

# **Ethernet Switch (16-port Unmanaged Hardened Switch) User's Manual**



# Foreword

## General






This manual introduces the installation, functions and operations of the 16-port unmanaged hardened switch (hereinafter referred to as "the device"). Read carefully before using the device, and keep the manual safe for future reference.

## Model

HS3220-16GT-190

## Safety Instructions

The following signal words might appear in the manual.

Signal Words	Meaning
 <b>DANGER</b>	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a medium or low potential hazard which, if not avoided, could result in slight or moderate injury.
 <b>CAUTION</b>	Indicates a potential risk which, if not avoided, could result in property damage, data loss, reductions in performance, or unpredictable results.
 <b>TIPS</b>	Provides methods to help you solve a problem or save time.
 <b>NOTE</b>	Provides additional information as a supplement to the text.

## Revision History

Version	Revision Content	Release Time
V1.0.1	Update important safeguards and warnings.	Dec 2023
V1.0.0	First release.	May 2023

# Important Safeguards and Warnings

This section introduces content covering the proper handling of the device, hazard prevention, and prevention of property damage. Read carefully before using the device, and comply with the guidelines when using it.

## Transportation Requirements



Transport the device under allowed humidity and temperature conditions.

## Storage Requirements



Store the device under allowed humidity and temperature conditions.

## Installation Requirements



- Do not connect the power adapter to the device while the adapter is powered on.
- Strictly comply with the local electrical safety code and standards. Make sure that the ambient voltage is stable and meets the power supply requirements of the device.
- Personnel working at heights must take all necessary measures to ensure personal safety including wearing a helmet and safety belts.



- Do not place the device in a place exposed to sunlight or near heat sources.
- Keep the device away from dampness, dust, and soot.
- Put the device in a well-ventilated place, and do not block its ventilation.
- Use an adapter or cabinet power supply provided by the manufacturer.
- The power supply must conform to the requirements of ES1 in IEC 62368-1 standard and be no higher than PS2. Please note that the power supply requirements are subject to the device label.
- Do not connect the device to two or more kinds of power supplies, to avoid damage to the device.
- The device is a class I electrical appliance. Make sure that the power supply of the device is connected to a power socket with protective earthing.
- The device must be grounded by a copper wire with a cross-sectional area of 2.5 mm<sup>2</sup> and a ground resistance no more than 4 Ω.
- Voltage stabilizer and lightning surge protector are optional depending on the actual power supply on site and the ambient environment.
- To ensure heat dissipation, the gap between the device and the surrounding area should not be less than 10 cm on the sides and 10 cm on top of the device.
- When installing the device, make sure that the power plug and appliance coupler can be easily reached to cut off power.

## Operation Requirements



- Do not disassemble the device without professional instruction.
- Operate the device within the rated range of power input and output.
- Make sure that the power supply is correct before use.
- Make sure the device is powered off before disassembling wires to avoid personal injury.
- Do not unplug the power cord on the side of the device while the adapter is powered on.



- Use the device under allowed humidity and temperature conditions.
- Do not drop or splash liquid onto the device, and make sure that there is no object filled with liquid on the device to prevent liquid from flowing into it.
- Subordinate equipment supply by type BT PoE port shall comply with IEC/EN 62368-1 clause 6.6.

## Maintenance Requirements



- Power off the device before maintenance.
- Mark key components on the maintenance circuit diagram with warning signs.

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# 1 Overview

## 1.1 Introduction

16-port unmanaged switch is a hardened switch. Equipped with a high performance switching engine, the switch performs optimally. It has low transmission delay, large buffer and is highly reliable. It also has a strong switching capability and optimizes transmission performance when accessing Ultra HD videos. With its full metal and fanless design, the device has great heat dissipation and low power consumption, working in environments ranging from  $-30\text{ }^{\circ}\text{C}$  to  $+65\text{ }^{\circ}\text{C}$  ( $-22\text{ }^{\circ}\text{F}$  to  $+149\text{ }^{\circ}\text{F}$ ). With the DIP switch, it provides a variety of working modes for different scenarios.

The device is applicable for use in different scenarios, including corridors, factories and parks.

## 1.2 Features

- $16 \times 10/100/1000$  Mbps downlink Ethernet ports (PoE),  $2 \times 10/100/1000$  Mbps uplink electrical ports, and  $2 \times 1000$  Mbps uplink optical ports.
- Two-layer hardened switch.
- Supports IEEE802.3af, IEEE802.3at standard. Red ports support IEEE802.3bt, and are compatible with Hi-PoE.
- Supports 250 m long-distance PoE power supply, which can be controlled by the DIP switch.



In Extend Mode, the transmission distance of the PoE port is up to 250 m but the transmission rate drops to 10 Mbps. The actual transmission distance might vary due to power consumption of connected devices or the cable type and status.

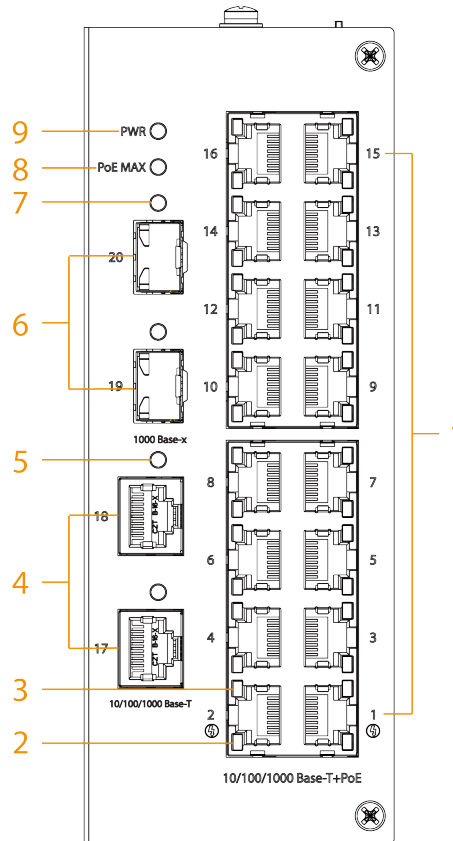
- Fanless design.
- Desktop mount and DIN-rail mount.
- Full metal design.
- Supports  $-30\text{ }^{\circ}\text{C}$  to  $+65\text{ }^{\circ}\text{C}$  ( $-22\text{ }^{\circ}\text{F}$  to  $+149\text{ }^{\circ}\text{F}$ ) working temperature.
- High protection rate. Supports 4 kV under common mode, and 2 kV under differential mode.
- Supports 48–57 VDC power supply, and dual-power backup.
- Large buffer and low transmission delay.

# 2 Port and Indicator

## 2.1 Front Panel

The following figure is for reference only, and might differ from the actual product.

Figure 2-1 Front panel



The following are all the ports and indicators on the front panel of the 16-port unmanaged hardened switch. Refer to the table below for the contents of the actual device panel.

Table 2-1 Description of front panel

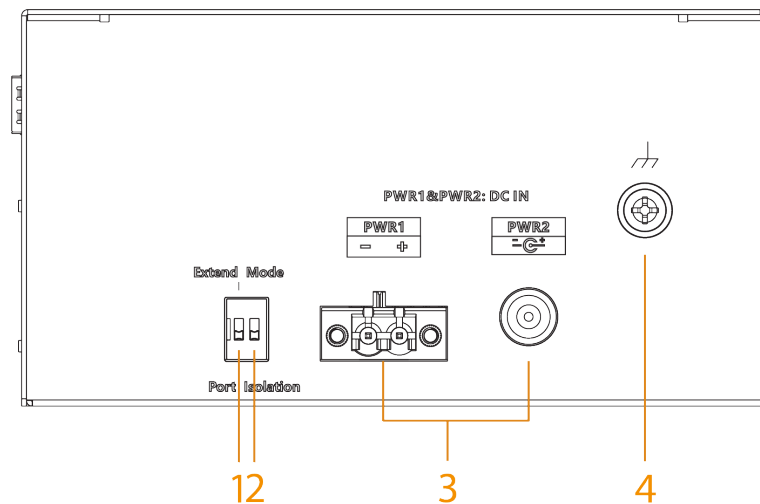
No.	Description
1	10 Mbps/100 Mbps/1000 Mbps self-adaptive PoE port.
2	PoE port status indicator. <ul style="list-style-type: none"> <li>● On: Powered by PoE.</li> <li>● Off: Not powered by PoE.</li> </ul>
3	Data transmission status indicator (Link/Act) for uplink Ethernet port. <ul style="list-style-type: none"> <li>● On: Connected to device.</li> <li>● Off: Not connected to device.</li> <li>● Flashes: Data transmission is in progress.</li> </ul>

No.	Description
4	10 Mbps/100 Mbps/1000 Mbps uplink Ethernet port.
5	Single-port connection or data transmission status indicator (Link/Act). <ul style="list-style-type: none"> <li>● On: Connected to device.</li> <li>● Off: Not connected to device.</li> <li>● Flashes: Data transmission is in progress.</li> </ul>
6	1000 Mbps uplink optical port.
7	Data transmission status indicator (Link/Act) for uplink optical port. <ul style="list-style-type: none"> <li>● On: Connected to device.</li> <li>● Off: Not connected to device.</li> <li>● Flashes: Data transmission is in progress.</li> </ul>
8	PoE max indicator. <ul style="list-style-type: none"> <li>● On: The current total output rate is higher than 80% of the available output rate of the device.</li> <li>● Off: The current total output rate is higher than 80% of the available output rate of the device.</li> </ul>
9	Power indicator. <ul style="list-style-type: none"> <li>● On: Power on.</li> <li>● Off: Power off.</li> </ul>

## 2.2 Side Panel

The following figure is for reference only, and might differ from the actual product.


Figure 2-2 Side panel



The following are all the ports and indicators on the front panel of the 16-port unmanaged hardened switch. Refer to the table below for the contents of the actual device panel.



Table 2-2 Description of side panel (with PoE)

No.	Name
1	<p>Extend Mode DIP switch.</p> <p>You can enable the Extend Mode by the DIP switch.</p>  <p>In Extend Mode, the transmission distance of the PoE port is up to 250 m but the transmission rate drops to 10 Mbps. The actual transmission distance might vary due to power consumption of connected devices or the cable type and status.</p>
2	<p>Port Isolation DIP switch.</p> <p>You can enable the port isolation mode by the DIP switch to realize the isolation between the two layer data.</p>
3	<p>Power port, dual-power backup. Supports 48–57 VDC.</p>
4	<p>Ground terminal.</p>

### 3 DIN-rail Mount

The device supports DIN-rail mount. Hang the switch hook on the rail, and press the switch to make the buckle latch on to the rail.



The width of the guide rail supported by the device is 50 mm.

Figure 3-1 DIN rail

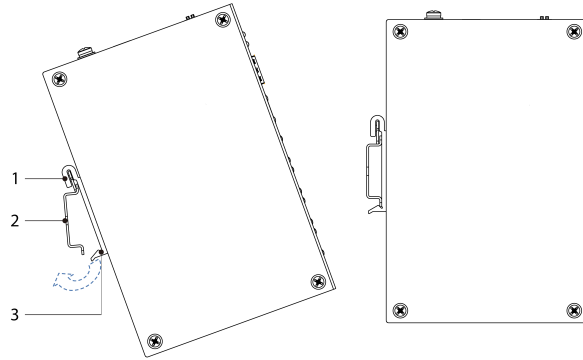


Table 3-1 Description of DIN rail

No.	Name
1	Hook
2	Rail
3	Buckle

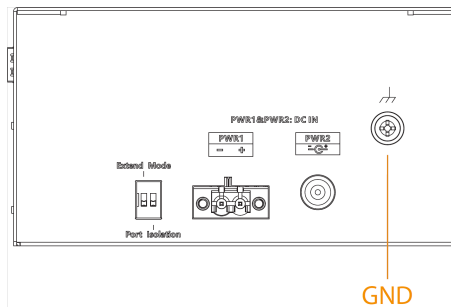
# 4 Wiring

## 4.1 Connecting GND Cable

### Background Information

Device GND connection helps ensure device lightning protection and anti-interference. You should connect the GND cable before powering on the device, and power off the device before disconnecting the GND cable. There is a GND screw on the device cover board for the GND cable. It is called enclosure GND.

Figure 4-1 GND port



### Procedure

- Step 1** Remove the GND screw from the enclosure GND with a cross screwdriver.
- Step 2** Connect one end of the GND cable to the cold-pressed terminal, and attach it to the enclosure GND with the GND screw.
- Step 3** Connect the other end of the GND cable to the ground.



The sectional area of the GND cable must be more than 2.5 mm<sup>2</sup>, and the GND resistance must be less than 4 Ω.

## 4.2 Connecting Power Cord

### Background Information

The power cord is connected to the power terminal, and provides power supply for the device. The device supports redundant power input of two channels: PWR2 and PWR1. When one channel of power breaks down, the other channel can continue to work, which improves network reliability.



**WARNING**

To avoid personal injury, do not touch the bare wire, terminal, or the areas marked with danger voltage on the device. Do not disassemble the component or plug the connector during power up.



Make sure the power supply is in accordance with the power supply requirement marked on the device before connecting power to avoid damaging the device.

Figure 4-2 Power terminal

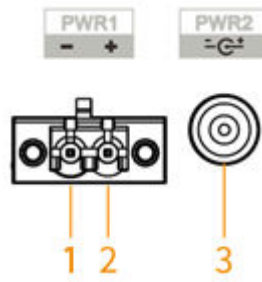


Table 4-1 Description of power terminal

No.	Description
1	To connect the negative pole.
2	To connect to the positive pole.
3	To connect the power adapter.

## Procedure

- Step 1 Connect the device grounding wire.
- Step 2 Take off the power terminal plug from the device.
- Step 3 Insert one end power cord into the power terminal plug, and fix the power cord.



The device must be grounded by a copper wire with a cross-sectional area above 0.75 mm<sup>2</sup>, and the maximum of 2.5 mm<sup>2</sup>.

- Step 4 After the power cord is connected, insert the plug back to the power terminal socket.
- Step 5 Connect the other end of power cord to the corresponding external power supply system according to the power supply requirement marked on the device, and check whether the device indicator light is on. If the light is on, the power connection is correct.

## 4.3 Connecting SFP Ethernet Port

### Background Information

We recommend wearing antistatic gloves before installing SFP module, and then wear antistatic wrist, and confirm the antistatic wrist is well linked to the surface of the gloves.

### Procedure

- Step 1 Lift the handle of SFP module upward vertically and make it get stuck to the top hook.
- Step 2 Hold the SFP module on both sides and push it gently into the SFP slot till the SFP module is firmly connected to the slot (You can feel that both the top and bottom spring strip of the SFP module are firmly stuck with the SFP slot).



**WARNING**

The device uses laser to transmit signal via optical fiber cable. The laser conforms to the requirements of level 1 laser products. To avoid injury upon eyes, do not look at the 1000 Base-X optical port directly when the device is powered on.



- When installing the SFP optical module, do not touch the gold finger of the SFP optical module.
- Do not remove the dust plug of the SFP optical module before connecting the optical port.
- Do not directly insert the SFP optical module with the optical fiber inserted into the slot. Unplug the optical fiber before installing it.

Figure 4-3 SFP module structure

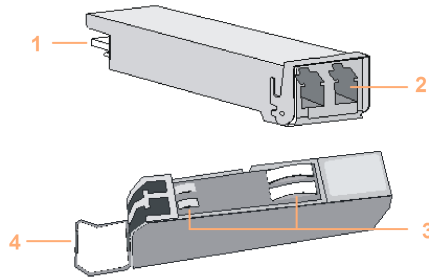
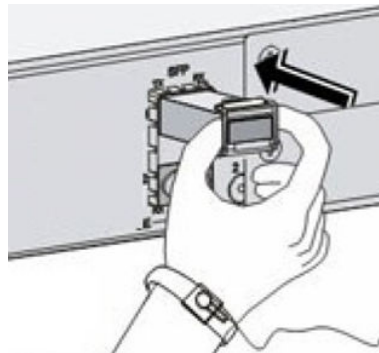


Table 4-2 Description SFP module

No.	Name
1	Gold finger
2	Optical port
3	Spring strip
4	Handle

Figure 4-4 SFP module installation



## 4.4 Connecting Ethernet Port

Ethernet port adopts standard RJ-45 port. With self-adaptation function, it can be automatically configured to full duplex/half-duplex operation mode. It supports MDI/MDI-X self-recognition of the cable, therefore, you can use cross-over cable or straight-through cable to connect terminal device to network device.

Figure 4-5 Ethernet port pin number

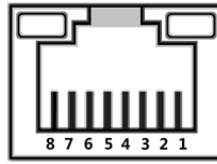
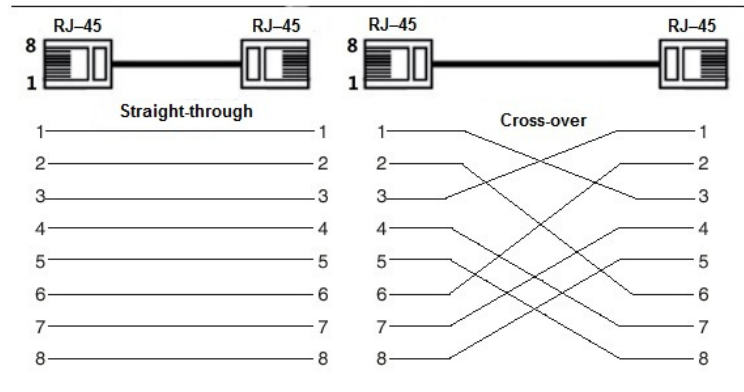


Figure 4-6 Pin description



The cable connection of RJ-45 connector conforms to the standard 568B (1-orange white, 2-orange, 3-green white, 4-blue, 5-blue white, 6-green, 7-brown white, 8-brown).

## 4.5 Connecting PoE Ethernet Port

You can directly connect the device PoE Ethernet port to the switch PoE Ethernet port through network cable to achieve synchronized network connection and power supply. With **Extend Mode** disabled, the maximum distance between the switch and the device is about 100 m.



When connecting to a non-PoE device, the device needs to be used with an isolated power supply.

# Appendix 1 Cybersecurity Recommendations

## **Mandatory actions to be taken for basic device network security:**

### **1. Use Strong Passwords**

Please refer to the following suggestions to set passwords:

- The length should not be less than 8 characters.
- Include at least two types of characters; character types include upper and lower case letters, numbers and symbols.
- Do not contain the account name or the account name in reverse order.
- Do not use continuous characters, such as 123, abc, etc.
- Do not use overlapped characters, such as 111, aaa, etc.

### **2. Update Firmware and Client Software in Time**

- According to the standard procedure in Tech-industry, we recommend to keep your device (such as NVR, DVR, IP camera, etc.) firmware up-to-date to ensure the system is equipped with the latest security patches and fixes. When the device is connected to the public network, it is recommended to enable the "auto-check for updates" function to obtain timely information of firmware updates released by the manufacturer.
- We suggest that you download and use the latest version of client software.

## **"Nice to have" recommendations to improve your device network security:**

### **1. Physical Protection**

We suggest that you perform physical protection to device, especially storage devices. For example, place the device in a special computer room and cabinet, and implement well-done access control permission and key management to prevent unauthorized personnel from carrying out physical contacts such as damaging hardware, unauthorized connection of removable device (such as USB flash disk, serial port), etc.

### **2. Change Passwords Regularly**

We suggest that you change passwords regularly to reduce the risk of being guessed or cracked.

### **3. Set and Update Passwords Reset Information Timely**

The device supports password reset function. Please set up related information for password reset in time, including the end user's mailbox and password protection questions. If the information changes, please modify it in time. When setting password protection questions, it is suggested not to use those that can be easily guessed.

### **4. Enable Account Lock**

The account lock feature is enabled by default, and we recommend you to keep it on to guarantee the account security. If an attacker attempts to log in with the wrong password several times, the corresponding account and the source IP address will be locked.

### **5. Change Default HTTP and Other Service Ports**

We suggest you to change default HTTP and other service ports into any set of numbers between 1024–65535, reducing the risk of outsiders being able to guess which ports you are using.

### **6. Enable HTTPS**

We suggest you to enable HTTPS, so that you visit Web service through a secure communication channel.

### **7. MAC Address Binding**

We recommend you to bind the IP and MAC address of the gateway to the device, thus reducing the risk of ARP spoofing.

### **8. Assign Accounts and Privileges Reasonably**

According to business and management requirements, reasonably add users and assign a minimum set of permissions to them.

#### 9. **Disable Unnecessary Services and Choose Secure Modes**

If not needed, it is recommended to turn off some services such as SNMP, SMTP, UPnP, etc., to reduce risks.

If necessary, it is highly recommended that you use safe modes, including but not limited to the following services:

- SNMP: Choose SNMP v3, and set up strong encryption passwords and authentication passwords.
- SMTP: Choose TLS to access mailbox server.
- FTP: Choose SFTP, and set up strong passwords.
- AP hotspot: Choose WPA2-PSK encryption mode, and set up strong passwords.

#### 10. **Audio and Video Encrypted Transmission**

If your audio and video data contents are very important or sensitive, we recommend that you use encrypted transmission function, to reduce the risk of audio and video data being stolen during transmission.

Reminder: encrypted transmission will cause some loss in transmission efficiency.

#### 11. **Secure Auditing**

- Check online users: we suggest that you check online users regularly to see if the device is logged in without authorization.
- Check device log: By viewing the logs, you can know the IP addresses that were used to log in to your devices and their key operations.

#### 12. **Network Log**

Due to the limited storage capacity of the device, the stored log is limited. If you need to save the log for a long time, it is recommended that you enable the network log function to ensure that the critical logs are synchronized to the network log server for tracing.

#### 13. **Construct a Safe Network Environment**

In order to better ensure the safety of device and reduce potential cyber risks, we recommend:

- Disable the port mapping function of the router to avoid direct access to the intranet devices from external network.
- The network should be partitioned and isolated according to the actual network needs. If there are no communication requirements between two sub networks, it is suggested to use VLAN, network GAP and other technologies to partition the network, so as to achieve the network isolation effect.
- Establish the 802.1x access authentication system to reduce the risk of unauthorized access to private networks.
- Enable IP/MAC address filtering function to limit the range of hosts allowed to access the device.