



The **Front Runner Series** offers a multiplicity of connector features which makes it a first choice to meet the high performance and high reliability requirements of Medical, Transportation, Industrial Control, and Avionics applications. **Front Runner** features include:



- 1** Composite components:
Lightweight and non-corrodible.
Contacts machined from solid copper alloy.
- 2** Sixteen (16) contact arrangements from 3 to 29 contacts.
- 3** Two level sequential mating of contacts.
- 4** A mix of power and signal contacts in Sizes 12, 16, 20, and 22. Crimp removable contacts and printed board straight and right angle terminations.
- 5** Mounting options include flange and jam nut or printed circuit board mount.
- 6** Environmental version provides dust and water ingress protection to I.E.C. IP67 (1 meter immersion for 30 minutes in mated condition).
- 7** EMI/RFI shielded version, electroless nickel plated plastic.
- 8** Easy contact servicing - rear insertion/front release contact retention system.
- 9** Threaded coupling nut system.

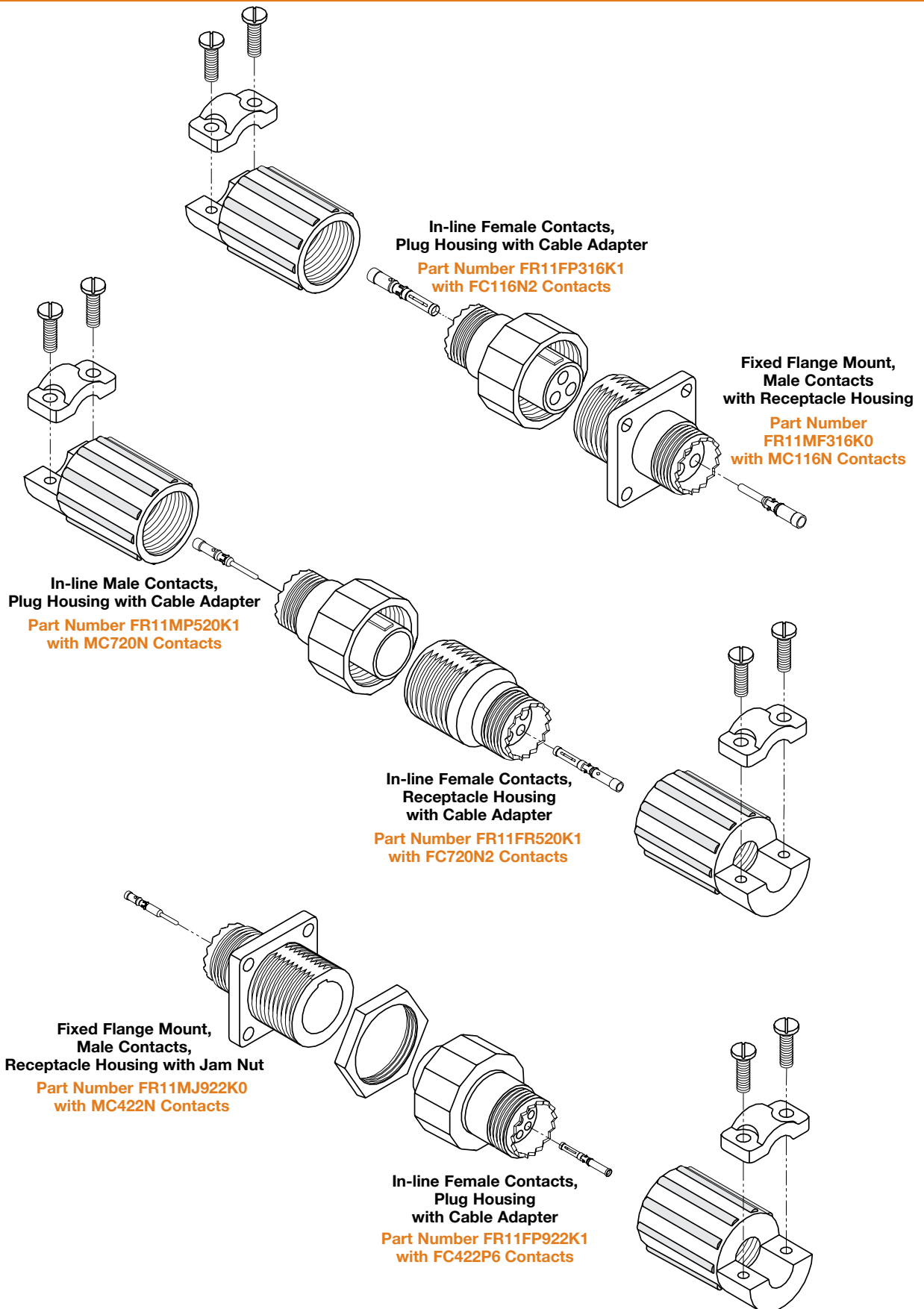
Contact Technical Sales for additional information.



Positronic
connectpositronic.com

TYPICAL CONNECTOR ASSEMBLIES

Front
Runner





CONTACT ARRANGEMENTS FOR SIZE 11 HOUSING

VOLTAGE RATINGS PER EN60950 * INSULATION RESISTANCE OF 5 G OHMS

CONTACT ARRANGEMENTS ARE SHOWN APPROXIMATELY ACTUAL SIZE
MATING FACE OF MALE OR REAR VIEW OF FEMALE CONNECTOR SHOWN



316

Three (3) Size 16 Contacts
0.063 inch [1.6 mm] minimum creepage
for operation at 300V RMS



520

Five (5) Size 20 Contacts
0.039 inch [1.0 mm] minimum creepage
for operation at 200V RMS



822

Eight (8) Size 22 Contacts
0.028 inch [0.7 mm] minimum creepage
for operation at 100V RMS



420

Four (4) Size 20 Contacts
0.059 inch [1.5 mm] minimum creepage
for operation at 250V RMS



722

Seven (7) Size 22 Contacts
0.063 inch [1.6 mm] minimum creepage
for operation at 300V RMS



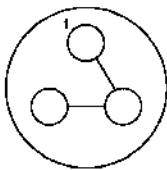
922

Nine (9) Size 22 Contacts
0.028 inch [0.7 mm] minimum creepage
for operation at 100V RMS

CONTACT ARRANGEMENTS FOR SIZE 19 HOUSING

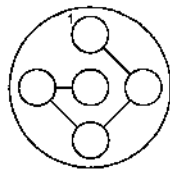
VOLTAGE RATINGS PER EN60950 * INSULATION RESISTANCE OF 5 G OHMS

CONTACT ARRANGEMENTS ARE SHOWN APPROXIMATELY ACTUAL SIZE
MATING FACE OF MALE OR REAR VIEW OF FEMALE CONNECTOR SHOWN



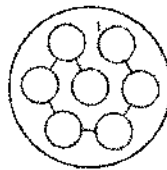
312

Three (3) Size 12 Contacts
0.197 inch [5.0 mm]
minimum creepage for
operation at 600V RMS



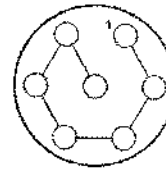
512

Five (5) Size 12 Contacts
0.091 inch [2.3 mm]
minimum creepage for
operation at 400V RMS



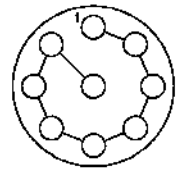
712

Seven (7) Size 12 Contacts
0.071 inch [1.8 mm]
minimum creepage for
operation at 300V RMS



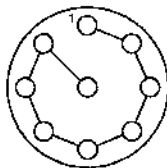
716

Seven (7) Size 16 Contacts
0.189 inch [4.8 mm]
minimum creepage for
operation at 600V RMS



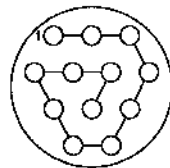
916

Nine (9) Size 16 Contacts
0.118 inch [3.0 mm]
minimum creepage for
operation at 400V RMS



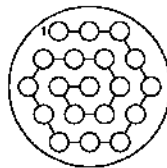
920

Nine (9) Size 20 Contacts
0.154 inch [3.9 mm]
Minimum Creepage for
Operation at 600V RMS



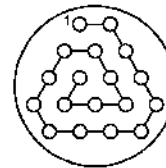
1220

Twelve (12) Size 20 Contacts
0.102 inch [2.6 mm]
minimum creepage for
operation at 400V RMS



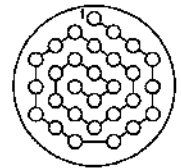
1920

Nineteen (19) Size 20 Contacts
0.059 inch [1.5 mm]
minimum creepage for
operation at 250V RMS



1822

Eighteen (18) Size 22 Contacts
0.086 inch [2.2 mm]
minimum creepage for
operation at 400V RMS



2922

Twenty-nine (29)
Size 22 Contacts
0.051 inch [1.3 mm]
minimum creepage for
operation at 250V RMS

• NOTE: Contact Technical Sales for availability of other contact arrangements.



TECHNICAL CHARACTERISTICS

MATERIALS AND FINISHES:

Insulator Inserts: Glass-filled DAP, Type SDG-F, black color, UL 94V-0.

Non-Environmental Connectors:

Housings: Glass-filled polyester, black color, UL 94V-0.

Coupling Nut: Glass-filled polyester, black color, UL 94V-0.

Cable Adapters: Glass-filled polyester, black color, UL 94V-0.

Environmental Connectors:

Interfacial O-Rings: T.P.E.

Cable Adapters: Glass-filled polyester with T.P.E. boot.

Dust Cover: Glass-filled polyethylene, black color, or low density polyethylene, black color, UL 94V-0.

EMI/RFI Shielded Connectors:

Housings: Thermoplastic, electroless nickel over copper plated.

Cable Adapters: Thermoplastic, electroless nickel over copper plated.

Contacts: Copper alloy with gold flash over nickel or 0.000030 inch [0.76 microns] gold plate over nickel plate.

Jam Nuts: Aluminum, black anodized.

MECHANICAL CHARACTERISTICS:

Polarization: Plug and receptacle housings are molded with integral polarization system.

Removable Contacts: Rear insertion/Front release removal. Female contact features "Closed Entry Design" for highest reliability.

Contact Retention in Insulator:

Size 22: 6 lbs. [27 N] per IEC 60512-8, Test 15a.
Size 20: 10 lbs. [44 N] per IEC 60512-8, Test 15a.
Size 16: 20 lbs. [89 N] per IEC 60512-8, Test 15a.
Size 12: 20 lbs. [89 N] per IEC 60512-8, Test 15a.

Sequential Contact

Mating Systems: One and two level systems. Contact Technical Sales for ordering information.

Coupling System:

Size 11 Housing: M19 coupling nut.

Size 19 Housing: M32 coupling nut.

Printed Board

Contact Terminations: Straight and 90° solder terminations.

Mechanical Operations: 500 operations.

ELECTRICAL CHARACTERISTICS:

Nominal Contact Current Rating:

Size 12: 25 amperes.

Size 16: 13 amperes.

Size 20: 7.5 amperes.

Size 22: 5 amperes.

Initial Contact Resistance, Maximum:

Size 12: 0.001 ohms per IEC 60512-2, Test 2b.

Size 16: 0.0016 ohms per IEC 60512-2, Test 2b.

Size 20: 0.007 ohms per IEC 60512-2, Test 2b.

Size 22: 0.012 ohms per IEC 60512-2, Test 2b.

Size 16 Micro-Coaxial Contacts:

See page 22 for technical information.

Insulation Resistance:

5 G ohms per IEC 60512-2, Test 3a, Method A.

Creepage and

Clearance Distance:

See values given with the specific contact arrangements on page 3.

Working Voltage:

See values given with the specific contact arrangements on page 3.

CLIMATIC CHARACTERISTICS:

Working Temperature: -55°C to +125°C.

Dust and Water Ingress:

Per IEC IP67 (1 meter immersion for 30 minutes) in mated condition.

EMI/RFI SHIELDING CHARACTERISTICS:

Surface Conductivity: < 0.5 ohm per square.

Attenuation:

70-80 dB at most frequencies.

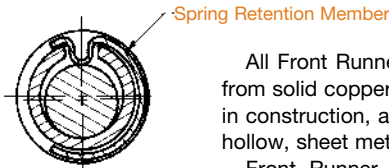
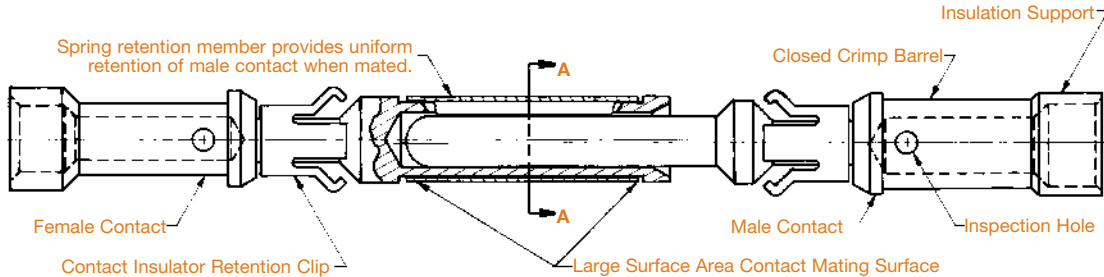
THERMOCOUPLE CONTACTS:

Size 20 and 22 crimp contacts are available. See page 20 for details.

PCB mount contacts are available please contact Technical Sales for details.



FRONT RUNNER HIGH PERFORMANCE CONTACTS “LARGE SURFACE AREA CONTACT MATING SYSTEM” HIGH RELIABILITY “CLOSED ENTRY” DESIGN PRECISION MACHINED SOLID COPPER ALLOY



SECTION A-A
ENLARGED

All contacts of Positronic’s Front Runner Series utilize the “Large Surface Area (L.S.A.) Contact Mating System.” The “L.S.A. Contact Mating System” insures the lowest level of contact resistance during mechanical endurance tests of 1000 coupling cycles or more. Contact insertion/withdrawal forces remain substantially the same during the life of the connector.

Front Runner Series use only “Closed Entry” design female contacts. The “Closed Entry” design prevents probe damage to the female contacts, and will not allow the female contact to accept misaligned or bent male contacts.

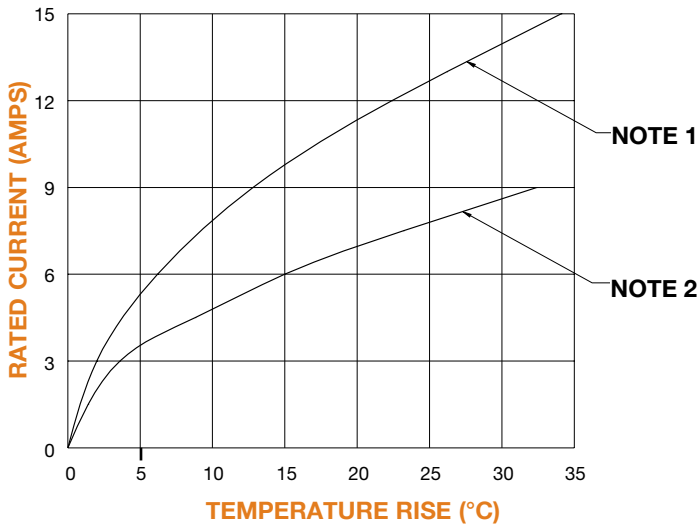
All Front Runner Series contacts are precision machined from solid copper alloy barstock. They are durable, smooth in construction, and have greater amperage capacities than hollow, sheet metal-style contacts.

Front Runner Series contacts, having a large contact surface area, produce less heat at the contact surface, thereby permitting the connector to operate at high amperage levels continuously and still maintain lower connector temperatures.

CONNECTOR TEMPERATURE RISE CURVES

Tested per IEC Publication 60512-5-2, Test 5a

Size 16 Contact / Size 20 Contacts / Size 11 Housing



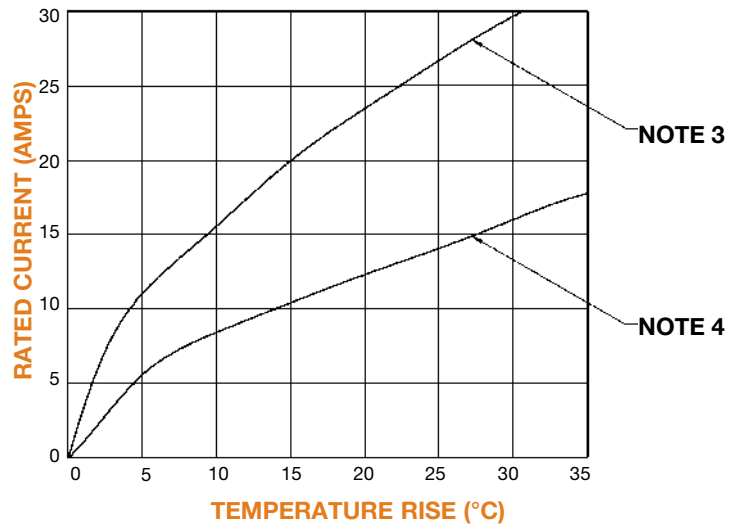
NOTE 1:

Curve developed using FR11MP316K0 and FR11FF316K0 connectors, MC116N and FC116N2 crimp contacts and 16 AWG [1.5 mm²] size wire. All contacts under load.

NOTE 2:

Curve developed using FR11MP520K0 and FR11FF520K0 connectors, MC720N and FC720N2 crimp contacts and 20 AWG [0.5 mm²] size wire. All contacts under load.

Size 12 Contact / Size 16 Contacts / Size 19 Housing



NOTE 3:

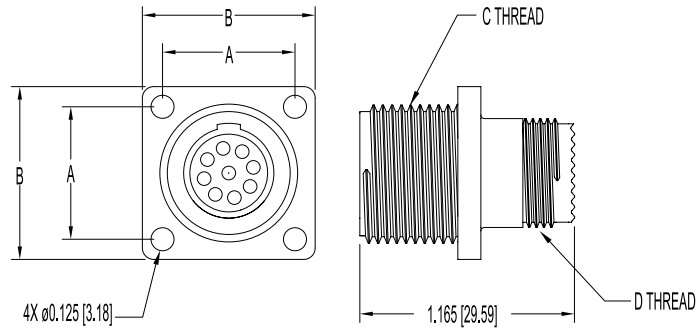
Curve developed using FR19MF312K0 and FR19FP312K0 connectors, MC612N and FC612N2 crimp contacts and 12 AWG [4.0 mm²] size wire. All contacts under load.

NOTE 4:

Curve developed using FR19MF716K0 and FR19FP716K0 connectors, MC116N and FC116N2 crimp contacts and 16 AWG [1.5 mm²] size wire. All contacts under load.



FIXED FLANGE-MOUNT HOUSING RECEPTACLE HOUSING, MALE OR FEMALE CONTACTS



DIMENSION	SIZE 11 HOUSING	SIZE 19 HOUSING
A	0.719 [18.26]	1.062 [26.97]
B	0.938 [23.83]	1.438 [36.53]
C Thread	M19	M32
D Thread	M15	M28

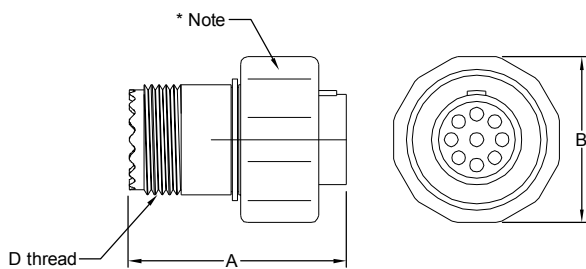
MATERIALS:

Insert: Glass-filled DAP.

Housing: Glass-filled polyester.

FREE IN-LINE HOUSINGS

PLUG HOUSING, MALE OR FEMALE CONTACTS

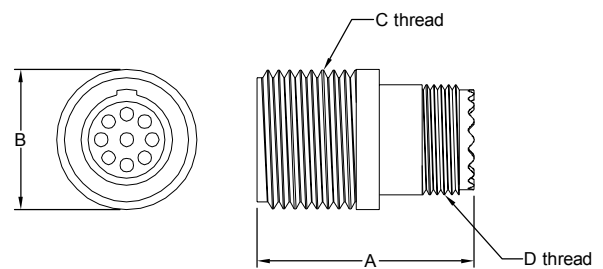


DIMENSION	SIZE 11 HOUSING	SIZE 19 HOUSING
A	1.165 [29.59]	1.165 [29.59]
B	0.890 [22.61]	1.435 [36.45]
D Thread	M15	M28

NOTE:

This connector may be ordered without the coupling nut.

RECEPTACLE HOUSING, MALE OR FEMALE CONTACTS



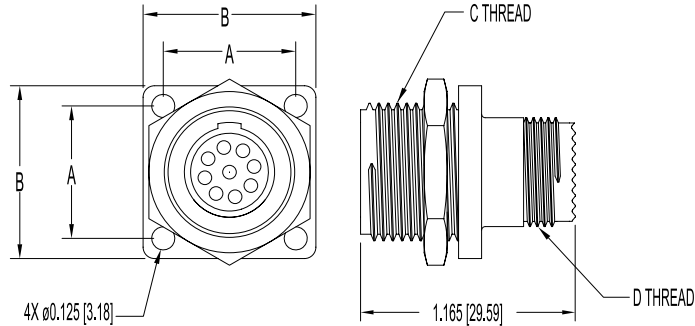
DIMENSION	SIZE 11 HOUSING	SIZE 19 HOUSING
A	1.165 [29.59]	1.165 [29.59]
B	ø 0.750 [19.05]	ø 1.181 [30.00]
C Thread	M19	M32
D Thread	M15	M28

MATERIALS:

Insert: Glass-filled DAP.

Housing & Coupling Nut: Glass-filled polyester.

FIXED JAM NUT MOUNTING RECEPTACLE HOUSING, MALE OR FEMALE CONTACTS



DIMENSION	SIZE 11 HOUSING	SIZE 19 HOUSING
A	0.719 [18.26]	1.062 [26.97]
B	0.938 [23.83]	1.438 [36.53]
C Thread	M19	M32
D Thread	M15	M28

MATERIALS AND FINISHES:

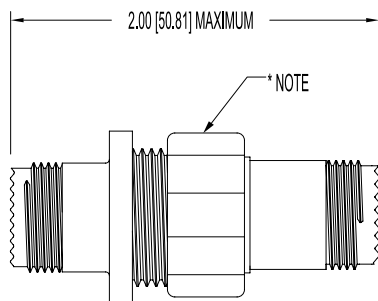
Insert: Glass-filled DAP.

Housing: Glass-filled polyester.

Jam Nut: Aluminum, black anodize.

DIMENSIONS

IN-LINE TO IN-LINE MOUNTING LENGTH OF MATED PAIR



MATERIALS:

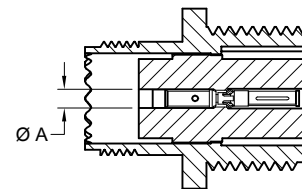
Insert: Glass-filled DAP.

Housing & Coupling Nut: Glass-filled polyester.

NOTE:

This connector may be ordered without the coupling nut.

CONTACT HOLE DIAMETER TERMINATION SIDE OF INSULATOR



CONTACT SIZE	Ø D
12	0.195 [4.95]
16	0.125 [3.18]
20	0.097 [2.46]
22	0.079 [2.01]



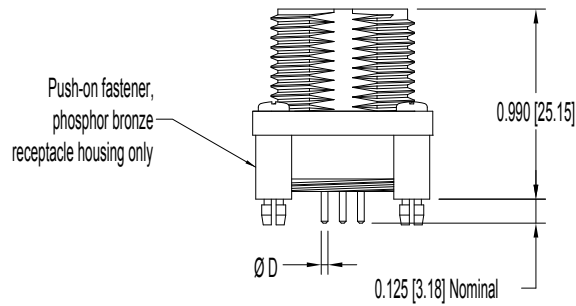
Positronic
connectpositronic.com

STRAIGHT AND 90° PRINTED BOARD CONNECTORS

Front
Runner

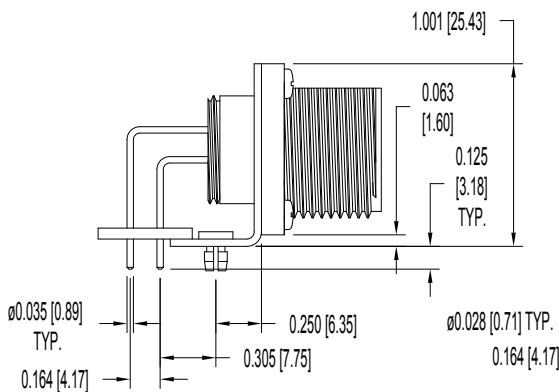
STRAIGHT PRINTED BOARD MOUNT CONNECTOR RECEPTACLE HOUSING, MALE OR FEMALE CONTACTS

CONTACT SIZE	Ø D
12	0.094 [2.39]
16	0.035 [0.89]
20	0.028 [0.71]
22	0.025 [0.64]

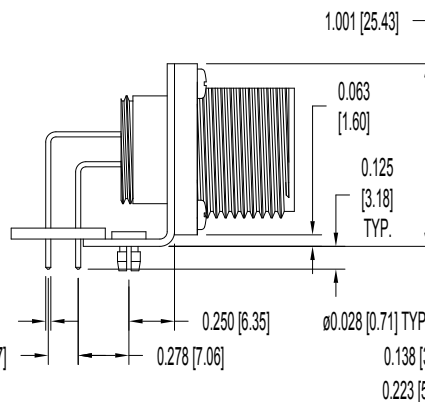


Typical Part Number:
FR11FF316K0-1554.0

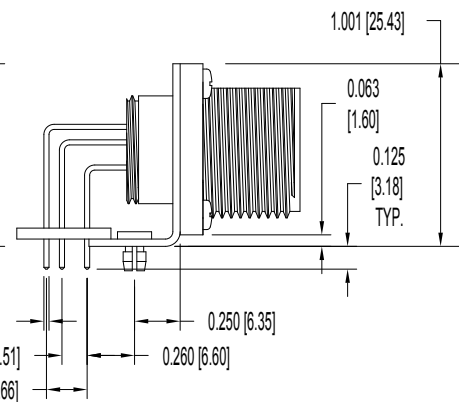
90° PRINTED BOARD MOUNT CONNECTOR



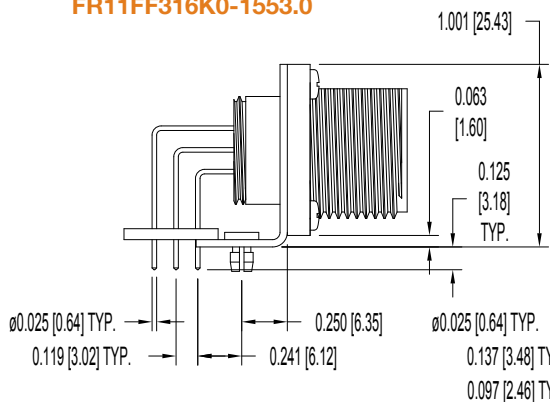
Typical Part Number:
FR11FF316K0-1553.0



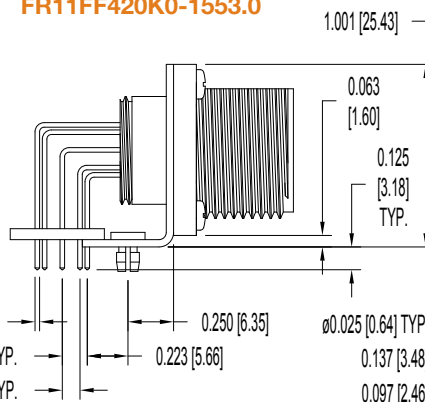
Typical Part Number:
FR11FF420K0-1553.0



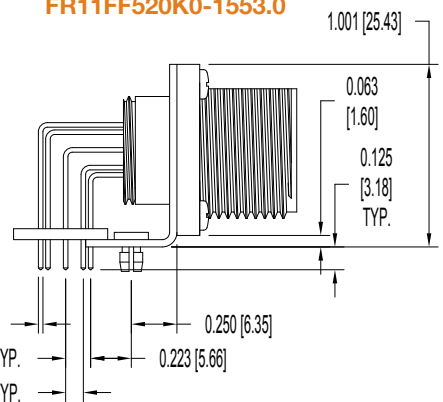
Typical Part Number:
FR11FF520K0-1553.0



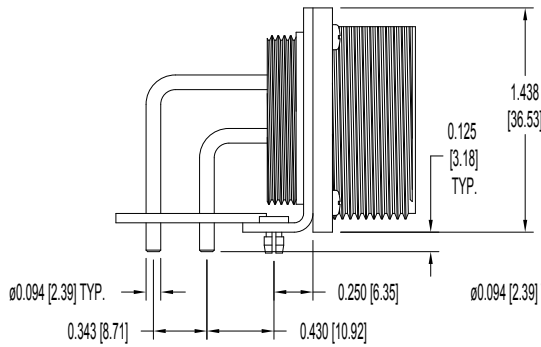
Typical Part Number:
FR11FF722K0-1553.0



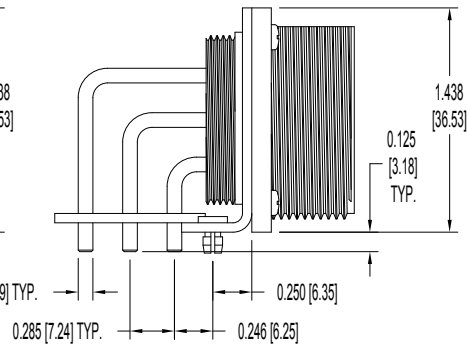
Typical Part Number:
FR11FF822K0-1553.0



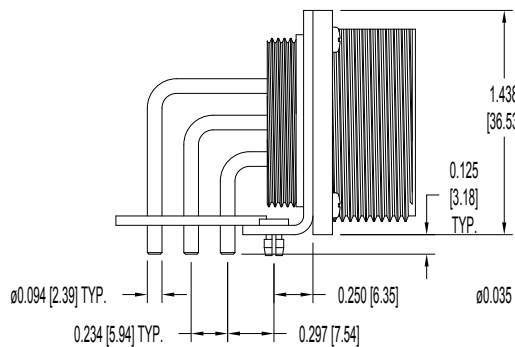
Typical Part Number:
FR11FF922K0-1553.0



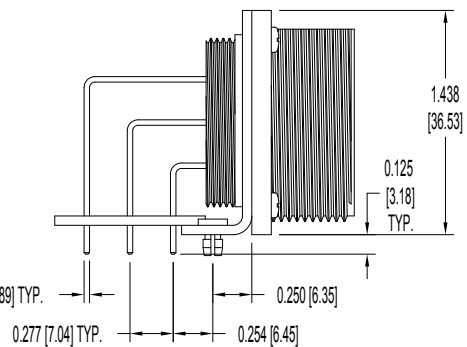
Typical Part Number:
FR19FF312K0-1553.0



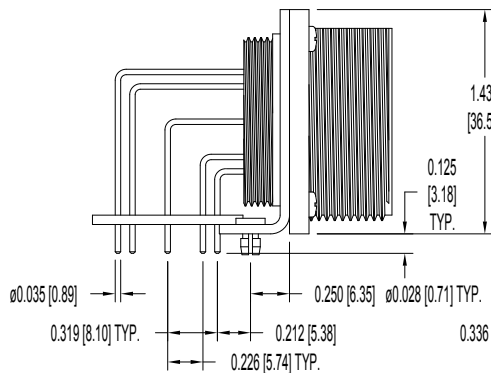
Typical Part Number:
FR19FF512K0-1553.0



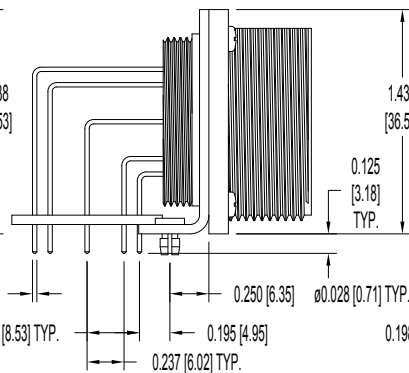
Typical Part Number:
FR19FF712K0-1553.0



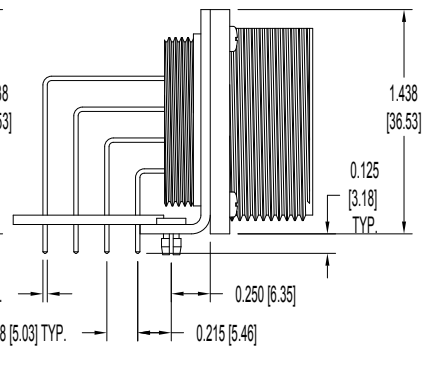
Typical Part Number:
FR19FF716K0-1553.0



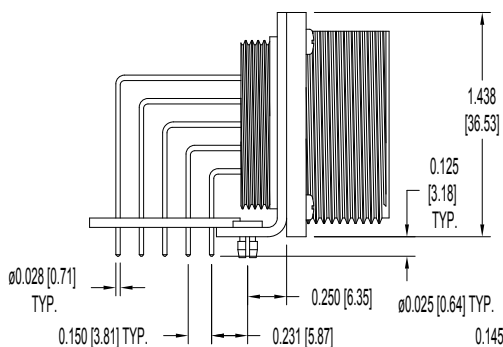
Typical Part Number:
FR19FF916K0-1553.0



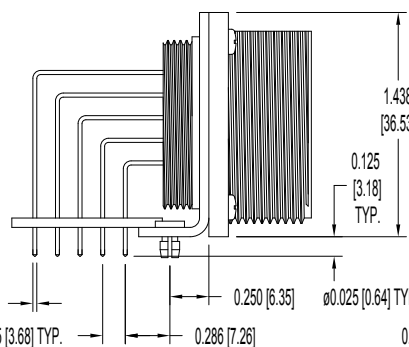
Typical Part Number:
FR19FF920K0-1553.0



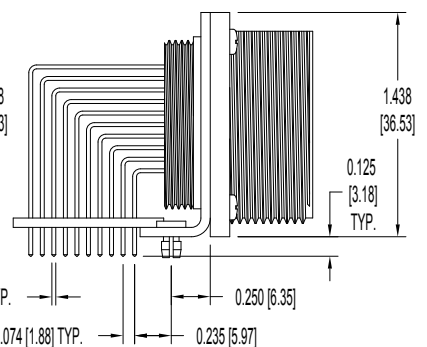
Typical Part Number:
FR19FF1220K0-1553.0



Typical Part Number:
FR19FF1920K0-1553.0



Typical Part Number:
FR19FF1822K0-1553.0



Typical Part Number:
FR19FF2922K0-1553.0



Positronic
connectpositronic.com

STRAIGHT PRINTED BOARD CONTACT HOLE PATTERN

Front
Runner

SUGGESTED PRINTED BOARD HOLE SIZES:

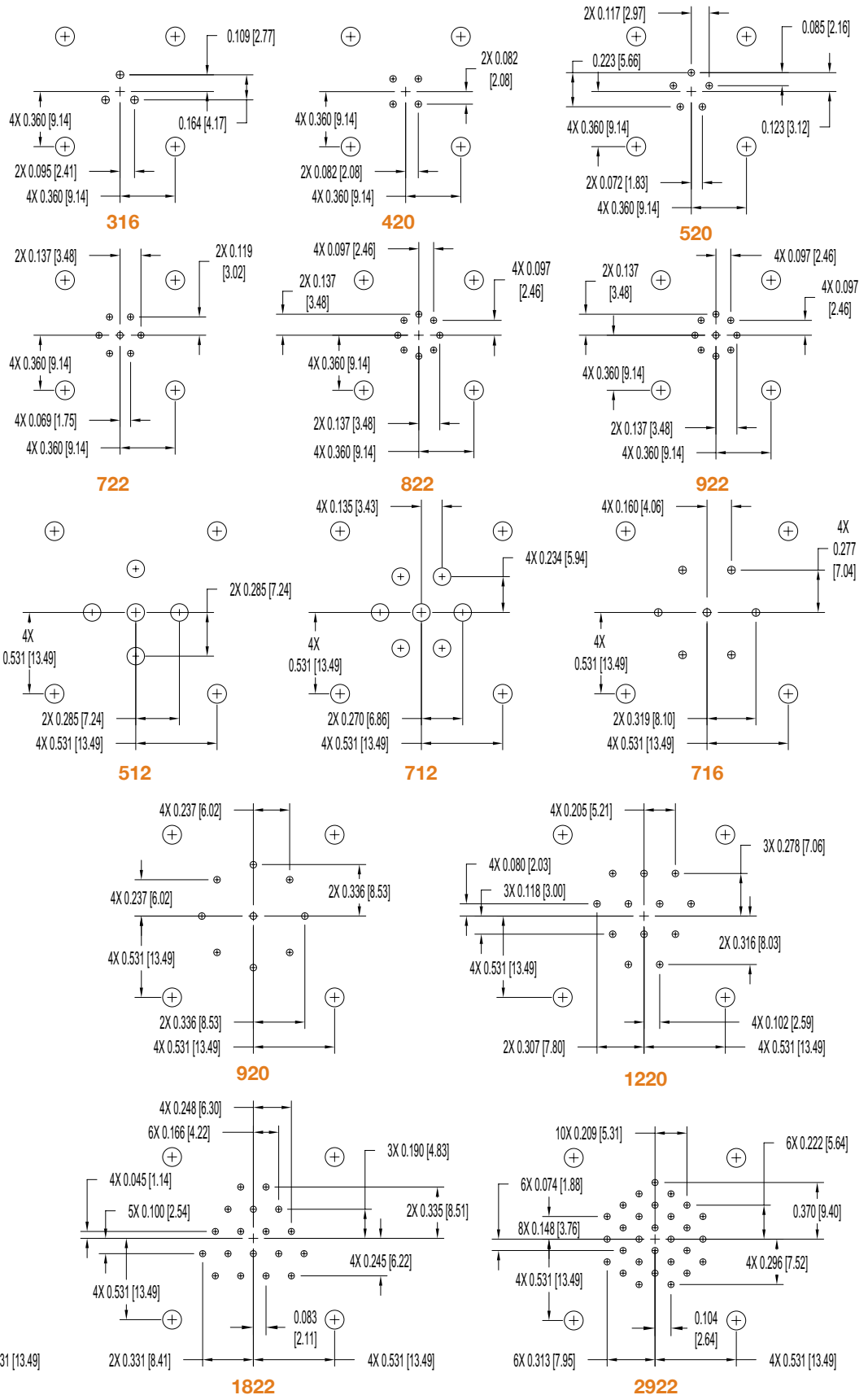
Suggest \varnothing 0.114 [2.90] plated through hole for size 12 contact termination positions.

Suggest \varnothing 0.052 [1.32] plated through hole for size 16 contact termination positions.

Suggest \varnothing 0.045 [1.14] plated through hole for size 20 contact termination positions.

Suggest \varnothing 0.040 [1.02] plated through hole for size 22 contact termination positions.

Suggest \varnothing 0.123 \pm 0.003 [3.12 \pm 0.08] hole for mounting connector with push-on fasteners.



DIMENSIONS



SUGGESTED PRINTED BOARD HOLE SIZES:

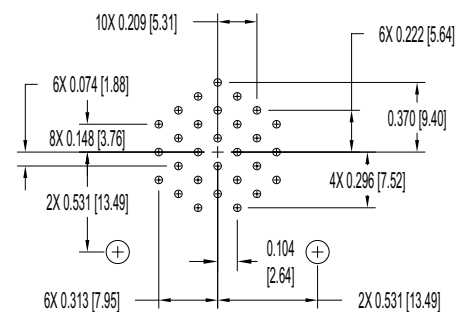
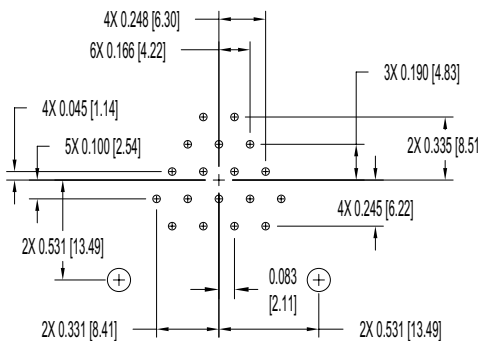
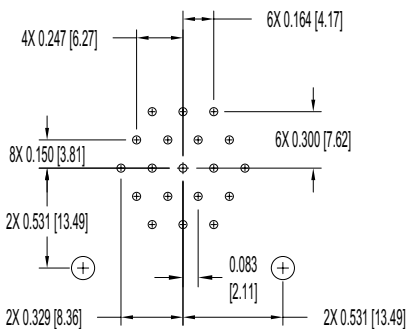
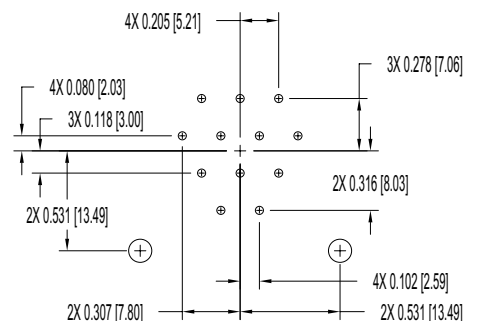
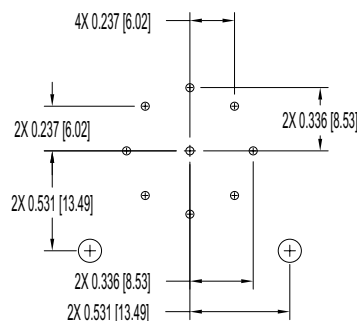
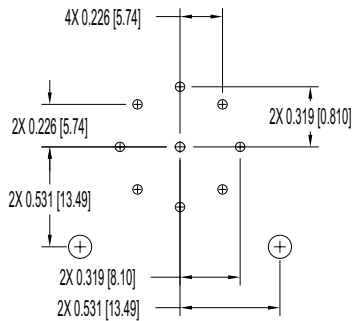
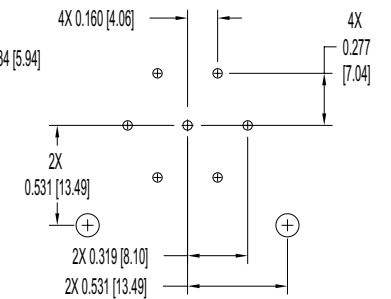
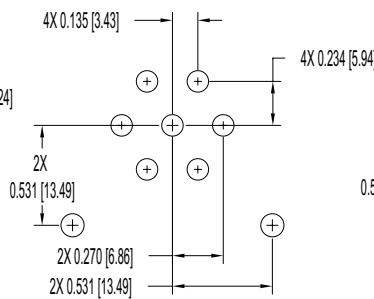
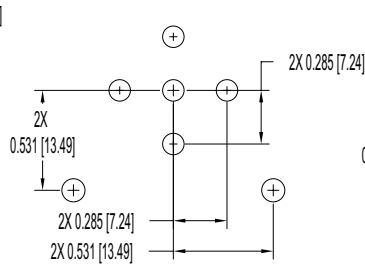
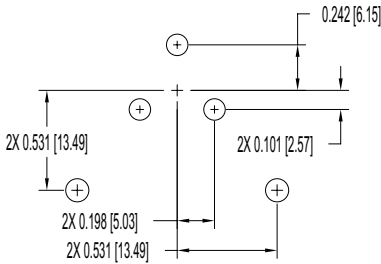
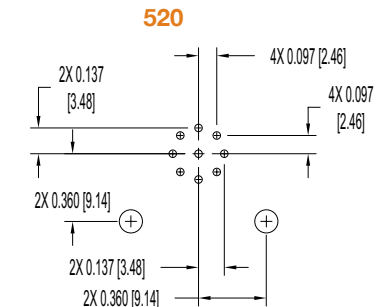
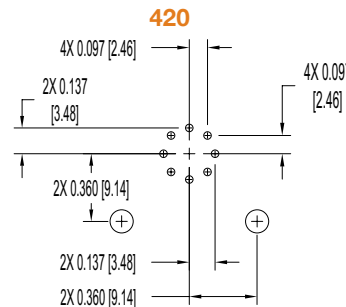
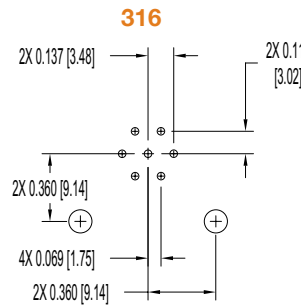
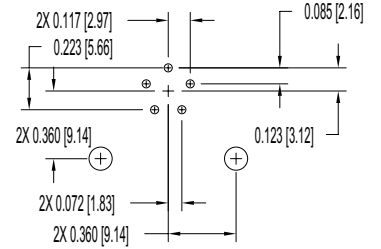
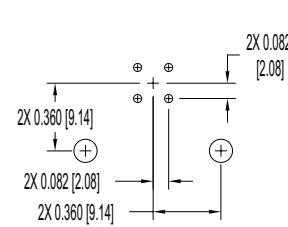
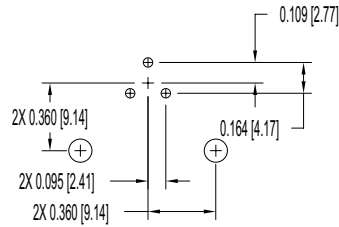
Suggest \varnothing 0.114 [2.90] plated through hole for size 12 contact termination positions.

Suggest \varnothing 0.052 [1.32] plated through hole for size 16 contact termination positions.

Suggest \varnothing 0.045 [1.14] plated through hole for size 20 contact termination positions.

Suggest \varnothing 0.040 [1.02] plated through hole for size 22 contact termination positions.

Suggest \varnothing 0.123±0.003 [3.12±0.08] hole for mounting connector with push-on fasteners.



DIMENSIONS



ORDERING INFORMATION - CODE NUMBERING SYSTEM

Specify Complete Connector By Selecting An Option From Step 1 Through 6

STEP	1	2	3	4	5	6	7	8
EXAMPLE	FR	11	MF	922	K	0	/AA	-1554.0

STEP 1 - BASIC SERIES

FR - Front Runner Series

STEP 2 - HOUSING SIZE

11 - Size 11 Housing
19 - Size 19 Housing

STEP 3 - HOUSING STYLE AND GENDER

MP - Free In-line, Male Contacts with Plug Housing
FP - Free In-line, Female Contacts with Plug Housing
MF - Fixed Flange Mount, Male Contacts with Receptacle Housing
FF - Fixed Flange Mount, Female Contacts with Receptacle Housing
MJ - Fixed Jam Nut, Male Contacts with Receptacle Housing
FJ - Fixed Jam Nut, Female Contacts with Receptacle Housing
MR - Free In-line, Male Contacts with Receptacle Housing
FR - Free In-line, Female Contacts with Receptacle Housing

STEP 4 - CONTACT ARRANGEMENTS AND SIZE

SIZE 11 HOUSING

316 - Three (3) Size 16 Contacts
420 - Four (4) Size 20 Contacts
520 - Five (5) Size 20 Contacts
722 - Seven (7) Size 22 Contacts
822 - Eight (8) Size 22 Contacts
922 - Nine (9) Size 22 Contacts

SIZE 19 HOUSING

312 - Three (3) Size 12 Contacts
512 - Five (5) Size 12 Contacts
712 - Seven (7) Size 12 Contacts
716 - Seven (7) Size 16 Contacts
916 - Nine (9) Size 16 Contacts
920 - Nine (9) Size 20 Contacts
1220 - Twelve (12) Size 20 Contacts
1822 - Eighteen (18) Size 22 Contacts
1920 - Nineteen (19) Size 20 Contacts
2922 - Twenty-nine (29) Size 22 Contacts

STEP 5 - SERVICE CLASS

K - Non-Environmental
L - Environmental
M - EMI/RFI Shielded
LM - Environmental and EMI/RFI Shielded

STEP 8 - SPECIAL OPTIONS

FOR SPECIAL OPTIONS, SEE SPECIAL
OPTIONS APPENDIX ON PAGE 13.

STEP 7 - ENVIRONMENTAL COMPLIANCE OPTIONS

/AA - Compliant per EU Directive
2002/95/EC (RoHS)

Note: If compliance to environmental
legislation is not required, this step will
not be used. Example: FR11MP922K1



STEP 6 - CABLE ADAPTERS (HOOD)

- 0 - None
- 1 - Long, Straight, Non-Environmental
- 2 - Short, Straight, Non-Environmental
- 4 - Long, Straight, Environmental
- 41- Long, Straight, Environmental with single cable seal.
(Size 11 - 0.150 [3.81] ID, size 19 - 0.345 [8.76] ID)
- 42- Long, Straight, Environmental with single cable seal.
(Size 11 - 0.200 [5.08] ID, size 19 - 0.420 [10.67] ID)
- 43- Long, Straight, Environmental with single cable seal.
(Size 11 - 0.250 [6.35] ID, size 19 - 0.495 [12.57] ID)
- 44- Long, Straight, Environmental with single cable seal.
(Size 11 - 0.300 [7.62] ID, size 19 - 0.570 [14.48] ID)
- 5 - Long, Straight, EMI/RFI
- 6 - Short, Straight, EMI/RFI

Note: Crimp contacts must be ordered separately. Select desired
contact size and wire gauge size from pages 18 - 19.

Order thermocouple contacts from page 20.
Order size 16 micro-coaxial contacts from page 22.