

# 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**

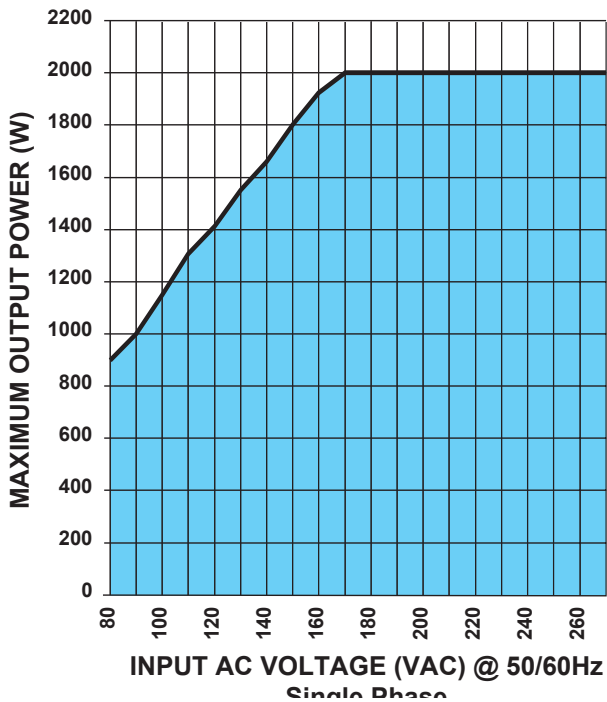
**Input**

|                    |  |
|--------------------|--|
| Fuse rating        | 600 V / 25 A (internal)1Ø<br>250 V / 20 A (internal)3Ø                                       |
| Input voltage      | 85-264 VAC 1Ø<br>VS1, VS3 & VS4<br>(See operating curve)<br>180-264 VAC 3Ø<br>VS6, VS8 & VS9 |
| Frequency          | 47 to 440 Hz   |
| Inrush current     | 40 A peak max.   |
| Efficiency         | 75% - 82%  |
| Power factor       | 0.99 typical<br>(0.9 on VS6, VS8 & VS9)  |
| Turn-on time       | AC / 1 sec;<br>Inhibit / 100 ms max.   |
| EMI-filter         | CISPR 22, EN55022 Level B<br>conducted/radiated  |
| Leakage current    | 2 mA max. at 240 VAC   |
| Holdover storage   | 20 ms min. / 40 ms typical<br>independent of VAC   |
| AC-OK warning time | >5 ms (power fail)   |
| Loss of phase      | On VS6, VS8 & VS9, unit will<br>continue to operate with loss<br>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<br>P-P: 1.0% or 50 mV<br>Bandwidth limited to 20 MHz                         |
| Dynamic response           | 2% or 100 mV with 25% load step<br>(any output)   |
| Recovery time              | To within 1% in <300 µsec   |
| Overvoltage protection     | 2-5 V 122% to 134% of output voltage;<br>12-48 V 110% to 120%; recycle AC                       |
| Overload protection        | Main: 105% to 120% of rated current<br>Auxiliaries: 105% to 140%                                |
| Short circuit protection   | Protected for continuous short circuit,<br>recovery automatic                                   |
| Reverse voltage protection | 100% of rated output current  |
| Thermal protection         | Each module thermally protected.<br>Input module: auto recovery. Output<br>modules; recycle AC. |
| Remote sense               | Up to 0.5 V - total drop  |
| Single wire parallel       | Current share to 2% of total rated<br>current   |
| Switching frequency        | 200 KHz<br>(900-1500 W module, 400 KHz)   |
| DC OK                      | -2% to -6% of nominal   |
| Output/Output isolation    | >1 Megohm   |

**Input Operating Curve**

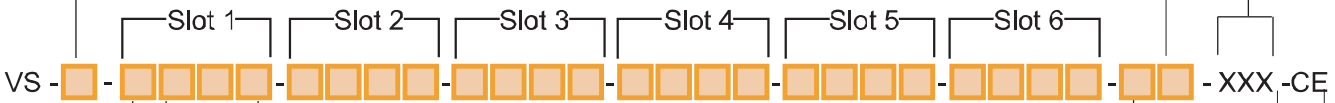


# Common Examples and Specifications

## 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)



## 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

## 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

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

## Parallel Code

VS1 and VS6 available slots

VS3 and VS8 available slots

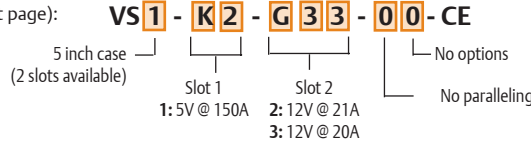
VS4 and VS9 available slots

## 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):



## 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:

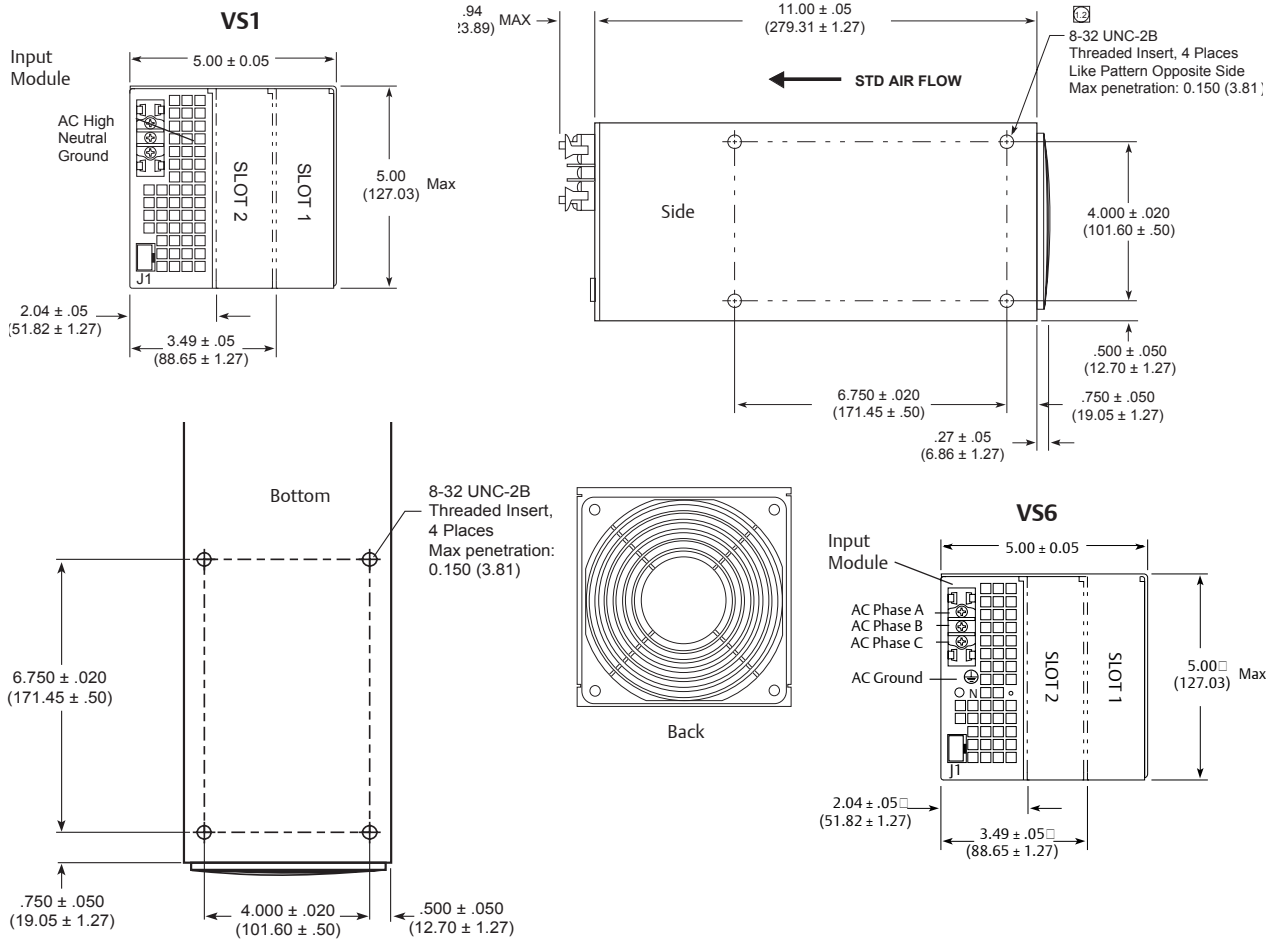
Electrical Characteristics

- 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)

- 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).
- 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.
- 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).
- 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).
- 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.
- Chassis material: aluminum with chemical film coating.
- Adjustment access: voltage, power fail, and overcurrent from front panel.
- Bar code: code 39 extended.
- 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).
- 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.
- 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
- All dimensions are in inches (mm).
- Specifications subject to change without notice.

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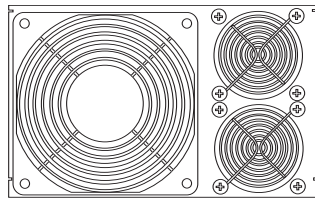
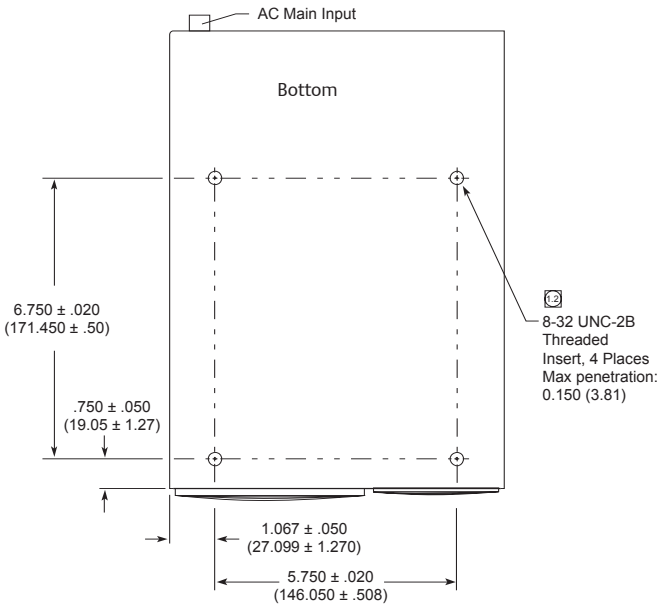
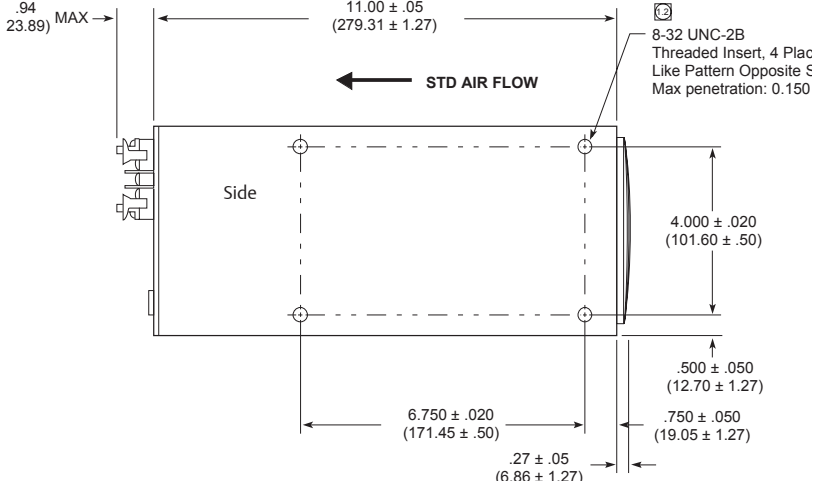
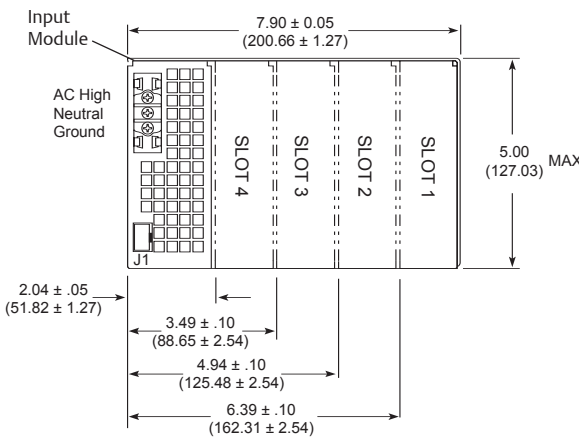


VS Series

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

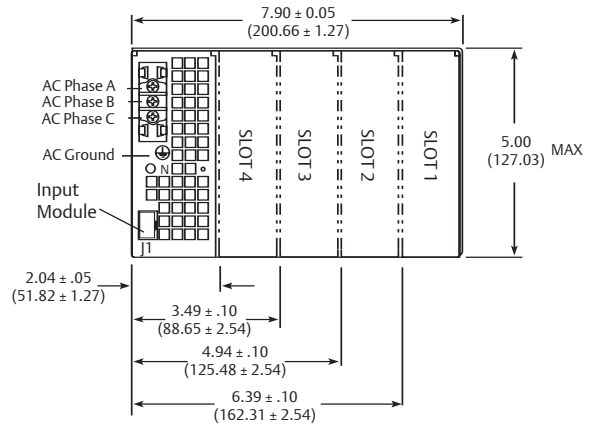
DRAWINGS • VS3 & VS8 • 1000-2500 WATTS

VS3



Back

VS8

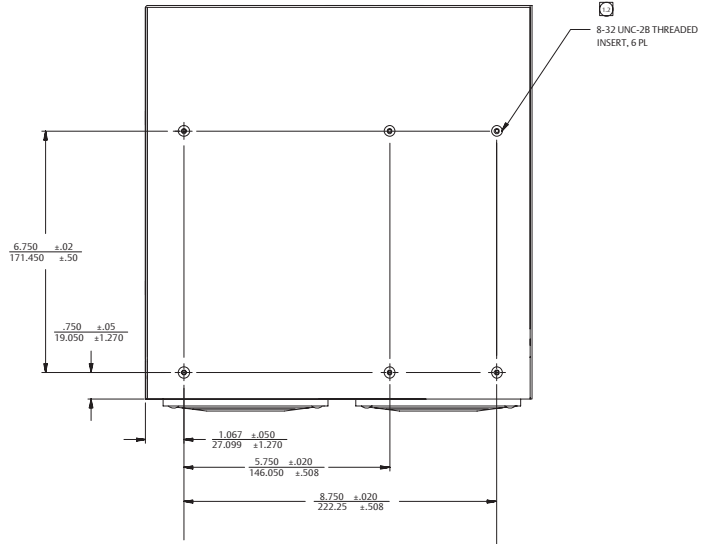
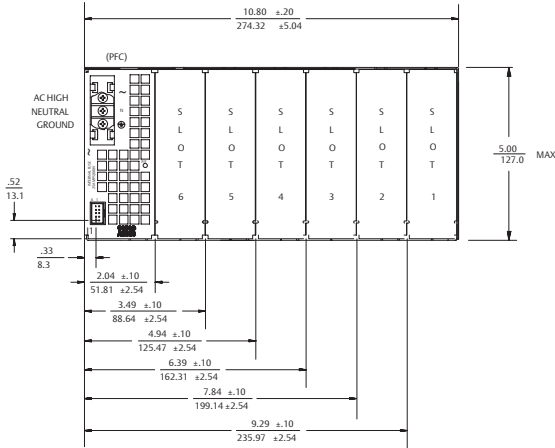


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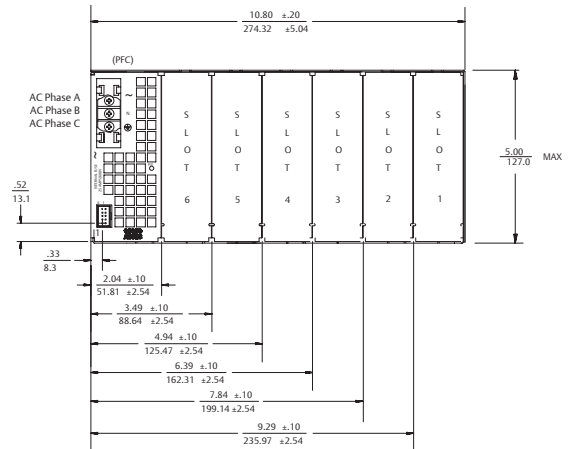
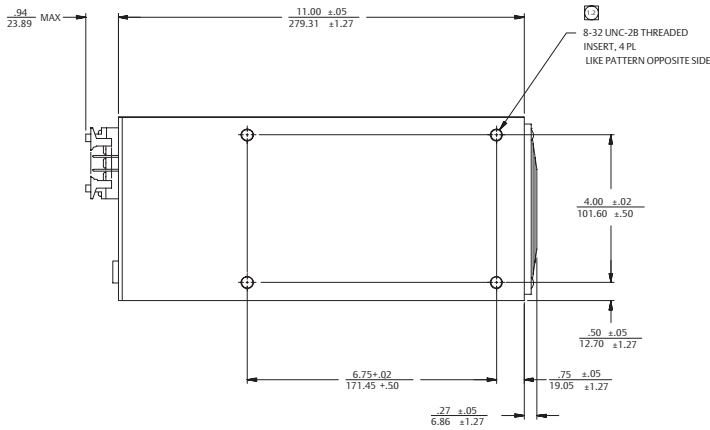
VS4 & VS9 • 2000-2500 WATTS

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

**VS4**



**VS9**



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**Module Front Panels**

