

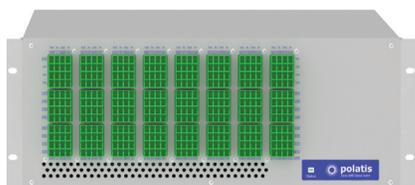
# POLATIS® SERIES 6000i

## Instrument Optical Matrix Switch

### Single-mode instrument optical switch from 8×8 to 192×192 ports



Series 6000i Ultra 32×32 Optical Switch



Series 6000i 192×192 Optical Switch

The POLATIS Series 6000i Instrument optical switch is a high-performance, fully non-blocking all-optical matrix switch available in sizes from 8×8 up to 192×192. 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 for 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. It is also used extensively by major network equipment manufacturers to automate testing of optical components and subsystems. Its exceptionally low optical loss and low latency also make it particularly suitable for Quantum Networking and QKD.

#### KEY FEATURES

- Non-blocking matrix switch sizes from 8×8 to 192×192
- Available in symmetric N×N and N×CC any-to-any port configurations; asymmetric M×N configurations on request
- Fully bidirectional optics
- Protocol and bit-rate agnostic up to 400 Gbs and beyond
- Switch and hold dark fiber connections
- SDN enabled with NETCONF and RESTCONF command interfaces
- Carrier-class interfaces with SNMP, TL1 and SCPI control languages
- Built-in user-friendly secure web GUI interface
- Supports secure user access protocols
- Optional Optical Power Monitoring (OPMs) with user configurable optical power alarms
- Optional Variable Optical Attenuation (VOA) on every switch connection
- Exceptional optical stability and repeatability
- Programmable port shutter for fiber break simulation
- High reliability distributed architecture
- Eco-friendly low power consumption
- Dual redundant power and network interface cards

#### DirectLight® technology

POLATIS Series 6000i switches use POLATIS patented, highly reliable piezoelectric DirectLight® beam-steering technology that sets the industry standard for lowest optical loss and highest optical performance. POLATIS DirectLight® technology allows true dark fiber switching where the connections can be made and held without light being present on the fiber. This allows operators to pre-provision paths, as well as switch intermittent and variable-power test signals, over lit or dark fiber.

#### SDN enabled with user friendly interfaces

POLATIS offers a full complement of Software Defined Networking (SDN) interfaces including NETCONF and RESTCONF, enabling infrastructure vendors and system test operators to dynamically and cost effectively setup, monitor and operate cloud-based test configurations. In addition, POLATIS also offers SNMP, TL1, and SCPI command languages that allow for seamless integration with test equipment controllers. Each switch also has a user-friendly secure web browser GUI interface that can be used to provision, monitor, and control the switch.

#### Switch matrix size options

The POLATIS Series 6000i switch is available in matrix sizes from 8×8 to

192×192 in symmetric (N×N) and single-sided customer-configurable (N×CC) switch matrices, to meet a broad range of test and measurement applications. Asymmetric (M×N) configurations are available on request. Switch sizes up to 32×32 can be accommodated in a 1 RU chassis.

#### Integrated features for test lab applications

POLATIS Series 6000i switches include options for integrated Optical Power Monitors (OPMs) on every connection. These are ideal for identifying signal degradation or loss and can be used to provide Variable Optical Attenuation (VOA) on every connection to protect sensitive equipment from higher power levels. POLATIS Series 6000i switches have a unique user-programmable shutter function that can be used to simulate single or repeated fiber breaks on any number of switch connections for network stress testing. Switches can also be partitioned in software to enable multiple test teams to use the same switch without risk of conflict

#### POLATIS 6000i Ultra

POLATIS 6000i Series switches up to 96×96 matrix size are designated "Ultra" owing to their ultra-high optical performance with <1.0 dB maximum insertion loss on sizes up to 32×32 and <1.2 dB maximum on sizes up to 96×96.

## 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.
- Signal format, wavelength, direction and bitrate independence with minimal signal impairment provides truly transparent connections
- Remote operation and fast switching times speed up and simplify testbed setup and reconfiguration
- 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
- Interoperates with popular third-party test software

## APPLICATIONS

- Network and data center SIT lab test applications
- Centralized test equipment sharing and automated network testing
- Component, transponder, line card and subsystem testing
- Automated regression testing for new product releases
- Lab as a Service (Laas) and Test as a Service (TaaS) automation and orchestration
- Cloud-based SDN test configurations
- Satellite uplink and RFoF testing
- PON and FTTx system testbeds
- Quantum technology test beds
- QKD

### For installation and technical support

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## POLATIS 6000i

Performance Parameters	6000i-Ultra	6000i-Ultra	6000i
Matrix Switch Sizes (NxN) <sup>1</sup>	8x8 to 32x32	48x48 to 96x96	144x144 to 192x192
Typical Insertion Loss <sup>2</sup>	0.5 dB	0.6 dB	0.9 dB
Maximum Insertion Loss <sup>2</sup>	1.0 dB	1.2 dB	1.9 dB
Maximum Insertion Loss with single OPM <sup>2</sup>	1.3 dB	1.5 dB	2.2 dB
Loss Repeatability <sup>3</sup>	+/-0.05 dB	+/-0.05 dB	+/-0.1 dB
Connection Stability <sup>3</sup>	+/-0.05 dB	+/-0.05 dB	+/-0.1 dB
<b>For all switch sizes</b>			
Operating Wavelength Range	1260-1675 nm		
Return Loss (with APC connectors)	>50 dB		
Max Switching Time	25 ms		
Data Latency through a switch connection	25 ns		
Dark Fiber Switching	Yes		
Bi-Direction Optics	Yes		
Wavelength Dependent Loss (WDL)	<0.3 dB (C+L Band)		
Polarization Dependent Loss (PDL)	<0.1 dB (C+L Bands)		
	<0.3 dB with optional OPM (C+L Band)		
Crosstalk	<-55 dB		
Optical Input Power Range	Dark to +24 dBm		
Optional Optical Power Monitoring (OPM)	Calibrated wavelength range 1290-1330 nm and 1450-1640 nm Dynamic range -40 dBm to +22 dBm Accuracy +/-0.5 dBm		
Switch Lifetime	>10 <sup>9</sup> Cycles		
Operating Temperature	+5 °C to +40 °C <85 % RH non-condensing		
Storage Temperature	-40 °C to +70 °C <40 % RH non-condensing		

## Electrical and Mechanical

Electrical and Mechanical	POLATIS 6000i Specifications
Fiber Type	Single-mode
Single Fiber Connector Types	LC or LC-HD, SC, FC and E-2000 Connectors Angled (APC) or Ultra (UPC) connector types available
Array Connector Types	MTP-8 or MTP-12 Elite Array Connectors
Control Languages	NETCONF, RESTCONF, SNMP, TL1 and SCPI Secure User-Friendly Web GUI
User Interfaces	RJ45 Dual Redundant Hot-Swap Gigabit Ethernet
Craft Interface	RS232 Serial
Secure User Access Protocols	RADIUS AAA (EAP-TTLS, PAP), LDAP
Power options	Hot-Swap Dual Redundant 100-240 VAC 50/60 Hz Hot-Swap Dual Redundant -48 VDC
Power Consumption	25-75W

## Switch Chassis Height<sup>4</sup>

Connector	Maximum matrix size per RU – no OPMs				
	1RU	2RU	3RU	4RU	6RU
LC	32x32	n/a	96x96	n/a	192x192
MTP	32x32	n/a	96x96	192x192	n/a
SC	16x16	32x32	64x64	96x96	192x192
Connector	Maximum matrix size per RU – 1 side OPMs				
	1RU	2RU	3RU	4RU	6RU
LC	32x32	48x48	96x96	144x144	192x192
MTP	32x32	n/a	144x144	n/a	192x192
SC	16x16	n/a	144x144	192x192	n/a
Connector	Maximum matrix size per RU – 2 side OPMs				
	1RU	2RU	3RU	4RU	6RU
LC	32x32	n/a	64x64	96x96	192x192
MTP	32x32	n/a	64x64	96x96	192x192
SC	16x16	32x32	48x48	96x96	192x192

All parameters are measured excluding connectors at 1550 nm and 20 °C with an unpolarized source after thermal equalization unless otherwise noted.

1. Single-sided NxCC customer-configurable switches with any-to-any port connectivity are also available. Asymmetric MxN switches on request.
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