

## QUICK START GUIDE

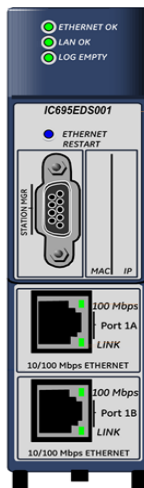
GFK-2912A

Sep 2019

# PACSystems™ RX3i

DNP3 - SLAVE MODULE

(IC695EDS001)



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## Caution & Warning Notes as Used in this Publication

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**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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# 1. User Features

## 1.1. Overview
























The PACSystems RX3i DNP3 Slave Module, catalog number IC695EDS001, or **EDS001**, implements the DNP3 Outstation protocol. It permits a PACSystems RX3i controller to be connected to a DNP3 network using a standard Ethernet TCP/IP connection scheme. It allows a DNP3 Master to poll data from the Slave Station, and can set up the Master to receive unsolicited communications from the Slave. Up to eight DNP3 Masters may be attached to a single DNP3 Slave.

Two auto-sensing 10BaseT/100BaseTX RJ-45 shielded twisted-pair Ethernet ports permit direct connection to either a 10BaseT or 100BaseTX IEEE 802.3 network without an external transceiver. Line, Star and Daisy Chain topologies are supported.

## 1.2. Restart Pushbutton

The recessed Restart pushbutton can be used to restart the module without cycling power. The restart operation begins when the pushbutton is released.

### 1.3. Light-Emitting Diode Indicators (LEDs)

LED	State		Indicates
ETHERNET OK LAN OK LOG EMPTY	  	Fast Blink Off Off	Performing Diagnostics
ETHERNET OK LAN OK LOG EMPTY	  	Slow Blink Off Off	Waiting for Ethernet configuration from CPU
ETHERNET OK LAN OK LOG EMPTY	    	Slow Blink* On/Traffic/Off Slow Blink* <i>(* EOK and STAT blink in unison)</i>	Waiting for IP Address
ETHERNET OK LAN OK LOG EMPTY	     	On On/Traffic/Off On/Off	Operational
ETHERNET OK LAN OK LOG EMPTY	  	Blink error code Off Off	Hardware failure. See EDS001 User Manual GFK-2911 for blink code definitions.
ETHERNET OK LAN OK LOG EMPTY	  	Slow Blink* Slow Blink* Slow Blink* <i>(* All LEDs blink in unison)</i>	Firmware Update <i>(pattern is the same for awaiting or performing load)</i>

LED	State		Indicates
Port LEDs (one pair for Port 1A, second pair for Port 1B)			
100 Mbps	<div><div></div><div></div></div>	On Off	100 Mbps Active 100 Mbps Not Achieved
LINK	<div><div></div><div></div></div>	Rapid Blink Off	Traffic Detected on Port No Traffic Detected on Port

## 1.4. Station Manager Port

The Station Manager Port is an RS-232 serial port intended to permit the user to perform set-up operations or monitoring functions, but is not intended for permanent connection. The Station Manager port provides a means to access the module via a terminal interface. This function can alternatively be accessed over the Ethernet network.

A Station Manager interface application can be downloaded from Emerson Global Customer Care by searching “KB14092” or following the link <https://www.emerson.com/Industrial-Automation-Controls/support>.

## 1.5. Ethernet Interface Ports

The module provides two auto-sensing 10BaseT / 100BaseTX RJ-45 shielded twisted pair Ethernet ports for connection to either a 10BaseT or 100BaseTX IEEE 802.3 network. The port automatically senses the speed (10Mbps or 100Mbps), duplex mode (half duplex or full duplex) and cable (straight-through or crossover) attached to it with no intervention required. There is only one interface to the network (only one Ethernet MAC address and only one IP address).



## 2. Hardware Installation

### 2.1. Initial Checks

Upon receiving your RX3i equipment, carefully inspect all shipping containers for damage. If any part of the system is damaged, notify the carrier immediately. The damaged shipping container should be retained as evidence for inspection by the carrier. As the consignee, it is your responsibility to register a claim with the carrier in the event of damage incurred during shipment.

After unpacking the RX3i equipment, record all serial numbers. Serial numbers are required should you need to contact Customer Care during the warranty period. All shipping containers and all packing material should be saved should it be necessary to transport or ship any part of the system.

Verify that all components of the system have been received and that they agree with your order.

### 2.2. Installation Location

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. At a minimum, the enclosure shall provide a degree of protection against solid objects as small as 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. For details about installing RX3i rack systems, refer to GFK-2314.

If you need technical help, contact Technical Support. For phone numbers and email addresses, see the “Contact Information” page in the front of the user manual referenced in section 5.

## 2.3. 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 an 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.
- WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

### ATEX Zone 2

The EDS001 must be mounted in an enclosure certified in accordance with EN60079-15 for use in Zone 2, Group IIC and rated IP54. The enclosure shall only be able to be opened with the use of a tool.

### ATEX Marking



II 3 G Ex nA IIC T5 X Ta: 0 - 60C

## 2.4. Module Installation

The EDS001 is compatible with all RX3i CPU models v2.51 or later. EDS001 supports insertion into and removal from an Rx3i backplane which is under power. This module may be installed in any available RX3i backplane slot in the main (CPU) rack.

### Module Insertion

- RX3i rack power may be off or on (“hot insertion”).
- Holding the module firmly, align the module with the correct slot and connector. The installation slot must match the slot selected for the module location in the PAC Machine Edition application.
- Engage the plastic hook at top rear of the module with the corresponding exposed ridge in the backplane.
- Swing the module down until the connector at the rear of the module securely engages the mating backplane connector.
- Visually inspect the module to be sure it is properly seated.

### Module Connections

- Attach Cat5 or higher-rated cables to one or both RJ-45 connectors marked Port 1A and Port 1B, as the application demands.
- As needed, attach the RS-232 serial port connection to the D-connector marked Station Manager.

## 2.5. Station Manager Port Connections

Pin No *	Signal	Direction	Description
1	DCD	IN	Data Carrier Detect
2	TX	OUT	Transmit Data
3	RX	IN	Receive Data
4	DSR	IN	Data Set Ready
5	GND		Signal Ground
6	DTR	OUT	Data Terminal Ready
7	CTS	IN	Clear to Send
8	RTS	OUT	Ready to Send
9	RI	IN	Ring Indicator

\* Pin 1 is at the bottom right of the Station Manager Port connector as viewed from the front of the module.

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**Note:** Station Manager software configuration is performed in Station Manager tab of PME.

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## 2.6. Ethernet Port Connections

The module provides two RJ-45 10BaseT/100BaseTX Ethernet Network Port Connectors.

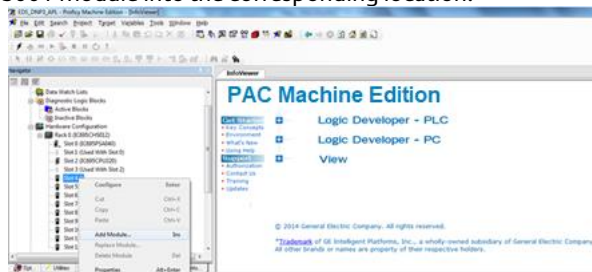
## 3. Configuration

You will need:

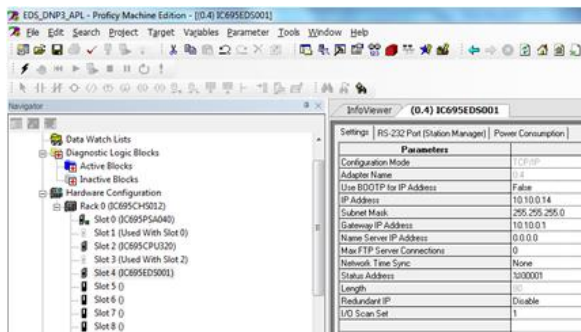
- PACSystems RX3i CPU Firmware 6.0 or later.
- PAC Machine Edition version 8.60 SIM 5.0 or later).
- PACSystems RX3i DNP3 Slave Module User Manual, GFK-2911, available from the Emerson support website, <https://www.emerson.com/Industrial-Automation-Controls/support>. You will need to refer to this manual to fully configure and commission the EDS001.

### 3.1. Configure EDS001 into Target CPU

Start the PME application, then open or create the project to contain the EDS001. After configuring the rack, power supply, and CPU in the Project tab of the Navigator, select a vacant slot in the main rack into which the EDS001 is to be installed. Right-click on that slot icon and select **Add Module**. From the Communications tab of the Module Catalog, select the IC695EDS001 module. This “adds” the EDS001 module from the drop-down list into that location. Install the physical EDS001 module into the corresponding location.

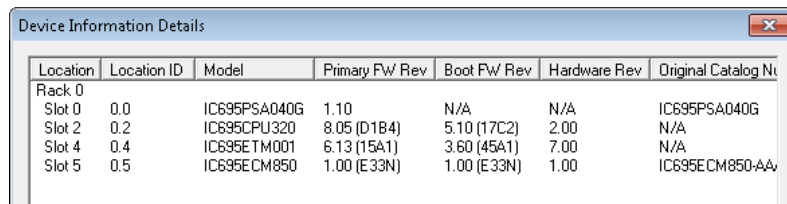


Once “added” to the rack location, set up the EDS001 parameters in the “Settings” and “RS-232 Port (Station Manager)” tabs as needed for the application.



## 3.2. Confirm EDS001 Communication with the CPU

Power up the target RX3i system. In MPE, go “online”, right-click on the target and select **Online Commands** ►, **Show Status...**, **Details**, to display the **Device Information Details** window. This queries the CPU and all modules present on all racks in the system, whether configured or not. If the EDS001 is displayed in the list similar to the following screenshot, it indicates that the module has powered up as expected, is communicating with the CPU over the rack backplane, and that it is ready for further configuration.



	Location	Location ID	Model	Primary FW Rev	Boot FW Rev	Hardware Rev	Original Catalog N
Rack 0							
Slot 0	0.0		IC695PSA040G	1.10	N/A	N/A	IC695PSA040G
Slot 2	0.2		IC695CPU320	8.05 (D1B4)	5.10 (17C2)	2.00	N/A
Slot 4	0.4		IC695ETM001	6.13 (15A1)	3.60 (45A1)	7.00	N/A
Slot 5	0.5		IC695ECM850	1.00 (E33N)	1.00 (E33N)	1.00	IC695ECM850-AA

### 3.3. Program COMMREQs for EDS001 Initialization

A single COMMREQ instruction must be passed from the CPU to the EDS001 in order to configure the DNP3 Slave module attributes. These are explained in the Configuration portion of the User Manual GFK-2911. The COMMREQ is executed once following power-up of the EDS001 and can be added to an existing ladder logic program.

### 3.4. Complete the RX3i Application

The variables created in the previous step are used to develop an RX3i application program. This program, along with the hardware configuration and network configuration is then downloaded to the RX3i controller for validation and deployment.

### 3.5. Verify DNP3 Network Operations

After the COMMREQ has been executed, verify the data exchange on the DNP3 Network is as expected. Establish that data originating at each Master is passed to the RX3i tables per the DNP3 configuration. Verify also that data originating at the DNP3 Slave is passed to each Master per the corresponding DNP3 configuration. DNP3 network activity verification may be part of the DNP3 configuration

(heartbeat bits, for instance) or may be accomplished via the Station Manager interface. See GFK-2911 for more information.



## 4. Status and Diagnostic Data

### 4.1. Module Status Data

Bit#	LAN Interface Status Bits
0 (lsb)	Port 1A Full Duplex
1	Port 1A 100 Mbps
2	Port 1B Full Duplex
3	Port 1B 100 Mbps
4	Network Time Locked
5	Redundant IP Address is Active
6-7	Reserved
8	Any Channel Error (error on any channel)
9	Used with Plugin Application 1
10	Used with Plugin Application 2
11	Used with Plugin Application 3
12	LAN OK
13	Resource Problem
14	Module Over-Temperature
15	LAN Interface OK
16-79	Not Used

## 4.2. Problems during Power-Up and Reset

Certain conditions can prevent the module from becoming operational.

Problem	Indication	Action
Hardware failure	All Indicator LEDs off. Module unresponsive.	Return the module to Emerson.
Invalid bootstrap image		
Invalid boot image	<ul style="list-style-type: none"> <li>No Indicator LEDs turn on and the module is unresponsive, or</li> <li>The STATUS LED is solid green and is the only LED on.</li> </ul>	
Fatal power-up initialization failure	Fatal Error LED blink code	Note the blink code and contact Customer Service.
Non-fatal initialization failure	Module powers up normally, but an entry is added to the Local Log table and the RX3i CPU fault table.	Note the fault and contact Customer Service.
Module does not contain hardware identity info	Fatal Error LED blink code	Note the blink code and contact Customer Service.
Module operates with limited point counts	Only a small number of DNP3 points are accessible, no matter the configuration	Module is operating without a license, Contact customer service
Module shuts down after 4 hours	DNP traffic stops after 4 hours of operation	Module is operating without a license, Contact customer service

## **5. Additional Information**

### **5.1. PACSystems RX3i User Manuals**

PACSystems RX3i DNP3 Slave Module User Manual, GFK-2911

PACSystems RX3i and RX7i CPU Reference Manual, GFK-2222

TCP/IP Ethernet Communications for PACSystems RX3i User's Manual, GFK-2224

TCP/IP Ethernet Communications for PACSystems Station Manager Manual, GFK-2225

PACSystems RX3i System Manual, GFK-2314

User manuals, product updates and other information sources are available on the Support website, <https://www.emerson.com/Industrial-Automation-Controls/support>, under *Controllers and IO, RX3i Controllers*.

### **5.2. Information about DNP3**

For detailed information about DNP3 refer to [www.DNP3.org](http://www.DNP3.org).

## Technical Support & Contact Information

Online Technical Support and Global Care: <https://www.emerson.com/en-us/support>

Knowledge Base: <https://www.emerson.com/Industrial-Automation-Controls/support>

**Note:** If the product is purchased through an Authorized Channel Partner, please contact the seller directly for any support.

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