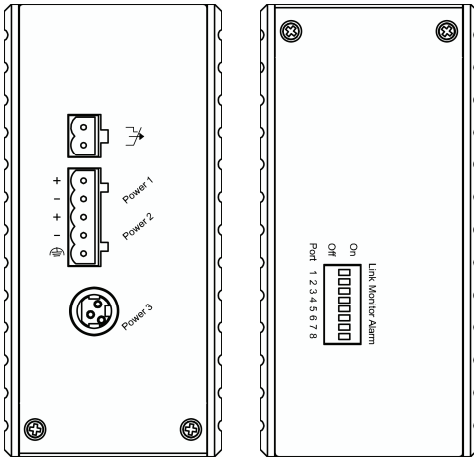


## Quick Start Guide

This quick start guide describes how to install and use the Hardened Ethernet Switch. This is the switch of choice for harsh environments constrained by space.

## Physical Description

### The Terminal Block and Power inputs



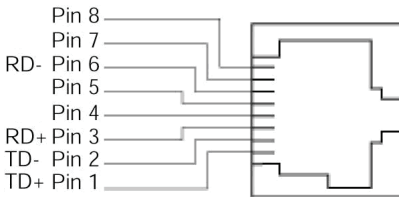
Power Input Assignment		
Power3		12VDC
Power2	+	12-48VDC
	-	Power Ground
Power1	+	12-48VDC
	-	Power Ground
		Earth Ground
Terminal Block		
DC Jack		
Relay Alarm Assignment		
	FAULT	*Relay warning signal disable for following: <ul style="list-style-type: none"> <li>The relay contact closes if Power1 and Power2 are both failed but Power3 on.</li> <li>The relay contact closes if Power3 is failed but Power1 and Power2 are both on.</li> </ul>

DC Terminal Block Power Inputs: There are two pairs of power inputs can be used to power up this switch. Redundant power supplies function is supported.

## **The 10/100Base-TX and 100Base-FX/BX Connectors**

### **1. The 10/100Base-TX Connections**

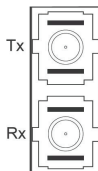
The following lists the pinouts of 10/100Base-TX ports.



<b>Pin</b>	<b>Regular Ports</b>	<b>Uplink port</b>
1	Output Transmit Data +	Input Receive Data +
2	Output Transmit Data -	Input Receive Data -
3	Input Receive Data +	Output Transmit Data +
4	NC	NC
5	NC	NC
6	Input Receive Data -	Output Transmit Data -
7	NC	NC
8	NC	NC

### **2. The 100Base-FX Connections**

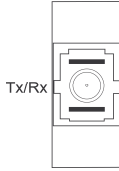
The fiber port pinouts: The Tx (transmit) port of device I is connected to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II.



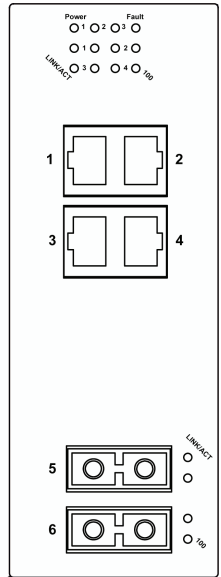
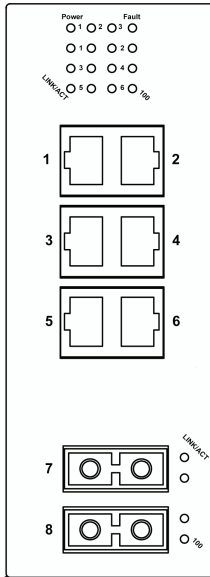
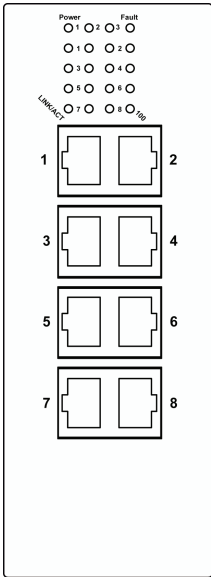
### **3. The WDM 100Base-BX Connections**

The fiber port pinouts: Only one single-mode optical fiber is

required to transmit and receive data.



## The Port Status LEDs



## **Hardened Ethernet Switch**

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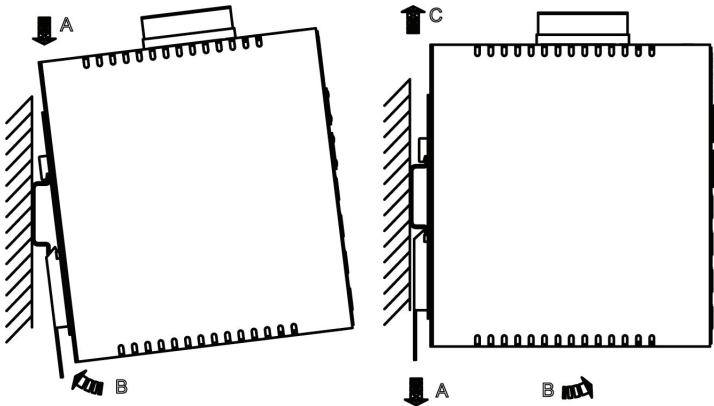
<b>LED</b>	<b>State</b>	<b>Indication</b>
<b>Power</b>		
<b>Power 1 Power 2 Power 3</b>	Steady	Switch is properly connected to power and turned on.
	Off	Switch is not connected to power and is turned off.
<b>Fault</b>		
<b>Fault</b>	Steady	<ul style="list-style-type: none"><li>• Power redundant system failure occurred.</li><li>• Port failure occurred (when link monitor alarm dip switch is enabled).</li></ul>
	Off	<ul style="list-style-type: none"><li>• Power redundant system failure is not occurred.</li><li>• Port failure is not occurred (when link monitor alarm dip switch is enabled).</li><li>• Link monitor alarm dip switch is disabled.</li></ul>
<b>10/100Base-TX, 100Base-FX/BX</b>		
<b>LINK/ACT</b>	Steady	A valid network connection established.
	Flashing	Transmitting or receiving data. ACT stands for ACTIVITY.
<b>100</b>	Steady	Light solidly for a port transferring at 100Mbps.
	Off	The port is transferring at 10Mbps If this LED is dark.

## **Functional Description**

- Complies with IEC61850-3 and IEEE1613 environmental requirements for power substation automation systems.
- Complies with EN50121-4 environmental requirements for railway applications.
- Meets NEMA TS1 & TS2 environmental requirements for traffic control equipments.
- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, Full/Half-duplex, Auto-Negotiation, Auto MDI/MDIX.
- 100Base-FX: Multi/Single mode SC or ST type, 100Base-BX: WDM Single mode SC type.
- Supports 2048 MAC addresses. Provides 448K bits buffer memory.
- DIP switch configuration for link monitor alarm.
- Alarms for power and port link failure by relay output 1A @ 24VDC.
- Power Supplies: Redundant 12-48VDC Terminal Block power inputs and 12VDC DC JACK with 100-240VAC external power supply.
- Operating voltage and Max. current consumption: 0.5A @ 12VDC, 0.25A @ 24VDC, 0.125A @ 48VDC. Power consumption: 6W Max.
- -40°C to 75°C (-40°F to 167°F) operating temperature range. Tested for functional operation @ -40°C to 85°C (-40°F to 185°F).
- Supports DIN-Rail or Panel Mounting installation.

## Assembly, Startup, and Dismantling

- Assembly: Place the switch on the DIN rail from above using the slot. Push the front of the switch toward the mounting surface until it audibly snaps into place.
- Startup: Connect the supply voltage to start up the switch via the terminal block (or DC JACK).
- Dismantling: Pull out the lower edge and then remove the switch from the DIN rail.



## **Preface**

A member of the growing family of rugged switches, this switch addresses a need for a smaller switch. This switch provides an affordable solution for rugged and outdoor environment, transportation road-side cabinet, industrial floor shop, multitenant dwellings or Fiber To The Home (FTTH) applications. Capable of operating at temperature extremes of  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$ , this is the switch of choice for harsh environments constrained by space.

### **Plug-and-Play Solution:**

The switch is a plug-and-play Fast Ethernet Switch in compact size. It doesn't have any complicated software to set up.

This manual describes how to install and use the hardened Ethernet Switch. This switch integrates full wire speed switching technology. This switch brings the answer to complicated hardened networking environments.

To get the most out of this manual, you should have an understanding of Ethernet networking concepts.

In this manual, you will find:

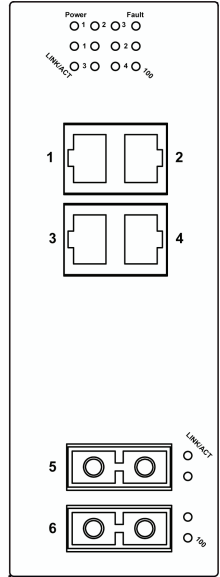
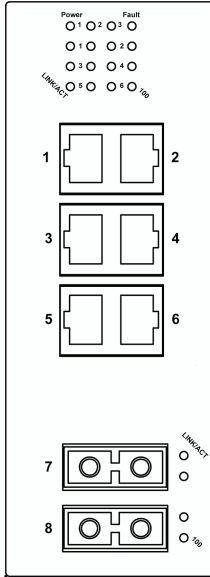
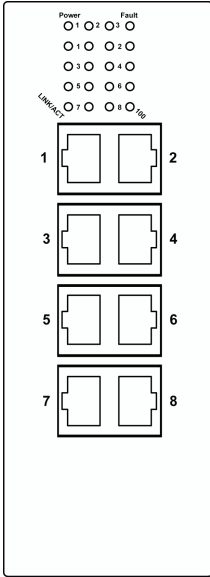
- Features on the switch
- Illustrative LED functions
- Installation instructions
- Specifications

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# Product Overview

## Hardened Ethernet Switch



## Package Contents

When you unpack the product package, you shall find the items listed below. Please inspect the contents, and report any apparent damage or missing items immediately to your authorized reseller.

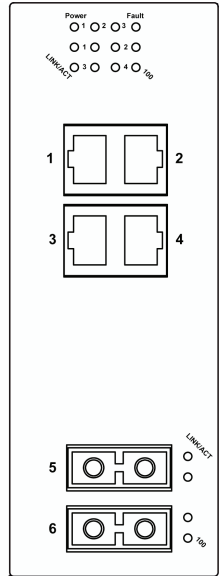
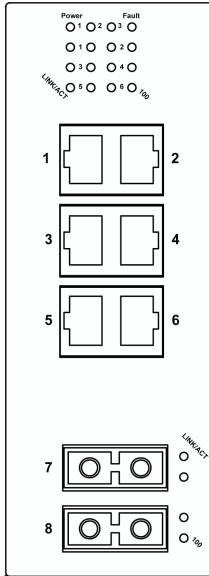
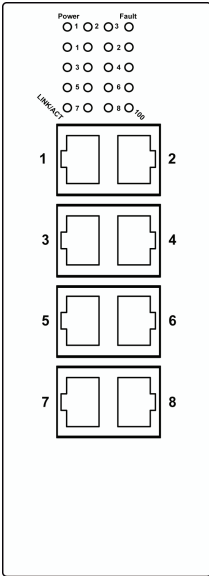
- ✓ ***This Switch***
- ✓ ***User's Manual***
- ✓ ***External power adapter & Power Cord (Optional)***

## **Product Highlights**

### **Basic Features**

- Complies with IEC61850-3 and IEEE1613 environmental requirements for power substation automation systems.
- Complies with EN50121-4 environmental requirements for railway applications.
- Meets NEMA TS1 & TS2 environmental requirements for traffic control equipments.
- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, Full/Half-duplex, Auto-Negotiation, Auto MDI/MDIX.
- 100Base-FX: Multi/Single mode SC or ST type, 100Base-BX: WDM Single mode SC type.
- Supports 2048 MAC addresses. Provides 448K bits buffer memory.
- DIP switch configuration for link monitor alarm.
- Alarms for power and port link failure by relay output 1A @ 24VDC.
- Power Supplies: Redundant 12-48VDC Terminal Block power inputs and 12VDC DC JACK with 100-240VAC external power supply.
- Operating voltage and Max. current consumption: 0.5A @ 12VDC, 0.25A @ 24VDC, 0.125A @ 48VDC. Power consumption: 6W Max.
- -40°C to 75°C (-40°F to 167°F) operating temperature range. Tested for functional operation @ -40°C to 85°C (-40°F to 185°F).
- Supports DIN-Rail or Panel Mounting installation.

## Front Panel Display



## Status LEDs

LED	State	Indication
<b>Power</b>		
<b>Power 1</b> <b>Power 2</b> <b>Power 3</b>	Steady	Switch is properly connected to power and turned on.
	Off	Switch is not connected to power and is turned off.
<b>Fault</b>		
<b>Fault</b>	Steady	<ul style="list-style-type: none"><li>• Power redundant system failure occurred.</li><li>• Port failure occurred (when link monitor alarm dip switch is enabled).</li></ul>
	Off	<ul style="list-style-type: none"><li>• Power redundant system failure is not occurred.</li><li>• Port failure is not occurred (when link monitor alarm dip switch is enabled).</li><li>• Link monitor alarm dip switch is disabled.</li></ul>
<b>10/100Base-TX, 100Base-FX/BX</b>		
<b>LINK/ACT</b>	Steady	A valid network connection established.
	Flashing	Transmitting or receiving data. ACT stands for ACTIVITY.
<b>100</b>	Steady	Light solidly for a port transferring at 100Mbps.
	Off	The port is transferring at 10Mbps If this LED is dark.

## Physical Ports

This switch provides:

- Eight 10/100Base-TX ports
- Six 10/100Base-TX ports + one or two 100Base-FX/BX ports
- Four 10/100Base-TX ports + one or two 100Base-FX/BX ports

### CONNECTIVITY

- RJ-45 connectors
- SC or ST connector on 100Base-FX fiber port.
- SC connector on 100Base-BX fiber port.

## Installation

This chapter gives step-by-step instructions about how to install the switch:

### Selecting a Site for the Switch

As with any electric device, you should place the switch where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

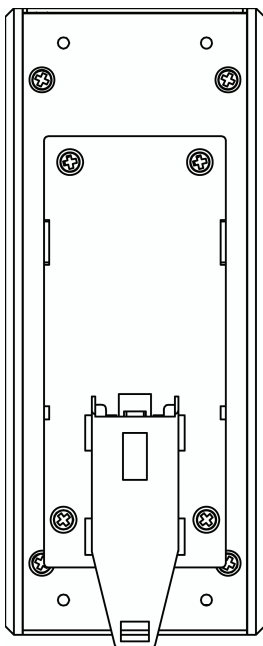
- The ambient temperature should be between -40 to 75 degrees Celsius.
- The relative humidity should be less than 95 percent, non-condensing.
- Surrounding electrical devices should not exceed the electromagnetic field (RF) standards.
- Make sure that the switch receives adequate ventilation. Do not block the ventilation holes on each side of the switch
- The power outlet should be within 1.8 meters of the switch.

## **DIN Rail Mounting**

Fix the DIN rail attachment plate to the back panel of the switch.

**Installation:** Place the switch on the DIN rail from above using the slot. Push the front of the switch toward the mounting surface until it audibly snaps into place.

**Removal:** Pull out the lower edge and then remove the switch from the DIN rail.



## Connecting to Power

Redundant DC Terminal Block Power Inputs and 12VDC DC Jack:

### Redundant DC Terminal Block Power Inputs

There are two pairs of power inputs can be used to power up this device. You only need to have one power input connected to run the switch.

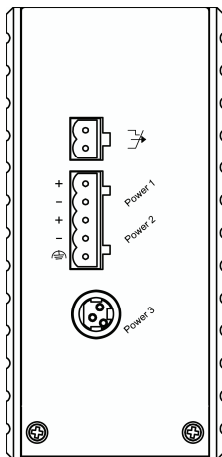
**Step 1:** Connect the DC power cord to the plug-able terminal block on the switch, and then plug it into a standard DC outlet.

**Step 2:** Disconnect the power cord if you want to shut down the switch.

### 12VDC DC Jack



**Step 1:** Connect the supplied AC to DC power adapter to the receptacle on the topside of the switch.

**Step 2:** Connect the power cord to the AC to DC power adapter and attach the plug into a standard AC outlet with the appropriate AC voltage.



### Alarms for Power Failure

**Step 1:** There are two pins on the terminal block are used for power failure detection. It provides the normally closed output when the power source is active. Use this as a dry contact application to send a signal for power failure detection.

Power Input Assignment			
Power3		12VDC	DC Jack
Power2	+	12-48VDC	Terminal Block
	-	Power Ground	
Power1	+	12-48VDC	
	-	Power Ground	
		Earth Ground	
Relay Alarm Assignment			
 FAULT	*Relay warning signal disable for following: <ul style="list-style-type: none"> <li>• The relay contact closes if Power1 and Power2 are both failed but Power3 on.</li> <li>• The relay contact closes if Power3 is failed but Power1 and Power2 are both on.</li> </ul>		

**Special note:**

The relay output is normal open position when there is no power to the switch. Please do not connect any power source to this terminal to prevent the shortage to your power supply.

## Connecting to Your Network

### Cable Type & Length

It is necessary to follow the cable specifications below when connecting the switch to your network. Use appropriate cables that meet your speed and cabling requirements.

#### Cable Specifications

Speed	Connector	Port Speed Half/Full Duplex	Cable	Max. Distance
10Base-T	RJ-45	10/20 Mbps	2-pair UTP/STP Cat. 3, 4, 5	100 m
100Base-TX	RJ-45	100/200 Mbps	2-pair UTP/STP Cat. 5	100 m
100Base-FX	SC, ST	200 Mbps	MMF (50 or 62.5 $\mu$ m)	2 km
100Base-FX	SC, ST	200 Mbps	SMF (9 or 10 $\mu$ m)	20, 40, or 75 km
100Base-BX	SC	200 Mbps	SMF (9 or 10 $\mu$ m)	20 or 40 km

## **Cabling**

**Step 1:** First, ensure the power of the switch and end devices are turned off.

**<Note>** Always ensure that the power is off before any installation.

**Step 2:** Prepare cable with corresponding connectors for each type of port in use.

**Step 3:** Consult the previous section for cabling requirements based on connectors and speed.

**Step 4:** Connect one end of the cable to the switch and the other end to a desired device.

**Step 5:** Once the connections between two end devices are made successfully, turn on the power and the switch is operational.

## Specifications

<b>Hardened Ethernet Switch</b>	10/100Base-TX auto-negotiating ports with RJ-45 connectors, 100Base-FX/BX fiber ports
<b>Applicable Standards</b>	IEEE 802.3 10Base-T IEEE 802.3u 100Base-TX/FX
<b>Switching Method</b>	Store-and-Forward
<b>Forwarding Rate</b>	
10Base-T:	10 / 20Mbps half / full-duplex
100Base-TX:	100 / 200Mbps half / full-duplex
100Base-FX/BX:	200Mbps full-duplex
<b>Performance</b>	14,880pps for 10Mbps 148,810pps for 100Mbps
<b>Cable</b>	
10Base-T:	2-pair UTP/STP Cat. 3, 4, 5
100Base-TX:	2-pair UTP/STP Cat. 5 Up to 100m (328ft)
100Base-FX:	MMF (50 or 62.5µm), SMF (9 or10µm)
100Base-BX:	SMF (9 or10µm)
<b>LED Indicators</b>	Per unit – Power status (Power 1, Power 2, Power 3) Fault Per port – 10/100TX or 100FX/BX - LINK/ACT, 100
<b>Dimensions</b>	60mm (W) × 125mm (D) × 145mm (H) (2.36" (W) × 4.92" (D) × 5.7" (H))
<b>Net Weight</b>	1Kg (2.2lbs.)
<b>Power</b>	Terminal Block: 12-48VDC DC Jack: 12VDC, External AC/DC required
<b>Operating Voltage &amp; Max. Current Consumption</b>	0.5A @ 12VDC, 0.25A @ 24VDC, 0.125A @ 48VDC
<b>Power Consumption</b>	6W Max.
<b>Operating Temperature</b>	-40°C to 75°C (-40°F to 167°F) Tested for functional operation @ -40°C to 85°C (-40°F to 185°F)
<b>Storage Temperature</b>	-40°C to 85°C (-40°F to 185°F)
<b>Humidity</b>	5%-95% non-condensing

### EMI

FCC Part 15, Class A

EN61000-6-4

EN55022

EN61000-3-2

## ***Hardened Ethernet Switch***

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EN61000-3-3

### **EMS**

EN61000-6-2

EN61000-4-2 (ESD Standard)

EN61000-4-3 (Radiated FRI Standards)

EN61000-4-4 (Burst Standards)

EN61000-4-5 (Surge Standards)

EN61000-4-6 (Induced RFI Standards)

EN61000-4-8 (Magnetic Field Standards)

### **Environmental Test Compliance**

IEC60068-2-6 Fc (Vibration Resistance)

IEC60068-2-27 Ea (Shock)

IEC60068-2-32 Ed (Free Fall)

IEC61850-3 and IEEE1613 environmental requirements for substation and power automation systems

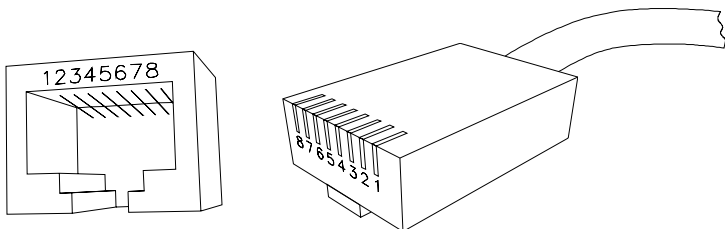
EN50121-4 environmental requirements for railway applications

NEMA TS1/2 Environmental requirements for traffic control equipments

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## Appendix A – Connector Pinouts

Pin arrangement of RJ-45 connectors:



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### RJ-45 Connector and Cable Pins

The following table lists the pinout of 10/100Base-TX ports.

Pin	Regular Ports	Uplink port
1	Output Transmit Data +	Input Receive Data +
2	Output Transmit Data -	Input Receive Data -
3	Input Receive Data +	Output Transmit Data +
4	NC	NC
5	NC	NC
6	Input Receive Data -	Output Transmit Data -
7	NC	NC
8	NC	NC