



SERIES BMA, SUBMINIATURE BLIND MATE CONNECTORS

DESCRIPTION

HUBER+SUHNER BMA blind mate connectors open up special dimensions in microwave applications up to 18 GHz. HUBER+SUHNER offers a range of connectors for fixed as well as "floating" configurations with any axial or radial misalignment taken out by the outer contact of the jacks.

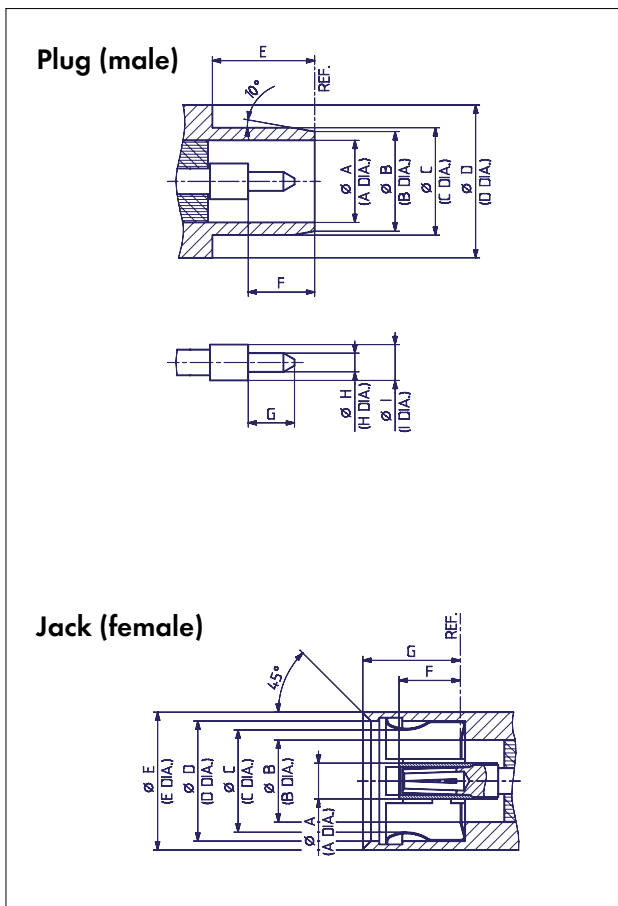
The BMA series presents an outstanding range of products featuring high reliability and ease of assembly.

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INTERFACE DIMENSIONS



INTERFACE DIMENSIONS (MM / INCHES)

| | Plug | | Jack | |
|---|------------------|-----------|------------------|-----------|
| | min. | max. | min. | max. |
| A | 4.09 / .161 nom. | | 1.78 / .070 nom. | |
| B | 4.88 / .192 nom. | | 4.09 / .161 nom. | |
| C | 5.31/.209 | 5.35/.211 | — | 5.08/.200 |
| D | 7.62 / .300 nom. | | 5.71/.225 | — |
| E | 5.03/.198 | — | 7.37/.290 | — |
| F | 3.25/.128 | — | 3.05/.120 | 3.23/.127 |
| G | 2.29 / .090 nom. | | — | 5.03/.198 |
| H | 0.90/.035 | 0.94/.037 | | |
| I | 1.78 / .070 nom. | | | |

Interface dimensions conformable to the Standards:

USA: MIL-STD-348A/321

COMPATIBILITY

The HUBER+SUHNER range of BMA connectors is fully compatible with the OSP connector series.

IP rating (interface, mated) IP60

BMA

TECHNICAL DATA

| ELECTRICAL DATA | REQUIREMENTS | |
|---|---|---|
| Cable type | .086" Semi-Rigid | .141" Semi-Rigid |
| Impedance | 50 Ω | |
| Frequency range | DC ... 18 GHz | |
| Dielectric withstanding voltage (at sea level) | 1.5 kV rms, 50 Hz | 1.0 kV rms, 50 Hz |
| Insulation resistance | $\geq 5 \cdot 10^3 \text{ M}\Omega$ | |
| Contact resistance - centre contact - outer contact | $\leq 2 \text{ m}\Omega$ $\leq 2 \text{ m}\Omega$ | |
| VSWR (typical values) - DC ... 18 GHz | (mated connector pair) $\leq 1.02 + 0.005 f \text{ (GHz)}$ | (mated connector pair) $\leq 1.05 + 0.005 f \text{ (GHz)}$ |
| RF-leakage interface only (fully mated) | $\geq 90 \text{ dB} - f \text{ (GHz)}^1$ | |
| RF-testing voltage (at sea level) | 1.0 kV rms, 5 MHz | 670 V rms, 5 MHz |
| Admissible power (at sea level and room temperature) | $\leq 300 \text{ W at } 3 \text{ GHz}$ | |

1) measured at interface with reference planes being in true alignment

| MECHANICAL DATA | REQUIREMENTS |
|-------------------------------------|---------------------------------------|
| Engagement force | $\leq 13.5 \text{ N}$ |
| Disengagement force | $\geq 2 \text{ N}$ |
| Contact captivation | $\geq 27 \text{ N} / 6.1 \text{ lbs}$ |
| Cable retention force ¹⁾ | see pages 28 - 34 |
| Durability (matings) | ≥ 1000 |

1) Value considers maximum load of the cables without irreversible variations of specifications.

| ENVIRONMENTAL DATA | TEST CONDITIONS |
|---------------------|---|
| Temperature range | - 65°C ... + 125°C / - 85 °F ... + 257 °F |
| Thermal shock | MIL-STD-202, Method 107, Condition B |
| Moisture resistance | MIL-STD-202, Method 106 |
| Corrosion | Saltspray test acc. to MIL-STD-202, Method 101, Condition B |
| Vibration | MIL-STD-202, Method 204, Condition D |
| Shock | MIL-STD-202, Method 213, Condition I |

| MATERIAL DATA | | |
|-------------------------------|---|---------|
| CONNECTOR PARTS | MATERIAL | PLATING |
| Bodies | copper-beryllium alloy stainless steel | gold |
| Pin contacts | copper-beryllium alloy | gold |
| Spring basket | copper-beryllium alloy | gold |
| Springs (floating connectors) | stainless steel | |
| Insulators | PTFE or PFA | |
| Gaskets | EPDM, 40 shore A | |

Some connectors may have a specification that differs from the above mentioned data.

The products are designed and guaranteed to pass the above mentioned test procedures. Any additional or different requirement arising from specific applications or environmental conditions which is not covered by these test procedures is subject to request.

BMA CONNECTOR APPLICATIONS

Quick and reliable engagement and disengagement of multiple microwave transmission lines, high packaging density of flexible and rigid coaxial lines and cable free connection of modules to motherboard are some needs of modern microwave systems.

HUBER+SUHNER BMA connectors offer an economical solution for the most demanding interconnector applications found today in civil and military microwave circuits. To help ensure a problem free, reliable long term operation the following guidelines should be used.

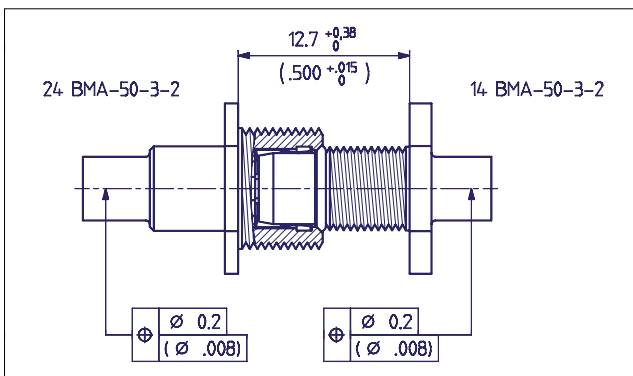
Assembly hints

Radial and axial misalignments can be accommodated with the spring outer contacts of the HUBER+SUHNER BMA connector.

These misalignments are due to the build up of tolerances with the major contributions coming from: Axial direction, mounting plate distances and plate distortions. Radial direction: mounting hole positions and concentricity, plate distortion and misalignment.

For recommended mounting hole sizes see page 412.

Rigid mounting

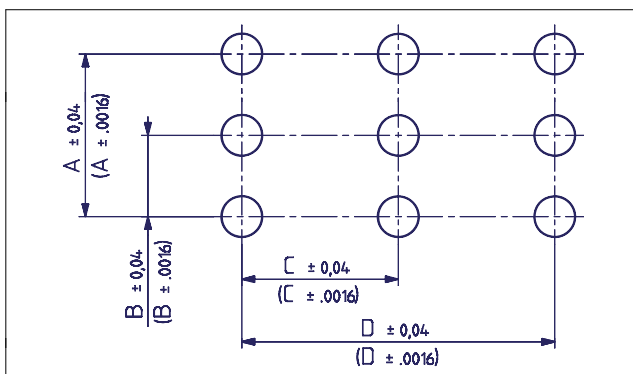


Maximum misalignment

Axial: 0.38 mm / .015 in. *
Radial: 0.20 mm / .008 in.

* For applications with reduced return loss specifications 0.76 mm / .030 in. is allowable.

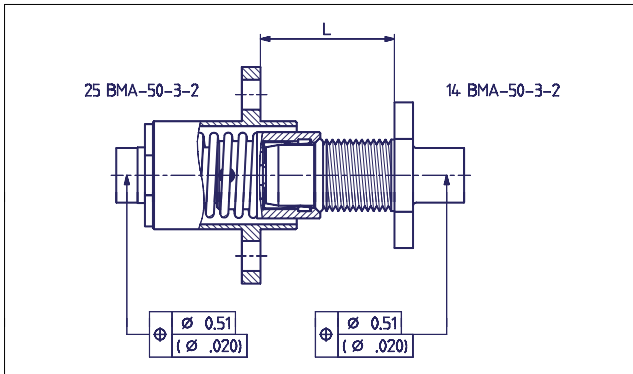
Hole dimensions



To avoid tolerances build up all mounting holes must be tolerated from a single datum point.

It is also important that both of the mounting plates are properly affixed and correctly positioned.

Float mounting



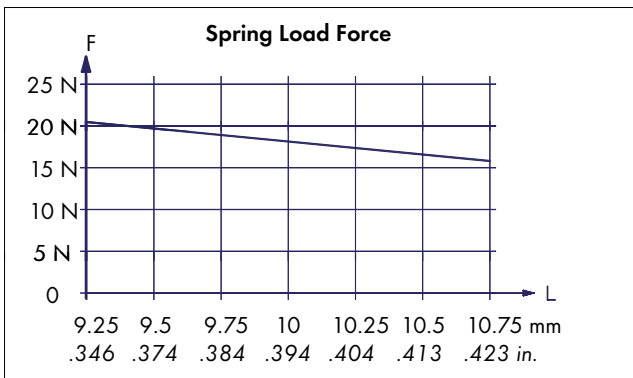
The increased tolerance correction of the connector is achieved by using an extra spring system.

This allows the centre assembly of the connector to move freely within the flange body.

Recommended maximum tolerances:

Axial: 1.52 mm / .060 in.

Radial: 0.51 mm / .020 in.



The adjacent diagram shows the relationship between the connector preloading force and the separation distance "L" between the mounting reference planes for a typical connector pair (25_BMA-50-3-2 and 14_BMA-50-3-2).

To ensure optimum contact under extreme radial misalignment the following points must be considered:

A:

The maximum misalignment tolerances must not be exceeded. Any possible bending of the mounting plate due to the spring preloading of the individual connectors must be taken into account.

If distortion occurs the following steps should be taken to minimize the effect:

- re-dimensioning
- bracing of the mounting plate
- reduction of maximum connector preloading force which will result in the limitation of length L.

B:

A minimum preloading force of 16 N must be ensured for each connector pair so that the maximum engaging force will be exceeded. This represents the upper limit of separation. For the example above this is a length L of maximum 10.65 mm / .419 in.

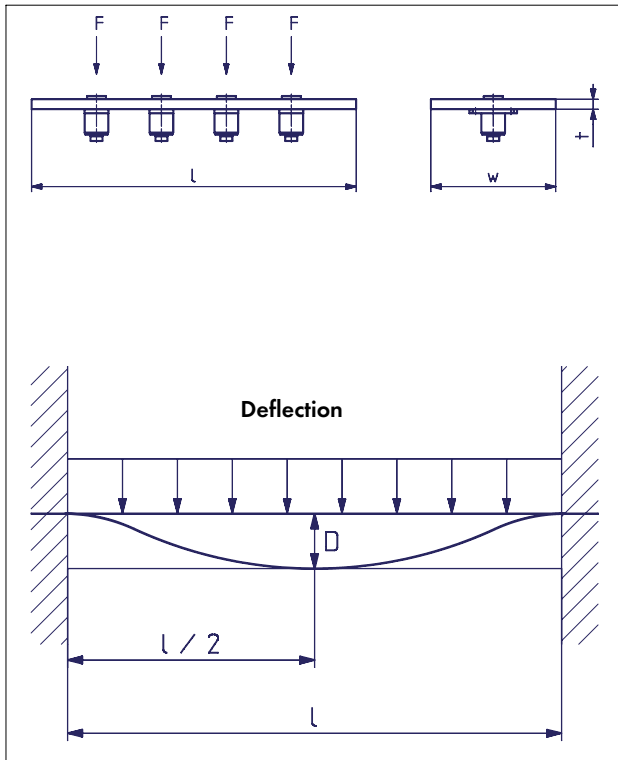
Data on other connector combinations available on request.

For the dimensioning of the holes the same points must be considered as for the rigid mounting.

Mounting plate bending

For an array of BMA connectors to be mounted on a chassis, the forces on the connectors must be taken into account and in the case of a floating assembly the preloading forces must be considered.

For a simplified calculation the mounting plate can be considered as a beam under deflection, thus the bending is:



Legend:

| | |
|-----|--|
| D | deflection = $\frac{n \cdot F \cdot l^3}{384 E \cdot I}$ |
| E | modulus of elasticity aluminium: $E = 70'000 \text{ N/mm}^2$ steel: $E = 210'000 \text{ N/mm}^2$ |
| F | preloading force |
| I | moment of beam = $\frac{w \cdot t^3}{12}$ |
| l | length of panel |
| n | number of connectors |
| t | thickness of panel |
| w | width of panel |

Example:

4 connectors of type 25_BMA-50-3-2 (preloading force $F = 20 \text{ N}$ each):

$E = 70'000 \text{ N/mm}^2$ (aluminium chassis)

thickness of panel (t) 2 mm

width of panel (W) 20 mm

length of panel (l) 80 mm

$$I = \frac{20\text{mm} \cdot (2\text{mm})^3}{12} = 13.33\text{mm}^4$$

$$D = \frac{4 \cdot 20\text{N} \cdot (80\text{mm})^3}{384 \cdot 70'000 \frac{\text{N}}{\text{mm}^2} \cdot 13.33\text{mm}^4} = 0.11\text{mm}$$

CABLE CONNECTORS

Straight bulkhead cable plugs (male)

- > for semi-rigid cables
- > cable entry soldered
- > bulkhead mounted, rigid
- > body material: CuBe, gold plated

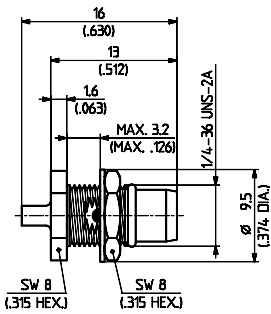


Fig. 1

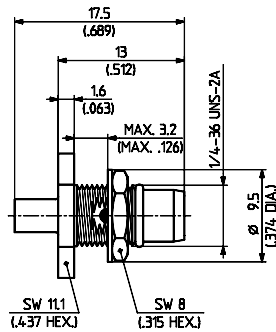


Fig. 2

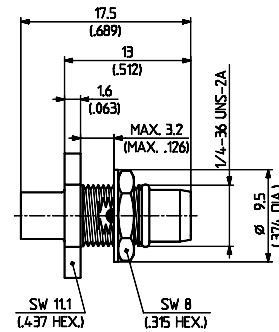


Fig. 3

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Mounting hole | Fig. |
|-----------------------|----------|-----------------------|-----------|----------------------|---------------|------|
| 14_BMA-50-1-15/111_NE | 22646663 | Y2 (EZ 47) | single | 27180 | ML 56 | 1 |
| 14_BMA-50-2-2/111_NE | 22645600 | Y3, Y11 (EZ 86) | single | 9171 | ML 56 | 2 |
| 14_BMA-50-3-2/111_NE | 22645601 | Y5, Y12 (EZ 141) | single | 9171 | ML 56 | 3 |

> for flexible cables

- > cable entry crimp
- > bulkhead mounted, rigid
- > body material: stainless steel

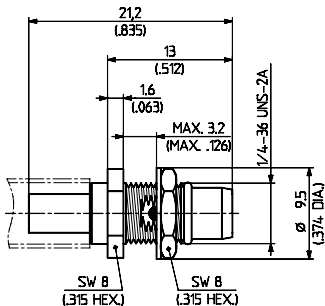


Fig. 1

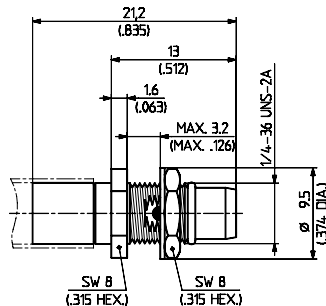


Fig. 2

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Mounting hole | Crimp insert | Fig. |
|----------------------|----------|-----------------------|-----------|----------------------|---------------|-----------------|------|
| 14_BMA-50-2-3/199_NE | 22645614 | U2 (RG 316/U) | single | 9172 | ML 56 | A ¹⁾ | 1 |
| 14_BMA-50-3-3/199_NE | 22645615 | U9, 11 (RG 400/U) | single | 9173 | ML 56 | B ²⁾ | 2 |

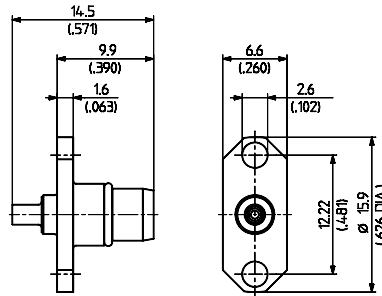
1) MIL insert M22520/5-03A can also be used

2) MIL insert M22520/5-05A can also be used

Straight panel cable plugs (male)

> for semi-rigid cables

- > cable entry soldered
- > 2-hole mounted
- > body material: CuBe, gold plated



| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Notes |
|-----------------------|----------|-----------------------|-----------|----------------------|-------|
| 15_BMA-50-1-15/111_NE | 22649704 | Y2 (EZ 47) | single | 27180 | |

Straight bulkhead cable jacks (female)

> for semi-rigid cables

- > cable entry soldered
- > snap-in, floating
- > body material: CuBe, gold plated

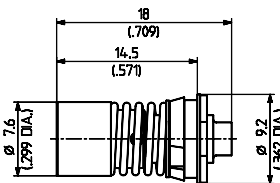


Fig. 1

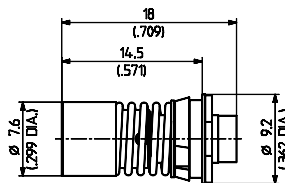


Fig. 2

Connector fixed into mounting panel with snap-in mechanism.
Recommended removal tool: 74_Z-0-0-213

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction/ Mounting hole | Fig. |
|----------------------|----------|-----------------------|-----------|--|------|
| 24_BMA-50-2-4/111_NE | 22645606 | Y3, Y11 (EZ 86) | single | 9171 / ML 66 | 1 |
| 24_BMA-50-3-4/111_NE | 22645607 | Y5, Y12 (EZ 141) | single | 9171 / ML 66 | 2 |

It is recommended to use a service loop to facilitate the float features of the connector

- > for flexible cables
- > cable entry crimp
- > snap-in, floating
- > body material: stainless steel

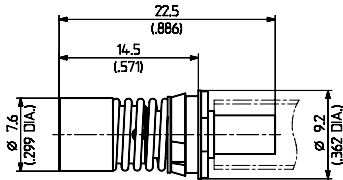


Fig. 1

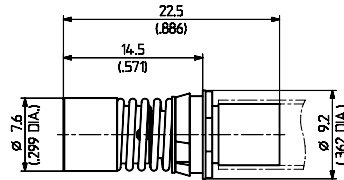


Fig. 2

Connector fixed into mounting panel with snap-in mechanism.
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| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction/ Mounting hole | Crimp insert | Fig. |
|----------------------|----------|-----------------------|-----------|--|-----------------|------|
| 24_BMA-50-2-5/119_NE | 22645620 | U2 (RG 316/U) | single | 9172 / ML 66 | A ¹⁾ | 1 |
| 24_BMA-50-3-5/119_NE | 22645621 | U9, 11 (RG 400/U) | single | 9173 / ML 66 | B ²⁾ | 2 |

1) MIL insert M22520/5-03A can also be used

2) MIL insert M22520/5-05A can also be used

Straight panel cable jacks (female)

- > for semi-rigid cables
- > cable entry soldered
- > flange mount, floating

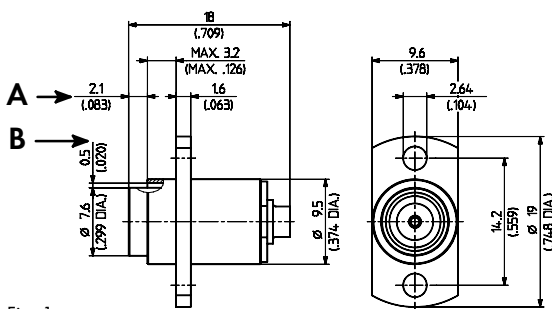


Fig. 1

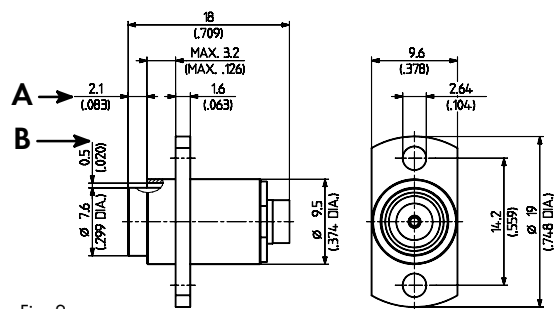


Fig. 2

A = min. 2.1 mm/.083 in. axial range of spring

B = min. 0.5 mm/.020 in. radial misalignment

Outer connector body and flange of stainless steel, inner floating part of gold plated CuBe

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction/ Mounting hole | Fig. |
|----------------------|----------|-----------------------|-----------|--|------|
| 25_BMA-50-2-2/119_NE | 22645604 | Y3, Y11 (EZ 86) | single | 9171 / ML 58 | 1 |
| 25_BMA-50-3-2/119_NE | 22645605 | Y5, Y12 (EZ 141) | single | 9171 / ML 58 | 2 |

It is recommended to use a service loop to facilitate the float features of the connector

- > for flexible cables
- > cable entry crimp
- > flange mount, floating

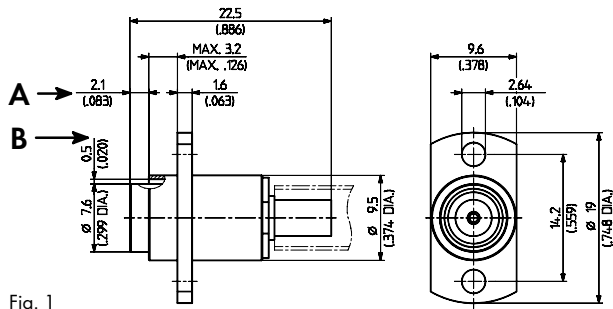


Fig. 1

A = min. 2.1 mm/.083 in. axial range of spring
 B = min. 0.5 mm/.020 in. radial misalignment

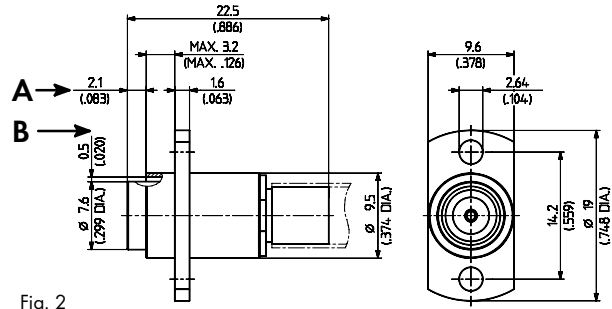


Fig. 2

Outer connector body and flange of stainless steel, inner floating part of gold plated CuBe

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction/ Mounting hole | Crimp insert | Fig. |
|----------------------|----------|-----------------------|-----------|--|-----------------|------|
| 25_BMA-50-2-3/119_NE | 22645618 | U2 (RG 316/U) | single | 9172 / ML 58 | A ¹⁾ | 1 |
| 25_BMA-50-3-3/119_NE | 22645619 | U9, 11 (RG 400/U) | single | 9173 / ML 58 | B ²⁾ | 2 |

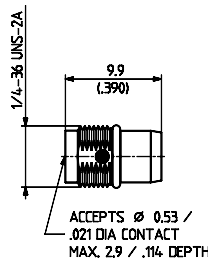
1) MIL insert M22520/5-03A can also be used

2) MIL insert M22520/5-05A can also be used

RECEPTACLES WITH SOLDER-IN HERMETIC SEAL

Receptacles, plugs (male)

- > bulkhead mounted
- > threaded installation
- > body material: stainless steel



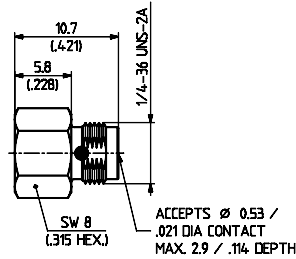
| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Suitable ¹⁾ glass-bead | Notes |
|----------------------|----------|-----------|---------------|-----------------------------------|-------|
| 12_BMA-50-0-3/199 NE | 22645636 | single | ML 61 | 73 Z-0-0-198 | |

Use tool 74_Z-0-0-215 with torque wrench 74_Z-0-0-214 for mounting. For fixturing hermetic seal while soldering, fixture 74_Z-0-0-211 is recommended.

1) see page 411

Receptacles, jacks (female)

- > bulkhead mounted
- > threaded installation
- > body material: stainless steel



| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Suitable ¹⁾ glass-bead | Notes |
|----------------------|----------|-----------|---------------|-----------------------------------|-------|
| 22_BMA-50-0-3/199_NE | 22645637 | single | ML 61 | 73 Z-0-0-198 | |

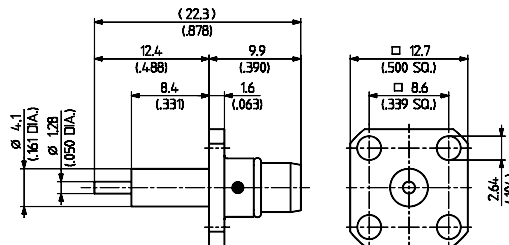
1) see page 411

Use torque wrench 74_Z-0-0-214 for mounting. For fixturing hermetic seal while soldering, fixture 74_Z-0-0-211 is recommended.

RECEPTACLES WITH SOLDER END

Receptacles, plugs (male)

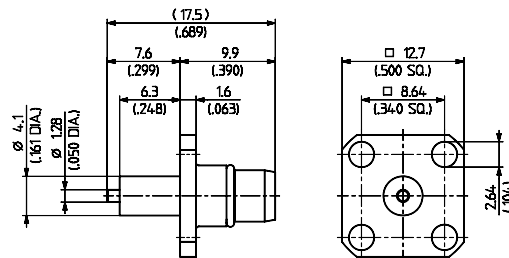
- > panel mounted
- > body material: stainless steel



BMA

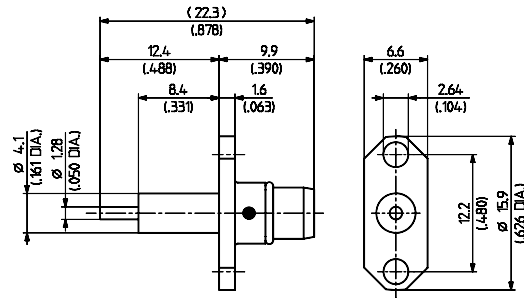
| HUBER+SUHNER type | Item no. | Packaging | Flange type | Notes |
|----------------------|----------|-----------|-------------|--------------------------|
| 13_BMA-50-0-1/199_NE | 22645622 | single | square | with extended dielectric |

- > panel mounted
- > body material: stainless steel



| HUBER+SUHNER type | Item no. | Packaging | Flange type | Notes |
|-----------------------|----------|-----------|-------------|--------------------------|
| 13_BMA-50-0-13/199_NE | 22660107 | single | square | with extended dielectric |

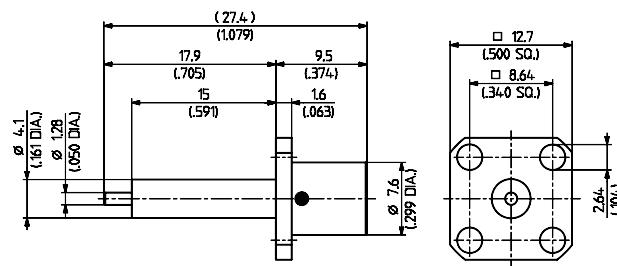
- > panel mounted
- > body material: stainless steel



| HUBER+SUHNER type | Item no. | Packaging | Flange type | Notes |
|----------------------|----------|-----------|-------------|--------------------------|
| 13_BMA-50-0-2/199_NE | 22645623 | single | 2-hole | with extended dielectric |

Receptacles, jacks (female)

- > panel mounted
- > body material: stainless steel

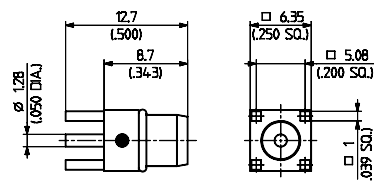


| HUBER+SUHNER type | Item no. | Packaging | Flange type | Notes |
|----------------------|----------|-----------|-------------|--------------------------|
| 23_BMA-50-0-1/199_NE | 22645624 | single | square | with extended dielectric |

PCB CONNECTORS

Straight PCB plugs (male)

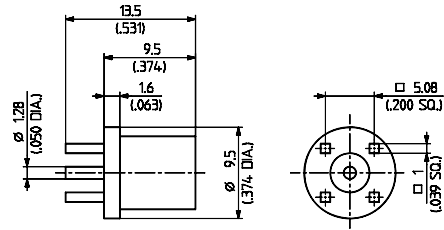
- > body material: CuBe, gold plated



| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Notes |
|----------------------|----------|-----------|---------------|-------|
| 81_BMA-50-0-1/111_NE | 22645630 | single | ML 41 | |

Straight PCB jacks (female)

> body material: CuBe, gold plated



| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Notes |
|----------------------|----------|-----------|---------------|-------|
| 82_BMA-50-0-1/111_NE | 22645631 | single | ML 41 | |