

Section 3: Backplanes

This section describes the types of backplane that can be included in an RX3i system:

Backplane Type	Catalog Number	Section
7-Slot RX3i Universal Backplane	IC695CHS007	3.1
12-Slot RX3i Universal Backplane	IC695CHS012	3.1
16-Slot RX3i Universal Backplane	IC695CHS016	3.1
5-Slot RX3i Serial Expansion Backplane	IC694CHS398	3.2
10-Slot RX3i Serial Expansion Backplane	IC694CHS392	3.2
5-Slot Series 90-30 Expansion Backplane	IC693CHS398 ⁵	
10-Slot Series 90-30 Expansion Backplane	IC693CHS392 ⁵	
5-Slot Series 90-30 Remote Backplane	IC693CHS399 ⁵	
10-Slot Series 90-30 Remote Backplane	IC693CHS393 ⁵	

3.1 RX3i Universal Backplanes: IC695CHS007, IC695CHS012, IC695CHS016

Three Universal Backplanes are available for RX3i PACSystems:

- the 7-slot IC695CHS007,
- the 12-slot IC695CHS012, displayed in Figure 57 below, and
- the 16-slot IC695CHS016.

⁵ For information about the IC693 Series 90-30 Expansion and Remote Backplanes, refer to the *Series 90-30 PLC Installation Manual*, GFK-0356.

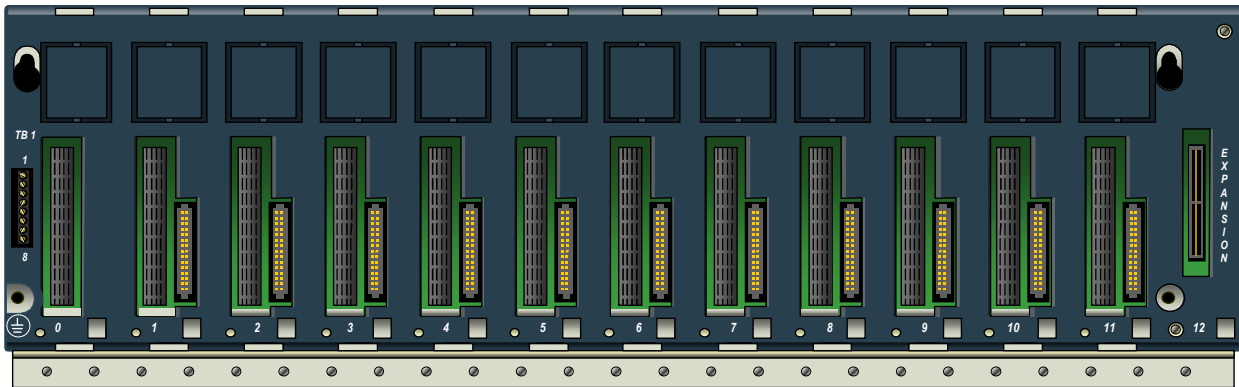


Figure 57: 12-Slot RX3i Universal Backplane IC695CHS012

The RX3i Universal Backplane supports both PCI (IC695) and serial (IC694) I/O and option modules with its dual-bus backplane. The RX3i Universal Backplane also supports 90-30 IO and option modules. Refer to Section 1.3 for supported modules and to Section **Error! Reference source not found.** for **Error! Reference source not found.**

RX3i modules (IC695 catalog numbers) communicate over the backplane PCI bus.

RX3i modules (IC694 catalog numbers) and Series 90-30 modules (IC693) communicate over the backplane serial bus.

3.1.1 RX3i Universal Backplane Features

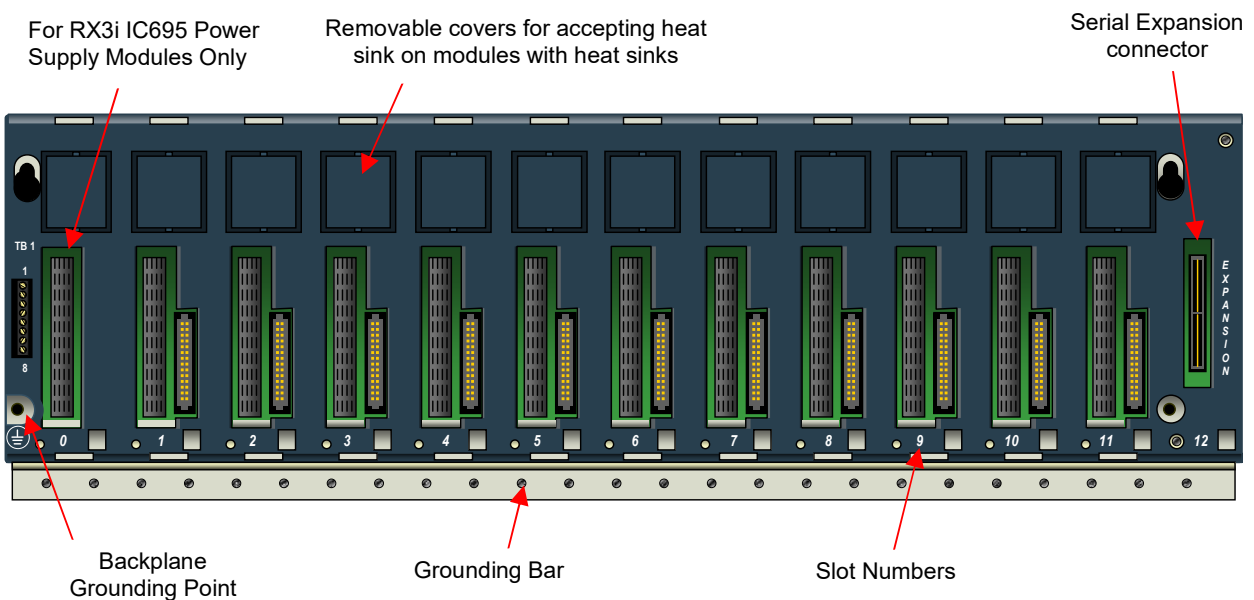


Figure 58: Features of RX3i Universal Backplanes

RX3i Universal Backplane features include:

- Terminal Strip on the left (Figure 58) for Isolated +24Vdc input.
- Backplane grounding point as described in Section 0.
- An integral grounding bar for connecting module/shield grounds as described in Section 2.5.5.
- Removable covers that, when knocked out, allow heat sinks on modules equipped with heat sinks to be inserted.
- Serial Expansion connector for connection (Figure 58, far right) to Serial Expansion and Remote Backplanes (12- and 16-slot models only).
- Slot numbers are printed on the backplane (Figure 58) and are used for reference for configuration in Proficy Machine Edition (PME). Slots and connectors are described on the following pages. Most modules occupy one slot. Some modules, such as CPUs and AC Power Supplies occupy two slots.

3.1.1.1 Universal Backplane TB1 Input Terminals

The RX3i IC695 Power Supplies do not provide Isolated +24Vdc output power over the backplane. Terminals 7 and 8 can be used to connect an optional external source of Isolated +24Vdc, which is required for some IC693 and IC694 modules as listed in the table, *Module Load Requirements*, Section 4.2.

These terminals accept individual wires from 14 to 22 AWG.

If modules that require Isolated +24Vdc are installed in an Expansion Backplane instead, an external Isolated +24Vdc power supply is not required.

Terminals 1 through 6 are not used.

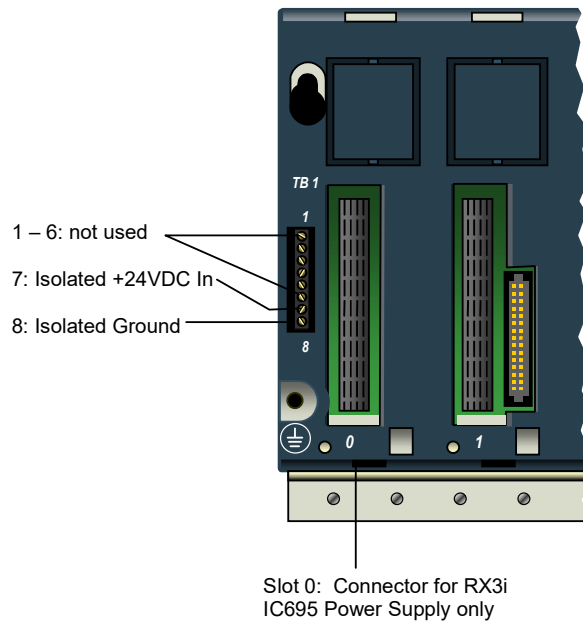


Figure 59: TB1 Terminal Detail

3.1.1.2 Slot 0

The leftmost slot in a Universal Backplane is slot 0. Only the backplane connector of IC695 Power Supplies can be installed in slot 0 (note: IC695 Power Supplies can be installed any slot). However, 2-slot wide modules that have right-justified connectors, such as the CPU310, can be plugged into slot 1 and also cover slot 0.

The CPU is referenced for configuration and application logic by the leftmost slot occupied by the entire module, not by the slot the physical connector is located in. For example, if the CPU has its physical connector inserted in slot 3, the module occupies slots 2 and 3 and the CPU is referenced as being located in slot 2. A double-wide CPU may therefore be located in slot 0 with its backplane connector inserted in slot 1.

3.1.1.3 Dual-Connector Slots

Dual-connector slots are identified as follows:

CHS016: 0 through 15

CHS012: 0 through 11

CHS007: 0 through 5

They have two connectors, a connector for the RX3i PCI bus, and connector for the RX3i serial bus. Each of these slots can accept any type of compatible module: IC695 Power Supply, IC695 CPU, or IC695, IC694 and IC693 I/O or option modules.

Provided the *Hot Insertion and Removal* procedure described in Section 2.6.4.1 is carefully followed, I/O and option modules in a Universal Backplane may be removed and replaced without powering-down.

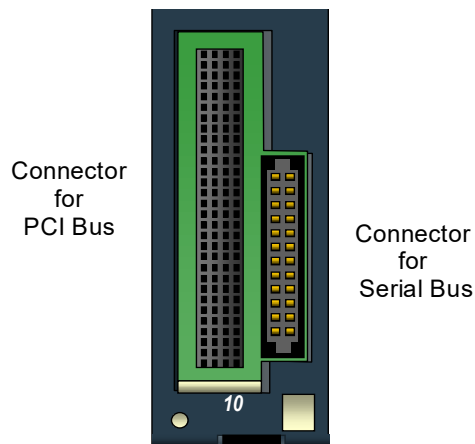


Figure 60: RX3i Universal Backplane Dual Connector Slot for PCI Bus & Serial Bus

3.1.1.4 Expansion Slot (Slot 12 or Slot 16)

The rightmost slot in a Universal Backplane has a different connector than the other slots. It can only be used for an RX3i Serial Expansion Module, IC695LRE001.

An RX3i 2-slot module may not occupy this expansion slot.

The 7-slot CHS007 rack does not provide an expansion slot, or support the LRE001 Serial Expansion Module.

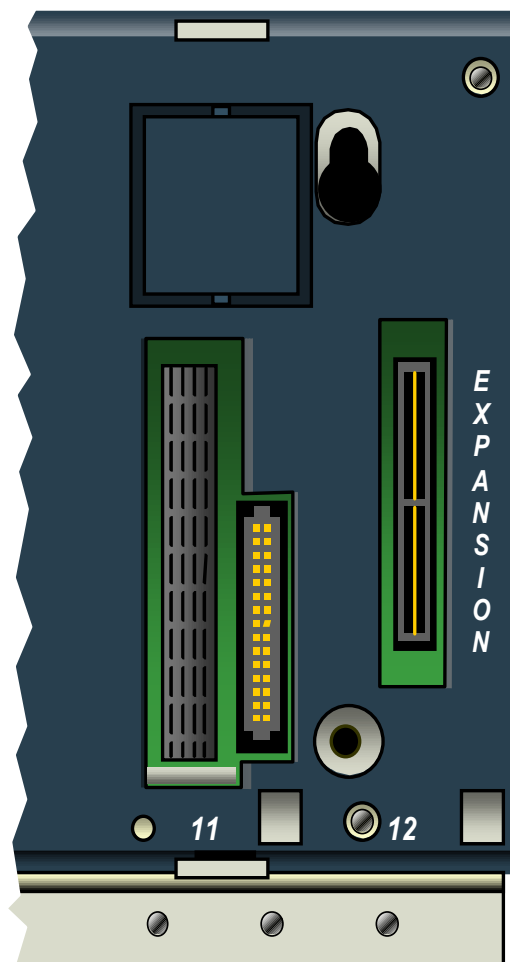


Figure 61: Expansion Slot Connector shown at Slot 12

3.1.1.5 Slot 6 of 7-Slot Rack

In the CHS007 seven-slot rack, slot 6 has one RX3i PCI connector and can accept only IC695 single-width I/O or option modules.

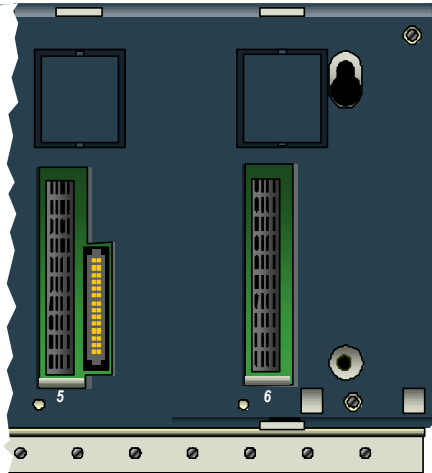


Figure 62: Slot 6 of IC695CHS007

3.1.2 Module Locations in a 12- or 16-Slot Universal Backplane

- IC695 Power Supply modules may be installed in any slot. DC Power Supplies IC695PSDx40 occupy one slot and AC Power Supplies IC695PSAx40 occupy two slots. RX3i (IC694) and Series 90-30 (IC693) Power Supplies cannot be installed in Universal Backplanes.
- An RX3i CPU module can be installed anywhere in the backplane except the Expansion slot. CPU modules occupy two slots.
- I/O and option modules can be installed in any available slot except slot 0, which can only accept IC695 Power Supplies, and the Expansion slot. Each I/O slot has two connectors, so either an RX3i PCI-based module or a serial module can be installed in any I/O slot.
- The rightmost slot is the expansion slot. It can only be used for optional serial expansion module IC695LRE001. Refer to Chapter 5 for information about the LRE001 Serial Expansion Module and expansion cables.

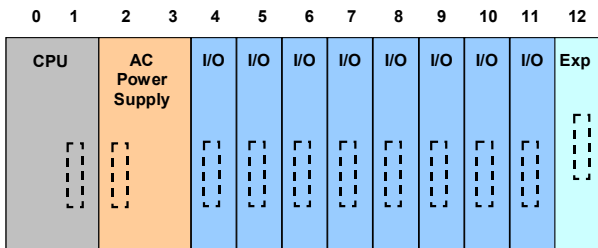


Figure 63: Configured as CPU in slot 0, Power Supply in Slot 2

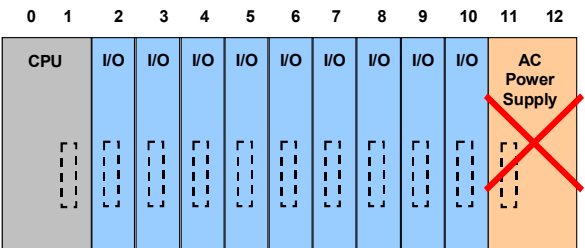


Figure 64: Invalid: AC Power Supply cannot be in Slot 11

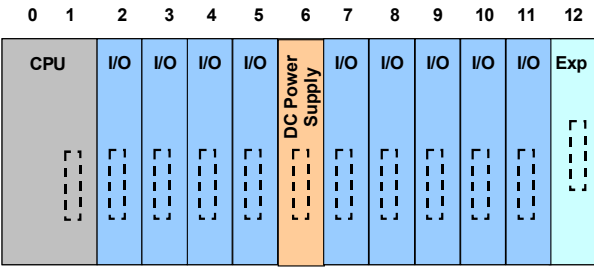


Figure 65: Configured as CPU in slot 0, Power Supply in Slot 6

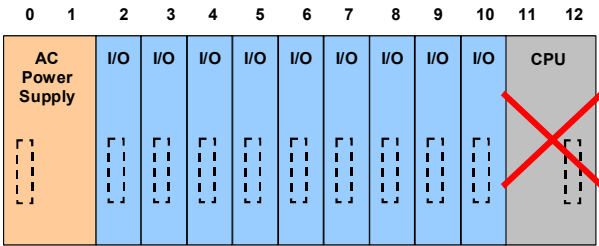


Figure 66: Invalid: CPU cannot be configured in Slot 11

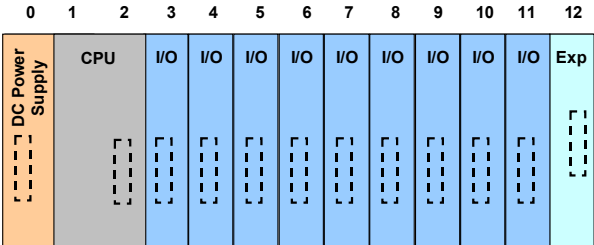


Figure 67: Configured as Power Supply in slot 0, CPU in Slot 1

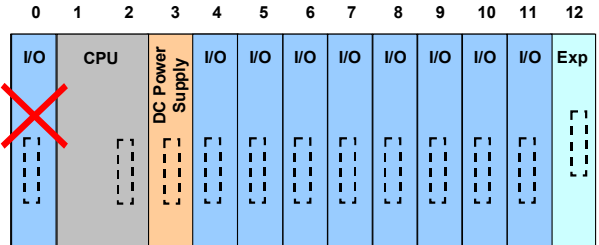


Figure 68: Invalid: Only a Power Supply can be installed in Slot 0

3.1.2.1 Locating the CPU in Slot 1

Whenever the CPU is installed in slot 1, only a single-wide power supply may be used in slot 0. Either DC power supply can be used (IC695PSD040 or IC695PSD140). If, for a given application, the CPU must be located in slot 1, and also uses an AC power-supply, the RX3i AC power-supply must then be located in the slot to the right of that CPU.

3.1.2.2 Locating the CPU in a Slot Other than 1

Before deciding to place the CPU in a slot other than slot 1, it is important to consider possible issues that could arise as follows.

Communications: For Service Request #15 (Read Last-Logged Fault Table Entry) and Service Request #20 (Read Fault Tables), the location of CPU faults is not the standard 0.1 location, but the slot the CPU is located in. Logic that decodes fault table entries retrieved by these service requests may need updating.

COMMREQs directed to the CPU (e.g. those directed to the serial ports of the CPU) will need to be updated with the correct CPU slot reference.

Hardware Configuration: The slot location of the CPU must be updated in the hardware configuration to reflect the true location of the CPU.

Fault Tables: Faults logged for the CPU in the fault table will reflect the actual slot of the CPU.

Remote Series 90 PLCs that use SRTP Channels COMMREQs expect the CPU to be in slot 1 or slot 2. To support communications with Series 90 SRTP clients such as Series 90 PLCs using SRTP Channels, the RX3i internally redirects incoming SRTP requests destined for {backplane 0, slot 1} to {backplane 0, slot 2}, provided that the CPU is located in backplane 0 slot 2 (and the remote client has not issued an SRTP Destination service on the connection to discover the backplane and slot of the CPU). This special redirection permits Series 90-30 applications that expect the power supply to be located leftmost and the CPU to be located to the right of the power supply to function. Attempts to establish channels with CPUs in slots other than 1 or 2 will fail if initiated from Series 90 PLCs.

All external communication devices that interact with the CPU should be checked for compatibility with CPU slot locations other than slot 1. Problems may arise with, but are not limited to, initial connection sequences and fault reporting. Machine Edition View users should select *GE SRTP* as their communications driver as it can communicate with a CPU in any slot.

3.1.3 Module Locations in a 7-Slot Universal Backplane

- DC Power Supplies IC695PSDx40 occupy one slot and can be installed in any slot. AC Power Supplies IC695PSAx40 occupy two slots and cannot be installed in slot 6. *IC694 and IC693 Power Supplies cannot be installed in Universal Backplanes.*
- Any I/O or option module can be installed in slots 1 through 5, which have two connectors and can accommodate either an RX3i PCI-based module or a serial module. Slot 6 can accommodate only RX3i PCI-based single-wide modules. I/O and option modules cannot be installed in slot 0, which can only accept IC695 Power Supplies.

- An RX3i CPU can be installed anywhere in the backplane except slot 6. CPU modules occupy two slots. Installing the CPU in slot 1 means only a singlewide power supply can be used in slot 0. If the application must maintain a slot 1 CPU and use an AC power supply, the AC power supply must be located in a slot to the right of the RX3i CPU in slot 1. Before deciding to place the CPU in a slot other than slot 1, it is important to consider the factors listed in the section, *Locating the CPU in a Slot Other than 1*.

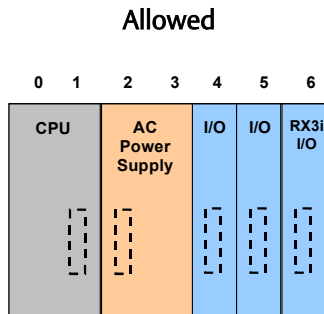


Figure 69: Configured as CPU in slot 0, Power Supply in Slot 2

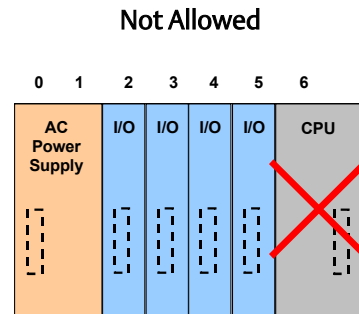


Figure 70: CPU cannot be configured in Slot 6

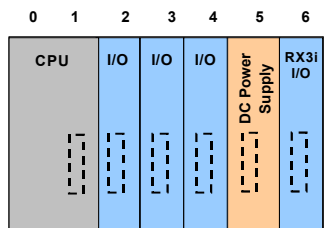


Figure 71: Configured as CPU in slot 0, Power Supply in Slot 5

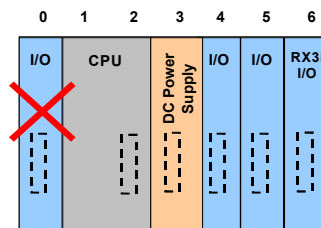


Figure 72: I/O or Option Module cannot be installed in Slot 0

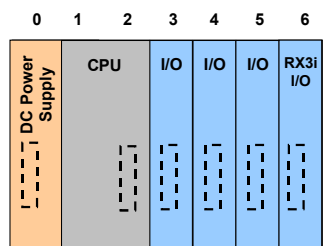


Figure 73: Configured as Power Supply in slot 0, CPU in Slot 1

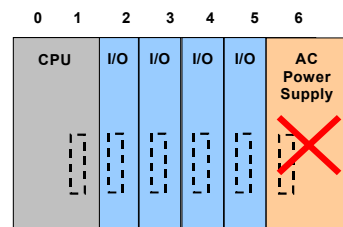


Figure 74: AC Power Supply cannot be configured in Slot 6

3.2 Serial Expansion Backplanes: IC694CHS392, IC694CHS398

The RX3i system can include any combination of up to seven RX3i Serial Expansion backplane and/or Series 90-30 Expansion/Remote Backplanes. RX3i Serial Expansion Backplanes are available with either five I/O slots (IC694CHS398, displayed in the following figure) or ten I/O slots (IC694CHS392).

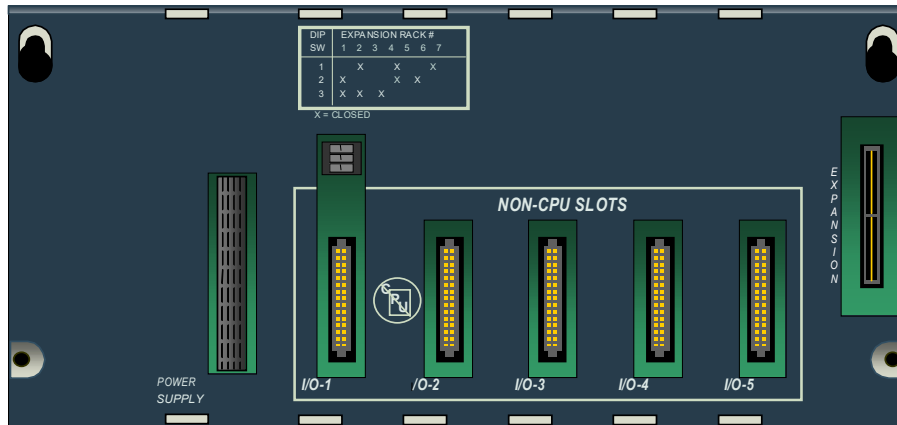


Figure 75: Serial Expansion Backplane

- The leftmost module in an RX3i Serial Expansion Backplane must be a Serial Expansion Power Supply:
 - IC694PWR321: Serial Expansion Power Supply, 120/240 Vac, 125Vdc
 - IC694PWR330: Serial Expansion Power Supply, 120/240 Vac, 125Vdc, High Capacity
 - IC694PWR331: Serial Expansion Power Supply, 24Vdc, High Capacity
- Module Hot Insertion and Removal are NOT permitted on Expansion Backplanes.
- Each Expansion Backplane has a Rack Number Selection DIP switch (Figure 18) that must be set before module installation.
- Each Expansion Backplane has a Bus Expansion connector at its right end for attaching an optional expansion cable. There can be no more than 50 feet (15 meters) of cable connecting Expansion backplanes with the Universal Backplane. If the system includes Series 90-30 Remote Backplanes, the additional requirements summarized in Section 1.3 through Section 1.5 must also be observed.

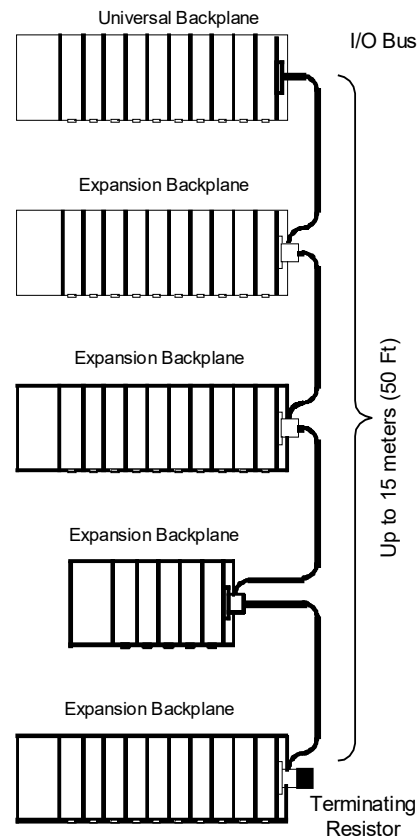


Figure 76: Example RX3i System with Expansion Backplane Racks

Section 4: Power Supplies

This chapter describes power supplies for RX3i PACSystems:

Power Supply Description	Catalog Number	Section
120/240 Vac 125Vdc 40 W Power Supply	IC695PSA040	4.4
120/240 Vac 125Vdc 40 W Multi-Purpose Power Supply	IC695PSA140	0
24Vdc 40 W Power Supply	IC695PSD040	4.6
24Vdc 40 W Multi-Purpose Power Supply	IC695PSD140	0
120/240 Vac 125Vdc 30 W Serial Expansion Power Supply	IC694PWR321	4.8
120/240 Vac 125Vdc 30 W High Capacity Serial Expansion Power Supply	IC694PWR330	4.9
24Vdc 30 W High Capacity Serial Expansion Power Supply	IC694PWR331	4.10

4.1 Power Supply Overview

This section provides a general description of the IC695 Power Supplies, which must be used in RX3i (IC695) Universal Backplanes, and IC694 Power Supplies, which must be used in RX3i Serial Expansion (IC694) Backplanes. Individual power supply specifications are listed in the following sections.

The IC695 Power Supplies provide up to 40 W each. The IC694 (Expansion) Power Supplies provide up to 30 W each. However, IC694PWR321 is limited to 15 Watts on the +5Vdc output.

The total of all outputs combined cannot exceed the stated load capacity in Watts. PME Logic Developer will automatically calculate the power consumption of modules as they are added to the system configuration. Power requirements of system modules are shown in this section, for reference when planning the system.

The maximum load for each type of power supply is displayed in the following table.

Catalog Number	Can be Located In	Nominal Input	Load Capacity ⁶	Load Sharing, Redundancy	Max +3.3Vdc	Max +5Vdc	Max +24Vdc Isolated	Max +24Vdc Relay
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⁶ A power supply must be able to provide the total of the internal and external loads that may be placed upon it by all the hardware components in the backplane as well as by all the loads that may be connected to the Isolated +24Vdc supply on an expansion backplane.

IC695PSA040	Universal Backplane	120/240 Vac or 125Vdc	40 W	No	30 W	30 W	–	40 W
IC695PSA140	Universal Backplane	120/240 Vac or 125Vdc	40 W	Yes	30 W	30 W	–	40 W
IC695PSD040	Universal Backplane	24Vdc	40 W	No	30 W	30 W	–	40 W
IC695PSD140	Universal Backplane	24Vdc	40 W	Yes	30 W	30 W	–	40 W
IC694PWR321	Serial Expansion Backplane	100/240 Vac or 125Vdc	30 W	No	–	15 W	20 W	15 W
IC694PWR330	Serial Expansion Backplane	100/240 Vac or 125Vdc	30 W	No	–	30 W	20 W	15 W
IC694PWR331	Serial Expansion Backplane	24Vdc	30 W	No	–	30 W	20 W	15 W

4.1.1 Power Supply Field Wiring

Refer to *Power Supply Field Wiring*, Section 2.6.6.1. See also AC Power Source Connections (Section 2.6.6.2) or DC Power Source Connections (Section 2.6.6.3) as appropriate for how each power supply is being applied.

4.1.2 24Vdc Isolated Power

The IC695 Power Supplies do not have Isolated +24Vdc output terminals. The RX3i Universal Backplane provides external input terminals (TB1) for connecting an optional Isolated +24Vdc external supply. Modules that draw +24Vdc from the backplane are listed in the table *Module Load Requirements*, Section 4.2. Refer to *Universal Backplane TB1 Input Terminals* for details on how to wire to terminal TB1.

4.1.3 RX3i IC695 Power Supply Outputs

The IC695 power supplies have +5.1Vdc, +24Vdc Relay, and 3.3Vdc outputs that are connected internally on the backplane. The voltage and power required by modules installed on the backplane is supplied through the backplane connectors.

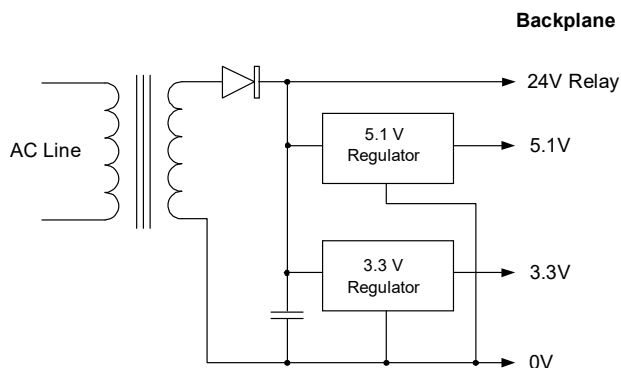


Figure 77: Outputs of Power Supply IC695PSA040

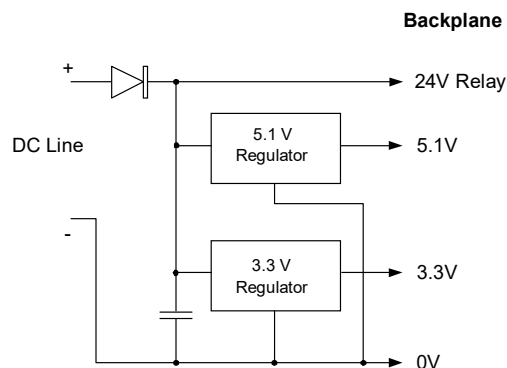


Figure 78: Outputs of Power Supply IC695PSD040 & IC695PSD140

4.1.4 RX3i IC694 Power Supply Outputs

The IC694 power supplies have +5Vdc, Relay +24Vdc and Isolated +24Vdc outputs that are connected internally on the backplane. The voltage and power required by modules installed on the backplane is supplied through the backplane connectors.

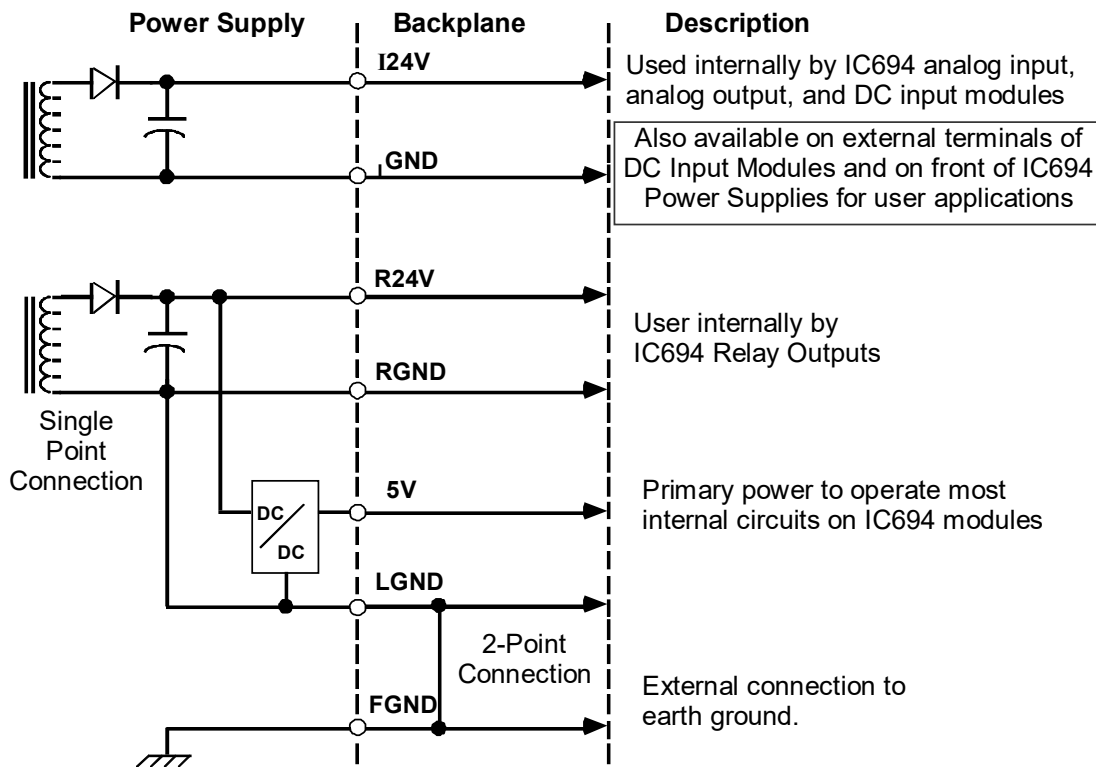


Figure 79: Outputs of Power Supplies IC694PWR321, IC694PWR330, and IC694PWR331

4.2 Module Load Requirements

The following table summarizes the maximum load requirements in milliamps and Watts for RX3i modules. Modules are listed alphabetically by the last six characters of the catalog number. For I/O modules, the actual load may depend on the number of points on at the same time.

Catalog Number	Module	+3.3Vdc		+5Vdc		+24Vdc Relay		+24Vdc Isolated	
		mA	W	mA	W	mA	W	mA	W
IC694ACC300	Input Simulator	–	–	120	0.60	–	–	–	–
IC694ACC307	Expansion Bus Termination Plug	–	–	72	0.36	–	–	–	–
IC695ALG106	Analog Input Module, 6-Channel Isolated Current/Voltage	390	1.287	225	1.125	–	–	–	–
IC695ALG112	Analog Input Module, 12-Channel Isolated Current/Voltage	370	1.221	425	2.125	–	–	–	–
IC694ALG220	Analog Input, Voltage, 4-Channel	–	–	27	0.135	–	–	98	2.352

Catalog Number	Module	+3.3Vdc		+5Vdc		+24Vdc Relay		+24Vdc Isolated	
		mA	W	mA	W	mA	W	mA	W
IC694ALG221	Analog Input, Current, 4-Channel	–	–	25	0.125	–	–	100	2.4
IC694ALG222	Analog Input, 8-/16-Channel Voltage Version -AA Versions –BA and later	–	–	112	0.56	–	–	0 41	0.984
		–	–	112	0.56	–	–	110	2.64
IC694ALG223	Analog Input, 8-/16-Channel Current	–	–	120	0.60	–	–	65	1.56
IC694ALG232	Advanced Diagnostics, 16-Channel Input Analog Voltage Module	–	–	112	0.56	–	–	110	2.64
IC694ALG233	Advanced Diagnostics, 16-Channel Input Analog Current Module	–	–	120	0.60	–	–	65	1.56
IC695ALG306	Thermocouple Input Module, 6-Channel Isolated	400	1.320	225	1.125	–	–	–	–
IC695ALG312	Thermocouple Input Module, 12-Channel Isolated	400	1.320	425	2.125	–	–	–	–
IC694ALG390	Analog Output 2-Channel Voltage	–	–	32	0.16	–	–	120	2.88
IC694ALG391	Analog Output 2-Channel Current	–	–	30	0.15	–	–	215	5.16
IC694ALG392	Analog Output 8-Channel Current/Voltage	–	–	110	0.55	–	–	315	7.56
IC694ALG542	Analog Module 4-Input 2-Output Current /Voltage with Advanced Diagnostics	–	–	95	0.475	–	–	150	3.6
IC695ALG412	Isolated Thermocouple Input Module 12-Channel	400	1.320	425	2.125	–	–	–	–
IC694ALG442	Analog Module 4-Input 2-Output Current/Voltage	–	–	95	0.475	–	–	129	3.096
IC695ALG508	RTD Input Module, 8-Channel Isolated	400	1.320	200	1.00	–	–	–	–
IC695ALG600	Universal Analog Input Module	350	1.155	400	2.00	–	–	–	–
IC695ALG608	Analog Input 8-/4-Channel Current/Voltage	330	1.089	600	3.00	–	–	–	–
IC695ALG616	Analog Input 16-/8-Channel Current/Voltage	450	1.485	600	3.00	–	–	–	–

Catalog Number	Module	+3.3Vdc		+5Vdc		+24Vdc Relay		+24Vdc Isolated	
		mA	W	mA	W	mA	W	mA	W
IC695ALG626	Analog Input 16-/8-Channel Current/Voltage with HART Communications	625	2.063	600	3.00	–	–	–	–
IC695ALG628	Analog Input 8-/4-Channel Current/Voltage with HART Communications	625	2.063	450	2.25	–	–	–	–
IC695ALG704	Analog Output, 4-Channel Current/Voltage	375	1.238	–	–	–	–	150	3.6
IC695ALG708	Analog Output, 8-Channel Current/Voltage	375	1.238	–	–	–	–	250	6
IC695ALG728	Analog Output, 8-Channel Current/Voltage with HART Communications enabled	380	1.255	–	–	–	–	–	–
IC695ALG808	Analog Output 8-Channel Current/Voltage Isolated	450	1.485	25	–	0.138	–	600	14.4
IC694APU300	High-Speed Counter	–	–	250	1.25	–	–	–	–
IC694APU305	Special I/O Processor (360mA module +10mA per output on)	–	–	440	2.2	–	–	80	1.92
IC694BEM320	I/O Link Interface Module with Optical Adapter	–	–	205 405	1.025 2.025	–	–	–	–
IC694BEM321	IO Link Master Module with Optical Adapter	–	–	415 615	2.075 3.075	–	–	–	–
IC694BEM331	Genius Bus Controller Module	–	–	1300	6.50	–	–	–	–
IC695CHS007	Universal Backplane 7-Slot	600	1.98	240	1.20	–	–	–	–
IC695CHS012	Universal Backplane 12-Slot	600	1.98	240	1.20	–	–	–	–
IC695CHS016	Universal Backplane 16-Slot	600	1.98	240	1.20	–	–	–	–
IC694CHS392	Expansion/Remote Backplane 10-Slot	–	–	150	0.75	–	–	–	–
IC694CHS398	Expansion/Remote Backplane 5-Slot	–	–	170	0.85	–	–	–	–
IC695CMM002	Serial Communications Module, 2 Ports	700	2.310	115	0.508	–	–	–	–