# Subsea Qualified 7-Port Ethernet Switch

Model 922-FOM

Focal's Model 922 product line is a modular set of interface and telemetry cards specifically designed and tested for long term deployment in subsea communications systems. With full qualification to API/ ISO standards, this flexible platform combines the high reliability and performance of custom, rugged solutions with the ready availability and cost-effectiveness of standard industrial products.
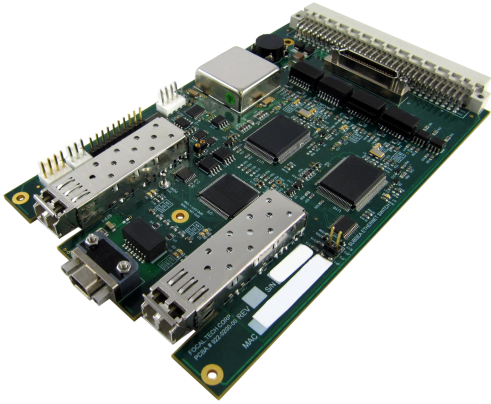
The Model 922-FOM is a lightly managed Ethernet switch designed and tested for use in subsea controls and communication applications. With five copper Ethernet ports and two optical Ethernet ports, the FOM may be operated with both optical ports and (optionally) one copper port configured for redundant operation, so that the failure of one link automatically and rapidly redirects traffic to one of the other ports in a protocol independent manner.

Communication formats include SIIS Level 3 Ethernet at 10 Mb/s or 100 Mb/s with ports configured manually or through autonegotiation. Optical links operate in 100Base-FX format (100 Mb/s). A range of subsea-qualified, pluggable, fiber-optic transceivers enables many optical topologies, including dual fiber operation and bidirectional operation with up to 16 wavelengths on a single fiber using CWDM (Coarse Wavelength Division Multiplexing) technology. Fiber umbilicals of up to 200 km length are supported.

Model 922 software provides advanced diagnostics via Modbus TCP for real-time health monitoring of the system as well as easy configuration of all interfaces and modes of operation.

Features

- User configurable, 7-port Ethernet switch, 10/100M
- Dual optical transceivers for redundant 100M Ethernet uplink with automatic failover
- Isolated, fault-tolerant power and signal interfaces
- Qualified per ISO 13628-6 and API 17F to Q1 levels
- Advanced diagnostics and setup via Modbus TCP or Telnet
- Proven hi-rel components rated for -40 °C to +85 °C
- Robust remote update method for subsea firmware with multistage validation and permanent factory fallback code
- UDP heartbeat packet with IP settings and key diagnostics
- 3U Eurocard size for card rack or bolt-down installation

Benefits

- Reduces overall system costs and size
- Delivers high performance optimized for subsea controls
- Saves costs for qualifications and obsolescence management; avoids requalification of industrial solutions
- Provides an easy upgrade path via remote code updates to "future proof" system designs
- Supports many copper and optical configurations

Applications

- Subsea communications for drilling and production controls
- Subsea Electronics Modules (SEM) and other subsea nodes
- Upgrades to existing subsea systems and sensor hubs
- Highly reliable industrial networking

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Specifications

Ethernet Interfaces (SIIS Level 3)

No. Ports	5 x Copper (4 on DIN connector, 1 on front) 2 x Optical (via SFP cages)
Protocols	10/100Base-T(X), copper 100Base-FX, optical
Protection	ESD and transient suppressors (TVS) 500 Vrms isolation
Ethernet Switch Layer 2 Functions	Includes broadcast storm protection, rate limiting, flow control, 802.1q VLAN, 802.1p port priority, port mirroring, fast aging
IP Configuration	DHCP with configurable static IP fallback
Diagnostics and Control	Modbus TCP, Webserver, Telnet
Diagnostics and Control Parameters	Includes temperature, humidity, voltage, current draw, optical power (Tx/Rx), on time and power off events, Ethernet port status/ configuration, MIB counters, card mftr. data (s/n, p/n, F/W revision)
Redundancy	Automatic link failover (fiber, copper)

Optical [1]

Wavelengths	1310 nm and 1550 nm standard CWDM wavelengths (e.g. 1471 to 1611 nm)
Optical Power Budget	20 to 45 dB, depending on SFP installed
Cable Length	10 to 200 km, depending on SFP installed
Options	Bidirectional (single fiber) transceivers

[1] See Subsea Qualified SFP Modules datasheet for available optical transceivers.

Connectors

Rear Card Edge	1 x 96-pin DIN 41612 (Ethernet, power)
Front Card Edge	2 x SFP (Ethernet, optical), single or dual LC 1 x 9-pin Micro-D (Ethernet)
Options	37-pin Micro-D (replaces 96-pin DIN)

Power

Consumption	5 W typical (8 W max.)
Operating Voltage	+20 to +28 VDC, regulated input
Rated Current	0.4 A max.
Protection	ESD, EMI, over-voltage, reverse voltage, overcurrent (no fuses), 500 Vrms isolation

Mechanical

Dimensions	3U Eurocard, 4 HP, 160 mm x 100 mm
Mounting	3U Eurocard rack or M2.5 hardware
Options	Front panel, LED panel, heat plate

Reliability

Design Life	> 20 years @ +40 °C
MTBF	> 250,000 hrs @ +40 °C
Testing	Factory Acceptance Test (FAT) At Tmin and Tmax design temperatures
Qualification	ISO 13628-6, API 17F (Q1 Levels) Includes 30 g shock, 5 g vibration
Firmware Update	Failsafe remote firmware update
Options	Environmental Stress Screening (ESS) Custom qualifications per OEM specification

Environmental

Temperature	-18 °C to +70 °C (design and operation) -40 °C to +85 °C (storage)
Humidity	5 % to 85 % RH, non-condensing