



SERIES MMBX MICRO MINIATURE BOARD CONNECTORS

DESCRIPTION

Modularity with a minimum space requirement is demanded for the existing and coming generation of systems (GSM 900 / 1800 / 1900, PCS, WCDMA, UMTS). To achieve this for all different systems, the smallest possible components must be used also for interconnections.

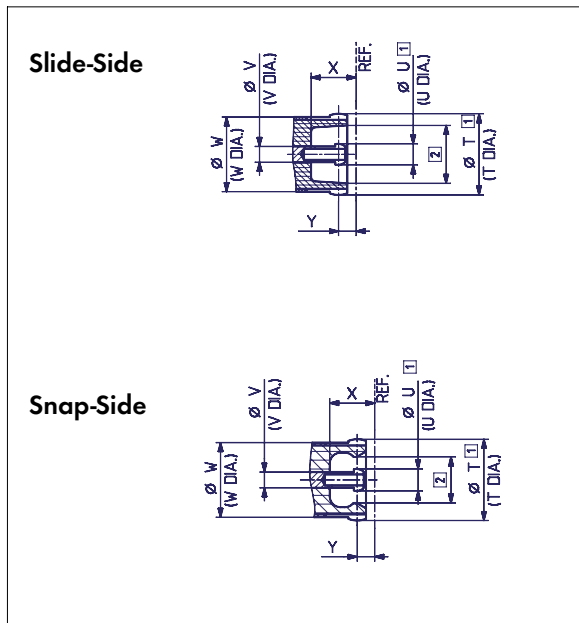
In order to reduce the variety of products and to achieve standardised systems (in other words: modularity), the HUBER+SUHNER Series MMBX™ (Micro Miniature Board Connector) contains a range of board and cable connectors which require a minimum of space. It offers all the necessary characteristics to obtain a unified design of the various systems.

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INTERFACE DIMENSIONS



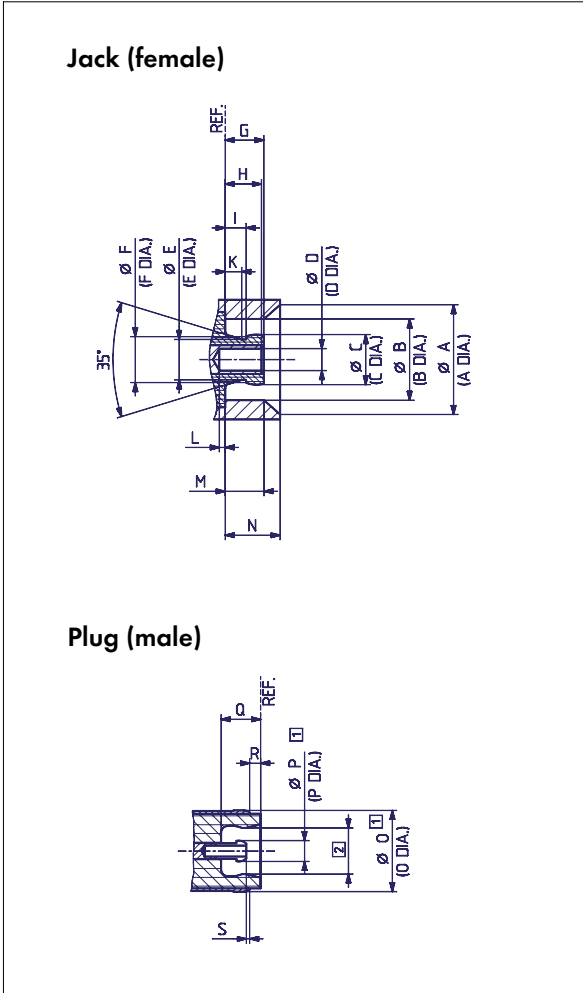
INTERFACE DIMENSIONS (MM / INCHES)

Adaptors Within-Series

| | min. / max. mm | min. / max. inches |
|---|----------------|--------------------|
| T | 3.70 nom. | .146 nom. |
| U | 0.95 nom. | .037 nom. |
| V | 0.70 nom. | .028 nom. |
| W | 3.65 nom. | .144 nom. |
| X | 2.05 nom. | .081 nom. |
| Y | 0.80 nom. | .032 nom. |

- ① Slotted and flared to meet electrical and mechanical requirements
- ② Dimension to meet electrical and mechanical requirements

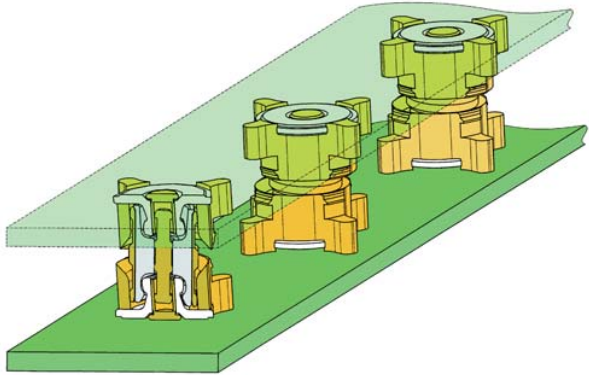
IP rating (interface, mated) IP50



MMBX Connectors:

| | min. mm | min. inches | max. mm | max. inches |
|---|-----------|-------------|-----------|-------------|
| A | 5.00 nom. | .197 nom. | 5.00 nom. | .197 nom. |
| B | 3.68 | .145 | 3.71 | .146 |
| C | 2.25 | .089 | 2.30 | .091 |
| D | 0.98 | .039 | 1.01 | .040 |
| E | 1.85 nom. | .073 nom. | 1.85 nom. | .073 nom. |
| F | 2.10 nom. | .083 nom. | 2.10 nom. | .083 nom. |
| G | — | — | 1.80 | .071 |
| H | 1.55 | .061 | 1.75 | .069 |
| I | 0.90 | .035 | — | — |
| K | 0.75 nom. | .030 nom. | 0.75 nom. | .030 nom. |
| L | 0 | 0 | — | — |
| M | 1.45 | .057 | — | — |
| N | 2.50 nom. | .098 nom. | 2.50 nom. | .098 nom. |
| O | 3.70 nom. | .146 nom. | 3.70 nom. | .146 nom. |
| P | 0.95 nom. | .037 nom. | 0.95 nom. | .037 nom. |
| Q | 1.85 nom. | .073 nom. | 1.85 nom. | .073 nom. |
| R | 0.50 nom. | .020 nom. | 0.50 nom. | .020 nom. |
| S | 0.10 nom. | .004 nom. | 0.10 nom. | .004 nom. |

- 1 Slotted and flared to meet electrical and mechanical requirements
- 2 Dimension to meet electrical and mechanical requirements



Direct interconnection with excellent electrical and mechanical properties.

TECHNICAL DATA OF CABLE CONNECTORS

| ELECTRICAL DATA | CECC 22000 | REQUIREMENTS |
|---|---------------------|--|
| for cable groups | | Y 11, U2, U4 |
| Impedance | | 50 Ω |
| Frequency range | | DC ... 12.4 GHz |
| Dielectric withstanding voltage (at sea level) | 4.4.5 | 750 V rms, 50 Hz |
| Working voltage (at sea level) - unmated | IEC 169-1 14.6.1 | 250 V rms, 50 Hz (calculated) |
| Working voltage (at 21'000 m/70'000 ft.) - mated and unmated | Appendix C | 42 VAC 50 Hz (calculated) |
| Insulation resistance | 4.4.4 | $\geq 1 \text{ G}\Omega$ |
| Contact resistance - centre contact - outer contact | 4.4.2 4.4.3 | $\leq 5 \text{ m}\Omega$ $\leq 1 \text{ m}\Omega$ |

| MECHANICAL DATA | CECC 22000 | REQUIREMENTS |
|-----------------------|------------|---------------------------------------|
| Engagement force | 4.5.4 | max. 30 N / max. 6.7 lbs |
| Disengagement force | 4.5.4 | 8 - 30 N / 1.8 - 6.7 lbs |
| Contact captivation | 4.5.2 | $\geq 10 \text{ N} / 2.3 \text{ lbs}$ |
| Cable retention force | 4.5.5 | see pages 28 - 34 |
| Durability (matings) | 4.7.1 | 100 |

| ENVIRONMENTAL DATA | CECC 22000 TEST CONDITIONS | EQUIVALENT MIL TEST CONDITIONS |
|---------------------|-------------------------------|---|
| Temperature range | | - 55° C ... + 155° C / - 67 °F ... + 311 °F |
| Climatic category | → 55 / 155 / 21 | |
| Thermal shock | 4.6.7 → IEC 68-2-14 Na | MIL-STD-202, Method 107 G, Condition B1 |
| Moisture resistance | 4.6.6 → IEC 68-2-3 Ca | MIL-STD-202, Method 106 F |
| Corrosion | 4.6.10 → IEC 68-2-11 Ka | MIL-STD-202, Method 101, Condition B |
| Vibration | 4.6.3 → IEC 68-2-6 Fc | MIL-STD-202, Method 204 D, Condition A |

| MATERIAL DATA | | |
|-----------------|------------------------|---------------|
| CONNECTOR PARTS | MATERIAL | PLATING |
| Centre contact | copper-beryllium alloy | SUCOPRO /gold |
| Outer contact | copper-beryllium alloy | SUCOPRO |
| Body | brass | SUCOPRO |
| Crimp ferrules | E-copper | SUCOPRO/gold |
| Insulators | PTFE / PFA | |

TECHNICAL DATA OF PCB CONNECTORS - BOARD-TO-BOARD

| ELECTRICAL DATA | CECC 22000 | REQUIREMENTS | REQUIREMENTS |
|--|------------------|---|--|
| | | Nominal PCB distance 6.7 mm / .264 in. | Nominal PCB distance 11.7 mm / .461 in. |
| Impedance | | 50 Ω | |
| Frequency range | | DC ... 12.4 GHz | |
| Dielectric withstanding voltage (at sea level) | 4.4.5 | 1 kV rms, 50 Hz | |
| Working voltage (at sea level) | IEC 169-1 11.6.1 | ≤ 330 V rms, 50 Hz | |
| Insulation resistance | 4.4.4 | ≥ 1 GΩ | |
| Contact resistance | | | |
| - centre contact | 4.4.2 | ≤ 5 mΩ | |
| - outer contact | 4.4.3 | ≤ 1 mΩ | |

| MECHANICAL DATA | CECC 22000 | REQUIREMENTS | REQUIREMENTS |
|---------------------------------|------------|------------------|------------------|
| | | 6 SLOTS | 4 SLOTS |
| Engagement force (Slideside) | 4.5.4 | < 15 N / 3.4 lbs | < 20 N / 4.5 lbs |
| Disengagement force (Slideside) | 4.5.4 | < 15 N / 3.4 lbs | < 20 N / 4.5 lbs |
| Contact captivation | 4.5.2 | 10 N / 2.3 lbs | |
| Durability (matings) | 4.7.1 | 100 | |

| RETURN LOSS | REQUIREMENTS | | |
|---------------------------------|---|---------------------|---------------------|
| Nominal board-to-board distance | 6.7 mm / .2638 in. | 11.7 mm / .4606 in. | 20.0 mm / .7874 in. |
| Typical return loss | board-to-board = two PCB-connector + one adaptor (without termination to PCB) | | |
| - up to 2.5 GHz | 26 dB | 26 dB | 26 dB |
| - 2.5 up to 6 GHz | 25 dB | 19 dB | 19 dB |

| PROCESSING DATA | REQUIREMENTS |
|-----------------------------|------------------|
| Adherent to the print | |
| - shearing | 150 N / 33.7 lbs |
| - pulling (vertical to PCB) | 150 N / 33.7 lbs |

| MATERIAL DATA | | |
|-----------------|------------------|----------------|
| CONNECTOR PARTS | MATERIAL | PLATING |
| Centre contact | brass | SUCOPRO / gold |
| Outer contact | bronze | SUCOPRO |
| Body | brass | SUCOPRO |
| Insulators | LCP / PTFE / PFA | |

| ENVIRONMENTAL DATA | CECC 22000 TEST CONDITIONS | EQUIVALENT MIL TEST CONDITIONS |
|---------------------|----------------------------|---|
| Temperature range | | - 55° C ... + 155° C / - 67 °F ... + 311 °F |
| Climatic category | → 55 / 155 / 21 | |
| Thermal shock | 4.6.7 → IEC 68-2-14 Na | MIL-STD-202, Method 107 G, Condition B1 |
| Moisture resistance | 4.6.6 → IEC 68-2-3 Ca | MIL-STD-202, Method 106 F |
| Corrosion | 4.6.10 → IEC 68-2-11 Ka | MIL-STD-202, Method 101, Condition B |
| Vibration | 4.6.3 → IEC 68-2-6 Fc | MIL-STD-202, Method 204 D, Condition A |

TECHNICAL DATA OF ADAPTORS BETWEEN SERIES

| ELECTRICAL DATA | CECC 22000 | REQUIREMENTS | | |
|--|------------------|-----------------------|----------------------|-----------------------|
| Impedance | | 50 Ω | | |
| Frequency range | | DC ... 12.4 GHz | | |
| Typical return loss (mated pair) | | DC – 2.5 GHz 32 dB | 2.5 – 6 GHz 30 dB | 6 – 12.4 GHz 16 dB |
| Dielectric withstanding voltage (at sea level) | 4.4.5 | 1 kV rms, 50 Hz | | |
| Working voltage (at sea level) | IEC 169-1 11.6.1 | ≤ 330 V rms, 50 Hz | | |
| Insulation resistance | 4.4.4 | ≥ 1 GΩ | | |
| Contact resistance | | | | |
| - centre contact | 4.4.2 | ≤ 5 mΩ | | |
| - outer contact | 4.4.3 | ≤ 1 mΩ | | |

| MECHANICAL DATA | CECC 22000 | REQUIREMENTS |
|----------------------------|------------|--------------------------|
| Engagement force (MMBX) | 4.5.4 | max. 30 N / max. 6.7 lbs |
| Disengagement force (MMBX) | 4.5.4 | 8 - 30 N / 1.8 - 6.7 lbs |
| Durability (matings) | 4.7.1 | 500 |

| MATERIAL DATA | | |
|---------------------|--------------------------|----------------|
| CONNECTOR PARTS | MATERIAL | PLATING |
| MMBX centre contact | copper-beryllium alloy | SUCOPRO / gold |
| MMBX outer contact | brass / copper-beryllium | SUCOPRO |
| MMBX body | brass / copper-beryllium | SUCOPRO |
| MMBX insulators | LCP / PTFE / PFA | |

| ENVIRONMENTAL DATA | CECC 22000 TEST CONDITIONS | EQUIVALENT MIL TEST CONDITIONS |
|---------------------|----------------------------|---|
| Temperature range | | - 55° C ... + 155° C / - 67 °F ... + 311 °F |
| Climatic category | → 55 / 155 / 21 | |
| Thermal shock | 4.6.7 → IEC 68-2-14 Na | MIL-STD-202, Method 107 G, Condition B1 |
| Moisture resistance | 4.6.6 → IEC 68-2-3 Ca | MIL-STD-202, Method 106 F |
| Corrosion | 4.6.10 → IEC 68-2-11 Ka | MIL-STD-202, Method 101, Condition B |
| Vibration | 4.6.3 → IEC 68-2-6 Fc | MIL-STD-202, Method 204 D, Condition A |

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

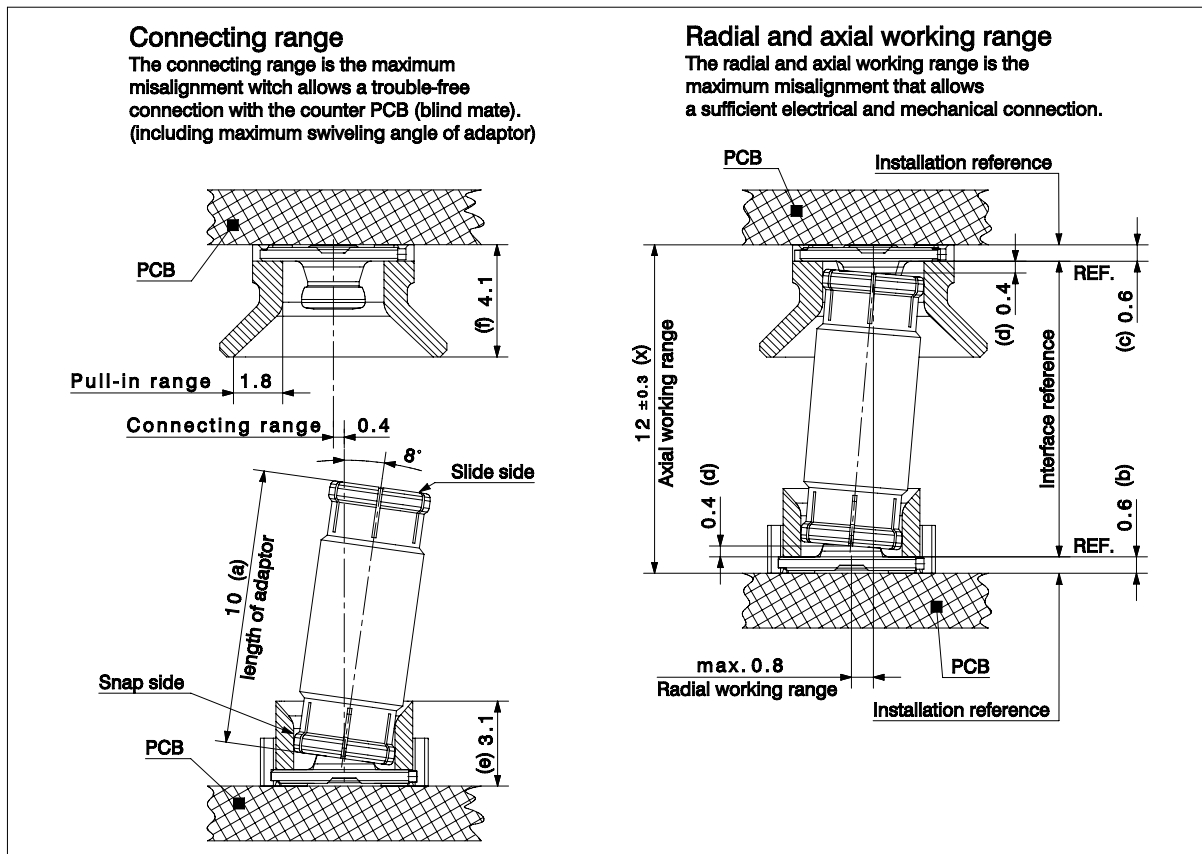
The products are designed and guaranteed to pass the above mentioned test procedures. Any additional or different requirement arising from specific applications or environmental conditions which is not covered by these test procedures is subject to request.

MMBX APPLICATION INSTRUCTION FOR PCB AND PANEL DISTANCES

The MMBX connector range offers a wide variety of interconnection solutions for blind mate PCB and panel applications. The formulas below provides a guideline to help to quickly determine; the board to board distance (x) for a combination of two board connectors and an adaptor, the minimum board to board or panel distance and the required adaptor length (a).

The parameters used in these formulas can be found on the MMBX connector outline drawings.

Example for board to board connection



Formula

$$\begin{aligned} \text{Distance } x &= a + b + c + (2 * d) \\ \text{Min. distance } x &= e + f + 0.5\text{mm} \\ \text{Adaptor length } a &= x - b - c - (2 * d) \end{aligned}$$

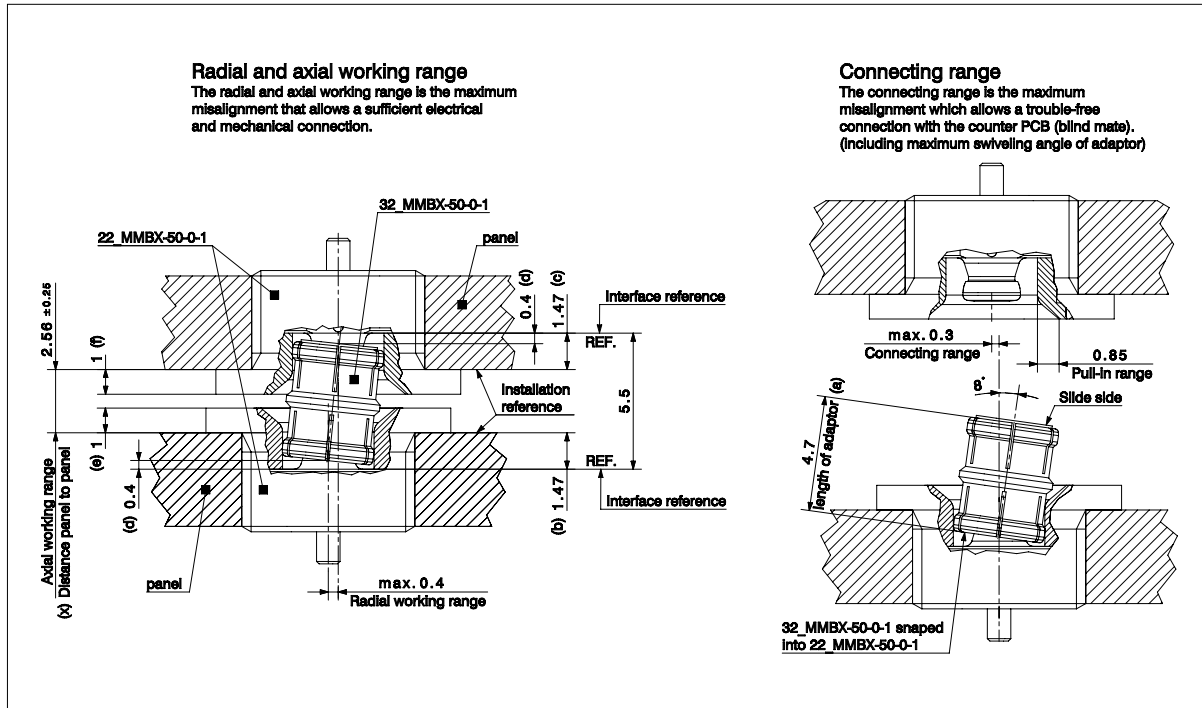
Variables

x = Board to board distance
a = adaptor length
b = interface reference connector
c = interface reference connector
d = gap for adaptor movement
e = height connector
f = height connector

Calculation of example

$$\begin{aligned} \text{Board to board distance } x &= a + b + c + (2 * d) = 10 \text{ mm} + 0.6 \text{ mm} + 0.6 \text{ mm} + (2 * 0.4 \text{ mm}) = \underline{12 \text{ mm}} \\ \text{Min. board to board distance } x &= e + f + 0.5 \text{ mm} = 3.1 \text{ mm} + 4.1 \text{ mm} + 0.5 \text{ mm} = \underline{7.7 \text{ mm}} \\ \text{Adaptor length } a &= x - b - c - (2 * d) = 12 \text{ mm} - 0.6 \text{ mm} - 0.6 \text{ mm} - (2 * 0.4 \text{ mm}) = \underline{10 \text{ mm}} \end{aligned}$$

Example for panel to panel connection



Note: For panel connectors the interface reference (b, c) needs to be subtracted.

Calculation of example

Panel to panel distance $x = a - b - c + (2 * d) = 4.7 \text{ mm} - 1.47 \text{ mm} - 1.47 \text{ mm} + (2 * 0.4 \text{ mm}) = \underline{2.56 \text{ mm}}$

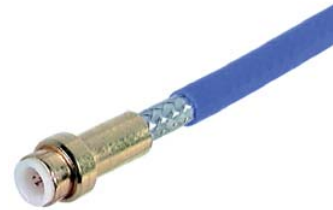
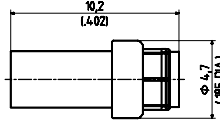
Min. panel to panel distance $x = e + f + 0.5 \text{ mm} = 1 \text{ mm} + 1 \text{ mm} + 0.5 \text{ mm} = \underline{2.5 \text{ mm}}$

Adaptor length $a = x + b + c - (2 * d) = 2.56 \text{ mm} + 1.47 \text{ mm} + 1.47 \text{ mm} - (2 * 0.4 \text{ mm}) = \underline{4.7 \text{ mm}}$

CABLE CONNECTORS

Straight cable plugs (male)

- > for HUBER+SUHNER® MULTIFLEX
- > cable entry soldered
- > centre contact soldered



MMBX

| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction |
|-----------------------|----------|-----------------------|---------------|----------------------|
| 11_MMBX-50-2-4/111_NE | 84026769 | Y11 (Multiflex 86) | single | 27534 |
| 11_MMBX-50-2-4/111_NH | 23033280 | Y11 (Multiflex 86) | bulk 100 pcs. | 27534 |

- > for flexible cables
- > HUBER+SUHNER® full crimp

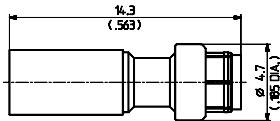


Fig. 1

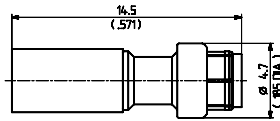


Fig. 2



| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Crimp insert | Fig. |
|-----------------------|----------|-----------------------|-----------|----------------------|--------------|------|
| 11_MMBX-50-1-1/111_NE | 23001743 | U1 (EF 178) | single | 27350 | 0.54 / A | 1 |
| 11_MMBX-50-2-1/111_NE | 23001745 | U2 (EF 316) | single | 27351 | 1 / A | 2 |
| 11_MMBX-50-2-2/111_NE | 23001744 | U4 (EF 316 D) | single | 27351 | 1 / A | 2 |

Right angle cable plugs (male)

- > for microwave cables
- > cable entry soldered
- > centre contact soldered

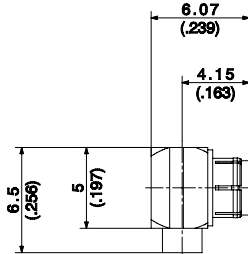


Fig. 1

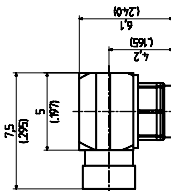


Fig. 2



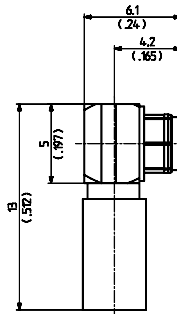
| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Fig. |
|-----------------------|----------|-----------------------|---------------|----------------------|------|
| 16_MMBX-50-1-2/111_NH | 21000174 | Y2 (EZ 47) | bulk 100 pcs. | 0000247073 | 1 |
| 16_MMBX-50-2-4/111_NE | 84026740 | Y11 (Multiflex 86) | single | 27533 | 2 |
| 16_MMBX-50-2-4/111_NH | 23033281 | Y11 (Multiflex 86) | bulk 100 pcs. | 27533 | 2 |

Cable groups see page 28

Assembly tools see page 385

Mounting holes see page 412

- > for flexible cables
- > cable entry crimp
- > centre contact soldered



| HUBER+SUHNER type | Item no. | Cable group (example) | Packaging | Assembly instruction | Crimp insert |
|-----------------------|----------|-----------------------|---------------|----------------------|--------------|
| 16_MMBX-50-1-1/111_NE | 23001748 | U1 (EF 178) | single | 27352 | A |
| 16_MMBX-50-2-1/111_NE | 23001747 | U2 (EF 316) | single | 27352 | A |
| 16_MMBX-50-2-1/111_NH | 84018554 | U2 (EF 316) | bulk 100 pcs. | 27352 | A |
| 16_MMBX-50-2-2/111_NE | 23001746 | U4 (EF 316 D) | single | 27352 | A |
| 16_MMBX-50-2-2/111_NH | 84028931 | U4 (EF 316 D) | bulk 100 pcs. | 27352 | A |

RECEPTACLES WITH SOLDER END

Receptacles, jacks (female)

- > bulkhead mounted

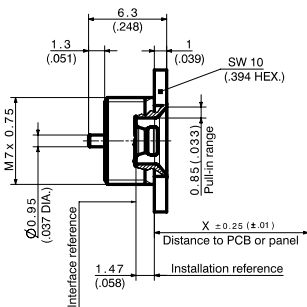


Fig. 1

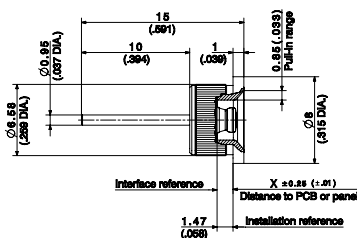


Fig. 2



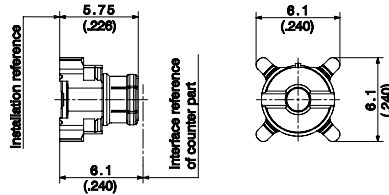
| HUBER+SUHNER type | Item no. | Packaging | Assembly style | Fig. |
|-----------------------|----------|---------------|----------------|------|
| 22_MMBX-50-0-1/111_NE | 23008312 | single | screwed-in | 1 |
| 22_MMBX-50-0-2/111_NY | 84005177 | bulk 100 pcs. | pressed-in | 2 |

PCB CONNECTORS

Straight PCB plugs (male)

> surface mount type SMT

MMBX



| HUBER+SUHNER type | Item no. | Packaging | Soldering pad | Notes |
|------------------------|----------|---------------|---------------|-------|
| 81_MMBX-S50-0-1/111_NM | 23001780 | tape and reel | ML 122 | |
| 81_MMBX-S50-0-1/111_NH | 23001781 | bulk 100 pcs. | ML 122 | |
| 81_MMBX-S50-0-1/111_NE | 23001782 | single | ML 122 | |

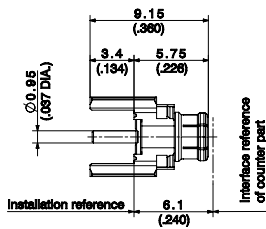


Fig. 1

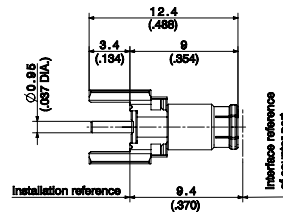


Fig. 2



| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Notes | Fig. |
|------------------------|----------|---------------|---------------|-------|------|
| 81_MMBX-50-0-2/111_NM | 23001776 | tape and reel | ML 15 | | 1 |
| 81_MMBX-50-0-2/111_NH | 23001778 | bulk 100 pcs. | ML 15 | | 1 |
| 81_MMBX-50-0-2/111_NE | 23001779 | single | ML 15 | | 1 |
| 81_MMBX-50-0-11/111_NM | 23028072 | tape and reel | ML 15 | | 2 |

Straight PCB jacks (female)

> surface mount type SMT

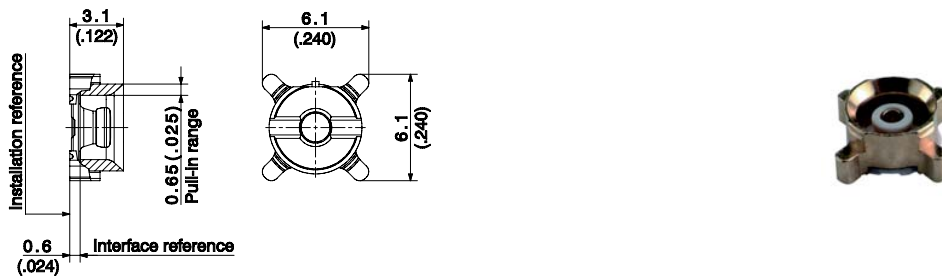


Fig. 1

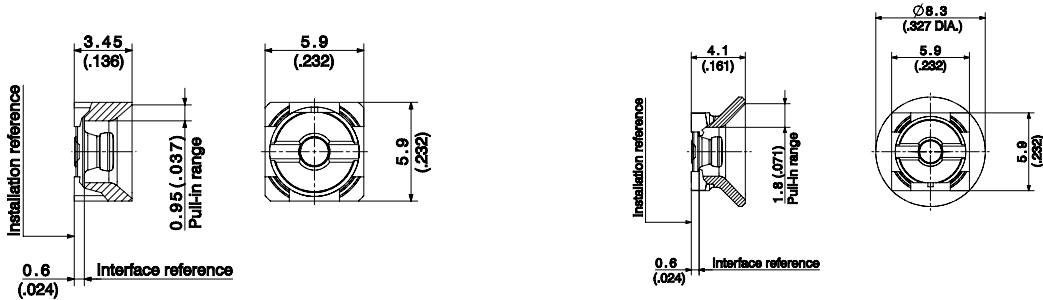


Fig. 2

Fig. 3

| HUBER+SUHNER type | Item no. | Packaging | Soldering pad | Notes | Fig. |
|-------------------------|----------|---------------|---------------|-----------------------------------|------|
| 82_MMBX-S50-0-1/111_NM | 23001783 | tape and reel | ML 122 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-S50-0-1/111_NH | 23001784 | bulk 100 pcs. | ML 122 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-S50-0-1/111_NE | 23001785 | single | ML 122 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-S50-0-3/111_NM | 23031931 | tape and reel | ML 122 | pull-in range 0.95 mm / .0374 in. | 2 |
| 82_MMBX-S50-0-3/111_NH | 23011273 | bulk 100 pcs. | ML 122 | pull-in range 0.95 mm / .0374 in. | 2 |
| 82_MMBX-S50-0-3/111_NE | 23015527 | single | ML 122 | pull-in range 0.95 mm / .0374 in. | 2 |
| 82_MMBX-S50-0-13/111_NM | 23041511 | tape and reel | ML 122 | pull-in range 1.80 mm / .0709 in. | 3 |
| 82_MMBX-S50-0-13/111_NH | 23036608 | bulk 100 pcs. | ML 122 | pull-in range 1.80 mm / .0709 in. | 3 |
| 82_MMBX-S50-0-13/111_NE | 84032435 | single | ML 122 | pull-in range 1.80 mm / .0709 in. | 3 |

Straight PCB jacks (female)

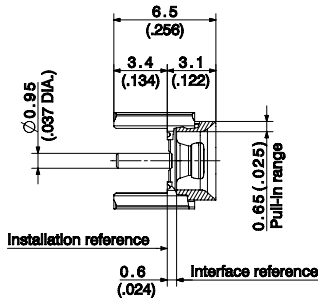


Fig. 1



MMBX

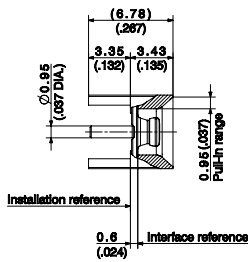


Fig. 2

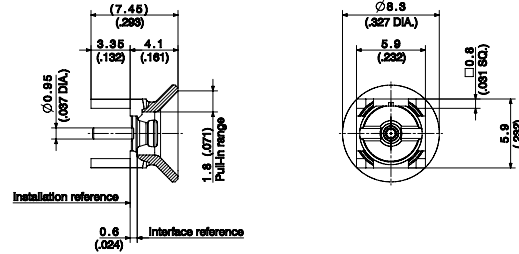
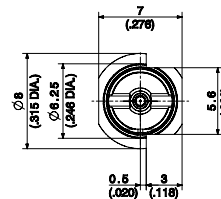
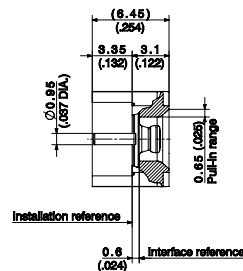


Fig. 3

| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Notes | Fig. |
|------------------------|----------|---------------|---------------|-----------------------------------|------|
| 82_MMBX-50-0-2/111_NM | 23001786 | tape and reel | ML 15 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-50-0-2/111_NH | 23001787 | bulk 100 pcs. | ML 15 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-50-0-2/111_NE | 23001788 | single | ML 15 | pull-in range 0.65 mm / .0256 in. | 1 |
| 82_MMBX-50-0-4/111_NH | 23013667 | bulk 100 pcs. | ML 15 | pull-in range 0.95 mm / .0374 in. | 2 |
| 82_MMBX-50-0-14/111_NH | 23038051 | bulk 100 pcs. | ML 15 | pull-in range 1.80 mm / .0709 in. | 3 |
| 82_MMBX-50-0-14/111_NE | 84032421 | single | ML 15 | pull-in range 1.80 mm / .0709 in. | 3 |

Straight PCB jacks (female), edge-mount

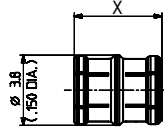


| HUBER+SUHNER type | Item no. | Packaging | Mounting hole | Notes |
|-------------------------|----------|---------------|---------------|-------|
| 92_MMBX-S50-0-12/111_NM | 23038620 | tape and reel | ML 147 | |
| 92_MMBX-S50-0-12/111_NE | 84019159 | single | ML 147 | |

ADAPTORS WITHIN-SERIES

Straight adaptors

> plug to plug (male)



| HUBER+SUHNER type | Item no. | Packaging | Board-to-board distance | Adaptor length X | Min. pull-in range |
|------------------------|----------|---------------------|-------------------------|-------------------|--------------------------|
| 32_MMBX-50-0-1/111_NE | 23001749 | single | 6.7 mm/.264 in. | 4.7 mm/.158 in. | 0.65 mm/.026 in. |
| 32_MMBX-50-0-1/111_NY | 84028418 | industrial 200 pcs. | 6.7 mm/.264 in. | 4.7 mm/.158 in. | 0.65 mm/.026 in. |
| 32_MMBX-50-0-12/111_NH | 84004734 | industrial 100 pcs. | 8.0 mm/.315 in. | 6.0 mm/.236 in. | 0.95 mm/.037 in. |
| 32_MMBX-50-0-11/111_NE | 23040373 | single | 9.0 mm/.354 in. | 7.0 mm/.276 in. | 0.95 mm/.037 in. |
| 32_MMBX-50-0-4/111_NE | 23010564 | single | 10.0 mm/.394 in. | 8.0 mm/.315 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-4/111_NY | 23038658 | industrial 300 pcs. | 10.0 mm/.394 in. | 8.0 mm/.315 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-8/111_NE | 23030066 | single | 11.65 mm/.459 in. | 9.65 mm/.380 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-13/111_NE | 84031096 | single | 12.0 mm/.472 in. | 10.0 mm/.417 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-5/111_NE | 84026915 | single | 14.0 mm/.551 in. | 12.0 mm/.472 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-5/111_NY | 23011920 | industrial 200 pcs. | 14.0 mm/.551 in. | 12.0 mm/.472 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-10/111_NY | 23034946 | industrial 200 pcs. | 15.0 mm/.591 in. | 13.0 mm/.512 in. | 1.80 mm/.071 in. |
| 32_MMBX-50-0-6/111_NE | 23022532 | single | 16.5 mm/.650 in. | 14.5 mm/.571 in. | external guidance needed |
| 32_MMBX-50-0-6/111_NH | 84024341 | industrial 100 pcs. | 16.5 mm/.650 in. | 14.5 mm/.571 in. | external guidance needed |
| 32_MMBX-50-0-9/111_NH | 23033418 | industrial 100 pcs. | 18.0 mm/.709 in. | 16.0 mm/.630 in. | external guidance needed |
| 32_MMBX-50-0-3/111_NE | 23023073 | single | 20.0 mm/.787 in. | 18.0 mm/.709 in. | external guidance needed |
| 32_MMBX-50-0-15/111_NY | 84033819 | industrial 100 pcs. | 21.2 mm/.835 in. | 19.2 mm/.755 in. | external guidance needed |
| 32_MMBX-50-0-14/111_NY | 84010338 | industrial 100 pcs. | 32.7 mm/1.287 in. | 30.7 mm/1.207 in. | external guidance needed |

