

# Neptune Series

Gigabit Ethernet, External M28876, 1000Base-T / SX Media Converter, 28Vdc, Multimode, 850nm

## Dual Port, Flange Receptacles

### FEATURES

- Compliant with IEEE-802.3:2005 Gigabit Ethernet
- Optical fiber link distances up to 550 Meters
- Maximum optical channel bit error rate less than  $1 \times 10^{-12}$
- Operating temperature range from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Shock, vibration and immersion resistant per Mil-Std-810 and Mil-Std-1344
- Olive Drab Cadmium over Aluminum meets stringent EMI / RFI performance specifications
- Aluminum housing, M28876 and Mil-Dtl-38999 connectors are strong, durable and corrosion resistant
- M28876 compliant optical fiber connector interface
- D38999 Quadrax electrical signal interfaces provide robust interconnection to vehicle or shelter cabling

### APPLICATIONS

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

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

The M28876 optical and D38999 Series III electrical 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.



M28876 to D38999 / Optical to Electrical Media Converter

### DESCRIPTION

Neptune series Gigabit Ethernet media converters consist of optoelectronic transmitter and receiver functions integrated along with the 1000Base-T Ethernet electrical to 1000Base-SX optical media conversion circuitry into a wall mounted M28876 connector assembly.

The optical transmitters are high output 850nm VCSEL's. The optical receivers consist of GaAs PIN and preamplifier assemblies and limiting post-amplifiers.

The electrical signal interface to the Neptune series optical media converters is a Mil-Dtl-38999 Quadrax connector enabling interconnection to an internal or external backbone cable interface. The electrical power interface to the Neptune series bulkhead optical media converters is a Mil-Dtl-38999 electrical connector enabling interconnection to a vehicle or shelter power supply.

Neptune series Gigabit 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

### ORDERING INFORMATION

Application	Item Number
1000Base-T to SX, 28Vdc	M76R-4SAT-FW

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## 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

## SPECIFICATIONS COMPLIANCE

Requirement	Feature	Condition	Notes
MIL-STD-883	ESD	Class II	2200V
MIL-STD-810	Vibration	3.8g <sup>2</sup> /Hz	43G rms
MIL-STD-810	Shock	40.0g	6-9mS
MIL-STD-1344	Flame Resistance	Method 1012	30 Seconds
MIL-STD-1344	Damp Heat	10 Cycles	24 Hours
M28876	Mating Durability	2000 Cycles	EIA/TIA-455-21
FDA / CDRH / IEC-825-1	Eye Safety	Class 1	No Safety Interlocks Required

## MATERIALS

Item	Detail	Notes
D38999 & M28876 Cylindrical Shells	Aluminum	
Plating	OD / CD	
D38999 Inserts	Thermoplastic	
Interfacial Seals	Elastomer	
Optical Ferrules	Zirconia	
Printed Circuits	Polyimide / FR-4	MIL-P-31032 Type 4
Housing	Aluminum	

Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
Gigabit Ethernet Media Converter, Multimode, 28Vdc, 850nm

**OPTICAL TRANSMITTERS  $T_A$  = Operating Temperature Range**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Output Power	$P_o$	-9.5		-4.0	dBm
Optical Output Wavelength	$\lambda_{OUT}$	830	850	860	nM
Spectral Width	$\Delta\lambda_{RMS}$			0.85	nM

**OPTICAL RECEIVERS  $T_A$  = Operating Temperature Range**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Optical Sensitivity	$P_i$	-17.0		-2.0	dBm
Optical Wavelength	$\lambda_{IN}$	830	850	860	nM

**POWER SUPPLY CURRENT  $T_A$  = Operating Temperature Range**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Supply Current per Port @ 28VDC	$I_{CCT}$		100	150	mA

**OPTICAL LINK DISTANCES**

Protocol	Cable Specification	Distance
Gigabit Ethernet - IEEE-802.3:2005 - 1000BASE-SX	62.5/125 $\mu$ 200MHz*Km	275M
	50/125 $\mu$ 500MHz*Km	550M

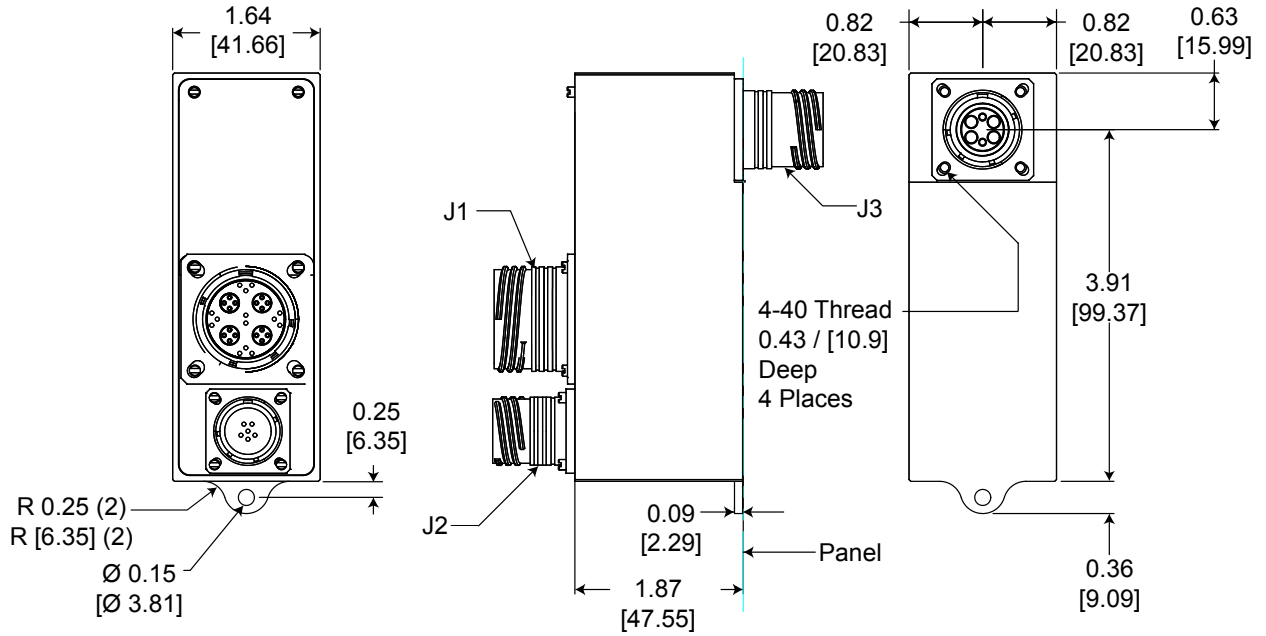
**COPPER LINK DISTANCES**

Protocol	Cable Specification	Distance
Gigabit Ethernet - IEEE-802.3:2005 - 1000BASE-T	TIA/EIA-568-B Cat 5E - for other transmission media, please consult the factory	100M

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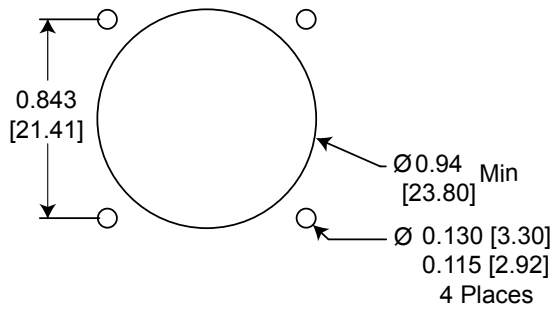
**OUTLINE DRAWING**

Dimensions are shown as: inches [mm]



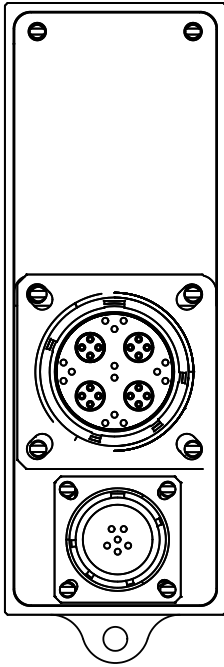
**RECOMMENDED PANEL CUTOUT**

Dimensions are shown as: inches [mm]



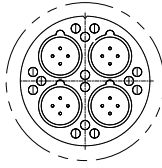
Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
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**MEDIA CONVERTER INSERT ARRANGEMENTS**



**J1**

**Media Converter  
Insert Pin Numbers**



**Media Converter  
Pin Functions**

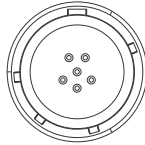
**Electrical Signal Interface**

See Appendix A2

**Mating Cable Plug**

20 Gauge & Quadrx Cable  
See Appendix A3

**J2**



**Power Supply Interface**

See Appendix A4

20 Gauge Copper Wire  
See Appendix A5

**Media Converter  
Optical Pin Numbers**

**Media Converter  
Optical Functions**

**Mating Cable Plug**

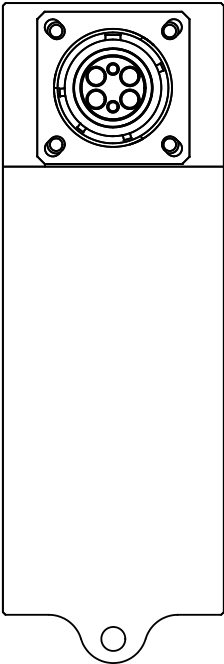
**Optical Fiber Interface**

**J3**



Position 1 = Optical TX(1)  
Position 2 = Optical RX(1)  
Position 3 = Optical TX(2)  
Position 4 = Optical RX(2)

Fiber Optic Cable  
See Appendix A1

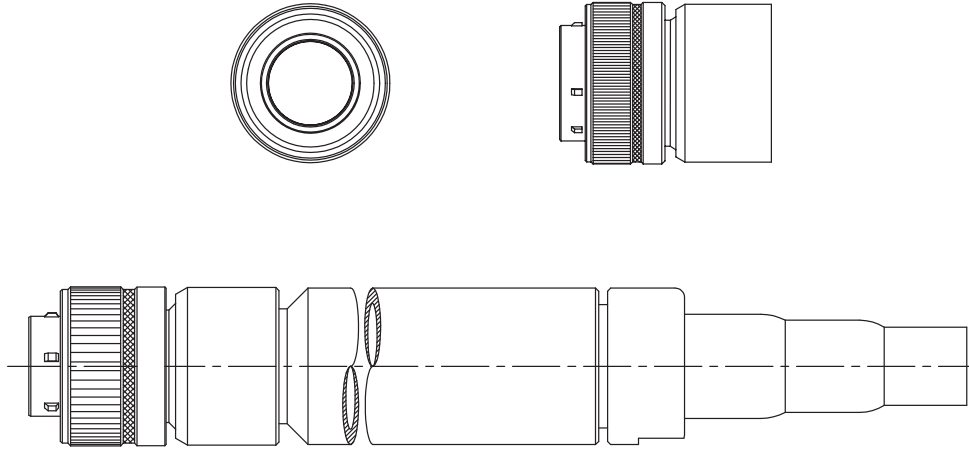


Media Converter Fiber Pin Numbers and Functions Shown - Mating Cable Plug Opposite

Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
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## APPENDIX A1

### M28876/7 4 Channel Fiber Optic Cable Plug



#### \*M28876 FIBER OPTIC CABLE PLUG

CONFIGURATION	GENERIC P/N	AMPHENOL P/N*
4 Fiber / Size 13 Shell / Pol 1	M28876/7-B12P1	FS3M1100-12P1*
Termini - Multimode	M29504/14-4131C	*
Termini - Single Mode	M29504/14-4141C	*

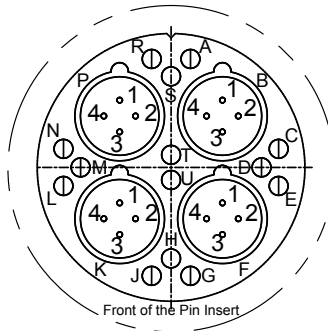
\*Contact Amphenol Fiber Systems International for more information about the M28876 fiber optic cable plugs and termini: +1.214.547.2400 or sales@fibersystems.com

Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
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## APPENDIX A2

### J1 Pin Functions

#### Electrical Data Connector Wiring Schematic



Dual Port / Gigabit Ethernet

Pin	Channel	Pin Function	Pin	Channel	Pin Function
A	N/A	Power Supply Status	K1	2	IEEE-802.3:2005 DA+
B1	1	IEEE-802.3:2005 DA+	K2	2	IEEE-802.3:2005 DB+
B2	1	IEEE-802.3:2005 DB+	K3	2	IEEE-802.3:2005 DA-
B3	1	IEEE-802.3:2005 DA-	K4	2	IEEE-802.3:2005 DB-
B4	1	IEEE-802.3:2005 DB-	L	N/A	No Connect
C	N/A	No Connect	M	N/A	No Connect
D	N/A	No Connect	N	N/A	No Connect
E	N/A	No Connect	P1	2	IEEE-802.3:2005 DC+
F1	1	IEEE-802.3:2005 DC+	P2	2	IEEE-802.3:2005 DD+
F2	1	IEEE-802.3:2005 DD+	P3	2	IEEE-802.3:2005 DC-
F3	1	IEEE-802.3:2005 DC-	P4	2	IEEE-802.3:2005 DD-
F4	1	IEEE-802.3:2005 DD-	R	N/A	DC Return
G	N/A	No Connect	S	N/A	No Connect
H	N/A	No Connect	T	N/A	No Connect
J	N/A	No Connect	U	N/A	No Connect

### J1 Power Supply Status Indicator Functions

The Power Supply Status Indicator is High when power supply conditions are acceptable and Low when power supply conditions are unacceptable. The Power Supply Status Indicator logic state is referenced to 3.3Vdc.

See Appendix A3 for identification of the mating cable plug

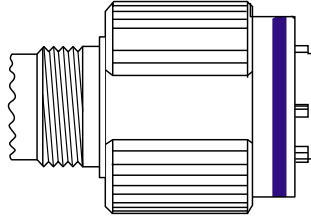
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## APPENDIX A3

### Electrical Data Cable - Plug Configuration

#### ELECTRICAL CABLE PLUG - SOCKET INSERT\*

CONFIGURATION	GENERIC P/N	AMPHENOL P/N*
D38999 Size 19-18	D38999/26xF18SN	TV06RQx19-18S*



x = Service Class\*

\*Contact your local Amphenol Sales Representative for more information about the Amphenol D38999 QuadraX cable plugs

#### RJ-45 PIN ASSIGNMENTS

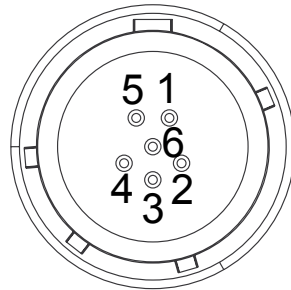
Signal	Media Converter		RJ-45
DA+	B1	K1	1
DB+	B2	K2	3
DA-	B3	K3	2
DB-	B4	K4	6
DC+	F1	P1	4
DD+	F2	P2	7
DC-	F3	P3	5
DD-	F4	P4	8



Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
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## APPENDIX A4

### J2 Pin Functions - Power Supply Connector Electrical Power Cable - Connector Wiring Schematic



Pin	Pin Function
1	Isolated Case Ground
2	Isolated Case Ground
3	Isolated Case Ground
4	Isolated Case Ground
5	18 - 36 VDC
6	VDC Return

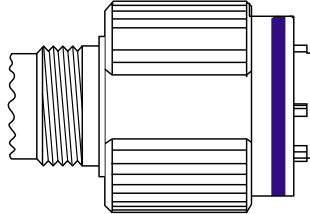
Dual Port Neptune Series M28876 Connector, 1000Base-T to 1000Base-SX,  
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## APPENDIX A5

### Power Cable - Plug Configuration

#### POWER CABLE PLUG - SOCKET INSERT\*

CONFIGURATION	GENERIC P/N	AMPHENOL P/N*
D38999 Size 9-35	D38999/26xA35SN	TV06Rx-9-35SN*



x = Service Class

\*Contact your local Amphenol Sales Representative for more information about the Amphenol D38999 power cable plugs



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