

PLASTIC CONNECTORS



SERIES



| | | |
|----------|----------|----------|
| 244 | 278 | 246 |
| X-XXX | XXX | 76 |
| PVC 0 | 71 | 24 |
| I=60ms | II-0.2mm | 260 |
| SUM | 110 / 69 | NSP 265 |
| | 14:03 | 210 |
| | ADULT | 87 80 |
| | 137 / 73 | ART 6 |
| | 71 95 | |
| CO 5.2 | C1 | ICG -266 |
| SVR 1120 | 2.5 | |
| TFC 33 | *** | 280 |
| □□□ | 1 | 2 |
| | 71 | 505 |
| | | 50 |
| | | 268 |
| | | 502 |
| | | 50 |

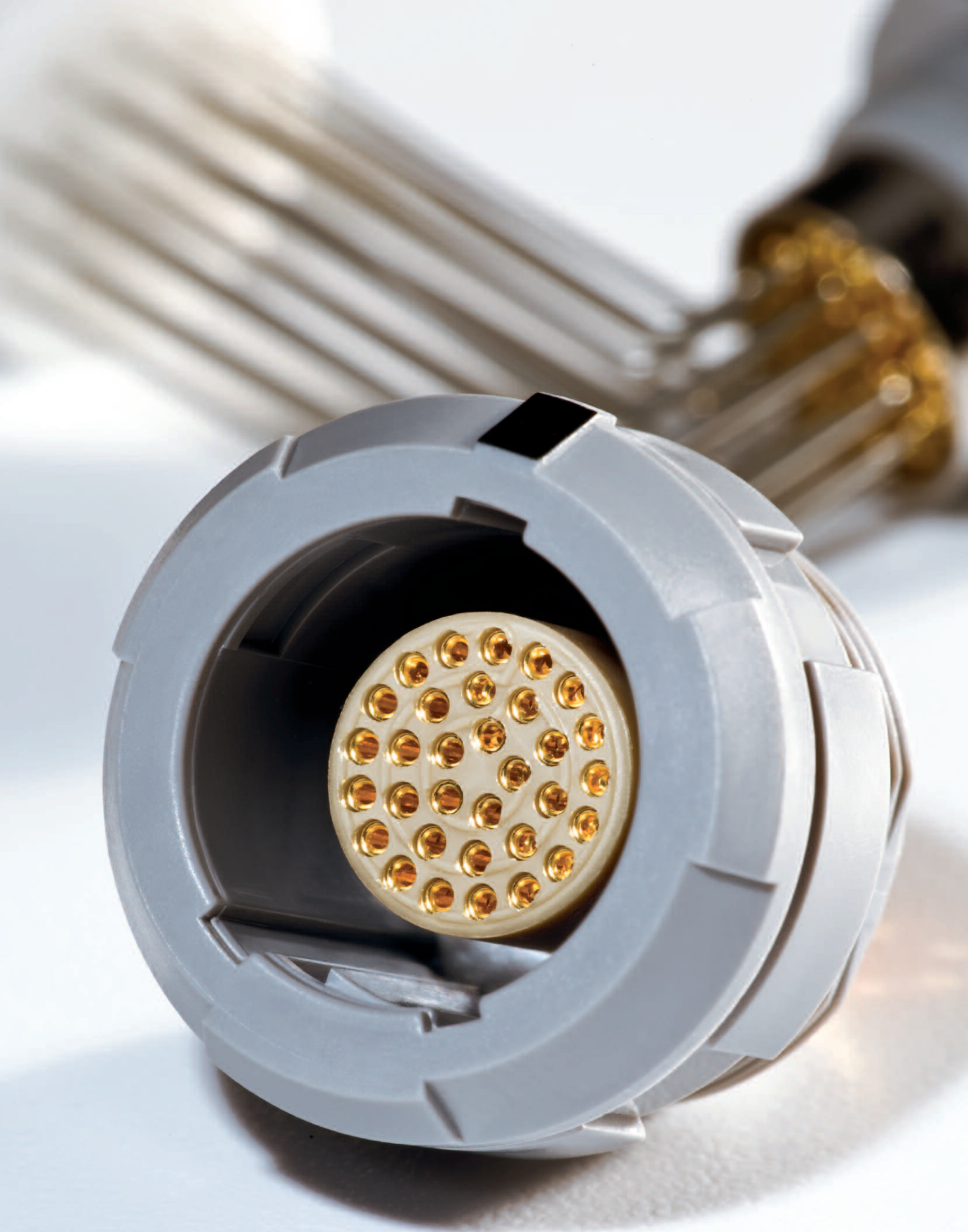


Table of contents

1P Series

| | |
|------------------------------------|----|
| Part numbering system | 7 |
| Shell style | |
| Standard models (IP50)..... | 8 |
| Elbow socket models (IP50) | 12 |
| Disposable plug | 13 |
| Disposable socket..... | 13 |
| Watertight models (IP64)..... | 14 |
| Fluidic configuration..... | 16 |
| Mains power configuration | 18 |
| Insert configuration | 19 |
| Alignment key | 20 |
| Outer shell material | 20 |
| Contact type | 20 |
| Colour coding | 20 |
| Accessories | 21 |
| Tooling | 23 |
| Panel hole | 24 |
| PCB drilling pattern | 24 |
| Assembly instructions | 26 |

2P Series

| | |
|--|----|
| Part numbering system | 33 |
| Shell style | |
| Standard models..... | 34 |
| Watertight models (IP66)..... | 37 |
| Fluidic configuration..... | 39 |
| Insert configuration | 40 |
| Alignment key | 42 |
| Outer shell material | 42 |
| Contact type | 42 |
| Colour coding | 42 |
| Accessories | 43 |
| Tooling | 45 |
| Panel hole | 46 |
| PCB drilling pattern | 46 |
| Assembly instructions | 48 |
| Assembly instructions for watertight models | 50 |

3P Series

| | |
|---|----|
| Part numbering system | 55 |
| Shell style | |
| Standard models (IP61) | 56 |
| Insert configuration | 58 |
| Contact type | 59 |
| Colour coding | 59 |
| Accessories | 60 |
| Fibre optic contact | 61 |
| Recommended coaxial cables | 62 |
| Tooling | 62 |
| Panel hole | 65 |
| PCB drilling pattern | 65 |
| Assembly instructions | 66 |
| Mechanical latching characteristics and test voltage | 68 |
| Technical tables | 69 |
| Product safety notice | 70 |

Precision modular connectors to suit your application

Since its creation in Switzerland in 1946 the LEMO Group has been recognized as a global leader of circular Push-Pull connectors and connector solutions. Today LEMO and its affiliated companies, REDEL and COELVER, are active in more than 80 countries with the help of over 40 subsidiaries and distributors.

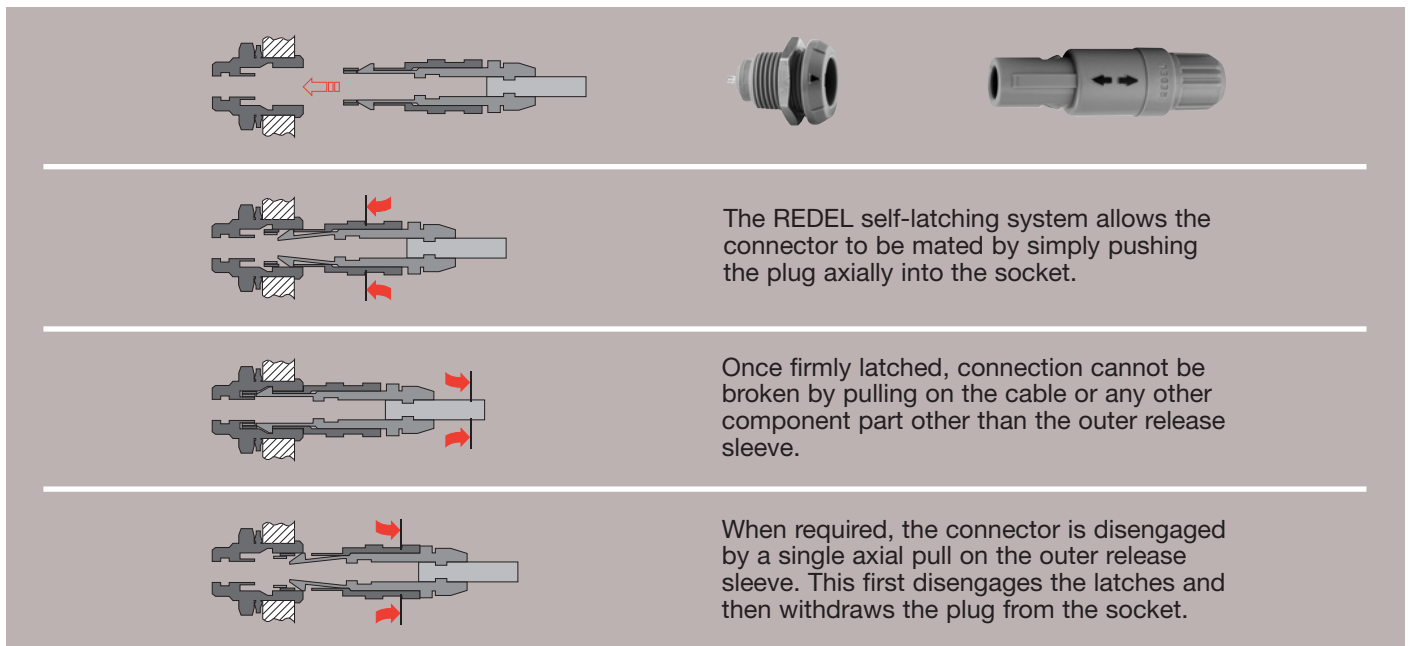
Over 5'000 REDEL connectors

The modular design of the REDEL range provides over 5'000 connectors from \varnothing 14 mm to \varnothing 21 mm, capable of handling cable diameters up to 9.5 mm and up to 32 contacts.

This vast portfolio enables you to select the ideal connector configuration to suit almost any specific requirement in most markets, including medical devices, test and measurement instruments, machinery, audio video broadcast, telecommunications and military.

REDEL's Push-Pull Self-Latching Connection System


This self-latching system is renowned worldwide for its easy and quick mating and unmating features. It provides absolute security against vibration, shock or pull on the cable, and facilitates operation in a very limited space.




UL Recognition

REDEL connectors are recognized by the Underwriters Laboratories (UL). The approval of the complete system (REDEL connector, cable and your equipment) will be easier because REDEL connectors are approved.

CE Marking

CE marking  means that the appliance or equipment bearing it complies with the protection requirements of one or several European safety directives.

CE marking  applies to complete products or equipment, **but not to electromechanical components, such as connectors.**

RoHS

REDEL connector specifications exceed the requirements of the RoHS directives (2011/65/EU) of the European Parliament and the latest amendments. This directive specifies the restrictions of the use of hazardous substances in electrical and electronic equipment marketed in Europe.

REDEL connector range

The REDEL connectors are plastic Push-Pull connectors. These circular plastic connectors are especially adapted for applications such as medical electronics and test & measurement. REDEL offers a wide choice of connectors with various contact configurations: multipole contacts, coaxial, fibre optics and fluidic connectors. In addition, a range of one time use connectors and connectors for mains power is available. The REDEL connectors are available in 3 sizes, depending on the cable diameter.

Features & Benefits

- | | |
|--|--|
| <ul style="list-style-type: none"> ● Aesthetically pleasing design ● Lightweight ● Plastic shell made of PSU or PEI ● Extensive sterilisation (over 100 cycles) ● Excellent electrical safety (touch & scoop proof) | <ul style="list-style-type: none"> ● Wide choice of colours for easy identification (grey, blue, yellow, black, red, green and white) ● Large choice of keying to avoid cross mating ● Various contact types: solder, crimp, print and elbow print 90° ● Disposable models |
|--|--|

Applications

- | | |
|---|--|
| <ul style="list-style-type: none"> ● Medical electronics ● Test and measurement | <ul style="list-style-type: none"> ● Industrial electronics ● Automotive |
|---|--|

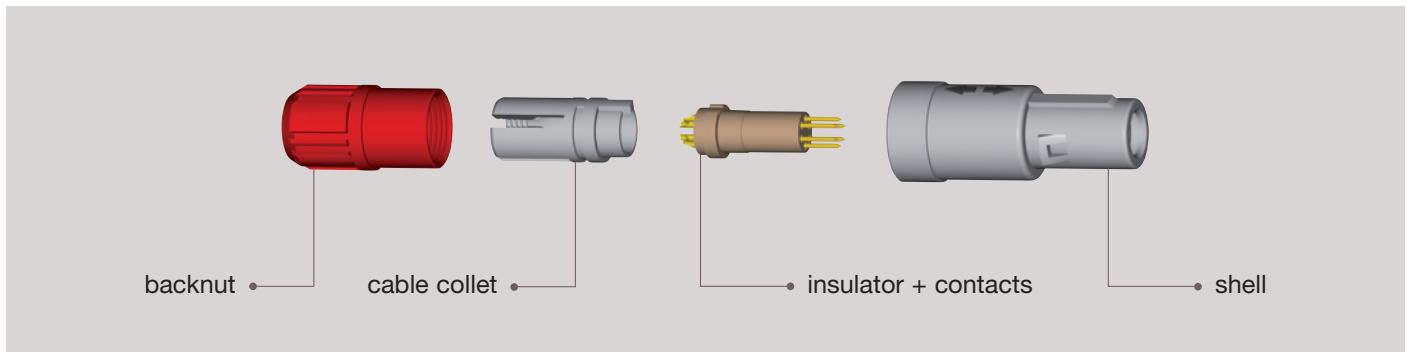


| | 1P | 2P | 3P |
|--|--|---|--|
| Series | 1P | 2P | 3P |
| Environment | indoor / splash proof | indoor / outdoor | indoor / dripping water |
| Ingress¹⁾ protection | IP50 / IP64 | IP50 / IP66 | IP61 |
| Temperature range | PSU: -50° / +150°C PEI: -50° / +170°C | PSU: -50° / +150°C PEI: -50° / +170°C | PSU: -50° / +150°C |
| Latching | Push-Pull self latching | | |
| Insulator type | Multipole, Mains Power, Fluidic | Multipole, Hybrid: fluidic + LV, coaxial + LV | Multipole, Hybrid: high voltage + LV, coaxial + LV, fibre optic + LV, fluidic + LV |
| Contact type | Solder, crimp or print | | |
| Other | Disposable models | - | - |
| Cable diameter | 2.7 mm to 6.5 mm | 3.2 mm to 9.2 mm | 6.7 mm to 9.5 mm |
| Features | 6 keyways | 3 keyways | Insert Polarizations |

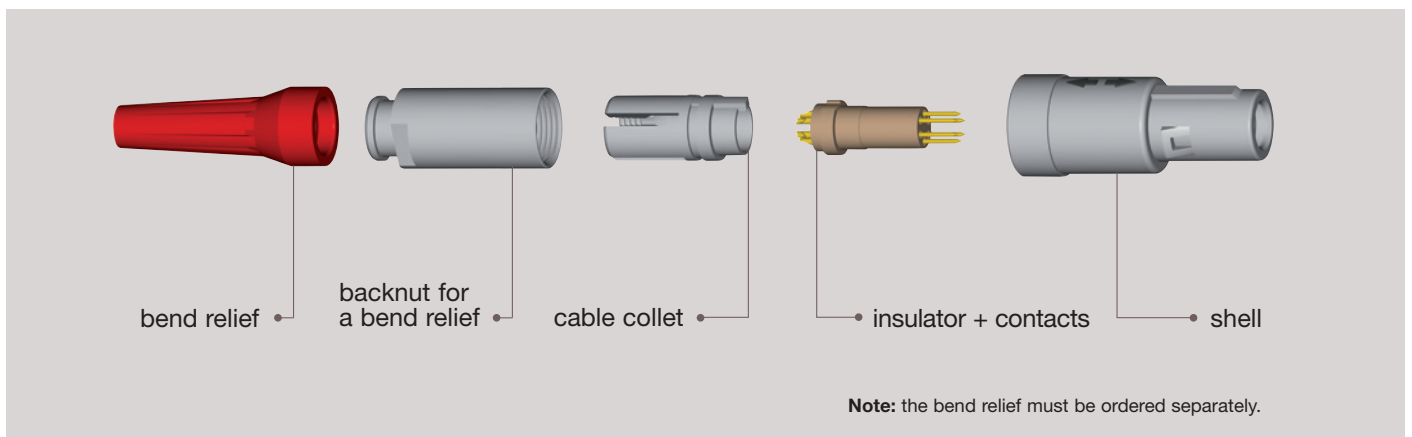
Note: ¹⁾ mated connector.

Exploded view of the REDEL 1P

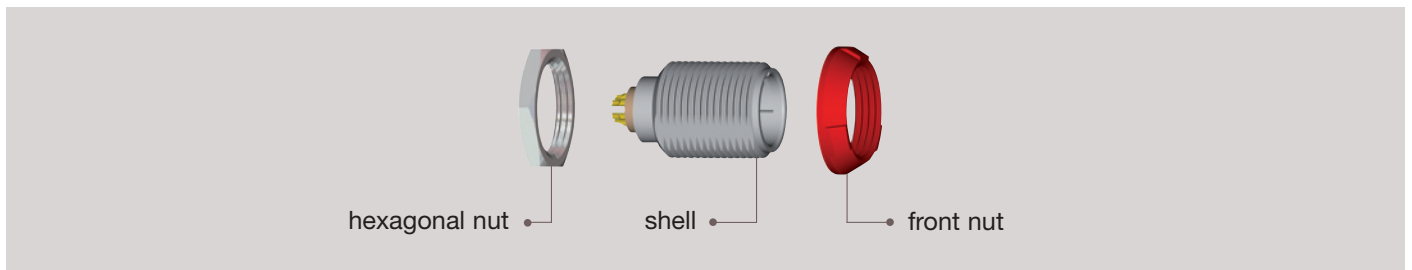
Straight plug



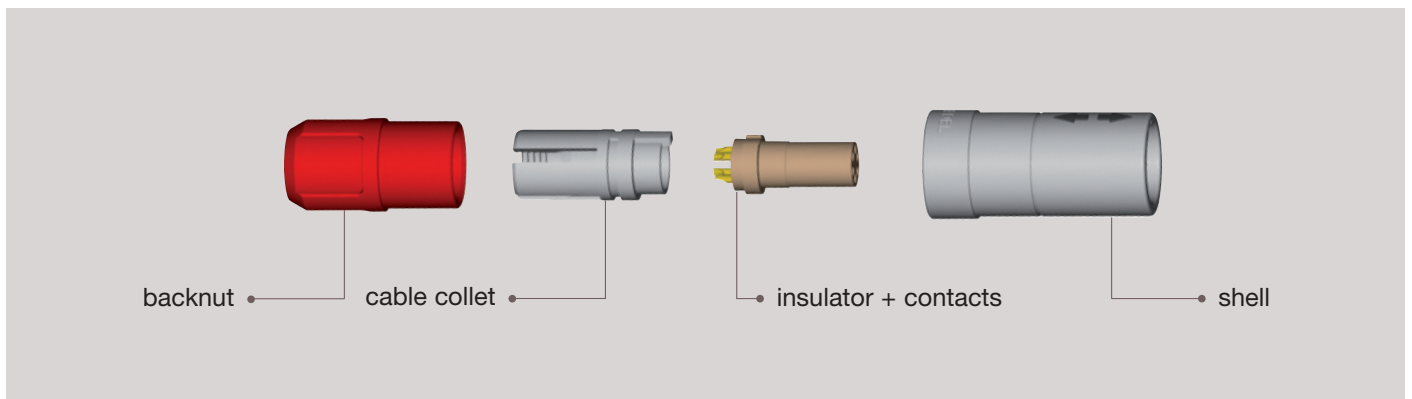
Straight plug with bend relief

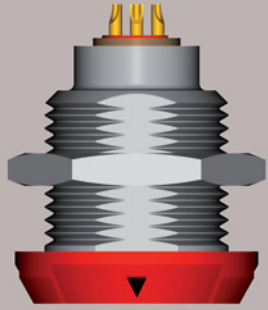


Fixed socket



Free socket





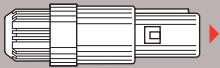
1P SERIES

1P Series

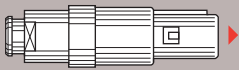
A well proven connector of a small size to accommodate cable diameter up to 6.5 mm and allow up to 14 solder contacts. Top quality lightweight and rugged materials have been chosen to optimize most applications. Polysulfone (PSU), UL certified as autoextinguishable, can be sterilized by gas or by steam. The contacts are gold-plated over copper and nickel to ensure at least 1000 mating/unmating cycles without significantly affecting the electrical characteristics. A keying system combined with colour coding can be incorporated on most connector models to assist in the prevention of mismatching. Colour coding of the plug collet nut and socket flange will give an instant visual indication of connector compatibility.

Standard models (page 8 to 11)

Straight plugs

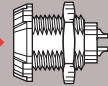


PA ●

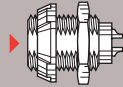


PA ●

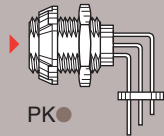
Fixed sockets



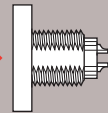
PL ●



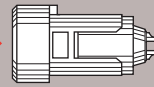
PK ●



PK ●



PM ●

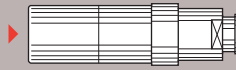


PY ●

Free sockets

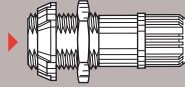


PR ●

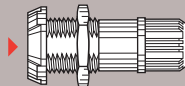


PR ●

Fixed sockets

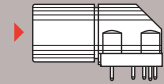


PT ●

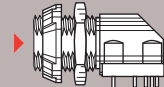


PD ●

Elbow socket models (page 12)

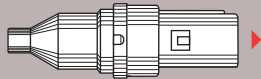


PP ●



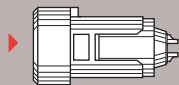
PX ●

Disposable plug (limited use) (page 13)



PJ ●

Disposable socket (limited use) (page 13)



PY ●

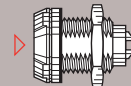
Watertight models (page 14 to 15)

Straight plug



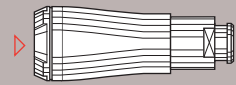
PF ●

Fixed socket



PN ●

Free socket



PS ●

Fluidic configuration (page 16 to 17)

Straight plugs

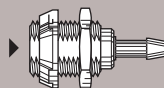


PA ●

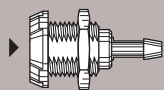


PA ●

Fixed sockets



PK ●



PL ●

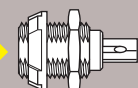
Mains power configuration (page 18)

Straight plug



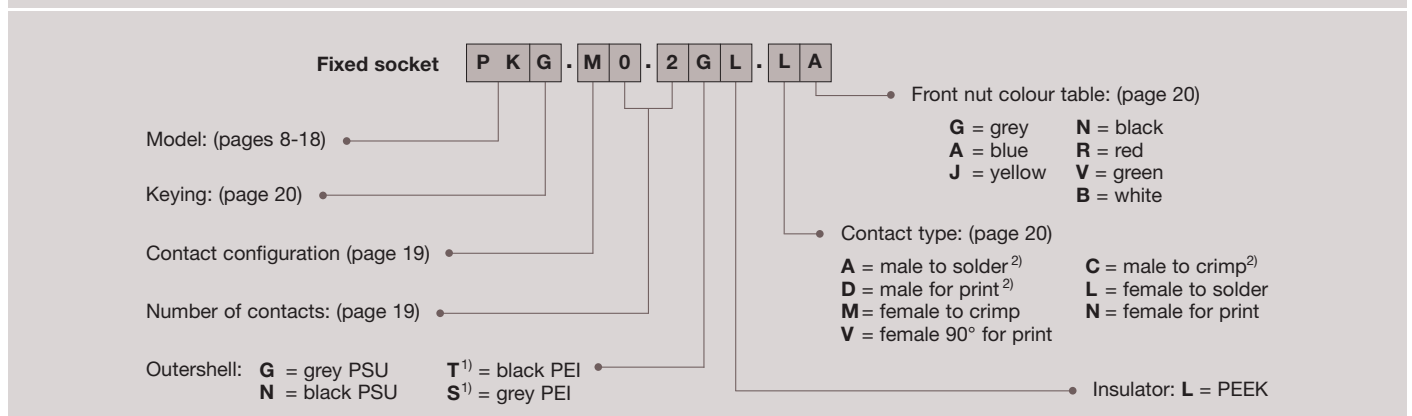
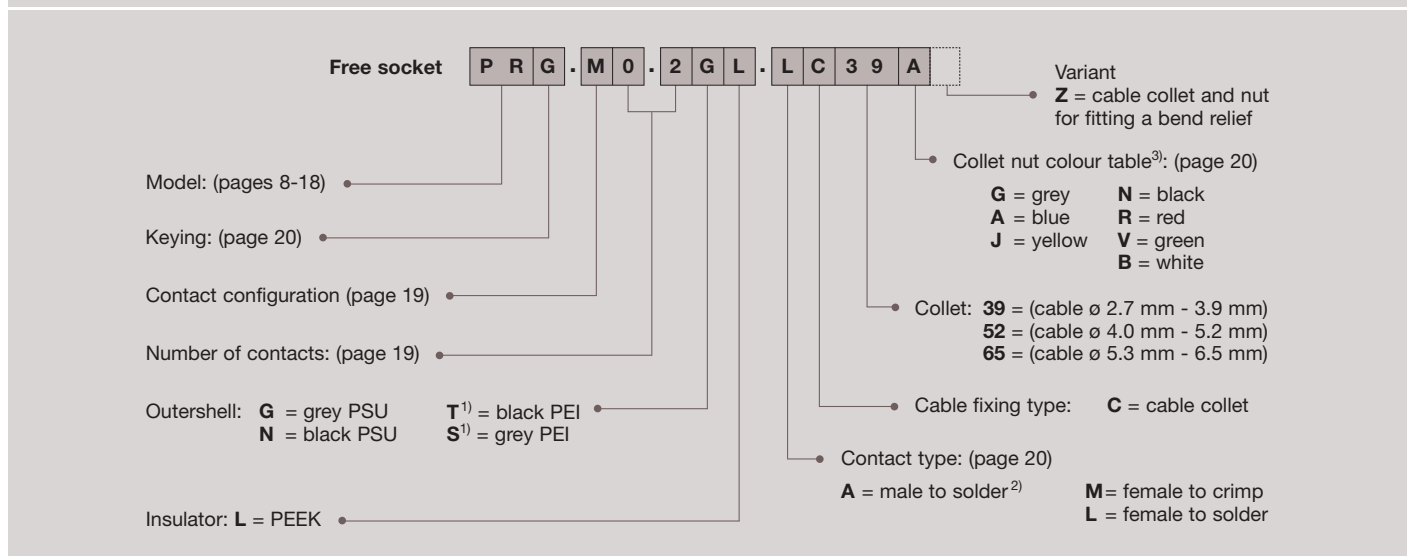
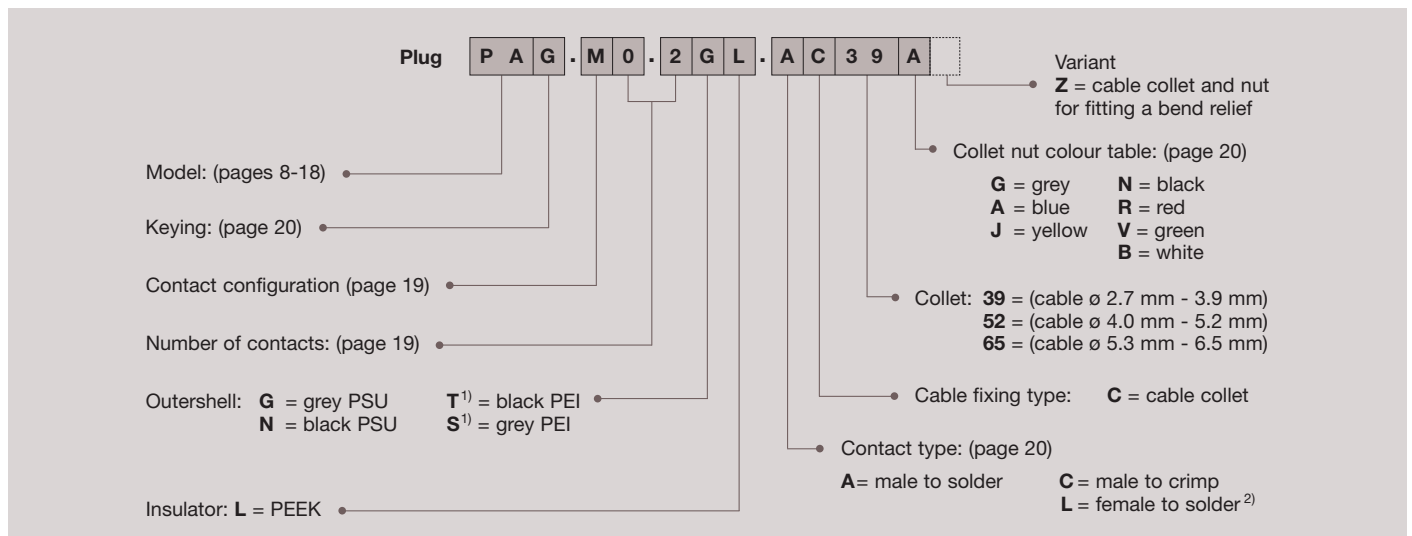
PAH

Fixed socket



PKH

Part numbering system



PAG.M0.2GL.AC39A Straight plug with cable collet and alignment key (G), multipole type with 2 male contacts to solder, grey PSU outershell, PEEK insulator, collet for a cable ø 2.7 to 3.9 mm and blue collet nut.

PRG.M0.2GL.LC39A Free socket with cable collet and alignment key (G), multipole with 2 female contacts to solder, grey PSU outershell, PEEK insulator, collet for a cable ø 2.7 to 3.9 mm and blue collet nut.

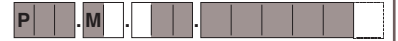
PKG.M0.2GL.LA Fixed socket with two nuts and alignment key (G), multipole type with 2 female contacts to solder, grey PSU outershell, PEEK insulator, and blue plastic front nut.

Note: 1) for extensive steam sterilization we recommend Polyetherimide ULTEM® (PEI).

2) contact available only with H and J keying and with 8, 10 or 14 contacts (inverted contacts).

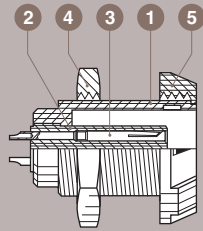
3) collet nut and front nut colour table for PT• and PD• models.

Standard models (IP50)



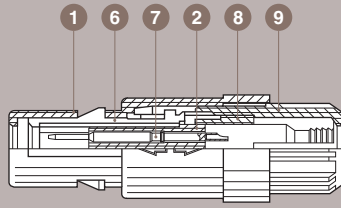
Fixed socket

- 1 Outershell
- 2 Insulator
- 3 Female contact
- 4 Hexagonal nut
- 5 Front nut



Straight plug

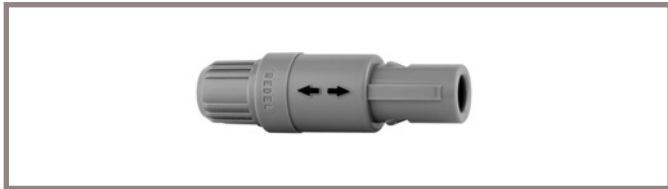
- 1 Outershell
- 2 Insulator
- 6 Latch sleeve
- 7 Male contact
- 8 Cable collet
- 9 Backnut



| Characteristics | Value | Standards |
|---|------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 90 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 50 - 150 N | IEC 60512-9 test 17c |

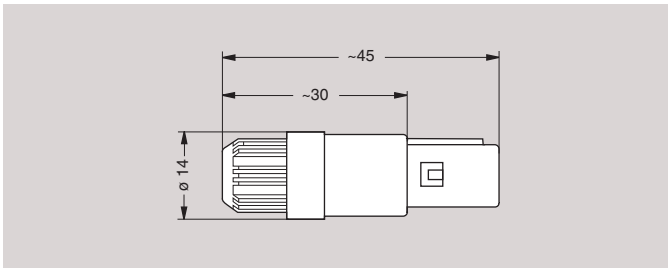
| Characteristics | Value | Standards |
|---------------------------------|---------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| Working temperature range (PEI) | -50/+170°C | - |

PAG Straight plug, key (G) or keys (A, B, C, H and J), with cable collet



| Part Number | Cable ϕ | |
|-----------------|--------------|-----|
| | min | max |
| PAG.M●●GL.AC39G | 2.7 | 3.9 |
| PAG.M●●GL.AC52G | 4.0 | 5.2 |
| PAG.M●●GL.AC65G | 5.3 | 6.5 |

Note: replace ●● by contact configuration (see page 19).

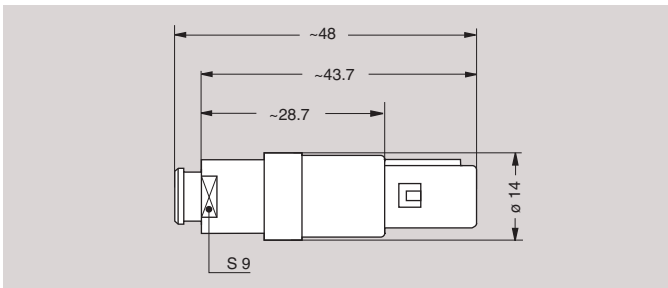


PAG Straight plug, key (G) or keys (A, B, C, H and J), with cable collet and nut for fitting a bend relief



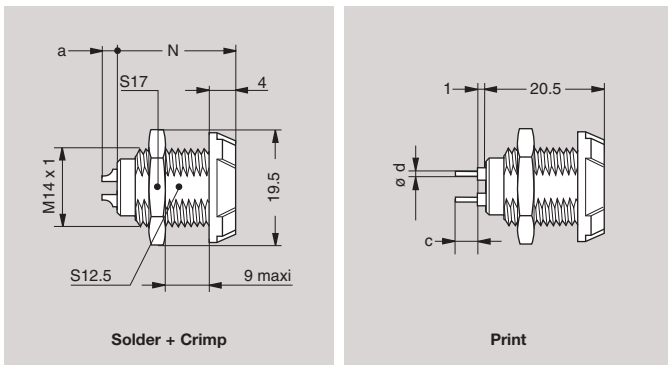
| Part Number | Cable ϕ | |
|------------------|--------------|-----|
| | min | max |
| PAG.M●●GL.AC39GZ | 2.7 | 3.9 |
| PAG.M●●GL.AC52GZ | 4.0 | 5.2 |
| PAG.M●●GL.AC65GZ | 5.3 | 6.5 |

Note: replace ●● by contact configuration (see page 19). The bend relief must be ordered separately (see page 22).



Note: all dimensions are in millimeters

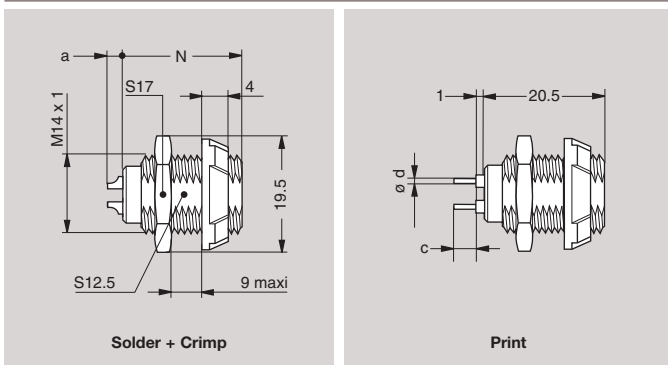
PLG Fixed socket, key (G) or keys (A, B, C, H and J), nut fixing



| Part Number | number of contacts | Contact | | | | | |
|---------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| PLG.M0.2GL.LG | 2 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PLG.M0.4GL.LG | 4 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PLG.M0.5GL.LG | 5 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PLG.M0.6GL.LG | 6 | 20.5 | 2.5 | 22.2 | 0 | 3 | 0.5 |
| PLG.M0.7GL.LG | 7 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PLG.M0.8GL.LG | 8 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PLG.M0.9GL.LG | 9 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PLG.M1.0GL.LG | 10 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PLG.M1.4GL.LG | 14 | 20.5 | 3.9 | - | - | 3 | 0.5 |

Note: for PCB drilling pattern and panel hole see page 24.

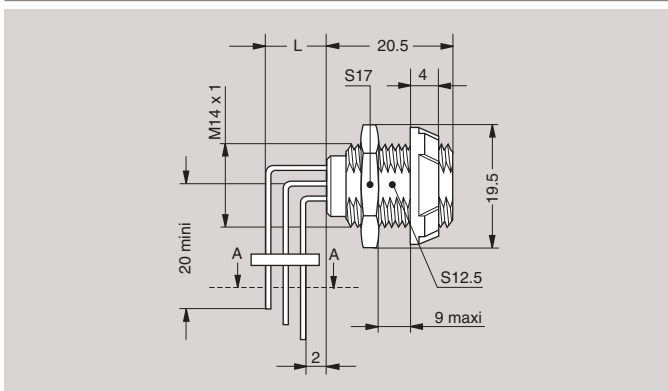
PKG Fixed socket, key (G) or keys (A, B, C, H and J), with two nuts (back panel mounting)



| Part Number | number of contacts | Contact | | | | | |
|---------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| PKG.M0.2GL.LG | 2 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PKG.M0.4GL.LG | 4 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PKG.M0.5GL.LG | 5 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PKG.M0.6GL.LG | 6 | 20.5 | 2.5 | 22.2 | 0 | 3 | 0.5 |
| PKG.M0.7GL.LG | 7 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PKG.M0.8GL.LG | 8 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PKG.M0.9GL.LG | 9 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PKG.M1.0GL.LG | 10 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PKG.M1.4GL.LG | 14 | 20.5 | 3.9 | - | - | 3 | 0.5 |

Note: for PCB drilling pattern and panel hole see page 24.

PKG Fixed socket, key (G) or keys (A, B, C, H and J), with two nuts, with 90° contacts (back panel mounting)

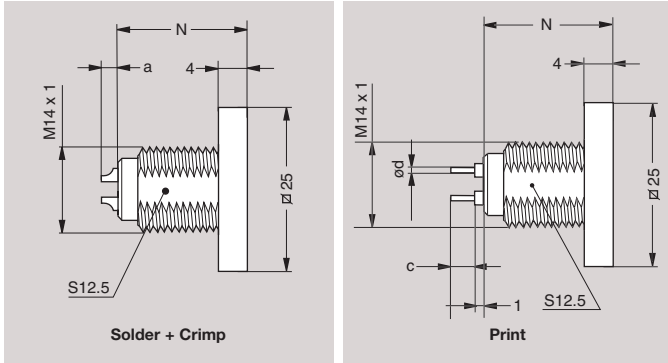
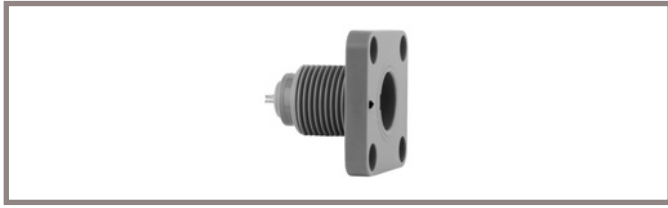


| Part Number | number of contacts | L |
|---------------|--------------------|------|
| PKG.M0.2GL.VG | 2 | 5.4 |
| PKG.M0.4GL.VG | 4 | 5.2 |
| PKG.M0.5GL.VG | 5 | 7.7 |
| PKG.M0.6GL.VG | 6 | 7.7 |
| PKG.M0.7GL.VG | 7 | 7.7 |
| PKG.M0.8GL.VG | 8 | 7.7 |
| PKG.M0.9GL.VG | 9 | 10.3 |
| PKG.M1.0GL.VG | 10 | 10.3 |
| PKG.M1.4GL.VG | 14 | 12.9 |

Note: for PCB drilling pattern see page 25.
Panel hole see page 24.

Note: all dimensions are in millimeters

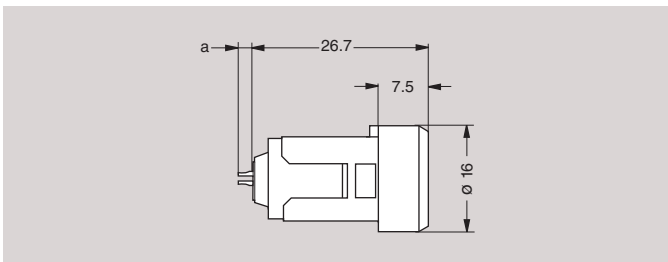
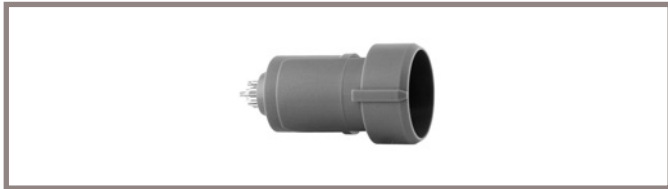
PMG Fixed socket, key (G) or keys (A, B, C, H and J), with square flange



| Part Number | number of contacts | Contact | | | | | |
|---------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| PMG.M0.2GL.LG | 2 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PMG.M0.4GL.LG | 4 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PMG.M0.5GL.LG | 5 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PMG.M0.6GL.LG | 6 | 20.5 | 2.5 | 22.2 | 0 | 3 | 0.5 |
| PMG.M0.7GL.LG | 7 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PMG.M0.8GL.LG | 8 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PMG.M0.9GL.LG | 9 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PMG.M1.0GL.LG | 10 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PMG.M1.4GL.LG | 14 | 20.5 | 3.9 | - | - | 3 | 0.5 |

Note: for PCB drilling pattern see page 24.
Panel hole see page 24.

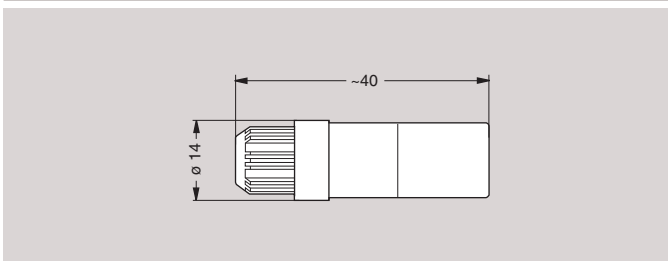
PYG Fixed socket, key (G) or keys (A, B or H), snap-on fixing



| Part Number | number of contacts | Solder |
|---------------|--------------------|--------|
| | | a max |
| PYG.M0.2GL.LG | 2 | 2.5 |
| PYG.M0.4GL.LG | 4 | 2.5 |
| PYG.M0.5GL.LG | 5 | 2.5 |
| PYG.M0.6GL.LG | 6 | 2.5 |
| PYG.M0.7GL.LG | 7 | 2.5 |
| PYG.M0.8GL.LG | 8 | 2.5 |
| PYG.M0.9GL.LG | 9 | 4.0 |
| PYG.M1.0GL.LG | 10 | 4.0 |
| PYG.M1.4GL.LG | 14 | 4.0 |

Note: only with A, B or G keying (2 to 14 contacts) or H (8,10 or 14 contacts).
The insulator is made of PEEK.

PRG Free socket, key (G) or keys (A, B, C, H and J), with cable collet

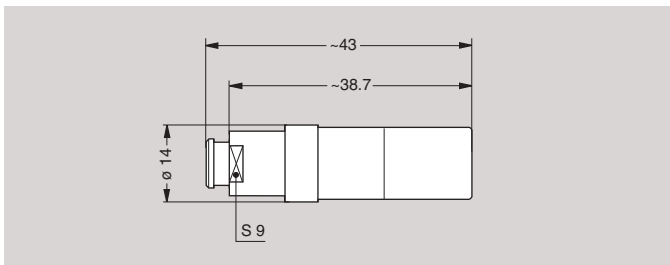


| Part Number | Cable ø | |
|------------------|---------|-----|
| | min | max |
| PRG.M●.●GL.LC39G | 2.7 | 3.9 |
| PRG.M●.●GL.LC52G | 4.0 | 5.2 |
| PRG.M●.●GL.LC65G | 5.3 | 6.5 |

Note: replace ●.● by contact configuration (see page 19).

Note: all dimensions are in millimeters

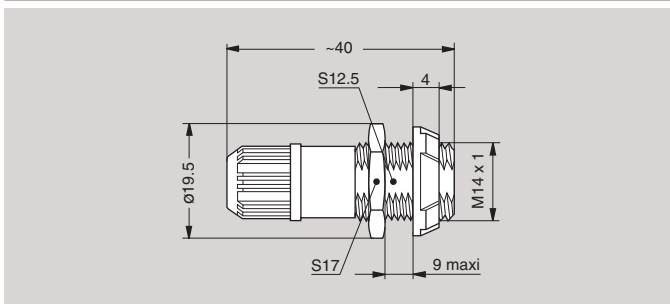
PRG Free socket, key (G) or keys (A, B, C, H and J), with cable collet and nut for fitting a bend relief



| Part Number | Cable \varnothing | |
|------------------|---------------------|-----|
| | min | max |
| PRG.M●●GL.LC39GZ | 2.7 | 3.9 |
| PRG.M●●GL.LC52GZ | 4.0 | 5.2 |
| PRG.M●●GL.LC65GZ | 5.3 | 6.5 |

Note: replace ●● by contact configuration (see page 19). The bend relief must be ordered separately (see page 22).

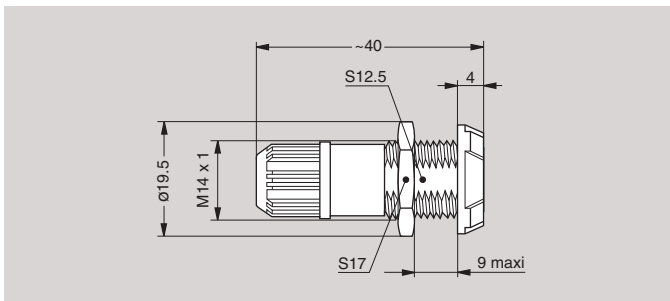
PTG Fixed socket, key (G) or keys (A, B, C, H and J), with two nuts and cable collet (back panel mounting)



| Part Number | Cable \varnothing | |
|-----------------|---------------------|-----|
| | min | max |
| PTG.M●●GL.LC39G | 2.7 | 3.9 |
| PTG.M●●GL.LC52G | 4.0 | 5.2 |
| PTG.M●●GL.LC65G | 5.3 | 6.5 |

Note: replace ●● by contact configuration (see page 19). Panel hole see page 24.

PDG Fixed socket, key (G) or keys (A, B, C, H and J), nut fixing and cable collet



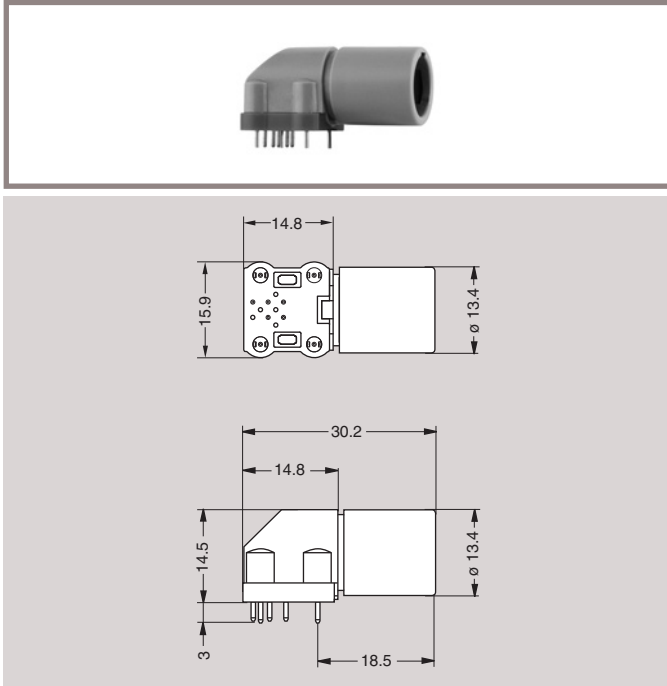
| Part Number | Cable \varnothing | |
|-----------------|---------------------|-----|
| | min | max |
| PDG.M●●GL.LC39G | 2.7 | 3.9 |
| PDG.M●●GL.LC52G | 4.0 | 5.2 |
| PDG.M●●GL.LC65G | 5.3 | 6.5 |

Note: replace ●● by contact configuration (see page 19). Panel hole see page 24.

Note: all dimensions are in millimeters

Elbow socket models (IP50)

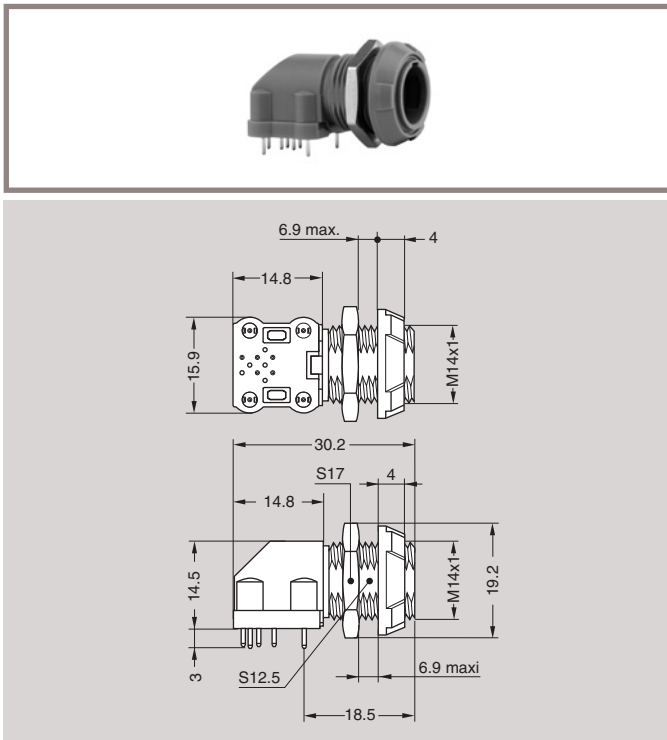
PPG Elbow socket, key (G) or keys (A, B, C), for printed circuit



| Part Number | number of contacts |
|--------------|--------------------|
| PPG.M0.2GG.N | 2 |
| PPG.M0.4GG.N | 4 |
| PPG.M0.5GG.N | 5 |
| PPG.M0.6GG.N | 6 |
| PPG.M0.7GG.N | 7 |
| PPG.M0.8GG.N | 8 |
| PPG.M0.9GG.N | 9 |
| PPG.M1.0GG.N | 10 |

Note: only available with G or A, B, C keying. The insulator is made of PSU. Outershell material is grey or black PSU. For PCB drilling, see page 25.

PXG Elbow socket, key (G) or keys (A, B, C), with two nuts, for printed circuit



| Part Number | number of contacts |
|---------------|--------------------|
| PXG.M0.2GG.NG | 2 |
| PXG.M0.4GG.NG | 4 |
| PXG.M0.5GG.NG | 5 |
| PXG.M0.6GG.NG | 6 |
| PXG.M0.7GG.NG | 7 |
| PXG.M0.8GG.NG | 8 |
| PXG.M0.9GG.NG | 9 |
| PXG.M1.0GG.NG | 10 |

Note: only available with G or A, B, C keying. The insulator is made of PSU. Outershell material is grey or black PSU. For PCB drilling, see page 25. Panel hole see page 24.

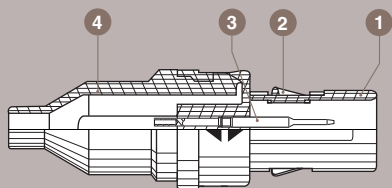
Note: all dimensions are in millimeters. For outershell in black PSU replace material code by «N».

Disposable plug (limited use)

P J . M . A A . A T 3 8 B

Fixed socket

- 1 Outershell
- 2 Latch sleeve
- 3 Male contact
- 4 Backshell



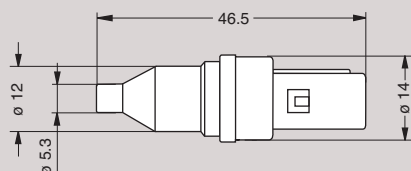
| Characteristics | Value | Standards |
|---------------------------------|-----------|---------------------|
| Endurance for PJ● (latching) | 5 cycles | IEC 60512-5 test 9a |
| Working temperature range (ABS) | -30/+90°C | - |
| Shell material | ABS | - |

PJG Straight disposable plug



| Part Number | nb. of cts. | Test Voltage (kV rms) | Recommended Mating fixed socket part number |
|------------------|-------------|-----------------------|---|
| PJG.M0.9AA.AT38B | 9 | 0.85 | PKG.M0.9GL.LG |
| PJG.M1.0AA.AT38B | 10 | 0.85 | PKG.M1.0GL.LG |
| PJG.M1.4AA.AT38B | 14 | 0.60 | PKG.M1.4GL.LG |

Note: only G, A, B, C keying available.
Only ABS plastic shell. White standard (B) or grey optional (G)
Cables up to 3.8mm diameter. Available only with male solder contacts.
Delivered in blister packs.

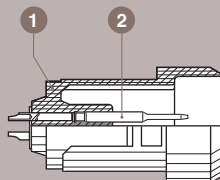


Disposable socket (limited use)

P Y . M

Fixed socket

- 1 Outershell
- 2 Male contact



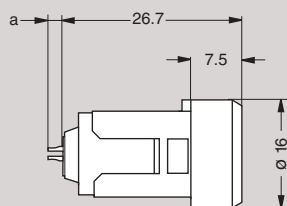
| Characteristics | Value | Standards |
|---------------------------------|-------------|----------------------|
| Endurance for PY● (latching) | 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| Average latching force | 6N | IEC 60512-7 test 13a |
| Average unmating force | 7N | IEC 60512-7 test 13a |
| Average retention force | 90N | IEC 60512-7 test 13a |

PY● Fixed disposable socket, snap on fixing



| Part Number | nb. of cts. | Contact Type | Solder a max | Shell color | Recommended Mating straight plug part number |
|---------------|-------------|--------------|--------------|-------------|--|
| PYG.M0.4GG.LG | 4 | female | 2.5 | grey | PAG.M0.4GL.AC*** |
| PYG.M0.4GG.LN | 4 | female | 2.5 | black | PAG.M0.4GL.AC*** |
| PYH.M0.8GG.AA | 8 | male | 2.5 | blue | PAH.M0.8GL.LC*** |
| PYH.M0.8GG.AB | 8 | male | 2.5 | white | PAH.M0.8GL.LC*** |
| PYA.M1.0GG.LG | 10 | female | 4.0 | grey | PAA.M1.0GL.AC*** |
| PYH.M1.0GG.AA | 10 | male | 4.0 | blue | PAH.M1.0GL.LC*** |

Note: The outershell and the insulator are moulded out of the same material (PSU).
Protective backshell available (see page 22).
Part number last digit represents the colour.



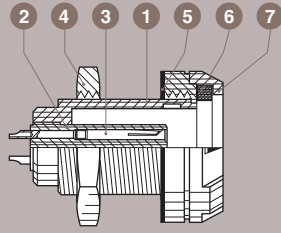
Note: all dimensions are in millimeters

Watertight models (IP64 when mated)



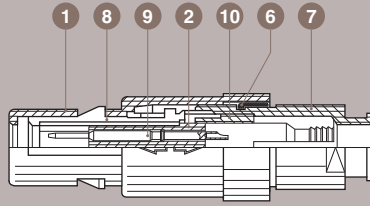
Fixed socket

- 1 Outershell
- 2 Insulator
- 3 Female contact
- 4 Hexagonal nut
- 5 Flat gasket
- 6 Gasket
- 7 Nut



Straight plug

- 1 Outershell
- 2 Insulator
- 6 Gasket
- 7 Nut
- 8 Latch sleeve
- 9 Male contact
- 10 Cable collet



| Characteristics | Value | Standards |
|---|------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 90 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 50 - 150 N | IEC 60512-9 test 17c |

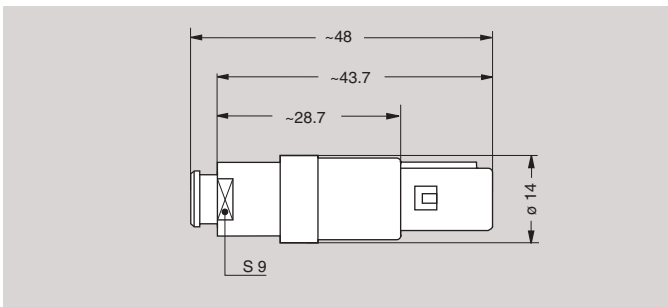
| Characteristics | Value | Standards |
|---------------------------------|----------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+90°C | - |
| Gasket material | Elastomer SEBS | - |

PFG Straight plug with cable collet and nut for fitting a bend relief



| Part Number | Cable ϕ | |
|------------------|--------------|-----|
| | min | max |
| PFG.M●●GL.AC39GZ | 2.7 | 3.9 |
| PFG.M●●GL.AC52GZ | 4.0 | 5.2 |
| PFG.M●●GL.AC65GZ | 5.3 | 6.5 |

Note: the bend relief must be ordered separately (see page 22). Replace ●● by contact configuration (see page 19).

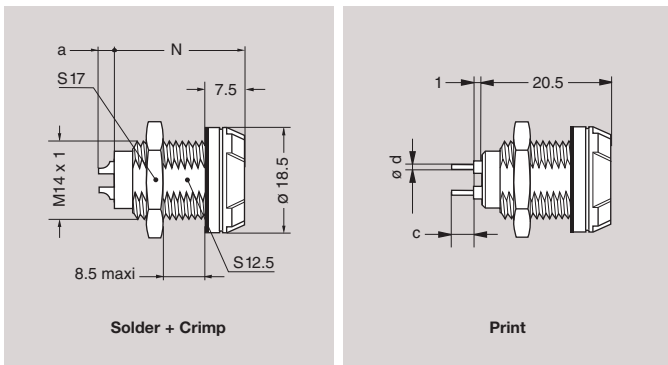


PNG Fixed socket, nut fixing



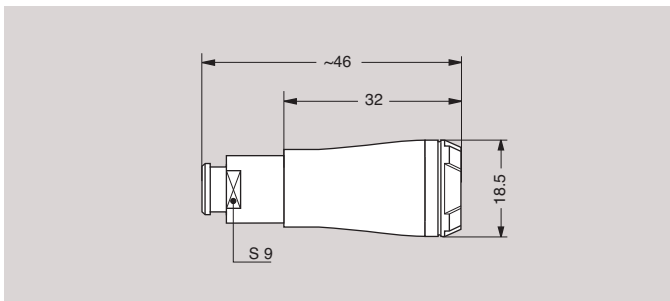
| Part Number | number of contacts | Contact | | | | | |
|---------------|--------------------|---------|-------|-------|---|-------|----------|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ϕ d |
| PNG.M0.2GL.LG | 2 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PNG.M0.4GL.LG | 4 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PNG.M0.5GL.LG | 5 | 20.5 | 2.5 | 22.2 | 0 | 5 | 0.7 |
| PNG.M0.6GL.LG | 6 | 20.5 | 2.5 | 22.2 | 0 | 3 | 0.5 |
| PNG.M0.7GL.LG | 7 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PNG.M0.8GL.LG | 8 | 20.5 | 4.5 | 22.2 | 0 | 3 | 0.5 |
| PNG.M0.9GL.LG | 9 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PNG.M1.0GL.LG | 10 | 20.5 | 3.9 | - | - | 3 | 0.5 |
| PNG.M1.4GL.LG | 14 | 20.5 | 3.9 | - | - | 3 | 0.5 |

Note: for PCB drilling pattern see page 24.



Note: all dimensions are in millimeters

PSG Free socket, conical outershell with cable collet and nut for fitting a bend relief



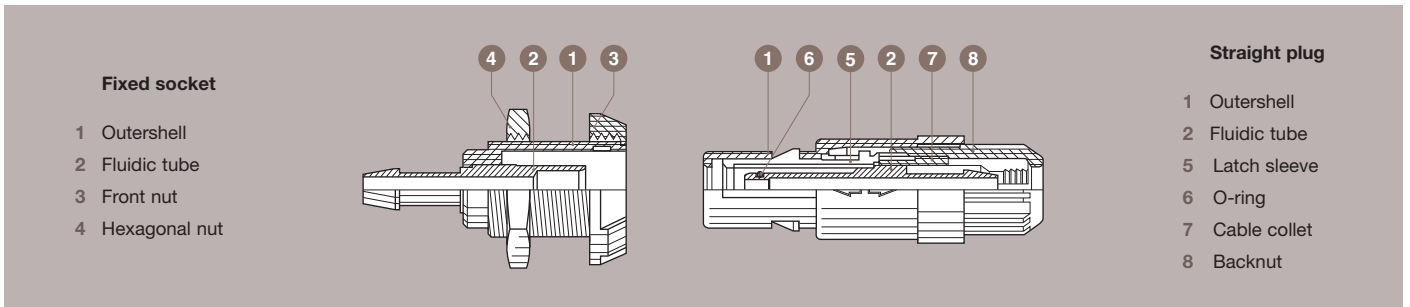
Note: all dimensions are in millimeters

| Part Number | Cable ϕ | |
|-------------------|--------------|-----|
| | min | max |
| PSG.M*.*YL.LC52NZ | 4.0 | 5.2 |
| PSG.M*.*YL.MC65RZ | 5.3 | 6.5 |
| PSG.M*.*YL.MC65AZ | 5.3 | 6.5 |
| PSG.M*.*YL.LC52NZ | 4.0 | 5.2 |

Note: replace *.* by contact configuration (see page 19).
 Outershell in black Delrin®
 The bend relief must be ordered separately (see page 22).

Fluidic configuration (2 bars) P . A0 . 1GZ .

The REDEL fluidic connector has many applications for example in medical or dentistry equipment. The connector is a monotube type and primarily intended for use with air or inert gas.



| Characteristics | Value | Standards |
|---------------------------------|---------------|---------------------|
| Max. working pressure | 2 bars | - |
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -20/+150°C | - |

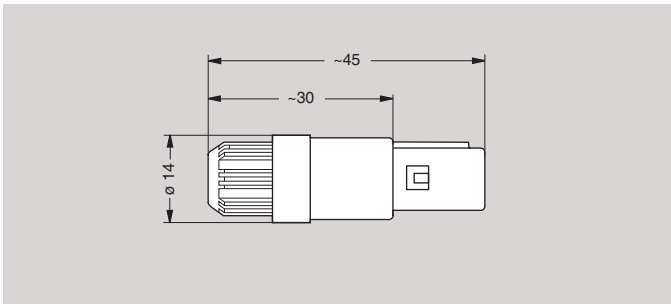
| Characteristics | Value | Standards |
|--------------------------------|-----------------|-----------|
| Inner fluidic contact diameter | 2.6 mm | - |
| Tube diameter inner/outer | 4 mm / 6 mm | - |
| Fluidic tube material | Ni plated brass | - |
| O-ring material | FPM (Viton®) | - |

PAG Straight plug, key (G) or keys (A, B, C, H and J), with cable collet



| Part Number | ø max. tube (mm) | ø inner tube (mm) |
|------------------|------------------|-------------------|
| PAG.A0.1GZ.ZC65G | 6.5 | 4 |

Note: For collet nut colour replace last digit (see table page 20).

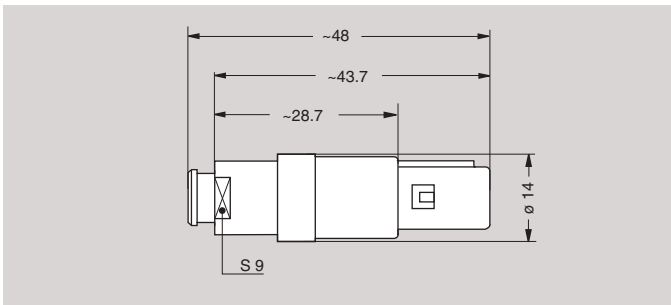


PAG Straight plug, key (G) or keys (A, B, C, H and J), with cable collet and nut for fitting a bend relief



| Part Number | ø max. tube (mm) | ø inner tube (mm) |
|-------------------|------------------|-------------------|
| PAG.A0.1GZ.ZC65GZ | 6.5 | 4 |

The bend relief must be ordered separately (see page 22).



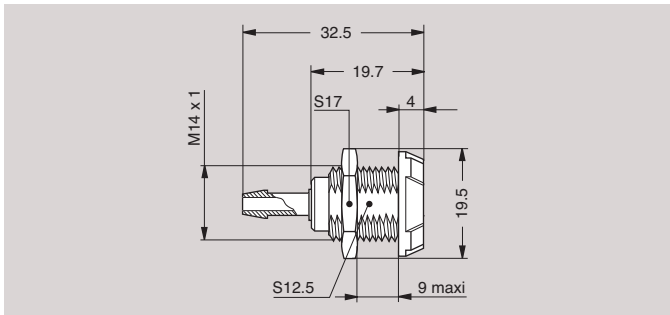
Note: all dimensions are in millimeters

PLG Fixed socket, key (G) or keys (A, B, C, H and J), with fluidic contact, nut fixing



| Part Number | ø inner tube (mm) |
|---------------|-------------------|
| PLG.A0.1GZ.ZG | 4 |

Note: For front nut colour replace last digit (see table page 20).
Recommended tube Legris 102540601

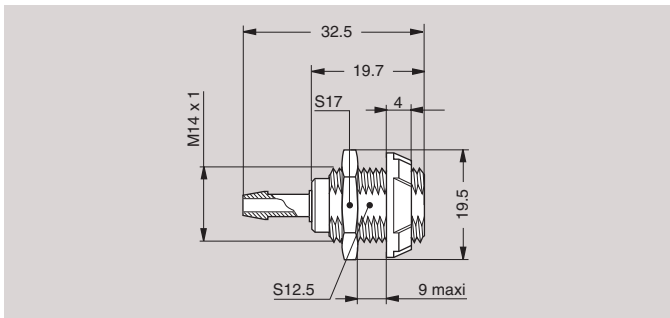


PKG Fixed socket, key (G) or keys (A, B, C, H and J), with fluidic contact, with two nuts (back panel mounting)



| Part Number | ø inner tube (mm) |
|---------------|-------------------|
| PKG.A0.1GZ.ZG | 4 |

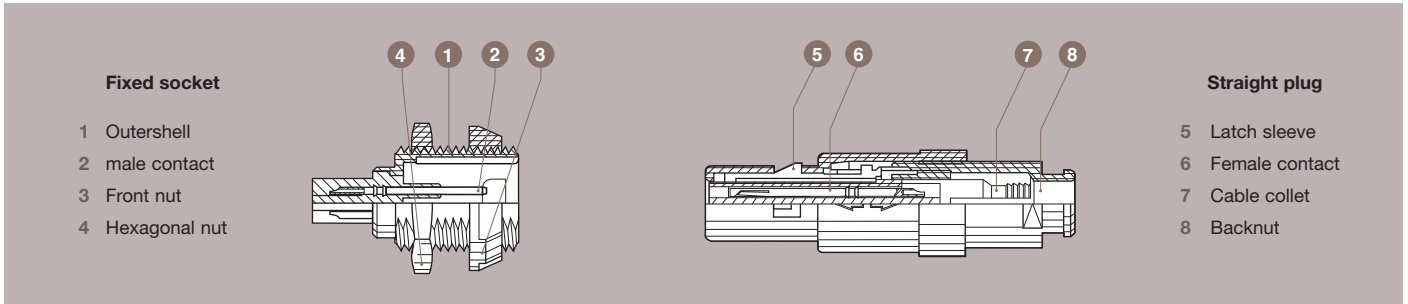
Note: For front nut colour replace last digit (see table page 20).
Recommended tube Legris 102540601



Note: all dimensions are in millimeters

Mains power configuration

The new PAH and PKH models are used for mains power in medical applications. The design of a special insulator offers the required creepage distance. The 3 contacts are only solder type with a maximum AWG 18 (wire size max 1.35 mm). The connectors are UL certified to be used at 250 Volt AC (9 Amps). See UL approval file number N°E242949.



| Characteristics | Value | Standards |
|---|--------|----------------------|
| Test voltage (rms) | 1.5 kV | IEC 60512-2 test 4a |
| Rated voltage (rms) | 250 V | IEC 60601/UL 60601-1 |
| Average retention force when pulling on the cable 1N = 0.102 kg | 90 N | IEC 60512-8 test 15f |

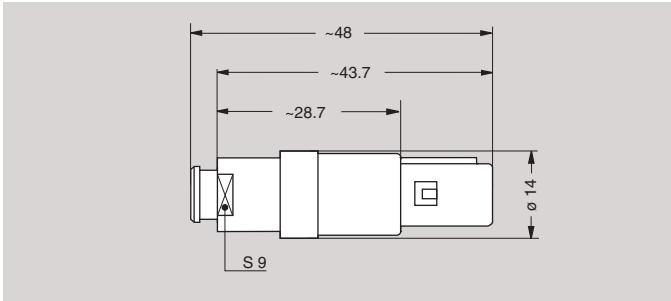
| Characteristics | Value | Standards |
|---|--------------|----------------------|
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 50 – 150 N | IEC 60512-9 test 17c |
| Endurance (latching) | >1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| UL file number | E242949 | - |

PAH Straight plug, key (H), with cable collet and nut for fitting a bend relief



| Part Number | Cable ϕ | |
|-------------------|--------------|-----|
| | min | max |
| PAH.N0.3GL.LC52GZ | 4.0 | 5.2 |
| PAH.N0.3GL.LC65GZ | 5.3 | 6.5 |
| PAH.N0.4GL.LC52GZ | 4.0 | 5.2 |
| PAH.N0.4GL.LC65GZ | 5.3 | 6.5 |

Note: The bend relief must be ordered separately (see page 22).

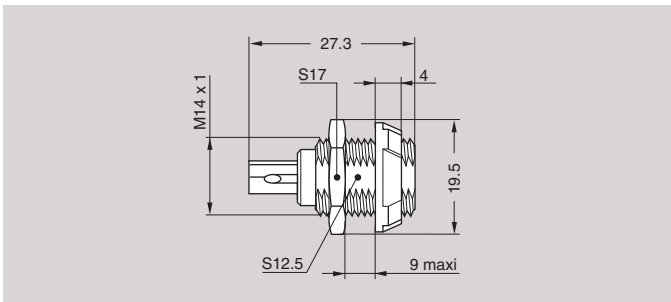


PKH Fixed socket, key (H), with two nuts (back panel mounting)



| Part Number |
|---------------|
| PKH.N0.3GL.AG |
| PKH.N0.4GL.AG |

Note: For front nut colour replace last digit (see table page 20). Not available with print contact.



Note: all dimensions are in millimeters

Insert configuration



| | Male solder contact | Female solder contacts | Reference | Number of contacts | Contact ø (mm) | Solder bucket ø (mm) ⁵⁾ | Crimp bucket ø (mm) ⁵⁾ | Contact type | | | | Test voltage (kV rms) ¹⁾ Contact-contact | Air clearance min ²⁾ (mm) Creepage distance min ³⁾ (mm) | Rated current (A) |
|-----------|---------------------|------------------------|-----------|-----------------------------------|----------------|------------------------------------|-----------------------------------|--------------|-------|------------------|---------------|--|--|-------------------|
| | | | | | | | | Solder | Crimp | Print (straight) | Print (elbow) | | | |
| Multipole | | | M0.2 | 2 | 1.3 | 1.10 | 1.4 | • | • | • | • | 1.20 | 1.30 | 10.0 |
| | | | M0.4 | 4 | 0.9 | 0.80 | 1.1 | • | • | • | • | 1.20 | 1.20 | 8.0 |
| | | | M0.5 | 5 | 0.9 | 0.80 | 1.1 | • | • | • | • | 1.05 | 0.80 | 7.0 |
| | | | M0.6 | 6 | 0.7 | 0.60 | 0.8 | • | • | • | • | 1.05 | 0.85 | 6.0 |
| | | | M0.7 | 7 | 0.7 | 0.60 | 0.8 | • | • | • | • | 1.05 | 0.85 | 5.0 |
| | | | M0.8 | 8 | 0.7 | 0.60 | 0.8 | • | • | • | • | 1.05 | 0.60 | 5.0 |
| | | | M0.9 | 9 | 0.5 | 0.45 | - | • | - | • | • | 0.85 | 0.60 | 3.0 |
| | | | M1.0 | 10 | 0.5 | 0.45 | - | • | - | • | • | 0.85 | 0.45 | 3.0 ⁴⁾ |
| | | | M1.4 | 14 | 0.5 | 0.45 | - | • | - | • | • | 0.60 | 0.50 | 2.0 |
| | Mains power | | | N0.3 ⁶⁾ | 3 | 0.9 | 1.40 | - | • | - | - | - | 1.50 | 2.00 6.00 |
| | | | N0.4 | 4 | 0.9 | 1.40 | - | • | - | - | - | 2.50 | 1.30 3.50 | 8.0 |
| Fluidic | | | A0.1 | 1 Fluidic (monotube) up to 2 bars | | | | | | | | | | |

Note: 1) depending on specific application and related standard, more restrictive operating voltage may apply.

We suggest operating voltage = 1/3 test voltage, see page 68.

2) shortest distance in air between two conductive parts.

3) shortest distance along the surface of the insulating material between two conductive parts.

4) for PPG and PXG (with 10 contacts) electrical characteristics, please contact factory.

5) for a given AWG, the diameter of some stranded conductor design is larger than the solder cup diameter (see page 69).

6) UL file number: E242949

Alignment key P

Verify the third digit of the part number in order to select the right keying.
The standard keying is «G» coded.

| | | | | | | |
|--------------------------|----------|----------|----------|----------|-------------|----------|
| Keying (plug front view) | | | | | | |
| | G | A | B | C | H | J |
| Reference | G | A | B | C | H | J |
| Contact type for plug | male | male | male | male | female | female |
| Contact type for socket | female | female | female | female | male | male |
| Number of contacts | 2 to 14 | | | | 8, 10 or 14 | |

Outer shell material P

| Material | Ref. | Colour | Temperature |
|----------|------|--------|---------------|
| PEI | S | Grey | -50° / +170°C |
| PEI | T | Black | |
| PSU | G | Grey | -50° / +150°C |
| PSU | N | Black | |

Note: for extensive sterilization use PEI. For complete connector in PEI (collet nut, front nut or flange also in PEI), available colours are grey or black only. Use colour coding grey or black according to colour coding table (see below)

Contact type P

Select the type of contact: solder or crimp?

Plug

| Type | Male | Female |
|--------|------|-----------------|
| solder | A | L ¹⁾ |
| crimp | C | - |

Socket

| Type | Male | Female |
|-----------|-----------------|--------|
| solder | A ¹⁾ | L |
| crimp | - | M |
| print | D | N |
| print 90° | - | V |

Note: 1) only for H and J keying with 8, 10 or 14 contacts
For complete connector in PEI (collet nut, front nut or flange also in PEI), available colours are grey or black only. Use colour coding grey or black according to colour coding table (see below)

When should I use crimp rather than solder contacts ?

Soldering

- recommended for small volumes
- requires little amount of tooling (soldering iron)
- requires more time

Crimping

- recommended for large volumes
- no heat is required to make the connection
- for contacts with high density
- for use in high temperature environment
- requires extra tooling (crimping tools)

Colour coding P

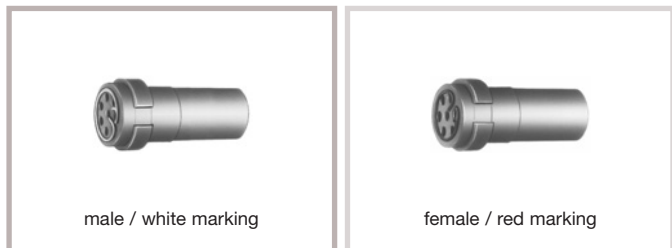
| Reference | Colours | | | | | | |
|-----------|---------|------|--------|-------|------|-------|-------|
| | grey | blue | yellow | black | red | green | white |
| Reference | G | A | J | N | R | V | B |
| RAL code | 7001 | 5002 | 1016 | 9005 | 3020 | 6024 | 9003 |

Note: the RAL colours are indicative and depend on raw material and production process. Colour may differ.

Easy identification with the assistance of colour coding.
Outershell is only available in grey or black.

Accessories

PAG-PLG Insulator for crimp contacts



| Contact configuration | Insulator part number | |
|-----------------------|-----------------------|--------------------|
| | For male contact | For female contact |
| M0.2 | PAG.302.YL | PLG.402.YL |
| M0.4 | PAG.304.YL | PLG.404.YL |
| M0.5 | PAG.305.YL | PLG.405.YL |
| M0.6 | PAG.306.YL | PLG.406.YL |
| M0.7 | PAG.307.YL | PLG.407.YL |
| M0.8 | PAG.308.YL | PLG.408.YL |

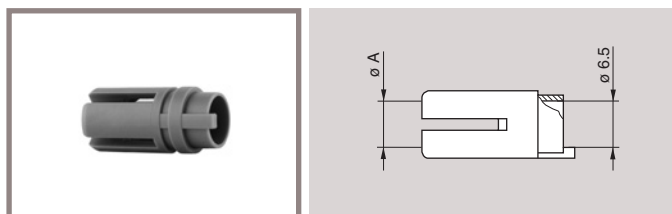
PAG-PKG Crimp contacts, kit with the number of contacts in a tube



| Contact configuration | nb. of contacts | ø contact (mm) | Kit contact part number | |
|-----------------------|-----------------|----------------|-------------------------|-------------|
| | | | Male | Female |
| M0.2 | 2 | 1.3 | PAG.567.02C | PKG.667.02M |
| M0.4 | 4 | 0.9 | PAG.562.04C | PKG.662.04M |
| M0.5 | 5 | 0.9 | PAG.562.05C | PKG.662.05M |
| M0.6 | 6 | 0.7 | PAG.557.06C | PKG.657.06M |
| M0.7 | 7 | 0.7 | PAG.557.07C | PKG.657.07M |
| M0.8 | 8 | 0.7 | PAG.557.08C | PKG.657.08M |

Note: upon request, contacts with reduced crimp barrel are available.

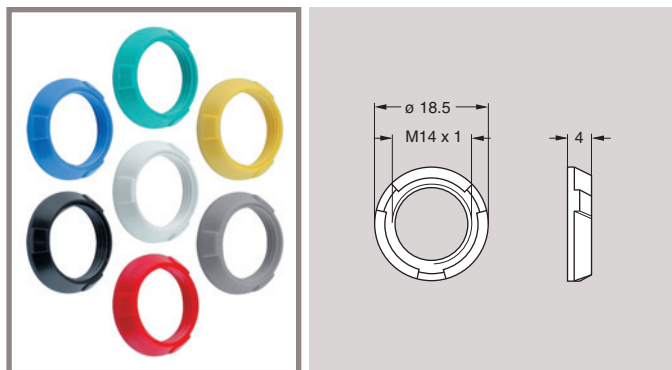
PLA Collet



| Part Number | ø A (mm) | Cable ø (mm) | |
|-------------|----------|--------------|------|
| | | min. | max. |
| PLA.739.●● | 3.9 | 2.7 | 3.9 |
| PLA.752.●● | 5.2 | 4.0 | 5.2 |
| PLA.765.●● | 6.5 | 5.3 | 6.5 |

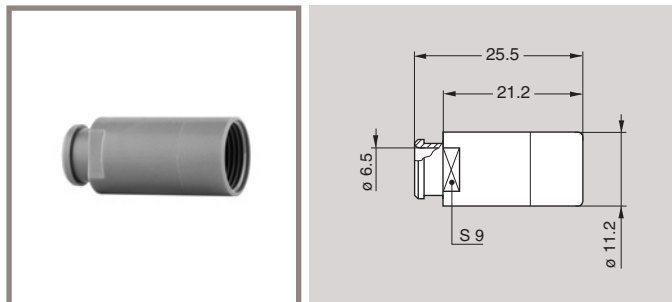
Note: ●● = UG (grey PSU), TN (black PEI) or UN (black PSU).

PKG Plastic front nut for PK● and PT● models



| Part Number | Mat. | Colours |
|-------------|------|---------|
| PKG.220.UA | PSU | blue |
| PKG.220.UB | PSU | white |
| PKG.220.UG | PSU | grey |
| PKG.220.UJ | PSU | yellow |
| PKG.220.UN | PSU | black |
| PKG.220.UR | PSU | red |
| PKG.220.UV | PSU | green |
| PKG.220.TG | PEI | grey |
| PKG.220.TN | PEI | black |

PAM.130.●● Nut for fitting a GMA.1B bend relief

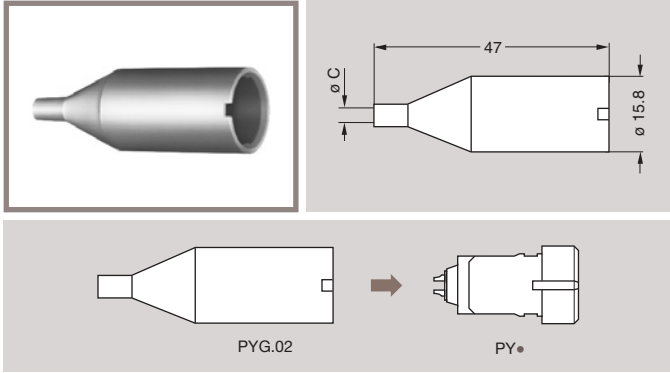


Note: all dimensions are in millimeters

| Part Number | Mat. | Colours |
|-------------|------|---------|
| PAM.130.UA | PSU | blue |
| PAM.130.UB | PSU | white |
| PAM.130.UG | PSU | grey |
| PAM.130.UJ | PSU | yellow |
| PAM.130.UN | PSU | black |
| PAM.130.UR | PSU | red |
| PAM.130.UV | PSU | green |
| PAM.130.TN | PEI | black |
| PAM.130.TG | PEI | grey |

Note: only for PA●, PR● or PT● models.

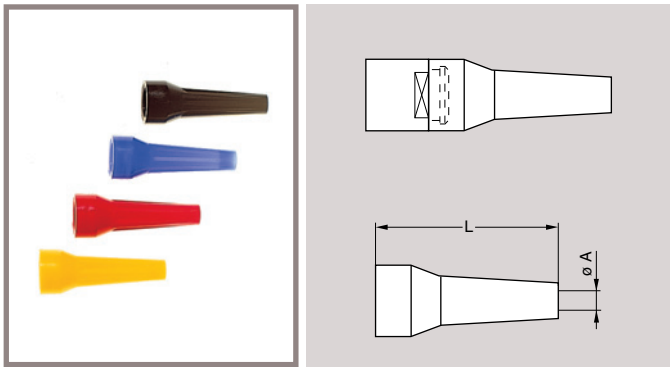
PYG.02 Protective backshell for PY●



| Part Number | ϕC (mm) | Mat. | Colours |
|-----------------|---------------|------|---------|
| PYG.02.5UG.0 | 2.5 | PSU | grey |
| PYG.02.5YG.0ABS | 2.5 | ABS | grey |
| PYG.02.7YG.0ABS | 2.7 | ABS | grey |
| PYG.02.5YG.0PSU | 2.5 | PSU | grey |

Note: ABS working temperature: -30°C +90°C. All dimensions are in millimeters.

GMA.1B Bend relief



A bend relief absorbs the force that may be exerted on cables. These are designed for plugs and free sockets with cable collet and nut.

| Part Number | Dimensions (mm) | | | | Material | Temperature range | |
|---------------|-----------------|----|--------------|------|-------------------------------------|-------------------|----------------|
| | Bend relief | | Cable ϕ | | | in dry atmosphere | in water steam |
| | A | L | max. | min. | | | |
| GMA.1B.025.DG | 2.5 | 30 | 2.9 | 2.5 | Desmopan 786 Polyurethane elastomer | -40°C, +80°C | - |
| GMA.1B.030.DG | 3.0 | 30 | 3.4 | 3.0 | | | |
| GMA.1B.035.DG | 3.5 | 30 | 3.9 | 3.5 | | | |
| GMA.1B.040.DG | 4.0 | 30 | 4.4 | 4.0 | | | |
| GMA.1B.045.DG | 4.5 | 30 | 4.9 | 4.5 | | | |
| GMA.1B.054.DG | 5.4 | 30 | 6.0 | 5.4 | | | |
| GMA.1B.065.DG | 6.5 | 30 | 7.0 | 6.5 | | | |
| GMA.1B.025.RG | 2.5 | 34 | 2.9 | 2.5 | Silicone elastomer VMQ | -60°C, +200°C | +140°C |
| GMA.1B.030.RG | 3.0 | 34 | 3.4 | 3.0 | | | |
| GMA.1B.035.RG | 3.5 | 34 | 3.9 | 3.5 | | | |
| GMA.1B.040.RG | 4.0 | 34 | 4.4 | 4.0 | | | |
| GMA.1B.045.RG | 4.5 | 34 | 5.0 | 4.5 | | | |
| GMA.1B.051.RG | 5.1 | 34 | 5.6 | 5.1 | | | |
| GMA.1B.057.RG | 5.7 | 34 | 6.2 | 5.7 | | | |
| GMA.1B.063.RG | 6.3 | 34 | 7.0 | 6.3 | | | |

Note: the last letter «G» of the part number indicates a grey colour, see the adjacent table and replace letter «G» by the letter of the colour required.

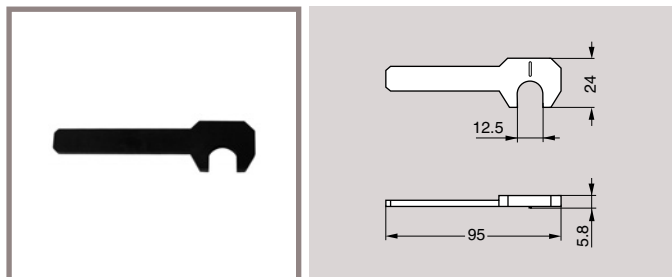
Note: all dimensions are in millimeters

| Reference | Colours |
|-----------|---------|
| A | blue |
| B | white |
| G | grey |
| J | yellow |
| M | brown |
| N | black |
| R | red |
| S | orange |
| V | green |

Note: the selection of pigments, which should remain stable at high temperature, is limited by the new regulations. For this reason, some colours will be a shade different from those used for Desmopan bend reliefs. The selected solutions represent the best possible compromise.

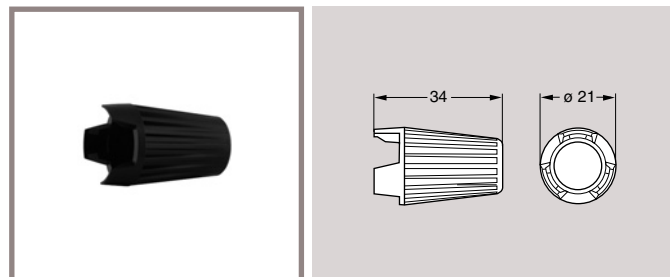
Tooling

POP.125.GN Spanner for outershell



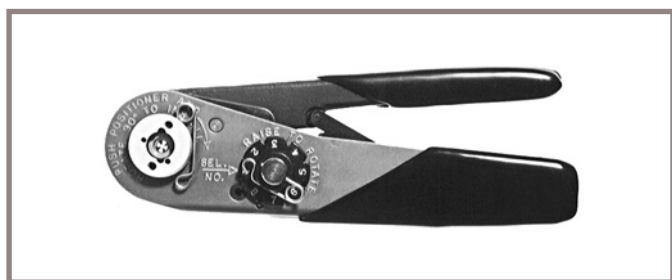
Note: both spanners available as a kit, ref. POZ.12.18G.N.
Material: PA 6.6

POB.186.GN Spanner for front nut

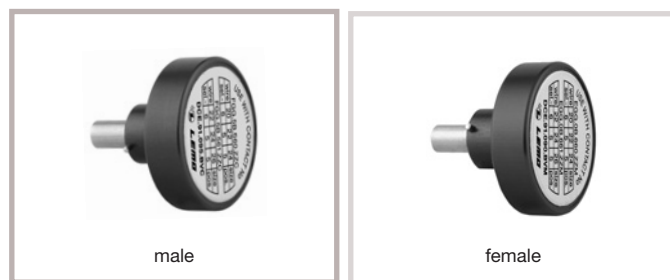


Material: PA 6.6

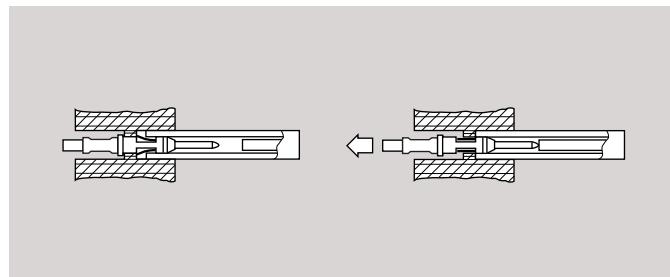
DPC.91.701.V Crimping tool



DCE Positioners for crimp contacts



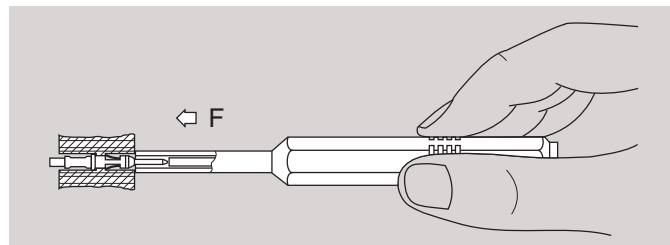
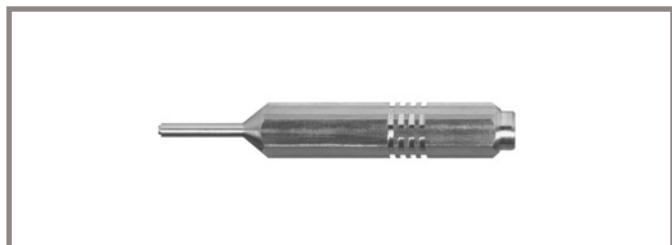
DCF Automatic extraction tools for crimp contacts



| Configuration | Contact ø (mm) | Conductor AWG | Positioner part number | | Selector No Setting | Part number extractor | |
|----------------|----------------|---------------|------------------------|----------------|---------------------|-----------------------|----------------|
| | | | Male contact | Female contact | | Male contact | Female contact |
| M0.2 | 1.3 | 18-20 | DCE.91.135.BVD | DCE.91.130.BVM | 8-7 | DCF.91.133.5LT | DCF.91.131.2LT |
| M0.4/M0.5 | 0.9 | 20-22-24 | DCE.91.095.BVD | DCE.91.090.BVM | 6-5-5 | DCF.91.093.5LT | DCF.91.090.2LT |
| M0.6/M0.7/M0.8 | 0.7 | 22-24-26 | DCE.91.075.BVD | DCE.91.070.BVM | 6-5-5 | DCF.91.073.5LT | DCF.91.070.2LT |

Note: the variance in conductor stranding diameter for the minimum AWG is such that some can have a cross section which is not sufficient to guarantee crimping as per IEC 60352-2 standard. All dimensions are in millimeters.

DCK Retention testing tools for crimp contacts

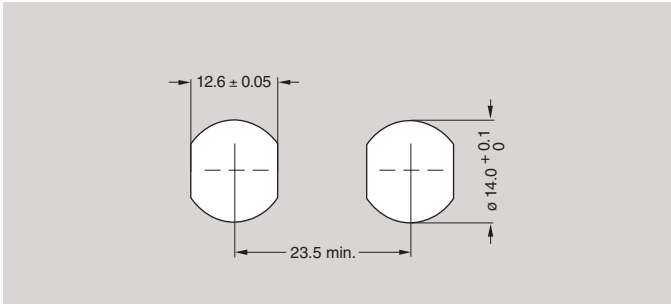


| Contact ø (mm) | Test force (N) | Testing tool part number | |
|----------------|----------------|--------------------------|-----------------|
| | | Male contact | Female contact |
| 0.7 | 10 | DCK.91.071.0LRC | DCK.91.071.0LRM |
| 0.9 | 14 | DCK.91.091.4LRC | DCK.91.091.4LRM |
| 1.3 | 25 | DCK.91.132.5LRC | DCK.91.132.5LRM |

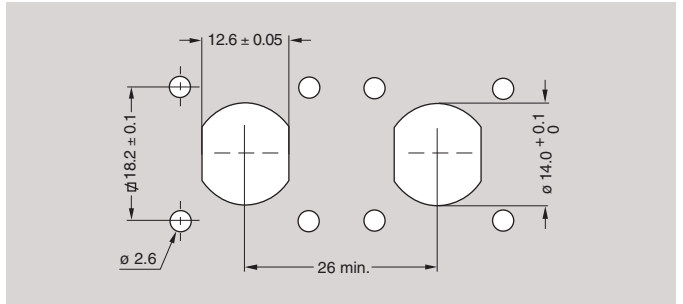
Note: all dimensions are in millimeters

Panel hole

For PL●, PK●, PN●, PX●, PT● and PD●



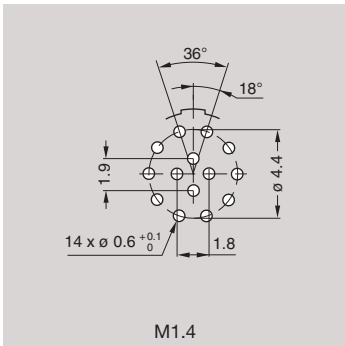
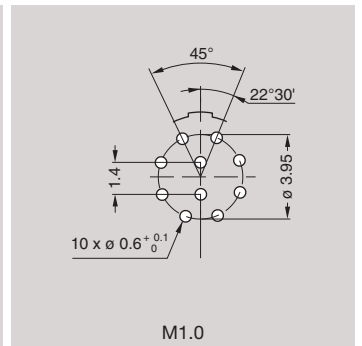
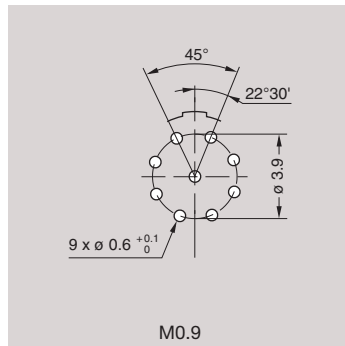
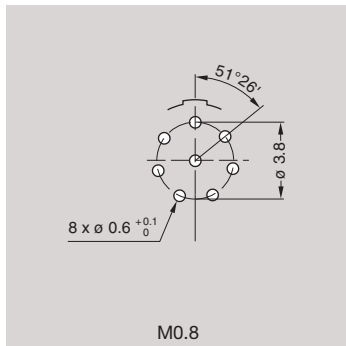
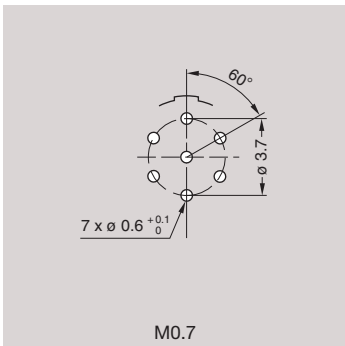
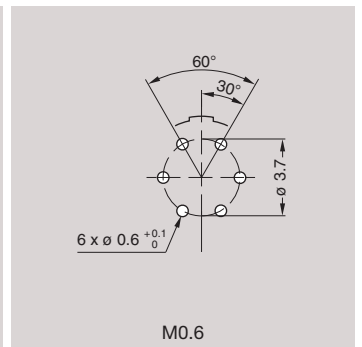
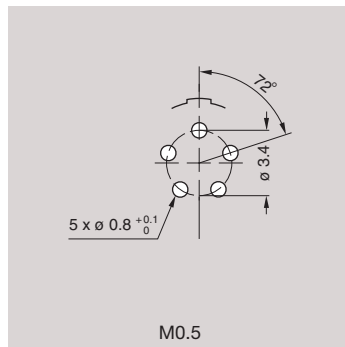
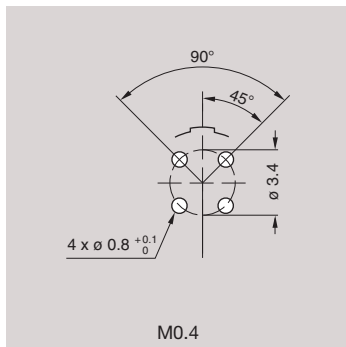
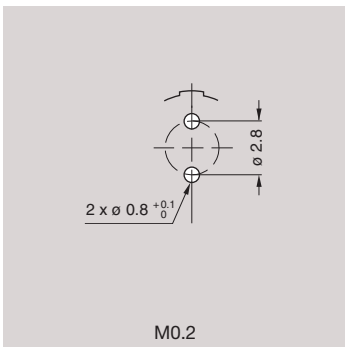
For PM●



Note: PY* is also designed for snap-on fixing into customer housing. Consult factory for information.
 – Socket mounting nut torque = 1.5 Nm.

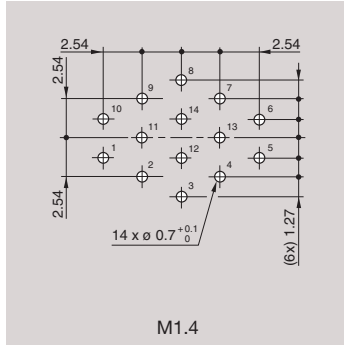
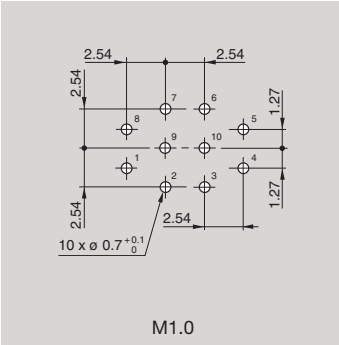
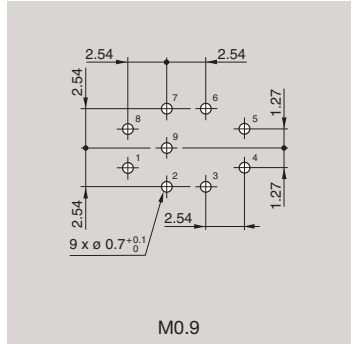
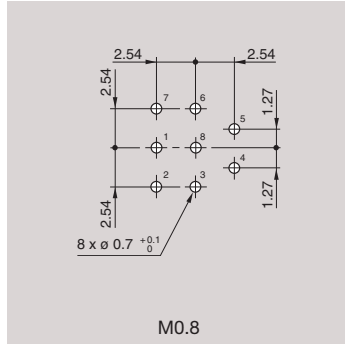
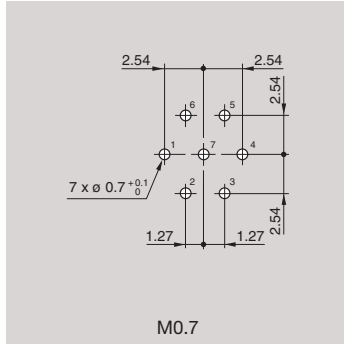
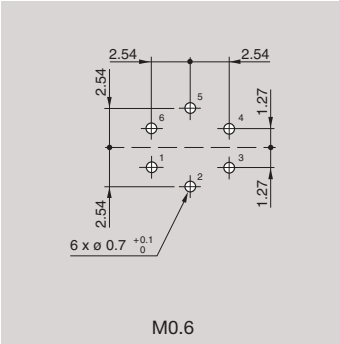
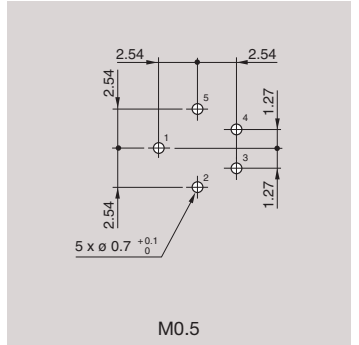
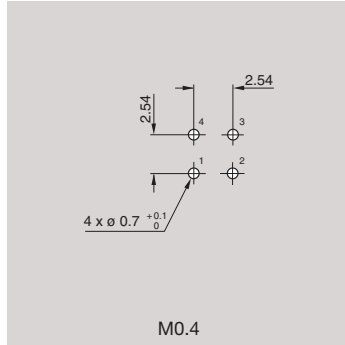
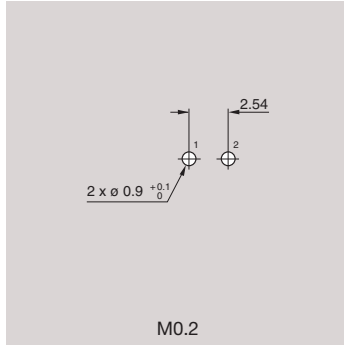
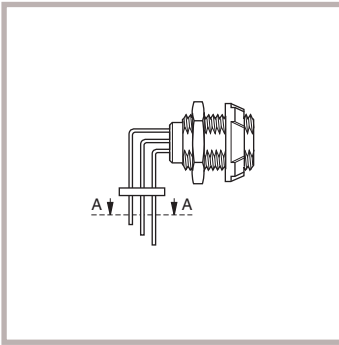
PCB drilling pattern

For straight contacts

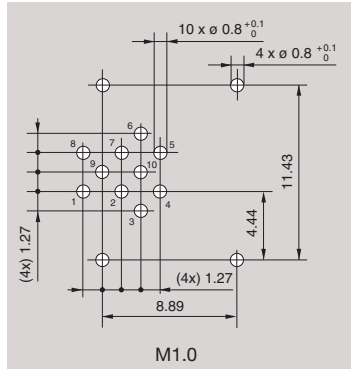
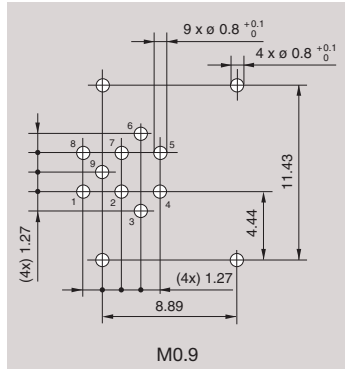
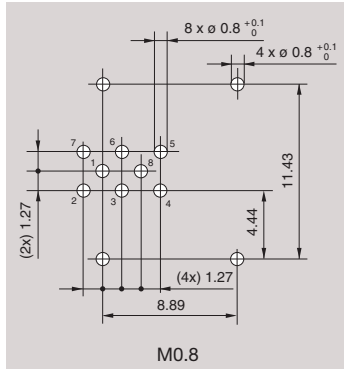
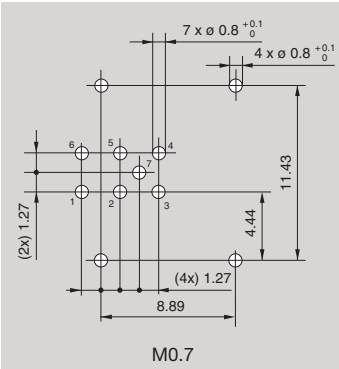
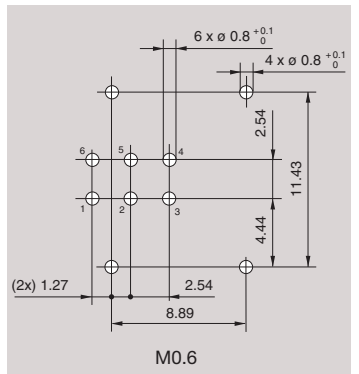
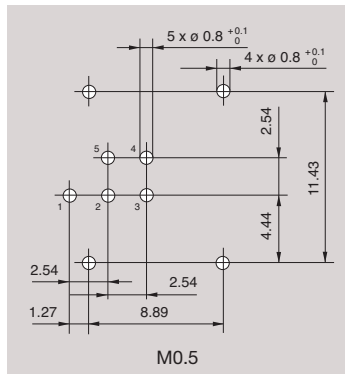
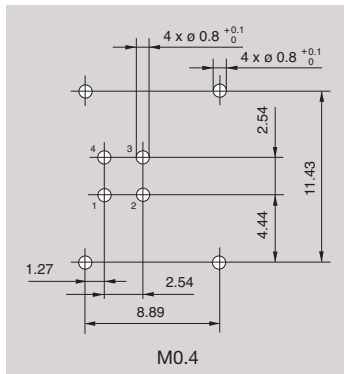
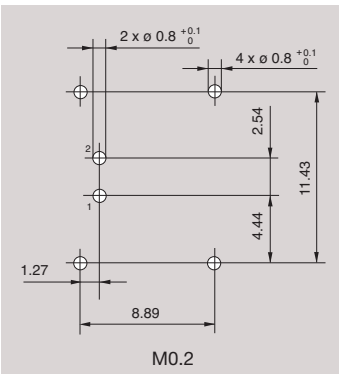


Note: all dimensions are in millimeters

For 90° elbow contacts (A-A view)

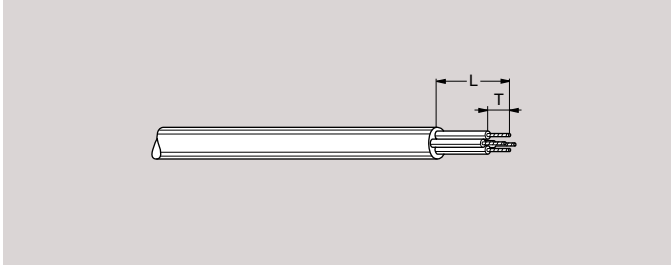
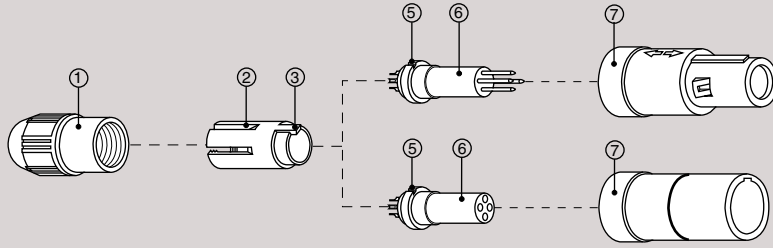


For PPG and PXG models



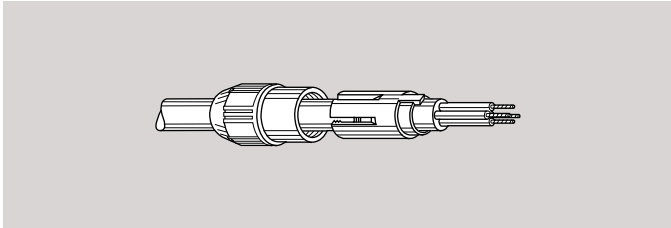
Assembly instructions

Solder contacts

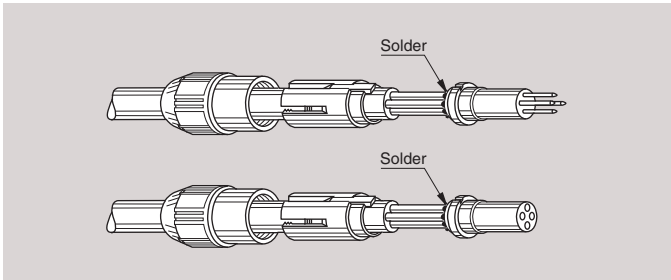


1. Strip the cable according to the lengths given in the table. Tin the conductors.

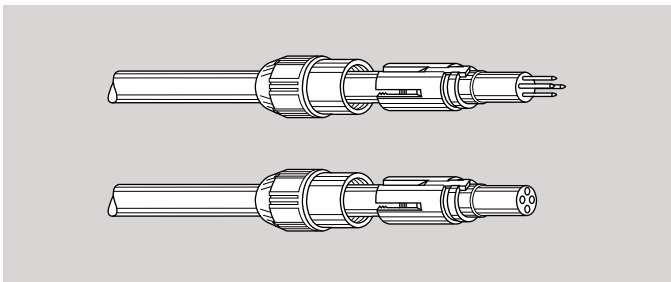
| Configuration | Dimensions (mm) | |
|---------------|-----------------|-----|
| | L | T |
| M0.2 | 14.0 | 4.0 |
| M0.4, M0.5 | 13.0 | 3.0 |
| M0.6 to M1.4 | 12.5 | 2.5 |
| N0.3 | 11.5 | 3.5 |
| N0.4 | 11.5 | 3.5 |



2. Slide the collet nut ① and then the collet ② onto the cable.



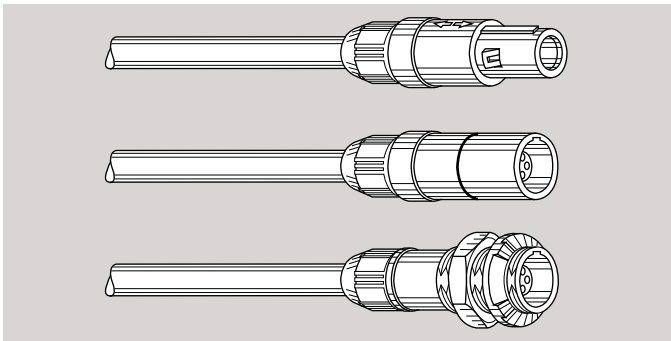
3. Solder conductors into contacts, making sure that neither solder nor flux gets onto the insulator or cable insulation.



4. Slide the collet ② forward and locate tag ③ in the slot ⑤ on the insulator ⑥.

Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst turning it to ensure that the tag ③ locates in the inside slot of the shell. Tighten the collet nut ① to the maximum torque of 0.25 Nm.

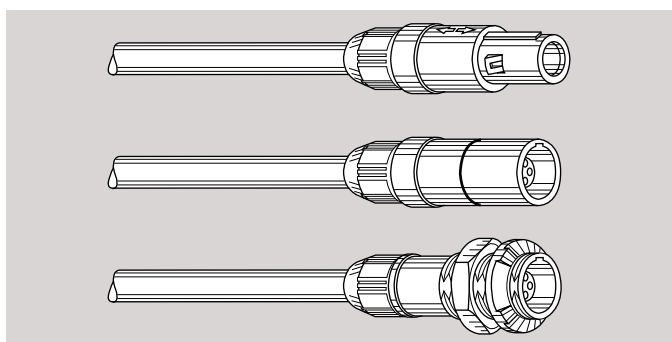
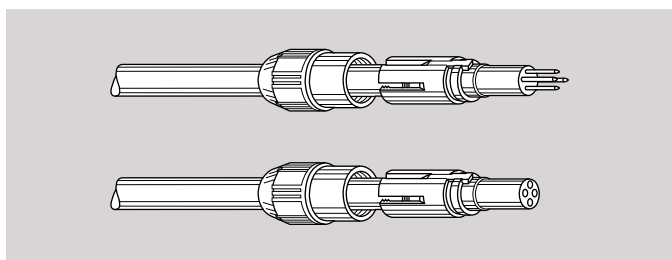
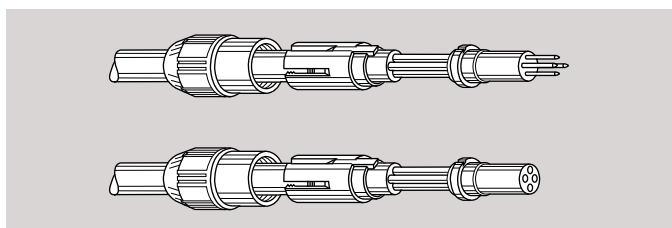
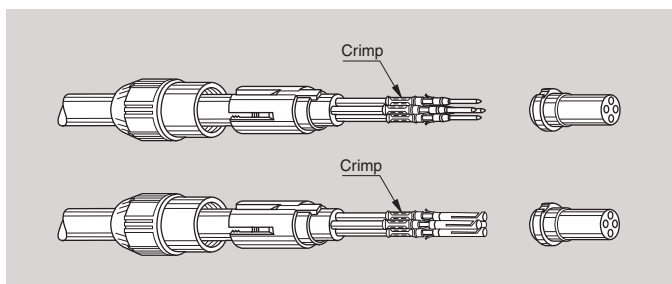
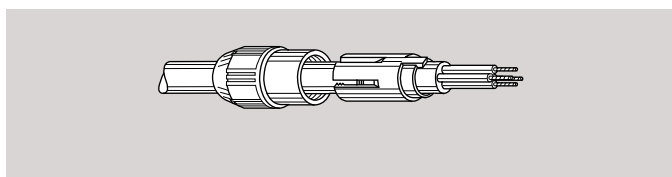
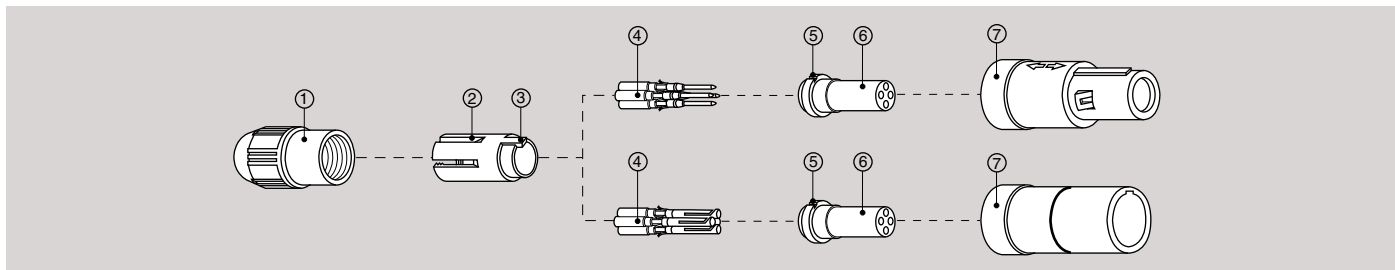
– Socket mounting nut torque = 1.5 Nm.



For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Crimp contacts



1. Strip the cable according to the lengths given in the table.

| Configuration | Dimensions (mm) | |
|---------------|-----------------|-----|
| | L | T |
| M0.2 to M0.8 | 15.0 | 3.9 |

2. Slide the collet nut ① and then the collet ② onto the cable.

3. Fix the appropriate positioner (table page 23) in the crimping tool. Set selector to the number corresponding to the conductor AWG as indicated on the positioner label. Fit conductor into contact ④ and make sure it is visible through the inspection hole in the crimp barrel. Slide conductor-contact combination into the open crimping tool; make sure that the contact is fully pushed into the positioner. Close the tool. Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.

4. Now arrange contact-conductor combinations according to the insert marking and locate them into the insert ⑥. Check that all contacts are correctly located and remain in position when given a gentle pull.

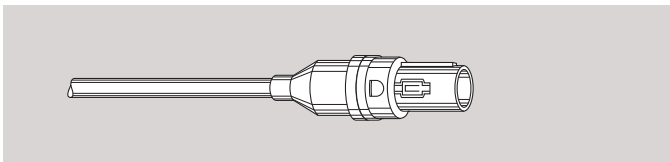
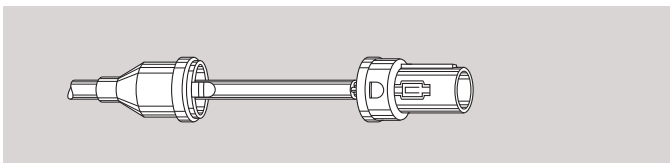
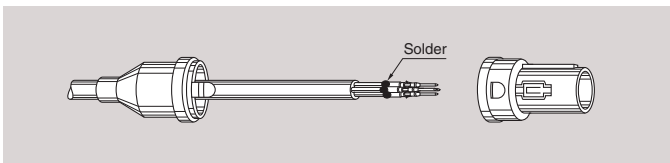
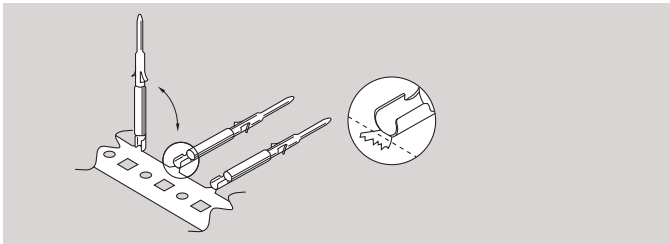
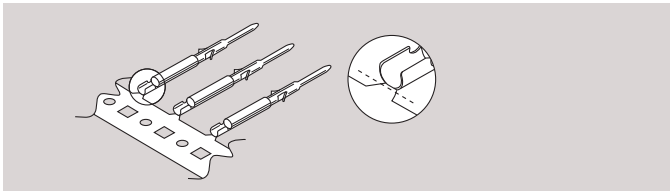
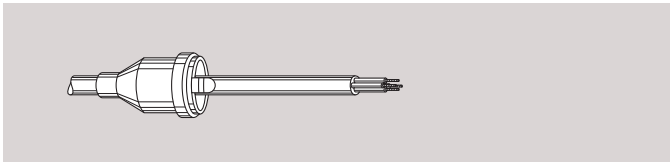
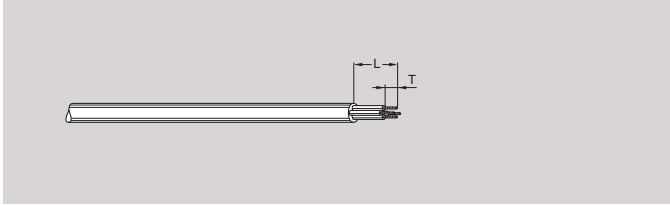
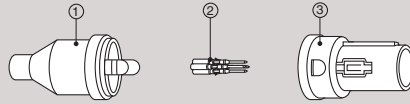
5. Slide the collet ② forward and locate tag ③ in the slot ⑤ on the insulator ⑥. Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst turning it to ensure that the tag ③ locates in the inside slot of the shell. Tighten the collet nut ① to the maximum torque of 0.25 Nm.

– Socket mounting nut torque = 1.5 Nm.

For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Stamped contacts (For PJ●)



1. Strip the cable according to the lengths given in the drawing. Tin the conductors.

| Configuration | Dimensions (mm) | |
|------------------|-----------------|-----|
| | L | T |
| M0.9, M1.0, M1.4 | 15.0 | 3.0 |

2. Slide the backshell ① onto the cable

3. Contact removal

Automated removal: if using automated equipment to remove the contacts ②, cut as near to the curled portion of the contact to minimize the size of the remaining attachment tab.

Manual removal

Gently remove each of the individual contacts ② by breaking in both directions as shown. If any portion of the attachment tab remains on the contact ②, clip off to minimize risk of shorting.

4. Solder conductors into contacts ②, making sure that neither solder nor flux gets onto the cable insulation.

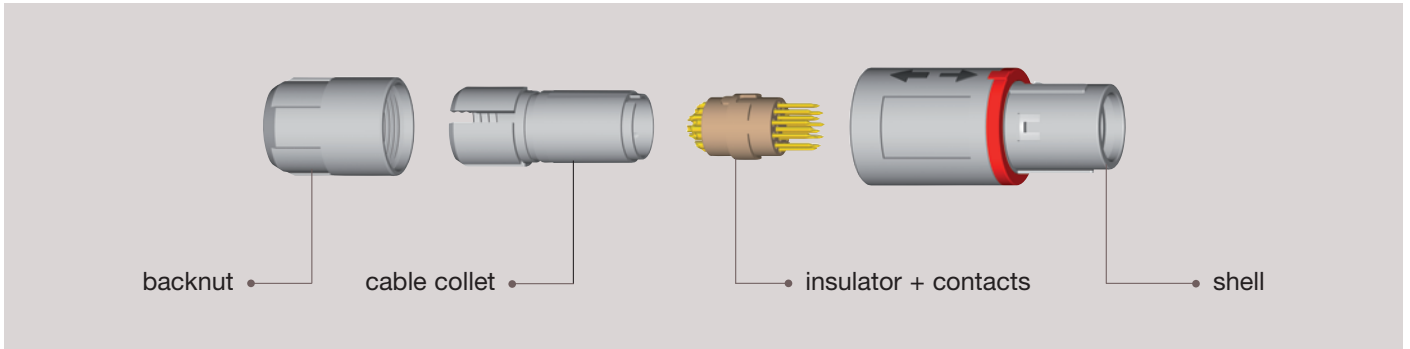
5. Arrange the contact-conductor combinations according to the marking on the plug ③ and locate them into the plug by gently pushing the contact-conductor into the proper hole until fully seated. Check that all contacts ② are correctly located and remain in position when given a gentle pull.

6. Slide backshell ① forward and align the tabs to the slots on the plug ③. Snap backshell onto the plug to complete the assembly. Various strain relief techniques can be incorporated, depending on application.

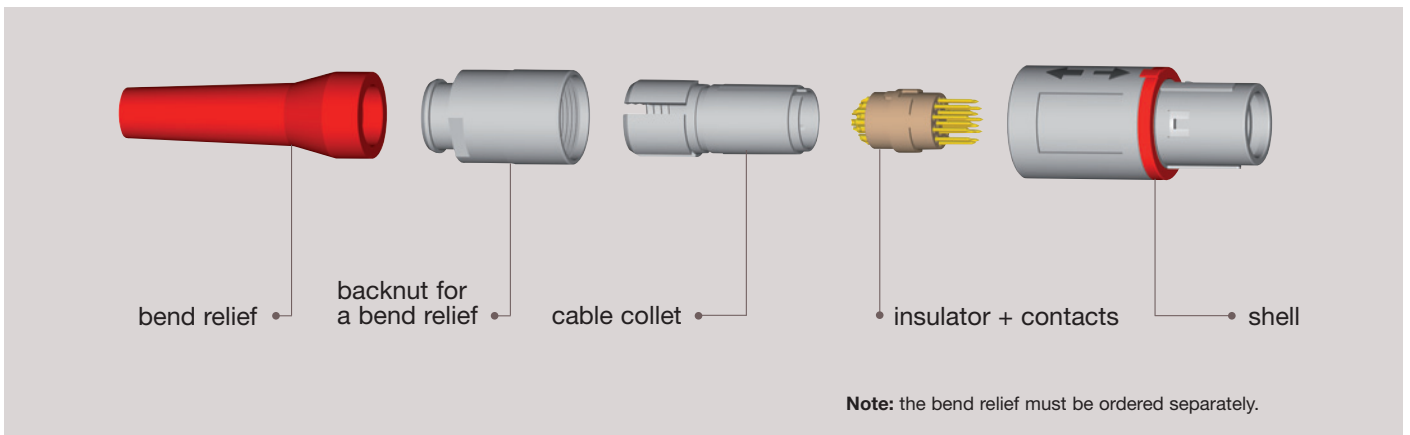
7. If the need arises to remove an installed contact, during the assembly process or subsequent repair, individual contacts can be removed using LEMO extraction tool (part number: DCF.91.050.2LT). DO NOT reuse extracted contacts. The only recommended chemical cleaner is Isopropyl Alcohol.

Exploded view of the REDEL 2P

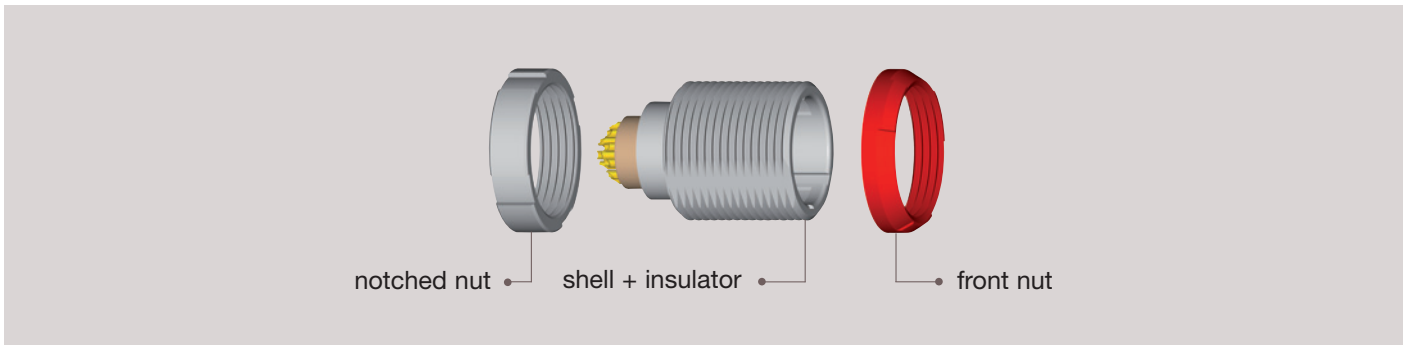
Straight plug



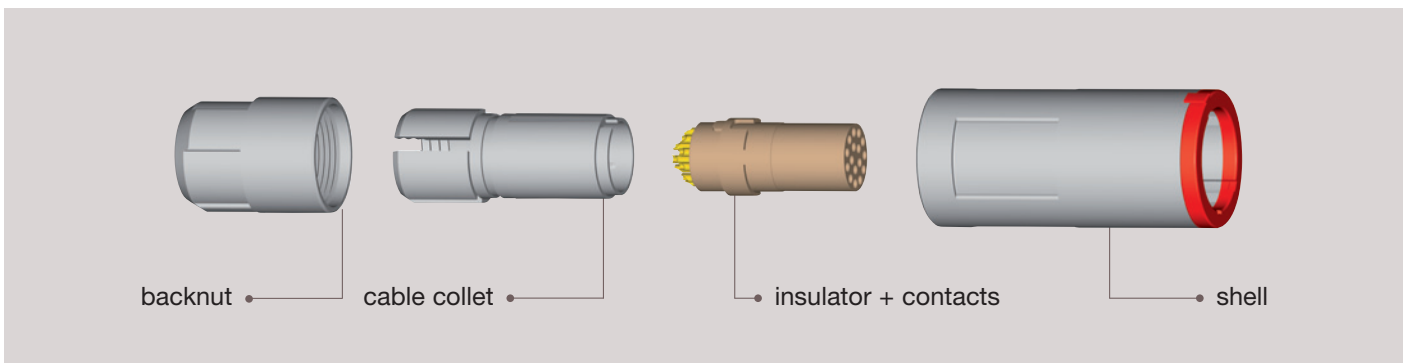
Straight plug with bend relief

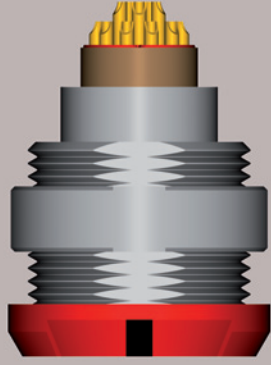


Fixed socket



Free socket



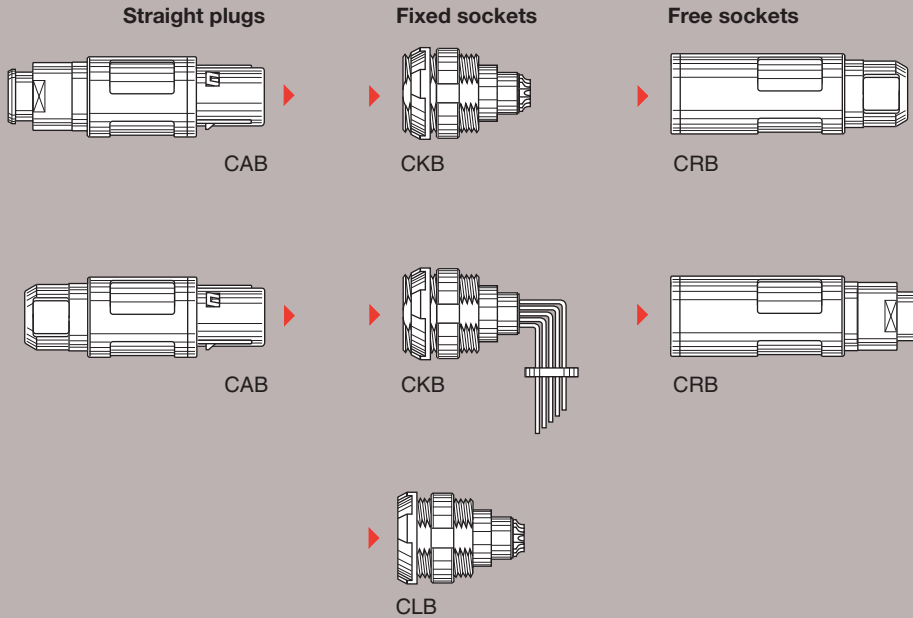


2P SERIES

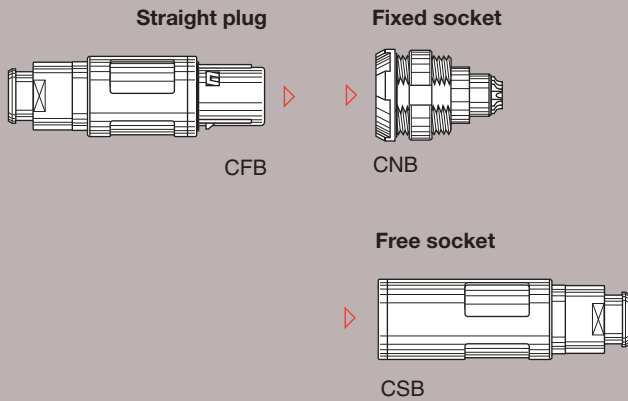
2P Series

This Ø 18 mm connector accommodates cable diameter up to 9.2 mm and allows up to 34 solder or crimp contacts. Top quality lightweight but rugged materials have been chosen to optimize most applications. Polysulfone (PSU), UL certified as autoextinguishable, can be sterilized by gas or by steam. The contacts are gold-plated over copper and nickel to ensure at least 1000 mating/unmating cycles without significantly affecting the electrical characteristics. Three keys on the plug nose will allow blind mating. Colour coding of the plug and socket flange will give an instant visual indication as to whether connectors are compatible or not. Water resistant to IP 66 options are available.

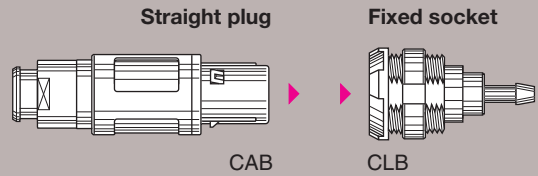
Standard models (page 34 to 36)



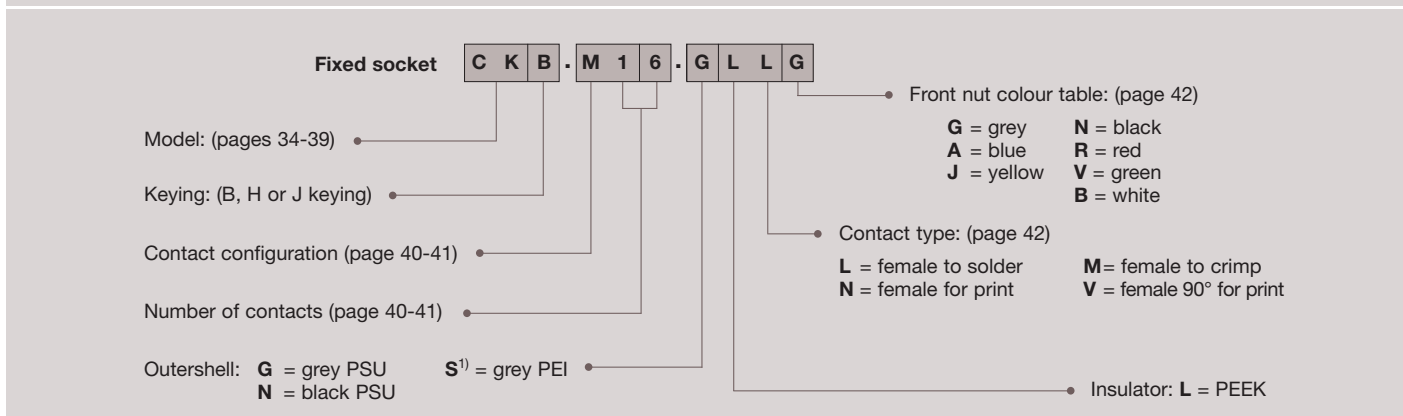
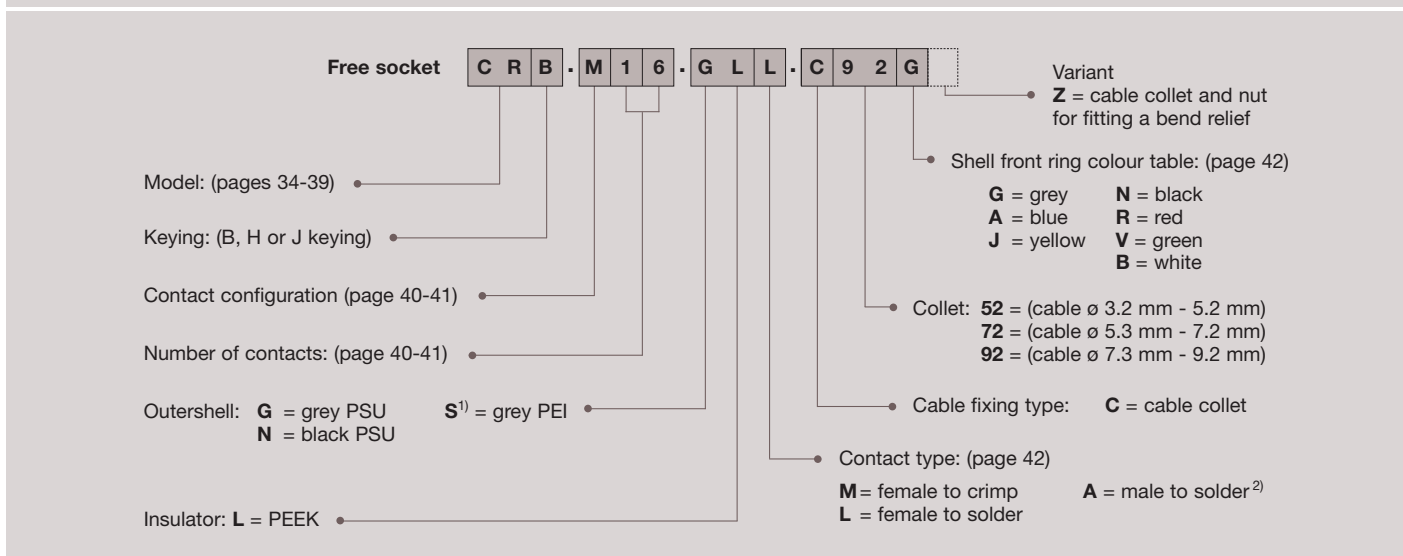
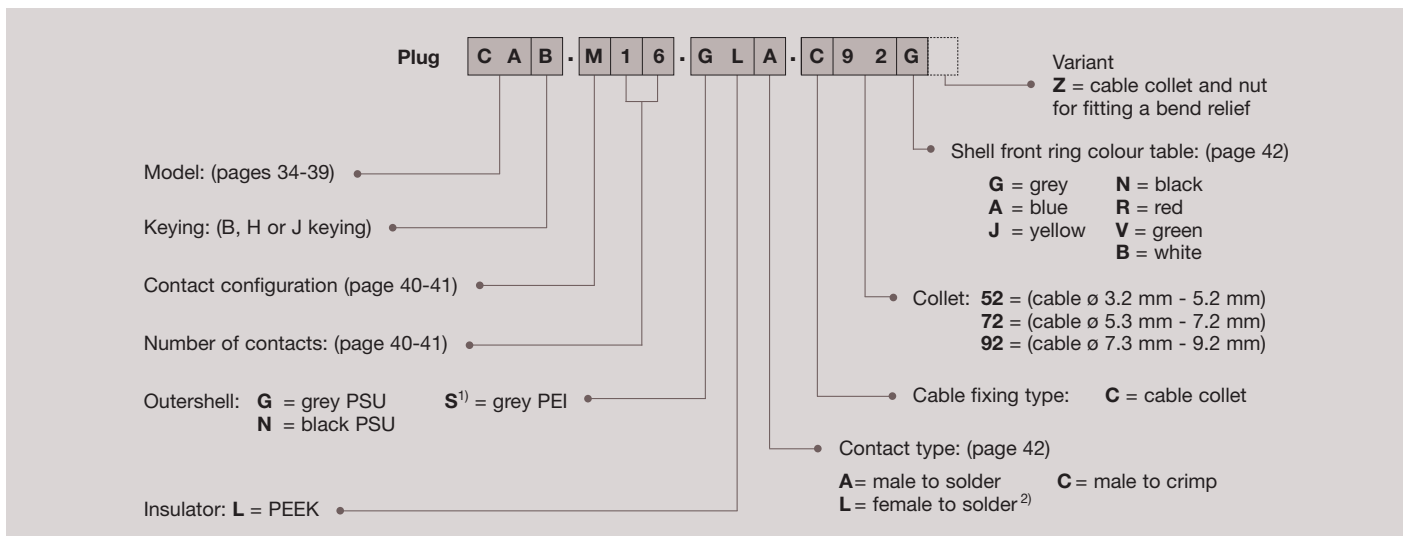
Watertight models (page 37 to 38)



Fluidic configuration (page 39)



Part numbering system



CAB.M16.GLA.C92G Straight plug with cable collet and alignment key (B), multipole type with 16 male contacts to solder, grey PSU outershell, PEEK insulator, collet for a cable ø 7.3 to 9.2 mm and grey front ring.

CRB.M16.GLL.C92G Free socket with two nuts and alignment key (B), multipole type with 16 female contacts to solder, grey PSU outershell, PEEK insulator, collet for a cable ø 7.3 to 9.2 mm and grey front ring.

CKB.M16.GLLG Fixed socket with two nuts and alignment key (B), multipole type with 16 female contacts to solder, grey PSU outershell, PEEK insulator, and grey front ring.

Note: 1) for extensive steam sterilization we propose polytherimide ULTEM® (PEI)
2) model available only with H and J keying and with 26 or 34 contacts (inverted contacts)

Standard models (IP50) C

Fixed socket

- 1 Outershell
- 2 Insulator
- 3 Female crimp contact
- 4 Hexagonal nut

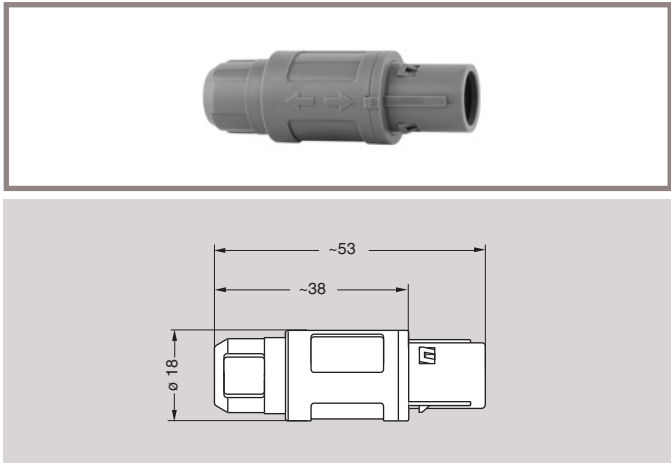
Straight plug

- 1 Outershell
- 2 Latch sleeve
- 3 Insulator
- 4 Male crimp contact
- 5 Collet + mid piece
- 6 Collet nut

| Characteristics | Value | Standards |
|---|-------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 150 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 150 - 250 N | IEC 60512-9 test 17c |

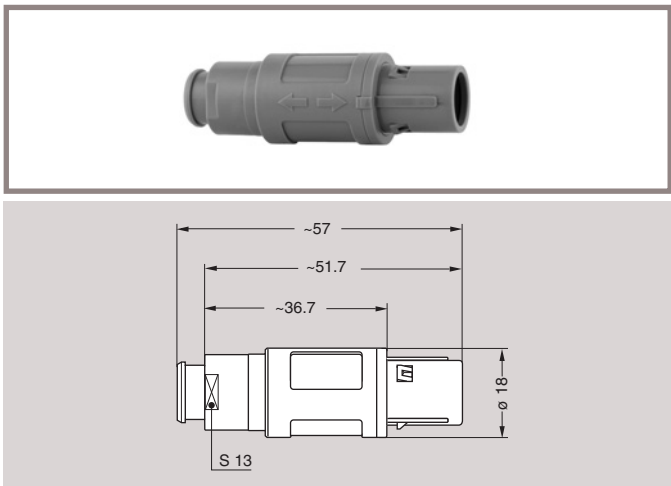
| Characteristics | Value | Standards |
|---------------------------------|---------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| Working temperature range (PEI) | -50/+170°C | - |

CAB Straight plug with cable collet



| Part Number | Cable ϕ | |
|------------------|--------------|-----|
| | min | max |
| CAB.M●●.GLA.C52G | 3.2 | 5.2 |
| CAB.M●●.GLA.C72G | 5.3 | 7.2 |
| CAB.M●●.GLA.C92G | 7.3 | 9.2 |

CAB Straight plug with cable collet and nut for fitting a bend relief

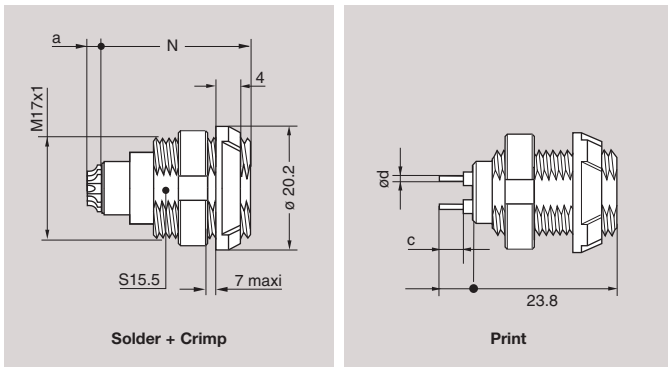


| Part Number | Cable ϕ | |
|-------------------|--------------|-----|
| | min | max |
| CAB.M●●.GLA.C52GZ | 3.2 | 5.2 |
| CAB.M●●.GLA.C72GZ | 5.3 | 7.2 |
| CAB.M●●.GLA.C92GZ | 7.3 | 9.2 |

Note: the bend relief must be ordered separately (see page 44).



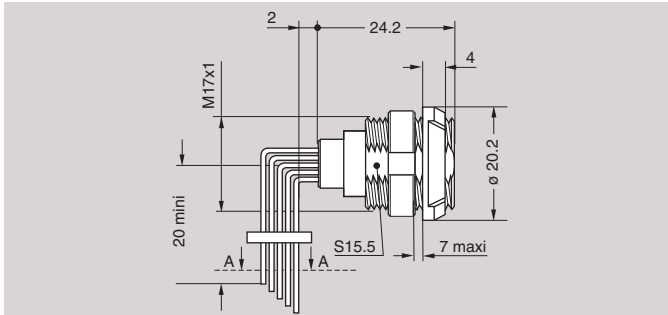
CKB Fixed socket with two nuts (back panel mounting)



| Part Number | number of contacts | Contact | | | | | |
|--------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| CKB.M16.GLLG | 16 | 23.8 | 3.4 | 25.1 | 0 | 5.6 | 0.7 |
| CKB.M19.GLLG | 19 | 23.8 | 4.9 | 25.1 | 0 | 5.6 | 0.7 |
| CKB.M26.GLLG | 26 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |
| CKB.M32.GLLG | 32 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |

Note: for PCB drilling pattern see page 46.
Panel hole see page 46.

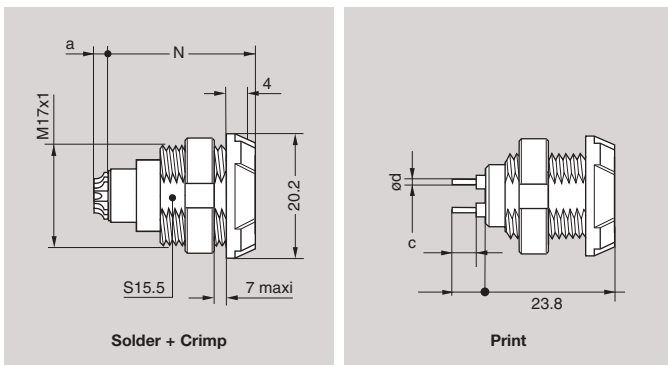
CKB Fixed socket with two nuts with 90° contacts (back panel mounting)



| Part Number | number of contacts |
|--------------|--------------------|
| CKB.M16.GLVG | 16 |
| CKB.M19.GLVG | 19 |
| CKB.M26.GLVG | 26 |

Note: for PCB drilling pattern see page 46.
Panel hole see page 46.

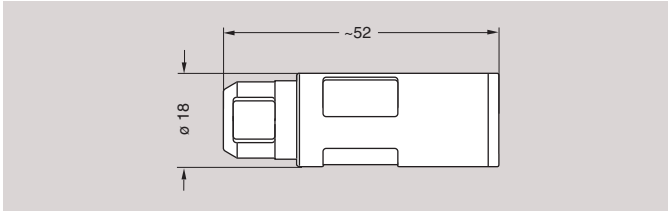
CLB Fixed socket, nut fixing



| Part Number | number of contacts | Contact | | | | | |
|--------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| CLB.M16.GLLG | 16 | 23.8 | 3.4 | 25.1 | 0 | 5.6 | 0.7 |
| CLB.M19.GLLG | 19 | 23.8 | 4.9 | 25.1 | 0 | 5.6 | 0.7 |
| CLB.M26.GLLG | 26 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |
| CLB.M32.GLLG | 32 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |

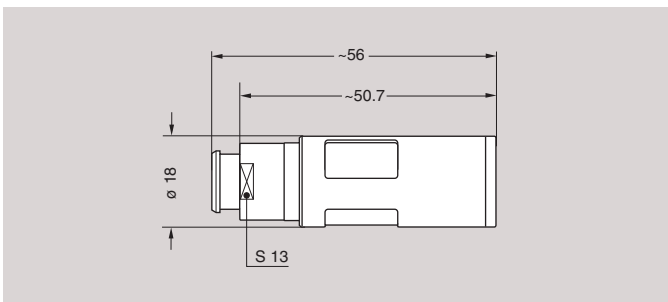
Note: for PCB drilling pattern see page 46.
Panel hole see page 46.

CRB Free socket with cable collet



| Part Number | Cable ø | |
|------------------|---------|-----|
| | min | max |
| CRB.M●●.GLL.C52G | 3.2 | 5.2 |
| CRB.M●●.GLL.C72G | 5.3 | 7.2 |
| CRB.M●●.GLL.C92G | 7.3 | 9.2 |

CRB Free socket with cable collet and nut for fitting a bend relief



| Part Number | Cable ø | |
|-------------------|---------|-----|
| | min | max |
| CRB.M●●.GLL.C52GZ | 3.2 | 5.2 |
| CRB.M●●.GLL.C72GZ | 5.3 | 7.2 |
| CRB.M●●.GLL.C92GZ | 7.3 | 9.2 |

Note: the bend relief must be ordered separately (see page 44).

Watertight models (IP66)



Fixed socket

- 1 Outershell
- 2 Insulator
- 3 Female crimp contact
- 4 Hexagonal nut
- 5 O-ring

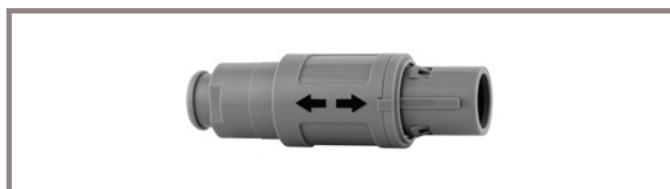
Straight plug

- 1 Outershell
- 2 Latch sleeve
- 3 Insulator
- 4 Male crimp contact
- 5 Collet + mid piece
- 6 Collet nut
- 7 Front seal
- 8 Gasket

| Characteristics | Value | Standards |
|---|------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 90 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 50 - 150 N | IEC 60512-9 test 17c |

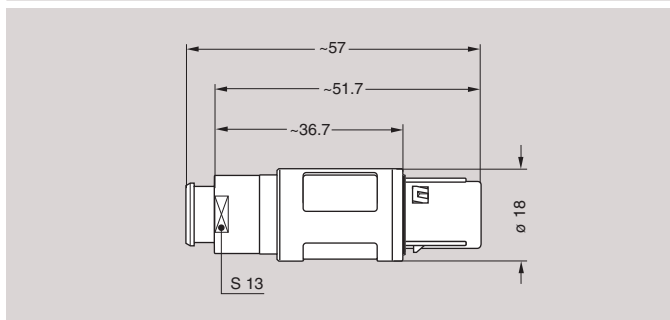
| Characteristics | Value | Standards |
|---------------------------------|---------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| Working temperature range (PEI) | -50/+170°C | - |
| Index protection | IP66 | IEC-60529 |

CFB Straight plug with cable collet and nut for fitting a bend relief



| Part Number | Cable ø | |
|-------------------|---------|-----|
| | min | max |
| CFB.M●●.GLA.C52GZ | 3.2 | 5.2 |
| CFB.M●●.GLA.C72GZ | 5.3 | 7.2 |
| CFB.M●●.GLA.C92GZ | 7.3 | 9.2 |

Note: the bend relief must be ordered separately (see page 44).

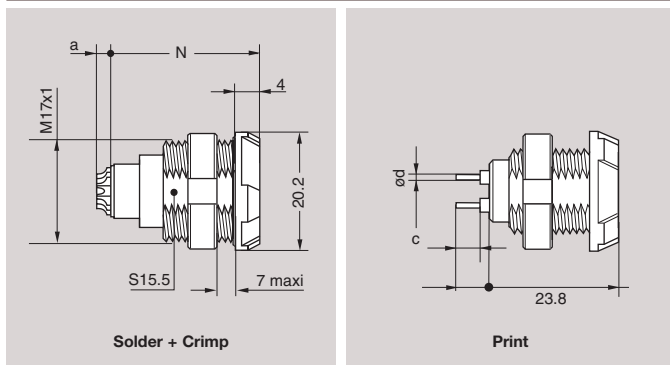


CNB Fixed socket, nut fixing

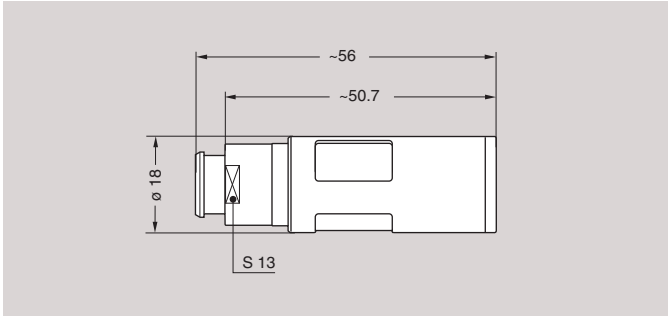


| Part Number | number of contacts | Contact | | | | | |
|--------------|--------------------|---------|-------|-------|---|-------|-----|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ø d |
| CNB.M16.GLLG | 16 | 23.8 | 3.4 | 25.1 | 0 | 5.6 | 0.7 |
| CNB.M19.GLLG | 19 | 23.8 | 4.9 | 25.1 | 0 | 5.6 | 0.7 |
| CNB.M26.GLLG | 26 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |
| CNB.M32.GLLG | 32 | 23.8 | 4.7 | 25.1 | 0 | 3.4 | 0.5 |

Note: for PCB drilling pattern see page 46.
Panel hole see page 46.



CSB Free socket with cable collet and nut for fitting a bend relief



| Part Number | Cable ϕ | |
|-------------------|--------------|-----|
| | min | max |
| CSB.M●●.GLL.C52GZ | 3.2 | 5.2 |
| CSB.M●●.GLL.C72GZ | 5.3 | 7.2 |
| CSB.M●●.GLL.C92GZ | 7.3 | 9.2 |

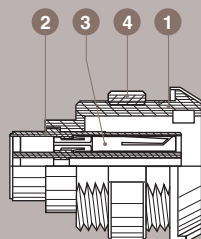
Note: the bend relief must be ordered separately (see page 44).

Fluidic models



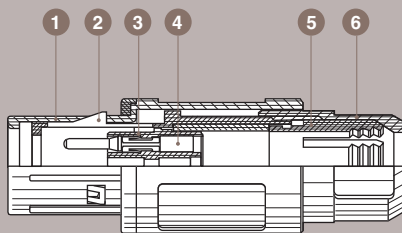
Fixed socket

- 1 Outershell
- 2 Insulator
- 3 Female crimp contact
- 4 Hexagonal nut



Straight plug

- 1 Outershell
- 2 Latch sleeve
- 3 Insulator
- 4 Male crimp contact
- 5 Collet + mid piece
- 6 Collet nut



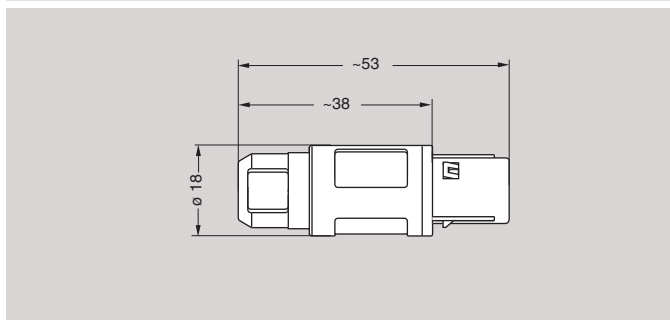
| Characteristics | Value | Standards |
|---|------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 90 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 50 - 150 N | IEC 60512-9 test 17c |

| Characteristics | Value | Standards |
|---------------------------------|---------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range (PSU) | -50/+150°C | - |
| Working temperature range (PEI) | -50/+170°C | - |

CAB Straight plug with cable collet



| Part Number | Cable ø | |
|------------------|---------|-----|
| | min | max |
| CAB.012.GLA.C52G | 3.2 | 5.2 |
| CAB.012.GLA.C72G | 5.3 | 7.2 |
| CAB.012.GLA.C92G | 7.3 | 9.2 |

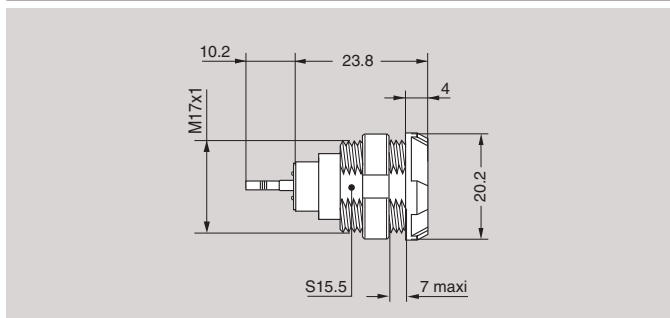


CLB Fixed socket nut fixing



| Part Number | Number of low voltage contacts | Fluidic contact | Maximum working pressure (bars) |
|--------------|--------------------------------|-----------------|---------------------------------|
| CLB.012.GLLG | 4 | without valve | 6 |
| CLB.015.GLLG | 10 | without valve | 6 |
| CLB.P12.GLLG | 4 | with valve | 6 |
| CLB.P15.GLLG | 10 | with valve | 6 |

Note: panel hole see page 46.



Insert configuration



| | Male solder contacts | Female solder contacts | Reference | Number of contacts | Contact ø (mm) | Solder bucket ø (mm) ⁵⁾ | Crimp bucket ø (mm) ⁵⁾ | Contact type | | | | Test voltage (kV rms) ¹⁾ Contact-contact | Air clearance min ²⁾ (mm) Creepage distance min ³⁾ (mm) | Rated current (A) |
|-----------|----------------------|------------------------|-----------|--------------------|----------------|------------------------------------|-----------------------------------|--------------|-------|------------------|---------------|--|--|-------------------|
| | | | | | | | | Solder | Crimp | Print (straight) | Print (elbow) | | | |
| Multipole | | | M02 | 2 | 2.0 | 1.8 | 2.4 | • | • | • | • | 2.10 | 1.60 | 30.00 |
| | | | M03 | 3 | 1.6 | 1.4 | 1.9 | • | • | • | • | 2.40 | 1.50 | 17.00 |
| | | | M04 | 4 | 1.3 | 1.1 | 1.4 | • | • | • | • | 1.85 | 1.80 | 15.00 |
| | | | M05 | 5 | 1.3 | 1.0 | 1.4 | • | • | • | • | 1.75 | 1.10 | 14.00 |
| | | | M06 | 6 | 1.3 | 1.0 | 1.4 | • | • | • | • | 1.35 | 0.85 | 12.00 |
| | | | M07 | 7 | 1.3 | 1.0 | 1.4 | • | • | • | • | 1.75 | 0.95 | 11.00 |
| | | | M08 | 8 | 0.9 | 1.1 | 1.1 | • | • | • | • | 1.50 | 1.00 | 10.00 |
| | | | M10 | 10 | 0.9 | 0.8 | 1.1 | • | • | • | • | 1.45 | 0.75 | 8.00 |
| | | | M12 | 12 | 0.7 | 0.8 | 0.8 | • | • | • | • | 1.25 | 0.85 | 7.00 |
| | | | M16 | 16 | 0.7 | 0.8 | 0.8 | • | • | • | • | 1.50 | 0.65 | 6.00 |
| | | | M19 | 19 | 0.7 | 0.8 | 0.8 | • | • | • | • | 1.40 | 0.60 | 5.00 |
| | | | M26 | 26 ⁴⁾ | 0.5 | 0.4 | - | • | - | • | • | 1.00 | 0.55 | 2.00 |
| | | | M32 | 32 | 0.5 | 0.4 | - | • | - | • | - | 0.70 | 0.35 | 1.50 |
| | | | M34 | 34 ⁴⁾ | 0.5 | 0.4 | - | • | - | - | - | 0.70 | 0.30 | 1.50 |

Note: 1) depending on specific application and related standard, more restrictive operating voltage may apply.

We suggest operating voltage = 1/3 test voltage, see page 68.

2) shortest distance in air between two conductive parts.

3) shortest distance along the surface of the insulating material between two conductive parts.

4) available only with 26 or 34 contacts, H or J keying (inverted contacts).

5) for a given AWG, the diameter of some stranded conductor design is larger than the solder cup diameter (see page 69).

| | Male solder contacts | Female solder contacts | Reference | Number of contacts | Contact ø (mm) | Solder bucket ø (mm) ⁵⁾ | Crimp bucket ø (mm) ⁵⁾ | Contact type | | | | Test voltage (kV rms) ¹⁾ Contact-contact | Air clearance min ²⁾ (mm) Creepage distance min ³⁾ (mm) | Rated current (A) |
|---------|----------------------|------------------------|-------------------|--------------------|----------------|------------------------------------|-----------------------------------|--------------|-------|------------------|---------------|--|--|-------------------|
| | | | | | | | | Solder | Crimp | Print (straight) | Print (elbow) | | | |
| Fluidic | | | 012 | 4 | 0.7 | 0.8 | 0.8 | • | • | - | - | 0.85 | 0.60 | 5.0 |
| | | | 015 | 10 | 0.7 | 0.8 | 0.8 | • | • | - | - | 1.15 | 0.90 | 5.0 |
| | | | P12 ⁶⁾ | 4 | 0.7 | 0.8 | 0.8 | • | • | - | - | 0.85 | 0.60 | 9.0 |
| | | | P15 ⁶⁾ | 10 | 0.7 | 0.8 | 0.8 | • | • | - | - | 1.15 | 0.90 | 6.0 |
| Coaxial | | | 804 ⁴⁾ | 4 | 0.7 | 0.8 | 0.8 | • | • | - | - | 0.85 | 0.60 | 5.0 |
| | | | 810 ⁴⁾ | 10 | 0.7 | 0.8 | 0.8 | • | • | - | - | 1.25 | 0.90 | 5.0 |

Note: 1) depending on specific application and related standard, morerestrictive operating voltage may apply.

We suggest operating voltage = 1/3 test voltage, see page 68.

2) shortest distance in air between two conductive parts.

3) shortest distance along the surface of the insulating material between two conductive parts.




4) configuration 804 and 810 use «C» type coaxial contact.

5) for a given AWG, the diameter of some stranded conductor design is larger than the solder cup diameter (see page 69).

6) configuration P12 and P15 use fluidic contact with valve (FGG.P1.150.AC.V and EGG.P1.150.AC.V). Contacts must be ordered separately.

Alignment key C | | | | | | | |

Verify the third digit of the part number in order to select the right keying.
The standard keying is «B» coded.

| | | | |
|--------------------------|---|---|---|
| Keying (plug front view) |  |  |  |
| Reference | B | H | J |
| Contact type for plug | male | female | female |
| Contact type for socket | female | male | male |
| Nb. of contacts | 2 to 32 | 26 or 34 | |

Outer shell material C | | | | | | | |

| Material | Ref. | Colour | Temperature |
|----------|------|--------|---------------|
| PEI | S | Grey | -50° / +170°C |
| PSU | G | Grey | -50° / +150°C |
| PSU | N | Black | |

Note: for extensive sterilization use PEI

Contact type C | | | | | | | |

Select the type of contact: solder or crimp?

Plug

| Type | Male | Female |
|--------|------|-----------------|
| solder | A | L ¹⁾ |
| crimp | C | - |

Socket

| Type | Male | Female |
|-----------|-----------------|--------|
| solder | A ¹⁾ | L |
| crimp | - | M |
| print | - | N |
| print 90° | - | V |

Note: 1) only for H and J keying with 26 or 34 contacts

When should I use crimp rather than solder contacts ?

Soldering

- recommended for small volumes
- requires little amount of tooling (soldering iron)
- requires more time

Crimping

- recommended for large volumes
- no heat is required to make the connection
- for contacts with high density
- for use in high temperature environment
- requires extra tooling (crimping tools)

Colour coding C | | | | | | | |

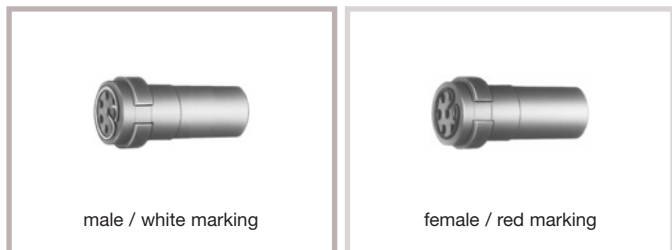
| Reference | Colours | | | | | |
|-----------|---------|------|--------|-------|------|-------|
| | grey | blue | yellow | black | red | green |
| Reference | G | A | J | N | R | V |
| RAL code | 7001 | 5002 | 1016 | 9005 | 3020 | 6024 |

Note: the RAL colours are indicative and depend on raw material and production process. Colour may differ.

Easy identification with the assistance of colour coding.
Outershell is only available in grey or black.

Accessories

CAG-CLG Insulator for crimp contacts



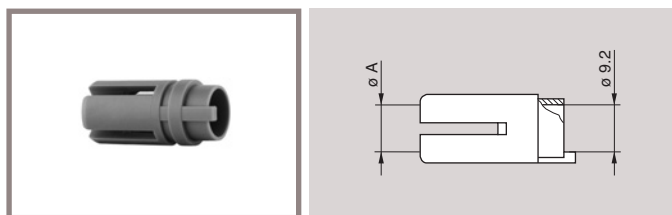
| Contact configuration | Insulator part number | |
|-----------------------|-----------------------|--------------------|
| | For male contact | For female contact |
| M02 | CAG.302.YL | CLG.402.YL |
| M03 | CAG.303.YL | CLG.403.YL |
| M04 | CAG.304.YL | CLG.404.YL |
| M05 | CAG.305.YL | CLG.405.YL |
| M06 | CAG.306.YL | CLG.406.YL |
| M07 | CAG.307.YL | CLG.407.YL |
| M08 | CAG.308.YL | CLG.408.YL |
| M10 | CAG.310.YL | CLG.410.YL |
| M12 | CAG.312.YL | CLG.412.YL |
| M16 | CAG.316.YL | CLG.416.YL |
| M19 | CAG.319.YL | CLG.419.YL |

CAG-CLG Crimp contacts, kit with the number of contacts in a tube



| Contact configuration | nb. of contacts | ø contact (mm) | Kit contact part number | |
|-----------------------|-----------------|----------------|-------------------------|-------------|
| | | | Male | Female |
| M02 | 2 | 2.0 | CAG.575.02C | CLG.675.02M |
| M03 | 3 | 1.6 | CAG.570.03C | CLG.670.03M |
| M04 | 4 | 1.3 | CAG.565.04C | CLG.665.04M |
| M05 | 5 | 1.3 | CAG.565.05C | CLG.665.05M |
| M06 | 6 | 1.3 | CAG.565.06C | CLG.665.06M |
| M07 | 7 | 1.3 | CAG.565.07C | CLG.665.07M |
| M08 | 8 | 0.9 | CAG.560.08C | CLG.660.08M |
| M10 | 10 | 0.9 | CAG.560.10C | CLG.660.10M |
| M12 | 12 | 0.7 | CAG.555.12C | CLG.655.12M |
| M16 | 16 | 0.7 | CAG.555.16C | CLG.655.16M |
| M19 | 19 | 0.7 | CAG.555.19C | CLG.655.19M |

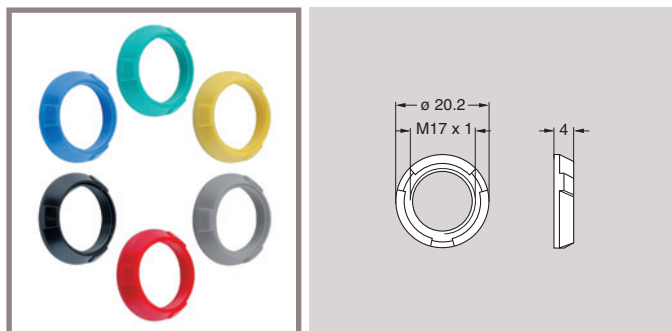
CAG Collet



| Part Number | ø A (mm) | Cable ø (mm) | |
|-------------|----------|--------------|------|
| | | min. | max. |
| CAG.752.*** | 5.2 | 3.2 | 5.2 |
| CAG.772.*** | 7.2 | 5.3 | 7.2 |
| CAG.792.*** | 9.2 | 7.3 | 9.2 |

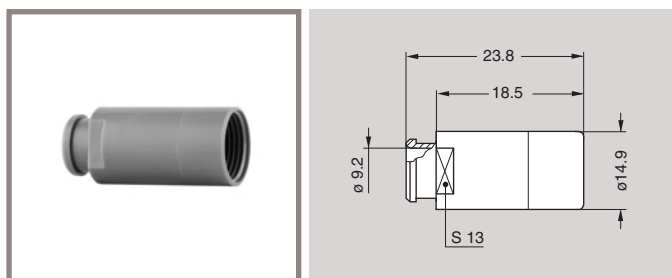
Note: *** = UGG (grey PSU), UGN (black PSU), TGG (grey PEI)

CKG Plastic front nut for CKB models



| Part Number | Mat. | Colours |
|-------------|------|---------|
| CKG.240.UA | PSU | blue |
| CKG.240.UG | PSU | grey |
| CKG.240.UJ | PSU | yellow |
| CKG.240.UN | PSU | black |
| CKG.240.UR | PSU | red |
| CKG.240.UV | PSU | green |

CAM Nut for fitting a GMA.2B bend relief



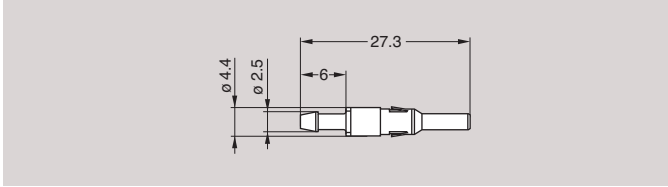
| | Mat. | Colours |
|------------|------|---------|
| CAM.130.UG | PSU | grey |
| CAM.130.UN | PSU | black |
| CAM.130.TG | PEI | grey |

Note: all dimensions are in millimeters

FGG.P1 Male fluidic contact with valve



| |
|-----------------|
| Part Number |
| FGG.P1.150.AC.V |

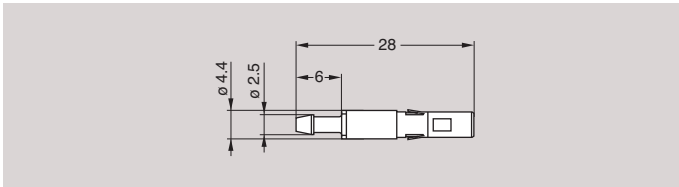


Note: Connectors are delivered without the P1 contacts.

EGG.P1 Female fluidic contact with valve

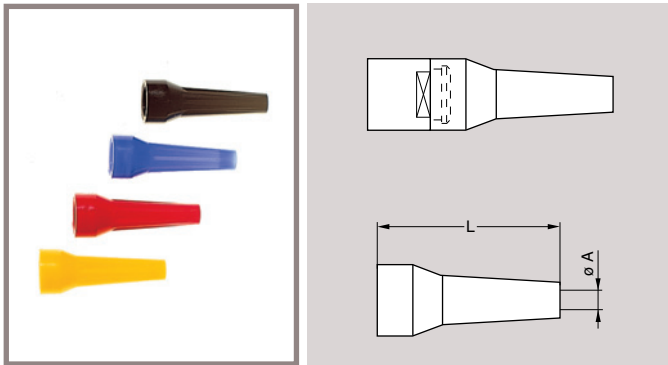


| |
|-----------------|
| Part Number |
| EGG.P1.150.AC.V |



Note: Connectors are delivered without the P1 contacts.

GMA Bend relief



A bend relief absorbs the force that may be exerted on cables. These are designed for plugs and free sockets with cable collet and nut.

| Part Number | Dimensions (mm) | | | | Material | Temperature range | |
|---------------|-----------------|----|--------------|------|-------------------------------------|-------------------|----------------|
| | Bend relief | | Cable ϕ | | | in dry atmosphere | in water steam |
| | A | L | max. | min. | | | |
| GMA.2B.040.DG | 4.0 | 36 | 4.5 | 4.0 | Desmopan 786 Polyurethane elastomer | -40°C, +80°C | - |
| GMA.2B.045.DG | 4.5 | 36 | 5.0 | 4.5 | | | |
| GMA.2B.050.DG | 5.0 | 36 | 5.5 | 5.0 | | | |
| GMA.2B.060.DG | 6.0 | 36 | 6.5 | 6.0 | | | |
| GMA.2B.070.DG | 7.0 | 36 | 7.7 | 7.0 | | | |
| GMA.2B.080.DG | 7.8 | 36 | 8.8 | 7.8 | | | |
| GMA.2B.040.RG | 4.0 | 41 | 4.4 | 4.0 | Silicone elastomer VMQ | -60°C, +200°C | +140°C |
| GMA.2B.045.RG | 4.5 | 41 | 5.0 | 4.5 | | | |
| GMA.2B.051.RG | 5.1 | 41 | 5.6 | 5.1 | | | |
| GMA.2B.057.RG | 5.7 | 41 | 6.2 | 5.7 | | | |
| GMA.2B.063.RG | 6.3 | 41 | 7.0 | 6.3 | | | |
| GMA.2B.071.RG | 7.1 | 41 | 7.9 | 7.1 | | | |
| GMA.2B.080.RG | 8.0 | 41 | 9.0 | 8.0 | | | |

| Reference | Colours |
|-----------|---------|
| A | blue |
| B | white |
| G | grey |
| J | yellow |
| M | brown |
| N | black |
| R | red |
| S | orange |
| V | green |

Note: the selection of pigments, which should remain stable at high temperature, is limited by the new regulations. For this reason, some colours will be a shade different from those used for Desmopan bend reliefs. The selected solutions represent the best possible compromise.

Note: the last letter «G» of the part number indicates a grey colour, see the adjacent table and replace letter «G» by the letter of the colour required.

Tooling

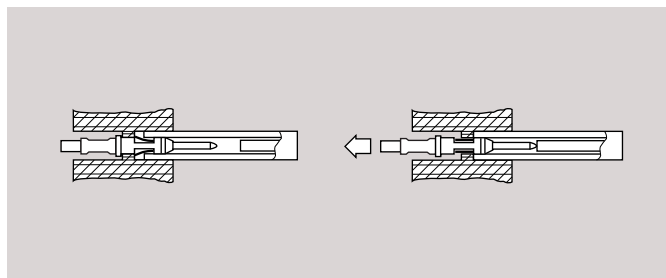
DPC.91.701.V Crimping tool



DCE Positioners for crimp contacts



DCF Automatic extraction tools for crimp contacts

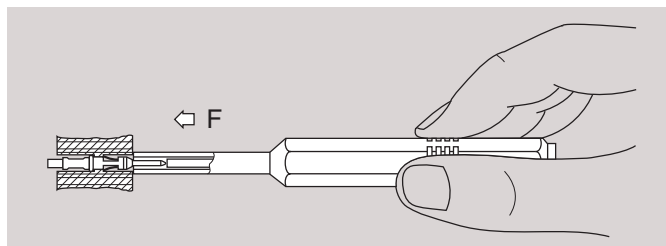


| Type | Conductor (mm) | Contact ø AWG | Positioner part number | | Selector No Setting | Part number extractor |
|-----------------|----------------|---------------|------------------------|-----------------|---------------------|-------------------------------------|
| | | | Male | Female | | For male contact and female contact |
| M02 | 2.0 | 12-14-16 | DCE.91.202.BVCM | DCE.91.202.BVCM | - | DCC.91.202.5LA ¹⁾ |
| M03 | 1.6 | 14-16-18 | DCE.91.162.BVCM | DCE.91.162.BVCM | - | DCF.91.162.2LT |
| M04/M05/M06/M07 | 1.3 | 18-20 | DCE.91.132.BVC | DCE.91.132.BVM | 8-7 | DCF.91.131.2LT |
| M08/M10 | 0.9 | 20-22-24 | DCE.91.092.BVC | DCE.91.092.BVM | 6-5-5 | DCF.91.090.2LT |
| M12/M16/M19 | 0.7 | 22-24-26 | DCE.91.072.BVC | DCE.91.072.BVM | 6-5-5 | DCF.91.070.2LT |
| M26/M32 | 0.5 | 28-30-32 | DCE.91.052.BVC | DCE.91.052.BVM | | |

Note: 1) this model is thumb-operated.

This model is used for male and female contacts. The variance in conductor stranding diameter for the minimum AWG is such that some can have a cross section which is not sufficient to guarantee crimping as per IEC 60352-2 standard.

DCK Retention testing tools for crimp contacts

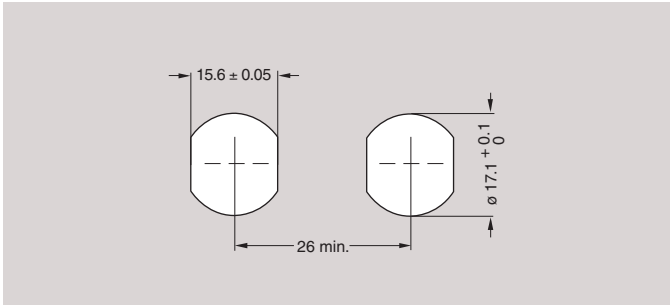


| Contact ø (mm) | Test force (N) | Testing tool part number | |
|----------------|----------------|--------------------------|-----------------|
| | | Male contact | Female contact |
| 0.7 | 10 | DCK.91.071.0LRC | DCK.91.071.0LRM |
| 0.9 | 14 | DCK.91.091.4LRC | DCK.91.091.4LRM |
| 1.3 | 25 | DCK.91.132.5LRC | DCK.91.132.5LRM |

Note: all dimensions are in millimeters

Panel hole

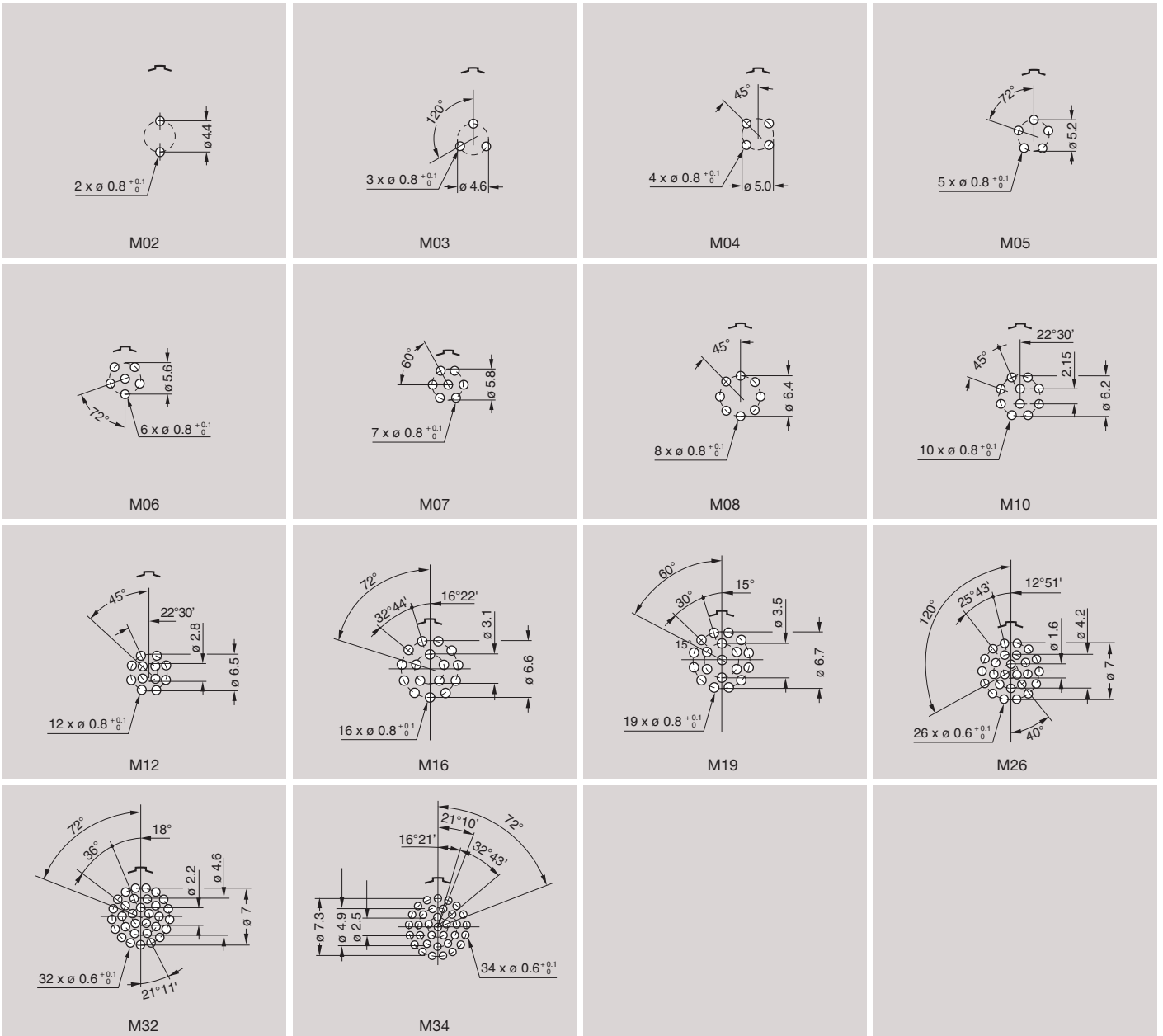
For CK●, CL●, and CN●



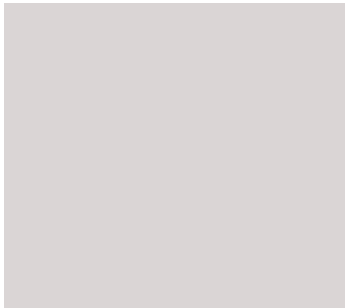
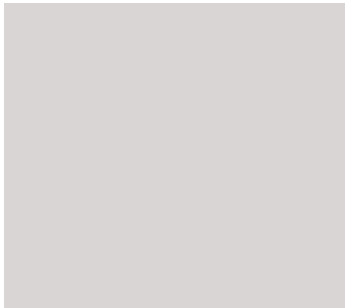
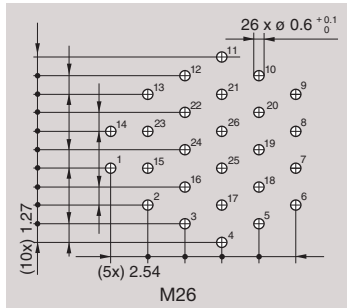
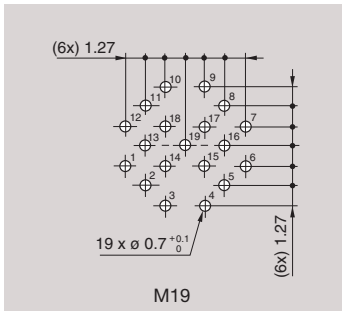
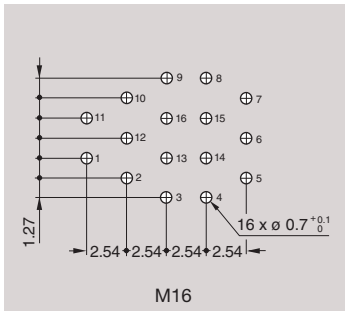
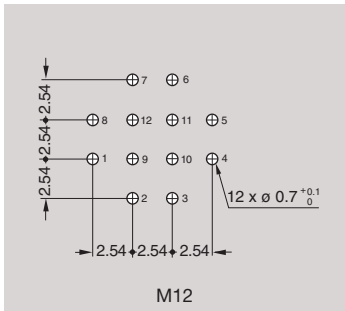
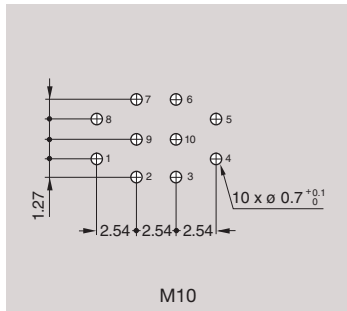
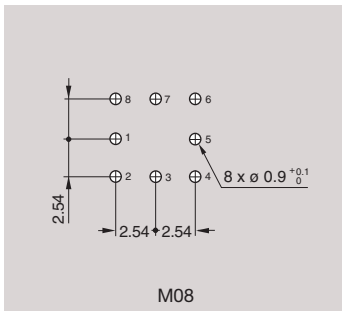
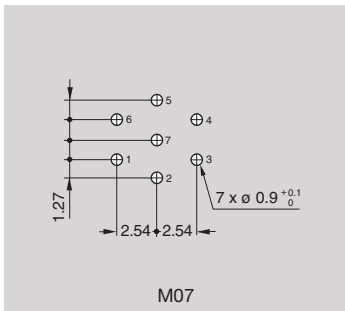
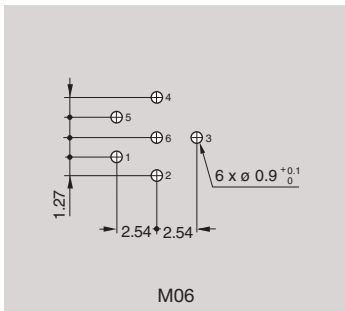
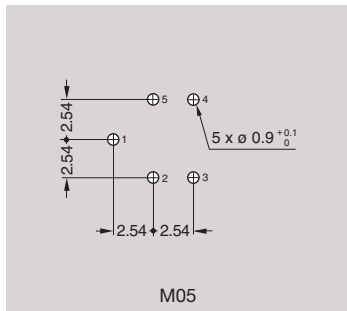
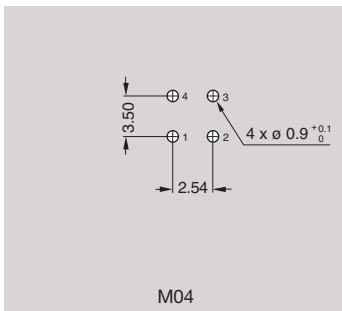
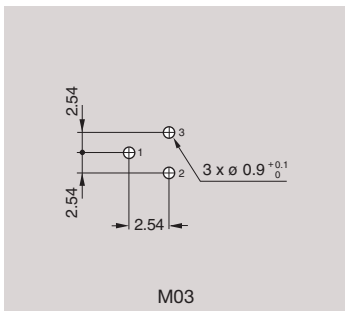
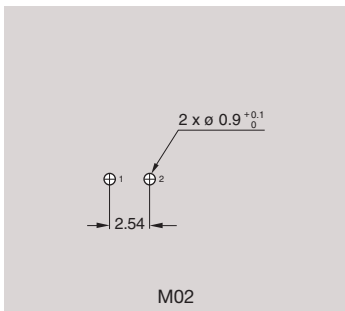
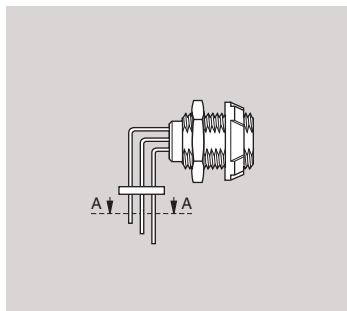
Note: socket mounting nut torque = 0.8 Nm.

PCB drilling pattern

For straight contacts

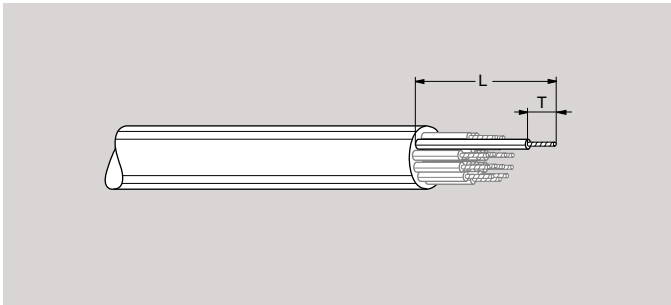
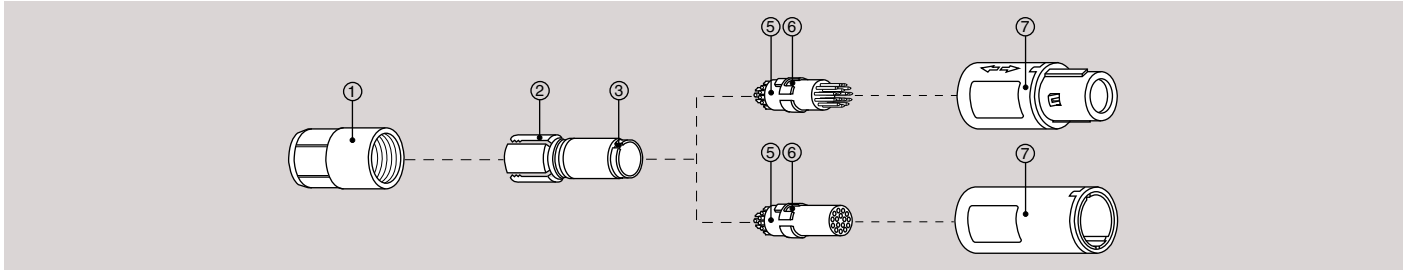


For 90° elbow contacts (A-A view)



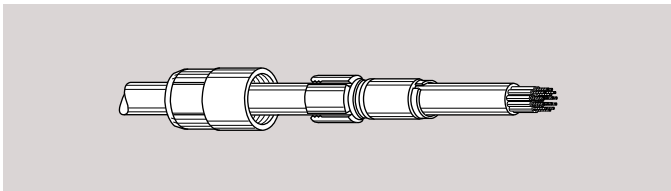
Assembly instructions

Solder contacts

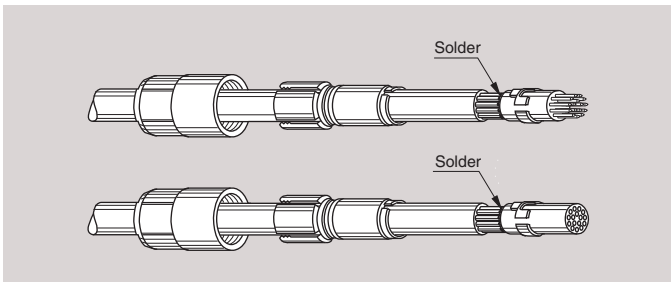


1. Strip the cable according to the lengths given in the table. Tin the conductors.

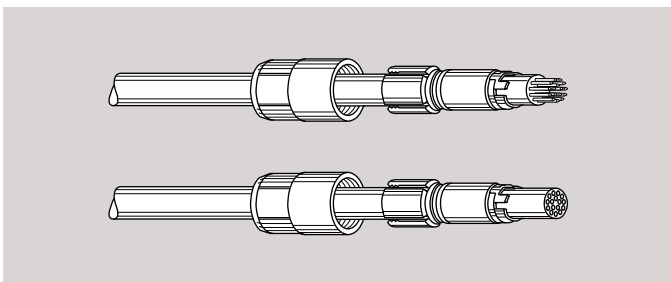
| Configuration | Dimensions (mm) | |
|-------------------------|-----------------|-----|
| | L | T |
| M02 | 19.0 | 4.0 |
| M03 | 19.0 | 3.5 |
| M04, M05, M06, M07 | 18.0 | 3.5 |
| M08, M10, M12, M16, M19 | 17.0 | 3.0 |
| M26, M32 | 17.0 | 2.5 |



2. Slide the collet nut ① and then the collet ② onto the cable.

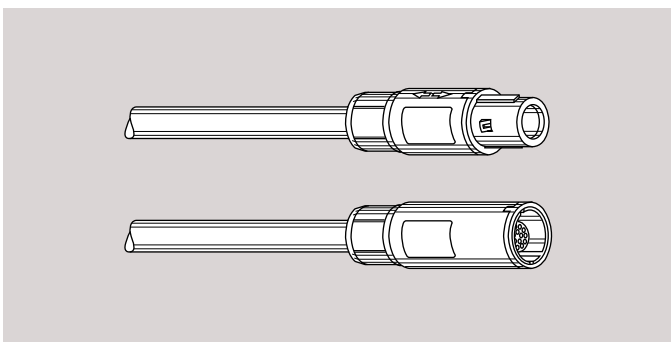


3. Solder conductors into contacts, making sure that neither solder nor flux gets onto the insulator or cable insulation.



4. Slide the collet ② forward and locate slot ③ in the key of the insulator ⑤.

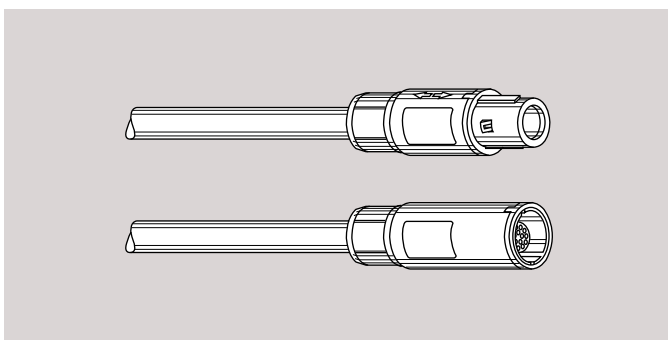
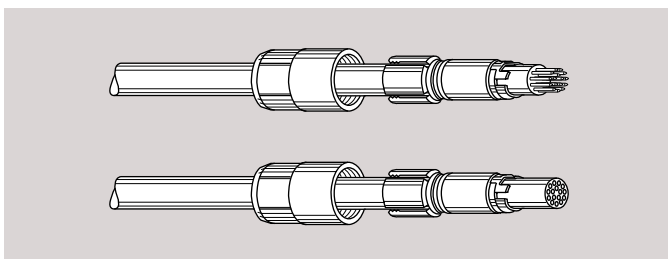
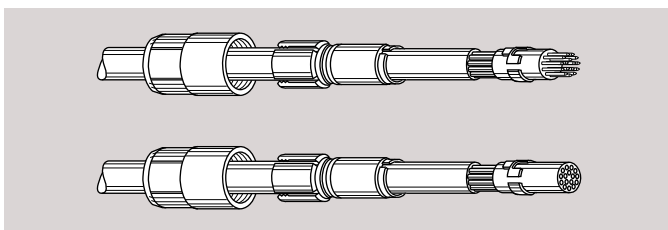
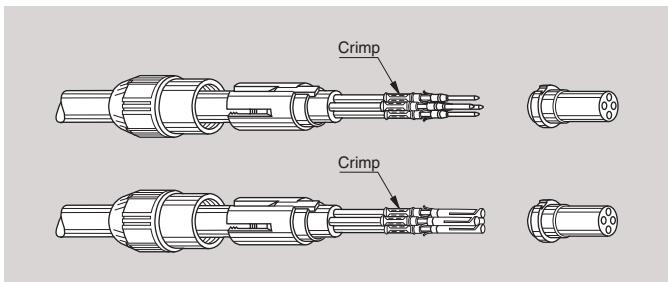
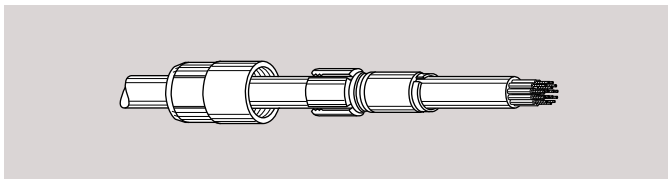
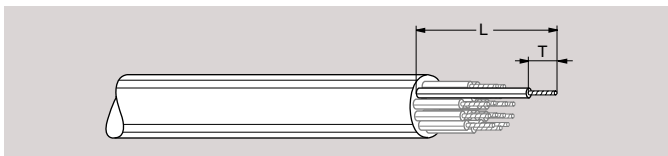
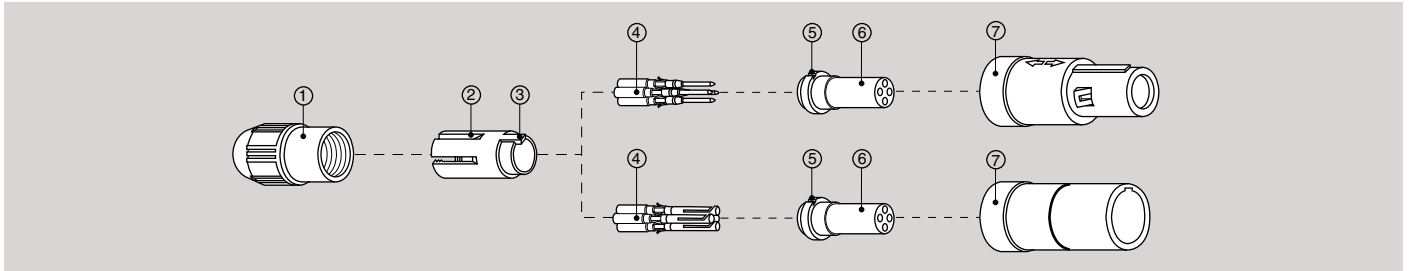
Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst positioning it to ensure that the slot ⑥ of insulator ⑤ locates in the inside key of the shell. Tighten the collet nut ① to the maximum torque of 0.5 Nm.



For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Crimp contacts



- Strip the cable according to the lengths given in the table.

| Configuration | Dimensions (mm) | |
|--------------------|-----------------|-----|
| | L | T |
| M02 | 17.0 | 5.5 |
| M03 | 17.0 | 5.5 |
| M04, M05, M06, M07 | 15.0 | 4.0 |
| M08, M10, M12 | 15.0 | 4.0 |
| M16, M19 | 15.0 | 4.0 |

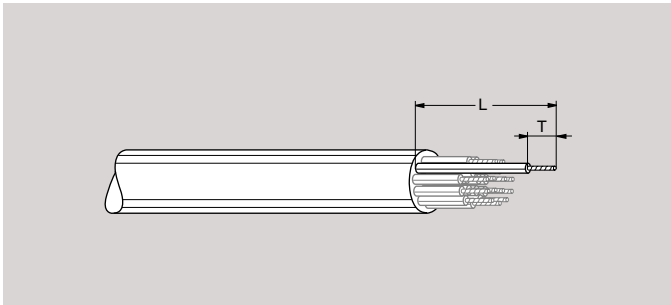
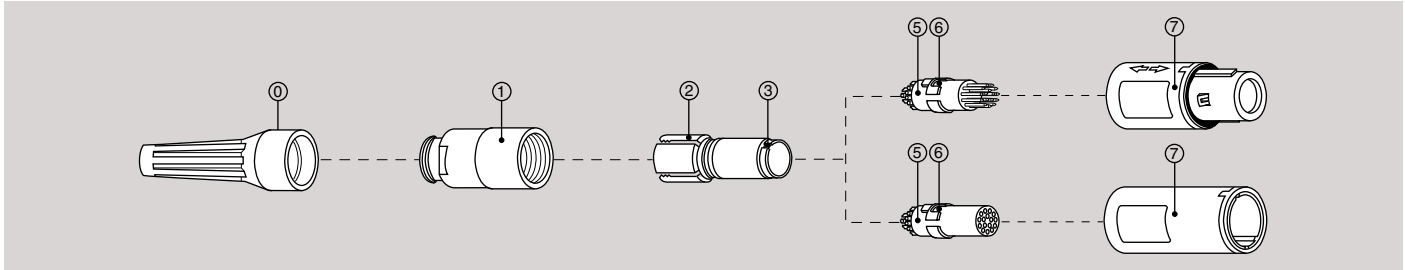
- Slide the collet nut ① and then the collet ② onto the cable.
- Fix the appropriate positioner (table page 45) in the crimping tool. Set selector to the number corresponding to the conductor AWG as indicated on the positioner label. Fit conductor into contact ④ and make sure it is visible through the inspection hole in the crimp barrel. Slide conductor-contact combination into the open crimping tool; make sure that the contact is fully pushed into the positioner. Close the tool. Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.
- Now arrange contact-conductor combinations according to the insert marking and locate them into the insert ⑥. Check that all contacts are correctly located and remain in position when given a gentle pull.
- Slide the collet ② forward and locate slot ③ in the key of the insulator ⑤. Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst positioning it to ensure that the slot ⑥ of insulator ⑤ locates in the inside key of the shell. Tighten the collet nut ① to the maximum torque of 0.5 Nm.

For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

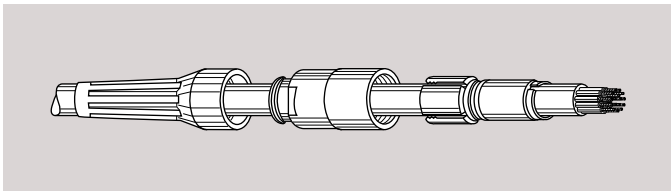
Assembly instructions for watertight models

Solder contacts

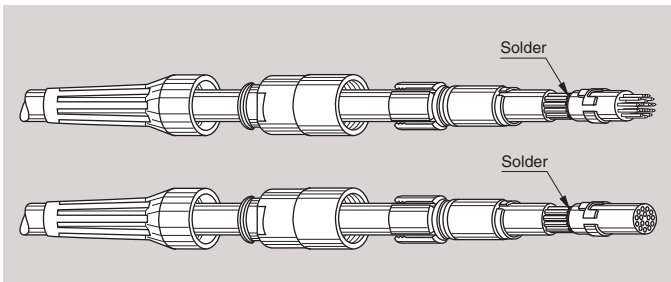


1. Strip the cable according to the lengths given in the table. Tin the conductors.

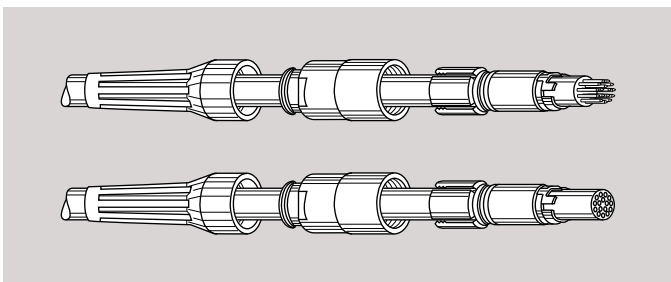
| Configuration | Dimensions (mm) | |
|-------------------------|-----------------|-----|
| | L | T |
| M02 | 19.0 | 4.0 |
| M03 | 19.0 | 3.5 |
| M04, M05, M06, M07 | 18.0 | 3.5 |
| M08, M10, M12, M16, M19 | 17.0 | 3.0 |
| M26, M32 | 17.0 | 2.5 |



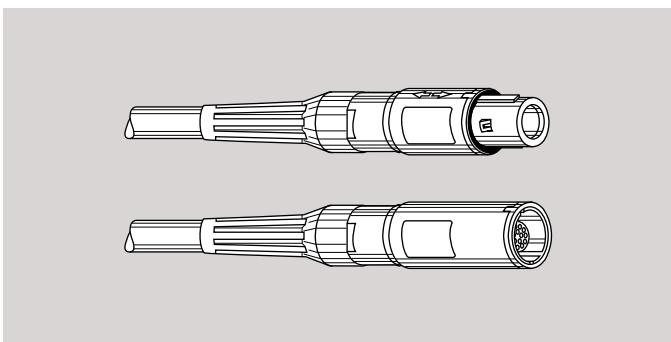
2. Slide the bend relief ⑥, the collet nut ① and then the collet ② onto the cable.



3. Solder conductors into contacts, making sure that neither solder nor flux gets onto the insulator or cable insulation. Fill up completely the inside of the collet ② and the gap between conductors with the adhesive/sealant DOW CORNING type 3145RTV.

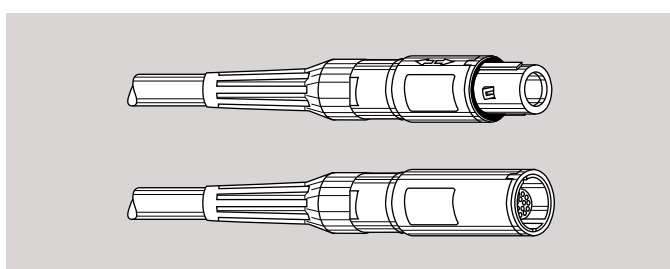
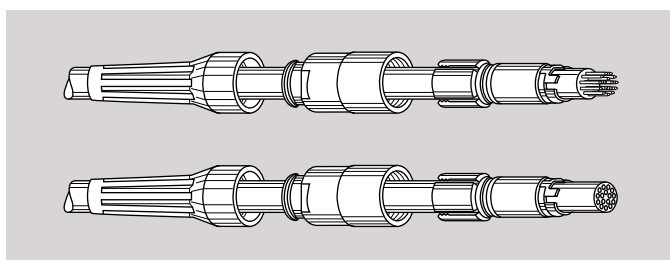
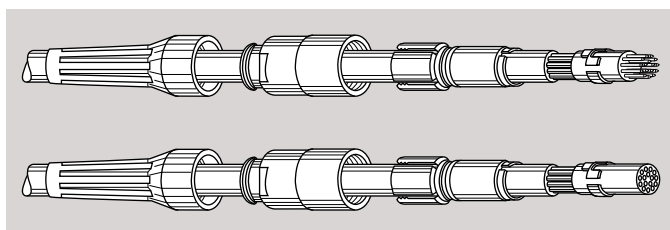
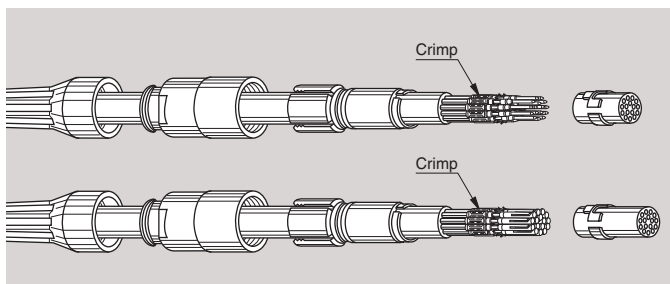
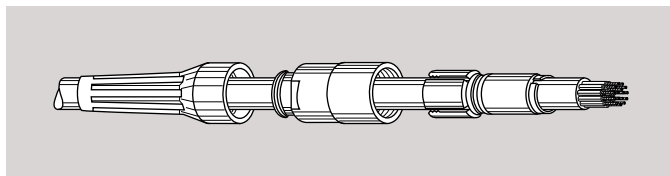
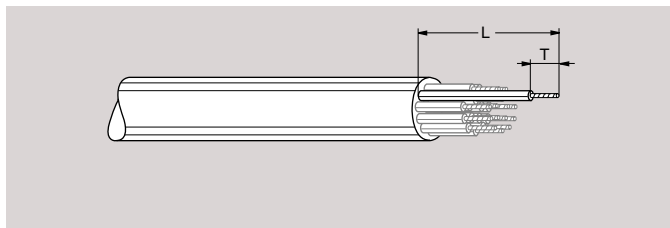
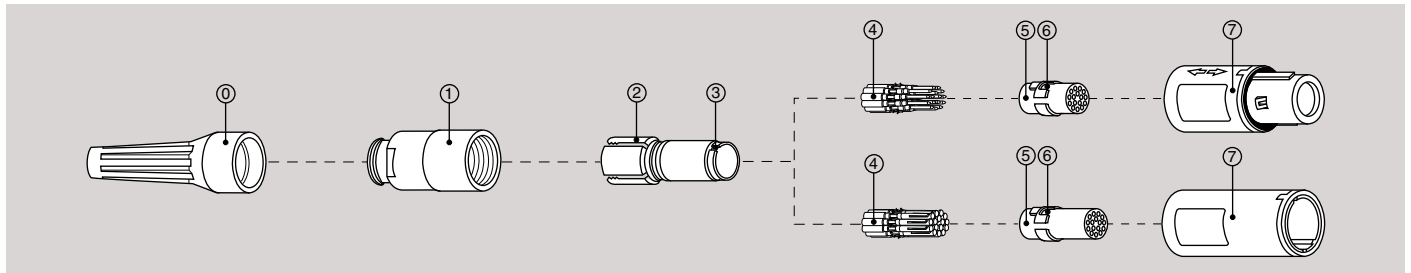


4. Slide the collet ② forward and locate slot ③ in the key of the insulator ⑤. Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst positioning it to ensure that the slot ⑥ of insulator ⑤ locates in the inside key of the shell. Tighten the collet nut ① to the maximum torque of 0.5 Nm. Push the bend relief ⑥ onto the collet nut ①.



For PSU only:
We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Crimp contacts



1. Strip the cable according to the lengths given in the table.

| Configuration | Dimensions (mm) | |
|--------------------|-----------------|-----|
| | L | T |
| M02 | 17.0 | 5.5 |
| M03 | 17.0 | 5.5 |
| M04, M05, M06, M07 | 15.0 | 4.0 |
| M08, M10, M12 | 15.0 | 4.0 |
| M16, M19 | 15.0 | 4.0 |

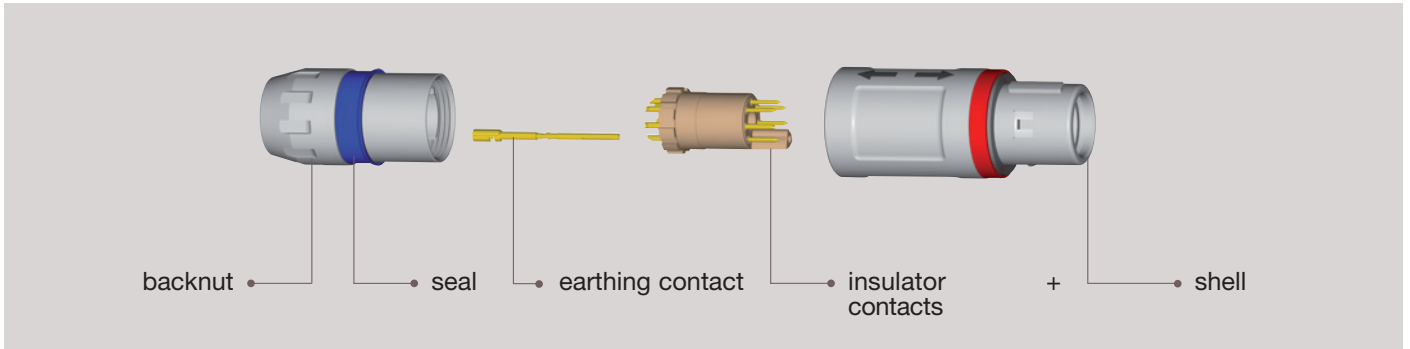
2. Slide the bend relief[®], the collet nut ① and then the collet ② onto the cable.
3. Fix the appropriate positioner (table page 45) in the crimping tool. Set selector to the number corresponding to the conductor AWG as indicated on the positioner label. Fit conductor into contact ④ and make sure it is visible through the inspection hole in the crimp barrel. Slide conductor-contact combination into the open crimping tool; make sure that the contact is fully pushed into the positioner. Close the tool. Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.
4. Now arrange contact-conductor combinations according to the insert marking and locate them into the insert ⑥. Check that all contacts are correctly located and remain in position when given a gentle pull.
5. Slide the collet ② forward and locate slot ③ in the key of the insulator ④. Slide collet nut ① over collet ② and then push the whole assembly into the shell ⑦ whilst positioning it to ensure that the slot ⑤ of insulator ④ locates in the inside slot of the shell. Tighten the collet nut ① to the maximum torque of 0.5 Nm.
Push the bend relief[®] onto the collet nut ①.

For PSU only:

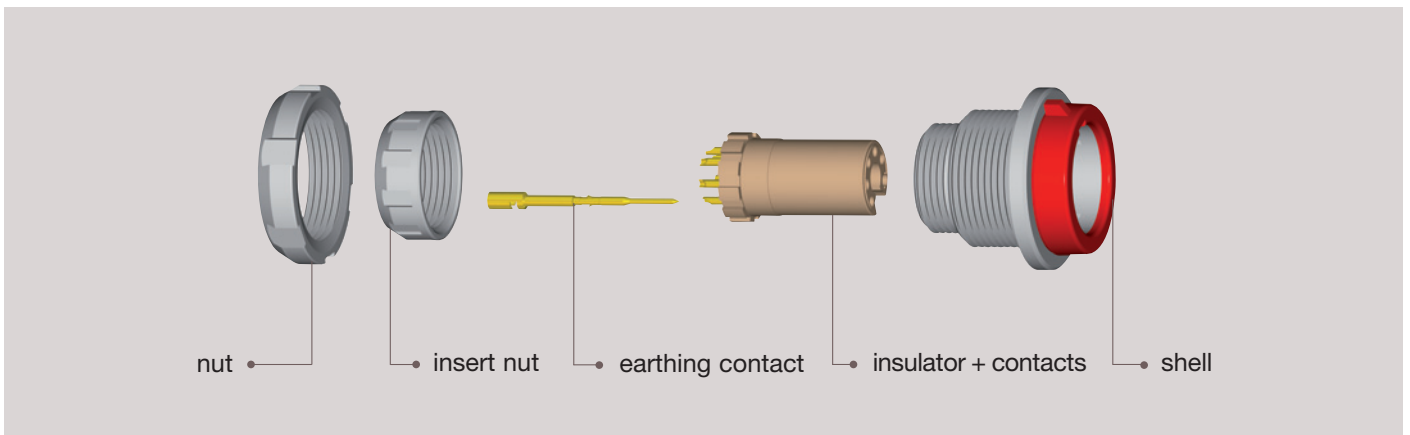
We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Exploded view of the REDEL 3P

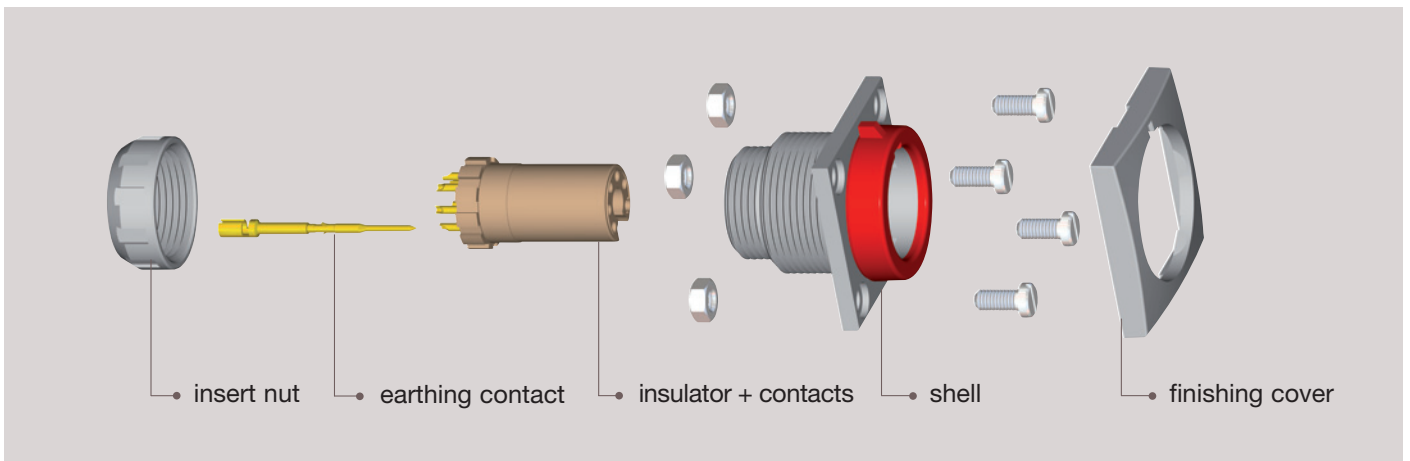
Straight plug

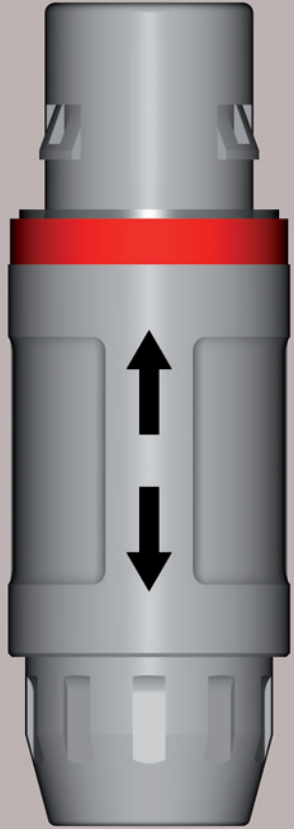
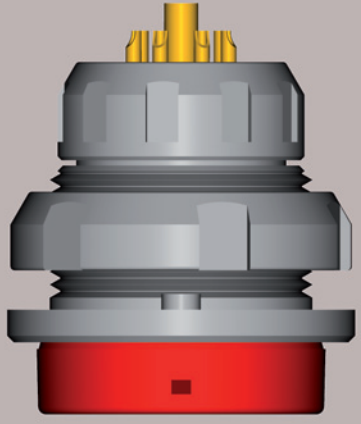


Fixed socket



Fixed socket with square flange



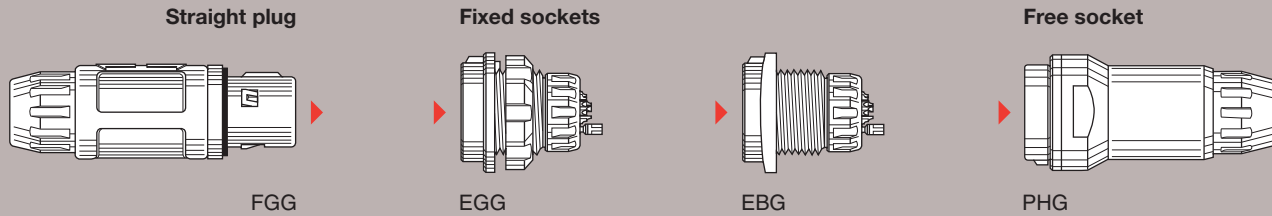


3P SERIES

3P Series

Historically the 3P is LEMO's first series of completely plastic connectors. It is designed to accommodate cable diameters up to 9.5 mm. Available in 11 different contact configurations including multicontact, and hybrid HV/electrical; coax/electrical; fibre optic/electrical, fluidic, the 3P series has been specifically designed for all applications requiring minimum weight, maximum electrical insulation values, and high thermal and mechanical properties, as well as suitability for either vapour or gas sterilization and for cold sterilization with a chemical product. These connectors provide remarkable safety by using nonconductive materials and four different systems to prevent accidental cross-mating, i. e. colour coding, housing keying, insert keying and insert polarization.

Standard models



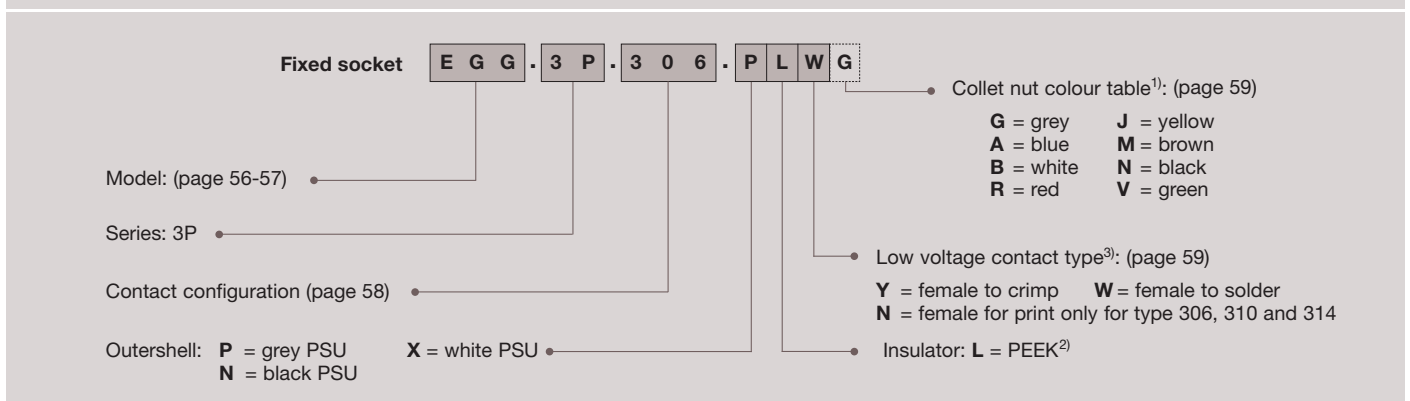
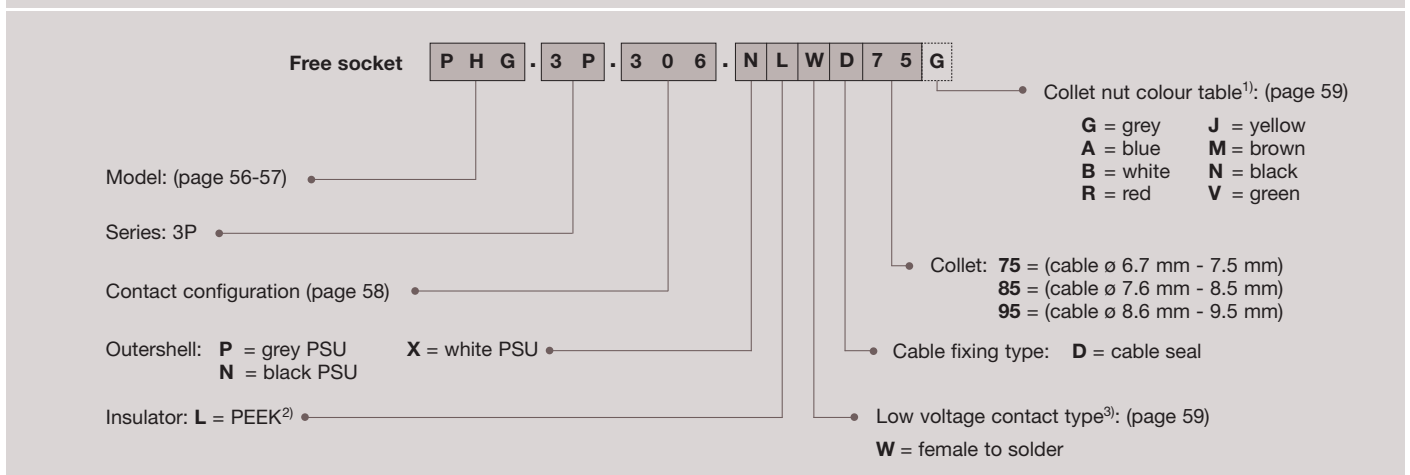
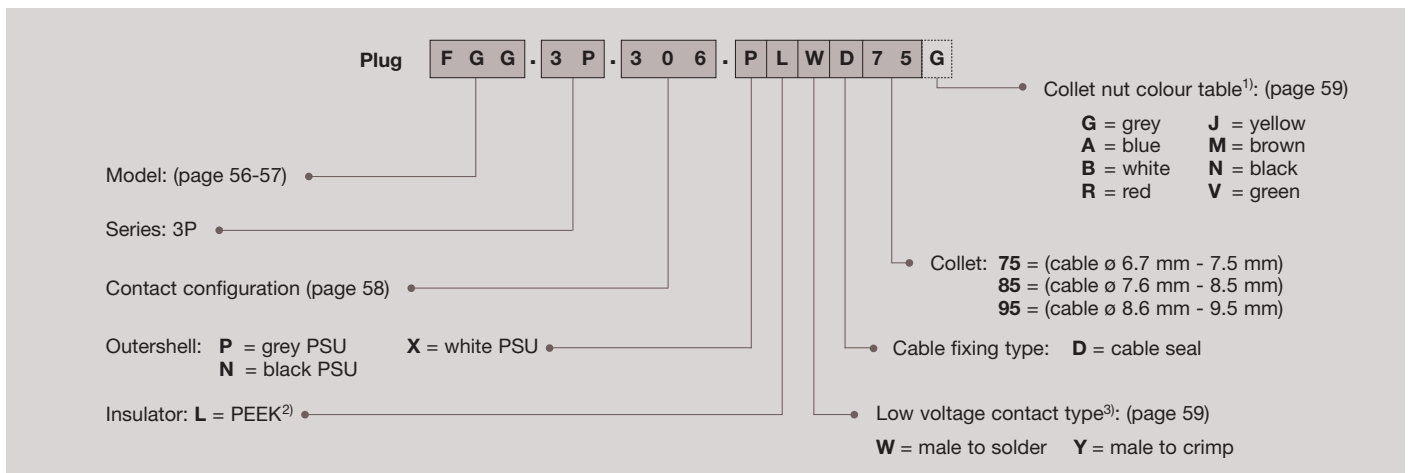
Alignment keys and insert polarization

The 3P series makes it possible for the user to configure his own keying system. The insert can be located into 11 different angular positions relative to the external alignment key.

Note: the reference letter:
 - on the plug insert, is placed to the left of the alignment key.
 - on the socket insert, is placed to the right of the alignment key.

| Rear view of a socket | Insert code | Angle | |
|-----------------------|-------------|----------|----------|
| | | Plug | Socket |
| | A | 180° | 180° |
| | B | 147° 16' | 212° 44' |
| | C | 114° 33' | 245° 27' |
| | D | 81° 49' | 278° 11' |
| | E | 49° 05' | 310° 55' |
| | F | 16° 22' | 343° 38' |
| | G | 343° 38' | 16° 22' |
| | H | 310° 55' | 49° 05' |
| | J | 278° 11' | 81° 49' |
| | K | 245° 27' | 114° 33' |
| | L | 212° 44' | 147° 16' |

Part numbering system



FGG.3P.306.PLWD75G Straight plug with key and cable seal, 3P series, multipole type with 6 contacts, outer shell in grey PSU, PEEK insulator, male solder contact, D type collet for 6.7 mm to 7.5 mm diameter cable and grey coloured ring.

PHG.3P.310.NLWD75G Free socket with key and cable seal, 3P series, multipole with 6 contacts, outer shell in black PSU, PEEK insulator, female solder contact, D type collet for 6.7 mm to 7.5 mm diameter cable and black coloured ring.

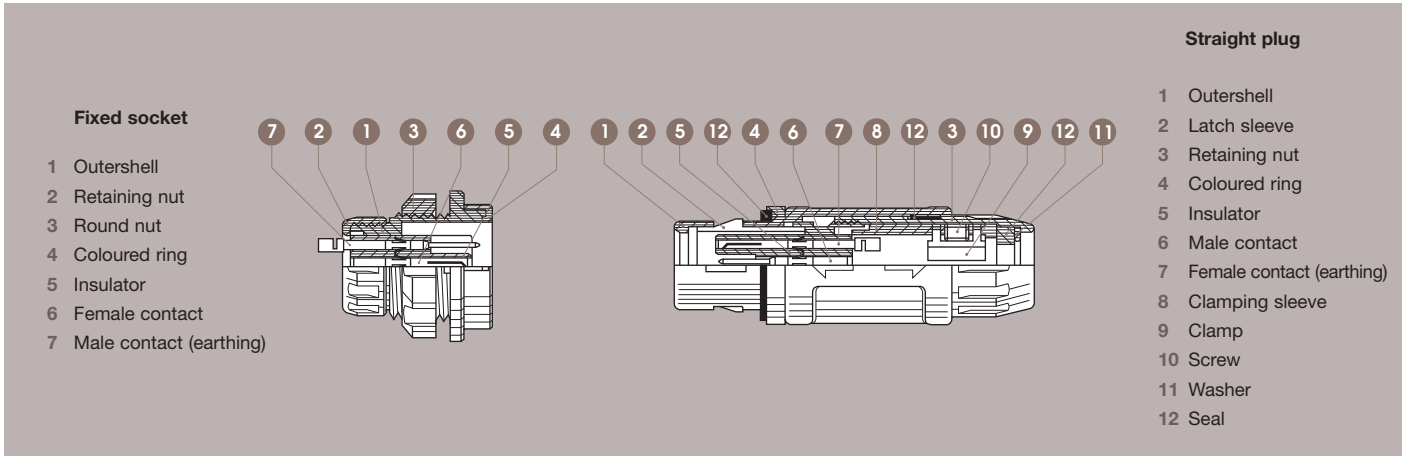
EGG.3P.306.PLWG Fixed socket with key, 3P series, multipole type with 6 contacts, outer shell in grey PSU, PEEK insulator, female solder contact and grey coloured ring.

Note: 1) the variant position of the part number is used to specify the colour of the coloured ring. For grey PSU (material Code P).

2) for the high voltage type «709» use «J» enhanced PEEK material code. The standard colour is grey and nothing is mentioned in the variant position.

3) the letters W or Y are also used for special arrangements.

Standard models (IP61) . 3 P .

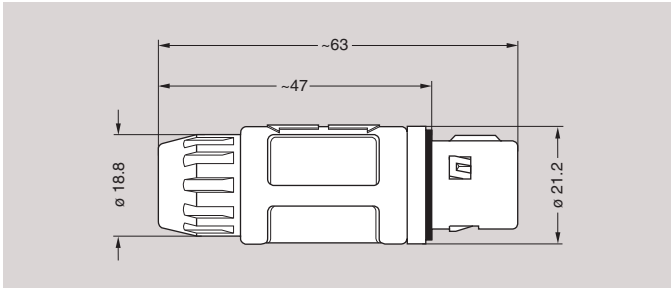


| Characteristics | Value | Standards |
|---|-------------|----------------------|
| Average retention force when pulling on the cable 1N = 0.102 kg | 120 N | IEC 60512-8 test 15f |
| Cable retention force (depends on cable construction) 1N = 0.102 kg | 100 - 200 N | IEC 60512-9 test 17c |

| Characteristics | Value | Standards |
|---|---------------|---------------------|
| Endurance (latching) | > 1000 cycles | IEC 60512-5 test 9a |
| Working temperature range ¹⁾ (PSU) | -50/+150°C | - |
| Watertightness (mated) | IP61 | IEC 60529 |

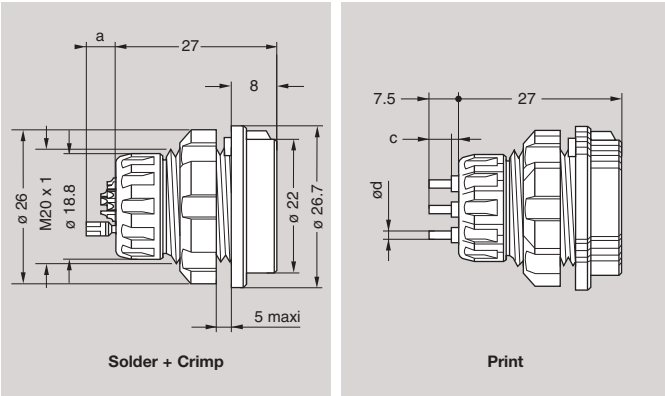
Note: 1) for the type hybrid LV + fibre optic, the temperature is: -40/+80°C

FGG Straight plug with key and cable seal



| Part Number | Cable ø | |
|--------------------|---------|-----|
| | min | max |
| FGG.3P.●●●.PLWD75G | 6.7 | 7.5 |
| FGG.3P.●●●.PLWD85G | 7.6 | 8.5 |
| FGG.3P.●●●.PLWD95G | 8.6 | 9.5 |

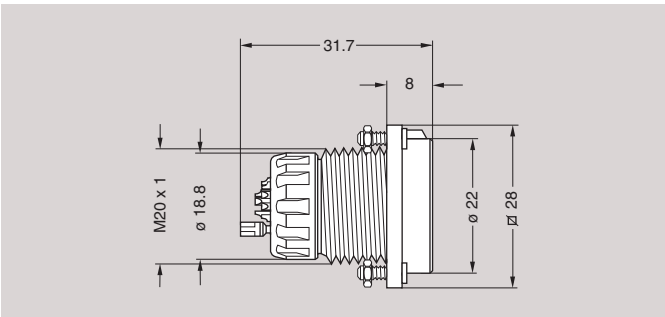
EGG Fixed socket with key, nut fixing



| Part Number | number of contacts | Contact | | | | | |
|-----------------|--------------------|---------|-------|-------|-----|-------|----------|
| | | Solder | | Crimp | | Print | |
| | | N | a max | N | a | c | ϕd |
| EGG.3P.306.PLWG | 6+1LV | 27 | 4.7 | 27 | 4.7 | 5.5 | 0.7 |
| EGG.3P.310.PLWG | 10+1LV | 27 | 4.7 | 27 | 4.7 | 5.5 | 0.7 |
| EGG.3P.314.PLWG | 14+1LV | 27 | 4.7 | 27 | 4.7 | 5.5 | 0.7 |
| EGG.3P.318.PLWG | 18+1LV | 27 | 4.7 | 27 | 4.7 | - | - |

Note: for PCB drilling pattern see page 65.
Panel hole see page 65.

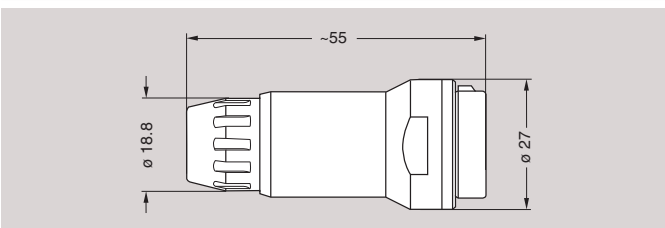
EBG Fixed socket with key, square flange and screw fixing



| Part Number |
|-----------------|
| EBG.3P.306.PLWG |
| EBG.3P.310.PLWG |
| EBG.3P.314.PLWG |

Note: for PCB drilling pattern see page 65.
Panel hole see page 65.

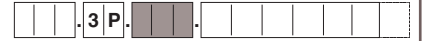
PHG Free socket with key and cable seal



| Part Number | Cable ϕ | |
|--------------------|--------------|-----|
| | min | max |
| PHG.3P.●●●.NLWD75N | 6.7 | 7.5 |
| PHG.3P.●●●.NLWD85N | 7.6 | 8.5 |
| PHG.3P.●●●.NLWD95N | 8.6 | 9.5 |

Note: the picture shows outershell in black PSU.

Insert configuration



| | Male solder contacts | Female solder contacts | Reference | Number of contacts | ø A (mm) | Solder bucket ø (mm) ⁵⁾ | Contact type | | | | Air clearance min ²⁾ (mm) | Creepage distance min ³⁾ (mm) | Rated current (A) |
|------------------------|----------------------|------------------------|-----------|------------------------------|----------|------------------------------------|--------------|-------|------------------|---|--------------------------------------|--|-------------------|
| | | | | | | | Solder | Crimp | Print (straight) | Test voltage (kV rms) ¹⁾ Contact-contact | | | |
| Multipole | | | 306 | 6+1LV | 0.9 | 0.8 | • | • | • | 3.9 | 1.95 | 1.95 | 6.0 |
| | | | 310 | 10+1LV | 0.9 | 0.8 | • | • | • | 3.3 | 1.25 | 1.25 | 5.0 |
| | | | 314 | 14+1LV | 0.9 | 0.8 | • | • | • | 1.7 | 0.90 | 0.90 | 4.0 |
| | | | 318 | 18+1LV | 0.7 | 0.6 | • | - | - | 2.7 | 0.70 | 0.70 | 3.0 |
| H.V. Hybrid +LV | | | 709 | 9+1LV 1HV | 0.9 | 0.8 | • | • | - | 1.7 | 0.90 | 0.90 | 4.0 |
| Coaxial Hybrid +LV | | | 809 | 9+1LV 1Coax ⁶⁾ | 0.9 | 0.8 | • | • | - | 1.7 | 0.90 | 0.90 | 4.0 |
| Fibre optic Hybrid +LV | | | 92H | 9+1LV 1FO ⁴⁾ | 0.9 | 0.8 | • | • | - | 1.7 | 0.90 | 0.90 | 4.0 |
| | | | 92K | 11+1LV 1FO ⁴⁾ | 0.7 | 0.6 | • | - | - | 2.7 | 0.75 | 0.75 | 3.0 |
| | | | 96H | 9+1LV 1FO ⁴⁾ | 0.9 | 0.8 | • | • | - | 1.7 | 0.90 | 0.90 | 4.0 |
| | | | 96K | 11+1LV 1FO ⁴⁾ | 0.7 | 0.6 | • | - | - | 2.7 | 0.75 | 0.75 | 3.0 |
| Fluidic Hybrid +LV | | | 033 | 3Fluid. + 3LV | 0.9 | - | - | • | - | 3.0 | 1.45 | 1.45 | 9.0 |

- Note:** 1) depending on specific application and related standard, more restrictive operating voltage may apply. We suggest operating voltage = 1/3 test voltage, see page 68.
 2) shortest distance in air between two conductive parts.
 3) shortest distance along the surface of the insulating material between two conductive parts.
 4) fibre optic contact must be ordered separately (see page 61)
 5) for a given AWG, the diameter of some stranded conductor design is larger than the solder cup diameter (see page 69).
 6) configuration 809 use «C» type coaxial contact.

Contact type □□□.3P.□□□.□□□□□□□□

Select the type of contact: solder or crimp?

| | | |
|------|--------|------|
| Plug | Type | Male |
| | solder | W |
| | crimp | Y |

| | | |
|--------|--------|--------|
| Socket | Type | Female |
| | solder | W |
| | crimp | Y |
| | print | N |

When should I use crimp rather than solder contacts ?

Soldering

- recommended for small volumes
- requires little amount of tooling (soldering iron)
- requires more time

Crimping

- recommended for large volumes
- no heat is required to make the connection
- for contacts with high density
- for use in high temperature environment
- requires extra tooling (crimping tools)

Colour coding □□□.3P.□□□.□□□□□□□□

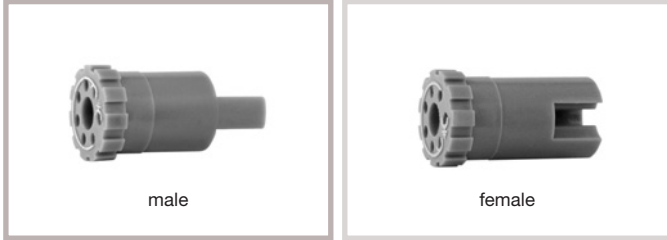
| | Colours | | | | | | | |
|-----------|---------|------|--------|-------|------|-------|-------|-------|
| | grey | blue | yellow | black | red | green | brown | white |
| Reference | G | A | J | N | R | V | M | B |
| RAL code | 7001 | 5002 | 1016 | 9005 | 3020 | 6024 | 8002 | 9003 |

Note: the RAL colours are indicative and depend on raw material and production process. Colour may differ.

Easy identification with the assistance of colour coding. Outershell is only available in grey, black or white (see page 55).

Accessories

FGG-EGG Insulator for crimp contacts



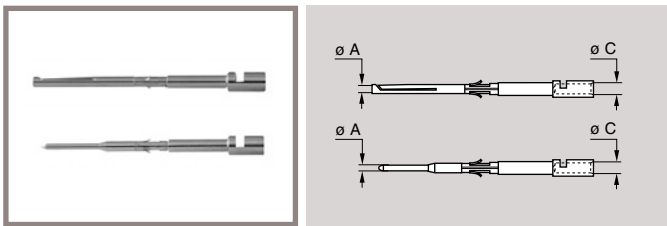
| Contact configuration | Insulator part number | |
|-----------------------|-----------------------|---------------|
| | For plug | For socket |
| 306 | FGG.3P.306.ML | EGG.3P.406.ML |
| 310 | FGG.3P.310.ML | EGG.3P.410.ML |
| 314 | FGG.3P.314.ML | EGG.3P.414.ML |

FGG-EGG Crimp contacts, kit with the number of contacts in a tube



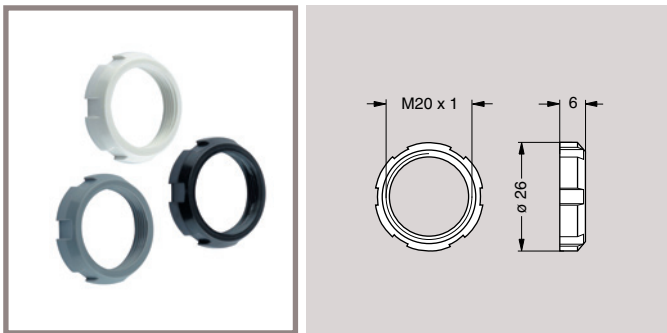
| Contact configuration | ø A (mm) | ø C (mm) | Contact part number | |
|-----------------------|----------|----------|---------------------|-----------------|
| | | | Male | Female |
| 306 | 0.9 | 1.1 | FGG.3P.306.ZZYT | EGG.3P.306.ZZYT |
| 310 | 0.9 | 1.1 | FGG.3P.310.ZZYT | EGG.3P.310.ZZYT |
| 314 | 0.9 | 1.1 | FGG.3P.314.ZZYT | EGG.3P.314.ZZYT |

FGG-EGG Earthing contacts



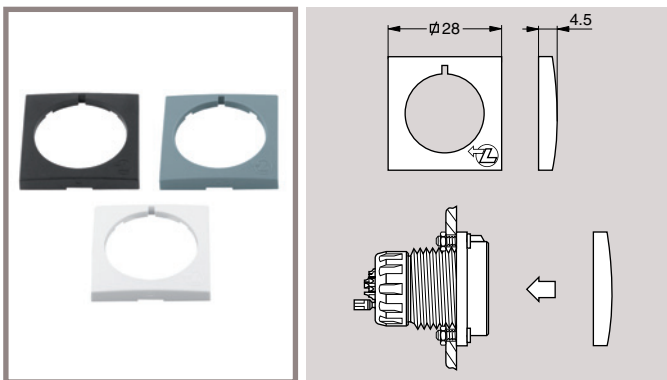
| Type | ø A (mm) | ø C (mm) | Contact part number | |
|-----------|----------|----------|---------------------|----------------|
| | | | Male | Female |
| 306 - 310 | 0.9 | 2.0 | FGG.3P.561.ZZY | EGG.3P.661.ZZY |
| 314 - 318 | 0.9 | 2.0 | FGG.3P.561.ZZY | EGG.3P.661.ZZY |
| 709 - 809 | 0.9 | 2.0 | FGG.3P.561.ZZY | EGG.3P.661.ZZY |
| 96H - 92H | 0.9 | 2.0 | FGG.3P.561.ZZY | EGG.3P.661.ZZY |
| 96K - 92K | 0.9 | 2.0 | FGG.3P.561.ZZY | EGG.3P.661.ZZY |

GEB Plastic nut



| Part Number | Mat. | Colours |
|---------------|------|---------|
| GEB.3P.240.UB | PSU | white |
| GEB.3P.240.UG | PSU | grey |
| GEB.3P.240.UN | PSU | black |

EBG Finishing cover

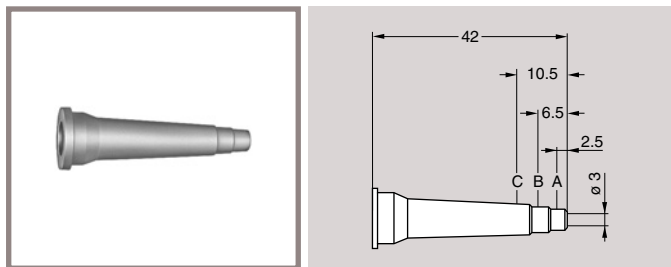


| Part Number | Mat. | Colours |
|---------------|------|---------|
| EBG.3P.260.UB | PSU | white |
| EBG.3P.260.UG | PSU | grey |
| EBG.3P.260.UN | PSU | black |

Note: a finishing cover is supplied with all EBG fixed sockets with a square flange. Models EBG sockets, with a square flange, can also be mounted without using the fixing screws.

Note: all dimensions are in millimeters

GMA Bend relief



| Part Number | Cut | Cable ϕ (mm) | |
|---------------|-----|-------------------|------|
| | | min. | max. |
| GMA.3P.050.SN | - | 3.0 | 3.9 |
| | A | 4.0 | 4.9 |
| | B | 5.0 | 5.9 |
| | C | 6.0 | 7.0 |

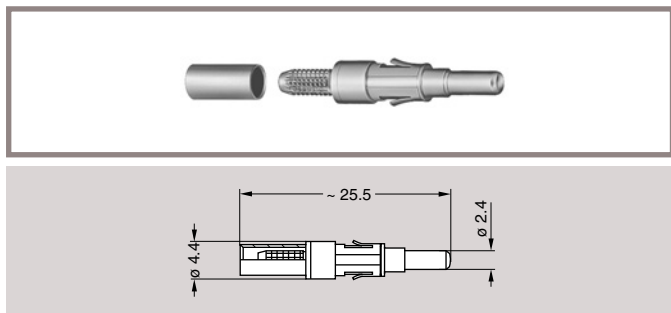
Material: Black thermoplastic rubber

Note: the cable entry of the FGJ plugs can be fitted with a flexible bend relief which can accommodate cables of 3 to 7 mm in diameter. The adjustment to the diameter is done by cutting the conical end. The bend relief is mounted inside the nut. The cable must have a sheath with a large enough diameter in order to be held by the clamping system.

Fibre optic contact

For the hybrid type LV + fibre optic, fibre optic contacts must be ordered separately.

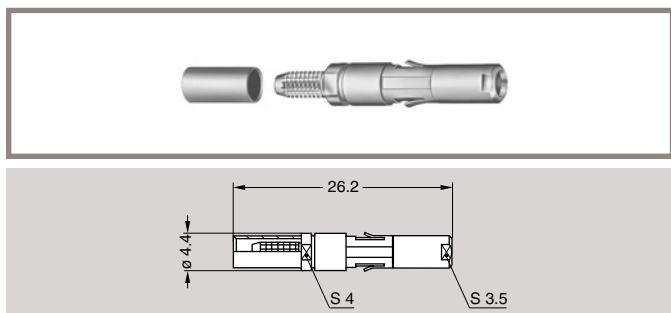
FFS.F1 Male F1 Fibre Optic Contact for plug



| Reference | Ferrule inside ϕ (μ m) | Fibre type |
|------------------|----------------------------------|------------|
| FFS.F1.GB1.ACE30 | 235 | HCS |
| FFS.F1.HB1.AAE30 | 335 | HCS |
| FFS.F1.JB1.AAE30 | 435 | HCS |
| FFS.F1.KB1.AAE30 | 640 | HCS |
| FFS.F1.RB1.AAE30 | 1100 | Polymer |

Note: other ferrule inside diameter, consult us.

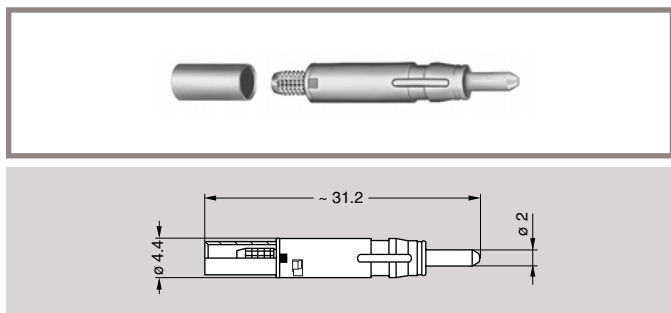
PSS.F1 Female F1 Fibre Optic Contact for socket



| Reference | Ferrule inside ϕ (μ m) | Fibre type |
|------------------|----------------------------------|------------|
| PSS.F1.GB1.ACE30 | 235 | HCS |
| PSS.F1.HB1.AAE30 | 335 | HCS |
| PSS.F1.JB1.AAE30 | 435 | HCS |
| PSS.F1.KB1.AAE30 | 640 | HCS |
| PSS.F1.RB1.AAE30 | 1100 | Polymer |

Note: other ferrule inside diameter, consult us.

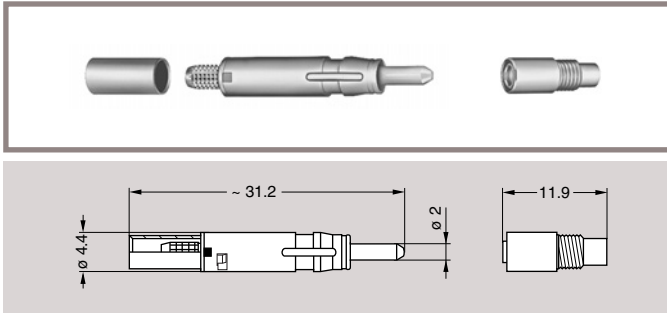
FFS.F2 Male F2 Fibre Optic Contact for plug



| Reference | Ferrule inside ϕ (μ m) | Fibre type |
|------------------|----------------------------------|------------|
| FFS.F2.BA2.LCE30 | 125 | 9/125 |
| FFS.F2.BB2.LCE30 | 126 | 9/125 |
| FFS.F2.BD2.LCE30 | 128 | 50/125 |
| FFS.F2.BD2.LCE30 | 128 | 62.5/125 |
| FFS.F2.FB2.LCE30 | 144 | 100/40 |

Note: all dimensions are in millimeters.

PSS.F2 Female F2 Fibre Optic Contact for socket



| Reference | Ferrule inside ϕ (μm) | Fibre type |
|------------------|---|------------|
| PSS.F2.BA2.LCE30 | 125 | 9/125 |
| PSS.F2.BB2.LCE30 | 126 | 9/125 |
| PSS.F2.BD2.LCE30 | 128 | 50/125 |
| PSS.F2.BD2.LCE30 | 128 | 62.5/125 |
| PSS.F2.FB2.LCE30 | 144 | 100/40 |

Note: all dimensions are in millimeters.

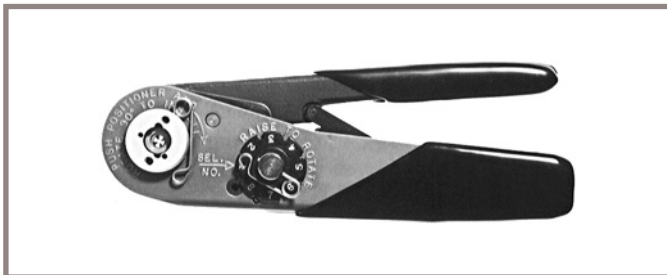
Recommended coaxial cables

| Group ¹⁾ | | | Type |
|---------------------|---|---|-----------|
| 1 | 2 | 3 | |
| • | | | RG.174A/U |
| | • | | RG.178B/U |
| | | • | RG.179B/U |
| | | • | RG.187A/U |
| • | | | RG.188A/U |
| | • | | RG.196A/U |
| • | | | RG.316/U |

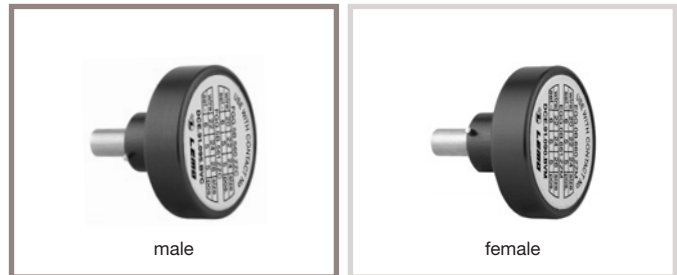
Note: 1) the cable group number corresponding to the cable must be written in the variant position of the part number (see page 55).

Tooling

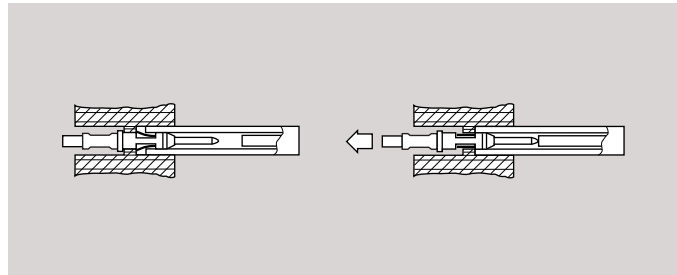
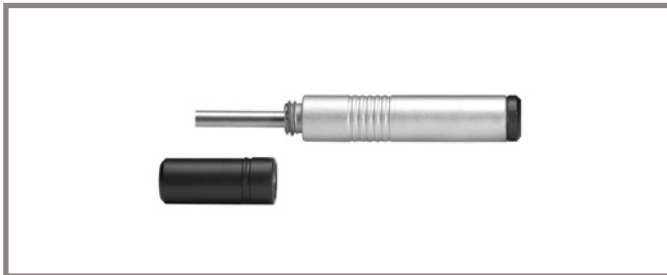
DPC.91.701.V Crimping tool



DCE Positioners for crimp contacts



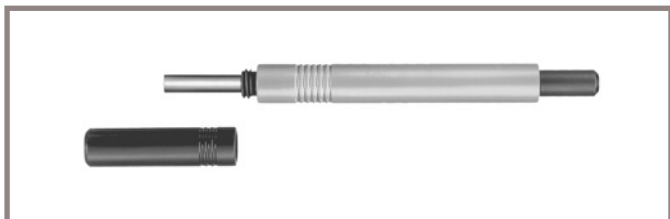
DCF Automatic extraction tools for crimp contacts



| Contact type | Conductor (mm) | Contact ϕ AWG | Positioner part number | | Selector No Setting | Part number extractor |
|--------------|----------------|--------------------|------------------------|----------------|---------------------|-------------------------------------|
| | | | Male | Female | | For male contact and female contact |
| 306 | 0.9 | 20-22-24 | DCE.91.093.PVC | DCE.91.093.PVM | 6-5-5 | DCF91.093.5LT |
| 310 | 0.9 | 20-22-24 | DCE.91.093.PVC | DCE.91.093.PVM | 6-5-5 | DCF91.093.5LT |
| 314 | 0.9 | 20-22-24 | DCE.91.093.PVC | DCE.91.093.PVM | 6-5-5 | DCF91.093.5LT |

Note: this model is used for male and female contacts. The variance in conductor stranding diameter for the minimum AWG is such that some can have a cross section which is not sufficient to guarantee crimping as per IEC 60352-2 standard. All dimensions are in millimeters.

DCC Extraction tool for coax contact type «C»



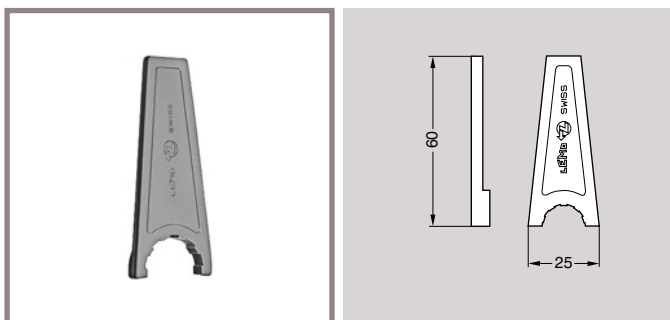
| Part Number | Contact type |
|----------------|--------------|
| DCC.91.384.5LA | 809 |

DPE Crimping tool for coax contact type «C»



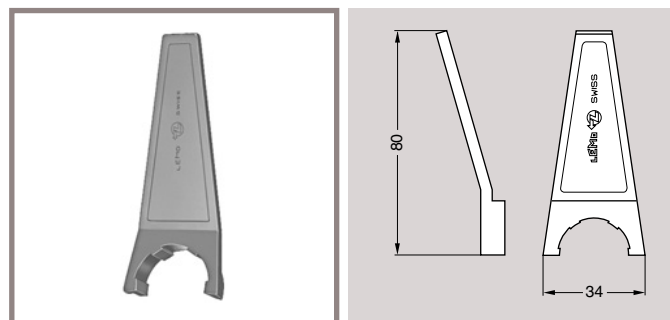
| Part Number | Cable group |
|---------------|-------------|
| DPE.99.103.8K | 1-3 |
| DPE.99.103.1K | 2 |

DCP.91.019.HN Spanners with notch for securing the collet nut



Material: Black polyamide

DCP.91.026.HN Spanners for securing the socket nut



Material: Black polyamide

DCS Polishing tool for fibre optic contact



| Part Number | Contact type |
|---------------|--------------|
| DCS.91.F24.LC | F2 |
| DCS.91.F13.LC | F1 |

Note: all dimensions are in millimeters.

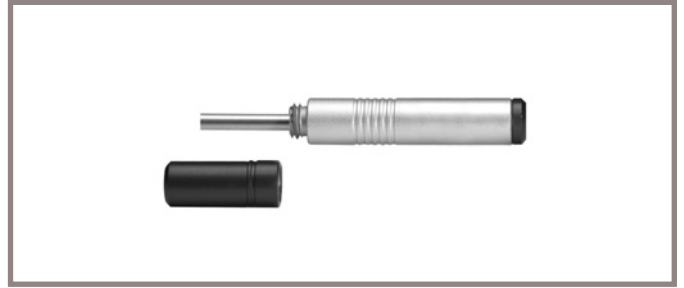
DRV.91.CF2.PN F2 contact fibre optic work station



DPE.99.524.337K Crimp tool for fibre optic contact F1 and F2 type



DCC.91.312.5LA Extraction/Installation tool for fibre optic contact F1 and F2 type



DCS Microscope adaptor for fibre optic contact



WST Epoxy curing oven for fibre optic contact



| Part Number | Contact type |
|------------------|--------------|
| DCS.91.G90.6E200 | F2 |
| DCS.91.G90.6E240 | F1 |

| Part Number | Voltage |
|---------------|-----------|
| WST.FR.220.VA | 220 volts |
| WST.FR.110.VA | 110 volts |

WST.FB.G00.301 Fibre inspection microscope



DCS.91.F23.LA Cleaning tool for F2 contact

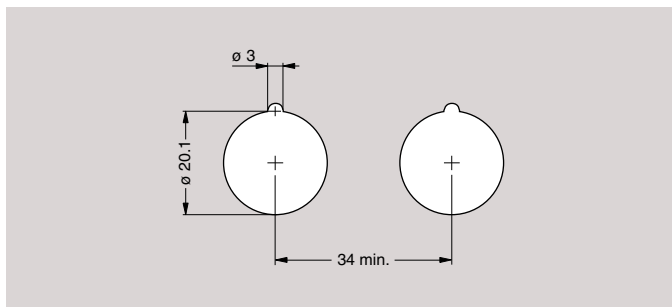


DCS.F2.035.PN F2 contact alignment device installation/extraction tool

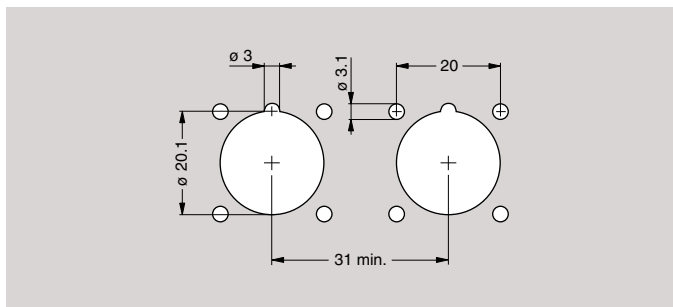


Panel hole

For EGG

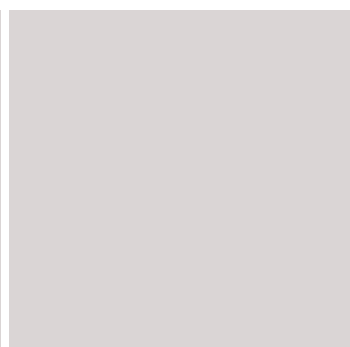
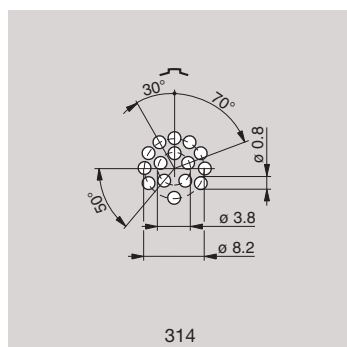
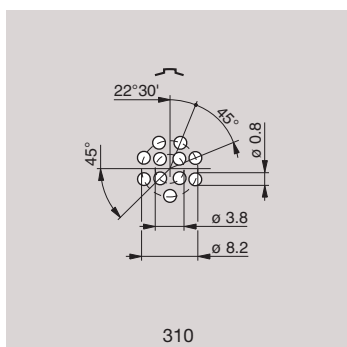
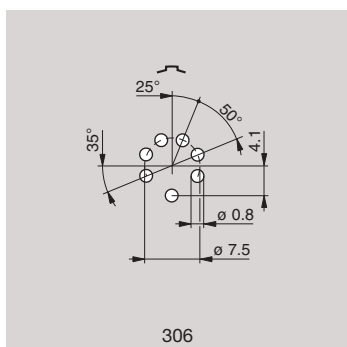


For EBG



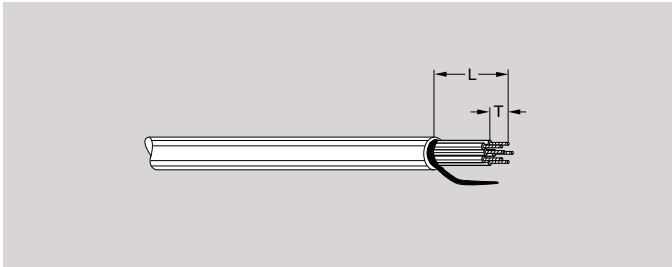
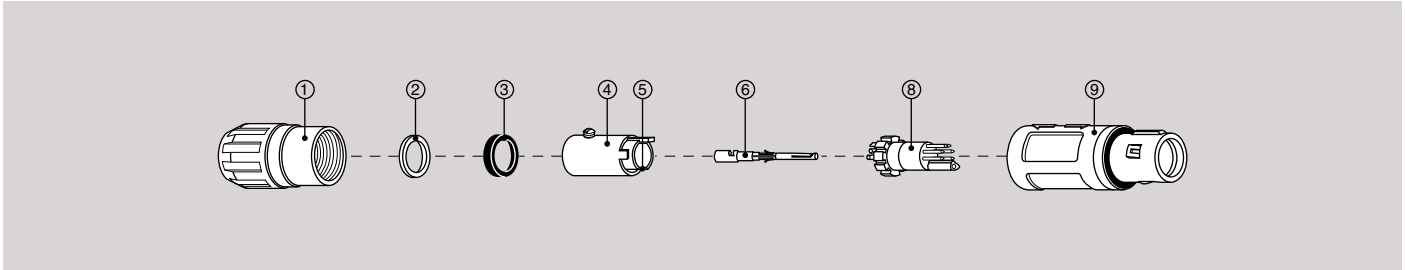
PCB drilling pattern

For straight contacts



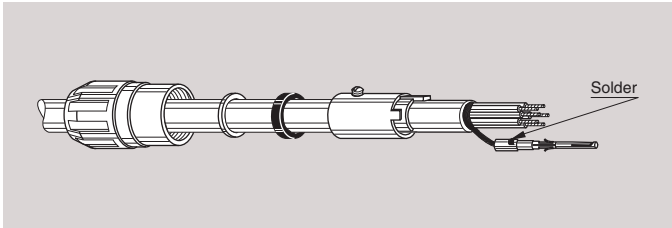
Assembly instructions

Solder LV contacts

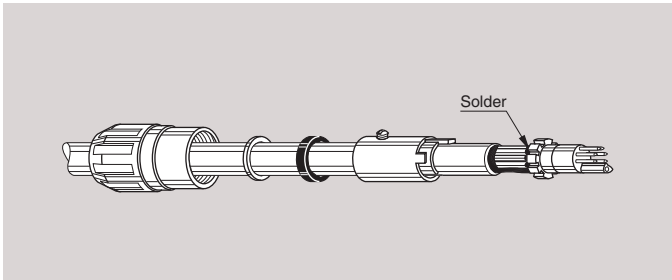


1. Strip the cable according to the lengths given in the table. Tin the conductors. In case of a screened cable separate the braid and twist it apart as shown.

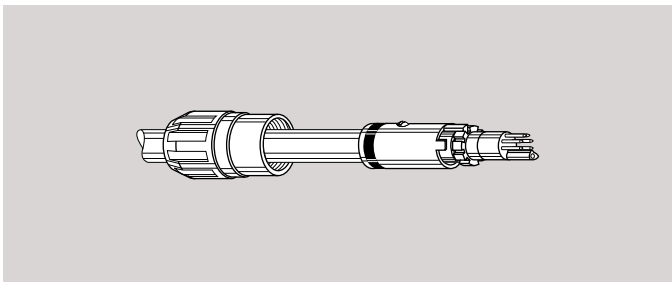
| Configuration | Dimensions (mm) | |
|---------------|-----------------|-----|
| | L | T |
| 306 - 310 | 13.0 | 3.0 |
| 314 - 318 | 13.0 | 3.0 |



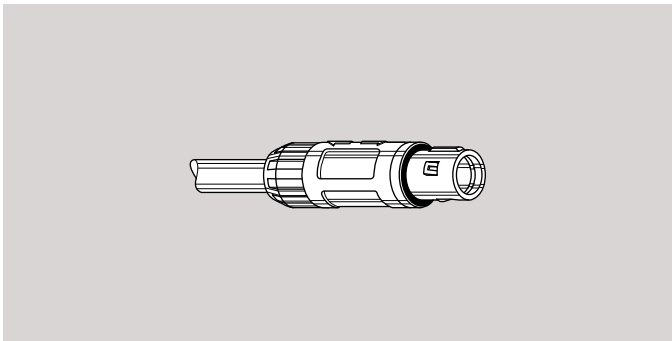
2. Slide the retaining nut ①, the washer ②, the seal ③ and the clamping sleeve ④. In case of a screened cable solder the braid into the earthing contact ⑥.



3. In case of a screened cable introduce the earthing contact ⑥ into the insert ⑧. Check that contact is correctly located and remains in position when given a gentle pull. Solder conductors into contacts, making sure that neither solder nor flux gets onto the insulator or cable insulation.



4. Slide the clamping sleeve ④ forward and locate tag ⑤ into one of the insulator slot according to the selected polarization code. Make sure that same code is used for plug and socket. Tight the screw of the clamping sleeve ④ to secure the cable. Slide washer and seal against clamping sleeve.



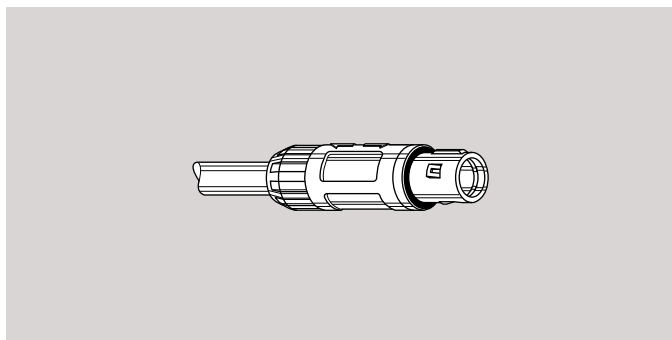
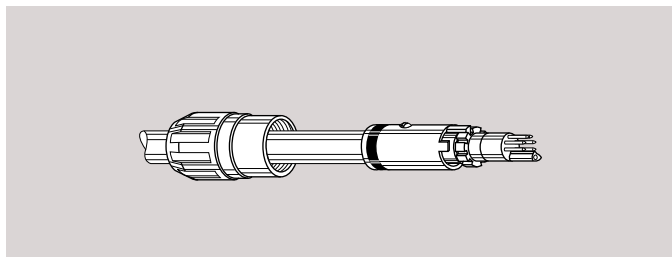
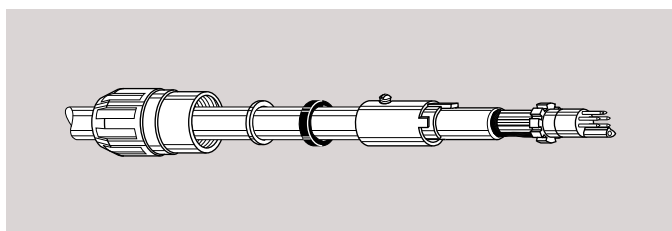
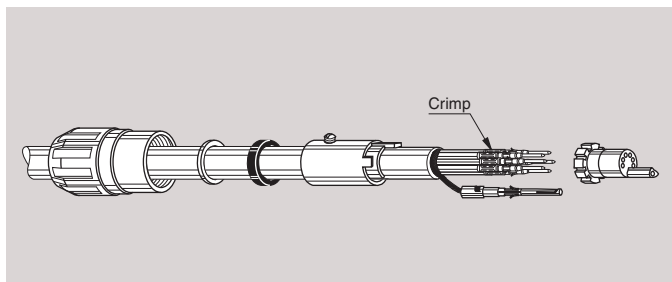
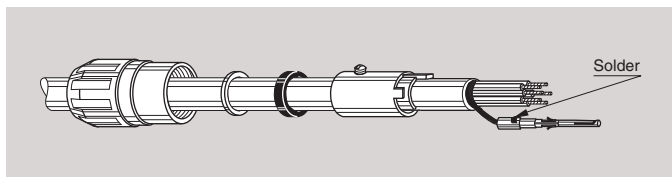
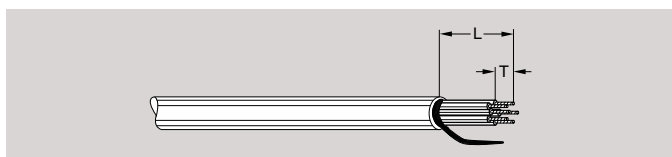
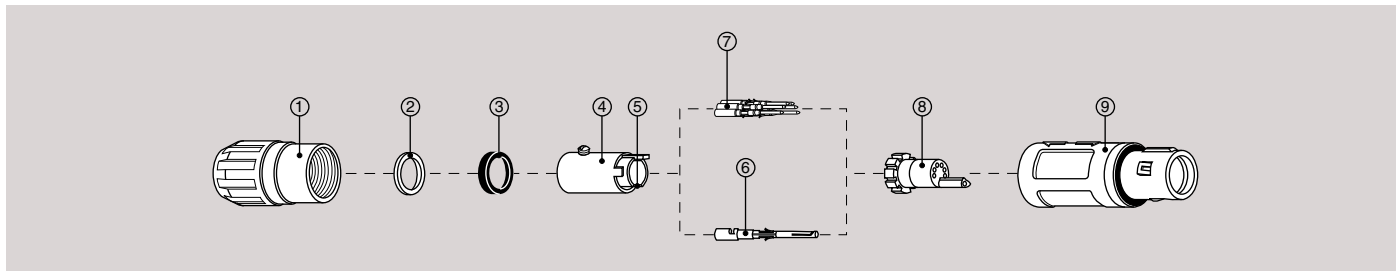
5. Push the whole assembly into the shell ⑧ whilst turning it to insure that the tag ⑤ is correctly located in the inside slot of the shell. Tighten the retaining nut ① to the maximum torque of 1.2 Nm.

– Socket mounting nut or screws = 2.3 Nm.

For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Crimp LV contacts



- Strip the cable according to the lengths given in the table. Tin the conductors. In case of a screened cable separate the braid and twist it apart as shown.

| Configuration | Dimensions (mm) | |
|---------------|-----------------|-----|
| | L | T |
| 306, 310, 314 | 19.0 | 5.4 |

- Slide the retaining nut ①, the washer ②, the seal ③ and the clamping sleeve ④. In case of a screened cable solder the braid into the earthing contact ⑥.

- Fix the appropriate positioner (table page 51) in the crimping tool. Set selector to the number corresponding to the conductor AWG as indicated on the positioner label. Fit conductor into contact ⑦ and make sure it is visible through the inspection hole in the crimp barrel. Slide conductor-contact combination into the open crimping tool; make sure that the contact is fully pushed into the positioner. Close the tool. Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.

- Now arrange contact-conductor combinations according to the insert marking and locate them into the insert ⑤. Check that all contacts are correctly located and remain in position when given a gentle pull. In case of a screened cable introduce the earthing contact ⑥ into the insert ⑧. Check that contact is correctly located and remains in position when given a gentle pull.

- Slide the clamping sleeve ④ forward and locate tag ⑤ into one of the insulator slot according to the selected polarization code. Make sure that same code is used for plug and socket. Tight the screw of the clamping sleeve ④ to secure the cable. Slide washer and seal against clamping sleeve.

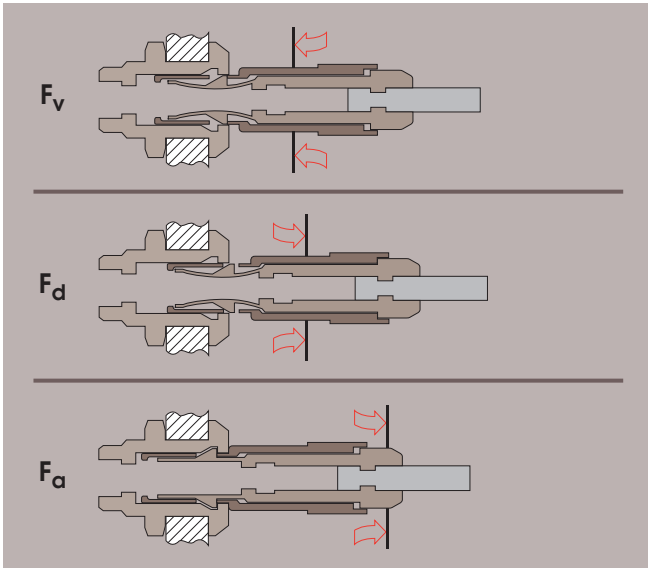
- Push the whole assembly into the shell ⑨ whilst turning it to insure that the tag ⑤ is correctly located in the inside slot of the shell. Tighten the retaining nut ① to the maximum torque of 1.2 Nm.

– Socket mounting nut or screws = 2.3 Nm.

For PSU only:

We recommend ONLY the use of VTCS-6 Clear Vibra-tite or ThreeBond 1401 to secure the connector backnut. The use of other materials could result in damage to the connector. The only recommended chemical cleaner is Isopropyl Alcohol.

Mechanical latching characteristics



F_v : average latching force

F_d : average unmatting force with axial pull on the outer release sleeve

F_a : average retention force for straight pull on the collet nut

PSU shell material

| Force (N) | Series | | |
|-----------|--------|-----|------|
| | 1P | 2P | 3P |
| F_v | 8.0 | 5.5 | 7.5 |
| F_d | 8.0 | 8.5 | 17.0 |
| F_a | 100 | 150 | 120 |

PEI shell material

| Force (N) | Series | |
|-----------|--------|-----|
| | 1P | 2P |
| F_v | 6.5 | 6.0 |
| F_d | 6.5 | 9.0 |
| F_a | 120 | 100 |

Notes: 1N = 0.102 kg.
Mechanical endurance: 1000 cycles.

Notes: The forces were measured on PSU outer shells not fitted with contacts. The mechanical endurance represents the number of cycles after which the latching system is still effective (1 cycle = 1 latching/unlatching – 300 cycles per hour). The values were measured according to the standard IEC 60512-7, test 13a.

Contact resistance with relation to the number of mating cycles

(measured according to IEC 60512-2 test 2a)

Average values measured after the mating cycles and the salt spray test according to IEC 60512-6 test 11f.

| A ϕ (mm) | Contact resistance (m Ω) |
|---------------|----------------------------------|
| | 1000 cycles |
| 0.5 | < 8.5 |
| 0.7 | < 6.5 |
| 0.9 | < 4.5 |
| 1.3 | < 2.8 |
| 1.6 | < 2.6 |
| 2.0 | < 2.9 |

Note: 1) 21 days at 95% RH according to IEC 60068-2-3.

Insulation resistance between the contacts and contact/shell

(measured according to IEC 60512-2 test 3a)

| Insulating material | Multipole |
|-----------------------------------|-----------------------------|
| | PEEK |
| new | > 10 ¹² Ω |
| after humidity test ¹⁾ | > 10 ¹⁰ Ω |

Test voltage

Test voltage (U_e) :
(measured according to the IEC 60512-2 test 4a standard)

It corresponds to 75% of the mean breakdown voltage.
Test voltage is applied at 500 V/s and the test duration is 1 minute.

This test has been carried out with a mated plug and socket, with power supply only on the plug end.

Operating voltage (U_s) :
It is proposed according to the following ratio : $U_s = \frac{U_e}{3}$

Caution:

For a number of applications, safety requirements for electrical appliances are more severe with regard to operating voltage.

In such cases operating voltage is defined according to creepage distance and air clearance between live parts.

Please consult us for the choice of a connector by indicating the safety standard to be met by the product.

Technical tables

Table of American Wire Gauge

| AWG | Construction | | ø wire max | | Wire section | |
|------------------|--------------|------------|------------|-------|--------------------|----------------------|
| | Strand nb | AWG/strand | (mm) | (in) | (mm ²) | (sq in) |
| 0 | 259 | 24 | 11.277 | 0.444 | 52.90 | 0.0820 |
| 1 | 817 | 30 | 9.702 | 0.382 | 41.40 | 0.0641 |
| 2 | 259 | 26 | 8.89 | 0.35 | 33.20 | 0.0514 |
| 4 | 133 | 25 | 6.9596 | 0.274 | 21.5925 | 0.0335 |
| 6 | 133 | 27 | 5.5118 | 0.217 | 13.5885 | 0.0211 |
| 8 | 168 | 30 | 4.4450 | 0.175 | 8.5127 | 0.0132 |
| 8 | 133 | 29 | 4.3942 | 0.173 | 8.6053 | 0.0133 |
| 10 | 105 | 30 | 3.3020 | 0.13 | 5.3204 | 0.0082 |
| 10 | 37 | 26 | 2.9210 | 0.115 | 4.7397 | 0.0073 |
| 10 | 1 | 10 | 2.6162 | 0.103 | 5.2614 | 0.0082 |
| 12 | 37 | 28 | 2.3114 | 0.091 | 2.9765 | 0.0046 |
| 12 | 19 | 25 | 2.3622 | 0.093 | 3.0847 | 0.0048 |
| 12 ¹⁾ | 7 | 20 | 2.5400 | 0.10 | 3.6321 | 0.0056 |
| 12 | 1 | 12 | 2.0828 | 0.082 | 3.3081 | 0.0051 |
| 14 | 41 | 30 | 2.0574 | 0.081 | 2.0775 | 0.0032 |
| 14 | 19 | 27 | 1.8542 | 0.073 | 1.9413 | 0.0030 |
| 14 ¹⁾ | 7 | 22 | 2.0828 | 0.082 | 2.2704 | 0.0035 |
| 14 | 1 | 14 | 1.6510 | 0.065 | 2.0820 | 0.0032 |
| 16 ¹⁾ | 65 | 34 | 1.5748 | 0.062 | 1.3072 | 0.0020 |
| 16 | 26 | 30 | 1.5748 | 0.062 | 1.3174 | 0.0020 |
| 16 | 19 | 29 | 1.4986 | 0.059 | 1.2293 | 0.0019 |
| 16 ¹⁾ | 7 | 24 | 1.5494 | 0.061 | 1.4330 | 0.0022 |
| 16 | 1 | 16 | 1.3208 | 0.052 | 1.3076 | 0.0020 |
| 18 ¹⁾ | 65 | 36 | 1.2700 | 0.05 | 0.8234 | 0.0013 |
| 18 ¹⁾ | 42 | 34 | 1.2700 | 0.05 | 0.8447 | 0.0013 |
| 18 | 19 | 30 | 1.3208 | 0.052 | 0.9627 | 0.0015 |
| 18 | 16 | 30 | 1.2954 | 0.051 | 0.8107 | 0.0013 |
| 18 | 7 | 26 | 1.2700 | 0.05 | 0.8967 | 0.0014 |
| 18 | 1 | 18 | 1.0414 | 0.041 | 0.8229 | 0.0013 |
| 20 ¹⁾ | 42 | 36 | 1.0160 | 0.04 | 0.5320 | 8.2x10 ⁻⁴ |
| 20 | 19 | 32 | 1.0414 | 0.041 | 0.6162 | 0.0010 |
| 20 | 10 | 30 | 1.0160 | 0.04 | 0.5067 | 7.9x10 ⁻⁴ |
| 20 | 7 | 28 | 0.9906 | 0.039 | 0.5631 | 8.7x10 ⁻⁴ |
| 20 | 1 | 20 | 0.8382 | 0.033 | 0.5189 | 8.0x10 ⁻⁴ |
| 22 | 19 | 34 | 0.8382 | 0.033 | 0.3821 | 5.9x10 ⁻⁴ |
| 22 | 7 | 30 | 0.7874 | 0.031 | 0.3547 | 5.5x10 ⁻⁴ |
| 22 | 1 | 22 | 0.6604 | 0.026 | 0.3243 | 5.0x10 ⁻⁴ |
| 24 ¹⁾ | 42 | 40 | 0.6604 | 0.026 | 0.2045 | 3.2x10 ⁻⁴ |
| 24 | 19 | 36 | 0.6858 | 0.027 | 0.2407 | 3.7x10 ⁻⁴ |
| 24 | 7 | 32 | 0.6350 | 0.025 | 0.2270 | 3.5x10 ⁻⁴ |
| 24 | 1 | 24 | 0.5588 | 0.022 | 0.2047 | 3.2x10 ⁻⁴ |
| 26 | 19 | 38 | 0.5588 | 0.022 | 0.1540 | 2.4x10 ⁻⁴ |
| 26 | 7 | 34 | 0.5080 | 0.02 | 0.1408 | 2.2x10 ⁻⁴ |
| 26 | 1 | 26 | 0.4318 | 0.017 | 0.1281 | 2.0x10 ⁻⁴ |
| 28 ¹⁾ | 19 | 40 | 0.4318 | 0.017 | 0.0925 | 1.4x10 ⁻⁴ |
| 28 | 7 | 36 | 0.4064 | 0.016 | 0.0887 | 1.4x10 ⁻⁴ |
| 28 | 1 | 28 | 0.3302 | 0.013 | 0.0804 | 1.2x10 ⁻⁴ |
| 30 | 7 | 38 | 0.3302 | 0.013 | 0.0568 | 8.8x10 ⁻⁵ |
| 30 | 1 | 30 | 0.2794 | 0.011 | 0.0507 | 7.9x10 ⁻⁵ |
| 32 | 7 | 40 | 0.2794 | 0.011 | 0.0341 | 5.3x10 ⁻⁵ |
| 32 | 1 | 32 | 0.2286 | 0.009 | 0.0324 | 5.0x10 ⁻⁵ |
| 34 | 1 | 34 | 0.1693 | 0.007 | 0.0201 | 3.1x10 ⁻⁵ |
| 36 | 1 | 36 | 0.127 | 0.005 | 0.0127 | 2.0x10 ⁻⁵ |
| 38 | 1 | 38 | 0.1016 | 0.004 | 0.0081 | 1.3x10 ⁻⁵ |
| 40 | 1 | 40 | 0.078 | 0.003 | 0.0049 | 7.5x10 ⁻⁶ |

Table of wire gauges according to IEC-60228 standard

| Conductor no x Ø (mm) | Max Ø (mm) | Max Ø (in) | Section (mm ²) | Section (sq in) |
|-----------------------|------------|------------|----------------------------|----------------------|
| 196x0.40 | 7.50 | 0.295 | 25.00 | 0.0387 |
| 7x2.14 | 6.10 | 0.240 | 25.00 | 0.0387 |
| 125x0.40 | 6.00 | 0.236 | 16.00 | 0.0248 |
| 7x1.72 | 4.90 | 0.192 | 16.00 | 0.0248 |
| 1x4.50 | 4.50 | 0.177 | 16.00 | 0.0248 |
| 80x0.40 | 4.70 | 0.155 | 10.00 | 0.0155 |
| 7x1.38 | 3.95 | 0.155 | 10.00 | 0.0155 |
| 1x3.60 | 3.60 | 0.141 | 10.00 | 0.0155 |
| 84x0.30 | 3.70 | 0.145 | 6.00 | 0.0093 |
| 7x1.50 | 3.15 | 0.124 | 6.00 | 0.0093 |
| 1x2.76 | 2.76 | 0.108 | 6.00 | 0.0093 |
| 56x0.30 | 2.80 | 0.110 | 4.00 | 0.0062 |
| 7x0.86 | 2.58 | 0.098 | 4.00 | 0.0062 |
| 1x2.25 | 2.25 | 0.082 | 4.00 | 0.0062 |
| 50x0.25 | 2.15 | 0.084 | 2.50 | 0.0038 |
| 7x0.68 | 2.04 | 0.080 | 2.50 | 0.0038 |
| 1x1.78 | 1.78 | 0.070 | 2.50 | 0.0038 |
| 30x0.25 | 1.60 | 0.062 | 1.50 | 0.0023 |
| 7x0.52 | 1.56 | 0.061 | 1.50 | 0.0023 |
| 1x1.4 | 1.40 | 0.055 | 1.50 | 0.0023 |
| 32x0.20 | 1.35 | 0.053 | 1.00 | 0.0015 |
| 7x0.43 | 1.29 | 0.050 | 1.00 | 0.0015 |
| 1x1.15 | 1.15 | 0.045 | 1.00 | 0.0015 |
| 42x0.15 | 1.20 | 0.047 | 0.75 | 0.0011 |
| 28x0.20 | 1.15 | 0.045 | 0.75 | 0.0011 |
| 1x1.0 | 1.00 | 0.039 | 0.75 | 0.0011 |
| 28x0.15 | 0.95 | 0.037 | 0.50 | 7.7x10 ⁻⁴ |
| 16x0.20 | 0.90 | 0.035 | 0.50 | 7.7x10 ⁻⁴ |
| 1x0.80 | 0.80 | 0.031 | 0.50 | 7.7x10 ⁻⁴ |
| 7x0.25 | 0.75 | 0.029 | 0.34 | 5.2x10 ⁻⁴ |
| 1x0.60 | 0.60 | 0.023 | 0.28 | 4.3x10 ⁻⁴ |
| 14x0.15 | 0.75 | 0.029 | 0.25 | 3.8x10 ⁻⁴ |
| 7x0.20 | 0.65 | 0.023 | 0.22 | 3.4x10 ⁻⁴ |
| 18x0.10 | 0.50 | 0.019 | 0.14 | 2.1x10 ⁻⁴ |
| 14x0.10 | 0.40 | 0.015 | 0.11 | 1.7x10 ⁻⁴ |
| 21x0.07 | 0.40 | 0.015 | 0.09 | 1.3x10 ⁻⁴ |
| 14x0.10 | 0.40 | 0.015 | 0.09 | 1.3x10 ⁻⁴ |

Note: 1) not included in the standard

Product safety notice

PLEASE READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY AND CONSULT ALL RELEVANT NATIONAL AND INTERNATIONAL SAFETY REGULATIONS FOR YOUR APPLICATION. IMPROPER HANDLING, CABLE ASSEMBLY, OR WRONG USE OF CONNECTORS CAN RESULT IN HAZARDOUS SITUATIONS.

1. SHOCK AND FIRE HAZARD

Incorrect wiring, the use of damaged components, presence of foreign objects (such as metal debris), and / or residue (such as cleaning fluids), can result in short circuits, overheating, and / or risk of electric shock.

Mated components should never be disconnected while live as this may result in an exposed electric arc and local overheating, resulting in possible damage to components.

2. HANDLING

Connectors and their components should be visually inspected for damage prior to installation and assembly. Suspect components should be rejected or returned to the factory for verification.

Connector assembly and installation should only be carried out by properly trained personnel. Proper tools must be used during installation and / or assembly in order to obtain safe and reliable performance.

3. USE


Connectors with exposed contacts should never be live (or on the current supply side of a circuit). Under general conditions voltages above 30 VAC and 42 VDC are considered hazardous and proper measures should be taken to eliminate all risk of transmission of such voltages to any exposed metal part of the connector.


4. TEST AND OPERATING VOLTAGES

The maximum admissible operating voltage depends upon the national or international standards in force for the application in question. Air and creepage distances impact the operating voltage; reference values are indicated in the catalog however these may be influenced by PC board design and / or wiring harnesses.

The test voltage indicated in the catalog is 75% of the mean breakdown voltage; the test is applied at 500 V/s and the test duration is 1 minute.

5. CE MARKING

CE marking  means that the appliance or equipment bearing it complies with the protection requirements of one or several European safety directives.

CE marking  applies to complete products or equipment, **but not to electromechanical components, such as connectors.**

6. PRODUCT IMPROVEMENTS

The LEMO Group reserves the right to modify and improve to our products or specifications without providing prior notification.

Notes:

Notes:

| | B | S | K | E | F | 00 | 01 | 0A | 3T | 4A | 4M | 3K.93C | 1D | Y | 05 | 5G | 2G | 2C | L | H | M | R | N | 03 | V | W | F | P | D | K/S | 01 | DIN | | |
|--------------------|---|---|---|---|---|----|----|----|----|----|----|--------|----|---|----|----|----|----|---|---|---|---|---|----|---|---|---|---|---|-----|----|-----|--|--|
| Unipole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multipole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coaxial 50 Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coaxial 75 Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multi Coaxial | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mixed Coax + LV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Triaxial 50 Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Triaxial 75 Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mixed Triax + LV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quadrax | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| High Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multi High Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mixed HV + LV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fibre Optic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multi Fibre Optic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mixed FO + LV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Thermocouple | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fluidic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multi Fluidic | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mixed Fluidic + LV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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