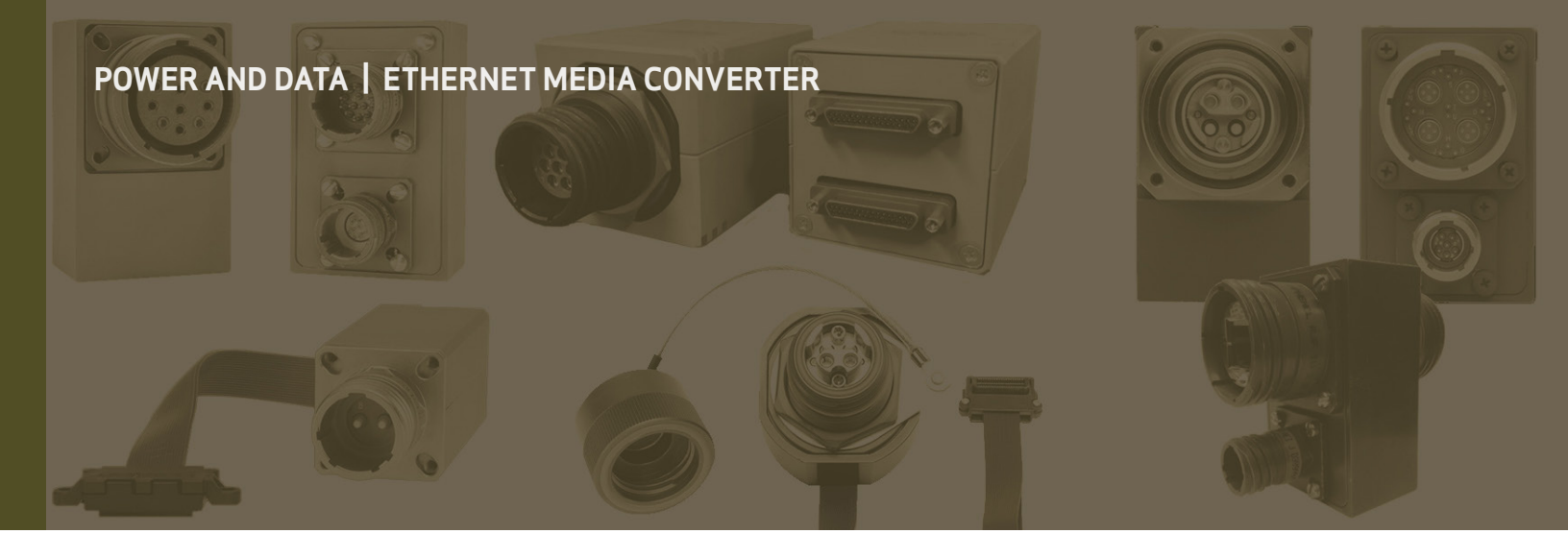


MERCURY SERIES

FAST ETHERNET, EXTERNAL D38999, 100BASE-TX / FX MEDIA CONVERTER, 28 VDC, MULTIMODE, 1310 NM

Mercury series Fast Ethernet media converters consist of optoelectronic transmitter and receiver functions integrated along with the 100Base-TX Ethernet electrical to 100Base-FX optical media conversion circuitry into a bulkhead mounted MIL-DTL-38999 connector assembly.

The optical transmitters are high output 1310 nM devices. The optical receivers consist of InGaAs PIN and preamplifier assemblies and limiting post-amplifiers.

The electrical interface to the Mercury series bulkhead optical media converters is a MIL-DTL-38999 connector enabling interconnection to an internal or external backbone cable interface.

Mercury series Fast Ethernet media converters are vibration isolated, environmentally hardened components designed for use in harsh environment applications.

- Sealed against liquid and solid contaminants
- Shock and vibration resistant

MOOG

DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

Dual Port, Flange Receptacles
D38999 to D38999 / Optical to Electrical Media Converter

FEATURES

- Compliant with IEEE-802.3u Fast Ethernet
- Optical fiber link distances up to 2.0 kilometers
- Maximum optical channel bit error rate less than 2.5×10^{-10}
- Operating temperature range from -40° to +85° C
- Shock, vibration and immersion resistant per MIL-STD-810
- Olive drab cadmium plating meets stringent EMI / RFI performance specifications
- Aluminum alloy chassis and MIL-DTL-38999 housings are strong, durable, corrosion resistant and light weight
- MIL-T-29504 compliant optical fiber connector interface
- D38999 fiber optic insert configuration conforms to MIL-STD-1560
- D38999 electrical interfaces provides robust interconnection to vehicle wiring

APPLICATIONS

Mercury series bulkhead mounted Fast Ethernet media converters enable high speed network communications over long distances in harsh environments.

- Fast Ethernet switches and peripherals
- Telecom and datacom switch / router rack-to-rack links
- Storage or computation clusters

The MIL-DTL-38999, series III connectors provide sealed optical and electrical interfaces that are water-tight to MIL-STD-810 / IP67 / NEMA-4x when mated.

The multimode optical fiber interface supports applications where copper cable link distance, bandwidth, weight or bulk make the use of twisted pair, twinax or quadrax copper conductors unacceptable.

ORDERING INFORMATION

Application	Part Number
Dual Port, 100Base-TX to FX, 28 VDC	M33R-4LAU-FW

See Appendix A3 for more part number options.

DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

ABSOLUTE MAXIMUM RATINGS

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Storage Temperature	T_S	-55		+100	°C
Supply Voltage	V_{CC}	-0.5		45.0	V
Data Input Voltage	V_I	-0.5		V_{CC}	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Operating Temperature	T_A	-40		+85	°C
Supply Voltage	V_{CC}	+18.0	+28.0	+36.0	VDC
Power Supply Noise (p-p)	N_P			200	mV

DESIGNED TO SPECIFICATIONS COMPLIANCE

Requirement	Feature	Condition	Notes
MIL-STD-883	ESD	Class II	2200 V
MIL-STD-810	Vibration	$3.8g^2$ / Hz	43G rms
MIL-STD-810	Shock	40.0 g	6-9 mS
MIL-STD-1344	Flame Resistance	Method 1012	30 Seconds
MIL-STD-1344	Damp Heat	10 Cycles	24 Hours
MIL-STD-38999	Mating Durability	500 Cycles	< 0.5 dB Change
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

MATERIALS

Item	Detail	Notes
D38999 Cylindrical Shells	Aluminum Alloy	
Plating	Olive Drab Cadmium	
D38999 Inserts	Thermoplastic	
Interfacial Seals	Elastomer	
Optical Alignment Sleeves	Composite Polymer	
Printed Circuits	Polyimide / FR-4	MIL-P-31032 Type 4
Housing	Aluminum Alloy	

DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

TRANSMITTERS T_A = OPERATING TEMPERATURE RANGE

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power	P_O	-19.0		-14.0	dBm
Optical Output Wavelength	λ_{OUT}	1260	1310	1380	nM

RECEIVERS T_A = OPERATING TEMPERATURE RANGE

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity	P_I	-31.5		-12.0	dBm
Optical Wavelength	λ_{IN}	1100		1590	nM

SUPPLY CURRENT T_A = OPERATING TEMPERATURE RANGE

Parameter	Symbol	Typical	Maximum	Unit
Supply Current per Port	I_{CCT}	100	150	mA

OPTICAL FIBER LINK DISTANCES

Protocol	Cable Specification	Distance
Fast Ethernet - IEEE 802.3u FDDI PMD ISO / IEC 9314-3	62.5 / 125µ - 500 MHz*Km	2.0 Km
	50 / 125µ - 500 MHz*Km	2.0 Km

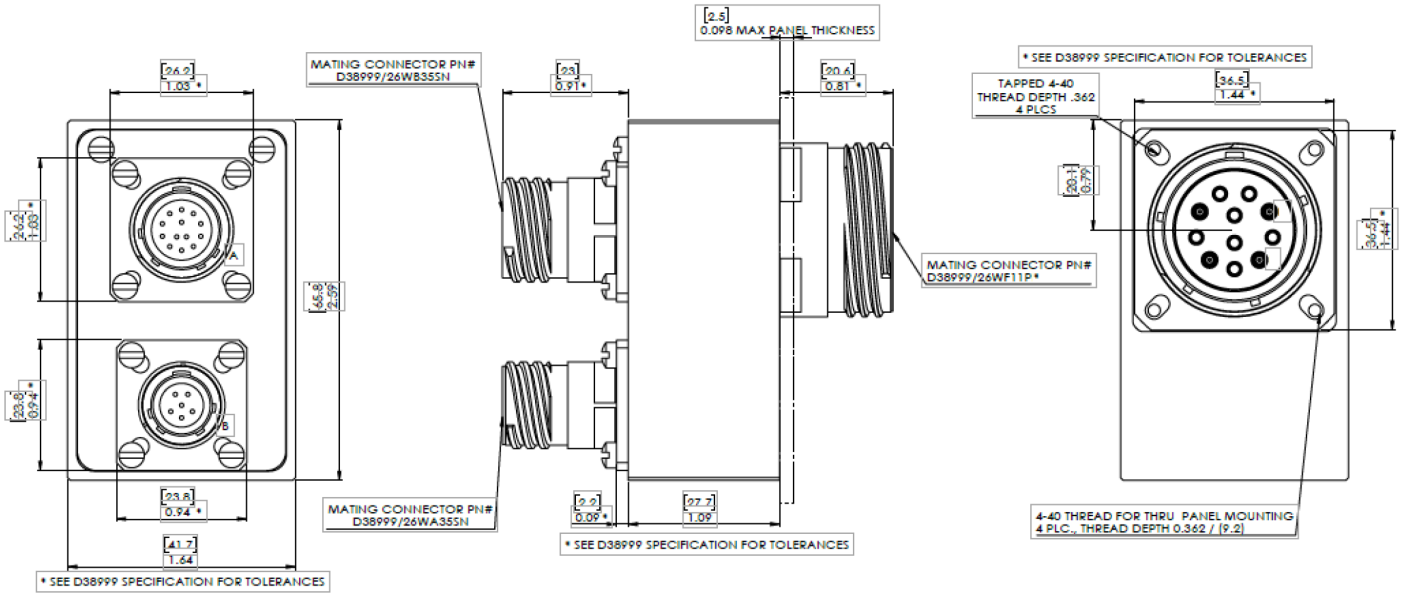
COPPER CABLE LINK DISTANCES

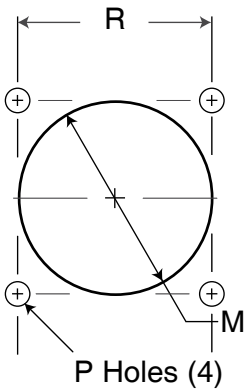
Protocol	Cable Specification	Distance
Fast Ethernet - IEEE 802.3u	TIA / EIA-568-B Cat 5*	100 M

*For other transmission media, please consult the factory.

DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

OUTLINE DRAWING





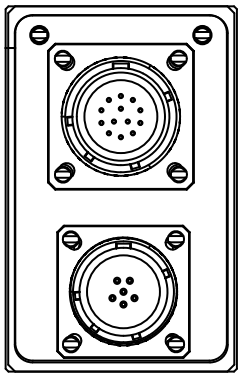
*See appendix A3 for J1 options

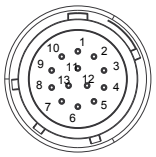
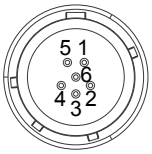
PANEL CUTOUT DIMENSIONS - REAR PANEL MOUNTING ONLY

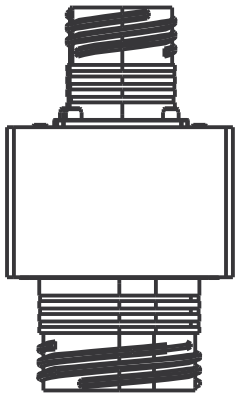
Shell Size Code	Shell Size	M Min	P Holes	R Bsc
F	19	1.297 (32.94)	0.133 (3.4) 0.123 (3.1)	1.156 (29.4)

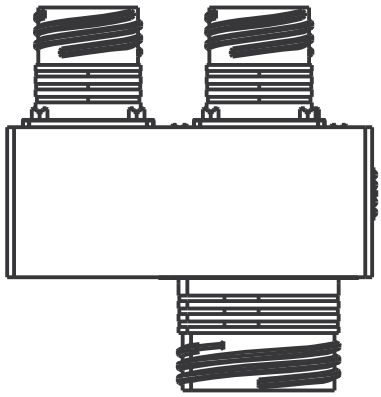
DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

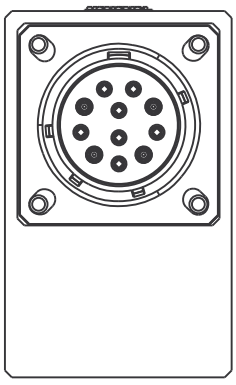
MEDIA CONVERTER INSERT ARRANGEMENTS

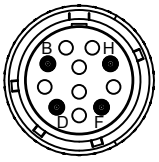


Media Converter Insert Pin Numbers	Media Converter Pin Functions	Mating Cable Plug Connector P/N
	**100Base-TX** See Appendix A2	D38999 / 26WB35SN Cat-5E Twisted Pair Cable
	**Power Supply Interface** Pin 1 = Case Ground Pin 2 = Case Ground Pin 3 = Case Ground Pin 4 = Case Ground Pin 5 = VEE Pin 6 = VCC	26-22 Guage Copper Wire D38999 / 26WA35SN
Media Converter Pin Numbers and Functions Shown - Mating Cable Plug Opposite		







Media Converter Insert Pin Numbers	Media Converter Pin Functions	Mating Cable Plug Connector P/N
	**Port 0** Position H = Optical TX Position F = Optical RX **Port 01** Position B = Optical TX Position D = Optical RX	**62.5 / 125 Fiber Optic Cable** D38999 / 26WF11P* M29504 / 04 *See Appendix A2
Media Converter Fiber Pin Numbers and Functions Shown - Mating Cable Plug Opposite		

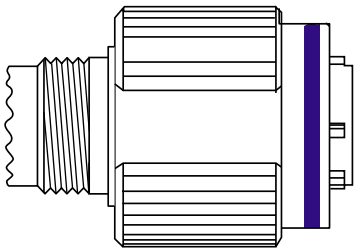
DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

APPENDIX A2 MIL-DTL-38999 FIBER OPTIC CABLE PLUG / MIL-T-29504 PIN TERMINI

*See DSCC or SAE QPL for Approved Suppliers
http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=38999

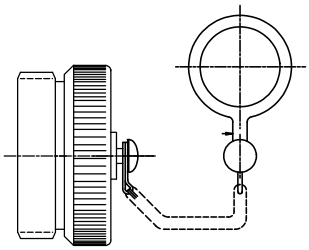
*D38999 PLUG - PIN INSERT
MIL-DTL-38999 CABLE PLUG

MS Plug P/N *D38999 / 26WF11P*



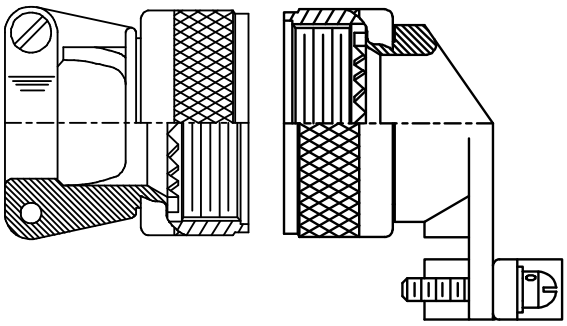
*CABLE PROTECTION CAP
D38999 / 32 PLUG PROTECTION CAP

MS Plug Cap P/N *D38999 / 32W19N



*CABLE BACKSHELL
MIL-C-85049 CABLE BACKSHELL

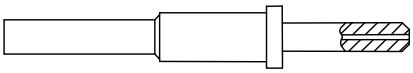
MS Backshell P/N *MS85049 / XXXXXX**



**Straight or angled backshell - defined by application / mounting configuration

*FIBER OPTIC PIN TERMINUS
MIL-T-29504 PIN TERMINUS

MS Pin Terminus P/N *M29504 / 04-xxxx**

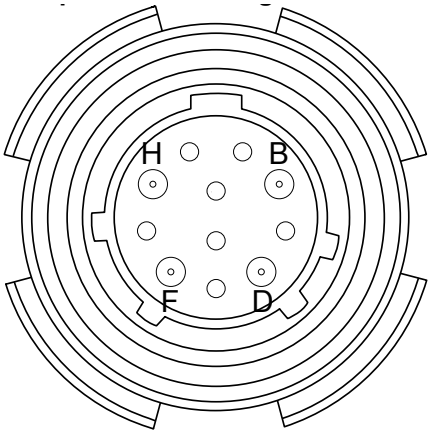


**Defined by fiber optic cable configuration

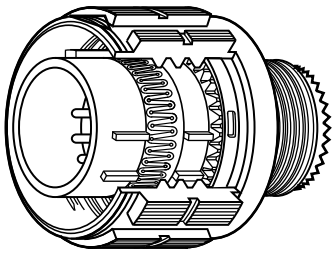
D38999 PLUG PORT FUNCTIONS

Port Number	TX	RX
0	H	F
1	B	D

TOP
Optical Cable Plug Interface

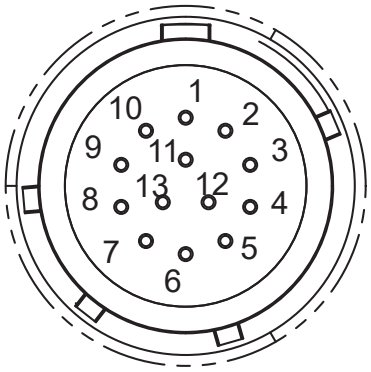


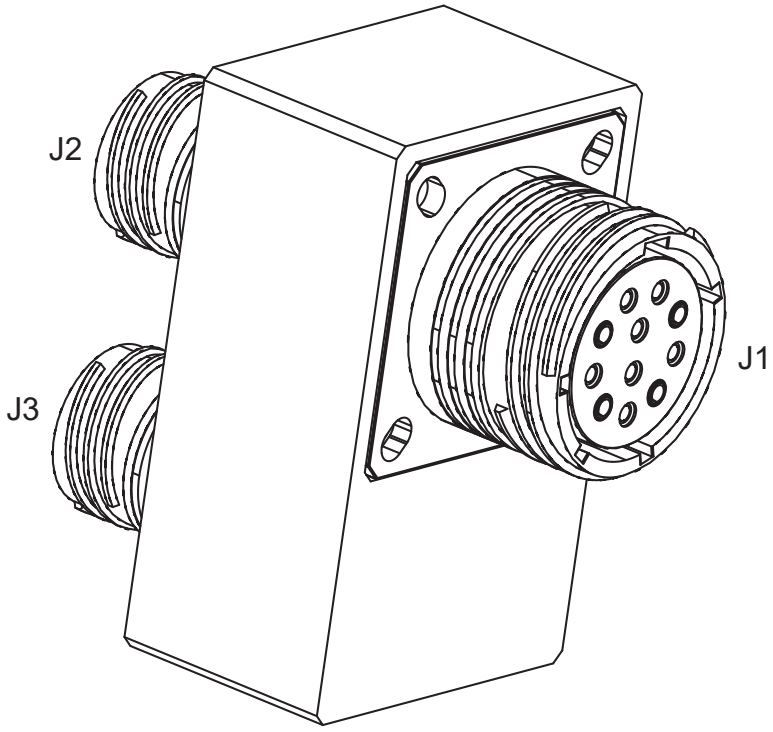
Front face of the optical cable plug pin insert shown. Transceiver insert oppostie.



DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

APPENDIX A3 ELECTRICAL DATA CABLE - CONNECTOR WIRING SCHEMATIC





WIRING FOR CONNECTION

J2 Pin Functions	RJ-45 Equivalent Pin Number
Pin 2 = Port 0 TX+	1
Pin 3 = Port 0 TX-	2
Pin 4 = Port 0 RX+	3
Pin 5 = Port 0 RX-	6
Pin 8 = Port 1 TX+	1
Pin 7 = Port 1 TX-	2
Pin 10 = Port 1 RX+	3
Pin 9 = Port 1 RX-	6

All others are signal GND.

DUAL PORT MERCURY SERIES MIL-DTL-38999, 100BASE-TX TO 100BASE-FX, FAST ETHERNET MEDIA CONVERTER, MULTIMODE, 28 VDC, 1310 NM

APPENDIX A4 PART NUMBER OPTIONS

DUAL PORT, FAST ETHERNET, MEDIA CONVERTER, 1310 nM

M33R - 4 L A U - F x x

SHELL CONFIGURATION
M33R = 38999 Receptacle

CHANNELS (TX + RX)
4 = 2 TX + 2 RX

WAVELENGTH
L = 1310 nM

POWER SUPPLY VOLTAGE
A = 28.0 VDC

FIBER OPTIC INTERFACE
U = 125 Mbps

SHELL SIZE CODE
F = 19-11

SHELL PLATING
F = NI
W = OD CD / NI
Z = ZN / NI

J1 SHELL POLARIZATION
(Leave blank) = N
A = A
B = B
C = C
D = D

Other wavelength, mounting and port count options are available.

Please consult the Protokraft website for alternate configurations.

192 Bob Fitz Road, Johnson City, TN 37615
salesmp@moog.com
moogprotokraft.com