



26 Ward Hill Ave., Bradford, MA 01835
Ph: 978-241-8260 Fx: 978-241-8262

CCPF-1500/2000-XX OPERATION MANUAL



- 1. Description of CCPF-1500/2000**
- 2. Explanation of Symbols**
- 3. Specifications**
- 4. Block Diagram**
- 5. Typical Applications**
- 6. Warnings**
- 7. Installation**
- 8. Service**

1. Description of CCPF-1500/2000-XX

The CCPF-1500/2000-XX is a capacitor charging power supply designed for OEM laser manufacturers. The power supply provides up to 1500J/sec for line voltages below 140VAC and up to 2000J/sec for line voltages between 200VAC and 240AC. The main power output provides a constant current to charge up a capacitor to the programmed value. An optional +24V is also available for auxiliary power.

The CCPF-1500/2000-XX can be configured for maximum output voltages up to 4000V. 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 the P indicates a positive output. Positive output is the standard polarity.

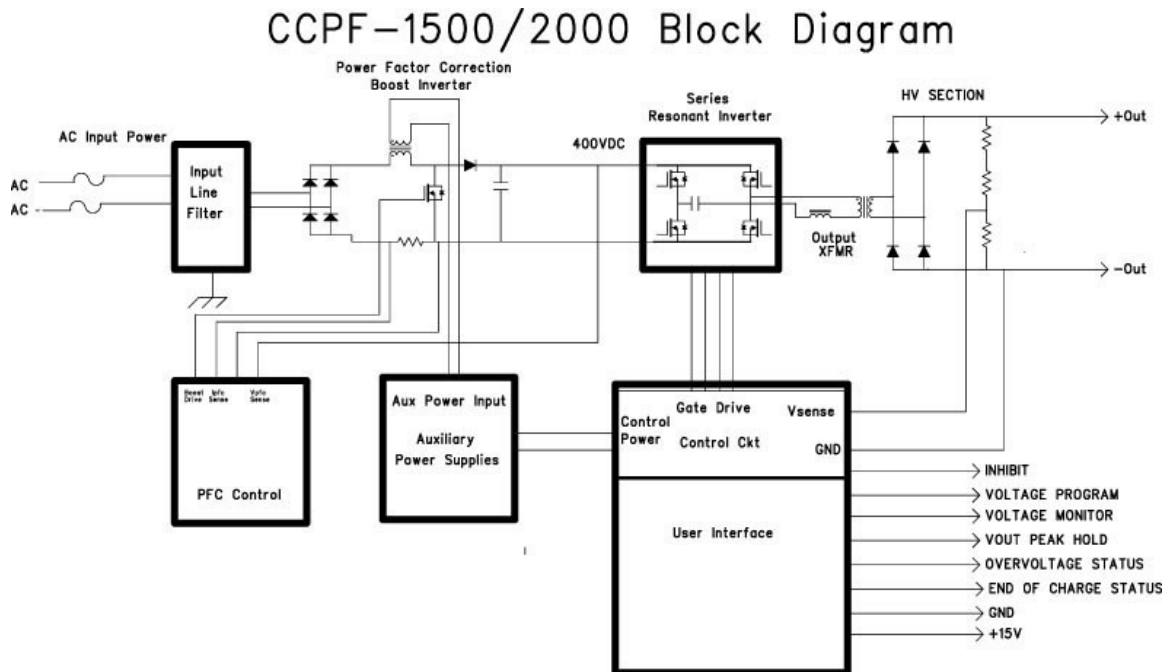


Figure 1.1 CCPF-1500/2000-XX Block Diagram

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.

Section Intentionally left blank

3. Specifications

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, 11A @240VAC

Output

Power: CCPF-1500: 1500J/sec
CCPF-2000: 2000J/sec
Output Voltage: Configurable from 200V to 4kV.
Output Current: $2 * P_{out_{max}}/V_{out_{max}}$
Polarity: Positive
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- $V_{out_{max}}$
 $V_{out_{peak}}$ 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: 0 to 90% non-condensing
Cooling: Forced air

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

Regulatory

Leakage Current: 350uA
Isolation: 1500VAC/2200VDC
EMI: EN55011 Class A, Group 1 (Conducted and radiated)
Safety: EN60601.1, UL60601-1

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.
2	N/C. Do not use.
3	OVER-TEMP FAULT- (Output) Indicates an internal high temperature condition. When an over temperature fault occurs, the signal is pulled either to GND or 15V/5V based on specific customers’ requirement. Please refer to the test data sheet for a specific power supply to see how that unit is configured. A N/O (a N/C switch is available) thermal switch closes during an over temperature condition. Under normal temperature conditions, the over temperature output is pulled to 15V via a 4.99k resistor. For a 5V interface, a 2.49k resistor is in parallel with the thermal switch. The thermal switch will reset itself when the temperature has been reduced by approximately 20°C.
4	N/C. Do not use.
5	VOLTAGE PROGRAM- (Input) Output is programmed externally with a 0 to +10V signal = 0 to V_{out}^{max} . Note: Accuracy and linearity will be compromised operating below 20% of the maximum value.
6	OVERVOLTAGE / OVERLOAD / NO LOAD STATUS INDICATOR - (OUTPUT) : When the output is open or shorted circuited, or if the capacitor can’t be fully charged to the programmed level in a given time, the Over-Load Fault will latch Low and the power supply will shut down to protect itself. Typically, it is 15V at an open collector with a 4.99k pull up during normal operation. To Clear the Fault: Correct the problem at the load and toggle the Inhibit signal or recycle the AC input.
7	V_{out} PEAK HOLD- (Output) Monitors output voltage with a peak hold circuit. The time constant of the peak hold circuit is approximately 5 seconds. 0 to +10V = 0 to $V_{out,max}$.
8	V_{out} MONITOR- (Output) Monitors output voltage. 0 to +10V = 0 to $V_{out,max}$.

CCPF-1500/2000-XX INTERFACE (continued)

<u>PIN #</u>	<u>TITLE/DESCRIPTION</u>
9	+15V (Output) Maximum output current is 100mA. This pin is internally tied to pins 11.
10	N/C. Do not use
11	+15V (Output) Maximum output current is 100mA. This pin is internally tied to pins 9.
12	N/C. Do not use
13	END OF CHARGE STATUS INDICATOR - (Output) When the load capacitor is fully charged to the programmed level, the EOC signal will go Low thru an NPN transistor. The signal is Normally High via a 4.99k pulled up to 15V. The EOC signal will toggle when the power supply is refreshing the load cap. Latched EOC is optional: The EOC signal will latch Low when the capacitor is fully charged and stays Low until the cap is discharged and the Inhibit signal is asserted.
14	GND
15	N/C. Do not use.

CCPF-1500/2000-XX INTERFACE SCHEMATIC

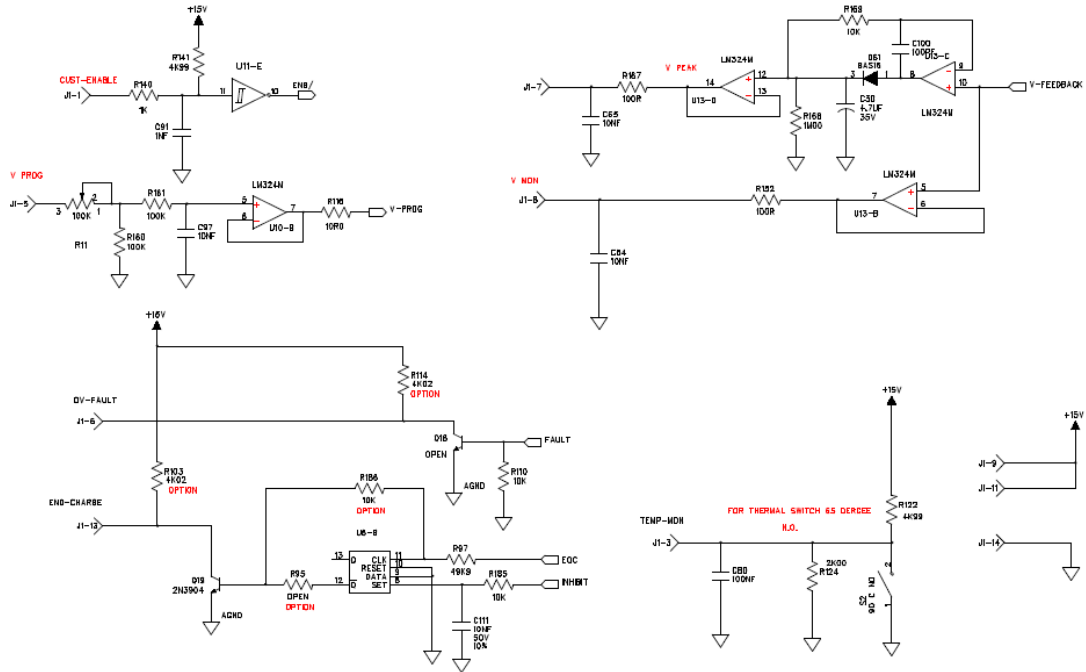
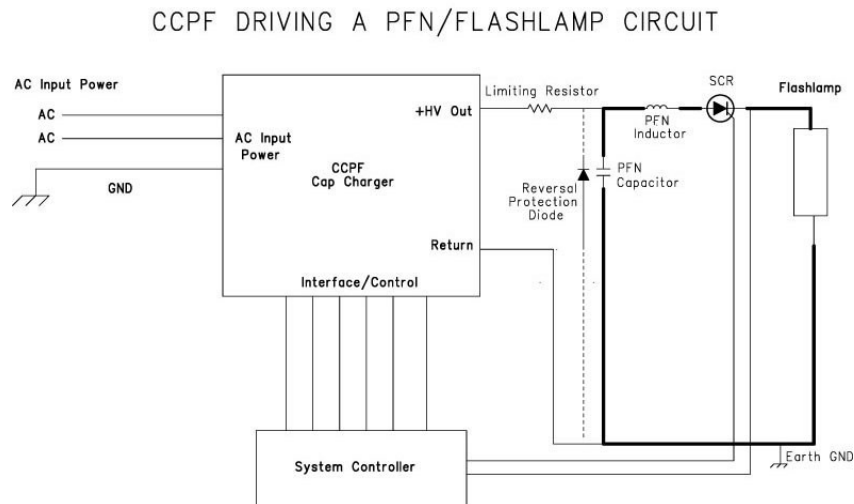


Figure 4.1 CCPF-1500/2000 Interface Schematic

5. Typical Applications

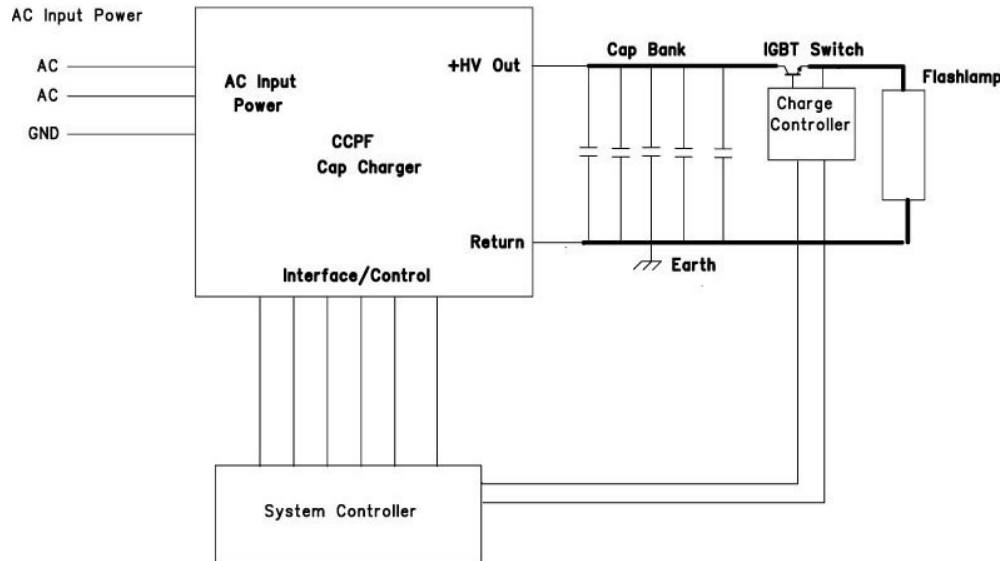
5.1 Using a CCPF with a pulse forming network (PFN)



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)

Square Wave Lamp Driver



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 tops the capacitor bank.

5.3 Using a CCPF with multiple PFNs or capacitors

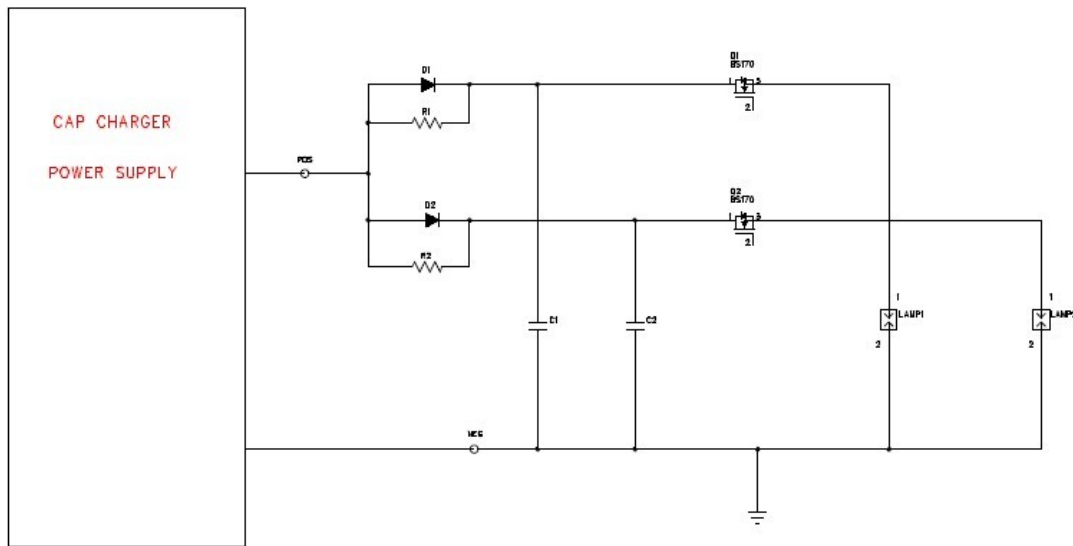
In applications where the power supply has to charge 2 or more separate capacitors which are discharged at different times, diodes must be used in series with the output to prevent one cap from discharge into the other. Also, a resistor must be in parallel with each diode to help the power supply to “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 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 isolated its circuits electrically from the supply mains on all poles simultaneously.



Warning:

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

7. Installation

7.1 These power supplies are designed for and intended only for installation into laser systems using capacitor – 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 7.1 below for the locations of connections. Table 7-1 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 7-1 CCPF-1500/2000-XX Connections

- **Mounting of chassis:** Refer to Figure 7.1 below for location of four mounting holes in the power supply flanges.

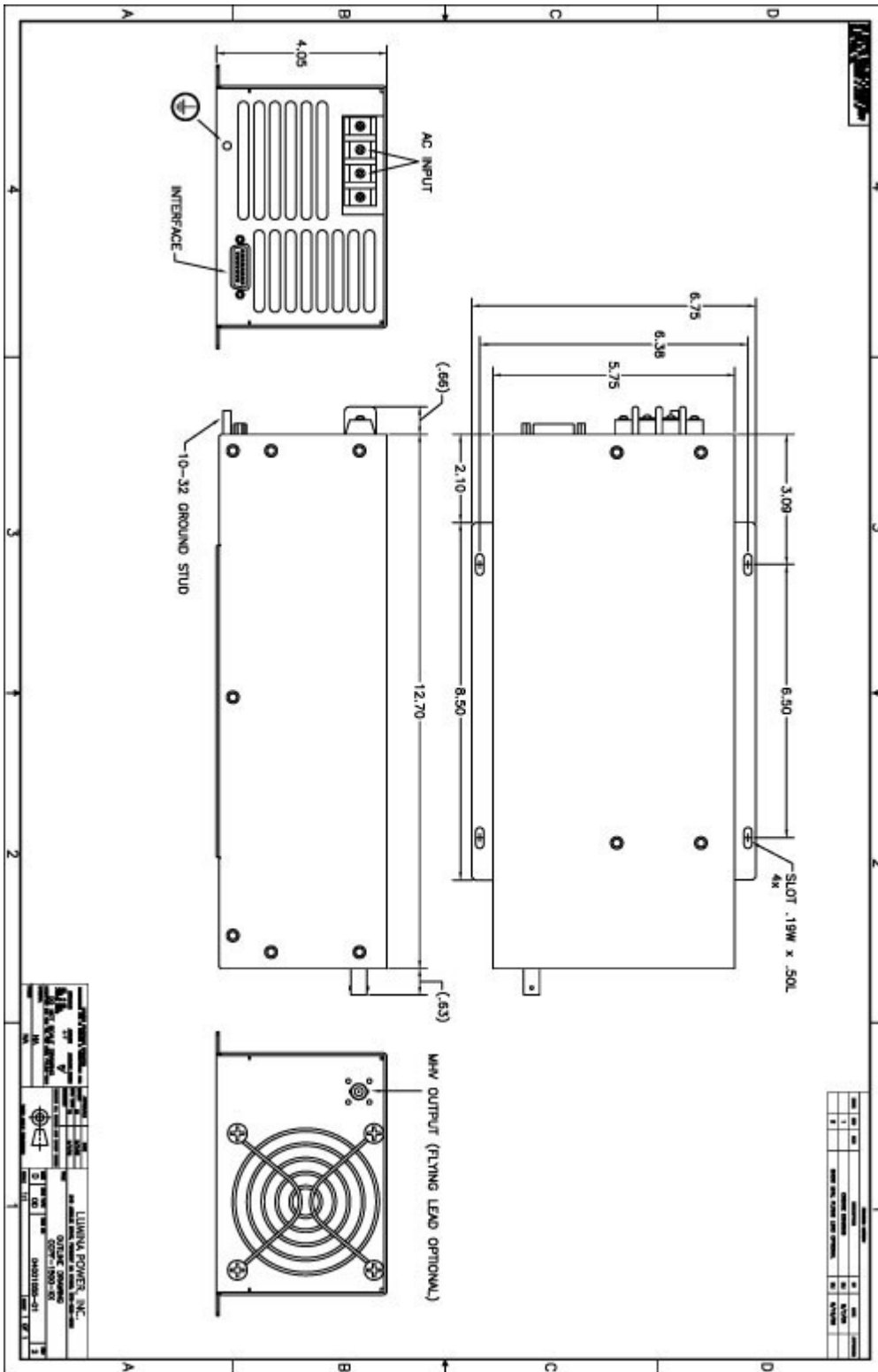


Figure 7.1 CCPF-1500/2000-XX Outline Drawing

- **Ventilation:** Unit is forced air cooled via an internal DC fan. A clearance of 2” should 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.

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

**Lumina Power, Inc.
26 Ward Hill Ave.,
Bradford, MA 01960
Ph: 978-241-8260
Fx: 978-241-8262**

ECO	Description	Doc Ctrl	Date	Approved
	Initial Release	M J		BO'B

02001055-01 Rev 1	Operation Manual: CCPF-1500/2000-XX	Page 14 of 14
-------------------	--	---------------