MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GE PACSYSTEMS RX3I

IC695CPE305-BCAB

CPE305 PROGRAMMABLE CONTROLLER

Used with the applicable PACSystems RX3i controllers configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: GE official manufacturer documentation

1.2.3 PACSystems CPU Models

Family	Catalog #	Description
RSTi-EP Standalone CPUs	EPSCPE100	1 MB user memory
	EPSCPE115	1.5 MB user memory
RX3i Standalone CPUs with embedded Ethernet/PROFINET Interface	IC695CPE400	64 MB user memory with Field Agent
	IC695CPL410	64 MB user memory with Linux
RX3i CPUs with embedded Ethernet/PROFINET Interface	IC695CPE330	64 MB user memory
RX3i CPUs with embedded Ethernet Interface[2]	IC695CPE302	2 MB user memory
	IC695CPE305	5 MB user memory
	IC695CPE310	10 MB user memory
RX3i CPUs	IC695CPU310	10 MB user memory
	IC695CPU315	20 MB user memory
	IC695CPU320	64 MB user memory
	IC695NIU001+ versions –AAAA & later	For information, refer to the *PACSystems RX3i Ethernet Network Interface Unit User's Manual*, GFK-2439
	IC695NIU001	For information, refer to the *PACSystems RX3i Ethernet Network Interface Unit User's Manual*, GFK-2439
RX3i Redundancy CPU	IC695CRU320	64 MB user memory

[2] *The RX3i CPE302/CPE305/CPE310 embedded Ethernet interface provides a maximum of two programmer connections. It does not support the full set of Ethernet interface features described in this manual. For a summary of RX3i embedded Ethernet interface features, refer to PACSystems RX3i TCP/IP Ethernet Communications User Manual, GFK-2224K or later.*

- Effective with the release of IC695EIS001, the RX3i may be configured to act as an IEC 104 Server. Refer to *PACSystems RX3i IEC 104 Server Module IC695EIS001 User's Manual,* GFK-2949.

- PROFINET Scanner User Manual, GFK-2883.

- HART Pass Through allows an RX3i CPU to communicate HART asset management data between HART-capable I/O modules and PC-based asset management tools. This entails usage of PC-based applications, RX3i Analog modules with HART functionality and (optionally) supporting PROFINET products. HART Pass Through operation is described in the *PACSystems HART Pass Through User Manual*, GFK-2929.

- The following RX3i CPUs support HART Pass Through: IC695CPE305, IC695CPE310, IC695CPU315, IC695CPU320, IC695CRU320, IC695CPE330[8,9] (firmware version 8.50 or later). All versions of IC695CPE302[11] support this feature.

The following RX3i analog modules support HART:

IC695ALG626
IC695ALG628
IC695ALG728

If used for HART Pass Through, the supporting RX3i PROFINET Controller and PROFINET Scanner must also contain HART-compatible firmware:

IC695PNC001-AK firmware version 2.20

IC695PNS001-ABAH firmware version 2.30[10]

IC695PNS101-AAAA firmware version 3.10
IC695CEP001-AAAD firmware version 2.30.

- IC695CMM002 and IC695CMM004 expand the serial communications capability of the RX3i system. Refer to *PACSystems RX3i Serial Communications Modules User's Manual,* GFK-2460.

- CPE310, CPU310, CPU315, CPU/CRU320 and NIU001 provide two serial ports, one RS-232 and one RS-485.

- CPE400 (firmware version 9.40), CPL410, CPE302 and CPE305 each provides one RS-232 serial port.

- CPE330 provides no serial ports.

- Effective with CPE302 firmware version 9.40[11], CPE305/CPE310/CPE400[12] firmware version 9.20, or CPE330 firmware version 9.21, the CPE embedded Ethernet interface supports Simple Network Time Protocol (SNTP) Client, Coordinated Universal Time (UTC), and Daylight Savings Time (DST). Refer to *PACSystems RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual,* GFK-2224 version Q or higher. CPL410 supports this feature in all firmware versions.

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[8] *When used to support HART Pass Through, CPE330 must do so via a PNC001 and cannot employ its embedded PROFINET feature for this purpose.*

[9] *IC695CPE330 firmware version 8.95 added support for the Remote Get HART Device Information COMMREQ.*

[10] *IC695PNS001 firmware version 2.41 added support for the Remote Get HART Device Information COMMREQ not previously supported, as documented in PACSystems RX3i PROFINET Scanner Important Product Information, GFK-2738L. The syntax and usage for this COMMREQ are described in the PACSystems RX3i System Manual, GFK-2314M or later.*

[11] *PAC Machine Edition Release 9.50 SIM 7 or later is required for CPE302 configuration.*

[12] *PAC Machine Edition Release 9.00 SIM 10, or 9.50 SIM 2, or later is required for SNTP Client, UTC, and DST support.*

System power-down occurs when the power supply detects that incoming power has dropped for more than 15ms.

4.10.3.3 Power Cycle Operation with an Energy Pack

Energy Packs offer distinct advantages over batteries:

a) significantly longer life cycles

b) they are more reliable

c) flammability during shipment is not an issue

d) in their end-of-life phase, their decline is a lot more gradual.

The system design includes the ability of the CPU and the Energy Pack to monitor each other in real time. This permits the user to monitor alarms and thereby determine when to replace a capacitor pack. The capacitor pack is normally replaced while the CPU is powered on, giving it time to charge up before any subsequent loss of power. Users should target periods which are expected to be free from electrical events, such as thunderstorms, to carry out such work. Capacitor packs may also be replaced while power is off.

When power is lost, the Energy Pack supplies current and maintains voltage levels for a period of time sufficient to permit the connected CPU to save all dynamic memory to non-volatile memory.

When power is restored, the CPU will not start running its application until the Energy Pack signals that it is fully charged. The CPU will then resume operation using the contents of memory retained at the previous loss of power event. The Energy Pack charges continuously during normal operation.

The RX3i product lines encompass several different Energy Packs, so it is important to use compatible products:

CPU	IC695CPE400 IC695CPL410	IC695CPE330	IC695CPE302 IC695CPE305 IC695CPE310	ICRXICTL000
Energy Pack	IC695ACC403	IC695ACC402	IC695ACC400	ICRXIACCEPK01
Capacitor Pack	IC695ACC413	IC695ACC412	IC695ACC400	ICRXIACCCPK01
Connecting Cable	IC695CBL003	IC695CBL002	IC695CBL001	ICRXIACCCBL01
Documentation	GFK-3000	GFK-2939	GFK-2724	GFK-2741

User memory is preserved only if the compatible Energy Pack is connected (and charged) at power-down.

If the Energy Pack is connected at power-up, the CPU waits for it to charge up before beginning normal operations. For CPE330/CPE400/CPL410, this typically takes up to 90 seconds.

In the event the Energy Pack fails to charge up in a reasonable amount of time, or is absent, the CPU will time out the wait period and will then commence operations without the Energy Pack. When this occurs, the CPU is vulnerable to loss of memory, should another power failure occur. It is critical to monitor the status bits shown in *Energy Pack Status Bit Operation* so that human intervention can be summoned.

Removing or reconnecting the Energy Pack while the connected CPU is powered off has no effect on the preservation of user memory.

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Response Data (Minor Type)	CPU Model[83]
02 hex	IC698CPE010
04 hex	IC698CPE020
05 hex	IC698CRE020
06 hex	IC698CPE030
08 hex	IC698CPE040
0A hex	IC695CPE302 IC695CPE305 IC695CPU310
0C hex	IC695NIU001
10 hex	IC695CPU320
11 hex	IC695CRU320
12 hex	IC695CPE302 IC695CPE305
18 hex	IC695CPU315

6.3.3.12 Message (22): Mask Write 4x Memory

Modifies the contents of a specified 4*x* register using a combination of an AND mask, an OR mask, and the register's current contents. The function can be used to set or clear individual bits in the register. Broadcast is not supported.

6.3.3.12.1 Query:

The query specifies the 4x reference to be written, the data to be used as the AND mask, and the data to be used as the OR mask.

The function's algorithm is:

Result = (Current Contents AND And_Mask) OR (Or_Mask AND And_Mask)

For example:

	Hex	Binary	
Current Contents	12	0001	0010
And_Mask	F2	1111	0010
Or_Mask	25	0010	0101
And_Mask	0D	0000	1101
Result	17	0001	0111

[83] *Does not apply to CPE330, which has no serial ports.*

	Model	*PLC Firmware Version*
All instructions except as listed below	RSTi-EP EPSCPE100	9.15
	RSTi-EP EPSCPE115	9.45
	IC695CPL410	9.55
	IC695CPE400	9.00
	IC695CPE305/CPE310/CPE330	7.10
	IC695CPE302	9.40
	IC695CPU310/CPU315	6.0
	IC695CPU320/IC695CRU320[89]	7.18
	IC698CPE010/CPE020	6.0
	IC698CRE020	6.0 (with ECC enabled)
	IC698CPE030/CPE040	6.0
	IC698CRE030/CRE040	6.0 (with ECC enabled)
MOVE_UINT	CPE010/020	3.5
	CRE020[89]	2.04 (with ECC enabled)
SVC_REQs for Redundancy	IC695CRU320[89]	6.0 (with ECC enabled)
TON, TOF, TP Instructions	CPU310/CPU315/CPU320, CRU320	5.7
	CPE010/CPE030/CPE040	3.6
	CRE030/CRE040[89]	3.6 (with ECC enabled)
Instructions for PACMotion	CPU315/CPU320	5.6
	CPU310	6.0

A-1.4 RX3i & RSTi-EP Instruction Times

The following tables are intended to provide guidance for expected instruction execution times when using Ladder Diagram (LD) and C Language. For simplicity, the instructions are grouped as follows:

- Boolean Operation: this includes coil and contact operation (LD only).
- Word Operation: applies to MOVE instruction for all basic types.
- Fixed-point math covers all math operations which are not floating point (INT, UINT, DINT types).
- Floating-point math covers all math operations which are not fixed point (REAL and LREAL types).

[89] *Due to Error Checking and Correction (ECC), Redundant CPU times are approximately 5% slower, on average, than the equivalent Non-Redundant CPU.*

Timed Interrupt Performance and Sweep Impact Times for a 0.001s Timed Interrupt Block

Sweep Impact Item	CPU310 (µs)	CPU315 CPU320 (µs)	CPE010 (µs)	CPE020 (µs)	CPE030 (µs)	CPE040 (µs)
Timed interrupt sweep impact	87.3	26.2	88.6	28.0	31.2	23.3
Minimum interrupt period	908.3	969.8	951.4	946.0	922.8	973.0
Average interrupt period	1000.0	1000.0	1005.5	999.7	1000.0	999.9
Maximum interrupt period	1081.2	1030.8	1056.6	1054.0	1077.0	1026.9

A-1.20 User Memory Allocation

User Memory Size is the number of bytes of memory available to the user for PLC applications.

Model	User Memory Size (MB)
IC695CPE302	2MB
IC695CPE305	5MB
IC695CPU310, IC695CPE310, IC698CPE010, IC698CPE020, IC698CRE020	10MB
IC695CPU315	20MB
IC695CPL410, IC695CPE400, IC695CPE330, IC695CPU320, IC695CRU320	64MB
IC698CPE030, IC698CRE030 IC698CPE040, IC698CRE040	64MB
EPSCPE100	1MB
EPSCPE115	1.5MB

For a list of items that count against user memory, see below.

A-1.21 Items that Count Against User Memory

The following items count against the CPU memory and can be used to estimate the minimum amount of memory required for an application. Additional space may be required for items such as Advanced User Parameters, zipped source files, user heap, and published symbols.

Register Memory Size (%R)	Bytes = %R references configured × 2
Word Memory Size (%W)	Bytes = %W references configured × 2