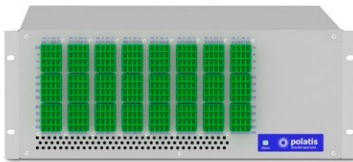# HUBER+SUHNER
Polatis

SERIES 6000i
Instrument Optical Matrix Switch

SINGLE MODE INSTRUMENT OPTICAL SWITCH FROM 8x8 TO 192x192 PORTS

Series 6000 Ultra 32x32 Optical Switch

Series 6000 192x192 Optical Switch

The Polatis Series 6000i Instrument optical switch is a high-performance, fully non-blocking all-optical matrix switch available in sizes from 8x8 up to 192x192. It is designed to meet the highest performance needs of the most demanding test and measurement applications with exceptionally low optical loss, superior connection stability and repeatability in a compact form factor. With support of Software-Defined Networks (SDNs) via embedded NETCONF and RESTCONF control interfaces, the Series 6000i interfaces directly with cutting edge cloud-based network and infrastructure testing applications. The Series 6000i is based on Polatis' patented DirectLight® optical switching technology that has been proven in the most challenging defense, data center and telecom applications and is exclusively used by major network equipment manufacturers to automate testing of optical components and subsystems.

KEY FEATURES

> **Ultra-high performance now available for the 6000i Ultra in sizes up to 32x32 with <1.0dB and 96x96 with <1.2dB max insertion loss**

- **Non-blocking matrix switch sizes from 8x8 to 192x192**
- **Ultra-low insertion loss and superior optical specifications**
- **Exceptional optical stability and repeatability**
- **Dark fiber all-band single mode connectivity**
- **Fully bidirectional optics**
- **Available in NxN, MxN single-sided, and customer configurable (NxCC) any-to-any port configurations**
- **Protocol and bit-rate agnostic up to 400Gbs and beyond**
- **Optional Optical Power Monitoring (OPMs) with user configurable optical power alarms**
- **Optional Variable Optical Attenuation (VOAs) on every switch connection**
- **Programmable port shutter for fiber break simulation**
- **SDN enabled with NETCONF and RESTCONF command interfaces**
- **Configurable interface options with SNMP, TL1, and SCPI control languages**
- **Built-in user-friendly Web GUI**
- **High reliability distributed architecture**
- **High density switching in a compact chassis**
- **Eco-friendly energy efficiency chassis**
- **Supports RADIUS secure user access protocols**

DIRECTLIGHT TECHNOLOGY

The Series 6000i 8x8 to 192x192 switch leverages Polatis' patented, highly reliable piezoelectric DirectLight beam-steering technology that sets the industry standard for lowest optical loss and highest optical performance. Polatis' beam-steering technology can be switched without light being present on the fiber and can also switch bi-directional signals. This allows operators to pre-provision paths, as well as switch intermittent and variable-power test signals, over lit or dark fiber. Ultra-high performance is now available for the 6000i-Ultra in matrix sizes up to 96x96 with <1.0dB max insertion loss.

SDN ENABLED WITH USER FRIENDLY INTERFACES

Polatis offers a full complement of Software Defined Networking (SDN) interfaces including NETCONF, and RESTCONF. Optical switching with SDN allows infrastructure vendors and system test operators to dynamically and cost effectively setup, monitor and operate cloud-based test configurations. Polatis works closely with leading SDN companies and research organizations to provide leading edge SDN solutions. In addition, Polatis also offers traditional SNMP, TL1, GPIB, and SCPI command languages that allow for seamless integration with test equipment controller systems. Each switch also has a user-friendly secure web browser GUI interface that can be used to provision, monitor, and control the switch and the switch software can be easily upgraded in the field without affecting in-service switch operations.

FLEXIBLE SWITCH MATRIX SIZE OPTIONS

The Series 6000i switch is available in matrix sizes from 8x8 to 192x192 in a variety of matrix configurations, including symmetric (NxN), asymmetric (MxN), and (NxCC) customer configurable, to meet a broad range of testing applications. Polatis offers two different versions of the Series 6000i: the high-performance 8x8 to 96x96 Ultra, and the high-port count 108x108 to 192x192 6000i. The 6000i's large matrix size, combined with its low loss characteristics, allows for building multistage scalable switch solutions that can grow to interconnect thousands of ports.

INTEGRATED FEATURES FOR TEST LAB APPLICATIONS

Polatis Series 6000i switches can be customized to incorporate a variety of passive and active components to suit individual customer testing needs. These include options for integrated Optical Power Monitors (OPMs) and optical taps on every connection. The power monitoring can be used to provide Variable Optical Attenuation (VOA) on every connection and the taps can used for signal monitoring or multicast. In addition, Polatis instrument grade switches have a unique user-programmable shutter function that can be used to create single or repeated fiber breaks on any number of switch connections for network stress testing.

SERIES 6000i Instrument Optical Matrix Switch

BENEFITS OF POLATIS SWITCHING

- Low optical loss minimizes impact on equipment and system optical power budgets
- Exceptional stability and repeatability increase measurement consistency, accuracy and precision
- NETCONF and RESTCONF SDN interfaces communicate directly to cloud-based manufacturing and network test configurations.
- Remote operation and fast switching times speed up and simplify testbed setup and reconfiguration
- Signal format, wavelength, direction and bitrate independence with minimal signal impairment provides truly transparent connections
- Dark fiber switching enables pre-provisioning and use with intermittent signals or variable power signals
- Low power usage and compact physical size fits into applications other switches cannot
- Interoperate with popular third-party test software

APPLICATIONS

- Centralized test equipment sharing and automated network testing
- Component, transponder, line card, and subsystem testing
- Automated regression testing for new product releases
- Cloud-based SDN test configurations
- Satellite uplink and RFoF testing
- System and network testbed reconfiguration
- PON and FTTx system testbeds

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Performance Parameters	Polatis 6000i-Ultra Matrix Sizes[1] 8x8 to 32x32	Polatis 6000i-Ultra Matrix Sizes[1] 48x48 to 96x96	Polatis 6000i Matrix Sizes[1] 108x108 to 192x192
Typical Insertion Loss[2]	0.5dB	0.6dB	0.9dB
Maximum Insertion Loss[2]	1.0dB	1.2dB	1.9dB
Maximum Insertion Loss with single OPM[2]	1.3dB	1.5dB	2.2dB
Loss Repeatability[3]	+/-0.05dB	+/-0.05dB	+/-0.1dB
Connection Stability[3]	+/-0.05dB	+/-0.05dB	+/-0.1dB

	For All Switch Sizes
Operating Wavelength Range	1260-1675nm
Return Loss (with APC connectors)	>50dB
Data Latency through a switch connection	25ns
Max Switching Time	25ms
Crosstalk	<-55dB
Polarization Dependent Loss (PDL)	<0.1dB (C+L Bands)
	<0.3dB with optional OPMs (C+L Band)
Dark Fiber Switching	Yes
Bi-Direction Optics	Yes
Wavelength Dependent Loss (WDL)	<0.3 dB (C+L Band)
Optional Optical Power Monitoring (OPM)	Calibrated wavelength range 1290-1330nm and 1450-1640nm
	Dynamic range -40dBm to +24dBm
	Accuracy +/-0.5dBm
Maximum Optical Input Power	+27dBm
Switch Lifetime	>10^9 Cycles
Operating Temperature	+10ºC to +40ºC <85% RH non-condensing
Storage Temperature	-40ºC to +70ºC <40% RH non-condensing

Electrical and Mechanical	For All Switch Sizes
Fiber Type	Single Mode
Single Fiber Connectors	LC, LC-HD, SC, FC and E-2000 Connectors
	Angled (APC) or Ultra (UPC) variants available
Array Connector Types	MTP-8 or MTP-12 Elite Array Connectors
Control Languages	NETCONF, RESTCONF, SNMP, TL1, SCPI, and
	Secure User-Friendly Web GUI
User Interfaces	Dual Gigabit Ethernet and optional GPIB
Craft Interface	RS232 Serial and USB
Secure User Access Protocols	RADIUS
Power Options	Hot Swappable Dual Redundant 100-240 VAC 50/60 Hz
	Hot Swappable Dual Redundant -48 VDC
Power Consumption	25–75W

Switch Chassis Height[4,5] Optical Connector Type	6000i-Ultra Matrix Size 32x32	6000i-Ultra Matrix Size 96x96	6000i Matrix Size 192x192
MTP or LC-HD (High Density LC)	1RU	3RU	4RU
LC	1RU	3RU	6RU
SC or E2000	3RU	6RU	8RU

All parameters are measured excluding connectors at 1550nm and 20ºC with an unpolarized source after thermal equalization unless otherwise noted.
1. Asymmetric MxN switches and single-sided NxCC customer-configurable switches with any-to-any port connectivity are also available
2. Measured using the 3 patch-cord method as defined in ANSI/TIA/EIA-526-7-1998
3. Stability and repeatability are measured at maximum transmission
4. The switch chassis width is 19" and the depth is 22" for all Series 6000 switches
5. Series 6000 switches with optional optical power meters may have larger switch chassis height