

Installation & Application Notes

500 - 2500 Watts

VS Series



Input Specifications

Input voltage range	85 to 264 VAC 1 Ø 180 to 264 VAC 3 Ø	Turn-on time EMI filter	AC / 1 sec. FCC and VDE Level B
Input fuse (Internal)	600V/25A	Leakage current	2mA max @ 264 VAC
Frequency	47 to 440 Hz	Holdover storage	30 ms min/40 ms typ independent of VAC
Inrush current	40 A peak max	AC OK	Full cycle ride thru (50 Hz)
Efficiency	> 75% - 82%		
Power factor	0.99 typical		

Output Specifications

Voltage adjustment	±10% minimum	Overload protection	105% to 120% of rated current. Auxiliaries 105% - 140%
Margining	±4-6% nominal	Short circuit protection	Protected for continuous short circuit, recovery automatic
Line & Load regulation	0.2% + 5 mV max	Reverse voltage protection	100% of rated output current
Ripple: RMS PK-PK	0.1% or 10 mV 1% or 50 mV	Thermal protection	Each module thermally protected. Input module: auto recovery. Output modules: recycle AC
Dynamic response	25% load step, 2% or 100 mV (any output)	Remote sense	Up to 0.5V drop
Recovery time	To within 1% in 300 µsec	Single wire parallel	Current share to 2% of total rated current
Overvoltage protection	2 to 5V 122% to 134% of output voltage; 12 to 48V 110% to 120%; recycle AC	Switching frequency	200 KHz (1200W module, 400 kHz)

CAUTION

- 1) Connect the power supply correctly. 115/230 VAC 60 Hz line voltages can be lethal. To avoid shock, always use correct size and style lugs as described within.
- 2) Install power supply correctly. Use correct screw sizes for mounting. Screws must not penetrate the interior of the supply excessively to avoid shorting of internal components. Always use the ground connection provided to protect against shock hazard due to power line capacitive leakage.
- 3) Operate the power supply safely. Power supplies generate heat; keep them away from combustible materials or atmosphere. Make sure liquid or metal shavings do not enter the supply to cause internal arcing, which can be a fire hazard.
- 4) Maintain power supply safely. Only qualified personnel should service or repair. Beware of possible internal lethal voltages due to charged capacitors, even after AC power is disconnected.

Installation & Application Notes

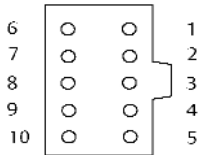
PFC Input Module

Control Connector Pin Out

J1 Control Connector

Pin#	Function
J1-1	AC OK/Logic 1
J1-2	AC OK/Logic 0
J1-3	Global DC OK/Converter Running Logic 1
J1-4	Global DC OK/Converter Running Logic 0
J1-5	Global DC OK/Converter Running/AC OK, Return
J1-6	Global Inhibit Logic 0*
J1-7	Global Inhibit Logic 1*
J1-8	Global Inhibit Return*
J1-9	Global Isolated Inhibit
J1-10	Global Isolated Inhibit Return

* Changes to Enable when option 3 selected. Global meaning all outputs.



UNIT CONNECTOR

90130-3210 gold plated (Molex)

MATING IDT HOUSING/PINS

90153-0210 gold plated (Molex)

MATING HOUSING

90142-0010 (Molex)

PINS

90119-2110 gold plated (Molex)

CONNECTOR KIT

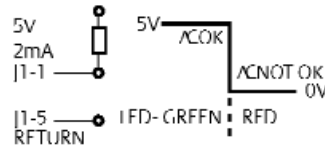
Astec P/N 70-841-004

CRIMP TOOL

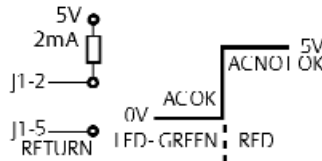
69008-0005 (Molex)

Control Signal Information

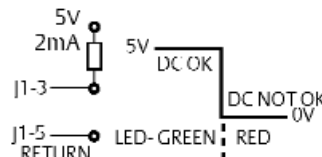
J1-1 AC OK / Logic 1



J1-2 AC OK / Logic 0

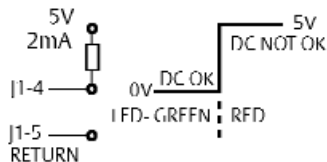


J1-3 Global DC OK / Converter Running Logic 1



NOTE: "DC OK/Converter Running" signals are OR'ed together internally. If any one module fails, the LED on the affected module will be red and the logic signal will indicate 'DC NOT OK'.

J1-4 Global DC OK / Converter Running Logic 0

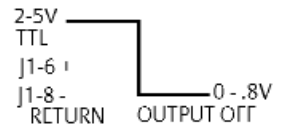


NOTE: "DC OK/Converter Running" signals are OR'ed together internally. If any one module fails, the LED on the affected module will be red and the logic signal will indicate 'DC NOT OK'.

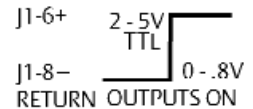
J1-5* Global DC/OK, Converter running, AC OK Return

* Note: J1-5, J1-8, J1-10 returns are isolated (floating), and may be tied together or to any DC Output Return.

J1-6 Global Inhibit Logic "0"

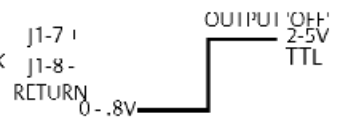


J1-6 Global Enable Logic "0" (Option 3)

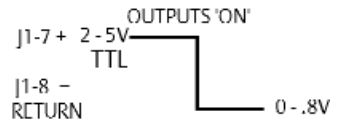


NOTE: If an external source is not available short pin 6 to pin 8 to enable outputs "ON".

J1-7 Global Inhibit Logic "1"

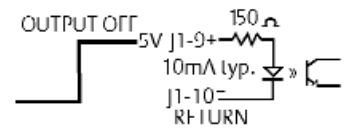


J1-7 Global Enable Logic "1" (Option 3)

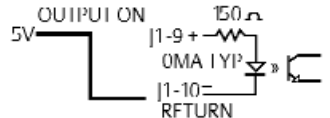


J1-8* Global Inhibit / Enable Return

J1-9 Isolated Global Inhibit



J1-9 Isolated Global Enable (Option 3)



J1-10* Isolated Global Inhibit / Enable Return

Installation & Application Notes

DC/DC Converter Output Modules

Single Output Module

Control Signal Information
A, B, C, D, K or L Modules

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 Logic
J1-7	DC OK / Converter Running / Isolated Inhibit Return

J1-8 Single Wire Parallel
J1-9 Spare Pin
J1-10 Spare Pin
DC OK signals are open collector and require pull up resistor to external source, 5-30V/ 2ma max.

Multiple Output Module

Control Signal Information
E, F, G, and H Modules

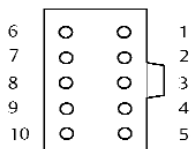
J1 Control Connector

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	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

J2 Control Connector

Pin No.	Function
J2-1	V2 +Remote Sense
J2-2	V2 Remote Margin
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
J2-8	V3 Remote Margin Hi
J2-9	V3 -Remote Sense / Margin Lo
J2-10	V3 DC OK Logic 1

*Inhibits all of the modules outputs



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MATING HOUSING

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PINS

90119-2110 gold plated (Molex)

CONNECTOR KIT

Astec P/N 70-841-004

CRIMP TOOL

69008-0005 (Molex)

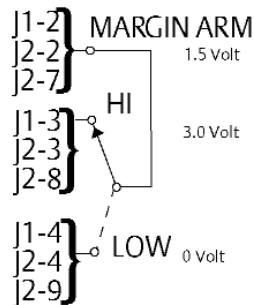
Control Signal Information

J1-1 +Remote Sense
J1-4 -Remote Sense

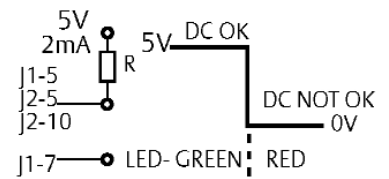
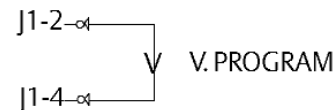
Compensates for up to 0.5V drop. Recommend shielded twisted pair wire.

Remote Margining

4-6% of nominal output voltage. Margin will track the output voltage when V out is adjusted via front panel pot or pots.

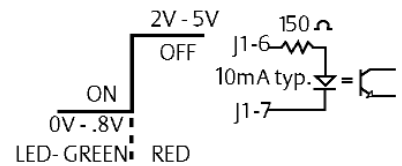


Voltage Programming



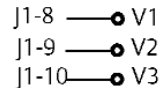
DC OK / Converter running "OR"ed together internally.

Isolated Inhibit
Output is "ON" with low or open



Can be used for external output sequencing in multi-output units.

Single Wire Parallel



Can also be used as a relative current monitor using proportional voltage: 2-6V, High impedance, do not load this pin, use buffer.

NOTE: When individual unit outputs are in parallel the SWP's lines are tied together. This provides forced current sharing of the outputs. Not required for paralleled modules within a unit.

Special Application Notes

Multiple Output Modules

- 1) An OVP condition on V2 or V3, will "latch" off the entire module. Recycle the AC input to reset. V1 is main output forward converter V2, V3 Sub regulated current mode magamp outputs.
- 2) V2 and V3 return for DC OK is (-)remote sense.
- 3) When the main output of a multi output module is paralleled with the main of a 600W or 1200W single a 10% minimum load is required.

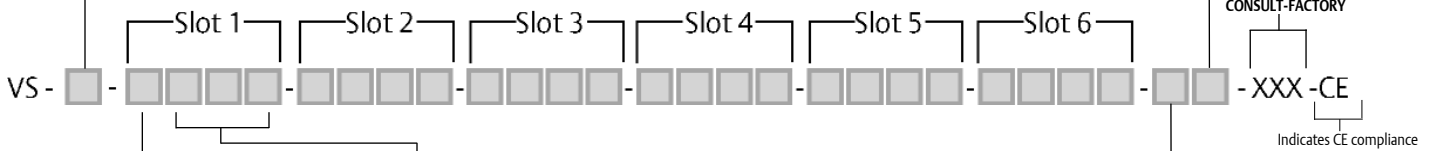
Installation & Application Notes

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

Option Code

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



Output Module Code (Same for each Slot)

- 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 (Same for each Slot)

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

- 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.

Parallel Code

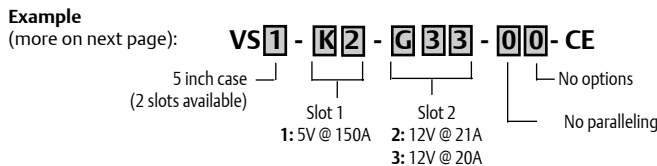
VS1 and VS6 available slots

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



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	2V	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	5V	60 A	120 A	180 A	240 A	25 A	50 A	150 A	300 A
3	12V	25 A	50 A	75 A	100 A	10.5 A	21 A	62.5 A	125 A
4	15V	20 A	40 A	60 A	80 A	8.3 A	16.6 A	50 A	100 A
5	24V	12.5 A	25 A	37.5 A	50 A	5.3 A	10.5 A	31.2 A	62.4 A
6	28V	10.7 A	21.4 A	32.1 A	42.8 A	4.5 A	9 A	26.7 A	53.4 A
7	36V	8.3 A	16.6 A	24.9 A	33.2 A	N/A	N/A	20.8 A	41.6 A
9	48V	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).

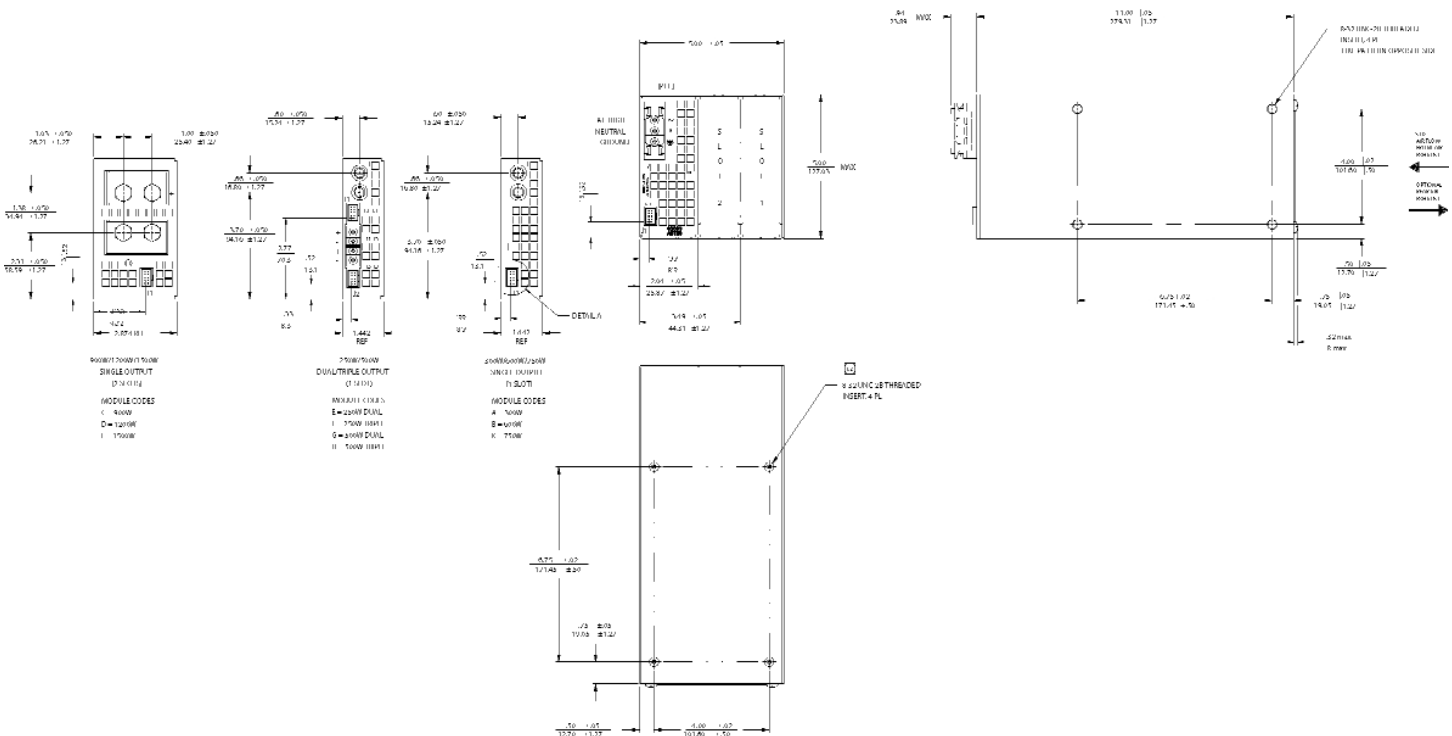
Auxiliary Output Table: Output(s) 2 and/or 3 of Module

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	2V	10 A	5 A	20 A	10 A
1	3.3 V	10 A	5 A	20 A	10 A
2	5V	10 A	5 A	20 A	10 A
3	12V	10 A	5 A	20 A	10 A
4	15V	10 A	5 A	20 A	10 A
5	24V	5 A	2.5 A	10 A	5 A
6	28V	5 A	2.5 A	10 A	5 A

Installation & Application Notes

Mechanical Drawings

VS1 and VS6: 5-Inch Case Size (5" x 5" x 11")
(12 lbs. max)



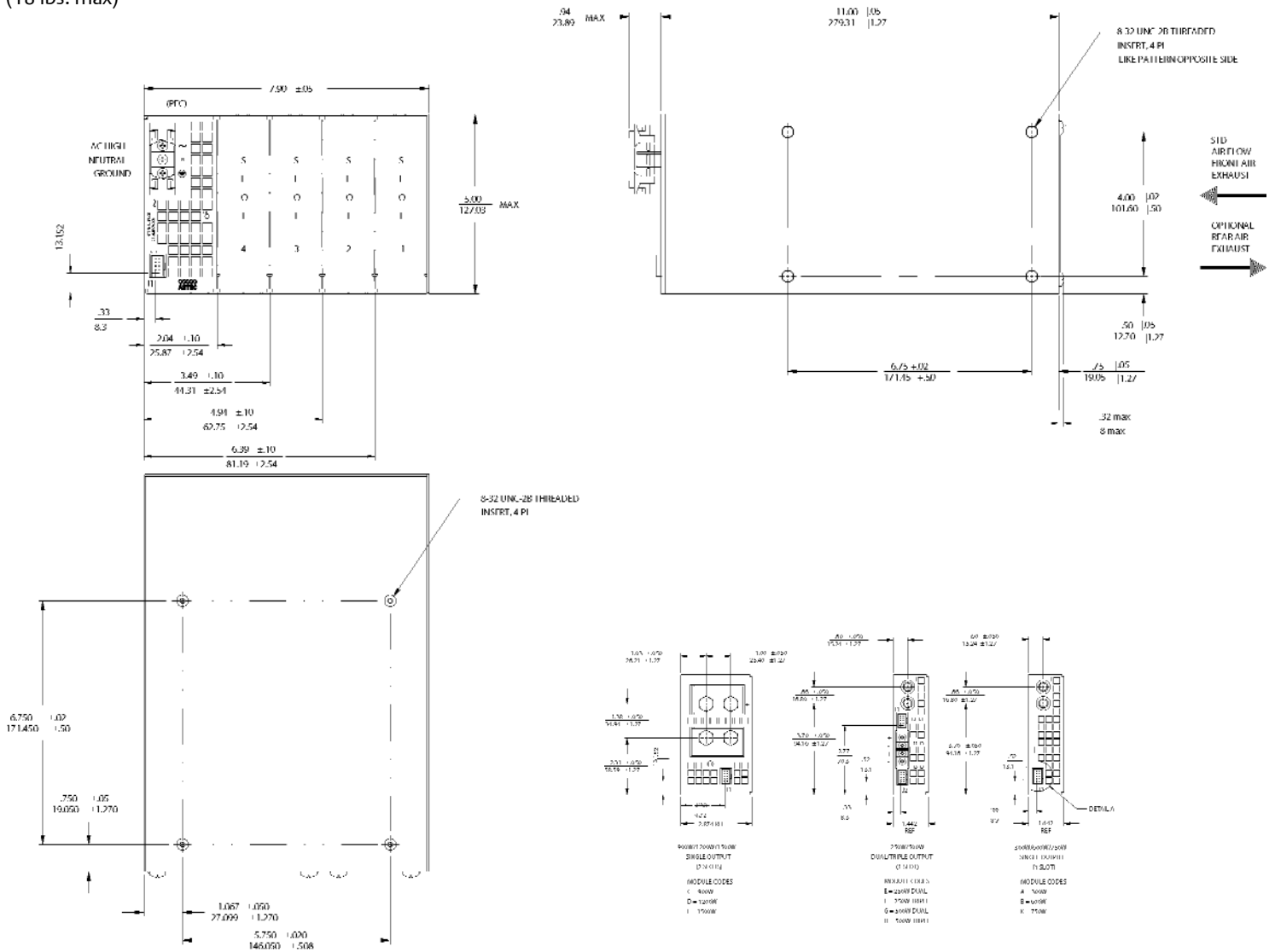
Mechanical / Electrical Hook-up Notes

- Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). For VS1 & VS3, additional GND CONN added for VS6 & VS8. Max torque: 6 in-lbs (0.67 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: 6 in-lbs (0.67 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 four 8-32 clinch nuts on three surfaces. 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 (upside down).
- Fan: (1) 4.5" dia, 112 CFM (no load), 49 dBA.
- All dimensions are in inches (mm).

Installation & Application Notes

Mechanical Drawings

VS3 and VS8: 8-Inch Case Size (5" x 8" x 11")
(18 lbs. max)



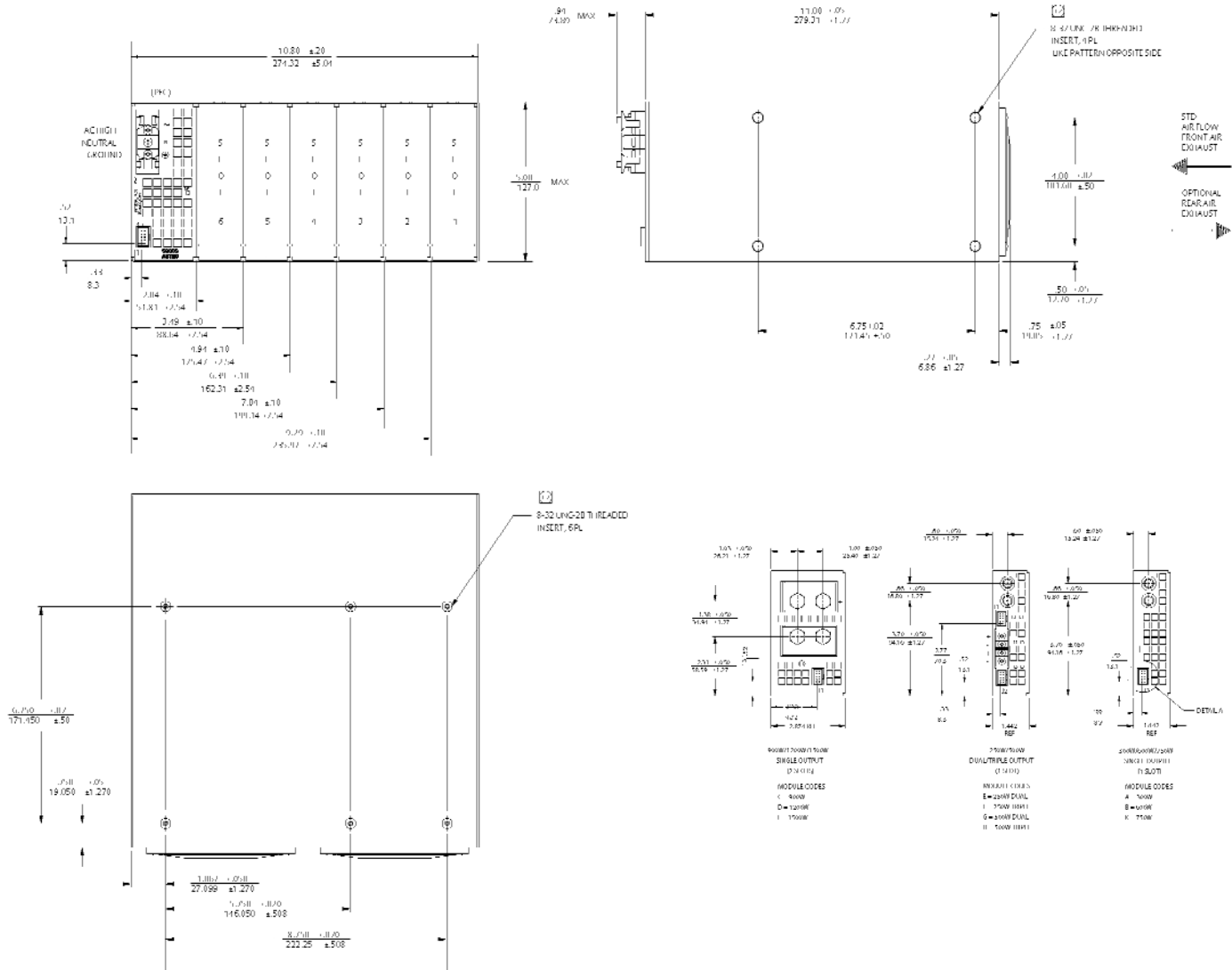
Mechanical / Electrical Hook-up Notes

- Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers). For VS1 & VS3, additional GND CONN added for VS6 & VS8. Max torque: 6 in-lbs (0.67 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: 6 in-lbs (0.67 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 four 8-32 clinch nuts on three surfaces. 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 (upside down).
- Fans: (1) 4.5" dia, 112 CFM (no load), 49 dBA.
- All dimensions are in inches (mm).

Installation & Application Notes

Mechanical Drawings

VS4 and VS9 : 11-Inch Case Size (5" x 11" x 11")
(25 lbs. max)



Mechanical / Electrical Hook-up Notes

- Input: Barrier type. Three No. 6-32 B.H. screws (0.375" centers) for VS4, additional GND CONN added for 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 finish.
- Adjustment access: voltage, power fail, and overcurrent from front panel.
- Bar code: code 39 extended.
- Mounting: four 8-32 clinch nuts on two side surfaces. Six 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 (upside down).
- Fans: (2) 4.5" dia, 112 CFM (no load), 49 dBA.
- All dimensions are in inches (mm).

Installation & Application Notes

APPENDIX A INSTALLATION AND OPERATING INSTRUCTIONS FOR VS SERIES

To comply with the published safety standards, the following must be observed when using this power supply.

Um den zur Zeit gültigen Sicherheitsbestimmungen zu genügen, müssen die nachstehenden Maßnahmen beim Einsatz dieser Netzgeräte berücksichtigt werden.

1. Maximum ambient temperature around the power supply must not exceed 50 deg. C.
Das Netzgerät darf bis zu einer Umgebungstemperatur von max 50 grad C eingesetzt werden
2. The power supply is intended for use as a component part of other equipment. When installing the power supply and making input and output connections, the relevant safety standards e.g. UL 1950; IEC950; EN 60 950; VDE 0805; CSA C22.2 No 234; must be complied with, especially the requirements for creepage distances, clearances and distance through insulation between primary wiring and earth or secondary (SELV) wiring. Unit has high leakage current at 400Hz and requires special marking and reliable grounding.
Ein Netzgerät im Einbau in ein entsprechendes Gerät und bei Herstellung der elektrischen Verbindungen in und am Gerät muss man die einschlägigen Bestimmungen wie z.B. UL 1950; IEC 950; EN 60 950; VDE 0805; CSA C22.2; No. 234 beachten und einzuhalten, insbesondere die Anforderungen fZz Kriech und Luftstrecken in Dicke der Isolation zwischen Primär und Schutzleiter- Kreis und Primär zum Sekundärstromkreis (SELV-Kreis).
3. The output power taken from the supply must not exceed the rating given on the power supply.
Die Ausgangsleistung darf die auf dem Netzgerät angegebene Werte nicht übersteigen.
4. The circuit wiring of the power supply is made in such a way that components like capacitors are positioned in front of the power supply fuse. Therefore the unit must be protected by a fuse in the installation system.
Die Schaltung des Netzgerätes ist so ausgelegt, daß Bauteile wie Kondensatoren vor der Sicherung des Netzgerätes liegen. Aus diesem Grunde muß unbedingt darauf geachtet werden, daß das Gerät durch eine Sicherung in der Installation abgesichert ist.
5. This power supply is a table model and is used for office machines and data processing appliances. It is certified according to the relevant safety standards IEC 950, EN 60 950, UL 1950 and CSA C22.2 No. 234.
Dieses Netzgerät ist ein Tischgerät und dient zur Spannungsversorgung von Büromaschinen und Datenverarbeitungsgeräten. Es ist geprüft nach den einschließlichen Bestimmungen IEC 950, EN 60 950, UL 1950 und CSA C22.2 No. 234.
6. This power supply is suitable for different rated voltages. The switch over to the corresponding rated voltage which belongs to the specific appliance is done automatically in the appliance.
Dieses Netzgerät ist für verschiedene Nennspannungen geeignet. Die Anpassung an die jeweilige Netzspannung, an die das Gerät angeschlossen ist, erfolgt automatisch im Gerät.
7. To maintain protection against electric shock if the pins of the input plug are touched, it is absolutely necessary that an all pole switch be used when the power supply is built in.
Damit der Schutz gegen elektrischen Schlag beim berührung von Steckerstiften gewährleistet ist, ist unbedingt darauf zu achten, daß dieses Netzgerät nach dem Einbau nur mit einem allpoligen Schalter betrieben wird.
8. The power supply is approved and certified for the rated voltage range 200-250 V.
Dieses Netzgerät ist für den Spannungsbereich 100-250V geprüft und genehmigt.
9. The disconnection from line voltage is made by pulling the main plug.
Die Trennung vom Netz erfolgt durch Ziehen des Netzsteckers.
10. The fuse F1 should only be replaced by type KLK25, 25A, 600V, manufacturer: Littelfuse.
Die Sicherung F1 darf nur durch den Typ KLK25, 25A, 600V, Hersteller Littelfuse ersetzt werden.
11. The earth wire must be connected only to the earthing point which is marked with the earth symbol. If the earth wire is connected by a screw, the wire must have an annular eyelet and has to be adequately locked against accidental loosening.
Der Schutzleiter muß an der mit dem Schutzleitersymbol bezeichneten Stelle angeschlossen werden. Bei Schraubanschluß der Schutzleiter mit einer Ringöse zu versehen und muß gegen Lockern gesichert sein.
12. The power supply should be connected to the network only with a power supply cord, capable to carry 15A by 230V.
Der Anschluß an das Netz soll mit einem Netzkabel und Stecker vorgenommen werden, die für 15A bei 230V geeignet sind.
13. This power supply is designed for TN-S-power system.
Dieses Gerät ist geeignet für TN-S netzwerke.
14. The switch indication of On/Off position must be provided at the end use system.
Die "EIN/AUS" Position des Netzshalters muß am Endsystem angebracht werden.
15. This unit contains secondary outputs exceeding 240 VA. When installing into the end system care must be taken that those secondary outputs and the appropriate wire may not be touched.
Das Netzgerät hat Sekundärausgänge mit Leistungen über 240 VA. Beim Einbau in das Endsystem ist darauf zu achten, daß diese Sekundärausgänge und die dazugehörigen Leitungen nicht berührt werden können.
16. For safe operation, the unit must be protected by a fuse in the installation system.
Zum sicheren Betrieb muß eine Installationssicherung vor dem Netzgerät geschaltet sein.
17. The AC line input mating connector used in end system must be designed in such a way that it cannot be accidentally connected to, or interchanged with, the secondary output of the power supply.
Im Endsystem ist darauf zu achten, daß der AC-Anschlußstecker mechanisch so gestaltet ist, daß er nicht mit dem sekundär Anschlußstecker verwechselt b.z.w. vertauscht werden kann.
18. This power supply is part of an EDP-system. It is not equipped with a power cord. A safety agency (e.g. UL, CSA, VDE) approved power cord and plug, with appropriate wire gauge for the rated input current, must be provided together with EDP-system by the end system manufacturer.
Dieses Netzteil ist Teil eines EDP-Systems. Es ist nicht mit einer Netzanschlußleitung ausgestattet. Eine für den Eingangsstrom entsprechend zugelassene (UL, CSA, VDE) Netzanschlußleitung mit Netzstecker muß vom End System Hersteller bereitgestellt werden.