

High Voltage AC-DC

MODULAR
REGULATED

Output ranges:

0-1 kVdc to 0-30 kVdc

- Shipped Within 6 Days
- Five Year Warranty
(internal encapsulated module - One Year)

These modular High Voltage supplies may be used as constant voltage or constant current sources. They may be remotely programmed by means of either voltage or resistance, and have provisions for remote monitoring and output inhibiting. All control and monitoring connections are on a pluggable terminal block that functions as a connector, providing wiring convenience and permitting easy and rapid connect/disconnect. Outputs are protected for short circuit and short term arcing.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Polarity: Positive output is standard. For negative output, change first letter of model number from P to N.

Regulation (constant voltage operation):

Line: $\pm 0.05\%$

Load: $\pm 0.05\%$

Regulation (constant current operation):

Line: $\pm 0.1\%$

Load: $\pm 0.1\%$ plus 50 μA .

Ripple: 0.05%, peak-to-peak.

Output Controls: Voltage and current may be controlled by means of two 20-turn front panel adjustments, or by using remotely located 1000 ohm potentiometers.

Output Programming: Output voltage and current may be programmed from 0 to full rating by means of control voltage inputs of 0 to +5.1 Vdc.

Voltage Monitor Terminal: Permits monitoring output voltage, stepped down by ratio shown. Accuracy is 2% of maximum rated output voltage.

Current Monitor Terminal: Permits monitoring output current at mV/mA ratio shown. Accuracy is 2% of maximum rated output current.

Inhibit Terminal: Grounding inhibits output.

Input Protection: "Soft start" circuit minimizes start-up power stresses.

Output Protection: Current regulation circuit protects power supply from short circuits, overload, and arcing.

Efficiency: Greater than 70% at full load.

Response Time: Less than 5 mS for 100 μA load step change.



Stability: 0.05% over eight hours, after 30 minute warmup.

Temperature Coefficient: 200 PPM/ $^{\circ}\text{C}$ = 0.02%/ $^{\circ}\text{C}$ (Typical).

Ambient Operating Temperature: -10 to $+60^{\circ}\text{C}$. No derating required.

Storage Temperature: -20 to $+85^{\circ}\text{C}$.

Humidity: Maximum of 90% relative, non-condensing.

Connections: 24" flying lead for high side of output and 5-way binding post for return (ground) are at the rear. AC input connections on separate terminal strip. All other connections on pluggable terminal block.

Mounting: Threaded mounting holes permit mounting to a chassis, cabinet wall or bracket, or they may be used on a test bench or tabletop. To mount from the power supply side of the mounting surface, see accessory Mounting Kit GB8 on page H3.

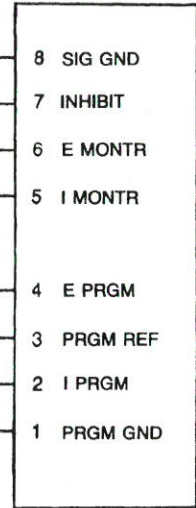
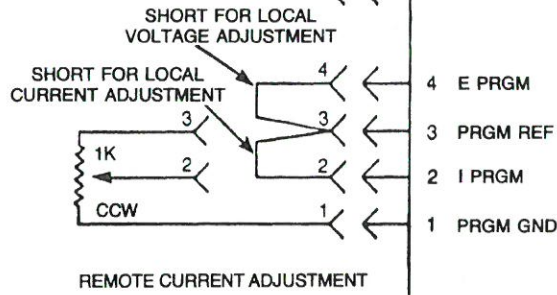
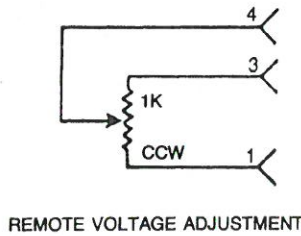
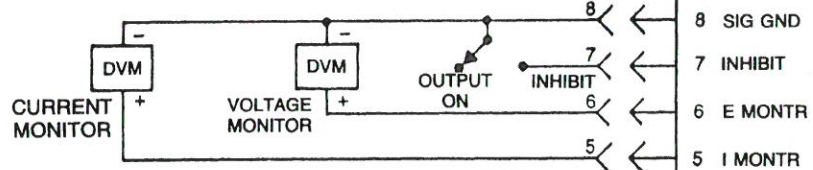
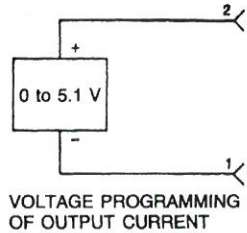
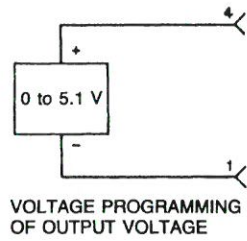
OPTIONS

Terminal Strip Cover: Clips on AC input terminal strip. To order, add suffix "M" to model number.

Output Connector: Models with an output of 5000 volts or less can be provided with an MHV connector (and 8' long detachable shielded output cable with mating MHV connector installed on one end) instead of the flying lead. To order, add suffix letter "T" to the model number.

230 Volt Input: For operation on inputs of 210-250 VAC, 50-400 Hz, single phase. To order, add suffix "-230" to model number. The "-230" option requires two additional days.

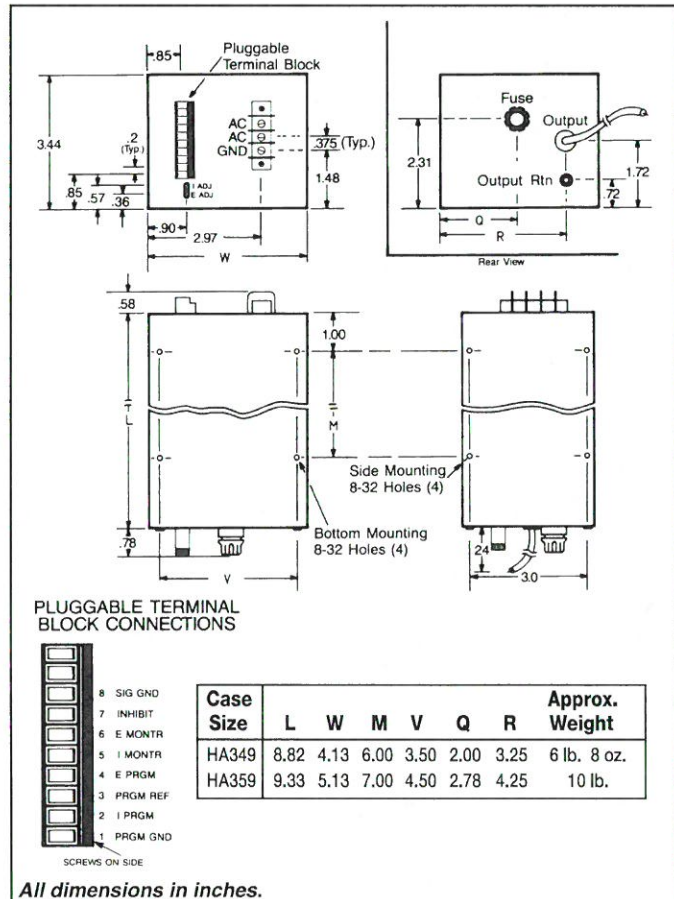
REMOTE PROGRAMMING AND MONITORING



AC-DC MODELS

Output Range kVdc	Output Current mA	Output Monitor Ratio		Model (Positive Output)*	Case Size
		Voltage	Current mV/mA		
0-1	30	1,000:1	100:1	P01HA30	HA349
0-1	60	1,000:1	10:1	P01HA60	HA359
0-1.5	20	1,000:1	100:1	P01.5HA20	HA349
0-1.5	40	1,000:1	100:1	P01.5HA40	HA359
0-2	15	1,000:1	100:1	P02HA15	HA349
0-2	30	1,000:1	100:1	P02HA30	HA359
0-2.5	12	1,000:1	100:1	P02.5HA12	HA349
0-2.5	24	1,000:1	100:1	P02.5HA24	HA359
0-3.5	8.5	1,000:1	100:1	P03.5HA8.5	HA349
0-3.5	17	1,000:1	100:1	P03.5HA17	HA359
0-5	6	10,000:1	100:1	P05HA6	HA349
0-5	12	10,000:1	100:1	P05HA12	HA359
0-7.5	4	10,000:1	100:1	P07.5HA4	HA349
0-7.5	8	10,000:1	100:1	P07.5HA8	HA359
0-10	3	10,000:1	1,000:1	P010HA3	HA349
0-10	6	10,000:1	100:1	P010HA6	HA359
0-12	2.5	10,000:1	1,000:1	P012HA2.5	HA349
0-12	5	10,000:1	100:1	P012HA5	HA359
0-15	2	10,000:1	1,000:1	P015HA2	HA349
0-15	4	10,000:1	100:1	P015HA4	HA359
0-18	1.6	10,000:1	1,000:1	P018HA1.6	HA349
0-18	3.2	10,000:1	1,000:1	P018HA3.2	HA359
0-20	1.5	10,000:1	1,000:1	P020HA1.5	HA349
0-20	3	10,000:1	1,000:1	P020HA3	HA359
0-22	1.3	10,000:1	1,000:1	P022HA1.3	HA349
0-22	2.6	10,000:1	1,000:1	P022HA2.6	HA359
0-25	1.2	10,000:1	1,000:1	P025HA1.2	HA349
0-25	2.4	10,000:1	1,000:1	P025HA2.4	HA359
0-30	1	10,000:1	1,000:1	P030HA1	HA349
0-30	2	10,000:1	1,000:1	P030HA2	HA359

* Positive output is standard. For negative output, change first letter of model number from P to N.



High Voltage DC-DC

MODULAR
REGULATED

Output ranges:

0-1 kVdc to 0-30 kVdc

- Shipped Within 6 Days
- Five Year Warranty
(internal encapsulated module - One Year)

DC inputs from 21.6 to 32.0 volts may be used for these versatile power supplies. Although their outputs are continuously adjustable from 0 to their maximum ratings, 20-turn controls permit precise setability.

These supplies have been designed to withstand severe arcing and short circuits without damage. They are ruggedly constructed with quality components to provide many years of reliable service.

SPECIFICATIONS

Input Voltage: +21.6 to 32.0 Vdc.

Output Polarity: Positive output is standard. For negative output, change first letter of model number from P to N.

Regulation (constant voltage operation):

Line: $\pm 0.05\%$

Load: $\pm 0.05\%$

Regulation (constant current operation):

Line: $\pm 0.1\%$

Load: $\pm 0.1\%$ plus 50 μ A.

Ripple: 0.05%, peak-to-peak.

Output Controls: Voltage and current may be controlled by means of two 20-turn front panel adjustments, or by using remotely located 1000 ohm potentiometers.

Output Programming: Output voltage and current may be programmed from 0 to full rating by means of control voltage inputs of 0 to +5.1 Vdc.

Voltage Monitor Terminal: Permits monitoring output voltage, stepped down by ratio shown. Accuracy is 2% of maximum rated output voltage.

Current Monitor Terminal: Permits monitoring output current at mV/mA ratio shown. Accuracy is 2% of maximum rated output current.

Inhibit Terminal: Grounding inhibits output.

Input Protection: "Soft start" circuit minimizes start-up power stresses.

Output Protection: Current regulation circuit protects power supply from short circuits, overload, and arcing.



Efficiency: Greater than 70% at full load.

Response Time: Less than 5 ms for 100 μ A load step change.

Stability: 0.05% over eight hours, after 30 minute warmup.

Temperature Coefficient: 200 PPM/ $^{\circ}$ C = 0.02%/ $^{\circ}$ C (Typical).

Ambient Operating Temperature: -10 to $+60^{\circ}$ C. No derating required.

Storage Temperature: -20 to $+85^{\circ}$ C.

Humidity: Maximum of 90% relative, non-condensing.

Connections: 24" flying lead for high side of output and 5-way binding post for return (ground). All other connections on pluggable terminal block.

Mounting: Threaded mounting holes permit mounting to a chassis, cabinet wall or bracket, or they may be used on a test bench or tabletop. To mount from the power supply side of the mounting surface or for DIN rail mounting, see accessory Mounting Kits on page H3.

OPTIONS

Output Connector: Models with an output of 5000 volts or less can be provided with an MHV connector (and 8 long detachable shielded output cable with mating MHV connector installed on one end) instead of the flying lead. To order, add suffix letter "T" to the model number.

OPTIONAL OUTPUT CONNECTOR

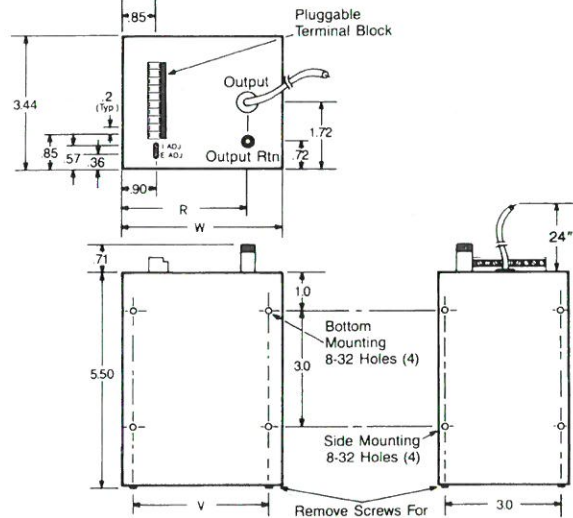
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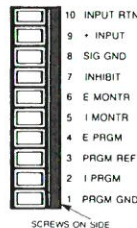
DC-DC MODELS

Output Range kVdc	Output Current mA	Output Monitor Ratio		Model (Positive Output) *	Case Size
		Voltage	Current mV/mA		
0-1	30	1,000:1	100:1	P01HD30	HD345
0-1	60	1,000:1	10:1	P01HD60	HD355
0-1.5	20	1,000:1	100:1	P01.5HD20	HD345
0-1.5	40	1,000:1	100:1	P01.5HD40	HD355
0-2	15	1,000:1	100:1	P02HD15	HD345
0-2	30	1,000:1	100:1	P02HD30	HD355
0-2.5	12	1,000:1	100:1	P02.5HD12	HD345
0-2.5	24	1,000:1	100:1	P02.5HD24	HD355
0-3.5	8.5	1,000:1	100:1	P03.5HD8.5	HD345
0-3.5	17	1,000:1	100:1	P03.5HD17	HD355
0-5	6	10,000:1	100:1	P05HD6	HD345
0-5	12	10,000:1	100:1	P05HD12	HD355
0-7.5	4	10,000:1	100:1	P07.5HD4	HD345
0-7.5	8	10,000:1	100:1	P07.5HD8	HD355
0-10	3	10,000:1	1,000:1	P010HD3	HD345
0-10	6	10,000:1	100:1	P010HD6	HD355
0-12	2.5	10,000:1	1,000:1	P012HD2.5	HD345
0-12	5	10,000:1	100:1	P012HD5	HD355
0-15	2	10,000:1	1,000:1	P015HD2	HD345
0-15	4	10,000:1	100:1	P015HD4	HD355
0-18	1.6	10,000:1	1,000:1	P018HD1.6	HD345
0-18	3.2	10,000:1	1,000:1	P018HD3.2	HD355
0-20	1.5	10,000:1	1,000:1	P020HD1.5	HD345
0-20	3	10,000:1	1,000:1	P020HD3	HD355
0-22	1.3	10,000:1	1,000:1	P022HD1.3	HD345
0-22	2.6	10,000:1	1,000:1	P022HD2.6	HD355
0-25	1.2	10,000:1	1,000:1	P025HD1.2	HD345
0-25	2.4	10,000:1	1,000:1	P025HD2.4	HD355
0-30	1	10,000:1	1,000:1	P030HD1	HD345
0-30	2	10,000:1	1,000:1	P030HD2	HD355

* Positive output is standard. For negative output, change first letter of model number from P to N.



PLUGGABLE TERMINAL BLOCK CONNECTIONS



Case Size	W	V	R	Approx. Weight
HD345	4.13	3.50	3.25	2 lb.
HD355	5.13	4.50	4.25	2 lb. 12 oz.

All dimensions in inches.

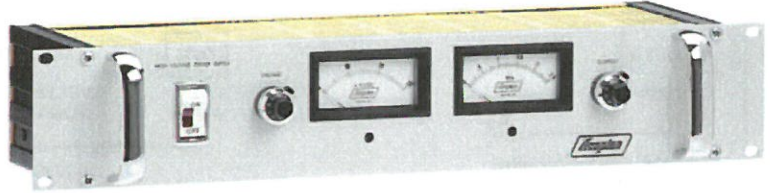
High Voltage AC-DC

RACK MOUNTING
REGULATED

Output ranges:

0-1 kVdc to 0-30 kVdc

- Shipped Within 9 Days
- Five Year Warranty
(internal encapsulated module - One Year)



Ideal for laboratory and instrumentation applications, these rack mounting supplies have the same output ratings and specifications as the modular supplies shown on pages 70 and 71, but additionally feature calibrated ten-turn controls (with locking vernier dials) for precisely setting voltage and current. Voltmeter, ammeter and handles are standard. An 8' long shielded output cable is included.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Input Current:

30 watt output ratings: 0.6A
60 watt output ratings: 1.2A

Output Polarity: Positive output is standard. For negative output, change first letter of model number from P to N.

Regulation (constant voltage operation):

Line: $\pm 0.05\%$
Load: $\pm 0.05\%$

Regulation (constant current operation):

Line: $\pm 0.1\%$
Load: $\pm 0.1\%$ plus 50 μ A.

Ripple: 0.05%, peak-to-peak.

Output Controls: Voltage and current may be controlled by means of two 10-turn front panel adjustments with locking vernier dials. Control linearity is 1% of full rated output. Calibration accuracy is 1% of rated output plus 1% of setting. (Remotely located 1000 ohm potentiometers may alternately be used for output control.)

Metering: Voltmeter and ammeter are standard. Accuracy is 2% of full scale.

Voltage Monitor Terminal: Permits remote monitoring of output voltage, stepped down by ratio shown. Accuracy is 2% of maximum rated output voltage.

Current Monitor Terminal: Permits remote monitoring of output current, at mV/mA ratio shown. Accuracy is 2% of maximum rated output current.

Inhibit Terminal: Grounding inhibits output.

Input Protection: "Soft start" circuit minimizes start-up power stresses.

Output Programming: Output voltage and current may be programmed from 0 to full rating by means of control voltage inputs of 0 to +5.1 Vdc, $\pm 2\%$.

Output Protection: Current regulation circuit protects power supply from short circuits, overload, and arcing.

Response Time: Less than 5 mS for 100 μ A load step change.

Stability: 0.05% over eight hours, after 30 minute warmup.

Temperature Coefficient: 200 PPM/ $^{\circ}$ C = 0.02%/ $^{\circ}$ C (Typical).

Ambient Operating Temperature: -10 to $+60^{\circ}$ C. No derating required.

Storage Temperature: -20 to $+85^{\circ}$ C.

Humidity: Maximum of 90% relative, non-condensing.

Connections:

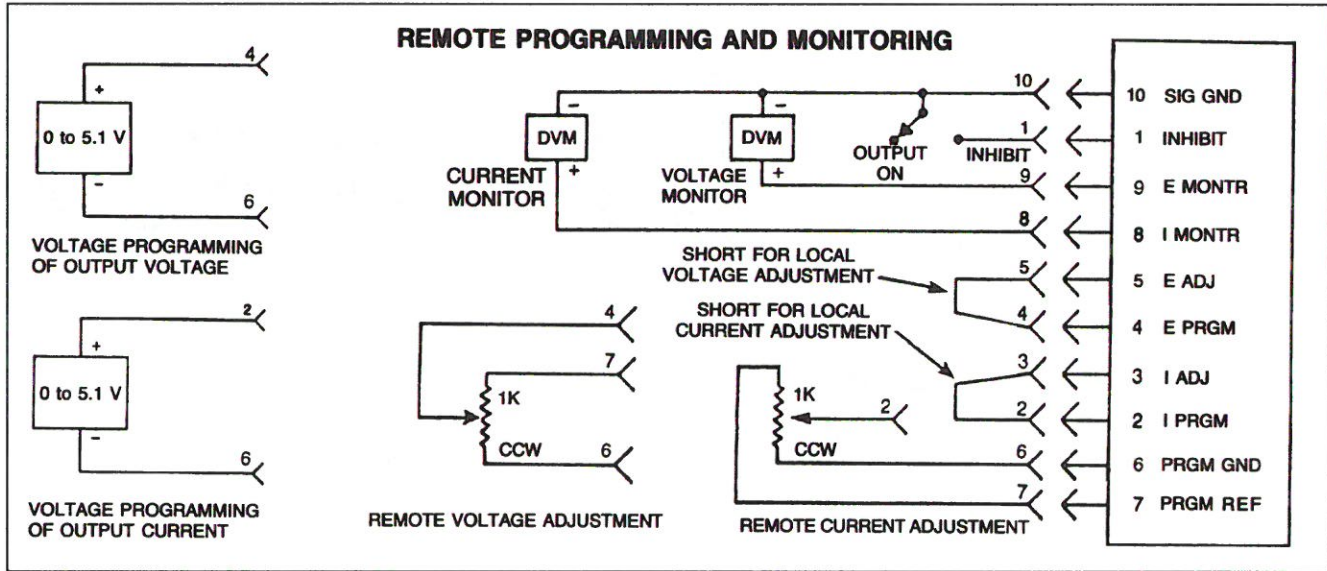
Input, Control and Monitoring: Screw terminals.

Output: High voltage connector (Type varies with model number). An 8' shielded output cable, with mating connector installed, is provided.

OPTIONS

Terminal Strip Cover: Clips on AC input terminal strip. To order, add suffix "M" to model number.

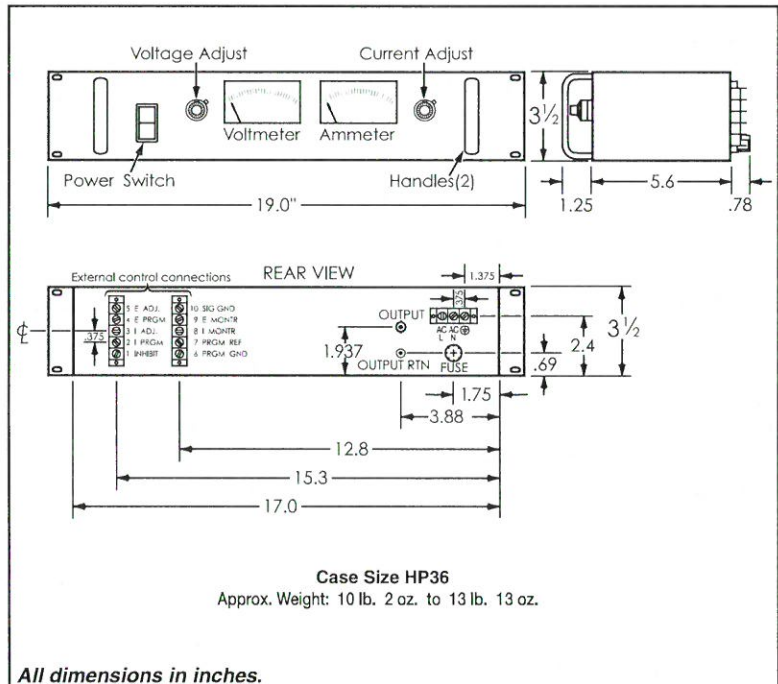
230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz, single phase. To order, add suffix "-230" to model number. The "-230" option requires two additional days.



AC-DC MODELS

Output Range kVdc	Output Current mA	Output Monitor Ratio		Model (Positive Output)*
		Voltage	Current mV/mA	
0-1	30	1,000:1	100:1	P01HP30
0-1	60	1,000:1	10:1	P01HP60
0-1.5	20	1,000:1	100:1	P01.5HP20
0-1.5	40	1,000:1	100:1	P01.5HP40
0-2	15	1,000:1	100:1	P02HP15
0-2	30	1,000:1	100:1	P02HP30
0-2.5	12	1,000:1	100:1	P02.5HP12
0-2.5	24	1,000:1	100:1	P02.5HP24
0-3.5	8.5	1,000:1	100:1	P03.5HP8.5
0-3.5	17	1,000:1	100:1	P03.5HP17
0-5	6	10,000:1	100:1	P05HP6
0-5	12	10,000:1	100:1	P05HP12
0-7.5	4	10,000:1	100:1	P07.5HP4
0-7.5	8	10,000:1	100:1	P07.5HP8
0-10	3	10,000:1	1,000:1	P010HP3
0-10	6	10,000:1	100:1	P010HP6
0-12	2.5	10,000:1	1,000:1	P012HP2.5
0-12	5	10,000:1	100:1	P012HP5
0-15	2	10,000:1	1,000:1	P015HP2
0-15	4	10,000:1	100:1	P015HP4
0-18	1.6	10,000:1	1,000:1	P018HP1.6
0-18	3.2	10,000:1	1,000:1	P018HP3.2
0-20	1.5	10,000:1	1,000:1	P020HP1.5
0-20	3	10,000:1	1,000:1	P020HP3
0-22	1.3	10,000:1	1,000:1	P022HP1.3
0-22	2.6	10,000:1	1,000:1	P022HP2.6
0-25	1.2	10,000:1	1,000:1	P025HP1.2
0-25	2.4	10,000:1	1,000:1	P025HP2.4
0-30	1	10,000:1	1,000:1	P030HP1
0-30	2	10,000:1	1,000:1	P030HP2

* Positive output is standard. For negative output, change first letter of model number from P to N.





HIGH VOLTAGE - MODULAR POWER SUPPLIES (AC-DC and DC-DC)

Standard features include constant-voltage/constant-current crossover, remote programming of both voltage and current, provision for output inhibiting, and arc/short circuit protection.

INSTALLATION AND OPERATION

Threaded holes on the bottom and one side surface may be used for mounting. DC input models may also be rear mounted using the same holes that attach the rear cover plate. An accessory Mounting Kit (model GB8) is available to enable mounting the power supply when the opposite side of the mounting surface is inaccessible. DC input models may also be DIN rail mounted using an accessory Mounting Kit (model GR35DIN).

Even a relatively small amount of air flowing around and through a power supply will significantly reduce the rise in its temperature resulting from operation, and therefore the temperature of the critical components within it, improving both reliability and stability. Avoid blocking air flow through vented surfaces. If the perforated bottom of a supply is mounted to a solid surface, use spacers at least 3/16" thick between it and the surface to which it is fastened, to permit convection air flow, or punch ventilation holes in the mounting surface. Allow free air to circulate around heat sinks. Space at least one inch away from surrounding objects.

Dc input models are protected against reversed polarity input voltage by means of a shunt diode rated at 3A for models with a 30 watt output rating, and at 6A for 60 watt models. External protection is recommended to limit fault currents to these values. (This also protects the DC input voltage against power supply failure.)

Do not connect the output of two or more power supplies in series or in parallel.

The high voltage output return, signal ground, programming ground and case ground, and the input return of DC input models, are common and internally connected. However, each function should be wired separately, in order to avoid ground loops and/or transients resulting from any shorting or arcing in the external wiring or the load. Note that the input voltage on the connector pin 9 of DC input models must be positive.

The power supplies are shipped from the factory wired for local (front panel) voltage and current control, and with the output set to 500 volts. Remove appropriate jumper only when remote voltage or current control is desired.

MAINTENANCE

The internal high voltage sections are encapsulated, and are not repairable. The control circuitry on the printed circuit board is repairable. Servicing the power supply with input power applied involves substantial risk of shock. If a supply is in need of repair, returning it to the factory is recommended.

CAUTION

The voltages developed by these powers supplies are high enough to cause serious electric shock.

To minimize risk of shock:

1. Make ALL connections before applying input power.
2. DO NOT remove high voltage output lead or open the high voltage return lead during operation. IN THE ABSENCE OF A SECURE HIGH VOLTAGE RETURN LEAD, TOUCHING POWER SUPPLY CASE MAY RESULT IN SHOCK.
3. Servicing the power supply with input power applied involves substantial risk of shock.
4. Performance testing requires special equipment and must be done with extreme caution.
5. To prevent power supply damage, DO NOT apply a negative polarity control voltage to the voltage or current programming terminals.
6. Do not route high voltage output lead near input or control wiring.

**ALL ACOPIAN
POWER SUPPLIES
MADE IN U.S.A.**

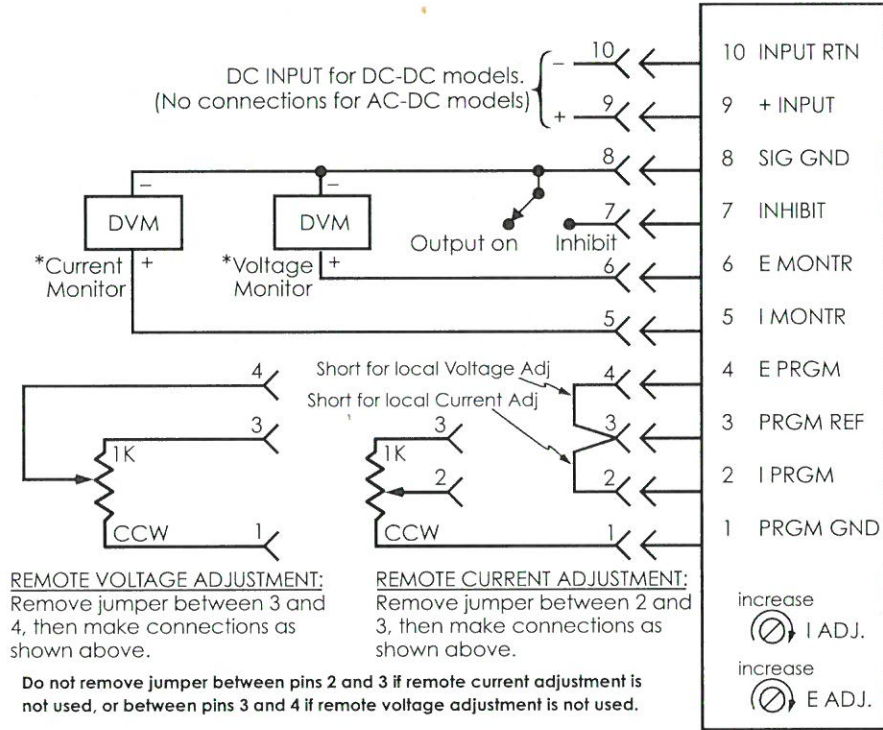


The complete Acopian catalog is available on the Internet at www.acopian.com
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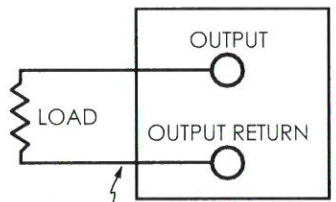


HIGH VOLTAGE - MODULAR POWER SUPPLIES (AC-DC and DC-DC)

CONNECTIONS



*When monitoring the output voltage and current by means of the monitor terminals, the use of an instrument having an input impedance of at least 10 megohms is recommended. The ratio of output voltage to monitor voltage is 1,000:1 for power supplies with maximum output voltages less than 5 kV, and 10,000:1 for supplies with the maximum outputs of 5 through 30 kV. The ratio of the voltage on the current monitor connection to the output current is 10 mV/mA for supplies with maximum current ratings greater than 40 mA, 100 mV/mA for ratings of 4 to 40 mA, and 1 V/mA for ratings less than 4 mA.



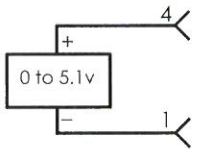
CAUTION: DO NOT open return lead while power supply is in operation

REMOTE VOLTAGE ADJUSTMENT:
Remove jumper between 3 and 4, then make connections as shown above.
Do not remove jumper between pins 2 and 3 if remote current adjustment is not used, or between pins 3 and 4 if remote voltage adjustment is not used.

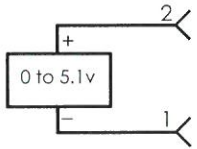
REMOTE CURRENT ADJUSTMENT:
Remove jumper between 2 and 3, then make connections as shown above.

increase
⊗ I ADJ.
increase
⊗ E ADJ.

NOTE: Use positive polarity programming voltages for both positive and negative output power supplies.



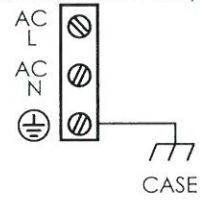
VOLTAGE PROGRAMMING OF OUTPUT VOLTAGE:
First set front panel voltage adjustment to maximum rated output voltage, then remove jumper between 3 and 4.



VOLTAGE PROGRAMMING OF OUTPUT CURRENT:
First set front panel current adjustment to maximum rated output current, then remove jumper between 2 and 3.

CAUTION: DO NOT apply negative polarity control voltage to the voltage or current program terminals.

AC INPUT for AC-DC models:
105-125 VAC, 50-400Hz (Standard)
210-250 VAC, 50-400Hz (When model number ends in -230)



OPTIONAL OUTPUT CONNECTOR

Models with an output of 5000 volts or less can be provided with an MHV connector (and 8' long detachable output cable with mating MHV connector installed on one end) instead of the flying lead. To order, add suffix letter "T" to the model number.

