



# RX3i CPE400

## Outcome optimizing control



### Designed for Real-world Demands

GE's PACSystems Rx3i is a flexible and high performance control system that is widely used in a diverse range of applications including water/wastewater metro, industrial steam, automotive, chemical, oil and gas, discrete manufacturing and modular machine designs. These diverse applications require a compact controller that can deliver the high performance and flexibility needed to run application specific control reliably.

The PACSystems Rx3i CPE400, part of GE's Industrial Internet Control System, is the industry's first outcome optimizing controller. It augments real-time deterministic control with embedded Field Agent technology, delivering near-real time advice through market analysis, fleet and enterprise data, or asset/process knowledge to optimize the outcomes that today's businesses require. The Predix enabled CPE400 provides reliable, secure communication and analytics using either cloud-based or edge-based outcome optimizing apps. Controls can now be programmed to dynamically influence business outcomes, generate new forms of revenue, and improve profitability.

### Reliable, High-Speed Performance

The PACSystems Rx3i CPE400 runs on a real time operating system for high-speed, reliable, industrial applications. It can be configured for simplex and redundant

operation, at incremental frame rates as fast as 3ms in any configuration. A large working memory allows for storing more data and for it to be accessed faster than ever before. The CPE400 offers premier high speed performance and data handling across any multi-disciplined control system. With all gigabit data interfaces, the CPE400 is built for rapid, reliable performance.

### Industrial Internet Enabled

Outcome Optimizing controllers include embedded Field Agent\* technology as a platform for securely applying Predix applications and secure connectivity to the Predix\* Cloud. In addition to the ability to connect to the cloud, the Rx3i CPE400 is also built to run edge apps locally on the controller in a safe and cooperative manner without impacting the real-time deterministic controls. Simultaneously running the Field Agent with the real-time control applications allows the CPE400 to leverage external data to analyze and optimize business operations, enabling industrial controls to dynamically adjust to changing business objectives in today's Industrial Internet age.

### Advanced Security

In today's Internet age, industrial controls are constant targets of cyber threats. We at GE understand the risk involved in securing our customer's most important assets. We believe in defense in depth architecture to secure the asset from potential cyber threats. At the controller's hardware level, at the bottom of the architecture, is the

hardware root of trust. The Rx3i CPE400 has been developed to be secure by design, incorporating technologies such as Trusted Platform modules, secure, trusted, and measured boot to enable that hardware root of trust. A centralized configuration allows patches and updates to be executed from a central location. A broad suite of cyber-security technology and tools help prevent unauthorized updates while built-in security protocols help protect against man-in-the-middle and denial of service attacks.

### Key Benefits

**Reduced risk.** Built over the strong foundation of our 40 years' experience providing real-time, deterministic controls for the world's industrial assets. Hardware root of trust makes the controller secure by design, enabling secure operations and connectivity from edge to cloud.

**Reduced lifecycle cost.** Advanced capabilities simplify system architecture and reduce applied engineering costs. Further costs are reduced with embedded PROFINET, allowing for the correct I/O to be chosen for application specific needs.

**Optimized Business Outcomes.** Embedded Field Agent technology allows for secure connection to the Industrial Internet, leveraging data to analyze and optimize business operations.

# Specifications

- Microprocessor Specification – 1.2 GHz AMD G Series Quad Core
- Operating System – VxWorks

## Temperature Range

- -40°C to 70°C

## Power Requirements

- Input Power (Max) – 20 Watts
- Input Voltage (Min) – 18 Vdc
- Input Voltage (Max) – 30 Vdc
- Memory Backup Mechanism – Energy Pack: IC695ACC403

## Firmware Upgrade

- CPU Firmware Upgrade Mechanism – Web Interface/Ethernet Port

## Display

- OLED Display – Yes

## Program Portability

- RX3i PACSystems Applications using Family Type Conversion

## Program Security

- Secure Boot – Yes
- Trusted Platform Module (TPM) – Yes

## Program Storage

- Battery-backed RAM – 64 Mbytes
- Non-Volatile Flash – 64 Mbytes
- Battery Life Expectancy, RAM Backup<sup>5</sup> – N/A
- Life Expectancy, Energy Pack Capacitors – 5 years

## Auxiliary Storage

- Micro SD – Pending
- Remote Data Storage Device (RDSD) – USB - pending

## Communications

- Ethernet RJ-45 with dedicated NIC – 10/100/1000 x1
- Ethernet RJ-45 Switch with dedicated NICs – 2-Port Switch 10/100/1000 x2
- Embedded Field Agent Ethernet RJ-45 with dedicated NIC – 10/100/1000 x1
- Ethernet Communications Platform – Built-in
- Advanced User Parameters (AUP file) config – No
- USB – USB-A 3.0 x2

## Protocols

- SRTP
- Modbus TCP
- Ethernet Global Data (EGD)
- Profinet – Yes
- MRP – Yes
- OPC-UA Server<sup>5</sup> – Y15

## EU

- CE Mark
- EMC Directive
  - IEC/EN 61131-2: 2007 (sections 8-10, Zone B)
  - IEC/EN 61000-6-2: 2005 Ed 2.0
  - IEC/EN 61000-6-4: 2006 Ed 2.0
  - CISPR 11:2009 +A1: 2010 / EN 55011: 2009 +A1: 2010
  - CISPR 22: 2010 / EN55022: 2010/AC:2011, (Class A)
  - CISPR 24: 2010 / EN55024: 2010
  - IEC/EN 61131-2: 2007 (sections 4 & 6)
- ATEX Directive
  - Category 3 equipment - [II 3 G]
  - EN 60079-0: 2012 A+11:2013
  - EN 60079-7: 2015 [Type of Protection Ex ec]
- RoHS Directive
- REACH Regulation
- WEEE Directive

## US

- FCC 47 CFR 15 Subpart B, Class A
- Hazardous Locations
  - ISA 12.12.01: 2015, Class I Div. 2 Groups ABCD
  - UL 60079-0 Ed 6.0 (2013), Class I, Zone 2 Gas Group ABCD
  - UL 60079-15 Edition 4.0 (2013), [Ex nA]

## Canada

- ICES-003:2016 (Class A)
- Hazardous Locations
  - CSA C22.2 No. 213-15
  - CAN/CSA-C22.2 NO. 60079-0:15, Class I, Zone 2
  - CAN/CSA-C22.2 NO. 60079-15:12
- WEEE & Battery Regulations

## Environmental

- IEC/EN 61131-2: 2007 (sections 5 & 6)
- Storage
  - Dry Heat - IEC 60068-2-2: 1974 test Bb (70C @16hrs, unpowered)
  - Cold Temp - IEC 60068-2-1: 2007 test Ab (-40C @16hrs, unpowered)
- Damp Heat
  - IEC 60068-2-30: 2005 test Db (unpowered, 55C, 2x)
- Marine Damp Heat
  - IEC 60068-2-30: 2005 test Db (powered & unpowered, 55C, 95%RH, 12hr x 2cycles)
- Sinusoidal Vibration
  - IEC 60068-2-6: 1995 (test Fc)
- Shock
  - IEC 60068-2-27: 1987 (test Ea)

1 See Battery Compatibility and Memory Retention (Time in Days at 20°C) in GFK-2741

2 Note: Whenever the size of any reference memory is changed, the content of the corresponding reference memory is automatically cleared.

3 For discussion of memory types and how they are managed, refer to PACSystems RX7i and RX3i CPU Programmer's Reference Manual, GFK-2950 Chapter 3.

4 Limit is per target, so all producers and consumers in the rack are counted towards this limit.

5 For a discussion of OPC UA, refer to PACSystems RX7i & RX3i TCP/IP Ethernet Communications User Manual, GFK-2224M Chapter 10.

6 Switchover time is defined as the time from failure detection until backup CPU is active in a redundancy system.

7 Symbolic variable and Reference data can be exchanged between redundancy controllers, up to the stipulated limit.