IGS-P9164 Series

Managed Cyber-hardened IEC 61850-3 20-port managed Gigabit Ethernet switch

Features

- Developed according to IEC 62443-4-1 and certified with the IEC 62443-4-2 industrial cybersecurity standards.
- Designed for power substation / Railway application and fully compliant with the requirement of IEC 61850-3 and IEEE 1613
- Support **O-Ring** (recovery time < 30ms over 250 units of connection) and MSTP(RSTP/STP compatible) for Ethernet Redundancy
- **Open-Ring** support the other vendor's ring technology in open architecture
- **O-Chain** allow multiple redundant network rings
- Support standard IEC 62439-2 **MRP** (Media Redundancy Protocol) function
- Support IEEE 1588v2 clock Synchronization
- Support IPV6 new internet protocol version
- Support Modbus TCP protocol
- Provided HTTPS/SSH protocol to enhance network security
- Support IEEE 802.3az **Energy-Efficient Ethernet** technology
- Support SMTP client and NTP server protocol
- Support IP-based bandwidth management
- Support application-based QoS management
- Support Device Binding security function
- Support DOS/DDOS auto prevention
- IGMP v2/v3 (IGMP snooping support) for filtering multicast traffic
- Support SNMP v1/v2c/v3 & RMON & 802.1Q VLAN Network Management
- Support ACL, TACACS+ and 802.1x User Authentication for security
- Support 9.6K Bytes Jumbo Frame
- Support DBU-01 backup unit to quickly backup/restore configuration
- Built-in MMS server and IEC 61850 QoS
- Support **DBU-01** backup unit device to quickly backup/restore configuration
- Web-based ,Telnet, Console (CLI), and Windows utility (**Open-Vision**) configuration
- Support LLDP Protocol
- Rigid IP-30 housing design
- DIN-Rail and wall mounting enabled

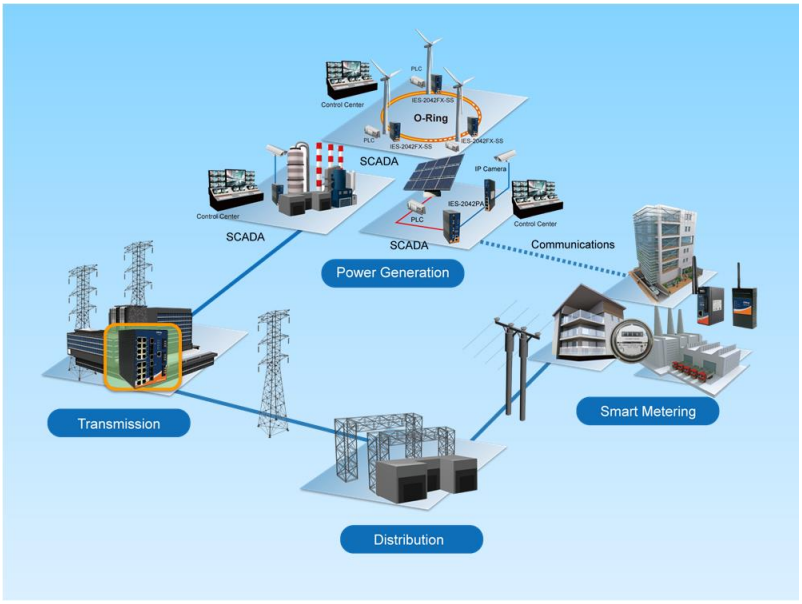
IPv6 READY | IEC61850 | Full Gigabit | O-Ring | Redundant PWR | -40~85°C Temperature

Introduction

IGS-P9164 series are IEC 61850-3 managed redundant ring Ethernet switches. These switches are designed for power substation application and rolling stock application, fully compliant with the requirement of IEC 61850-3 and IEEE 1613. **IGS-P9164GF** series are IEC 61850-3 managed redundant ring Ethernet switch with 16x10/100/1000Base-T(X) ports and 4x1000Base-X optical fiber port with SC connector. **IGS-P9164FX** series are IEC 61850-3 managed redundant ring Ethernet switch with 16x10/100/1000Base-T(X) ports and 4x100Base-FX optical fiber port with SC connector. **IGS-P9164GC** series are IEC 61850-3 managed redundant ring Ethernet switch with 16x10/100/1000Base-T(X) ports and 4xGigabit combo ports with SFP socket. With completely support of Ethernet Redundancy protocol, **O-Ring** (recovery time < 30ms over 250 units of connection) and MSTP (RSTP/STP compatible) can protect your mission-critical applications from network interruptions or temporary malfunctions with its fast recovery technology. And support wide operating temperature

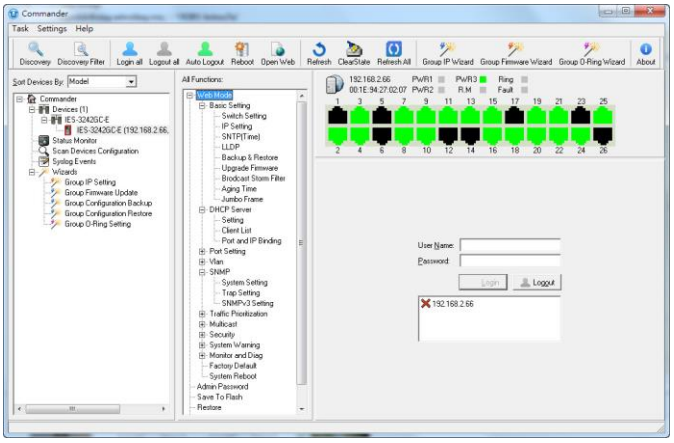
from -40℃ to 85℃. IGS-P9164GF(X) series can also be managed centralized and convenient by Open-Vision, Except the Web-based interface, Telnet and console (CLI) configuration. Therefore, the switch is one of the most reliable choice for highly-managed and Fiber Ethernet application.

- **O-Ring :** O-Ring is ORing's proprietary redundant ring technology, with recovery time of less 30 milliseconds and up to 250 nodes. The O-Ring redundant ring technology can protect mission-critical application from network interruptions or temporary malfunction with its fast recover technology.
- **Open-Ring :** Open-Ring is an enhanced redundant technology that makes ORing's switches compatible with other vendor's proprietary redundant ring technologies. It enables ORing's switches to form a single ring with other vendor's switch. In cases where the ring is setup using proprietary technology, ORing offers a compatibility service where ORing can make its switches compatible with your particular network requirements.
- **O-Chain :** O-Chain is the revolutionary network redundancy technology that provides the add-on network redundancy topology for any backbone network, O-Chain allows multiple redundant network rings of different redundancy protocols to join and function together as a larger and more robust compound network topology. O-Chain providing ease-of-use while maximizing fault-recovery swiftness, flexibility, compatibility, and cost-effectiveness in one set of network redundancy topology.
- **MRP : Media Redundancy Protocol** (**MRP**[*NOTE]) is a data network protocol standardized by the IEC 62439-2. It allows rings of Ethernet switches to overcome any single failure with recovery time much faster than achievable with Spanning Tree Protocol.
- **IP-based Bandwidth Management :** The switch provide advanced IP-based bandwidth management which can limit the maximum bandwidth for each IP device. User can configure IP camera and NVR with more bandwidth and limit other device bandwidth.
- **Application-Based QoS :** The switch also support application-based QoS. Application-based QoS can set highest priority for data stream according to TCP/UDP port number.
- **Device Binding Function :** ORing special Device Binding function can only permit allowed IP address with MAC address to access the network. Hacker cannot access the IP surveillance network without permission. It can avoid hacker from stealing video privacy data and attacking IP camera, NVR and controllers.
- **Advanced DOS/DDOS Auto Prevention :** The switch also provided advanced DOS/DDOS auto prevention. If there is any IP flow become big in short time, the switch will lock the source IP address for certain time to prevent the attack. It's hardware based prevention so it can prevent DOS/DDOS attack immediately and completely.
- **IEEE 1588 Technology :** The IEEE 1588 technology can fulfill precision time synchronization requirements for protection and control applications.
- **Modbus TCP :** This is a Modbus variant used for communications over TCP/IP networks.
- **IEEE 802.3az Energy-Efficient Ethernet :** This is a set of enhancements to the twisted-pair and backplane Ethernet family of networking standards that will allow for less power consumption during periods of low data activity. The intention was to reduce power consumption by 50% or more.

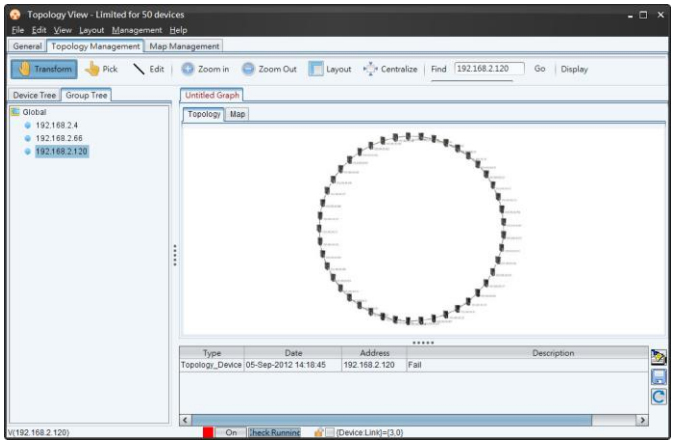


Open-Vision

ORing's switches are intelligent switches. Different from other traditional redundant switches, ORing provides a set of Windows utility (Open-Vision) for user to manage and monitor all of industrial Ethernet switches on the industrial network.



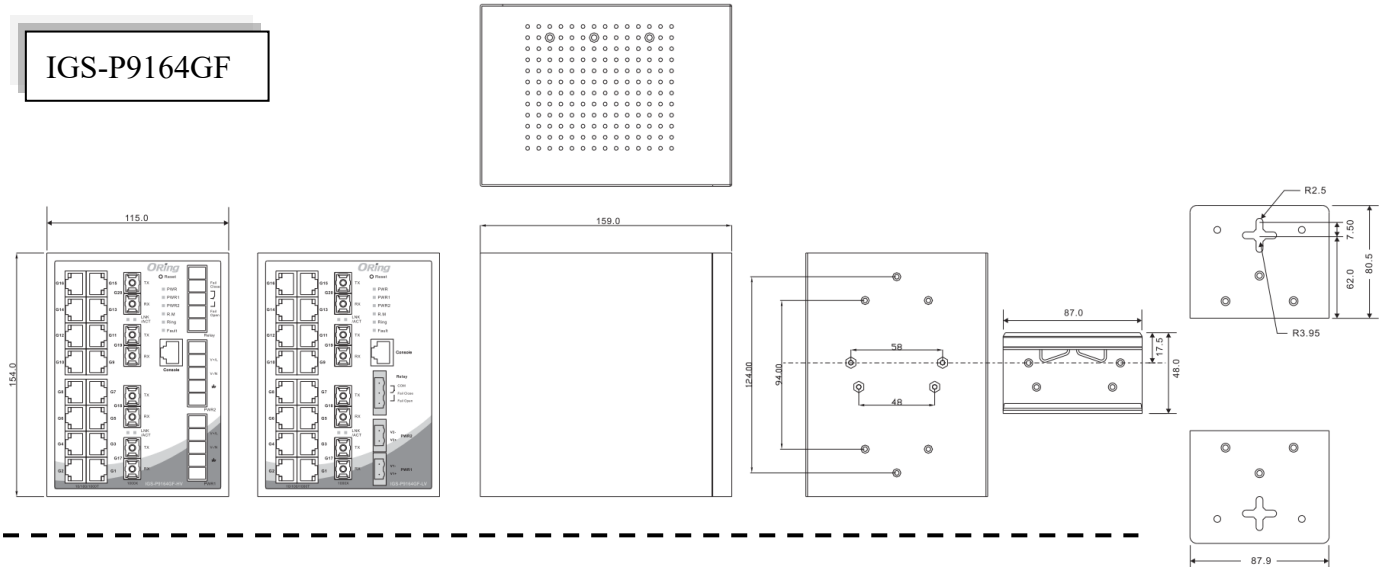
Commander



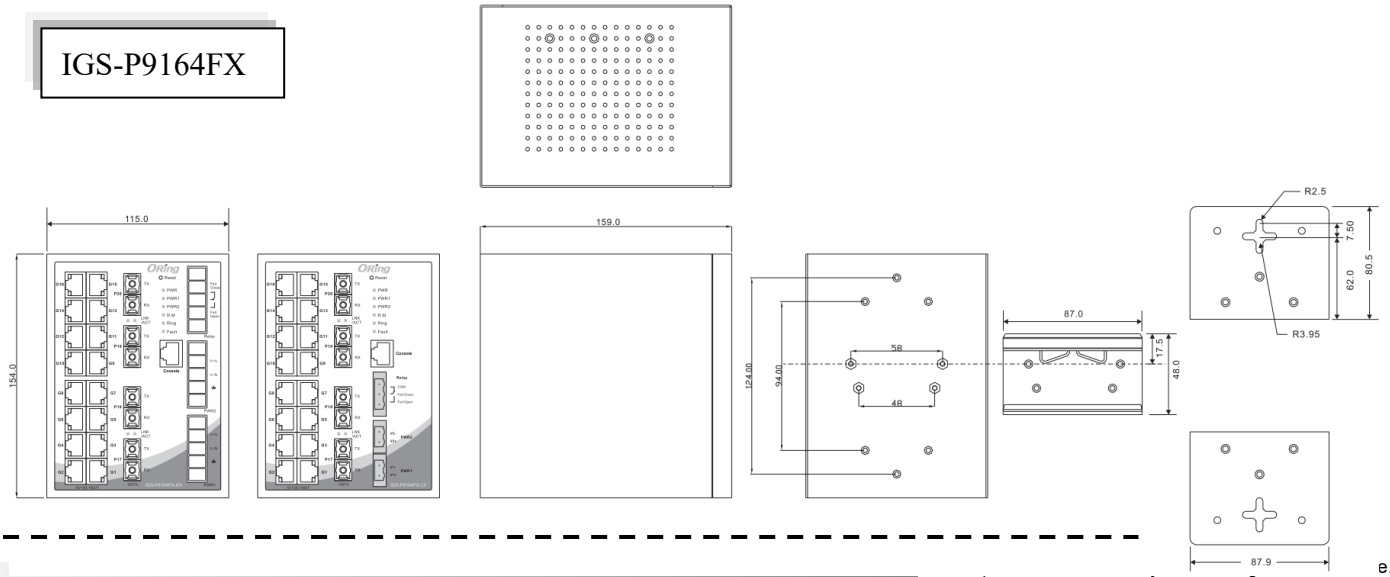
Topology View

Specifications

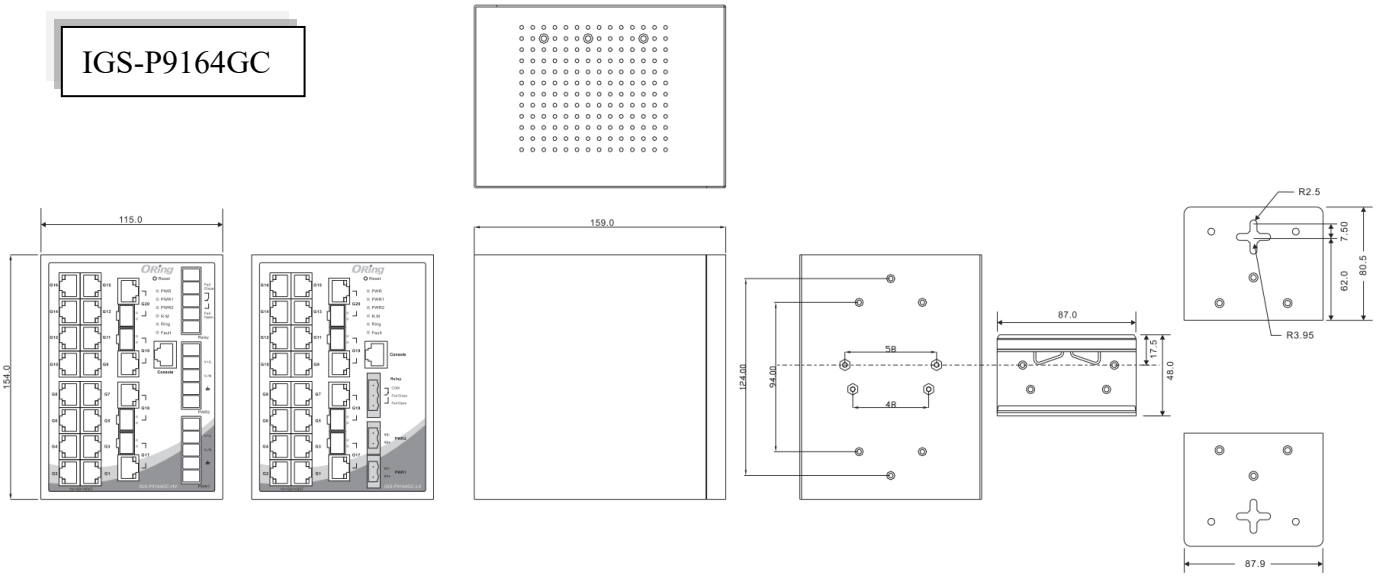
IGS-P9164GF



IGS-P9164FX



IGS-P9164GC



Specifications

ORing Switch Model		IGS-P9164GF-MM	IGS-P9164FX-MM	IGS-P9164GF-SS	IGS-P9164FX-SS	IGS-P9164GC
Physical Ports						
10/100/1000Base-T(X) Ports in RJ45 Auto MDI/MDIX		**16**				
Gigabit Combo Port with 10/100/1000Base-T(X) and 100/1000Base-X SFP Port		**-**				**4**
Fiber Ports Specification	Fiber Ports Number	**4**				**-**
	Fiber Ports Standard	1000Base-SX	100Base-FX	1000Base-LX	100Base-FX	-
	Fiber Mode	Multi-mode	Multi-mode	Single-mode	Single-mode	-
	Fiber Diameter (μm)	62.5/125 μm @ 50/125 μm	62.5/125 μm 50/125 μm	9/125 μm	9/125 μm	-
	Fiber Optical Connector	SC	SC	SC	SC	-
	Typical Distance (Km)	0.55 Km	2 Km	10 Km	30 Km	-
	Wavelength (nm)	850 nm	1310 nm	1310 nm	1310 nm	-
	Max. Output Optical Power (dbm)	-4 dbm	-14 dbm	-3 dbm	-8 dbm	-
	Min. Output Optical Power (dbm)	-9.5 dbm	-23.5 dbm	-9.5 dbm	-15 dbm	-
	Max. Input Optical Power (Saturation)	0 dbm	0 dbm	-3 dbm	0 dbm	-
	Min. Input Optical Power (Sensitivity)	-18 dbm	-31 dbm	-20 dbm	-34 dbm	-
	Link Budget (db)	8.5 db	7.5 db	10.5 db	19 db	-
Technology						
Ethernet Standards		IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX and 100Base-FX IEEE 802.3ab for 1000Base-T IEEE 802.z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.1p for COS (Class of Service) IEEE 802.1Q for VLAN Tagging IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol)				

	IEEE 802.1s for MSTP (Multiple Spanning Tree Protocol) IEEE 802.1x for Authentication IEEE 802.1AB for LLDP (Link Layer Discovery Protocol)				
MAC Table	8k				
Packet Buffer	4Mbits				
Priority Queues	8				
Processing	Store-and-Forward				
Switch Properties	Switching latency: 7 us Switching bandwidth: 40Gbps Max. Number of Available VLANs: 4095 VLAN ID Range : VID 1 to 4094 IGMP multicast groups: 128 for each VLAN Port rate limiting: User Define				
Jumbo frame	Up to 9.6K Bytes				
Security Features	Device Binding security feature Enable/disable ports, MAC based port security Port based network access control (802.1x) VLAN (802.1Q) to segregate and secure network traffic Radius centralized password management SNMPv3 encrypted authentication and access security Https / SSH enhance network security				
Software Features	STP/RSTP/MSTP (IEEE 802.1D/w/s) Redundant Ring (O-Ring) with recovery time less than 30ms over 250 units TOS/Diffserv supported Quality of Service (802.1p) for real-time traffic VLAN (802.1Q) with VLAN tagging and GVRP supported IGMP Snooping IP-based bandwidth management Application-based QoS management DOS/DDOS auto prevention Port configuration, status, statistics, monitoring, security DHCP Server/Client/Relay SMTP Client Modbus TCP NTP server				
Network Redundancy	O-Ring Open-Ring O-Chain MRP *NOTE Fast Recovery MSTP (RSTP/STP compatible)				
RS-232 Serial Console Port	RS-232 in RJ45 connector with console cable. 115200bps, 8, N, 1				
LED indicators					
Power Indicator	Green : Power LED x 3				
Ring Master Indicator (R.M.)	Green : Indicates that the system is operating in O-Ring Master mode				
O-Ring Indicator (Ring)	Green : Indicates that the system operating in O-Ring mode Green Blinking : Indicates that the Ring is broken.				
Fault Indicator (Fault)	Amber : Indicate unexpected event occurred				
10/100/1000Base-T(X) RJ45 Port Indicator	Green for Link/Act indicator. Dual color LED for speed indicator : Green for 1000Mbps indicator / Amber for 100Mbps indicator / Off light for 10Mbps indicator				
1000Base-X Fiber Port Indicator	Green for port Link/Act. (for IGS-P9164GF series)				
100Base-FX Fiber Port Indicator	Green for port Link/Act. (for IGS-P9164GFX series)				
100/1000Base-X SFP Port Indicator	Green for port Link/Act. (for IGS-P9164GC series)				
Fault contact					
Relay	Relay output to carry capacity of 1A at 24VDC on 3-pin terminal block				
Power					
Redundant Input power	LV model : Dual power inputs with 12~48VDC on dual 2-pin terminal block HV model : Dual100-240(85~264) VAC /125~300(88~300) VDC power inputs at terminal block				
Power consumption (Typ.)	LV : 18Watts HV : 18.5Watts	LV : 21Watts HV : 20.7Watts	LV : 18Watts HV : 18.5Watts	LV : 21Watts HV : 19.3Watts	LV : 17Watts HV : 18Watts
Overload current protection	Present				
Reverse Polarity Protection	Present				

Physical Characteristic					
Enclosure	IP-30				
Dimension (W x D x H)	115 (W) x 159 (D) x 154 (H)mm (4.53 x 6.3 x 6.06 inch)				
Weight (g)	LV Model : 1780 g HV Model : 2216 g	LV Model : 1769 g HV Model : 2205 g	LV Model : 1780 g HV Model : 2216 g	LV Model : 1769 g HV Model : 2205 g	LV Model : 1750 g HV Model : 2186 G
Environmental					
Storage Temperature	-40 to 85°C (-40 to 185°F)				
Operating Temperature	-40 to 85°C (-40 to 185°F)				
Operating Humidity	5% to 95% Non-condensing				
Industrial Cybersecurity	IEC 62443-4-1, IEC 62443-4-2				
EMC	CE EMC (EN55035, EN 55032), IEC 61850-3, IEEE 1613,				
EMI	EN 55022, CISPR32, EN 61000-3-2, EN 61000-3-3, FCC Part 15B class A,				
EMS	(IEC/EN 61000-4-2 (ESD), IEC/EN 61000-4-3 (RS), IEC/EN 61000-4-4 (EFT), IEC/EN 61000-4-5 (Surge), IEC/EN 61000-4-6 (CS), IEC/EN 61000-4-8(PFMF), IEC/EN 61000-4-11(DIP))				
Shock	IEC60068-2-27				
Free Fall	IEC60068-2-31				
Vibration	IEC60068-2-6				
Safety	EN62368				
MTBF		LV:236,923 HV:300,460	LV:224681 HV:281,040	LV:196,356 HV:238,082	LV:299,365 HV:408,521
Warranty	5 years				

Ordering Information

IGS-P9AABCC -FF-GG

Code Definition	10/100/1000Base-T(X) Port Number	Additional Port Number	Additional Port Type	Fiber Optical Mode	Fiber Optical Connector
Option	**- 16:** 16 ports	**- 4:** 4 ports	**- GF:** 1000Base-X optical fiber port **- FX:** 100Base-FX optical fiber port **- GC:** Gigabit combo port	**- MM:** Multi-mode **- SS:** Single-mode	**- SC:** SC connector

	Model Name	Description
Available Model	**IGS-P9164FX-MM-SC-LV**	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, multi-mode, 2Km/1310nm, SC connector, low-voltage power inputs
	IGS-P9164FX-SS-SC-LV	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, single-mode, 30Km/1310nm, SC connector, low-voltage power inputs
	IGS-P9164FX-MM-SC-HV_US	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, multi-mode, 2Km/1310nm, SC connector, high-voltage power inputs, US power cord
	IGS-P9164FX-MM-SC-HV_UK	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, multi-mode, 2Km/1310nm, SC connector, high-voltage power inputs, UK power cord
	IGS-P9164FX-MM-SC-HV_EU	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, multi-mode, 2Km/1310nm, SC connector, high-voltage power inputs, EU power cord

IGS-P9164FX-MM-SC-HV_JP	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, multi-mode, 2Km/1310nm, SC connector, high-voltage power inputs, JP power cord
IGS-P9164FX-SS-SC-HV_US	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, single-mode, 30Km/1310nm, SC connector, high-voltage power inputs, US power cord
IGS-P9164FX-SS-SC-HV_UK	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, single-mode, 30Km/1310nm, SC connector, high-voltage power inputs, UK power cord
IGS-P9164FX-SS-SC-HV_EU	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, single-mode, 30Km/1310nm, SC connector, high-voltage power inputs, EU power cord
IGS-P9164FX-SS-SC-HV_JP	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x100Base-FX, single-mode, 30Km/1310nm, SC connector, high-voltage power inputs, JP power cord
IGS-P9164GF-MM-SC-LV	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-SX, multi-mode, 550m/850nm, SC connector, low-voltage power inputs
IGS-P9164GF-SS-SC-LV	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-LX, single-mode, 10Km/1310nm, SC connector, low-voltage power inputs
IGS-P9164GF-MM-SC-HV_US	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-SX, multi-mode, 550m/850nm, SC connector, high-voltage power inputs, US power cord
IGS-P9164GF-MM-SC-HV_UK	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-SX, multi-mode, 550m/850nm, SC connector, high-voltage power inputs, UK power cord
IGS-P9164GF-MM-SC-HV_EU	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-SX, multi-mode, 550m/850nm, SC connector, high-voltage power inputs, EU power cord
IGS-P9164GF-MM-SC-HV_JP	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-SX, multi-mode, 550m/850nm, SC connector, high-voltage power inputs, JP power cord
IGS-P9164GF-SS-SC-HV_US	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-LX, single-mode, 10Km/1310nm, SC connector, high-voltage power inputs, US power cord
IGS-P9164GF-SS-SC-HV_UK	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-LX, single-mode, 10Km/1310nm, SC connector, high-voltage power inputs, UK power cord
IGS-P9164GF-SS-SC-HV_EU	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-LX, single-mode, 10Km/1310nm, SC connector, high-voltage power inputs, EU power cord
IGS-P9164GF-SS-SC-HV_JP	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4x1000Base-LX, single-mode, 10Km/1310nm, SC connector, high-voltage power inputs, JP power cord
IGS-P9164GC-LV	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4xGigabit combo ports, SFP socket, low-voltage power inputs
IGS-P9164GC-HV_US	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4xGigabit combo ports, SFP socket, high-voltage power inputs, US power cord
IGS-P9164GC-HV_UK	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4xGigabit combo ports, SFP socket, high-voltage power inputs, UK power cord
IGS-P9164GC-HV_EU	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4xGigabit combo ports, SFP socket, high-voltage power inputs, EU power cord
IGS-P9164GC-HV_JP	Industrial IEC 61850-3 20-port managed Gigabit Ethernet switch with 16x10/100/1000Base-T(X) and 4xGigabit combo ports, SFP socket, high-voltage power inputs, JP power cord

Packing List

- **IGS-P9164GF(X) or GC x 1**
- **ORing Tool CD x 1**
- **Quick Installation Guide x 1**
- **DIN-Rail Kit x 1**
- **Wall-mount Kit x 2**
- **Console Cable x 1**
- **AC power cord (for HV only)**

Optional Accessories

- **Open-Vision M500 : Powerful Network Management Windows Utility Suit, 500 IP devices**
- **DR/SDR/DRP Series DIN-Rail power supply**