Goldfish Power Connectors

Typical Examples of Goldfish Power Connectors

Goldfish Power Connector Features !!

- Excellent Power Density
- Blind mate - Float mounting
- 20, 30, 35 and 50 ampere power contacts
- Hot Plug Capability
- AC, DC and Signal solid machined contacts in one connector
- Safety Agency Recognition

Unless otherwise specified, dimensional tolerances are:

1) ±0.03 [0.001] for male contact mating diameters.
2) ±0.08 [0.003] for contact termination diameters
3) ±0.13 [0.005] for all diameters
4) ±0.38 [0.015] for all other dimensions

All dimensions are in millimeters [inches]

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Connector Versions and Technical Characteristics

Connector Versions (face view of male)

GFSH02: Fully populated
Twenty-one (21) Size 16 power contacts
Twelve (12) Size 20 signal contacts

GFSH109: Fully populated
Ten (10) Size 16 power contacts
Nine (9) Size 22 signal contacts

GFSH435: Fully populated
Four (4) size 12 power contacts
Nine (9) size 16 power contacts
Twelve (12) size 20 signal contacts

GFSH928: Fully populated
Eighteen (18) Size 16 power contacts
Twenty-eight (28) Size 22 signal contacts

GFSH624: Fully populated
Six (6) size 16 power contacts.
Twenty four (24) size 22 signal contacts.

GFSH89: Fully populated
Eight (8) Size 16 power contacts
Nine (9) Size 22 signal contacts

Technical Characteristics

Materials and Finishes:
Insulator: Glass-filled nylon, UL 94V-0. Color: Orange.
Contacts: Precision machined copper alloy with gold over nickel plate. Other finishes available upon request.

Electrical Characteristics:
Contact Current Ratings (per UL 1977):
Size 12 Contacts: 35 amperes, continuous (standard material).
Size 16 Contacts: 20 amperes, continuous (standard material).
Size 20 Contacts: 5 amperes, nominal (standard material).
Size 22 Contacts: 3 amperes, nominal (standard material).
Initial Contact Resistance (max.) per IEC 60512-2, Test 2b:
Size 12 Contacts: 0.0004 ohms (high conductivity material).
Size 16 Contacts: 0.0007 ohms (high conductivity material).
Size 20/22 Contacts: 0.0009 ohms (precision-formed).
Insulation Resistance (per IEC 60512-2, Test 3a): 5 G ohms min.

Proof Voltage:
Power Contacts: 1500 V r.m.s.
Signal Contacts: 1300 V r.m.s. (GFSH89 and GFSH624)
Working Voltage:
Power Contacts: 500 V r.m.s.
Signal Contacts: 333 V r.m.s. (GFSH89 and GFSH624)
Hot Pluggable (50 couplings per UL 1977, paragraph 15):
Size 12 Contacts: 250 VAC at 25 amperes.
Size 16 Contacts: Consult Technical Sales.

Mechanical Characteristics:
Blind Mating System: Molded in guides allow for misalignment up to 2.00 mm [0.079 inch].
Polarization: Provided by insulator.
Removable Contacts: Install contact from rear of insulator; release with extraction tool from front of insulator. Female contacts feature “closed entry” 1,000 cycles design.
Fixed Contacts: Size 12 and 16 female contacts feature “closed entry” 1,000 cycles design (for both straight & right angle (90°) PCB mount).
Sequential Mating: Two and three level systems available. Consult Technical Sales for customization.
Climatic Characteristics:
Working temperature: -55° to +105°C.
Recognized:
UL: UL File E49351 is available for all GFSH versions except GFSH928 crimp version.
CONTACT PERFORMANCE

Contact Resistance vs Mating Cycles

- Humidity condition per EIA-364-31B, Method II (condition A) after 250, 500 and 1,000 cycles.
- Contact resistance tested per IEC 60512-2, Test 2b.
- Connectors tested: GFSH624.

Note: This information is supplied for reference. Contact wear and change in contact resistance may vary from one application to another. Contact technical sales to discuss details.

Temperature Rise (°C) Curves

Goldfish Versions 02, 435 and 928

1) Connectors tested: GFSH435.
   Temperature curve developed using wires of 10 AWG and 12 AWG.
   For curve (a) and (b).
   All size 12 contacts under load.
2) Connectors tested: GFSH928.
   Temperature curve developed using wire of 12 AWG.
   For curve (c).
   All size 16 contacts under load.
3) Connectors tested: GFSH02.
   Temperature curve developed using wire of 12 AWG.
   For curve (d) and (e).
   All size 16 contacts under load.

Goldfish Versions 109, 624 and 89

1) Connectors tested: GFSH89.
   Temperature curve developed using wires of 12 AWG.
   For curve (a) and (b).
   All size 16 contacts under load.
2) Connectors tested: GFSH624.
   Temperature curve developed using wires of 14 AWG.
   For curve (c).
   All size 16 contacts under load.
   Temperature curve developed using wires of 12 AWG.
   For curve (d).
   All size 16 contacts under load.

Tested per IEC Publication 60512-3, Test 5a.
Note: These information supplied for reference only. Contact wear and change in contact resistance may vary from one application to another. Contact technical sales to discuss details.
GOLDFISH • SERIES

Straight and Right Angle (90°) PCB Mount Connectors for Versions 02, 435 and 928

OUTLINE DIMENSIONS FOR 02, 435 AND 928

CONTACT TERMINATION DIMENSIONS FOR 02, 435 AND 928

Code 3, 38, 4 or 48 in Step 4

<table>
<thead>
<tr>
<th>DIM</th>
<th>GOLDFISH 02 / 435</th>
<th>GOLDFISH 928</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.25 [0.049]</td>
<td>1.35 [0.053]</td>
</tr>
<tr>
<td>B</td>
<td>3.75 [0.148]</td>
<td>4.05 [0.159]</td>
</tr>
<tr>
<td>C</td>
<td>6.99 [0.275]</td>
<td>6.49 [0.256]</td>
</tr>
<tr>
<td>D</td>
<td>9.49 [0.374]</td>
<td>9.32 [0.367]</td>
</tr>
<tr>
<td>E</td>
<td>11.99 [0.472]</td>
<td>12.16 [0.479]</td>
</tr>
<tr>
<td>F</td>
<td>14.49 [0.570]</td>
<td>14.99 [0.590]</td>
</tr>
<tr>
<td>T</td>
<td>Ø0.71 [ØO.028]</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Male 3.70 [1.46]</td>
<td>Female 4.50 [1.77]</td>
</tr>
</tbody>
</table>
OUTLINE DIMENSIONS FOR VERSIONS 109 AND 624

Male Connector

56.00 [2.205]  
47.00 [1.850]  
12.50 [0.492]  
Ø3.25 [Ø0.128] Thru’

6.60 [0.260]  
3.81 [0.150]  
18.50 [0.728]

Female Connector

56.00 [2.205]  
47.00 [1.850]  
12.50 [0.492]  
Ø1.93 [Ø0.076] Thru’

3.81 [0.150]  
6.60 [0.260]  
21.20 [0.835]

CONTACT TERMINATION DIMENSIONS FOR VERSIONS 109 AND 624

Code 3, 37, 4 or 47 in Step 4

Size 16

Straight PCB Mount
Code 3 or 37 in Step 4

Ø1.60 [Ø0.063]  
2.13 [0.084]  
3.50 [0.138] (Male)  
4.25 [0.167] (Female)

Right Angle (90°)
PCB Mount
Code 4 or 47 in Step 4

Ø1.60 [Ø0.063]  
7.88 [0.310]  
12.13 [0.478]  
3.75 [0.148]

Size 22

Ø0.71 [Ø0.028]  
2.70 [0.106]  
4.60 [0.181] (Male)  
4.25 [0.167] (Female)

Ø0.71 [Ø0.028]  
7.30 [0.287]  
10.00 [0.394]  
12.70 [0.500]  
3.75 [0.148]
GOLDFISH SERIES

Panel Mount Connectors with Removable Contacts for Versions 02, 435, 928, 109 and 624

OUTLINE DIMENSIONS FOR VERSIONS 02, 435 AND 928
Code 1 in Step 4

Male Connector

Female Connector

OUTLINE DIMENSIONS FOR VERSIONS 109 AND 624
Code 1 in Step 4

Male Connector

Female Connector

Removable contacts should be allowed to float after installing in connector body for optimum mating.
Consult Technical Sales if alignment insert for male contacts is desired.
Alignment insert for GFSH89, GFSH109 and GFSH928 are available. Consult Technical Sales for other versions.
### OUTLINE DIMENSIONS FOR VERSION 89
#### STRAIGHT AND RIGHT ANGLE (90°) PCB MOUNT CONNECTOR

#### Male Connector

- 35.70 [1.406]
- 31.50 [1.240]
- 11.30 [0.445]
- 3.00 [0.118]
- 14.80 [0.583]
- 6.00 [0.236]

#### Female Connector

- 35.70 [1.406]
- 31.50 [1.240]
- 11.30 [0.445]
- 3.00 [0.118]
- Ø1.93 [Ø0.076] x 4.00 [0.157] Deep

For Straight PCB Mount Use

- Ø1.93 [Ø0.076] Thru'

For Right Angle (90°)

PCB Mount Use

- 17.00 [0.669]
- 6.00 [0.236]

### CONTACT TERMINATION DIMENSIONS FOR VERSION 89

#### Code 3, 37, 4 or 47 in Step 4

#### Size 16

- Ø1.60 [Ø0.063]
- 2.10 [0.083]

For Straight PCB Mount Use

- Ø1.93 [Ø0.076] Thru'

For Right Angle (90°)

PCB Mount Use

- Ø2.25 [Ø0.089] Thru'

#### Size 22

- 3.50 [0.138]
- 2.70 [0.106]
- 0.71 [Ø0.028]

### OUTLINE DIMENSIONS FOR VERSION 89
#### PANEL MOUNT Connectors

#### Male Connector

- 42.60 [1.677]
- 37.20 [1.465]
- 11.30 [0.445]
- 14.80 [0.583]
- 6.00 [0.236]

#### Female Connector

- 42.60 [1.677]
- 37.20 [1.465]
- 11.30 [0.445]
- 7.00 [0.276]
- 25.30 [0.996]

Removable contacts should be allowed to float after installing in connector body for optimum mating.

Contact Technical Sales for additional polarization features for panel mounting.
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Panel Cutout Dimensions
For Panel Mount Connectors

PANEL CUTOUT DIMENSIONS FOR FLOAT BUSHING

Goldfish 02, 435 and 928

Goldfish 109 and 624

Goldfish 89

PANEL CUTOUT DIMENSIONS FOR MOUNTING SCREWS AND JACKSCREWS

MOUNTING SCREWS

Goldfish 02, 435 and 928

Goldfish 109 and 624

Goldfish 89

JACKSCREWS

Goldfish 02, 435 and 928

Goldfish 109 and 624

Goldfish 89

<table>
<thead>
<tr>
<th>MOUNTING SCREWS</th>
<th>ØA ±0.08 [0.003]</th>
</tr>
</thead>
<tbody>
<tr>
<td>02, 435 and 928</td>
<td>4.06 [0.160]</td>
</tr>
<tr>
<td>109 and 624</td>
<td>3.56 [0.140]</td>
</tr>
<tr>
<td>89</td>
<td>3.05 [0.120]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JACKSCREWS</th>
<th>ØB ±0.08 [0.003]</th>
</tr>
</thead>
<tbody>
<tr>
<td>02, 435 and 928</td>
<td>3.15 [0.124]</td>
</tr>
<tr>
<td>109 and 624</td>
<td>2.49 [0.098]</td>
</tr>
<tr>
<td>89</td>
<td>2.49 [0.098]</td>
</tr>
</tbody>
</table>
Goldfish Series
Connector shown is male. Unless otherwise specified, above dimensions are identical to female connector.

Contact Termination Dimensions

- Bi-Spring Power size 16 contacts per IEC 60352-5
- Omega Signal size 20/22 contacts

Patent No. 6,260,268

Note: Outline dimensions for Press-Fit Connectors are the same as those of Straight PCB Mount Versions.
For Suggested Straight Mount PCB Holes Sizes of Compliant Press-Fit Connectors, please refer to SK6370 or consult Technical Sales for more information.

Press-Fit User Information

Connectors-to-PCB installation instructions:
1. Choose the proper tooling. Insertion tooling and single contact repair tooling are available from Positronic.
2. Insert the connector into the PCB or backplane and seat connector fully with seating/support tool.
3. Secure the connector to the PCB or backplane using two self-tapping screws for plastic.

Need to repair a single contact because of damage in manufacturing, testing, or field use?
1. Choose the proper contact extraction tool.
2. Push the contact out with a firm, steady force. Remember, excessive force is not required.
3. Install a new contact with the proper contact insertion tool. You are done.

Connector Installation Tools:
Ordering Information

<table>
<thead>
<tr>
<th>Connector Variant</th>
<th>Seating Tool Part No.</th>
<th>Support Tool Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFSH02M93/94H</td>
<td>9513-309-2-0</td>
<td>9513-404-1-0</td>
</tr>
<tr>
<td>GFSH02F93/94H</td>
<td>9513-309-3-0</td>
<td></td>
</tr>
<tr>
<td>GFSH109M93/94H</td>
<td>9513-309-4-0</td>
<td>9513-404-2-0</td>
</tr>
<tr>
<td>GFSH109F93/94H</td>
<td>9513-309-9-0</td>
<td></td>
</tr>
<tr>
<td>GFSH435M93/94H</td>
<td>9513-309-10-0</td>
<td>9513-309-11-0</td>
</tr>
<tr>
<td>GFSH435F93/94H</td>
<td>9513-309-5-0</td>
<td></td>
</tr>
<tr>
<td>GFSH624M93/94H</td>
<td>9513-309-12-0</td>
<td>9513-309-13-0</td>
</tr>
<tr>
<td>GFSH624F93/94H</td>
<td>9513-309-14-0</td>
<td></td>
</tr>
<tr>
<td>GFSH89M93/94H</td>
<td>9513-309-7-0</td>
<td>9513-309-8-0</td>
</tr>
<tr>
<td>GFSH89F93/94H</td>
<td>9513-309-6-0</td>
<td>9513-309-16-0</td>
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<tr>
<td>GFSH928M93/94H</td>
<td>9513-309-15-0</td>
<td></td>
</tr>
<tr>
<td>GFSH928F93/94H</td>
<td>9513-309-17-0</td>
<td></td>
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Mounting Screws:
Ordering Information

<table>
<thead>
<tr>
<th>Connector Variant</th>
<th>Screw Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFSH02/928*1H</td>
<td>A2076-12-6-97</td>
</tr>
<tr>
<td>GFSH02/928*3H</td>
<td>A4546-7-1-97</td>
</tr>
<tr>
<td>GFSH02/928*4H</td>
<td>A4546-7-0-97</td>
</tr>
<tr>
<td>GFSH02/928*93H</td>
<td>A4546-7-2-97</td>
</tr>
<tr>
<td>GFSH02/928*94H</td>
<td>A4546-7-3-97</td>
</tr>
<tr>
<td>GFSH109/624*1H</td>
<td>A2076-16-1-97</td>
</tr>
<tr>
<td>GFSH109/624*3H</td>
<td>A2076-12-6-97</td>
</tr>
<tr>
<td>GFSH109/624*4H</td>
<td>A4546-7-0-97</td>
</tr>
<tr>
<td>GFSH109/624*94H</td>
<td>A2076-12-9-97</td>
</tr>
<tr>
<td>GFSH435*1H</td>
<td>A2076-12-9-97</td>
</tr>
<tr>
<td>GFSH435*3H</td>
<td>A4546-7-1-97</td>
</tr>
<tr>
<td>GFSH435*4H</td>
<td>A4546-7-0-97</td>
</tr>
<tr>
<td>GFSH435*38H</td>
<td>A4546-7-1-97</td>
</tr>
<tr>
<td>GFSH435*48H</td>
<td>A4546-7-0-97</td>
</tr>
<tr>
<td>GFSH89*1H</td>
<td>A4546-14-1-97</td>
</tr>
<tr>
<td>GFSH89*3H</td>
<td>A4546-7-1-97</td>
</tr>
<tr>
<td>GFSH89*4H</td>
<td>A4546-7-0-97</td>
</tr>
<tr>
<td>GFSH89*93H</td>
<td>A4546-7-1-97</td>
</tr>
<tr>
<td>GFSH89*94H</td>
<td>A4546-7-2-97</td>
</tr>
</tbody>
</table>

Material: Steel, zinc plate
JACKSCREW SYSTEMS FOR VERSION 89
Code E or T in Step 5

Version 89
Panel Mount Only

Material: E - Stainless Steel, Passivated.
T - Stainless Steel, Passivated.

Hex Nut and Lockwashers
- Stainless Steel, Passivated.
Knob - Aluminium, Yellow Anodized.

JACKSCREW SYSTEMS FOR VERSION 109 AND 624
Code E or T in Step 5

Version 109 and 624
Panel Mount

Material: E - Stainless steel, passivated.
T - Stainless steel, passivated.

Hex Nut and Lockwashers
- Stainless steel, passivated.
Knob - Aluminium, yellow anodized.

Version 109 and 624
Straight or Right Angle (90°)

Material: T - Stainless steel, passivated.

Hex Nut and Lockwashers
- Stainless steel, passivated.
For PCB version, only T is available.

Note: For GFSH624, only PCB male fixed jackscrew and Panel female rotating jackscrew is available.

JACKSCREW SYSTEMS FOR VERSION 02, 435 AND 928
Code E or T in Step 5

Version 02, 435 and 928
Panel Mount

Material:
E - Steel, zinc plate with dichromate seal or chromate seal.
Knob - Aluminium, yellow anodized.

Material:
T - Steel, zinc plate with dichromate seal or chromate seal.
Hex Nut - Brass, zinc plate with dichromate seal or chromate seal
Lockwashers - Phosphor bronze, zinc plate with dichromate seal or chromate seal

Consult Technical Sales for GFSH02, 435 and 928 PCB version of code T for availability.
GOLDFISH • SERIES

Modular Cable Clamp Hoods for Versions 02, 435 and 928

MODULAR CABLE CLAMP HOODS FOR VERSIONS 02, 435 AND 928

Code W or WE in Step 5

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Hood, cable clamps, hex nuts and screws.</td>
<td>63.60</td>
</tr>
<tr>
<td>WE</td>
<td>Hood, rotating jackscrews, cable clamps, hex nuts and screws.</td>
<td>77.00</td>
</tr>
</tbody>
</table>

Materials and Finishes:

- Hood Top and Bottom (Qty: 1x each):
  - Glass-filled nylon, UL 94-0. Black color.

- Cable Clamps (Qty: 3x):
  - Steel with nickel plate. Screws (Qty: 10x): Brass, zinc plate with chromate seal.
  - Brass, zinc plate with dichromate seal or brass, zinc plate with chromate seal.

- Hex Nuts (Qty: 4x):
  - Bronze, zinc plate with dichromate seal or bronze, zinc plate with chromate seal.

Consult Technical Sales for more customized Cable Clamp or Cable openings.

Note: Hood only available for GFSH02, 435 and 928. Consult Technical Sales for GFSH89, 109 and 624 hood availability.
Mounting Styles and Contact Hole Patterns for PCB Mount

**Goldfish 02**
Straight PCB Mount
- Code 02 in Step 2
- Code 3 or 38 in Step 4
- Code H or N in Step 5

**Goldfish 435**
Straight PCB Mount
- Code 435 in Step 2
- Code 3 or 38 in Step 4
- Code H or N in Step 5

**Goldfish 928**
Straight PCB Mount
- Code 928 in Step 2
- Code 3 or 38 in Step 4
- Code H or N in Step 5

### Contact Hole Patterns for Straight PCB Mount

**Suggested Straight Mount PCB Holes Sizes of Compliant Press-Fit Connectors, please refer to SK6370 or consult Technical Sales for more information.**

Hole pattern shown is for male connector. Use mirror image for female connector.

### MOUNTING STYLES

**Push-on Fastener**
Code N in Step 5

Material: Copper alloy with tin plating.

**Float Mounting Hardware**
Code 82 or 82 in Step 5

Material: Steel with zinc or tin plating.

**Note:** For GFSH89 with code 83, consult Technical Sales for availability.

### Dimension Chart

<table>
<thead>
<tr>
<th>DIM</th>
<th>SUGGESTED SIZE</th>
<th>FOR USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>Ø1.14 [0.045]</td>
<td>Size 20 &amp; 22 contact terminals</td>
</tr>
<tr>
<td>ØB</td>
<td>Ø2.11 [0.083]</td>
<td>Size 16 contact terminals</td>
</tr>
<tr>
<td>ØC</td>
<td>Ø2.90 [0.114]</td>
<td>Size 12 contact terminals</td>
</tr>
<tr>
<td>ØD</td>
<td>Ø2.54 [0.100]</td>
<td>Mounting connector with screws</td>
</tr>
<tr>
<td>ØE</td>
<td>Ø3.12±0.08 [0.123±0.003]</td>
<td>Mounting connector using push-on fasteners</td>
</tr>
</tbody>
</table>
Contact Hole Patterns for PCB Mount for Versions 02, 435 and 928

Goldfish 02
Right Angle (90°) Mount
Code 02 in Step 2
Code 4 in Step 4
Code H, B or LN in Step 5

Goldfish 435
Right Angle (90°) Mount
Code 435 in Step 2
Code 4 or 48 in Step 4
Code H, B or LN in Step 5

Goldfish 928
Right Angle (90°) Mount
Code 928 in Step 2
Code 4 in Step 4
Code H, B or LN in Step 5

<table>
<thead>
<tr>
<th>DIM</th>
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<tr>
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</tr>
<tr>
<td>ØC</td>
<td>Ø2.90 [0.114]</td>
<td>Size 12 contact terminals</td>
</tr>
<tr>
<td>ØD</td>
<td>Ø2.54 [0.100]</td>
<td>Mounting connector with screws</td>
</tr>
<tr>
<td>ØE</td>
<td>Ø3.12 [0.123]</td>
<td>Mounting connector using angle brackets</td>
</tr>
</tbody>
</table>

For Suggested Straight Mount PCB Holes Sizes of Compliant Press-Fit Connectors, please refer to SK6370 or consult Technical Sales for more information.

Hole pattern shown is for male connector. Use mirror image for female connector.
Contact Hole Patterns for PCB Mount for Versions 109 and 624

**Goldfish 109**

**Straight PCB Mount**
- Code 109 in Step 2
- Code 3 or 37 in Step 4
- Code H or N in Step 5

**Goldfish 109**

**Right Angle (90°) Mount**
- Code 109 in Step 2
- Code 4 or 47 in Step 4
- Code H, B or LN in Step 5

**Goldfish 624**

**Straight PCB Mount**
- Code 624 in Step 2
- Code 3 in Step 4
- Code H or N in Step 5

**Goldfish 624**

**Right Angle (90°) Mount**
- Code 624 in Step 2
- Code 4 in Step 4
- Code H, B or LN in Step 5

### Suggested Sizes for Use

<table>
<thead>
<tr>
<th>DIM</th>
<th>SUGGESTED SIZE</th>
<th>FOR USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØA</td>
<td>Ø1.14 [0.045]</td>
<td>Size 20 &amp; 22 contact terminals</td>
</tr>
<tr>
<td>ØB</td>
<td>Ø2.11 [0.083]</td>
<td>Size 16 contact terminals</td>
</tr>
<tr>
<td>ØC</td>
<td>Ø2.90 [0.114]</td>
<td>Size 12 contact terminals</td>
</tr>
<tr>
<td>ØD</td>
<td>Ø3.54 [0.100]</td>
<td>Mounting connector with screws</td>
</tr>
<tr>
<td>ØE</td>
<td>Ø3.96±0.08 [0.156±0.003]</td>
<td>Mounting connector using push-on fasteners</td>
</tr>
<tr>
<td>ØF</td>
<td>Ø3.12 [0.123]</td>
<td>Mounting connector using angle brackets</td>
</tr>
</tbody>
</table>

For Suggested Straight Mount PCB Holes Sizes of Compliant Press-Fit Connectors, please refer to SK6370 or consult Technical Sales for more information.

Hole pattern shown is for male connector. Use mirror image for female connector.
GOLDFISH • SERIES

Contact Hole Patterns for PCB Mount for Version 89 and Removable, Solder, Straight PCB Mount Contacts

CONTACT HOLE PATTERNS FOR PCB MOUNT FOR VERSION 89

Straight PCB Mount
Code 89 in Step 2
Code 3 or 37 in Step 4
Code H or N in Step 5

Right Angle (90°) Mount
Code 89 in Step 2
Code 4 or 47 in Step 4
Code H or LN in Step 5

REMovable, Solder, Straight PCB MOUNT CONTACTS

Size 12

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>PIN OUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDS12G3N2</td>
<td>GFSH02F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>MDS12G3N</td>
<td>GFSH02M1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>FDS16G3N3</td>
<td>GFSH109/624F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>MDS16G3N4</td>
<td>GFSH109/624M1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
</tbody>
</table>

Size 16

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>PIN OUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDS16G3N2</td>
<td>GFSH02F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>MDS16G3N</td>
<td>GFSH02M1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>FDS20G3N</td>
<td>GFSH435F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>MDS20G3N</td>
<td>GFSH435M1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
</tbody>
</table>

Size 20

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>PIN OUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDS22G3N2</td>
<td>GFSH02F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
<tr>
<td>MDS22G3N3</td>
<td>GFSH02M1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
</tbody>
</table>

Size 22

<table>
<thead>
<tr>
<th>CONNECTOR</th>
<th>PIN OUT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDS22G3N4</td>
<td>GFSH02F1H</td>
<td>Ø1.14 [0.045]</td>
</tr>
</tbody>
</table>

Material and Finishes: Precision machined copper alloy with gold flash over nickel. Other finishes are available.

Now you can easily mix crimp terminations and PCB mount solder terminations within one connector!

For use in crimp version connectors.

Contact Ordering Information

Reference contact tail length is 4.50 [0.177] beyond insulator.
Consult Technical Sales for other contact sizes.
**Removable Crimp Contacts and Sequential Mating System**

### Size 12

<table>
<thead>
<tr>
<th>Female Contact</th>
<th>Male Contact</th>
<th>Wire Size*</th>
<th>ØA</th>
<th>ØB</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC610N2</td>
<td>MC610N</td>
<td>10 [6.0]</td>
<td>3.73 [0.147]</td>
<td>N/A</td>
</tr>
<tr>
<td>FC610N2-228.1*</td>
<td>MC610N</td>
<td>12 [4.0]</td>
<td>2.54 [0.100]</td>
<td>4.19 [0.165]</td>
</tr>
</tbody>
</table>

*Note: Please use correct wire size and it should be smaller than ØA of the contact.

### Size 16

<table>
<thead>
<tr>
<th>Female Contact</th>
<th>Male Contact</th>
<th>Wire Size*</th>
<th>ØA</th>
<th>ØB</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC112N2</td>
<td>MC112N</td>
<td>12 [4.0]</td>
<td>2.49 [0.098]</td>
<td>N/A</td>
<td>6.45 [0.254]</td>
</tr>
<tr>
<td>FC112N2-133.5*</td>
<td>MC112N</td>
<td>16-18 [2.5-1.5]</td>
<td>2.05 [0.081]</td>
<td>2.64 [0.104]</td>
<td></td>
</tr>
</tbody>
</table>

*First mate contact, C=21.74 [0.856]

### Size 20

<table>
<thead>
<tr>
<th>Female Contact</th>
<th>Male Contact</th>
<th>Wire Size*</th>
<th>ØA</th>
<th>ØB</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC720N2</td>
<td>MC720N</td>
<td>20-22-24 [0.5-0.3-0.25]</td>
<td>1.14 [0.045]</td>
<td>1.73 [0.068]</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Please use correct wire size and it should be smaller than ØA of the contact.

### Size 22

<table>
<thead>
<tr>
<th>Female Contact</th>
<th>Male Contact</th>
<th>Wire Size*</th>
<th>ØA</th>
<th>ØB</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC420N6</td>
<td>MC420N</td>
<td>20 [0.5]</td>
<td>1.14 [0.045]</td>
<td>N/A</td>
</tr>
<tr>
<td>FC422N6</td>
<td>MC422N</td>
<td>22-24-26 [0.3-0.25-0.12]</td>
<td>0.89 [0.035]</td>
<td>1.63 [0.064]</td>
</tr>
</tbody>
</table>

**Note:** Please use correct wire size and it should be smaller than ØA of the contact.

---

**Material and Finishes (standard contact):**

Precision machined copper alloy with gold flash over nickel. Other finishes available. Consult Technical Sales for sequential mating and high conductivity material options.

---

**SEQUENTIAL MATING SYSTEMS**

Available in both PCB and Crimp Version Connectors

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.69 [0.106]</td>
<td>2.03 [0.080]</td>
</tr>
</tbody>
</table>

Contact Technical Sales for ordering information.

Dimensions valid for Goldfish 02 PCB mount versions only.

Contact Technical Sales for other versions.
**SPECIFY COMPLETE CONNECTOR BY FOLLOWING STEP 1 THROUGH STEP 6.**
Include step 7 for customized connectors.

<table>
<thead>
<tr>
<th>STEP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE</td>
<td>GFSH</td>
<td>02</td>
<td>F</td>
<td>4</td>
<td>LN</td>
<td>/AA</td>
<td>XXXXX</td>
</tr>
</tbody>
</table>

**STEP 1: Basic Series**
GFSH: Goldfish Series

**STEP 2: Connector Versions**
- 02: Connector with 21 size 16 power contacts and 12 size 20 signal contacts.
- 89: Connector with 8 size 16 power contacts and 9 size 22 signal contacts.
- 109: Connector with 10 size 16 power contacts and 9 size 22 signal contacts.
- 435: Connector with 9 size 16 power contacts, 4 size 12 power contacts and 12 size 20 signal contacts.
- 624: Connector with 6 size 16 power contacts and 24 size 22 signal contacts.
- 928: Connector with 18 size 16 power contacts and 28 size 22 signal contacts.

**STEP 3: Connector Gender**
F: Female
M: Male

**STEP 4: Type of Contact**
- 1: Removable contact, panel/float mount/cable version. (contacts ordered separately).
- 3: Solder, straight PCB mount.
- 4: Solder, right angle (90°) PCB mount.
- 37: Solder, straight PCB mount.
- (high conductivity size 16 power contacts).
- 38: Solder, straight PCB mount, GFSH435 only.
- (high conductivity size 12 power contacts).
- 47: Solder, right angle (90°) PCB mount.
- (high conductivity size 16 power contacts).
- 48: Solder, right angle (90°) PCB mount.
- GFSH435 only.
- (high conductivity size 12 power contacts).
- 93: Press-fit compliant terminations.

**STEP 5: Mounting Style**
- H: No hardware.
- For mounting connector with self-tapping screws. (Order screws separately.)
- N: Straight PCB mount push-on fasteners.
- B: Right angle (90°) PCB mount through hole angle brackets.
- LN: Right angle (90°) PCB mount board lock angle brackets.
- 82: Panel/float mount for 1.5 mm thick panel.
- 83: Panel/float mount for 2.3 mm thick panel.
- E: Turnable male jackscrews.
- (Not available in GFSH624 male panel.)
- T: Fixed female jackscrews.
- (Not available in GFSH89 PCB, GFSH624 Female PCB.)
- TB: Fixed female jackscrews with Right angle (90°) PCB mount through hole angle brackets.
- TLN: Fixed female jackscrews with Right angle (90°) PCB mount board lock angle brackets.
- W*: Hood.
- WE*: Turnable Male Jackscrew with Hood.

*Not available in GFSH89, 109 and 624.
Recommended Tools for Crimp Contacts and GG (Great Golden) Series

<table>
<thead>
<tr>
<th>CONTACT SIZE</th>
<th>CONTACT EXTRACTION TOOL</th>
<th>CONTACT INSERTION TOOL</th>
<th>HAND CRIMP TOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 12</td>
<td>2711-0-0-0</td>
<td>9099-3-0-0</td>
<td>9509-6-0-0 (MC/FC610)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9501-0-0-0 with 9502-19-0-0 positioner (MC/FC612)</td>
</tr>
<tr>
<td>Size 16</td>
<td>9081-0-0-0</td>
<td>9099-0-0-0</td>
<td>9501-0-0-0 with 9502-1-0-0 positioner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9501-0-0-0 with 9502-17-0-0 positioner (male first mate contacts)</td>
</tr>
<tr>
<td>Size 20</td>
<td>9081-2-0-0</td>
<td>9099-4-0-0</td>
<td>9507-0-0-0 with 9502-21-0-0 positioner (male contacts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9507-0-0-0 with 9502-22-0-0 positioner (female contacts)</td>
</tr>
<tr>
<td>Size 22</td>
<td>9081-3-0-0</td>
<td>9099-1-0-0</td>
<td>9507-0-0-0 with 9502-12-0-0 positioner (male contacts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9507-0-0-0 with 9502-20-0-0 positioner (female contacts)</td>
</tr>
</tbody>
</table>

GG SERIES CONNECTORS
MODULAR TOOLING ALLOWS DELIVERY OF A MULTITUDE OF VARIANTS!

CONTACT VARIANT & DIMENSIONS

<table>
<thead>
<tr>
<th>CONTACT SIZE</th>
<th>CONTACT MATERIAL</th>
<th>CONTACT CURRENT RATING</th>
<th>CONTACT RESISTANCE</th>
<th>WORKING VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 0</td>
<td>Standard</td>
<td>175 amps</td>
<td>0.00038 ohms</td>
<td>250 V r.m.s</td>
</tr>
<tr>
<td></td>
<td>HC**</td>
<td>200 amps</td>
<td>0.00012 ohms</td>
<td></td>
</tr>
<tr>
<td>Size 12</td>
<td>Standard</td>
<td>35 amps</td>
<td>0.0016 ohms</td>
<td>500 V r.m.s</td>
</tr>
<tr>
<td></td>
<td>HC**</td>
<td>45 amps</td>
<td>0.0005 ohms</td>
<td></td>
</tr>
<tr>
<td>Size 16</td>
<td>Standard</td>
<td>20 amps</td>
<td>0.0024 ohms</td>
<td>500 V r.m.s</td>
</tr>
<tr>
<td></td>
<td>HC**</td>
<td>28 amps</td>
<td>0.0012 ohms</td>
<td></td>
</tr>
<tr>
<td>Size 20</td>
<td>Standard</td>
<td>5 amps</td>
<td>0.0036 ohms</td>
<td>333 V r.m.s</td>
</tr>
</tbody>
</table>

** HC = High Conductivity Contact Material

Insulators: Glass filled nylon, UL 94 V-0, gold color.
Contacts: Precision machined copper alloy. Plated gold flash over nickel. Other finishes available upon request.
Electrical characteristics: Contact current ratings to 200 amps per contact in accordance to UL 1977.
Contact resistance: As low as 0.00012 ohms, per IEC 60912-2, test 2b.
Voltage proof: Up to 3,000 V r.m.s.
Mechanical operations: 1,000 cycles.
Termination types: Cable and panel mount – crimp, solder or buss bar. Contact Technical Sales for PCB solder type.
Features: Excellent blind mating; sequential mating options.
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