

Fiber Optic Selector Guide for PLC & Serial Communication Networks



Electrical Interface Modules



Optical Interface Modules



Power Supply Modules



Self-Healing Ring Modules

EOTec 2000 Self-Healing Ring (SHR) Networks



- Self-Healing Ring solution
- Achieve media redundancy without duplicate hardware
- Instantaneous switchover, in case of fiber failure, eliminates down time
- Snap-on upgrade to existing EOTec 2000 systems
- Local and remote alarm indication
- Automatic ring recovery after failed fiber link is restored

The use of fiber optic technology to replace copper communications cable provides many advantages for industrial control applications. In addition to EMI/RFI immunity, the ability to run fiber optic cable through hazardous areas and long distance communications runs, another benefit of fiber is the ability to achieve media redundancy without incurring the cost of duplicate hardware systems. By using Ultra Electronics' **Self-Healing Ring (SHR)** modules, a critical system can achieve uninterrupted communications in the event of a failure in the fiber optic communications lines.

Constructing a self-healing ring network is as simple as adding the appropriate module(s) from the table below to an existing EOTec 2000 stack consisting of a PSM, EIM and two OIM's. In the case of Profibus, the self-healing ring function is integrated into the electrical interface module, so that only the EIM, PSM and two OIM's are required.

When employing a self-healing ring configuration, the self-healing ring module is hardwired as Master. The electrical interface module must be set to "1" and the adjacent modules must be set to "2" and "3".

Part Number	Network Protocol	Communications Data Rate	Certifications	Compatible Electrical Interface Modules
2C23	PROFIBUS-DP W/ 24VDC POWER	ALL PROFIBUS DATA RATES	CE	BUILT INTO DEVICE
2C30	GE GENIUS, R-NET, MODICON REMOTE I/O, MODICON MODBUS PLUS, AB DH+, AB REMOTE I/O	9.6K TO 2M BAUD	FM APPROVED CLASS 1 DIVISION 2 GROUPS A, B, C, D	2C02, 2C07, 2C12, 2C14, 2C15, 2C29
2C30 - RELAY CONTACT RATING: 175VDC, 0.25A SWITCHING, 1A CONTINUOUS				

EOTec 2000 Modular Fiber Optic Converters



- Transparent copper to fiber conversion
- Modular, flexible, scalable
- Real-time monitoring of fiber optic signal strength
- Protocol specific copper interface connections
- High Performance Deterministic Technology
- Full industrial operating temperature range (-40 to +85 °C)
- FM approved Class I, Div 2, Groups A, B, C & D
- Standard 35 mm DIN rail mounting

EOTec 2000 Fiber Optic Converters are designed to take traditional copper networks, convert them to fiber optic signals, and back again. Options support all popular fiber optic connectors (ST, SMA, SC). Problems such as ground loops, EMI/RFI noise and lightning strikes are eliminated. Fiber optic communication links can also be extended over much greater distances and support physical topologies not available with copper networks.

Every fiber optic node requires

- Electrical Interface Module (EIM)
- Optical Interface Module (OIM)
- Power Supply Module (PSM)

The **Electrical Interface Module (EIM)** is connected to the copper communication line. The module receives signals from the copper link, conditions them and makes the signal available to the backplane for conversion. The EIM also accepts signals from the backplane and transmits the signal to the attached copper link. The user must be sure to select the proper EIM for the copper protocol being converted.

Considerations when selecting an Electrical Interface Module (EIM)

- What communication protocol is being converted?
- What is the baud rate?

EIM Description and Part Number			Baud Rate	Physical Interface	Copper Cable Termination	Max. Devices/Copper Cable Length per Module
Rockwell Automation	GE FANUC GENIUS BUS™/ REMOTE I/O	2C02	153.6K EXTENDED	SCREW TERMINAL, CAGE CLAMP	NONE	32UNITS, 3500FT (1KM)
	RELIANCE R-NET™/ REMOTE I/O	2C07	800K	BNC	INTERNAL (75Ω)	1UNIT, 200FT (50M)
	A-B DH & DH+™/ REMOTE I/O	2C12	57.6K, 115.2K AND 230.4K JUMPER SELECTABLE	SCREW TERMINAL, CAGE CLAMP	NONE	60 UNITS, 10,000FT (3KM)
	A-B DH-485™	2C15	19.2K	SCREW TERMINAL, CAGE CLAMP	NONE	DH-485 SPECIFICATION 32 DEVICES/4000FT.
Schneider	MODICON REMOTE I/O	2C14	1.54M	F-TYPE	INTERNAL (75Ω)	20DB OF CABLE/TAP LOSS
	MODICON MODBUS PLUS™	2C29	1.0M	DB-9 PIN	NONE	MODICON MODBUS PLUS™ SPECIFICATION
Open Protocols	RS-232/485	2C10	RS-232: 9.6K-115K RS-485: 9.6K-230K HALF DUPLEX	SCREW TERMINAL, CAGE CLAMP	NONE	RS-232: 1 UNIT, 50FT (15M) RS-485: 30 UNITS, 4000FT (1.2KM)
	CONTROLNET™	2C20	5.0M	BNC	INTERNAL (75Ω)	CONTROLNET™ SPECIFICATION
	DEVICENET™	2C21	125K	5-POS DNET TERMINAL	NONE	DEVICENET™ SPECIFICATION
	PROFIBUS™	2C22	ALL	DB-9 PIN	NONE	PROFIBUS™ SPECIFICATION

EIM's without internal termination can be used anywhere along a copper segment, whereas, modules with internal termination must be used at the end of copper segments only.

EOTec 2000 Modular Optical Interface Modules



- Extend your network up to 30 km without a repeater
- SMA or ST fiber connectors
- Diagnostic Output (4-20mA)
- Up to 5 optical modules per modem
- Single/Multi-mode conversion possible
- 850nm or 1300nm wavelength
- High/Low power setting
- Long lifetime - Class I LED

The **Optical Interface Module (OIM)** accepts a signal from the backplane, converts it to an optical signal, and transmits this signal down the fiber optic cable. Conversely, the module will receive optical signals, condition the signal and make it available to the backplane.

Considerations when selecting an Optical Interface Module (OIM)

- Is the fiber optic cable single mode or multi-mode?
- What types of connectors terminate the fiber optic cable? (ST or SMA)
- What is the total loss on the fiber optic link? (This number must be less than the optical budget of the OIM selected)
- Is fiber link monitoring desirable?

OIM Type and Part Number	Optical Wavelength	Baud Rate	Optical Connector Type	Optical Dynamic Range (dB)	Applicable Fiber Optic Cable Size/Type (µm)	Diagnostic Output (4-20mA)
MULTIMODE	2E06*	9.6K to 12M	SMA	21	200/230	No
	2D06*	9.6K to 12M	SMA	21	200/230	Yes
	2E07	9.6K to 12M	ST	21	200/230	No
	2D07	9.6K to 12M	ST	21	200/230	Yes
	2E10	9.6K to 12M	ST	23	200/230	No
	2D10	9.6K to 12M	ST	23	200/230	Yes
	2E09	1300nm	ST	12	62.5/125	No
	2D09	1300nm	ST	12	62.5/125	Yes
	2E19	1300nm	ST	18	62.5/125	No
	2D19	1300nm	ST	18	62.5/125	Yes
SINGLE MODE	2E36	9.6K to 12M	ST	10	8-10/125	No
	2D36	9.6K to 12M	ST	10	8-10/125	Yes
	2E46	9.6K to 12M	ST	16	8-10/125	No
	2D46	9.6K to 12M	ST	16	8-10/125	Yes

Safety: IEC 60825-1 Class 1 LED Products, FDA 21CFR1040.10 & 1040.11

Each 2E/2D OIM module can be set for high power or low power. Default jumper setting for the optical transmit power is "H" (high); this setting should not be adjusted unless an optical overdrive situation occurs. Select position "L" (Low) in overdriving conditions.

* Not suitable for use with 2C20 ControlNet module

EOTec 2000 Power Supply Modules



- Universal Power Supply 85-240VAC, 50/60Hz and 85-125VDC Input (2A06/2A16)
- Discrete Diagnostic Output for Remote Control (2A16/2A18)
- Dual Power Supply Capability for Redundancy
- 24VDC Power Supply (2A08/2A18)
- UL/CSA listed (2A06/2A16)
- FM Approved for Class I, Div. 2, Groups A, B, C & D (2A08/2A18)

The Power Supply Module (PSM) will accept the user's DC or AC power input and provide DC voltage to any module engaged to its backplane connector. PSM part numbers always begin with 2A, for example, 2A08 is our DC power supply.

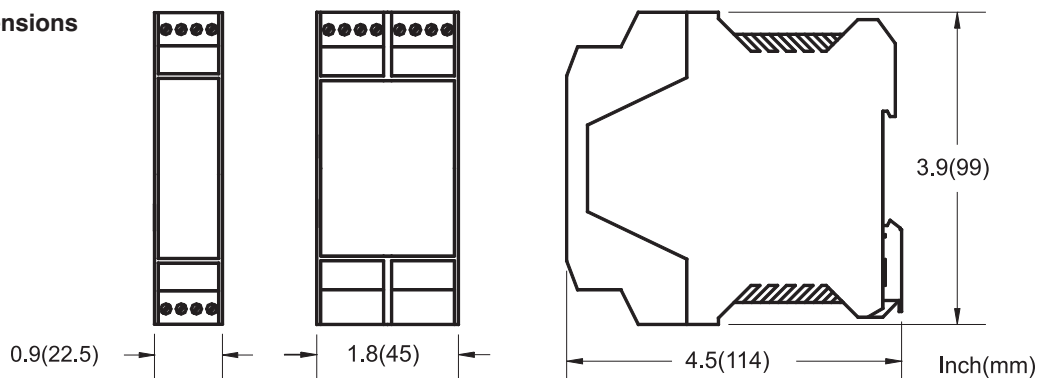
Considerations when selecting a Power Supply Module (PSM)

- Will AC or DC power be available at the installation site?
- Is redundancy required?

Part Number	Input Voltage	Input Current (Max.)	Input Fuse	Alarm Relay	CE Mark/UL	FM Approval Class I, Div. 2
2A06	85-240VAC 50/60Hz & 85-140VDC	250mA	400mA SLOW-BLOW	NO	YES/YES	NO
2A16	85-240VAC 50/60Hz & 85-140VDC	250mA	400mA SLOW-BLOW	YES	YES/YES	NO
2A08	24VDC ($\pm 10\%$)	400mA	400mA SLOW-BLOW	NO	YES/YES	YES
2A18	24VDC ($\pm 10\%$)	400mA	400mA SLOW-BLOW	YES	YES/NO	YES

ALARM RELAY CONTACT RATING: FORM-C, 175FDC, 1A CONTINUOUS

Module Dimensions



Topologies Supported by the EOTec 2000 Product Family



POINT TO POINT
Basic connection between two devices.



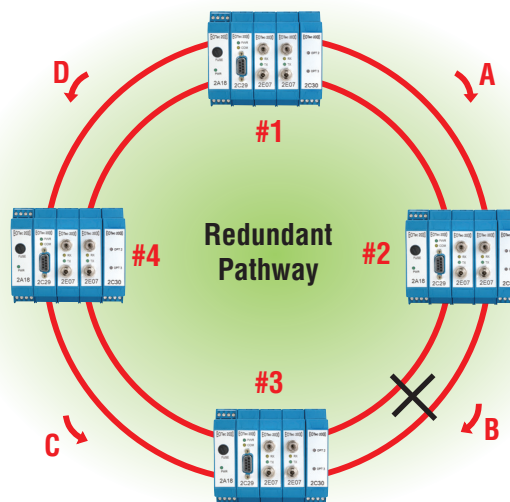
DAISY CHAIN
Used for multiple drops along a line.



STAR
Connects a central location to several branches.



OPTICAL REPEATER
Used to boost optical signals or for multimode single mode conversion.



SELF-HEALING RING
Achieve Media Redundancy

Ultra Electronics' Self-Healing Ring Modules

Ultra Electronics' Self-Healing Ring Module (SHR) provides media redundancy when utilized in each drop of a fiber optic ring network. Data is always routed on the shortest possible path to reduce propagation delay through the system. Ultra Electronics' SHR accomplishes this by creating a "virtual" break in the ring at the link farthest from the originating node. Referring to the figure above, if Node 1 is the originating node of a message, a virtual break will be created on the fiber link B or C (B is shown here). This virtual break is created on a packet-by-packet basis. The network behaves as if it were in a Daisy Chain, preventing the delivery of the same packet to any node twice. When fiber breaks actually occur, the SHR devices detect the break and a virtual break is no longer created since the real fiber break has done the function of putting the system into a Daisy Chain. The SHR automatically resets when the fiber path has been restored. Visible LED indicators in conjunction with relay contacts provide local and remote monitoring of the integrity of the fiber optic network.



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Specifications subject to change without notice.



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