

1000 - 2500 Watts

VS Series

VS1-B2-H522-00
1100W total



VS3-D2-C2-20
1200W total



VS6-L2-00
1500W total



VS8-L9-D9-20
2500W total (case limit)



VS4/9
2000 - 2500 W



Special Features

- Power factor correction
- IEC 555-2 harmonic distortion compliance
- CISPR 22, EN55022 Level B conducted / radiated EMI
- EN61000 immunity standards
- European CE Mark
- Current share on all outputs
- Remote sense on all outputs
- Overload protection on all outputs
- Voltage adjustment on all outputs
- Margining on all outputs
- AC-OK-signal (logics "1" or "0")
- Global DC OK (logics "1" or "0")
- DC-OK signal and status indicator LED-on all outputs
- Global and individual module inhibits/enable
- 3 year warranty
- 2500 W with 3-phase input

Environmental

Operating temperature: -10°C to 50°C
(derate each output linearly to 60% at 70°C)
40°C max. for reverse air (option #1)

Shock/Vibration: Mil-Hdbk 810E

Humidity: 95% non-condensing

Storage temperature: -55°C to +85°C

Temperature coefficient: 0.02% per °C

Cooling: Internal DC fan 24V

Safety

UL	UL60950-1	E133211
CSA	CSA C22.2 No. 60950-1-03	
VDE	EN60950	
CB	Certificate and report	
CE	Mark	

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Electrical Specs

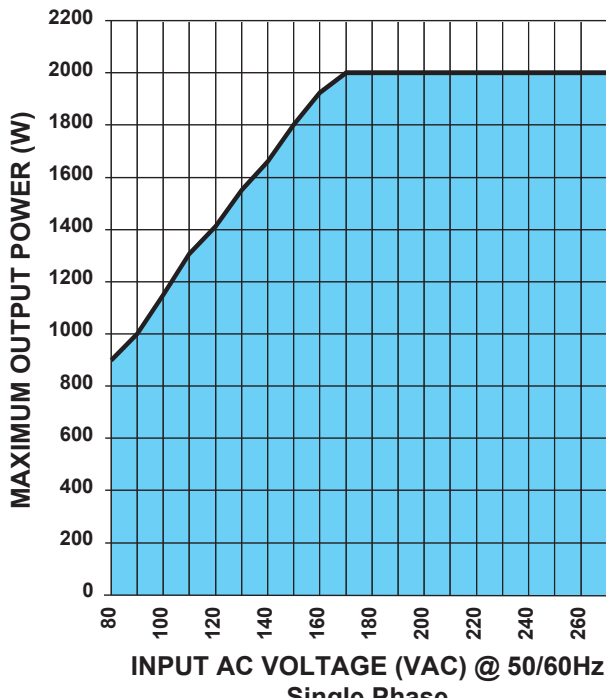
Input

Fuse rating	600 V / 25 A (internal)1Ø 250 V / 20 A (internal)3Ø
Input voltage	85-264 VAC 1Ø VS1, VS3 & VS4 (See operating curve) 180-264 VAC 3Ø VS6, VS8 & VS9
Frequency	47 to 440 Hz
Inrush current	40 A peak max.
Efficiency	75% - 82%
Power factor	0.99 typical (0.9 on VS6, VS8 & VS9)
Turn-on time	AC / 1 sec; Inhibit / 100 ms max.
EMI-filter	CISPR 22, EN55022 Level B conducted/radiated
Leakage current	2 mA max. at 240 VAC
Holdover storage	20 ms min. / 40 ms typical independent of VAC
AC-OK warning time	>5 ms (power fail)
Loss of phase	On VS6, VS8 & VS9, unit will continue to operate with loss of phase

Output

Adjustment range	±10% minimum
Margining	±4-6% nominal
Line/load reg	0.2% or 5 mV max.
Ripple	RMS: 0.1% or 10 mV P-P: 1.0% or 50 mV Bandwidth limited to 20 MHz
Dynamic response	2% or 100 mV with 25% load step (any output)
Recovery time	To within 1% in <300 µsec
Overvoltage protection	2-5 V 122% to 134% of output voltage; 12-48 V 110% to 120%; recycle AC
Overload protection	Main: 105% to 120% of rated current Auxiliaries: 105% to 140%
Short circuit protection	Protected for continuous short circuit, recovery automatic
Reverse voltage protection	100% of rated output current
Thermal protection	Each module thermally protected. Input module: auto recovery. Output modules; recycle AC.
Remote sense	Up to 0.5 V - total drop
Single wire parallel	Current share to 2% of total rated current
Switching frequency	200 KHz (900-1500 W module, 400 KHz)
DC OK	-2% to -6% of nominal
Output/Output isolation	>1 Megohm

Input Operating Curve

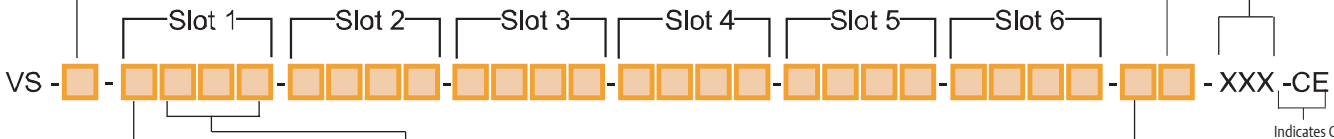


Common Examples and Specifications

Case size

1 = 5 inch, 2 slot, 1500 W max 1Ø
 3 = 8 inch, 4 slot, 2000 W max 1Ø
 4 = 11 inch, 6 slot, 2000 W max 1Ø
 6 = 5 inch, 2 slot, 1500 W max 3Ø
 8 = 8 inch, 4 slot, 2500 W max 3Ø
 9 = 11 inch, 6 slot, 2500 W max 3Ø

(Same for Each Slot)



Output Module Code

A = 300 W single 1 slot
 B = 600 W single 1 slot
 C = 900 W single 2 slots
 D = 1200 W single 2 slots
 E = 250 W dual 1 slot
 F = 250 W triple 1 slot
 G = 500 W dual 1 slot
 H = 500 W triple 1 slot
 K = 750 W single 1 slot
 L = 1500 W single 2 slots

Output Voltage Code

0 = 2V
 1 = 3.3 V
 2 = 5 V
 3 = 12 V
 4 = 15 V
 5 = 24 V
 6 = 28 V
 7 = 36 V
 8 = special voltage (consult factory)
 9 = 48 V

Configuration Rules

- Omit digits that do not apply.
- Specify modules from lowest number of outputs to highest.
 - If number of outputs are equal, specify from highest to lowest power increments.
 - If power increments are equal, specify from highest to lowest current.
- All model configurations created using this selection guide represent standard products with standard availability and lead times.
- If slots are left empty, a blank panel will be automatically installed.

Option Codes

0 = no options
 1 = rear air exhaust (40°C max.)
 3 = set unit for global enable
 5 = options 1 & 3

USE ONLY FOR MODIFIED STANDARD, CONSULT-FACTORY

Indicates CE compliance

Parallel Code

VS1 and VS6 available slots

VS3 and VS8 available slots

VS4 and VS9 available slots

Parallel Codes

0 = no parallel
 1 = 1 & 2
 2 = 2 & 3
 3 = 3 & 4
 4 = 1 & 2 & 3
 5 = 2 & 3 & 4
 6 = 1 & 2 & 3 & 4
 7 = 1 & 2 & 3 & 4
 8 = 3 & 4 + 5 & 6
 9 = 1 & 2 + 3 & 4 + 5 & 6

Example

(more on next page):

VS1 - K2 - G33 - 00 - CE

5 inch case (2 slots available) Slot 1: 1: 5V @ 150A Slot 2: 2: 12V @ 21A 3: 12V @ 20A No options No paralleling

Output Current

Output Voltage Identification		Module Identification							
Output Voltage Code	Output Voltage	A (1 slot) 300 W Single	B (1 slot) 600 W Single	C (2 slots) 900 W Single	D (2 slots) 1200 W Single	E, F (1 slot) 250 W Multi Main Output	G, H (1 slot) 500 W Multi Main Output	K (1 slot) 750 W Single	L (2 slots) 1500 W Single
0	2 V	60 A	120 A	180 A	240 A	25 A	50 A	150 A	300 A
1	3.3 V	60 A	120 A	180 A	240 A	25 A	50 A	150 A	300 A
2	5 V	60 A	120 A	180 A	240 A	25 A	50 A	150 A	300 A
3	12 V	25 A	50 A	75 A	100 A	10.5 A	21 A	62.5 A	125 A
4	15 V	20 A	40 A	60 A	80 A	8.3 A	16.6 A	50 A	100 A
5	24 V	12.5 A	25 A	37.5 A	50 A	5.3 A	10.5 A	31.2 A	62.4 A
6	28 V	10.7 A	21.4 A	32.1 A	42.8 A	4.5 A	9 A	26.7 A	53.4 A
7	36 V	8.3 A	16.6 A	24.9 A	33.2 A	N/A	N/A	20.8 A	41.6 A
9	48 V	6.3 A	12.5 A	18.75 A	25 A	N/A	N/A	15.6 A	31.2 A

Note: Increments of current not shown can be achieved by paralleling modules (add currents of each module selected).

Auxiliary Output Table: Output(s) 2 and/or 3 of Module

Voltage Identification		Module Identification			
Output Voltage Code	Output Voltage	E 250 W Dual Aux. Output	F 250 W Triple Aux. Output	G 500 W Dual Aux. Output	H 500 W Triple Aux. Output
0	2 V	10 A	5 A	20 A	10 A
1	3.3 V	10 A	5 A	20 A	10 A
2	5 V	10 A	5 A	20 A	10 A
3	12 V	10 A	5 A	20 A	10 A
4	15 V	10 A	5 A	20 A	10 A
5	24 V	5 A	2.5 A	10 A	5 A
6	28 V	5 A	2.5 A	10 A	5 A

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EXAMPLES

Examples of Model Numbers - SINGLE OUTPUTS

Total Power	Volts / Amps	Size (H x W x L)	Model Number	Other Voltages Available	Voltage ID Code
600 W	5 V / 120 A	5 x 5 x 11	VS1-B2-00	2 V	0
750 W	12 V / 62.5 A	5 x 5 x 11	VS1-K3-00	3.3 V	1
900 W	5 V / 180 A	5 x 5 x 11	VS1-C2-00	5 V	2
1200 W	5 V / 240 A	5 x 5 x 11	VS1-D2-00	12 V	3
1200 W	2 V / 600 A	5 x 8 x 11	VS3-L0-L0-20	15 V	4
1500 W	15 V / 100 A	5 x 5 x 11	VS1-L4-00	24 V	5
2000 W	5 V / 400 A	5 x 8 x 11	VS3-D2-C2-20*	28 V	6
2500 W	48 V / 52 A	5 x 8 x 11	VS8-L9-D9-20**	36 V	7
				Special 48 V	8 (consult factory)
					9

* D2 module derated to 1100 W (2000 W max.)

** D9 module derated to 1000 W (2500 W max.)

Examples of Model Numbers - MULTIPLE OUTPUTS

Total Power	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Size	Model Number
500 W	5 / 50	12 / 10	12 / 10				5 x 5 x 11	VS1-H233-00
750 W	5 / 50	12 / 10	12 / 10	15 / 8.3	15 / 5	5 / 5	5 x 5 x 11	VS1-H233-F442-00
800 W	5 / 60	12 / 21	12 / 10	5 / 10			5 x 5 x 11	VS1-A2-H332-00
800 W	5 / 60	12 / 21	12 / 10	24 / 5			5 x 5 x 11	VS1-A2-H335-00
800 W	5 / 60	15 / 16.6	15 / 10	5 / 10			5 x 5 x 11	VS1-A2-H442-00
800 W	5 / 60	15 / 16.6	15 / 10	24 / 5			5 x 5 x 11	VS1-A2-H445-00
990 W	5 / 150	2 / 120					5 x 5 x 11	VS1-K2-B0-00
1000 W	5 / 50	12 / 10	12 / 10	15 / 16.6	15 / 10	24 / 5	5 x 5 x 11	VS1-H233-H445-00
1000 W	5 / 50	12 / 10	12 / 10	15 / 16.6	5 / 10	24 / 5	5 x 5 x 11	VS1-H233-H425-00
1100 W	5 / 120	12 / 21	12 / 20				5 x 5 x 11	VS1-B2-G33-00
1100 W	5 / 120	12 / 21	12 / 10	5 / 10			5 x 5 x 11	VS1-B2-H332-00
1100 W	5 / 170	12 / 10	12 / 10				5 x 5 x 11	VS1-B2-H233-10
1100 W	5 / 120	15 / 16.6	15 / 10	5 / 10			5 x 5 x 11	VS1-B2-H442-00
1100 W	5 / 120	15 / 16.6	15 / 10	24 / 5			5 x 5 x 11	VS1-B2-H445-00
1400 W	5 / 180	12 / 21	12 / 20				5 x 8 x 11	VS3-C2-G33-00
1400 W	5 / 180	12 / 21	12 / 10	5 / 10			5 x 8 x 11	VS3-C2-H332-00
1440 W	5 / 240	2 / 120					5 x 8 x 11	VS3-D2-B0-00
1600 W	5 / 170	12 / 20	12 / 21	5 / 20			5 x 8 x 11	VS3-B2-G23-G32-10
1680 W	5 / 240	2 / 240					5 x 8 x 11	VS3-D2-D0-00
1700 W	5 / 240	12 / 21	12 / 20				5 x 8 x 11	VS3-D2-G33-00
1900 W	5 / 180	12 / 21	12 / 20	5 / 50	15 / 10	24 / 5	5 x 8 x 11	VS3-C2-G33-H245-00
2000 W	5 / 300	12 / 21	12 / 10	5 / 10			5 x 8 x 11	VS3-L2-H332-00
2000 W	5 / 240	12 / 21	12 / 20	5 / 60	15 / 10	24 / 5	5 x 8 x 11	VS3-D2-G33-H245-00
2500 W	5 / 300	3.3 / 120	12 / 21	12 / 10	15 / 10		5 x 8 x 11	VS8-L2-B1-H334-00

Pin Assignments

PFC

J1 CONTROL CONNECTOR

Pin No.	Function
J1-1	AC OK Logic 1
J1-2	AC OK Logic 0
J1-3	Global DC OK / Conv Run Logic 1
J1-4	Global DC OK / Conv Run Logic 0
J1-5	Global DC OK / Conv Run / AC OK Return
J1-6	Global Inhibit Logic 0* / ENA Logic '0'
J1-7	Global Inhibit Logic 1* / ENA Logic '1'
J1-8	Global Inhibit Return* ENA RTN
J1-9	Global Isolated Inhibit
J1-10	Global Isolated Inhibit Return

* Changes to Enable with Option Code 3

Multiple Output

J1 CONTROL CONNECTOR

Pin No.	Function
J1-1	V1 +Remote Sense
J1-2	V1 Remote Margin / V. Program
J1-3	V1 Remote Margin Hi
J1-4	V1 -Remote Sense / Margin Lo
J1-5	V1 DC OK / Conv Run Logic 1
J1-6*	V1 Isolated Inhibit
J1-7	V1 DC OK / Conv Run / ISO Inh. Return
J1-8	V1 Single Wire Parallel
J1-9	V2 Single Wire Parallel
J1-10	V3 Single Wire Parallel

* Inhibits off all the outputs within that module.

Single Output

J1 CONTROL CONNECTOR

Pin No.	Function
J1-1	+Remote Sense
J1-2	Remote Margin / V. Program
J1-3	Remote Margin Hi
J1-4	-Remote Sense / Margin Lo
J1-5	DC OK / Conv Run Logic 1
J1-6	Isolated Inhibit
J1-7	DC OK / Conv Run / ISO Inh. Return
J1-8	Single Wire Parallel
J1-9	Spare Pin
J1-10	Spare Pin

J2 CONTROL CONNECTOR

Pin No.	Function
J2-1	V2 +Remote Sense
J2-2	V2 Remote Margin / V. Program
J2-3	V2 Remote Margin Hi
J2-4	V2 -Remote Sense / Margin Lo
J2-5	V2 DC OK / Logic 1
J2-6	V3 +Remote Sense
J2-7	V3 Remote Margin / V. Program
J2-8	V3 Remote Margin Hi
J2-9	V3 -Remote Sense
J2-10	V3 DC Good / Logic 1

Notes:

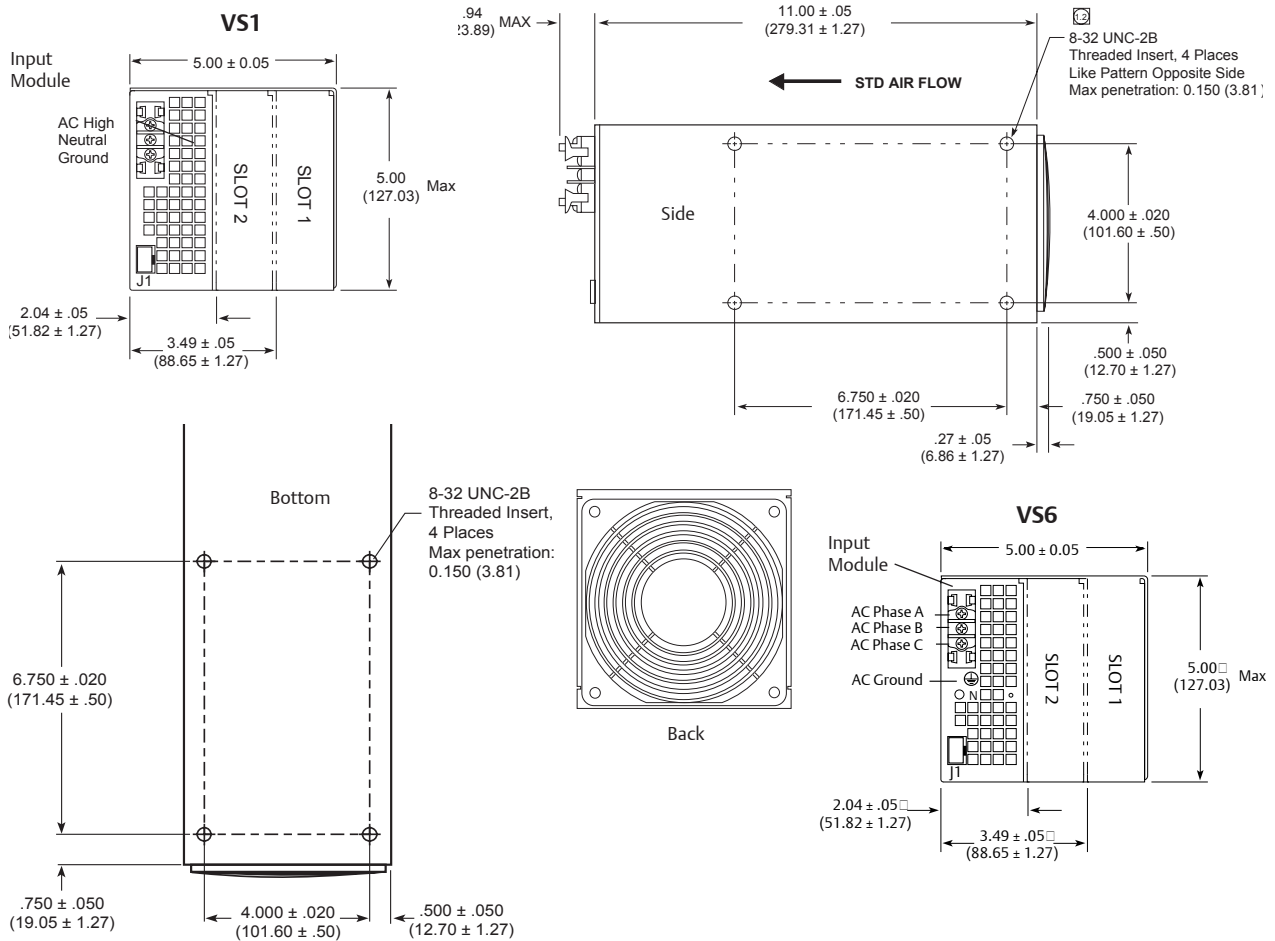
Electrical Characteristics

- DC OK minus 2 to 6% of nominal output voltage (tracking).
- Inhibit & Enable are both TTL compatible. ISOLATED requires 2 mA source, typical.
- DC OK / Converter Run denotes output voltage is present and converters are running (Or'ed signal configuration).
- PFC LED: Red = Bulk DC bus voltage low; Green = Bulk DC OK.
- Output LED: Red = Indicated output not operating within tolerance; Green = Indicated output operating within tolerance.
- The 5 x 5 x 11 (VS1/6) case is power limited to 1500W max. See operating curve.
- The 5 x 8 x 11 case and 5 x 11 x 11 case (VS3/4) are power limited to 2000W max. The VS8/9 cases are power limited to 2500W max.
- Specifications subject to change without notice.
- Warranty: 3 yrs

Drawings

VS1 & VS6 • 1000-1500 WATTS

5-inch Case Size (5" x 5" x 11")

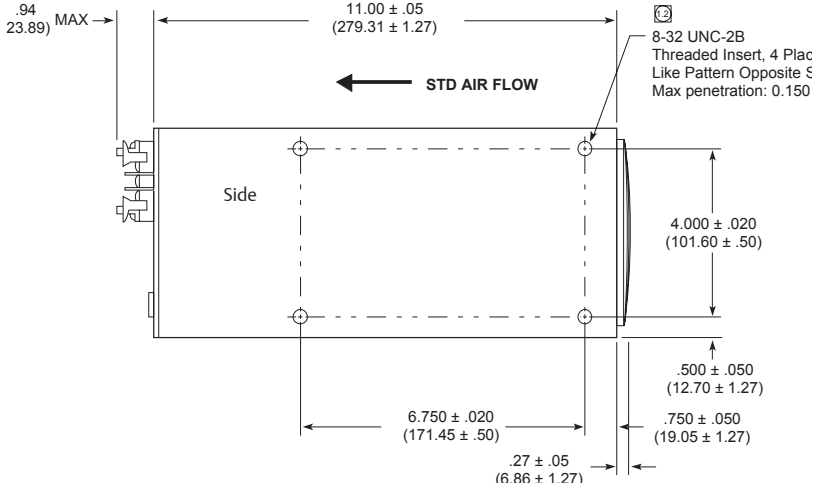
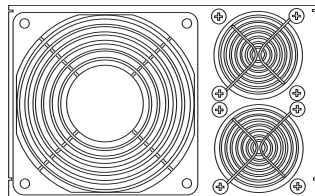
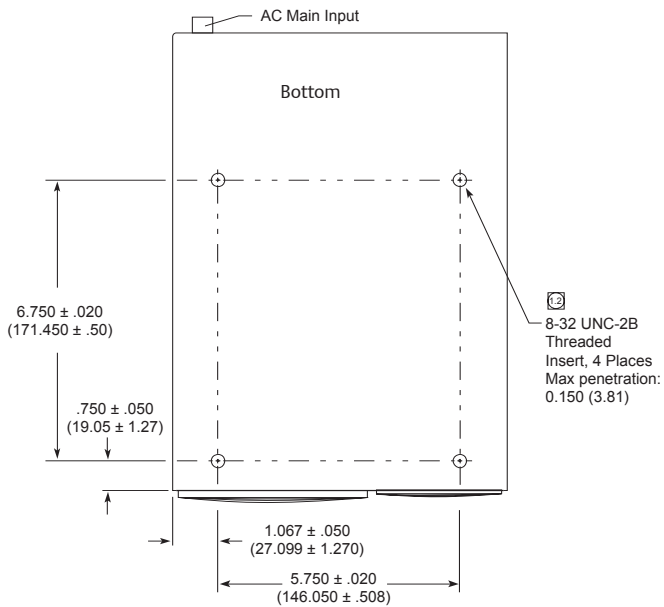
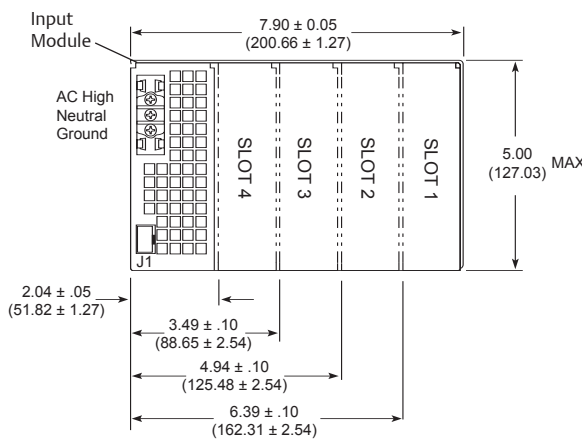


NOTES (ALL MODELS)

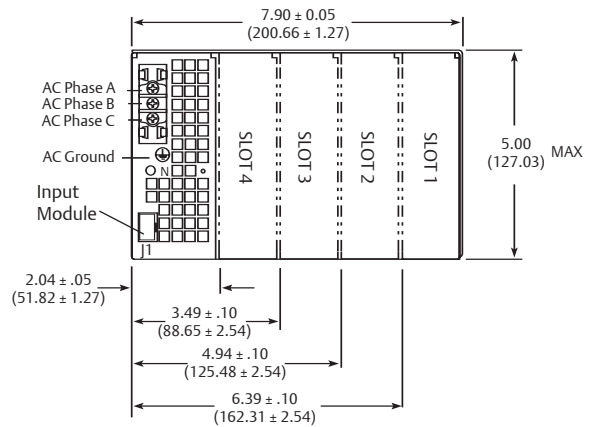
1. Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). For VS1, VS3 & VS4 additional GND CONN added for VS6, VS8 & VS9. Max torque: 10 in-lbs (1.1 N-m).
2. Control connectors: (J1 and J2) 10 position Molex 90130-3210 housing, gold plated contacts. Mates with Molex 90142-0010 housing with 90119-2110 crimp contacts (Molex C - Grid III Series). Connector kit includes mating connector and 10 pins, Astec part #70-841-004.
3. Output terminals (A-300 W) (B-600 W) & (K-750 W) single modules: two (2) 10-32 UNF HEX HD BOLTS. Max. torque: 25 in-lbs (2.78 N-m).
4. Output terminals (E/F-250 W) & (G/H-500 W) dual/triple modules: Primary: two (2) 10-32 UNF HEX HD BOLTS. Max. torque: 25 in-lbs (2.78 N-m). Secondary: barrier strip two (2) 6-32 UNC screws (0.375" centers) per output. Max torque: 10 in-lbs (1.1 N-m).
5. Output terminals (C-900 W) (D-1200 W) & (L-1500 W) single modules: four 5/16-18 x 5/8" hex head cap screws. Max. torque: 120 in-lbs (13.35 N-m). Captive lock washer provided.
6. Chassis material: aluminum with chemical film coating.
7. Adjustment access: voltage, power fail, and overcurrent from front panel.
8. Bar code: code 39 extended.
9. Mounting for 5-inch & 8-inch case: four (4) 8-32 clinch nuts on three (3) surfaces.
Mounting for 11-inch case: four (4) 8-32 clinch nuts on two (2) side surfaces & six (6) 8-32 clinch nuts on bottom surface.
Max. penetration 0.150 inch (3.81). Max. torque: 15 in-lbs (1.67 N-m).
10. Additional support is recommended when unit is mounted in a suspended configuration.
Mounting clinch nuts are not designed to support the weight of the unit.
11. Fans: 5-inch case, (1) 4.5" dia, 112 CFM (no load), 49 dBA.
8-inch case, (1) 4.5" dia, 112 CFM (no load), 49 dBA; (2) 2.25" dia, 23 CFM (no load), 38 dBA.
11-inch case, (2) 4.5" dia, 112 CFM (no load), 49dBA
12. All dimensions are in inches (mm).
13. Specifications subject to change without notice.

8-inch Case Size (5" x 8" x 11")
(18 lbs. / 8.2 kg. maximum)

DRAWINGS • VS3 & VS8 • 1000-2500 WATTS

VS3

VS8

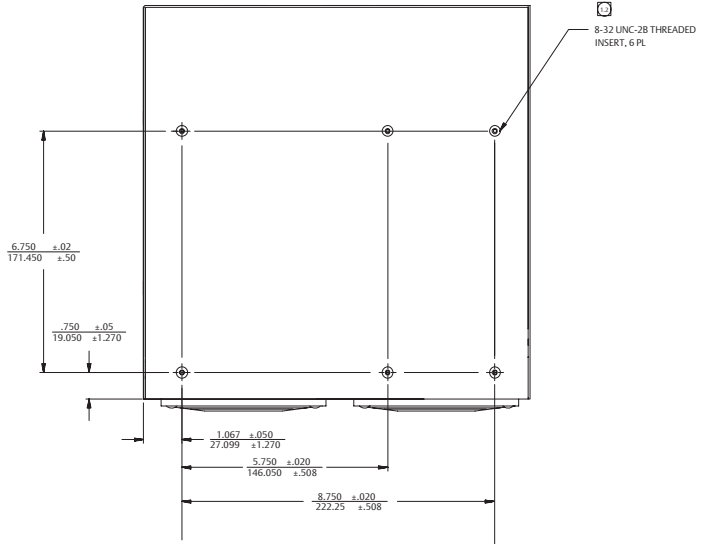
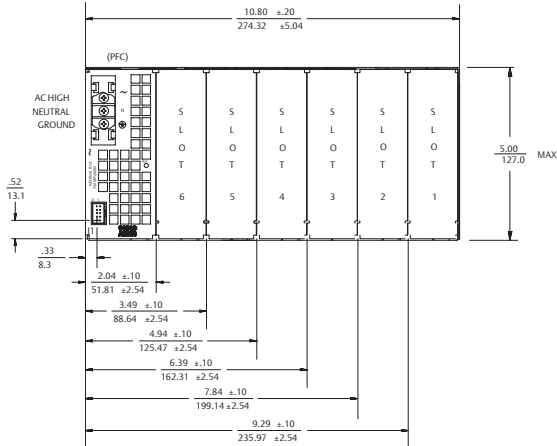


Drawings

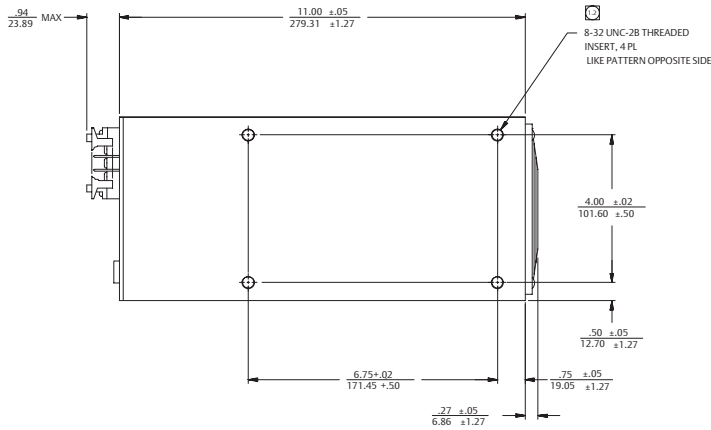
VS4 & VS9 • 2000-2500 WATTS

11-inch Case Size (5" x 11" x 11")

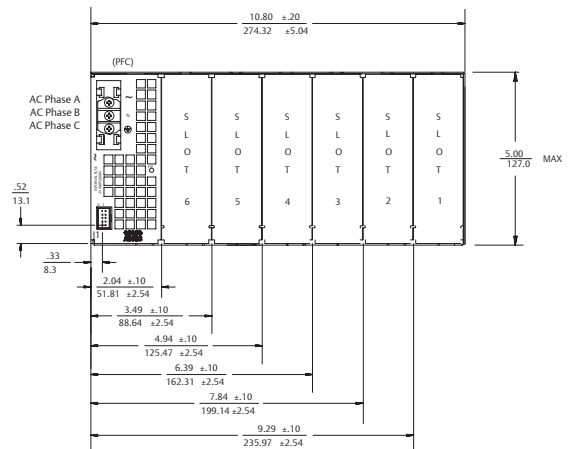
VS4



VS9



STD
AIR FLOW
FRONT AIR
EXHAUST
←
OPTIONAL
REAR AIR
EXHAUST
→



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Module Front Panels

