

MRE2400 SERIES

2400W TELECOM RECTIFIERS



Output

- 44A, 48V/54V
- 88A, 24V/27V

Features

- 91% efficiency including series output diode
- High power density 320mW/cm³, 5.28W/in³
- Power Factor Corrected to EN61000-3-2
- Thermally managed power limit
- Comprehensive alarm signal packages
- Compatible with μ P control systems
- -40°C to +55°C operation
- International safety approvals
- Hot-pluggable capability

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The new MRE2400 Series rectifiers from Advance Power offer the latest in high power density technology for critical fault tolerant applications. The hot-pluggable MRE2400 delivers 2400 watts of output power in an external forced air flow environment. The rectifier's thermal management system automatically limits output power as external forced air flow is reduced. Input current harmonic distortion is minimized by the rectifier's active input power factor correction.

Five MRE2400 rectifiers can be inserted into a 6U high 19" **powerdeck**[®] chassis to produce a maximum current of 220A for 48V systems.

Applications

- PSTN, central office
- Network datacom
- Distributed power systems
- N+1 redundant power systems
- Mobile base stations
- PABX

Systems & Power Shelves

powerdeck[®] 2400 - is a "rack-ready" pre-wired 19" x 6U modular power shelf housing up to five hot-pluggable rectifiers.

Power Systems - Available in cabinets and relay frames configured using **powerdeck**[®] 2400 and other rack mounting modules such as distribution, fuse panels and system controllers.



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Input Specifications

		Minimum	Typical	Maximum
Voltage Range, V_{IN}	Single phase TN-S (as defined by IEC 364)	176Vac	230Vac	264Vac
Frequency		45Hz		66Hz
R.M.S. Current	Maximum power output 230Vac input 176Vac input			12.9A 15.8V
Peak Inrush Current	264Vac input 230Vac input		13.0A	19.5A
Power	2400W output power Maximum load (current limit)		2,740W	2,962W
Apparent Power Factor		98%	99%	
Efficiency	$V_{IN}=230Vac$, $P_{OUT}=2400W$ Includes integral series output diode	54V 27V	90% 88%	91% 89%
Harmonic Distortion	Units comply with the requirements of EN61000-3-2		3%	10%thd
Turn On Voltage		165Vac	172Vac	176Vac
Turn Off Voltage		145Vac	152Vac	156Vac
Input Fuse	Internally fitted fuse rated at 20AT 250V			

54V Output Specifications (For Additional Data, See General Output Specifications, p.4)

		Minimum	Typical	Maximum
Nominal Voltage, V_{OUT}		54.8V	54.9V	55.0V
Adjustment Range	Front panel potentiometer default range is 52V to 58V Range can be offset to 47.8V to 53.8V using DIL switch #3 See figures 10 & 12 (p.11)	47.8V		58.0V
Maximum terminal voltage				59.0V
Current, I_{MAX} Continuous	<55°C ambient. $V_{OUT}=54.9V$, $V_{IN}>198Vac$, 1 m/s airflow	44.0A		
Current Limit	Rectifier automatically reduces its current limit set point with changes in airflow, ambient temperature, input voltage and output voltage. Current limit characteristics are shown in figures 1 and 2, (p.3). A selection of output currents available under various operating conditions is shown in table 1, (p.3)			
Output Short Circuit	See figures 1 and 2, (p.3)			
Power, P_{MAX} Continuous	$V_{IN}>198Vac$, 1 m/s airflow			2,400W
Load Regulation	Load change from 0 to I_{MAX}			60mV
Line Regulation	Input voltage change over the operating range			20mV

54V Output Specifications *Continued*

		Minimum	Typical	Maximum
Combined Regulation	A combination of load change from 0 to 100% and input voltage variation over the operating range			100mV
Dynamic Regulation Maximum Deviation	A step change in output current from 10% to 90% of full load			±1V
Recovery	To within 500mV of final value			2ms
Hold up time	V _{OUT} 54.9V dropped to 54.6V, 220Vac input, 44A output V _{OUT} 54.9V dropped to 40V, 220Vac input, 44A output		12ms 32ms	
Output Overvoltage		59.0V		59.9V
Parallel Voltage	Maximum allowable voltage applied to output terminals			80V

54V Output Current Limit Characteristics

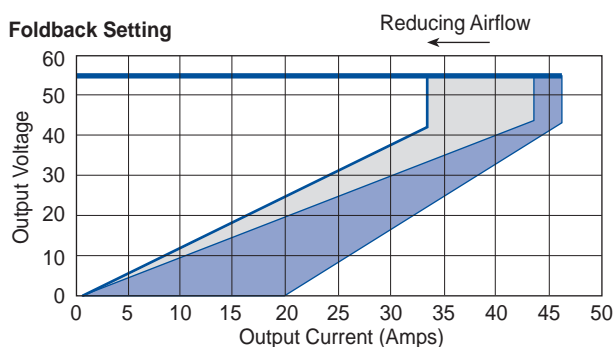


Figure 1

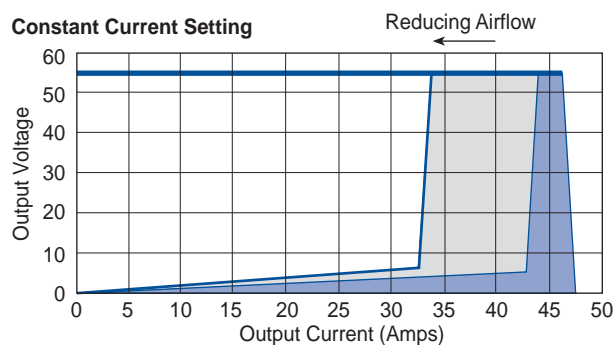


Figure 2

(Table 1)

Operating Conditions

Airflow	Ambient Temperature	V _{IN}	V _{OUT}	Minimum	Typical	Maximum
1m/s	55	198	54.9	44.0A		46.6A
1m/s	55	176	54.9	38.5A		42.5A
1m/s	55	198	59.0	39.0A		43.2A
1m/s	55	176	59.0	35.3A		39.3A
0m/s	45	198	54.9	33.5A		35.6A
0m/s	55	198	54.9	29.2A		32.3A
0m/s	45	176	54.9	30.2A		33.4A
0m/s	55	176	54.9	27.1A		29.9A
0m/s	45	198	59.0	30.5A		33.7A
0m/s	55	198	59.0	27.4A		30.2A
0m/s	45	176	59.0	28.2A		31.2A
0m/s	55	176	59.0	25.5A		28.2A

- Notes:** (1) The available current will vary between the limits defined above for intermediate airflows.
 (2) Higher operating ambient temperatures are possible given greater than indicated airflow. Please contact Advance to discuss your requirement.

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General Output Specifications 54V & 27V

		Minimum	Typical	Maximum
Remote Sense	Total lead voltage drop			1V
Start up time	From application of line input to output voltage achieving regulation			3.3s
Rise Time	Time for V_{OUT} to rise monotonically to its full value		100ms	
Reverse Quiescent Current	Source = V_{OUT} connected to output of non energized unit			5mA
Temperature Coefficient	Temperature range -25°C to +55°C		±0.015%/°C	
Noise, Low Frequency	Frequency range 10Hz -100kHz			40mV p-p
Noise, Broadband	Frequency range 10Hz - 100MHz Individual harmonics Complies with requirements of ETS300386-2-3 and BTNR2511			25mV rms 4mV peak
Noise, Psophometric	Weighted to C.C.I.T.T. No. 1 C message weighted			2mV rms 38dBmC
Series Output Diode	Units are fitted with a series diode in the positive output			
Series Voltage	Units connected in series			150V

27V Output Specifications (For Additional Data, See General Output Specifications, Above)

		Minimum	Typical	Maximum
Nominal Voltage, V_{OUT}		27.3V	27.4V	27.5V
Adjustment Range	Front panel potentiometer default range is 26V to 29V Range can be offset to 23.9V to 26.9V using DIL switch #3 See figures 10 & 12 (p.11)	23.9V		29.0V
Maximum Terminal Voltage				29.5V
Current, I_{MAX} Continuous	<55°C ambient. $V_{OUT}=27.4V$, $V_{IN}>198Vac$, 1 m/s airflow	88.0A		
Current Limit	Rectifier automatically reduces its current limit set point with changes in airflow, ambient temperature, input voltage and output voltage. Current limit characteristics are shown in figures 3 and 4 (p.5). A selection of output currents available under various operating conditions is shown in table 2, (p.5)			
Output Short Circuit	See figures 3 and 4, (p.5)			
Power, P_{MAX} Continuous	$V_{IN}>198Vac$, 1 m/s airflow			2,400W
Load Regulation	Load change from 0 to I_{MAX}			40mV
Line Regulation	Input voltage change over the operating range			20mV

27V Output Specifications *Continued*

		Minimum	Typical	Maximum
Combined Regulation	A combination of load change from 0 to 100% and input voltage variation over the operating range			50mV
Dynamic Regulation Maximum Deviation	A step change in output current from 10% to 90% of full load			±500mV
Recovery	To within 250mV of final value			2ms
Hold up time	V _{OUT} 27.4V dropped to 27.1V, 220Vac input, 88A output V _{OUT} 27.4V dropped to 20V, 220Vac input, 88A output		9ms 28ms	
Output Overvoltage		31V		32V
Parallel Voltage	Maximum allowable voltage applied to output terminals			35V

27V Output Current Limit Characteristics

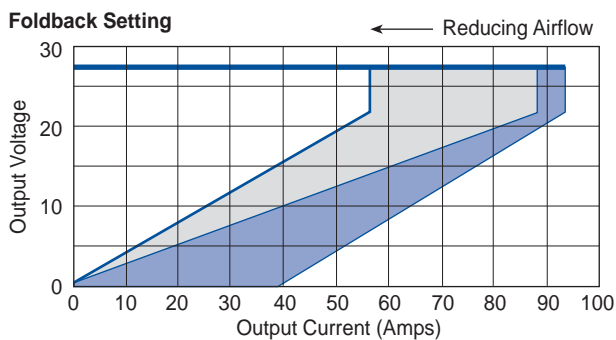


Figure 3

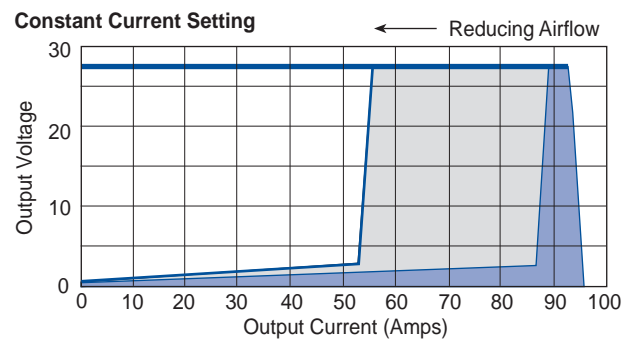


Figure 4

(Table 2)

Operating Conditions

Airflow	Ambient Temperature	V _{IN}	V _{OUT}	Minimum	Typical	Maximum
1m/s	55	198	27.4	88.0A		93.1A
1m/s	55	176	27.4	77.0A		85.0A
1m/s	55	198	29.5	78.1A		86.3A
1m/s	55	176	29.5	70.5A		78.1A
0m/s	45	198	27.4	56.0A		59.3A
0m/s	55	198	27.4	48.2A		53.2A
0m/s	45	176	27.4	50.9A		56.3A
0m/s	55	176	27.4	45.2A		50.0A
0m/s	45	198	29.5	51.4A		56.8A
0m/s	55	198	29.5	45.8A		50.4A
0m/s	45	176	29.5	48.1A		53.2A
0m/s	55	176	29.5	43.0A		47.5A

Notes: (1) The available current will vary between the limits defined above for intermediate airflows.

(2) Higher operating ambient temperatures are possible given greater than indicated airflow. Please contact Advance to discuss your requirement.

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Basic Signals *(Available on all Versions. See Pinout Information p.10)*

			Minimum	Typical	Maximum
Post Mate Enable (Input)	Connect to (-) sense to enable the unit	Start-up delay			2s
Note: Connection must be made to operate unit					
Current Share	Accuracy $I_{OUT} = I_{MAX}$				±10%
Voltage Trim, See Figures 5 and 6	Scale factor	54V 27V		-1.56V/V -0.7V/V	
	Offset	Trim port open circuit		5.1V	
	Current	$V_{TRIM} = 2V$		-94µA	
	Referenced to (-) sense	$V_{TRIM} = 7V$		94µA	
	Margin Low	Reduction in V_{OUT} with margin low pin connected to (+) sense		2.2V	2.25V
	Factory adjustment range		0V		5V
Current Monitor	Monitor output (unloaded). Referenced to (-) sense		97mV/A	100mV/A	103mV/A
	Output impedance			5.1kΩ	
Output Healthy Relay and GREEN LED	Minimum 'healthy' voltage to energize relay and LED	54V 27V	38V 19V	40V 20V	43V 22V
	Contact voltage rating			50V	
	Break current rating			1A	

Output Voltage Programming

54V Output - MRE24H54

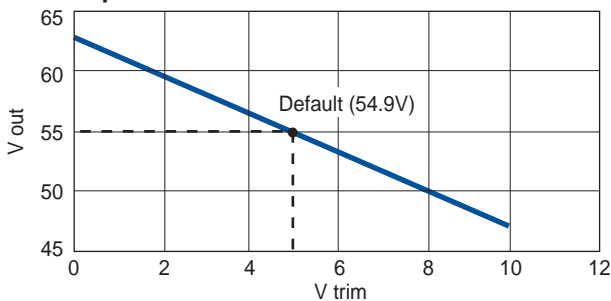


Figure 5

27V Output - MRE24H27

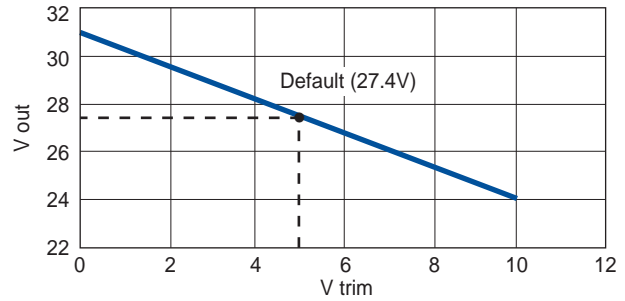


Figure 6

Enhanced Signals *(Available on MRE24HXXB Versions Only. See Pinout Information p.10)*

			Minimum	Typical	Maximum
Program Down (Input)	5V applied to program pin with respect to opto common	54V 27V	45.6V 22.8V	45.8V 22.9V	46.0V 23.0V
Remote On/Off (Input)	Voltage applied to remote on/off pins	Voltage to inhibit		5V	
		Current to inhibit		10mA	
Auxiliary Output	Referenced to opto common	Voltage		10V	
		Current		50mA	
		Protected against current and thermal overload			
Current Limit Programming See Figures 7 and 8, (p.7)	I_{OUT} limit, connect resistance between pin b8 and pin b6				

Current Limit Programming

54V Output - MRE24H54

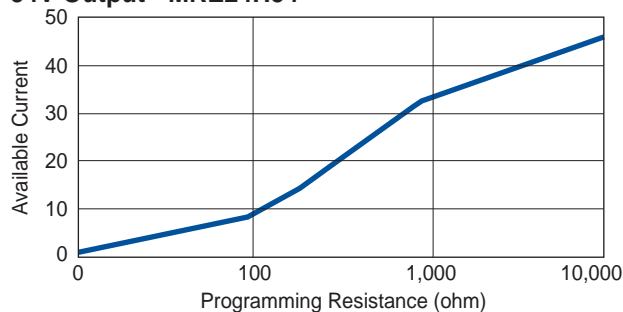


Figure 7

27V Output - MRE24H27

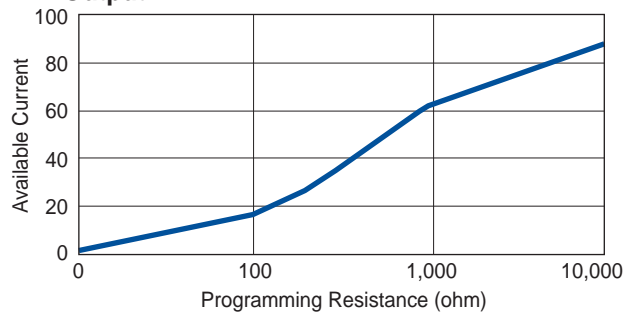


Figure 8

Enhanced Signals (Available on MRE24HXXB Versions Only. See Pinout Information p.10)

		Minimum	Typical	Maximum
Open Collector Opto-Coupled Signals	Opto activates (Output voltage LOW)			0.8V
	Opto resets (Output voltage HIGH)	2.5V		
	V _{CE} withstand	50.0V		
	Sink current (Output voltage LOW)			5mA
	Opto signals referenced to optos common			
Opto characteristics common to all of the following signals:				
Standby Signal and YELLOW LED	Remote off activates opto and LED			
Input Healthy Signal and YELLOW LED	Input voltage rising activates opto and LED	165V	172V	176V
	Input voltage falling resets opto and LED	145V	152V	156V
Output Healthy Signal and GREEN LED	Output voltage above limits, but below overvoltage trip activates opto and LED	54V	38V	43V
		27V	19V	22V
Current Limit Signal and RED LED	Output current demand >I _{MAX} activates opto and LED	See output specification		
Overvoltage Trip Signal and RED LED	Output voltage rising activates opto and LED	54V	59.0V	59.9V
		27V	31.0V	32.0V
	Reset line input is interrupted or extended inhibit is applied			
Output Current Healthy and GREEN LED	Output current demand >15% I _{MAX} activates opto and LED	54V	2.3A	4.3A
		27V	4.6A	8.6A
Thermal Control Signal and YELLOW LED	Thermal control of power limit activates opto and LED			
Over Temperature Signal and RED LED	Exceeding internal sensor's upper limit activates opto and LED		110°C	
	Reset occurs once sensor falls below lower limit		90°C	

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Approvals & Safety Standards

EN60950	CE marked to the EC low voltage directive
UL1950	CSA NRTL/C approved, file number LR58666-84C
C22.2 #950	CSA NRTL/C approved, file number LR58666-84C

The output of these power supplies is reliably SELV.

This power supply is designed for incorporation within an enclosure. For user safety, the enclosure must protect the user against accidental contact with any electrical hazard, cooling fans etc., associated with the power supply.

Electromagnetic Compatibility

Emission	Compliant with EN50081-1(92) with compliance to the following specific conditions: Conducted 0 – 2kHz EN61000-3-2 Conducted 0.15 – 30MHz EN55022-B Radiated 0.03 – 1GHz EN55022-B at 10m
Immunity	Compliant with EN50082-1(92) with compliance to the following specific conditions: ESD EN61000-4-2 failure criteria A. 4kV contact. RF Field EN61000-4-3. 3V _m -1 80% amplitude modulation 0.08 – 1GHz. Fast Transients EN61000-4-4 failure criteria B. 1kV on ac line, 500V on dc lines. Surge EN61000-4-5. 2kV line to earth, 1kV line to line on ac input. 500V line to earth and line to line on dc output. Conducted RF EN61000-4-6. 3V _{rms} 80% amplitude modulation 0.15 – 80MHz

Isolation

		Minimum	Typical	Maximum
Primary to Earth	Test voltage	1500Vac		
Secondary to Earth	Test voltage	500Vac		
Primary to Secondary	Test voltage	3000Vac		
Earth Leakage Current	240V, 60Hz input			3.5mA
Output to Earth Voltage	Working voltage			150Vdc
Signal to Earth Voltage	Working voltage			150Vdc
Signal to Output Voltage	Working voltage			150Vdc

Environmental Specifications

		Minimum	Typical	Maximum
Ambient Temperature	Operational (See tables 1 and 2 for details)	-25°C		+55°C
	Starting	-40°C		+55°C
	Non-operation	-40°C		+85°C
Humidity	Non-condensing			
		Operational		85% RH
		Non-Operational		95% RH
Altitude	Operational	0m		3,000m
		0ft		10,000 ft
	Non-Operational	0m		10,000m
		0ft		30,000 ft
Vibration	Compliant with the requirements of BS2011 Test Fc			
	Drop and topple			
	EN60068-2-31 Test Ec			
	Bump			
	EN60068-2-47 Test Eb			
	Transportation			
	BS2011 Part 2.1 Test Fc in original packing			
	Drop			
	EN60068-2-32 Test Ed in original packing			
Pollution	EN60950 degree 2 i.e. office type environments			

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Mechanical Specifications

External Dimensions	W x H x D = 80 x 245 x 379.4mm, 3.15 x 9.65 x 14.96 in.
Front Panel Dimensions	86 x 266mm, 3.39 x 10.47 in.
Weight	5.5kg, 12.1lb.
Fixings	Units are designed for rack mounting with fixing hole in the front panel
Mounting Orientation	Unit is designed to mount in a rack with the front panel vertical and the front panel text upright
Ventilation and Cooling	Free air flow through the ventilation slots in the top and bottom of the unit is required, forced air must be 1 m/s minimum vertically through unit for full output power
Finish	Front panel is finished in grey with blue legend and the body is finished in gold coloured chemical etch
Connectors	See Figure 11, (p.11)

Signals Pinout Information

Pin	Function	Pin	Function
a1	Reserved	b1	Reserved
a2	Reserved	b2	Reserved
a3	Post mate enable	b3	Reserved
a4	Standby opto*	b4	Reserved
a5	Program down*	b5	Reserved
a6	Auxiliary output*	b6	Current limit program*
a7	Reserved	b7	Output current healthy opto*
a8	Over temperature opto*	b8	(-) sense
a9	Thermal control opto*	b9	Voltage trim
a10	Relay normally closed contact	b10	Over voltage opto*
a11	Relay common	b11	Current limit opto*
a12	Relay normally open contact	b12	Output healthy opto*
a13	Current share	b13	Input healthy opto*
a14	Remote on/off (com)*	b14	Optos common*
a15	Remote on/off (+ve)*	b15	Current monitor
a16	Margin low	b16	(+) sense

* Only available on "B" version units.

Reserved: These pins are reserved for future options or internal use.

Note:

The unit requires a link between pin a3 (post mate enable) and pin b8 (negative sense) to operate.

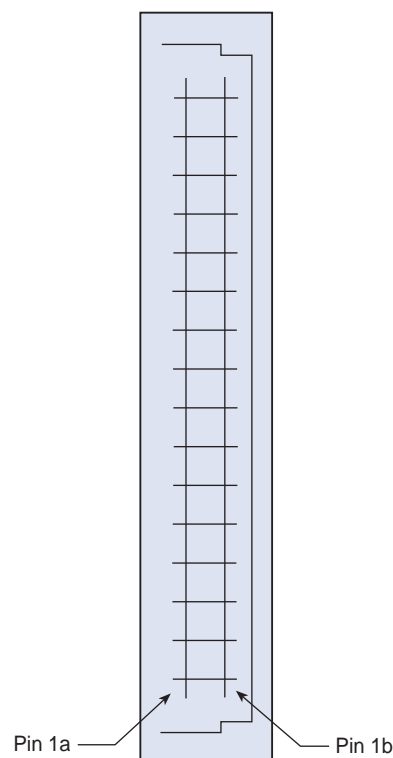


Figure 9

Dimensions Units in mm (inches)

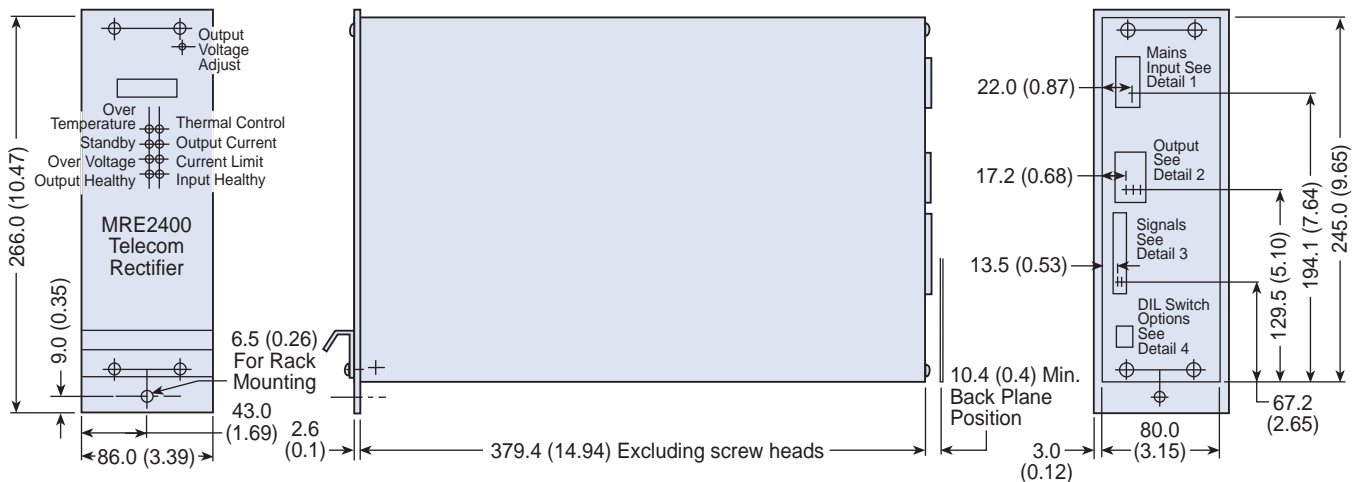


Figure 10

Connector Details (Hot Pluggable Connections)

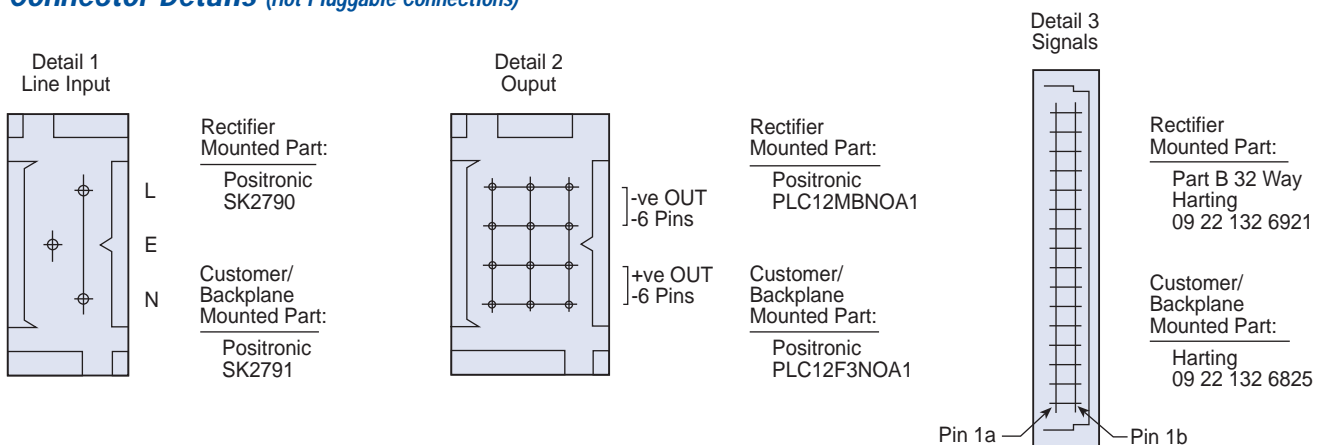


Figure 11

Rectifier Operating Mode Switches

Mode setting switches are accessed through the rear (connector) face of the rectifier.

Switch Number	Switch Set OFF	Switch Set ON	Standard Setting
1	(+) Sense remote	(+) Sense local	ON
2	(-) Sense remote	(-) Sense local	ON
3	Output set 54.9V/27.4V	Reduce output by at least 4.2V/2.1V To offset output voltage adjust range	OFF
5	Constant current limit	Foldback current limit	ON

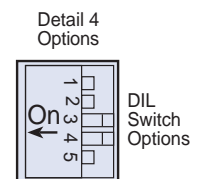


Figure 12

MRE2400 SERIES

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Ordering Information

Part Number	Output Voltage		Alarms	Current Limit	Voltage Sensing
	(Default Setting)	(Margin Low Pin Connected)			
1MRE24H54A	54.9V	52.65V	Basic	Foldback	Local
1MRE24H54B	54.9V	52.65V	Enhanced	Foldback	Local
1MRE24H27A	27.4V	25.15V	Basic	Foldback	Local
1MRE24H27B	27.4V	25.15V	Enhanced	Foldback	Local

Use the space below to specify your requirements and fax to your local sales office.

Options	23.9 to 29.0 or 47.8 to 58.0	Up to 5V less than Output V	Basic or Enhanced	Foldback or Constant	Local or Remote
Example	53.5V	52.0V	Enhanced	Constant	Remote

Special signals and other requirements

Accessory Table

Part Number	Product
1MKC2401	Connector kit consisting of input, output and signals connectors
1MS24A	powerdeck® 2400, 19" x 6U mounting shelf to accommodate up to 5 rectifiers
1MFT01	19" x 1U fan tray to provide vertical forced air cooling to complement powerdeck® 2400

Consult Advance sales for other product accessories

Warranty

All Advance Power products are under warranty against faulty manufacture and faulty components for a period of twelve months from the date of delivery. Please refer to conditions of sale for full details.

We reserve the right to amend specifications without prior notification.

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Other Products

Power Supplies

- AC-DC multi output
- AC-DC single output
- DC-DC converters

Telecommunications Power

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- Rectifiers
- Sub-systems
- Complete systems

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- Product development
- Accessories

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