

specialty connectors & harnessing



api 
 technologies corp.
 Spectrum Control

Specialty Connectors & Custom Cable Assemblies

a premium line of custom and specialty filtered and unfiltered connectors with a range of value-added cable and harnessing products

Custom Filtered Connectors provide filtered versions of MIL-STD connectors in custom configurations. Tubular and planar filtered arrays are available with Pi, LC, T and C circuits... **SC3**

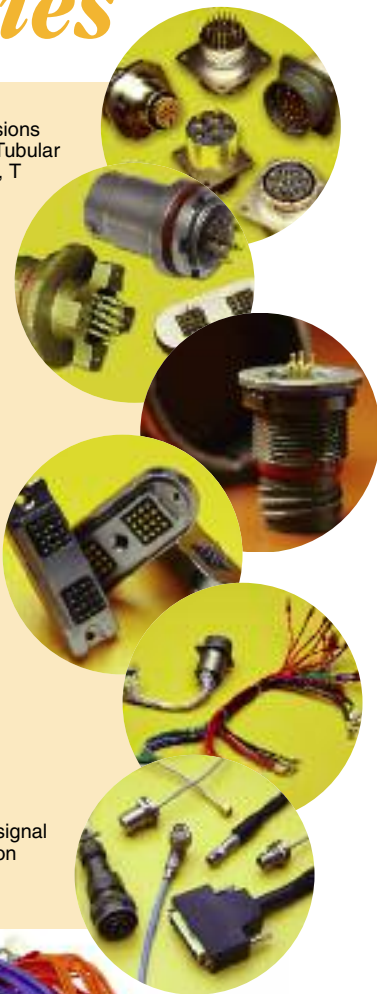
Custom Unfiltered Connectors are built to meet various environmental requirements and MIL specifications with power, signal and coax line combinations and multiple terminations available... **SC3**

Mini-MIL Connectors offer space and weight savings with MIL-DTL-38999 equivalent performance... **SC5**

Rapid Mate Connectors provide positive mating force to ensure a reliable connection, offering the ease and reliability of hot shoe style mating with the added benefit of integral EMI filtering.... **SC6**

Harnessing Products and Services are designed in accordance with IPC-A-610 and J-STD-001 for military, commercial and industrial applications. We provide assemblies for both unfiltered and filtered interconnects including lead wire preparation, soldering and tinning, marking and ribbon cable processing... **SC8**

Custom Cable Assemblies include discrete and signal cables, RF cables, power cables, system integration and overmolded connector backshells... **SC9**



- Audio, circular and hermetically sealed connectors
- Connector harnessing built to IAW, IPC-A-610 and J-Std-001
- Complete electro-mechanical assembly and testing services
- Custom connectors can be designed to meet RTCA/DO-160 Section 22 Lightning Strike
- EMI filtered connectors with complex schematics available

For complete specs and drawings, visit www.SpecEMC.com/specconn

Specialty Connectors

Custom Filtered Connectors for MIL & Hi-Rel Applications

API Technologies' Spectrum Control brand offers a complete line of compact and extended shell filtered connectors providing a wide range of design flexibility. Our compact shell filtered connectors offer designers an effective filtering device that reduces the amount of real estate required within a product enclosure. Our extended shell connectors are constructed by adding either planar or tubular capacitor filtering to the rear of a standard connector, which makes them ideal when quick turnaround is required for prototype devices.

Styles offered include the following, as well as custom designs.

- MIL-DTL-38999
- MIL-DTL-55116
- MIL-DTL-83723
- MIL-DTL-24308
- MIL-DTL-26482
- MIL-DTL-5015

We offer tubular and planar style filtered arrays in Pi, LC, T and C circuits with TVS protection also available. Reliability is ensured through 100% testing of each position for critical electrical parameters.

Custom Unfiltered Connectors

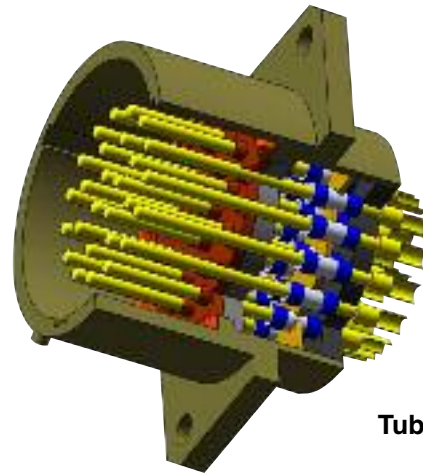
API also offers unfiltered custom connector design and manufacturing. Parts can be designed to meet your mechanical and environmental specifications or those of similar QPL connectors.

Features

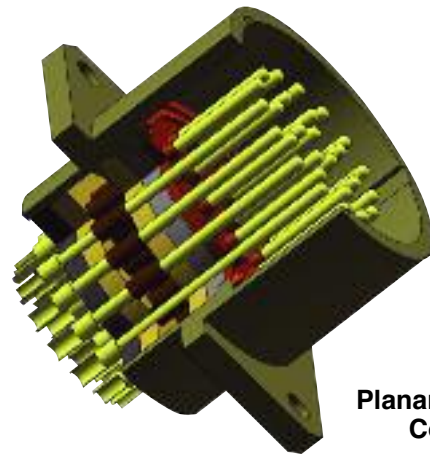
- Built to MIL specifications
- Custom shells to fit your available space
- Multiple terminations available
- Built to meet various environmental requirements
- Integral strain relief
- Power, signal and coax line combinations

Vertically Integrated

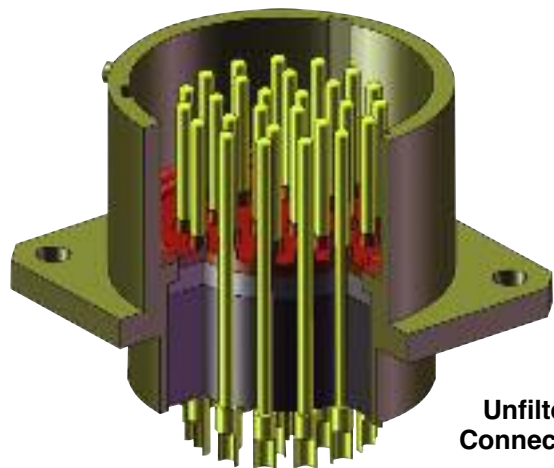
API's Spectrum Control line of custom filtered and unfiltered connector offerings are fully vertically integrated. Components including capacitors and shells are manufactured by API, providing our customers high quality parts at very competitive prices, with the industry's shortest lead times.



Tubular Filtered Connector



Planar Filtered Connector



Unfiltered Connectors

For complete specs and drawings, visit www.SpecEMC.com/circular

Custom Filtered Connectors MIL and High Reliability

API's Spectrum Control brand offers a premium line of custom and specialty filtered connectors. These custom high reliability, circular, rack and panel and ARINC connectors have a reputation for superior quality and performance. Several types of filtering are available (See figure at right).

Electrical Specifications

- Operating Temperature -55°C - 125°C
- Capacitance Up to 1 μ F
- Capacitance Tolerance \pm 10%, \pm 20%, +100%
- Capacitance Rating Up to 1500VDC
- Dielectric Withstanding Voltage Up to 3000VDC
- Dissipation Factor < 3.5%
- Insulation Resistance 1000 M Ω , μ F or 10KM Ω

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.

Figure A (1)

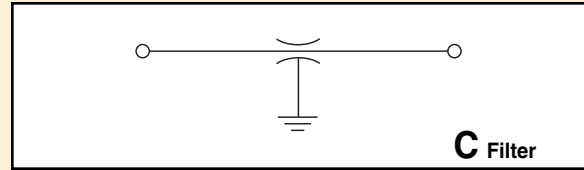


Figure B (2)

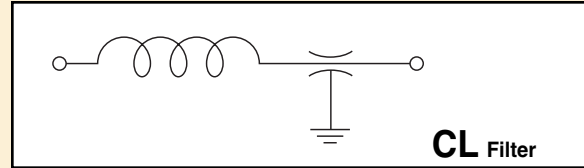


Figure C (3)

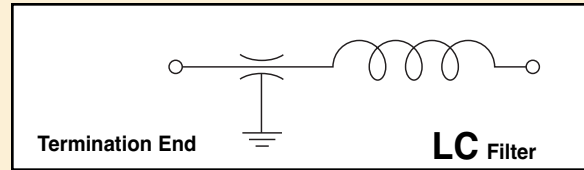
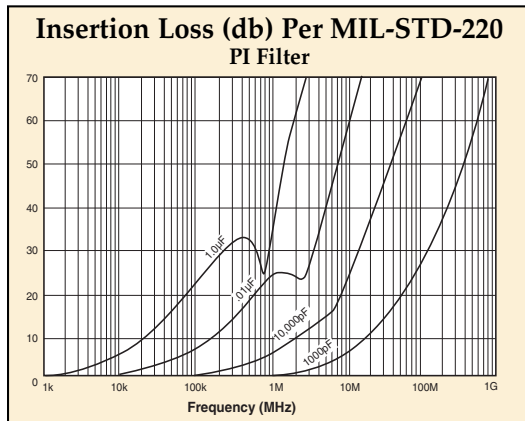
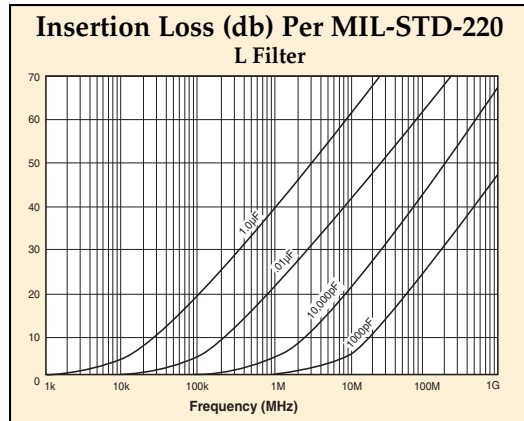
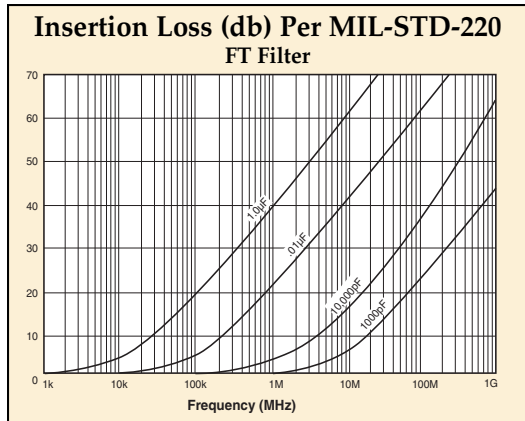
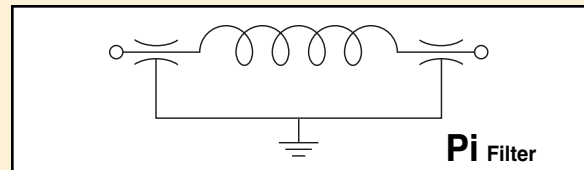


Figure D (4)



Mini-MIL Connectors

API's Spectrum Control line of new 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, and can be customized to satisfy various mechanical and electrical requirements. These connectors are ideal for military, industrial and medical applications where space restrictions do not allow for larger 38999 connectors.

Specifications

Engagement Types:

- Bayonet
- Single-start UN thread
- Double-start ACME thread
- Triple-start ACME thread

Termination Types:

- PC tail
- Solder cup
- Crimp removable
- Piggyback socket
- Custom

Receptacle Types:

- Flange mount (front or rear mount)
- Jam nut (front or rear mount)
- In-line



Mechanical Specifications

- Shell* Eight shell sizes are available in either pin or socket contact genders
- Shell Materials* Aluminum, stainless steel, composite, custom
- Contacts* Pin and socket contacts are available in 1 to 55 contacts in various combinations of size 23 to size 12.

Electrical Characteristics with C Filter

Capacitance (pF, GMV)*	Working Voltage		Dielectric Withstanding Voltage (VDC)	Minimum Insertion Loss (dB)					
	DC 85°C	AC 85°C		Cut-Off Freq. MHz	1 MHz	10 MHz	100 MHz	500 MHz	1,000 MHz
1,000	200	115	500	5	—	4	21	34	39
2,000	200	115	500	1	—	9	26	39	44
3,000	200	115	500	1	—	12	30	43	48
5,000	200	115	500	1	1	16	34	46	52
7,000	200	115	500	1	3	19	37	49	55
10,000	200	115	500	1	4	21	39	52	57
20,000	100	—	250	.50	9	26	44	57	58

Electrical Characteristics with Pi Filter

Capacitance (pF, GMV)*	Working Voltage		Dielectric Withstanding Voltage (VDC)	Minimum Insertion Loss (dB)					
	DC 85°C	AC 85°C		Cut-Off Freq. MHz	1 MHz	10 MHz	100 MHz	500 MHz	1,000 MHz
1,000	200	115	500	5	—	4	28	54	65
2,000	200	115	500	1	—	8	39	65	70
3,000	200	115	500	1	—	11	47	70	70
5,000	200	115	500	1	1	14	54	70	70
7,000	200	115	500	1	3	18	60	70	70
10,000	200	115	500	1	4	22	64	70	70
20,000	100	—	250	.50	9	33	70	70	70

* Custom values available.

Rapid Mate Connectors

API's Spectrum Control brand Rapid Mate connectors offer the ease and reliability of hot shoe style mating with the added benefit of integral EMI filtering. By mating via spring loaded, compliant contacts, Rapid Mate connectors provide positive mating force to ensure a reliable connection. This method provides rapid connection with low mating force, allowing for some misalignment during mating.

Additionally, the EMI filter experts at API can design a filtered Rapid Mate connector built to your requirements, providing the advantages of hot shoe style mating while ensuring system functionality in EMI-prone applications.

Applications

- Military and commercial communications systems
- Thermal and ambient light imaging cameras
- Docking stations
- Scanners



EMI Filter Performance

The electrical characteristics table indicates the performance of feed-through capacitors and Pi type filters. Utilize this information to specify the EMI filtering components included in your connector. Selective loading and custom values can also be designed.

Features

- Custom filtering
- 100% tested before shipment
- Rugged and reliable
- Resists sand, dust and water
- Low, flexible mating force

Filter Designation	Filter* Circuits	Capacitance		3 dB Max Cut-off Frequency (MHz)	Working Voltage DC -55°C to +125°C	Minimum Insertion Loss - Decibels (dB) 50 ohm system per MIL-STD-220 (no load)							
		Value	Tolerance			5 MHz	10 MHz	20 MHz	50 MHz	100 MHz	200 MHz	500 MHz	1 GHz
A	C	68 pF	±20%	77	100V	—	—	—	—	—	3	10	16
B		100 pF	±20%	53	100V	—	—	—	—	1	6	14	19
C		135 pF	+100/-0%	23	100V	—	—	—	1	5	10	16	20
D		470 pF	±20%	11	100V	—	—	2	7	13	19	25	27
E		820 pF	±20%	6	100V	—	2	6	12	18	24	30	33
F		1000 pF	±20%	5	100V	—	3	7	14	20	26	32	35
G		1500 pF	±20%	3.5	100V	1	4	10	16	22	29	36	37
H		2500 pF	+100/-0%	1.3	100V	5	11	17	23	29	35	38	40
I		4000 pF	+100/-0%	.8	100V	9	15	21	27	34	38	42	46
J	Insulated	10 pF	Max.	635	100V	—	—	—	—	—	—	—	—
K	Grounded Insert					—	—	—	—	—	—	—	—
L	Pi	68 pF	±20%	65	100V	—	—	—	—	1	6	17	23
M		100 pF	±20%	46	100V	—	—	—	—	2	9	22	28
N		135 pF	+100/-0%	25	100V	—	—	—	1	6	17	26	34
O	Pi	470 pF	±20%	11	100V	—	—	—	9	18	22	36	43
P		820 pF	±20%	6	100V	—	—	4	13	23	31	45	52
Q		1000 pF	±20%	5	100V	—	2	7	16	24	36	51	59
R	Pi	1700 pF	+100/-0%	1.9	100V	1	6	14	28	35	49	64	69
S		2500 pF	+100/-0%	1.3	50V	4	9	16	28	41	54	70	70
T		5000 pF	+100/-0%	.7	100V	9	15	28	41	53	66	70	70

Quality Acceptance Test Specifications

All filtered connectors undergo extensive testing to assure that all product meets our high quality expectations. Many of the tests are performed 100% as routine and others are carried out on a sample basis when this is deemed more meaningful.

Visual

The connectors shall be manufactured and processed in a careful and workmanlike manner in accordance with good design and sound practice. All connectors shall be checked 100% to insure dimensions are as shown in this catalog.

Capacitance

Checked on 100% of the contacts per detailed specifications when measured @ 25°C, 1 KHz, 0.1 to 1.0VRMS. On insulated feed-thru lines, the maximum capacitance is 25 pF.

Dissipation factor

4% maximum, checked 100% @ 25°C, 1KHz, 0.1 to 1.0VRMS

Dielectric withstanding voltage

Performed on 100% of the filtered contacts. The test voltage unless otherwise specified will be 2.5 times the working voltage as specified at 25°C. This voltage will be applied for 1 to 5 seconds with the charging current limited to 50 milliamps.

Insulation resistance

Performed on 100% of the filtered contacts at 25°C. The minimum acceptance level will be 1000 megohms at 25°C and 100 megohms at 125°C if required. This test will be carried out in accordance with MIL-STD-202 Method 302, test voltage of 100VDC or at rated voltage whichever is less.

Insertion loss

Performed on a sample quantity of filtered contacts, minimum acceptance levels as specified by typical insertion loss graphs.

Resistance to ground

The RDC on ground lines is 5 milliohms max.

Marking

As a minimum, all connectors shall have the Spectrum part number, date code and logo. Upon request, customer specified marking can be incorporated into the manufacturing cycle.

Special Testing

Spectrum has a fully qualified test laboratory and is willing to provide additional acceptance testing upon customers request, at minimal additional costs.

Minimum Design Specifications

All of the filtered connectors are designed to meet minimum standards shown in table below.

Environmental Performance

Test*	MIL-STD-1344		MIL-STD-202		Comments**
	Method	Condition	Method	Condition	
Vibration	-	-	204	G	30G for 10 to 2000 Cycles
Thermal Shock	-	-	107	A-1	Except Step 3 is +125 degrees C
Immersion	1016	-	104	A	-
Salt Spray	1001	-	101	B	-
Moisture Resistance	1002	II	106	-	Except Step 7
Shock	2004	-	213	I	-
Barometric Pressure	3001	-	105	C	125% rated voltage
Resistance to Solder Heat	-	-	210	B	-
Terminal Strength	-	-	211	A	The applied force shall be 5 lbs.
Contact Resistance	-	-	307	-	.0152 max.
Life	-	-	108	D	1000 hrs.
Durability	-	-	-	-	500 cycles
Solderability	-	-	208	-	-

* All tests are performed per applicable MIL spec.

** All parts will meet post test electricals (i.e. dielectric withstanding voltage, insulation resistance, capacitance, insertion loss and visual/mechanical).

Harnessing Products & Services

API Technologies' Spectrum Control brand offers custom harnessing products and services for military, aerospace, commercial and industrial applications. Our skilled operators and supervisors work in a modern well-equipped facility to provide interconnect assemblies made to the highest workmanship standards.

Our manufacturing engineers design tooling and fixturing, which meet the tightest tolerances. From simple to complex, API can provide assemblies in compliance with all requirements.

Product Capabilities

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

Manufacturing Capabilities

- Lead wire preparation
- Soldering and tinning
- Strip and removal of insulation
- Wire, component and assembly marking
- Ribbon cable processing



Wire Harnesses

API will add wires to a filtered or unfiltered connector to allow the customer to easily install the connector into the system at a lower cost. These value-added services include adding wires terminated or unterminated to all lines or only select lines, twisted pairs and labeling of wires for easy placement in your system. We can also encapsulate the wires inside the connector adding strength to the total harness.

By contracting API to add the harness assembly, customers are assured the performance of the connector has not been adversely affected. **All of our custom connectors are 100% tested for integrity and effective performance.**

API's connector manufacturing operators are all certified to MIL-STD-2000 solder specification. We have invested in this certification to provide you with confidence that the quality of our custom construction meets the highest standards in the industry.

Markets Served

- | | |
|---------------|----------------------------|
| ■ Medical | ■ MIL Spec |
| ■ Electronics | ■ Military instrumentation |
| ■ Automotive | ■ Marine |
| ■ Telecom | ■ Industrial |

Custom Cables Assemblies

API Technologies' Spectrum Control brand has developed a range of capabilities to produce custom cable assemblies that deliver dependable operation and cost savings in high reliability/high value applications. We can integrate any of API's extensive family of EMI connectors and components, RF filters and subsystems and power management systems or use industry standard components. As a vertically integrated manufacturer, we utilize our dedicated facility that is AS9100 Rev C/ISO 9001:2008 certified to produce the highest quality custom cable assemblies in the industry's shortest lead times. We also have in-house low and high volume PCB manufacturing capabilities.

Signal & Discrete Cables

- Point-to-point, multi-conductor, branched harness, flex, semi-rigid, and rigid circuit card assembly
- API supplied EMI filtered and custom non-filtered connectors and EMI filters

RF Cables

- Frequency up to 40 GHz
- Phase matching
- Rigid/semi-rigid cable
- Custom RF cable builder tool

Power Cables

- Current ratings up to 750 amps
- Cooper "Roughneck" 4/00 + power distribution cable fabrication
- API supplied power management solutions

Systems Integration

- In-house machining capabilities
- In-house EMI/RF filters, connectors, PDU's, turn key
- Vertically integrated manufacturing approach
- Basic box builds through complex systems
- In-house high and low volume PCB manufacturing capabilities

API custom cable assemblies are ideal for aerospace, military, high-end commercial and medical applications.



Overmolded Connector Backshells

API offers an alternative to the traditional connector backshell that improves performance while providing significant cost savings. Our overmolded connector backshells are completely weather sealed and EMI shielded and cost a fraction of a typical connector backshell. We machine our own overmolded backshells and then seal the attached wires and shielding with an extremely durable mold material. The result is a more attractive connector that is far more resistant to environmental conditions and costs 10 to 20 times less than traditional backshells.

- API overmold backshells available for almost any connector configuration
- Overmolding provides better strain relief than heat shrink or metal backshells
- Total encapsulation of mold material protects against weather and environmental degradation
- Overmolded connector is 10 to 20x less expensive than traditional backshells
- More attractive final assembly, custom mold imprinting available