MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GE

IC695CPU310

300 MHZ PACSYSTEMS RX3I CPU

Used with the applicable GE PACSystems RX3i configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: GE Fanuc RX3i IC695CPU310 Central Processing Unit, GFK-2329T

PACSystems™ RX3i

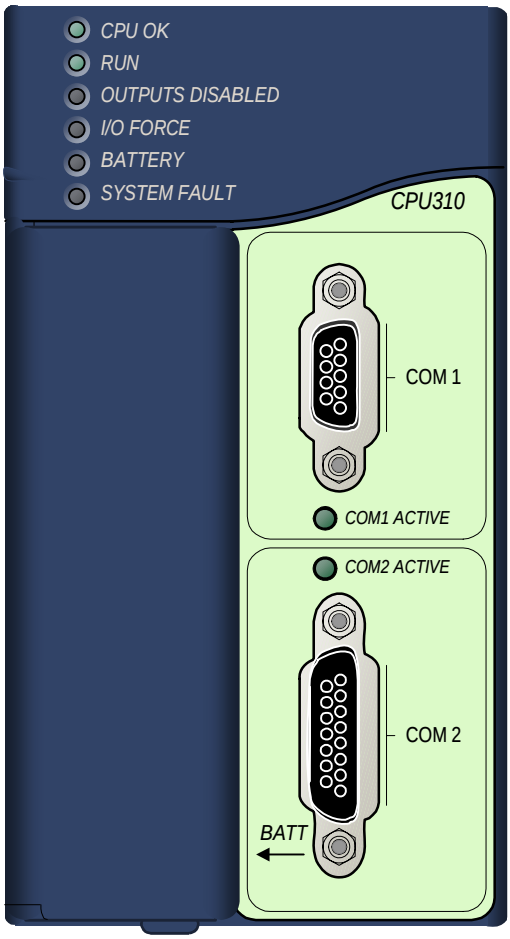
IC695CPU310-ER

Central Processing Unit

GFK-2329T
December 18, 2007

The RX3i CPU can be used to perform real time control of machines, processes, and material handling systems. The CPU communicates with the programmer and HMI devices via a serial port using SNP Slave protocol. It communicates with I/O and Intelligent Option modules over a dual backplane bus that provides:

- High-speed, PCI backplane for fast throughput of new advanced I/O.
- Serial backplane for easy migration of existing Series 90-30 I/O



Features

- Contains 10 Mbytes of battery-backed user memory and 10 Mbytes of non-volatile flash user memory.
- Provides access to bulk memory using reference table %W.
- Configurable data and program memory.
- Programming in Ladder Diagram, Structured Text, Function Block Diagram, and C.
- Supports auto-located Symbolic Variables that can use any amount of user memory.
- Reference table sizes include 32Kbits for discrete %I and %Q and up to 32Kwords each for analog %AI and %AQ.
- Supports most Series 90-30 modules and expansion racks. For a list of supported I/O, Communications, Motion, and Intelligent modules, see the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.
- Supports up to 512 program blocks. Maximum size for a block is 128KB.
- Bit-in-word referencing allows you to specify individual bits in a WORD reference in retentive memory as inputs and outputs of Boolean expressions, function blocks, and calls that accept bit parameters.
- In-system upgradeable firmware.
- Two serial ports: an RS-485 serial port and an RS-232 serial port.
- Ethernet communications via the rack-based Ethernet Interface module (IC695ETM001). For details on Ethernet capabilities, refer to *TCP/IP Ethernet Communications for PACSystems User's Manual,* GFK-2224.
- PLC time synchronization to SNTP Time Server on Ethernet network when used with Ethernet Release 5.0 or later module.

Ordering Information

Description	Catalog Number
RX3i VME 300Mhz CPU	IC695CPU310
Lithium Battery Pack	IC698ACC701
Auxiliary Battery Module (optional)	IC693ACC302
RX3i Power Supplies 40 Watt High Capacity Universal AC 40 Watt High Capacity 24 VDC For additional power supplies, see the PACSystems RX3i System Manual, GFK-2314.	 IC695PSA040 IC695PSD040
[Optional] RS-232 Cable	IC200CBL001
Rx3i Standard 12 Slot Rack	IC695CHS012
Rx3i Standard 16 Slot Rack	IC695CHS016

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

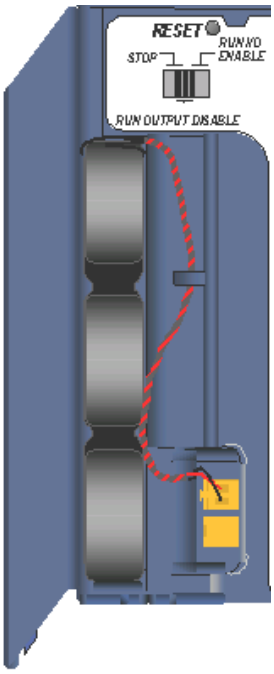
Operation, Protection, and Module Status

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 CPU is indicated by the eight CPU LEDs on the front of the module. (See “LED Operation” on page 5)

Battery

A three-cell lithium battery pack (IC698ACC701) is installed as shown in the figure below. The battery maintains program and data memory when power is removed and operates the calendar clock. When replacing the battery, be sure to install a new battery before disconnecting the old one.

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.



Mode Switch and Battery Compartment

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

User RAM Memory

The CPU has 10 Mbytes of battery-backed CMOS RAM memory for user data (program, configuration, register data, and symbolic variable) storage.

User Flash Memory

The CPU has 10 Mbytes of built-in flash memory for user data (program, configuration, register data, and symbolic variable) storage. Use of this flash memory is optional.

Firmware Storage in Flash Memory

This CPU uses non-volatile flash memory for storing the operating system firmware. This allows firmware to be updated without disassembling the module or replacing EPROMs. The operating system firmware is updated by connecting a PC compatible computer to the module’s RS-232 serial port and running the software included with the firmware upgrade kit.

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. Product manuals provide detailed information about installation, startup, and proper use of the control system equipment.

Installation should not be attempted without referring to the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.

1. Make sure that rack power is off.
2. Install the CPU module in rack 0. The CPU requires two slots and can use any slots except the highest numbered (rightmost) slot. Ensure mounting screws are tightened to completely secure the CPU in the rack.
3. Turn on power. The module should power up. When the CPU has successfully completed initialization, the OK LED stays on and the RUN and EN LEDs are off. The CPU is now ready to be programmed.
4. Connect the battery to either of the battery connectors on the module. (You can connect the battery at any step in the installation process but it will begin to drain immediately unless power is applied. To maximize battery life, install it after power has been turned on).

After the program has been verified, the mode switch can be moved to the appropriate operation mode position: RUN I/O ENABLED, RUN OUTPUT DISABLE, or STOP. The LEDs indicate the position of the mode switch and status of serial port activity. For details, see “LED Operation” on page 5.

Programmer Connection

The programmer can communicate with the CPU via the serial port 1, serial port 2, or the rack-based Ethernet interface.

If you connect your programmer via an Ethernet TCP/IP network, you will need a CAT5 standard Ethernet cable with RJ-45 connectors. Before connecting the programmer and RX3i to the Ethernet TCP/IP network you must 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.

For a description of programming functions, consult *Proficy™ Machine Edition Logic Developer-PLC Getting Started*, GFK-1918 and the software online help.

Serial Ports

The CPU has two independent, on-board serial ports, accessed by connectors on the front of the module. These ports provide serial interfaces to external devices.

Protocols Supported

Protocol	*Port 1*	*Port 2*
RTU (slave)	Yes	Yes
SNP Slave	Yes	Yes
Serial I/O	Yes	Yes
Firmware Upgrade	RX3i in STOP/No I/O mode	
Message Mode (C Runtime Library Functions: serial read, serial write, sscanf, sprintf)	Yes	Yes

Serial Port Baud Rates

Protocol	*Port 1 (RS-232)*	*Port 2 (RS-485)*
Modbus RTU Slave protocol	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Message	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Firmware Upgrade via Winloader	2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
SNP Slave	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Serial I/O	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	

Serial Cable Lengths and Shielding

The connection from a CPU serial port COM1 to the serial port on a computer or other serial device requires a serial cable. This connection can be made with the IC200CBL001 cable kit or you can build cables to fit the needs of your particular application. See the *PACSystems CPU Reference Manual,* GFK-2222 for more information on serial communications, cables, and converters.

Maximum cable lengths (the total length from the CPU to the last device attached to the serial cable) are:

- Port 1 (RS-232) – 15 meters (50 ft.), shielded cable optional
- Port 2 (RS-485) – 1200 meters (4000 ft.), shielded cable required

Port 1

Port 1 (COM1) is RS-232 compatible. It has a 9-pin, female, D-sub connector with a standard pin out. This is a DCE (data communications equipment) port that allows a simple straight-through cable to connect with a standard AT-style RS-232 port.

The COM1 Active LED provides the status of serial port activity.

Port 1 RS-232 Signals

Pin Number	*Signal Name*	*Description*
1*	NC	No Connection
2	TXD	Transmit Data
3	RXD	Receive Data
4	DSR	Data Set Ready
5	0V	Signal Ground
6	DTR	Data Terminal Ready
7	CTS	Clear To Send
8	RTS	Request to Send
9	NC	No Connection

* Pin 1 is at the bottom right of the connector as viewed from the front of the module.

Port 2

Port 2 (COM2) is RS-485 compatible. Port 2 has a 15-pin, female D-sub connector. This port does not support the RS-485 to RS-232 adapter (IC690ACC901). This is a DCE port.

The COM2 Active LED provides the status of serial port activity.

Port 2 RS-485 Signals

Pin No.	Signal Name	Description
1*	Shield	Cable Shield
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	+5VDC	Logic Power**
6	RTS(A)	Differential Request to Send
7	0V	Signal Ground
8	CTS(B‘)	Differential Clear To Send
9***	RT	Resistor Termination
10**	RD(A‘)	Differential Receive Data
11	RD(B‘)	Differential Receive Data
12	SD(A)	Differential Send Data
13	SD(B)	Differential Send Data
14	RTS(B)	Differential Request To Send
15	CTS(A’)	Differential Clear To Send

* Pin 1 is at the bottom right of the connector as viewed from the front of the module.

** Pin 5 provides isolated +5VDC power (300mA maximum) for powering external options.

*** Termination resistance for the RD A’ signal should be connected on units at the end of the line. To make this termination, connect a jumper between pins 9 and 10 inside the 15-pin D-shell.

Configuration

The RX3i CPU and I/O system is configured with Machine Edition PLC-Logic Developer programming software.

The CPU verifies the actual module and rack configuration at power-up and periodically during operation. The actual configuration must be the same as the programmed configuration. Deviations are reported to the CPU alarm processor function for configured fault response. Refer to the *Proficy Machine Edition Logic Developer-PLC Getting Started Manual,* GFK-1918 and the online help for a description of configuration functions.

Ethernet Global Data (EGD)

Each RX3i CPU supports up to 255 simultaneous Ethernet Global Data (EGD) exchanges across all Ethernet interfaces in the PLC. EGD exchanges must be configured in the programming software and stored into the CPU. The EGD configuration can also be loaded from the CPU into the programming software. Both produced and consumed exchanges can be configured. RX3i CPUs support using only part of a consumed EGD exchange. EGD exchange production and consumption can use the broadcast IP address of the local subnet.

The RX3i CPU supports 2msec EGD exchange production and timeout resolution. RX3i EGD exchanges can be configured for a production period of 0, indicating the exchange is to be produced every output scan. These “as fast as possible” exchanges are not produced more often than 2msec. RX3i CPUs support enhanced EGD freshness, providing better EGD timeliness than Series 90-30 CPU products.

During EGD configuration, RX3i Ethernet interfaces are identified by their Rack/Slot location.

Firmware Upgrades

The CPU receives firmware upgrades through a CPU serial port. To install a firmware upgrade, connect WinLoader to the CPU RS-232 or RS-485 serial port. Since you are connecting directly to the CPU, there is no need to specify the Rack/Slot location. For upgrades to intelligent option modules (the IC695ETM001, for example), which are performed indirectly via the CPU serial port, you must specify a rack/slot location.

LED Operation

The following table lists the CPU LED functions during normal operation (after initialization sequence is complete).

LED State (On / Blinking / Off)			CPU Operating State
On	**CPU OK**	On	CPU has passed its powerup diagnostics and is functioning properly.
Off	**CPU OK**	Off	CPU problem. RUN and OUTPUTS ENABLED LEDs may be blinking in an error code pattern, which can be used by technical support for troubleshooting. This condition and any error codes should be reported to your technical support representative.
Blinking	**CPU OK**, **OUTPUTS ENABLED, RUN**	Blinking in unison	CPU is in boot mode and is waiting for a firmware update through serial port.
On	**RUN**	On	CPU is in Run mode
Off	**RUN**	Off	CPU is in Stop mode.
On	**OUTPUTS ENABLED**	On	Output scan is enabled.
Off	**OUTPUTS ENABLED**	Off	Output scan is disabled.
On	**I/O FORCE**	On	Override is active on a bit reference.
Blinking	**BATTERY**	Blinking	Battery is low.
On	**BATTERY**	On	Battery is dead or not attached.
On	**SYSTEM FAULT**	On	CPU is in Stop/Faulted or Stop/Halted mode.
Blinking	**COM1** **COM2**	Blinking Blinking	Signal activity on port.

Specifications*

IC695CPU310	
Battery: Memory retention	For estimated battery life under various conditions, refer to the *PACSystems CPU Reference Manual,* GFK-2222.
Program storage	Up to 10 Mbytes of battery-backed RAM 10 Mbytes of non-volatile flash user memory
Power requirements	+3.3 VDC: 1.25 Amps nominal +5 VDC: 1.0 Amps nominal
Operating Temperature	0 to 60°C (32°F to 140°F)
Floating point	Yes
Boolean execution speed, typical	0.195ms per 1000 Boolean contacts/coils
Time of Day Clock accuracy	Maximum drift of 2 seconds per day
Elapsed Time Clock (internal timing) accuracy	0.01% maximum
Embedded communications	RS-232, RS-485
Serial Protocols supported	Modbus RTU Slave, SNP, Serial I/O
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
Program blocks	Up to 512 program blocks. Maximum size for a block is 128KB.
Memory	*%I and %Q:* 32Kbits for discrete *%AI and %AQ:* configurable up to 32Kwords *%W:* configurable up to the maximum available user RAM Symbolic: configurable up to 10 Mbytes
* 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.	

Release Information

Firmware release 5.02 fixes an issue where Series 90-30 Intelligent Option modules in the main rack do not transition to stop mode after a “Loss of Module” fault is logged. For details, refer to “Problems Resolved by this Revision (Firmware Release 5.02)” on page 7.

Updates

IC695CPU310 can be field-upgraded to firmware version 5.02 using the firmware upgrade utility. The upgrade kit, 44A752290-G17, can be downloaded at no charge from http://support.gefanuc.com or purchased.

Release History

Catalog Number	Firmware Version	Date
IC695CPU310-ER	5.02	Dec. 07
IC695CPU310-EP	5.00	Aug. 07
IC695CPU310-EN	3.83	Nov. 06
IC695CPU310-EM	3.82	Jul. 06
IC695CPU310-EL	3.81	May 06
IC695CPU310-DK	3.52	Jan. 06
IC695CPU310-DJ	3.51	Nov. 05
IC695CPU310-DH	3.50	Sep. 05
IC695CPU310-CG	3.12	Aug. 05
IC695CPU310-CF	3.11	Jun. 05
IC695CPU310-CD	3.00	Apr. 05
IC695CPU310-CC	2.90	Dec. 04
IC695CPU310-CB	2.80	Nov. 04
IC695CPU310-CB	2.51	Nov. 04
IC695CPU310-BB	2.51	Jul. 04
IC695CPU310-AA	2.50 (initial release)	Jun. 04