

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GE PACSYSTEMS RX3i

IC695NIU001

ETHERNET NETWORK INTERFACE UNIT

Used with the applicable PACSystems RX3i network interfaces configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

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PACSystems™ RX3i

IC695NIU001

GFK-2419N
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Ethernet Network Interface Unit

The PACSystems RX3i Ethernet NIU, IC695NIU001, makes it possible to use PACSystems RX3i and Series 90-30 I/O remotely on an Ethernet network. Once set up by configuration, data exchange is completely automatic. System control can be provided by any GE master device capable of exchanging Ethernet Global Data. The Ethernet NIU automatically provides the controller with status information in each exchange. The application program logic in the controller can monitor this status data, and issue appropriate commands to the Ethernet NIU.

An RX3i Ethernet NIU station consists of:

- an RX3i Universal Backplane (IC695CHS0xx)
- an RX3i power supply (IC695PSxxxx)
- the RX3i Ethernet NIU (IC695NIU001)
- one or more RX3i Ethernet modules (IC695ETM001)
- proprietary application software
- Optional Series 90-30 expansion backplanes.
- PACSystems RX3i and/or Series 90-30 modules, as appropriate for the application.

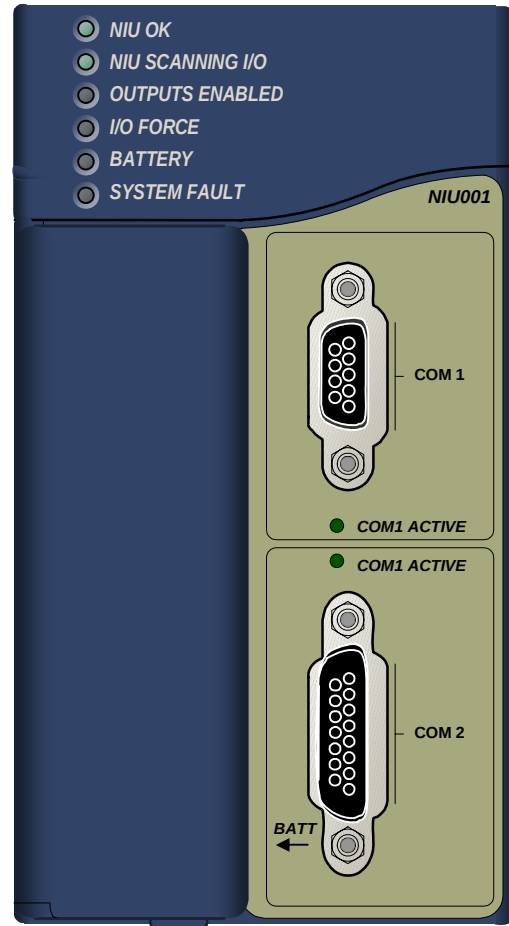
The Ethernet NIU is compatible with the same types of modules, backplanes, and other equipment as a PACSystems RX3i CPU. For a list of compatible products, see the *PACSystems RX3i Hardware and Installation Manual*, GFK-2314.

This module requires Machine Edition Logic Developer software, version 5.51 or later.

Ethernet NIU Features

- 20Kbytes of optional local logic. Supports all languages except C programming.
- 10 Mbytes of built-in flash memory for local user data storage.
- Battery-backed calendar clock.
- In-system upgradeable firmware.
- Two serial ports: an RS-485 serial port and an RS-232 serial port.
- Supports Ethernet communications via the backplane-based Ethernet Interface module (IC695ETM001)
- Data exchange using Ethernet Global Data (EGD)
- TCP/IP communication services using SRTP
- Comprehensive station management and diagnostic tools
- Supports operation with redundant controllers

- PACSystems RX7i and RX3i controllers can send selected COMMREQs to the RX3i ENIU via Ethernet Global Data. The ENIU executes the COMMREQs and returns the results to the controller.
- During EGD configuration, RX3i Ethernet interfaces are identified by their Backplane/Slot location.



Ethernet Global Data Features

The Ethernet NIU communicates with its controller via Ethernet Global Data exchanges. One exchange is used to send outputs to the ENIU and another exchange is used to send inputs back to the controller. The ENIU supports receiving outputs from redundant controllers. By sending the EGD exchange to a group address both controllers can receive the inputs. Up to 1300 bytes of outputs can be sent to a set of ENIUs from a controller. Each ENIU can send up to 1300 bytes of inputs to the controller.

A typical system might consist of a controller with five ENIUs. The controller sends 1300 bytes of outputs and each ENIU

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sends 100 bytes of inputs to the controller. This typical system would have its I/O updates occur in less than 25 milliseconds. If the controller scan time is greater than 25 milliseconds, the update occurs at the controller's scan rate. This performance timing is a guideline, not a guarantee, and assumes that there is no other traffic on the Ethernet link to the I/O. More performance data for other system configurations can be found in the Ethernet NIU Manual, GFK-2196A or later.

ENIU COMMREQ Feature

The ENIU supports selected COMMREQs that are sent to it by a "C" block application in a PACSystems Rx7i or RX3i controller. Ladder code is written in the RX7i or RX3i to interface to the "C" block which results in COMMREQ commands being sent via a EGD Exchange to the ENIU. The ENIU executes the COMMREQ and sends the results back to the RX7i or RX3i via another EGD exchange.

The following COMMREQs are supported:

- Modbus Master – function codes 1, 2, 3, 4, 5, 6, 7, 15, 16, 17
- Genius – enable/disable outputs, switch BSM, clear fault, clear all faults, assign monitor, read diagnostic
- PROFIBUS Master – Commreqs 1, 2, 4, 5, 6
- Motion (DSM314/DSM324) – load parameters
- High Speed Counter – Data command
- DeviceNet Master – Commreqs 1, 4, 5, 6, 7, 9
- Analog Module – HART Protocol Commreqs

Operation, Protection, and Module Status

Operation of this module can be controlled by the three-position RUN/STOP switch or remotely by an attached programmer and programming software. Program and configuration data can be locked through software passwords. The status of the NIU is indicated by the eight NIU LEDs on the front of the module. (See "LED Operation").

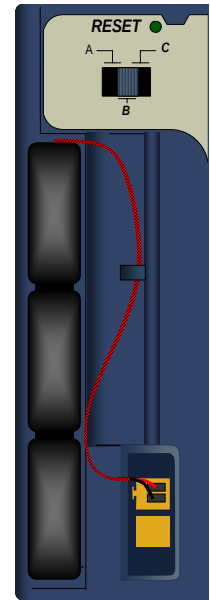
Battery

A three-cell lithium battery pack (IC698ACC701) is installed as show below. The battery maintains data memory when power is removed and operates the calendar clock. Program and initial values are always loaded from flash when the ENIU powers up. When replacing the battery, be sure to install a new battery before disconnecting the old one. If a new battery is installed when no battery is currently installed, the new battery must be installed while the ENIU has power. Otherwise, the ENIU may not power up. If that happens,

remove the battery, power-cycle the ENIU, then reinstall the battery.

Disposal of lithium batteries must be done in accordance with federal, state, and local regulations. Be sure to consult with the appropriate regulatory agencies before disposing of batteries.

To avoid loss of RAM memory contents, routine maintenance procedures should include scheduled replacement of the NIU's lithium battery pack. For information on estimating battery life, refer to the *PACSystems NIU Reference Manual*, GFK-2222.



Installation

It is the responsibility of the OEM, system integrator, or end user to properly install the control system equipment for safe and reliable operation. Installation should not be attempted without referring to the *PACSystems RX3i Hardware and Installation Manual*, GFK-2314.

1. Make sure that backplane power is off.
2. Install the NIU module in backplane 0. The NIU requires two slots and can use any slots except the highest numbered (rightmost) slot. It is recommended that the ENIU be located in slots 2 and 3. For more information about choosing a slot for the ENIU, see below.
3. Turn on power. The module should power up. When the NIU has successfully completed initialization, the NIU OK LED stays on and the NIU SCANNING I/O and EN LEDs are off.
4. To save battery life, do not connect the battery for the first time until the ENIU is installed in the backplane and the backplane powered on. The battery may then be attached to either of the two terminals in the battery compartment. Once that is done, the ENIU may be powered down and normal battery back up operation will begin.

Backplane Locations for the ENIU

1. The A/C Power Supply (IC695PSAx40) for the RX3i is a doublewide module whose connector is left-justified as viewed when installed in a backplane. It cannot be located in slot 11 of a 12-slot backplane or slot 15 of a 16-slot backplane. No latch mechanism is provided for the last (rightmost) slot in a backplane, so it is not

possible to place the power supply in the second to last slot.

2. The RX3i ENIU (IC695NIU001) is a doublewide module whose connector is right justified as viewed when installed in a backplane. The ENIU is referenced for configuration and application logic by the leftmost slot occupied by the entire module, not by the slot the physical connector is located in. For example, if the ENIU has its physical connector inserted in slot 3, the module occupies slots 2 and 3 and the ENIU is referenced as being located in slot 2.
 - The ENIU may be located in slot 0 with its connector in slot 1.
 - The ENIU cannot be located in slot 11 of a 12-slot backplane or in slot 15 of a 16-slot backplane, because its connector cannot be installed in the slot reserved for an expansion module.
3. When migrating a Series 90-30 ENIU system to a PACSystems RX3i ENIU, maintaining the slot 1 location of the ENIU means that only a singlewide power supply may be used in slot 0. Either DC power supply can be used (IC695PSD040 or IC695PSD140). Therefore, if the application must maintain a slot 1 ENIU and uses an AC power-supply, the RX3i system must have the RX3i AC power-supply located in a slot to the right of the RX3i ENIU in slot 1.

Locating the ENIU in a Slot Other than 1

Before deciding to place the ENIU in a slot other than slot 1, it is important to consider the possible application migration issues that could arise, as explained below.

Application Program

For Service Request #15 (Read Last-Logged Fault Table Entry) and Service Request #20 (Read Fault Tables), the location of ENIU faults is not the standard 0.1 location, but the slot the ENIU is located in (see above). Logic that decodes fault table entries retrieved by these service requests may need updating.

COMMREQs directed to the ENIU (e.g. those directed to the serial ports of the ENIU) will need to be updated with the correct ENIU slot reference.

Hardware Configuration

The slot location of the ENIU must be updated in the hardware configuration to reflect the ENIU's true location.

Fault Tables

Faults logged for the ENIU in the fault table will not in the standard 0.1 (backplane.slot) location, but will reflect the ENIUs actual slot.

Series 90 Controllers

Remote Series 90 controllers that use SRTP Channels COMMREQs expect the ENIU to be in slot 1 or slot 2. To support communications with Series 90 SRTP clients such as Series 90 controllers using SRTP Channels, the RX3i internally redirects incoming SRTP requests destined for {backplane 0, slot 1} to {backplane 0, slot 2}, provided that the ENIU is located in backplane 0 slot 2 (and the remote client has not issued an SRTP Destination service on the connection to discover the backplane and slot of the ENIU). This special redirection permits Series 90-30 applications that expect the power supply to be located leftmost and the ENIU to be located to the right of the power supply to function. Attempts to establish channels with ENIUs in slots other than 1 or 2 will fail if initiated from Series 90 controllers.

HMI and External Communication Devices

All external communication devices that interact with the ENIU should be checked for compatibility with ENIU slot locations other than slot 1. Problems may arise with, but are not limited to, initial connection sequences and fault reporting. Machine Edition View users should select "GE SRTP" as their communications driver – it can communicate with an ENIU in any slot.

Programmer Connection

The programmer can communicate with the NIU via serial port 1, serial port 2, or the backplane-based Ethernet interface. Connecting a programmer via an Ethernet TCP/IP network requires a CAT5 standard Ethernet cable with RJ-45 connectors.

Before connecting the programmer and ENIU to the Ethernet TCP/IP network, set the IP address using the Initial IP Address software tool. After setting the IP address, connect the RX3i and the computer running the programming software to the Ethernet Interface. For detailed information on programmer connection via Ethernet TCP/IP, refer to the *TCP/IP Ethernet Communications for PACSystems User's Manual*, GFK-2224.

Specifications for IC695NIU001

Battery: Memory retention	For estimated battery life under various conditions, refer to the <i>PACSystems NIU Reference Manual</i> , GFK-2222.
Power requirements	+3.3 VDC: 1.25 Amps nominal +5 VDC: 1.0 Amps nominal
Operating Temperature	0°C to 60°C (32°F to 140°F)
Floating point	Yes
Embedded communications	RS-232, RS-485
Serial Protocols supported	Modbus RTU Slave, SNP, Serial I/O, Modbus RTU Master by application "C" block
Backplane	Dual backplane bus support: RX3i PCI and 90-30-style serial
PCI compatibility	System designed to be electrically compliant with PCI 2.2 standard

For environmental specifications and compliance to standards (for example, FCC or European Union Directives), refer to the *PACSystems RX3i Hardware and Installation Manual*, GFK-2314.

Ordering Information

Description	Catalog Number
RX3i Ethernet Network Interface Unit	IC695NIU001
RX3i Ethernet Module	IC695ETM001
Package consisting of RX3i Ethernet NIU IC695NIU001 and one Ethernet Transmitter Module IC695ETM001	IC695NTK001
Package consisting of RX3i Ethernet NIU IC695NIU001 and two Ethernet Transmitter Modules IC695ETM001	IC695NTK002
Lithium Battery Pack	IC698ACC701
Auxiliary Battery Module (optional)	IC693ACC302
RX3i Power Supply, 40 Watt High Capacity Universal AC Power Supply	IC695PSA040
RX3i Power Supply, 40 Watt High Capacity 24 VDC Power Supply	IC695PSD040
RX3i Multi-Purpose Power Supply, 40 Watt High Capacity Universal AC	IC695PSA140
RX3i Multi-Purpose Power Supply, 40 Watt High Capacity 24 VDC	IC695PSD140
[Optional] RS-232 Cable	IC200CBL001
Rx3i Standard 12 Slot Backplane	IC695CHS012
Rx3i Standard 16 Slot Backplane	IC695CHS016

Note: For Conformal Coat option, please consult the factory for price and availability.

Release History

Catalog Number	FW Revision	Comments
IC695NIU001-DN	6.00	For details, see “Problems Resolved by Release 6.0” on page 8 and “New Features and Enhancements in Release 6.00” on page 8.
IC695NIU001-DM	5.70	Enables support that is functionally identical to the IC695CMX128 for the IC695RMX128.
IC695NIU001-CL	5.61	Corrects the problem described in GFK-2419L.
IC695NIU001-CL	5.60	Supports the IC695PMM335 PACMotion Multi-Axis Motion Controller and other new features, and corrects the problems listed in GFK-2419L.
IC695NIU001-CK	5.50	Supports Run-mode store of EGD. Adds support for LREAL data type.
IC695NIU001-CJ	5.03	Corrects problem of Corrupted User Memory issue after a power cycle. Corrects problem in 5.02 firmware only, in which loss of certain IC694 and IC693 modules in an expansion rack caused the outputs of similar modules in expansion racks to be disabled when the “Loss of Module” fault was configured as diagnostic.
IC695NIU001-BH	5.02	Fixed an issue where certain IC694 and IC693 modules in the main rack did not transition to stop mode after a “Loss of Module” fault was logged.
IC695NIU001-BG	5.00	Supports Proficy Process Systems rel. 1.00, Scan_Set_IO, Quality Function Blocks, Optional UDF Parameters, IEC Transitionals, SNPT Network time sync.
IC695NIU001-BF	3.83	Support for PACSystems RX3i Serial Communications modules IC695CMM002 and CMM004.
IC695NIU001-BE	3.82	
IC695NIU001-BD	3.81	Support for eight ETM modules in the main backplane.
IC695NIU001-AC	3.52	
IC695NIU001-AB	3.51	
IC695NIU001-AA	3.50	Initial Release

Important Product Information for this Release

Firmware release 6.00 provides the following new features, described in “New NIU Features and Enhancements” on page 8:

- User Defined Types (UDTs)
- Variable Indexed Arrays
- Logic Driven Write to Flash
- Backplane Operations Controller Enhancement.

Updates

The IC695NIU001 is field upgradeable to firmware version 6.00 using the firmware upgrade utility. To upgrade an existing NIU001 to firmware version 6.00, you will need the 44A753013-G13 upgrade kit, which can be downloaded from <http://www.ge-ip.com/support>.