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USER MANUAL CCPF-1500-XX CCPF-2000-XX



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1. Description of CCPF-1500/2000-XX

The CCPF-1500/2000-XX is a capacitor charging power supply designed for OEM laser manufacturers. The CCPF-1500 power supply provides up to 1500J/sec for AC line voltages from 100 to 240VAC while the CCPF-2000 provides up to 2000J/sec for AC line voltages from 200VAC and 240AC. The main power output provides a constant current to charge up a capacitor to the programmed value.

The CCPF-1500/2000-XX can be configured for maximum output voltages up to 4000V where the XX is the model designation which indicates the maximum output voltage. As an example, a CCPF-1500 configured for 1000V maximum output voltage is designated as a CCPF-1500-1P, where P indicates a positive output. Positive output is the standard polarity.

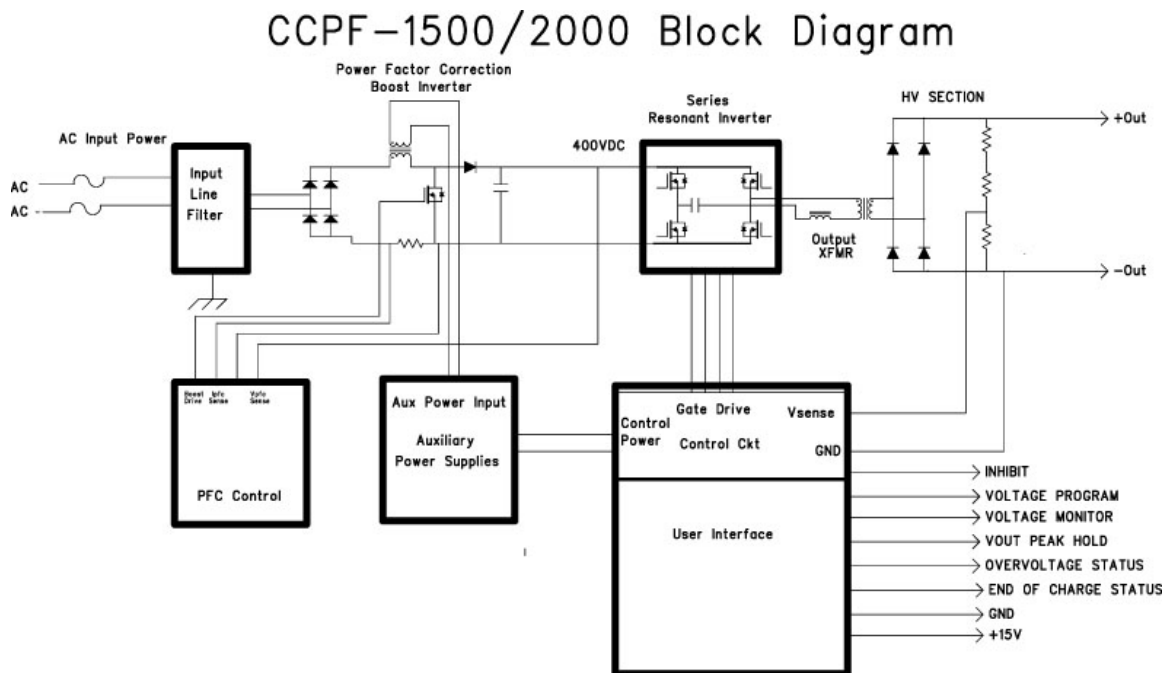


Figure 1. CCPF-1500/2000-XX Block Diagram

2. Explanation of Symbols



Hazard: This equipment produces high voltages which can be fatal. Only service personnel of Lumina Power, Inc. are qualified to service this equipment.



High Voltage Present. This power supply produces lethal high voltages. Only service personnel of Lumina Power, Inc., are qualified to service this equipment. Only qualified service personnel are permitted to install this power supply.

3. CCPF-1500/2000-XX Specifications

XX = .2P to 4P (Units can be configured for $V_{out_{max}}$ from 200V to 4000V)

Input

Voltage: CCPF-1500: 100-240 VAC, 50Hz to 60Hz
CCPF-2000: 200-240 VAC, 50Hz to 60Hz
Current: CCPF-1500: 20A @100VAC, 7.8 @240VAC
CCPF-2000: 12.5A @200VAC, 10.4A @240VAC

Output

Power: CCPF-1500: 1500J/sec
CCPF-2000: 2000J/sec
Output Voltage: Configurable from 500V to 4kV.
Output Current: $2 * P_{out_{max}}/V_{out_{max}}$
Polarity: Positive standard, Negative optional
Efficiency: >75% at full output
Regulation: 0.5% @100Hz

Interface

Connector: 15 Pin "D"
Vout Program: 0-10V for 0- $V_{out_{max}}$
Vout Monitor: 0-10V for 0- $V_{out_{max}}$
Vout_{peak} Monitor: 0-10V for 0- $V_{out_{max}}$
Inhibit Control
End of Charge Status
Over-Temp Status

Environment

Operating Temp: 0 to 40 °C
Storage: -20 to 85 °C
Humidity: 90% non-condensing
Cooling: Forced air
Altitude and Pressure: 2000 meters maximum, 80 to 103 kPa

Dimensions

12.5" x 4" x 5.75"
31.7cm x 10.1cm x 14.6cm

Safety and Regulatory

Classification: Class I ME equipment, externally powered
Leakage Current: 350uA maximum at 240VAC 60Hz
Isolation: 1500VAC/2200VDC
EMI: EN55011 Class A, Group 1 (Conducted and radiated)
Safety: EN60601.1, UL60601-1
Certified to IEC 60601-1:2005 + CORR. 1 (2006) + CORR. 2 (2007)

4. Interface Information

CCPF-1500/2000-XX INTERFACE (15 Pin “D” Sub Connector Female)

<u>PIN #</u>	<u>TITLE/DESCRIPTION</u>
1	INHIBIT/FAULT RESET - (Input) This pin is the basic ON/OFF control pin for the power supply. Grounding pin 1 enables power supply operation if all faults are clear. Applying +15V to pin 1 prevents the inverter from operating. NOTE: In PFN applications, the power supply should be INHIBITED via Pin 1 during the period the PFN capacitor is discharged into the load. Noise from the discharge could cause improper operation if the power supply is not INHIBITED. Optional – High enable, contact Lumina Power if a >+10V signal to turn on the power supply is required.
2	Not Connected. Do not use.
3	OVER-TEMP STATUS INDICATOR - (Output) (4.5V±0.5V) indication of over-temperature condition. This indicator is normally High (5V) and will switch to Low (0V) to warn of a pending over-temperature condition.
4	Not Connected. Do not use.
5	VOLTAGE PROGRAM - (Input) Output is programmed externally with a 0 to +10V signal for 0 to $V_{out_{max}}$. Contact Lumina Power if a different programming voltage range is required.
6	OVERVOLTAGE STATUS INDICATOR - (Output) Open collector output rated 30V, 100mA. Collector is tied internally to 5kohm pull-up resistor. If the load becomes open circuited, the power supply will detect the fault and shut down instantaneously, protecting itself and other equipment from over-voltage. If this occurs, pin 6 is pulled low. To restart, the INHIBIT/FAULT RESET function (Pin 1) must be toggled.
7	V_{out} PEAK HOLD - (Output) Monitors output voltage with a peak hold circuit. The peak hold time constant is approximately 5 seconds. 0 to +10V out for 0 to $V_{out_{max}}$.
8	V_{out} MONITOR - (Output) Monitors output voltage. 0 to +10V out for 0 to $V_{out_{max}}$.
9	+15V (Output) Maximum output current is 100mA. This pin is internally tied to pins 11.

CCPF-1500/2000-XX INTERFACE (continued)

<u>PIN #</u>	<u>TITLE/DESCRIPTION</u>
10	Not Connected. Do not use.
11	+15V (Output) Maximum output current is 100mA. This pin is internally tied to pins 9.
12	Not Connected. Do not use.
13	END OF CHARGE STATUS INDICATOR - (Output) Open collector output rated 30V, 100mA. Collector is tied internally to 5kohm pull-up resistor. When the load capacitor reaches the programmed voltage, pin 13 is pulled low. Pin 13 will oscillate from high to low as the power supply replaces charge that is bled through the feedback network. Optional - Latched Low EOC signal is available, contact Lumina Power. The Latched Low EOC signal will go low when the load cap is fully charged and stays low until the cap is emptied by the PFN and the Inhibit signal resets the EOC signal. The Inhibit must be active for every charge/discharge cycle.
14	GND, This pin is internally tied to pin 15.
15	GND, This pin is internally tied to pin 14.

Other interface configurations are available to conform to older capacitor charger models, contact Lumina Power for any interface changes.

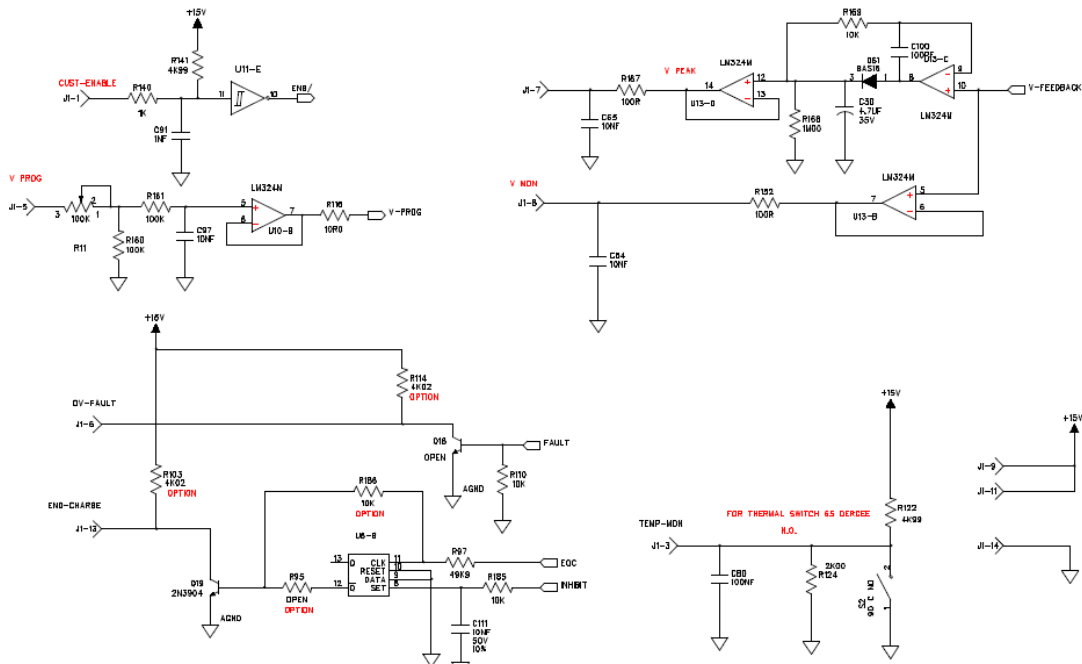
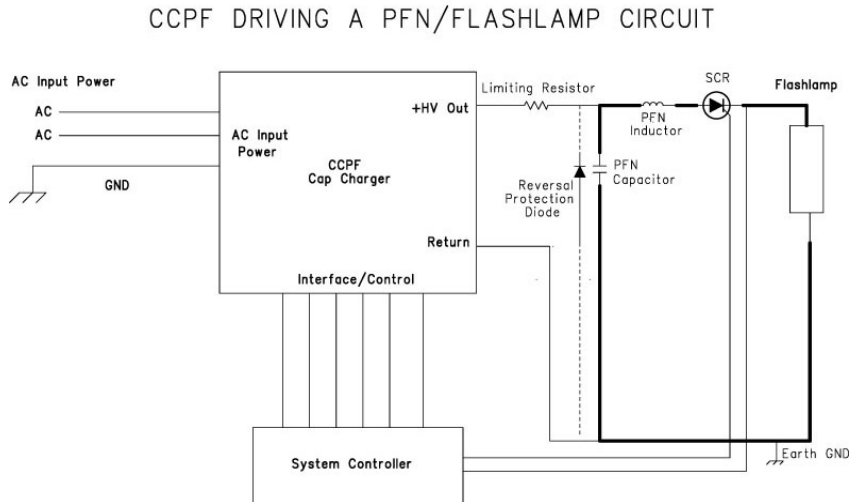


Figure 2. CCPF-1500/2000 Interface Schematic

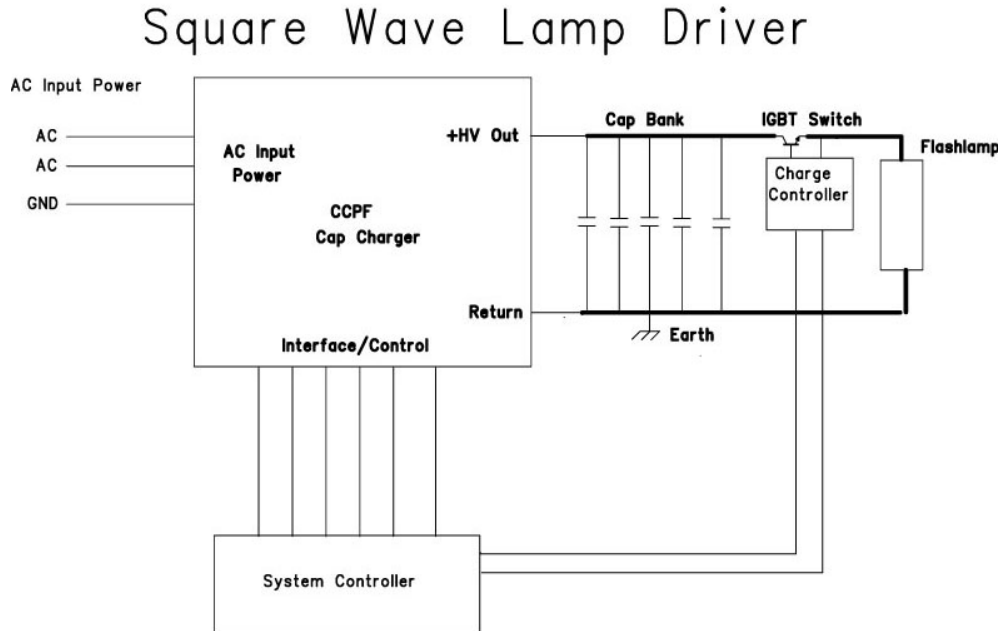
5. Typical Applications

5.1 Using a CCPF with a pulse forming network (PFN)



The above block diagram shows a typical connection between a CCPF capacitor charging power supply and a well matched pulse forming network. In a typical operation, when the CCPF is ENABLED via Pin 1, the INHIBIT function, the CCPF will charge up the PFN capacitor to the programmed value and then transmit an END OF CHARGE signal to the user. Before discharging the load capacitor into the PFN, the CCPF should be disabled via the INHIBIT function. Once the PFN is completely discharged and the SCR has completely extinguished, the charging function can be ENABLED via the INHIBIT function and the CCPF will charge the capacitor again to the programmed value. PFN designers may choose to include a limiting resistor and a reversal protection diode to protect the power supply if there is any possibility of an arc in the PFN circuitry.

5.2 Using a CCPF with a square wave network (Reservoir Charging)



In this application, the power supply is ENABLED via the INHIBIT function and charges up the capacitor bank to the programmed voltage. The IGBT will deliver short, high current pulses to the flashlamp. The power supply is not INHIBITED during this process and continuously maintains the capacitor bank charged.

5.3 Using a CCPF with multiple PFNs or capacitors

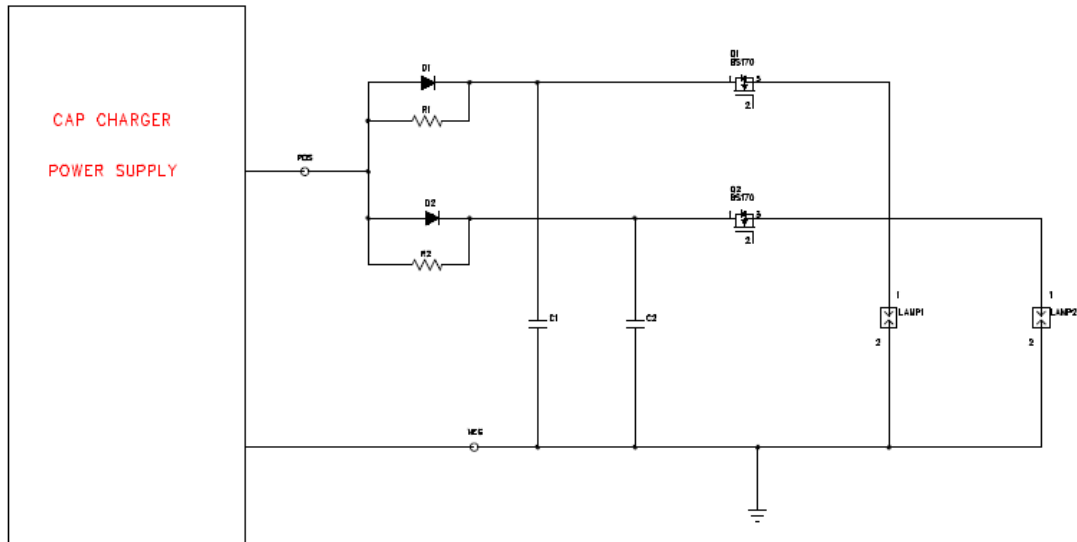
In applications where the power supply has to charge 2 or more separate capacitors which are discharged at different times, diodes must be used in series with the output to prevent one cap from discharge into the other. Also, a resistor must be in parallel with each diode to help the power supply to “see” the cap voltage which is now blocked by the diodes. Failure to add the parallel resistors will result in over charging the cap as the power supply does not see the real voltage on the caps.

The diodes must have voltage rated at least 300V higher than the max voltage and 2 times the current.

The resistor values are calculated as follows:

$$R \text{ (in Ohm)} \geq 100 * V_{out}.$$

$$P \text{ (in Watts)} \geq V^2 / R.$$



Multiple PFN system.

6. Warnings



Warning:

Equipment is not suitable for use in presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.



Warning:

These power supplies are not provided with any isolation devices and shall only be used inside other medical equipment that has means to isolate its circuits electrically from the supply mains on all poles simultaneously.



Warning:

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth

7. Installation

These power supplies are designed for and intended only for installation into laser systems using capacitor discharge flashlamp circuitry:

- Only qualified technicians or qualified assemblers may install these power supplies into their lasers.
- Only qualified Lumina Power personnel may service these power supplies.
- There are no user serviceable parts in this equipment.
- **Required wire and connectors:** Refer to the Figure 3 below for the locations of connections. Table 1 below shows required cables and connectors:

Connection	Description	Required Wire and Connectors
AC Input Power	2 Position terminal strip	At least 14AWG wire
AC Earth	10-32 GND stud	At least 14AWG wire
Interface	15 pin "D" female	15 pin "D" male
HV Output	MHV Female	MHV Male and coax cable rated for at least 150% of maximum rated output voltage of unit

Table 1. CCPF-1500/2000-XX Connections

- **Mounting of chassis:** Refer to Figure 3 below for location of four mounting holes in the power supply flanges.
- **Ventilation:** Unit is forced air cooled via an internal DC fan and requires a clearance of 5 cm (2 inches) be maintained at either side of the power supply, the fan end of the power supply as well as the grill side of the power supply. Hot air exits the grill side and should be routed out of the system.

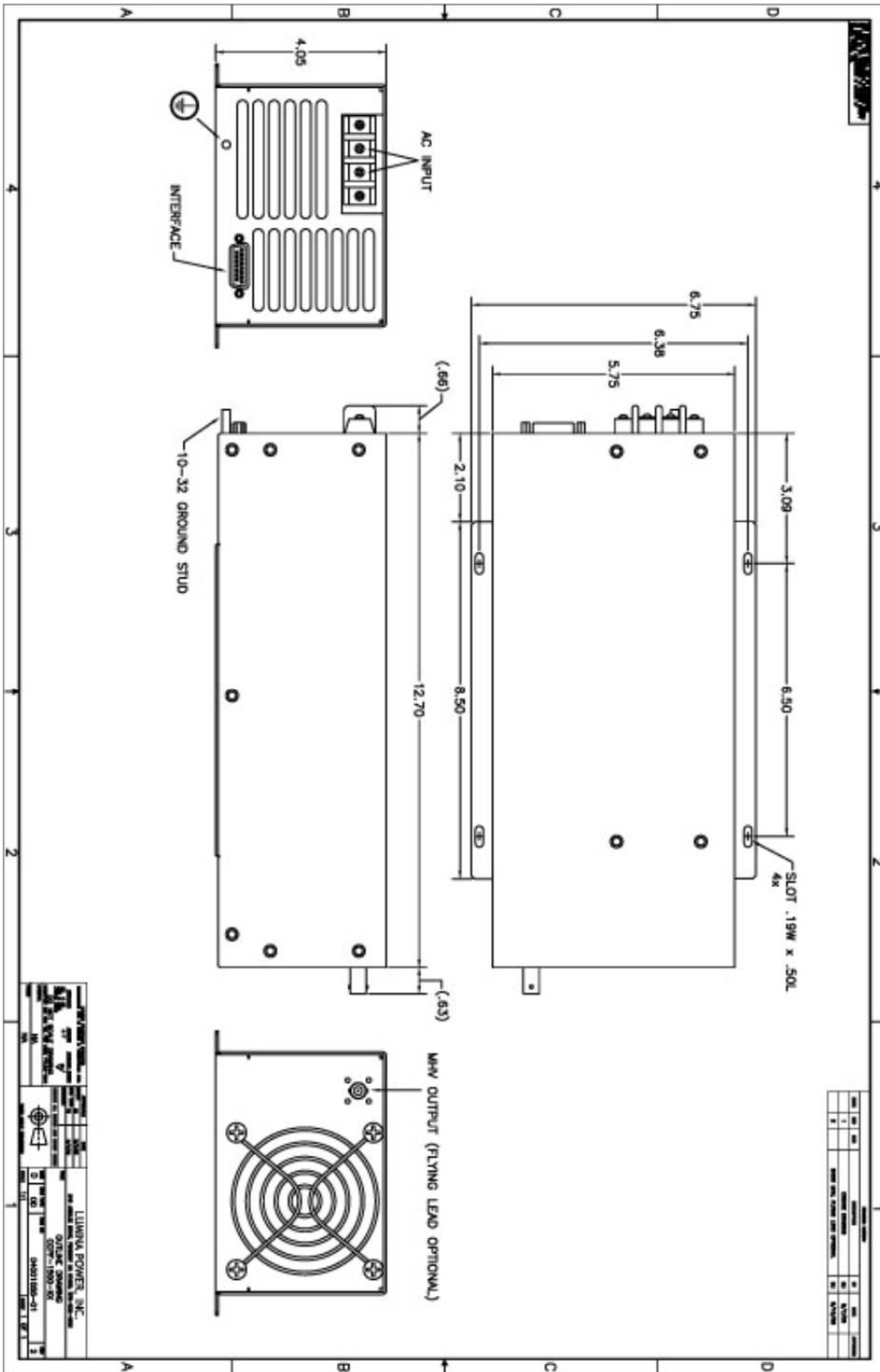


Figure 3. CCPF-1500/2000-XX Outline Drawing

8. Service

This unit contains no user serviceable parts. Service and repair should be performed only by qualified personnel from Lumina Power, Inc. For more information contact

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