

CHARGE-SERIES operating instructions

REV216 Use for models CHARGE1000, CHARGE5000, CHARGE10000

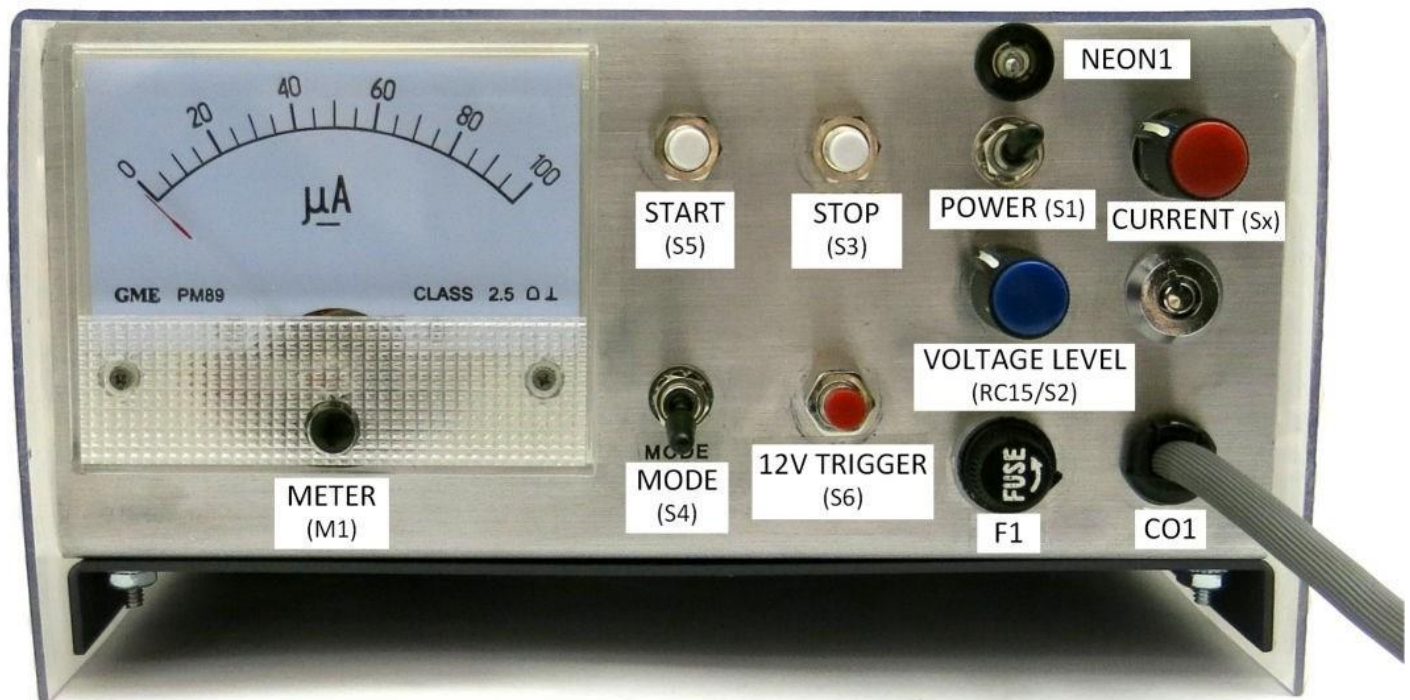
DANGER do not use this unit unless you fully understand high-voltage and its hazards.

DANGER A SERIOUS DEADLY SHOCK HAZARD WILL EXIST WHEN USING WITH HIGH ENERGY CAPACITORS ABOVE 50 J

You can calculate joules by squaring the charging voltage, then multiplying by one half the capacitance in microfarads and dividing by 1 million. If over 50 J use extreme caution as improper contact can electrocute OR cause serious burns.

PLEASE READ THE FOLLOWING VERY CAREFULLY

Capacitive energy storage over 1000 joules **MUST** use for the high-voltage charge feed wire from the unit to the capacitors being **SEVERAL FEET** of a thin insulated preferably Teflon wire of a gauge that will disintegrate as a fuse between 100-500 amps. This wire should be sleeved into some polyethylene tubing that is available in a hardware store. You may even want to use several telescopic layers as this sleeving to provide a positive voltage rating and good mechanical rigidity.



Note on knob

Figure 1: Front Panel Controls



Figure 2: Back Panel

APPLICATIONS

Electronic circuit charges up high energy banks of electrolytic, photo flash or other types storage capacitors from 200 to 30,000 V (depending on charger model) . Recommended capacities are between 1 to 10,000 μF . This equates out to many thousands of joules! Note the kinetic energy of a 30-06 is 750 J.

Units are manually voltage controlled by an external control on the front panel, meter indicates the charging voltage and allows presetting the target value. This feature helps prevent over charging and potentially dangerous explosions.

Charging is current controlled by our unique circuitry and does not require power robbing resistors. Unit operates from direct 115 V AC power. Charging rate is over 200 W seconds joules but will depend on load impedance.

Size of unit is 10 x 7 x 3.75"

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EXPLANATION OF CONTROLS

POWER (S1): Turns device on/off.

SAFETY LAMP: Not seen on the front panel, the **safety lamp** is attached to the rear HV output jacks instead (see Figures and indicates when the capacitor being charged exceeds 70-90 volts (varies with temperature) – and the lamp will glow until the capacitor discharges below that voltage. [This lamp is placed at the rear because placing it at the front would require running HV wires across the circuitry close enough to interfere with the unit's operation. Therefore a clear cover is used in order to see the lamp at the rear of the device. If you do not have (or want) a clear cover, a hole may be cut in the cover with the safety lamp poking through it, so that it can still be seen to illuminate.]

NEON1: This lamp indicates that the unit is on, and also will continue to glow until the circuit's internal capacitors discharge. ***The low voltage control circuitry remains on until the unit is unplugged.***

MODE (S4): The mode switch changes between two methods of charging the capacitor: down is "manual" and up is "automatic." In the **manual (down)** position the capacitor is charged to the voltage set by the Voltage Level dial (RC15/S2) and then the charger turns off. This setting is for larger capacitors that are scheduled to be discharged before much of the charge leaks off. In the **auto (upper)** setting, the capacitor is continually 'topped off' to keep the voltage at the amount set by the Voltage Level dial– the capacitor will slightly discharge and then automatically be recharged, repeating this cycle and keeping the capacitor charged up indefinitely. The mode switch only determines the *type* of charging (manual or auto). Charging does not begin until the Start button (S5) is pushed. (Note that factory-built negative output units have the **auto** mode deactivated.)

Note if the mode switch is left in the “auto” position the capacitor will immediately start to recharge after every full (or partial) discharge. This feature is for repetitive firing modes, but can be dangerous if the user forgets that the auto-recharge mode is on. The “stop” switch (S3) can be pushed to cease this automatic recharging action, at which point the charging can be restarted at the user’s control for the next event, or the capacitor can be safely manually discharged as a safety issue.

***SAFETY NOTE**

S8 is mounted internally and disables the above auto charging mode to prevent unwanted repeat charging. You may enable at own risk!! UNIT IS SHIPPED DISABLED!

START (S5): The start button must be pressed to start the charging action, in either mode switch setting. If the charging has been stopped, pressing this button will restart the charge. (This is convenient when charging a large storage capacitor and topping it off should it drop too far, for example.) The charging will still stop once the preset charge value is reached in the manual mode.

STOP (S3): The **stop button** will stop the charging at any time, regardless of the mode setting. The start button must be pressed to resume charging.

*Re-verify a positive earth ground. If in doubt, run a separate heavy gauge #14 wire from the frame of the charger to a known earth ground. This is very important for safety.
Never discharge the capacitor via the connection points to the charger. It is assumed the user is aware of discharge ground loops and is experienced in high energy technology.*

12V TRIGGER (S6): Pressing this button supplies 12V to the rear 12V JACK, and is used as a convenience switch to activate an external device (such as the TRIGATRON SPARK GAP SWITCH SUCH AS WHEN USED WITH OUR HEP10).

VOLTAGE LEVEL (RC15/SC2): The **voltage control** dial is used to set the charge voltage of the capacitor.

METER (M1): All meters read current; placing a proper resistor in series (as per the circuitry of this device) makes this meter draw its deflection current, and thereby display voltage. This meter’s units say “μA” but the circuitry has been modified such that it reads 100s of Volts. If desired, it is a simple matter to remove the 2 front screws, pull off the cover, and put a white sticker over the “μA” microamps); or write “kV” and then white-out the “0’s”. Either way, this will give your meter accurate readings.

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DANGER: A SERIOUS DEADLY SHOCK HAZARD WILL EXIST WHEN USING WITH HIGH ENERGY CAPACITORS ABOVE 50 JOULES.

Calculate JOULES by squaring the charge voltage, then multiplying by ½ the capacitance in microfarads and dividing by one million (to compensate for the measurement in *microfarads*). If the result is over 50 Joules, use extreme caution as improper contact can electrocute or cause serious burns.

$$\frac{1}{2} = \frac{CV^2}{2000000}$$

OPERATION STEPS

(first read the above control explanation)

Before you begin, select your capacitor and use the Joulean formula above to calculate the maximum energy storage for determining if it will be hazardous when charged.

Always verify that the capacitor is discharged before handling as dangerous values must have a shorting wire across the terminals. Remove the safety shorting wire across the capacitor terminals before attaching it to the charger. (If you need to discharge, you can use an insulated screwdriver or a discharge resistor shorting wand for small electrolytic capacitors under 5 Joules. **Larger capacitors require a properly-made discharge probe, depending on voltage and energy.**)

It is assumed the user of a product like this will have the electrical knowledge and ability to properly make a safe discharge probe. This is paramount when operating any electrical device such as this. If a fault should occur you must have some way of discharging the capacitors are at least roping off the area avoiding accidental access

IMPORTANT: Verify all controls are in their “off” position (POWER switch is turned off, VOLTAGE dial is turned off full counter-clockwise), and plug device into a grounded wall jack. **Unit will prematurely start charging if the VOLTAGE LEVEL control is not turned off. Place MODE switch in manual (down) position.**

1. Be sure that all controls of the charger are in their “off” position, and connect leads to capacitor, observing polarity (if any). Electrolytics are polarized. (If you require higher accuracy than the 3% front panel meter, connect a proper range voltmeter across capacitor to monitor charging voltage.)
2. Note the safety neon across the output leads indicates voltages over 70-90 (varies with temperature), and is placed inside a clear cover for max visibility.
3. Turn charger on (POWER switch) Note NEON1 Igniting. **Set mode switch in manual.** Rotate **VOLTAGE LEVEL** until it clicks on. Push and release the START button. The capacitor will gradually charge a small amount to the value set by the Voltage Level. Voltage Level only past the first “on” click, then pressing start to see how high the voltage rises.
4. Repeat the process of increasing the Voltage Level, then pressing START button and watching the voltage increase on the front panel meter until the required setting is reached (remembering that the STOP button can be pressed at any time to stop the charging). You may make notes on charge rate times for certain value of capacitance
5. Note the voltage will continue to increase until it reaches the level set by the Voltage level potentiometer. Capacitor may slowly discharge with the **mode switch in the manual** position and eventually totally discharge over a long period of time.
6. Repeat the process of increasing the Voltage Level, then pressing START button and watching the voltage increase on the front panel meter until the required setting is reached (remembering that the STOP button can be pressed at any time to stop the charging). You may make notes on charge rate times for certain value of capacitance.

7. If the mode switch is in the **manual** position once the set charge is reached, the capacitor will slowly **discharge** and eventually totally discharge over a long enough period of time. If you again push the start button it will go to its preset level again and stop.
8. However, if the mode switch is flipped to the **auto** position, then pressing start will keep the capacitor 'topped off' at the level set by the Voltage Level potentiometer. (And again, pressing the STOP button will stop the automatic charging, allowing the capacitor to slowly discharge over time.) **READ ABOVE DISCLAIMER ON SWITCH S8**
9. The voltage level potentiometer can be 'matched' to the voltage meter). Always double check readings periodically.
10. Obviously do not allow the capacitor to charge beyond its volt rating as indicated on the front panel voltmeter. larger values take longer charging time.
11. Always remember to verify that capacitors are fully discharged, disconnected from the charger, and have a shorting wire across their terminals when not being used. This is important if units are left exposed to contact or handling. Connect leads across capacitor and observe polarity if any. Electrolytics are polarized.
12. There is no more data we can give as to the safety of handling the charged capacitors, as we do not know your specific application.

You are on your own and are assumed to understand the hazards of handling these very DANGEROUS and lethal amounts of electrical energy.

Note that the above instructions and information may seem like we repeats ourselves on certain issues. This was done for a reason as this repeated data is very important in safe operation of this product. Probably the most important thing is the position of the mode switch and making sure that the voltage level switch is completely off before power is applied to the unit.

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Purchase of this product require our signed HAZARD EQUIPMENT FORM