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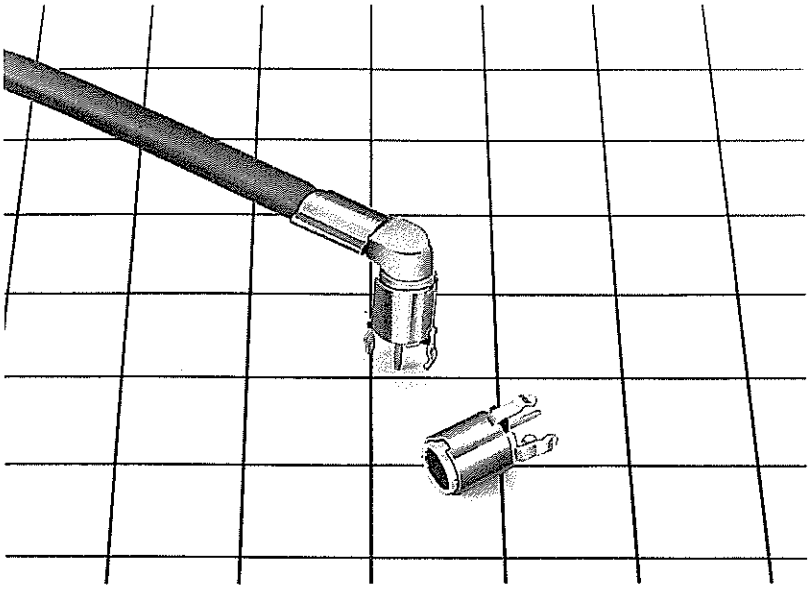
# FINGER-LOCK COAXIAL CONNECTORS

## (LOW-PROFILE MICROMINIATURE HIGH-FREQUENCY CONNECTORS)

## D.C.~1500MHz

## GENERAL

The FL (finger-lock) series connectors are low-profile microminiature coaxial connectors intended for high-density packaging of components on printed circuit boards. The FL series is ideal for high-density circuit board wiring in signal transmission applications at high frequencies up to 1 GHz.



## FEATURES

(1) Low Profile.
Fully mated, the FL series is only 10.5 mm, (0.413") in height, with a maximum diameter of 5 mm (0.197).

(2) Low Cost.
Unique design and production methods assure quality and competitive pricing.

(3) Fully Solderless Termination.
The FL series plug uses solderless crimping for both center conductors and outer conductors thus providing improved reliability and savings in assembly time.

(4) High Reliability.
An exclusive Hirose interface design, using combined axial forces, allows consistent performance under vibration and assures simple and positive locking.

(5) High-level Matching.
Maximum V.S.W.R. is only 1.2 at frequencies up to 1 GHz.

(6) Recommended Cable.
Cable #1.5D-QEW and 1.5C-QEW•CW, manufactured by Fujikura Electric Wires Co., Ltd., are recommended for optimal performance. Contact factory for information regarding use with other cable.

## APPLICATIONS

Typical applications include cellular telephones, radio communications equipment, electronic measuring instruments, CATV, control units, etc.

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# MATERIAL AND FINISH

| Part name | Material | Finish |
|---|---|---|
| Shell | Brass or phosphor bronze | Silver plating |
| Center contact (male) | Brass | Gold plating |
| Center contact (female) | Phosphor bronze | Gold plating |
| Insulation | Polybutylene terephthalate (PBT) | Black |

# PERFORMANCE CHARACTERISTICS

(1) General performance characteristics

| Item | Specification |
|---|---|
| Characteristic impedance | 50Ω |
| Insulation resistance | 1000MΩ or more (at 250 VDC) |
| Contact resistance | 10 mΩ or less for both center and outer conductors (at 1 ADC) |
| Withstanding voltage | 250 VAC (rms) for one minute |
| Coupling/removal force | 300 gf or more |
| Life of contacts | 50 times of use |

(2) V.S.W.R.

a. When used on 50Ω lines

From DC to 1 GHz 1.2 or less
From 1 GHz to 1.5 GHz 1.25 or less

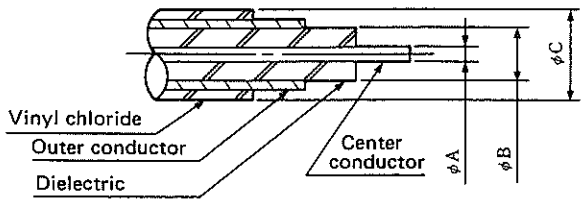
b. When used on 75Ω lines

With FL-LP-1.5C·QEW·CW connectors, the FL series can also be used on 75Ω lines. However, the operating frequency is limited to a maximum of 500 MHz since the characteristic impedance of the connector body is 50 Ω. V.S.W.R at this time is as follows:

From DC to 140 MHz 1.15 or less
From 140 MHz to 500 MHz 1.25 or less

# SPECIFIED CABLE

The dimensions, construction, and materials of the cables for use with the FL series are as follows (use only these cables, since equivalent cables produced by other manufacturers differ in dimensional tolerance, material, etc.):




| Cable name | Dimensions | | | Materials | | | Cable manufacturer |
|---|---|---|---|---|---|---|---|
| | φA | φB | φC | Center conductor | Dielectric | Outer conductor | |
| 1.5D-QEW | 7/0.18(0.54) | 1.6 ± 0.05 | 3.4 ± 0.2 | Annealed copper wire | Crosslinked polyethylene | Annealed copper wire | Fujikura Electric Wires Co., Ltd. |
| 1.5C-QEW·CW | 0.26 | 1.6 ± 0.05 | 3.4 ± 0.3 | Copper welded wire | Crosslinked polyethylene | Annealed copper wire | Fujikura Electric Wires Co., Ltd. |

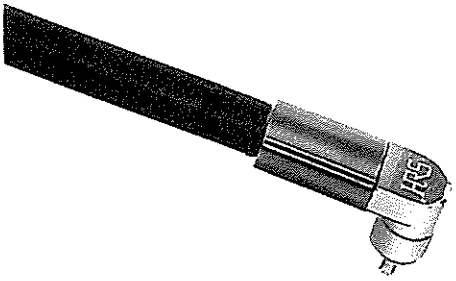
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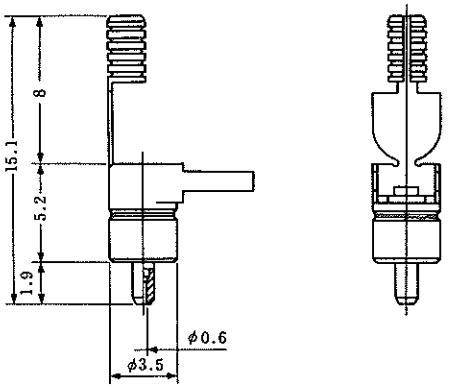


## PLUGS

The following FL series products are available:

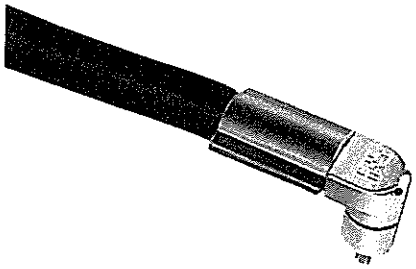
| HRS No. | Part No. | Applicable cable |
|---|---|---|
| CL331-0001-6-40 | FL-LP-1.5DW(40) | 1.5D-QEW |

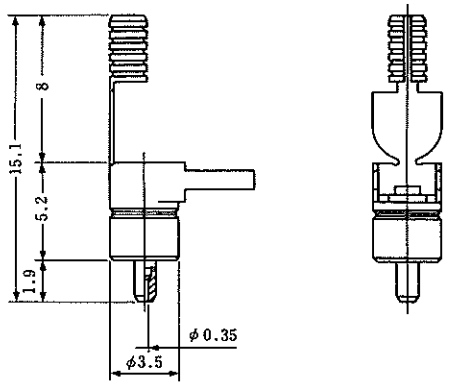





This product is provided with a crimp sleeve.

| HRS No. | Part No. | Applicable cable |
|---|---|---|
| CL331-0007-2-40 | FL-LP-1.5C.QEW.CW(40) | 1.5C-QEW.CW |






This product is provided with a crimp sleeve.

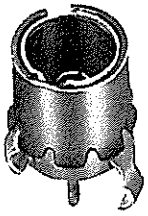
This connector is specially designed for use with 75Ω cable 1.5C-QEW·CW.

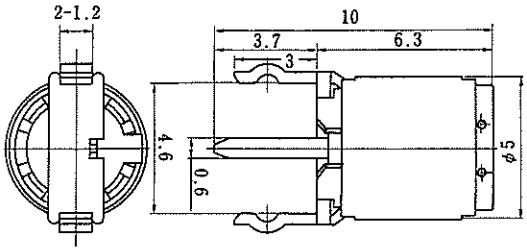
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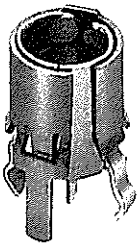
# RECEPTACLES

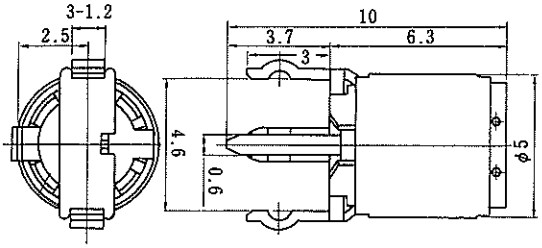
| HRS No. | Part No. |
|---|---|
| 331-0066-1 | FL-R-PC-11 |



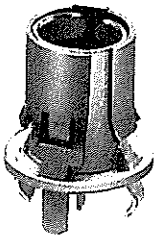


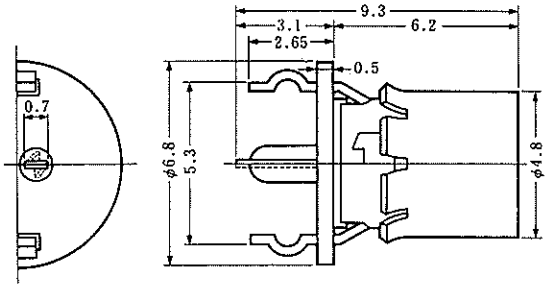

| HRS No. | Part No. |
|---|---|
| 331-0065-9 | FL-R-PC-10 |






| HRS No. | Part No. |
|---|---|
| 331-0053-0 | FL-R-PC-(3) |






Teflon washer included to prevent potential shorting between connector and PCB traces.

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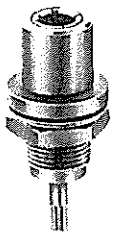


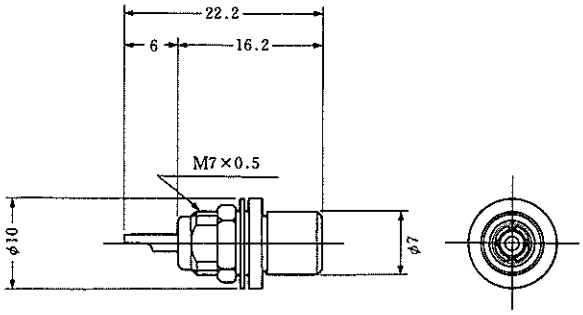
# CONVERTER ADAPTERS

For converter adapters for connecting the FL series to other series, see the CL311BWA series.

# ATTACHMENTS

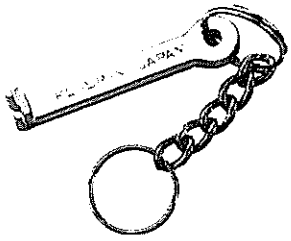
| HRS No. | Part No. |
|---|---|
| 331-0042-3-40 | FL-harness inspection receptacle(40) |

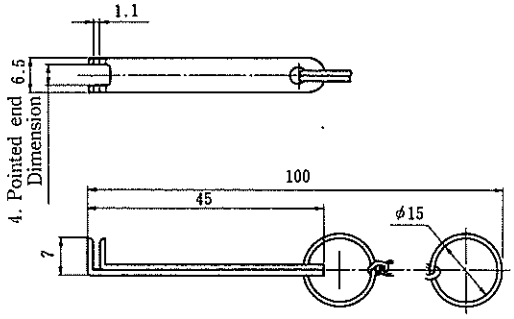





This receptacle is used for checking the continuity, withstand voltages, etc. of harness products.

| HRS No. | Part No. |
|---|---|
| 331-0048-0 | FL-LP-N2 |






This jig is not suitable for heat contractibility tube shielding with crimping sleeve.

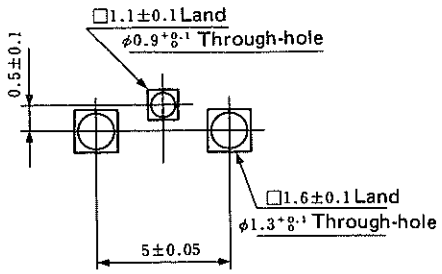
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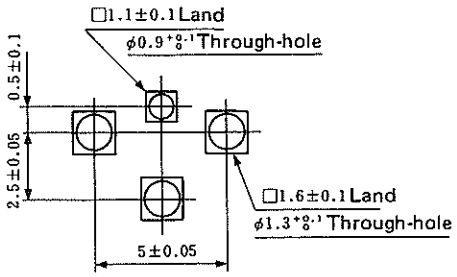
# LAYOUT DIAGRAMS FOR PRINTED CIRCUIT BOARDS:

Prepare printed circuit boards in strict accordance with the diagrams shown below. Note that an excessive thru-hole diameter may cause solder to flow onto the printed-circuit-board mounting side during automatic soldering. This solder flow could damage the connector.

### Example 1: Square type Land

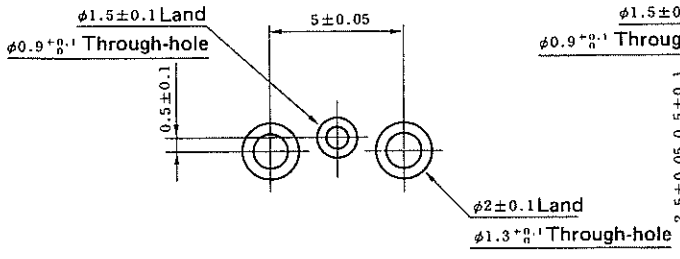



FL-R-PC-11

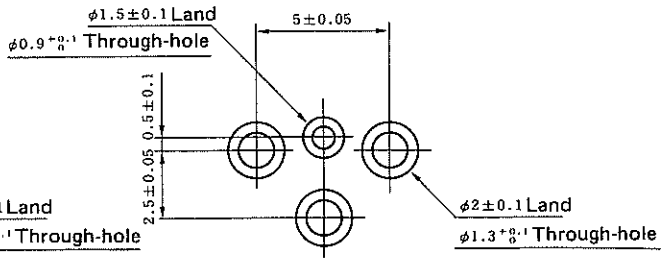



FL-R-PC-10
FL-R-PC(3)

### Example 2: Round type Land



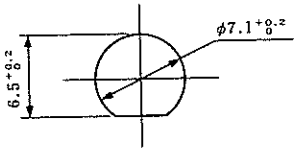

FL-R-PC-11




FL-R-PC-10
FL-R-PC(3)

Note: Dimensions of Lands show an example.

# PANEL-MOUNTING HOLE DIAGRAM FOR FL HARNESS INSPECTION RECEPTACLES



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# PRECAUTIONS ON USE

(1) High-frequency leakage.
The FL-LP-1.5DW connector may allow high-frequency leakage from the gap in its L-bend. This leakage may be approximately 5 dB (at 900 MHz) than our UM (SMB) connectors. Please contact the factory for high-frequency leakage test data, if necessary.

(2) Mounting the receptacles on printed circuit boards.
a. Use the FL-R-PC(3) receptacle when drawing patterns on printed-circuit-board mounting side. (This receptacle has an added insulating washer). Note that using the FL-R-PC-11or FL-R-PC-10receptacles may cause short circuiting between the central pattern and the outer conductor.
b. Each of our receptacles is designed to prevent flux from flowing into the center conductor contacts, thus permitting soldering in an automatic solder bath. The hole dimensions, however, must be exactly as specified in LAY-OUT DIAGRAMS FOR PRINTED CIRCUIT BOARDS.
Note: Excessive thru-hole diameter may cause solder to flow onto the printed-circuit-board mounting side during automatic soldering and damage the connector.
The soldering conditions:

| | |
|---|---|
| Soldering temperature | 250°C or less |
| Soldering time | 5 sec or less |

Inflow of solder may also occur due to factors other than the soldering temperature and soldering time. Contact the factory for details.

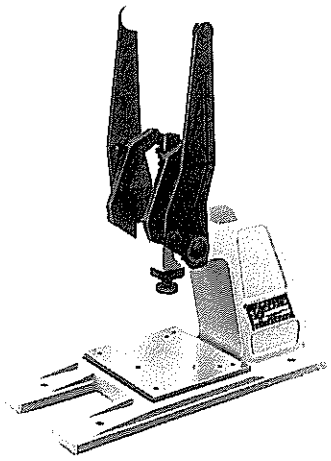
(3) Connector Insertion and Removal.
a. To connect the FL series, align the coupling axes of both connectors and then snap the connectors together. Do not insert the connector at an angle.
b. To release the connector, hook the tip of the FL-LP-N2 removal jig onto the connector lid, then pull the jig vertically along the connector coupling axis. If the removal jig is not used, hold the connector carefully by hand and pull it out along the coupling axis. Do not pull the attached cable when removing the connector. This will damage the connector.

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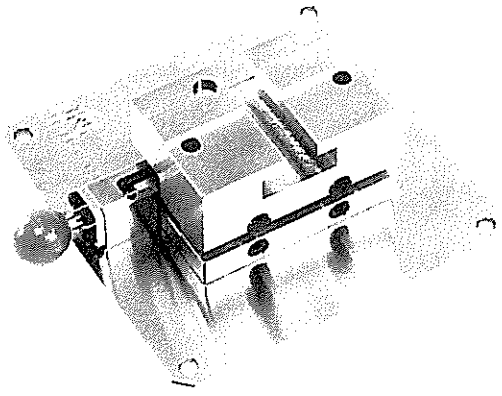
# HI-FLEX CONNECTING PRESSES AND ATTACHMENTS

## Hi-Flex Connecting Press



| Product No. | Height | Width | Depth | Weight |
|---|---|---|---|---|
| Hi-Flex connecting press | 440 mm | 160 mm | 350 mm | 13 kg |

## Guide Plate With Block



| Product No. | Applicable connector |
|---|---|
| FL-LP-C (1.5D) | FL-LP-1.5DW |
| FL-LP-C (1.5C) | FL-LP-1.5C•QEW•CW |

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# TERMINATION METHODS 1(FL-LP-1.5DW, FL-LP-1.5C.QEW.CW)

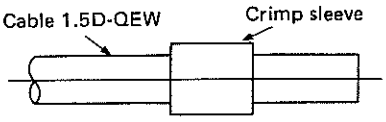



Fig. 1

## 1. Installing the crimp sleeve.

Mount the crimp sleeve on the cable as shown in Figure 1.

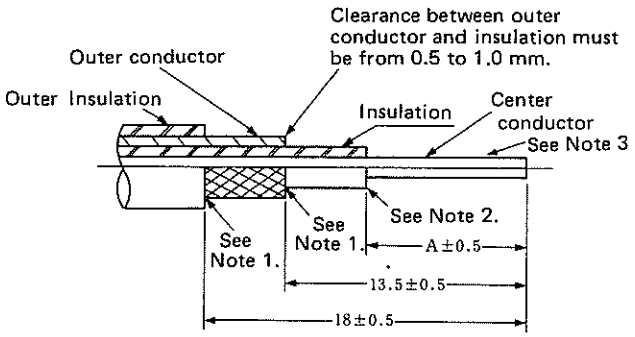



Fig. 2

## 2. Cable Preparation

(1) Strip the outer insulation to 18 ± 0.5 mm from the cable end shown in Figure 2. Cut the outer conductor of the cable to 13.5 ± 0.5 mm. Cut the insulation by dimension "A" specified in the table below.

(2) After preparing the cable per #1, wipe the center conductor with an alcohol-dampened cloth to remove any polythylene residue from the surface of the center conductor.

Note 1: Do not damage the outer or center conductors when cutting the insulation and outer insulation.
Note 2: Cut the insulation uniformly. Do not pull the insulation while cutting it.
Note 3: Stranded wires of center conductor should not be spread out or bent.

The specified value of dimension "A" is shown below for each connector part number.

| Connector part No. | Dimension A |
|---|---|
| FL-LP-1.5DW | 11 ± 0.5 |
| FL-LP-1.5C·QEW·CW | 11 ± 0.5 |

* Jig (FL-LP-S) for this cable end treatment is available.

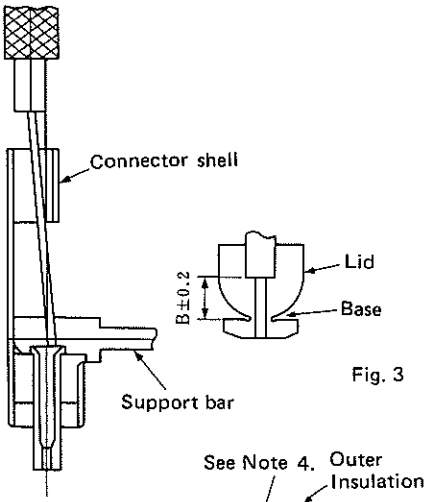



Fig. 3

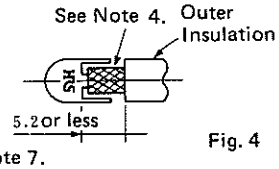



Fig. 4

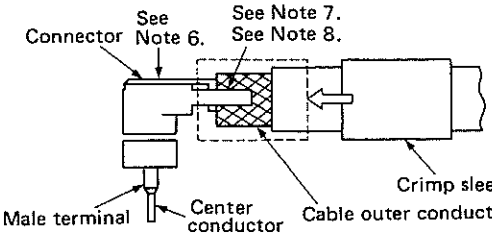



Fig. 5

## 3. Inserting the cable into the connector

(1) Pass the cable center conductor through the connector shell, as shown in Figure 3. Then insert the center conductor into the hole in the male terminal while making sure that the connector shell passes between the outer conductor and the cable insulation. Insertion will be completed when the cable insulation reaches the section of dimension "B" specified in the table below.

Note 4: The end of the outer conductor must be uniform with respect to the connector shell.
Note 5: After insertion, there must be a clearance of about 2 mm between the cable center conductor and the end face of the male terminal.

(2) Bend the connector lid, as shown in Figure 5.

Note 6: Directly press the lid to bend it. Do not hold the connector by the connector shell when bending the connector lid.
Note 7: Place the outer conductor in the support bar.

(3) The clearance between the outer insulation and the end face of the LP shell must be 5.2 mm or less.

(4) Slide the crimp sleeve further in up to the base of the support bar. (Fig. 5 dotted line section)

Note 8: At this time, the support bar must be inside the crimp sleeve.

The specified value of dimension "B" is shown in the table below for each connector part number.

| Connector part No. | Dimension B |
|---|---|
| FL-LP-1.5DW | 2 |
| FL-LP-1.5C·QEW·CW | 2 |

(5) Visually check the cable center conductor to ensure that its end is uniform with respect to the end of the male terminal. If the conductor does not have a uniform end, pull out hidden strands with pillars, etc.

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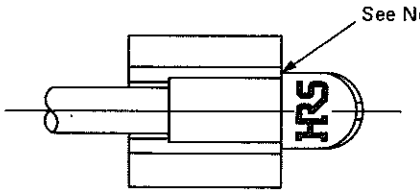



Fig. 6

### 4. Crimp connection of the outer conductor

(1) Insert the mating section of the connector into the hole of the crimp connection jig, as shown in Figure 6.
Note 9: After insertion, make sure that the crimp sleeve is inserted fully in the base of the support bar.

(2) Fully depress the lever of the crimp connection jig to make the connection.

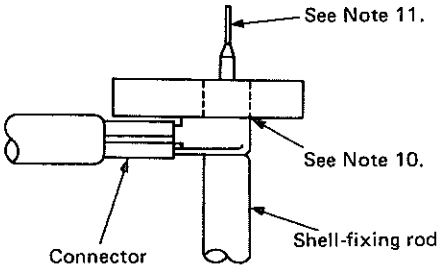
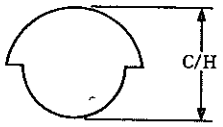



Fig. 7




This shows one example of crimp connection.

Fig. 8

### 5. Crimp connection of the center conductor

(1) Insert the mating section of the connector into the hole of the crimp connection jig, as shown in Figure 7, and press the shell-fixing rod firmly against the shell.
Note 10: After insertion, make sure that the shell is inserted fully into the hole of the jig.

(2) Fully depress the lever of the crimp connecting jig to make the connection. After connection, measure dimension C/H with a micrometer and check that the measured value is within the specifications shown in the table below.

| Connector part No. | C/H |
|---|---|
| FL-LP-1.5DW | 0.81 ~ 0.85 |
| FL-LP-1.5C•QEW•CW | 0.87 ~ 0.92 |

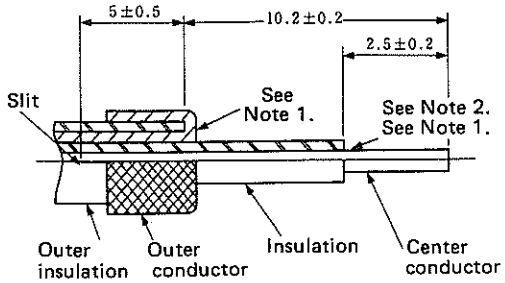
Note 11: The section of the center conductor protruding from the end of the male terminal will have been cut off by this assembly operation. If this section still remains uncut, break and remove it by hand.

* For this crimp-connection process, the FL-LP-C (1.5D) or FL-LP-C (1.5C) jigs are available.

The product information in this catalog is for reference only. Please request the Engineering Drawing for the most current and accurate design information.
All non-RoHS products have been discontinued, or will be discontinued soon. Please check the products status on the Hirose website RoHS search at www.hirose-connectors.com, or contact your Hirose sales representative.



# TERMINATION METHODS 2 (FL-P-1.5DW-1)

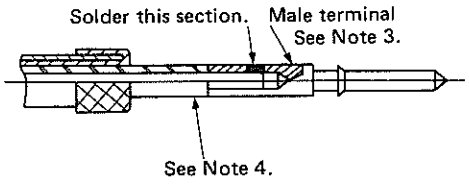



**1. Cable preparation**

(1) Strip the cable outer insulation by 10.2 ± 0.2 mm from the end.
(2) Make a 5 ± 0.5 mm slit in the cable insulation.
(3) Fold back the outer conductor and cut the center conductor to 2.5 ± 0.2 mm from the end.

Note 1: Do not damage the outer or center conductors when stripping the insulation and outer insulation.

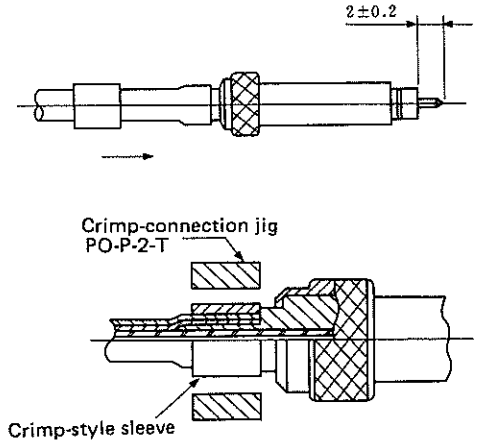
Note 2: Cut the insulation uniformly, do not pull the insulation when cutting it.




**2. Soldering the center conductor**

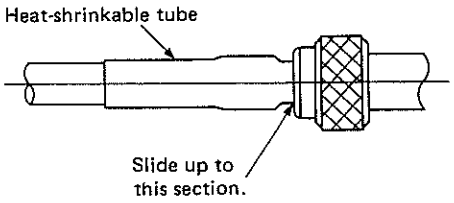
Solder the male terminal to the cable center conductor.

Note 3: Pre-solder the male terminal.
Note 4: Carry out the soldering operation to prevent melting of the end portion of the insulation due to heat.
Note 5: After soldering, remove excess solder from the soldered portion.
Note 6: Use a soldering iron with a heating capacity of 20 to 30 watts.




**3. Inserting the cable into the connector**

(1) Place the heat-shrinkable tube and the crimp sleeve onto the cable. Insert the block into the connector until the central terminal emerges 2 ± 0.2 mm cut from the shell end.
(2) Fully slide the solderless sleeve in, and then crimp it with the PO-P-2-T crimp-connection jig.




**4. Mounting the heat-shrinkable tube**

Slide the heat-shrinkable tube to the position shown, and then shrink it with a heat gun. Take great care during shrinking not to melt the cable outer insulation.

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