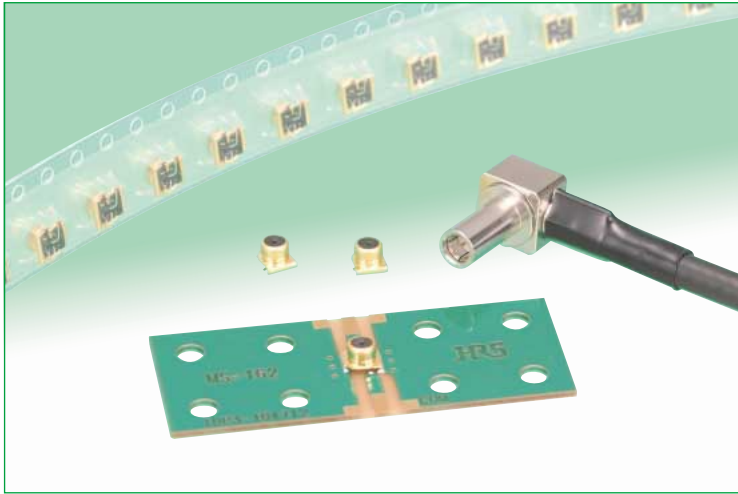


# Miniature Interface Coaxial Switch, DC to 10 GHz

## MS-162 Series



### Overview

Designed to be used as the interface antenna connection for portable terminal devices as well as circuit testing on microwave boards (DC to 10GHz) the coaxial switch offers high performance, low loss, extremely high durability and reliability, in a small and lightweight package.

Normally closed, the circuit is re-directed to the plug side by the mating of the plug with the receptacle.

### Features

#### 1. Low insertion loss

- 0.08 dB typical at 1 GHz
- 0.12 dB typical at 2 GHz  
(not mated with the plug)

#### 2. Space-saving design

- 3.5 mm x 3.1 mm occupied board space.

#### 3. Low profile

- 2.5 mm max. protrusion above the board.

#### 4. Lightweight

- 0.044 g total weight

#### 5. Durability

- 12, 000 mating/unmating cycles, with corresponding plug.

#### 6. Critical area protection

- MS-162 (Receptacle) contact has nickel plating areas to prevent solder wicking into critical areas.

#### 7. Board placement with automatic equipment.

- Packaged on tape-and-reel.

#### 8. Self alignment

- When mating, plug and receptacle will self align in horizontal axis within 0.5mm.

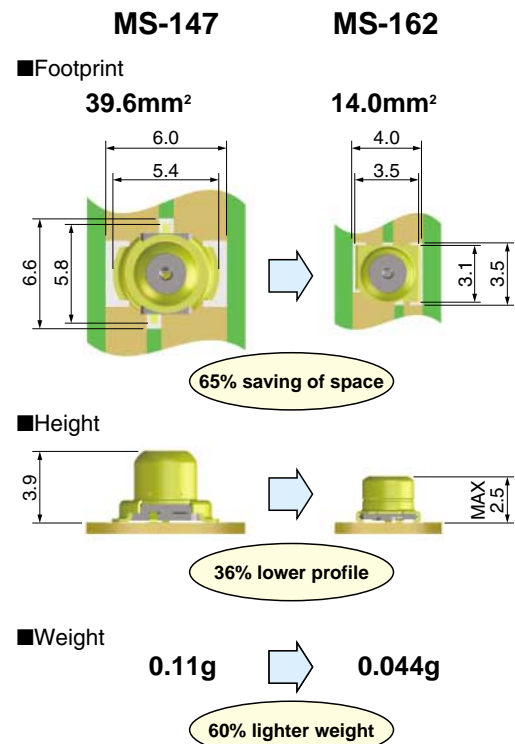
#### 9. RoHS compliant

- All components and materials comply with the requirements of the EU Directive 2002/95/EC.

### Applications

- \*Wireless communication modules (Bluetooth, WLAN, UWB, ZigBee)
- \*Portable terminals, notebook computers, ETC, POS terminals, GPS terminals, PDA, and any small devices requiring verification of antenna/circuit performance and re-direction of the transmission.

### Comparison with the existing MS-147

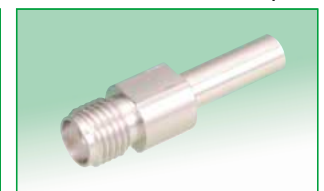


#### Plugs



MS-162-C(LP)-1

#### SMA conversion adapter



MS-162-HRMJ-1

## ■ Product Specifications

|                             | Not mated with the plug  | Open (Mated with MS-162-HRMJ-1)   |
|-----------------------------|--|---|
| Operating temperature range | -40°C to +85°C   |   |
| Rated power                 | 4W   |   |
| Frequency range             | DC to 10GHz  |   |
| V.S.W.R.                    | 1.2 max. (DC to 3GHz)<br>1.5 max. (3GHz to 6GHz)<br>1.7 max. (6GHz to 10GHz)                                     | 1.2 max. (DC to 3GHz)<br>1.6 max. (3GHz to 6GHz)<br>1.7 max. (6GHz to 10GHz)                                    |
| Insertion loss              | 0.15 dBmax. (DC to 2GHz)<br>0.2 dBmax. (2GHz to 3GHz)<br>0.4 dBmax. (3GHz to 6GHz)<br>0.7 dBmax. (6GHz to 10GHz) | 0.2 dBmax. (DC to 2GHz)<br>0.3 dBmax. (2GHz to 3GHz)<br>0.5 dBmax. (3GHz to 6GHz)<br>0.7 dBmax. (6GHz to 10GHz) |
| Isolation loss              | —————  | 25 dBmin. (DC to 1GHz)<br>20 dBmin. (1GHz to 3GHz)<br>14 dBmin. (3GHz to 6GHz)<br>12 dBmin. (6GHz to 10GHz)     |

| Item   | Specification  | Conditions   |
|--|--|--|
| 1. Contact resistance  | 100 mΩ max.  | 100 mA   |
| 2. Insulation resistance                                     | 1000 MΩ min.   | 100 V DC   |
| 3. Withstanding voltage                                      | No flashover or insulation breakdown                                 | 100 V AC / 1 minute  |
| 4. Vibration   | No electrical discontinuity of 10 μs or more                         | Frequency: 10 to 55 Hz, single amplitude of 1.5 mm, 2 hours in each of the 3 axis.                                   |
| 5. Shock   | No electrical discontinuity of 10 μs or more                         | Acceleration of 490 m/s <sup>2</sup> , 6 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis.       |
| 6. Humidity  | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | 96 hours at 40°C, RH of 90% to 95%   |
| 7. Thermal shock   | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | Temperature: -55°C → +5°C to +35°C → +85°C → +5°C to +35°C<br>Time: 30 → 5 max. → 30 → 5max. (Minutes)<br>100 cycles |
| 8. Durability<br>(mating/un-mating, with corresponding plug) | Contact resistance: 100 mΩ max.                                      | 12, 000 cycles   |

## ■ Materials

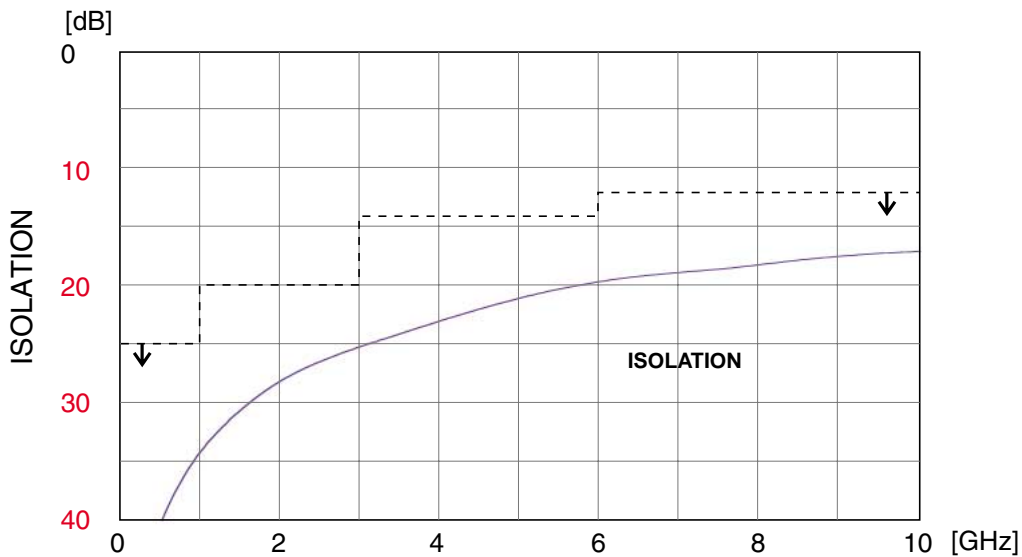
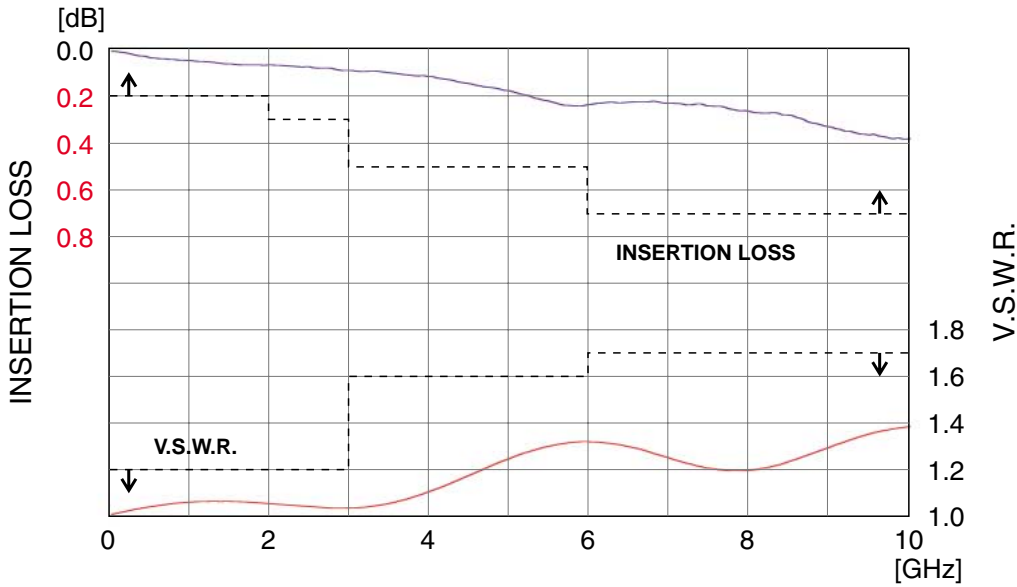
| Part             | Material         | Finish                                 | Remarks |
|------------------|------------------|--|---------|
| Shell            | Brass            | Gold plated                            | —————   |
| Insulators       | Polyamide        | —————                                  | UL94V-0 |
| Common terminal  | Beryllium copper | Partially gold plated (Nickel barrier) | —————   |
| Antenna terminal | Phosphor bronze  | Partially gold plated (Nickel barrier) | —————   |

## ◆ High Frequency Characteristics (Typical)

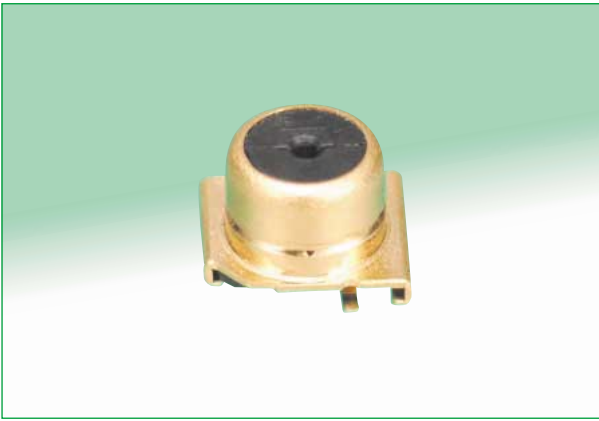
### ● NORMALLY CLOSED(N.C) ~ (Not mated with the plug)



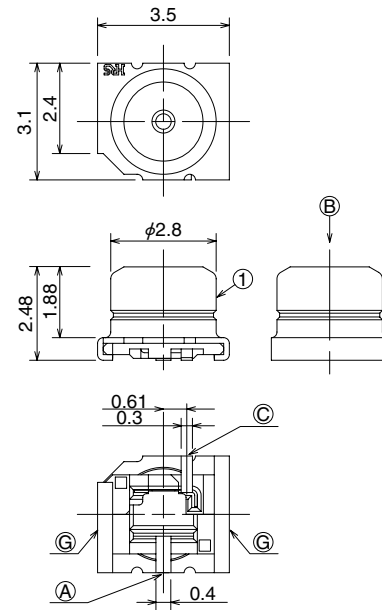
### ● OPEN(N.O) ~ (Mated with the plug)



## ■ Receptacle

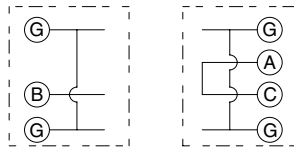


| Part Number | CL No.        | Packaging          | RoHS |
|-------------|---------------|--------------------|------|
| MS-162      | 358-0208-3    | 3, 000 pieces/reel | YES  |
| MS-162 (01) | 358-0208-3-01 | 100 pieces/bag     |      |



## ◆ Circuit diagram

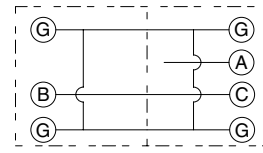
Not mated with the plug (N.C)



MS-162 Plug

MS-162

Mated with the plug (N.O)

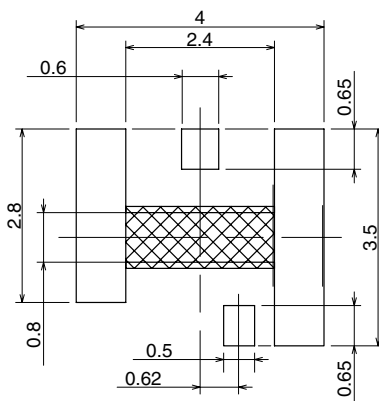



MS-162 Plug

MS-162

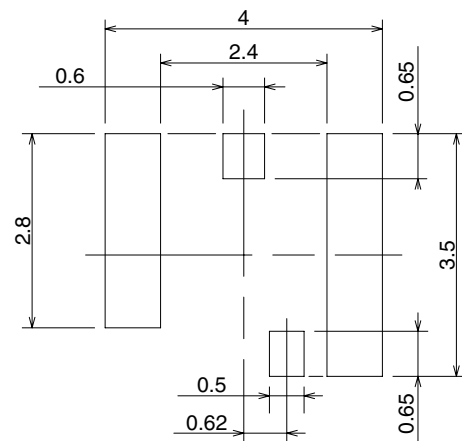
## ◆ PCB mounting pattern and metal mask dimensions

PCB mounting pattern



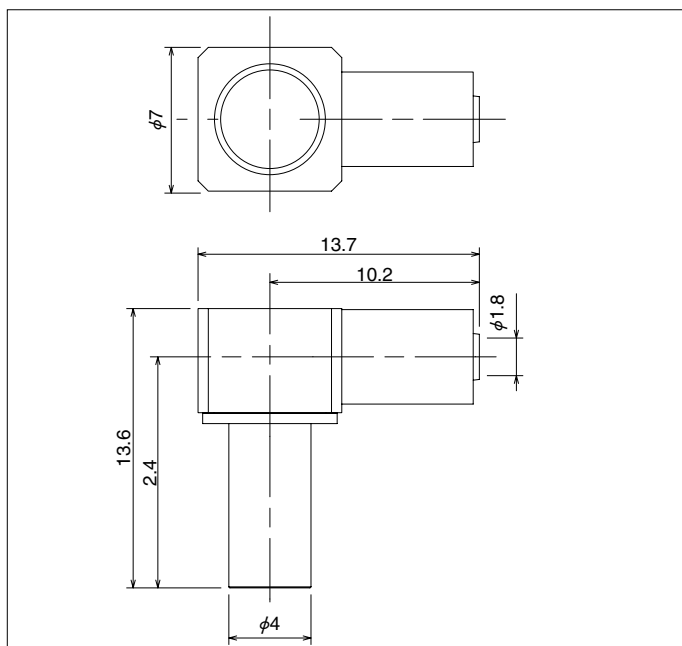
 area show the conductive pattern prohibited area.

Metal mask dimensions



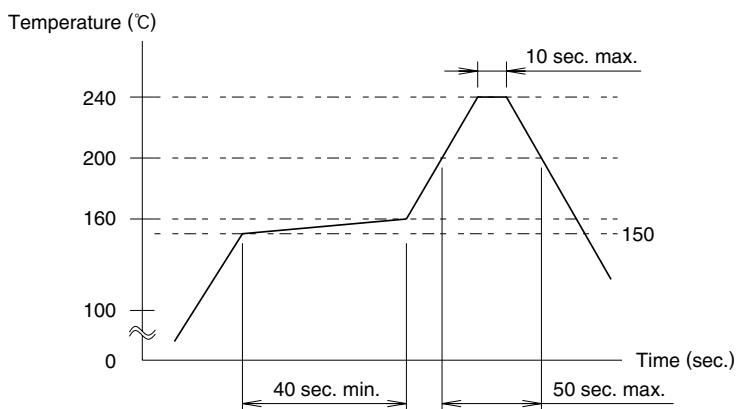
## ■ Plug

| Part Number    | CL No.     | RoHS |
|----------------|------------|------|
| MS-162-C(LP)-1 | 358-0222-4 | YES  |



Applicable cable: 1.5D-HQEW, 1.5D-QEW (Fujikura Ltd.)

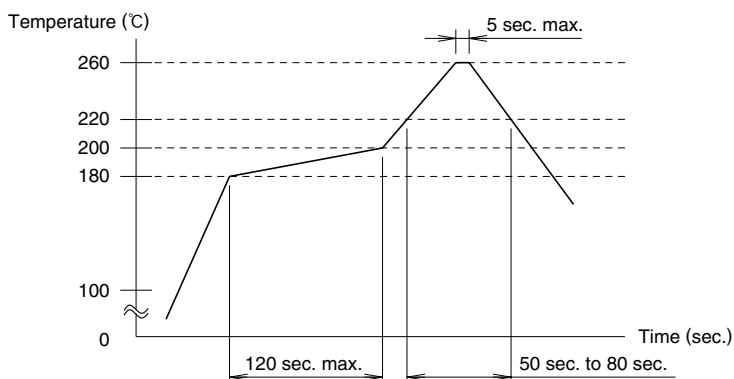
## ◆ Recommended Temperature profile



### ● Typical Solder Paste

|   |                       |                  |
|---|-----------------------|------------------|
| ① | Maximum temperature   | : 240°C          |
| ② | Peak temperature      | : 200°C to 235°C |
| ③ | Peak temperature time | : 10 sec. max.   |
| ④ | 200°C min.            | : 50 sec. max.   |
| ⑤ | 150°C to 160°C        | : 40 sec. min.   |

Metal mask thickness: 0.12mm  
 Reflow cycles: 2 cycles



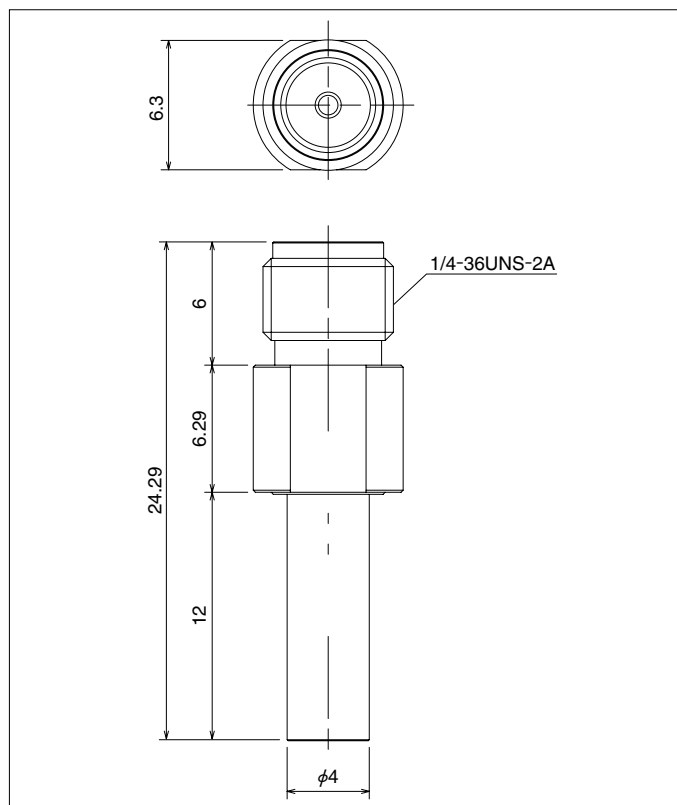
### ● Typical Lead-free Solder Paste

|   |                       |                      |
|---|-----------------------|----------------------|
| ① | Maximum temperature   | : 260°C              |
| ② | Peak temperature      | : 240°C to 255°C     |
| ③ | Peak temperature time | : 5 sec. max.        |
| ④ | 220°C min.            | : 50 sec. to 80 sec. |
| ⑤ | 180°C to 200°C        | : 120 sec. max.      |

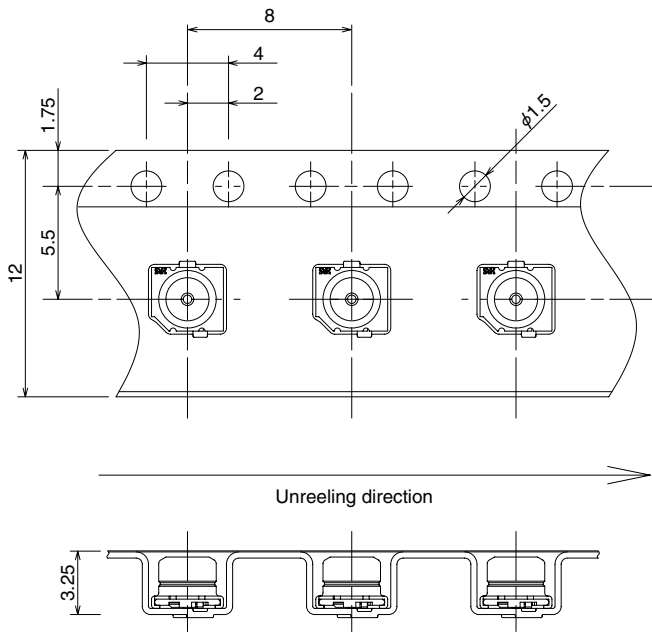
Metal mask thickness: 0.12mm  
 Reflow cycles: 2 cycles

## ■ SMA conversion adapter

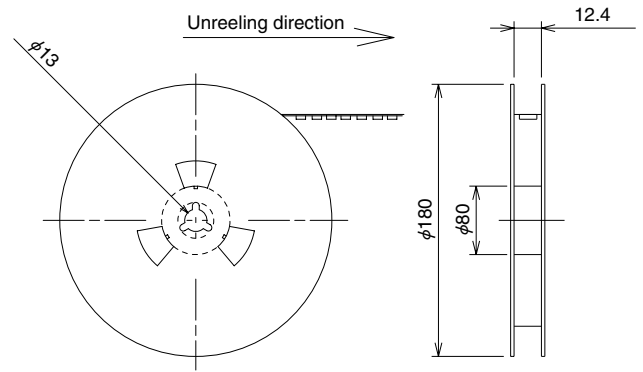
| Part Number   | CL No.     | RoHS |
|---------------|------------|------|
| MS-162-HRMJ-1 | 358-0210-5 | YES  |



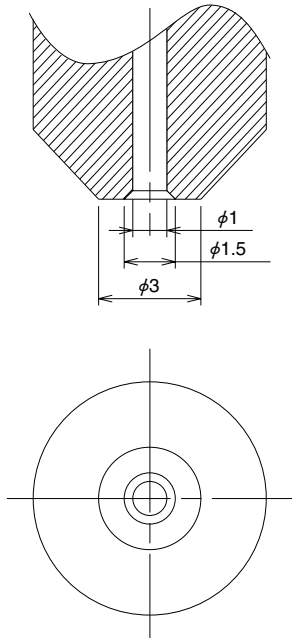
## ◆ Packaging Specifications



## ● Reel dimensions

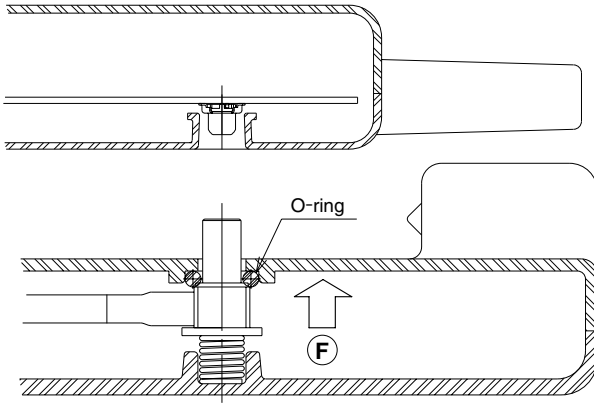


## ◆ Recommended Nozzle Dimensions



## ◆ Example of Application

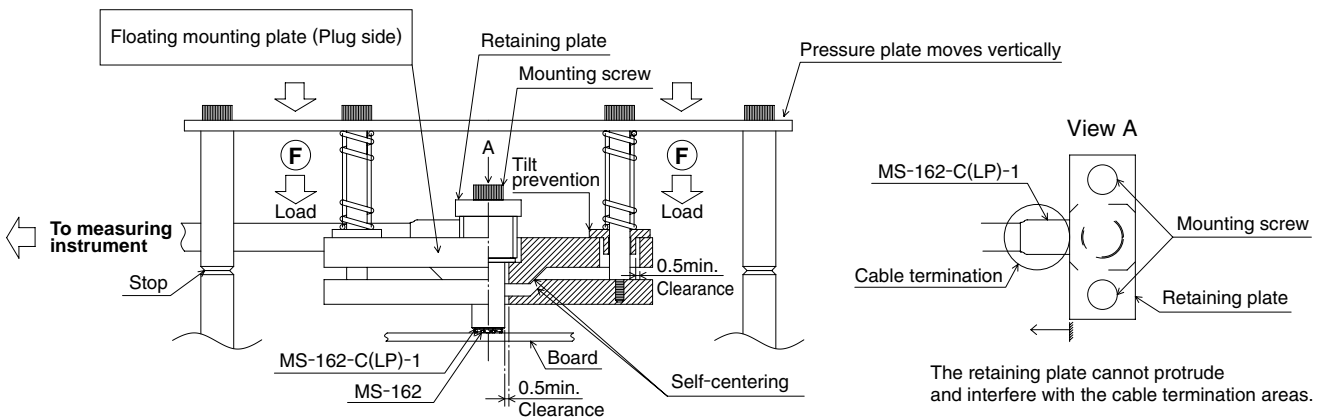
### Installed in portable devices



Note 1: When mounting the MS-162-C(LP)-1 make sure that the recommended self alignment distances and angle can be maintained.

Note 2: When fully mated the spring force  $\textcircled{F}$  must be 10N to 15N.

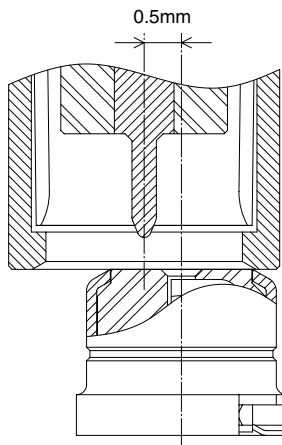
### Installed in test fixture



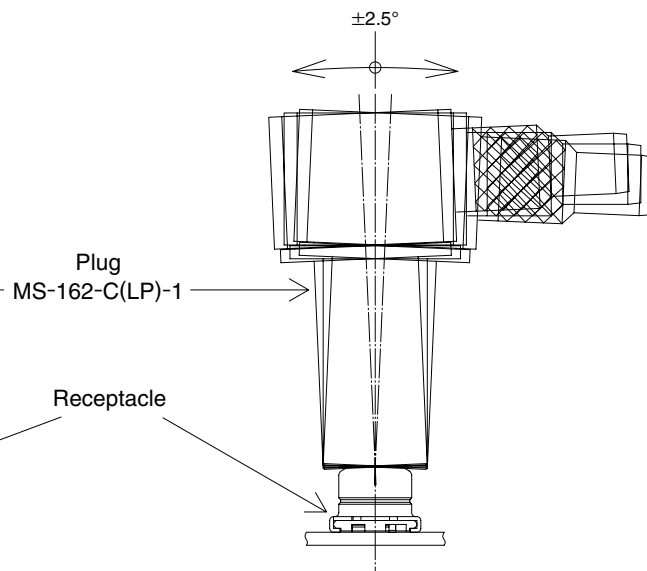
Note 1: When mounting the MS-162-C(LP)-1 make sure that the recommended self alignment distances and angle can be maintained.

Note 2: When fully mated the spring force  $\textcircled{F}$  must be 10N to 15N.

### Axial misalignment distance

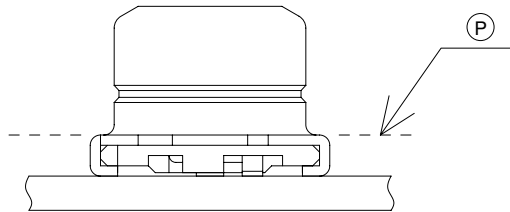


### Allowable angular misalignment for mating



## ◆Precautions

1. Do not use the washing process.
2. Do not use hand soldering for mounting of MS-162.
3. When using a heat gun, hot plate, or similar methods, limit the temperature to 260°C applied for 10 seconds max.
4. Consult Hirose if your application, installation methods or end-user environment are different than the recommended.
5. Please refrain from using the product in environments specifically affected by dust, high humidity, gases, very high temperatures and very low temperatures.
6. When used as an RF interface of a portable terminal, consider using a rubber cap or other means of protection against intrusion of dust, dirt or other harmful elements.
7. When using, assure that the plug is fully inserted to the surface (P), as shown.



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