MACH-D

High-Performance D-Sub Connectors for Use in Harsh Environments

- Precision machined shell provides EMI shielding protection
- Grounding strip provides excellent electromagnetic compatibility (EMC)
- Mechanically rugged machined shell protects against shock, vibration, and impact
- IP67 configurations protect against fluid and dust ingress
- High-performance M24308 intermateable





THE SCIENCE OF CERTAINTY®

Positronic°

an **Amphenol** company



Positronic builds premium D-Sub connectors for a wide variety of global industries. But every product delivers the same outcome: Certainty. That's our master spec, our driving purpose.

We believe in the people who are advancing our world and making it a better place, those who are realizing new discoveries, developing technologies that help humans connect, and expanding commerce to advance economies. That is why we are serious about developing high-reliability interconnect solutions – because failure is not an option for critical systems, they must perform.

From deep space discovery to medical breakthroughs, Positronic delivers *The Science of Certainty*.

WHAT CAN YOU BE CERTAIN ABOUT?

- Failsafe product performance
- Maximum design flexibility
- Leading levels of energy efficiency and
- temperature control
- Responsive, knowledgeable support

THE SCIENCE OF CERTAINT

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Positronic MACH-D connectors are built with precision machined shells that provide superior EMI shielding. EMI shielding protects against electronic disruptions, guarding against data loss, and defending against system failure. The MACH-D design and manufacturing process removes these worries and allows the connector to exceed our customers' needs for quality and reliability. The MACH-D offers standard and high density signal contact arrangements as well as hybrid versions, which combine power and signal in a single connector body. A wide variety of accessories are also available.

			C C C C C C				
	MCD	MCDD	МСВХ				
Shell sizes	1 to 5	1 t	0 6				
Shell material		Machined aluminum, stainless steel					
Shell finish	Electroless nickel, passivated stainless steel, cadmium, chemical conversion coating						
Contact size	#20	#22	#8, #20				
Current rating	Up to 17A	Up to 12A	Up to 75A				
Female contact design		PosiBand [®] Closed Entry (LSA for size 8)					
Contact termination		Crimp Solder Cup Solder PCB Press-Fit					
Insulator material	DAP, PBT	PBT					
Insulator color	Green (DAP), Blue (PBT)	Blue					
Polarization		Trapezoidal shape of shell					
Number of layouts	5	6	25				
Locking system	Jackscrews						

PLATING OPTIONS

MACH-D Connectors							
SHELL PLATING		CODE	SHELL MATERIAL	ROHS COMPLIANT	PLATING SPECIFICATIONS		
Electroless nickel		К	Aluminum	YES	ASTM B733, Type V, SC2, Class 4		
Stainless steel, passivated		S	Stainless steel	YES	SAE AMS2700 Type 6 Comparable to MIL-DTL-24308 Code P		
Cadmium		U	Aluminum	NO	SAE AMS-QQ-P-416 Type II, Class 2 Comparable to MIL-DTL-24308 Code F		
Chemical conversion		т	Aluminum	YES	MIL-DTL-5541, Type II, Class 1A and Class 3		

The above plating images are software-generated and may differ from the actual product appearance.

The Advantages of Stainless Steel Shells

D-Sub connector shells are typically made from steel, aluminum, or brass. Although these are strong materials, they are vulnerable to moisture and subsequent corrosion. Plating the shell with a protective coating helps abate corrosion, but plating materials are vulnerable and can also be hazardous to the environment -- especially cadmium. There is an increasing industry appetite for shell material options that can survive extremely harsh conditions and be environmentally green.

To address this need, Positronic offers stainless steel shells as a standard option on a variety of our D-Sub connector products -- including MACH-D. Stainless steel does not easily corrode and it can outperform nearly any plating material option in a salt spray test. It is also resistant to high temperatures and is very mechanically robust. Our expertise in stainless steel connector shells is evidenced by the fact that Positronic is approved to manufacture over 600 part numbers as part of the MIL-DTL-24308 QPL. That's more than any other connector manufacturer in the industry. Give stainless steel the opportunity to prove why it is quickly becoming one of the most desirable D-Sub shell materials available on the market today!

NEW ACCESSORIES & FEATURES

EMI Grounding Strips



Keyed / Polarized Jackscrew System

This keyed jackscrew system functions by way of corresponding keyways on the Code K rotating male jackscrew and Code S fixed female jackpost. When used properly, this system allows for 36 unique key combinations, which are user-configurable. The rotating male jackscrews feature an internal hex head for troublefree rotation.



Banding Feature on Rear Connector Shell

For applications requiring both 360 degree braid shield termination as well as desirable strain relief characteristics, the new diamond knurl banding feature is a perfect solution.

This is an option on the rear shell of all MACH-D connectors by selecting Code C in the Backshells & Boardlocks step.

This feature is designed for use with standard bandingstyle clamps and tooling. The diamond knurl is ideal in preventing braid rotation and slippage.



M24308 AT A GLANCE

Overview

The M24308 D-Subminiature connector is a standardized military connector, defined by United States military specification MIL-DTL-24308. Small enough to fit into tight spaces and with proven reliability, M24308 connectors are an ideal choice for mission-critical tasks where connector performance cannot be a question.



About M24308

M24308 connectors come in many different styles with a variety of options for class, contact termination, and type. They are designed to operate between -55°C and +125°C. Compact and spatially efficient, M24308 connectors are ideal for applications requiring high density packaging. You can find these connectors in a variety of applications from communication and information technology to aircraft, missiles, and satellites.

Positronic products meet or exceed the requirements set forth within the M24308 specification. Our connectors have gone through rigorous testing to certify quality and performance. They are built for mission-critical applications – where failure is not an option.

Positronic products are part of the U.S. Defense Logistics Agency (DLA) Qualified Products List (QPL), which means they have met the qualification requirements, including appropriate product identification, qualification, and periodic verification testing. This designation means the products are trusted and approved for use in any appropriate application requiring high quality components.

The MIL-DTL-24308 specification can be downloaded at https://quicksearch.dla.mil



Positronic MACH-D Connectors

Although machined shell D-Sub connectors are not included as part of MIL-DTL-24308, MACH-D connectors are fully intermateable with standard M24308-type D-Subs and, in many cases, outperform the minimum requirements as outlined in MIL-DTL-24308. For our DD, HDC, and RD Series connectors, Positronic has held its position on the MIL-DTL-24308 QPL for over 40 years and we continue to boast the largest M24308 QPL of any connector manufacturer. Qualified materials, processes, and supply chain are the backbone of our connectors, which we rely on for every D-Sub product from industrial to military and space-grade product offerings.





LAYOUTS _____

	Connectors shown at actual size. Face view of male or rear view of female shown. All Positronic products utilize solid, machined contacts				
	МСВХ	SIZE	МСВХ		
Contact Technical Sales	2WK2 (2) #8	1	5W1 (1) #8, (4) #20		
	8W2 (2) #16, (6) #22				
	○ ● ● ● ○ ○ 3W3 (3) #8		SWK3 (3) #8		
	W2 (2) #8, (5) #20	2	11W1 (1) #8, (10) #20		
Contact Technical Sales	19W1 (1) #8, (18) #22				
	5W5 (5) #8		9W4 (4) #8, (5) #20		
	13W3 (3) #8, (10) #20	3	17W2 (2) #8, (15) #20		
	21W1 (1) #8, (20) #20		Contact Technical Sales		

CONTACT SIZE								
#8 #16 #20 #22								
	•	•	•					





POSIBAND®

PosiBand is a unique contact technology that eliminates the weaknesses of the split-tine design.

- The PosiBand female contact configuration features a higher cross-sectional area of material compared to split-tine designs and a solid, unbroken ring at the entry point, which increases the mechanical robustness of the contact.
- PosiBand has greater surface engagement at the male and female contact interface, resulting in more consistent electrical performance.
- Resistance of size 22 contacts is 5 milliohms, maximum. Resistance of size 20 contacts is 4 milliohms, maximum. Low contact resistance offers opportunities to use size 22 and size 20 contacts for power.
- PosiBand has lower average insertion forces, resulting in greater ease in mating, especially in larger high density connectors. The average lower insertion force is accomplished while meeting or exceeding performance requirements.
- As the PosiBand external pressure element performs the mechanical action of the connection, the contact body material can be selected from a large spectrum of alloys featuring higher conductivity or superior crimp deformation properties, eliminating the need for further processing such as annealing.
- PosiBand is qualified under SAE AS39029 and MIL-DTL-24308 specifications. PosiBand is also qualified to the higher 40 gram contact separation test requirement of GSFC S-311-P4/08 and GSFC S-311-P4/10.

TEMPERATURE RISE CURVES



PosiBand®

Over-separation is eliminated

Surface engagement is **consistent** along the barrel





Open Entry Leg Over-separation is limited by insulator cavity

Surface engagement concentrated at the tip

Legacy Closed Entry Over-separation is limited by sleeve

Surface engagement concentrated at the tip

Tested per IEC Publication 60512-3, Test 5a

MCD / MCBX #20 Contacts

Initial Contact Resistance: 4 milliohms, maximum. Curve developed using 50-pin Standard Density D-subminiature connectors loaded with size 20 crimp contacts terminated to 20 AWG wire.



MCDD #22 Contacts

Initial Contact Resistance: 5 milliohms, maximum. Curve developed using 104-pin High Density D-subminiature connectors loaded with size 22 crimp contacts terminated to 22 AWG wire.



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TEMPERATURE RISE CURVES

Tested per IEC Publication 60512-3, Test 5a

MCBX3W3 #8 Contacts



Curves developed using male crimp connectors mated to female crimp connectors.

Higher performing curve is developed using high conductivity (HC) contacts.



MCBX8W8 #8

Curves developed using male crimp connectors mated to female crimp connectors.

Higher performing curve is developed using high conductivity (HC) contacts.

MCBX21WA4 #8

Contacts

MCBX8W8 #8 Contacts



Curves developed using male crimp connectors mated to female crimp connectors.

Curves are developed using standard conductivity contacts.

MCBX7W2 #8 Contacts



Curves developed using male crimp connectors mated to female PCB terminations.

Curves are developed using standard conductivity contacts.

100 90 Rated Current (AMPS) 80 21W4 70 with 8 AWG 60 50 21W4 40 -with 10 AWG 30 20 21W4 with 10 12 AWG 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 Ω Temperature Rise (°C)

Curves developed using male crimp connectors mated to female PCB terminations.

Curves are developed using standard conductivity contacts.

Positronic MACH-D MCD Series





TECH SPECS

MCD Series connectors are standard density D-Sub connectors, built for high-performance applications requiring rugged machined shells. Features include:

- Machined shells for ruggedness, planarity, and precision
- Interfacial seals and rear grommets for waterproofing
- Unique accessories include EMI grounding strips, keyed jackscrews, and banding backshell
- Quality and performance in accordance with MIL-DTL-24308

Trust the **MCD** to deliver *The Science of Certainty* in missioncritical applications.

GENERAL		
Part Number Prefix	MCD	
Performance Level	Mil/Aero Spaceflight	
Conformance	Meets or exceeds performance requirements for MIL-DTL-24308; fully intermateable to M Meets or exceeds performance requirements for NASA Goddard GSFC-311; fully intermated to the second secon	IL-DTL-24308 connectors teable to GSFC-311 connectors
RoHS Compliance	Optional	
MATERIAL		IN ACCORDANCE WITH
Insulator	PBT (PCB terminations) DAP (wire terminations)	MIL-DTL-24308 §3.3.5.1
Insulator Color	Blue (PBT), Green (DAP)	
Flammability Rating	UL 94V-0	UL 94
Contact Material	Copper alloy	MIL-DTL-24308 §3.3.4; AS39029 MIL-DTL-24308 §3.3.4.2; AS39029
Contact Plating	50 µin gold over nickel or copper underplate	MIL-DTL-24308 §3.3.4.1; AS39029
Shell Material	Aluminum Stainless steel For other shell options, please contact Technical Sales	ASTM B221 ASTM A240
Shell Finish	Electroless nickel Stainless steel, passivated Cadmium Chemical conversion coating	See page 3
Interfacial Seal	Fluorosilicone	MIL-R-25988 Type II Class I Grade 40
Rear Grommet	Fluorosilicone	MIL-R-25988 Type II Class I Grade 40

TECH SPECS _____

MATERIAL		IN ACCORDANCE WITH
EMI Spring	Copper alloy, plated electroless nickel	ASTM B194; AMS-C-26074
Adhesive/Sealant	MasterBond Supreme 10AOHT 3M DP190 For low outgassing requirements, please contact Technical Sales	
Conductive Gasket	CHOFORM 5513 For non-conductive options or configurations compatible with Spira-Shield metal EMI shielding, please contact Technical Sales	
ELECTRICAL		IN ACCORDANCE WITH
Working Voltage (rms)	300V	EIA-364-20
Initial Contact Resistance	4 mΩ maximum	MIL-DTL-24308 §3.5.9; EIA-364-06; IEC 60512-2, Test 2b
Contact Current Rating at 70°C Temperature Rise	 18A 2 contacts energized 14A 6 contacts energized 11A 15 contacts energized 10A 25 contacts energized 9A 50 contacts energized 	UL 1977
Insulation Resistance	5 GΩ	MIL-DTL-24308 §3.5.8; EIA-364-21
Proof Voltage (rms)	1000V	EIA-364-20
MECHANICAL		IN ACCORDANCE WITH
Female Contact Design	PosiBand closed entry	
Contact Retention in Insulator	40N [9 lbs] (removable contacts only)	MIL-DTL-24308 §3.5.5; EIA-364-29
Resistance to Soldering Heat - Hand Soldering - Wave Soldering	360°C [680°F] for 4 seconds 260°C [500°F] for 20 seconds	MIL-STD-202-210, condition A MIL-STD-202-210, condition C
Polarization	Trapezoidal shape of shell	
Mechanical Durability	500 cycles	MIL-DTL-24308 §3.5.16; EIA-364-09
Shock and Vibration	See page 36 for more details	
ENVIRONMENTAL		IN ACCORDANCE WITH
Operating Temperature	-55 to 125°C	MIL-DTL-24308 §3.5.11; EIA-364-32
Outgassing	Low outgassing options (TML <1.0%, CVCM <0.1%, RML <1.0%) are available, please contact Technical Sales.	ASTM E 595; ECSS-Q-ST-70-02C

Waterproof

IP67 (when ordered with the IP-rated panel mount accessories)

IEC 60529

SHELL DIMENSIONS



*1 The 1.85 [.073] shell thickness in the SIDE VIEW is only valid for configurations without angle brackets.

SHELL SIZE	GENDER	A ±0.38 [.015]	B ±0.13 [.005]	C ±0.13 [.005]	D ±0.13 [.005]	E ±0.38 [.015]	G ±0.25 [.010]	H ±0.25 [.010]	К ±0.13 [.005]	F ±0.38 [.015]
-	Male	30.81	18.75 [.738]	24.99	10.19 [.401]	12.55	19.82	10.82	5.92 [.233]	6.73
I	Female	[1.213]	16.33 [.643]	[.984]	7.90 [.311]	[.494]	[.780]	[.426]	6.17 [.243]	[.265]
0	Male	39.14	27.08 [1.066]	33.32	10.19 [.401]	10.19 [.401] 12.55 7.90 [.494] [.311]	12.55 28.15	10.82 [.426]	5.92 [.233]	6.73 [.265]
2	Female	[1.541]	24.66 [.971]	[1.312]	7.90 [.311]		[1.108]		6.17 [.243]	
Ma	Male	53.04	40.79 [1.606]	47.04	10.19 [.401]	12.55 [.494]	12.55 41.87 [.494] [1.648]	10.82 [.426]	5.84 [.230]	6.50
5	Female	[2.088]	38.19 [1.504]	[1.852]	7.90 [.311]				6.17 [.243]	[.256]
4	Male	69.32	57.25 [2.254]	63.50	10.19 [.401]	12.55	58.28	10.82	5.84 [.230]	6.50
4	Female	[2.729]	54.84 [2.159]	[2.500]	7.90 [.311]	[.494]	.494] [2.294]	[.426]	6.17 [.243]	[.256]
5 -	Male	66.93	54.64 [2.151]	61.11	13.03 [.513]	15.37	55.88	13.67	5.84 [.230]	6.50
	Female	[2.635]	52.43 [2.064]	[2.406]	10.74 [.423]	[.605]	[2.200]	[.538]	6.17 [.243]	[.256]

CONTACT TERMINATIONS



Code	Termination type	A	В	C	ØD	E
0/1	Crimp					6.60 [.260]
2	Solder cup	3.18 [.125]				11.37 [.448]
3	Straight solder	4.31 [.170]			0.76 [.030]	6.60 [.260]
31	Straight solder	4.31 [.170]			1.01 [.040]	6.60 [.260]
32	Straight solder	9.52 [.375]			0.76 [.030]	6.60 [.260]
33	Straight solder	12.70 [.500]			0.76 [.030]	6.60 [.260]
36	Straight solder	6.00 [.236]			0.60 [.024]	6.60 [.260]
38	Straight solder	8.45 [.333]			0.76 [.030]	12.29 [.484]
39	Straight solder	11.63 [.458]			0.76 [.030]	12.29 [.484]
4	Right angle solder	4.31 [.170]	12.34 [.486]	2.84 [.112]	0.76 [.030]	
42	Right angle solder	5.00 [.197]	10.3 [.406]	2.54 [.100]	0.60 [.024]	
5	Right angle solder	4.31 [.170]	8.07 [.318]	2.84 [.112]	0.76 [.030]	
51	Right angle solder	3.18 [.125]	8.07 [.318]	2.84 [.112]	0.76 [.030]	
52	Right angle solder	6.35 [.250]	8.07 [.318]	2.84 [.112]	0.76 [.030]	
53	Right angle solder	4.31 [.170]	8.07 [.318]	2.84 [.112]	1.01 [.040]	
54	Right angle solder	3.18 [.125]	8.07 [.318]	2.84 [.112]	1.01 [.040]	

CREATE A PART

For additional options and accessories, please see following page.



*1 Required if Termination Code 98 selected

*2 Only available for use with Code 0, 1, 12 and 19 in Termination step

ADDITIONAL OPTIONS

Options shown on this page are less common than others. Customers may experience a price and/or lead time impact when selecting these options.

Additional Termination Options

- 12 Wire, crimp contacts included, 26 30 AWG [0.12mm² 0.05mm²]
- 31 Straight solder, 1.02 [.040] tail diameter, 4.32 [.170] tail length
- 33 Straight solder, 0.71 [.030] tail diameter, 12.70 [.500] tail length
- 36 Straight solder, metric footprint, 0.60 [.024] tail diameter, 6.00 [.236] tail length
- **38** Straight solder, 0.71 [.030] tail diameter, 8.45 [.333] tail length
- 39 Straight solder, 0.71 [.030] tail diameter, 11.63 [.458] tail length
- 42 Right angle solder, metric footprint, 0.61 [.024] tail diameter, 10.31 [.406] contact extension, 5.00 [.197] tail length
- 51 Right angle solder, 0.71 [.030] tail diameter, 8.07 [.318] contact extension, 3.18 [.125] tail length
- 52 Right angle solder, 0.71 [.030] tail diameter, 8.07 [.318] contact extension, 6.35 [.250] tail length
- 53 Right angle solder, 1.02 [.040] tail diameter, 8.07 [.318] contact extension, 4.32 [.170] tail length
- 54 Right angle solder, 1.02 [.040] tail diameter, 8.07 [.318] contact extension, 3.18 [.125] tail length

Additional Mounting Options

C5	IP67-rated inside wall mount, standoffs, for use with termination codes 2, 3, and 98
C6	IP67-rated inside wall mount, integrated angle brackets, alignment bar, for use with right angle PCB termination types

Additional Backshell Options

EJ Backshell, aluminum, top opening, machined, chemical conversion coating, grounding clips

Additional Locking Systems Options

T Fixed female jackposts, compatible with EN and EJ backshells

Additional Shells Options

T Aluminum, chemical conversion coating
 U Aluminum, cadmium finish - omit Code /AA from Environmental Compliance step when selecting this option

Typical Modification Options

- Low outgassing per ASTM E595 and ECSS-Q-ST-70-02C
- Solder coated contact tails
- Thermocouple contacts
- Blind mate hardware
- Protective dust caps
- EMI dust caps
- ESD packaging
- 100% inspection or other increased inspection levels

Please contact Technical Sales for additional modification options not listed here and for part numbering details.





TECH SPECS

MCDD Series connectors are high density D-sub connectors, built for high performance applications requiring rugged machined shells. Features include:

- Machined shells for ruggedness, planarity, and precision
- Interfacial seals and rear grommets for waterproofing
- Unique accessories include EMI grounding strips, keyed jackscrews, and banding backshell
- Quality and performance in accordance with MIL-DTL-24308

Trust the **MCDD** to deliver *The Science of Certainty* in mission-critical applications.

GENERAL	
Part Number Prefix	MCDD
Performance Level	Mil/Aero Spaceflight
Qualifications	Meets or exceeds performance requirements for MIL-DTL-24308; fully intermateable to MIL-DTL-24308 connectors Meets or exceeds performance requirements for NASA Goddard GSFC-311; fully intermateable to GSFC-311 connectors
RoHS Compliance	Optional

MATERIAL		IN ACCORDANCE WITH
Insulator	РВТ	MIL-DTL-24308 §3.3.5.1
Insulator Color	Blue (PBT)	
Flammability Rating	UL 94V-0	UL 94
Contact Material	Copper alloy	MIL-DTL-24308 §3.3.4; AS39029 MIL-DTL-24308 §3.3.4.2; AS39029
Contact Plating	50 µin gold over nickel or copper underplate	MIL-DTL-24308 §3.3.4.1; AS39029
Shell Material	Aluminum Stainless steel For other shell options, please contact Technical Sales	ASTM B221 ASTM A240
Shell Finish	Electroless nickel Stainless steel, passivated Cadmium Chemical conversion coating	See page 3
Interfacial Seal	Fluorosilicone	MIL-R-25988 Type II Class I Grade 40
Rear Grommet	Fluorosilicone	MIL-R-25988 Type II Class I Grade 40

TECH SPECS

MATERIAL		IN ACCORDANCE WITH
EMI Spring	Copper alloy, plated with electroless nickel	ASTM B194; AMS-C-26074
Adhesive/Sealant	MasterBond Supreme 10AOHT 3M DP190 For low outgassing requirements, please contact Technical Sales	
Conductive Gasket	CHOFORM 5513 For non-conductive options or configurations compatible with Spira-Shield metal EMI shielding, please contact Technical Sales	
ELECTRICAL		IN ACCORDANCE WITH
Working Voltage (rms)	300V	EIA-364-20
Initial Contact Resistance	5 mΩ maximum	MIL-DTL-24308 §3.5.9; EIA-364-06; IEC 60512-2, Test 2b
Contact Current Rating	12A 2 contacts energized	

at 70°C Temperature Rise	10A	6 contacts energized	
	7.5A 6.5A 5.0A	62 contacts energized 104 contacts energized	UL 1977
Insulation Resistance	5 GΩ		MIL-DTL-24308 §3.5.8; EIA-364-21
Proof Voltage	1000V		EIA-364-20

MECHANICAL		IN ACCORDANCE WITH
Female Contact Design	PosiBand closed entry	
Contact Retention In Insulator	40N [9 lbs] (removable contacts only)	MIL-DTL-24308 §3.5.5; EIA-364-29
Resistance To Soldering Heat - Selective Soldering - Wave Soldering	360°C [680°F] for 4 seconds 260°C [500°F] for 20 seconds	MIL-STD-202-210, condition A MIL-STD-202-210, condition C
Polarization	Trapezoidal shape of shell	
Mechanical Durability	500 cycles	MIL-DTL-24308 §3.5.16; EIA-364-09
Shock and Vibration	See page 36 for more details	

ENVIRONMENTAL		IN ACCORDANCE WITH
Operating Temperature	-55 to 125°C	MIL-DTL-24308 §3.5.11; EIA-364-32
Outgassing	Low outgassing options (TML <1.0%, CVCM <0.1%, RML <1.0%) are available, please contact Technical Sales.	ASTM E 595; ECSS-Q-ST-70-02C
Waterproof	IP67 (when ordered with the IP-rated panel mount accessories)	IEC 60529

SHELL DIMENSIONS



 \star1 The 1.85 [.073] shell thickness in the SIDE VIEW is only valid for configurations without angle brackets.

SHELL SIZE	GENDER	A ±0.38 [.015]	B ±0.13 [.005]	C ±0.13 [.005]	D ±0.13 [.005]	E ±0.38 [.015]	G ±0.25 [.010]	H ±0.25 [.010]	к ±0.13 [.005]	F ±0.38 [.015]	
	Male	30.81	18.75 [.738]	24.99 [.401] 12.55 [.984] 7.90 [.494] [.311] [.311] 12.55	10.19 [.401]	12.55	19.82	10.82	5.92 [.233]	6.73	
I	Female	[1.213]	16.33 [.643]		[.780]	[.426]	6.17 [.243]	[.265]			
0	Male	39.14	27.08 [1.066]	33.32	10.19 [.401]	12.55	.55 28.15 94] [1.108]	10.82 [.426]	5.92 [.233]	6.73	
2	Female	[1.541]	24.66 [.971]	[1.312]	7.90 [.311]	[.494]			6.17 [.243]	[.265]	
2	Male	53.04 [2.088]	40.79 [1.606]	47.04	10.19 [.401]	12.55	41.87	10.82 [.426]	5.84 [.230]	6.50	
3	Female		38.19 [1.504]	[1.852]	7.90 [.311]	[.494]	[1.648]		6.17 [.243]	[.256]	
Λ	Male	69.32 [2.729]	57.25 [2.254]	63.50	10.19 [.401]	12.55	12.55 58.28 .494] [2.294]	10.82	5.84 [.230]	6.50	
4	Female		54.84 [2.159]	[2.500]	7.90 [.311]	[.494]		[.426]	6.17 [.243]	[.256]	
5	Male	66.93	54.64 [2.151]	61.11	13.03 [.513]	15.37	55.88	13.67	5.84 [.230]	6.50	
5	Female	[2.635]	52.43 [2.064]	[2.406]	10.74 [.423]	[.605]	[2.200]	[.538]	6.17 [.243]	[.256]	
6	Male	69.32	58.01 [2.284]	63.50	14.61 [.575]	16.97	59.03	15.24	5.84 [.230]	6.50	
6	6	Female	[2.729]	55.60 [2.189]	[2.500]	12.32 [.485]	[.668]	[2.324]	[.600]	6.17 [.243]	[.256]

CONTACT TERMINATIONS



Code	Termination type	A	В	C	E
0/1	Crimp				10.41 [.410]
3	Straight solder	3.81 [.150]			10.41 [.410]
32	Straight solder	7.62 [.300]			10.41 [.410]
33	Straight solder	12.70 [.500]			10.41 [.410]
38	Straight solder	5.53 [.218]			12.29 [.484]
39	Straight solder	8.71 [.343]			12.29 [.484]
4 (Shell sizes 1-4)	Right angle solder	3.18 [.125]	12.34 [.486]	1.98 [.078]	
4 (Shell sizes 5-6)	Right angle solder	3.18 [.125]	12.34 [.486]	2.08 [.082]	
51 (Shell sizes 1-4)	Right angle solder	3.18 [.125]	8.07 [.318]	1.98 [.078]	
51 (Shell sizes 5-6)	Right angle solder	3.18 [.125]	8.07 [.318]	2.08 [.082]	
52 (Shell sizes 1-4)	Right angle solder	6.35 [.250]	8.07 [.318]	1.98 [.078]	
52 (Shell sizes 5-6)	Right angle solder	6.35 [.250]	8.07 [.318]	2.08 [.082]	

CREATE A PART



*1 Required if Termination Code 98 selected

*2 Only available for use with Code 0, 1 and 19 in Termination step

ADDITIONAL OPTIONS

Options shown on this page are less common than others. Customers may experience a price and/or lead time impact when selecting these options.

Additional Termination Options

- 2 Wire, removable solder cup, 22 30 AWG [0.3mm²-0.05mm²]
- 33 Straight solder, 0.51 [.020] tail diameter, 12.70 [.500] tail length
- 38 Straight solder, 0.51 [.020] tail diameter, 5.53 [.218] tail length
- 39 Straight solder, 0.51 [.020] tail diameter, 8.71 [.343] tail length
- 51 Right angle solder, 0.51 [.020] tail diameter, 8.07 [.318] contact extension, 3.18 [.125] tail length
- 52 Right angle solder, 0.51 [.020] tail diameter, 8.07 [.318] contact extension, 6.35 [.250] tail length

Additional Mounting Options

C5 IP67-rated inside wall mount, standoffs, for use with termination codes 2, 3, and 98
 C6 IP67-rated inside wall mount, integrated angle brackets, alignment bar, for use with right angle PCB termination types

Additional Backshell Options

EJ Backshell, aluminum, top opening, machined, chemical conversion coating, grounding clips

Additional Locking Systems Options

Fixed female jackposts, compatible with EN and EJ backshells

Additional Shells Options

т

T Aluminum, chemical conversion coating

U Aluminum, cadmium finish - omit Code /AA from Environmental Compliance step when selecting this option

Typical Modification Options

- Low outgassing per ASTM E595 and ECSS-Q-ST-70-02C
- Solder coated contact tails
- Thermocouple contacts
- Blind mate hardware
- Protective dust caps
- EMI dust caps
- ESD packaging
- 100% inspection or other increased inspection levels

Please contact Technical Sales for additional modification options not listed here and for part numbering details.

Positronic MACH-D MCBX Series





TECH SPECS

MCBX Series connectors are mixed density, combination D-Sub connectors built for high-performance applications requiring rugged machined shells. Features include:

- Ability to mix power and signal together in one D-Sub package
- Twenty-five (25) layout options available
- Machined shells for ruggedness, planarity, and precision
- Unique accessories include EMI grounding strips, keyed jackscrews, and banding backshell
- Quality and performance in accordance with MIL-DTL-24308

Trust the **MCBX** to deliver *The Science of Certainty* in mission-critical applications.

GENERAL	
Part Number Prefix	MCBX
Performance Level	Mil/Aero Spaceflight
Qualifications	Meets or exceeds performance requirements for MIL-DTL-24308 Meets or exceeds performance requirements for NASA Goddard GSFC-311
RoHS Compliance	Optional

MATERIAL		IN ACCORDANCE WITH
Insulator	PBT	MIL-DTL-24308 §3.3.5.1
Insulator Color	Blue (PBT)	
Flammability Rating	UL 94V-0	UL 94
Contact Material	Copper alloy	MIL-DTL-24308 §3.3.4; AS39029 MIL-DTL-24308 §3.3.4.2; AS39029
Signal Contact Plating	50 µin gold over nickel or copper underplate	MIL-DTL-24308 §3.3.4.1; AS39029 MIL-DTL-24308 §3.3.4.2; AS39029
Power Contact Plating	50 µin gold over nickel or copper underplate	MIL-DTL-24308 §3.3.4.1
Shell Material	Aluminum Stainless steel For other shell options, please contact Technical Sales	ASTM B221 ASTM A240
Shell Finish	Electroless nickel Stainless steel, passivated Cadmium Chemical conversion coating	See page 3
Interfacial Seal	Contact Technical Sales	
Rear Grommet	Contact Technical Sales	

TECH SPECS

MATERIAL		IN ACCORDANCE WITH
EMI Spring	Copper alloy, plated with electroless nickel	ASTM B194; AMS-C-26074
Adhesive/Sealant	RTV 133 MasterBond Supreme 10AOHT 3M DP190 For low outgassing requirements, please contact Technical Sales	
Conductve Gasket	CHOFORM 5513 For non-conductive options or configurations compatible with Spira-Shield metal EMI shielding, please contact Technical Sales	

ELECTRICAL		IN ACCORDANCE WITH
Working Voltage (rms)	300V	EIA-364-20
Initial Contact Resistance	Size 8 $0.5 \text{ m}\Omega$ maximumSize 161 mΩ maximumSize 204 mΩ maximumSize 225 mΩ maximum	MIL-DTL-24308 §3.5.9; EIA-364-06; IEC 60512-2, Test 2b
Contact Current Rating at 70°C Temperature Rise	Up to 75A, see page 10	UL 1977
Insulation Resistance	5 GΩ	MIL-DTL-24308 §3.5.8; EIA-364-21
Proof Voltage	1000V	EIA-364-20

MECHANICAL		IN ACCORDANCE WITH
Female Contact Design	PosiBand Closed Entry (LSA for size 8)	
Contact Retention In Insulator	40N [9 lbs] (Applies to removable signal contacts) 98N [22 lbs] (Applies to size 8 contacts)	MIL-DTL-24308 §3.5.5; EIA-364-29
Resistance To Soldering Heat - Selective Soldering - Wave Soldering	360°C [680°F] for 4 seconds 260°C [500°F] for 20 seconds	MIL-STD-202-210, condition A MIL-STD-202-210, condition C
Polarization	Trapezoidal shape of shell	
Mechanical Durability	500 cycles	MIL-DTL-24308 §3.5.16; EIA-364-09

ENVIRONMENTAL		IN ACCORDANCE WITH
Operating Temperature	-55 to 125°C	MIL-DTL-24308 §3.5.11; EIA-364-32
Outgassing	Low outgassing options (TML <1.0%, CVCM <0.1%, RML <1.0%) are available, please contact Technical Sales.	ASTM E 595; ECSS-Q-ST-70-02C
Waterproof	Contact Technical Sales	

SHELL DIMENSIONS



 \star1 The 1.85 [.073] shell thickness in the SIDE VIEW is only valid for configurations without angle brackets.

SHELL SIZE	GENDER	A ±0.38 [.015]	B ±0.13 [.005]	C ±0.13 [.005]	D ±0.13 [.005]	E ±0.38 [.015]	G ±0.25 [.010]	H ±0.25 [.010]	К ±0.13 [.005]	F ±0.38 [.015]		
-	Male	30.81	18.75 [.738]	24.99	10.19 [.401]	12.55	19.82	10.82	5.92 [.233]	6.73		
I	Female	[1.213]	16.33 [.643]	[.984]	7.90 [.311]	[.494]	[.494] [.780]	[.426]	6.17 [.243]	[.265]		
0	Male	39.14	27.08 [1.066]	33.32	10.19 [.401]	12.55	28.15	10.82	5.92 [.233]	6.73		
2	Female	[1.541]	24.66 [.971]	[1.312]	7.90 [.311]	[.494]	[1.108]	[.426]	6.17 [.243]	[.265]		
3	Male	53.04	53.04	40.79 [1.606]	47.04	10.19 [.401]	12.55	41.87	10.82	5.84 [.230]	6.50	
5	Female	[2.088]	38.19 [1.504]	[1.852]	7.90 [.311]	[.494]	[1.648]	[.426]	6.17 [.243]	[.256]		
Λ	Male	69.32	69.32	69.32	57.25 [2.254]	63.50	10.19 [.401]	12.55	58.28	10.82	5.84 [.230]	6.50
4	Female	[2.729]	54.84 [2.159]	[2.500]	7.90 [.311]	[.494]	[2.294]	[.426]	6.17 [.243]	[.256]		
5	Male	66.93	54.64 [2.151]	61.11	13.03 [.513]	15.37	55.88	13.67	5.84 [.230]	6.50		
5	Female	[2.635]	52.43 [2.064]	[2.406]	10.74 [.423]	[.605]	[2.200]	[.538]	6.17 [.243]	[.256]		
6	Male	69.32	58.01 [2.284]	63.50	14.61 [.575]	16.97	59.03	15.24	5.84 [.230]	6.50		
0	Female	[2.729]	55.60 [2.189]	[2.500]	12.32 [.485]	[.668]	[.668] [2.324]	[2.324] [.600]	6.17 [.243]	[.256]		

CONTACT TERMINATIONS





Code	Termination type	A	ØD Size 8
2	Solder cup	3.18 [.125]	
3	Straight solder	4.32 [.170]	
35	Straight solder	4.32 [.170]	1.98 [.078]
37	Straight solder	4.32 [.170]	3.18 [.125]
65	Straight solder	4.32 [.170]	

CONTACT TERMINATIONS



Right Angle Solder, code 7 and 77



Right Angle Solder, code 85, shell size 1-5



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See page 35 for PCB mounting hole locations.

CREATE A PART

For additional options and accessories, please see following page.

		МСВХ	17W2	2 S	55	R7	0	0	S	/AA	-15		
													Modifications
•	Series	s Combo-D										-XXXX S	ee bottom of Ilowing page for
	Layou	ut										0	ptions
•	SHEL	L SIZE 1	SHELL SIZE 4									(Contact Plating
	2WK2 5W1	2 (2) #8 (1) #8, (4) #20	8W8 (8) #8 13W6 (6) #8,	(7) #20							-15 -50	50µin Au (min 50µin Au (min) over Ni over Cu) over Cu
	SHEL 3W3	L SIZE 2 (3) #8	17W5 (5) #8, 21WA4 (4) #8,	(12) #20 (17) #20								Environment	al Compliance
	3WK3	(3) #8	25W3 (3) #8, 27W2 (2) #8.	(22) #20 (20) #20						/AA	RoHS		•
	7W2	(2) #8, (5) #20 (1) #8, (10) #20		(20) 20									
		(1) #8, (10) #20	24W7 (7) #8,	(17) #20									Shells
	5W5	(5) #8	36W4 (4) #8,	(32) #20					K	Alumin	um, elect	troless nickel fini	sh
	9W4	(4) #8, (5) #20	43W2 (2) #8,	(41) #20					S	Stainle	ess steel,	, passivated	
	13W3	(3) #8, (10) #20	47 V1 (1) #0,	(40) #20									alvia a Overta era
	17W2 21W1	(2) #8, (15) #20 (1) #8 (20) #20	SHELL SIZE 6									LO	cking Systems
		(.,, (,	46W4 (4) #8,	(42) #20				0	None			areal bay	
	Conta	act Gender					N	ES EW K	Rotating	male jacksc	rews interviews interv	w-profile, intern	al hex,
•	м	Male nin							36-positi	on polarizat	ion (mate	es to S jackpos	t)
NEW	MG	Male pin with grou	unding strips				N	ew s	Fixed ten (mates to	nale jackpos Kiackscre	sts, 36-p w)	osition polariza	tion
	S	Female socket						T2	Fixed fen	nale jackpos	sts, wash	ner set	
•	Termi	ination						All Ic	ocking system o	ptions are cor	mpatible w	vith EN and EJ bac	kshells
	Other si	ize 8 contact styles can	be ordered separate	ly - see Contacts	section							Backsnells	S & BOardlocks
	0	Connector ordered	d without contacts	5			0	None	a faatura an	reer chell c	liamond	loo ud	
	11	Crimp signal & MC	C/FC 4012D power	contacts inclu	uded		C -	elimina)	ates the need	d for backsh	iell)	KHUH	
	15	Crimp signal & MC	C/FC 4008D powe	r contacts incl	uded	1	NEW EN	Backsh	iell, aluminum	, top opening	, machin	ed, electroless n	ckel finish,
	19	Wire, M39029 crin 20 - 24 AWG [0.50	np contacts incluc)mm ² - 0.25mm ²].	led,			Ν	Boardlo	ocks, for use v	with R angle I	orackets i	in Mounting Opti	ons step
	2	Fixed solder cup, s	signal contacts on	ly 4 22 [170] toil	longth								
	3 35	Straight solder, sig	anal and 1.98 [.078	4.32 [.170] tai	itacts.								
	37	4.32 [.170] tail leng Straight solder, sig	ith gnal and 3.18 [.125	Ø power con	tacts,								
	5	4.32 [.170] tail leng Right angle solder	ith , signal contacts c	nly,									
	55	Right angle solder 8.07 [3.18] signal of	, signal and 1.98 [.	078] Ø power	contacts,								
	57	Right angle solder 8.07 [3.18] signal c	, signal and 3.18 [. contact extension	125] Ø power (contacts,				F	or addit	ional	options	
	65	Straight solder, sig 4.32 [.170] tail leng	Inal and size 8 shi	elded contacts	S,					and	acce	essories,	
	85	Right angle solder 8.07 [3.18] signal c	, signal and size 8 contact extension	shielded cont	acts,					fo	ple Ilowir	ease see	
-	Mour	nting Options								10		ig page.	
-	0 R2 ^{*1}	Clearance hole, 3. Angle brackets int non-removable fer	.05 [.120] Ø egrated with shell, male jackposts	alignment ba	r with								
	R6*1	Angle brackets int clearance hole. 3.0	egrated with shell 05 [.120] Ø, alianm	ent bar									
	R7 ^{*1} R8 ^{*1} S	Angle brackets int Angle brackets int Standoffs. swage	egrated with shell, egrated with shell, d, 4-40	4-40 threade 4-40 locknut,	d hole, aligr alignment l	nment bar bar		+1 AP	ment le suferior	kinglugi - tr			ol 014/0 L ou t ¹¹¹

Locknut, swaged, 4-40

Standoffs, swaged, 4-40, boardlocks

S5 S6 *1 Alignment bar is not included for 2WK2, 3WK3, 3W3, 5W5, and 8W8 Layouts with right angle termination styles.

*2 Only available for use with Code 0, 1, 11, 12, 15 and 19 in Termination step

ADDITIONAL OPTIONS

Options shown on this page are less common than others. Customers may experience a price and/or lead time impact when selecting these options.

Additional Termination Options

- 12 Crimp signal & MC/FC 4016D power contacts included
- 36 Straight solder, signal and 2.39 [.094] Ø power contacts included, 4.32 [.170] tail length
- 7 Right angle solder, metric footprint, signal contacts included, 10.31 [.406] contact extension
- 75 Right angle solder, metric footprint, signal and 1.98 [.078] Ø power contacts included, 10.31 [.406] contact extension
- 77 Right angle solder, metric footprint, signal and 3.18 [.125] Ø power contacts included, 10.31 [.406] contact extension

Additional Backshell Options

EJ Backshell, aluminum, top opening, machined, chemical conversion coating, grounding clips

Additional Locking Systems Options

T Fixed female jackposts, compatible with EN and EJ backshells

Additional Shells Options

T Aluminum, chemical conversion coating
 U Aluminum, cadmium finish - omit Code /AA from Environmental Compliance step when selecting this option

Typical Modification Options

- Low outgassing per ASTM E595 and ECSS-Q-ST-70-02C
- Solder coated contact tails
- Thermocouple contacts
- IP-rated waterproofing
- Blind mate hardware
- Protective dust caps
- EMI dust caps
- Panel mount with EMI O-ring
- ESD packaging
- 100% inspection or other increased inspection levels

Please contact Technical Sales for additional modification options not listed here and for part numbering details.

#20 & #22 SIGNAL CONTACTS



*1 Chromel® and Alumel® are registered trademarks of the Hoskins Manufacturing Company

M39029 MILITARY CONTACT PART NUMBERS

PART NUMBER	Series	Size	Gender	Female Contact Style	Stranded AWG [mm2]	Color Code	Plating	Туре
M39029/57-354	MCDD, MCBX	#22	Female	Closed entry	#22-28 [.308]	Orange / Green / Yellow	50µin Au (min) over Ni	Crimp
M39029/58-360	MCDD, MCBX	#22	Male	n/a	#22-28 [.308]	Orange / Blue / Black	50µin Au (min) over Ni	Crimp
M39029/57-982	MCDD, MCBX	#22	Female	Closed entry	#22-28 [.308]	White / Gray / Red	50µin Au (min) over Cu	Crimp
M39029/58-986	MCDD, MCBX	#22	Male	n/a	#22-28 [.308]	White / Gray / Blue	50µin Au (min) over Cu	Crimp
M39029/63-368	MCD, MCBX	#20	Female	Closed entry	#20-24 [.525]	Orange / Blue / Gray	50µin Au (min) over Ni	Crimp
M39029/64-369	MCD, MCBX	#20	Male	n/a	#20-24 [.525]	Orange / Blue / White	50µin Au (min) over Ni	Crimp
M39029/63-928	MCD, MCBX	#20	Female	Closed entry	#20-24 [.525]	White / Red / Gray	50µin Au (min) over Cu	Crimp
M39029/64-968	MCD, MCBX	#20	Male	n/a	#20-24 [.525]	White / Blue/ Gray	50µin Au (min) over Cu	Crimp

Positronic is qualified to supply the legacy design, as well as the PosiBand design. If the requirement is for PosiBand-style female contacts, add "POSIBAND" to the end of the M39029 part number (e.g. M39029/57-354 POSIBAND).

#8 POWER CONTACTS



- 10 For use with 10 AWG wire, not available in solder cup
- 12 For use with 12 14 AWG wire
- 16 For use with 16 18 AWG wire

#8 HIGH VOLTAGE CONTACTS



#8 COAX CONTACTS



Braid conductor is plated 30µin Au (min) over Ni over Cu.

BACKSHELLS & BOARDLOCKS



PANEL MOUNT SEALING FLANGE



*1 Standard O-ring material: CHOFORM 5513 Ag/Cu filled silicone (form-in-place, non-removable)

*2 O-ring groove dimensions compatible with Spira-Shield SS-02 metal EMI gasketing

	SHELL SIZE	А	В	С
_	1	20.47 [.806]	11.40 [.449]	24.99 [.984]
NNO	2	28.80 [1.134]	11.40 [.449]	33.32 [1.312]
∑ ⊒ 3	3	42.52 [1.674]	11.40 [.449]	47.04 [1.852]
	4	59.08 [2.326]	11.40 [.449]	63.50 [2.500]
INSIN	5	56.34 [2.218]	14.10 [.555]	61.11 [2.406]
-	6	59.51 [2.343]	15.67 [.617]	63.50 [2.500]

Panel Cutout Dimensions



For panel cutout details for use with code S keyed jackposts, contact Technical Sales.

MOUNTING OPTIONS _____



LOCKING SYSTEMS



MOUNTING HOLE FOR ANGLE BRACKET _____

	1
3.18 [.125] Typ.	G

		Shell size							
SERIES	Termination Code	1	2	3	4	5	6		
				25 [.01	10]				
	4		13.76	[.542]		15.18 [.598]			
MCD	42		11.58	[.456]		12.85 [.506]			
	5/51/52/53/54		9.44	10.87 [.428]					
MCDD	4		14.24	15.39 [.606]	16.43 [.647]				
MCDD	51/52		10.06	[.396]		11.20 [.441]	12.11 [.477]		
MODY	5/55/57/85		9.44	10.87 [.428]	12.36 [.487]				
WCBX	7/75/77		11.58	[.456]		12.85 [.506]	13.89 [.547]		

TEST DATA _____

The following tests have been conducted using applicable configurations of MCD, MCDD, and MCBX Series connectors:

Test	Test Condition	Criteria	Results	
Comboot Datastics	MIL-DTL-24308J	Signal contacts: 9 pound axial force, each direction		
Contact Retention	EIA-364-29	Power contacts: 22 pounds axial force, each direction	Pass	
Dielectric Withstanding	MIL-DTL-24308J @ sea level	1000V	Pass	
Voltage	MIL-DTL-24308J @ 70000 ft-equivalent	325V	1 455	
Insulation Resistance	MIL-DTL-24308J EIA-364-21	5 GΩ	Pass	
Contact Resistance	MIL-DTL-24308J EIA-364-06	Per MIL-DTL-24308J Table VI	Pass	
Temperature Cycling	MIL-DTL-24308J EIA-364-32, condition I (5 cycles) @ -55°C to 155°C	Connector verified with DWV, insulation resistance, mating/unmating	Pass	
Humidity MIL-DTL-24308J EIA-364-31, method IV Cc		Connector verified with DWV, insulation resistance	Pass	
Vibration	MIL-DTL-24308J EIA-364-28, test condition IV (sinusoidal) 10-2000 Hz, 20 g peak	No signal discontinuity longer than 1 µs, no damage	Pass	
VIDFATION	MIL-DTL-24308J EIA-364-28, test condition VI, letter J (random) 50-2000 Hz, 1.0 g²/Hz, 43.92 g RMS	No signal discontinuity longer than 1 µs, no damage		
Shock	MIL-DTL-24308J EIA-364-27, test condition E No signal discontinuity longer than 1 µs, no damag		Pass	
Durability	MIL-DTL-24308J EIA-364-09	500 mating cycles	Pass	
	EIA-364-09 (extreme lifespan)	10000 mating cycles		
Salt Spray	MIL-DTL-24308J EIA-364-26, test condition A	96 hours (Code T shell plating)	Page	
San Spray	MIL-DTL-24308J EIA-364-26, test condition C	500 hours (Code K, S, U shell platings)	1 455	
Magnetic Permeability	ASTM A342/A342M	≤ 2µ	Pass	
Residual Magnetism	Goddard S-311 Level C (GSFC NMC)	≤ 20 gamma	Pass	
Outgassing	ASTM E595, ECSS-Q-ST-70-02C	TML <1.0%, CVCM <0.1%, RML <1.0%	Pass	

Zero Gravity. Zero Oxygen. Zero Margin of Error.

When you're dangling 150 miles above the stratosphere, systems failure is not an option. At Positronic, we build high reliability power and signal connectors. But our true call is to provide certainty. Rock solid, mission-critical performance upon which you can bank life and limb, family and fortune. We consider it an honor. We consider it an inviolable trust.



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22 Mile Patrol.6 Roadside IEDs.Zero Margin of Error.

When it's your job to detect and disarm concealed explosives, systems failure is not an option. At Positronic, we build high reliability power and signal connectors. But our true call is to provide certainty. Rock solid, mission-critical performance upon which you can bank life and limb, family, fortune, freedom. We consider it an honor. We consider it an inviolable trust.



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All dimensional tolerances are \pm 0.38 [0.015], unless otherwise specified. Dimensions are in millimeters [inches]. All dimensions are subject to change. Product pictures may not be identical in appearance to actual production parts.

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Products described within this catalog may be protected by one or more of the following US patents:

#4,900,261[°] #5,255,580 #5,329,697 #6,260,268 #6,835,079 #7,115,002 #8,944,697 #9,304,263

Patented in Canada, 1992 Other patents pending

Federal Supply Code for Manufacturers

Positronic Industries: 28198 Positronic Industries SAS: FA7Y0 Positronic Asia PTE LTD: QB952

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