

SMi2000HD

TECHNICAL DESCRIPTION

1 GENERAL DESCRIPTION

The SMi2000HD module is a high frequency switch mode rectifier. It converts the single phase A line voltage into an isolated DC voltage. It can be used as a power supply or battery charger.



Key Features:

- Optimal electronic and thermal design for telecom applications with wide output range for lead acid battery types charging.
- High power density 1.25W/cm³.
- Wide operating input voltage range.
- Automatic shutdown on low and high mains voltage with automatic restart.
- Hot plug capability in 400 mm rack.
- High efficiency up to 93%.
- Low quiescence power ECOPX compatibility.
- Sine Wave input current.
- Electronic fan speed vs current and temperature.
- Full thermal management with fan speed control and automatic power de-rating.
- Adjustable output voltage via digital CAN bus communication.
- Led's signalling.
- CE marked, UL pending.

2 STANDARDS

➤ **Safety:**

EN 60950-1 ; UL 60950-1 pending

➤ **EMC:**

Emission:

EN 55022

- . complies with EN 61000.6-3 installed in system (generic residential)
- . complies with EN 61000.6-4 (generic industrial)
- . complies with EN 61000.3-2 (harmonics)
- . complies with EN 61000.3-3 (flicker)

Immunity:

- . complies with EN 61000.6-1
- . complies with EN 61000.6-2
- . Standard EN 61000.4-2
- . Standard EN 61000.4-3

- . Standard EN 61000.4-4
- . Standard EN 61000.4-5
- . Standard EN 61000.4-6
- . Standard EN 61000.4-11

Telecom standard

- . EN 300 386

➤ **Environmental conditions:**

- . Complies with ETS 300 019
- . Complies with EN 300 019-1-2 class 2.2
- . Complies with EN 300 019-1-1 class 2.2
- . Complies with EN 300 019-1-3 class 2.1

➤ **Operating conditions:**

- . Complies with EN 300 132-2.

3 CHARACTERISTICS

3.1 ENVIRONMENTAL CHARACTERISTICS

➤ **Temperature**

- Shipping and storage : -50°C to +85° C.
- Operating : -10° to 70° C, start up at -20° C.
Full power up to +55° C,
De-rating of 2% per ° C between + 55° C and 70° C.

➤ **Humidity**

- Shipping and storage : 5 % to 95 %.
- Operating humidity : 5 % to 95 % Non condensing.

➤ **Altitude**

- Operating : - 60 m to + 2500 m.

➤ **Cooling**

: Forced air, front to back with automatic speed control.

3.2 MECHANICAL CHARACTERISTICS

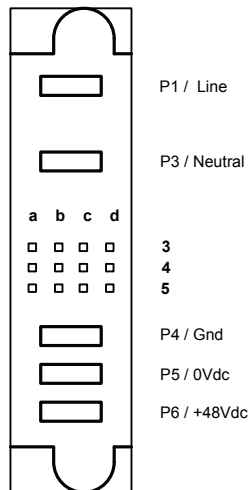
- Height : 43.45 mm.
- Width : 109 mm.
- Depth : 355.14 mm with 335.64 mm inside rack.
- Weight : 1.9kg.
- Degree of protection : IPX0.
- Mounting : Horizontal 1U; 4 rectifiers across 19" or ETSI rack.
- Connection : Hot pluggable with a single rear connector.

➤ Rear connector

Input/output connector + control and signal:

Male : 51939-400LF Powerblade or 9-6450130-0 Multibeam.

Female installed in system : 51915-144LF Powerblade or 2-6450170-9 Multibeam.



P100
Pin assignments
Front view

a3: +5 Vdc; 0.2 Amax

b3: 0Vs

d3: Factory reserved

b4: Can H

b5: Can L

Connector characteristics:

Inputs: 45 A max by pin

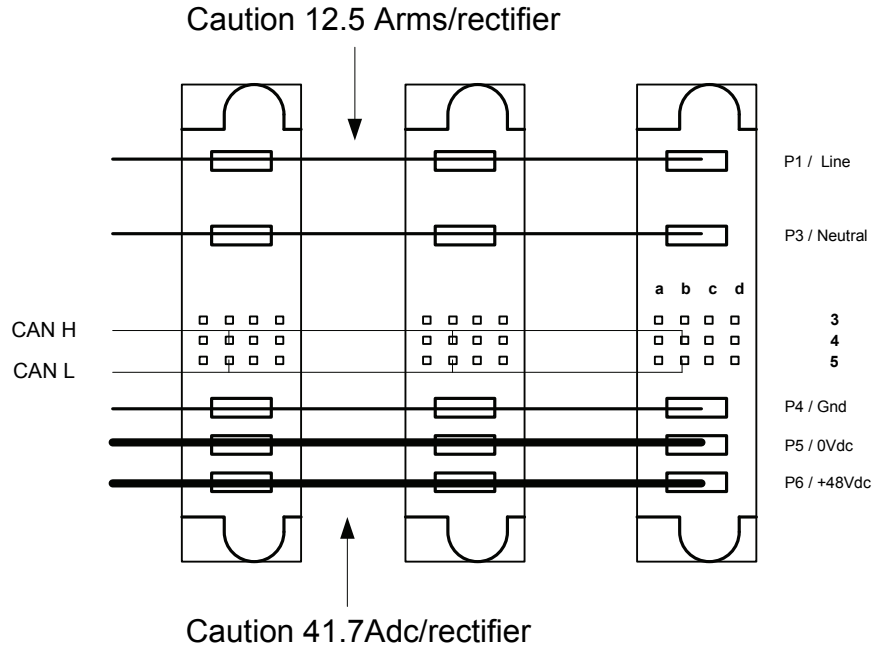
Outputs: 45 A max by pin

Signals: 1 A max by pin

d3, b4, d5, b5, c5: Inputs 3Vdc max

➤ **Paralleling**

The SMi2000HD are designed to be parallel connected.
 A maximum number of 30 rectifiers are permitted in the standard configuration.
 Over 30 rectifiers please contact Harmer & Simmons.



The rectifiers will be recognised by the controller; correct addressing is mandatory for digital communication.

3.3 ELECTRICAL CHARACTERISTICS

DIELECTRIC STRENGTH	
AC line to output	4200 Vdc (3000 Vac)
AC line to chassis	2100 Vdc (1500 Vac)
Output to chassis	700 Vdc (500 Vac)
INPUT	
Nominal voltage	230 Vac
Voltage range	90 to 300 Vac
Full power	Pdc=2000 W 180 to 300 Vac
Reduced power	Pdc=700 W 90 to 140 Vac
Frequency range	45 to 66 Hz
Power factor	0.99 typical Pdc 800 W to 2000 W
Maximum input current	12.5 A
Protection input voltage	Auto shutdown, auto restart when input voltage is within valid range Over 300 Vac 80 to 90 Vac
Input current	Electronic current limiting HRC fuses on line and neutral conductors
Inrush current	<40A for nominal voltage
Efficiency	Up to 93% within voltage range, 1500 W
Quiescence power	Output off 5W typical; Pdc=0 W; Vdc=0 V Output on 18W typical; Pdc=0 ; Vdc=52.5 V
OUTPUT	
Nominal voltage	48 Vdc
Voltage range	42 to 57 Vdc
Output power rating	2000W input ≥ 180 Vac < 300 Vac 700W input ≥ 90 Vac < 140 Vac
Maximum output current	41.7 Adc at 48 Vdc
Hold up time	>10ms Pdc=1800 W
Turn on	<3 S
Rise time	<500 ms 42 to 57 Vdc
Voltage regulation	Set point accuracy <1% Total regulation <2% line, load & temperature
Ripple & noise	Psophometric < 2 mV weighted Wideband < 50 mV rms 5 Hz to 100 Mhz Wideband < 200 mV peak peak 5 Hz to 100 Mhz
Protection	Power limit @ 48 V to 57 V. Current limit: 44 A typical with automatic recovery. Programmable. Hot Plugging: Automatic surge limiting via Or-ing device Over voltage: shutdown with auto restart programmable or latched after 2 nd fault Over temperature: Automatic power derating and excessive temperature shutdown Hiccup up function on short circuit
EFFICIENCY	
92% typical at 1500 W, 54.5 Vdc; 230 Vac.	
RELIABILITY	
MTBF 371000 h according to Telcordia SR332 at 1600 W, 40° C excluding fans.	

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BN 44 1111/01

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3.4 PROTECTIONS

Input

- **Caution : double pole/neutral HRC fusing.**
- Hot pluggable with inrush current limitation.
- Soft start.
- Low voltage and high voltage shutdown.
- Surge suppression by varistors (L/N), (L/Gnd), (N/Gnd).

Output

- Hot pluggable.
- Dc overvoltage selective and memorized shutdown.
- Constant output power limit.
- Over-current and short-circuit electronic protection.
- O-ring function.

Thermal

- Automatic power derating on high temperature, warning at T=90° C.

Fan

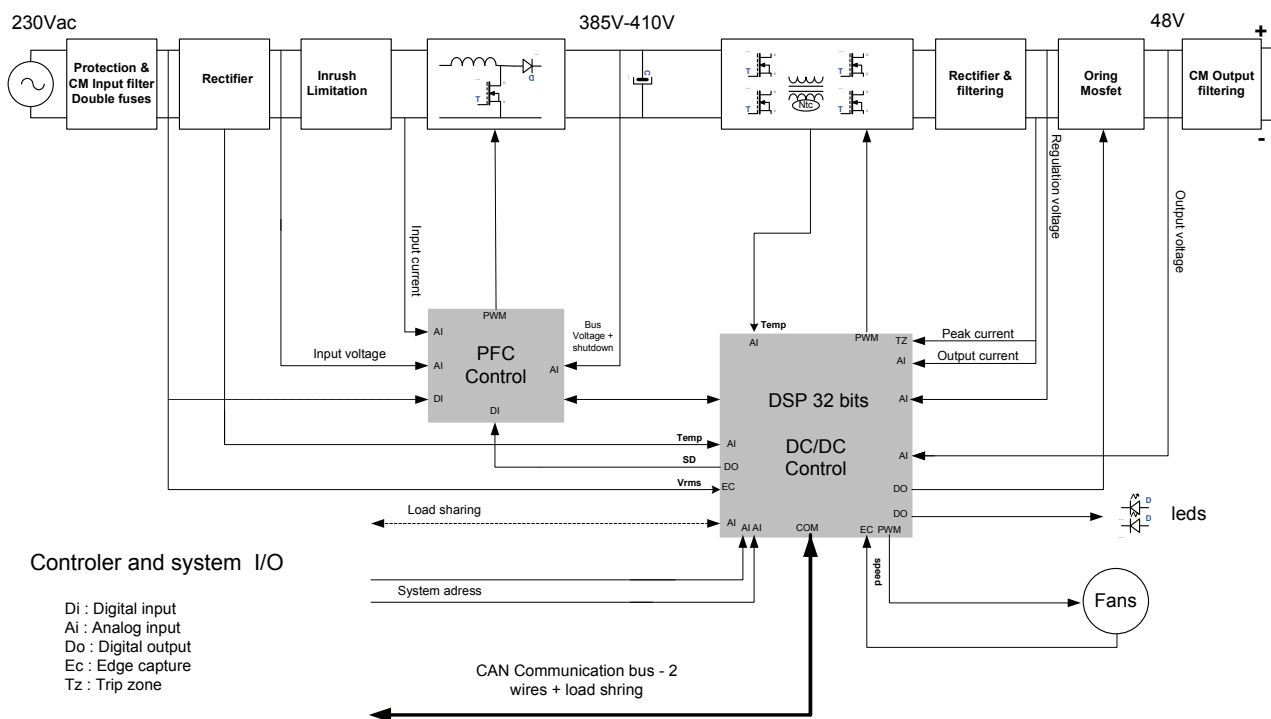
- Rectifier stop on fan fail
- Fan speed control versus temperature and DC current.

4 INDICATORS AND ALARMS

ALARM AND SIGNALLING	
Reported via CAN bus to system controller.	
Major alarms	Mains fail, Fan fail, DC overvoltage, Overtemperature shutdown
Minor alarms	Over temperature warning, Current share fail, Power derating, Current limitation, EEPROM, DC low voltage, output short circuit.
VISUAL INDICATORS	
Green Led	Normal operation, Vdc>42 V
Fast blinking green Led	Communication failure
Slow blinking green Led	Rectifier in stand by mode, presence of AC and Vdc=0 V
Green Led + red led	Minor alarms except power derating and current limitation
Green Led + blinking red led	Power derating, Current limitation
Green Led off + red Led	Major alarm, no power on output

5 DETAILED DESCRIPTION

5.1 BLOCK DIAGRAM



5.2 TECHNOLOGY

The rectifier module converts the AC mains supply into direct current. The function is achieved using the latest high frequency topology and results in reduced volume. The forced convection design offers high power density of 1.25W/cm³ at 55°C, as well as high efficiency and low weight.

The control via DSP allows getting a quiescent power consumption extremely low. Parameters as internal temperature, DC current, AC voltage are monitored.

Each rectifier module is factory pre-set and can operate independently or in parallel with other rectifiers.

The modules share their nominal power between the load and the battery.

5.3 OPERATING DESCRIPTION

The rectifier module consists of four sub-assemblies:

- An input circuit with protection devices,
- A rectifying circuit,
- An EMI filter,
- A filtering and storage capacitor.

The input circuit includes an active power factor correction (boost chopper with frequency dithering to spread the spectrum) which ensures a sinusoidal input current as well as a power factor better than 0.99.

A bridge converter connected to an RF transformer converting DC voltage from the storage capacitor into high-frequency AC voltage (150khz).

An output circuit with EMI filter and rectifying devices converts the transformed secondary voltage into DC voltage.

6 PACKAGING AND PRODUCT REFERENCE

6.1 PACKAGING

In carton.

6.2 PACKING TABLE

<i>SMi2000HD</i> packed dimensions and weight		
W x D x H	mm	190 x 410 x 70
Gross Weight	kg	2.25
Volume	m ³	0.0055

6.3 PRODUCT REFERENCE

Designation	H&S's Code
SMi2000HD	3AW01177ACAA

7 ASSOCIATED PRODUCTS

Designation	H&S's Code
Fan	BKVA00000003

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8 SUPPLIER

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Harmer & Simmons offers installation, customization and technical support services.
Contact your local re-seller.

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