

PS-AC-R

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PS-AC-R

USER'S MANUAL

PS-AC-R Power Supply Module 90 to 264 Vac Input



P S A C R M E

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Up-to-date address information is available on our website.

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AVOIDING ELECTRICAL DISCHARGES



ATTENTION

Electrostatic discharges may damage semiconductor electronic components in printed circuit boards. They usually occur when touching components or connector pins from modules and racks, without wearing the appropriate equipment to prevent discharges. It is recommended to take the following precautions:

- Before handling modules and racks, remove the electrostatic charge from your body by wearing a proper wristband or touching grounded devices;
- Avoid touching electronic components or connector pins from racks and modules.

PS-AC-R - POWER SUPPLY MODULE - 90 TO 264 VAC INPUT - REDUNDANT

Description

This redundant power supply works independently or in together with other redundant power supply module to ensure a constant supply of power to the application.

When two redundant power supplies are used, if one of them fails, the backup will automatically assume the operation. A relay is provided to indicate failure on each power supply giving the user a chance to replace the faulty one.

This module provides two voltage outputs:

5 Vdc @ 3 A: distributed by Power Lines in the Inter-Module-Bus (IMB) throughout the racks to supply the module circuits;

24 Vdc @ 300 mA: for external use through the terminals 1B and 2B.

The applied AC voltage, the 5 Vdc and the 24 Vdc are all isolated between them.

Installation and Configuration

For systems based on DF93 rack, with DF90 and DF91

Redundant mode options

- **Splitting Power concept:** In this situation, two modules will supply power to a bus segment. If one of them was turned off or fails, the other power supply must be able to supply energy, alone, to the segment.
The **CH1** jumper (power supply) must be set in **R** position for both modules and **W1** jumper (power supply) must be opened for both modules.
- **Standby concept:** In this case, just one power supply provides energy to the system. If it was turned off or fails, the backup module will assume the operation. In both modules, the jumper **CH1** (power supply) must be set in the **R** position and **W1** jumper (power supply) must be placed only in the backup module.

Expansion of load capacity by adding power supplies

If the system consumption is greater than 3A, it can be subdivided in up to 8 groups sized for consumption of up to 3A each, and each group is individually powered by a power supply. More details on the Power supplies positioning topic. In the power supply module the **CH1** jumper must be set in **E** position.

Power supplies positions in the racks

On **DF93** is recommended the placement of the redundant pair in the first and second slots, but it can be installed in any slots if necessary.

For systems based on R-700-4A rack

Non-redundant (single module) - power consumption **limited** to 3A

There is an addressing restriction related to the power supply location. The restriction is that the first rack (address 0) must always contain a power supply module at the first slot. In the power supply module the **CH1** jumper must be set in **E** position.

Non-redundant (more than one module) - power consumption **bigger** than 3A

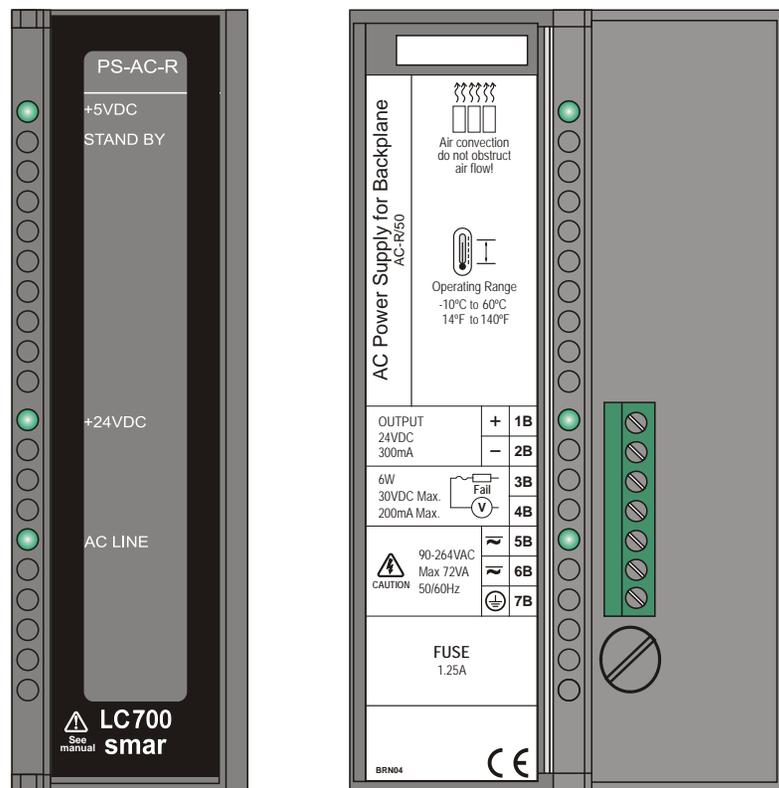
Additional modules are placed in the bus in parallel, but isolated one of the other. For systems based on **R-700-4A** rack, the power supplies modules must always be placed at the first rack's slot. The jumper **W1** (in the rack), where is the new power supply module, must be cut. The new power supply module will only supply power to the rack where it is sitting on and to the consecutive ones (never backwards).

In all power supplies modules, the **CH1** jumper must be set in **E** position.

Redundant mode:

- **Split power concept:** In this case of redundancy, the user may have two power supplies modules in parallel in first and third slots of rack **R-700-4A**. The **CH1** jumper (power supply) must be set in **R** position in both modules and **W1** jumper (power supply) must be opened in both modules. In this situation, the two modules will supply power to the bus.

- **Standby concept:** In this case, the main module must be placed in the first slot and the backup module in the third slot of rack **R-700-4A**. In both modules, the jumper **CH1** must be set in the position **R** and **W1** jumper must be placed only in the backup module.



AC Power Supply Module: PS-AC-R

Technical specifications

INPUTS	
DC	127 to 135 Vdc
AC	90 to 264 Vac, 50/60 Hz (nominal), 47 to 63 Hz (range)
Inrush Current	< 36 A @ 220 Vac. [ΔT < 740 μs]
Time until Power Fail	6 ms @ 102 Vac (120 Vac – 15%) [Full Load]
Time until Shutdown	27 ms @ 102 Vac; > 200 ms @ 220 Vac [Full Load]
Maximum Consumption	72 VA
Indicator	AC LINE (Green LED)

OUTPUTS	
a) Output 1 (internal use)	5.2 Vdc +/- 2%
Current	3 A Maximum
Ripple	100 mVpp Maximum
Indicator	+5 Vdc (Green LED)
Hold up time	> 40 ms @ 120 Vac [Full Load]
b) Output 2 (external use)	24 Vdc +/- 10%
Current	300 mA Maximum
Ripple	200 mVpp Maximum
Short circuit current	700 mA
Indicator	+24 Vdc (Green LED)

ISOLATION	
Input, internal output and external output signals are isolated between them.	
Between outputs and ground	1000 Vrms
Between input and output	2500 Vrms

FAILURE RELAY	
Type of Output	Solid state relay, normally closed (NC), isolated
Limits	6 W, 30 Vdc max, 200mA max
Maximum Initial Contact Resistance	<13Ω
Overload Protection	Should be provided externally
Operation Time	5 ms maximum

TEMPERATURE	
Operation	-10 °C to 60 °C (14 °F to 140 °F)

DIMENSIONS AND WEIGHT	
Dimensions (L X H X D)	39.9 x 137.0 x 141.5 mm (1.57 x 5.39 x 5.57 in)
Weight	0.450 kg

CABLES	
One wire	14 AWG (2 mm ²)
Two wires	20 AWG (0.5 mm ²)

NOTES	
<p>1) If the power consumption exceeds the power supplied, the system may operate in an unpredictable manner that may causes damages to the equipment or risk of personal injury. Hence, the power consumption must be calculated correctly and install more power supplies modules, if it is necessary.</p> <p>2) To increase the service life of your contacts and protect the modules from potential reverse voltage damage, connect externally a clamping diode in parallel with each inductive DC load or connect a RC snubber circuit in parallel with each inductive AC load.</p> <p>3) To meet the EMC standards requirements, the wires' length to the failure relay must be less than 30 meters. The power supply of activated load by the failure relay must not be from external network.</p> <p>4) The redundancy feature is only guaranteed for racks with GLL1270 Revision 2 or greater. For the models with their revisions less than the mentioned above, the technical support must be consulted in order to check the compatibility.</p>	

Calculating the Power Consumption

Since the power available from the power supply is limited, it is important to calculate the modules power consumption that will be used. One way of doing that is constructing a sheet to summarize all current supplied and required from each module and the associated devices (such as operator interface). And then, to calculate the maximum current required and the maximum current supplied. If “maximum current required” is greater than “current supplied” the power consumption will be exceeded. If this is the case, it will be unsafe to use this configuration and you will need to review the system design or add more power supply modules through out the racks.

However, **CONF700** software for **LC700** offers the fastest way to obtain the total power consumption for an application. Once the modules in the **Hardware Page** have been selected, the power consumption report is immediately available. To learn how to use this feature of **CONF700**, refer to the **LC700** Configuration Manual for further information.

The Power Supply Concept of a LC700 System

If the **LC700** needs more power supply modules, each one of the power supply modules will provide current up to the maximum value of modules located on its right-hand side. The following steps will help you to understand how many power supply modules are required for the **LC700** system:

- Observe the maximum current values from the power supply module specification.
- Be sure that the consumption of the modules to the right of the power supply does not exceed the maximum value.
- Follow the steps in the next topic if the power consumption exceeds the limit.

To add a new power supply module

- Determine the rack where the new power supply will be installed.
- Cut the jumper W1 located on the rack.
- Plug the new power supply at the first slot of the rack (Slot 0).
- In this case the **CH1** of all **PS-AC-R** modules must be set in **E** position.

Power supplies positioning

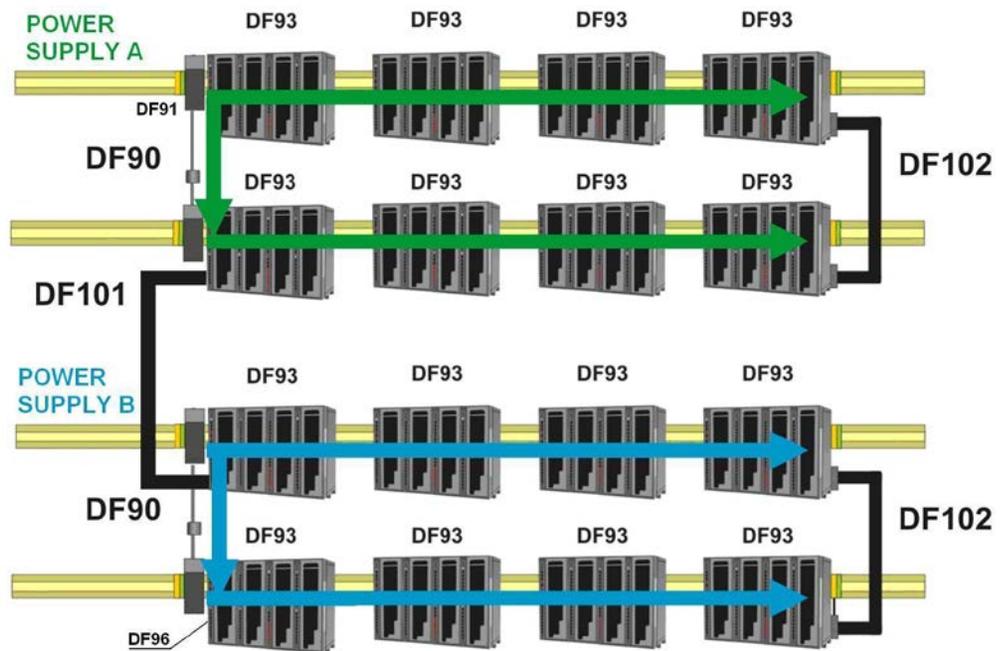
For systems based on DF93 rack with DF90 and DF91

A power supply connected to a rack, in a system, provides current to the racks row that are horizontally interconnected to it by their terminals of lateral connections, and vertically through DF90 cables, thus forming a group of rows of racks that use the same power supply.

The system can have only one power supply or it can be subdivided in several of these groups¹, each one powered by a power supply.

The recommended way to distribute the power is to divide the system in groups of horizontal rows of racks. In this scheme, each power supply must be positioned on the top left of the group of rows of racks that it powers. The rack were is the power supply must be the **W1** jumper cut and the **DF90** cable must not be connected to the rows powered by other power supplies (top rows). See in the following figure an example of system powered by two power supplies, each one powers a part of rows represented in green and blue.

¹ Maximum 8 groups allowed when the PS-AC-R power supplies are used.



System powered by two power supplies

Note that this system, for greater efficiency, is optimized for power distribution by groups of rows of racks. Thus, a power supply powers a whole number of rows it supports. However, in rare cases, with long rows or many modules with great consumption in the same row, there is the option to add power supplies in the middle of the row, dividing the power within this row. In this case, the power supply added powers only the modules positioned on the right in the same row, up to the end, or even where there is another power supply added. In the rack where the power supply was added, in this scheme, the **W1** jumper must be cut and left lateral connection terminal (+5 Vdc) must be disconnected (collapsed).

In this system, **PS-AC-R** modules must be their **CH1** jumper always configured in **E**.



ATTENTION

A mixture of these power supplies with the **CH1** configured in **R** and in **E** in any **LC700** system, is not allowed!

On **DF93** is recommended the placement of the redundant pair in the first and second slots, but it can be installed in any slots if necessary.

The system has diagnostic for voltage level distributed to racks. It also supports modules with great power consumption in any place on the bus. Nevertheless, is recommended to place those modules close to the power supplies, to avoid unnecessary power transmission.

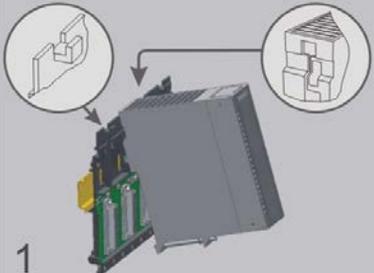
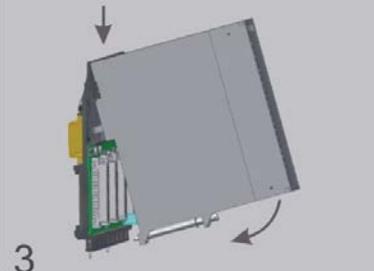
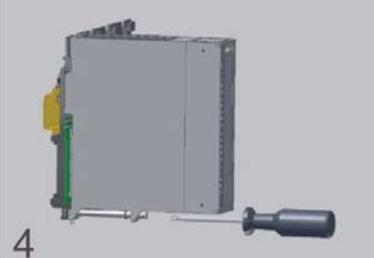
For systems based on R-700-4A rack

1. Observe the maximum current values from the power supply module specification. The limit for **PS-AC-R** is 3 A.
2. After the connection with long cables (**FC-700-1A**, **FC-700-2A**, **FC-700-3A** and/or **FC-700-4A**) you have to put another power supply module in the first slot of the first rack.
3. Use up to 6 modules **M-401-R/M-401-DR** per power supply; always place the **M-401-R/M-401-DR** consecutively and close to the power supply. Because of the high current consumption of the modules **M-401-R/M-401-DR**, a not desired voltage drop in the bus can occur if these modules are placed after other modules.

4. When is necessary to add interface modules, such as **MB700** and **SI-700**, in the same bus which is used by output and input modules, is recommended that these modules are placed close to the power supply, because in the same way as described in the previous item, a not desired voltage drop in the bus can occur if these modules are placed after other modules.
5. Adding a new power supply module
 - Determine the rack where the new power supply will be installed.
 - Cut the jumper **W1** of the rack.
 - Plug the new power supply at the first slot of the rack (slot 0).
 - In this case, the **CH1** jumper of all **PS-AC-R** modules must be set in **E** position.

Installing Modules in the Rack

Follow the steps below to install a module in the rack.

 <p>1</p>	<p>Attach the top of the module (with a 45° inclination) to the module support located on the upper part of the rack.</p>
 <p>2</p>	<p>Mounting detail.</p>
 <p>3</p>	<p>Push the module fixing it to the module connector.</p>
 <p>4</p>	<p>Next, fix the module to the rack using a screwdriver, and fasten the fixation screw at the bottom of the module.</p>

Appendix A

smar	FSR – SERVICE REQUEST FORM	
	LC700 – User's Guide	Proposal N°: _____
COMPANY INFORMATION		
Company: _____		
Unit: _____		
Invoice: _____		
COMMERCIAL CONTACT		
Full Name: _____		
Phone: _____		Fax: _____
E-mail: _____		
TECHNICAL CONTACT		
Full Name: _____		
Phone: _____		Extension: _____
E-mail: _____		
EQUIPMENT DATA		
Model: _____		
Serial Number: _____		
PROCESS DATA		
Process Type (Ex. boiler control): _____		
Operation Time: _____		
Failure Date: _____		
FAILURE DESCRIPTON		
(Please, describe the failure. Can the error be reproduced? Is it repetitive?)		

OBSERVATIONS		

USER INFORMATION		
Company: _____		
Contact: _____		
Section: _____		
Title: _____		Signature: _____
Phone: _____		Extension: _____
E-mail: _____		Date: ____/____/____
For warranty or non-warranty repair, please contact your representative. Further information about address and contacts can be found on www.smar.com/contactus.asp		

