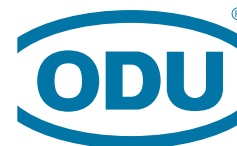


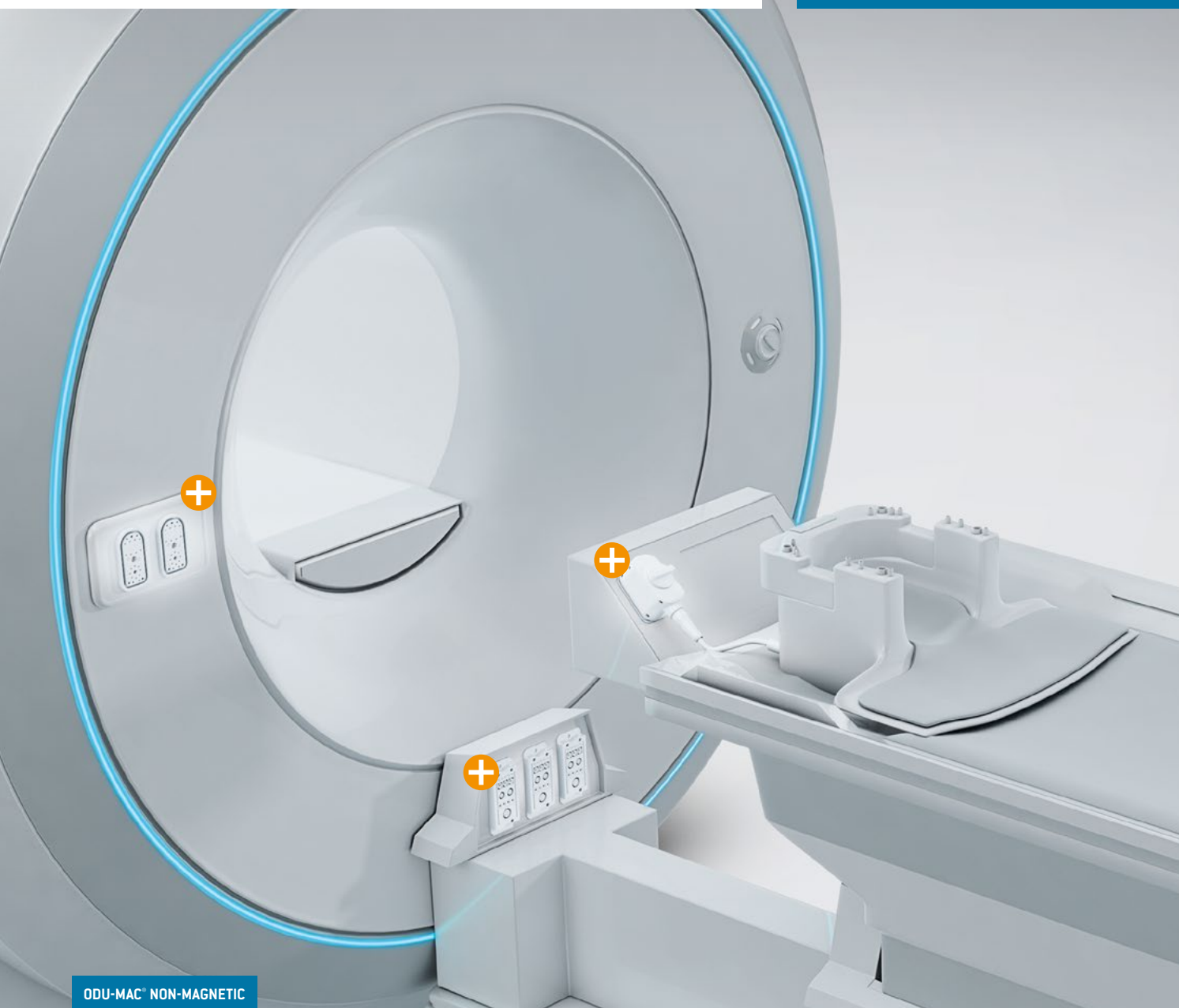
A PERFECT ALLIANCE.



ODU-MAC[®] **Silver-Line** **White-Line** NON-MAGNETIC

Connector solutions for MRI applications.

HIGH RELIABILITY
HIGH MATING CYCLES
CABLE ASSEMBLY
INTEGRATED SOLUTIONS



ODU-MAC[®] NON-MAGNETIC

ODU-MAC[®] SILVER-LINE

ODU-MAC[®] WHITE-LINE

ODU-MAC[®] BLUE-LINE

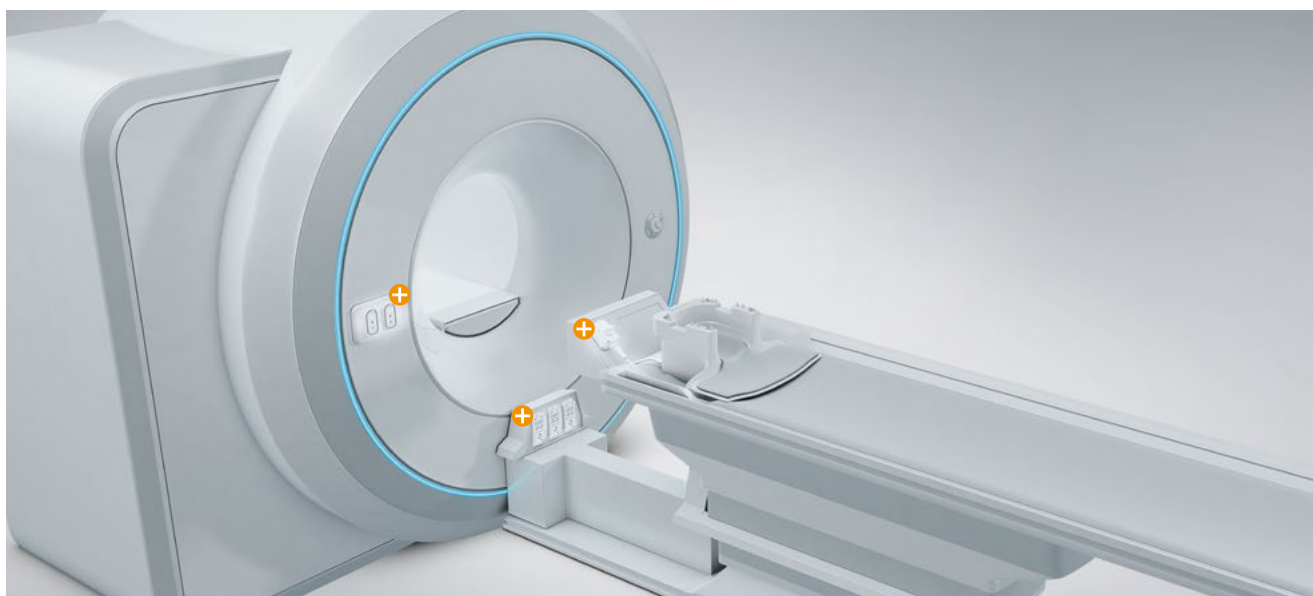
ODU-MAC[®] NON-MAGNETIC

FEATURES

- Non-magnetic
- Rugged version
- High number of mating cycles (> 100,000)
- Low contact resistances
- High contact stability with multiple individual contact points
- High reliability
- High module variety
- Versatile solution possibilities
- High contact density
- Blind mating

APPLICATIONS

- Medical
- Industrial
- Test and measurement
- Military and security



All shown connectors are according to IEC 61984:2008 (VDE 0627:2009); connectors without breaking capacity (COC).

Tested acc. UL 1977/CSA C22.2 No. 1823. Tested acc. MIL/SAE/EIA. (ODU-USA is registered with the DDTC and able to complete ITAR restricted manufacturing projects.)

All dimensions are in mm. Some figures are for illustrative purposes only. Subject to change without notice. Errors and omissions excepted. We reserve the right to change our products and their technical specifications at any time in the interest of technical improvement. This publication supersedes all prior publications.

This publication is also available as a PDF file that can be downloaded from www.odu-connectors.com

Issue: 2018-06



A COMPLETE ODU-MAC PROGRAM CAN BE FOUND IN THIS SERIES:



ODU-MAC[®] ZERO

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For assembly instructions please refer to our website: www.odu-connectors.com/downloads.

A PERFECT ALLIANCE.

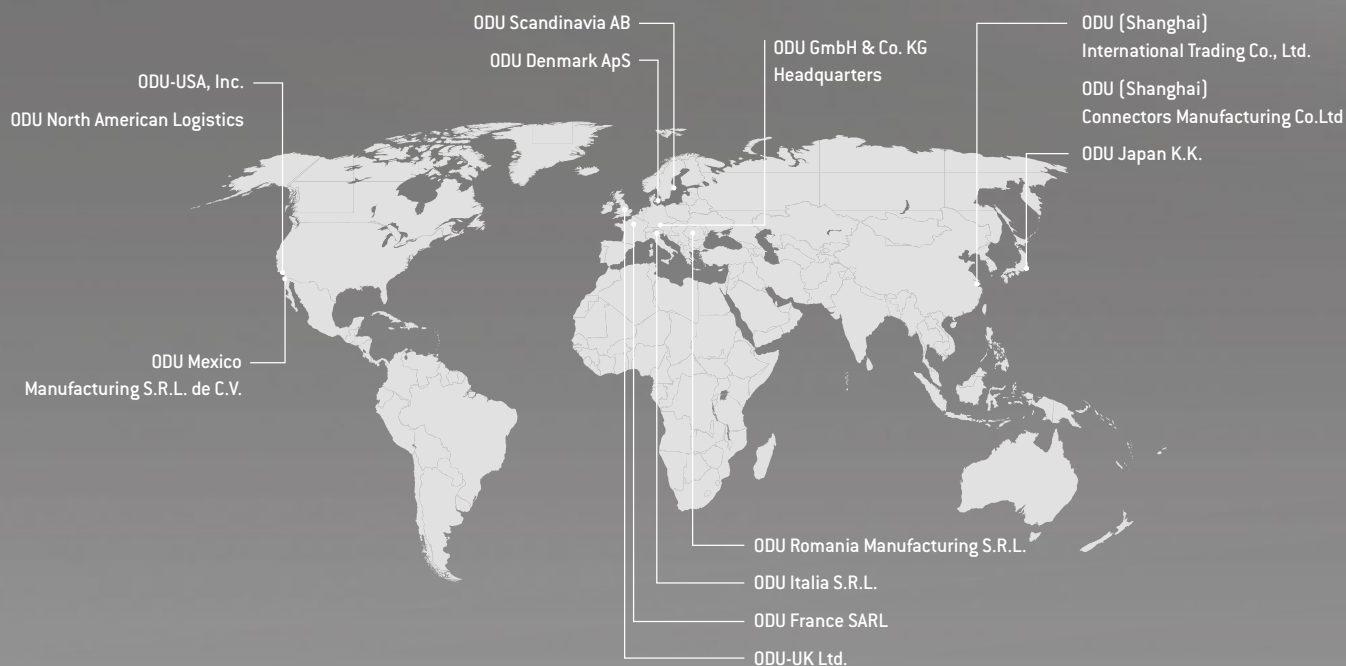
CREATING CONNECTIONS, BUILDING ALLIANCES, COLLABORATING INTO THE FUTURE: WHETHER TWO TECHNICAL COMPONENTS COME TOGETHER TO FORM A UNIT OR PEOPLE COME TOGETHER TO STRIVE FOR GREAT RESULTS – THE KEY IS TO ASPIRE IN ACHIEVING SUPERB RESULTS. THIS GOAL DRIVES OUR WORK. **PERFECT CONNECTIONS THAT INSPIRE AND DELIVER ON THE PROMISES.**





A PERFECT ALLIANCE.

ODU WORLDWIDE



ODU GROUP OVERVIEW

- More than 75 years of experience in connector technology
- A turnover of 170 million Euro
- Over 1,900 employees worldwide
- 9 sales subsidiaries in China, Denmark, France, Germany, Italy, Japan, Sweden, the UK and the US as well as 5 production and logistics sites
- All technologies under one roof: Design and development, machine tool and special machine construction, injection, stamping, turning, surface technology, assembly and cable assembly

As of February 2018

CERTIFIED QUALITY

- DIN EN ISO 9001
- IATF 16949
- DIN EN ISO 14001
- ISO 13485
- Wide range of UL, CSA, VG and DVA licenses
- UL certified cable assembly

For a complete list of our certifications, please visit our website.

INGENIOUS IDEAS PERFECT SOLUTIONS

ODU'S PRODUCT PORTFOLIO.



COMPACT MODULAR CONNECTOR SOLUTIONS

- Application-specific hybrid interface
- For manual mating and automatic docking
- The highest packing density
- Flexible modular construction
- Multitude of data transmission modules
- Variety of locking options available
- For the transmission of signals, power, high current, high voltage, coax, high-speed data, fiber optics and other media such as air or fluid.
- Mating cycles scalable as required from 10,000 to over 100,000 (1 million)



PUSH-PULL CIRCULAR CONNECTORS

- Circular connector series in robust metal or plastic housing
- Contacts for soldering, crimping and PCB termination
- Optional selectable Push-Pull locking ensuring a secure connection at all times as well as easy to release Break-Away function
- 2 up to 55 contacts
- IP 50 to IP 69
- Autoclavable for medical applications
- Hybrid inserts for combined transmission



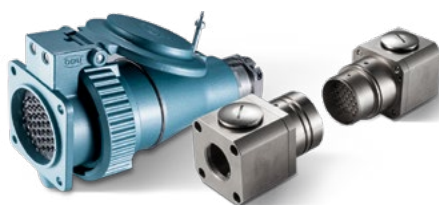
ELECTRICAL CONTACTS

- Versatile connector technologies
- Outstanding reliability, lifetime and durability
- Up to 1 million mating cycles
- Current-carrying capacity of up to 2,400 amperes and more
- Rugged contact systems, suitable even for harsh environments
- Economical solutions for automatic processing



A PERFECT ALLIANCE.

+ Versatile connector solutions for transmission of power, signals, data, or media – ODU never fails to offer the right interface when quality and absolute reliability are the top priorities.



HEAVY-DUTY & DOCKING AND ROBOTIC CONNECTOR SOLUTIONS

- Extremely durable even under extreme /harsh environments
- Interference-free and secure connection, even under vibration
- Up to 500 A (higher currents upon request)
- High contact security due to the springwire technology
- High pin density due to a minimum contact diameter
- Low contact resistance



APPLICATION AND CUSTOMER-SPECIFIC SOLUTIONS

- Contacts, connectors and assemblies for the highest technical requirements as well as special applications
- First-class implementation expertise
- High level of vertical manufacturing – all competences and key technologies under one roof
- Expert advice based on mutual partnership
- Fast development and production



CABLE ASSEMBLY

- Complete systems from a single source based on years of assembly expertise
- State-of-the-art production facilities with 100% end testing, high-voltage testing, component testing and pressure testing up to 100 bar
- Cleanroom production
- Hot-melt and high-pressure injection molding
- Customer-specific labeling
- Rapid prototyping of samples

MORE THAN A CONNECTION

OUR KNOW-HOW FOR YOUR SUCCESS.

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

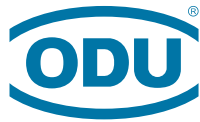
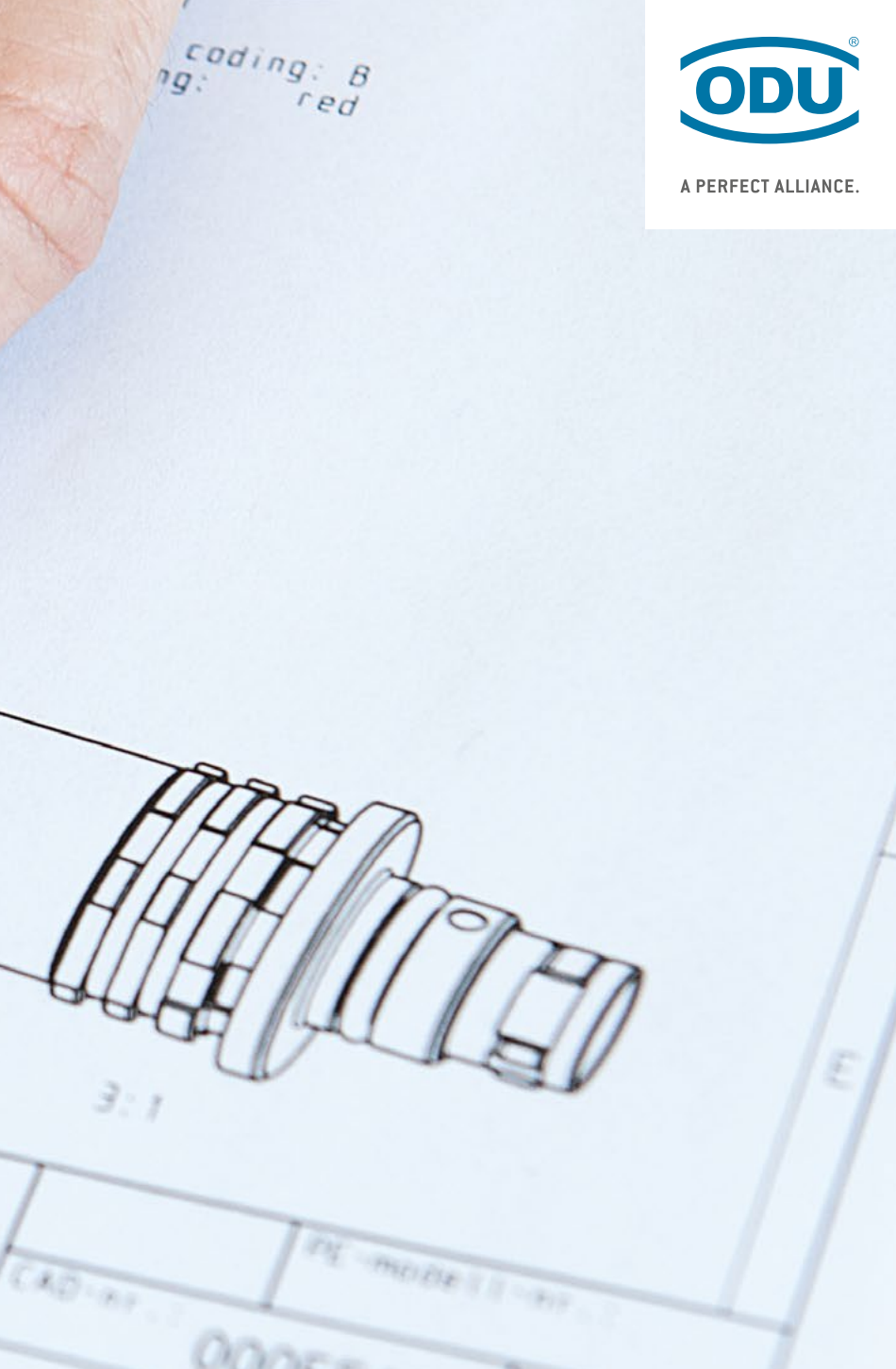
General tolerances to DIN ISO 2768-mK		Tolerances to DIN ISO 8015	
2013	date	name	designation
prep.	11.06.	Unterblum	Break-A
app.			
norm.			

HIGH PERFORMANCE CONNECTOR TECHNOLOGY FOR DEMANDING KEY MARKETS

Customers rely on ODU technology wherever first-class, high-performance connector solutions are required. All our skills go into our products to ensure your success. In addition to the top quality, reliable stability and maximum flexibility in customer-specific requirements, our products also stand for dynamics, reliability, safety, precision, efficiency and sustainability. And they guarantee unrestricted functionality for the final product due to our high quality connectors. ODU – A PERFECT ALLIANCE.

APPLICATION-SPECIFIC SOLUTIONS

Demands that can't be pigeon-holed call for creative specialists who think outside the box. ODU offers the type of expertise that focuses solely on the specific requirements of our customers. For every development order we get, we not only perform a thorough check to make sure it's feasible, we intensively incorporate our customers in the ongoing design process. This guarantees an impressive, custom-fit final result. Our solutions are frequently based on the modifications of our products, especially for the ODU MINI-SNAP and ODU-MAC connectors.



A PERFECT ALLIANCE.

MEDICAL

TEST AND MEASUREMENT

MILITARY AND SECURITY

INDUSTRIAL

ENERGY

EMOBILITY

HIGH LEVEL OF VERTICAL INTEGRATION

ODU combines all the competences and key technologies for the connector manufacturing. These include design and development, machine tool and special machine construction, injection, stamping, turning, surface technology, assembly and cable assembly and our own test laboratory.

INDIVIDUAL CABLE ASSEMBLY

Our production skills together with our cutting edge production facilities from Europe, China and the USA enable us to deliver to our customers locally tested assemblies and also global ones.



ODU-MAC®



PRODUCT INFORMATION

Compact modular connector system	<u>12</u>
Correct configuring – step by step	<u>14</u>
ODU-MAC® Silver-Line – Automatic docking	<u>16</u>
ODU-MAC® White-Line – Manual mating	<u>18</u>
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ODU-MAC® – A MODULAR ALL-ROUNDER FOR THE MOST VARIED APPLICATIONS

THE SMART SOLUTION FOR CUSTOMIZED CONNECTIONS

The ODU-MAC's flexible, modular design enables multiple connection types to be combined within single contacts. Whether signal, power, high current, high voltage, coax, high-speed data transmission and fiber optic – all types can be selected from the module and integrated into the individual connector solution. The connection options are just as versatile.

Many options are available for a variety of applications in industry or medical technology. For example, automated docking systems can use our stable adjustable aluminium frames, or a manual connection can be made with our robust housing design.

The result is an effective, compact and attractive complete connection that cannot be beaten in terms of functionality. Confusion due to an excessive number of connections is a thing of the past – an ODU-MAC customized to meet your requirements is today's solution.

The non-magnetic product variety in this catalog is an extension of the current ODU-MAC product portfolio. ODU has over 20 years of experience in providing connector solutions for non-magnetic environments up to 11 Tesla. The non-magnetic products in this catalog benefit from all of the product features as ODU-MAC.

Depending on the customer requirements for the application, the material used for standard products in this catalog may have to change from low magnetic materials that are currently used to fully non-magnetic materials.

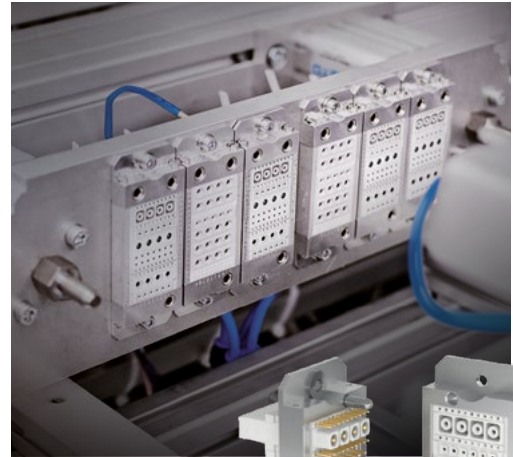
Find out more about custom configurations on the following pages.

THE ODU-MAC LEAVES NOTHING TO BE DESIRED:

- 100,000 mating cycles and more
- Versions in the docking frame for automatic docking
- Versions in rugged housing suitable for use in harsh environments
- Easy locking of the housing with Snap-In or spindle
- Many different module options available
- Extremely compact due to the high contact density



ADDITIONAL INFORMATION PROVIDED IN VIDEOS
www.youtube.com/ODUSteckverbinder



Silver-Line
 AUTOMATIC DOCKING.



White-Line
 MANUAL MATING.

ODU-MAC ZERO

THE MODULARITY AT A GLANCE:

General ODU-MAC product range.

Only select parts available in non-magnetic version.

100,000
Mating cycles and more

2 Possible applications:
automatic docking or manual mating

4 Cable hood versions

5 Different docking frames
independently configurable length
(see page [16](#))

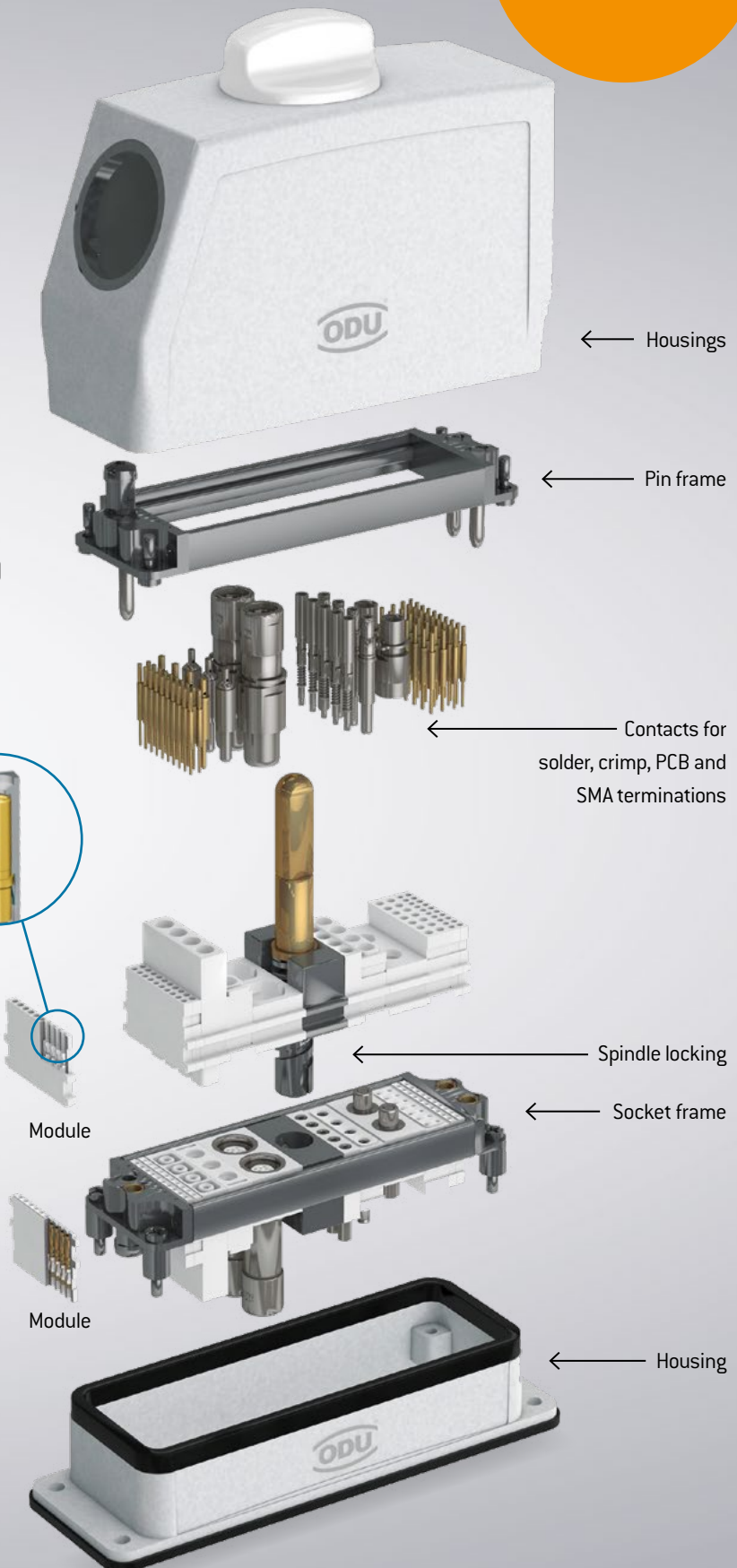
2 Locking types: Snap-In (Break-Away)
or spindle locking

Removable contacts
with clip principle
(see page [24](#))

2 Different spindle geometries

16 Modules to choose from:
signal, power, high voltage, coax,
and fiber optic

2 Variations of bulkhead mounted and
surface mounted housing hoods in
various sizes



YOUR WAY TO AN INDIVIDUAL CONNECTION

How to configure your ODU-MAC®.

INDIVIDUAL REQUIREMENTS – INDIVIDUAL CONFIGURATION

With ODU-MAC, we offer a modular connector system configured to your requirements. This means that you always receive the appropriate hybrid connection.

SELECT & REQUEST OFFERS

You will receive a drawing and a detailed offer within one working day of submitting your request. When placing an order you will receive the complete article number for connections preassembled by ODU (contacts supplied as accompanying loose items). **We ask you to enquire directly about customized versions not covered by the standard.**



For information to the configuration of your connector please refer to our website: www.odu-mac.com

ODU-MAC® Silver-Line

AUTOMATIC DOCKING.

1ST STEP: FRAME SELECTION

Depending upon your requirements, you can choose 5 different frame sizes as a base for automatic docking.

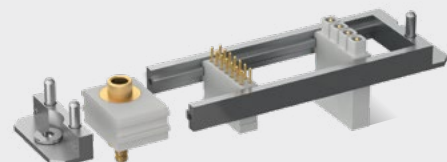
Frames	
ODU-MAC® S (Standard)	ODU-MAC® P+ (Power)
ODU-MAC® M+ (Mini)	ODU-MAC® QCH (Quick Change Head) (connector saver)
ODU-MAC® T (Transverse)	



2ND STEP: MODULE SELECTION

Choose from 16 different modules for transferring signal, power, high voltage, coax, fiber optic and assemble your ODU-MAC individually.

Modules	
Signal	Coax
Power	Fiber optic
High voltage	Blank modules/spacer modules/ coding modules/pin protection module



ODU-MAC® **White-Line**

MANUAL MATING.

1ST STEP: LOCKING

Select the type of lock in this first step. You have the choice between Snap-In and spindle locking.

Snap-In locking	Spindle locking
-----------------	-----------------



2ND STEP: CONNECTOR HOUSING

Depending upon the lock, choose the housing suited to your requirements. The following housings are available:

Snap-In locking	Spindle locking
90° Cable exit	Cable hood
45° Cable exit	Cable hood XXL
0° Cable exit	



3RD STEP: RECEPTACLE SELECTION

Depending upon the requirements for the receptacle and the selected connector housing, a wide variety of designs is available.

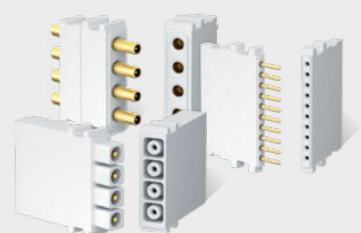
Snap-In locking	Cable hood	Cable hood XXL
Receptacle	Bulkhead mounted housing	Bulkhead mounted housing
	Surface mounted housing	Surface mounted housing



4TH STEP: MODULE SELECTION

Choose from a wide variety of modules for transferring signal, power, high voltage, coax, fiber optic and assemble your ODU-MAC individually.

Modules
See page 60



ODU-MAC[®] **Silver-Line** AUTOMATIC DOCKING.

Overview of docking frames.

ODU-MAC in the docking frame is used only for automatic docking. Choose from a variety of different frames, adjust the length individually and assemble the frame with the modules you need for your requirements.

With ODU-MAC you can always find the perfect solution. And should your requirements for a connection go beyond the standard solutions, we also offer customized special solutions.

ODU-MAC is configured for 3 to 60 grid units (more upon request), meaning that up to 600 contacts can be installed when the 10 contacts module with a module width of 2.54 mm (1 unit) is used. Versions for limited space (ODU-MAC M+ (Mini)) and increased mechanical load (ODU-MAC P+ (Power)) are also available.

ODU-MAC[®] S (STANDARD) P. 34

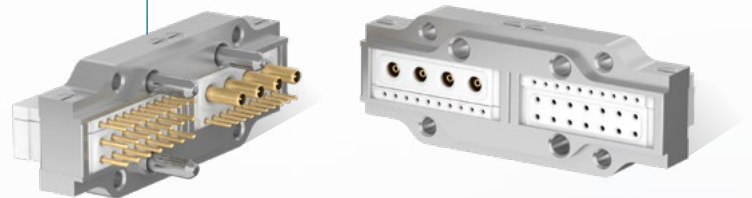
Standard solution for docking tasks.
Tolerance compensation: +/- 0.6 mm.



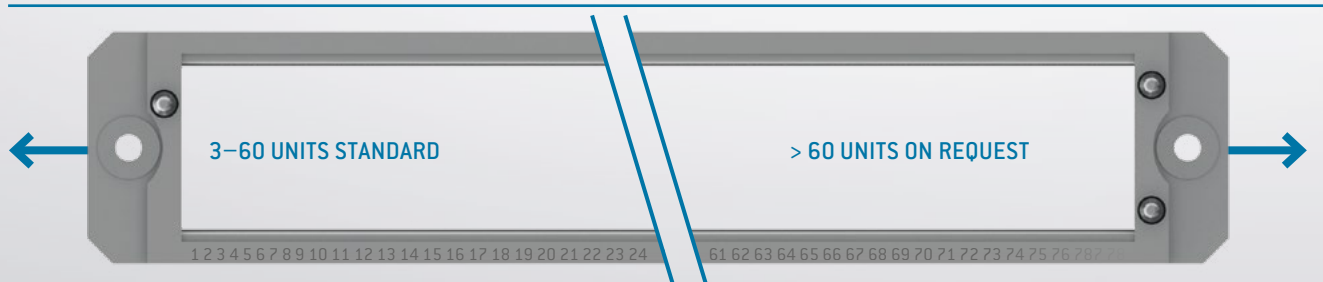
FURTHER INFORMATION FROM PAGE 30.

ODU-MAC[®] T (TRANSVERSE) P. 40

Transverse frames for installation in customized housing solutions or where low clearance heights make this necessary.

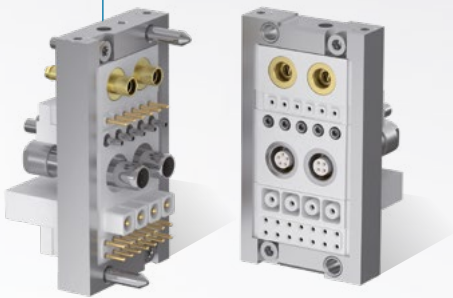


The length of the frames can be ordered individually depending upon the number and combination of modules.



ODU-MAC® M+ (MINI) P. 36

Compact size with the smallest space requirement
Tolerance compensation: ± 0.6 mm.



ODU-MAC® P+ (POWER) P. 37

The frame for the highest requirements thanks to reinforced frame design.
Tolerance compensation: ± 2.5 mm.



ODU-MAC® QCH (QUICK CHANGE HEAD) P. 35

Docking frames for the highest requirements with regard to mating cycles (connector saver) with the lowest maintenance time and expense thanks to easy exchange of the replacement parts.
Tolerance compensation: ± 0.6 mm.



MODULARITY AND ERGONOMIC DESIGN FOR THE SMALLEST OF SPACES.

The ODU-MAC® ZERO – Modular Multitasker.

The ODU-MAC ZERO is a space-saving hybrid connector that combines the widest variety media – the ideal choice from the ODU-MAC product family. Its symmetric housing geometry enables a generous range – up to 9 units – of signals, power, fiber optic, data-rate and coax modules. In place of an aluminum frame, the plastic housing parts have integrated rails, making the use of magnetic components no longer necessary.

This is how a solid, effective, and attractive overall connection is created – pure functionality that is hard to ignore. Confusion due to an excessive number of connections? This challenge belongs to the past – because the customized ODU-MAC ZERO is today's solution.

FURTHER INFORMATION FROM PAGE [44](#).

- Housing made of 2 plastic half-shells which also form the frame
- All touchable parts **nickel-free**
- **Bio-compatibility** upon request
- **Coding:** by guiding pins (Ø 4 mm, length 16 mm), housing geometry, coding modules and color-coded cable bend relief varieties
- Suitable for a wide range of ODU-MAC modules
- Up to **60,000 mating cycles**
- **3 different cable outlets: straight, 45°, 90°**
- **Simple, safe housing locking**
(Break-Away function/emergency release)



Solid grip



Blind mating



Non-magnetic



Space-saving

Size	Units	
	2.54 mm	
ZERO	9	



HOUSING
PLASTIC HALF-SHELL INCLUDING RAILS FOR MODULAR INSERTS

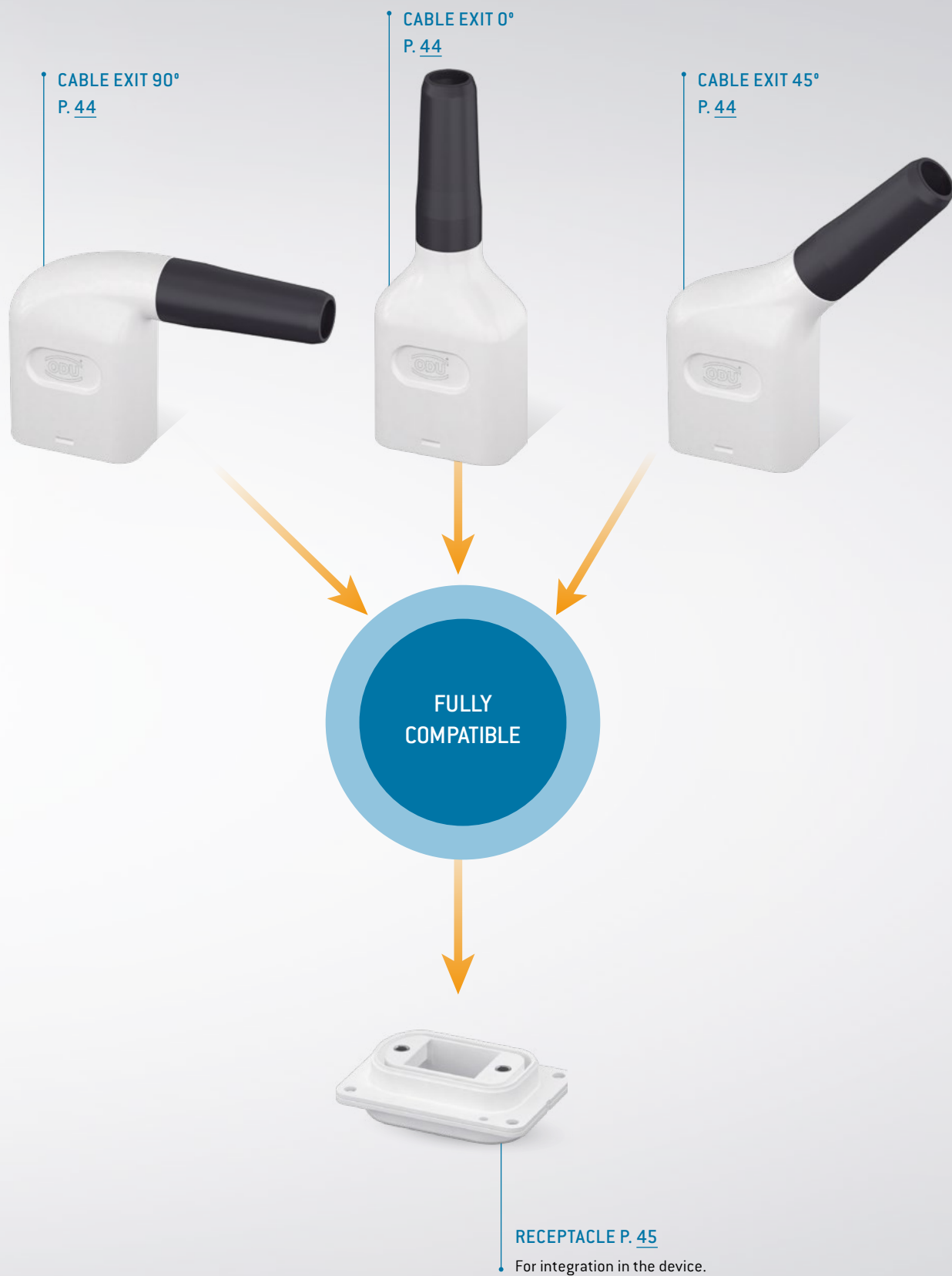
SNAP-IN LOCKING

Easy mating, automatic locking, quick demating option when necessary:

- Quick, reliable housing locking thanks to snap fits and sealing strip (frictional locking principle)
- Low mating/demating forces (approx. 7 N for the housing) guarantee quick connection demating (break-away function/emergency release)



CONNECTOR HOUSING FOR ASSEMBLY



ODU-MAC® **White-Line**

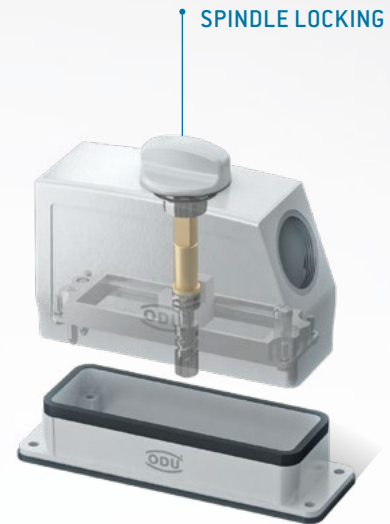
MANUAL MATING.

Overview of housings with spindle locking.

In the case of spindle locking, the housings can be equipped with an easy to operate precision locking spindle. This spindle enables easy closing and opening of the housing with a single turning movement. The mating and sliding forces overcome in this way ease handling significantly. Only 5 units of space are required for this purpose.

Especially in case of high connection frequency and limited space for locking, the use of precision locking is a preferred option.

Depending upon the application scenario, the mechanisms are designed for up to 30,000 locking cycles. Easy to mount replacement sets are available for larger numbers of mating cycles [See page 50].



FURTHER INFORMATION FROM PAGE 52.

- **Low profile** – less space for operation than lever latching
- **Ease of use** – one hand operation
- **Ergonomic design** – easy single spindle knob
- **Improved reliability** – preferred designed for high mating cycles
- **Fully enclosed** – internal mechanism prevents damage
- **Repairable** – can be replaced without removal of the hood or frame
- **User friendly** – lower force required for operation
- **Precision** – materials, design and tolerances assist the life of contacts over time

Size	Units ¹	
2	16	
3	24	
4	34	

CABLE HOOD XXL:

4	34	
---	----	--

¹ 5 units of space required for spindle.

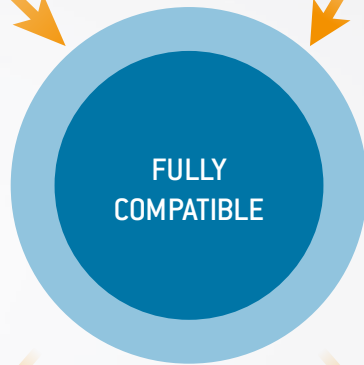
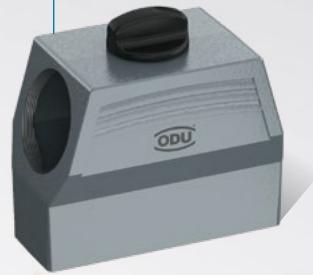
CABLE HOOD WITH SIDE CABLE ENTRY P. 52

Connector housing for assembly on the cable.



CABLE HOOD XXL WITH SIDE M50 CABLE ENTRY P. 53

Connector housing with expanded assembly space and side M50 cable entry.



BULKHEAD MOUNTED HOUSING P. 54

For mounting on device with spindle locking.



SURFACE MOUNTED HOUSING P. 55

For surface mounting on your device/ wall with spindle locking and two side cable entries.



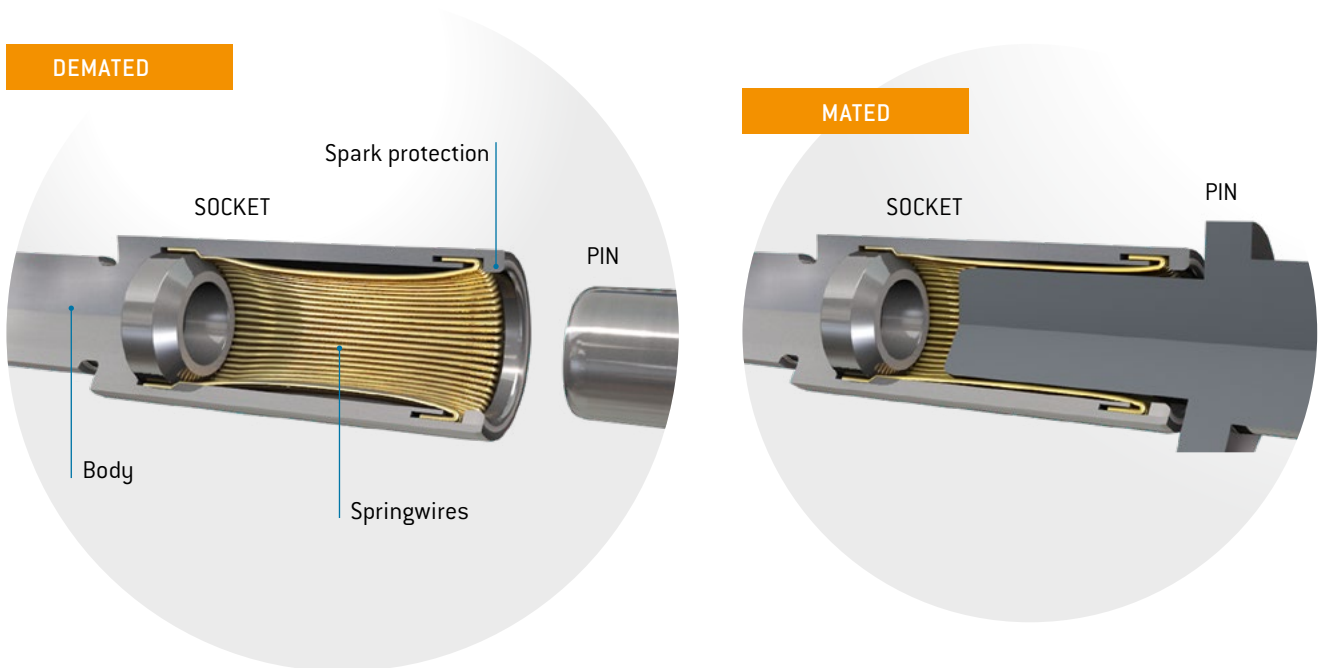
BEST CONNECTIONS – THE CONTACT PRINCIPLE

Electrical Contacts from ODU meet the highest quality standards and ensure secure and reliable connections. Behind this achievement are 80 years of experience in the electrical connector technology. In addition to the springwire and the lamella technology ODU also offers turned, slotted contact systems and stamping technology for a wide variety of specifications.

ODU SPRINGTAC®

Contacts with springwire technology.

The ODU SPRINGTAC is the most effective contact system on the market. It offers maximum reliability and an exceptionally long durability. Due to the many independent wire springs, a constant transmission is provided at all times. Even the smallest contact, at 0.76 mm in diameter, contains 15 individual springs. In other words, 15 contact surfaces are present in this tiny contact area.



BENEFITS

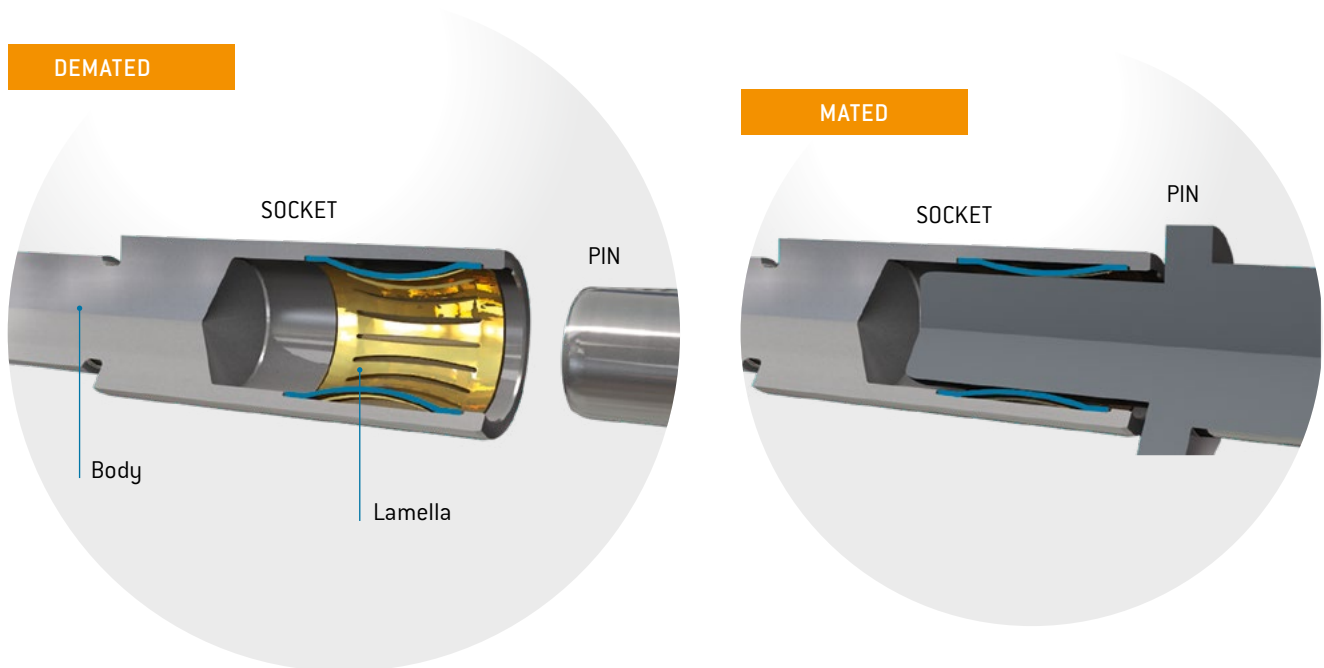
- Outstanding reliability, lifetime and durability with up to 1 million mating cycles (on request)
- Very high contact security
- Low mating and demating forces
- Very high vibration resistance
- Low contact resistance
- High current-carrying capacity

Standard contact principle for:	
Signal	14 to 5 contacts
Power	4 to 3 contacts
High voltage	4 contacts
Coax	2 contacts

ODU LAMTAC®

Contacts with lamella technology.

The ODU LAMTAC is a high-performance contact system with lamella technology. It possesses high current-carrying capacity and best coax shielding performance. It consists of a turned carrier containing one or several stamped lamella belts. The lamella's individual slats make for a multitude of contact points, thereby guaranteeing a high level of contact security and ease of connecting.



BENEFITS

- > 10,000 mating cycles
- High vibration resistance
- Low contact resistance
- Automated lamella assembly
- High contact security

Standard contact principle for:	
Coax	4 contacts

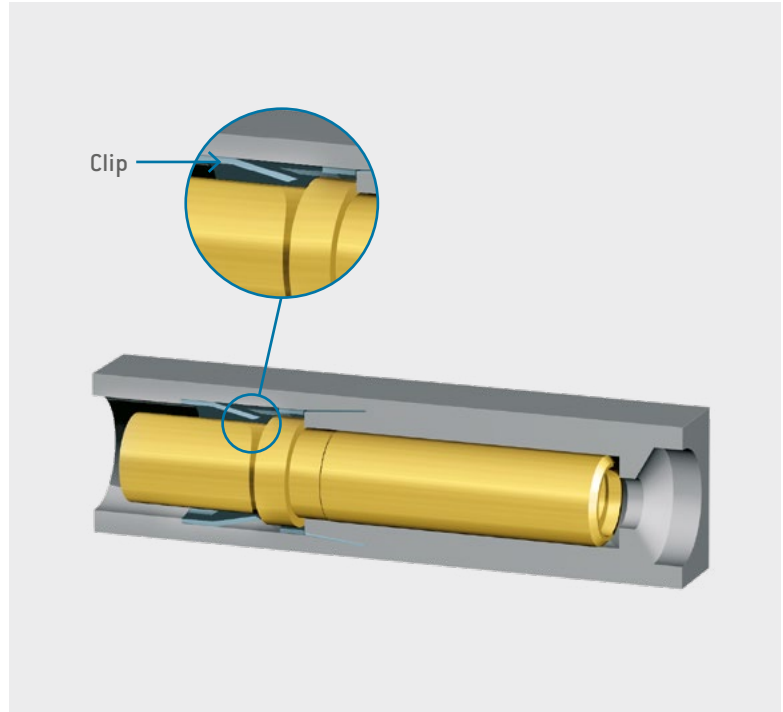
CONTACT RETENTION WITH THE CLIP PRINCIPLE (STANDARD)

The adjacent photo shows how the contact is fixed in the insulator. The contact is pushed from the termination area (rear insertion) into the insulator and locked in by a metal clip (barbed hook) snapping behind a flange.

The contacts can be easily removed again at any time with a removal tool.

Compared with permanent connections, crimp technology allows replacement of contacts and easy repair. Voltage values can be increased by leaving contact positions free. Contact assembly can be performed independently of the insulator.

Not all modules are equipped with the clip principle, but removal is possible.

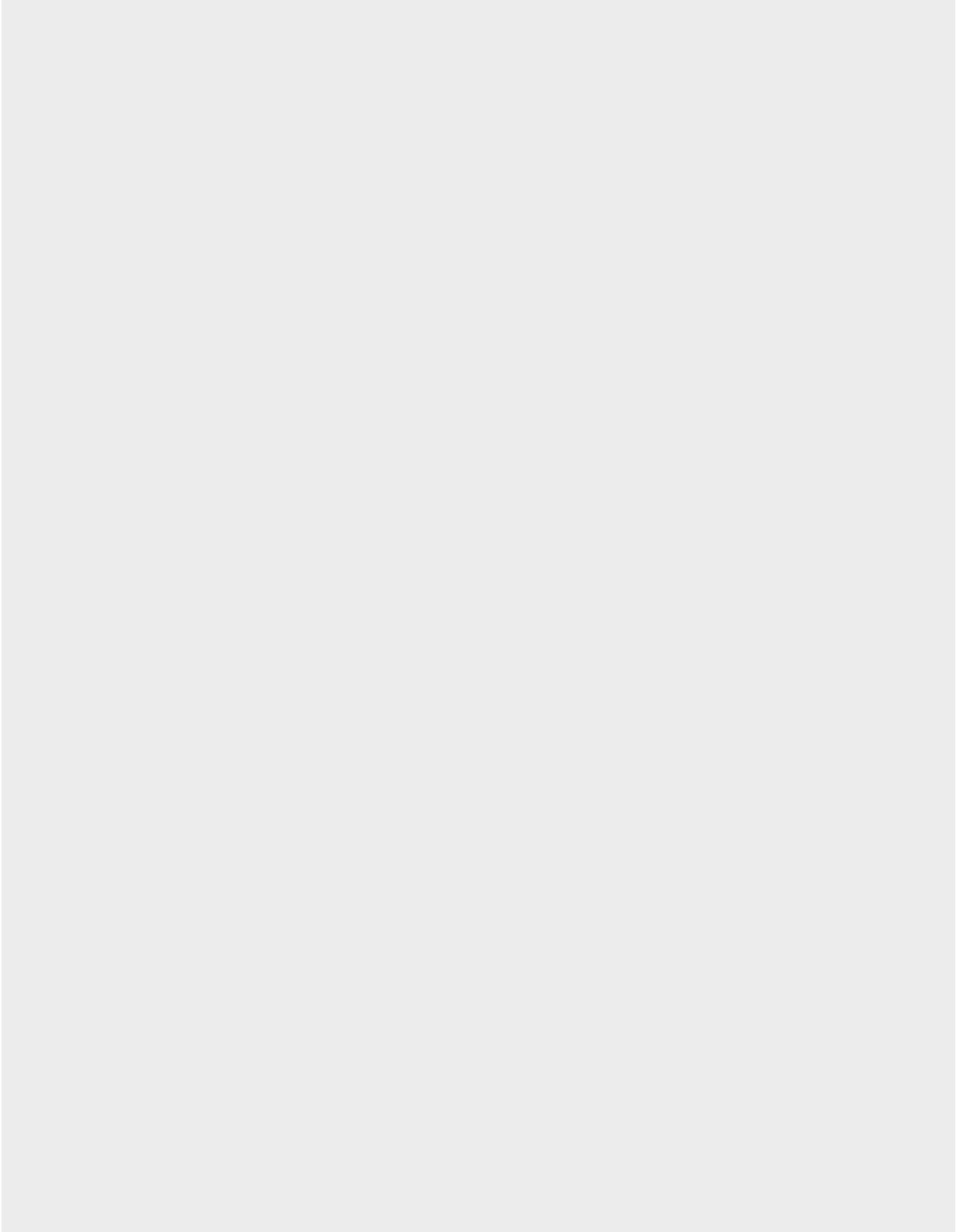


Most of the modules include this fastening technology.



3 mounting lugs for optimal stability.

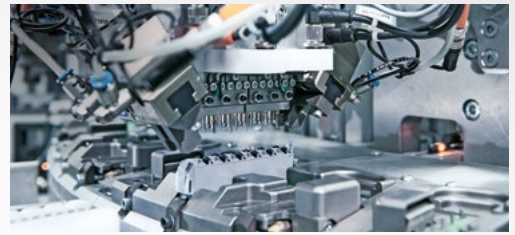
FOR YOUR NOTES



APPLICATION SPECIFIC SOLUTIONS

Problem solvers who think outside the box are required when standard solutions find their limits. ODU offers you just this kind of expert: the ones who focus on your specific requirements. For every development order we get, we not only perform a thorough review study, we intensively involve our customers in the ongoing design process. This guarantees an impressive, custom-fit final result. Our standard connectors are frequently the base for custom modifications.

FOR INDUSTRIAL




FOR MEDICAL



MONOBLOC INSULATOR

Customers install this insulator block, equipped with standard ODU-MAC contacts, into its own custom housing.

Advantages

-  Non-magnetic version

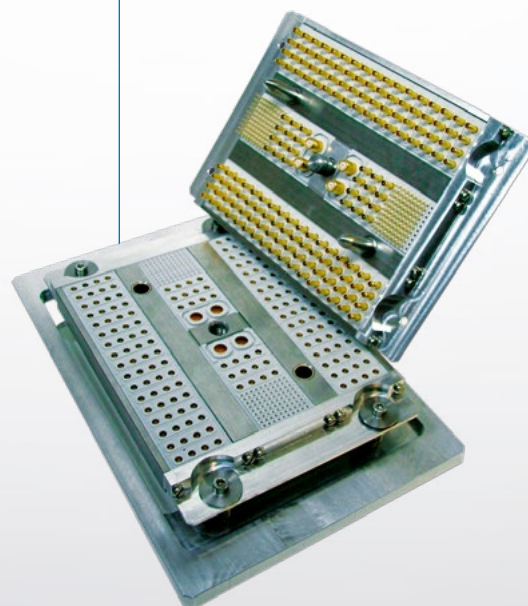


COMPLETE DOCKING UNIT

Three ODU-MAC rows incl. spindle locking are mounted in a special stainless steel frame.

Advantages


- Special floating support with tolerance compensation ± 3 mm



MANUAL MATING

Well-known manufacturers worldwide trust in the ODU-MAC system as a reliable connector between the various patient coils and the MRI device. In addition to increased ease of operation, the connector is also available in a version with non-magnetic materials.

Advantages


-  Non-magnetic version, e.g. for MRI application
- Plastic sleeve housing with individual monobloc
- Customized contact configuration possible
- Spindle locking



MANUAL MATING

An insulator developed specific to the application, equipped with coaxial and signal contacts, forms the connector between the MRI device and the individual body coils.

Advantages

- Minimum 50,000 mating cycles
-  Non-magnetic
- 1.3 and 2.8 GHz frequency range
- 50 Ω
- High packing density



ODU-MAC® FOR SPARK WAVE® THERAPY DEVICE

The Spark Wave® therapy device for urogenital treatment applications contains the ODU-MAC modular connector. This ensures a secure connection between the device and the applicator, which sends out bundled sound waves. The sophisticated cable assembly is also provided by ODU.

Advantages



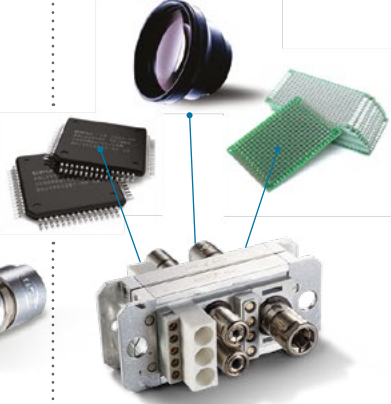

- Extremely easy change of applicator via a fully automatic locking and unlocking function
- Hybrid solution with signals, high voltage and fluids
- System solution including cable assembly



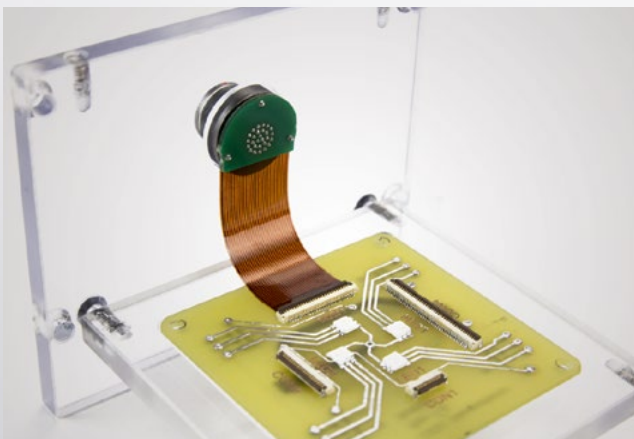
CABLE ASSEMBLY INTEGRATED SOLUTIONS

ODU offers a comprehensive solution of services and capabilities as part of the cable assembly solutions available for the market.

CORE CONTACT TECHNOLOGY

			
ELECTRICAL CONTACTS	COMPLETE CONNECTOR SYSTEM	INTELLIGENT CONNECTORS	SYSTEM SOLUTION

CABLE ASSEMBLY



CABLE ASSEMBLY CAPABILITIES

- Custom turnkey solutions
- Rapid prototyping & product development
- Thermoplastic injection molding design & fabrication
- Bonding & laser etching
- Private labeling
- Factory direct
- ITAR regulated facility

PRODUCT ASSEMBLY TECHNOLOGIES AND SERVICES

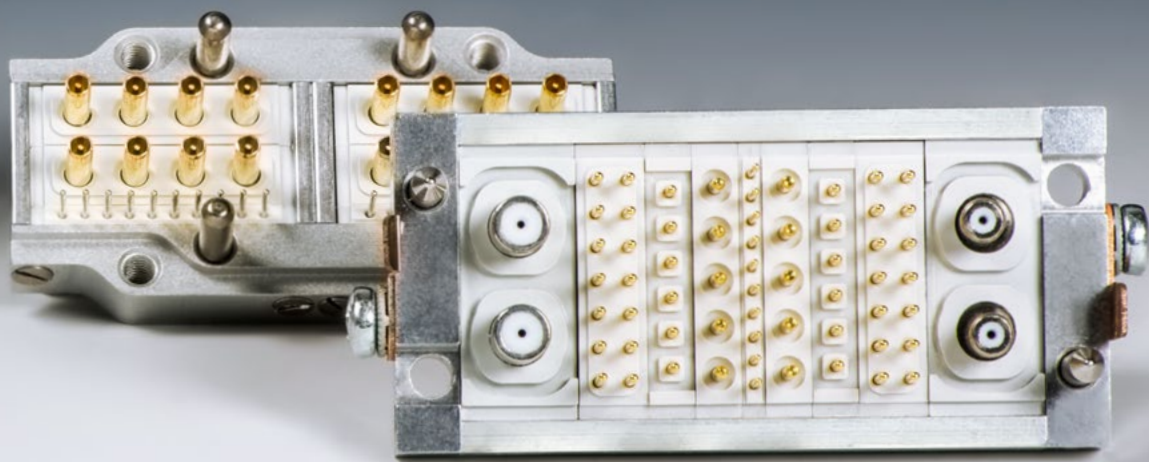
- One stop shop
- Solder, crimp and PCB terminations
- Overmolding with TPE, TPU and PVC
- Customizable overmolding turn-key solutions
- EMC-compatible assembly
- 100% final inspection
- Custom specific testing options available





ODU-MAC®

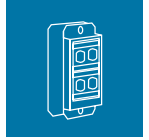
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AUTOMATIC DOCKING

Requirements on the complete system	32
ODU-MAC® S (Standard)	34
ODU-MAC® QCH (Quick Change Head)	35
ODU-MAC® M+ (Mini)	36
ODU-MAC® P+ (Power)	37
PE transmission, grounding kit	38
ODU-MAC® T (Transverse)	40

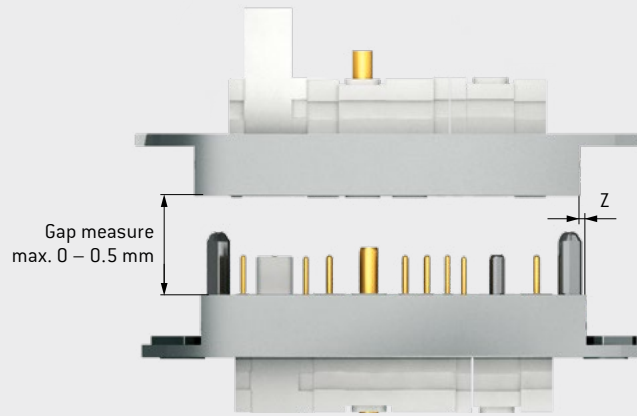
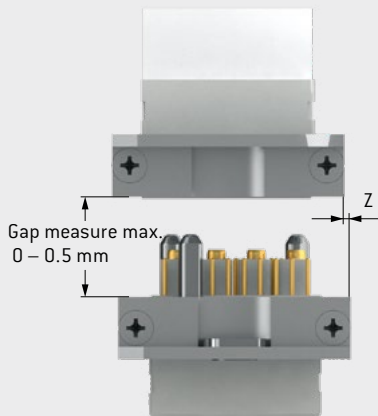
SYSTEM REQUIREMENTS AND TOLERANCES



High mating cycles and perfect transfer rates – in order to ensure these for automatic docking over the long term, the docking system must be a design consideration (e.g. centering systems).

Clean and smooth docking is secured by special guiding pins that are designed for the forces which guide the connector. Please note the mechanical requirements behind the design.

MAXIMUM PERMISSIBLE OFFSET + STANDARD GAP MEASURE IN MATED CONDITION (RADIAL PLAY)

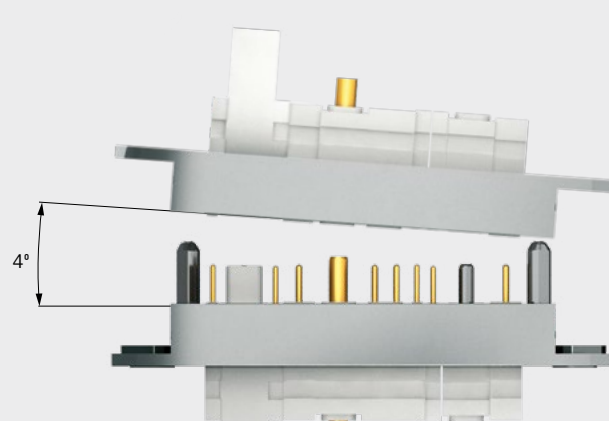
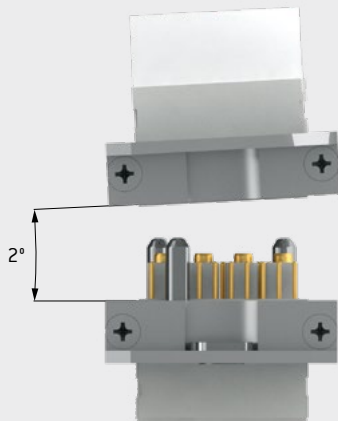


Frame	Tolerance
	Z
S	+/- 0.6 mm
M+	+/- 0.6 mm
T	On request

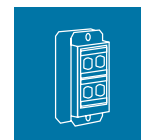
Frame	Tolerance
	Z
P+	+/- 2.5 mm
QCH	+/- 0.6 mm

The maximum permissible gap between socket and pin pieces is 0.5 mm as a standard. Extension with long contact pins is possible.

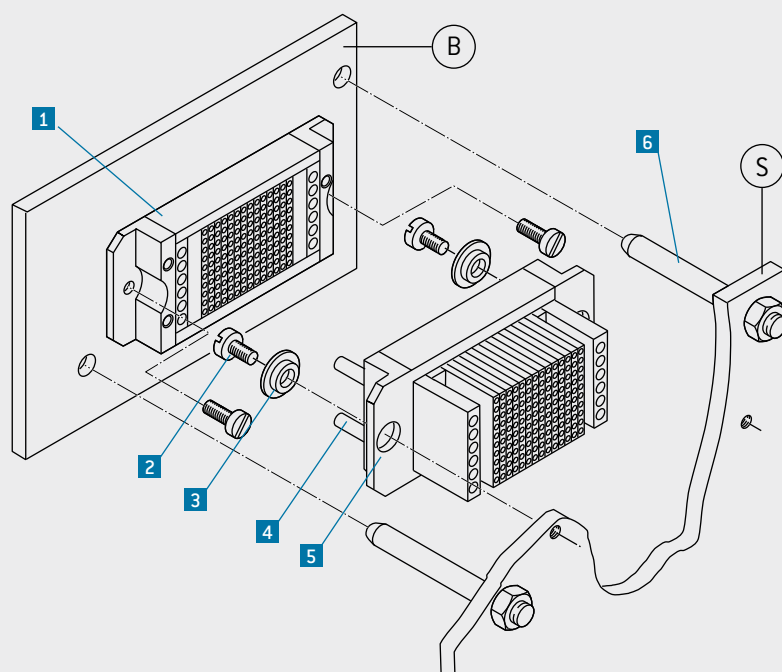
MAXIMUM PERMISSIBLE ANGLE DEVIATION WHEN MATING



OUR TEAM IS HAPPY TO ANSWER ANY ENQUIRIES YOU MAY HAVE.



EXAMPLE OF AN S FRAME SYSTEM



Strain relief for cables/braids must be provided by the customer.

- 1 ODU-MAC® socket piece (fixed)
(screwed tight without play to wall B)
- 2 Fastening screw
- 3 Tolerance compensation in the example of an S frame:
Axial play: 0.2 mm
Radial play: ± 0.6 mm
- 4 Pins for self-centering of ODU-MAC®
- 5 ODU-MAC® pin piece (floating)
(with play via centering socket; screwed tight to wall S)
- 6 Pin for guiding walls B and S
(customer performance)

The values for the connected condition (pin S in B) result from the axial play of the centering sockets.

NOTE: AUTOMATIC DOCKING SYSTEMS

- The pin piece of the ODU-MAC S is to be fixed with the accompanying centering sockets and has mounted floating
- The guiding system of the ODU-MAC requires additional guiding hardware for the system
- The maximum permissible gap between socket and pin pieces is 0.5 mm as standard.
Extension with long contact pins is possible.
- An alignment system (e.g. guide rails, etc.) is necessary to achieve high mating cycles.
The max. permissible alignment error is, for example, with the ODU-MAC S frame, less than ± 0.6 mm radial
- Strain relief for the cables/braids must be provided by the customer.

FAILURE TO OBSERVE THESE SPECIFICATIONS MAY RESULT IN DAMAGE.

ODU-MAC® S (STANDARD)

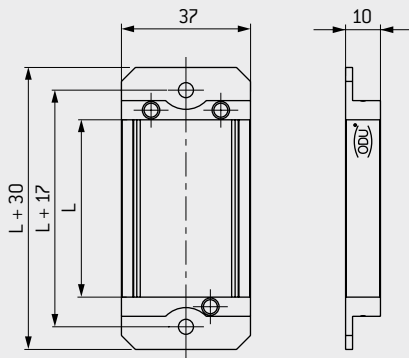
Standard solutions for docking applications.



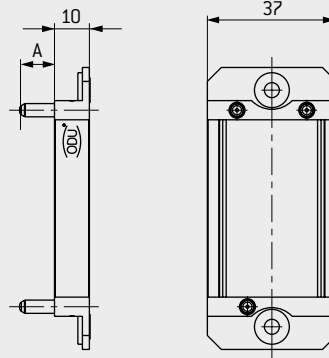
TECHNICAL DATA

- Tolerance compensation:
Axial play: 0.2 mm
Radial play: +/- 0.6 mm
- Pin piece floating supported
- Minimum 100,000 mating cycles

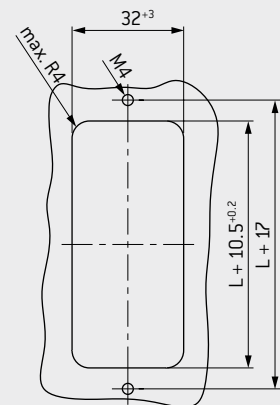
SOCKET FRAME WITH GUIDING HOLE



PIN FRAME WITH GUIDING PIN



PANEL CUT-OUT



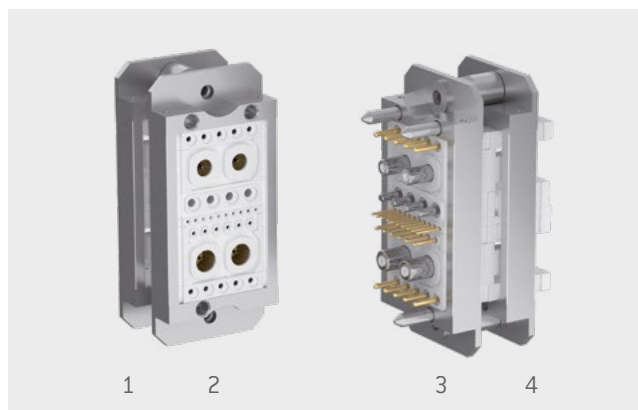
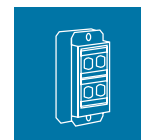
Description	Part number	Dim. A	Note
Pin frame	611.020.0__400.000	10	
Socket frame	610.020.0__400.000		
Pin frame	611.021.0__400.000	12.5	
Socket frame	610.020.0__400.000		
Pin frame	611.025.0__400.000	21	Model for spindle locking
Socket frame	610.020.0__400.000		
Pin frame	611.050.0__400.000	10	With labelling
Socket frame	610.050.0__400.000		

L = Number of units × 2.54

__ = Here please register number of desired units (03 to 40, above 41 on request)

ODU-MAC® QCH (QUICK CHANGE HEAD)

Frames for the highest cycle requirements (connector saver) and with a low maintenance downtime, due replaceable parts.



TECHNICAL DATA

- Tolerance compensation:
Axial play: 0.2 mm
Radial play: +/- 0.6 mm
- Pin piece floating supported
- Unlimited number of mating cycles (min. 100,000 mating cycles)
- Replacement of the interchange parts without assembly effort

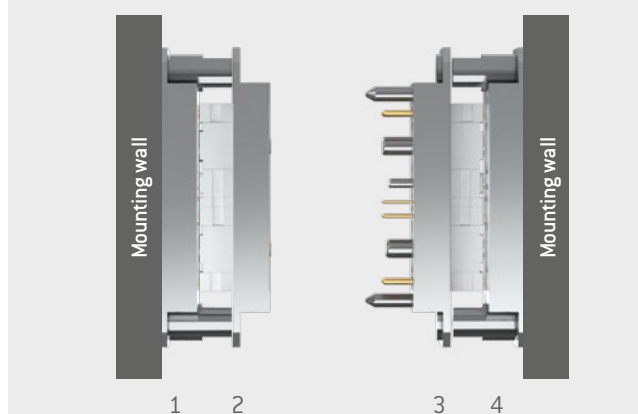
These models are available on request.

Technical specifications have to be clarified in detail.

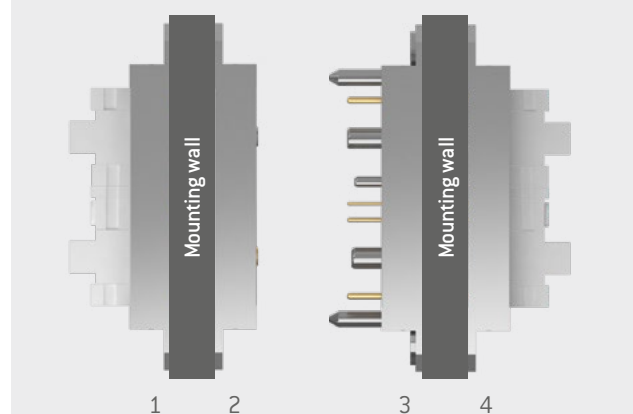


Non-magnetic version available upon request.

MOUNTING WALL BACK



MOUNTING WALL CENTRAL – FOR WALL THICKNESS 10 mm



Description	Part number
Part 1: Base part incl. distance piece	610.026.0 __.600.000
Part 2: Socket frame – interchange part	610.020.0 __.600.000
Part 3: Pin frame – interchange part	611.021.0 __.600.000
Part 4: Base part incl. distance piece	610.026.0 __.600.000
Distance piece as a spare part	610.026.201.304.000

Description	Part number
Part 1: Base part	610.027.0 __.600.000
Part 2: Socket frame – interchange part	610.020.0 __.600.000
Part 3: Pin frame – interchange part	611.021.0 __.600.000
Part 4: Base part	611.027.0 __.600.000

The quick change head (connector saver) consists of 4 frames. Pin and socket frames are disconnected or connected when disconnecting or connecting between the second and third frame.

Pieces 1 and 2 or 3 and 4 always remain together.

In the event of damage or wear to the contacts, both replacement parts 2 and 3 are disconnected from pieces 1 and 4 and can be quickly and easily replaced with the new replacement parts without time spent on assembly. The connection is ready to use again within a matter of seconds.

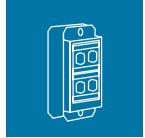
FRAMES FOR THE QUICK CHANGE HEAD SYSTEM

The standard ODU-MAC S docking frames can be used for the connector saver. ODU-MAC L docking frames upon request. (P+ possible, M+ not possible).

MODULES AND CONTACTS FOR THE QUICK CHANGE HEAD SYSTEM

All modules with depths not exceeding 19 mm can be used in the connector saver system. PCB contacts are installed in pieces 2 and 3. All socket contacts (crimp and PCB termination) suitable for pieces 2 and 3 can be used in pieces 1 and 4.

ODU-MAC® M+ (MINI)



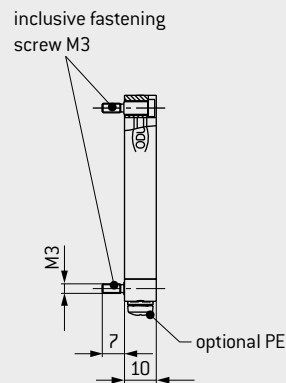
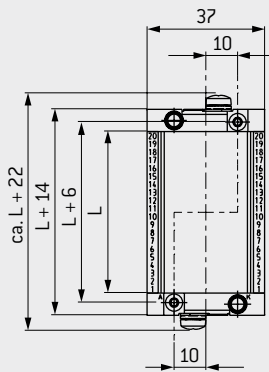
Compact design with minimal space requirements and optional PE transmission.



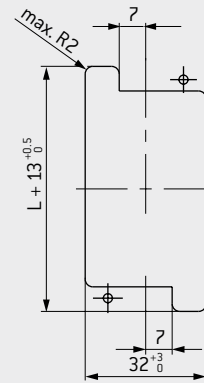
TECHNICAL DATA

- Tolerance compensation:
Axial play: 0.4 mm
Radial play: ± 0.6 mm
- Double-sided floating supported
- Minimum 100,000 mating cycles
- Optional PE transmission see page [38](#)

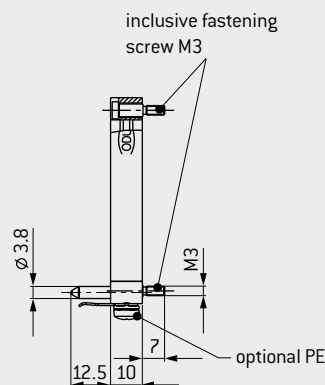
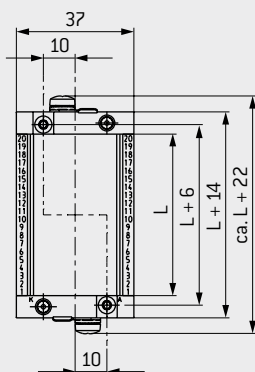
SOCKET FRAME WITH GUIDING HOLE



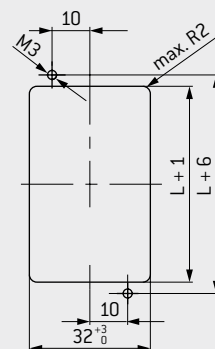
PANEL CUT-OUT



PIN FRAME WITH GUIDING PIN



PANEL CUT-OUT



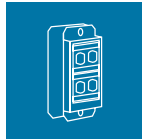
Description	Part number
Pin frame	611.716.0__400.000
Socket frame	610.716.0__400.000

L = Number of units \times 2.54

__ = Here please register number of desired units
(03 to 40, above 41 on request)

NOT COMPATIBLE WITH ODU-MAC M FRAME.

ODU-MAC® P+ (POWER)



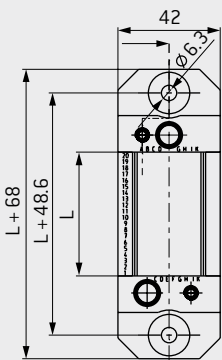
The frame for highest requirements by a reinforced frame design.
High tolerance compensation ± 2.5 mm.



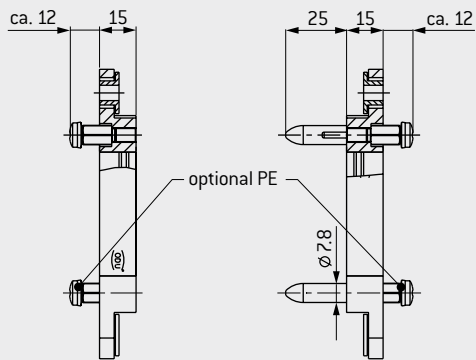
TECHNICAL DATA

- Tolerance compensation:
Axial play: 1 mm
Radial play: ± 2.5 mm
- Double-sided floating supported
- Advisable for modules
with contact diameter > 5 mm
and frame length > 40 units (depending on configuration)
- Contact diameter > 8 mm: this frame has to be used
- Minimum 100,000 mating cycles
- Optional PE transmission see page [39](#)

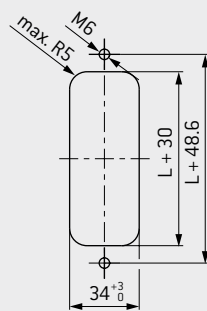
SOCKET FRAME WITH GUIDING BUSHES



PIN FRAME WITH GUIDING PIN



PANEL CUT-OUT



Description	Part number
Pin frame	611.730.0 __.400.000
Socket frame	610.730.0 __.400.000

L = Number of units $\times 2.54$

__ = Here please register number of desired units
(05 to 60 in steps of 5, above 61 on request)

ODU-MAC P+ FRAME WITHOUT OPTIONAL PE TRANSMISSION BACKWARDS COMPATIBLE WITH ODU-MAC P FRAME.

PE TRANSMISSION FOR ODU-MAC M+(MINI)



GROUNDING KIT FOR M+ SOCKET FRAME



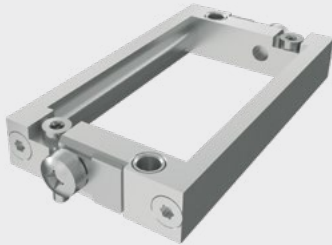
TECHNICAL DATA

- Tolerance compensation:
Axial play: 0.4 mm
Radial play: +/- 0.6 mm
- Minimum 100,000 mating cycles
- Double-sided version
- Surface: nickel-plated



Non-magnetic version available upon request.

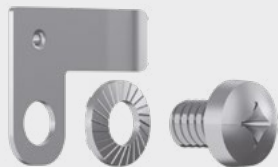
GROUNDING KIT MOUNTED



Part number	Connection threads
190.270.001.000.000	M4

Max. 6 mm² lug connection for PE transmission.

GROUNDING KIT FOR M+ PIN FRAME



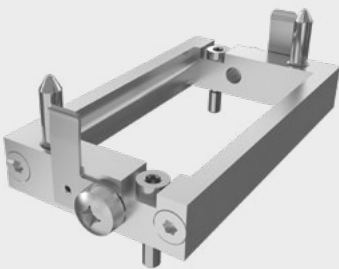
TECHNICAL DATA

- Tolerance compensation:
Axial play: 0.4 mm
Radial play: +/- 0.6 mm
- Minimum 100,000 mating cycles
- Double-sided version
- Surface: nickel-plated



Non-magnetic version available upon request.

GROUNDING KIT MOUNTED



Part number	Connection threads
190.270.002.000.000	M4

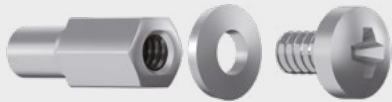
Max. 6 mm² lug connection for PE transmission.

CONTACT RESISTANCE COMPLIANT WITH < 0,1 Ω STANDARD.

PE TRANSMISSION FOR ODU-MAC P+ (POWER)



GROUNDING KIT FOR P+ SOCKET FRAME



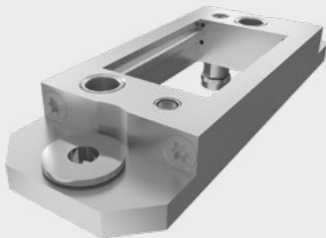
TECHNICAL DATA

- Tolerance compensation:
Axial play: 1 mm
Radial play: +/- 2.5 mm
- Minimum 100,000 mating cycles
- Double-sided version
- Surface: Ag



Non-magnetic version available upon request.

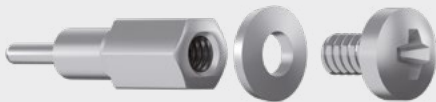
GROUNDING KIT MOUNTED



Part number	Connection threads
174.100.100.201.100	M5

Max. 10 mm² lug connection for PE transmission.

GROUNDING KIT FOR P+ PIN FRAME



TECHNICAL DATA

- Tolerance compensation:
Axial play: 1 mm
Radial play: +/- 2.5 mm
- Minimum 100,000 mating cycles
- Double-sided version
- Surface: Ag



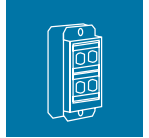
Non-magnetic version available upon request.

Part number	Connection threads
180.100.000.301.100	M5

Max. 10 mm² lug connection for PE transmission.

CONTACT RESISTANCE COMPLIANT WITH < 0,1 Ω STANDARD.

ODU-MAC® T (TRANSVERSE)



Transverse frame, for when a low installation height is required.

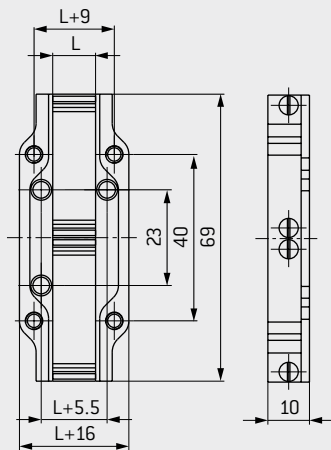


TECHNICAL DATA

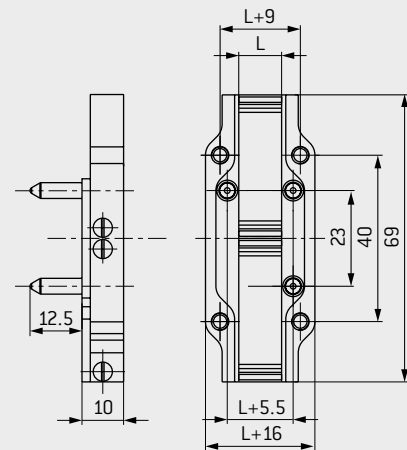
- Installation even in housing solution

These models are available on request. Technical specifications have to be clarified in detail.

SOCKET FRAME WITH GUIDING HOLE

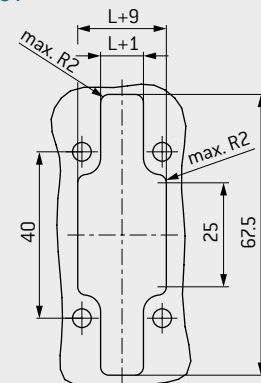


PIN FRAME WITH GUIDING PIN

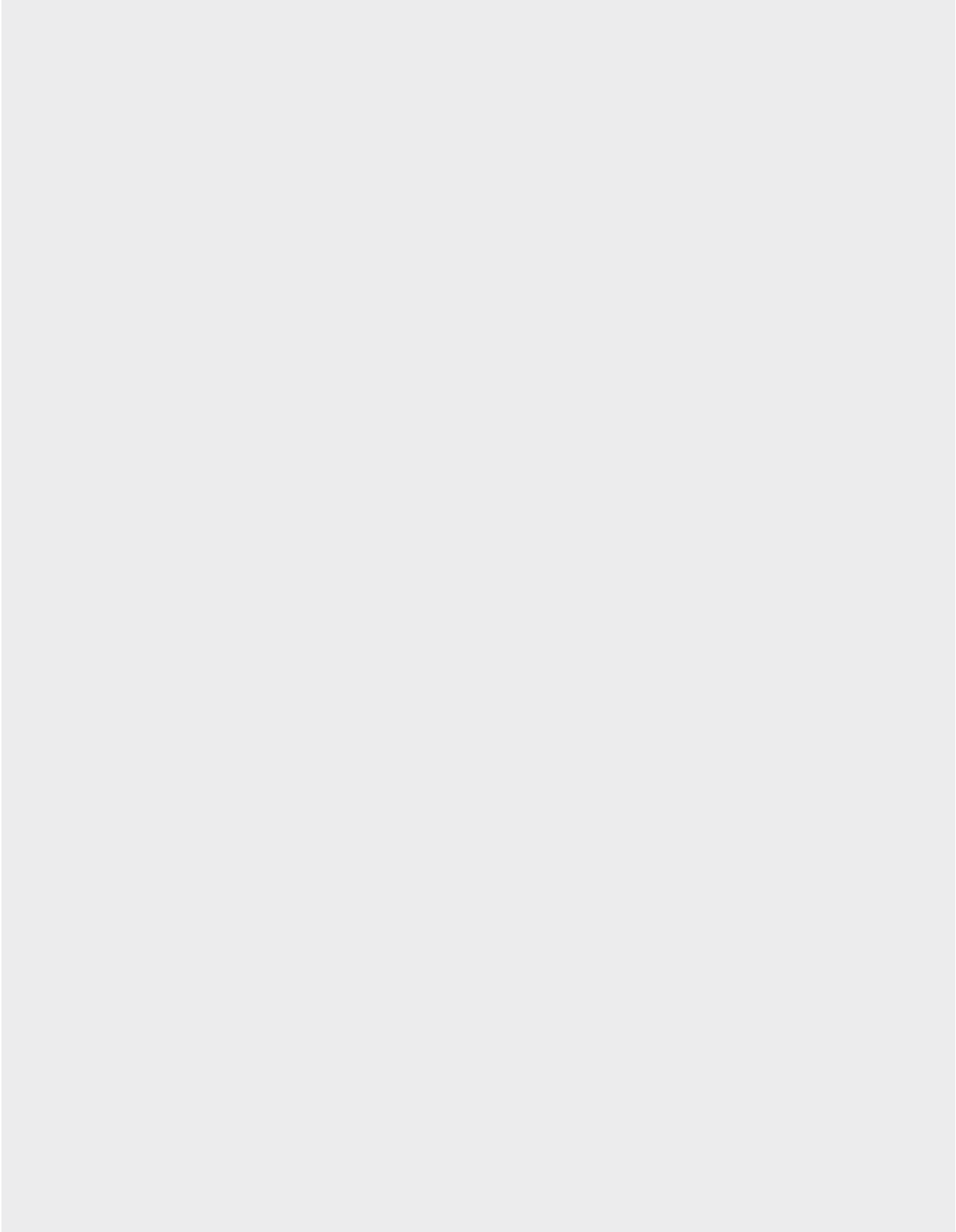


Part number Pin frame	Part number Socket frame	Dim. L mm	Units
611.055.029.303.600	610.055.029.103.600	7.62	3 × 2
611.055.029.304.600	610.055.029.104.600	10.16	4 × 2
611.055.029.305.600	610.055.029.105.600	12.7	5 × 2
611.055.029.306.600	610.055.029.106.600	15.24	6 × 2
611.055.029.307.600	610.055.029.107.600	17.78	7 × 2
611.055.029.308.600	610.055.029.108.600	20.32	8 × 2
611.055.029.309.600	610.055.029.109.600	22.86	9 × 2
611.055.029.310.600	610.055.029.110.600	25.4	10 × 2

PANEL CUT-OUT



FOR YOUR NOTES





ODU-MAC®



MANUAL MATING

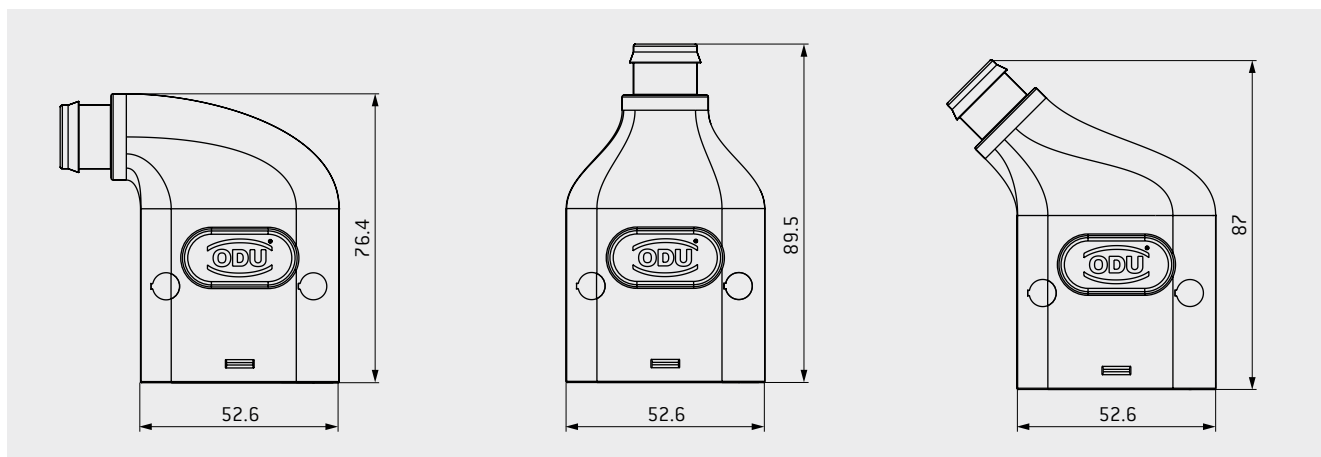
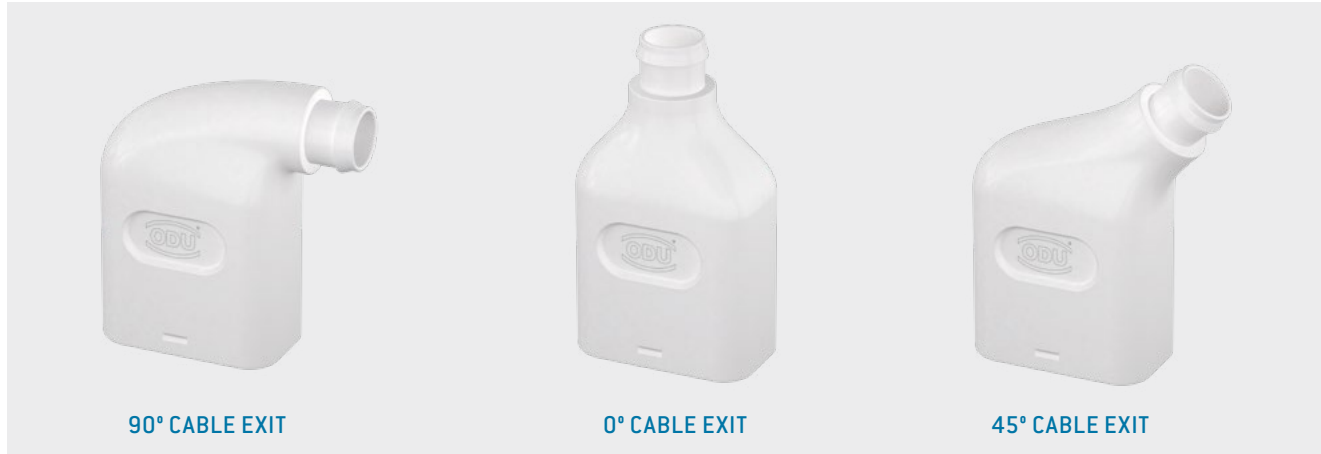
ODU-MAC® ZERO/Snap-In locking	44
ODU MEDI-FLEX with customizable insert	46
Spindle locking, metal housing	50
Frame for housing	56
Accessories	57

ODU-MAC® ZERO

Connector housing for mounting on the cable with different cable entries.
ODU-MAC rail for installing the insulator is already integrated in the housing.



SNAP-IN LOCKING (BREAK-AWAY FUNCTION)



Part number	Cable exit	Size	Units ¹ 2.54 mm
656.560.004.001.000	90°	ZERO	9 Units
656.560.006.001.000	0°	ZERO	9 Units
656.560.002.001.000	45°	ZERO	9 Units

TECHNICAL DATA

Color of housing	White black/gray on request
Locking cycles	60,000
Material	PC Lexan (PEI on request)
Protection class ²	IP 54
Operating temperature	-40 °C to +125 °C
Cable-Ø	8 to 14.5 mm

The cable bend relief must be ordered separately see page [58](#).



SUITABLE MODULES ARE MARKED.

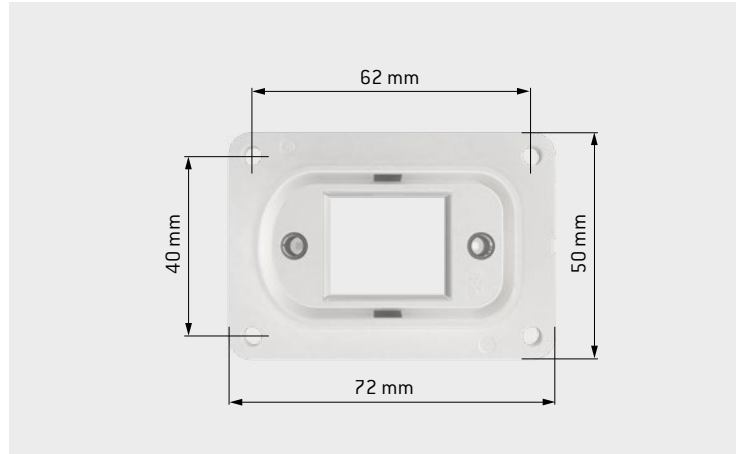
¹The frame is already permanently integrated and consists of nine units. ² IEC 60529:2013 (VDE 0470-1:2014).

RECEPTACLE

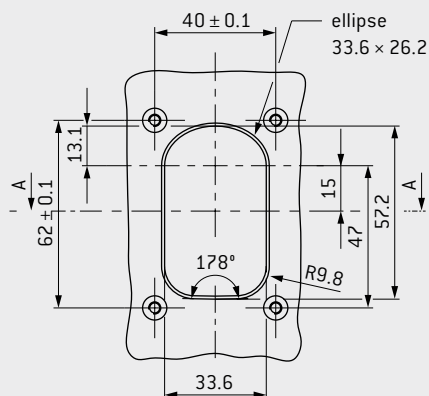


For integration in the device.

SNAP-IN LOCKING (BREAK-AWAY FUNCTION)



PANEL CUT-OUT

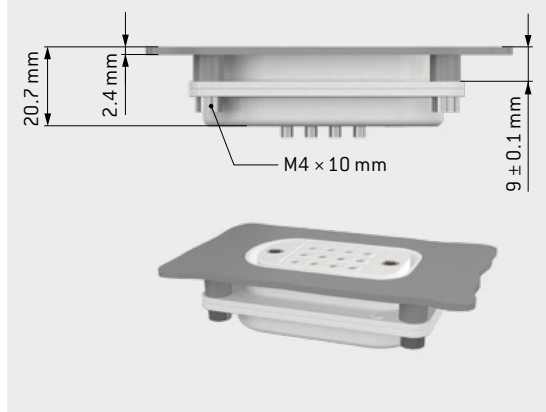


TECHNICAL DATA

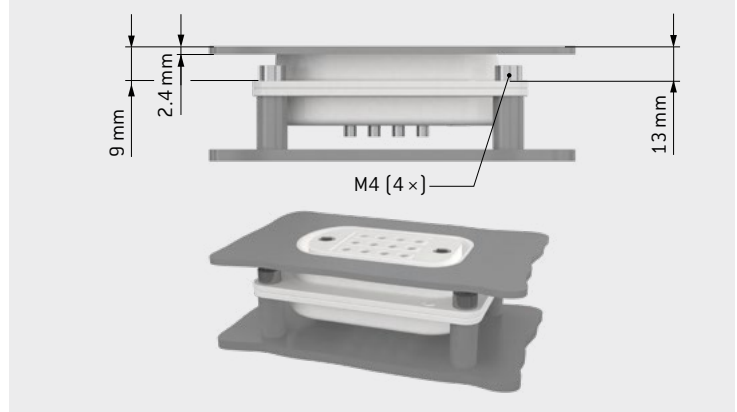
Color of housing	White black/gray on request
Locking cycles	60,000
Material	PC Lexan (PEI on request)
Protection class ¹	IP 54
Operating temperature	-40 °C to +125 °C

Part number	Units ²
656.560.001.001.000	2.54 mm 9 Units

MOUNTING FROM BELOW



MOUNTING FROM ABOVE



MAXIMUM MATING SECURITY THROUGH MECHANICAL CODING (D-SHAPE) AND EASY HANDLING.

¹ IEC 60529:2013 (VDE 0470-1:2014). ² The frame is already permanently integrated and consists of nine units.

ODU MEDI-FLEX WITH CUSTOMIZABLE INSERT

Plug and receptacle connector housing and insulator

Connector housing and insulation body for cable-to-panel connections with customizable insulation body.

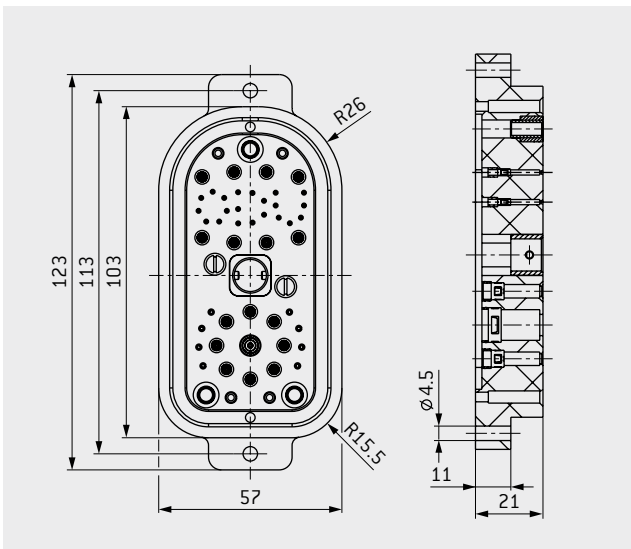


SPINDLE LOCKING



TECHNICAL NOTES

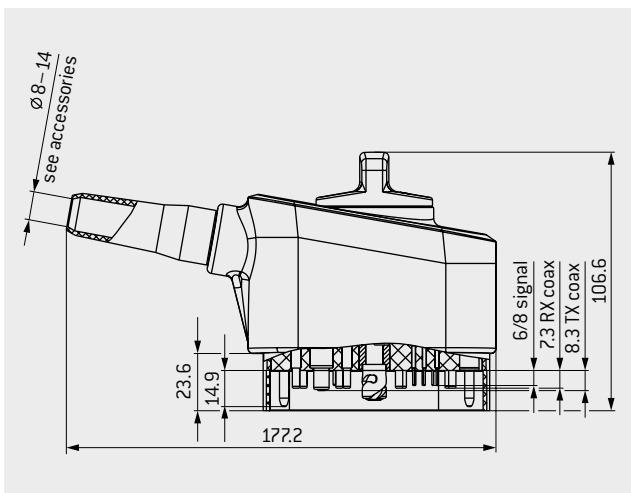
- Plastic housing with customizable mono-block insulation
- Iconography on knob to indicate secure locking



TECHNICAL DATA

Color of housing	White
Insulation material	according (UL 94 V0)
Housing material	PC Lexan 925A (UL 94 V-2)
Protection class ¹	IP 54
Operating temperature	-40°C to 125°C
Cable-Ø	8 to 14 mm
Locking system	180° Spindle locking (up to 30 K mating cycles, with replaceable tip)

The cable bend relief must be ordered separately see page 58.
Part number will be determined based on desired configuration.



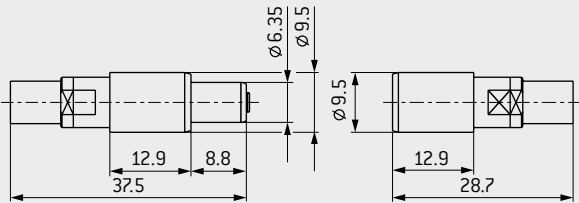
¹ IEC 60529:2013 (VDE 0470-1:2014).



CONTACTS SUITABLE FOR ODU MEDI-FLEX

COAX-VERSIONS

TX COAX 50 Ω



TECHNICAL DATA – TX COAX 50 Ω

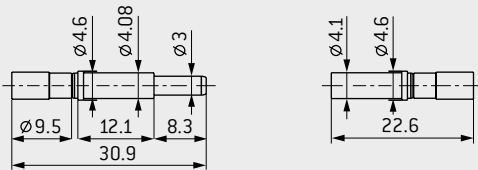
Frequency range	0–2.8 GHz
Mating force	6.95 N
Demating force	4.95 N
Rated voltage	850 V
Test voltage	2,600 V

Voltage information acc. to MIL²

Insulation resistance	> 100 GΩ
Operating temperature	–40 °C to +125 °C
Mating cycles	minimum 100,000

All technical information see module description p. [84–85](#).

RX COAX 50 Ω



TECHNICAL DATA – RX COAX 50 Ω

Frequency range	0–1.3 GHz
Mating force	4.45 N
Demating force	3.8 N
Rated voltage	350 V
Test voltage	1,050 V

Voltage information acc. to MIL²

Insulation resistance	> 100 GΩ
Operating temperature	–40 °C to +125 °C
Mating cycles	minimum 60,000

All technical information see module description p. [82–83](#).

SIGNAL

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 [see page 119].
- All technical information see module description.
- Crimp information see page 106.

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ	More information see page
				Single contact A	Module fully equipped A			

CONTACT Ø 0.76

Pin contact short	182.958.000.370.000	0.38	22	7.5	6	11	3.8	68–69
Pin contact long	182.959.000.370.000							
Socket contact	172.958.700.257.000							
Pin contact short	182.965.000.370.000	0.25/0.08	24/28	6	5	9	3.8	
Pin contact long	182.966.000.370.000							
Socket contact	172.965.700.257.000							

CONTACT Ø 1.02

Pin contact short	182.956.000.370.000	0.50/0.38	20/22	9	8	13.5	2.1	70–71
Pin contact long	182.957.000.370.000							
Socket contact	172.956.700.257.000							
Pin contact short	182.944.000.370.000	0.25/0.08	24/28	6	6	9	2.1	
Pin contact long	182.945.000.370.000							
Socket contact	172.944.700.257.000							

CONTACT Ø 1.5

Pin contact short	182.960.000.370.000	1.5	14	18	14.5	27	0.95	72–73
Pin contact long	182.961.000.370.000							
Socket contact	172.960.700.257.000							
Pin contact short	180.545.000.370.000	1/0.75	18	16	13	22.5	0.95	
Pin contact long	180.575.000.370.000							
Socket contact	170.545.700.257.000							
Pin contact short	180.541.000.370.000	0.5/0.38	20/22	10	8	15	0.95	
Pin contact long	180.571.000.370.000							
Socket contact	170.541.700.257.000							

CONTACT Ø 2.41

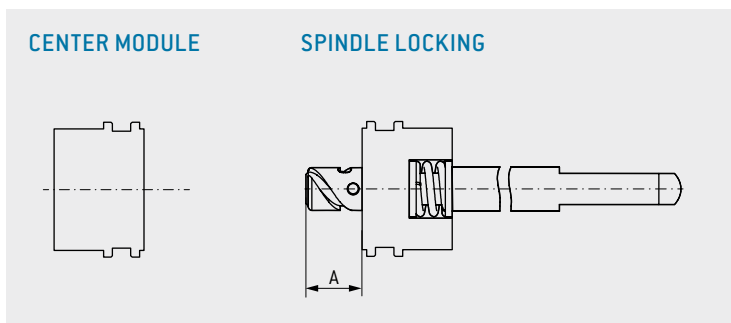
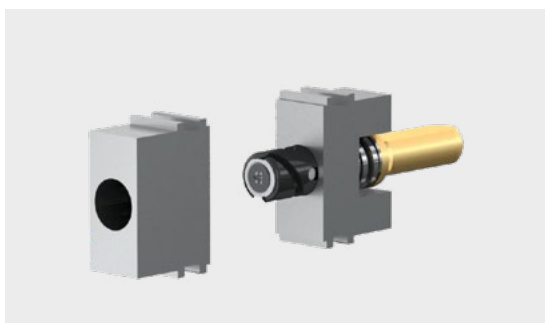
Pin contact short	182.962.000.370.000	2.5		24	19	33.5	0.45	74–75
Pin contact long	182.963.000.370.000							
Socket contact	172.962.700.257.000							
Pin contact short	182.608.000.370.001	0.5/0.38	20/22	10.5	8	15.5	0.55	
Pin contact long	182.605.000.370.001							
Socket contact	172.605.700.257.000							

SPINDLE LOCKING

Module for installation in ODU-MAC® frames for housings. Quick-action locking system with 30,000 locking cycles. Simple replacement of the front (spindle exchange set) enables further mating cycles of the complete system.



VERSION 1: FOR SOCKETS IN BULKHEAD MOUNTED OR SURFACE MOUNTED HOUSING AND PINS IN CABLE HOOD



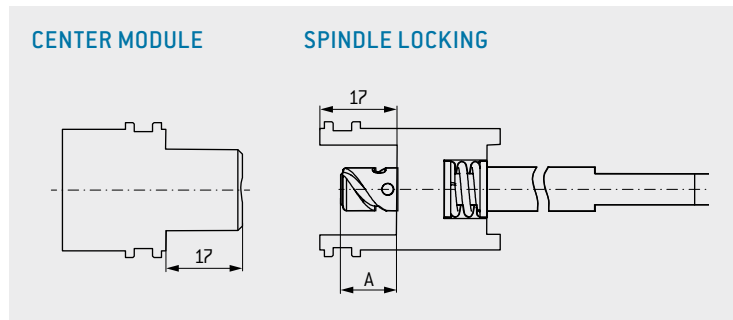
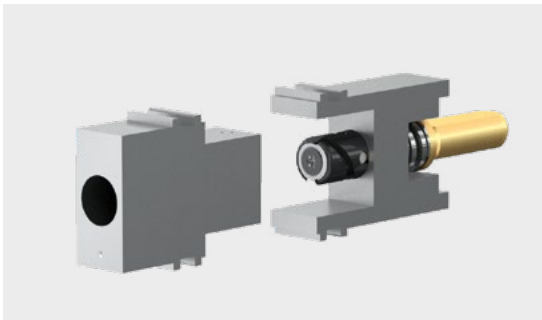
Size	Part number Center module for bulkhead mounted and surface mounted housing	Part number Spindle locking for cable hood	Angle of rotation	Dim. A mm
2 (52 mm high)	614.090.001.338.001	615.091.003.900.001	180°	12
2 (72 mm high)		615.091.001.900.001	180°	12
3/4		615.092.011.900.001	360°	16.3

- Max. locking cycles 30,000¹
- Space requirement 5 units (5 × 2.54 mm)
- Further spindle geometries on request
- Can account for 80 lbf (9 Nm) of mating forces

¹ 30,000 cycles depending on mating force of the used modules.



VERSION 2: FOR PINS IN BULKHEAD MOUNTED OR SURFACE MOUNTED HOUSING AND SOCKETS IN CABLE HOOD (REVERSED GENDER)



Size	Part number Center module for bulkhead mounted and surface mounted housing	Part number Spindle locking for cable hood	Angle of rotation	Dim. A mm
2 (52 mm high)	614.090.002.338.001	615.091.004.900.001	180°	12
2 (72 mm high)		615.091.002.900.001	180°	12
3/4		615.092.012.900.001	360°	16.3

- Max. locking cycles 30,000¹
- Space requirement 5 units (5 × 2.54 mm)
- Further spindle geometries on request

REPLACEMENT SPINDLE SET FOR VERSION 1 AND 2



Part number spindle exchange set	Angle of rotation	Dim. A mm
615.090.104.249.010	180°	12
615.090.104.249.012	360°	16.3

Replacement set for easy and rapid replacement of spindle screw from the front.

¹ 30,000 cycles depending on mating force of the used modules.

CABLE HOOD



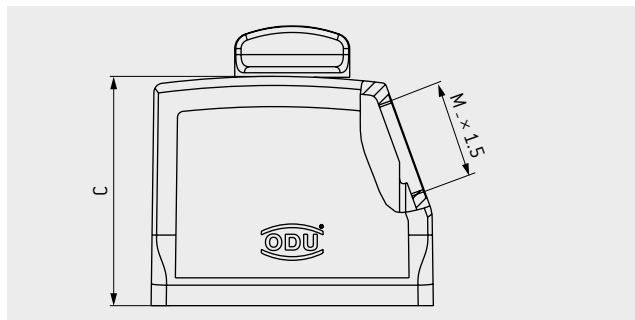
Connector housing for assembly on the cable with side cable entry.

SPINDLE LOCKING



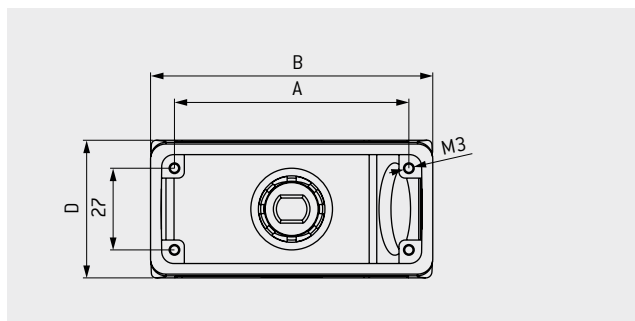
B WHITE MODEL

C WHITE MODEL WITH BLACK KNOB



TECHNICAL DATA

Color of housing	White (similar RAL 9010)
Material	Aluminium die casting
Protection class ¹	IP 50 IP 65 on request
Operating temperature	−40 °C to +125 °C
Cable clamp	see page 57
Number of locking cycles	see page 50



Size	Part number B Color of housing white/ spindle knob white	Part number C Color of housing white/ spindle knob black	Dim. A mm	Dim. B mm	Dim. C mm	Dim. D mm	Dim. M Cable entry	Part number protective cover gray (see page 58)
2	613.091.513.453.203	–	57	73	52	43	M25	On request
	613.091.514.453.203	613.091.514.453.208	57	73	72	43		
3	613.092.514.453.203	613.092.514.453.208	77.5	93.3	76	45.5	M32	On request
4	613.093.514.453.203	613.093.514.453.208	104	120	76	45.5	M40	On request
	On request	613.093.515.453.008	104	120	76	45.5		

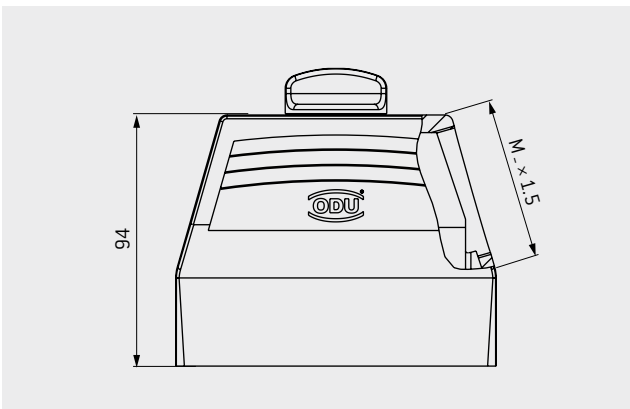
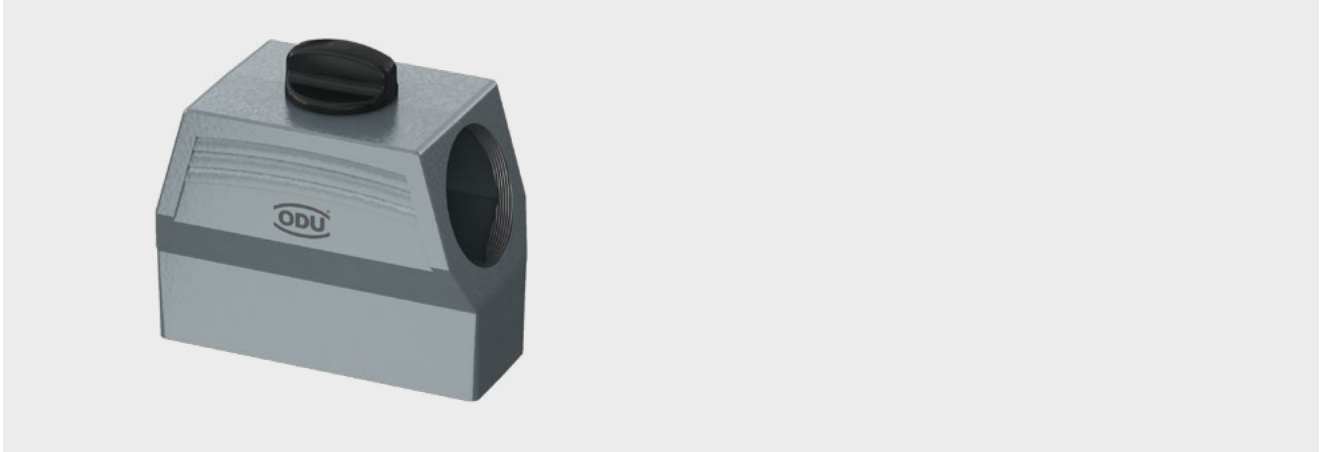
¹ IEC 60529:2013 (VDE 0470-1:2014) [Depends on the cable clamp(s) and spindle type used].

CABLE HOOD XXL



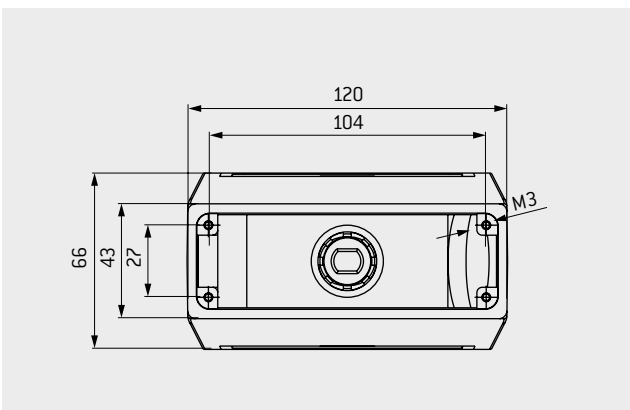
Connector housing for assembly on the cable. With expanded assembly space and side M50 cable entry.

SPINDLE LOCKING



TECHNICAL DATA

Color of housing	Gray, white on request
Material	Aluminium die casting
Protection class ¹	IP 50 IP 65 on request
Operating temperature	-40 °C to +125 °C
Cable clamp	see page 57
Number of locking cycles	see page 50



Size	Part number	Dim. M	Part number protective cover
	Color of housing gray/spindle knob black	Cable entry	(see page 58)
4	613.093.516.444. 208	M50	On request

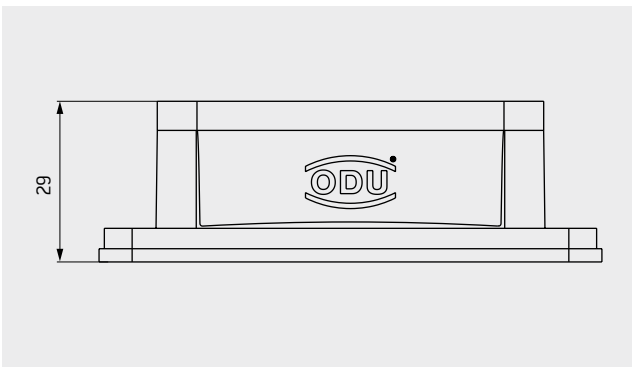
¹ IEC 60529:2013 [VDE 0470-1:2014] (Depends on the cable clamp(s) and spindle type used).

BULKHEAD MOUNTED HOUSING



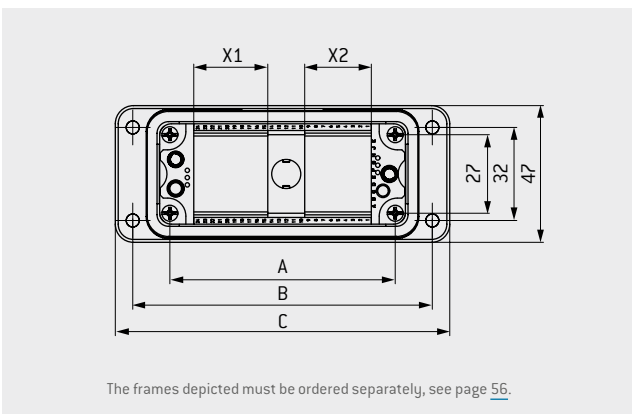
For mounting on the device.

SPINDLE LOCKING



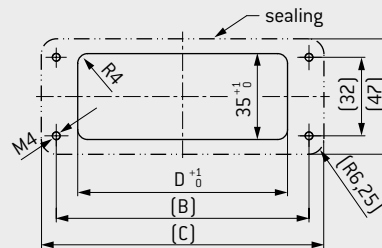
TECHNICAL DATA

Color of housing	White (similar to RAL 9010), gray on request
Material	Aluminium die casting
Protection class ¹	IP 65
Operating temperature	-40 °C to +125 °C (short duration) -40 °C to +85 °C (operating)
Sealing	NBR; sealing material FKM on request (higher temperature range)



The frames depicted must be ordered separately, see page 56.

PANEL CUT-OUT



Size	Part number	Dim. A	Dim. B	Dim. C	Dim. D Panel cut-out	X1	X2
	Color of housing white	mm	mm	mm	mm	Units 2.54 mm	Units 2.54 mm
2	612.091.010.453.000	57	83	95	65.2	5	6
3	612.092.010.453.000	77.5	103	115	85.5	9	10
4	612.093.010.453.000	104	130	143	112.2	14	15

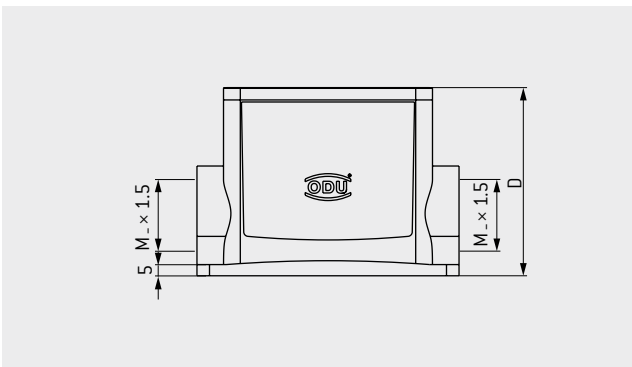
¹ IEC 60529:2013 (VDE 0470-1:2014) [Depends on the spindle type used].

SURFACE MOUNTED HOUSING



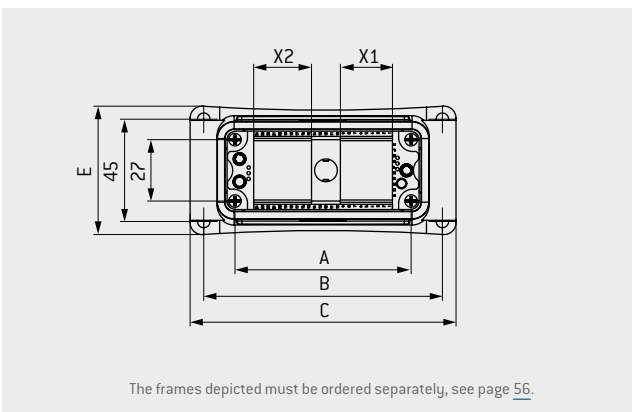
For surface mounting on your device/wall with two side cable entries.

SPINDLE LOCKING



TECHNICAL DATA

Color of housing	White (similar to RAL 9010), gray on request
Material	Aluminium die casting
Protection class ¹	IP 65
Operating temperature	-40 °C to +125 °C (short duration) -40 °C to +85 °C (operating)
Sealing	NBR; sealing material FKM on request (higher temperature range)
Cable clamp	See page 57



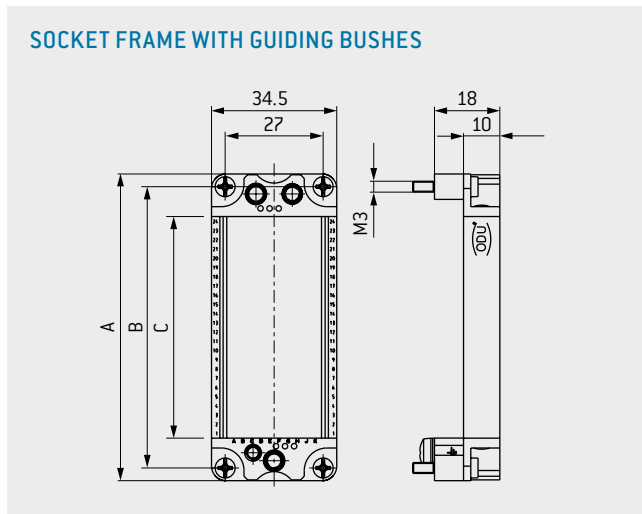
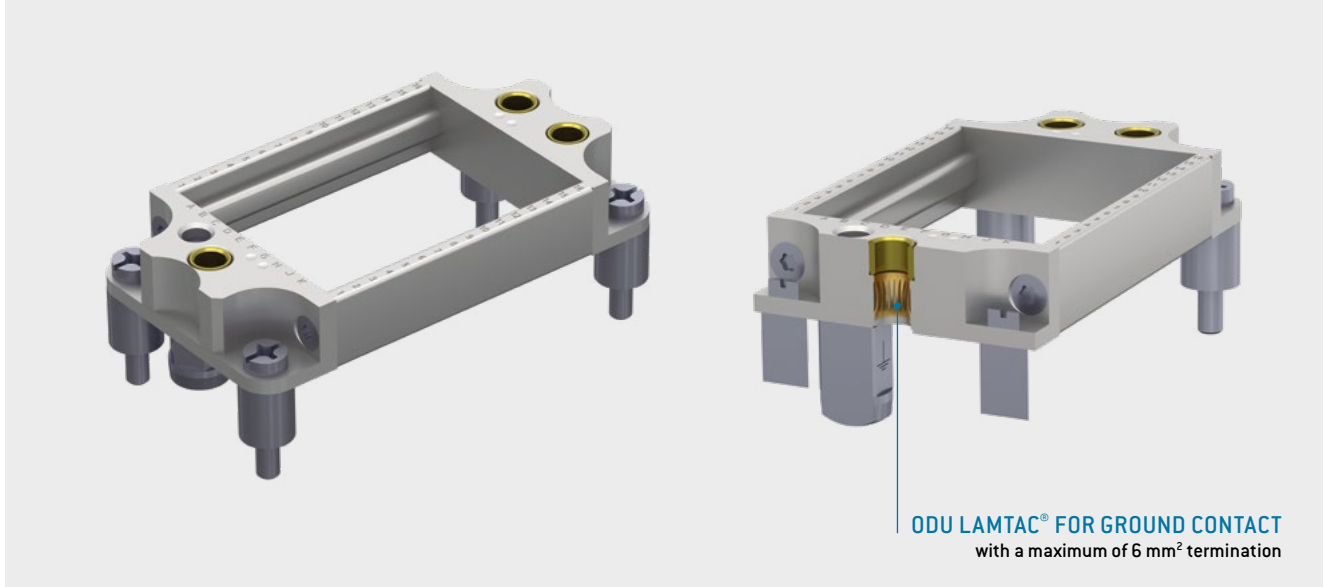
Size	Part number	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	X1	X2	Dim. M
	Color of housing white	mm	mm	mm	mm	mm	Units 2.54 mm	Units 2.54 mm	Cable entry
2	612.091.025.453.102	57	82	92.5	74	55.5	5	6	M32
3	612.092.025.453.102	77.5	105	117	84	56.5	9	10	M32
4	612.093.025.453.102	104	132	144	84	57.5	14	15	M32

¹ IEC 60529:2013 (VDE 0470-1:2014) [Depends on the cable clamp(s) and spindle type used].

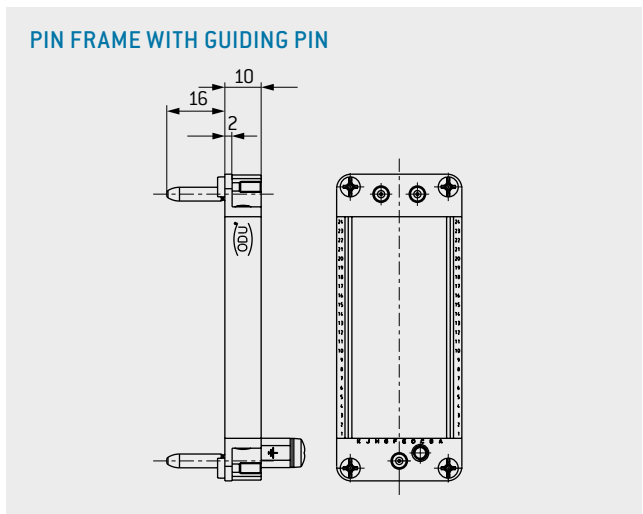
ODU-MAC® FRAME FOR HOUSING



With grounded housing. (The frame is not required for the ODU-MAC® ZERO.)



Sockets in bulkhead mounted housing, cable to cable hood or surface mounted housing. Pins in cable hood. Modules are mounted, contacts are not fixed enclosed.



For the height of the contact pins the same dimensions are valid as described by the respective modules.

Size	Part number Socket frame	Part number Pin frame	Max. units 2.54 mm ¹	Dim. A mm	Dim. B mm	Dim. C mm
ZERO	No frame required.	No frame required.	9	–	–	–
2	610.191.000.400.000	611.191.000.400.000	16	64	57	40.8
3	610.192.000.400.000	611.192.000.400.000	24	84.5	77.5	61.1
4/XXL	610.193.000.400.000	611.193.000.400.000	34	111	104	86.5

¹ If the configuration doesn't fill the frame completely, please use blank modules (see page 100).

CABLE CLAMP AND BLIND GROMMET



CABLE CLAMP¹ FOR HOUSINGS ACCORDING TO IEC 62444:2010 (VDE 0619:2014)



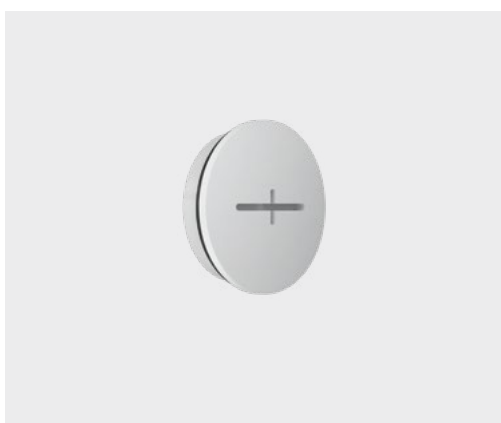
TECHNICAL DATA

Material Body	PA
Sealing	NBR; sealing material
Protection class	IP 68 to 5 bar
Temperature range	-40 °C to +100 °C

EMC clamp on request.

Part number	Thread	Color	Width across flats	Tightening torque Nm	Cable diameter mm	
					min.	max.
027.825.060.130.007	M25 × 1.5	Gray	30	8	6	13
027.825.090.170.007					9	17
027.832.070.150.007	M32 × 1.5		36	10	7	15
027.832.110.210.007					11	21
027.840.190.280.007	M40 × 1.5		46	13	19	28
027.850.270.350.007	M50 × 1.5		55	15	27	35
027.825.060.130.003	M25 × 1.5	White	30	8	6	13
027.825.090.170.003					9	17
027.832.070.150.003	M32 × 1.5		36	10	7	15
027.832.110.210.003					11	21
027.840.190.280.003	M40 × 1.5		46	13	19	28
027.832.070.150.008	M32 × 1.5		Black	36	10	7
027.832.110.210.008		11				21
027.840.190.280.008	M40 × 1.5	46		13	19	28

BLIND GROMMET FOR SURFACE MOUNTED HOUSING



TECHNICAL DATA

Color	Gray
Material	PA fiber glass reinforced
Protection class	IP68
Temperature range	-40 °C to +125 °C
Sealing	NBR; sealing material

Part number	Thread
921.000.006.000.279	M25 × 1.5
921.000.006.000.268	M32 × 1.5
On request	M40 × 1.5
On request	M50 × 1.5

¹ Delivery doesn't contain cable clamp, but o-ring is enclosed with the housing.

SILICONE BEND RELIEFS FOR ODU-MAC® ZERO AND MEDI-FLEX



TECHNICAL DATA

Material	Silicone Depending on the application, the MRI field must be checked by the customer.
Temperature	-50 °C to +200 °C

DESCRIPTION

Bend reliefs for cable- \varnothing 8–14.5 mm (MINI-SNAP Size 4, Silicone)
Ideal for color coding.

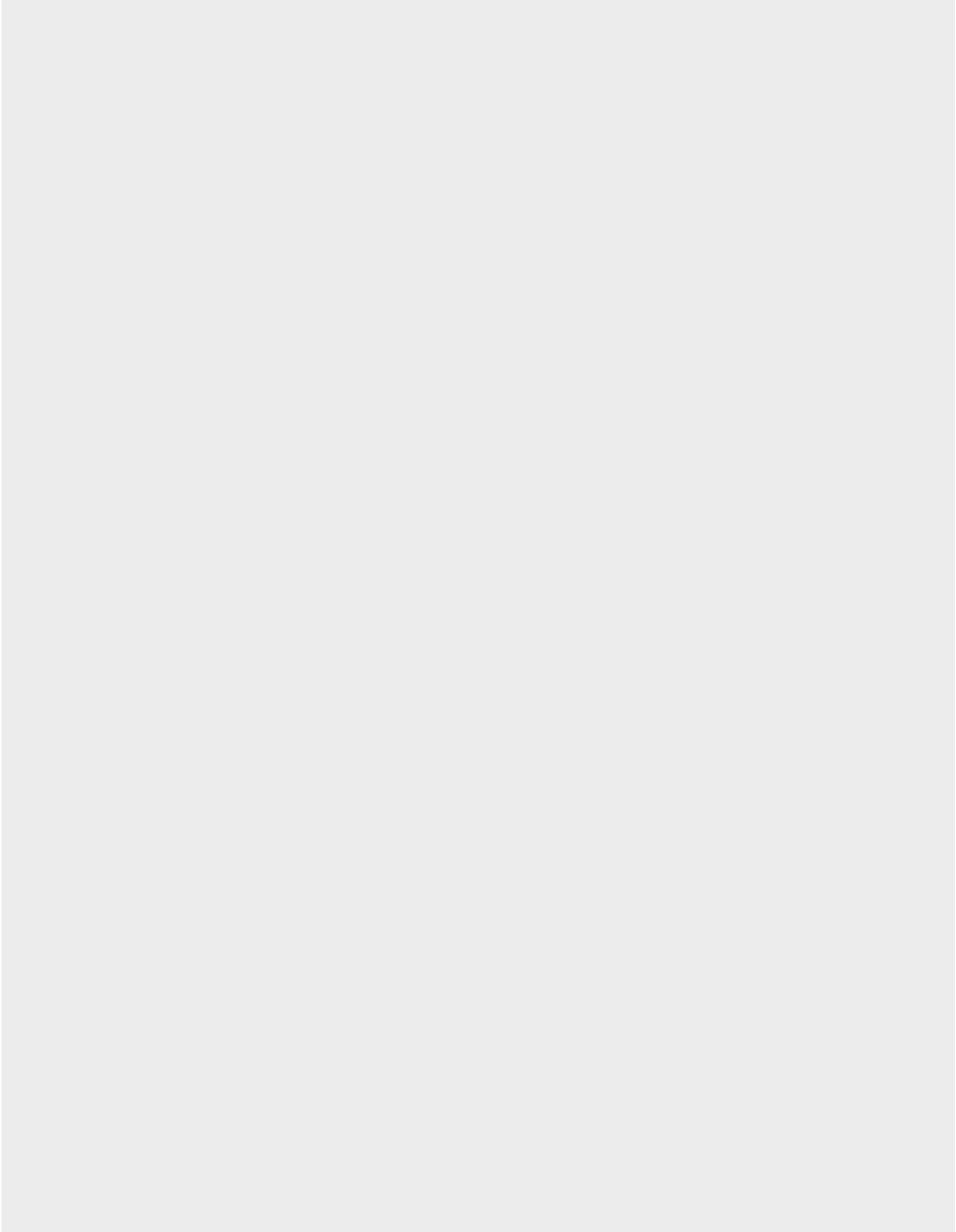
Part number	Dim. L mm	Cable jacket (\varnothing outside)	
		min.	max.
704.023.____.965.080	60	8	10
704.023.____.965.100		10	12
704.023.____.965.120		12	14
704.023.____.965.140		14	16

Color code	Color	RAL no. ¹ (similar)
202	Red	3020
203	White ²	9010
204	Yellow	1016
205	Green	6029
206	Blue	5002
207	Gray ²	7005
208	Black ²	9005



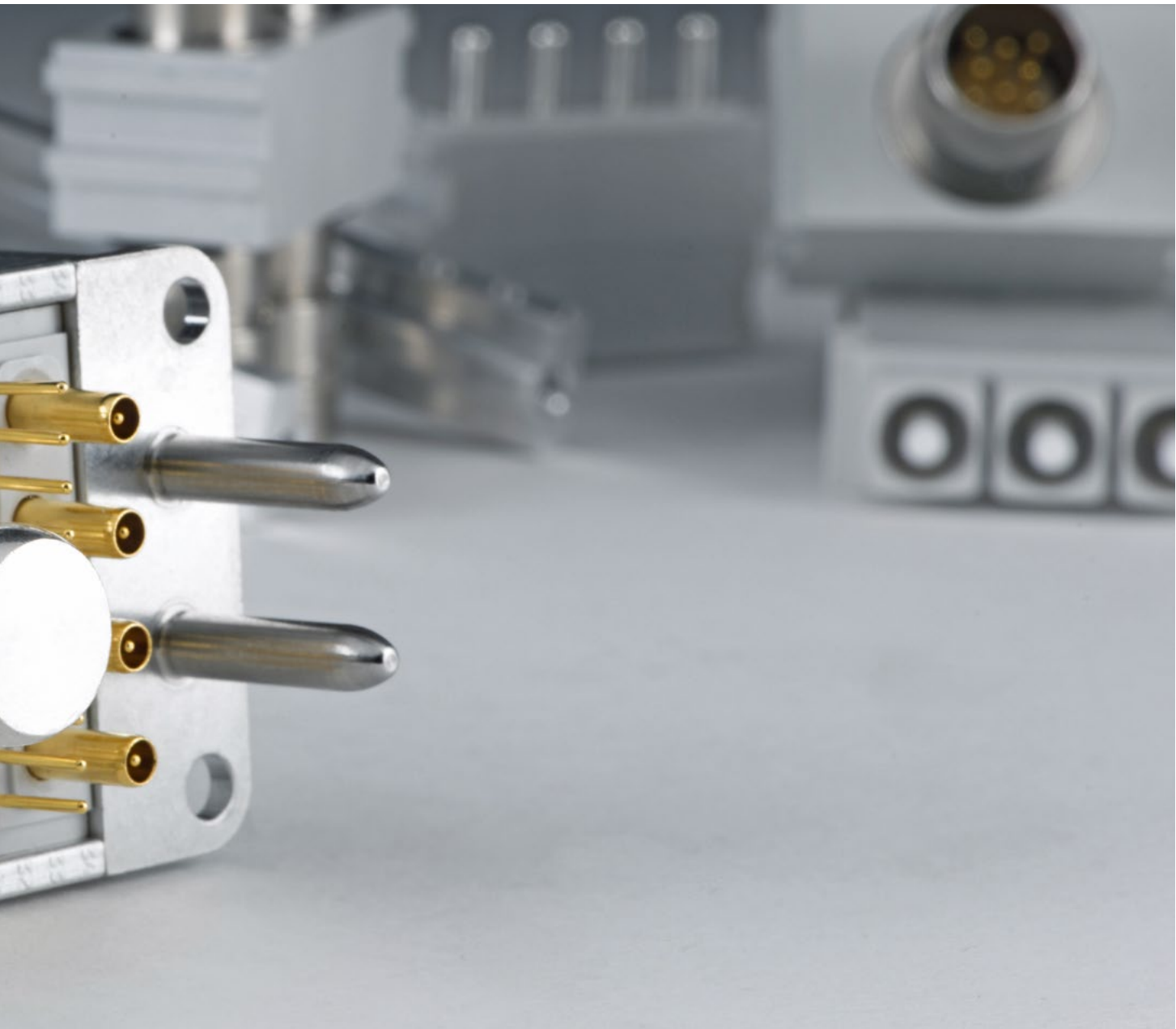
¹ Due to variations in raw materials, colors may differ slightly from RAL numbers. ² Standard colors with short delivery period.

FOR YOUR NOTES





ODU-MAC®



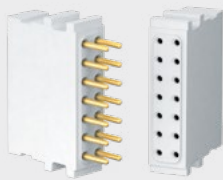


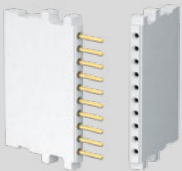


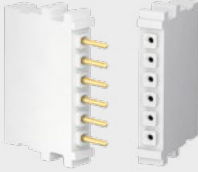


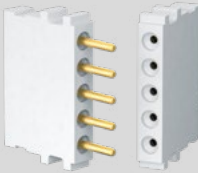


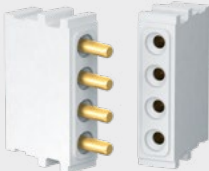


MODULES

Overview	62
Signal	66
Power	74
High voltage	80
Coax	82
Fiber optic	96
Blank modules/spacer modules/coding modules/pin protection modules	100

OVERVIEW OF ALL MODULES



Modules marked with this symbol can be used in the ODU-MAC® ZERO.

	Modules	Description	Units /width	Features	Page
Signal		14 contacts for turned contacts Contact Ø: 1.02 mm	 7.62 mm 	High contact density Operating voltage ¹ 320 V Rated impulse voltage ¹ 2,500 V Max. continuous current ² 13.5 A for 0.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	66
		10 contacts for turned contacts Contact Ø: 0.76 mm	 2.54 mm 	Highest contact density Operating voltage ¹ 250 V Rated impulse voltage ¹ 1,500 V Max. continuous current ² 11 A for 0.38 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	68
		6 contacts for turned contacts Contact Ø: 1.02 mm	 5.08 mm 	Operating voltage ¹ 400 V Rated impulse voltage ¹ 3,000 V Max. continuous current ² 13.5 A for 0.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	70
		5 contacts for turned contacts Contact Ø: 1.5 mm	 5.08 mm 	Operating voltage ¹ 500 V Rated impulse voltage ¹ 2,500 V Max. continuous current ² 27 A for 1.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	72
Power		4 contacts for turned contacts Contact Ø: 2.41 mm	 7.62 mm 	Operating voltage ¹ 500 V Rated impulse voltage ¹ 3,000 V Max. continuous current ² 33.5 A for 2.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	74

¹Acc. to IEC 60664-1:2007 (VDE 0110-1:2008) for degree of pollution 2. ²Definition max. continuous current see page 125.

OVERVIEW OF ALL MODULES



Modules marked with this symbol can be used in the ODU-MAC® ZERO.

	Modules	Description	Units /width	Features	Page
Power		3 contacts for turned contacts Contact Ø: 3 mm	 7.62 mm 	Operating voltage ¹ 500 V Rated impulse voltage ¹ 3,000 V Max. continuous current ² 28 A for 1.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	76
		3 contacts for turned contacts Contact Ø: 3 mm	 10.16 mm 	High voltage Operating voltage ¹ 2,500 V Rated impulse voltage ¹ 10,000 V Max. continuous current ² 28 A for 1.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	78
High voltage		4 contacts for turned contacts Contact Ø: 1.5 mm	 7.62 mm 	High contact density high voltage Operating voltage ¹ 2,500 V Rated impulse voltage ¹ 10,000 V Max. continuous current ² 27 A for 1.5 mm ² Degree of pollution ¹ 2 Mating cycles minimum 100,000	80
Coax		4 contacts for 50 Ω coax contacts	 7.62 mm 	High contact density Frequency range 0–1.3 GHz Mating cycles minimum 60,000	82
		2 contacts for 50 Ω coax contacts	 12.7 mm 	High voltage Frequency range 0–2.8 GHz Mating cycles minimum 100,000	84

¹Acc. to IEC 60664-1:2007 (VDE 0110-1:2008). ²Definition max. continuous current see page 125. ³Contact with springwire technology. ⁴Contact with lamella technology.

OVERVIEW OF ALL MODULES



Modules marked with this symbol can be used in the ODU-MAC® ZERO.

	Modules	Description	Units / width	Features	Page
Coax		10 contacts for 50 Ω common shield	 7.62 mm 	Frequency range 0–1.3 GHz Mating cycles 40,000	86
		8 contacts for 50 Ω common shield	 7.62 mm 	Frequency range 0–1.3 GHz Mating cycles 40,000	88
		6 contacts for 50 Ω common shield	 7.62 mm 	Frequency range 0–1.3 GHz Mating cycles 40,000	90
		8-channel module (coax option)	 10.16 mm 	Easy to assemble Frequency range 0–350 MHz Mating cycles 100,000	92
		MINI-COAX	Frequency range 0–1.15 GHz Mating cycles minimum 5,000	94	

¹Acc. to IEC 60664-1:2007 (VDE 0110-1:2008) for degree of pollution 2. ²Definition max. continuous current see page [125](#).

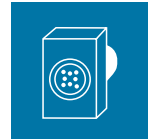
OVERVIEW OF ALL MODULES



Modules marked with this symbol can be used in the ODU-MAC® ZERO.

	Modules	Description	Units / width	Features	Page
Fiber optic		5 contacts for fiber optic contacts for plastic fiber (POF) Non-magnetic on request.	 2 Units 5.08 mm	High contact density Insertion loss typical 1.5 dB for 670 nm Mating cycles minimum 40,000	96
		2 contacts for fiber optic contacts for plastic fiber (POF)	 3 Units 7.62 mm 	Insertion loss < 4.0 dB with polished fiber Mating cycles infinite	98
Blank modules / spacer modules / coding modules / pin protection modules		Blank modules	 1 Unit 2.54 mm 3 Units 7.62 mm 5 Units 12.7 mm 	Used to fill incomplete frames.	100
		Spacer module	 1 Unit 2.54 mm 2 Units 5.08 mm 3 Units 7.62 mm 5 Units 12.7 mm 	Not equipped, enable the pluggability despite different contact equipment in the pin piece. For information on the individual spacer modules please look at the corresponding modules.	101
		Coding modules	 1 Unit 2.54 mm 	Arranged between the modules to create keyed guiding system.	102
		Pin protection modules	 1 Unit 2.54 mm 	Used to protect the pins in conjunction with small pin diameters.	103

MODULES 14 CONTACTS



Contact diameter: 1.02 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 13.5 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Contacts and insulators up to 200 °C on request.
- Crimp information see page [106](#).



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.362.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

TECHNICAL DATA

Voltage information²

Operating voltage	320 V	100 V
Rated impulse voltage	2,500 V	2,500 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	950 V
Test voltage	2,850 V

Mechanical data

Total mating force (average)	18.9 N / Module
Total sliding force (average)	13.7 N / Module
Contact diameter	1.02 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

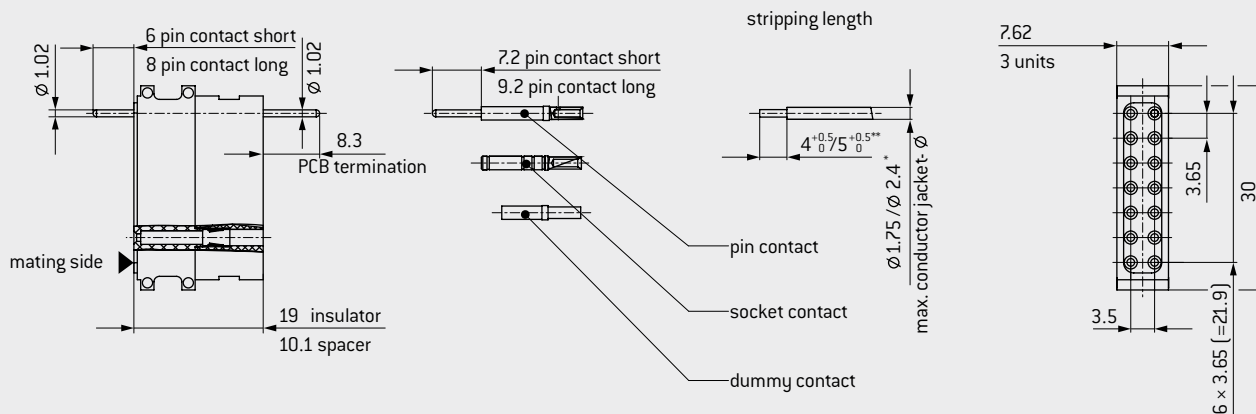
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuBe alloy
Contact processing	Au over NiP

¹Definition max. continuous current see page [125](#). ²IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#). ³See page [123](#).



INSULATOR PIN AND SOCKET



Module 14 contacts	Part number
Insulator	611.130.114.923.000
Spacer	611.130.111.923.000
Dummy contact	021.341.124.923.000

* ≤ Ø 1.75 removal possible / ≤ Ø 2.4 removal not possible.

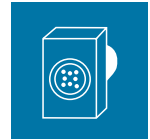
** 4^{+0.5/0}: AWG 24/28; 0.25/0.08 mm²

5^{+0.5/0}: AWG 20/22; 0.5/0.38 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG/mm	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.956.000.370.000	0.5/0.38	20/22	9	7	13.5	2.1
Pin contact long	182.957.000.370.000						
Socket contact	172.956.700.257.000						
Pin contact short	182.944.000.370.000	0.25/0.08	24/28	6	5	9	2.1
Pin contact long	182.945.000.370.000						
Socket contact	172.944.700.257.000						
Pin contact short	182.818.000.370.000		PCB termination Ø 1.02 mm	9	7	13.5	2.1
Pin contact long	182.819.000.370.000						
Socket contact	172.818.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 10 CONTACTS FOR TURNED CONTACTS



Contact diameter: 0.76 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 11 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page 119).
- The 10 contacts modules with turned contacts are not compatible with stamped contacts or modules.
- Contacts and insulators up to 200 °C on request.
- Crimp information see page 106.



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.361.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page 113.

TECHNICAL DATA

Voltage information²

Operating voltage	250 V	32 V
Rated impulse voltage	1,500 V	1,500 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	500 V
Test voltage	1,500 V

Mechanical data

Total mating force (average)	13.5 N / Module
Total sliding force (average)	9.8 N / Module
Contact diameter	0.76 mm
Operating temperature	-40 °C to +125 °C acc. to UL 1977, Second edition, max. 75 °C
Mating cycles	minimum 100,000

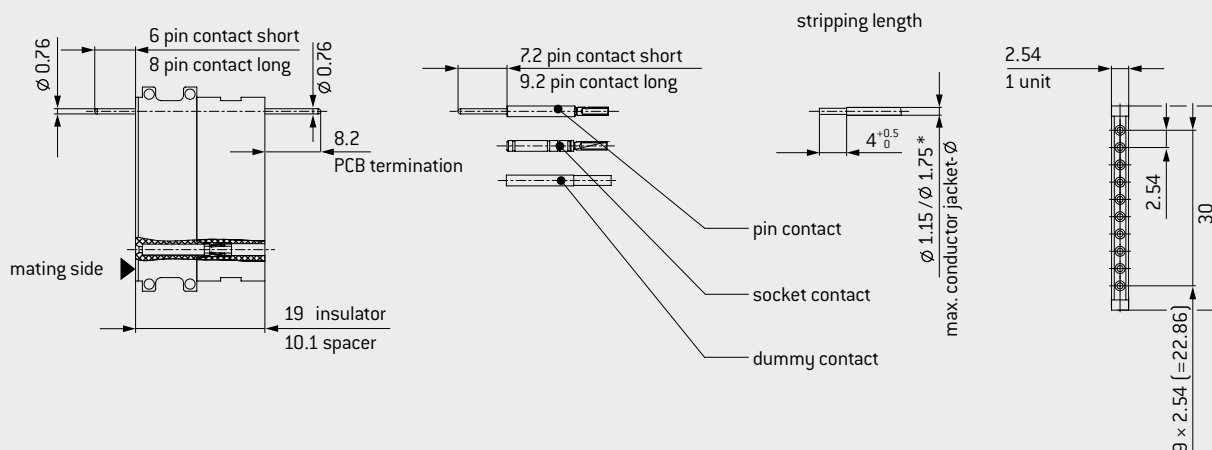
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuBe alloy
Contact processing	Au over NiP

¹Definition max. continuous current see page 125. ²IEC 60664-1:2007 (VDE 0110-1:2008) see page 119. ³See page 123.



INSULATOR PIN AND SOCKET



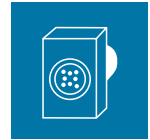
* ≤ Ø 1.15 removal possible / ≤ Ø 1.75 removal not possible.

Module 10 contacts	Part number
Insulator	611.122.110.923.000
Spacer	611.122.111.923.000
Dummy contact	021.341.123.923.000

Description	Part number	Conductor cross-section mm ²	Termination AWG/mm	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.958.000.370.000	0.38	22	7.5	6	11	3.8
Pin contact long	182.959.000.370.000						
Socket contact	172.958.700.257.000						
Pin contact short	182.965.000.370.000	0.25/0.08	24/28	6	5	9	3.8
Pin contact long	182.966.000.370.000						
Socket contact	172.965.700.257.000						
Pin contact short	182.850.000.370.000		PCB termination Ø 0.76 mm	7.5	6	11	3.8
Pin contact long	182.851.000.370.000						
Socket contact	172.889.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 6 CONTACTS



Contact diameter: 1.02 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 13.5 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Contacts and insulators up to 200 °C on request.
- Crimp information see page [106](#).



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.362.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

TECHNICAL DATA

Voltage information²

Operating voltage	400 V	160 V
Rated impulse voltage	3,000 V	3,000 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	850 V
Test voltage	2,550 V

Mechanical data

Total mating force (average)	8.1 N / Module
Total sliding force (average)	5.9 N / Module
Contact diameter	1.02 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

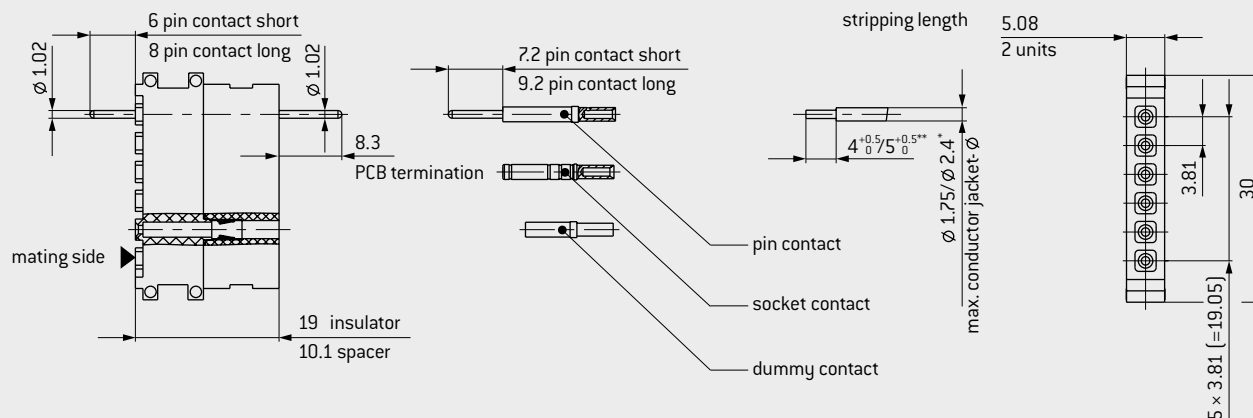
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuBe alloy
Contact processing	Au over NiP

¹ Definition max. continuous current see page [125](#). ² IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#). ³ See page [123](#).



INSULATOR PIN AND SOCKET



Module 6 contacts	Part number
Insulator	611.123.106.923.000
Spacer	611.123.111.923.000
Dummy contact	021.341.124.923.000

* ≤ Ø 1.75 removal possible / ≤ Ø 2.4 removal not possible.

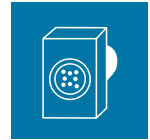
** 4^{+0.5/-0}: AWG 24/28; 0.25/0.08 mm²

5^{+0.5/-0}: AWG 20/22; 0.5/0.38 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG/mm	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.956.000.370.000	0.5/0.38	20/22	9	8	13.5	2.1
Pin contact long	182.957.000.370.000						
Socket contact	172.956.700.257.000						
Pin contact short	182.944.000.370.000	0.25/0.08	24/28	6	6	9	2.1
Pin contact long	182.945.000.370.000						
Socket contact	172.944.700.257.000						
Pin contact short	182.818.000.370.000		PCB termination Ø 1.02 mm	9	8	13.5	2.1
Pin contact long	182.819.000.370.000						
Socket contact	172.818.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 5 CONTACTS



Contact diameter: 1.5 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 27 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 [see page 119].
- Contacts and insulators up to 200 °C on request.
- Crimp information see page 106.



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.138.000.000



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.363.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page 113.

TECHNICAL DATA

Voltage information²

Operating voltage	500 V	200 V
Rated impulse voltage	2,500 V	2,500 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	750 V
Test voltage	2,250 V

Mechanical data

Total mating force (average)	15 N / Module
Total sliding force (average)	11.3 N / Module
Contact diameter	1.5 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

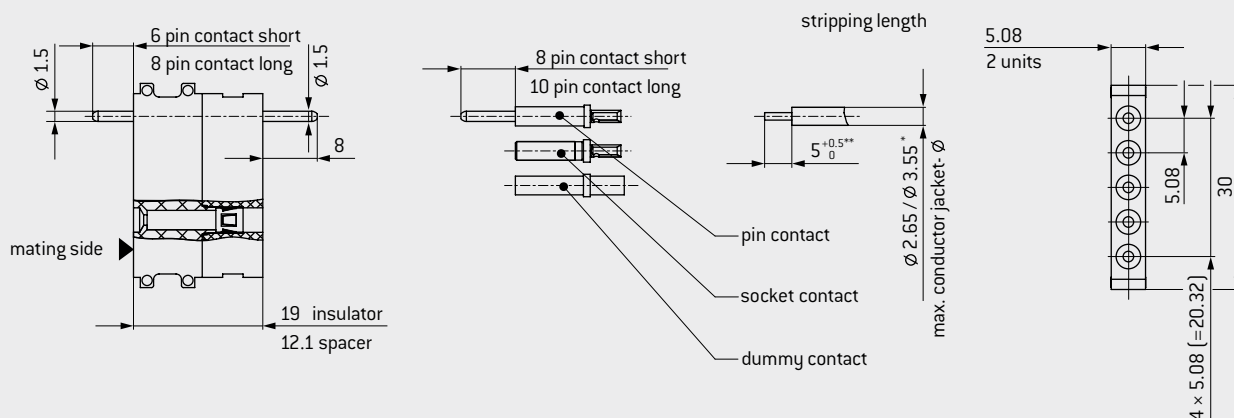
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuSn alloy
Contact finish	
Contact body	Au over NiP
Contact springs	Ag

¹Definition max. continuous current see page 125. ²IEC 60664-1:2007 (VDE 0110-1:2008) see page 119. ³See page 123.



INSULATOR PIN AND SOCKET



Module 5 contacts	Part number
Insulator	611.124.105.923.000
Spacer	611.124.111.923.000
Dummy contact	021.341.125.923.000

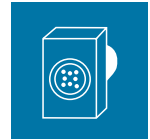
* ≤ Ø 2.65 removal possible / ≤ Ø 3.55 removal not possible.

** 5^{+0.5}: AWG 20/22; 0.5/0.38 mm²
AWG 14/18; 0.75/1.5 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.960.000.370.000	1.5	14	18	14.5	27	0.95
Pin contact long	182.961.000.370.000						
Socket contact	172.960.700.257.000						
Pin contact short	180.545.000.370.000	1/0.75	18	16	13	22.5	0.95
Pin contact long	180.575.000.370.000						
Socket contact	170.545.700.257.000						
Pin contact short	180.541.000.370.000	0.5/0.38	20/22	10	8	15	0.95
Pin contact long	180.571.000.370.000						
Socket contact	170.541.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 4 CONTACTS



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.139.000.000



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.365.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

Contact diameter: 2.41 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 33.5 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Crimp information see page [106](#).

TECHNICAL DATA

Voltage information²

Operating voltage	500 V	200 V
Rated impulse voltage	3,000 V	3,000 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	1,100 V
Test voltage	3,300 V

Mechanical data

Total mating force (average)	13 N / Module
Total sliding force (average)	12 N / Module
Contact diameter	2.41 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

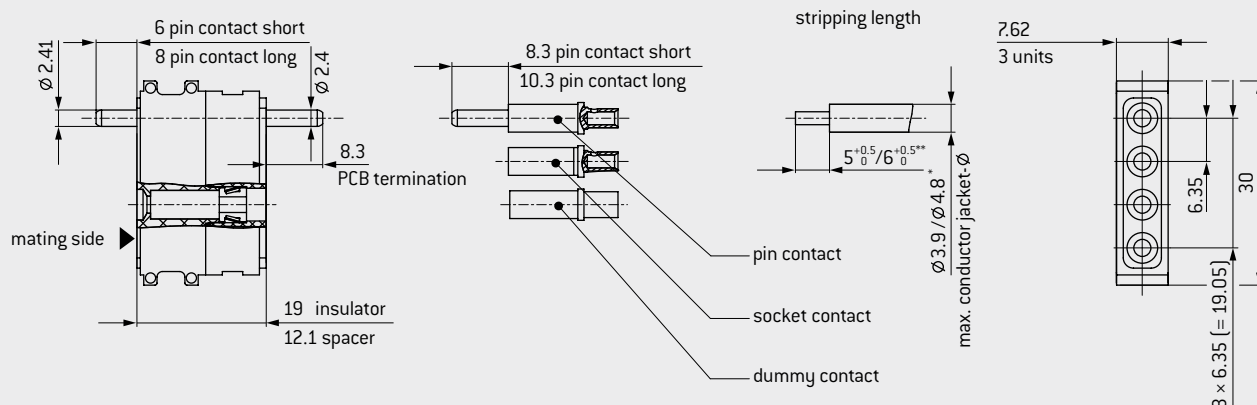
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuSn alloy
Contact finish	Au over NiP

¹ Definition max. continuous current see page [125](#). ² IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#). ³ See page [123](#).



INSULATOR PIN AND SOCKET



Module 4 contacts	Part number
Insulator	611.126.104.923.000
Spacer	611.126.111.923.000
Dummy contact	021.341.127.923.000

* ≤ Ø 3.9 removal possible / ≤ Ø 4.8 removal not possible.

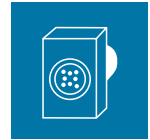
** 5^{+0.5}₀: AWG 20/22; 0.38/0.5 mm²

6^{+0.5}₀: AWG 12; 2.5 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.962.000.370.000	2.5		24	19	33.5	0.45
Pin contact long	182.963.000.370.000						
Socket contact	172.962.700.257.000						
Pin contact short	182.608.000.370.001	0.5/0.38	20/22	10.5	8	15.5	0.55
Pin contact long	182.605.000.370.001						
Socket contact	172.605.700.257.000						
Socket contact	On request		PCB termination				

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 3 CONTACTS



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.136.000.000



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.366.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

Contact diameter: 3 mm
Mating cycles: minimum 100,000
Termination cross-section: from 0.75 to 1.5 mm²

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Crimp information see page [106](#).

TECHNICAL DATA

Voltage information¹

Operating voltage	500 V	200 V
Rated impulse voltage	3,000 V	3,000 V
Degree of pollution	2	3

Voltage information acc. to MIL²

Operating voltage	1,200 V
Test voltage	3,600 V

Mechanical data

Total mating force (average)	13.5 N / Module
Total sliding force (average)	9.8 N / Module
Contact diameter	3 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

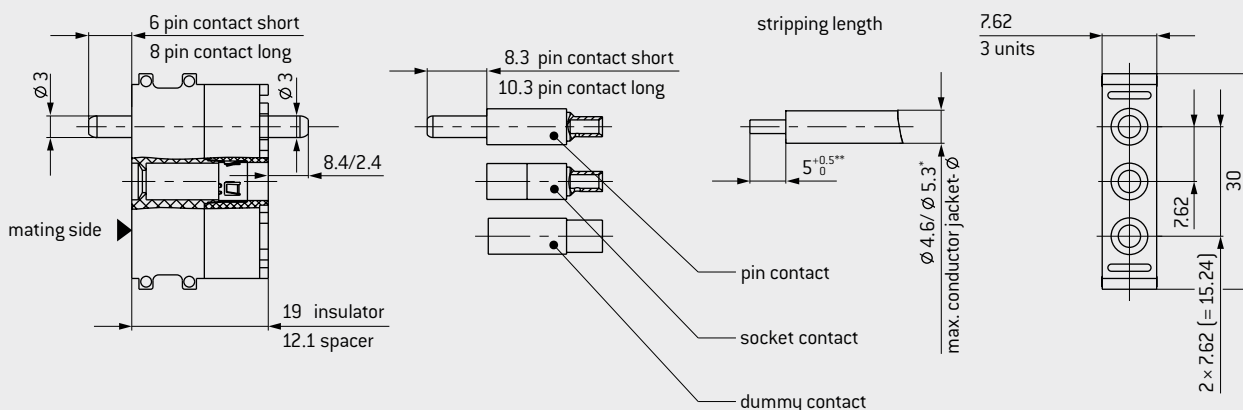
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuSn alloy
Contact finish	Au over NiP

¹ IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#). ² See page [123](#).



INSULATOR PIN AND SOCKET



Module 3 contacts	Part number
Insulator	611.127.103.923.000
Spacer	611.127.111.923.000
Dummy contact	021.341.128.923.000

* $\leq \varnothing 4.6$ removal possible / $\leq \varnothing 5.3$ removal not possible.

** $5^{+0.5}$: AWG 14–18 / 0.75–1.5 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.582.000.370.000	1.5	14	19	16	28	1
Pin contact long	On request						
Socket contact	172.582.700.257.000						
Pin contact short	On request	1 / 0.75	18	16.5	14	24.5	1
Pin contact long	182.585.000.370.000						
Socket contact	172.584.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 3 CONTACTS



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.136.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

Contact diameter: 3 mm
Mating cycles: minimum 100,000
Current-carrying capacity¹: 28 A

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Crimp information see page [106](#).

TECHNICAL DATA

Voltage information²

Operating voltage	2,500 V	1,000 V
Rated impulse voltage	10,000 V	8,000 V
Degree of pollution	2	3

Voltage information acc. to MIL³

Operating voltage	2,500 V
Test voltage	7,500 V

Mechanical data

Total mating force (average)	13.5 N / Module
Total sliding force (average)	9.8 N / Module
Contact diameter	3 mm
Operating temperature	-40 °C to +125 °C acc. to UL 1977, Second Edition, max. 75 °C
Mating cycles	minimum 100,000

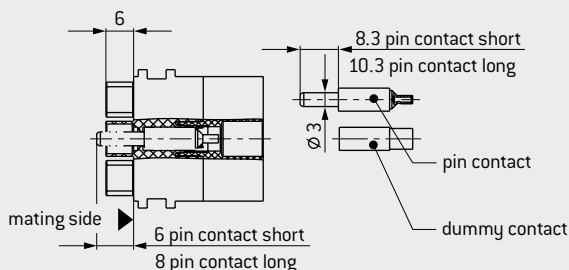
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuSn alloy
Contact finish	Au over NiP

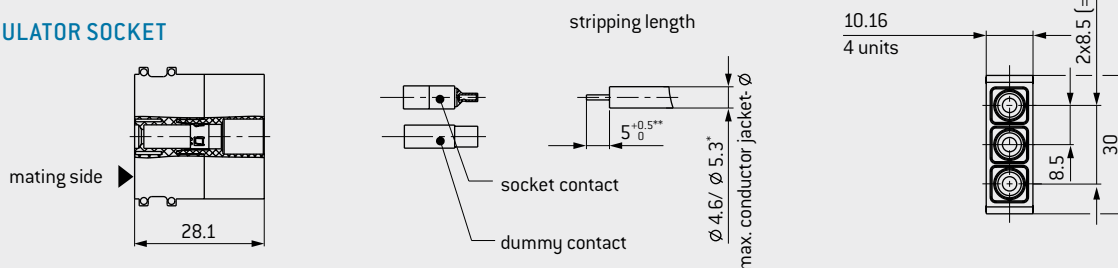
¹ Definition max. continuous current see page [125](#). ² IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#). ³ See page [123](#).



INSULATOR PIN



INSULATOR SOCKET



Module 3 contacts	Part number
Insulator socket	610.162.103.923.000
Insulator pin	611.162.103.923.000
Dummy contact	021.341.128.923.000

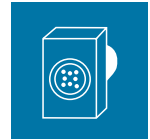
* ≤ Ø 4.6 removal possible / ≤ Ø 5.3 removal not possible.

** 5₀^{+0.5}; AWG 14–18/0.75–1.5 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.582.000.370.000	1.5	14	19	16	28	1
Pin contact long	On request						
Socket contact	172.582.700.257.000						
Pin contact short	On request	1/0.75	18	16.5	14	24.5	1
Pin contact long	182.585.000.370.000						
Socket contact	172.584.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 4 CONTACTS



Removal of the already assembled contact (incl. cable).
PART NUMBER: 087.170.138.000.000



Removal of unassembled contacts, or contacts from which the cable has been removed.
PART NUMBER: 087.611.001.001.000

For an overview of all tools please see from page [113](#).

Contact diameter: 1.5 mm
Mating cycles: minimum 100,000
Operating voltage: 2,500 V

TECHNICAL NOTES

- The current load information is valid for single contacts or fully equipped modules. For use in connector systems, the load should be reduced according to VDE 0298-4:2013 (see page [119](#)).
- Crimp information see page [106](#).

TECHNICAL DATA

Voltage information¹

Operating voltage	2,500 V	1,000 V
Rated impulse voltage	10,000 V	8,000 V
Degree of pollution	2	3

Voltage information acc. to MIL²

Operating voltage	2,500 V
Test voltage	7,500 V

Mechanical data

Total mating force (average)	12 N / Module
Total sliding force (average)	9.2 N / Module
Contact diameter	1.5 mm
Operating temperature	-40 °C to +125 °C
Mating cycles	minimum 100,000

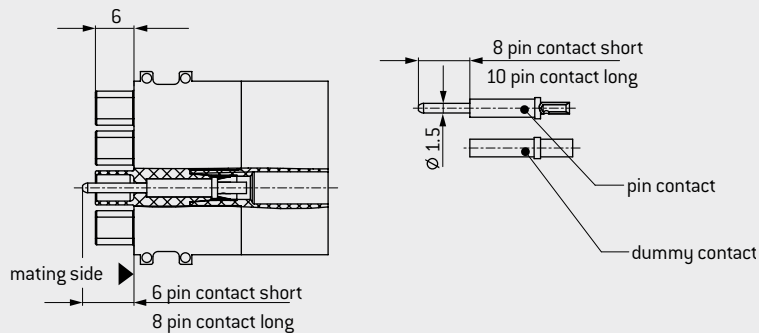
Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Contact body	Cu alloy
Contact spring	CuSn alloy
Contact finish	
Contact body	Au over NiP
Contact spring	Ag

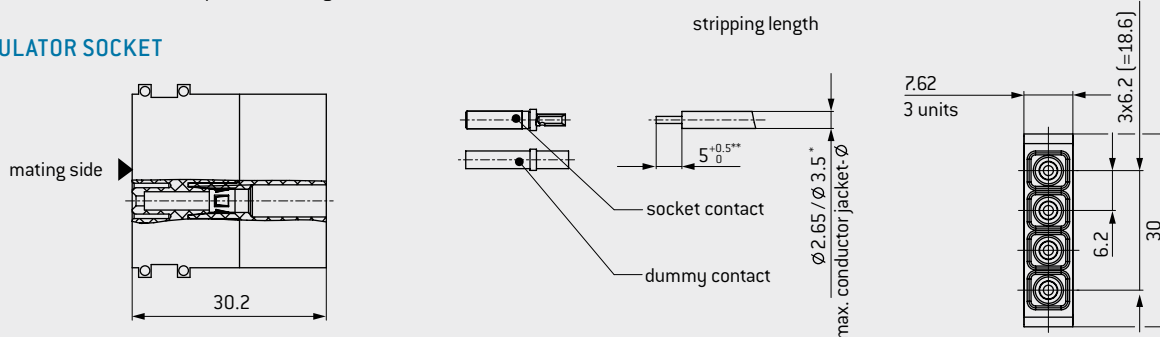
¹ IEC 60664-1:2007 (VDE 0110-1:2008) see page [119](#), ² See page [123](#).



INSULATOR PIN



INSULATOR SOCKET



Module 4 contacts	Part number
Insulator socket	610.159.104.923.000
Insulator pin	611.159.104.923.000
Dummy contact	021.341.125.923.000

* ≤ Ø 2.65 removal possible / ≤ Ø 3.5 removal not possible.

** 5^{+0.5}₀ : AWG 20/22; 0.5/0.38 mm²
AWG 14/18; 0.75/1.5 mm²

Description	Part number	Conductor cross-section mm ²	Termination AWG	Nominal current ¹		Max. continuous current ² Single contact A	Contact resistance mΩ
				Single contact A	Module fully equipped A		
Pin contact short	182.960.000.357.000	1.5	14	18	14.5	27	0.95
Pin contact long	182.961.000.357.000						
Socket contact	172.960.700.257.000	1/0.75	18	16	13	22.5	0.95
Pin contact short	180.545.000.357.000						
Pin contact long	180.575.000.357.000						
Socket contact	170.545.700.257.000	0.5/0.38	20/22	10	8	15	0.95
Pin contact short	180.541.000.357.000						
Pin contact long	180.571.000.357.000						
Socket contact	170.541.700.257.000						

¹ Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K. ² Definition max. continuous current see page 125.

MODULE 4 CONTACTS FOR 50 Ω



Mating cycles: minimum 60,000
 Frequency range¹: 0–1.3 GHz

TECHNICAL NOTES

- Crimp information see page 106.

TECHNICAL DATA

Frequency range¹ 0–1.3 GHz¹
 Insulation resistance > 100 GΩ

Voltage information acc. to MIL²

Operating voltage 350 V
 Test voltage 1,050 V

Mechanical data

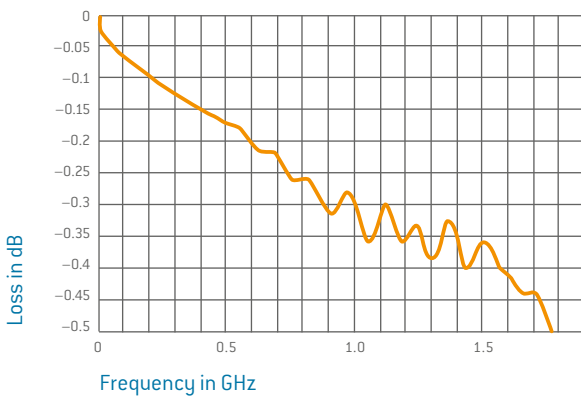
Total mating force (average) 17.8 N / Module
 Total sliding force (average) 15.3 N / Module
 Operating temperature –40 °C to +125 °C
 Mating cycles minimum 60,000

Materials

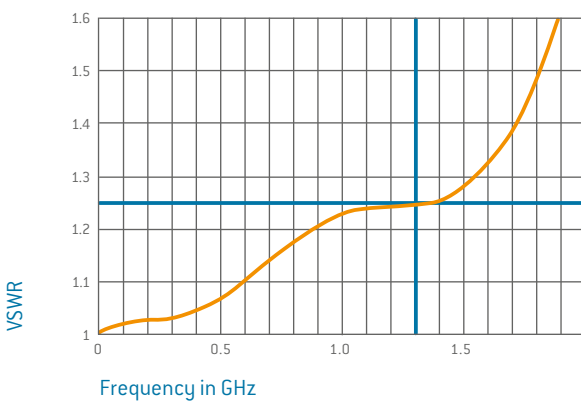
Insulator Thermoplastic fiber glass reinforced acc. to UL-94
 Contact body / insulator Cu alloy / PTFE
 Contact spring CuSn / CuBe alloy
 Contact finish Au over CuSnZn

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

Insertion loss



Voltage standing-wave ratio VSWR



¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.

REMOVAL TOOL I (STRAIGHT)



Removal of the already assembled contact (incl. cable).

PART NUMBER: 087.170.139.000.000

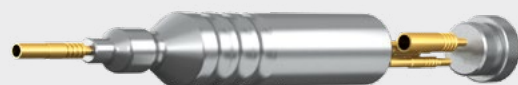
REMOVAL TOOL I (ANGLED)



Removal of the already assembled contact (incl. cable).

PART NUMBER: 087.170.365.000.000

REMOVAL TOOL II



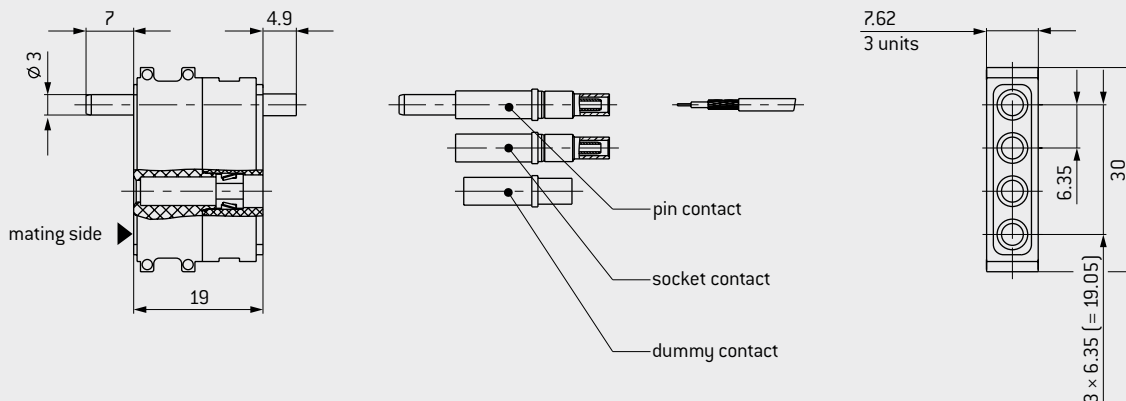
Removal of the not assembled contact (with cable – wire may have removed).

PART NUMBER: 087.611.001.001.000

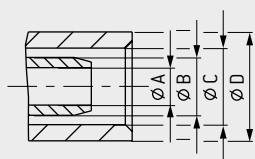
For an overview of all tools please see from page 113.



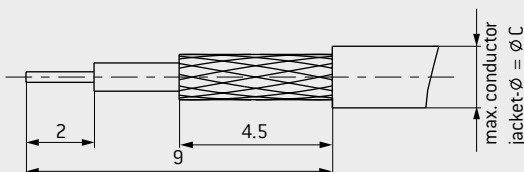
INSULATOR FOR PIN AND SOCKET



CABLE TERMINATION



RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH

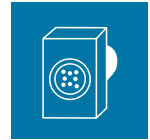


Module 4 contacts	Part number
Insulator	611.149.104.923.000
Dummy contact	021.341.127.923.000

Description	Part number	Characteristic impedance Ω	Frequency range GHz	Cable ¹	A	B	C	D	Part number crimp inserts
Pin contact	122.120.001.257.000	50	1.3	RG 178/RG 196	1.1	1.7	2.25	3.2	082.000.039.101.000
Pin contact	122.120.003.257.000		0.8	RG 174/RG 188/ RG 316 (75 Ω: RG 179, RG 187)	1.75	2.7	3.2	3.8	082.000.039.102.000
Pin contact	122.120.011.257.000		0.85	G 02232 (H+S) ²	1.75	2.7	3.5	4.3	082.000.039.103.000
Socket contact	122.120.002.257.000	50	1.3	RG 178/RG 196	1.1	1.7	2.25	3.2	082.000.039.101.000
Socket contact	122.120.004.257.000		0.8	RG 174/RG 188/ RG 316 (75 Ω: RG 179, RG 187)	1.75	2.7	3.2	3.8	082.000.039.102.000
Socket contact	122.120.012.257.000		0.85	G 02232 (H+S) ²	1.75	2.7	3.5	4.3	082.000.039.103.000
Crimping tool for shielding sleeve	080.000.039.000.000								

¹Special lines and alternative models on request. ²Removal tool II is not possible due to the conductor diameter.

MODULE 2 CONTACTS FOR 50 Ω AND HIGH VOLTAGE



Mating cycles: minimum 100,000
Frequency range¹: 0–2.8 GHz

TECHNICAL NOTES

- Crimp information see page [106](#).

TECHNICAL DATA

Voltage information

Frequency range¹ 0–2.8 GHz
Insulation resistance > 100 GΩ

Voltage information acc. to MIL²

Operating voltage 850 V
Test voltage 2,600 V

Mechanical data

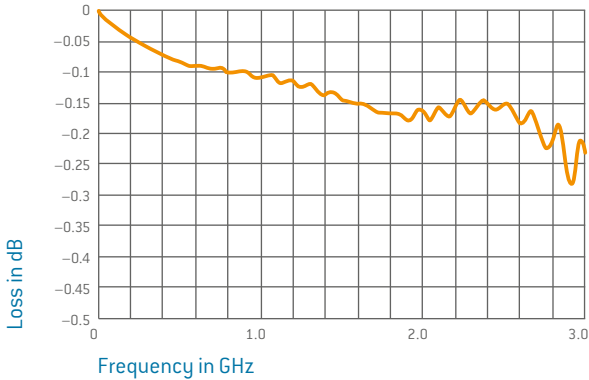
Total mating force (average) 13.9 N / Module
Total sliding force (average) 9.9 N / Module
Operating temperature –40 °C to +125 °C
Mating cycles minimum 100,000

Materials

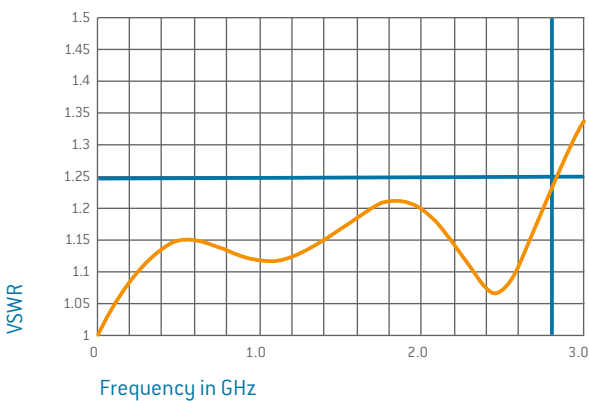
Insulator Thermoplastic fiber glass reinforced acc. to UL-94
Contact body Cu alloy / PTFE
Contact spring CuSn / CuBe alloy
Contact finish Au over CuSnZn

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

Insertion loss



Voltage standing-wave ratio VSWR



REMOVAL TOOL



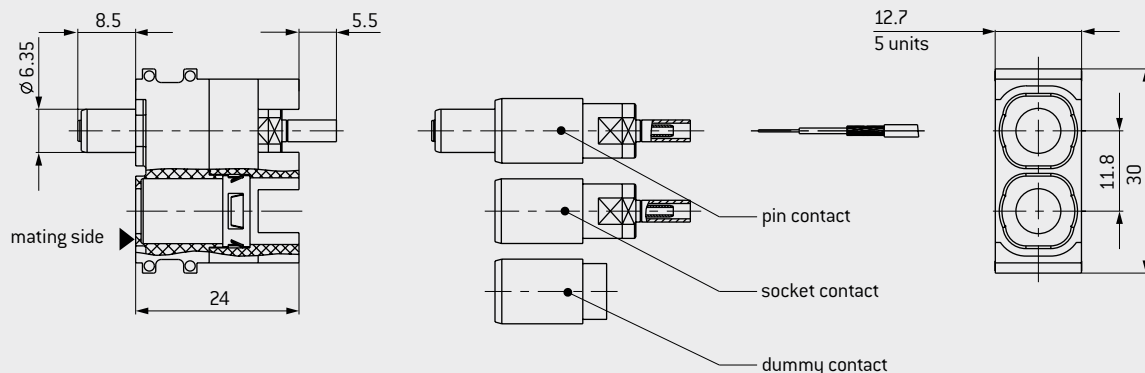
PART NUMBER: 087.170.391.000.000

For an overview of all tools please see from page [113](#).

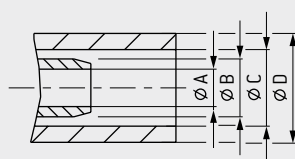
¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page [123](#).



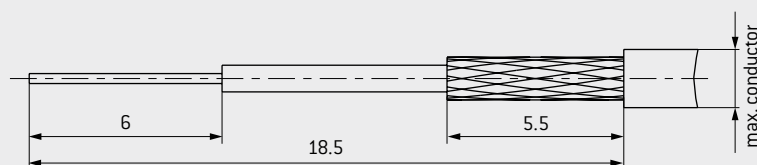
INSULATOR FOR PIN AND SOCKET



CABLE TERMINATION



RECOMMENDED CABLE CONSTRUCTION / STRIPPING LENGTH

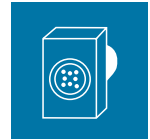


Module 2 contacts	Part number
Insulator	611.155.102.923.000
Dummy contact	021.341.179.923.000

Description	Part number	Characteristic impedance Ω	Frequency range GHz	Cable ¹	A	B	C	D	Part number crimp inserts
Pin contact	122.126.001.270.000	50	0.3	RG 178/RG 196	1.1	1.7	2.25	3.2	082.000.039.101.000
Pin contact	122.126.003.270.000		2.0	RG 174/RG 188/RG 316	1.75	2.7	3.2	3.8	082.000.039.102.000
Pin contact	122.126.013.270.000		2.8	RG 223	3.15	4.5	5.9	6.75	082.000.039.108.000
Pin contact	122.126.007.270.000		2.6	RG 58	3.15	4.5	5.2	6.15	082.000.039.106.000
Socket contact	122.126.002.270.000	50	0.3	RG 178/RG 196	1.1	1.7	2.25	3.2	082.000.039.101.000
Socket contact	122.126.004.270.000		2.0	RG 174/RG 188/RG 316	1.75	2.7	3.2	3.8	082.000.039.102.000
Socket contact	122.126.014.270.000		2.8	RG 223	3.15	4.5	5.9	6.75	082.000.039.108.000
Socket contact	122.126.008.270.000		2.6	RG 58	3.15	4.5	5.2	6.15	082.000.039.106.000
Crimping tool for shielding sleeve	080.000.039.000.000								

¹Special lines on request.

MODULE 10 CONTACTS FOR 50 Ω COMMON SHIELD



Mating cycles: minimum 40,000
Frequency range¹: 0–1.3 GHz

TECHNICAL NOTES

- Crimp information see page 106.

TECHNICAL DATA

Frequency range¹ 0–1.3 GHz
Insulation resistance > 500 GΩ

Voltage information acc. to MIL²

Rated voltage 175 V
Test voltage 525 V

Mechanical data

Mating force (average) 8.6 N / Module
Demating force (average) 8.3 N / Module
Operating temperature –40 °C to +125 °C
Mating cycles minimum 40,000

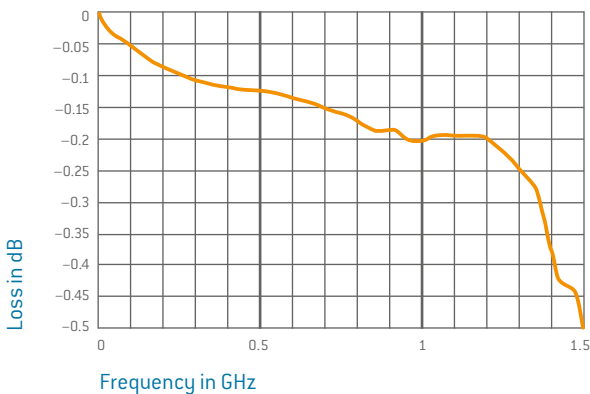
Materials

Carrier CuZn alloy
Carrier finish NiP
Contact CuSn alloy
Contact finish Au over NiP

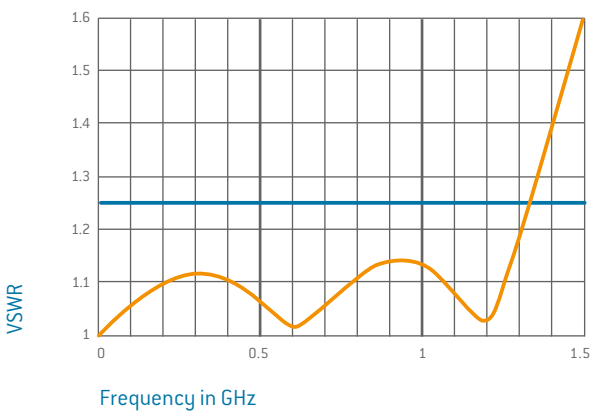
Contacts are press-fit into insulation body during manufacturing, so they cannot be removed.
Connector assembly instructions available on request.
Number 010.010.000.000.092

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

Insertion loss



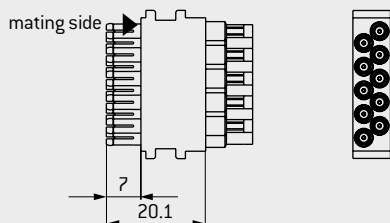
Voltage standing-wave ratio VSWR



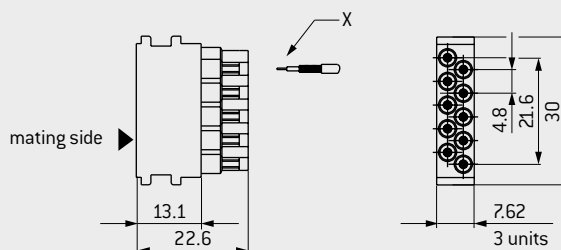
¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.



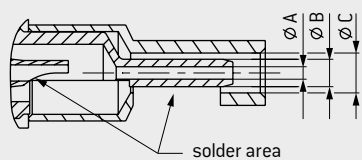
INSULATOR FOR PIN



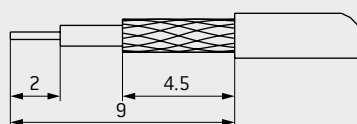
INSULATOR FOR SOCKET



CABLE TERMINATION/DETAIL X



RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH



Description	Part number	Characteristic impedance	Frequency range	Cable	A	B	C
		Ω	GHz				
Socket configuration	610.168.010.270.000	50	–	Micro Coax	0.5	1.1	1.6
Pin configuration	611.168.010.270.000		–				
Socket configuration	610.168.010.270.001		1.3	RG 178/RG 196	1.1	1.7	2.25
Pin configuration	611.168.010.270.001		1.3				

MODULE 8 CONTACTS FOR 50 Ω COMMON SHIELD



Mating cycles: minimum 40,000
Frequency range¹: 0–1.3 GHz

TECHNICAL NOTES

- Crimp information see page 106.

TECHNICAL DATA

Frequency range¹ 0–1.3 GHz
Insulation resistance > 500 GΩ

Voltage information acc. to MIL²

Rated voltage 175 V
Test voltage 525 V

Mechanical data

Mating force (average) 6.7 N / Module
Demating force (average) 6.5 N / Module
Operating temperature –40 °C to +125 °C
Mating cycles minimum 40,000

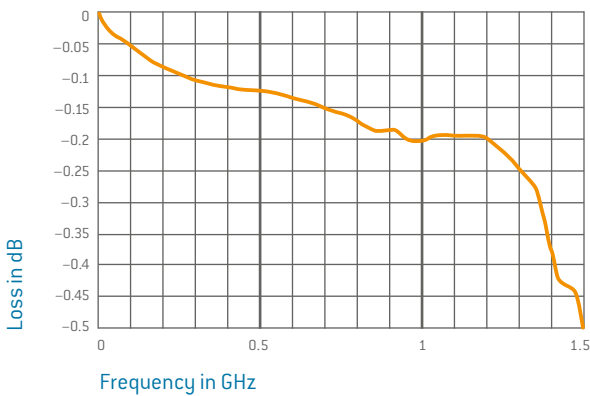
Materials

Carrier CuZn alloy
Carrier finish NiP
Contact CuSn alloy
Contact finish Au over NiP

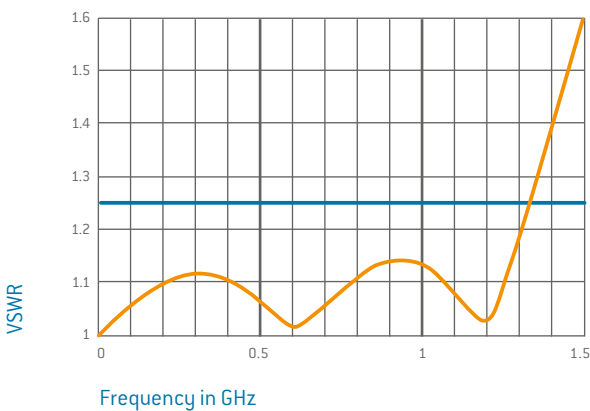
Contacts are press-fit into insulation body during manufacturing, so they cannot be removed.
Connector assembly instructions available on request.
Number 010.010.000.000.092

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

Insertion loss



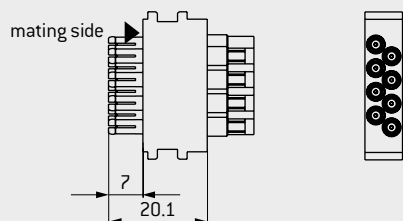
Voltage standing-wave ratio VSWR



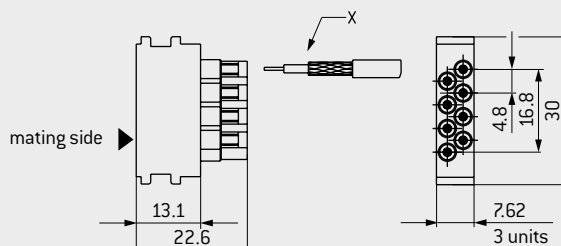
¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.



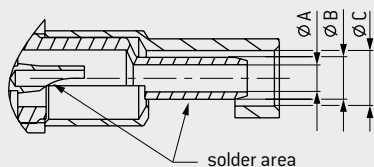
INSULATOR FOR PIN



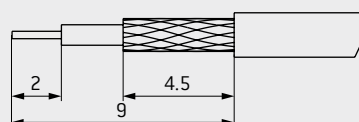
INSULATOR FOR SOCKET



CABLE TERMINATION/DETAIL X

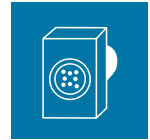


RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH



Description	Part number	Characteristic impedance	Frequency range	Cable	A	B	C
Socket configuration	610.168.008.270.001	50 Ω	1.3 GHz	RG 178/RG 196	1.1	1.7	2.25
Pin configuration	611.168.008.270.001		1.3 GHz				

MODULE 6 CONTACTS FOR 50 Ω COMMON SHIELD



Mating cycles: minimum 40,000
Frequency range¹: 0–1.3 GHz

TECHNICAL NOTES

- Crimp information see page 106.

TECHNICAL DATA

Frequency range¹ 0–1.3 GHz
Insulation resistance > 500 GΩ

Voltage information acc. to MIL²

Rated voltage 175 V
Test voltage 525 V

Mechanical data

Mating force (average) 5.1 N / Module
Demating force (average) 5 N / Module
Operating temperature –40 °C to +125 °C
Mating cycles minimum 40,000

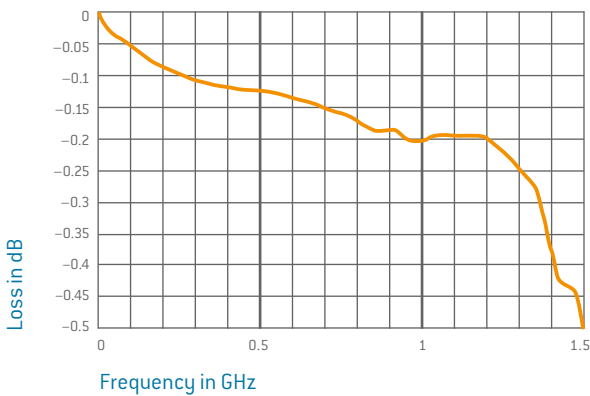
Materials

Carrier CuZn alloy
Carrier finish NiP
Contact CuSn alloy
Contact finish Au over NiP

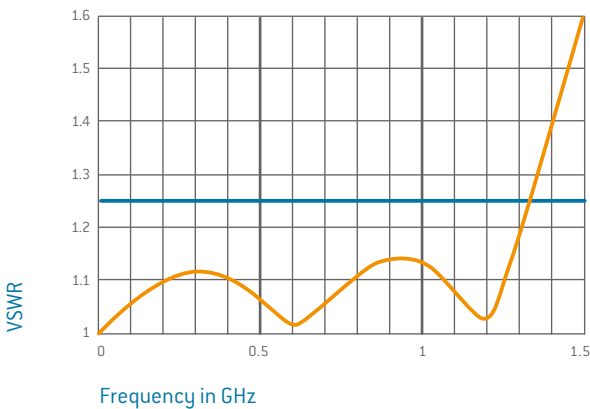
Contacts are press-fit into insulation body during manufacturing, so they cannot be removed.
Connector assembly instructions available on request.
Number 010.010.000.000.092

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

Insertion loss



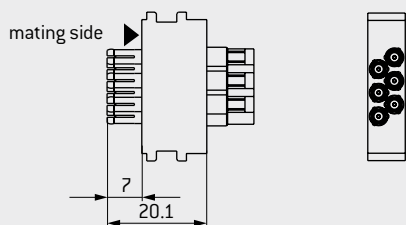
Voltage standing-wave ratio VSWR



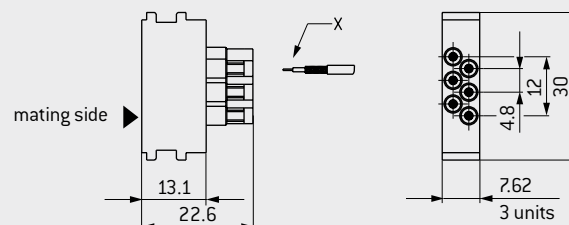
¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.



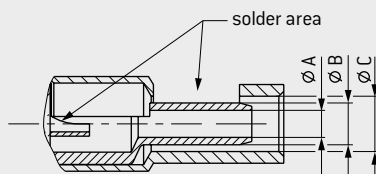
INSULATOR FOR PIN



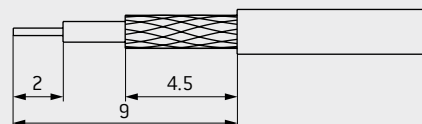
INSULATOR FOR SOCKET



CABLE TERMINATION/DETAIL X

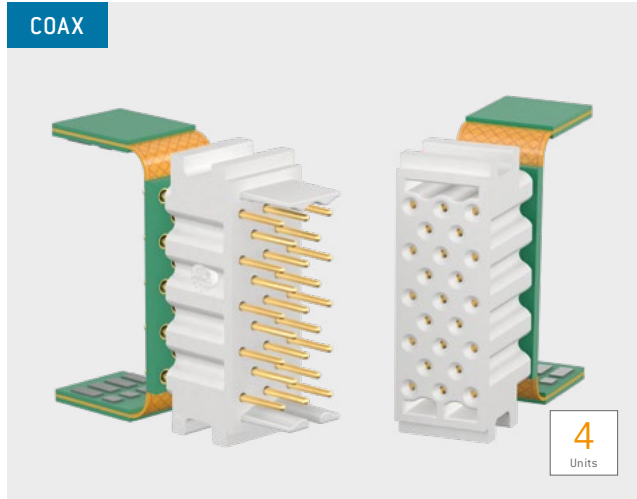
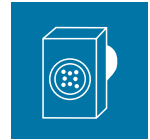


RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH



Description	Part number	Characteristic impedance	Frequency range	Cable	A	B	C
		Ω	GHz				
Socket configuration	610.168.006.270.000	50	–	Micro Coax	0.5	1.1	1.6
Pin configuration	611.168.006.270.000		–				
Socket configuration	610.168.006.270.001		1.3	RG 178 / RG 196	1.1	1.7	2.25
Pin configuration	611.168.006.270.001		1.3				
Socket configuration	610.168.006.270.002		0.8	RG 316	1.75	2.7	3.2
Pin configuration	611.168.006.270.002		0.8				

8 CHANNEL MODUL (COAX OPTION) 50 Ω



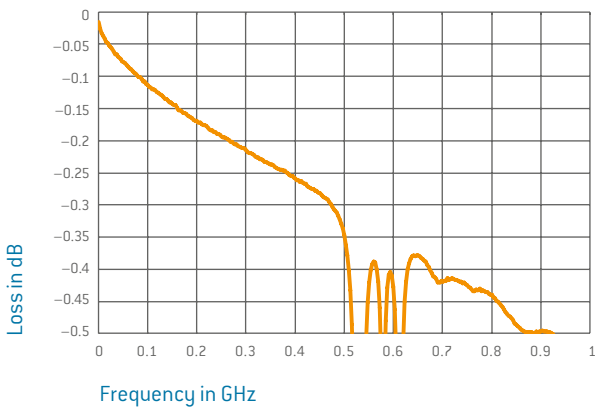
Mating cycles: minimum 100,000
Frequency range¹: 0–350 MHz

TECHNICAL DATA

Frequency range ¹	0–350 MHz	
Insulation resistance	> 0.5 GΩ	
Voltage information acc. to MIL²		
Operating voltage	32 V	80 V
Rated impulse voltage	1,500 V	1,500 V
Degree of pollution	2	3
Rated voltage	425 V	
Test voltage	1,275 V	

HIGH FREQUENCY CHARACTERISTICS FOR 75 Ω COAX CONTACTS¹

Insertion loss



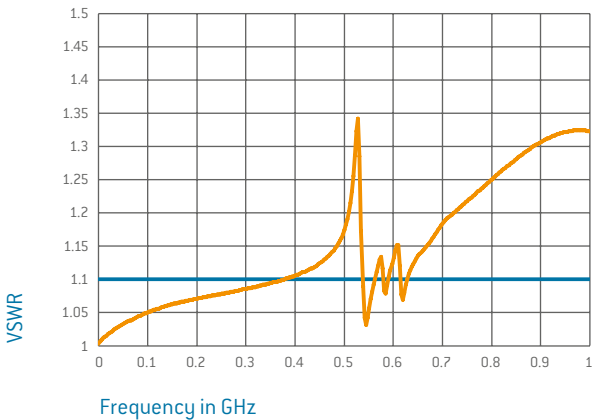
Mechanical data

Mating force (average)	30 N / Module
Demating force (average)	21 N / Module
Contact diameter	0.76 mm
Operating temperature	–40 °C to +100 °C
Mating cycles	minimum 100,000

Materials

Insulator	LCP
Contact body	Cu alloy
Contact spring	CuBe alloy
Contact processing	Au over NiP
Contact finish	Au over CuSnZn

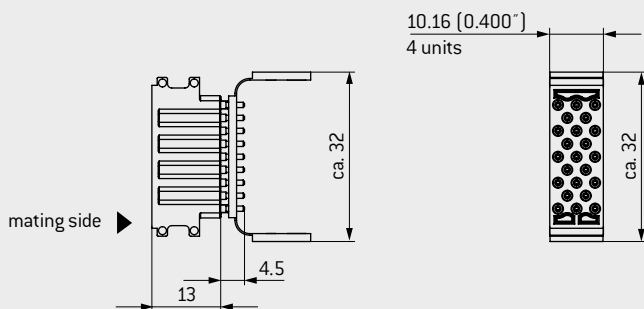
Voltage standing-wave ratio VSWR



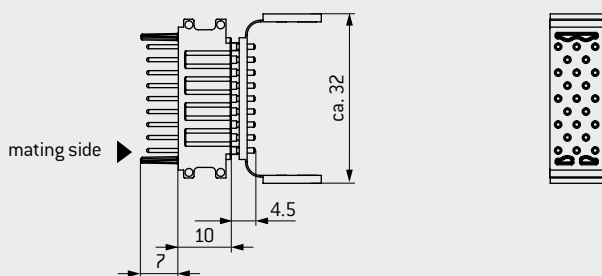
¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.



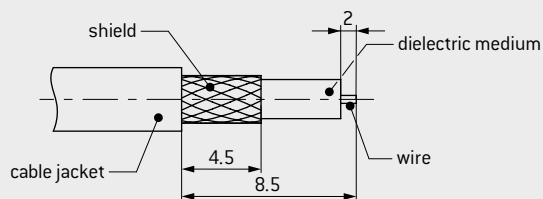
INSULATOR FOR PIN



INSULATOR FOR SOCKET



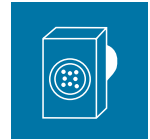
RECOMMENDED CABLE CONSTRUCTION / STRIPPING LENGTH



Description	Part number	Characteristic impedance	Frequency range	Cable
		Ω	MHz	
8-position pin insulator with contacts and PCB terminated	611.175.008.935.000	50	350	Micro-coax, recommend RG 178
8-position socket insulator with contacts and PCB terminated	610.175.008.935.000	50	350	Micro-coax, recommend RG 178



MINI-COAX CONTACT 50 Ω



The Mini-Coax Contact is designed to be implemented into custom insulation body solutions, where there are low cycle requirements, but high contact density and small space requirements.



Mating cycles: minimum 5,000
Frequency range¹: 0–1.9 GHz

TECHNICAL DATA

Frequency range¹ 0–1.9 GHz
Insulation resistance > 100 GΩ

Voltage information

Rated voltage 250 V
Rated test voltage 750 V

Mechanical data

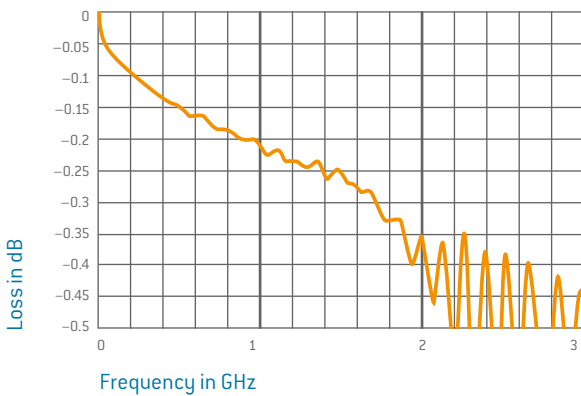
Total Mating force (average) 1.6 N/Contact
Total sliding force (average) 1.4 N/Contact
Operating temperature –40 °C to +125 °C
Mating cycles minimum 5,000

Materials

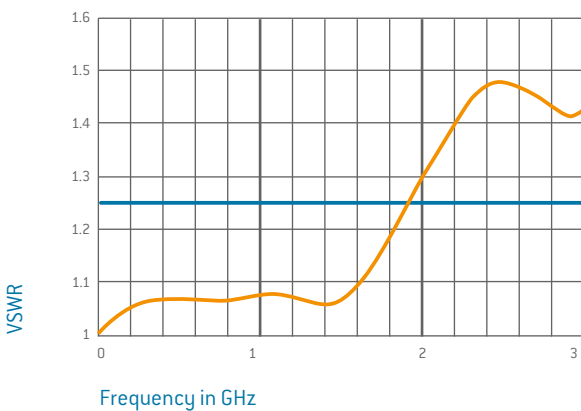
Contact CuSn alloy
Contact finish Au over NiP

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS¹

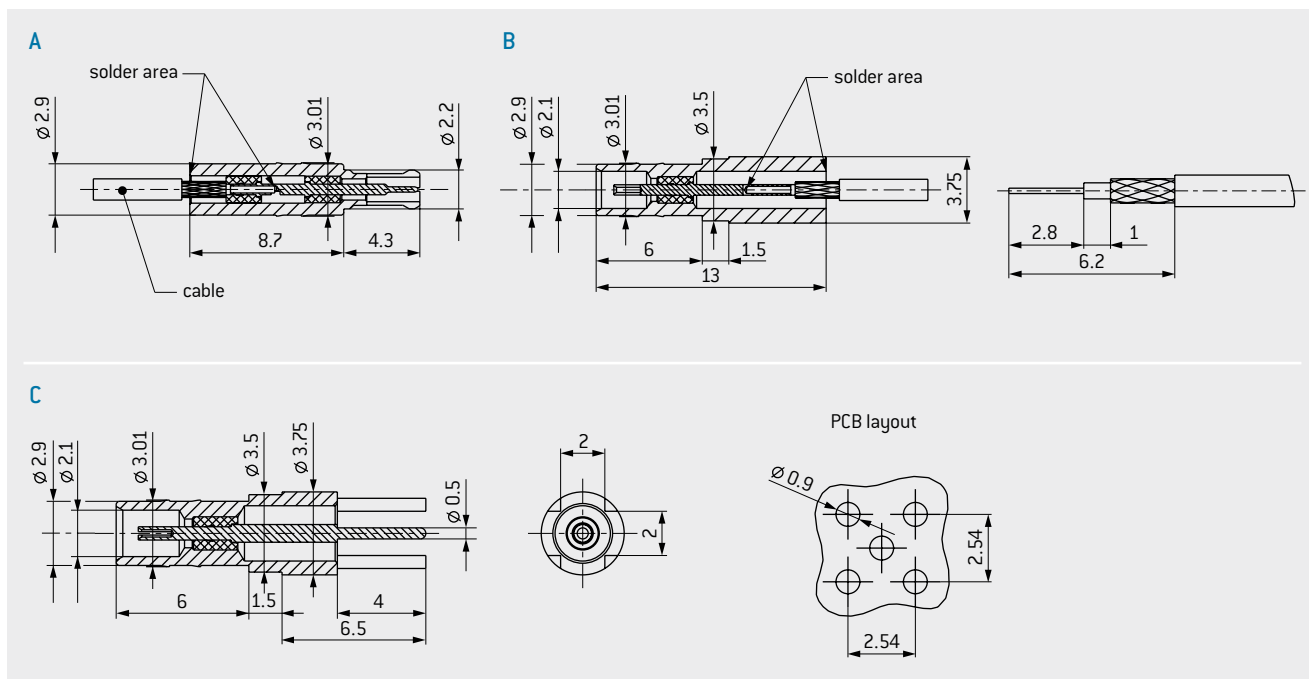
Insertion loss



Voltage standing-wave ratio VSWR

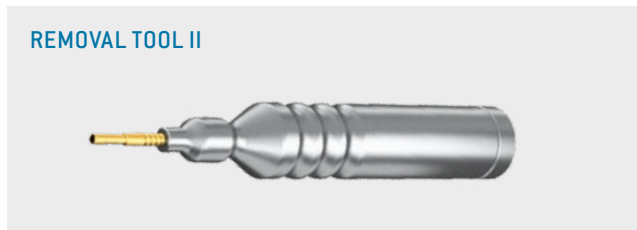
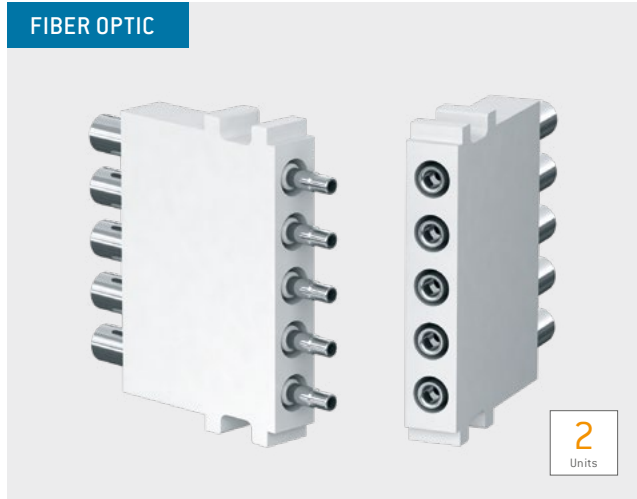
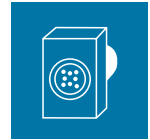


¹ Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 2 × 5 cm conductor length. ² See from page 123.



Description	Part number	Characteristic impedance	Frequency range	Cable
		Ω	GHz	
Pin contact to cable [A]	122.141.013.270.000	50	1.9	RG 178
Socket contact to cable [B]	122.141.014.270.000	50	1.9	RG 178
Pin contact to cable [A]	122.141.013.270.000	50	1.25	Micro-coax
Socket contact to cable [B]	122.141.014.270.000	50	1.25	Micro-coax
Socket contact to PCB [C]	122.142.002.270.000	50	1.9	

MODULE 5 CONTACTS FOR PLASTIC FIBER POF



Removal from front, cutting-off not necessary.

PART NUMBER: 087.611.001.002.000

For an overview of all tools please see from page [113](#).

Ferrule

Mating cycles: minimum 40,000

Non-magnetic on request

TECHNICAL NOTES

- Conditional with the function, the contacts are pre-stressed in the mated state. This pre-stressing must be maintained by the frame via a holding device.

TECHNICAL DATA

Mechanical data

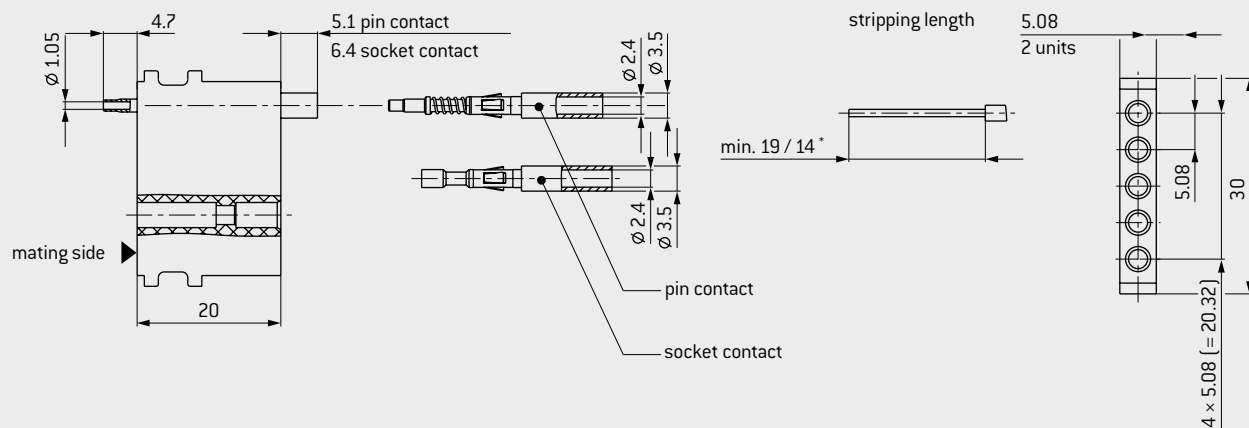
POF (Polymer Optical Fiber)	1 mm
Outer diameter	2.2 mm–2.3 mm
Fiber fastening	Crimp
Insertion loss	
Typical	1.5 dB at 670 nm
During life-time	< 2 dB at 670 nm
Total mating force (average)	< 17.5 N
Operating temperature (depending on fiber)	
Standard fiber	–40 °C to +85 °C
High temperature fiber	–40 °C to +115 °C
Mating cycles	minimum 40,000

Materials

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Fiber optic contact	Cu alloy
Type of fiber	Plastic fiber 980/1.000 (POF)



INSULATOR PIN AND SOCKET

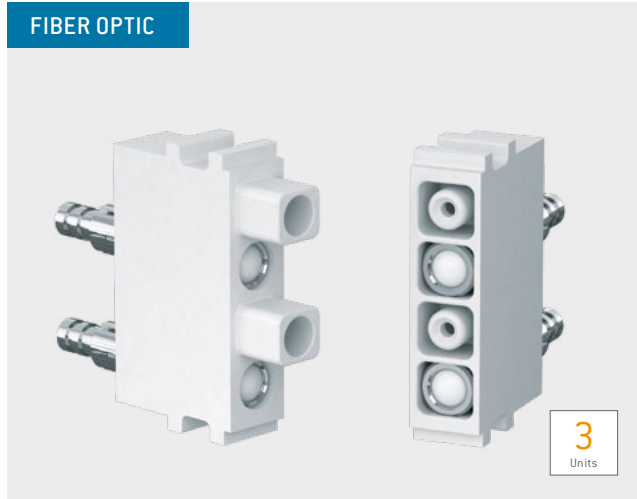
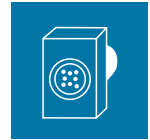


* min. 19 pin contact / min. 14 socket contact

Module 5 contacts	Part number
Insulator	611.163.105.923.000

Description	Part number
Socket contact 980 / 1,000 µm	196.503.001.901.000
Pin contact 980 / 1,000 µm	196.503.002.901.000
Processing set (multi-purpose and crimping tool)	080.000.048.000.000
Cutting/stripping universal pliers	080.000.048.100.000
Crimping tool	080.000.048.200.000

MODULE 2 CONTACTS FOR PLASTIC OPTICAL FIBER (POF)



Lense with HFBR-Ferrule Mating cycles: infinite

TECHNICAL DATA

Mechanical data

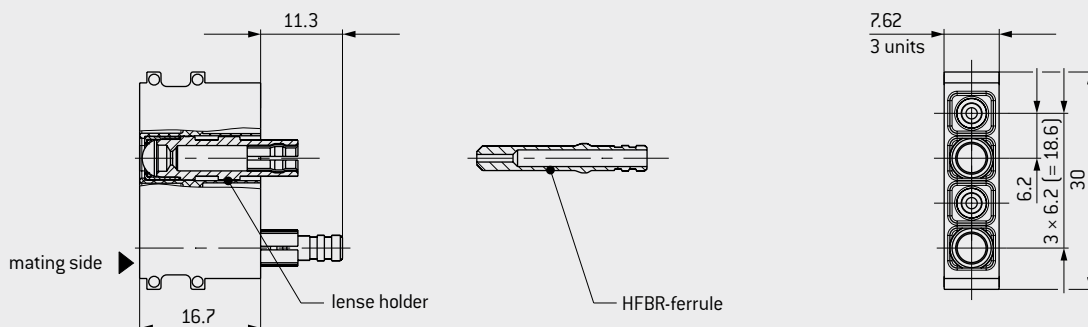
POF (Polymer Optical Fiber)	1 mm
Outer diameter	2.2 mm–2.3 mm
Fiber fastening	Crimp
Attenuation	< 4 dB with with polished fiber
Beam expansion	> 3 mm
Insertion loss	
Typical	1.5 dB at 670 nm
During life-time	< 2 dB at 670 nm
Total mating force (average)	< 0 N
Operating temperature (depending on fiber)	
Standard fiber	–40 °C to +85 °C
High temperature fiber	–40 °C to +115 °C
Mating cycles	infinite

Materials

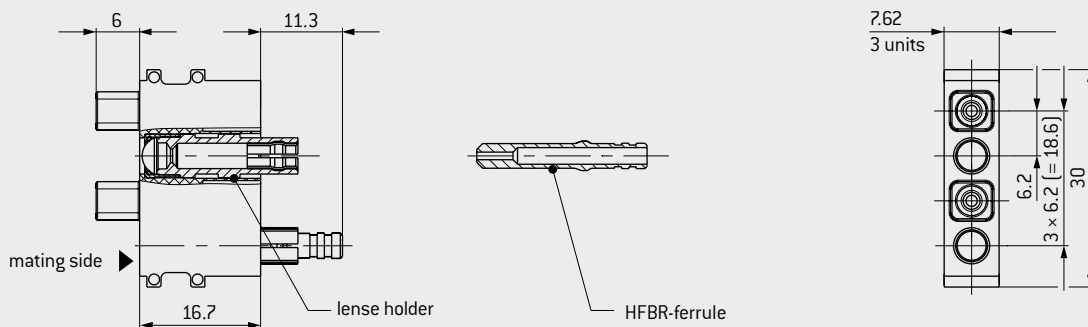
Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
Fiber optic contact	Cu alloy
Type of fiber	Plastic fiber 980/1,000 (POF)



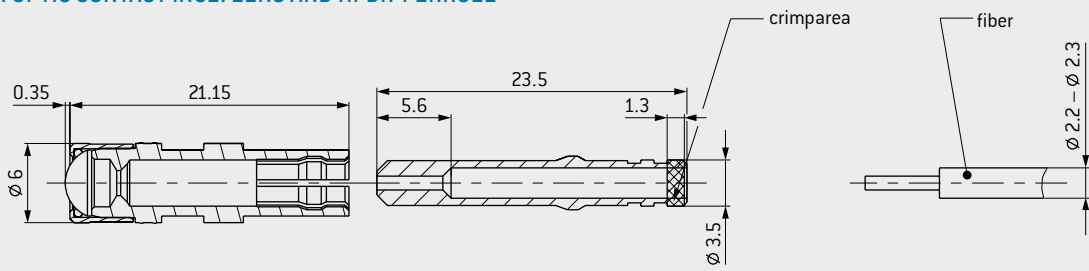
INSULATOR SOCKET



INSULATOR PIN



FIBER OPTIC CONTACT INCL. LENS AND HFBR-FERRULE



Description	Part number
2-Position pin side insulator with contacts	611.174.102.923.000
2-Position socket side insulator with contacts	610.174.102.923.000
Assembling set for fiber optic (consists of:)	080.000.052.000.000
Cutting tool	080.000.052.100.000
Reserve cutter	080.000.052.101.000
Crimp tool	080.000.052.200.000
Removal tool (ferrule)	087.656.509.010.000
POF-polisher	598.503.003.001.000

BLANK MODULES



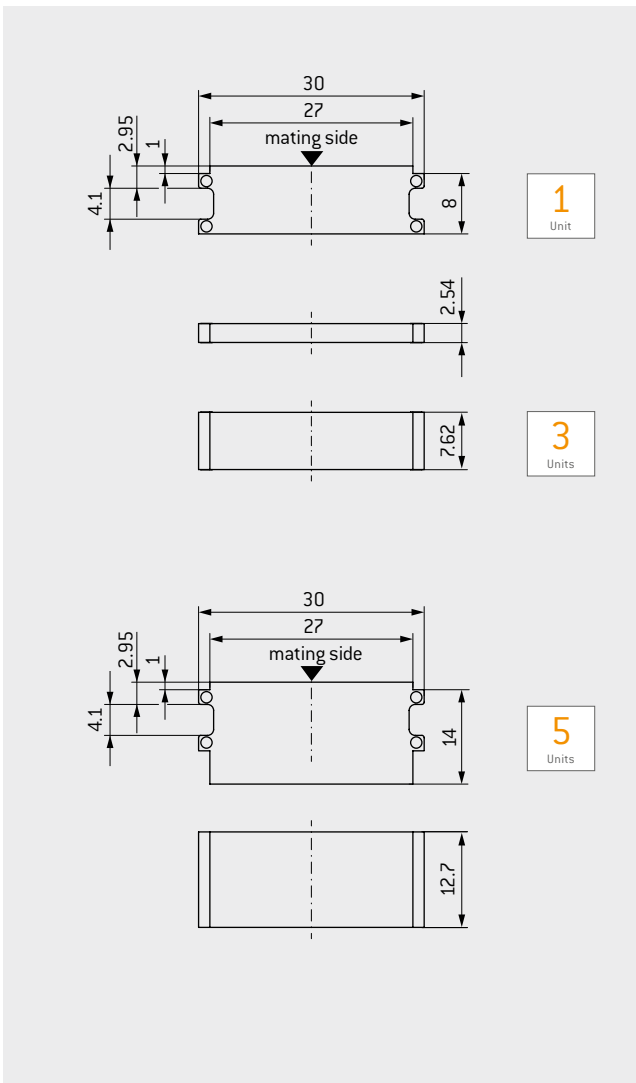
BLANK MODULES



These blank modules are used to fill in spaces not occupied by contact modules. It is important to completely fill each frame with the maximum allowable modules to prevent sliding of the modules and ensure proper mating.

TECHNICAL DATA

Insulator Thermoplastic
fiber glass reinforced
acc. to UL-94

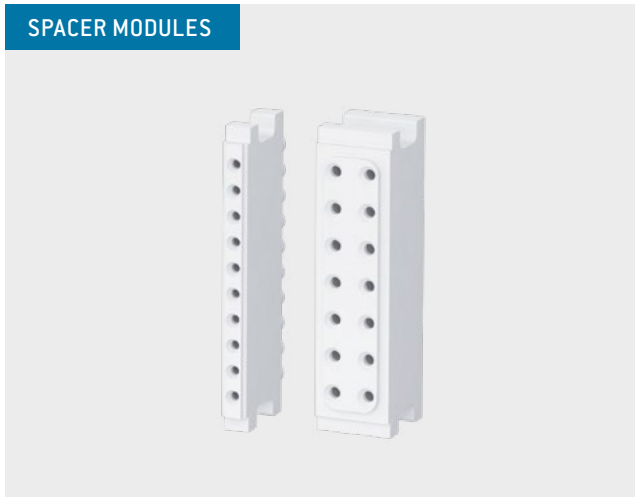


Units	Part number
1	611.122.113.923.000
3	611.130.113.923.000
5	611.128.113.923.000

SPACER MODULES



SPACER MODULES



Cannot be equipped with contacts. Spacer modules are found on the same page as their respective contact module counterparts (e.g. the 14-pos spacer module is found on the same page as the 14-pos contact module).

Supplied without contact arrangements and enable blind mating despite differing contact arrangements. This is the case, for example, with test lanes with various testing scenarios. This means that various tasks can be carried out with one contact arrangement.

TECHNICAL DATA

Insulator	Thermoplastic fiber glass reinforced acc. to UL-94
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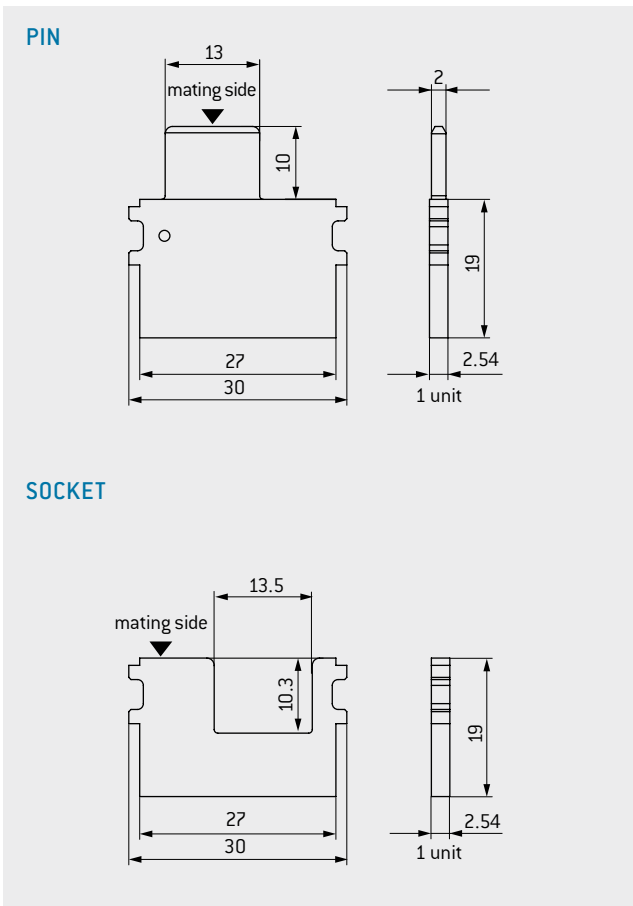
CODING MODULES



Coding modules are placed between the modules to enable coding in addition to the guide system.

TECHNICAL DATA

Insulator Thermoplastic
fiber glass reinforced
acc. to UL-94



Description	Units	Part number
Coding module (pin)	1	611.161.101.923.000
Coding module (socket)	1	610.161.101.923.000

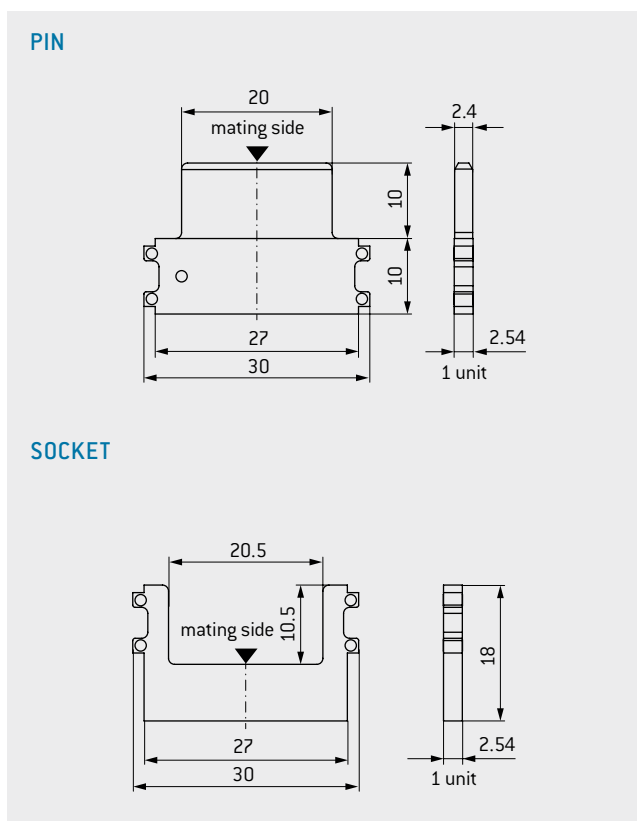
PIN PROTECTION MODULES



Pin protection modules help shield smaller pin sizes, such as the 0.76 mm and the 1.02 mm diameter pins, from collision. These small plastic inserts in the frame alongside contact modules and act as a wall that extends past the pins.

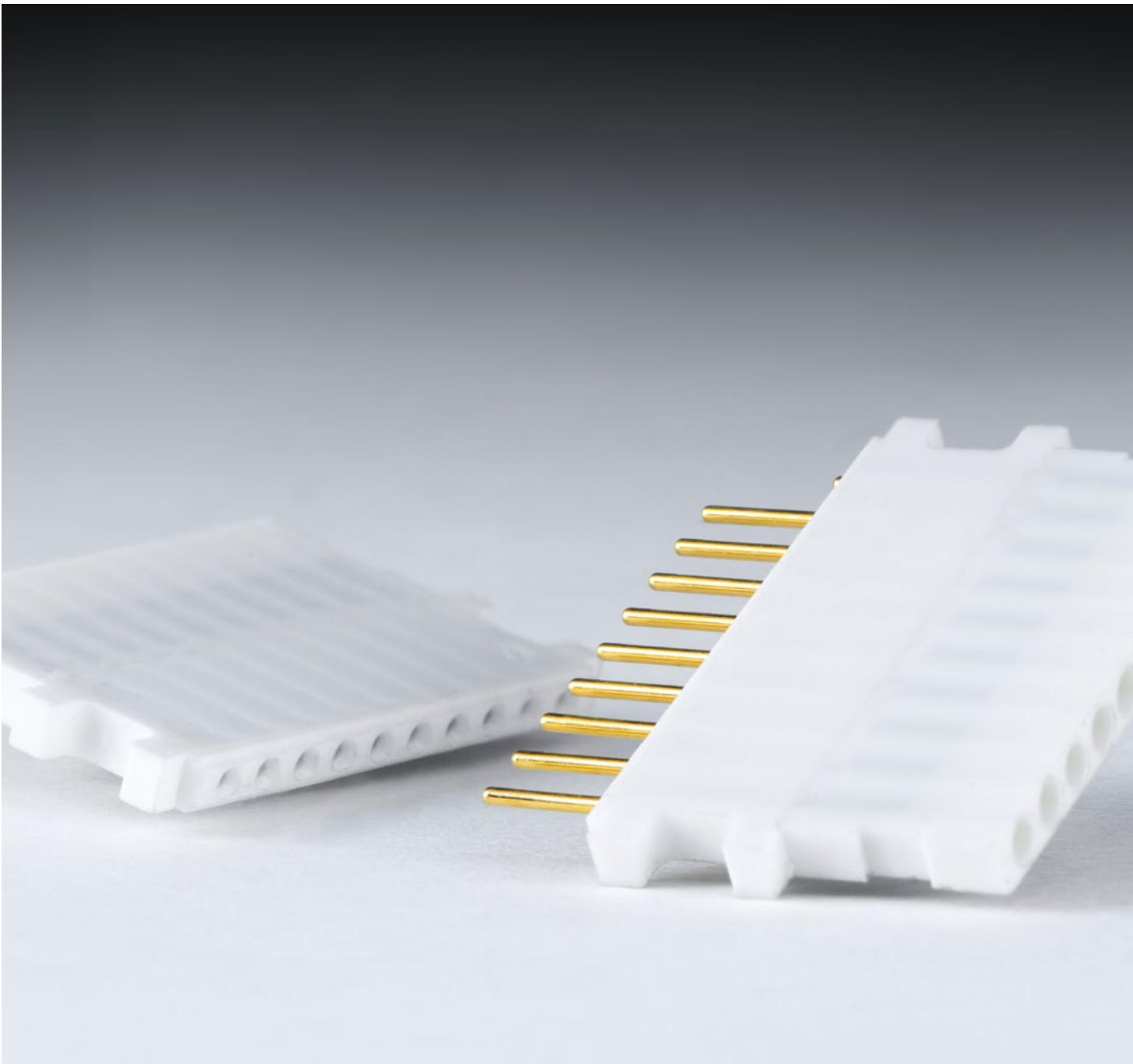
TECHNICAL DATA

Insulator Thermoplastic
fiber glass reinforced
acc. to UL-94

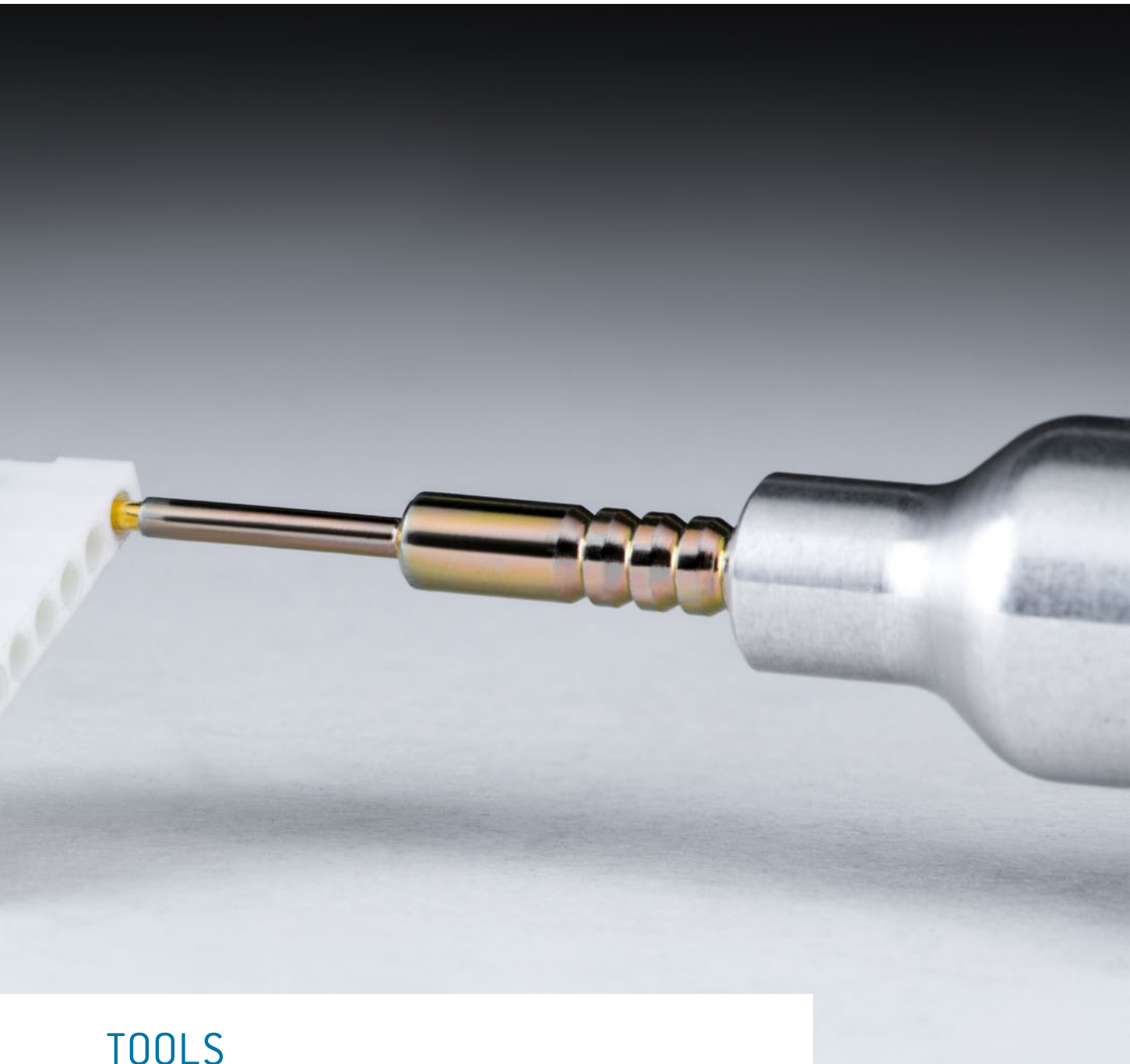


Description	Units	Part number
Pin protection module (pin)	1	611.122.115.923.000
Pin protection module (socket)	1	610.122.115.923.000

Alternatively, these modules can be used to extend clearance and creepage distances.



ODU-MAC®



TOOLS

Contact processing and crimping	106
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Crimp information	110
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TERMINATION TECHNOLOGY



ODU offers three different contact termination technologies for the single contacts:

- Crimp
- Solder
- PCB

CRIMP TERMINATION

Using contacts to establish connecting lines through crimping creates a permanent, secure and corrosion-free connection. For most people, crimping is easy and quick to carry out.

Through crimping, the conductor and contact materials in the compressed areas become so dense as to create a connection which is nearly gas-tight, and with a tensile strength befitting the conductor material.

Crimping can be carried out on the tiniest of diameters as well as in larger diameters. For small diameters ($0.8 - 2.5 \text{ mm}^2$), eight-point crimp tools are used; six-point crimp tools are used for larger dimensions. The corner measurement of the crimping is never larger than the original diameter. The cable insulation is not damaged in the process and can be directly attached to the connector end.

For error-free crimping, the bore diameter must be perfectly fitted to the cable. Such error-free crimping is only guaranteed if using ODU-recommended crimping tools. In order to correctly advise you, we need to know your cable type and profile, preferably by means of a sample and corresponding data sheet.

HEXAGONAL CRIMPING



8-POINT CRIMPING



FOR ASSEMBLY INSTRUCTIONS PLEASE REFER TO OUR WEBSITE: WWW.ODU-CONNECTORS.COM.

CRIMPING TOOLS



For further crimp information please refer to the table on page [110](#).

All tools are magnetic, by default.

8-POINT CRIMPING TOOL FOR CONDUCTOR CONNECTIONS FROM 0.08 TO 1.0 mm²



With user-friendly digital display.

PART NUMBER: 080.000.051.000.000

POSITIONER FOR CONTACT DIAMETER FROM 0.76 TO 3 mm

PART NUMBER: 080.000.051.101.000

Has to be ordered separately.

8-POINT CRIMPING TOOL FOR CONDUCTOR CONNECTIONS FROM 1.5 TO 2.5 mm²



With user-friendly digital display.

PART NUMBER: 080.000.057.000.000

POSITIONER FOR CONTACT DIAMETER FROM 1.5 TO 3 mm

PART NUMBER: 080.000.057.101.000

Has to be ordered separately.

HEXAGONAL CRIMPING TOOL FOR CROSS-SECTIONS (AWG 12), 4 TO 6.0 mm²



With blocking system.

PART NUMBER: 080.000.062.000.000

MECHANICAL HEXAGONAL HAND CRIMPING TOOL FROM 10 TO 50 mm²



PART NUMBER: 080.000.064.000.000

High pressing force with low manual force through precision mechanics. Folding head facilitates processing of unwieldy connector forms and changing of crimp inserts.

CRIMPING JAWS FOR CONTACT DIAMETER FROM 5 TO 12 mm SEE PAGE [111](#)

Has to be ordered separately.

CRIMPING TOOLS



For further crimp information please refer to the table on page [110](#).

All tools are magnetic, by default.

HEXAGONAL CRIMPING TOOL FOR COAX CONTACTS



With blocking system.

PART NUMBER PLIER: 080.000.039.000.000

CRIMPING JAWS PLEASE SEE PAGE [110](#)

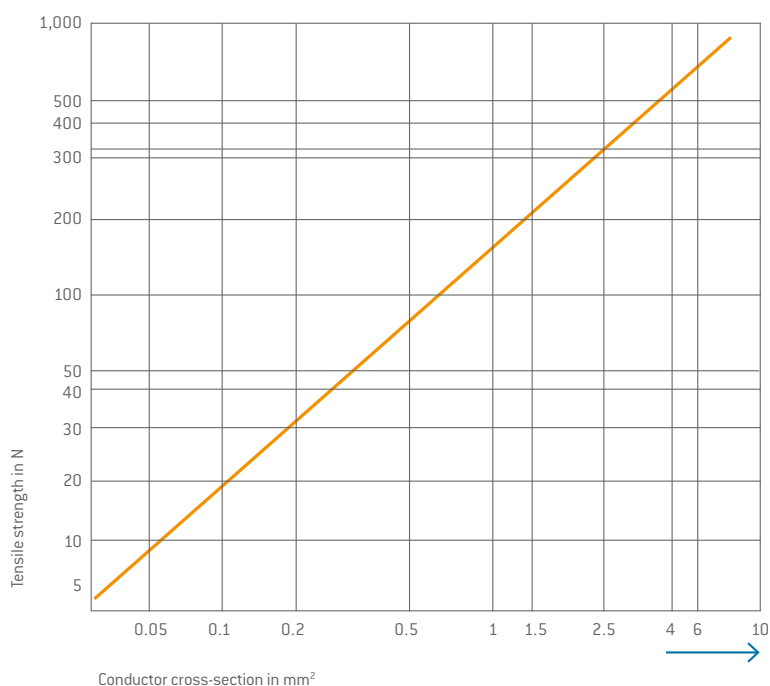
Has to be ordered separately.

CRIMP CONNECTIONS



IEC 60352-2:2013 (DIN EN 60352-2:2014)

Tensile strength diagram of a crimp termination depending upon the conductor cross-section IEC 60352-2:2013 (DIN EN 60352-2:2014). **Example:** A 2.5 mm² conductor must achieve a minimum tensile strength of approx. 320 N.



NOTE

Internal standards and guidelines are used for cross-sections (> 10 mm²), as these are not clearly defined in the international standard.

TESTING ELECTRICAL CONTINUITY FOLLOWING ASSEMBLY / TESTING OF WIRING:

One of the most important functional features is the observance of the specified mating and sliding forces. All socket contacts in fully automatic systems supplied by ODU are therefore tested for 100% observance of these values in the context of process monitoring. This takes place with the correctly chosen testing systems without damage to the socket. However, ODU points out that incorrectly chosen test systems (e.g. test pin)

or processing methods (e.g. test speed) following packaging can damage the sockets/pins. Please note the instructions in the assembly instructions (www.odu-connectors.com/downloads/assembly-instructions).

We recommend using suitable test adapters here.



CRIMP INFORMATION



Contact diameter	Termination cross-section ¹		Stripping length	8-pt crimping tool 080.000.051.000.000 without positioner	8-pt crimping tool 080.000.057.000.000 without positioner	Crimping tool for coax 080.000.039.000.000	Hexagonal crimping tool 080.000.062.000.000
	mm	AWG		mm ²	mm	Positioner 080.000.051.101.000 position / adjustment dim.	Positioner 080.000.057.101.000 position / adjustment dim.
0.76	24/28	0.25/ 0.08	4 ^{+0.5}	1/0.67			
1.02				2/0.67			
1.5				3/0.67			
0.7	26/28		3 ^{+0.5}				
0.7	22/24						
0.76	22	0.38	4 ^{+0.5}	1/0.67			
1.02	20/22	0.5/ 0.38	5 ^{+0.5}	2/0.92			
1.5				3/0.92			
2.41				4/0.92			
3				5/0.92			
1.5	18	1/0.75	5 ^{+0.5}	3/1.12			
2.41				4/1.12			
3				5/1.12			
1.5	16	1.5	5 ^{+0.5}	3/1.42	10/1.42 ²		
1.5	14		5 ^{+0.5}	3/1.32	10/1.42 ²		
2.41				4/1.32	9/1.42 ²		
3				5/1.32	6/1.42 ²		
1.5	14		5 ^{+0.5}	5 ^{+0.5}	3/1.42	10/1.42 ²	
2.41		4/1.42			9/1.42 ²		
3		5/1.42			6/1.42 ²		
2.41		2.5	6 ^{+0.5}		9/1.67 ²		
3					6/1.67 ²		
2.41	12[7/20]		6 ^{+0.5}		9/2.12 ²		Profile no.2
2.41	12[19/26]		6 ^{+0.5}		9/1.92 ²		Profile no.2
3		4	6 ^{+0.5}		6/2.12 ²		Profile no.3
5							
3	10	6	7 ^{+0.5}		8/2.22 ²		Profile no.3
5		10	10 ^{+0.5}				
5		16	10 ^{+0.5}				
8		16	10 ^{+0.5}				
8		25	18 ^{+0.5}				
10							
12							
10		35	18 ^{+0.5}				
12							
12		50	18 ^{+0.5}				
RG 178/RG 196			[9/4.5/18.5] See module description			082.000.039.101.000	
RG 174/RG 188/RG 316/RG 179/RG 187						082.000.039.102.000	
G 02232 D/K 02252 D						082.000.039.103.000	
RG 122/2YCY 0.4/2.5						082.000.039.104.000	
RG 58/G 03233 (H&S)						082.000.039.106.000	
RG 223						082.000.039.108.000	
RG 59						082.000.039.109.000	

CRIMP INFORMATION




Contact diameter	Termination cross-section ¹		Stripping length	Hexagonal crimping tool 080.000.064.000.000	Hand crimping tool stamped contacts	Hand crimping tool stamped contacts
	mm	AWG				
0.76	24/28	0.25/ 0.08	4 ^{+0.5}			
1.02						
1.5						
0.7	26/28		3 ^{+0.5}		080.000.040.000.000	080.000.041.000.000
0.7	22/24			080.000.040.000.000	080.000.041.000.000	
0.76	22	0.38	4 ^{+0.5}			
1.02	20/22	0.5/ 0.38	5 ^{+0.5}			
1.5						
2.41						
3						
1.5	18	1/0.75	5 ^{+0.5}			
2.41						
3						
1.5	16	1.5	5 ^{+0.5}			
1.5						
2.41						
3						
1.5	14		5 ^{+0.5}			
2.41						
3						
2.41		2.5	6 ^{+0.5}			
3						
2.41	12[7/20]		6 ^{+0.5}			
2.41	12[19/26]		6 ^{+0.5}			
3	10	4	6 ^{+0.5}			
5						
3						
5		10	10 ^{+0.5}	080.000.064.110.000		
5		16	10 ^{+0.5}	080.000.064.101.000		
8		16	10 ^{+0.5}	080.000.064.116.000		
8		25	18 ^{+0.5}			
10				080.000.064.125.000		
12						
10		35	18 ^{+0.5}			
12				080.000.064.135.000		
12		50	18 ^{+0.5}	080.000.064.150.000		

¹ The listed cross section correspond to a finely stranded conductor design according to IEC 60228:2005 (VDE 0295:2005) class 5 or a finely stranded conductor design (7/19-stranded) according to AWG ASTM B258-14). ² Recommended by ODU as a standard tool and setting.

ASSEMBLY AIDS



All tools are magnetic, by default.

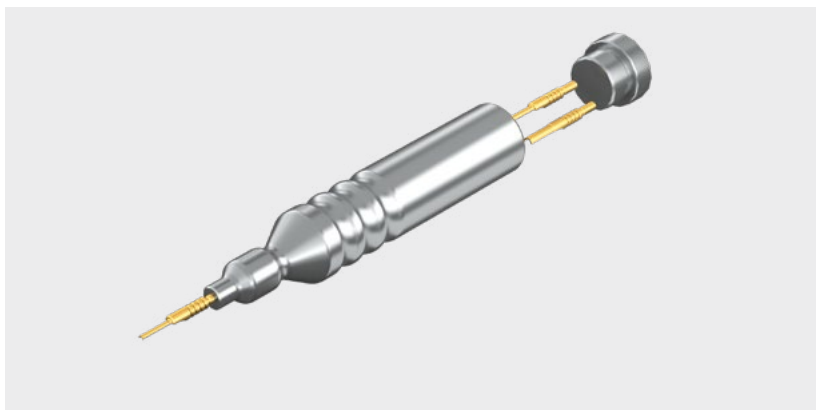
Description	For use in	Part number	Nm	Recommended tightening torque
Torque wrench With cross handle. fixed. automatic release (for inner hexagonal bits with C6.3- or E6.3-shaft). Bit has to be ordered separately.		598.054.001.000.000	0.9	
		598.054.002.000.000	1.2	
		598.054.003.000.000	3	
		598.054.004.000.000	1.5	
		598.054.005.000.000	0.6	
		598.054.006.000.000	2.2	
		598.054.007.000.000	4.2	
Bit slot 3.5 (0.5/50)	Screwing of the rails in the T frame	598.054.108.000.000		0.9 Nm +/- 0.2 Nm
Bit slot 5.5 (0.8/50)	Mounting screw on frames in a housing	598.054.101.000.000		0.6 Nm +/- 0.1 Nm
Bit Phillips cross slot size 1	Grounding screw on frames in a housing and M+ frame	598.054.106.000.000		1.2 Nm +/- 0.2 Nm
Bit Phillips cross slot size 1	Grounding plug socket for P+ frame ¹	598.054.106.000.000		1.5 Nm +/- 0.2 Nm
Bit Phillips cross slot size 1	Grounding pin for P+ frame ²	598.054.106.000.000		3.0 Nm +/- 0.3 Nm
SW 8	Mounting of grounding socket P+ frame	598.054.111.000.000		2.2 Nm +/- 0.3 Nm
SW 8	Mounting of grounding pin P+ frame	598.054.111.000.000		4.2 Nm +/- 0.5 Nm
Bit slot 3.5 (0.5/50)	Rails on frames in a housing	598.054.108.000.000		0.9 Nm +/- 0.2 Nm
Bit slot 5.5 (0.8/50)	Screwing of the rails in the S, M+ frame and replacement spindle	598.054.101.000.000		0.9 Nm +/- 0.2 Nm
Bit Torx TX 10	Mounting of ODU-MAC ZERO housing	598.054.104.000.000		0.6 Nm +/- 0.1 Nm
Bit Torx TX 20	Screwing of the rails in the P+ frame	598.054.105.000.000		1.5 Nm +/- 0.2 Nm
Distance spacer/QCH	S frame for quick change head and rear mounting panel	598.054.204.000.000		1.2 Nm +/- 0.2 Nm

¹ Grounding screw for P+ socket frame. ² Grounding screw for P+ pin frame.

ASSEMBLY AIDS



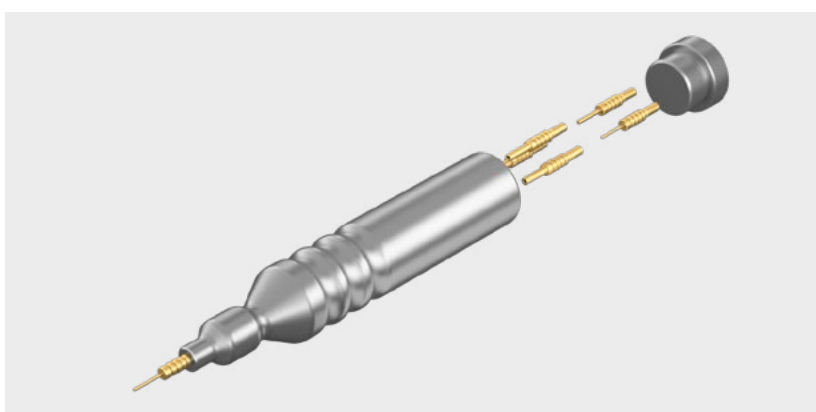
All tools are magnetic, by default.



INSERTION TOOL Ø 0.76–1.5 mm

For assembly aid of contacts with flexible/ thin conductors (pin and socket side).

PART NUMBER: 085.611.001.001.000



EXTRACTION TOOL Ø 0.76–1.5 mm

Extraction tool for sockets and pins by use of the removal tool.

PART NUMBER: 087.611.005.001.000

Contact Ø	Assembly aid insertion tool	Assembly aid extraction tool
0.76	085.611.001.001.000	087.611.005.001.000
1.02	085.611.001.001.000	087.611.005.001.000
1.5	085.611.001.001.000	087.611.005.001.000

REMOVAL AND ASSEMBLY OF CONTACTS IS ONLY POSSIBLE WITH ODU TOOLS.

REMOVAL OF CONTACTS



All tools are magnetic, by default.



REMOVAL TOOL I

Removal of the already assembled contact (incl. cable): The removal tool is pressed from behind into the insulator until a quiet click is heard. The contact is removed from the insulator by pulling on the cable or by lightly pressing the contact with the extraction tools.

REMOVAL TOOL II

Removal of unassembled contacts, or contacts from which the cable has been removed. The removal tool is pressed from behind into the insulator until a quiet click is heard. The contact can be removed from the insulator by lightly pushing it with the extraction tools.

REMOVAL ONLY POSSIBLE WITH ODU TOOLS.

Contact Ø	Removal tool I straight	Removal tool I angled	Removal tool II	Removal tool	Removal tool
0.76 ²		087.170.361.000.000	087.611.001.001.000		
1.02 ²		087.170.362.000.000	087.611.001.001.000		
1.5 ²	087.170.138.000.000	087.170.363.000.000 ¹	087.611.001.001.000		
2.41	087.170.139.000.000	087.170.365.000.000	087.611.001.001.000		
3	087.170.136.000.000	087.170.366.000.000	087.611.001.001.000		
Coax 50Ω 4 contacts	087.170.139.000.000	087.170.365.000.000	087.611.001.001.000 ²		
Coax 50Ω 2 contacts				087.170.391.000.000	
Fiber optic 5 contacts					087.611.001.002.000

¹In use with high voltage module, 4 contacts, [see page 80] the angled version cannot be used.

²With cable (H+S) G02232 only removal tool I is usable.

MAINTENANCE PACKAGE FOR ODU SPRINGTAC® AND ODU LAMTAC® CONTACTS



Contact lubrication improves the mechanical properties of contact systems. Cleaning the contact surfaces prior to lubrication is also recommended in order to remove pollution. With appropriate care, wear due to high mating frequency can be significantly minimised and the mating and unmating forces reduced. The cleaning and lubricating interval must be individually adapted to circumstances and should only be carried out with products recommended by the contact manufacturer.

ODU has put together a maintenance package to this purpose, so that lubrication can be carried out directly on location. A cleaning brush and a special cleaning cloth, as well as precise instructions allow optimal care of the contacts. In the absence of other specifications, the maintenance package can be used for all ODU contacts and connections.

PART NUMBER: 170.000.000.000.100

For technical properties of the maintenance package please refer our website: www.odu-connectors.com/downloads.

CLEANING INFORMATION

Maintenance instruction 003.170.000.000.000

FURTHER INFORMATION

Never submerge the connector in liquid. The connector may only be put back into operation again when it has been assured that it is completely dry.

Ensure that contact pins are not bent or otherwise damaged. The connector may no longer be used when damage or other signs of wear are detected. Clean with maximum 2.5 bar compressed air to avoid contact damage. A slight blackening of the contact points may occur over the course of the service life and represents no impairment of the electrical properties.

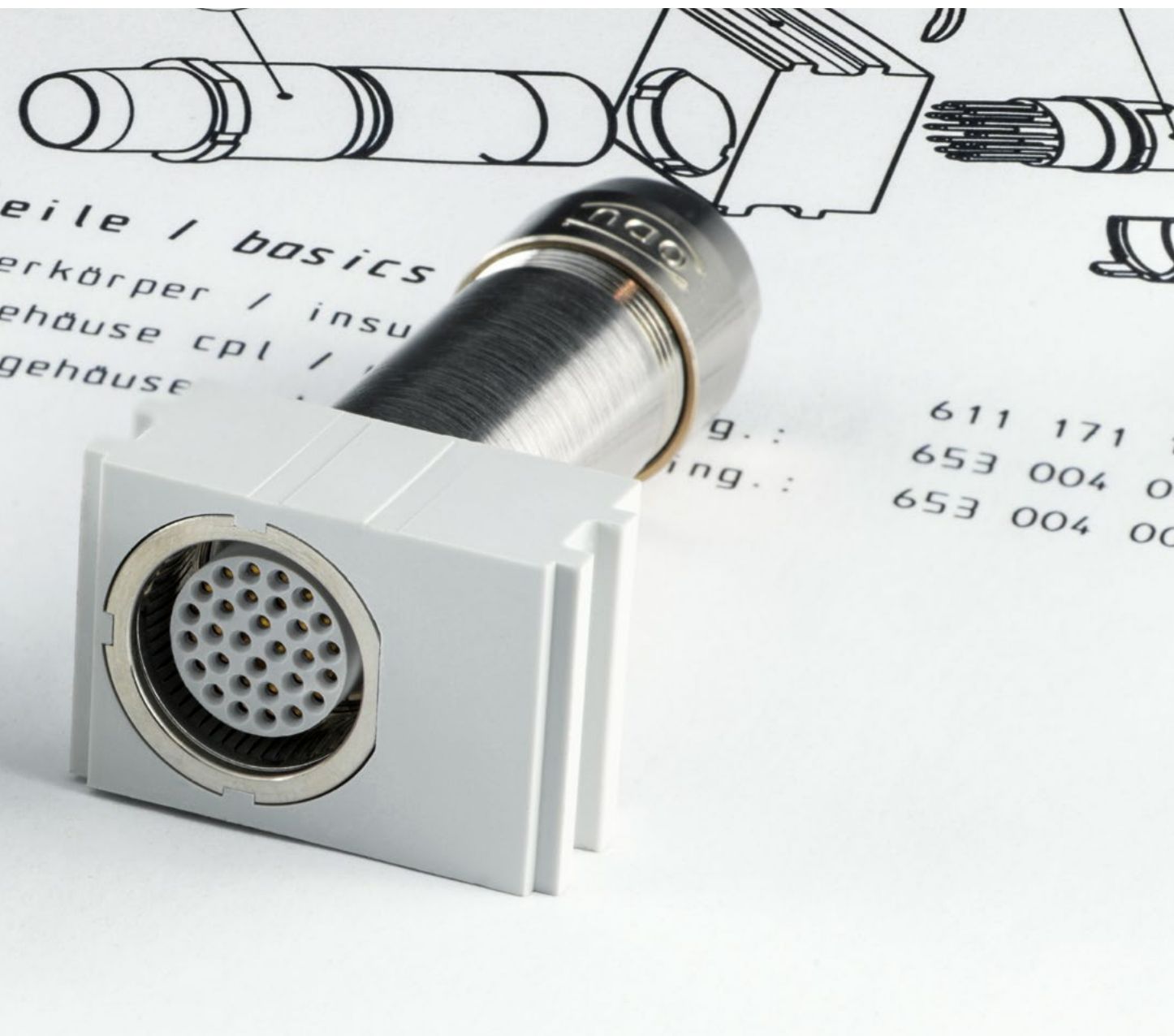
Recommended cleaning agent

Soap: liquid soaps on sodium bicarbonate or potassium base.

Alcohol: ethanol 70%, isopropyl alcohol 70%.



ODU-MAC®



TECHNICAL INFORMATION

International protection classes acc. IEC 60529:2013 (VDE 0470-1:2014)	118
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INTERNATIONAL PROTECTION CLASSES



Acc. IEC 60529:2013 (VDE 0470-1:2014).

Code letters (International Protection)		First code number (Degrees of protection against access to hazardous parts respectively against solid foreign objects)		Second code number (Degrees of protection against water)		
IP		6		5		
Code number	Protection against access to hazardous parts / Protection against ingress of solid foreign objects			Code number	Protection against harmful effects due to the ingress of water	
0	No protection		No protection against contact / No protection against solid foreign objects	0	No protection against water	No protection against water
1	Protection against large foreign objects		Protection against contact with the back of the hand / Protection against solid foreign objects $\varnothing \geq 50$ mm	1	Protection against dripping water	Protection against vertically falling waterdrops
2	Protection against medium-sized foreign objects		Protection against contact with the fingers / Protection against solid foreign objects $\varnothing \geq 12.5$ mm	2	Protection against dripping water (tilted)	Protection against falling waterdrops when tilted (any angle up to 15° from the vertical)
3	Protection against small foreign objects		Protection against contact with tools / Protection against solid foreign objects $\varnothing \geq 2.5$ mm	3	Protection against spray water	Protection against spray water (any angle up to 60° from the vertical)
4	Protection against granular foreign objects		Protection against contact with a wire / Protection against solid foreign objects $\varnothing \geq 1.0$ mm	4	Protection against splashing water	Protection against splashing water from all directions
5	Dustproof		Protection against contact with a wire / Protection against uncontrolled ingress of dust	5	Protection against water jet	Protection against water jet from all directions
6	Dustproof		Protection against contact with a wire / Complete protection against ingress of dust	6	Protection against powerful water jet	Protection against powerful water jet from all directions
				7	Protection against the effects of temporary immersion in water	Protection against ingress of harmful quantities of water by temporary submersion into water
				8	Protection against the effects of continuous immersion in water	Protection against ingress of harmful quantities of water by continuous submersion into water
				9	Protection against high pressure and high water jet temperatures	Protection against water from all directions by high pressure and high temperatures

EXPLANATIONS AND INFORMATION ON INSULATION COORDINATION



IEC 60664-1:2007 (VDE 0110-1:2008): TABLE F.1 – RATED SURGE VOLTAGE FOR OPERATING MEDIA FED DIRECTLY FROM THE LOW VOLTAGE MAINS.

Nominal voltage of the power supply system (network) acc. to IEC 60038:2009 (VDE 0175-1:2012)		Voltage conductor to neutral conductor derived from nominal voltages a.c. or d.c. up to and including V	Rated impulse voltage Overvoltage category			
Three-phase-system V	Single-phase-system V		I V	II V	III V	IV V
		50	330	500	800	1,500
		100	500	800	1,500	2,500
	120 to 240	160	800	1,500	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

APPLICABLE STANDARDS

IEC 60664-1:2007 (VDE 0110-1:2008) and IEC 61984:2008 (VDE 0627:2009), original (IEC 60664-1:2007 VDE 0110-1:2008) and IEC 61984:2008 (VDE 0627:2009) remains definitive for all of the technical information named).

GENERAL

The selection of a connector cannot only take functionality, number of contacts, current or voltage parameters into account. In fact, consideration of the place of use and the installation conditions prevailing there is indispensable. Depending upon the installation and ambient conditions, the connector can be used in accordance with the standards in a variety of voltage and current ranges. All of the voltage data listed in this catalogue refers to the use of insulators in the ODU-MAC solid frame for housings or in the ODU-MAC docking frame. All of the connectors shown here involve connectors without contact rating (COC) in accordance with IEC 61984:2008 (VDE 0627:2009).

The most important influence variables and the electrical parameters harmonised with these will be explained in more detail in the following. Our technicians would be happy to assist you with any further questions. The following texts and tables are excerpts from the indicated standards.

OVERVOLTAGE CATEGORY

The necessary rated surge voltage is defined through the overvoltage category according to table F.1 together with the nominal voltage used. Depending upon the installation location, the respective overvoltage category is selected according to the criteria listed below for operating media that is fed directly from the low voltage mains.

Overvoltage category I

Operating media for connection to circuits in which measures for limiting the transient overvoltages to an appropriately low value have been taken. For example, connectors for the voltage supply of computer hardware permanently connected to a power supply with electronic overvoltage limitation.

Overvoltage category II

Operating media fed by the fixed installation that consume energy. For example, household devices, portable tools and similar devices.

Overvoltage category III

(= standard, when no special overvoltage category is indicated)
Operating media in permanent installations and cases for which special requirements for reliability and availability of the operating media exist. For example, switches in permanent installations and operating media for industrial use with permanent connection to the permanent installation.

Overvoltage category IV

Operating media for use at the termination point of the installation. For example, electricity meters and primary overcurrent protection devices.

EXPLANATIONS AND INFORMATION ACCORDING TO VDE



DEGREE OF POLLUTION

Potentially occurring pollution combined with moisture can influence the insulation capacity on the surface of the connector. In order to define various rating parameters, a degree of pollution according to the criteria listed below must be selected for the operating medium.

In the case of a connector with a degree of protection of minimum IP 54 IEC 60529:2013 (VDE 0470-1:2014), the insulating parts may be measured enclosed according to the standard for a low degree of pollution. This also applies for mated connectors for which enclosure is ensured by the connector housing and which are only disconnected for testing and maintenance purposes.

Degree of pollution 1

No or only dry, non-conductive pollution is present. The pollution has no influence. For example, computer systems and measuring devices in clean, dry or air-conditioned rooms.

Degree of pollution 2

Only non-conductive pollution is present. However, temporary conductivity due to condensation must be anticipated. For example, devices in laboratories, residential, sales and other business areas.

Degree of pollution 3

(= standard, when no special degree of pollution is indicated)
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.

Degree of pollution 4

Permanent conductivity is present, caused by conductive dust, rain or moisture. For example, devices in the open air or outdoor facilities and construction machinery.

Operating voltage (VDE : Rated voltage): Value of a voltage that is specified by the manufacturer for a component, device or operating medium and relates to the operating and performance features.

Depending upon the indicated degree of pollution, the rated voltage is dependent upon the insulating material group of the connector and the respective creepage distances between the individual contacts. The rated voltage may be significantly influenced by the use of blank modules and varying positioning of the contacts in the insulator. Operating media may have more than one value or one range for rated voltage (see table F.4 in IEC 60664-1:2007 (VDE 0110-1:2008)).

NOMINAL VOLTAGE

A suitably rounded voltage value indicated by the manufacturer for the designation or identification of an operating medium. In these explanations, the term nominal voltage is used for the value of the issued voltage indicated by the power supply company (PSC) or by the manufacturer of the voltage source for classification of the overvoltage category.

RATED IMPULSE VOLTAGE

Value of an impulse withstand voltage that is indicated by the manufacturer for an operating medium or a part of this, and which indicates the defined endurance of its insulation against transient (brief, duration of a few milliseconds) overvoltages. The impulse withstand voltage is the highest value of the surge voltage of a defined form and polarity which will not result in the dielectric breakdown of the insulation under defined conditions.

Depending upon the indicated degree of pollution, the rated surge voltage depends upon the clearance distance between the individual contacts. The rated surge voltage may be influenced significantly by the usage of blank modules and varied positioning of the contacts in the insulators, (see table F.2 in IEC 60664-1:2007 (VDE 0110-1:2008)).

In the most recent edition of IEC 60664-1:2007 (VDE 0110-1:2008), the minimum clearance distances for operating media not connected directly to the low voltage mains should be measured according to the possible permanent voltages, the temporary overvoltages or periodic peak voltages (see table F.7 in IEC 60664-1:2007 (VDE 0110-1:2008)).



**IMPULSE TEST VOLTAGE /
POWER FREQUENCY TEST VOLTAGE**

Highest value of the surge voltage of a defined form and polarity that will not result in a dielectric breakdown or flashover of the insulation under defined conditions.

CLEARANCE DISTANCE

The shortest distance in the air between two conductive parts.

CREEPAGE DISTANCE

The shortest distance between two conductive parts over the surface of an insulation material. The creepage distance is influenced by the degree of pollution applied.

TEST VOLTAGE

The dielectric strength of the connector is confirmed according to the standard corresponding to the indicated rated surge voltage by applying the test voltage according to table F.5 over a defined time range.

IEC 60664-1:2007 [VDE 0110-1:2008]: 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 ú kV	Test impulse voltage at sea level ú kV	Test impulse voltage at 200 m elevation ú kV	Test impulse voltage at 500 m elevation ú 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	4.923	4.874	4.675
6	7.385	7.236	7.013
8	9.847	9.648	9.350
12	14.770	14.471	14.025

CONVERSIONS/AWG (AMERICAN WIRE GAUGE)



Circular wire					
AWG	Diameter		Cross-section mm ²	Weight kg/km	Max. resistance Ω/km
	Inch	mm			
4/0 [259/21]	0.6010	15.300	107.0	997.00	0.17
3/0 [259/22]	0.5360	13.600	85.0	793.00	0.22
2/0 [259/23]	0.4770	12.100	67.4	628.00	0.27
1/0 [259/24]	0.4240	10.800	53.5	497.00	0.34
1 [259/25]	0.3780	9.600	42.2	395.00	0.43
2 [259/26]	0.3350	8.500	33.6	312.00	0.55
4 [133/25]	0.2660	6.800	21.1	195.00	0.87
6 [133/27]	0.2100	5.300	13.3	122.00	1.38
8 [133/29]	0.1670	4.200	8.37	76.80	2.18
10 [1]	0.1019	2.590	5.26	46.77	3.45
10 [37/26]	0.1150	2.921	4.74	42.10	4.13
12 [1]	0.0808	2.050	3.31	29.41	5.45
12 [19/25]	0.0930	2.362	3.08	27.36	5.94
12 [37/28]	0.0910	2.311	2.97	26.45	6.36
14 [1]	0.0641	1.630	2.08	18.51	8.79
14 [19/27]	0.0730	1.854	1.94	17.23	9.94
16 [1]	0.0508	1.290	1.31	11.625	13.94
16 [19/29]	0.0590	1.499	1.23	10.928	15.70
18 [1]	0.0403	1.020	0.823	7.316	22.18
20 [1]	0.0320	0.813	0.519	4.613	35.10
20 [7/28]	0.0390	0.991	0.563	5.003	34.10
20 [19/32]	0.0420	1.067	0.616	5.473	32.00
22 [1]	0.0253	0.643	0.324	2.883	57.70
22 [19/34]	0.0330	0.838	0.382	3.395	51.80
24 [1]	0.0201	0.511	0.205	1.820	91.20
24 [7/32]	0.0250	0.635	0.227	2.016	86.00
24 [19/36]	0.0270	0.686	0.241	2.145	83.30
26 [1]	0.0159	0.404	0.128	1.139	147.00
26 [7/34]	0.0200	0.508	0.141	1.251	140.00
26 [19/38]	0.0220	0.559	0.154	1.370	131.00
28 [1]	0.0126	0.320	0.0804	0.715	231.00
28 [7/36]	0.0160	0.406	0.0889	0.790	224.00
28 [19/40]	0.0170	0.432	0.0925	0.823	207.00
30 [1]	0.0100	0.254	0.0507	0.450	374.00
30 [7/38]	0.0130	0.330	0.0568	0.505	354.00
32 [1]	0.0080	0.203	0.0324	0.288	561.00
32 [7/40]	0.0110	0.279	0.0341	0.303	597.10
34 [1]	0.0063	0.160	0.0201	0.179	951.00
34 [7/42]	0.0070	0.180	0.0222	0.197	1,491.00
36 [1]	0.0050	0.127	0.0127	0.1126	1,519.00
36 [7/44]	0.0060	0.150	0.0142	0.1263	1,322.00

The American Wire Gauge (AWG) is based on the principle that the cross-section of the wire changes by 26% from one gauge number to the next. The AWG numbers decrease as the wire diameter increases, while the AWG numbers increase as the wire diameter decreases. This only applies to solid wire.

However, stranded wire is predominately used in practice. This has the advantage of a longer service life under bending and vibration as well as greater flexibility in comparison with solid wire.

Stranded wires are made of multiple, smaller-gauge wires (higher AWG number). The stranded wire then receives the AWG numbers of a solid wire with the next closest cross-section to that of the stranded wire. In this case, the cross-section of the stranded wire refers to the sum of the copper cross-sections of the individual wires.

Accordingly, strands with the same AWG number but different numbers of wires differ in cross-section. For instance, an AWG 20 strand of 7 AWG 28 wires has a cross-section of 0.563 mm², while an AWG 20 strand of 19 AWG 32 wires has a cross-section of 0.616 mm².

Source: ASTM

OPERATING VOLTAGE



EIA-364-20E:2015 [SAE AS 13441:2004 method 3001.1].

The values specified in the catalogue correspond to SAE AS 13441:2004 method 3001.1. The table values were determined according to EIA-364-20E:2015. The inserts were tested while mated, and the test current was applied to the pin insert.

75% of the dielectric withstanding voltage is used for the further calculation. The operating voltage is 1/3 of this value.

All tests were conducted at normal indoor climate and apply up to an altitude of 2,000 m. If there are any deviations, the derating factors are to be factored in according to the applicable standards.

Test voltage: Dielectric withstanding voltage $\times 0.75$

Operating voltage: Dielectric withstanding voltage $\times 0.75 \times 0.33$

ATTENTION:

With certain applications, the safety requirements for electrical devices are very strict in terms of operating voltage. In such cases, the operating voltage is defined according to the clearance and creepage distances between parts which could be touched.

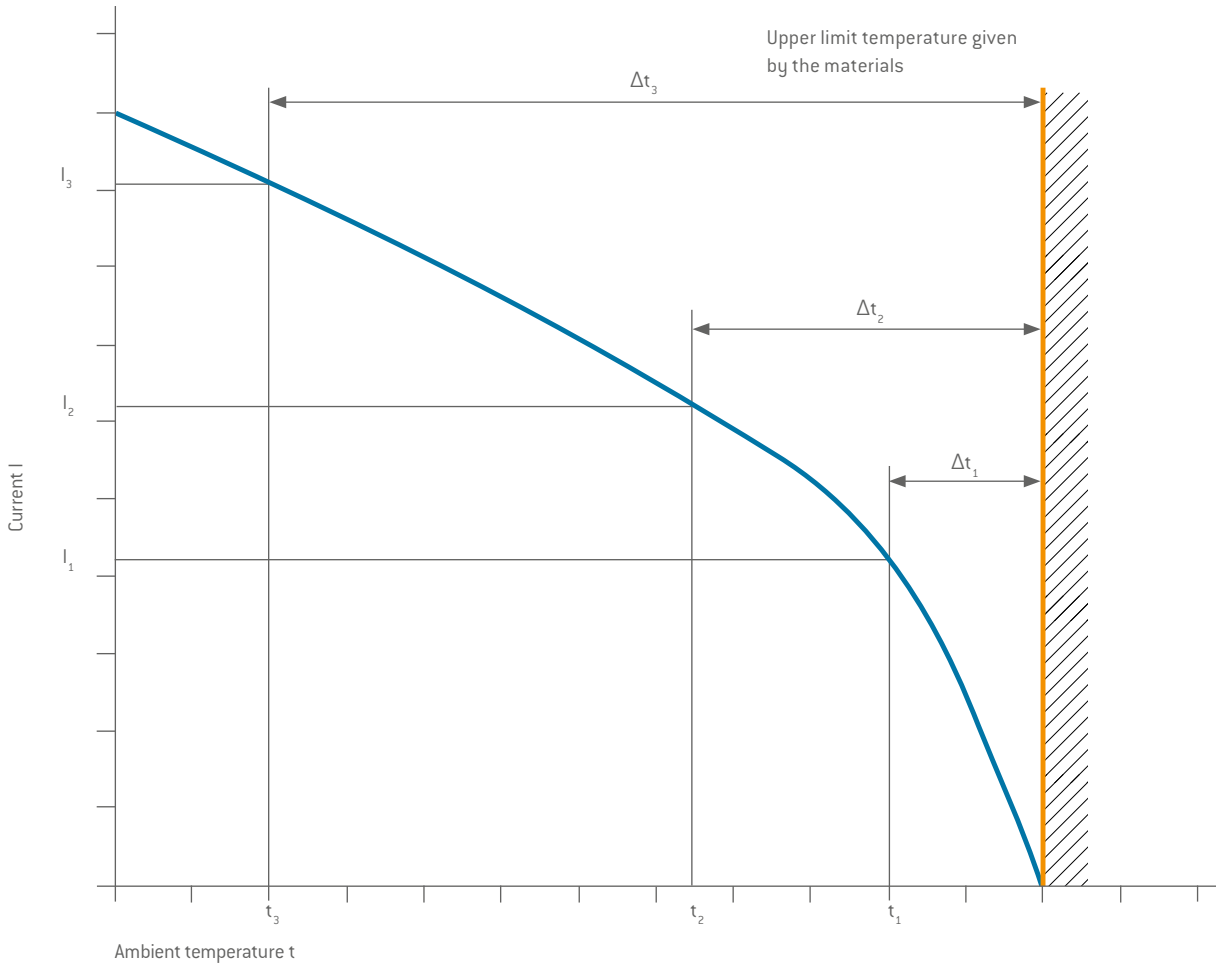
When selecting such a connector, please contact us and let us know the safety standard which the product must meet.

BASE FOR CURRENT-CARRYING CAPACITY



Derating measurement procedure IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003).

STRUCTURE OF THE BASE CURRENT-CARRYING CAPACITY CURVE



A current-carrying capacity curve metrologically determined according to the method described in IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003) depending on the permissible limit temperature of the materials.

The current-carrying capacity of a connector is determined by measurement. It is determined taking self-heating by Joule heat and the ambient temperature into account, and is limited by the thermal properties of the contact materials used. Their upper limit temperature may not be exceeded in the process.

The relationship between current, the resulting temperature increase, conditioned by the dissipation loss at the contact resistance, and the ambient temperature is represented in a

curve. The curve is plotted in a linear coordinate system with current “ I ” as Y-axis and temperature “ t ” as X-axis. The upper limiting temperature forms the limit of the diagram.

Over three measurements, the temperature rise due to Joule heat (Δt) is measured respectively for different currents on minimum three connectors, and the resulting values are joined to produce the parabolic basic curve. The basic curve is then used to derive the corrected current-carrying capacity curve (derating curve). The safety factor ($0.8 \times I_n$) also makes allowance for factors such as manufacturing tolerances and uncertainties in temperature measurement or the measuring arrangement.

CURRENT LOAD



[In dependence on VDE 0276-1000:1995].

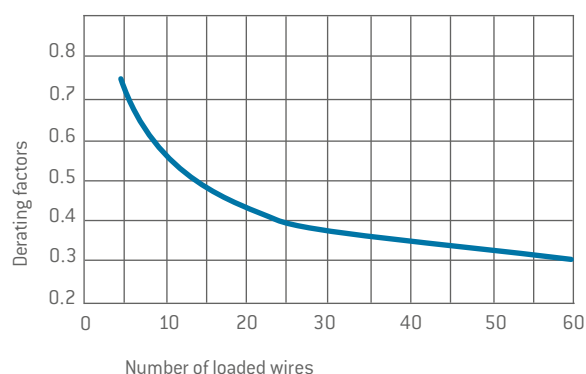
RATED CURRENT (NOMINAL CURRENT)

The metrologically determined current which is permitted to flow continuously through all contacts at the same time and will increase the contact temperature by 45 Kelvin. The amperage is determined according to the derating measurement method (DIN EN 60512-5-2:2003) and derived from the derating curve. The values specified in the catalogue apply to either individual contacts or completely assembled inserts/modules, as indicated.

DERATING FACTORS

In the case of multi-position connectors and cables, heating is greater than with individual contacts. It is therefore calculated with a derating factor.

There are no direct regulations for connectors in this context. The derating factors for multi-core cables pursuant to VDE 0298-4:2013 are applied. The derating factor assumes relevance as of 5 live wires.



Example:

VA cable with 24 wires is used (24 contacts). The nominal cross-section of a wire is 6 mm². A derating factor of 0.4 (e.g. cable installed in the open air) is to be presumed for the load reduction depending upon the number of live cable wires. A 6 mm² Cu line (contact diameter 3.0 mm) can be used according to current-carrying capacity with 39 ampere. The 24 contacts plug can thus be loaded with a max. of 15.6 A/contact (0.4 × 39 A).

MAX. CONTINUOUS CURRENT

The measured amperage at room temperature (approx. 20 °C) which increases the contact temperature to the limit temperature. The values specified in the catalogue apply to either individual contacts or completely assembled inserts/modules, as indicated.

Number of loaded wires	Derating factor
5	0.75
7	0.65
10	0.55
14	0.5
19	0.45
24	0.4
40	0.35
61	0.3

Load and derating factors

Multi-core plastic cable with conductor cross-section of 1.5 to 10 mm² when installed in the open air.

NOTE

Designs may differ depending upon the wiring of the modules and be verified with a heating test.

CURRENT-CARRYING CAPACITY DIAGRAM



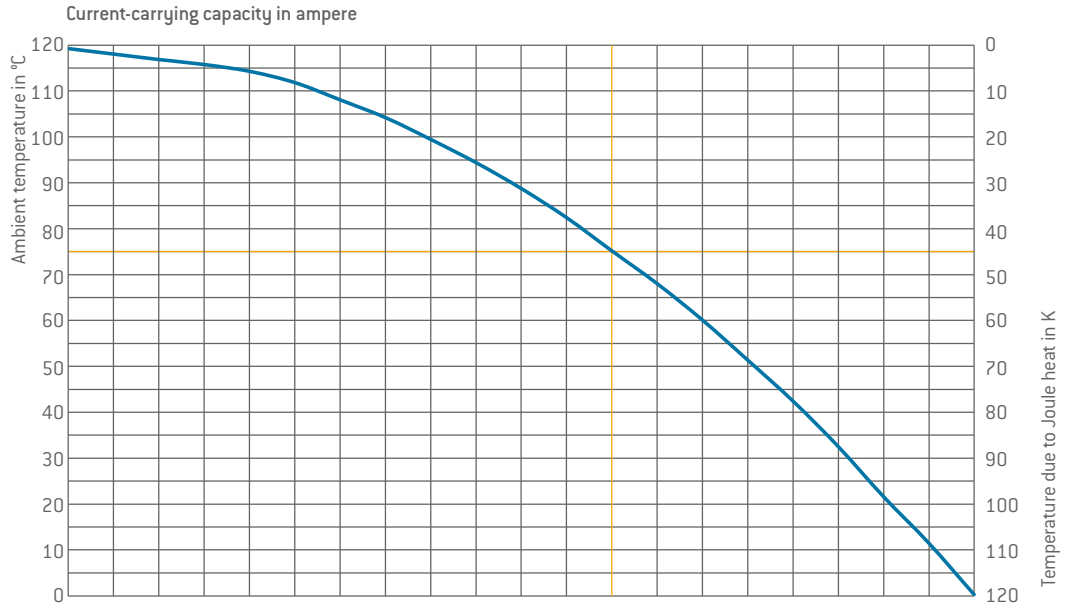
FOR SINGLE CONTACTS

Measurement made in acc. with IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003)

(derived base curve shown = 0.8 × Base curve).

Upper limit temperature: +120 °C.

Termination with nominal cross-section.



Contact	Contact Ø	Termination cross-section mm²	0	1	2	3	4	5	6	7	8	9	10
ODU SPRINGTAC®	0.76	0.25	0	1	2	3	4	5	6	7	8	9	10
		0.38	0	1.5	2.5	3.5	5	6	7.5	8.5	9.5	11	12
	1.02	0.25	0	1	2	3	4	5	6	7	8	9	10
		0.5	0	1.5	3	4.5	6	7.5	9	10.5	12	13.5	14.5
	1.5	0.25	0	1	2	3	4	5	6	7	8	9	10
		0.5	0	1.5	3.5	5	6.5	8	10	11.5	13	15	16.5
		1	0	2.5	5	7.5	10	12.5	15	17.5	19.5	22.5	24.5
		AWG 16	0	3	6	9	12	15	18	21	24	27	29.5
	2.41	1.5	0	3	6	9	12	15	18	21	24	27	29.5
		0.5	0	1.5	3.5	5	7	8.5	10.5	12	13.5	15.5	17.5
		1	0	2.5	5.5	8	10.5	13	16	18.5	21	23.5	26
		1.5	0	3	6	9	12	15	18	21	24	27	30
	3	2.5	0	4	8	12	16	20	24	27.5	31.5	35.5	39
		AWG 12	0	4.5	9	13.5	18.5	23	28	32	36.5	41	45
		0.5	0	2	4	5.5	7.5	9.5	11.5	13	15	17	18.5
		1	0	2.5	5.5	8	11	13.5	16.5	19	21.5	24.5	27
		1.5	0	3	6	9	12	15.5	19	22	25	28	31
		2.5	0	4	8	12	16	20	25	29	33	37	41
	6	4	0	6	13	19	25	32	39	45	51	58	64
		6	0	6	13	19	25	32	39	45	51	58	64

Nominal current

Max. continuous current

CURRENT-CARRYING CAPACITY DIAGRAM

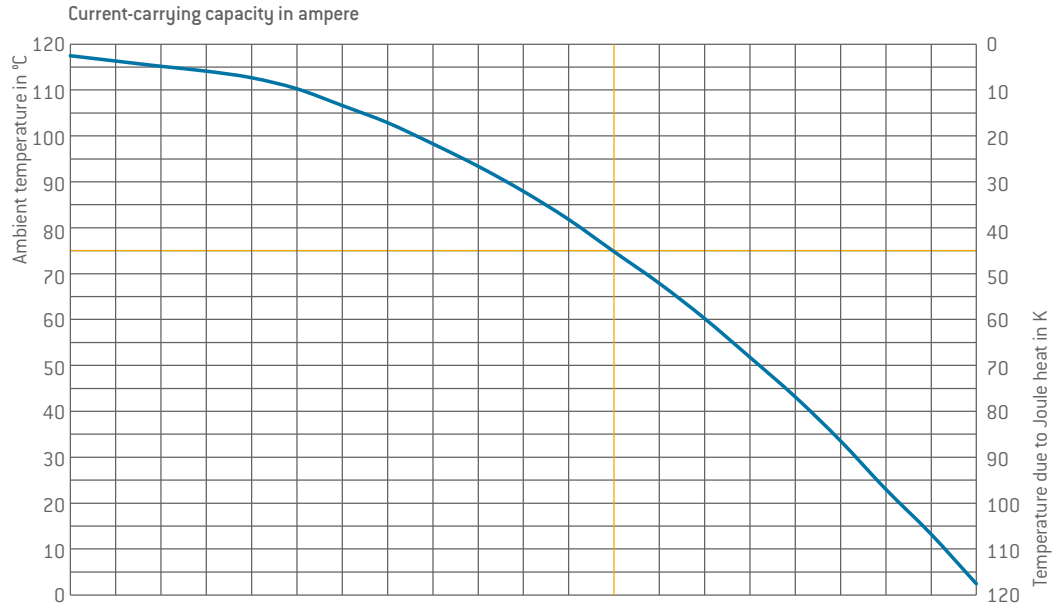


FOR FULLY EQUIPPED MODULES

Measurement made in acc. with IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003) (derived base curve shown = 0.8 × Base curve). Upper limit temperature: +120 °C. Termination with nominal cross-section.

The values of the 4 contact high voltage module (page 80) correspond to the values of the 5 contacts signal module (page 72).

The values of the 3 contacts power module (page 78) correspond to the values of the 3 contacts power module (page 76).



Contact	Module	Contact Ø	Termination cross-section mm ²	0	1	2	3	3.5	4	5	6	7	8	8.5
ODU SPRINGTAC®	10 con-tacts	0.76	0.25	0	1	2	3	3.5	4	5	6	7	8	8.5
			0.38	0	1	2	3	4	5	6	7	8	9	10
	6 con-tacts	1.02	0.25	0	1	2	3	4	5	6	7	8	9	10
			0.5	0	1.5	3	4.5	6	7	8	9.5	11	12.5	14
	14 con-tacts	1.02	0.25	0	1	2	3	3.5	4.5	5	6	7	8	9
			0.5	0	1.5	2.5	4	5	6	7	8.5	9.5	11	12
	5 con-tacts	1.5	0.25	0	1	2	3	4	5	6	7	8	9	10
			0.5	0	1.5	2.5	4	5	6.5	8	9	10.5	11.5	13
			1	0	2	4.5	6.5	9	11	13	15	17.5	20	22
			AWG 16	0	2.5	5	7.5	10	12.5	14.5	17.5	20	22.5	25
			1.5	0	2.5	5	7.5	10	12.5	14.5	17.5	20	22.5	25
	4 con-tacts	2.41	0.5	0	1.5	3	4	5.5	7	8	9.5	11	12.5	14
			1	0	2.5	5	7	9	11	13	15.5	18	20.5	23
			1.5	0	2.5	5	7.5	10	12.5	15	18	21	24	27
			2.5	0	3.5	7	10	13	16	19	22.5	26	29.5	33
			AWG 12	0	4	8	12.5	16.5	20.5	25	29	33	37	41
	3 con-tacts	3	0.5	0	2	3.5	5	6.5	8	9.5	10.5	12	13	14.5
			1	0	2.5	5	7	9.5	12	14	16.5	19	21.5	24
			1.5	0	2.5	5.5	8	11	13.5	16	19	21.5	24.5	27
			2.5	0	3.5	7	10.5	14	17.5	21	25	29	33	37
4			0	5	10	15	20	25	30	35.5	41	46.5	52	
6			0	5	10	15	20	25	30	35.5	41	46.5	52	

Nominal current

Max. continuous current

LINE CURRENT LOAD



The current-carrying capacity of the individual conductors is frequently lower than that of the individual contacts used. When determining the maximum current-carrying capacity, the lowest value is always to be taken into account.

Laying procedure	Exposed in air Single-wire lines PVC, PE, PUR, TPE heat resistant	or on surfaces		
		Multi-wire highly flexible lines for hand-held devices, wire/sheath cold-resistant, PVC insulated		Multi-wire movable lines PVC, PE, PUR, TPE standard program harmonised series
Number of loaded wires	1	2	3	4
Nominal cross-section copper conductor in mm ²	Current load in A			
0.14 ¹	3			2
0.25 ¹	5			4
0.34 ¹	8			6
0.5 ¹	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	32	25	34
6	54	40		44
10	73	63		61
16	98			82
25	129			108
35	158			135
50	198			168
Current load acc. to:	VDE 0298-4:2013 table 11			

Carrying capacity of cables with a rated voltage of up to 1,000 V and of heat resistant cables. The specification of data does not release one from the need to conduct the test. The original standards remain authoritative for all of the listed technical specifications.

¹VDE 0891-1:1990.

TECHNICAL TERMS



AMBIENT TEMPERATURE

Temperature of the air or other medium in which a piece of equipment is intended to be used in. (IEC 44/709/CDV:2014 [VDE 0113-1:2014]).

AWG

American Wire Gauge – see page [122](#).

BASE CURVE

See page [124](#).

CHEMICAL RESISTANCE

Many secondary processing procedures use adhesives, cleaning agents or other chemicals on our products. Contact with unsuitable chemicals may have an adverse effect on the mechanical and electrical properties of the insulation and housing materials which specified properties may not be able to withstand.

CLEARANCE DISTANCE

The shortest distance in the air between two conductive parts. The insulation coordination is explained in detail from page [119](#).

CONNECTORS

Also known as connectors without contact rating (COC): (IEC 61984:2008 [VDE 0627:2009]). An element which enables electrical conductors to be connected and is intended to create and/or separate connections with a suitable counterpart.

CONTACT RESISTANCE

Total resistance value measured from terminal to terminal. In this case, the resistance is significantly lower than the contact resistance. The specifications are average values.

CORES

Electrical conductor, solid wire or multi-wire strand, with insulation as well as any conductive layers. Cables or leads may have one or more cores.

CREEPAGE DISTANCES

The shortest distance between two conductive parts along the surface of a solid insulation material. This factors in all elevations and recesses in the insulator, as long as defined minimum dimensions are on hand. The insulation coordination is explained in detail from page [119](#).

CRIMP BARREL

A terminal sleeve which can accommodate one or more conductors and be crimped by a crimping tool.

CRIMP CONNECTION (CRIMP TERMINATION)

The permanent, non-detachable and solder-free mounting of a contact to a conductor via deforming or shaping under pressure to make a good electrical and mechanical connection. Executed with crimping tool, press or automatic crimping machine (see page [107](#)).

CRIMP TERMINATION

Termination technology, see crimp connection.

CRIMPING AREA

The specified area of the crimp barrel in which the crimp termination is executed by means of deforming or shaping the barrel under pressure around the conductor.

CURRENT-CARRYING CAPACITY (NOMINAL CURRENT AND MAXIMUM CONTINUOUS CURRENT)

The data relates to adequately dimensioned connection cable in accordance with IEC 60228:2004 [VDE 0295:2005; class 5], so that no significant temperature increase here. The indicated temperature increase takes place through the contact. The specifications are average values.

DEGREE OF POLLUTION

The insulation coordination is explained in detail from page [120](#).

DELIVERY FORM

Connectors can be delivered in assembled form or as individual parts on request.

DERATING CURVE

See page [124](#).

DERATING FACTOR

According to VDE 0298-4:2013, with connectors and cables over 5 contacts, the heating is greater than it is with individual contacts. For that reason, the aforementioned standard is calculated with a derating factor. See page [125](#).

TECHNICAL TERMS



DERATING MEASUREMENT METHOD

IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003)

See page [124](#).

INSULATOR

Part of a connector which separates conductive parts with different potentials from one another; usually identical to the contact carrier.

MATERIALS (STANDARD DESIGN)

Pins and bodies of the sockets are manufactured from a CuZn alloy and silver or gold-plated. The lamellas consist of a CuBe alloy and are also silver or gold-plated. The springwire contact wires consist of a CuSn alloy and are also silver or gold-plated.

MATING AND SLIDING FORCE (UNMATING FORCE)

The force required to fully insert or withdraw pluggable elements without the influence of a coupling or locking device. The higher value of the mating force is caused by the "attachment peak". Subsequently, only the pure sliding force has an effect. In the case of lamella contacts, the data refers to contacts in the lubricated state (status at delivery) and after approx. 30 mating cycles. The forces are/may be higher in new condition (lubricated). In the case of springwire contacts, the data refers to contacts in new condition. The data represents average values with a potential fluctuation of $\pm 50\%$.

MATING CYCLES

Mechanical actuation of connectors by mating and sliding. A mating cycle consists of one mating and sliding action. 10,000 mating cycles are the standard value for ODU TURNTAC and ODU LAMTAC contacts; 50,000 mating cycles for flat sockets and 100,000 mating cycles for springwire contacts. These values only apply under the following circumstances: clean environment, appropriate radial guidance, impeccable counterpins.

MAX. CONTINUOUS CURRENT

The metrologically determined amperage at room temperature (approx. 20 °C) which increases the contact temperature to the limit temperature. The values specified in the catalog apply to either individual contacts or completely assembled inserts/modules, as indicated.

NOMINAL CURRENT

IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003)

See rated current.

NOMINAL SINGLE CONTACT CURRENT LOAD

The current-carrying capacity which each individual contact can be loaded with on its own (see from page [124](#)).

NOMINAL VOLTAGE

The voltage which the manufacturer specifies for a connector and which the operating and performance features relate to.

NON-MAGNETIC DEFINITION

ODU modules, plastic housing and frames are 100% tested with a permeability $\mu r < 1.0005$. Metal housing on request.

OPERATING TEMPERATURE FOR ODU-MAC®

See uppermost limit temperature (see page [131](#)). Single modules may differ from the indicated temperature values. Here you find the technical information on the appropriate pages.

PCB TERMINATION

Production of a conductive connection between the PCB and an element in through-hole assembly, THT (through-hole technology).

RATED CURRENT (NOMINAL CURRENT)

See page [125](#).

RATED VOLTAGE

According to IEC 60512-5-2:2002 (DIN EN 60512-5-2:2003) standard "Value of a voltage which is specified by the manufacturer for a component, device or operating medium and relates to the operating and performance features."

SOLDER CONNECTION (SOLDER TERMINATION)

Termination technology in which a molten additional metal (solder) with a lower melting point than the base materials to be connected is used to attach two metallic materials to one another.

TECHNICAL TERMS



SOLDER TERMINATION

Termination technology, see solder connection.

SPINDLE LOCKING

Locking of two halves of a connector pair by one or more screws, which are generally fluted or have a toggle for easier activation. To extend the provided service life, re-lubrication with a suitable lubricant is recommended.

TERMINATION CROSS-SECTION

The specified cross-sections correspond to a "fine-wire" conductor structure pursuant to IEC 60228:2004 (VDE 0295:2005; Class 5) or a "fine-wire" conductor structure (7/19 wire) according to AWG (ASTM B258-14).

TERMINATION TECHNOLOGIES

Methods for connecting the leads to the electro-mechanical element, such as solder-free connections pursuant to IEC 60352 (DIN EN 60352): crimp, screw connection etc. or soldering connection (see page [106](#)).

TIGHTNESS IEC 60529:2013 (VDE 0470-1:2014)

See protection types on page [118](#).

UPPERMOST LIMIT TEMPERATURE

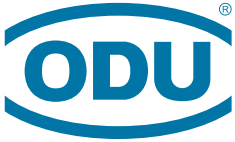
The maximum permissible temperature at which a connector may be operated. It includes contact heating through current-carrying capacity. With contacts with standard springwire, it amounts to +120 °C, with contacts with standard lamella +150 °C. Please consult ODU for high-temperature applications.

WIRE

Wires (solid conductors) are available with an insulator sleeve and/or electrical shielding. Cables or conductors may be made up of one or more wires.

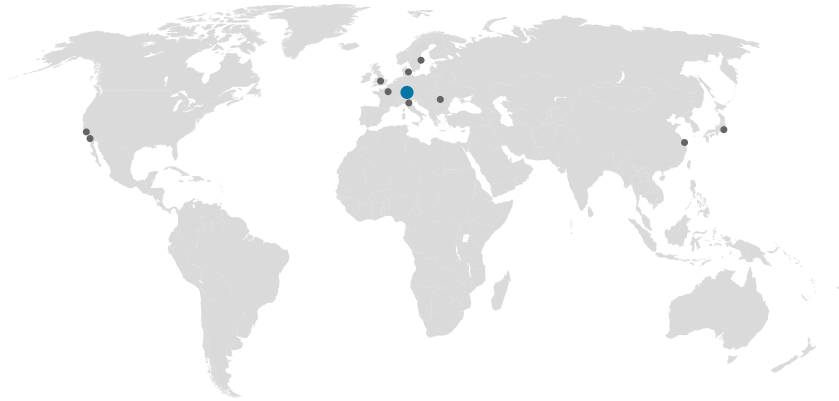
GENERAL NOTE

The connectors listed in this catalogue are intended for use in high voltage and frequency ranges. Suitable precautionary measures must be taken to ensure that people do not come into contact with live conductors during installation and operation. All entries in this catalogue were thoroughly reviewed before printing. ODU reserves the right to make changes based on the current state of knowledge without prior notice without being obliged to provide replacement deliveries or refinements of older designs.



A PERFECT ALLIANCE.

ODU GROUP WORLDWIDE



HEADQUARTERS

ODU GmbH & Co. KG

Pregelstraße 11, 84453 Mühldorf a. Inn, Germany
Phone: +49 8631 6156-0, Fax: +49 8631 6156-49, E-mail: zentral@odu.de

SALES SUBSIDIARIES

ODU Denmark ApS

Phone: +45 2233 5335
E-mail: sales@odu-denmark.dk
www.odu-denmark.dk

ODU Japan K.K.

Phone: +81 3 6441 3210
E-mail: sales@odu.co.jp
www.odu.co.jp

ODU-UK Ltd.

Phone: +44 330 002 0640
E-mail: sales@odu-uk.co.uk
www.odu-uk.co.uk

ODU France SARL

Phone: +33 1 3935-4690
E-mail: odu@odu.fr
www.odu.fr

ODU Scandinavia AB

Phone: +46 176 18262
E-mail: sales@odu.se
www.odu.se

ODU-USA, Inc.

Phone: +1 805 484-0540
E-mail: sales@odu-usa.com
www.odu-usa.com

ODU Italia S.R.L.

Phone: +39 331 8708847
E-mail: sales@odu-italia.it
www.odu-italia.it

ODU (Shanghai)

International Trading Co., Ltd.
Phone: +86 21 58347828-0
E-mail: oduchina@odu.com.cn
www.odu.com.cn

Further information and specialized representatives can be found at:

www.odu-connectors.com/contact

PRODUCTION AND LOGISTICS SITES

Germany Otto Dunkel GmbH
China ODU (Shanghai) Connectors Manufacturing Co.Ltd
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