

# PACSystems™ RX3i

## IC695LRE001

### Serial Bus Transmitter Module

GFK-2553  
January 2010

The RX3i Serial Bus Transmitter Module, IC695LRE001, provides communications between a PACSystems RX3i Universal Backplane (IC695-model number), and serial expansion and remote backplanes (IC694- or IC693-model numbers). It translates the signal levels present in the Universal Backplane to the signal levels required by a Serial Expansion Backplane.

The Serial Bus Transmitter Module must reside in the special expansion connector on the right end of the Universal Backplane.

Two green LEDs indicate the operating status of the module and the status of the expansion link.

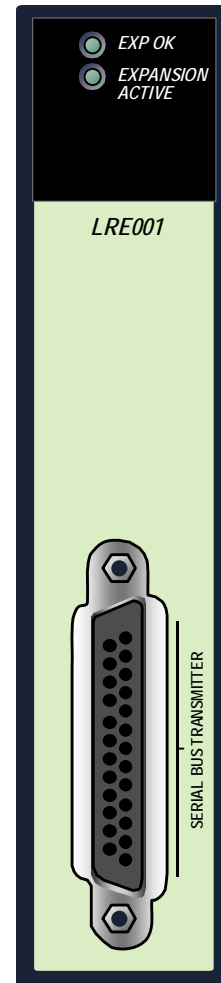
- The EXP OK LED is lit when backplane 5V power is applied to the module.
- The Expansion Active LED indicates the status of the expansion bus. This LED is ON when the Expansion module is communicating with expansion backplanes. It is OFF when they are not communicating.

The connector on the front of the module is used to attach the expansion cable.

For more information about this module, please refer to the *PACSystems RX3i System Manual*, GFK-2314.

### Module Specifications

<b>Current Required from Backplane</b>	5.0V: 132mA
<b>Maximum Total Expansion Cable Length</b>	15 meters (50 feet) – Expansion Backplanes 213 meters (700 feet) – Remote Backplanes
<b>Effective Data Rate</b>	500k Bytes per second if the expansion bus includes Remote backplanes.
<b>Electrical Isolation</b>	Non-isolated differential communications
<b>Serial Port</b>	Station Manager Port: RS-232 DCE, 1200 - 115200 bps.



### Cable Specifications

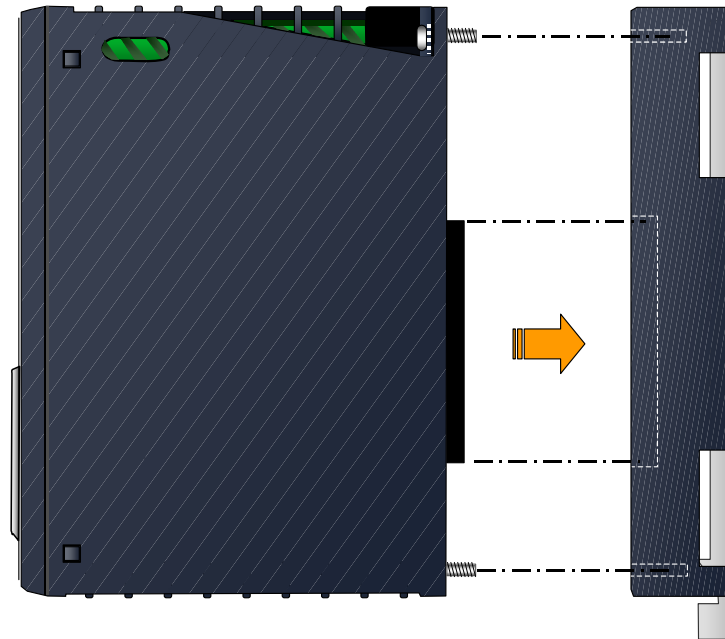
Connector part numbers are provided for reference only. Any part meeting the same specifications could be used for making custom cables.

<b>Cable</b> Belden 8107 only (no substitutes):	Computer cable, overall braid over foil shield, twisted-pair 30 volt/80°C (176°F), 24 AWG (.22mm <sup>2</sup> ) tinned copper, 7 x 32 stranding Velocity of propagation = 70% , Nominal impedance = 100 Ohms
<b>25 Pin Male Connector</b>	Crimp Plug = Amp 207464-1; Pin = Amp 66506-9 Solder Plug = Amp 747912-2
<b>25 Pin Female Connector</b>	Crimp Receptacle = Amp 207463-2; Pin = Amp 66504-9 Solder Receptacle = Amp 747913-2
<b>Connector Shell</b>	Kit – Amp 745833-5: Metal-plated plastic (plastic with nickel over copper), Crimp ring – Amp 745508-1, split ring ferrule

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### Expansion Module Installation

The Serial Bus Transmitter Module must reside in the special expansion connector on the right end of the Universal Backplane. This module may NOT be hot-inserted in the backplane; power must be removed before installing or removing the Expansion Module. In addition, the expansion cable may not be attached or removed if the expansion rack has power applied.



### Powering Down Individual Expansion or Remote Backplanes

Expansion and Remote Backplanes can be powered-down individually without affecting the operation of other backplanes; however, powering off a backplane generates a loss of module (LOSS\_OF\_MODULE) fault in the PLC Fault Table for each module in the backplane. When this fault condition occurs, and until the backplane is powered back on and all modules recovered, the lost I/O modules are not scanned.

### Installation in Hazardous Locations

**The following information is for products bearing the UL marking for Hazardous Locations:**

- 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.
- 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

### Release History

<i>Catalog Number</i>	<i>Date</i>	<i>Description</i>
IC695LRE001C	October 2008	Hardware changes for EU-RoHS compliance
IC695LRE001B	September 2007	ATEX approval for Group 2, Category 3 applications.
IC695LRE001A	August 2004	Initial product release

**I/O Bus Expansion Cables**

I/O Bus Expansion Cables are used to connect a Serial Bus Transmitter Module (IC695LRE001) in a Universal Backplane (IC695CHS012 or IC695CHS016) to a Serial Expansion Backplane (IC694/693CHS392 or IC694/693CHS398). These cables are also used to interconnect additional expansion and remote backplanes in the system. This section describes several types of prefabricated cables that are available (part numbers IC693CBL300, 301, 302, 312, 313). Custom cables can also be made, as described in the *PACSystems RX3i System Manual*, GFK-2314.

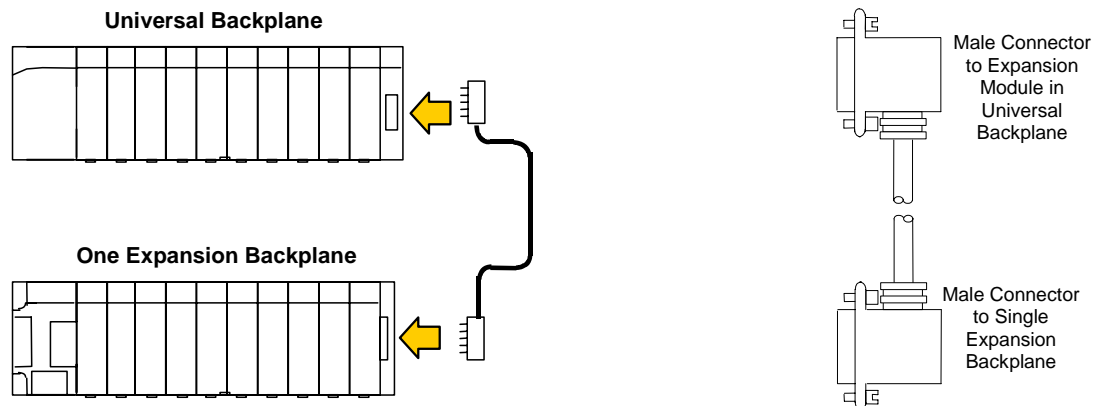
**Expansion Port Pin Assignments**

All connections between cables are point-to-point, that is, pin 2 of one end to pin 2 of the opposite end, etc.

<b>Pin Number</b>	<b>Signal Name</b>	<b>Function</b>
16	DIODT	I/O Serial Data Positive
17	DIODT/	I/O Serial Data Negative
24	DIOCLK	I/O Serial Clock Positive
25	DIOCLK/	I/O Serial Clock Negative
20	DRSEL	Remote Select Positive
21	DRSEL/	Remote Select Negative
12	DRPERR	Parity Error Positive
13	DRPERR/	Parity Error Negative
8	DRMRUN	Remote Run Positive
9	DRMRUN/	Remote Run Negative
2	DFRAME	Cycle Frame Positive
3	DFRAME/	Cycle Frame Negative
1	FGND	Frame Ground for Cable Shield
7	0V	Logic Ground

**Cable with Two Connectors**

Cable IC693CBL302 is 15 meters (50 feet) long and has one male connector on each end. This cable has I/O bus terminating resistors built into the end connector on the cable. It does not require a separate termination block. It can only be used in a system having just one expansion backplane.



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### Cables with Three Connectors

Cables IC693CBL300, 301, 312, and 313 have a male and female connector on one end and a male connector on the other end (“wye” cables). These cables are the same except for their lengths:

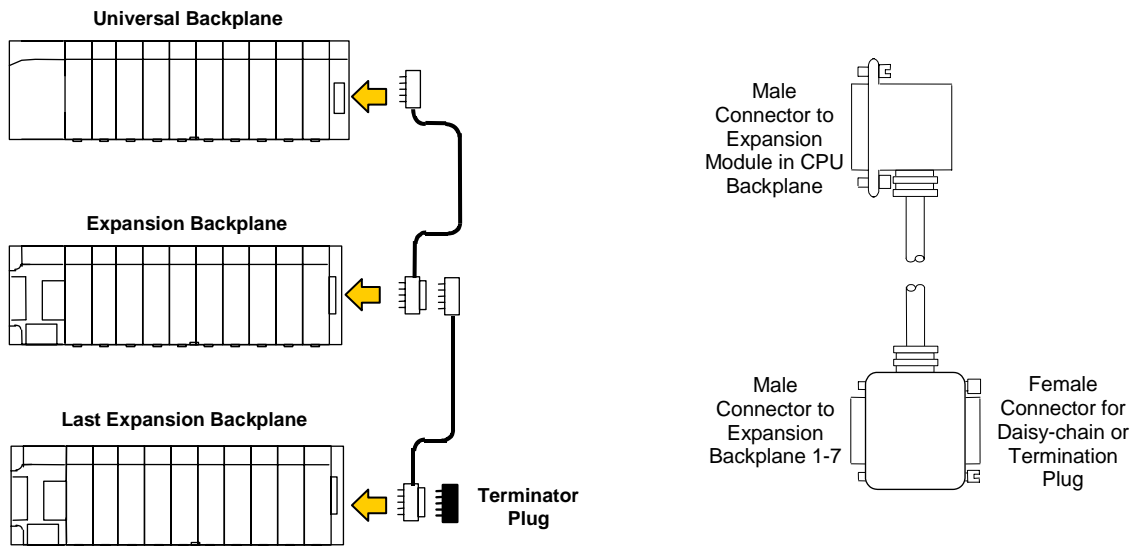
- IC693CBL312: 0.15 meter (0.5 feet)
- IC693CBL300: 1 meter (3 feet)
- IC693CBL301: 2 meters (6 feet)
- IC693CBL313: 8 meters (25 feet)

Combinations of these cables can be used to daisy-chain up to seven expansion backplanes to the main backplane. Custom cables can also be made. Wiring information is given in the *PACSystems RX3i System Manual*, GFK-2314.

These cables can also be used to provide connection points for custom point-to-point cables (IC693CBL300 is often used for this).

These cables do not have built-in termination. The last cable in the expansion system must be terminated as shown. Terminator Plug IC693ACC307 can be used for this purpose.

The maximum number of cables that can be included in an I/O expansion system is seven, and the total maximum cable length between the Universal Backplane and the last expansion backplane is 50 feet (15 meters). Failure to observe these limits could result in erratic system operation.



### Termination Requirement for Expansion or Remote System

When two or more backplanes are connected via the I/O Bus Expansion System, the I/O Expansion Bus must be properly terminated. The most common method of terminating the I/O Expansion Bus is by installing a termination resistor pack (IC693ACC307) on the open connector on the last (most distant from the CPU) expansion or remote backplane in the system. The resistor pack is physically mounted inside of a connector. Although a termination resistor pack is shipped with each backplane, only the last backplane in the chain needs to have this termination connector installed. Unused termination packs can be discarded. The prewired 50 foot (15 meter) cable (IC693CBL302) has termination resistors wired inside the connector on one end of the cable. This cable can be used if only one expansion rack is needed in a system and a 50 foot cable link is required (the IC693ACC307 resistor pack is not needed in this case). Also, a custom-built cable with built-in resistors would eliminate the need for the IC693ACC307 resistor pack. When using a custom cable, each signal pair must be terminated with 120 ohm, 1/4 watt resistors wired between the appropriate pins: 16 – 17; 24 – 25; 20 – 21; 12 – 13; 8 – 9; 2 – 3.