

Section 1 Introduction

This Section is an introduction to the PACSystems RX3i Serial Communications modules:

- Introduction to PACSystems RX3i Serial Communications Modules
- Introduction to Installing Serial Communications Modules
- Introduction to Serial Communications Module Configuration
- Introduction to Serial Communications Module Data
- Introduction to MODBUS Communications
- Introduction to Serial I/O Communications
- Introduction to CCM Slave Communications
- Introduction to DNP3 Communications
- Introduction to SPL Custom Protocol
- Introduction to Installing Serial Communications Modules in a Remote RX3i PROFINET Scanner Rack/ RX3i CEP PROFINET Scanner

1.1 Additional Documentation

PACSystems Serial Communications Modules IC695CMM002 and IC695CMM004, GFK-2461. This datasheet-type document contains the same module descriptions and specifications found in this user manual, plus the most up-to-date release information for both modules.

PACSystems RX3i System Manual, GFK-2314. This manual contains system and module installation procedures and includes descriptions and specifications of PACSystems RX3i I/O and option modules.

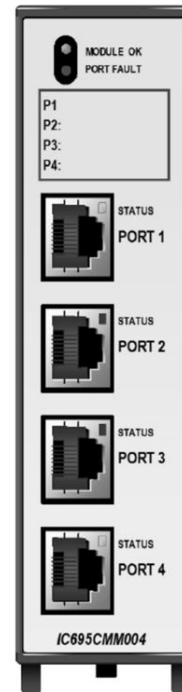
PACSystems RX3i user manuals, module datasheets, and other important product documents are available online on the Support website. They are also included in the Infolink for PLC documentation library on CDs, catalog number IC690CDR002.

1.2 Introduction to PACSystems RX3i Serial Communications Modules

PACSystems RX3i Serial Communications modules expand the serial communications capabilities of an RX3i system.

Serial Communications module IC695CMM002 provides two independent, isolated serial ports. Serial Communications module IC695CMM004, illustrated at right, provides four independent, isolated serial ports. Up to six Serial Communications modules can be located in the main PACSystems RX3i backplane, four modules can be configured in a remote rack that is managed by a PACSystems RX3i PROFINET Scanner or one module can be configured in a remote rack that is managed by a PACSystems RX3i CEP PROFINET Scanner.

Figure 1: CMM004



Each port can be configured for MODBUS Master, MODBUS Slave, CCM Slave, DNP3 Master, DNP3 Slave, or Serial I/O protocol. When located in a remote rack that is managed by a PACSystems RX3i PROFINET Scanner/RX3i CEP PROFINET Scanner, only MODBUS Master or MODBUS Slave protocol configurations are supported. In addition, for modules that have firmware version 1.10 or later, each port can be configured for CCM Slave protocol. For modules that have version 1.20 or later, each port can be configured for DNP3 Master or DNP3 Slave protocol using Machine Edition 5.6 SIM 10 or later. If any port is configured for DNP3 Master or Slave, the other ports on the module can only be configured for DNP3 Master or Slave.

For modules with firmware version 1.32 or later, half-duplex flow control can be configured. Otherwise, flow control defaults to full-duplex.

1.2.1 Module Specifications

Specification	Description	
Number of Serial Ports	IC695CMM002: two independent serial ports IC695CMM004: four independent serial ports	
Connectors	RJ-45	
Number of Serial Communications Modules per CPU	Six in the main CPU backplane	
Number of Serial Communications Modules per remote RX3i PROFINET Scanner rack	Four in the PROFINET remote rack	
Number of Serial Communications Modules per remote RX3i CEP PROFINET Scanner	One in every Rx3i CEP PROFINET Scanner	
Backplane power requirements	IC695CMM002	0.7 Amps maximum @ 3.3 VDC 0.115 Amps maximum @ 5.0 VDC
	IC695CMM004	0.7 Amps maximum @ 3.3 VDC 0.150 Amps maximum @ 5.0 VDC
Internal clock accuracy	Maximum drift +/- 0.0105% (± 9.072 seconds per day) from 0 - 60 C.	
LEDs	Module OK, Port Fault, Port Status (2 or 4)	
Port Type	RS-232 or RS-485/22, 4-wire (full duplex) or 2-wire (half-duplex) operation for RS-485/422	
Flow Control for RS-232	Selectable: Hardware (RTS/CTS, RFR/CTS) with Half Duplex or Full Duplex, or None	
Turnaround Delay	6mS minimum enforced by module. External devices must hold off response for at least 6ms after the last character received.	
Baud rates	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Parity	Even, odd, none	
Data bits	7, 8	
Stop bits	1, 2	
Operating Temperature	0°C to + 60°C	
Input Impedance	Zin > 96 kOhm for RS-485/422 3 kOhm < Zin < 7 kOhm for RS-232	
Max Overvoltage	+/- 25V	
Channel-Channel Crosstalk	-55 dB minimum	
Isolation	Port to Backplane and to frame ground: 250VAC continuous; 1500 VAC for 1 minute, 2550VDC for one second. Port to port: 500VDC continuous, 710VDC for one minute.	

In order to meet emission and immunity requirements for the EMC directive (CE mark), shielded cable must be used with this module.

1.3 Introduction to Installing Serial Communications Modules

Up to six RX3i Serial Communications modules can be installed in the PACSystems Universal Backplane. Modules are installed following the general installation instructions in the PACSystems RX3i System Manual, GFK-2314.

Section 2 of this manual, Installation and Wiring, describes the module LEDs and communications ports, and gives port pin assignments. Note that RX3i Serial Communications modules require custom cables for MODBUS communications; their port pin assignments do not match the MODBUS specification.

RX3i Serial Communications modules can be connected to one serial device for either RS-232 or RS-422/485 communications. Connections to multiple devices require RS-422 or RS-485 communications. Each port is easily set up for either RS-232 or RS-485 communications in the module configuration.

1.3.1 Introduction to Installing Serial Communications Modules in a Remote RX3i PROFINET Scanner Rack/RX3i CEP PROFINET Scanner

Up to four RX3i Serial Communications modules can be installed in a remote rack that is managed by a PACSystems RX3i PROFINET Scanner (PNS) or one RX3i Serial Communications module can be installed in a remote rack that is managed by a PACSystems RX3i CEP PROFINET Scanner. However, due to some hardware and firmware restrictions in earlier versions of the Serial Communications modules, only the IC695CMM002-EJ or later and IC695CMM004-EJ or later modules with firmware version 2.02 or later are approved for use in a remote RX3i PROFINET Scanner rack or RX3i CEP PROFINET Scanner.

Each CMM port can be configured as Disabled or for MODBUS Master and/or MODBUS Slave. The CCM Slave, DNP3 Master, DNP3 Slave, and Serial I/O protocols are not allowed at this time, nor is the Serial Protocol Language.

Section 3 Configuration

This Section describes the configurable parameters of PACSystems RX3i Serial Communications modules.

- **Configuring Basic Module Settings in the Main RX3i Backplane**
 - I/O Settings
 - General Settings
- **Configuring a Port for Serial I/O Protocol**
- **Configuring a Port for MODBUS Master Protocol**
- **Configuring a Port for MODBUS Slave Protocol**
- **Configuring a Port for CCM Slave Protocol**
- **Configuring a Port for DNP3 Master Protocol**
- **Configuring a Port for DNP3 Slave Protocol**
- **Configuring a Port for Serial Protocol Language (SPL)**
- **Configuring Basic Module Settings in a Remote RX3i PROFINET Scanner Rack/RX3i CEP PROFINET Scanner**
 - I/O Settings
 - Configuring the Ports

3.1 Configuring Basic Module Settings in the Main RX3i Backplane

Machine Edition version 5.5 with Service Pack 2 SIM 4 or later is required for basic configuration of an RX3i Serial Communications Module. Some protocols require later programmer versions, as noted in the individual protocol configuration sections in this Section. It is strongly recommended that the latest version of Machine Edition be used.

Click on the slot and right-click Add a Module. From the module catalog, select either of the following from the list of Communications Modules:

- IC695CMM002: RX3i Serial Communications Module (2 ports)
- IC695CMM004: RX3i Serial Communications Module (4 ports)

3.8.7 SPL Validation Errors

Each port on a Serial Communications Module that is configured for SPL protocol must have an SPL file attached as described above. The following errors may occur when the target is Validated:

12249 SPL file is present but larger than 32k bytes

12250 No file configured or missing from AUP file directory.

If an error occurs, double-click on the error to jump to the error location in the Inspector window.

3.9 Configuring Basic Module Settings in a Remote RX3i PROFINET Scanner Rack/RX3i CEP PROFINET Scanner

To add a module to a remote RX3i PROFINET Scanner rack, it is recommended that the procedures listed in the *Adding RX3i Modules* and *Configuring Module Parameters* sections of the PROFINET I/O Scanner User Manual, GFK-2737, are followed.

To add a module to a remote RX3i CEP PROFINET Scanner, it is recommended that the user follows the procedures listed in the *Adding RX3i Modules* and *Configuring Module Parameters* sections of the RX3i CEP PROFINET Scanner User Manual, GFK-2883. At the point where a new module is added to the remote rack from the Change Module List, select either of the following from the list of Communications Modules:

- IC695CMM002: RX3i Serial Communications Module (2 ports)
- IC695CMM004: RX3i Serial Communications Module (4 ports)

5.2 MODBUS Communications for RX3i Serial Communications Modules

PACSystems RX3i Serial Communications modules IC695CMM002 and IC695CMM004 use the standard MODBUS Function codes listed below to communicate with MODBUS devices.

5.2.1 Supported MODBUS Functions

Function Code	Function	MODBUS Master	MODBUS Slave
01	Read Coil Status (Read Output Table)	Yes	Yes
02	Read Input Status (Read Input Table)	Yes	Yes
03	Read Holding Registers	Yes	Yes
04	Read Input Registers (Read Registers)	Yes	Yes
05	Force Single Coil (Force Single Output)	Yes	Yes
06	Preset/Write Single Register	Yes	Yes
07	Read Exception Status	No	Yes
08	Diagnostics (Loopback Maintenance)	Yes	Yes
	Dagnostic Code 00: Return Query Data: Reads query data from one slave.	Yes	Yes
15	Write Multiple Coils (Force Multiple Outputs)	Yes	Yes
16	Preset/Write Multiple Registers Presets a group of contiguous registers to a specified value.	Yes	Yes
17	Report Slave ID (Report Device Type).	No	Yes
20	Mask 4x Registers	No	Yes
23	Read/Write 4x Registers	No	Yes

5.2.2 Supported Transmission Mode

RX3i Serial Communications modules execute MODBUS communications in RTU (Remote Terminal Unit) transmission mode. The entire message is transmitted as a continuous stream of characters. Between characters, the line is held in the 1 state. In RTU transmission mode, gaps of silence are used to frame a message. Because message frames must be separated by intervals of silence, MODBUS RTU is not recommended for use with modems, which can compress or change the gaps between frames and interfere with message timing.