GOLDFISH

Power Connectors

POSITRONIC
GLOBAL Connector SOLUTIONS

Catalog-A-001-Rev.C
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
- Lower Cost Precision-Formed Female Signal Contacts also available
- Safety Agency Recognition

Unless otherwise specified, dimensional tolerances are:

1. Male contact mating diameters ±0.03 [0.001]
2. Contact termination diameters ±0.08 [0.003]
3. All diameters ±0.13 [0.005]
4. All other dimensions ±0.38 [0.015]

All dimensions are in millimeters [inches]

Unless otherwise stated, Positronic code and part number are marked on each connector. The contents of the code are subjected to the discretion of Positronic Asia Pte Ltd and it is for internal use only. Marking may be done on either side or both sides of the connector.

Positronic Asia Pte Ltd believes the data contained herein to be reliable. Since the technical information is given free of charge, the user employs such information at his own discretion and risk. Positronic Asia Pte Ltd assumes no responsibility for results obtained or damages incurred from use of such information in whole or in part.
Goldfish Power Connectors
Connector versions and technical characteristics

### Connector Versions

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFSH02</td>
<td>Fully populated Twenty-one (21) Size 16 power contacts Twelve (12) Size 20 signal contacts</td>
</tr>
<tr>
<td>GFSH109</td>
<td>Fully populated Ten (10) Size 16 power contacts Nine (9) Size 22 signal contacts</td>
</tr>
<tr>
<td>GFSH28</td>
<td>Fully populated Eighteen (18) Size 16 power contacts Twenty-eight (28) Size 22 signal contacts</td>
</tr>
<tr>
<td>GFSH624</td>
<td>Fully populated Six (6) size 16 power contacts Twenty four (24) size 22 signal contacts</td>
</tr>
<tr>
<td>GFSH435</td>
<td>Fully populated Four (4) size 12 power contacts Nine (9) size 16 power contacts Twelve (12) size 20 signal contacts</td>
</tr>
<tr>
<td>GFSH89</td>
<td>Fully populated Eight (8) Size 16 power contacts Nine (9) Size 22 signal contacts</td>
</tr>
</tbody>
</table>

### 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. Precision formed copper alloy with selective gold over nickel plate at mating end, and tin over nickel plate at termination end.

#### Electrical Characteristics:
- Contact Current Ratings (per UL 1977):
  - Size 12 Contacts: 35 amperes, continuous (standard material). 50 amperes, continuous (high conductivity material).
  - Size 16 Contacts: 20 amperes, continuous (standard material). 30 amperes, continuous (high conductivity material).
  - Size 20 Contacts: 5 amperes, nominal (standard material).
  - Size 22 Contacts: 3 amperes, nominal (standard material).
- Initial Contact Resistance (max.) per IEC 512-2, Test 2b:
  - Size 12 Contacts: 0.0004 ohms (standard material). 0.0007 ohms (high conductivity material).
  - Size 16 Contacts: 0.0016 ohms (standard material). 0.0007 ohms (high conductivity material).
- Size 20/22 Contacts: 0.0005 ohms (standard material). 0.0009 ohms (precision-formed).
- Insulator Resistance (per IEC 512-2, Test 3a): 5 G ohms min.

#### Proof Voltage:
- Power Contacts: 1500 V r.m.s. 1300 V r.m.s. (GFSH89 and GFSH624)
- Signal Contacts: 1000 V r.m.s.

#### Working Voltage:
- Power Contacts: 500 V r.m.s. 150 V r.m.s. (GFSH89 and GFSH624)
- Signal Contacts: 333 V r.m.s.

#### Hot Pluggable (50 couplings per UL 1977, paragraph 15):
- Size 12 Contacts: 250 VAC at 25 amperes.
- Size 16 Contacts: Consult factory.

#### 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). Size 22 machined and precision-formed contacts feature "open entry" 250 cycle design for both straight & right angle (90°) PCB mount.
- Contact Retention in insulator (removable and fixed):
  - Power Contacts: 45 N (10 lbs.) min.
  - Signal Contacts: 27 N [ 6 lbs.] min.
- Sequential Mating: Two and three level systems available. Consult factory 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.
- TÜV: File 006089 For TÜV, first mate contact is not designed for use as protective earthing terminal. Consult factory for updated information.
Goldfish Power Connectors

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 512-2, 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 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 512-3, 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.
Outline Dimensions

**Male Connector**

- Dimensions: 72.86 [2.869] x 61.00 [2.402]
- Ø1.93 [Ø0.076] x 3.40 [0.134] Deep
- For Straight PCB Mount Use

**Female Connector**

- Dimensions: 72.86 [2.869] x 61.00 [2.402]
- Ø1.93 [Ø0.076] x 3.40 [0.134] Deep
- For Right Angle (90°) PCB Mount use

Contact Termination Dimensions

See Step 4 of Ordering Information

**Straight PCB Mount**

Specify code 3 or 38 in Step 4

- Size 12 contacts
- Ø2.29 [Ø0.090] x 3.25 [0.128]
- Size 16 contacts
- Ø1.60 [Ø0.063] x 4.25 [0.167]
- Size 20/22 contacts
- Ø2.29 [Ø0.090] x 7.49 [0.295] x 13.99 [0.551]

**Right Angle (90°) PCB Mount**

Specify code 4 or 48 in Step 4

- Size 12 contacts
- Ø2.29 [Ø0.090] x 7.49 [0.295] x 13.99 [0.551]
- Size 16 contacts
- Ø1.60 [Ø0.063] x 6.49 [0.256] x 10.74 [0.423] x 14.99 [0.590]

**Goldfish 02/435**

<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>
</tbody>
</table>

**Goldfish 928**

<table>
<thead>
<tr>
<th>DIM</th>
<th>Goldfish 02/435</th>
<th>Goldfish 928</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Ø0.71 [Ø0.028]</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>3.70 [0.146]</td>
<td>4.50 [0.177]</td>
</tr>
</tbody>
</table>

Connector shown is male. Unless otherwise specified, above dimensions are identical to female connector.
GOLDFISH • SERIES

Outline Dimensions

Male Connector

Female Connector

Contact Termination Dimensions

See Step 4 of Ordering Information

Straight PCB Mount
Specify code 3 or 37 in Step 4

Size 16 contacts

Size 22 contacts

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

Size 16 contacts

Size 22 contacts
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Panel Mount Connectors (Removable contacts)

Goldfish Versions 02, 435 and 928
Specify code 1 in Step 4 of Ordering Information
Outline Dimensions

Male Connector

Female Connector

Ø3.25 [Ø0.128] x 5.10 [0.201]
Deep from farside

Baby Goldfish Versions 109 and 624
Specify code 1 in Step 4 of Ordering Information
Outline Dimensions

Male Connector

Female Connector

Removable contacts should be allowed to float after installing in connector body for optimum mating.
Consult factory if alignment insert for male contacts is desired.
Alignment insert for GFSH89, GFSH109 and GFSH928 are available. Consult factory for other versions.
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Baby Baby Goldfish Version 89

Straight and Right Angle (90°) PCB Mount Connector
Outline Dimensions

Male Connector
- 35.70 [1.406]
- 31.50 [1.240]
- 11.30 [0.445]
- 4.00 [0.157] Deep
For Straight PCB Mount Use

Female Connector
- 35.70 [1.406]
- 11.30 [0.445]
- Ø1.93 [Ø0.076]
Thru’
For Right Angle (90°) PCB Mount use

Contact Termination Dimensions - See Step 4 of Ordering Information

Straight PCB Mount
Specify code 3 or 37 in Step 4
- 3.50 [0.138]
- Ø1.60 [Ø0.063]
- 2.10 [0.083]
Size 16 contacts

Right Angle (90°) PCB Mount
Specify code 4 or 47 in Step 4
- 3.50 [0.138]
- 4X 5.80 [0.228]
- 4X 10.00 [0.394]
Size 16 contacts
- 2.70 [0.106]
- 0.70 [Ø0.028]
- 3X 5.20 [0.205]
- 3X 7.90 [0.311]
- 3X 10.60 [0.417]
Size 22 contacts

Panel Mount Connectors
Specify code 1 in Step 4 of Ordering Information
Outline Dimensions

Male Connector
- 42.60 [1.677]
- 37.20 [1.465]
- 11.30 [0.445]
- Ø2.25 [Ø0.089] Thru’

Female Connector
- 42.60 [1.677]
- 37.20 [1.465]
- 11.30 [0.445]
- 17.00 [0.669]

Removable contacts should be allowed to float after installing in connector body for optimum mating.
Contact factory for additional polarization features for panel mounting.
Panel Cutout Dimensions
(For Panel Mount Connectors)

Panel Cutout Dimensions (for Float Bushing)

Goldfish 02, 435 and 928

Goldfish 02, 435 and 928

Baby Goldfish 109 and 624

Baby Goldfish 89

Panel Cutout Dimensions (for Mounting Screws and Jackscrews)

Goldfish 02, 435 and 928

Goldfish 02, 435 and 928

Goldfish 02, 435 and 928

Goldfish 02, 435 and 928

Goldfish 02, 435 and 928

Mounting Screws | ØA ±0.08 [0.003]
---|---
02, 435 and 928 | 4.06 [0.160]
109 and 624 | 3.56 [0.140]
89 | 3.05 [0.120]

Jackscrews | ØB ±0.08 [0.003]
---|---
02, 435 and 928 | 3.15 [0.124]
109 and 624 | 2.49 [0.098]
89 | 2.49 [0.098]
**Compliant Press-Fit Terminations**

For Straight PCB Mount Connectors

See Step 4 of Ordering Information

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**Contact Termination Dimensions**

<table>
<thead>
<tr>
<th>Bi-Spring Power</th>
<th>Omega Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>size 16 contacts per IEC 60352-5</td>
<td>size 20/22 contacts</td>
</tr>
</tbody>
</table>

Connector shown is male. Unless otherwise specified, above dimensions are identical to female connector.

---

**Specify code 93 or 94 in Step 4.**

<table>
<thead>
<tr>
<th>Order Code</th>
<th>&quot;L&quot; Length</th>
<th>PCB Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>5.72 [0.225]</td>
<td>2.29 to 4.45 [0.090 to 0.175]</td>
</tr>
<tr>
<td>94</td>
<td>7.04 [0.277]</td>
<td>4.45 [0.175] min.</td>
</tr>
</tbody>
</table>

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**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.

---

**Single Contact Insertion/Extraction Tools:**

Ordering Information

<table>
<thead>
<tr>
<th>Contact Size</th>
<th>Insertion Tool Part No.</th>
<th>Extraction Tool Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 16</td>
<td>Male 9513-100-0-0</td>
<td>Female 9513-101-0-0</td>
</tr>
<tr>
<td></td>
<td>Female 9513-102-0-0</td>
<td></td>
</tr>
<tr>
<td>Size 20</td>
<td>Male 9512-100-0-0</td>
<td>Female 9512-101-0-0</td>
</tr>
<tr>
<td></td>
<td>Female 9512-102-0-0</td>
<td></td>
</tr>
<tr>
<td>Size 22</td>
<td>Male 9512-103-0-0</td>
<td>Female 9512-104-0-0</td>
</tr>
</tbody>
</table>

---

**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>2076-12-6-16</td>
</tr>
<tr>
<td>GFSH02/928* 3H</td>
<td>4546-7-1-16</td>
</tr>
<tr>
<td>GFSH02/928* 4H</td>
<td>4546-7-0-16</td>
</tr>
<tr>
<td>GFSH02/928*93H</td>
<td>4546-7-2-16</td>
</tr>
<tr>
<td>GFSH02/928*94H</td>
<td>4546-7-3-16</td>
</tr>
<tr>
<td>GFSH109/624* 1H</td>
<td>2076-16-1-16</td>
</tr>
<tr>
<td>GFSH109/624* 3H</td>
<td>2076-12-6-16</td>
</tr>
<tr>
<td>GFSH109/624* 4H</td>
<td>4546-7-0-16</td>
</tr>
<tr>
<td>GFSH109/624*93H</td>
<td>2076-12-6-16</td>
</tr>
<tr>
<td>GFSH109/624*94H</td>
<td>2076-12-6-16</td>
</tr>
<tr>
<td>GFSH435* 1H</td>
<td>2076-12-6-16</td>
</tr>
<tr>
<td>GFSH435* 3H</td>
<td>4546-7-1-16</td>
</tr>
<tr>
<td>GFSH435* 4H</td>
<td>4546-7-0-16</td>
</tr>
<tr>
<td>GFSH435* 8H</td>
<td>4546-7-1-16</td>
</tr>
<tr>
<td>GFSH435*48H</td>
<td>4546-7-0-16</td>
</tr>
<tr>
<td>GFSH89*1H</td>
<td>4546-14-1-16</td>
</tr>
<tr>
<td>GFSH89*3H</td>
<td>4546-7-1-16</td>
</tr>
<tr>
<td>GFSH89*4H</td>
<td>4546-7-0-16</td>
</tr>
<tr>
<td>GFSH89*93H</td>
<td>4546-7-1-16</td>
</tr>
<tr>
<td>GFSH89*94H</td>
<td>4546-7-2-16</td>
</tr>
</tbody>
</table>

Material: Steel with Zinc plating

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**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>9513-404-2-0</td>
</tr>
<tr>
<td>GFSH109M93/94H</td>
<td>9513-309-4-0</td>
<td>9513-309-11-0</td>
</tr>
<tr>
<td>GFSH109F93/94H</td>
<td>9513-309-9-0</td>
<td>9513-309-5-0</td>
</tr>
<tr>
<td>GFSH435M93/94H</td>
<td>9513-309-10-0</td>
<td>9513-309-13-0</td>
</tr>
<tr>
<td>GFSH435F93/94H</td>
<td>9513-309-5-0</td>
<td>9513-309-16-0</td>
</tr>
<tr>
<td>GFSH624M93/94H</td>
<td>9513-309-12-0</td>
<td>9513-309-8-0</td>
</tr>
<tr>
<td>GFSH624F93/94H</td>
<td>9513-309-14-0</td>
<td>9513-309-15-0</td>
</tr>
<tr>
<td>GFSH89M93/94H</td>
<td>9513-309-7-0</td>
<td>9513-309-17-0</td>
</tr>
<tr>
<td>GFSH89F93/94H</td>
<td>9513-309-6-0</td>
<td>9513-309-16-0</td>
</tr>
</tbody>
</table>
Goldfish Version 89
(Only for Panel Mount)

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

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

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

Goldfish 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.

Goldfish 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.

Knob - Aluminium, Yellow Anodized.

Jackscrew Systems for Goldfish Version 109 and 624

Specify code E in Step 5 of Ordering Information

Specify code T in Step 5 of Ordering Information

Jackscrew Systems for Goldfish Version 02, 435 and 928

Goldfish 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 with dichromate seal or chromate seal
Lockwashers - Phosphor Bronze with dichromate seal or chromate seal

Consult factory for GFSH02, 435 and 928 PCB version of code T for availability.
Modular Cable Clamp Hoods for Goldfish Versions 02, 435 and 928 and Precision-Formed Female Signal Contacts

Specify code W or WE in Step 5 of Ordering Information

GOLDFISH • SERIES
Connector shown is male. Unless otherwise specified, above dimensions are identical to female connector.

Standard Hood and Cable Clamps

Modular Hood and Cable Clamps

Introducing Precision-Formed Female Signal Contacts for the Goldfish Connector Series.

- A Lower Cost and Lower Mating force of Precision-Formed Female Signal Contacts.
- Precision-Formed Female Signal Contacts available for size 22 contacts only.
- Available for Solder, Straight and Right Angle (90°) PCB Mount Versions of Goldfish 109, 624 and 928 FEMALE CONNECTORS ONLY.
- To order, please specify PA688 in step 7 of the GOLDFISH ordering information in page 17. (for example, GFSH624F3H-PA688)

Note: For contact termination dimensions and contact hole patterns of straight and right angle (90°) PCB Mount also applied to female connector with precision form signal contacts of MOS PA 688
Goldfish • SERIES

Mounting Styles and Contact Hole Patterns for PCB Mount

Mounting Styles

Right Angle (90°) Mounting Brackets

Through Hole (B) Board Lock (LN)

Specify code B or LN.
Material: Brass with Zinc or Tin plating.

Push-on Fastener

Goldfish “A”

<table>
<thead>
<tr>
<th>Code</th>
<th>Goldfish</th>
<th>“A”</th>
</tr>
</thead>
<tbody>
<tr>
<td>02/435</td>
<td>3.17 [0.124]</td>
<td></td>
</tr>
<tr>
<td>109/624</td>
<td>3.42 [0.134]</td>
<td></td>
</tr>
<tr>
<td>928</td>
<td>3.37 [0.132]</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>3.34 [0.131]</td>
<td></td>
</tr>
</tbody>
</table>

Specify code N.
Material: Copper Alloy with Tin plating.

Float Mounting Hardware

Code Goldfish “B”

<table>
<thead>
<tr>
<th>Code</th>
<th>Goldfish</th>
<th>“B”</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>02/435/928</td>
<td>2.00 [0.078]</td>
</tr>
<tr>
<td>82</td>
<td>109/624</td>
<td>2.13 [0.083]</td>
</tr>
<tr>
<td>83</td>
<td>89</td>
<td>1.52 [0.060]</td>
</tr>
<tr>
<td>83</td>
<td>02/435/928</td>
<td>2.70 [0.106]</td>
</tr>
<tr>
<td>83</td>
<td>109/624</td>
<td>2.84 [0.111]</td>
</tr>
<tr>
<td>83</td>
<td>89</td>
<td>2.79 [0.110]</td>
</tr>
</tbody>
</table>

Specify code 82 or 83.
Material: Steel with Zinc or Tin plating.
Note: For GFSH89 with code 83, consult factory for availability.

Goldfish 02
Straight PCB Mount

Code 02 in Step 2
Code 3 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 in Step 4
Code H or N in Step 5

Contact Hole Patterns for Straight PCB Mount

DIM  Suggested size  For use
A  Ø1.14 [0.045] Size 20 & 22 contact terminals
B  Ø2.11 [0.083] Size 16 contact terminals
C  Ø2.90 [0.114] Size 12 contact terminals
D  Ø2.54 [0.100] Mounting connector with screws
E  Ø3.12±0.08 [0.123±0.003] Mounting connector using push-on fasteners

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

Hole pattern shown is for male connector. Use mirror image for female connector.
Goldfish Versions 02, 435 and 928
Contact Hole Patterns for PCB Mount

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>
<th>Suggested size</th>
<th>For use</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.14 [0.045]</td>
<td>Size 20 &amp; 22 contact terminals</td>
</tr>
<tr>
<td>B</td>
<td>0.21 [0.083]</td>
<td>Size 16 contact terminals</td>
</tr>
<tr>
<td>C</td>
<td>0.29 [0.114]</td>
<td>Size 12 contact terminals</td>
</tr>
<tr>
<td>D</td>
<td>0.54 [0.21]</td>
<td>Mounting connector with screws</td>
</tr>
<tr>
<td>E</td>
<td>0.12 [0.047]</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 SK0370 or consult factory for more information.)

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

**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

---

**DIM**  | **Suggested size**  | **For use**  
---|---|---  
A  | Ø1.14 [0.045]  | Size 20 & 22 contact terminals  
B  | Ø2.11 [0.083]  | Size 16 contact terminals  
C  | Ø2.90 [0.114]  | Size 12 contact terminals  
D  | Ø2.54 [0.100]  | Mounting connector with screws  
E  | Ø3.96±0.08 [0.156±0.003]  | Mounting connector using push-on fasteners  
  | Ø2.49±0.08 [0.098±0.003]  | Mounting connector with jackscrew system  
F  | Ø3.12 [0.123]  | Mounting connector using angle brackets  

(For Suggested Straight Mount PCB Holes Sizes of Compliant Press-Fit Connectors, please refer to SK6370 or consult factory for more informations.)

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

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

---

**Goldfish 89**

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

**Goldfish 89**

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

---

**Contact Hole Patterns for PCB Mount**

- **Goldfish 89**
  - **Straight PCB Mount**
  - **Right Angle (90°) Mount**

---

**Removable, Solder, Straight PCB Mount Contacts**

<table>
<thead>
<tr>
<th>Size 12</th>
<th>FDS12G3N2</th>
<th>MDS12G3N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.60  [0.063]</td>
<td>12.50 [0.492]</td>
<td>12.91 [0.508]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>6.50 [0.256]</td>
<td>6.50 [0.256]</td>
</tr>
<tr>
<td>Ø1.588 [0.0625]</td>
<td>13.06 [0.514]</td>
<td>13.13 [0.514]</td>
</tr>
<tr>
<td>Ø2.29 [0.090]</td>
<td>13.13 [0.517]</td>
<td>14.30 [0.563]</td>
</tr>
<tr>
<td>Ø2.38 [0.094]</td>
<td>1.68 [0.066]</td>
<td>1.68 [0.066]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>9.50 [0.374]</td>
<td>9.50 [0.374]</td>
</tr>
</tbody>
</table>

**Size 16**

<table>
<thead>
<tr>
<th>FDS16G3N2</th>
<th>MDS16G3N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.60  [0.063]</td>
<td>12.80 [0.504]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>6.00 [0.236]</td>
</tr>
<tr>
<td>Ø1.588 [0.0625]</td>
<td>13.06 [0.514]</td>
</tr>
<tr>
<td>Ø2.29 [0.090]</td>
<td>13.13 [0.517]</td>
</tr>
<tr>
<td>Ø2.38 [0.094]</td>
<td>1.68 [0.066]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>9.50 [0.374]</td>
</tr>
</tbody>
</table>

**Size 20**

<table>
<thead>
<tr>
<th>FDS20G3N2</th>
<th>MDS20G3N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.60  [0.063]</td>
<td>11.53 [0.454]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>5.90 [0.232]</td>
</tr>
<tr>
<td>Ø1.588 [0.0625]</td>
<td>12.07 [0.475]</td>
</tr>
<tr>
<td>Ø2.29 [0.090]</td>
<td>13.13 [0.517]</td>
</tr>
<tr>
<td>Ø2.38 [0.094]</td>
<td>1.68 [0.066]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>9.50 [0.374]</td>
</tr>
</tbody>
</table>

**Size 22**

<table>
<thead>
<tr>
<th>FDS22G3N2</th>
<th>MDS22G3N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1.60  [0.063]</td>
<td>13.13 [0.517]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>6.00 [0.236]</td>
</tr>
<tr>
<td>Ø1.588 [0.0625]</td>
<td>11.91 [0.469]</td>
</tr>
<tr>
<td>Ø2.29 [0.090]</td>
<td>13.13 [0.517]</td>
</tr>
<tr>
<td>Ø2.38 [0.094]</td>
<td>1.68 [0.066]</td>
</tr>
<tr>
<td>Ø0.71 [0.028]</td>
<td>9.50 [0.374]</td>
</tr>
</tbody>
</table>

**Contact Ordering Information**

- **Connector Variant**
  - GFSH02F1H
  - GFSH02M1H
  - GFSH02F1H
  - GFSH02M1H
  - GFSH02F1H
  - GFSH02M1H
  - GFSH02F1H
  - GFSH02M1H
- **Power Contact**
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
  - FDS16G3N2
- **Signal Contact**
  - FDS20G3N2
  - MDS16G3N
  - MDS16G3N
  - MDS16G3N
  - MDS16G3N
  - MDS16G3N
  - MDS16G3N
  - MDS16G3N

**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.

---

Reference contact tail length is 4.50 [0.177] beyond insulator. Consult factory for other contact sizes.
### Removable Crimp Contacts & Sequential Mating System

#### Size 12

**Female**
- ØB: 19.96 [0.786]
- ØA: 6.48 [0.255]
- D: 1.06 [0.042]

**Male**
- ØB: 19.41 [0.764]
- ØA: 6.48 [0.255]
- C: 1.65 [0.065]

* First mate contact, D=23.18 [0.913]

#### Size 16

**Female**
- ØB: 19.41 [0.764]
- ØA: 6.48 [0.255]
- C: 6.48 [0.255]

**Male**
- ØB: 19.41 [0.764]
- ØA: 6.48 [0.255]
- Ø1.588 [0.0625]

* First mate contact, C=21.74 [0.856]

#### Size 20

**Female**
- ØB: 19.41 [0.764]
- ØA: 6.48 [0.255]
- Ø1.00 [0.039]

**Male**
- ØB: 19.41 [0.764]
- ØA: 6.48 [0.255]
- Ø1.06 [0.042]

#### Size 22

**Female**
- ØB: 19.66 [0.774]
- ØA: 3.35 [0.132]
- Ø0.749 [0.0295]

**Male**
- ØB: 15.49 [0.610]
- ØA: 3.35 [0.132]
- Ø0.76 [0.030]

Material and Finishes (standard contact): Precision machined copper alloy with gold flash over nickel. Other finishes available.

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

Consult factory for sequential mating and high conductivity material options.

### Sequential Mating Systems

(Available in both PCB and Crimp Version Connectors)

- **Length of A =** 2.69 [0.106]
- **Length of B =** 2.03 [0.080]

Contact factory for ordering information.

Dimensions valid for Goldfish 02 PCB mount versions only.

Contact factory for other versions.
GOLDFISH • SERIES

Connector Ordering Information and Automatic Crimp Machine

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 and 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. (high conductivity size 16 power contacts).
37 : Solder, straight PCB mount. (high conductivity size 12 power contacts).
38 : Solder, right angle (90°) PCB mount. (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.
94 : 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.
Notes:
*: Not available in GFSH89, 109 and 624.

STEP 6: Environmental Compliance Options
/AA : Compliant per EU Directive 2002/95/EC (RoHS)
Note: If no environmental options are required, this step will not be used.
Examples: GFSH02F4LN

STEP 7: Special Options
Consult factory for customization of Goldfish Power Connectors, e.g. selective loading, sequential mating, etc.

Automatic Crimp Machine

Part No. 9550-0
This fast cycling and reliable automatic crimp machine produces a four double-indent crimp, meeting Military Standard and proprietary specifications on wire sizes 12 AWG (4.0mm²) through 30 AWG (0.05mm²).

The tool is a bench mount pneumatic unit of compact size and weight. Contacts must be ordered separately and are supplied on a reel in quantities of 2000.

To order, specify part number 9550-0. Foot pedal control valve is supplied as a standard accessory.

CONTACT CARRIERS
Molded thermoplastic carriers in a continuous belt feed contacts to the crimp station of the automatic feed tool. They also locate the contacts in respect to the tool’s indenters. The carriers are color coded white and natural for contact identification for both MS and proprietary applications. Part number for contacts supplied in reels ends with a ‘R’, example, FC114N2R.

Machine not sold, for rent only.
Recommended Tools for Crimp Contacts and GG (Giant Goldfish) Series

<table>
<thead>
<tr>
<th>Contact Size</th>
<th>Contact Extraction Tool</th>
<th>Contact Insertion Tool</th>
<th>Hand Crimp Tool</th>
<th>Semi-Automatic Crimp Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size 12</td>
<td>2711-0</td>
<td>9099-3</td>
<td>9509-6 (MC/FC610) 9501-0 with 9502-19 positioner (MC/FC612)</td>
<td>-</td>
</tr>
<tr>
<td>Size 16</td>
<td>9081-0</td>
<td>9099-0</td>
<td>9501-0 with 9502-1 positioner 9501-0 with 9502-17 positioner (male first male contacts)</td>
<td>9550-0</td>
</tr>
<tr>
<td>Size 20</td>
<td>9081-2</td>
<td>9099-4</td>
<td>9507-0 with 9502-21 positioner (male contacts) 9507-0 with 9502-22 positioner (female contacts)</td>
<td>9550-1</td>
</tr>
<tr>
<td>Size 22</td>
<td>9081-3</td>
<td>9099-1</td>
<td>9507-0 with 9502-12 positioner (male contacts) 9507-0 with 9502-20 positioner (female contacts)</td>
<td></td>
</tr>
</tbody>
</table>

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

<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

** CONTACT VARIANT & DIMENSIONS

- Glass filled nylon, UL 94 V-0, gold color.
- Precision machined copper alloy. Plated gold flash over nickel. Other finishes available upon request.
- Contact current ratings to 200 amps per contact in accordance to UL 1977.
- Contact resistance: as low as 0.00012 ohms, per IEC 512-2, 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

Contact sales for complete GG series catalog information