



SANDCAT-2000 series

Industrial Ethernet 5-port Unmanaged Switches

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1 Safety Instruction

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 the device.
- Products should be used in environments with a pollution index of less than 2.
- (Laser) LASER-Related Hazards and Warnings Class 1 Laser Product.

CLASS 1 LASER PRODUCT

IEC 60825-1:2014

Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

This equipment is intended to be installed in a certified optical transceiver module, Laser class 1. When using a fiber optic port, never look at the transmit laser while it is powered on. Also, never look directly at the fiber port and fiber cable end when they are powered on. If you need further assistance, please contact Westermo.

- ✓ **A Warning symbol indicates a hazardous situation which, if not avoided, could result in damage to the device, serious injury or death. Read the following Instructions:**




WARNING




- 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.
- To avoid an electric shock or malfunction, do not touch any terminal blocks or IO modules while the system is running.
- Keep away from strange metallic materials not related to the unit. Wiring works should be controlled by an electric expert engineer or else it may cause a fire, electric shock or malfunction of the unit.
- Modules should not be placed near inflammable materials. A fire may result if it is not handled properly.

1.1 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>

1.2 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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1.3 Certification

Note! For specific information relating to certification of this module type, see the separate certification document summary. The following certification information applies to SandCat-2000 series models:

- CE compliance
- FCC part 15b compliance
- UL 62368-1

2 Switch Overview

2.1 Introduction

2.1.1 Overview

The SandCat-2000 series is designed with robustness and a long service life in mind. It has an excellent set of industry approvals and certifications, ensuring its reliability and performance. The devices operate in a wide temperature range from -40 to +75 °C (-40 to +167 °F), making them suitable for harsh industrial environments.

The devices feature a single 10 - 60 VDC wide power input and a slim industrial design with an IP30 all-metal housing, offering durability and compactness. They come with software features to ensure full connectivity and includes broadcast storm protection to prevent degrading network performance.

SandCat-2000 supports Quality-of-Service to prioritize network traffic, and Flow Control to ensure efficient and reliable data transmission. It is easy to install and use, offering plug-and-play functionality. The unmanaged switches are transparent to all industry Ethernet protocols, ensuring compatibility with various devices and networks.


Additionally, the unmanaged switches include diagnostic LEDs, providing visual indicators of the system's status and performance. These mission-critical unmanaged switches are a comprehensive solution for maintaining robust and reliable network connectivity in critical Fast Ethernet applications.

2.1.2 Main Features

The SandCat-2000 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 x RJ-45 ports for 10/100Base-TX Ethernet Ports (SandCat-2305-T5-LV)



SandCat-2000 Series User Guide

- 4 x RJ-45 ports for 10/100Base-TX Ethernet Ports and 1 x 100Base-FX (SandCat-2305-F1 series)
 - Industrial Slim Size Design
 - Broadcast storm protection
 - Support 802.1p QoS (CoS, DSCP)
 - Supports AC 1.5KV Hi-port isolation protection¹
- 

¹ Only valid for Ethernet

2.1.3 Switch Models

The SandCat-2000 series is available in the following models:

Switch Model	Description	Image
SandCat-2305-T5-LV	Industrial 5 x RJ45 10/100Base-TX Ethernet ports	
SandCat-2305-F1-MM-T4-LV SandCat-2305-F1-SM-T4-LV	Industrial 4 x RJ45 10/100Base-TX Ethernet ports and 1 x 100Base-FX	

2.2 Technical Specifications

Specifications		Description
Interface	Enclosure Port	<p>SandCat-2305-T5-LV</p> <ul style="list-style-type: none"> • 5-port 10/100BaseT(X) RJ-45 Ethernet Port • Non-blocking Switching Performance • Auto negotiation speed, Full/Half duplex mode and auto MDI/MDI-X connection <p>SandCat-2305-F1-MM-T4-LV, SandCat-2305-F1-SM-T4-LV</p> <ul style="list-style-type: none"> • 4-port 10/100T(X) RJ-45 Ethernet Port • Non-blocking Switching Performance • Auto negotiation speed, Full/Half duplex mode and auto MDI/MDI-X connection
	Fiber Port	<p>SandCat-2305-F1-MM-T4-LV, SandCat-2305-F1-SM-T4-LV</p> <p>1-port 100Base F(X)</p>
	Ethernet Cable	<p>100Base-TX: 4-pair Cat.5e / Cat.6 UTP/STP cable, 100Meters</p>
	LEDs	<p>SandCat-2305</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>SandCat-2305-F1-MM-T4-LV, SandCat-2305-F1-SM-T4-LV</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, 0.21A-0.04A (The recommended working voltage is 24VDC)
	Power Consumption	Max 5W
	Connection	1 x removable 2-contact terminal block
Technology	IEEE Standards	<ul style="list-style-type: none"> • IEEE 802.3 10Base-T • IEEE 802.3u 100Base-TX/100Base-FX • IEEE 802.3x Flow Control • IEEE 802.1p QoS
Performance	Switch Technology	Store and Forward technology
	MAC Address	1K MAC address table

Specifications		Description
	Packet Buffer	448 Kbits packet buffer
	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 0.93 kg / 32.63 oz Without package 0.35 kg / 12.34 oz
Environmental	Operating Temperature	-40 ~ 75°C / -40°F ~ 167°F
	Operating Humidity	0% ~ 95%, non-condensing
	Storage Temperature	-40 ~ 85°C / -40°F ~ 185°F
Regulatory	EMC	IEC / EN 61000-6-2, IEC / EN 61000-6-4, EN 55032/55035 EMI: FCC Class B, CE/Class B
	Vibration	Compliance with IEC 60068-2-6
	Safety	EN / IEC / UL 62368-1
	Warranty	5 years

2.3 Front Panel

Described in this section are the front panel components of the SandCat-2305 switch.

2.3.1 SandCat-2305-T5-LV

The LEDs and ports for the SandCat-2305 model are located on the front panel of the switch as illustrated in the following illustrations.

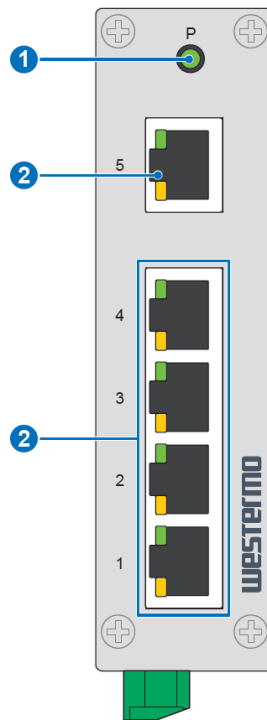


Figure 1: Front Panel of SandCat-2305

No.	Item	Description
1.	System LEDs	See Front Panel LEDs on page 15 for further details
2.	ETH ports	RJ-45 Ethernet ports, 10 Mbps and 100 Mbps on Cat 5e cables

2.3.2 SandCat-2305-F1-MM-T4-LV, SandCat-2305-F1-SM-T4-LV

The LEDs and ports for the SandCat-2305-F1 are located on the front panel of the switch as illustrated in the following illustrations.

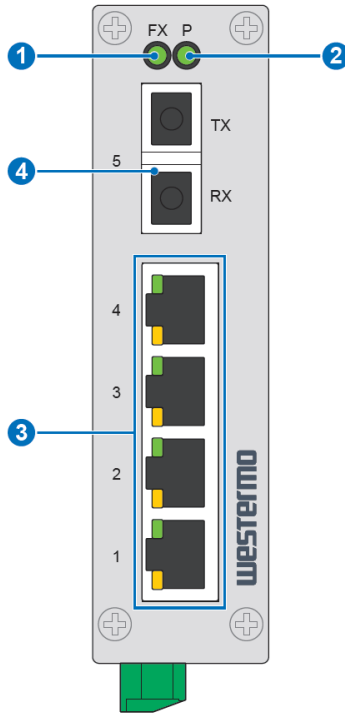


Figure 2: Front Panel of SandCat-2305-F1

No.	Item	Description
1.	Fiber LED	See Front Panel LEDs on page 15 for further details
2.	System LED	
3.	RJ-45 console ports	Console/Terminal Port (RJ-45) for device management/debug
4.	Fiber port	100BASE SC Type Fiber SandCat-2305-F1-SM-T4-LV: Single-mode 30km SandCat-2305-F1-MM-T4-LV: Multi-mode 2 km

2.3.3 Front Panel LEDs

The system LEDs are used to monitor the switch activity and performance. The following illustration depicts the front panel on the SandCat-2000 series. A specific LED panel is dependent on a specific SandCat model.

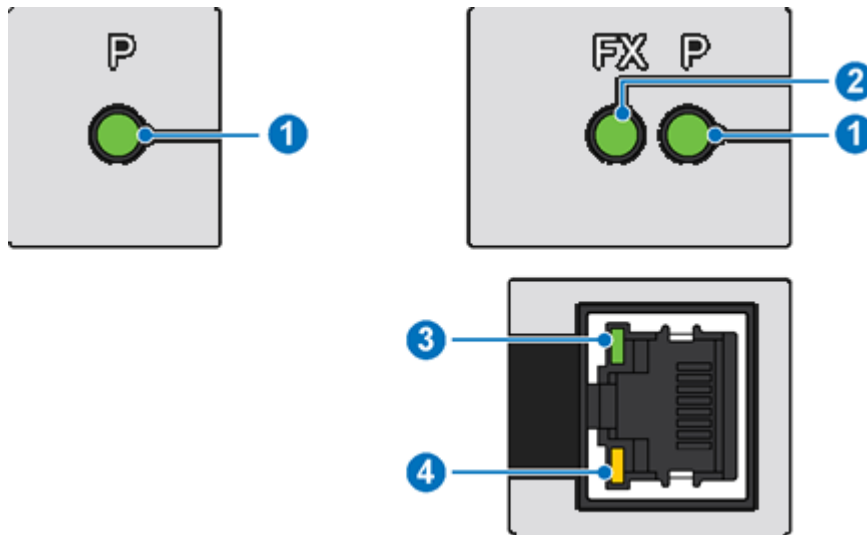


Figure 3: Front Panel LEDs for SandCat-2000 series

No.	LED	Description
1.	Power	Solid green: Device is powered on Off: Device is powered off
2.	FX	SandCat-2305-F1-MM-T4-LV, SandCat-2305-F1-SM-T4-LV Solid green: Fiber connector is connected Flashing green: Fiber interface is transmitting / receiving Off: Link is inactive
3.	100 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

2.4 Rear View

The following rear view illustrates the rear view of a SandCat-2000 series device. For demonstration purposes a single sample is illustrated. Varying models may differ in shape and form.

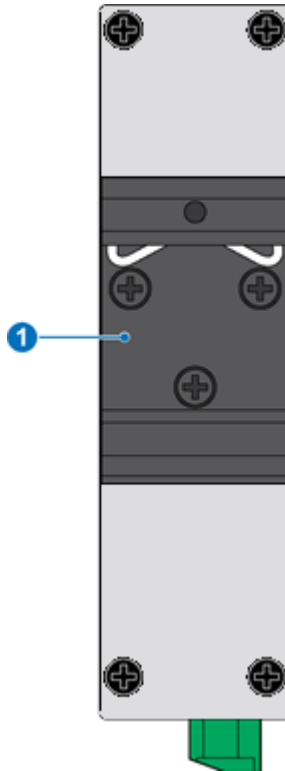


Figure 4: Rear Panel of SandCat-2000 series

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

2.5 Bottom View

The following bottom view illustrates the bottom view of a SandCat-2000 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.

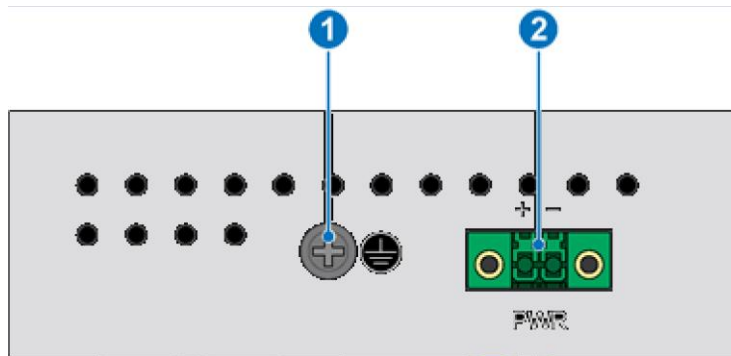


Figure 5: Bottom View of SandCat-2000 series

	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

2.6 Dimensions

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

2.6.1 SandCat-2305-T5-LV

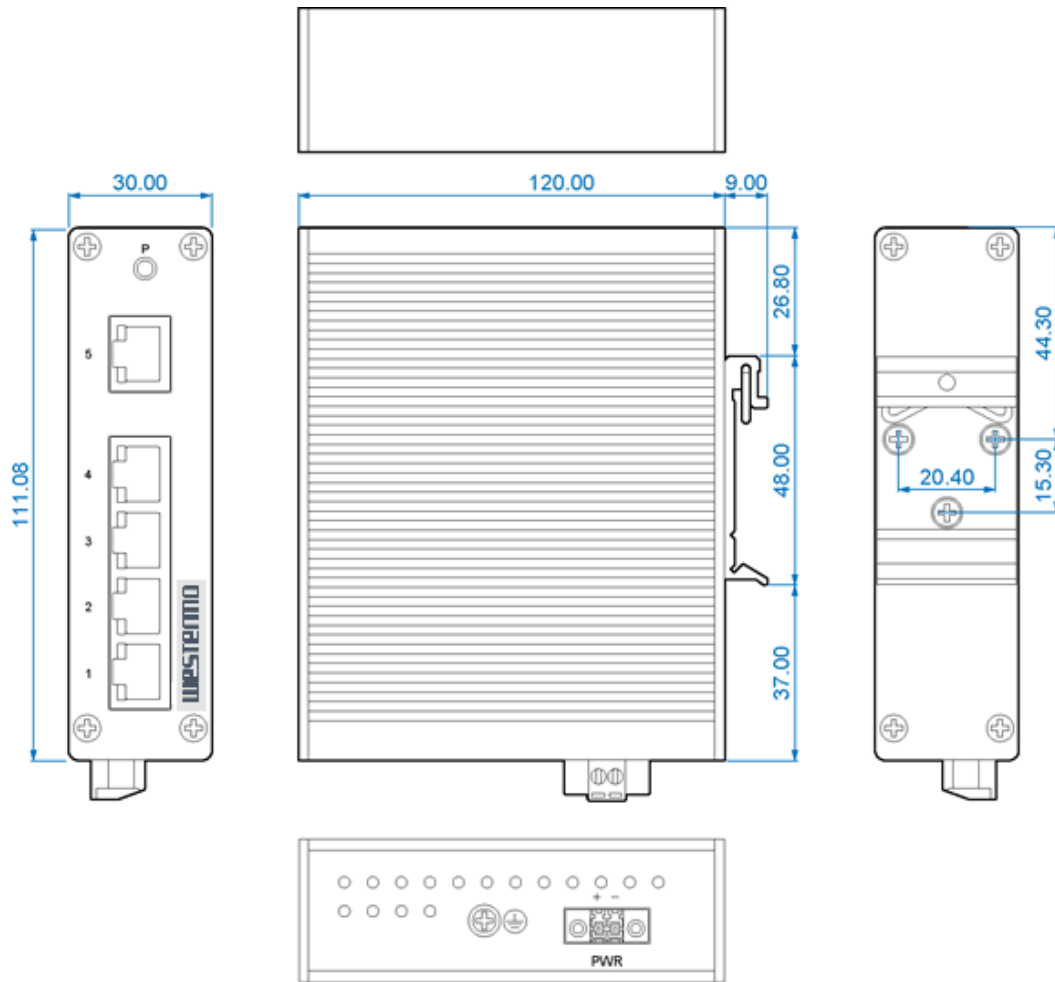


Figure 6: Dimensions of 5-Port SandCat-2305

2.6.2 SandCat-2305-F1-SM/MM-T4-LV

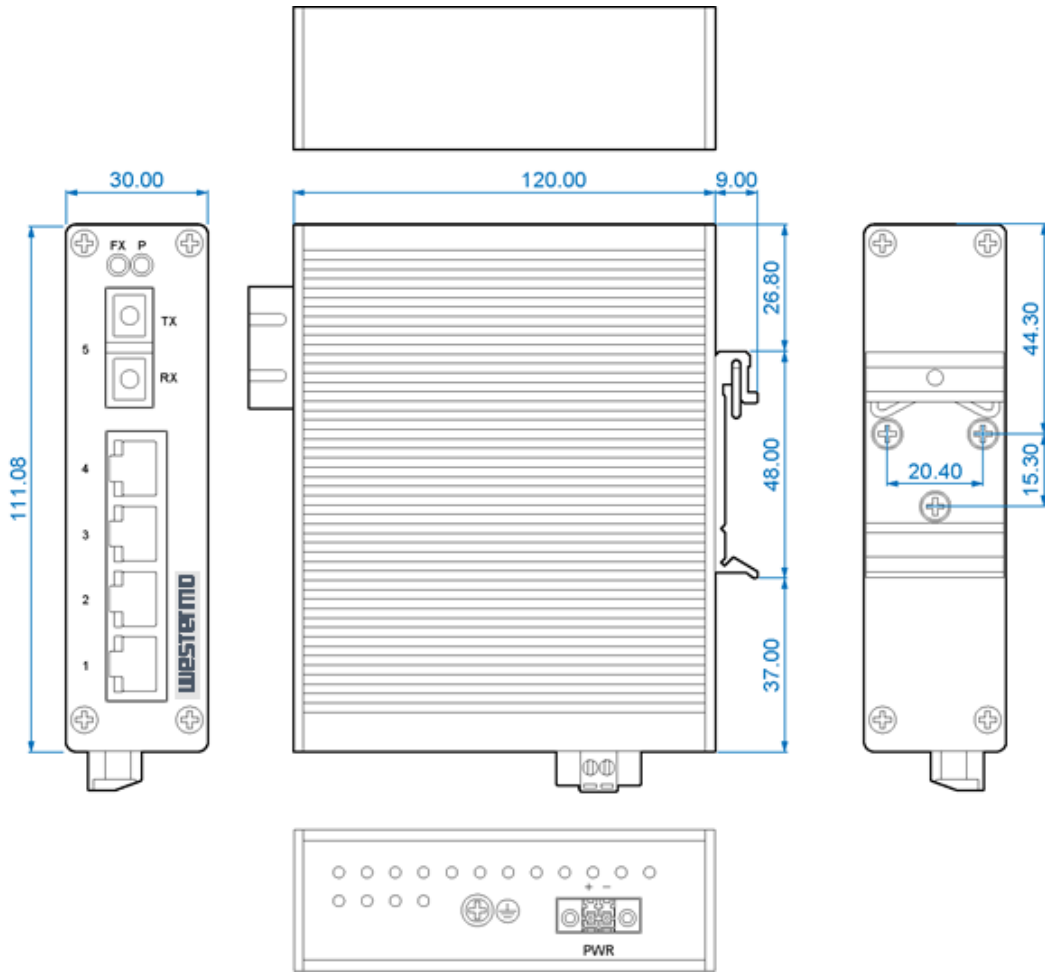



Figure 7: Dimensions of 5-Port SandCat-2305-F1

3 Hardware Installation

3.1 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 power rating 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 should come with an integrated 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.

3.2 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 6561 feet (2000m). 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. The subsequent sections of this publication may contain information on specific enclosure-type ratings that must be met to obtain certain product safety certifications.

3.3 Package Contents

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

- SandCat-2000 series model: industrial Ethernet switch, model may include SandCat-2305, SandCat-2305-F1
- Documentation – Quick Installation Guide

3.4 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.

3.5 Installing the Switch

3.5.1 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.

3.5.2 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:

- **IMPORTANT:** Ground screw must be connected to ground before power or ethernet cords are connected to the unit
- 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 ethernet cable transmit distance 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.

3.5.3 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.

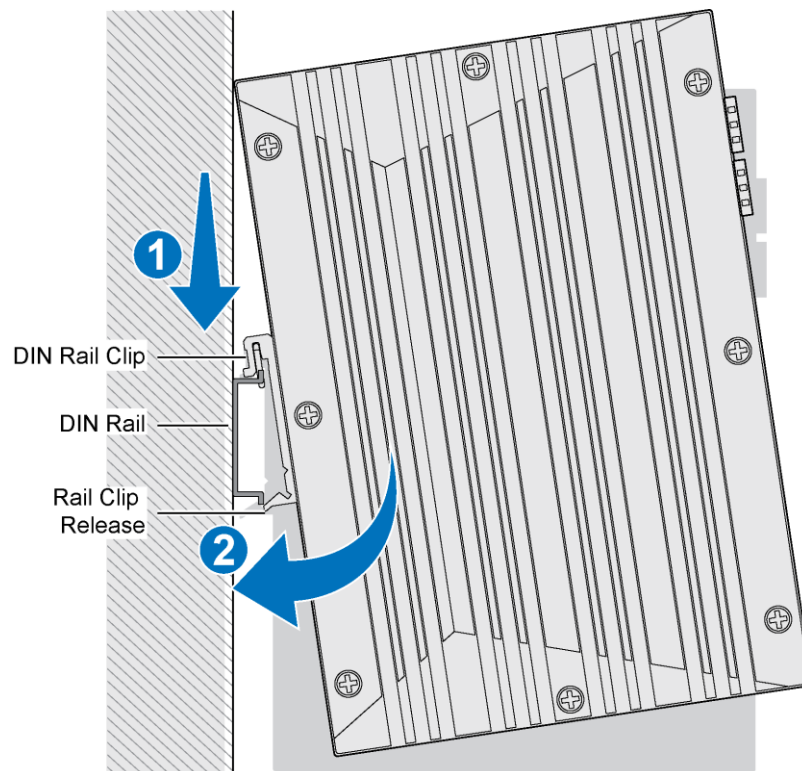


Figure 8: Installing the DIN-Rail Kit

The following is an illustration of a completed DIN installation.

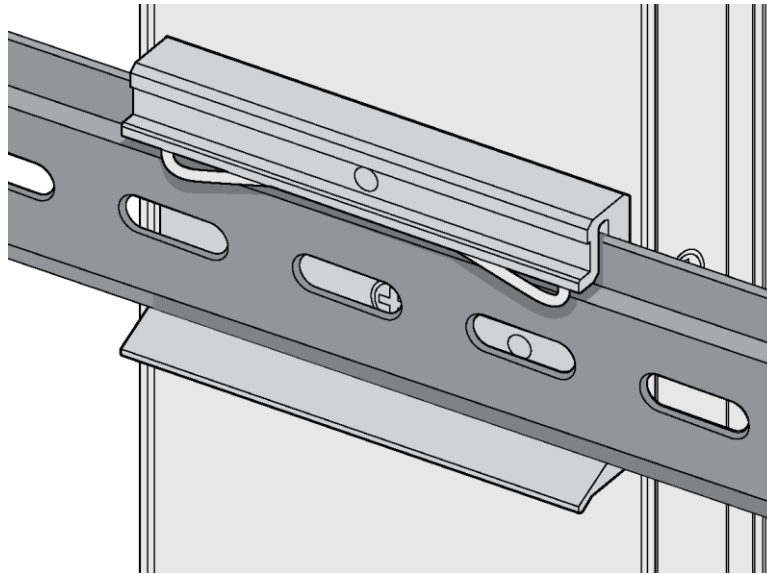


Figure 9: Example of an Installed DIN Rail Kit

- 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.

3.5.4 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.

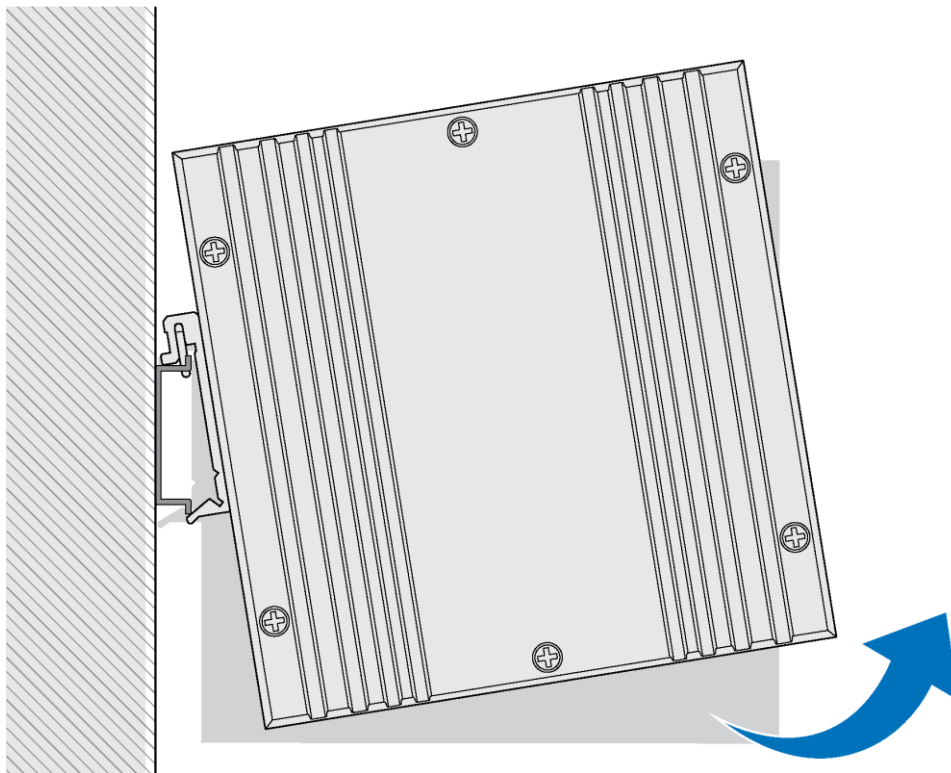


Figure 10: Removing a DIN Rail

3.5.4.1 Ethernet Cable Wiring

You should use data-quality twisted-pair cabling (rated CAT5 or higher) for RJ-45 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-

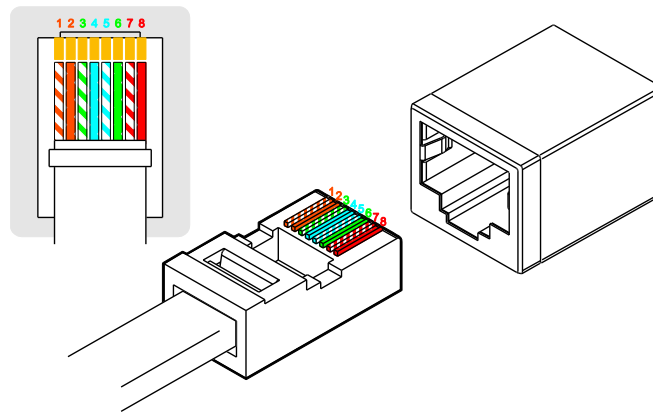


Figure 11: Mounting a Switch in a Rack

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)

3.5.5 Connecting Power Inputs

3.5.5.1 Overview

WARNING	Before servicing or wiring the switch, power it down and disconnect the power cord. Connect ground screw before energizing or putting ethernet cables into the unit. During the installation, the ground screw shall be disconnected last.
----------------	--



WARNING	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.
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To power a switch, it is necessary to apply a DC voltage within the range of 10 to 60 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.

This product is intended to be supplied by DC power source with minimum rated 10-60 VDC, Tma = 75 °C and the altitude of operation = 2000 m.

The product is intended to be supplied by an approved (UL Listed) DC power source which is separated from AC mains by double or reinforced insulation when unit with DC power.

If need further assistance, please contact Westermo for further information. Furthermore, the chassis ground screw terminal should be connected to the chassis ground or earth in the field site. Insert the Earth Ground Screw with the green-yellow wire (wire size: 16 AWG minimum), and tighten the screw. Connection of the other end to the building protective earth

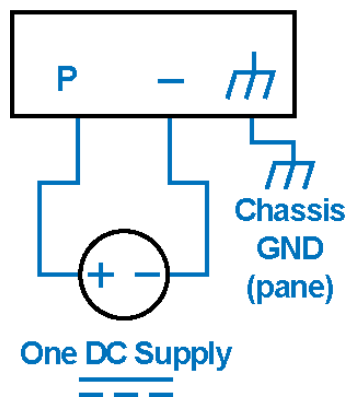


Figure 12: Power Wiring Diagram

3.5.5.2 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 1.5 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.

3.5.5.3 Grounding the Device

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

<p>WARNING</p> 	<p>The ground connection must always be made first and disconnected last when installing or replacing the unit. Make sure the device is properly grounded before connecting power or Ethernet cables to it. An improper grounding setup may cause a safety risk and could be hazardous.</p>
<p>WARNING</p> 	<p>Equipment or cables should not be serviced during periods of lightning activity.</p>
<p>CAUTION</p> 	<p>Use a UL-listed ground-lug screw and a UL-listed lug that is suitable for wire with number 16 AWG minimum, which will secure the equipment to earth ground.</p>

3.5.6 Wiring a Relay

The two contacts on the side and the front two contacts on the 2-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.

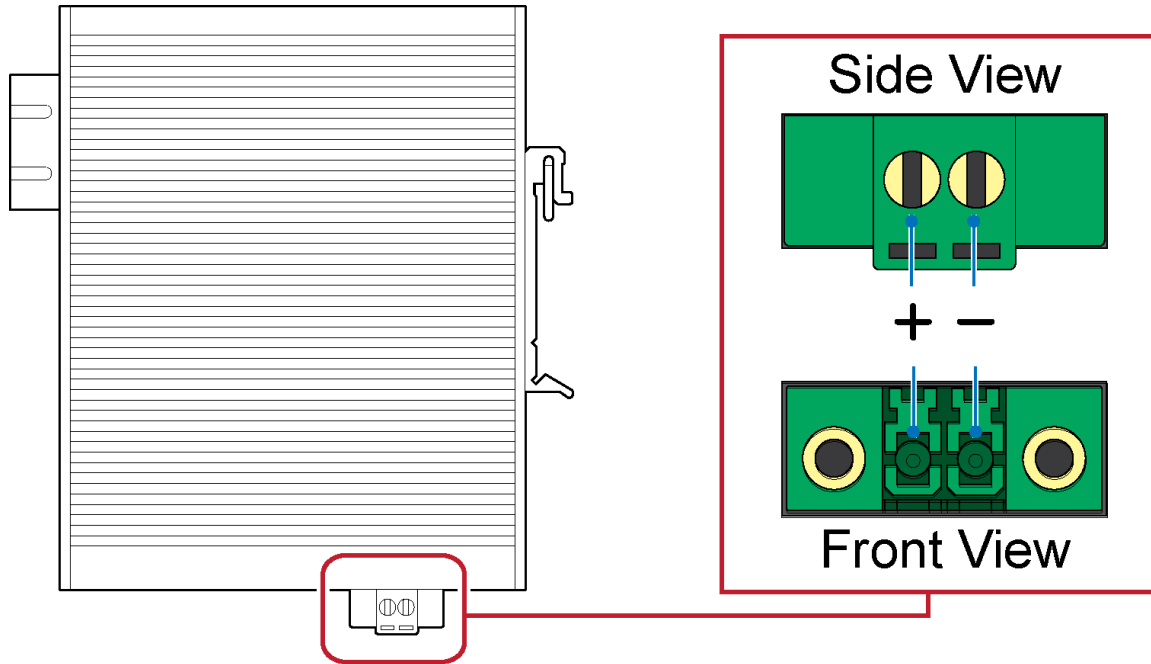


Figure 13: Terminal Block Side and Front Views

3.5.6.1 Wiring Power Inputs

Power cables for DC power systems include 10~60 VDC power cables and a RTN ground cable. Based on actual size requirements, ensure that the DC power cables are of a suitable length.

WARNING



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.

WARNING



To service or wire the switch, it is essential to power down the device and disconnect the power cord.

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. Loosen the screws on the input terminal block connector.
- 2 Insert the input wire (10 - 60 VDC, Wire Size: 28 - 14 AWG min., Wire type: Copper wire) into the input terminal block connector, and then tighten the screw to 0.19 N m (1.7 lbin) of torque.
- 3 Install the input terminal block connector into the equipment.

CAUTION: The installation and maintenance of input terminal block connector must be carried out by qualified personnel.

- 1 Next, insert the negative (-) and positive (+) DC wires into the V-/V+ terminals.
- 2 Secure the DC wires in place by tightening the wire-clamp screws on the side of the terminal block connector.

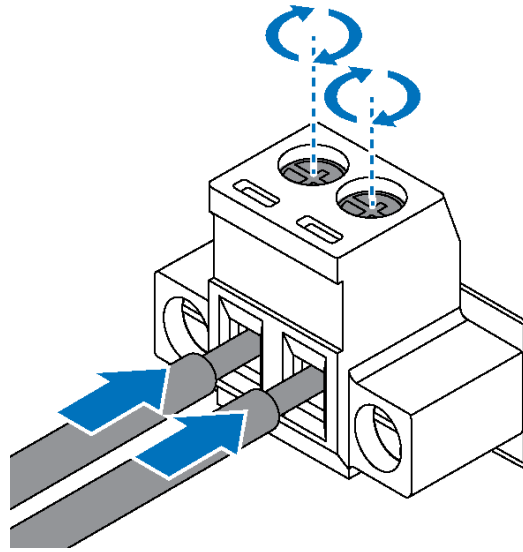




Figure 14: Installing Power Cabling in a Terminal Block

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

3.5.6.2 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 label. 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.

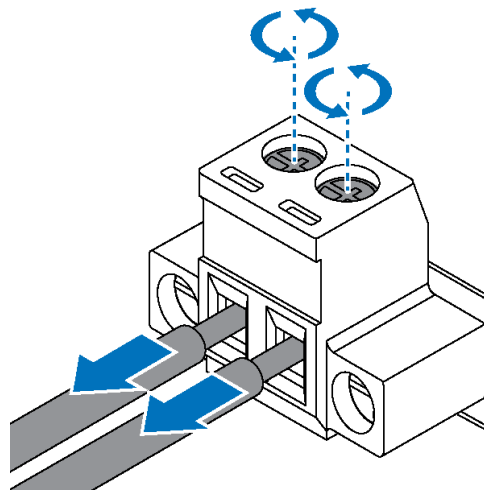


Figure 15: Installing Power Cabling in a Terminal Block

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

DOCUMENT CHANGE SUMMARY				

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