

# PACSystems™ RX3i IC695CPS400 Safety Controller IPI

## IC695CPS400-AAAA<sup>1</sup>

### Firmware Version 10.95



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<sup>1</sup> Includes conformal coat module variant.

## Warnings and Caution Notes as Used in this Publication

### **WARNING**

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

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

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### **CAUTION**

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

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

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# Introduction

RX3i CPS400 is Emerson's PACSystems Safety controller. This is a compact controller with a large memory capacity to support mission critical applications. An optimal choice for SIL2 applications across diverse markets, this solution stands out for its high-performance capabilities and refined design. With a generous 2000 IO template, our system offers the flexibility needed to accommodate a wide range of applications. Scalable architecture ensures adaptability to evolving project requirements.

Our CPS400 controller is IEC61508 safety certified, providing a robust foundation for safety-critical applications. Utilizing Black Channel principle over Ethernet Global Data (EGD) communication protocol ensures standardized, secure, and reliable communication. Our safety manual is designed to be user-friendly, offering clear guidance for quick and effective implementation.

The system is built with security in mind, providing a reliable foundation for your critical applications. Rigorous security measures ensure data integrity and protection against potential threats.

# Current Release Information

IC695CPS400 64MB Rackless CPU Safety Controller Firmware Release 10.95 resolves the issues found in the RX3i PLC: Problems Resolved in Current Release section.

Component		Version Number
Field Upgradable Using This Upgrade Kit: 41G3375-MS10-000-A0	PACSystems	Release 10.95 Build EP4Q
	FPGA	02.03.00
	CPLD	02.03.07
	IC695ACC403SN/CA Energy Pack Base	3.03
	PACEdge	Disabled.
Not Field Upgradable	UEFI	3.15.000

# RX3i PLC: New Features and Enhancements in Current Release

Initial release of the IC695CPS400 PACSystems Safety Controller firmware.

There are no new features or enhancements in this release.

# Field Upgrades

PACSystems Safety Controller CPU firmware version 10.95 is the initial release, no field upgrades at this time.

All production versions of the CPS400 are field upgradeable and future upgrades available for download on the Landing Page found at the links provided at the end of this document.

Release in line with software license compliance requirements.

## PACSystems CPU Upgrade

The RX3i firmware upgrade process may take up to four minutes to complete, depending on the contents of the update. During the update, the RUN and OUTPUTS ENABLED LEDs blink GREEN in unison and the CPS400 may automatically reset one or more times. All LEDs will be off during the automatic reset. The IC695ACC403SN/CA Energy Pack (if present) may also be updated. The energy pack blinks all LEDs GREEN and performs an automatic reset following its update.

**Note:** Do not manually power cycle the CPS400 or remove the energy pack (if present) or the cap pack from the energy pack base during the updates as this may place the CPU and energy pack in an unrecoverable and unusable state.

### CPS400 PACSystems CPU Upgrade Kit

Kit Part Number: 41G3375-MS10-000-A0

Kit File Name: CPS400\_FW10\_95\_41G3375-MS10-000-A0.zip

## Release History

### CPS400

Catalog Number <sup>1</sup> <small>Error! Bookmark not defined.</small>	Date	Firmware Version (Build Number)			
		Field Upgradeable Elements			
		PAC Systems	FPGA <sup>2</sup>	CPLD	ACC403SN/CA EP Base
IC695CPS400-AAAA	Jan 2025	10.95 (EP4Q)	02.03.00	02.03.07	3.03

# RX3i PLC: Functional Compatibility

Compatibility Issue	Description	
	Feature	Minimum Version of PME Required
PAC Machine Edition Logic Developer PLC Programmer Version Requirements	Run Mode Store (RMS) to User Flash and %S53, %S54, & %S55	PACSystems RX3i CPU firmware revision 10.95 (or later). PAC Machine Edition 10.5 (or later) to configure Run Mode Store (RMS) to User Flash and view the new S bits. Refer to GFK-3277 for Safety System restrictions
	IC695CMM002/CMM004 Serial Module Support in the IC695PNS001-Bxxx/PNS101 and IC695CEP001 PROFINET Scanners	PACSystems RX3i CPUs with firmware revision 10.30 (or later) support IC695CMM002/CMM004 Serial Modules in the IC695PNS001-Bxxx/PNS101 and IC695CEP001 when configured using PAC Machine Edition 10.00. (or later)
	Legacy Client/Server Protocol Memory Access	PACSystems RX3i CPUs with firmware revision 10.95 (or later) support Legacy Client/Server Protocol Memory Access when configured using PAC Machine Edition 10.5. (or later)
	OPC UA Non-Transparent Server Redundancy	PACSystems Hot Standby Redundancy RX3i CPUs with firmware revision 10.95 or later support OPC UA Non-Transparent Server Redundancy when configured using PAC Machine Edition 10.5 or later.
	OPC UA Server Logging	PACSystems RX3i CPUs with firmware revision 10.95 or later support OPC UA Server Logging when configured using PAC Machine Edition 10.5 or later.
	Sequence of Events with IRIG-B	PAC Machine Edition Logic Developer PLC 9.80 SIM 5 or later is required to use Sequence of Events recording with IRIG-B time synchronization.
	Produce EGD on Redundant IP	PAC Machine Edition Logic Developer PLC 10.5 or later is required to support EGD Production with the Redundant IP address.
	DNP3 Outstation Configuration	PAC Machine Edition Logic Developer PLC 10.5 or later is required to support DNP3 Outstation Configuration. Refer to GFK-3277 for Safety System restrictions
	OPC UA Management and Security Provisioning	PAC Machine Edition Logic Developer PLC 10.5 or later is required to support OPC UA Secure (Encrypted) Connection provisioning.
	Increased Program Block Count	PAC Machine Edition Logic Developer PLC 10.5 and PACSystems PLC Firmware R10.95, or later are required to support user programs with more than 512 blocks, up to a maximum of 768 blocks.
	CPS400 Hot Standby Redundancy with PROFINET® IO.	PME 10.50 or later is required for the configuration of Hot Standby Redundancy with PROFINET IO, also requires a Non-Safety configuration.
	CPS400 functionality including Embedded Simplex PROFINET I/O Controller	PME 10.5 or later is required for native configuration support of the CPS400, also requires a Non-Safety configuration.
	SNTP Client Configuration	PME 10.5 or later
	CPS400 Configuration	PAC Machine Edition Logic Developer PLC 10.6 or later is required for native configuration support of the CPS400.

Compatibility Issue	Description			
Backward Compatibility	To convert an existing project which uses any other PLC, use the <i>Family Conversion</i> feature in PME. Be aware of the constraints involved, as will be notified in PME. For instance, the second LAN on CPS400 will be assigned to the embedded ethernet. LAN 2 can support PROFINET, but the CPS400 must be configured for Non-Safety configuration.			
C Toolkit Compatibility	<b>Feature</b>	<b>Supported C Toolkit Versions</b>	<b>Note:</b>	
	The CPS400 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 the CPS400.	9.00 and higher	The Series 90 Toolkit (IC641SWP709/719) is not compatible with PACSystems.	
	The function PLCC_get_plc_version() the CPS400 will return 0x0026 (38).			
PROFINET IO Compatibility – (non-safety configuration)	<b>Feature</b>	<b>Minimum CPS400 Version</b>	<b>Minimum 3iPNS Version</b>	<b>Minimum CEP001 Version</b>
	IC695CMM002/CMM004 Serial Module Support in the IC695PNS001-Bxxx/PNS101 and IC695CEP001	10.95	3.35 (PNS001-Bxxx hw and PNS101)	2.80
	Increased PROFINET Device Support (up to 64 simplex or 32 Hot Standby Redundancy)	N/A	N/A	N/A
	SVC_REQ 20 Read Extended IO Fault Table with Remote Fault Record	10.95	N/A	N/A
	Remote Get HART Device Information COMMREQ	10.95	2.41	2.60
	Extended PROFINET Subslot Numbers	10.95	N/A	N/A
	Redundantly controlled PROFINET IO (20 Hot Standby Redundancy)	10.95	2.00	N/A
	32 Simplex (non-redundantly controlled) PROFINET IO	10.95	N/A	N/A
Minimum RX3i PNS GSDML Version for IC695ALG600	<p>IC695PNC001-Bxxx PROFINET IO Controllers after version 3.25 and Embedded PROFINET IO Controllers after CPU version 10.86 verify the maximum record length specified in the PROFINET Device GSDML files when using PME 10.3 or later. The RX3i IC695PNS001/101 GSDML did not provide the correct maximum record length to support the IC695ALG600 module until GSDML-V2.3-IntelligentPlatformsLLC-RX3iPNS-20210817. (This GSDML version shipped with RX3i PNS firmware version 3.35 and contains support for IC695PNS001-Axxx, IC695PNS001-Bxxx, and IC695PNS101.)</p> <p>Applications using an IC695ALG600 that are updated to the aforementioned (or later) PROFINET IO Controller and PME versions must also update the RX3i PNS GSDML to the specified (or later) version so that the PROFINET controller and PROFINET scanner will connect.</p>			
Ethernet AUP File Support	The CPS400 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.			

Compatibility Issue	Description
Service Request 56 & 57 Logic Driven Read/Write to Flash Support	<p>The IC695ACC403SN/CA Energy Pack automatically saves user memory to nonvolatile storage when the CPS400 is powered off and restores it to RAM when the CPS400 is turned on. Consequently, the CPS400 does not support Service Requests 56 &amp; 57 Logic Driven Read/Write to Flash. The service request function block's ENO output returns no power flow if these service requests are executed.</p> <p>Whenever an RX3i application that uses service requests 56 &amp; 57 is being migrated to a CPS400 an IC695ACC403SN/CA Energy Pack should be used to provide equivalent functionality, since the service requests themselves will have no effect and should ideally be removed.</p>
Supported Browsers for Firmware Update	<p>The CPS400 support secure firmware updates over Ethernet using a web browser. Supported browsers are listed below along with the minimum required version:</p> <ul style="list-style-type: none"> <li>• Chrome: 62.0.3202.94 (or later)</li> <li>• Firefox: 57.0.2 (or later)</li> <li>• Microsoft Edge 38.14393.1066.0 (or later)</li> <li>• Safari: 11.0.2 (12604.4.7.1.6) (or later)</li> </ul>
CIMPLICITY® OPC UA Client	<p>PACSystems OPC UA servers support up to five concurrent sessions with up to ten concurrent variable subscriptions and up to 12,500 variables. The subscription limit is shared across all available sessions.</p> <p>When using CIMPLICITY OPC UA Client, ensure the total number of subscriptions does not exceed the maximum. CIMPLICITY OPC UA Client is configured to create one subscription for every 500 items by default. If, for example, a project contains 1000 monitored items, CIMPLICITY creates two subscriptions. The number of items per subscription may be modified from the Device Configuration Panel / OPC UA DA Configuration / Subscriptions / Max. Number of Monitored Items.</p>
RDSD Support	<p>RDSD support using a USB memory stick or a micro SD card is not available with the current release.</p>

Compatibility Issue	Description
PACSystems Energy Pack Compatibility	<p>The only energy pack compatible with the IC695CPS400 is the IC695ACC403SN/CA. The CPS400 are not compatible with the IC695ACC403 CPE400/CPL410, the ICRXIACCEPK01 RXi Controller Energy Pack, the IC695ACC400 CPE305/310 Energy Pack, or the IC695ACC402 CPE330 Energy Pack.</p> <ul style="list-style-type: none"> <li>It is not possible to connect the CPE400/CPL410 and the IC695ACC400 CPE305/310 Energy Pack together.</li> <li>It is possible to connect the ICRXIACCCPK01A RXi Capacitor Pack to the IC695ACC403 Energy Pack Base. If this occurs, the capacitor pack operates normally.</li> <li>It is possible to connect the IC695ACC403 CPE400/CPL410 Energy Pack and IC695ACC413 Capacitor Pack to an ICRXICTL000 controller. If this occurs no errors are logged however user memory may not be preserved under all conditions <b><u>Do not use the CPE400 Energy Pack or Capacitor Pack with the RXi Controller.</u></b></li> <li>It is physically possible to connect the IC695ACC403 CPE400/CPL410 Energy Pack to an IC695CPE330 controller. If this occurs, no errors are logged. However, it will not allow any future firmware updates to the ACC403 Energy Pack. <b><u>Do not use the ACC403 Energy Pack with the RX3i CPE330 Controller.</u></b></li> <li>It is physically possible to connect the IC695ACC402 CPE330 Energy Pack and IC695ACC412 Capacitor Pack to an IC695CPE400 or CPL410 controller. If this occurs no errors are logged. However, it will not allow any future firmware updates to the ACC402 and the capacitors will reach their end-of-life threshold faster than the RX3i Capacitor Pack IC695ACC413. <b><u>Do not use the ACC402 Energy Pack or ACC412 Capacitor Pack with the RX3i CPE400 or CPL410 Controller.</u></b></li> <li>It is physically possible to connect the ICRXIACCEPK01A RXi Energy Pack to an IC695CPE400 or CPL410 controller. If this occurs no errors are logged. However, it will not allow any future firmware updates to the EPK01A and user memory may not be preserved under all conditions. <b><u>Do not use the EPK01A RXi Energy Pack with the RX3i CPE400 or CPL410 Controller.</u></b></li> <li>It is physically possible to connect the IC695ACC403 CPE400/CPL410 Energy Pack to the IC695CPS400 controller. <b><u>Do not use the ACC403 Energy Pack with the CPS400 Controller.</u></b></li> </ul>
Embedded PROFINET Controller HART Pass-Through Support	HART Pass-Through is supported on all versions of the CPS400 with PACSystems HART Device Type Manager v1.1 and PACSystems HART Multiplexer v1.1.
Remote Get HART Device Information COMMREQ	<p>The Remote Get HART Device Information COMMREQ is supported by these products:</p> <ul style="list-style-type: none"> <li>RX3i CPUs with version 8.95 or later (which includes the CPS400)</li> <li>IC695PNC001 RX3i PROFINET Controller version 2.26 or later</li> <li>IC695PNS001 RX3i PROFINET Scanner version 2.41 or later</li> </ul> <p>IC695PNS001 RX3i PROFINET Scanner GSDML-V2.3-GEIP-RX3iPNS-20160602.xml</p>
Ethernet Station Manager Compatibility	Ethernet Station Manager Utility Version 1.3 Build 2 or later is recommended for use with the CPS400. Earlier versions are compatible; however, they may not display all the Ethernet parameters after issuing a <i>parm all</i> command. Should this issue occur, pressing <i>enter</i> , or issuing another command will cause the station manager to display the remaining parameters.
Set Temporary IP Address not supported	Since the configured IP Addresses may be viewed using the CPS400 OLED display, the Set Temporary IP Address tool in PME is not required for CPS400 and is therefore not supported for CPS400.

Compatibility Issue	Description
Redundant IP Support	CPS400 firmware release 10.95 support two independent Redundant IP addresses, one for LAN 1 and one for LAN 2. Redundant IP is supported by the SRTP Server, Modbus TCP Server, and EGD protocols. It is not possible to use Redundant IP with the OPC UA Server or with the Ethernet firmware update web page.
Hot Standby Redundancy	CPE400 firmware release 9.30 and CPL410 release 9.55 support Hot Standby Redundancy with PROFINET IO. Hot Standby Redundancy with Genius IO is supported using the IC695GCG001 RX3i Genius Communications Gateway. Hot Standby Redundancy with Ethernet (EGD) IO is not supported.
LAN3 restriction	LAN3 is used only to synchronize the Primary and Secondary CPUs in a Hot Standby Redundancy configuration. No additional hardware may be attached to LAN3. Use of both ports is recommended when used in this fashion, as this provides a redundant synchronization link between the two CPUs.
Supported Primary and Secondary CPUs	The Primary and Secondary CPUs in a redundant system must be the same model. For example, two CPS400s may be paired together as the Primary and Secondary CPUs. Pairing CPS400 and CPE400/CPL410 as Primary and Secondary CPUs in a redundant system is not permitted.
Display Port and RJ45 ETH port are not operational	The Display port, located on the underside of the CPS400 and the RJ45 marked ETH are not operational.
USB Ports	The CPS400's left and right USB port are reserved and not available for use.
Micro SD Card	The Micro SD Card Slot is reserved and not available for use.
Serial IO Protocol	Serial IO Protocol is supported on the CPS400 effective with firmware release 10.95.
Cimplicity and RX3i Subscription Size Incompatibility	The RX3i OPC UA server supports up to 10 subscriptions with up to 12,500 monitored items each. Cimplicity OPC UA driver supports 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. The effective 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.
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.
Sequence of Events with IRIG-B	Sequence of Events recording with IRIG-B time synchronization is available when used with these SoE enabled components: <ul style="list-style-type: none"> <li>• Support for up to five IC695PNS101 Advanced PROFINET Scanner modules <ul style="list-style-type: none"> <li>○ IC695CPS400 Release 10.95 or later</li> <li>○ IC695PNS101 Release 3.30 and GSDML-V2.3-IntelligentPlatformsLLC-RX3iPNS-20191010.xml or later</li> </ul> </li> <li>• SoE_App C Block version 1.08 or later</li> <li>• Irig_Diag C Block version 1.00 or later</li> </ul> UDT IRIG_DIAG_DATA.UDT (no version)

# RX3i PLC: Problems Resolved in Current Release

Subject	ID code	Description
N/A	N/A	Initial release of IC695CPS400 Safety Controller

## RX3i PLC: Restrictions and Open Issues CPS400 CPU & Embedded Ethernet

Open Issue	ID code	Description
Firmware Update Login Timeout	DE196 DE205 DE2626	<p>The CPU enforces a 2-minute login activity timeout on the <i>Firmware Update</i> web page. Selecting an update package on the <i>Firmware Update</i> page and pressing the <i>Upload File</i> button after the timer expires initiates a firmware update. However, instead of displaying the firmware update status, one of these scenarios may occur:</p> <ul style="list-style-type: none"> <li>• Another login page is presented. After entering the user name and password the update status is displayed.</li> <li>• The web browser loses connection with the PLC and is unable to display the update status because the CPU is automatically resetting while applying the firmware update. After the reset completes, pressing the refresh button in the browser shows the installed firmware version.</li> <li>• 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.</li> </ul> <p>These timeout issues may be avoided by having the firmware file ready so that the firmware update can be initiated immediately after logging in.</p>
Running applications with fatal faults from flash	DE86	<p>If an application that generates a fatal fault (such as a watchdog timeout) is stored to flash, the controller is configured to power up from flash and go to RUN, and the RUN/STOP switch is disabled, the application may become stuck in an endless loop. (Power-up from flash, go to RUN, watchdog timeout, repeat.) It is recommended that users thoroughly test their application before writing it to flash and disabling the RUN/STOP switch. RX3i CPUs that experience this issue must be returned to Emerson Automation Solutions for repair.</p>
Using OEM Passwords with Enhanced Security Disabled	DE755	<p>Single-character OEM passwords are not supported when enhanced security is disabled.</p>
PME cannot display reference tables with Enhanced Security Enabled and OEM Locked	DE781	<p>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. 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.</p>

Open Issue	ID code	Description
Controller Communication Window Timer settings below 10 ms are ignored	DE845	Normal sweep allows the configuration of the Controller Communications Window Timer for Limited operation and a time range from 0 to 255 ms (default 10 ms). However, the system is currently ignoring settings in the 0 to 9 ms range which results in an effective window time of 10 ms for this configuration range. This means a sweep impact of up to 10 ms 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.
Dual Hardware Configuration Not Created When Uploading Redundant CPE400/CPL410/CPS400 Application	DE3052	A dual hardware configuration is not automatically created in PME when uploading a redundant CPE400/CPS400/CPL410 application. Before uploading the primary application, dual hardware configuration must be manually enabled by setting the CPE400/CPS400/CPL410's <i>Enable Redundancy</i> target property to <i>True</i> . The secondary application may then be uploaded.
Memory Not Preserved After Turning CPE400/CPS400/CPL410 Off with Power Button	DE3975	The CPE400/CPL410/CPS400 do not preserve user memory when the <i>Power Button</i> is used to turn the CPU off while an energy pack is connected. At this time, it is recommended to turn off power to the circuit powering either the CPE400/CPL410/CPS400 or its associated Energy Pack to allow for orderly shutdown procedures to occur.
Multibit ECC Memory Error Causes Hardware Watchdog	DE4181	The CPE400/CPS400/CPL410's hardware watchdog timer expires and the CPU reboots into STOP HALT mode if an uncorrectable (multi-bit) ECC memory error is detected. Correctable (single-bit) errors are automatically repaired as expected. No ECC memory faults are logged in the fault table whenever either occurs.
Sequence Store Failure Downloading Redundant Hardware Configuration	DE4254	<p>It is possible to download a redundant hardware configuration with a non-zero %W transfer list length to a CPE400/CPS400/CPL410 which has no %W memory configured. The downloaded configuration is not valid since no %W memory is configured, so none should be allowed in the transfer list.</p> <p>If this occurs, the CPU enters STOP / FAULT Mode and a Sequence Store Failure is listed in the PLC Fault Table. PAC Machine Edition's Feedback Zone shows Error 8097: Controller Error - Controller program reference exceeds configured reference [0x05][0x90] [0x80310015]</p> <p>This issue may be resolved by correcting the hardware configuration to either remove %W memory from the transfer list or allocate %W memory in the CPU corresponding to the length configured in the transfer list. Once corrected, place the CPE400/CPS400/CPL410 into STOP / NOIO Mode by clearing the <i>PLC Fault Table</i> and downloading the hardware configuration again.</p>
Run Mode Store of EGD Causes Sequence Store Failure & CPU Software Event Faults	DE4130 SFDC 00406176	<p>Performing a RUN Mode Store of a project where the total number of variables in EGD exchanges is near the maximum of 30,000 may result in a Controller Sequence Store Failure (Group: 137; Error Code 4) and CPU Software Event fault. (Group: 140; Error Code 145)</p> <p>If this occurs, the project may be successfully downloaded while the controller is in STOP Mode.</p>

Open Issue	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 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	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 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 restart the PLC. 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 the programmer mode.
Synchronize CPU to Host from more than a year out will be 1 hour off with DLS set	DE10291	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.
Ethernet COMMREQs 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 COMRREQ 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 since it thinks another programmer is currently attached. To correct the issue, go offline and then back online again.
Simultaneous Clears, Loads, and Stores Not Supported	CR-3118 CR-3300	Currently, PACSystems CPUs do not support multiple programmers changing CPU contents at the same time. The programming software may generate an error during the operation. Simultaneous loads from a single PLC are allowed.

Open Issue	ID code	Description
Hardware Configuration Not Equal After Changing Target Name	CR-3181	If the user stores a hardware configuration to flash that sets <i>Logic/Config Power-up Source</i> to <i>Always Flash</i> or <i>Conditional Flash</i> and then subsequently changes the name of the target in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.
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 <i>Force On</i> or <i>Force Off</i> has been stored in the PLC, the user cannot switch from <i>Force On</i> to <i>Force Off</i> or vice-versa directly by downloading initial values. The user can turn off the force by doing a download, and then change the <i>Force On</i> or <i>Force Off</i> by another download.
Second programmer can change logic while in Test & Edit mode	CR-4223	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the PLC.
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.
Extended Memory Types for IO Triggers	CR-5952 CR-6319	%R, %W, and %M cannot be used as IO triggers.
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.
Do not attempt to store logic and configuration to a PLC from 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 are <i>not equal</i> .
Sequence Store Failure	CR-6586 ISS176888	When downloading projects with very large hardware configurations or which use large amounts of user memory, it is possible to encounter a <i>PLC Sequence Store Failure</i> error when writing the project to flash. To work around this error, either or both of the following actions may be helpful: <ol style="list-style-type: none"> <li>1. Perform an explicit clear of flash before performing the write.</li> <li>2. Increase the operation timeout used by PME before performing the write. This is done by expanding the Additional Configuration in the Inspector window for the target controller and adjusting the Request Timeout. The timeout may need to be increased to as much as 60000 ms, depending on the amount of memory used and the condition of the flash memory.</li> </ol>
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.
Logic and HWC are not equal after the power cycle	ISS168431	If the Hardware Config from Target 1, with Logic/Configuration Power-up Source and Data Source both set to <i>Always from Flash</i> , is stored in Flash, then Logic and Hardware Config from Target 2, with Logic/Configuration Power-up Source both set to <i>Always from RAM</i> , are stored to RAM and there is a good battery, then when power is cycled the programmer may show that Logic and Hardware Config are not equal. The remedy is to clear Flash and re-store the Logic and Hardware Config from Target 2.

Open Issue	ID code	Description
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 the 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 re-establish 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 <i>parm</i> command help text is wrong	ISS181788	Although the <i>parm v</i> Station Manager command works correctly, the “v” subsystem code (SRTP server) is not shown as supported by the online help.
PACSystems CPU will not respond to SRTP requests	DE11050	In rare instances it is possible for a PACSystems CPU to get into a state where it will stop communicating with SRTP clients (PAC Machine Edition, HMIs, etc.). This resulted in connection timeouts with clients and required a reboot of the PACSystems controller to resolve.
OPC UA Server May Fail to Start After Clearing Configuration	DE11940	If an OPC UA server configuration clear is commanded, and then followed immediately by an OPC UA server start request, the OPC UA server might fail to start.
Controller Software Watchdog Timer Trip	DE11999 DE12098	One or more conditions exist that could cause the PACSystems Controller to trip the watchdog timer and reboot into Stop-Fault mode.
Controller Continuously Resets	DE9154	If the PACSystems controller experienced a fatal error with a configuration stored that would automatically start the OPC UA server, upon automatic recovery from the fatal error the OPC UA server would be started. If the OPC UA server itself was involved with the cause of the fatal error it could cause the controller to continually reset.
OPC UA Server Non-Transparent Redundancy Application Descriptions for Remote Server URI Not Available On Local FindServers Request	DE8313	The default method of configuration with CIMPLICITY software is to manually configure both DiscoveryURLs for local and remote redundant servers and is not impacted by this update.  When using PACSystems in a Hot-Standby Redundancy configuration with the Movicon.NEXT OPC UA Client, Movicon.NEXT version 4.3 or later must be used. See Operational Notes section item "Browsing OPC UA variables in a redundant system using the Movicon.NEXT OPC UA Client" for further information.

Open Issue	ID code	Description
OPC UA Client Incorrect keyUsage Warning	DE11422	When using OPC UA Certificates signed by a Certificate Authority, some OPC UA Clients may warn about an incorrect "keyUsage" setting on the OPC UA Server's certificate of "Certificate Sign". This is due to a recent change in protocol specification that is in the process of being rolled out in various OPC UA clients and OPC UA servers, this will be resolved with a future firmware or PAC Security Center software update. This warning may be ignored without any impact to operation or compromise of security when using a certificate signed by a Certificate Authority.
OPC UA Server May Fail to Start After Clearing Configuration	DE11940	If an OPC UA server configuration clear is commanded, and then followed immediately by an OPC UA server start request, the OPC UA server might fail to start.

## CPS400 Embedded PROFINET Controller Restrictions & Open Issues:

Open Issue	ID code	Description
IP Address changes to Embedded PROFINET Controller may cause Loss of Communications with PNS & GCG	DE3423	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.) 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.
Embedded PROFINET Controller indicates premature MRP Ring closure and logs extra Ring Closed/Ring Open faults when network cable reconnected	DE1461	Two scenarios can cause the Embedded PROFINET Controller to indicate that an MRP Ring is closed when in fact it is still open. The scenarios are: <ol style="list-style-type: none"> <li>When either an RX3i PNS or PROFINET Controller 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).</li> <li>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.</li> </ol> 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.



Open Issue	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 PROFINET Controller 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 PROFINET Controller 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: CPS400 CPU & Embedded Ethernet

Operational Note	Description																
Default IP Addresses for Embedded Ethernet	<p>The IP Address of any CPE400/CPL410/CPS400 LAN may be viewed via the OLED menu. The default IP Addresses programmed at the factory are:</p> <table border="1"> <thead> <tr> <th></th> <th>LAN1</th> <th>LAN2</th> <th>LAN3</th> </tr> </thead> <tbody> <tr> <td>IP Address:</td> <td>192.168.0.100</td> <td>10.10.0.100</td> <td>N/A</td> </tr> <tr> <td>Subnet Mask:</td> <td>255.255.255.0</td> <td>255.255.255.0</td> <td>N/A</td> </tr> <tr> <td>Gateway:</td> <td>0.0.0.0</td> <td>0.0.0.0</td> <td>N/A</td> </tr> </tbody> </table>		LAN1	LAN2	LAN3	IP Address:	192.168.0.100	10.10.0.100	N/A	Subnet Mask:	255.255.255.0	255.255.255.0	N/A	Gateway:	0.0.0.0	0.0.0.0	N/A
	LAN1	LAN2	LAN3														
IP Address:	192.168.0.100	10.10.0.100	N/A														
Subnet Mask:	255.255.255.0	255.255.255.0	N/A														
Gateway:	0.0.0.0	0.0.0.0	N/A														
Connecting to the Embedded Ethernet when IP Addresses are not Known	If the IP addresses of the CPE400/CPS400/CPL410's embedded LAN 1 and LAN 2 Ethernet interfaces are not known, communication may be established by using the OLED display to read the currently configured IP addresses.																
C Block support	C Programmer's Toolkit Rel 9.00 provides C Block support for the CPE400/CPS400/CPL410. To compile a project, use the command "compileCPACRX". This will create a .gefElf64 file in the plc directory. Add the .gefElf64 file to a CPE400/CPL410/CPS400 project using the "Add C Block..." option. Existing 32-bit C blocks (.gefElf files) must be rebuilt as 64-bit for the CPE400/CPL410/CPS400. Once the rebuild is complete, simply update the block.																
Unable to Download C Blocks	<p>When downloading an application containing C Blocks to a CPE400/CPL410/CPS400, PME may display an error indicating that the CPE400/CPL410/CPS400 does not support 32-bit C Blocks. This occurs even if the project validates successfully and all the C Blocks in the application are 64-bit.</p> <p>If this issue occurs, select <i>Clean Build Folders</i> from the <i>Target</i> ribbon and re-download to successfully store the application.</p> <p>CPS400 does not support user developed download of C-blocks when the project has been configured as safety enabled.</p>																
Ethernet Event Log not Preserved Across Power Cycle	The CPU's Ethernet event log for its embedded Ethernet interfaces is not maintained across a power cycle. Ethernet log events will be reported in the PLC Fault Table as with other RX3i CPUs. The PLC Fault Table entries will be preserved if an Energy Pack is attached.																
Station Manager Commands	The CPU's embedded Ethernet interfaces support a subset of Station Manager Commands (monitor-only commands). Refer to <i>PACSystems TCP/IP Ethernet Communications Station Manager Manual</i> , GFK-2225, for details.																

Operational Note	Description
Power-up Time	<p>The CPE400/CPL410/CPS400 power up as follows:</p> <ul style="list-style-type: none"> <li>• When an Energy Pack is not connected, the CPU requires approximately 75 seconds to complete power-up. When power is applied, all the Ethernet Port LEDs turn on and the status indicator LEDs on the front of the unit flash several times and turn off. Next, the PWR LED turns green, and the SSD LED flashes. After approximately 60 seconds, the Ethernet port LEDs flash and then indicate the port mode. The OE LED will turn on and then off. When power-up is complete, the OK LED turns on and the OE LED turns off.</li> <li>• When an energy pack is connected, the CPU requires up to 135 seconds to complete the power-up. The CPU's power-up sequence begins after the energy pack is fully charged. Charging may require up to 60 seconds depending on the capacitor pack's initial charge. (The energy pack's STAT LED blinks green while it is charging and turns solid green when charging is complete.)</li> </ul>
Insertion of Cap-Pack during Controller Power-up could cause Failed Battery Fault	<p>If the Energy Pack is powered on without a Cap Pack and a Cap Pack is then inserted during the power-up of the CPU, the CPU could log a failed battery fault. The CPU expects the Energy Pack to report fully charged within a certain amount of time. This time limit may not be met if the Cap Pack is absent at power-up.</p>
Avoid Overlapping IP Subnets when Configuring Embedded LAN IP Address and Subnet Mask	<p>The CPU contains two 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 both LAN interfaces on an overlapping IP subnet. (This may be changed by going to Controller General Options and changing the <i>Multiple Embedded LANs on the Same Subnet to Show as Warning.</i>)</p>
Avoid Overlapping Remote IP Networks when Configuring Embedded LAN IP Addresses and Subnet Mask	<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>
Embedded Ethernet Gateway Operation	<p>The CPU allows the configuration of an Ethernet gateway on the Embedded LAN interfaces. Since the CPU contains two LAN interfaces, each one supporting a unique IP Address, only one gateway is active at a time:</p> <ul style="list-style-type: none"> <li>• If a gateway is configured on only one of the LAN interfaces and the other is not configured (0.0.0.0) then, the single gateway is shared by both interfaces.</li> <li>• If a gateway is configured on multiple LAN interfaces, then the LAN1 gateway is given priority over the LAN2 gateway as long as LAN1 is functional. If, for example, the LAN1 cable is disconnected then the CPU will use the LAN2 gateway as a backup.</li> </ul>

Operational Note	Description
Embedded Ethernet Protocols & Performance	<p>The rackless CPUs have four independent Ethernet LANs with six auto-negotiating, full-duplex 10/100/1000 Ethernet Ports:</p> <p>LAN 1 &amp; LAN 2 support two IP Addresses and the following protocols:</p> <ul style="list-style-type: none"> <li>• OPC UA Server with support for up to 5 concurrent sessions with up to 10 concurrent variable subscriptions and up to 12,500 variables</li> <li>• SRTP Server with support for up to 48 simultaneous connections</li> <li>• Modbus/TCP Server with support for up to 16 simultaneous server connections</li> <li>• SRTP and Modbus/TCP Client with support for up to 32 clients; each may be SRTP or Modbus/TCP</li> <li>• Ethernet Global Data (EGD) Class 1</li> </ul> <p>LAN 3 is used to synchronize the Primary and Secondary CPUs in a Hot Standby Redundancy configuration. No other LAN devices are permitted on LAN 3 in this configuration. Use of both LAN 3 ports is recommended since this provides a redundant communications path between the two CPUs.</p> <p>Applications using Ethernet communication should be validated to ensure adequate throughput is available to meet the needs of the application.</p>
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 <i>stat g</i> station manager command shows that the multicast consumer exchange updates at a rate that is faster than the producer sends it. 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 CPE400/CPL410/CPS400 that has 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 CPE400/CPL410/CPS400 use the same LAN Interface Status Bit definition as the IC695CPE330. Refer to Section 12.6 Monitoring the Ethernet Interface Status Bits in PACSystems RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual, GFK-2224P (or later) for additional information.</p>
Reserved IP Subnet 192.168.180.x	<p>The IP subnet 192.168.180.x is reserved and is not available for configuration on any of the CPU's Ethernet ports.</p>
OPC UA Server Start-up Time	<p>The OPC UA server takes up to fifteen 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 <i>SERVER_STATUS</i> service request returns 0010h <i>OPC UA Server Starting</i>.</p>
Modbus/TCP & SRTP Client COMMREQ Function Block SYSID & TASK	<p>Modbus/TCP and SRTP Client Channels are supported. Set the COMMREQ SYSID to 0x0000 and TASK to 0x10000 to use these functions on the CPU.</p>
Secondary CPE400/CPL410/CPS400 Redundancy CPU Power-up Wait Time	<p>During power-up, when a CPE400/CPL410/CPS400 is configured as a secondary redundancy CPU, it waits up to 70 seconds to detect the primary unit. (The CRU320 waits 30 seconds.) If the primary unit is not detected within this wait time, the secondary unit assumes the primary unit is not present. In this case, if the second unit is configured to transition to Run on power-up, it becomes an active unit without a backup unit.</p>

Operational Note	Description
STOP to RUN Transition in CPS400 Redundancy System with PROFINET I/O	<p>A Primary CPS400 waits a maximum of 20 seconds during power-up for PROFINET device connections when there is no redundant link with the secondary unit. As soon as one PROFINET device connection is established (and no secondary PROFINET device connection exists) the Primary CPU can power-up in RUN mode. Otherwise, the Primary CPU powers-up in STOP mode. If a PROFINET connection is established after the timeout period expires, the standalone Primary CPU must be manually switched from STOP to RUN mode.</p> <p>In comparison, the CRU320 waits 3 seconds during power-up before attempting to go to RUN, which is not enough time to establish connections to its PROFINET devices. This means that a standalone Primary CRU320 always powers up in STOP mode.</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>
Redundant Link Communication Failure Fault During Dual Synchronization	<p>When both CPE400s or CPL410s or CPS400s in a redundant system are powered on at the same time and perform a dual synchronization, it is possible for the secondary unit to log <i>Redundant Link Communication Failure</i> faults if it completes power up before the primary unit. In this scenario, these faults occur because the primary unit is not yet online and do not indicate a redundant link failure. As soon as the primary unit completes power up it takes control and normal system operation begins with the primary controlling I/O and the secondary in standby mode.</p>
RUN & OE LED Operation During Firmware Update	<p>During a firmware update, the <i>RUN</i> and <i>OE</i> LEDs blink in unison to indicate that the FPGA is being updated. Occasionally, instead of blinking in unison, the <i>RUN</i> and <i>OE</i> LEDs blink alternately. If this occurs, no additional action is required. The firmware update will complete successfully.</p>
Setting the Time-of-Day Clock	<p>The CPU's Time-of-Day Clock may be set by:</p> <ul style="list-style-type: none"> <li>• The clock may be set from PACSystems using utilities in PAC Machine Edition.</li> </ul> <p>The CPU must be rebooted after the clock is set so that the time change is applied across all applications.</p>
LAN 3 Redundant Synchronization Link Failure Faults on Active Unit Power Loss	<p>Powering off the Active CPE400/CPL410/CPS400 in a redundant system causes the Backup unit to log any of these faults as the LAN 3 redundant synchronization links fail due to the loss of power:</p> <ol style="list-style-type: none"> <li>1. Redundant Link Communication Failure</li> <li>2. Redundant Link has Timed Out</li> <li>3. Fail Wait Time Exceeded</li> </ol> <ul style="list-style-type: none"> <li>• In this scenario, these faults indicate a <i>Redundant Link Communication Failure</i> and require no user action.</li> </ul>

Operational Note	Description
Restoring LAN 3 Redundant Synchronization Link when Backup Unit has No Connectivity to Redundant IO Devices	<p>If the CPE400/CPS400/CPL4 10's LAN 3 redundant synchronization link is lost while the backup unit has no connectivity to its redundant PROFINET IO devices, both controllers will become Non-Synchronized Active Units (NSAU). To restore synchronization, do one of the following:</p> <ol style="list-style-type: none"> <li>1. Restore connectivity between the backup and its devices first, then restore the LAN 3 redundant synchronization link. In this scenario, the backup unit will become active and the active will transition to <i>STOP</i> Mode.</li> <li>2. Restore the LAN 3 redundant synchronization link first, then transition the backup unit from <i>STOP</i> to <i>RUN</i> Mode. In this scenario, the backup will transition from NSAU to backup, and the active will remain active.</li> </ol> <p>If the CPS400 while configured for Safety, LAN 3 redundant synchronization link is lost, both controllers will become Non-Synchronized Active Units (NSAU) and the backup unit will transition to <i>STOP</i> mode.</p> <p>Perform the following:</p> <ul style="list-style-type: none"> <li>• Restore the LAN 3 redundant links, then transition the backup unit from <i>STOP</i> to <i>RUN</i> mode. In this scenario, the backup will transition from NSAU to backup, and the active will remain active.</li> </ul>
LAN System Software Fault After Redundant Unit Role Switch when Using Redundant IP	<p>In a redundant system, when Redundant IP is configured on either the CPU's Embedded Ethernet interface or a <i>LAN System Software Fault; Resuming</i> message may be logged in the fault table when a role switch occurs between the <i>Active</i> and <i>Backup</i> units. This fault indicates that SRTP connections on the previously active Ethernet interface were terminated due to the role switch. This fault does not impact normal operation and no additional action is necessary should this occur.</p>
Background Window Does Not Execute by Default when Redundancy is Enabled	<p>This prevents the Background Window from running CRC memory tests on the user logic. It is recommended that the <i>Background Window Timer</i> is set to a minimum of 5ms in both the Primary and Backup hardware configurations. The <i>Background Window Timer</i> setting may be found on the <i>Scan</i> Tab in the hardware configuration.</p>
Length of Serial I/O buffer	<p>The <i>Set-Up Input Buffer Function</i> will always allocate a buffer containing 2097 bytes.</p>
Oversweep Alarm When Using SoE or DNP3 With Constant Sweep	<p>PACSystems firmware version 10.10 and later adds additional synchronization between redundant controllers that support Sequence of Events or DNP3 Outstation protocol. The additional synchronization may result in a slightly higher sweep time (every sweep) when SoE, DNP3, or both are enabled. During a redundant role switch, controllers with DNP3 enabled may also experience a higher sweep time for the one sweep where the two controllers switch roles. This time is application dependent and is related to the amount of DNP3 that must be synchronized during the role switch.</p> <p>When upgrading to firmware version 10.10 or later, redundant applications that use Constant Sweep Mode may experience an Oversweep alarm if the actual sweep time is close to the configured Constant Sweep Timer setting. Should an Oversweep alarm occur, adjust the constant sweep timer to factor in the time necessary for the additional synchronization per sweep and, if DNP3 is enabled, perform a role switch.</p>
Reduced logic instruction set	<p>CPS400 has a reduced logic instruction set for ST, LD and FBD, refer to GFK-3279 VersaMax Function Block Manual for full details.</p>

Operational Note	Description
Abrupt Power Down Fault	An "Abrupt power down detected at power-up" fault is recorded in the PLC Fault Table if both the "Logic/Configuration Power-up Source" and "Data Power-up Source" in the hardware configuration are set to "Always Flash" or "Conditional Flash" and the PLC is turned off without an energy pack connected. This fault indicates that user memory was not preserved across the power cycle and does not interfere with normal operation because the application is already configured to power up from flash if there is no energy pack connected.
Browsing OPC UA variables in a redundant system using the Movicon.NExT OPC UA Client	When using OPC UA Non-Transparent Redundancy in a PACSystems Hot-Standby Redundancy configuration with the Movicon.NExT OPC UA Client, version 4.3 of the client must be used. It is required to use the OPC UA Client setting for "Redundancy Backup host list" located in the Driver Channel Settings. To do so configure the "Redundancy Backup host list" to include the IP address of each network adaptor you wish to fail over, separated by a ' ' character. With this configuration the Movicon.NExT OPC UA Client will connect to both addresses and automatically handle failover when a roll switch occurs. For example, if the system has LAN 1 IP Address 192.168.0.100 for the primary unit, and LAN 1 IP Address 192.168.0.101 for the secondary unit, then the Redundancy Backup host list parameter should be set to "192.168.0.100 192.168.0.101" (excluding the quotes). NOTE: The addresses must be for physical adaptors and the PACSystems Redundant IP Address cannot be used.

## Operational Notes: All RX3i CPUs

The following apply generically to any RX3i CPU:

Operational Note	Description
SRTP or Modbus Channel COMMREQ Error Response with Gateway	SRTP & Modbus TCP Channel commands on RX3i CPUs with embedded Ethernet (IC695CPE3xx and IC695CPx4xx) and the IC695ETM001 RX3i Ethernet module provides different COMMREQ error codes whenever a request is sent to an unreachable server. 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 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.
Cannot Clear Controller Passwords Loaded in Flash	<div style="background-color: yellow; padding: 5px;"><b>⚠ CAUTION</b></div> <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>

Operational Note	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 SRTTP connections can cause a temporary increase in sweep times.	Due to the complex math involved with Enhanced Security authentication, creating SRTTP 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 sweeping impact of Enhanced Security authentication and result in authentication processing across multiple sweeps.
C Toolkit Application Compatibility	Beginning with Rel 7.00 of the C Toolkit writing 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 PME Release 5.00 or later, if an attempt is made to download a C block containing undefined symbols, the download will fail. Machine Edition will display the following message in the Feedback Zone: Error 8097: Controller Error – Controller aborted the request [0x05][0xFF]
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 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 S90-30	The PACSystems RX3i CPU may return slightly different values for <i>Not A Number</i> 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	<ul style="list-style-type: none"> <li>Service Requests 6, 15, and 23 have slightly different parameters. Refer to <i>PACSystems RX3i and RSTi-EP CPU Programmer's Reference Manual</i>, GFK-2950.</li> <li>PACSystems PLCs support Service Request 26/30 functionality via fault-locating references.</li> <li>Service Request 13 requires a valid value in the input parameter block (Refer to <i>PACSystems RX3i and RSTi-EP CPU Programmer's Reference Manual</i>, GFK-2950 for details). On Series 90-30 and Series 90-70, the parameter block value was ignored.</li> <li>Service Requests 48 and 49 are no longer supported (there is no auto-restart) because most faults can be configured to be <i>not fatal</i>.</li> </ul>
IL and SFC	IL and SFC are not available.
DO I/O Instruction	The Series 90-30 Enhanced DO I/O instruction is converted to a standard DO I/O instruction (the ALT parameter is discarded and ignored.)

Operational Note	Description
END Instruction	The Series 90-30 END instruction is not supported. Alternate programming techniques should be used.
Non-nested JUMP, LABEL, MCR, & ENDMCR Instructions	Non-nested JUMPs, LABELs, MCRs, & ENDMCRs are translated to the corresponding nested JUMPs, LABELs, MCRs, & ENDMCRs when converting from Series 90-30 to PACSystems RX3i.
Changing 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.
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 ms 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 COMMREQs sent to Module in one sweep Causes Faults	A large number of COMMREQs (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, COMMREQs issued to a given board should be spread across multiple sweeps so that only a limited number (typically 8 or less) of COMMREQs 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 COMMREQ 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.
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.
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.	<i>Send Information Report</i> COMMREQ requests, with a minimum interval between host accesses of 200 ms or less, may fail if issued from the CPU's embedded Ethernet port. A COMMREQ Status Word value of 0290H, <i>Period expired before transfer completed; still waiting on transfer</i> indicates this condition occurred. To work around this issue, the user can set the <i>minimum interval between host accesses</i> to a value greater than 200 ms if issuing a <i>Send Information Report</i> COMMREQ from the embedded Ethernet port of the CPU.

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 sixteen 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.
Incorrect COMMREQ Status for Invalid Program Name	The program name for PACSystems is always <i>LDPROG1</i> . When another program name is used in a COMMREQ accessing %L memory, an Invalid Block Name (05D5) error is generated.
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 it to 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 a 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	In an S90-70 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.
CPU Parameters Reset to Default Values After Replacing CPU Module in PME	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 <i>Controller Communication Window Mode</i> , <i>Controller Communications Window Timer</i> , <i>Backplane Communication Window Mode</i> , and <i>Backplane Communications Window Timer</i> .

Operational Note	Description
OPC UA Sessions, Subscriptions, & Variables	PACSystems OPC UA servers support up to five concurrent sessions with up to ten concurrent variable subscriptions and up to 12,500 variables. The subscription limit is shared across all available sessions.

# Operational Notes: Embedded PROFINET Controller

Operational Note	Description
PROFINET Command Line Interface	The Embedded PROFINET Controller does not support the Command Line Interface (CLI).
PROFINET Interface	The PROFINET Interface is not supported in a Safety Configuration. To enable the PROFINET Interface on LAN 2, the Target Enable Safety option needs to be set to False.
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>The PME PROFINET DCP tool requires elevation to administrator privilege to run when it is launched by right-clicking on a PROFINET Controller. 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> <ol style="list-style-type: none"> <li>1. 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.”</li> <li>2. 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 <b>bold</b> when you right-click on the icon in the future.</li> </ol> <p>You may also launch the PROFINET DCP tool from the Utilities tab menu in PME. However, this launch method does not provide the 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>
PNIO_DEV_COMM Function Block Usage	<p>The <i>PNIO_DEV_COMM</i> 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> <ul style="list-style-type: none"> <li>• The <i>ENO</i> output turns on indicating that the function block’s parameters are successfully validated and the PROFINET Controller completed its first attempt to connect to the specified I/O device or;</li> <li>• The <i>OK</i> output turns on indicating the PROFINET Controller is successfully communicating with the I/O device</li> </ul>

Operational Note	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 <i>All Devices Connected</i> status bit, using the <i>PNIO_DEV_COMM</i> function block, or monitoring the CPU's IO Fault Table for <i>Loss of Device</i> 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 is 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 an expected operation. If one system is powered on slightly before the other, this condition does not occur.</p>

# Product Documentation

PACSystems RX3i CPU Reference Manual	GFK-2222
PACSystems RX3i CPU Programmer's Reference Manual	GFK-2950
PACSystems RX3i System Manual	GFK-2314
PACSystems TCP/IP Ethernet Communications User Manual	GFK-2224
PACSystems TCP/IP Ethernet Communications Station Manager User Manual	GFK-2225
PACSystems Hot Standby CPU Redundancy User Manual	GFK-2308
PACSystems RX3i PROFINET IO Controller User Manual	GFK-2571
PROFINET I/O Devices Secure Deployment Guide	GFK-2904
C Programmer's Toolkit for PACSystems User Manual	GFK-2259
PACSystems RXi and RX3i Controller Secure Deployment Guide	GFK-2830
PACSystems HART Pass Through User Manual	GFK-2929
PACSystems DNP3 Outstation User Manual	GFK-3103
PACSystems RX3i Sequence of Events User Manual	GFK-3050
PACSystems VersaMax SafetyNet Safety Manual	GFK-3277
PACSystems VersaMax SafetyNet Function blocks	GFK-3279




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

# Contact Information and Support Guide




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