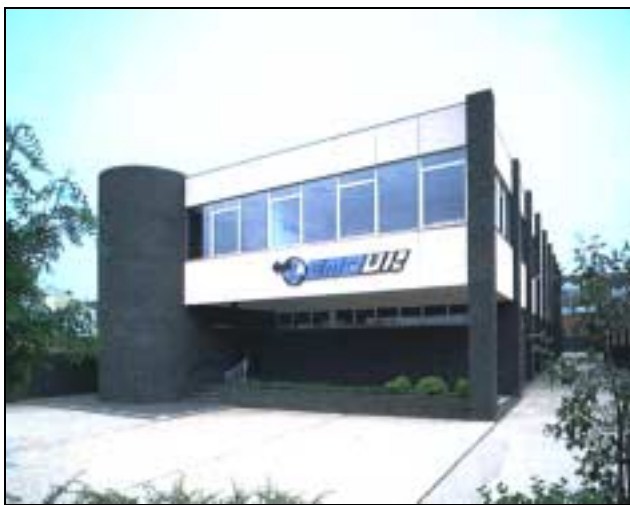


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## Introduction



**LEMO** is one of the world's leading manufacturers of professional connectors.

Initially employing 3 people making 35 products in premises of 70 m<sup>2</sup> at Morges in Switzerland, today over 50 years on, the LEMO group includes 15 companies with world-wide distribution. Over 620 staff work in facilities of more than 31'330 m<sup>2</sup> to produce over 40'000 different products.

This success can be explained by the reliability of the LEMO self-latching Push-Pull system, continuous product development and by the never-ending search for quality which has influenced the company since it's creation.

The organisation and the structure of these companies enable LEMO to control more than 93% of the added value of it's products and to distribute them in more than 80 countries.

## Quality self-latching interconnection

The LEMO range of precision self-latching electrical and fibre optic connectors has been developed and refined over many years to provide a complete choice for customers. This research is particularly apparent on the 4M series. Amongst the many benefits are the following:

- Modular design provides extensive choice to suit most applications.
- Quick and simple to install or disconnect.
- Safe - no risk of unintentional disconnection through pulling on the cable.
- Extremely reliable - all metal components are precision machined with gold plated contacts.
- Aesthetically pleasing designs to enhance the appearance of your product.

Due to the wide variety of possibilities of designs that can be supplied, it is strongly recommended that customers contact LEMO for a demonstration and evaluation of their applications.

### Self-latching PUSH-PULL system



Extremely easy and quick mating/unmating. Absolute security against vibration, shock or pull on the cable. Ease of operation in very limited space.



The self-latching system allows the connector to be mated by simply pushing the plug axially into the socket.



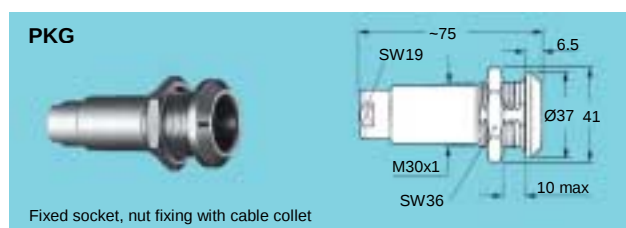
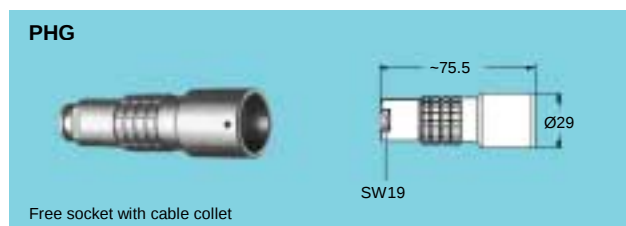
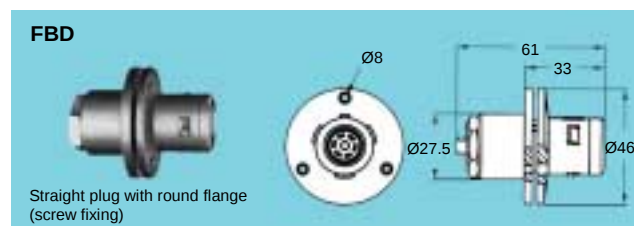
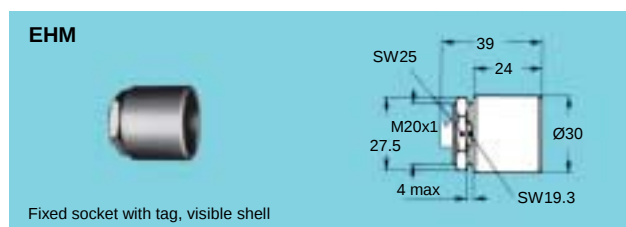
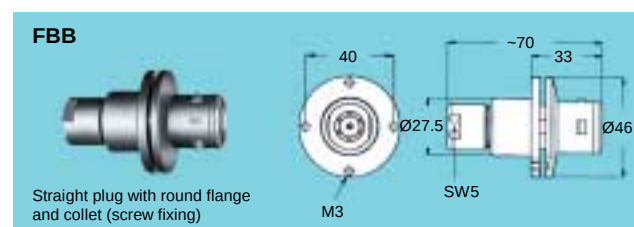
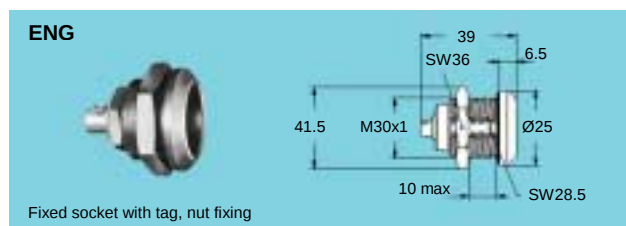
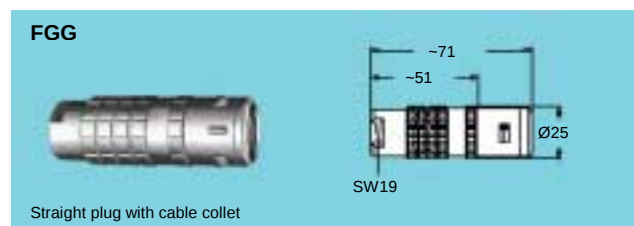
Connection cannot be broken by pulling on the cable or any part other than the outer shell.



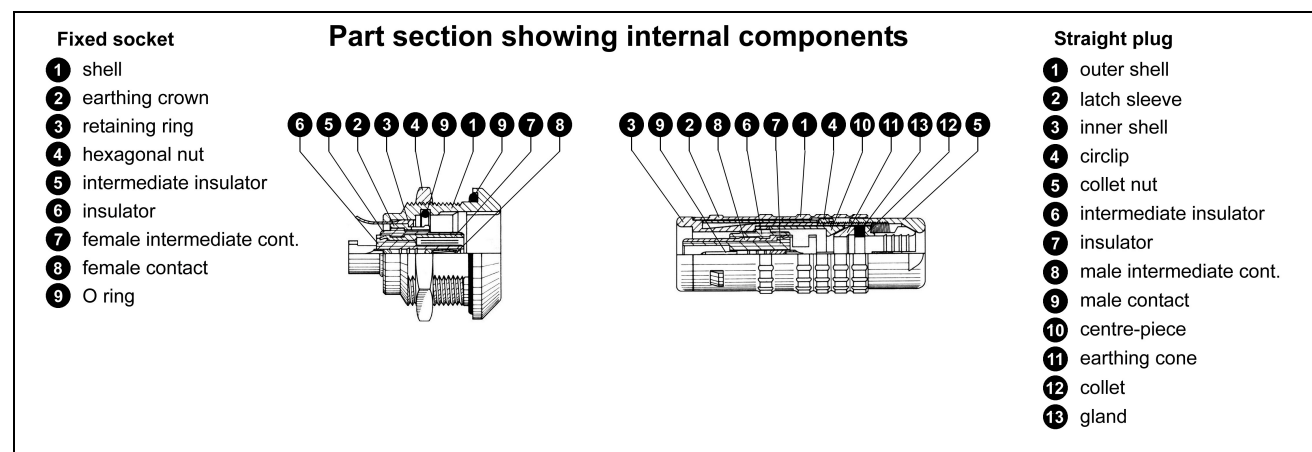
When required, the disengagement is by a single straight axial pull on the outer shell.

The LEMO 4M series of triaxial connectors are equipped with housings designed for use in harsh environments. Available in both 50  $\Omega$  and 75  $\Omega$  versions ( 75  $\Omega$  on request ), the wide range of models are designed to meet the requirements of the television and entertainment industries. Similar in construction to the E series, 4M connectors have a high degree of protection rated at IP66 in accordance with standard IEC 529 for mated connectors (up to IP68 if assembled to special instructions). In addition the outer shells are provided with a mechanical guide to prevent any connector rotation thereby avoiding any interruption of signals. The 4M.650 is a BBC standard connector for broadcast cameras.

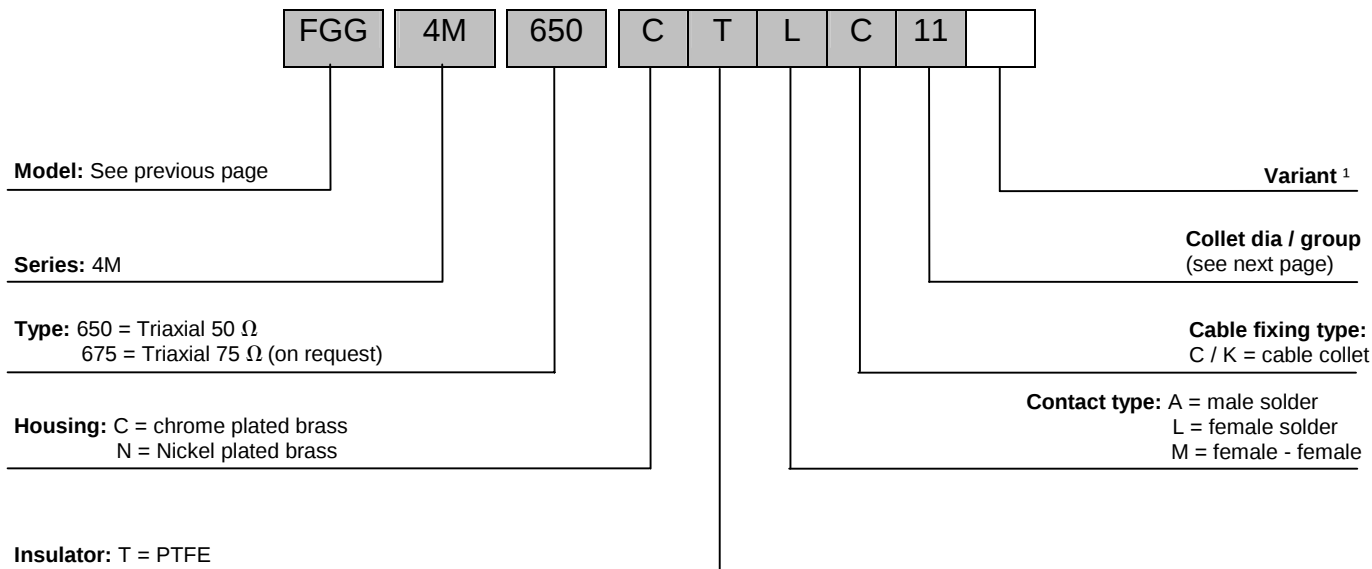
## Connector styles



All dimensions are in mm



## Part number example



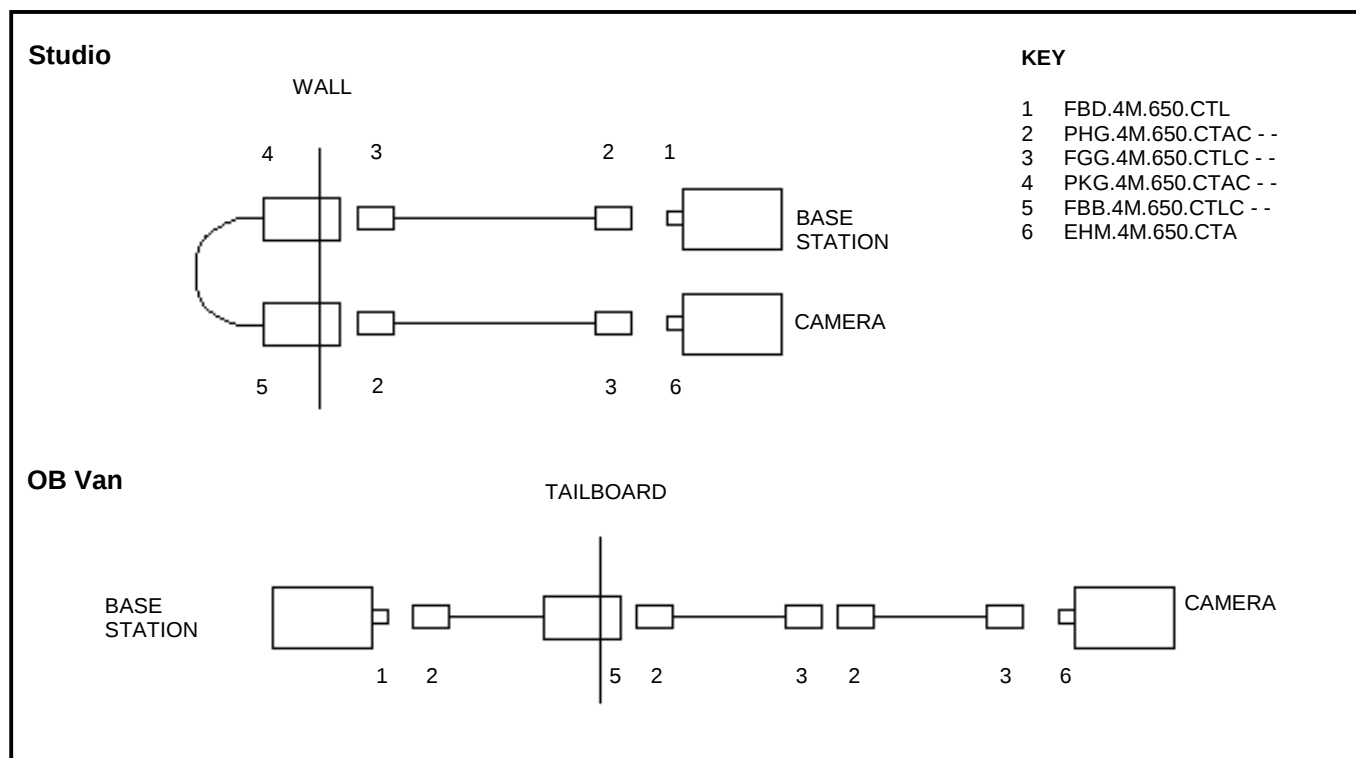
Note: As a standard, plugs are fitted with male contacts and sockets with female contacts. On request all plugs can be fitted with female contacts and sockets with male.  
Sockets have a gold plated earthing crown.

<sup>1</sup> A 'Z' in the variant position of the part number indicates that the model is fitted with a nut for accommodating a strain relief. The strain relief is ordered separately (see 'Accessories' section for part number).

## FGG.4M.650.CTLC11

Straight plug with key (G) and cable collet, series 4M, triaxial 50  $\Omega$  type, chrome plated brass shell, PTFE insulators, female solder contact, C type collet for a group 11 cable.

## Typical layout



## Recommended cables

| Supplier / Part number |                       | Basic coaxial cable | Impedance $\Omega$  | Construction and dimensions (mm) |      |      |              |      |          |       |              |       |          |       |        | Collet dia / Cable group |                 |
|------------------------|-----------------------|---------------------|---------------------|----------------------------------|------|------|--------------|------|----------|-------|--------------|-------|----------|-------|--------|--------------------------|-----------------|
|                        |                       |                     |                     | Conductor                        |      |      | Dielectric 1 |      | Screen 1 |       | Dielectric 2 |       | Screen 2 |       | Sheath |                          |                 |
|                        |                       |                     |                     | Constr.                          | Mat. | Dia  | Mat.         | Dia  | Mat.     | Dia   | Mat.         | Dia   | Mat.     | Dia   | Mat.   |                          | Dia             |
| Belden                 | 9222                  | RG.58A/U            | 50 $\Omega \pm 2\%$ | 7 x 0.32                         | CuSn | 0.90 | PE           | 2.90 | CuSn     |       | PE           |       | CuSn     |       | PVC    | 6.10                     | 65              |
| Belden                 | 9267                  | RG.59/U             | 75 $\Omega \pm 3\%$ | solid                            | Cu   | 0.84 | PE           | 3.70 | Cu       |       | PE           |       | Cu       |       | CSM    | 9.20                     | 95              |
| Belden                 | 9888                  | RG.8/U              | 50 $\Omega \pm 2\%$ | 7 x 0.91                         | Cu   | 2.70 | PE           | 7.30 | Cu       |       | PE           |       | Cu       |       | PE     | 12.20                    | 12              |
| Bryant                 | TR 765A               |                     | 75 $\Omega \pm 3\%$ | solid                            | CuAg | 1.02 | PE           | 4.60 | CuAg     | 5.10  | PE           | 6.40  | Cu       | 7.00  | PVC    | 8.50                     | 85              |
| Bryant                 | TR 755A               |                     | 75 $\Omega \pm 2\%$ | solid                            | CuAg | 1.40 | PE           | 6.40 | CuAg     | 6.90  | PE           | 8.50  | Cu       | 9.10  | PVC    | 11.20                    | 11              |
| Bryant                 | TR 745A               |                     | 75 $\Omega \pm 2\%$ | 7 x 0.70                         | CuAg | 2.10 | PE           | 9.70 | CuAg     | 10.40 | PE           | 11.80 | Cu       | 12.60 | PVC    | 14.40                    | 15              |
| Filotex                | 11820                 | RG.58B/U            | 50 $\Omega \pm 2\%$ | 19 x 0.18                        | CuSn | 0.90 | PE           | 3.00 |          |       | PE           |       |          |       | PVC    | 7.20                     | 75              |
| NEK                    | 63990                 |                     | 75 $\Omega \pm 3\%$ | solid                            | CuAg | 1.40 | PE           | 6.30 | CuAg     |       | PE           | 8.50  | Cu       |       | PUR    | 11.00                    | 11              |
| NEK                    | 23860                 |                     | 75 $\Omega \pm 3\%$ | solid                            |      | 1.00 | PE           | 4.50 |          |       | PE           |       |          |       |        | 8.60                     | 90              |
| NOKIA                  | Triax 8               |                     | 75 $\Omega \pm 3\%$ | solid                            | CuAg | 1.00 | PE           | 4.50 | CuAg     | 5.10  | PE           | 6.60  | Cu       | 7.20  | PUR    | 8.60                     | 90              |
| NOKIA                  | Triax 11              |                     | 75 $\Omega \pm 3\%$ | solid                            | CuAg | 1.40 | PE           | 6.50 | CuAg     | 7.10  | PE           | 8.60  | Cu       | 9.20  | PUR    | 10.90                    | 11              |
| NOKIA                  | Triax 14              |                     | 75 $\Omega \pm 3\%$ | strand                           | CuAg | 2.20 | PE           | 9.70 | CuAg     | 10.50 | PE           | 11.90 | Cu       | 12.70 | PUR    | 14.50                    | 15              |
| Superflex              | Triax 8               |                     | 75 $\Omega \pm 3\%$ | 7 x 0.35                         | CuAg | 1.05 | PE           | 4.50 | CuAg     |       | TPE          | 6.50  | Cu       |       | TPE    | 8.50                     | 85              |
| Superflex              | Triax 11 <sup>1</sup> |                     | 75 $\Omega \pm 3\%$ | 19 x 0.30                        | CuAg | 1.40 | PE           | 6.10 | CuAg     |       | TPE          | 8.50  | Cu       |       | TPE    | 11.20                    | 11 <sup>1</sup> |
| Superflex              | Triax 14              |                     | 75 $\Omega \pm 3\%$ | 12 x 0.50                        | CuAg | 2.10 | PE           | 9.70 | CuAg     |       | TPE          | 11.50 | Cu       |       | TPE    | 14.40                    | 15              |
| Bryant                 | BDFTR08               |                     | 75 $\Omega \pm 3\%$ | 7 x 0.35                         | CuAg |      | PE           | 3.70 | CuAg     |       | TPE          |       | Cu       |       | TPE    | 8.50                     | 85              |
| Bryant                 | BDFTR11               |                     | 75 $\Omega \pm 3\%$ | 19 x 0.287                       | CuAg |      | PE           | 6.40 | CuAg     |       | TPE          |       | Cu       |       | TPE    | 11.20                    | 11              |
| BBC                    | PSF1/9M               |                     | 75 $\Omega \pm 3\%$ | solid                            | CuAg | 1.25 | PE           | 6.50 | CuAg     |       | PE           | 8.50  | Cu       |       | PUR    | 11.20                    | 11              |

**Cu:** Copper  
**CuSn:** Tinned copper

**CuAg:** Silver-plated copper  
**PE:** Polyethylene

**PUR:** Polyurethane  
**TPE:** Thermoplastic elastomer

**CSM:** Hypalon  
**PVC:** Polyvinylchloride

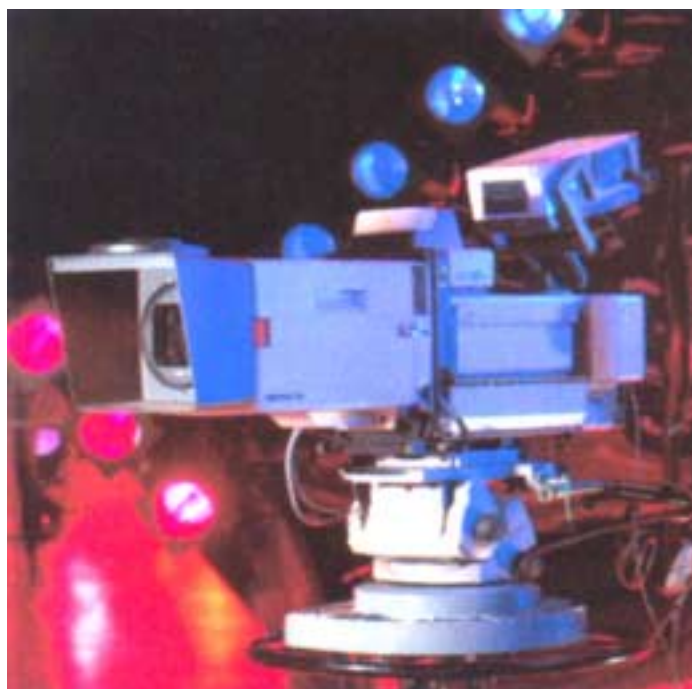
<sup>1</sup> There is also a 'Superflex Triax 11/17' which has the same specification as the Triax 11 cable with an additional PVC outer sheath of 17mm Dia, requiring the larger collet size K17.

## Type C collet

| Collet Dia / Cable group | 50  | 55  | 60  | 65  | 70  | 75  | 80  | 85  | 90  | 95  | 10   | 11   | 12   | 13   | 14   | 15   |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| Cable OD max (mm)        | 5.3 | 5.6 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.7 | 10.5 | 11.7 | 12.8 | 13.5 | 14.3 | 15.0 |
| Cable OD min (mm)        | 5.1 | 5.4 | 5.7 | 6.1 | 6.6 | 7.1 | 7.6 | 8.1 | 8.6 | 9.1 | 9.8  | 10.6 | 12.1 | 12.9 | 13.6 | 14.4 |

## Connector guide (UK Broadcast std.)

| Connector style | Connector part No. | Connector imp. ( $\Omega$ ) | Cable group / Collet size |
|-----------------|--------------------|-----------------------------|---------------------------|
| FGG             | FGG.4M.650.CTLC90  | 50                          | 90                        |
|                 | FGG.4M.650.CTLC11  | 50                          | 11                        |
|                 | FGG.4M.650.CTLC15  | 50                          | 15                        |
| FBB             | FBB.4M.650.CTLC90  | 50                          | 90                        |
|                 | FBB.4M.650.CTLC11  | 50                          | 11                        |
|                 | FBB.4M.650.CTLC15  | 50                          | 15                        |
| PHG             | PHG.4M.650.CTAC90  | 50                          | 90                        |
|                 | PHG.4M.650.CTAC11  | 50                          | 11                        |
|                 | PHG.4M.650.CTAC15  | 50                          | 15                        |
| PKG             | PKG.4M.650.CTAC90  | 50                          | 90                        |
|                 | PKG.4M.650.CTAC11  | 50                          | 11                        |
|                 | PKG.4M.650.CTAC15  | 50                          | 15                        |



## Technical characteristics

### Material and treatment

| Component                           | Material (Standard)          | Surface treatment ( $\mu\text{m}$ ) <sup>1</sup> |     |     |     |
|-------------------------------------|------------------------------|--------------------------------------------------|-----|-----|-----|
|                                     |                              | Cu                                               | Ni  | Cr  | Au  |
| Outer shell, collet nut and circlip | Brass (UNS C 38500)          | 0.5                                              | 3.0 | 0.3 |     |
| Earthing crown                      | Brass (UNS C 38500)          | 0.5                                              | 3.0 |     | 1.5 |
| Latch sleeve                        | Special brass                | 0.5                                              | 3.0 | 0.3 |     |
| Inner sleeve                        | Brass (UNS C 38500)          | 0.5                                              | 3.0 |     |     |
| Other metallic parts                | Brass (UNS C 38500)          | 0.5                                              | 3.0 |     |     |
| Gland and 'O' ring                  | Silicone rubber (ASTM D.200) |                                                  |     |     |     |
| Insulators                          | PTFE (ASTM D 1457-83)        |                                                  |     |     |     |
| Male intermediate contact           | Brass (UNS C 38500)          | 0.5                                              | 3.0 |     | 1.5 |
| Female intermediate contact         | Bronze (UNS C 54400)         | 0.5                                              | 3.0 |     | 2.0 |
| Male contact                        | Brass (UNS C 38500)          | 0.5                                              | 3.0 |     | 1.5 |
| Female contact                      | Bronze (UNS C 54400)         | 0.5                                              | 3.0 |     | 2.0 |

### Mechanical and climatical

| Characteristics                    | Value                           | Standard      | Method |
|------------------------------------|---------------------------------|---------------|--------|
| Cable retention force <sup>2</sup> | 500 N                           | MIL-STD-1344A | 2009.1 |
| Endurance                          | >1000 CYCLES                    | MIL-STD-1344A | 2016   |
| Degree of protection               | IP 66                           | IEC 529       |        |
| Operating temperature              | - 55°C + 230°C (- 67°F + 446°F) |               |        |

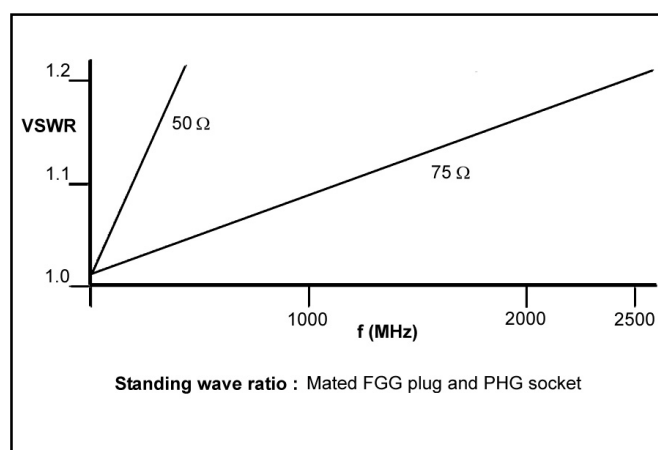
<sup>1</sup> The surface treatment standards are as follows:

- Nickel FS-QQ-N-290A
- Chrome FS-QQ-C-320B
- Gold MIL-G-45204C type I, class 1

<sup>2</sup> Average value 1N = 0.102 kg

### Electrical

| Characteristics                                   | Value                       |                             | Standard          | Method |
|---------------------------------------------------|-----------------------------|-----------------------------|-------------------|--------|
| Impedance                                         | 50 $\Omega$                 | 75 $\Omega$                 |                   |        |
| Operating voltage int.screen/contact <sup>3</sup> | 0.9 kV                      | 0.7kV                       | IEC 130-1 1re Ed. | t14.5  |
| Operating voltage screen/screen <sup>3</sup>      | 0.6 kV                      | 0.5 kV                      | IEC 130-1 1re Ed. | t14.5  |
| Test voltage int.screen/contact                   | 2.6 kV                      | 2.2 kV                      | MIL-STD-1344A     | 3001.1 |
| Test voltage screen/screen                        | 1.8 kV                      | 1.5 kV                      | MIL-STD-1344A     | 3001.1 |
| Rated current                                     | 26 A                        | 15 A                        | IEC 512-3         |        |
| Contact resistance                                | < 2.5 m $\Omega$            | < 3 m $\Omega$              | MIL-STD-202F      | 307    |
| Resistance contact/int.screen                     | < 0.5 m $\Omega$            | < 1 m $\Omega$              | MIL-STD-202F      | 307    |
| Insulating resistance contact/int.screen          | < 10 <sup>12</sup> $\Omega$ | < 10 <sup>12</sup> $\Omega$ | MIL-STD-1344A     | 3003.1 |
| Insulating resistance screen/screen               | < 10 <sup>12</sup> $\Omega$ | < 10 <sup>12</sup> $\Omega$ | MIL-STD-1344A     | 3003.1 |
| Frequency range VSWR < 1.2                        | 0.5 GHz                     | 1.3 GHz                     |                   |        |
| VSWR (f in GHz)                                   | 1.01 +0.38f                 | 1.01 + 0.14f                | MIL-STD-1344A     | 3005   |



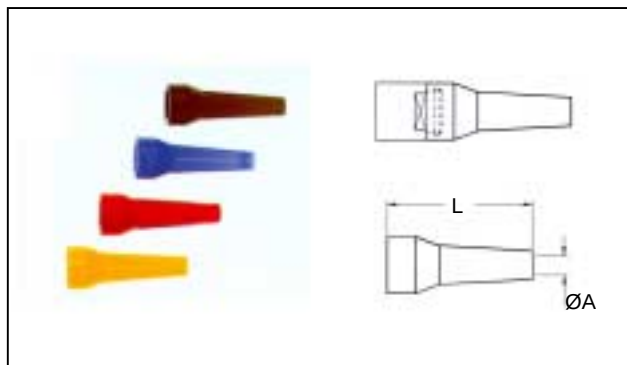
Note: Operating and test voltage are kV rms and have been measured at 50 Hz frequency

<sup>3</sup> **WARNING: For many applications, more specific safety standards may apply regarding determination of the working voltage  $U_s$ . Consider carefully when selecting connectors**

## Accessories

### Strain relief

The cable entry of plug and socket models with cable collets can be protected by a sleeve made of polyurethane. This accessory can be supplied according to the part numbers below.



| Part number <sup>1</sup> | Strain relief (mm) |    | Cable dia (mm) |      |
|--------------------------|--------------------|----|----------------|------|
|                          | A                  | L  | max.           | min. |
| GMA.4B.080.D-            | 8.0                | 60 | 9.0            | 8.0  |
| GMA.4B.010.D-            | 10.0               | 60 | 10.9           | 10.0 |
| GMA.4B.011.D-            | 11.0               | 60 | 11.9           | 11.0 |
| GMA.4B.012.D-            | 12.0               | 60 | 13.0           | 12.0 |
| GMA.4B.013.D-            | 13.5               | 60 | 14.5           | 13.5 |

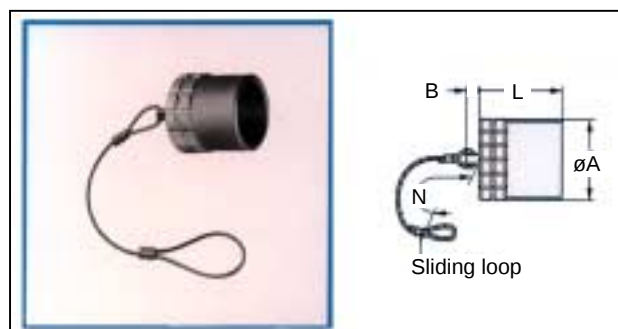
| Ref. | Colour |
|------|--------|
| A    | Blue   |
| B    | White  |
| G    | Grey   |
| J    | Yellow |
| M    | Brown  |
| N    | Black  |
| R    | Red    |
| S    | Orange |
| V    | Green  |

<sup>1</sup> Select colour of strain relief by adding letter from table on right to the end of the part number.

! Remember to add a 'Z' in the variant position of your connector code to accommodate the strain relief.

Note: Material is Polyurethane (Desmopan 786) and has a working temperature range of - 40°C + 80°C (- 40°F + 176°F)

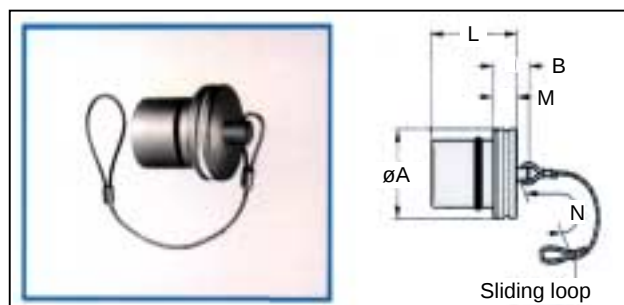
### Plug cap



| Part number    | 'O' ring material | Dimensions (mm) |    |      |     | Weight (g) |
|----------------|-------------------|-----------------|----|------|-----|------------|
|                |                   | A               | B  | L    | N   |            |
| BFG.4K.100.NAS | Silicone rubber   | 29.0            | 10 | 24.5 | 120 | 37         |
| BFG.4K.100.NAV | FPM (Viton)       | 29.0            | 10 | 24.5 | 120 | 37         |

Note: Body material: Brass (UNS C 38500), nickel plated (Ni 3µm)

### Blanking cap for free sockets

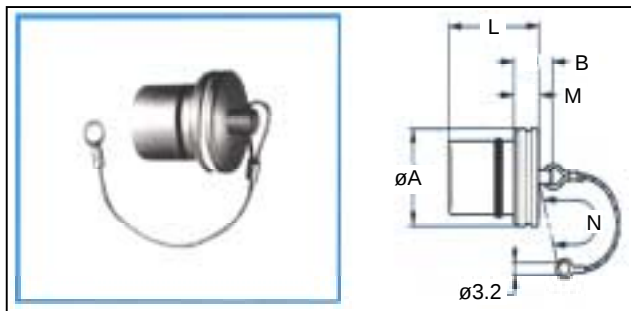


| Part number    | 'O' ring material | Dimensions (mm) |    |      |    |     | Weight (g) |
|----------------|-------------------|-----------------|----|------|----|-----|------------|
|                |                   | A               | B  | L    | M  | N   |            |
| BRF.4K.200.NAS | Silicone rubber   | 30.0            | 20 | 30.5 | 10 | 120 | 51         |
| BRF.4K.200.NAV | FPM (Viton)       | 30.0            | 20 | 30.5 | 10 | 120 | 51         |

Note: Body material: Brass (UNS C 38500), nickel plated (Ni 3µm)

All dimensions in mm

## Blanking cap for fixed sockets



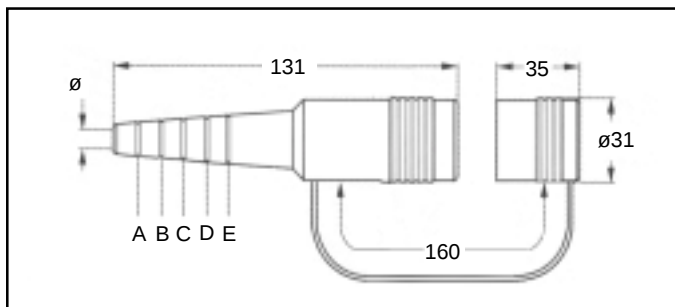
| Part number    | 'O' ring material | Dimensions (mm) |    |      |    |     | Weight (g) |
|----------------|-------------------|-----------------|----|------|----|-----|------------|
|                |                   | A               | B  | L    | M  | N   |            |
| BRE.4K.200.NAS | Silicone rubber   | 30.0            | 20 | 30.5 | 10 | 120 | 51         |
| BRE.4K.200.NAV | FPM (Viton)       | 30.0            | 20 | 30.5 | 10 | 120 | 51         |

Note: Body material: Brass (UNS C 38500), nickel plated (Ni 3µm)

## Strain relief with integral cap

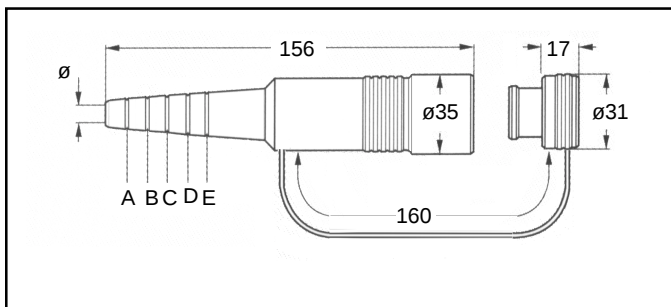
For added protection for an unmated connector, a strain relief with integral cap can be fitted to the FGG and PHG models. Manufactured from black EPDM.

### FGG Style



All dimensions in mm

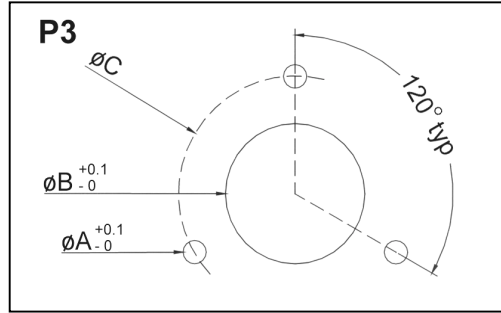
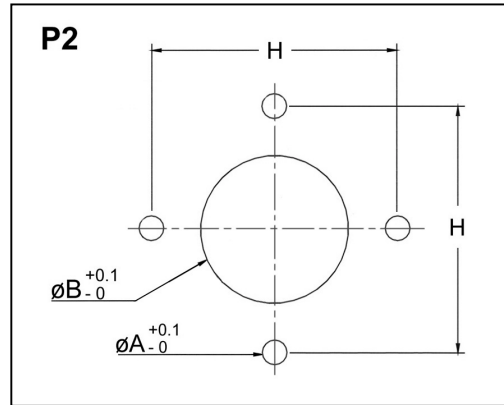
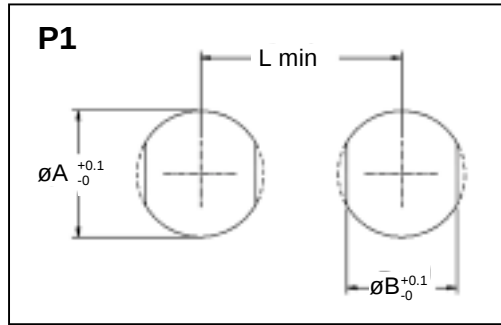
### PHG Style



| Part number     | Connector style | Section | Cable dia. |      |
|-----------------|-----------------|---------|------------|------|
|                 |                 |         | Min.       | Max. |
| GMF.4K.080.EANZ | FGG             | --      | 8.0        | 8.9  |
|                 |                 | A       | 9.0        | 9.9  |
|                 |                 | B       | 10.0       | 11.4 |
|                 |                 | C       | 11.5       | 12.9 |
|                 |                 | D       | 13.0       | 14.9 |
|                 |                 | E       | 15.0       | 16.5 |

| Part number     | Connector style | Section | Cable dia. |      |
|-----------------|-----------------|---------|------------|------|
|                 |                 |         | Min.       | Max. |
| GMP.4K.080.EANZ | PHG             | --      | 8.0        | 8.9  |
|                 |                 | A       | 9.0        | 9.9  |
|                 |                 | B       | 10.0       | 11.4 |
|                 |                 | C       | 11.5       | 12.9 |
|                 |                 | D       | 13.0       | 14.9 |
|                 |                 | E       | 15.0       | 16.5 |

## Panel cut-outs

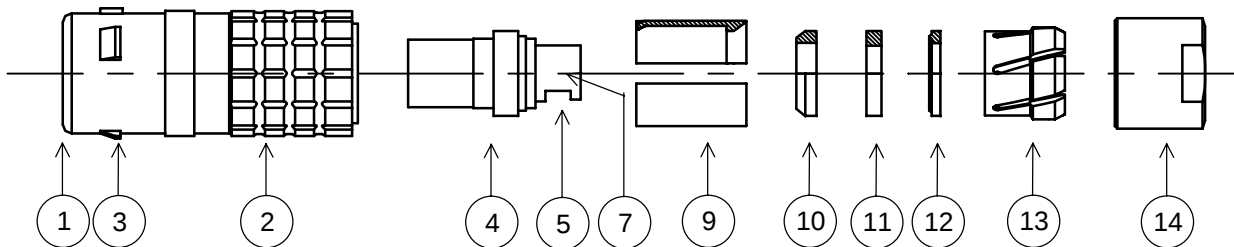


| Model   | P1   |      |      | P2  |      |      | P3  |      |      |
|---------|------|------|------|-----|------|------|-----|------|------|
|         | A    | B    | L    | A   | B    | H    | A   | B    | C    |
| EHM     | 20.2 | 19.5 | 32.0 |     |      |      |     |      |      |
| ENG-PKG | 30.2 | 28.7 | 43.0 |     |      |      |     |      |      |
| FBB     |      |      |      | 3.1 | 27.7 | 40.0 |     |      |      |
| FBD     |      |      |      |     |      |      | 5.0 | 27.7 | 35.0 |

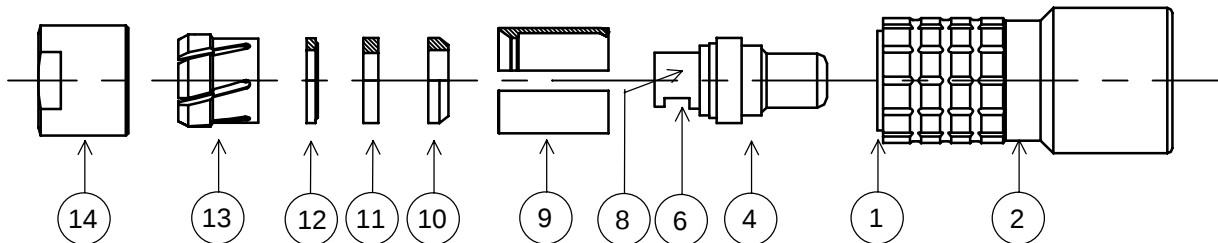
All dimensions in mm

## Cable termination and assembly

### FGG style



### PHG style

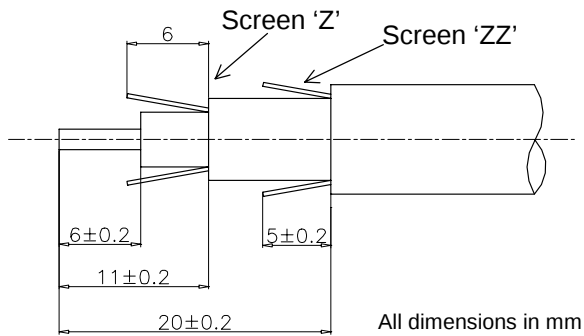


1. Inner shell
2. Outer shell
3. Spring sleeve
4. Insert

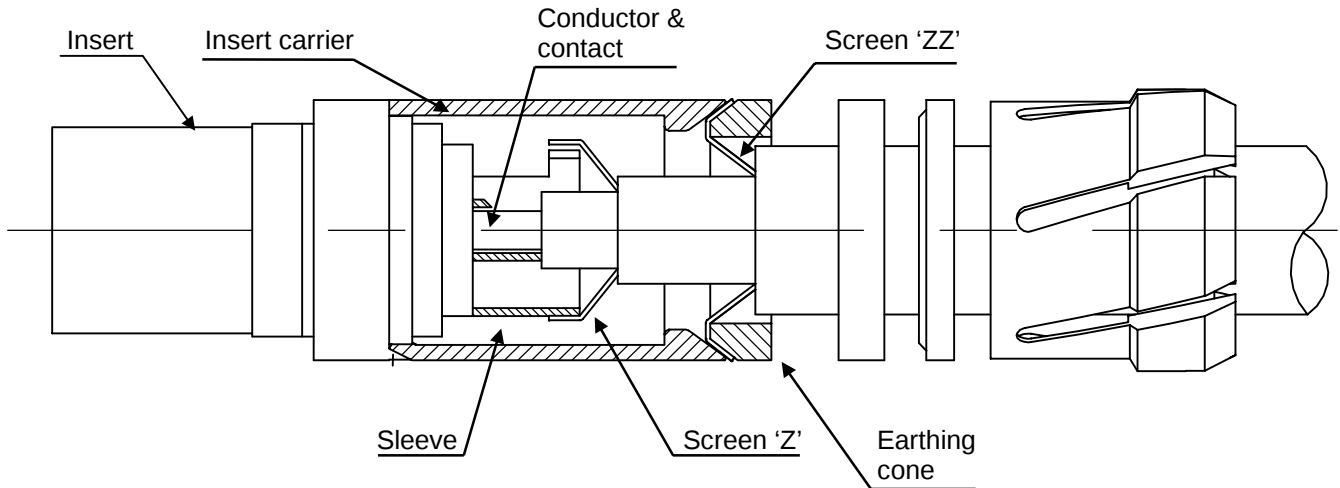
5. Female sleeve
6. Male sleeve
7. Female contact
8. Male contact

9. Split insert carrier
10. Earthing cone
11. Gasket
12. Washer

13. Collet
14. Collet nut



1. Slide collet nut, collet, washer, gasket and earthing cone on cable.
2. Strip cable to dimensions opposite.
3. Introduce conductor into contact and solder.
4. Solder the screen 'Z' over sleeve.
5. Fold screen 'ZZ' back over earthing cone.
6. Mount the two halves of the split insert carrier (note one half is keyed).
7. Push insert assembly into connector housing locating on key.
8. Screw collet nut on.



## Notes

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