

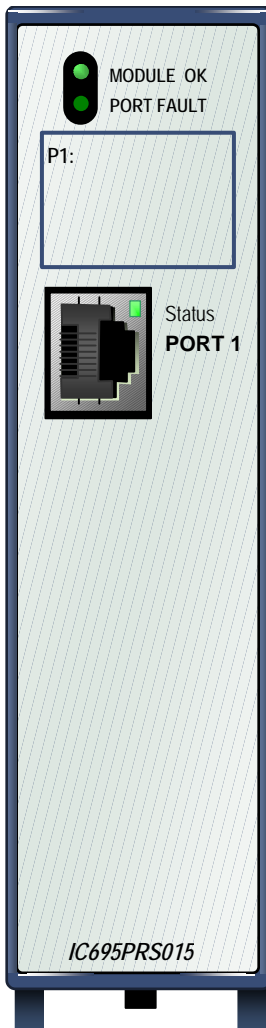
GE Fanuc IC695PRS015

<http://www.pdfsupply.com/automation/ge-fanuc/rx3i-pacsystem/IC695PRS015>

Rx3i PacSystem

PRESSURE TRANSDUCER MODULE

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The PACSystems* RX3i Pressure Transducer module expands the serial communications capabilities of the RX3i system to communicate with up to 15 Honeywell LG1237 Smart Pressure Transducer sensors.

The IC695PRS015 module provides an independent, isolated serial port. Up to four Pressure Transducer modules can be located in the main PACSystems RX3i backplane.

Additional module features include:

- Port-to-backplane isolation
- RS-485 communication
- Module fault status reporting (Watchdog, Ram Fail, Flash Fail)
- Module identity and status reporting, including LED status indicators
- Flash memory for future upgrades
- Supports hot insertion and removal (with system power applied).

These modules must be located in an RX3i Universal Backplane.

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Specifications: IC695PRS015

Refer to the *PACSystems RX3i System Manual*, GFK-2314, for product standards and general specifications.

Number of Serial Ports	One
Connectors	RJ-45
Number of modules per CPU	Four in the main CPU backplane
Backplane power requirements	0.7 Amps maximum @ 3.3 VDC 0.115 Amps maximum @ 5.0 VDC
LEDs	Module OK, Port Fault, Port Status
Port Type	RS-485 four-wire (full duplex)
Baud rate	375 Kbaud
Input Impedance	Zin > 96 kOhm for RS-485/422
Max Overvoltage	+/- 25V
Channel-Channel Crosstalk	-55dB minimum
Isolation	Port to Backplane and to frame ground: 250 VAC continuous; 1500 VAC for 1 minute, 2550VDC for one second.

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

LEDs

Module OK

The Module OK LED indicates the status of the module.

Off: The module is not receiving power from the RX3i backplane or the module has failed self-test.

Solid green: The module has been configured.

Blinking green, rapidly: The module is executing powerup diagnostics.

Blinking green, slowly: The module has not received configuration from the CPU. If configuration is not successful, the module will continue to blink in this mode.

Blinking amber: If a problem occurs, the Module OK LED blinks amber. The blink code (see below) indicates the cause of the error.

1 = watchdog expired

2 = RAM error

6 = Invalid CPU Master Interface version

7 = CPU heartbeat failure

8 = Failed to get semaphore

PORT FAULT

The Port Fault LED indicates the status of the port.

Green: There are no faults present on any enabled port.

Amber: There is a fault on the port.

The area below the module LED can be used to record identifying information about the port.

Port STATUS

The port's Status LED blinks green when there is activity on the port.

Configuration Parameters

Module Parameters

<i>Parameter</i>	<i>Default</i>	<i>Description</i>
Channel Value Reference Address	%Alxxxx	Starting address for the module's input data. This defaults to the next available %AI block
Channel Value Reference Length	30 (word oriented memory) 480 (bit oriented memory)	The number of words or bits used for the module's input data. Each channel is mapped to 2 words or 32 bits, whether the channel is used or not.
Inputs Default	Hold Last State	In the event of module failure or removal, this parameter specifies the state of the Channel Value References. Force Off: Sets input channel values to 0 and clears all alarm flags. Hold Last State: Channel Values hold their last state.
Diagnostic Reference Address	%lxxxx	Starting address for the channel diagnostics status data. This defaults to the next available %I block.
Diagnostic Reference Length	0	The number of bits or words required for the Channel Diagnostics data. Default is 0, which means mapping of Channel Diagnostics is disabled. Change this to a non-zero value to enable Channel Diagnostics mapping. 0 or 30 (Word oriented memory) 0 or 480 (bit oriented memory)
Command Input Data Reference Address	%Alxxxx	Starting address for the module's command input data. This defaults to the next available %AI block.
Command Input Data Reference Length	6 (word oriented memory) 96 (bit oriented memory)	The number of bits or words required for the module's command input data.
Command Output Data Reference Address	%AQxxxx	Starting address for the module's command output data. This defaults to the next available %AQ block.
Command Output Data Reference Length	6 (word oriented memory) 96 (bit oriented memory)	The number of bits or words required for the module's command output data.
Module Status Reference Address	%lxxxx	Starting address for the module's status data. This defaults to the next available block in the selected memory area.
Module Status Reference Length	0	The number of bits required for the Module Status data. Default is 0, which means mapping of Module Status data is disabled. Change this to a non-zero value to enable Module Status data mapping. 2 (word oriented memory) 32 (bit oriented memory)
I/O Scan Set	1	The scan set, as defined in the CPU's Scan Sets tab, to be assigned to this module. The scan set determines how often the CPU polls the data. Valid range: 1 through 32.

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Channel Parameters (Channels 1 through 15)

Parameter	Default	Description
Channel Enable	Disabled	Disabled, Enabled, Simulation Mode When Enabled, the Channel Value will be updated with the value of the associated LG1237. When Simulation Mode is selected the associated LG1237 will simulate a specified pressure reading.
Simulated Value	10.0	Pressure value to be reported, in A/D units when Channel Enable is set to Simulation Mode. Valid range: -3.40282E+38 through 3.40282E+38.
Channel Value Format	32-bit Floating Point	Read only: 32-bit floating point
High Scale Value (Eng Units)	1024.0	The upper value, in engineering units, used for scaling. Valid range: -3.40282E+38 through 3.40282E+38 engineering units. Note: Scaling is disabled if High Scale Eng. Units equals High Scale A/D Units and Low Scale Eng. Units equals Low Scale A/D Units.
Low Scale Value (Eng Units)	0.0	The lower value, in engineering units, used for scaling. Valid range: -3.40282E+38 through 3.40282E+38 engineering units. The Low Scale Value (Eng Units) parameter cannot be equal to the High Scale Value (Eng Units) parameter. It can be higher than the High Scale Value (Eng Units) parameter for reversed or inverse scaling. Default is Low A/D Limit. Must be lower than the High Scale Value.
High Scale Value (A/D Units)	1024.0	The upper value, in A/D Units, used for scaling. Valid range: 0 through 65535. Note: Scaling is disabled if High Scale Eng. Units equals High Scale A/D Units and Low Scale Eng. Units equals Low Scale A/D Units.
Low Scale Value (A/D Units)	0.0	The upper value, in A/D Units, used for scaling. Valid range: 0 through 65535.
High Alarm (Eng Units)	1024.0	When the channel input value reaches or exceeds this value, a High Alarm is triggered. Valid range: Within High Scale Value–Low Scale Value (Eng Units) range. Must be greater than Low Alarm. Note: A channel uses this value only when High Alarm Enable is set to Enabled under Diagnostic Reporting Enable and/or Fault Reporting Enable.
Low Alarm (Eng Units)	1.0	When the channel input value reaches or goes lower than this value, a Low Alarm is triggered. Valid range: Within High Scale Value to Low Scale Value (Eng Units) range. Must be less than High Alarm. Note: A channel uses this value only when Low Alarm Enable is set to Enabled under Diagnostic Reporting Enable and/or Fault Reporting Enable.
High Alarm Dead Band (Eng Units)	1.0	A range in Engineering Units below the alarm condition where the alarm status bit remains set even after the alarm condition no longer exists. For the alarm status to clear, the channel input must fall outside the deadband range. Valid range: 0 through the difference between High Scale Value and Low Scale Value (Eng Units).

Parameter	Default	Description
Low Alarm Dead Band (Eng Units)	1.0	A range in Engineering Units above the alarm condition where the alarm status bit remains set even after the alarm condition goes away. For the alarm status to clear, the channel input must fall outside the deadband range. Valid range: 0 through the difference between High Scale Value and Low Scale Value (Eng Units).
User Offset (Eng Units)	0.0	Engineering Units offset to change the base of the input channel. This value is added to the scaled value on the channel prior to alarm checking. Valid range: -3.40282E+38 through 3.40282E+38 engineering units.
Diagnostic Reporting Enable <i>If Diagnostic Reporting is enabled, the additional parameters listed below can be used to enable specific types of alarms.</i>	Disabled	The Diagnostic Reporting Enable, and Fault Reporting Enable configuration parameters can be used to enable different types of responses for individual channel alarms. By default, all responses are disabled on every channel. Any combination of alarm enables can be configured for each channel. Alarm values are applied to the scaled Engineering Units value. If <i>Diagnostic Reporting</i> is enabled, the module reports channel faults and enabled alarms in reference memory at the channel's Diagnostic Reference Address. (Diagnostic Reference Length must be greater than 0.)
Fault Reporting Enable <i>If Fault Reporting is enabled, the additional parameters listed below can be used to enable specific types of Faults.</i>	Disabled	If <i>Fault Reporting</i> is enabled, the module logs a fault in the I/O Fault table for each occurrence of a channel fault or an enabled channel alarm.
Low Alarm Enable	Disabled	These additional parameters enable or disable individual diagnostics features of a channel. When any of these parameters is enabled, the module uses the associated parameters to perform the enabled feature. For example, if the module detects a loss of circuit communication fault, and Open Wire is enabled for Diagnostic Reporting, the module will set the corresponding bit in the Diagnostic Reference memory for the channel. If any of these parameters is disabled, the module does not react to the associated alarm conditions. For details, refer to "Channel Diagnostic Bit Definitions" on page 7.
High Alarm Enable	Disabled	
Open Wire Enable	Disabled	
New Data Alarm Enable	Disabled	
Error Response Fault	Disabled	
Latched BIT Failure Fault	Disabled	
Latched IIC Failure Fault	Disabled	
Latched ICS Failure Fault	Disabled	
Sensor Scan Group	1	Associates the input channel with other channels that have been assigned the same value. Determines groups of channels to be scanned each internal sweep. To scan all sensors every sweep, they must be in the same scan group. Valid range: 1 through 15.

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Module Status Data

Bit offsets are from the Module Status Reference Address.

Bit Offset	Bit Flag Name	Description
0	Module OK	Set to 1 when the module is powered up and there are no errors on the module. Cleared when module has failed or is not present.
1–14	Reserved	Reserved
15	Watchdog failure	Set to 1 when watchdog timeout error has occurred.
16	RAM failure	Set to 1 when RAM failure has occurred.
17	Interface failure	Set to 1 when interface failure has occurred.
18–31	Reserved	Reserved

Input Channel Scaling

Scaling parameters specify the relationship between the LG1237 reported value (input signal) and the engineering units value.

AL = Low Scale A/D Units

AH = High Scale A/D Units

EL = Low Scale Engineering Units

EH = High Scale Engineering Units

IS = Input Signal (in signal units)

$$\text{User Scaled value} = IS \times \frac{EH - EL}{AH - AL} + EL - AL \times \frac{EH - EL}{AH - AL}$$

Channel Diagnostic Reporting

The module reports channel diagnostics in the Diagnostic Reference memory area, which is configured on the module Settings tab. Two words (32 bits) are allocated to each channel.

Channel Segments

Channel	Starting Reference Address
0	Diagnostic Reference Address +0
1	Diagnostic Reference Address +2
2	Diagnostic Reference Address +4
3	Diagnostic Reference Address +6
4	Diagnostic Reference Address +8
5	Diagnostic Reference Address +10
6	Diagnostic Reference Address +12
7	Diagnostic Reference Address +14

Channel	Starting Reference Address
8	Diagnostic Reference Address +16
9	Diagnostic Reference Address +18
10	Diagnostic Reference Address +20
11	Diagnostic Reference Address +22
12	Diagnostic Reference Address +24
13	Diagnostic Reference Address +26
14	Diagnostic Reference Address +28

Channel Diagnostic Bit Definitions

Bit offsets are from the start of each channel segment in Diagnostic Reference memory.

Bit Offset	Bit Flag Name	Description
0	Low Alarm fault	Set to 1 when Low Alarm is detected. Cleared when Low Alarm off or detection is disabled.
1	High Alarm fault	Set to 1 when High Alarm is detected. Cleared when High Alarm off or detection is disabled.
2–3	Reserved	Used by other analog modules.
4	Loss of circuit communication (Open Wire)	Set to 1 if the LG1237 fails to respond to the most recent attempt to read pressure. If any transducer fault bit (28, 29 or 30) is set for this channel, this bit will also be set. Cleared when the CPU completes an I/O scan.
5–22	Reserved	Reserved.
23	New Data	Set on every successful reading of pressure from the LG1237. Cleared when the CPU completes an I/O scan. This flag allows the application program to detect when new values are available to process.
24	Error response fault	Set when the Response Status flags (bits 25–27) from the LG1237's most recent response indicate an error.
25–27	Response Status bit 0	Reserved.
28	Latched Bit Failure fault	Set when LG1237 BIT failure is detected. The PRS015 reads this bit from the enabled channel on configured download and after a reset command is issued. Cleared when the CPU completes an I/O scan.
29	Latched IIC Failure fault	Set when LG1237 IIC(invalid input conditions) failure is detected. The PRS015 reads this bit from the enabled channel on configured download and after a reset command is issued. Cleared when the CPU completes an I/O scan.
30	Latched ICS Failure fault	Set when LG1237 ICS failure is detected. The PRS015 reads this bit from the enabled channel on configured download and after a reset command is issued. Cleared when the CPU completes an I/O scan.
31	Reserved	Reserved for future fault.

Command Data

The application logic uses the Command Data memory areas defined in the PRS015 module's configuration to send commands to LG1237 transducers and receive the transducer's responses through the serial port.

The application logic issues a command to the LG1237 by setting the value of the Command field in the Command Output data.

When the module is processing a command, the Command Response field contains the *Processing Command* value.

To issue another command, the application must set the Command field to *No Command* and wait for the *No Command Processing* response.

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Command Output Data

The Command Output data consists of six words, starting at the Command Output Data Reference Address.

Byte Offsets	Field Name	Command Values
0–3	Command	0x0000 0x0000 No Command 0x0000 0x0001 RESET All other values are reserved.
4–7	Address	Specifies the LG1237 channel to be accessed by the RESET command. Can be changed by the application logic in RUN mode Bits 0–3 Address (0–15 valid; no error checking)
8–23	Reserved	Reserved

Reset Command

The Reset command addresses the LG1237 channel defined in the Address field. No errors are generated for this command.

To reset all LG1237 transducers, issue the Reset command to the global address, 15.

Command Input Data

When the LG1237 receives a command from the Pressure Transducer module, it returns a command response, which is written to the Command Input Data Reference memory, starting at the Command Input Data Reference Address.

Byte Offsets	Field Name	Response Values
0–3	Command Response	0x0000 0x0000 (0d) No Command Processing 0x0000 0x0001 Processing Command 0x0000 0x0002 Command Complete 0x1111 0x1111 (-1d) Response not received prior to time out 0x1111 0x1110 Response error Parity, Address or Response code 0x1111 0x1101 Detected BIT (Built In Test) Failure 0x1111 0x1100 Detected IIC (Invalid Input Conditions) 0x1111 0x0111 Command Order Error
4–23	Reserved	Reserved

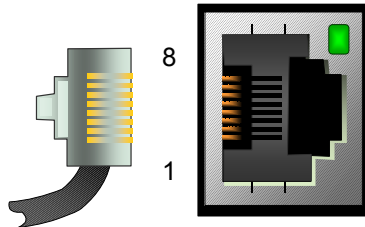
Installation in Hazardous Locations

- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Wiring

Serial Ports

This port is a standard RJ-45 female connector with the following pin assignments.



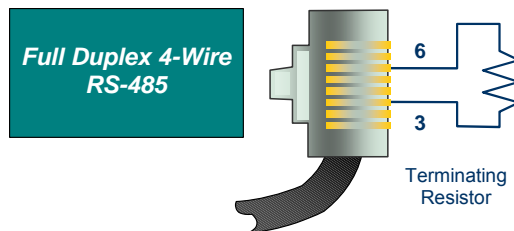
RJ-45 Pin	RS-485/422 Four-Wire Pinouts
8	GND
7	Termination 2
6	Rx- (Input)
5	GND
4	
3	Rx+ (Input)
2	Tx- (Output)
1	Tx+ (Output)

Note: There is no shield or frame ground pin on the port connector. To reduce susceptibility to noise, the RX+ and RX- signals should be wired to the same twisted pair. Likewise, the TX+ and TX- signals should be wired to a single twisted pair.

Termination

By default, each port is set for no termination. Termination is needed if the module is the first or last device on an RS-485 network, even if there is only one other device on the network. Termination can be provided using either an external resistor as shown below or the port's built-in 120-Ohm termination. If line termination other than 120 Ohms is required, an appropriate external resistor must be supplied.

User-Supplied Termination for RS-485

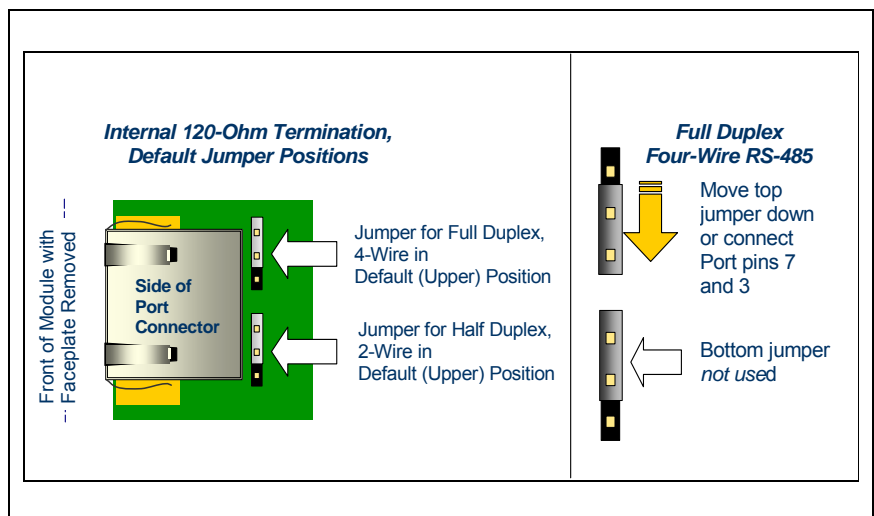


Built-in Termination for RS-485

Termination using the built-in 120-Ohm resistor can be provided by setting the appropriate RS-485 termination jumper OR by installing shorting jumpers on the RS-485 cable connector that attaches to the serial port.

To set 120-Ohm termination internally:

1. Remove the module's faceplate by pressing in on the side tabs and pulling the faceplate away from the module.
2. With the module oriented as shown, move *either* the upper or lower jumper.



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Release History

Version	Firmware Revision	Comments
IC695PRS015-AA	1.00	Initial release.

Important Product Information for this Release

Compatibility

The Pressure Transducer module requires the following CPU firmware and programming software versions:

- CPU RX3i CPU with firmware version 6.50 or above
- Programmer Machine Edition Logic Developer-PLC Version 6.50 or above

Restrictions and Open Issues

Issue	Description
Pressure sensor channel values are not scaled correctly when a pressure transducer is hot swapped with a transducer of a different type.	<p>The IC695PRS015 module does not support hot swapping of LG1237 pressure transducers. If a pressure transducer is hot swapped, the user should be aware of the following:</p> <p>When the IC695PRS015 module is on and scanning pressure transducer data, if an LG1237 pressure sensor is removed and replaced with a transducer that has a different pressure range, the channel values will be incorrectly scaled until one of the following actions occurs:</p> <ul style="list-style-type: none"> ▪ The rack containing the IC695PRS015 module is power cycled. ▪ The IC695PRS015 module is hot-swapped. ▪ The IC695PRS015 module is reset using SVC_REQ 24. ▪ The main rack containing the IC695PRS015 module has its hardware configuration downloaded through the programmer. ▪ The module's transducer 'Reset' command is issued through the I/O scan interface for at least one of the connected sensor addresses. <p>Any one of the above procedures will cause the module to correctly scale the pressure values from all connected and configured transducer channels, and respond to the module.</p>
Pressure sensor channel values are not scanned if the module is powered on and configured while pressure sensors are disconnected or powered down.	<p>For the IC695PRS015 module to scan pressure transducer data, the LG1237 sensors must be connected and powered on when the module's hardware configuration is downloaded or the module is powered on. Otherwise the pressure transducer channels will report as unavailable, and will not recover automatically when the pressure transducers are connected and powered on. This behavior will persist for newly connected pressure transducers until one of the following actions occurs:</p> <ul style="list-style-type: none"> ▪ The rack containing the IC695PRS015 module is power cycled. ▪ The IC695PRS015 module is hot-swapped. ▪ The IC695PRS015 module is reset using SVC_REQ 24. ▪ The main rack containing the IC695PRS015 module has its hardware configuration downloaded through the programmer. ▪ The module's transducer 'Reset' command is issued through the I/O scan interface for at least one of the connected sensor addresses. <p>Any one of the above procedures will cause the module to correctly scan the pressure values from all connected and configured transducer channels, and respond to the module.</p>

For technical assistance, please go to <http://support.ge-ip.com>.