

Aquam8012A/Aquam8512A Series Industrial
Ethernet Switches
Hardware Installation Manual

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KYLAND

Aquam8012A/Aquam8512A Series

Industrial Ethernet Switches Hardware Installation Manual

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Notice for Safety Operation

The product performs reliably as long as it is used according to the guidance. Artificial damage or destruction of the device should be avoided. Before using the device, read this manual carefully for personal and equipment safety. Please keep the manual for further reference. Kyland is not liable to any personal or equipment damage caused by violation of this notice.

- Do not place the device near water sources or damp areas. Keep the ambient relative humidity within the range from 5% to 95% (non-condensing).
- Do not place the device in an environment with high magnetic field, strong shock, or high temperature. Keep the working and storage temperatures within the allowed range.
- Install and place the device securely and firmly.
- Please keep the device clean; if necessary, wipe it with a soft cotton cloth.
- Do not place any irrelevant materials on the device or cables. Ensure adequate heat dissipation and tidy cable layout without knots.
- Wear antistatic gloves or take other protective measures when operating the device.
- Avoid any exposed metal wires because they may be oxidized or electrified.
- Install the device in accordance with related national and local regulations.
- Before power-on, make sure the power supply is within the allowed range of the device. High voltage may damage the device.
- Power connectors and other connectors should be firmly interconnected.
- Do not plug in or out the power supply with wet hands. When the device is powered on, do not touch the device or any parts with wet hands.
- Before operating a device connected to a power cable, remove all jewelry (such as rings, bracelets, watches, and necklaces) or any other metal objects, because they may cause electric shock or burns.

- Do not operate the device or connect or disconnect cables during an electrical storm.
- Use compatible connectors and cables. If you are not sure, contact our sales or technical support personnel for confirmation.
- Do not disassemble the device by yourself. When an anomaly occurs, contact our sales or technical support personnel.
- If any part is lost, contact our sales or technical support personnel to purchase the substitute. Do not purchase parts from other channels.
- Dispose of the device in accordance with relevant national provisions, preventing environmental pollution.

In the following cases, please immediately shut down your power supply and contact your Kyland representative:

- Water gets into the equipment.
- Equipment damage or shell damage.
- Equipment operation or performance has abnormally changed.
- The equipment emits odor, smoke or abnormal noise.

The following information applies when operating this device in hazardous locations:

Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or nonhazardous locations only.

Cet appareillage est utilisable dans les emplacements de Classe I, Division 2, Groupes A, B, C et D, ou dans les emplacements non dangereux seulement.

WARNING: EXPLOSION HAZARD

- Do not disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations.
- Substitution of any component may impair suitability for Class I, Division 2.

AVERTISSEMENT: RISQUE D'EXPLOSION

- Avant de deconnecter l'equipement, couper le courant ou s'assurer que l'emplacement est designe non dangereux.
- La substitution de composants peut rendre ce materiel inacceptable pour les emplacements de Classe I, Division 2.

Contents

1 Product Overview	1
2 Structure and Interface	2
3 Mounting	3
3.1 Dimension Drawing	3
3.2 Mounting Modes and Steps	4
4 Connection	5
4.1 10/100Base-T(X) Ethernet Port	5
4.1.1 Functions	5
4.1.2 Pin Definitions and Wiring Sequence	5
4.2 10/100/1000Base-T(X) Ethernet Port	7
4.3 Console Port	10
4.4 Grounding	11
4.5 Power port	11
4.6 Bypass Port	12
5 LEDs	13
6 Switch Access	14
6.1 Access through Console Port	14
6.2 Access through Telnet	17
6.3 Access through Web	17
7 Basic Features and Specifications	18

1 Product Overview

Aquam8012A/Aquam8512A includes a series of high-performance industrial Ethernet switches developed by Kyland particularly for rail transportation industry. The series devices are applicable to PIS, CCTV, video monitoring system, train control system, and the industrial field with strict requirements on vibration, shock, and EMC compatibility due to the solid closed housing, fanless but heat dissipation-capable single-rib shaped chassis, overcurrent, overvoltage protection for power input, sound EMC protection of M12 ports, and IP65 protection class. All the devices meet the requirements stipulated in the EN50155, EN50121 and other industrial standards. The series switches support Bypass power-off direct-connection function and redundancy protocol, guaranteeing the reliable operation of the system. Aquam8012A/Aquam8512A provides powerful network management functions. The devices can be managed through CLI, Telnet, Web, and SNMP-based network management software. Aquam8512A is a layer 3 switch that supports the layer 3 routing protocol.

The switches support panel mounting. They provide up to four 10/100/1000Base-T(X) Ethernet ports, and eight 10/100Base-T(X) Ethernet ports. The 10/100Base-T(X) Ethernet ports support IEEE802.3at (compatible with IEEE802.3af) POE output. Each POE port can provide a maximum of 30 W feed and the entire PSE is capable of providing a maximum of 61.6 W feed.

Table 1 Aquam8012A/Aquam8512A Models

Model	Aquam8012A-Ports-PS1-PS2 Aquam8512A-Ports-PS1-PS2	Aquam8012A-B-Ports-PS1-PS2 Aquam8512A-B-Ports-PS1-PS2
Code definition	Code option	
B	Support Bypass function	
Ports: GE, T, P	3GE9T, 3GE9P, 4GE8T, 4GE8P, 9T, 9P	
	Note: 3GE9T: three 10/100/1000Base-T(X) M12 ports; nine 10/100Base-T(X) M12 ports. 3GE9P: three 10/100/1000Base-T(X) M12 ports; nine 10/100Base-T(X) M12 POE ports.	
PS1-PS2: power input	Model without POE: H6-H6(72/96/110VDC, redundant power input), L14-L14(48DC, redundant power input), L13-L13(24DC, redundant power input) Model with POE: WV-WV(24-110VDC, redundant power input)	



Note:

We reserve the right to amend the product information listed in table 1 and table 2 without notice. To obtain the latest information, you can contact our sales or technical support personnel.

Table 2 Optional Accessories

Model	Description	Remarks
M12-A-4P-F	Female cable connector with M12, A-Coding, 4 Pin	Power port connector
M12-A-4P-M	Male cable connector with M12, A-Coding, 4 Pin	Console/USB port connector
M12-D-4P-M	Male cable connector with M12, D-Coding, 4 Pin	10/100Base-T(X) port connector
M12-X-8Pin-M	Male cable connector with M12, X-Coding, 8 Pin	10/100/1000Base-T(X) port connector
DT-XL-PWR-M12-xxx-3m	M12 to bare end cable	Power port cable

2 Structure and Interface



Caution:

It is recommended to purchase the port dustproof shield (optional) to keep ports clean and ensure switch performance.

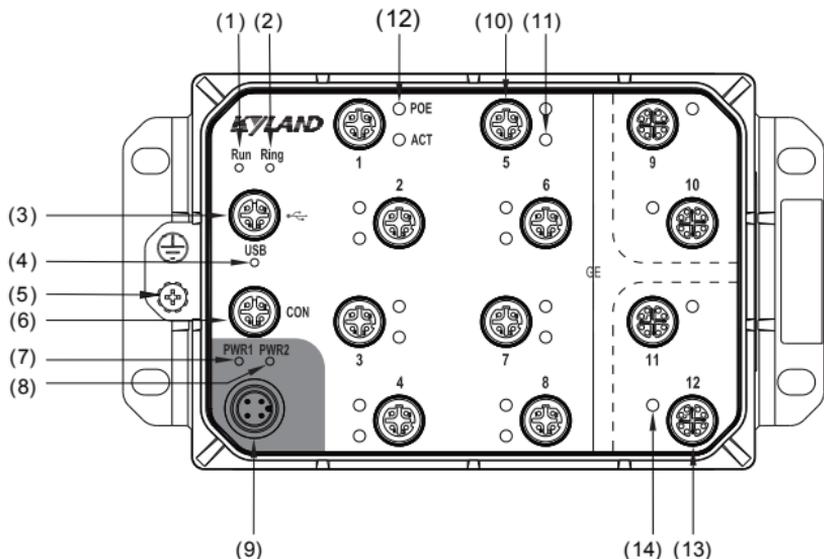


Figure 1 Front Panel

- | | | |
|------------------------------------|---------------------|-------------------------|
| (1) Running LED | (2) Ring LED | (3) USB Port (reserved) |
| (4) USB LED (reserved) | (5) Grounding screw | (6) Console port |
| (7) Power 1 LED | (8) Power 2 LED | (9) Power port |
| (10) 10/100Base-T(X) Ethernet port | | |

- (11) 10/100Base-T(X) Ethernet port connection status LED
- (12) 10/100Base-T(X) Ethernet Port POE LED
- (13) 10/100/1000Base-T(X) Ethernet port
- (14) 10/100/1000Base-T(X) Ethernet port connection status LED



Note:

- Non-PoE products do not have PoE indicators.
- For products that support the bypass function, the two gigabit ports enclosed in the dashed lines are one pair of bypass ports.

3 Mounting

3.1 Dimension Drawing

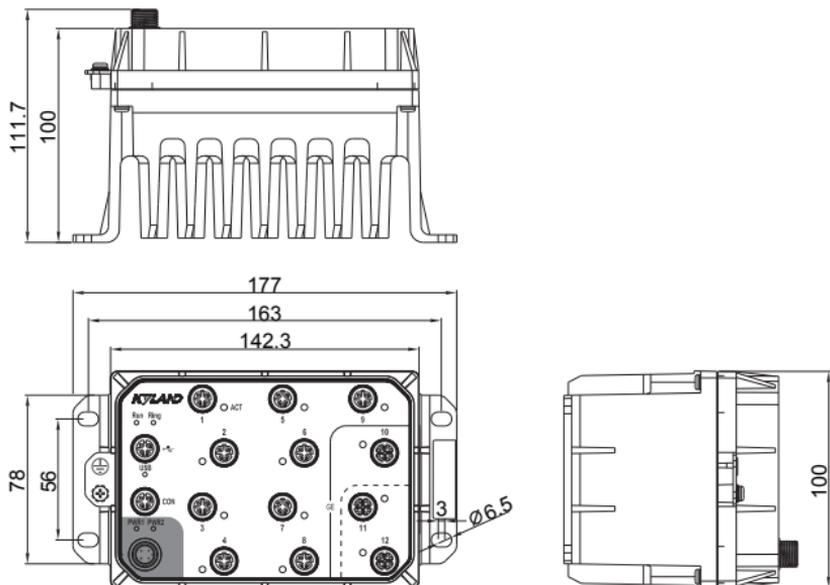


Figure 2 Dimensions(unit: mm)



Caution:

- As part of the heat dissipation system, the switch housing becomes hot during operation. Please use caution when coming in contact and avoid covering the switch housing when the switch is running.
- The figures in this manual are only for reference.

3.2 Mounting Modes and Steps

The series devices support panel mounting. Before installation, make sure that the following requirements are met.

- 1) Environment: temperature (-40°C to 70°C), ambient relative humidity (5% to 95%, non-condensing).
- 2) Power requirement: The power input is within the voltage range of the switch.
- 3) Grounding resistance: <math><5\Omega</math>
- 4) No direct sunlight, distant from heat source and areas with strong electromagnetic interference.
- 5) Devices are to be installed in an authority certified enclosure and accessible only by the use of a tool.
- 6) Devices should be installed and accessed by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.

● Mounting

Step 1: Select the mounting position (on a wall or inner wall of a cabinet) for the device and guarantee adequate space and heat dissipation.

Step 2: Punch four holes in the selected position according to the dimensions of the device. Put the screw holes of device in alignment with the corresponding punched holes. Then use four screws to secure the device to the wall or inner wall of a cabinet.

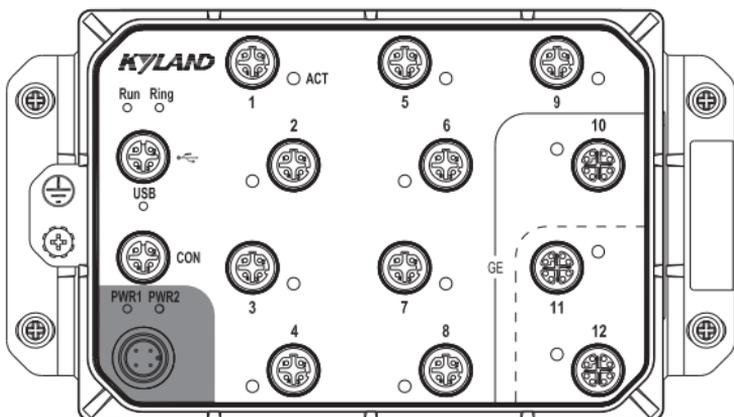


Figure 3 Panel Mounting

● Dismounting

Loosen the screws with a screwdriver, remove the screws and device from the wall or inner wall of a cabinet to complete dismounting.

4 Connection

10/100Base-T(X) port connector, 10/100/1000Base-T(X) port connector, console port connector, USB port connector, power port connector, and power port connection cable are all optional (For details, see Table 2). That is, these components need to be purchased separately as required.

4.1 10/100Base-T(X) Ethernet Port

4.1.1 Functions

- Data Transmission

10/100Base-T(X) Ethernet port is equipped with M12 connector, which is dustproof, waterproof, and anti-vibration. The port is self-adaptive. It can automatically configure itself to work in 10M or 100M state, full or half duplex mode. The port can also adapt to MDI or MDI-X connection automatically. You can connect the port to a terminal or network device with a straight-through or cross-over cable.

- POE

Serving as the Power Sourcing Equipment (PSE), the switches can provide power supply for PDs through 10/100Base-T(X) Ethernet ports. The 10/100Base-T(X) Ethernet ports support IEEE802.3at (compatible with IEEE802.3af) POE output. Each POE port can provide a maximum of 30 W feed and the entire PSE is capable of providing a maximum of 61.6 W feed.

1. POE Definition

POE indicates that the device can provide power supply for PDs through Ethernet ports. The device supports a maximum distance of 100m for power supply.

2. POE Power Supply

The device supports data wires to provide power supply for PDs.

4.1.2 Pin Definitions and Wiring Sequence

- Pin Definition



Figure 4 M12 Port (female)

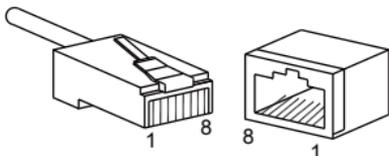


Figure 5 RJ45 Port

You can use an M12-M12 or M12-RJ45 cable to connect the port for communication. The preceding figures show the pin numbers of an M12 port and an RJ45 port. For pin definitions, see the following table.

Table 3 Pin Definitions of M12/RJ45 Port

Pin	MDI-X Signal	MDI Signal	POE
M12 Port			
1	Receive Data+ (RD+)	Transmit Data+ (TD+)	V+
2	Transmit Data+ (TD+)	Receive Data+ (RD+)	V-
3	Receive Data- (RD-)	Transmit Data- (TD-)	V+
4	Transmit Data- (TD-)	Receive Data- (RD-)	V-
RJ45 Port			
1	Receive Data+ (RD+)	Transmit Data+ (TD+)	--
2	Receive Data- (RD-)	Transmit Data- (TD-)	--
3	Transmit Data+ (TD+)	Receive Data+ (RD+)	--
6	Transmit Data- (TD-)	Receive Data- (RD-)	--
4, 5, 7, 8	Unused	Unused	--
 Note: "+" and "-" indicate level polarities.			

● Wiring Sequence



Note:

- The color of the cable for RJ45 connector meets the 568B standard: 1-orange and white, 2-orange, 3-green and white, 4-blue, 5-blue and white, 6-green, 7-brown and white, and 8-brown.
- The 1 and 3, 2 and 4 pins on the M12 interface are differentiated signal pins in pairs. The orange-and-white and orange pair, green-and-white and green pair, blue-and-white and blue pair, and brown-and-white and brown pair in twist pair cables must be used in correct pairs while being connected with the signal pins. For example, the following figure, the orange-and-white and orange and green-and-white and green pairs are used.
- POE ports will not deliver any power for a certain time when a 10ms interruption occurs on the power input. A suggested workaround is to connect a UPS to prevent power interruption of the PSE.

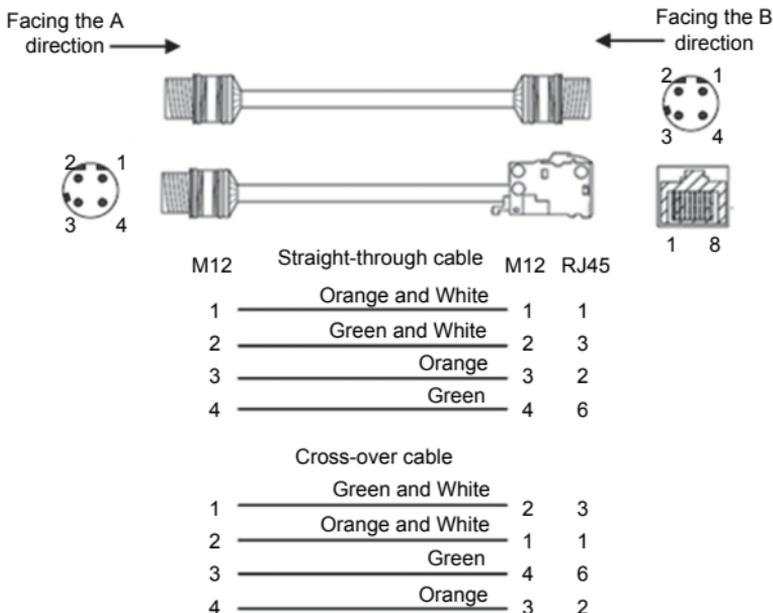


Figure 6 Connection Using Straight-through/Cross-over Cable

4.2 10/100/1000Base-T(X) Ethernet Port

10/100/1000Base-T(X) Ethernet port is equipped with M12 connector, which is dustproof, waterproof, and anti-vibration. The port is self-adaptive. It can automatically configure itself to work in 10M or 100M state, full or half duplex mode. The port can also adapt to MDI or MDI-X connection automatically. You can connect the port to a terminal or network device with a straight-through or cross-over cable.

● Pin Definition



Figure 7 M12 Port (female)

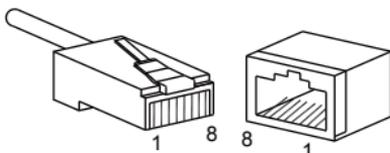


Figure 8 RJ45 Port

You can use an M12-M12 or M12-RJ45 cable to connect the port for communication. The preceding figures show the pin numbers of an M12 port and an RJ45 port. For pin definitions, see the following table.

Table 4 Pin Definitions of M12/RJ45 Port

Pin	MDI-X Signal	MDI Signal
M12 Port		
1	Transmit/Receive Data (TRD1+)	Transmit/Receive Data (TRD0+)
2	Transmit/Receive Data (TRD1-)	Transmit/Receive Data (TRD0-)
3	Transmit/Receive Data (TRD0+)	Transmit/Receive Data (TRD1+)
4	Transmit/Receive Data (TRD0-)	Transmit/Receive Data (TRD1-)
5	Transmit/Receive Data (TRD3+)	Transmit/Receive Data (TRD2+)
6	Transmit/Receive Data (TRD3-)	Transmit/Receive Data (TRD2-)
7	Transmit/Receive Data (TRD2+)	Transmit/Receive Data (TRD3+)
8	Transmit/Receive Data (TRD2-)	Transmit/Receive Data (TRD3-)
RJ45 Port		
1	Transmit/Receive Data (TRD1+)	Transmit/Receive Data (TRD0+)
2	Transmit/Receive Data (TRD1-)	Transmit/Receive Data (TRD0-)
3	Transmit/Receive Data (TRD0+)	Transmit/Receive Data (TRD1+)
4	Transmit/Receive Data (TRD3+)	Transmit/Receive Data (TRD2+)
5	Transmit/Receive Data (TRD3-)	Transmit/Receive Data (TRD2-)
6	Transmit/Receive Data (TRD0-)	Transmit/Receive Data (TRD1-)
7	Transmit/Receive Data (TRD2+)	Transmit/Receive Data (TRD3+)
8	Transmit/Receive Data (TRD2-)	Transmit/Receive Data (TRD3-)
	Note: "+" and "-" indicate level polarities.	

● Wiring Sequence

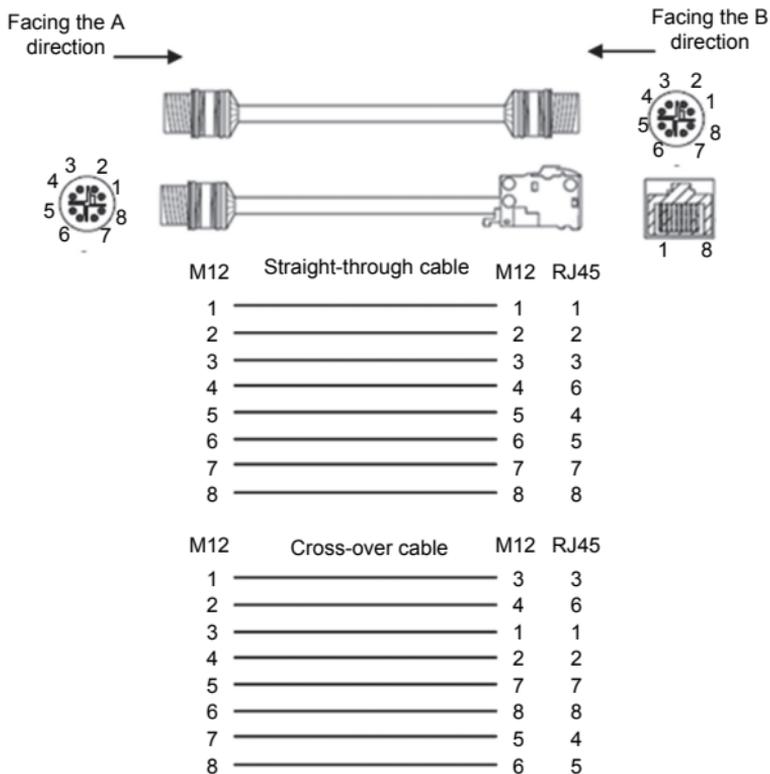


Figure 9 Connection Using Straight-through/Cross-over Cable



Note:

The color of the cable for RJ45 connector meets the 568B standard: 1- orange and white, 2-orange, 3-green and white, 4-blue, 5-blue and white, 6-green, 7-brown and white, and 8-brown.

4.3 Console Port

There is a console port on the front panel. The port is equipped with M12 connector. Connect the console port of the switch to the 9-pin serial port of a PC with an M12-DB9 console cable. You can configure, maintain, and manage the switch by running Hyper Terminal in Windows OS of a computer.



Figure 10 Console Port (female)

● M12-DB9 Console Cable

One end of the M12-DB9 cable is an M12 connector to be inserted into the console port of the device, and the other end is the DB9 connector to be inserted into the 9-pin serial port of a PC.

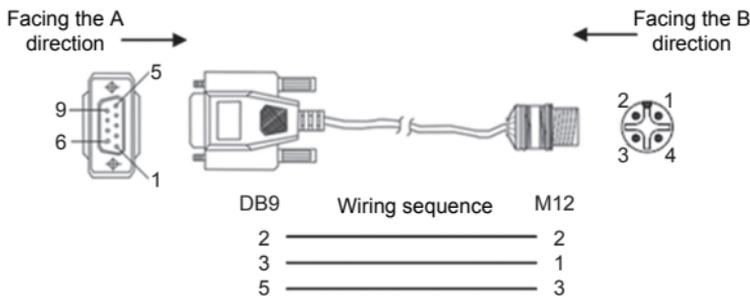


Figure11 Wiring Sequence M12-DB9 Console Cable

Table 5 Pin Definition of DB9 Port (9-Pin Serial Port) and M12 Port (Console Port)

DB9 Port (9-Pin Serial Port)		M12 Port (Console Port)	
Pin	Signal	Pin	Signal
2	RXD (Receive Data)	1	RXD (Receive Data)
3	TXD (Transmit Data)	2	TXD (Transmit Data)
5	GND (Grounding)	3	GND (Grounding)

4.4 Grounding

Grounding protects the device from lightning and interference. Therefore, you must ground the device properly. You need to ground the device before it is powered on and disconnect the grounding cable after the device is powered off. There is a grounding screw (see Figure 1) on the front panel of the device. The screw is for chassis grounding. After crimping one end of the grounding cable to a cold pressed terminal, secure the end of the grounding cable to the grounding screw and firmly connect the other end to ground.



Note:

Cross-sectional area of the chassis grounding cable $>2.5\text{mm}^2$;
Grounding resistance $<5\Omega$.

4.5 Power port

There is a power port on the front panel of the device. You need to connect the power cable to the power port to provide power to the device. Power port is equipped with M12 connector, which is dustproof, waterproof, and anti-vibration. The device supports redundant power input, when one power input is faulty, the device can continue operating properly, thereby improving network reliability.



Note:

- $0.75\text{mm}^2 < \text{Cross-sectional area of the power cable} < 2.5\text{mm}^2$;
grounding resistance $< 5\Omega$.
- It is supplied with required DC power by the engine and is not directly connected to the public power grid.

● Pin Definition

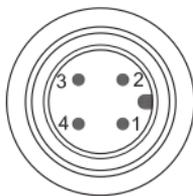


Figure 12 Power Port (male)

Table 6 Pin Definitions of Power Port

Pin	Signal	DC Wiring Definition	AC Wiring Definition
1	-/N2	PWR2: -	PWR2: N
2	+/L2	PWR2: +	PWR2: L
3	+/L1	PWR1: +	PWR1: L
4	-/N1	PWR1: -	PWR1: N

● Wiring and Mounting

Step 1: Ground the device properly according to section 4.4.

Step 2: Insert one end of the power cable into the M12 connector firmly.

Step 3: Insert the M12 connector with the connected cable into the power port on the device.

Step 4: Connect the other end of the power cable to an external power supply system according to the power supply requirements of the device. View the status of the power LED. If the LED is on, the power is connected properly.



Caution:

- Before connecting the device to power supply, make sure that the power input meets the power requirement. If connected to an incorrect power input, the device may be damaged.
- To comply with UL restrictions, this equipment must be powered from a source compliant with Class 2.



Warning:

- Do not touch any exposed conducting wire, terminal, or component with a voltage warning sign, because it may cause personal injury.
- Do not remove any part or plug in or out any connector when the device is powered on.

4.6 Bypass Port

The series switches provide one or two pairs of Bypass ports, as shown in Figure 13, port 11 and port 12 are one pair of bypass ports. When the power is interrupted, the bypass function is enabled, the relay switch jumps to the 2 state so that switch A and switch B are directly connected physically. After the power is restored and the device runs properly, the bypass function is disabled and the relay switch jumps to the 1 state so that switch A and switch B communicate with each other through the switch Aquam8512A.

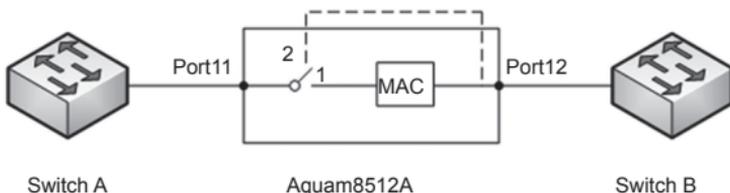


Figure 13 Bypass

5 LEDs

Table 7 Front Panel LEDs

LED	State	Description
Power 1 LED-PWR1	On	The power 1 is connected and operates properly.
	Off	The power 1 is not connected or operates abnormally.
Power 2 LED-PWR2	On	The power 2 is connected and operates properly.
	Off	The power 2 is not connected or operates abnormally.
Running LED-Run	On	The device is starting up
	Blinking	The CPU operates properly.
	Off	The device does not start up
Ring LED-Ring	On	Master (DT-Ring mode)/Root (DRP mode)
	Blinking	Slave (DT-Ring mode)/B-Root or Normal (DRP mode)
	Off	No ring
Ethernet port connection status LED-ACT	On	Effective port connection
	Blinking	Ongoing network activities
	Off	No effective port connection
Ethernet port POE LED-POE	On	The POE port provides power supply normally
	Blinking	The POE port provides power supply abnormally
	Off	The POE port provides no power supply

6 Switch Access

You can access the switch in any of the following ways.

6.1 Access through Console Port

Step 1: Connect the console port of the switch to the 9-pin serial port of a PC with the M12-DB9 console cable.

Step 2: Open Hyper Terminal in Windows OS. On the computer's desktop, click Start → All Programs → Accessories → Communications → Hyper Terminal.

Step 3: Create a connection "Switch", as shown in the following figure.



Figure 14 Creating a Connection

Step 4: Connect the communication port in use, as shown in the following figure.



Figure 15 Selecting a Serial Port



Note:

To confirm the communication port in use, right-click [My Computer] and select [Property]. Click [Hardware] → [Device Manager] → [Port] to view the communication port.

Step 5: Set port parameters (Bits per second: 115200, Data bits: 8, Parity: None, Stop bits: 1 and Flow control: None), as shown in the following figure.



Figure 16 Setting Port Parameters

Step 6: Click OK to enter the switch CLI. Then you can run the commands in Table 8 and Table 9 to perform operations.

Table 8 CLI Commands for Aquam8012A

View	Command	Description
Privileged mode	SWITCH#show interface vlan 1	Query the IP address of the switch
Privileged mode	SWITCH#show version	Query the version of the switch
Privileged mode	SWITCH#reboot	Restart the switch
Privileged mode	SWITCH#load default	Restore the factory default settings
Privileged mode	SWITCH#config terminal	Enter the configuration mode

Table 9 CLI Commands for Aquam8512A

View	Command	Description
General mode	SWITCH>enable	Enter the privileged mode
Privileged mode	SWITCH#show interface vlan 1	Query the IP address of the switch
Privileged mode	SWITCH#show version	Query the version of the switch
Privileged mode	SWITCH#reboot	Restart the switch
Privileged mode	SWITCH#set default SWITCH#save	Restore the factory default settings
Privileged mode	SWITCH#config terminal	Enter the configuration mode

6.2 Access through Telnet

- Step 1: Connect the network port of the PC to the Ethernet port of the device with a network cable.
- Step 2: On the Windows desktop, click Start and Run. The Run Dialog box is displayed. Enter "telnet *IP-address*". For example, if the IP address of the switch is 192.168.0.2 (default IP address of a Kyland switch), enter "telnet 192.168.0.2" in the dialog box.

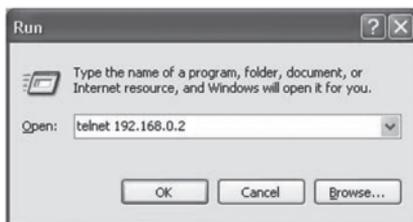


Figure 17 Access through Telnet

- Step 3: Click OK. The Telnet CLI is displayed. Then you can run the commands in Table 8 and Table 9 to perform operations.

6.3 Access through Web

- Step 1: Connect the network port of the PC to the Ethernet port of the device with a network cable.
- Step 2: Enter the IP address of the switch in the address box of the browser. The user login interface is displayed. You can log in to the Web UI by using default user name "admin" and password "123".



Note:

- IE8.0 or a later version is recommended.
- For details about how to access the switch and other operation, refer to the Web operation manual in the delivered CD.

7 Basic Features and Specifications

Power Requirements		
Power Identifier	Rated Voltage Range	Maximum Voltage Range
L13 (24DC)	24VDC	Meeting EN50155
L14 (48DC)	48VDC	
H6 (72/96/110VDC)	72-110VDC	
WV	24-110VDC	
Terminal Block	4-pin M12 connector	
Rated Power Consumption		
Rated Power Consumption	Aquam8012A without POE: 13W (MAX) Aquam8012A with POE: 101W (MAX) Aquam8512A without POE: 18W (MAX) Aquam8512A with POE: 108W (MAX)	
Rated Current	Aquam8012A without POE: MAX 0.45A @ 24VDC MAX 0.22A @ 48VDC MAX 0.14A @ 72VDC MAX 0.10A @ 110VDC Aquam8012A with POE: MAX 4.2A @ 24VDC MAX 1.9A @ 48VDC MAX 0.8A @ 110VDC Aquam8512A without POE: MAX 0.63A @ 24VDC MAX 0.31A @ 48VDC MAX 0.20A @ 72VDC MAX 0.13A @ 110VDC Aquam8512A with POE: MAX 4.5A @ 24VDC MAX 2.0A @ 48VDC MAX 0.84A @ 110VDC	
Physical Characteristics		
Housing:	Metal, fanless	
Installation	Panel mounting	
Dimensions(W×H×D)	177mm×100mm×100mm (excluding connectors)	
Weight:	1.7Kg	
Environmental Limits		
Ambient temperature	-40℃~+70℃	
Storage temperature	-40℃~+85℃	
Ambient relative humidity	5%~95% (non-condensing)	
MTBF		
MTBF	Aquam8012A: 733606h Aquam8512A: 764615h	
Warranty		
Warranty	Five years	

KYLAND

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