

IEC 61850-3 24+4G-port Layer 2 Gigabit modular managed rackmount Ethernet switches



Features and Benefits

- IEC 61850-3, IEEE 1613 (power substations), and EN 50121-4 (railway applications) compliant
- IEC 62439-3 Clause 4 (PRP) and Clause 5 (HSR) compliant¹
- Built-in MMS server based on IEC 61850-90-4 switch data modeling for power SCADA
- Complies with a portion of EN 50155 specifications
- Turbo Ring and Turbo Chain (recovery time < 20 ms @ 250 switches),² RSTP/STP, and MSTP for network redundancy
- VLAN Unaware: Supports priority-tagged frames to be received by specific IEDs
- Up to 12 ports with M12 connectors
- Isolated redundant power inputs with universal 24 VDC, 48 VDC, or 110/220 VDC/VAC power supply range
- -40 to 85°C operating temperature range

Certifications



Introduction

The PT-7728 is designed to meet the demands of power substation automation systems (IEC 61850-3, IEEE 1613), and railway applications (EN 50121-4), and also features critical packet prioritization (GOOSE and SMVs) and a built-in MMS server. The PT-7728's Gigabit and Fast Ethernet backbone, redundant ring, and 24 VDC, 48 VDC, or 110/220 VDC/VAC dual isolated redundant power supplies increase the reliability of your communications and save on cabling/wiring costs. The modular design of the PT-7728 also makes network planning easy, and allows greater flexibility by letting you install up to 4 Gigabit ports and 24 Fast Ethernet ports. Along with the optional front or rear wiring, these features together make the PT-7728 suitable for a variety of industrial applications.

Additional Features and Benefits

- Switch data modeling based on the IEC 61850-90-4 standard
- IEEE 1588v2 PTP (Precision Time Protocol) for time synchronization of networks (PTP models only)
- VLAN Unaware: Supports priority-tagged frames to be received by specific IEDs
- DHCP Option 82 for IP address assignment with different policies
- EtherNet/IP and Modbus TCP industrial Ethernet protocols supported
- Line-swap fast recovery
- Configurable by web browser, Telnet/serial console, CLI, Windows utility, and ABC-01 automatic backup configurator
- IGMP snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- Supports advanced VLAN capability with Q-in-Q tagging
- IEEE 802.3ad, LACP for optimum bandwidth utilization
- Bandwidth management to prevent unpredictable network status
- Multi-port mirroring for online debugging
- Automatic warning by exception through email and relay output
- RMON for proactive and efficient network monitoring
- Automatic recovery of connected device's IP addresses

Cybersecurity Features

- User passwords with multiple levels of security protect against unauthorized configuration
- SSH/HTTPS is used to encrypt passwords and data
- Lock switch ports with 802.1X port-based network access control so that only authorized clients can access the port
- RADIUS/TACACS+ allows you to manage passwords from a central location
- 802.1Q VLAN allows you to logically partition traffic transmitted between selected switch ports
- Secure switch ports so that only specific devices and/or MAC addresses can access the ports
- Disable one or more ports to block network traffic
- SNMPv3 provides encrypted authentication and access security

1. Only available with PM-7200-4GTX-PHR-PTP and PM-7200-4GSFP-PHR-PTP modules.
2. Gigabit Ethernet recovery time < 50 ms

Ethernet Interface

Cabling Direction	PT-7728-F Series: Front cabling PT-7728-R Series: Rear cabling
Compatible Modules	<p>Slot 1/2/3:</p> <p>PM-7200-8TX PM-7200-2MSC4TX PM-7200-2MST4TX PM-7200-2SSC4TX PM-7200-4MSC2TX PM-7200-4MST2TX PM-7200-4SSC2TX PM-7200-6MSC PM-7200-6MST PM-7200-6SSC PM-7200-8SFP PM-7200-4M12 PM-7200-8MTRJ PM-7200-4TX-PTP (PT-7728-PTP only) PM-7200-4MST-PTP (PT-7728-PTP only) PM-7200-4MSC-PTP (PT-7728-PTP only)</p> <p>Slot 4:</p> <p>PM-7200-4GTXSFP PM-7200-2GTXSFP PM-7200-4GSFP-PHR-PTP (PT-7728-PTP only) PM-7200-4GTX-PHR-PTP (PT-7728-PTP only) PM-7200-1BNC2MST-PTP (PT-7728-PTP only)</p>
Standards	<p>IEEE 802.1D-2004 for Spanning Tree Protocol IEEE 802.1p for Class of Service IEEE 802.1Q for VLAN Tagging IEEE 802.1s for Multiple Spanning Tree Protocol IEEE 802.1w for Rapid Spanning Tree Protocol IEEE 802.1X for authentication IEEE 802.3 for 10BaseT IEEE 802.3ab for 1000BaseT(X) IEEE 802.3ad for Port Trunk with LACP IEEE 802.3u for 100BaseT(X) and 100BaseFX IEEE 802.3x for flow control IEEE 802.3z for 1000BaseSX/LX/LHX/ZX</p>

Ethernet Software Features

Filter	802.1Q, GMRP, GVRP, IGMP v1/v2c, QinQ VLAN, VLAN unaware
Industrial Protocols	EtherNet/IP, Modbus TCP
Management	Back Pressure Flow Control, BOOTP, DHCP Option 66/67/82, DHCP Server/Client, Flow control, HTTP, IPv4/IPv6, LLDP, Port Mirror, RARP, RMON, SMTP, SNMP Inform, SNMPv1/v2c/v3, Syslog, Telnet, TFTP, Fiber check
MIB	Bridge MIB, Ethernet-like MIB, MIB-II, P-BRIDGE MIB, Q-BRIDGE MIB, RMON MIB Groups 1, 2, 3, 9, RSTP MIB
Power Substation	IEC 61850 QoS, MMS
Redundancy Protocols	All models: Link Aggregation, MSTP, RSTP, STP, Turbo Chain, Turbo Ring v1/v2 PTP models: HSR, PRP
Security	Broadcast storm protection, HTTPS/SSL, TACACS+, Port Lock, RADIUS, Rate Limit, SSH
Time Management	All models (except PTP models): NTP Server/Client, SNTP PTP models: NTP Server/Client, SNTP, IEEE 1588 PTP v1/v2 (hardware-based)

Switch Properties

IGMP Groups	256
Max. No. of VLANs	64
VLAN ID Range	VID 1 to 4094
Priority Queues	4

Serial Interface

Console Port	RS-232 (RJ45)
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Input/Output Interface

Alarm Contact Channels	Resistive load: 3 A @ 30 VDC, 240 VAC
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Power Parameters

Input Voltage	-24-24/-48-48/-HV-HV/-24-HV/-48-HV models: Redundant power modules PT-7728-24 Series: 24 VDC (18 to 36 VDC) PT-7728-48 Series: 48 VDC (36 to 72 VDC) PT-7728-HV Series: 110/220 VAC/VDC (85 to 264 VAC, 88 to 300 VDC)
Overload Current Protection	Supported
Reverse Polarity Protection	Supported
Connection	10-pin terminal block
Input Current	PT-7728-24 Series: 2.38 A @ 24 VDC PT-7728-48 Series: 1.12 A @ 48 VDC PT-7728-HV Series: 0.49/0.26 A @ 110/220 VAC, 0.59/0.30 A @ 110/220 VDC

Physical Characteristics

Housing	Aluminum
IP Rating	IP30
Dimensions (without ears)	440 x 44 x 325 mm (17.32 x 1.73 x 12.80 in)
Weight	5900 g (13.11 lb)
Installation	19-inch rack mounting

Environmental Limits

Operating Temperature	-40 to 85°C (-40 to 185°F) Note: Cold start requires minimum of 100 VAC @ -40°C
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Standards and Certifications

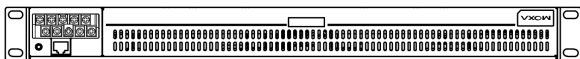
Safety	UL 60950-1
EMI	EN 55032 Class A, CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 35 V/m IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8 PFMF IEC 61000-4-11 DIPs
Power Substation	IEC 61850-3, IEEE 1613

Railway	EN 50121-4, EN 50155 (complies with a portion of EN 50155 specifications)
Traffic Control	NEMA TS2
MTBF	
Time	393,828 hrs
Standards	Telcordia SR332
Warranty	
Warranty Period	5 years
Details	See www.moxa.com/warranty
Package Contents	
Device	1 x PT-7728 Series switch
Cable	1 x DB9 female to RJ45 10-pin
Installation Kit	4 x cap, plastic, for RJ45 port 2 x rack-mounting ear
Documentation	1 x document and software CD 1 x quick installation guide 1 x warranty card 1 x product certificates of quality inspection, Simplified Chinese 1 x product notice, Simplified Chinese
Note	SFP modules and/or modules from the PM-7200 Module Series need to be purchased separately for use with this product.

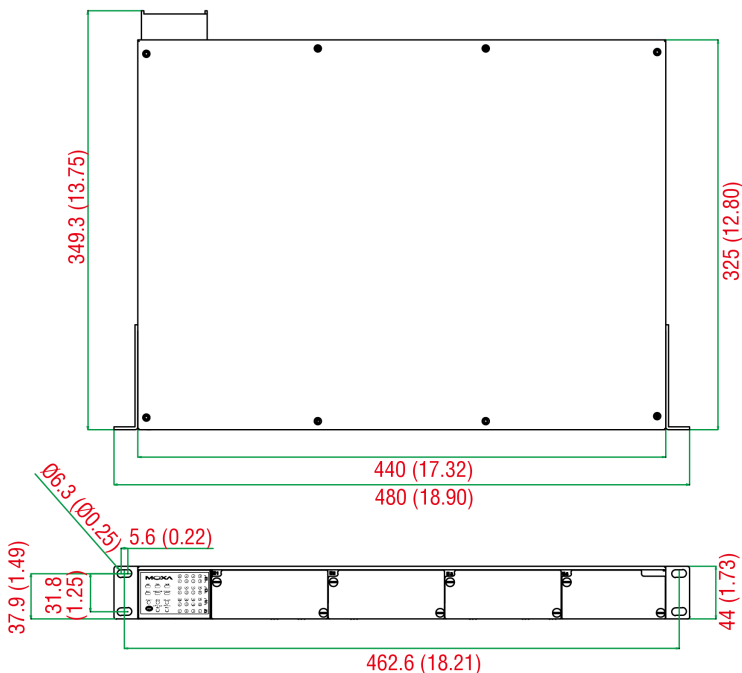
Dimensions

Unit: mm (inch)

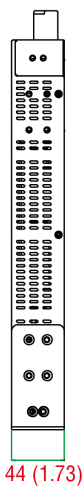
Rear View



Top View



Side View



Model Name	Max. No. of Ports	Max. No. of Gigabit Ports	Max. No. of Fast Ethernet Ports	Cabling	Redundant Power Module	Input Voltage 1	Input Voltage 2	Operating Temp.
PT-7728-F-24	28	Up to 4	Up to 24	Front	–	24 VDC	–	-45 to 85°C
PT-7728-R-24	28	Up to 4	Up to 24	Rear	–	24 VDC	–	-45 to 85°C
PT-7728-F-24-24	28	Up to 4	Up to 24	Front	✓	24 VDC	24 VDC	-45 to 85°C
PT-7728-R-24-24	28	Up to 4	Up to 24	Rear	✓	24 VDC	24 VDC	-45 to 85°C
PT-7728-F-24-HV	28	Up to 4	Up to 24	Front	✓	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-24-HV	28	Up to 4	Up to 24	Rear	✓	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-F-48	28	Up to 4	Up to 24	Front	–	48 VDC	–	-45 to 85°C
PT-7728-R-48	28	Up to 4	Up to 24	Rear	–	48 VDC	–	-45 to 85°C
PT-7728-F-48-48	28	Up to 4	Up to 24	Front	✓	48 VDC	48 VDC	-45 to 85°C
PT-7728-R-48-48	28	Up to 4	Up to 24	Rear	✓	48 VDC	48 VDC	-45 to 85°C
PT-7728-F-48-HV	28	Up to 4	Up to 24	Front	✓	48 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-48-HV	28	Up to 4	Up to 24	Rear	✓	48 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-F-HV	28	Up to 4	Up to 24	Front	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-R-HV	28	Up to 4	Up to 24	Rear	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-F-HV-HV	28	Up to 4	Up to 24	Front	✓	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-R-HV-HV	28	Up to 4	Up to 24	Rear	✓	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-F-24	28	Up to 4	Up to 24	Front	–	24 VDC	–	-45 to 85°C
PT-7728-PTP-F-24-24	28	Up to 4	Up to 24	Front	✓	24 VDC	24 VDC	-45 to 85°C
PT-7728-PTP-F-24-HV	28	Up to 4	Up to 24	Front	✓	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-F-48	28	Up to 4	Up to 24	Front	–	48 VDC	–	-45 to 85°C
PT-7728-PTP-F-48-48	28	Up to 4	Up to 24	Front	✓	48 VDC	48 VDC	-45 to 85°C
PT-7728-PTP-F-HV	28	Up to 4	Up to 24	Front	–	110/220 VDC/ VAC	–	-45 to 85°C
PT-7728-PTP-F-HV-HV	28	Up to 4	Up to 24	Front	✓	110/220 VDC/ VAC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-R-24	28	Up to 4	Up to 24	Rear	–	24 VDC	–	-45 to 85°C
PT-7728-PTP-R-24-24	28	Up to 4	Up to 24	Rear	✓	24 VDC	24 VDC	-45 to 85°C
PT-7728-PTP-R-24-HV	28	Up to 4	Up to 24	Rear	✓	24 VDC	110/220 VDC/ VAC	-45 to 85°C
PT-7728-PTP-R-48	28	Up to 4	Up to 24	Rear	–	48 VDC	–	-45 to 85°C
PT-7728-PTP-R-48-48	28	Up to 4	Up to 24	Rear	✓	48 VDC (36-72 VDC)	48 VDC (36-72 VDC)	-45 to 85°C

Model Name	Max. No. of Ports	Max. No. of Gigabit Ports	Max. No. of Fast Ethernet Ports	Cabling	Redundant Power Module	Input Voltage 1	Input Voltage 2	Operating Temp.
PT-7728-PTP-R-HV	28	Up to 4	Up to 24	Rear	–	110/220 VDC/ VAC	–	–45 to 85°C
PT-7728-PTP-R-HV-HV	28	Up to 4	Up to 24	Rear	✓	110/220 VDC/ VAC	110/220 VDC/ VAC	–45 to 85°C

Accessories (sold separately)

PM-7200 Module Series

PM-7200-1BNC2MST-PTP	Fast Ethernet module for PT-7728-PTP series with 2 100BaseFX multi-mode ports with ST connectors, 1 PPS output with BNC connector, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-2GTXSFP	Gigabit Ethernet module with 2 10/100/1000BaseT(X) or 1000BaseSFP slot combo ports
PM-7200-2MSC4TX	Fast Ethernet module with 2 100BaseFX multi-mode ports with SC connectors and 4 10/100BaseT(X) ports
PM-7200-2MST4TX	Fast Ethernet module with 2 100BaseFX multi-mode ports with ST connectors and 4 10/100BaseT(X) ports
PM-7200-2SSC4TX	Fast Ethernet module with 2 100BaseFX single-mode ports with SC connectors and 4 10/100BaseT(X) ports
PM-7200-4GTXSFP	Gigabit Ethernet module with 4 10/100/1000BaseT(X) or 1000BaseSFP slot combo ports
PM-7200-4M12	Fast Ethernet module with 4 10/100BaseT(X) ports with M12 connectors
PM-7200-4MSC2TX	Fast Ethernet module with 4 100BaseFX multi-mode ports with SC connectors and 2 10/100BaseT(X) ports
PM-7200-4MST2TX	Fast Ethernet module with 4 100BaseFX multi-mode ports with ST connectors and 2 10/100BaseT(X) ports
PM-7200-4SSC2TX	Fast Ethernet module with 4 100BaseFX single-mode ports with SC connectors and 2 10/100BaseT(X) ports
PM-7200-6MSC	Fast Ethernet module with 6 100BaseFX multi-mode ports with SC connectors
PM-7200-6MST	Fast Ethernet module with 6 100BaseFX multi-mode ports with ST connectors
PM-7200-6SSC	Fast Ethernet module with 6 100BaseFX single-mode ports with SC connectors
PM-7200-8SFP	Fast Ethernet module with 8 100BaseSFP slots
PM-7200-8TX	Fast Ethernet module with 8 10/100BaseT(X) ports
PM-7200-8MTRJ	Fast Ethernet module with 8 100BaseFX multi-mode ports with MTRJ connectors
PM-7200-4TX-PTP	Fast Ethernet module for PT-7728-PTP series with 4 10/100BaseT(X) ports, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4MST-PTP	Fast Ethernet module for PT-7728-PTP series with 4 100BaseFX multi-mode ports with ST connectors, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4MSC-PTP	Fast Ethernet module for PT-7728-PTP series with 4 100BaseFX multi-mode ports with SC connectors, hardware-based IEEE 1588 PTP V2 protocol support
PM-7200-4GTX-PHR-PTP	Gigabit Ethernet module with 4 1000Base T(X) ports, PRP/HSR protocol support
PM-7200-4GSFP-PHR-PTP	Gigabit Ethernet module with 4 100/1000Base SFP slots, PRP/HSR protocol support

Software

MXview-50	Industrial network management software with a license for 50 nodes (by IP address)
MXview-100	Industrial network management software with a license for 100 nodes (by IP address)
MXview-250	Industrial network management software with a license for 250 nodes (by IP address)
MXview-500	Industrial network management software with a license for 500 nodes (by IP address)
MXview-1000	Industrial network management software with a license for 1000 nodes (by IP address)
MXview-2000	Industrial network management software with a license for 2000 nodes (by IP address)
MXview Upgrade-50	License expansion of MXview industrial network management software by 50 nodes (by IP address)

Storage Kits

ABC-01	Configuration backup and restoration tool for managed Ethernet switches and AWK Series wireless APs/bridges/clients, 0 to 60°C operating temperature
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SFP Modules

SFP-1FELLC-T	SFP module with 1 100Base single-mode with LC connector for 80 km transmission, -40 to 85°C operating temperature
SFP-1FEMLC-T	SFP module with 1 100Base multi-mode with LC connector for 4 km transmission, -40 to 85°C operating temperature
SFP-1FESLC-T	SFP module with 1 100Base single-mode with LC connector for 40 km transmission, -40 to 85°C operating temperature
SFP-1G10ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G10ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G10BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature
SFP-1G10BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 10 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1G20ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G20ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G20BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature
SFP-1G20BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 20 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1G40ALC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1310 nm, RX 1550 nm, 0 to 60°C operating temperature
SFP-1G40ALC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1310 nm, RX 1550 nm, -40 to 85°C operating temperature
SFP-1G40BLC	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1550 nm, RX 1310 nm, 0 to 60°C operating temperature
SFP-1G40BLC-T	WDM-type (BiDi) SFP module with 1 1000BaseSFP port with LC connector for 40 km transmission; TX 1550 nm, RX 1310 nm, -40 to 85°C operating temperature
SFP-1GEZXLC	SFP module with 1 1000BaseEZ port with LC connector for 110 km transmission, 0 to 60°C operating temperature
SFP-1GEZXLC-120	SFP module with 1 1000BaseEZ port with LC connector for 120 km transmission, 0 to 60°C operating temperature
SFP-1GLHLC	SFP module with 1 1000BaseLH port with LC connector for 30 km transmission, 0 to 60°C operating temperature
SFP-1GLHLC-T	SFP module with 1 1000BaseLH port with LC connector for 30 km transmission, -40 to 85°C operating temperature
SFP-1GLHXLC	SFP module with 1 1000BaseLHX port with LC connector for 40 km transmission, 0 to 60°C operating temperature
SFP-1GLHXLC-T	SFP module with 1 1000BaseLHX port with LC connector for 40 km transmission, -40 to 85°C operating temperature
SFP-1GLSXLC	SFP module with 1 1000BaseLSX port with LC connector for 500 m transmission, 0 to 60°C operating temperature
SFP-1GLSXLC-T	SFP module with 1 1000BaseLSX port with LC connector for 500 m transmission, -40 to 85°C operating temperature
SFP-1GLXLC	SFP module with 1 1000BaseLX port with LC connector for 10 km transmission, 0 to 60°C operating temperature
SFP-1GLXLC-T	SFP module with 1 1000BaseLX port with LC connector for 10 km transmission, -40 to 85°C operating temperature

SFP-1GSXLC	SFP module with 1 1000BaseSX port with LC connector for 300/550 m transmission, 0 to 60°C operating temperature
SFP-1GSXLC-T	SFP module with 1 1000BaseSX port with LC connector for 300/550 m transmission, -40 to 85°C operating temperature
SFP-1GZXLC	SFP module with 1 1000BaseZX port with LC connector for 80 km transmission, 0 to 60°C operating temperature
SFP-1GZXLC-T	SFP module with 1 1000BaseZX port with LC connector for 80 km transmission, -40 to 85°C operating temperature

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