ORing
SWITCH
INDUSTRIAL MANAGED

Quick Installation Guide

IGS-P9164 Series

IEC 61850-3 Industrial Managed Ethernet Switch

Introduction

The **IGS-P9164 series** is a managed industrial Ethernet switch designed for power substation and rolling stock applications as it is fully compliant with the requirements of IEC 61850-3 and IEEE 1613. The series consists of three models: **IGS-P9164GF**, **IGS-P9164FX**, and **IGS-P9164GC,** each comes with 16x10/100/1000Base-T(X) ports and differ numbers or types of optical fiber ports. The devices can be managed centrally via web browsers, TELNET, Console or other third-party SNMP software as well as ORing's proprietary Open-Vision management utility. With complete support for Ethernet redundancy protocols such as O-Ring (recovery time < 30ms over 250 units of connection) and MSTP (RSTP/STP compatible), the devices can protect your mission-critical applications from network interruptions or temporary malfunctions with its fast recovery technology. Boasting a wide operating temperature from -40℃ to 85℃, the switch can meet the demanding requirements of power substations and rolling stock applications.

Package Contents

The device is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for

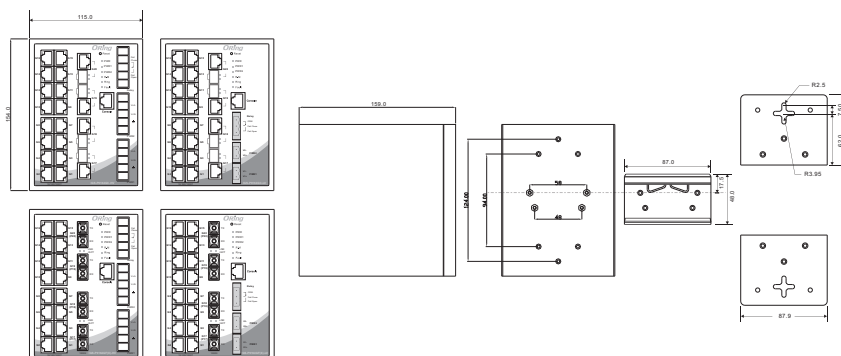| Contents	Pictures	Number
IGS-P9164GF or IGS-P9164FX or IGS-P9164GC		X 1
CD		X 1
DIN-rail Kit		X 1
Wall-mount Kit		X 2
Console Cable		X 1
QIG		X 1
Power Cable (For HV only)		X 2

Preparation

Before you begin installing the device, make sure you have all of the package contents available and a PC with Microsoft Internet Explorer 6.0 or later, for using web-based system management tools.
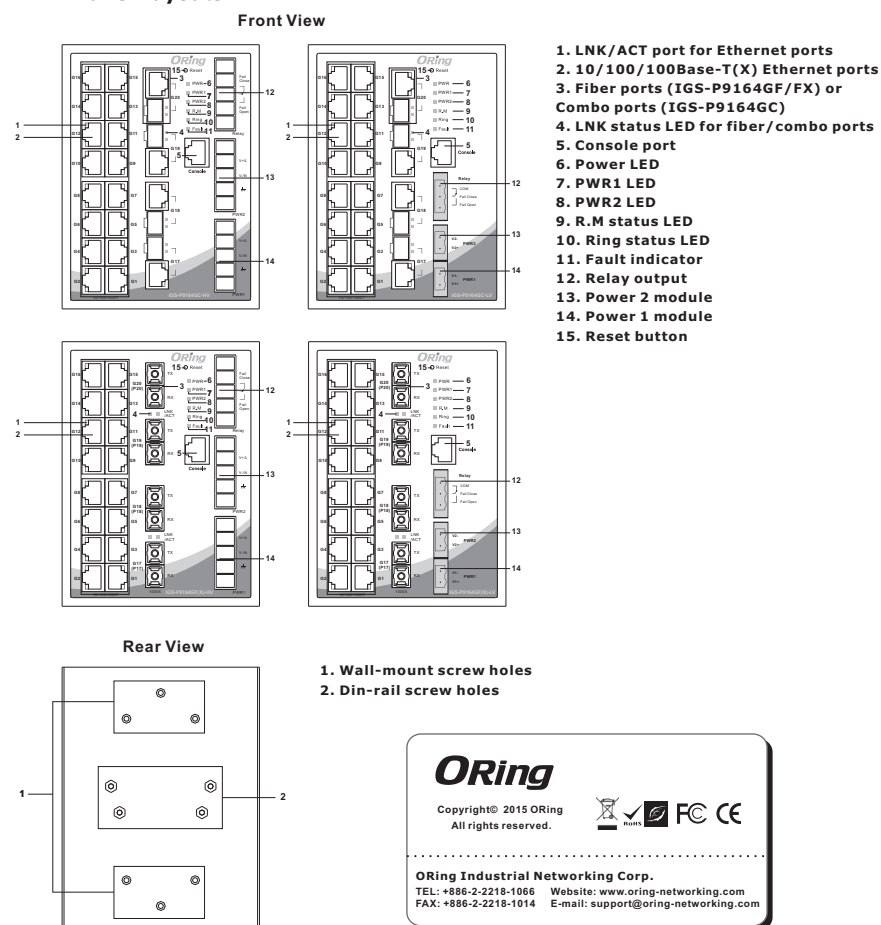
Safety & Warnings

Elevated Operating Ambient: If installed in a closed environment, make sure the operating ambient temperature is compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Reduced Air Flow: Make sure the amount of air flow required for safe operation of the equipment is not compromised during installation.

Mechanical Loading: Make sure the mounting of the equipment is not in a hazardous condition due to uneven mechanical loading.

Circuit Overloading: Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Dimension

Panel Layouts

Front View

1. LNK/ACT port for Ethernet ports
2. 10/100/100Base-T(X) Ethernet ports
3. Fiber ports (IGS-P9164GF/FX) or Combo ports (IGS-P9164GC)
4. LNK status LED for fiber/combo ports
5. Console port
6. Power LED
7. PWR1 LED
8. PWR2 LED
9. R.M status LED
10. Ring status LED
11. Fault indicator
12. Relay output
13. Power 2 module
14. Power 1 module
15. Reset button

Rear View

1. Wall-mount screw holes
2. Din-rail screw holes

Installation

Use the mounting kits attached with the package and follow the steps below to install the switch to a rail or to the wall.

DIN-rail Installation

Step 1: Slant the switch and screw the Din-rail kit onto the back of the switch, right in the middle of the back panel.
Step 2: Slide the switch onto a DIN-rail from the Din-rail kit and make sure the switch clicks into the rail firmly.
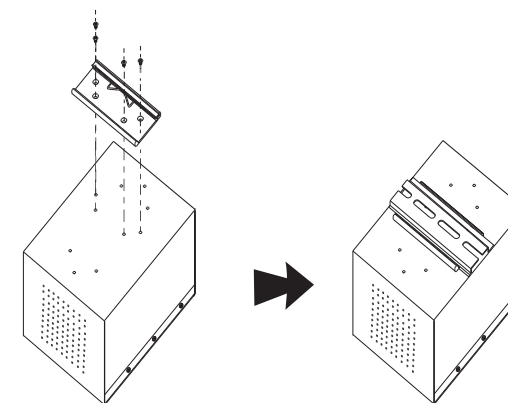
Wall-mounting

Step 1: Screw the two pieces of wall-mount kits onto both ends of the rear panel of the switch. A total of six screws are required, as shown below.
Step 2: Use the switch, with wall mount plates attached, as a guide to mark the correct locations of the four screws.
Step 3: Insert a screw head through the large parts of the keyhole-shaped apertures, and then slide the switch downwards. Tighten the screw for added stability.
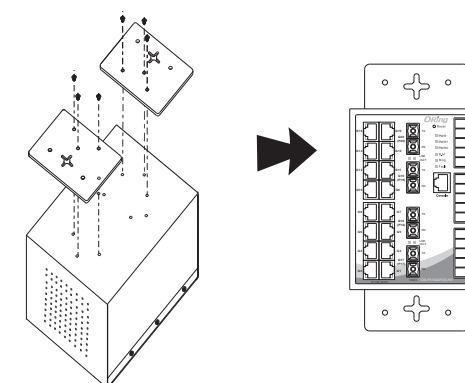
Network Connection

The switch provides standard Ethernet ports. According to the link type, the switch uses CAT 3, 4, 5, 5e UTP cables to connect to any other network devices (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

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Cable Types and Specifications:

Cable	Type	Max. Length	Connector
10BASE-T	Cat. 3, 4, 5 100-ohm	UTP 100 m (328 ft)	RJ-45
100BASE-TX	Cat. 5 100-ohm UTP	UTP 100 m (328 ft)	RJ-45
1000BASE-T	Cat. 5 / Cat. 5e 100-ohm UTP	UTP 100 m (328 ft)	RJ-45

For pin assignments for different types of cables, please refer to the following tables.

1000 Base-T RJ-45	
Pin Number	Assignment
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

10/100 Base-T(X) RJ-45	
Pin Number	Assignment
1	TD+
2	TD-
3	RD+
4	Not used
5	Not used
6	RD-
7	Not used
8	Not used

10/100 Base-T(X) MDI/MDI-X		
Pin Number	MDI port	MDI-X port
1	TD+(transmit)	RD+(receive)
2	TD-(transmit)	RD-(receive)
3	RD+(receive)	TD+(transmit)
4	Not used	Not used
5	Not used	Not used
6	RD-(receive)	TD-(transmit)
7	Not used	Not used
8	Not used	Not used

1000Base-T MDI/MDI-X		
Pin Number	MDI port	MDI-X port
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

Note: "+" and "-" signs represent the polarity of the wires that make up each wire pair.

Console Port Pin Definition

To connect the console port to an external management device, you need an RJ-45 to DB-9 cable, which is also supplied in the package. Below is the console port pin assignment information.

PC (male) pin assignment	RS-232 with DB9 (female) pin assignment (RJ45-DB9 cable)	RJ45 pin assignment
PIN#2 RxD	PIN#2 RxD	PIN#2 RxD
PIN#3 TxD	PIN#3 TxD	PIN#3 TxD
PIN#5 GND	PIN#5 GND	PIN#5 GND

Wiring

Power inputs

The switch supports dual redundant power supplies, Power Supply 1 (PWR1) and Power Supply 2 (PWR2). The connections for PWR1, PWR2 and the RELAY are located on the front panel along with LAN ports. Follow the steps below to wire power cables.
STEP 1: Insert the negative/positive wires into the V-/V+ terminals, respectively.
STEP 2: To keep the wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the connector.
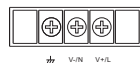
Relay contact

The switch provides fail open and fail close options for you to form relay circuits based on your needs. If you want the relay device to start operating at power failure, attach the two wires to COM and fail close to form a close circuit, vice versa. The relay contact of the 3-pin terminal block connector will respond to user-configured events according to the wiring.

Grounding

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screws to the grounding surface prior to connecting devices.
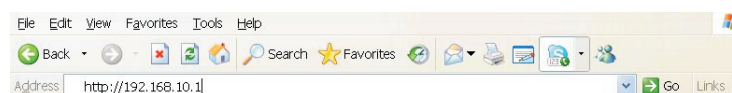
Configurations

After installing the switch card, the green power LED should turn on. Please refer to the following tablet for LED indication.

LED	Color	Status	Description
PWR	Green	On	DC power on
PW1	Green	On	DC power module 1 activated
PW2	Green	On	DC power module 2 activated
R.M	Green	On	System running in Ring Master mode
Ring	Green	On	System running in Ring mode
		Blinking	Ring structure is broken
Fault	Amber	On	Faults occurs
10/100/1000Base-T(X) Fast Ethernet ports			
LNK/ACT	Green	On	Port is connected and running at 1000Mbps
	Amber	On	Port is connected and running at 100Mbps
	Green/Amber	Off	Port running at 10Mbps
1000Base-X fiber ports			
LNK/ACT	Green	On	Ethernet links connected
		Blinking	Transmitting data
100Base-FX fiber ports			
LNK/ACT	Green	On	Ethernet links connected
		Blinking	Transmitting data
100/1000Base-X SFP ports			
LNK/ACT	Green	On	Ethernet links connected
		Blinking	Transmitting data

Follow the steps below to log in and access the system

1. Launch the Internet Explorer and type in IP address of the switch. The default static IP address is **192.168.10.1**

2. Log in with default user name and password (both are **admin**). After logging in, you should see the following screen. For more information on configurations, please refer to the user manual. For information on operating the switch using ORing's Open-Vision management utility, please go to ORing website.

Resetting

To reboot the switch, press the **Reset** button for 5 seconds.
To restore the switch configurations back to the factory defaults, press the **Reset** button for 5 seconds.

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 RJ-45 Auto MDI/MDIX	16				
Gigabit Combo Port with 10/100/1000Base-T(X) and 100/1000Base-X SFP Port	-				4

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	-
Optical Input Power-minimum (Sensitivity)		-18 dbm	-31 dbm	-20 dbm	-34 dbm	-
Optical Input Power-maximum (Saturation)		0 dbm	0 dbm	-3 dbm	-0 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 802.3z for 1000Base-X IEEE 802.3ab for 1000Base-T IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.3x for Flow control 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		Switch latency: 7 us Switch bandwidth: 40Gbps Max. Number of Available VLANs: 256 IGMP multicast groups: 128 for each VLAN Port rate limiting: User Define				
Processing		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 for multicast filtering IP-based bandwidth management Application-based QoS management DOS/DDOS auto prevention Port configuration, status, statistics, monitoring, security DHCP Server / Client support SMTP Client Modbus TCP				
Network Redundancy		O-Ring, Open-Ring, O-chain, MRP, MSTP (RSTP/STP compatible), Fast Recovery				
RS-232 Serial Console Port		RS-232 in RJ45 connector with console cable. Baud rate setting: 115200bps, 8, N, 1				
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 : Dual power inputs with 85~264VAC/88~373VDC on dual 3-pin 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)		115.0 (W) x 159.0(D) x 154.0(H) mm (4.52x 6.26 x 6.06 inch)				
Weight (g)		LV : 1780 g HV : 2216 g	LV : 1796 g HV : 2205 g	LV : 1780 g HV : 2216 g	LV : 1796 g HV : 2205 g	LV : 1780 g HV : 2186 g
Environmental						
Storage Temperature		-40 to 85°C (-40 to 185°F)				
Operating Temperature		-40 to 75°C (-40 to 167°F)				
Operating Humidity		5% to 95% Non-condensing				
Regulatory Approvals						
Power Automation		IEC 61850-3, IEEE 1613				
EMI		FCC Part 15, CISPR (EN55022) class A, EN50155 (EN50121-3-2, EN55011, EN55012-4)				
EMS		EN61000-4-2 (ESD) EN61000-4-3 (RS) EN61000-4-4 (EFT) EN61000-4-5 (Surge) EN61000-4-6 (CS) EN61000-4-8 EN61000-4-11				
Shock		IEC60068-2-27				
Free Fall		IEC60068-2-32				
Vibration		IEC60068-2-6				
Safety		EN60950-1				
Warranty		5 years				