

Amphenol® EMI Filter/Transient Protection Connectors

12-120-13

*High Technology
Connector Products That
Protect Sensitive Circuits*



- *Protection in VHF, UHF, HF and other filter ranges*
- *Tubular Contact Assemblies*
- *Planar Array Assemblies*
- *Diodes, MOV'S, Adapters*
- *Filter Composite Connectors*
- *Header Assemblies*

Amphenol

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For more assistance, contact your local Amphenol field sales office or:

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 Fax: 607-563-5157
 Web: www.amphenol-aerospace.com

NOTE: The connector products in this brochure were formerly known as Bendix® products. These products are now manufactured and sold under the Amphenol® brand name. The name "Amphenol" will replace the name "Bendix" on products and literature in the future.

Due to space limitations, metric equivalents of dimensional data in this catalog have not been included. All dimensions given may be converted to the metric system by the standard formula: dimension (inches) x 25.40 = dimension (millimeters).

Amphenol has the following and other patents which relate to the products described in this catalog:
 U.S. Patent 3,764,943, U.S. Patent 3,840,841, U.S. Patent 4,029,386, U.S. Patent 4,264,116, U.S. Patent 4,275,945, U.S. Patent 4,431,251, U.S. Patent 4,440,463, U.S. Patent 4,583,810, U.S. Patent 4,707,048, U.S. Patent 4,707,049, U.S. Patent 4,741,710, U.S. Patent 4,746,310, U.S. Patent 4,747,789, U.S. Patent 4,768,977, U.S. Patent 4,789,360, U.S. Patent 4,932,900, U.S. Patent 5,163,853, U.S. Patent 5,164,873, U.S. Patent 5,167,537, U.S. Patent 5,195,014, U.S. Patent 5,198,958, U.S. Patent 5,211,582
 Amphenol has additional patents pending, as well as patents and applications in other countries.

Amphenol Aerospace operates quality systems that are certified to ISO9001: 2000 by third party registrars.

Amphenol® EMI/EMP Filter Protection Connectors

for protection of sensitive circuits

Amphenol® EMI/EMP Protection Connectors offer the versatility of standard connectors with EMI/EMP protection for sensitive circuits. Internal housing of the EMI/EMP devices eliminates costly and bulky exterior discrete protection devices.

Virtually all major MIL-Spec cylindricals can be incorporated with filter devices:

- MIL-DTL-38999
- MIL-DTL-5015
- MIL-C-26482
- MIL-C-27599
- MIL-C-83723
- MIL-C-26500

Amphenol offers filter connectors that include:

- EMP protection using diodes
- EMP protection utilizing metal oxide varistors (MOV's)
- Filtered plug connectors
- Filtered hermetic connectors
- Filter connectors with ESD protection
- Combinations of filtering devices within one connector package

This catalog focuses on the cylindrical connector offerings from Amphenol with EMI/EMP filter transient protection. There are also many rectangular filter connectors that are offered by Amphenol which include:

- MIL-DTL-24308 D-Sub
- MIL-DTL-83513 Micro D
- ARINC 404/600
- DOD-83527 Rack and Panel
- MIL-DTL-83733 Rack and Panel

Rectangular filter interconnects are manufactured and supplied by Amphenol Canada. See further information at the end of the catalog.

Advantages of Filter Connectors:

- Reduction in overall weight and space with the elimination of external filter circuits
- Reduction of solder junctions
- Increase in reliability due to fewer connections
- Fragile filter elements protected from handling and environmental damage
- Pre-testing from factory and ready for installation

FTV
Subminiature Tri-Start, MIL-DTL-38999 Series III, Metal or Composite shells with Filter Protection.

FLJT
Subminiature LJT, MIL-DTL-38999 Series I with Filter Protection.

Filter AN Connectors
MIL-DTL-5015 Type Connectors with Filter Protection.

FJT
Subminiature JT, MIL-DTL-38999 Series II with Filter Protection.

FCTV with Stand-off Flange
Filtered Tri-Start connectors with composite shells for attachment to printed circuit boards.

FPT
Miniature MIL-C-26482 Series 1 with Filter Protection.

Filter Contacts Combined with High Speed Contacts
Filter Connectors can incorporate high frequency coax, twinax, triax, quadax and differential twinax contacts.

MOV Connectors
MOV's act as a variable resistor to efficiently dissipate energy. MOV can be packaged singularly or in combinations with other EMI Filtering.

Header Assemblies
Allow for easy separation and easy termination of connectors when attaching to flex or printed circuit boards. Allow for electrical testing that would adversely affect sensitive diodes, MOV's or filter capacitors.

EMI Capabilities for maximum design flexibility

The Amphenol® EMI filter connector utilizes two manufacturing technologies to provide the user with the most cost effective performance across the frequency range. (For EMP performance data, see pages 58-61).

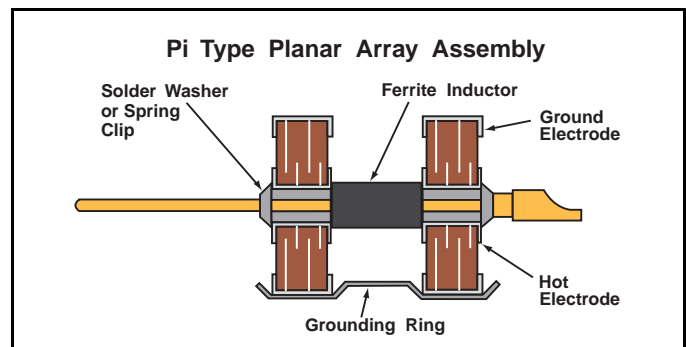
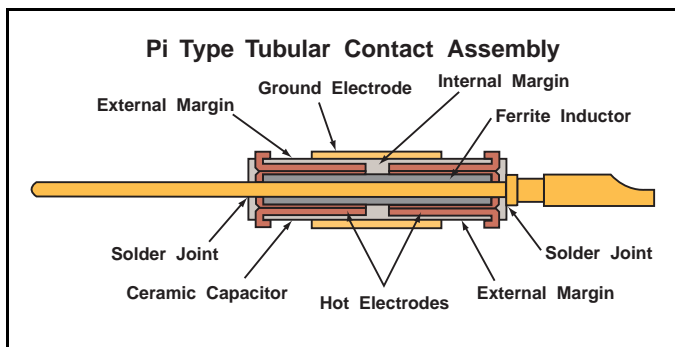
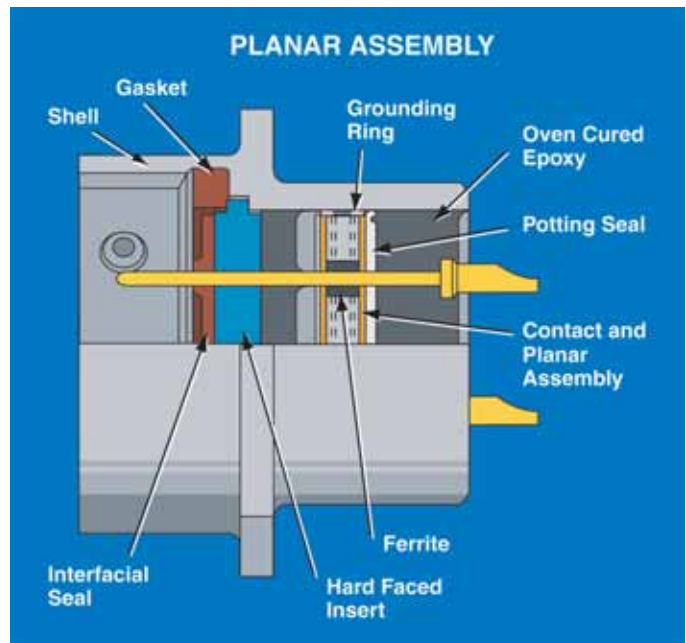
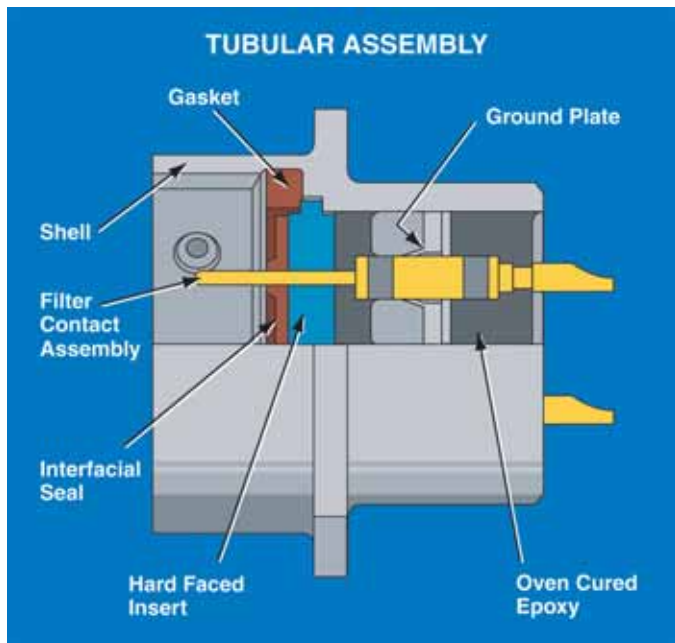
The tubular design offers over 40 years of proven field reliability. All filter contacts within the connector share a common ground plane, which is connected to the connector shell. The pin to pin isolation is 85 dB minimum at 100 MHz. The planar design joins pins to a multi-layered ceramic forming an array sub-assembly, with a peripheral ground which is connected to the connector shell via a ground spring. Pin to pin capacitance is less than 50 pf with a pin to pin isolation of 85 dB minimum at 100 MHz.

Filter contacts for both designs contain either a pi passive ele-

ment network comprised of a ferrite inductor and ceramic capacitor, or a single capacitor.

For planar designs other filter networks are available, ie. T Type, L-C Type, C-L Type and C Type. An encapsulant of oven-cured epoxy in the rear provides:

- Mechanical and thermal insulation of the ceramic elements – mechanical loading can be accomplished without capacitor damage. Pins can be bent 90° and straightened with no damage to the filter.
- Hermeticity (4.6×10^{-3} cc/sec) – prevents water from entering through the rear of the connector in high humidity environments. Amphenol recommends using metal protection caps during cleaning operations.



* More in-depth information on attenuation is available in: L-1146, General Design Guideline for EMI Filters and/or TVS (Transient Voltage Suppression) Connectors. Also for further information ask for: L-1145, How to Specify Filter Connectors.

EMI Capabilities, cont.

Amphenol provides a wide range of filtering solutions. You can select your options for your particular interference threats - VHF, UHF, HF or other filter ranges, then couple with a connector package of your choice. Or give Amphenol your custom shell design requirements for assistance in designing your unique filter solution.

EMI Filter connectors are intended for use in temperatures from -55°C to $+125^{\circ}\text{C}$. Attenuation will change with feed-through current and temperature.*

To assure reliability, connectors may be subjected to an attenuation performance test verifying proper assembly and grounding of the filters. Attenuation data on filter performance is stated in reference to a 50 ohm impedance system in order to allow filter performance to be more easily translated into real world impedances.

Those interested in determining the expected filter performance in an impedance system other than 50 ohms may refer to page 7 of this catalog or may contact Amphenol Aerospace for further assistance.

It is suggested that the user analyze his system requirements for EMI protection in the following areas:

- Working voltage (DC or AC and Frequency)
- Peak voltage
- Desired attenuation at a given frequency level
- Any special capacitance limitations

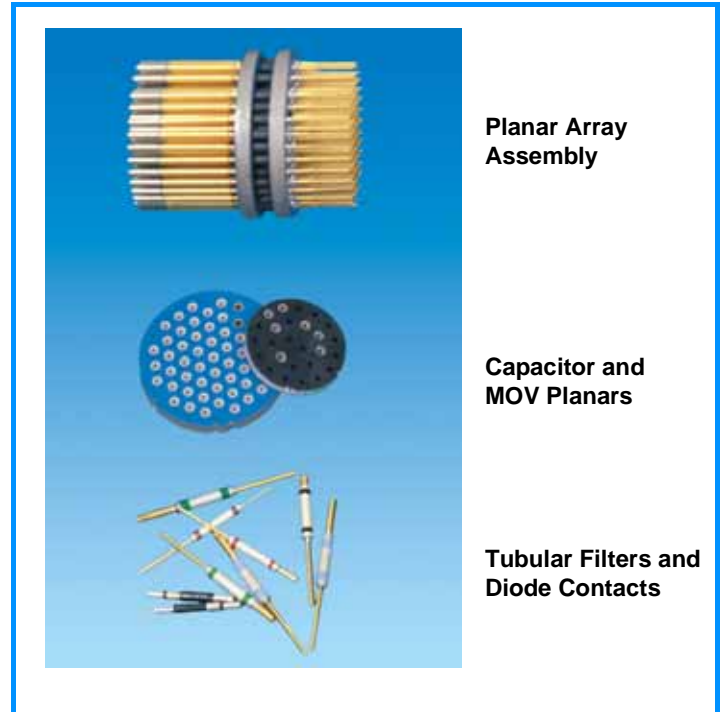
Definition of Filter Contacts:

| | |
|-----|--|
| MF | Medium Frequency 50 dB performance between 300 - 2999 KHz |
| HF | High Frequency 50 dB performance between 3 - 29 MHz |
| VHF | Very High Frequency 50 dB performance between 30 - 2999 MHz |
| UHF | Ultra High Frequency 50 dB performance between 300 - 2999 MHz |

Filter contacts can be provided in most frequencies in contact sizes 22 or larger. Consult Amphenol Aerospace for availability.

Tubular connector designs will meet 3 amps RF current from -55°C through $+125^{\circ}\text{C}$. Planar connector designs will meet 5 amps.

Planars, MOV's, Tubular and Diode Contacts



Planar Array Assembly

Capacitor and MOV Planars

Tubular Filters and Diode Contacts

Contact Options

- Coaxial, concentric twinax, triax and quadax contacts can be included in arrangements of filtered contacts for signal or power circuits (See Amphenol catalog 12-130, High Frequency Contacts for Multi-pin Connectors).
- Filter contacts with differing cutoff frequencies can be mixed in any given insert arrangement. (ratio 20:1 typical)
- Ground, insulated or filter contacts can be combined within the same connector to meet unique or changing frequency protection requirements.
- Thermocouple contacts
- Diodes for EMP

Methods of Wire Termination

- Solder cup - wire termination
- PCB termination (Pre-tinning is available)
- Solderless wrap
- Amphenol® UTS (Universal Termination System) allows crimp termination. It uses crimp insertable socket contacts on conductor wires. Sockets mate with filter pins within the connector body. (Socket type M39029/57). (For further contact information, see catalog 12-090, MIL-DTL-38999 Series I & II).
- Weld terminal for thermocouple contacts

Filter Connector Options

Other Filter Connector Options include:

- Filter adapters eliminate replacement of either existing mated pair. The adapter provides the circuit protection at the MF, VHF and UHF levels, and is an effective and economical method of introducing EMI/EMP protection to an installed system. Adapters are to be placed between mating faces. (See pages 56, 57).
- Receptacle shell modifications that allow mounting directly to a PC board or flex header. Stand-off shells are available in different configurations. These offer improved reliability by eliminating external spacers and washers. (See pages 12, 13, 19, 20 and 33).
- The hermetic filter connector, while only approximately 1/2 inch longer than standard series connectors, provides all the benefits of a hermetic connector, plus EMI protection for sensitive circuits. The filter assembly is protected by a fused glass insert within a unique steel housing. This design provides the capability to tolerate high level static pressure while maintaining a low level leakage rate. Consult Amphenol Aerospace for more information.
- Composite shell filter connectors meet the MIL-DTL-38999, Series III dimensional length, and offer a light-weight, corrosion resistant, durable connector with the same high performance features as its metal counterpart. The composite filter connector utilizes planar technology to accommodate VHF-1 or better electrical performance characteristics. (See pages 9-13).
- Filter connectors with ESD (Electrostatic Discharge) protection are available. These MIL-DTL-38999 Series III connectors have an added feature of a Faraday Cage to shunt electrostatic discharge events to the conductive enclosure on which the connector is mounted. (See page 65).
- Filtered Plugs are designed for applications where EMI protection is essential, but access to the receptacle is denied. Designed with the same components as a standard filter receptacle, the filtered plug offers the option of being mounted on the cable harness. It is a cost effective method of achieving EMI protection when length restrictions prohibit inclusion of an adapter to the system. Consult Amphenol Aerospace for availability.
- Diode Connectors offers versatility with transient protection for sensitive circuits, such as TTL lines. Diodes can stand alone or be combined with other filters. (Pages 60, 61).
- Receptacles with EMP protection are available for MIL-DTL-38999 Series IV. (Pages 44-46).
- Amphenol's Energy Shunting Assembly is a simple, compact unit which provides lightning and electromagnetic pulse protection of systems in which many signal lines enter sensitive electronic equipment. (Page 62).



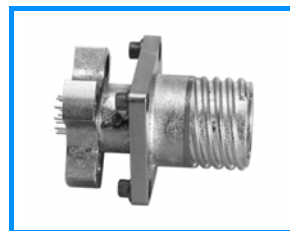
Cylindrical Filter Protection Connectors are offered in a wide range of styles, with custom designs for special applications.



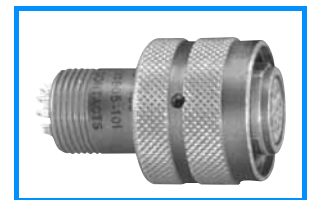
Filter Adapters can be attached to connectors to provide EMI/EMP protection.



Hermetic filter connector



Composite shell stand-off Filter 38999 connector



Filtered plug



Diode Connectors



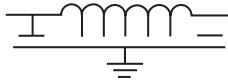
ESA - Energy Shunting Assembly

Filter Selection Data

Amphenol® EMI Connectors are produced with several types of filters. They are all low band pass filters with the following configurations:

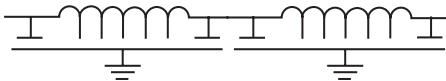
Pi -

Typical of the VHF, UHF and MF filter



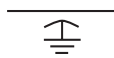
Cascaded Pi -

Typical of the HF filter. It consists of two VHF Pi filters on a common pin and is available in tubular designs only.



Capacitor *-

Consists of a feed-through capacitor without any ferrite. It can be 50pf to 1µf and carry the MF, HF and VHF designation depending on its typical 50dB performance.



L-C *-

Typical of HF, VHF and UHF filter. Low source / high load impedance.



C-L *-

Typical of HF, VHF and UHF filter. High load impedance / low source.



T *-

Typical of HF, VHF and UHF filter. Low source / low load impedance.



* Consult factory for attenuation performance values.

| Parameters | | Medium Frequency Filter† | High Frequency Filter† | Very High Frequency Filter | | Ultra High Frequency Filter | |
|--|------------------|-------------------------------|------------------------|----------------------------|----------------|-----------------------------|----------------|
| | | MF1 (Pi) | HF1 (Cascaded Pi) | VHF1 (Pi) | VHF2† (Pi) | UHF1† (Pi) | UHF2† (Pi) |
| Minimum Attenuation (Test Points)* | 150kHz | 20dB | - | - | - | - | - |
| | 15MHz | - | 50dB | - | - | - | - |
| | 50MHz | - | 80dB | - | - | - | - |
| | 100MHz | 80dB | - | 62dB | 46dB | 18dB | 28dB |
| Maximum Working Voltage (User must specify DC or AC)††† | DC††† | 50VDC | 200VDC | 200VDC | 200VDC | 200VDC | 200VDC |
| Dielectric Withstanding Voltage Capability (for 5 sec. with 10 milliamperes max. charging current)◆◆ | | 100 volts DC | 500 volts DC | 500 volts DC | 500 volts DC | 500 volts DC | 500 volts DC |
| Maximum Feed-thru Current (DC and/or Audio Frequency R.M.S.) | Size 16 contacts | 13.0 amps | 13.0 amps | 13.0 amps | 13.0 amps | 13.0 amps | 13.0 amps |
| | Size 20 contacts | 7.5 amps | 7.5 amps | 7.5 amps | 7.5 amps | 7.5 amps | 7.5 amps |
| | Size 22 contacts | not available | not available | 5.0 amps | 5.0 amps | 5.0 amps | 5.0 amps |
| Maximum RF Current | | 3.0 amps | 3.0 amps | 3.0 amps | 3.0 amps | 3.0 amps | 3.0 amps |
| Minimum Insulation Resistance** | | 250 megohms | 10 gigaohms | 10 gigaohms | 10 gigaohms | 10 gigaohms | 10 gigaohms |
| Typical Capacitance*** | | 1.0 microfarad | 16 nanofarads | 7 nanofarads | 2.5 nanofarads | 375 picofarads | 710 picofarads |
| Air Leakage†† | | 4.6 x 10 ⁻³ cc/sec | | | | | |
| Operating Temperature Range | | -55°C to +125°C | | | | | |

* When tested at 25°C per MIL-STD-220.

** After 2 minutes at working DC voltage through a protective resistance of 1 megohm when measured between contact and ground at +25°C.

*** When measured at a frequency of 1 ±.1kHz and a voltage not exceeding 1.0 V.A.C.R.M.S. at +25°C.

† Consult Amphenol, Sidney, NY or your Amphenol representative for part number.

†† Lower leakage rates are available upon request.

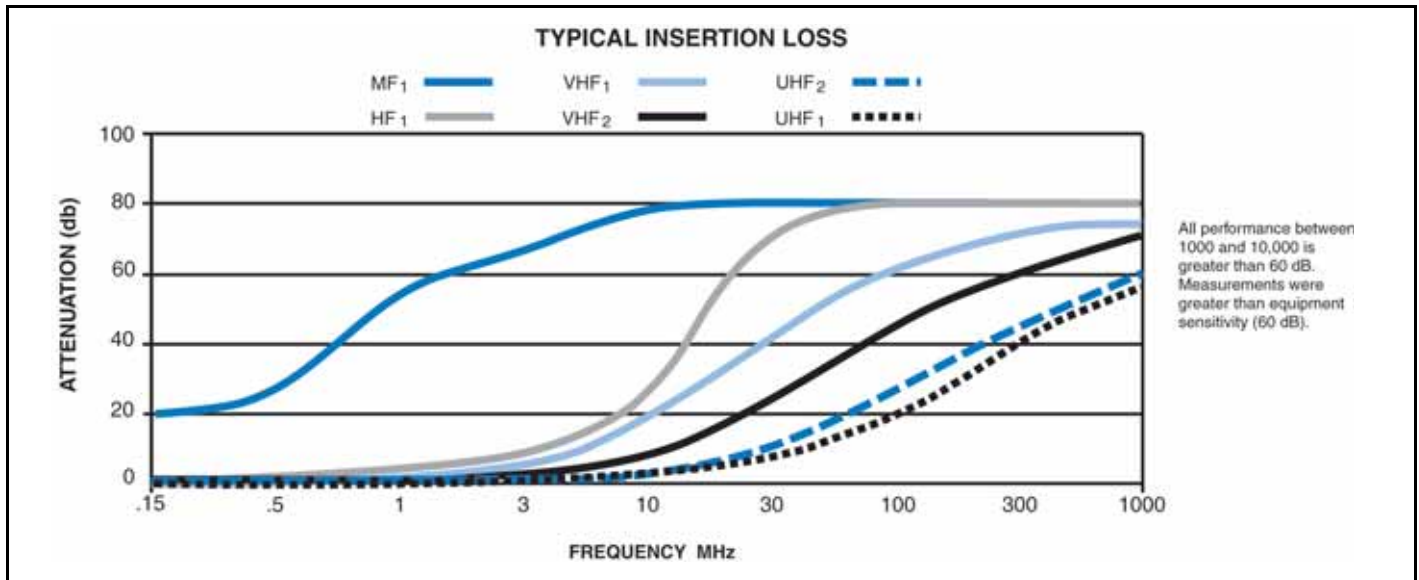
††† Summation of the DC and low level AC super-imposed peak voltage.

†††† Consult Amphenol, Sidney, NY whenever AC voltage is present.

◆ Consult Amphenol, Sidney, NY or your Amphenol representative for availability.

◆◆ Higher DWV ratings are available upon request. Consult Amphenol, Sidney, NY.

Effect of Temperature on EMI Filter Attenuation



**TYPICAL INSERTION LOSS (dB)
PER MIL-STD-220, 5 ADC, 25°C**

| Capacitance | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------------------------|------|------|-------|-------|--------|--------|---------|
| 375 pf UHF ₁ | 0 | 0 | 1 | 8 | 16 | – | – |
| 750 pf UHF ₂ | 0 | 0 | 3 | 10 | 19 | – | – |
| 2500 pf VHF ₂ | 0 | 2 | 8 | 20 | 28 | – | – |
| 7000 pf VHF ₁ | 5 | 9 | 17 | 23 | 40 | – | – |
| 16000 pf HF ₁ | 6 | 14 | 20 | 24 | 80 | – | – |

MF₁*

Typical Capacitance = 1,000,000 pf Min. 800,000 pf Max. 1,600,000 pf
Type Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 18 | – | 64 | 80 | 80 | 80 | 80 |
| Room | 7.94K | 55 | – | 80 | 80 | 80 | 80 | 80 |
| +125°C | – | 22 | – | 70 | 80 | 80 | 80 | 80 |

HF₁*

Typical Capacitance = 16,000 pf Min. 9,800 pf Max. 24,000 pf
Type Cascaded Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 15MHz | 50MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 2 | 6 | 24 | 62 | 80 | 80 | 80 |
| Room | 648K | 3 | 9 | 50 | 80 | 80 | 80 | 80 |
| +125°C | – | 0 | 6 | 30 | 62 | 80 | 80 | 80 |

VHF₁

Typical Capacitance = 7,000 pf Min. 4,900 pf Max. 12,000 pf
Band G, Type Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 1 | 2 | 8 | 21 | 44 | 61 | 65 |
| Room | 1.27M | 1 | 6 | 18 | 42 | 62 | 72 | 75 |
| +125°C | – | 0 | 2 | 9 | 24 | 45 | 62 | 64 |

VHF₂

Typical Capacitance = 2,500 pf Min. 1,900 pf Max. 4,000 pf
Band E, Type Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 0 | 2 | 7 | 17 | 40 | 58 | 71 |
| Room | 3.3M | 0 | 2 | 8 | 24 | 46 | 61 | 71 |
| +125°C | – | 0 | 3 | 10 | 26 | 46 | 63 | 69 |

UHF₂

Typical Capacitance = 750 pf Min. 500 pf Max. 1,100 pf
Band C, Type Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 0 | 0 | 3 | 9 | 25 | 46 | 61 |
| Room | 12.7M | 0 | 0 | 3 | 10 | 28 | 46 | 61 |
| +125°C | – | 0 | 0 | 3 | 10 | 24 | 42 | 60 |

UHF₁

Typical Capacitance = 375 pf Min. 290 pf Max. 450 pf
Band B, Type Pi

| Temp. | F _{CO} | 1MHz | 3MHz | 10MHz | 30MHz | 100MHz | 300MHz | 1000MHz |
|--------|-----------------|------|------|-------|-------|--------|--------|---------|
| -55°C | – | 0 | 0 | 1 | 6 | 21 | 43 | 58 |
| Room | 21.9M | 0 | 0 | 1 | 8 | 18 | 42 | 56 |
| +125°C | – | 0 | 0 | 1 | 8 | 17 | 38 | 50 |

Note: F_{CO} = Cut-off Frequency

* Consult Amphenol, Sidney, NY for availability.

Impedance Matching Formula (your system to a 50 ohm system)

The following formula and example are offered in order to determine the expected filter performance in an impedance system other than 50 ohms.

With the attenuation expressed in 50 ohms and the transfer impedance curve shown in Figure 1 below, a designer can relate the expressed attenuation to the input and output impedance of his circuit.

Example:

- (1) Noise is 40dB above specification level at 100 MHz
- (2) Input and output impedance are 10 and 100 ohms respectively
- (3) Amphenol® VHF 7000 pf filter has a 65 dB minimum attenuation at 100 MHz and +25°C

Formula (Taken from Figure 1):

$1.4 \times 10^2 \Omega$ = transfer impedance
for 65 dB in a 50 ohm system

$$\text{Atten (dB)} = 20 \log_{10} \left[1 + \frac{Z_S Z_L}{Z_{12}(Z_S + Z_L)} \right]$$

Z_S = source impedance

Z_L = load impedance

Z_{12} = transfer impedance

Atten = filter performance in a system other than 50 ohms

$$\text{Atten (dB)} = 20 \log_{10} \left[1 + \frac{10(100)}{1.4 \times 10^{-2} (10 + 100)} \right]$$

Attenuation = 56.3dB

In this case, the 7000 pf VHF filter will give 56.3 dB which is 16.3dB below the desired reduction in noise (40dB) as stated in the above problem.

Attenuation vs Transfer Impedance in 50 Ohm System

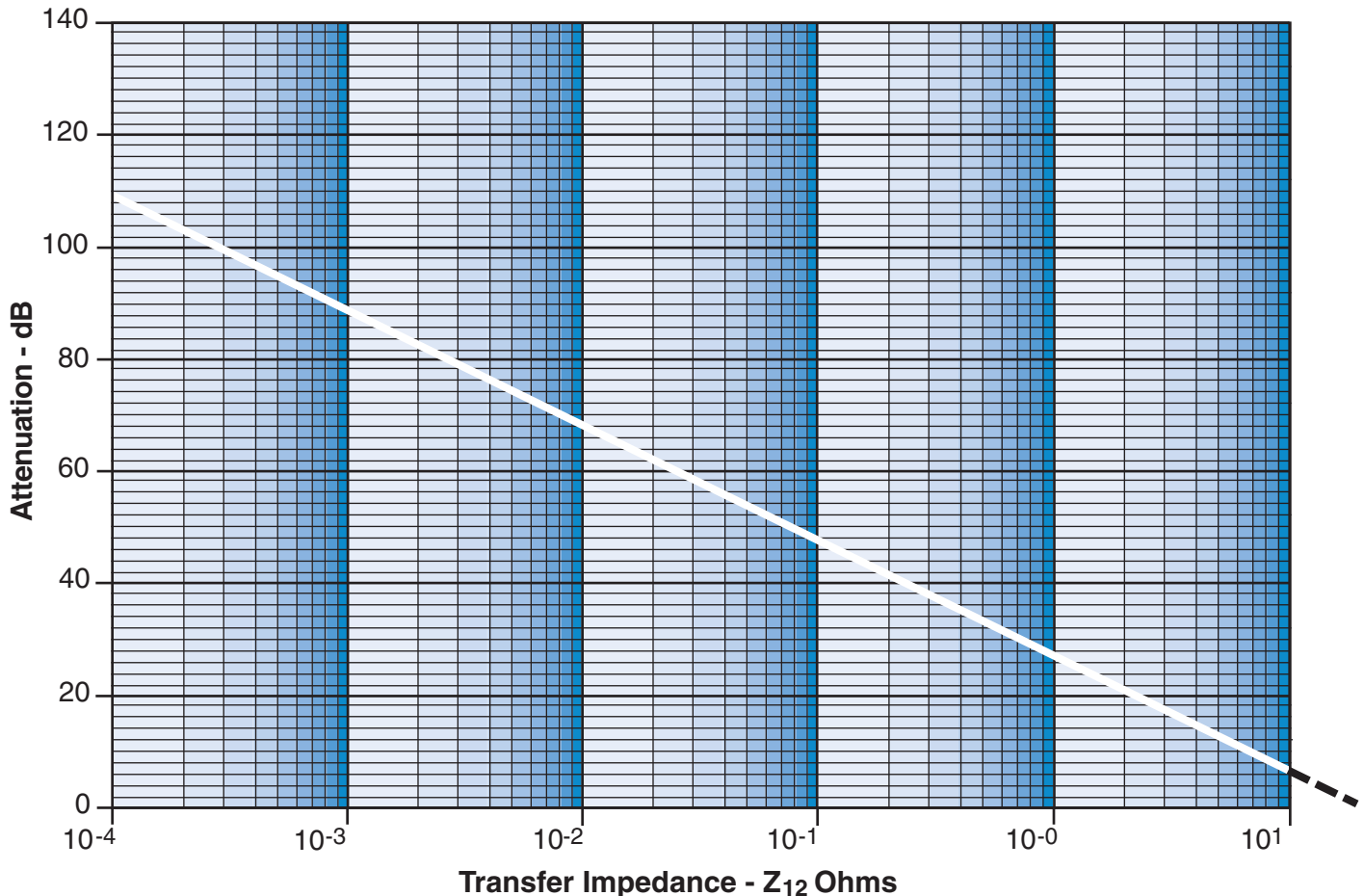


Figure 1

Quality Assurance Testing

ACCEPTANCE TESTING

All filter connectors undergo extensive acceptance testing to assure product quality. An outline of standard acceptance testing performed is as follows:

Mechanical Inspection

- Dimensional inspection of shells, keys, keyways and mounting surfaces by either in-process inspection of components or inspection of final assemblies.
- Visual inspection of contacts, inserts and seals, gaskets and surface finish of shells and hardware.

Electrical Tests

- Insulation resistance of filter contacts is checked 100% at the working voltage and to the test limit listed for each filter in the filter selection data table.
- Dielectric withstanding voltage is tested on 100% of filter contacts at the voltage listed in the filter selection data table.
- Capacitance is tested 100% at 1KHz.

Special Tests/Processes

In addition to the standard acceptance testing and processes, the following additional production testing and processing can be provided upon request:

- Attenuation testing (through 100 MHz)
- Leakage inspection
- Thermal cycling/shock
- Burn-in
- De-gassing

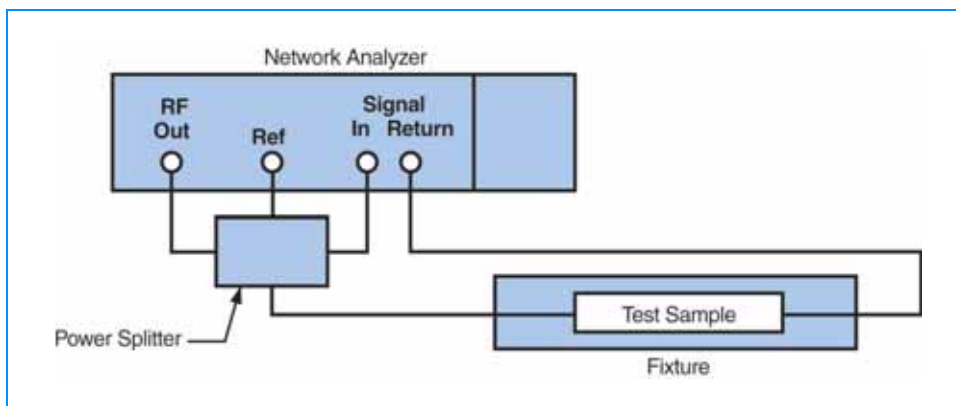
Consult Amphenol Aerospace for further information.

Qualifications

Amphenol® filter connectors have been qualified and are on periodic requalification to specification BSF-1 (available from your Amphenol representative). This is patterned after MIL-DTL-38999, modified to include mechanical and environmental testing and electrical parameters important to filter connector performance.

These acceptance tests, along with exhaustive in-process inspection and testing, give Amphenol® filter connectors their reputation for reliability.

ATTENUATION TEST CIRCUIT

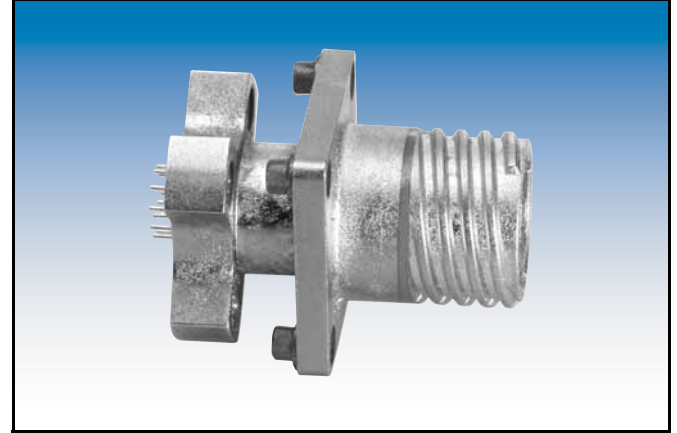


There are multiple test stations located on the Amphenol production floor that support all in-process, final electric and qualification testing as necessary.

Amphenol® FCTV Series Composite Tri-Start™ Subminiature Cylindrical Filters

The Amphenol® FCTV Series is the Composite Tri-Start with filtering for EMI/EMP protection. It offers the same high performance as its metal counterpart, the FTV, but with a lightweight, corrosion resistance shell.

- Intermateable with MIL-DTL-38999 Series III connectors (See Catalog 12-092)
- Quick Mating - completely mates in a 360° turn of the coupling nut
- Lockwiring Eliminated - incorporates anti-decoupling device
- Contact Protection - 100% "scoop-proof"
- Improved Moisture Resistance - prevents electrolytic erosion of contacts
- Lightweight Composite shell - 17% – 70% weight savings over metal
- Corrosion Resistant - available in standard MIL-DTL-38999 olive drab cadmium (175°C) and electroless nickel plating (200°C), both withstanding 2000 hours of salt spray exposure. The base material is able to withstand an indefinite exposure to salt spray.
- Durability - 1500 couplings minimum (in reference to connector couplings, not contacts)



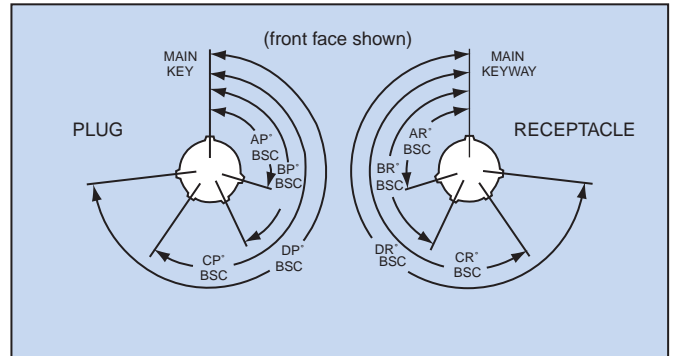
Composite FCTV Connector for PCB board mounting. Amphenol is currently the only supplier of one-piece composite PCB stand-off shells.

FCTV Master Key/Keyway Rotation

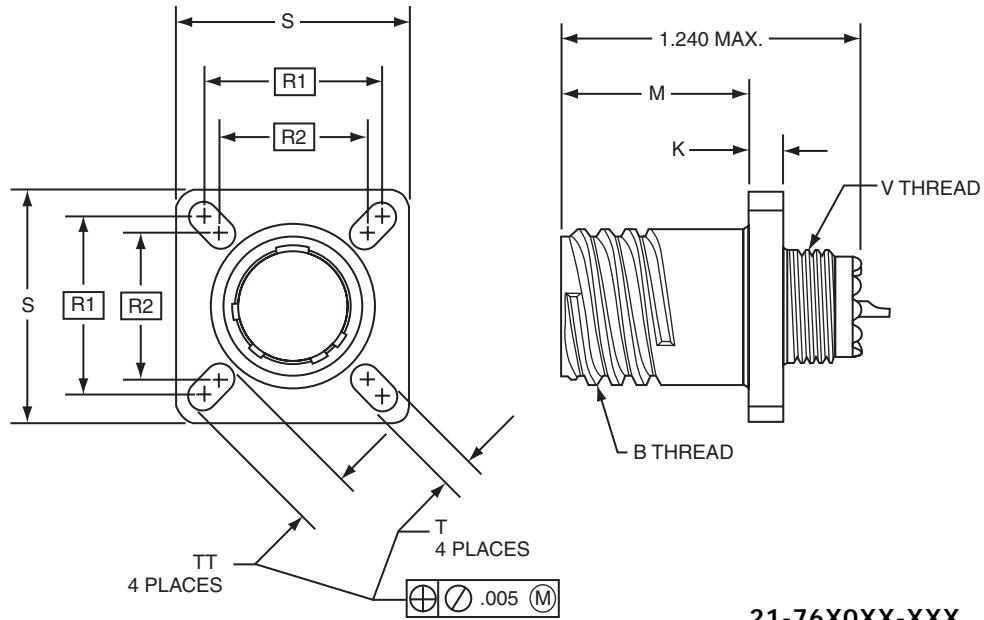
| Shell Size | Key & Keyway arrangement identification letter | AR° or AP° BSC | BR° or BP° BSC | CR° or CP° BSC | DR° or DP° BSC |
|------------|--|----------------|----------------|----------------|----------------|
| 9 | N | 105 | 140 | 215 | 265 |
| | A | 102 | 132 | 248 | 320 |
| | B | 80 | 118 | 230 | 312 |
| | C | 35 | 140 | 205 | 275 |
| | D | 64 | 155 | 234 | 304 |
| | E | 91 | 131 | 197 | 240 |
| 11, 13, 15 | N | 95 | 141 | 208 | 236 |
| | A | 113 | 156 | 182 | 292 |
| | B | 90 | 145 | 195 | 252 |
| | C | 53 | 156 | 220 | 255 |
| | D | 119 | 146 | 176 | 298 |
| | E | 51 | 141 | 184 | 242 |
| 17 and 19 | N | 80 | 142 | 196 | 293 |
| | A | 135 | 170 | 200 | 310 |
| | B | 49 | 169 | 200 | 244 |
| | C | 66 | 140 | 200 | 257 |
| | D | 62 | 145 | 180 | 280 |
| | E | 79 | 153 | 197 | 272 |
| 21, 23, 25 | N | 80 | 142 | 196 | 293 |
| | A | 135 | 170 | 200 | 310 |
| | B | 49 | 169 | 200 | 244 |
| | C | 66 | 140 | 200 | 257 |
| | D | 62 | 145 | 180 | 280 |
| | E | 79 | 153 | 197 | 272 |

All angles are BSC

The insert arrangement does not rotate with main key/keyway.



wall mounting receptacle



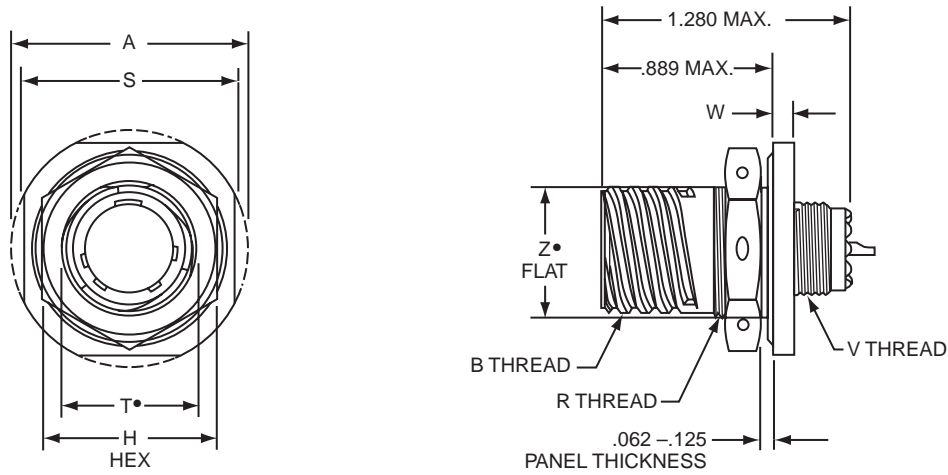
21-76X0XX-XXX

For ordering information see how to order page 67.

| Shell Size | B Thread Class 2A 0.1P-0.3L-TS (Plated) | M +.000 -.005 | K ±.0025 | R ¹ TP | R ² TP | S +.011 -.010 | T +.008 -.006 | TT +.008 -.006 | V Thread Metric (Plated) |
|------------|---|---------------------|-------------|----------------------|----------------------|---------------------|---------------------|----------------------|--------------------------|
| 9 | .6250 | .773 | .1378 | .719 | .594 | .938 | .128 | .216 | M12X1-6g0.100R |
| 11 | .7500 | .773 | .1378 | .812 | .719 | 1.031 | .128 | .194 | M15X1-6g0.100R |
| 13 | .8750 | .773 | .1378 | .906 | .812 | 1.125 | .128 | .194 | M18X1-6g0.100R |
| 15 | 1.0000 | .773 | .1378 | .969 | .906 | 1.219 | .128 | .173 | M22X1-6g0.100R |
| 17 | 1.1875 | .773 | .1378 | 1.062 | .969 | 1.312 | .128 | .194 | M25X1-6g0.100R |
| 19 | 1.2500 | .773 | .1378 | 1.156 | 1.062 | 1.438 | .128 | .194 | M28X1-6g0.100R |
| 21 | 1.3750 | .741 | .1654 | 1.250 | 1.156 | 1.562 | .128 | .194 | M31X1-6g0.100R |
| 23 | 1.5000 | .741 | .1654 | 1.375 | 1.250 | 1.688 | .154 | .242 | M34X1-6g0.100R |
| 25 | 1.6250 | .741 | .1654 | 1.500 | 1.375 | 1.812 | .154 | .242 | M37X1-6g0.100R |

All dimensions for reference only.

jam nut receptacle



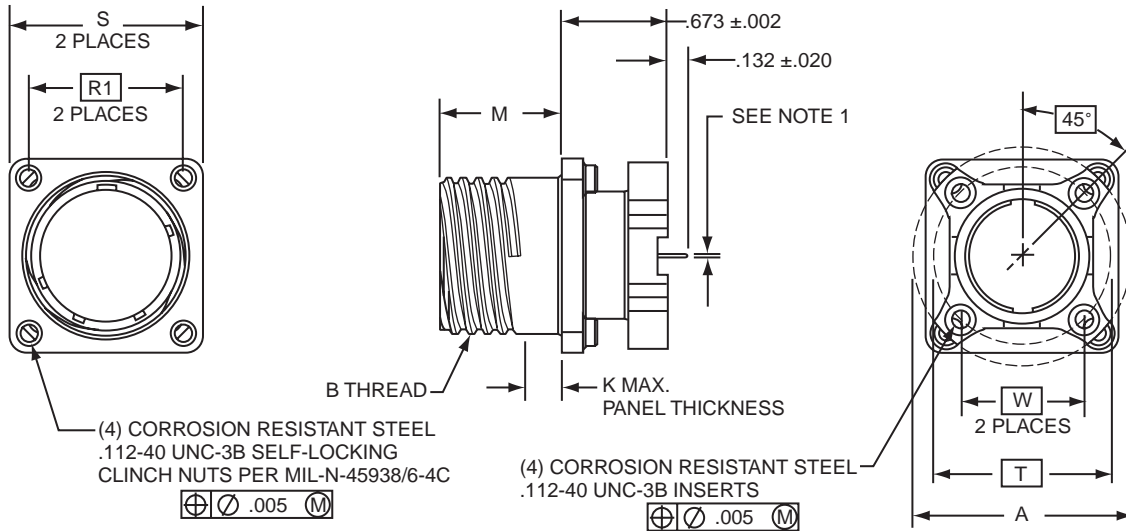
21-76X7XX-XXX

- D shaped mounting hole dimensions
For ordering information see how to order page 67.

| Shell Size | A Dia. ±.010 | B Thread Class 2A 0.1P-0.3L-TS (Plated) | H Hex +.017 - .016 | R Thread Metric (Plated) | S ±.015 | T* +.010 - .000 | V Thread Metric (Plated) | W +.035 - .004 | Z* Flat +.000 - .010 |
|------------|--------------|---|--------------------|--------------------------|---------|-----------------|--------------------------|----------------|----------------------|
| 9 | 1.188 | .6250 | .875 | M17X1-6g0.100R | 1.062 | .697 | M12X1-6g0.100R | .086 | .669 |
| 11 | 1.375 | .7500 | 1.000 | M20X1-6g0.100R | 1.250 | .822 | M15X1-6g0.100R | .086 | .769 |
| 13 | 1.500 | .8750 | 1.188 | M25X1-6g0.100R | 1.375 | 1.007 | M18X1-6g0.100R | .086 | .955 |
| 15 | 1.625 | 1.0000 | 1.312 | M28X1-6g0.100R | 1.500 | 1.134 | M22X1-6g0.100R | .086 | 1.084 |
| 17 | 1.750 | 1.1875 | 1.438 | M32X1-6g0.100R | 1.625 | 1.259 | M25X1-6g0.100R | .086 | 1.208 |
| 19 | 1.937 | 1.2500 | 1.562 | M35X1-6g0.100R | 1.812 | 1.384 | M28X1-6g0.100R | .118 | 1.333 |
| 21 | 2.062 | 1.3750 | 1.688 | M38X1-6g0.100R | 1.938 | 1.507 | M31X1-6g0.100R | .118 | 1.459 |
| 23 | 2.188 | 1.5000 | 1.812 | M41X1-6g0.100R | 2.062 | 1.634 | M34X1-6g0.100R | .118 | 1.575 |
| 25 | 2.312 | 1.6250 | 2.000 | M44X1-6g0.100R | 2.188 | 1.759 | M37X1-6g0.100R | .118 | 1.709 |

All dimensions for reference only.

box mount receptacle (printed circuit board mount)



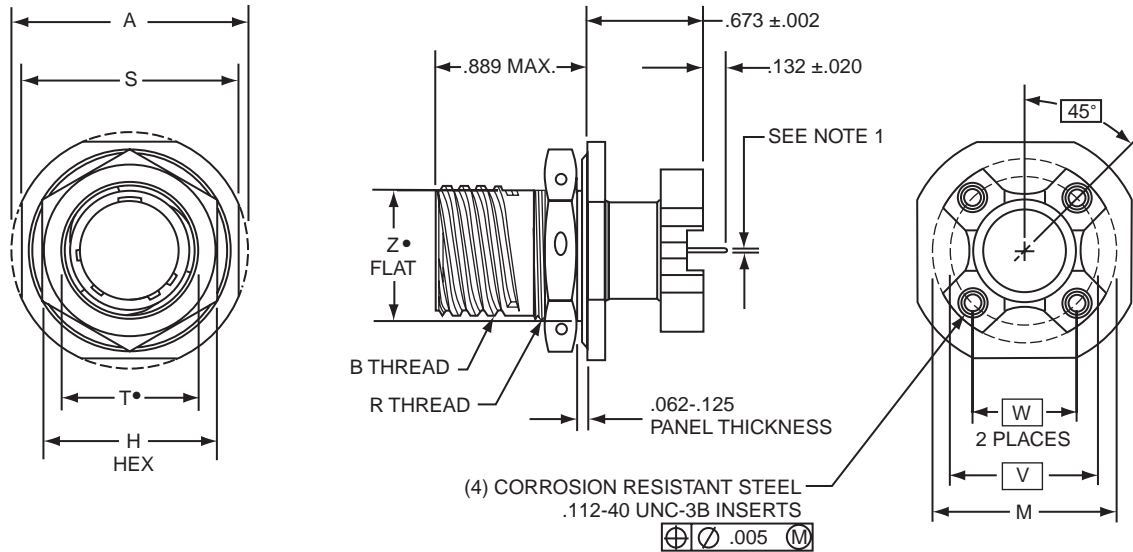
21-78X2XX-XXX

- Standard tail for size 22 is $.020 \pm .001$ dia.
Standard tail for size 20 is $.030 \pm .001$ dia.
For ordering information, see how to order page 67.

| Shell Size | A Dia. $\pm .005$ | B Thread Class 2A 0.1P-0.3L-TS (Plated) | M $+.000$ $-.005$ | K Max. Panel Thickness | R ¹ TP | S $+.011$ $-.010$ | PCB Mounting Dimensions | |
|------------|-------------------|---|-------------------|------------------------|-------------------|-------------------|-------------------------|-------|
| | | | | | | | T Dia. TP | W TP |
| 9 | 1.016 | .6250 | .773 | .234 | .719 | .938 | .752 | .532 |
| 11 | 1.062 | .7500 | .773 | .234 | .812 | 1.031 | .850 | .601 |
| 13 | 1.250 | .8750 | .773 | .234 | .906 | 1.125 | .994 | .703 |
| 15 | 1.375 | 1.0000 | .773 | .234 | .969 | 1.219 | 1.119 | .791 |
| 17 | 1.500 | 1.1875 | .773 | .234 | 1.062 | 1.312 | 1.237 | .875 |
| 19 | 1.625 | 1.2500 | .773 | .234 | 1.156 | 1.438 | 1.379 | .975 |
| 21 | 1.750 | 1.3750 | .741 | .204 | 1.250 | 1.562 | 1.489 | 1.053 |
| 23 | 1.875 | 1.5000 | .741 | .204 | 1.375 | 1.688 | 1.619 | 1.145 |
| 25 | 2.000 | 1.6250 | .741 | .204 | 1.500 | 1.812 | 1.744 | 1.233 |

All dimensions for reference only.

jam nut receptacle (printed circuit board mount)



21-78X7XX-XXX

- Standard tail for size 22 is $.020 \pm .001$
Standard tail for size 20 is $.030 \pm .001$

- "D" shaped mounting hole dimensions

For ordering information see how to order page 67.

| Shell Size | A Dia. $\pm .005$ | B Thread Class 2A 0.1P-0.3L-TS (Plated) | H Hex $+.017$ $-.016$ | M Dia. $\pm .005$ | R Thread Metric (Plated) | S $+.011$ $-.010$ | T \bullet Dia. $+.010$ $-.000$ | PCB Mounting Dimensions | | Z \bullet Flat $+.000$ $-.010$ |
|------------|-------------------|---|-----------------------|-------------------|--------------------------|-------------------|----------------------------------|-------------------------|-----------|----------------------------------|
| | | | | | | | | W TP | V Dia. TP | |
| 9 | 1.188 | .6250 | .875 | 1.016 | M17X1-6g0.100R | 1.062 | .697 | .532 | .752 | .669 |
| 11 | 1.375 | .7500 | 1.000 | 1.062 | M20X1-6g0.100R | 1.250 | .822 | .601 | .850 | .769 |
| 13 | 1.500 | .8750 | 1.188 | 1.250 | M25X1-6g0.100R | 1.375 | 1.007 | .703 | .994 | .955 |
| 15 | 1.625 | 1.0000 | 1.312 | 1.375 | M28X1-6g0.100R | 1.500 | 1.134 | .791 | 1.119 | 1.084 |
| 17 | 1.750 | 1.1875 | 1.438 | 1.500 | M32X1-6g0.100R | 1.625 | 1.259 | .875 | 1.237 | 1.208 |
| 19 | 1.937 | 1.2500 | 1.562 | 1.625 | M35X1-6g0.100R | 1.812 | 1.384 | .975 | 1.379 | 1.333 |
| 21 | 2.062 | 1.3750 | 1.688 | 1.750 | M38X1-6g0.100R | 1.937 | 1.507 | 1.053 | 1.489 | 1.459 |
| 23 | 2.188 | 1.5000 | 1.812 | 1.875 | M41X1-6g0.100R | 2.062 | 1.634 | 1.145 | 1.619 | 1.575 |
| 25 | 2.312 | 1.6250 | 2.000 | 2.000 | M44X1-6g0.100R | 2.188 | 1.759 | 1.233 | 1.744 | 1.709 |

All dimensions for reference only.

Amphenol® FTV Series Tri-Start™ Subminiature Cylindrical Filters

The Amphenol® FTV Series demonstrates unsurpassed technical leadership. With the added feature of the filter, this high performance general duty threaded connector is designed to withstand the pressures of severe environment applications.

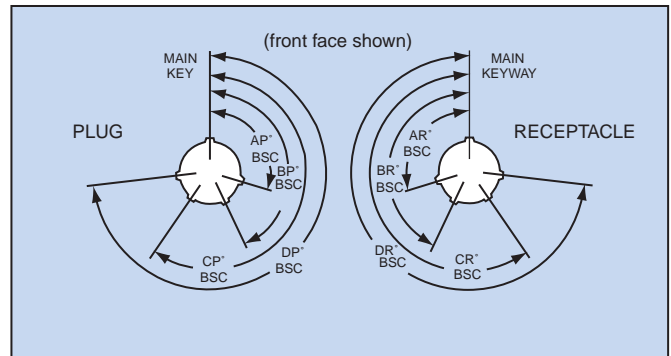
- Intermateable with MIL-DTL-38999 Series III connectors (see Catalog 12-092)
- Quick Mating – completely mates in a 360° turn of the coupling nut
- Lockwiring Eliminated – incorporates anti-decoupling device
- Contact Protection – 100% “scoop-proof”
- Improved Moisture Resistance – prevents electrolytic erosion of contacts
- Corrosion Resistant – 500 hour salt spray olive drab cadmium over nickel plating, class RW, or stainless steel shells



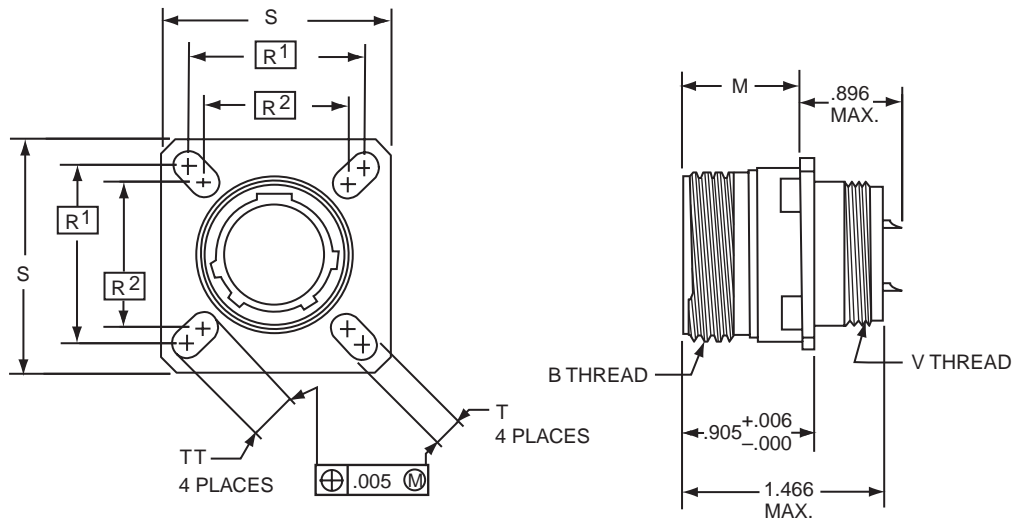
FTV Master Key/Keyway Rotation

| Shell Size | Key & Keyway arrangement identification letter | AR° or AP° BSC | BR° or BP° BSC | CR° or CP° BSC | DR° or DP° BSC |
|------------|--|----------------|----------------|----------------|----------------|
| 9 | N | 105 | 140 | 215 | 265 |
| | A | 102 | 132 | 248 | 320 |
| | B | 80 | 118 | 230 | 312 |
| | C | 35 | 140 | 205 | 275 |
| | D | 64 | 155 | 234 | 304 |
| | E | 91 | 131 | 197 | 240 |
| 11, 13, 15 | N | 95 | 141 | 208 | 236 |
| | A | 113 | 156 | 182 | 292 |
| | B | 90 | 145 | 195 | 252 |
| | C | 53 | 156 | 220 | 255 |
| | D | 119 | 146 | 176 | 298 |
| | E | 51 | 141 | 184 | 242 |
| 17 and 19 | N | 80 | 142 | 196 | 293 |
| | A | 135 | 170 | 200 | 310 |
| | B | 49 | 169 | 200 | 244 |
| | C | 66 | 140 | 200 | 257 |
| | D | 62 | 145 | 180 | 280 |
| | E | 79 | 153 | 197 | 272 |
| 21, 23, 25 | N | 80 | 142 | 196 | 293 |
| | A | 135 | 170 | 200 | 310 |
| | B | 49 | 169 | 200 | 244 |
| | C | 66 | 140 | 200 | 257 |
| | D | 62 | 145 | 180 | 280 |
| | E | 79 | 153 | 197 | 272 |

All angles are BSC
The insert arrangement does not rotate with main key/keyway.



FTV wall mounting receptacle



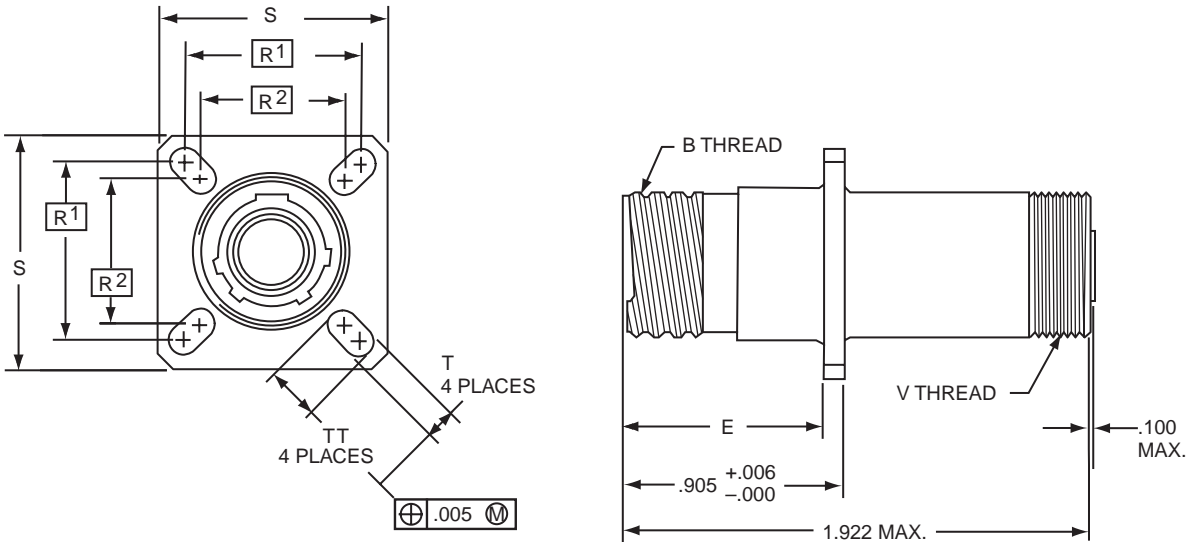
21-52X0XX-XXX

For ordering information, see how to order page 67.
Plug movement required to clear FTV receptacles: .625 min.

| Shell Size | B Thread Class 2A 0.1P-0.3L-TS (Plated) | M +.000 - .005 | R ¹ TP | R ² TP | S ±.010 | T +.008 - .006 | V Thread Metric (Plated) | TT +.008 - .006 |
|------------|---|----------------|-------------------|-------------------|---------|----------------|--------------------------|-----------------|
| 9 | .6250 | .820 | .719 | .594 | .938 | .128 | M12X1-6g0.100R | .216 |
| 11 | .7500 | .820 | .812 | .719 | 1.031 | .128 | M15X1-6g0.100R | .194 |
| 13 | .8750 | .820 | .906 | .812 | 1.125 | .128 | M18X1-6g0.100R | .194 |
| 15 | 1.0000 | .820 | .969 | .906 | 1.219 | .128 | M22X1-6g0.100R | .173 |
| 17 | 1.1875 | .820 | 1.062 | .969 | 1.312 | .128 | M25X1-6g0.100R | .194 |
| 19 | 1.2500 | .820 | 1.156 | 1.062 | 1.438 | .128 | M28X1-6g0.100R | .194 |
| 21 | 1.3750 | .790 | 1.250 | 1.156 | 1.562 | .128 | M31X1-6g0.100R | .194 |
| 23 | 1.5000 | .790 | 1.375 | 1.250 | 1.688 | .154 | M34X1-6g0.100R | .242 |
| 25 | 1.6250 | .790 | 1.500 | 1.375 | 1.812 | .154 | M37X1-6g0.100R | .242 |

All dimensions for reference only.

wall mounting receptacle (UTS crimp)



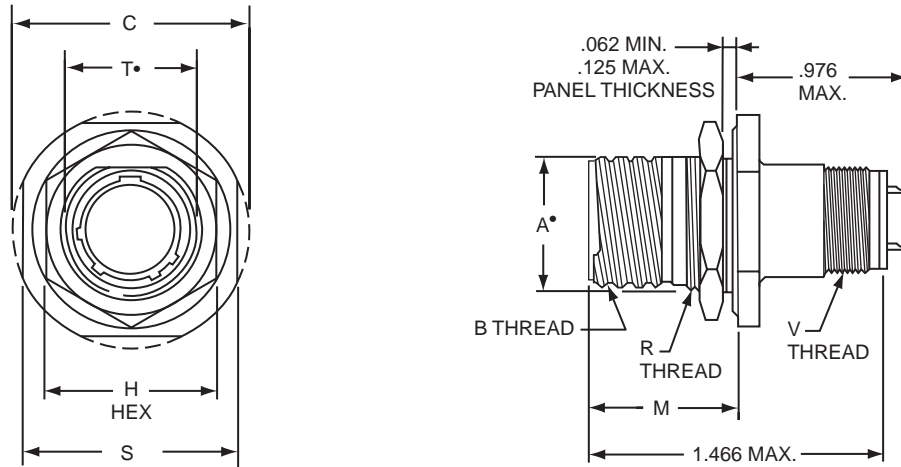
**21-50X0XX-XXX
UTS (Crimp) Contact
MIL-C-39029/57**

For ordering information, see how to order page 67.

| Shell Size | B Thread Class 2A 0.1P-0.3L-TS (Plated) | E $+0.000$ -0.005 | R ¹ TP | R ² TP | S ± 0.010 | T $+0.008$ -0.006 | V Thread Metric (Plated) | TT $+0.008$ -0.006 |
|------------|---|---------------------|-------------------|-------------------|---------------|---------------------|--------------------------|----------------------|
| 9 | .6250 | .820 | .719 | .594 | .938 | .128 | M15X1-6g0.100R | .216 |
| 11 | .7500 | .820 | .812 | .719 | 1.031 | .128 | M18X1-6g0.100R | .194 |
| 13 | .8750 | .820 | .906 | .812 | 1.125 | .128 | M22X1-6g0.100R | .194 |
| 15 | 1.0000 | .820 | .969 | .906 | 1.219 | .128 | M25X1-6g0.100R | .173 |
| 17 | 1.1875 | .820 | 1.062 | .969 | 1.312 | .128 | M28X1-6g0.100R | .194 |
| 19 | 1.2500 | .820 | 1.156 | 1.062 | 1.438 | .128 | M31X1-6g0.100R | .194 |
| 21 | 1.3750 | .790 | 1.250 | 1.156 | 1.562 | .128 | M34X1-6g0.100R | .194 |
| 23 | 1.5000 | .790 | 1.375 | 1.250 | 1.688 | .154 | M37X1-6g0.100R | .242 |
| 25 | 1.6250 | .790 | 1.500 | 1.375 | 1.812 | .154 | M41X1-6g0.100R | .242 |

All dimensions for reference only.

jam nut receptacle



21-52X7XX-XXX

- “D” shaped mounting hole dimensions

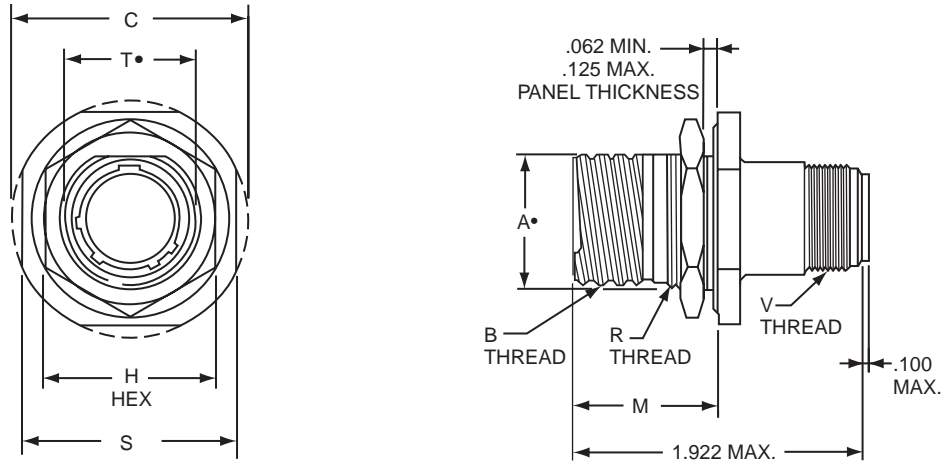
For ordering information, see how to order page 67.

Plug movement required to clear FTV receptacles: .625 min.

| Shell Size | A* +.000 -.010 | B Thread Class 2A 0.1P-0.3L-TS (Plated) | C Max | H Hex +.017 -.016 | M +.011 -.010 | R Thread (Plated) | S +.011 -.010 | T* +.010 -.000 | V Thread Metric (Plated) |
|------------|----------------------|--|----------|----------------------------|---------------------|-------------------------|---------------------|----------------------|-----------------------------------|
| 9 | .669 | .6250 | 1.199 | .875 | .871 | M17X1-6g0.100R | 1.062 | .697 | M12X1-6g0.100R |
| 11 | .769 | .7500 | 1.386 | 1.000 | .871 | M20X1-6g0.100R | 1.250 | .822 | M15X1-6g0.100R |
| 13 | .955 | .8750 | 1.511 | 1.188 | .878 | M25X1-6g0.100R | 1.375 | 1.007 | M18X1-6g0.100R |
| 15 | 1.084 | 1.0000 | 1.636 | 1.312 | .878 | M28X1-6g0.100R | 1.500 | 1.134 | M22X1-6g0.100R |
| 17 | 1.208 | 1.1875 | 1.761 | 1.438 | .878 | M32X1-6g0.100R | 1.625 | 1.259 | M25X1-6g0.100R |
| 19 | 1.333 | 1.2500 | 1.949 | 1.562 | .878 | M35X1-6g0.100R | 1.812 | 1.384 | M28X1-6g0.100R |
| 21 | 1.459 | 1.3750 | 2.073 | 1.688 | .878 | M38X1-6g0.100R | 1.938 | 1.507 | M31X1-6g0.100R |
| 23 | 1.575 | 1.5000 | 2.199 | 1.812 | .878 | M41X1-6g0.100R | 2.062 | 1.634 | M34X1-6g0.100R |
| 25 | 1.709 | 1.6250 | 2.323 | 2.000 | .878 | M44X1-6g0.100R | 2.188 | 1.759 | M37X1-6g0.100R |

All dimensions for reference only.

jam nut receptacle (UTS crimp)



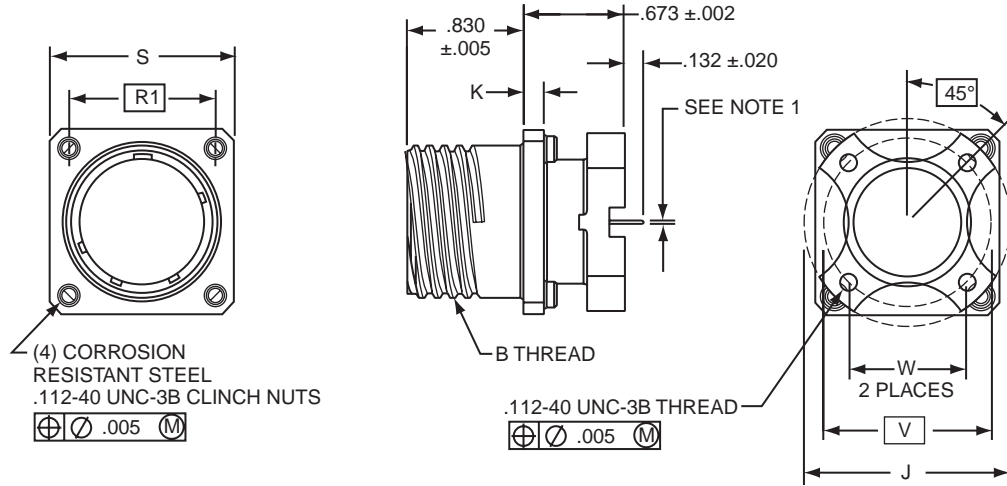
**21-50X7XX-XXX
UTS (Crimp) Contact
MIL-C-39029**

- “D” shaped mounting hole dimensions
- For ordering information, see how to order page 67.
Plug movement required to clear FTV receptacles: .625 min.

| Shell Size | A* +.000 -.010 | B Thread Class 2A 0.1P-0.3L-TS (Plated) | C Max | H Hex +.017 -.016 | M ±.005 | R Thread (Plated) | S +.011 -.010 | T* +.010 -.000 | V Thread Metric (Plated) |
|------------|----------------------|--|----------|----------------------------|------------|-------------------------|---------------------|----------------------|-----------------------------------|
| 9 | .669 | .6250 | 1.199 | .875 | .871 | M17X1-6g0.100R | 1.062 | .697 | M15X1-6g0.100R |
| 11 | .769 | .7500 | 1.386 | 1.000 | .871 | M20X1-6g0.100R | 1.250 | .822 | M18X1-6g0.100R |
| 13 | .955 | .8750 | 1.511 | 1.188 | .878 | M25X1-6g0.100R | 1.375 | 1.007 | M22X1-6g0.100R |
| 15 | 1.084 | 1.0000 | 1.636 | 1.312 | .878 | M28X1-6g0.100R | 1.500 | 1.134 | M25X1-6g0.100R |
| 17 | 1.208 | 1.1875 | 1.761 | 1.438 | .878 | M32X1-6g0.100R | 1.625 | 1.259 | M28X1-6g0.100R |
| 19 | 1.333 | 1.2500 | 1.949 | 1.562 | .878 | M35X1-6g0.100R | 1.812 | 1.384 | M31X1-6g0.100R |
| 21 | 1.459 | 1.3750 | 2.073 | 1.688 | .878 | M38X1-6g0.100R | 1.938 | 1.507 | M34X1-6g0.100R |
| 23 | 1.575 | 1.5000 | 2.199 | 1.812 | .878 | M41X1-6g0.100R | 2.062 | 1.634 | M37X1-6g0.100R |
| 25 | 1.709 | 1.6250 | 2.323 | 2.000 | .878 | M44X1-6g0.100R | 2.188 | 1.759 | M41X1-6g0.100R |

All dimensions for reference only.

box mount receptacle (printed circuit board mount)



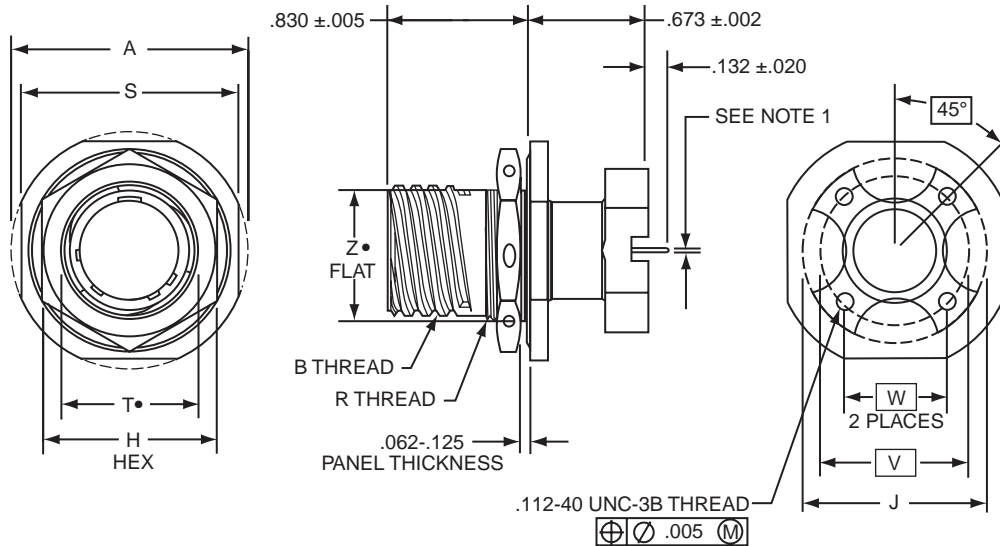
21-80X2XX-XXX

- Standard tail for size 22 is $.020 \pm .001$.
Standard tail for size 20 is $.030 \pm .001$.
For ordering information, see how to order page 67.

| Shell Size | B Thread Class 2A 0.1P-0.3L-TS (Plated) | J Dia. $\pm .005$ | K $\pm .005$ | R ¹ TP | S $\pm .010$ | PCB Mounting Dimensions | |
|------------|---|-------------------|--------------|-------------------|--------------|-------------------------|-----------|
| | | | | | | W TP | V Dia. TP |
| 9 | .6250 | 1.016 | .085 | .719 | .938 | .532 | .752 |
| 11 | .7500 | 1.062 | .085 | .812 | 1.031 | .601 | .850 |
| 13 | .8750 | 1.250 | .085 | .906 | 1.125 | .703 | .994 |
| 15 | 1.0000 | 1.375 | .085 | .969 | 1.219 | .791 | 1.119 |
| 17 | 1.1875 | 1.500 | .085 | 1.062 | 1.312 | .875 | 1.237 |
| 19 | 1.2500 | 1.625 | .085 | 1.156 | 1.438 | .975 | 1.379 |
| 21 | 1.3750 | 1.750 | .115 | 1.250 | 1.562 | 1.053 | 1.489 |
| 23 | 1.5000 | 1.875 | .115 | 1.375 | 1.688 | 1.145 | 1.619 |
| 25 | 1.6250 | 2.000 | .115 | 1.500 | 1.812 | 1.233 | 1.744 |

All dimensions for reference only.

jam nut receptacle (printed circuit board mount)



21-80X7XX-XXX

- Standard tail for size 22 is $.020 \pm .001$.
Standard tail for size 20 is $.030 \pm .001$.
- "D" shaped mounting hole dimensions
- For ordering information, see how to order page 67.

| Shell Size | A Dia. $\pm .010$ | B Thread Class 2A 0.1P-0.3L-TS (Plated) | H Hex $+.017$ $-.016$ | J Dia. $\pm .005$ | R Thread Metric (Plated) | S $\pm .015$ | T \bullet Dia. $+.010$ $-.000$ | PCB Mounting Dimensions | | Z \bullet Flat $+.000$ $-.010$ |
|------------|-------------------|---|-----------------------|-------------------|--------------------------|--------------|----------------------------------|-------------------------|-----------|----------------------------------|
| | | | | | | | | W TP | V Dia. TP | |
| 9 | 1.188 | .6250 | .875 | 1.016 | M17X1-6g0.100R | 1.062 | .697 | .532 | .752 | .669 |
| 11 | 1.375 | .7500 | 1.000 | 1.062 | M20X1-6g0.100R | 1.250 | .822 | .601 | .850 | .769 |
| 13 | 1.500 | .8750 | 1.188 | 1.250 | M25X1-6g0.100R | 1.375 | 1.007 | .703 | .994 | .955 |
| 15 | 1.625 | 1.0000 | 1.312 | 1.375 | M28X1-6g0.100R | 1.500 | 1.134 | .791 | 1.119 | 1.084 |
| 17 | 1.750 | 1.1875 | 1.438 | 1.500 | M32X1-6g0.100R | 1.625 | 1.259 | .875 | 1.237 | 1.208 |
| 19 | 1.937 | 1.2500 | 1.562 | 1.625 | M35X1-6g0.100R | 1.812 | 1.384 | .975 | 1.379 | 1.333 |
| 21 | 2.062 | 1.3750 | 1.688 | 1.750 | M38X1-6g0.100R | 1.937 | 1.507 | 1.053 | 1.489 | 1.459 |
| 23 | 2.188 | 1.5000 | 1.812 | 1.875 | M41X1-6g0.100R | 2.062 | 1.634 | 1.145 | 1.619 | 1.575 |
| 25 | 2.312 | 1.6250 | 2.000 | 2.000 | M44X1-6g0.100R | 2.188 | 1.759 | 1.233 | 1.744 | 1.709 |

All dimensions for reference only.

Amphenol® FJT Series Subminiature Cylindrical Filters

The Amphenol® FJT Series space and weight saving design, coupled with a filter, gives high reliability.

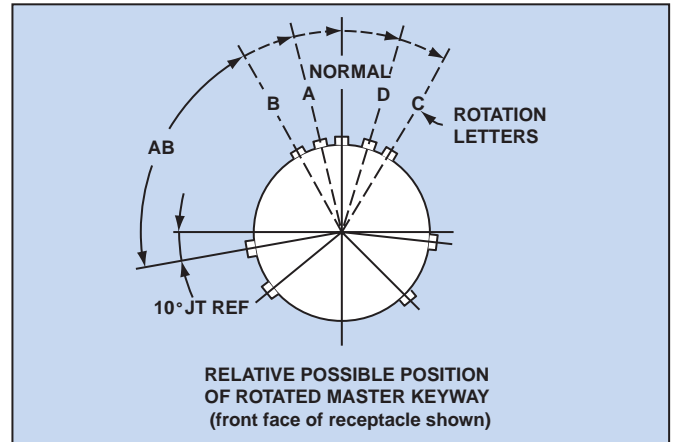
- Intermateable with MIL-DTL-38999/27599 Series II connectors (see Catalog 12-090)
- Quick Positive Coupling – 3 point bayonet locking
- Error-proof alternate positioning of shell keyways
- Higher reliability and greater durability with permanently encapsulated contacts
- Environmental Resistant
- Aluminum shells with several finish options

FJT Master Key/Keyway Rotation

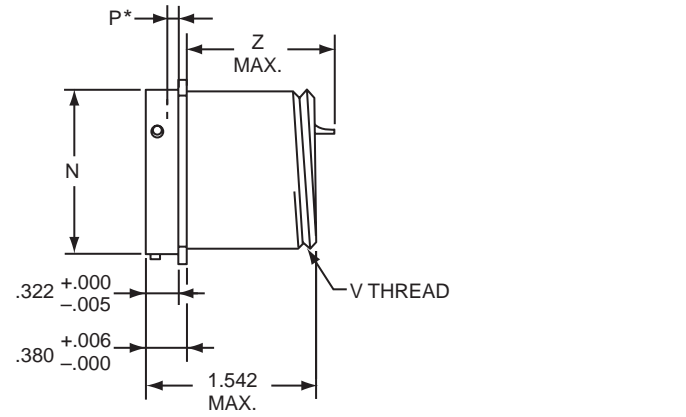
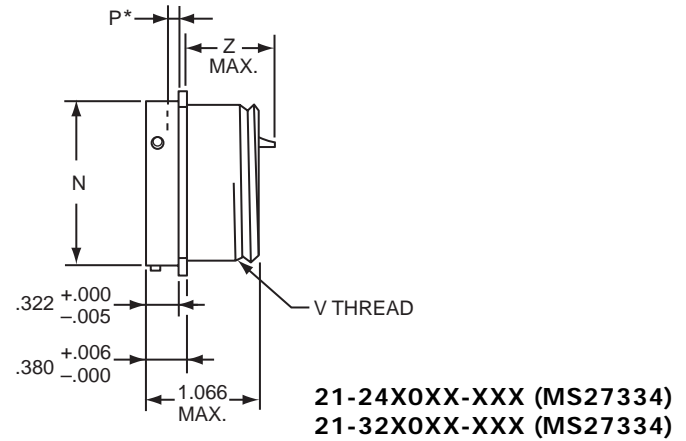
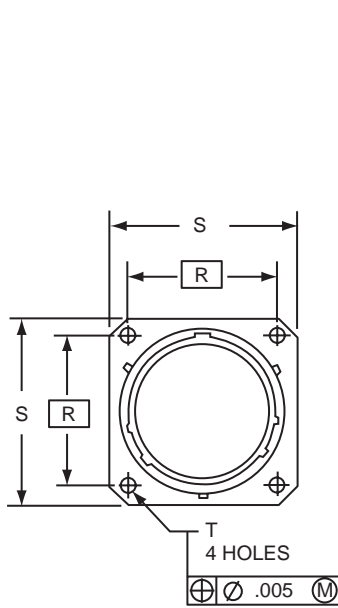
| Shell Size | AB Angle of Rotation (Degrees) | | | | |
|------------|--------------------------------|----|----|-----|-----|
| | Normal | A | B | C | D |
| 8 | 100 | 82 | – | – | 118 |
| 10 | 100 | 86 | 72 | 128 | 114 |
| 12 | 100 | 80 | 68 | 132 | 120 |
| 14 | 100 | 79 | 66 | 134 | 121 |
| 16 | 100 | 82 | 70 | 130 | 118 |
| 18 | 100 | 82 | 70 | 130 | 118 |
| 20 | 100 | 82 | 70 | 130 | 118 |
| 22 | 100 | 85 | 74 | 126 | 115 |
| 24 | 100 | 85 | 74 | 126 | 115 |

A plug with a given rotation letter will mate with a receptacle with the same rotation letter. The AB angle for a given connector is the same whether it contains pins or sockets. Inserts are not rotated in conjunction with the master key/keyway.

AB angles shown are viewed from the front face of the connector. A receptacle is shown at right. The angles for the plug are exactly the same, except the direction of rotation is opposite of that shown for the receptacle.



FJT wall mounting receptacle



For ordering information, see how to order page 67.

Plug movement required to clear FJT receptacles: .281 min.

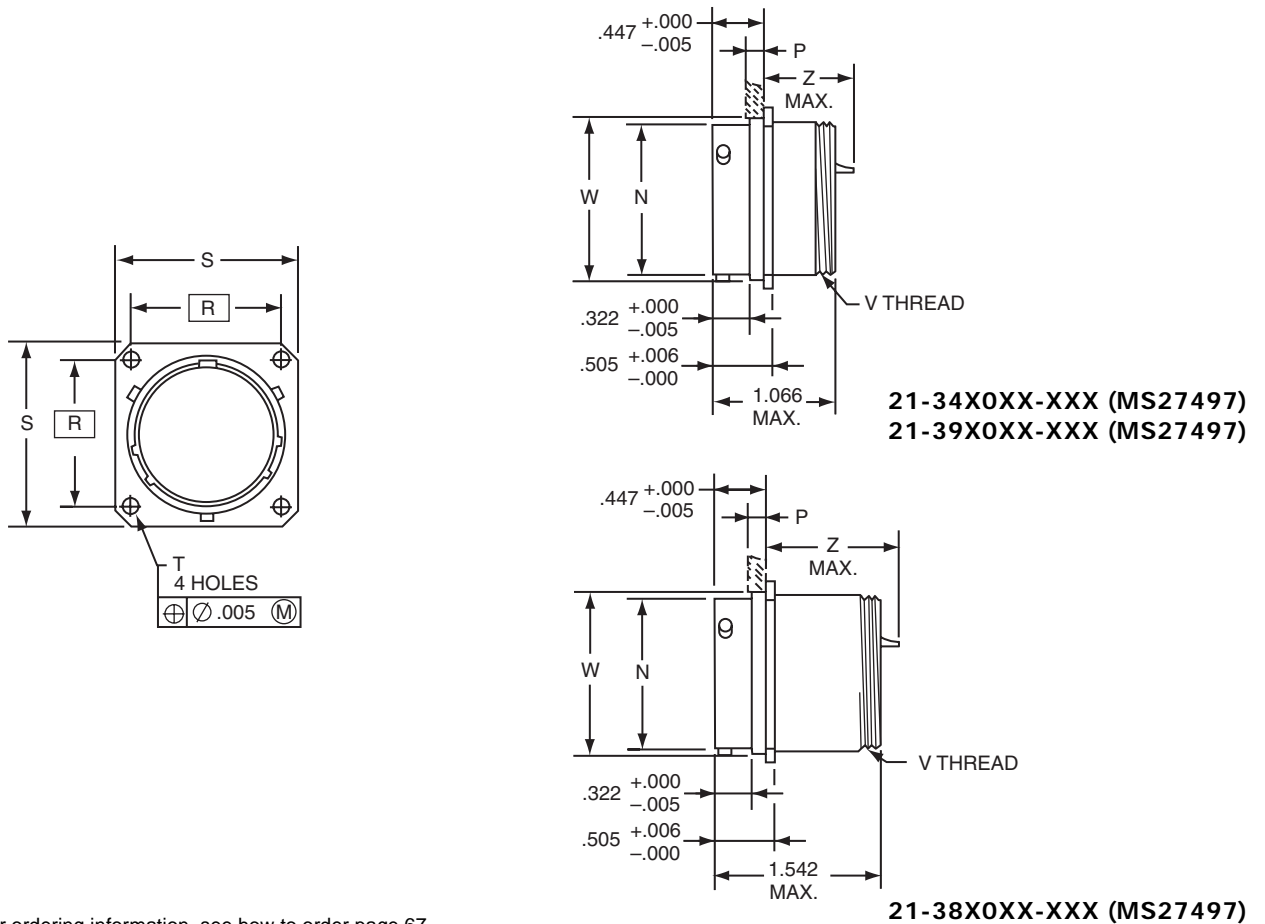
* Acceptable panel thickness for back panel mounting a standard receptacle.

21-37X0XX-XXX (MS27334)

| Shell Size | N Dia +.001 -.005 | P* Max. | R (TP) | S +.011 -.010 | T Dia. ±.005 | V Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|-------------------------|------------|-----------|---------------------|--------------------|------------------------------------|-----------------------------------|---|------------------------------|------------------------------|--|
| | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .473 | .022 | .594 | .812 | .120 | .4375-28 | .937 | .952 | .902 | 1.300 | 1.496 |
| 10 | .590 | .027 | .719 | .938 | .120 | .5625-24 | .937 | .952 | .902 | 1.300 | 1.496 |
| 12 | .750 | .027 | .812 | 1.031 | .120 | .6875-24 | .937 | .952 | .902 | 1.300 | 1.496 |
| 14 | .875 | .027 | .906 | 1.125 | .120 | .8125-20 | .937 | .952 | .902 | 1.300 | 1.496 |
| 16 | 1.000 | .027 | .969 | 1.219 | .120 | .9375-20 | .937 | .952 | .902 | 1.300 | 1.496 |
| 18 | 1.125 | .027 | 1.062 | 1.312 | .120 | 1.0625-18 | .937 | .952 | .902 | 1.300 | 1.496 |
| 20 | 1.250 | .054 | 1.156 | 1.438 | .120 | 1.1875-18 | .937 | .952 | .902 | 1.300 | 1.496 |
| 22 | 1.375 | .054 | 1.250 | 1.562 | .120 | 1.3125-18 | .937 | .952 | .902 | 1.300 | 1.496 |
| 24 | 1.500 | .054 | 1.375 | 1.688 | .147 | 1.4375-18 | .937 | .952 | .902 | 1.300 | 1.496 |

All dimensions for reference only.

wall mounting receptacle (back panel mounting)

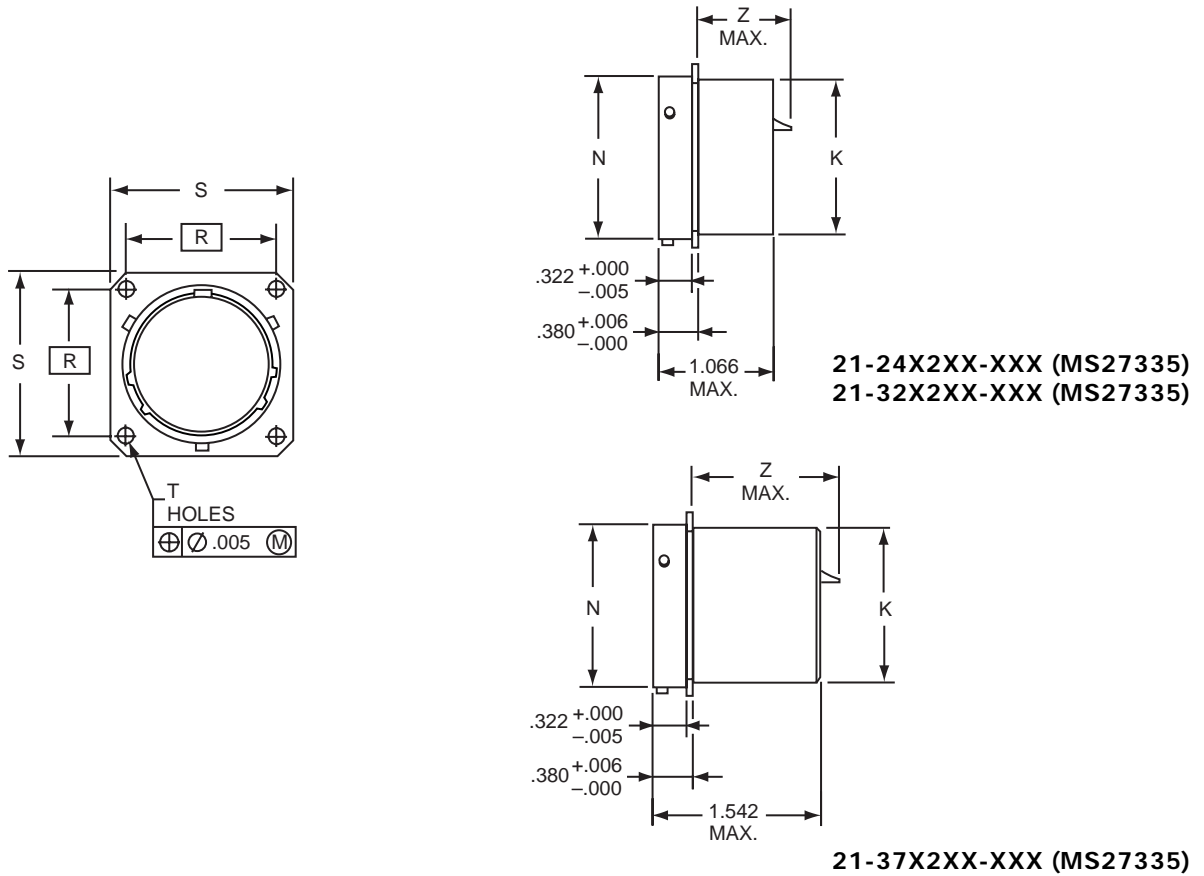


For ordering information, see how to order page 67.
 Plug movement required to clear FJT receptacles: .281 min.

| Shell Size | N Dia +.001 -.005 | P Max. Panel Thickness | R (TP) | S +.011 -.010 | T Dia. ±.005 | V Thread UNEF-2A (Plated) | W Dia. +.001 -.005 | SHORT SHELL VHF/UHF/MF Filters | | LONG SHELL HF Filters | |
|------------|-------------------------|------------------------|--------|---------------------|-----------------|---------------------------------|--------------------------|---------------------------------------|---------------------------------|---------------------------------------|---------------------------|
| | | | | | | | | Size 16 or 16 & 20 Contacts Z Max. | Size 20 or 22 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. |
| 8 | .473 | .147 | .594 | .812 | .120 | .4375-28 | .516 | .900 | .875 | 1.385 | 1.285 |
| 10 | .590 | .152 | .719 | .938 | .120 | .5625-24 | .633 | .900 | .875 | 1.385 | 1.285 |
| 12 | .750 | .152 | .812 | 1.031 | .120 | .6875-24 | .802 | .900 | .875 | 1.385 | 1.285 |
| 14 | .875 | .152 | .906 | 1.125 | .120 | .8125-20 | .927 | .900 | .875 | 1.385 | 1.285 |
| 16 | 1.000 | .152 | .969 | 1.219 | .120 | .9375-20 | 1.052 | .900 | .875 | 1.385 | 1.285 |
| 18 | 1.125 | .152 | 1.062 | 1.312 | .120 | 1.0625-18 | 1.177 | .900 | .875 | 1.385 | 1.285 |
| 20 | 1.250 | .179 | 1.156 | 1.438 | .120 | 1.1875-18 | 1.302 | .900 | .875 | 1.385 | 1.285 |
| 22 | 1.375 | .179 | 1.250 | 1.562 | .120 | 1.3125-18 | 1.427 | .900 | .875 | 1.385 | 1.285 |
| 24 | 1.500 | .179 | 1.375 | 1.688 | .147 | 1.4375-18 | 1.552 | .900 | .875 | 1.385 | 1.285 |

All dimensions for reference only.

box mounting receptacle



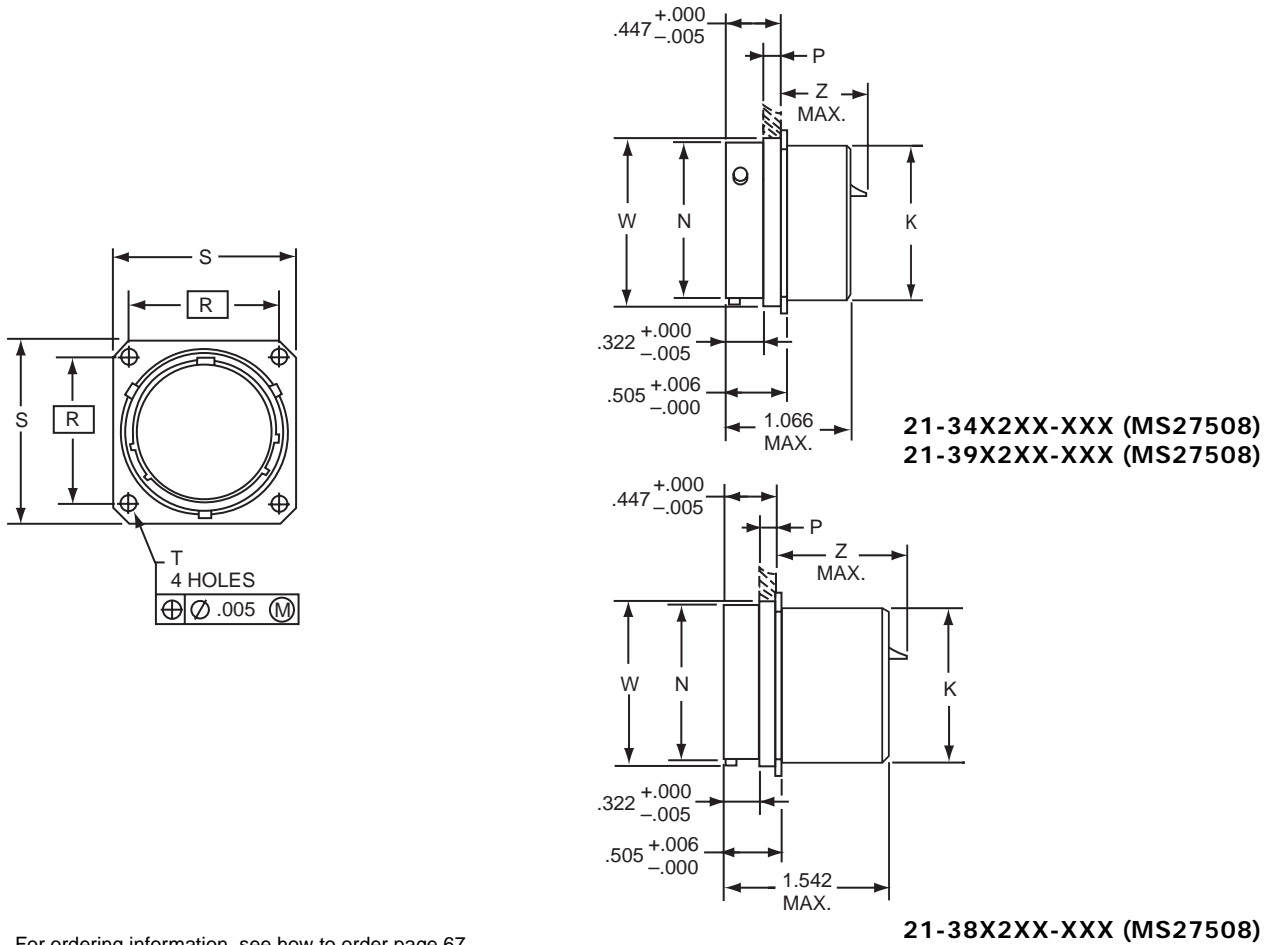
For ordering information, see how to order page 67.

Plug movement required to clear FJT receptacles: .281 min.

| Shell Size | K Dia. +.000 -.007 | N Dia +.001 -.005 | R (TP) | S +.011 -.010 | T Dia. ±.005 | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|--------------------------|-------------------------|--------|---------------------|-----------------|-----------------------------------|---------------------------------------|---------------------------|---------------------------|---------------------------------------|
| | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .438 | .473 | .594 | .812 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 10 | .562 | .590 | .719 | .938 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 12 | .688 | .750 | .812 | 1.031 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 14 | .812 | .875 | .906 | 1.125 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 16 | .938 | 1.000 | .969 | 1.219 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 18 | 1.062 | 1.125 | 1.062 | 1.312 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 20 | 1.188 | 1.250 | 1.156 | 1.438 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 22 | 1.312 | 1.375 | 1.250 | 1.562 | .120 | .937 | .952 | .902 | 1.300 | 1.496 |
| 24 | 1.438 | 1.500 | 1.375 | 1.688 | .147 | .937 | .952 | .902 | 1.300 | 1.496 |

All dimensions for reference only.

box mounting receptacle (back panel mounting)



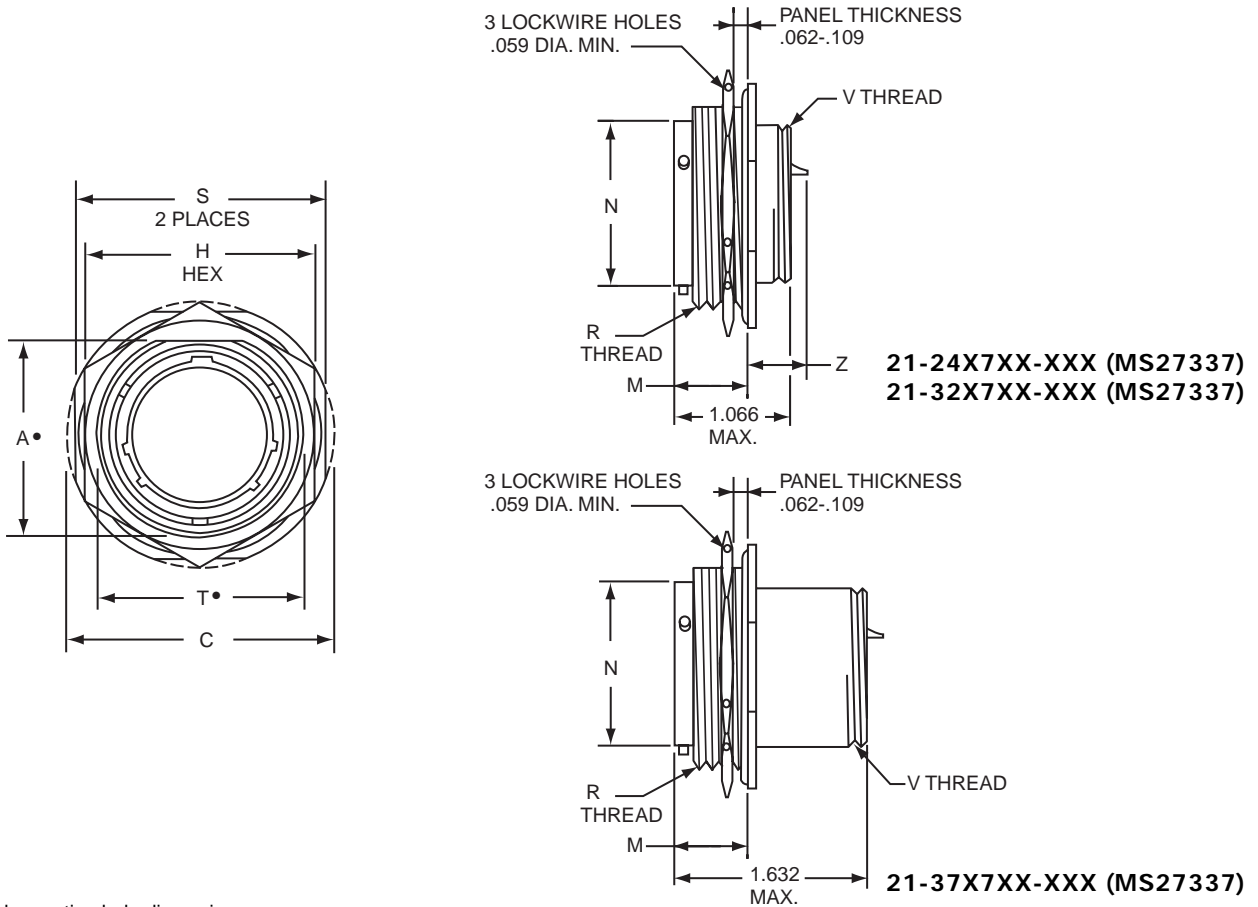
For ordering information, see how to order page 67.

Plug movement required to clear FJT receptacles: .281 min.

| Shell Size | K Dia. +.000 -0.007 | N Dia. +.001 -0.005 | P Max. Panel Thickness | R (TP) | S +.011 -0.010 | T Dia. ±.005 | W Dia. +.001 -0.005 | SHORT SHELL VHF/UHF/MF Filters | | LONG SHELL HF Filters | |
|------------|---------------------|---------------------|------------------------|--------|----------------|--------------|---------------------|------------------------------------|------------------------------|------------------------------------|------------------------|
| | | | | | | | | Size 16 or 16 & 20 Contacts Z Max. | Size 20 or 22 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. |
| 8 | .438 | .473 | .147 | .594 | .812 | .120 | .516 | .900 | .875 | 1.385 | 1.285 |
| 10 | .562 | .590 | .152 | .719 | .938 | .120 | .633 | .900 | .875 | 1.385 | 1.285 |
| 12 | .688 | .750 | .152 | .812 | 1.031 | .120 | .802 | .900 | .875 | 1.385 | 1.285 |
| 14 | .812 | .875 | .152 | .906 | 1.125 | .120 | .927 | .900 | .875 | 1.385 | 1.285 |
| 16 | .938 | 1.000 | .152 | .969 | 1.219 | .120 | 1.052 | .900 | .875 | 1.385 | 1.285 |
| 18 | 1.062 | 1.125 | .152 | 1.062 | 1.312 | .120 | 1.177 | .900 | .875 | 1.385 | 1.285 |
| 20 | 1.188 | 1.250 | .179 | 1.156 | 1.438 | .120 | 1.302 | .900 | .875 | 1.385 | 1.285 |
| 22 | 1.312 | 1.375 | .179 | 1.250 | 1.562 | .120 | 1.427 | .900 | .875 | 1.385 | 1.285 |
| 24 | 1.438 | 1.500 | .179 | 1.375 | 1.688 | .147 | 1.552 | .900 | .875 | 1.385 | 1.285 |

All dimensions for reference only.

jam nut receptacle



• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

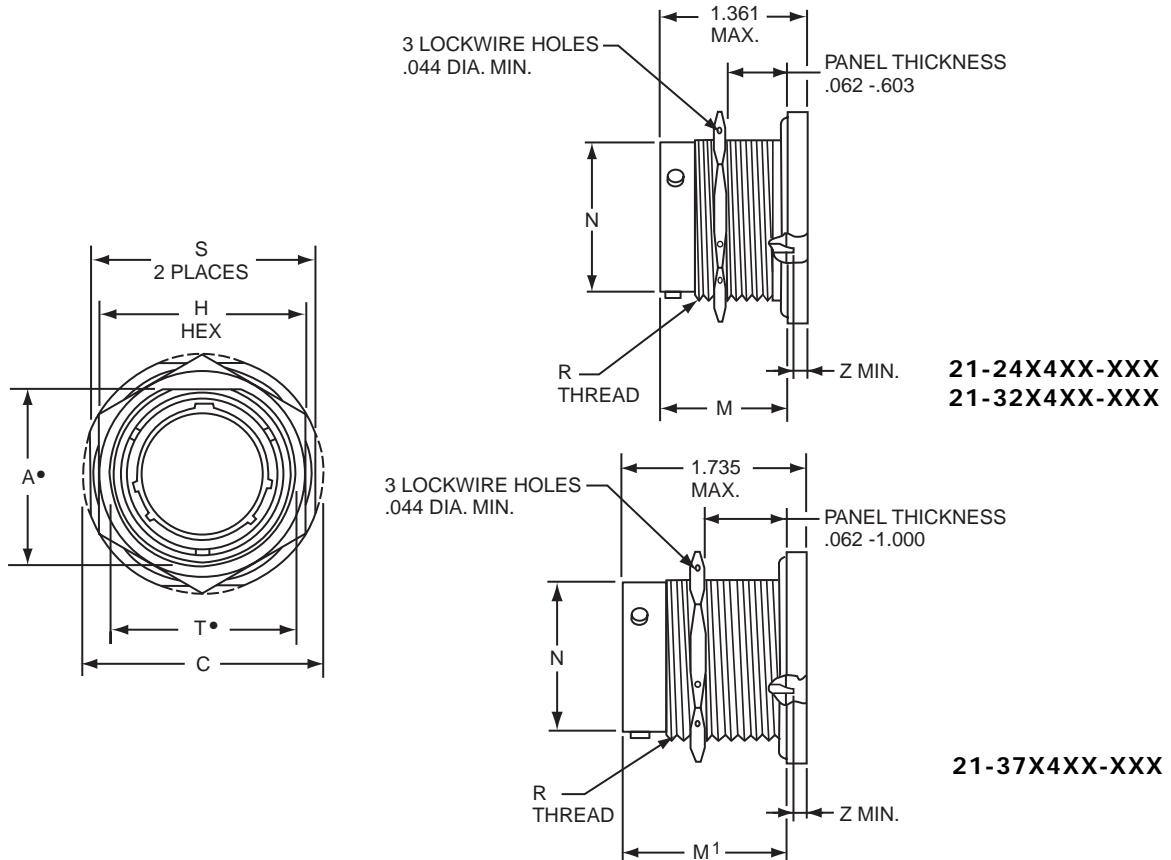
Plug movement required to clear FJT receptacles: .281 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | M ±.005 | N Dia +.001 -.005 | R Thread (Plated) Class -2A | S ±.010 | T* Dia. +.010 -.000 | V Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|---------------------------|--------------------------|-------------------------|------------|-------------------------|-----------------------------------|------------|---------------------------|---------------------------------|---|------------------------------|------------------------------|---|------------------------------|
| | | | | | | | | | | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. | Size 22 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. |
| 8 | .830 | 1.375 | 1.062 | .438 | .473 | .8750-20UNEF | 1.250 | .884 | .4375-28 | .900 | .884 | .849 | 1.443 | 1.276 |
| 10 | .955 | 1.500 | 1.188 | .438 | .590 | 1.0000-20UNEF | 1.375 | 1.007 | .5625-24 | .900 | .884 | .849 | 1.443 | 1.276 |
| 12 | 1.084 | 1.625 | 1.312 | .438 | .750 | 1.1250-18UNEF | 1.500 | 1.134 | .6875-24 | .900 | .884 | .849 | 1.443 | 1.276 |
| 14 | 1.208 | 1.750 | 1.438 | .438 | .875 | 1.2500-18UNEF | 1.625 | 1.259 | .8125-20 | .900 | .884 | .849 | 1.443 | 1.276 |
| 16 | 1.333 | 1.938 | 1.562 | .438 | 1.000 | 1.3750-18UNEF | 1.781 | 1.384 | .9375-20 | .900 | .884 | .849 | 1.443 | 1.276 |
| 18 | 1.459 | 2.016 | 1.688 | .438 | 1.125 | 1.5000-18UNEF | 1.890 | 1.507 | 1.0625-18 | .900 | .884 | .849 | 1.443 | 1.276 |
| 20 | 1.576 | 2.141 | 1.812 | .464 | 1.250 | 1.6250-18UNEF | 2.016 | 1.634 | 1.1875-18 | .874 | .858 | .823 | 1.443 | 1.276 |
| 22 | 1.701 | 2.265 | 2.000 | .464 | 1.375 | 1.7500-18UNS | 2.140 | 1.759 | 1.3125-18 | .874 | .858 | .823 | 1.417 | 1.250 |
| 24 | 1.826 | 2.390 | 2.125 | .464 | 1.500 | 1.8750-16UN | 2.265 | 1.884 | 1.4375-18 | .874 | .858 | .823 | 1.417 | 1.250 |

All dimensions for reference only.

FJTP

jam nut receptacle (minimum penetration)



• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

Plug movement required to clear FJT receptacles: .281 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | M ±.005 | M ¹ ±.005 | N Dia +.001 -.005 | R Thread UNEF-2A (Plated) | S +.011 -.010 | T* Dia. +.010 -.000 | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|---------------------------|--------------------------|-------------------------|------------|-------------------------|-------------------------|---------------------------------|---------------------|---------------------------|---|------------------------------|------------------------------|---|------------------------------|
| | | | | | | | | | | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. | Size 22 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. |
| 8 | .542 | 1.062 | .750 | 1.220 | 1.594 | .473 | .5625-24 | .938 | .572 | .000 | .022 | .057 | .000 | .000 |
| 10 | .669 | 1.188 | .875 | 1.220 | 1.594 | .590 | .6875-24 | 1.062 | .697 | .000 | .022 | .057 | .000 | .000 |
| 12 | .830 | 1.375 | 1.062 | 1.220 | 1.594 | .750 | .8750-20 | 1.250 | .844 | .000 | .022 | .057 | .000 | .000 |
| 14 | .955 | 1.500 | 1.188 | 1.220 | 1.594 | .875 | 1.0000-20 | 1.375 | 1.007 | .000 | .022 | .057 | .000 | .000 |
| 16 | 1.084 | 1.625 | 1.312 | 1.220 | 1.594 | 1.000 | 1.1250-18 | 1.500 | 1.134 | .000 | .022 | .057 | .000 | .000 |
| 18 | 1.208 | 1.750 | 1.438 | 1.220 | 1.594 | 1.125 | 1.2500-18 | 1.625 | 1.259 | .000 | .022 | .057 | .000 | .000 |
| 20 | 1.333 | 1.938 | 1.562 | 1.188 | 1.563 | 1.250 | 1.3750-18 | 1.812 | 1.384 | .000 | .022 | .057 | .000 | .000 |
| 22 | 1.459 | 2.062 | 1.688 | 1.188 | 1.563 | 1.375 | 1.5000-18 | 1.938 | 1.507 | .000 | .022 | .057 | .000 | .000 |
| 24 | 1.575 | 2.188 | 1.812 | 1.188 | 1.563 | 1.500 | 1.6250-18 | 2.062 | 1.634 | .000 | .022 | .057 | .000 | .000 |

All dimensions for reference only.

Amphenol® FLJT Series Subminiature Cylindrical Filters

The Amphenol® FLJT Series offers all the design features of the FJT plus a 100% “scoop-proof” contact protection design.

- Intermountable with MIL-DTL-38999/27599 Series I connectors (see Catalog 12-090)
- Contact Protection - shell design prevents contact damage
- Quick Positive Coupling – 3 point bayonet locking
- Higher reliability and greater durability with permanently encapsulated contacts
- Environmental Resistant
- Aluminum shells with several finish options
- Error-proof alternate positioning of shell keyways
- Corrosion Resistant - 500 hour salt spray olive drab cadmium over nickel plating, class T (aluminum), or stainless steel shells

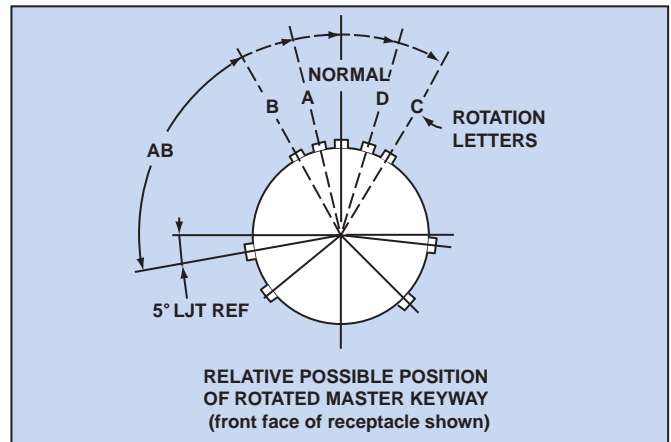


FLJT Master Key/Keyway Rotation

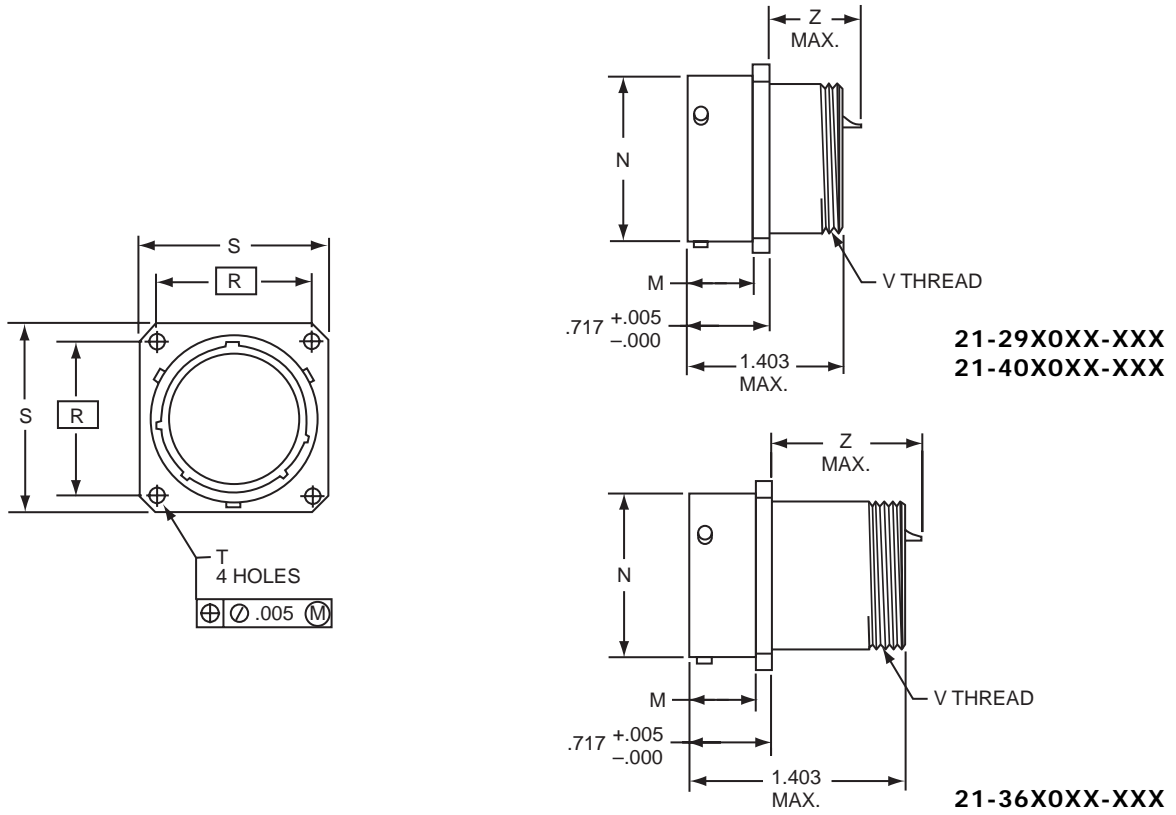
| Shell Size | AB Angle of Rotation (Degrees) | | | | |
|------------|--------------------------------|----|----|-----|-----|
| | Normal | A | B | C | D |
| 9 | 95 | 77 | – | – | 113 |
| 11 | 95 | 81 | 67 | 123 | 109 |
| 13 | 95 | 75 | 63 | 127 | 115 |
| 15 | 95 | 74 | 61 | 129 | 116 |
| 17 | 95 | 77 | 65 | 125 | 113 |
| 19 | 95 | 77 | 65 | 125 | 113 |
| 21 | 95 | 77 | 65 | 125 | 113 |
| 23 | 95 | 80 | 69 | 121 | 110 |
| 25 | 95 | 80 | 69 | 121 | 110 |

A plug with a given rotation letter will mate with a receptacle with the same rotation letter. The AB angle for a given connector is the same whether it contains pins or sockets. Inserts are not rotated in conjunction with the master key/keyway.

AB angles shown are viewed from the front face of the connector. A receptacle is shown at right. The angles for the plug are exactly the same, except the direction of rotation is opposite of that shown for the receptacle.



FLJT wall mounting receptacle



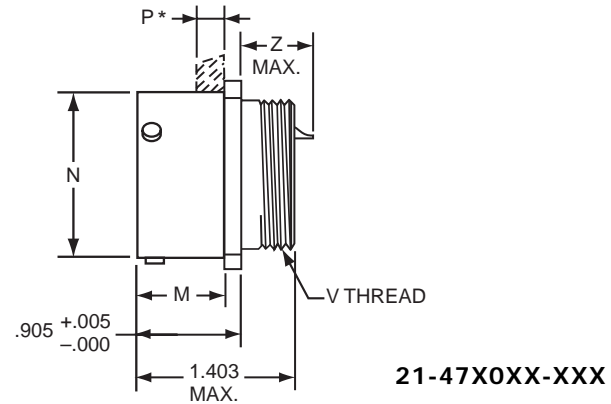
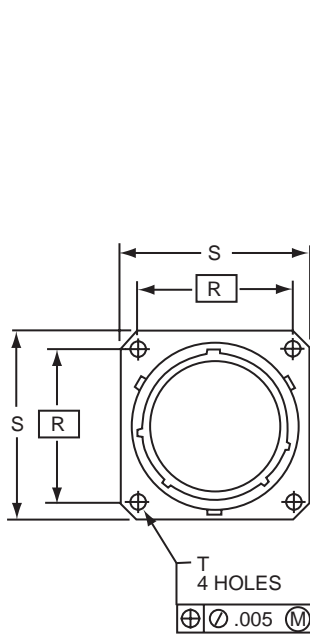
For ordering information, see how to order page 67.
 Plug movement required to clear FLJT receptacles: .625 min.

| Shell Size | M +.000 -.006 | N Dia. +.001 -.005 | R (TP) | S +.011 -.010 | T Dia. ±.005 | V Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|---------------------|-----------------------------|-----------|---------------------|--------------------|------------------------------------|-----------------------------------|---|------------------------------|------------------------------|--|
| | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 9 | .632 | .572 | .719 | .938 | .128 | .4375-28 | .865 | .950 | .820 | 1.324 | 1.394 |
| 11 | .632 | .700 | .812 | 1.031 | .128 | .5625-24 | .865 | .950 | .820 | 1.324 | 1.394 |
| 13 | .632 | .850 | .906 | 1.125 | .128 | .6875-24 | .865 | .950 | .820 | 1.324 | 1.394 |
| 15 | .632 | .975 | .969 | 1.219 | .128 | .8125-20 | .865 | .950 | .820 | 1.324 | 1.394 |
| 17 | .632 | 1.100 | 1.062 | 1.312 | .128 | .9375-20 | .865 | .950 | .820 | 1.324 | 1.394 |
| 19 | .632 | 1.207 | 1.156 | 1.438 | .128 | 1.0625-18 | .865 | .950 | .820 | 1.324 | 1.394 |
| 21 | .602 | 1.332 | 1.250 | 1.562 | .128 | 1.1875-18 | .865 | .950 | .820 | 1.324 | 1.394 |
| 23 | .602 | 1.457 | 1.375 | 1.688 | .147 | 1.3125-18 | .865 | .950 | .820 | 1.324 | 1.394 |
| 25 | .602 | 1.582 | 1.500 | 1.812 | .147 | 1.4375-18 | .865 | .950 | .820 | 1.324 | 1.394 |

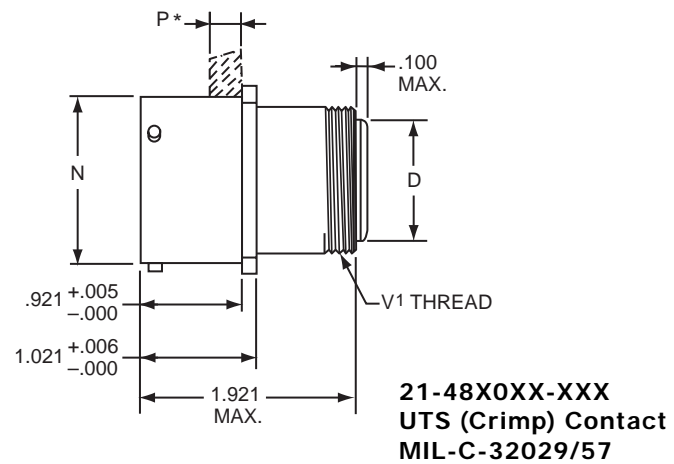
All dimensions for reference only.

FLJTPO

wall mounting receptacle (back panel mounting, UTS crimp)



21-47X0XX-XXX



**21-48X0XX-XXX
UTS (Crimp) Contact
MIL-C-32029/57**

For ordering information, see how to order page 67.

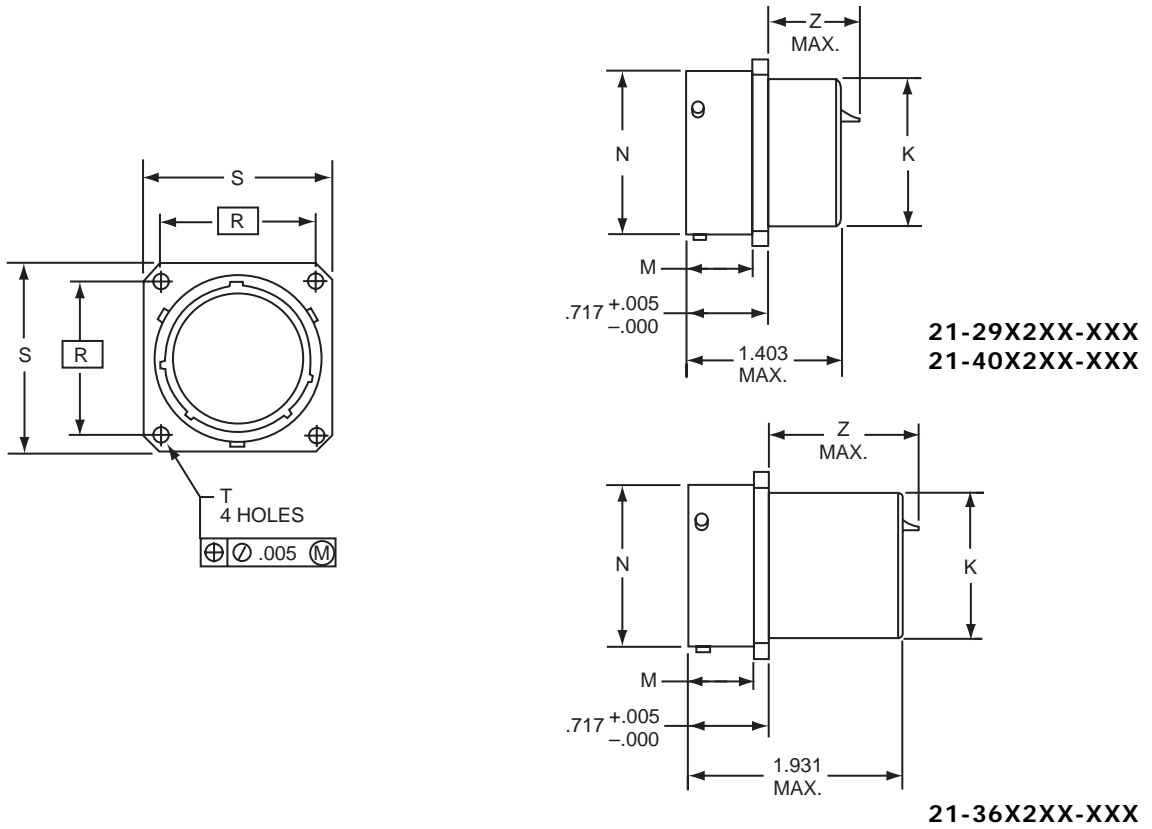
Plug movement required to clear FLJT receptacles: .625 min.

* Acceptable panel thickness for back panel mounting a standard receptacle.

| Shell Size | D Dia. ±.005 | M +.000 - .006 | N Dia. +.001 - .005 | P Max. Panel Thickness | R (TP) | S +.011 - .010 | T Dia. ±.005 | V Thread UNEF-2A (Plated) | V ¹ Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF Filters | | |
|------------|--------------|----------------|---------------------|------------------------|--------|----------------|--------------|---------------------------|--|-----------------------------|------------------------------------|------------------------|
| | | | | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. |
| 9 | .299 | .820 | .572 | .234 | .719 | .938 | .128 | .4375-28 | .5625-24 | .672 | .763 | .632 |
| 11 | .427 | .820 | .700 | .234 | .812 | 1.031 | .128 | .5625-24 | .6875-24 | .672 | .763 | .632 |
| 13 | .541 | .820 | .850 | .234 | .906 | 1.125 | .128 | .6875-24 | .8125-20 | .672 | .763 | .632 |
| 15 | .666 | .820 | .975 | .234 | .969 | 1.219 | .128 | .8125-20 | .9375-20 | .672 | .763 | .632 |
| 17 | .791 | .820 | 1.100 | .234 | 1.062 | 1.312 | .128 | .9375-20 | 1.0625-18 | .672 | .763 | .632 |
| 19 | .897 | .820 | 1.207 | .234 | 1.156 | 1.438 | .128 | 1.0625-18 | 1.1875-18 | .672 | .763 | .632 |
| 21 | 1.022 | .790 | 1.332 | .204 | 1.250 | 1.562 | .128 | 1.1875-18 | 1.3125-18 | .672 | .763 | .632 |
| 23 | 1.147 | .790 | 1.457 | .204 | 1.375 | 1.688 | .147 | 1.3125-18 | 1.4375-18 | .672 | .763 | .632 |
| 25 | 1.272 | .790 | 1.582 | .193 | 1.500 | 1.812 | .147 | 1.4375-18 | 1.5625-18 | .672 | .763 | .632 |

All dimensions for reference only.

FLJT box mounting receptacle



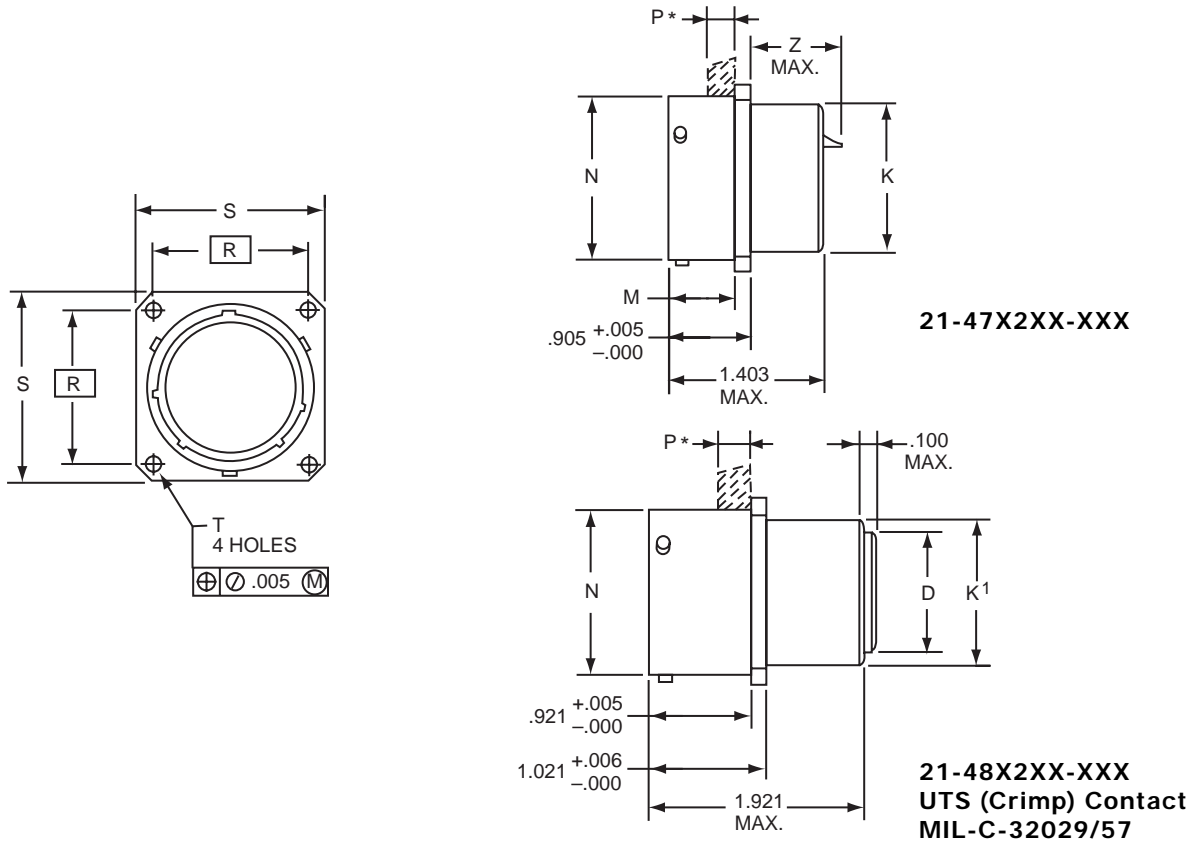
For ordering information, see how to order page 67.
 Plug movement required to clear FLJT receptacles: .625 min.

| Shell Size | K Dia. +.001 -.006 | M +.000 -.006 | N Dia. +.001 -.005 | R (TP) | S +.011 -.010 | T Dia. ±.005 | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|--------------------------|---------------------|--------------------------|--------|---------------------|-----------------|-----------------------------------|---------------------------------------|---------------------------|---------------------------|---------------------------------------|
| | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 9 | .436 | .632 | .572 | .719 | .938 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 11 | .560 | .632 | .700 | .812 | 1.031 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 13 | .686 | .632 | .850 | .906 | 1.125 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 15 | .810 | .632 | .975 | .969 | 1.219 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 17 | .936 | .632 | 1.100 | 1.062 | 1.312 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 19 | 1.060 | .632 | 1.207 | 1.156 | 1.438 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 21 | 1.186 | .602 | 1.332 | 1.250 | 1.562 | .128 | .865 | .950 | .820 | 1.324 | 1.394 |
| 23 | 1.310 | .602 | 1.457 | 1.375 | 1.688 | .147 | .865 | .950 | .820 | 1.324 | 1.394 |
| 25 | 1.436 | .602 | 1.582 | 1.500 | 1.812 | .147 | .865 | .950 | .820 | 1.324 | 1.394 |

All dimensions for reference only.

FLJTP

box mounting receptacle (back panel mounting, UTS crimp)



For ordering information, see how to order page 67.

Plug movement required to clear FLJT receptacles: .625 min.

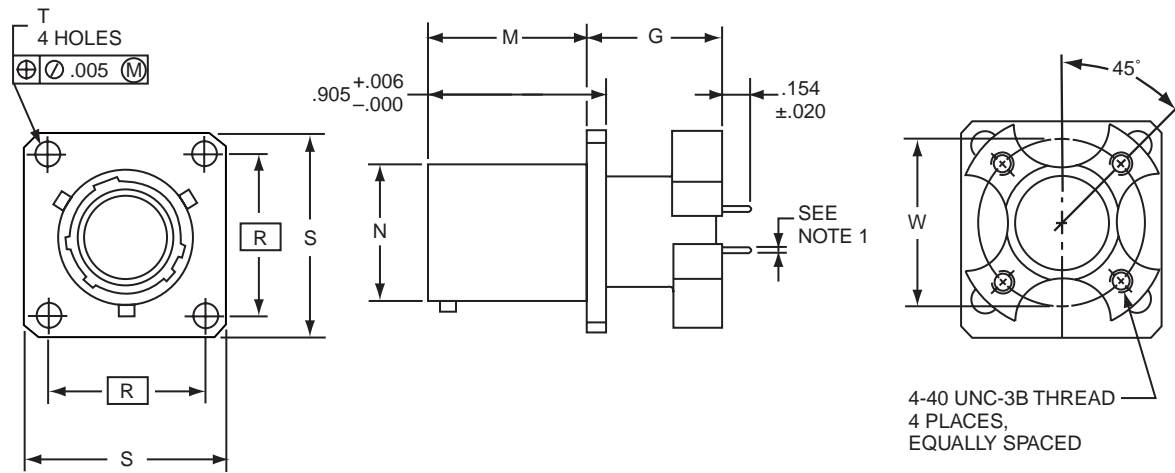
* Acceptable panel thickness for back panel mounting a standard receptacle.

| Shell Size | D Dia. ±.005 | K Dia. +.000 - .006 | K ¹ Dia. +.000 - .007 | M +.000 - .006 | N Dia. +.001 - .005 | P Max. Panel Thickness | R (TP) | S +.011 - .010 | T Dia. ±.005 | SHORT SHELL VHF/UHF Filters | | |
|------------|--------------|---------------------|----------------------------------|----------------|---------------------|------------------------|--------|----------------|--------------|-----------------------------|------------------------------------|------------------------|
| | | | | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. |
| 9 | .299 | .437 | .561 | .820 | .572 | .234 | .719 | .938 | .128 | .672 | .763 | .632 |
| 11 | .427 | .562 | .687 | .820 | .700 | .234 | .812 | 1.031 | .128 | .672 | .763 | .632 |
| 13 | .541 | .688 | .811 | .820 | .850 | .234 | .906 | 1.125 | .128 | .672 | .763 | .632 |
| 15 | .666 | .812 | .937 | .820 | .975 | .234 | .969 | 1.219 | .128 | .672 | .763 | .632 |
| 17 | .791 | .938 | 1.061 | .820 | 1.100 | .234 | 1.062 | 1.312 | .128 | .672 | .763 | .632 |
| 19 | .897 | 1.062 | 1.187 | .820 | 1.207 | .234 | 1.156 | 1.438 | .128 | .672 | .763 | .632 |
| 21 | 1.022 | 1.188 | 1.312 | .790 | 1.332 | .204 | 1.250 | 1.562 | .128 | .672 | .763 | .632 |
| 23 | 1.147 | 1.312 | 1.437 | .790 | 1.457 | .204 | 1.375 | 1.688 | .147 | .672 | .763 | .632 |
| 25 | 1.272 | 1.438 | 1.562 | .790 | 1.582 | .193 | 1.500 | 1.812 | .147 | .672 | .763 | .632 |

All dimensions for reference only.

FLJT

box mounting receptacle (printed circuit board mount)



21-57X2XX-XXX

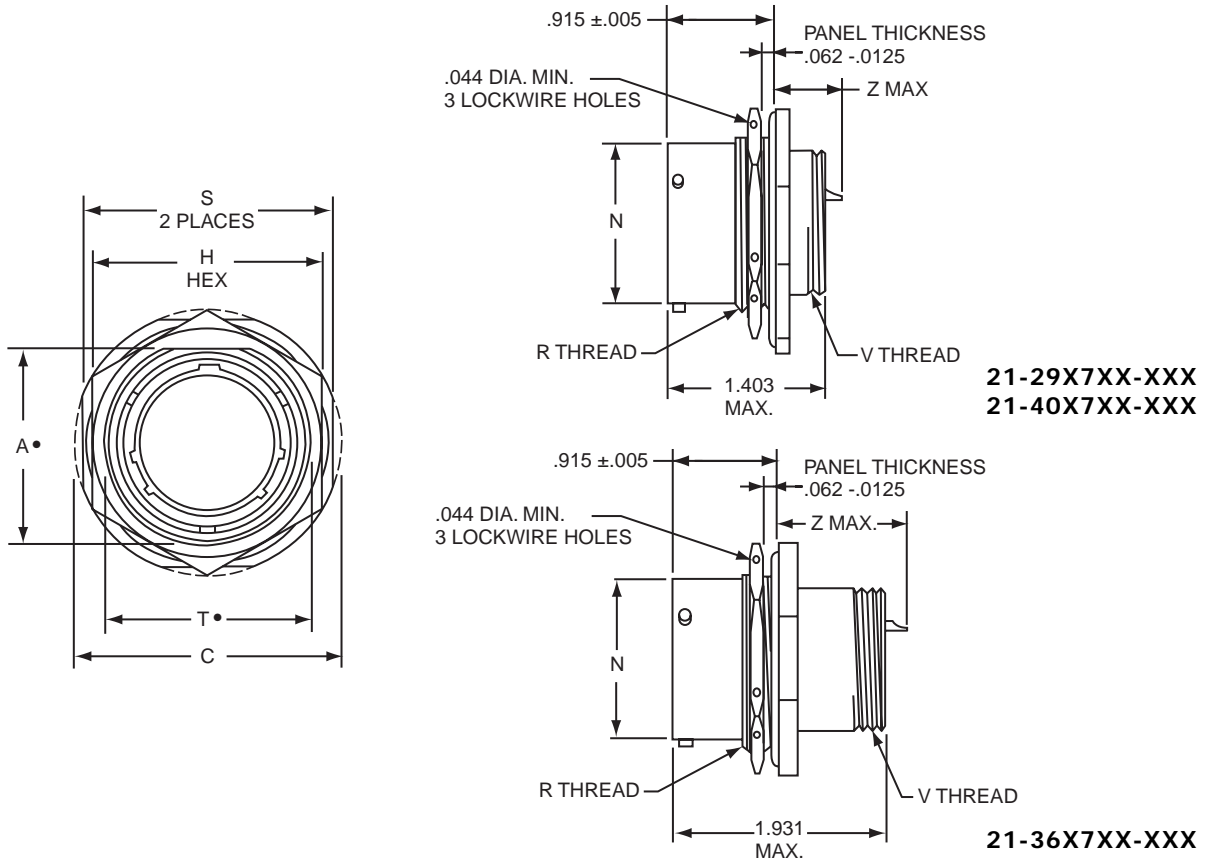
- Standard tail for size 22 is $.020 \pm .001$ dia.
Standard tail for size 20 is $.030 \pm .001$ dia.
- For ordering information, see how to order page 67.
Plug movement required to clear FLJT receptacles: $.625$ min.

| Shell Size | G +.006 -.005 | M +.000 -.005 | N Dia. +.001 -.005 | R (TP) | S +.011 -.010 | T Dia. +.004 -.003 | W |
|------------|---------------------|---------------------|--------------------------|-----------|---------------------|--------------------------|-------|
| 11 | .689 | .820 | .700 | .812 | 1.031 | .128 | .850 |
| 13 | .689 | .820 | .850 | .906 | 1.125 | .128 | .994 |
| 15 | .689 | .820 | .975 | .969 | 1.219 | .128 | 1.119 |
| 17 | .689 | .820 | 1.100 | 1.062 | 1.312 | .128 | 1.237 |
| 19 | .689 | .820 | 1.207 | 1.156 | 1.438 | .128 | 1.379 |
| 21 | .689 | .790 | 1.332 | 1.250 | 1.562 | .128 | 1.489 |
| 23 | .719 | .790 | 1.457 | 1.375 | 1.688 | .147 | 1.619 |
| 25 | .719 | .790 | 1.582 | 1.500 | 1.812 | .147 | 1.744 |

All dimensions for reference only.

FLJT

jam nut receptacle



• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

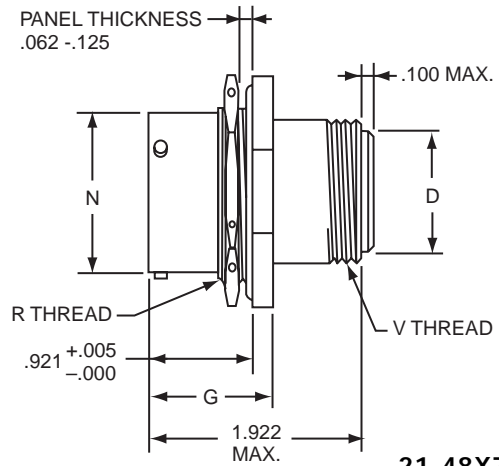
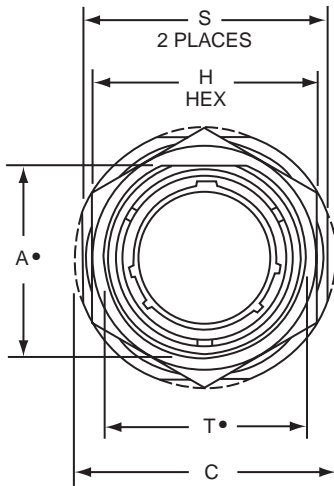
Plug movement required to clear FLJT receptacles: .625 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | N Dia +.001 -.005 | R Thread (Plated) Class -2A | S +.016 -.015 | T* Dia. +.010 -.000 | V Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | |
|------------|---------------------------|--------------------------|-------------------------|-------------------------|-----------------------------------|---------------------|---------------------------|---------------------------------|-----------------------------------|---|---------------------------|---------------------------|---|
| | | | | | | | | | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 22 Contact Z Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 9 | .669 | 1.188 | .875 | .572 | .6875-24UNEF | 1.062 | .697 | .4375-28 | .667 | .756 | .616 | 1.228 | 1.201 |
| 11 | .769 | 1.375 | 1.000 | .700 | .8125-20UNEF | 1.250 | .822 | .5625-24 | .667 | .756 | .616 | 1.228 | 1.201 |
| 13 | .955 | 1.500 | 1.188 | .850 | 1.0000-20UNEF | 1.375 | 1.007 | .6875-24 | .667 | .756 | .616 | 1.228 | 1.201 |
| 15 | 1.084 | 1.625 | 1.312 | .975 | 1.1250-18UNEF | 1.500 | 1.134 | .8125-20 | .667 | .756 | .616 | 1.228 | 1.201 |
| 17 | 1.208 | 1.750 | 1.438 | 1.100 | 1.2500-18UNEF | 1.625 | 1.259 | .9375-20 | .667 | .756 | .616 | 1.228 | 1.201 |
| 19 | 1.333 | 1.938 | 1.562 | 1.207 | 1.3750-18UNEF | 1.812 | 1.384 | 1.0625-18 | .667 | .756 | .616 | 1.228 | 1.201 |
| 21 | 1.459 | 2.062 | 1.688 | 1.332 | 1.5000-18UNEF | 1.938 | 1.507 | 1.1875-18 | .667 | .756 | .616 | 1.228 | 1.201 |
| 23 | 1.580 | 2.188 | 1.812 | 1.457 | 1.6250-18UNEF | 2.062 | 1.634 | 1.3125-18 | .667 | .756 | .616 | 1.228 | 1.201 |
| 25 | 1.709 | 2.312 | 2.000 | 1.582 | 1.7500-18UNS | 2.188 | 1.759 | 1.4375-18 | .667 | .756 | .616 | 1.228 | 1.201 |

All dimensions for reference only.

FLJTPO

jam nut receptacle (UTS crimp)



**21-48X7XX-XXX
UTS (Crimp) Contact
MIL-C-39029/57**

• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

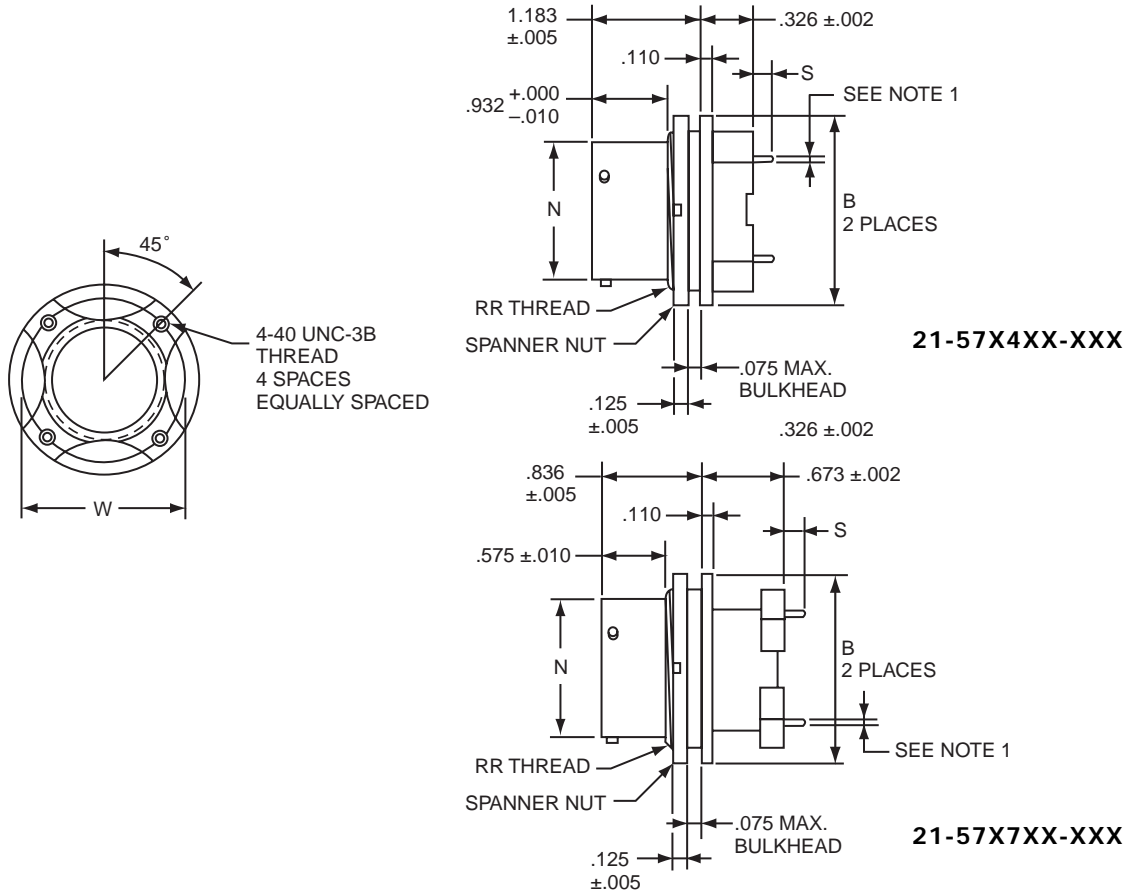
Plug movement required to clear FLJT receptacles: .625 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | D Dia. ±.005 | G +.006 -.005 | H Hex +.017 -.016 | N Dia +.001 -.005 | R Thread (Plated) Class -2A | S +.016 -.015 | T* Dia. +.010 -.000 | V Thread UNEF-2A (Plated) |
|------------|---------------------------|--------------------------|-----------------|---------------------|-------------------------|-------------------------|-----------------------------------|---------------------|---------------------------|---------------------------------|
| 9 | .669 | 1.188 | .299 | 1.030 | .875 | .572 | .6875-24UNEF | 1.062 | .697 | .5625-24 |
| 11 | .769 | 1.375 | .427 | 1.030 | 1.000 | .700 | .8125-20UNEF | 1.250 | .822 | .6875-24 |
| 13 | .955 | 1.500 | .541 | 1.030 | 1.188 | .850 | 1.0000-20UNEF | 1.375 | 1.007 | .8125-20 |
| 15 | 1.084 | 1.625 | .666 | 1.030 | 1.312 | .975 | 1.1250-18UNEF | 1.500 | 1.134 | .9375-20 |
| 17 | 1.208 | 1.750 | .791 | 1.030 | 1.438 | 1.100 | 1.2500-18UNEF | 1.625 | 1.259 | 1.0625-18 |
| 19 | 1.333 | 1.938 | .897 | 1.061 | 1.562 | 1.207 | 1.3750-18UNEF | 1.812 | 1.384 | 1.1875-18 |
| 21 | 1.459 | 2.062 | 1.022 | 1.061 | 1.688 | 1.332 | 1.5000-18UNEF | 1.938 | 1.507 | 1.3125-18 |
| 23 | 1.580 | 2.188 | 1.147 | 1.061 | 1.812 | 1.457 | 1.6250-18UNEF | 2.062 | 1.634 | 1.4375-18 |
| 25 | 1.709 | 2.312 | 1.272 | 1.061 | 2.000 | 1.582 | 1.7500-18UNS | 2.188 | 1.759 | 1.5625-18 |

All dimensions for reference only.

FLJT

jam mounting receptacle (printed circuit board mount)



1. Standard tail for size 22 is $.020 \pm .001$ dia.

Standard tail for size 20 is $.030 \pm .001$ dia.

For ordering information, see how to order page 67.

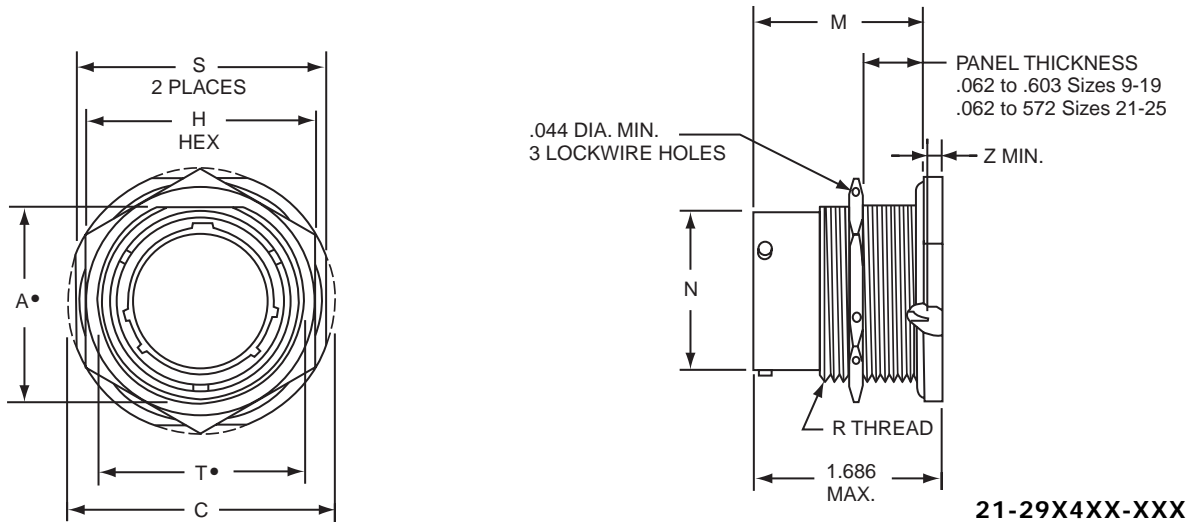
Plug movement required to clear FLJT receptacles: $.625$ min.

| Shell Size | B Dia. ±.005 | N Dia. +.001 -.005 | S ±.020 | W | RR Thread UNEF-2A |
|------------|--------------|-----------------------|---------|-------|-------------------|
| 11 | 1.062 | .700 | .132 | .850 | .8125-20 |
| 13 | 1.250 | .850 | .132 | .994 | 1.0000-20 |
| 15 | 1.375 | .975 | .132 | 1.119 | 1.1250-20 |
| 17 | 1.500 | 1.100 | .132 | 1.237 | 1.2500-18 |
| 19 | 1.625 | 1.207 | .132 | 1.379 | 1.3750-18 |
| 21 | 1.750 | 1.332 | .132 | 1.489 | 1.5000-18 |
| 23 | 1.875 | 1.457 | .132 | 1.619 | 1.6250-18 |
| 25 | 2.000 | 1.582 | .132 | 1.744 | 1.7500-18 |

All dimensions for reference only.

FLJT

jam nut receptacle (minimum penetration)



21-29X4XX-XXX

• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

Plug movement required to clear FLJT receptacles: .625 min.

| Shell Size | A* Flat +0.000 -0.010 | C Dia. +0.011 -0.010 | H Hex +0.017 -0.016 | M ±.005 | N Dia +0.001 -0.005 | R Thread (Plated) Class -2A | S +0.016 -0.015 | T* Dia. +0.010 -0.000 | SHORT SHELL VHF/UHF Filters | | | |
|------------|-----------------------------|----------------------------|---------------------------|------------|---------------------------|-----------------------------------|-----------------------|-----------------------------|--------------------------------|---|------------------------------|------------------------------|
| | | | | | | | | | Size 16 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | Size 20 Contact Z Max. | Size 22 Contact Z Max. |
| 9 | .669 | 1.188 | .875 | 1.557 | .572 | .6875-24UNEF | 1.062 | .697 | .000 | .000 | .000 | .000 |
| 11 | .769 | 1.375 | 1.000 | 1.557 | .700 | .8125-20UNEF | 1.250 | .822 | .000 | .000 | .000 | .000 |
| 13 | .955 | 1.500 | 1.188 | 1.557 | .850 | 1.0000-20UNEF | 1.375 | 1.007 | .000 | .000 | .000 | .000 |
| 15 | 1.084 | 1.625 | 1.312 | 1.557 | .975 | 1.1250-18UNEF | 1.500 | 1.134 | .000 | .000 | .000 | .000 |
| 17 | 1.208 | 1.750 | 1.438 | 1.557 | 1.100 | 1.2500-18UNEF | 1.625 | 1.259 | .000 | .000 | .000 | .000 |
| 19 | 1.333 | 1.938 | 1.562 | 1.557 | 1.207 | 1.3750-18UNEF | 1.812 | 1.384 | .000 | .000 | .000 | .000 |
| 21 | 1.459 | 2.062 | 1.688 | 1.525 | 1.332 | 1.5000-18UNEF | 1.938 | 1.507 | .000 | .000 | .000 | .000 |
| 23 | 1.580 | 2.188 | 1.812 | 1.525 | 1.457 | 1.6250-18UNEF | 2.062 | 1.634 | .000 | .000 | .000 | .000 |
| 25 | 1.709 | 2.312 | 2.000 | 1.525 | 1.582 | 1.7500-18UNS | 2.188 | 1.759 | .000 | .000 | .000 | .000 |

All dimensions for reference only.

Amphenol® FSJT Series Subminiature Cylindrical Filters

The Amphenol® FSJT Series combines the unique design features of the scoop-proof FLJT Series with the standard mounting dimensions of JT types. (See SJT Catalog 12-091)

- 100% scoop-proof design
- Standard mounting dimensions
- Compliance with European Specifications PAN6433-2, LN29729, BS9522 F0012, VG96912
- Uses proven filter technology with available components from other series
- EMP protection versions available

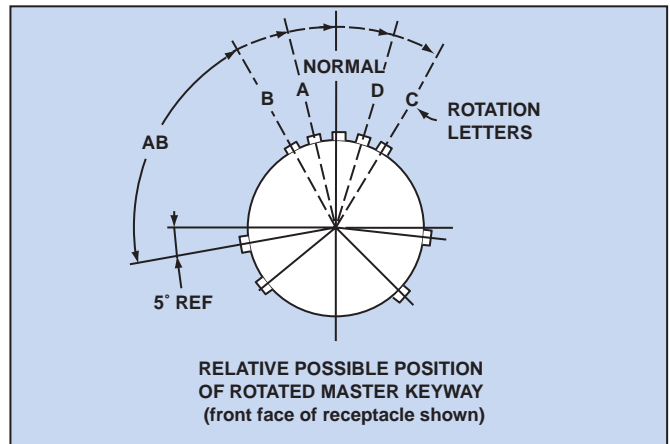


FSJT Master Key/Keyway Rotation

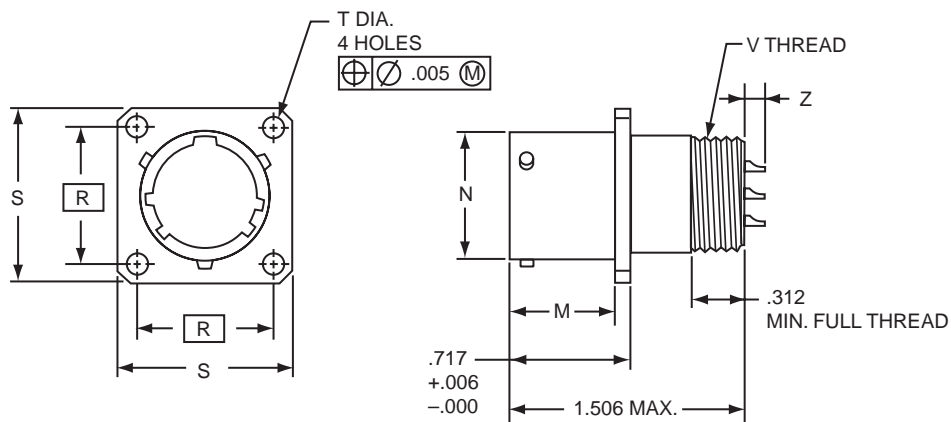
| Shell Size | AB Angle of Rotation (Degrees) | | | | |
|------------|--------------------------------|----|----|-----|-----|
| | Normal | A | B | C | D |
| 8 | 95 | — | — | — | — |
| 10 | 95 | 81 | 67 | 123 | 109 |
| 12 | 95 | 75 | 63 | 127 | 115 |
| 14 | 95 | 74 | 61 | 129 | 116 |
| 16 | 95 | 77 | 65 | 125 | 113 |
| 18 | 95 | 77 | 65 | 125 | 113 |
| 20 | 95 | 77 | 65 | 125 | 113 |
| 22 | 95 | 80 | 69 | 121 | 110 |
| 24 | 95 | 80 | 69 | 121 | 110 |

A plug with a given rotation letter will mate with a receptacle with the same rotation letter. The AB angle for a given connector is the same whether it contains pins or sockets. Inserts are not rotated in conjunction with the master key/keyway.

AB angles shown are viewed from the front face of the connector. A receptacle is shown at right. The angles for the plug are exactly the same, except the direction of rotation is opposite of that shown for the receptacle.



FSJT wall mounting receptacle



21-63X0XX-XXX

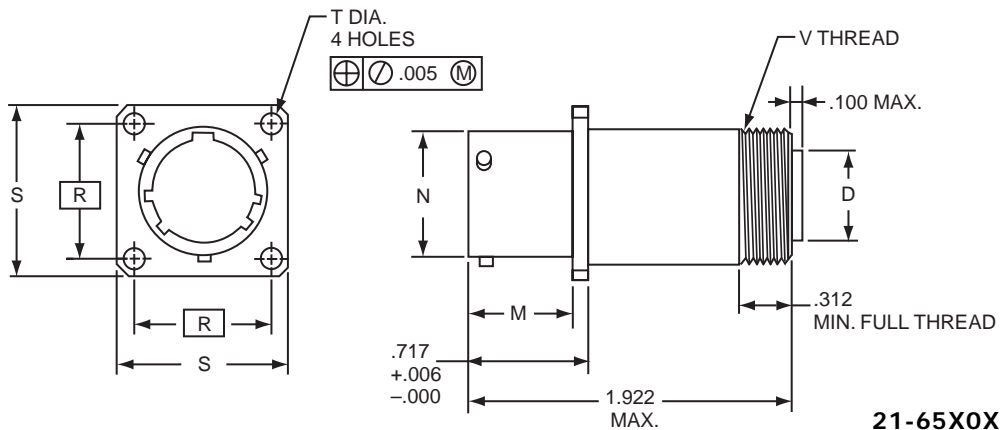
For ordering information, see how to order page 67.
Plug movement required to clear FSJT receptacles: .625 min.

| Shell Size | M +.000 -.005 | N Dia. +.001 -.005 | R (TP) | S +.021 -.020 | T Dia. +.004 -.003 | V Thread UNEF-2A | Z Max. | | |
|------------|---------------------|--------------------------|--------|---------------------|--------------------------|---------------------|-----------------|------------------------|-----------------|
| | | | | | | | Size 20 Contact | Size 16 or 20 Contacts | Size 22 Contact |
| 10 | .632 | .590 | .719 | .938 | .120 | .5625-24 | .165 | .265 | .134 |
| 12 | .632 | .750 | .812 | 1.031 | .120 | .6875-24 | .165 | .265 | .134 |
| 14 | .632 | .875 | .906 | 1.125 | .120 | .8125-20 | .165 | .265 | .134 |
| 16 | .632 | 1.000 | .969 | 1.219 | .120 | .9375-20 | .165 | .265 | .134 |
| 18 | .632 | 1.125 | 1.062 | 1.312 | .120 | 1.0625-18 | .165 | .265 | .134 |
| 20 | .602 | 1.250 | 1.156 | 1.438 | .120 | 1.1875-18 | .165 | .265 | .134 |
| 22 | .602 | 1.375 | 1.250 | 1.562 | .120 | 1.3125-18 | .165 | .265 | .134 |
| 24 | .602 | 1.500 | 1.375 | 1.688 | .147 | 1.4375-18 | .165 | .265 | .134 |

All dimensions for reference only.

FSJT

wall mounting receptacle (UTS crimp)



21-65X0XX-XXX
UTS (Crimp) Contact
MIL-C-39029/57

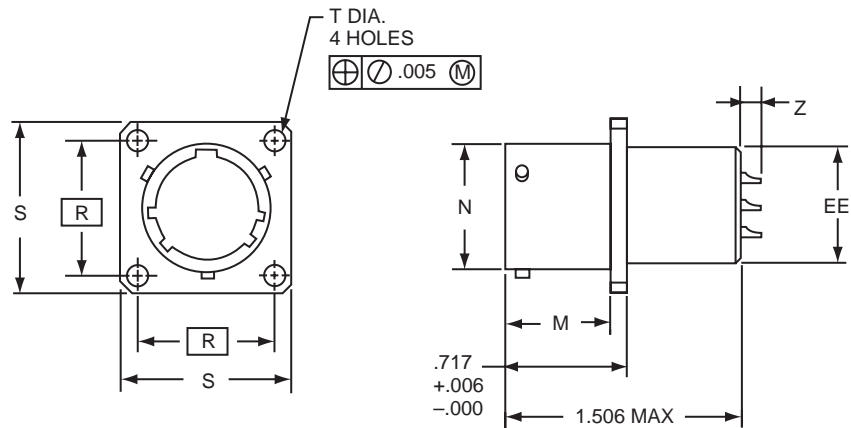
For ordering information, see how to order page 67.
 Plug movement required to clear FSJT receptacles: .625 min.

| Shell Size | D Dia. $\pm .005$ | M $+ .000$ $- .005$ | N Dia. $+ .001$ $- .005$ | R (TP) | S $+ .021$ $- .020$ | T Dia. $+ .004$ $- .003$ | V Thread UNEF-2A |
|------------|-------------------|---------------------|--------------------------|--------|---------------------|--------------------------|------------------|
| 10 | .427 | .632 | .590 | .719 | .938 | .120 | .6875-24 |
| 12 | .541 | .632 | .750 | .812 | 1.031 | .120 | .8125-20 |
| 14 | .666 | .632 | .875 | .906 | 1.125 | .120 | .9375-20 |
| 16 | .791 | .632 | 1.000 | .969 | 1.219 | .120 | 1.0625-18 |
| 18 | .897 | .632 | 1.125 | 1.062 | 1.312 | .120 | 1.1875-18 |
| 20 | 1.022 | .602 | 1.250 | 1.156 | 1.438 | .120 | 1.3125-18 |
| 22 | 1.147 | .602 | 1.375 | 1.250 | 1.562 | .120 | 1.4375-18 |
| 24 | 1.272 | .602 | 1.500 | 1.375 | 1.688 | .147 | 1.5625-18 |

All dimensions for reference only.

FSJT

box mounting receptacle



21-63X2XX-XXX

For ordering information, see how to order page 67.

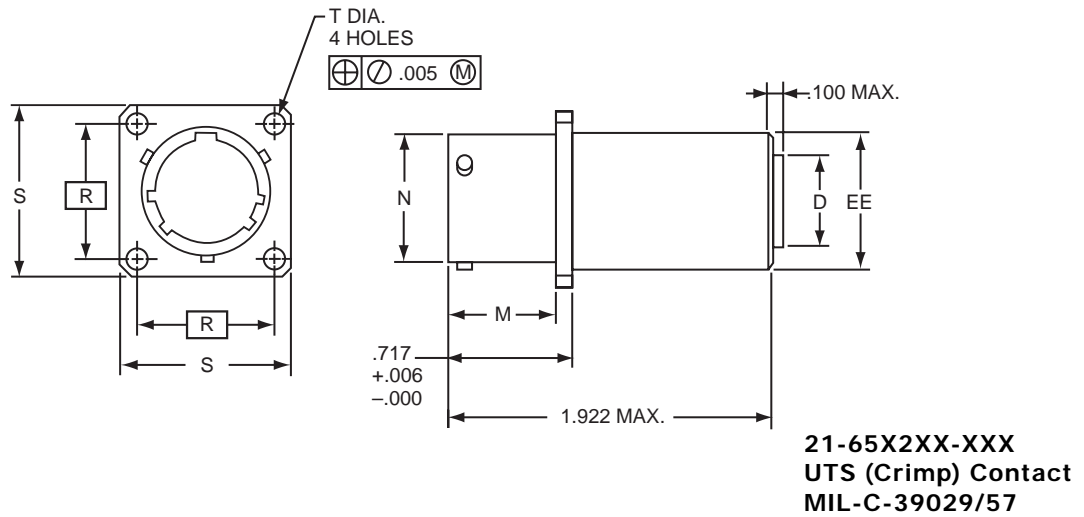
Plug movement required to clear FSJT receptacles: .625 min.

| Shell Size | M +.000 -.005 | N Dia. +.001 -.005 | R (TP) | S +.021 -.020 | T Dia. +.004 -.003 | EE +.001 -.005 | Z Max. | | | |
|------------|---------------------|-----------------------------|-----------|---------------------|-----------------------------|----------------------|--------------------|--------------------|-----------------------------------|--------------------|
| | | | | | | | Size 16 Contact | Size 20 Contact | Size 16 or 16 & 20 Contacts | Size 22 Contact |
| 10 | .632 | .590 | .719 | .938 | .120 | .562 | .265 | .165 | .265 | .134 |
| 12 | .632 | .750 | .812 | 1.031 | .120 | .687 | .265 | .165 | .265 | .134 |
| 14 | .632 | .875 | .906 | 1.125 | .120 | .812 | .265 | .165 | .265 | .134 |
| 16 | .632 | 1.000 | .969 | 1.219 | .120 | .937 | .265 | .165 | .265 | .134 |
| 18 | .632 | 1.125 | 1.062 | 1.312 | .120 | 1.062 | .265 | .165 | .265 | .134 |
| 20 | .602 | 1.250 | 1.156 | 1.438 | .120 | 1.187 | .265 | .165 | .265 | .134 |
| 22 | .602 | 1.375 | 1.250 | 1.562 | .120 | 1.312 | .265 | .165 | .265 | .134 |
| 24 | .602 | 1.500 | 1.375 | 1.688 | .147 | 1.437 | .265 | .165 | .265 | .134 |

All dimensions for reference only.

FSJT

box mounting receptacle (UTS crimp)



For ordering information, see how to order page 67.

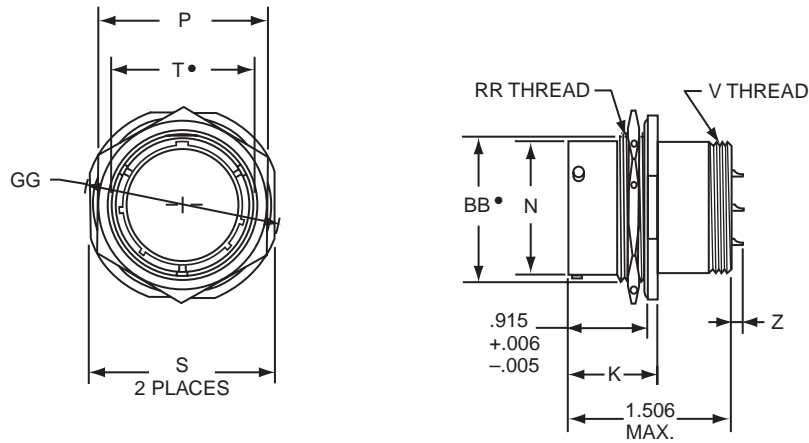
Plug movement required to clear FSJT receptacles: .625 min.

| Shell Size | D Dia. ±.005 | M +.000 -.005 | N Dia. +.001 -.005 | R (TP) | S +.021 -.020 | T Dia. +.004 -.003 | EE Dia. +.001 -.005 |
|------------|-----------------|---------------------|--------------------------|-----------|---------------------|--------------------------|---------------------------|
| 10 | .427 | .632 | .590 | .719 | .938 | .120 | .687 |
| 12 | .541 | .632 | .750 | .812 | 1.031 | .120 | .811 |
| 14 | .666 | .632 | .875 | .906 | 1.125 | .120 | .937 |
| 16 | .791 | .632 | 1.000 | .969 | 1.219 | .120 | 1.061 |
| 18 | .897 | .632 | 1.125 | 1.062 | 1.312 | .120 | 1.187 |
| 20 | 1.022 | .602 | 1.250 | 1.156 | 1.438 | .120 | 1.312 |
| 22 | 1.147 | .602 | 1.375 | 1.250 | 1.562 | .120 | 1.437 |
| 24 | 1.272 | .602 | 1.500 | 1.375 | 1.688 | .147 | 1.562 |

All dimensions for reference only.

FSJT

jam nut receptacle



21-63X7XX-XXX

- “D” shaped mounting hole dimensions

For ordering information, see how to order page 67.

Plug movement required to clear FSJT receptacles: .625 min.

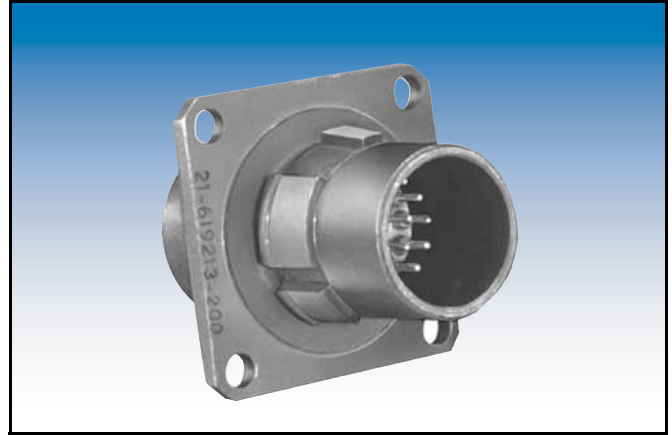
| Shell Size | K +.006 -.005 | N Dia. +.001 -.005 | P Hex | S ±.016 | T• +.010 -.000 | V Thread UNEF Class 2A | Z ±.020 | BB• +.000 -.010 | GG Max. | RR Thread UNEF Class 2A | SS +.001 -.016 |
|------------|---------------------|-----------------------------|----------|------------|----------------------|---------------------------------|------------|-----------------------|------------|----------------------------------|----------------------|
| 10 | 1.024 | .590 | .875 | 1.062 | .697 | .5625-24 | .150 | .669 | 1.203 | .6875-24 | .680 |
| 12 | 1.024 | .750 | 1.062 | 1.250 | .884 | .6875-24 | .150 | .830 | 1.391 | .8750-20 | .859 |
| 14 | 1.024 | .875 | 1.188 | 1.375 | 1.007 | .8125-20 | .150 | .955 | 1.515 | 1.0000-20 | .984 |
| 16 | 1.024 | 1.000 | 1.312 | 1.500 | 1.134 | .9375-20 | .150 | 1.084 | 1.641 | 1.1250-18 | 1.108 |
| 18 | 1.055 | 1.125 | 1.438 | 1.625 | 1.259 | 1.0625-18 | .150 | 1.208 | 1.766 | 1.2500-18 | 1.233 |
| 20 | 1.055 | 1.250 | 1.562 | 1.812 | 1.384 | 1.1875-18 | .150 | 1.333 | 1.953 | 1.3750-18 | 1.358 |
| 22 | 1.055 | 1.375 | 1.688 | 1.938 | 1.507 | 1.3125-18 | .150 | 1.459 | 2.078 | 1.5000-18 | 1.483 |
| 24 | 1.055 | 1.500 | 1.812 | 2.062 | 1.634 | 1.4375-18 | .150 | 1.580 | 2.203 | 1.6250-18 | 1.610 |

All dimensions for reference only.

Amphenol® FBL Series IV Subminiature Cylindrical Filters

Components designed to meet the severe mechanical and environmental requirements of MIL-DTL-38999 Series III are now available to Series IV users. Modifications of the connector are available with EMP protection, incorporating MOV's, diodes or a combination of both.

- Intermateable with MIL-DTL-38999 Series IV plugs
- Maintains all the features of standard MIL-DTL-38999 Series IV receptacles
- Scoop-proof pins provide contact protection
- Uses insert patterns from MIL-DTL-38999 Series III

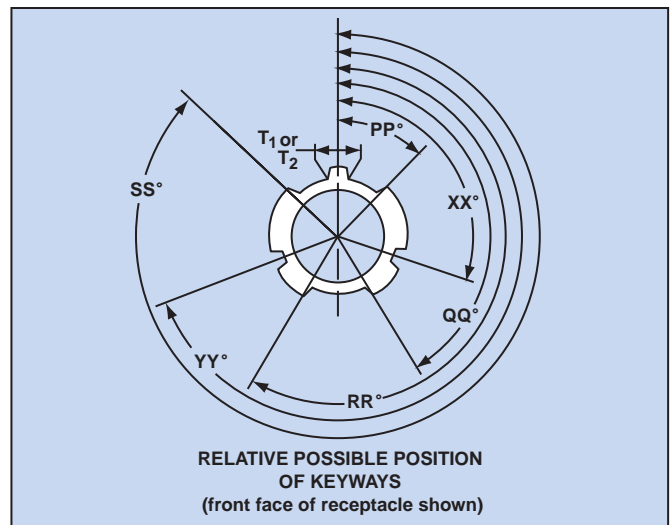


FBL Master Key/Keyway Rotation

| Shell Size | Receptacle Key Position | | | | Main Key Receptacle/Basic | |
|------------|-------------------------|---------|---------|---------|-------------------------------|----------------------------|
| | PP° | QQ° | RR° | SS° | Socket Contact T ₁ | Pin Contact T ₂ |
| 11 | 44°28' | 151°6' | 208°54' | 315°32' | .075 | .109 |
| 13 | 44°25' | 150°31' | 209°29' | 315°35' | .076 | .112 |
| 15 | 44°33' | 150°24' | 209°36' | 315°27' | .096 | .132 |
| 17 | 44°36' | 150°22' | 209°38' | 315°24' | .096 | .134 |
| 19 | 44°33' | 150°27' | 209°33' | 315°27' | .117 | .154 |
| 21 | 44°34' | 150°23' | 209°37' | 315°26' | .118 | .155 |
| 23 | 44°34' | 150°20' | 209°40' | 315°26' | .138 | .176 |
| 25 | 44°42' | 150°22' | 209°48' | 315°18' | .139 | .177 |

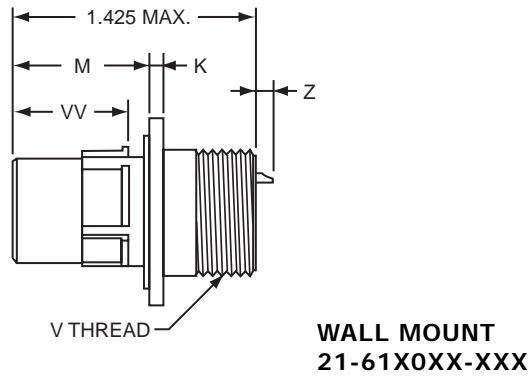
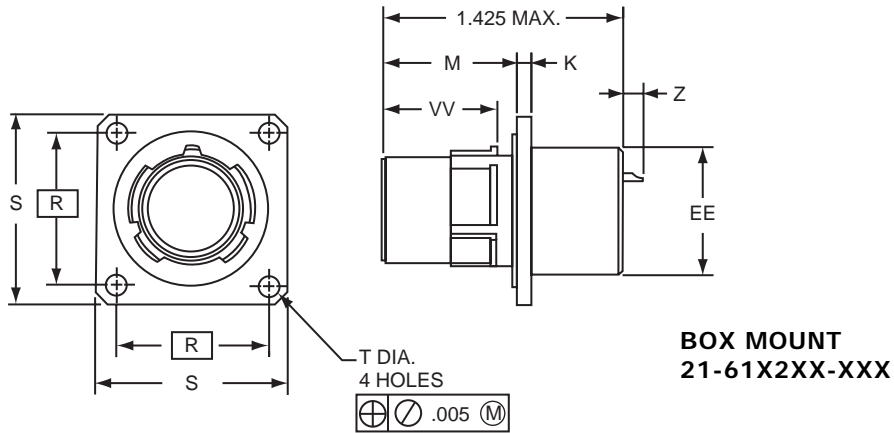
Polarity Dimensions

| Key and Keyway Arrangement | XX° | YY° |
|----------------------------|------|------|
| N | 110° | 250° |
| A | 100° | 260° |
| B | 90° | 270° |
| C | 80° | 280° |
| D | 70° | 290° |
| K | 120° | 255° |



FBL

box mounting receptacle wall mounting receptacle



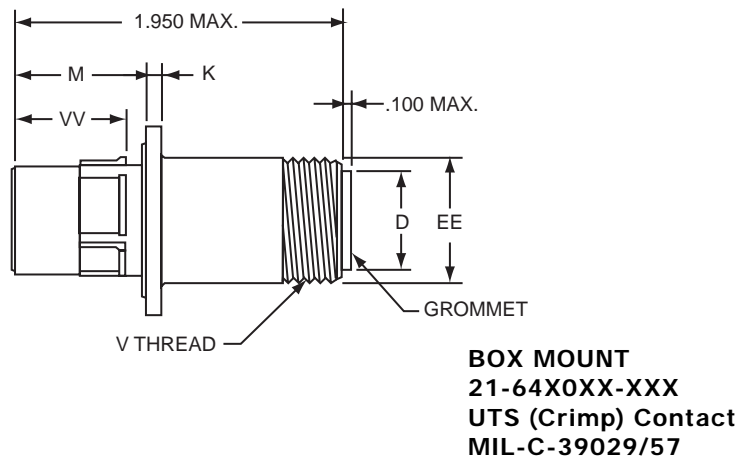
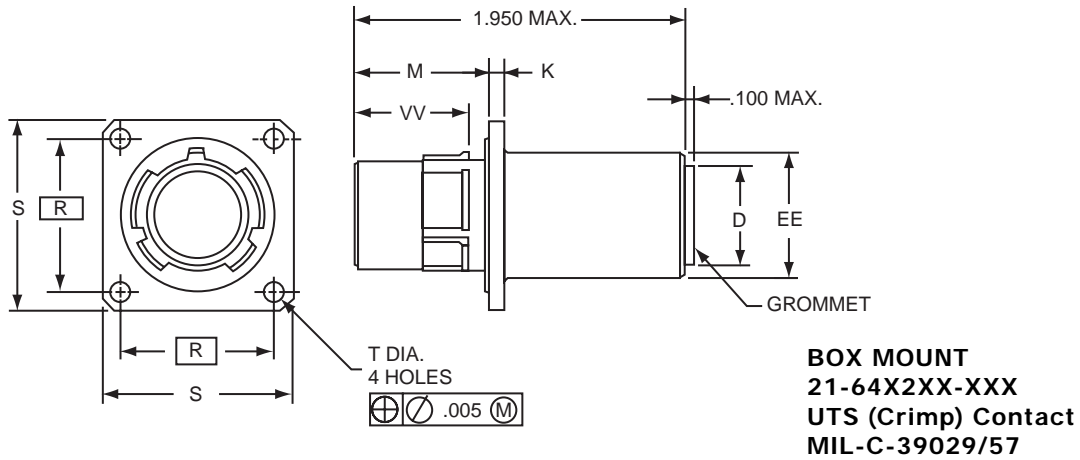
For ordering information, see how to order page 67.

| Shell Size | K ±.010 | M ±.020 | R (TP) | S +.021 -.020 | T Dia. +.004 -.003 | V Thread (Plated) -.006 | EE Dia. +.001 -.005 | VV ±.003 | Z Max. | | | |
|------------|------------|------------|-----------|---------------------|-----------------------------|----------------------------------|------------------------------|-------------|--------------------|--------------------|-----------------------------------|--------------------|
| | | | | | | | | | Size 16 Contact | Size 20 Contact | Size 16 or 16 & 20 Contacts | Size 22 Contact |
| 11 | .092 | .791 | .812 | 1.029 | .128 | M15X1-6g0.100R | .589 | .672 | .265 | .165 | .265 | .134 |
| 13 | .092 | .791 | .906 | 1.124 | .128 | M18X1-6g0.100R | .707 | .672 | .265 | .165 | .265 | .134 |
| 15 | .092 | .791 | .969 | 1.218 | .128 | M22X1-6g0.100R | .865 | .672 | .265 | .165 | .265 | .134 |
| 17 | .092 | .791 | 1.062 | 1.313 | .128 | M25X1-6g0.100R | .983 | .672 | .265 | .165 | .265 | .134 |
| 19 | .092 | .791 | 1.156 | 1.439 | .128 | M28X1-6g0.100R | 1.101 | .662 | .265 | .165 | .265 | .134 |
| 21 | .124 | .791 | 1.250 | 1.561 | .128 | M31X1-6g0.100R | 1.219 | .662 | .265 | .165 | .265 | .134 |
| 23 | .124 | .791 | 1.375 | 1.687 | .147 | M34X1-6g0.100R | 1.337 | .662 | .265 | .165 | .265 | .134 |
| 25 | .124 | .791 | 1.500 | 1.813 | .147 | M37X1-6g0.100R | 1.455 | .662 | .265 | .165 | .265 | .134 |

All dimensions for reference only.

FBL

box mounting receptacle (UTS crimp) wall mounting receptacle (UTS crimp)



For ordering information, see how to order page 67.

| Shell Size | D Dia. ±.005 | K ±.010 | M ±.020 | R (TP) | S +.021 - .020 | T Dia. +.004 - .003 | V Thread (Plated) -.006 | EE Dia. +.001 - .005 | VV ±.003 |
|------------|--------------|---------|---------|--------|----------------|---------------------|-------------------------|----------------------|----------|
| 11 | .427 | .092 | .791 | .812 | 1.029 | .128 | M18X1-6g0.100R | .687 | .672 |
| 13 | .541 | .092 | .791 | .906 | 1.124 | .128 | M22X1-6g0.100R | .811 | .672 |
| 15 | .666 | .092 | .791 | .969 | 1.218 | .128 | M25X1-6g0.100R | .937 | .672 |
| 17 | .791 | .092 | .791 | 1.062 | 1.313 | .128 | M28X1-6g0.100R | 1.061 | .672 |
| 19 | .897 | .092 | .791 | 1.156 | 1.439 | .128 | M31X1-6g0.100R | 1.187 | .662 |
| 21 | 1.022 | .124 | .791 | 1.250 | 1.561 | .128 | M34X1-6g0.100R | 1.312 | .662 |
| 23 | 1.147 | .124 | .791 | 1.375 | 1.687 | .147 | M37X1-6g0.100R | 1.437 | .662 |
| 25 | 1.272 | .124 | .791 | 1.500 | 1.813 | .147 | M41X1-6g0.100R | 1.562 | .662 |

All dimensions for reference only.

Amphenol® FPT Series Miniature Cylindrical Filters

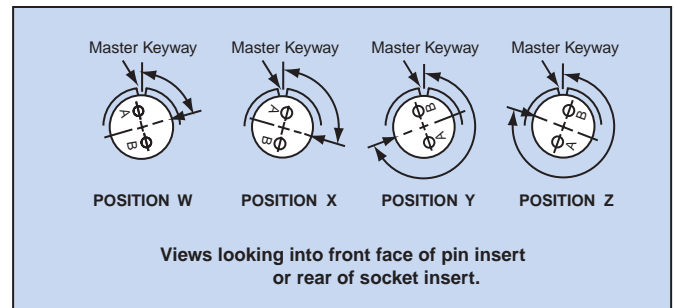
The Amphenol® FPT Series combines the unique design features of the miniature PT Series with an EMI filter.

- Intermateable with MIL-C-26482 Series connectors (see Catalog 12-070), and MIL-C-83723 Series I connectors (see Catalog MS-102)
- Quick positive coupling with visual confirmation of mating
- Higher reliability and greater durability with permanently encapsulated contacts
- Aluminum shells with several finish options



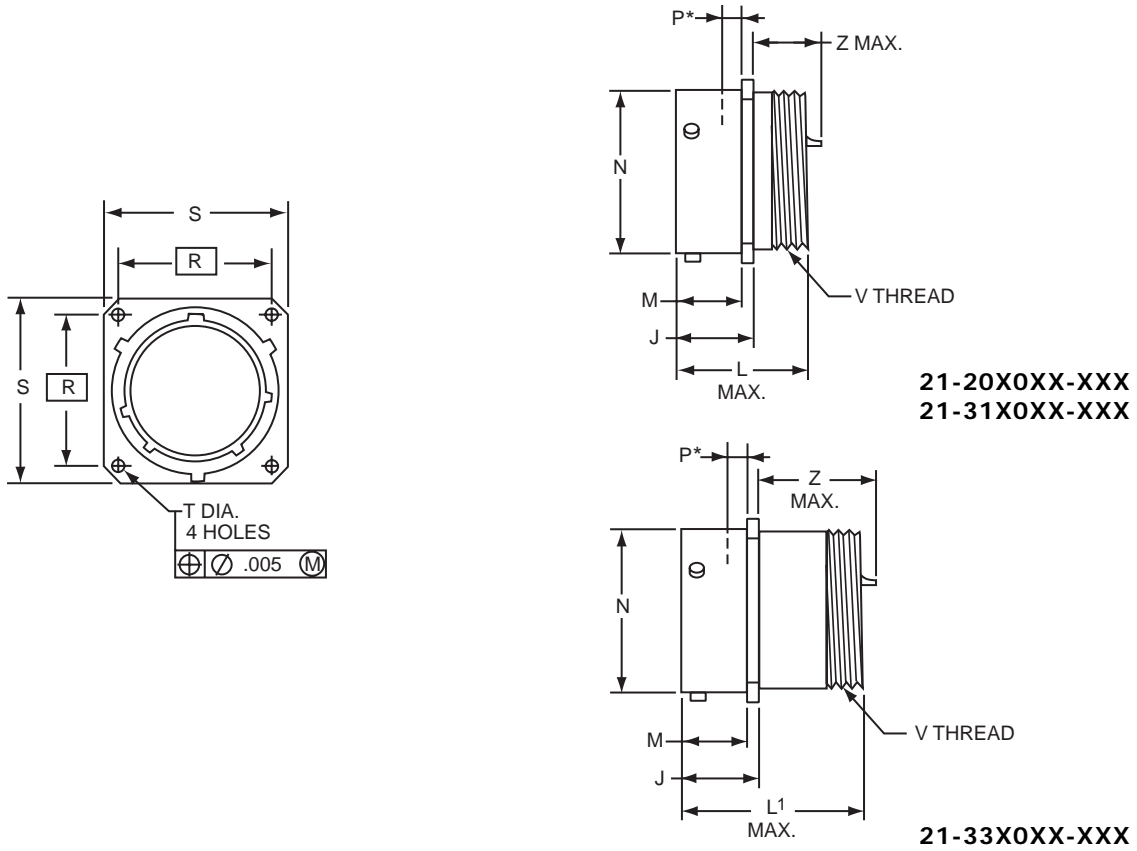
FPT Alternate Positions

| Insert Arrangements | Degrees | | | |
|---------------------|---------|-----|-----|-----|
| | W | X | Y | Z |
| 10-5 | 45 | 151 | 180 | 270 |
| 10-6 | 90 | – | – | – |
| 10-98 | 90 | 180 | 240 | 270 |
| 12-3 | – | – | 180 | – |
| 12-8 | 90 | 112 | 203 | 292 |
| 12-10 | 60 | 155 | 270 | 295 |
| 12-98 | 61 | 135 | 189 | 340 |
| 14-12 | 434 | 90 | – | – |
| 14-18 | 15 | 90 | 180 | 270 |
| 14-19 | 30 | 165 | 315 | – |
| 16-8 | 54 | 152 | 180 | 331 |
| 16-26 | 60 | – | 275 | 338 |
| 18-32 | 85 | 138 | 222 | 265 |
| 20-41 | 45 | 126 | 225 | – |
| 22-41 | 39 | – | – | – |
| 22-55 | 30 | 142 | 226 | 314 |
| 24-61 | 90 | 180 | 270 | 324 |



FPT

wall mounting receptacle



For ordering information, see how to order page 67.

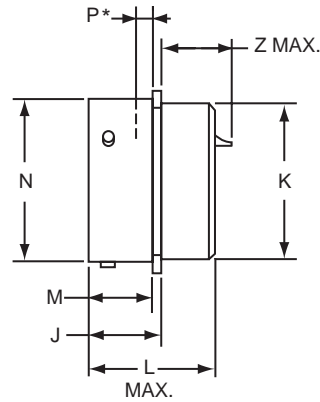
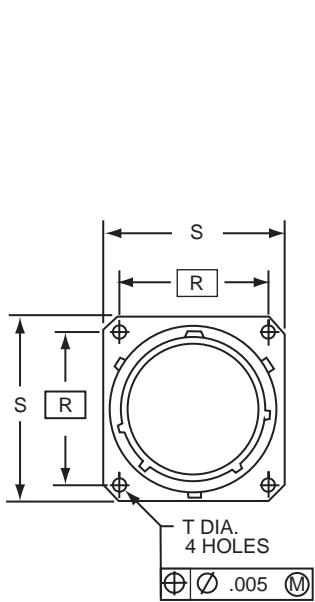
Plug movement required to clear FPT receptacles: .438 min.

* Acceptable panel thickness for back panel mounting a standard receptacle.

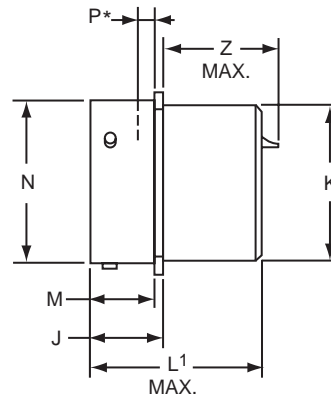
| Shell Size | J +.021 -.010 | M +.010 -.000 | N Dia +.001 -.005 | P* Max. | R (TP) | S +.011 -.010 | T Dia. ±.005 | V Thread UNEUF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | | |
|------------|---------------------|---------------------|-------------------------|------------|-----------|---------------------|-----------------|----------------------------------|-----------------------------------|---------------------------|---------------------------------------|--------------------------|---------------------------|---------------------------------------|
| | | | | | | | | | L Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | L ¹ Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .493 | .431 | .473 | .087 | .594 | .812 | .120 | .4375-28 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 10 | .493 | .431 | .590 | .087 | .719 | .938 | .120 | .5625-24 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 12 | .493 | .431 | .750 | .087 | .812 | 1.031 | .120 | .6875-24 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 14 | .493 | .431 | .875 | .087 | .906 | 1.125 | .120 | .8125-20 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 16 | .493 | .431 | 1.000 | .087 | .969 | 1.219 | .120 | .9375-20 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 18 | .493 | .431 | 1.125 | .087 | 1.062 | 1.312 | .120 | 1.0625-18 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 20 | .650 | .556 | 1.250 | .212 | 1.156 | 1.438 | .120 | 1.1875-18 | 1.166 | .755 | .809 | 1.651 | 1.163 | 1.233 |
| 22 | .650 | .556 | 1.375 | .212 | 1.250 | 1.562 | .120 | 1.3125-18 | 1.166 | .755 | .809 | 1.651 | 1.163 | 1.233 |
| 24 | .683 | .589 | 1.500 | .212 | 1.375 | 1.688 | .147 | 1.4375-18 | 1.166 | .722 | .776 | 1.651 | 1.130 | 1.200 |

All dimensions for reference only.

FPT box mounting receptacle



21-20X2XX-XXX
21-31X2XX-XXX



21-33X2XX-XXX

For ordering information, see how to order page 67.

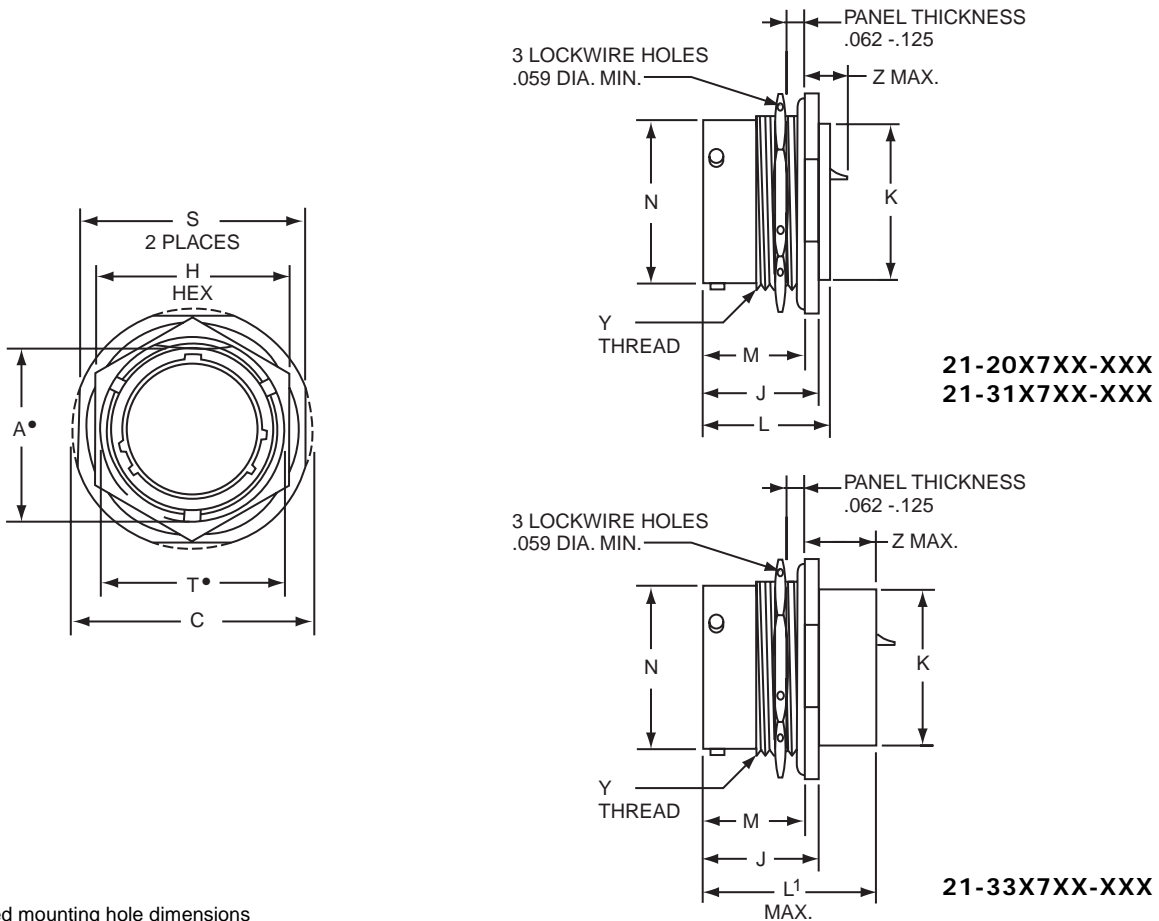
Plug movement required to clear FPT receptacles: .438 min.

* Acceptable panel thickness for back panel mounting a standard receptacle.

| Shell Size | J +.021 -.010 | K Dia. +.011 -.000 | M +.010 -.000 | N Dia +.001 -.005 | P* Max. | R (TP) | S +.011 -.010 | T Dia. ±.005 | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | | |
|------------|---------------------|--------------------------|---------------------|-------------------------|------------|-----------|---------------------|-----------------|-----------------------------------|------------------------------|---|--------------------------|------------------------------|---|
| | | | | | | | | | L Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | L ¹ Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .493 | .438 | .431 | .473 | .087 | .594 | .812 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 10 | .493 | .562 | .431 | .590 | .087 | .719 | .938 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 12 | .493 | .688 | .431 | .750 | .087 | .812 | 1.031 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 14 | .493 | .812 | .431 | .875 | .087 | .906 | 1.125 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 16 | .493 | .938 | .431 | 1.000 | .087 | .969 | 1.219 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 18 | .493 | 1.062 | .431 | 1.125 | .087 | 1.062 | 1.312 | .120 | 1.103 | .850 | .904 | 1.588 | 1.258 | 1.328 |
| 20 | .650 | 1.188 | .556 | 1.250 | .212 | 1.156 | 1.438 | .120 | 1.166 | .755 | .809 | 1.651 | 1.163 | 1.233 |
| 22 | .650 | 1.312 | .556 | 1.375 | .212 | 1.250 | 1.562 | .120 | 1.166 | .755 | .809 | 1.651 | 1.163 | 1.233 |
| 24 | .683 | 1.438 | .589 | 1.500 | .212 | 1.375 | 1.688 | .147 | 1.166 | .722 | .776 | 1.651 | 1.130 | 1.200 |

All dimensions for reference only.

jam nut receptacle



• "D" shaped mounting hole dimensions

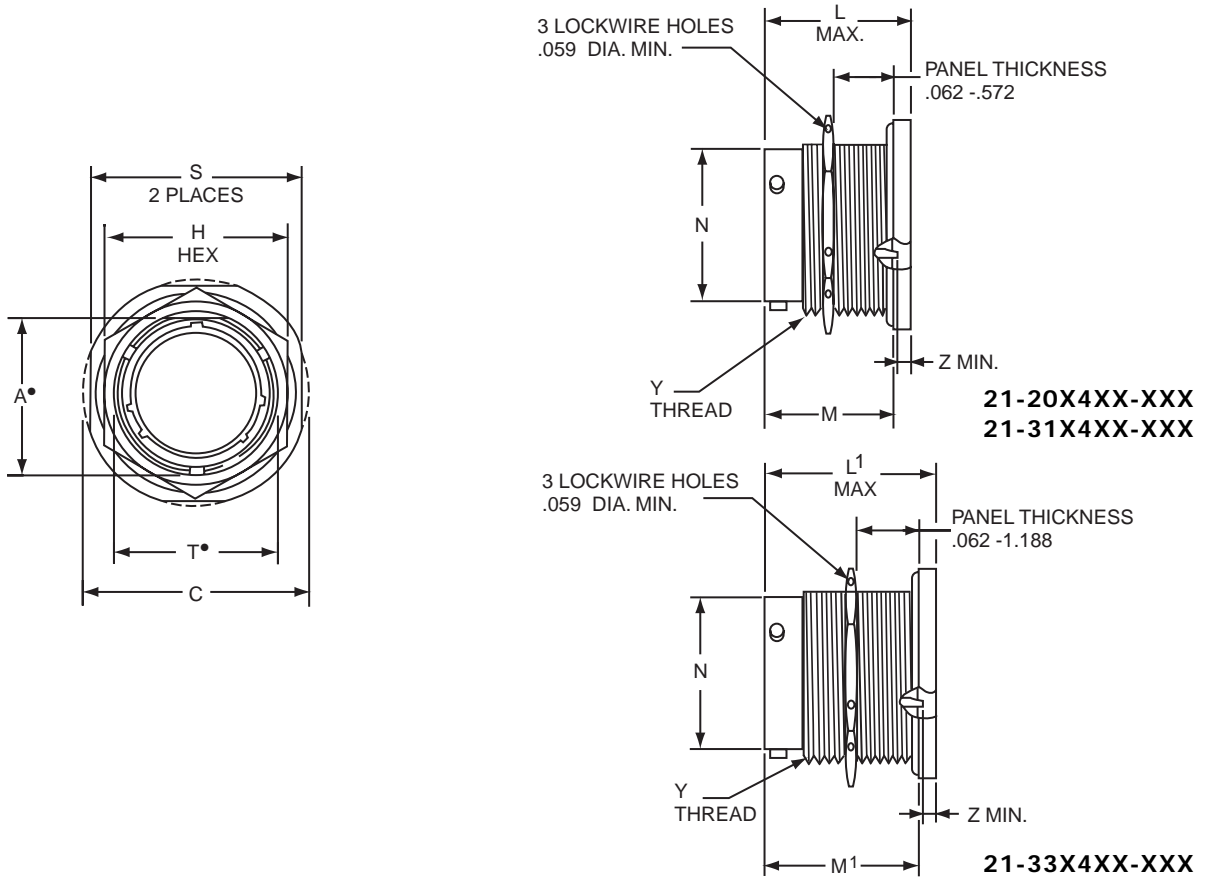
For ordering information, see how to order page 67.

Plug movement required to clear FPT receptacles: .438 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | J +.006 -.005 | K Dia. +.011 -.000 | M ±.005 | N Dia +.001 -.005 | S ±.010 | T* Dia. +.010 -.000 | Y Thread UNEF-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | | |
|------------|------------------------------|-----------------------------|----------------------------|---------------------|-----------------------------|------------|----------------------------|------------|------------------------------|------------------------------------|-----------------------------------|------------------------------|---|--------------------------|------------------------------|---|
| | | | | | | | | | | | L Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | L ¹ Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .542 | 1.062 | .750 | .821 | .438 | .696 | .473 | .938 | .572 | .5625-24 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 10 | .669 | 1.188 | .875 | .821 | .562 | .696 | .590 | 1.062 | .697 | .6875-24 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 12 | .830 | 1.375 | 1.062 | .821 | .688 | .696 | .750 | 1.250 | .884 | .8750-20 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 14 | .955 | 1.500 | 1.188 | .821 | .812 | .696 | .875 | 1.375 | 1.009 | 1.0000-20 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 16 | 1.084 | 1.625 | 1.312 | .821 | .938 | .696 | 1.000 | 1.500 | 1.134 | 1.1250-18 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 18 | 1.208 | 1.750 | 1.438 | .821 | 1.062 | .696 | 1.125 | 1.625 | 1.259 | 1.2500-18 | 1.103 | .642 | .698 | 1.588 | 1.050 | 1.120 |
| 20 | 1.333 | 1.938 | 1.562 | 1.040 | 1.188 | .884 | 1.250 | 1.812 | 1.384 | 1.3750-18 | 1.166 | .516 | .570 | 1.651 | .924 | .994 |
| 22 | 1.459 | 2.062 | 1.688 | 1.040 | 1.312 | .884 | 1.375 | 1.938 | 1.509 | 1.5000-18 | 1.166 | .516 | .570 | 1.651 | .924 | .994 |
| 24 | 1.575 | 2.188 | 1.812 | 1.073 | 1.438 | .917 | 1.500 | 2.062 | 1.634 | 1.6250-18 | 1.166 | .483 | .537 | 1.651 | .891 | .961 |

All dimensions for reference only.

jam nut receptacle (minimum penetration)



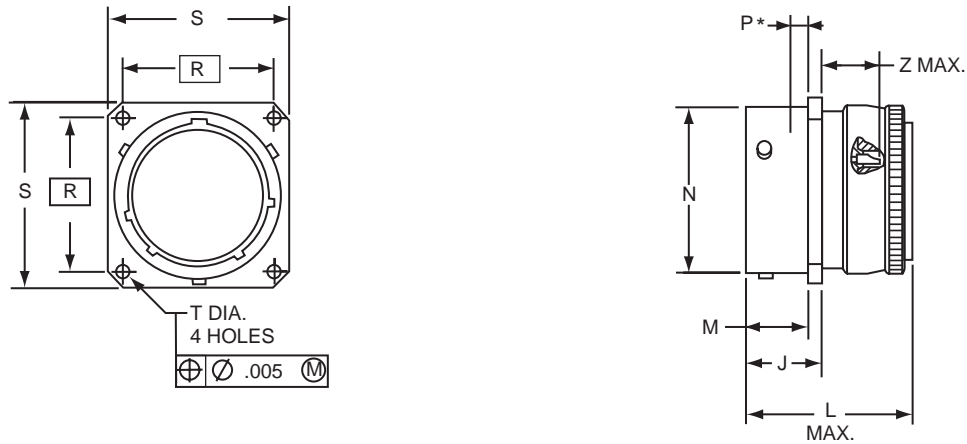
• "D" shaped mounting hole dimensions
 For ordering information, see how to order page 67.
 Plug movement required to clear FPT receptacles: .438 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | M | M ¹ +.016 -.015 | N Dia +.001 -.005 | S +.011 -.010 | T* Dia. +.010 -.000 | Y Thread UNEf-2A (Plated) | SHORT SHELL VHF/UHF/MF Filters | | | LONG SHELL HF Filters | | |
|------------|---------------------------|--------------------------|-------------------------|-------|----------------------------------|-------------------------|---------------------|---------------------------|---------------------------------|-----------------------------------|---------------------------|---------------------------------------|--------------------------|---------------------------|---------------------------------------|
| | | | | | | | | | | L Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. | L ¹ Max. | Size 20 Contact Z Max. | Size 16 or 16 & 20 Contacts Z Max. |
| 8 | .542 | 1.062 | .750 | 1.235 | 1.690 | .473 | .938 | .572 | .5625-24 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 10 | .669 | 1.188 | .875 | 1.235 | 1.690 | .590 | 1.062 | .697 | .6875-24 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 12 | .830 | 1.375 | 1.062 | 1.235 | 1.690 | .750 | 1.250 | .884 | .8750-20 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 14 | .955 | 1.500 | 1.188 | 1.235 | 1.690 | .875 | 1.375 | 1.009 | 1.0000-20 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 16 | 1.084 | 1.625 | 1.312 | 1.235 | 1.690 | 1.000 | 1.500 | 1.134 | 1.1250-18 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 18 | 1.208 | 1.750 | 1.438 | 1.235 | 1.690 | 1.125 | 1.625 | 1.259 | 1.2500-18 | 1.366 | .022 | .029 | 1.821 | .070 | .000 |
| 20 | 1.333 | 1.938 | 1.562 | 1.266 | 1.721 | 1.250 | 1.812 | 1.384 | 1.3750-18 | 1.428 | .062 | .029 | 1.883 | .070 | .000 |
| 22 | 1.459 | 2.062 | 1.688 | 1.266 | 1.721 | 1.375 | 1.938 | 1.509 | 1.5000-18 | 1.428 | .062 | .029 | 1.883 | .070 | .000 |
| 24 | 1.575 | 2.188 | 1.812 | 1.266 | 1.721 | 1.500 | 2.062 | 1.634 | 1.6250-18 | 1.428 | .062 | .029 | 1.883 | .070 | .000 |

All dimensions for reference only.

FPTE

wall mounting receptacle



21-22X0XX-XXX

For ordering information, see how to order page 67.

Plug movement required to clear FPT receptacles: .438 min.

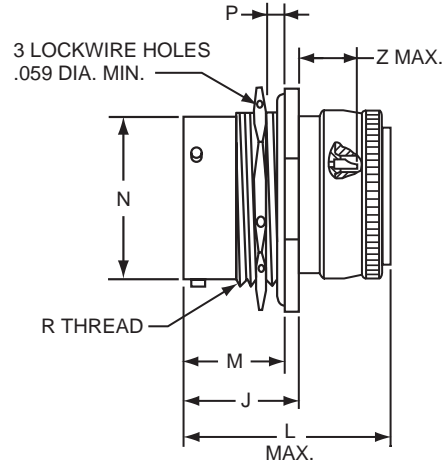
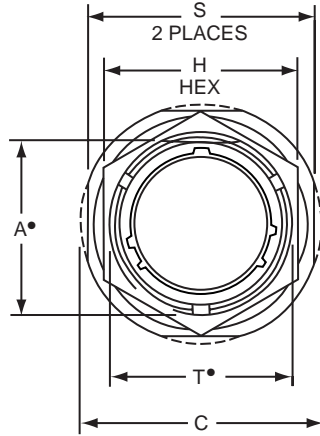
* Acceptable panel thickness for back panel mounting a standard receptacle.

| Shell Size | J +.021 -.010 | M +.010 -.000 | N Dia +.001 -.005 | P* Max. | R (TP) | S +.011 -.010 | T Dia. ±.005 | SHORT SHELL VHF/UHF/MF Filters | |
|------------|---------------------|---------------------|-------------------------|------------|-----------|---------------------|-----------------|-----------------------------------|------------------------------|
| | | | | | | | | L Max. | Size 20 Contact Z Max. |
| 8 | .493 | .431 | .473 | .087 | .594 | .812 | .120 | 1.409 | .774 |
| 10 | .493 | .431 | .590 | .087 | .719 | .938 | .120 | 1.409 | .774 |
| 12 | .493 | .431 | .750 | .087 | .812 | 1.031 | .120 | 1.409 | .774 |
| 14 | .493 | .431 | .875 | .087 | .906 | 1.125 | .120 | 1.409 | .774 |
| 16 | .493 | .431 | 1.000 | .087 | .969 | 1.219 | .120 | 1.409 | .774 |
| 18 | .493 | .431 | 1.125 | .087 | 1.062 | 1.312 | .120 | 1.409 | .774 |
| 20 | .650 | .556 | 1.250 | .212 | 1.156 | 1.438 | .120 | 1.553 | .679 |
| 22 | .650 | .556 | 1.375 | .212 | 1.250 | 1.562 | .120 | 1.553 | .679 |
| 24 | .683 | .589 | 1.500 | .212 | 1.375 | 1.688 | .147 | 1.553 | .646 |

All dimensions for reference only.

FPTE

jam nut receptacle



21-22X7XX-XXX

• "D" shaped mounting hole dimensions

For ordering information, see how to order page 67.

Plug movement required to clear FPT receptacles: .438 min.

| Shell Size | A* Flat +.000 -.010 | C Dia. +.011 -.010 | H Hex +.017 -.016 | J +.006 -.005 | M ±.005 | N Dia. +.001 -.005 | P Panel Thickness | | R Thread UNEF-2A (Plated) | S ±.010 | T* Dia. +.010 -.000 | SHORT SHELL VHF/UHF Filters | |
|------------|---------------------------|--------------------------|-------------------------|---------------------|------------|--------------------------|-------------------|------|---------------------------------|------------|---------------------------|--------------------------------|---------------------------|
| | | | | | | | Max. | Min. | | | | L Max. | Size 20 Contact Z Max. |
| 8 | .542 | 1.062 | .750 | .821 | .696 | .473 | .125 | .062 | .5625-24 | .938 | .572 | 1.546 | .566 |
| 10 | .669 | 1.188 | .875 | .821 | .696 | .590 | .125 | .062 | .6875-24 | 1.062 | .697 | 1.546 | .566 |
| 12 | .830 | 1.375 | 1.062 | .821 | .696 | .750 | .125 | .062 | .8750-20 | 1.250 | .884 | 1.546 | .566 |
| 14 | .955 | 1.500 | 1.188 | .821 | .696 | .875 | .125 | .062 | 1.0000-20 | 1.375 | 1.009 | 1.546 | .566 |
| 16 | 1.084 | 1.625 | 1.312 | .821 | .696 | 1.000 | .125 | .062 | 1.1250-18 | 1.500 | 1.134 | 1.546 | .566 |
| 18 | 1.208 | 1.750 | 1.438 | .821 | .696 | 1.125 | .125 | .062 | 1.2500-18 | 1.625 | 1.259 | 1.546 | .566 |
| 20 | 1.333 | 1.938 | 1.562 | 1.040 | .884 | 1.250 | .250 | .062 | 1.3750-18 | 1.812 | 1.384 | 1.672 | .440 |
| 22 | 1.459 | 2.062 | 1.688 | 1.040 | .884 | 1.375 | .250 | .062 | 1.5000-18 | 1.938 | 1.509 | 1.672 | .440 |
| 24 | 1.575 | 2.188 | 1.812 | 1.073 | .917 | 1.500 | .250 | .062 | 1.6250-18 | 2.062 | 1.634 | 1.672 | .407 |

All dimensions for reference only.

Amphenol FAN Connectors

filtered “AN”

The “AN” Filter Connector is designed in configurations intermateable and intermountable with MIL-DTL-5015* connectors and provides electromagnetic interference protection for critical circuits.

- Same dimensions as the non-filtered standard MIL-spec connectors with the exception of back shell length. (See Catalog 12-020).
- Uses non-removable solder cup terminated contacts.
- Shells are impact extruded or machined bar stock aluminum and are available in several conductive platings.
- Applications include power transmission, medical communications, and ground support equipment.



The following insert arrangements within the 5015 family have the same alternate insert rotations for W, X, Y and Z, which are:

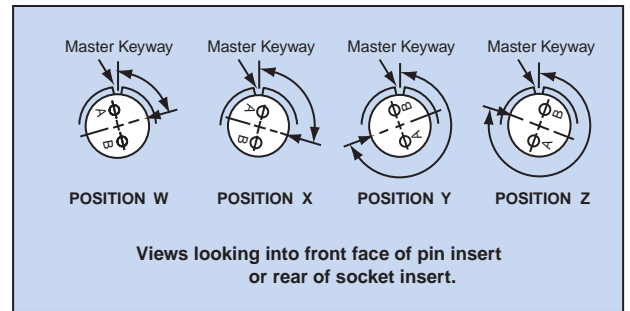
| Degrees | | | |
|---------|-----|-----|-----|
| W | X | Y | Z |
| 80 | 110 | 250 | 280 |

| | | | | | |
|-------|-------|-------|-------|-------|-------|
| 16-7 | 20-22 | 22-29 | 24-17 | 28-16 | 32-13 |
| 18-5 | 22-6 | 22-33 | 24-20 | 28-17 | 32-22 |
| 18-9 | 22-12 | 22-34 | 24-21 | 28-19 | 32-AF |
| 18-13 | 22-14 | 24-1 | 24-28 | 28-20 | 36-1 |
| 18-14 | 22-15 | 24-3 | 28-1 | 28-21 | 36-7 |
| 20-7 | 22-16 | 24-4 | 28-4 | 32-1 | 36-8 |
| 20-8 | 22-17 | 24-5 | 28-8 | 32-3 | 36-13 |
| 20-9 | 22-18 | 24-6 | 28-9 | 32-4 | 40-AR |
| 20-12 | 22-19 | 24-7 | 28-10 | 32-6 | 40-AS |
| 20-14 | 22-21 | 24-12 | 28-11 | 32-9 | 40-AT |
| 20-16 | 22-24 | 24-14 | 28-14 | 32-10 | 40-AU |
| 20-20 | 22-25 | 24-16 | 28-15 | 32-12 | |

The following are additional 5015 insert arrangements with alternate rotations.

| Insert Arrangement | Degrees | | | |
|--------------------|---------|-----|-----|-----|
| | W | X | Y | Z |
| 10SL-4 | 63 | - | - | - |
| 12S-3 | 70 | 145 | 215 | 290 |
| 14S-2 | - | 120 | 240 | - |
| 14S-5 | - | 110 | - | - |
| 14S-7 | 90 | 180 | 270 | - |
| 14S-9 | 70 | 145 | 215 | 290 |
| 16-9 | 35 | 110 | 250 | 325 |
| 16-10 | 90 | 180 | 270 | - |
| 16-11 | 35 | 110 | 250 | 325 |
| 16-13 | 35 | 110 | 250 | 325 |
| 16S-1 | 80 | - | - | 280 |
| 16S-4 | 35 | 110 | 250 | 325 |
| 16S-5 | 70 | 145 | 215 | 290 |
| 16S-6 | 90 | 180 | 270 | - |
| 16S-8 | - | 170 | 265 | - |
| 18-1 | 70 | 145 | 215 | 290 |
| 18-3 | 35 | 110 | 250 | 325 |
| 18-4 | 35 | 110 | 250 | 325 |
| 18-8 | 70 | - | - | 290 |
| 18-10 | - | 120 | 240 | - |
| 18-11 | - | 170 | 265 | - |
| 18-12 | 80 | - | - | 280 |
| 18-15 | - | 120 | 240 | - |
| 18-20 | 90 | 180 | 270 | - |
| 18-22 | 70 | 145 | 215 | 290 |
| 18-29 | 90 | 180 | 270 | - |
| 20-3 | 70 | 145 | 215 | 290 |

* MIL-DTL-5015 supersedes MIL-C-5015.

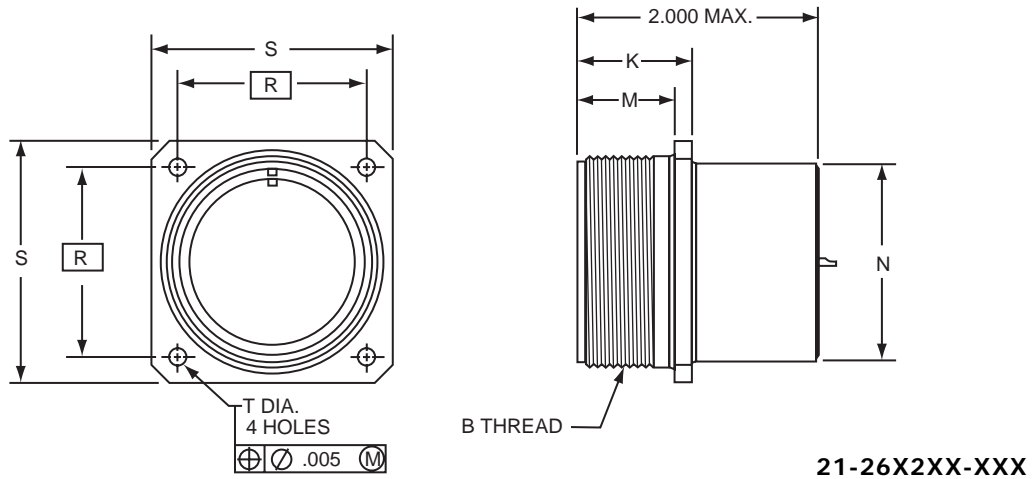


| Insert Arrangement | Degrees | | | |
|--------------------|---------|-----|-----|-----|
| | W | X | Y | Z |
| 20-4 | 45 | 110 | 250 | - |
| 20-5 | 35 | 110 | 250 | 325 |
| 20-6 | 70 | 145 | 215 | 290 |
| 20-15 | 80 | - | - | 280 |
| 20-17 | 90 | 180 | 270 | - |
| 20-18 | 35 | 110 | 250 | 325 |
| 20-19 | 90 | 180 | 270 | - |
| 20-21 | 35 | 110 | 250 | 325 |
| 20-23 | 35 | 110 | 250 | 325 |
| 20-24 | 35 | 110 | 250 | 325 |
| 20-27 | 35 | 110 | 250 | 325 |
| 20-29 | 80 | - | - | 280 |
| 22-1 | 35 | 110 | 250 | 325 |
| 22-2 | 70 | 145 | 215 | 290 |
| 22-4 | 35 | 110 | 250 | 325 |
| 22-5 | 35 | 110 | 250 | 325 |
| 22-8 | 35 | 110 | 250 | 325 |
| 22-9 | 70 | 145 | 215 | 290 |
| 22-10 | 35 | 110 | 250 | 325 |
| 22-11 | 35 | 110 | 250 | 325 |
| 22-13 | 35 | 110 | 250 | 325 |
| 22-20 | 35 | 110 | 250 | 325 |
| 22-22 | - | 110 | 250 | - |
| 22-23 | 35 | - | 250 | - |
| 22-27 | 80 | - | 250 | 280 |
| 22-28 | 80 | - | - | 280 |
| 22-63 | 20 | - | - | - |
| 24-2 | 80 | - | - | 280 |
| 24-9 | 35 | 110 | 250 | 325 |
| 24-10 | 80 | - | - | 280 |
| 24-11 | 35 | 110 | 250 | 325 |
| 24-22 | 45 | 110 | 250 | - |
| 24-27 | 80 | - | - | 280 |
| 28-2 | 35 | 110 | 250 | 325 |
| 28-3 | 70 | 145 | 215 | 290 |

| Insert Arrangement | Degrees | | | |
|--------------------|---------|-----|-----|-----|
| | W | X | Y | Z |
| 28-5 | 35 | 110 | 250 | 325 |
| 28-6 | 70 | 145 | 215 | 290 |
| 28-7 | 35 | 110 | 250 | 325 |
| 28-12 | 90 | 180 | 270 | - |
| 28-18 | 70 | 145 | 215 | 290 |
| 28-22 | 70 | 145 | 215 | 290 |
| 28-AY | 45 | 110 | 250 | - |
| 32-2 | 70 | 145 | 215 | 290 |
| 32-5 | 35 | 110 | 250 | 325 |
| 32-7 | 80 | 125 | 235 | 280 |
| 32-8 | 80 | 125 | 235 | 280 |
| 32-15 | 35 | 110 | 250 | 280 |
| 32-17 | 45 | 110 | 250 | - |
| 32-25 | 60 | 120 | - | - |
| 32-48 | 80 | - | - | - |
| 32-64 | 80 | 100 | 110 | 250 |
| 32-68 | 30 | - | - | - |
| 32-82 | 30 | - | - | - |
| 36-3 | 70 | 145 | 215 | 290 |
| 36-4 | 70 | 145 | 215 | 290 |
| 36-5 | - | 120 | 240 | - |
| 36-6 | 35 | 110 | 250 | 325 |
| 36-9 | 80 | 125 | 235 | 280 |
| 36-10 | 80 | 125 | 235 | 280 |
| 36-14 | 90 | 180 | 270 | - |
| 36-15 | 60 | 125 | 245 | 305 |
| 36-AF | 65 | - | - | - |
| 40-1 | 65 | 130 | 235 | 300 |
| 40-5 | 33 | - | - | 270 |
| 40-9 | 65 | 125 | 225 | 310 |
| 40-10 | 65 | 125 | 225 | 310 |
| 40-35 | 70 | 130 | 230 | 290 |
| 40-AD | 45 | - | - | - |
| 40-AG | 37 | 74 | 285 | 322 |
| 40-AP | 35 | 110 | 250 | 325 |
| 40-AV | 90 | 180 | 270 | - |

FAN (MIL-DTL-5015)

box mounting receptacle



For ordering information, see how to order page 67.
 Note: MIL-DTL-5015 supersedes MIL-C-5015.

| Shell Size | B Thread Class 2A (Plated) | M +.010 -.000 | K +.020 -.010 | N Dia. +.010 -.000 | R TP | S ±.031 | T Dia. +.004 -.002 |
|------------|----------------------------------|---------------------|---------------------|--------------------------|---------|------------|--------------------------|
| 8S | .5000-28 UNEF | .562 | .672 | .375 | .594 | .875 | .120 |
| 10S | .6250-24 UNEF | .562 | .672 | .500 | .719 | 1.000 | .120 |
| 10SL | .6250-24 UNEF | .562 | .672 | .625 | .719 | 1.000 | .120 |
| 12S | .7500-20 UNEF | .562 | .672 | .625 | .812 | 1.094 | .120 |
| 12 | .7500-20 UNEF | .750 | .860 | .625 | .812 | 1.094 | .120 |
| 14S | .8750-20 UNEF | .562 | .672 | .750 | .906 | 1.188 | .120 |
| 14 | .8750-20 UNEF | .750 | .860 | .750 | .906 | 1.188 | .120 |
| 16S | 1.0000-20 UNEF | .562 | .672 | .875 | .969 | 1.281 | .120 |
| 16 | 1.0000-20 UNEF | .750 | .860 | .875 | .969 | 1.281 | .120 |
| 18 | 1.1250-18 UNEF | .750 | .891 | 1.000 | 1.062 | 1.375 | .120 |
| 20 | 1.2500-18 NEF | .750 | .891 | 1.125 | 1.156 | 1.500 | .120 |
| 22 | 1.3750-18 NEF | .750 | .891 | 1.250 | 1.250 | 1.625 | .120 |
| 24 | 1.5000-18 NEF | .812 | .953 | 1.375 | 1.375 | 1.750 | .147 |
| 28 | 1.7500-18 NS | .812 | .953 | 1.625 | 1.562 | 2.000 | .147 |
| 32 | 2.0000-18 NS | .875 | 1.031 | 1.875 | 1.750 | 2.250 | .173 |
| 36 | 2.2500-16 UN | .875 | 1.031 | 2.062 | 1.983 | 2.500 | .173 |
| 40 | 2.5000-16 UN | .875 | 1.031 | 2.312 | 2.188 | 2.750 | .173 |

All dimensions for reference only.

Amphenol® Filter Adapters

effective circuit protection for existing applications

Filter adapters present an effective and economical method of introducing EMI/EMP protection to an installed system. The adapter series of filter connectors from Amphenol are available to intermate with all the popular MIL-Specs.

Features of the Amphenol® adapter include:

- Planar technology from the industry's leader in cylindrical filter products
- MOV or diode capability for transient protection
- Wide range of tooled patterns
- Space qualified components

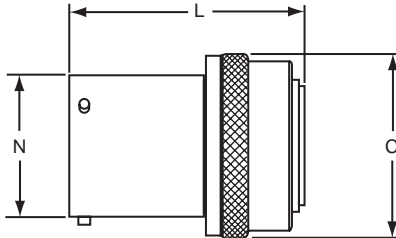
Installation of the adapter is quick and efficient, requiring no tools, fixtures or extended downtime. Simply unmate the existing cable harness from the receptacle; attach the coupling nut to the receptacle on the unit; then mate the cable harness to the receptacle side of the adapter.

Several design alternatives are available that will help ensure that the adapter remains permanently attached to either the cable harness or the unit receptacle.



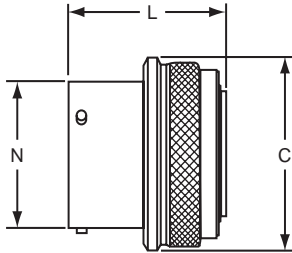
FPT, FJT, FLJT, FTV adapters

**FPT Adapter
21-900075-XX**



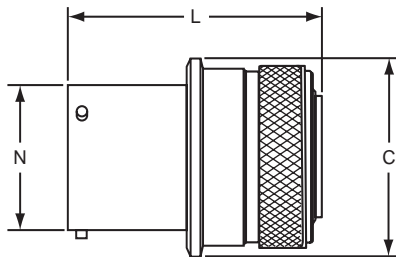
| FPT Shell Size | C Dia. Ref. | N Dia. +.001 - .005 | L Max. |
|----------------|-------------|---------------------|--------|
| 8 | .729 | .473 | 1.626 |
| 10 | .851 | .590 | 1.626 |
| 12 | 1.035 | .750 | 1.626 |
| 14 | 1.158 | .875 | 1.626 |
| 16 | 1.280 | 1.000 | 1.626 |
| 18 | 1.403 | 1.125 | 1.626 |
| 20 | 1.525 | 1.250 | 1.688 |
| 22 | 1.648 | 1.375 | 1.688 |
| 24 | 1.770 | 1.500 | 1.688 |

**FJT Adapter
21-900393-XX**



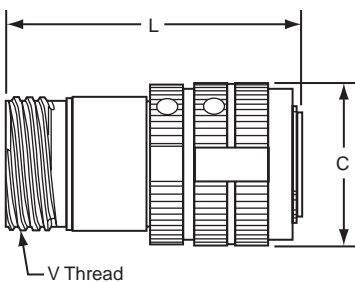
| FJT Shell Size | C Dia. +.011 - .010 | N Dia. +.001 - .005 | L Max. |
|----------------|---------------------|---------------------|--------|
| 8 | .847 | .473 | 1.397 |
| 10 | .969 | .590 | 1.397 |
| 12 | 1.143 | .750 | 1.397 |
| 14 | 1.255 | .875 | 1.397 |
| 16 | 1.388 | 1.000 | 1.397 |
| 18 | 1.510 | 1.125 | 1.397 |
| 20 | 1.633 | 1.250 | 1.397 |
| 22 | 1.756 | 1.375 | 1.397 |
| 24 | 1.878 | 1.500 | 1.397 |

**FLJT Adapter
21-900423-XX**



| FLJT Shell Size | C Dia. +.011 - .010 | N Dia. +.001 - .005 | L Max. |
|-----------------|---------------------|---------------------|--------|
| 9 | .920 | .572 | 2.038 |
| 11 | 1.045 | .700 | 2.038 |
| 13 | 1.246 | .850 | 2.038 |
| 15 | 1.371 | .975 | 2.038 |
| 17 | 1.496 | 1.100 | 2.038 |
| 19 | 1.616 | 1.207 | 2.038 |
| 21 | 1.743 | 1.332 | 2.038 |
| 23 | 1.866 | 1.457 | 2.038 |
| 25 | 1.991 | 1.582 | 2.038 |

**FTV Adapter
21-900529-XX**



| FTV Shell Size | C Dia. Ref. | V Thread 0.1P-0.3L-TS Class 2A | L Max. |
|----------------|-------------|--------------------------------|--------|
| 9 | .845 | .6250 | 2.257 |
| 11 | .950 | .7500 | 2.257 |
| 13 | 1.121 | .8750 | 2.257 |
| 15 | 1.249 | 1.0000 | 2.257 |
| 17 | 1.386 | 1.1875 | 2.257 |
| 19 | 1.493 | 1.2500 | 2.257 |
| 21 | 1.620 | 1.3750 | 2.257 |
| 23 | 1.737 | 1.5000 | 2.257 |
| 25 | 1.864 | 1.6250 | 2.257 |

All dimensions for reference only.
Consult Amphenol, Sidney, NY for ordering information.

Amphenol® Transient Protection

MOV – Metal Oxide Varistor Connectors

- Filter connector size package
- Protection for 14, 31, 38 DC voltage circuits
- Radiation hardened
- No additional circuits required
- Low impedance
- Increased reliability
- Nanosecond response time
- Elimination of costly external suppression assemblies

The Amphenol® MOV Connector offers the versatility of a standard connector, with transient protection for sensitive circuits.

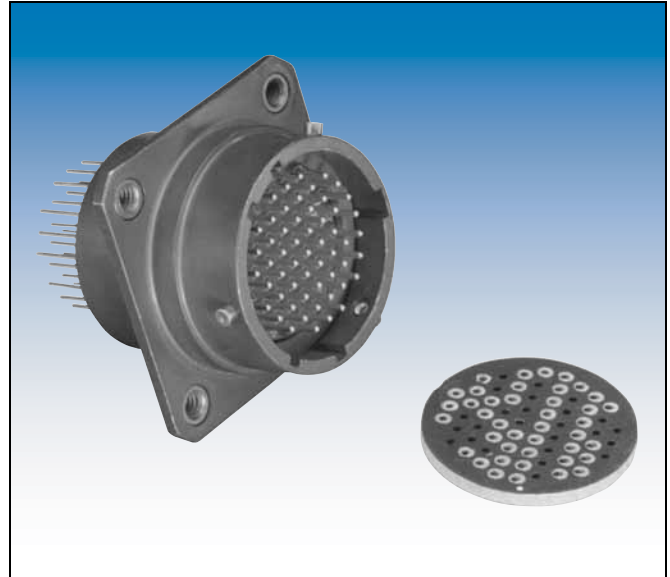
Transients in electrical circuits caused by a sudden release of stored energy can originate within or outside of the circuit and may be repeatable or random.

Regardless of frequency or origin, transient caused failures generated by load switching, lightning, electrostatic discharge (ESD) and electromagnetic pulse (EMP) can destroy unprotected IC components.

Compatible with present filter connector assembly procedures, MOVs can be combined with existing filters. Internal housing of the MOV sleeve offers weight and space savings over other protection methods available today, and eliminates costly and bulky exterior suppression mechanisms in appropriate situations. MOVs are presently available in contact sizes 22, 20 and 16.

Transient protection can be provided in receptacle, plug or adapter configuration. These connectors are intermateable and intermountable with the following MIL-Specs:

- MIL-DTL-5015
- MIL-C-26482
- MIL-C-26500
- MIL-C-27599
- MIL-DTL-38999
- MIL-C-83723



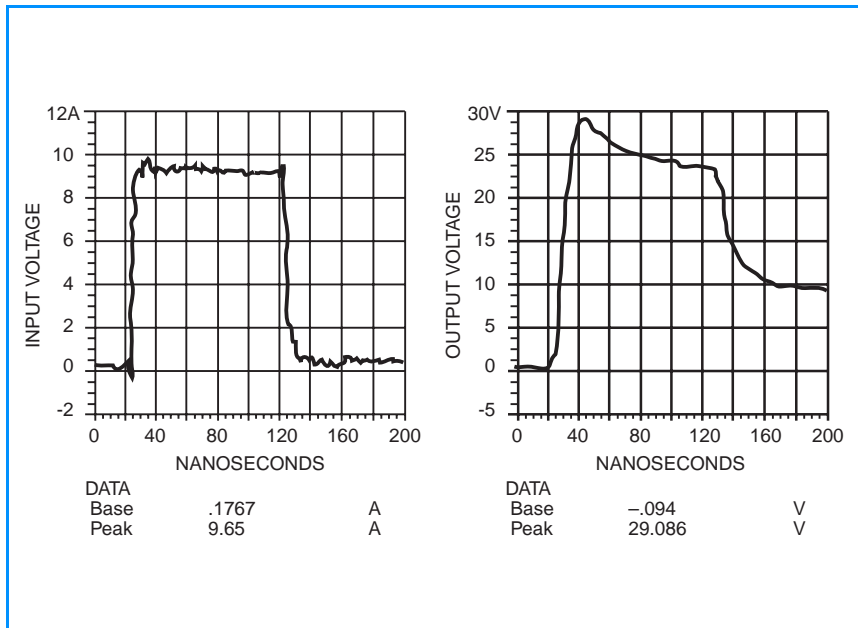
MOV Connectors, cont.

M.O.V. PERFORMANCE CHARACTERISTICS

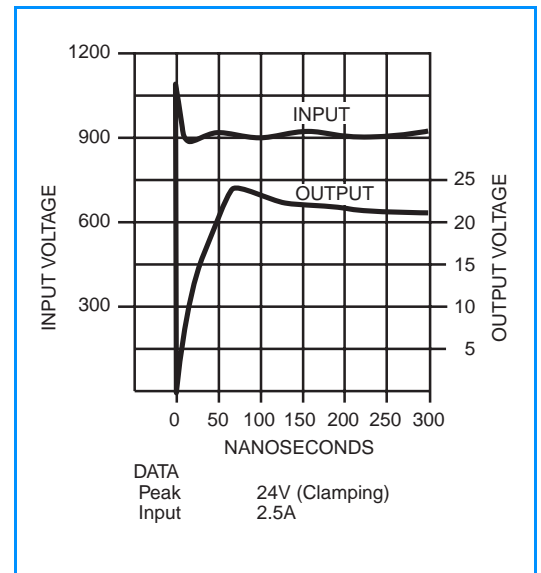
| Designation | Contact Size | Maximum Ratings (125°C) | | | | Specifications (25°C) | | | | | | Maximum Leakage Current at V_t (dc) | | | |
|-------------|--------------|-------------------------|-------------|--------------------------|-----------------------------|------------------------------|------------------|------------|---|------------|----------------------|---------------------------------------|-------------------------|--------------------------|----------------|
| | | Continuous | | Transient | | Varistor Voltage at 1mA (DC) | | | Maximum Clamping Voltage V_C at Test Current I_p (8/20 μ S) | | Capacitance at 1 MHz | | | | |
| | | DC Voltage | RMS Voltage | Energy (10/1000 μ S) | Peak Current (8/20 μ S) | | | | | | | | | | |
| | | V_m Volts | V_m Volts | W_{tm} Joules | I_{tm} Amperes | Min. Volts | V_N (dc) Volts | Max. Volts | V_C Volts | I_p Amps | PicoFarads | | 25°C I_L Max. μ A | 125°C I_L Max. μ A | V_t DC Volts |
| F14 | 22 | 14 | 10 | 1.5 | 250 | 18 | 22 | 26 | 42 | 10 | 1000 | 3000 | 5 | 50 | 14 |
| F31 | 22 | 31 | 25 | 1.5 | 250 | 35 | 39 | 48 | 85 | 5 | 450 | 1950 | 5 | 50 | 28 |
| F38 | 22 | 38 | 30 | 1.5 | 250 | 42 | 47 | 58 | 100 | 5 | 400 | 1500 | 5 | 50 | 36 |
| F31 | 20 | 31 | 25 | 2 | 300 | 35 | 39 | 48 | 85 | 10 | 450 | 1950 | 5 | 50 | 28 |
| F38 | 20 | 38 | 30 | 2 | 300 | 42 | 47 | 58 | 100 | 10 | 400 | 1500 | 5 | 50 | 36 |
| F38 | 16 | 38 | 30 | 3 | 350 | 42 | 47 | 58 | 100 | 20 | 450 | 1950 | 5 | 50 | 36 |

NOTE: Continuous voltage ratings are based on 1000 hour reliability assurance tests at 125°C rated ambient temperature per MIL-STD-202 Method 108. Contact Amphenol Sidney for options not listed in chart.

The following charts show the typical MOV response to an input pulse open circuit of 1000V and 10A peak square wave with a 5 nanosecond rise time in a 50 Ohm system.



The following chart shows response time and output voltage of a typical MOV with 1000V, 5 nanosecond, 2.5A input pulse mounted in an LJT 13-35P connector. Test was performed without load.



Amphenol® Transient Protection Diode Connectors

- Clamping voltage as low as 11.9 volts
- Low capacitance – suitable for high frequency applications
- Unipolar or bipolar – using existing proven diode technology
- Protection for 5.8 to 60 VDC circuits
- No additional circuits required
- Low impedance – high frequency response
- Increased reliability
- Nanosecond response time
- Elimination of costly external suppression assemblies
- Screening to applicable requirements of MIL-S-19500TX/ TXV available
- Keeps transients outside of the box
- Minimizes fast transient voltage overshoot

The Amphenol® Diode Connector offers the versatility of a standard connector, with transient protection for sensitive circuits, such as TTL Lines.

Transients in electrical circuits caused by a sudden release of stored energy can originate within or outside of the circuit and may be repeatable or random.

Regardless of frequency or origin, transient caused failures generated by load switching, lightning, electrostatic discharge (ESD) and electromagnetic pulse (EMP) can destroy unprotected IC components.

Compatible with present filter connector assembly procedures, diodes can stand alone or can be combined in series with filters. Internal housing of the diode offers weight and space savings over other protection methods available today, and eliminates costly and bulky exterior suppression mechanisms in appropriate situations. Diodes are presently available in contact sizes 22 and 20.

Transient protection can be provided in receptacle, plug or adapter configurations. These connectors are intermateable and intermountable with the following MIL-Specs:

- MIL-DTL-5015
- MIL-DTL-27599
- MIL-C-26482
- MIL-DTL-38999
- MIL-C-26500
- MIL-C-83723



Diode Connector and Adapter



Close-up View of Diode Contact

Diode Connectors, cont.

STANDARD DIODE CONNECTOR CHARACTERISTICS AT 25 °C

| Stand-off Voltage † (VDC) | Max. Capacitance* (pf) | Breakdown Voltage at 1 mA (VDC) | Max. Clamping Voltage (8 x 20µ sec. pulse) | Leakage Current at Stand-off Voltage (µA) | Power Capability † 20µs Exp. Impulse (Peak) (Watts) |
|---------------------------|------------------------|---------------------------------|--|---|---|
| + 5.8 | 1600 | + 6.45 to + 7.1** | +11.9 | <100 | 1000 |
| ± 5.8 | 1000 | ± 6.45 to ± 7.1** | ±11.9 | <150 | 1000 |
| ± 7.0 | 750 | ± 7.3 to ± 9.3 | ±13.5 | <10 | 1000 |
| ± 8.0 | 750 | ± 8.2 to ±10.6 | ±15.4 | <5 | 1000 |
| + 8.0 | 1500 | + 8.5 to +10.6 | +15.4 | <5 | 1000 |
| ±10.0 | 500 | ±11.1 to ±12.3 | ±17.0 | <1 | 1000 |
| +10.0 | 1100 | +11.1 to +12.3 | +17.0 | <1 | 1000 |
| ±15.0 | 500 | ±16.7 to ±18.5 | ±24.9 | <1 | 1000 |
| +15.0 | 750 | +16.2 to +19.2 | +24.9 | <1 | 1000 |
| -15.0 | 750 | -16.2 to -19.2 | -24.9 | <1 | 1000 |
| ±17.0 | 500 | ±18.9 to ±23.0 | ±32.0 | <1 | 1000 |
| +17.1 | 600 | +19.0 to +21.0 | +27.7 | <1 | 1000 |
| ±22.0 | 500 | ±25.7 to ±28.4 | ±38.0 | <1 | 1000 |
| ±25.0 | 500 | ±27.8 to ±30.7 | ±40.5 | <1 | 1000 |
| +28.0 | 500 | +30.5 to +35.7 | +46.4 | <1 | 1000 |
| ±33.3 | 500 | +37.1 to +41.0 | ±53.9 | <1 | 1000 |
| +33.3 | 500 | +37.1 to +41.0 | +53.9 | <1 | 1000 |
| ±40.0 | 500 | ±44.4 to ±49.1 | ±64.5 | <1 | 1000 |
| ±45.0 | 500 | ±47.1 to ±58.1 | ±84.2 | <1 | 1000 |
| +57.8 | 500 | +64.6 to +71.4 | +95.2 | <1 | 1000 |
| ±57.8 | 500 | ±64.6 to ±71.4 | ±95.2 | <1 | 1000 |

Clamping Time -

Unipolar: Less than 1 nanosecond, 0V to breakdown

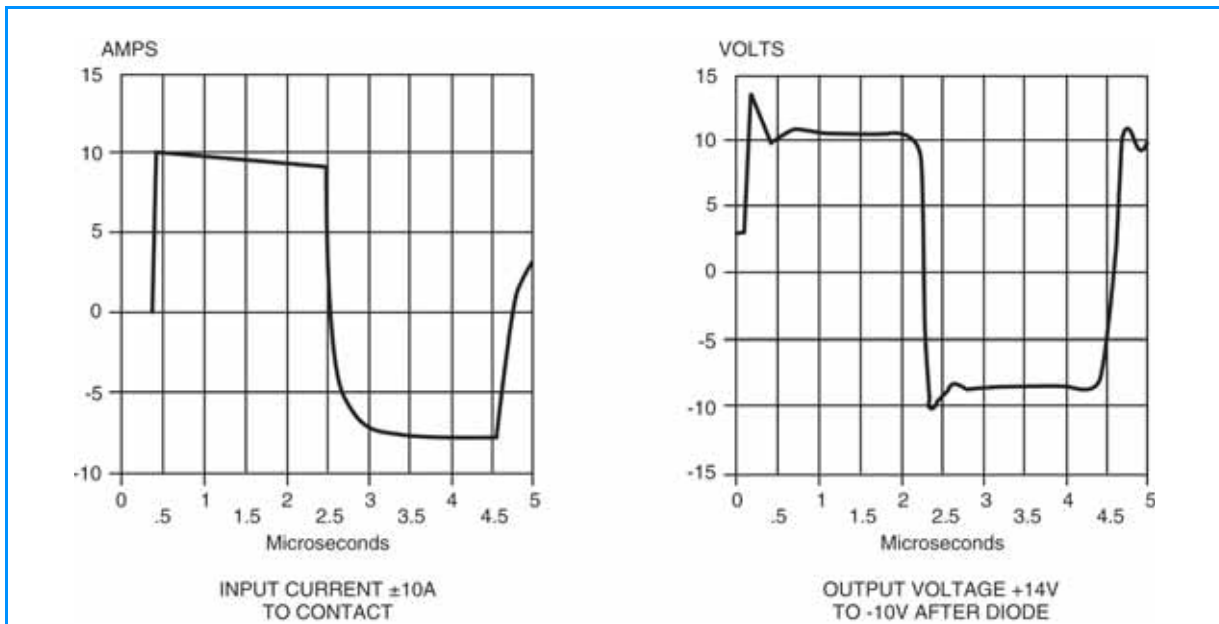
Bipolar: Less than 5 nanoseconds, 0V to breakdown

* Lower capacitance devices available; consult Amphenol, Sidney, NY.

**This device only measured at 10ma

† Higher power ratings also available

DIODE CONTACT PULSE TEST, ±5.8 DIODE



Amphenol® Transient Protection

ESA – Energy Shunting Assembly

The Amphenol® Energy Shunting Assembly (ESA) is a simple, compact unit which provides lightning and electromagnetic pulse (EMP) protection of systems in which many signal lines enter sensitive electronic equipment. The efficient packaging of the ESA circumvents the concept of one protective device per line. It provides a surge arrester which has the advantage of space saving and simplified assembly when compared to current protective devices which range from diodes to large spark gaps.

The current ESA design consists of two 53-pin contact, Mil-Standard, hermetic connectors assembled back to back, and encompassing a ground plate. A sealed chamber is formed within this thru-bulkhead unit, housing 53 in-line spark gaps. Introducing a controlled atmosphere enhances fast rise breakdown.

The ESA can be integrated with an EMI filter connector which can improve its performance. These two assemblies provide a method to help protect against lightning, EMP, EMI and TEM-PEST effects.



Performance Characteristics

| | | |
|---|------------------------------------|----------------------------------|
| 1. DC breakdown voltage | 230 Volts | |
| 2. Maximum rated surge discharge current (8 x 20 microsecond pulse) | 5,000 Amperes per pin | |
| 3. Insulation resistance | 10 ¹⁰ ohms minimum | |
| 4. Capacitance between each electrode and the ground plane | Less than 2 pf | |
| 5. Rate-of-rise breakdown voltage | Maximum Breakdown Voltage (Volts) | Rate of Rise (Volts/microsecond) |
| | 600 | 10 |
| | 800 | 1,000 |
| | 1,500 | 10,000 |
| | 2,000 | 100,000 |
| 6. Surge breakdown unbalance (at 100 Volts/microseconds) | 180 Volts | |
| 7. Surge life (500 Ampere – 10 x 1,000 microsecond) | 400 Surges | |
| 8. Hold-over voltage | 100 Volts | |
| 9. Arcing voltage | 40 Volts | |
| 10. Glow to arc transition point | 1 Ampere | |
| 11. Temperature range | -40°F to 150°F (233°K to 339°K) | |

Filter Accessories

Universal “Header Assembly” for flex print or PC board connectors

Mounts to all MIL-DTL-38999 and MIL-C-26482 Connectors

The use of connectors with printed circuit termination is rapidly gaining popularity due to the use of high volume, vapor phase or wave solder manufacturing processes. Termination of this style of connector to flex print or a printed circuit board represents a major cost in the manufacturing process for users. When adding flex or printed circuit board assemblies to an expensive filter or filter/transient protection connector, the total cost of a failed solder joint, a bent pin, or an unanticipated electrical failure becomes prohibitive. The universal header assembly from Amphenol will provide for easy separation of the connector from the board on these occasions.

Header Assemblies Provide Cost Savings

Incorporation of the header assembly provides the user with time and cost saving potentials. These header assemblies can be vapor phase or wave soldered to flex or printed circuit boards prior to the receipt of the EMI/EMP connector. Headers can be installed to standard connectors, allowing for electrical testing that would adversely affect the sensitive diodes, MOV's or capacitors in the EMI/EMP connectors. Expensive connector assemblies can be easily removed from and reattached to the header assembly as the manufacturing process dictates.

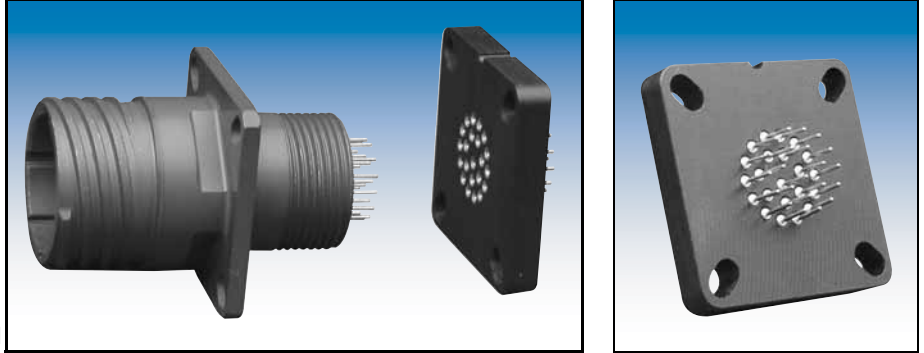
Mounting Applications

Shell modifications are recommended, but are not necessary. The header assembly can be attached to connectors with standard flange placement or directly to the circuit board. The ideal application would involve either a single flange moved all the way to the rear of the connector or a double flange. Cinch nuts can be installed in either flange to allow easier mounting to the panel or the header assembly. The forward flange would mount the connector to the panel; the rear flange would be used to mount the header assembly. Various types of captivated or loose attaching screws can be utilized for unique applications.

Amphenol universal headers are slotted to allow mounting to all series of MIL-DTL-38999 or MIL-C-26482 connectors without special alterations. They are of similar dimension as the flange of the mounting connector and would be approximately .185 inches (4.70 mm) thick.

Incorporates a Shorter Pin/Socket Contact

The heart of the header assembly is a short pin/socket contact. The tall of the contact would accommodate standard through-hole diameter and thickness of the flex or printed circuit board materials. The socket is imbedded in the molded material, making electrical engagement with the printed circuit tail of the connector.



Headers provide easy separation of the connector from the PC board.

Cylindrical Configuration

- 3 PCB stickout dimensions are available.
- Size 22D contacts use .175 thick headers
- Size 16 to 20 contacts use .195 thick headers
- Consult Amphenol, Sidney NY for additional configurations.
- Headers for cylindrical connectors accommodate up to 128 pins. Consult Amphenol catalogs for mating connector contact layouts (12-092 and 12-090 for MIL-DTL-38999 and 12-070 for MIL-C-26482).

Mounting to Rectangular ARINC Connectors

- Headers for ARINC connector arrangements accommodate up to 150 pins.
- Consult Amphenol, Sidney NY for ARINC configurations and detailed dimensions.

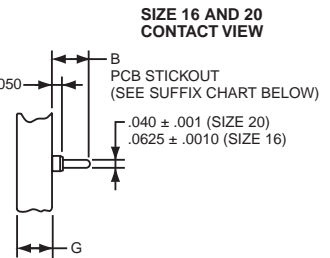
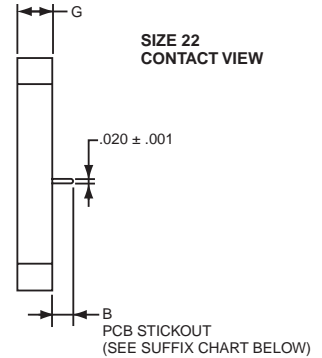
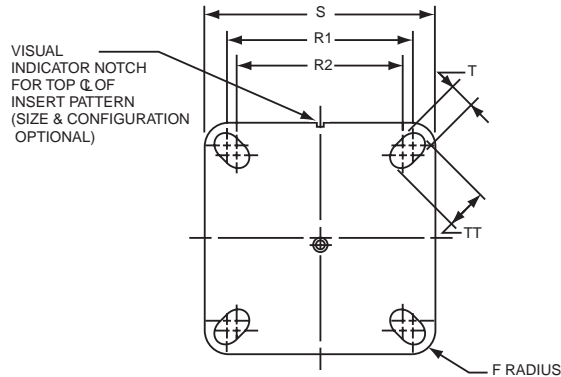
Materials

- Body is molded from Torlon or PPS (Polyphenylene Sulfide)
- Electrical engagement areas of the header contact are plated with .00003 inches minimum of gold over .00005 inches minimum of nickel.

Filter Accessories

Universal "Header Assembly" for flex print or PC board connectors, cont.

The drawing below shows the standard universal adapter for use with MIL-DTL-38999 and MIL-C-26482 connectors. Consult Amphenol, Sidney, NY for drawings of headers for ARINC configurations.



| Assembly Part Number | Shell Size | F Radius | G ±.005 | S ±.005 | T +.008 - .006 | R1 TP† | R2 TP† | TT +.008 - .006 |
|----------------------|------------|----------|---------|---------|----------------|--------|--------|-----------------|
| 21-904008-XX() | 8/9 | .094 | | .938 | .128 | .719 | .594 | .216 |
| 21-904010-XX() | 10/11 | .094 | | 1.031 | .128 | .812 | .719 | .194 |
| 21-904012-XX() | 12/13 | .094 | | 1.125 | .128 | .906 | .812 | .194 |
| 21-904014-XX() | 14/15 | .125 | | 1.219 | .128 | .969 | .906 | .173 |
| 21-904016-XX() | 16/17 | .125 | | 1.312 | .128 | 1.062 | .969 | .194 |
| 21-904018-XX() | 18/19 | .125 | | 1.438 | .128 | 1.156 | 1.062 | .194 |
| 21-904020-XX() | 20/21 | .125 | | 1.562 | .128 | 1.250 | 1.156 | .194 |
| 21-904022-XX() | 22/23 | .125 | | 1.688 | .154 | 1.375 | 1.250 | .242 |
| 21-904024-XX() | 24/25 | .125 | | 1.812 | .154 | 1.500 | 1.375 | .242 |

See Suffix Chart

Assemblies containing Size 22 contact only: .175
Assemblies containing Size 16 or 20 contacts: .195

† TP designates true position dimensioning.

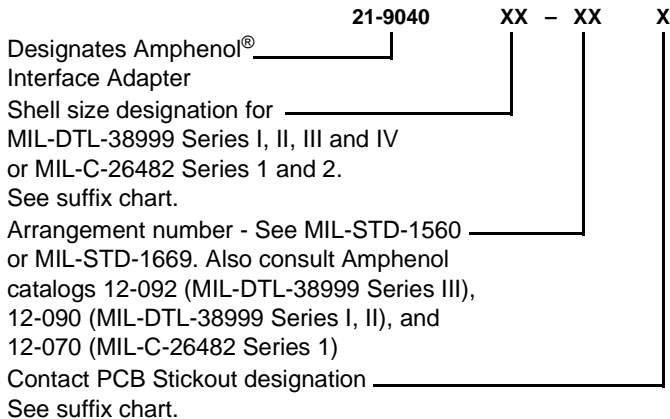
NOTE:

Size 22 accepts .018 to .022 dia. PCB tails.
Size 16 accepts .048 to .064 dia. PCB tails.
Size 20 accepts .037 to .043 dia. PCB tails.

HOW TO ORDER INFORMATION

For Universal Adapter used with MIL-DTL-38999 and MIL-C-26482 Connectors

Use coded number as follows:



For how to order information on adapters to be used with ARINC connectors, consult Amphenol Aerospace, Sidney NY.

ASSEMBLY NUMBER SUFFIX CHART

| Shell Size Designation* | Arrangement Number Suffix*** | Contact PCB Stickout** | |
|-------------------------|---|------------------------|------------------|
| | | Suffix | B ±.015 Stickout |
| 08 | Insert Arrangement Suffix from MIL-STD-1560 or MIL-STD-1669 | 1 | .120 |
| 10 | | 2 | .185 |
| 12 | | 3 | .270 |
| 14 | | | |
| 16 | | | |
| 18 | | | |
| 20 | | | |
| 22 | | | |
| 24 | | | |

* Shell size designation for MIL-DTL-38999 Series I, II, III & IV and MIL-C-26482 Series 1 and 2.
Examples: Shell size 9 use 08. Shell size 25 use 24.

** Size 22 contacts available in all 3 stickout lengths. Size 16 and 20 contacts available only in .185 and .270 lengths.

*** Insert arrangement 14-97 and 15-97 are not available at this time. Consult Amphenol, Sidney, NY for information.

Filter Accessories

Amphenol Electrostatic Discharge (ESD) Protected Connectors

Amphenol has developed cylindrical and rectangular connectors which protect sensitive components from Electrostatic Discharge (ESD) without diodes, varistors, gas tubes, or “experimental” semiconductive materials.

These connectors utilize the Faraday Cage principal to shunt electrostatic discharge events to the conductive enclosure on which the connector is mounted, thus never allowing the high voltage, high current discharge event to reside on any contacts.

The ESD protected connectors have the same physical envelope as their standard counterparts, and do not require special mounting or terminating techniques. All of the contacts remain fully functional, and electrical characteristics such as capacitance are not effected.

Product Features:

- Connector envelope identical to unprotected design for most applications
- Exceeds Protection Requirements of IEC 801-2 and MIL-STD-1686:
- Ensures that All Components within a Conductive Enclosure will be Subjected to a Maximum of 10V during Electrostatic Discharges between – 26 KV and +26 KV
- Voltage Observed on Contacts during ESD Events – <10V (at 1 megohm)
- Current Observed on Contacts during ESD Events – <100 milliamperes (at 2 ohms)
- Response Time – Instantaneous (Voltage and Current are Maximum Values)
- Maximum ESD Voltage – Tested to $\pm 26KV$
- No Capacitive Loading
- Eliminates the Need for Discrete Components (such as diodes) and Maximizes Printed Circuit Board Real Estate for Equipment Housed in Conductive Enclosures which require ESD Protection as Free-standing Units
- Operating Voltage of Connectors not Effected for Most Designs
- Pulse Life – Infinite

What is Electrostatic Discharge (ESD)?

Electrostatic Discharge (ESD) is the rapid transfer of a static electric charge from one body to another. A static electric charge consists of either a surplus or depletion of electrons on a body, which gives that body a potential or voltage relative to ground (or another body). The discharge is extremely fast (less than 1 nanosecond risetime) and the current flow may exceed 100 amps!

Static electricity is normally the result of two materials transferring charges when rubbed or separated, such as shoes scuffing across a dry carpet, or sheets of untreated plastic being separated. This phenomena is commonly referred to as the **triboelectric effect**.

The voltage developed due to the **triboelectric effect** depends on the materials involved, the quantity and type of contact, and relative humidity. In a dry environment a person can accumulate a charge of up to 25 KV! In a moist environment a person’s potential is reduced due to the effect of moisture on the insulating properties of materials.

For further information see:

Amphenol Product Data Sheet #171-1 Amphenol Electrostatic Discharge (ESD) Protected Connectors.

Amphenol Publication L-2075, “ESD Attenuation Test Procedure for Connectors with Faraday Cage Protective Structures”

* For further information on Amphenol LRM connectors with ESD protection consult Amphenol Aerospace, Sidney, NY



ESD Testing on MIL-DTL-38999, Series III Filter Cylindrical Connector (Actual Photo)

What is a Faraday Cage?

A **Faraday cage** is a conductive enclosure. It may be solid in form such as a sheet-metal enclosure, or it may be full of apertures, such as a wire cloth box. When a charge is placed on a faraday cage the electrons which make up the charge, having like polarity, try to position themselves as far as possible from each other. This places the electrons on the outer surface of the enclosure, leaving the inner surface uncharged. The charge on the outer surface does not induce a charge on any neutral object inside of the faraday cage, and therefore does not try to transfer itself onto the internal object. Neutral objects (such as IC’s) inside of a faraday cage are thereby protected from ESD activity external to the faraday cage.

The voltage and current observed on neutral objects within a faraday cage during ESD events are due to the secondary effects of ESD. These include Electromagnetic Interference (EMI), magnetic and electrical field coupling. The faraday cage of the Amphenol ESD Protected Connectors has been designed to minimize these effects.

The Amphenol® ESD Protected Connectors

The Amphenol® ESD Protected Connectors have a faraday cage at the mating interface. The faraday cage has been specifically designed to intercept electrostatic discharges from the contacts in the unmated state, while maintaining each contact’s isolation when the connector is mated. When the ESD Protected Connectors have been mounted to a conductive enclosure, a faraday cage is created which will protect components located within the enclosure from electrostatic discharges. This eliminates the need for discrete components such as diodes and gas discharge tubes, and saves printed circuit board real estate. Amphenol ESD Protected Connectors have also been applied to Line Replaceable Modules (LRM).*

How to Order Filter Connectors

The following format is suggested when ordering Amphenol® EMI filter connectors:

- Fill out the EMI Filter Connector check list on the next page. This check list page can be copied, filled out and sent to an Amphenol technical support person. Fax it to 607-563-5157 and a filter connector specialist will help you. It is also available on-line at www.amphenol-aerospace.com/products_filter.html.
- Choose the contact and attenuation characteristics required. (see pages 5 and 6).
- Choose the contact size and insert arrangement. Refer to corresponding Mil-Spec or go to the applicable Amphenol detailed connector catalog as follows:
 - 12-092, MIL-DTL-38999, Series III Tri-Start Connectors
 - 12-090, MIL-DTL-38999, Series I & II, LJT & JT Connectors
 - 12-070, MIL-C-26482, Series 1 Connectors
 - 12-020, MIL-C-5015 Connectors
 These detailed catalogs are all available on-line at www.amphenol-aerospace.com.
- Choose the shell style that fits your application. Refer to each of the style sections in this catalog:

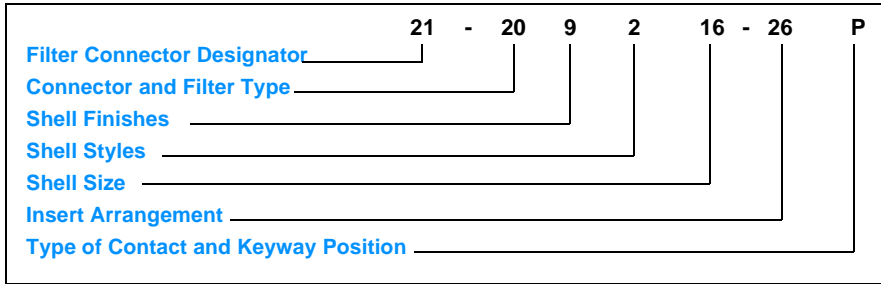


| Filter Connector Type | Filter Connector Brief Description | Pages |
|-----------------------|---|-------|
| FCTV | MIL-DTL-38999 Series III with Composite shell | 9-13 |
| FTV | MIL-DTL-38999 Series III with Metal shell | 14-20 |
| FJT | MIL-DTL-38999, Series II | 21-27 |
| FLJT | MIL-DTL-38999 Series I | 28-37 |
| FSJT | Proprietary 38999 type | 38-43 |
| FBL | MIL-DTL-38999 Series IV | 44-46 |
| FPT | MIL-C-26482 | 47-53 |
| FAN | MIL-DTL-5015 | 54-55 |

- To arrive at part number, see pages 67, 68, How to Order.

How to Order

Ordering procedure for example part number 21-209216-26P is shown below. If further assistance is needed to determine your filter connector requirements and order number(s), see the EMI Filter Check List on the next page and/or consult Amphenol Aerospace, Sidney, NY.



-2XX

Any combination of filters, non-filters, grounds, and non-standard contact terminations will require -2XX suffix. Please consult Amphenol Aerospace for assistance in setting up these part numbers.

- Standard voltage for diode is ± 8 volts. Any deviation requires a -2XX suffix.
- Standard voltage for a MOV is 47 volts. Any deviation requires a -2XX suffix.
- Standard diode/filter combination is ± 8 volt/VHF-1 filter. Any deviation requires a -2XX suffix.
- Standard MOV/filter combination is 47 volt/VHF-1 filter. Any deviation requires a -2XX suffix.

21 Filter Connector Designator

- 21 - Filter Connector
- 36 - MOV Connector
- 47 - Diode Connector

20 Connector/Filter Type*

- 20 - FPT with VHF-1 filter (short shell)
- 22 - FPTE with VHF-1 filter (short shell)
- 24 - FJT with VHF-1 filter (short shell)
- 25 - FJT with ± 8 volt diode/VHF-1 filter combination
- 26 - FAN with VHF-1 filter
- 29 - FLJT with VHF-1 filter (short shell)
- 31 - FPT with MF filter (short shell)
- 32 - FJT with MF filter (short shell)
- 33 - FPT with HF filter (long shell)
- 34 - FJTP with VHF-1 filter (short shell)
- 36 - FLJT with HF filter (long shell)
- 37 - FJT with HF filter (long shell-min. penetration also available)
- 38 - FJTP with HF filter (long shell)
- 39 - FJTP with MF filter (short shell)
- 40 - FLJT with MF filter (short shell)
- 41 - FJT (UTS) with VHF-1 filter (short shell)
- 46 - FPT (UTS) with VHF-1 filter
- 47 - FLJTPQ with VHF-1 filter (short shell)
- 48 - FLJTPQ (UTS) with VHF-1 filter (short shell)
- 50 - FTV (UTS) with VHF-1 filter (short shell)
- 51 - FTV (UTS) with HF filter (long shell)
- 52 - FTV with VHF-1 filter (short shell)
- 53 - FTV with HF-1 filter (long shell)
- 56 - FJTP (UTS) with VHF-1 filter
- 57 - FLJT with VHF-1 filter (printed circuit mount)
- 58 - FJTPQ (UTS) with VHF-1 filter (short shell)
- 60 - FTV with VHF-1 filter (printed circuit board mount, mod. flange)
- 61 - FBL with VHF-1 filter (short shell)
- 63 - FSJT with VHF-1 filter (short shell)
- 64 - FBL (UTS) with VHF-1 filter
- 65 - FSJT (UTS) with VHF-1 filter
- 67 - FTV with VHF-1 filter (printed circuit board mount, Std. flange)
- 68 - FTV (UTS) with ± 8 volt diode/VHF-1 filter combination
- 73 - M83723 bayonet coupling with VHF-1 filter
- 76 - FTV with VHF-1 filter with composite shell

- 77 - FLJT with ± 8 volt diode/VHF-1 filter combination
- 78 - FTV PCB mount with standard flange
- 79 - M83723 (UTS) with bayonet mount
- 80 - FTV PCB mount with standard flange and standard nut
- 82 - FTV with ± 8 volt diode/VHF-1 filter combination
- 83 - FSJT with ± 8 volt diode/VHF-1 filter combination
- 84 - FTV (UTS) with ± 8 volt diode only
- 85 - FBL with ± 8 volt/VHF-1 filter combination
- 87 - FLJT (UTS) with ± 8 volt diode/VHF-1 filter combination
- 96 - FPT-E (UTS) with 3-8 Nfd Pi 1500V filter

9 Shell Finishes

- 0 - chromate
- 1 - bright cadmium
- 2 - stainless steel (electrolytic nickel plated)
- 4 - electroless nickel, MS (F)
- 5 - gold plate over nickel
- 7 - cadmium plate over nickel, MS (A)
- 8 - bright nickel
- 9 - cadmium plate, nickel base, OD, MS(B), (500 hr. salt spray test)

2 Shell Styles

- 0 - wall mount receptacle
- 2 - box mount receptacle
- 3 - jam nut receptacle with rear thread (PT only)
- 4 - minimum penetration jam nut receptacle
- 7 - jam nut receptacle

16 Shell Size

- 8 through 24 - FJT and FPT shell sizes available
- 9 through 25 - FLJT and FTV shell sizes available

26 Insert Arrangement

Refer to corresponding Mil-Spec.

P Type of Contact and Insert Arrangement

- P - pins in a normal rotation
 - S - sockets in a normal rotation
- For alternate rotations go to the table below for suffix letter.

* Call Amphenol Aerospace for information on Programmable Filter types.

ALTERNATE ROTATION SUFFIX LETTERS

| FJT, FLJT or FSJT | | | FTV or FCTV | | | FPT | | | FBL Series IV | | | FAN | | |
|--------------------|---------------|---------|--------------------|---------------|---------|--------------------|---------------|---------|--------------------|---------------|---------|--------------------|---------------|---------|
| Alternate Position | Suffix Letter | | Alternate Position | Suffix Letter | | Alternate Position | Suffix Letter | | Alternate Position | Suffix Letter | | Alternate Position | Suffix Letter | |
| | Pins | Sockets | | Pins | Sockets | | Pins | Sockets | | Pins | Sockets | | Pins | Sockets |
| Normal | P | S | Normal | P | S | Normal | P | S | N | P | S | Normal | P | S |
| A | E | F | A | G | H | W | G | H | A | E | F | W | G | H |
| B | R | T | B | I | J | X | I | J | B | G | H | X | I | J |
| C | W | X | C | K | L | Y | K | L | C | J | L | Y | K | L |
| D | Y | Z | D | M | N | Z | M | N | D | R | T | Z | M | N |
| | | | E | R | T | | | | K | W | X | 12 | C | D |
| | | | | | | | | | | | | 13 | A | B |

How to Order EMI filter check list

Date _____

Ref. Filter P/N _____ Ref. Mil-Spec _____

Filter Requirements:

Filter Type (Pi, C, LC, T, LL, other) _____

Capacitance (locations) _____

Capacitance (locations) _____

Capacitance (locations) _____

Ground Contacts (locations) _____

Insulated feed-thru (locations) _____

| Frequency (MHz) | Insertion Loss (dB) |
|-----------------|---------------------|
| 1 | |
| 3 | |
| 10 | |
| 30 | |
| 100 | |

Electrical Requirements:

Working Voltage (VDC or VAC and frequency) _____

Dielectric Withstand Voltage (VDC) _____

Modified Shell: (Flange moved, clinch nuts, heilicoils, stand offs, etc.) _____

Special Requirements: (AC voltage, spike voltage, attenuation testing, thermal cycling, burn-in, capacitor lot traceability, water immersion, etc.) _____

Contact Termination:

UTS (Crimp) _____

Solder Cup _____

Wire Wrap Flat dim. _____

Stickout dim. _____

PCB tail:

Diameter dim. _____

Stickout dim. _____

Pre-tin? _____

What is terminated to connector (ie. flex, rigid flex, PCB, etc.)? _____

Special Cleaning _____

(if so, recommend a protective cap with an environmental gasket)

Special Stamping: _____

Customer: _____

Program: _____

Forecast: _____

Requested by: _____

Comments: _____

Rectangular Filter Connectors from Amphenol Canada

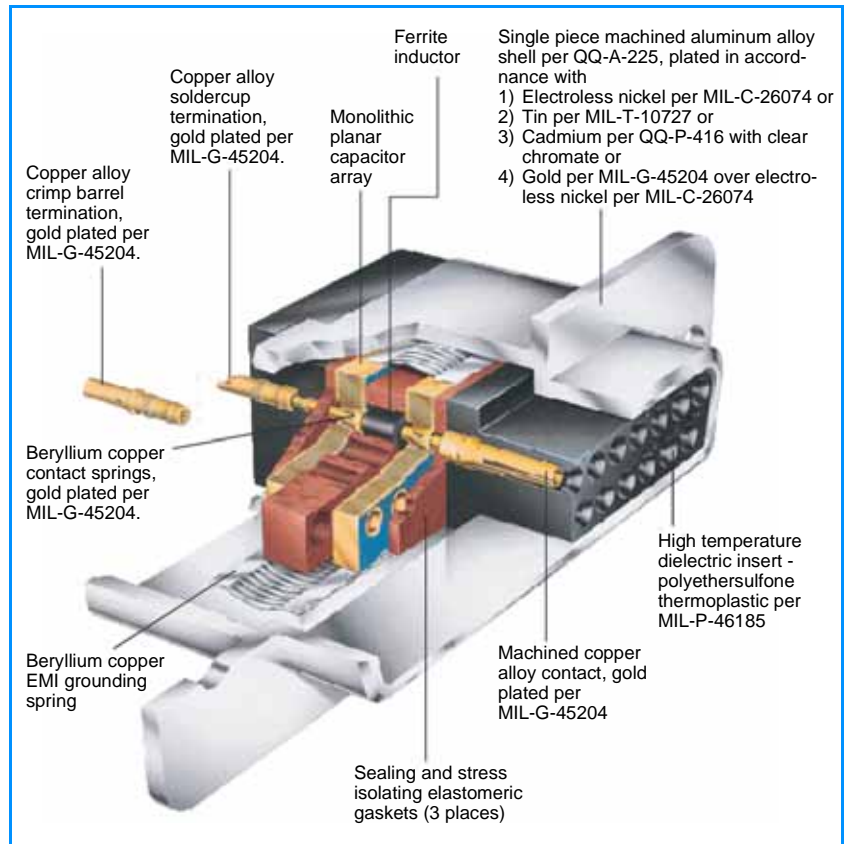
Amphenol Filtered Rectangulars

In addition to the filter interconnection products shown in this catalog, there is a wide range of filter products from Amphenol Canada which include:

- Micro D
- D-Sub
- Rectangular 38999
- M83733 Style
- ARINC 404 and ARINC 600
- Custom Rectangular Filter Designs

Some products and ordering information are shown here and on page 70. Please contact Amphenol Canada for any further information and for order placement.

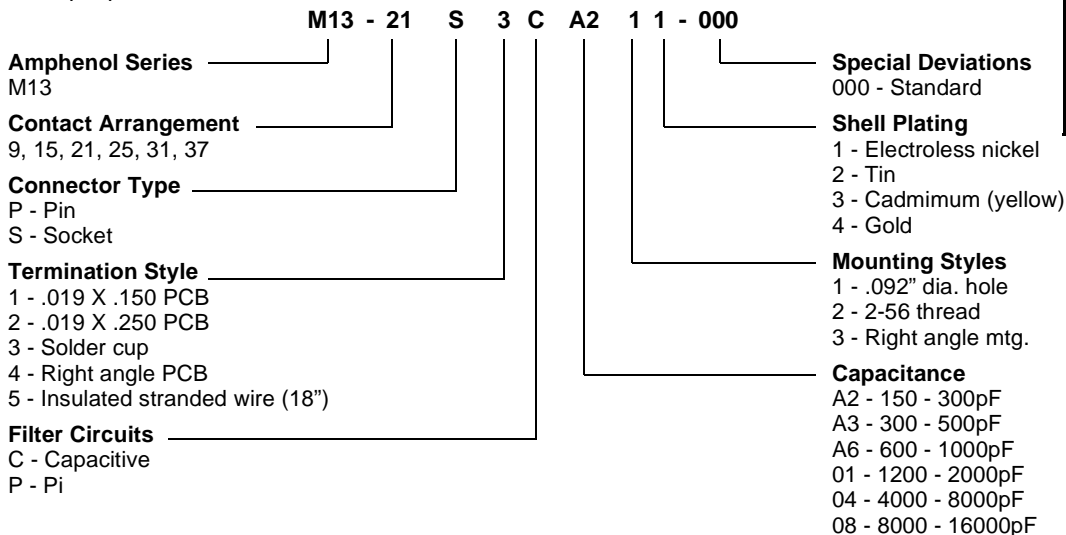
Amphenol Canada
20 Melford Drive
Scarborough, ON M1B 2X6 Canada
Phone: 416-291-4401
Fax: 416-292-0647
Website: www.amphenolcanada.com



Micro-D Filter (M83513 Style)

Rack and panel mounting connectors for applications where space and weight are at a premium. For panel mount, cable mount and PCB mounting.

Example part number M13-21S3CA211-000 is shown:



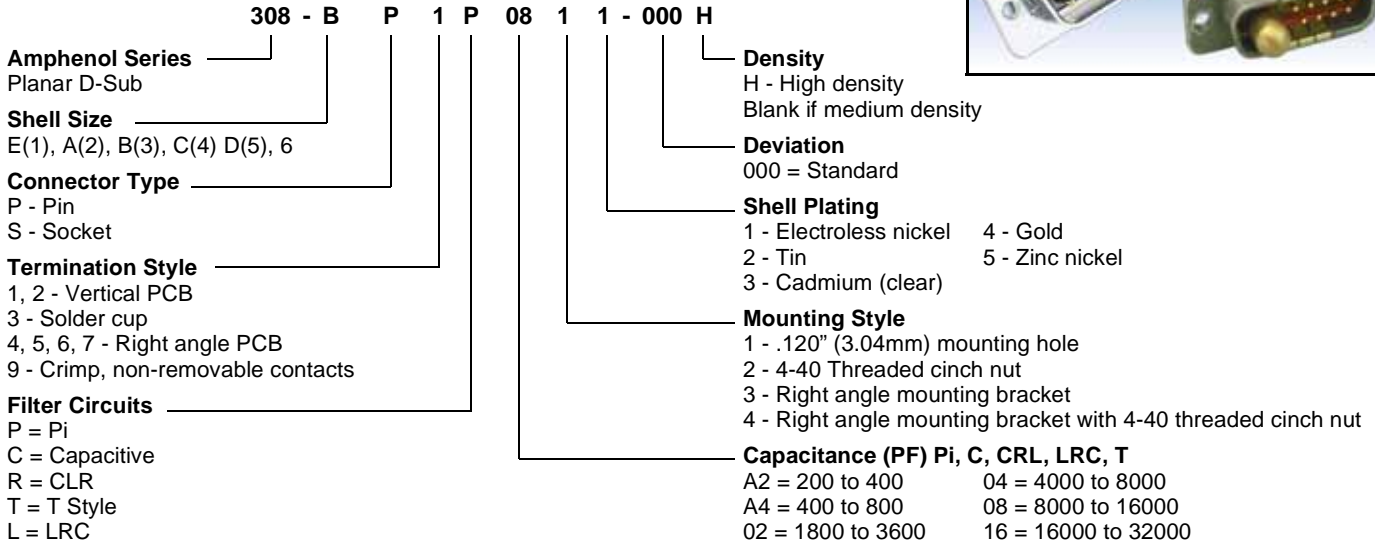
Rectangular Filter Connectors

from Amphenol Canada, cont.

D-Sub Filter (M24308 Style)

EMI Filtered D-Sub connectors designed for aerospace, industrial and commercial applications, using planar capacitors for high reliability.

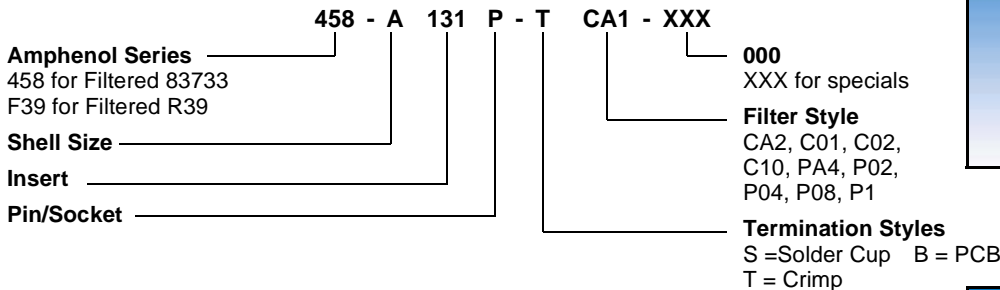
Example part number 308-BP1P08111-000H is shown:



458 Filtered (83733) & F39 Filtered (R39)

458 Series filter rack and panel connectors offer the cost advantages of planar ceramic technology in conjunction with stress isolation techniques. F39 filter connectors provide the same advantages in custom rectangular connectors using 38999 Series II contacts.

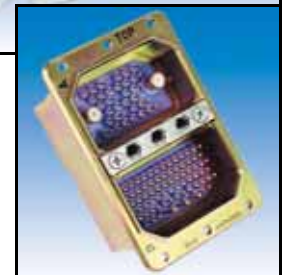
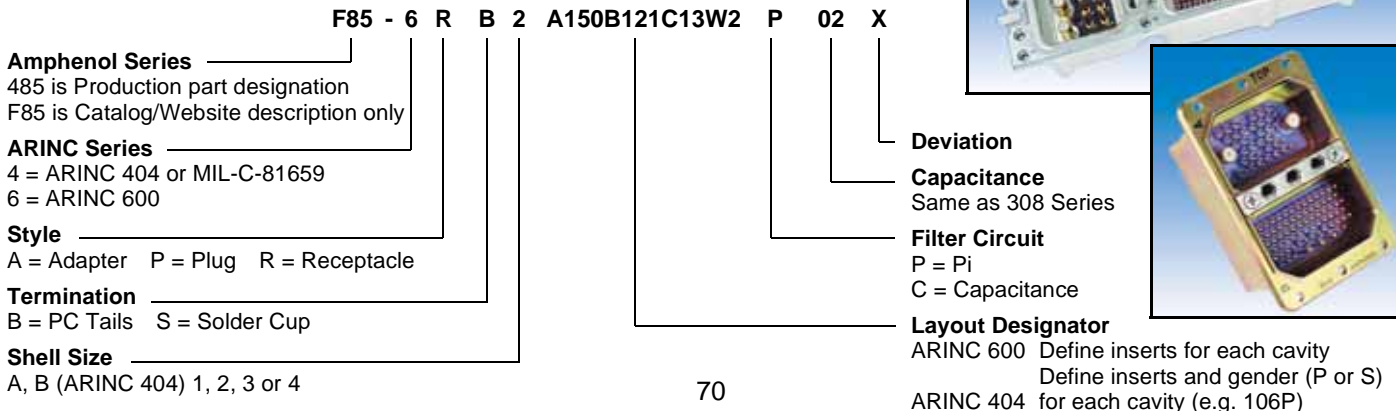
Example part number 458-A131P-TCA1-XXX is shown:



ARINC Filter (404 & 600)

Rack and panel ARINC 404 connectors meet or exceed MIL-C-81659 and ARINC Spec. 404. ARINC 600 connectors is the successor to the 404 for many new avionic designs.

Example part number F85-6RB2A150B121C13W2P02X is shown:



Amphenol® EMI/Transient Protection specials

The Hermetic Filter Connector

While only approximately 1/2 inch longer than standard series connectors, the hermetic filter connector provides all the benefits of a hermetic connector, as well as EMI protection for sensitive circuits. The filter assembly is protected by a fused glass insert within a unique steel housing. This design accounts for the connector's capability in tolerating high level static pressure, while maintaining a low level leakage rate. Applications include pressurized test equipment, environmental and toxic gas chambers, and moisture sealing on industrial equipment and missiles.



Filtered Plug



Hermetic Filter Connector

Filtered Plug

This connector is designed for applications where EMI protection is essential, but access to the receptacle is denied. The filtered plug presents an alternative for the electrical engineer. The filter plug is designed with the same components as a standard filter receptacle, but offers the option of being mounted on the cable harness. This device is a cost effective method of achieving EMI protection when length restrictions prohibit inclusion of an adapter to the system.

Filter Connectors can also incorporate high frequency coax, twinax, triax, quadax and differential twinax contacts.

Amphenol MIL-DTL-38999 Series III connectors are the most commonly used connectors for incorporation of shielded contacts along with traditional crimp contacts. High performance shielded coaxial, twinax and triax contacts are available to fit various RG and special cables. They eliminate discontinuities or impedance variations due to movement of parts under axial load. Size 8 quadax and differential twinax contacts provide high speed data transfers.



Filter Connectors with Coax Shielded Contacts

Filter Connectors with Flex Termination

Flex circuits are available for MIL-DTL-38999, MIL-DTL-5015 and MIL-C-26482 filter connectors. They are offered in flat or sculptured styles and provide flexibility in assembling to printed circuit boards.

Through Amphenol's Advanced Circuit Technology division, these strong and rigid, yet highly flexible circuits eliminate the need to purchase and attach individual pins or connectors. Thus they promote system automation, reduce space requirements and lower installation costs.

Sculptured® Flexible Circuits have built-in terminations which eliminate the failure associated with crimped or soldered-on contacts, and geometrically fit the tight space requirements within a unit.



Flex Circuitry for Attachment to Printed Circuit Boards



MIL-DTL-38999 with Quadax Contacts

For more information on these specials, consult Amphenol Aerospace and see our website at www.amphenol-aerospace.com.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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