Circular & D-Sub Connectors

API Technologies has been a leader in providing application specific EMI filtered connector solutions since its founding in 1968. Our Spectrum Control brand offers the industry’s most extensive line of circular and D-Sub connectors that are designed for high reliability or demanding environmental applications such as commercial aviation and avionics, off-highway and agricultural vehicles, high reliability power supplies, as well as all airborne, ship or ground-based military applications.

At API, we know it is rare to find an off-the-shelf connector that completely satisfies the environmental, mechanical and electrical requirements of demanding, high reliability applications. Our engineering team is ready to modify one of these existing designs or start with a “clean sheet” to ensure our connector satisfies all of your requirements.

Vertical Integration

As a fully vertically integrated company, API's Spectrum Control brand is truly unique among connector suppliers. We design and manufacture all components for our circular filtered and unfiltered connectors. From shells and shields to seals and grommets, each component of your custom connector undergoes our extensive assembly and testing process, ensuring API is able to deliver extremely reliable, high performance connectors to fit both your economic and mechanical needs.

Our complete in-house production capability allows us to maintain tighter quality control, in turn enabling us to provide our customers with high quality parts at very competitive prices. In addition, our vertical integration facilitates the industry’s shortest lead-times of 8 to 10 weeks, standard.
In response to market demand, we have developed a line of standard circular connectors for commercial, industrial and military applications that are completely intermateable with MIL-DTL-38999 Series III compact shell connectors. To meet this need, we reviewed our extensive library of proven API Technologies’ Spectrum Control brand connector designs to create a line of EMI filtered or unfiltered circular connectors that are highly reliable, durable and fully customizable. Our standard circular connectors are available in wall mount, jam nut or straight plug shell options, 9 different shell sizes, 5 contact/termination styles and 18 insert configurations.

**EMI Filtered or Specialty Unfiltered Connectors**

API Technologies offers custom circular connectors in EMI filtered or unfiltered styles, including MIL-DTL-55116, -83723, -24308, -26482 and -5015. Our filtered compact shell connectors provide an effective filtering device that reduces the amount of real estate required within a product enclosure. Using our expertise in EMI filter design and manufacturing, we offer planar-style filtered arrays, available in C and Pi circuits. Other filter circuits including transient protection are available.

In addition, we can accommodate your quick-turn schedule for prototyping by adding either planar or tubular capacitor filtering to the rear of a standard connector.

Unfiltered circular connectors also can be designed to meet various environmental and mechanical specifications. As with our filtered connectors, API offers multiple termination styles, various material and finishing options and a variety of shell styles and sizes. Integral strain relief, as well as power, signal and coax line features are also available.

**Composite Shell Connectors**

For even greater design flexibility, API offers composite shell circular connectors. These composite connectors feature shells fabricated from high grade thermoplastic and are designed to replace traditional metal connector shells for substantial weight reduction. The composite shell maintains the form, fit and function of the original connector shell, making it ideal for applications where weight is a critical factor. A composite shell version of any API’s circular connector designs are available.

**Custom Mechanical Packages**

Our vertical integration includes a unique material process and extensive machining capabilities, allowing us to easily modify the mechanical package of any connector, ensuring fast and affordable custom designs. Other connector manufacturers mold their composite shells, making custom designs expensive. At API, custom mechanical variations are machined allowing for unique packages without traditional tooling charges.

**Hermetically Sealed Connectors**

API also has a family of hermetically sealed circular connectors that protect against changes in atmospheric pressure and exposure to humidity, grime, and chemicals, making them ideal for aerospace engine control, hydraulic, and caustic environments where harsh conditions could exist. The hermetically sealed connector’s receptacle has a seal of 10⁻⁷ cm³ and comes in filtered and unfiltered versions.

**Mini-MIL Connectors**

API’s Mini-MIL circular connectors are small and lightweight offering space and weight savings while providing equivalent performance to standard MIL-DTL-38999 connectors. These connectors are available filtered with C, Pi or mixed capacitance, or unfiltered, with a range of engagement, termination and receptacle types. Mini-MIL connectors can be customized to satisfy various mechanical and electrical requirements and are ideal for military, industrial and medical applications where space restrictions do not allow for larger 38999 connectors.
API Technologies offers a premium line of circular filtered connectors completely interchangeable with MIL-DTL-38999 Series III. These custom high reliability, circular connectors have a proven reputation for superior quality and performance. Several types of EMI filtering are available (see figures at right).

**Electrical Specifications**

- **Operating Temperature**: -55°C - 125°C
- **Capacitance**: See table
- **Capacitance Tolerance**: ±25%, +100%
- **Voltage Rating**: 200VDC
- **Dielectric Withstanding Voltage**: 500VDC
- **Dissipation Factor**: < 3.5%
- **Insulation Resistance**: 1000 MΩ, μF or 10KΩ

The electrical properties listed above are typical, and can be exceeded based on customer requirements and mechanical configuration. Since many variables affect the design, it is best to contact us directly for a detailed assessment of your connector needs.

### Circuits

- **Figure A (1)**
  - C Filter

- **Figure B (2)**
  - Pi Filter

### Capacitance

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
<th>Circuit</th>
</tr>
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<tbody>
<tr>
<td>251</td>
<td>250pF</td>
<td>1</td>
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<tr>
<td>501</td>
<td>500pF</td>
<td>1, 2</td>
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<td>102</td>
<td>1,000pF</td>
<td>2</td>
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<tr>
<td>122</td>
<td>1,250pF</td>
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<td>252</td>
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<td>1, 2</td>
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<tr>
<td>502</td>
<td>5,000pF</td>
<td>1, 2</td>
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<tr>
<td>103</td>
<td>10,000pF</td>
<td>1, 2</td>
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<td>203</td>
<td>20,000pF</td>
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<td>1</td>
</tr>
<tr>
<td>503</td>
<td>50,000pF</td>
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</tr>
</tbody>
</table>

*Note: Custom capacitance values and tolerances available.*

### Insertion Loss (db) Per MIL-STD-220

- **C Filter**
  - Frequency (MHz) vs. Insertion Loss (db)

- **Pi Filter**
  - Frequency (MHz) vs. Insertion Loss (db)
Wall Mount

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>A(9)</td>
<td>0.937</td>
<td>1.031</td>
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<tr>
<td>B(11)</td>
<td>0.719</td>
<td>0.812</td>
<td>0.906</td>
<td>0.969</td>
<td>1.062</td>
<td>1.156</td>
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<tr>
<td>C(13)</td>
<td>0.584</td>
<td>0.719</td>
<td>0.812</td>
<td>0.906</td>
<td>0.969</td>
<td>1.062</td>
<td>1.156</td>
<td>1.250</td>
<td>1.375</td>
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<tr>
<td>D(15)</td>
<td>0.128</td>
<td>0.128</td>
<td>0.128</td>
<td>0.128</td>
<td>0.128</td>
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<tr>
<td>E(17)</td>
<td>0.216</td>
<td>0.194</td>
<td>0.194</td>
<td>0.194</td>
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<tr>
<td>F(19)</td>
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<td>0.820</td>
<td>0.820</td>
<td>0.820</td>
<td>0.820</td>
<td>0.820</td>
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<tr>
<td>G(21)</td>
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<td>0.594</td>
<td>0.594</td>
<td>0.594</td>
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<tr>
<td>H(23)</td>
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<td>0.128</td>
<td>0.128</td>
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<td>0.128</td>
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<tr>
<td>J(25)</td>
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<td>0.279</td>
<td>0.279</td>
<td>0.279</td>
<td>0.279</td>
<td>0.279</td>
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<table>
<thead>
<tr>
<th>Size</th>
<th>ØA</th>
<th>ØB</th>
<th>ØC</th>
<th>ØD</th>
<th>ØE</th>
<th>ØF</th>
<th>ØG</th>
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<th>ØJ</th>
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<td>22-26AWG</td>
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<tr>
<td>B(11)</td>
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<td>0.862</td>
<td>1.220</td>
<td>0.830</td>
<td>0.030</td>
<td>0.076</td>
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<tr>
<td>C(13)</td>
<td>1.157</td>
<td>1.027</td>
<td>1.220</td>
<td>1.000</td>
<td>0.040</td>
<td>0.100</td>
<td>14-18AWG</td>
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<tr>
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<td>1.279</td>
<td>1.153</td>
<td>1.220</td>
<td>1.129</td>
<td>0.062</td>
<td>0.145</td>
<td>10-14AWG</td>
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<td>E(17)</td>
<td>1.405</td>
<td>1.291</td>
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<td>6-10AWG</td>
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<td>G(21)</td>
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<td>1.500</td>
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insert configurations

(A) 35
6 # 22

(A) 98
3 # 20

(B) 35
13 # 22

(B) 98
6 # 20

(C) 35
22 # 22

(C) 98
10 # 20

(D) 35
37 # 22

(D) 18
18 # 20

(E) 35
55 # 22

(E) 26
26 # 20

(F) 32
32 # 20

(F) 35
66 # 22

(G) 35
79 # 22

(G) 41
41 # 20

(H) 35
100 # 22

(H) 55
55 # 20

(J) 35
128 # 22

(J) 61
61 # 20
specialty circular connector

ordering information

<table>
<thead>
<tr>
<th>FC</th>
<th>O</th>
<th>A</th>
<th>35</th>
<th>PP</th>
<th>N</th>
<th>1</th>
<th>102</th>
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<tbody>
<tr>
<td>Series</td>
<td>RoHS</td>
<td>Shell Style</td>
<td>Insert Configurations</td>
<td>Polarization</td>
<td>Filter Circuit</td>
<td>EIA Capacitance Code</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Standard</td>
<td>0 - Wall Mount Receptacle</td>
<td>(See page 6)</td>
<td>N - Normal</td>
<td></td>
<td>Example: 1000pF = 102</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F - RoHS Compliant</td>
<td>1 - Jam Mount Receptacle</td>
<td></td>
<td>A, B, C, D, E</td>
<td></td>
<td>(See page 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - Straight Plug Self-Locking</td>
<td></td>
<td></td>
<td></td>
<td>*Note: Leave blank for unfiltered</td>
<td></td>
</tr>
</tbody>
</table>

Material Finish:
- A - AL/Electroless Ni
- B - AL/Olive Drab Cad (Not available RoHS)
- C - SS/Electroless Ni
- D - SS/Electro Deposited Ni
- E - SS/Passivated
- F - Composite/Electroless Ni
- G - Composite/Olive Drab Cad (Not Available RoHS)
- H - Alum Nickel PTFE (Teflon)
- I - Ni Alum Bronze

Contact Termination Style:
- PP - Pin to PCB
- PS - Pin to Solder cup
- SP - Socket to PCB
- SS - Socket to Solder cup
- CR - Crimp Removable (Plug Only, Unfiltered)

Manufacturing Capabilities:
- Lead wire preparation
- Soldering & tinning
- Strip & removal of insulation
- Wire, component & assembly marking
- Ribbon cable processing
- Over-molding connector backshells
- 100% testing includes full functional and environmental testing to product specific requirements
- Fully automated testing includes Hi pot, continuity, insertion Loss, TDR, and VSWR up to 40GHz

To help you simplify the installation of our connectors into your system and lower your costs, we provide custom cabling and harnessing services. Our capabilities include a wide range of cable harnessing, flat ribbon cable and ribbon cable processing, lead wire preparation, component, wire, and assembly marking, electro-mechanical assembly and more. All of our custom connector assemblies are 100% tested for integrity and effective performance.

- Built in accordance with IPC-A-610 and J-Std-001
- Cable harnessing
- Wide range of interconnects
- Flat ribbon cable
- High voltage
- Electro-mechanical assembly

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- 100% testing includes full functional and environmental testing to product specific requirements
- Fully automated testing includes Hi pot, continuity, insertion Loss, TDR, and VSWR up to 40GHz
For more than 45 years, API’s Spectrum Control brand has been a leader in designing and manufacturing EMI filtered D-Sub connectors for high reliability applications. Our wide range of connector options will help you improve performance, save board space and reduce costs by managing EMI at the signal and power I/O. API’s filtered connector advantages include:

- **Low ground impedance** - Full ground plate and metallic shell provide minimal impedance and superior performance
- **Eliminate re-radiation** - Filtered connector at interface leaves no path for bypassing the filter
- **Ground plane shielding** - Filtered connector ground planes shield the box even at the connector port
- **Efficient space utilization** - Filters located in the connectors provide additional space on PCB board
- **Consistent performance** - Filtered connectors provide more consistent pin to pin performance
- **Fewer components** - Filtered connectors reduce component count creating cost savings
- **Reliability** - 100% testing of filters, on-board filters are usually spot tested

The miniaturization of electronic systems and sub-systems is pushing designers to increase circuit densities within smaller packages. To address this growing need, API has developed a line of filtered High-Density D-subminiature connectors. This line of connectors incorporates the high performance and reliable filtering of API’s standard D-sub connectors in the High-Density format.

**Features**
- Connectors designed to MIL-C-24308
- Capacitance values from 85 pF to 4000 pF
- Filter type is feed-through C
- Selectively specify and filter each contact position
- Available in feed-through capacitive configurations

**High-Density Filtered Adapter for Telecommunications**

In response to the unique requirements of the telecommunication industry, API has developed a High-Density EMI filtered adapter.
d-sub connectors

Series 700 High Performance
API’s Series 700 connectors offer the highest performance filtering for all types of professional applications.

Features
- Available in 9, 15, 25, 37 and 50 shell sizes
- One-piece die cast housing design
- Available in both feed-through capacitive and PI configurations
- Selective line filtering is available
- Tubular capacitor filtering provides effective performance through 10 GHz
- RoHS compliant versions available

Series 600 High-Density
API’s Series 600 connectors incorporates the high performance and reliable filtering of their standard d-subminiature connectors in the high-density format.

Features
- Connectors designed to MIL-C-24308
- Capacitance values from 85 pF to 4000 pF
- Filter type feed-through C
- Selectively specify and filter each contact
- Available in feed-through capacitive configurations

Series 500 Low Profile
The Series 500 Low Profile D-Subminiature Connectors are cost effective, highly reliable EMI filtered D-Sub connectors that feature a .318” footprint for 90° PCB Connectors and a low profile housing on straight PCB connectors.

Features
- Drop-in replacements for unfiltered D-Subminiature Connectors
- Compact-design, featuring .318” footprint
- Full interchangeability; based on MIL-C-24308
- 9, 15 and 25 shell sizes
- Available with board lock feature & 4-40 mounting threads
- Selective filtering available

Series F Ferrite Connectors
The Series F filtered D-subminiature connectors incorporate a solid slab of ferrite material as the filtering element, making it rugged and interchangeable with standard D-subminiature connectors.

Features
- Optimum filtering performance in the 10 to 300 MHz range
- No distortion of wave forms
- Replaces individual ferrite bead filters, saving cost & space (.318” footprint)
- Provides both pin to ground & pin to pin filtering
- 4-40 UNC locking insert eliminates loose hardware
- RoHS compliant versions available

Filtered Micro-D Connectors
For designs that require even smaller connector packages, the Micro-D offers a range of reliable filtering options, including capacitive, ESD versions, and several sizes and termination options to satisfy your smallest space constraints.

Features
- Light weight
- Compact size
- Environmentally sealed contact area when mated
- Corrosion resistant
- Durable (500 cycles min.)
- Superior electrical performance
- RoHS compliant
d-sub connectors

ordering information

Example: 56-513-012-TI

This part number represents a Series 500 connector with 15 contacts in a socket to straight PCB mount configuration. All connector positions have a capacitance value of 840 pF and there are 4-40 threads on mounting flange.

This part number represents a Series 500 connector with 15 contacts in a socket to straight PCB mount configuration. All connector positions have a capacitance value of 840 pF and there are 4-40 threads on mounting flange.

Options
- **Series F**
  - **HD** = High Density (15 socket only)
- **Series 500**
  - **TI** = 4-40 threads on mounting flange (.125" hole if not selected)
- **GBL** = Grounded board lock and ferrite slab provides enhanced LC performance (available only on 90° PCB)
- **GBLF** = Grounded board lock and ferrite slab provides enhanced LC performance (available only on 90° PCB)

Series 600 High Density
- **LI** = 4-40 UNC inserts
- **S** = Solder dipped tails
- **50G** = 50 µ (1.27 µm) gold
- **GB** = Grounded board lock

Series 700
- **LI** = 4-40 UNC inserts
- **LIM** = Metric M3.0 self-locking threads
- **GB** = Metal bracket provides ground connection, includes 4-40 self-locking threads (for right angle mount only)
- **GBL** = Grounded board lock (right angle)
- **GBLS** = For .062" boards (straight PCB mount) (1.57mm)
- **GBLR** = For .093" boards (straight PCB mount) (2.36mm)
- **50G** = 50 µ (1.27 µm) gold plating
- **S** = Solder dipped tails
- **JS** = Jack screw mounting

For option combinations, consult factory.

Filtered Combo D-Subminiature Connectors

API’s Spectrum Control line of filtered combo Dsubs provide high insertion loss with capacitive filtering. These connectors are available with 20 Amp power contacts or 40 Amp power contacts. Configurations include male and female versions with straight PC terminals, right angle PC terminals or solder cup terminals. Standard D-sub shell sizes provide interchangeability with unfiltered connectors. High strength epoxy potting protects ceramic elements.

Additional capacitance ranges and configurations can be provided upon request. Please consult factory for more information.

Applications
- Telecommunications base station equipment
- Switching and transmission equipment
- Power supplies
- Industrial equipment
- Computer work stations

Models
- 3W3 in plug-solder cup and plug-right angle
- 5W5 in plug-vertical
- 9W4 in socket-solder cup, socket-vertical and plug-right angle
- 24W7 in socket-solder cup

For option combinations, consult factory.

Note: For Micro-D ordering information, please visit eis.apitech.com/micro

Filtered D-Subminiature Connectors

Series 600 High Density
- **0** = 15 Contacts
- **1** = 26 Contacts
- **2** = 44 Contacts
- **3** = 62 Contacts
- **4** = 78 Contacts

Series 700
- **0** = 9 Contacts
- **1** = 15 Contacts
- **2** = 25 Contacts
- **3** = 37 Contacts
- **4** = 50 Contacts

Contact Type/Termination
- **1** = Pin to solder cup
- **2** = Pin to 90° PCB mount
- **3** = Socket to straight PCB mount
- **4** = Socket to 90° PCB mount
- **5** = Pin-socket adapter
- **6** = Socket to solder cup
- **7** = Pin to straight PCB mount

Styles available for Series 600 only
- **2** = 3, 4 & 7
- **6** = 1, 2, 3, 4 & 5

Series 700
- **1** thru **7**

Capacitance Value
- **Series 400**
  - **01** = Always
- **Series 500**
  - **10** = 120 pF
  - **11** = 440 pF
  - **12** = 840 pF
  - **13** = 1000 pF
  - **14** = 1500 pF

Series 600
- **15** = 85 pF FT
- **16** = 180 pF FT
- **18** = 1000 pF FT
- **19** = 4000 pF FT
- **20** = Insulated contact

Series 700
- See filter specification chart online.

Series 400, Series 500
- **0** = 9 Contacts
- **1** = 15 Contacts
- **2** = 25 Contacts
- **4** = 50 Contacts

Series 600 High Density
- **0** = 15 Contacts
- **1** = 26 Contacts
- **2** = 44 Contacts
- **3** = 62 Contacts
- **4** = 78 Contacts

Shell Size
- **Series 400, Series 500**
  - **0** = 9 Contacts
  - **1** = 15 Contacts
  - **2** = 25 Contacts

Product Series/Shell Size
- **4** = Series F Ferrite
- **5** = Series 500 Low Profile
- **6** = Series 600 High Density
- **7** = Series 700 High Performance

Filtered D-Subminiature Connectors

56 - Standard connector
- **F** = RoHS compliant version

Note: For Micro-D ordering information, please visit eis.apitech.com/micro

For option combinations, consult factory.
About API Technologies

API Technologies Corp. is a trusted provider of RF/microwave, microelectronics, and security solutions for critical and high-reliability applications. The company designs, develops and manufactures electronic components, modules, systems and products for technically demanding defense, commercial/industrial and aerospace applications. API Technologies’ customers include many leading Fortune 500 companies, as well as a majority of NATO governments. While API was founded in 1981, our heritage brands have served the demanding, hi-rel marketplace for more than 60 years.

RF/Microwave & Microelectronics
Electromagnetic Integrated Solutions
Power Solutions
Secure Systems & Information Assurance