

# PACSystems™ RX3i CPU IC695CPE310 IPI

IC695CPE310-ADBC<sup>1</sup>

Firmware Version 9.90



<sup>1</sup> Includes conformal coat and low temperature module variants, if available.

## Warnings and Caution 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.

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### **CAUTION**

Caution notices are used where equipment might be damaged if care is not taken.

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

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## Current Release Information

IC695CPE310 firmware release 9.90 upgrades the OPC UA server, adding secure, encrypted communication with server and application authentication via certificate management and rebrands the CPUs to Emerson. Applied patches for VxWorks Urgent/11 vulnerabilities and made additional security enhancements to harden the products against an attacker. This release also resolves the issues found in the *Problems Resolved* section.

This firmware change is released for full production and as a web-only upgrade kit.

### Firmware Version Numbers

Firmware Component	RX3i CPU Models	Version Number
CPU Primary Firmware	CPE310	Rel 9.90 Build EC93
CPU Boot Firmware	CPE310	Version 8.30 Build E4DS

## Field Upgrades

All versions of the CPE310 are field upgradeable to this firmware release using the upgrade kit listed below. The upgrade is available via download from the support website. Links are available at the end of this document.

Release in line with software license compliance requirements.

### Upgrade Kit:

Part Number: 41G1734-MS10-000-A20

File Name: CPE310\_FW9\_90\_41G1734-MS10-000-A20.zip

## New Features

- **Updated OPC UA Stack and Certificate Management for OPC UA Connections:** Supports an updated OPC UA stack with server and application authentication via certificate management beginning with FW R9.90, PROFICY Machine Edition (PME) 9.50 SIM 17, and PAC Security. PME now has a GUI management interface for OPC UA configuration integrated (start, stop, restart, clear, and provisioning mode, etc.). The new PAC Security tool is available to manage certificate trust for clients and servers.
- **VxWorks Urgent/11:** Applied patches for VxWorks Urgent/11 vulnerabilities and made additional security enhancements to the IC695CPE302, CPE305, & CPE310 to harden the products against an attacker.

## Problems Resolved

Resolved Issue	ID	Description
On Delay, Off Delay, and Pulse Timer Roll Over	DE5314 SFDC00419660	An On Delay Timer (TON), Off Delay Timer (TOF), or Timer Pulse (TP) that runs for more than 25 days without being reset reports a negative elapsed time value. This issue can be mitigated by resetting the timer before 25 days elapse.
Cyber Security Updates	US30007 DE5328 DE5466 DE5467	Applied patches for VxWorks Urgent/11 vulnerabilities and made additional security enhancements to the IC695CPE302, CPE305, & CPE310 to harden the products against an attacker.
AUP <i>ip_ttl</i> not Applied	DE5564	Beginning with firmware version 9.90, the AUP file setting <i>ip_ttl</i> is applied after a configuration download. In prior versions, this setting was applied after a change of IP address or on power up.
TTL for Unicast Messages Advanced Ethernet Parameter Not Applied	DE5578	The <i>gucast_ttl</i> AUP parameter does not properly apply the TTL for unicast EGD exchanges.
OPC UA Server Can Cause Watchdog Reset	DE5641 SFDC00763354 DE5685 SFDC00771769 SFDC00781790	In releases prior to 9.90, it is possible to encounter a software and/or hardware watchdog reset when the OPC UA server is enabled. The chances of encountering this issue are increased when: <ul style="list-style-type: none"> <li>the sweep mode is set to "normal"</li> <li>the controller communications window is set to "run to completion"</li> <li>at least moderate SRTP, or Modbus, communications being processed in the communications window</li> </ul>

## Functional Compatibility

Compatibility Issue	Description	
Programmer Version Requirements	Feature	Minimum Version of PME Required
	OPC UA Management and Security Provisioning	9.50 SIM 17
	SNTIP Client Configuration OPC UA Server Configuration	9.00 SIM 10 or 9.50 SIM 2
	Extended PROFINET® device Subslot Number range	8.60 SIM8
	Support for 255 PROFINET I/O Devices	8.50 SIM9 or 8.60 SIM1
	Embedded Ethernet EGD Configuration	8.50 SIM7
	IC695RMX228 Reflective Memory Module Configuration	8.50 SIM2
	IC695ECM850 IEC 61850 Communication Module Configuration	8.00 SIM7
	Enhanced Security Functionality	7.00 SIM11
	CPE310 Configuration	7.00 SIM3
Remote Get HART® Device Information COMMREQ	<p>The Remote Get HART Device Information COMMREQ is supported by these products:</p> <p>RX3i CPUs with version 8.95 or later</p> <p>IC695PNC001 RX3i PROFINET Controller version 2.26 or later</p> <p>IC695PNS001 RX3i PROFINET Scanner version 2.41 or later</p> <p>IC695PNS001 RX3i PROFINET Scanner GSDML-V2.3-GEIP-RX3iPNS-20160602.xml<sup>2</sup></p>	

<sup>2</sup> IC695PNS001 RX3i PROFINET Scanner GSDML-V2.3-GEIP-RX3iPNS-20160602.xml is required to enable HART Pass Through Service Options settings in PME.

Compatibility Issue	Description		
Supports the HART® Pass Through Feature	<p>HART-capable RX3i Analog I/O modules can communicate HART data via this CPU to compatible asset management tools. Refer to the PACSystems HART Pass Through User Manual, GFK-2929 for more details.</p> <p>The following RX3i analog modules support HART:</p> <p>IC695ALG626</p> <p>IC695ALG628<sup>3</sup></p> <p>IC695ALG728</p> <p>If used for HART Pass Through, the supporting RX3i PROFINET Controller (PNC001) and PROFINET Scanner (PNS001 or CEP001) must also contain HART-compatible firmware:</p> <p>IC695PNC001 Firmware Release 2.20</p> <p>IC695PNS001 Firmware Release 2.30</p> <p>IC695CEP001 Firmware Release 2.30.</p>		
CPU Backward Compatibility	Legacy CPU310 Projects are supported on the CPE310.		
C Toolkit Compatibility	<p>C Toolkit version 7.00 or later</p> <p>The C Toolkit for PACSystems is distributed with PAC Machine Edition Logic Developer. Updates can be downloaded from from our support site. See the links available at the end of this document.</p> <p>Note: All C blocks must be recompiled using the new toolkit before downloading to a release 7.00 or later CPU.</p> <p>The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.</p>		
PROFINET IO Compatibility	Feature	Minimum Version of PNC Controller Required	Minimum Version of 3iPNS Required
	Remote Get HART Device Information COMMREQ	2.26	2.41
	Extended PROFINET Subslot Numbers	2.25	N/A
	Simplex (non-redundantly controlled) PROFINET IO	2.00	N/A
Backplanes, power supplies and system modules	<p>As listed in the PACSystems RX3i System Manual, GFK-2314.</p> <p>Power Sync and Measurement module, IC694PSM001.</p>		

<sup>3</sup> If used, IC695ALG628 must be installed in the RX3i CPU Rack. At time of publication, it is not supported by PROFINET scanners IC695PNS001 or IC695CEP001. Refer to IPs for IC695PNS001 or IC695CEP001 for future updates.

Compatibility Issue	Description
RX3i Backplane Hardware Revision Compatibility	<p>The following backplane hardware revisions MUST be used:</p> <p>IC695CHS012-BAMP  IC695CHS016-BAMP  IC695CHS012CA-BAMP  IC695CHS016CA-BAMP</p> <p>or</p> <p>IC695CHS007-AA (or later)  IC695CHS012-CA (or later)  IC695CHS016-CA (or later)IC695CHS012CA-CA (or later)  IC695CHS016CA-CA (or later)</p>
Series 90-30 Main Rack Compatibility	<p>Series 90-30 Main Racks cannot be used in a PACSystems RX3i system.</p> <p>Series 90-30 CPUs do not operate in PACSystems RX3i Racks.</p>
Isolated 24Vdc power	<p>In applications that use the IC69xALG220/221/222, consult <i>PACSystems RX3i System Manual</i>, GFK-2314 for details on wiring the 24Vdc power.</p>
COMMREQ to PBM300	<p>In Release 3.0, the behavior of the COMMREQ fault output on a COMMREQ sent to the PROFIBUS master module IC695PBM300 was changed to be compatible with the Series 90-30 CPU366 PROFIBUS Master. Previously, the fault output was enabled when the module received a COMMREQ and it was busy. Now, the busy condition does not result in the fault output being enabled.</p>
Recommended IC200ALG240 revision	<p>When a VersaMax™ system Genius™ Network Interface Unit (IC200GBI001) interoperates with a Genius Bus Controller located in a PACSystems PLC, and the VersaMax system contains an IC200ALG240 Analog Input Module, it is recommended to update the IC200ALG240 firmware to Revision 1.20 or later. Use firmware update kit 44A752313-G02, available in Article ID 000004438 on our support site.</p>
Configuration of IC694MDL754	<p>Always configure 16 bits of module status when using this module. Configuring 0 bits of module status will result in invalid data in the module's ESCP status bits.</p>
CIMPLICITY® OPC UA Client	<p>PACSystems OPC UA servers support up to five concurrent sessions with up to ten concurrent variable subscriptions and up to 12,500 variables. The subscription limit is shared across all available sessions.</p> <p>When using CIMPLICITY OPC UA Client, ensure the total number of subscriptions does not exceed the maximum. CIMPLICITY OPC UA Client is configured to create one subscription for every 500 items by default. If, for example, a project contains 1000 monitored items, CIMPLICITY creates two subscriptions. The number of items per subscription may be modified from the Device Configuration Panel / OPC UA DA Configuration / Subscriptions / Max. Number of Monitored Items.</p>
Ethernet Station Manager Modify Command Support	<p>The CPE302/CPE305/CPE310 Ethernet Station Manager supports monitor commands only. Modify commands are not supported in firmware release 8.65 or later. Refer to <i>TCP/IP Ethernet Communications for PACSystems Station Manager Manual</i>, GFK-2225M or later, for additional information.</p>

Compatibility Issue	Description
PNC001 Version for Extended PROFINET Subslot Numbers	IC695PNC001 PROFINET Controller firmware version 2.25 or later is required to configure PROFINET devices using extended subslot numbers.
HART Pass Through Version Requirements	HART Pass Through entails usage of PC-based applications, RX3i Analog modules with HART functionality and (optionally) supporting PROFINET products. HART Pass Through operation is described in the <i>PACSystems HART Pass Through User Manual</i> , GFK-2929.

## Release History

Catalog Number	FW Version	Comments
IC695CPE310-ADBC	9.90	<p><b>Updated OPC UA Stack and Certificate Management for OPC UA Connections:</b> Supports an updated OPC UA stack with server and application authentication via certificate management beginning with FW R9.90, PAC Machine™ Edition (PME) 9.50 SIM 16 (SIM 17 required for CPE310), and PAC Security. PME now has a GUI management interface for OPC UA configuration integrated (start, stop, restart, clear, and provisioning mode, etc.). The new PAC Security tool is available to manage certificate trust for clients and servers.</p> <p><b>VxWorks Urgent/11:</b> Applied patches for VxWorks Urgent/11 vulnerabilities and made additional security enhancements to the IC695CPE302, CPE305, &amp; CPE310 to harden the products against an attacker.</p>
IC695CPE310-ACBB	9.75	Firmware release 9.75 resolves the issues documented in the <i>Problems Resolved</i> section.
IC695CPE310-ACBA	9.65	Firmware release 9.65 resolves an issue with the IC695ETM001 resetting during heavy programmer traffic in some hardware configurations.
IC695CPE310-ACAZ	9.40	Firmware release 9.40 enhances SVC_REQ 20 to uniquely identify remote PROFINET IO faults and resolves a number of OPC UA issues.
IC695CPE310-ACAY	9.20	Firmware release 9.20 adds support for Embedded Simple Network Time Protocol (SNTP) Client, Coordinated Universal Time (UTC) and Day Light Savings Time (DST), and OPC UA Server configuration.
IC695CPE310-ACAX	9.10	Firmware release 9.10 adds support for OPC UA <i>Sweep Mode</i> and <i>Sweep Time</i> variables.



Catalog Number	FW Version	Comments
IC695CPE310-ACAW	8.96	Firmware release 8.96 adds support for the <i>Remote Get HART Device Information COMMREQ</i> . This allows the user application to retrieve information from a HART device connected to an RX3i Analog module via an IC695PNS001 RX3i PROFINET Scanner (PNS).
IC695CPE310-ACAV	8.90	Firmware release 8.90 resolves an issue where in rare cases EGD production to Multicast Destination Type addresses may not start when the CPE305/CPE310 powers on and goes to Run Mode.
IC695CPE310-ACAU	8.80	Firmware release 8.80 resolves an EGD multicast issue.
IC695CPE310-ACAT	8.75	The internal FLASH drive that holds the firmware and backs up user data updated to a new vendor. This change addresses an issue in which a very small percentage of IC695CPE310 units may not properly power up after a power cycle.
IC695CPE310-ABAT	8.75	Several security enhancements were made to various PACSystems Controllers to harden the product against an attacker with local area network access. See Article ID 000017059.
IC695CPE310-ABAS	8.70	Firmware Release 8.70 supports extended PROFINET device Subslot Numbers. The maximum Subslot Number for PROFINET devices has been increased from 255 to 21845.
IC695CPE310-ABAR	8.65	Firmware release 8.65 resolves security and OPC UA issues.
IC695CPE310-ABAP	8.50	Support for RX3i HART Pass Through feature.
IC695CPE310-ABAN	8.30	Adds support for EGD Class 1 on Embedded Ethernet Interface.
IC695CPE310-ABAM	8.20	Adds support for OPC UA.
IC695CPE310-ABAL	8.15	Adds support for IC695RMX228 (128 MB Reflective Memory Module with Single Mode Transceiver.) Adds ability to read reflective memory status bits for IC695CMX128, IC695RMX128, and IC695RMX228 (reflective memory modules). Adds enhanced Ethernet diagnostics capabilities.
IC695CPE310-ABAK	8.05	Adds support for the new IC695ECM850 (IEC 61850 Ethernet Communication Module), which operates as an IEC 61850 Client and provides connectivity to IEC 61850 Server devices.  Resolves three issues detailed in <i>PACSystems RX3i CPU IC695CPE310-ABAK IPI</i> , GFK-2713K.

Catalog Number	FW Version	Comments
IC695CPE310-ABAJ	7.80	Resolves the following issues: Unable to enter existing CPU password after Enhanced Security enabled. The PNC0001 fails to reconnect after remote IO power loss. The PBM300 stops responding after SUS_IO instruction executed.
IC695CPE310-ABAH	7.75	Corrects issues with the OEM lock functionality and with Ethernet communications. Adds support for RX3i CMX/RMX modules version –CG (hardware version Cx with firmware version 2.00 and later). For details, see <i>PACSystems RX3i CPU IC695CPE310-ABAH IPI</i> , GFK-2713H.
IC695CPE310-ABAG	7.70	Adds support for the following new modules: IC694MDL758, IC695CNM001 and IC694PSM001. Refer to <i>PACSystems RX3i CPU IC695CPE310-ABAG IPI</i> , GFK-2713G for issues resolved.
IC695CPE310-ABAF	7.30	Adds support for Modbus/TCP Server, Modbus/TCP Client, SRTP Server, and SRTP Channels from the embedded Ethernet port. For details, refer to <i>PACSystems RX7i &amp; RX3i TCP/IP Ethernet Communications User Manual</i> , GFK-2224L or later.
IC695CPE310-ABAE	7.16	Adds the ability to write DTR and read DSR, DCD, and RI on CPE310 Serial Port 1. This functionality has been implemented (for all CPUs with RS-232 Serial ports) using COMMREQ 4304 (Write Port Control) & COMMREQ 4303 (Read Port Status).
IC695CPE310-ABAD	7.15	Adds native support for the new Power Sync and Measurement module (IC694PSM001) and resolves several issues. Also introduces new features to augment security in the CPU firmware and PAC Machine Edition software. For details, see <i>PACSystems RX3i CPU IC695CPE310-ABAD IPI</i> , GFK-2713D.
IC695CPE310-ABAC	7.14	Corrects an issue where executing a Run Mode Store, displaying the PAC Machine Edition Show Status window, or requesting data using the PACSAnalyzer tool could cause discrete output modules to unexpectedly change state momentarily (up to one PLC scan). Corrects an issue that was introduced in release 7.13, which prevented configuration of Modbus TCP on Ethernet modules.
IC695CPE310-ABAB	7.13	Corrects issues with <i>Logic Write to Flash</i> (Service Request 57).
IC695CPE310-ABAB	7.11	Resolves the issues detailed in <i>PACSystems RX3i CPU IC695CPE310-ABAB IPI</i> , GFK-2713A.
IC695CPE310-AAAA	7.10	Initial release.

## Restrictions and Open Issues

Restriction/Open Issue	Description
Serial I/O Half Duplex Mode Failures at Low Baud Rates	When the CPE310 serial port is configured for Serial I/O protocol with 2-wire half-duplex serial port mode with baud rates less than 19.2k, upon switching from transmitting to receiving the last transmitted character may end up as the first character in the receive message buffer.
Rare Power-Up Problem on CPE310	When the CPE310 has logic and configuration source set to flash, rarely the controller will power up with all LEDs blinking in unison and the controller will be unreachable. An additional power down and then power up cycle will allow the controller to completely power up.
Missing <i>Addition of IOC</i> event when ECM850 module restarts due to reset pushbutton or SVC_REQ 24	When ECM850 module RESET is triggered using SVC_REQ 24 or Reset pushbutton, CPU does not report <i>Addition of IOC</i> fault message in Controller fault table after successful reset of module.
Run Mode Store of EGD Causes Sequence Store Failure & CPU Software Event Faults	<p>Performing a RUN Mode Store of a project where the total number of variables in EGD exchanges is near the maximum of 30,000 may result in a Controller Sequence Store Failure (Group: 137; Error Code 4) and CPU Software Event fault. (Group: 140; Error Code 145)</p> <p>If this occurs, storing the project may be successfully downloaded while the controller is in STOP Mode.</p>
Flash part issue on CPE305/CPE310 modules shipped in 2012	<p>When the CPE305 or CPE310 powers down with an Energy Pack connected, all user memory is written out to the NVS flash device. In 2012, a batch of flash memory chips were received that exhibited longer write times, which exceeded the capabilities of the Energy Pack. This will result in the CPE310 not retaining memory during a power-cycle event and logging a <i>User memory not preserved</i> fault.</p> <p>The parts that exhibit the extended write times went obsolete in 2012. Units shipped after January 1<sup>st</sup>, 2013 or prior to 2012 do <i>not</i> have the substandard part.</p> <p>Units shipped in 2012 that exhibit the symptoms of the issue (<i>User memory not preserved</i> fault after power cycle with a working Energy Pack) can be replaced via the warranty return policy.</p>
Ethernet COMMREQs not always delivered on the first logic sweep	In certain instances where User Logic is of sufficient size and a COMMREQ is issued on first logic sweep, the COMMREQ may be aborted before its transmission is attempted. The condition is much more observable on COMMREQs issued from the CPU's embedded Ethernet port. To avoid the possibility of encountering this condition, users should avoid issuing COMMREQs on first logic sweep.

Restriction/Open Issue	Description
PMM335 loss is occasionally detected on power down of the CPU. (Module is not lost on power-up.)	<p>The PMM335 PACMotion Multi-axis Motion Controller monitors power loss, independently of the CPU. The CPU is fast enough that it can occasionally detect and log the loss of the PMM335 just before the CPU itself powers down.</p> <p>No corrective action is required. This situation can be verified in two ways:</p> <p>(1) by inspecting the timestamp in the <i>Loss of Module</i> report one can correlate it with the power-down event, and</p> <p>(2) by performing a PME Show Status Details report to see that the PMM335 is present after power-up.</p>
Ethernet rack-based module fails to exchange EGD data properly during power cycling	<p>Very rarely, after experiencing multiple rapid power cycles, the CPU may fail to establish communication with one or more modules in the backplane at power up. When this occurs, several pairs of <i>Loss of, or missing option module</i> and <i>Reset of option module</i> faults with identical timestamps will be logged in the controller fault table. If the module is an Ethernet module, an event 30H is recorded in its station manager event log.</p> <p>To recover from this issue, cycle power again.</p>
Loss of Power Supplies after firmware update	<p>A Loss of Power Supplies after firmware update may occur. This does not happen with all firmware updates and will <i>not</i> occur if the system is power cycled after the firmware upgrade has completed. The faults displayed when this issue occurs are as follows:</p> <p>0.0 Loss of, or missing option module 01-12-2009 11:25:38</p> <p>Error Code Group Action Task Num</p> <p>36 4 3:Fatal 9</p> <p>Fault Extra Data:</p> <p>01 58 02 4f 80 08 0a 07 00</p>
Hot swapping some analog modules slowly result in modules not being recognized	<p>Occasionally during a hot insertion (hot swap) of IC695 Non-Isolated Analog Input Modules, input channels may take up to 2 seconds to reflect actual input values after the Module OK bit is enabled in the module status word. This has only been seen when the hot insertion has been done slowly (i.e. approximately 1.5 seconds to insert the module)</p>
Simultaneous clears, loads and stores not supported	<p>Currently, PACSystems CPUs do not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation. Simultaneous loads from a single controller are allowed.</p>
Hardware configuration Not Equal after changing target name	<p>If the user stores a hardware configuration to flash that sets <i>Logic/Config Power up Source</i> to <i>Always Flash</i> or <i>Conditional Flash</i> and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.</p>

Restriction/Open Issue	Description
Controller and IO Fault Tables may need to be cleared twice to clear faulted state	Both Controller and IO fault tables may need to be cleared to take the CPU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables are cleared may be significant. If the CPU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again.
Setting force on/off by storing initial value	Once a force on or force off has been stored to the RX3i, you cannot switch from force on to force off or vice-versa directly by downloading initial values. To turn off the force, perform a download, and then change the force on or off by another download.
Number of active programs returned as zero	The SNP request Return Controller Type and ID currently returns the number of active programs as zero.
Serial I/O failure at 115K during heavy interrupt load	Rare data corruption errors have been seen on serial communications when running at 115K under heavy interrupt load on the RX3i. Under heavy load applications, users should restrict serial communications to 57K or lower.
Multi-drop Serial Communications Interrupted by CPU315/320 Power Cycle	Communications can be disrupted when two EIA485 ports (Comm2) are wired together/multi-dropped using a 2-wire connection (wired or) and either the CPUs (IC695CPU320 and/or IC695CPU315) are powered on while the other CPU is communicating.
SNP ID not always provided	Unlike the Series 90-30, the RX3i CPU's SNP ID will not appear in the Machine Edition programmer Show Status display. Service Request 11 will always return zeroes.
Second programmer can change logic while in Test & Edit mode	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the RX3i.
Must have logic if powering-up from flash	If the application will configure the CPU to retrieve the contents of flash memory at power-up, be sure to include logic along with hardware configuration when saving to flash memory.
Two <i>Loss of Module</i> faults for Universal Analog Module	Occasionally, the hot removal of the Universal Analog Input Module (IC695ALG600) results in two <i>Loss of I/O Module</i> faults instead of one.
Power up of Series 90-30 HSC module may take as long as 20 seconds	As power is applied to a 90-30 High-Speed Counter, the <i>module ready</i> bit in the status bits returned each sweep from the module may not be set for as long as 20 seconds after the first PLC sweep, even though there is no <i>loss of module</i> indication. I/O data exchanged with the module is not meaningful until this bit is set by the module. Refer to <i>PACSystems RX3i and Series 90-30 High Speed Counter Modules User's Manual</i> , GFK-0293, Chapter 4.
Informational fault at power-up	Intermittently during power-up, an Informational non-critical CPU software fault may be generated with fault extra data of 01 91 01 D6. This fault will have no effect on the normal operation of the RX3i. But, if the hardware watchdog timer expires after this fault and before power has been cycled again, then the outputs of I/O modules may hold their last state, rather than defaulting to zero.

Restriction/Open Issue	Description
Extended memory types for IO triggers	%R, %W and %M cannot be used as IO triggers.
SNP Update Datagram message	If an Update Datagram message requests six (or fewer) bits (or bytes) of data, the RX3i will return a Completion Ack without Text Buffer. The protocol specifies that the returned data will be in the Completion Ack message, but it may not be present.
GBC30 may not resume operation after power cycle	In rare instances, a GBC30 in an expansion rack may not resume normal operation after a power cycle of either the expansion rack or the main rack.
Configuration of third-party modules	Do not specify a length of 0 in the configuration of a third-party module. The module will not work properly in the system.
Power supply status after CPU firmware update	The RX3i will report a <i>Loss of or missing option module</i> fault for the IC695PSD140 power supply following an update of CPU firmware. Also, the slot will appear empty in the programmer's online status detail view. The power supply continues to operate normally. Power cycle to restore normal status reporting.
Power supply status after power cycling	Rarely, turning a power supply on or off may not result in an <i>add</i> or <i>loss</i> fault. Also, the slot will appear empty in the programmer's online status detail view. The power supply continues to operate normally. To restore normal status reporting, cycle the power.
Do not use multiple targets	In a system in which the hardware configuration is stored from one target and logic is stored from a different target, powering-up from flash will not work. The observed behavior is that, following a power up from flash, PME reports hardware configuration and logic <i>not equal</i> .
Missing <i>Loss of terminal block</i> fault	The IC695ALG600/608/616 analog input modules do not produce a <i>Loss of Terminal Block</i> fault when hardware configuration is stored or the module is hot-inserted, and the terminal block is not locked into place.
Sequence Store Failure	<p>When downloading projects with very large hardware configuration or which use large amounts of user memory, it is possible to encounter a <i>PLC Sequence Store Failure</i> error when writing the project to flash. To avoid this error, either or both of the following actions may be helpful:</p> <p>Perform an explicit clear of flash prior to performing the write.</p> <p>Increase the operation timeout used by ME prior to performing the write. This is done by expanding the Additional Configuration in the Inspector window for the target controller, and adjusting Request Timeout. The timeout may need to be increased to as much as 60000 msec, depending on the amount of memory used and the condition of the flash memory.</p>
IC694MDL754: must configure module status bits	Always configure sixteen bits of module status when using this module. Configuring zero bits of module status will result in invalid data in the module's ESCP status bits.

Restriction/Open Issue	Description
IC695ALG600 Lead Resistance Compensation setting	A configuration store operation will fail if a channel is configured for 3-wire RTD and Lead Resistance Compensation is set to Disabled. A Loss of Module fault will be logged in the I/O Fault table at the end of the store operation. To recover the lost module, the configuration must be changed to enable Lead Resistance Compensation and module must be power cycled.
C Toolkit PlcMemCopy Documentation Incorrect	This routine does allow the destination and source pointers to be outside of reference memory. If the destination points to discrete reference memory, overrides and transitions will be honored. Note that the header for PlcMemCopy has been updated in Release 3.50 of the C toolkit.
Logic and HWC <i>not equal</i> after power cycle	If the Hardware Config from Target 1, with Logic/Configuration Power-up Source and Data Source both set to <i>Always from Flash</i> , is stored in Flash, and then Logic and Hardware Config from Target 2, with Logic/Configuration Power-up Source both set to <i>Always from RAM</i> , are stored to RAM and there is a good Energy Pack, when power is cycled the programmer may show that Logic and Hardware Config are <i>not equal</i> . The remedy is to clear Flash and re-store the Logic and Hardware Config from Target 2.
WinLoader does not detect PC COM port in use when upgrading PACSystems CPU	WinLoader does not detect whether a PC's COM port is in use when attempting to connect to a PACSystems CPU to perform a firmware upgrade. If the port is already in use it displays the status <i>trying to connect</i> followed by <i>waiting for target</i> . To proceed with the upgrade, press the abort button and disconnect the other application that is using the COM port.
WinLoader does not display error when it cannot connect serially with PACSystems CPU	WinLoader does not display an error message if it cannot connect to a PACSystems CPU to perform a firmware upgrade. This occurs if the cable is physically not connected to the CPU or if the CPU's serial port is not configured for the same baud as WinLoader. In this case Winloader displays the status <i>trying to connect</i> followed by <i>waiting for target</i> . To proceed with the upgrade, press the <i>abort</i> button and correct the cable or baud rate setting.
REPP does not save results of aborted PING	The station manager REPP command does not retain the results of a PING that is aborted due to error. The PING results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING.
Multiple log events	The Ethernet Interface sometimes generates multiple exception log events and Controller Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or Controller Fault Table can be completely filled with repetitive error messages.
Clear of large hardware configurations may cause log event 08/20	A Log event 08/20 may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored.

Restriction/Open Issue	Description
PLC response timeout errors (8/08) in Ethernet exception log under extremely heavy SRTP traffic	Under extremely heavy SRTP traffic conditions, the Ethernet Interface may log an event in the Ethernet exception log (Event 8, Entry 2 = 08H) indicating an overload condition. This error terminates the SRTP connection. If this event appears, either the traffic load should be reduced, or the application should use an alternate communications method to verify that critical data transfers were not lost due to the overload.
SRTP channel transfers may take up to 20 seconds after power cycle	When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to re-establish TCP connection used for SRTP communications.
TCP connection may timeout early if the timeout is set above 10 minutes	If the TCP connection timeout is set higher than 10 minutes, the connection may time out before the configured value. The connection timeout is derived from three AUP parameters: $wkal\_idle + (wkal\_cnt + 1) * wkal\_intvl$
Station Manager PARM command help text is wrong	Although the <i>parm v</i> Station Manager command works correctly, the <i>v</i> subsystem code (SRTP server) is not shown as supported by the online help.
Blink code upon Power-up	In rare occasions a blink code of 9-1-1-15 may be reported upon power up. To resume operation the unit must be power cycled again with the Energy Pack disconnected.
All CPE LEDs blinking in unison at power-up	In very rare occasions a CPE310 may power up erroneously indicating an over temperature condition (all CPU status lights blinking on and off in unison) and fail to go into run mode. To resume operation the unit must be power cycled again (with or without the Energy Pack connected.)
Watchdog Timer Trip on Logic-Initiated Read or Write of User Nonvolatile RAM	In rare instances, a <i>Logic Driven Read or Write of User Nonvolatile RAM</i> via Service Request 56 or Service Request 57 on a CPE310 can result in the expiration of the Software Watchdog Timer. The expiration of the Software Watchdog forces the CPE into a Stop Halt state. If this occurs the user must remove the Energy Pack and cycle power to the CPU to clear the failure mode. To resume operation the unit must then have project downloaded again from the programmer or via RDSD.



## Operational Notes

**Note:** For a summary of operational differences between Series 90™ and PACSystems RX3i controllers, refer to *Series 90 to PACSystems Applications Conversion Guide*, GFK-2722.

Operational Note	Description
OPC UA Client Commissioning	In the event that an OPC UA client device fails to connect to a RX3i PLC due to an incorrect OPC UA security certificate, the PLC will add that device to its reject list. This will prevent any future communication between the client and the PLC. To get the PLC to communicate with that client in the future, you must generate a new private key for the client and re-provision it with the GDS, using the Security Console.
Firmware upgrades using Slot 1	Firmware upgrades for modules in Slot 1 will only work for CPUs. Modules other than the CPU need to be in Slot 2 or higher to perform a firmware upgrade.
PMC display of CPE310 Module Information	The <i>Show Status</i> dialog box in PME displays <i>CPU310A</i> whenever the CPE310 is configured as a CPU310.
Serial port operation	The RS-232 port does not supply the 5V power offered by earlier RX3i and Series 90-30 CPUs.
C Toolkit Application Compatibility	Beginning with Rel 7.00 of the C Toolkit, writes to %S memory will fail to compile. In previous releases a compilation warning was issued. This affects use of the PACSystems C Toolkit macros Sw(), Si(), and Sd().
Multiple calls to SVC_REQ 57 ( <i>Logic Driven Write to Nonvolatile Storage</i> ) in a single sweep)	<p>Multiple calls to SVC_REQ 57 could cause the CPU to trip the watchdog timer and go to STOP-HALT mode. The number of calls to SVC_REQ 57 that can be made depends on variables such as the software watchdog timeout value, how much data is being written, how long the sweep is, age of nonvolatile storage (flash), etc.</p> <p>The number of calls to SVC_REQ 57 should be limited to one call per sweep to avoid the potential of going to STOP-HALT mode.</p>
Use of SVC_REQ 56 and 57 should be limited in frequency to avoid CPU watchdog timeouts	The <i>Logic Driven Read/Write to Flash</i> service requests are not intended for high frequency use. Depending on the amount of data being accessed and the condition of the flash memory, writing to flash could take more than one sweep interval to finish. If the application attempts to write to flash too frequently, the CPU could experience a watchdog timeout while waiting for a preceding write operation to complete. To avoid the potential for causing a watchdog timeout (resulting in the CPU going to Stop-Halt), the application should be designed such that one <i>Logic Driven Write</i> operation (SVC_REQ 57) is executed per sweep.

Operational Note	Description
<p>RUN LED is not illuminated on the Series 90-30 power supply for an RX3i remote/expansion rack with input modules only</p>	<p>For firmware version 6.70 and later, the RUN LED for remote/expansion racks will reflect the current IO enable/disable state (even when there are no output modules in the expansion rack).</p> <p>RUN LED for remote/expansion rack with input modules only works as follows for all versions prior to version 6.70:</p> <p>When a remote or expansion baseplate is used with the RX3i, the RUN LED on the Series 90-30 power supply for that baseplate is illuminated when the system is in Run mode only if the rack contains at least one output module. If the rack contains input modules only, the RUN LED is not illuminated. This is due to the way input modules are managed in the PACSystems design and does not indicate an error.</p>

<p>Slot numbering, power supply placement, CPU placement and reference</p>	<p>The A/C Power-Supply (IC695PSA040) for the RX3i is a doublewide module whose connector is left justified as viewed when installed in a rack. It cannot be located in Slot 11 of a 12-slot rack nor Slot 15 of a 16-slot rack. No latch mechanism is provided for the last (right-most) slot in a rack, therefore it is not possible to place the power-supply in the second to last slot.</p> <p>When migrating a Series 90-30 CPU system to a PACSystems RX3i CPU, be aware that to maintain the Slot 1 location of the CPU, 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 using an existing Series 90-30 system must maintain a Slot 1 CPU 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 CPU in Slot 1.</p> <p>In deciding to place the CPU in slots other than Slot 1, the user should be aware of the possible application migration issues that could arise. The following lists the areas that could be affected when migrating an application from one CPU slot to another.</p>																		
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	<p>of the CPU). This special redirection permits Series 90-30 applications that expect the power supply to be located leftmost and the CPU to be located to the right of the power supply to function. Attempts to establish channels with CPUs in slots other than 1 or 2 will fail if initiated from Series 90 PLCs.</p> <p><b>HMI and External Communication Devices</b></p> <p>All external communication devices that interact with the CPU should be checked for compatibility with CPU slot locations other than slot 1. Problems may arise with, but are not limited to, initial connection sequences and fault reporting. Machine Edition View customers should select <i>SRTP</i> as their communications driver – it can communicate with a CPU in any slot.</p> <p><b>Host Communications Toolkit (HCT)</b></p> <p>Applications that utilize the Host Communications Toolkit may require updated drivers.</p>
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Operational Note	Description
Undefined Symbols in C Blocks	<p>In Release 5.00 or later, if an attempt is made to download a C block containing undefined symbols, the download will fail. Machine Edition will display the following message in the Feedback Zone: Error 8097: Controller Error – Controller aborted the request [0x05][0xFF]</p> <p>Prior to Release 5.00, C blocks containing undefined symbols could be successfully downloaded, but if they were executed the CPU would transition to Stop/Halt mode.</p>
Length of serial I/O buffer	Effective with Release 5.70, the <i>Set Up Input Buffer Function</i> will always allocate a buffer containing 2097 bytes. This is one byte more than previous PACSystems releases.
LD-PLC operations	Machine Edition LD-PLC no longer supports a function that connects to the PLC, downloads, and then disconnects from the PLC. The <i>connect</i> and <i>download</i> functions are now separate. To perform a download to the PLC, you must first connect to the PLC.
Logic Executed in Row Major Instead of Column Major	Logic execution in PACSystems RX3i is performed in row major order (similar to the Series 90-30). This is different from the Series 90-70 that executes in column major order. This means that some complicated rungs may execute slightly differently on PACSystems RX3i and Series 90-70. For specific examples, see the programming software on-line help.
NaN Handled Differently Than in 90-30	The PACSystems RX3i CPU may return slightly different values for Not A Number as compared to Series 90-30 CPUs. In these exception cases (e.g., 0.0/0.0), power flow out of the function block is identical to Series 90-30 operation and the computed value is still Not A Number.
PID Algorithm Improved	<p>The PID algorithm used in PACSystems has been improved and therefore PID will function slightly differently on PACSystems RX3i than on the Series 90-30. The differences are that the elapsed time is computed in 100 <math>\mu</math>S instead of 10 mS units. This smooths the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS.</p> <p>Also, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated.</p>
Some Service Requests different from 90-30 or no longer supported	<ul style="list-style-type: none"> <li>• Service Requests 6, 15, and 23 have slightly different parameters. Refer to GFK-2222.</li> <li>• PACSystems PLCs support Service Request 26/30 functionality via fault locating references.</li> <li>• Service Request 13 requires a valid value in the input parameter block (Refer to GFK-2222 for details). On the Series 90-30 and Series 90-70 the parameter block value was ignored.</li> </ul> <p>Service Requests 48 and 49 are no longer supported (there is no auto-restart) because most faults can be configured to be not fatal.</p>
IL and SFC	IL and SFC are not available.
DO I/O Instruction	The Series 90-30 Enhanced DO I/O instruction is converted to a standard DO I/O instruction (the ALT parameter is discarded and ignored.)

Operational Note	Description
END Instruction	The Series 90-30 END instruction is not supported. Alternate programming techniques should be used.
Non-nested JUMP, LABEL, MCR, & ENDMCR Instructions	Non-nested JUMPs, LABELs, MCRs, & ENDMCRs are translated to the corresponding nested JUMPs, LABELs, MCRs, & ENDMCRs when converting from Series 90-30 to PACSystems RX3i.
Changing IP Address of Ethernet Interface While Connected	Storing a hardware configuration with a new IP address to the RX3i while connected via Ethernet will succeed, then immediately disconnect because the RX3i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting.
Duplicate Station Address for Modbus Will Conflict with Other Nodes	The default serial protocol for the RX3i is Modbus RTU. The default Station Address is 1. If the PLC is added to a multi-drop network, care must be taken that the PLC is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly.
Timer Operation	<p>Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. This means that they function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed in such a manner as to account for this catch up feature.</p> <p>Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep.</p>
Constant Sweep	Constant Sweep time, when used, should be set at least 10 milliseconds greater than the normal sweep time to avoid any over-sweep conditions when monitoring or performing on-line changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough.
Large Number of COMM_REQs Sent to Module in One Sweep Causes Faults	A large number of COMM_REQs (typically greater than 8) sent to a given board in the same sweep may cause Module Software faults to be logged in the PLC fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). When this occurs, the “FT” output of the function block will also be set. To prevent this situation, COMM_REQs issued to a given board should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMM_REQs are sent to a given board in each sweep. In addition, the FT output parameter should be checked for errors. If the FT output is set (meaning an error has been detected), the COMM_REQ could be re-issued by the application logic.
C Block Standard Math Functions Do Not Set errno	In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided.

Operational Note	Description
Upgrading Firmware	<p>The process of upgrading the CPU firmware with the WinLoader utility may fail when multiple IO modules are in the main rack, due to the time it takes to power cycle the rack system. If the upgrade process fails, move the CPU to a rack without IO modules and restart the upgrade process.</p> <p>Winloader initial connect baud rate is fixed at 19200 baud. Note that the firmware download will occur at 115.2K baud by default.</p> <p>Note that if you have hyperterm open on a port, and then try to use Winloader on the same port, Winloader will often say <i>Waiting for Target</i> until the hyperterm session is closed.</p>
Hot Swap	Hot Swap of power supplies or CPUs is not supported in this release
Serial Port Configuration COMMREQs	<p>With the following combination of circumstances, it is possible to render serial communications with the CPU impossible:</p> <p>User configuration disables the Run/Stop switch</p> <p>User configures the power up mode to Run or Last</p> <p>Logic is stored in FLASH and user configures CPU to load from FLASH on power-up</p> <p>User application issues COMMREQs that set the protocol on both of the serial ports to something that does not permit communications to the ME programmer.</p>
Run Mode Store of EGD	Rx3i peripheral Ethernet modules (IC695ETM001) must be running firmware version 6.00 or greater to utilize the Run Mode Store of EGD feature.
Reporting of Duplicate IP Address	The PACSystems RX3i does not log an exception or a fault in the PLC Fault Table when it detects a duplicate IP address on the network.
SRTP Connections Remain Open After IP Address Changed	<p>The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Once the local IP address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the <i>wkal_idle</i> Advanced User Parameter to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to <i>TCP/IP Ethernet Communications for PACSystems User Manual</i>, GFK-2224, for details.</p>
Lengthy CPE Backplane Operations	<p>Some exceptionally lengthy CPE backplane operations, such as MC_CamTableSelect, Data Log, and Read Event Queue functions, will take longer to complete compared to other RX3i CPU models, and may delay backplane operations to IC695 modules.</p> <p>For example, when a MC_CamTableSelect function block is executed on the PMM335 module, the CPU's acknowledgement of the PMM355 module interrupt may be delayed. In this situation, you may see the following fault in the I/O Fault Table, even when the interrupt has not been dropped: <i>Error initiating an interrupt to the CPU.</i></p>
Incorrect COMMREQ Status for Invalid Program Name	The program name for PACSystems is always <i>LDPROG1</i> . When another program name is used in a COMMREQ accessing %L memory, an Invalid Block Name (05D5) error is generated.

Operational Note	Description
FANUC I/O Master and Slave operation	<p>Scansets on the master do not work properly for the first operation of the scanset after entering RUN mode. They do work properly for subsequent scans.</p> <p>After downloading a new hardware configuration and logic, a power cycle may be required to resume FANUC I/O operation.</p> <p>Use PLCs of similar performance in FANUC I/O networks. If a master or slave is located in an RX3i system, the other PLCs should be RX3is or Series 90-30 CPU374s.</p> <p>Repeated power up/down cycles of an expansion rack containing FANUC I/O slaves may result in failure of the slaves' operation, with the RDY LED off.</p>
Lost count at power-up for Serial IO Processor	<p>The serial IO Processor (IC693APU305) will lose the first count after every power up or every time the module receives a config.</p>
COMMREQ Status Words Declared in Bit Memory Types Must Be Byte-Aligned	<p>In previous releases, the CPU allowed configuration of COMMREQ Status Words in bit memory types on a non-byte-aligned boundary. Even though the given reference was not byte-aligned, the firmware would adjust it the next-lowest byte boundary before updating status bits, overwriting the bits between the alignment boundary and specified location. To ensure that the application operates as expected, release 3.50 requires configuration of COMMREQ Status Words in bit memory types to be byte-aligned. For example, if the user specified status bit location of %I3, the CPU aligns the status bit location at %I1. Release 3.50 firmware requires the user to specify the appropriate aligned address (%I1) to ensure that the utilized location is appropriate for their application. Note that the actual reference location utilized is not changed, but now is explicitly stated for the user.</p>
STOP and RUN Mode Transition Priority	<p>The PACSystems CPU receives requests to change between stop and run mode from many different sources. These include (but are not limited to) PAC Machine Edition, HMIs, the user application, and the RUN/STOP switch. Since there are many potential sources for a mode change request, it is possible to receive a new mode change request while another is already in progress. When this scenario occurs, the CPU evaluates the priority of the new mode change request with the mode change that is in progress. If the new mode change request has an equal or higher priority than the one already in progress, the CPU transitions to the new mode instead of the one in progress. If, however, the new mode change request has a lower priority than the one in progress, the new mode request is discarded and the CPU completes the mode change that is in progress. The sweep mode priorities are (listed from highest to lowest priority) STOP HALT, STOP FAULT, STOP, and RUN.</p> <p>Note: The IO ENABLED/DISABLED state is not part of the mode priority evaluation.</p> <p>For example, a CPU is in RUN IO ENABLED mode and a Service request 13 function block is executed to place the CPU into STOP IO DISABLED mode. Before the transition to STOP IO DISABLED is completed, the RUN/STOP switch is changed from RUN IO ENABLED to RUN IO DISABLED. In this case, the CPU ignores the new request from the RUN/STOP switch to go to RUN IO DISABLED mode because it is already processing a request to go to STOP IO DISABLED mode and STOP mode has a higher priority than RUN mode.</p>
Suspend IO Function Block does not Suspend EGD	<p>In a 9070 the SUSPEND_IO function block suspends EGD in addition to IO Scan. In PACSystems controllers the SUSPEND IO only suspends IO Scan.</p>



Operational Note	Description
Nuisance Faults Sometimes Logged for Missing Power Supply	If a power supply is missing or has some fault that makes it appear to be missing, the CPU may improperly report (upon download of configuration) more than one fault. Such additional faults may be safely ignored and will not occur in a properly configured rack (with no mismatches or missing modules),
Uploaded Controller Supplemental Files lose date and time	Controller Supplemental Files uploaded from the CPU are time stamped as 8/1/1980 12:08AM regardless of PC or PLC time.
OPC UA Sessions, Subscriptions, & Variables	PACSystems OPC UA servers support up to five concurrent sessions with up to ten concurrent variable subscriptions and up to 12,500 variables. The subscription limit is shared across all available sessions.

## Embedded Ethernet Interface

### Embedded Ethernet Interface Restrictions and Open Issues

Restriction/Open Issue	Description
Ethernet disconnect during word-for-word change	If the Ethernet connection is broken during a word-for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting due to the fact that it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again.
Possible PME inability to connect	Infrequently, an attempt to connect a programmer to an RX3i via Ethernet will be unsuccessful. The normal connection retry dialog will not be displayed. Rebooting the computer that is running the programmer will resolve the behavior.
Spurious Ethernet fault	In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28h, Entry 2 = 000Eh. This fault can be safely ignored.
Intermittent Ethernet log event 8H/15H after power cycle	When starting after a power cycle, the Ethernet Interface may intermittently log an exception (entry 8H, Entry 2 = 15H, Entry 3 = 0000H, Entry 4 = 00aaH). This exception is benign and may be ignored.
Station Manager PING commands	When initiating ICMP echo requests from the PLC via Station Manager's PING command, the operation occasionally fails and an exception is logged (Event eH, Entry 2 = 6H).

## Embedded Ethernet Interface Operational Notes

Operational Note	Description
Configuration of IP address is required <i>before</i> using Ethernet communications	<p>Note: <i>BOOTP and the SetIP tool in PME are not supported.</i></p> <p>The embedded Ethernet Interface cannot operate on a network until a valid IP address is configured. (The default IP address is 192.168.0.100.) The Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP address:</p> <p>Download a CPE configuration from the Programmer using a serial connection.</p> <p>Download a CPE configuration from the Programmer using the Ethernet connection of an ETM001 in the same rack with a known IP address configuration.</p> <p>Once a temporary IP address has been set up, the Embedded Ethernet Interface may be accessed over the network.</p>
Programmer version requirements	<p>PAC Machine Edition Logic Developer PLC 7.00 SIM3 or later must be used to configure the embedded Ethernet port of a CPE310.</p> <p>If the embedded port is not needed, older versions of PAC Machine Edition Logic Developer PLC can be used to download a CPU310 configuration to the CPE310.</p>
Ethernet cable should not be connected when a CPE310 is configured as a CPU310	<p>Although the CPE310 can be configured as a CPU310 for backward compatibility, an Ethernet cable should not be connected to the device when it is configured as a CPU310.</p> <p>Ethernet is not supported when CPE310 is configured as a CPU310 and the Ethernet port should not be connected to any network as it may have adverse effects to the network and/or operation of the CPU.</p>
Ethernet Event Log not preserved across power cycle	<p>The Ethernet event log on the CPE310 is not maintained across a power-cycle. However, Ethernet log events will be reported in the Controller Fault Table as with other Rx3i CPUs. An Energy Pack can be used to preserve these entries when power is lost.</p>
Station Manager commands	<p>The embedded Ethernet interface of the CPE302/305/310 supports a subset of Station Manager Commands. (monitor only commands) For details, refer to <i>TCP/IP Ethernet Communications for PACSystems Station Manager Manual</i>, GFK-2225P (or later).</p> <p>Beginning with R9.40, the <i>plcread</i> and <i>egdread</i> commands are no longer supported by the Ethernet Station Manager. PAC Machine Edition may be used to read data in reference memory and EGD exchanges.</p>

Operational Note	Description
AUP parameter restrictions	<p>The Advanced User Parameter <i>wsnd_buf</i> should not be changed by the user. Changing the value of this parameter may cause the Ethernet Interface to drop its connection and the LAN LED to turn off.</p> <p>When explicitly configuring speed or duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), do not request a store to flash as a part of the download when communicating over the CPE's embedded Ethernet port. In this situation you first must store to the RX3i and then initiate a separate request to write to flash.</p>
Changing IP address of Ethernet interface while connected	<p>Storing a hardware configuration with a new IP address to the RX3i while connected via Ethernet will succeed, then immediately disconnect because the RX3i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting.</p>
Two 10Base-T / 100Base-TX auto-negotiating Full-Duplex Ethernet Ports	<p>The PACSystems RX3i CPU with embedded Ethernet provides a direct connection to one 10Base-T / 100Base-TX CAT5 (twisted pair) Ethernet LAN cable from one network port. By comparison, Rx3i peripheral Ethernet modules (IC695ETM001) provide direct connection to one or two 10Base-T / 100Base-TX CAT5 (twisted pair) Ethernet LAN cables from two network ports. In either case, the Ethernet-enabled device has only one IP address that may be used by one or two ports. Cables may be shielded or unshielded.</p> <p><b>⚠ CAUTION</b></p> <p>The hub or switch connections in an Ethernet network must for a tree and not a ring; otherwise duplication of packets and network overload may result.</p> <hr/> <p><b>⚠ CAUTION</b></p> <p>The IEEE 802.3 standard strongly discourages the manual configuration of duplex mode for a port (as would be possible using Advanced User Parameters). Before manually configuring duplex mode for a PACSystems RX3i port using Advanced User Parameters (AUP), be sure that you know the characteristics of the link partner and are aware of the consequences of your selection. Setting both the speed and duplex AUPs on a PACSystems RX3i port will disable the port's auto-negotiation function. If its link partner is not similarly manually configured, this can result in the link partner concluding an incorrect duplex mode. In the words of the IEEE standard: Connecting incompatible DTE/MAU combinations such as full duplex mode DTE to a half-duplex mode MAU, or a full-duplex station (DTE or MAU) to a repeater or other half duplex network, can lead to severe network performance degradation, increased collisions, late collisions, CRC errors, and undetected data corruption.</p> <hr/>

Operational Note	Description
Send Information Report (COMMREQ 2010) requests may fail at minimum intervals less than 200 ms from embedded Ethernet port.	Send Information Report COMMREQ requests with a minimum interval between host accesses of 200 ms or less may fail if issued from the CPU's embedded Ethernet port. A COMMREQ Status Word value of 0290H, <i>Period expired before transfer completed; still waiting on transfer</i> indicates this condition occurred. To work around this issue, the user can set the minimum interval between host accesses to a value greater than 200 ms if issuing a <i>Send Information Report</i> COMMREQ from the CPU's embedded Ethernet port.
Modbus/TCP Client Channels require at least a 10 ms delay between bulk channel close and bulk channel open processing	On CPUs with embedded Ethernet ports, a delay of at least 10 ms must occur between logic-driven attempts to close sixteen Modbus/TCP Channels simultaneously and a then re-open 16 Modbus/TCP Channels. This delay is necessary to provide external Modbus/TCP Servers sufficient time to close all channels before the Client issues channel open requests.

## Removable Data Storage Devices (RDSDs)

For full details on RDSD operation, refer to the *PACSystems RX3i and RX7i CPU Reference Manual*, GFK-2222R or later.

### RDSD Restrictions and Open Issues

Restriction/Open Issue	Description
Default RDSD Write to Flash value is 'N' when no <i>Options.txt</i> file is created	The default <i>RDSD Write_Flash</i> value is 'N'. Storing a project from the RDSD to the CPE310 will result in the files not being written to user flash if no <i>Options.txt</i> file is included on the RDSD device.
RDSD upload / unintended OEM protection lock	When an OEM key is set in a controller, and the controller is unlocked, if an RDSD upload is performed, in rare occasions OEM protection will be unintentionally locked after the upload completes. To recover, enter OEM password to unlock the project, then clear the user memory and flash memory.

### RDSD Operational Notes

Operational Note	Description
RDSD / Programmer Interaction	When using RDSD, all PAC Machine Edition Logic Developer PLC connections must be in the Offline state for the RDSD to function properly.
RDSD OEM / Password Protection of Former Uploads Incorrectly Maintained	When deleting an OEM key from a project, you must remove the Energy Pack and cycle power before writing to the RDSD. If this procedure is not followed, there are rare occasions where the OEM key that had been deleted may be restored on the RDSD device and therefore could be unexpectedly downloaded to the CPU on a subsequent RDSD download.

## Energy Pack Operational Notes

For details on the Energy Pack, refer to the datasheet *PACSystems RX3i Energy Pack, IC695ACC400 IPI*, GFK-2724.

The %S0014 (PLC\_BAT) system status reference indicates the Energy Pack status as follows:

- 0 Energy Pack is connected and functioning.
- 1 Energy Pack is not connected or has failed.

**Note:** When the Energy Pack is powered up for the first time, or is in a system that has been powered down long enough to completely discharge the Energy Pack, it may require a few seconds for it to charge up to its operating level. The CPU's STATUS LED will blink green during this time.

**Note:** Because the Time of Day (TOD) clock is powered by the Real Time Clock battery, removal of the Energy Pack does not cause the CPU to lose the TOD value.

## Power-Up Characteristics

The Conditional Power-up From Flash feature works the same as in previous Rx3i CPUs: that is if the configuration is configured for *Conditional – Flash* and the Energy Pack is disconnected or has failed, the contents of flash will be loaded into RAM at power up. The CPU's logic and configuration source and operating mode at power-up are in accordance with the tables in *PACSystems RX3i and RX7i CPU Reference Manual*, GFK-2222, section 4.7, where *memory not preserved* means that the Energy Pack is not connected or not working. The contents of those tables apply as follows:

- All entries in the *Logic/Configuration Source and CPU Operating Mode at Power-Up* table which address *Logic/Configuration Power-Up Source in User Memory* apply to Logic/Configuration as if there were a battery.
- The condition *Memory not preserved (i.e., no battery or memory corrupted)* is created on a CPE310 by power cycle with the Energy Pack removed.
- The condition *No configuration in User Memory, memory preserved* is created on a CPE310 by clearing configuration (or never downloading configuration), and then cycling power with the Energy Pack connected.
- The conditions for Logic/Configuration source of *Always Flash*, *Conditional Flash* and *Always RAM* are created by setting the appropriate configuration setting in the CPE310 and cycling power with the Energy Pack connected.
- User memory is preserved only if the Energy Pack is connected (and charged) at power-down. Similarly, user memory is preserved only if the Energy Pack is present at power-up.
- The user memory is preserved on a CPE310 by an Energy Pack connection at the instant of power-down and the instant of power-up. Removing or reconnecting the Energy Pack while the CPE310 is not powered has no effect on the preservation of user memory.

## Energy Pack Replacement

If an Energy Pack fails, you can replace it with a new unit while the CPU is in operation. When an Energy Pack is replaced, the new Energy Pack must charge. If a loss of power occurs while the Energy Pack is disconnected or before it is fully charged, a memory loss may occur.

## Product Documentation

<i>PACSystems RX3i CPU Reference Manual</i>	GFK-2222
<i>PACSystems RX3i CPU Programmer's Reference Manual</i>	GFK-2950
<i>PACSystems RX3i System Manual</i>	GFK-2314
<i>PACSystems RX3i TCP/IP Ethernet Communications User Manual</i>	GFK-2224
<i>PACSystems TCP/IP Ethernet Communications Station Manager User Manual</i>	GFK-2225
<i>PACSystems RXi, RX3i Controller Secure Deployment Guide</i>	GFK-2830
<i>PACSystems HART Pass Through User Manual</i>	GFK-2929
<i>C Programmer's Toolkit for PACSystems User's Manual</i>	GFK-2259
<i>IPI: PACSystems RX3i Energy Pack Datasheet</i>	GFK-2724
<i>PACSystems Memory Xchange Modules User's Guide</i>	GFK-2300

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

# General Contact Information

Please visit us for product support or updated product information:

**Online Technical Support:** <https://www.emerson.com/Industrial-Automation-Controls/support>

**General Information:** <https://www.emerson.com/Industrial-Automation-Controls/>

**Note:** If you purchased this product through an Authorized Channel Partner, please contact the seller directly.

## Technical Support

If you experience technical problems that cannot be resolved with the information in this manual, please contact us by telephone, email, or on the web at <https://www.emerson.com/Industrial-Automation-Controls/support>

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