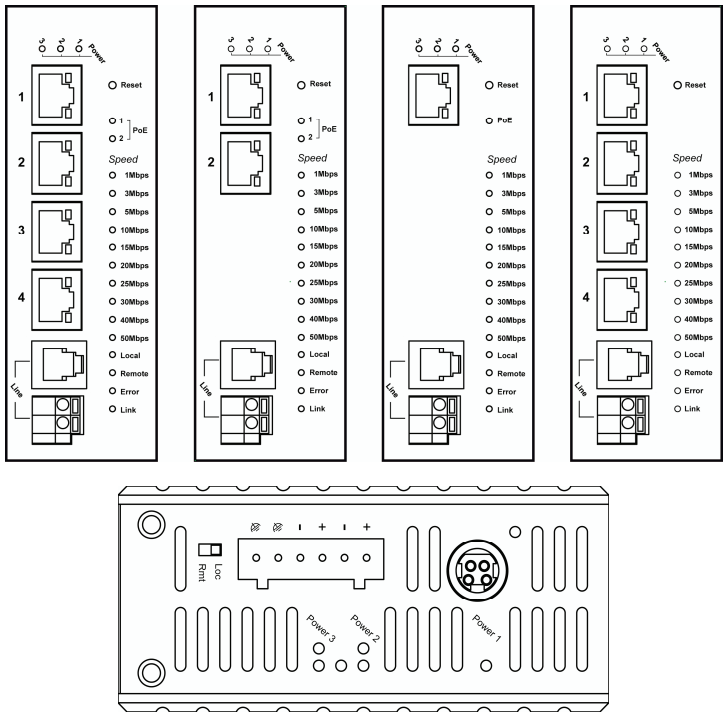


Quick Start Guide

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

Physical Description

The Port Status LEDs and Power Inputs



DIREKTRONIK

Direktronik AB tel. 08-52 400 700 www.direktronik.se

Power Input Assignment			
Power1		48VDC	DC Jack
Power2	+	24-48VDC	Terminal Block
	—	Power Ground	
Power3	+	24-48VDC	
	—	Power Ground	
		Earth Ground	
DIP Switch Assignment			
Loc	The device operates in local mode		
Rmt	The device operates in remote mode		

LEDs	State	Indication
Power1	Steady	Power on
Power2	Off	Power off
Power3		
Ethernet		
PoE	Steady	Powered Device (PD) is connected
	Off	Powered Device (PD) is disconnected
Link/ACT (Green)	Steady	Valid network connection established
	Flashing	Transmitting or receiving data ACT stands for ACTIVITY
	Off	Neither valid network connection established nor transmitting/receiving data
Speed (Yellow)	Steady	Valid port connection at 100Mbps
	Off	Valid port connection at 10Mbps
Ethernet Extender		
Remote	Steady	The device operates in remote mode
Local	Steady	The device operates in local mode
Error	Steady	Error occurred
Link	Steady	A valid connection established

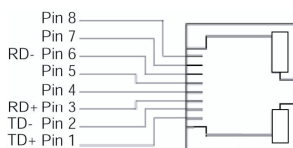
Ethernet Extender	
Speed	Distance
1Mbps	1,900 M (6,232 ft.)
3Mbps	1,800 M (5,904 ft.)
5Mbps	1,600 M (5,249 ft.)
10Mbps	1,400 M (4,593 ft.)
15Mbps	1,200 M (3,936 ft.)
20Mbps	1,000 M (3,280 ft.)
25Mbps	800 M (2,624 ft.)
30Mbps	700 M (2,296 ft.)
40Mbps	600 M (1,968 ft.)
50Mbps	300 M (984 ft.)

- PoE LED is only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version.
- DC Terminal Block Power Inputs: There are two pairs of power inputs can be used to power up this Ethernet Extender. Redundant power supplies function is supported. You only need to have one power input connected to run the Ethernet Extender.
- DC JACK Power Input: 48VDC.

10/100Base-TX and Ethernet Extender Connectors

10/100Base-TX Connection

The following lists the pinouts of 10/100Base-TX RJ-45 port.



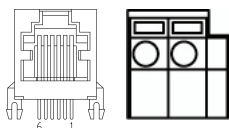
Pin	Regular Ports	Uplink ports
1	Output Transmit Data +	Input Receive Data +
2	Output Transmit Data -	Input Receive Data -
3	Input Receive Data +	Output Transmit Data +
4	Positive (VCC+)	Positive (VCC+)
5	Positive (VCC+)	Positive (VCC+)
6	Input Receive Data -	Output Transmit Data -
7	Negative (VCC-)	Negative (VCC)
8	Negative (VCC-)	Negative (VCC)

- Pin 4, 5 Positive (VCC+) and Pin 7, 8 Negative (VCC-) are only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version.

Ethernet Extender Connection

The RJ-11 and Terminal Block port pinouts
Pin 3: Tip, Pin 4: Ring.

Use a telephone line to connect two
RJ-11 or Terminal Block ports between
two Hardened Ethernet Extenders.



Tip Ring

Warning: Improprate operation might cause the damage of Terminal Block.

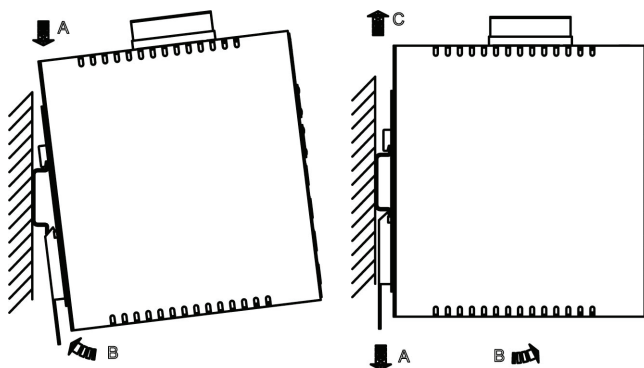
Functional Description

- Meets NEMA TS1/TS2 Environmental requirements: temperature, shock, and vibration for traffic control equipment.
- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Operates transparent to higher layer protocols such as TCP/IP.
- Ethernet port: Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Complies with IEEE802.3at standard for high power input required device and also compatible with IEEE802.3af powered devices (Only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version).
- Ethernet Extender port (RJ-11 & Terminal Block): Symmetrical on the VDSL, full-duplex 50Mbps communications link over existing copper telephone line.
- One DIP switch for configuring Local (Loc) and Remote (Rmt).
- Ten speeds with speed indicator LEDs on front panel of unit, up to 50Mbps @ about 300 meters (984 ft.), down to 1Mbps @ about 1,900 meters (6,232 ft.).
- 4-port 10/100Base-TX (2-port IEEE802.3at PoE PSE) Ethernet Extender: 2.88A @ 24VDC, 1.44A @ 48VDC. Power consumption: 69.12W Max.
- 2-port IEEE802.3at PoE PSE Ethernet Extender: 2.88A @ 24VDC, 1.44A @ 48VDC. Power consumption: 69.12W Max.
- 1-port IEEE802.3at PoE PSE Ethernet Extender: 1.6A @ 24VDC, 0.8A @ 48VDC. Power consumption: 38.4W Max.
- 4-port 10/100Base-TX Ethernet Extender: 0.36A @ 24VDC, 0.18A @ 48VDC. Power consumption: 8.64W Max.
- Power Supply: Redundant 24-48VDC Terminal Block power inputs and 48VDC DC JACK with 100-240VAC external power supply.

- Field Wiring Terminal Markings: Use Copper Conductors Only, 60/75 °C, wire range 12-24 AWG, torque value 7 lb-in.
- Operating temperature range @ -40°C to 75°C (-40°F to 167°F). Tested for functional operation @ -40°C to 85°C (-40°F to 185°F). UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75°C (167°F).
- For use in Pollution Degree 2 Environment.
- Supports Din-Rail, Panel, and Rack Mounting installation.

Assembly, Startup, and Dismantling

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



Preface

This manual describes how to install and use the Hardened Ethernet Extender. The Hardened Ethernet Extender introduced here provides one channel for Ethernet over existing voice grade copper wire.

The Hardened Ethernet Extender fully complies with IEEE802.3 10Base-T and IEEE802.3u 100Base-TX/FX standards.

In this manual, you will find:

- Product overview
- Features on the Hardened Ethernet Extender
- Illustrative LED functions
- Installation instructions
- Specifications

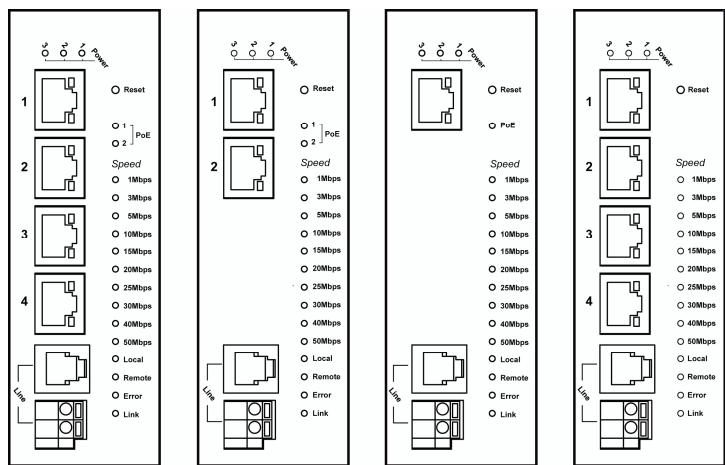
Table of Contents

Quick Start Guide	1
<i>Physical Description</i>	<i>1</i>
The Port Status LEDs and Power Inputs.....	1
10/100Base-TX and Ethernet Extender Connectors	3
<i>Functional Description.....</i>	<i>4</i>
<i>Assembly, Startup, and Dismantling.....</i>	<i>5</i>
Preface.....	6
Table of Contents	7
Introduction	8
<i>Product Overview.....</i>	<i>8</i>
<i>Product Features</i>	<i>8</i>
<i>Packing List.....</i>	<i>9</i>
One-Channel Hardened Ethernet Extender	10
<i>Ports</i>	<i>10</i>
<i>Ethernet Extender Mode Settings</i>	<i>10</i>
<i>DIP switch</i>	<i>10</i>
<i>Front Panel & LEDs</i>	<i>11</i>
LED Indicators.....	11
10/100Base-TX and Ethernet Extender Connectors	12
Installation	14
<i>Selecting a Site for the Equipment.....</i>	<i>14</i>
<i>Wiring Diagram</i>	<i>14</i>
<i>DIN Rail Mounting.....</i>	<i>15</i>
<i>Connecting to Power</i>	<i>16</i>
12VDC DC Jack	16
Redundant DC Terminal Block Power Inputs	16
Specifications	17

Introduction

The Hardened Ethernet Extender provides one channel for Ethernet over existing voice grade copper wire. This Hardened Ethernet Extender solution is perfectly fitted in the industrial applications or rugged environment.

Product Overview



Product Features

- Meets NEMA TS1/TS2 Environmental requirements: temperature, shock, and vibration for traffic control equipment.
- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Operates transparent to higher layer protocols such as TCP/IP.
- Ethernet port: Supports IEEE802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Complies with IEEE802.3at standard for high power input required device and also compatible with IEEE802.3af powered devices (Only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version).
- Ethernet Extender port (RJ-11 & Terminal Block): Symmetrical on the VDSL, full-duplex 50Mbps communications link over existing copper telephone line.
- One DIP switch for configuring Local (Loc) and Remote (Rmt).

- Ten speeds with speed indicator LEDs on front panel of unit, up to 50Mbps @ about 300 meters (984 ft.), down to 1Mbps @ about 1,900 meters (6,232 ft.).
- 4-port 10/100Base-TX (2-port IEEE802.3at PoE PSE) Ethernet Extender: 2.88A @ 24VDC, 1.44A @ 48VDC. Power consumption: 69.12W Max.
- 2-port IEEE802.3at PoE PSE Ethernet Extender: 2.88A @ 24VDC, 1.44A @ 48VDC. Power consumption: 69.12W Max.
- 1-port IEEE802.3at PoE PSE Ethernet Extender: 1.6A @ 24VDC, 0.8A @ 48VDC. Power consumption: 38.4W Max.
- 4-port 10/100Base-TX Ethernet Extender: 0.36A @ 24VDC, 0.18A @ 48VDC. Power consumption: 8.64W Max.
- Power Supply: Redundant 24-48VDC Terminal Block power inputs and 48VDC DC JACK with 100-240VAC external power supply.
- Field Wiring Terminal Markings: Use Copper Conductors Only, 60/75 °C, wire range 12-24 AWG, torque value 7 lb-in.
- Operating temperature range @ -40°C to 75°C (-40°F to 167°F). Tested for functional operation @ -40°C to 85°C (-40°F to 185°F). UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75°C (167°F).
- For use in Pollution Degree 2 Environment.
- Supports Din-Rail, Panel, and Rack Mounting installation.

Packing List

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

- The Hardened Ethernet Extender
- User's Manual
- AC to DC Power Adaptor and Power Cable (optional)

One-Channel Hardened Ethernet Extender

Ports

The Hardened Ethernet Extender provides TX ports and one Ethernet Extender port.

For the TX ports, it uses RJ-45 connector and auto senses the speed of 10/100Mbps.

For the Ethernet Extender port, it uses RJ-11 and Terminal Block connectors and auto senses the speed of 1/3/5/10/15/20/25/30/40/50Mbps.

Ethernet Extender Mode Settings

Ethernet Extender mode settings are made very simple by means of a DIP (Dual Inline Package) switch on the top panel of the Hardened Ethernet Extender.

DIP switch

There is one pin on the DIP switch for Ethernet Extender mode settings. Refer to the table below for more details.

Loc	Rmt
The device operates in local mode	The device operates in remote mode

Front Panel & LEDs

LED Indicators

The LED indicators give you instant feedback on status of the Hardened Ethernet Extender:

LEDs	State	Indication
Power1	Steady	Power on
Power2	Off	Power off
Power3		
Ethernet		
PoE	Steady	Powered Device (PD) is connected
	Off	Powered Device (PD) is disconnected
Link/ACT (Green)	Steady	Valid network connection established
	Flashing	Transmitting or receiving data ACT stands for ACTIVITY
	Off	Neither valid network connection established nor transmitting/receiving data
Speed (Yellow)	Steady	Valid port connection at 100Mbps
	Off	Valid port connection at 10Mbps
Ethernet Extender		
Remote	Steady	The device operates in remote mode
Local	Steady	The device operates in local mode
Error	Steady	Error occurred
Link	Steady	A valid connection established

Ethernet Extender	
Speed	Distance
1Mbps	1,900 M (6,232 ft.)
3Mbps	1,800 M (5,904 ft.)
5Mbps	1,600 M (5,249 ft.)
10Mbps	1,400 M (4,593 ft.)
15Mbps	1,200 M (3,936 ft.)
20Mbps	1,000 M (3,280 ft.)
25Mbps	800 M (2,624 ft.)
30Mbps	700 M (2,296 ft.)
40Mbps	600 M (1,968 ft.)
50Mbps	300 M (984 ft.)

10/100Base-TX and Ethernet Extender Connectors

10/100Base-TX Connection

The following lists the pinouts of 10/100Base-TX RJ-45 port.



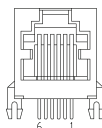
Pin	Regular Ports	Uplink ports
1	Output Transmit Data +	Input Receive Data +
2	Output Transmit Data -	Input Receive Data -
3	Input Receive Data +	Output Transmit Data +
4	Positive (VCC+)	Positive (VCC+)
5	Positive (VCC+)	Positive (VCC+)
6	Input Receive Data -	Output Transmit Data -
7	Negative (VCC-)	Negative (VCC)
8	Negative (VCC-)	Negative (VCC)

- Pin 4, 5 Positive (VCC+) and Pin 7, 8 Negative (VCC-) are only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version.

Ethernet Extender Connection

The RJ-11 and Terminal Block port pinouts
Pin 3: Tip, Pin 4: Ring.

Use a telephone line to connect two
RJ-11 or Terminal Block ports between
two Hardened Ethernet Extenders.



Tip Ring

Warning: Improprate operation might cause the damage of Terminal Block.

Installation

This chapter gives step-by-step installation instructions for the Hardened Ethernet Extender.

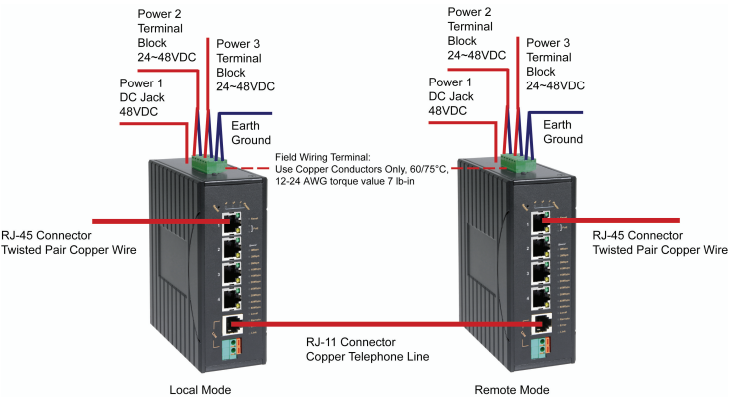
Selecting a Site for the Equipment

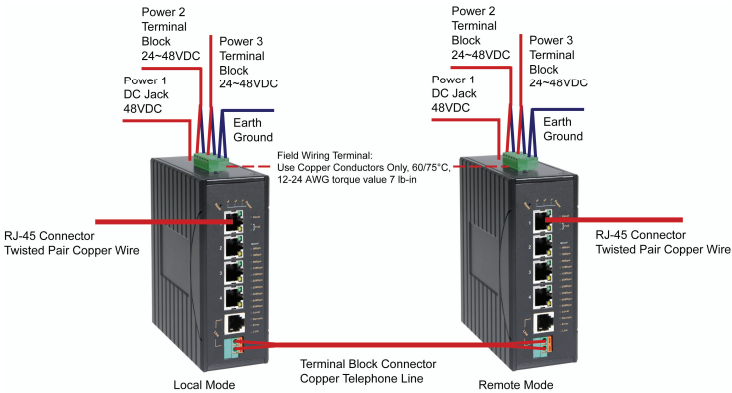
As with any electric device, you should place the equipment where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

- The Surrounding Air 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 (RFC) standards.
- Make sure that the equipment receives adequate ventilation. Do not block the ventilation holes of the equipment.
- The power outlet should be within 1.8 meters of the product.

Wiring Diagram

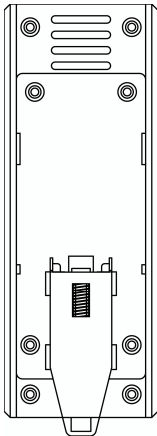
Field Wiring Terminal Markings: Use Copper Conductors Only, 60/75°C, wire range 12-24 AWG, torque value 7 lb-in.





DIN Rail Mounting

- Fix the DIN rail attachment plate to the back panel of the Hardened Ethernet Extender.
- Installation: Place the Hardened Ethernet Extender on the DIN rail from above using the slot. Push the front of the Hardened Ethernet Extender toward the mounting surface until it audibly snaps into place.
- Removal: Pull out the lower edge and then remove the Hardened Ethernet Extender from the DIN rail.



Connecting to Power

Redundant DC Terminal Block Power Inputs or 48VDC 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 Hardened Ethernet Extender.

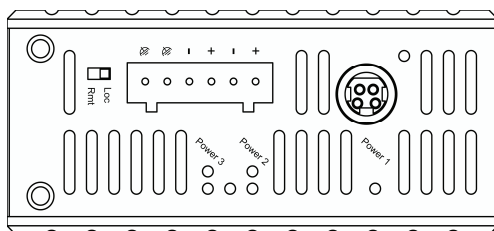
Step 1: Connect the DC power cord to the plug-able terminal block on the Hardened Ethernet Extender, and then plug it into a standard DC outlet.

Step 2: Disconnect the power cord if you want to shut down the Hardened Ethernet Extender.

48VDC DC Jack

Step 1: Connect the supplied AC to DC power adapter to the receptacle on the topside of the Hardened Ethernet Extender.

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.



Power Input Assignment			
Power1		48VDC	DC Jack
Power2	+	24-48VDC	Terminal Block
	—	Power Ground	
Power3	+	24-48VDC	
	—	Power Ground	
		Earth Ground	
DIP Switch Assignment			
Loc	The device operates in local mode		
Rmt	The device operates in remote mode		

Specifications

Applicable Standards	IEEE802.3 10Base-T, IEEE802.3u 100Base-TX, Ethernet over VDSL, IEEE802.3at
Fixed Ports	10/100Mbps Ethernet ports with RJ-45 connectors 1 x Ethernet Extender port with RJ-11 and Terminal Block connectors
Speed 10Base-T 100Base-TX Ethernet Extender	10/20Mbps for half/full-duplex 100/200Mbps for half/full-duplex 1, 3, 5, 10, 15, 20, 25, 30, 40, 50Mbps
Switching Method	Store-and-Forward
Forwarding rate	14,880/148,810pps for 10/100Mbps
Cable 10Base-T 100Base-TX Ethernet Extender	4-pair UTP/STP Cat. 3, 4, 5 up to 100m 4-pair UTP/STP Cat. 5 up to 100m Telephone wires
LED Indicators	Per Unit (3 LEDs)- Power1, Power2, Power3 Per Port- RJ-45 (2 or 3 LEDs): Link/ACT (Green), Speed (Yellow), PoE (Only available for Hardened IEEE802.3at PoE PSE Ethernet Extender version) RJ-11, Terminal Block (14 LEDs): Remote, Local, Error, Link, 1Mbps, 3Mbps, 5Mbps, 10Mbps, 15Mbps, 20Mbps, 25Mbps, 30Mbps, 40Mbps, 50Mbps
Dimensions	50mm (W) × 110mm (D) x 135mm (H) (1.97" (W) x 4.33" (D) x 5.31" (H))
Weight	0.8Kg (1.76lbs.)
Power	Terminal Block: 24-48VDC DC Jack: 48VDC, External AC/DC required
Operating Voltage Max. Current Consumption Power Consumption	
4 x 10/100Base-TX (2 x IEEE802.3at PoE PSE)	2.88A @ 24VDC, 1.44A @ 48VDC, 69.12W Max.
2 x IEEE802.3at PoE PSE	2.88A @ 24VDC, 1.44A @ 48VDC, 69.12W Max.
1 x IEEE802.3at PoE PSE	1.6A @ 24VDC, 0.8A @ 48VDC, 38.4W Max.
4 x 10/100Base-TX	0.36A @ 24VDC, 0.18A @ 48VDC, 8.64W Max.
Operating Temperature	-40°C ~ 75°C (-40°F ~ 167°F) Tested for functional operation @ -40°C ~ 85°C (-40°F ~ 185°F) UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75°C (167°F)

Hardened 10/100Base-TX IEEE802.3at PoE PSE Ethernet Extender

Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Humidity	5 ~ 95%, non-condensing
Safety	UL508
EMI	FCC Part 15, Class A EN61000-6-4: EN55022, EN61000-3-2, EN61000-3-3
EMS	EN61000-6-2: EN61000-4-2 (ESD Standard) EN61000-4-3 (Radiated RFI 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)
NEMA TS1/2 Environmental requirements for traffic control equipment	