TPGS-R5416MGT

16 10/100/1000T + 4 1G/2.5G Copper M12 X-coded w/8/10/16 PoE at/af EN50155 OS4 Managed Ethernet Switch w/ Enhanced G.8032 Ring, PXE; WVI input

- *Total 16 10/100/1000T + 4 1G/2.5G Copper M12 X-coded w/8/16 or 10 (incl.8 copper + 2 uplink 1G/2.5G copper) PoE ports*
- *Support IEEE802.3at/af up to 30W per port PoE management incl. Detection and Scheduling*
- *Enhanced G.8032 ring protection < 20ms for single ring. Supports enhanced mode and basic mode; Enhanced G.8032 ring covers multicast packets; MSTP 8 MSTI /RSTP; support MRP ring*
- *Miss-wiring avoidance & node failure protection*
- *User friendly UI, including auto topology drawing ; Complete CLI*
- *Support LACP link aggregation, IGMP v3/router port, MLD snooping, DHCP server & DHCP Option82; Port based DHCP distribution, Mac based DHCP server, SSH v2/SSL, HTTPS, INGRESS ACL L2/L3, TACACS+, QinQ, QoS by VLAN*
- *Protocol based VLAN ; IPv4 Subnet based VLAN*
- *Support PXE to verify switch firmware with the latest or certain version on server*
- *Enhanced Environmental Monitoring for temp., actual input voltage, current & total power load*
- *Optional smart bypass 1G/2.5G ports in case of power failure, CPU hang (Up to two pairs)*
- *IP21 aluminum enclosure*
- *Optional L3Lite or IEEE61375-2-5 TBN features to be upgradable*
- *USB port to upload & download the configuration file*
- *Dual power input 16.8V~137.5V with galvanic isolation between input power , PoE and system*
- *Factory reset pin to restore to factory default setting*
- *Inrush current protection*
- *Wide range operation temperature :-40~70C/-40~158F*

OVERVIEW

Lantech TPGS-R5416MGT is a high performance OS4 Ethernet switch with 16 10/100/1000T + 4 1G/2.5G Copper M12 X-Coded with 8/16 or 10 (incl.8 copper + 2 uplink 1G/2.5G copper) PoE 802.3af/at ports which provides advanced security function for network aggregation deployment. It delivers ITU G.8032 enhanced ring recovery less than 20ms in single ring while also supports enhanced mode with easy configuration. The comprehensive QoS, advanced security including INGRESS ACL L2/L3, TACACS+, SSH v2/SSL and subnet VLAN, protocol VLAN and Mac based DHCP server, DHCP Option 82, DHCP server, IGMPv1/v2/v3/router port are supported and also required in large network. It also supports 10K Jumbo frames.

Miss-wiring avoidance, node failure protection, Loop protection

The TPGS-R5416MGT also embedded several features for strong and reliable network protection in an easy and intuitive way. When the pre-set ring configuration failed or looped by miss-wiring, Lantech TPGS-R5416MGT is able to alert with the LED indicator and disable ring automatically.

Node failure protection ensures the switches in a ring to survive after power breakout is back. The status can be shown in NMS when each switch is back.

Loop protection is also available to prevent the generation of broadcast storm when a dumb switch is inserted in a closed loop connection.

Support PXE to verify switch firmware with the latest or certain version

The switch can check its firmware version during booting time via PXE protocol. If switch finds any newer version, it will upload automatically.

DHCP option 82 & Port based, Mac based DHCP, Option66, IPv6 DHCP server

DHCP server can assign dedicated IP address by MAC or by port (Port based for single switch), it also can assign IP address by port for multiple switches with single DHCP option82 server. DHCP Option66 server can offer IP address of

TFTP server to DHCP client for VOIP application. Basic IPv6 DHCP service can be supported.

User friendly GUI, Auto topology drawing
The user friendly UI, innovative auto topology drawing and topology demo makes TPGS-R5416MGT much easier to get hands-on. The complete CLI enables professional engineer to configure setting by command line.

Enhanced G.8032 ring, 8 MSTI MSTP; MRP ring
Lantech TPGS-R5416MGT features enhanced G.8032 ring which can be self-healed in less than 20ms for single ring topology protection covering multicast packets. It also supports various ring topologies that covers enhanced ring and basic ring by easy setup than others. It supports MSTP that allows RSTP over VLAN for redundant links with 8 MSTI.
MRP (Media Redundancy Protocol) can be supported for industrial automation networks.

Built-in IEC 61375-3-4 ECN (Ethernet Consist Network) to work with IEC61375-2-5 TBN
Lantech OS4 Ethernet switches comply with IEC 61375-3-4 (ECN) standard. The support of Ethernet Consist Network allows interconnection between end devices located in single consist of train and interoperability with IEC61375-2-5 (TBN).

Enhanced Storm control*
Storm control prevents traffic on a LAN from being disrupted by a broadcast, multicast, or unicast storm on one of the physical interfaces and the detection is more precise and reaction is more efficient.

Optional L3Lite/L3*/ETBN to be upgradable
Lantech OS4 are optional upgradable to L3 Lite/ L3* or ETBN communication protocols for future expansion. The optional L3Lite includes editable routing table, VRRP, Router-on-a-stick, Inter- VLAN routing. Optional ETBN complies with IEC61375-2-5 ETBN for Train Backbone Network.

QinQ, QoS and GVRP supported
It supports the QinQ, QoS and GVRP for large VLAN segmentation.

Up to 8/10/16 (at) PoE at/af ports w/advanced PoE management
Compliant with 802.3af/at standard, the Lantech TPGS-R5416MGT is able to feed each PoE port up to 30 Watt at each PoE port for various IP PD devices. Lantech TPGS-R5416MGT supports advanced PoE management including PoE detection and scheduling. PoE detection can detect if the connected PD hangs then restart the PD; PoE scheduling is to allow pre-set power feeding schedule upon routine time table. Each PoE port can be Enabled/disabled, get the voltage, current, Watt, and temperature info displayed on WebUI.

IGMPv3, GMRP, router port, MLD Snooping, static multicast forwarding and multicast Ring protection
The unique multicast protection under enhanced G.8032 ring can offer immediate self-recovery instead of waiting for IGMP table timeout. It also supports IGMPv3, GMRP, router port, MLD snooping and static multicast forwarding binding by ports for video surveillance application.

Protocol based VLAN; Subnet based VLAN
The protocol-based VLAN processes traffic based on protocol. It filters IP traffic from nearby end-stations using a particular protocol such as IP, IPX, ARP or other Ethernet-types in a Hex value. Subnet based VLANs group traffics into logical VLANs based on the source IP address and IP subnet. The above features can help to build VLAN in the network mixed with managed and un-managed switch as to define packets to which VLAN group based on protocol or subnet.

Editable configuration file; USB port for upload/download configuration
The configuration file of Lantech TPGS-R5416MGT can be exported and edited with word processor for the following switches to configure with ease.
The USB port can upload/download the configuration from/to USB dongle.

Event log & message; 2DI + 2DO; Factory default pin
TPGS-R5416MGT provides 2DI and 2DO. When disconnection of the specific port was detected; DO will activate the signal LED to alarm. DI can integrate the sensors for events and DO will trigger the outside alarm and switch will send alert information to IP network with email and traps.
The factory reset pin can restore the setting back to factory default.

Enhanced environmental monitoring for switch inside information
The enhanced environmental monitoring can detect switch overall temperature, total power load, actual input voltage and current. It also can send the SNMP traps alert when abnormal.

Optional smart bypass protection on dual 1G/2.5G copper ports**
The bypass relay is set to bypass the switch to the next one when power is off to prevent network disruption. Lantech bypass caters to remain in bypass mode until the switch is completely booting up when power is back to avoid another network lost. Optional smart bypass (Up to two pairs) can be activated when switch encounters power failure or CPU hang. (-BT/-BBT model)

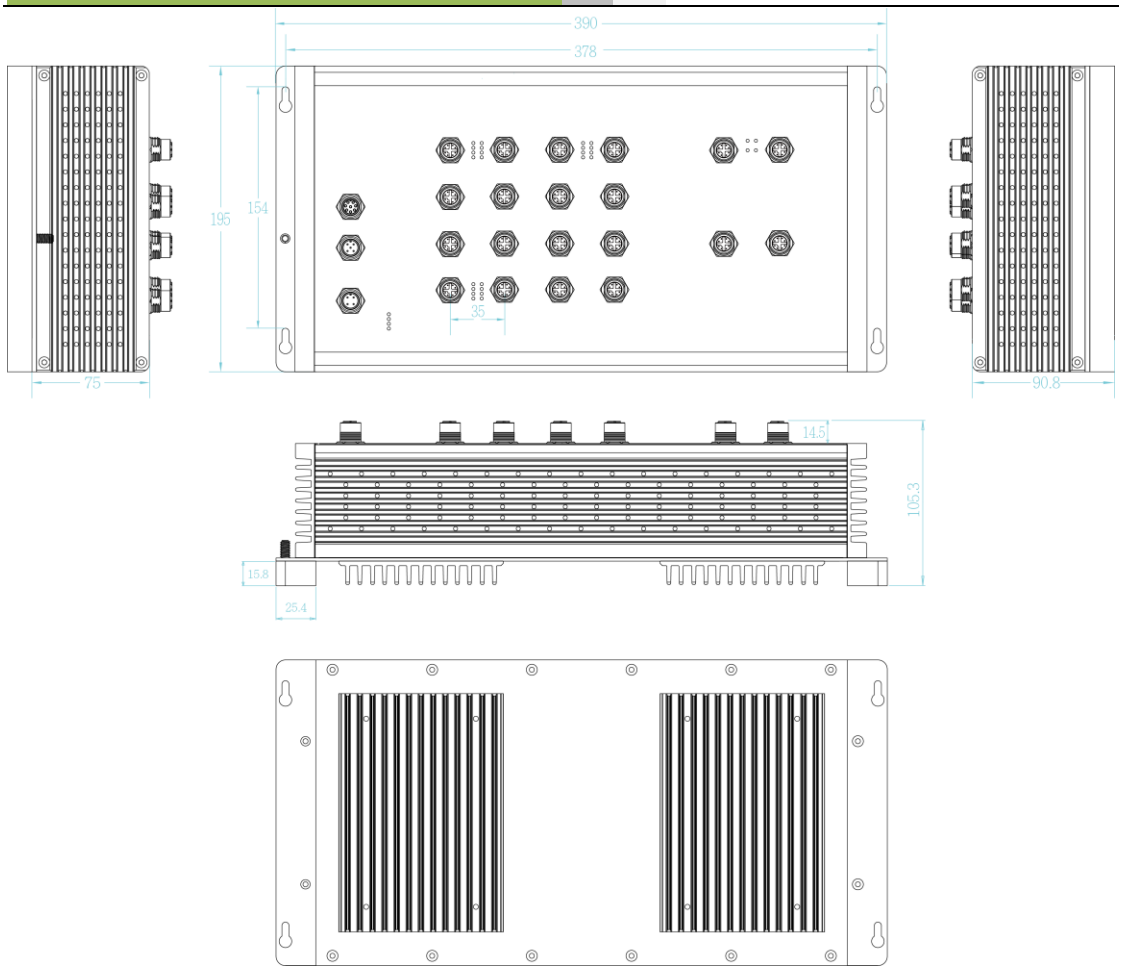
Dual WVI input with max PoE budget and Inrush current protection
The TPGS-R5416MGT WVI model accept 16.8~137.5VDC dual input with galvanic protection and can feed 54V output for PoE feeding with 80W budget. A voltage which can be minimal 0,5 Un nominal voltage (when Vin≧36V) and/or a voltage which can be maximal 1,5 Un nominal voltage for more than 1000 consecutive ms (one second).
The inrush current on initial power up can be limited lower than 10 x nominal current and for less than 1ms.

EN50155, EN45545-2; EN61373 compliance; High ESD protection
TPGS-R5416MGT passed serious tests under extensive Industrial EMI and Safety standards. With EN45545-2 Fire & Smoke, EN50155 verification, the TPGS-R5416MGT is best switch for railway on-board/track side, vehicle and mining applications. For more usage flexibilities, TPGS-R5416MGT supports wide operating temperature from -40°C to 70°C. (85°C operation for 10min.)

FEATURES & BENEFITS

- **16 10/100/1000T + 4 1G/2.5G Copper auto-sensing OS4 Ethernet Switch with 8/16 or 10 (incl.8 copper + 2 uplink 1G/2.5G copper) PoE 802.3af/at Ports (Total 20 Ports Switch) to feed power up to 30W for active mode operation**
- **Dual WV input (16.8V~137.5VDC) for PoE budget 80W**
- **Galvanic isolation from power input/Ethernet ports to system 1.5KV**
- **Back-plane (Switching Fabric): 52Gbps**
- **16K MAC address table**
- **10KB Jumbo frame**
- **PoE management including PoE detection and scheduling for PD (power devices)**
- **User friendly UI, auto topology drawing, topology demo, complete CLI for professional setting**
- **Enhanced G.8032 Ring protection in 20ms for single ring**
  - *Support various ring/chain topologies, including enhanced ring & basic ring*
  - *Enhanced G.8032 ring configuration with ease*
  - *Cover multicast and data packets protection*
- **Supports IEEE 802.1p Class of Service, per port provides 8 priority queues Port base, Tag Base and Type of Service Priority**
- **IEEE 802.1d STP, IEEE 802.1w RSTP,802.1s MSTP VLAN redundancy with 8 MSTI**
- **4K 802.1Q VLAN, Port based VLAN, GVRP, QinQ, QoS**
- **Subnet VLAN and protocol VLAN**
- **Supports IEEE 802.1ab LLDP, Cisco CDP; LLDP info can be viewed via Web/ Console**
- **Support PXE to verify switch firmware with the latest or certain version**
- **DHCP server / client / DHCP Option 82 relay / DHCP Option 82 server; Port based DHCP server; DHCP Option 66 ; basic IPv6 DHCP server**
- **Mac based DHCP server to assign IP address in DHCP network**
- **Bandwidth Control**
  - *Ingress packet filter and egress* rate limit*
  - *Broadcast/multicast packet filter control*
- **Miss-wiring avoidance**
  - *LED indicator*
- **Node failure protection**
  - *Ensure the switches in a ring to survive after power breakout is back*
  - *The status can be shown in NMS when each switch is back*
- **System Event Log, SMTP alert and SNMP Trap for alarm support**
- **Security**
  - *SSL/SSH v2/INGRESS ACL L2/L3*
  - *MAC address table: MAC address entries/Filter/static MAC-Port binding*
  - *Remote Admin: IP address security management to prevent unauthorized intruder*
  - *TACACS+*
  - *Login Security: IEEE802.1X/RADIUS*
  - *HTTPS for secure access to the web interface*
- **Static multicast forwarding forward reversed IGMP flow with multicast packets binding with ports for IP surveillance application**
- **IGMP router port for Multicast protection**
- **MLD snooping for IPv6 Multicast steam**
- **IGMPv1,v2,v3 with Query mode for multi media**
- **Dual image firmware support**
- **Factory reset pin to restore setting to factory default**
- **Enhanced environmental monitoring for system actual input voltage, current, ambient temperature and total power load**
- **Supports 2DI/2DO (Digital Input/Digital Output)**
- **Configuration backup and restoration**
  - *Supports editable configuration file for system quick installation*
  - *USB port for upload/download the config*
- **TFTP/HTTP firmware upgrade**
- **Wide operation temperature: -40C~70C/-40F~158F (85°C operation for 10min.)**
- **EN45545-2 Fire & Smoke, EN50155 and EN61373 shock/vibration verification**
- **Diagnostic including Ping / ARP table / DDM information**
- **Enhanced Storm Control***
- **Optional L3Lite/L3*/ETBN to be upgradable**
- **Built-in IEC 61375-3-4 ECN (Ethernet Consist Network) to work with IEC61375-2-5 TBN**
- **Optional smart bypass (Up to two pairs) (-BT/-BBT model)**
- **Inrush current protection**
- **IP21 aluminum housing with wall mount design**

DIMENSIONS (unit=mm)



SPECIFICATIONS

Hardware Specification

Standards	IEEE802.3 10Base-T Ethernet IEEE802.3ab 1000Base-T IEEE802.3x Flow Control and Back Pressure IEEE802.3ad Port trunk with LACP IEEE802.1d Spanning Tree IEEE802.1w Rapid Spanning Tree IEEE802.1s Multiple Spanning Tree IEEE802.3ad Link Aggregation Control Protocol (LACP) IEEE802.1AB Link Layer Discovery Protocol (LLDP) IEEE802.1X User Authentication (Radius) IEEE802.1p Class of Service IEEE802.1Q VLAN Tag IEEE802.3at/af Power over Ethernet
Switch Architecture	Back-plane (Switching Fabric): 52Gbps
Mac Address	16K MAC address table
Jumbo frame	10KB
Connectors	10/100/1000T: 16 x M12 8-pole X-coded with Auto MDI/MDI-X function 1G/2.5G Copper: 4 x M12 8-pole X-coded with Auto MDI/MDI function Power Input connector: 1 x M12 4-pole Male A-coded Reset/Console/USB : 1 x M12 8-pole A-coded DIDO: 1 x M12 5-pole A-coded
Network Cable	10Base-T: 2-pair STP Cat. 3, 4, 5/ 5E/ 6 cable EIA/TIA-568 100-ohm (100m)
	100Base-TX: 2-pair STP Cat. 5/ 5E/ 6 cable; EIA/TIA-568 100-ohm (100m) 1000Base-T: 4-pair STP Cat5E/6 cable
LED	Per unit: Power 1 (Green), Power 2 (Green), FAULT (Red); RM(Green) 10/100/1000T Ethernet port: Link/Activity (Green) 1G/2.5G copper: Link/Act (Yellow) PoE : Link/Act (Green)
DI/DO	2 Digital Input (DI) : Level 0: -30~2V / Level 1: 10~30V Max. input current:8mA 2 Digital Output(DO): Open collector to 40 VDC, 200mA
Operating Humidity	5% ~ 95% (Non-condensing)
Operating Temperature	-40°C~70°C / -40°F~158°F (85°C operation for 10min.)
Storage Temperature	-40°C~85°C / -40°F~185°F
Power Supply	Dual DC input, 16.8VDC~137.5VDC
PoE Budget	Input Range / Power Input / Maximal PoE Budget 16.8~27VDC / Dual Power Input / 80W 28~137.5VDC / Single Power Input / 80W
PoE pin assignment	M12 port #1~#8/16 (-8/-16 model) ; #19~#20 (-10 model) ; support IEEE 802.3at/af End-point, Alternative A mode

Power Consumption	max. 46.3W exclude PoE load
Dimensions	IP21 model: Aluminum case 390mm(W)x195mm(H)x105.3mm(D)
Weight	3.8kgs
Installation	Wall Mount Design
EMI & EMS	FCC Part 15 Class A IEC/EN61000-6-2 IEC/EN61000-6-4 CE EN55032 Class A CE EN55024 CE EN61000-4-2 (ESD) Level 3 CE EN61000-4-3 (RS) Level 3 CE EN61000-4-4 (EFT) Level 3 CE EN61000-4-5 ED3 (Surge) Level 3 CE EN61000-4-6 (CS) Level 3 CE EN61000-4-8 (Magnetic field) Level 3
Verifications	EN50155/EN50121-3-2/EN50121-4 ; EN45545-2 R13/R22/R23/R24/R25 (EN ISO 4589-2, EN ISO 5659-2, NF X70-100-1 & 2) Fire & Smoke verification
Stability Testing	EN61373 (Shock and Vibration)
MTBF	TBC (standards: IEC 62380)
Warranty	5 years
Bypass**	Up to two pairs Bypass module on 1G/2.5G Copper ports to pass to next switch in case of power failure and CPU hang

Software Specification

Management	SNMP v1 v2c, v3/ Web/Telnet/CLI
SNMP MIB	RFC 1213 MIBII RFC 1158 MIB RFC 1157 SNMP MIB RFC 1493 Bridge MIB* RFC 1573 IF MIB RFC 2674 Q-Bridge MIB* RFC 2819 RMON MIB Private MIB
PoE Management	PoE Detection to check if PD hangs then restart the PD PoE scheduling
Per Port PoE Status	On/ Off, voltage, current, watts, temperature
ITU G.8032	Support ITU G.8032 for Ring protection in less than 20ms for self-heal recovery (single ring enhanced mode) Support basic single ring & enhanced ring Enhanced G.8032 ring configuration with ease Cover multicast & data packets protection
User friendly UI	■ Auto topology drawing ■ Topology demo ■ Complete CLI for professional setting
Port Trunk with LACP	LACP Port Trunk: 8 Trunk groups
LLDP	Supports LLDP to allow switch to advise its identification and capability on the LAN
CDP	Cisco Discovery Protocol for topology mapping
Enhanced Environmental Monitoring	System status for actual input voltage, current, total power load and ambient temperature to be shown in GUI and sent alerting if any abnormal status
VLAN	Port Based VLAN IEEE 802.1Q Tag VLAN (256 entries)/ VLAN ID (Up to 4K, VLAN ID can be assigned from 1 to 4096) GVRP, QinQ, QoS Protocol based VLAN IPv4 Subnet based VLAN
Spanning Tree	Supports IEEE802.1d Spanning Tree and IEEE802.1w Rapid Spanning Tree, IEEE802.1s Multiple Spanning Tree 8 MSTI
Quality of Service	The quality of service determined by port, Tag and IPv4 Type of service, IPv4 Differentiated Services Code Points - DSCP
Class of Service	Support IEEE802.1p class of service, per port provides 8 priority queues
Remote Admin	Supports 10 IP addresses that have permission to access the switch management and to prevent unauthorized intruder
Login Security	Supports IEEE802.1X Authentication/RADIUS
Port Mirror	Support 3 mirroring types: “RX, TX and Both packet”
Network Security	Support 10 IP addresses that have permission to access the switch management and to prevent unauthorized intruder. 802.1X access control for port based and MAC based authentication/static MAC-Port binding Ingress ACL L2/L3 SSL/SSH v2 for Management HTTPS for secure access to the web interface TACACS+ for Authentication
IGMP	Support IGMP snooping v1,v2,v3; Supports IGMP static route; 1024 multicast groups; IGMP router port ; IGMP query; GMRP
MLD Snooping	Support IPv6 Multicast stream
Static multicast forwarding	Static multicast forwarding forward reversed IGMP flow with multicast packets binding with ports for IP surveillance application
Bandwidth Control	support ingress packet filter and egress* packet limit. The egress* rate control supports all of packet type. Ingress filter packet type combination rules are Broadcast/Multicast/Flooded Unicast packet, Broadcast/Multicast packet, Broadcast packet only and all types of packet. The packet filter rate can be set an accurate value through the pull-down menu for the ingress packet filter and the egress* packet limit.
Flow Control	Supports Flow Control for Full-duplex and Back Pressure for Half-duplex
System Log	Supports System log record and remote system log server
Protection	■ Miss-wiring avoidance ■ Node failure protection ■ Loop protection
SNMP Trap	Up to 5 trap stations; trap types including: ● Device cold start ● Authorization failure ● Port link up/link down ● DI/DO open/close ● Typology change(ITU ring) ● Power failure ● Environmental abnormal
PXE	PXE to verify switch firmware with the latest or certain version
DHCP	Provide DHCP Client/ DHCP Server/DHCP Option 82/Port based DHCP ; DHCP Option 66 ; basic IPv6 DHCP server
Mac based DHCP Server	Assign IP address by Mac in DHCP network
DNS	Provide DNS client feature and can set Primary and Secondary DNS server
NTP/SNTP	Supports NTP/SNTP to synchronize system clock in Internet
Firmware Update	Supports TFTP firmware update, TFTP backup and restore; HTTP firmware upgrade
Configuration upload and download	Supports editable configuration file for system quick installation; Support factory reset ping to restore all settings back to factory default
Enhanced Storm Control*	prevents traffic on a LAN from being disrupted by a broadcast, multicast, or unicast storm on one of the physical interfaces
ECN	Complies with IEC 61375-3-4 (ECN) standard. The support of Ethernet Consist Network allows interconnection between end devices located in single consist of train and interoperability with IEC61375-2-5 (TBN).
Optional L3Lite/L3*/ETBN **	Lantech OS4 are optional upgradable to L3 Lite/ L3* or ETBN communication protocols for future expansion. The optional L3Lite includes editable routing table, VRRP, Router-on-a-stick, Inter-VLAN routing. Optional ETBN complies with IEC61375-2-5 ETBN for Train Backbone Network. Detail SPEC upon request.

Diagnostic	Support Ping, ARP table and DDM information
Dual Image Firmware	Support dual image firmware function

*Future release
**Optional

ORDERING INFORMATION

All model packages include M12 caps. For optional bypass add –BT (one pair); -BBT (two pairs) to end of model names. For Coating add –C to end of model names.

- **TPGS-R5416MGT-8-21-WVI…..……..…..…….…....P/N: 8361- 556**
  16 10/100/1000T + 4 1G/2.5G Copper M12 X-coded ; w/8 PoE at/af EN50155 OS4 Managed PoE Ethernet Switch ; 16.8V~137.5VDC dual input ; -40C~70C/-40F~158F ; IP21 housing w/ galvanic isolation
- **TPGS-R5416MGT-10-21-WVI…..……..…..…….…....P/N: 8361- 5561**
  16 10/100/1000T + 4 1G/2.5G Copper M12 X-coded ; w/10 PoE at/af incl.2 1G/2.5G Copper EN50155 OS4 Managed PoE Ethernet Switch ; 16.8V~137.5VDC dual input ; -40C~70C/-40F~158F ; IP21 housing w/ galvanic isolation
- **TPGS-R5416MGT-16-21-WVI…..……..…..…….…....P/N: 8361- 5562**
  16 10/100/1000T + 4 1G/2.5G Copper M12 X-coded ; w/16 PoE at/af EN50155 OS4 Managed PoE Ethernet Switch ; 16.8V~137.5VDC dual input ; -40C~70C/-40F~158F ; IP21 housing w/ galvanic isolation

OPTIONAL ACCESSORIES

Software package

- **OS4 – L3L …….. P/N: 9000-110**
  OS software platform with Layer 3 Lite functions (please check Lantech software data sheet for details)
- **OS4 – IEC61375-2-5 ……..... P/N: 9000-111**
  OS4 software platform with IEC-61375-2-5 ETBN (Ethernet Train Backbone Networks) function (please check Lantech software data sheet for details)
- **OS4 – L3* …….. P/N: 9000-112**
  OS4 software platform with Layer 3 functions (please check Lantech software data sheet for details)
- **OS4 – R-NAT ……. P/N: 9000-113**
  OS4 software platform with R-NAT function (please check Lantech software data sheet for details)

M12 Connector & Cable

Connector	
ECONM12-04A(F)-C-180	4 pin M12 (Female) A-coded 180 degree crimp type connector for power supply
ECONM12-08A(M)-180	8 pin M12 (Male) A-coded 180 degree crimp type connector for reset/console/USB
ECONM12-05A(M)-C-180	5 pin M12 (Male) A-coded 180 degree crimp type connector for DI/DO
ECONM12-08X(M)-SPEEDCON	8 pin M12 (Male) X-coded 180 degree crimp type connector for data, Ethernet CAT6A (10G), shielded, SPEEDCON
Cable	
ECONM12-4P(F)1.5M CABLE	4 pin M12 (Female) A-coded 90 degree cable for power supply, 150cm
ECONM12-08M2-CONSOLE	8 pin M12 (Male) A-coded 180 degree to RS232 cable for console, 150cm
ECABM12X83MSTP	8 pin M12 (Male) X-coded 180 degree RJ45 STP cable for data, shielded, 300cm
Others	
USB adapter	8pin M12 (Male) A-coded 180 degree M12 to USB 2.0 interface adapter, 8cm

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