp jaws	Adjustment dimension "X"
16	*6.0 / 0.8*		080.000.026.000.000	*080.000.026.116.000*	
25	6.0 / 8.0			080.000.026.125.000	
35	8.0			080.000.026.135.000	
50	*8.0*			*080.000.026.150.000*	
1.5 pilot contacts	2.0	080.000.051.000.000			1.40 to 1.45

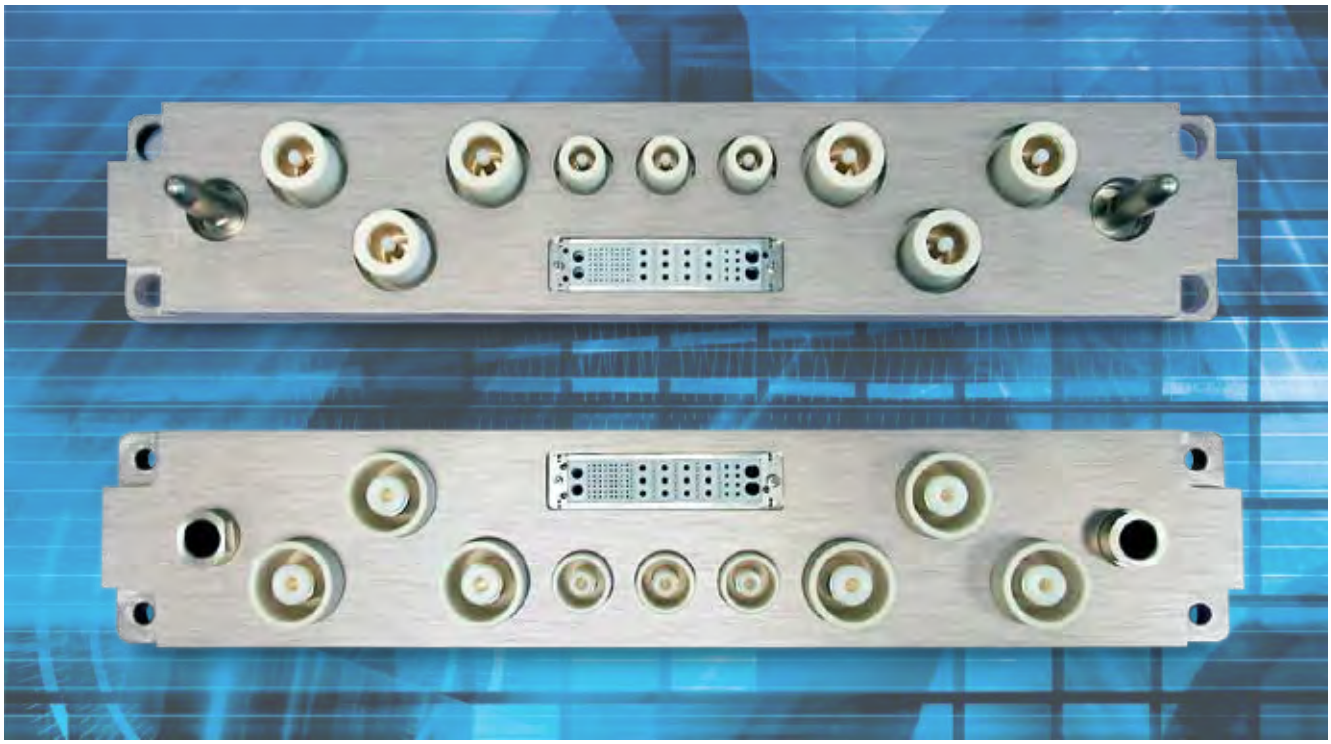
Grey = on request!



8-point crimping tool
part number:
080.000.051.000.000

Hexagonal crimping tool
part number:
080.000.026.000.000

Application Specific
Connectors for Docking and Robot Systems



Additional Docking Connectors

Modular rectangular connector

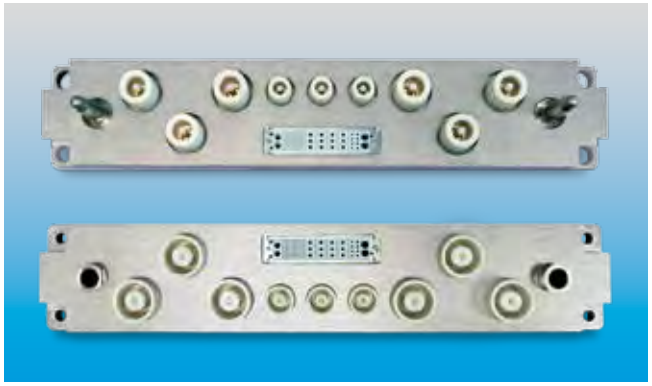
The frames can be given a floating mounting and consequently automatically docked. There are versions with axial play of ± 0.4 mm and radial play of ± 1.2 mm.

Modules are available for signals, power, high frequency, fibre-optic, pneumatic, media and shielded implementations / high-speed-connectors.

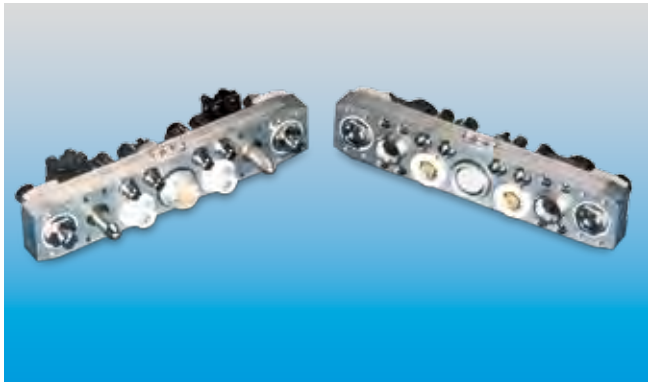
Small docking connectors

Docking connectors from the ODU MINI-SNAP series L Push-Pull product program can have an outer diameter from 9.5 to 24 mm. The pin and groove coding makes incorrect mating almost impossible.
Suitable for creating a docking connection between two devices (such as at a charging station) 2 to 40 positions.
Versions with IP 50 and IP 68 sealing of the end device are available.

Application Specific Docking Systems

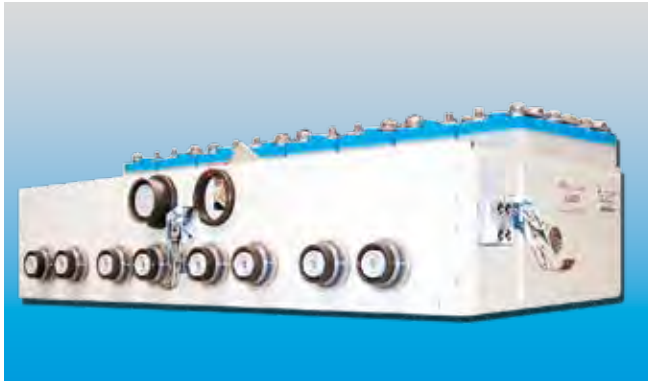


Application specific docking unit for AC/DC converter.
Interface to the inverter.



Application specific docking unit for electric cars.

Application specific docking unit for electric cars.



Application specific docking units for the Transrapid in Shanghai.

Docking plate in magnetic resonance imaging (contacting of the gradient coil) with 6 contact pins, diameter 22 mm.

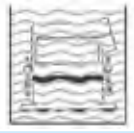
Technical Information

International Protection (IP) Classes in Accordance with DIN EN 60 529 (or IEC 529 / VDE 0470 T1, respectively)

Code letters (International Protection) **IP**

First code number (Protection against solid foreign bodies) **6**

Second code number (Protection against water) **5**

Code number	Extent of protection			Code number	Extent of protection		
0	No protection		No protection against contact, no protection against solid foreign bodies	0	No protection against water		No protection against water
1	Protection against large foreign bodies		Protection against large-surface contact with the back of the hand, protection against foreign bodies ∅ ≥ 50 mm	1	Protection against dripping water		Protection against vertically falling water drops
2	Protection against medium-sized foreign bodies		Protection against contact with the fingers, protection against foreign bodies. ∅ ≥ 12 mm	2	Protection against dripping water when tilted		Protection against falling water drops when tilted (any angle up to 15° from the vertical)
3	Protection against small foreign bodies		Protection against contact with tools, wires, or the like with ∅ ≥ 2.5 mm, protection against foreign bodies ∅ ≥ 2.5 mm	3	Protected against spraying water		Protection against water spraying at any angle up to 60° from the vertical
4	Protection against granular foreign bodies		The same as 3, except ∅ ≥ 1 mm	4	Protection against splashing water		Protection against splashing water from all directions
5	Protection against dust deposits		Protection against contact, protection against harmful dust deposit in the interior	5	Protection against water jet		Protection against water jet (nozzle) from any angle
6	Protection against dust ingress		Protection against foreign bodies ∅ ≥ 1 mm, protection against dust ingress	6	Protection against powerful water jet		Protection against powerful water jet from any angle
				7	Protection against immersion		Protection against water ingress during temporary immersion
				8	Protection against continuous immersion		Protection against pressurized water during continuous immersion
				9k[1]	Protection against high pressure		Protection against water from high-pressure/ steam jet cleaners.

[1] IP x9k is not included in EN 60529 or IEC 60529, but is included in DIN 40 050-9.

Explanations and Information in Compliance with VDE

Standards applied

DIN EN 60664-1 (VDE 0110 – part 1) and
DIN EN 61984 (VDE 0627)
(Original DIN EN 60664-1 : 2007 and DIN EN 61984 : 2009 remain authoritative for all technical information given).

General information

A connector cannot be chosen by taking into consideration only functionality, number of contacts and current or voltage characteristics. The consideration of the place where it will be used and the installation conditions that prevail there are essential. Depending on the installation conditions and local conditions, the connector can be used in different voltage and current ranges, according to the standardization.
All voltage information listed in this catalog refers to use of insulators in ODU MAC massive frame for DIN housings or ODU MAC aluminium frames.

The most important influencing quantities and the electrical characteristics tuned to them are explained in more detail in the following. If you have further questions, we would be happy to provide support.

The following texts and tables are excerpts from the specified standards. The originals, DIN EN 60664-1 from Nov. 2003 and DIN EN 61984 from Sep. 2002, remain authoritative for all technical information given.

Overvoltage category

Using the overvoltage category, the necessary rated impulse voltage is defined according to table F.1 and the nominal voltage used. The particular overvoltage category for the device, depending on the installation location, is selected according to the criteria listed below.

– **Overvoltage category I**
Devices for connection to electric circuits in which measures have been taken to limit transient overvoltages to a suitable low level.
For example: Connectors for the power supply of computer hardware that is permanently connected to a power pack with electronic overvoltage limiting.

– **Overvoltage category II**
Devices that consume energy and that are supplied from the fixed wiring system.
For example: Household appliances, portable tools and similar devices.

– **Overvoltage category III**
(= standard, if no special overvoltage category is given).
Devices in fixed wiring systems and for those cases in which particular demands are placed on the reliability and availability of the devices.
For example: Switches in fixed wiring systems and devices for industrial use with permanent connection to the fixed wiring system.

– **Overvoltage category IV**
Devices for use at the wiring system connecting point.
For example: Electric meters and primary overvoltage protective devices

DIN EN 60664-1: Table F.1 – Rated impulse voltage for devices that are fed directly from the low-voltage system.

Nominal voltage of the electric power supply system according to IEC 60038		Voltage line to neutral, derived from nominal voltages a.c. or d.c. up to and including	Rated impulse voltage Overvoltage category			
Three-phase-system	Single-phase-system		I	II	III	IV
V	V	V	V	V	V	V
		50	330	500	800	1500
		100	500	800	1,500	2,500
	120 to 240	160	800	1500	2,500	4,000
230/400 277/480		300	1,500	2,500	4,000	5,000
400/692		600	2,500	4,000	6,000	8,000
1,000		1,000	4,000	6,000	8,000	12,000

Pollution degree

Combined with moisture, any pollution that may arise can influence the insulating property on the surface of the connector. For defining the different rated values, a pollution degree must be selected for the device, according to the criteria listed below. For a connector with a degree of protection of at least IP 54 (to IEC 60529), the insulating parts inside the encapsulation may be measured for a lower pollution degree according to the standard.
This also applies to inserted connectors where the encapsulation is ensured by the connector housing and that are detached only for testing and maintenance purposes.

- **Pollution degree 1**
  There is either no pollution or only dry, non-conductive pollution; the pollution has no influence.
  For example: Measuring instruments and hardware in computer systems.
- **Pollution degree 2**
  Only non-conductive pollution occurs. Transient conductivity caused by dewfall must be expected occasionally, however.
  For example: Devices in laboratories and in living areas and sales and other commercial areas.
- **Pollution degree 3**
  (= standard, if no special pollution degree is given).
  Conductive pollution occurs or dry, non-conductive pollution that becomes conductive because of dewfall must be expected.
  For example: Devices in industrial, commercial and agricultural operations, unheated storage areas and workshops.
- **Pollution degree 4**
  Continuous conductivity occurs, caused by conductive dust, rain or wetness.
  For example: Devices in open-air plants and on construction machines.

Operating voltage (VDE: Rated voltage)

The level of a voltage that is specified by the manufacturer for a component, device or piece of equipment and to which the operating and performance parameters apply. The rated voltage depends on the connector's insulating material group and the respective creepage distances between the separate contacts, according to the specified pollution degree. By using empty modules and by differing the positioning of the contacts in the insulators, it is possible to influence the rated voltage considerably.

Devices are permitted to have more than one value for the rated voltage or to have a range of rated voltages) (see table F.4 in DIN EN60664-1:2007).

Nominal voltage

A suitable rounded voltage level, which is specified for a device by the manufacturer for labeling or identification. In these explanations, the term nominal voltage is used for the value of the output voltage specified by the power company or the manufacturer of the voltage source for classification of the overvoltage category.

Rated impulse voltage

Value of the impulse test voltage that is specified by the manufacturer for a device or a part thereof and that indicates the defined staying power of its accompanying insulation against transient (short-term, lasting a few milliseconds) overvoltages. The impulse test voltage here is the highest level of the impulse voltage of a defined shape and polarity that is not permitted to lead to any insulation disruptive discharge under defined conditions.

The rated impulse voltage depends on the clearance distance between the separate contacts, according to the specified pollution degree. By using empty modules and by differing the positioning of the contacts in the insulators, it is possible to influence the rated impulse voltage considerably (see table F.2 in DIN EN60664-1:2007).

In the most recent version of DIN EN 60664-1:2009, resources that are not connected directly to the low voltage supply should be designed for the minimum clearance distance according to the possible continuous voltage, the temporary overvoltages or the periodic peak voltage (see table F.7 in DIN EN 60664-1:2007).

Impulse test voltage / power-frequency test voltage

Highest value of the impulse voltage of a defined shape and polarity that is not permitted to lead to any insulation disruptive discharge or sparkover under defined conditions.

Clearance distance

Shortest distance between two conductive parts, through the air.

Creepage distance

Shortest distance between two conductive parts, along the surface of an insulating material. The creepage distance is influenced by the pollution degree used.

Test voltage

The connector's electric strength is tested to the standard according to the specified rated impulse voltage by applying the test voltage (impulse test voltage or power-frequency test voltage according to table F.5) over a defined time period.

DIN EN 60664-1: Table F.5 – Test voltages for testing clearance distances at different altitudes
(The voltage levels are valid only to verify the clearance distances)

Rated impulse voltage	Test impulse voltage		
	At sea level (NN)	at 200 m elevation	at 500 m elevation
û	û	û	û
kV	kV	kV	kV
0.33	0.357	0.355	0.350
0.5	0.541	0.537	0.531
0.8	0.934	0.920	0.899
1.5	1.751	1.725	1.685
2.5	2.920	2.874	2.808
4.0	4.923	4.874	4.675
6.0	7.385	7.236	7.013
8.0	9.847	9.648	9.950
12.0	14.770	14.471	14.025

Conversions AWG – Cross Section (AWG = American Wire Gauge)

The AWG system describes the cross section of a wire using a gauge number for every 26 % increase in conductor cross section. With larger wire diameters, the AWG gauge numbers decrease; as the wire sizes increase, the AWG gauge numbers decrease. **This is only valid for solid conductors.**

Most wires are made with **stranded conductors.** Compared to solid conductors stranded wires offer higher durability, higher flexibility and better performance under bending and vibration.

Stranded wires are made from wires with smaller gauge sizes (higher AWG gauge number). The AWG gauge number of the stranded wire is equal to that of a solid conductor of the same size wire. The cross section of the stranded conductor is the sum of cross sections of the single conductors.
For example, a AWG-20 stranded wire of 7 AWG-28 conductors has a cross section of 0.563 mm²; an AWG-20 stranded wire with 19 AWG-32 conductors has a cross section of 0.616 mm².

Source: Gore & Associates, Pleinfeld

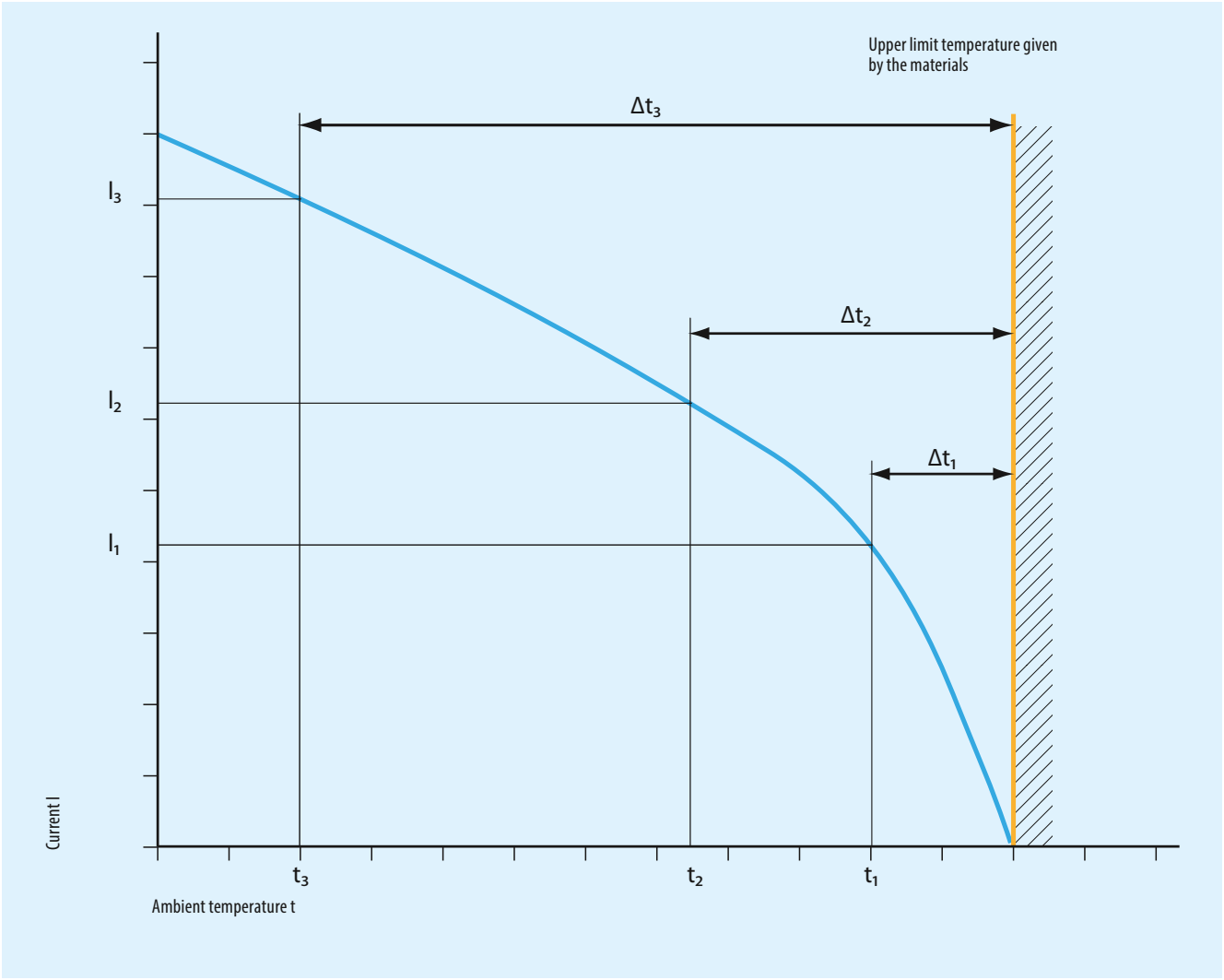
Conversion table AWG/mm²

Circular wire					
AWG	Diameter		Cross section	Weight	Max. resistance
	Inch	mm	mm²	kg/km	Ω/km
10 (1)	0.1020	2.5900	5.2700	47.000	3.45
10 (37/26)	1.1090	2.7500	4.5300	43.600	4.13
12 (1)	0.0808	2.0500	3.3100	29.500	5.45
12 (19/25)	0.0895	2.2500	3.0800	28.600	6.14
12 (37/28)	0.0858	2.1800	2.9700	26.300	6.36
14 (1)	0.0641	1.6300	2.0800	18.500	8.79
14 (19/27)	0.0670	1.7000	1.9400	18.000	9.94
14 (37/30)	0.0673	1.7100	1.8700	17.400	10.50
16 (1)	0.0508	1.2900	1.3100	11.600	13.94
16 (19/29)	0.0551	1.4000	1.2300	11.000	15.70
18 (1)	0.0403	1.0200	0.8200	7.320	22.18
18 (19/30)	0.0480	1.2200	0.9600	8.840	20.40
20 (1)	0.0320	0.8130	0.5200	4.610	35.10
20 (7/28)	0.0366	0.9300	0.5600	5.150	34.10
20 (19/32)	0.0384	0.9800	0.6200	5.450	32.00
22 (1)	0.0252	0.6400	0.3240	2.890	57.70
22 (7/30)	0.0288	0.7310	0.3540	3.240	54.80
22 (19/34)	0.0307	0.7800	0.3820	3.410	51.80
24 (1)	0.0197	0.5000	0.1960	1.830	91.20
24 (7/32)	0.0230	0.5850	0.2270	2.080	86.00
24 (19/36)	0.0252	0.6400	0.2400	2.160	83.30
26 (1)	0.1570	0.4000	0.1220	1.140	147.00
26 (7/34)	0.0189	0.4800	0.1400	1.290	140.00
26 (19/38)	0.0192	0.4870	0.1500	1.400	131.00
28 (1)	0.0126	0.3200	0.0800	0.716	231.00
28 (7/36)	0.0150	0.3810	0.0890	0.813	224.00
28 (19/40)	0.0151	0.3850	0.0950	0.931	207.00
30 (1)	0.0098	0.2500	0.0506	0.451	374.00
30 (7/38)	0.0115	0.2930	0.0550	0.519	354.00
30 (19/42)	0.0123	0.3120	0.0720	0.622	310.00
32 (1)	0.0080	0.2030	0.0320	0.289	561.00
32 (7/40)	0.0094	0.2400	0.0350	0.340	597.10
32 (19/44)	0.0100	0.2540	0.0440	0.356	492.00
34 (1)	0.0063	0.1600	0.0201	0.179	951.00
34 (7/42)	0.0083	0.2110	0.0266	0.113	1,491.00
36 (1)	0.0050	0.1270	0.0127	0.072	1,519.00
36 (7/44)	0.0064	0.1630	0.0161	0.130	1,322.00
38 (1)	0.0040	0.1000	0.0078	0.072	2,402.00
40 (1)	0.0031	0.0800	0.0050	0.043	3,878.60
42 (1)	0.0028	0.0700	0.0038	0.028	5,964.00
44 (1)	0.0021	0.0540	0.0023	0.018	8,660.00

Principles of Current Carrying Capacity

Derating measurement procedure (DIN EN 60512-5-2:2002)

Structure of the basis current carrying capacity curve



A connector's current carrying capacity is determined by measurement. It is determined by taking into account the self-heating due to Joule heat and the ambient temperature, and is limited by the thermal properties of the contact materials used; the upper limit temperatures of these materials should not be exceeded.

The relationship between current, the temperature increase caused as a result of the power dissipation at the contact resistor and the ambient temperature is depicted in a curve. The curve is drawn in a linear coordinate system with the current **"I"** as the ordinate and the temperature **"t"** as the abscissa. The upper limit temperature is used as a limit for the diagram.

In three measurements, the temperature rise due to Joule heat (Δt) is determined at different currents in at least three connectors and the points determined in this process are connected into a parabolic basis curve.

The corrected current carrying capacity curve (derating curve) can be derived from the basis curve.
The safety factor ($0.8 \times I_n$) can be used to give consideration to such values as manufacturing tolerances as well as uncertainties in the temperature measurement and in the measurement setup.

Current Load

The heating in multi-position connectors and cables is greater than the heating in single contacts. A **reduction factor** is therefore used in the calculation. There is no direct regulation for connectors in this regard. For this reason, the reduction factors for multi-wire cables as given in DIN 57 298 Part 2 / VDE 0298 Part 2 are used. The reduction factor applies for 5 or more loaded wires (cf. also DIN 41 640, Part 3).

The nominal current is the current intensity that leads to a contact temperature increase of 45 K in a contact. Nominal current refers to individually loaded contacts.

Example
A cable with 24 wires (24 positions) is used. The nominal cross-section of a wire is 6 mm².
A reduction factor (e.g. cable laid in air) of 0.4 is to be applied for the load reduction depending on the number of loaded cable wires.
According to the current carrying capacity, a 6 mm² Cu line can be used for 44 amperes.
The 24 positions cable can accordingly be loaded with a max. 17.6 A/wire (0.4 × 44 A).

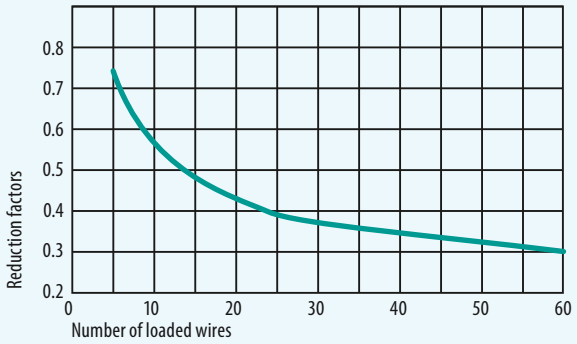
Technical information / application examples

Example: Termination cross-sections
The current load curve for the contact diameter 3 mm refers to a termination cross-section of 6 mm². If the contact (⌀ 3 mm) is connected to a cable with a cross-section of 2.5 mm², the max. permissible current intensity is limited by the conductor. To determine the max. permissible current intensity, a smaller contact with corresponding cross-section is then selected.

Contact ⌀ 3 mm with 6 mm²
= max. nominal single contact current load 50 A
Contact ⌀ 3 mm with 2.5 mm² (with ⌀ 2 mm)
= max. nominal single contact current load 40 A

Reduction factors
Multi-wire cable with the conductor cross-sections from 1.5 to 10 mm² when laid in air.

Cable in air



Load reduction factors
For plastic cable from 1.5 to 10 mm² when laid in air.

Number of loaded wires	Reduction factors
5	0.75
7	0.65
10	0.55
14	0.50
19	0.45
24	0.40
40	0.35
61	0.30

Line Current Load

Laid	Exposed in air	Or on surfaces		
	Single-wire lines PVC, PE, PUR, TPE heat resistant	Multi-wire highly flexible lines for hand-held devices, wire/sheath cold-resistant, PVC insulated		Multi-wire movable lines standard program harmonized series
Number of loaded wires	1	2	3	2 or 3
Nominal cross-section of copper conductor in mm²	Current load in A			
0.14	3			2
0.25	5			4
0.34	8			6
0.5	12	3	3	9
0.75	15	6	6	12
1	19	10	10	15
1.5	24	16	16	18
2.5	32	25	20	26
4	42			36
6	54			44
10	73			62
16	98			81
25	129			108
35	158			135
50	198			168
Current load according to	DIN VDE 0100 T.523 1981-06 group 3	following the principles of HD21S2T.1 based on H05VV-F VDE 0281		DIN VDE 0100T523 1981-06 group 2 DIN VDE 0298 T4 table 9

Permissible loads on insulated lines up to 30° C Ambient temperature following the principles of VDE 0100 part 523, 0298 part 4 and 0891 part 1.

Current load, flexible lines with nominal voltages up to 1,000 V at ambient temperature +30° C.

Technical Terms / Definitions / Information

Basis curve for ODU DOCK / ODU ROB
Current carrying capacity curve for connectors as determined by measurement according to the measurement procedure described in DIN EN 60512-5-2:2002 depending on the permissible limit temperature of the materials.

Clearance distance
The shortest distance, measured as a thread measure, between two live metallic parts in the air.

Connector = ODU DOCK / ODU ROB
A component that allows the connection of electrical conductors and that is intended to set up connections to a suitable mating component and/or to such separate connections. Connectors are operating materials that are not permitted to be inserted or separated when used as intended (when energized or loaded). The connector consists of the connector housing and the contact element.

Connectors, fixed (receptacles)
Are intended for attachment to racks, slide-in modules, devices or walls.

Connectors, loose (plugs)
Are intended for attachment to free ends of moving lines and cables.

Contact resistance
Total resistance from termination to termination. The contact resistance here is considerably less than the volume resistance. The values given are average values.

Creepage distances
Shortest distances between live parts on the surface of insulation bodies. All elevations and depressions in the insulation body are taken into account as far as specified minimum dimensions are available.

Crimp area
The area of the crimp barrel in which the crimp connection is made by compressive deformation or compressive forming of the sleeve around the conductor.

Current carrying capacity (nominal current and max. continuous current)
The information refers to sufficiently dimensioned connection cable in accordance with DIN VDE 0295 (DIN EN 60228) in class 5, so that no stronger temperature increase is caused from here. The specified temperature increase takes place through the contact. The information provided refers to average values.

Derating curve
The corrected current carrying capacity curve, derived from the established basis curve (0.8 x measured current). It takes into consideration production spreads as well as uncertainties in the temperature measurement and the measurement setup.

Derating measurement procedure (DIN EN 60512-5-2)
Measurement procedure for determining the current carrying capacity of connectors, taking the maximum permissible limit temperature into consideration.

Insertion or withdrawal force
Force that, without the influence of a coupling or locking device, is required for completely inserting or withdrawing pluggable components.

Insulator
Part of a connector, usually identical to the contact carrier.

Lubrication
The contacts are pre-lubricated at the factory.

Mating cycles
Mechanical activation of connectors and plug-and-socket devices by insertion and withdrawal. A mating cycle consists of an insertion and withdrawal step.

Max. continuous current
The metrologically determined current intensity at room temperature (approx. 20° C) that leads to a rise in the contact temperature to the limit temperature.

Nominal current
The metrologically determined current intensity that leads to an increase of 45° Kelvin in the contact temperature. The nominal current is determined according to the derating measurement procedure (DIN EN 60512-5-2:2002). The information refers to the basis curve.

Nominal single contact current load
The current carrying capacity with which each single contact can be separately loaded.

Nominal voltage
The voltage stated for a connector by the manufacturer; this is used as a reference for the operating and performance characteristics.

Operating temperature
for the ODU DOCK / ODU ROB – 40° C to +100° C
(–40 to 212° F).

Operating voltage
The nominal voltage of the current source for which the connector is intended for use. The operating voltage is not permitted to be greater than the connectors nominal voltage.

Plug device
Operating materials that are permitted to be inserted or separated during the intended use (when energized or electrically charged).

Rated current (IEC 61984)
The metrologically determined current intensity that leads to an increase of 45° Kelvin in the contact

temperature. The current is determined according to the derating measurement procedure (DIN EN 60512-5-2:2002) and is derived from the basis curve

Rated voltage
The voltage according to which the connectors are dimensioned and to which the particular operating properties are related.

Reference voltage
The standardized voltage (VDE 0110 or DIN EN 60664-1) for which a connectors insulation is dimensioned.

Solder connections
Termination technology in which a melted added metal (solder), whose melting temperature is less than that of the base metals to be connected, is used to join two metallic materials.

Surge current
One-time power pulse current with a load period of 10 ms.

Termination cross-section
The specified cross-sections correspond to DIN VDE 0295 (DIN EN 60228) Class 5.

Termination technologies
Methods for connecting the lines to the electro-mechanical components, such as solderless connections in accordance with DIN EN 60352: crimp, press-fit connection, etc. or solder connection.

Test voltage
The voltage that a connector can withstand under defined conditions without disruptive discharge or sparkover.

Wire
Conductor with its insulation, including any guiding layers that may be present.
Cables or lines can have one or more wires.

Suitable safety precautions must be taken in order to ensure that personnel do not come into contact with live conductors during installation and operation.
All entries were reviewed with maximum care before this catalogue was printed.

ODU reserves the right to make changes in accordance with the current state of the art without advance notice, and without being obligated to provide replacement deliveries or to continue production of older designs.

Company Information

Quality Management

ODU has had a powerful quality management system in place for years. ODU has been successfully certified to ISO 9001 since 1994. In addition, the automotive sector of the company group is certified to ISO TS 16949.
The certification process was carried out by the internationally active BVQI (Bureau Veritas Quality International) company.

ODU is also certified according to the medical standard ISO 13485 : 2003 + AC : 2007.

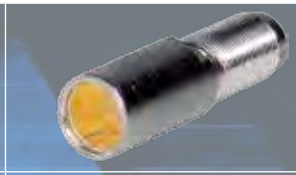
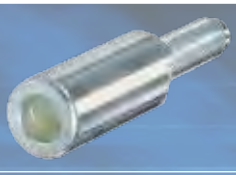
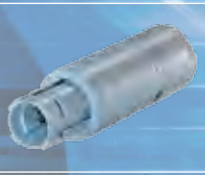
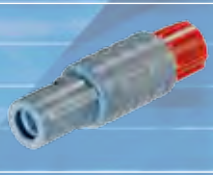
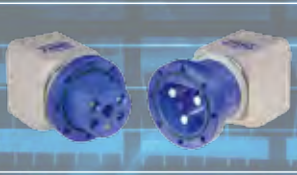
Additional to this ODU is certificated to DIN EN ISO 14001 : 2009 as well as to different certifications: VDE, UL, UL wiring harness, SCA, VG, MIL.

Your Partner in Many Application Areas

ODU stands for quality, flexibility and reliability. This is why customers working in many application areas rely on ODU products in markets such as the following:

– Medical
– Industrial
– Measuring and testing
– Military and security
– Energy
– Automotive.

The Complete ODU Product Range

Single contacts (round or flat)			
High current connectors			
Circular connectors with Push-Pull locking			
Modular rectangular connectors			
PCB connectors			
Robust connectors			
Disposable Systems			
Application specific solutions			
AMC – Advanced Military Connector			
Cable assembly			

Everything From One Source

Each connection needs its individual cable. Make no compromises when it comes to the quality of the complete connection system. ODU gives you the complete system solution from one source, with no intermediary suppliers.

Cable assembly is a very complex subject. It requires equal measures of expertise in the areas of connectors, cables and assembly. ODU meets all these requirements in full.

Our competent assembly team tests the complete system according your specifications. Our assembly service promises you the same quality found in our connectors – without compromises.

ODU offers you all from one source

- 100 % final inspections
- Production in clean room acc. to EN ISO14644-1 possible
- Automatic processes (cutting, stripping, attaching)
- Extrusion possible with a hot-melt and high pressure/ temperature process
- Ultrasound welding
- EMC compatible assembly
- Application specific labeling
- Widest range of potting possibilities for sealed systems
- Extruded cable crossovers.

Advantages for the customer

- Modern manufacturing facilities in Mühldorf (Germany), Shanghai (China) and Sibiu (Romania)
- Reliability thanks to our company-wide quality strategy
- Products with durability and functional reliability
- Production according to UL (file: E333666) possible
- Inspections, such as crimp force monitoring, during production.

Application Specific Connectors

Innovative, dynamic markets call for innovative connectors.

As an expert for special applications and requirements, we develop forward-looking, appropriate connectors attuned to your needs!

In spite of the global trend toward standardized connectors, there are always applications that call for an application specific solution. We accept this challenge and develop innovative products for our customers based on our many years of extensive know-how, our creativity and, not least, our high level of vertical integration. Technology access and technology mastery, combined with intensive cooperation with the user, form the basis for achieving success together.

Design-to-cost is joined by design-for-application for the customer's benefit.

ODU Worldwide

A perfect alliance.

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