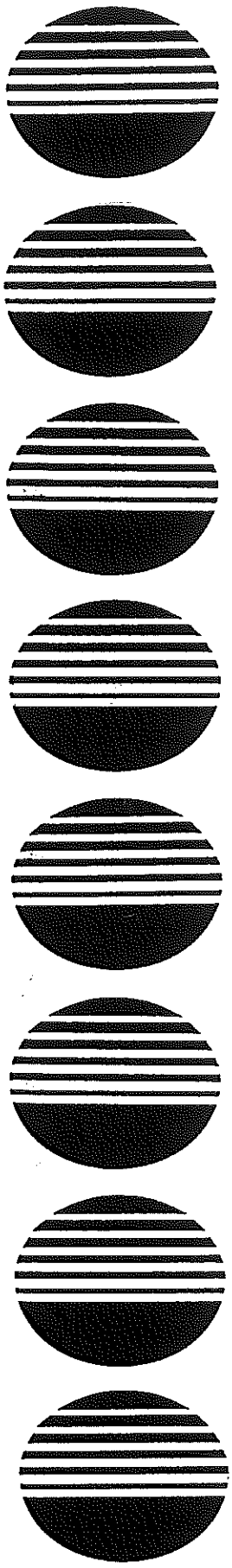


PRICE: $25.00

F SERIES
POWER FACTOR CORRECTED
SWITCHING POWER SUPPLIES

Manual No. F-593-0

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

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

F SERIES OPERATING MANUAL

1.0 INTRODUCTION

1.1 This Operating Manual should be read through carefully before installing and operating the F Series switching power supplies.

1.2 The F Series are compact, single-output switching power supplies with output power levels of 650, 800 and 1,000 watts. See Fig. 1. They feature input power factor correction to 0.98 and worldwide input autoranging in 4 x 5 and 5 x 5 inch case formats. There are 24 standard models with output voltages from 2VDC to 48VDC. The units are safety agency recognized by UL and certified by CSA and TUV.

The F Series incorporates a number of important features and options including current sharing, N + 1 redundancy capability, no load operation, 100 kHz MOSFET switching, input EMI filter, electronic inrush current limiting, remote sensing, thermal warning and protection, output inhibit and remote margining.

2.0 SAFETY WARNINGS

2.1 This switching power supply has hazardous 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 hazardous voltage potentials. Do not touch this area when AC power is applied.

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

2.4 The internal voltages are at hazardous potentials. The power supply cover should not be removed. There are no user-serviceable components in this unit. Removing the cover of the power supply will void the warranty.

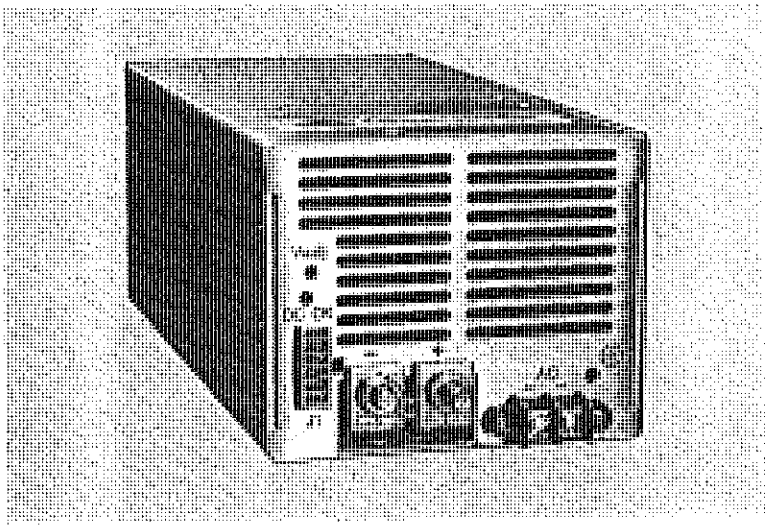


Figure 1. **F Series Power Supply**

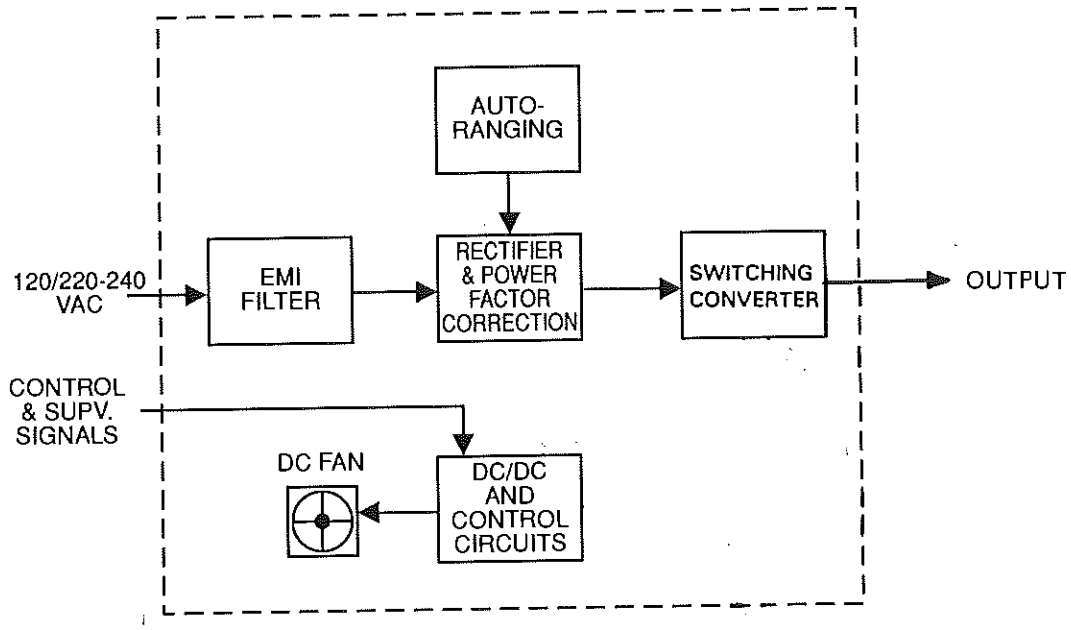


Figure 2. **F Series Block Diagram**

3.0 WARRANTY POLICY

ALL PRODUCTS of UNIPOWER Corporation are warranted 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 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 F Series Power Supply 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. The final acceptance test report is included with each power supply.

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 supply 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 Input.** The front end of the F Series power supplies incorporates an input EMI filter to suppress line noise and high frequency transients both from the AC power line and from the power supply to the line. The AC input voltage range is automatically selected by an autoranging circuit for either 120 VAC or 220 to 240 VAC. Electronic inrush current limiting controls the initial AC input current on power up.

5.2 **Power Factor Correction.** The front end also 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. 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 supply 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.

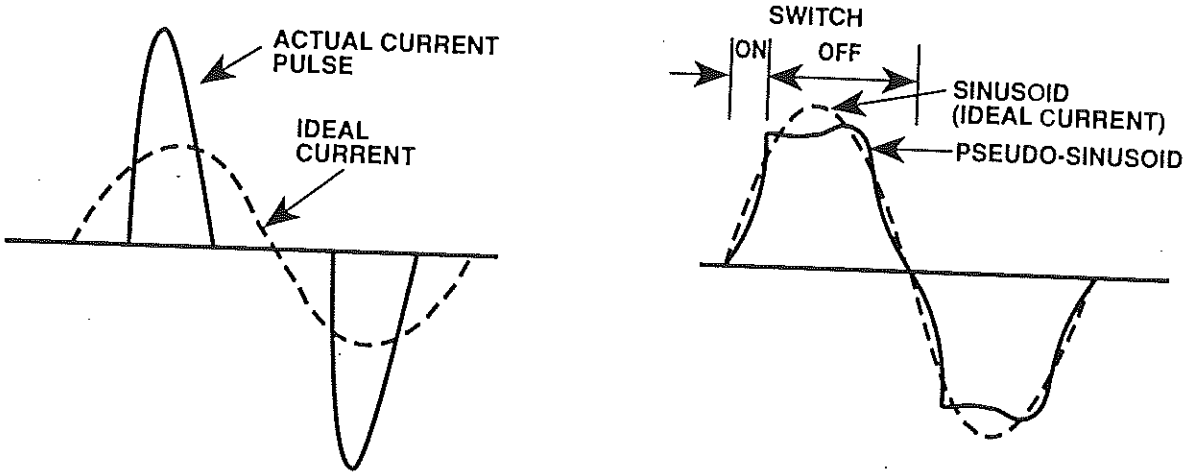
5.3 **DC Output.** The F Series uses an isolated feedback circuit to regulate the output voltage. This is done by means of pulse-width modulation control of a full-bridge circuit using MOSFET switches operating at 100kHz. The output has both overload and overvoltage protection.

6.0 FRONT PANEL DESCRIPTION

6.1 The F Series front panel is shown in Figure 5. Case 40 (650W models) is 4 inches (101.6mm) high and case 42 (800 & 1000W models) is 5 inches (127.9mm) high.

6.2 The output is at two terminal lugs on the lower left side of the front panel. Connections are made by means of No. 5/16-18 studs. To the left and above the terminal lugs is the voltage adjustment potentiometer which adjusts the output voltage $\pm 10\%$.

6.3 AC input connections are made to a two-terminal barrier strip by means of No. 6-32 screws. This terminal strip is located on the lower right side of the front panel. There is also a No. 6-32 screw on the front panel for the ground connection.



(a) Uncorrected

(b) Corrected to Pseudo-Sinusoid

Figure 3. Input Current Waveforms Before and After Power Factor Correction.

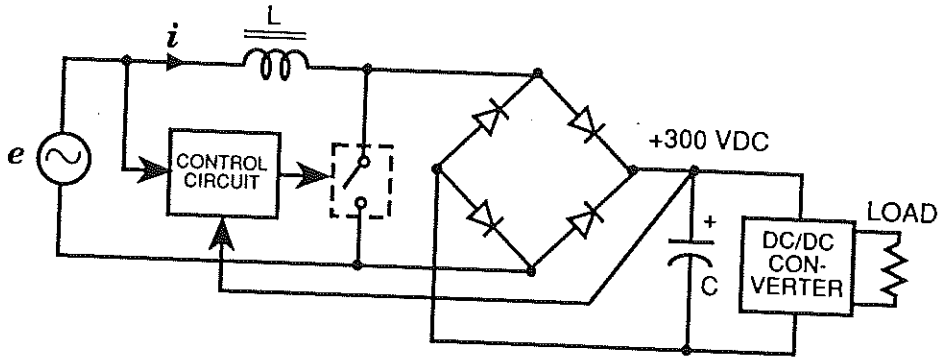


Figure 4. Simplified Version of Circuit for Active, Low-Frequency Power Factor Correction.

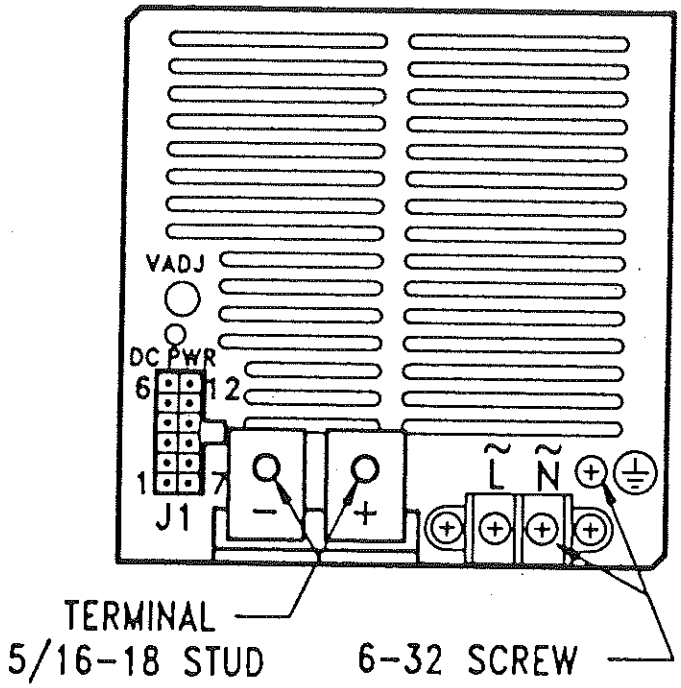


Figure 5. **F Series Front Panel Diagram.**

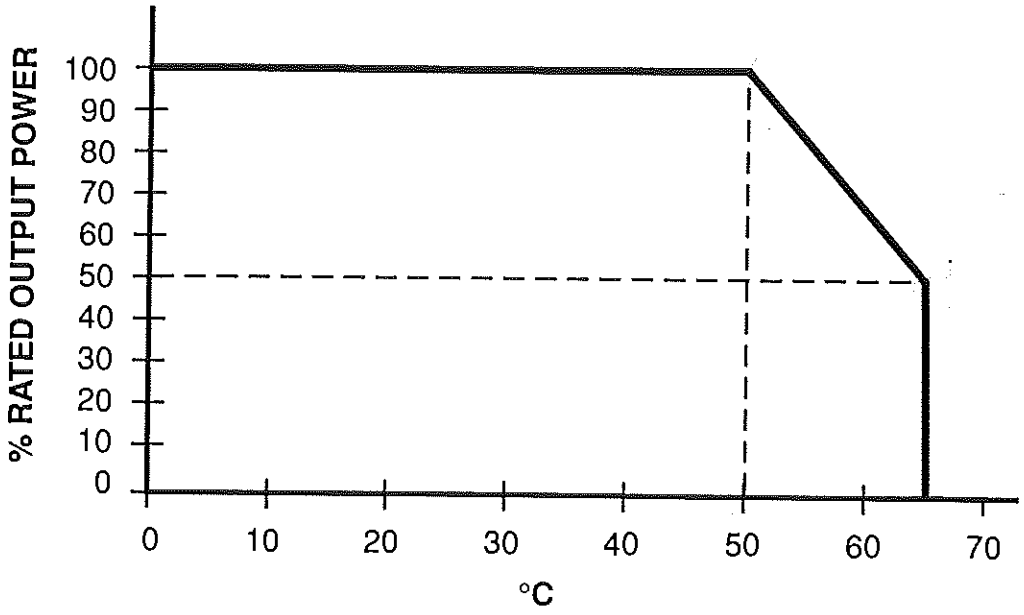


Figure 6. **Output Power vs. Ambient Temperature**

6.4 On the extreme left side of the front panel is a 12-pin Molex connector, J1, for the control and supervisory signal inputs and outputs.

7.0 AVAILABLE OUTPUTS

The following table shows the choice of outputs available for the F Series.

MODEL	VOLTAGE	CURRENT	OUTPUT POWER	CASE
FJ1000	2VDC	130A	650W	40
FJ9000	3.3VDC	130A		
FJ2000	5VDC	130A		
FJ3000	12VDC	55A		
FJ4000	15VDC	44A		
FJ5000	24VDC	28A		
FJ6000	28VDC	24A		
FJ7000	48VDC	14A		
FM1000	2VDC	160A	800W	42
FM9000	3.3VDC	160A		
FM2000	5VDC	160A		
FM3000	12VDC	67A		
FM4000	15VDC	54A		
FM5000	24VDC	34A		
FM6000	28VDC	29A		
FM7000	48VDC	17A		
FN1000	2VDC	200A	1000W	42
FN9000	3.3VDC	200A		
FN2000	5VDC	200A		
FN3000	12VDC	84A		
FN4000	15VDC	67A		
FN5000	24VDC	42A		
FN6000	28VDC	36A		
	48VDC	21A		
FN7000				

8.0 DESCRIPTION OF FEATURES AND OPTIONS

FEATURE/OPTION	DESCRIPTION
Autorange Input.	The AC input circuit automatically switches to the proper range for the input line voltage. The ranges are 90 to 132 VAC and 180 to 264 VAC for automatic worldwide operation.

FEATURE/OPTION	DESCRIPTION
AC Undervoltage Protection.	The power supply is protected for all conditions below low line voltage. The power supply shuts down when the input voltage drops below 65-80 VAC (115 VAC range) or 140-165 VAC (230 VAC range) under full load.
Electronic Inrush Current Limiting and Soft Start.	A triac circuit limits the input current to 80A peak, maximum, when the power supply is first turned on. The output voltage rises monotonically to its specified value within 1.0 second of turn-on with a maximum 3% overshoot.
EMI Input Filter.	The input filter suppresses conducted noise on the AC line. It meets FCC part 15 Class A and VDE 0871 Class A requirements.
Input Protection.	The input is protected by a 20A fuse.
Power Factor Correction.	A power factor correction circuit reshapes the large input current pulses into a near sinusoidal current which reduces input harmonic currents. The resultant power factor is 0.98 typical, 0.95 minimum.
Safety Agency Approvals.	UL recognized to UL1950; CSA certified to CSA22.2 (1402C); TUV approved to VDE0805 and EN 60 950.
Thermal Protection and Warning.	The power supply shuts down and latches off when the internal temperature reaches an excessive value. The supply must be reset by cycling the AC input off and then on. The Power Good signal gives warning of overtemperature shutdown 10 msec. minimum before the output voltage drops by 5%.
No Load Operation.	With this feature the power supply can be operated down to zero load current without affecting the regulation.

FEATURE/OPTION	DESCRIPTION
Output Current Limiting.	Current limiting protects the output from overload conditions. Current limiting is set at 110% to 130% of the rated output load current. Overload protection is continuous, without damage, and recovery is automatic when the overload is removed.
Short Circuit Current.	The short circuit output current is 100% maximum of the rated output load current.
Overvoltage Protection.	The output is protected from fault conditions in the power supply. OVP operates at 120% to 135% of the nominal output voltage. The converter circuit is shut down. The output is reset by cycling the AC input off and then on.
Reverse Voltage Protection.	The output is reverse voltage protected to 100% maximum of the rated output current.
LED Output Indicator.	A green LED located directly above the J1 connector indicates that the DC output is good.
Power Good Signal.	The Power Good output signal and its inverse provide advance warning of loss of output power due to: 1. Loss of AC input. 2. Overtemperature shutdown or 3. OVP shutdown. For further details see the timing diagram in Fig. 7.
N + 1 Redundancy Capability	This capability permits redundant operation by paralleling the outputs of two or more F Series power supplies. For further details see Sections 9.6 and 9.9.

FEATURE/OPTION	DESCRIPTION
DC "OK" Signal (Option D)	This signal and its inverse indicate when the DC output voltage goes outside the typical tolerance limit of ±5% of nominal. The sense levels are set within ±4% to ±7%.
Current Share and Current Monitor (Option F)	The Current Share (CS) pin permits F Series identical models to current share a load to within an accuracy of ±10% of the rated output current. The Current Monitor (CM) pin provides a positive output voltage proportional to the output load current.
Reverse Air Flow (Option R)	Standard air flow is from the fan to front panel of the power supply. This option reverses the air flow. With this option the output must be derated by 2.0%/°C from 40°C to 65°C.

9.0 OPERATING INFORMATION

9.1 **Input Voltage.** The F Series power supplies operate on standard 120 VAC (90 to 132 VAC range) or 220-240 VAC (180 to 264 VAC range) input voltages at 47-63 Hz and automatically adapt to the given input anywhere in the world. This is the input autoranging feature which is standard on all models. A protective 20A fuse is located inside the power supply case. This fuse is not user accessible.

9.2 **Outputs.** The output power connections are made to No. 5/16-18 studs on nickel plated brass bus bars. See Fig. 5. The right bus bar is positive and the left bus bar is negative.

The connecting wires for all outputs should be sized to carry the rated output current plus 30%. Connecting wires or lugs must be clean and securely connected to the terminals to reduce contact resistance. All outputs should have a 0.1uF ceramic capacitor and 10 uF electrolytic capacitor in parallel across each output at the backplane, connection point, or point of load to prevent noise pickup.

9.3 **Output Power.** The F Series have maximum output power ratings of 650, 800 and 1,000 watts. This output power must not be exceeded under normal conditions. The voltage drop at the output which occurs as a result of remote sensing must be taken

into account when calculating the maximum current available.

The maximum continuous output power of the power supply may be drawn at up to 50°C ambient temperature (40°C for the Reverse Air Flow option). Above 50°C the output must be derated by 3.3%/°C up to 65°C maximum. For reverse air flow, above 40°C the output must be derated by 2.0%/°C up to 65°C maximum. See Fig. 6.

9.4 **Remote Sensing.** Remote sense connections for the output are made to pins 1 and 4 of J1. The remote sense feature is used to regulate the output voltage at the point of load. The + Sense lead is connected to the + output at the load, and the - Sense lead 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 total, 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 at the DC output.

9.5 **Control and Supervisory Signals.** All control and supervisory signals are accessible at the 12-pin J1 receptacle on the front panel of the power supply. Some pins are for control inputs and others are for warning outputs. The inputs and outputs that are used must have external 0.1uF ceramic capacitors across them to prevent noise pickup. For a description of each function see Section 11, "Description of Control and Supervisory Signals".

9.6 **Current Sharing (Paralleled Outputs).** The outputs of two or more F Series power supplies may be connected in parallel to current share if they are identical in both voltage and current rating. The current share function is implemented by first adjusting the output voltages of all outputs which are to be current shared to within ±2% of each other. For best performance adjust to ±1%. This is required so that the output with the lowest voltage will be within the capture range of the output with the highest output voltage. Then with the power off on all supplies, the outputs are connected in parallel with all remote sense leads connected, and the current share terminals (J1 pin 7) are connected together. After this the output voltages should not be adjusted since it will cause the variation between outputs to exceed the capture range and result in unstable operation. AC power may then be applied to all units. The current sharing accuracy of each output is within ±10% of its output current rating.

9.7 **Output Voltage Adjustment.** The output voltage is adjustable by means of the potentiometer on the front panel above J1. See Fig. 5. The output should not be continuously operated outside its nominal range of ±5%, and the output power must not exceed the maximum rating of the power supply.

9.8 **Timing Diagram.** The Power Good signal on pin 5 of J1 is a warning signal for the loss of AC power, main output loss, OVP shutdown, or thermal shutdown. It is a TTL output signal which is shown in the timing diagram of Fig. 7. An Inverse Power Good signal is also available on pin 11. As shown, the Power Good signal gives at least a 10 millisecond warning of a thermal shutdown and at least a 5 millisecond warning of loss of AC power.

9.9 **N + 1 Redundancy.** This feature is a type of parallel operation. Redundancy is achieved by having one more power supply output in parallel operation than needed to supply the load power. If two identical outputs in parallel can provide the total load power, then three outputs are used, each providing approximately one third of the total current. If one power supply fails, the other two automatically take up the total load current, sharing it approximately 50/50.

10.0 CONTROL & SUPERVISORY SIGNAL CONNECTIONS

The following are the control and supervisory signal pin designations for J1. See Fig. 5.

J1	
PIN	**FUNCTION**
1	+ Sense
2	HI Margin
3	LO Margin
4	- Sense
5	Power Good
6	Inhibit
7	Current Share (CS)
8	Current Monitor (CM)
9	DC OK
10	DC OK Inverse
11	Power Good Inverse
12	Return (- Sense)

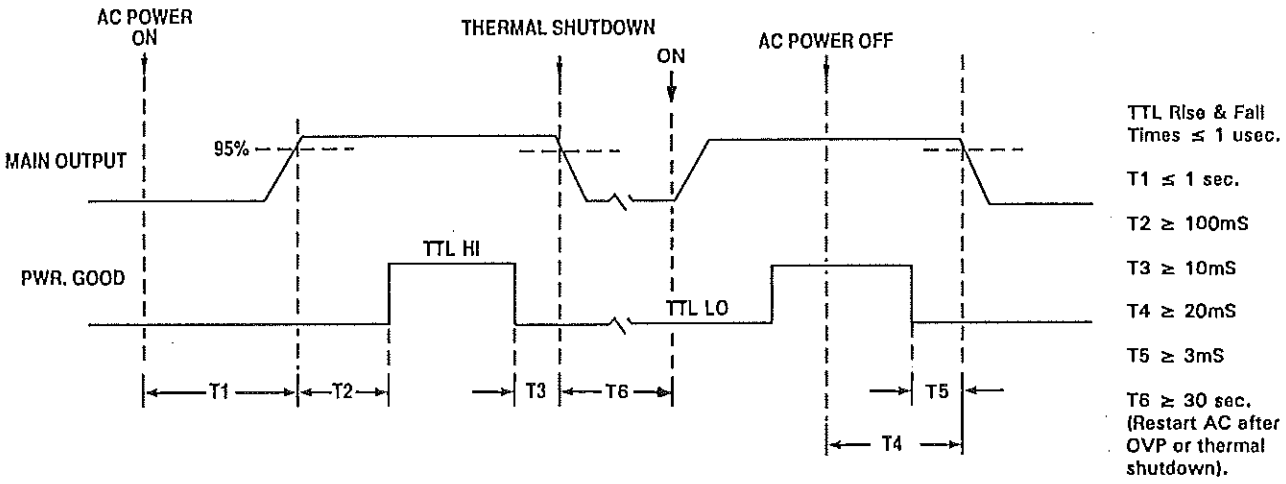
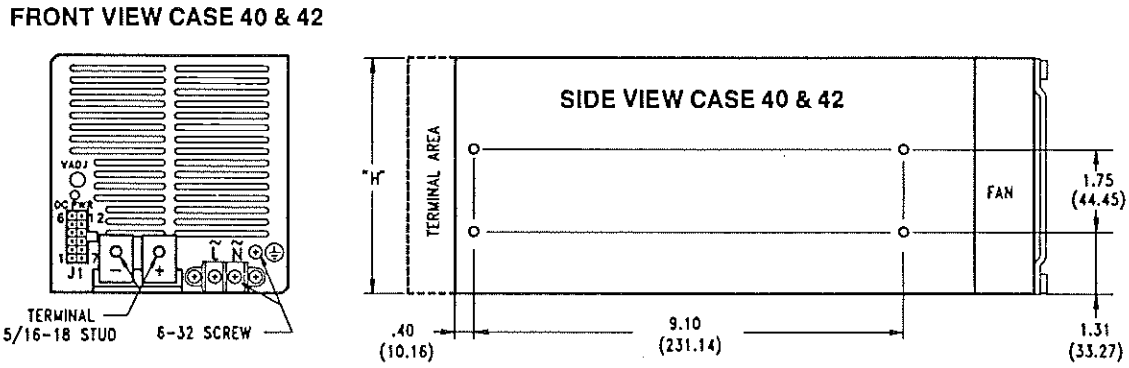


Figure 7. Timing Diagram



DIMENSIONS INCHES (mm)	CASE STYLE	
	40	42
H	4.00 (101.6)	5.00 (127.0)
W	5.00 (127.0)	5.00 (127.0)
L	12.00 (304.80)	12.50 (317.50)
A	.40 (10.16)	.40 (10.16)
B	10.27 (260.86)	10.27 (260.86)
C	.56 (14.22)	.56 (14.22)
D	3.89 (98.81)	3.89 (98.81)

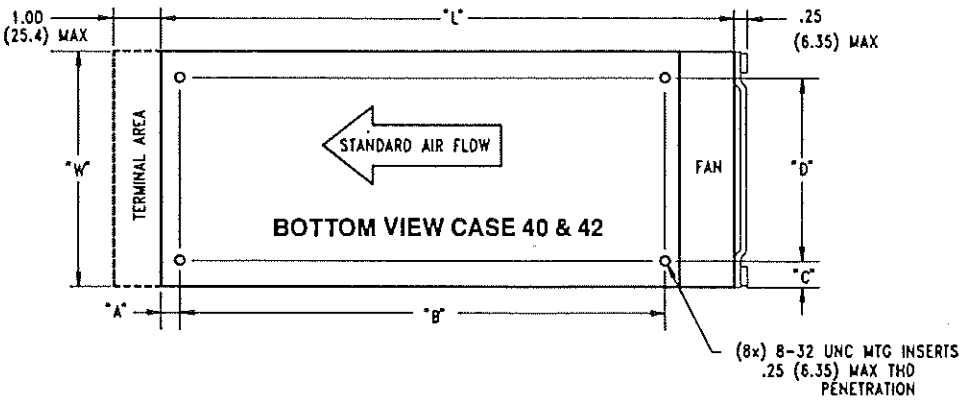


Figure 8. Mechanical Dimensions

J1 Mating Connector:
Molex #39-01-2125
Female Pins
Molex #39-00-0039

11.0 DESCRIPTION OF CONTROL AND SUPERVISORY SIGNALS (J1)

SIGNAL	PIN	DESCRIPTION
+ Sense	1	This remote sense lead should be connected to the + output at the load point by means of a twisted pair with the - Sense lead. See Section 9.4 for a full description of remote sensing.
HI Margin (Input)	2	The output voltage can be remotely controlled by a switch closure. Closing a switch between this pin and - Sense (pin 4) or common (pin 9) will put the output into the HI Margin state in which the output voltage is 4% to 10% higher than its nominal value.
LO Margin (Input)	3	LO Margin operates the same as HI Margin above except that switch closure puts the output into the LO Margin state in which the output voltage is 4% to 10% lower than its nominal value.
- Sense	4	This remote sense lead should be connected to the - output at the load point by means of a twisted pair with the + Sense lead. See Section 9.4 for a full description of remote sensing.
Power Good (Output)	5	The Power Good signal is a warning signal for the loss of AC input power, loss of output power, thermal shutdown, or OVP activation. A TTL LO (sinks 10mA) warning occurs before the output voltage drops by 4 to 7%. See Fig. 7. A TTL HI (sources 10mA) is normal. The signal is referenced to the output - Sense (pin 4) or common (pin 9).

SIGNAL	PIN	DESCRIPTION
Inhibit (Input)	6	The power supply can be remotely turned on and off by means of the inhibit input. A TTL Hl (sourcing 1.0mA) or open circuit turns the power supply on and a TTL LO (sinking 1.0mA) turns it off. The signal is referenced to the main output - Sense (pin 4) or common (pin 9).
Current Share (CS)	7	This connection, made between other F Series power supplies with identical outputs, permits current sharing with ±10% accuracy. See Section 9.6 for a full description of current sharing.
Current Monitor (CM) (Output)	8	This output voltage is proportional to the output current. At no load the output voltage is 0V to +0.5 V; at full load the voltage is +3.3 V to +4.5 V. This signal is referenced to the - Sense (pin 4) or common (pin 9).
DC OK (Output)	9	This optional output signal (Option D) indicates that the main output voltage is outside a tolerance limit of ±4% to ±6% of nominal value. A TTL LO (sinks 20mA) indicates the output is out of tolerance and a TTL HI (sources 10mA) indicates it is within tolerance. This signal is referenced to the main output - Sense (pin 4) or common (pin 9).
DC OK Inverse (Output)	10	This signal (also Option D) is the logic inverse of the DC OK signal on pin 9. All other characteristics are the same.
Power Good Inverse (Output)	11	This signal is the logic inverse of the Power Good signal on pin 5. All other characteristics are the same.
Return (Common)	12	This is connected internally to the main output - Sense and is the reference for all control and supervisory signals.

12.0 INSTALLATION

12.1 **Mounting.** See Fig. 8. The F Series has two mounting surfaces, one on the bottom and one on the side, each with four threaded mounting inserts. The inserts accept no. 8-32 screws with maximum penetration of 0.25 inch (6.4mm). Maximum torque on these screws is 19 in.-lbs.

12.2 **Cooling.** The F Series is cooled by means of an internal DC ball-bearing fan. To insure proper cooling, the power supply requires a minimum clearance of 1 inch (25mm) between all air intakes and outlets, and other surfaces. Both standard and optional reverse air cooling (Option R) are available. Additional derating is required for reverse air cooling. See Section 9.3.

12.3 **Input Connections.** AC input connections are made to a two-terminal barrier strip. The barrier strip has no. 6-32 screws. A three-wire AC line and plug must be used for the AC power connection with proper connection made to line, neutral and safety ground terminals. The safety ground terminal is on the front panel above the terminal strip and also has a no. 6-32 screw. See front panel diagram in Fig. 5. The proper line cord wire size must be used: No. 14 AWG is recommended. Maximum torque on the screws is 9 in.-lbs.

12.4 **Output Connections.** Connections to the output are made to nickel-plated, brass bus bars by means of 5/15-18 studs. The connections must be secure, and the wires or lugs must be clean to reduce contact resistance. Maximum torque on the stud nuts is 50 in.-lbs. The wires must be of correct size to carry the rated output current plus 30%.

12.5 **Control and Supervisory Signal Connections.** These connections are made to J1, a 12-pin Molex connector. The mating plug is Molex 39-01-2125 with female pins 39-00-0039.

13.0 MAINTENANCE

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

14.0 POWER SUPPLY SETUP AND TESTING

14.1 Connect the AC power cord to the AC input barrier terminal strip. See Fig. 5. Be sure to use a three-wire connection to the proper terminals including the safety connection. Do not plug in the AC power cord yet. See Fig. 9.

14.2 Connect the remote sense leads, with proper polarity, directly to the output on the front panel of the power supply. See Section 9.4. Make sure that the Inhibit input (pin 6 of J1) is open or a TTL HI. Make sure that the HI and LO Margin inputs (pins 2 and 3 of J1) are both open.

14.3 Plug the AC power cord into the wall socket and measure the output voltage with a digital voltmeter to see that it is the correct value. The voltage should be

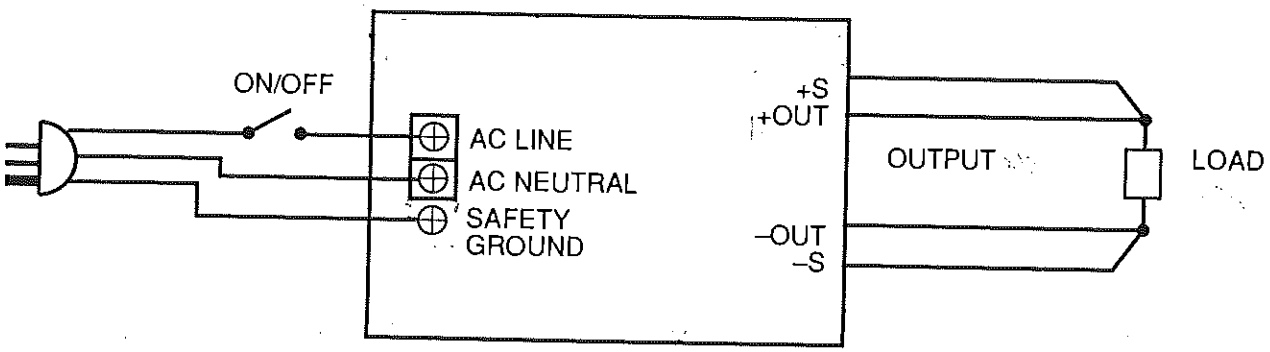


Figure 9. **Input and Output Connections**

within ±1% of nominal value as set at the factory. If a more precise value is required, adjust the voltage-adjustment potentiometer for the output. A clockwise adjustment increases the output voltage. See Section 9.7. Unplug the AC power cord.

14.4 If output is to be current shared (connected in parallel) or connected for N + 1 redundancy, follow the instructions in Sections 9.6 and 9.9.

14.5 With the AC input unplugged, connect the desired load to the output and connect the remote sense leads to the load points as described in Section 9.4. Plug the AC power cord into the wall socket and re-check the output voltage at the sense point with a digital voltmeter. The reading should be nearly the same as before, within the regulation specification for the output.

15.0 TROUBLE SHOOTING GUIDE

15.1 If you encounter difficulty and do not get the proper output voltage, go through the following trouble shooting guide.

SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
No output.	No AC input.	Check connection to AC power.
No output.	Shorted output.	Remove short.
No output.	Overvoltage protection (OVP) is engaged.	Check Power Good output (pin 5) for a logic LO. Wait 30 seconds and cycle the AC input off and then on.
No output.	Overtemperature protection is activated.	Check Power Good output (pin 5) for a logic LO. Check to see that fan is operating. Wait 30 seconds and cycle the AC input off and then on.
No output.	Output is turned off by Inhibit control.	Check to see if pin 6 is a logic LO. It should be logic HI, or open.

SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
Output is higher or lower than nominal value.	HI or LO Margin is activated.	Check pins 2 and 3 to make sure they are open.
Noisy output voltages or poor regulation.	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

15.2 If none of these actions solves the problem, call the UNIPOWER factory for help and try to resolve the problem over the telephone. If this is not successful, request an RMA (Return Material Authorization) number and return the power supply 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.

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CORAL SPRINGS, FL 33065
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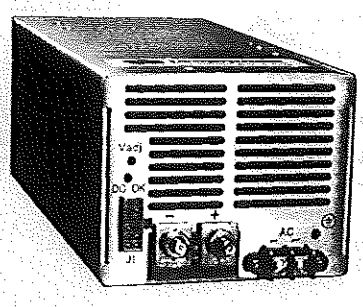
F SERIES: POWER FACTOR CORRECTED

Single Output, 650-1500 Watts



KEY FEATURES

- .98 Power Factor (UNIFACTOR®)
- Patented Circuit (U.S. Pat 4,831,508)
- Low Harmonic Current Distortion
- Designed To Meet EN6055-2
- Worldwide Autorange (115/230VAC)
- Compact 4x5 & 5x5 Inch Format
- Power Density To 4.6 W/Cubic Inch
- Redundant N + 1 Capability
- No Load Operation
- LED Output Power Indicator

OPTIONS

- DC "OK" Signal With Inverse
- Current Share and Current Monitor
- Reverse Air Flow

OTHER FEATURES

- Outputs From 2VDC To 48VDC
- Full Output Power To 50°C
- 80 kHz Switching
- Efficiency To 85%
- Field MTBF Over 500,000 Hours
- Surface Mount Technology
- Rear Mounted DC Ball Bearing Fan
- Soft Start
- Electronic Inrush Current Limiting
- Tight Regulation, Low Noise
- Overload And Overvoltage Protection
- Thermal Warning And Protection
- EMI Input Filter
- Remote Sense, Inhibit, Margin
- AC Power Fail Signal
- 24 Hour Power-Cycle Burn-In At 55°C
- Full Test Data With Each Unit
- Safety Agency Approvals
- Manufactured In U.S.A.
- Two Year Warranty

SPECIFICATIONS

Typical at Nominal Line, Full Load and 25°C Unless Otherwise Noted.

OUTPUT SPECIFICATIONS

Output Voltage Adjustment Range	±10%
Line Regulation[1]	0.2% or 10 mV, max.
Load Regulation[2]	0.2% or 10 mV, max.
Ripple and Noise[3]	1% or 50mV, max.
Hold-Up Time	20 msec., min.
Dynamic Response[4]	500 usec., max.
Temperature Coefficient	0.02%/°C, max.
Overvoltage Protection	Power Shutdown
Remote Sense[5]	Standard

INPUT SPECIFICATIONS

Voltage Range, (Autorange)[7]	90 to 132 VAC 180 to 264 VAC
Power Factor	0.98
Input Frequency	47 to 63 Hz
Inrush Current	80A Peak
Input EMI Filter, Conducted	FCC & VDE Class A
Input Protection	Internal Fuse

GENERAL SPECIFICATIONS

Efficiency, 12V To 48V Out	75 to 85%
2V To 5V Out	55 to 70%
Switching Frequency	80 kHz
MTBF[6]	Greater Than 500,000 Hrs.
Input To Output Isolation	3000 VAC

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	0°C to 65°C
Derating, 50°C to 65°C	3.3%/°C
Storage Temperature Range	–40°C to +85°C
Cooling	Internal DC Ball Bearing Fan
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	See Case Drawings
Weight:	
650W	13.0 lbs. (5.9 kg.)
800W & 1000W	14.0 lbs. (6.4 kg.)
1250W & 1500W	14.5 lbs. (6.6 kg.)

NOTES:
1. Whichever figure is greater. Measured over AC input range.
2. Whichever figure is greater. Remote sense must be connected.
3. Whichever figure is greater. 20 MHz bandwidth.
4. 4% maximum deviation with recovery to within 1% for 25% step change at 75% rated load.
5. 0.25V maximum load cable voltage drop.
6. Field MTBF.
7. 1500W models have 180-264VAC input only.

UL 1950 CSA 22.2, No. 234 TUV EN 60 950 VDE 0805

All specifications subject to change without notice.

STANDARD MODELS

MAX WATTS	MODEL NUMBER	OUTPUT	CASE
650	FJ1000	2V130A	40
	FJ9000	3.3V130A	
	FJ2000	5V130A	
	FJ3000	12V55A	
	FJ4000	15V44A	
	FJ5000	24V28A	
	FJ6000	28V24A	
	FJ7000	48V14A	
800	FM1000	2V160A	42
	FM9000	3.3V160A	
	FM2000	5V160A	
	FM3000	12V67A	
	FM4000	15V54A	
	FM5000	24V34A	
	FM6000	28V29A	
	FM7000	48V17A	
1000	FN1000	2V200A	
	FN9000	3.3V200A	
	FN2000	5V200A	
	FN3000	12V84A	
	FN4000	15V67A	
	FN5000	24V42A	
	FN6000	28V36A	
	FN7000	48V21A	
1250	FP 1000	2V250A	43
	FP 9000	3.3V250A	
	FP 2000	5V250A	
	FP 3000	12V105A	
	FP 4000	15V84A	
	FP 5000	24V52A	
	FP 6000	28V45A	
	FP 7000	48V26A	
1500[3]	FQ 1000	2V300A	
	FQ 9000	3.3V300A	
	FQ 2000	5V300A	
	FQ 3000	12V125A	
	FQ 4000	15V100A	
	FQ 5000	24V63A	
	FQ 6000	28V54A	
	FQ 7000	48V31A	

For special output voltages, consult factory.

OPTIONS[1]	
D	DC "OK" With Inverse
F	Current Share and Current Monitor
R	Reverse Air Flow[2] (Consult Factory)

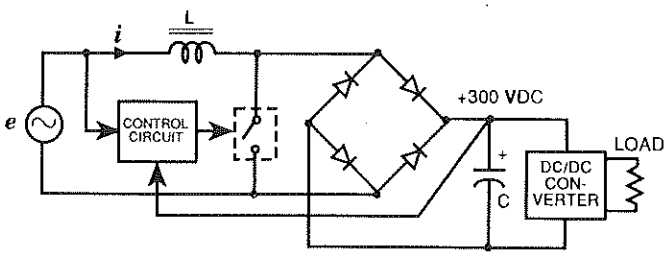
NOTES:
1. Add suffix letters to model numbers for additional options.
2. Requires derating from 40°C to 65° of 1.7%/°C.
3. 1500W models have 180-264VAC input only.

MATING PLUGS AND PINS
J1 mating plug: Molex 39-01-2125
Female pins are 39-00-0039

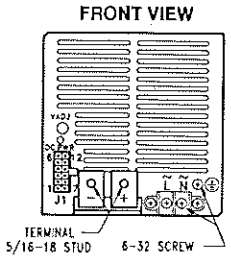
ACTIVE LOW-FREQUENCY POWER FACTOR CORRECTION

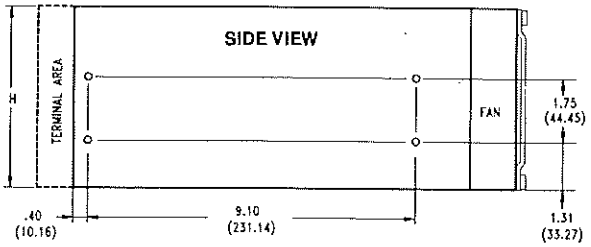
Active low-frequency (LF) power factor correction operates at a switching frequency of twice the line frequency, 100 or 120Hz, and in synchronism with it. This method uses an active switch, LF inductor and control circuit to provide power factor correction.

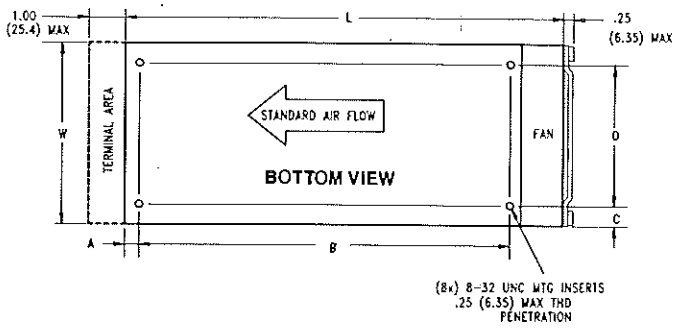
One way to implement active LF correction is shown below. This circuit, in simplified form, is the patented UNIFACTOR® technique used by UNIPOWER. It was chosen because of its simplicity and the fact that it provides the best overall performance with minimum impact on size, efficiency, reliability, EMI and cost.



SIMPLIFIED CIRCUIT FOR ACTIVE, LOW-FREQUENCY POWER FACTOR CORRECTION.







DIMENSIONS INCHES (mm)	CASE STYLE 40	42	43
H	4.00 (101.6)	5.00 (127.0)	5.00 (127.0)
W	5.00 (127.0)	5.00 (127.0)	5.00 (127.0)
L	12.00 (304.80)	12.50 (317.50)	13.00 (330.2)
A	.40 (10.16)	.40 (10.16)	.40 (10.16)
B	10.27 (260.86)	10.27 (260.86)	10.27 (260.86)
C	.56 (14.22)	.56 (14.22)	.56 (14.22)
D	3.89 (98.81)	3.89 (98.81)	3.89 (98.81)

ALL DIMENSIONS IN INCHES (mm). All specifications subject to change without notice.

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