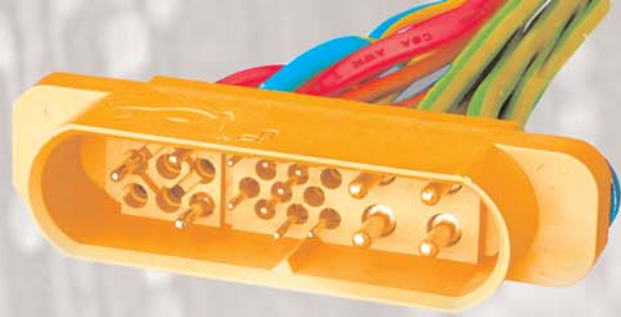
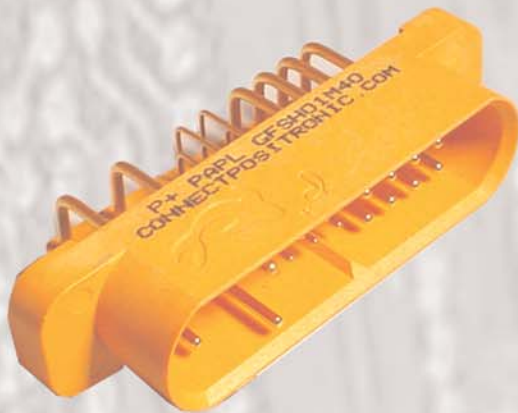
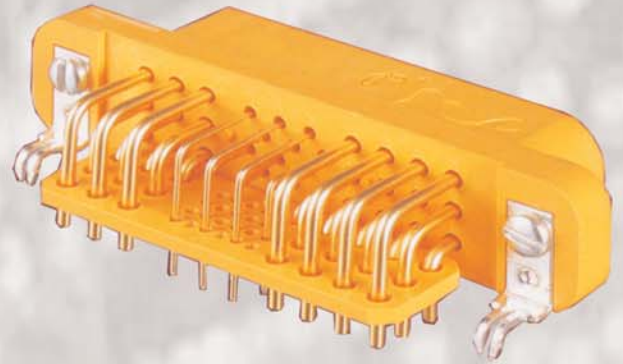


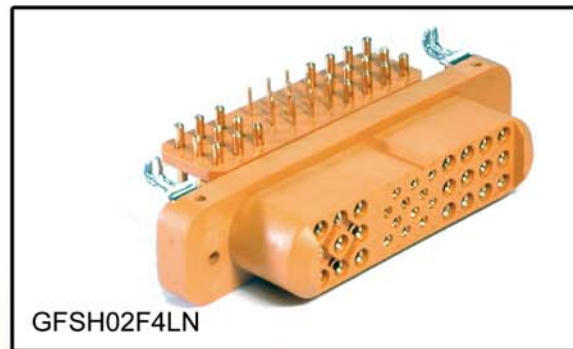
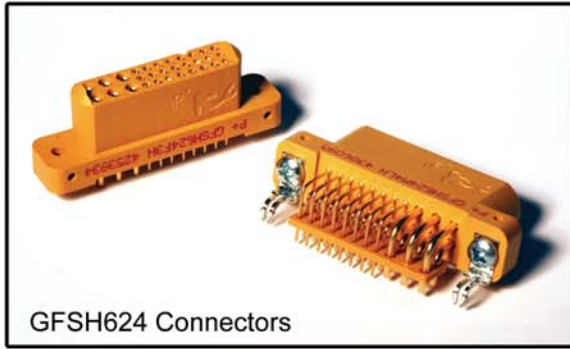
# GOLDFISH



## Power Connectors

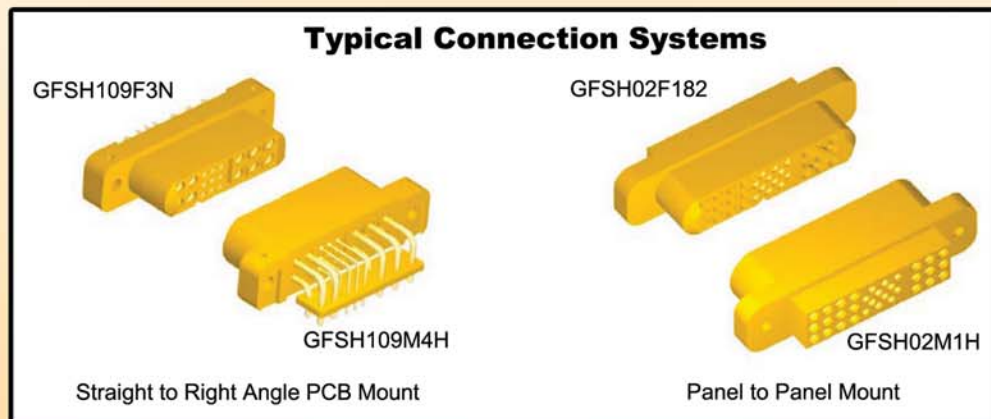


## Positronic Industries



## GoldFish Power Connectors Feature!!!

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



Unless otherwise specified, dimensional tolerances are:

- 1) Male contact mating diameters :  $\pm 0.03$  [0.001]
- 2) Contact termination diameters :  $\pm 0.08$  [0.003]
- 3) All diameters :  $\pm 0.13$  [0.005]
- 4) All other dimensions :  $\pm 0.38$  [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.

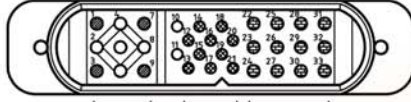
CATALOG NO: A-001 Rev. A

## Goldfish Power Connectors

### Connector versions and technical characteristics



### Connector Versions



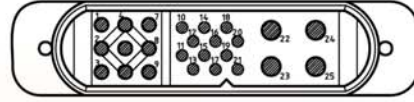
Size 16 AC Power      Size 20 Signal      Size 16 DC Power

**GFSH01:** Partially populated connector  
 Number of size 16 power contacts: 16  
 Number of size 20 signal contacts: 10  
 Positions 7 & 9 of male connector are first mate contacts.

**GFSH02:** Fully populated connector  
 Number of size 16 power contacts: 21  
 Number of size 20 signal contacts: 12  
 (Same connector body as GFSH01.)



**GFSH109:** Fully populated connector  
 Number of size 16 power contacts: 10  
 Number of size 22 signal contacts: 9



**GFSH435:** Fully populated connector  
 Number of size 12 power contacts: 4  
 Number of size 16 power contacts: 9  
 Number of size 20 signal contacts: 12



**GFSH928:** Fully populated connector  
 Number of size 16 power contacts: 18  
 Number of size 22 signal contacts: 28



**GFSH624:** Fully populated connector  
 Number of size 16 power contacts: 6  
 Number of size 22 signal contacts: 24

### Technical Characteristics

#### Materials and Finishes

Insulator: Glass-filled nylon, UL 94V-0.  
 Contacts: Precision machined copper alloy with gold over nickel plate.

#### Electrical Characteristics

##### Contact Current Ratings

Size 12 Contacts: 35 amperes, continuous.  
 50 amperes, continuous (super conductive material).  
 Size 16 Contacts: 20 amperes, continuous.  
 Size 20 Contacts: 5 amperes, nominal.  
 Size 22 Contacts: 3 amperes, nominal.

##### Initial Contact Resistance (max.) per IEC 512-2, Test 2b.

Size 12 Contacts: 0.0007 ohms (super conductive material).  
 Size 12 Contacts: 0.001 ohms.  
 Size 16 Contacts: 0.003 ohms.  
 Size 20/22 Contacts: 0.005 ohms.

Insulator Resistance: 5 G ohms min. per IEC 512-2, Test 3a.

##### Proof Voltage

Power Contacts: 1500 V r.m.s.  
 Signal Contacts: 1000 V r.m.s.

##### Working Voltage

Power Contacts: 500 V r.m.s.  
 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).

##### 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 +125°C.

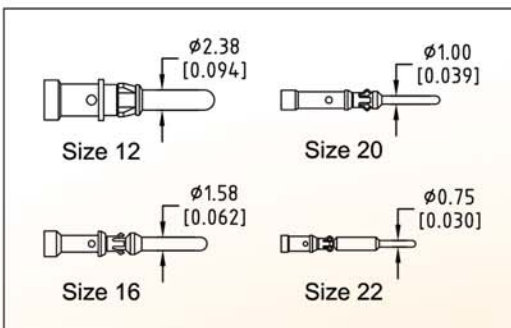
#### Recognized

UL: File E49351  
 TÜV: File 006089

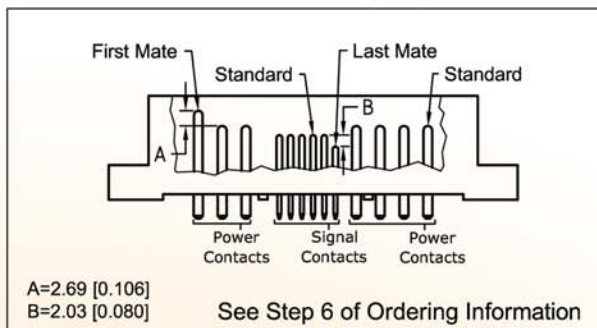
For TÜV, first mate contact is not designed for use as protective earthing terminal.



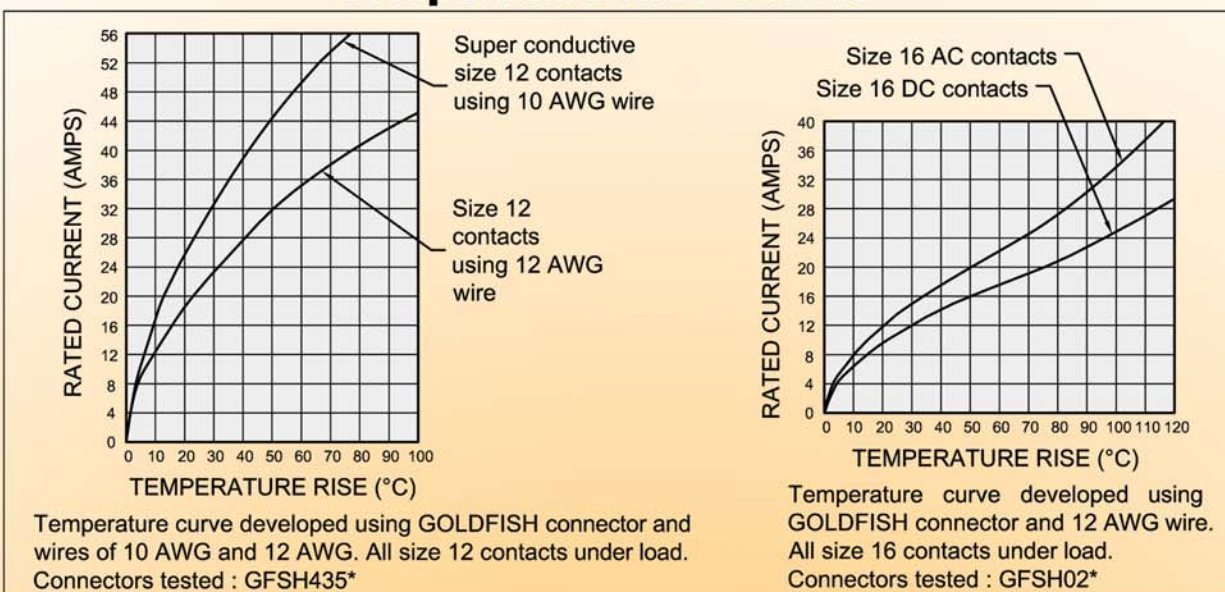
## Contact Sizes



## Sequential Mating Systems



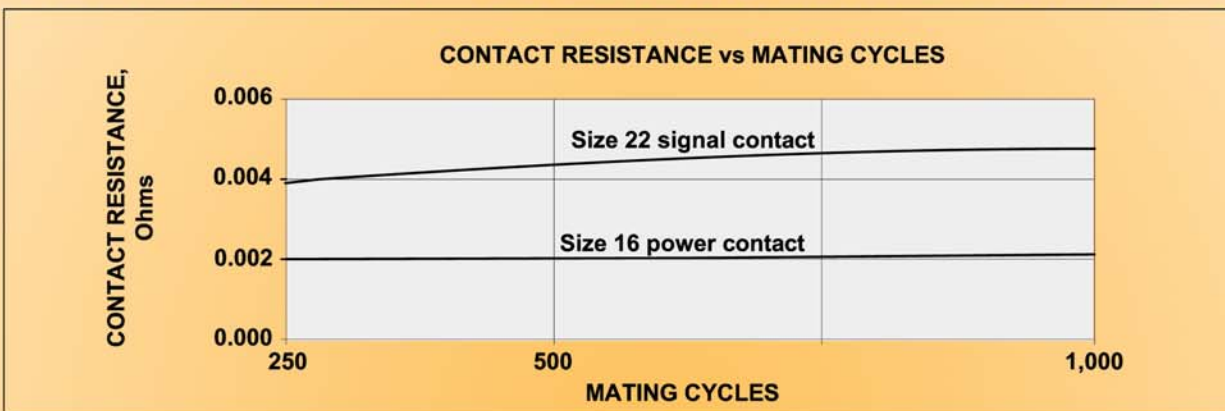
## Temperature Rise Curves



Tested per IEC Publication 512-3, Test 5a

## 1,000 CYCLES CONTACT PERFORMANCE

### CONTACT RESISTANCE - DURING CYCLE TESTING AND HUMIDITY CONDITIONING

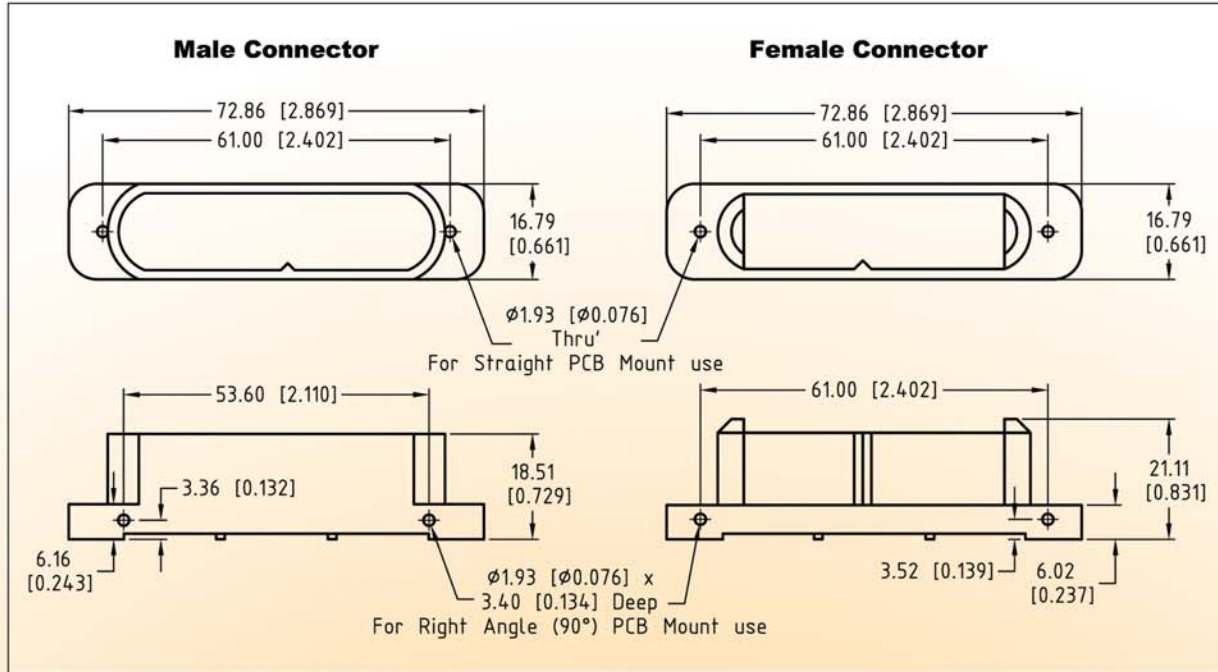


Humidity condition per EIA-364-31B, Method II (condition A) after 250, 500 and 1,000 cycles.  
 Contact resistance per IEC 512-2, Test 2b. Connectors tested : GFSH624\*

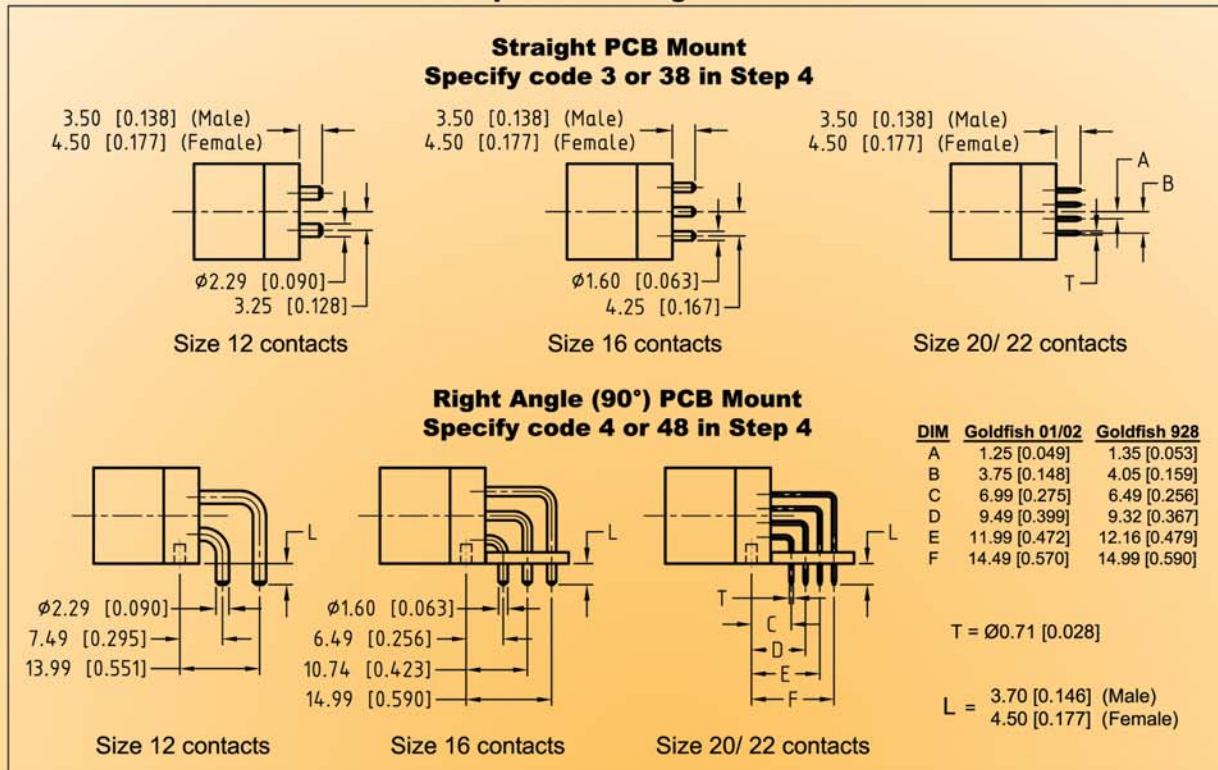
## Straight and Right Angle (90°) PCB Mount Connectors Goldfish Versions 01, 02, 435 and 928



### Outline Dimensions



### Contact Termination Dimensions See Step 4 of Ordering Information

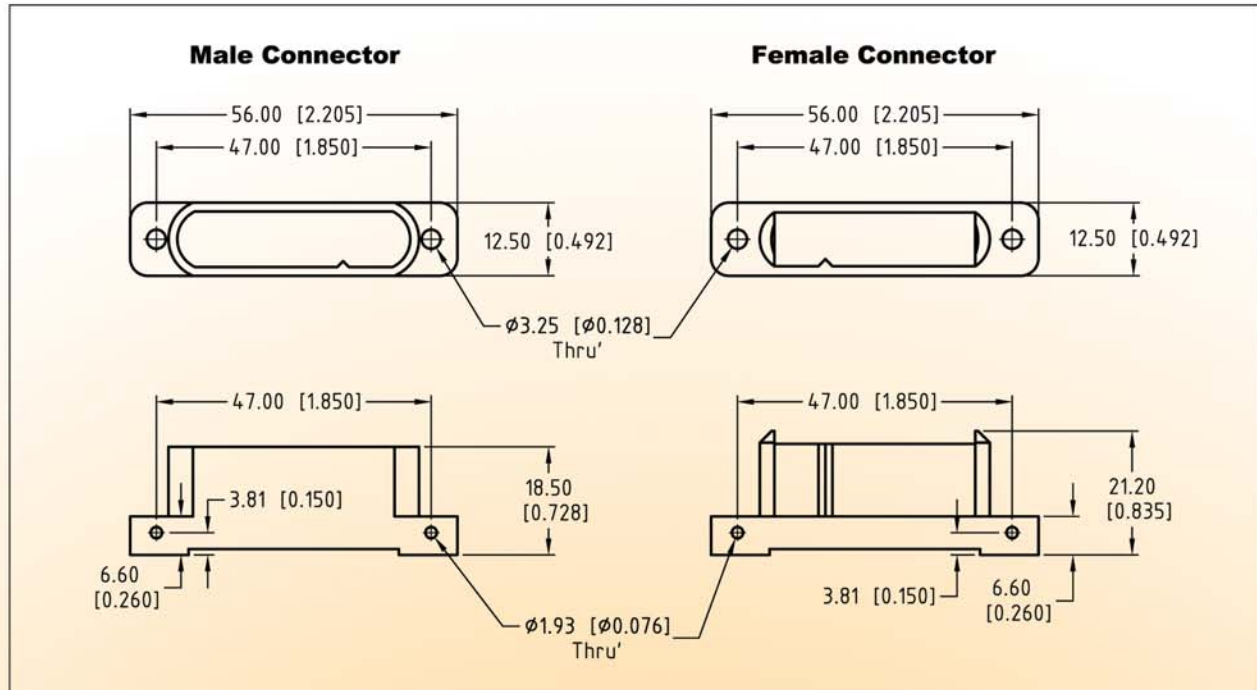


Connector shown is male. Unless otherwise specified, above dimensions are identical to female connector.

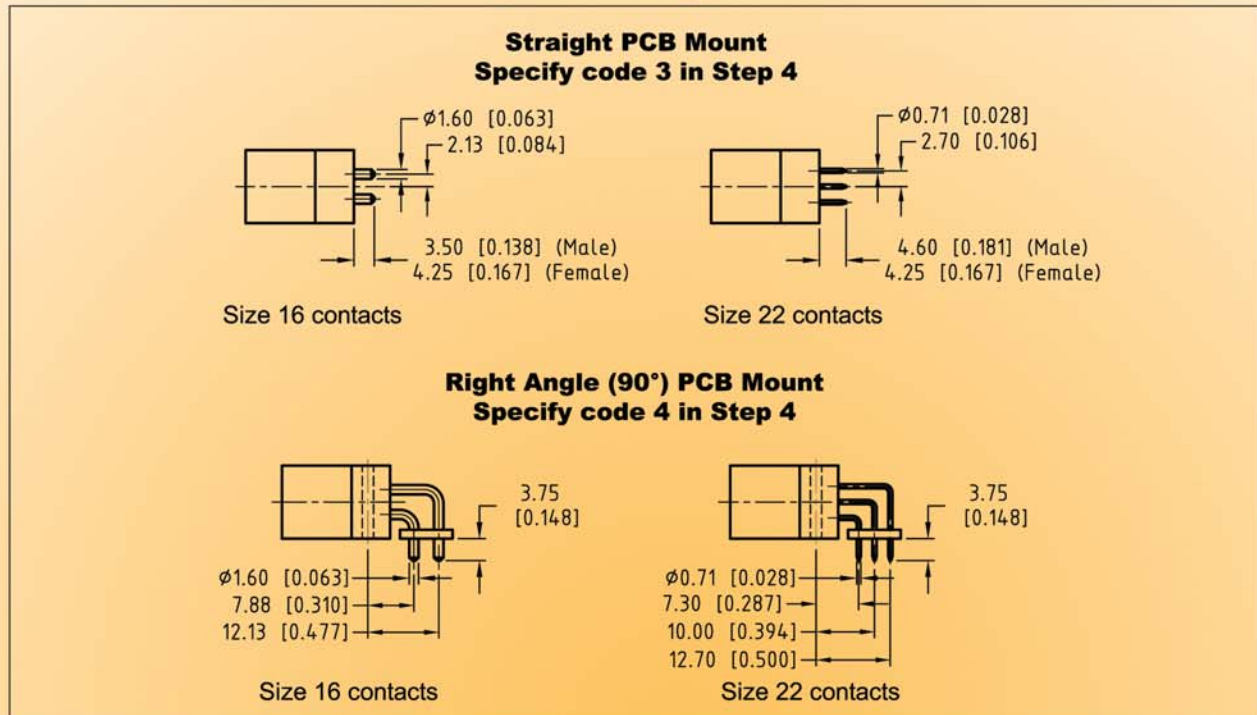
## Straight and Right Angle (90°) PCB Mount Connectors Baby Goldfish Versions 109 and 624



### Outline Dimensions



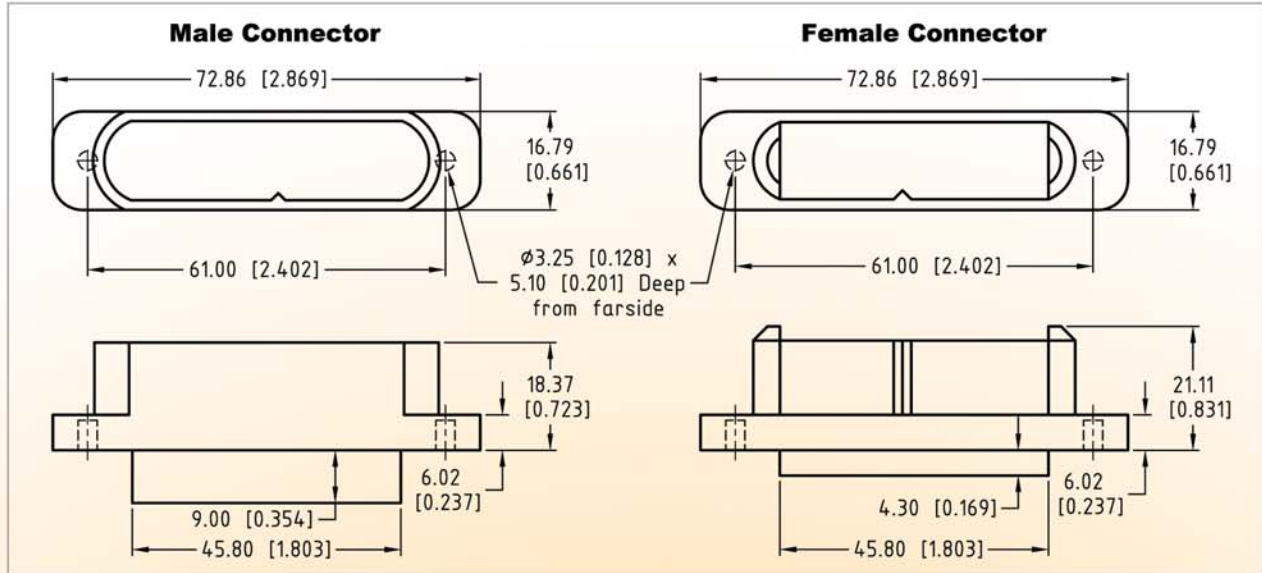
### Contact Termination Dimensions See Step 4 of Ordering Information



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



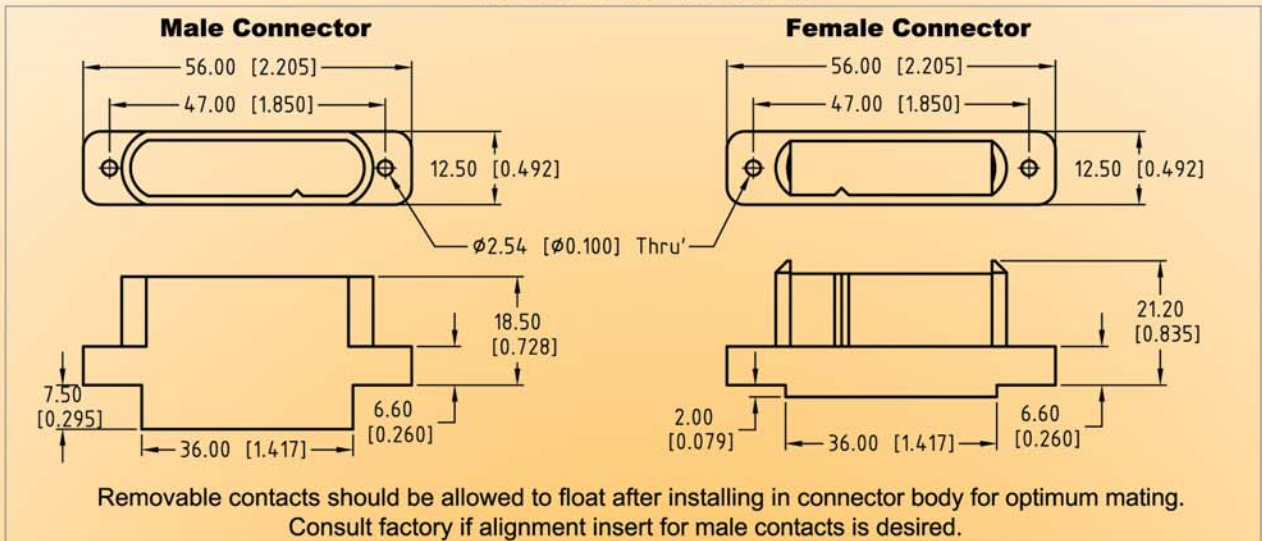
### Outline Dimensions



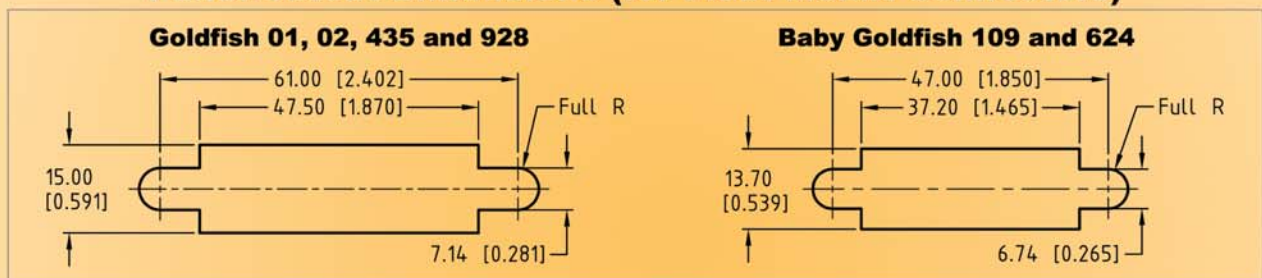
### Baby Goldfish Versions 109 and 624

Specify code 1 in Step 4 of Ordering Information

### Outline Dimensions



### Panel Cutout Dimensions (for Float Mount Connectors)



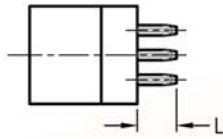
## Compliant Press-Fit Terminations

See Step 4 of Ordering Information

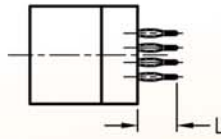
### PCB Straight Mount



#### Contact Termination Dimensions



Bi-Spring Power  
size 16 contacts  
per IEC 60352-5



Omega Signal  
size 20/ 22 contacts  
Patent No. 6,260,268

Specify code 93 or 94 in Step 4.



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

| Order Code | "L" Length   | PCB Thickness                 |
|------------|--------------|-------------------------------|
| 93         | 5.72 [0.225] | 2.29 to 4.45 [0.090 to 0.175] |
| 94         | 7.04 [0.277] | 4.45 [0.175] min.             |

Note: Outline dimensions for Press-Fit Connectors are the same as those of Straight PCB Mount Versions.

#### 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.

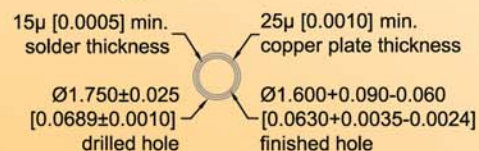
#### Mounting Screws Ordering Information

| Connector Variant  | Screw Part No. |
|--------------------|----------------|
| GFSH01/02/928* 1 H | 2076-12-6-16   |
| GFSH01/02/928* 3 H | 4546- 7 -1-16  |
| GFSH01/02/928* 4 H | 4546- 7 -0-16  |
| GFSH01/02/928*93H  | 4546- 7 -2-16  |
| GFSH01/02/928*94H  | 4546- 7 -3-16  |
| GFSH109/624* 1 H   | 2076-16-1-16   |
| GFSH109/624* 3 H   | 2076-12-6-16   |
| GFSH109/624* 4 H   | 4546- 7 -0-16  |
| GFSH109/624*93H    | 2076-12-6-16   |
| GFSH109/624*94H    | 2076-12-0-16   |
| GFSH435* 1 H       | 2076-12-6-16   |
| GFSH435* 3 H       | 4546- 7 -1-16  |
| GFSH435* 4 H       | 4546- 7 -0-16  |
| GFSH435*38H        | 4546- 7 -1-16  |
| GFSH435*48H        | 4546- 7 -0-16  |

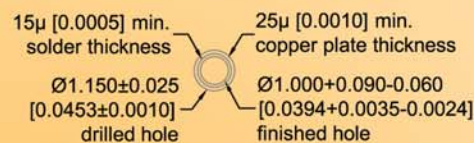
Material: Steel with Zinc plating

#### Contact Hole Patterns

as per PCB straight mount suggested PCB hole sizes



Size 16 Press-Fit Contact Hole



Size 20/ 22 Press-Fit Contact Hole

Consult factory for optional platings

#### Single Contact Insertion/ Extraction Tools Ordering Information

| Contact Size | Insertion Tool Part No. | Extraction Tool Part No. |
|--------------|-------------------------|--------------------------|
| Size 16      | Male 9513-100-0-0       | 9513-102-0-0             |
|              | Female 9513-101-0-0     |                          |
| Size 20      | Male 9512-100-0-0       | 9512-102-0-0             |
|              | Female 9512-101-0-0     |                          |
| Size 22      | Male 9512-103-0-0       | 9512-105-0-0             |
|              | Female 9512-104-0-0     |                          |

#### Connector Installation Tools Ordering Information

| Connector Variant | Seating Tool Part No. | Support Tool Part No. |
|-------------------|-----------------------|-----------------------|
| GFSH01M93/94H     | 9513-309-1-0          | 9513-404-1-0          |
| GFSH02M93/94H     | 9513-309-2-0          |                       |
| GFSH02F93/94H     | 9513-309-3-0          |                       |

Consult factory for other connector variants.



## Mounting Styles and Contact Hole Patterns for PCB Mount



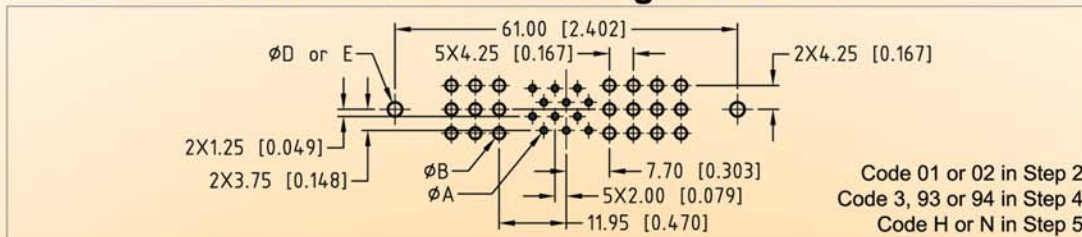
| Right Angle (90°) Mounting Brackets                    |                      | Push-on Fastener                        | Float Mounting Hardware           |
|--|----------------------|---|-----------------------------------|
|  |                      |   |                                   |
| Through Hole (B)                                       | With Board Lock (LN) | "A"                                     | "B"                               |
| Specify code B or LN.                                  |                      | Specify code N.                         | Specify code 82 or 83.            |
| Material: Brass with Zinc and Tin plating respectively |                      | Material: Copper Alloy with Tin plating | Material: Steel with Zinc plating |

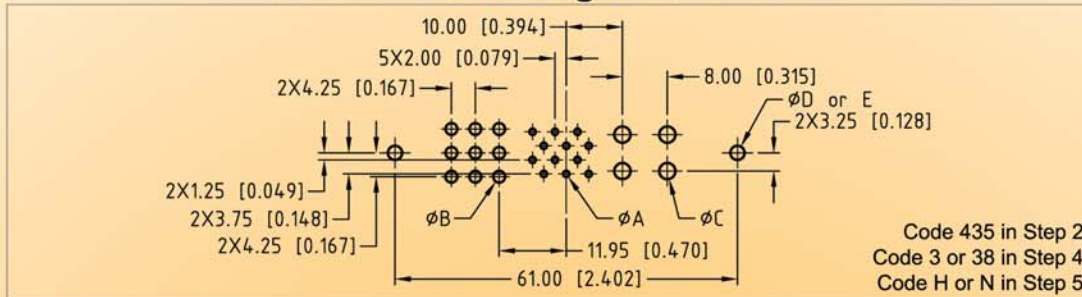
| Goldfish | "A"          | Code | Goldfish   | "B"          |
|----------|--------------|------|------------|--------------|
| 02/435   | 3.17 [0.124] | 82   | 02/435/928 | 2.00 [0.078] |
| 109/624  | 3.42 [0.134] | 82   | 109/624    | 2.13 [0.083] |
| 928      | 3.37 [0.132] | 83   | 02/435/928 | 2.70 [0.106] |
|          |              | 83   | 109/624    | 2.84 [0.111] |

### Contact Hole Patterns for Straight PCB Mount

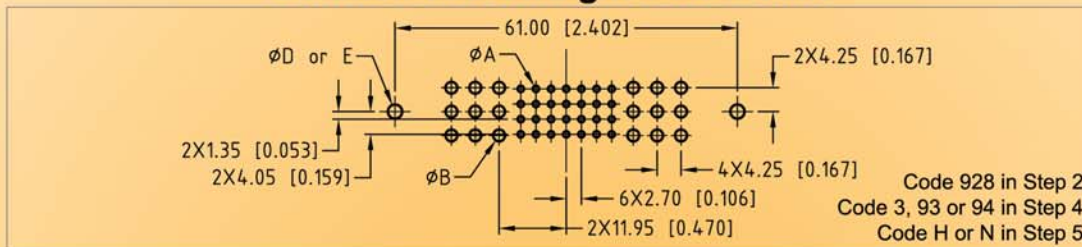
#### Goldfish 01 and 02 Straight PCB Mount



#### Goldfish 435 Straight PCB Mount



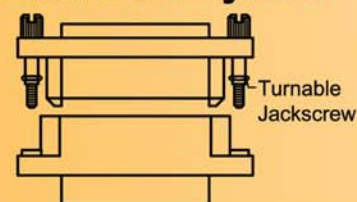
#### Goldfish 928 Straight PCB Mount



| 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                 |
| (See page 6 for suggested PCB holes sizes of press-fit terminations.) |                          |   |
| D   | Ø2.54 [0.100]            | Mounting connector with screws            |
| E   | Ø3.12±0.08 [0.123±0.003] | Mounting connector with push-on fasteners |

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

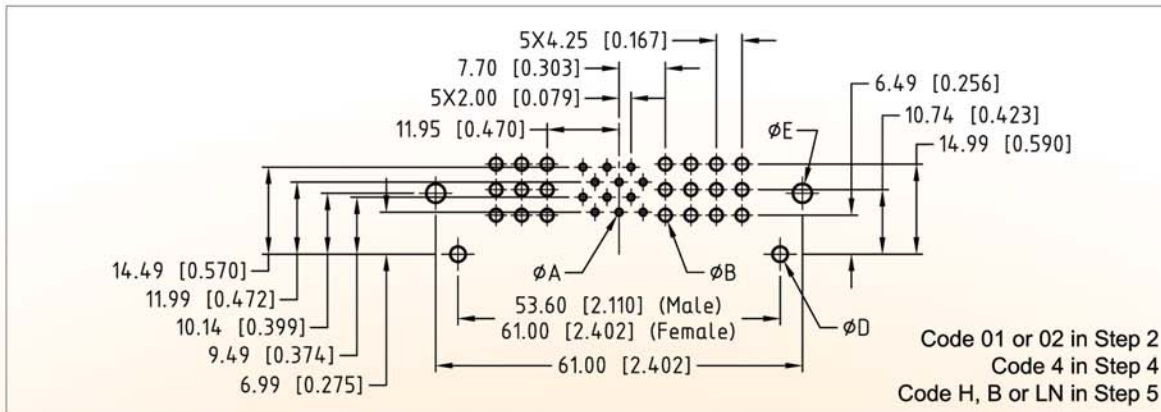
#### Jackscrew System



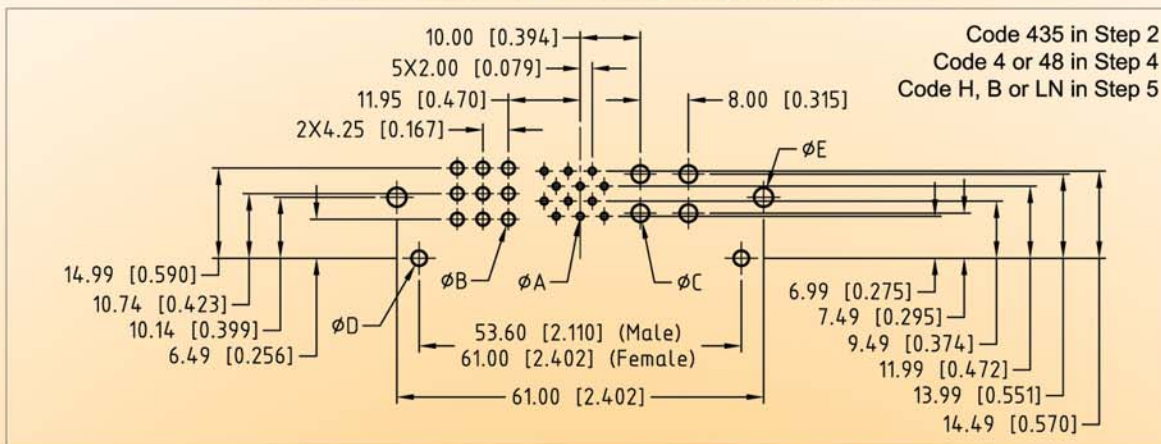
Consult factory for availability



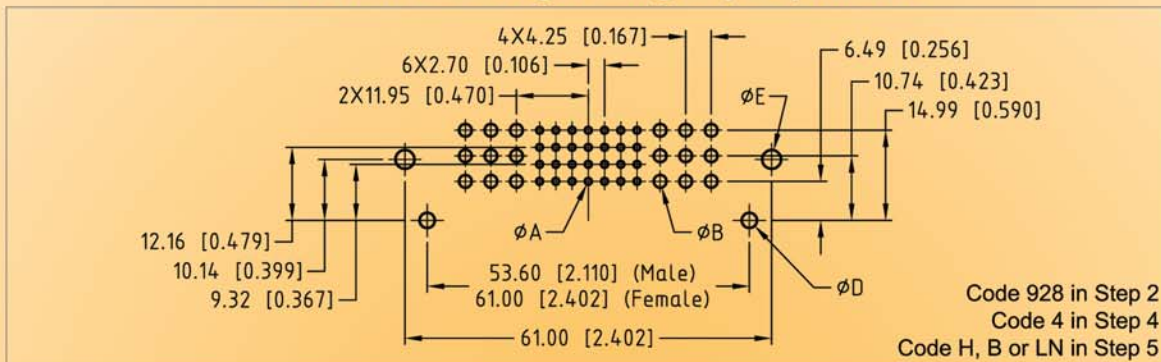
### Goldfish 01 and 02 Right Angle (90°) Mount



### Goldfish 435 Right Angle (90°) Mount



### Goldfish 928 Right Angle (90°) Mount

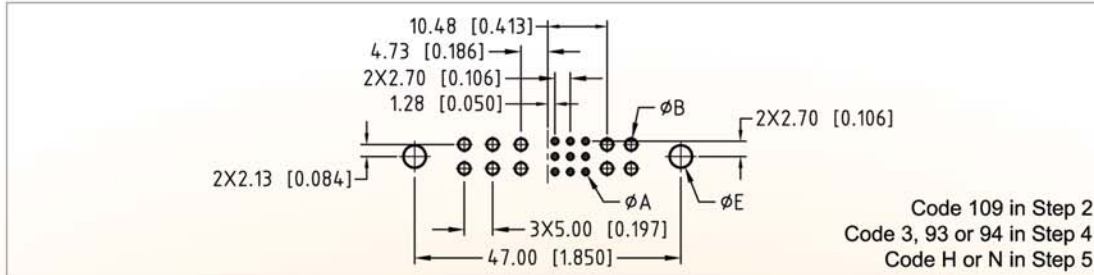


| DIM | Suggested size | For use                                 |
|-----|----------------|---|
| A   | Ø1.14 [0.045]  | Size 20 & 22 contact terminals          |
| B   | Ø2.11 [0.083]  | Size 16 contact terminals               |
| C   | Ø2.90 [0.114]  | Size 12 contact terminals               |
| D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

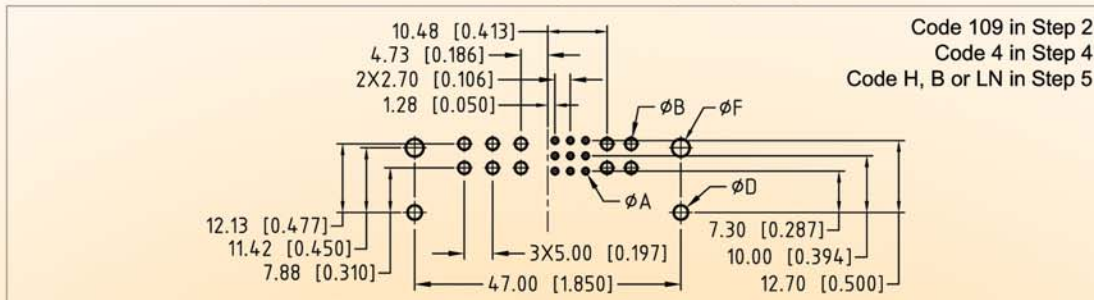
Hole pattern shown is for male connector. Use mirror image for female connector.



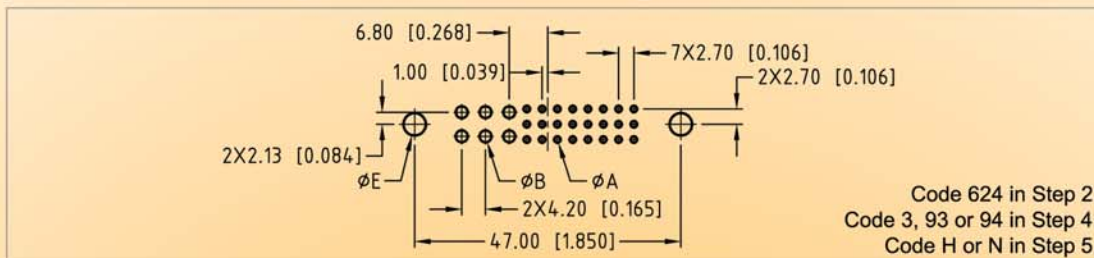
### Baby Goldfish 109 Straight PCB Mount



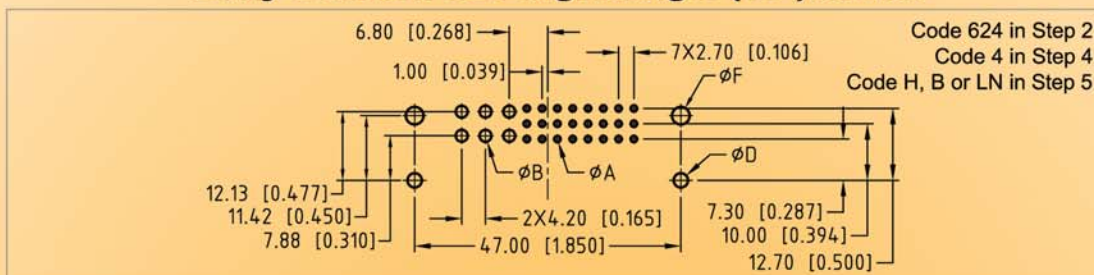
### Baby Goldfish 109 Right Angle (90°) Mount



### Baby Goldfish 624 Straight PCB Mount



### Baby Goldfish 624 Right Angle (90°) 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                         |
| (See page 6 for suggested PCB holes sizes of press-fit terminations.) |                             |   |
| D   | Ø2.54 [0.100]               | Mounting connector with screws                    |
| E   | Ø3.96±0.08<br>[0.156±0.003] | Mounting connector with push-on fasteners/ screws |
| F   | Ø3.12 [0.123]               | Mounting connector using angle brackets           |

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

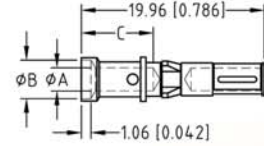
## Removable Crimp Contact

Consult factory for sequential mating and super conductive material options.

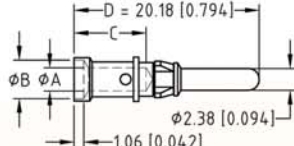


### Size 12

Female



Male



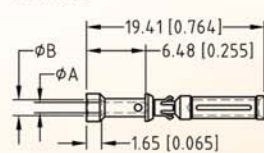
\* First mate contact, D = 23.18 [0.913]

| Female Contact | Male Contact  | ** Wire Size AWG [mm <sup>2</sup> ] | ØA              | ØB              | C               |
|----------------|---------------|-------------------------------------|-----------------|-----------------|-----------------|
| FC610N2        | MC610N        | 10<br>[6.0]                         | 3.73<br>[0.147] | N/A             | 6.45<br>[0.254] |
|                | MC610N-228.1* |                                     |                 |                 |                 |
| *** FC610N2S   | MC610NS       |                                     |                 |                 |                 |
| FC612N2        | MC612N        | 12<br>[4.0]                         | 2.54<br>[0.100] | 4.19<br>[0.165] | 7.90<br>[0.311] |
|                | MC612N-228.1* |                                     |                 |                 |                 |
| *** FC612N2S   | MC612NS       |                                     |                 |                 |                 |

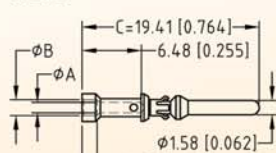
\*\*\* Super conductive material: High conductive copper alloy.

### Size 16

Female



Male



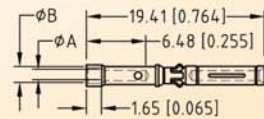
\* First mate contact, C = 21.74 [0.856]

| Female Contact | Male Contact  | ** Wire Size AWG [mm <sup>2</sup> ] | ØA              | ØB              |
|----------------|---------------|-------------------------------------|-----------------|-----------------|
| FC112N2        | MC112N        | 12<br>[4.0]                         | 2.49<br>[0.098] | N/A             |
|                | MC112N-133.5* |                                     |                 |                 |
| *** FC112N2S   | MC112NS       |                                     |                 |                 |
| FC114N2        | MC114N        | 14-16<br>[2.5-1.5]                  | 2.06<br>[0.081] | 2.64<br>[0.104] |
|                | MC114N-133.5* |                                     |                 |                 |
| FC116N2        | MC116N        | 16-18<br>[1.5-1.0]                  | 1.70<br>[0.067] | 2.36<br>[0.093] |
|                | MC116N-133.5* |                                     |                 |                 |
| FC120N2        | MC120N        | 20-22-24<br>[0.5-0.3-0.25]          | 1.14<br>[0.045] | 1.73<br>[0.068] |
|                | MC120N-133.5* |                                     |                 |                 |

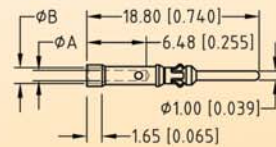
\*\*\* Super conductive material: High conductive copper alloy.

### Size 20

Female



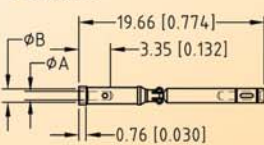
Male



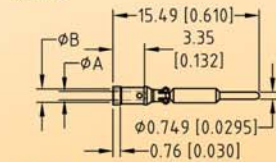
| Female Contact | Male Contact | ** Wire Size AWG [mm <sup>2</sup> ] | ØA              | ØB              |
|----------------|--------------|-------------------------------------|-----------------|-----------------|
| FC720N2        | MC720N       | 20-22-24<br>[0.5-0.3-0.25]          | 1.14<br>[0.045] | 1.73<br>[0.068] |

### Size 22

Female



Male



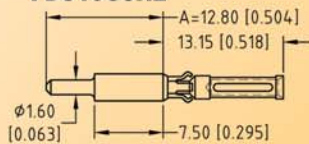
\*\* Note: Please use correct wire size and it should be smaller than ØA of the contact.

| Female Contact | Male Contact | ** Wire Size AWG [mm <sup>2</sup> ] | ØA              | ØB              |
|----------------|--------------|-------------------------------------|-----------------|-----------------|
| FC420N6        | MC420N       | 20<br>[0.5]                         | 1.14<br>[0.045] | N/A             |
| FC422N6        | MC422N       | 22<br>[0.3]                         | 0.89<br>[0.035] | 1.42<br>[0.056] |

## Removable, Solder, Straight PCB Mount, Contacts

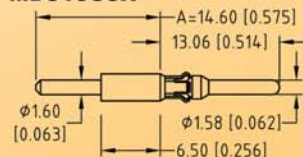
### Size 16

FDS16G3N2



FDS16G3N3, A = 12.00 [0.472]

MDS16G3N



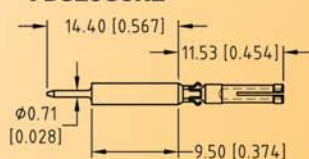
MDS16G3N4, A = 13.31 [0.516]

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

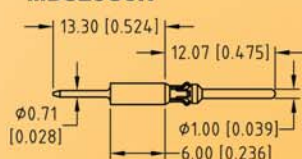
For use in crimp version connectors.

### Size 20

FDS20G3N2

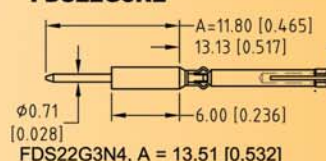


MDS20G3N



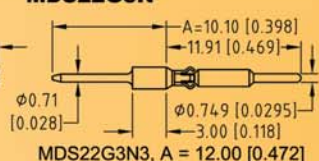
### Size 22

FDS22G3N2



FDS22G3N4, A = 13.51 [0.532]

MDS22G3N



MDS22G3N3, A = 12.00 [0.472]

### Contacts Ordering Information

| Connector Variant | Power Contact | Signal Contact |
|-------------------|---------------|----------------|
| GFSH01/02F1H      | FDS16G3N2     | FDS20G3N2      |
| GFSH01/02M1H      | MDS16G3N      | MDS20G3N       |
| GFSH109/624F1H    | FDS16G3N3     | FDS22G3N2      |
| GFSH109/624M1H    | MDS16G3N4     | MDS22G3N       |
| GFSH928F1H        | FDS16G3N2     | FDS22G3N4      |
| GFSH928M1H        | MDS16G3N      | MDS22G3N3      |

Reference contact tail length is 4.50 [1.77].

Consult factory for other contact sizes.

# GOLDFISH

## Connector Ordering Information

Specify complete connector by following step 1 through step 5  
Include step 6 for customized connectors.



| GFSH   |  |  |  |  | 02   | F | 4 | LN | - | XXXXX |
|--|--|--|--|--|--|---|---|----|---|-------|
| <b>STEP 1: Basic Series</b><br>GFSH : Goldfish Series  |  |  |  |  | <b>STEP 6: Special Options</b><br>Consult factory for customization of Goldfish Power Connectors.<br>E.g. selective loading, sequential mating, etc.   |   |   |    |   |       |
| <b>STEP 2: Connector Versions</b><br>01 : Partially populated connector with 16 size 16 power contacts and 10 size 20 signal contacts.<br>02 : Fully populated connector with 21 size 16 power contacts and 12 size 20 signal contacts.<br>109 : Fully populated connector with 10 size 16 power contacts and 9 size 22 signal contacts.<br>435 : Fully populated connector with 9 size 16 power contacts, 4 size 12 power contacts and 12 size 20 signal contacts.<br>624 : Fully populated connector with 6 size 16 power contacts and 24 size 22 signal contacts.<br>928 : Fully populated connector with 18 size 16 power contacts and 28 size 22 signal contacts. |  |  |  |  | <b>STEP 5: Mounting Style</b><br>H : No hardware.<br>For mounting connector with self-tapping screws. (Order screws separately.)<br>82 : Panel/ float mount for 1.5 mm thick panel.<br>83 : Panel/ float mount for 2.3 mm thick panel.<br>B : Right angle (90°) PCB mount through hole angle brackets.<br>LN : Right angle (90°) PCB mount board lock angle brackets.<br>N : Straight PCB mount push-on fasteners.   |   |   |    |   |       |
| <b>STEP 3: Connector Gender</b><br>F : Female<br>M : Male  |  |  |  |  | <b>STEP 4: Type of Contact</b><br>1 : Removable contact, panel/ float mount. (contacts ordered separately).<br>3 : Solder, straight PCB mount.<br>4 : Solder, right angle (90°) PCB mount.<br>38 : Solder, straight PCB mount, GFSH435 only, (super conductive size 12 power contacts).<br>48 : Solder, right angle (90°) PCB mount, GFSH435 only, (super conductive size 12 power contacts).<br>* 93 : Press-fit compliant terminations.<br>* 94 : Press-fit compliant terminations.<br>*Consult factory for GFSH435. |   |   |    |   |       |

Good luck ... turns into a great power connector!!!



For the best in Interconnection Power Density

- . Blind Mating - Float Mounting
- . Hot Plug Capability
- . AC, DC and Signal in one connector
- . 2 sizes, 5 versions
- . Uh, CSA Recog.
- . 20, 35 and 50 amp contacts

## Recommended Tools for Crimp Contacts



### CONTACT EXTRACTION TOOLS

Shown for reference only.



### CONTACT INSERTION TOOLS

Shown for reference only.



### CYCLE-CONTROLLED STEP ADJUSTABLE HAND CRIMP TOOLS

Shown for reference only.



| Contact size | Contact extraction tool | Contact insertion tool | Hand crimp tool  | Semi-Automatic Crimp Machine |
|--------------|-------------------------|------------------------|--|------------------------------|
| Size 12      | 2711-0                  | 9099-3                 | 9509-6 (MC/FC610)<br>9501-0 with 9502-19 positioner (MC/FC612)                                     | -                            |
| Size 16      | 9081-0                  | 9099-0                 | 9501-0 with 9502-1 positioner<br>9501-0 with 9502-17 positioner (male first mate contacts)         | 9550-0                       |
| Size 20      | 9081-2                  | 9099-4                 | 9507-0 with 9502-21 positioner (male contacts)<br>9507-0 with 9502-22 positioner (female contacts) | 9550-1                       |
| Size 22      | 9081-3                  | 9099-1                 | 9507-0 with 9502-12 positioner (male contacts)<br>9507-0 with 9502-20 positioner (female contacts) |                              |

## Semi-Automatic Crimp Machine

### Part No. 9550-0

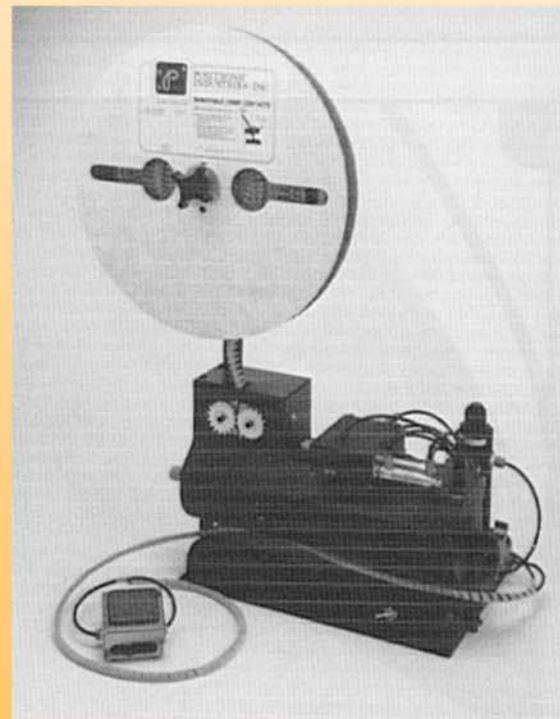
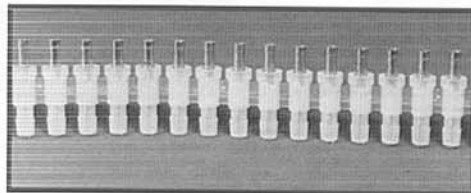
This fast cycling and reliable automatic crimp machine produces a four double-indent crimp, meeting Military Standard and proprietary specifications on wire sizes 12 AWG (4.0mm<sup>2</sup>) through 30 AWG (0.05mm<sup>2</sup>).

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; on rent only.

## ASIA / PACIFIC SALES OFFICES

|   |                    |                                |
|---|--------------------|--------------------------------|
| Singapore Factory, Sales and Engineering Office | +65 6842 1419      |                                |
| Japan   | +813 5661 3047     | japan@connectpositronic.com    |
| South Korea                                     | +82 31 909 8047    | korea@connectpositronic.com    |
| India   | +91 20 5623 5258   | india@connectpositronic.com    |
| Taiwan  | +886 2 2937 8775   | taiwan@connectpositronic.com   |
| China   | +86 13 6 0262 7840 | shenzhen@connectpositronic.com |
| Beijing   | +86 10 6296 9275   |                                |
| Chengdu   | +86 28 8669 8195   |                                |
| Shanghai  | +86 21 6487 3477   |                                |
| ShenZhen  | +86 755 8294 7272  |                                |
| Malaysia  | +60 4 644 9688     |                                |
| New Zealand                                     | +64 3 358 5154     |                                |
| Australia (Military)                            | +61 2 8966 3600    |                                |
| Australia ( Commercial)                         | +61 2 4328 5783    |                                |

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| Mexico Sales Office                  | 800 872 7674 |
| Canada Sales Office                  | 800 327 8272 |

## EUROPEAN SALES OFFICES

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| France, Auch Factory and Sales | 33 (0)5 6263 4491  |
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