



HFE1600 Series

1600W 1U Hot Swap Front End
Power Supplies

- 25.2W/in³ power density
- Internal ORing MOSFET & Current Share
- Climate Savers Computing efficiency standards
- Up to 8000W in 1U rack
- Status monitoring signals
- PMBus option



Key Market Segments & Applications

Power for Distributed Power Architecture
Industrial Automation

HFE1600 Features and Benefits

Features

- 1U high
- Internal ORing MOSFET & Current Share
- Status monitoring signals

Benefits

- Utilizes less system space
- Suitable for N+1 redundancy
- Easier system monitoring including PMBus

Specifications

ITEMS		MODELS	
Input Voltage Range	(2)	VAC	85 - 265VAC, 47 - 63Hz. See model selector for power derating
Input Current (Max) 100/230VAC		A	12.4 / 8.1A
Inrush Current		A	<35A
Power Factor Correction		-	Meets EN61000-3-2, PF > 0.98 at full load
Temperature Coefficient		%/°C	<0.02%/°C
Overcurrent Protection		%	105 - 120%. Programmable by external voltage (0-5V)
Overvoltage Protection	(1)	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off
Overtemperature Protection	(1)	-	Shutdown with automatic restart. Warning signal provided
Hold up time		ms	>10ms, 100/230VAC Input, 80% loading
Leakage Current		mA	< 0.75 / 1.5mA 100/230VAC, 60Hz
Remote Sense Compensation		-	HFE1600-12: 0.25V/wire, HFE1600-24: 0.5V/wire, HFE1600-32: 0.75V/wire, HFE1600-48: 1V/wire
Indicators		-	AC OK: Green LED, DC OK / Fail: Green / Red LED
Remote On/Off		-	Unit ON: 0 - 0.6V or short, OFF: 2 - 15V or open circuit
Parallel Operation		-	Yes, single wire current share, 90% accuracy, up to 10 units
AC Fail Signal		-	Open Collector, ON when AC is within 85 - 270VAC
DC Good Signal		-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)
Remote Adjust	(1)	-	By either external 0 - 5V signal or 1k potentiometer
I ² C Interface	(1)	-	Isolated from output, Add suffix /S, PMBus compatible
Auxiliary Output		-	11.2 - 12.5V, 0.5A, 240mV ripple and noise
Operating Temp. (-TB Rack)		°C	-10°C to +70°C, derate 2%/°C from 50°C to 60°C, 2.5%/°C from 60°C to 70°C
Operating Temp. (-IEC320 Rack)		°C	-10°C to +60°C, derate 2%/°C from 50°C to 60°C
Storage Temperature		°C	-30°C to +85°C
Humidity (Non condensing)		%RH	Operating: 10 - 90%RH, Storage: 10 - 95%RH
Cooling		-	Two variable speed internal fans, airflow exits across input/output connector
Withstand Voltage		-	I/P to O/P 3kVAC, I/P to Ground 2kVAC, O/P to Ground: HFE1600-12, -24V 500VAC, HFE1600-48 1.5kVAC
Isolation Resistance		Ω	>100MΩ at 25°C & 70%RH, Output to Ground 500VDC
Vibration (Basic transportation)		-	Meets IEC61068-2-64
Shock (Basic transportation)		-	Meets IEC61068-2-27
Safety Agency Certifications		-	UL60950-1, EN60950-1, CE Mark
Line Dip		-	Complies with SEMI F47 (200VAC line only)
Conducted and Radiated EMI		-	EN55022 & FCC part 15; Conducted class B, Radiated class A
Immunity		-	IEC61000-4-2 (lv 2,3), -3 (lv 2), -4 (lv2), -5 (lv3,4), -6 (lv2), -8 (lv 4), -11
Size (W x H x D)		mm	Power Supply: 85 x 41 x 300, Rack: 445 x 44 x 365
Weight		g	Power Supply: 1550g, Rack: 4800g
Warranty		yrs	3

(1) See installation manual for detailed specifications & test methods

(2) Derate output power linearly 1%/V from 100VAC to 85VAC input

Model Selector

Model	Output Voltage	Adjust Range (1)	Max Current (Vin>170VAC)(2)	Max Power (Vin>170VAC)(2)	Max Current (100<Vin<170VAC)(2)	Max Power (100<Vin<170VAC)(2)
HFE1600-12	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-12/S	12V	9.6 - 13.2V	133A	1596W	100A	1200W
HFE1600-24	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-24/S	24V	19.2 - 29V	67A	1608W	50A	1200W
HFE1600-32	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
HFE1600-32/S	32V	25.6 - 38.4V	47A	1504W	37.5A	1200W
HFE1600-48	48V	38.4 - 58V	33A	1584W	25A	1200W
HFE1600-48/S	48V	38.4 - 58V	33A	1584W	25A	1200W

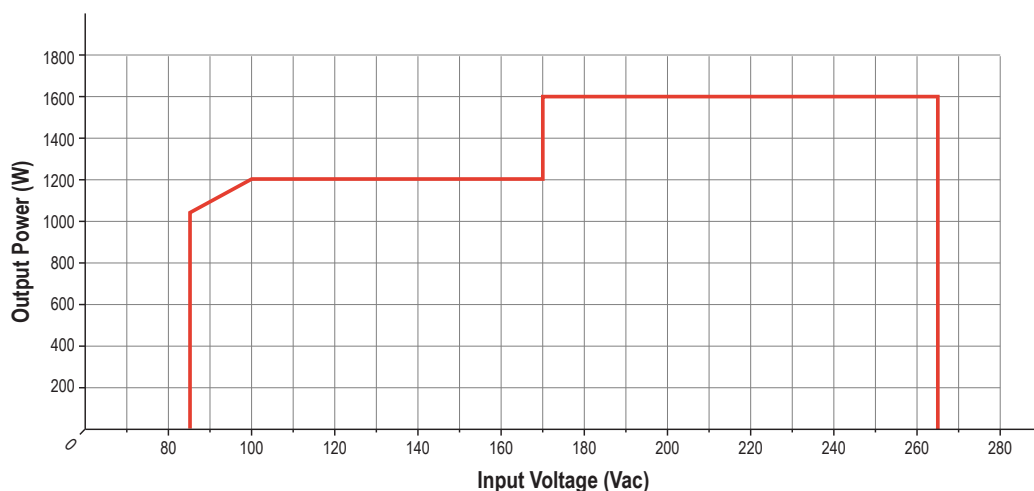
Model	Load Reg	Line Reg	Ripple & Noise	Efficiency (%) (3)	I ² C
HFE1600-12	60mV	30mV	240mV	87 / 90%	-
HFE1600-12/S	60mV	30mV	240mV	87 / 90%	Yes
HFE1600-24	120mV	60mV	240mV	88 / 90%	-
HFE1600-24/S	120mV	60mV	240mV	88 / 90%	Yes
HFE1600-32	160mV	80mV	320mV	88 / 90%	-
HFE1600-32/S	160mV	80mV	320mV	88 / 90%	Yes
HFE1600-48	240mV	120mV	480mV	89 / 92%	-
HFE1600-48/S	240mV	120mV	480mV	89 / 92%	Yes

(3) At 75% load, 100 / 230VAC input

- HFE2500 high power density 1U hotswap front end 29W/cu in • 12, 24 or 48 V models • Up to 4 units in a 1U 19" rack •
 - 10 kW output power per rack (2 racks can be paralleled for 20kW) •
- Available early 2011**

Rack Model Selector

Model	Description	Maximum Rack Current
HFE1600-S1U	Five slot 19" rack, IEC320 input connectors (5)	200A each side (400A total)
HFE1600-S1U-TB	Five slot 19" rack, Terminal Block input connectors (5)	200A each side (400A total)
HFE1600/BP	One slot blanking panel, three provided with each rack	



HFE 1600 Power Derating v's Input Voltage

FRONT VIEW

85.0 ± 0.5

21.4 42.2

22 ± 0.2

40.8 ± 0.2

20.4

SEE NOTE 2

POWER SUPPLY LOCKING

86.2 ± 0.5

REAR VIEW

12.1

43.0

I/O CONNECTOR
SEE NOTE 1.

320.4 ± 1.0

311.0 ± 1.0

300.0 ± 0.5

(9.4)

43.0

252.0 ± 0.5

22.8 ± 0.5

MOUNTING HOLES M4
MARKED "A"
2 HOLES ON EACH SIDE.

The technical drawing illustrates the HFE-S1U rack from three perspectives: front, top, and side views.

- Front View:** Shows five modules labeled MODULE "A" through MODULE "E". The total width is 900.0 mm. Individual module widths are 174.0 mm (A), 174.0 mm (B), 174.0 mm (C), 174.0 mm (D), and 174.0 mm (E). The height is 380.5 ± 1.0 mm. Mounting holes for blank panel mounting are indicated at the bottom.
- Top View:** Shows the layout of the modules and output bus bars. Dimensions include 290.0 mm, 236.6 mm, 80.5 mm, 114.0 mm, and 16.0 mm. Output bus bars are labeled -V and +V.
- Side View:** Shows the depth of the rack, which is 308.0 mm. It also indicates the mounting bracket dimensions and the location of M5 holes for mounting brackets.

NOTES

- MOUNTING HOLES FOR RACK 19". USE M6x12 SCREWS TO FIX THE UNIT TO A RACK.
- USE NUT, FLAT WASHER AND SPRING WASHER FOR LOAD WIRES FIXING. USE M6 LUG FOR LOAD WIRES. RECOMMENDED TORQUE: 42-56 Kgf.cm
- TO FIX THE MOUNTING BRACKET TO THE CHASSIS USE M5x10 SEMS SCREWS. RECOMMENDED TIGHTENING TORQUE 27-31Kgf.cm. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6.0 mm.
- REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.
- MODEL NAME, VOLTAGE AND CURRENT RATING AND SAFETY APPROVALS SYMBOLS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATION.

6. THE HFE-S1U RACK IS SHOWN WITH 5 HFE1600 UNITS INSTALLED.