



Industrial 5-port Fast Ethernet Switches

JetNet 3905 Series

Installation Guide

DOCUMENT CHANGE SUMMARY				

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Contents

- I. Safety Instruction 9
 - I.I. Symbols..... 9
 - I.II. Safety Notes 9
 - I.III. Certification 9
- 1.1. Introduction 10
 - 1.1.1. Overview..... 10
 - 1.1.2. Main Features 10
 - 1.1.3. Switch Models 11
- 1.2. Technical Specifications 12
- 1.3. Front Panel 14
 - 1.3.1. JetNet 3905 14
 - 1.3.2. JetNet 3905f 15
 - 1.3.3. Front Panel LEDs 16
- 1.4. Rear View 17
- 1.5. Bottom View 18
- 1.6. Dimensions..... 19
 - 1.6.1. JetNet 3905 19
 - 1.6.2. JetNet 3905f 20
- 2.1. Electrical Safety Information..... 21
- 2.2. Environment and Enclosure Guidelines 21
- 2.3. Package Contents..... 22
- 2.4. Validating Operational Function..... 22
- 2.5. Installing the Switch 23
 - 2.5.1. Installation Requirements 23

2.5.2.	Installing Guidelines	23
2.5.3.	DIN Rail Mounting.....	24
2.5.4.	Removing the DIN-Rail Mounting Kit	25
2.5.4.1.	Ethernet Cable Wiring.....	26
2.5.4.2.	Data and Power Ports.....	28
2.5.5.	Connecting Power Inputs	29
2.5.5.1.	Overview.....	29
2.5.5.2.	Considerations	30
2.5.5.3.	Grounding the Device	30
2.5.6.	Wiring a Relay.....	32
2.5.6.1.	Wiring Power Inputs	32
2.5.6.2.	Disconnecting Power Inputs	34
2.5.6.3.	Power Supply Specifications	35

Important Notes

- Solid state equipment has operational characteristics differing from those of electromechanical equipment.
- Safety Guidelines for the Application, Installation and Maintenance of Solid-State Controls describes some important differences between solid state equipment and hard-wired electromechanical devices.
- Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.
- In no event will Beijer Electronics be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.
- The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Beijer Electronics cannot assume responsibility or liability for actual use based on the examples and diagrams.

CAUTION




- ✓ **A Caution symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and or damage to the device.**
Read the following Instructions:
 - Keep vibrations away from it.
 - Products should be used in environments with a pollution index of less than 2.
 - Ensure that the installation environment does not exceed 85% humidity.

WARNING


- ✓ **A Warning symbol indicates a hazardous situation which, if not avoided, could result in damage to the device, death or serious injury. Read the following Instructions:**
- In order to prevent electric arcs, never assemble or wire the products with power applied. Otherwise, it may result in unexpected and potentially dangerous actions by field devices. Arching poses an explosion risk in hazardous locations. Before assembling or wiring the modules, ensure that the area is non-hazardous or that the system power has been removed accordingly.
 - Check the rated voltage and terminal array before wiring. Avoid environments over 50°C of temperature. Avoid placing it directly in the sunlight.
 - Ensure that inputs and outputs are made according to the module specification. Wire the system using standard cables.
 - In order to avoid an electric shock or malfunction, do not touch any terminal blocks or IO modules while the system is running.
 - Keep away from the strange metallic materials not related to the unit and wiring works should be controlled by the electric expert engineer. Else it may cause the unit to a fire, electric shock or malfunction.
 - Modules should not be placed near inflammable materials. A fire may result if it is not handled properly.

I. Safety Instruction

I.I. Symbols

<p>CAUTION</p> 	<p>A Caution symbol indicates a potentially hazardous situation to you.</p>
<p>WARNING</p> 	<p>A Warning symbol indicates situations that can be potentially lethal or extremely hazardous to you.</p>
<p>ATTENTION</p> 	<p>An Attention symbol indicates potential damage to programs, devices, or data.</p>
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>

I.II. Safety Notes

<p>WARNING</p> 	<p>The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, M-bus and Hot swap-bus pin.</p>
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I.III. Certification

Note! For specific information relating to certification of this module type, see the separate certification document summary.

The following certification information applies to JetNet 3905 series models:

- CE compliance
- FCC compliance
- DNV compliance

Chapter 1. Switch Overview

1.1. Introduction

1.1.1. Overview

The JetNet 3905 Series, comprising the JetNet 3905, JetNet 3905f-s, and JetNet 3905f-m models, offers DNV marine certification. This certification enables the utilization of JetNet 3905 switches in various marine applications, ensuring network redundancy and security. Specifically designed to meet the rigorous demands of DNV marine certification, these switches exhibit exceptional resistance to corrosion, vibration, extreme temperatures, humidity, and shock. With enhanced EMC and reliability design features, the JetNet 3905 Series is perfectly suited for boat applications, providing unmatched performance and durability.

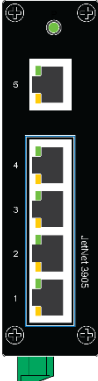
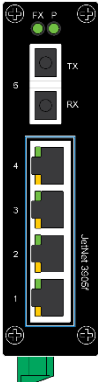
1.1.2. Main Features

The JetNet 3905 Series support the features. All features are not available in each model. For device specific features review the device's datasheet to obtain further details.

- 5 RJ45 ports for 10/100Base-TX Ethernet Ports (JetNet3905)
- 4 RJ45 ports for 10/100Base-TX Ethernet Ports and 1 100Base FX (JetNet3905f)
- Industrial Slim Size Design
- Broadcast storm protection
- Support 802.1p QoS (CoS, DSCP)
- Supports AC 1.5KV Hi-port isolation protection
- DNV Certificate

1.1.3. Switch Models

The JetNet 3905 series is available in the following models.

Switch Model	Description	Image
JetNet 3905	JetNet 3905 (left): Industrial 5 x 10/100 base TX RJ45 Ethernet ports	
JetNet 3905f	JetNet 3905f: Industrial 4 x 10/100 base TX RJ45 Ethernet ports	

1.2. Technical Specifications

Specifications		Description
Interface	Enclosure Port	<p>JetNet 3905</p> <ul style="list-style-type: none"> • 5-port 10/100BaseT(X) RJ-45Ethernet Port • Non-blocking Switching Performance • Auto negotiation speed, Full/Half duplex mode and auto MDI/MDI-X connection <p>JetNet 3905f</p> <ul style="list-style-type: none"> • 4-port 10/100T(X) RJ-45Ethernet Port • Non-blocking Switching Performance • Auto negotiation speed, Full/Half duplex mode and auto MDI/MDI-X connection
	Fiber Port	<p>JetNet 3905f</p> <p>1-port 100Base F(X)</p>
	Ethernet Cable	100Base-TX: 4-pair Cat.5e / Cat.6 UTP/STP cable, 100Meters
	LEDs	<p>JetNet 3905 / 3905f</p> <ul style="list-style-type: none"> • 1x Power (Green on) • Ethernet Port: <ul style="list-style-type: none"> 100Mbps Link (Green on) 100Mbps Activity (Green blinking) 10Mbps link (Amber on) 10Mbps Activity (Amber blinking) <p>JetNet 3905f</p> <ul style="list-style-type: none"> • 1x Fiber: <ul style="list-style-type: none"> Link (Green on) Activity (Green blinking)
Power Requirements	System power	Power inputs
	Voltage	10-60 VDC
	Power Consumption	2 W
	Connection	1 x removable 2-contact terminal block
Technology	IEEE Standards	<ul style="list-style-type: none"> • IEEE 802.3 10Base-T • IEEE 802.3u100Base-TX/100Bae-Fx • IEEE 802.3x Flow Control • IEEE 802.1p QoS
Performance	Switch Technology	Store and Forward technology
	MAC Address	1K MAC address table
	Packet Buffer	448 Kbits packet buffer

Specifications		Description
	Transfer packet size	64 Bytes ~ 1536 Bytes
	Transfer Performance	14,880 pps for 10 Mbps, 148,800 pps for 100 Mbps
	Broadcast Storm Control	Default enabled
Mechanical	Installation	DIN-Rail mounting
	Case	IP30 grade metal case
	Dimensions	Without DIN rail clip - W x D x H 89.4 x 30 x 111.8 mm / 3.52 x 1.18 x 4.40 in.
	Weight	Packaged 0.35 kg / 12.34 oz Without package 0.35 kg / 32.63 oz
Environmental	Operating Temperature	-40 ~ 75 °C / -40 °F ~ 167 °F
	Operating Humidity	0% ~ 100%, non-condensing
	Storage Temperature	-40 ~ 85 °C / -40 °F ~ 185 °F
Regulatory	EMC	IEC/EN61000-6-2, IEC/EN61000-6-4 Heavy Industrial EMC EMI: FCC Class A, CE/Class A EMS: IEC/EN61000-4-2, IEC/EN61000-4-3, IEC/EN61000-4-4, IEC/EN61000-4-5, IEC/EN61000-4-6, IEC/EN61000-4-8
	Shock	Compliance with IEC 60068-2-27
	Vibration	Compliance with IEC 60068-2-6
	Free Fall	Compliance with IEC 60068-2-32
	Marine	DNV
	Warranty	5 years

1.3. Front Panel

Described in this section are the front panel components of the JetNet 3905 series switches.

1.3.1. JetNet 3905

The LEDs and ports for the JetNet 3905 are located on the front panel of the switch as illustrated in the following illustrations.

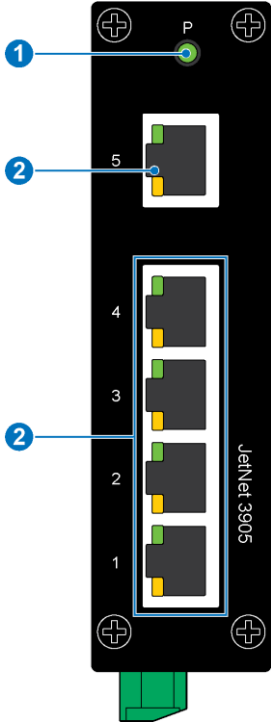


Figure 1: Front Panel of JetNet 3905

No.	Item	Description
1.	System LEDs	See Front Panel LEDs on page 16 for further details
2.	ETH ports	RJ45 Ethernet ports, 10 Mbps and 100 Mbps on Cat 5e cables

1.3.2. JetNet 3905f

The LEDs and ports for the JetNet 3905f are located on the front panel of the switch as illustrated in the following illustrations.

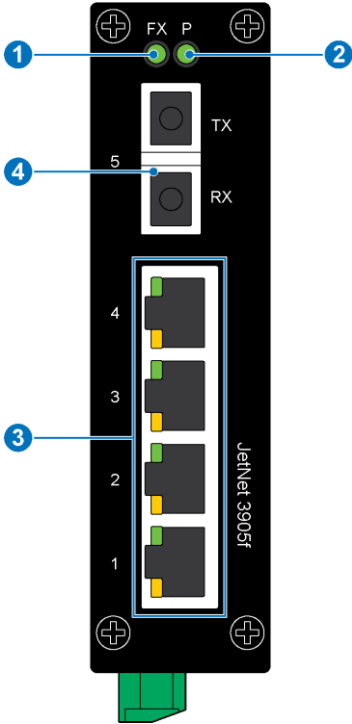


Figure 2: Front Panel of JetNet 3905f

No.	Item	Description
1.	Fiber LED	See Front Panel LEDs on page 16 for further details
2.	System LED	
3.	RJ-45 console ports	Console/Terminal Port (RJ45) for device management/debug
4.	Fiber port	100BASE SC Type Fiber 3905f-s:Single-mode 30km 3905f-m:Multi-mode 2 km

1.3.3. Front Panel LEDs

The system LEDs are used to monitor the switch activity and performance. The following illustration depicts the front panel on a JetNet 3905 Series. A specific LED panel is dependent on a specific JetNet model.

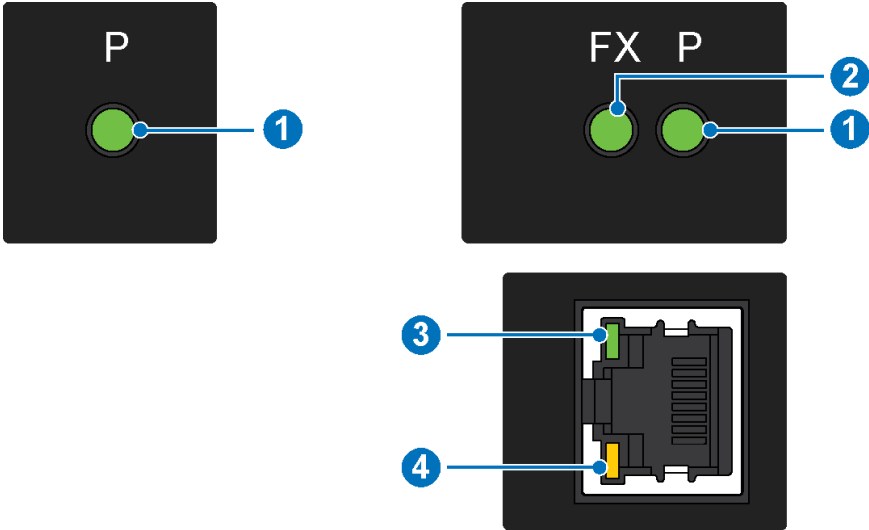


Figure 3: Front Panel LEDs for JetNet 3905 Series

No.	LED	Description
1.	Power	Solid green: Device is powered on Off: Device is powered off
2.	FX	JetNet 3905f Solid green: fiber connector is connected Flashing green: fiber interface is transmitting / receiving Off: Link is inactive
3.	1000 Mbps	Solid green: Port is operating at 100 Mbps speed Blinking green: Packet transmitting / receiving at 100 Mbps speed Off: Port is inactive
4.	Link / Act	Solid amber: Port is operating at 10 Mbps speed Blinking amber: Packet transmitting / receiving at 10 Mbps speed Off: Link is inactive

1.4. Rear View

The following rear view illustrates the rear view of a JetNet 3905 Series device. For demonstration purposes a single sample is illustrated. Varying models may differ in shape and form.

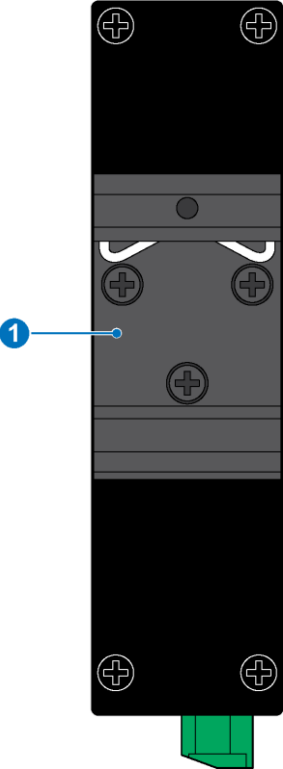


Figure 4: Rear Panel of JetNet 3905 Series

No.	Item	Description
1.	DIN rail plate	Connect to DIN rail for mounting

1.5. Bottom View

The following bottom view illustrates the bottom view of a JetNet 3905 Series device. The power inputs and relay connectors are located on the bottom panel of the switch as illustrated in the following illustrations. For demonstration purposes a single sample is illustrated. Varying models may differ in shape and form.

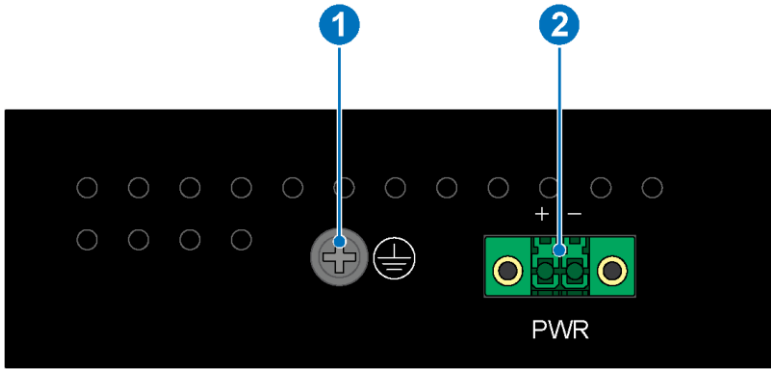


Figure 5: Bottom View of JetNet 3905 Series

	Item	Description
1.	Ground terminal	Connect to a ground source to provide local earth potential.
2.	Terminal block receptor	Connect a terminal block for power

1.6. Dimensions

The power inputs and relay connectors are located on the rear panel of the switch as illustrated in the following illustrations.

1.6.1. JetNet 3905

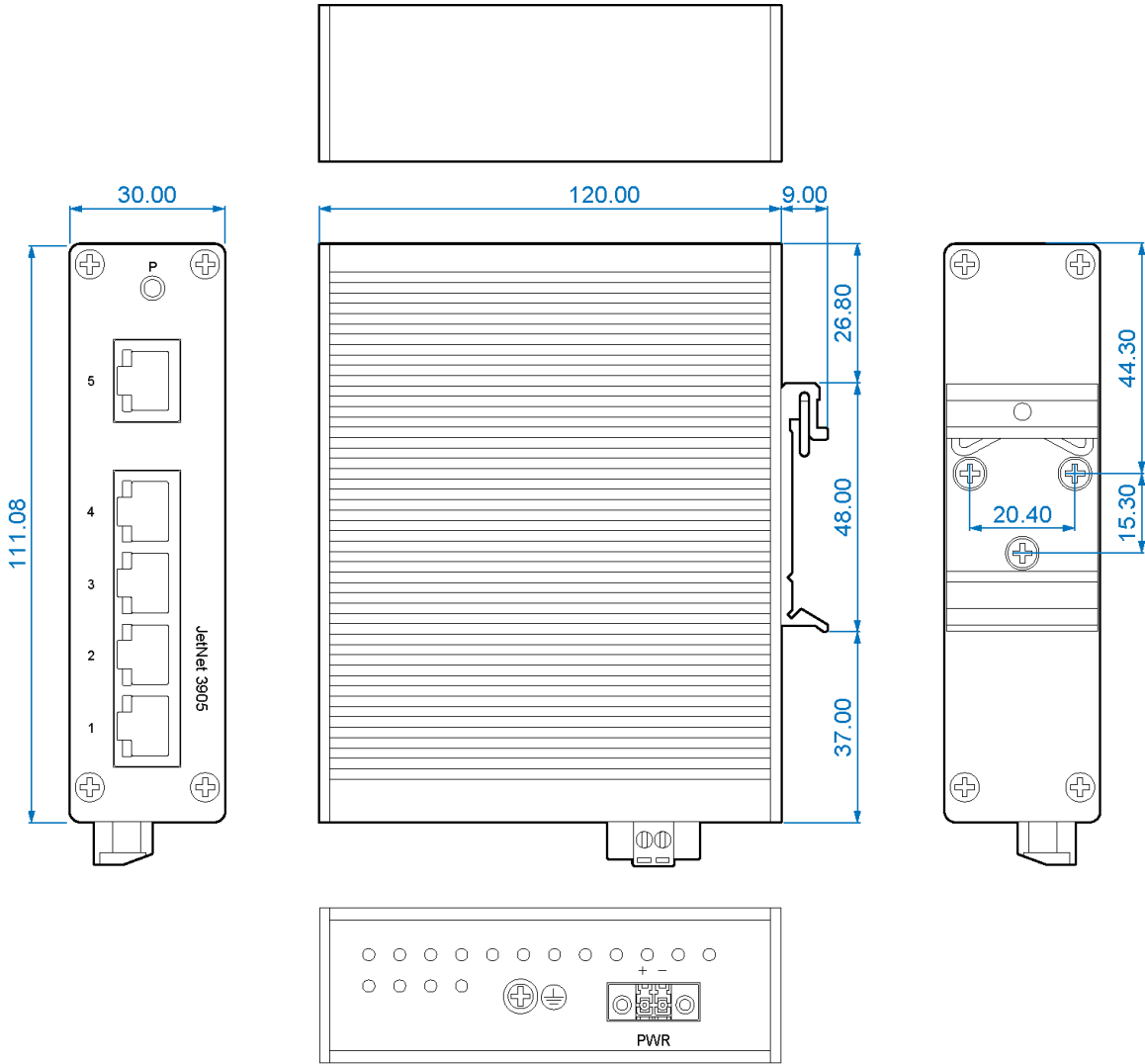


Figure 6: Dimensions of 5-Port JetNet 3905

1.6.2. JetNet 3905f

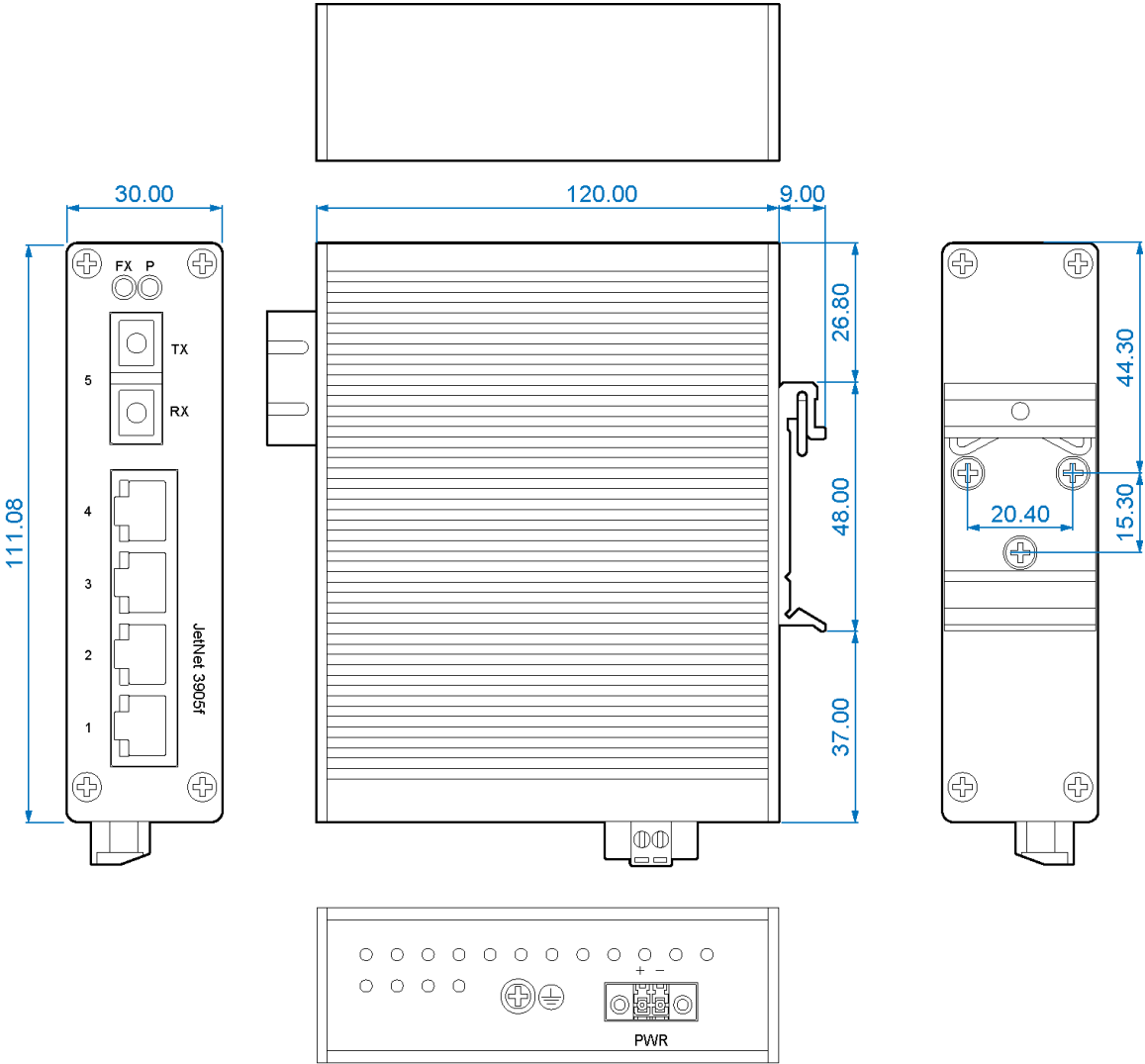


Figure 7: Dimensions of 5-Port JetNet 3905f

Chapter 2. Hardware Installation

2.1. Electrical Safety Information

- 1 Voltage, frequency, and current requirements must be met according to the manufacturer's label. Using a power source other than those specified may cause improper operation, damage to the equipment, or pose a fire hazard.
- 2 This equipment contains no user-serviceable parts. Service should only be provided by qualified technicians.
- 3 Power cords for this equipment come with an integral safety ground wire that can be connected to grounded safety outlets.
- 4 It is not recommended to replace the power cord with one that is not approved by the manufacturer. Connecting an adapter plug to a 2-wire outlet will defeat the continuity of the grounding wire.
- 5 Modification or misuse of the ground wire can cause serious injury or death; the ground wire is required as part of the safety certification.
- 6 In case of questions regarding the installation, contact a qualified electrician or the manufacturer.
- 7 AC adapters with Listed certification provide protective earthing. Short-circuit backup protection shall be provided in the building installation.
- 8 Local and national wiring regulations and guidelines must be followed when installing protective bonding.

2.2. Environment and Enclosure Guidelines

Before installation, review these environmental and enclosure guidelines:

In accordance with IEC publication 60664-1, this equipment is intended for use in an industrial environment with pollution degree 2, overvoltage Category II applications, and at altitudes up to 9842 feet (3 km). As per IEC/CISPR Publication 11, this equipment is classified as Group 1, Class A industrial equipment. It may be difficult to ensure electromagnetic compatibility in other environments without appropriate precautions due to conducted and radiated disturbances. This equipment is provided as open-type equipment. Enclosures must be designed appropriately to

prevent personal injury resulting from access to live parts and to suit the specific environmental conditions that will be present. In order to prevent or minimize flame spread, the enclosure should have flame-retardant properties that meet a flame-spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The subsequent sections of this publication may contain information on specific enclosure-type ratings that must be met to obtain certain product safety certifications.

2.3. Package Contents

After unpacking the device, validate the contents to ensure you have received all the included components.

- JetNet 3905 series includes a model: industrial Ethernet switch, model may include JetNet 3905, JetNet 3905f
- Documentation – Quick Installation Guide

2.4. Validating Operational Function

Ensure the switch passes POST before installing it in a rack, on a wall, or on a table or shelf.

During the switch POST process, it initiates a series of tests to ensure that it functions correctly. The **P** (Power) LED blinks green, while the other LEDs remain solid green.

A successful POST results in the **P** (Power) LED remaining green. The other LEDs turn off and reflect the switch operating status. A failed POST results in the **P** (Power) LED turning amber.

After a successful POST, unplug the power cord from the switch and install it in a rack, on a table, or on a shelf. POST failures are usually fatal. Contact your technical support representative if you experience a POST failure.

2.5. Installing the Switch

2.5.1. Installation Requirements

The fastest way to install the product is by choosing the DIN rail mount option. Moreover, this option efficiently utilizes the available rail space.

To secure the switch, you can use the metal DIN rail kit provided. It can be attached to the back of the device, allowing for mounting on a standard DIN rail:

- Measuring 30 mm (1.18") in width and 111.8 mm (4.40") in height

You have the flexibility to mount the devices either vertically or horizontally. For more detailed instructions, please consult the following information.

2.5.2. Installing Guidelines

Make sure the following guidelines are met when selecting a location for the switch:

To ensure that the switch front and rear panels are clear, the following conditions must be met:

- The ports are accessible without restriction, allowing unrestricted cabling.
- The front-panel LEDs are easy to read.
- The power cord can reach the switch rear panel connector from the power outlet. The cable length from the switch to the device connected cannot exceed 100 meters (328 feet).
- Electrical noise sources such as radios, power lines, and fluorescent lighting fixtures should be kept away from the cabling. Ensure that the cabling is safe from other devices that might damage it.
- There is no restriction on airflow around the switch and through the vents.
- Do not expose the unit to temperatures above 75°C (167°F). If installed in a closed cabinet, ensure the temperature around the switch is not higher than specified.
- Fan and blowers in cooling mechanisms can draw dust and other particles, resulting in contaminant buildup inside the chassis, resulting in system malfunction. In order to ensure the best performance of this equipment, it must be installed in a dust-free environment
- It is important that the humidity around the switch does not exceed 90%.

2.5.3. DIN Rail Mounting

- 1 Place the rear panel of the switch in front of the DIN rail, ensuring that the top part of the DIN rail clip securely hooks over the top of the rail. This arrangement is depicted in the following illustration.
- 2 Confirm that the DIN rail is positioned behind the spring mechanism. Once the rail is correctly seated within the DIN rail clip, press the front of the switch to rotate it downward and engage the release tab on the DIN rail clip.

If the installation is accurate, the bottom part of the DIN rail should be fully inserted into the release tab.

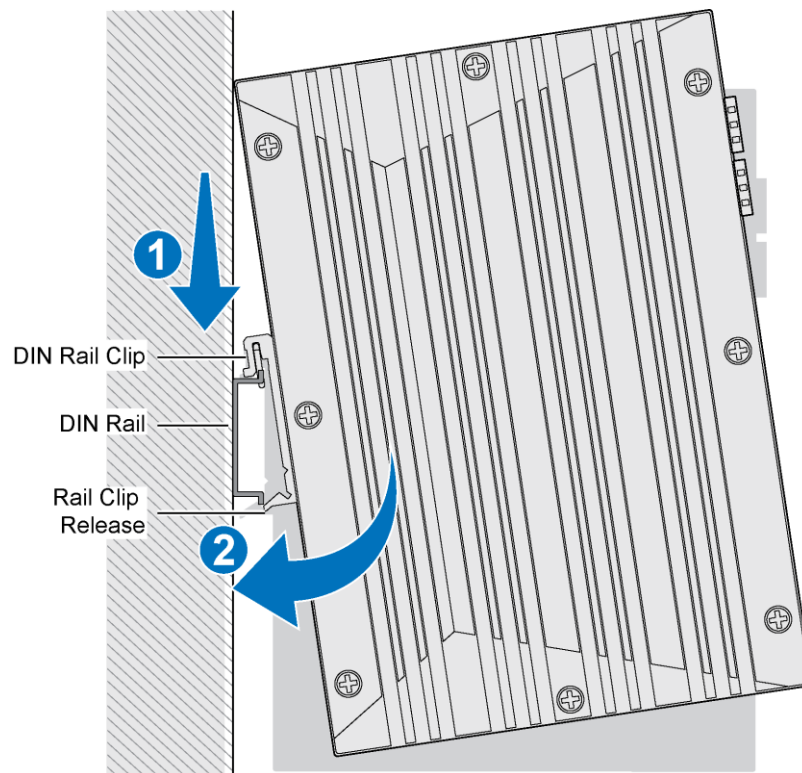


Figure 8: Installing the DIN-Rail Kit

The following is an illustration of a completed DIN installation.

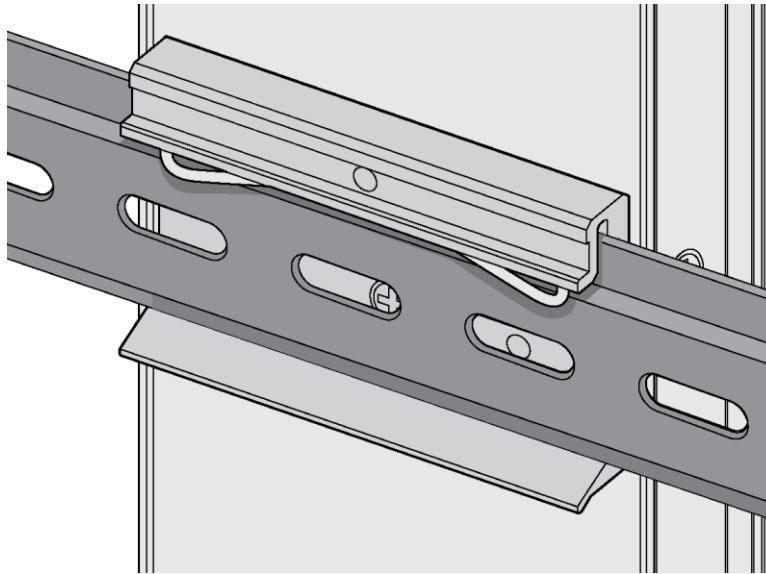


Figure 9: Example of an Installed DIN Rail Kit

- 3 Hold the bottom of the switch and gently tilt it upward. If you encounter resistance, it indicates that the switch has been properly installed. If you do not experience any resistance, it is advisable to restart the installation process from the beginning.

2.5.4. Removing the DIN-Rail Mounting Kit

- 1 Depress the switch downwards to release the lower part of the plate from the DIN rail.
- 2 Rotate the lower section of the device towards yourself and away from the DIN rail.
- 3 When the bottom portion is no longer in contact with the DIN rail, lift the device directly upwards to detach it from the rail.

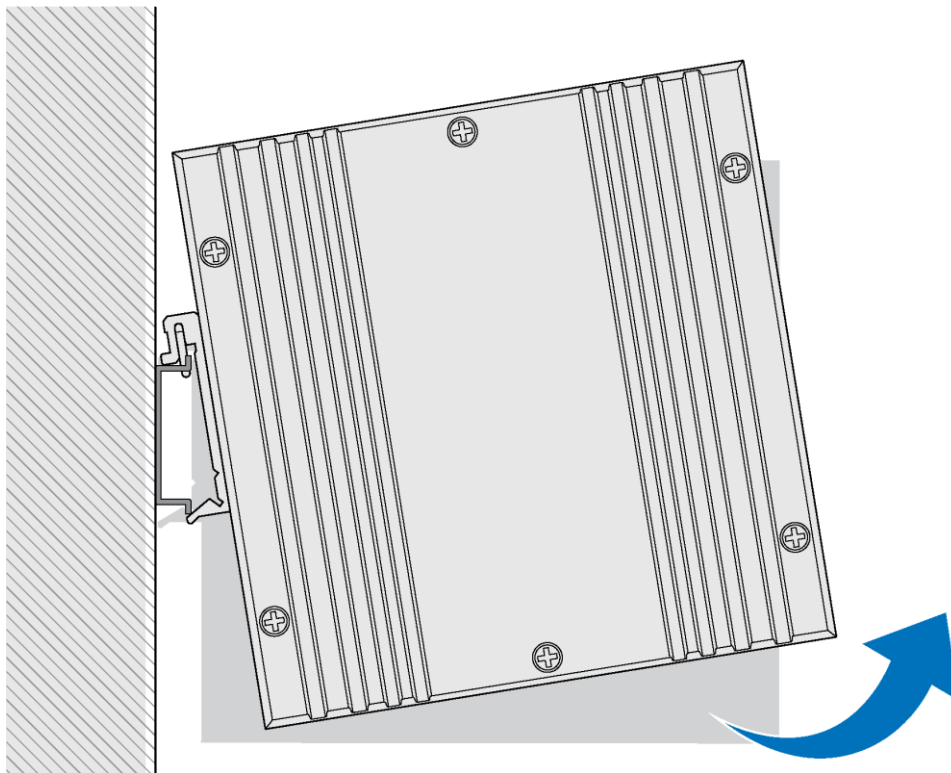


Figure 10: Removing a DIN Rail

2.5.4.1. Ethernet Cable Wiring

You should use data-quality twisted-pair cabling (rated CAT5 or higher) for RJ45 connectors. For optimal performance, shielded cabling should be used. Additional protection may be provided by shielded cabling.

Straight Through Cable Wiring			Cross-over Cable Wiring		
Switch	Direction	Router or PC	Switch	Direction	Switch
Pin 1 RD+	→	Pin 1 TD+	Pin 1 RD+	←	Pin 3 TD+
Pin 2 RD-	→	Pin 2 TD-	Pin 2 RD-	←	Pin 6 TD-
Pin 3 TD+	→	Pin 3 RD+	Pin 3 TD+	→	Pin 1 RD+
Pin 6 TD-	→	Pin 6 RD-	Pin 6 TD-	→	Pin 2 RD-

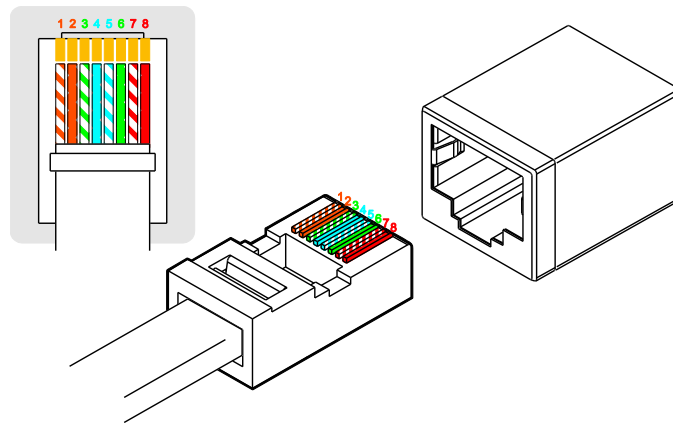


Figure 11: Mounting a Switch in a Rack

Note!! Ethernet cables use pins 1, 2, 3, and 6 of an 8-pin RJ-45 connector. The signals of these pins are converted by the automatic MDI-X function, as shown in the table below:

Ethernet Cable Pin Definition		
Pin MDI-X	Signals	MDI Signals
1	RD+	TD+
2	RD-	TD-
3	TD+	RD+
6	TD-	RD-

Connect one side of an Ethernet cable into any switch port and connect the other side to your attached device. The LNK LED will light up when the cable is correctly connected.

Refer to the LED Indicators section for descriptions of each LED indicator. Always make sure that the cables between the switches and attached devices (e.g. switch, hub, or workstation) are less than 100 meters (328 feet).

The wiring cable types are listed as follows:

- 10Base-T: 2-pair UTP/STP Cat. 3, 4, 5 cable, EIA/TIA-568 100-ohm (100m)
- 100Base-TX: 2-pair UTP/STP Cat. 5 cable, EIA/TIA-568 100-ohm (100m)
- 1000Base-TX: 4-pair UTP/STP Cat. 5 cable, EIA/TIA-568 100-ohm (100m)
- IEEE 802.3af: 4-pair UTP/STP Cat. 5 cable, EIA/TIA-568 100-ohm (100m)
- IEEE 802.3at: 4-pair UTP/STP Cat. 5e / 6 cable, EIA/TIA-568 100-ohm (100m)



2.5.4.2.Data and Power Ports

There are 24 Ethernet ports (ports 1-24) on the JetNet series that are compatible with IEEE802.3af (PoE) and IEEE802.3at (PoE Plus). As well as 10/100BaseTX ports, PoE ports are also equipped with 48 VDC at 350mA (max 15.4W/port) and 53 VDC at 606mA (max 30W/port), automatic sensing and automatic power off when cables are removed. An assignment of RJ45 PoE pinout can be found in the following table.

10/100BaseTx PoE Pin-out	
Pin	Description
1	RX + and V port -
2	RX - and V port -
3	TX + and V port +
6	TX - and V port +
4, 5, 7, 8	Not applicable

2.5.5. Connecting Power Inputs

2.5.5.1. Overview

<p>WARNING</p> 	<p>Before servicing or wiring the switch, power it down and disconnect the power cord.</p>
<p>WARNING</p> 	<p>Ensure that the power has been turned off before disconnecting modules or cabling. Only the voltage specified on the type plate can be used with the device. Ensure that you are only using components that are specifically intended for the switch device when powering it.</p>

To power a switch, it is necessary to apply a DC voltage within the range of 12 to 48 VDC between the V1+ terminal and the V1- terminal (PW1), as shown in the provided illustrations. It is important to note that a Class 2 power supply is required to maintain a UL62368 panel listing. Furthermore, the chassis ground screw terminal should be connected to the panel or chassis ground.

To minimize network downtime caused by power loss, a redundant power configuration is supported by incorporating a secondary power supply unit. This enables the use of dual power inputs.

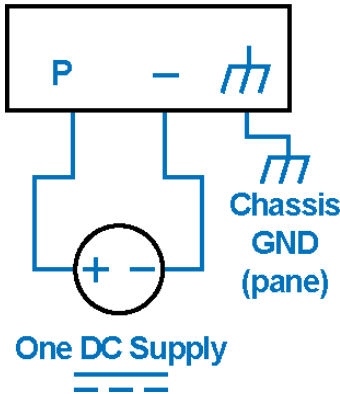


Figure 12: Power Wiring Diagram

2.5.5.2.Considerations



Before wiring the device, consider the following guidelines:



- For better management and servicing, label all wiring and cabling to the various devices.
- Earthing conductors must have at least a 3.31 mm² cross section.
- Terminal Blocks (DC1) are suitable for AWGs from 12 to 22.
- Route power and device wiring separately according to best practices.
- Calculate the maximum current that can flow through each power and common wire. Ensure that the power draw is within the limits set by your local electrical code.
- Electrically similar wiring should not be bundled together.
- Ensure that inputs and outputs are wired separately.

IMPORTANT	It is possible for signal interference to occur when power and communication wiring are routed through the same conduit. Ensure that power and communications wires are routed through separate conduits in order to avoid interference and degradation of signal quality.
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2.5.5.3.Grounding the Device

Follow the grounding procedure instructions and observe these warnings to ensure your equipment is adequately connected to earth ground:

WARNING 	Make sure the device is properly grounded before connecting it. An improper grounding setup may pose a safety risk and could be hazardous.
WARNING 	The ground connection must always be made first and disconnected last when installing or replacing the unit.

WARNING 	Equipment or cables should not be serviced during periods of lightning activity.
CAUTION 	Use a UL-listed ground-lug screw and a UL-listed lug that is suitable for wire with number-6 AWG, which will secure the equipment to earth ground.

Follow these steps to install a single-ground lug on the switch.

- 1 Make sure you locate the ground adaptor and lug that come with the switch.
- 2 If the ground wire is insulated, strip it to 0.5 inch (12.7 mm) \pm 0.02 inch (0.5 mm).
- 3 Remove the ground screw from the rear panel of the switch.
- 4 Install the lug and the wire assembly over the grounding hole and secure with the ground-lug screw (60 in-lb).
- 5 Connecting the other end of the grounding wire to a grounding point.

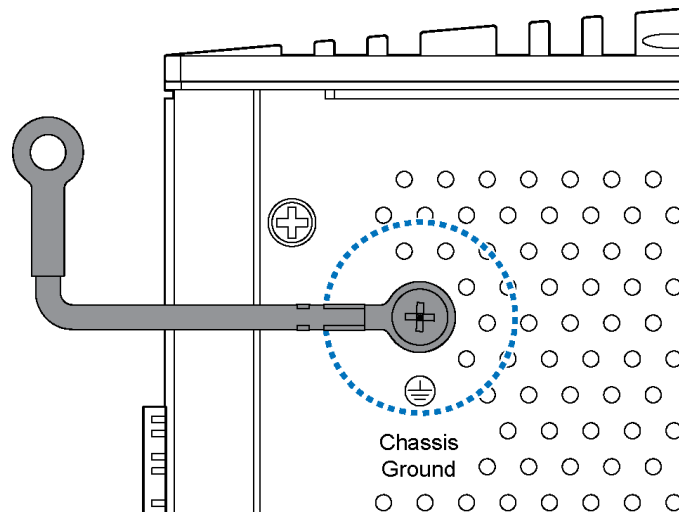


Figure 13: Installing a Ground Lug and Wire

2.5.6. Wiring a Relay

The two contacts on the side and the front two contacts on the 4-contact terminal block connector are for the AC/DC inputs. As illustrated in the following figure, the side and front view of a terminal block are displayed.

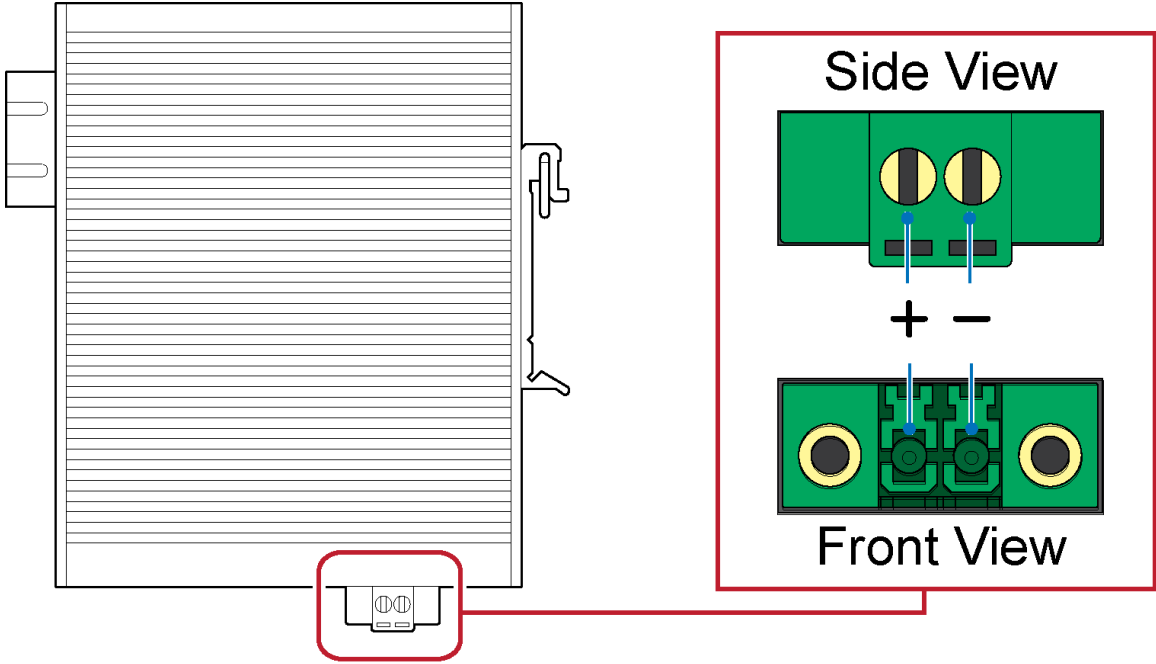




Figure 14: Terminal Block Side and Front Views

2.5.6.1. Wiring Power Inputs

Power cables for DC power systems include 48V power cables and a RTN ground cable. Based on actual site requirements, ensure that the DC power cables are of a suitable length.

<p>WARNING</p> 	<p>Prior to disconnecting any modules or cables, ensure that the power is switched off. It is important to note that the device only supports the voltage specified on the type plate. Avoid using any power components that are not explicitly designated for the switch device.</p>
<p>WARNING</p> 	<p>To service or wire the switch, it is essential to power down the device and disconnect the power cord.</p>

To wire the power inputs:

Ensure that the power is disconnected from both the switch and the power converter before proceeding. Follow these steps:

- 1 Use a flat-bladed screwdriver and insert it into the wire-clamp screws to loosen the screws.
- 2 Next, insert the negative (-) and positive (+) DC wires into the V-/V+ terminals.
- 3 Secure the DC wires in place by tightening the wire-clamp screws on the side of the terminal block connector.

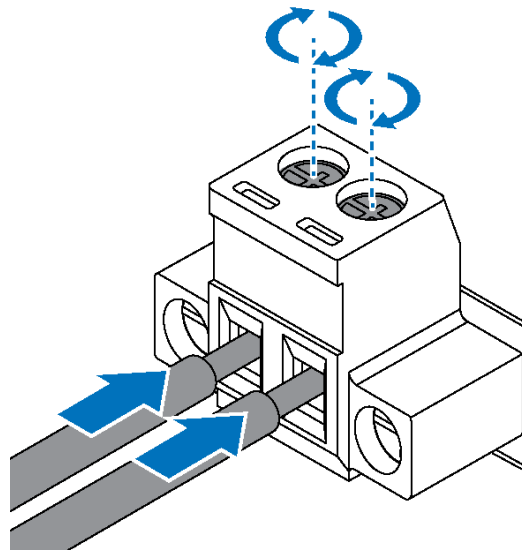




Figure 15: Installing Power Cabling in a Terminal Block

- 4 Ensure the terminal block is secure by pressing it firmly in the receptor. If necessary, tighten the screws on the terminal block. If there is no visible gap between the terminal block and the receptor, it indicates that the terminal block is correctly seated.

2.5.6.2. Disconnecting Power Inputs

<p>WARNING</p> 	<p>Prior to disconnecting any modules or cables, ensure that the power is switched off. It is important to note that the device only supports the voltage specified on the type plate. Do not use any power components not explicitly designated for the switch device.</p>
<p>WARNING</p> 	<p>To service or wire the switch, it is essential to power down the device and disconnect it from the power source.</p>

To disconnect the power inputs:

Ensure that the power is disconnected from both the switch and the power converter before proceeding. Follow these steps:

- 1 Use a flat-bladed screwdriver and insert it into the wire-clamp screws to loosen the screws.
- 2 Slide the negative (-) and positive (+) DC wires from the V-/V+ terminals. If there is resistance when pulling the DC wires out, loosen the terminal screws further until the DC wires slide out without resistance.

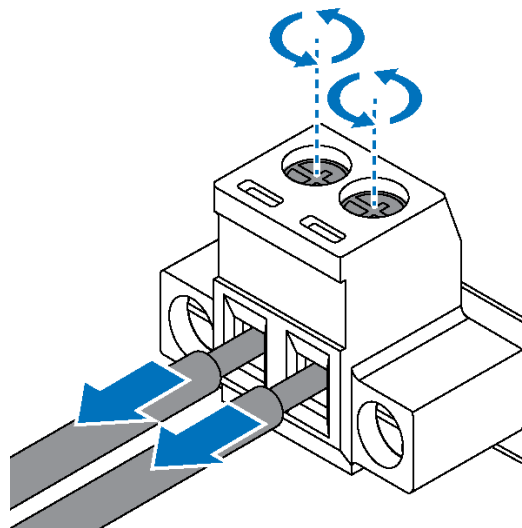


Figure 16: Installing Power Cabling in a Terminal Block

- 3 Ensure the terminal block is secure by pressing it firmly in the receptor. If necessary, tighten the screws on the terminal block.

2.5.6.3. Power Supply Specifications

Table 1 Power Supply Specifications - JetNet 3905 Series

Model	Input Range	Power Consumption
JetNet 3905	10-60 VDC	2W
JetNet 3905f		