InSwitch Industrial Ethernet Switch

ISE Series User Manual

Version 3.5

InHand Networks

User’s Manual for InSwitch ISE Series Products

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Please log in our website or contact our business agent directly for revision status of the manual.

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Safety Instructions

The product has excellent and reliable performance within its designed use, however damage to the ISE switch should be avoided.

Please read the manual carefully and keep it for later reference.

Please pay attention to the follows when using the equipment:

- Do not place the equipment close to water or wet places.
- Do not place anything on power cable, which shall be kept out of reach.
- Do not cover, tie or wrap-up the power cable in order to prevent fire.
- Inspect the power cable and other connections regularly to ensure they are not damaged and well connected.
- Please keep the socket and plug of the optical fiber clean ,and do not looking directly the into cross section of optical fiber during operation of the equipment.
- Keep the equipment clean and wipe with soft cotton cloth when necessary.
- Unless other wise instructed in the manual, please do not try to repair the equipment by yourself.

Please disconnect power source immediately under the following circumstances and then contact InHand Networks.

- Entering of water into the equipment.
- Physical damage to the equipment or cracking of the casing.
- Abnormal equipment behavior or a complete change in performance.
- Gas, smoke or noise generated by the equipment.

Brief Introduction to the ISE Manual

The manual is applicable for ISE2005D，ISE2008D，ISE2016D，ISE3005D，ISE3008D，ISE3009D，ISE3010D，ISE3018D of ISE series products.

The manual contains the following chapters:

- Package contents . List of goods that should be contained in packing box of the equipment.
- Product introduction. Brief introduction of the product and outstanding features thereof.
- Front panel and dimension. Front panel diagram and dimension of each and every product of ISF series are provided.
- Installation. Installation method is given in details to guide users to install the equipment correctly.
- Cable connection. Description of correct methods for connecting power cables and communication cables.
- Introduction of functions. Detailed description of features and uses.
- Specifications and parameters. Description of codes and standards observed by the product, and product specifications and parameters.
- Networking models. Briefly explain the common networking models for the ISE series switch.

Readers are instructed to read the contents carefully when the following icons are present in the manual. Example of the icons are listed in the following table.

Note: Supplementary to main text.

Warning: Function may not be available or damage of equipment may occur if operational instructions are not followed.

Danger: Bodily injury may occur if operation instruction is not followed.

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I. Package Contents

Common accessories are provided for each set of ISE series products (as shown in list of standard accessories). Please check our package carefully after taking delivery and contact InHand sales personnel in a timely manner if any piece is missing or damaged.

In addition, InHand can also provide users with optional accessories as per different field conditions and customer requirements. Please refer to list of optional accessories for details.

Standard Accessories

Accessory	Qty.	Description
Industrial Ethernet switch	1 Device	InSwitch ISE series switch
Product documents	1 Package	Optical disk
DIN-rail	1 Piece	Fixed type switch
Product warranty statement	1 Sheet	Warranty period is 5 years.

Optional accessories

Accessory	Qty.	Description
220VAC-24VDC adapter	1 Set	InSwitch ISF series switch
1m optical jumper wire	1 Piece	For user testing
Installation accessorions	1 Set	1 piece wall-mounting accessory and 4 screws

II. Product Introduction

2.1 General

The ISE1005D series switches are designed for applications in electric power, transportation, industrial control and other severe industrial environments. They integrates a wide temperature range, high voltage tolerance, enterprise-class forwarding performance, high-bandwidth, strong cabinet, protected industrial circuits and other industrial features. They are capable of plug and play, and can satisfy reliability requirements in the harsh industrial environment.

2.2 Outstanding Product Features

High-performance Ethernet switch technology:

- IEEE802.3/802.3u/802.3x
- Flow control (full duplex and half duplex flow control)
- Automated speed and duplex negotiation
- Broadcast storm protection
- Store-and-forward switching mode
- 10/100M full duplex/half duplex MDI/MDI-X self adaptive

Reliable and steady operation in severe electrical environments:

- Passed high-standard electromagnetic compatibility tests
- Zero packet loss under intensive electromagnetic interference

Suitable for application under various severe conditions and environment:

- Working temperature: -40～85 ℃
- Relative humidity: 5%～95% (free of condensation)
- IP40 protection class, fully enclosed and seamless type metal cabinet, and fanless cooling
- Pollution degree 2

Satisfying industrial installation requirement:

- Standard industrial DIN rail or wall-mount type installation
- Industrial power source terminal or I/O terminal
- PCB protection coating available

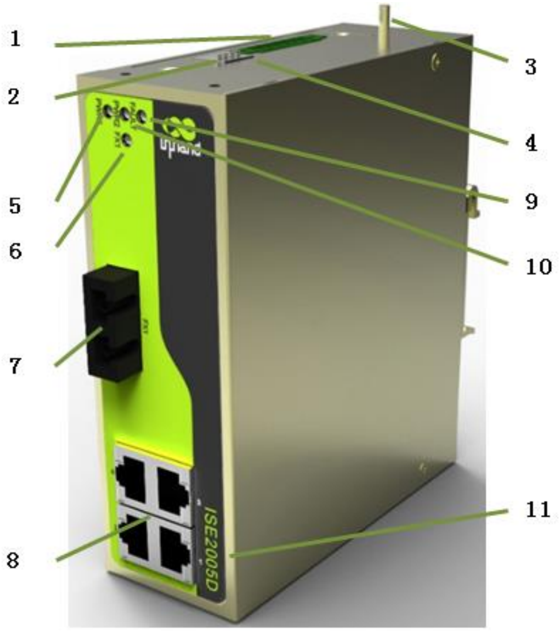
Network reliability enhanced with redundancy and alarms:

- Dual power-supply redundant inputs
- A warning can be produced via relay after power supply failure and interruption of port connections

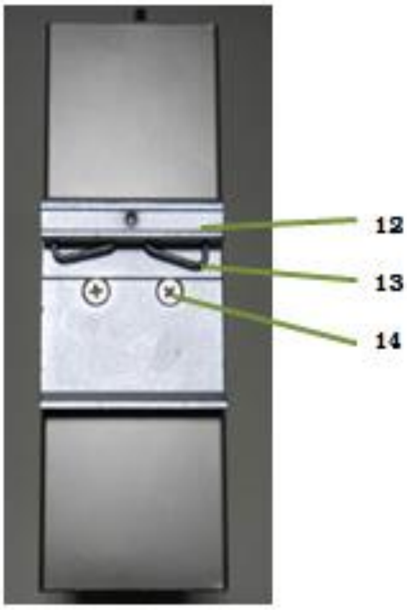
III. Front Panel Layout and Dimensions

3.1 ISE2005D

Front Panel Layout



1. Power source connection and alarm connection terminal
2. DIP switch
3. Grounding screw
4. Cover plate
5. Power source one indicator lamp
6. FX2 LINK/ACT indicator lamp
7.100Base-FX single mode/multimode FC/SC/ST interface FX1
8. 10/100Base-T(X) RJ45 interface
9. Alarm indicator lamp
10. Power source two indicator lamp
11. InSwitch model number



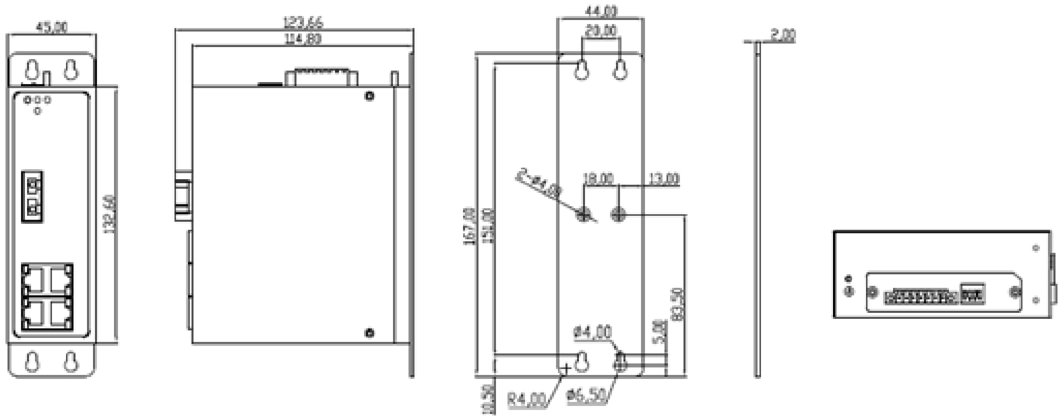
12. DIN-rail bracket upper lip

13. Clamping spring

14. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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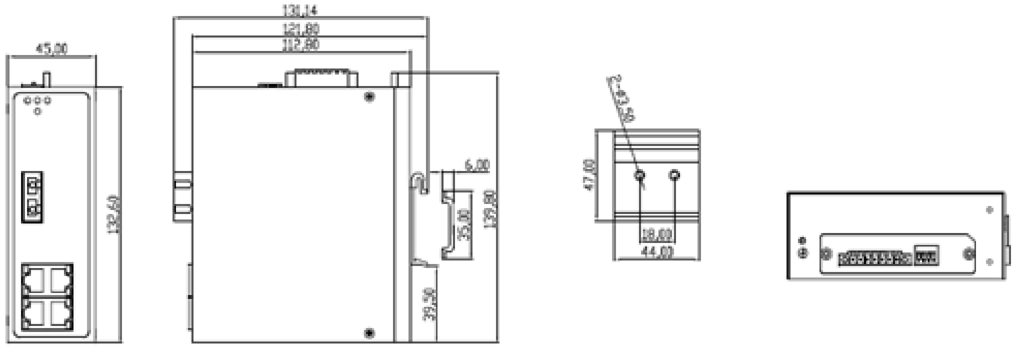
Wall mounting diagram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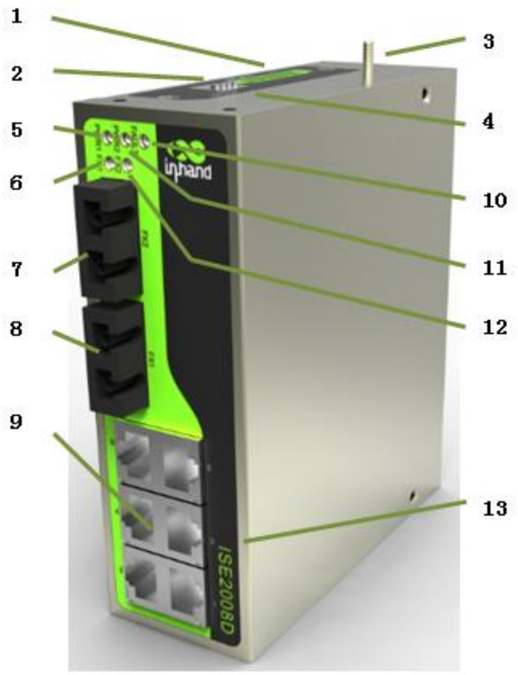
DIN-rail mounting diagram

3.2 ISE2008D

Front Panel Layout



1. Power source connection and alarm connection terminal

2. Dip switch

3. Protective grounding screw

4. Cover plate

5. Power source one indication lamp

6. Optical port FX1 LINK/ACT indication lamp

7. 100Base-FX single mode/multimode FC/SC/ST interface FX1
8. 100Base-FX single mode/multimode FC/SC/ST interface FX2

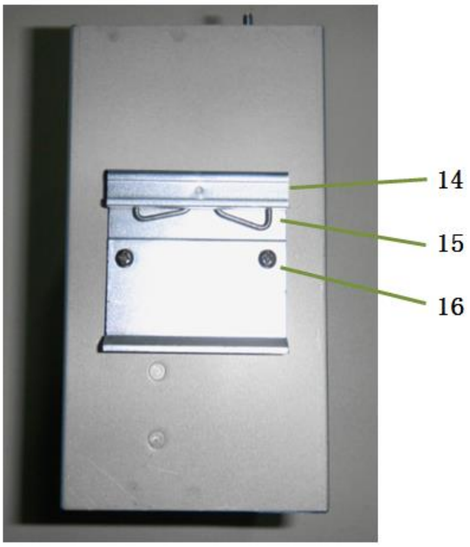
9. 10/100Base-T(X) RJ45

10. Alarm indication lamp

11. Power source two indication lamp

12. Optical port FX2 LINK/ACT indication lamp

13. InSwitch model number



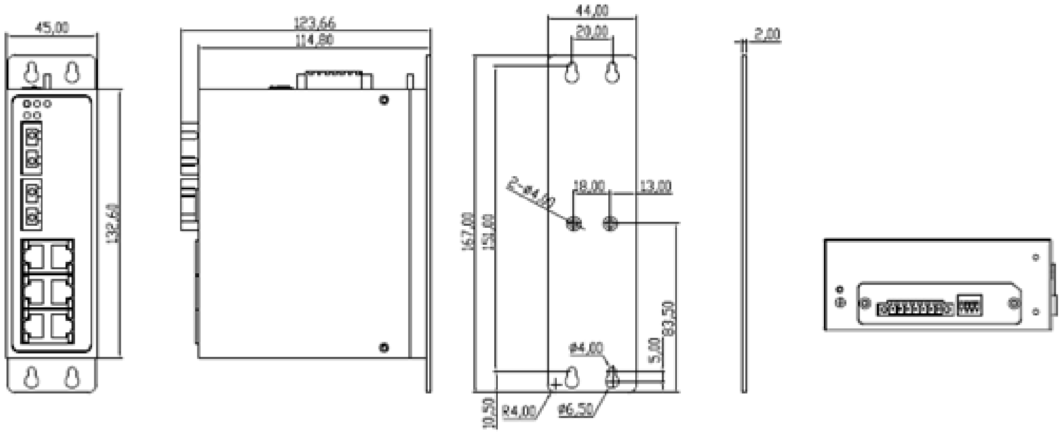
14. DIN-rail bracket upper lip

15. Clamp spring

16. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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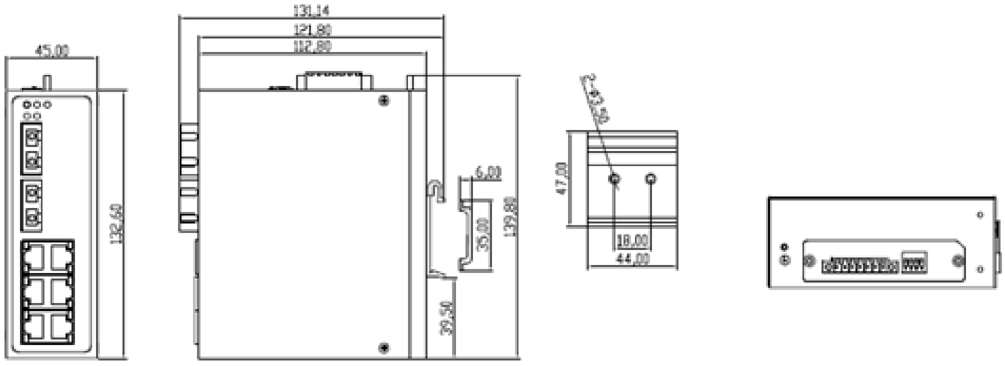
Wall mounting diagram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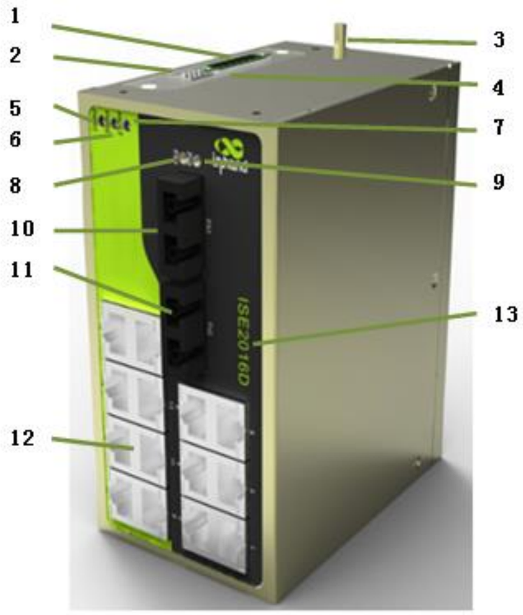
DIN-rail mounting diagram

3.3 ISE2016D

Front Panel Layout



1. Power source connection and alarm connection terminal

2. Dip switch

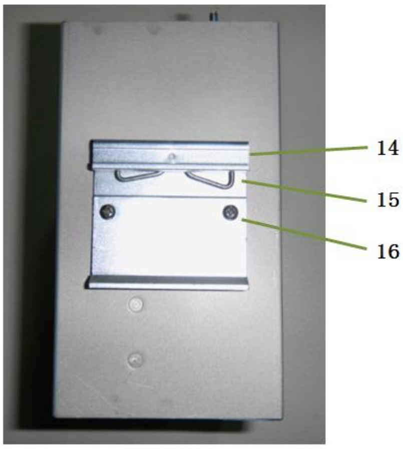
3. Grounding screw

4. Cover plate

5. Power source one indication lamp

6. Power source two indication lamp
7. Alarm indication lamp
8. Optical port FX1 LINK/ACT indication lamp
9. Optical port FX2 LINK/ACT indication lamp
10. 100Base-FX single mode/multimode FC/SC/ST interface FX1
11. 100Base-FX single mode/multimode FC/SC/ST interface FX2
12.10/100Base-T(X) RJ45 port

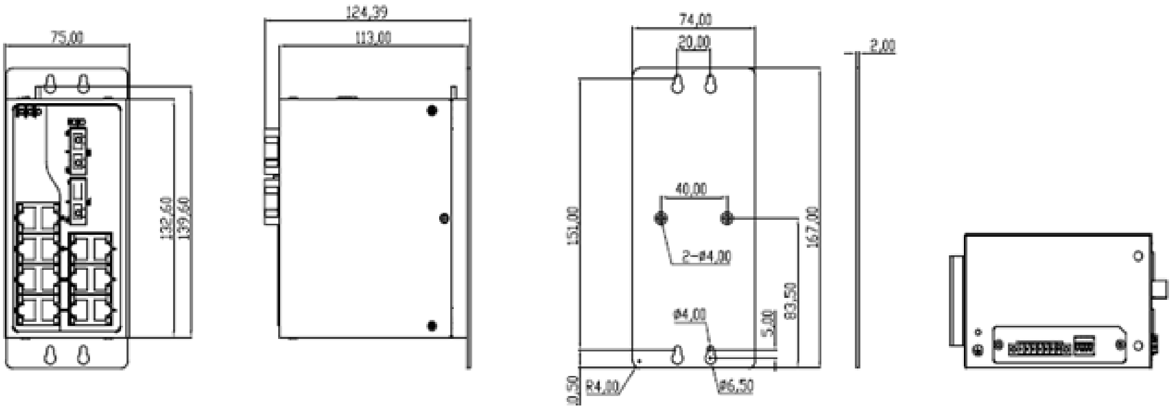
13. InSwitch model number



14. DIN-rail bracket upper lip
15. Clamp spring
16. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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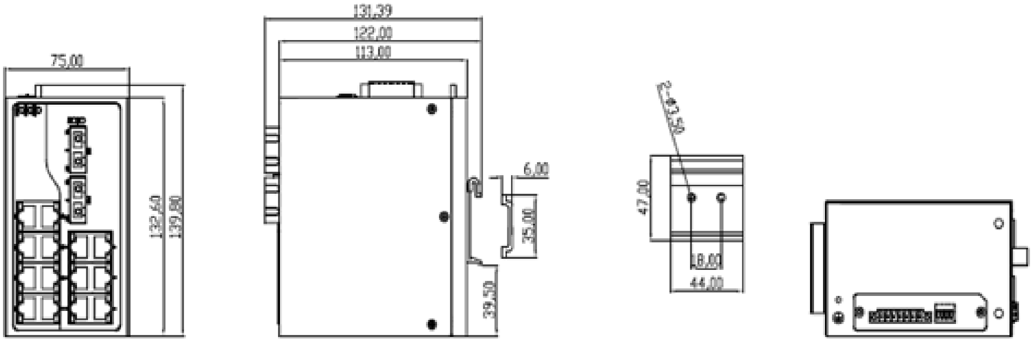
wall mounting diagram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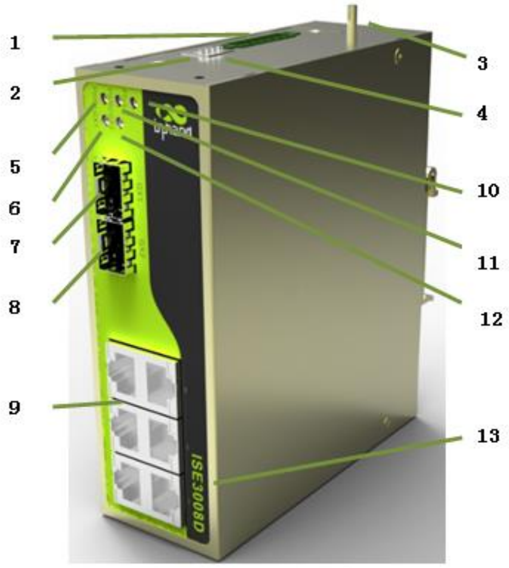
DIN-rail mounting diagram

3.4 ISE3008D

Front Panel Layout



1. Power source connection and alarm connection terminal

2. Dip switch

3. Grounding Screw

4. Cover plate

5. Power source one indication lamp

6. GX1 LINK/ACT indication lamp
7. 1000Base-X, 1000Base-T(X) SFP port GX1
8. 1000Base-X, 1000Base-T(X) SFP port GX2

9. 10/100Base-T(X) RJ45 port

10. Alarm indication lamp

11. Power source two indication lamp

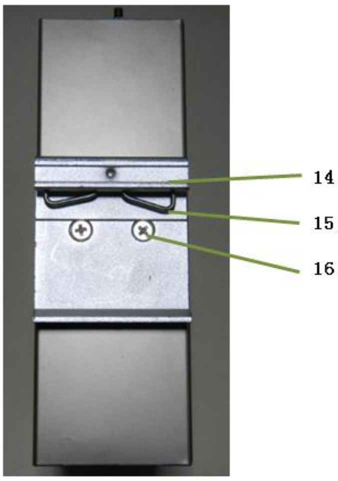
12. GX2 LINK/ACT indication lamp

13. InSwitch model number

14. DIN-rail bracket upper lip

15. Clamp spring

16. DIN-rail bracket attachment screw



Structural Dimensions

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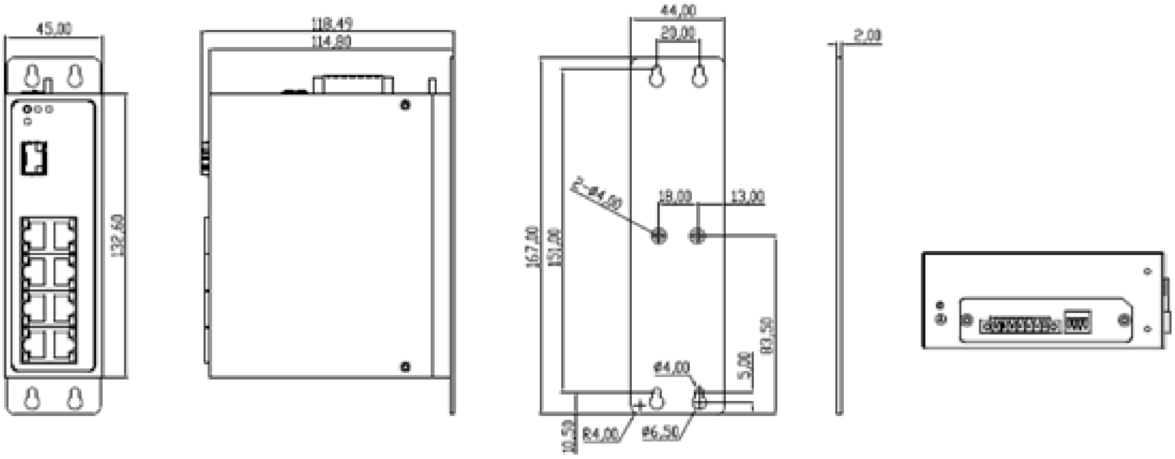
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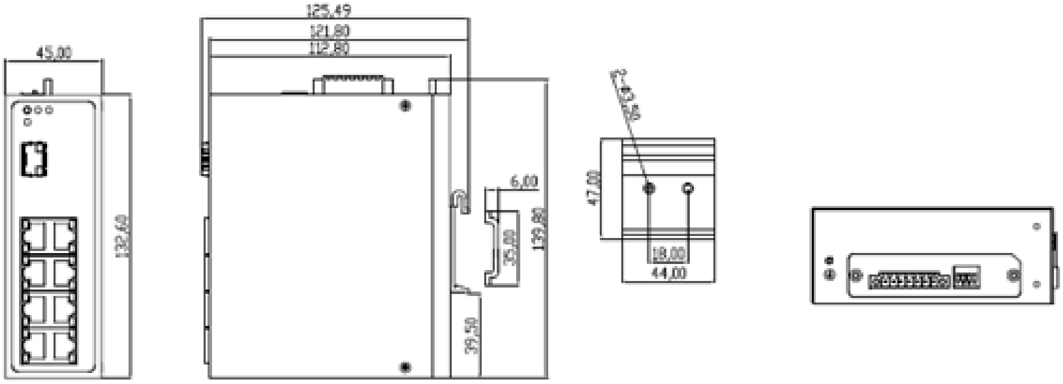
wall mounting diagram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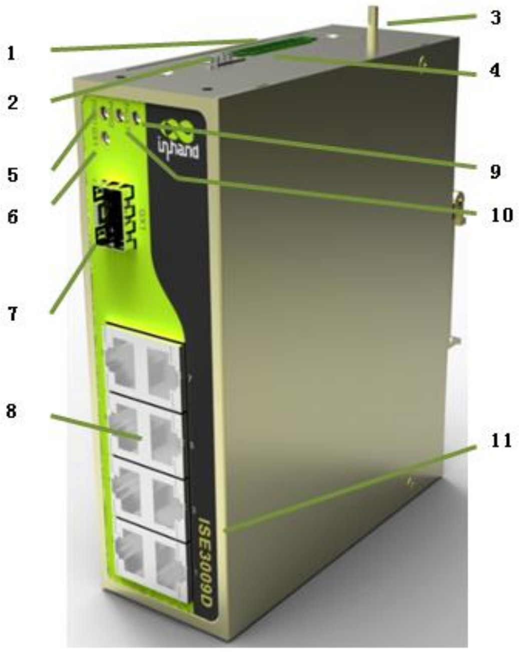
DIN-rail mounting diagram

3.5 ISE3009D

Front Panel Layout



1.Power source connection and alarm connection terminal

2. Dip switch

3. Grounding Screw

4. Cover plate

5. Power source one indication lamp

6. GX1 LINK/ACT indication lamp

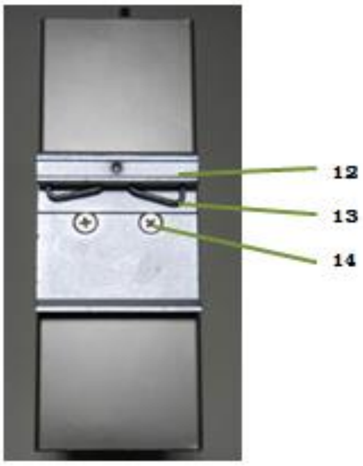
7. 1000Base-X, 1000Base-T(X) SFP port GX1

8. 10/100Base-T(X) RJ45 port

9. Alarm indication lamp

10. Power source two indication lamp

11. InSwitch model number



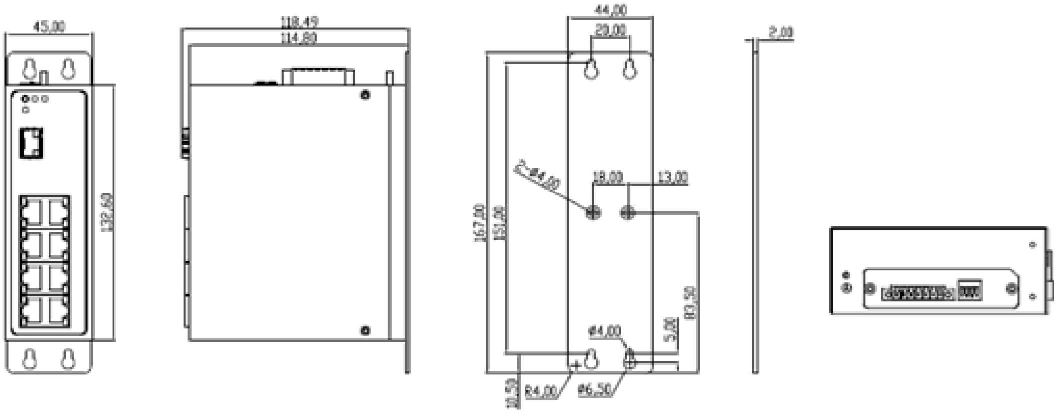
14. DIN-rail bracket upper lip

15. Clamp spring

16. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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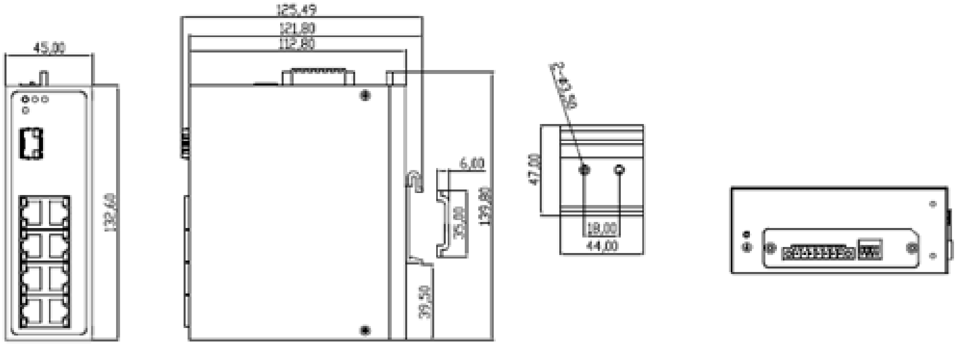
wall mounting diagram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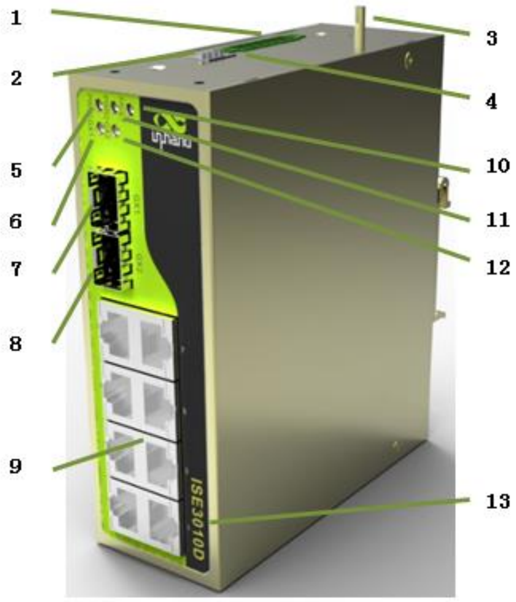
DIN-rail mounting diagram

3.6 ISE3010D

Front Panel Layout



1. Power source connection and alarm connection terminal

2. Dip switch

3. Grounding screw

4. Cover plate

5. Power source one indication lamp

6. GX1 LINK/ACT indication lamp
7.1000Base-X, 1000Base-T(X) SFP interface GX1
8.1000Base-X, 1000Base-T(X) SFP interface GX2

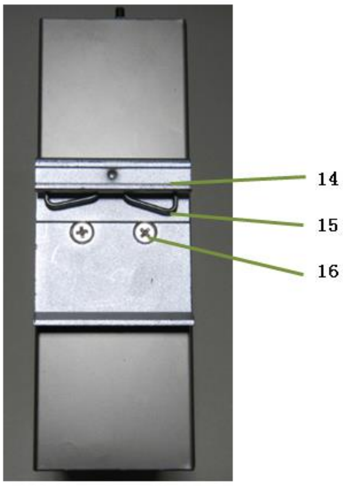
9. 10/100Base-T(X) RJ45 port

10. Alarm indication lamp

11. Power source two indication lamp

12. GX2 LINK/ACT indication lamp

13. InSwitch model number



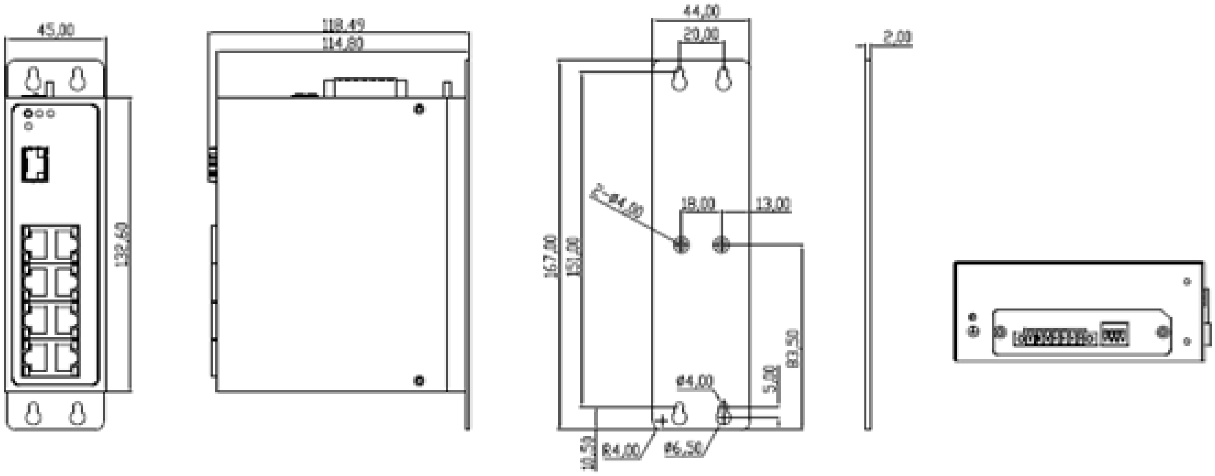
14. DIN-rail bracket upper lip

15. Clamp spring

16. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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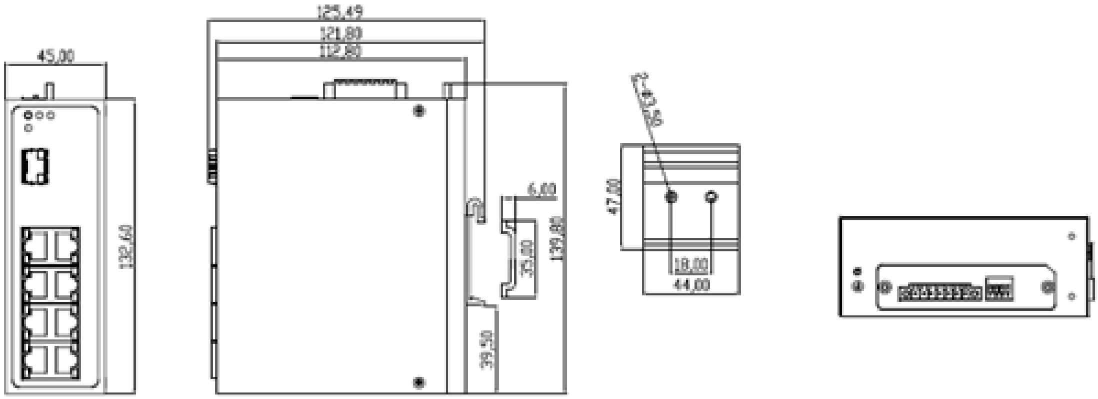
wall mounting diagram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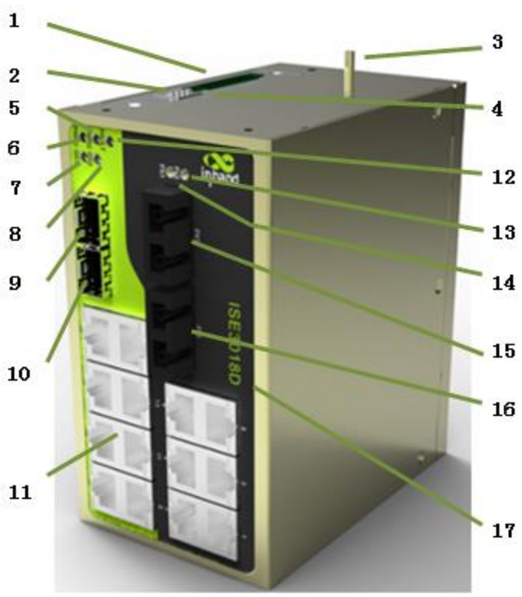
DIN-rail mounting diagram

3.7 ISE3018D

Front Panel Layout



1. Power terminal

2. Dip switch

3. Grounding screw

4. Cover plate

5. Power source two indication lamp

6. Power source one indication lamp

7. GX1 LINK/ACT indication lamp

8. GX2 LINK/ACT indication lamp

9.1000Base-X,1000Base-T(X) SFP interface GX1

10.1000Base-X,1000Base-T(X) SFP interface GX2

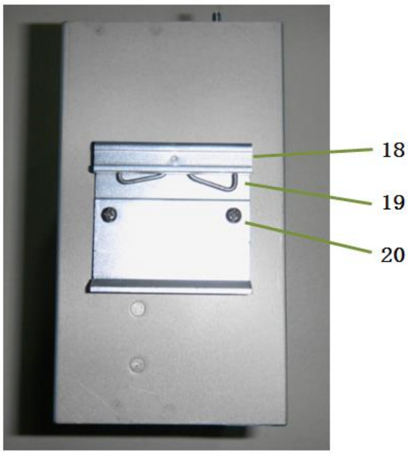
11.10/100Base-T(X) RJ45 port

12. Alarm indication lamp

13. Optical port FX2 LINK/ACT indication lamp

14.Optical port FX2 LINK/ACT indication lamp

15.100Base-FX single mode/multimode FC/SC/ST interface FX1
16.100Base-FX single mode/multimode FC/SC/ST interface FX2
17. InSwitch model number



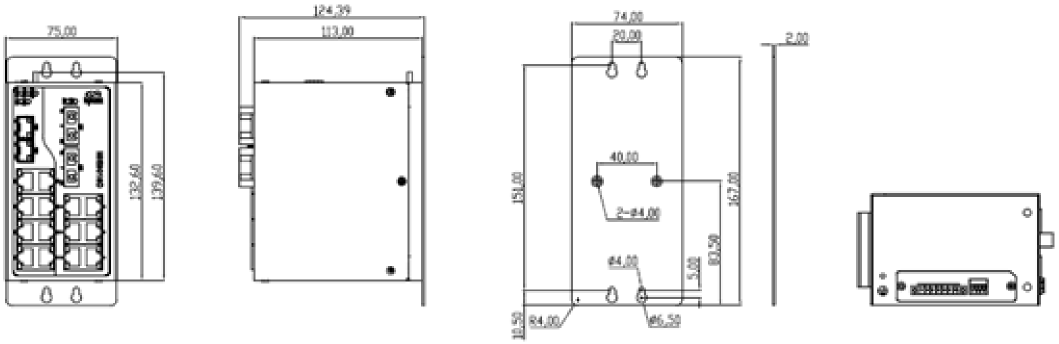
18. DIN-rail bracket upper lip

19. Clamp spring

20. DIN-rail bracket attachment screw

Structural Dimensions

(Units: mm)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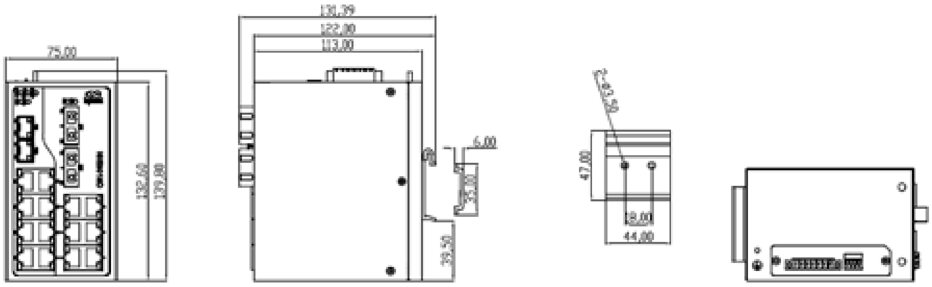
wall mounting diagram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DIN-rail mounting diagram

Note：

1. Some product models have optional copper and fiber ports. Therefore, one part number is used as an example in the layout sections. The models have optional ports:

   ISE1005D：1 100M fiber/copper port optional, 4 100baseT(x)
   ISE2005D：1 100M fiber/copper port optional, 4 100baseT(x)
   ISE2008D：4 100M fiber/copper port optional, 4 100baseT(x)
   ISE3008D：1 1000M fiber port, 3 100M fiber port,4 100baseT(x)
   ISE3009D：1 1000M fiber port, 8 100baseT(x)
   ISE5005D：1 100M fiber/copper port optional, 4 100baseT(x)

IV. Installation

Installation Requirement

- Power source requirements: 24 VDC (12～48 VDC). Attention shall be paid to power voltages.
- Operating temperature: -40～85 ℃
- Storage temperature: -40～85 ℃
- Relative humidity 5％～95% (non-condensing).
- Grounding resistance requirement: less than 1 Ω.
- Avoid direct sunshine and keep away from heat sources or intensive electromagnetic interference.
- Inspect for availability of cable and joints required for installation.

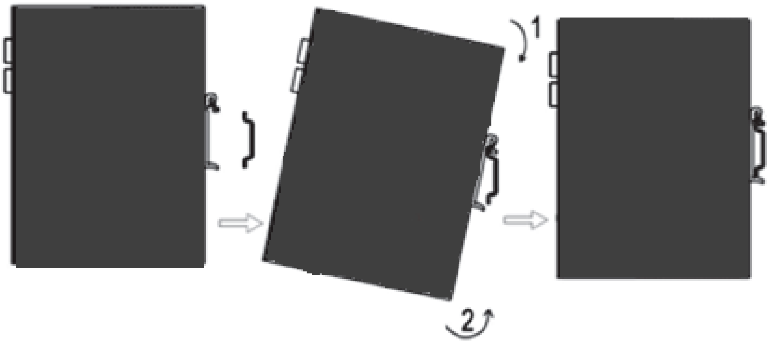
4.1 Instruction for DIN-Rail Installation

4.1.1 DIN-Rail Mounting

Step 1: Select a place to install the device, and make sure there is sufficient space.

Step 2: Hook the upper lip of the bracket onto the DIN-rail.

Step 3: While pushing down to compress the clips, push the bottom part of the switch towards the wall.



4.1.2 DIN-Rail Removal

Step 1: As the arrow 1 shows, pull down on the device to compress the bracket clips.

Step 2: Pull the bottom of the device away from the wall until is unsnaps from the DIN-rail.

Step 3: Unhook the device from the DIN-rail.

4.2 Instruction for Wall mounting

4.2.1 Wall mount

Follow these steps:

Step 1: Install the wall-mounting plate onto the switch.

Step 2: Locate the screws which are packaged with the wall mounting plate. Fix screws in the mounting position as shown by the arrows in Figure 4-3.

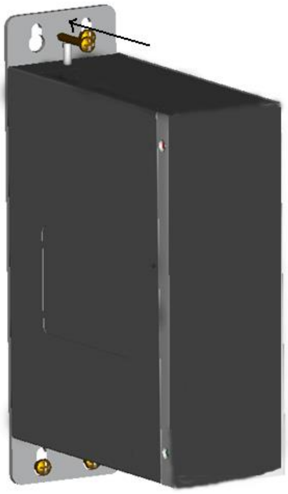


Figure 4-3 Mount the Device on the Wall

Step3: After installing the screws, pull the switch into the position as shown in Figure 4-4.

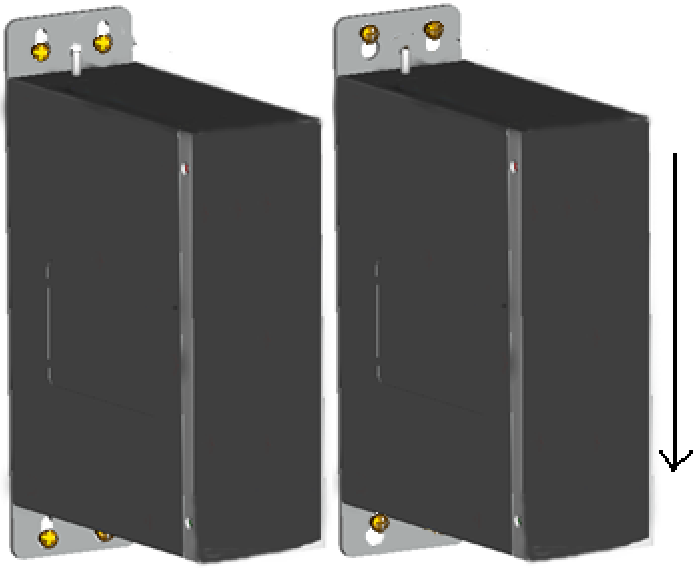


Figure 4-4

4.2.2 DIN-Rail Dismount

Step1: Use a screwdriver to loosen the screws, so that the switch can freely move up and down.

Step2: Lift switch to the position shown in Figure 4-5.

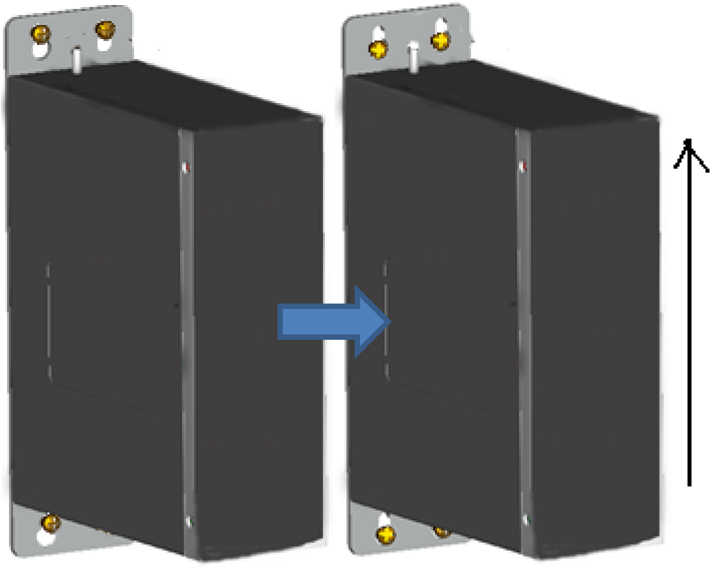


Figure 4-5

Step3: Hold the switch up and remove the four screws.

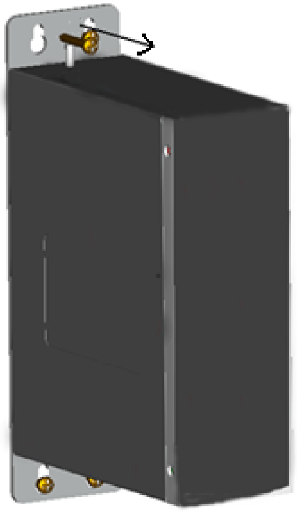


Figure 4-6

Step 3b: Alternatively, do not remove the screws, and directly remove the switch by lifting while gently pulling it away from the wall, as shown in figure 4-7.

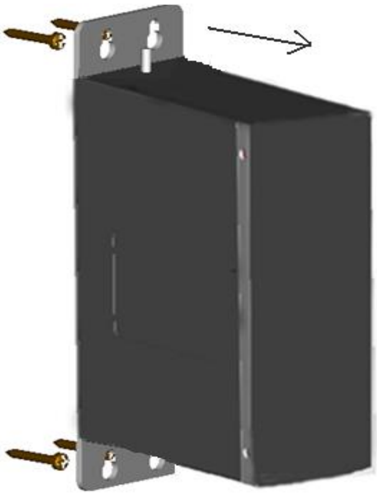


Figure 4-7

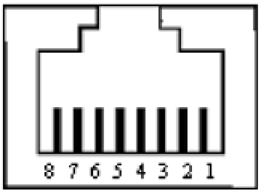
V. Ethernet Cables and Wiring

5.1 10/100Base-T(X) port

The RJ45 interface automatically detects 10/100Base-T(X) and MID/MDI-X protocols. The RJ-45 ports may be connected with either a straight-through or crossover cable and can automatically compensate for either type.

! **Attention:** Standard CAT5 or CAT5e types twisted pair cabling shall be used.

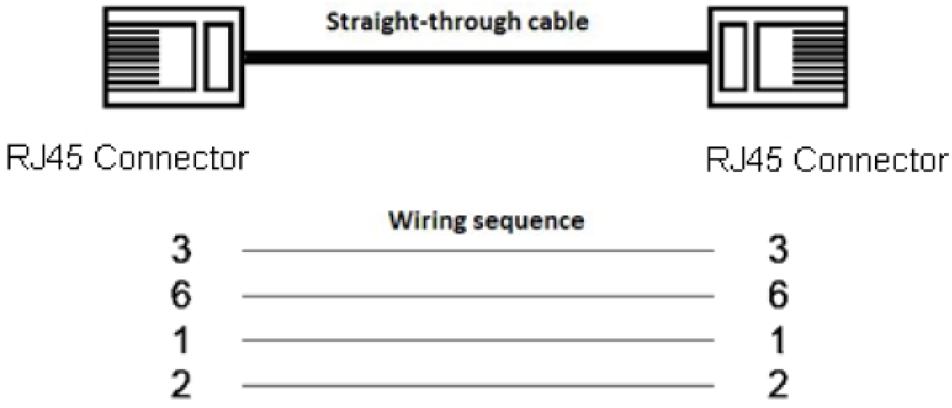
- Image of an RJ45 interface



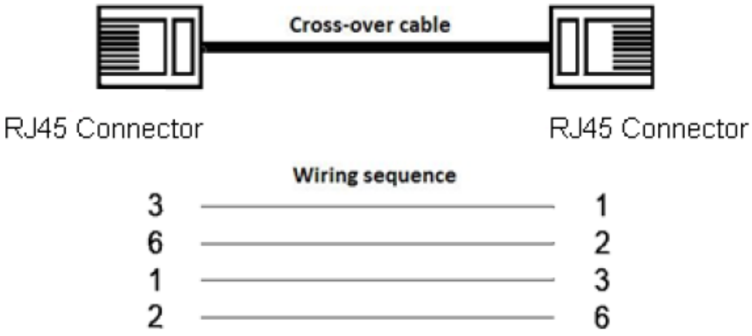
- Description of pins on 10/100Base-T(X) port

Pin	MDI	MDI-X
1	Positive terminal for data transmission（TD+）	Positive terminal for data receiving（RD+）
2	Negative terminal for data transmission（TD-）	Negative terminal for data receiving（RD-）
3	Positive terminal for data receiving（RD+）	Positive terminal for data transmission（TD+）
6	Negative terminal for data receiving（RD-）	Negative terminal for data transmission（TD-）
4,5,7,8	Not used	Not used

- 100Base-TX Straight-through cable


Straight-through cable
RJ45 Connector
RJ45 Connector
Wiring sequence
3
6
1
2
3
6
1
2

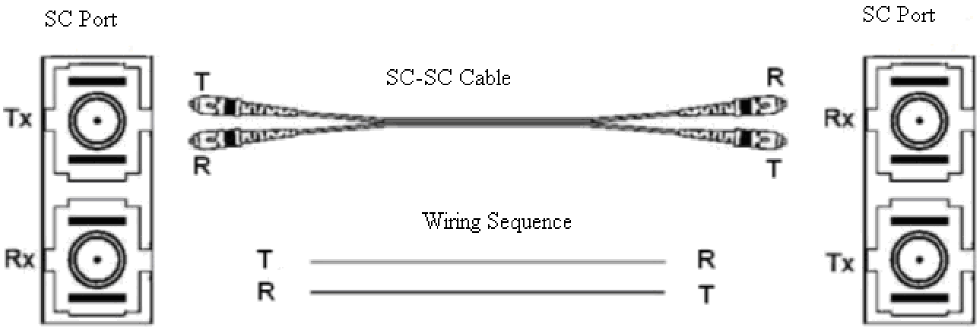
100Base-TX cross-over cable


Cross-over cable
RJ45 Connector
RJ45 Connector
Wiring sequence
3
6
1
2
1
2
3
6

5.2 100Base-FX port

Carefully plug in the optical cables and polish the connectors if nessecary. Rough handling and repeated use can damage the cable and connectors.

Ensure that both ends of the fiberoptic cable are correctly wired. The Tx port of the home terminal shall be connected to Rx port of the opposite terminal, and the Rx of the home terminal shall be connected to Tx port of the opposite terminal. Here, the SC port is used as an example for wiring optical cable connections. The process for connecting ST, FC and LC cables are the same as SC.


SC Port
SC Port
Tx
Rx
T
R
SC-SC Cable
R
T
Rx
Tx
Wiring Sequence
T
R
R
T

Attention:

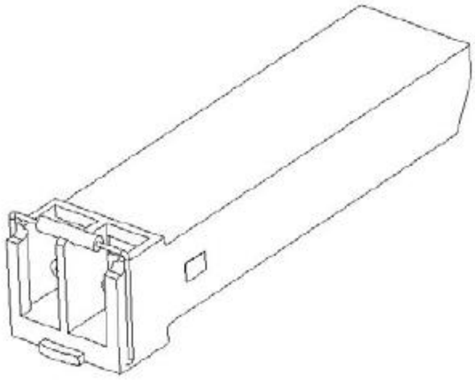
When both ends of the fiberoptic cable are plugged in, but the port LEDs do not blink, check that the wiring is correct. The Rx and Tx cables may be switched.

5.3 1000Base-X, 1000Base-T(X) SFP Port

The SFP port supports either a gigabit SFP optical module (1000Base-X) or gigabit SFP electric module, 1000Base-T(X), depending on network requirements.

Gigabit SFP optical module

A typical gigabit SFP optical module is shown in the following diagram:

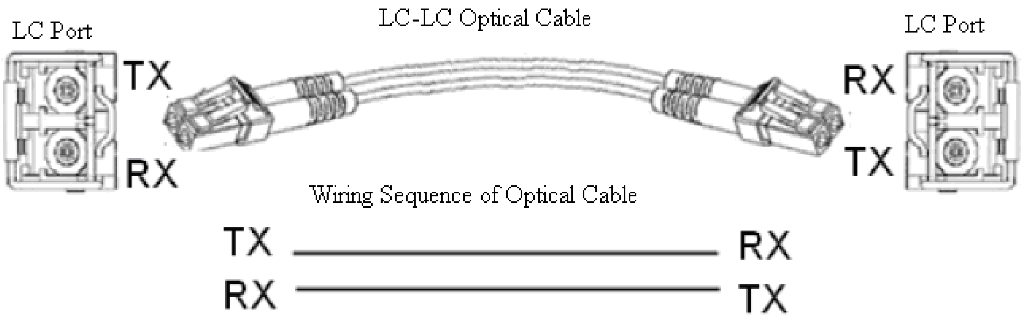


LC interface is adopted for gigabit SFP optical module, including receiving port (Rx) and transmission port (Tx).

Optical cable connection steps:

Step 1: Plug a SFP optical module into the SFP slot.

Step 2: To onnect an optical cable, connect the Rx of the home port to the Tx of the opposite port, and connect the Tx of the home port to the Rx of the opposite port, as shown in the following diagram:

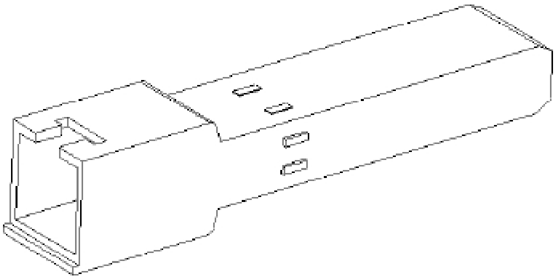

LC Port
LC-LC Optical Cable
LC Port
TX
RX
RX
TX
Wiring Sequence of Optical Cable
TX
RX
RX
TX

Attention:

When both ends of the fiberoptic cable are plugged in, but the port LEDs do not blink, check that the wiring is correct. The Rx and Tx cables may be switched.

- Gigabit SFP electric module

  Typical gigabit SFP electric module is shown in the following diagram.



The steps for connecting network cables to an SFP electric module are as follows:

Step 1: Plug the SFP electric module into the SFP slot.

Step 2: Connect both ends with an Ethernet cable.

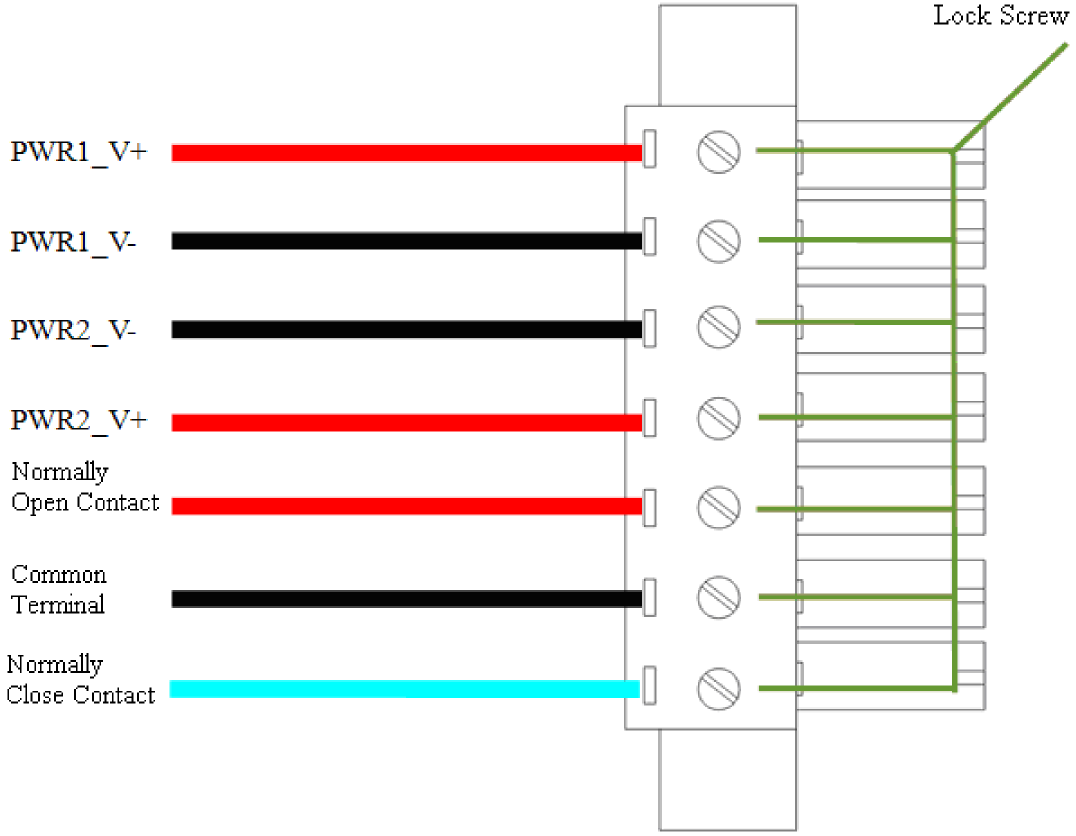
Attention:

CAT5, CAT6 or CAT7 types of twisted pair cable shall be used.

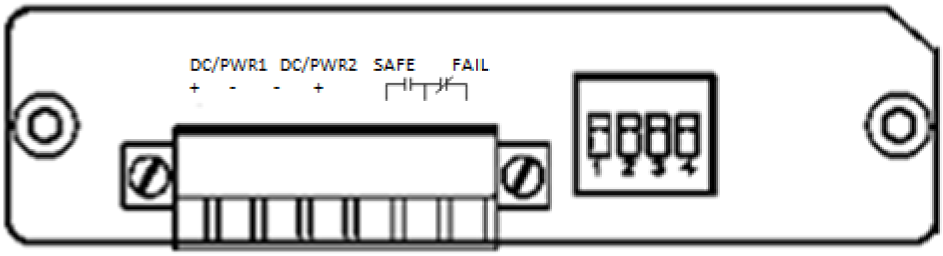
5.4 Power Source

The InSwitch ISE series allow for dual redundant power supplies on it’s industrial terminal block. Dual power supply connections allow users to provide more redundancy and fallback options for important nodes. The terminal block allows industrial and electric power users to employ the existing power supply in an enclosure. Simply wire the power supply’s positive negative and ground into the power terminal to power on the switch.

The wiring schematic for the industrial power terminal is shown below.


Lock Screw
PWR1_V+
PWR1_V-
PWR2_V-
PWR2_V+
Normally Open Contact
Common Terminal
Normally Close Contact

The terminal block is shown in the following schematic.

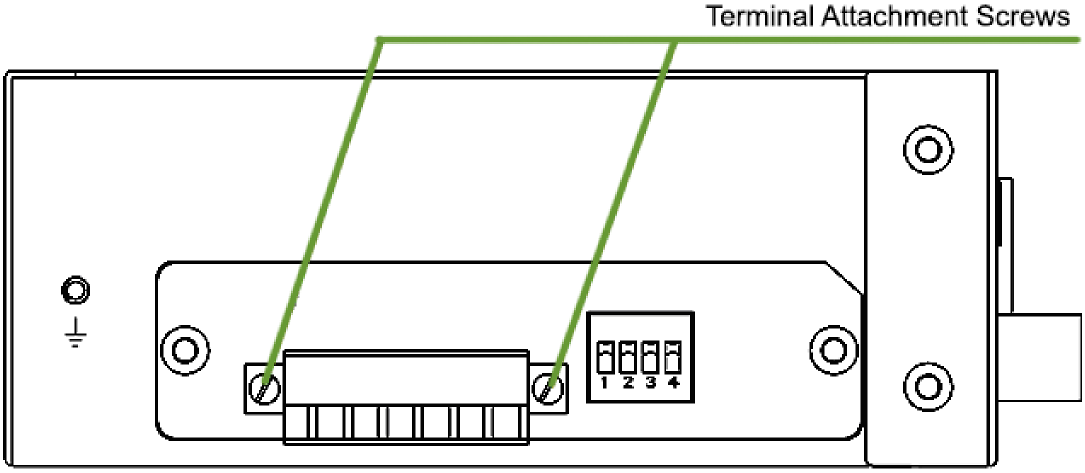

DC/PWR1
DC/PWR2
SAFE
FAIL
+
-
-
+
1
2
3
4

Wiring Method:

Step 1: Unplug the terminal-block from the switch.

Step 2: Insert the cables into the terminal before tightening screw.

Step 3: Insert the terminal-block back into the switch before fastening the flange screws. The method for screwing down the block is shown below.



Attention

Power supply wire diameter and torque：

- Minimum cross-section of wire, AWG/kcmil 28
- Maximum wire cross-section，AWG/kcmil 16
- Minimum applied torque, 0.22 Nm
- Maximum applied torque, 0.25 Nm

5.5 Grounding Protection

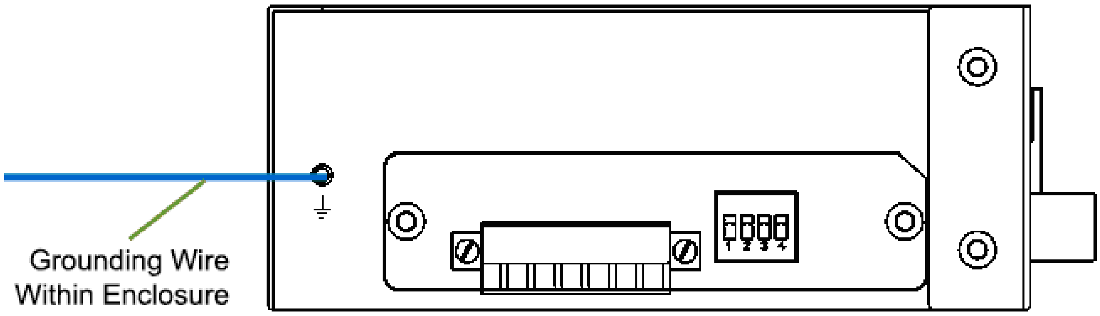
ISE InSwitches have a metal case and grounding screw for protection from electrical surges, discharges, electrical fields and magnetic fields. To make sure the electrial protection of the switch is functioning well, connect the grounding screw to an existing power supply or any designated grounding area.

Wiring Method:

Step 1: Unscrew the grounding screw.

Step 2: Wrap the grounding wire around the screw.

Step 3: Tighten the grounding screw.


Grounding Wire
Within Enclosure
1 2 3 4

5.6. Alarm

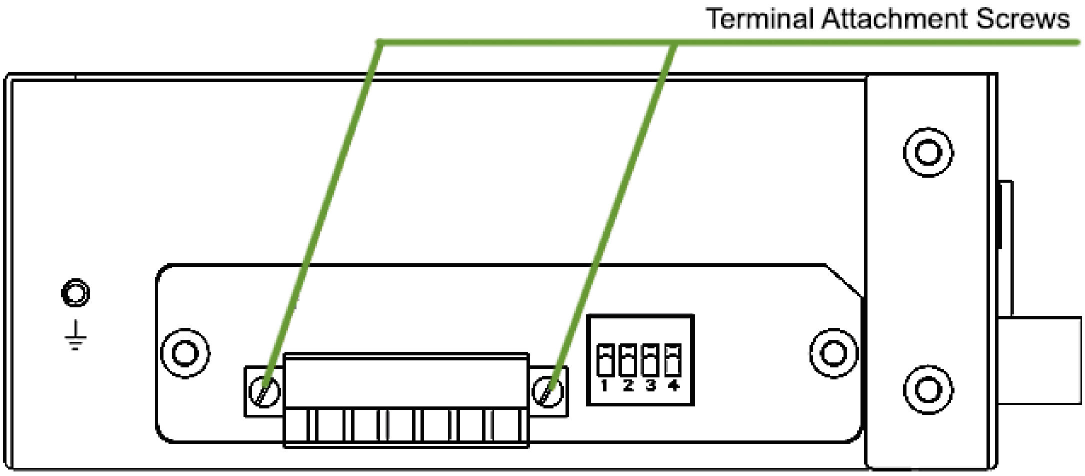
Please refer to chapter 6.3 “Introduction to alarms” for a detailed description of the alarm function.

Wiring Method:

Step 1: Unplug the terminal-block from the switch.

Step 2: Plug the alarm cable into the terminal before tightening the screw.

Step 3: Plug the terminal into the switch and tighten down the attachment screws.


Terminal Attachment Screws
1 2 3 4

Step 4: Change the alarm-related dip switch to the desired positions. Please refer to 6.2 “Dip Switch” for more information on the dip switches.

VI. Functions and Features

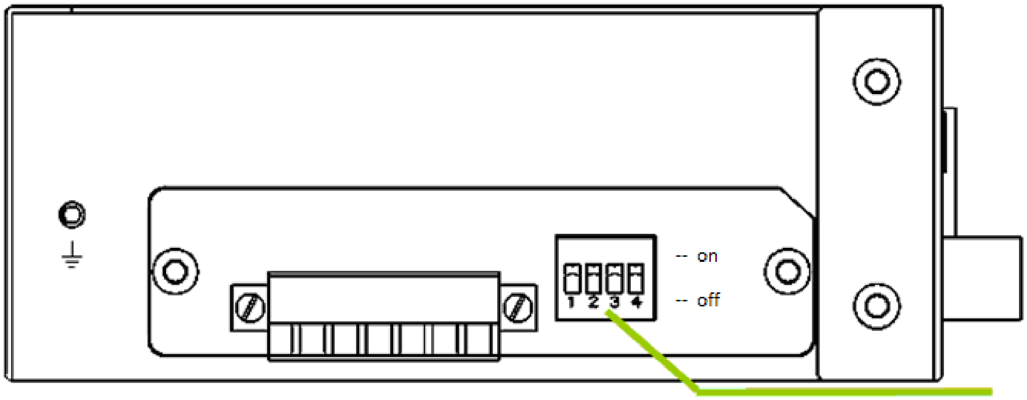
6.1 LED Indicator Codes

A variety of LED indicators are located on the front panel of the switch. Please see the table below for definitions on each indicator.

Name of Indication Lamp	Lamp State	ISE Equipment State
Power source indication lamp		
PWR1	On	Connection of power source 1 normal
	Off	Connection of power source 1 failure
PWR2	On	Connection of power source 2 normal
	Off	Connection of power source 2 failure
Alarm indication lamp		
FAULT	On	Switch equipment in alarm state
	Off	Switch equipment in normal state
1000Base-X,1000Base-T(X) indicator lamp		
GX1 **…** **GXn**	On	Port connected
	Flash	Data passing through
	Off	Interruption of port connection
100Base-FX indicator lamp		
FX1 **…** **FXn**	On	Port connected
	Flash	Data passing through
	Off	Interruption of port connection
10/100Base-T(X) indicator lamp Each 10/100Base-T(X) RJ45 interface is provided with a red lamp and a green lamp. The red lamp indicates port rate, and the green lamp indicates port connection state.		
Red lamp	On	Port connected
	Off	Interruption of port connection
Green lamp	On	Optical port connected
	Flash	Data passing through
	Off	Interruption of port connection

6.2. Dip Switches

There are four DIP switches located on the top panel of the InSwitch. Each DIP switch has either an ON or OFF state, controlling one of the switches functions. In the following diagram, all of the switches are in the ON state.



Four DIP Switches in the 'ON' Position

Dip Switch	Corresponding Functions
Switch 1	Connection disruption alarm for optical port one OFF = Disabled ON = Enabled
Switch 2	Connection interruption alarm for optical port two OFF = Disabled ON = Enabled
Switch 3	Broadcast storm control function OFF = Broadcast storm control disabled ON = Broadcast storm control enabled
Switch 4	Flow control OFF = Flow control disabled ON = Flow control enabled

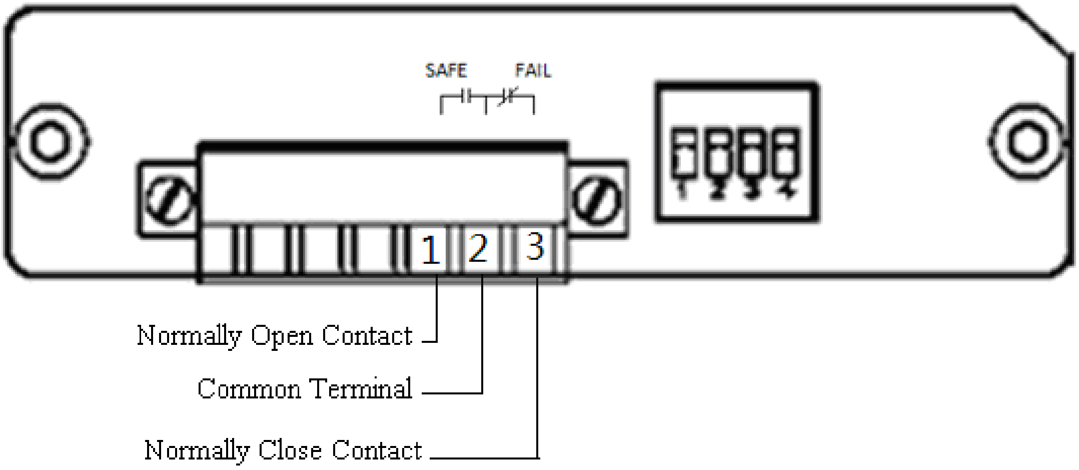
Note:

- For type ISE2XXX products, switches one and two corresponds to alarms for disrupted connections on FX1 and FX2 respectively. If the FX2 port is not included on your model number, then dip-switch 2 is not used.
- For type ISE3XXX products, position 1 and 2 corresponds to alarm for disrupted connections on GX1 and GX2 respectively. If the GX2 portis not included on your model number, then dip-switch 2 is not used.
- If an optical port is not included on your specific model, then both switches one and two are not used.

6.3 Introduction to Alarms

Two abnormal events are defined for ISE series products: loss of connection and power supply failure. Either of these events will trigger an alarm.

The relay is provided with three contacts: open by default, closed by default and one common terminal. The ports are shown in the following diagram.



When the switch is in a normal operational state, the two ports corresponding to SAFE will become a closed circuit (switched on), and the two ports corresponding to FAIL will become an open circuit (switched off) state. When the switch is not powered on or undergoing an abnormal operation status, the two ports corresponding to SAFE will be an open circuit (switched off), and the two ports corresponding to FAIL will be a closed circuit (switched on). Alarm output: 2A@30VDC.

Note:

- Port connectivity interruption alarms can be enabled or disabled via the dip switch, but the main power source fault alarm is always enabled.
- When an alarm event occurs, a triggered relay will maintain the alarm state. The relay will return to a normal state only after all alarm events have been corrected.

VII. Specifications

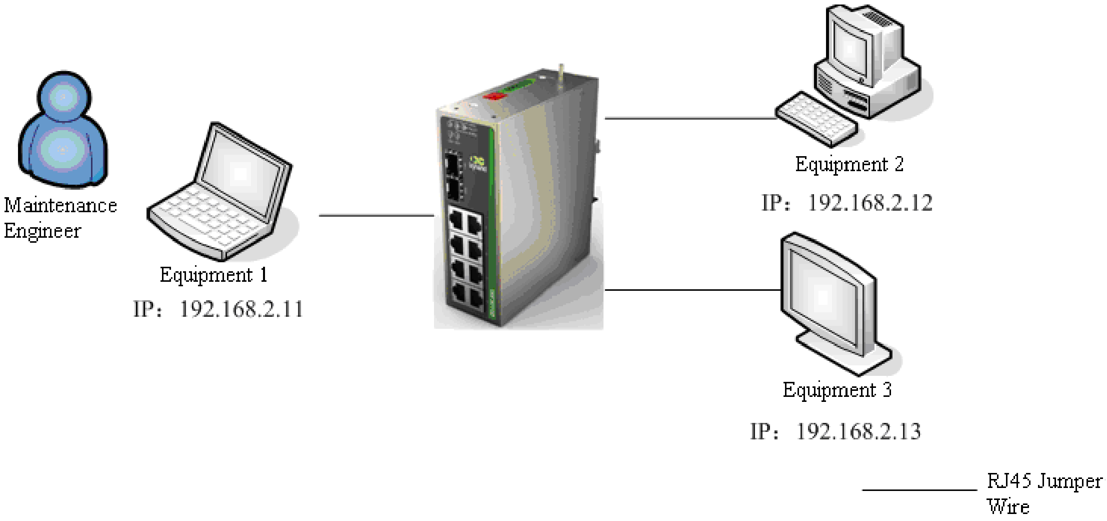
The specifications of the ISE industrial Ethernet switch are given in the following table.

System Index	Parameter Introduction
Switching properties	Supports IEEE802.3 and IEEE 802.3u Switching mode: Store-and-forward mode Inherent time delay for forwarding: under 4 µs
Electromagnetic compatibility	IEC 61000-4-2 (static electricity), class 3 IEC 61000-4-3 (radiating electric filed), class 3 IEC 61000-4-4 (pulse packet), class 3 IEC 61000-4-5 (surge), class 3 IEC 61000-4-6 (conducted emission), class 3 IEC 61000-4-8 (power frequency magnetic filed), class 4
Power source	Input voltage: 24VDC (12~48VDC) redundant input s
Alarm relay output	Maximum voltage 220 VDC Maximum current 2A Maximum switching power 60W
Mechanical properties	Physical dimensions: Size of narrow body type: 45mm×132.6mm×112mm（W×H×D） Size of wide body type: 75mm×132.6mm×112mm（W×H×D） Housing material: Galvanized corrosion resistant steel Housing surface treatment: Powder coating Installation mode: Industrial rail clamps and wall mounting options Heat dissipation mode: Fanless heat dissipation Protection class: IP40 Impact: IEC60068-2-27 Vibration: IEC60068-2-6 Free falling: IEC60068-2-32 Weight: Narrow body type: <0.6kg Wide body type: <0.9kg
Working environment	Working temperature: -40 ～ 85 ℃ Storage temperature: -40 ～ 85℃. Humidity: 5%～95% (free of condensation)
MTBF	35 years
Warranty period	5 years

VIII. Networking Mode

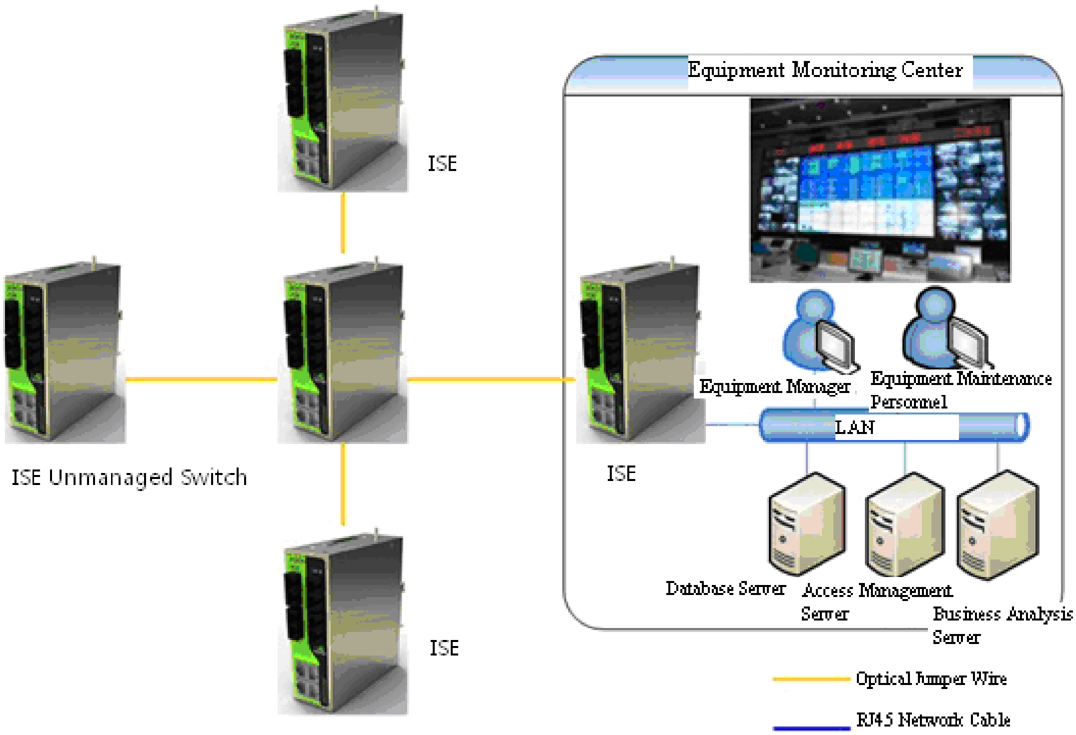
8.1 Networking of Single Set of Equipment

To communicate between device one, two and three, connect them all to the switch and configure the correct IP addresses. All device on a single switching network must share the same subnet of IP addresses, for instance 192.168.2.x/24. X can be any value from 1 to 255. An example topology is shown below:


Maintenance Engineer
Equipment 1
IP：192.168.2.11
Equipment 2
IP：192.168.2.12
Equipment 3
IP：192.168.2.13
RJ45 Jumper Wire

8.2 Networking of Multiple Sets of Equipment

InSwitch ISE industrial Ethernet switch provides 10/100Base-T(X) Ethernet RJ45 ports or 100Base-FX or 1000Base-GX fiber ports for connecting switches and devices.Each port may be connected to a device or another switch. The InSwitch ISE industrial Ethernet switch have 100Base-FX(1000Base-GX optional) single mode/multimode fiber ports for compatibility with fiber optic cables. Fiber optic rings are widely used in Elecric power, transportation, energy, water treatment and industrial automatic control. A networking example is shown below:


ISE
ISE Unmanaged Switch
ISE
ISE
Equipment Monitoring Center
Equipment Manager
Equipment Maintenance Personnel
LAN
Database Server
Access Management Server
Business Analysis Server
Optical Jumper Wire
RJ45 Network Cable

IX. Appendix

Appendix One: Glossary of Terms

Abbreviation	Full English Name	Meaning
100Base-TX	100Base-TX	100 Mbps baseband Ethernet specification uses two pairs of category 5 twisted-pair cables. They can provide a maximum transmission rate of 100Mbits per second.
10Base-T	10Base-T	10Mbps baseband Ethernet specification uses two pairs of twisted-pair (category 3/4/5 twisted pair) connections, one of which will be used for sending data and the other for receiving data, They support a maximum transmission rate of 10Mbits per second.
DDNS	Dynamic Domain Name Service	Dynamic Domain Name Service can assign and retrieve the domain name of a dynamic, public IP address.
DHCP	Dynamic Host Configuration Protocol	Dynamic Host Configuration Protocol dynamically assigns the IP addresses, subnet mask, gateway and other information to hosts on a network.
DNS	Domain Name Service	Domain Name Service resolves a domain name into an IP address. DNS information is distributed hierarchically between DNS servers throughout the Internet. When we visit a website, DNS server views the domain name sending the request and searches for the corresponding IP address. If the DNS server can not find the IP address, it will submit the request to the superior DNS server and continue to search for the IP address. For example, the IP address corresponding to the domain name www.yahoo.com is 216.115.108.243.
Firewall	Firewall	A firewall protects your computer or local area network from malicious attacks from internet.

MAC address	Media Access Control address	A Media Access Control address is the permanent physical address assigned by the manufacturer to the device. It is composed of 6 pairs of hexadecimal digits. For example: 00-0F-E2-80-65-25. Each network device has a global unique 48-bit MAC address.
NAT	Network Address Translation	Network Address Translation allow multiple hosts to access the internet on a single public IP address. Without NAT, only one host may be assigned a public IP. NAT also helps protect the local network from external threats.
Ping	Packet Internet Grope	Ping tests connectivity from a host to a remote host using ICMP packets. It is a very common and easy tool to use.
QoS	Quality of Service	Quality of Service is a technology used to solve the problems of network delay and obstruction. In case of network overload or congestion, QoS can ensure that important traffic will not be delayed or discarded, while ensuring efficient operation of network.
RJ-45	RJ-45	Standard plug for connecting Ethernet switches, hubs, routers, and other devices. Straight-through cable and crossover cable may be used with this interface.
Route	Route	A router routes packets between networks based on an IP address. A route is the path between those two networks. Routing is a layer-three only, while local networks are layer-two only.
SNMP	Simple Network Management Protocol	SNMP is a protocol for remote management of device on the network. It defines a series of messages, methods and syntax used to achieve remote management.
TCP	Transfer Control Protocol	Transfer Control Protocol is a connection-oriented and reliable transport layer protocol.
TCP/IP	Transmission Control Protocol/Internet Protocol	Transmission Control Protocol/Internet Protocol is the cluster of basic communication protocols for network communication. TCP / IP defines a set of protocols, including not only TCP and IP.
Telnet	Telnet	A character-based interactive program used to access a remote host. Telnet allows the user to remotely login and manage the device.

UDP	User Datagram Protocol	User Datagram Protocol is a non-connection oriented based transport layer protocol.
WAN	Wide Area Network	Wide Area Network is a data communication network covering a relatively wide geographical scope, e.g. the Internet.
LAN	Local Area Network	Local Area Network generally refers to the internal network like a home network or internal network of a business.

Appendix Two: Important Safety Information

This product is not intended for use in the following circumstances

- Area(s) where radio transmission equipment (such as cell phone) are not permitted.
- Hospitals, health care facilities and area(s) where cell phones are restricted by law.
- Gas stations, fuel storage and places where chemical are stored.
- Chemical plants or places with potential explosion hazard.
- Any metal surface that may weaken the radio signal level.

RF safety distance

- For GPRS router, the compliance boundary distance is r=0.26m for GSM 900MHz and r=0.13m for DCS 1800 MHz.
- For HSUPA router, the compliance boundary distance is r=0.26m for GSM 900MHz and
- r=0.13m for DCS 1800 MHz, r=.0.094 for WCDMA 900MHz, r=0.063 for WCDMA 2100MHz.

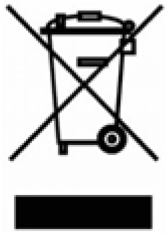
Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

WEEE Notice

The Directive on Waste Electrical and Electronic Equipment (WEEE), which entered into force as European law on 13th February 2003, resulted in a major change in the treatment of electrical equipment at end-of-life.
The purpose of this Directive is, as a first priority, the prevention of WEEE, and in addition, to promote the reuse, recycling and other forms of recovery of such wastes so as to reduce disposal.

The WEEE logo (shown at the left) on the product or on its box indicates that this product must not be disposed of or dumped with your other household waste. You are liable to dispose of all your electronic or electrical waste equipment by relocating over to the specified collection point for recycling of such hazardous waste. Isolated collection and proper recovery of your electronic and electrical waste equipment at the time of disposal will allow us to help conserving natural resources. Moreover, proper recycling of the electronic and electrical waste equipment will ensure safety of human health and environment.



For more information about electronic and electrical waste equipment disposal, recovery, and collection points, please contact your local city centre, household waste disposal service, shop from where you purchased the equipment, or manufacturer of the equipment.