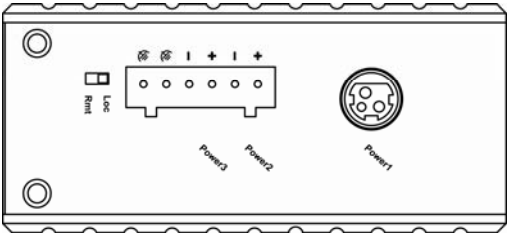
Quick Start Guide

This quick start guide describes how to install and use the Hardened Ethernet Extender. The Hardened Ethernet Extender introduced here provides one channel for Ethernet over existing coaxial cable. This is the Hardened Ethernet Extender of choice for harsh environments constrained by space.

Physical Description

The Terminal Block and Power inputs

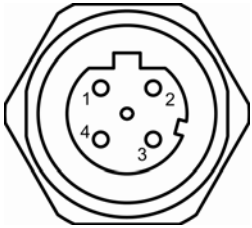


Power Input Assignment			
Power1		12VDC	DC Jack
Power2	+	12-48VDC	Terminal Block
	−	Power Ground	
Power3	+	12-48VDC	
	−	Power Ground	
⏚		Earth Ground	
DIP Switch Assignment			
Loc	The device operates in local mode		
Rmt	The device operates in remote mode		

- 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: 12VDC.

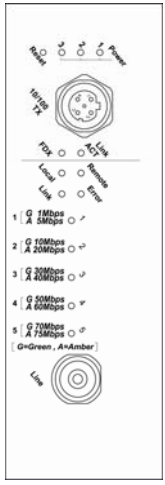
The 10/100Base-TX Connector

The 10/100Base-TX Connection
The following lists the pinouts of 10/100Base-TX M12 4Pin D-type female port.



Pin	Regular Ports	Uplink ports
1	Output Transmit Data +	Input Receive Data +
2	Input Receive Data +	Output Transmit Data +
3	Output Transmit Data -	Input Receive Data -
4	Input Receive Data -	Output Transmit Data -

The Port Status LEDs



LEDs	State	Indication
Power1 Power2 Power3	Steady	Power on
	Off	Power off
Ethernet		
Link/ACT	Steady	Valid network connection established
	Flashing	Transmitting or receiving data ACT stands for ACTIVITY
	Off	Neither valid network connection established nor transmitting/receiving data
FDX	Steady	Connection in full-duplex mode FDX stands for FULL-DUPLEX
	Off	Connection in half-duplex mode

Ethernet Extender	
Remote	The device operates in remote mode
Local	The device operates in local mode
Error	Error occurred
Link	A valid connection established
1	Green, 1-5Mbps, up to 2,600M (8,530ft.) Amber, 6-10Mbps, up to 2,400M (7,874ft.)
2	Green, 11-16Mbps, up to 2,000M (6,561ft.) Amber, 17-20Mbps, up to 1,800M (5,905ft.)
3	Green, 21-29Mbps, up to 1,600M (5,249ft.) Amber, 30-43Mbps, up to 1,400M (4,593ft.)
4	Green, 44-54Mbps, up to 1,200M (3,937ft.) Amber, 55-63Mbps, up to 1,000M (3,280ft.)
5	Green, 64-74Mbps, up to 600M (1,968ft.) Amber, 75-85Mbps, up to 200M (656ft.)

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.
- Complies with EN50121-3-2 EMC requirement.
- Operates transparent to higher layer protocols such as TCP/IP.
- Ethernet port (M12 connector): Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Ethernet Extender port (BNC connector): Symmetrical on the VDSL, full-duplex 85Mbps communications link over existing coaxial cable.
- Provides BNC to F-Type connector.

- One DIP switch for configuring Local (Loc) and Remote (Rmt).
- Ten speeds with speed indicator LEDs on front panel of unit, up to 85Mbps @ about 200meters (656ft.), down to 1Mbps @ about 2,600meters (8,530ft.).
- Operating voltage and Max. current consumption: 0.48A @ 12VDC, 0.24A @ 24VDC, 0.12A @ 48VDC. Power consumption: 5.76W Max.
- Power Supply: Redundant 12-48VDC Terminal Block power inputs and 12VDC DC JACK with 100-240VAC external power supply.
- Field Wiring Terminal: Use Copper Conductors Only, 60/75℃, wire range 12-24 AWG, torque value 7 lb-in.
- Operating temperature range @ -40℃ to 75℃ (-40℉ to 167℉). Tested for functional operation @ -40℃ to 85℃ (-40℉ to 185℉). UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75℃ (167℉).
- For use in Pollution Degree 2 Environment.
- Supports Din-Rail or Panel Mounting installation.

Ethernet Extender Mode Settings

Ethernet Extender mode settings are made very simple by means of a switch at the top panel of the Ethernet Extender. The switch has two positions for Ethernet Extender mode settings. Refer to the table below for more details. One device must be set to Loc and the other to Rmt when two devices are connected.

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

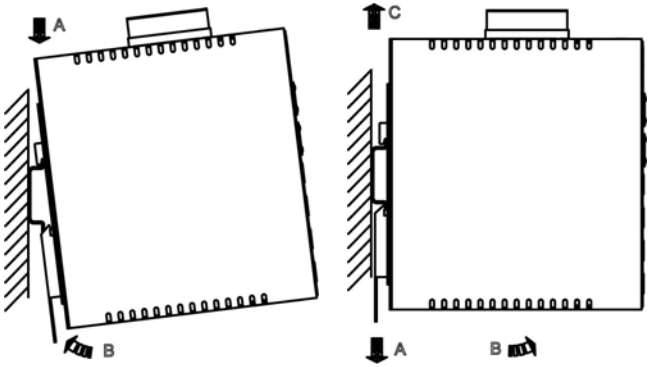
Self-diagnostic Test Procedure

- Two Hardened Ethernet Extenders are connected in pairs by BNC connectors over coaxial cable.
- One Hardened Ethernet Extender is configured as local unit located at local site of Ethernet extension by setting mode switch at top panel of this Hardened Ethernet Extender to Loc (local mode).
- The other Hardened Ethernet Extender is configured as remote unit located at remote site of Ethernet extension by setting mode switch at top panel of this Hardened Ethernet Extender to Rmt (remote mode).
- Connect supplied power supplies to Terminal Block or DC Jack power input on top panel of these two Hardened Ethernet Extenders to power on these two Hardened Ethernet Extenders.
- LED 5 on front panel of these two Hardened Ethernet Extenders might light on in amber or green color if these two Hardened Ethernet Extenders are connected in pairs by BNC connectors over a short coaxial cable (less than 200 meters). This means that these two Hardened

Ethernet Extenders could operate in normal condition since they finally negotiate a best performance for symmetrical transmission.

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 coaxial cable.

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

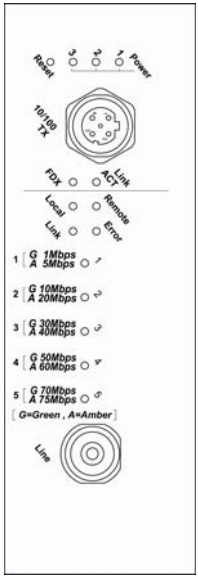
- Features on the Hardened Ethernet Extender
- Illustrative LED functions
- Installation instructions
- Specifications

Table of Contents

Introduction

The Hardened Ethernet Extender provides one channel for Ethernet over existing coaxial cable. 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.
- Complies with EN50121-3-2 EMC requirement.
- Operates transparent to higher layer protocols such as TCP/IP.
- Ethernet port (M12 connector): Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Ethernet Extender port (BNC connector): Symmetrical on the VDSL, full-duplex 85Mbps communications link over existing coaxial cable.
- Provides BNC to F-Type connector.
- One DIP switch for configuring Local (Loc) and Remote (Rmt).

- Ten speeds with speed indicator LEDs on front panel of unit, up to 85Mbps @ about 200meters (656ft.), down to 1Mbps @ about 2,600meters (8,530ft.).
- Operating voltage and Max. current consumption: 0.48A @ 12VDC, 0.24A @ 24VDC, 0.12A @ 48VDC. Power consumption: 5.76W Max.
- Power Supply: Redundant 12-48VDC Terminal Block power inputs and 12VDC DC JACK with 100-240VAC external power supply.
- Field Wiring Terminal: Use Copper Conductors Only, 60/75℃, wire range 12-24 AWG, torque value 7 lb-in.
- Operating temperature range @ -40℃ to 75℃ (-40℉ to 167℉).
  Tested for functional operation @ -40℃ to 85℃ (-40℉ to 185℉).
  UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75℃ (167℉).
- For use in Pollution Degree 2 Environment.
- Supports Din-Rail or Panel 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 one TX port and one Ethernet Extender port.
For the TX port, it uses M12 4Pin D-type female connector and auto senses the speed of 10/100Mbps.
For the Ethernet Extender port, it uses BNC connector and auto senses the speed of 1/5/10/20/30/40/50/60/70/75Mbps.

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 Power2 Power3	Steady	Power on
	Off	Power off
Ethernet		
Link/ACT	Steady	A valid Ethernet connection established
	Flashing	Transmitting or receiving Ethernet data ACT stands for ACTIVITY
	Off	Neither valid Ethernet connection established nor transmitting/receiving Ethernet data
FDX	Steady	Ethernet Connection in full-duplex mode FDX stands for FULL-DUPLEX
	Off	Ethernet Connection in half-duplex mode
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
1	Green	1-5Mbps, up to 2,600M (8,530ft.)
	Amber	6-10Mbps, up to 2,400M (7,874ft.)
2	Green	11-16Mbps, up to 2,000M (6,561ft.)
	Amber	17-20Mbps, up to 1,800M (5,905ft.)
3	Green	21-29Mbps, up to 1,600M (5,249ft.)
	Amber	30-43Mbps, up to 1,400M (4,593ft.)
4	Green	44-54Mbps, up to 1,200M (3,937ft.)
	Amber	55-63Mbps, up to 1,000M (3,280ft.)
5	Green	64-74Mbps, up to 600M (1,968ft.)
	Amber	75-85Mbps, up to 200M (656ft.)

Installation

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

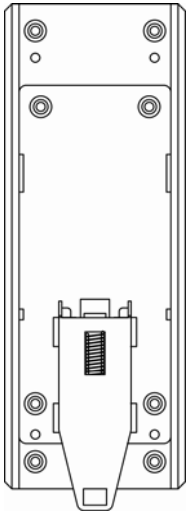
Selecting a Site for the Equipment

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:

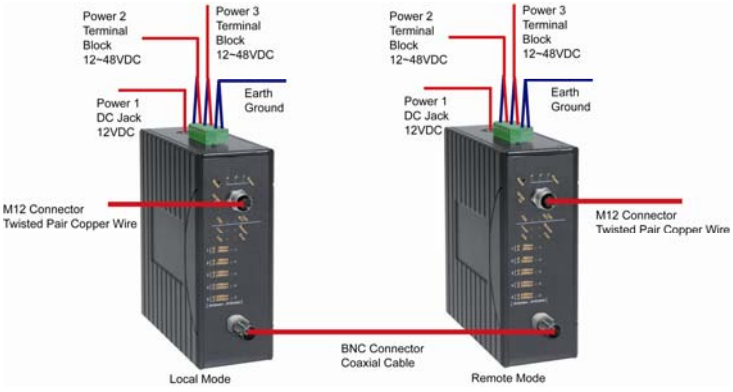
- The Surrounding Air temperature should be between -40 to 75 degrees Celsius.
- The relative humidity should be less than 95 percent, non-condensing.
- Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards.
- Make sure that the equipment receives adequate ventilation.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

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.



Wiring Diagram



Connecting to Power

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

12VDC DC Jack

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

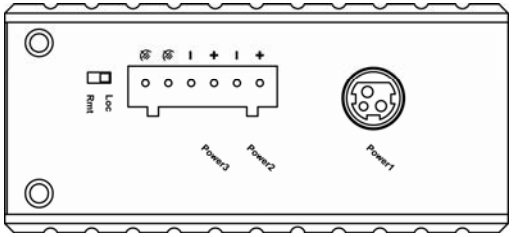
Step 2: Connect the power cord to the AC to DC power adapter and attach the plug into a standard AC outlet with the appropriate AC voltage.

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.



Power Input Assignment			
Power1		12VDC	DC Jack
Power2	+	12-48VDC	Terminal Block
	−	Power Ground	
Power3	+	12-48VDC	
	−	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
Fixed Ports	1 x 10/100Mbps Ethernet port with M12 4Pin D-type female connector 1 x Ethernet Extender port with BNC connector
Speed 10Base-T 100Base-TX Ethernet Extender	 10/20Mbps for half/full-duplex 100/200Mbps for half/full-duplex 1, 5, 10, 20, 30, 40, 50, 60, 70, 75Mbps
Switching Method	Store-and-Forward
Forwarding rate	14,880/148,810pps for 10/100Mbps
Cable 10Base-T 100Base-TX Ethernet Extender	 2-pair UTP/STP Cat. 3, 4, 5 up to 100m 2-pair UTP/STP Cat. 5 up to 100m Coaxial cable (5C2V, RG58AU, RG6AU)
LED Indicators	Per Unit (3 LEDs)- Power1, Power2, Power3
	Per Port- M12 (2 LEDs): Link/ACT, FDX BNC (9 LEDs): Remote, Local, Error, Link, 1, 2, 3, 4, 5
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: 12-48VDC DC Jack: 12VDC, External AC/DC required
Operating Voltage & Max. Current Consumption	0.48A @ 12VDC, 0.24A @ 24VDC, 0.12A @ 48VDC
Power Consumption	5.76W Max.
Operating Temperature	-40°C ~ 75°C (-40℉ ~ 167℉) Tested for functional operation @ -40°C ~ 85°C (-40℉ ~ 185℉) UL508 Industrial Control Equipment certified Maximum Surrounding Air Temperature @ 75℃ (167℉)
Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Humidity	5 ~ 95%, non-condensing
Safety	UL508
EMI	FCC Part 15, Class A VCCI, 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	Vibration Resistance: EN61373, IEC60068-2-6 Fc Shock: EN61373, IEC60068-2-27 Ea Free Fall: IEC60068-2-32 Ed
NEMA TS1/2 Environmental requirements for traffic control equipment	