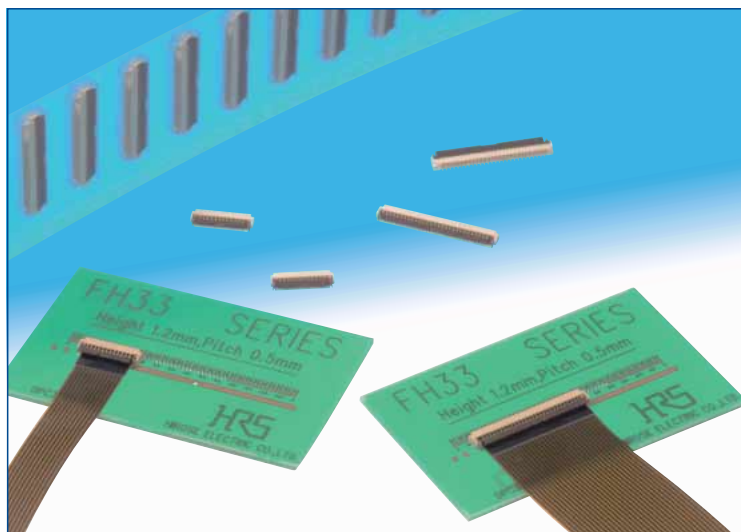


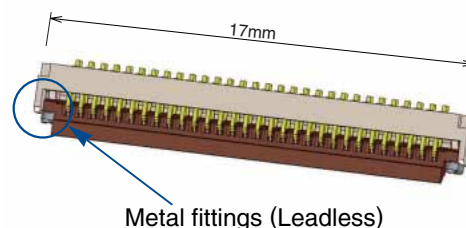
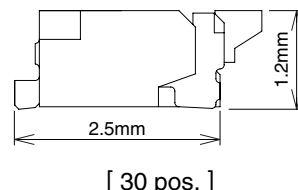
## 0.5 mm Pitch, 1.2 mm above the board, Flexible Printed Circuit & Flexible Flat Cable ZIF Connectors

### FH33 Series



#### Increased FPC retention force

##### ● Small size



### ■ Features

#### 1. Low-profile, small PCB mounting area

Narrow width of only 2.5 mm reduced the board footprint by approximately 17% to 57%, as compared to several similar FH Series HRS connectors.

#### 2. Increased FPC/FFC retention force

- In the horizontal direction: Approximately 2.0 times (compared to similar FH Series HRS connectors)
- In the vertical direction: Approximately 1.7 times (compared to similar FH Series HRS connectors)

#### 3. Conductive traces on the PCB can run under the connector

No exposed contacts on the bottom of the connector.

#### 4. One finger operation of the actuator

Proven (in several other Hirose's connectors) Flip-Lock® rotating actuator assures reliable mechanical and electrical connection with FPC/FFC, confirming it with a definite tactile feel.

#### 5. Easy FPC/FFC insertion

FPC/FFC is self-guided in the connector assuring correct and reliable electrical and mechanical connection.

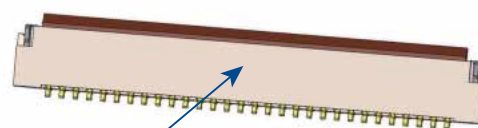
#### 6. Accepts 0.3 mm thick FPC, FFC

Increased rigidity 0.3 mm thick FPC / FFC is reliably inserted and terminated.

#### 7. Board placement with automatic equipment

Flat top surface and packaging on the tape-and-reel allows use of vacuum nozzles.  
Standard reel contains 5,000 connectors.

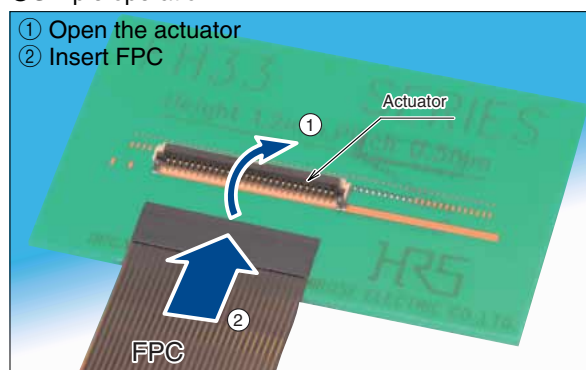
##### ● Can be mounted over conductive traces.



No exposed contacts on the bottom of the connector

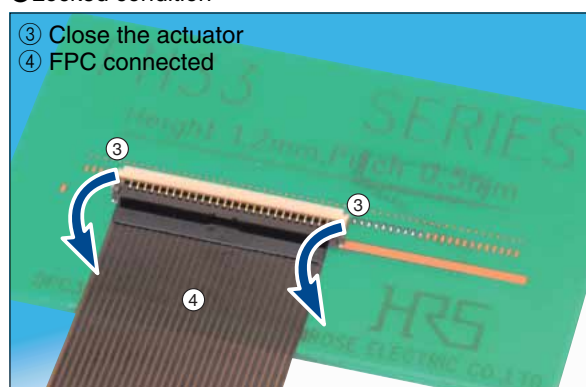
##### ● Simple operation

- ① Open the actuator
- ② Insert FPC



##### ● Locked condition

- ③ Close the actuator
- ④ FPC connected



### ■ Applications

Notebook computers, digital cameras, LCD connections, plasma displays, Digital Video Cameras, Portable Digital Assistants and other compact devices requiring Flexible Printed Circuit Connections using high reliability ZIF connectors.

## FH33 Series 0.5 mm Pitch, 1.2 mm above the board, Flexible Printed Circuit & Flexible Flat Cable ZIP Connectors

### Product Specifications

|         |                |         |                                                         |                                                                             |                                                     |                                                                            |
|---------|----------------|---------|---------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------|
| Ratings | Current rating | 0.5 A   | Operating temperature range<br>Operating humidity range | -55 °C to +85°C (Note 1)<br>Relative humidity 90% max.<br>(No condensation) | Storage temperature range<br>Storage humidity range | -10°C to +50°C (Note 2)<br>Relative humidity 90% max.<br>(No condensation) |
|         | Voltage rating | 50 V AC |                                                         |                                                                             |                                                     |                                                                            |

|                 |                                                                                               |
|-----------------|-----------------------------------------------------------------------------------------------|
| Recommended FPC | Thickness = 0.3 ± 0.05mm gold plated (under 30 pos.), 0.3 ± 0.03mm gold plated (over 31 pos.) |
|-----------------|-----------------------------------------------------------------------------------------------|

| Item                                     | Specification                                                                                                             | Conditions                                                                                                        |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 1. Insulation resistance                 | 500 MΩ min.                                                                                                               | 100 V DC                                                                                                          |
| 2. Withstanding voltage                  | No flashover or insulation breakdown.                                                                                     | 150 V AC /one minute                                                                                              |
| 3. Contact resistance                    | 50 mΩ max.<br>* Including FPC conductor resistance                                                                        | 1 mA                                                                                                              |
| 4. Durability<br>(insertion/ withdrawal) | Contact resistance: 50 mΩ max.<br>No damage, cracks, or parts dislocation.                                                | 20 cycles                                                                                                         |
| 5. Vibration                             | No electrical discontinuity of 1μs or more.<br>Contact resistance: 50 mΩ max.<br>No damage, cracks, or parts dislocation. | Frequency: 10 to 55 Hz, single amplitude of 0.75 mm, 10 cycles in each of the 3 directions.                       |
| 6. Shock                                 |                                                                                                                           | Acceleration of 981 m/s <sup>2</sup> , 6 ms duration, sine half-wave waveform, 3 cycles in each of the 3 axis     |
| 7. Humidity<br>(Steady state)            | Contact resistance: 50 mΩ max.<br>Insulation resistance: 50 MΩ min.<br>No damage, cracks, or parts dislocation.           | 96 hours at 40°C and humidity of 90% to 95%.                                                                      |
| 8. Temperature cycle                     |                                                                                                                           | Temperature : -55°C→+15°C to +35°C→+85°C→+15°C to +35°C<br>Time : 30 → 2 to 3 → 30 → 2 to 3 (Minutes)<br>5 cycles |
| 9. Resistance to soldering heat          | No deformation of components affecting performance.                                                                       | Reflow : At the recommended temperature profile<br>Manual soldering: 350°C ± 10°C for 5 seconds                   |

Note 1: Includes temperature rise caused by current flow.

Note 2: The term "storage" refers to products stored for long period of time prior to mounting and use. Operating Temperature Range and Humidity range covers non- conducting condition of installed connectors in storage, shipment or during transportation.

### Materials

| Part           | Material        | Finish                 | Remarks |
|----------------|-----------------|------------------------|---------|
| Insulator      | Polyamide       | Color : Beige          | UL94V-0 |
| Actuator       |                 | Color : Dark brown     |         |
| Contacts       | Phosphor bronze | Gold flash plated      | _____   |
| Metal fittings |                 | Pure tin reflow plated | _____   |

### Ordering information

**FH33 - 28S - 0.5 SH (10)**

①

②

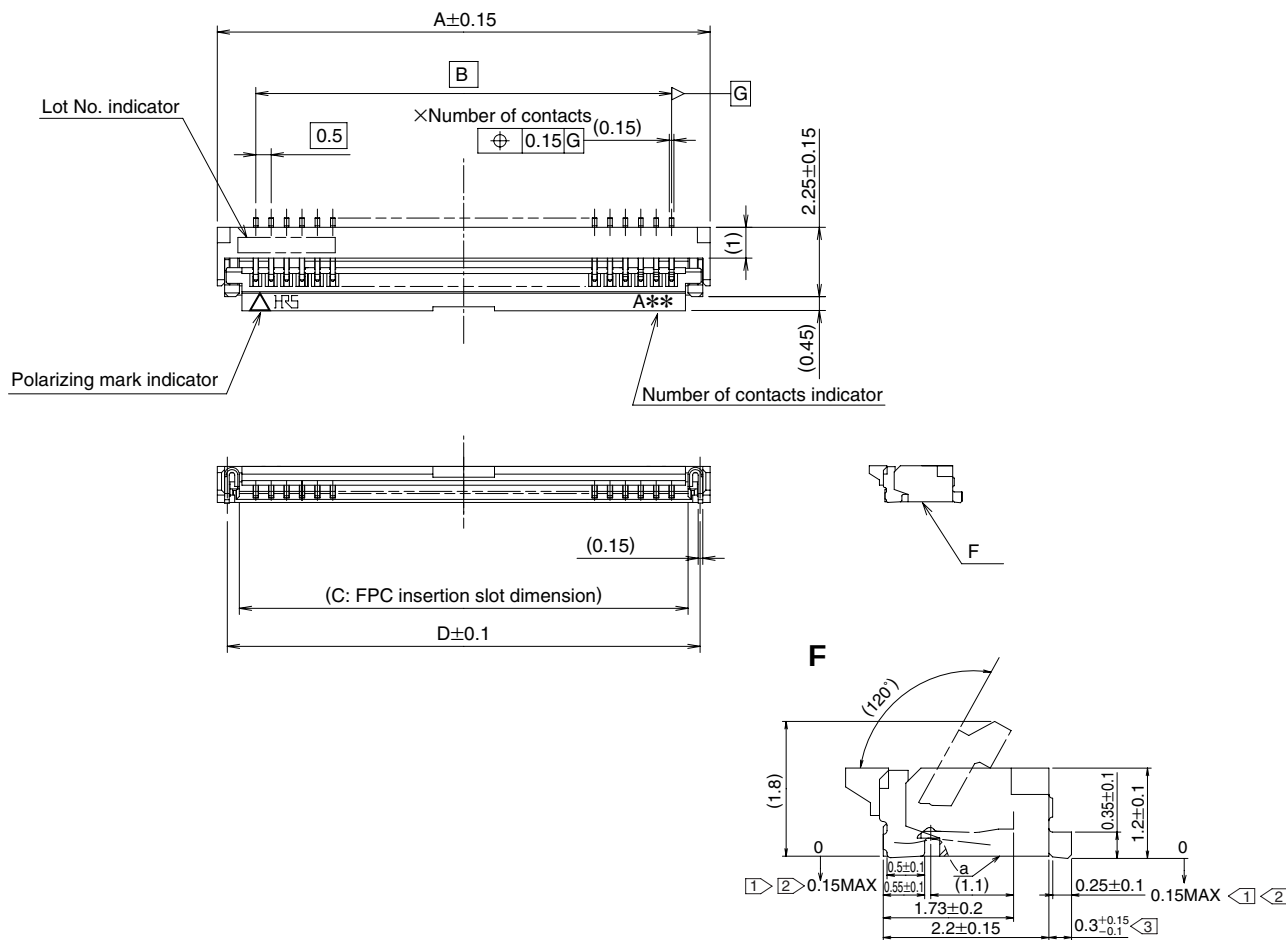
③

④

⑤

|                                                                                               |                                                                                                          |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| ① Series name: FH33                                                                           | ④ Termination type<br>SH : SMT horizontal                                                                |
| ② No. of contacts<br>Number of contacts: 6, 9, 10, 12, 14, 19, 20, 26, 28, 30, 32, 36, 40, 45 | ⑤ Blank : Gold flash plated (RoSH compliant)<br>(10) : Nickel barrier gold flash plated (RoHS compliant) |
| ③ Contact pitch: 0.5 mm                                                                       |                                                                                                          |

## Connector Dimensions



- Notes
- ① The coplanarity of each terminal lead is within 0.1 max.
  - ② The contact terminal lead position indicates the dimension from the bottom a surface of the insulator body.
  - ③ Difference of each terminal lead is within 0.1 max.
  - ④ Slight variations in color of the plastic compounds do not affect form, fit or function of the connector.

Unit: mm

| Part Number         | CL No.         | Number of Contacts | A    | B    | C     | D     | RoHS            |
|---------------------|----------------|--------------------|------|------|-------|-------|-----------------|
| FH33- 6S-0.5SH (**) | 580-1301-1-**- | 6                  | 5    | 2.5  | 3.57  | 4.35  | YES<br>(Note 1) |
| FH33- 9S-0.5SH (**) | 580-1303-7-**- | 9                  | 6.5  | 4    | 5.07  | 5.85  |                 |
| FH33-10S-0.5SH (**) | 580-1304-0-**- | 10                 | 7    | 4.5  | 5.57  | 6.35  |                 |
| FH33-12S-0.5SH (**) | 580-1302-4-**- | 12                 | 8    | 5.5  | 6.57  | 7.35  |                 |
| FH33-14S-0.5SH (**) | 580-1305-2-**- | 14                 | 9    | 6.5  | 7.57  | 8.35  |                 |
| FH33-19S-0.5SH (**) | 580-1307-8-**- | 19                 | 11.5 | 9    | 10.07 | 10.85 |                 |
| FH33-20S-0.5SH (**) | 580-1317-1-**- | 20                 | 12   | 9.5  | 10.57 | 11.35 |                 |
| FH33-26S-0.5SH (**) | 580-1306-5-**- | 26                 | 15   | 12.5 | 13.57 | 14.35 |                 |
| FH33-28S-0.5SH (**) | 580-1300-9-**- | 28                 | 16   | 13.5 | 14.57 | 15.35 |                 |
| FH33-30S-0.5SH (**) | 580-1312-8-**- | 30                 | 17   | 14.5 | 15.57 | 16.35 |                 |
| FH33-32S-0.5SH (**) | 580-1310-2-**- | 32                 | 18   | 15.5 | 16.57 | 17.35 |                 |
| FH33-36S-0.5SH (**) | 580-1311-5-**- | 36                 | 20   | 17.5 | 18.57 | 19.35 |                 |
| FH33-40S-0.5SH (**) | 580-1308-0-**- | 40                 | 22   | 19.5 | 20.57 | 21.35 |                 |
| FH33-45S-0.5SH (**) | 580-1316-9-**- | 45                 | 24.5 | 22   | 23.07 | 23.85 |                 |

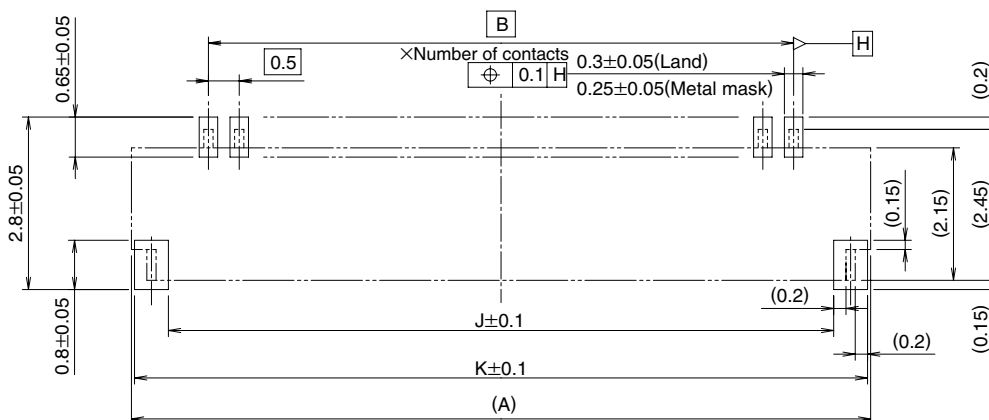
Note 1: (\*\*) : Plating specification. Refer to ordering information.

Note 2: Tape-and-reel packaging (5,000 pieces/reel).

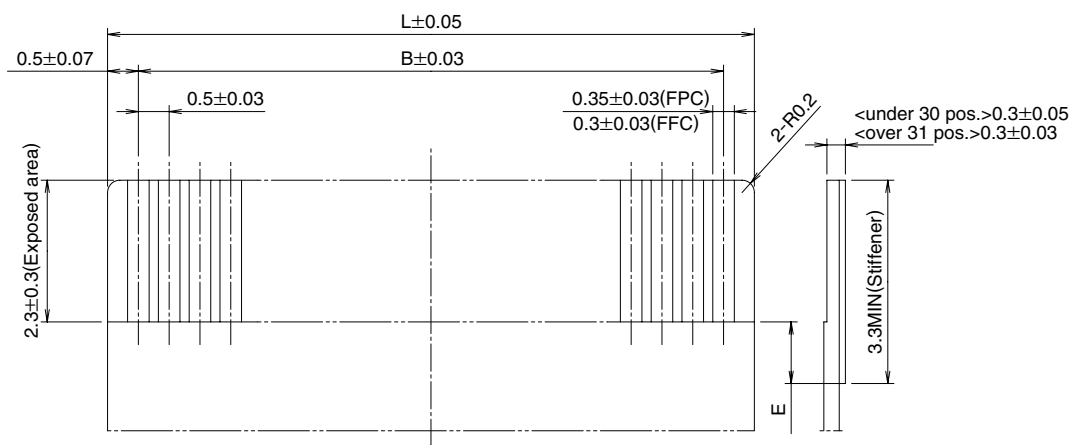
Order by number of reels.

## FH33 Series 0.5 mm Pitch, 1.2 mm above the board, Flexible Printed Circuit & Flexible Flat Cable ZIP Connectors

### ◆ Recommended PCB mounting pattern and metal mask dimensions



### ◆ Recommended FPC dimensions



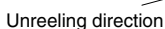
Note 1: Polyimide and a thermally hardened adhesive is recommended as the materials for the stiffener.

Note 2: If the stiffener is less than 3.3 mm, E dimension must be 0.5 mm min.

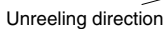
Unit: mm

| Part Number         | CL No.         | Number of Contacts | A    | B    | J    | K    | L    |
|---------------------|----------------|--------------------|------|------|------|------|------|
| FH33- 6S-0.5SH (**) | 580-1301-1-**- | 6                  | 5    | 2.5  | 3.8  | 4.9  | 3.5  |
| FH33- 9S-0.5SH (**) | 580-1303-7-**- | 9                  | 6.5  | 4    | 5.3  | 6.4  | 5    |
| FH33-10S-0.5SH (**) | 580-1304-0-**- | 10                 | 7    | 4.5  | 5.8  | 6.9  | 5.5  |
| FH33-12S-0.5SH (**) | 580-1302-4-**- | 12                 | 8    | 5.5  | 6.8  | 7.9  | 6.5  |
| FH33-14S-0.5SH (**) | 580-1305-2-**- | 14                 | 9    | 6.5  | 7.8  | 8.9  | 7.5  |
| FH33-19S-0.5SH (**) | 580-1307-8-**- | 19                 | 11.5 | 9    | 10.3 | 11.4 | 10   |
| FH33-20S-0.5SH (**) | 580-1317-1-**- | 20                 | 12   | 9.5  | 10.8 | 11.9 | 10.5 |
| FH33-26S-0.5SH (**) | 580-1306-5-**- | 26                 | 15   | 12.5 | 13.8 | 14.9 | 13.5 |
| FH33-28S-0.5SH (**) | 580-1300-9-**- | 28                 | 16   | 13.5 | 14.8 | 15.9 | 14.5 |
| FH33-30S-0.5SH (**) | 580-1312-8-**- | 30                 | 17   | 14.5 | 15.8 | 16.9 | 15.5 |
| FH33-32S-0.5SH (**) | 580-1310-2-**- | 32                 | 18   | 15.5 | 16.8 | 17.9 | 16.5 |
| FH33-36S-0.5SH (**) | 580-1311-5-**- | 36                 | 20   | 17.5 | 18.8 | 19.9 | 18.5 |
| FH33-40S-0.5SH (**) | 580-1308-0-**- | 40                 | 22   | 19.5 | 20.8 | 21.9 | 20.5 |
| FH33-45S-0.5SH (**) | 580-1316-9-**- | 45                 | 24.5 | 22   | 23.3 | 24.4 | 23   |

### ● Embossed Carrier Tape Dimensions (Tape width up to 24mm)



### ● Embossed Carrier Tape Dimensions (Tape width 32mm and over)

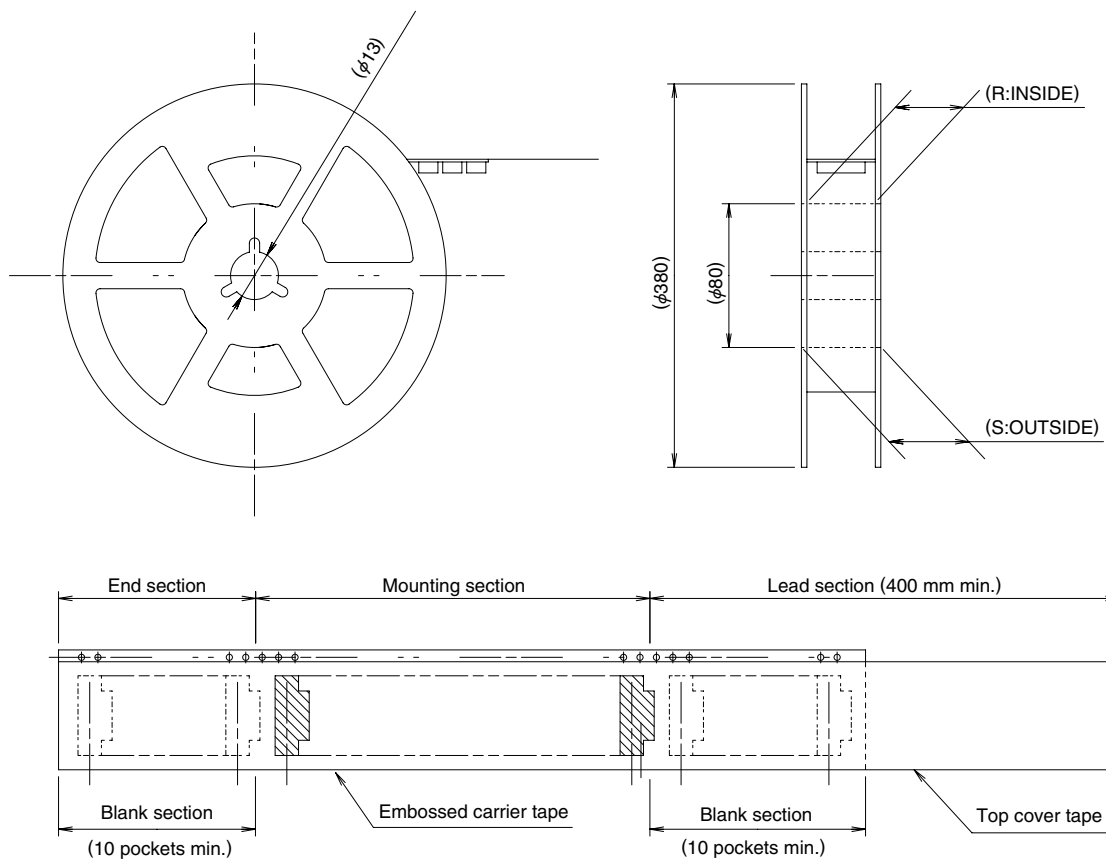


Unit: mm

| Part Number         | CL No.        | Number of Contacts | M  | N    | P    | Q    | R    | S    |
|---------------------|---------------|--------------------|----|------|------|------|------|------|
| FH33- 6S-0.5SH (**) | 580-1301-1-** | 6                  | 16 | 7.5  | ———— | 5.3  | 17.4 | 21.4 |
| FH33- 9S-0.5SH (**) | 580-1303-7-** | 9                  | 16 | 7.5  | ———— | 6.8  | 17.4 | 21.4 |
| FH33-10S-0.5SH (**) | 580-1304-0-** | 10                 | 16 | 7.5  | ———— | 7.3  | 17.4 | 21.4 |
| FH33-12S-0.5SH (**) | 580-1302-4-** | 12                 | 16 | 7.5  | ———— | 8.3  | 17.4 | 21.4 |
| FH33-14S-0.5SH (**) | 580-1305-2-** | 14                 | 16 | 7.5  | ———— | 9.3  | 17.4 | 21.4 |
| FH33-19S-0.5SH (**) | 580-1307-8-** | 19                 | 24 | 11.5 | ———— | 11.8 | 25.4 | 29.4 |
| FH33-20S-0.5SH (**) | 580-1317-1-** | 20                 | 24 | 11.5 | ———— | 12.3 | 25.4 | 29.4 |
| FH33-26S-0.5SH (**) | 580-1306-5-** | 26                 | 24 | 11.5 | ———— | 15.3 | 25.4 | 29.4 |
| FH33-28S-0.5SH (**) | 580-1300-9-** | 28                 | 24 | 11.5 | ———— | 16.3 | 25.4 | 29.4 |
| FH33-30S-0.5SH (**) | 580-1312-8-** | 30                 | 24 | 11.5 | ———— | 17.3 | 25.4 | 29.4 |
| FH33-32S-0.5SH (**) | 580-1310-2-** | 32                 | 32 | 14.2 | 28.4 | 18.3 | 33.4 | 37.4 |
| FH33-36S-0.5SH (**) | 580-1311-5-** | 36                 | 32 | 14.2 | 28.4 | 20.3 | 33.4 | 37.4 |
| FH33-40S-0.5SH (**) | 580-1308-0-** | 40                 | 44 | 20.2 | 40.4 | 22.3 | 45.4 | 49.4 |
| FH33-45S-0.5SH (**) | 580-1316-9-** | 45                 | 44 | 20.2 | 40.4 | 24.8 | 45.4 | 49.4 |

## FH33 Series 0.5 mm Pitch, 1.2 mm above the board, Flexible Printed Circuit & Flexible Flat Cable ZIP Connectors

### ●Reel Dimensions

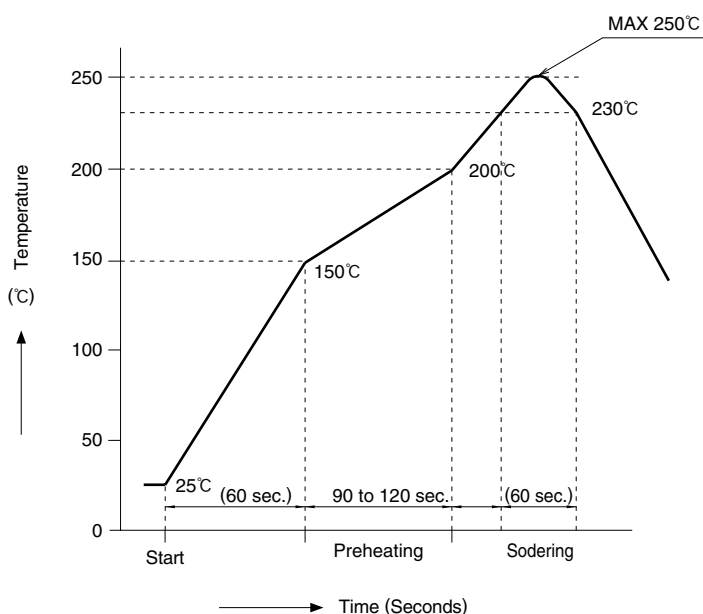


Note: 5,000 pieces per reel.

Embossed tape 32 mm or wider will have perforated feed holes on two sides.

## ◆ Recommended Temperature Profile

### ● Using Lead-free Solder paste



### HRS test conditions

Solder method : Reflow, IR/hot air

(Nihon Den-netsu Co., Ltd.'s Part Number: SENSBY NR-2)

Environment : Room air

Solder composition : Paste, 96.5%Sn/3.0%Ag/0.5%Cu

(Senju Metal Industry, Co., Ltd.'s Part Number: M705-GRN360-K2-V)

Test board : Glass epoxy 25mm×50mm×0.8mm thick

Land dimensions : Contacts lead 0.3mm×0.65mm

Metal fittings 0.55mm×0.8mm

Metal mask : Contacts lead 0.25mm×0.65mm×0.1mm thick

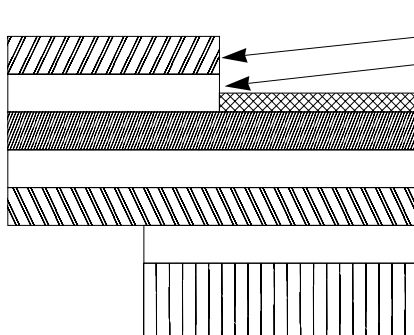
Metal fittings 0.55mm×0.8mm×0.1mm thick

This temperature profile is based on the above conditions.

In individual applications the actual temperature may vary, depending on solder paste type, volume/thickness and board size/thickness. Consult your solder paste and equipment manufacturer for specific recommendations.

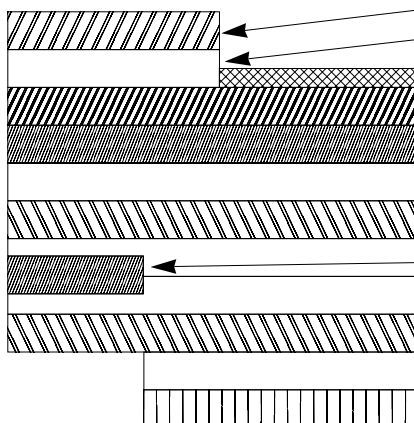
## ◆FH33 Series FPC/FFC Construction (Recommended Specifications)

### 1. Using Single-sided FPC



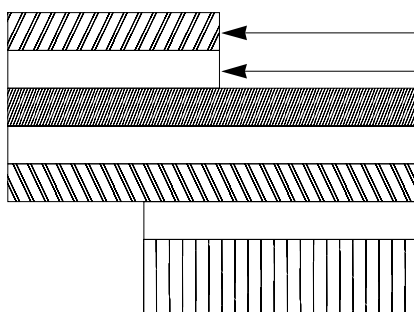
| Material Name                   | Material                                         | Thickness (μm) |
|---------------------------------|--------------------------------------------------|----------------|
| Covering film layer             | Polyimide 1 mil thick                            | 25             |
| Cover adhesive                  |                                                  | 25             |
| Surface treatment               | Nickel under plated 1 to 5μm / Gold plated 0.2μm | 3              |
| Copper foil                     | Cu 1oz                                           | 35             |
| Base adhesive                   |                                                  | 25             |
| Base film                       | Polyimide 1 mil thick                            | 25             |
| Reinforcement material adhesive | Heat-hardened adhesive                           | 30             |
| Stiffener                       | Polyimide 7 mil thick                            | 175            |
| Total                           |                                                  | 293            |

### 2. Using Double-sided FPC



| Material Name                   | Material                                         | Thickness (μm) |
|---------------------------------|--------------------------------------------------|----------------|
| Covering film layer             | Polyimide 1 mil thick                            | 25             |
| Cover adhesive                  |                                                  | 25             |
| Surface treatment               | Nickel under plated 1 to 5μm / Gold plated 0.2μm | 3              |
| Through-hole copper             | Cu                                               | 15             |
| Copper foil                     | Cu 1/2oz                                         | 18             |
| Base adhesive                   |                                                  | 18             |
| Base film                       | Polyimide 1 mil thick                            | 25             |
| Base adhesive                   |                                                  | 18             |
| Copper foil                     | Cu 1/2oz                                         | 18             |
| Cover adhesive                  |                                                  | 25             |
| Covering film layer             | Polyimide 1 mil thick                            | 25             |
| Reinforcement material adhesive | Heat-hardened adhesive                           | 50             |
| Stiffener                       | Polyimide 4 mil thick                            | 100            |
| Total                           |                                                  | 297            |

### 3. Using FFC



| Material Name                 | Material                     | Thickness (μm) |
|-------------------------------|------------------------------|----------------|
| Polyester film                |                              | 12             |
| Adhesive                      | polyester thermoplastic type | 30             |
| Gold plated, soft copper film |                              | 35             |
| Adhesive                      | Polyester                    | 30             |
| Polyester                     |                              | 12             |
| Adhesive                      | Polyester                    | 30             |
| Stiffener                     | Polyester                    | 188            |
| Total                         |                              | 295            |

※ Practical tolerance of thickness dimension is ±20 μm

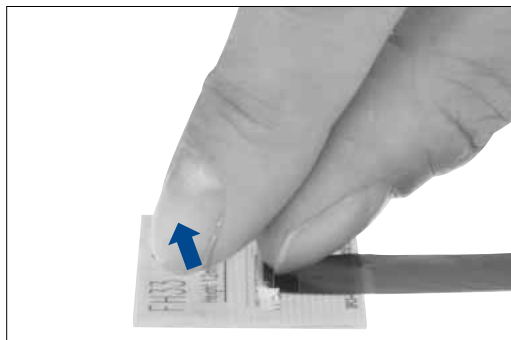
●To prevent release of the FPC due to it's bending, use of double sided FPC with copper foil on the back side is NOT RECOMMENDED.

## ◆ Operation and Precautions

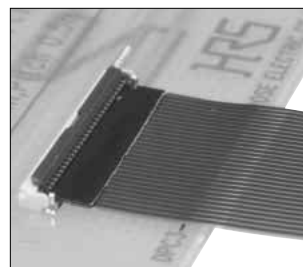
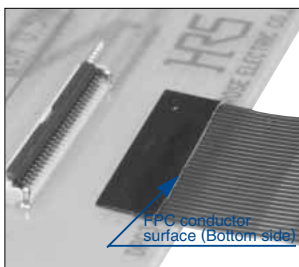
### Operation

#### 1.FPC insertion procedure. Connector installed on the board.

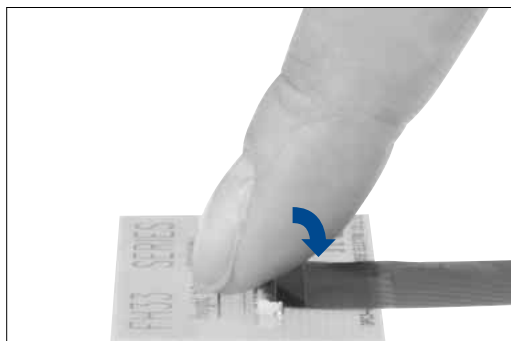
- ❶ Lift up the actuator. Use thumb or index finger.



- ❷ Fully insert the FPC in the connector parallel to mounting surface, with the exposed conductive traces facing down.

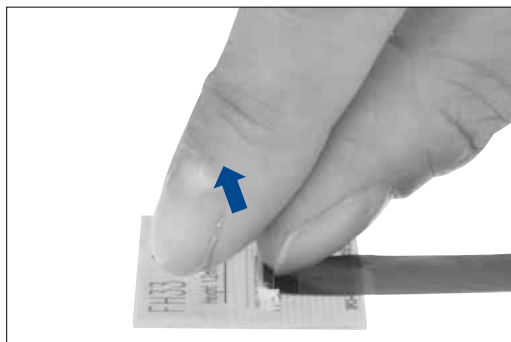


- ❸ Rotate down the actuator until firmly closed. It is critical that the inserted FPC is not moved and remains fully inserted.



#### 2.FPC removal

- ❶ Lift up the actuator. Carefully withdraw the FPC.



## Precautions

**Exercise care when handling connectors. Follow recommendations given below.**

### PC board flexing

#### ◆PC board connector mounting area

The connectors are straight within 0.1 mm max.

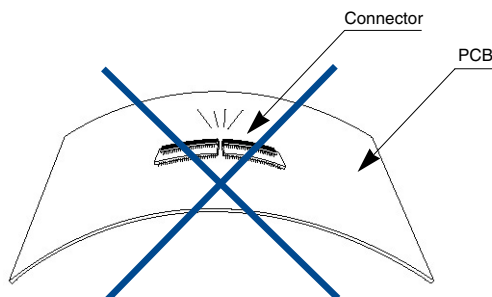
Make sure that the PC board connector mounting area flatness can accept the connector terminals without causing any failure of the solder joints.

#### ◆Handling before mounting on PCB

Insertion of the FPC or operation of the actuator prior to mounting on the PCB is NOT RECOMMENDED.

#### ◆PC Board handling

Exercise caution when handling boards with the connectors installed. Do not apply any forces affecting soldered joints.

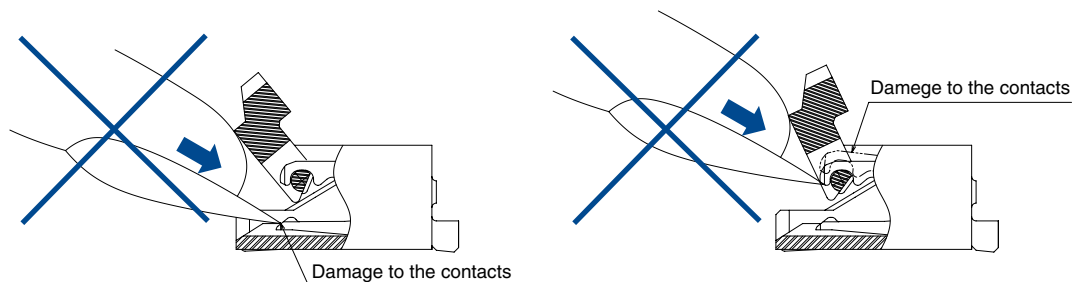


### Precautions When Inserting or Removing FPC

**Pay attention to the following points when inserting FPC.**

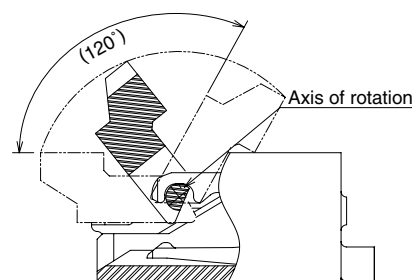
#### ◆Actuator operation

- ① Do not apply excessive force when opening the actuator prior to FPC insertion. When opening make sure that the force is applied only to the actuator itself, avoiding touching of the contacts.

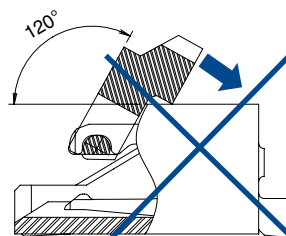


#### ② Axis of rotation

Assure free rotation of the actuator

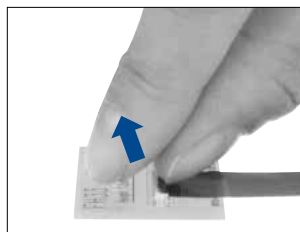
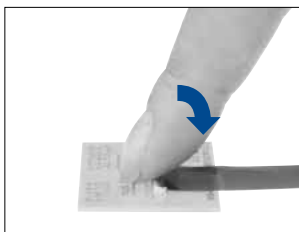


- ③ The actuator will rotate 120 degrees maximum. Do not force it to rotate further.

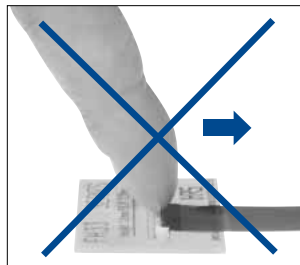
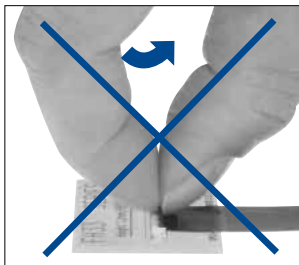


## Precautions

- ④ When operating the actuator, do so at the center portion.

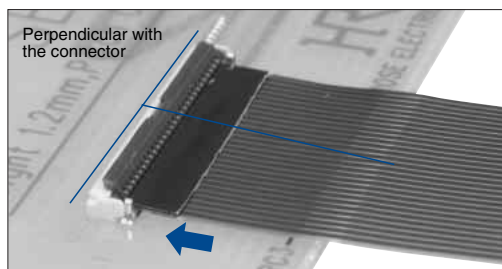
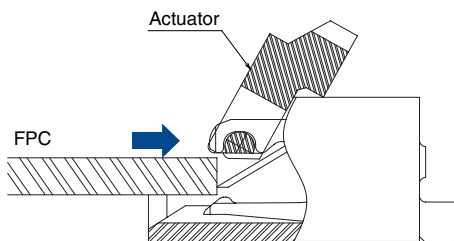


- ⑤ As illustrated, do not attempt removal or re-positioning of the actuator.



### ◆ FPC Insertion①

The FPC should be aligned parallel with the board surface and perpendicular with the connector (as shown), then completely inserted.

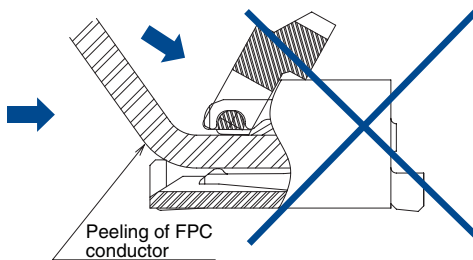
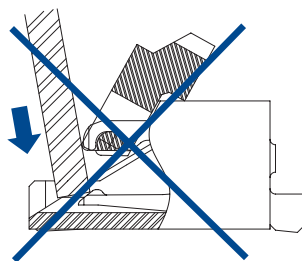


To assure correct electrical and mechanical connection do not insert FPC at angle. It must be fully inserted.

Make sure that the FPC is NOT MOVED during the closing of the actuator.

### ◆ FPC Insertion②

When inserting the FPC, do not forcefully rub against the bottom surface of the connector insertion entrance. Doing so will result in the contacts and FPC making strong contact and may cause deformation of the contacts, peeling of the FPC conductor, and other problems.



## Precautions

### ◆ Verification of the fully closed actuator.

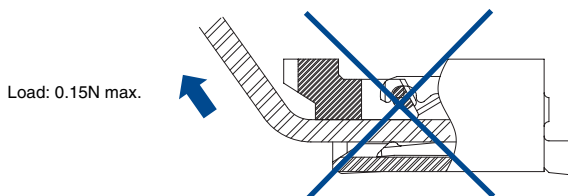
The actuator should be fully closed (as illustrated) and the FPC held firmly in the connector.

Do not press against the actuator when is fully closed. Max force applied to the fully closed actuator should not exceed 1 N.

### Routing the FPC (FPC fully inserted/ actuator closed)

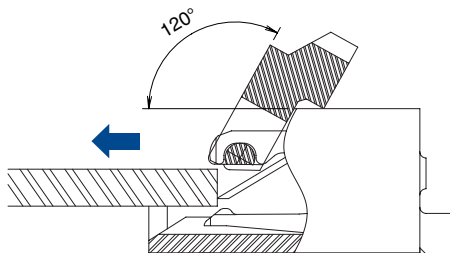
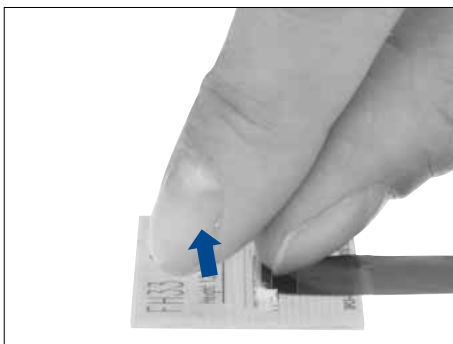
#### ◆ FPC Load

Do not apply force in excess of 0.15N max. in the upward direction (as illustrated). Do not bend the FPC too close to the actuator.



### Removing the FPC

Rotate the actuator to the open position (maximum open angle of 120°). Carefully withdraw the FPC.



### Other Precautions

#### ◆ Hand Soldering Precautions

When hand soldering:

- ① Do not perform reflow or hand soldering with the FPC inserted in the connector.
- ② Do not apply excessive heat or touch the soldering iron anywhere other than the connector leads.
- ③ Do not use excessive amount of solder or flux compounds.

Operation of the actuator and contacts may be affected by excessive amounts of solder or flux compounds.



## HIROSE ELECTRIC CO.,LTD.

5-23,OSAKI 5-CHOME,SHINAGAWA-KU,TOKYO 141-8587,JAPAN

PHONE: 81-3-3491-9741, FAX: 81-3-3493-2933

<http://www.hirose.com>

<http://www.hirose-connectors.com>