PACSystems™ RX3i CPU IC695CPE302-Bxxx, IC695CPE305-Bxxx, and IC695CPE310-Bxxx IPI

IC695CPE302-BCAD[1] [2]

IC695CPE305-BCAD[1] [2]

IC695CPE310-BCAD[1] [2]

Firmware Version 10.91

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[1] *Includes conformal coat and low temperature module variants, if available.*

[2] *The last two characters of the catalog number suffix may not increment with every firmware release beginning with IC695CPE302-BAAA, IC695CPE305-BAAA 10.60 and IC695CPE310-BAAA 10.70.*

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In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

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Introduction

The PACSystems™ RX3i IC695CPE302-Bxxx / IC695CPE305-Bxxx / IC695CPE310-Bxxx can be used to perform real-time control of machines, processes, and material handling systems. The CPU communicates with the programmer or HMI/SCADA via the Ethernet ports or a serial port. It communicates with I/O and Intelligent Option modules over a dual PCI/Serial backplane. It can also communicate natively with remote I/Os over EGD Class1.

- Contains 2 MB of user memory and 2 MB of non-volatile flash user memory (CPE302-Bxxx).
- Contains 6 MB of user memory and 6 MB of non-volatile flash user memory (CPE305-Bxxx).
- Contains 13 MB of user memory and 13 MB of non-volatile flash user memory (CPE310-Bxxx).
- Supports battery-less retention of user memory when configured with an Energy Pack, IC695ACC400, to power the CPU long enough to write user memory to non-volatile storage (NVS) on system power loss.
- Supports programming in Ladder Diagrams, Structured Text, Function Block Diagram, and C.
- Supports up to 512 program blocks (The maximum size for a block is 128 KB).
- Supports auto-located Symbolic Variables that can use any amount of user memory.
- Equipped with reference table sizes to include 32 kbits for discrete %I and %Q and up to 32K words each for analog %AI and %AQ.
- Supports OPC UA communications with encrypted connections.
- Supports PME's GUI management interface for OPC UA configuration. integration (start, stop, restart, clear, and provisioning mode).
- Supports the PAC Security Center available for certificate trust management of clients and servers.
- Supports most Series 90-30 modules and expansion racks. For supported I/O, Communications, Motion, and Intelligent modules refer to the latest version of *PACSystems RX3i Hardware and Installation Manual*, GFK-2314.
- Supports the ability to set the IP address through the serial port.
- The embedded Ethernet interface provides two Gigabit Ethernet Ports.
- Supports up to 32 simultaneous SRTP Server connections, up to 16 simultaneous Modbus/TCP Server connections, and up to 16 simultaneous communications channels of either SRTP Channels or Modbus/TCP Client channels. For details, refer to the latest version of *PACSystems RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual*, GFK-2224.
- Supports Ethernet Global Data, Class 1.
- Supports HART® Pass-Through.
- Time synchronization to SNTP Time Server on Ethernet network when used with a rack-based Ethernet module (IC695ETM001) version 5.0 or later.
- Enhanced ability to display the serial number and date code in PME's **Device Information Details**.
- Ability to transfer applications to and from USB 2.0 A type removable data storage devices, or **RDSD**s.
- 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.

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Current Release Information

PACSystems RX3i CPU IC695CPE302-Bxxx, IC695CPE305-Bxxx, and IC695CPE310-Bxxx Release 10.91 adds support for Run Mode Store (RMS) to User Flash, SVC_REQ 63 Logic Driven Data Write to Non-Volatile Storage, three diagnostic %S bits and Enhancements to Web-Based Firmware Upgrade Feature. This release also resolves issues found in the section *Problems Resolved in this Release.* There is no change to form, fit, or function.

RX3i CPU Models	Firmware / Hardware Component	Version Number
CPE302/305/310-Bxxx	CPU Primary Firmware	Rel 10.91 Build EMWX
CPE302/305/310-Bxxx	CPLD	Rel 03.00.00 Build N/A
CPE302/305/310-Bxxx	FPGA	Rel 01.07.03 Build N/A
CPE302/305/310-Bxxx CHS007/012/016-Hx (and earlier)	BOC	Rel 1.19 Build 43A1
CPE302/305/310-Bxxx CHS007/012/016-JC (and later)	BOC	Rel 3.01 Build 08A1
CPE302/305-Bxxx	BIOS	VC4D0108 8ffc3e82db79 (20230628-1328) (28-JUN-2023)
CPE310-Bxxx	BIOS	VC4D1108 8ffc3e82db79 (20230628-1328) (28-JUN-2023)

Field Upgrades

All versions of the CPE302/305/310-Bxxx are field upgradeable to this firmware release using the upgrade kits listed below. The upgrade kit 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.

Note: These upgrade kits are not compatible with the CPE302-Axxx, CPE305-Axxx, and CPE310-Axxx versions and should not be used for upgrading their firmware. Downgrading Firmware to previous versions is restricted once updated to this release (Rel 10.91 Build EMWX).

CPE302/305-Bxxx:

      Part Number: 41G3109-MS10-000-A5

      File Name: CPE30X-Bxxx_FW10_91_41G3109-MS10-000-A5.zip

CPE310-Bxxx:

      Part Number: 41G3110-MS10-000-A3

      File Name: 41G3110-MS10-000-A3.zip

New Features in this Release

New Features	Description
Run Mode Store (RMS) to User Flash	Enables the user to make logic changes while in RUN mode that will be saved to both User RAM and Flash. User RAM and User Flash equality will be maintained.
SVC_REQ 63 Logic Driven Data Write to Non-Volatile Storage	Allows logic to write up to four regions of %R, %AI, or %AQ data to non-volatile storage up to 24 times in a 24-hour period. The data is reloaded to the data tables on power up.
%S53: #LG_CFG_SRC_RAM	Set to 1 if CPU logic and HWC is retrieved from User RAM at powerup.
%S54: #DATA_SRC_RAM	Set to 1 if the CPU reference data is retrieved from User RAM at powerup.
%S55: #DATA_SRC_NV	Set to 1 if the CPU reference data is retrieved from any SVC_REQ 63 NV Storage locations at powerup.
Web Based Firmware Upgrade	Enhanced firmware upgrade mechanism for the Hardware components (CPLD and FPGA) and optimized their programming duration from 18 minutes to 9 minutes.

Problems Resolved in this Release

Subject	ID code	Description
CPU Logic block containing faulty logic that generate excessive amounts of PLC Fault alarms may restart CPU into Stop Faulted State	**DE9790**	When a CPU Logic block containing a faulty logic that generate excessive amounts of PLC Fault alarms can increase CPU Logic execution time, this may trigger the Software Watchdog timer to timeout and cause the CPU to go into STOP HALTED state and reboot in STOP-FAULTED state.
Failure To Publish All Expected Variables to OPC UA Address Space	**DE9888 SFDC02016781**	Variables with their "Publish" property set to "Internal" were incorrectly counted against the CPU's OPC UA address space limit but not actually published. This caused some variables with their "Publish" property set to "External Read/Write" or "External Read-Only" to not be present the OPC UA address space. If variables did not have their "Publish" property set to "Internal", or if an internally published variable came alphabetically after any externally published variables, then this issue did not occur.
Incorrect Data for "Application Information" Variable "Address Space Status" in OPC UA Address Space	**DE9900**	In the OPC UA address space folder "Application Information" the "Address Space Status" could incorrectly state that "All Elements Published to Address Space" when they were not. This could occur when the total number of internal and external published variables exceeded the externally published variable limit for the controller.

Subject	ID code	Description
OPC UA Server Sessions May Not Expire Correctly When PLC Clock Set to Date Prior to Year 2010	**DE9942** **SFDC02004019**	If the PLC Clock was set to a day prior to the year 2010, the OPC UA server would negotiate session timeouts during session creation, but if the attached OPC UA client stopped responding to the OPC UA protocol the session timeout would not be enforced, consuming a session incorrectly. Restarting the OPC UA server would reclaim the abandoned sessions. If the PLC clock was set to any date in the year 2010 or later, including the correct time/date, the problem did not occur.
ALG626 Loss of I/O Module fault on a firmware update	**DE9979** **SFDC02031591**	If a firmware update was performed to an ALG626 module through the Web interface on a CPE model, the ALG626 could experience a Loss of Module fault in the I/O fault table when the firmware update package was updating both the boot and primary firmware. This occurred even though the firmware update itself was successful and required a power cycle to restore the module.
Local and Remote Port numbers wrong in Station Manager 'log' output	**DE10095** **SFDC02027478**	If a Station Manager 'log' entry provided local or remote port information about a TCP/UDP port, the port number was byte swapped. This has been corrected. Other commands such as 'stat v' were previously correct.
IC695ETM001 SVC_REQ #24 Does not Reset Module After a Previous Failure	**DE10117**	SVC_REQ #24 to an IC695ETM001 now allows future reset attempts with SVC_REQ #24 after a reset failure. Previously, if an IC695ETM001 failed to reset with a SVC_REQ #24, then later attempts to reset again with SVC_REQ #24 would not send the reset request.
CPU Stop-Fault with C-blocks using strtok()	**DE10263** **SFDC02043625**	The IC695CPE310-Bxxx controller resets and enters Stop-Fault mode after running a project containing a C block that includes a call to C Runtime Library API 'strtok()'.

Subject	ID code	Description
Language Specific Characters Truncated Using sprintf()	**DE10332 SFDC02039703**	Using the sprintf() function in C program blocks on the IC695CPE303/305/310-Bxxx models may cause strings containing language-specific special characters to be truncated when written to PLC memory (for example, when written to %R locations) or sent over the serial port.

Functional Compatibility

Compatibility Subject	Description	
	Feature	**Minimum Version of PME Required**
Programmer Version Requirements	Run Mode Store (RMS) to User Flash and %S53, %S54, & %S55	PACSystems RX3i CPU firmware revision 10.91 (or later). PAC Machine Edition 10.2 (or later) to configure Run Mode Store (RMS) to User Flash and view the new S bits.
	IC695CMM002/CMM004 Serial Module Support in the IC695PNS001-Bxxx/PNS101 and IC695CEP001 PROFINET Scanners	PAC Machine Edition 10.00. (or later)
	Legacy Client/Server Protocol Memory Access	PAC Machine Edition 10.00. (or later)
	IC695PSD180 24VDC 80W Power Supply	PAC Machine Edition 10.00. (or later)
	OPC UA Server Logging	PAC Machine Edition 9.80 SIM 5. (or later)
	OPC UA Management and Security Provisioning	9.50 SIM 16
	CPE302 Configuration	9.50 SIM 7
	SNTP 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 and CPE 305 / CPE310 Configuration	8.00 SIM7

Compatibility Subject	Description						
Remote Get HART® Device Information COMMREQ	The Remote Get HART Device Information COMMREQ is supported by these products: RX3i CPUs with version 8.95 or later IC695PNC001 RX3i PROFINET Controller version 2.26 or later IC695PNS001 RX3i PROFINET Scanner version 2.41 or later IC695PNS001 RX3i PROFINET Scanner GSDML-V2.3-GEIP-RX3iPNS-20160602.xml3						
Downgrading Firmware	Restrictions on downgrading firmware to previous versions apply after updating to R10.91. However, upgrading and downgrading will be unrestricted for subsequent revisions.						
CPU Backward Compatibility	CPE302-Bxxx, CPE305-Bxxx, and CPE310-Bxxx are drop-in replacements for CPE302-Axxx, CPE305-Axxx, and CPE310-Axxx. Legacy CPU310 Projects are not supported by the CPE302 / CPE305 / CPE310. Note: CPE305-Bxxx includes 6MB of user memory compared with 5MB on the CPE305-Axxx. CPE310-Bxxx includes 13MB of user memory compared with 10MB on the CPE305-Axxx. Applications that are newly developed on the -Bxxx or migrated to the -Bxxx and later modified may not be downloaded to the -Axxx if they exceed its user memory limits.						
C Toolkit Compatibility	C Toolkit version 7.00, 7.10, or 9.00 and higher The C Toolkit for PACSystems is distributed with PAC Machine Edition Logic Developer. Updates can be downloaded from the support links located at the end of this document. The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.						
PROFINET IO Compatibility	**Feature**	**Minimum Version Required**					
		IC695CPE302/305-Bxxx	IC695CPE310-Bxxx	IC695PNC001-Ax	IC695PNC001-Bxxx	IC695PNS001-Axxx	IC695PNS001-Bxxx & PNS101	IC695CEP001
	IC695CMM002/CMM004 Serial Module Support in the IC695PNS001-Bxxx/PNS101 and IC695CEP001	10.60	10.70	N/A	3.20	N/A	3.35	2.80
	Applications using CPE302/305/310-Bxxx Version 10.60 (or later) with a PNC001 Bxxx must also upgrade the PNC to Version 3.16 (or later) for compatibility with the controller.	10.60	10.70	N/A	3.16	N/A	N/A	N/A
	Remote Get HART Device Information COMMREQ	10.60	10.70	2.26	3.00	2.41	3.10	2.60
	Extended PROFINET Subslot Numbers	10.60	10.70	2.25	3.00	N/A	N/A	N/A
	Simplex (non-redundantly controlled) PROFINET IO	10.60	10.70	2.00	3.00	N/A	N/A	N/A

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[3] *IC695PNS001 RX3i PROFINET Scanner GSDML-V2.3-GEIP-RX3iPNS-20160602.xml is required to enable HART Pass Through Service Options settings in PME.*

Compatibility Subject	Description
Backplanes, power supplies, and system modules	As listed in the PACSystems RX3i System Manual, GFK-2314. Power Sync and Measurement module, IC694PSM001.
RX3i Backplane Hardware Revision Compatibility	The following backplane hardware revisions MUST be used: IC695CHS007-AA (or later) IC695CHS012-CA (or later) IC695CHS016-CA (or later) IC695CHS012CA-CA (or later) IC695CHS016CA-CA (or later) -JC or later backplanes require R10.85 firmware or later.
Series 90-30 Main Rack Compatibility	Series 90-30 Main Racks cannot be used in a PACSystems RX3i system. Series 90-30 CPUs do not operate in PACSystems RX3i Racks.
Isolated 24Vdc power	In applications that use the IC69xALG220/221/222, consult the latest version of *PACSystems RX3i System Manual*, GFK-2314 for details on wiring the 24Vdc power.
COMMREQ to PBM300	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.
Recommended IC200ALG240 revision	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 000034948.
Configuration of IC694MDL754	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.
CIMPLICITY® OPC UA Client	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. 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.
CIMPLICITY® and RX3i Subscription Size Incompatibility	The RX3i OPC UA server supports up to 10 subscriptions with up to 12,500 monitored items each. Some versions of the CIMPLICITY OPC UA driver support an unlimited number of subscriptions with a default limit of 500 monitored items per subscription, and a hard limit of 32,767 bits of data in a subscription. This means that it is not possible to subscribe to all 12,500 variables of the RX3i PLC with a CIMPLICITY HMI using those driver versions. The effectively monitored item limit in CIMPLICITY is dependent on the size of the data being subscribed to. Other OPC UA clients with a larger monitored item per subscription limit can subscribe to the entire address space of variables, such as UA Expert.
Ethernet Station Manager Modify Command Support	The CPE302/CPE305/CPE310[4] Ethernet Station Manager supports monitor commands only. Modify commands are not supported in firmware release 8.65 or later. Refer to the latest version of *TCP/IP Ethernet Communications for PACSystems Station Manager Manual GFK-2225* for additional information.

Compatibility Subject	Description
HART® Pass-Through	HART Pass-Through entails the usage of PC-based applications, RX3i Analog modules with HART functionality, and (optionally) supporting PROFINET products. HART Pass-Through operation is described in the *PACSystems HART Pass-Through User Manual,* GFK-2929.
Network and Memory Performance Monitor PACS Analyzer Requirements	PACSystems RX3i CPUs with firmware revision 10.05 or later support Network and Memory Performance Monitoring when used with PACS Analyzer version 4.3 or later.
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.

Release History

Catalog Number	FW Version	Comments
IC695CPE302-BCAD, IC695CPE305-BCAD and IC695CPE310-BCAD	10.91	Adds Run Mode Store (RMS) to User Flash, SVC_REQ 63 Logic Driven Data Write to Non-Volatile Storage, and three diagnostic %S bits. Enhanced Firmware Upgrade Mechanism for the Hardware components and optimized their programming duration from 18 minutes to 9 minutes. This release also resolves problems found in Section *Problems* Resolved in this Release.
IC695CPE302-BCAB, IC695CPE305-BCAB and IC695CPE310-BCAB	10.85	Resolves issue with energy pack not charging properly and memory not being retained after a power cycle.
IC695CPE302-BBAB, IC695CPE305-BBAB and IC695CPE310-BBAB	10.85	Adds support for -JC or later IC695CHS007/012/016 backplanes. Resolves problems found in Section *Problems* Resolved in this Release.
IC695CPE302-BBAB, IC695CPE305-BBAB and IC695CPE310-BBAB	10.76	Resolved manufacturing component issues.
IC695CPE302-BAAA, IC695CPE305-BAAA and IC695CPE310-BAAA	10.70	CPE310-BXXX: Adds support for OPC UA 2D Array Access, a new hardware platform with a new layout of front panel LEDs, two COM Ports, and two Gigabit Ethernet Ports. Firmware is not compatible with previous hardware revisions (-AXXX). IC695CPE310-BXXX is Achilles Level 2 Certified. CPE302-BXXX and CPE305-BXXX: Adds support for OPC UA 2D Array Access, Security enhancements, and other minor bug fixes.
IC695CPE302-BAAA and IC695CPE305-BAAA	10.60	New hardware platform with a new layout of front panel LEDs and provides two, Gigabit Ethernet Ports. Firmware is not compatible with previous hardware revisions (-AXXX). IC695CPE302-BXXX, IC695CPE305-BXXX is Achilles Level 2 Certified.

PLC CPU

PLC CPU Restrictions and Open Issues

Restriction/Open Issue	Description
PME Error Programmer already attached	When connected to a target, there is a field called the request timeout, which can be up to 240s. If you are connected to PME via a switch port, and you remove the ethernet cable and then re-attach it to a switched port, reconnect to PME, and try to enter programmer mode, the operation will fail. To enter programmer mode, you must wait for the request timeout amount of time to be able to enter programmer mode. You will see the following error in PME when trying to enter the programmer before the request timeout has expired: Error 8085: Programmer already attached [{PC name}\{user name}] To recover, you can wait for the request timeout amount of time, or you can reboot the PLC. To avoid this issue, make sure you press "Disconnect" before removing the ethernet cable from the switched port, or else, you will have to wait for the configured request timeout before you can re-enter programmer mode.
Firmware Update Login Timeout	The CPU enforces a two-minute login activity timeout on the firmware update web page. Selecting an update package and pressing the Upload File button after the timer expires initiates a firmware update however, instead of displaying the firmware update status, one of these scenarios may occur: Another login page is presented. After entering the username and password the update status is displayed. The web browser loses connection with the CPU and is unable to display the update status because it is automatically resetting while applying the firmware update. After the reset completes, pressing the refresh button on the browser shows the installed firmware version. An error message is displayed indicating the firmware update was not successful however, returning to the firmware update home page shows that the new firmware version was installed. These issues may be avoided by having the firmware file ready so that the firmware update can be initiated immediately after logging in.
Controller Error: 'No user memory is available to allocate'. Unable to download the PME program.	Rarely, a stop mode stored to a PACSystems controller may fail to complete. PME reports "Download to Controller Not Completed" with Error 8097 "Controller Error - No user memory is available to allocate [0x05][0xE8] [0x801B0044]" Perform a "clear all" and download to try and resolve. Tech Support can provide a resolution in case this issue happens at the Customer site.
Missing *Addition of IOC* event when ECM850 module restarts due to reset pushbutton or SVC_REQ 24	When ECM850 module RESET is triggered using SVC_REQ 24 or the Reset pushbutton, the CPU does not report the addition of an IOC fault message in the controller fault table after a successful reset of the module.
Run Mode Store of EGD Causes Sequence Store Failure & CPU Software Event Faults	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) If this occurs, storing the project may be successfully downloaded while the controller is in STOP Mode.
PLC Fault Table Faults Not Shown in Chronological Order	Faults in the PLC Fault Table may not be listed in chronological order following an automatic controller restart due to a fatal error.

Restriction/Open Issue	Description
Audit Trail final entry does not indicate stop/fault state after an ECC error is detected	While investigating ECC error behavior, it was noted that the final entry of audit trail did not indicate stop/fault, but rather the hardware configuration determined start-up CPU mode. Audit trail now correctly contains stop/fault startup mode entry when a fault occurs during CPU startup.
Synchronize CPU to Host from more than a year out will be 1 hour off with DLS set	If the date on the PLC is set to a date that is more than one year in the past, and the user performs a "Synchronize CPU to Host" operation, the time on the PLC may be set one hour earlier than the time on the host computer. To correct this, simply click the "Synchronize CPU to Host" button again, and the time on the PLC will be set to match the exact time on the host computer.
Controller Stops Communicating with Third Party SRTP Devices	A third-party device configured to communicate via SRTP with the wrong slot for a controller can cause the controller to stop communicating SRTP with some external devices until power cycled.
CPEs log a Lan System software fault on power cycle	CPEs will log a LAN System Software Fault after power cycling while connected to PME in programmer mode.
Ethernet COMMREQs are not always delivered on the first logic sweep	In certain instances where User Logic is of sufficient size and a COMMREQ is issued on the 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 the first logic sweep.
PMM335 loss is occasionally detected on the power down of the CPU. (Module is not lost on power-up.)	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. No corrective action is required. This situation can be verified in two ways: (1) by inspecting the timestamp in the *Loss of Module* report one can correlate it with the power-down event, and (2) by performing a PME Show Status Details report to see that the PMM335 is present after power-up.
Ethernet rack-based module fails to exchange EGD data properly during power cycling	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 *Loss of, or missing option modules* and *Reset of option module* 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. To recover from this issue, cycle power again.
Loss of Power Supplies after firmware update	A Loss of Power Supplies after a firmware update may occur. This does not happen with all firmware updates and will ***not*** occur if the system is power cycled after the firmware upgrade has been completed. The faults displayed when this issue occurs are as follows: 0.0 Loss of, or missing option module 01-12-2009 11:25:38 Error Code Group Action Task Num 36 4 3:Fatal 9 Fault Extra Data: 01 58 02 4f 80 08 0a 07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Hot swapping some analog modules slowly result in modules not being recognized	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)
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.

Restriction/Open Issue	Description
Setting force on/off by storing the initial value	Once a force on or force off has been stored to the RX3i, you cannot switch from the 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 with 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.
Two *Loss of Module* faults for Universal Analog Module	Occasionally, the hot removal of the Universal Analog Input Module (IC695ALG600) results in two *Loss of I/O Module* 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 *module ready* 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 *loss of module* indication. I/O data exchanged with the module is not meaningful until this bit is set by the module. Refer to *PACSystems RX3i and Series 90-30 High-Speed Counter Modules User's Manual*, 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 not affect 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.
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 the 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 power cycling	Rarely, turning a power supply on or off may not result in an *add* or *loss* 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 are *not equal*.
Missing *Loss of terminal block* fault	The IC695ALG600/608/616 analog input modules do not produce a *Loss of Terminal Block* fault when hardware configuration is stored or the module is hot-inserted, and the terminal block is not locked into place.

Restriction/Open Issue	Description
Sequence Store Failure	When downloading projects with very large hardware configurations or which use large amounts of user memory, it is possible to encounter a *PLC Sequence Store Failure* error when writing the project to flash. To avoid this error, either or both of the following actions may be helpful: Perform an explicit clear of flash before performing the write. Increase the operation timeout used by ME before 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.
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.
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 the 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.
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 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.
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 the power cycle	When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to re-establish the TCP connection used for SRTP communications.
The 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 **parm v** Station Manager command works correctly, the **v** subsystem code (SRTP server) is not shown as supported by the online help.
Watchdog Timer Trip on Logic-Initiated Read or Write of User Nonvolatile RAM	In rare instances, a *Logic Driven Read* or *Write of User Nonvolatile RAM* 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 the project downloaded again from the programmer or via RDSD.

PLC CPU Operational Notes

Operational Note	Description
Default IP Addresses for CPE302/305/310-Bxxx Embedded Ethernet	Initial Ethernet communication with the CPE302/305/310-Bxxx may be accomplished using the default IP addresses programmed at the factory: LAN 1 (Switched Ethernet Ports) IP Address: 192.168.0.100 Subnet Mask: 255.255.255.0 Gateway: 0.0.0.0
Connecting to CPE302/305/310-Bxxx when IP Address not Known	When the CPE302/305/310-Bxxx is shipped, LAN1 is assigned a default IP address. (LAN1: 192.168.0.100) PAC Machine Edition may be used to re-program the addresses as needed. Once programmed, the addresses remain assigned until they are re-programmed using PME. If a CPE302/305/310-Bxxx LAN1 IP addresses are not known, it is possible to re-program them by inserting an IC695ETM001 module with a known IP address into the backplane so that PME may connect to the CPU through this module. Once connected through the ETM, PME may be used to program the CPE302/305/310-Bxxx LAN1 address to new values. The CPE302/305/310-Bxxx does not support PME's Set IP tool. An alternate option is to connect to the controller using the COM (RS-232) port from within the PAC Machine Edition and use it to change the IP address.
Downgrading Firmware	Restrictions on downgrading firmware to previous versions apply after updating to R10.91. However, upgrading and downgrading will be unrestricted for subsequent revisions.

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

Operational Note	Description
OPC UA Client Commissioning	If an OPC UA client device fails to connect to an 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.
Some PROFINET configurations may be too large for IC695CPE302/CPE305[4] memory	While the CPE302/CPE305[4] is capable of utilizing hardware configurations with the maximum allowed PROFINET IO Device count of 255 PROFINET IO Devices, hardware configurations approaching the maximum allowed IO Submodule count of 2048 IO Submodules may nearly exhaust the available 2 / 5 MB of User Memory. Customers requiring hardware configurations approaching the maximum allowed IO Submodule count of 2048 IO Submodules should consider using a CPU model with more available User Memory, such as the CPE310, CPU315, or CPU320.
Serial port operation	Cable IC693CBL316 must be used for RS-232 serial connections to the CPE302/CPE305[4]. 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 the use of the PACSystems C Toolkit macros Sw(), Si(), and Sd().
Multiple calls to SVC_REQ 57 (*Logic Driven Write to Nonvolatile Storage*) in a single sweep)	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, the age of nonvolatile storage (flash), etc. 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.

Operational Note	Description
Use of SVC_REQ 56 and 57 should be limited in frequency to avoid CPU watchdog timeouts	The *Logic Driven Read/Write to Flash* 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 *Logic Driven Write* operation (SVC_REQ 57) is executed per sweep.
RUN LED is not illuminated on the Series 90-30 power supply for an RX3i remote/expansion rack with input modules only	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). RUN LED for remote/expansion rack with input modules only works as follows for all versions before version 6.70: 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.

Slot numbering, power supply placement, CPU placement, and reference

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.

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 single-wide 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.

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.

Item Affected		How Affected
User Logic	Service Request #15 (Read Last-Logged Fault Table Entry)	The location of CPU faults will not be the standard 0.1 location but will reflect the slot the CPU is located in. User logic that decodes fault table entries retrieved by these service requests may need updating.
	Service Request #20 (Read Fault Tables)	
	Communications Request (COMMREQ)	COMMREQs directed to the CPU (e.g. those directed to the serial ports of the CPU) will need to be updated with the correct CPU slot reference.
H/W Configuration	CPU Slot location	Slot location of the CPU must be updated in the HW Configuration to reflect the CPU's true location.

Operational Note	Description		
	Fault Tables	Faults logged for the CPU	The location of faults logged for the CPU in the fault table will not be the standard 0.1 (rack.slot) location, but will reflect the CPU's actual slot.
	External Devices	**Note***:* CPE releases before 7.30 can communicate only with a programmer. Additional protocols and communication with other devices are *not* supported.	
		Series 90 PLCs Remote Series 90 PLCs that use SRTP Channels COMMREQs expect the CPU to be in slot 1. To support communications with Series 90 SRTP clients such as Series 90 PLCs using SRTP Channels, the RX3i internally redirects incoming SRTP requests destined for {rack 0, slot 1} to {rack 0, slot 2}, provided that the CPU is located in rack 0 slot 2 (and the remote client has not issued an SRTP Destination service on the connection to discover the rack and slot 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.	
		HMI and External Communication Devices 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 *SRTP* as their communications driver – it can communicate with a CPU in any slot.	
		Host Communications Toolkit (HCT) Applications that utilize the Host Communications Toolkit may require updated drivers.	
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 Series 90-70 which 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 online 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	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 µS instead of 10 mS units. This smoothes the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS. Also, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated.		
Some Service Requests different from 90-30 or no longer supported	- Service Requests 6, 15, and 23 have slightly different parameters. Refer to the latest version of GFK-2222. - PACSystems PLCs support Service Request 26/30 functionality via fault-locating references. - Service Request 13 requires a valid value in the input parameter block (Refer to the latest version of GFK-2222 for details). On Series 90-30 and Series 90-70 the parameter block value was ignored. - Service Requests 48 and 49 are no longer supported (there is no auto-restart) because most faults can be configured to be not fatal.		

Operational Note	Description
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.)
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.
Duplicate Station Addresses 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	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, the timers should be programmed in such a manner as to account for this catch-up feature. 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.
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 online 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 invalid input is provided.
Hot Swap	Hot-Swap of power supplies or CPUs is not supported in this release
Serial Port Configuration COMMREQs	With the following combination of circumstances, it is possible to render serial communications with the CPU impossible: 1. The user configuration disables the Run/Stop switch 2. The user configures the power-up mode to Run or Last 3. Logic is stored in FLASH and the user configures the CPU to load from FLASH on power-up User application issues COMMREQs that set the protocol on both serial ports to something that does not permit communications to the ME programmer.
Reporting of Duplicate IP Addresses	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.
Incorrect Commreq Status for Invalid Program Name	The program name for PACSystems is always "LDPROG1". When another program name is used in a COMM_REQ accessing %L memory, an Invalid Block Name (05D5) error is generated.

Operational Note	Description
FANUC I/O Master and Slave operation	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. After downloading a new hardware configuration and logic, a power cycle may be required to resume FANUC I/O operation. 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. 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.
Lost count at power-up for Serial IO Processor	The serial IO Processor (IC693APU305) will lose the first count after every power-up or every time the module receives a config
COMMREQ Status Words Declared in Bit Memory Types Must Be Byte-Aligned	In previous releases, the CPU allowed the 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 the next-lowest byte boundary before updating status bits, overwriting the bits between the alignment boundary and the specified location. To ensure that the application operates as expected, release 3.50 requires the 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.
STOP and RUN Mode Transition Priority	The PACSystems CPU receives requests to change between stop and run modes 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. (NOTE: The IO ENABLED/DISABLED state is not part of the mode priority evaluation.) 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.
Suspend IO Function Block does not Suspend EGD	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.
Uploaded Controller Supplemental Files lose date and time	Controller Supplemental Files uploaded from the CPU are time-stamped as 8/1/1980 at 12:08 AM regardless of PC or PLC time.

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 because it thinks another programmer is currently attached. If this occurs, you should go offline and then back online again.
Spurious Ethernet fault	In rare instances, after the 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.

Embedded Ethernet Interface Operational Notes

Operational Note	Description
Ethernet Cable Should Not Be Connected When Configured as a CPU310	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 on the network and/or operation of the CPU. 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.
SRTP connections remain open after the IP address changed	The Ethernet Interface does not terminate all open SRTP connections before changing its IP address. Thus, once the local IP address has changed, the privileged connection may not be available until the TCP keep-alive timeout has expired. If quicker recovery of the SRTP connection is needed, modify the *wkal_idle* Advanced User Parameter to reduce the TCP keep-alive timer down to the desired maximum time for holding open the broken connection. Refer to the latest version of *PACSystems RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual,* GFK-2224, for details.
Ethernet Event Log not preserved across a power cycle	The Ethernet event log on the CPE302/CPE305/310 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.
Station Manager commands	The embedded Ethernet interface of the CPE302/305/310 supports a subset of Station Manager Commands. (monitor only commands) For details, refer to the latest version of *TCP/IP Ethernet Communications for PACSystems Station Manager Manual,* GFK-2225. Beginning with R9.40, the *plcread* and *egdread* 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.

Operational Note	Description
AUP parameter restrictions	• The Advanced User Parameter *wsnd_buf* 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. • 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.
Programmer Display of Module Information	PAC Machine Edition Logic Developer PLC's functionality to display module status will show "CPU310A" when the CPE310 is configured as a CPU310.
Changing the IP address of the 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.
Two 10Base-T / 100Base-TX / 1000Base-TX auto-negotiating Full-Duplex Ethernet Ports	The PACSystems RX3i CPU with embedded Ethernet provides a direct connection to one or two 10Base-T /100Base-TX CAT5 (twisted pair) / 1000Base-TX Ethernet LAN cables from two network ports. By comparison, Rx3i peripheral Ethernet modules (IC695ETM001) provide a direct connection to one or two 10Base-T /100Base-TX CAT5 (twisted pair) 1000Base-TX (Kxxx versions only) 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. **⚠CAUTION** The hub or switch connections in an Ethernet network must be for a tree and not a ring; otherwise, duplication of packets and network overload may result. **⚠CAUTION** 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
Send Information Report (COMMREQ 2010) requests may fail at minimum intervals of less than 200 ms from the 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, *Period expired before transfer completed; still waiting on transfer* 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 *Send Information Report* COMMREQ from the CPU's embedded Ethernet port.

Operational Note	Description
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 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 latest version of *PACSystems RX3i and RSTi-EP CPU Reference Manual,* GFK-2222.

RDSD Restrictions and Open Issues

Restriction/Open Issue	Description
Default RDSD Write to Flash value is 'N' when no Options.txt file is created	The default RDSD Write_Flash value is 'N'. Storing a project from the RDSD to the CPE302/CPE305/CPE310[4] will result in the files not being written to use flash if no Options.txt 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, on rare occasions OEM protection will be unintentionally locked after the upload completes. To recover, enter the 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 latest 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, the 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 explained by the tables in *PACSystems RX3i and RSTi-EP CPU Reference Manual,* GFK-2222, section 4.7, where *memory is 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 the power-up table which addresses 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 CPE302/CPE305/CPE310[4] by power cycle with the Energy Pack removed.

- The condition *No configuration in User Memory, memory preserved* is created on a CPE302/CPE305/CPE310[4] 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 CPE302/CPE305/CPE310[4] 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 CPE302/CPE305/CPE310[4] 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 CPE302/CPE305/CPE310[4] is not powered does not affect 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.

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[4] *Unless otherwise explicitly stated / differentiated all the statements are equally applicable to both the versions Axxx and Bxxx of these controllers.*

Product Documentation

PACSystems RX3i and RSTi-EP CPU Reference Manual	GFK-2222
PACSystems CPU Programmer's Reference Manual	GFK-2950
PACSystems RX3i System Manual	GFK-2314
PACSystems RX3i CPU IC695CPE302-Bxxx/IC695CPE305-Bxxx/IC695CPE310-Bxxx Quick Start Guide	GFK-3249
PACSystems RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual	GFK-2224
PACSystems TCP/IP Ethernet Communications Station Manager User Manual	GFK-2225
PACSystems RXi, RX3i, and RSTi-EP Controller Secure Deployment Guide	GFK-2830
PACSystems HART Pass-Through User Manual	GFK-2929
C Programmer's Toolkit for PACSystems User's Manual	GFK-2259
PACSystems RX3i Energy Pack Datasheet	GFK-2724
PACSystems Memory Xchange Modules User's Guide	GFK-2300

User manuals, product updates, and other information sources are available on the support website. Please see the support link located at the end of this document.

Support Links

Customer Support and Contact Information

Note: If the product is purchased through an Authorized Channel Partner, please contact the seller directly for any support.

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