

Model 7100 Series

Hot Swap Redundant External Power Bay



FEATURES

- **700 OR 1400W Output Power**
- **N+1 Redundancy**
- **Diagnostic Indicators**
- **Fail-safe Contact Closure Diagnostic Outputs**
- **Less than 60 Seconds to Replace a Failed Module**
- **True Load Sharing**

DESCRIPTION

These external power bays are available in two configurations, primarily for use with Industrial Computer Source computer chassis and others using external four or five output DC power sources. The computer system chassis has no internal power supply in this configuration but relies on the properly conditioned and regulated +/- 5VDC, +/- 12VDC, and +3.3VDC supplied from this external source. The advantages gained for the user are the use of a single redundant power source to supply multiple computer systems. The built-in diagnostics and indicators with the hot swap capability permits easily changing a failed module in less than one minute. During repair time, no system operation time is lost as the supplies are N+1 redundant and actively share the current load during normal operation. If one module fails, the other modules can handle the entire load until the defective module is replaced.

The power bay can accept either three or five AC power modules. With three modules installed, each with a rating of 350W, system power output is 700W and with five modules installed, system power output is 1400W.

These power sources have been designed to mount into standard EIA 19" equipment cabinets and are provided with roller bearing slides to facilitate easy installation and service. The chassis is 8.75" (3U) high and less than 17.5" deep.

Power Modules

The switching mode power modules are specifically designed for absolute current sharing when operating in parallel. Current sharing is imperative in redundant systems because it requires the smallest step load change if a power supply fails or must be replaced. It also insures that all supplies in the system operate under equal load, providing maximum life.

Multiple Level Diagnostics

To assist in the determination of a failed power module there are several diagnostic circuits incorporated into the system. The very first indication, of course, is the front panel system power indicator which is illuminated when AC Main power is applied to the system. No service should be performed on the system as long as mains power is applied. When the power supply system is turned on, the remaining front panel LED indicators will be illuminated. At the system level there are also indicators for the system cooling fans and the internal system cabinet temperature. Under normal operation these indicators are illuminated green and glow red for a failure or warning indication. The temperature warning indication should be used as a signal that preventive maintenance is required immediately. When the temperature is sensed as above the maximum operating temperature for the power supply modules, the system will shut off. A separate closure for a system fan failure is provided. The fans are provided with an air intake filter in a tray which is easily extracted from the front of the system enclosure for cleaning. The fans themselves may be removed for simple replacement from the side of the system chassis when extracted on its slides.

DESCRIPTION CONT.

There are monitoring circuits to evaluate the output of the system power as well. A separate indicator is provided for each of the five system output voltages. The +5V and +3.3V supplies are monitored to +/- 5% of value, the +12V supply to -6.7% to +10.8% and the other supplies to +/- 10% of nominal value. A green indication is provided for proper operation and a red indication for out of tolerance. A contact closure is provided to indicate the failure of any power output.

The power modules are also monitored individually. Normal operation is indicated by a green LED for each module. In the event of a failure of any output of the module the LED for that module will turn red. LEDs for positions which have no module installed will not illuminate at all. There is a contact closure output that indicates a failed module.

A LED indicator is also provided for each power module fan operation. A failed fan will cause a red indication for that module as well as a contact closure available at the rear of the chassis.

Each module also has its own front panel indication of "power good" which indicates that it has power and the +5VDC output is at its correct minimum level.

All contact closures are "fail-safe", i.e. the normally closed contacts are used as an indication. Under normal operation the contacts are forced open. Even if main power fails, the relays will properly indicate an alarm condition.

An audio alarm is also provided to call local attention to a failure condition. An "Alarm Acknowledge" button is provided on the front panel to silence the alarm. Relay closure outputs, however, will not be reset until the alarm condition is removed and will then automatically clear.

Interface connections to the failed module are automatically electronically disconnected so it will not affect the operating supplies. The system can operate indefinitely in this mode. When the service technician arrives at the system, it is a simple matter to locate the supply which is indicated by the red LED. The hot swap capability permits it to be removed and replaced while the system is still operating and be back in the redundant mode of operation. The statistical probability of a second supply failing, before you replace the first unit, is extremely remote.

Installation and Operation

The power system will be delivered to you ready for installation with the chassis and power modules all in individual packages. It will only be necessary to mount the chassis in your rack, hook up the input and output cables, and slide in the power modules. Turn on the input breakers and your system is in operation.

To use the power bay with a system enclosure requires the ability to turn the DC power on or off at the system box and should include over current conditions within the system in order to shut down and protect the power to other system enclosures.

Industrial Computer Source offers a wide variety of system chassis that accept the DC outputs of the power bay. Each system chassis has circuitry to monitor over current conditions and, in the event of an internal short, or over current condition, will disconnect itself from the power bay.

Costs

As with most advancements in technology, there is a cost associated with the benefits derived by using hot swap plug-in power systems. However, if you are building a critical system which should never be shut down to replace a power supply, the added cost of the hot swap system becomes insignificant. These power modules utilize special connectors which will reliably handle the high currents involved, yet have a very low voltage drop.

The design of the hot swap system makes any required service easy, fast and fool proof.

- No tools required to replace a failed module,
- No special adjustments required,
- No chance for wiring errors,
- All similar supplies are interchangeable,
- Maximum system output may be upgraded from 700W to 1400W by adding two more modules.

Standard Hot Swap Module Features

- Module Power is Disabled Automatically Before Module Can Be Extracted
- Input Indicator Light
- DC-OK Indicator Light
- Individual Module Cooling Fan



SPECIFICATIONS

Dimensions (W x H x D)

Power Shelf
19" x 8.75" x 17.1"
(482.6mm x 222.2mm x 434.3mm)
Modules
3.39" x 5.93" x 7.88"
(86.1 x 150.6 x 200.1mm)

Weight

Power Chassis
39.0 lb
Modules
4.0 lb

INPUT SPECIFICATIONS

AC Input Voltage

104-253VAC, 46-63Hz, Single Phase

Inrush Current

Approximately 120A at 115VAC, 240A at 230VAC RMS

Input Line Current

30A Max at 110VAC, 20A Max at 220VAC

Efficiency

70% at Full Load

OUTPUT SPECIFICATIONS

Output Power

700W with three modules installed
1400W with five modules installed

Output Ratings	700W 3 Modules	1400W 5 Modules
+5VDC	96A	192A
+12VDC	20A	40A
-5VDC	4A	8A
-12VDC	4A	8A
+3.3VDC	20A	40A

For each AMP of 3.3VDC, the +5VDC is derated by 1 AMP not to exceed 40 AMPS Maximum.
Maximum power output in Watts must not be exceeded.

Load Regulation

-5% No Load to Full Load

Ripple and Noise (p - p)

50mV on +/-5VDC and +3.3VDC, 120mV on +/-12VDC

Hold Up Time

All outputs will remain within specification 16.7ms after loss of power

Minimum Load

No minimum load is required on any output. Under no load condition no output will go above the regulation band.

LOGIC AND CONTROL

AC Power Fail Warning

A signal is provided at least 16.7 milliseconds before loss of any output voltage. Output warning is provided through a contact closure and may be referenced as desired.

DC-OK, System

A contact closure is made when any system output drops below monitored limit

DC-OK, Modules

A contact closure is made for any module whose DC-OK signal has gone down.

PROTECTION

Over Voltage Protection

If the +5VDC Output Exceeds 6.2VDC, All Outputs Will Be Latched Off

Thermal Shutdown

Front panel indicators are provided for fan status and temperature status. Normally green, the LED's will turn red on fan failure or over temperature warning status.
The supply will shut down if the internal temperature reaches an unsafe operating level. The system can be restarted manually after the over-temp condition is cleared by cycling the power on/off for a minimum of 2 seconds.

Reverse Polarity

Outputs are protected against reverse voltage up to their maximum current rating.

ENVIRONMENTAL

Operating Temperature

0°C to 50°C, 5 to 95% R.H.N.C.

Storage Temperature

-40°C to +70°C, 5 to 95%

MTBF

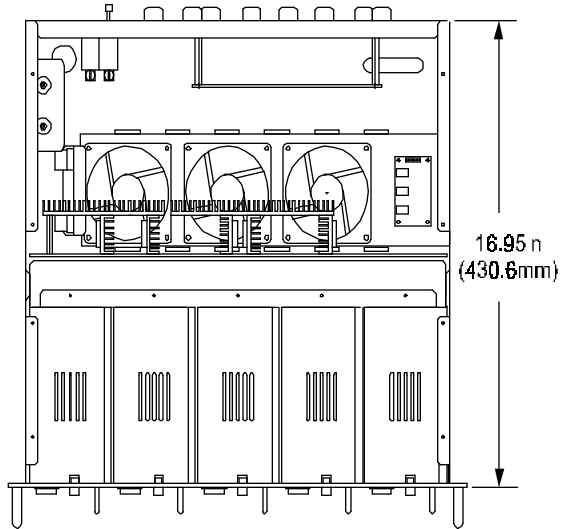
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Chassis Series with Termination Connections

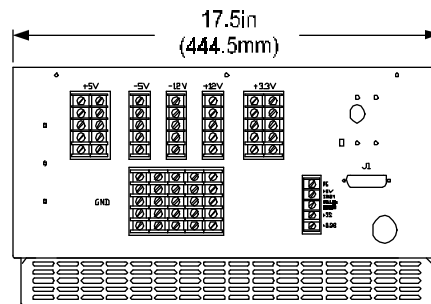
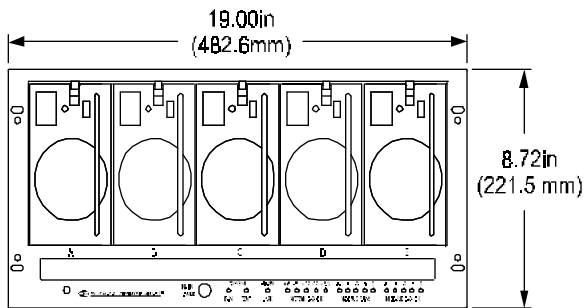
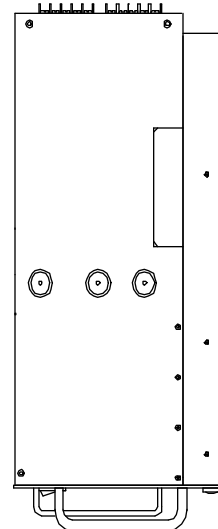
7700, 7520, 7400, 7300

DIMENSIONAL DRAWINGS

**Model 7100 Top Side
With Cover Removed**



Model 7100 Side View



Model 7100 Front View

Model 7100 Rear View

ORDERING GUIDE

Model 7100-3

700W, three module power bay

Model 7100-5

1400W, five module power bay

Model 7100-A

Power module, spare

POWER CONNECTION CABLES

Model 7100-P1

Cable, 6', Power Bundle. Attaches Power Supply to Computer Chassis



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