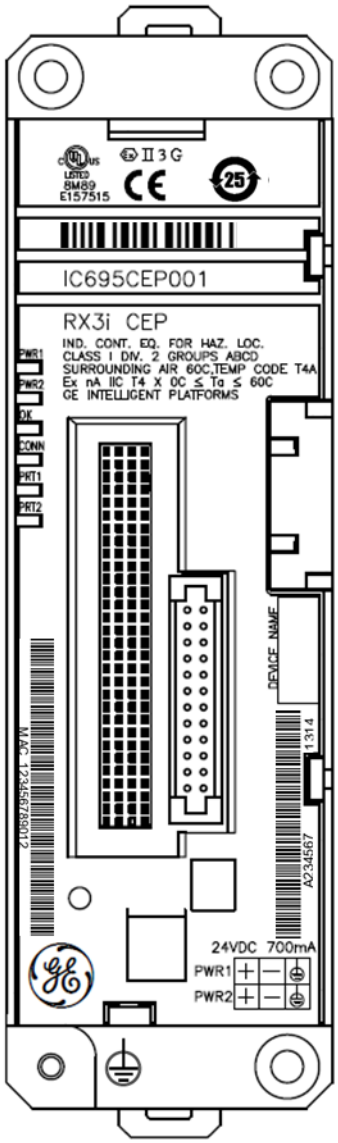
PACSystems* RX3i CEP

IC695CEP001

RX3i CEP Carrier

GFK-2884A
February 2014



The PACSystems* RX3i CEP Carrier interfaces a remote node of one RX3i IO module to a PROFINET IO Local Area Network (LAN). The optional RX3i CEP Expansion Carrier, attached to the RX3i CEP Carrier, provides the ability to add one additional RX3i IC694 IO module to the remote node.

The RX3i CEP Carrier works as a PROFINET IO-Device. The RX3i CEP Carrier's main Remote IO functions include:

- Scanning all the modules within the remote node (input and output scan).
- Publishing data on the PROFINET network to a PROFINET IO-Controller at a user-specified production period.
- Receiving data from a PROFINET IO-Controller on the PROFINET network at a customer-specified production period.
- Managing PROFINET communication and module configuration between a PROFINET IO-Controller and modules within the remote node.
- Managing the state of the I/O when communications is lost
- Publishing fault information (alarms, diagnostics, etc.) to the PROFINET IO-Controller

The insertion and removal of IO modules is the same as in an RX3i Universal Backplane. See *PACSystems RX3i System Manual,* GFK-2314 for details on insertion and removal of IO modules.

The RX3i CEP Carrier (IC695CEP001) provides two RJ-45 Ethernet receptacles. It supports 10/100BASE-TX Ethernet standard interface.

Features

- Full programming and configuration services for all supported RX3i IO Modules using Proficy Machine Edition. For a list of currently supported IO modules, see page 12.
- Support daisy-chain/line, star, or ring (redundant media) network topologies.
- Two switched Ethernet ports: two eight-conductor RJ-45 shielded twisted pair 10/100 Mbps copper interfaces.
- A USB port for field updates of firmware using WinLoader.

Note: The USB port is for firmware upgrades only. It is not intended for permanent connection

The CEP Carrier requires a user-supplied +24 VDC power source.

Ordering Information

IC695CEP001	RX3i CEP Carrier with RJ-45 Copper Ethernet Interface
IC694CEE001	RX3i CEP Expansion Carrier

Specifications

PROFINET support	PROFINET Version 2.3 Class A IO-Device	
RX3i Controller version required	IC695CPU315/CPU320/CPE305/CPE310, with firmware version 7.75 or later IC69PNC001 PROFINET IO-controller with firmware version 1.23 or later	
RXi Controller version required	RXi Controller with firmware version 7.80 or later	
Proficy Machine Edition version required	Version 8.0 SIM 5 or later	
Power requirements	IC695CEP001: 5.25W (0.22 A) at 24VDC with or without Expansion Carrier (IC694CEE001) [1] DC power supply input range: 19.2V – 30V	
Module dimensions	177.2 mm x 51 mm x 35 mm (6.98 inches x 2.01 inches x 1.38 inches)	
Operating temperature range	0 to 60℃ maximum surrounding air temperature	
Number of Ethernet port connectors	IC695CEP001: Two RJ-45 10/100Base-TX receptacles IC694CEE001: None	
USB connector (for firmware upgrades)	IC695CEP001: One Micro-B connector. USB 2.0 compliant running at Full-speed (12 MHz) in device mode IC694CEE001: None	
PNS Status and Control bits	32 input status bits and 32 output control bits	
I/O data update on the PROFINET LAN	Configurable: 1ms, 2ms, 4ms, 8ms, 16ms, 32ms, 64ms, 128ms, 256ms and 512ms	
Number of IP addresses	One. Supports Classless Inter-Domain Routing (CIDR)	
Number of MAC addresses	Three. One per external port and one internal. External MAC addresses are only used for specialized Ethernet protocols such as MRP or LLDP	
I/O station maximum limits	**Number of I/O Modules per station**	IC695CEP001: One IC695CEP001 with IC694CEE001: Two
	I/O data per station	1024 bytes total 512 bytes of input data 512 bytes of output data
Configuration	Configured using Proficy Machine Edition when used with a PACSystems RX3i PROFINET Controller module, as part of an RX3i High-Speed IO LAN system. V2.3 GSDML file available for import into 3rd-Party tools.	

For product standards, general operating specifications, and installation requirements, refer to the *PACSystems RX3i System Manual*, GFK-2314.

[1] Value does not include the power consumption of the installed IO modules. When calculating the total power requirements, you will need to add the power consumption of the IO modules according to the IO module datasheet.

Additional Information

Manuals can be downloaded from the Support website, http://support.ge-ip.com.

PACSystems RX3i CEP Manual, GFK-2883
PACSystems RX3i PROFINET Controller Manual, GFK-2571
PACSystems RX3i PROFINET Controller Command Line Interface Manual, GFK-2572
PACSystems CPU Reference Manual, GFK-2222
PACSystems RX3i System Manual, GFK-2314
PACSystems RXi Distributed IO Controller User Manual, GFK-2816

General Installation Requirements

This product is intended for use with the RX3i system. Its components are considered open equipment (having live electrical parts that may be accessible to users) and must be installed in an ultimate enclosure that is manufactured to provide safety. As a minimum, the enclosure shall provide a degree of protection against solid objects up to 12mm (e.g. fingers). This equates to a NEMA/UL Type 1 enclosure or an IP20 rating (IEC60529) providing at least a pollution degree 2 environment.

Installation in Hazardous Areas

The following information is for products bearing the UL marking for Hazardous Areas or ATEX marking for explosive atmospheres:

Class 1 Division 2 Groups ABCD

- This equipment is open-type device and is meant to be installed in an enclosure suitable for the environment that is only accessible with the use of a tool.
- Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or nonhazardous locations only.
- WARNING - Explosion hazard - substitution of components may impair suitability for Class I, Division 2;

ATEX ZONE 2

- Device must be mounted in an enclosure certified in accordance with EN60079-15 for use in Class I, Zone 2, Group IIC and rated IP54. The enclosure shall only be able to be opened with the use of a tool.
- Provisions shall be made, external to the apparatus, to provide the transient protection device to be set at a level not exceeding 140% of the rated voltage at the input terminals of this apparatus.

ATEX Marking

Ex nA IIC T4 X 0C $\leq$ Ta $\leq$ 60C

Normal Operation of Individual LEDs

Power LEDs

The RX3i CEP Carrier has two Power LEDs, PWR1 and PWR2 that indicate whether the power is applied and good corresponding to the two power sources.

●	Green, ON	Power is applied at the minimum specified level
○	OFF	The power supply does not have power or has failed.

OK LED

The OK LED indicates whether the CEP Carrier is able to perform normal operation.

●	Green, ON	RX3i CEP is OK
●	Amber, ON	Either the RX3i CEP Carrier or IO module has a fault
◐	Amber, blink pattern	Fatal error. Flashes once between error codes.
◐	Fast blinking	CEP has no valid MAC addresses
○	OFF	CEP has an unrecoverable fault

Connect LED

The CONN LED indicates the status of PROFINET connections.

●	Green, ON	At least one PROFINET connection (AR) exists with an IO-Controller
◐	Amber, blink pattern	Fatal error. Flashes once between error codes blinked on the OK LED
◐	Amber, blink in 1Hz	No device name configured
○	OFF	No PROFINET connection (AR) exists

Port LEDs

The RX3i CEP has two Port LEDs, PRT1 and PRT2 that indicate link speed, link connection and link activity corresponding to the two external Ethernet ports.

●	Green, ON	Link connected, 100 Mbps
◐	Green, blinking	Port active, 100 Mbps
●	Amber, ON	Link connected, 10 Mbps
◐	Amber, blinking	Port active, 10 Mbps
◐	Amber, blink pattern	Fatal error. Flashes once between error codes blinked on the OK LED
○	OFF	The associated Ethernet port is not connected to an active link (can be disabled by configuration)

Note: Multiple LEDs can blink in patterns that indicate special conditions, such as a request for module identification. For additional information, refer to the *PACSystems RX3i CEP Manual*, GFK-2883.

Quick Start

Carrier Installation Requirements

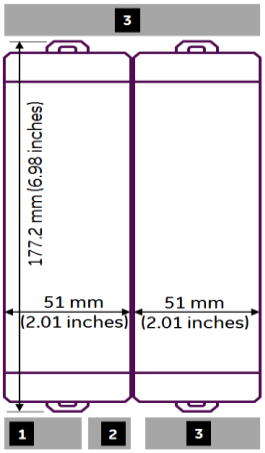
The CEP Carrier and Expansion Carrier can be mounted on a DIN rail or a panel.

Adequate installation space is required for:

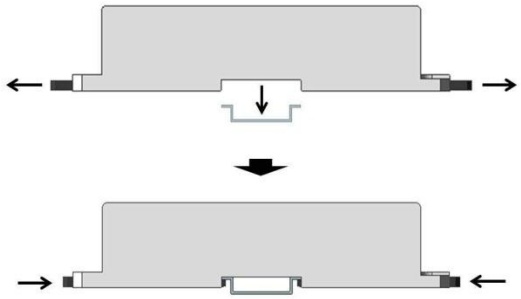
1. Clearance for communications port cables.
2. Power wiring.
3. Operating the DIN latch.

The RX3i CEP Carrier with an IO module attached requires an enclosure with minimum depth of 165mm.

Rated thermal specifications are based on a clearance of 5.1 cm (2 inches) above and below the equipment and 2.54 cm (1 inch) to the left of the RX3i CEP Carrier.



Installing an RX3i CEP Carrier on a DIN Rail



The carrier mounts on a standard EN 50022, 35mm x 7.5mm DIN rail. Conductive (unpainted) finish is required for proper grounding.

For best resistance to vibration, the DIN rail should be installed horizontally on a panel using screws spaced approximately 15cm (6inch) apart.

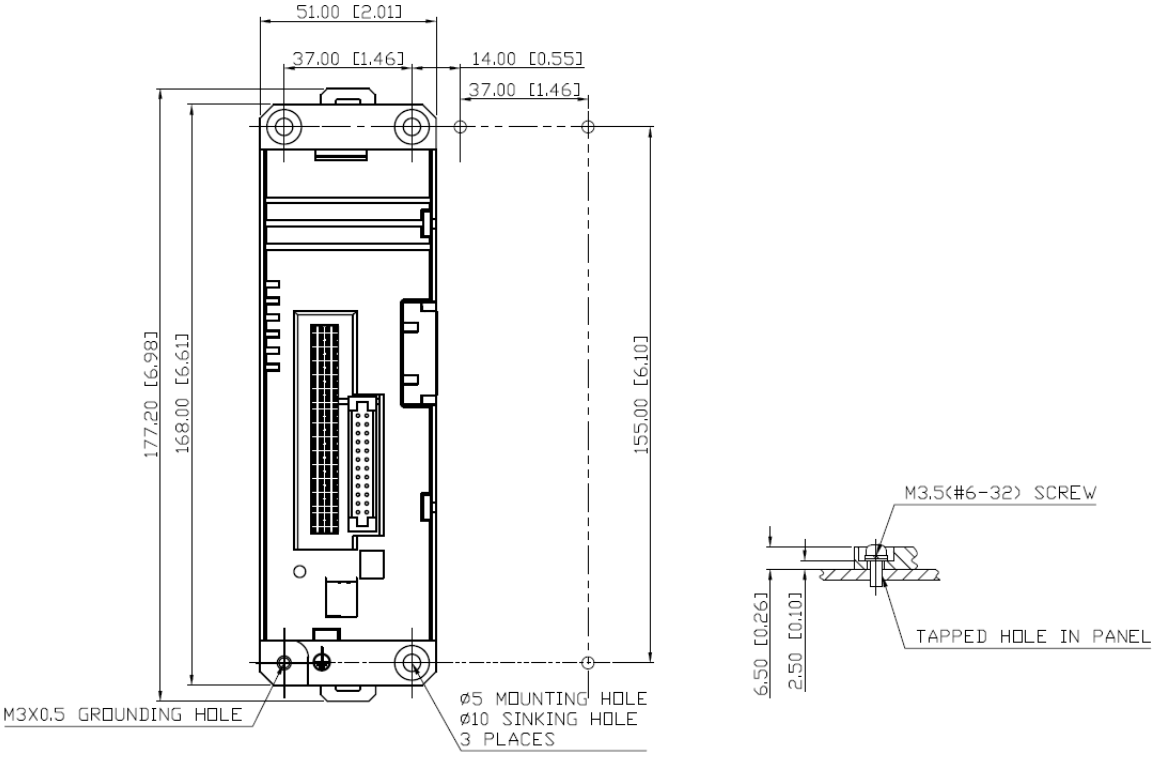
1. With a small flathead screwdriver, pull out the two DIN rail latches and stand the carrier on the DIN rail.
2. Push in the two DIN rail latches so that the latches hold the DIN rail.

Panel Mounting

For applications requiring maximum or long term resistance to mechanical vibration and shock, the panel-mounting method is strongly recommended. A minimum panel thickness of 2.4mm (.093in) is required.

Note 1: Tolerances on all dimensions are ±0.2mm (0.078 inch) non-cumulative.

Note 2: Apply 1.1–1.4Nm (10–12 in/lbs) of torque to M3.5 (#6-32) steel screws threaded into tapped holes in the panel.



Grounding

Warning

All CEP Carriers in a system must be grounded to minimize electrical shock hazard. Failure to do so can result in severe personal injury.

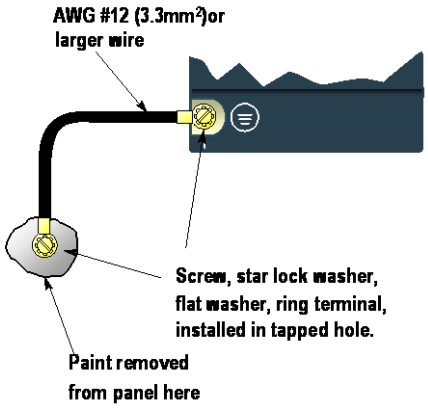
The RX3i CEP Carrier and Expansion Carrier each provide two grounding connection contacts:

- the grounding clips at the back of the carrier, which require DIN rail installation
- the grounding screw hole at the left-bottom of the carrier.

Note: When the Carrier is mounted on a DIN rail, the grounding clips on the back of the Carrier do not provide an adequate ground connection. The Carrier's metal back must also be grounded using a separate conductor.

Ground each Carrier to the panel or enclosure using a minimum AWG #12 (3.3 mm^2) wire with ring terminals. Use an M3 screw, star lock washer and a flat washer to connect the wire at the Carrier's grounding hole. Connect the other end of the ground wire to a tapped hole in the grounded mounting panel or enclosure, using a machine screw, star lock washer and flat washer. Alternately, if the panel has a ground stud, use a nut and star lock washer for each wire on the ground stud to ensure adequate grounding. Where connections are made to a painted panel, the paint should be removed so clean, bare metal is exposed at the connection point. Terminals and hardware used should be rated to work with the aluminum carrier material.

Note: The star lock washer method is suitable for a shield ground, but not suitable for a safety ground.



Installing Modules on the Carrier

The insertion and removal of IO modules is the same as in an RX3i Universal Backplane. For details, refer to the *PACSystems RX3i System Manual,* GFK-2314.

Caution

Do not install a Power Supply module on the CEP or CEE Carrier. Attempting to do so could damage the module and/or the Carrier.

Unsupported Modules

Caution

If an unsupported module is inserted in the CEP or CEE Carrier, the module will not be recognized correctly and could cause damage to the Carrier or the module.

When an unsupported IO module is inserted in either the RX3i CEP Carrier or RX3i CEP Expansion Carrier, no alarm is reported to indicate this.

For the latest updated list of supported IO modules, refer to page 12.

Some unsupported IO modules have the same Distinguishing Class (for example, IC694MDL740 has the same Distinguishing Class as IC694MDL742).

Connecting Power Supplies

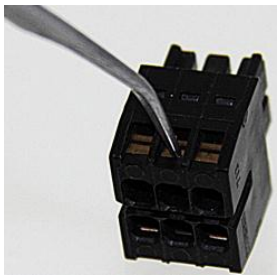
You will need:

Note: Two power supplies are required if using redundant power supplies.

- One 24 VDC power supply which provides a low voltage/limited current (LVLC) power source. (Example: the combination of an isolated DC supply and a fuse, listed 30VDC minimum and 3A maximum, connected in series with the input.)
- A power cord with 28–16 AWG / 0.08–1.32mm2 wires
- Ferrules for 28–16 AWG wires (optional)
- A frame ground wire, 28–16 AWG
- An input power terminal block – provided (WAGO Part Number 713-1103.)
- A small screwdriver, 2.5×0.4 mm/0.098×.0157 in

Note: For CE Mark purposes, input power lines to the CEP Carrier should be limited 30 meters or less.

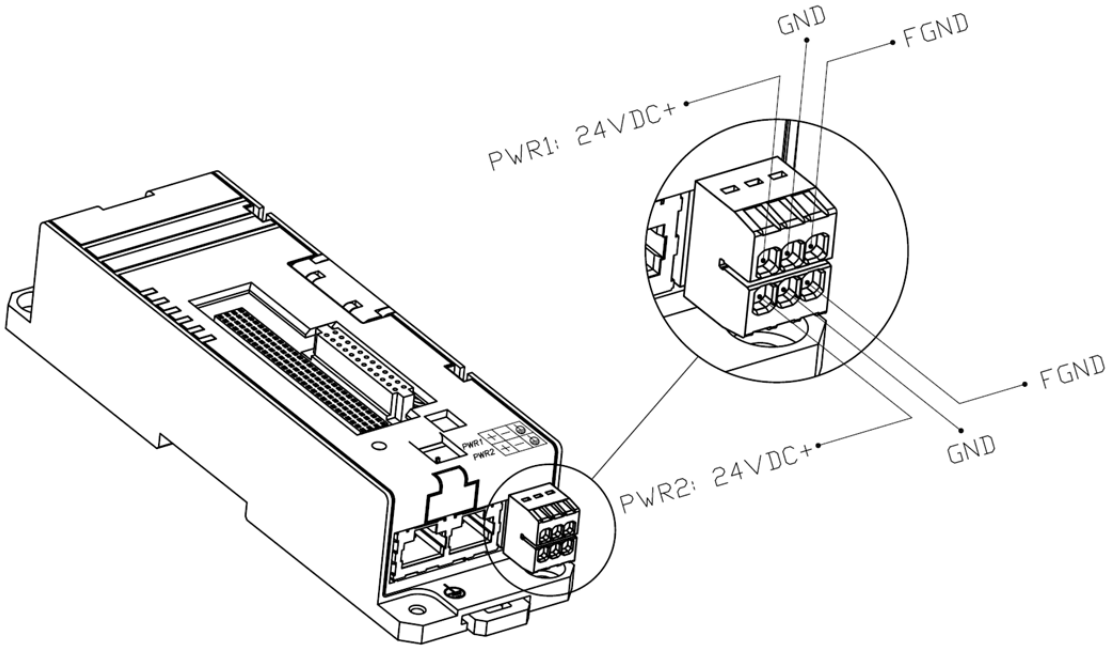
Note: Before inserting the wires into the power connector terminal block, use a small screwdriver to release the spring clamp on the terminal block.



1. Using the power cord, attach the power supply to the power terminal block as shown in the following figure.

   Recommended wire stripping length is 6–7mm (0.25 in).
2. If using redundant power supplies, connect the second power supply to the input power terminal block.
3. Insert the input power terminal block into the Input Power connector.

Note: There are no user-serviceable fuses in the CEP Carrier.



Connecting Power to the RX3i CEP Carrier

Adding a Redundant Power Supply

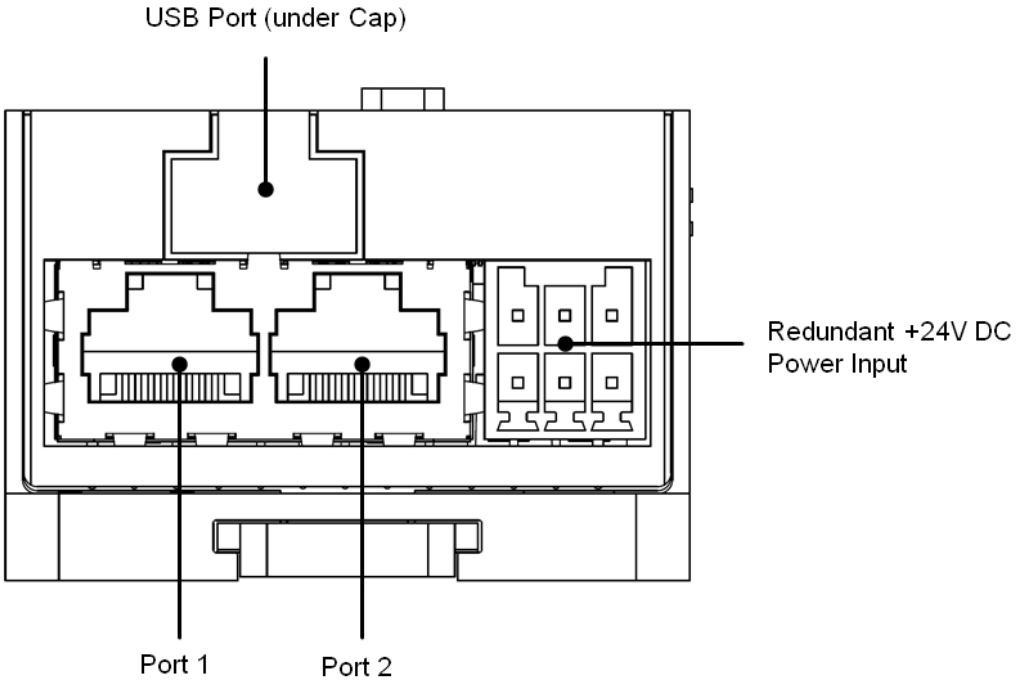
To add a redundant power supply to a system that is already in operation, use the following procedure.

1. Remove power from the primary power supply to the RX3i CEP carrier
2. Remove the power terminal block from the carrier.
3. Without disturbing the primary power supply input lines, connect the redundant power supply input lines to the power terminal block.
4. Insert the power terminal block into the Input Power connector.
5. Apply power to the redundant power supply. The PWR2 LED on the RX3i CEP carrier should be on.
6. Apply power to the primary power supply. The PWR1 LED on the CEP Carrier should be on.

Note: For the procedure to swap a redundant power supply, see the *PACSystems RX3i CEP Manual*, GFK-2883.

Connecting the CEP to the PROFINET Network

The two external RJ-45 Ethernet ports, which provide 10/100 Mbps copper interfaces, are on the bottom of the CEP Carrier.



Devices connected to the RX3i CEP ports should have Ethernet Auto-negotiation enabled. The RX3i CEP Carriers and other participating devices can be connected in a daisy-chain/line, or star topology.

Caution

Do not connect both ports on the Ethernet interface, directly or indirectly, to the same device so as to form a circular network unless Media Redundancy is enabled with one node actively set up as the Media Redundancy Manager.

Supported Network Media Types and Distances

Media Type	*Connector Type*	*Wavelength (nm)*	*Media Type*	*Core Size (µm)*	*Modal Bandwidth (MHz – Km)*	*Maximum Distance (m)*
10/100BASE-TX	RJ45	-	CAT5/CAT5e/ CAT6	-	-	100 (maximum)

PROFINET IO over wired infrastructure must be 100Mbps full-duplex or faster. The hardware is capable of operating at 10Mbps but should not be used for PROFINET.

Assigning an IO Device Name to the CEP

Before attempting to connect to or configure the CEP, the IO Device Name must be set with a Discovery and Configuration Protocol (DCP) tool.

Configuring the CEP and its IO Modules on a PROFINET Network

Proficy Machine Edition is the primary tool used to configure an RX3i PROFINET network. The GSDML file for the RX3i CEP is included with Proficy Machine Edition. To obtain the GSDML for import into a 3rd-Party tool, contact GE Technical Support.

Supported IO Modules

The following modules can be used with this release of the RX3i CEP Carrier:

Catalog Number	Module Description	Distinguishing Classes[2]
	Discrete Input Modules	
IC694MDL250	120 VAC Isolated Input (16 Points)	none
IC694MDL646	24 VDC Input, Neg/Pos Logic, 1 mSec Filter (16 Points)	16 in
IC695MDL664	Digital Input Module with Diagnostics – 16-Channel	none
	Discrete Output Modules	
IC694MDL742	12/24 VDC Output, 1 Amp, Positive Logic (16 Points), Fused	16 out
IC694MDL916	Relay Output, 4 Amp (16 Points)	none
IC695MDL765	Digital Output Module with Diagnostics – 16-Channel	none
	Analog Input Modules	
IC695ALG616	Analog Input, Voltage/Current, Configurable, (16 Channels)[3]	none
IC695ALG626	Analog Input with HART Communications, Voltage/Current, Configurable, (16 Channels)[3], [4]	none
	Analog Output Modules	
IC695ALG728	Analog Output with HART Communications, Voltage/Current, (8 Channels)[3], [4]	none
IC695ALG808	Isolated Analog Output module, voltage/current, (8 Channels)[3]	none

[2] The RX3i CEP Carrier and the RX3i CEP Expansion Carrier cannot distinguish between modules within the same Distinguishing Class type. This means that any module physically present that is in the same class as the one configured will not alert the user with a System Configuration Mismatch fault on the Controller Fault Table. See GFK-2222 Chapter 3 for CPU operation during System Configuration Mismatch faults.
[3] The RX3i CEP Carrier and the RX3i CEP Expansion Carrier do not support Interrupts from this module.
[4] The RX3i CEP Carrier and the RX3i CEP Expansion Carrier do not support all HART features in this module.

Important Product Information for this Release

Release History

Version	*Firmware Release*	*Date*	*Comments*
IC695CEP001-AAAA	1.00	January 2014	Initial release

Compatibility

The PROFINET Scanner modules require the following CPU firmware and programming software versions:

Proficy Machine Edition	Proficy Machine Edition 8.0 version or later
RX3i CPU Version	PACSystems RX3i CPU, IC695CPU315/CPU320/CPE305/CPE310, with firmware version 7.75 or later
RX3i PNC Version	PACSystems RX3i PROFINET IO-Controller, IC695PNC001, with firmware version 1.23 or later
RXi Controller Version	PACSystems RXi Distributed IO Controller, ICRXICTL000, with firmware version 7.80 or later
RX3i IO Modules	For a complete list, refer to “Supported IO Modules”, on page 12.

Restrictions and Open Issues

Issue	*Description*
Loss of AR connection when another PNC try to connect CEP001	If the RX3i CEP Carrier has established a PROFINET connection with one PNC, when another PNC connects to the same RX3i CEP Carrier, the old PROFINET connection will be terminated and the new PROFINET connection will be accepted. The RX3i CEP cannot work as shared device. It only can accept one PROFINET connection at a time. It is recommended to configure all IO controllers and IO devices in one network on the same LAN in PME. PME checks the LAN for duplicate device names to avoid configuring the same device names for IO devices in one LAN.
CEP001 goes to fatal error after lots of Low/Low-Low/Underrange Alarm testing	When an RX3i IO module generates many Diagnosis Appears and Diagnosis Disappears alarms in a short time, the RX3i CEP Carrier might go to a fatal error state. In this state, the Carrier sometimes blinks code 6:8 or sometimes fails with OK LED off. For example, when using an IC695ALG616 module with RX3i CEP, if the ALG616 is configured to report faults for Low Low under range diagnosis and these diagnostic alarms appear and disappear quickly, the RX3i CEP Carrier will go to fatal error. For these cases, it is recommended to configure a reasonable Deadband value to avoid generating a high volume of Diagnosis Appear and Diagnosis Disappears alarms. To recover, cycle power to the RX3i CEP Carrier.

Operational Notes

Note	Description
No alarm report when inserted an unsupported IO module	When an unsupported IO module is inserted in either the RX3i CEP Carrier or RX3i CEP Expansion Carrier, no alarm is reported to indicate this. For a list of supported IO modules , see page 12. Some unsupported IO modules have the same Distinguishing Class (for example, IC694MDL740 has the same Distinguishing Class as IC694MDL742). If an unsupported module is inserted in the CEP or CEE Carrier, the module will not be recognized correctly.
Wait time is too long to enter download mode	If power to the RX3i CEP Carrier lost during a firmware update, a delay of more than 50 seconds might be required before the RX3i CEP Carrier can enter the firmware update mode again.
USB port drivers	When connecting the USB cable to the RX3i CEP Carrier, you may receive a warning for installing a driver that has not passed Windows Logo testing. Each RX3i CEP Carrier is recognized as a separate Windows device with separate installation, as each has a unique serial number. This is normal operation for this release.
Network parameters for IO-Devices	If the network parameters (IP Address, subnet mask, and gateway IP) assigned by the DCP tool are different from the configuration in the IO-Controller and the IO-Controller is configured to assign IP settings to devices, when the IO Controller assigns its IP settings, the settings previously stored from the DCP tool are lost. On a reset, the IO-Device is set to factory default values (0.0.0.0/0.0.0.0/0.0.0.0) as prescribed by the PROFINET specification.
No Extra Module Alarms	The RX3i CEP Carrier and RX3i CEP Expansion Carrier ignore all extra equipment. No Extra I/O Module faults or Loss of I/O Module faults are generated for unconfigured modules.
Diagnosis Disappears alarms may be out of sequence with Diagnosis Appears alarms	For RX3i Intelligent Modules Diagnosis Disappears alarms are generated by cyclically polling diagnostic data which may be slower than Appears messages generated by interrupt. Example: When re-applying field power, new channel alarms such as Hi/Low alarms may occur before the Loss of Field Power alarm clears. Affected modules are: IC695MDL664 IC695MDL765/ALG616 IC695ALG626 IC695ALG728 IC695ALG808