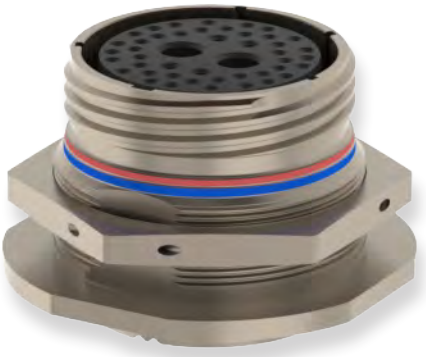
QPL, general purpose, NATC, hermetic, filtered, lanyard released and custom solutions

MIL-DTL-38999 Series III connectors and cable assemblies



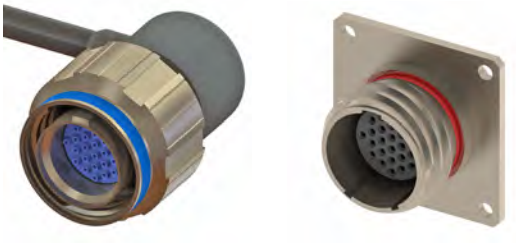
Powering Business Worldwide

General purpose connectors

Specialized interconnect solutions

An extensive array of mil-circular connectors

NASA SSQ 21635 NATC connectors are available in 53 standard contact patterns including MIL-DTL-1553 high speed data and bussed configurations.



Micro-military circular connectors incorporate latest-generation designs to deliver significantly smaller sizes, lower weights and higher contact densities that MIL-DTL-38999 solutions.

Power-Breech™ connectors are rated up to 900 amps. These shell size 33 – 57 solutions utilize MIL-DTL-38999 Series IV derived coupling mechanisms.

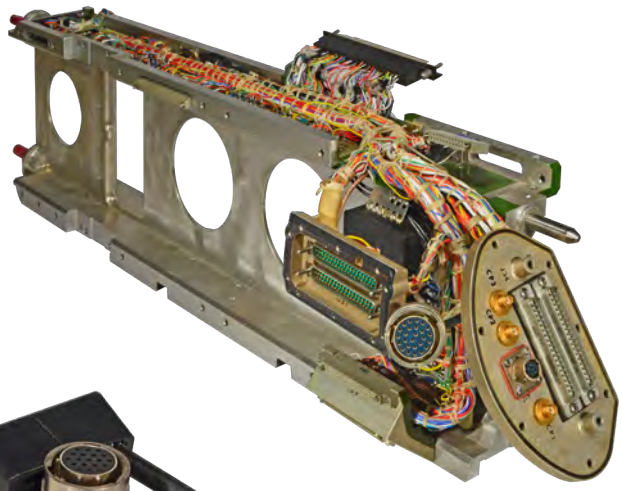
MIL-DTL-38999 Series III and IV solutions include QPL, general purpose, hermetic, filtered, lanyard released and Wing-Lok™ plugs.

Custom cables and wiring harnesses

Eaton can provide custom cables and wiring harnesses for turnkey design, collaborative co-development, or build-to-print programs.

End-to-end connectivity capabilities include:

- Application-specific solutions for high currents and voltages, Ethernet, and RF applications
- Single and multiple-layer foil and braided EMI/RFI shielding
- Extreme temperatures, shock, vibration, radiation, corrosive media and vacuum
- Integrated fluid and gas delivery and cable separation
- NASA NHB 5300 soldering and NASA-STD-8739.4 cable manufacturing compliances



C4ISR and mission systems solutions

Eaton has the product breadth and demonstrated field-proven performance needed to support a broad range of C4ISR and mission-system applications.

QPL and specialized standard products and modified/custom solution capabilities include:

- Form factors ranging from latest generation miniaturized to legacy.
- High-current power, high-speed data, and filtered signal solutions.
- Operation in extreme EMI/RFI, temperatures, shock/vibration, radiation, corrosive media, and vacuum/pressures.
- Custom connectors, cable assemblies, wiring harnesses, and non-explosive actuators.

Heritage proven products and custom capabilities position Eaton as a primary source for mission-critical interconnect for all physical domains: air, space, sea, and terrestrial.

MIL-DTL-38999 Series III and IV solutions support applications ranging from battlefield-weapons control to airborne-weapons release.

Mission-system-connectivity heritage includes shoulder fired guided missiles and shipboard vertical launch missiles.

Naval interconnect heritage includes sonar arrays, minesweepers, propulsion control, ROVs, and weapons control.

From subsea to space; Eaton's program heritage includes custom connector/cable assemblies for critical submarine control systems (left) and power-cable assemblies that incorporate NASA NATC, connectors (right).

Modified MIL-DTL-38999 and full-custom solutions

D38999 Series III and Series IV custom shells, inserts, and accessories

- High-speed data including MIL-DTL-1553, USB, Ethernet and fiber optic.
- Standard and split-pair quadrax, differential twinax and controlled impedance contacts.
- Power solutions include D38999 Series IV derived Power-Breech™ connectors rated up to 900 amps.
- Additional application-specific features include custom materials, platings, mounting flanges, backshells, strain reliefs and extended coupling rings.

Space rated technologies accelerate EVA and IVA custom-solution development

- Custom solutions are available with Class G finishes and space-rated materials that contain <0.1% volatile materials with a total-mass loss of <1%.
- D38999 Series IV, Breech-Lok™ connectors have been approved for space flight by the NASA Goddard Space Flight Center.
- Ergonomic Wing-Lok™ coupling rings (depicted to the left) facilitate rapid mating and demating when wearing bulky gloves in EVA and IVA applications.
- NATC-derived custom solution capabilities include thermally and electrically deadfaced connectors.

Heritage-proven design platforms can be leveraged to quickly provide a wide range of custom solutions

Eaton's heritage-proven array of technologies and design platforms can be quickly leveraged to provide a wide range of harsh-environment interconnects:

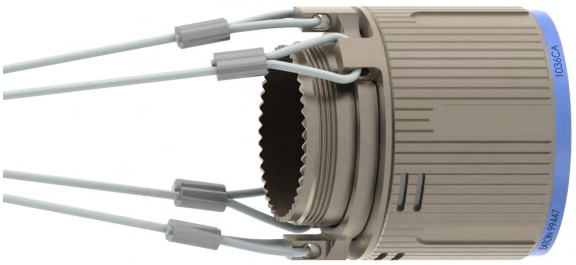
- Cryogenic and high temperature
- Electrically and/or mechanically released
- EVA and IVA quick disconnecting
- Integrated electrical, gas and fluid
- Interstage raceway
- Low-imparted shock and zero-separation force
- Positive-mate monitoring
- Thermally and electrically deadfaced
- Vertical launch

Innovative engineering facilitates cost effective, reusable solutions

Heritage-proven technologies and design platforms can be leveraged to quickly provide a wide range of custom, harsh-environment solutions for interconnect applications ranging from shoulder-fired missile launchers to deep space probes.

One example of Eaton's track record of innovation is the umbilical connector described below.

- MIL-DTL-38999 Series III derived shells and inserts reduce costs and leverage proven reliability and availability. Inserts can be upgraded to support changing mission requirements.
- A resettable release mechanism was developed based on a separation-nut design with over 40 years of flight heritage.



This lanyard connector integrates redundant-release mechanisms with standard MIL-DTL-38999 Series III coupling threads to support low-pull force, off-angle releases.

Connector pins mate with the umbilical cable. The opposing ends of these feedthroughs mate to connectors mounted on the stationary plate.

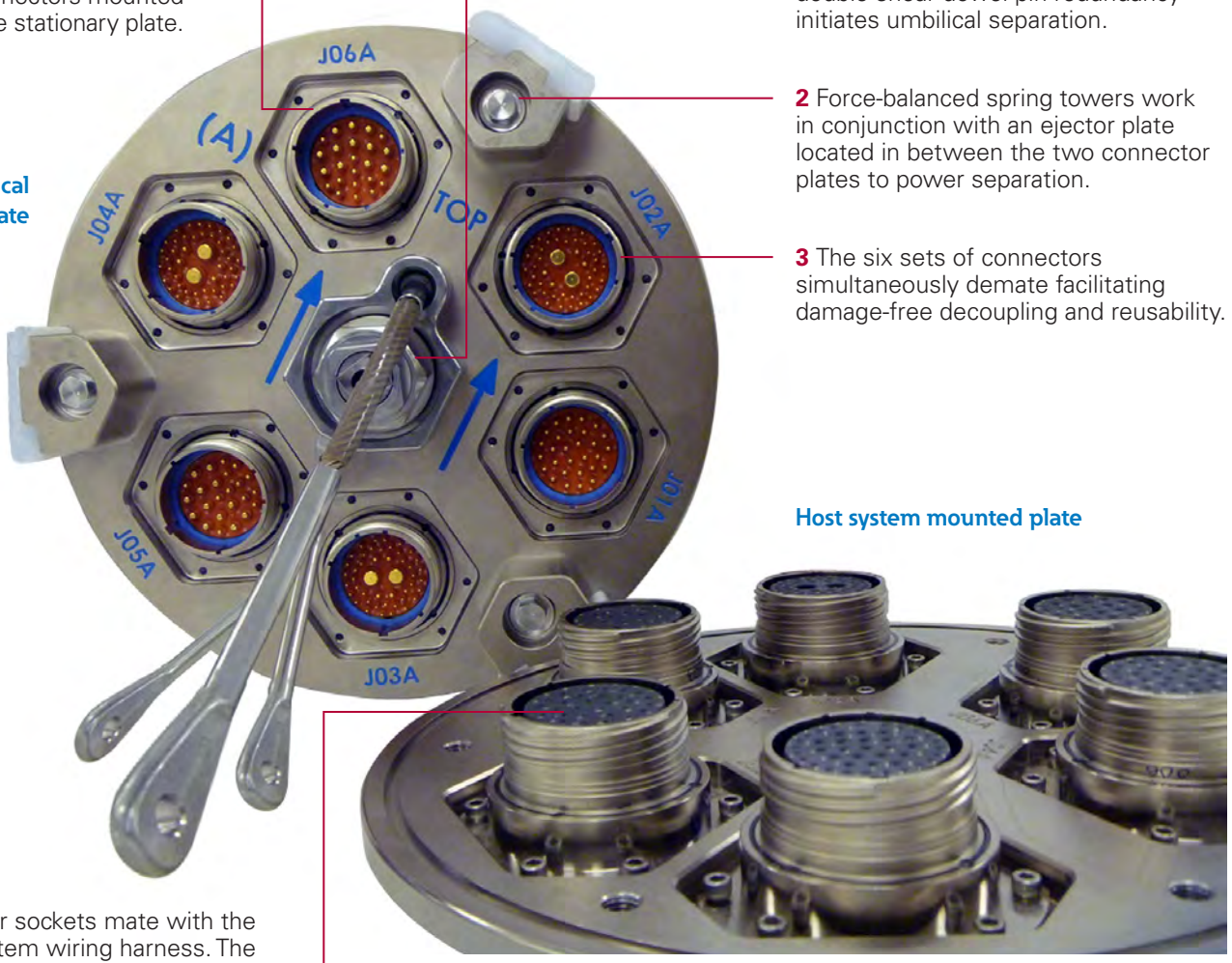
Umbilical cable plate

Umbilical-separation sequence

1 Lanyard-actuated separation nut with double-shear dowel pin redundancy initiates umbilical separation.

2 Force-balanced spring towers work in conjunction with an ejector plate located in between the two connector plates to power separation.

3 The six sets of connectors simultaneously demate facilitating damage-free decoupling and reusability.



Host system mounted plate

Connector sockets mate with the host system wiring harness. The opposing ends of these feedthroughs connect to the umbilical-cable plate.

General purpose connectors overview

Engineered to Deliver Uncompromised Performance in Mission-Critical Applications

Eaton's MIL-DTL-38999 Series III, QPL and modified connectors are designed to deliver uncomprimised performance in harsh-environment applications.

Eaton can quickly deliver modified Series III solutions to meet a broad range of application-specific requirements:

- Customer-defined EMI/RFI compliances.
- Special insert patterns and shell configurations.
- Custom connector/cable assemblies.

- Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.
- High speed data including MIL-STD-1553.
- 360° grounding fingers provide up to 65dB protection at 10GHz.
- -65°C to 200°C operating temperatures.
- Self locking coupling nuts and end-bell-accessory hardware.
- Finish options include 500 hour salt-spray-rated platings.

Straight plugs

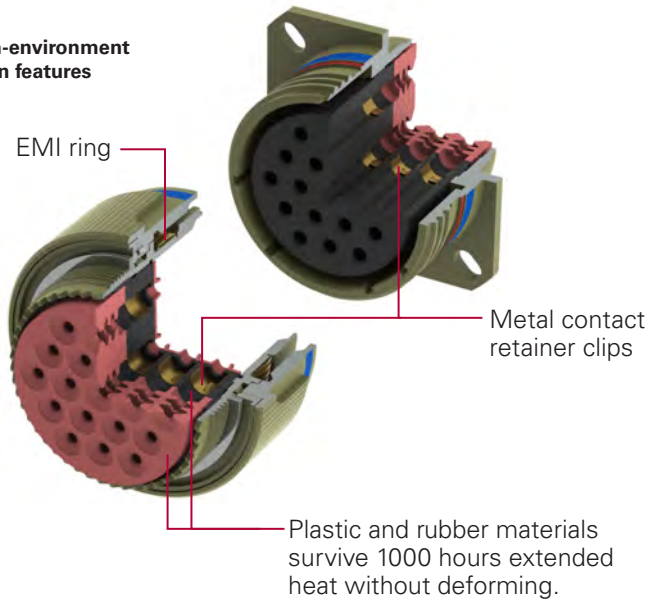
Wall-mount receptacles

Jam-nut receptacles

In-line receptacles

Feed-thru receptacles

Harsh-environment design features



General-purpose connectors technical specifications

Materials, Finish, and Mechanical

	Class C	Class F	Class G	Class K	Class T	Class W
Receptacle/Plug Shell and Coupling Ring Material	2024 Aluminum	2024 Aluminum	2024 Aluminum	Corrosion Resistant Stainless Steel	2024 Aluminum	2024 Aluminum
Receptacle /Plug Shell and Coupling Ring Plating	Anodize	Nickel per ASTM B733	Nickel per ASTM B733	Passivated	Nickel Fluorocarbon Polymer	CAD/OD per QQ-P-416
Contact Material & Plating	Copper Alloy with Gold Plating, 50 Micro-Inches Minimum - All Finish Classes					
Insulator	Hard Dielectric Wafer - All Finish Classes					
Grommet and Seal	Fluorosilicone - All Finish Classes					
Grounding Springs	Beryllium Copper - All Finish Classes					
Mating Life	500 Cycles Minimum - All Finish Classes					
Contact Retention	Up to 25 Pounds - All Finish Classes					
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E - All Finish Classes					

Contact Eaton to discuss additional finish classes.

Environmental, Shock, Vibration, and EMI/RFI

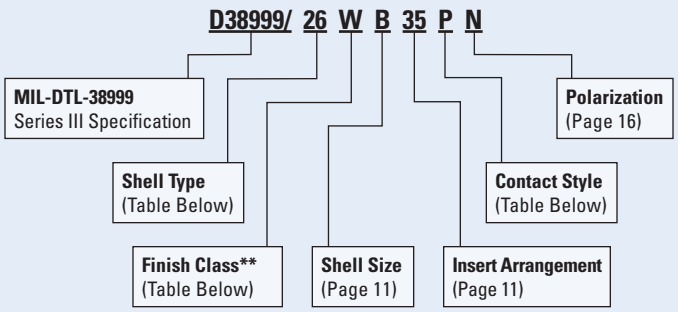
	Class C	Class F	Class G*	Class K**	Class T	Class W
Operating Temperature	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 175°C (-85°F to 347°F)	-65°C to 175°C (-85°F to 347°F)
Sealing	Sand and Dust as per MIL-STD-202 and Ice Resistance - All Finish Classes					
Corrosion Resistance	Withstands 500 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Coolants, and Oils as per EIA-364-10 - All Finish Classes					
Sine Vibration	60g at Ambient Temperature - All Finish Classes					
Random Vibration	50G at Ambient Temperature with Simulated Accessory Load - All Finish Classes					
Shock	300g +/- 15% Half-Sine-Wave Magnitude for 3 +/- 1mS - All Finish Classes					
EMI Attenuation @ 100MHz	No EMI Shielding	> 90 dB	> 90 dB	> 80 dB	> 90dB	> 90dB
EMI Attenuation @ 10GHz	No EMI Shielding	> 65 dB	> 65 dB	> 45 dB	> 50dB	> 50dB
Shell-to-Shell Conductivity	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop

*Class G thermal vacuum outgassing: total mass loss 1.0%, collected volatile condensible material 0.1% maximum.

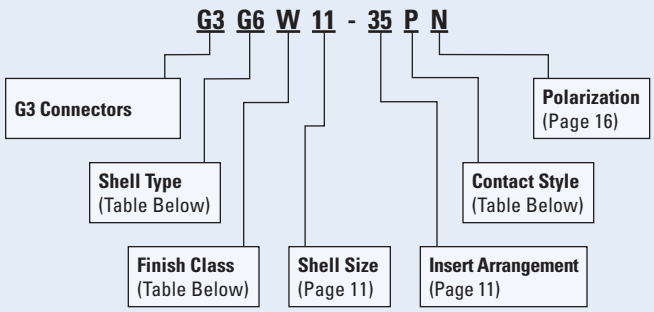
**Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.

General-purpose connectors part-number configuration

MIL-DTL part number



Eaton part number



Designator Descriptions

Designator Type	Military	Eaton	Description
Shell Type	MIL-DTL-38999 / 26	G6	Straight Plug
	MIL-DTL-38999 / 20	00	Wall-Mount Receptacle
	-	03	In-Line Receptacle
	-	05	Feed-Through Receptacle
	MIL-DTL-38999 / 24	07	Jam-Nut Receptacle
Finish Class	C	C	Anodize, -65°C to 200°C (-85°F to 392°F)
	F	F	Nickel per ASTM B733, -65°C to 200°C (-85°F to 392°F)
	G	G	Nickel per ASTM B733, -65°C to 200°C (-85°F to 392°F)
	K	K	CRES (Passivated), -65°C to 200°C (-85°F to 392°F)
	T	T	Nickel Fluorocarbon Polymer, -65°C to 175°C (-85°F to 347°F)
	W	W*	CAD/OD per QQ-P-41665, -65°C to 175°C (-85°F to 347°F)
Contact Style**	P	P	Pin
	S	S	Socket
	H	H	Pin, 1500 cycle
	J	J	Socket, 1500 cycle
	A	A	Pin, Connector Shipped Without Contacts
	B	B	Socket, Connector Shipped Without Contacts
Feedthrough Receptacle Contact Styles	P	P	Pin/Pin
	S	S	Socket/Socket
	A	A	Socket/Pin
	B	B	Pin/Socket

*Many Eaton Finish Class W connectors are QPL certified. Please contact Eaton, or visit the Defense Logistics Agency web site, for the latest configuration-specific information.

**PCB terminated contact part numbers are listed in the PC Tail Terminations section.

General-purpose connectors standard shell & insert configurations

Shell-Size Conversions

Military Designation	A	B	C	D	E	F	G	H	J
Shell Size & Eaton Designation	9	11	13	15	17	19	21	23	25

Please contact Eaton to discuss custom shells and inserts

Shell Size	Insert #	SR	Total # Contacts	# 22D	# 20	# 16	# 12	# 8
9	35	M	6	6				
9	98	I	3		3			
11	2	I	2			2		
11	3*	II	3			3		
11	5	I	5		5			
11	35	M	13	13				
11	98	I	6		6			
11	99	I	7		7			
13	4	I	4			4		
13	35	M	22	22				
13	98	I	10		10			
15	5	II	5			5		
15	15	I	15		14	1		
15	18	I	18		18			
15	19	I	19		19			
15	35	M	37	37				
15	97	I	12		8	4		
17	2*	M,T	2					2T
17	6	I	6				6	
17	8	II	8			8		
17	26	I	26		26			
17	35	M	55	55				
17	98*	M,T	26	24				2T
17	99	I	23		21	2		
19	3*	M,T	3					3T
19	4*	M,T	4					4T
19	11	II	11			11		

Shell Size	Insert #	SR	Total # Contacts	# 22D	# 20	# 16	# 12	# 10	# 8
19	18	M,T	18	14					4T
19	32	I	32		32				
19	35	M	66	66					
21	5*	M,T	5						5T
21	11	I	11				11		
21	16	II	16			16			
21	26*	M,T	25		23				2T
21	35	M	79	79					
21	39	I	39		37	2			
21	41	I	41		41				
23	21	II	21			21			
23	35	M	100	100					
23	53	I	53		53				
23	55	I	55		55				
23	97	I	16			16			
23	99	II	11			11			
25	4	I	56		48	8			
25	8	M,T	8						8T
25	11	N	11		2			9	
25	19	I	19				19		
25	20	N,T,C	30		10	13	4C		3T
25	24	I	24			12	12		
25	29	I	29			29			
25	35	M	128	128					
25	43	I	43		23	20			
25	46	I,C	46		40	4			2C
25	61	I	61		61				

SR = Service Rating, T=Twinax, C=Coax.

* Not a MIL-STD-1560 defined insert arrangement.

Insert and contact ratings

Insert Service Ratings

	Suggested Operating Voltage (Sea Level)		Test Voltage (Sea level)	Test Voltage 50,000 Ft.	Test Voltage 70,000 Ft.	Test Voltage 100,000 Ft.
Service Rating	AC (RMS)	DC				
I	600	850	1800 VRMS	600 VRMS	400 VRMS	200 VRMS
II	900	1250	2300 VRMS	800 VRMS	500 VRMS	200 VRMS
M	400	550	1300 VRMS	550 VRMS	350 VRMS	200 VRMS
N	230	270	1000 VRMS	400 VRMS	260 VRMS	200 VRMS

Contact Part Number Cross Reference - PC tail contact information is listed on page 52

	Contact Size	Eaton Part Number	Military Part Number
Pin	22D	5034-2400-0220	M39029/58-360
	20	5034-2400-0200	M39029/58-363
	16	5034-2400-0160	M39029/58-364
	12	5034-2400-0120	M39029/58-365
	10	Contact Eaton	M39029/58-528
	12 COAX	5034-2428-12P00	M39029/28-211
	8 TWINAX	5034-2507-08P00	M39029/90-529
	8 Power	5034-2488-0080	N/A
Socket	22D	5034-2600-0220	M39029/56-348
	20	5034-2600-0200	M39029/56-351
	16	5034-2600-0160	M39029/56-352
	12	5034-2600-0120	M39029/56-353
	10	5034-2600-0100	M39029/56-527
	12 COAX	5034-2711-12S00	M39029/75-416
	8 TWINAX	5034-2703-08S00	M39029/91-530
	8 Power	5034-2651-0080	N/A

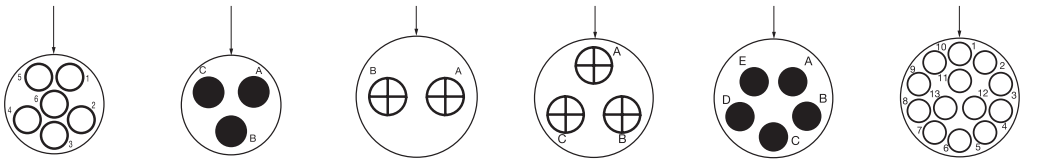
	Crimp Well Data		Recommended Contact Rating (Amps)									
Contact Size	Well Diameter	Minimum Well Depth	Wire Size (Awg)									
			28	26	24	22	20	18	16	14	12	10
22D	0.0345 ± 0.001	0.141	1.5	2.0	3.0	5.0						
20	0.047 ± 0.001	0.209			3.0	5.0	7.5					
16	0.067 ± 0.001	0.209					7.5	10.0	13.0			
12	0.100 ± 0.002	0.209								20.0	23.0	
10	0.137 ± 0.003	0.355									23.0	33.0

Insert drawings 9-35 to 19-18

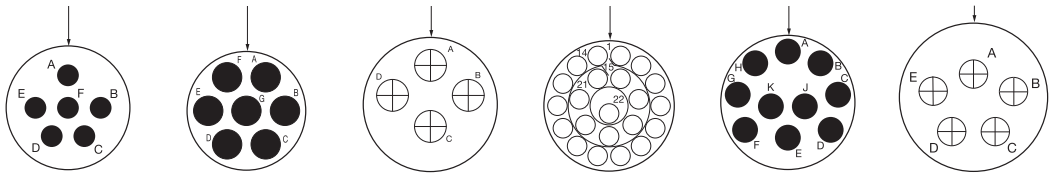
Legend:
† = Not MIL-Standard
↓ = Main Key, Key Way Polarization

Contact Size — Front Face of Pin Insert Shown)

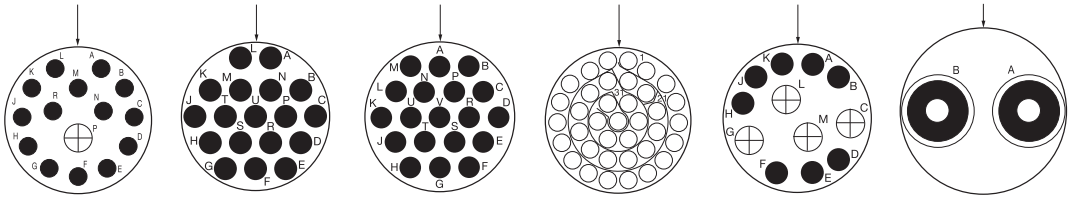
No. 8 | No. 10 | No. 12 | No.16 | No. 20 | No. 22D



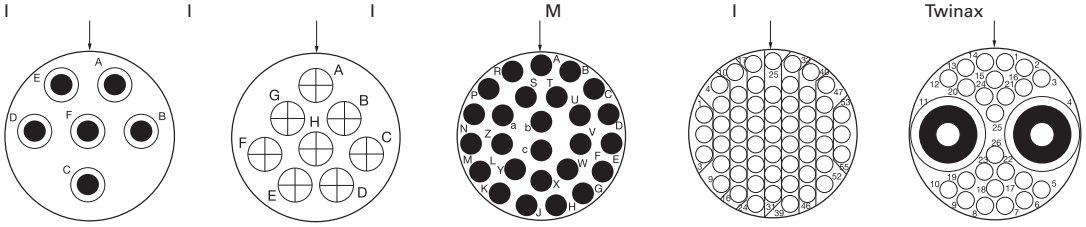
	9-35	9-98	11-2	11-3 †	11-5	11-35
Insert Arrangement:						
Quantity and Size:	6 No, 22D Contacts	3 No. 20 Contacts	2 No. 16 Contacts	3 No. 16 Contacts	5 No. 20 Contacts	13 No. 22D Contacts
Service Rating:	M	I	I	II	I	M



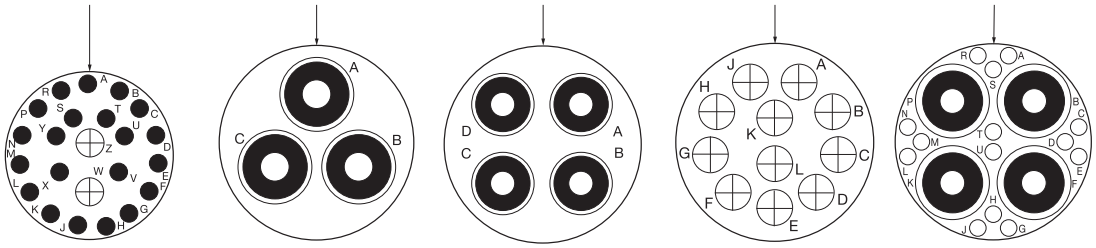
	11-98	11-99	13-4	13-35	13-98	15-5
Insert Arrangement:						
Quantity and Size:	6 No. 20 Contacts	7 No. 20 Contacts	4 No. 16 Contacts	22 No. 22D Contacts	10 No. 20 Contacts	5 No. 16 Contacts
Service Rating:	I	I	I	M	I	II



	15-15	15-18	15-19	15-35	15-97	17-2 †
Insert Arrangement:						
Quantity and Size:	1 No. 16 Contacts 14 No. 20 Contacts	18 No. 20 Contacts	19 No. 20 Contacts	37 No. 22D Contacts	4 No. 16 Contacts 8 No. 20 Contacts	2 No. 8 Twinax
Service Rating:	I	I	I	M	I	Twinax



	17-6	17-8	17-26	17-35	17-98 †
Insert Arrangement:					
Quantity and Size:	6 No. 12 Contacts	8 No. 16 Contacts	26 No. 20 Contacts	55 No. 22D Contacts	24 No. 22D Contacts 2 No. 8 Twinax
Service Rating:	I	II	I	M	M & Twinax



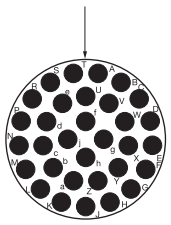
	17-99	19-3 †	19-4 †	19-11	19-18
Insert Arrangement:					
Quantity and Size:	21 No. 20 Contacts 2 No. 16 Contacts	3 No. 8 Twinax	4 No. 8 Twinax	11 No. 16 Contacts	14 No. 22D Contacts 4 No. 8 Twinax
Service Rating:	I	Twinax	Twinax	II	M & Twinax

Insert drawings 19-32 to 23-99

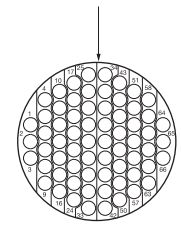
Legend:
† = Not MIL-Standard
⏐ = Main Key, Key Way Polarization

Contact Size

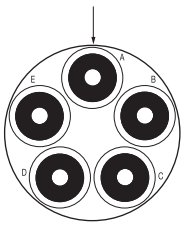
Front Face of Pin Insert Shown)



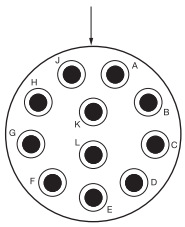
Insert Arrangement: 19-32
Quantity and Size: 32 No. 20 Contacts
Service Rating: I



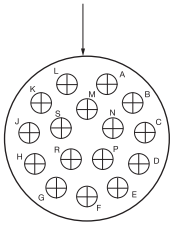
Insert Arrangement: 19-35
Quantity and Size: 66 No. 22D Contacts
Service Rating: M



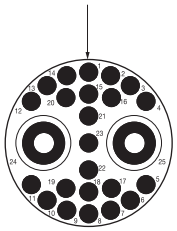
Insert Arrangement: 21-5 †
Quantity and Size: 5 No. 8 Contacts
Service Rating: M



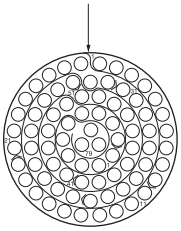
Insert Arrangement: 21-11
Quantity and Size: 11 No. 12 Contacts
Service Rating: I



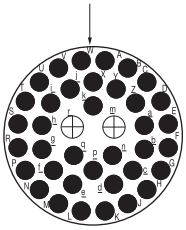
Insert Arrangement: 21-16
Quantity and Size: 16 No. 16 Contacts
Service Rating:: II



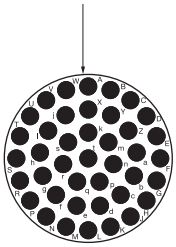
Insert Arrangement: 21-26 †
Quantity and Size: 23 No. 20 Contacts
2 No. 8 Contacts
Service Rating: M



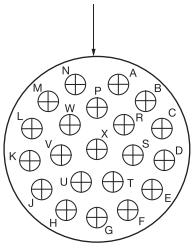
Insert Arrangement: 21-35
Quantity and Size: 79 No. 22D Contacts
Service Rating: M



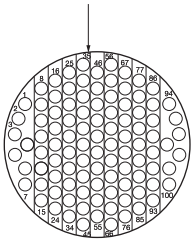
Insert Arrangement: 21-39
Quantity and Size: 37 No. 20 Contacts
2 No. 16 Contacts
Service Rating: I



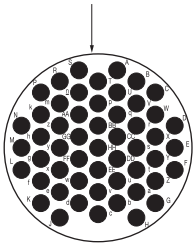
Insert Arrangement: 21-41
Quantity and Size: 41 No. 20 Contacts
Service Rating: I



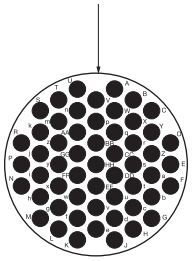
Insert Arrangement: 23-21
Quantity and Size: 21 No. 16 Contacts
Service Rating: II



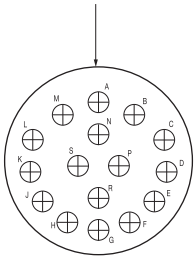
Insert Arrangement: 23-35
Quantity and Size: 100 No. 22D Contacts
Service Rating: M



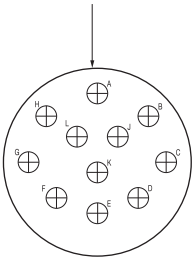
Insert Arrangement: 23-53
Quantity and Size: 53 No. 20 Contacts
Service Rating: I



Insert Arrangement: 23-55
Quantity and Size: 55 No. 20 Contacts
Service Rating: I



Insert Arrangement: 23-97
Quantity and Size: 16 No. 16 Contacts
Service Rating: I



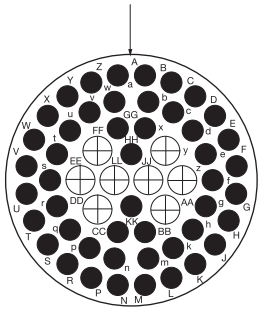
Insert Arrangement: 23-99
Quantity and Size: 11 No. 16 Contacts
Service Rating: II

Insert drawings 25-4 to 25-61

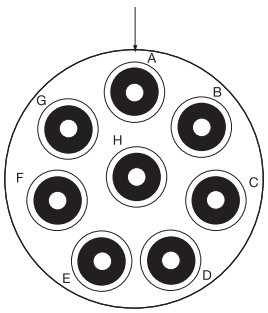
Legend:
† = Not MIL-Standard
↓ = Main Key, Key Way Polarization

Contact Size — Front Face of Pin Insert Shown)

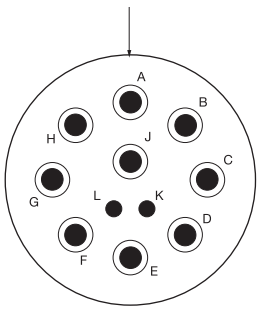
No. 8 | No. 10 | No. 12 | No.16 | No. 20 | No. 22D



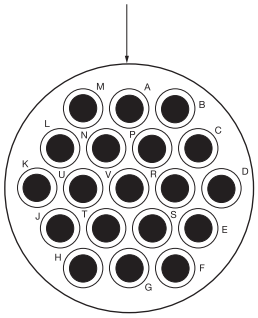
Insert Arrangement:	25-4
Quantity and Size:	48 No. 20 Contacts 8 No. 16 Contacts
Service Rating:	I



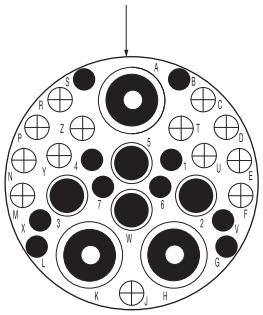
Insert Arrangement:	25-8
Quantity and Size:	8 No. 8 Twinax
Service Rating:	Twinax



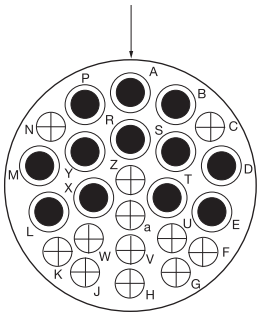
Insert Arrangement:	25-11
Quantity and Size:	2 No. 20 Contacts 9 No. 10 Contacts
Service Rating:	N



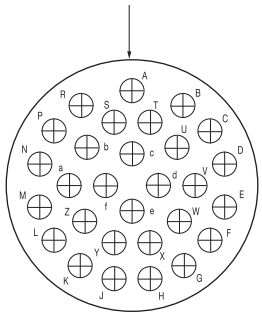
Insert Arrangement:	25-19
Quantity and Size:	19 No. 12 Contacts
Service Rating:	I



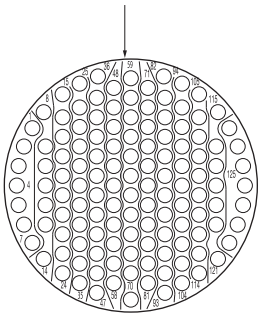
Insert Arrangement:	25-20
Quantity and Size:	10 No. 20 Contacts 13 No. 16 Contacts 4 No. 12 Coax 3 No. 8 Twinax
Service Rating:	N & Coax & Twinax



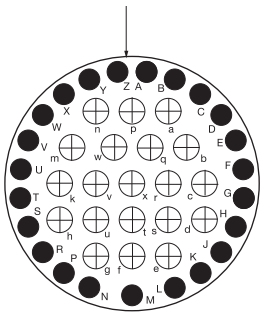
Insert Arrangement:	25-24
Quantity and Size:	12 No. 16 Contacts 12 No. 12 Contacts
Service Rating:	I



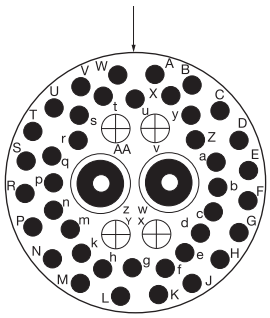
Insert Arrangement:	25-29
Quantity and Size:	29 No. 16 Contacts
Service Rating:	I



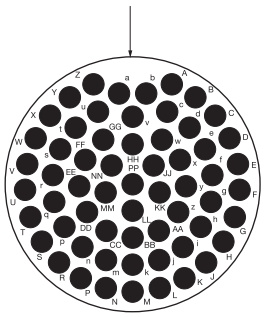
Insert Arrangement:	25-35
Quantity and Size:	128 No. 22D Contacts
Service Rating:	M



Insert Arrangement:	25-43
Quantity and Size:	23 No. 20 Contacts 20 No. 16 Contacts
Service Rating:	I

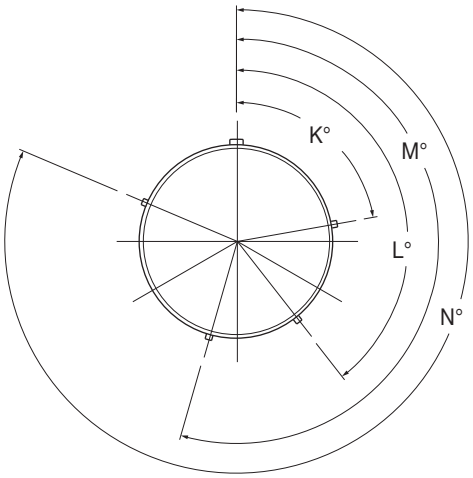


Insert Arrangement:	25-46
Quantity and Size:	40 No. 20 Contacts 4 No. 16 Contacts 2 No. 8 Coax
Service Rating:	I & Coax

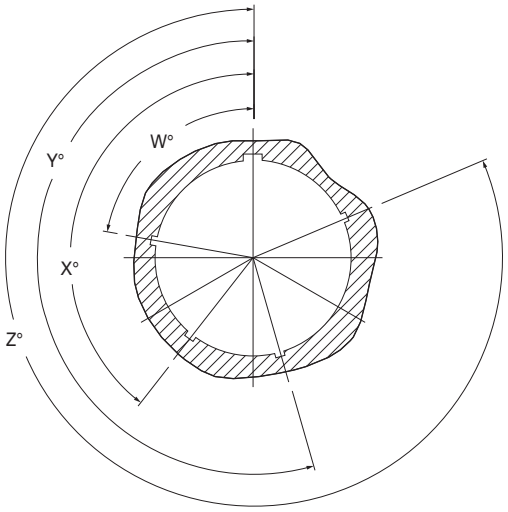


Insert Arrangement:	25-61
Quantity and Size:	61 No. 20 Contacts
Service Rating:	I

Polarization tables



Plugs

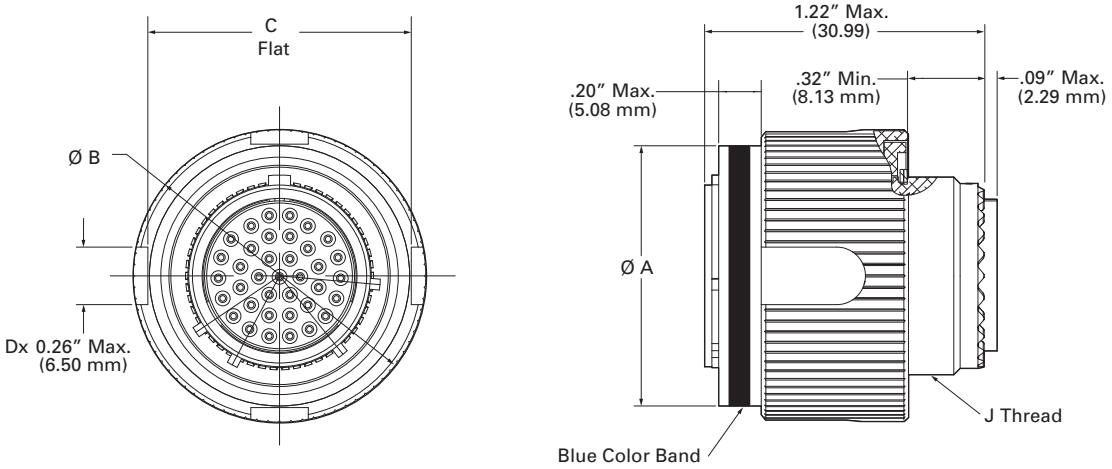


Receptacles

Polarization Table - Plug/Receptacle

Shell Size	Keyway ID Letter	K° W°	L° X°	M° Y°	N° Z°
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 thru 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
25L,33, & 37	N	80	142	188	293
	A	135	170	188	310
	B	49	169	188	244
	C	66	140	188	257
	D	62	145	188	280
	E	79	153	188	272

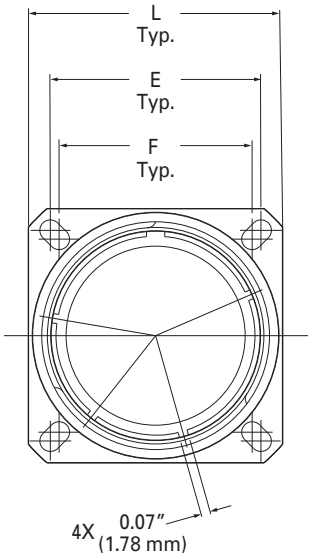
D38999/26 straight plugs, Eaton type G6

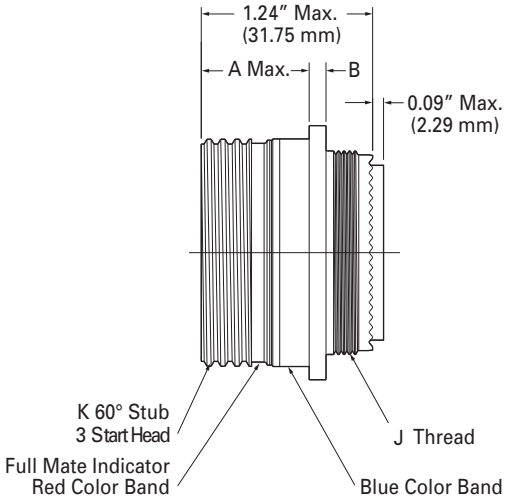


Shell Size	ØA Max	ØB	C Flat	J Thread
9	0.732 (18.60)	0.858 (21.80)	0.748 (19.00)	M12x1.0-6g-0.1R
11	0.839 (21.31)	0.984 (25.00)	0.862 (21.90)	M15x1.0-6g-0.1R
13	1.008 (25.60)	1.157 (29.40)	1.028 (26.11)	M18x1.0-6g-0.1R
15	1.138 (28.91)	1.280 (32.51)	1.154 (29.31)	M22x1.0-6g-0.1R
17	1.276 (32.41)	1.406 (35.71)	1.291 (32.80)	M25x1.0-6g-0.1R
19	1.382 (35.10)	1.516 (38.50)	1.398 (35.51)	M28x1.0-6g-0.1R
21	1.508 (38.30)	1.642 (41.70)	1.524 (38.71)	M31x1.0-6g-0.1R
23	1.626 (41.30)	1.768 (44.90)	1.642 (41.71)	M34x1.0-6g-0.1R
25	1.752 (44.50)	1.890 (48.01)	1.768 (44.91)	M37x1.0-6g-0.1R

Dimensions are stated as inches (mm).

D38999/20 wall-mount receptacles, Eaton type 00

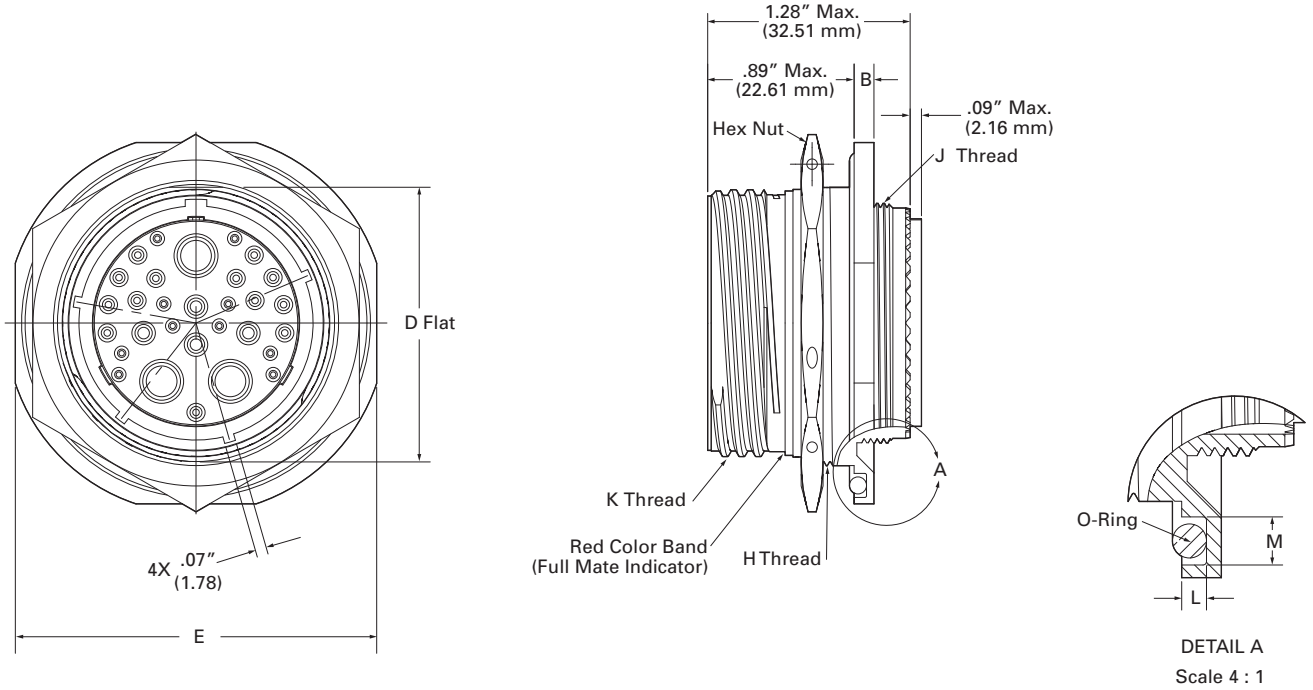




Shell Size	A	B	E	F	J Thread	K Thread	L ±.012
9	0.883 (22.42)	0.098 (2.50)	0.719 (18.30)	0.594 (15.10)	M12 X 1.0-6g-0.1R	0.6250-.1P-.3L-2A	0.937 (23.80)
11	0.883 (22.42)	0.098 (2.50)	0.812 (20.62)	0.719 (18.30)	M15 X 1.0-6g-0.1R	0.7500-.1P-.3L-2A	1.032 (26.21)
13	0.883 (22.42)	0.098 (2.50)	0.906 (23.01)	0.812 (20.62)	M18 X 1.0-6g-0.1R	0.8750-.1P-.3L-2A	1.126 (28.60)
15	0.883 (22.42)	0.098 (2.50)	0.969 (24.61)	0.906 (23.01)	M22 X 1.0-6g-0.1R	1.0000-.1P-.3L-2A	1.221 (31.01)
17	0.883 (22.42)	0.098 (2.50)	1.062 (27.00)	0.969 (24.61)	M25 X 1.0-6g-0.1R	1.1875-.1P-.3L-2A	1.311 (33.30)
19	0.883 (22.42)	0.098 (2.50)	1.156 (29.36)	1.062 (27.00)	M28 X 1.0-6g-0.1R	1.2500-.1P-.3L-2A	1.437 (36.50)
21	0.791 (20.10)	0.126 (3.20)	1.250 (31.75)	1.156 (29.36)	M31 X 1.0-6g-0.1R	1.3750-.1P-.3L-2A	1.563 (39.70)
23	0.791 (20.10)	0.126 (3.20)	1.375 (35.00)	1.250 (31.75)	M34 X 1.0-6g-0.1R	1.5000-.1P-.3L-2A	1.689 (42.90)
25	0.791 (20.10)	0.126 (3.20)	1.500 (38.10)	1.375 (35.00)	M37 X 1.0-6g-0.1R	1.6250-.1P-.3L-2A	1.811 (46.00)

Dimensions are stated as inches (mm).

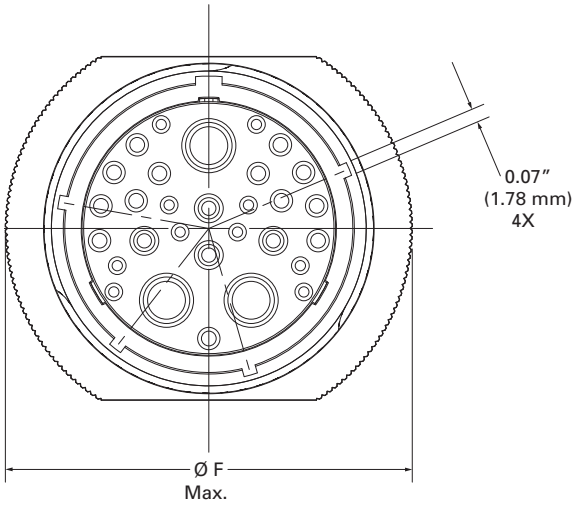
D38999/24 jam-nut receptacles, Eaton type 07

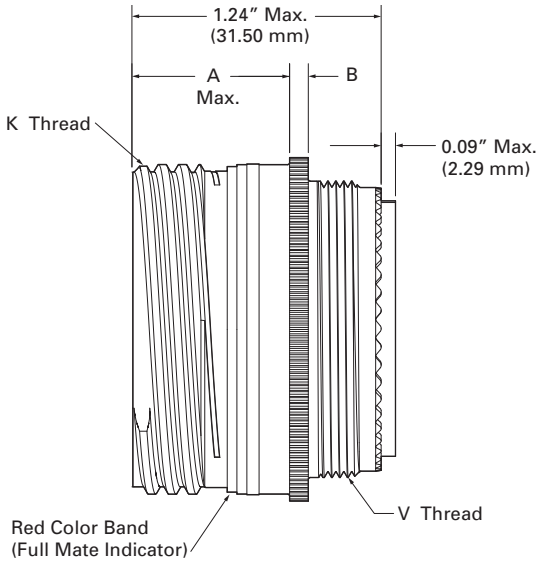


Shell Size	B	D Flat	E	L	M	H Thread	J Thread	K Thread	O-Ring 068
9	0.114 (2.90)	0.655 (16.64)	1.079 (27.41)	0.050 (1.27)	0.099 (2.51)	M17 X 1.0-6g-0.100R	M12 X 1.0-6g-0.1R	0.6250-.1P-.3L-2A	-019
11	0.114 (2.90)	0.755 (19.18)	1.268 (32.21)	0.050 (1.27)	0.099 (2.51)	M20 X 1.0-6g-0.100R	M15 X 1.0-6g-0.1R	0.7500-.1P-.3L-2A	-022
13	0.114 (2.90)	0.942 (23.93)	1.390 (35.31)	0.050 (1.27)	0.099 (2.51)	M25 X 1.0-6g-0.100R	M18 X 1.0-6g-0.1R	0.8750-.1P-.3L-2A	-024
15	0.114 (2.90)	1.066 (27.08)	1.516 (38.51)	0.050 (1.27)	0.099 (2.51)	M28 X 1.0-6g-0.100R	M22X 1.0-6g-0.1R	1.0000-.1P-.3L-2A	-026
17	0.114 (2.90)	1.191 (30.25)	1.642 (41.71)	0.050 (1.27)	0.099 (2.51)	M32 X 1.0-6g-0.100R	M25 X 1.0-6g-0.1R	1.1875-.1P-.3L-2A	-028
19	0.146 (3.71)	1.316 (33.43)	1.827 (46.41)	0.080 (2.03)	0.146 (3.71)	M35 X 1.0-6g-0.100R	M28 X 1.0-6g-0.1R	1.2500-.1P-.3L-2A	-128
21	0.146 (3.71)	1.441 (36.60)	1.953 (49.61)	0.080 (2.03)	0.146 (3.71)	M38 X 1.0-6g-0.100R	M31 X 1.0-6g-0.1R	1.3750-.1P-.3L-2A	-130
23	0.146 (3.71)	1.566 (39.78)	2.079 (52.81)	0.080 (2.03)	0.146 (3.71)	M41 X 1.0-6g-0.100R	M34 X 1.0-6g-0.1R	1.5000-.1P-.3L-2A	-132
25	0.146 (3.71)	1.691 (42.95)	2.205 (56.01)	0.080 (2.03)	0.146 (3.71)	M44 X 1.0-6g-0.100R	M37 X 1.0-6g-0.1R	1.6250-.1P-.3L-2A	-134

Dimensions are stated as inches (mm).

In-line receptacles, Eaton type 03

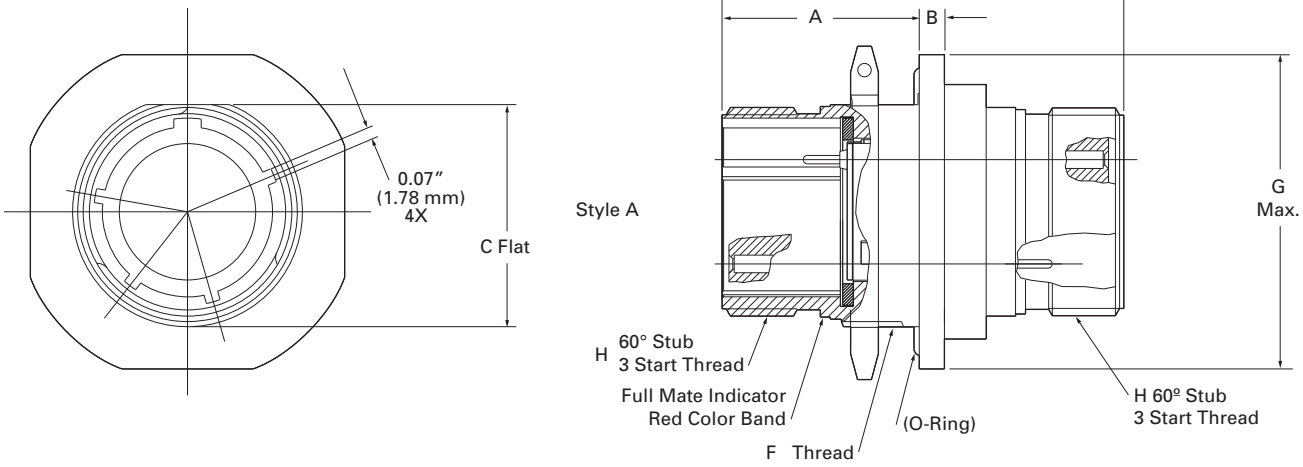




Shell Size	A Max	B	ØF Max	K Thread	V Thread
9	0.883 (22.43)	0.098 (2.50)	0.775 (19.69)	0.6250-.1P-.3L-2A	M12x1.0-6g-0.1R
11	0.883 (22.43)	0.098 (2.50)	0.900 (22.86)	0.7500-.1P-.3L-2A	M15x1.0-6g-0.1R
13	0.883 (22.43)	0.098 (2.50)	1.025 (26.04)	0.8750-.1P-.3L-2A	M18x1.0-6g-0.1R
15	0.883 (22.43)	0.098 (2.50)	1.150 (29.21)	1.0000-.1P-.3L-2A	M22x1.0-6g-0.1R
17	0.883 (22.43)	0.098 (2.50)	1.483 (37.67)	1.1875-.1P-.3L-2A	M25x1.0-6g-0.1R
19	0.791 (20.10)	0.126 (3.20)	1.440 (36.58)	1.2500-.1P-.3L-2A	M28x1.0-6g-0.1R
21	0.791 (20.10)	0.126 (3.20)	1.583 (40.21)	1.3750-.1P-.3L-2A	M31x1.0-6g-0.1R
23	0.791 (20.10)	0.126 (3.20)	1.709 (43.41)	1.5000-.1P-.3L-2A	M34x1.0-6g-0.1R
25	0.791 (20.10)	0.126 (3.20)	1.833 (46.56)	1.6250-.1P-.3L-2A	M37x1.0-6g-0.1R

Dimensions are stated as inches (mm).

Feed-through receptacles, Eaton type 05



Shell Size	A Max	B	C Flat	F Thread	G Max	H Thread
9	0.985 (25.02)	0.114 (2.90)	0.655 (16.64)	M17x1.0-6g 0.100R	1.078 (27.38)	0.625-0.1P-0.3L-2A
11	0.985 (25.02)	0.114 (2.90)	0.755 (19.18)	M20x1.0-6g 0.100R	1.268 (32.21)	0.750-0.1P-0.3L-2A
13	0.985 (25.02)	0.114 (2.90)	0.942 (23.93)	M25x1.0-6g 0.100R	1.390 (35.31)	0.875-0.1P-0.3L-2A
15	0.985 (25.02)	0.114 (2.90)	1.066 (27.08)	M28x1.0-6g 0.100R	1.516 (38.51)	1.000-0.1P-0.3L-2A
17	0.985 (25.02)	0.145 (3.68)	1.191 (30.25)	M32x1.0-6g 0.100R	1.642 (41.71)	1.187-0.1P-0.3L-2A
19	0.985 (25.02)	0.145 (3.68)	1.316 (33.43)	M35x1.0-6g 0.100R	1.827 (46.41)	1.250-0.1P-0.3L-2A
21	0.985 (25.02)	0.145 (3.68)	1.441 (36.60)	M38x1.0-6g 0.100R	1.953 (49.61)	1.375-0.1P-0.3L-2A
23	0.985 (25.02)	0.145 (3.68)	1.566 (39.78)	M41x1.0-6g 0.100R	2.079 (52.81)	1.500-0.1P-0.3L-2A
25	0.985 (25.02)	0.145 (3.68)	1.691 (42.95)	M44x1.0-6g 0.100R	2.205 (56.01)	1.625-0.1P-0.3L-2A

Dimensions are stated as inches (mm).

Wing-Lok™ plugs overview

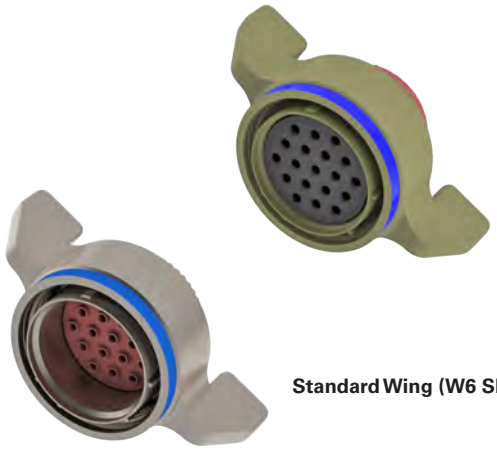
Designed for Fast and Repetitive Engagements in Harsh-Environment Applications

Wing-Lok™ plugs incorporate ergonomic designs that significantly reduce the effort required for mating and demating. These non-slip-grip designs are especially beneficial while wearing gloves and when performing rapid and repetitive connector engagements.

Wing-Lok™ plugs can be quickly customized to meet a broad array of mission-specific requirements:

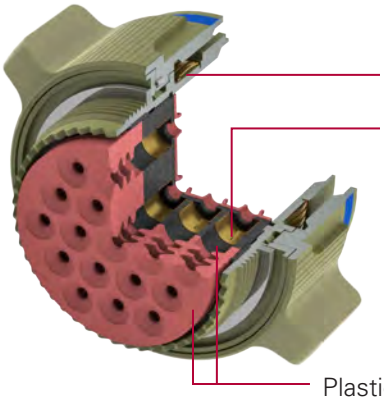
- Special insert and shell configurations.
- Customer-defined EMI/RFI compliances.
- Custom connector/cable assemblies.

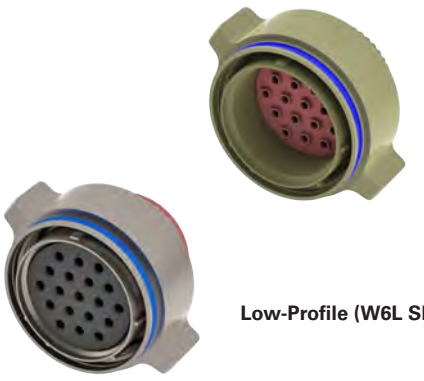
- Meets all MIL-DTL-38999 Series III physical and electrical requirements.
- High speed data including MIL-STD-1553.
- Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.
- Rugged coupling design will not demate or loosen due to shock or vibration.
- Shell-to-shell ground prior to contact engagement.
- 100% scoop-proof shell designs.
- -65°C to 200°C operating temperatures.
- Please contact customer service at 805.484.0543 to order products or receive additional information.



Standard Wing (W6 Shell)

Harsh-Environment Design Features





Low-Profile (W6L Shell)

Wing-Lok™ plugs technical specifications

Materials, Finish, and Mechanical

	Class C	Class F	Class G	Class K	Class T	Class W
Receptacle/Plug Shell and Coupling Ring Material	2024 Aluminum	2024 Aluminum	2024 Aluminum	Corrosion Resistant Stainless Steel	2024 Aluminum	2024 Aluminum
Receptacle /Plug Shell and Coupling Ring Plating	Anodize	Nickel per ASTM B733	Nickel per ASTM B733	Passivated	Nickel Fluorocarbon Polymer	CAD/OD per QQ-P-416
Contact Material & Plating	Copper Alloy with Gold Plating, 50 Micro-Inches Minimum - All Finish Classes					
Insulator	Hard Dielectric Wafer - All Finish Classes					
Grommet and Seal	Fluorosilicone - All Finish Classes					
Grounding Springs	Beryllium Copper - All Finish Classes					
Mating Life	500 Cycles Minimum - All Finish Classes					
Contact Retention	Up to 25 Pounds - All Finish Classes					
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E - All Finish Classes					

Contact Eaton to discuss additional finish classes.

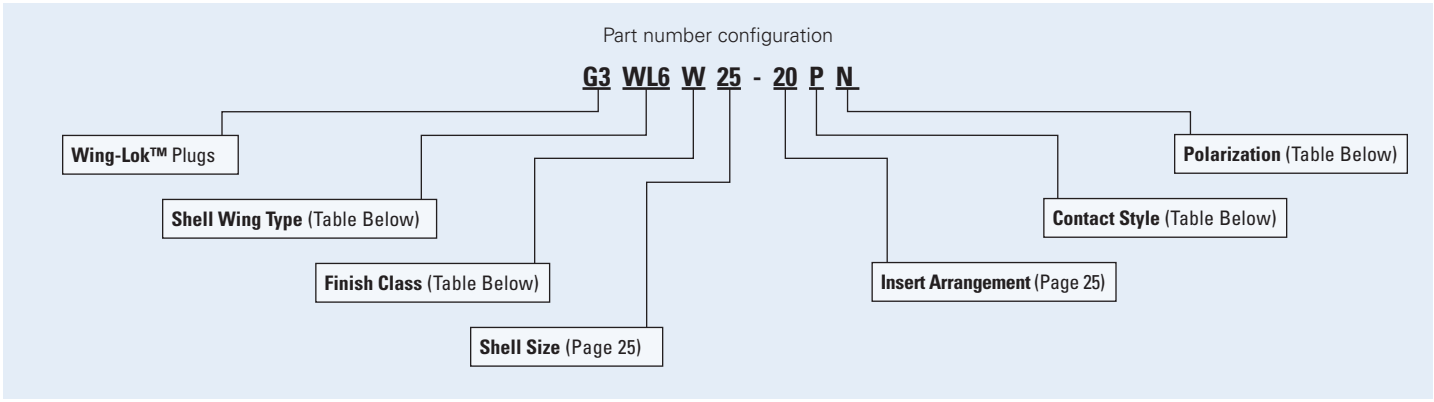
Environmental, Shock, Vibration, and EMI/RFI

	Class C	Class F	Class G*	Class K**	Class T	Class W
Operating Temperature	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 175°C (-85°F to 347°F)	-65°C to 175°C (-85°F to 347°F)
Sealing	Sand and Dust as per MIL-STD-202 and Ice Resistance - All Finish Classes					
Corrosion Resistance	Withstands 500 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Coolants, and Oils as per EIA-364-10 - All Finish Classes					
Sine Vibration	60g at Ambient Temperature - All Finish Classes					
Random Vibration	50G at Ambient Temperature with Simulated Accessory Load - All Finish Classes					
Shock	300g +/- 15% Half-Sine-Wave Magnitude for 3 +/- 1mS - All Finish Classes					
EMI Attenuation @ 100MHz	No EMI Shielding	> 90 dB	> 90 dB	> 80 dB	> 90dB	> 90dB
EMI Attenuation @ 10GHz	No EMI Shielding	> 65 dB	> 65 dB	> 45 dB	> 50dB	> 50dB
Shell-to-Shell Conductivity	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop

*Class G thermal vacuum outgassing: total mass loss 1.0%, collected volatile condensible material 0.1% maximum.

**Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.

Wing-Lok™ plugs part-number configuration



Designator Descriptions

Designator Type	Eaton	Description
Shell Type	W6	Full Wing
	WL6	Low-Profile Wing
Finish Class*	C	Anodize, -65°C to 200°C (-85°F to 392°F)
	F	Nickel per ASTM B733, -65°C to 200°C (-85°F to 392°F)
	G	Nickel per ASTM B733, -65°C to 200°C (-85°F to 392°F)
	K	CRES (Passivated), -65°C to 200°C (-85°F to 392°F)
	T	Nickel Fluorocarbon Polymer, -65°C to 175°C (-85°F to 347°F)
	W	CAD/OD per QQ-P-41665, -65°C to 175°C (-85°F to 347°F)
Contact Type	P	Pin
	S	Socket
	H	Pin, 1500 cycle
	J	Socket, 1500 cycle
	A	Pin, Connector Shipped Without Contacts
	B	Socket, Connector Shipped Without Contacts

*Contact Eaton to discuss additional finish classes.

Wing-Lok™ connectors standard shell & insert configurations

Please contact Eaton to discuss custom shells and inserts

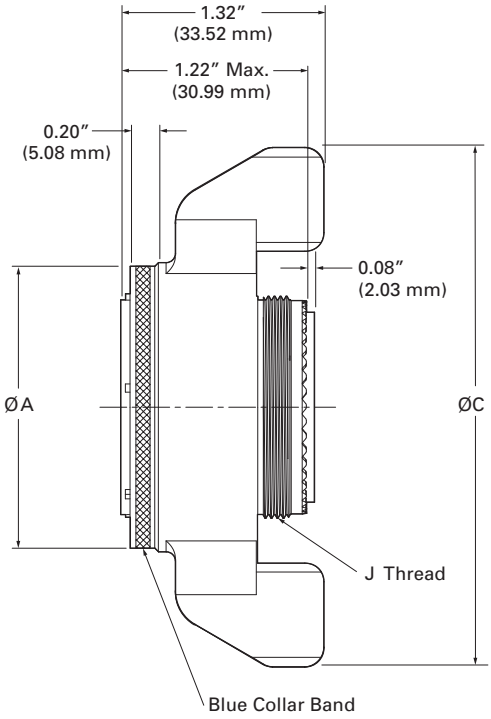
Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 8
9	35	M	6	6				
9	98	I	3		3			
11	2	I	2			2		
11	3*	II	3			3		
11	5	I	5		5			
11	35	M	13	13				
11	98	I	6		6			
11	99	I	7		7			
13	4	I	4			4		
13	35	M	22	22				
13	98	I	10		10			
15	5	II	5			5		
15	15	I	15		14	1		
15	18	I	18		18			
15	19	I	19		19			
15	35	M	37	37				
15	97	I	12		8	4		
17	2*	M,T	2					2T
17	6	I	6				6	
17	8	II	8			8		
17	26	I	26		26			
17	35	M	55	55				
17	98*	M,T	26	24				2T
17	99	I	23		21	2		
19	3*	M,T	3					3T
19	4*	M,T	4					4T
19	11	II	11			11		

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10	# 8
19	18	M,T	18	14					4T
19	32	I	32		32				
19	35	M	66	66					
21	5*	M,T	5						5T
21	11	I	11				11		
21	16	II	16			16			
21	26*	M,T	25		23				2T
21	35	M	79	79					
21	39	I	39		37	2			
21	41	I	41		41				
23	21	II	21			21			
23	35	M	100	100					
23	53	I	53		53				
23	55	I	55		55				
23	97	I	16			16			
23	99	II	11			11			
25	4	I	56		48	8			
25	8	M,T	8						8T
25	11	N	11		2			9	
25	19	I	19				19		
25	20	N,T,C	30		10	13	4C		3T
25	24	I	24			12	12		
25	29	I	29			29			
25	35	M	128	128					
25	43	I	43		23	20			
25	46	I,C	46		40	4			2C
25	61	I	61		61				

SR = Service Rating, T=Twinax, C=Coax.

* Not a MIL-STD-1560 defined insert arrangement.

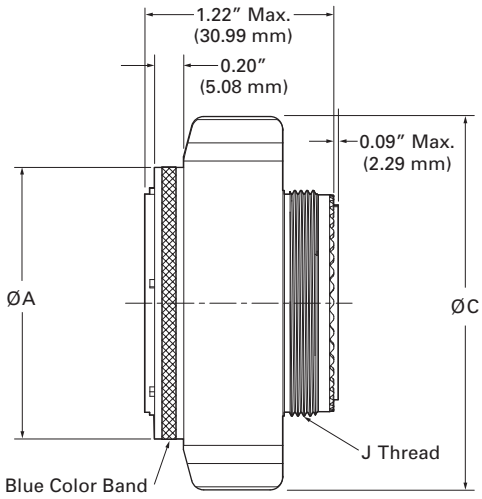
Standard wings mechanical drawings



Shell Size	ØA Max	ØC Max	J Thread
11	0.839 (21.31)	2.57 (65.28)	M15x1.0-6h 0.1R
13	1.008 (25.60)	2.72 (69.09)	M18x1.0-6h 0.1R
15	1.138 (28.91)	2.87 (72.90)	M22x1.0-6h 0.1R
17	1.276 (32.41)	2.97 (75.44)	M25x1.0-6h 0.1R
19	1.382 (35.10)	3.09 (78.49)	M28x1.0-6h 0.1R
21	1.508 (38.30)	3.22 (81.79)	M31x1.0-6h 0.1R
23	1.626 (41.30)	3.34 (84.84)	M34x1.0-6h 0.1R
25	1.752 (44.50)	3.47 (88.14)	M37x1.0-6h 0.1R

Dimensions are stated as inches (mm).

Low-profile wings mechanical drawings



Shell Size	ØA Max	ØC Max	J Thread
11	0.839 (21.31)	1.80 (45.72)	M15x1.0-6h 0.1R
13	1.008 (25.60)	2.00 (50.80)	M18x1.0-6h 0.1R
15	1.138 (28.91)	2.10 (53.34)	M22x1.0-6h 0.1R
17	1.276 (32.41)	2.22 (56.39)	M25x1.0-6h 0.1R
19	1.382 (35.10)	2.33 (59.18)	M28x1.0-6h 0.1R
21	1.508 (38.30)	2.46 (62.48)	M31x1.0-6h 0.1R
23	1.626 (41.30)	2.58 (65.53)	M34x1.0-6h 0.1R
25	1.752 (44.50)	2.70 (68.58)	M37x1.0-6h 0.1R

Dimensions are stated as inches (mm).

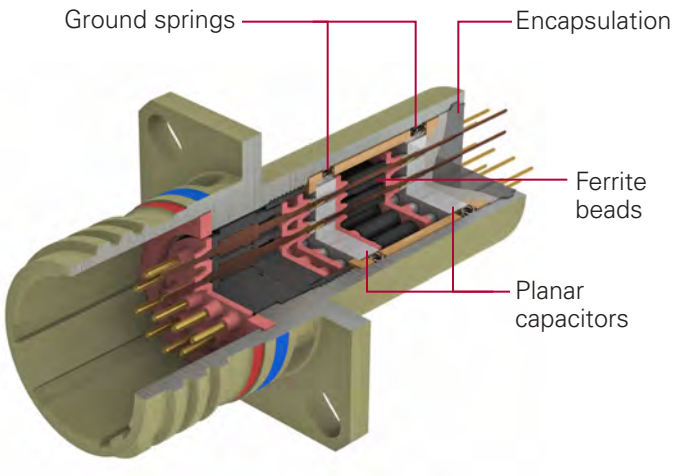
Filtered connectors overview

Meets All Of the Shock and Vibration Requirements of MIL-DTL-38999 with No Deratings

Eaton's MIL-DTL-38999 Series III filtered connectors are designed to reduce EMI/RFI in a wide range of noise-sensitive applications such as avionics, communications, SIGINT, and ISR.

These rugged connectors can be quickly modified to meet a broad array of mission-specific requirements:

- Filters optimized for any frequency, voltage, and impedance requirements.
- Special insert and shell configurations.
- Shielded connector/cable assemblies.



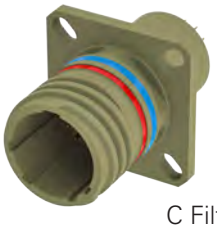
A rugged design enables meeting MIL-DTL-38999 shock and vibration requirements with no deratings.

- Configurations include shell sizes 9 to 25 and most insert arrangements.
- Rugged design survives 500 cycles of mating and demating.
- -55°C to 125°C operating temperatures.
- Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.
- Unique approach to planar-capacitor filtering facilitates high-density-connector designs.
- Standard options include platings rated for 500-hours, salt-spray exposure.

C, L, T and Pi-Type Filters are Available

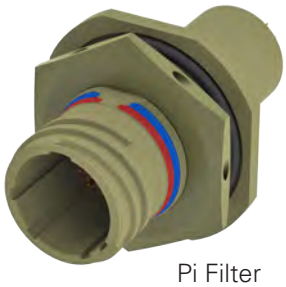
Box Mount

Pi Filter

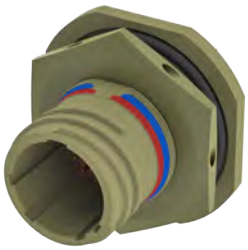


C Filter

Jam-Nut Mount



Pi Filter



C Filter

Filtered connectors technical specifications

Materials, Finish, and Mechanical

	Class F	Class K	Class W
Receptacle/Plug Shell and Coupling Ring Material	2024 Aluminum	Corrosion Resistant Stainless Steel	2024 Aluminum
Receptacle /Plug Shell and Coupling Ring Plating	Nickel per ASTM B733	Passivated	CAD/OD per QQ-P-416
Contact Material & Plating	Copper Alloy with Gold plating, 50 Micro-Inches Mminimum - All Finish Classes		
Insulator	Hard Dielectric Wafer - All Finish Classes		
Grommet and Seal	Fluorosilicone - All Finish Classes		
Grounding Springs	Beryllium Copper - All Finish Classes		
Mating Life	500 Cycles Minimum - All Finish Classes		
Contact Retention	Up to 25 Pounds - All Finish Classes		
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E - All Finish Classes		

Contact Eaton to discuss additional finish classes.

Environmental, Shock, Vibration, and EMI/RFI

	Class F	Class K*	Class W
Operating Temperature	-55°C to 125°C (-167°F to 257°F)	-55°C to 125°C (-167°F to 257°F)	-55°C to 125°C (-167°F to 257°F)
Sealing	Dust (Fine Sand) per MIL-STD-202 and Ice Resistance - All Finish Classes		
Corrosion Resistance	48 Hours Salt Spray	500 Hours Salt Spray	500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Coolants, And Oils as per EIA-364-10 - All Finish Classes		
Sine Vibration	60g at Ambient Temperature - All Finish Classes		
Random Vibration	50g at Ambient Temperature with Simulated Accessory Load - All Finish Classes		
Shock	300g +/- 15% Half-Sine-Wave Magnitude for 3 +/- 1mS - All Finish Classes		
EMI Leakage Attenuation	> 90 dB @ 100MHz > 65 dB @ 10GHz	> 80 dB @ 100MHz > 45 dB @ 10GHz	> 90 dB @ 100MHz > 50 dB @ 10GHz
Shell-to-Shell Conductivity	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop	1.0 Millivolt Max. Drop

*Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.

Filter performance graphs

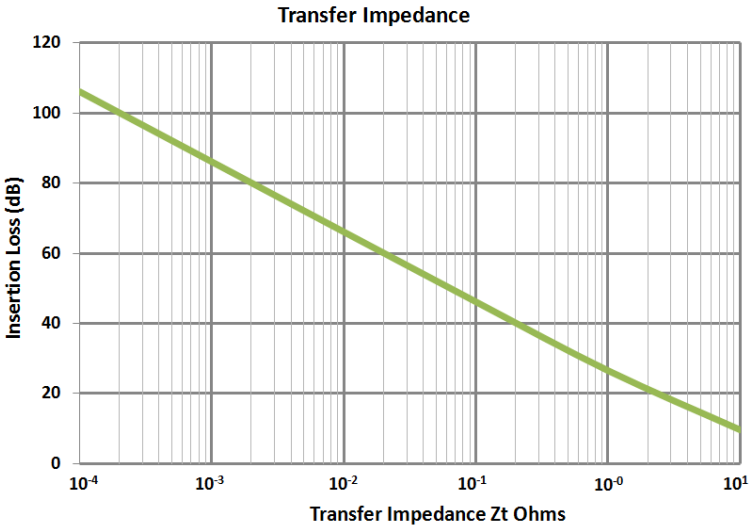
An estimate of insertion loss can be made using the following formula:

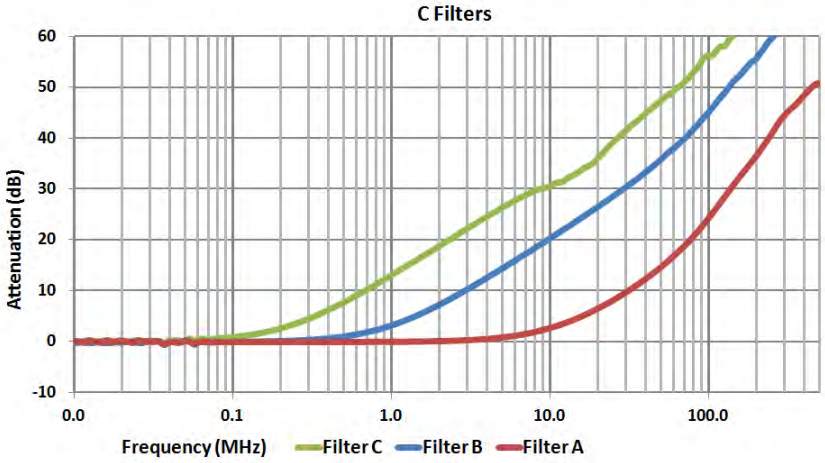
$$IL\ (dB) = 20 \log \left[1 + \frac{Zs\ Z1}{Zt\ (Zs + Z1)} \right]$$

Zs = Source impedance in ohms

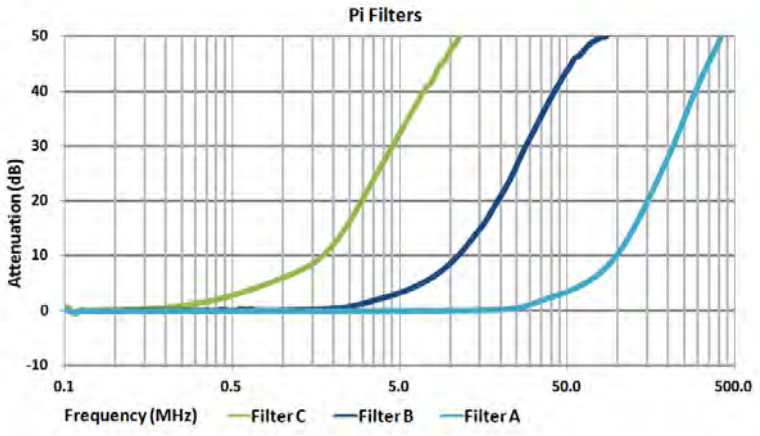
Z1 = Load impedance in ohms

Zt = Transfer impedance in 50 ohm system

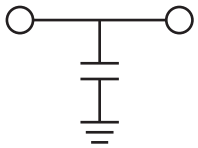




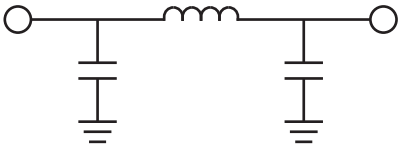
Please contact Eaton for L and T filter performance information.



Filter types and attenuation ratings



The C filter is a low inductance, feed-thru capacitor. It is used to attenuate high-frequency signals.



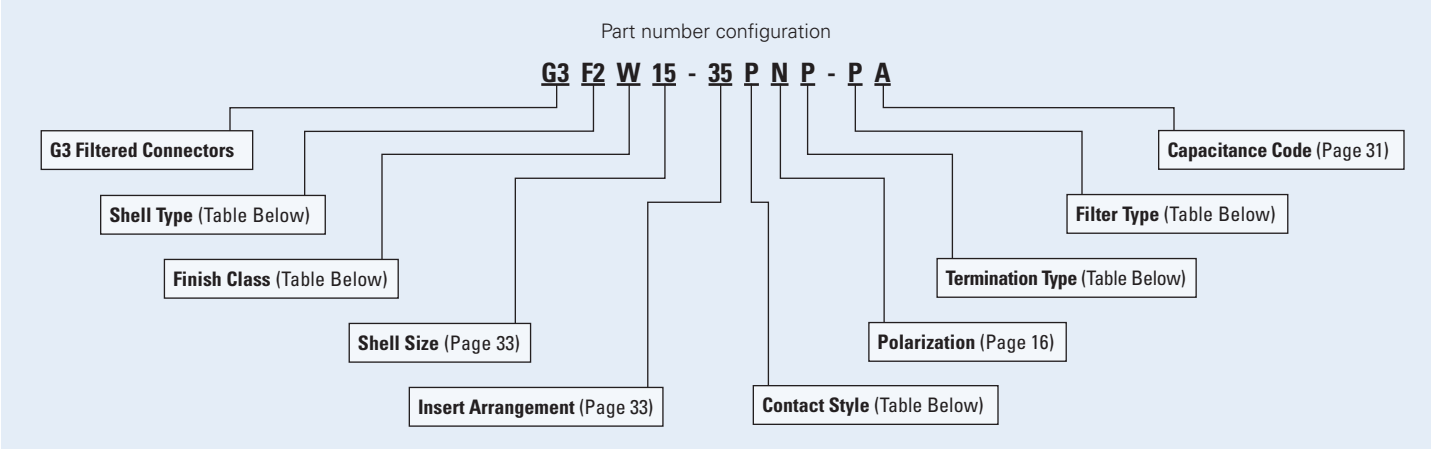
The Pi filter consists of two capactive elements and one inductive element. The Pi filter provides better high-frequency performance than the C filter due to sharper roll-off and is designed for high source and load impedances.

Electrical Ratings - Pi and C Filters

Maximum operating voltage	200VDC
Current rating (RF)	3.0 amps minimum
IR/DWV	20 Giga Ohms min @ 500 VDC
Dissipation factor	2.5% maximum

	Pi Filter				**C Filter**			
	Capacitance Code	C	B	A	Capacitance Code	C	B	A
	Capacitance (pF)	5300 8000	530 800	53 80	Capacitance (pF)	12000 18000	530 800	53 80
	Frequency (MHz)	dB Attenuation	dB Attenuation	dB Attenuation	Frequency (MHz)	dB Attenuation	dB Attenuation	dB Attenuation
Attenuation Minimums per MIL-STD-220 @25°C Without Bias Voltage or Curent	0.1	0	0	0	0.1	-1	0	0
	0.5	-3	0	0	0.25	-3	0	0
	1	-6	0	0	1	-12	-3	0
	5	-32	-3	0	5	-26	-14	-1
	10	-47	-8	0	10	-30	-20	-3
	50	-81	-42	-3	50	-47	-36	-14
	100	-85	-54	-10	100	-56	-45	-24

Filtered connectors part number configuration



Designator Descriptions

Designator Type	Eaton	Description
Shell Type	F2	Box Mount
	F7	Jam-Nut Mount
Finish Class**	F	Nickel per ASTM B733
	K	CRES (Passivated)
	W	CAD/DD per QQ-P-416
Contact Style	P	Pin
	S	Socket
Filter Types	C	Capacitive
	L*	One Capacitive and One Inductive Element
	P	Pi Filter, One Capacitive and One Inductive Element
	T*	Two Inductive and One Capacitive Element
Temination Types	P	PC Tails***
	S	Solder Cup

*Contact Eaton for L and T-Type filter specifications.

**Contact Eaton to discuss additional finish classes.

***Contact Eaton to discuss customer-specific part numbers that designate PC tail contact lenghts.

Insert and shell arrangements

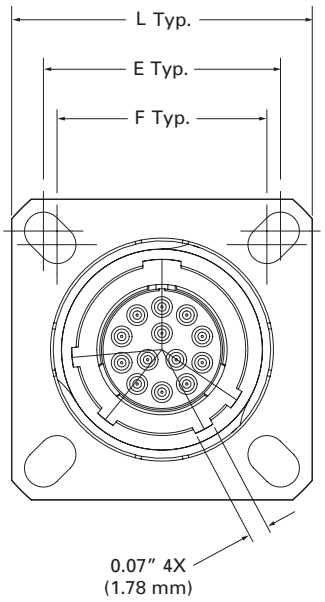
Please contact Eaton to discuss custom shells and inserts

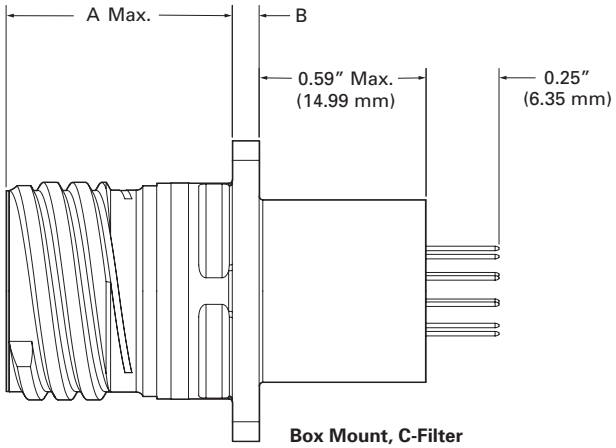
Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12
9	35	M	6	6			
9	98	I	3		3		
11*	2	I	2			2	
11*	3	II	3			3	
11	5	I	5		5		
11	35	M	13	13			
11	98	I	6		6		
11	99	I	7		7		
13*	4	I	4			4	
13	35	M	22	22			
13	98	I	10		10		
15*	5	II	5			5	
15*	15	I	15		14	1	
15	18	I	18		18		
15	19	I	19		19		
15	35	M	37	37			
15*	97	I	12		8	4	
17	6	I	6				6
17	8	II	8			8	
17	26	I	26		26		
17	35	M	55	55			
17*	99	I	23		21	2	

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10
19*	11	II	11			11		
19	32	I	32		32			
19	35	M	66	66				
21*	11	I	11				11	
21*	16	II	16			16		
21	35	M	79	79				
21*	39	I	39		37	2		
21	41	I	41		41			
23*	21	II	21			21		
23	35	M	100	100				
23	53	I	53		53			
23	55	I	55		55			
23*	97	I	16			16		
23*	99	II	11			11		
25	4	I	56		48	8		
25*	11	N	11		2			9
25*	19	I	19				19	
25*	24	I	24			12	12	
25*	29	I	29			29		
25	35	M	128	128				
25*	43	I	43		23	20		
25	61	I	61		61			

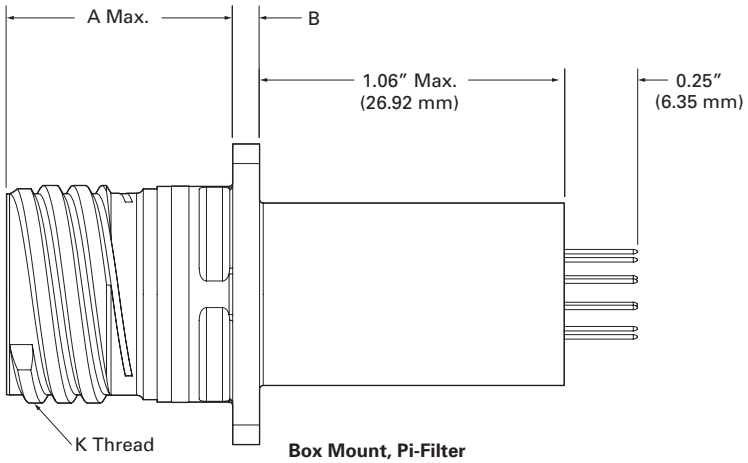
SR = Service Rating. Insert drawings are located in the General-Purpose Products section.
TTL # = The total number of contacts.
*Please contact factory for lead times.

Box-mount receptacles mechanical drawings





Box Mount, C-Filter

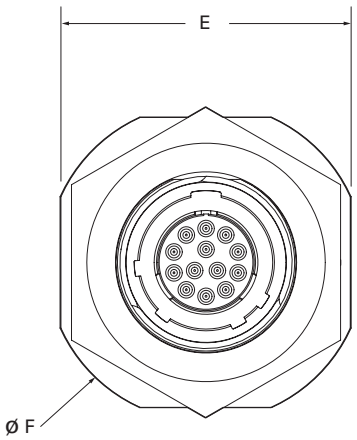


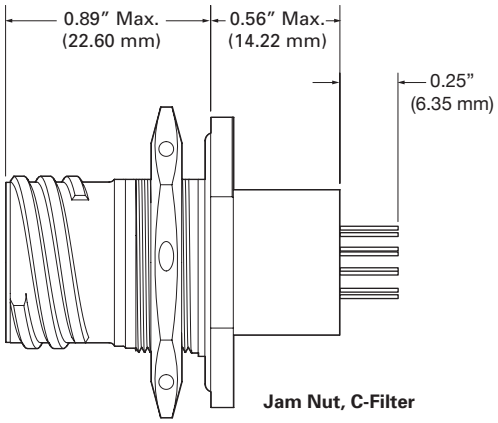
Box Mount, Pi-Filter

Shell Size	ØA Max	ØB Max	E	F	K Thread	L ±.012 (0.30)
9	0.883 (22.43)	0.098 (2.49)	0.719 (18.26)	0.594 (15.09)	0.6250-.1P-.3L-2A	0.937 (23.80)
11	0.883 (22.43)	0.098 (2.49)	0.812 (20.62)	0.719 (18.26)	0.7500-.1P-.3L-2A	1.032 (26.21)
13	0.883 (22.43)	0.098 (2.49)	0.906 (23.01)	0.812 (20.62)	0.8750-.1P-.3L-2A	1.126 (28.60)
15	0.883 (22.43)	0.098 (2.49)	0.969 (24.61)	0.906 (23.01)	1.0000-.1P-.3L-2A	1.221 (31.01)
17	0.883 (22.43)	0.098 (2.49)	1.062 (26.97)	0.969 (24.61)	1.1875-.1P-.3L-2A	1.311 (33.30)
19	0.883 (22.43)	0.098 (2.49)	1.156 (29.36)	1.062 (26.97)	1.2500-.1P-.3L-2A	1.437 (36.50)
21	0.791 (20.09)	0.126 (3.20)	1.250 (31.75)	1.156 (29.36)	1.3750-.1P-.3L-2A	1.563 (39.70)
23	0.791 (20.09)	0.126 (3.20)	1.375 (34.93)	1.250 (31.75)	1.5000-.1P-.3L-2A	1.689 (42.90)
25	0.791 (20.09)	0.126 (3.20)	1.500 (38.10)	1.375 (34.93)	1.6250-.1P-.3L-2A	1.811 (46.00)

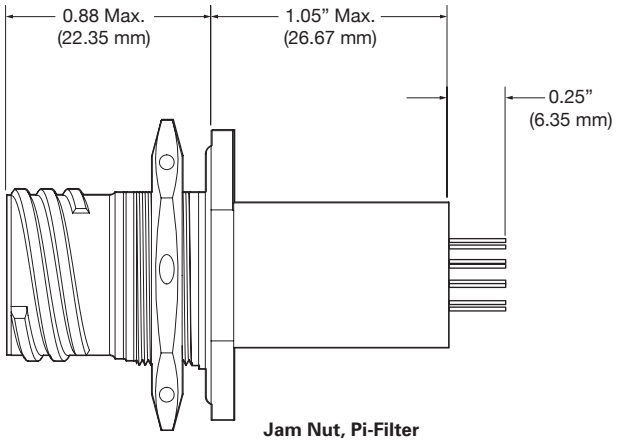
Dimensions are stated as inches (mm).

Jam-nut receptacles mechanical drawings





Jam Nut, C-Filter



Jam Nut, Pi-Filter

Shell Size	E	Ø F
9	1.079 (27.41)	1.201 (56.01)
11	1.168 (29.67)	1.386 (35.20)
13	1.390 (35.31)	1.512 (38.40)
15	1.516 (38.51)	1.638 (41.61)
17	1.642 (41.71)	1.764 (44.81)
19	1.826 (46.38)	1.949 (49.50)
21	1.953 (49.61)	2.075 (52.71)
23	2.079 (52.81)	2.201 (55.91)
25	2.205 (56.01)	2.323 (59.00)

Dimensions are stated as inches (mm).

Hermetic connectors overview

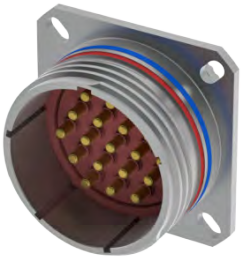
Hermetic Connectors for Applications Ranging From Submarines to Spacecraft

- Configurations include shell sizes 9 to 25 and most insert arrangements.
- Rugged designs survive 500 cycles of mating and demating.
- Proven performance at -65°C to 200°C operating temperatures.
- Quick mating, tri-start, self-locking couplings.
- No Helium leakage greater than 1 E-7 CC/S per EIA-364-02.

Eaton's Series III hermetic connectors are designed for use in pressurized or environmentally-sealed applications. These rugged products provide the same wide range of features offered by Eaton's non-hermetic Series III connectors.

Eaton's Series III hermetic connectors can be quickly customized to meet a broad array of mission-specific requirements:

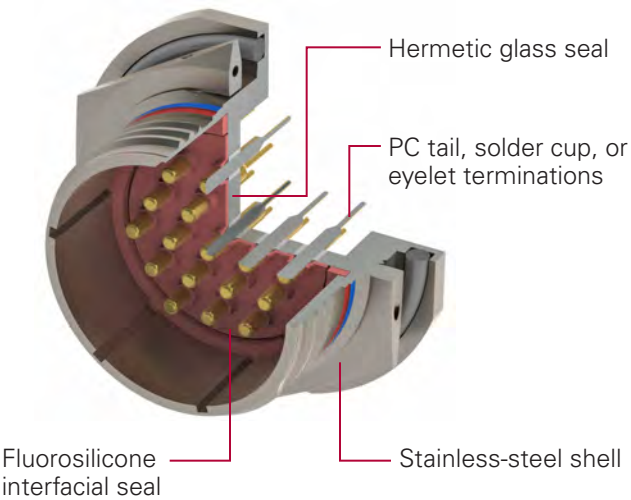
- Shell and seal materials optimized for specific environmental conditions.
- Special insert patterns.
- Custom connector/cable assemblies.

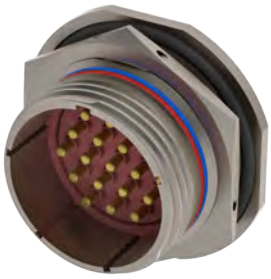


Box-Mount Receptacles

Weld-Mount Receptacles

Harsh-Environment Design Features





Jam-Nut Receptacles

Solder-Mount Receptacles

Hermetic connectors technical specifications

Materials, Finish, and Mechanical

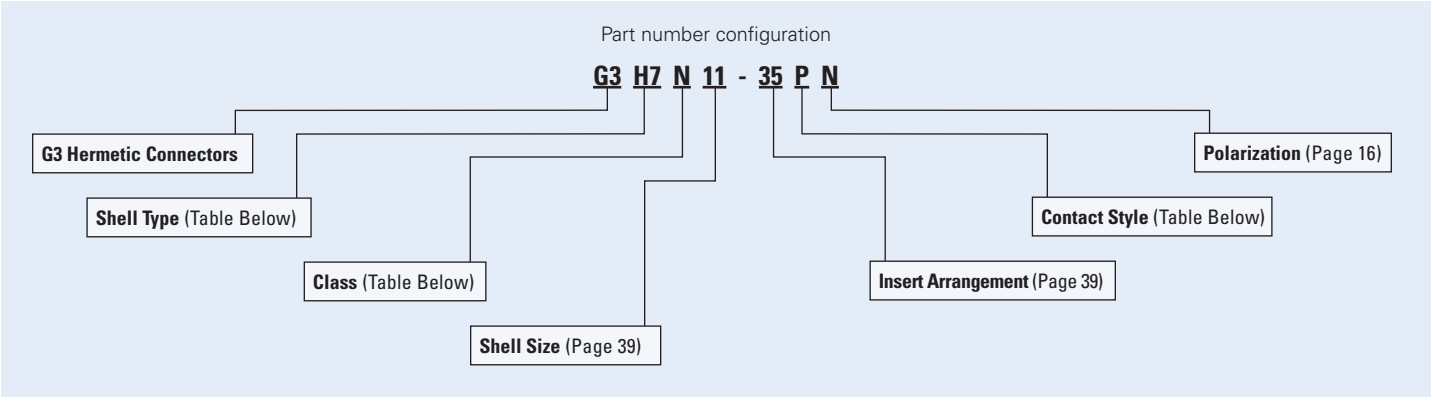
	Class N	Class Y
Shell	Stainless Steel	Stainless Steel
Receptacle /Plug Shell and Coupling Ring Plating	Nickel Plate per ASTM B733	Passivated per SAE-AMS-QQ-P-35
Contact Type	Pin Only	Pin Only
Contact Material and Plating	Copper Alloy with Gold Plating, 50 Micro-Inches Minimum	Copper Alloy with Gold Plating, 50 Micro-Inches Minimum
Insulator	Hard Dielectric Wafer	Hard Dielectric Wafer
Grommet and Seal	Fluorosilicone and Hermetic Glass	Fluorosilicone and Hermetic Glass
Grounding Springs	Beryllium Copper	Beryllium Copper
Mating Life	500 Cycles Minimum	500 Cycles Minimum
Contact Retention	Up to 25 Pounds	Up to 25 Pounds
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E	Per MIL-STD-38999 Series III; N, A, B, C, D, and E

Contact Eaton to discuss additional finish classes.

Environmental, Shock, Vibration, and EMI/RFI

	Class N	Class Y
Operating Temperature	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)
Sealing	No Helium Leakage Greater than 1.0E-7 CC/S per EIA-364-02 - All Finish Classes	
Corrosion Resistance	Withstands 48 Hours Salt Spray	Withstands 500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Coolants, and Oils as per EIA-364-10 - All Finish Classes	
Sine Vibration	60g at Ambient Temperature - All Finish Classes	
Random Vibration	50G at Ambient Temperature with Simulated Accessory Load - All Finish Classes	
Shock	300g +/- 15% Half-Sine-Wave Magnitude for 3 +/- 1mS - All Finish Classes	
EMI Leakage Attenuation	> 90dB @100MHz > 65dB @ 10GHz	> 80dB @100MHz > 45dB @ 10GHz
Shell-to-Shell Conductivity	1.0 Millivolt Maximum Drop	2.5 Millivolt Maximum Drop

Hermetic connectors part number configuration



G3-Series hermetic connectors are designed to meet all MIL-DTL-38999 requirements.

Designator Cross References

Designator Type	Military	Eaton	Description
Shell Types	MIL-DTL-38999/25	H1	Solder-Mount Receptacle
	MIL-DTL-38999/21	H2	Box-Mount Receptacle
	MIL-DTL-38999/27	H4	Weld-Mount Receptacle
	MIL-DTL-38999/23	H7	Jam-Nut-Mount Receptacle
Finish Classes*	N	N	Nickel Plated, -65°C to 200°C (-85°F to 392°F)
	Y	Y	Passivated, -65°C to 200°C (-85°F to 392°F)
Contact Types	C	C	Pins with PC Tails**
	P	P	Pins with Solder Cups
	X	X	Pins with Eyelets

*Contact Eaton to discuss additional finish classes.

**Contact Eaton to discuss customer-specific part numbers that designate PC tail contact lenghts.

Hermetic connectors standard shell and insert configurations

Shell-Size Conversions

Military Designation	A	B	C	D	E	F	G	H	J
Shell Size & Eaton Designation	9	11	13	15	17	19	21	23	25

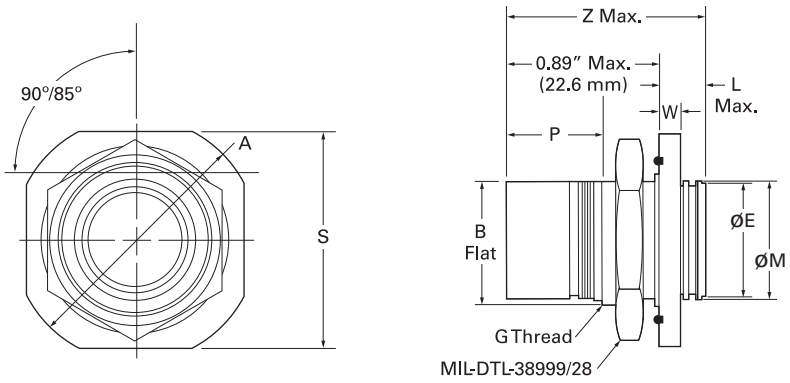
Please contact Eaton to discuss custom shells and inserts

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12
9	35	M	6	6			
9	98	I	3		3		
11	2	I	2			2	
11	3	II	3			3	
11	5	I	5		5		
11	35	M	13	13			
11	98	I	6		6		
11	99	I	7		7		
13	4	I	4			4	
13	35	M	22	22			
13	98	I	10		10		
15	5	II	5			5	
15	15	I	15		14	1	
15	18	I	18		18		
15	19	I	19		19		
15	35	M	37	37			
15	97	I	12		8	4	
17	6	I	6				6
17	8	II	8			8	
17	26	I	26		26		
17	35	M	55	55			
17	99	I	23		21	2	

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10
19	11	II	11			11		
19	32	I	32		32			
19	35	M	66	66				
21	11	I	11				11	
21	16	II	16			16		
21	35	M	79	79				
21	39	I	39		37	2		
21	41	I	41		41			
23	21	II	21			21		
23	35	M	100	100				
23	53	I	53		53			
23	55	I	55		55			
23	97	I	16			16		
23	99	II	11			11		
25	4	I	56		48	8		
25	11	N	11		2			9
25	19	I	19				19	
25	24	I	24			12	12	
25	29	I	29			29		
25	35	M	128	128				
25	43	I	43		23	20		
25	61	I	61		61			

SR = Service Rating. Insert drawings are located in the General Purpose Products section.
TTL # = The total number of contacts.

Jam-nut hermetic receptacles mechanical drawings

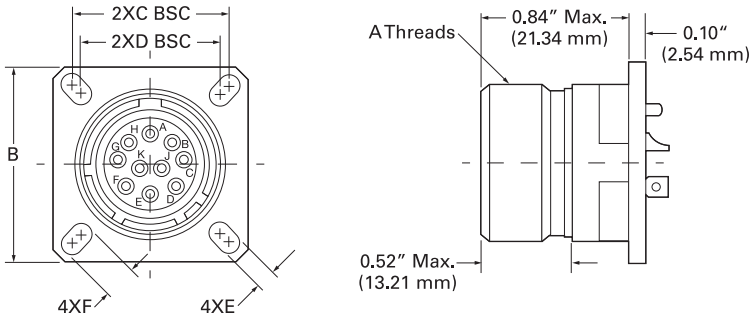


Jam Nut Receptacles

Shell Size	A Max	B Flat	ØE	G Thread	L Max	ØM	P	S Max	W	Z Max
9	1.201 (30.51)	0.651 (16.54)	0.602 (15.29)	M17X1-6g 0.100R	0.358 (9.09)	0.615 (15.62)	0.555 (14.10)	1.079 (27.41)	0.102 (2.59)	1.150 (29.21)
11	1.386 (35.20)	0.751 (19.08)	0.724 (18.39)	M20X1-6g 0.100R	0.358 (9.09)	0.737 (18.72)	0.555 (14.10)	1.268 (32.21)	0.102 (2.59)	1.150 (29.21)
13	1.512 (38.40)	0.938 (23.83)	0.850 (21.59)	M25X1-6g 0.100R	0.358 (9.09)	0.863 (21.92)	0.563 (14.30)	1.390 (35.31)	0.102 (2.59)	1.154 (29.31)
15	1.638 (41.61)	1.062 (26.97)	0.976 (24.79)	M28X1-6g 0.100R	0.358 (9.09)	0.989 (25.12)	0.563 (14.30)	1.516 (38.51)	0.102 (2.59)	1.154 (29.31)
17	1.764 (44.81)	1.187 (30.15)	1.102 (27.99)	M32X1-6g 0.100R	0.358 (9.09)	1.115 (28.32)	0.563 (14.30)	1.642 (41.71)	0.102 (2.59)	1.154 (29.31)
19	1.949 (49.50)	1.312 (33.32)	1.228 (31.19)	M35X1-6g 0.100R	0.382 (9.70)	1.241 (31.52)	0.563 (14.30)	1.827 (46.41)	0.134 (3.40)	1.185 (30.10)
21	2.075 (52.71)	1.437 (36.50)	1.350 (34.29)	M38X1-6g 0.100R	0.382 (9.70)	1.363 (34.62)	0.563 (14.30)	1.953 (49.61)	0.134 (3.40)	1.185 (30.10)
23	2.201 (55.91)	1.562 (39.67)	1.476 (37.49)	M41X1-6g 0.100R	0.382 (9.70)	1.489 (37.82)	0.563 (14.30)	2.079 (52.81)	0.134 (3.40)	1.185 (30.10)
25	2.323 (59.00)	1.687 (42.85)	1.602 (40.69)	M44X1-6g 0.100R	0.382 (9.70)	1.615 (41.02)	0.563 (14.30)	2.205 (56.01)	0.134 (3.40)	1.185 (30.10)

Dimensions are stated as inches (mm).

Box-mount hermetic receptacles mechanical drawings

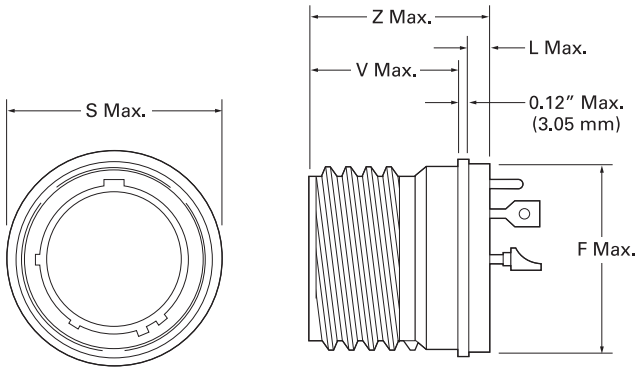


Box Mount Receptacles

Shell Size	A Thread	B SQ	C BSC	D BSC	E	F
9	0.6250-.1P-.3L-TS-2A	0.937 (23.80)	0.719 (18.26)	0.594 (15.09)	0.128 (3.25)	0.216 (5.49)
11	0.7500-.1P-.3L-TS-2A	1.031 (26.19)	0.812 (20.62)	0.719 (18.26)	0.128 (3.25)	0.194 (4.93)
13	0.8750-.1P-.3L-TS-2A	1.126 (28.60)	0.906 (23.01)	0.812 (20.62)	0.128 (3.25)	0.194 (4.93)
15	1.0000-.1P-.3L-TS-2A	1.220 (30.99)	0.969 (24.61)	0.906 (23.01)	0.128 (3.25)	0.194 (4.93)
17	1.1875-.1P-.3L-TS-2A	1.311 (33.30)	1.062 (26.97)	0.969 (24.61)	0.128 (3.25)	0.194 (4.93)
19	1.2500-.1P-.3L-TS-2A	1.437 (36.50)	1.156 (29.36)	1.062 (26.97)	0.128 (3.25)	0.194 (4.93)
21	1.3750-.1P-.3L-TS-2A	1.563 (39.70)	1.250 (31.75)	1.156 (29.36)	0.128 (3.25)	0.194 (4.93)
23	1.5000-.1P-.3L-TS-2A	1.689 (42.90)	1.375 (34.93)	1.250 (31.75)	0.154 (3.91)	0.242 (6.15)
25	1.6250-.1P-.3L-TS-2A	1.811 (46.00)	1.500 (38.10)	1.375 (34.93)	0.154 (3.91)	0.242 (6.15)

Dimensions are stated as inches (mm).

Solder-mount hermetic receptacles mechanical drawings

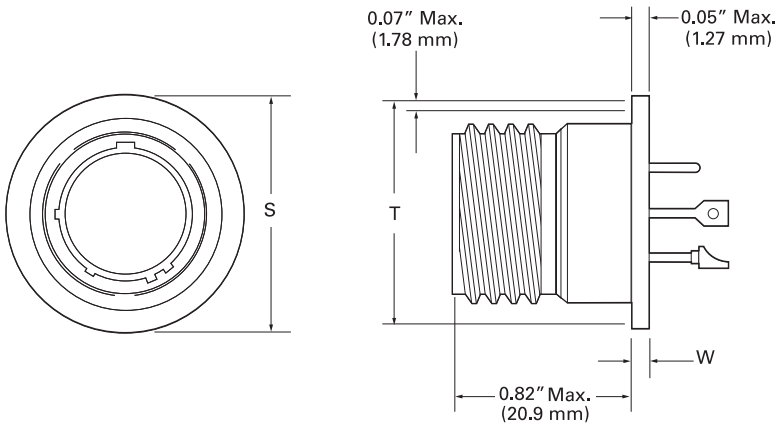


Solder Mount Receptacles

Shell Size	F Max	L Max	S Max	V Max With Pins	V Max With Sockets	Z Max
9	0.673 (17.09)	0.201 (5.11)	0.764 (19.41)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
11	0.783 (19.89)	0.201 (5.11)	0.858 (21.79)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
13	0.909 (23.09)	0.201 (5.11)	0.980 (24.89)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
15	1.031 (26.19)	0.201 (5.11)	1.106 (28.09)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
17	1.157 (29.39)	0.201 (5.11)	1.232 (31.29)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
19	1.252 (31.80)	0.201 (5.11)	1.323 (33.60)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
21	1.378 (35.00)	0.201 (5.11)	1.449 (36.80)	0.677 (17.20)	0.764 (19.41)	0.937 (23.80)
23	1.504 (38.20)	0.232 (5.89)	1.575 (40.01)	0.677 (17.20)	0.764 (19.41)	0.969 (24.61)
25	1.626 (41.30)	0.232 (5.89)	1.701 (43.21)	0.677 (17.20)	0.764 (19.41)	0.969 (24.61)

Dimensions are stated as inches (mm).

Weld-mount hermetic receptacles mechanical drawings



Weld Mount Receptacles

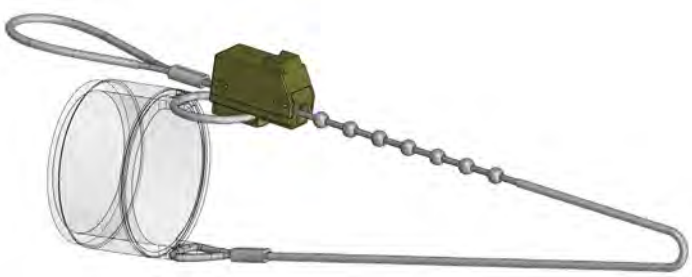
Shell Size	S	T	W
9	0.972 (24.69)	0.941 (23.90)	0.126 (3.20)
11	1.094 (27.79)	1.063 (27.00)	0.126 (3.20)
13	1.220 (30.99)	1.189 (30.20)	0.126 (3.20)
15	1.346 (34.19)	1.315 (33.40)	0.126 (3.20)
17	1.433 (36.40)	1.402 (35.61)	0.126 (3.20)
19	1.579 (40.11)	1.547 (39.29)	0.126 (3.20)
21	1.720 (43.69)	1.689 (42.90)	0.126 (3.20)
23	1.886 (47.90)	1.854 (47.09)	0.157 (3.99)
25	1.972 (50.09)	1.941 (49.30)	0.157 (3.99)

Dimensions are stated as inches (mm).

Lanyard connectors overview

The Industry's Most Durable MIL-DTL-38999 Lanyard-Release Connectors

Eaton's MIL-DTL-38999 Series III lanyard-release connectors are available in QPL and modified and single and dual-release configurations. These rugged connectors employ all the same features as Eaton's general purpose Series III plugs and provide the same high levels of quality, performance, and durability.



Eaton's lanyard-release connectors can be quickly customized to meet a broad array of mission-specific requirements:

- Adjustable-length lanyards as depicted above.
- Application-specific lanyard lengths.
- Low-force (40 – 90 pound) release mechanisms.
- Redundant releases as described below.
- MIL-DTL-38999/31 Type 6 lanyard connectors.

- Solutions include MIL-STD-1760 mechanical release including umbilical release and staging.
- Finish Class K configurations provide 2000°F firewall protection for 20 minutes minimum.
- 360° grounding fingers provide up to 65dB protection at 10GHz.
- -65°C to 200°C operating temperatures.
- Finish options include 500 hour salt-spray-rated platings.

MIL-DTL-38999/29 and /30 QPL

MIL-DTL-38999/31 Type 4 QPL

MIL-DTL-38999/31 Type 1 QPL

MIL-DTL-38999/36 Modified

This redundant release lanyard connector utilizes Series III compliant coupling threads and supports low-pull force, off-axis releases. Please contact Eaton for additional information

22 Degree off-axis-pull capabilities outperform MIL-DTL-38999 requirements

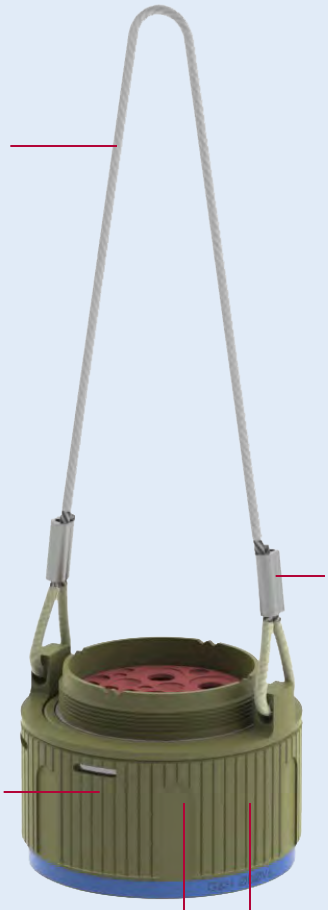
100 Off-Angle Snatch Releases at Under 100-Pounds Separation Force

Eaton's MIL-DTL-38999 Series III lanyard-release connectors provide low-force separations at ambient and low temperatures, increased off-axis separation capabilities in all four quadrants, and are not sensitive to new receptacles. This industry-leading performance has been documented in rigorous testing that included 100 off-angle snatch releases.

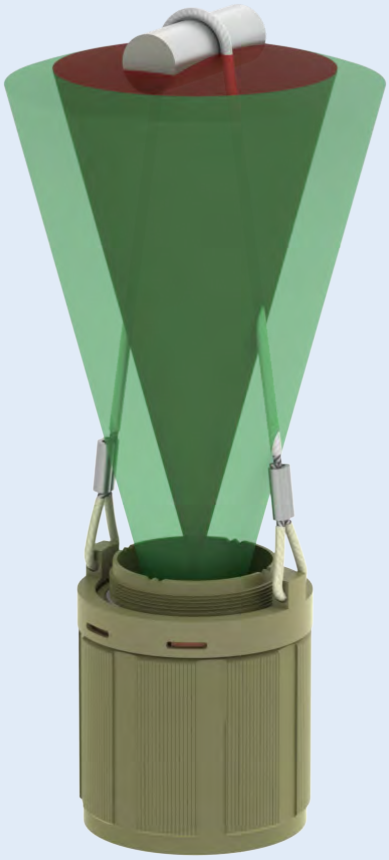
Test results confirmed:

- Maximum ambient-temperature separation forces of 91 pounds in all four quadrants at 22° off axis.
- Almost no change in separation forces at -65° C in all four quadrants at 0 and 15 degrees off-axis.

Design & Materials Exceed MIL-DTL-38999 Specifications



Industry-Leading Performance



Eaton's connectors reliably release at up to 22 degrees off-angle pull with less than 100 pounds of separation force.

MIL-DTL-38999 fifteen-degree range is the maximum off-angle pull that competitors' products can typically accommodate.

Lanyard connectors technical specifications

Materials, Finish, and Mechanical

	Class C	Class F	Class G	Class K	Class T	Class W
Receptacle/Plug Shell and Coupling Ring Material	2024 Aluminum	2024 Aluminum	2024 Aluminum	Corrosion Resistant Stainless Steel	2024 Aluminum	2024 Aluminum
Receptacle /Plug Shell and Coupling Ring Plating	Anodize	Nickel per ASTM B733	Nickel per ASTM B733	Passivated	Nickel Fluorocarbon Polymer	CAD/OD per QQ-P-416
Contact Material & Plating	Copper Alloy with Gold Plating, 50 Micro-Inches Minimum - All Finish Classes					
Insulator	Hard Dielectric Wafer - All Finish Classes					
Grommet and Seal	Fluorosilicone - All Finish Classes					
Grounding Springs	Beryllium Copper - All Finish Classes					
Mating Life	500 Cycles Minimum - All Finish Classes					
Contact Retention	Up to 25 Pounds - All Finish Classes					
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E - All Finish Classes					

Contact Eaton to discuss additional finish classes.

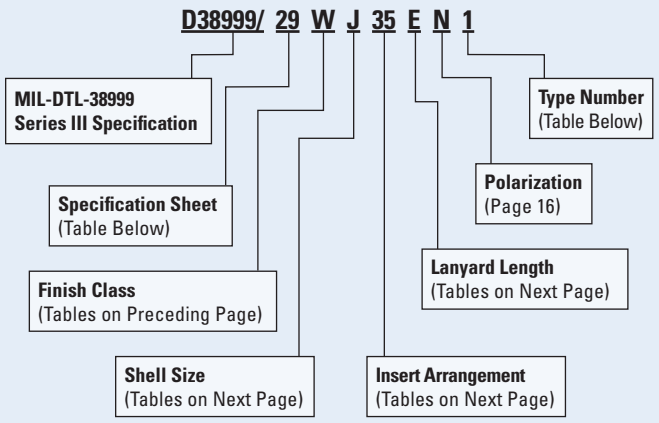
Environmental, Shock, Vibration, and EMI/RFI

	Class C	Class F	Class G*	Class K	Class T	Class W
Operating Temperature	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 200°C (-85°F to 392°F)	-65°C to 175°C (-85°F to 347°F)	-65°C to 175°C (-85°F to 347°F)
Sealing	Sand and Dust as per MIL-STD-202 and Ice Resistance - All Finish Classes					
Corrosion Resistance	Withstands 500 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 48 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray	Withstands 500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Coolants, and Oils as per EIA-364-10 - All Finish Classes					
Sine Vibration	60g at Ambient Temperature - All Finish Classes					
Random Vibration	50G at Ambient Temperature with Simulated Accessory Load - All Finish Classes					
Shock	300g +/- 15% Half-Sine-Wave Magnitude for 3 +/- 1mS - All Finish Classes					
EMI Attenuation @ 100MHz	No EMI Shielding	> 90 dB	> 90 dB	> 80 dB	> 90dB	> 90dB
EMI Attenuation @ 10GHz	No EMI Shielding	> 65 dB	> 65 dB	> 45 dB	> 50dB	> 50dB
Shell-to-Shell Conductivity	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	1.0 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop	2.5 Millivolt Max. Drop

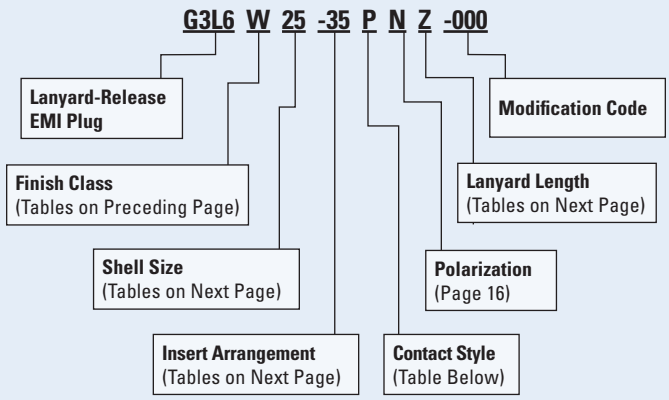
*Class G thermal vacuum outgassing: total mass loss 1.0%, collected volatile condensible material 0.1% maximum.

Lanyard connectors part number configuration

MIL-DTL-38999 /29 and /30 part numbers



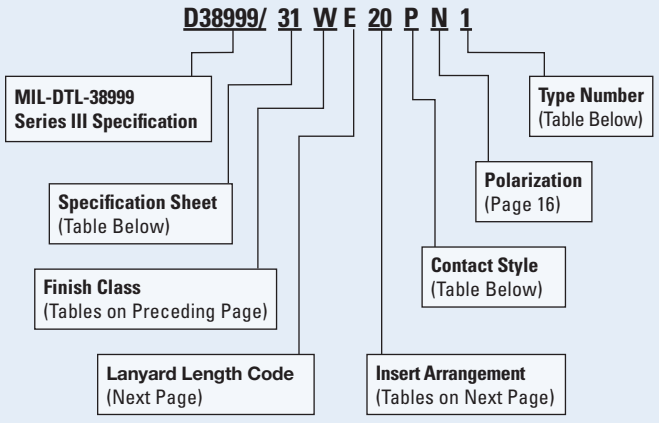
Eaton /29 and /30 part numbers



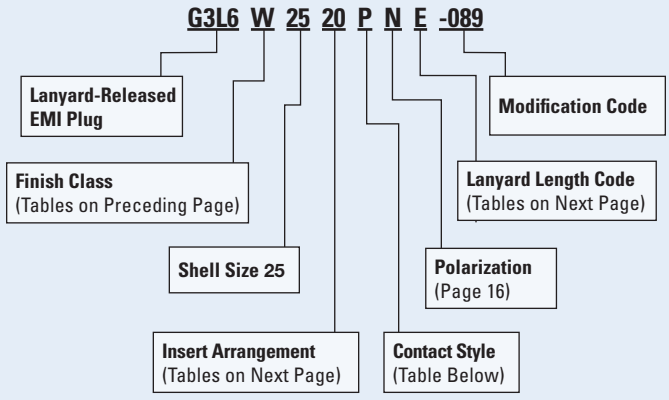
Designator Descriptions

Specification Sheet	Contact Style	Mod. Code	Eaton Shell Sizes	Eaton QPL Configurations
MIL-DTL-38999/29	P = Pin, A = No Contacts Supplied	000	17 to 25 (Codes E to J)	Finish Class W; Inserts 4, 20, 24, 35
MIL-DTL-38999/30	S = Socket only, B = No Contacts Supplied	000		

MIL-DTL-38999 /31 and /36 part numbers



Eaton /31 and /36 part numbers



MIL-DTL-38999/31* Designators

Type Number	Shell Length	Contact Style	Modification Code
Type 1	Long	P = Pins A = No Contacts Supplied	089
Type 4	Short		091
Type 6	Medium		Contact Eaton

MIL-DTL-38999/36 Designators

Type Number	Shell Length	Contact Style	Modification Code
Type 1	Long	P = Pins A = No Contacts Supplied	Contact Eaton for /36 Modification Codes
Type 4	Short		
Type 6	Medium		

*Many Eaton Finish Class W connectors are QPL certified.

Please contact Eaton, or visit the Defense Logistics Agency web site, for the latest configuration-specific information.

Lanyard lengths & shell/insert arrangements

Lanyard Length Codes*

Code	Length	Code	Length	Code	Length	Code	Length
A	4.016	G	7.008	M	10.000	U	13.032
B	4.528	H	7.520	N	10.512	V	14.016
C	5.000	I	7.992	P	11.024	W	15.000
D	5.512	J	8.504	R	11.535	X	16.024
E	6.024	K	9.016	S	12.008	Y	17.008
F	6.535	L	9.528	T	12.520	Z	18.032

*Lengths are +/- 0.24 inches

Shell-Size Conversions

Military Designation	A	B	C	D	E	F	G	H	J
Shell Size & Eaton Designation	9	11	13	15	17	19	21	23	25

Lanyard connector, standard shell and insert configurations

Short and long-profile lanyards are only available in shell size 25. Please contact Eaton to discuss custom shells and inserts.

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10	# 8
17	2	M,T	2						2T
17	6	I	6				6		
17	8	II	8			8			
17	11	N	11		8		3		
17	26	I	26		26				
17	35	M	55	55					
17	98*	M,T	26	24					2T
17	99	I	23		21	2			
19	4*	M,T	4						4T
19	11	II	11			11			
19	18	M,T	18	14					4T
19	32	I	32		32				
19	35	M	66	66					
21	11	I	11				11		
21	16	II	16			16			
21	26*	M,T	25		23				2T

SR = Service Rating. TTL # = The total number of contacts.

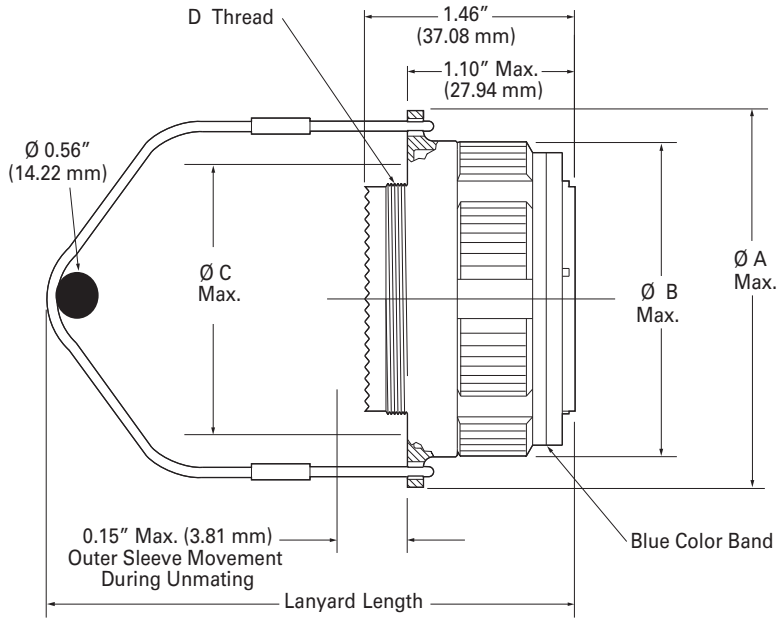
* Not a MIL-STD-1560 defined insert arrangement.

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10	# 8
21	35	M	79	79					
21	41	I	41		41				
23	21	II	21			21			
23	35	M	100	100					
23	55	I	55		55				
25	4	I	56		48	8			
25	8	M,T	8						8T
25	11	N	11		2			9	
25	19	I	19				19		
25	20	N,C,T	30		10	13	4C		3T
25	24	I	24			12	12		
25	29	I	29			29			
25	35	M	128	128					
25	43	I	43		23	20			
25	46	I,T	46		40	4			2T
25	61	I	61		61				

C = Coax. T = Twinax.

Insert drawings are located in the General Purpose Products section

D38999/29 & 30 mechanical drawings

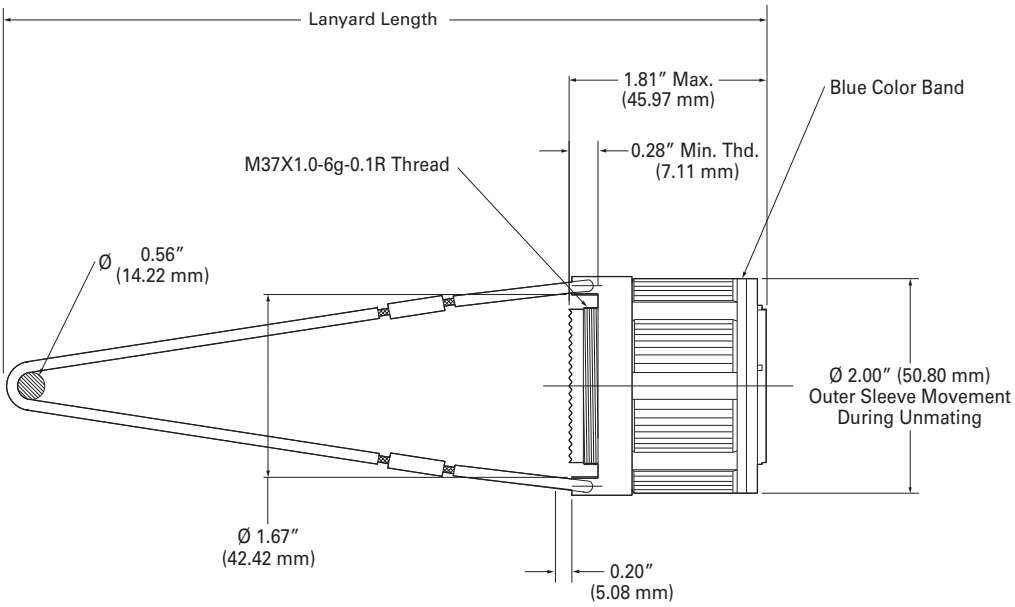


Eaton Shell Type L6

Shell Size	ØA Max	ØB Max	ØC Max	D Thread
17	2.204 (55.98)	1.555 (39.50)	1.200 (30.48)	M25x1.0-6g-0.1R
19	2.330 (59.18)	1.625 (41.28)	1.310 (33.27)	M28x1.0-6g-0.1R
21	2.472 (62.79)	1.775 (45.09)	1.450 (36.83)	M31x1.0-6g-0.1R
23	2.594 (65.89)	1.865 (47.37)	1.550 (39.37)	M34x1.0-6g-0.1R
25	2.704 (68.68)	1.995 (50.67)	1.673 (42.49)	M37x1.0-6g-0.1R

Dimensions are stated as inches (mm).

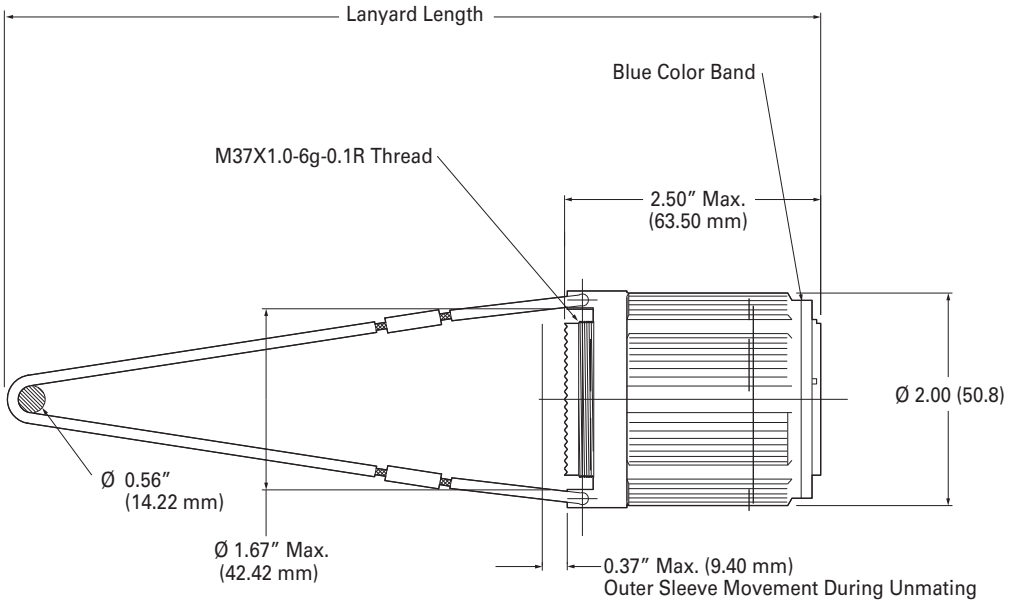
D38999/31 type 4 mechanical drawings



Eaton Shell Type L6, Mod 091, Shell Size 25

Dimensions are stated as inches (mm).

D38999/31 type 1 mechanical drawings



Eaton Shell Type L6, Mod 089, Shell Size 25

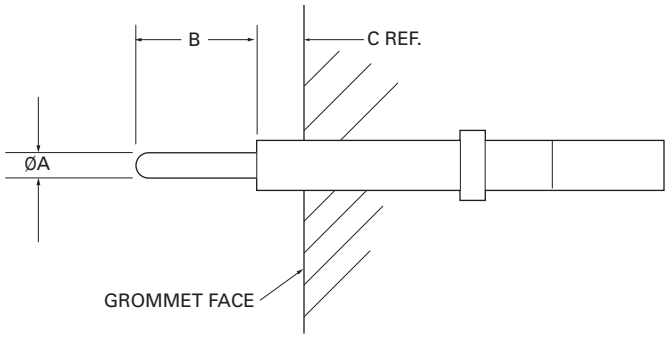
Dimensions are stated as inches (mm).

Printed-circuit-board contact terminations

PC Tail Contact Terminations Solder Directly to Printed Circuit Boards

- Available on all MIL-DTL-38999 Series III connectors for contacts from size 22D through size 12.
- Contact material: Copper alloy per QQ-C-530.
- Contact finish: Gold plate per MIL-G-45204, Type II, Grade C, Class 1 over Nickel per QQ-N-290.
- Mating portions of pin per MIL-C-39029/58 and socket per MIL-C-39029/56 as applicable.
- Solders directly to printed-circuit boards using standard through-hole-soldering processes.

Printed Circuit Contacts - Socket



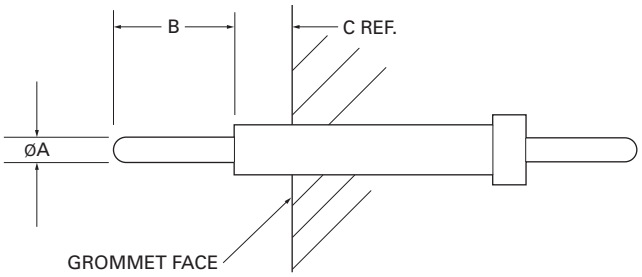
Contact Size	Part Number	ØA	B	C
22d	5034-2601-0220	0.026 (0.67)	0.203 (5.16)	0.047 (1.19)
22d	5034-2602-0220	0.020 (0.51)	0.128 (3.25)	0.044 (1.12)
22d	5034-2608-2200	0.019 (0.48)	0.125 (3.18)	0.040 (1.02)
22d	5034-2609-0220	0.026 (0.67)	0.113 (2.87)	0.047 (1.19)
22d	5034-2612-0220	0.026 (0.67)	0.203 (5.16)	0.230 (5.84)
22d	5034-2613-0220	0.020 (0.51)	0.203 (5.16)	0.230 (5.84)
22d	5034-2620-0220	0.020 (0.51)	0.178 (4.52)	0.115 (2.92)
22d	5034-2628-0220	0.017 (0.44)	0.130 (3.30)	0.067 (1.70)
22d	5034-2629-0220	0.026 (0.67)	0.154 (3.91)	0.019 (0.48)
22d	5034-2635-0220	0.019 (0.48)	0.203 (5.16)	0.051 (1.30)
20	5034-2601-0200	0.026 (0.67)	0.023 (0.58)	0.047 (1.19)
20	5034-2602-0200	0.020 (0.51)	0.128 (3.25)	0.044 (1.12)
20	5034-2620-0200	0.020 (0.51)	0.178 (4.52)	0.115 (2.92)
20	5034-2632-0200	0.025 (0.64)	0.215 (5.46)	0.168 (4.27)
16	5034-2620-0160	0.029 (0.75)	0.178 (4.52)	0.115 (2.92)
12	5034-2620-1200	0.029 (0.75)	0.178 (4.52)	0.115 (2.92)

Dimensions are stated as inches (mm).

Contact Eaton to discuss customer-specific part numbers that designate PC tail lenghts.

How to Order	
Hermetic Connectors	Contact Eaton to discuss customer-specific part numbers that designate PC tail lenghts.
Filtered Connectors	Contact Eaton to discuss customer-specific part numbers that designate PC tail lenghts.
All Other Connectors	Select "A" or "B" contact styles when ordering connectors and specify the appropriate PCB-terminated contact part numbers on your purchase order.

Printed Circuit Contacts - Pin



Contact Size	Part Number	ØA	B	C
22d	5034-2408-22P00	0.0265 (0.67)	0.187 (4.75)	0.065 (1.65)
22d	5034-2418-0220	0.019 (0.48)	0.285 (7.24)	0.174 (4.42)
22d	5034-2421-0220	0.018 (0.46)	0.160 (4.06)	0.273 (6.93)
22d	5034-2422-0220	0.0265 (0.67)	0.160 (4.06)	0.273 (6.93)
22d	5034-2430-22P00	0.0265 (0.67)	0.203 (5.16)	0.047 (1.19)
22d	5034-2436-0220	0.020 (0.51)	0.250 (6.35)	0.328 (8.33)
22d	5034-2449-0220	0.027 (0.69)	0.154 (3.91)	0.019 (0.48)
22d	5034-2503-22P00	0.027 (0.69)	0.145 (3.68)	0.065 (1.65)
22d	5034-2506-22P00	0.0265 (0.67)	0.250 (6.35)	0.058 (1.47)
20	5034-2408-0200	0.0265 (0.67)	0.187 (4.75)	0.065 (1.65)
20	5034-2418-0200	0.019 (0.48)	0.285 (7.24)	0.124 (3.15)
20	5034-2503-20P00	0.0265 (0.67)	0.145 (3.68)	0.065 (1.65)
20	5034-2505-20P00	0.0265 (0.67)	0.187 (4.75)	0.065 (1.65)
20	5034-2506-20P00	0.0265 (0.67)	0.250 (6.35)	0.058 (1.47)
16	5034-2464-16P00	0.050 (1.27)	0.145 (3.68)	0.028 (0.71)
16	5034-2503-16P00	0.050 (1.27)	0.145 (3.68)	0.065 (1.65)
12	5034-2503-12P00	0.050 (1.27)	0.145 (3.68)	0.065 (1.65)

Dimensions are stated as inches (mm).

NASA Thread Coupling (NATC) connectors

Meets All of the Requirements of NASA Specification SSQ 21635

Eaton's NATC connectors utilize space-rated materials to meet all of the requirements of NASA Specification SSQ 21635.

These space-rated connectors can be quickly customized to meet a broad array of mission-specific requirements:

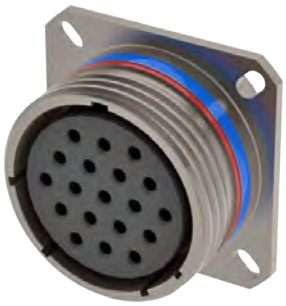
- Thermal and electrical deadfaces.
- Special insert patterns and shell configurations.
- Power configurations based on MIL-DTL-5015 inserts in shell sizes 25L to 37.

- 53 standard contact patterns including bussed contact configurations.
- Interchangeable with MIL-DTL-38999 Series III shell sizes 9 to 25.
- -115°C to 200°C operating temperatures.
- High speed data including MIL-STD-1553.
- Shell-housing ground prior to contact engagement.
- Coupling nut anti-rotation system eliminates lock wires.

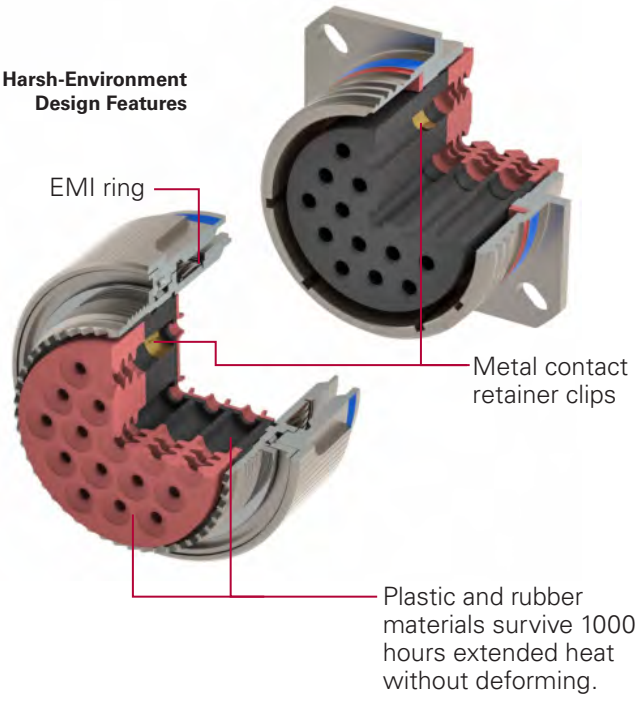
Straight Plugs

Jam-Nut Receptacles

Wall-Mount Receptacles



Harsh-Environment Design Features



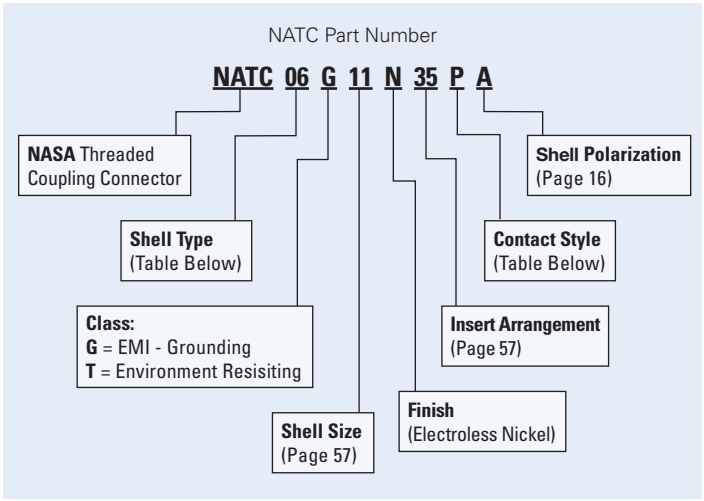
NATC connectors technical specifications

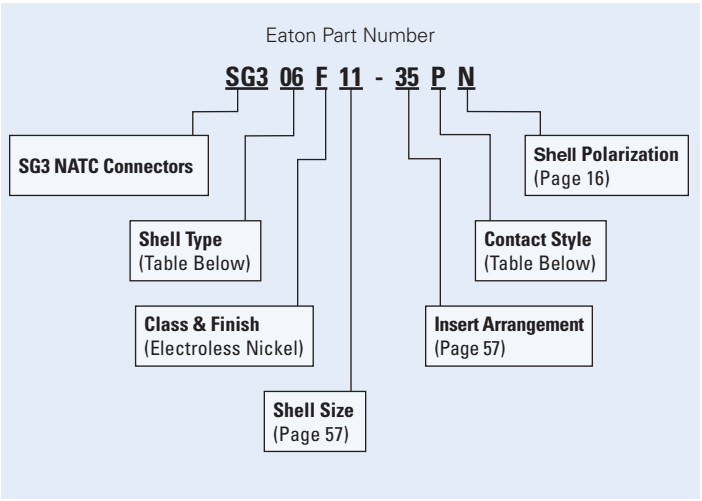
Materials, Finish, and Mechanical	
Shell	Stainless Steel
Receptacle /Plug Shell and Coupling Ring Plating	Electroless Nickel
Contact Material and Plating	Copper Alloy with Gold Plating, 50 Micro-linches Minimum
Insulator	Hard Dielectric Wafer
Grommet and Seal	Fluorosilicone
Grounding Springs	Beryllium Copper
Mating Life	500 Cycles Minimum
Contact Retention	Up to 25 Pounds
Polarization	Per MIL-STD-38999 Series III; N, A, B, C, D, and E

Environmental, Shock, Vibration, and EMI/RFI	
Operating Temperature	-115°C to 200°C (-175°F to 392°F)
Sealing	Sand and Dust as per MIL-STD-202 and Ice Resistance
Corrosion Resistance	Withstand 500 Hours Salt Spray
Fluid Immersion	Various Fuels, Solvents, Ccoolants, and Oils as per EIA-364-10
Sine Vibration	Per MIL-STD-202, Method 204, Condition G
Random Vibration	+6 dB/octave 20Hz to 100Hz; $1g^2Hz$; 100Hz to 2KHz
Shock	75g, 11 ms Half-Sine, each Axis
EMI Leakage Attenuation	90dB at 100MHz and 65dB Through 10GHz
Shell-to-Shell Conductivity	1.0 Millivolt Maximum Drop

Space-rated Series III solutions include dual-release lanyards designed to support critical spacecraft events. Contact Eaton for additional dual-release-lanyard information.

NATC connectors part number configuration





Designator Cross References

Designator Type	NATC	Eaton	Description
Shell Types	00	00	Wall-Mount Receptacle
	06	06	Plug
	07	07	Jam-Nut Receptacle
Classes	G	N/A	EMI Grounding
	T	N/A	Environment Resisting
Finish	N	F	Electroless Nickel
Contact Types	P	P	Pin
	S	S	Socket

NATC connectors standard shell and insert configurations

Shell-Size Conversions

Military Designation	A	B	C	D	E	F	G	H	J
Shell Size & Eaton Designation	9	11	13	15	17	19	21	23	25

Please contact Eaton to discuss custom shells and inserts

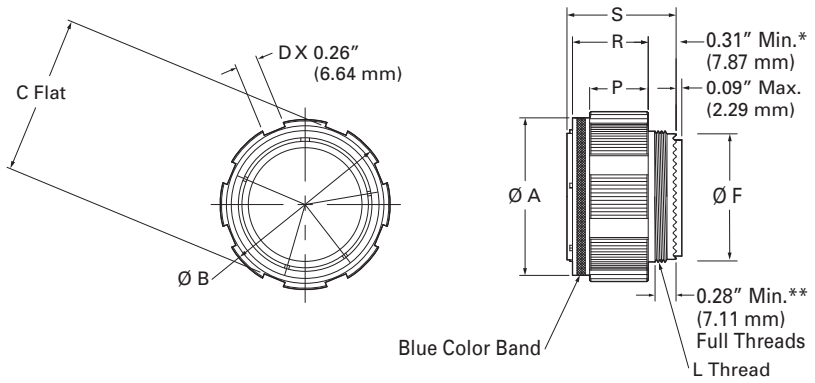
Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 8
9	35	M	6	6				
11	2	I	2			2		
11	35	M	13	13				
11	98	I	6		6			
11	99	I	7		7			
13	4	I	4			4		
13	35	M	22	22				
13	98	I	10		10			
15	4	I	4				4	
15	5	II	5			5		
15	19	I	19		19			
15	35	M	37	37				
15	68	I	8			8		
15	97	I	12		8	4		
17	2	M	2					2T
17	6	I	6				6	
17	8	II	8			8		
17	26	I	26		26			
17	35	M	55	55				
17	99	I	23		21	2		
19	11	II	11			11		
19	28	I	28		26	2		
19	32	I	32		32			
19	35	M	66	66				
19	68	I	18			18		
19	96	I	9				9	
21	11	I	11				11	
21	16	II	16			16		
21	35	M	79	79				

SR = Service Rating. Insert drawings are located in the general-purpose products section. Please contact Eaton for any NATC-specific configurations that are not included on the insert-drawings pages.
TTL # = The total number of contacts.

Shell Size	Insert #	SR	TTL #	# 22D	# 20	# 16	# 12	# 10	# 8	# 4	# 0
21	39	I	39		37	2					
21	41	I	41		41						
21	75	N,T	4						4T		
21	79	II,T	19	17					2T		
23	14	I	14				14				
23	21	II	21			21					
23	35	M	100	100							
23	55	I	55		55						
25	4	I	56		48	8					
25L	7	II	7						7		
25	8	M,T	8						8T		
25	19	I	19				19				
25	20	N	30		10	13	4		3T		
25	24	I	24			12	12				
25	29	I	29			29					
25	35	M	128	128							
25	37	I	37			37					
25	43	I	43		23	20					
25	46	I,C	46		40	4			2C		
25	61	I	61		61						
33*	3	II	3							1	2
33*	5	II	5							5	
33*	6	II								4	
33*	58	I	58		34	14	10				
37*	5	II	4								4

*Contact Eaton for shell size 33 and 37 insert-arrangement drawings.
C = Coax, T = Twinax

NATC plugs

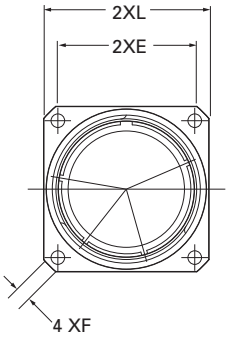


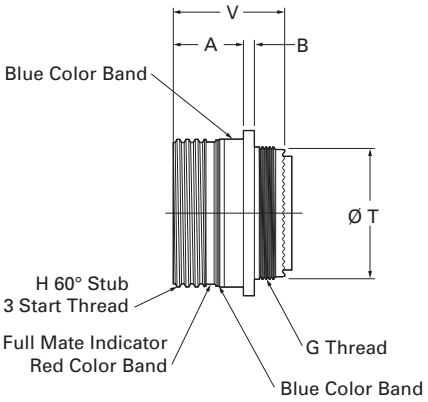
NOTES:
*NOT APPLICABLE FOR SHELL SIZES 2L TO 37
**NOT APPLICABLE FOR SHELL SIZES 33 & 37

Shell Size	ØA Max	ØB Max	C Flat Max	ØF Max	L Thread	P Max	R Max	S Max
9	0.733 (18.62)	0.859 (21.82)	0.748 (19.00)	0.416 (10.57)	M12 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
11	0.838 (21.29)	0.969 (24.61)	0.860 (21.84)	0.534 (13.56)	M15 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
13	1.009 (25.63)	1.141 (28.98)	1.024 (26.01)	0.652 (16.56)	M18 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
15	1.137 (28.88)	1.269 (32.23)	1.152 (29.26)	0.810 (20.57)	M22 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
17	1.274 (32.36)	1.391 (35.33)	1.289 (32.74)	0.928 (23.57)	M25 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
19	1.381 (35.08)	1.500 (38.10)	1.396 (35.46)	1.046 (26.57)	M28 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
21	1.508 (38.30)	1.625 (41.28)	1.523 (38.68)	1.164 (29.57)	M31 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
23	1.625 (41.28)	1.750 (44.45)	1.640 (41.66)	1.282 (32.56)	M34 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
25	1.752 (44.50)	1.875 (47.63)	1.767 (44.88)	1.400 (35.56)	M37 X 1.0-6g-0.100R	0.587 (14.91)	0.840 (21.34)	1.221 (31.01)
25L	1.849 (46.96)	1.875 (47.63)	1.767 (44.88)	1.400 (35.56)	M37 X 1.0-6g-0.100R	0.845 (21.46)	1.126 (28.60)	2.579 (65.51)
33	2.168 (55.07)	1.750 (44.45)	2.089 (53.06)	1.685 (42.80)	M45 X 1.0-6g-0.100R	0.955 (24.26)	1.257 (31.93)	2.579 (65.51)
37	2.358 (59.89)	2.391 (60.73)	2.274 (57.76)	1.860 (47.24)	M50 X 1.0-6g-0.100R	0.955 (24.26)	1.257 (31.93)	2.579 (65.51)

Dimensions are stated as inches (mm).

NATC wall-mount receptacles

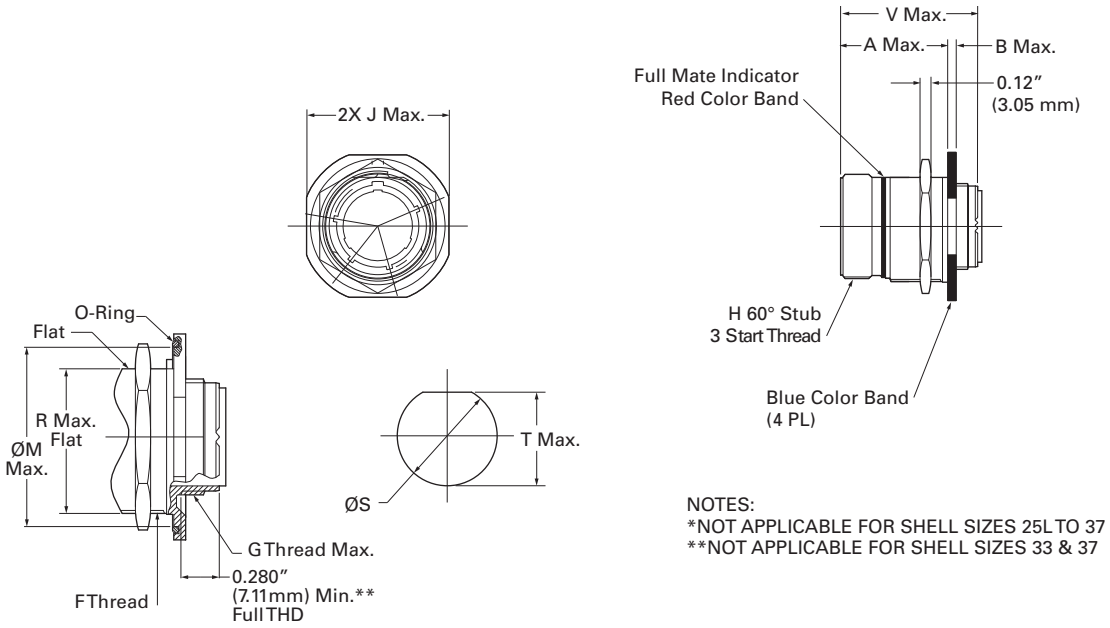




Shell Size	A Max	B Max	E Max	ØF Max	G Thread	H Thread	L Max	V Max	ØT Max
9	0.823 (20.90)	0.096 (2.44)	0.719 (18.26)	0.136 (3.45)	M12 X 1.0-6g-0.100R	0.625-0.1P-.3L-TS	0.948 (24.08)	1.240 (31.50)	0.416 (10.57)
11	0.823 (20.90)	0.096 (2.44)	0.812 (20.62)	0.136 (3.45)	M15 X 1.0-6g-0.100R	0.750-0.1P-.3L-TS	1.041 (26.44)	1.240 (31.50)	0.534 (13.56)
13	0.823 (20.90)	0.096 (2.44)	0.906 (23.01)	0.136 (3.45)	M18 X 1.0-6g-0.100R	0.875-0.1P-.3L-TS	1.135 (28.83)	1.240 (31.50)	0.652 (16.56)
15	0.823 (20.90)	0.096 (2.44)	0.969 (24.61)	0.136 (3.45)	M22 X 1.0-6g-0.100R	1.000-0.1P-.3L-TS	1.229 (31.22)	1.240 (31.50)	0.810 (20.57)
17	0.823 (20.90)	0.096 (2.44)	1.062 (26.97)	0.136 (3.45)	M25 X 1.0-6g-0.100R	1.187-0.1P-.3L-TS	1.322 (33.58)	1.240 (31.50)	0.938 (23.83)
19	0.823 (20.90)	0.096 (2.44)	1.156 (29.36)	0.136 (3.45)	M28 X 1.0-6g-0.100R	1.250-0.1P-.3L-TS	1.448 (36.78)	1.240 (31.50)	1.046 (26.57)
21	0.791 (20.09)	0.126 (3.20)	1.250 (31.75)	0.136 (3.45)	M31 X 1.0-6g-0.100R	1.375-0.1P-.3L-TS	1.572 (39.93)	1.240 (31.50)	1.164 (29.57)
23	0.791 (20.09)	0.126 (3.20)	1.375 (34.93)	0.162 (4.11)	M34 X 1.0-6g-0.100R	1.500-0.1P-.3L-TS	1.698 (43.13)	1.240 (31.50)	1.282 (32.56)
25	0.791 (20.09)	0.126 (3.20)	1.500 (38.10)	0.162 (4.11)	M37 X 1.0-6g-0.100R	1.625-0.1P-.3L-TS	1.822 (46.28)	1.240 (31.50)	1.399 (35.53)
25L	1.161 (29.49)	0.203 (5.16)	1.500 (38.10)	0.162 (4.11)	M37 X 1.0-6g-0.100R	1.625-0.1P-.3L-TS	1.818 (46.18)	2.600 (66.04)	1.399 (35.53)
33	1.161 (29.49)	0.203 (5.16)	1.750 (44.45)	0.217 (5.51)	M45 X 1.0-6g-0.100R	1.875-0.1P-.3L-TS	2.318 (58.88)	2.600 (66.04)	1.684 (42.77)
37	1.161 (29.49)	0.203 (5.16)	1.922 (48.82)	0.217 (5.51)	M50 X 1.0-6g-0.100R	2.125-0.1P-.3L-TS	2.990 (75.95)	2.600 (66.04)	1.860 (47.24)

Dimensions are stated as inches (mm).

NATC jam-nut receptacles



NOTES:
*NOT APPLICABLE FOR SHELL SIZES 25L TO 37
**NOT APPLICABLE FOR SHELL SIZES 33 & 37

Shell Size	A Max	B Max	F Thread	G Thread	H Thread	J Max	V Max	ØM Max	R Flat	ØS Max	T Max
9	1.236 (31.39)	0.114 (2.90)	M17 X 1.0-6g-0.100R	M12 X 1.0-6g-0.100R	0.625-0.1 P-.3L-TS	1.077 (27.36)	1.690 (42.93)	0.783 (19.89)	0.655 (16.64)	0.698 (17.73)	0.667 (16.94)
11	1.236 (31.39)	0.114 (2.90)	M20 X 1.0-6g-0.100R	M15 X 1.0-6g-0.100R	0.750-0.1 P-.3L-TS	1.265 (32.13)	1.690 (42.93)	0.971 (24.66)	0.755 (19.18)	0.823 (20.90)	0.767 (19.48)
13	1.243 (31.57)	0.114 (2.90)	M25 X 1.0-6g-0.100R	M18 X 1.0-6g-0.100R	0.875-0.1 P-.3L-TS	1.390 (35.31)	1.690 (42.93)	1.096 (27.84)	0.942 (23.93)	1.009 (25.63)	0.954 (24.23)
15	1.243 (31.57)	0.114 (2.90)	M28 X 1.0-6g-0.100R	M22 X 1.0-6g-0.100R	1.000-0.1 P-.3L-TS	1.515 (38.48)	1.690 (42.93)	1.221 (31.01)	1.066 (27.08)	1.135 (28.83)	1.081 (27.46)
17	1.243 (31.57)	0.114 (2.90)	M32 X 1.0-6g-0.100R	M25 X 1.0-6g-0.100R	1.187-0.1 P-.3L-TS	1.640 (41.66)	1.690 (42.93)	1.346 (34.19)	1.191 (30.25)	1.268 (32.21)	1.203 (30.56)
19	1.243 (31.57)	0.145 (3.68)	M35 X 1.0-6g-0.100R	M28 X 1.0-6g-0.100R	1.250-0.1 P-.3L-TS	1.827 (46.41)	1.690 (42.93)	1.454 (36.93)	1.316 (33.43)	1.389 (35.28)	1.328 (33.73)
21	1.243 (31.57)	0.145 (3.68)	M38 X 1.0-6g-0.100R	M31 X 1.0-6g-0.100R	1.375-0.1 P-.3L-TS	1.953 (49.61)	1.690 (42.93)	1.580 (40.13)	1.441 (36.60)	1.507 (38.28)	1.453 (36.91)
23	1.243 (31.57)	0.145 (3.68)	M41 X 1.0-6g-0.100R	M34 X 1.0-6g-0.100R	1.500-0.1 P-.3L-TS	2.077 (52.76)	1.690 (42.93)	1.705 (43.31)	1.566 (39.78)	1.634 (41.50)	1.577 (40.06)
25	1.243 (31.57)	0.145 (3.68)	M44 X 1.0-6g-0.100R	M37 X 1.0-6g-0.100R	1.625-0.1 P-.3L-TS	2.203 (55.96)	1.690 (42.93)	1.830 (46.48)	1.691 (42.95)	1.760 (44.70)	1.703 (43.26)
25L	1.536 (39.01)	0.198 (5.03)	M44 X 1.0-6g-0.100R	M37 X 1.0-6g-0.100R	1.625-0.1 P-.3L-TS	2.203 (55.96)	2.600 (66.04)	1.830 (46.48)	1.691 (42.95)	1.760 (44.70)	1.703 (43.26)
33	1.536 (39.01)	0.198 (5.03)	M52 X 1.0-6g-0.100R	M45 X 1.0-6g-0.100R	1.875-0.1 P-.3L-TS	2.484 (63.09)	2.600 (66.04)	2.078 (52.78)	1.927 (48.95)	1.979 (50.27)	1.939 (49.25)
37	1.536 (39.01)	0.198 (5.03)	M60 X 1.0-6g-0.100R	M50 X 1.0-6g-0.100R	2.125-0.1 P-.3L-TS	2.843 (72.21)	2.600 (66.04)	2.456 (62.38)	2.276 (57.81)	2.373 (60.27)	2.298 (58.37)

Dimensions are stated as inches (mm).

Assembly instructions and tools

Crimp Tools and Positioners

Contact Style	Contact Size	Crimp Tool Part Number	Positioner Part Number
Pin	22D	M22520/2-01	M22520/2-09
	20	M22520/1-01	M22520/1-04
	16	M22520/1-01	M22520/1-04
	12	M22520/1-01	M22520/1-04

Contact Style	Contact Size	Crimp Tool Part Number	Positioner Part Number
Socket	22D	M22520/2-01	M22520/2-07
	20	M22520/1-01	M22520/1-04
	16	M22520/1-01	M22520/1-04
	12	M22520/1-01	M22520/1-04

Wire stripping

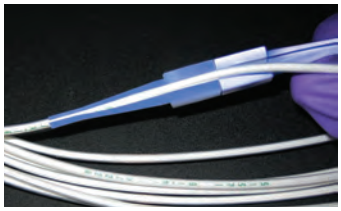
Strip insulation from end of wire to be crimped. Do not cut or damage wire strands.

Contact crimping

1. Insert stripped wire into contact crimp pot. Wire must be visible through inspection hole.
2. Using correct crimping tool and locator. Cycle the tool once to be sure the indenters are open. Insert contact and wire into locator. Squeeze tool handle firmly and completely to insure a proper crimp. The tool will not release unless the crimp indenters of tool is fully actuated.
3. Release crimped contact and wire from tool. Inspect the wire to be certain wire is visible through inspection hole in contact.

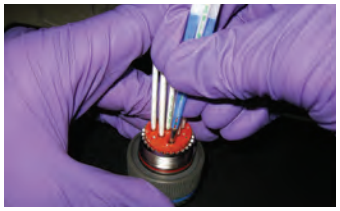
Contact insertion

1. Insert wire into the insertion tool.



2. Slide insertion tool to the shoulder of the contact.

3. Stop insertion tool at the shoulder of the contact.



4. Use isopropyl alcohol to lubricate the grommet seal. Insert contact through grommet seal and wiggle until the contact locks in retainer clip.

Contact extraction

1. Insert wire into insertion tool.

2. Use isopropyl alcohol to lubricate the grommet seal. Slide insertion tool along wire into grommet seal.

3. Press the insertion tool until seated firmly. Pull wire and insertion tool out to remove contact.

For additional information

- Visit www.eaton.com/interconnect
- Call 805.484.0543
- Email cicustomer.service@eaton.com

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