SIGNAMAX
CONNECTIVITY SYSTEMS

Signamax™ Connectivity Systems
Industrial 10/100BASE-TX Ethernet Extender

U S E R ' S G U I D E

Signamax™ Connectivity Systems

Industrial Ethernet Extender
Model 065-1167A

User's Guide

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

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Trademarks

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- Ethernet is a trademark of Xerox Corporation.

- Signamax™ is a trademark of Advanced Electronic Support Products, Inc.

Preface

Audience

This guide is designed for the person who installs, configures, deploys, and maintains the Ethernet network. This document assumes the reader has moderate hardware, computer, and Internet skills.

Safety and Warnings

This guide uses the following symbols to draw your attention to certain information.

Symbol	Meaning	Description
	Note	Notes emphasize or supplement important points of the main text.
	Tip	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	Warning	Warnings indicate that failure to take a specified action could result in damage to the device, or could result in serious bodily injury.
	Electric Shock Hazard	This symbol warns users of electric shock hazard. Failure to take appropriate precautions such as not opening or touching hazardous areas of the equipment could result in injury or death.

Typographic Conventions

This guide also uses the following typographic conventions.

| Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user.
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Italic font is also used to indicate variables.
[ ] square brackets	Indicates optional values.
{ } braces	Indicates required or expected values.
| vertical bar	Indicates that you have a choice between two or more options or arguments.

Contents

Introduction

Congratulations on your purchase of the 065-1167A
Industrial Ethernet Extender. This Industrial Ethernet
Extender is a state-of-the-art IEEE-compliant network
solution designed for users who require
high-performance to eliminate bottlenecks and increase
productivity.

To simplify installation, the Industrial Ethernet Extender
is shipped ready for use.
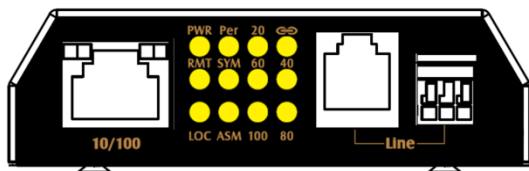
065-1167A Industrial Ethernet Extender

Key Features

This section summarizes the key features of the 065-1167A Industrial Ethernet Extender.

- One 10/100Base-TX Ethernet port with RJ-45 connector
- Auto negotiation of speed and duplex mode on Ethernet port
- Auto MDIX on Ethernet port
- Complies with IEEE 802.3 10Base-T and IEEE 802.3u 100Base-TX standards
- One Ethernet Extender port with RJ-11 connector or Termianl Block
- Ethernet Extender port auto senses the speed
- DIP switch for configuring Ethernet Extender Auto or Local mode, Symmetic or Asymmetric mode, and Performance or Standard mode
- Status LEDs
- External AC to DC power adapter

Quick Start Guide

Description	For Reference, See…
Find a Location for the Industrial Ethernet Extender Set the Industrial Ethernet Extender on a flat surface, Wall-mount, or DIN-Rail mount.	" " (page 16)
Connect to the 10/100 Mbps Ethernet Port • Connect one end of a Category 5 or better Ethernet cable to the Ethernet port of a computer, printer, network storage, or other network device. • Connect the other end to a 10/100 Mbps RJ-45 port on the Industrial Ethernet Extender.	"10/100 Mbps RJ-45 Port" (page 10) and "Connecting to the 10/100 Mbps RJ-45 Port" (page 18)
Connect to the Ethernet Extender Port Insert the voice grade copper wire between one pair of Ethernet Extenders via Ethernet Extender port (RJ-11 connector or Terminal Block).	
Power On • Connect the female end of the supplied AC power adapter cable to the power receptacle on the back of the Industrial Ethernet Extender. • Connect the 3-pronged end of the AC power adapter cable to a grounded 3-pronged AC outlet. • Wait for the Industrial Ethernet Extender to complete its Power On Self Test. • Confirm that the LEDs for ports connected to a device are green. If not, replace the Ethernet cable, and then check the port LED again.	"Applying AC Power" (page 19)

Unpacking the Hardware

Unpack the items and confirm that no items are missing or damaged. Your package should include:

- One 065-1167A Industrial Ethernet Extender

- One external power adapter

- One CD containing this user's guide

If any item is damaged or missing, notify your authorized representative. Keep the carton, including the original packing material, in case you need to store the product or return it.

Hardware Features

The following sections describe the hardware features of the 065-1167A Industrial Ethernet Extender.

Front Panel

The figure below shows the front panels of the 065-1167A Industrial Ethernet Extender.
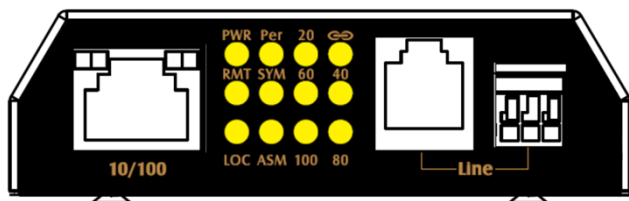
Front Panel

10/100 Mbps RJ-45 Port

The 065-1167A Industrial Ethernet Extender has one 10/100 Mbps RJ-45 port. This port is an auto-sensing, auto-MDIX 10/100 Mbps port.

When you insert a cable into an RJ-45 port, the Industrial Ethernet Extender:

- Determines whether the cable is a straight-through or crossover cable.

- Automatically ascertains the maximum speed (10 or 100 Mbps) and duplex mode (half- or full-duplex) of the attached device.

After determining this information, the Industrial Ethernet Extender configures the RJ-45 port automatically to enable communications with the attached device, without requiring user intervention.

Ethernet Extender Port

The 065-1167A Industrial Ethernet Extender has one Ethernet Extender port (RJ-11 connector or Terminal Block.

Insert the voice grade copper wire between one pair of Ethernet Extenders via Ethernet Extender port (RJ-11 connector or Terminal Block). One device must be set to LOC mode and the other to Auto mode when two devices are connected.

LEDs

The 065-1167A front panel LEDs show power and link/activity status. The following table summarizes the LEDs on the Industrial Ethernet Extender.

Front Panel LEDs

LED	Color	Status	Description
PWR	Green	ON	Receiving power.
		OFF	Power off.
Ethernet Extender Port			
⌒⌒ **Link/Activity**	Green	ON	Connection is established.
		OFF	No connection is established.
		Flashing	Port is sending or receiving data.
Per	Green	ON	Performance mode.
		OFF	Standard mode.
RMT	Green	ON	Remote mode.
LOC	Green	ON	Local mode.
SYM	Green	ON	Symmetric mode.
ASM	Green	ON	Asymmetric mode.
Line Speed	Green	ON	Displays the link speed in Mbps.
10/100TX Port			
Link/Activity	Green	ON	Valid network connection.
		OFF	No data transmission on port.
		Flashing	Port is sending or receiving data.
Speed	Yellow	ON	Link speed at 100Mbps.
		OFF	Link speed at 10Mbps.

Rear Panel

The 065-1167A rear panel has a receptacle for connecting the supplied external power adapter. Use only the external power adapter supplied with the Industrial Ethernet Extender.
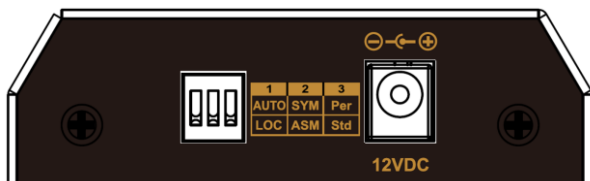
Rear Panel

DIP Switch Settings

Switch	Setting	Description
1	AUTO	Default. Recommended setting for all Ethernet extenders.
	LOC	Local mode. Connected extenders must be set to Auto.
2	SYM	Symmetric transmission mode
	ASM	Asymmetric transmission mode
3	Per	Peformance mode: Faster speed with less noise immunity
	Std	Standard mode: Standard speed with better noise immunity

Symmetric and Asymmetric Transmission Modes

Symmetric Mode provides a balanced data rate for upstream and downstream. This mode is suitable for network extension.
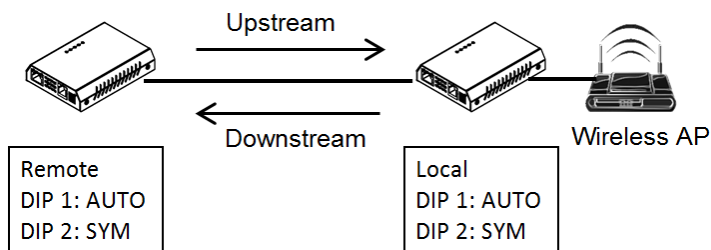
Similar transmission rates for upstream and downstream.

In asymmetric mode, the downstream data rate is higher than the upstream. This mode is suitable for applications such as IP cameras.
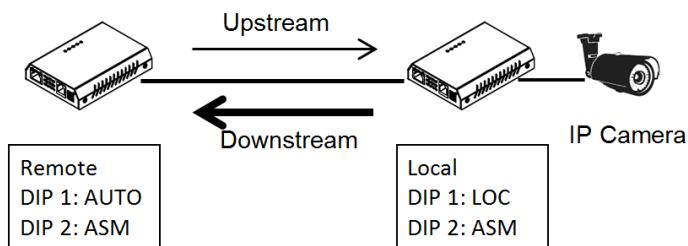
Higher transmission rate from Local to Remote.

Bottom Panel (Not shown)

The 065-1167A bottom panel has a product label that shows regulatory compliance, product serial number, and other information.

Top Panel

There are five LEDs on the top casing, which indicate the current transmission speed.

Installation

Before you install your Industrial Ethernet Extender, be sure
your operating environment meets the following operating
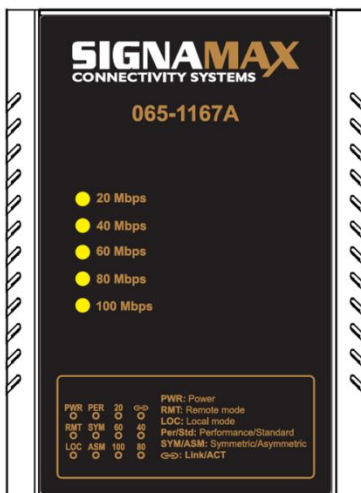environment requirements.

Site Requirements

Parameter	Requirements
Desktop installations DIN-Rail installations Wall Mount installations	Provide a flat table or shelf surface. Top hat type 35mm. Stably mount on wall surface.
Access	Locate the Industrial Ethernet Extender in a position that lets you access the front panel RJ-45 port and Ethernet Extender port, view the front panel LEDs, and access the rear-panel power connector.
Power source	Provide a power source within 6 feet (1.8 meters) of the installation location. Power specifications for the Industrial Ethernet Extender are shown in Appendix A. Be sure the AC outlet is not controlled by a wall switch, which can accidentally turn off power to the outlet and the Industrial Ethernet Extender.
Environmental Temperature:	Install the Industrial Ethernet Extender in a dry area, with ambient temperature between -10 and 60°C (14 and 140°F). Keep the Industrial Ethernet Extender away from heat sources such as direct sunlight, warm air exhausts, hot-air vents, and heaters.
Operating humidity:	The installation location should have a maximum relative humidity of 95%, non-condensing.

Parameter	Requirements
Ventilation:	Do not restrict airflow by covering or obstructing the rear and side panels of the Industrial Ethernet Extender. Keep at least 2 inches (5.08 centimeters) free on all sides for cooling.
	Be sure there is adequate airflow in the room where you intend to install the Industrial Ethernet Extender.
Operating conditions:	Keep the Industrial Ethernet Extender at least 6 ft (1.83 m) away from nearest source of electromagnetic noise, such as a photocopy machine.
Stacking	If you intend to stack two or more Industrial Ethernet Extenders, be sure:
	• The mounting surface can safely support the stack.
	• There is adequate space around the stack for ventilation and cooling.

Installing the Industrial Ethernet Extender

You can install your Industrial Ethernet Extender on a flat surface, DIN-Rail, or wall with other equipment.

- If installing the Industrial Ethernet Extender on a desktop, shelf, DIN-Rail, or wall, allow sufficient ventilation space between the device and the objects around it.

- 065-1167A Industrial Ethernet Extender Dimensions: 80.3 x 109.2 x 23.8mm (W x D x H) (3.16 x 4.3 x 0.94")

Connecting to the 10/100 Mbps RJ-45 Port

The front panel has one 10/100 Mbps RJ-45 port. To prevent ESD damage, follow normal board and component handling procedures.

To connect devices to the 10/100 Mbps RJ-45 port:

1. Insert one end of a Category 5 or better Ethernet cable into a Ethernet port.
2. Insert the other cable end into the Ethernet port of a computer, printer, network storage, or other network device.

Connecting to Ethernet Extender Port

The front panel of the Industrial Ethernet Extender provides one RJ-11 connector or Terminal Block (see "Ethernet Extender Port" on page 11). To prevent ESD damage, follow normal board and component handling procedures.

To connect the Industrial Ethernet Extender's Ethernet Extender port:

Insert the voice grade copper wire between one pair of Ethernet Extenders via Ethernet Extender port (RJ-11 connector or Terminal Block). One device must be set to LOC mode and the other to Auto mode when two devices are connected.

Checking the Installation

Before you apply power:

- Inspect the equipment thoroughly.

- Verify that all cables are installed correctly.

- Check cable routing to make sure cables are not damaged or create a safety hazard.

- Be sure all equipment is mounted properly and securely.

Applying AC Power

Before you connect the power adapter, select an AC outlet that is not controlled by a wall switch, which can turn off power to the Industrial Ethernet Extender. After you select an appropriate outlet, use the following procedure to apply AC power.

1. Connect the female end of the supplied AC power adapter cable to the power receptacle on the back of the Industrial Ethernet Extender.

2. Connect the 3-pronged end of the AC power adapter cable to a grounded 3-pronged AC outlet.

When you apply power:

- All green **Link/Activity** LEDs blink momentarily.

- The green **Power LED** goes ON.

- The **Link/Activity** LEDs for every port connected to a device flash, as the Industrial Ethernet Extender conducts a brief Power On Self-Test (POST).

After the Industrial Ethernet Extender passes the POST, the **Link/Activity** LEDs for every port connected to a device go ON. The Industrial Ethernet Extender is now functional and ready to pass data.

If the **Power** LED is not ON, check that the power adapter is plugged in correctly, and that the power source is good and not controlled by a wall switch.

Troubleshooting

Symptom	Cause	Solution
Power LED is OFF	The Industrial Ethernet Extender is not receiving power.	Check the power adapter connections for the Industrial Ethernet Extender at the Industrial Ethernet Extender and the connected device. Be sure all cables used are correct and comply with Ethernet specifications.
Link/Activity LED is OFF or intermittent	Port connection is not working.	Check the crimp on the connectors and be sure the plug is inserted properly and locked into the port at both the Industrial Ethernet Extender and the connecting device. Be sure all cables used are correct and comply with Ethernet specifications. Check for a defective adapter card, cable, or port by testing them in an alternate environment where all products are functioning.
File transfer is slow or performance degradation is a problem	Half- or full-duplex setting on the Industrial Ethernet Extender and the connected device are not the same.	Configure the Industrial Ethernet Extender and the attached device to auto-negotiate.
A segment or device is not recognized as part of the network	One or more devices are not connected properly or cabling does not meet Ethernet guidelines.	Verify that the cabling is correct. Be sure all connectors are securely positioned in the required ports. Equipment may have been disconnected accidentally.

Collisions are occurring on the connected segment	Some collisions are normal when the connection is operating in half-duplex mode.	Recheck the settings of the device attached to the Industrial Ethernet Extender port. Be sure the Industrial Ethernet Extender and the attached device are using the same duplex setting. Be sure the Industrial Ethernet Extender and the attached device are set to auto-negotiate.
Link/Activity LED is flashing continuously on all connected ports and the network is disabled	A network loop (redundant path) has been created.	Break the loop by ensuring that there is only one path from any networked device to any other networked device.

Additional Troubleshooting

Suggestions

If the suggestions the previous troubleshooting table do not resolve your problem, refer to the troubleshooting suggestions in this section.

Configuration

If problems occur after altering the Industrial Ethernet Extender's network configuration, restore the original connections and determine the problem by implementing the new changes one step at a time. Be sure cable distances, repeater limits, and other physical aspects of the installation do not exceed the Ethernet limitations.

Industrial Ethernet Extender Integrity

If required, verify the integrity of the Industrial Ethernet Extender by resetting it.

Auto-Negotiation

The 10/100 Mbps ports negotiate the correct duplex mode and speed since the Industrial Ethernet Extender is configured for auto-negotiation (this is the Industrial Ethernet Extender's default setting) and the device at the other end of the link supports auto-negotiation. If the device does not support auto-negotiation, the Industrial Ethernet Extender determines only the speed correctly and the duplex mode defaults to half-duplex.

Specifications

Technology

Specification	Description
Standards:	• IEEE802.3, 10BASE-T • IEEE802.3u, 100BASE-TX • IEEE802.3x, full-duplex and flow control
Forward and Filtering Rate:	• 10 Mbps: 14,880 pps • 100 Mbps: 148,810 pps
Processing Type:	• Store-and-Forward • Half-duplex back-pressure and IEEE802.3x full-duplex flow control • Auto Negotiation • Auto MDI/MDIX

Power

Specification	Description
Power Input:	12 VDC (DC Jack)
Power Consumption:	4.2 W Max.

Mechanical

Specification	Description
Casing:	Aluminum case IP30
Dimensions:	80.3 x 109.2 x 23.8mm (W x D x H) (3.16 x 4.3 x 0.94")
Weight:	150 g (0.33 lb)
Installation:	DIN-Rail (Top hat type 35 mm) or Wall Mount

Interface

Specification	Description
Ethernet Port:	One 10/100BASE-TX port
Ethernet Extender Port:	One RJ-11 and Terminal Block port
DIP Switch	DIP Switch 1: Auto/Local mode DIP Switch 2: Symmetric/Asymmetric mode DIP Switch 3: Performance/Standard mode
LED Indicators:	Per unit: Power Status Ethernet port: Link/Activity, Speed Ethernet Extender port: Link/Activity, Per, RMT, LOC, SYM, ASM, Line Speed

Data rates vary according to the quality of the connected cable. The information below is only for reference of applications.

Distance (m)	Data Rate (Mbps)
300	100
400	80
600	60
800	40
2600	1

This distance/data rate information is measured according testing standards. The actual installation will be affected by the quality of copper wire and the impact of noise disturbance. The connection speed will be affected.

Environment

Specification	Description
Operating Temperature:	-10°C to 60°C (14°F to 140°F)
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)
Ambient Relative Humidity:	5% to 95% (non-condensing)

Regulatory Approvals

Specification	Description
ISO:	Manufactured in an ISO 9001 facility
Safety:	UL60950-1, EN60950-1
EMI:	FCC Part 15B, 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) • FED STD 101C Method 5007.1 (Free fall w/ package)

Contact Information

SIGNAMAX™ CONNECTIVITY SYSTEMS

999 N.W. 159th Drive

Miami, Florida 33169, U.S.A.

Phone: 305-944-7710

Fax: 305-949-4483

Sales: 800-446-2377

Tech. Support: 800-446-2377, ext. 201

Http://www.signamax.com

E-mail: info@signamax.com