

# PACSystems™ RSTi-EP Backplane CPUs

EPXCPE205-ABAA

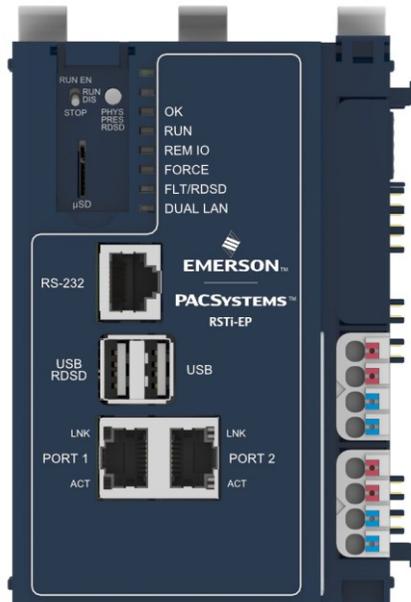
EPXCPE210-ABAA

EPXCPE215-ABAA

EPXCPE220-ABAA

EPXCPE240-ABAA

Firmware Version 10.75



## 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.

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met during installation, operation, and maintenance. The information is supplied for informational purposes only, and Emerson makes no warranty as to the accuracy of the information included herein. Changes, modifications, and/or improvements to equipment and specifications are made periodically and these changes may or may not be reflected herein. It is understood that Emerson may make changes, modifications, or improvements to the equipment referenced herein or to the document itself at any time. This document is intended for trained personnel familiar with the Emerson products referenced herein.

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## Current Release Information

This is the initial firmware release of the RSTi-EP Backplane CPUs which contains the following models: EPXCPE205 512KB, EPXCPE210 1MB, EPXCPE215 1.5MB, EPXCPE220 2MB, and EPXCPE240 4MB. Using the same high-performance runtime and toolchain as the PACSystems RX3i large controller, the PACSystems RSTi-EP CPE200 Series delivers large Programmable Logic Controller (PLC) capability in a small, cost-effective, IIoT-ready form factor so machine manufacturers (OEMs) do not need to sacrifice performance for the price. With security-by-design, open programming, and open communications built in, it simplifies connectivity to external analytics software platforms while reducing cost and complexity for OEMs and end users.

Component		Version Number
EPXCPE205-ABAA EPXCPE210-ABAA EPXCPE215-ABAA EPXCPE220-ABAA EPXCPE240-ABAA	PACSystems	Release 10.75 Build EKQZ
	FPGA	01.00.00
	Microcontroller	01.04.00.00
	UBoot	1.2.4.REL
	Disk Image	41G3158-MS10-000-A0
	Purchased Part	EPXCPE205-ABAA EPXCPE210-ABAA EPXCPE215-ABAA EPXCPE220-ABAA EPXCPE240-ABAA

## Field Upgrades

PACSystems firmware version 10.75 is released to manufacturing for full production and as a downloadable upgrade kit.

All production versions of the CPE200 Series are field upgradeable to this release using the upgrades available for download on the landing pages found at <http://www.emerson.com/industrial-automation-controls/support>.

The release is in line with software license compliance requirements.

The firmware upgrade process may take up to four minutes to complete depending on the contents of the update. During the update, the CPE200 Series may automatically reset one or more times. All LEDs will be off during the automatic resets.

**Do not manually power cycle the CPE200 Series during the updates as this may place the CPU in an unrecoverable and unusable state.**

### **EPXCPE2xx**

Part Number: 41G3158-MS10-000-A0

File Name: EPXCPE2xx\_FW10\_75\_41G3158-MS10-000-A0.zip

Download Link: <http://www.emerson.com/industrial-automation-controls/support>

## New Features in this Release

**The initial release of the CPE200 Series:** Using the same high-performance runtime and toolchain as the PACSystems RX3i large controller, the PACSystems RSTi-EP CPE200 Series deliver large Programmable Logic Controller (PLC) capability in a small, cost-effective, IIoT-ready form factor so machine manufacturers (OEMs) do not need to sacrifice performance for the price. With security-by-design, open programming, and open communications built in, it simplifies connectivity to external analytics software platforms while reducing cost and complexity for OEMs and end users. The CPE200 Series offer between 512KB to 4MB of user memory, up to 64 local IO modules, real-time I/O networking capabilities, and now up to 3x 1-Gbps Ethernet ports, built-in support for PROFINET, OPC UA, Modbus/TCP, and DNP3, and the ability to add third-party devices with ease.

**CPE200 Series PLCs:** The CPE200 Series PLCs share the same PACSystems Runtime as the RX3i Series of controllers. CPE200 Series PLCs support Runtime features among others:

Programming in Ladder Diagram, Structured Text, or Function Block Diagram via PAC Machine Edition (PME) software

Support for auto-located Symbolic Variables that can use any amount of user memory

Support for importing C blocks using PAC Machine Edition (PME) software. These C blocks are built using the PACSystems C Programmer's Toolkit.

Bulk memory area accessed via reference table %W. The upper limit of this memory area can be configured to the maximum available user RAM

Embedded serial and/or Ethernet communications

Security: The CPE200 Series incorporates technologies such as secure boot and encrypted firmware updates

Ethernet Firmware Update: The CPE200 Series support secure firmware updates over Ethernet using a web browser

Product	EPXCPE205	EPXCPE210	EPXCPE215	EPXCPE220	EPXCPE240
PACS Runtime	Same as RX3i				
Program Memory	0.5MB	1.0MB	1.5MB	2.0MB	4.0MB
NV Memory (**)	0.5MB	1.0MB	1.5MB	2.0MB	4.0MB
Program Blocks	512				
Max Block Size	128KB				
System I/O	1024 DIO	2048 DIO		4096 DIO	
	16320 AIO	32640			
Local I/O Modules	16	32		64	
Serial Capabilities	Serial Ports: One RS-232 Serial Protocols: ASCII Serial, Message Mode, Serial I/O, Modbus RTU Slave, Modbus RTU Master through the EP-5261 Serial Communications module				
USB Interface	Two USB A 2.0				
Memory Card	One Micro SD				
Temp Range	-40°C to +70°C				
Power	24VDC +/- 25%				
Agency Approvals	UL, cUL, UKCA, FCC, RoHS, FCC, Reach, UL HaxLoc C1D2, ATEX Zone 2				
Marine Approvals	ABS, BV, DNV GL				

**Two Embedded Gigabit Ethernet LANs:** Two independent 100/1000 Ethernet LANs with two or three auto-negotiating, full duplex 100/1000 Ethernet Ports allow support of multiple IP addresses. LAN1 attaches via the dedicated lower left RJ45 connector. LAN2 attaches via a pair of internally switched RJ45 connectors (upper two connectors). The embedded communications interface is supported by a dedicated microprocessor core. The EPXCPE205 can be configured for one or two LANs. This dedicated processing capability permits the CPU to independently support LAN1 and LAN2 with:

Product		EPXCPE205	EPXCPE210	EPXCPE215	EPXCPE220	EPXCPE240
SRTP Server		32				
Modbus Server		16				
Client Channels (Each channel may be an SRTP Client or a Modbus/TCP Client. Any given channel can be assigned to only one protocol at a time)		16				
EGD Class 1		32				
SNTP		Yes				
Station Manager		Yes				
HTTP (Web Update)		Yes				
DNP3		No	No	8 Masters 24000 Events		
OPCUA	OPC UA Server Concurrent Sessions	3				5
	OPC UA Server Subscriptions Limit	4				10
	Total OPC UA Variables Supported	1000	2000			4000
	Max Num of Monitored Items Per Subs	1000	2000			4000
SNMP		SNMPv1/SNMPv2c (MIB-II, LLDP MIB, LLDP 802.3 Extension MIB) Read Access Only				
PROFINET	Max I/O Devices		8	16		32
	I/O Update Rate per Device	1 ms	2			
		2 ms	4			
		4 ms	8			
		8 ms	8	16		16
		16 – 512 ms	8	16		32
		32 – 512 ms	8	16		32
	Max MRP Clients when configured as MRP Manager		7	15		31
	I/O Update Rate as MRP Client with Third-party MRP Manager	Ports @100Mbps	8 ms			
Ports @1Gbps		64 ms				

**Achilles Level II Certification:** The CPE200 Series CPUs <sup>1</sup> meets GE Digital's Achilles Level II Certification security standard.

**Local IO:** The CPE200 Series CPUs support up to 64 RSTi-EP I/O modules. Hot swap of RSTI-EP modules is not supported.

**OPC UA 2D Array Access:** Arrays of two dimensions, as published in PME using the "External Read/Write" or "External Read-only" settings, are now available for access in the OPC UA address space.

**Reset to Factory Defaults:** The CPE200 Series CPUs, by means of the physical presence button, can be brought to their original factory state. This includes erasing all user programs and non-volatile memory, erasing passwords, defaulting IP addresses, clearing PLC and IO fault tables, and clearing the Audit Trail. The PLCs firmware image is not reverted during this process.

**Run Mode Store/Word-For-Word/Test-And-Edit to User Flash:** The CPE200 Series can perform Run Mode Store, Word-For-Word, and Test-and-Edit operations to User Flash. After a download while in run mode, User RAM and User Flash remain equal. All the documented restrictions, Assumptions, and Operational Notes for the download while in run mode still apply.

**Logic Driven Read/Write Service Requests (SVC REQ 56 & 57):** The CPE200 Series PLC supports the PACSystems' 64 KB non-volatile flash memory area, which can be accessed by the logic-driven read/write service requests. The SVC\_REQ 57 stores the values in the non-volatile storage area. These values are applied to the controller user memory on power-up. The SVC\_REQ 56 restores the values on a transition from STOP to RUN. The CPE200 Series controllers do not disable the Logic Driven Read/Write Service Request after a Run Mode Store/Word-For-Word/Test-and-Edit.

**MicroSD Card Backup of Logic Driven Write Service Requests Data:** The CPE200 Series CPUs enable the creation of a backup of the Logic Driven Write Service Request Data onto a microSD card for later restoration into different CPE200 Series CPUs.

**RDSD setting of unique IP Address:** The CPE200 Series CPUs enable the RDSD users to download unique IP addresses per CPU.

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<sup>1</sup> The CPE200 Series CPUs' PACSystems Runtime is pending Achilles Level II Certification.

**Duplicate Ethernet IP Detection:** The CPE200 Series CPUs generate an ARP message every two minutes to find duplicate IP addresses on the network. This feature is enabled or disabled using PME. When a conflict is detected a duplicate IP Address Detect fault is logged with the remote node's MAC address added to the fault extra data, an audit Trail event is logged, and the CPU's FLT/RDSD LED will blink RED.

**Audit Trail:** The CPE200 Series CPUs have a log of user actions performed on the PLC. PACAnalyzer is used to retrieve the Audit Trail log. Events like Web Page connection, configuration download, STOP/RUN transition, clearing of fault tables, etc.

**IO Module Firmware Upgrade:** The CPE200 Series supports Local IO module firmware upgrades over Ethernet using a web browser and contain enhanced security features (IO module firmware upgrade instructions are included in the specific Local IO modules' firmware upgrade kits).

## Problems Resolved in this Release

Subject	ID code	Description
N/A	N/A	Initial Release of the RSTi-EP CPE200 Series

## Release History

Hardware Version	Date	Description
EPXCPE205-ABAA EPXCPE210-ABAA EPXCPE215-ABAA EPXCPE220-ABAA EPXCPE240-ABAA	May 2023	Product labels have been updated to show compliance with new certifications. For updated certifications, please refer to <a href="https://emerson-mas.my.site.com/communities/en_US/Article/Certifications-and-Agency-Approvals-Landing-Page">https://emerson-mas.my.site.com/communities/en_US/Article/Certifications-and-Agency-Approvals-Landing-Page</a> .
EPXCPE205-AAAA EPXCPE210-AAAA EPXCPE215-AAAA EPXCPE220-AAAA EPXCPE240-AAAA	Oct 2022	Initial Release

## Functional Compatibility

Subject	Description	
Programmer Version Requirements	CPE200 Series Configuration	PAC Machine Edition Logic Developer PLC v10.0 Build 9413 or later is required for native configuration support of the CPE200 Series.
Backward Compatibility	<p>To convert an existing project which uses any other PLC, use the Family Conversion feature in PME. Be aware of the constraints involved, as will be notified in PME. For instance, the first PROFINET Controller in an RX3i application will be assigned to the embedded PROFINET Controller feature of the CPE200 Series.</p> <p>EPSCPE100 projects without C-Blocks can be directly downloaded onto EPXCPE210 CPUs. EPSCPE115 projects without C-Blocks can be directly downloaded to EPXCPE215 CPUs.</p> <p>EPSCPE100/115 projects with C-Blocks will need to recompile the C-Blocks with the C-Toolkit version 9.00 or greater, and then do a target conversion to the RSTi-EP Backplane family to use the program and C-Blocks in CPE200 Series CPUs.</p> <p>When downloading an EPSCPE100/115 project to a compatible EPXCPE210/215, care must be taken to change the EPSCPE100/115 Hardware Configuration to indicate that the source of the program is Always Flash. CPE200 Series CPUs preserve the program in User Flash. If the configuration is left as Always RAM/Conditional Flash, it will not be preserved on the CPE200 CPU.</p>	
C Toolkit Compatibility	<p><b>Feature</b></p>	<p><b>Minimum Version of C Toolkit Required</b></p>
	<p>The CPE200 Series support 64-bit C blocks compiled with the C Toolkit Version 9.00 or later. All pre-existing C blocks must be recompiled as a 64-bit C block before downloading to any CPE200 Series.</p>	<p>9.00</p>
<p><b>NOTE:</b> The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.</p>		

Subject	Description		
PROFINET IO Compatibility	<b>Feature</b>	<b>Minimum 3iPNS Version</b>	<b>Minimum CEP001 Version</b>
	IC695CMM002/CMM004 Serial Module Support in the IC695PNS001-Bxxx/PNS101 and IC695CEP001	3.35 (PNS001-Bxxx hw and PNS101)	2.80
	Remote Get HART Device Information COMMREQ	2.41	2.60
Ethernet AUP File Support	The CPE200 Series does not support Advanced User Parameter (AUP) files for their Embedded Ethernet interfaces. Instead, use PAC Machine Edition to set the Ethernet configuration parameters for SNTP and advanced Ethernet Global Data applications.		
Supported Browsers for Firmware Update	<p>The CPE200 Series support secure firmware updates over Ethernet using one of the web browser versions listed below:</p> <p>Chrome: 62.0.3202.94 (or later)</p> <p>Firefox: 57.0.2 (or later)</p> <p>Microsoft Edge 38.14393.1066.0 (or later)</p> <p>Safari: 11.0.2 (12604.4.7.1.6) (or later)</p>		
CIMPLICITY OPC UA Client	<p>PACSystems RSTi CPE200 Series' OPC UA Server support between 3 and up to 5 concurrent sessions, between 4 and up to 10 concurrent variable subscriptions, and between 1000 and up to 4000 variables. The subscription limit is shared across all available sessions.</p> <p>When using the 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>		
PACSystems Energy Pack Compatibility	The CPE200 Series does not require an Energy Pack for retentive user memory functionality. User variables are stored in the built-in NV memory.		
Embedded PROFINET Controller HART Pass-Through Support	HART Pass Through is supported on all versions of the CPE200 Series with PACSystems HART Device Type Manager v1.3 and PACSystems HART Multiplexer v1.4		

Subject	Description
Remote Get HART Device Information COMMREQ	The Remote Get HART Device Information COMMREQ is supported by these products: RSTi-EP CPE200 Series 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.xml <sup>2</sup>
Ethernet Station Manager Compatibility	Ethernet Station Manager Utility Version 1.3 Build 2 or later is recommended for use with the CPE200 Series. Earlier versions are compatible; however, they may not display all the Ethernet parameters after issuing a parm all command. Should this issue occur, pressing enter or issuing another command will cause the station manager to display the remaining parameters.
Set Temporary IP Address Tool	CPE200 Series does not support the Set Temporary IP Address tool in PME.
Redundant IP Support	CPE200 Series does not support Redundant IP.
Hot Standby Redundancy	CPE200 Series does not support Hot Standby Redundancy.
I/O Interrupts Blocks	CPE200 Series does not support I/O Interrupt Blocks
USB Ports	CPE200 Series has 2 USB ports. The Left USB port is assigned to RDS. The Right USB port is reserved and not available for use.
microSD Port	CPE200 Series does not support RDS through the microSD port. However, the microSD port is used for backup of Logic Driven Write Service Requests Data.
Network and Memory Performance Monitor PACS Analyzer Requirements	CPE200 Series supports Network and Memory Performance Monitoring when used with PACS Analyzer version 4.3 or later.
EGD Class Commands (Class II)	CPE200 Series does not support EGD Commands (Class II).
DNP3 Server	DNP3 Server is only supported in the following models: EPXCPE215, EPXCPE220, and EPXCP240. EPXCPE205 and EPXPCE210 do not support DNP3 Server.
IO-Link Configurator Tool	Emerson IO-Link Configurator Tool version V1.2 does not export the required .bsc file required for IO-Link Module configuration. Users can work around this limitation by configuring the IO-Link Module using an RSTi-EP PNS and then moving the IO-Link module to the EPXCPE2xx CPU.
IO-Link Module	Emerson IO-Link Module firmware version 01.04.00 doesn't properly perform a data storage clear if the clear is done in isolation. Users can, however, work around this by loading a different configuration which will perform a clear first and then an update.
Local IO Hot Swap	CPE200 Series does not support Local IO hot swap.
VersaSafe	CPE200 Series do not support VersaSafe.

<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. Refer to the PACSystems RX3i System Manual, GFK-2314M or later, for more information.

Subject	Description		
IO Module Firmware Upgrade	<p>The CPE200 Series support Local IO module firmware upgrades over Ethernet using a web browser and contain enhanced security features (IO module firmware upgrade instructions are included in the specific Local IO modules' firmware upgrade kits).</p> <p>The Local IO module upgrade kits listed here are compatible with the CPE200 Series' enhanced security. Older versions may not contain the necessary security features to allow them to work with the CPE200 Series. Should you need to use an older version of an upgrade kit that is incompatible, contact Emerson Automation Solutions Support for assistance at <a href="http://www.emerson.com/industrial-automation-controls/support">http://www.emerson.com/industrial-automation-controls/support</a>.</p> <p>All future Local IO module firmware upgrade kits will be compatible with the CPE200 Series.</p>		
	Module	Version	File Name
	EP-3xxx	01.02.04	EP-3xxx-0007618-01_02_04-5.zip
EP-4xxx	01.03.03	EP-4xxx-0007617-01_03_03-6.zip	
EP-37xx/EP-38xx	01.00.11	EP-37xx_EP-38xx-0007616-01_00_11-9.zip	
EP-1813	01.00.47	EP-1813-0010819-01_00_47-9.zip	
EP-3664	01.03.05	EP-3664-0010284-01_03_05-0.zip	
EP-5261	01.00.16	EP-5261-0008012-01_00_16-1.zip	
EP-5324	01.04.00	EP-5324-0702654-01_04_00-3.zip	

# Restrictions and Open Issues

## CPU & Embedded Ethernet

Subject	ID code	Description
Using OEM Passwords with Enhanced Security Disabled	DE755	Single-character OEM passwords are not supported when enhanced security is disabled.
PME cannot display reference tables with Enhanced Security Enabled and OEM Locked	DE781	When Enhanced Security is enabled, and OEM protection is engaged, only reference areas specified within the Access Control List can be viewed by a programmer or HMI, regardless of privilege level. The Access Control List reference range must be at least as large as the reference table view. For example, if viewing %R memory from words 1 to 400 then the Access Control List must include read access to %R words 1 to 400. A custom reference view table with smaller reference sizes may also be used.
Controller Communication Window Timer settings below 10ms are ignored	DE845	Normal sweep allows the configuration of the Controller Communications Window Timer for Limited operation and a time range from 0 to 255ms (default 10ms). However, the system is currently ignoring settings in the 0 to 9ms range which results in an effective window time of 10ms for this configuration range. This means a sweep impact of up to 10ms may occur for some complex Controller Communication Window operations. If this operation is undesired then it is recommended to use a different sweep mode, such as Constant Sweep or Constant Window.
Selecting Variable Publish State = Internal causes variable to be published in Address Space	DE1330	PME allows users to select a Variables Publish State to Internal. In some cases, this will cause the variable to be published in the OPC-UA address space. The manual states users should select "External Read/Write" or "External Read-Only" to publish to the address space. This is the recommended approach.
Run Mode Store of EGD Causes Sequence Store Failure & CPU Software Event Faults	DE4130 SFDC 00406176	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, the project may be successfully downloaded while the controller is in STOP Mode.

Subject	ID code	Description
SRTP and Modbus TCP Client Retries	DE5687	SRTP and Modbus TCP Client COMMREQs may require multiple TCP retries to establish a connection when a gateway is configured on both LAN 1 and LAN 2. Once a TCP connection is established, client operations proceed normally. Client communications occur without multiple retries if only one of the LANs has a gateway configured or if there are no gateways configured.
PLC Fault Table Empty After Restart Due to Fatal Error	DE6573	PAC Machine Edition may not display any faults in the PLC fault table if it is connected to a controller when it encounters a fatal error that results in an automatic restart (STOP/HALT). Should this occur, the fault table is empty and the PME Fault Table Viewer indicates zero faults out of X number of faults are displayed (EX: Displaying 0 of 11 faults, 11 Overflowed). Closing and re-opening the PME Fault Table View displays the faults correctly.
PLC Fault Table Faults Not Shown in Chronological Order	DE6574	Faults in the PLC Fault Table may not be listed in chronological order following an automatic controller restart due to a fatal error.
PME Error Programmer already attached	DE8016	<p>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 LAN2 port, and you remove the ethernet cable and then re-attach it to a LAN2 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. You will see the following error in PME when trying to enter programmer before the request timeout has expired: Error 8085: Programmer already attached [{PC name}\{user name}]</p> <p>To recover, you can wait for the request timeout amount of time, or you can restart the PLC.</p> <p>To avoid this issue, make sure you press "Disconnect" before removing the ethernet cable from the LAN2 port, or else, you will have to wait for the configured request timeout before you can re-enter programmer mode.</p>
Reset to Factory Defaults LED indication not shown correctly during STOP FAULTED	DE9193	The Reset to Factory Default LED indication will not show correctly when operating while the PLC is in Stop Faulted state; as opposed to blinking the OK and RUN LED, only the OK led will be blinking. The RUN LED will be OFF. This behavior doesn't affect the Reset to Factory Default operation.

Subject	ID code	Description
Ethernet COMMREQs are not always delivered on the first logic sweep	ISS183540	In certain instances where User Logic is of sufficient size and a COMMREQ is issued on the first logic sweep, a race condition exists between the determination of the CPU Run/Stop state and logic-driven issuance of a COMMREQ which may cause the COMMREQ to be aborted before its transmission is attempted. To the user, it would appear as if the COMMREQ was never issued. 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.
Ethernet Disconnect During Word for Word Change	CR-2234	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.
Hardware Configuration Not Equal After Changing Target Name	CR-3181	If the user stores a hardware configuration to flash that sets "Logic/Config Power up Source" to "Always Flash" or "Conditional Flash" 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.
PLC and IO Fault Tables May Need to be Cleared Twice to Clear Faulted State	CR-3191	Both PLC 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	CR-3317	Once a force on or force off has been stored in the PLC, the user cannot switch from the force on to force off or vice-versa directly by downloading initial values. The user can turn off the force by doing a download, and then change the force on or off by another download.
Must Have Logic If Powering Up from Flash	CR-4633	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.
Possible PME inability to connect	CR-6067	Infrequently, an attempt to connect a programmer to a PLC 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.
Don't use multiple targets	CR-6450	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 "not equal".

Subject	ID code	Description
C Toolkit PlcMemCopy Documentation Incorrect	CR-7082	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	CR-2014	The Ethernet Interface sometimes generates multiple exception log events and PLC Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or PLC Fault Table can be filled with repetitive error messages.
Spurious Ethernet Fault	CR-4104	In rare instances, after a power cycle, the Ethernet Interface may log the following fault, Event = 28H, Entry 2 = 000eH. This fault can be safely ignored.
Clear of large hardware configurations may cause log event 08/20	CR-6577	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	ISS010006	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	ISS155214	When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to reestablish the TCP connection used for SRTP communications.
Intermittent Ethernet log event 8H/15H after power cycle	ISS163056	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 "PARM" command help text is wrong	ISS181788	Although the "parm v" Station Manager command works correctly, the "v" subsystem code (SRTP server) is not shown as supported by the online help.

## CPE200 Series Embedded PROFINET Controllers

Subject	ID code	Description
IP Address Changes to Embedded PNC May Cause Loss of Communications with PNS & GCG	DE3423	<p>Downloading a new hardware configuration with a different IP Address for the CPU's embedded PROFINET interface to a CPU that already has a PROFINET configuration may cause configured PNSs and GCGs to disconnect from the embedded PROFINET interface (This issue is observed when using both PME 8.6 SIM 12/13 and PME 9.0 SIM 4).</p> <p>If this issue occurs, disconnect PME from the CPU, remove the Energy Pack if one is attached to the CPU, and cycle power to the main rack. Then reconnect PME and download the hardware configuration again.</p>
Embedded PNC indicates premature MRP Ring closure and logs extra Ring Closed/Ring Open faults when network cable reconnected	DE1461	<p>Two scenarios can cause the Embedded PNC to indicate that an MRP Ring is closed when in fact it is still open. The scenarios are:</p> <p>When either an RX3i PNS or PNC that participates in the MRP ring as an MRP Client communicating via Copper or Fiber SFPs is powered-up in the MRP ring, extra Ring Closed/Ring Open faults are logged in the I/O fault table. A Ring Closed fault occurs during the initial stage of the PNS/PNC power-up, followed by a Ring Open fault in the middle of the PNS/PNC power-up sequence, and finally a Ring Closed fault occurs when the PNS/PNC completes the power-up (OK LED on).</p> <p>When the first of two MRP ring breaks is restored, extra Ring Closed/Ring Open faults are logged in the I/O fault table. Upon restoration of the first ring break, a Ring Closed fault occurs, followed by a Ring Open fault. Then upon restoration of the second ring break, a final Ring Closed fault occurs. The duration between faults is a function of the PNC's configured MRP Default Test Interval and Test Monitoring Count.</p> <p>When either of the two scenarios is invoked, the user sees extra Ring Closed/Ring Open faults in the IO Fault Table. The extra Ring Closed/Ring Open fault may be ignored.</p>
STXPNS001 Firmware revision is not displayed correctly when viewed using PME PROFINET Explorer	DE568 ISS182843	Firmware revision information for the STXPNS001 does not display correctly using PAC Machine Edition. The correct firmware revision information can be viewed on the module using HyperTerminal.

Subject	ID code	Description
Loss of IOC and Backplane Communications Faults after Clearing Hardware Configuration with Mismatched STXPNS001 Configuration	DE569 ISS182293	Clearing the CPU's hardware configuration after downloading a mismatched RSTi STXPNS001 PROFINET Network Adapter configuration causes a Loss of IOC fault and a Backplane communications with Controller fault; lost request fault to be recorded in the fault table. Communication with PAC Machine Edition is also lost. If this issue occurs, power cycle both the CPU and STXPNS001 (When power cycling the CPU, disconnect its energy pack if one is connected). Then, correct the STXPNS001 hardware configuration in PME so that it matches the physical hardware in the IO node and download the updated hardware configuration to the CPU.
Loss of IO Device following hot insertion of mismatched VersaMax I/O module	DE579	<p>In very rare cases, hot insertion of a mismatched VersaMax I/O module (i.e., MDL650 in a slot configured for an MDL640) into the VersaMax PNS can cause a loss of connection between the PNS and the Embedded PNC.</p> <p>No user action is required. When this behavior is seen, the Embedded PNC will automatically re-connect to the VersaMax PNS.</p>
IOC SW Fault with large configurations	DE838	<p>When storing a PROFINET configuration that is close to the upper limit of the CPU's user memory, the store may fail with an IOC Software Fault logged in the I/O Fault Table.</p> <p>Clearing the PLC's existing Hardware Configuration (and I/O Fault Table if the controller is Faulted) before attempting the store should allow the store to succeed.</p>
Breaking & reconnecting an MRP ring by pulling either of the 2 MRM ports causes extra ring open/close faults	DE1140	<p>In some cases, if the network is broken and repaired at either of the two ring ports of a CPU configured to be the MRM, extra "I/O Bus Fault-Redundant Ethernet network ring broken (open)" and "I/O Bus Fault-Redundant Ethernet network ring okay (closed)" faults are logged in both the I/O Fault Table and the PNC Local Log when the ring is repaired.</p> <p>These additional faults may safely be ignored as long as the last fault to be logged is "I/O Bus Fault-Redundant Ethernet network ring okay (closed)."</p>
INFO CPU SOFTWR – CPU Software Event Fault	DE3792	<p>Rarely, a CPE200 Series CPU, CPE330, CPE400, or CPL410 may log an INFO_CPU_SOFTWR – CPU software event fault. (Group140; Error 430; Extra Data 01 28 0a 91 80 4a 00 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00)</p> <p>Should this issue occur, the CPE400/CPL410 continues to run normally. No additional action is required, and the fault may be cleared from the fault table.</p>

Subject	ID code	Description
Unintended operation of PNIO DEV COMM function block	ISS181379	The power flow output of the PNIO_DEV_COMM function block provides validation of the input parameters and confirms that the Embedded PNC has locally processed the configuration of the specified I/O Device. As currently implemented, the power flow output will not turn ON until after the Embedded PNC has made its first attempt to connect to the specified I/O Device. Therefore, we recommend the user not rely on power flow output for parameter validation.

## Operational Notes

### CPU & Embedded Ethernet

Subject	Description												
<b>Note:</b> The following items are specific to systems using the CPE200 Series:													
Default IP Addresses for Embedded Ethernet	<p>The default IP addresses programmed at the factory are:</p> <table border="0"> <thead> <tr> <th></th> <th><u>LAN 1</u></th> <th><u>LAN 2</u></th> </tr> </thead> <tbody> <tr> <td>IP Address:</td> <td>192.168.0.100</td> <td>10.10.0.100</td> </tr> <tr> <td>Subnet Mask:</td> <td>255.255.255.0</td> <td>255.255.255.0</td> </tr> <tr> <td>Gateway:</td> <td>0.0.0.0</td> <td>0.0.0.0</td> </tr> </tbody> </table>		<u>LAN 1</u>	<u>LAN 2</u>	IP Address:	192.168.0.100	10.10.0.100	Subnet Mask:	255.255.255.0	255.255.255.0	Gateway:	0.0.0.0	0.0.0.0
	<u>LAN 1</u>	<u>LAN 2</u>											
IP Address:	192.168.0.100	10.10.0.100											
Subnet Mask:	255.255.255.0	255.255.255.0											
Gateway:	0.0.0.0	0.0.0.0											
Local IO Substitute Value operation during Controller Firmware Update	Local IO substitute values take effect during the CPE200 Series controller firmware update. During controller firmware update there will be a bus communication error as the controller resets. This triggers the substitute value operation of all backplane modules.												
IO Enabled Faceplate LED Indication	CPE200 Series CPUs do not have a specific faceplate LED to indicate the IO Enabled state. Stop IO Enabled state is indicated through PME. Run IO Disabled is indicated with Amber colored RUN LED.												

Subject	Description
Ethernet Switch Operation with Multiple Speeds	<p>The RSTi-EP Backplane controllers have two to three Ethernet port connectors, each of which supports both 100Base-TX and 1000Base-T operation using either full-duplex or half-duplex operation.</p> <p>A forced transition from 1 Gb to 100 Mb speeds is required when either Port 1 or 2 is plugged with an ethernet device that only supports 100 Mb. A port is also forced to 100 Mb when the Network Port Critical setting is enabled for the port in the PME Hardware Configuration.</p> <p>Once a port is running at 100 Mb, the controller cannot switch back to 1 Gb speeds automatically. To get back to 1 Gb speeds, a user must disable all network-critical ports (if enabled), manually disconnect both Port 1 and 2, and then reconnect 1 Gb devices. Alternately, the EPXCPE can be power cycled.</p> <p>If the PME Hardware Configuration (HWC) enables a single Network Critical port, it is possible that the non-critical port can initially run at 1 Gb speeds if no link is present on the designated critical port. However, the port at 1 Gb will be forced to 100 Mb if the critical port's link is ever established. Once in the 100 Mb state, both ports will remain at 100 Mb until the HWC is cleared/modified and both ports reconnected.</p>
Reset to Factory Defaults	<p>CPE200 Series CPUs will enter Reset to Factory Default when CPE is in Stop mode and the physical presence button is pressed for 10 seconds and no more than 14 seconds. If the physical presence button is pressed for more than 14 seconds the LED pattern will stop, the LEDs will show the current PLC status, and no Reset to Factory Defaults operation was performed.</p>
RDSD Options.txt file	<p>Care must be taken when using the RDSD Options.txt file and setting the WriteToFlash option to FALSE. Should the User do that, the download will succeed however it will not be stored in User Flash and the program will be lost after a power cycle.</p>
C Block support	<p>C Programmer's Toolkit Rel 9.00 provides C Block support for the CPE200 Series. To compile a project, use the command "compileCPACRSTiEPX" This will create a .gefElfARM64 file in the plc directory. Add the .gefElfARM64 file to a CPE200 Series CPU project using the "Add C Block..." option. Existing 32-bit C blocks (.gefElf files) must be rebuilt as 64-bit for the CPE200 Series. Once the rebuild is complete, simply update the block.</p>
Station Manager Commands	<p>The CPU's embedded Ethernet interfaces support a subset of Station Manager Commands (monitor-only commands). Refer to TCP/IP Ethernet Communications for PACSystems Station Manager Manual, GFK-2225, for details.</p>
Power up Time	<p>The CPE200 Series CPUs take about 18 seconds to power up.</p>

Subject	Description
<p>Avoid Overlapping IP Subnets when Configuring Embedded LAN IP Address and Subnet Mask</p>	<p>The CPU contains multiple LAN interfaces, each one supporting a unique IP address. Care must be taken when assigning IP Addresses and subnet masks to each LAN so that an overlapping IP subnet is not created. Intermittent or no Ethernet communication may result if an overlapping IP subnet is created, and the two interfaces are NOT connected (cabled) to the same physical network.</p> <p>By default, PME prohibits configuring the Embedded LAN interfaces on an overlapping IP subnet (This may be changed by going to Controller General Options and changing the "Multiple Embedded LANs on Same Subnet" to "Show as Warning").</p>
<p>Avoid Overlapping Remote IP Networks when Configuring Embedded LAN IP Address and Subnet Mask</p>	<p>The CPU contains multiple LAN interfaces, each one supporting a unique IP address. Care must be taken when assigning IP Addresses and subnet masks to each LAN so that each network does not overlap any remote subnets in the network infrastructure. Intermittent or no Ethernet communication may result if the local networks on the CPU overlap a remote subnet.</p>
<p>Embedded Ethernet Gateway Operation</p>	<p>The CPU allows the configuration of an Ethernet gateway on the Embedded LAN interfaces. Only one gateway is active at a time:</p> <p>If a gateway is configured on only one of the LAN interfaces and the others are not configured (0.0.0.0), then the single gateway is shared by all interfaces.</p> <p>If a gateway is configured on multiple LAN interfaces, then the LAN 1 gateway is given priority over the LAN 2 gateway as long as LAN 1 is functional. If, for example, the LAN 1 cable is disconnected, then the CPU will use the LAN 2 gateway as a backup.</p>

Subject	Description						
<p>Embedded Ethernet Protocols &amp; Performance</p>	<p>The CPE200 Series has two independent Ethernet LANs with two or three auto-negotiating, full duplex 100/1000 Ethernet Ports:</p> <p>LAN 1 &amp; LAN 2 support two IP addresses and these protocols:                      OPC UA Server with support for between 3 and up to 5 concurrent sessions, between 4 and up to 10 concurrent variable subscriptions, and between 1000 and up to 4000 variables                      SRTP Server with support for up to 32 simultaneous connections                      Modbus/TCP Server with support for up to 16 simultaneous server connections                      SRTP and Modbus/TCP Client with support for up to 16 clients; each may be SRTP or Modbus/TCP                      Up to 32 simultaneous Class 1 Ethernet Global Data (EGD) exchanges                      SNTP                      Up to 8 DNP3 Server connections on EPXCPE215, EPXCPE220, and EPXCPE240. EPXCPE205 and EPXCPE210 do not support DNP3 Server</p> <p>Applications using Ethernet communication should be validated to ensure adequate throughput is available to meet the application’s needs.</p>						
<p>EPXCPE205 LAN Operating Modes</p>	<p>The EPXCPE205 operating mode can be configured for Single LAN mode or Dual LAN mode. The default operating mode is Dual LAN mode.</p> <table border="1" data-bbox="545 1108 1349 1390"> <tbody> <tr> <td data-bbox="545 1108 776 1234" rowspan="2">Single LAN Mode</td> <td data-bbox="776 1108 1349 1171">All protocols including MRP will be supported.</td> </tr> <tr> <td data-bbox="776 1171 1349 1234">Dual LAN LED will be <b>OFF</b>.</td> </tr> <tr> <td data-bbox="545 1234 776 1390" rowspan="2">Dual LAN Mode</td> <td data-bbox="776 1234 1349 1329">LAN1 (port 1) and LAN2 (port 2). All protocols are supported except PROFINET MRP.</td> </tr> <tr> <td data-bbox="776 1329 1349 1390">Dual LAN LED will turn solid <b>GREEN</b>.</td> </tr> </tbody> </table>	Single LAN Mode	All protocols including MRP will be supported.	Dual LAN LED will be <b>OFF</b> .	Dual LAN Mode	LAN1 (port 1) and LAN2 (port 2). All protocols are supported except PROFINET MRP.	Dual LAN LED will turn solid <b>GREEN</b> .
Single LAN Mode	All protocols including MRP will be supported.						
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Dual LAN Mode	LAN1 (port 1) and LAN2 (port 2). All protocols are supported except PROFINET MRP.						
	Dual LAN LED will turn solid <b>GREEN</b> .						

Subject	Description
Multiple Consumptions of Multicast EGD Exchanges	<p>If the Embedded LANs are physically connected to the same Ethernet network, then any multicast EGD consumer exchanges may be consumed multiple times (once per each Ethernet interface) if the LAN interfaces use the same multicast IP addresses.</p> <p>These multiple consumptions occur because the CPU has more than one LAN interface and it is possible for the CPU to see duplicate multicast packets (one from each interface) and consume each. If this occurs, issuing a stat g station manager command shows that the multicast consumer exchange updates at a rate that is faster than the producer sends it.</p> <p>To avoid this issue, connect each Embedded LAN to physically separate Ethernet networks (i.e., no Ethernet switches in common).</p>
PME Connection Lost After Configuration Download that Swaps IP Addresses Between LAN 1 & LAN 2	<p>PAC Machine Edition may lose connection with a CPE200 Series CPU that has PROFINET enabled on LAN 2 if a configuration that swaps the IP addresses between LAN 1 and LAN 2 is downloaded. Even though the connection is lost, the store operation completes successfully. Re-connecting using the newly configured IP addresses shows the hardware configuration and logic are equal.</p>
LAN Interface Status Bits	<p>The CPE200 Series use the same LAN Interface Status Bit definitions as the IC695CPE330. Refer to Section 12 Monitoring the Ethernet Interface Status Bits in PACSystems RX7i &amp; RX3i TCP/IP Ethernet Communications User Manual GFK-2224P (or later) for additional information.</p>
OPC UA Server Startup Time	<p>The OPC UA server takes up to four minutes to start if the server's configuration files and certificates need to be generated. This occurs the first time the server is started on a new CPU or after the server is cleared.</p> <p>While the OPC UA server is starting, the OPC UA SERVER_STATUS service request returns 0010h OPC UA Server Starting.</p>
Modbus TCP & SRTP Client COMMREQ Function Block SYSID & TASK	<p>Modbus TCP Client and SRTP Client Channels are supported. Set the COMMREQ SYSID to 0x0000 and TASK to 0x10000 to use these functions on the CPU.</p>
Using OPC UA Server with Limited Communications Window	<p>When running an OPC UA Server with a Limited Communications Window, the Server can process enough requests to use the entire window which will add that time to your PLC Logic sweep. For example, a 100 ms Limited Backplane Communications Window could add the full 100 ms to your PLC Logic Sweep. Caution should be taken to ensure the Communication Window is configured within the tolerances of the system.</p>
Length of Serial I/O buffer	<p>The Set Up Input Buffer Function will always allocate a buffer containing 2097 bytes.</p>
NaN Handled Differently in CPE200 Series	<p>Mathematical operations resulting in Not A Number will always be a positive NaN.</p>

Subject	Description
Service Request 29: Read Elapsed Power Down Time (SVC_REQ29)	For Service Request 29: Read Elapsed Power Down Time (SVC_REQ29) to operate on the CPE200 Series CPUs the user shall configure the PLC's Data Power-up Source hardware configuration option to Conditional Flash or Always RAM. This configuration enables the CPE200 Series CPU to preserve the necessary data to calculate the elapsed power time.
SUSPEND_IO usage on the first PLC sweep	To avoid issues with enabling outputs in the CPE200 Series, it is recommended to not use SUSPEND_IO on the first PLC sweep. This allows all output modules to get initial output data on the first sweep. If SUSPEND_IO is used on the first sweep, then for outputs to be enabled, the logic execution must send an output DO_IO to every backplane module configured.

## All PACSystems CPUs

Subject	Description
<b>Note:</b> The following items apply generically to systems running any PACSystems CPU:	
SRTP & Modbus TCP Channel COMMREQ Error Response with Gateway	SRTP & Modbus TCP Channel commands on RSTi CPE200 Series with embedded Ethernet provide different COMMREQ error codes when a request is sent to an unreachable server as compared with the IC695ETM001 RX3i Ethernet module. When an Ethernet gateway is configured, the COMMREQ returns error code 0290H; when a gateway is not configured, the COMMREQ returns error code AA90H.
OPC UA Client Commissioning	If an OPC UA client device fails to connect to a CPE200 Series 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.
Cannot Clear Controller Passwords Loaded in Flash	<p><b>Important</b></p> <p>Passwords loaded to Flash (including OEM Password) cannot be cleared using clear Flash or by downloading new firmware. Users MUST document the password as it is not possible for the user to restore a unit to the default, no passwords condition (NULL).</p> <p>The CPE200 Series can be brought to Factory Defaults thus clearing controller passwords loaded in User Flash.</p>

Subject	Description
OEM Protection is not enforced on power-up from User Flash unless engaged before the power cycle.	The OEM Protection Lock must be explicitly set before power down to ensure the OEM lock will be set on power-up regardless of the type of security being used.
When passwords are set with Enhanced Security, connecting with PME or establishing SRTP connections can cause a temporary increase in sweep times.	Due to the complex math involved with Enhanced Security authentication, creating SRTP connections and changing privilege levels will take additional sweep time (several milliseconds) not required when passwords are set with legacy security. If consistent sweep time is important to the application, then it is recommended to configure the sweep mode for Constant Sweep. Alternately, Constant Window or a Normal Sweep with both Limited Backplane Window and Limited Controller Comm Windows can be configured. These sweep modes will limit the sweep impact of Enhanced Security authentication and result in authentication processing across multiple sweeps.
C Toolkit Application Compatibility	Beginning with Rel 9.00 of the C Toolkit, writes to %S memory will now fail to compile where in previous releases a compilation warning was issued. This affects the use of the PACSystems C Toolkit macros Sw(), Si(), and Sd().
Undefined Symbols in C Blocks	In Release 10.75 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] 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.
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 connect and download 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 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.
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 $\mu$ S instead of 10 mS units. This smooths 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.

Subject	Description
Some Service Requests different from 90-30 or no longer supported	<p>Service Requests 6, 15, and 23 have slightly different parameters. Refer to GFK-2222.</p> <p>PACSystems PLCs support Service Request 26/30 functionality via fault locating references.</p> <p>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.</p> <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).
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 CPUs.
Changing IP Address of Ethernet Interface While Connected	Storing a hardware configuration with a new IP address to the PACSystems Controller while connected via Ethernet will succeed and then immediately disconnect because the PACSystems Controller is now using a different IP address than the Programmer. The download to User Flash will not happen either. You must enter the new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting, and reuploading the program for it to be stored in User Flash.
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 online changes with the programmer. Window completion faults will occur if the constant sweep setting is not high enough.

Subject	Description
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.
SRTP Connections Remain Open After IP Address Changed	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.
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 milliseconds 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 milliseconds if issuing a Send Information Report COMMREQ from the CPU's embedded Ethernet port.
Modbus/TCP Client Channels require at least a 10-millisecond delay between bulk channel close and bulk channel open processing	On CPUs with embedded Ethernet ports, a delay of at least 10 milliseconds 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.
Multiple Calls to SVC_REQ 57 in a single sweep (SVC_REQ 57 - Logic Driven Write to Nonvolatile Storage)	Multiple calls to SVC_REQ 57 (Logic Driven Write to Nonvolatile Storage) writes could result in the CPU tripping the watchdog timer (and going to STOP-HALT mode). How many calls to SVC_REQ 57 can be made requires consideration of many variables, what the software watchdog timeout value is, how much data is being written, how long the sweep is, nonvolatile storage (flash) useful life remaining, etc.  The number of calls to SVC_REQ 57 should be limited to 1 call per sweep to avoid the potential of going to STOP-HALT.

Subject	Description	
<p>Use of SVC_REQ 56 &amp;57 should be limited in frequency to avoid CPU watchdog timeouts</p>	<p>The Logic Driven Read/Write to Flash service requests are not intended for high-frequency utilization. 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.</p>	
<p>Incorrect COMMREQ Status for Invalid Program Name</p>	<p>CR-3860</p>	<p>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.</p>
<p>COMMREQ Status Words Declared in Bit Memory Types Must Be Byte-Aligned</p>	<p>CR-5113 CR-7182</p>	<p>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 it to 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 the configuration of COMMREQ Status Words in bit memory types to be byte-aligned. For example, if the user specified the 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>

Subject	Description	
STOP and RUN Mode Transition Priority	ISS095271	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 (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	ISS174504	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	ISS181722	Controller Supplemental Files uploaded from the CPU are time stamped as 8/1/1980 12:08 AM regardless of PC or PLC time.
CPU Parameters Reset to Default Values After Replacing CPU Module in PME	DE2997	When replacing CPU modules in PAC Machine Edition, some parameters may be reset to default values. After replacing a CPU module, it is recommended that all parameters are evaluated for application compatibility including the Controller Communication Window Mode, Controller Communications Window Timer, Backplane Communication Window Mode, and Backplane Communications Window Timer.

## Embedded Controller

Subject	Description
PROFINET Command Line Interface	The CPE200 Series' Embedded PROFINET Controller does not support the Command Line Interface (CLI).
Configuring Ethernet & Embedded PROFINET Controller Operation with CPE200 Series CPU LAN 2 Mode	<p>The CPE200 Series LAN 2 Ethernet ports may be configured for either Ethernet or PROFINET controller operation using the LAN 2 Mode parameter on the hardware configuration Settings tab in PME.</p> <p>When LAN 2 is configured for Ethernet, these ports support SRTP Client/Server, Modbus TCP Client/Server, and EGD. All PROFINET controller services (Including Explore PROFINET Networks) are disabled when LAN 2 is configured for Ethernet. Configuring LAN 2 for PROFINET retains standard Ethernet operation and enables PROFINET controller services.</p>
Embedded PROFINET Controller Duplicate IP Address	<p>The Embedded PROFINET Controller can detect that a network device has the same IP address as its own. When a duplicate IP address is detected, the Embedded PROFINET Controller behaves as follows.</p> <p>In each case, the system has an active PROFINET network with a PROFINET Controller connected to at least one PROFINET Device:</p> <p>If a second PROFINET Controller with an identical IP address to the active PROFINET Controller is added to the network, the second controller will not enter the network and will log a Duplicate IP Detected fault. The first Controller will maintain all device connections.</p> <p>If a device with an identical IP address to an active PROFINET Controller is added to the network, the Controller will log a Duplicate IP Detected fault and maintain all device connections.</p> <p>If a device with an identical IP address to an active PROFINET Device is added to the network, the Controller will log a Duplicate IP Detected fault and maintain all device connections.</p>

Subject	Description																										
<p>IC695GCG001 Genius Communication Gateway COMMREQs</p>	<p>The Embedded PNC can send Communication Requests (COMMREQs) to the IC695GCG001 RX3i Genius Communication Gateway. When sending requests to the GCG001, the COMMREQ function block inputs must be set as follows:</p> <table border="1" data-bbox="493 432 1396 1043"> <thead> <tr> <th data-bbox="498 438 667 520">COMMREQ Input</th> <th colspan="3" data-bbox="667 438 1391 520">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="498 520 667 602">(enable)</td> <td colspan="3" data-bbox="667 520 1391 602">Permissive logic that controls power flow to the COMMREQ function block.</td> </tr> <tr> <td data-bbox="498 602 667 758">IN</td> <td colspan="3" data-bbox="667 602 1391 758">The memory location of the Command Block containing the specific COMMREQ command information. The Command Block may be located in any word-oriented area of memory (%P, %L, %R, %AI, %AQ, or %W).</td> </tr> <tr> <td data-bbox="498 758 667 963" rowspan="3">SYSID</td> <td colspan="3" data-bbox="667 758 1391 831">A two-byte hex value that gives the rack and slot location of the Embedded PROFINET Controller.</td> </tr> <tr> <th data-bbox="667 831 821 879">Rack#</th> <th data-bbox="821 831 943 879">Slot#</th> <th data-bbox="943 831 1391 879">Resulting SysID Hex Word Value</th> </tr> <tr> <td data-bbox="667 879 821 928">0</td> <td data-bbox="821 879 943 928">0</td> <td data-bbox="943 879 1391 928">0000h</td> </tr> <tr> <td data-bbox="498 963 667 1043">TASK</td> <td colspan="3" data-bbox="667 963 1391 1043">The task is always "20084h" (hexadecimal) for the Embedded PNC</td> </tr> </tbody> </table>	COMMREQ Input	Description			(enable)	Permissive logic that controls power flow to the COMMREQ function block.			IN	The memory location of the Command Block containing the specific COMMREQ command information. The Command Block may be located in any word-oriented area of memory (%P, %L, %R, %AI, %AQ, or %W).			SYSID	A two-byte hex value that gives the rack and slot location of the Embedded PROFINET Controller.			Rack#	Slot#	Resulting SysID Hex Word Value	0	0	0000h	TASK	The task is always "20084h" (hexadecimal) for the Embedded PNC		
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<p>MRP Ring Ethernet Traffic Storm Prevention</p>	<p>The CPE200 Series' LAN 2 Ethernet ports may be used as an MRP Ring Manager (MRM). The physical ring must not be connected until an MRM configuration is stored to any Ethernet node on the ring including the EPXCPE2xx CPU. Failure to have an active MRM configured in an Ethernet ring will result in an Ethernet traffic storm caused by the ring's network loop topology. The Ethernet traffic storm will prevent communication to all Ethernet nodes connected to the ring until the ring is broken or an MRM is configured. If the EPXCPE2xx CPU had been previously configured as an MRM, it maintains its MRM status after a hardware configuration clear and a power cycle. However, after clearing the hardware configuration, and before power-cycling, it is always a best practice to break the ring by physically disconnecting an Ethernet port on any network node in the ring.</p>																										

Subject	Description								
<p>Minimum IO Update Rates for Bumpless Operation in a Ring Topology</p>	<p>If your application requires the PROFINET IO to operate bumplessly (no Loss of Device faults and no defaulting of IO) through a break in the ring, then the IO Update Rates of all of the devices in that ring must be no smaller than the Minimum IO Update Rate.</p> <p>Refer to PROFINET Media Redundancy Protocol section 6 of GFK-2571 for more details on this topic.</p>								
<p>Third-party MRP Manager Use with Embedded PROFINET Controller as MRP Client</p>	<p>When using a third-party MRP Manager, it is recommended to set the MRP Manager Test Monitoring Interval and Count to 10ms and 2 respectively, and/or connect the PROFINET Controller client directly to a device that provides fast link down detection.</p> <p>Failure to follow these recommendations may result in degraded MRP Ring update performance for bumpless operation due to the speed at which ring breaks are detected. Use the table below as a guide when choosing to disregard these recommendations.</p> <table border="1" data-bbox="522 911 1377 1199"> <thead> <tr> <th colspan="2" data-bbox="522 911 1377 1041"><b><i>Bumpless Operation Using Third-party MRP Manager Without Recommended Test Monitoring Interval/Count</i></b></th> </tr> <tr> <th data-bbox="522 1041 821 1094"><b><i>Ring Port Connection</i></b></th> <th data-bbox="821 1041 1377 1094"><b><i>Minimum Recommended I/O Update Rate</i></b></th> </tr> </thead> <tbody> <tr> <td data-bbox="522 1094 821 1146">100Mbps</td> <td data-bbox="821 1094 1377 1146">8ms</td> </tr> <tr> <td data-bbox="522 1146 821 1199">1Gbps</td> <td data-bbox="821 1146 1377 1199">16ms</td> </tr> </tbody> </table> <p>Refer to Third-party MRP Manager Use with PROFINET Controller as MRP Client in section 6 of GFK-2571 for more details on this topic.</p>	<b><i>Bumpless Operation Using Third-party MRP Manager Without Recommended Test Monitoring Interval/Count</i></b>		<b><i>Ring Port Connection</i></b>	<b><i>Minimum Recommended I/O Update Rate</i></b>	100Mbps	8ms	1Gbps	16ms
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## All PACSystems PROFINET Controllers

Subject	Description
<p>PROFINET DCP – Direct Connection indicates that “no valid Ethernet adapters are available for PROFINET DCP discovery (must run PME as Administrator to use this feature)”</p>	<p>The PME PROFINET DCP tool requires elevation to administrator privilege to run when it is launched by right-clicking on a PNC. Since the PME installation does not set up PME or any of its internal tools to run at the administrator privilege level, you will have to inform Windows that you want it to run PME as an administrator. There are two ways to do this:</p> <p>Right-click on the PME icon (and any other shortcuts associated with PME) and select properties. Then select the Compatibility tab and check the checkbox for “Run this program as an administrator.”</p> <p>Right-click on the PME icon and select properties. Then select the Advanced button and check the checkbox “Run as administrator.” This method shows “Run as administrator” in bold when you right-click on the icon in the future.</p> <p>You may also launch the PROFINET DCP tool from the Utilities tab menu in PME. However, this launch method does not provide full functionality of the tool. That is, it does not compare I/O devices found to any configuration in the PME Project. Also, if PME was not launched as an administrator, this method of launching the DCP tool requests the user’s permission to elevate access to administrator privilege.</p>
<p>PNIO_DEV_COMM Function Block Usage</p>	<p>The PNIO_DEV_COMM function block may require multiple logic scans to return the status of an I/O device. It must continue to receive power flow until:</p> <p>The ENO output turns on indicating that the function block’s parameters are successfully validated, and the PNC completed its first attempt to connect to the specified I/O device, or</p> <p>The OK output turns on indicating the PNC is successfully communicating with the I/O device</p>

Subject	Description
Monitoring Remote IO Device Availability	<p>Applications using PROFINET IO should monitor the availability of remote IO devices and take appropriate action if the device becomes unavailable due to a network connectivity issue, power failure at the remote device, etc. PROFINET IO device status is available by monitoring the Controller's All Devices Connected status bit, using the PNIO_DEV_COMM function block, or monitoring the CPU's IO Fault Table for Loss of Device faults.</p> <p>Individual IO modules within a PROFINET IO device should also be monitored so that appropriate action may be taken if the IO module becomes unavailable. The status of input modules may be monitored by enabling point faults and monitoring the fault contact within the application. Outputs may be monitored by looping critical points to an input module and verifying the output value.</p>
Loss / Add of IO Device during dual power up	<p>If both IO Controllers of a PNSR system are powered up at the same time and attempt to connect to redundant PROFINET IO devices at the same time, the second of the two connection attempts will be rejected until the first connection completes. This rejection will cause a Loss of IO Device fault. When the retry is attempted, it will succeed, and an Addition of IO Device fault will be issued. This is the expected operation. If one system is powered on slightly before the other, this condition does not occur.</p>

## Product Documentation

Product Documentation	Document Number
PAC Logic Developer-PLC Getting Started	GFK-1918
PACSystems RX3i & RSTi-EP CPU Reference Manual	GFK-2222
PACSystems RX3i & RSTi-EP CPU Programmer's Reference Manual	GFK-2950
PACSystems RX3i System Manual	GFK-2314
PACSystems TCP/IP Ethernet Communications Station Manager Manual	GFK-2225
PACSystems RX3i & RSTi-EP TCP/IP Ethernet Communications User Manual	GFK-2224
PACSystems RX3i PROFINET IO Controller User Manual	GFK-2571
PACSystems RXi, RX3i, and RX7i Controller Secure Deployment Guide	GFK-2830
PROFINET I/O Devices Secure Deployment Guide	GFK-2904
PACSystems HART Pass Through User Manual	GFK-2929
C Programmer's Toolkit for PACSystems User's Manual	GFK-2259
PACSystems DNP3 Outstation User Manual	GFK-3103
PACSystems RSTi-EP User Manual	GFK-2958
PACSystems Functional Safety Manual	GFK-2956

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

Home link: <http://www.Emerson.com/Industrial-Automation-Controls>

Knowledge Base: <https://www.Emerson.com/Industrial-Automation-Controls/Support>

## Customer Support and Contact Information

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Technical Support: [support.mas@emerson.com](mailto:support.mas@emerson.com)

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Technical Support: [support.mas.emea@emerson.com](mailto:support.mas.emea@emerson.com)

### **Asia**

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+65-6955-9413 (All other countries)

Customer Care (Quotes/Orders>Returns): [customercare.cn.mas@emerson.com](mailto:customercare.cn.mas@emerson.com)

Technical Support: [support.mas.apac@emerson.com](mailto:support.mas.apac@emerson.com)

Any escalation request should be sent to: [mas.sfdcescalation@emerson.com](mailto:mas.sfdcescalation@emerson.com)

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