



## RS0400-Series Front-End Power Supplies: 85 Vac to 264 Vac Input; 48 Vdc to 56 Vdc Output; 400 W

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### Features

- Universal ac input
- Power-factor correction (meets IEC1000-3-2 requirements)
- Overvoltage and overcurrent protection
- Overtemperature protection
- *UL*\* Recognized; *CSA*† Certified, VDE Licensed
- CE mark meets 73/23/EEC and 93/68/EEC directives‡
- Redundant parallel operation
- Remote on/off
- Active load sharing
- Remote sense
- Hot insertion/removal (hot plug)
- Power fail warning
- External voltage control margining
- Front panel LED indicators

### Applications

- Advanced workstations
- Midrange computers
- File servers
- LAN/WAN applications
- RAID storage equipment
- Telecommunications equipment
- Asynchronous transfer mode equipment

### Description

The RS0400-Series front-end power supplies are specifically designed to operate as an integral part of a complete distributed power system, with or without battery backup. A full complement of alarm and shutdown features have been incorporated into the power supply to protect the system in the event of a fault condition. The feature set makes this front-end power supply an excellent choice for applications requiring modular ac-to-dc bulk intermediate voltages, such as distributed power and dc UPS.

\* *UL* is a registered trademark of Underwriters Laboratories, Inc.

† *CSA* is a registered trademark of Canadian Standards Association.

‡ This product is intended for integration into end-use equipment. All the required procedures for CE marking of end-use equipment should be followed. (The CE mark is placed on selected products.)

## Electrical Specifications

### Input Specifications

**Table 1. Input Specifications**

Parameter	Min	Typ	Max	Unit	Note
Input Voltage	85	—	264	Vac	—
Input Frequency	47	—	63	Hz	—
Input Overcurrent Protection	—	—	—	—	Protection provided by internal fuse. (In compliance with safety agency requirements.)
Inrush Current (peak)	—	—	50	A	Inrush of FEU at 264 Vac.
Power Factor	—	0.99*	—	—	≥50% of full load.
Line Harmonics	—	—	—	—	IEC1000-3-2 with nine units in parallel.
Input Leakage Current	—	—	0.65	mA	255 Vac, 60 Hz.
Lightning Surge and Transients (error-free operation)	—	—	—	—	1) IEC1000-4-5 Level 4. 2) IEC1000-4-4 Level 3.
Hold Over Time	20	—	—	ms	V <sub>OUT</sub> must remain above 47 Vdc.
EMC (conducted and radiated)	—	—	—	—	CISPR 22 Class B with 6 dB of margin (at nominal line voltage).

\* At full load.

### Line Harmonics

Active power factor correction circuitry ensures that this power supply meets the requirements of IEC-1000-3-2 with up to two power supplies connected in parallel and operating at full load.

**Table 2. Efficiency and Power Factor vs. Input Voltage at Full Load**

Input Voltage	Efficiency (typical)	Power Factor (typical)
85 Vac	82%	0.99
100 Vac	83%	0.99
120 Vac	84%	0.99
170 Vac	85%	0.99
220 Vac	85%	0.99
240 Vac	86%	0.98
264 Vac	86%	0.97

Notes:  
When using this table to calculate line cord requirements, allow, at a minimum, an extra 3% for variations between units. Actual measured results will depend upon the harmonic content of the input voltage waveform.

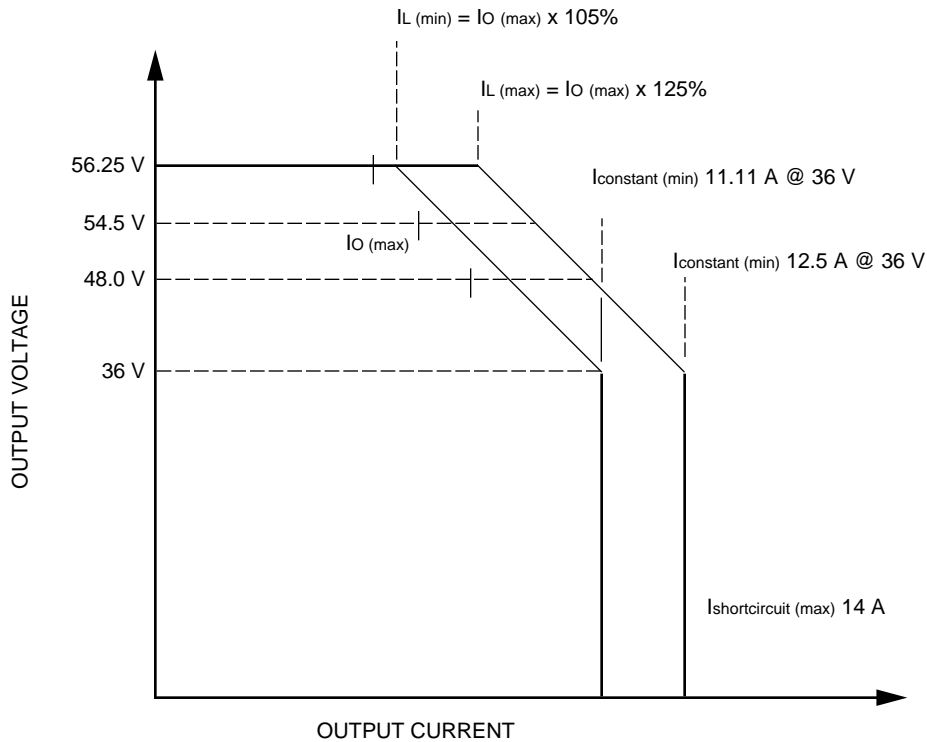
**Electrical Specifications** (continued)

**Output Specifications**

**Table 3. Output Specifications**

Parameter	Min	Typ	Max	Unit	Note
Vo Set Point: RS400A RS400H RS400L	— — —	48.0 54.5 56.25	— — —	Vdc Vdc Vdc	Frame GND strappable to either output terminal.
Regulation (line, load, temperature, and set point)	-2	—	2	%	Measured at remote sense. If not used, +R_ADJ pin must be connected to Vs (-).
Remote-sense Drop	—	—	1.0	Vdc	In both positive and negative leads.
Io (rated): RS400A RS400H RS400L	0 0 0	— — —	8.33 7.33 7.11	Adc Adc Adc	400 W maximum. 400 W maximum. 400 W maximum.
Ripple and Noise (50 MHz bandwidth)	—	—	500	mVp-p	Under any load condition.
Output Rise Time	25	—	100	ms	Rise from 10% to 90% of final output level.
Overvoltage Protection	58	—	59.9	Vdc	Selective latched high-voltage shutdown when ORing diode present. Reset by cycling ac input, pressing RESET, or reinsertion.
Iconstant (max)	11.11	—	14.0	Adc	—
Transient Response	—	—	1.1	Vdc	25% step at 25% to 75% nom load. 100% step, no overvoltage shutdown will occur.
Active Current Sharing Differential	—	—	2	A	Between master and slaves.
Efficiency	—	83 86	— —	% %	At full load, 100 Vac, with ORing diode. At full load, 264 Vac, with ORing diode.
Reverse Output Current Protection	—	—	—	—	ORing diode.
Turn On Delay	—	—	2	Sec	Measured from application of valid ac voltage.

**Electrical Specifications** (continued)



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**Figure 1. RS0400-Series Output Voltage and Current (Steady State)**

The power unit will operate in the constant voltage mode until the load current exceeds  $I_{L(\min)}$ , which is 105% of  $I_{O(\max)}$ . As the load current exceeds  $I_{L(\min)}$ , the power supply begins to operate in the constant power mode. The output voltage will decrease as the output current increases. This mode will continue until the output voltage drops below 36 Vdc, when the power supply enters the constant current mode. The output voltage will continue to decrease, but the current will be limited to  $I_{\text{constant}}$ . The maximum steady-state short-circuit current that can be drawn from the power supply is  $I_{\text{shortcircuit}}$ .

## Environmental Characteristics

Table 4. Environmental Characteristics

Parameter	Min	Typ	Max	Unit	Note
Storage Temperature	-40	—	85	°C	—
Operating Temperature (air inlet to power unit)	0	—	50	°C	Airflow front to back with 3" clearance for exhaust air in unpressurized enclosure.
Acoustics	—	—	55	dBA	Sound pressure level at 1 m.
Humidity (noncondensing)	5	—	95	%	—
Altitude	-200	—	13,000	ft.	Derate at 2 °C/1000 ft. above 8000 ft.
Shock and Vibration	—	—	—	—	Lucent L-533809.
ESD	—	—	—	—	IEC1000-4-2 Level 4 stand-alone.
Electromagnetic Immunity (error-free)	—	—	—	—	IEC000-4-3 Level 2 stand-alone.
Reliability	1.5 x 10 <sup>5</sup>	—	TBD	FITS hours	At 40 °C, 200 Vac, 400 W. Per TR-EOP-000332. MTBF per RIN.

## Physical Specifications

Table 5. Physical Specifications

Parameter	Min	Typ	Max	Unit	Note
Length	—	11.0	—	inches	—
Width	—	2.6	—	inches	Chasis
	—	3.42	—	inches	Face plate
Height	—	4.9	—	inches	Chasis
	—	5.20	—	inches	Face plate

## Warranty Information

When used within specified operating conditions, Lucent Technologies Microelectronics Group will warrant that this product will conform to published specifications and are free of material and workmanship defects for the period of three (3) years from date of manufacture. This warranty applies only to units having the date code of warranty period or less when returned to Lucent Technologies for repair. Lucent's liability will be limited to the repair or replacement, at our option, of the returned unit. Our warranty does not extend to any unit which has been subjected to abuse, misuse, or neglect or to units that have been repaired or altered by anyone other than Lucent Technologies or authorized agent.

## Physical Descriptions

### Definition of Terms

#### Power-Factor Correction

All RS-Series power supplies comply with the specifications set forth in IEC1000-3-2.

#### Input Overcurrent Protection

An internal fuse is provided for input protection in compliance with safety agency requirements.

#### Overcurrent Protection

In the event of an overload condition, the power supply limits the output current. See Figure 1 for details.

#### Overvoltage Protection

The power unit turns itself off before the output voltage reaches a specified threshold.

#### Overtemperature Protection

In the event of an overtemperature condition, the power unit protects itself by shutting down. The unit will automatically restart after it cools down.

#### ORing Diode

A diode at the output of the power unit protects the dc bus during a power supply failure or hot plugging of the power unit.

#### Remote On/Off (Inhibit)

This is an input signal referenced to the negative output. Shorting this signal to the negative output causes the output of the power unit to turn off.

#### Voltage Margining

This is an analog input signal. Adjust the voltage level of this signal to vary the output voltage of the power unit.

#### Load Share

A single-wire interface between each of the power units forces them to share the load current equally.

#### Remote Sense

These signals permit the power units to compensate for a voltage drop across the output distribution.

#### Front Panel LEDs

*AC Present* (yellow)  
*DC OK* (green).

#### Status Signals

The following are the optically isolated open-collector signals:

*DC OK*: The output voltage is greater than 45 Vdc.  
*Power Fail Warning*: The output of the power unit will be less than 47 Vdc in 5 ms.

## Front-End Power Supply Interfaces

### Input Voltages

The product can be used with any standard global line voltages; consult the factory for any particular regional application concerns.

### Input Connector

The ac input connection is through an IEC320 type connector system rated 10 A/250 Vac in Europe/Asia and 15 A/120 Vac in North America.

### Grounding

Frame ground can be connected so that the output may be floating, have a positive ground, or have a negative ground.

### Output Connector

The output connector is a Molex Series A44499-0020, 18-pin connector. The pins are assigned as shown in Table 6. The mating connector is a Molex Series A42385.

### Output Pin Connections

**Table 6. Output Connector (J400) Pin Assignment—View into Rear of Power Unit**

Pin 18	Pin 17	Pin 16	Pin 15	Pin 14	Pin 13	Pin 12	Pin 11	Pin 10
-VOUT	-VOUT	FIRST_BREAK	MM-	MM+	V <sub>s</sub> (+)	$\overline{\text{INHIBIT}}$	R_ADJ(+)	$\overline{\text{OTW}}$
+VOUT	+VOUT	NC	EGND	I_SHARE	DC_ $\overline{\text{OK}}$	PFW	V <sub>s</sub> (-)	ALARM_RTN
<b>Pin 9</b>	<b>Pin 8</b>	<b>Pin 7</b>	<b>Pin 6</b>	<b>Pin 5</b>	<b>Pin 4</b>	<b>Pin 3</b>	<b>Pin 2</b>	<b>Pin 1</b>

Notes:

Pin 16 (FIRST\_BREAK) has to be connected to pin 17 and/or pin 18 (-VOUT), if the rectifier is not used with PS1200 or PS2000 shelf.

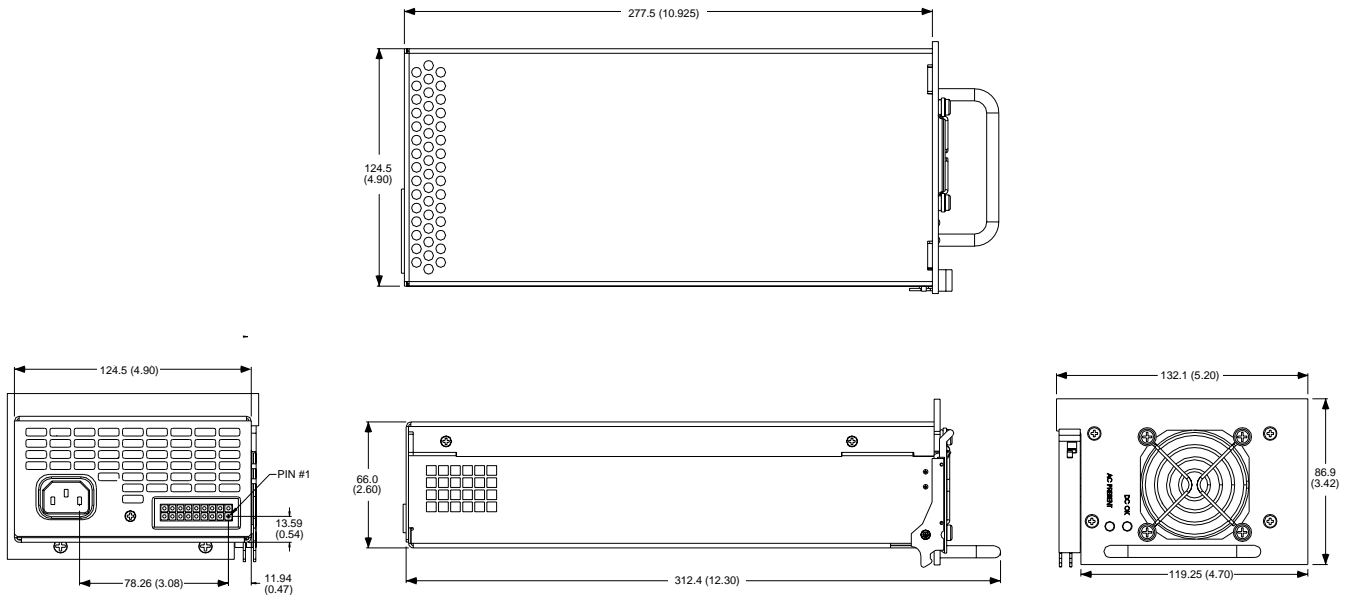
When Pin 11 (R\_ADJ(+)) pin is not used, it should be connected to Pin 2 (V<sub>s</sub> (-)), if the rectifier is not used with PS1200 or PS2000 shelf.

An overbar denotes active-low signals.

Pin 7 is reserved for factory use; no connection can be made here.

## Outline Drawing

Dimensions are in millimeters and (inches).



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## Ordering Information

**RS0400 \_ A-xxx**

Output Voltage

A—48.0  
H—54.5  
L—56.25

Factory Assigned

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