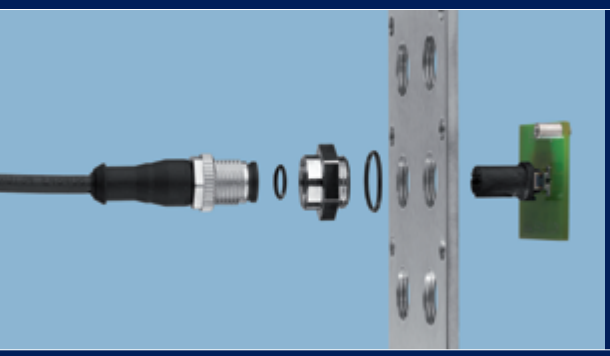

# M8/M12 Circular Connectors

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# M8/M12 Circular Connectors

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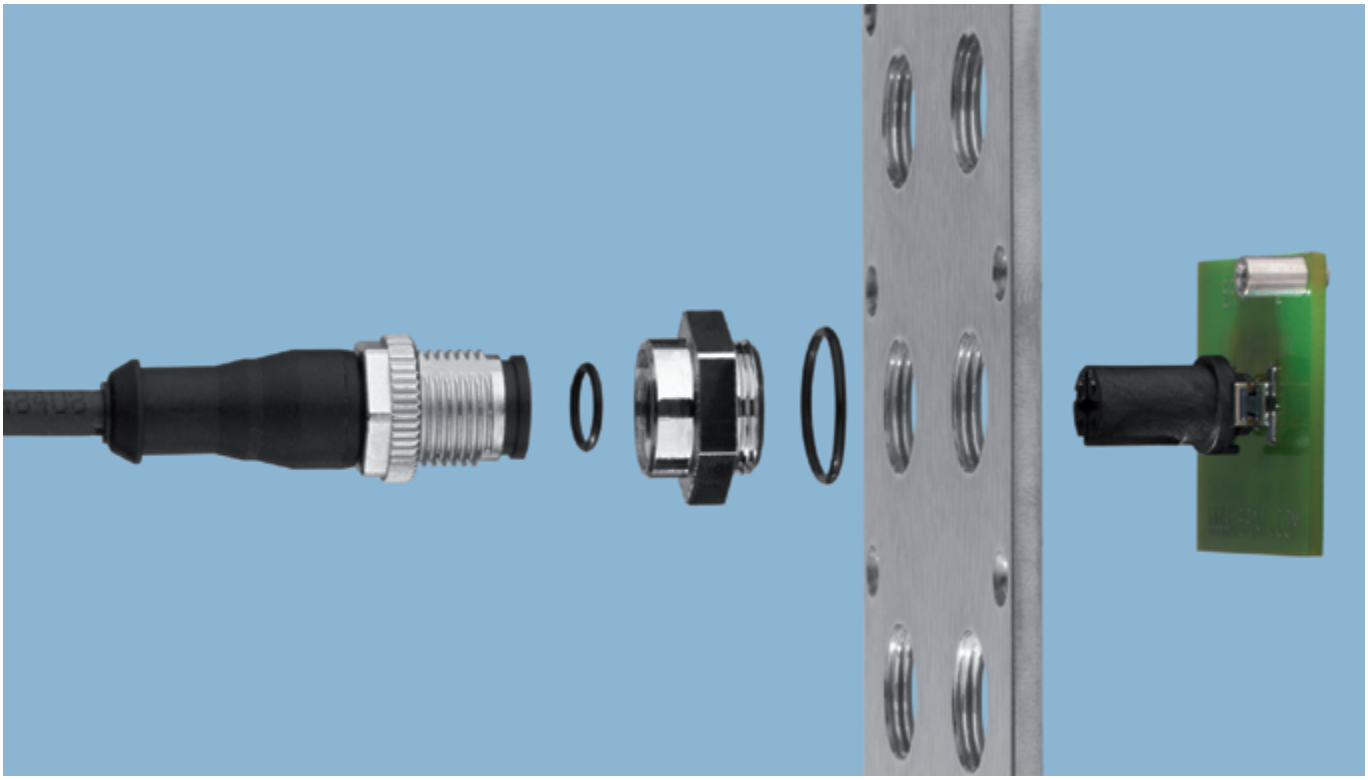


Since the end of the ‚80s, the trend of integrating more and more electronics and intelligence in machines has rapidly gained momentum. Whereas before, only controls in a switch cabinet regulated actuator or sensor systems by way of so-called I/O cards, today there is an increasing number of intelligent field devices outfitted with local I/Os and connected to the switch cabinet via a fieldbus or even have the entire control system on board.

Up until this point in time, M8 and M12 connectors were only referred to and used as sensor connectors. The open end of the sensor cable was routed in the switch cabinet and wired there. Today, sensors and actuators in the field frequently are connected to a passive I/O box or one with fieldbus capability. The harsh influences of the environment on these boxes make proven and, particularly, tightly sealed (IP 65/67) connectors a necessity. As such, it only made sense to use the M8 or M12 connector systems here as well, which already had established themselves in the field of sensor technology. Meanwhile, the M12 connector also is recommended as a fieldbus connector for almost all field bus applications. To make sure that nothing gets mixed up, there are a series of codes for assistance.

ERNI, the known specialist for printed circuit board connectors, has seized an opportunity. Today, there still is an insufficient number of connector types for these boards. As field devices are very specific, a wide variety of flexible modular connectors is required in order to implement these applications with as little effort and expense as possible.

### International Standards for M8/M12 connectors

- IEC 60947-5-2 low voltage sensor switch device
- IEC 61076-2-101 form factor M12 further polarizations for M12
- IEC 61076-2-104 form factor M8 further polarizations for M8
- Profibus installation guideline
- Interbus Club specification
- IAONA, Industrial Ethernet, planning and installation guide
- SafetyBUS
- DeviceNet

## PCB Connectors

ERNI has developed such a modular system with M8/12 connectors that is fully flexible in application and has SMT connections that are so robust that bulk packaging and feeding are possible. The connector has also been designed for tape-on-reel packaging. The concept allows connectors to be produced at various heights and with different pin configurations. The black insulator is made of high-temperature plastic, and is suitable for soldering with all the usual SMT soldering procedures. The new M8/M12 connectors are designed for lead-free processing, which is mandatory since July 2006. Especially cost cutting by reduction of printed circuit board surface is achieved. In specific applications, two printed circuit boards can be replaced by one. A pick & place pad for female connectors is not required while using a gripper or special pipette.

## Cable Assemblies

As a completion to the product portfolio ERNI Electronics also offers cable assemblies for the connection of sensors/actuators or other automation systems devices such as I/O distribution boxes. The standard product range covers pre-assembled, over-moulded circular connectors of sizes M8 and M12 either as interconnection of two circular connectors or as a cord set having an open end of line.
In addition, the portfolio comprises of field-attachable connectors for tool-less cable termination, T-coupler, panel feed-throughs and adapter for quick and cost-efficient connection in the field. ERNI extends the variety with different cable qualities that meet the most versatile industrial requirements and therefore are applicable for a wide range of use. PVC as a competitive and economic solution or PUR (UL/CSA approved), halogenfree and UV resistant, for highly demanding applications in drag chains and harsh environments – where operational reliability is crucial. Innovative product features like the self-securing screw locking guarantee vibration-proof and secure connection. The coupling nut additionally combines a knurled surface with a spanner flat suitable for standard wrenches.
Different configurations, designs and codings are available from stock. All parts meet IP67 requirements (IEC 60529) to ensure protection against dust and water immersion. ERNI's pre-assembled cable assemblies use standard-wise two cable qualities in five different lengths. Further options are possible on request.

### PVC

- qualified cable for medium mechanical load and usage of non-recurrent stress, i.e. for assembly lines
- easy to dismantle
- good chemical resistance
- limited resistance against abrasion and lubricants
- the competitive and economic solution for less demanding applications

### PUR

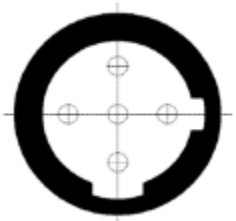
- cable for heavy-duty applications in harsh environments and continuous stress, i.e. during metal cutting operations
- drag chain capable
- highly resistant against abrasion
- very good resistance against oil, lubricants, coolants and other aggressive chemicals
- halogen-free, hydrolysis and UV resistant
- flame retardant
- reliable solution for highly demanding applications; UL/ CSA approved

As a proven specialist for printed circuit board connectors, ERNI Electronics has expanded its expertise towards industrial customers i.e. from automation technology and process industry by offering highly flexible and modular solutions, which consequently emphasize the idea of decentralised automation systems.

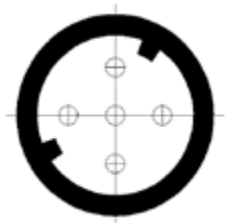
### Polarizations according to IEC 61076-2-101 for M12 male connectors

A - Polarization (sensor/actuator applications, DeviceNet CANopen)

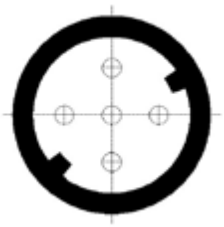
B - Polarization (fieldbus applications like Profibus, Interbus)



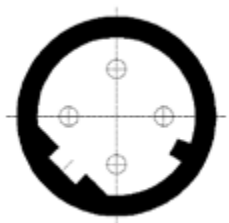
C - Polarization / not introduced yet on the market



P - Polarization (4 Signal + PE) / not introduced yet on the market



D - Polarization (5 Pin for Data-Applications) / not introduced yet on the market

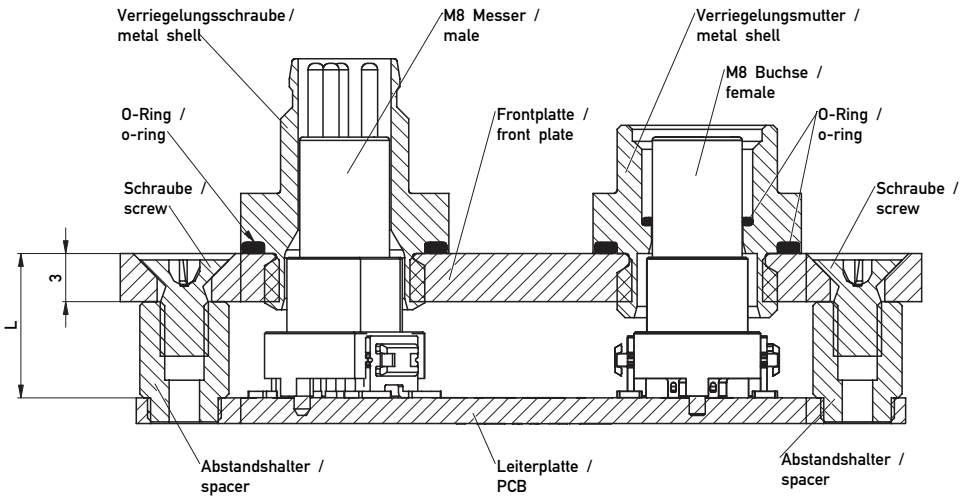


D - Polarization (4 Pin for Industrial Ethernet, Fast Ethernet 100 Mbit/s)

### Assembly of M8/M12 PCB connectors

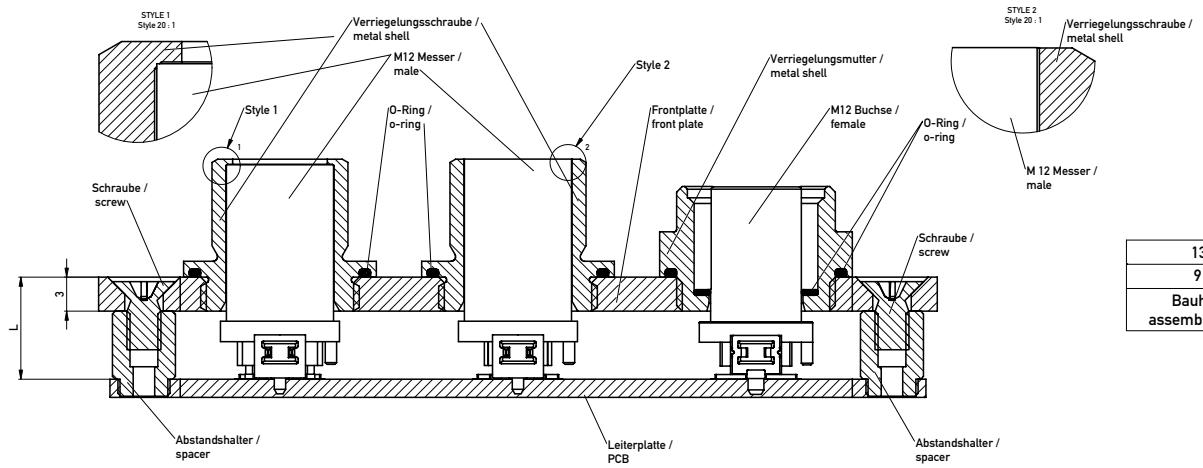
ERNI recommends two standard assembly heights. The usable connectors are the same for both heights. Based on a 3 mm thick front plate there are distances of 9 mm and 13 mm applicable with the according metal shells. The shells need to be fixed via thread in the front plate. To ensure the protection class IP65/67 it is necessary to remain within the recommended tolerances of 9 mm ±0.1 or 13 mm ±0.1.
The 9 and 13mm distances allow the use of standard spacers which enable a proper fixing to the pcb.

### Examples for mixed M8 pcb assembly




| |
|---|
| 13 |
| 9 |
| Bauhöhe L / assembly height |

### Examples for mixed M12 pcb assembly



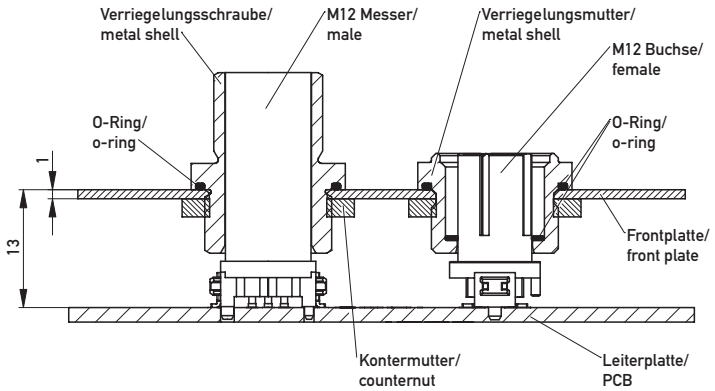

| |
|---|
| 13 |
| 9 |
| Bauhöhe L / assembly height |

**Style 1** prevents pressure on the o-ring when connectors are mated. The forces are absorbed by the metal shell, which protects the top surface of the pcb male connector from a direct o-ring contact.
**Style 2** allows more flexibility regarding tolerances in vertical direction.

Tightening force for all metal shells is 1.5 Nm ±0.2

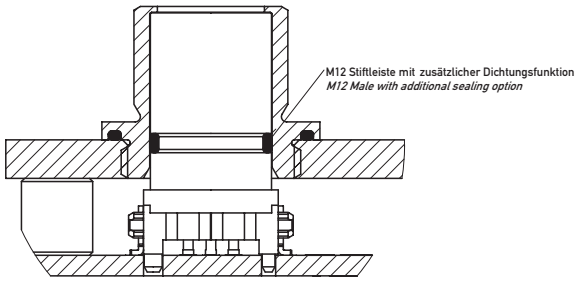
The mounting thread for M12 shell is M14x1 and for the M8 shell is M10x1. For mechanical issues the front panel thickness should be 3 mm thick and for proper sealing (O-Ring) the surface around the thread hole should have no damage and be of quality R max 16 µm. Please regard thickness of platings in conjunction with front panel threads. Regarding EMV issues the front plate or its plating should be conductive with the metal shell and have at least an Ni plating.

### Example for mixed M12 PCB assembly, front plate thickness 1 mm, assembled with counternut



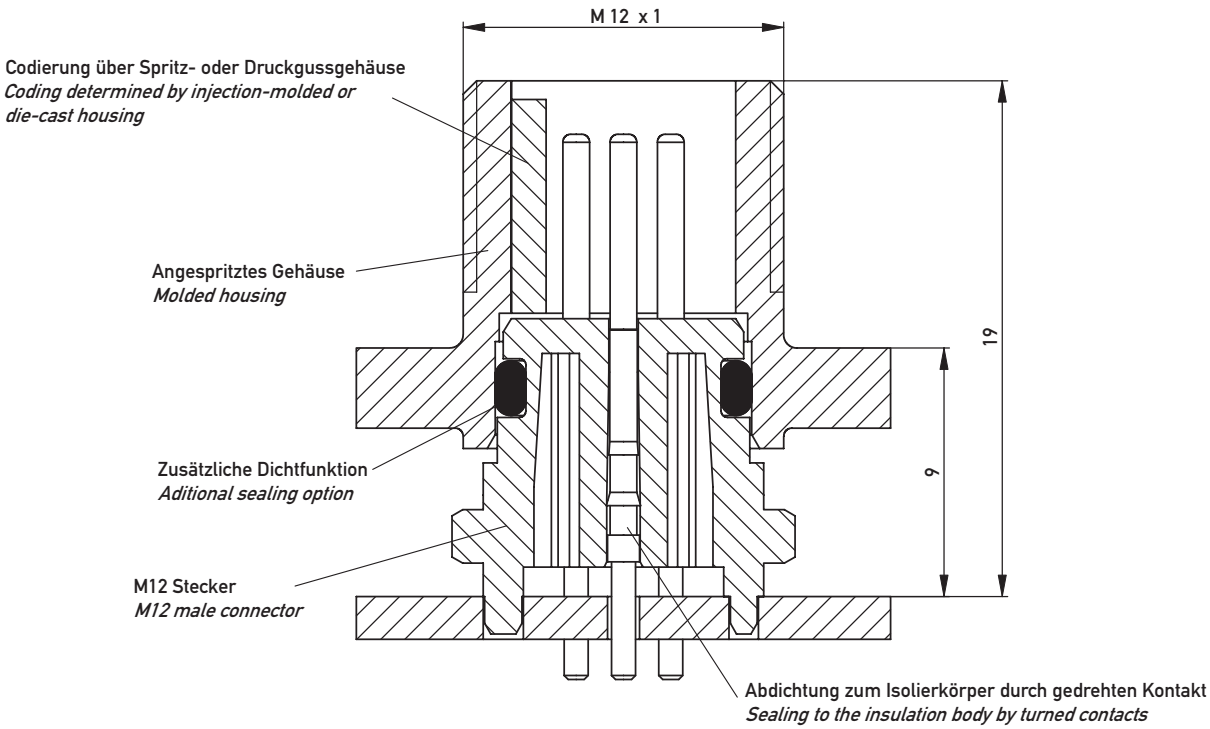

For the assembly option with a counternut there is no thread in the front plate necessary. This option is suitable for a front plate thickness beginning at 1 mm up to 4 mm.

### M12 male with additional sealing option.




Sensor and actuator applications in harsh industrial environment need to be sealed against liquids. Those devices have often abackfilling with gel or resin (epoxy) and therefore a sealing is required to keep the infill inside of the housing. On the other hand there are devices which should be protected against moisture and liquids from outside; especially also during installation if the connector interface is open (not connected to a cable). For this requirements the ERNI M12 male connector with additional sealing option is the best fit. A standard O-ring 7x1 can be used. The connector is always delivered without O-ring.

## M12 Connector for Direct Integration

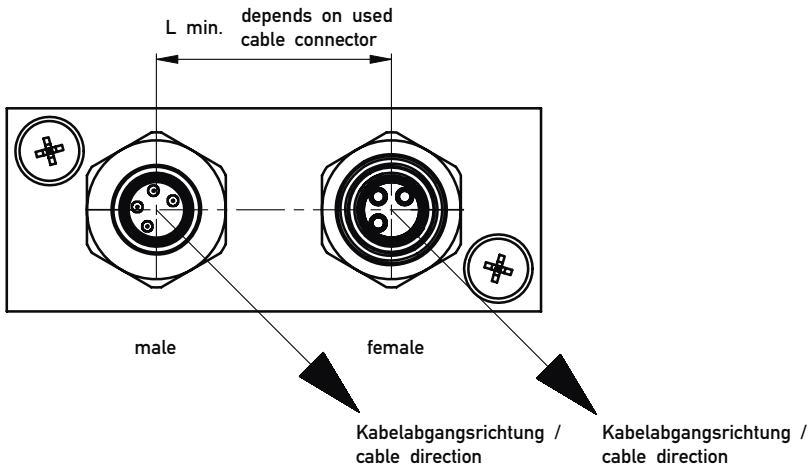



Automation components make considerable contributions to efficiency increases in production but are also subject to extreme cost pressure. To save costs, this M12 connector version can be „directly“ integrated, meaning that the device housing thus becomes part of the connector since it can be produced in a single operation with the coding and the locking thread.

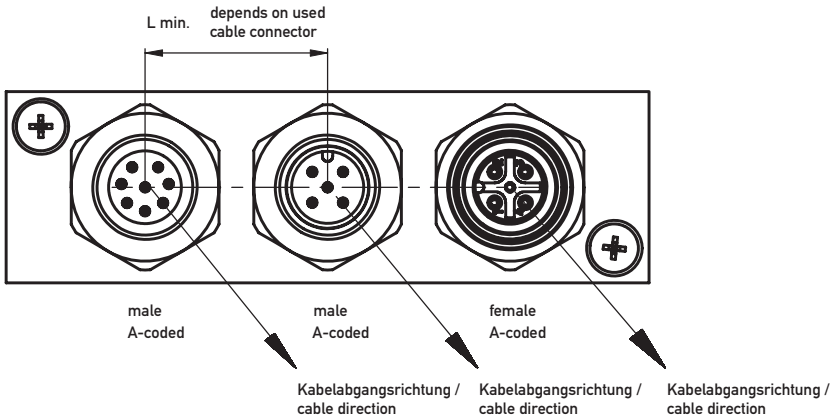
Potential savings: fully-automatic SMT soldering process and saving of threaded parts as well as their assembly share.

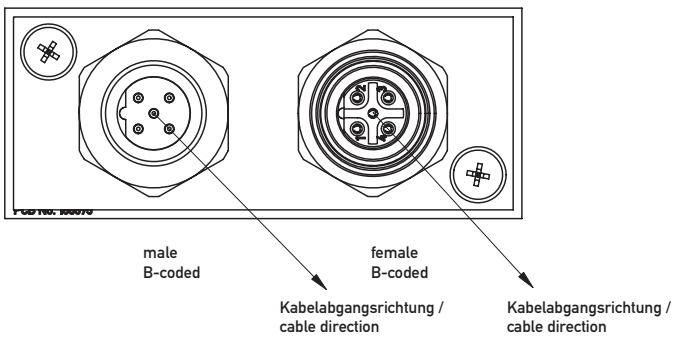
The coding is determined by means of the injection-molded or die-cast housing. Refer to the IEC 61076-2-101 for the dimensions for this. The sealing of the housing is performed via an O-ring, the assembly of which is optional. In addition, the turned contact seals the insulating body by means of special contours. The entire system is thereby water-proof, even when unconnected. Tightness with regard to casting compounds typically exists. This, however, must be tested in the respective project with the respective casting compound. Considerably different coefficients of expansion of the materials may lead to the necessity of the use of THR technology for better absorption of the forces that may affect the solder joints with casting technology due to temperature cycles and loads from vibrations and shocks.

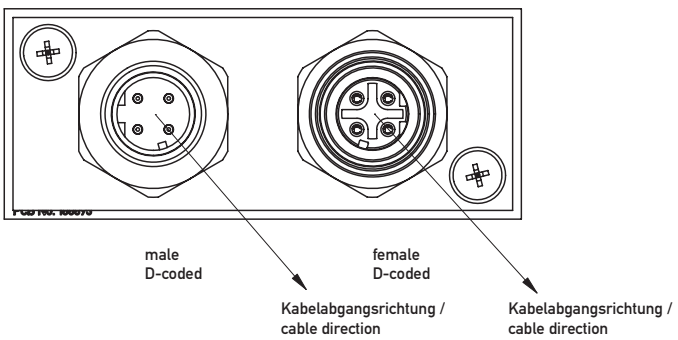
## Front panel with recommended distance between M8 PCB connectors




## Front panel with recommended distance between M12 PCB connectors

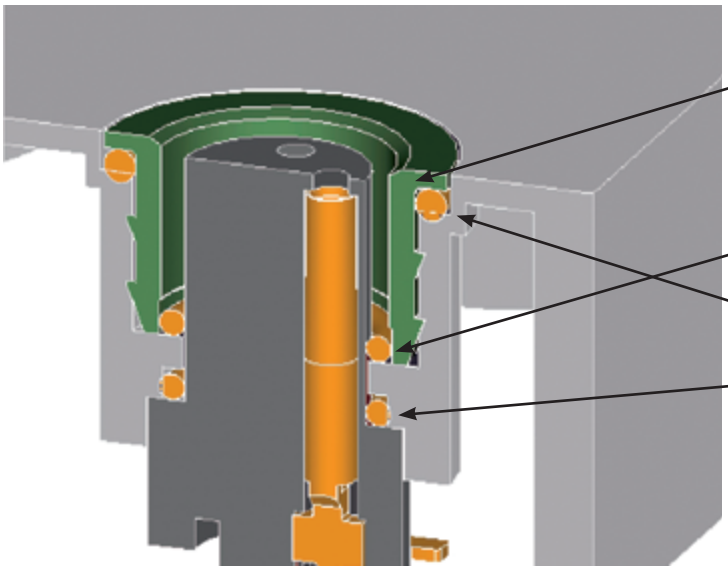


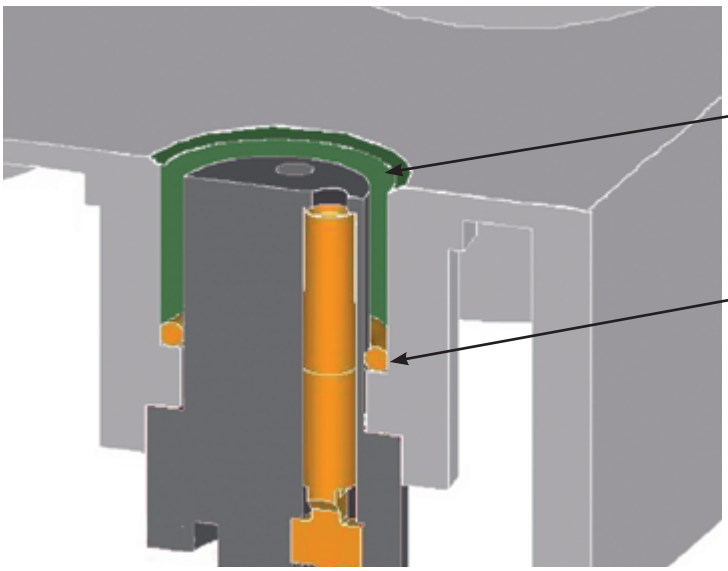



### Examples and sealing options for ERNI M8/M12 connectors combined with integrative metal shells

The solutions shown earlier should give further ideas, how the ERNI M8/M12 pcb connectors also could be used.
The mentioned solutions are not offered yet as standard parts. Of course ERNI is able to offer similar customized parts on request.




Technologies for integrating the metal shell: Insert molding,
heat setting,
ultrasonic setting,
press-in technique.



# M8/M12 Circular Connectors

## Electrical and Mechanical Characteristics

| | Standard | M8 | M12 |
|---|---|---|---|
| Number of pins | | 3, 4 | 4, 5, 8 |
| **Technical data** | | | |
| Climate category | DIN EN 60068-1<br>test b | 55/125/56 | 55/125/56 |
| Temperature range | | -55/125 °C | -55/125 °C |
| Current rating per contact | IEC60512<br>test 5b | By ambient temperature<br>20 °C 5.7 A<br>40 °C 4.8 A<br>70 °C 2.6 A | By ambient temperature<br>4, 5 pin 8 pin<br>20 °C 4.8 A<br>40 °C 4.1 A 2.0 A<br>70 °C 2.5 A |
| Air- and creepage distance | | 0.8 mm | 1.1 mm (4, 5 pin)<br>1.0 mm (8 pin male); 0.4 mm (8 pin female) |
| Operating voltage | IEC 60664 | The permissible operating voltages depend on the customer application and on the applicable or specified safety requirements.<br>Insulation coordination according to IEC 60664-1 has to be regarded for the complete electrical device. Therefore, the maximum creepage and clearance distances of the mated connectors are specified for consideration as a part of the whole current path.<br>In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used, and have to be taken into account separately.<br>As a result the creepage and clearance distances for the application may be reduced compared to those of the connector. | |
| Dielectric strength | IEC 60512<br>test 4a | 3 pin:<br>contact - contact 1000 $V_{rms}$<br>4 pin:<br>contact - contact 650 $V_{rms}$ | 4 pin:<br>contact - contact 1400 $V_{rms}$<br>5 pin:<br>contact - contact 1000 $V_{rms}$<br>8 pin:<br>contact - contact 650 $V_{rms}$ |
| Contact resistance | IEC 60512<br>test 2a | < 10 mΩ | < 10 mΩ |
| Insulation resistance | IEC 60512<br>test 3a | > $10^{12}$ Ω | > $10^{12}$ Ω |
| Vibration, sine | IEC 60512<br>test 6d | 10 – 500 Hz<br>5 g | 10 – 500 Hz<br>5 g |
| Contact disturbance (during vibration test) | IEC 60512<br>test 2e | < 1 µs | < 1 µs |
| Shock, halfsine | IEC 60512<br>test 6c | 50 g<br>11 ms | 50 g<br>11 ms |
| Contact disturbance (while shock test) | IEC 60512<br>test 2e | < 1 µs | < 1 µs |
| Mechanical operation (mating cycles) | IEC 60512<br>test 9a | > 100 mating cycles | > 100 mating cycles |
| Insertion and withdrawal force | IEC 60512<br>test 13b | max. 23 N | max. 23 N |
| Gauge retention force | IEC 60512<br>test 16e | > 0.2 N | > 0.2 N |

## Electrical and Mechanical Characteristics
## PCB Connectors

| | Standard | M8 | M12 |
|---|---|---|---|
| Number of pins | | 3, 4 | 4, 5, 8 |
| **Process-conditions** | | | |
| Solder temperature max. | IEC 68-2-20 | | |
| Hand soldering temperature max. | | 3.5 s at 350 °C | 3.5 s at 350 °C |
| Dip soldering temperature max. | | 10 s at 260 °C | 10 s at 260 °C |
| Reflow soldering temperature max. | JEDEC J-STD-020C | 20 - 40 s at 260 °C | 20 - 40 s at 260 °C |
| Coplanarity of SMT | | < 0.1 mm | < 0.1 mm |
| Stencil thickness min. | | 150 µm | 150 µm |
| **Housing Materials** | | | |
| Plastic material (symbol) | | LCP | LCP |
| CTI value | IEC 112 | CTI 200 | CTI 200 |
| UL flame rating | | UL 94 V-0 | UL 94 V-0 |
| UL file | | E83005 | E83005 |
| **Contact Materials** | | | |
| Base material | | Cu alloy | Cu alloy |
| Mating area | | gold plated | gold plated |
| Termination area | | gold plated (male)<br>Sn (female) | gold plated (male)<br>Sn (female) |
| **Environment compatibility** | | | |
| Recycling | | no flame-retardent additives, no toxic additives allows easy recycling | |
| **Approvals** | | | |
| Protection class | IEC 60529 | IP 67 (mated connector/cable) | IP 67 (mated connector/cable) |

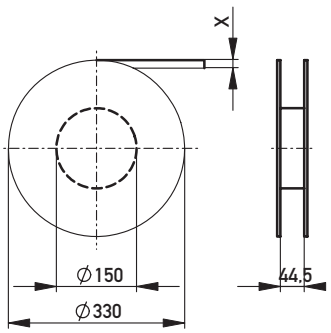
| | Standard | M8 Cable | M12 Cable |
|---|---|---|---|
| Number of pins | | 3, 4 | 4, 5 |
| **Technical specification** | | | |
| Coding | | A | A |
| Connection | | Screw locking M8x1<br>(max. tightening force 0.4 Nm) | Screw locking M12x1<br>(max. tightening force 0.6 Nm) |
| **Cable data** | | | |
| Jacket material | | PUR, PVC | PUR, PVC |
| Jacket diameter | | 3 pins / 4 pins<br>PUR 4.1 mm / 4.4 mm<br>PVC 4.4 mm / 4.7 mm | 4 pins / 5 pins<br>PUR 4.7 mm / 5.0 mm<br>PUR,shielded 6.5 mm / 7.0 mm<br>PVC 5.2 mm / 5.3 mm |
| Conductor cross-section | | 0.25 $mm^2$ | 0.34 $mm^2$<br>0.25 $mm^2$ + 0.34 $mm^2$ (5 pin, shielded) |
| Bending radius | | 10 x jacket diameter | 10 x jacket diameter<br>15 x jacket diameter (5 pin, PUR shielded) |
| Temperature range | | -25 ... +80°C (PUR)<br>-5 ... +70°C (PVC) | -25 ... +80°C (PUR)<br>-25 ... +75°C (PUR, shielded)<br>-5 ... +70°C (PVC) |
| **Materials** | | | |
| Contact | | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) |
| Finishing, mating zone | | gold plated | gold plated |
| Screw material | | Zinc die casting | Zinc die casting |
| Screw plating | | 4-6 µm Ni | 4-6 µm Ni |
| **Electrical data** | | | |
| Operating voltage | IEC 60664 | The permissible operating voltages depend on the customer application and on the applicable or specified safety requirements. Insulation coordination according to IEC 60664-1 has to be regarded for the complete electrical device. Therefore, the maximum creepage and clearance distances of the mated connectors are specified for consideration as a part of the whole current path. In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used, and have to be taken into account separately. As a result the creepage and clearance distances for the application may be reduced compared to those of the connector. | |
| Current rating per contact | IEC 61076-2-101 | max. 4 A | max. 4 A |
| Dielectric strength | IEC 61076-2-101 | max. 1.5 kV<br>(depends on type) | max. 2.5 kV<br>(depends on type) |
| **Approvals** | | | |
| Protection class | IEC 60529 | IP67 | IP67 |

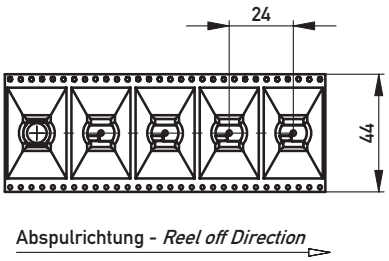
## Electrical and Mechanical Characteristics
## Quick Termination

| | Standard | M8 Quick Termination | M12 Quick Termination |
|---|---|---|---|
| Type | | male, female | male, female |
| **Technical specification** | | | |
| Number of Pins | | 3, 4 | 4 |
| Coding | | A | A |
| Connection | | Screw locking M8x1<br>(max. tightening force 0.4 Nm) | Screw locking M12x1<br>(max. tightening force 0.6 Nm) |
| Temperature range | | -25 ... +85°C | -25 ... +85°C |
| **Cable termination** | | | |
| Termination | | Quick termination (IDC) | Quick termination (IDC) |
| Cable jacket diameter | | 3.2 - 5.4 mm | 4.0 - 5.1 mm |
| Wire diameter | | 1.0 - 1.7 mm | 1.2 - 1.6 mm |
| Conductor cross-section | | 0.14 - 0.34 $mm^2$ | 0.14 - 0.34 $mm^2$ |
| Diameter of individual strands | | min. 0.1 mm | min. 0.1 mm |
| Reconnection<br>(same cross-section) | | 10 | 10 |
| **Materials** | | | |
| Contact | | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) |
| Finishing, mating zone | | gold plated | gold plated |
| **Electrical data** | | | |
| Operating voltage | IEC 60664 | The permissible operating voltages depend on the customer application and on the applicable or specified safety requirements.<br>Insulation coordination according to IEC 60664-1 has to be regarded for the complete electrical device. Therefore, the maximum creepage and clearance distances of the mated connectors are specified for consideration as a part of the whole current path.<br>In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used, and have to be taken into account separately.<br>As a result the creepage and clearance distances for the application may be reduced compared to those of the connector. | |
| Current rating per contact | IEC 61-076-2-101 | max. 4 A | max. 4 A |
| Dielectric strength | IEC 61-076-2-101 | 0.8 kV | 0.8 kV |
| **Approvals** | | | |
| Protection class | IEC 60529 | IP67 | IP67 |

| | Adapter | T-Coupler | Panel Feed-Through |
|---|---|---|---|
| Type | male, female | M12 male - 2 x M12 female,<br>M12 male - 2 x M8 female | M12 female - M12 male |
| **Technical specification** | | | |
| Number of Pins | 3, 4 | 5/4, 4/3 | 5 |
| Coding | A | A | A, B |
| Connection | Screw locking<br>M8x1 (0.4 Nm)<br>M12x1 (0.6 Nm) | Screw locking<br>M8x1 (0.4 Nm)<br>M12x1 (0.6 Nm) | Screw locking<br>M12x1 (0.6 Nm) |
| Temperature range | -25 ... +85°C | -25 ... +85°C | -25 ... +90°C |
| **Materials** | | | |
| Contact | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) | CuZn39Pb3F50 (male)<br>CuNi2Si HV160U (female) |
| Finishing, mating zone | gold plated | gold plated | gold plated |
| **Electrical data** | | | |
| Operating voltage | The permissible operating voltages depend on the customer application and on the applicable or specified safety requirements.<br>Insulation coordination according to IEC 60664-1 has to be regarded for the complete electrical device. Therefore, the maximum creepage and clearance distances of the mated connectors are specified for consideration as a part of the whole current path.<br>In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used, and have to be taken into account separately. As a result the creepage and clearance distances for the application may be reduced compared to those of the connector. | | |
| Current rating per contact | max. 4 A | max. 4 A | max. 4 A |
| Dielectric strength | 0.8 kV | 2.5 kV (M12 - 2 x M12)<br>0.8 kV (M12 - 2 x M8) | 0.8 kV |
| **Approvals** | | | |
| Protection class | IP67 | IP67 | IP67 |

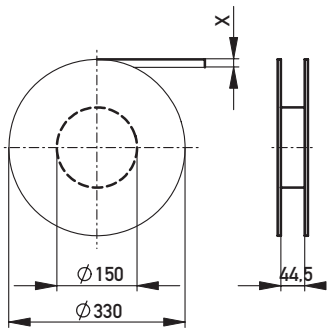
### Tape and reel packaging for female and male connectors M8

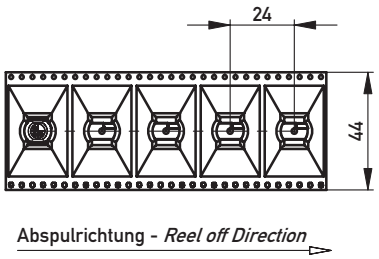



| | X |
|---|---|
| M8 female | 18.0 |
| M8 male | 21.0 |

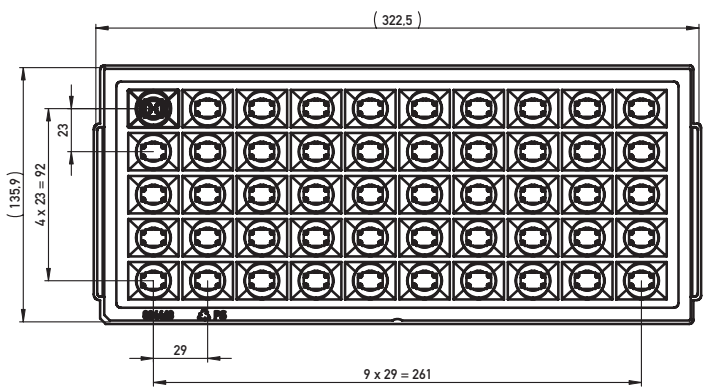
### Tape and reel packaging for female and male connectors M12




| | X |
|---|---|
| M12 female | 21,3 |
| M12 male | 23,8 |

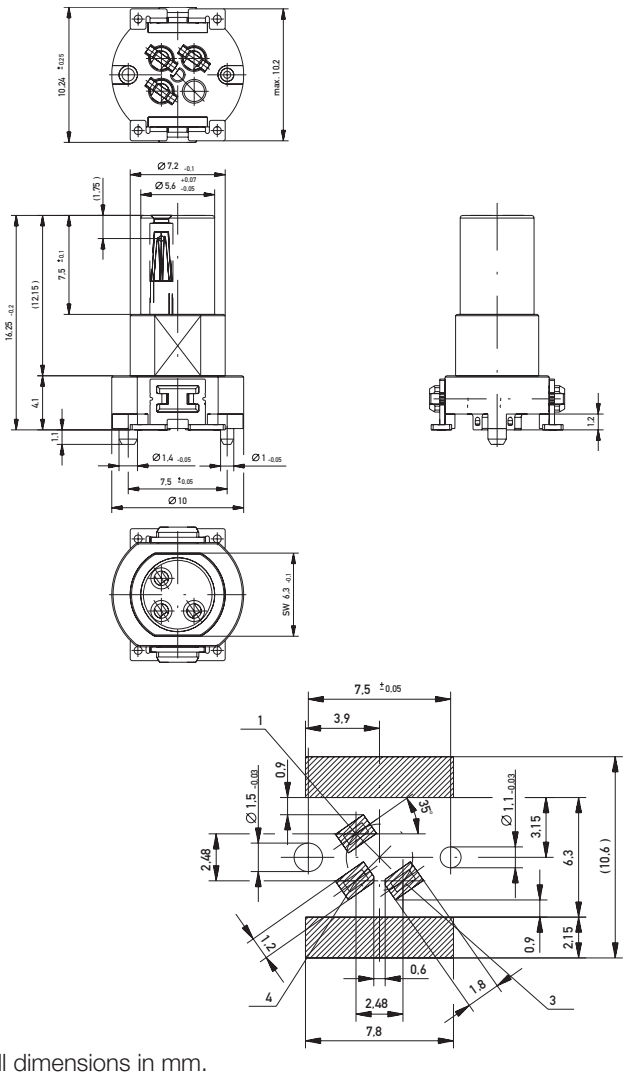
### Tray packaging for male connectors M12



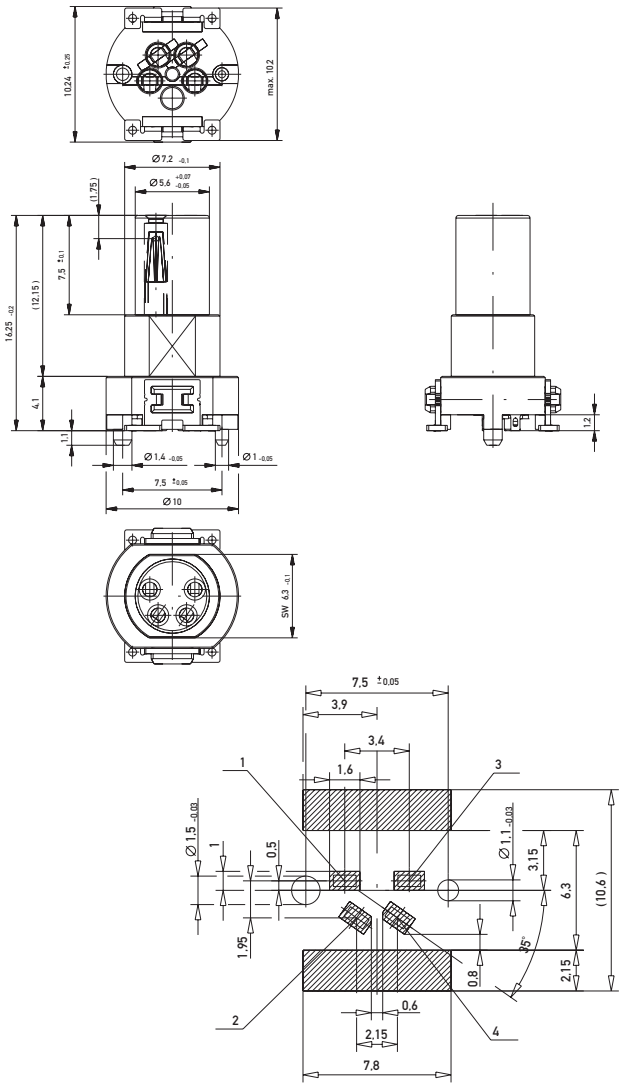
M8 connectors are well known for the connection of small form factor sensor/actuator devices like proximity sensors, photoelectric barriers, cylinder switches, vacuum valves or micro switches. For such miniature devices it is essential to have space-saving components for reaching compact designs. The M8 products from ERNI support this idea and meet the requirements to a high degree. The female connectors can be ideally used for integrative designs where the M8 locking thread is an integrated part of the housing. Female connectors are mostly used as an input connection for sensor signals.

### Dimensional Drawings

#### 3 Pin Version

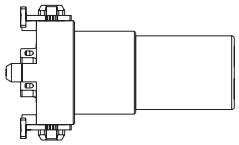
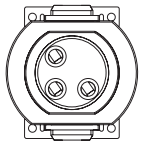
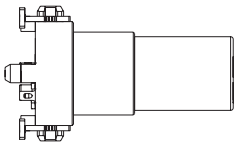
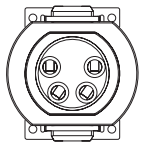


#### 4 Pin Version

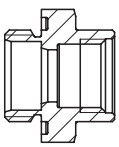
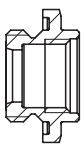


All dimensions in mm.

## Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
| |  | | | |  | |
| Female M8 | 3 | 9/13 mm | A | SMT | Tape and reel/100 pcs | **224150** |
| Female M8 | 3 | 9/13 mm | A | SMT | Bulk/100 pcs | **234233** |
| |  | | | |  | |
| Female M8 | 4 | 9/13 mm | A | SMT | Tape and reel/100 pcs | **224151** |
| Female M8 | 4 | 9/13 mm | A | SMT | Bulk/100 pcs | **234234** |

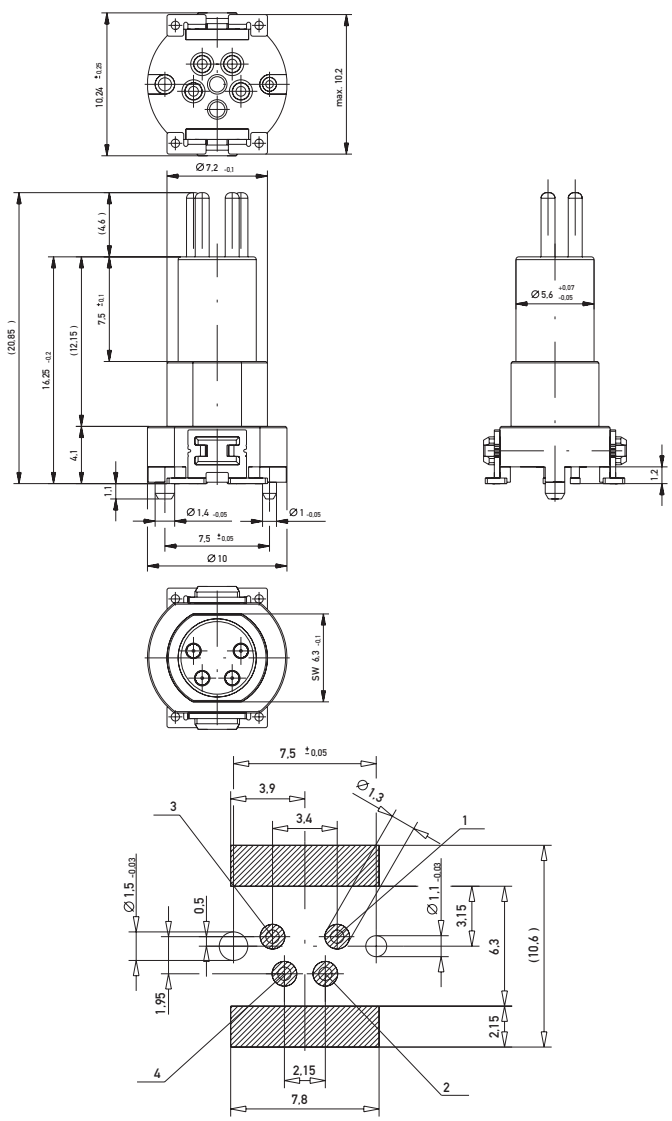
## Accessories for M8 Female Connectors

| Configuration | Assembly Height | Packaging | Part Number |
|---|---|---|---|
|  | | | |
| Metal shell for M8 female connectors | 9 mm | Bulk | **254154** |
|  | | | |
| Metal shell for M8 female connectors | 13 mm | Bulk | **284067** |
| O-ring for M8 connectors, 10x1 | _ | Bulk/100 pcs | **834898** |
| O-ring for M8 connectors, 5x0.8 | _ | Bulk/100 pcs | **835283** |

Consistent to M8 female versions, ERNI M8 male connectors succeed with the same concept: capability for fully-automated SMT soldering processes. The male version uses machined gold plated contacts ensuring at least 100 mechanical operations. Solid retention clips absorb mating forces and make the surface mounted device stress-resistant.
Male connectors are reliable for power supply interfaces in I/O boxes. Despite its small design the connector allows a current rating of 5.7 A at 20 °C (all pins fully loaded). It is also being used as bus connector where M12 B-coded types would need to much space.

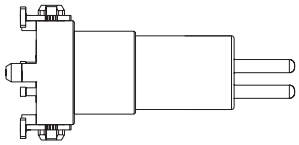
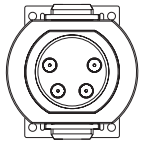
### Dimensional Drawings

### 4 Pin Version

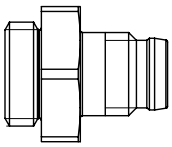
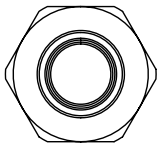
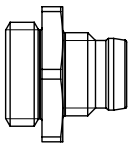
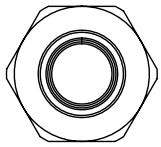



All dimensions in mm.

## Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
|  | | | | |  | |
| Male M8 | 4 | 9/13 mm | A | SMT | Tape and reel/80 pcs | **224152** |
| Male M8 | 4 | 9/13 mm | A | SMT | Bulk/100 pcs | **234235** |

## Accessories for M8 Male Connectors

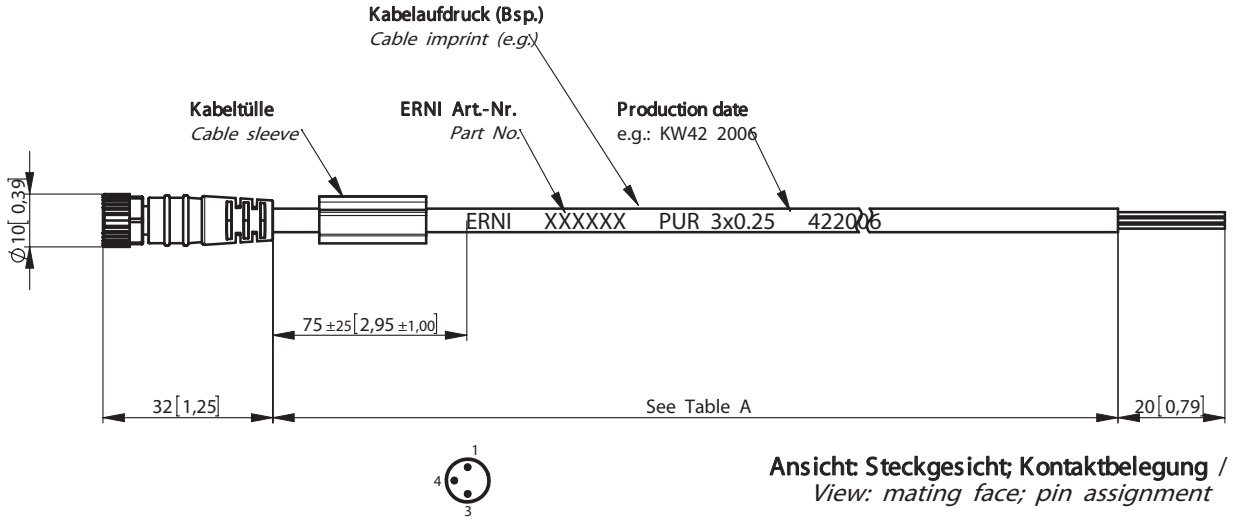
| Configuration | Assembly Height | Packaging | Part Number |
|---|---|---|---|
|  | |  | |
| Metal shell for M8 male connectors | 9 mm | Bulk | **284409** |
|  | |  | |
| Metal shell for M8 male connectors | 13 mm | Bulk | **284074** |
| O-ring for M8 connectors, 10x1 | – | Bulk/100 pcs | **834898** |

ERNI's M8 cable solutions fit to the according PCB counterpart and the threaded panel flange offered in addition.
The importance of this comprehensive solution offered by one supplier is that individual components are tested altogether. Even though there is a standard (IEC) applicable, small differences of individual components may cause problems, e.g. not achieving IP67. ERNI's solution is qualified and tested altogether and meets all IEC requirements. M8 cable assemblies are over-moulded and offered either as interconnection of two circular connectors or as a cord set having an open end of line.
ERNI's portfolio covers further criteria:

- no. of contacts:
  3, 4
- LED: 2 LEDs optional
- cable: PVC / PUR (UL/CSA)
- standard cable length:
  - interconnection: 0.3, 0.6, 1.0, 1.5, 2.0 m
  - pigtail: 1.5, 3.0, 5.0, 7.5, 10.0 m

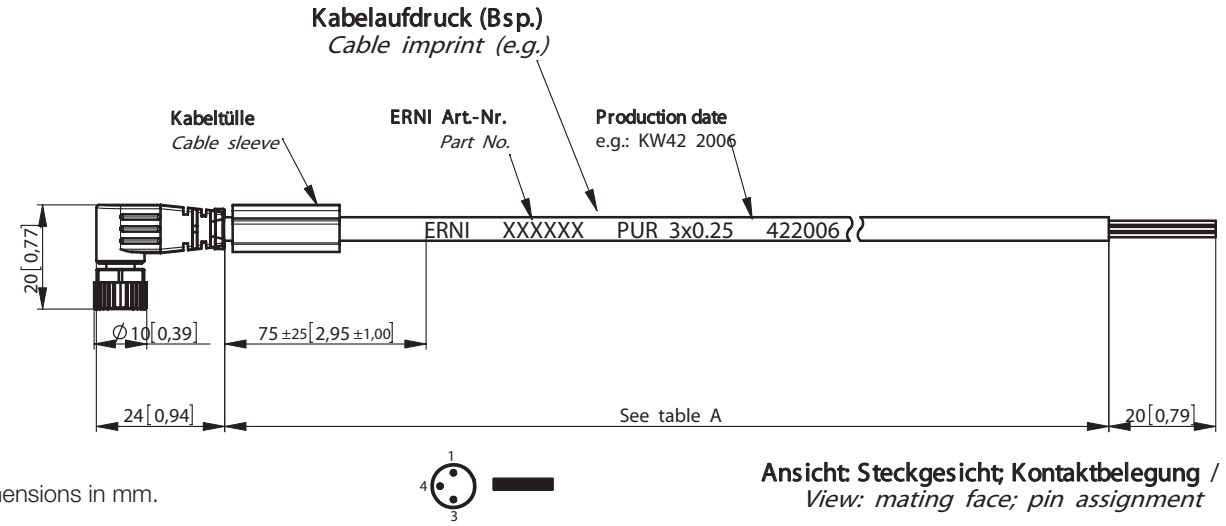
### Dimensional Drawings

### Female straight - Pigtail




**Ansicht: Steckgesicht; Kontaktbelegung /**
*View: mating face; pin assignment*

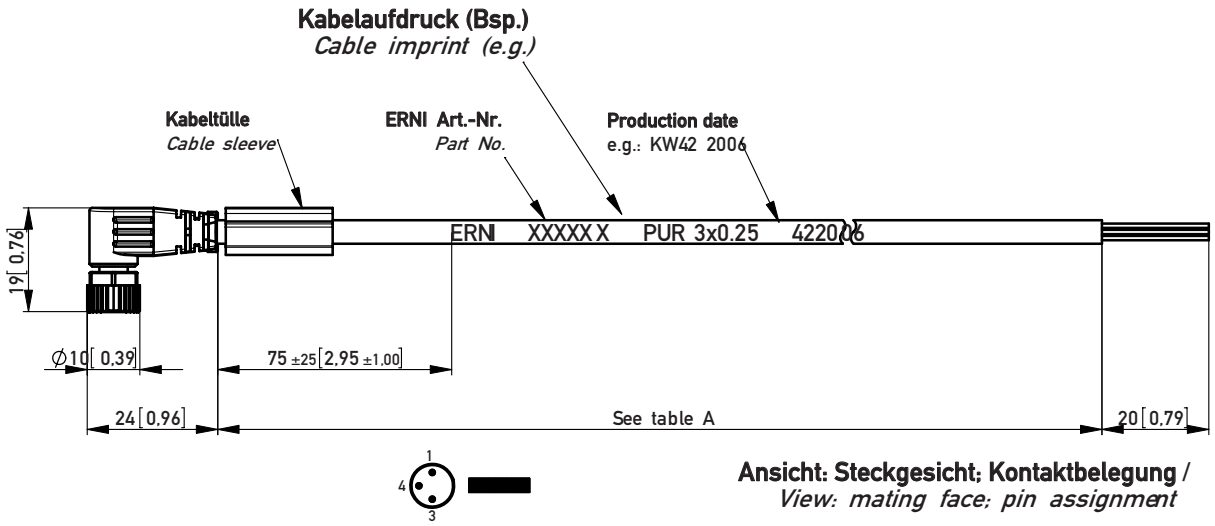
### Female angled - Pigtail



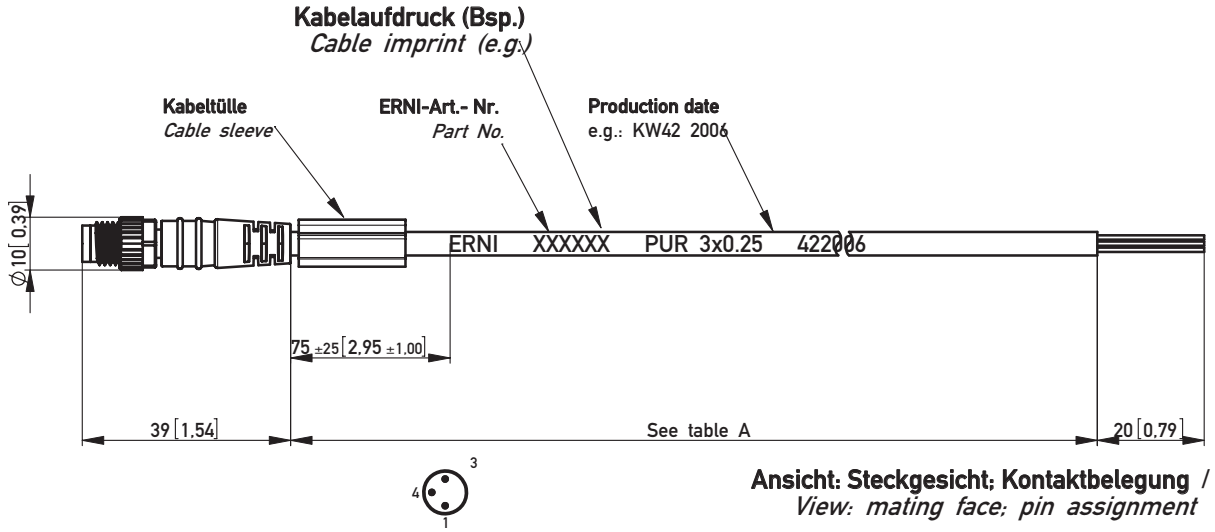

**Ansicht: Steckgesicht; Kontaktbelegung /**
*View: mating face; pin assignment*

All dimensions in mm.

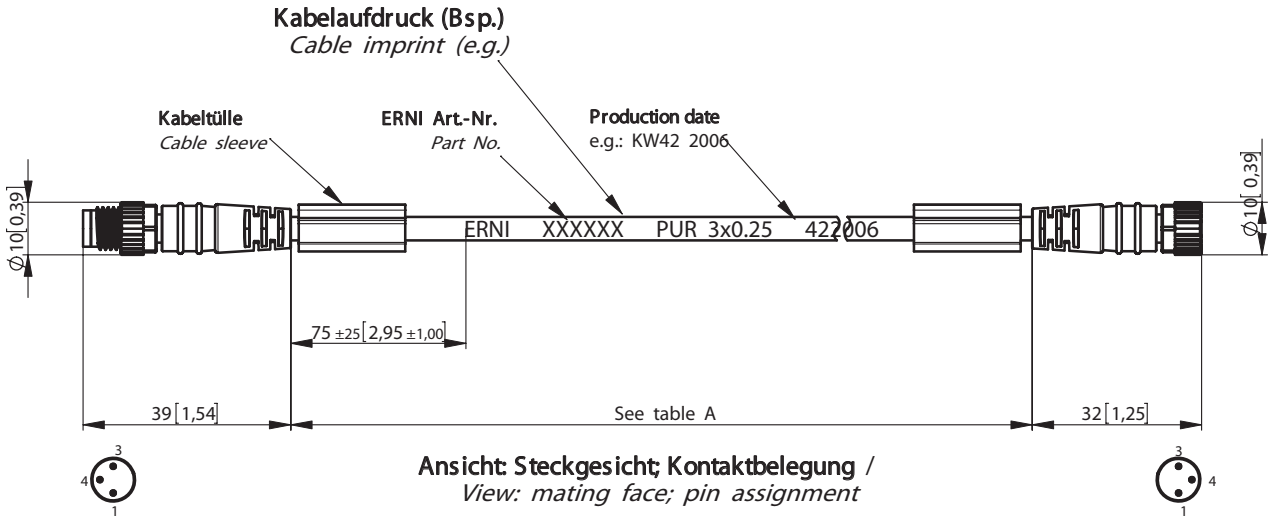
## Female angled, with LED - Pigtail



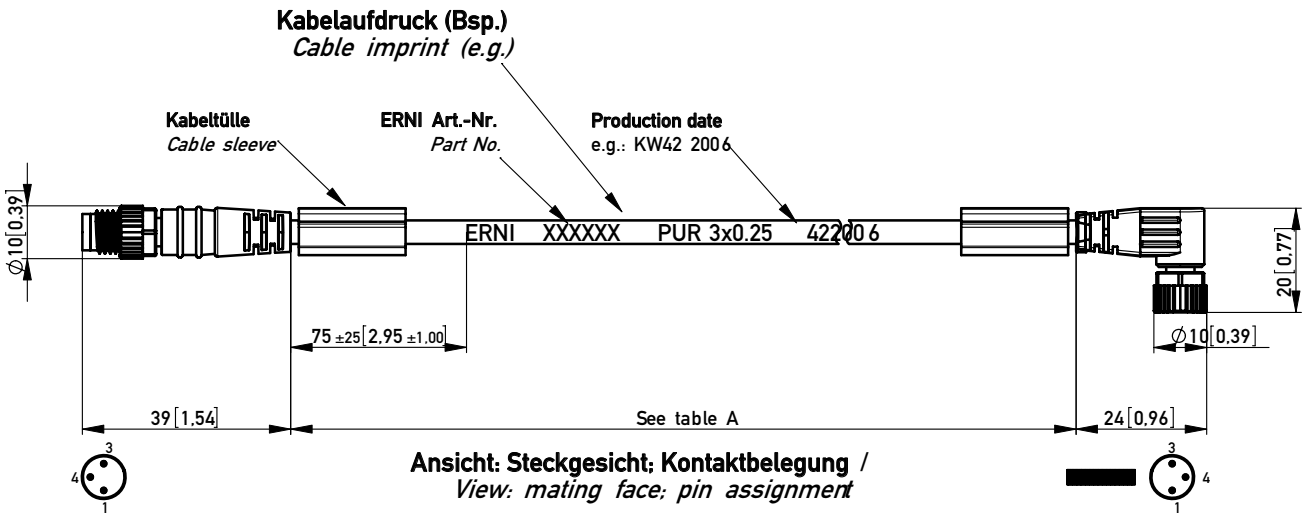

## Male straight - Pigtail



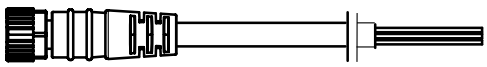
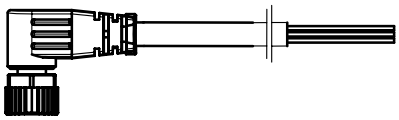
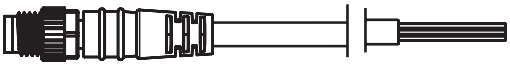
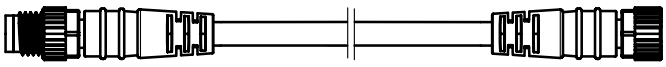

## Male straight - Female straight



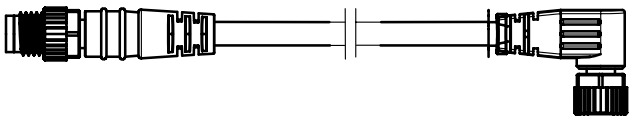
## Male straight - Female angled



### Ordering Information

| Connector1 | Connector2 | No. of Pins | Length | Coding | Cable Type | Part Number |
|---|---|---|---|---|---|---|
|  | | | | | | |
| Female straight | None | 3 | 3.0 m | A | PVC | **223764** |
| Female straight | None | 3 | 3.0 m | A | PUR | **223765** |
| Female straight | None | 4 | 1.5 m | A | PVC | **223933** |
| Female straight | None | 4 | 3.0 m | A | PVC | **223767** |
| Female straight | None | 4 | 3.0 m | A | PUR | **223769** |
|  | | | | | | |
| Female angled | None | 3 | 1.5 m | A | PUR | **223711** |
| Female angled | None | 3 | 3.0 m | A | PVC | **223770** |
| Female angled | None | 4 | 3.0 m | A | PVC | **223771** |
| Female angled | None | 4 | 3.0 m | A | PUR | **223772** |
| Female angled, with LED | None | 3 | 3.0 m | A | PVC | **223766** |
| Female angled, with LED | None | 3 | 3.0 m | A | PUR | **223768** |
|  | | | | | | |
| Male straight | None | 3 | 1.5 m | A | PUR | **223710** |
| Male straight | None | 4 | 3.0 m | A | PUR | **223762** |
|  | | | | | | |
| Male straight | Female straight | 3 | 1.0 m | A | PVC | **223773** |
| Male straight | Female straight | 3 | 1.0 m | A | PUR | **223774** |
| Male straight | Female straight | 4 | 1.0 m | A | PVC | **223776** |
| Male straight | Female straight | 4 | 1.0 m | A | PUR | **223777** |

## Ordering Information

| Connector1 | Connector2 | No. of Pins | Length | Coding | Cable Type | Part Number |
|---|---|---|---|---|---|---|
| | |  | | | | |
| Male straight | Female angled | 3 | 1.0 m | A | PVC | **223775** |
| Male straight | Female angled | 3 | 1.0 m | A | PUR | **223778** |
| Male straight | Female angled | 4 | 1.0 m | A | PUR | **223763** |
| Male straight | Female angled | 4 | 1.0 m | A | PVC | **223779** |
| Male straight | Female angled, with LED | 3 | 0.3 m | A | PUR | **223712** |
| Male straight | Female angled, with LED | 3 | 1.0 m | A | PVC | **223780** |

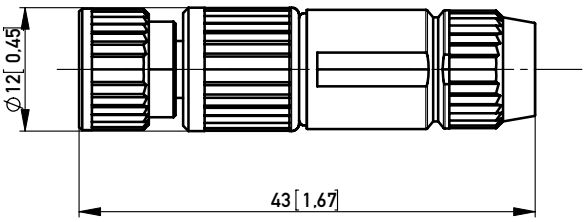
When installing sensor/actuator devices sometimes pre-assembled cables can cause difficulties or even prevent from successful installation because of cables laying in cable ducts or going through narrow components and small gaps. This would increase the wiring time and raise maintenance cost. ERNI's field-wireable quick termination connectors are an adequate and efficient solution ensuring highest flexibility for cabling of sensor/actuator peripherals. Easy termination of standard cables is guaranteed by tool-less IDC technology.
Further features:

- up to 10 times reconnectable
- integrated strain-relief
- vibration-proof feature
- suitable for cable diameter 3.2 - 5.4 mm

### Dimensional Drawings

### 3 Pin Female

Buchse M8 */M8 female*
3-polig */3 pin*

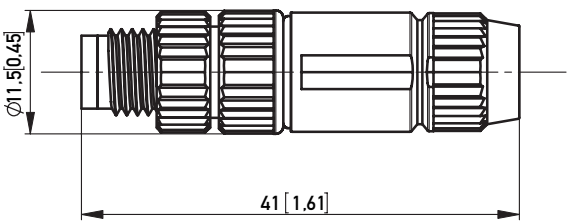



Quick termination technique (IDC)

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

### 3 Pin Male

Buchse M8 */M8 female*
3-polig */3 pin*



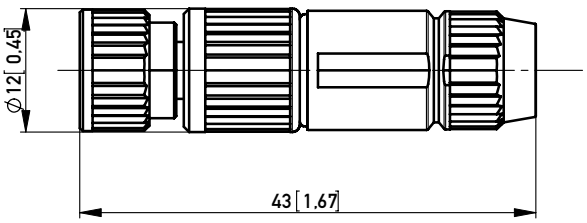

Quick termination technique (IDC)

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

All dimensions in mm.

## 4 Pin Female

Buchse M8 */M8 female*
4-polig */4 pin*

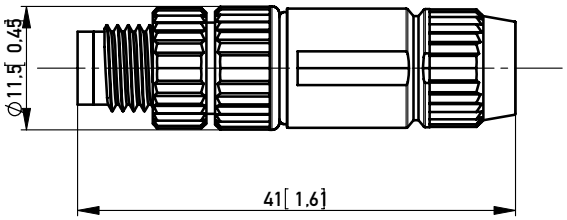



Quick termination technique (IDC)

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

## 4 Pin Male

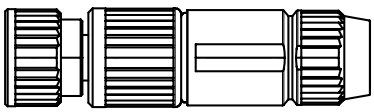
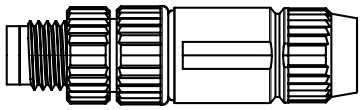
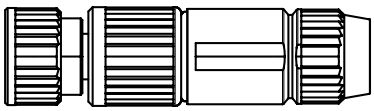
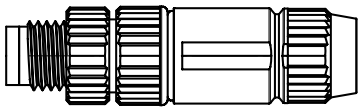
Stecker M8 */M8 male*
4-polig */4 pin*

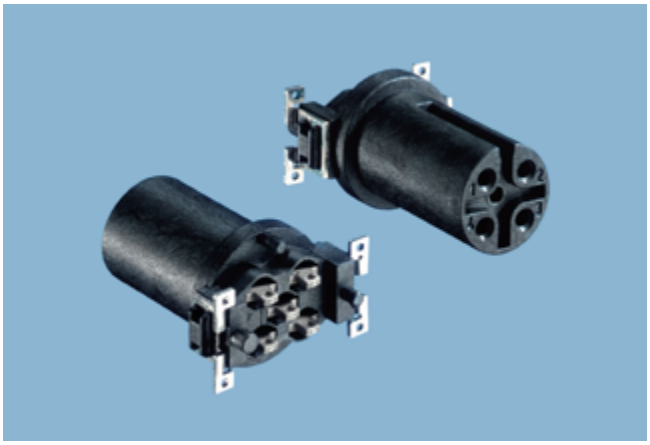



Quick termination technique (IDC)

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

## Ordering Information

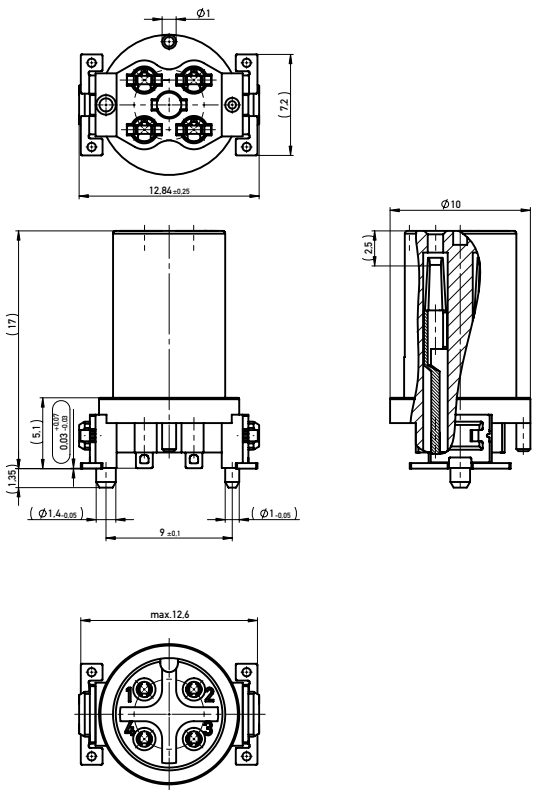
| Configuration | No. of Pins | Termination | Coding | Part Number |
|---|---|---|---|---|
| | |  | | |
| Female M8 | 3 | IDC | A Coding | **254760** |
| | |  | | |
| Male M8 | 3 | IDC | A Coding | **254758** |
| | |  | | |
| Female M8 | 4 | IDC | A Coding | **254764** |
| | |  | | |
| Male M8 | 4 | IDC | A Coding | **254762** |

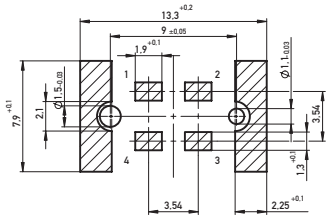


ERNI introduced the first M12 SMT connector in 2003. The ability for surface mount assembly processes contributes to the design-to-cost philosophy and leads to significant cost savings in general applications.
The modular connector system comprises of not only the connector itself but also considers various threaded metal flanges and O-ring seals. A solution that allows designer to flexibly create different PCB to front panel distances.
Moreover it protects from dust and water immersion according to IP67. Several codings compliant to IEC 61076-2-101 are supported.

### Dimensional Drawings

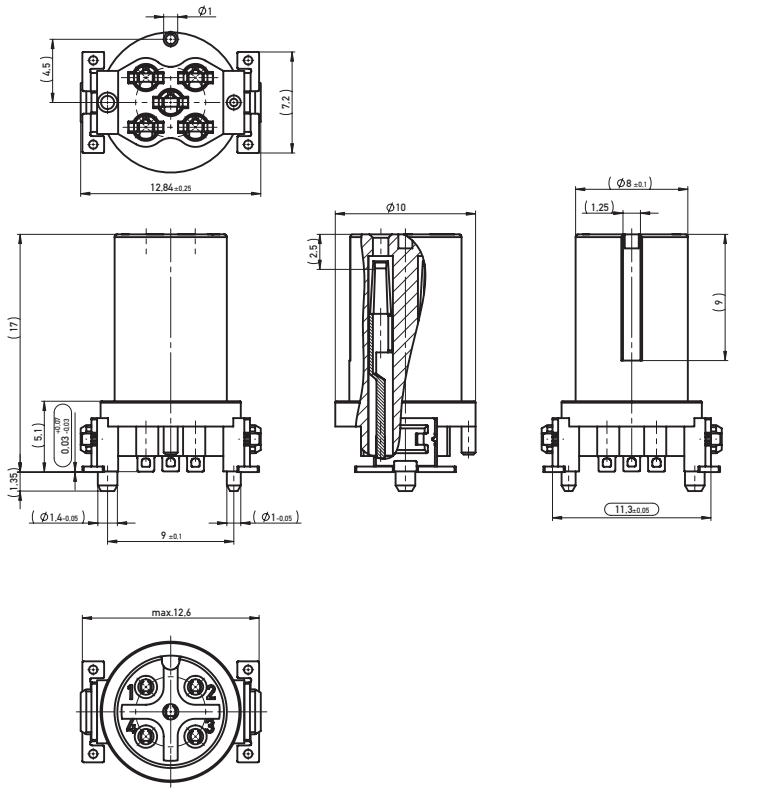
### 4 Pin Version, A Coding

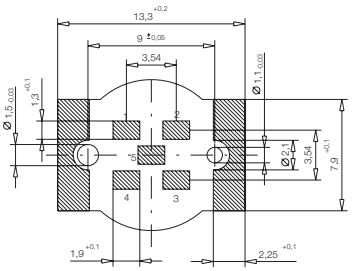


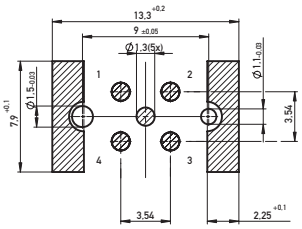

All dimensions in mm.

### 5 Pin Version, A Coding

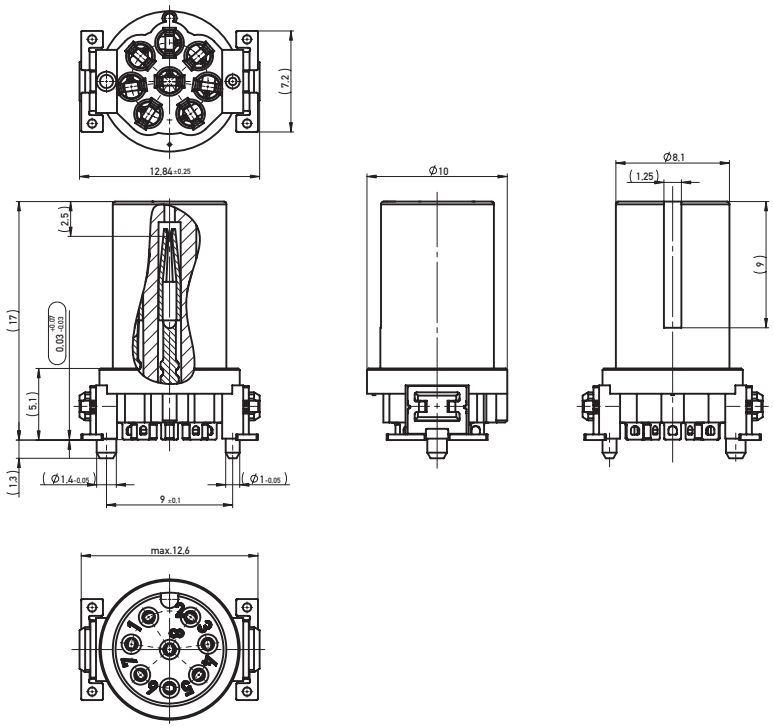


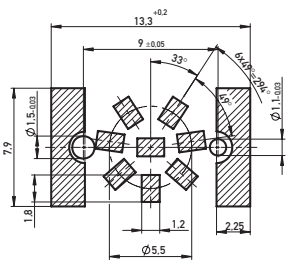




Layout for connectors with machined contacts

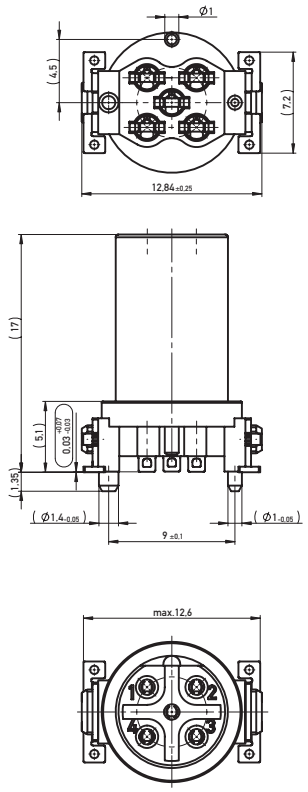


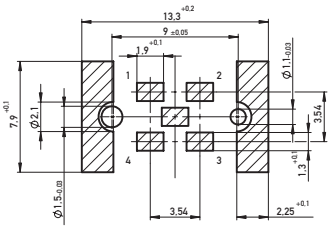

### 8 Pin Version, A Coding



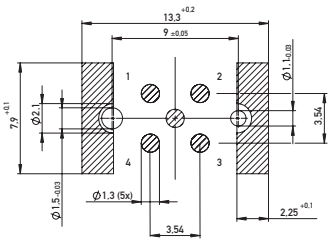



### 5 Pin Version, B Coding

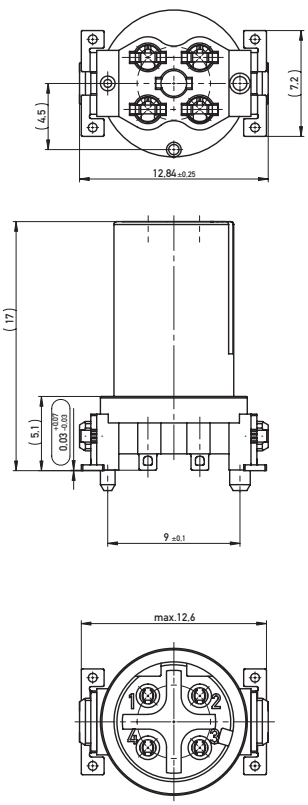


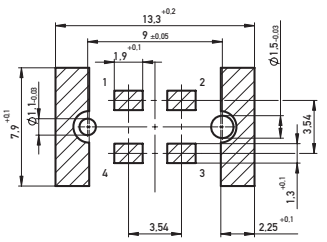




Layout for connectors with machined contacts

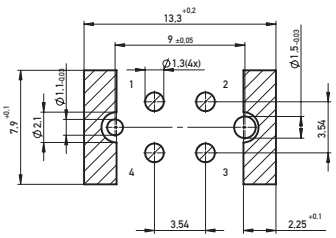



### 4 Pin Version, D Coding

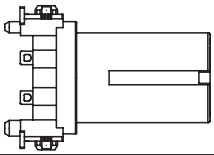
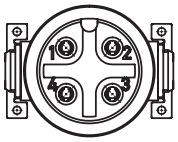
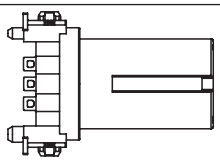
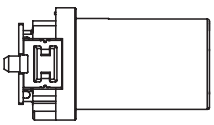
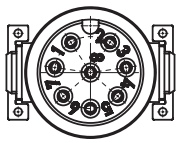
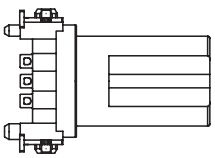


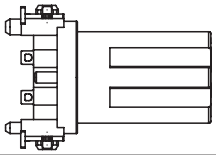

Layout for connectors with machined contacts



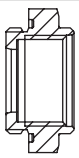
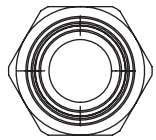
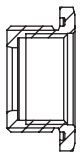
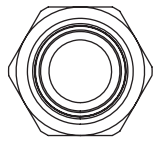
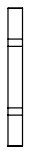
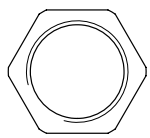
### Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
| |  | | | |  | |
| Female M12 | 4 | 9/13 mm | A | SMT | Bulk/100 pcs | **284322** |
| |  | | | | | |
| Female M12 | 5 | 9/13 mm | A | SMT | Tape and reel/100 pcs | **224064** |
| Female M12 | 5 | 9/13 mm | A | SMT | Bulk/100 pcs | **194781** |
| Female M12, machined contacts | 5 | 9/13 mm | A | SMT | Tape and reel/100 pcs | **354702** |
| |  | | | |  | |
| Female M12 | 8 | 9/13 mm | A | SMT | Tape and reel/100 pcs | **354131** |
| Female M12 | 8 | 9/13 mm | A | SMT | Bulk/100 pcs | **254310** |
| |  | | | | | |
| Female M12 | 5 | 9/13 mm | B | SMT | Tape and reel/100 pcs | **254206** |
| Female M12 | 5 | 9/13 mm | B | SMT | Bulk/100 pcs | **254205** |
| Female M12, machined contacts | 5 | 9/13 mm | B | SMT | Tape and reel/100 pcs | **384891** |

### Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
| |  | | | | | |
| Female M12 | 4 | 9/13 mm | D | SMT | Tape and reel/100 pcs | **234041** |
| Female M12 | 4 | 9/13 mm | D | SMT | Bulk/100 pcs | **234040** |
| Female M12, machined contacts | 4 | 9/13 mm | D | SMT | Tape and reel/100 pcs | **364175** |

### Accessories for M12 Female Connectors

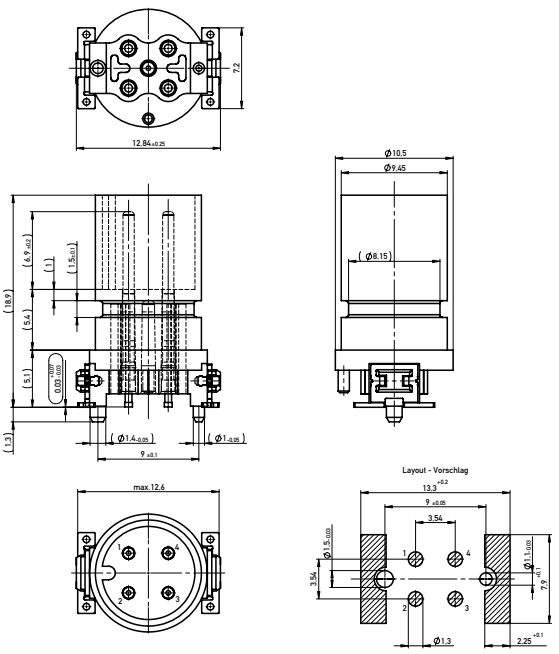
| Configuration | Assembly Height | Packaging | Part Number |
|---|---|---|---|
|  | |  | |
| Metal shell for M12 female connectors | 9 mm | Bulk | **374729** |
|  | |  | |
| Metal shell for M12 female connectors | 13 mm | Bulk | **374728** |
|  | |  | |
| Counternut M14x1 | – | Bulk | **354003** |

| Configuration | Material | Packaging | Part Number |
|---|---|---|---|
| O-ring for M12 connectors, 14x1 | NBR | Bulk/100 pcs | **834899** |
| O-ring for M12 connectors, 7x1 | Viton | Bulk/100 pcs | **835284** |
| Protective cap, female connectors, M12x1, IP67 | PE-HD | Bulk | **374343** |

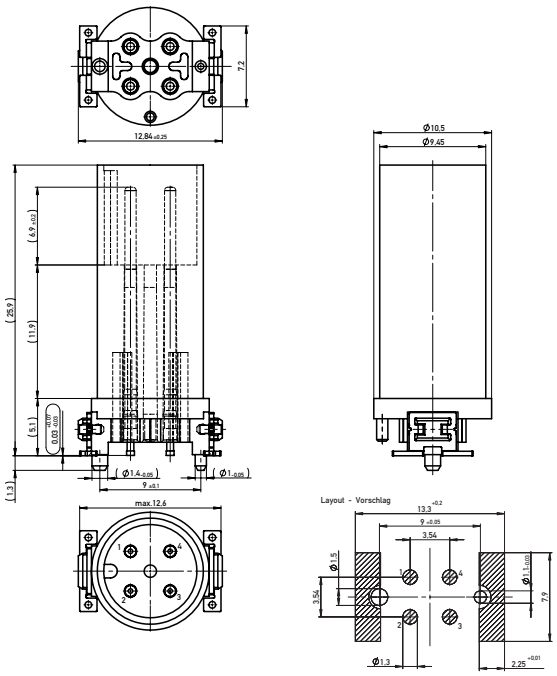
The M12 SMT male connectors complete the product range of M12 PCB connectors from ERNI.
A-coded versions are successfully used for power supply on sensor/actuator distribution boxes or on Ethernet switches.
The A-coded connectors are also standard for low voltage switching devices according to IEC 60947-5-2.
The modular connector system includes male connectors of two different heights and various threaded metal flanges that allow to realize different distances between PCB and front panel. O-ring seals ensure protection according to IP67.

### Dimensional Drawings

#### 4 Pin Version, Style 1, A Coding, Assembly Height 9 mm, Additional Sealing Option

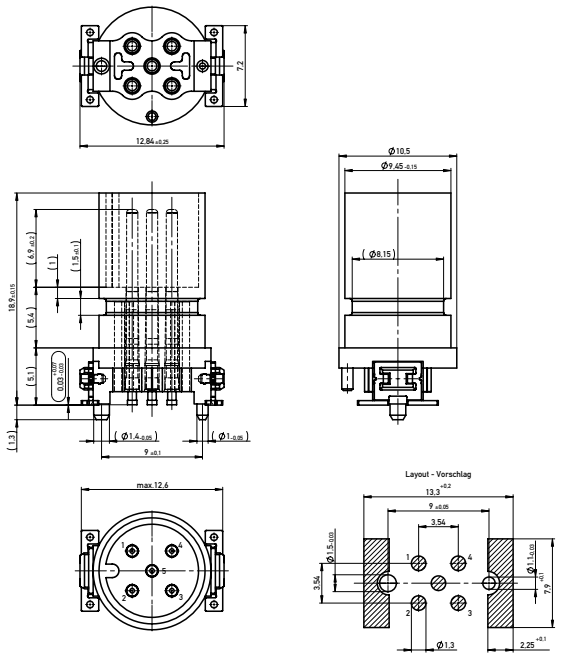



#### 4 Pin Version, Style 2, A Coding, Assembly Height 13 mm

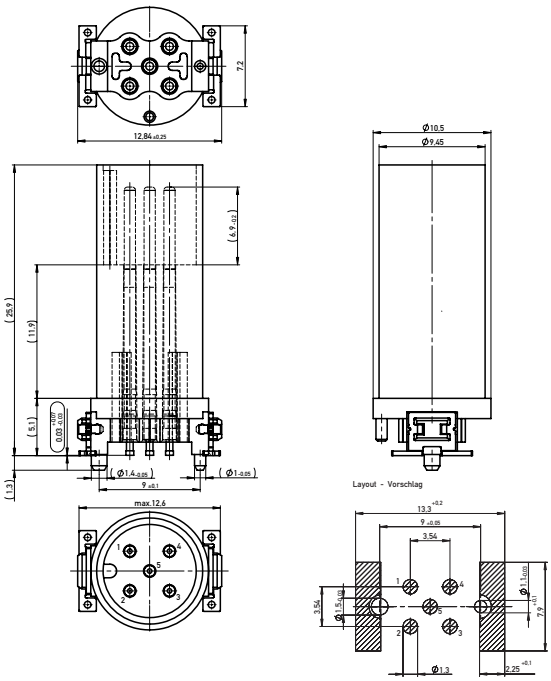



All dimensions in mm.

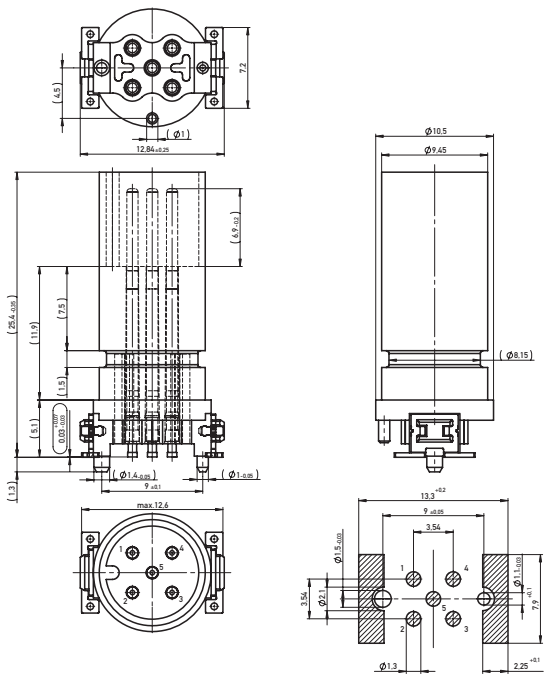
### 5 Pin Version, Style 1, A Coding, Assembly Height 9 mm, Additional Sealing Option



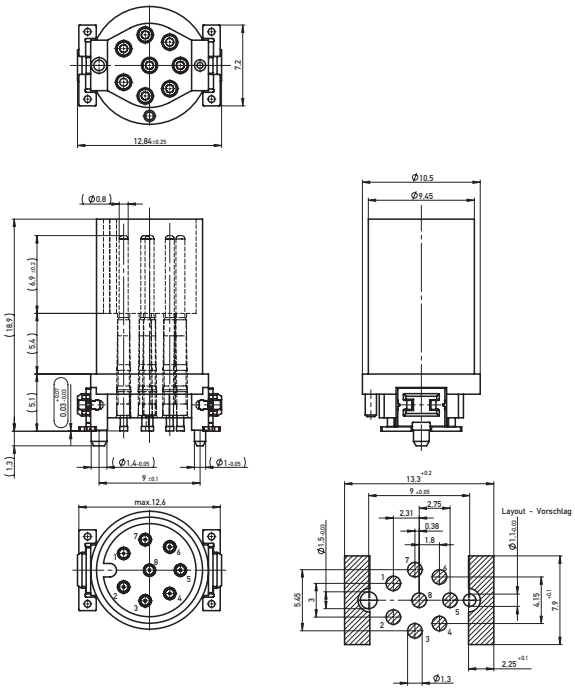

### 5 Pin Version, Style 2, A Coding, Assembly Height 13 mm



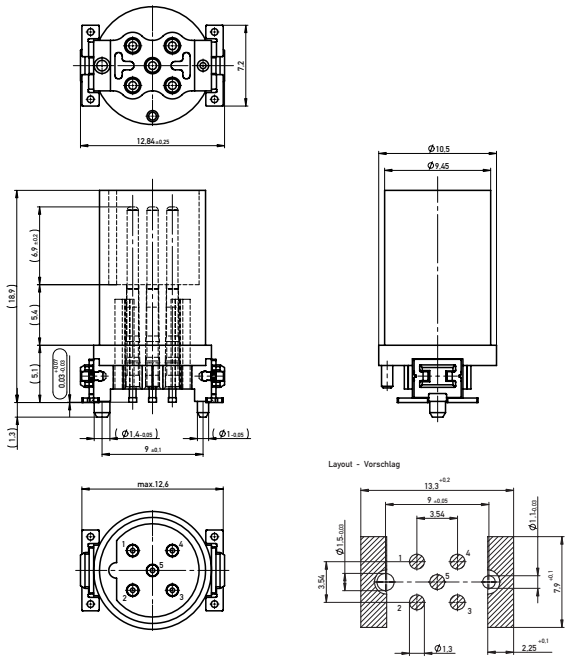

### 5 Pin Version, Style 1, A Coding, Assembly Height 13 mm, Additional Sealing Option



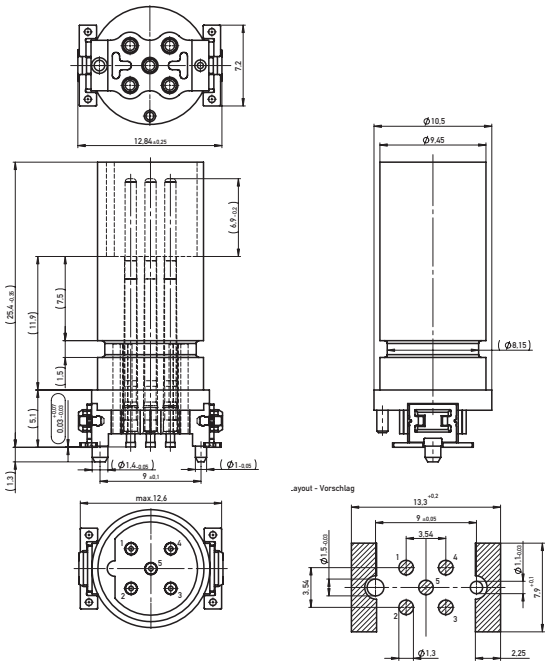

### 8 Pin Version, Style 1, A Coding, Assembly Height 9 mm



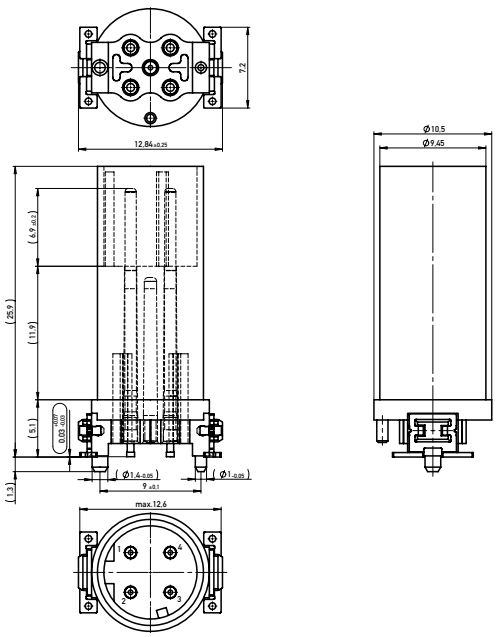
### 5 Pin Version, Style 1, B Coding, Assembly Height 9 mm



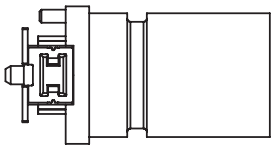
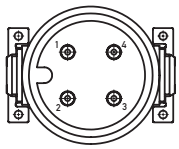
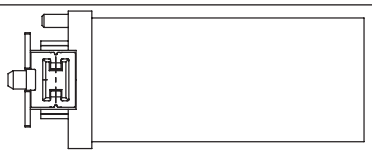
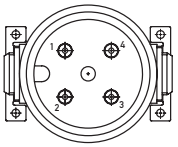
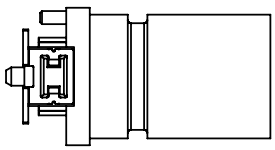
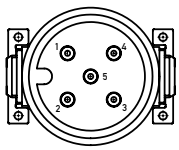
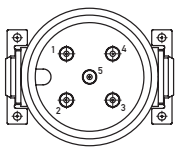
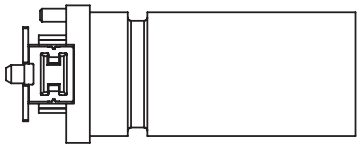
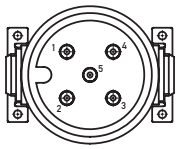

### 5 Pin Version, Style 1, B Coding, Assembly Height 13 mm, Additional Sealing Option



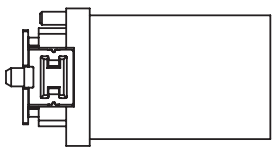
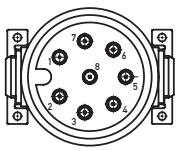
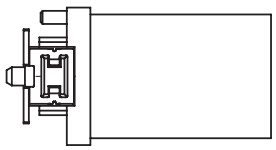
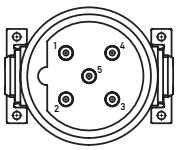
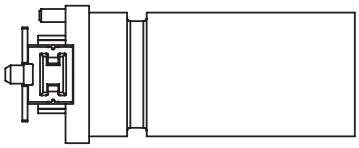
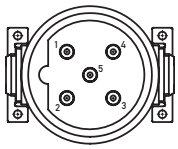
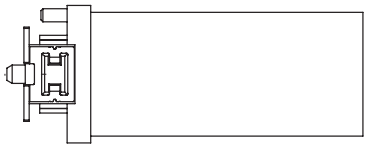
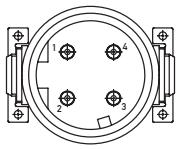

### 4 Pin Version, Style 2, D Coding, Assembly Height 13 mm



### Ordering Information

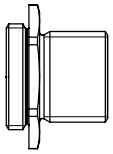
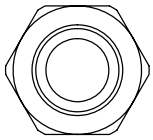
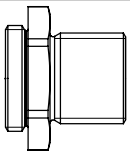
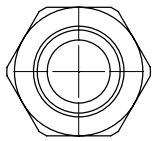
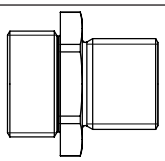
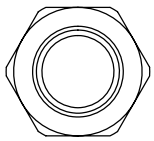
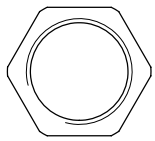
| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
|  | | | | |  | |
| Male M12, Style 1 | 4 | 9 mm | A | SMT | Tape and reel/75 pcs | **284809** |
| Male M12, Style 1 | 4 | 9 mm | A | SMT | Bulk/100 pcs | **284784** |
|  | | | | |  | |
| Male M12, Style 2 | 4 | 13 mm | A | SMT | Bulk/100 pcs | **254188** |
|  | | | | |  | |
| Male M12, Style 1 | 5 | 9 mm | A | SMT | Tape and reel/75 pcs | **284740** |
| Male M12, Style 1 | 5 | 9 mm | A | SMT | Bulk/100 pcs | **354132** |
| | | | | |  | |
| Male M12, Style 2 | 5 | 13 mm | A | SMT | Bulk/100 pcs | **244790** |
|  | | | | |  | |
| Male M12, Style 1 | 5 | 13 mm | A | SMT | Bulk/100 pcs | **364767** |

### Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
|  | | | | |  | |
| Male M12, Style 1 | 8 | 9 mm | A | SMT | Tape and reel/75 pcs | **284810** |
| Male M12, Style 1 | 8 | 9 mm | A | SMT | Bulk/100 pcs | **254317** |
|  | | | | |  | |
| Male M12, Style 1 | 5 | 9 mm | B | SMT | Tape and reel/75 pcs | **354130** |
| Male M12, Style 1 | 5 | 9 mm | B | SMT | Bulk/100 pcs | **254319** |
|  | | | | |  | |
| Male M12, Style 1 | 5 | 13 mm | B | SMT | Bulk/100 pcs | **374947** |
|  | | | | |  | |
| Male M12, Style 2 | 4 | 13 mm | D | SMT | Bulk/100 pcs | **244798** |

## Ordering Information

### Accessories for M12 Male Connectors

| Configuration | Assembly Height | Packaging | Part Number |
|---|---|---|---|
|  | |  | |
| Metal shell for M12 male connectors, Style 1 | 9 mm | Bulk | **254737** |
| Metal shell for M12 male connectors, Style 2 | 9 mm | Bulk | **254739** |
|  | |  | |
| Metal shell for M12 male connectors, Style 1 | 13 mm | Bulk | **284377** |
| Metal shell for M12 male connectors, Style 2 | 13 mm | Bulk | **284363** |
|  | |  | |
| Metal shell for M12 male connectors, Style 2, for counternut | 13 mm | Bulk | **354217** |
| | |  | |
| Counternut M14x1 | – | Bulk | **354003** |

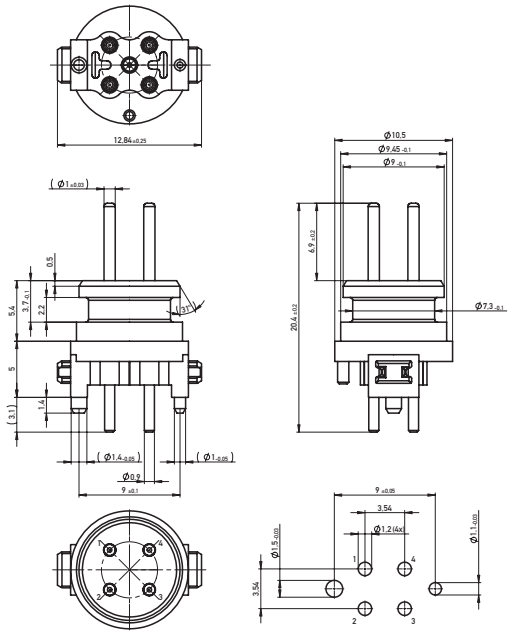
| Configuration | Material | Packaging | Part Number |
|---|---|---|---|
| O-ring for M12 connectors, 14x1 | NBR | Bulk/100 pcs | **834899** |
| Protective Cap, Male Connector, M12x1, incl. O-ring, IP67 | PE-HD | Bulk | **374342** |

Style 1 and Style 2 explained on page 5.

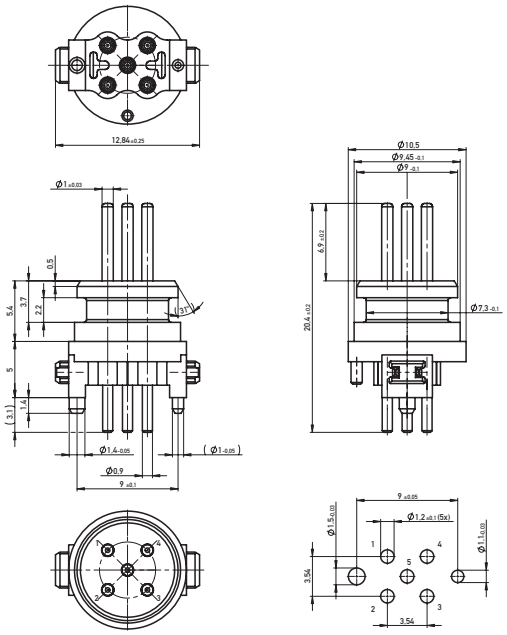
This M12 cThis M12 connector version is suitable for direct integration in a plastic housing. The connector insert is soldered to the PCB via SMT or THR process. It has no coding and no bushing. These are part of the customer‘s housing. By omitting the bushing, the M12 thread can be designed to be much more robust at the housing with a correspondingly greater wall thickness. The insert can be applied universally thanks to the separation of the coding from the connector. The customer can select the A, B or D coding, depending on the number of pins. The version is suitable for an installation height of 9 mm.
In addition, the connector insert can be sealed at the housing by means of an O-ring and is thereby water-proof, even when unconnected.

### Dimensional Drawings

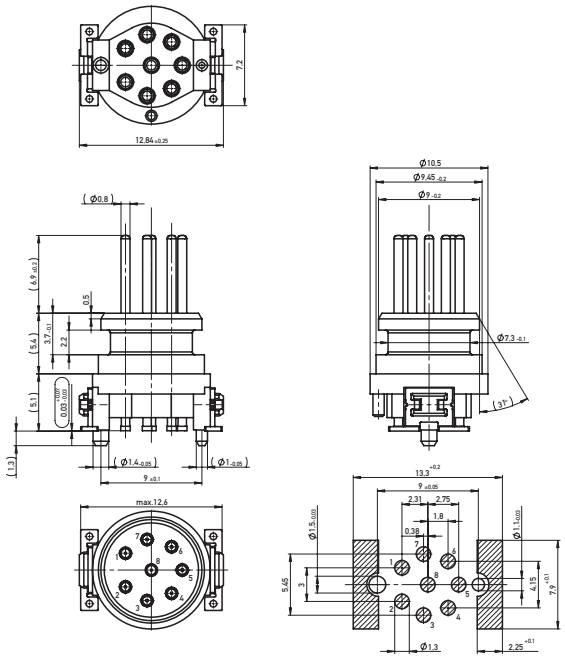
### 4 Pin Version, Assembly Height 9 mm, Additional Sealing Option



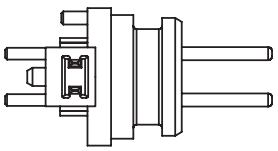
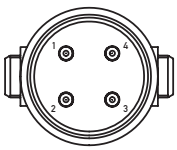
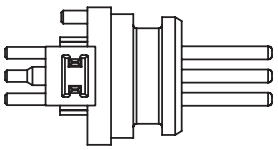
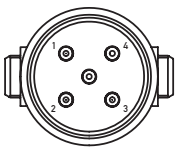
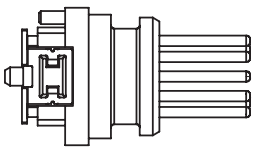
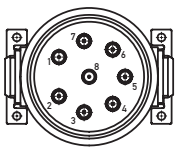
### 5 Pin Version, Assembly Height 9 mm, Additional Sealing Option



### 8 Pin Version, Assembly Height 9 mm, Additional Sealing Option



## Ordering Information

| Configuration | No. of Pins | Assembly Height | Coding | Termination | Packaging | Part Number |
|---|---|---|---|---|---|---|
|  | | | | |  | |
| Male M12 | 4 | 9 mm | – | THR | Tray/50 pcs | **364781** |
|  | | | | |  | |
| Male M12 | 5 | 9 mm | – | THR | Tray/50 pcs | **364779** |
|  | | | | |  | |
| Male M12 | 8 | 9 mm | – | SMT | Tray/50 pcs | **364777** |

## Accessories for M12 Connectors for Direct Integration

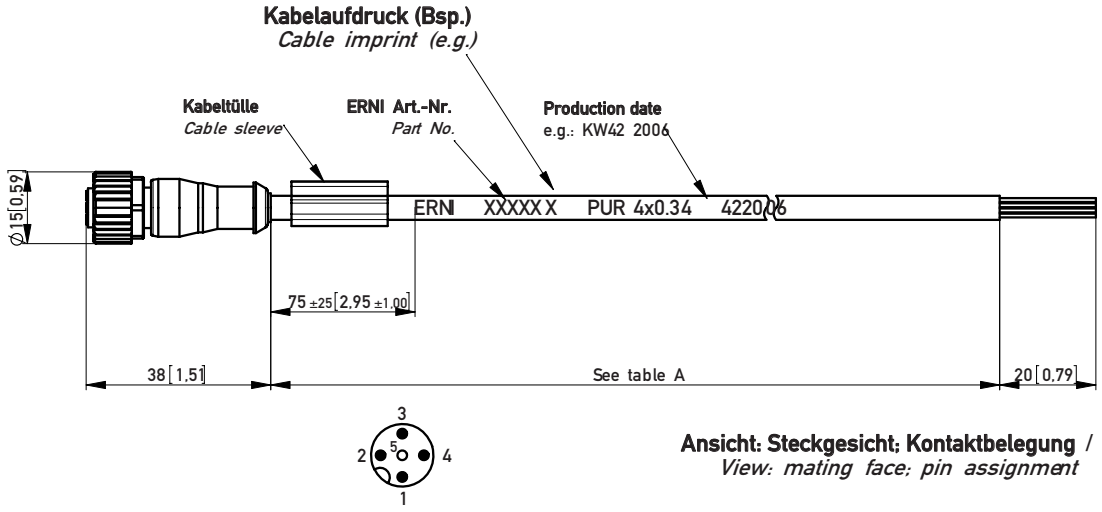
| Configuration | Material | Packaging | Part Number |
|---|---|---|---|
| O-ring for M12 connectors, 7x1.5 | NBR | Bulk/100 pcs | **835243** |

Pre-assembled cables are one of the effective possibilities to save time and money. There is no need to consider the correct pin assignment. Coding latches ensure secure mating supported by an integrated vibration-proof feature.
Over-moulded connectors guarantee a watertight solution (IP67).
M12 cable assemblies are either offered as an interconnection of two circular connectors or as a cord set having an open end of line (pigtail). Especially in harsh environments and for demanding applications the PUR cable assembly is the leading edge. Standardized coding is conform with requirements of different applications and bus technologies.
ERNI's portfolio covers further criteria:

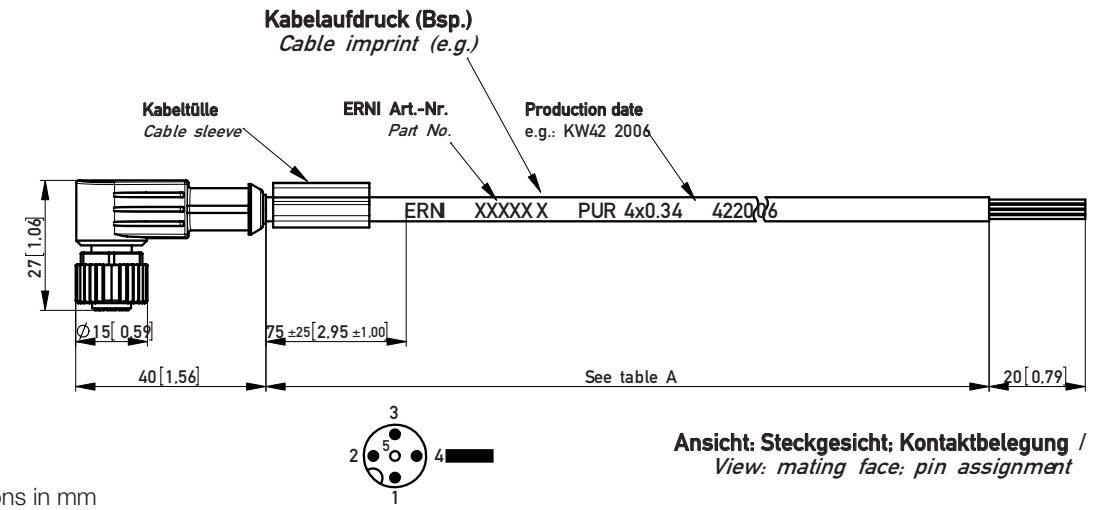
- no. of contacts: 4, 5, 8
- LED: 3 LEDs optional
- cable: PVC / PUR (UL/CSA)
- standard cable length:
  - interconnection: 0.3, 0.6, 1.0, 1.5, 2.0 m
  - pigtail: 1.5, 3.0, 5.0, 7.5, 10.0 m

### Dimensional Drawings

### Female straight - Pigtail

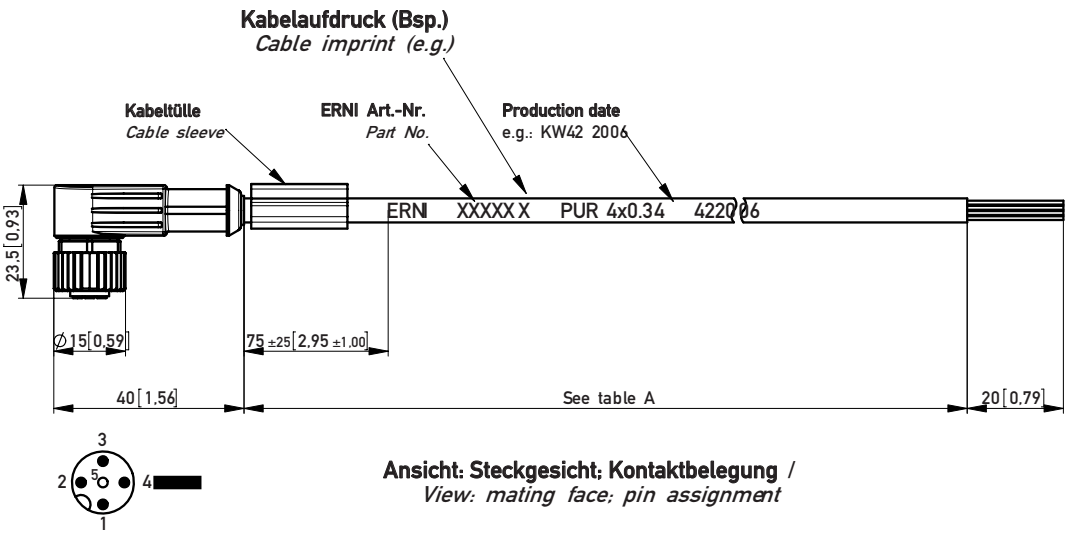



### Female angled - Pigtail



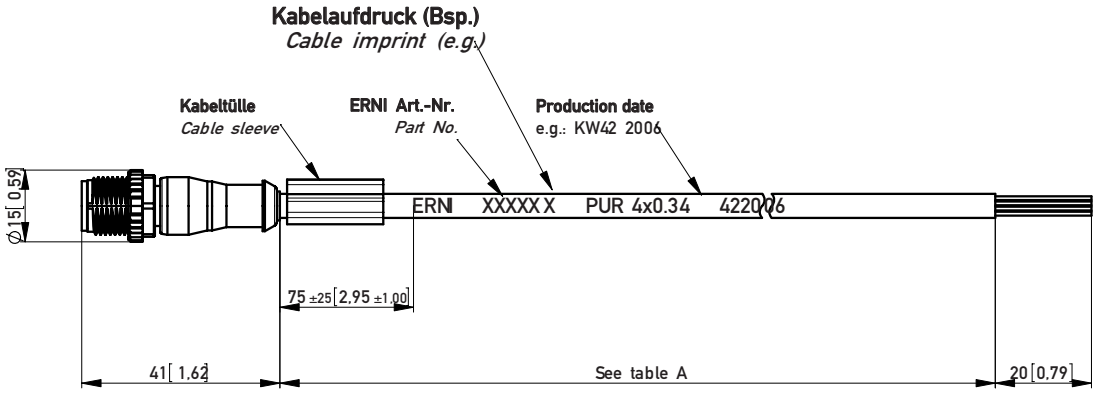

All Dimensions in mm

## Female angled, with LED - Pigtail



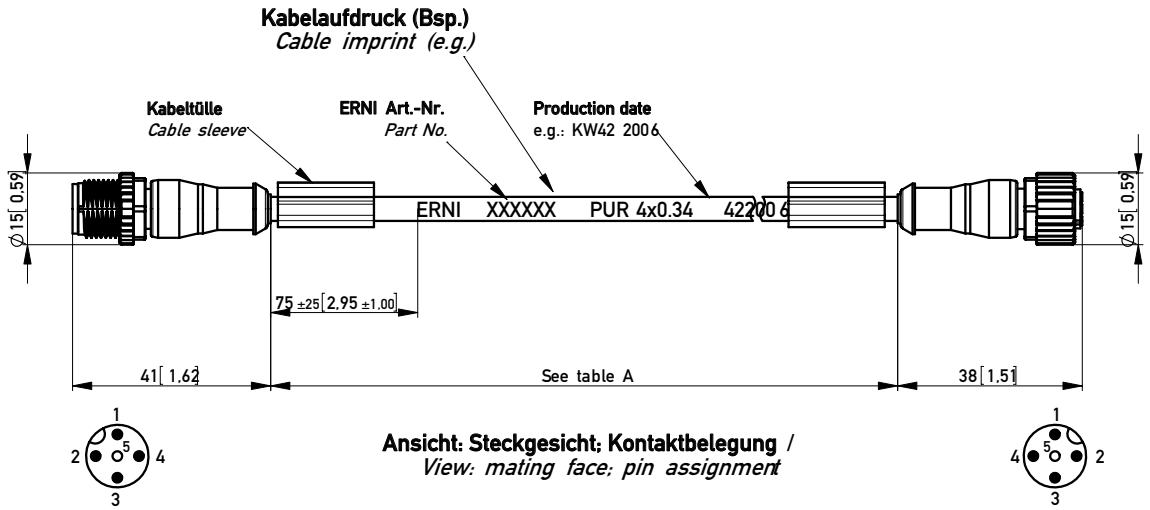

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

## Male straight - Pigtail



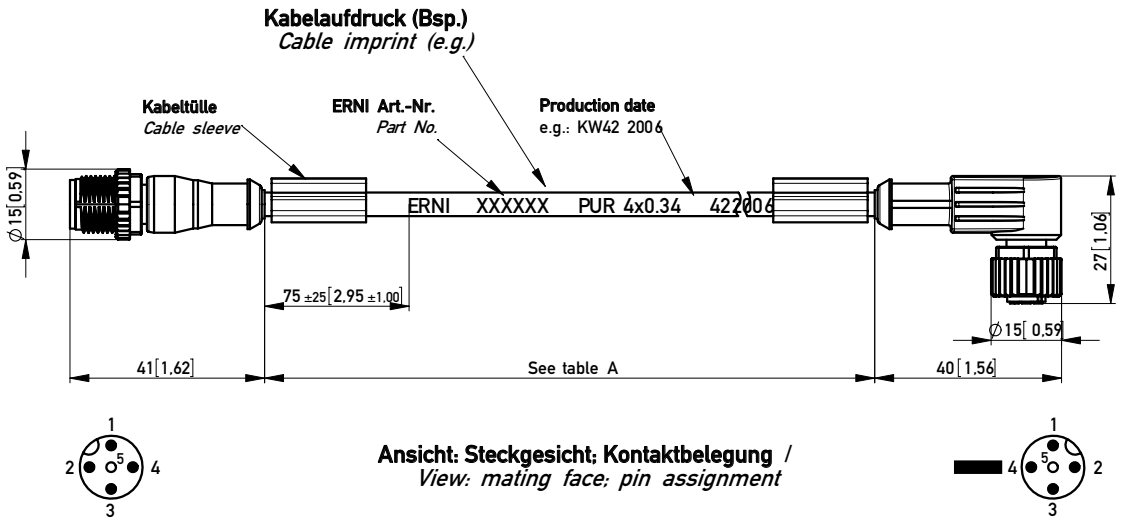

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

## Male straight - Female straight

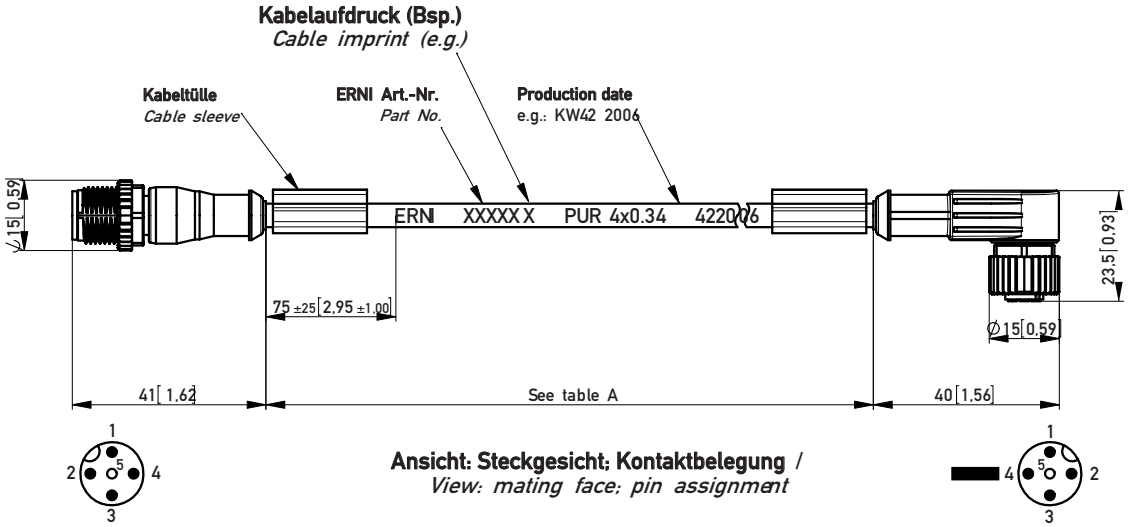



**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

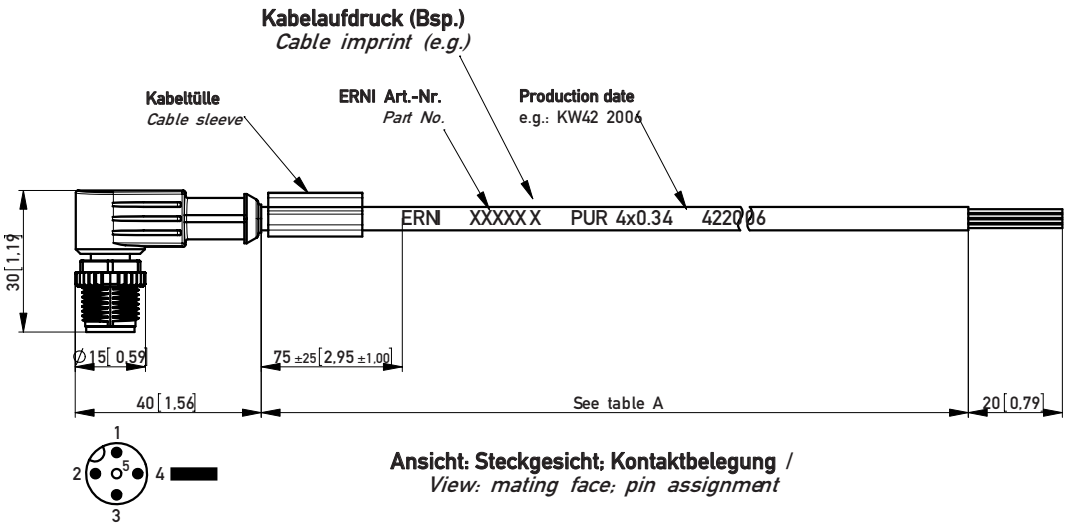
### Male straight - Female angled



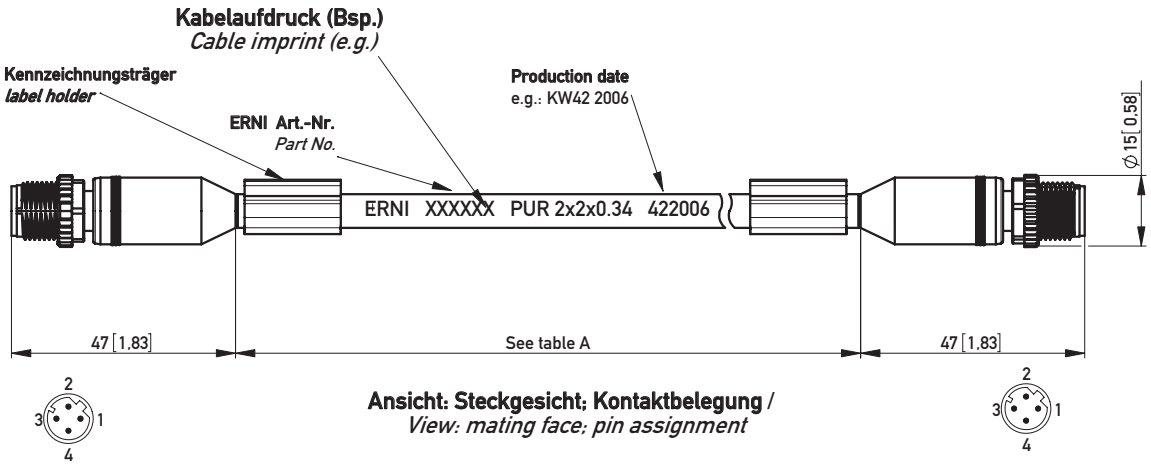

### Male straight - Female angled, with LED



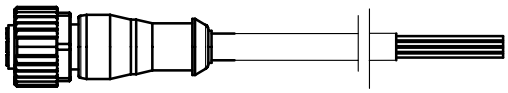
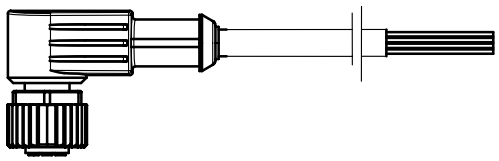
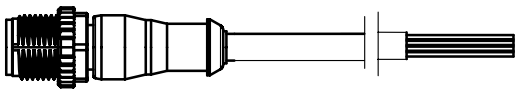

### Male angled - Pigtail



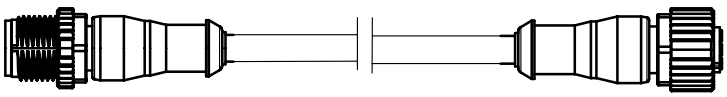
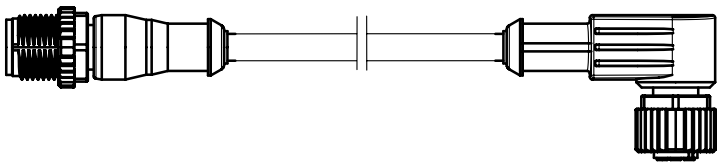
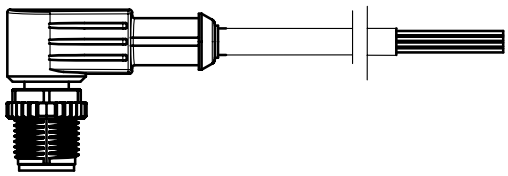
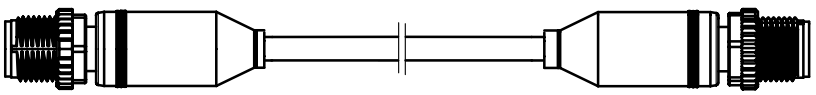
## Male straight, D coding - Female straight, D coding



## Ordering Information

| Connector1 | Connector2 | No. of Pins | Length | Coding | Cable Type | Part Number |
|---|---|---|---|---|---|---|
|  | | | | | | |
| Female straight | None | 4 | 2.0 m | A | PVC | **223866** |
| Female straight | None | 4 | 3.0 m | A | PVC | **223783** |
| Female straight | None | 4 | 3.0 m | A | PUR | **223784** |
| Female straight | None | 5 | 1.5 m | A | PVC | **223923** |
| Female straight | None | 8 | 3.0 m | A | PUR | **225039** |
|  | | | | | | |
| Female angled | None | 4 | 1.5 m | A | PUR | **223714** |
| Female angled | None | 4 | 3.0 m | A | PVC | **223785** |
| Female angled, with LED | None | 4 | 3.0 m | A | PVC | **223786** |
| Female angled, with LED | None | 4 | 3.0 m | A | PUR | **223787** |
|  | | | | | | |
| Male straight | None | 4 | 1.5 m | A | PUR | **223713** |
| Male straight | None | 4 | 3.0 m | A | PVC | **223781** |
| Male straight | None | 8 | 3.0 m | A | PUR | **225040** |

### Ordering Information

| Connector1 | Connector2 | No. of Pins | Length | Coding | Cable Type | Part Number |
|---|---|---|---|---|---|---|
|  | | | | | | |
| Male straight | Female straight | 4 | 1.0 m | A | PVC | **223788** |
| Male straight | Female straight | 4 | 1.0 m | A | PUR | **223789** |
| Male straight | Female straight | 5 | 1.0 m | A | TPM, shielded (CAN; DeviceNet) | **223944** |
| Male straight | Female straight | 5 | 1.0 m | A | PUR, shielded (CAN; DeviceNet) | **354195** |
| Male straight | Female straight | 5 | 1.5 m | A | PUR, shielded (CAN; DeviceNet) | **364415** |
|  | | | | | | |
| Male straight | Female angled | 4 | 1.0 m | A | PVC | **223790** |
| Male straight | Female angled | 4 | 1.0 m | A | PUR | **223791** |
| Male straight | Female angled, with LED | 4 | 0.3 m | A | PUR | **223715** |
|  | | | | | | |
| Male angled | None | 4 | 3.0 m | A | PVC | **223782** |
|  | | | | | | |
| Male straight | Male straight | 4 | 1.5 m | D | PUR, shielded (Ethernet) | **223922** |
| Male straight | Male straight | 4 | 3.0 m | D | PUR, shielded (Ethernet) | **223921** |

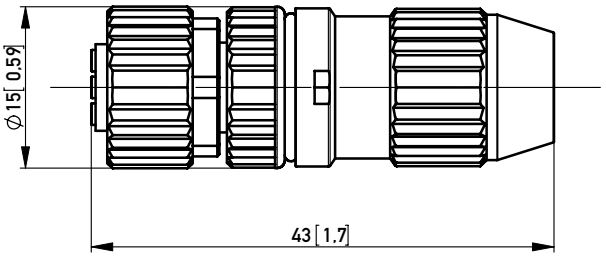
When installing a fieldbus system sometimes pre-assembled cables may cause difficulties or even prevent from successful installation because of cables laying in cable ducts or going through narrow components and small gaps. This would increase the wiring time and therefore raise maintenance cost. ERNI's field-attachable quick termination connectors are an adequate and efficient solution ensuring highest flexibility for cabling of automation systems. Easy termination of standard cables is guaranteed by tool-less IDC technology.
Further features:

- reconnectable up to 10 times
- integrated strain-relief
- vibration-proof screw locking
- suitable for cable diameter 4.0 - 5.1 mm

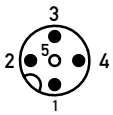
### Dimensional Drawings

#### 4 Pin Female

Buchse M12 *M12 female*
4-polig */4 pin*



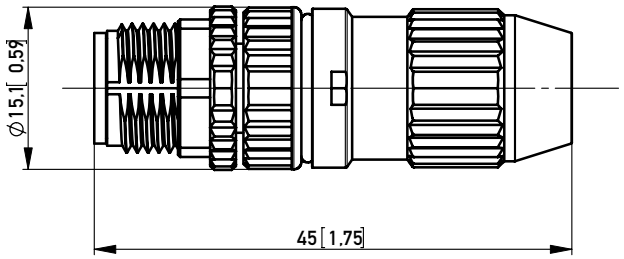

Quick termination technique (IDC)



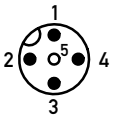

**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

#### 4 Pin Male

Stecker M12 *M12 male*
4-polig */4 pin*



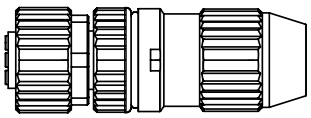
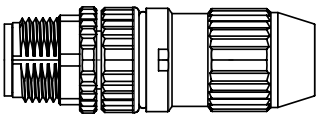

Quick termination technique (IDC)




**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*

All dimensions in mm.

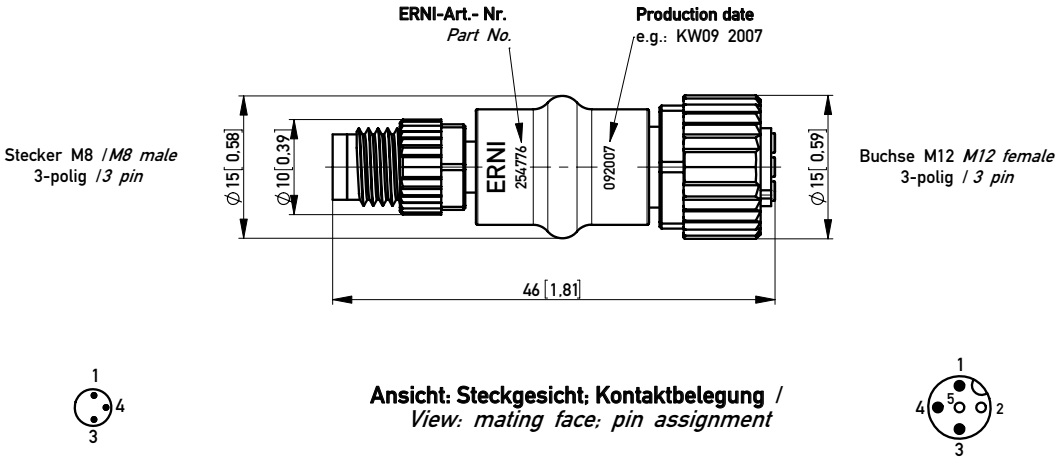
## Ordering Information

| Configuration | No. of Pins | Termination | Coding | Part Number |
|---|---|---|---|---|
| | |  | | |
| Female M12 | 4 | IDC | A | **254770** |
| | |  | | |
| Male M12 | 4 | IDC | A | **254768** |

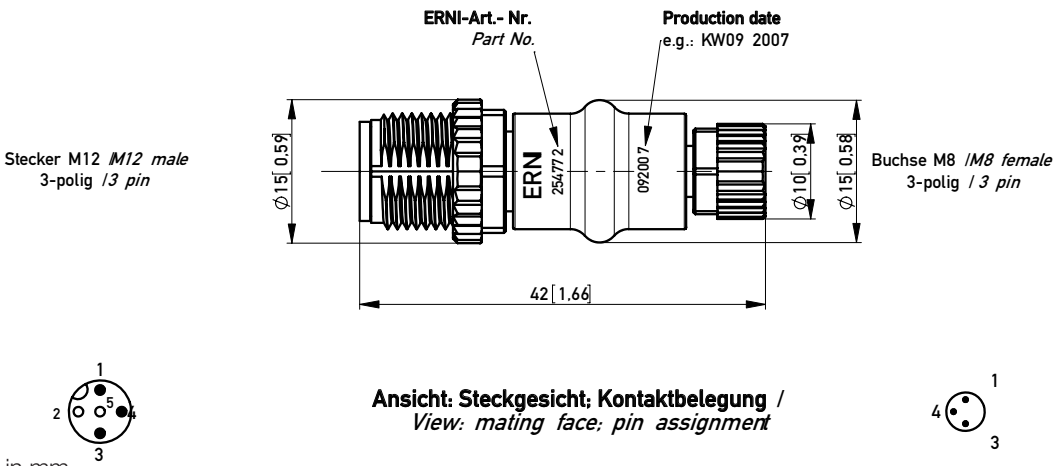
Adapters are useful to reduce the amount of different parts on stock or on Bill Of Materials. Sometimes there are automation components on the market which are available only as M8 or M12 size. In many cases this requires a multitude of connectors from both technologies.
With adapters this can be reduced to one system, M8 or M12, that is easily manageable.
Adapters are also recommended for service issues i.e. replacement of cables as they allow greater flexibility.

### Dimensional Drawings

#### 3 Pin Version, M8 Male - M12 Female

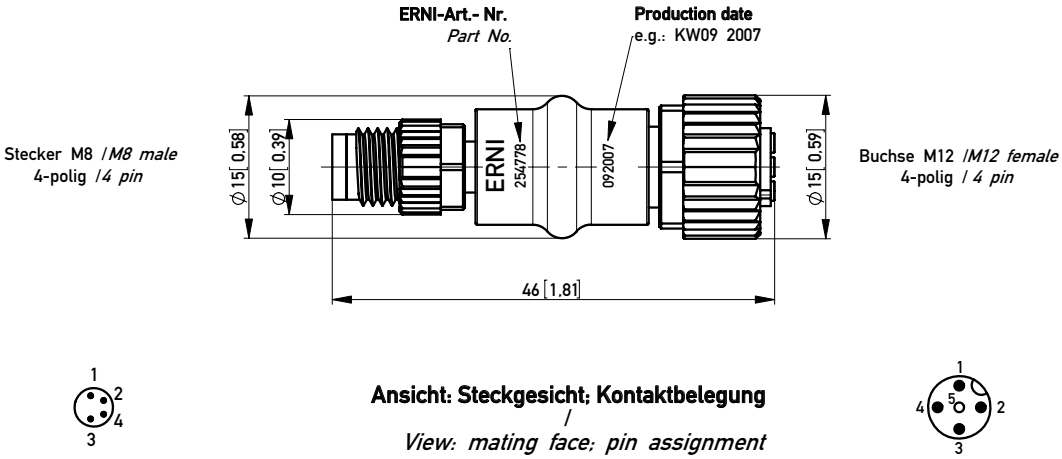



#### 3 Pin Version, M12 Male - M8 Female

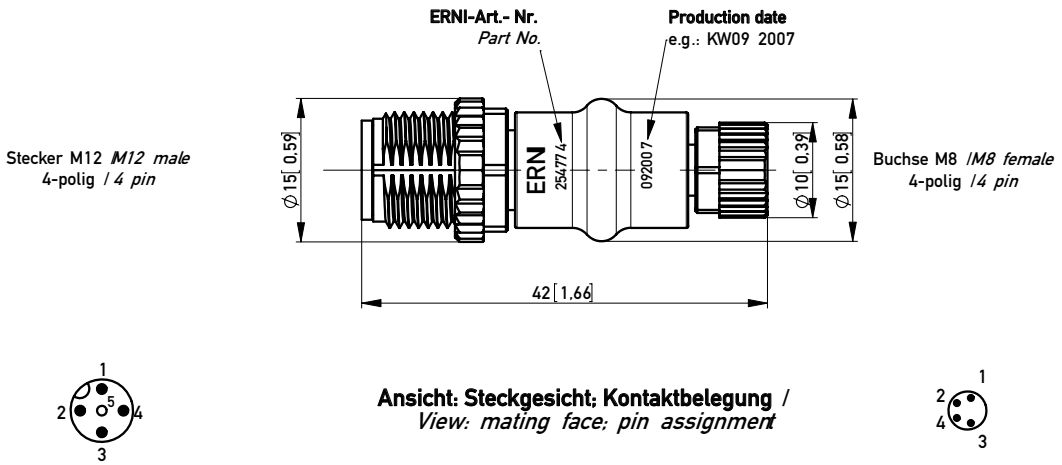



All dimensions in mm.

### 4 Pin Version, M8 Male - M12 Female

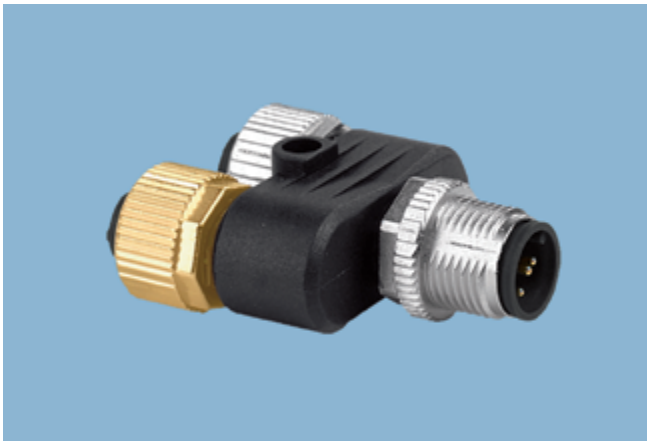



### 4 Pin Version, M12 Male - M8 Female




## Ordering Information

| Configuration | No. of Pins | Coding | Part Number |
|---|---|---|---|
| M8 Male - M12 Female | 3 | A | **254776** |
| M12 Male - M8 Female | 3 | A | **254772** |
| M8 Male - M12 Female | 4 | A | **254778** |
| M12 Male - M8 Female | 4 | A | **254774** |

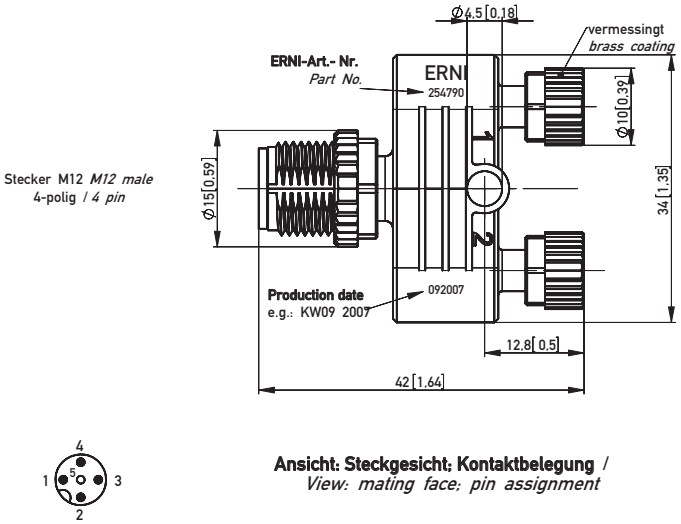


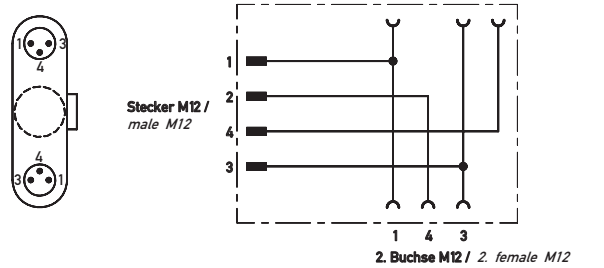
T-Couplers are used for space saving sensor connectivity. Two sensors/actuators can be merged to one cable. The coupler can be attached close to the machine e.g. near a pneumatic cylinder or directly screwed onto a sensor I/O distribution box by a designated mounting hole on the housing.
Features:

- self-securing screw locking, vibration-proof
- contact finish gold-plated for a minimum of 100 mechanical operations

### Dimensional Drawings

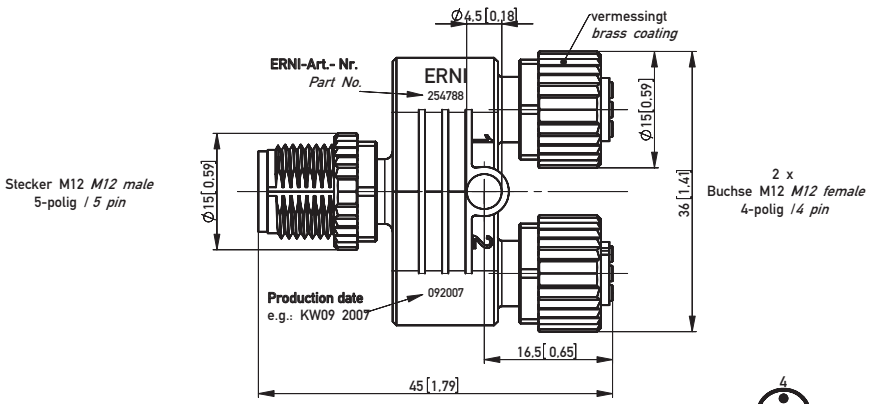
#### 1 x M12 Male, 4 pin - 2 x M8 Female, 3 pin



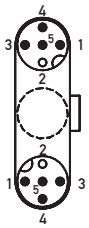




All dimensions in mm.

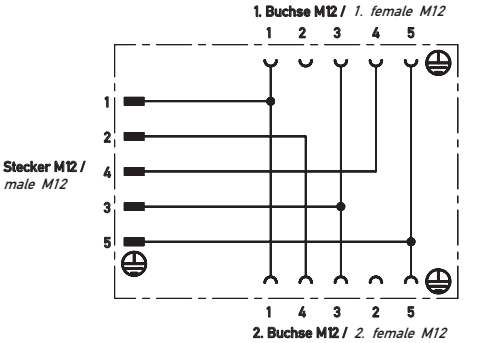
### 1 x M12 Male, 5 pin - 2 x M12 Female, 4 pin



**Ansicht: Steckgesicht; Kontaktbelegung** /
*View: mating face; pin assignment*




**STROMLAUFPLAN** /*Schematic diagram*




## Ordering Information

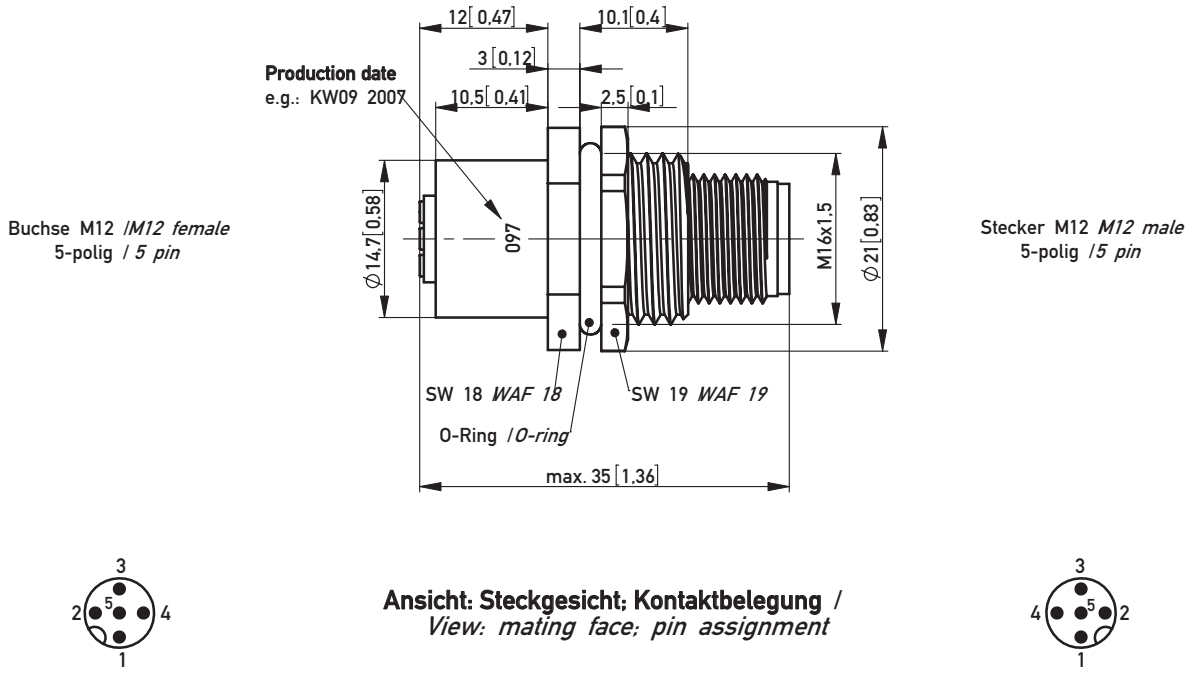
| Configuration | Coding | Part Number |
|---|---|---|
| 1 x M12 Male, 4 pin - 2 x M8 Female, 3 pin | A | **254790** |
| 1 x M12 Male, 5 pin - 2 x M12 Female, 4 pin | A | **254788** |

## Accessories
## Panel Feed-Through

Panel feed-throughs are available for use when cables need to pass through cabinets, racks or other electrical devices. They ensure protection against dust and water immersion and therefore allow reliable connectivity to the field level.

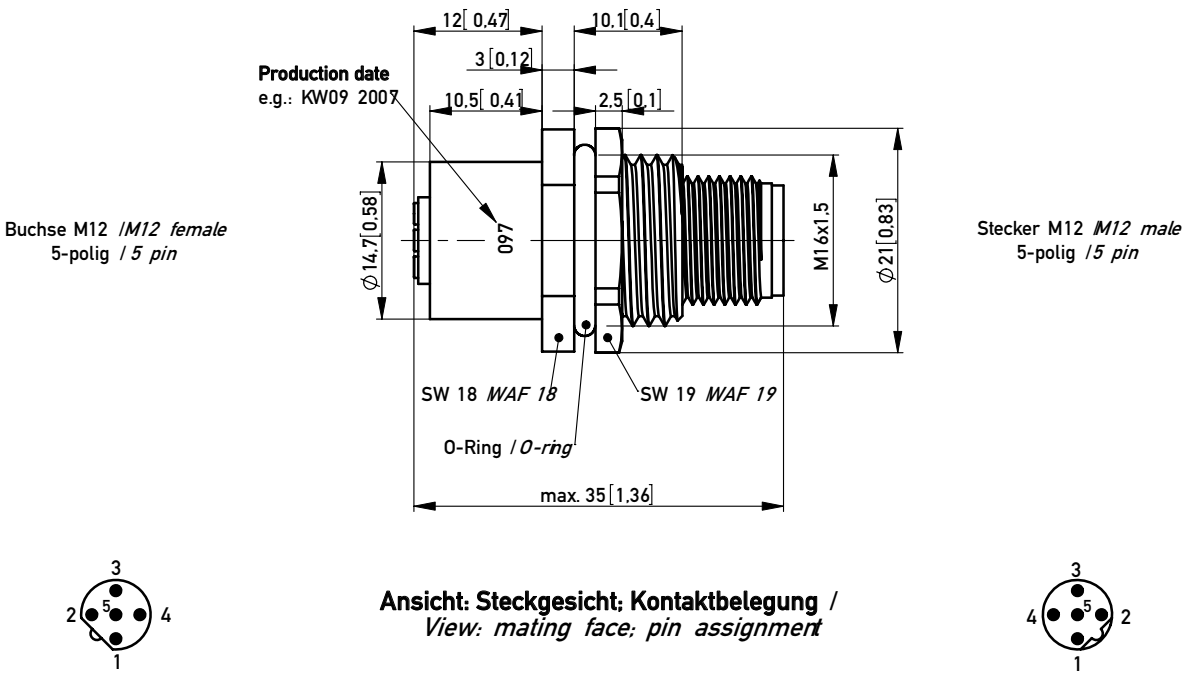
### Dimensional Drawing

### M12 5 Pin Version, A Coding




All dimensions in mm.

### M12 5 Pin Version, B Coding




## Ordering Information

| Configuration | No. of Pins | Coding | Part Number |
|---|---|---|---|
| M12 | 5 | A | **254780** |
| M12 | 5 | B | **254782** |

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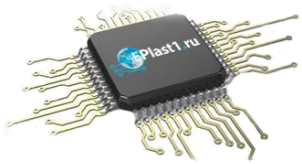


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