A PERFECT ALLIANCE.

ODU-MAC® NON-MAGNETIC

Connector solutions for MRI applications.

HIGH RELIABILITY
HIGH MATING CYCLES
CABLE ASSEMBLY
INTEGRATED SOLUTIONS
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
• Measurement and testing
• Military and security

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

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

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

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.

ODU WORLDWIDE

ODU GROUP OVERVIEW
- 75 years of experience in connector technology
- €150 million in turnover
- Over 1,650 employees worldwide
- 9 sales subsidiaries: China, Denmark, France, Germany, Italy, Japan, Sweden, the UK and the US
- 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 2017

CERTIFIED QUALITY
- DIN EN ISO 9001
- ISO/TS 16949
- DIN EN ISO 14001
- ISO 13485
- Wide range of UL, CSA, VG and DIN 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 contact density available
- Flexible modular construction
- Multiplicity of data transmission modules
- Variety of locking options available
- For the transmission of signals, power, high current, high voltage, 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
- With Push-Pull locking mechanism for a secure connector
- 2 up to 55 contacts
- IP 50 to IP 69
- Autoclavable for medical applications

SINGLE 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 environment
- Economical solutions for automatic processing

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
- Quantum production
- Hot-melt and high-pressure injection molding
- Customer-specific labeling
- Rapid prototyping of samples

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.
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.

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.

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 local tested assemblies and also global ones.
# PRODUCT INFORMATION

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact modular connector system</td>
<td>12</td>
</tr>
<tr>
<td>Correct configuring – step by step</td>
<td>14</td>
</tr>
<tr>
<td>ODU-MAC® Automatic docking</td>
<td>16</td>
</tr>
<tr>
<td>ODU-MAC® Manual mating</td>
<td>18</td>
</tr>
<tr>
<td>The contact principle</td>
<td>22</td>
</tr>
<tr>
<td>Contact retention with the clip principle</td>
<td>24</td>
</tr>
<tr>
<td>Application specific solutions</td>
<td>26</td>
</tr>
<tr>
<td>Cable assembly integrated solutions</td>
<td>28</td>
</tr>
</tbody>
</table>
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

THE MODULARITY AT A GLANCE:

Possible applications:
- automatic docking or manual mating

Cable hood versions

Different docking frames independently configurable length (see page 16)

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

Different spindle geometries

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

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

Housings

Pin frame

Contacts for solder, crimp, PCB and SMA terminations

Spindle locking

Socket frame

Housing
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.

ODU-MAC® silver-Line

1ST STEP: FRAME SELECTION
Depending upon your requirements, you can choose 5 different frame sizes as a base for automatic docking.

<table>
<thead>
<tr>
<th>Frames</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODU-MAC® S (Standard)</td>
</tr>
<tr>
<td>ODU-MAC® M (Mini)</td>
</tr>
<tr>
<td>ODU-MAC® T (Transverse)</td>
</tr>
</tbody>
</table>

2ND STEP: MODULE SELECTION
Choose from 16 different modules for transferring signal, power, high voltage, coax, fiber optic and assemble your ODU-MAC individually.

<table>
<thead>
<tr>
<th>Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
</tr>
<tr>
<td>Coax</td>
</tr>
<tr>
<td>Power</td>
</tr>
<tr>
<td>Fiber optic</td>
</tr>
<tr>
<td>High voltage</td>
</tr>
<tr>
<td>Blank modules/spacer modules/</td>
</tr>
<tr>
<td>coding modules/pin protection module</td>
</tr>
</tbody>
</table>

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

1ST STEP: LOCKING
Select the type of lock in this first step. You have the choice between Snap-In and spindle locking:

<table>
<thead>
<tr>
<th>Locking Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snap-In locking</td>
</tr>
<tr>
<td>Spindle locking</td>
</tr>
</tbody>
</table>

2ND STEP: CONNECTOR HOUSING
Depending upon the lock, choose the housing suited to your requirements. The following housings are available:

<table>
<thead>
<tr>
<th>Locking Type</th>
<th>Housing Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snap-In locking</td>
<td>Bulkhead mounted housing</td>
</tr>
<tr>
<td></td>
<td>Surface mounted housing</td>
</tr>
<tr>
<td>Spindle locking</td>
<td>Bulkhead mounted housing</td>
</tr>
<tr>
<td></td>
<td>Surface mounted housing</td>
</tr>
</tbody>
</table>

3RD STEP: RECEPTACLE SELECTION
Depending upon the requirements for the receptacle and the selected connector housing, a wide variety of designs is available.

<table>
<thead>
<tr>
<th>Receptacle</th>
<th>Cable Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead mounted</td>
<td>Housing</td>
</tr>
<tr>
<td>Surface mounted</td>
<td>Housing</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>See page 60</td>
</tr>
</tbody>
</table>
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.

FURTHER INFORMATION FROM PAGE 30.

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

3–60 UNITS STANDARD

> 60 UNITS ON REQUEST
ODU-MAC® White-Line
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, light waves, 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)

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)

<table>
<thead>
<tr>
<th>Size</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO</td>
<td>9</td>
</tr>
</tbody>
</table>

For integration in the device.
**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

<table>
<thead>
<tr>
<th>Size</th>
<th>Units¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
</tr>
</tbody>
</table>

CABLE HOOD XXL:

<table>
<thead>
<tr>
<th>Size</th>
<th>Units¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>34</td>
</tr>
</tbody>
</table>

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

ODU SPRINGTAC®
Contacts with springwire technology.

The ODU SPRINGTAC is the most effective contact system on the market. Constant transfer is always guaranteed thanks to the large number of individual, independently flexible springwires. Even with the smallest contact diameter of $\varnothing 0.76$ mm, 15 individual springs are still installed, meaning that even this small diameter provides 15 contact surfaces for current transfer. Correspondingly more for larger diameters.

ADVANTAGES
• Greater than 100,000 mating cycles (up to 1 million mating cycles can be achieved)
• High current-carrying capacity – surge current capacity
• Low contact resistances
• Large number of independently flexible contact springs, e.g. 40 springs with a diameter of 5 mm
• Low mating and demating forces
• Extremely secure connection
• High vibration and shock resistance
• Individual contacts upon request

Standard contact principle for:

<table>
<thead>
<tr>
<th>Signal</th>
<th>1 to 5 contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>4 to 3 contacts</td>
</tr>
<tr>
<td>High voltage</td>
<td>4 contacts</td>
</tr>
<tr>
<td>Coax</td>
<td>2 contacts</td>
</tr>
</tbody>
</table>

ODU LAMTAC®
Contacts with lamella technology.

The ODU LAMTAC contact consists of a lathe-turned body in which one or more stamped lamella strips are mounted. The individual bars of the lamella provide numerous contact points which guarantee high contact reliability and optimum conductive properties. The adopted contact force ensures low mating and demating forces, and a long service life with low wear. The mating cycles here are minimum 10,000.

ADVANTAGES
• > 10,000 mating cycles
• Low contact resistances
• Low mating and demating forces
• Secure connection
• High vibration and shock resistance
• Economical alternative to springwire contacts
• Individual contacts upon request

Standard contact principle for:

| Coax        | 4 contacts |

Table of Contents
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.
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

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

FOR MEDICAL

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

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

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

Advantages
- Non-magnetic version

PRODUCT INFORMATION

Table of Contents
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

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

CABLE ASSEMBLY CAPABILITIES

CABLE ASSEMBLY

- 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

PRODUCT ASSEMBLY TECHNOLOGIES AND SERVICES

CERTIFIED QUALITY

- DIN EN ISO 9001
- ISO/TS 16949
- DIN EN ISO 14001
- ISO 13485
- Vast range of UL, CSA, VG and VDE approvals
- UL-certified cable assembly

UL -certified cable assembly

PRIVATE LABELING

PRIVATE LABELING

PRIVATE LABELING
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)

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

<table>
<thead>
<tr>
<th>Frame</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>+/- 0.6 mm</td>
</tr>
<tr>
<td>M+</td>
<td>+/- 0.6 mm</td>
</tr>
<tr>
<td>T</td>
<td>On request</td>
</tr>
</tbody>
</table>

MAXIMUM PERMISSIBLE ANGLE DEVIATION WHEN MATING

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

EXAMPLE OF AN S FRAME SYSTEM

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

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 maximum 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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Dim. A</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin frame</td>
<td>611.020.0...400.000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Socket frame</td>
<td>610.020.0...400.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin frame</td>
<td>611.021.0...400.000</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Socket frame</td>
<td>610.020.0...400.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin frame</td>
<td>611.025.0...400.000</td>
<td>21</td>
<td>Model for spindle locking</td>
</tr>
<tr>
<td>Socket frame</td>
<td>610.020.0...400.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin frame</td>
<td>611.050.0...400.000</td>
<td>10</td>
<td>With labelling</td>
</tr>
</tbody>
</table>

L = Number of units x 2.54
---
Here please register number of desired units from 03 to 60, above 61 on request

TECHNICAL DATA

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

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

Non-magnetic version available upon request.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 1: Base part incl. distance piece</td>
<td>610.026.0...600.000</td>
<td>610.026.0...600.000</td>
</tr>
<tr>
<td>Part 2: Socket frame – interchange part</td>
<td>610.020.0...600.000</td>
<td>610.020.0...600.000</td>
</tr>
<tr>
<td>Part 3: Pin frame – interchange part</td>
<td>610.021.0...600.000</td>
<td>610.021.0...600.000</td>
</tr>
<tr>
<td>Part 4: Base part incl. distance piece</td>
<td>610.026.0...600.000</td>
<td>610.026.0...600.000</td>
</tr>
<tr>
<td>Distance piece as a spare part</td>
<td>610.26.201.304.000</td>
<td>610.26.201.304.000</td>
</tr>
</tbody>
</table>

Frames for 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.

MODULES AND CONTACTS FOR THE QUICK CHANGE HEAD SYSTEM

All modules with depths not exceeding 19 mm can be used in the connector saver. ODU-MAC L docking frames upon request. (M+ and P+ frames are not possible).

The quick change head connector saver is available from stock.

Non-magnetic version available upon request.

Frames for the quick change head system and modules are available on request.

Technical specifications have to be clarified in detail.

Frames for the highest cycle requirements (connector saver) and with a low maintenance downtime, due replaceable parts.
**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 39

**SOCKET FRAME WITH GUIDING HOLE**

**PIN FRAME WITH GUIDING PIN**

**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**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin frame</td>
<td>611.716.0…400.000</td>
</tr>
<tr>
<td>Socket frame</td>
<td>610.716.0…400.000</td>
</tr>
</tbody>
</table>

L = Number of units × 2.54
[5] = Here please register number of desired units (05 to 60 in steps of 5, above 61 on request)

**NOT COMPATIBLE WITH ODU-MAC M FRAME.**

**ODU-MAC P+ FRAME WITHOUT OPTIONAL PE TRANSMISSION BACKWARDS COMPATIBLE WITH ODU-MAC P FRAME.**
**PE TRANSMISSION FOR ODU-MAC M+ (MINI)**

**GROUNDBING KIT FOR M+ SOCKET FRAME**

- Non-magnetic version available upon request.

**GROUNDBING KIT MOUNTED**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Connection threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>190.270.002.000.000</td>
<td>M4</td>
</tr>
</tbody>
</table>

Max. 4 mm² lug connection for PE transmission.

**GROUNDBING KIT FOR M+ PIN FRAME**

- Non-magnetic version available upon request.

**GROUNDBING KIT MOUNTED**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Connection threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>190.270.002.000.000</td>
<td>M4</td>
</tr>
</tbody>
</table>

Max. 4 mm² lug connection for PE transmission.

**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

**CONTACT RESISTANCE COMPLIANT WITH < 0.1 Ω NORM.**

---

**PE TRANSMISSION FOR ODU-MAC P+ (POWER)**

**GROUNDING KIT FOR P+ SOCKET FRAME**

- Non-magnetic version available upon request.

**GROUNDING KIT MOUNTED**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Connection threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>174.100.000.301.100</td>
<td>M5</td>
</tr>
</tbody>
</table>

Max. 10 mm² lug connection for PE transmission.

**GROUNDING KIT FOR P+ PIN FRAME**

- Non-magnetic version available upon request.

**GROUNDING KIT MOUNTED**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Connection threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>180.100.000.301.100</td>
<td>M5</td>
</tr>
</tbody>
</table>

Max. 10 mm² lug connection for PE transmission.

**TECHNICAL DATA**

- Tolerance compensation:
  - Axial play: 1.0 mm
  - Radial play: +/- 2.5 mm
- Minimum 100,000 mating cycles
- Double-sided version
- Surface: Ag

**CONTACT RESISTANCE COMPLIANT WITH < 0.1 Ω NORM.**
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.

Table of Contents

<table>
<thead>
<tr>
<th>Part number Pin frame</th>
<th>Part number Socket frame</th>
<th>Dim. L mm</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>611 055.029.303.600</td>
<td>610 055.029.103.600</td>
<td>7.62</td>
<td>3 x 2</td>
</tr>
<tr>
<td>611 055.029.304.600</td>
<td>610 055.029.104.600</td>
<td>10.16</td>
<td>4 x 2</td>
</tr>
<tr>
<td>611 055.029.305.600</td>
<td>610 055.029.105.600</td>
<td>12.7</td>
<td>5 x 2</td>
</tr>
<tr>
<td>611 055.029.306.600</td>
<td>610 055.029.106.600</td>
<td>15.24</td>
<td>6 x 2</td>
</tr>
<tr>
<td>611 055.029.307.600</td>
<td>610 055.029.107.600</td>
<td>17.78</td>
<td>7 x 2</td>
</tr>
<tr>
<td>611 055.029.308.600</td>
<td>610 055.029.108.600</td>
<td>20.32</td>
<td>8 x 2</td>
</tr>
<tr>
<td>611 055.029.309.600</td>
<td>610 055.029.109.600</td>
<td>22.86</td>
<td>9 x 2</td>
</tr>
<tr>
<td>611 055.029.310.600</td>
<td>610 055.029.110.600</td>
<td>25.4</td>
<td>10 x 2</td>
</tr>
</tbody>
</table>
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]

90° CABLE EXIT

0° CABLE EXIT

45° CABLE EXIT

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Part number</th>
<th>Cable exit</th>
<th>Size</th>
<th>Units²</th>
</tr>
</thead>
<tbody>
<tr>
<td>656.560.004.001.000</td>
<td>90°</td>
<td>ZERO</td>
<td>9</td>
</tr>
<tr>
<td>656.560.006.001.000</td>
<td>0°</td>
<td>ZERO</td>
<td>9</td>
</tr>
<tr>
<td>656.560.002.001.000</td>
<td>45°</td>
<td>ZERO</td>
<td>9</td>
</tr>
</tbody>
</table>

SUITABLE MODULES ARE MARKED.

RECEPTACLE

For integration in the device.

SNAP-IN LOCKING [BREAK-AWAY FUNCTION]

Panel cut-out

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Part number</th>
<th>Units²</th>
</tr>
</thead>
<tbody>
<tr>
<td>656.560.001.001.000</td>
<td>2.54 mm</td>
</tr>
</tbody>
</table>

MAXIMUM MATING SECURITY THROUGH MECHANICAL CODING [D-SHAPE] AND EASY HANDLING.

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

TECHNICAL NOTES

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

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color of housing</td>
<td>White</td>
</tr>
<tr>
<td>Insulation material</td>
<td>according to UL 94 V0</td>
</tr>
<tr>
<td>Housing material</td>
<td>PC Lexan 925A (UL 94 V-2)</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 54</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40°C to 125°C</td>
</tr>
<tr>
<td>Cable diameter</td>
<td>8 to 14 mm</td>
</tr>
<tr>
<td>Locking system</td>
<td>180° Spindle locking (up to 30 K mating cycles, with replaceable tip)</td>
</tr>
</tbody>
</table>

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

## TECHNICAL DATA – TX COAX 50 Ω

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Conductor cross-section</th>
<th>Termination</th>
<th>Nominal current</th>
<th>Max continuous current</th>
<th>Contact resistance</th>
<th>Max information see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin contact short</td>
<td>182.958.000.370.000</td>
<td>0.38</td>
<td>22</td>
<td>7.5</td>
<td>11</td>
<td>3.8</td>
<td>68–69</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>182.959.000.370.000</td>
<td>0.38/0.08</td>
<td>24/28</td>
<td>6</td>
<td>5</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Socket contact</td>
<td>172.958.700.257.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## TECHNICAL DATA – RX COAX 50 Ω

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Conductor cross-section</th>
<th>Termination</th>
<th>Nominal current</th>
<th>Max continuous current</th>
<th>Contact resistance</th>
<th>Max information see page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin contact short</td>
<td>182.956.000.370.000</td>
<td>0.50/0.38</td>
<td>20/22</td>
<td>9</td>
<td>8</td>
<td>3.8</td>
<td>70–71</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>182.945.000.370.000</td>
<td>0.25/0.08</td>
<td>24/28</td>
<td>6</td>
<td>6</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Socket contact</td>
<td>172.944.700.257.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 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.
- Comp information see page 155.

All technical information see module description p. 84–85.
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

<table>
<thead>
<tr>
<th>Size</th>
<th>Part number</th>
<th>Part number Spindle locking for cable hood</th>
<th>Angle of rotation</th>
<th>Dim. A mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (52 mm high)</td>
<td>614.090.001.338.001</td>
<td>615.091.004.900.001</td>
<td>180°</td>
<td>12</td>
</tr>
<tr>
<td>2 (72 mm high)</td>
<td>615.091.001.900.001</td>
<td>615.091.002.900.001</td>
<td>180°</td>
<td>12</td>
</tr>
<tr>
<td>3/4</td>
<td>615.092.011.900.001</td>
<td>615.092.012.900.001</td>
<td>360°</td>
<td>16.3</td>
</tr>
</tbody>
</table>

• Max. locking cycles 30,0000
• Space requirement 5 units (5 × 2.54 mm)
• Further spindle geometries on request
• Can account for 80 lbf (9 Nm) of mating forces

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Part number</th>
<th>Part number Spindle locking for cable hood</th>
<th>Angle of rotation</th>
<th>Dim. A mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (52 mm high)</td>
<td>615.091.004.900.001</td>
<td>615.091.002.900.001</td>
<td>180°</td>
<td>12</td>
</tr>
<tr>
<td>2 (72 mm high)</td>
<td>615.091.004.900.001</td>
<td>615.091.002.900.001</td>
<td>180°</td>
<td>12</td>
</tr>
<tr>
<td>3/4</td>
<td>615.092.012.900.001</td>
<td>615.092.012.900.001</td>
<td>360°</td>
<td>16.3</td>
</tr>
</tbody>
</table>

• Max. locking cycles 30,0000
• Space requirement 5 units (5 × 2.54 mm)
• Further spindle geometries on request

REPLACEMENT SPINDLE SET FOR VERSION 1 AND 2

<table>
<thead>
<tr>
<th>Part number spindle exchange set</th>
<th>Angle of rotation</th>
<th>Dim. A mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>615.090.104.249.010</td>
<td>180°</td>
<td>12</td>
</tr>
<tr>
<td>615.090.104.247.010</td>
<td>360°</td>
<td>16.3</td>
</tr>
</tbody>
</table>

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.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Color of housing</th>
<th>White (similar RAL 9010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Aluminium die casting</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 50</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40 °C to +125 °C</td>
</tr>
<tr>
<td>Cable clamp</td>
<td>see page 57</td>
</tr>
<tr>
<td>Number of locking cycles</td>
<td>see page 50</td>
</tr>
</tbody>
</table>

SPINDLE LOCKING

SIZE

<table>
<thead>
<tr>
<th>Size</th>
<th>Part number B</th>
<th>Part number C</th>
<th>Dim. A (mm)</th>
<th>Dim. B (mm)</th>
<th>Dim. C (mm)</th>
<th>Dim. D (mm)</th>
<th>Part number protective cover (see page 52)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>613.091.513.453.203</td>
<td>–</td>
<td>57</td>
<td>73</td>
<td>52</td>
<td>43</td>
<td>M25 On request</td>
</tr>
<tr>
<td></td>
<td>613.091.514.453.203</td>
<td>613.091.514.453.208</td>
<td>57</td>
<td>73</td>
<td>72</td>
<td>43</td>
<td>On request</td>
</tr>
<tr>
<td>3</td>
<td>613.092.514.453.203</td>
<td>613.092.514.453.208</td>
<td>775</td>
<td>93.3</td>
<td>76</td>
<td>45.5</td>
<td>M32 On request</td>
</tr>
<tr>
<td></td>
<td>613.093.514.453.203</td>
<td>613.093.514.453.208</td>
<td>104</td>
<td>120</td>
<td>76</td>
<td>45.5</td>
<td>On request</td>
</tr>
<tr>
<td>4</td>
<td>613.093.515.453.008</td>
<td>613.093.515.453.008</td>
<td>104</td>
<td>120</td>
<td>76</td>
<td>45.5</td>
<td>M40 On request</td>
</tr>
</tbody>
</table>

CABLE HOOD XXL

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

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Color of housing</th>
<th>Gray, white on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Aluminium die casting</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 50</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–40 °C to +125 °C</td>
</tr>
<tr>
<td>Cable clamp</td>
<td>see page 57</td>
</tr>
<tr>
<td>Number of locking cycles</td>
<td>see page 50</td>
</tr>
</tbody>
</table>

SPINDLE LOCKING

SIZE

<table>
<thead>
<tr>
<th>Size</th>
<th>Part number B</th>
<th>Part number C</th>
<th>Dim. M (mm)</th>
<th>Part number protective cover (see page 52)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>613.093.516.444.208</td>
<td>613.093.516.444.208</td>
<td>104</td>
<td>M50 On request</td>
</tr>
<tr>
<td></td>
<td>613.092.514.453.203</td>
<td>613.092.514.453.208</td>
<td>76</td>
<td>On request</td>
</tr>
<tr>
<td>3</td>
<td>613.093.514.453.203</td>
<td>613.093.514.453.208</td>
<td>76</td>
<td>On request</td>
</tr>
<tr>
<td></td>
<td>613.093.515.453.008</td>
<td>613.093.515.453.008</td>
<td>76</td>
<td>M40 On request</td>
</tr>
</tbody>
</table>

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)
- **Material**: Aluminium die casting
- **Protection class**: 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)

#### PANEL-CUT OUT

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

#### Size | Part number | Dim. A | Dim. B | Dim. C | Dim. D | X1 | X2 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>Units 2.54 mm</td>
<td>Units 2.54 mm</td>
</tr>
<tr>
<td>2</td>
<td>612.091.010.653.000</td>
<td>57</td>
<td>83</td>
<td>95</td>
<td>65.2</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>612.092.010.653.000</td>
<td>77.5</td>
<td>103</td>
<td>115</td>
<td>85.5</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>612.093.010.653.000</td>
<td>104</td>
<td>130</td>
<td>143</td>
<td>112.2</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

1. IEC 60529:2013 (VDE 0470-1:2014) [Depends on the cable clamp(s) and 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)
- **Material**: Aluminium die casting
- **Protection class**: 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

#### Table of Contents

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>Units 2.54 mm</td>
<td>Units 2.54 mm</td>
<td>Cable entry</td>
</tr>
<tr>
<td>2</td>
<td>612.091.025.653.102</td>
<td>57</td>
<td>82</td>
<td>92.5</td>
<td>74</td>
<td>55.5</td>
<td>6</td>
<td>6</td>
<td>M32</td>
</tr>
<tr>
<td>3</td>
<td>612.092.025.653.102</td>
<td>77.5</td>
<td>105</td>
<td>117</td>
<td>84</td>
<td>56.5</td>
<td>9</td>
<td>10</td>
<td>M32</td>
</tr>
<tr>
<td>4</td>
<td>612.093.025.653.102</td>
<td>104</td>
<td>132</td>
<td>144</td>
<td>84</td>
<td>57.5</td>
<td>14</td>
<td>15</td>
<td>M32</td>
</tr>
</tbody>
</table>

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

CABLE CLAMP® FOR HOUSINGS ACCORDING TO IEC 62444-2010 (VDE 0619-2014)

<table>
<thead>
<tr>
<th>Part number</th>
<th>Thread</th>
<th>Color</th>
<th>Width across flats</th>
<th>Tightening torque</th>
<th>Cable diameter mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>027825060130007</td>
<td>M25 × 1.5</td>
<td>Gray</td>
<td>30</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>027825090170007</td>
<td>M32 × 1.5</td>
<td>36</td>
<td>10</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>027832070150007</td>
<td>M32 × 1.5</td>
<td>46</td>
<td>13</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>027832110210007</td>
<td>M50 × 1.5</td>
<td>55</td>
<td>15</td>
<td>27</td>
<td>35</td>
</tr>
<tr>
<td>027840190280007</td>
<td>M40 × 1.5</td>
<td>30</td>
<td>8</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>027850270350007</td>
<td>M50 × 1.5</td>
<td>9</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02782506030003</td>
<td>M25 × 1.5</td>
<td>36</td>
<td>10</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>027832070170003</td>
<td>M32 × 1.5</td>
<td>46</td>
<td>13</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>02783211030008</td>
<td>M40 × 1.5</td>
<td>36</td>
<td>10</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>027840190280008</td>
<td>M50 × 1.5</td>
<td>46</td>
<td>13</td>
<td>19</td>
<td>28</td>
</tr>
</tbody>
</table>

TECHNICAL DATA
- Material: Body – PA fiber glass reinforced
- Protection class: IP68
- Temperature range: −40°C to +125°C
- Sealing: NBR; sealing material

BLIND GROMMET FOR SURFACE MOUNTED HOUSING

<table>
<thead>
<tr>
<th>Part number</th>
<th>Thread</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>921000006000279</td>
<td>M25 × 1.5</td>
<td>Gray</td>
</tr>
<tr>
<td>92100000600268</td>
<td>M32 × 1.5</td>
<td></td>
</tr>
<tr>
<td>On request</td>
<td>M40 × 1.5</td>
<td></td>
</tr>
<tr>
<td>On request</td>
<td>M50 × 1.5</td>
<td></td>
</tr>
</tbody>
</table>

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

Socket frame and pin frame dimensions:
- Size: ZERO, 2, 3, 4/XXL
- Max. units: 2.54 mm
- Dimensions: A, B, C
- Typical dimensions: A: 27, B: 16, C: 10

Delivery does not contain cable clamp, but o-ring is enclosed with the housing.
PROTECTIVE TRANSPORT COVER

For protection of the assembled connector during transport.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Material</th>
<th>Plastic PP/antistatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Black (similar to RAL 9002)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Part number</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>491 097 900.924.000</td>
<td>491 097 900.924.101</td>
</tr>
<tr>
<td>3</td>
<td>492 097 900.924.000</td>
<td>492 097 900.924.101</td>
</tr>
<tr>
<td>4/XXL</td>
<td>493 097 900.924.000</td>
<td>493 097 900.924.101</td>
</tr>
</tbody>
</table>

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

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Material</th>
<th>Silicone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depending on the application, the MRI field must be checked by the customer.</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>–50 °C to +200 °C</td>
</tr>
</tbody>
</table>

DESCRIPTION

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

<table>
<thead>
<tr>
<th>Part number</th>
<th>Dim. L mm</th>
<th>Cable jacket (∅ outside) mm</th>
<th>Color code</th>
<th>Color</th>
<th>RAL no. 1 (convert)</th>
</tr>
</thead>
<tbody>
<tr>
<td>704.023.____ 965.080</td>
<td>60</td>
<td>8 10</td>
<td>202</td>
<td>Red</td>
<td>3020</td>
</tr>
<tr>
<td>704.023.____ 965.100</td>
<td>60</td>
<td>10 12</td>
<td>203</td>
<td>White 2</td>
<td>9010</td>
</tr>
<tr>
<td>704.023.____ 965.120</td>
<td>60</td>
<td>12 14</td>
<td>204</td>
<td>Yellow</td>
<td>1016</td>
</tr>
<tr>
<td>704.023.____ 965.140</td>
<td>60</td>
<td>14 16</td>
<td>205</td>
<td>Green</td>
<td>6029</td>
</tr>
</tbody>
</table>

1 Due to variations in raw materials, colors may differ slightly from RAL numbers. 2 Standard colors with short delivery period.
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
<table>
<thead>
<tr>
<th>Modules</th>
<th>Description</th>
<th>Units/width</th>
<th>Features</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
<td>14 contacts for turned contacts</td>
<td>3</td>
<td>High contact density</td>
<td>66</td>
</tr>
<tr>
<td>Contact ø 1.02 mm</td>
<td>Operating voltage¹</td>
<td>320 V</td>
<td>2,500 V</td>
<td>13.5 A for 0.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Rated impulse voltage¹</td>
<td>625 V</td>
<td>10,000 V</td>
<td>27 A for 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Max. continuous current¹</td>
<td>3.5 A for 0.5 mm²</td>
<td>2 minimum 100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of pollution¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 contacts for turned contacts</td>
<td>1</td>
<td>Highest contact density</td>
<td>68</td>
</tr>
<tr>
<td>Contact ø 0.76 mm</td>
<td>Operating voltage¹</td>
<td>250 V</td>
<td>1,500 V</td>
<td>11 A for 0.38 mm²</td>
</tr>
<tr>
<td></td>
<td>Rated impulse voltage¹</td>
<td>625 V</td>
<td>10,000 V</td>
<td>27 A for 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Max. continuous current¹</td>
<td>11 A for 0.38 mm²</td>
<td>2 minimum 100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of pollution¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 contacts for turned contacts</td>
<td></td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Contact ø 1.02 mm</td>
<td>Operating voltage¹</td>
<td>400 V</td>
<td>3,000 V</td>
<td>13.5 A for 0.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Rated impulse voltage¹</td>
<td>625 V</td>
<td>10,000 V</td>
<td>27 A for 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Max. continuous current¹</td>
<td>3.5 A for 2.5 mm²</td>
<td>2 minimum 100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of pollution¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 contacts for turned contacts</td>
<td></td>
<td></td>
<td>72</td>
</tr>
<tr>
<td>Contact ø 1.5 mm</td>
<td>Operating voltage¹</td>
<td>500 V</td>
<td>2,500 V</td>
<td>11.5 A for 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Rated impulse voltage¹</td>
<td>625 V</td>
<td>10,000 V</td>
<td>27 A for 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Max. continuous current¹</td>
<td>3.5 A for 2.5 mm²</td>
<td>2 minimum 100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of pollution¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power</td>
<td>4 contacts for turned contacts</td>
<td></td>
<td>74</td>
</tr>
<tr>
<td>Contact ø 2.41 mm</td>
<td>Operating voltage¹</td>
<td>500 V</td>
<td>3,000 V</td>
<td>13.5 A for 2.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Rated impulse voltage¹</td>
<td>625 V</td>
<td>10,000 V</td>
<td>27 A for 2.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Max. continuous current¹</td>
<td>3.5 A for 2.5 mm²</td>
<td>2 minimum 100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degree of pollution¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Modules</th>
<th>Description</th>
<th>Units / width</th>
<th>Features</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coax</td>
<td>6 contacts for SD 1 common shield</td>
<td>3, 7.62 mm</td>
<td>Frequency range: 0–1.3 GHz, Mating cycles: 40,000</td>
<td>86</td>
</tr>
<tr>
<td>Coax</td>
<td>8 contacts for SD 1 common shield</td>
<td>3, 7.62 mm</td>
<td>Frequency range: 0–1.3 GHz, Mating cycles: 40,000</td>
<td>88</td>
</tr>
<tr>
<td>Coax</td>
<td>8-channel module (coax option)</td>
<td>4, 10.16 mm</td>
<td>Easy to assemble: Frequency range: 0–150 MHz, Mating cycles: 100,000</td>
<td>92</td>
</tr>
<tr>
<td>MINI-COAX</td>
<td></td>
<td></td>
<td>Frequency range: 0–1.15 GHz, Mating cycles: minimum 5,000</td>
<td>94</td>
</tr>
<tr>
<td>Blank modules</td>
<td></td>
<td></td>
<td>Used to fill incomplete frames.</td>
<td>100</td>
</tr>
<tr>
<td>Spacer module</td>
<td></td>
<td></td>
<td>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.</td>
<td>101</td>
</tr>
<tr>
<td>Coding modules</td>
<td></td>
<td></td>
<td>Arranged between the modules to create keyed guiding system.</td>
<td>102</td>
</tr>
<tr>
<td>Pin protection</td>
<td></td>
<td></td>
<td>Used to protect the pins in conjunction with small pin diameters.</td>
<td>103</td>
</tr>
</tbody>
</table>

*1 Acc. to IEC 60664-1:2007 [VDE 0110-1:2008] for degree of pollution 2. 2 Definition max. continuous current see page 125.*
MODULES 14 CONTACTS

Contact diameter: 1.02 mm  
Mating cycles: minimum 100,000  
Current-carrying capacity\(^1\): 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 0110-1:2008 see page 119).  
• Contacts and insulators up to 200 °C on request  
• Crimp information see page 106.

TECHNICAL DATA

Voltage information\(^1\)
- Operating voltage: 320 V
- Rated impulse voltage: 2,500 V

Degree of pollution: 2

Voltage information acc. to MIL\(^1\)
- 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

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.

• Determined according to IEC 60664-1:2007 (VDE 0110-1:2008) see page 119.  
• Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K.  
• Determined max. continuous current see page 125.

- ** 4 0 +0.5: AWG 24/28; 0.25 /0.08 mm\(^2\)
- ** 4 5: AWG 20/22; 0.5 /0.38 mm\(^2\)

Table of Contents
MODULES

MODULE 10 CONTACTS FOR TURNED CONTACTS

Contact diameter: 0.76 mm
Mating cycles: minimum 100,000
Current-carrying capacity: 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.

TECHNICAL DATA
- Voltage information
  - Operating voltage: 250 V, 32 V
  - Rated impulse voltage: 1,500 V, 1,500 V
  - Degree of pollution: 2, 3
- Voltage information acc. to MIL
  - 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

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.

Table: Description, Part number, Conductor cross-section, Nominal current, Max. continuous current, Contact resistance

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

- Pin contact short: 182.958.000.370.000
- Pin contact long: 182.959.000.370.000
- Socket contact: 172.958.700.257.000
- Dummy contact: 021.341.123.923.000

Removal of unassembled contacts, or contacts from which the cable has been removed:

- Pin contact short: 182.965.000.370.000
- Pin contact long: 182.966.000.370.000
- Socket contact: 172.965.700.257.000
- Dummy contact: 021.341.123.923.000

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

* ≤ Ø 1.15 removal possible / ≤ Ø 1.75 removal not possible.
Contact diameter: 1.02 mm  
Mating cycles: minimum 100,000  
Current-carrying capacity: 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).  
• Crimp information see page 106.  

**TECHNICAL DATA**  
**Voltage information**  
- Operating voltage: 400 V, 160 V  
- Rated impulse voltage: 3,000 V, 3,000 V  
- Degree of pollution: 2, 3  
- Voltage information acc. to MIL  
  - 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  

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

**Description**  
- Pin contact short 182.956.000.370.000  
- Pin contact long 182.944.000.370.000  
- Socket contact 172.956.700.257.000  
- Pin contact short 182.818.000.370.000  
- Pin contact long 182.819.000.370.000  
- Socket contact 172.817.700.257.000  

**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.  

---  

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.
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).
- Crimp information see page 184.

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Conductor cross-section</th>
<th>Nominal current²</th>
<th>Max. continuous current²</th>
<th>Contact resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.124.105.923.000</td>
<td>500 V</td>
<td>15 A</td>
<td>18 A</td>
<td>0.95 mΩ</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.124.111.923.000</td>
<td>200 V</td>
<td>18 A</td>
<td>22 A</td>
<td>0.95 mΩ</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.125.923.000</td>
<td>2,500 V</td>
<td>14.5 A</td>
<td>18.5 A</td>
<td>0.95 mΩ</td>
</tr>
</tbody>
</table>

**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.

---

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

**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 150.

**Technical Data**

- **Voltage Information**
  - Operating Voltage: 500 V
  - Rated Impulse Voltage: 3,000 V

- **Voltage Information acc. to IEC**
  - 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: C u alloy
  - Contact Spring: C uSn alloy
  - Contact Finish: Au over NiP

**Removal Tool**

- **Removal Tool I (Straight)**
  - Part Number: 087 170 139 000 000

- **Removal Tool I (Angled)**
  - Part Number: 087 170 365 000 000

- **Removal Tool II**
  - Part Number: 087 611 001 001 000

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

---

**Table of Contents**

1. **Power**
2. **Module 4 Contacts**
3. **Technical Notes**
4. **Technical Data**
5. **Removal Tool**
6. **Materials**
7. **Removal Tool I (Straight)**
8. **Removal Tool I (Angled)**
9. **Removal Tool II**
10. **Insulator Pin and Socket**
11. **Description**
12. **Part Number**
13. **Conductor Cross-Section**
14. **Termination**
15. **Nominal Current1**
16. **Max. Continuous Current2**
17. **Contact Resistance**
18. **Pin Contact Short**
19. **Pin Contact Long**
20. **Socket Contact**
21. **Socket Contact On Request**
22. **PCB Termination**

---

1. **Table of Contents**
Contact diameter: 3 mm  
Mating cycles: minimum 100,000  
Termination cross-section: from 0.75 to 4 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**

<table>
<thead>
<tr>
<th>Voltage information¹</th>
<th>500 V</th>
<th>200 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>3,000 V</td>
<td>3,000 V</td>
</tr>
<tr>
<td>Rated impulse voltage</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage information acc. to MIL²</th>
<th>1,200 V</th>
<th>3,600 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test voltage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical data</th>
<th>13.5 N/Module</th>
<th>9.8 N/Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total mating force (average)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total sliding force (average)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact diameter</td>
<td>3 mm</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40°C to +125°C</td>
<td></td>
</tr>
<tr>
<td>Mating cycles</td>
<td>minimum 100,000</td>
<td></td>
</tr>
</tbody>
</table>

**Materials**

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

**Removal Tool I (Straight)**

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

**PART NUMBER**: 087.170.136.000.000

**Removal Tool I (Angled)**

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

**PART NUMBER**: 087.170.365.000.000

**Removal Tool II**

Removal of 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 117.

¹ IEC 60664-1:2007 (VDE 0110-1:2008) see page 113  
² See page 123

---

**Module 3 contacts**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.127.103.923.000</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.127.111.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.128.923.000</td>
</tr>
</tbody>
</table>

**Conductor cross-section**

<table>
<thead>
<tr>
<th>Part number</th>
<th>Conductor cross-section</th>
</tr>
</thead>
<tbody>
<tr>
<td>180.366.000.370.000</td>
<td>0.75 mm²</td>
</tr>
<tr>
<td>180.386.000.370.000</td>
<td>1.0 mm²</td>
</tr>
<tr>
<td>172.366.700.257.000</td>
<td>1.5 mm²</td>
</tr>
<tr>
<td>172.384.700.257.000</td>
<td>2.5 mm²</td>
</tr>
<tr>
<td>172.582.000.370.000</td>
<td>4.0 mm²</td>
</tr>
<tr>
<td>172.584.700.257.000</td>
<td>5.0 mm²</td>
</tr>
</tbody>
</table>

**Termination**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.127.103.923.000</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.127.111.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.128.923.000</td>
</tr>
</tbody>
</table>

**Nominal current**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.127.103.923.000</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.127.111.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.128.923.000</td>
</tr>
</tbody>
</table>

**Max. continuous current**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.127.103.923.000</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.127.111.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.128.923.000</td>
</tr>
</tbody>
</table>

**Contact resistance**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator</td>
<td>611.127.103.923.000</td>
</tr>
<tr>
<td>Spacer</td>
<td>611.127.111.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021.341.128.923.000</td>
</tr>
</tbody>
</table>

---

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

**POWER**

Contact diameter: 3 mm
Mating cycles: minimum 100,000
Current-carrying capacity: 58 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).
- 5.0 mm², AWG 14–18 / 0.75 – 4 mm² removal possible
- 5.3 mm² removal not possible.

**TECHNICAL DATA**
- Operating voltage: 2,500 V
- Rated impulse voltage: 10,000 V
- Degree of pollution: 2

Voltage information acc. to NL:
- 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
- Second Edition, max. 75°C minimum 100,000

**Materials**
- Insulator: Thermoplastic fiber glass reinforced
- Contact body: Cu alloy
- Contact spring: CuSn alloy
- Contact finish: Au over NiP

**Description**

<table>
<thead>
<tr>
<th>Module 3 contacts</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator pin</td>
<td>611 163.103.923.000</td>
</tr>
<tr>
<td>Insulator socket</td>
<td>610 162.103.923.000</td>
</tr>
<tr>
<td>Dummy contact</td>
<td>021 341.128.923.000</td>
</tr>
</tbody>
</table>

**Conductor cross-section**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Conductor cross-section</th>
<th>Nominal current1</th>
<th>Contact resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin contact</td>
<td>180.366.000.370.000</td>
<td>4 mm²</td>
<td>30</td>
<td>0.3</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>180.386.000.370.000</td>
<td>4 mm²</td>
<td>30</td>
<td>0.3</td>
</tr>
<tr>
<td>Socket contact</td>
<td>172.366.700.257.000</td>
<td>3 mm²</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Pin contact short</td>
<td>182.582.000.370.000</td>
<td>1.5 mm²</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>182.585.000.370.000</td>
<td>1.5 mm²</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Socket contact</td>
<td>172.584.700.257.000</td>
<td>1.5 mm²</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

1 Definition max. continuous current see page 125.
3 See page 123.
4 Determined acc. to IEC 60512-5-1:2002 (DIN EN 60512-5-1:2003) at a temperature increase of 45 K.
5 Definition max. continuous current see page 125.

**Removal Tool I (Straight)**
Removal of the already assembled contact (incl. cable).
PART NUMBER: 087 170 136 000 000

**Removal Tool II**
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.
MODULE 4 CONTACTS

HIGH VOLTAGE

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).
- Comp information see page 106.

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Conductor cross-section</th>
<th>Termination</th>
<th>Nominal current</th>
<th>Max. continuous current</th>
<th>Contact resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulator socket</td>
<td>610.159.104.923.000</td>
<td>mm²</td>
<td>AMG</td>
<td>Single contact</td>
<td>Module fully equipped</td>
<td>A</td>
</tr>
<tr>
<td>Pin contact short</td>
<td>182.960.000.357.000</td>
<td>1.5</td>
<td>14</td>
<td>18</td>
<td>14.5</td>
<td>27</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>182.961.000.357.000</td>
<td>1.5</td>
<td>14</td>
<td>18</td>
<td>14.5</td>
<td>27</td>
</tr>
<tr>
<td>Socket contact</td>
<td>172.960.700.257.000</td>
<td>0.75</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>22.5</td>
</tr>
<tr>
<td>Pin contact short</td>
<td>180.545.000.357.000</td>
<td>0.75</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>22.5</td>
</tr>
<tr>
<td>Pin contact long</td>
<td>180.575.000.357.000</td>
<td>0.75</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>22.5</td>
</tr>
<tr>
<td>Socket contact</td>
<td>170.545.700.257.000</td>
<td>0.75</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Removal Tool I (Straight)

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

Removal Tool II

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.

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 range²: 0–1.3 GHz
- Insulation resistance: > 1 000 GΩ
- Voltage information acc. to MIL
  - 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

**COAX**

**Module 4 contacts Part number**
- Insulator: 611.149.104.923.000
- Dummy contact: 021.341.127.923.000

**CABLE TERMINATION RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Characteristic impedance (Ω)</th>
<th>Frequency range (GHz)</th>
<th>Cable¹</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Part number crimp inserts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin contact</td>
<td>122.120.001.257.000</td>
<td></td>
<td>50</td>
<td>1.3</td>
<td>1.7</td>
<td>2.25</td>
<td>32</td>
<td>082.000.039.101.000</td>
<td></td>
</tr>
<tr>
<td>Pin contact</td>
<td>122.120.003.257.000</td>
<td>0.8</td>
<td>RG 174/RS 188/</td>
<td>1.75</td>
<td>2.7</td>
<td>3.2</td>
<td>38</td>
<td>082.000.039.102.000</td>
<td></td>
</tr>
<tr>
<td>Pin contact</td>
<td>122.120.011.257.000</td>
<td>0.85</td>
<td>G 02323 (H+5)²</td>
<td>1.75</td>
<td>2.7</td>
<td>3.5</td>
<td>43</td>
<td>082.000.039.103.000</td>
<td></td>
</tr>
<tr>
<td>Socket contact</td>
<td>122.120.002.257.000</td>
<td>1.3</td>
<td>RG 178/RS 196</td>
<td>1.1</td>
<td>1.7</td>
<td>2.25</td>
<td>32</td>
<td>082.000.039.101.000</td>
<td></td>
</tr>
<tr>
<td>Socket contact</td>
<td>122.120.004.257.000</td>
<td>0.8</td>
<td>RG 174/RS 188/</td>
<td>1.75</td>
<td>2.7</td>
<td>3.2</td>
<td>38</td>
<td>082.000.039.102.000</td>
<td></td>
</tr>
<tr>
<td>Socket contact</td>
<td>122.120.012.257.000</td>
<td>0.85</td>
<td>G 02323 (H+5)²</td>
<td>1.75</td>
<td>2.7</td>
<td>3.5</td>
<td>43</td>
<td>082.000.039.103.000</td>
<td></td>
</tr>
<tr>
<td>Crimping tool for shielding sleeve</td>
<td>080.000.039.000.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

Table of Contents

COAX

HIGH FREQUENCY CHARACTERISTICS
FOR 50 Ω COAX CONTACTS

Insertion loss
Frequency in GHz

Loss in dB

Voltage standing-wave ratio VSWR
Frequency in GHz

PART NUMBER: 087.170.391.000.000
For an overview of all tools please see from page 113.

REMOVAL TOOL

INSULATOR FOR PIN AND SOCKET

CABLE TERMINATION

RECOMMENDED CABLE CONSTRUCTION / STRIPPING LENGTH

Table of Contents
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 GO
Voltage information acc. to MIL 2
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 Ni P
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

COAX

INSULATOR FOR PIN

INSULATOR FOR SOCKET

HIGH FREQUENCY CHARACTERISTICS FOR 50 Ω COAX CONTACTS

Insertion loss

Loss in dB

Frequency in GHz

Voltage standing-wave ratio VSWR

Frequency in GHz

CABLE TERMINATION/DETAIL X

RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH

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

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.
### Module 8 Contacts for 50 Ω Common Shield

**COAX**

Mating cycles: minimum 40,000

Frequency range: 0–1.3 GHz

### Technical Notes

- Crimp information see page 106.
- **High Frequency Characteristics for 50 Ω COAX Contacts**

#### Insertion Loss

<table>
<thead>
<tr>
<th>Frequency in GHz</th>
<th>Loss in dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.0</td>
</tr>
<tr>
<td>0.5</td>
<td>-0.1</td>
</tr>
<tr>
<td>1</td>
<td>-0.2</td>
</tr>
</tbody>
</table>

#### Voltage Standing-Wave Ratio VSWR

<table>
<thead>
<tr>
<th>Frequency in GHz</th>
<th>VSWR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
<td>1.1</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

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

### Technical Data

- **Frequency range**: 0–1.3 GHz
- **Insulation resistance**: > 500 GO
- **Voltage information acc. to MIL**:
  - Rated voltage: 1.75 V
  - Test voltage: 5.25 V
- **Mechanical data**: 1.3 N / Module
- **Demating force [average]**: 6.5 N / Module
- **Operating temperature**:
  - From -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

### Connector Assembly

- **Cable Configuration**
  - **Cable**: RG 178 / RG 196
  - **Frequency**: 1.1 GHz
  - **Test Voltage**: 5.25 V
  - **Rated Voltage**: 1.75 V

### Recommended Cable Construction/Stripping Length

- **Description**: Socket Configuration
  - **Part Number**: 610.168.008.270.001
  - **Characteristic Impedance**: 1.3 GHz
  - **Cable**: RG 178 / RG 196
  - **A**: 1.1
  - **B**: 1.7
  - **C**: 2.25

- **Description**: Pin Configuration
  - **Part Number**: 611.168.008.270.001
  - **Characteristic Impedance**: 1.3 GHz

---

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. See from page 123.
MODULE 6 CONTACTS FOR 50 Ω
COMMON SHIELD

**COAX**

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

**TECHNICAL NOTES**
- Crimp information see page 106.

**TECHNICAL DATA**
- Frequency range: 0–1.3 GHz
- Insulation resistance: > 500 GO
- Voltage information acc. to MIL 2
  - 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 CONTACTS**

**Insertion loss**

<table>
<thead>
<tr>
<th>Frequency in GHz</th>
<th>Loss in dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
</tr>
</tbody>
</table>

**Voltage standing-wave ratio VSWR**

<table>
<thead>
<tr>
<th>Frequency in GHz</th>
<th>VSWR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>1.6</td>
</tr>
<tr>
<td>1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

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.

**Description**
- Socket configuration
- Pin configuration
- Socket configuration
- Pin configuration

**Characteristic impedance**
- 50 ohms

**Frequency range**
- 50
- 1.3

**Cable**
- Micro Coax
- RG 178/RG 196
- RG 316

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Characteristic impedance</th>
<th>Frequency range</th>
<th>Cable</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket configuration</td>
<td>610.168.006.270.000</td>
<td>50</td>
<td>–</td>
<td></td>
<td>0.5</td>
<td>1.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Pin configuration</td>
<td>611.168.006.270.000</td>
<td>50</td>
<td>1.3</td>
<td>Micro Coax</td>
<td>1.1</td>
<td>1.7</td>
<td>2.25</td>
</tr>
<tr>
<td>Socket configuration</td>
<td>610.168.006.270.001</td>
<td>50</td>
<td>1.3</td>
<td>RG 178/RG 196</td>
<td>1.75</td>
<td>2.7</td>
<td>3.2</td>
</tr>
<tr>
<td>Pin configuration</td>
<td>611.168.006.270.002</td>
<td>50</td>
<td>0.8</td>
<td>RG 316</td>
<td>1.75</td>
<td>2.7</td>
<td>3.2</td>
</tr>
</tbody>
</table>

**COAX INSULATOR FOR PIN**

**INSULATOR FOR SOCKET**

**CABLE TERMINATION/DETAIL X**

**RECOMMENDED CABLE CONSTRUCTION/STRIPPING LENGTH**

- 2.2 mm
- 4.5 mm
Mating cycles: minimum 100,000
Frequency range\(^1\): 0–510 MHz

**TECHNICAL DATA**

- **Frequency range**: 0–510 MHz
- **Insulation resistance**: > 0.5 GΩ

**Voltage information acc. to MIL\(^2\)**

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Rated impulse voltage</th>
<th>Degree of pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 V</td>
<td>1,500 V</td>
<td>2</td>
</tr>
<tr>
<td>80 V</td>
<td>1,500 V</td>
<td>3</td>
</tr>
<tr>
<td>10.16 (0.400˝)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rated voltage**

- 425 V

**Test voltage**

- 2,375 V

**Mechanical data**

<table>
<thead>
<tr>
<th>Mating force (average)</th>
<th>Demating force (average)</th>
<th>Contact diameter</th>
<th>Operating temperature</th>
<th>Mating cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 N/Module</td>
<td>21 N/Module</td>
<td>0.76 mm</td>
<td>−40 °C to +100 °C</td>
<td>minimum 100,000</td>
</tr>
</tbody>
</table>

**Materials**

- **Insulator**: LCP
- **Contact body**: Cu alloy
- **Contact spring**: CuBe alloy
- **Contact processing**: Anodized NiP
- **Contact finish**: Anodized CuSnZn

**Insulator for Pin**

**Insulator for Socket**

**Recommended Cable Construction/Stripping Length**

- **Cable jacket**: 4.5 mm
- **Dielectric medium**: 2 mm
- **Wire**: 8.5 mm
- **Stripping length**: ca. 32 mm

**Table of Contents**

- **8 CHANNEL MODUL (COAX OPTION) 50 Ω**
- **Technical Data**
- **Frequency Range**
- **Insulation Resistance**
- **Voltage Information**
- **Rated Voltage**
- **Test Voltage**
- **Mechanical Data**
- **Mating Force**
- **Demating Force**
- **Contact Diameter**
- **Operating Temperature**
- **Mating Cycles**
- **Materials**
- **Insulator**
- **Contact Body**
- **Contact Spring**
- **Contact Processing**
- **Contact Finish**

---

\(^1\) Loss levels depend on used conductor type at a VSWR of 1.25. Further are available on request. Tested with per 3 × 5 cm conductor length. \(^2\) See from page 123.
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: 0–1.15 GHz

TECHNICAL DATA
Frequency range²: 0–1.15 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 CONTACTS²

<table>
<thead>
<tr>
<th>Insertion loss</th>
<th>Frequency in GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.1</td>
<td>0</td>
</tr>
<tr>
<td>-0.2</td>
<td>1</td>
</tr>
<tr>
<td>-0.3</td>
<td>2</td>
</tr>
<tr>
<td>-0.4</td>
<td>3</td>
</tr>
<tr>
<td>-0.5</td>
<td>4</td>
</tr>
<tr>
<td>-0.6</td>
<td>5</td>
</tr>
<tr>
<td>-0.7</td>
<td>6</td>
</tr>
<tr>
<td>Loss in dB</td>
<td>Frequency in GHz</td>
</tr>
<tr>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>1.1</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>2</td>
</tr>
<tr>
<td>1.3</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>4</td>
</tr>
<tr>
<td>1.5</td>
<td>5</td>
</tr>
</tbody>
</table>

Voltage standing-wave ratio VSWR

<table>
<thead>
<tr>
<th>VSWR</th>
<th>Frequency in GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>1.1</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>2</td>
</tr>
<tr>
<td>1.3</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>4</td>
</tr>
<tr>
<td>1.5</td>
<td>5</td>
</tr>
</tbody>
</table>

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 | Cable
---|-------------|--------------------------|-----
Pin contact to cable (A) | 122.141.013.270.000 | 50 | Micro-coax-cable 0.2/0.5 (e. g. Leoni SYCER)
Socket contact to cable (B) | 122.141.014.270.000 | 50 |
Socket contact to PCB (C) | 122.142.002.270.000 | 50 |

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.
MODULE 5 CONTACTS FOR PLASTIC FIBER POF

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)

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.

For assembly instructions please refer to our website: www.odu-connectors.com/downloads.
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 polished fiber
- Beam expansion: > 3 mm
- Insertion loss:
  - Typical: 1.5 dB at 670 nm
  - During lifetime: < 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]

Table of Contents

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
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 |

<table>
<thead>
<tr>
<th>Units</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>611.122.113.923.000</td>
</tr>
<tr>
<td>3</td>
<td>611.130.113.923.000</td>
</tr>
<tr>
<td>5</td>
<td>611.128.113.923.000</td>
</tr>
</tbody>
</table>

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 |

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

**Coding modules**

**Technological Data**

- **Insulator**: Thermoplastic fiber glass reinforced acc. to UL-94

**Table**

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding module (pin)</td>
<td>1</td>
<td>611.161.101.923.000</td>
</tr>
<tr>
<td>Coding module (socket)</td>
<td>1</td>
<td>610.161.101.923.000</td>
</tr>
</tbody>
</table>

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.

**Pin Protection Modules**

**Technological Data**

- **Insulator**: Thermoplastic fiber glass reinforced acc. to UL-94

**Table**

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin protection module (pin)</td>
<td>1</td>
<td>611.122.115.923.000</td>
</tr>
<tr>
<td>Pin protection module (socket)</td>
<td>1</td>
<td>610.122.115.923.000</td>
</tr>
</tbody>
</table>

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

Contact processing and crimping .................................................. 106
Crimping tools ................................................................. 107
Tensile strength diagram for crimp terminations ....................... 109
Crimp information ........................................................... 110
Assembly aids ................................................................... 112
Removal of contacts ............................................................ 114
Maintenance package .......................................................... 115
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 mm²), 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.

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

**Crimp TERMINATION**

**8-POINT CRIMPING TOOL FOR CONDUCTOR CONNECTIONS FROM 0.08 TO 1.5 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 6 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 user-friendly digital display.
- PART NUMBER: 080.000.062.000.000

**MECHANICAL HEXAGONAL HAND CRIMPING TOOL FROM 10 TO 50 MM²**

- 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.

HAND CRIMPING TOOL FOR SINGLE CRIMP CONTACTS (STAMPED CONTACTS)

PART NUMBER: 080.000.040.000.000

Single contacts are positioned manually in the pliers and get crimped.

HAND CRIMPERS WITH ROLL FOR SPOOL GOODS (STAMPED CONTACTS)

PART NUMBER: 080.000.041.000.000

Contacts are supplied on the reel and are automatically isolated. The feed occurs by hand operation.

- Suitable for coil size: 115 mm
- Therefore 500/900 contacts can be processed.
- Processing with automatic stripper crimper possible.
- Further information on request.

CRIMP CONNECTIONS


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.

<table>
<thead>
<tr>
<th>Conductor cross-section in mm²</th>
<th>Tensile strength in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>5</td>
</tr>
<tr>
<td>0.1</td>
<td>10</td>
</tr>
<tr>
<td>0.2</td>
<td>20</td>
</tr>
<tr>
<td>0.5</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>1.5</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>2.5</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>1,000</td>
<td>1,000</td>
</tr>
</tbody>
</table>
# CRIMP INFORMATION

<table>
<thead>
<tr>
<th>Contact diameter (mm)</th>
<th>Termination cross-section</th>
<th>Stripping length (mm)</th>
<th>Hexagonal crimping tool</th>
<th>Hand crimping tool stamped contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø8 000 006 004 000 000</td>
<td>Ø8 000 006 004 000 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø8 000 006 062 003 000</td>
<td>Ø8 000 006 062 003 000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact diameter (mm)</th>
<th>Termination cross-section</th>
<th>Stripping length (mm)</th>
<th>Hexagonal crimping tool</th>
<th>Hand crimping tool stamped contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø8 000 006 004 000 000</td>
<td>Ø8 000 006 004 000 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø8 000 006 062 003 000</td>
<td>Ø8 000 006 062 003 000</td>
</tr>
</tbody>
</table>

1 The listed cross section corresponds to a finely stranded conductor design according to IEC 60228:2004 (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.

---

**Table of Contents**

- 1 The listed cross section corresponds to a finely stranded conductor design according to IEC 60228:2004 (VDE 0295:2005) class 5 or a finely stranded conductor design (7/19 stranded) according to AWG ASTM B258-14).
- Recommended by ODU as a standard tool and setting.
### ASSEMBLY AIDS

All tools are magnetic, by default.

#### Description
- Torque wrench
  - With cross handle: fixed automatic release (for inner hexagonal bits with CE 3- or EE 3-shaft). Bit has to be ordered separately.
- Insertion tool
  - Ø 0.76–1.5 mm
  - For assembly aid of contacts with flexible/thin conductors (pin and socket side).
  - PART NUMBER: 085.611.001.000
- 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

#### Tools

<table>
<thead>
<tr>
<th>Description</th>
<th>For use in</th>
<th>Part number</th>
<th>Nm</th>
<th>Recommended tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque wrench</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Screwing of the rails in the T frame</td>
<td>598.054.001.000.000</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Mounting screw on frames in a housing</td>
<td>598.054.002.000.000</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.003.000.000</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.004.000.000</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.005.000.000</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.006.000.000</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Insertion tool</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.007.000.000</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Bit slot 3.5 (Ø 0.5/50)</td>
<td>Screwing of the rails in the T frame</td>
<td>598.054.108.000.000</td>
<td>0.9</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Bit slot 5.5 (Ø 0.8/50)</td>
<td>Mounting screw on frames in a housing</td>
<td>598.054.101.000.000</td>
<td>0.6</td>
<td>–/– 0.1 Nm</td>
</tr>
<tr>
<td>Bit Phillips cross slot size 1</td>
<td>Grounding screw on frames in a housing and M+ frame</td>
<td>598.054.106.000.000</td>
<td>1.2</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Bit Phillips cross slot size 1</td>
<td>Grounding pin for P+ frame</td>
<td>598.054.106.000.000</td>
<td>1.5</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Bit Phillips cross slot size 1</td>
<td>Grounding pin for P+ frame</td>
<td>598.054.106.000.000</td>
<td>3.0</td>
<td>–/– 0.3 Nm</td>
</tr>
<tr>
<td>SW 8</td>
<td>Mounting of grounding socket P+ frame</td>
<td>598.054.111.000.000</td>
<td>2.2</td>
<td>–/– 0.3 Nm</td>
</tr>
<tr>
<td>SW 8</td>
<td>Mounting of grounding pin P+ frame</td>
<td>598.054.111.000.000</td>
<td>4.2</td>
<td>–/– 0.5 Nm</td>
</tr>
<tr>
<td>Bit slot 3.5 (Ø 0.5/50)</td>
<td>Mounting screw on frames in a housing</td>
<td>598.054.108.000.000</td>
<td>0.9</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Bit slot 5.5 (Ø 0.8/50)</td>
<td>Mounting screw on frames in the S and M+ frame</td>
<td>598.054.101.000.000</td>
<td>0.9</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Bit Torx TX 10</td>
<td>Mounting of ODU MAC ZERO housing</td>
<td>598.054.104.000.000</td>
<td>0.6</td>
<td>–/– 0.1 Nm</td>
</tr>
<tr>
<td>Bit Torx TX 20</td>
<td>Mounting of the rails in the P+ frame</td>
<td>598.054.105.000.000</td>
<td>1.5</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Distance spacer/QCH</td>
<td>Screwing of the rails in the P+ frame</td>
<td>598.054.105.000.000</td>
<td>1.5</td>
<td>–/– 0.2 Nm</td>
</tr>
<tr>
<td>Distance spacer/QCH</td>
<td>Screwing of the rails in the P+ frame</td>
<td>598.054.204.000.000</td>
<td>1.2</td>
<td>–/– 0.2 Nm</td>
</tr>
</tbody>
</table>

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

#### Table of Contents

<table>
<thead>
<tr>
<th>Contact Ø</th>
<th>Assembly aid insertion tool</th>
<th>Assembly aid extraction tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.76</td>
<td>085.611.001.000.000</td>
<td>087.611.005.001.000</td>
</tr>
<tr>
<td>1.02</td>
<td>085.611.001.000.000</td>
<td>087.611.005.001.000</td>
</tr>
<tr>
<td>1.5</td>
<td>085.611.001.000.000</td>
<td>087.611.005.001.000</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Contact Type</th>
<th>Removal Tool I</th>
<th>Removal Tool II</th>
<th>Removal Tool III</th>
<th>Removal Tool IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coax 50Ω 4 contacts</td>
<td>087.170.361.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.362.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>Coax 50Ω 2 contacts</td>
<td>087.170.363.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.365.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>Fiber optic 5 contacts</td>
<td>087.170.139.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.138.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>0.762</td>
<td>087.170.361.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.362.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>1.02</td>
<td>087.170.362.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.363.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>1.35</td>
<td>087.170.138.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.363.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>2.41</td>
<td>087.170.139.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.365.000.000</td>
<td>087.611.001.001.000</td>
</tr>
<tr>
<td>3</td>
<td>087.170.136.000.000</td>
<td>087.611.001.001.000</td>
<td>087.170.366.000.000</td>
<td>087.611.001.001.000</td>
</tr>
</tbody>
</table>

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 003.1 70.000.000.000

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%.

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 003.1 70.000.000.000

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%.
<table>
<thead>
<tr>
<th>TECHNICAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>International protection classes acc. IEC 60529:2013 (VDE 0470-1:2014)</td>
</tr>
<tr>
<td>Explanations and information according to VDE</td>
</tr>
<tr>
<td>Conversions / AWG</td>
</tr>
<tr>
<td>Operating voltage according to EIA-364-2010:2008</td>
</tr>
<tr>
<td>Current-carrying capacity</td>
</tr>
<tr>
<td>Technical terms</td>
</tr>
</tbody>
</table>
INTERNATIONAL PROTECTION CLASSES


<table>
<thead>
<tr>
<th>Code number</th>
<th>Protection against access to hazardous parts / Protection against ingress of solid foreign objects</th>
<th>Code number</th>
<th>Protection against harmful effects due to the ingress of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection / No protection against contact / No protection against solid foreign objects</td>
<td>0</td>
<td>No protection against water</td>
</tr>
<tr>
<td>1</td>
<td>Protection against contact with the back of the hand / Protection against solid foreign objects ≥ 50 mm</td>
<td>1</td>
<td>Protection against dripping water</td>
</tr>
<tr>
<td>2</td>
<td>Protection against medium-sized foreign objects / Protection against solid foreign objects ≥ 2.5 mm</td>
<td>2</td>
<td>Protection against failing waterdrops when tilted (any angle up to 15° from the vertical)</td>
</tr>
<tr>
<td>3</td>
<td>Protection against small foreign objects / Protection against tools / Protection against solid foreign objects ≥ 0.1 mm</td>
<td>3</td>
<td>Protection against spray water (any angle up to 60° from the vertical)</td>
</tr>
<tr>
<td>4</td>
<td>Protection against granular foreign objects / Protection against solid foreign objects ≥ 0.05 mm</td>
<td>4</td>
<td>Protection against splashing water from all directions</td>
</tr>
<tr>
<td>5</td>
<td>Dustproof / Protection against uncontrolled ingress of dust / Protection against water jet</td>
<td>5</td>
<td>Protection against water jet from all directions</td>
</tr>
<tr>
<td>6</td>
<td>Dustproof / Protection against a wire / Complete protection against ingress of dust</td>
<td>6</td>
<td>Protection against powerful water jet from all directions</td>
</tr>
<tr>
<td>7</td>
<td>Protection against the effects of temporary immersion in water</td>
<td>7</td>
<td>Protection against ingress of harmful quantities of water by temporary submersion into water</td>
</tr>
<tr>
<td>8</td>
<td>Protection against the effects of continuous immersion in water</td>
<td>8</td>
<td>Protection against ingress of harmful quantities of water by continuous submersion into water</td>
</tr>
<tr>
<td>9</td>
<td>Protection against high pressure and high-temperature conditions</td>
<td>9</td>
<td>Protection against water from all directions by high pressure and high temperatures</td>
</tr>
</tbody>
</table>

EXPLANATIONS AND INFORMATION ON INSULATION COORDINATION


<table>
<thead>
<tr>
<th>Nominal voltage of the power supply system (network) acc. to IEC 60038 2009 (VDE 0595-1:2010)</th>
<th>Voltage conductor to neutral conductor derived from nominal voltages i.e. zero sequence voltage</th>
<th>Rated impulse voltage (Overvoltage category)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Three-phase-system</td>
<td>Single-phase-system</td>
<td>Overvoltage category</td>
</tr>
<tr>
<td>50</td>
<td>330</td>
<td>I</td>
</tr>
<tr>
<td>100</td>
<td>500</td>
<td>II</td>
</tr>
<tr>
<td>1,000</td>
<td>1,500</td>
<td>III</td>
</tr>
<tr>
<td>500</td>
<td>800</td>
<td>IV</td>
</tr>
<tr>
<td>1,000</td>
<td>1,500</td>
<td>V</td>
</tr>
<tr>
<td>230 / 400 277 / 480</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>400 / 692</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>1,000</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>1,200</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>2,500</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>4,000</td>
<td>4,000</td>
<td></td>
</tr>
<tr>
<td>5,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>8,000</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>12,000</td>
<td>12,000</td>
<td></td>
</tr>
</tbody>
</table>

APPLICABLE STANDARDS


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 solid frame for housings or in the ODU-MAC docking frame.

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 significantly influenced 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 insulating 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.

The table for testing clearance distances at different altitudes (the voltage levels are valid only to verify the clearance distances).

<table>
<thead>
<tr>
<th>Rated impulse voltage</th>
<th>Test impulse voltage at sea level</th>
<th>Test impulse voltage at 200 m elevation</th>
<th>Test impulse voltage at 500 m elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33</td>
<td>0.357</td>
<td>0.355</td>
<td>0.350</td>
</tr>
<tr>
<td>0.5</td>
<td>0.541</td>
<td>0.537</td>
<td>0.531</td>
</tr>
<tr>
<td>0.8</td>
<td>0.934</td>
<td>0.920</td>
<td>0.899</td>
</tr>
<tr>
<td>1.5</td>
<td>1.751</td>
<td>1.725</td>
<td>1.685</td>
</tr>
<tr>
<td>2.5</td>
<td>2.920</td>
<td>2.874</td>
<td>2.808</td>
</tr>
<tr>
<td>4</td>
<td>4.923</td>
<td>4.874</td>
<td>4.675</td>
</tr>
<tr>
<td>6</td>
<td>7.385</td>
<td>7.236</td>
<td>7.013</td>
</tr>
<tr>
<td>8</td>
<td>9.847</td>
<td>9.648</td>
<td>9.950</td>
</tr>
</tbody>
</table>
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 up 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.

CONVERSIONS/AWG (AMERICAN WIRE GAUGE)

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 up 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.

The values specified in the catalogue correspond to SAE AS 13441:2004 method 3001.1. The table values were determined according to EIA 364-20D:2008. The inserts were tested while mated, and the test current was applied to the pin insert.

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.

**Operating Voltage**


The values specified in the catalogue correspond to SAE AS 13441:2004 method 3001.1. The table values were determined according to EIA 364-20D:2008. The inserts were tested while mated, and the test current was applied to the pin insert.

PSV’s 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 × 0.75
Operating voltage: Dielectric withstanding voltage × 0.75 × 0.33

## Table of Contents

- **Conversions/AWG (American Wire Gauge)**
- **Operating Voltage**

### Conversions/AWG (American Wire Gauge)

<table>
<thead>
<tr>
<th>Circular wire</th>
<th>AWG</th>
<th>Diameter (mm)</th>
<th>Cross-section (mm²)</th>
<th>Weight (kg/km)</th>
<th>Max. resistance (Ω/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 (1)</td>
<td>0.0403</td>
<td>1.0200</td>
<td>0.8200</td>
<td>7.32</td>
<td>22.18</td>
</tr>
<tr>
<td>20 (1)</td>
<td>0.0410</td>
<td>1.2000</td>
<td>1.0000</td>
<td>9.30</td>
<td>24.50</td>
</tr>
<tr>
<td>22 (1)</td>
<td>0.0417</td>
<td>1.4000</td>
<td>1.2000</td>
<td>11.30</td>
<td>27.00</td>
</tr>
<tr>
<td>24 (1)</td>
<td>0.0424</td>
<td>1.6000</td>
<td>1.4000</td>
<td>13.30</td>
<td>29.50</td>
</tr>
<tr>
<td>26 (1)</td>
<td>0.0431</td>
<td>1.8000</td>
<td>1.6000</td>
<td>15.30</td>
<td>32.00</td>
</tr>
<tr>
<td>28 (1)</td>
<td>0.0438</td>
<td>2.0000</td>
<td>1.8000</td>
<td>17.30</td>
<td>34.50</td>
</tr>
<tr>
<td>30 (1)</td>
<td>0.0445</td>
<td>2.2000</td>
<td>2.0000</td>
<td>19.30</td>
<td>37.00</td>
</tr>
<tr>
<td>32 (1)</td>
<td>0.0452</td>
<td>2.4000</td>
<td>2.2000</td>
<td>21.30</td>
<td>39.50</td>
</tr>
<tr>
<td>34 (1)</td>
<td>0.0459</td>
<td>2.6000</td>
<td>2.4000</td>
<td>23.30</td>
<td>42.00</td>
</tr>
<tr>
<td>36 (1)</td>
<td>0.0466</td>
<td>2.8000</td>
<td>2.6000</td>
<td>25.30</td>
<td>44.50</td>
</tr>
<tr>
<td>38 (1)</td>
<td>0.0473</td>
<td>3.0000</td>
<td>2.8000</td>
<td>27.30</td>
<td>47.00</td>
</tr>
<tr>
<td>40 (1)</td>
<td>0.0480</td>
<td>3.2000</td>
<td>3.0000</td>
<td>29.30</td>
<td>49.50</td>
</tr>
<tr>
<td>42 (1)</td>
<td>0.0487</td>
<td>3.4000</td>
<td>3.2000</td>
<td>31.30</td>
<td>52.00</td>
</tr>
<tr>
<td>44 (1)</td>
<td>0.0494</td>
<td>3.6000</td>
<td>3.4000</td>
<td>33.30</td>
<td>54.50</td>
</tr>
</tbody>
</table>

**Source:** Gore & Associates, Pleinfeld

### Operating Voltage

- **EIA-364-20D:2008 (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 364-20D:2008. The inserts were tested while mated, and the test current was applied to the pin insert.

PSV’s 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 × 0.75
Operating voltage: Dielectric withstanding voltage × 0.75 × 0.33
BASE FOR CURRENT-CARRYING CAPACITY


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 (∆t) 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 × ln) also makes allowance for factors such as manufacturing tolerances and uncertainties in temperature measurement or the measuring arrangement.

CURRENT LOAD

(Related to DIN EN 60512-5-2:2003)

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.

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

Example:
A 4k 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 on 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).

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
(developed base curve shown = 0.8 × Base curve).
Upper limit temperature: +120 °C.
Termination with nominal cross-section.

FOR FULLY EQUIPPED MODULES
(developed 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 79) correspond to the values of the 3 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).
- The values of the 5 contacts signal module (page 72) correspond to the values of the 5 contacts signal module (page 71).

<table>
<thead>
<tr>
<th>Contact</th>
<th>Module</th>
<th>Contact</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.76</td>
<td>0.35</td>
<td>0.25</td>
<td>0.18</td>
</tr>
<tr>
<td>1.02</td>
<td>0.35</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>1.6</td>
<td>0.35</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>2.41</td>
<td>0.35</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>3</td>
<td>0.35</td>
<td>0.18</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Nominal current: 0.25 A
Max. continuous current: 0.18 A
Temperature due to Joule heat in K: 0
Ambient temperature in °C: 120

Temperature due to Joule heat in K: 0
Ambient temperature in °C: 120

Table of Contents

Table of Contents
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.

<table>
<thead>
<tr>
<th>Laying procedure</th>
<th>Exposed in air</th>
<th>or on surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single-wire lines</td>
<td>Multi-wire highly flexible lines</td>
</tr>
<tr>
<td></td>
<td>PVC, PE, PUR, TPE</td>
<td>for hand-held devices, wire/sheath</td>
</tr>
<tr>
<td></td>
<td>heat resistant</td>
<td>cold-resistant, PVC insulated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of loaded wires</th>
<th>Current load in A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.14²</td>
</tr>
<tr>
<td>2</td>
<td>0.25²</td>
</tr>
<tr>
<td>3</td>
<td>0.34²</td>
</tr>
<tr>
<td>4</td>
<td>0.5²</td>
</tr>
<tr>
<td>5</td>
<td>0.75²</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1.5</td>
</tr>
<tr>
<td>8</td>
<td>2.5</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>60</td>
</tr>
<tr>
<td>22</td>
<td>70</td>
</tr>
<tr>
<td>23</td>
<td>80</td>
</tr>
<tr>
<td>24</td>
<td>90</td>
</tr>
<tr>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>26</td>
<td>110</td>
</tr>
<tr>
<td>27</td>
<td>120</td>
</tr>
<tr>
<td>28</td>
<td>130</td>
</tr>
<tr>
<td>29</td>
<td>140</td>
</tr>
</tbody>
</table>

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.

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/CND.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.

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.

² DIN VDE 0891-1:1990.
DERATING MEASUREMENT METHOD
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 CuSn alloy and silver or gold-plated. The lamellae consist of a CuB 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 new condition. The data represents average values with a potential fluctuation of ±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 TURN-TAC and ODU LAM-TAC 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
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 µr < 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, THA (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.

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

ODU USA
ODU-USA Inc.
4010 Adolfo Road, Camarillo, CA 93012, United States of America
Phone: +1 805 484-0540, Fax: +1 805 484-7458, E-mail: sales@odu-usa.com

HEADQUARTERS
ODU GmbH & Co. KG
Pregelstraße 11
84453 Mühldorf a. Inn, Germany
Phone: +49 8631 6 156-0
Fax: +49 8631 6156-49
E-mail: zentral@odu.de
www.odu.de

PRODUCTION SITES
Germany Otto Dunkel GmbH
84453 Mühldorf a. Inn, Germany
Phone: +49 8631 6 156-0
Fax: +49 8631 6156-49
E-mail: zentral@odu.de
www.odu.de

China ODU (Shanghai) Connectors Manufacturing Co. LTD
4010 Adolfo Road, Camarillo, CA 93012, United States of America
Phone: +86 21 58347828-0
Fax: +86 21 58347828-49
E-mail: oduchina@odu.com.cn
www.odu.com.cn

Mexico ODU Mexico Manufacturing S.R.L. de C.V.
4010 Adolfo Road, Camarillo, CA 93012, United States of America
Phone: +86 21 58347828-0
Fax: +86 21 58347828-49
E-mail: oduchina@odu.com.cn
www.odu.com.cn

Further information and specialized representatives can be found at:
www.odu.de/sales

FURTHER SALES SUBSIDIARIES

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

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

ODU Italia S.R.L.
Phone: +39 331 8708847
E-mail: sales@odu-italia.it
www.odu-italia.it

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

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

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

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