PACSystems™ RX3i 64 MB CPU w/Ethernet IC695CPE330 Quick Start Guide

EMERSON™

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User Features

The PACSystems™ RX3i CPE330 is a richly featured programmable controller CPU equipped with 64 Mbytes of built-in program memory and two independent high-speed Ethernet interfaces. It is ideally suited for multi-tier communications and for synchronizing large amounts of data. Its metal housing provides superior noise immunity.

The CPE330 is programmed and configured over Ethernet via PAC Machine Edition™ (PME) software. It resides in the RX3i main rack and supports all RX3i I/O and Intelligent Option modules, up to 32K I/O points.

- Supports an updated OPC stack and certificate management
- Supports PME's new GUI management interface for OPC UA configuration integration (start, stop, restart, clear, and provisioning mode)
- Supports the new PAC Security tool available for certificate trust management for clients and servers
- Supports RX3i Hot Standby Redundancy CPU with PROFINET® I/O using embedded PROFINET or using rack-mounted IC695PNC001 PROFINET Controllers.
- Supports RX3i Hot Standby Redundancy with Ethernet (EGD) & Genius I/O.
- Enabled simplex PROFINET I/O controller with support for up to 32 I/O devices and update rates of 1 – 512 ms. I/O device update rates of 8 ms

and faster are possible with 16 or fewer devices. When there are more than 16 devices configured, update rates of 16 ms and higher are available.

- Supports the Remote Get HART® Device Information COMMREQ, which allows the user application to read information from a HART device connected to an RX3i Analog module in an IC695PNS001 RX3i PROFINET Scanner. A UDFB that automates the COMMREQ control logic is available for download. (Refer to New Features and Enhancements for additional information.)

- Configured with Sequence of Events recording through the Embedded PROFINET Controller when used with up to four IC695PNS101 Advanced PROFINET Scanner modules. A RX3i SoE system supports events from up to 512 SoE input points with a system storage buffer for up to 128,000 events at a maximum rate of 400 events per second per PNS101. Each PNS101 supports SoE recording with IRIG B time synchronization of events accurate to 1ms and buffers up to 4000 events from up to four IC694MDL660 32 Circuit Discrete Input modules. Unmodulated IRIG B time signals are decoded by the PNS101 using either an IC695HSC304 or IC695HSC308 High Speed Counter Module. SoE recording is available in both simplex and redundant PROFINET systems.

- Supports programming in Ladder Diagram, Structured Text, Function Block Diagram, or C.

- Contains 64 Mbytes of configurable data and program memory.

- Supports auto-located Symbolic Variables that can use any amount of user memory.

- Contains reference tables include 32k bits for discrete %I and %Q and up to 32k words each for analog %AI and %AQ. Bulk memory (%W) also supported for data exchanges.
- Supports up to 768 program blocks. Maximum size for a block is 128KB.
- Configured to display serial number and date code in PME Device Information Details.
- Configured for Coordinated Universal Time (UTC) and Day Light Savings Time (DST) support.
- Operating temperature range 0 °C to 60 °C (32 °F to 140 °F).
- Compliant with EU RoHS Directive 2002/95/EC using the following exemptions identified in the Annex: 7(a), 7(c)-I and III, and 15.

Switches

The Run/Stop switch and RDSD UPLD and RDSD DNLD pushbuttons are located behind the protective front door. Switch operation is given in the following table.

The **Run/Stop** switch is enabled by default; it can be disabled in the PME Hardware Configuration (HWC) settings. The memory protection function of this switch can be disabled separately in HWC. The memory protection functionality is disabled by default.

RDSD Pushbuttons	Function	
RDSD UPLD	Loads user program or data from CPU to RDSD.	
RDSD DNLD	Stores user program or data from RDSD to CPU.	
Run/Stop	A three-position switch which operates as follows:	
Switch Position	CPU and Sweep Mode	Memory Protection
Run I/O	The CPU runs with I/O sweep enabled.	User program memory is read only.
Run	The CPU runs with outputs disabled.	User program memory is read only.
Stop	The CPU is not allowed to go into Run mode.	User program memory can be written.

Light-Emitting Diode Indicators (LEDs)

Status Indicators

LED	LED State		Operating State
CPU OK	🟢	On Green	CPU has passed its power-up diagnostics and is functioning properly. *(After initialization sequence is complete.)*
	⚪	Off	Power is not applied, or CPU has a problem, which may be indicated by blink pattern.
	💚	Blinking Other LEDs off	CPU in Stop-Halt state; possible watchdog timer fault. If the programmer cannot connect, cycle power with charged Energy Pack attached and refer to fault tables.
CPU OK FORCE	🟠 🟠	On Amber On Amber	CPU indicating CPU320/CRU320 compatibility setting Refer to the section, *Compatibility with CPU320/CRU320/CPU315* for more information.
RUN OUT EN	💚 💚	Blinking in unison	CPU is updating an internal programmable hardware device.

LED	LED State		Operating State
RUN	🟢	On Green	CPU is in Run mode.
	⚪	Off	CPU is in Stop mode.
OUT EN	🟢	On Green	Output scan is enabled.
	⚪	Off	Output scan is disabled.
FORCE	🟠	On Amber	Override is active on a bit reference.
	⚪	Off	No Overrides active in I/O Reference Tables.
RDSD	🟢	On Green	USB Device detected (No Activity)
	✳	Blinking Green	Port activity detected on USB Interface
	⚪	Off	No port activity detected on USB Interface
	🔴	On Red	RDSD Failure
	✳	Blinking Red	Target name mismatch: Press same RDSD pushbutton again to dismiss.
SYS FLT	🔴	On Red	CPU is in Stop/Faulted mode: a fatal fault has occurred.
	⚪	Off	No fatal faults detected.

CPE330 Ethernet Indicators

LED	LED State		Operating State
LINK (upper)	●	On Green	The corresponding link is physically connected.
	✿	Blinking Green	Traffic is detected at the corresponding port.
	○	Off	No connection detected at corresponding port.
1Gbps (lower)	●	On Amber (LAN1) or	Corresponding network data speed is 1 Gbps.
	●	On Green (LAN2)	
	○	Off	Corresponding network data speed is 100 Mbps or 10 Mbps.

Ethernet Ports

LAN1 connects to the uppermost RJ-45 connector. It is not switched. LAN2 connects to the two lower RJ-45 connectors. They are switched internally. Record the IP Address of each LAN in the space provided (Figure 1).

Each of the embedded Ethernet interfaces automatically senses the data rate (10 Mbps or 100 Mbps or 1 Gbps), communications mode (half-duplex or full-duplex), and cabling arrangement (straight-through or crossover) of the attached link.

For improved performance, the two Ethernet LANs are serviced by a dedicated microprocessor core. In addition, each Ethernet LAN is serviced by a dedicated Network Interface Controller (NIC). In this way, the servicing of the Ethernet ports is independent of the controller logic and I/O scanning. This superior level of servicing is required at the higher communications rates.

Any of the embedded Ethernet ports may be used to communicate with the PME programming software using the Service Request Transport Protocol (SRTP, a proprietary Emerson protocol, used primarily for communication with the programmer).

To establish Ethernet communications between PME and the CPE, Emerson recommends inserting an ETM with a known IP address into the rack to store a hardware configuration for the CPE330 with the desired IP address.

	CPE330 LAN1	CPE330 LAN2
IP Address:	192.168.0.100	10.10.0.100
Subnet Mask:	255.255.255.0	255.255.255.0
Gateway:	0.0.0.0	0.0.0.0

Figure 1: Typical Multi-Tier LAN Application
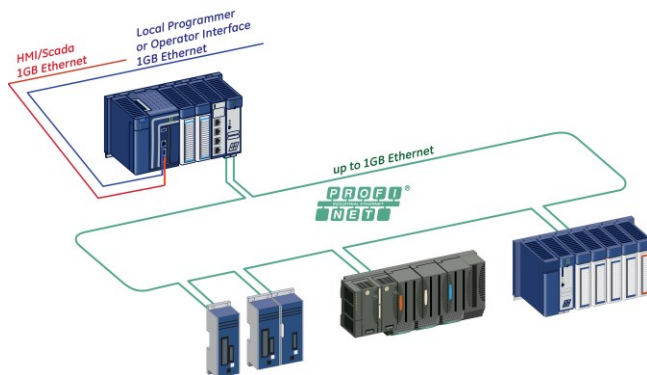
A typical application will take advantage of the two independent LANs. The dedicated LAN1 port will be used for communications with plant-level or supervisory layers. The switched LAN2 will typically be used to communicate with devices within the manufacturing cell or process, including local HMI devices and micro-controllers.

Hardware Installation

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 saved as evidence for inspection by the carrier.

As the consignee, it is your responsibility to register a claim with the carrier for damage incurred during shipment. Emerson Automation Solutions will fully cooperate with you, however, should such action be necessary.

After unpacking the RX3i equipment, record all serial numbers. Serial numbers are required if you should 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. If the system received does not agree with your order, contact Customer Care.

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 12mm (e.g. fingers). This equates to a NEMA/UL Type 1 enclosure or an IEC60529 IP20 rating providing at least a pollution degree 2 environment. For details about installing RX3i rack systems, refer to the *PACSystems RX3i System Manual,* GFK-2314.

If you need technical help, contact Technical Support. For phone numbers and email addresses, refer to the back cover of this Guide.

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 -** EXPLOSION HAZARD - WHEN IN HAZARDOUS AREAS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES.

ATEX Zone 2

This module 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.

Grounding

The RX3i rack into which this product will be mounted must be grounded per the instructions provided in *PACSystems RX3i System Manual,* GFK-2314. Also, if an Energy Pack (IC695ACC402) is connected, its ground-strap must be grounded as described in *PACSystems RX3i Energy Pack IC695ACC402 Quick Start Guide,* GFK-2939.

Module Start-up

You Will Need:

- An RX3i Universal Backplane: IC695CHS007, IC695CHS012 or IC695CHS016.
- This PACSystems RX3i CPU. This CPU occupies two backplane slots.
- An RX3i rack-mounted Power Supply Module and compatible power source (AC[1] or DC).
- A computer running PAC Machine Edition (PME) configuration and programming software. PME Version 9.70 SIM 16 or later supports all features in this document.
- Ethernet cable for connecting the PME programmer computer to the RX3i CPU.
- Phillip's head screwdriver.
- A very small slotted screwdriver (1.4 mm jeweler's size).

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[1] On lightly-loaded racks, use IC695PSA040H or later, or IC695PSA140D or later, otherwise power-up may be unsuccessful. Alternately, fill out the empty slots in the rack to draw more current.

Basic Installation Steps

For startup and configuration of the CPE330, complete the following steps. For full details on CPE330 operation, refer to the *PACSystems RX3i & RSTi-EP CPU Reference Manual,* GFK-2222 or later.

1. Turn power off at the RX3i rack and install the CPE330 in a double-slot which is CPU-compatible (refer to *PACSystems RX3i System Manual,* GFK-2314 Chapter 3). Typically, the CPU is in the left-most slot pair, or in the pair of slots to the right of the power supply module.

2. If used, mount the compatible RX3i Energy Pack (IC695ACC402) within 3 feet of the CPU. The dedicated interconnect cable attaches to the underside of CPE330. Follow interconnect and grounding instructions in *PACSystems RX3i Energy Pack IC695ACC402 Quick Start Guide,* GFK-2939. Secure the two retention flat-head screws with a very small slotted screwdriver.

3. Set the pair of hook tabs at top rear of the CPU module into two adjacent notches on the alignment rail of the RX3i rack backplane. This aligns the module with the intended slots in the main rack and with the right-side connector of this pair.

4. Swing the module down until the rear connector on the CPU module engages the mating backplane connector. Firmly engage the connectors.

5. Visually inspect the module to be sure it is properly seated.

6. Using a Phillip's head screwdriver, secure the two captive M3 x 5 mm machine screws into the matching threaded holes in the backplate of the RX3i I/O rack. The two screws are located at the bottom rear of the CPU module. Tighten.
7. Apply power to the rack.

Note: When the ACC402 Energy Pack is powered up, a period of time is required to charge it up to its operating level. During this time, the Energy Pack will indicate this condition via its LEDs (refer to *PACSystems RX3i Energy Pack IC695ACC402 Quick Start Guide,* GFK-2939).

The CPE330 will begin its boot cycle once ACC402 is charged. This typically takes 90 seconds or less. In the event the ACC402 is faulty or is not communicating, CPE330 commences operation without the Energy Pack.

Redundancy Configuration

PAC Machine Edition 8.60 SIM 8 or later may be used to create native CPE330 redundant applications when a rack-mounted IC695PNC001 is used as the PROFINET Controller. If using the CPE330 Embedded PROFINET Controller, use PME 9.50 SIM 7 or later.

To enable redundancy in a CPE330 project, select the CPE330 target in the *PME Navigator* and use the *Property Inspector* to change the *Enable Redundancy* target property to *True*.

PROFINET Controller Configuration

PAC Machine Edition 8.60 SIM 13, PME 9.00 SIM 4 or later may be used to configure an Embedded PROFINET Controller in the CPE330 Hardware Configuration on LAN 2.

To enable the PROFINET Controller in a CPE330 project, select the CPE330[2] target in the *PME Navigator* and open the Hardware Configuration. On the *Settings* tab, change the *LAN 2 Mode* to *PROFINET*. The *PROFINET Controller* node description now displays that it is using LAN 2 as a submodule under the CPE330.

Compatibility with CPU320/CRU320/CPU315

The CPE330 also serves as a drop-in replacement for the CPU320, CRU320, and CPU315 Controllers without the need to upgrade PME. To download projects intended for the CPU320/CRU320 to a CPE330 with versions of PME that do not support the CPE330, you must change the CPE330's compatibility setting.

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[2] CPE330 release 8.90 or later is required for the embedded PNC feature.

To change the compatibility setting, perform the following operations:

1. Power off the CPE330 and remove any USB stick that might be attached to its USB connector.
2. Place the CPE330's RUN/STOP switch in the STOP position.
3. Hold down the RDSD UPLD button and turn power on to the CPE330. Continue to depress the RDSD UPLD button until the CPE330 powers up and displays one of the following patterns on the LEDs.

CPU Status Indicators   ● On   ✿ Blinking   ○ Off

CPE330 LED	*LED State*		Operating State
CPU OK	●	On Amber	Normal mode. (Compatible with CPU320)
FORCE	●	On Amber	
RUN	○	Off	
RDSD	●	On Red	
OUT EN	○	Off	
SYS FLT	●	On Red	
CPU OK	●	On Amber	CRU320 Compatibility mode.
FORCE	●	On Amber	
RUN	●	On Red	
RDSD	○	Off	
OUT EN	○	Off	
SYS FLT	●	On Red	

4. To toggle the compatibility setting, press the RDSD DNLD button. The compatibility indication will toggle between the Normal (CPU320) and CRU320 compatibility patterns each time the RDSD DNLD button is pressed.
5. When the desired compatibility setting is displayed, press the RDSD UPLD button to save the setting and allow the CPE330 to continue its normal startup procedures with the new setting. The setting is maintained over a power cycle and firmware upgrade.

Note that with versions of PME that do not have native CPE330 support, only CPU320 projects can be stored to CPE330s that are in Normal (CPU320) compatibility mode and only CRU320 projects can be stored to CPE330s that are in CRU320 compatibility mode. Users of a CPE330 with PME version 8.60 SIM 8 or later do not need to change this compatibility setting if the project is converted to a CPE330 application. By factory default, the CPE330 is set to Normal (CPU320) compatibility mode.

Migration of CPU315 applications to the CPE330 is possible with no upgrade to PME by converting them to a CPU320 application and storing the project to the CPE330.

Note that CPE330s with firmware versions 8.45 through 8.60 support compatibility with the CPU320 and CPU315 only. The compatibility setting using the RDSD buttons is not supported for these firmware versions. Beginning with firmware version 8.70, CPE330s support compatibility with the CPU320, CPU315, and CRU320 using the RDSD buttons to set the compatibility mode.

The compatibility setting may be viewed at any time using the CPE330's firmware update web page. When the compatibility setting is Normal (CPU320), the catalog number is listed as "IC695CPE330." When the compatibility setting is CRU320 compatibility mode, the catalog number is listed as "IC695CPE330 CRU320 Compatibility Mode."

Removable Data Storage Device (RDSD)

The CPE330 user program and/or memory contents may be saved to a USB device via the RDSD UPLD pushbutton or loaded into the CPU from a USB device via the RDSD DNLD pushbutton. Similarly, data can be selected and saved. In this way, an application may be cloned and copied from one device to another.

Periodic Maintenance

Real-Time Clock Battery

The CPE330 is shipped with a real time clock (RTC) battery installed (Figure 2). Over time, this battery will need to be replaced. No action is required during initial installation.

Should the RTC battery fail, the CPU date and time will be reset to 12:00 AM, 01-01-2011 at start-up. The CPU operates normally with a failed or

missing RTC battery; however, the initial CPU time-of-day (TOD) clock information will be incorrect.

Figure 2: RTC Battery
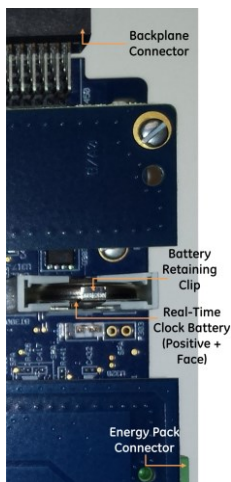
There are no diagnostics or indicators to monitor RTC battery status. The RTC battery has an estimated life of 5 years and must be replaced every 5 years on a periodic maintenance schedule.

For complete procedure, refer to Replacement of Real-Time Clock Battery on CPE330 in PACSystems RX3i, & RSTi-EP CPU Reference Manual, GFK-2222V or later.

Spare Parts

IC690ACC001   Battery, Lithium BR2032-BA Coin Cell 3 V 190 mAh -40 °C to +85 °C

Additional Information

General Contact Information

Please visit us for product support or updated product information:

Online Technical Support and GlobalCare:
https://www.emerson.com/en-us/support

Additional Information:
http://www.emerson.com/industrial-automation-controls

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