# PACSystems* RX3i Ethernet 104 Server Module IC695EIS001

**Quick Start Guide**

## Contents

# 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<br>LAN OK<br>LOG EMPTY | ✹<br>○<br>○ | Fast Blink<br>Off<br>Off | | Performing Diagnostics |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✹<br>○<br>○ | Slow Blink<br>Off<br>Off | | Waiting for Ethernet configuration from CPU |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✹<br>●✹○<br>✹ | Slow Blink[†]<br>On/Traffic/Off<br>Slow Blink[†] | ([†] *EOK and STAT blink in unison*) | Waiting for IP Address |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ●<br>●✹○<br>●○ | On<br>On/Traffic/Off<br>On/Off | | Operational |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✹<br>○<br>○ | Blink error code<br>Off<br>Off | | Hardware failure. Refer to GFK-2949, EIS001 User Manual for blink code definitions. |

| *LED* | *State* | | *Indicates* |
|---|---|---|---|
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | 🟢<br>🟢<br>🟢 | Slow Blink†<br>Slow Blink†<br>Slow Blink† | († *All LEDs blink in unison)* | Firmware Update<br>(*pattern is the same for awaiting or performing load*) |
| *Port LEDs* (one pair for Port 1A, second pair for Port 1B) | | | |
| 100 Mbps | 🟢<br>⚪ | On<br>Off | 100 Mbps Active<br>100 Mbps Not Achieved |
| LINK | 🟢<br>⚪ | Rapid Blink<br>Off | Traffic Detected on Port<br>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 GE IP Global Customer Care by searching *KB14092* or following the link

http://support.ge-ip.com/support/index?page=kbchannel&id=S:KB14092&actp=search .

## 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.

⚠ - **Warning** – WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND

⚠ - **Warning** – 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*

⟨Ex⟩ 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*

| Pin No† | Signal | Direction | Description |
|---|---|---|---|
| 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 |

† 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 GE Intelligent Platforms support website, http://www.ge-ip.com/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.
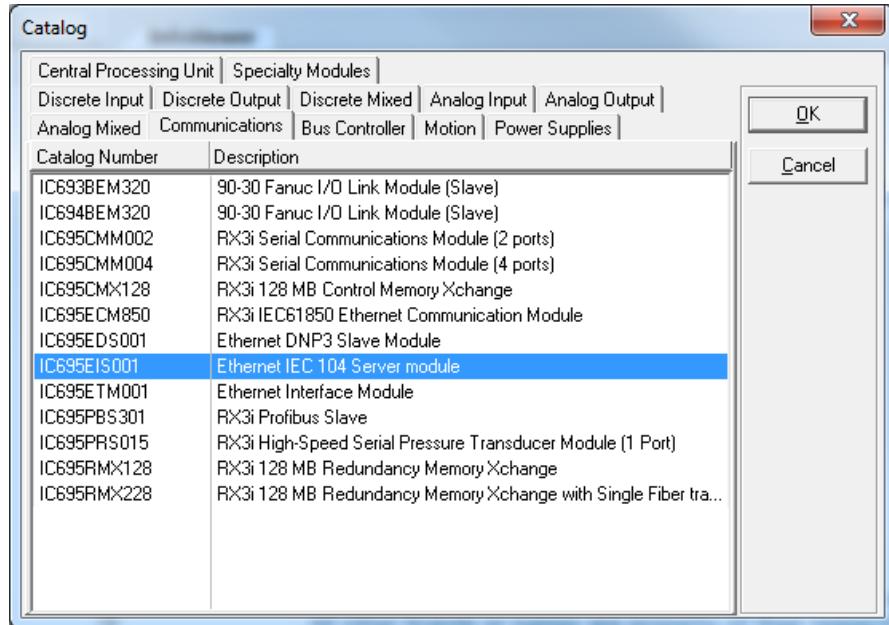
Once *added* to the rack location, set up the EIS001 parameters in the *Settings* and *RS-232 Port (Station Manager)* tabs as needed for the application.
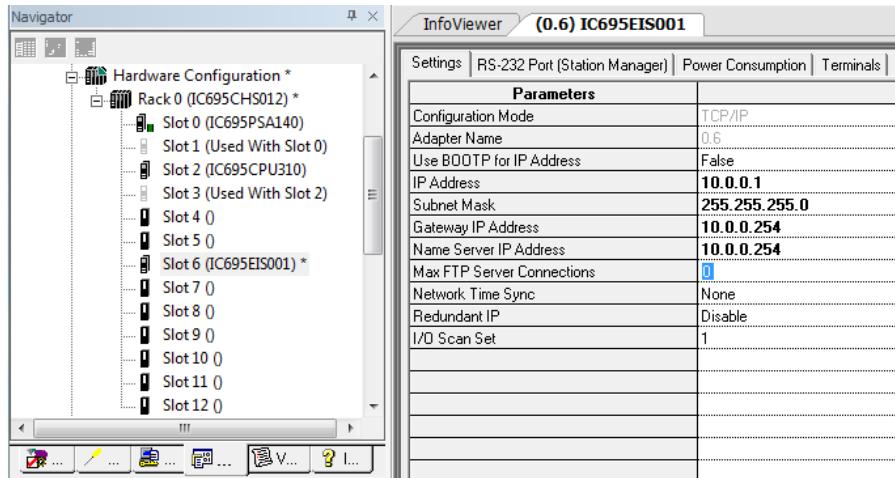
## 3.2. Confirm EIS001 Communication with the CPU

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 Nu |
|---|---|---|---|---|---|---|---|
| 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-AA/ |

### 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 to GE Intelligent Platforms. |
| Invalid bootstrap image | | |
| Invalid boot image | • No Indicator LEDs turn on and the module is unresponsive, or<br>• The STATUS LED is solid green and is the only LED on. | |
| 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 |

| Problem | Indication | Action |
|---|---|---|
| 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, http://www.ge-ip.com/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 relivant information, as there is not one specific site for this standard such as with other protocols.