

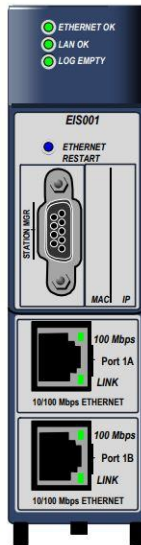
## QUICK START GUIDE

GFK-2948A

Sep 2019

# PACSystems™ RX3i

## ETHERNET 104 SLAVE MODULE (IC695EIS001)



# Contents

<b>1. User Features .....</b>	<b>ii</b>
1.1. Overview .....	1
1.2. Restart Pushbutton.....	1
1.3. Light-Emitting Diode Indicators (LEDs).....	2
1.4. Station Manager Port.....	4
1.5. Ethernet Interface Ports.....	4
<b>2. Hardware Installation .....</b>	<b>5</b>
2.1. Initial Checks .....	5
2.2. Installation Location .....	5
2.3. Installation in Hazardous Areas.....	6
2.4. Module Installation.....	7
2.5. Station Manager Port Connections .....	8
2.6. Ethernet Port Connections .....	8
<b>3. Configuration .....</b>	<b>9</b>
3.1. Configure EIS001 into Target CPU .....	9
3.2. Confirm EIS001 Communication with the CPU .....	11
3.3. Program COMMREQs for EIS001 Initialization .....	12
3.4. Complete the RX3i Application.....	12
3.5. Verify IEC 104 Network Operations .....	12
<b>4. Status and Diagnostic Data .....</b>	<b>14</b>
4.1. Module Status Data .....	14
4.2. Problems during Power-Up and Reset .....	15
<b>5. Additional Information .....</b>	<b>17</b>
5.1. PACSystems RX3i User Manuals.....	17
5.2. Information about IEC 60870-5-104 .....	17

## Warning Notes as used in this Publication

---



**Warning**

Warning Notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use. In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

---

**Note:** *Notes merely call attention to information that is especially significant to understanding and operating the equipment.*

---

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met during installation, operation, and maintenance. The information is supplied for informational purposes only, and Emerson makes no warranty as to the accuracy of the information included herein. Changes, modifications, and/or improvements to equipment and specifications are made periodically and these changes may or may not be reflected herein.

It is understood that Emerson may make changes, modifications, or improvements to the equipment referenced herein or to the document itself at any time. This document is intended for trained personnel familiar with the Emerson products referenced herein.

Emerson may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not provide any license whatsoever to any of these patents.

Emerson provides the following document and the information included therein as-is and without warranty of any kind, expressed or implied, including but not limited to any implied statutory warranty of merchantability or fitness for particular purpose.

# **1. User Features**

## **1.1. Overview**



















The PACSystems RX3i Ethernet 104 Server Module, catalog number IC695EIS001 implements the IEC 104 protocol, server side. It permits a PACSystems RX3i controller to be connected to an Ethernet network using a standard Ethernet TCP/IP connection scheme, and serve data to one or many IEC 104 clients, using interrogation polls, or report by exception (RBE) functions to retrieve data. Each IEC 104 Server module can be connected to IEC 104 Clients over the IEC 104 network.

Two auto-sensing 10BaseT/100BaseTX RJ-45 shielded twisted-pair Ethernet ports permit direct connection to either a 10BaseT or 100BaseTX IEEE 802.3 network without an external transceiver. Line, Star and Daisy Chain topologies are supported.

## **1.2. Restart Pushbutton**

The recessed Restart pushbutton can be used to restart the module without cycling power. The restart operation begins when the pushbutton is released.

### 1.3. Light-Emitting Diode Indicators (LEDs)

LED	State		Indicates
ETHERNET OK LAN OK LOG EMPTY	  	Fast Blink Off Off	Performing Diagnostics
ETHERNET OK LAN OK LOG EMPTY	  	Slow Blink Off Off	Waiting for Ethernet configuration from CPU
ETHERNET OK LAN OK LOG EMPTY	  	Slow Blink <sup>†</sup> On/Traffic/Off Slow Blink <sup>†</sup>	( <sup>†</sup> EOK and STAT blink in unison) Waiting for IP Address
ETHERNET OK LAN OK LOG EMPTY	  	On On/Traffic/Off On/Off	Operational
ETHERNET OK LAN OK LOG EMPTY	  	Blink error code Off Off	Hardware failure. Refer to GFK-2949, EIS001 User Manual for blink code definitions.
ETHERNET OK LAN OK LOG EMPTY	  	Slow Blink <sup>†</sup> Slow Blink <sup>†</sup> Slow Blink <sup>†</sup>	( <sup>†</sup> All LEDs blink in unison) Firmware Update (pattern is the same for awaiting or performing load)

LED	State		Indicates
Port LEDs (one pair for Port 1A, second pair for Port 1B)			
100 Mbps	<div><div></div><div></div></div>	On Off	100 Mbps Active 100 Mbps Not Achieved
LINK	<div><div></div><div></div></div>	Rapid Blink Off	Traffic Detected on Port No Traffic Detected on Port

## **1.4. Station Manager Port**

The Station Manager Port is an RS-232 serial port intended to permit the user to perform set-up operations or monitoring functions, but is not intended for permanent connection. The Station Manager port provides a means to access the module through a terminal interface. This function can alternatively be accessed over the Ethernet network.

A Station Manager interface application can be downloaded from Emerson Global Customer Care by searching KB14092 or following the link <https://www.emerson.com/Industrial-Automation-Controls/support>.

## **1.5. Ethernet Interface Ports**

The module provides two auto-sensing 10BaseT / 100BaseTX RJ-45 shielded twisted pair Ethernet ports for connection to either a 10BaseT or 100BaseTX IEEE 802.3 network. The port automatically senses the speed (10Mbps or 100Mbps), duplex mode (half duplex or full duplex) and cable (straight-through or crossover) attached to it with no intervention required. There is only one interface to the network (only one Ethernet MAC address and only one IP address).

## 2. Hardware Installation

### 2.1. Initial Checks

Upon receiving your RX3i equipment, carefully inspect all shipping containers for damage. If any part of the system is damaged, notify the carrier immediately. The damaged shipping container should be retained as evidence for inspection by the carrier. As the consignee, it is your responsibility to register a claim with the carrier in the event of damage incurred during shipment.

After unpacking the RX3i equipment, record all serial numbers. Serial numbers are required should you need to contact Customer Care during the warranty period. All shipping containers and all packing material should be saved should it be necessary to transport or ship any part of the system.

Verify that all components of the system have been received and that they agree with your order.

### 2.2. Installation Location

This product is intended for use with the RX3i system. Its components are considered open equipment (having live electrical parts that may be accessible to users) and must be installed in an ultimate enclosure that is manufactured to provide safety. At a minimum, the enclosure shall provide a degree of protection against solid objects as small as 12 mm (for example fingers). This equates to a NEMA/UL Type 1 enclosure or an IP20 rating (IEC 60529) providing at least a pollution degree 2 environment. For details about installing RX3i rack systems, refer to GFK-2314, *RX3i System Manual*.

If you need technical help, contact Technical Support. For phone numbers and email addresses, refer to GFK-2949, *PACSystems RX3i Ethernet IEC 104 Server Module User Manual* the section, *Contact Information*.



## 2.3. Installation in Hazardous Areas

The following information is for products bearing the UL marking for Hazardous Areas or ATEX marking for explosive atmospheres:

### CLASS 1 DIVISION 2 GROUPS ABCD

- This equipment is an open-type device and is meant to be installed in an enclosure suitable for the environment that is only accessible with the use of a tool.
- Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or nonhazardous locations only.

### WARNING

- EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.
- WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

### ATEX Zone 2

The EIS001 must be mounted in an enclosure certified in accordance with EN60079-15 for use in Zone 2, Group IIC and rated IP54. The enclosure shall only be able to be opened with the use of a tool.

### ATEX Marking



II 3 G Ex nA IIC T5 X Ta: 0 - 60C

## 2.4. Module Installation

The EIS001 is compatible with all RX3i CPU (no model restrictions). The EIS001 supports insertion into and removal from an Rx3i backplane which is under power. This module may be installed in any available RX3i backplane slot in the main (CPU) rack.

### Module Insertion

- RX3i rack power may be off or on (*hot insertion*).
- Holding the module firmly, align the module with the correct slot and connector. The installation slot must match the slot selected for the module location in the Proficy\* Machine Edition application.
- Engage the plastic hook at the top rear of the module with the corresponding exposed ridge in the backplane.
- Swing the module down until the connector at the rear of the module securely engages the mating backplane connector.
- Visually inspect the module to be sure it is properly seated.

### Module Connections

- Attach Cat5 or higher-rated cables to one or both RJ-45 connectors marked Port 1A and Port 1B, as the application demands.
- As needed, attach the RS-232 serial port connection to the D-connector marked Station Manager.

## 2.5. Station Manager Port Connections

<i>Pin No<sup>†</sup></i>	<i>Signal</i>	<i>Direction</i>	<i>Description</i>
1	DCD	IN	Data Carrier Detect
2	TX	OUT	Transmit Data
3	RX	IN	Receive Data
4	DSR	IN	Data Set Ready
5	GND		Signal Ground
6	DTR	OUT	Data Terminal Ready
7	CTS	IN	Clear to Send
8	RTS	OUT	Ready to Send
9	RI	IN	Ring Indicator

<sup>†</sup> Pin 1 is at the bottom right of the Station Manager Port connector as viewed from the front of the module.

---

**Note:** Station Manager software configuration is performed in the Station Manager tab of PME.

---

## 2.6. Ethernet Port Connections

The module provides two RJ-45 10BaseT/100BaseTX Ethernet Network Port Connectors.

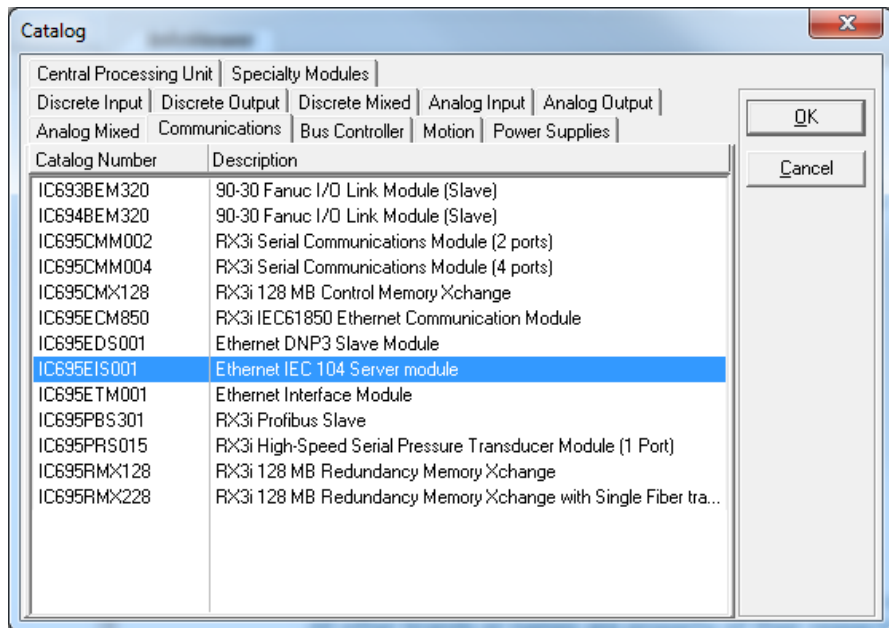
## 3. Configuration

### You will need:

- PACSystems RX3i CPU Firmware 7.18 or later.
- Proficy Machine Edition version 8.50 SIM 9 or later.
- GFK-2949, PACSystems RX3i Ethernet 104 Server Module User Manual, available from the Emerson Global Support <https://www.emerson.com/Industrial-Automation-Controls/support>. You will need to refer to this manual to fully configure and commission the EIS001.

### 3.1. Configure EIS001 into Target CPU

Start the PME application, then open or create the project to contain the EIS001. After configuring the rack, power supply, and CPU in the Project tab of the Navigator, select a vacant slot in the main rack into which the EIS001 is to be installed. Right-click on that slot icon and select **Add Module**. From the Communications tab of the Module Catalog, select the IC695EIS001 module. This *adds* the EIS001 module from the drop-down list into that location. Install the physical EIS001 module into the corresponding location.



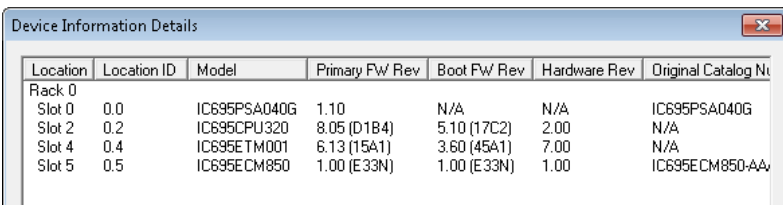
Once *added* to the rack location, set up the EIS001 parameters in the *Settings* and *RS-232 Port (Station Manager)* tabs as needed for the application.

The screenshot shows the InfoViewer interface. On the left, the 'Navigator' pane displays a tree structure under 'Hardware Configuration \*'. The tree includes 'Rack 0 (IC695CHSA12) \*' with slots 0 through 12. Slot 6 (IC695EIS001) is highlighted. On the right, the 'InfoViewer' pane shows the 'Parameters' table for the selected module.

Parameters	
Configuration Mode	TCP/IP
Adapter Name	0.6
Use BOOTP for IP Address	False
IP Address	10.0.0.1
Subnet Mask	255.255.255.0
Gateway IP Address	10.0.0.254
Name Server IP Address	10.0.0.254
Max FTP Server Connections	0
Network Time Sync	None
Redundant IP	Disable
I/O Scan Set	1

### 3.2. Confirm EIS001 Communication with the CPU

Power up the target RX3i system. In PME, go “online”, right-click on the target and select **Online Commands ►, Show Status..., Details**, to display the **Device Information Details** window. This queries the CPU and all modules present on all racks in the system, whether configured or not. If the EIS001 will appear as a ETM module, displayed in the list similar to the following screenshot, it indicates that the module has powered up as expected, is communicating with the CPU over the rack backplane, and that it is ready for further configuration.



Location	Location ID	Model	Primary FW Rev	Boot FW Rev	Hardware Rev	Original Catalog No
Rack 0						
Slot 0	0.0	IC695PSA040G	1.10	N/A	N/A	IC695PSA040G
Slot 2	0.2	IC695CPU320	8.05 (D1B4)	5.10 (17C2)	2.00	N/A
Slot 4	0.4	IC695ETM001	6.13 (15A1)	3.60 (45A1)	7.00	N/A
Slot 5	0.5	IC695ECM850	1.00 (E33N)	1.00 (E33N)	1.00	IC695ECM850-AAV

### 3.3. Program COMMREQs for EIS001 Initialization

A single COMMREQ instruction must be passed from the CPU to the EIS001 in order to configure the IEC 104 Server module attributes. These are explained in the Configuration portion of GFK-2949, Ethernet IEC 104 Server Module User Manual. The COMMREQ is executed once following power-up of the EIS001 and can be added to an existing ladder logic program.

### 3.4. Complete the RX3i Application

The variables created in the previous step are used to develop an RX3i application program. This program, along with the hardware configuration and network configuration is then downloaded to the RX3i controller for validation and deployment.

### 3.5. Verify IEC 104 Network Operations

After the COMMREQ has been executed, verify the data exchange on the Network is as expected. Establish that data originating at each Client is passed to the RX3i tables per the IEC 104 configuration. Verify also that data originating at the IEC 104 Server is passed to each Client per the corresponding IEC 104 configuration. IEC 104 network activity verification may be part of the IEC 104 configuration (heartbeat bits, for instance) or may be accomplished through the Station Manager interface. Refer

to GFK-2949, PACSystems RX3i Ethernet 104 Server Module User Manual for more information.



## 4. Status and Diagnostic Data

### 4.1. Module Status Data

Bit#	LAN Interface Status Bits
0 (lsb)	Port 1A Full Duplex
1	Port 1A 100 Mbps
2	Port 1B Full Duplex
3	Port 1B 100 Mbps
4	Network Time Locked
5	Redundant IP Address is Active
6-7	Reserved
8	Any Channel Error (error on any channel)
9	Used with Plugin Application 1
10	Used with Plugin Application 2, IEC 104 Server
11	Used with Plugin Application 3
12	LAN OK
13	Resource Problem
14	Module Over-Temperature
15	LAN Interface OK
16-79	Not Used

## 4.2. Problems during Power-Up and Reset

Certain conditions can prevent the module from becoming operational.

Problem	Indication	Action
Hardware failure	All Indicator LEDs off. Module unresponsive.	Return the module Emerson
Invalid bootstrap image		
Invalid boot image	<ul style="list-style-type: none"> <li>No Indicator LEDs turn on and the module is unresponsive, or</li> <li>The STATUS LED is solid green and is the only LED on.</li> </ul>	
Fatal power-up initialization failure	Fatal Error LED blink code	Note the blink code and contact Customer Service.
Non-fatal initialization failure	Module powers up normally, but an entry is added to the Local Log table and the RX3i CPU fault table.	Note the fault and contact Customer Service.
Module does not contain hardware identity info	Fatal Error LED blink code	Note the blink code and contact Customer Service.
Module operates with limited point counts	Only a small number of IEC 104 points are accessible, no matter the configuration	Module is operating without a license, Contact customer service

<b>Problem</b>	<b>Indication</b>	<b>Action</b>
Module shuts down after 4 hours	IEC 104 traffic stops after 4 hours of operation	Module is operating without a license, Contact customer service

## **5. Additional Information**

### **5.1. PACSystems RX3i User Manuals**

GFK-2949, PACSystems RX3i Ethernet IEC 104 Server Module User Manual

GFK-2222, PACSystems RX3i and RX7i CPU Reference Manual

GFK-2224, TCP/IP Ethernet Communications for PACSystems RX3i & RX7i User's Manual

GFK-2225, TCP/IP Ethernet Communications for PACSystems Station Manager Manual

GFK-2314, PACSystems RX3i System Manual

User manuals, product updates and other information sources are available on the Support website, <https://www.emerson.com/Industrial-Automation-Controls/support> under Controllers and IO, RX3i Controllers.

### **5.2. Information about IEC 60870-5-104**

For detailed information about IEC 60870-5-104 and related protocols (101, and 103), a web search using those key words will return sites with relevant information, as there is not one specific site for this standard such as with other protocols.

## Technical Support & Contact Information

Home link: <http://www.Emerson.com/Industrial-Automation-Controls>

Knowledge Base: <https://www.emerson.com/Industrial-Automation-Controls/support>

**Note:** If the product is purchased through an Authorized Channel Partner, please contact the seller directly for any support.

Emerson reserves the right to modify or improve the designs or specifications of the products mentioned in this manual at any time without notice. Emerson does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Emerson product remains solely with the purchaser.

© 2019 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

