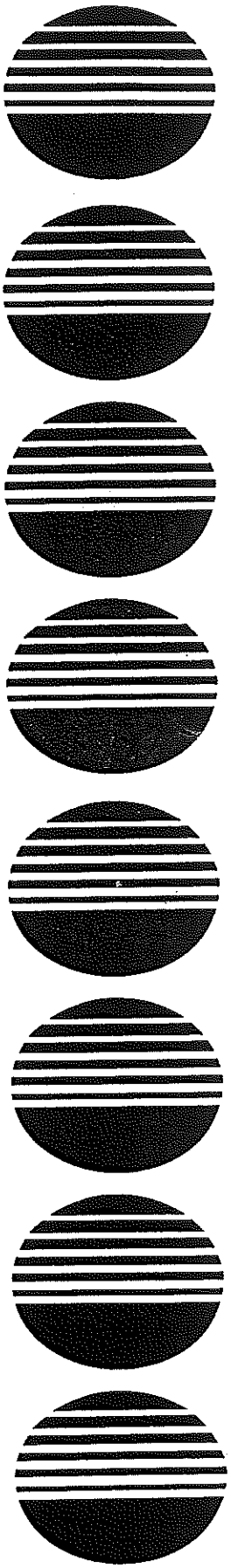
PRICE: $25.00



UNIMOD H SERIES
1200 WATT
USER-CONFIGURABLE
POWER SYSTEM

Manual No. H-493-1

UNIPOWER CORPORATION 3900 Coral Ridge Drive ▪ Coral Springs, FL 33065 ▪ 305-346-2442 ▪ FAX 305-340-7901

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UNIMOD H SERIES OPERATING MANUAL

1.0 INTRODUCTION

1.1 This Operating Manual should be read through carefully before installing and using the UNIMOD H Series Power System.

1.2 This power system is modular and configurable, with many different DC Power Modules available in addition to a Battery-Backup Module. See Fig. 1. It allows the user to quickly obtain a power supply configured to a specific requirement. The H Series provides up to 1200 watts continuous output power and is safety agency approved by UL, CSA and TUV .

The power system incorporates EMI filtering, input current limiting, autoranging, and power factor correction. The AC Power Chassis and all single-output DC Power Modules incorporate control and supervisory signal inputs and outputs for electronic systems applications. For a complete description and specifications, see the H Series product data in the Appendix.

2.0 SAFETY WARNINGS

2.1 This switching power supply has dangerous external and internal voltages. It should be handled, tested and installed only by qualified technical persons who are trained in the use of power supplies and are well aware of the hazards involved.

2.2 The AC input terminals are at dangerous voltage potentials. Do not touch this area when AC power is applied.

2.3 When operating this power system, the AC input ground terminal must be connected to safety ground to minimize electrical shock hazard and to assure low EMI (electromagnetic interference).

2.4 The internal 300 VDC power bus is at a dangerous potential. The power system cover should not be removed. There are no user-serviceable components in this unit.

3.0 WARRANTY POLICY

ALL PRODUCTS of UNIPOWER Corporation are guaranteed for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance. This warranty is extended directly by the manufacturer to the buyer and is the sole warranty applicable. EXCEPT FOR

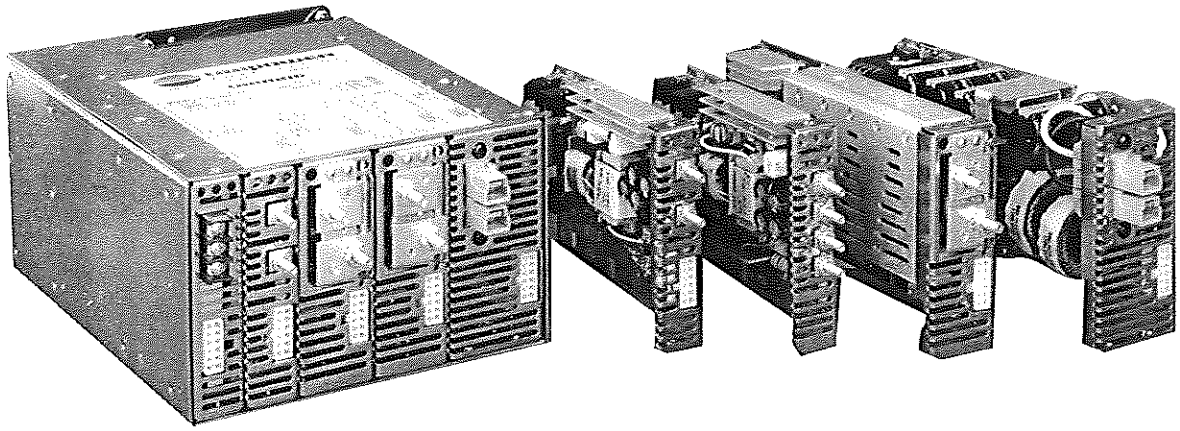


Figure 1. UNIMOD H Series Power System.

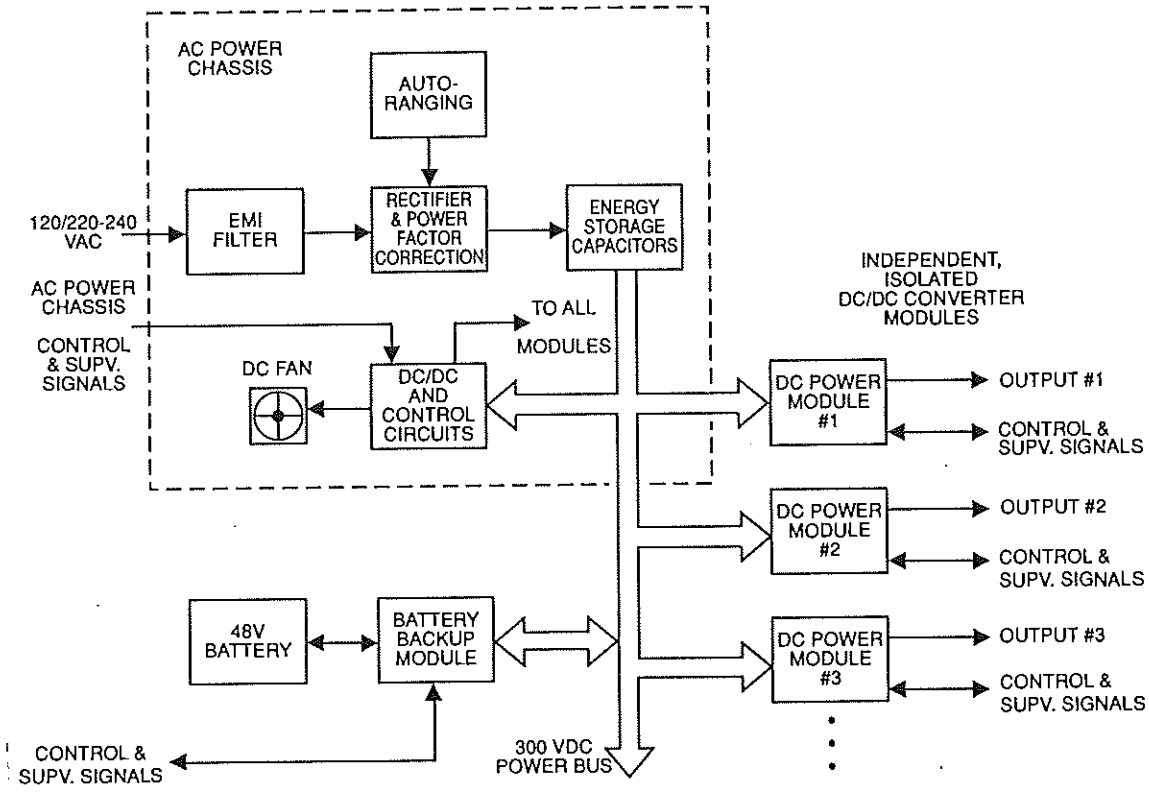


Figure 2. H Series Power System Block Diagram.

THE FOREGOING EXPRESS WARRANTY, THE MANUFACTURER MAKES NO WARRANTY, EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As the sole and exclusive remedy under this warranty, the manufacturer, at its option, may repair or replace the non-conforming product or issue credit, provided the manufacturer's inspection establishes the existence of a defect. To exercise this remedy, the buyer must contact the manufacturer's Customer Service Department to obtain a Return Material Authorization number and shipping instructions. Products returned without prior authorization will be returned to buyer. Freight charges incurred in returning the defective products will be paid by UNIPOWER. Charges incurred in returning the material will be paid by the buyer. If the buyer fails to fully comply with the foregoing, the buyer shall not be entitled to any allowance or claim with respect to such product. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property or any other incidental or consequential losses) shall be available to the buyer.

4.0 UNPACKING AND INSPECTION

4.1 This H Series Power System was carefully tested, inspected and packaged for shipment from our factory. Upon receipt of the unit it should be carefully unpacked and inspected for any damage in shipment.

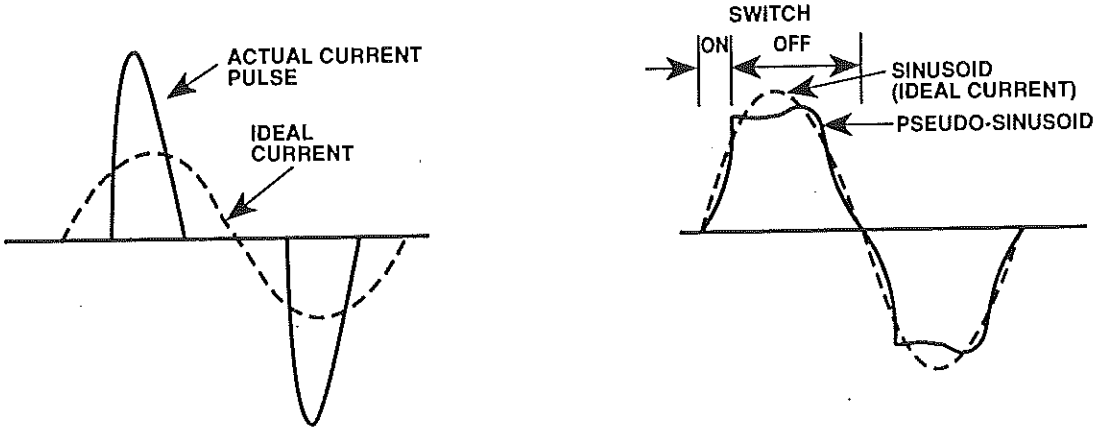
4.2 If there is evidence of damage, do not attempt to test the unit. The freight carrier should be notified immediately and a claim for the cost of the power system should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also, save the shipping carton and packing materials as evidence of damage for the freight carrier's inspection.

4.3 UNIPOWER Corporation will cooperate fully in case of any shipping damage investigation.

4.4 Always save the packing materials for later use in shipping the unit. Never ship the power system without proper packing.

5.0 DESCRIPTION OF OPERATION

5.1 **AC Power Chassis.** The UNIMOD H Series is designed as a distributed power system. See the block diagram, Fig. 2. The front end (AC Power Chassis) has an input EMI filter to suppress line noise and high frequency transients both from the AC power line and from the power system to the line. An autoranging circuit automatically selects the correct range for either 120 VAC or 220 to 240 VAC input voltages, and a power factor correction circuit (described below) maintains a high power factor. Inrush current limiting controls the initial AC input current on power up.



(a) Uncorrected

(b) Corrected to Pseudo-Sinusoid

Figure 3. **Input Current Waveforms Before and After Active, Low Frequency Power Factor Correction.**

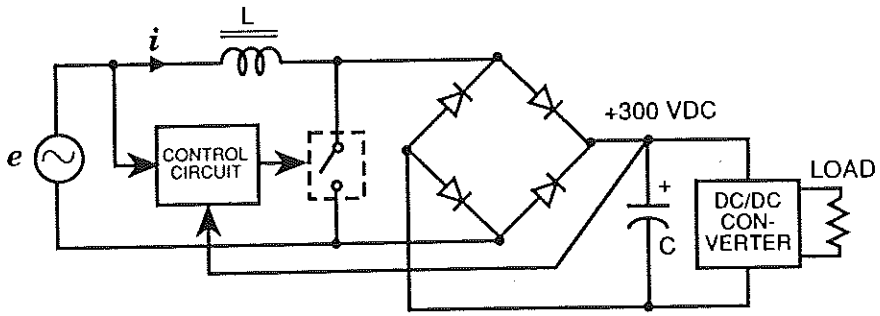


Figure 4. **Simplified Version of Circuit for Active, Low-Frequency Power Factor Correction.**

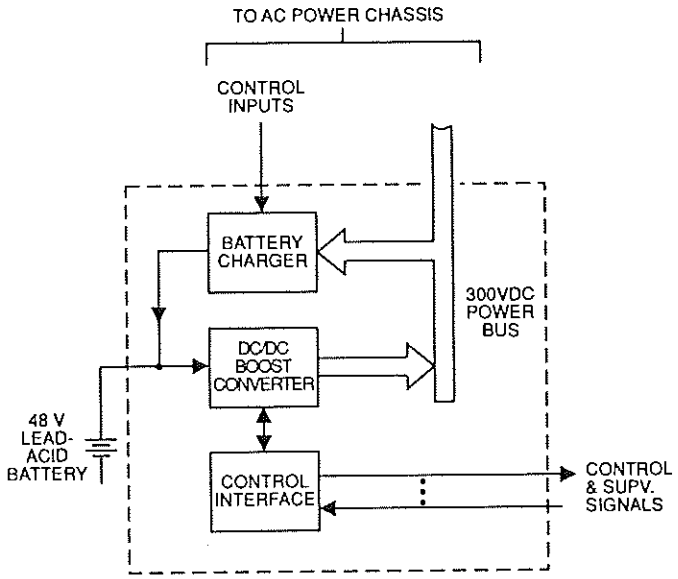


Figure 5. **Battery-Backup Module Block Diagram.**

The AC Power Chassis rectifies and filters the AC line current and provides power factor correction. The resultant 300 VDC goest to a power bus which distributes the power to each DC Power Module. The chassis has its own internal DC/DC converter which powers the control and supervisory signal circuits and the DC cooling fan.

5.2 **Power Factor Correction.** The AC Power Chassis incorporates a unique, patented power-factor correction circuit (U.S. Patent No. 4,831,508). This circuit modifies the input current waveform from a series of high amplitude current pulses to a much lower amplitude near sine wave. This substantially reduces the harmonic content of the input current to the power supply. See Fig. 3.

The technique employed is an active, low-frequency method. See Fig. 4. It operates once each half-cycle of input line current, at a 100 or 120 Hz rate. The circuit uses a control circuit and switched inductor in the rectifier and filter circuit of the AC Power Chassis. The switched inductor creates a pseudo-sinusoidal current which closely approximates a true sinusoid and substantially reduces the peak input current.

Without power-factor correction on this power system, only about 700W of output power could be safely produced from a standard 15-ampere AC circuit, and only about 930W could be safely produced from a standard 20-ampere AC circuit. With power factor correction, however, about 1000W can be safely drawn from a 15A AC circuit and more than 1200W from a 20A circuit.

5.3 **DC Power Modules.** Each DC Power Module is a DC/DC converter which converts the raw, unregulated 300 VDC from the power bus to a specific regulated DC output voltage. The converters use power MOSFETS, switching at 100 kHz, in either a half-bridge or full-bridge configuration. Each module is independent and fully isolated from the other modules, and each has output overvoltage protection and output current limiting. Each module, except for dual output modules, incorporates its own control and supervisory input and output signals.

5.4 **Battery-Backup Operation.** The Battery-Backup Module permits continuous operation of the power system when the AC input voltage is interrupted or sags below the specified input range. See Fig. 5. An external, user-supplied 48V lead-acid battery provides standby power to the system. During normal operation from the AC line, the battery charger charges the battery and maintains it in a charged state. The battery charger circuit operates off the 300 VDC power bus. When AC failure is sensed, the DC/DC boost converter is turned on, drawing current from the battery and boosting the voltage from 48 VDC to 215-220 VDC, supplying power to the high voltage power bus. This action maintains the voltage on the power bus and keeps the DC Power Modules operating, supplying rated output power to the loads.

The switchover from AC to battery power is automatic and free of transients. When AC power is restored, the power system automatically switches back to AC operation and the battery is recharged. This changeover is transparent to the outputs of the power system.

6.0 FRONT PANEL DESCRIPTION

6.1 A typical UNIMOD H Series front panel configuration is shown in Fig. 6. At the left side, the AC Power Chassis section is not a module, but is fixed to the case and is common to all H Series units. This section is one inch (25.4mm) wider when the Class B input EMI filter is ordered. The AC Power Chassis front panel has a barrier terminal strip for making the three AC input connections and a 12-pin Molex connector for connecting to the control and supervisory signal inputs and outputs.

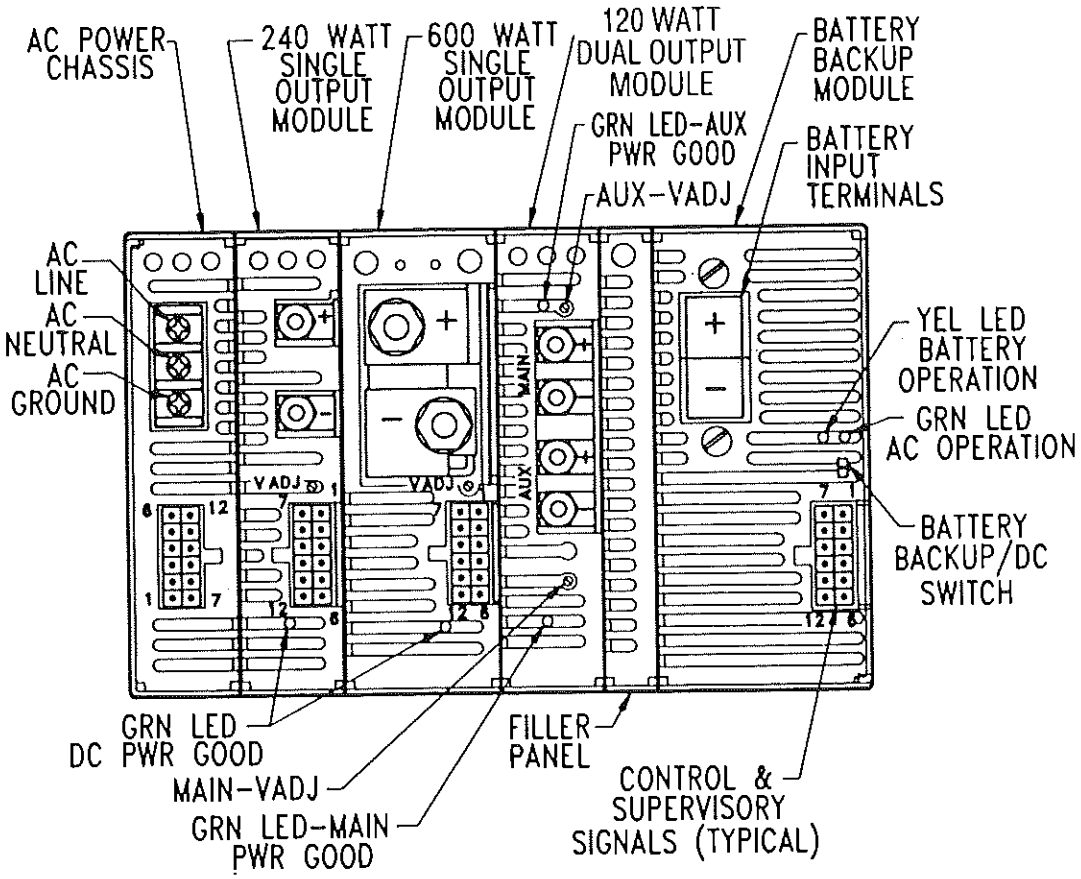
6.2 The next three sections to the right are DC Power Modules: The first is a 240 watt single output module; the second is a 600 watt single-output module; the third is a 120 watt dual-output module. Each module has an output voltage adjustment potentiometer and a green DC Power Good LED. All single output modules also have a 12-pin Molex connector for the control and supervisory signal inputs and outputs. The dual output module does not have this connector. On all modules the top output terminal lug is positive and the bottom one is negative.

6.3 The next section to the right is a filler panel which is provided on all configurations as needed.

6.4 The last module on the right is a Battery-Backup Module. This module can only be placed in the far right slots as shown. It also has a 12-pin Molex connector for control and supervisory signal inputs and outputs. There are two LEDs, a yellow one which indicates the unit is on battery operation and a green one which indicates the unit is on AC operation. Below the LEDs is a switch which is set for either a battery input or for another external DC source input. The positive battery input terminal is the red one at the top.

7.0 AVAILABLE MODULES

VOLTAGE & CURRENT	OUTPUT POWER	VOLTAGE ADJ. RANGE	SLOT WIDTH	ORDERING CODE
2V @ 40A	80W	1.5 - 4.0	1	1A
2V @ 100A	200W	1.5 - 4.0	1.5	1C
3.3V @ 40A	132W	1.5 - 4.0	1	9B
3.3V @ 100A	330W	1.5 - 4.0	1.5	9E
5V @ 20A	100W	4.5 - 6.5	1	2A
5V @ 40A	200W	4.5 - 6.5	1	2C
5V @ 100A	500W	4.5 - 6.5	1.5	2G
5V @ 200A	1000W	4.5 - 6.5	3	2N



NOTE:
IN DUAL-OUTPUT MODULES THE UPPER TERMINALS ARE MAIN POWER OUTPUT AND THE LOWER TERMINALS ARE AUXILIARY POWER OUTPUT. THERE ARE NO CONTROL AND SUPERVISORY SIGNALS FOR DUAL OUTPUT MODULES.

ALL CONTROL AND SUPERVISORY SIGNAL RECEPTACLES ARE MOLEX MINI-FIT, JR. (39-30-0120). MATING PLUGS ARE MOLEX (39-01-2125) WITH FEMALE PINS (39-00-0039).

BATTERY-BACKUP MODULE BATTERY INPUT RECEPTACLES AND MATING PLUGS ARE ANDERSON NO. 5916G4 (BLACK, FOR –) AND NO. 5916G7 (RED, FOR +) HOUSINGS WITH NO. 5900 CONTACTS.

Figure 6. UNIMOD H Series Front Panel Diagram.

VOLTAGE & CURRENT	OUTPUT POWER	VOLTAGE ADJ. RANGE	SLOT WIDTH	ORDERING CODE
12V @ 10A	120W	10.8 - 16.5	1	3A
12V @ 20A	240W	10.8 - 16.5	1	3D
12V @ 50A	600W	10.8 - 16.5	1.5	3H
12V @ 100A	1200W	10.8 - 16.5	3	3P
15V @ 8A	120W	10.8 - 16.5	1	4A
15V @ 16A	240W	10.8 - 16.5	1	4D
15V @ 40A	600W	10.8 - 16.5	1.5	4H
24V @ 5A	120W	20 - 30	1	5A
24V @ 10A	240W	20 - 30	1	5D
24V @ 25A	600W	20 - 30	1.5	5H
24V @ 50A	1200W	20 - 30	3	5P
28V @ 21.4A	600W	20 - 30	1.5	6H
48V @ 5A	240W	43 - 53	1	7D
48V @ 12.5A	600W	43 - 53	1.5	7H
5V@5A/12V@5A	85W	±10%	1	23A
12V@5A/12V@5A	120W	±10%	1	33C
15V@4A/15V@4A	120W	±10%	1	44C
BATTERY BACKUP MODULE			2	UB

8.0 DESCRIPTION OF FEATURES AND OPTIONS

FEATURE/OPTION	DESCRIPTION
AC Undervoltage Protection	Power supply is protected for all conditions below low line voltage.
Safety Agency Approvals	UL1950; CSA22.2 No. 234-M90; IEC950; EN60950; IEC601 (HPB version only).
Output Current Limiting	**Single Output Modules:** Current limiting takes place at 110% to 135% of rated load. **Dual Output Modules:** 25A max. for main output with no load on auxiliary output; 7A max for auxiliary output.
Short Circuit Current	**Single Output Modules:** 100% max. of rated load current. **Dual Output Modules:** 8A max. on all outputs.

FEATURE/OPTION	DESCRIPTION
Overvoltage Protection	OVP operates at 120% to 135% of the nominal output voltage. The module output latches off. It is reset by cycling the AC input off and then on.
Reverse Voltage Protection	To 100% of rated output current, maximum.
Turn-On Time	One second max. from AC turn-on. For AC turn-on or release of Inhibit control, the output voltage rise is monotonic with 3% maximum overshoot. Rise-time from 5% to 95% of nominal output voltage is 100 msec. maximum.
Isolated Outputs	All DC Power Module outputs are floating and isolated from all other module outputs. They can be connected as either + or - outputs and may be referenced up to ±100V from chassis ground.
Overtemperature Protection	The power supply latches off when the internal temperature reaches excessive value. It must be reset by recycling the AC input to off and then on.
EMI Input Filter	Either FCC and VDE level A or VDE level B input filtering may be ordered. For the level B filter, the power system chassis is 1 inch (25.4 mm) wider.
Reverse Air Flow (Option R)	Standard air flow is from fan to front panel of power supply. Reverse air flow can be ordered as an option.
Redundant N + 1 Outputs (Option H)	Redundant N + 1 operation is achieved by paralleling two or more identical single outputs and connecting the current share terminals together. If one of the outputs should fail, the others continue to operate. The failed module is indicated by a LO on the DC Power Good output and by the green LED going off.
5V Isolated Alarm (Option L)	This option permits all alarm circuits to operate from an external 5 VDC source that is isolated from the AC input and all DC outputs. This voltage must be present to start the supply.

9.0 OPERATING INFORMATION

9.1 **Input Voltage.** The UNIMOD H Series Power System operates on standard 120 VAC (90 to 132 VAC) or 220-240 VAC (180 to 264 VAC) input voltages and automatically adapts to the given input. This is the input autoranging feature. A protective 30A fuse

is located inside the AC power chassis. This fuse is not user accessible.

9.2 **Outputs.** Output power connections are made to nickel-plated brass studs on output bus bars. See Fig. 6. The top stud is positive and the bottom stud is negative on each DC Power Module. Dual-output modules have two sets of studs, the top set for the main (higher power) output and the bottom set for the auxiliary (lower power) output. All connecting wires for the outputs must be sized to carry the rated output current plus 30%. Connecting wires or lugs must be clean and securely connected at the studs to reduce contact resistance. See section 15.4 for maximum torque on stud nuts. All outputs should have a 0.1uF ceramic capacitor and 10uF electrolytic capacitor in parallel across each output at the backplane, connection point, or point of load to prevent noise pickup.

9.3 **Output Power.** Rated continuous output power from all DC Power Modules in a given configuration is 1200 watts maximum for 220 to 240 VAC nominal input voltage and 1000 watts maximum for 120 VAC nominal input voltage. 100% of rated output power can be drawn up to 50°C ambient temperature. Above 50°C the output must be derated at 2.5%/°C up to 70°C. See Fig. 7. The maximum operating temperature is 70°C.

Note that the total output power rating of all modules may exceed 1200 watts (or 1000 watts for 120 VAC) so long as the total power drawn by the loads does not exceed these values. This is important when an N + 1 redundancy configuration is employed.

9.4 **Remote Sensing.** Remote sense connections are made to pins 5 and 6 on the receptacle of each single output DC Power Module (dual output modules do not have remote sense). The remote sense feature is used to regulate the output voltage right at the point of load. The + sense is connected to the + output at the load, and the - sense is connected to the - output at the load. The sense leads should be a twisted pair to minimize noise pickup. The outputs can compensate for a total voltage drop in the power leads up to 0.5 V, or 0.25 V on each lead. Sense leads can be #22 or 24 AWG wire, but should not exceed 10 feet (3 meters) in length. If remote sensing is not required, the sense leads should be connected to the proper output terminals right at the DC Power Module.

9.5 **Control and Supervisory Signals.** All control and supervisory signals are accessible at the 12-pin receptacles on the front panel of the AC Power Chassis, on each single-output DC Power Module and on the Battery-Backup Module. Some of the pins are for control inputs and others are for alarm or monitoring outputs. Alarm and monitor outputs and control inputs that are used must have an external 0.1uF ceramic capacitor connected across them to prevent noise pickup. For a description of each function see the sections on "Description of Control and Supervisory Signals".

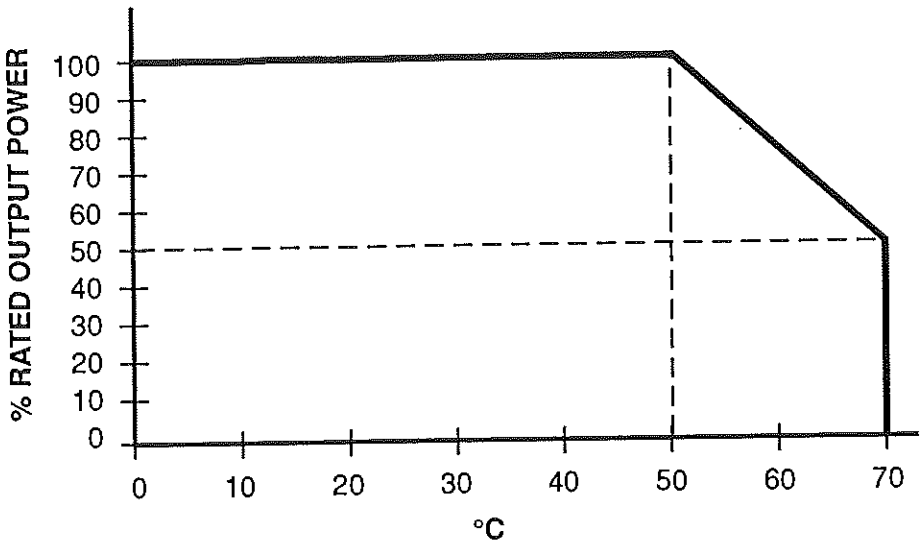


Figure 7. Output Power vs. Ambient Temperature.

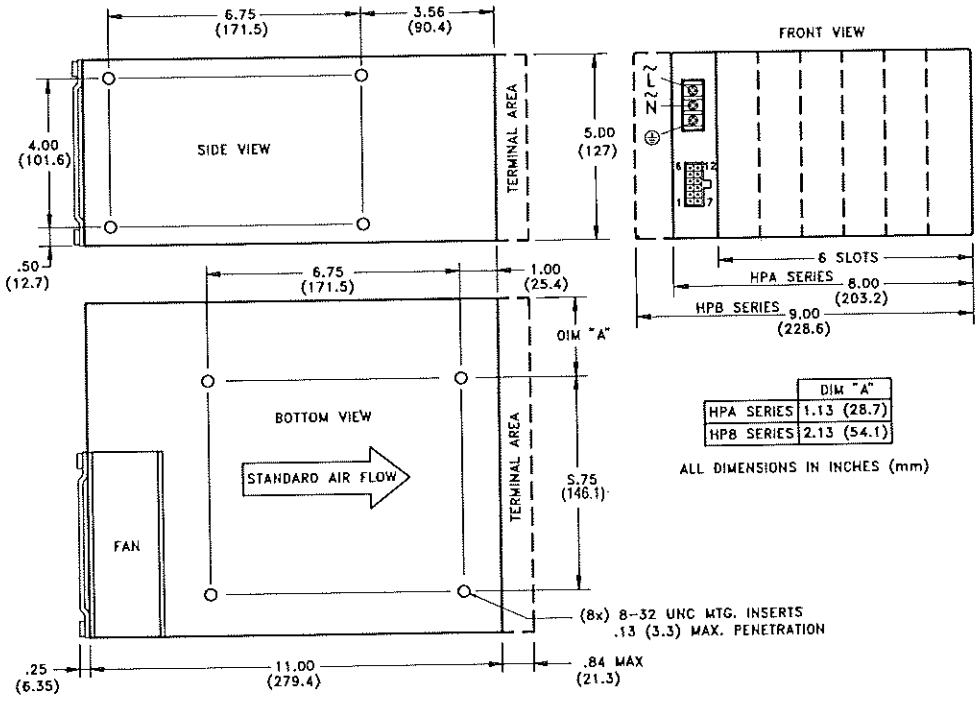


Figure 8. Mechanical Dimensions.

9.6 **Paralleled Outputs (Current Sharing).** Two or more DC Power Modules may be operated in parallel if they are identical modules in both output power and voltage. The output voltages must be adjusted to within 2% of each other and the current share pins (pin 2) must be connected together. Sense leads for each module must be connected to the load point.

Current sharing accuracy is as follows:

- 200 W to 600 W modules (1.5 slot width), ±5% of rated load current.
- 80 W to 240 W modules (1 slot width), ±10% of rated load current.

Current sharing accuracy is defined as:

$$\frac{I_1 - I_2}{I_{RATED}}$$

where I_1 and I_2 are individual module output currents and I_{RATED} is the rated output current of one module.

If Remote Margin is used, these control pins must be connected together for all modules in parallel. Likewise if Module Inhibit is to be used, these control pins must be connected together for all modules in parallel. The remaining functions operate independently for each module and are not connected together: Current Monitor, DC Power Good, Current Share Alarm, and OVP Latch Alarm. Therefore if one of the modules in parallel fails, the current share alarm output will go LO, the DC Power Good alarm of the bad module will go LO, and the DC Power Good green LED will go out.

9.7 **N + 1 Redundancy.** This feature is basically the same as parallel operation. Redundancy, however, is achieved by having one more DC Power Module in parallel operation than is needed to supply the load power. Thus, if two identical modules in parallel can provide the total load power, then three modules are used in parallel, each providing approximately one third of the total current. If one module fails, the other two automatically take up the total load current, sharing it approximately 50/50. The failed module is determined by its green LED going out and its DC Power Good signal going LO.

9.8 **5V Isolated Alarm.** This optional feature permits the power system alarm signals to be totally isolated from all DC outputs, the AC input, and the battery input. External power of +5 VDC ±5% at 200 mA must be provided to pins 5 and 6 of the AC power chassis receptacle. If this option is ordered, then all alarm signals have their returns (ground side) to the 5V alarm return (negative side of the external alarm power). If this option is not ordered, then the references (grounds) for the alarm signals are:

- AC Power Chassis, 5V Alarm Supply Return (Pin 5)
- DC Power Modules, Negative Sense terminal (Pin 6)
- Battery-Backup Module, battery return (negative) (Pin 10)

10.0 CONTROL AND SUPERVISORY SIGNAL CONNECTIONS (SEE FIGURE 6)

AC POWER MODULE RECEPTACLE

PIN	FUNCTION
1	Thermal Alarm
2	AC Power Fail (Inverse)
3	System Inhibit (Inverse)
4	Thermal Alarm (Inverse)
5	5V Alarm Supply Return
6	+5V Alarm Supply
7	AC Power Fail
8	System Inhibit
9	NC
10	NC
11	NC
12	NC

SINGLE-OUTPUT POWER MODULE RECEPTACLE
(80W to 240W, 1 slot width)

PIN	FUNCTION
1	Current Monitor
2	Current Share
3	Module Inhibit
4	DC Power Good
5	+ Sense
6	- Sense
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

SINGLE-OUTPUT POWER MODULE RECEPTACLE
(200W to 600W, 1.5 Slot Width)

PIN	FUNCTION
1	Current Monitor
2	Current Share
3	Module Inhibit
4	DC Power Good
5	+ Sense
6	- Sense

PIN	FUNCTION
7	Remote Margin (RM1), +5%
8	Remote Margin (RM2), -5%
9	Remote Margin (RM4), -10%
10	Remote Margin (RM3), +10%
11	Current Share Alarm
12	OVP Latch Alarm

BATTERY-BACKUP MODULE RECEPTACLE

PIN	FUNCTION
1	Low Battery Voltage Alarm
2	Battery Charge Fault Alarm
3	Battery Operation Inhibit
4	Charge Rate Alarm
5	5V Alarm Supply Return
6	Charge Current Monitor

PIN	FUNCTION
7	Battery Test
8	+ Battery Voltage
9	Battery Current Monitor
10	Battery Voltage Return (-Battery Voltage)
11	NC
12	NC

NOTES:
1. All control and supervisory signal receptacles are Molex Mini-Fit, Jr. 39-30-0120. Mating plugs are Molex 39-01-2125 with female pins 39-00-0039.
2. Dual output modules do not have supervisory and control signals.
3. NC = No Connection.

11.0 DESCRIPTION OF CONTROL AND SUPERVISORY SIGNALS: AC POWER CHASSIS

SIGNAL	PIN	DESCRIPTION
Thermal Alarm (Output)	1	A TTL LO (sinks 10 mA) occurs when internal temperature exceeds limit. A TTL HI (sources 1.8 mA) is normal. The LO signal occurs at least 10 msec. before the outputs are turned off. The power supply latches off and must be reset by re-cycling the AC input. This TTL signal is referenced to the 5V Alarm Supply return (Pin 5).
AC Power Fail Inverse (Output)	2	A TTL HI (sources 2 mA) occurs when the AC input voltage falls a preset amount below the low line voltage specification. A TTL LO (sinks 2 mA) is normal. The HI signal occurs at least 5 msec. before the output voltages drop out of regulation. This TTL signal is referenced to the 5V Alarm Supply return (Pin 5).
Power System Inhibit Inverse (Input)	3	A TTL HI (sourcing 5 mA) provided at this input inhibits (turns off) the DC outputs of all the DC Power Modules. Normal input is an open circuit or a TTL LO (sinking 2 mA). This TTL signal is referenced to the 5V Alarm Supply return (Pin 5).

SIGNAL	PIN	DESCRIPTION
Thermal Alarm Inverse (Output)	4	A TTL HI (sources 2 mA) occurs when internal temperature exceeds limit. A TTL LO (sinks 2 mA) is normal. The HI signal occurs at least 10 msec. before the outputs are turned off. The power supply latches off and must be reset by re-cycling the AC input. This TTL signal is referenced to the 5V Alarm Supply return (Pin 5).
5V Alarm Supply Return (Input)	5	This input is the return of the 5V, 200 mA Alarm Supply. All control and supervisory signals for the AC Power Chassis (this receptacle) are referenced to this return.
5V Alarm Supply (Input)	6	This input is for +5V ±5% at 200 mA, providing isolated power for all alarm output circuits.
AC Power Fail (Output)	7	A TTL LO sinks (10 mA) occurs when the AC input voltage falls a preset amount below the low line voltage specification. A TTL HI (sources 1.8 mA) is normal. The LO signal occurs at least 5 msec. before the output voltages drop out of regulation. This TTL signal is referenced to the 5V Alarm Supply return (Pin 5).
Power System Inhibit (Input)	8	A TTL LO (sinking 5 mA) provided at this input inhibits (turns off) the DC outputs of all the DC Power Modules. Normal input is an open circuit or a TTL HI (sourcing 5 mA). This signal is referenced to the 5V Alarm Supply return (Pin 5).

12.0 DESCRIPTION OF CONTROL AND SUPERVISORY SIGNALS: DC POWER MODULES

SIGNAL	PIN	DESCRIPTION
Current Monitor (Output)	1	This analog output voltage is proportional to the load current. **200W-600W Modules** (1.5 slot width): At 100% rated load current the voltage is +4.0V ± 0.2V; at 0% load current the voltage is +0.5V ± 0.2V. This output can drive a 2.5K load. **80W-240W Modules** (1 slot width): At 100% rated current the voltage is +3.0V ± 0.15V; at 0% load current the voltage is +0.4V ± 0.2V. The output can drive a 2.5K load. This signal is referenced to the negative sense lead (Pin 6).

SIGNAL	PIN	DESCRIPTION
Current Share	2	Each single-output DC Power Module, with current sharing option, will share load current with identical modules when the output voltages are adjusted within 2% of each other and the modules are connected together by means of the current share pins. The modules will operate down to zero load without giving alarm signals. The Current Share signal is referenced to the negative sense lead (Pin 6).
Module Inhibit (Input)	3	A TTL LO (sinking 0.3 mA) provided at this input inhibits (turns off) the DC Power Module output. A TTL HI (sourcing 0 mA) turns on the DC output. This signal is referenced to the negative sense lead (Pin 6).
DC Power Good (Output) 80W to 240W (1 slot width) DC Power Modules	4	A TTL LO (sinks 10 mA) occurs when the output voltage goes outside the limits of -5% to -25% from nominal value, or if the module stops functioning. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5 V Alarm Supply Return (if that option is ordered). Otherwise it is referenced to the negative sense lead (Pin 6).
DC Power Good (Output) 200W to 600W (1.5 slot width) DC Power Modules	4	A TTL LO (sinks 10 mA) occurs when: 1) The output voltage at the remote sense leads goes outside the limits of ±5% from nominal value, or 2) The module stops functioning, or 3) The module goes into a current limit condition. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5 V Alarm Supply Return (if that option is ordered). Otherwise it is referenced to the negative sense lead (Pin 6).
+ Sense - Sense	5 6	These remote sense leads are provided on all single output modules and should be connected to the load point by means of a twisted pair. They provide regulation to the point of load. Total external voltage drop from the DC output to the sense points is 0.5V min. Open sense leads will not cause the output to rise more than 2% above nominal value. The modules are protected against reverse sense connection except when operated in parallel.

SIGNAL	PIN	DESCRIPTION
Remote Margin (RM1), +5% (Input)	7	A TTL LO (sinking 0.2 mA) at this input causes the module DC output voltage to rise to 5% higher than its nominal value. A TTL HI (sourcing 0 mA) is normal. This signal is referenced to the negative sense lead (Pin 6).
Remote Margin (RM2), -5% (Input)	8	Same as RM1 except that a TTL LO causes a -5% change in output voltage.
Remote Margin (RM4), -10% (Input)	9	Same as RM1 except that a TTL LO causes a -10% change in output voltage.
Remote Margin (RM3), +10% (Input)	10	Same as RM1 except that a TTL LO causes a +10% change in output voltage.
Current Share Alarm (Output)	11	A TTL LO (sinks 10 mA) occurs when the current share error exceeds ±20% of rated load. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5 V Alarm Supply Return (if that option is ordered). Otherwise it is referenced to the negative sense lead (Pin 6).
OVP Latch Alarm (Output)	12	A TTL LO (sinks 10 mA) occurs when the overvoltage protection circuit is activated and the module output voltage is latched off. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5 V Alarm Supply Return (if that option is ordered). Otherwise it is referenced to the negative sense lead (Pin 6).

NOTE: The receptacle on the 80W to 240W (1 slot width) modules has signals specified on pins 1 through 6 only. Pins 7 through 12 are NC (no connection). The receptacle on the 200W to 600W (1.5 slot width) modules has all 12 signals. Dual output modules do not have control and supervisory signals.

13.0 DESCRIPTION OF BATTERY-BACKUP FEATURES

FEATURE	DESCRIPTION
Battery-Backup/DC Switch	Accessible switch on front of Battery-Backup Module which puts the power system into one of two operating modes: 1) AC with automatic battery backup operation, or 2) Continuous operation from an external DC power source. See front panel diagram, Fig. 6.
Battery-Backup Output Latch-Off	The battery-backup converter latches off when the battery voltage drops below a preset level of 38-42 V. This voltage is adjustable by means of a potentiometer. The converter remains off until the AC voltage is reapplied within its specified limits.
Battery Input Isolation	The 48 V battery is isolated from both the AC input circuit and all DC outputs of the power system.
Battery Charger Isolation	A series-connected diode isolates the battery charger output from the battery.
Battery Charger Paralleling	The battery charger produces a 0.55A charging current but may be connected in parallel with other multiple chargers to provide more charging current. The Battery-Backup Module will still provide all fault detection capabilities as specified.

14.0 DESCRIPTION OF CONTROL AND SUPERVISORY SIGNALS: BATTERY-BACKUP MODULE

SIGNAL	PIN	DESCRIPTION
Low Battery Voltage Alarm (Output)	1	A TTL LO (sinks 10 mA) occurs when the battery voltage drops below a value 1.5V to 3V above the voltage at which the battery backup converter latches off. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5V Alarm Supply return (if that option is ordered). Otherwise it is referenced to the negative battery terminal (Pin 10).
Battery Charge Fault Alarm (Output)	2	A TTL LO (sinks 10 mA) occurs when: 1) The battery circuit is opened, or 2) There is an overvoltage on the battery, or 3) There is a short circuit on the battery (voltage is below 36V). A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5V Alarm Supply return (if that option is ordered). Otherwise it is referenced to the negative battery terminal (Pin 10).

SIGNAL	PIN	DESCRIPTION
Battery Operation Inhibit (Input)	3	A TTL HI (sourcing 0 mA) provided at this input inhibits (turns off) all module DC outputs only when the system is operating from batteries. The outputs remain latched off until the AC voltage is reapplied. A TTL LO (sinking 4.4 mA) is normal. This signal is referenced to the 5V Alarm Supply return (if that option is ordered). Otherwise it is referenced to the negative battery terminal (Pin 10).
Charge Rate Alarm (Output)	4	A TTL LO (sinks 10 mA) occurs when the charger is providing a charge current higher than 0.2A to 0.3A. A TTL HI (sources 1.8 mA) is normal. This signal is referenced to the 5V Alarm Supply return (if that option is ordered). Otherwise it is referenced to the negative battery terminal (Pin 10).
5V Alarm Supply Return	5	The reference connection (return) for all Battery-Backup Module alarm signals if the external 5V Alarm Supply option is ordered (Pins 1, 2, 3, 4, 7).
Charge Current Monitor (Output)	6	This analog output voltage is proportional to the battery charging current. At 0.55A battery charging current, the voltage is +4.5V ± 0.5V. At 0A charging current, the voltage is +0.5V ± 0.5V. The output can drive a 2.5K load. The signal is referenced to the negative battery terminal (Pin 10).
Battery Test (Input)	7	A TTL LO (sinking 4.4 mA) at this input puts the module into a Battery Test mode whereby the battery supplies a portion of the load current, based on AC line voltage and output load conditions. A TTL HI (sourcing 0 mA) or open is normal. This signal is referenced to the 5V Alarm Supply return (if that option is ordered). Otherwise it is referenced to the negative battery terminal (Pin 10).
+Battery Voltage (Output)	8	This pin is connected to the positive battery terminal for monitoring the battery voltage. This output is referenced to the negative battery terminal (Pin 10).
Battery Current Monitor (Output)	9	This analog output voltage is proportional to the battery output current. The proportionality is approximately 1 volt per 10A of battery current. This output can drive a 2.5K load. The signal is referenced to the negative battery terminal (Pin 10).
Battery Voltage Return (– Battery)	10	This pin is connected to the negative battery terminal and is the reference for the above signals on pins 6, 8 and 9.

15.0 INSTALLATION

15.1 **Mounting.** See mechanical dimensions diagram, Fig. 8. The UNIMOD H Series has two mounting surfaces, one on the bottom and the other on the side, with four threaded mounting inserts on each. The inserts accept #8-32 screws with maximum penetration of 0.13 inch (3.3mm). Maximum torque on the mounting screws is 19 in.-lbs.

15.2 **Cooling.** The H Series is cooled by means of an internal DC ball bearing fan. To insure proper cooling, the power system requires a clearance of at least one (1) inch (25mm) between all air intakes and outlets and other surfaces. Both standard and optional reverse air cooling are available.

15.3 **Input Connections.** AC input connections to the power system are made on a three-terminal barrier strip. The barrier strip uses #6-32 screws. A three-wire AC line and plug must be used for the AC power connection, with the proper connection made to line, neutral and safety ground terminals. See front panel diagram, Fig. 6, for connections. The proper line cord wire size must be used: No. 12 AWG is recommended.

15.4 **Output Connections.** Connecting wires to the outputs must be of correct size to carry the rated output current plus 30%. Wires or lugs must be clean and securely connected at the studs to reduce contact resistance. Torque on the 1/4-20 output stud nuts of the 200-600W single output modules (1.5 slot width) must not exceed 50 in.-lbs. Torque on the 10-32 stud nuts of the 80-240W single output modules (1 slot width) 2 and dual output modules must not exceed 22 in.-lbs.

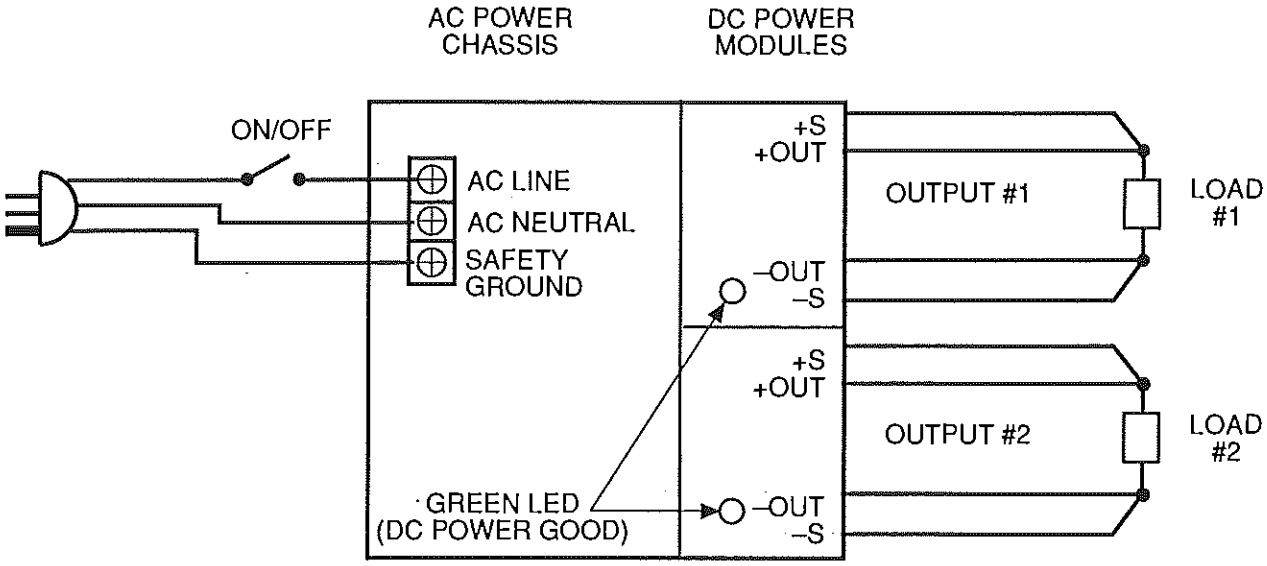
16.0 MAINTENANCE

No routine maintenance is required on the H Series Power System except for periodic cleaning of dust and dirt around the fan intake. A small vacuum nozzle should be used for this. The power system cover should not be removed; there are no user-serviceable components in the unit.

17.0 POWER SYSTEM SETUP AND TESTING

17.1 Connect the AC power cord to the barrier terminal strip on the front panel (See Figs. 6 and 9). Be sure to use a three-wire power line and plug and make connection to the proper terminals, including safety ground.

17.2 Connect remote sense leads (pins 5 and 6) of proper polarity directly to the output terminals of each module. Make sure that the System Inhibit (pin 3 and pin 8 on AC Power Chassis) and the Module Inhibit (pin 3 on DC Power Modules) are all open connection. Make sure that the Remote Margin inputs (pins 7, 8, 9 and 10) on the 200W to 600W, 1.5 slot width modules are all open connection or logic HI.



NOTE: Remote sense leads (+S & –S) should be twisted to minimize noise pickup.

Figure 9. H Series Input/Output Connections.

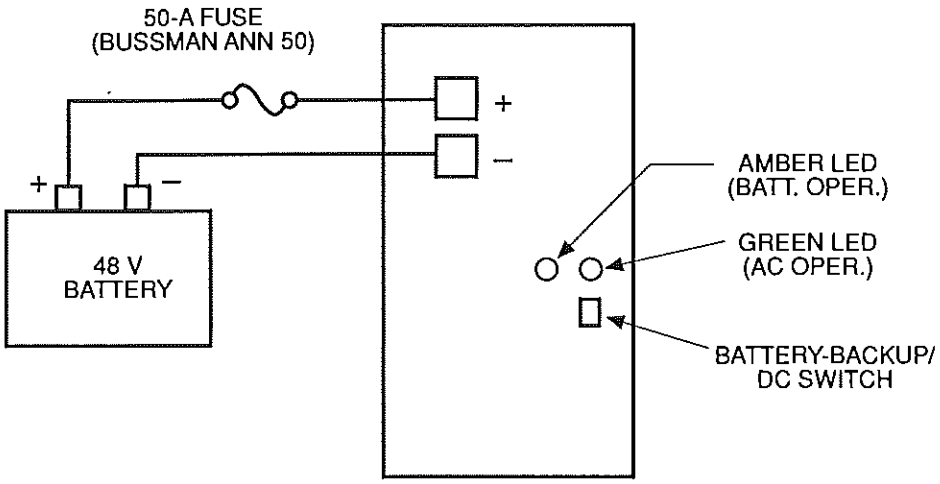


Figure 10. Battery Back-up Module Connections.

17.3 If two or more DC Power Modules are connected in parallel, make sure the instructions in Section 9.6 are followed.

17.4 Plug the AC power cord into the wall socket and check to see that the green DC Power Good LED is on for each module. Measure each output voltage with a digital voltmeter to see that it is the correct value. Each voltage should be within 1% of its nominal value. If a more precise value is required, adjust the voltage adjust potentiometer on the module to give the desired value. A clockwise adjustment increases the voltage. Unplug the AC power cord.

17.5 Connect the desired load to each DC Power Module and connect the remote sense leads to the load as described in section 9.4. Plug in the AC power cord and re-check the output voltages at the sense points with a digital voltmeter. These readings can be compared to the data provided with the final acceptance test report included with each power system.

18.0 TROUBLE SHOOTING GUIDE

18.1 If you encounter difficulty and do not get output voltages, go through the following trouble shooting guide.

SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
No output (all outputs).	No AC input.	Check connection to AC power.
No output (one module).	Shorted output.	Remove short.
No output (one module).	Overvoltage protection (OVP) is engaged on 200W-600W (1.5 slot width) single output module.	Check OVP Latch Alarm output (pin 12) for a logic LO. Recycle AC input off and then on.
No output (all outputs).	Overtemperature protection is activated.	Check Thermal Alarm output (pin 1) for a logic LO. Check to see that fan is operating. Recycle AC input off and then on.
No output (all outputs).	Output is inhibited by System Inhibit or Module Inhibit.	Check to see if pin 8 on AC Power Chassis or pin 3 on a DC Power Module is a logic LO. Both should be logic HI, or open. Check to see if pin 3 on AC Power Chassis is a logic HI. It should be logic LO or open.
Output higher than nominal value.	Remote sense leads not connected.	Connect sense leads as instructed in Section 9.4.

SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
Output higher or lower than nominal value (one module).	Remote Margin is activated.	Check pins 7, 8, 9 and 10 on 200W to 600W, 1.5 slot width modules to make sure they are all logic HI or open.
Noisy output voltages.	External pickup in sense leads.	Twist or shield sense leads and re-route away from noise source. Connect capacitors as instructed in Section 9.2.

18.2 If none of these actions solves the problem, call the UNIPOWER factory for help, then request an RMA (Return Material Authorization) number and return the power system to UNIPOWER. Be sure to pack the unit carefully in the original packing material, if possible. UNIPOWER will fax a form to be filled out and returned with the unit.

19.0 BATTERY-BACKUP SETUP AND TESTING

19.1 Unplug the AC power cord and wait 5 minutes so that the power system filter capacitors are fully discharged.

19.2 Set the Battery-Backup/DC Switch on the front panel of the Battery-Backup Module to "battery-backup" (down position). See Figs. 6 and 10 .

19.3 Connect a 48V, sealed lead-acid battery, in fully charged condition, to the battery terminals of the module. The positive terminal **must be connected in series with a 50 ampere fuse** (Bussmann ANN50) to meet safety agency requirements.

19.4 Make sure that the Battery Operation Inhibit input (pin 3) is at a logic LO or connected to the Battery Voltage Return. Also make sure that the Battery Test input (pin 7) is an open, or logic HI.

19.5 The power system outputs and sense leads should be connected to their loads, and the power system setup and testing as described in section 17.0 should be completed.

19.6 Plug in the AC power cord. The power system is now in the AC mode of operation. The green LED (on right) of the Battery-Backup Module should be on to indicate this; all green DC Power Good green LEDs should be on.

19.7 Apply a logic LO to the Battery Test input (pin 7) or connect it to the Battery Voltage Return (pin 10). This puts the module into the battery test mode of operation, in which the battery supplies part of the load current and the AC input supplies part. The portion supplied by the battery depends on the loads and the AC line voltage. This test mode permits testing battery operation without risking loss of outputs in case something is wrong.

During this test the amber LED (on left) should come on, indicating battery operation. A positive voltage should be present on the Battery Current Monitor output, indicating that current is being drawn from the battery.

19.8 Open or apply a logic HI to the Battery Test input (pin 7). The system is now back on full AC operation and the amber LED should be off and the green LED on. Now, unplug the AC line cord. The system is now on full battery operation. The amber LED should be on and the green LED off. All output voltages should be within specification and the green DC Power Good LEDs should be on.

19.9 If the Battery Operation Inhibit control is to be used, it should be checked out as follows. Apply a logic HI, or open, to this input (pin 3). Since the system is on battery operation, this will cause all the DC Power Module outputs to turn off. Check the green LEDs on each module to verify that the output power is off. Return the input on pin 3 to a logic LO, or connection to the Battery Voltage Return (pin 10). The output remains latched off until the AC input voltage is re-applied.

20.0 BATTERY-BACKUP TROUBLE SHOOTING GUIDE

20.1 If you encounter difficulty with battery-backup operation, go through the following trouble shooting guide.

SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
No output.	Battery voltage is low and the battery backup converter is latched off.	Check battery voltage to see that it is above 42 volts. If not, replace with a fully-charged battery or allow the battery sufficient time to recharge when the system is operating from AC. NOTE: The battery voltage may drop below the latch off point under heavy load but then rise above 42 V when the load is removed. This can cause the output to latch off. In this case, call the factory for assistance.
No output.	A logic HI, or open, is on pin 3, which inhibits all outputs.	Apply a logic LO to pin 3 or connect it to the Battery Voltage Return, pin 10.
No output.	Faulty battery connection.	Check battery terminals, clean them if necessary and make a tight connection.

20.2 If none of these actions solves the problem, call the UNIPOWER factory for help, then request an RMA (Return Material Authorization) number and return the power system to UNIPOWER. Be sure to pack the unit carefully in the original packing material if possible. UNIPOWER will fax a form to be filled out and returned with the unit.

21.0 OPERATION FROM AN EXTERNAL DC SOURCE

21.1 An external DC source other than a battery may be used to operate the H Series Power System. This source must have a DC voltage in the range of 42V to 56V.

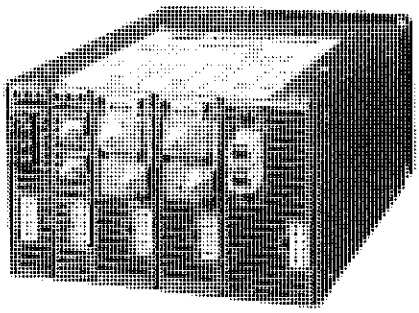
21.2 Unplug the AC power cord and wait 5 minutes for the internal filter capacitors to fully discharge. Set the Battery-Backup/DC Switch to "DC" (up position).

21.3 Connect the DC power source to the battery input terminals, being careful to connect to the correct polarities. A 50 ampere fuse (Bussmann ANN50) must be connected between the positive terminal of the source and the positive battery input terminal to meet safety agency requirements.

21.4 The power system now operates in the same manner as in the battery-backup mode. Follow sections 19.4 through 19.9 to complete the testing.

UNIPOWER CORPORATION

UNIMOD® H SERIES



GENERAL DESCRIPTION

The UNIMOD H Series is a fully modular 1200-watt power system that can be quickly configured at the factory for a specific requirement from a wide selection of standard modules. The AC power chassis has six plug-in module slots with a choice of 29 different DC power modules with output voltages from 2 to 48 VDC. The AC power chassis and all DC power modules are UL recognized, CSA certified and TUV approved, and meet other regulatory requirements such as EN60555-2. A choice of input filters meets either FCC and VDE level A or VDE level B specifications for conducted input noise.

The H Series comes with either power-factor corrected (PFC) or non-PFC front ends. The PFC version employs a unique, patented active low frequency technique (U.S. Pat. 4,831,508) that produces a 0.98 power factor. An autoranging input circuit automatically selects the correct range for 120 VAC or 220-240 VAC inputs. A battery-backup module is available for more critical applications where power outages cannot be tolerated. This module automatically switches the power system to an external 48 volt battery when an AC brown-out or power outage occurs.

The DC power modules are DC/DC converters which operate from an internal 300 VDC power bus and generate regulated output voltages. The modules have output power from 80 to 1000 watts, with each module output independent and fully isolated. They incorporate MOSFET switches operating at 100 kHz in either a half-bridge or full-bridge configuration. Single output modules incorporate a number of important control and supervisory signals such as output inhibit, DC power good, output current monitor, current share and current share alarm (options), overvoltage alarm, and remote margining. The single output modules may be optionally connected in parallel to achieve higher output current and also used in N + 1 redundancy applications. All single output modules have remote sensing.

The AC power chassis also has control and supervisory signals such as global inhibit, AC power fail, thermal alarm and provision for an isolated 5V alarm supply. Likewise, the battery-backup module incorporates a series of control and monitoring signals.

UL 1950 · CSA 22.2 No. 234-M90 · TUV EN 60 950 IEC 601 (HPB)

SPECIFICATIONS

Typical at nominal line, full load and 25°C unless otherwise noted.

OUTPUT MODULE SPECIFICATIONS

Total Output Power, max.	1200W @ 220-240 VAC
	1000W @ 120VAC
Output Voltage Set Tolerance, max.	±1.0%
Output Voltage Adj. Range, min.	±10%
Line Regulation[1], max.	0.2% or 10mV
Load Regulation[2], max.	
Single Output Modules	0.2% or 10 mV
Dual Output Modules	0.5% or 25 mV
Cross Regulation[2], max.	
Single Output Modules	0.1% or 5 mV
Dual Output Modules	0.5% or 25 mV
Ripple and Noise[3], pk-pk max.	1% or 100 mV
Holdup Time, min.	20 msec.
Temperature Coefficient,max.	0.02%/°C
Transient Response[4], max.	500 µsec.
Minimum Load, any output	0 Amperes
Turn-On Time, max.	1 sec.

AC INPUT SPECIFICATIONS

Input Voltage Range, Autoranging	90 to 132 VAC
	180 to 264 VAC
Input Frequency	47 to 63 Hz
Input Current, max., HNA	
1200W Load, 220-240 VAC	12A RMS
1000W Load, 120 VAC	18A RMS
Input Current, max., HPA, HPB	
1200W Load, 220-240 VAC	8 A RMS
1000W Load, 120 VAC	12 A RMS
Input Power Factor, HPA, HPB	0.98
Harmonic Input Current, HPA, HPB	
220-240 VAC	meets EN60555-2
Inrush Current, max. hot or cold start	
132 VAC In	40 A Peak
264 VAC In	80 A Peak
Input Protection, internal	30 A Fuse

GENERAL SPECIFICATIONS

Efficiency, min., 5V and greater	
Rated Load & Nominal AC In	70%
Rated Load & 48 VDC In	61%
Switching Frequency	100 kHz
MTBF[5]	275,000 hours
Isolation, min.	
Output to Chassis Ground	±100 VDC
Leakage Current, to ground, max.	2mA

ENVIRONMENTAL SPECIFICATIONS

Operating Temp. Range, rated load.	0°C to 50°C
Derating, 50°C to 70°C	2.5%/°C
Storage Temperature Range	–40°C to +85°C
Cooling	Internal DC Ball Bearing Fan
EMI, conducted	
HNA, HPA, HPB, 115/230 VAC	FCC 20780 Level A
HNA, HPA, 230 VAC	VDE 0871 Level A
HPB, 230 VAC	VDE 0871 Level B
Vibration	Per MIL-STD 810D, Method 514-3, Cat-I, Proc. I
Shock	Per MIL-STD 810D, Method 516-3, Proc. II, IV, VI

PHYSICAL SPECIFICATIONS

Case Material	Aluminum
Dimensions, HNA, HPA models	5" H x 8" W x 11" D (127 x 203 x 279 mm)
HPB model	5" H x 9" W x 11" D (127 x 229 x 279 mm)
Weight	8 to 19.5 lbs (3.6 to 8.9 kg)

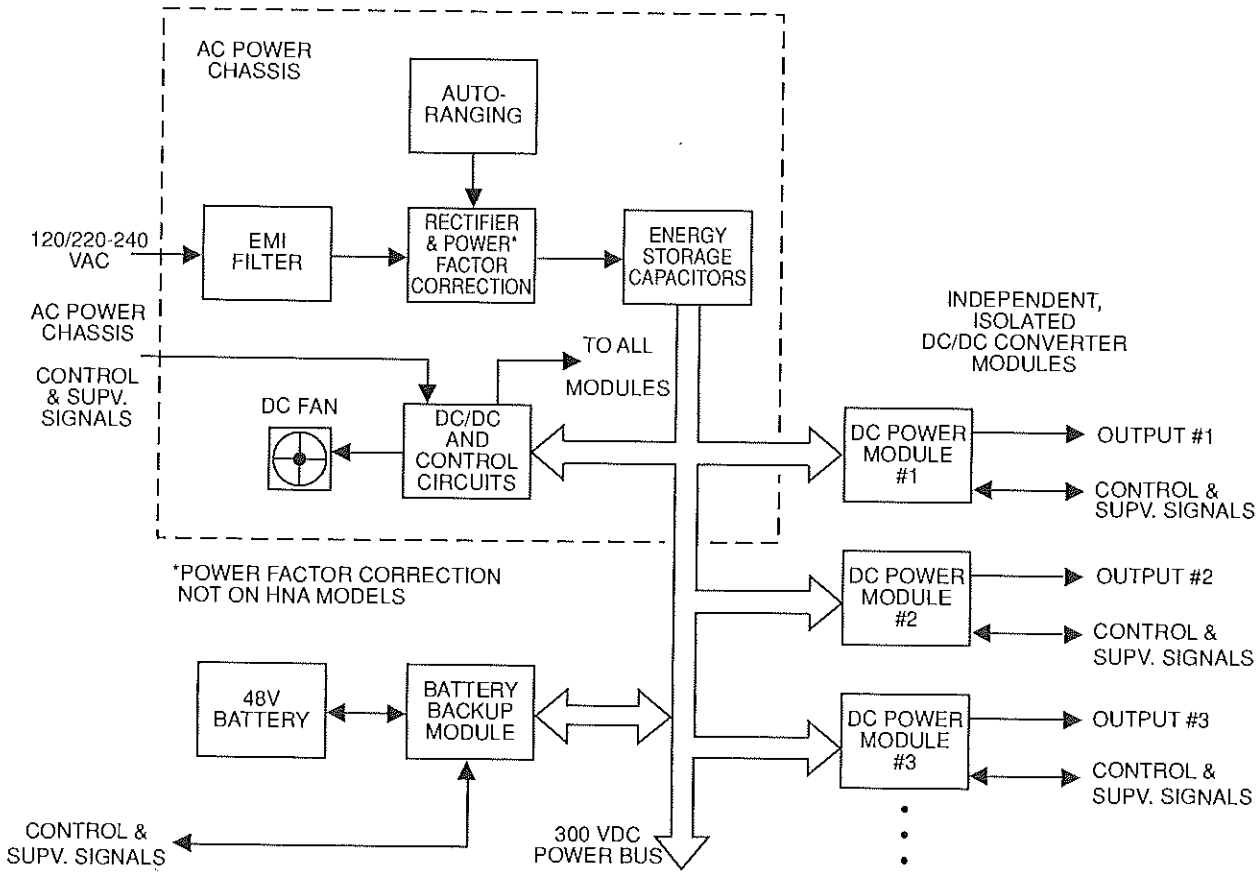
NOTES:

1. Whichever is greater; over AC input range.
2. Whichever is greater. Remote sense must be connected on single-output modules.
3. Whichever is greater. 20MHz bandwidth.
4. For 25% load step change at 75% rated load; 4% max. deviation with recovery to within 1%, at 1.0A/µsec.
5. Field MTBF.

TWO-YEAR WARRANTY

3900 Coral Ridge Drive ■ Coral Springs, FL 33065 ■ 954-346-2442 ■ FAX 954-340-7901

H SERIES POWER SYSTEM BLOCK DIAGRAM



H SERIES FEATURE & OPTION DESCRIPTIONS

FEATURE/OPTION	DESCRIPTION
AC Undervoltage Protection	Power supply is protected for all conditions below low line voltage.
Safety Agency Approvals	UL1950; CSA22.2 No. 234-M90; IEC950; EN60950; IEC601 (HPB models only).
Output Current Limiting	Single Output Modules: Current limiting takes place at 110% to 135% of rated load. Dual Output Modules: 25A on main output, 7A on auxiliary output.
Short Circuit Current	Single Output Modules: 10-100% of rated load current. Dual Output Modules: 8A max. on all outputs.
Overvoltage Protection	OVP operates at 120% to 135% of the nominal output voltage (60 VDC max.). The module output latches off. It is reset by cycling the AC input off and then on.
Reverse Voltage	To 100% of rated output current, maximum.
Turn-On Time	One second max. from AC turn-on. For AC turn-on or release of Inhibit control, the output voltage rise is monotonic with 3% maximum overshoot. Rise time from 5% to 95% of nominal output voltage is 100 msec. maximum.

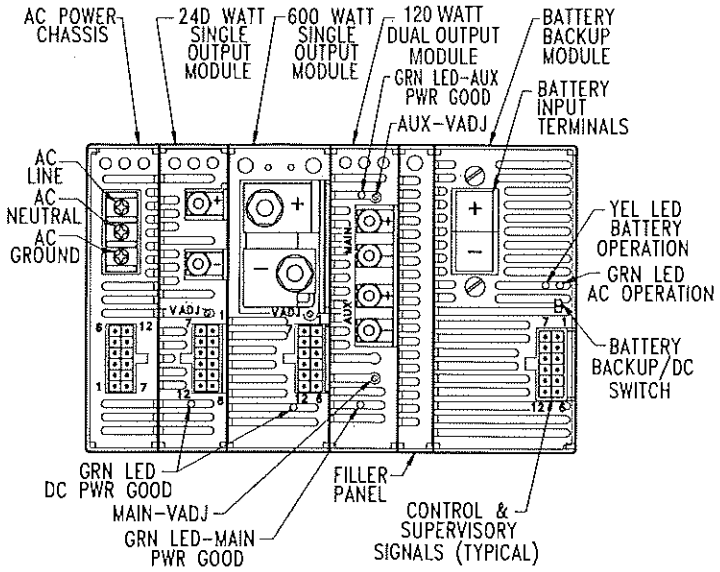
FEATURE/OPTION	DESCRIPTION
Isolated Outputs	All DC Power Module outputs are floating and isolated from all other module outputs. They can be connected as either + or – outputs and may be referenced up to ±100V from chassis ground.
Overtemperature Protection	The power supply latches off when internal temperature reaches excessive value. It must be reset by cycling the AC input off and then on.
EMI Input Filter	For HNA and HPA models, conducted EMI meets FCC and VDE level A. The HPB models, in addition, meet VDE level B for 220-240 VAC input; the HPB chassis is one-inch (25.4 mm) wider than the others.
Reverse Air Flow (Option R)	Standard air flow is from fan to front panel of power supply. This option reverses it.
Current Sharing (Option H)	All single outputs can current share with the output of another single output module either from the same or another H Series power system. This is done by connecting the current share pins together. Current sharing accuracy is within 10% of a module's rated output current.
+5V Isolated Alarm (Option L)	This option permits all alarm circuits to operate from an external source that is isolated from the AC input and all DC Power Module outputs. This voltage must be present to start the supply.

UNIPOWER CORPORATION

STANDARD MODULES

VOLTAGE & CURRENT	OUTPUT POWER	VOLTAGE ADJ. RANGE	SLOT WIDTH	MODULE CODE
2V @ 40A	80W	±10%	1	1A
2V @100A	200W	±10%	1.5	1C
3.3V @ 40A	132W	±10%	1	9B
3.3V @100A	330W	±10%	1.5	9E
5V @ 20A	100W	±10%	1	■ 2A
5V @ 40A	200W	±10%	1	■ 2C
5V @100A	500W	±10%	1.5	■ 2G
5V @120A	600W	±10%	1.5	2GA
12V @ 10A	120W	±10%	1	■ 3A
12V @ 20A	240W	±10%	1	■ 3D
12V @ 50A	600W	±10%	1.5	■ 3H
15V @ 8A	120W	±10%	1	■ 4A
15V @ 16A	240W	±10%	1	■ 4D
15V @ 40A	600W	±10%	1.5	■ 4H
24V @ 5A	120W	±10%	1	■ 5A
24V @ 10A	240W	±10%	1	■ 5D
24V @ 25A	600W	±10%	1.5	■ 5H
24V @ 33A	800W	±10%	1.5	5M
24V @ 42A	1000W	±10%	1.5	5N
28V @ 21A	600W	±10%	1.5	■ 6H
28V @ 29A	800W	±10%	1.5	6M
28V @ 36A	1000W	±10%	1.5	6N
48V @ 5A	240W	±10%	1	■ 7D
48V @12.5A	600W	±10%	1.5	■ 7H
48V @ 17A	800W	±10%	1.5	7M
48V @ 21A	1000W	±10%	1.5	7N
5V @5A/12V @5A	85W	±10%	1	23A
12V @5A/12V @5A	120W	±10%	1	33C
15V @4A/15V @4A	120W	±10%	1	44C
BATTERY BACKUP MODULE			2	UB

TYPICAL FRONT PANEL CONFIGURATION

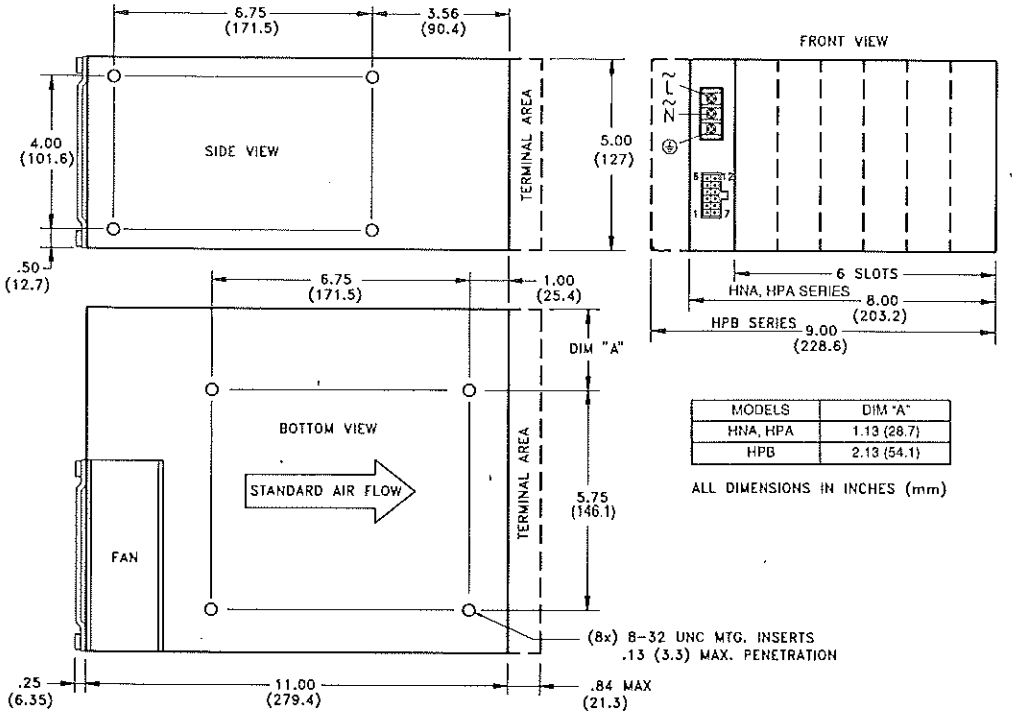


NOTE:
IN DUAL-OUTPUT MODULES THE UPPER TERMINALS ARE MAIN POWER OUTPUT AND THE LOWER TERMINALS ARE AUXILIARY POWER OUTPUT. THERE ARE NO CONTROL AND SUPERVISORY SIGNALS FOR DUAL OUTPUT MODULES.

ALL CONTROL AND SUPERVISORY SIGNAL CONNECTORS ARE MOLEX MINI-FIT, JR. (39-30-0120). MATING CONNECTORS ARE MOLEX (39-01-2125) WITH FEMALE PINS (39-00-0039).

BATTERY-BACKUP MODULE BATTERY INPUT RECEPTACLES AND MATING PLUGS ARE ANDERSON NO. 5916G4 (BLACK, FOR –) AND NO. 5916G7 (RED, FOR +) HOUSINGS WITH NO. 5900 CONTACTS.

CASE DRAWING



MODELS	DIM "A"
HNA, HPA	1.13 (28.7)
HPB	2.13 (54.1)

ALL DIMENSIONS IN INCHES (mm)

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UNIPOWER CORPORATION

ORDERING GUIDE

The UNIMOD H Series 1200-watt power system lets the user choose up to 6 out of 26 available output modules and a battery-backup module. Maximum continuous total output power drawn from all modules must not exceed 1200-watts for 220-240VAC input or 1000-watts for 120VAC input. The maximum number of slots is 6. Use the following guide to specify the model number.

EXAMPLE: An 1180W, three-output power system with power-factor correction, Class A EMI input filter, battery-backup and current share option. Input voltage is 230VAC.

Qty	Module	Module Code	Slots	Module Watts	Watts Drawn
1	5V@100A	2G	1.5	500	420
1	12V@50A	3H	1.5	600	550
1	24V@10A	5D	1	240	210
1	Battery Backup	UB	2	—	—
	Totals		6	1340	1180

Model Designation:

HPA – 2G 3H 5D UB – H

- HPA: Chassis (See Table)
- 2G 3H 5D: Output Modules (See Module Table)
- UB: Battery Backup Module
- H: Option (See Option Table)

NOTE: The position of the modules is determined by the factory. Filler panels are provided for empty slots.

H SERIES CHASSIS

CODE	PWR. FACTOR CORRECTION	INPUT EMI FILTER	CHASSIS WIDTH
■ HNA	No	Class A	8"
■ HPA	Yes	Class A	8"
■ HPB	Yes	Class B	9"

H SERIES OPTIONS

CODE	OPTION
■ H	Current Share (All Single-Output Modules)
L	Isolated Alarm Circuit
R	Reverse Air Flow (Consult Factory)

POWERSPEED™ 5 Day Delivery

On all models and options shown in bold and color with symbol ■

CONTROL AND SUPERVISORY SIGNAL CONNECTIONS

AC POWER CHASSIS CONNECTOR

PIN	FUNCTION
1	Thermal Alarm
2	AC Power Fail (Inverse)
3	Global Inhibit (Inverse)
4	Thermal Alarm (Inverse)
5	+5V Alarm Supply Return
6	+5V Alarm Supply
7	AC Power Fail
8	Global Inhibit
9	NC
10	NC
11	NC
12	NC

SINGLE OUTPUT POWER MODULE CONNECTOR (80W to 240W, 1 Slot Width)

PIN	FUNCTION
1	Current Monitor
2	Current Share
3	Module Inhibit
4	DC Power Good
5	+ Sense
6	– Sense
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

SINGLE OUTPUT POWER MODULE CONNECTOR (200W to 1000W, 1.5 Slot Width)

PIN	FUNCTION
1	Current Monitor
2	Current Share
3	Module Inhibit
4	DC Power Good
5	+ Sense
6	– Sense
7	Remote Margin (RM1), +5%
8	Remote Margin (RM2), –5%
9	Remote Margin (RM4), –10%
10	Remote Margin (RM3), +10%
11	Current Share Alarm
12	OVP Alarm

BATTERY-BACKUP MODULE CONNECTOR

PIN	FUNCTION
1	Low Battery Voltage Alarm
2	Battery Charge Fault Alarm
3	Battery Operation Inhibit
4	Charge Rate Alarm
5	+5V Alarm Supply Return
6	Charge Current Monitor
7	Battery Test
8	+ Battery Voltage
9	Battery Current Monitor
10	Battery Voltage Return
11	AC/Batt. Operation
12	NC

NOTES:
1. All control and supervisory signal connectors are Molex Mini-Fit, Jr. 39-30-0120. Mating connectors are Molex 39-01-2125 with female pins 39-00-0039.
2. Dual output modules do not have supervisory and control signals.
3. NC = No Connection.

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CONTROL AND SUPERVISORY SIGNAL DESCRIPTIONS

AC POWER CHASSIS CONNECTOR

SIGNAL	PIN	DESCRIPTION
ıermal Alarm)utput)	1	A TTL LO occurs when internal temperature exceeds limit. This occurs 10msec. before the outputs turn off. The power supply latches off and must be reset by cycling the AC input off and then on.
C Power Fail ıverse)utput)	2	This TTL signal is the logic inverse of the AC Power Fail signal on pin 7.
ılobal Inhibit ıverse nput)	3	This TTL input signal is the logic inverse of the Global Inhibit on pin 8.
hermal Alarm ıverse)utput)	4	This TTL signal is the logic inverse of the Thermal Alarm signal on pin 1.
5V Alarm Supply ieturn	5	This pin is the return for the +5V, 200mA Alarm Supply. All input and output logic signals for this connector are referenced to this return.
+5V Alarm Supply (Option L) (Input)	6	This input is for an external +5V, 200mA Alarm Supply which permits the alarm circuits to operate from a source that is isolated from the AC input and all DC Power Module outputs.
AC Power Fail (Output)	7	A TTL LO occurs when the AC input voltage falls a preset level below the low-line voltage specification. This happens 3 msec. before the output voltages drop out of regulation.
Global Inhibit (Input)	8	A TTL LO provided at this input inhibits (turns off) the DC outputs of all DC Power Modules.

DC POWER MODULE CONNECTOR*

SIGNAL	PIN	DESCRIPTION
Current Monitor (Output)	1	This + analog output voltage is proportional to the load current.
Current Share	2	Each single-output DC Power Module with current sharing option will share load current with identical modules when the output voltages are adjusted within 1% of each other and the modules are connected together by means of the current share pins. Current Share Accuracy: 10% of rated load current for all DC Power Modules.
Module Inhibit (Input)	3	A TTL LO provided at this input inhibits (turns off) the DC Power Module output.
DC Power Good 80W-240W (Output)	4	A TTL LO occurs when the output voltage goes outside the limit of –5% to –25% from nominal value or if the module stops functioning. This is for 80W to 240W (1 slot width) single-output DC Power Modules.
DC Power Good 200W-1000W (Output)	4	A TTL LO occurs when: 1) The output voltage at the remote sense leads goes outside the limits of ±5% from nominal value, or 2) The module stops functioning. This is for 200W to 1000W (1.5 slot width) DC Power Modules.
+ Sense – Sense	5 6	These remote sense leads are provided on all single-output modules and should be connected to the load point. They provide regulation to the point of load. Total external voltage drop from the DC output to the sense points is 0.5V max. Open sense leads will not cause the output to rise more than 2% above nominal value. The modules are protected against reverse sense connection except when operated in parallel.
Remote Margin, (RM1) +5% (Input)	7	A TTL LO at this input causes the DC Power Module output voltage to rise to 5% higher than its nominal value.
Remote Margin (RM2) –5% (Input)	8	Same as RM1 above except that a TTL LO causes a –5% change in output voltage.
Remote Margin (RM4) –10% (Input)	9	Same as RM1 above except that a TTL LO causes a –10% change in output voltage.
Remote Margin (RM3) +10% (Input)	10	Same as RM1 above except that a TTL LO causes a +10% change in output voltage.
Current Share Alarm (Output)	11	A TTL LO occurs when the current share error between modules exceeds 20% of rated load.
OVP Alarm (Output)	12	A TTL LO occurs when the overvoltage protection circuit is activated and the DC Power Module output voltage is latched off. To reset, cycle the AC input off and then on.

***NOTE:** The connector on the 80W to 240W (1 slot width) modules has signals specified on pins 1 through 6 only. Pins 7 through 12 are NC (no connection). The connector on the 200W to 1000W (1.5 slot width) modules has all 12 signals. Dual output modules do not have control and supervisory signals.

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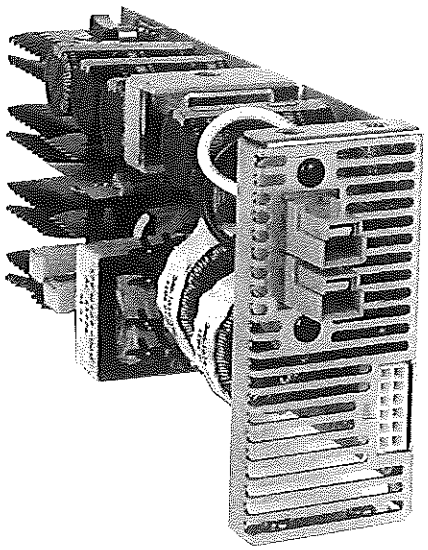
BATTERY-BACKUP MODULE

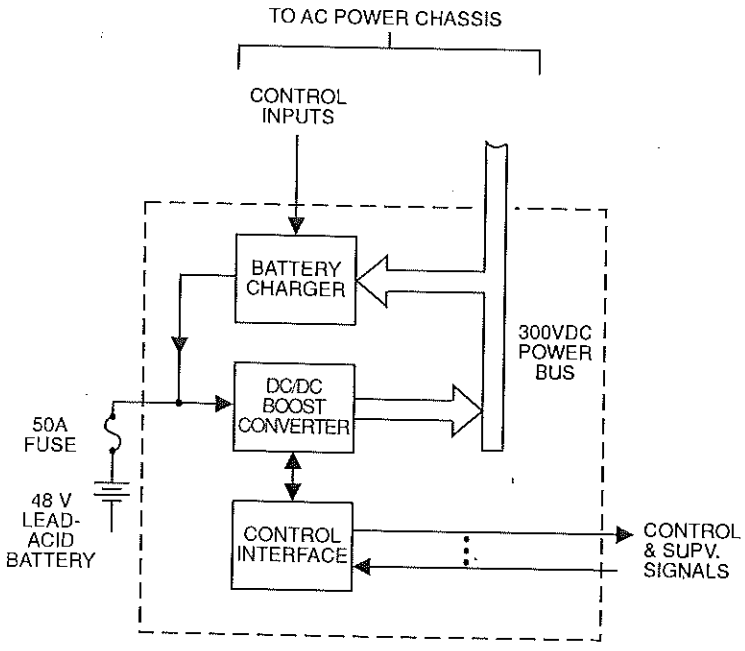
GENERAL DESCRIPTION

The UNIMOD H Series Battery-Backup Module permits continuous operation of the power system when the AC input voltage is interrupted or sags below the specified input range. A user-supplied 48V lead-acid battery provides standby power to the system. During normal AC operation the Battery-Backup Module charges the battery and maintains it in a charged state. When AC failure is sensed, energy is drawn from the battery through a switching DC/DC Boost Converter to the 300 VDC power bus, keeping the DC Power Modules operating and supplying rated outputs to the loads. Switchover from AC to battery power is automatic and free of transients. LED indicator lights show when operation is normal (AC operation) and when the system is operating from the battery.

Other important control and supervisory signals on the Battery-Backup Module include: Low Battery Voltage Alarm, Battery Charge Fault Alarm, Battery Operation Inhibit, Charge Rate Alarm, Charge Current Monitor, Battery Test and Battery Current Monitor. An accessible switch also allows the power system to be operated continuously from an external DC power source other than a battery.



BATTERY-BACKUP MODULE BLOCK DIAGRAM



SPECIFICATIONS

Typical at 48 VDC, full load and 25°C unless otherwise noted

BATTERY OPERATION SPECIFICATIONS

Nominal Input Voltage	48 VDC
Type of Battery	Sealed Lead- Acid, 24 Cells
Input Voltage Range	
1200W Continuous Output	42 to 60 VDC
1000W Continuous Output	40 to 60 VDC
Input Overvoltage, 1 sec. max.	65 VDC
Input Current, max.	
1200W load with 42 VDC in	45 A
1000W load with 40 VDC in	40 A
External Fuse Required	50A max.
Battery Drain, max. with batt. oper. inhibited	1 mA
Battery Drain, AC input in specified range	0 A
Module Output Voltage Transient, max., during transfer to battery	±3% change
AC Voltage for Transfer to Battery	75 to 90 VAC
	150 to 180VAC
Battery Voltage for Output Latch-Off	39-42 V, adjustable

BATTERY CHARGER SPECIFICATIONS

Charger Output Current	
Battery Voltage 56V±0.5V	0.55A min.
Battery Voltage 0 to 40 V	Self-protected to short
Charger Current Regulation, max.	
Above 46V	0.55A ±0.1A
Charger Output Voltage, rated load	56 VDC
Charger Voltage Adj. Range, rated load	54 to 58 VDC
Charger Minimum Load Current	2.0 mA
Charger Output Voltage, min.	
Zero Charge Current	60 VDC

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BATTERY-BACKUP FEATURE DESCRIPTIONS

FEATURE	DESCRIPTION	FEATURE	DESCRIPTION
attery-Backup/DC witch	Accessible switch on front of Battery-Backup Module which puts the power system into one of two operating modes: 1) AC with automatic battery-backup operation, or 2) Continuous operation from an external DC power source.	Battery Input Isolation	The 48 V battery is isolated from both the AC input circuit and all DC outputs of the power system.
		Battery Charger Isolation	A series-connected diode isolates the battery charger output from the battery.
attery-Backup Output atch-Off	The battery-backup converter latches off when the battery voltage drops below a preset level of 39-42 V. The voltage is adjustable by means of a potentiometer. The converter remains off until the AC voltage is re-applied within its specified limits.	Battery Charger Paralleling	The battery charger can be connected in parallel with other multiple chargers to provide more charging current. The Battery-Backup Module will still provide all fault detection capabilities as specified.

)ATTERY-BACKUP MODULE: CONTROL AND SUPERVISORY SIGNAL DESCRIPTIONS

SIGNAL	PIN	DESCRIPTION	SIGNAL	PIN	DESCRIPTION
ow Battery Voltage larm Output)	1	A TTL LO occurs when the battery voltage drops below 43-44V.	Charge Current Monitor (Output)	6	This + analog output voltage is proportional to the battery charging current.
attery Charge ault Alarm Output)	2	A TTL LO occurs when: 1) The battery circuit is opened, or 2) There is an overvoltage on the battery, or 3) There is a short circuit on the battery (voltage is below 36V).	Battery Test (Input)	7	A TTL LO at this input puts the module into a Battery Test mode whereby the battery supplies a portion of the load current based on AC line voltage and output load conditions. This input is on HPA and HPB models only.
attery Operation hibit nput)	3	A TTL HI provided at this input inhibits (turns off) all DC Power Module outputs only when the system is operating from batteries. The outputs remain latched off until the AC voltage is re-applied	+ Battery Voltage (Output)	8	This pin is connected to the positive battery terminal for monitoring the battery voltage.
			Battery Current Monitor (Output)	9	This + analog output voltage is proportional to the battery output current.
harge Rate Alarm Output)	4	A TTL LO indicates that the charger is providing a charge current higher than 0.2A to 0.3A.	Battery Voltage Return	10	This pin is connected to the negative battery terminal.
5V Alarm Supply eturn	5	This pin is connected to pin 5 of the AC Power Chassis connector.	AC/Battery Operation (Output)	11	A TTL LO indicates that the power system is operating on battery. A HI indicates that the system is operating on AC and the battery is being charged.

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