



DIGITAL DC REGULATED POWER SUPPLY

GPS-3000 Series



User Manual

GENERAL POLYTRONIC SYSTEMS LTD.

CONTENT

1	SAFETY	2
2	INTRODUCTION	2
3	TECHNICAL ARAMETERS	3
3.1	POWER SUPPLY AND ENVIRONMENT	3
3.2	OPERATION MODE.	4
3.3	CONSTANT VOLTAGE (CV)	4
3.4	CONSTANT CURRENT (CC)	4
3.5	TRACKING MODE	4
3.6	CH3 OUTPUT SPECIFICATIONS	5
3.7	AMMETER	5
4	THEORY OF OPERATION	5
5	PANEL INTRODUCTION	7
6	OPERATION INSTRUCTIONS	12
6.1	PRECAUTION	12
6.2	SETTING CURRENT LIMIT	12
6.3	CV/CC TRAITS	13
6.4	OPERATION MODE	13
7	ADJUSTMENTS	16

1. SAFETY

Please read the safety notices before using the instrument, to know more about the instrument and expand the using lifetime of the instrument, as well as avoid accidents because of the improper operations.

(1). Use the standard power cord, ensure that the cabinet and the output GND terminal is connected with the ground.

(2). Operation environment: use the instrument in the fine ventilation environment ($20^{\circ}\text{C} \pm 10^{\circ}\text{C}$), don't use it in the above 40°C environment.

(3). Placement: please put the instrument on the level place, avoid to put the weighty, the flammable, the corrosive objects on the instrument.

(4). Caution: the exceeding rating voltage and current is forbidden in using, the continual instantaneous short circuit between the positive and negative polarities is not allowed at the output terminal.

(5). Maintenance: meet any abnormal things in using, please send the instrument to our company or qualified maintenance man, don't check it by itself, avoid to expand the malfunction and accidents.

2. INTRODUCTION

The DC power supply can continually adjust output voltage with a high accuracy, while automatically change between the CC and CV mode. Adjust the output voltage from 0 to rating voltage, adjust the limited current protection optionally, when in the constant current mode, the stabilized current output can be adjusted in the rating range continually. Single output power supply has only one output, while triple outputs power supply has three outputs separately. The triple outputs power supply supports three operation models: independent, series and parallel. Select the needed model by the mode buttons on the front panel. The series mode twice the rating voltage, while the parallel mode twice the rating current. The output can be enabled or disabled by the output button separately. The

value of the voltage and current can be pre-set in the disabled state to avoid the fire sparkle from connecting load. Connecting the J309 and J111 to the 'ON' when the audio circuit running, can become the stable DC power supply.

3. TECHNICAL PARAMETERS

3.1 POWER SUPPLY AND ENVIRONMENT

Model No.	Voltage(V)	Current (A)	Power (VA)
GPS-3303S	0--30	0--3	213
GPS-3305S	0--30	0--5	360
GPS-3010S	0--30	0--10	720
GPS-3020S	0--30	0--20	1440
GPS-3603S	0--60	0--3	432
GPS-3605S	0--60	0--5	720
GPS-36010S	0--60	0--10	1440
GPS-31003S	0--100	0--3	720
GPS-31005S	0--100	0--5	1200
GPS-3303D	0--30×2/2.2-5.2V	0--3×2	450
GPS-3603D	0--60×2/5	0--3×2/3	550
GPS-3306D	0--30×2/5	0--6×2/3	550

Main supply (switch selectable): 220±10%, 50/60Hz

Operation environment:
environment temperature 0°C - 40°C, relative humidity<80%

Storage environment & Humidity:
environment temperature - 10°C - 40°C, relative humidity<70%

3.2 OPERATION MODE

- (1) Independent: Three independent outputs (single route power supply is a set of output.)
- (2) Series: Output from 0 to double rating volts at rating amperes.
- (3) Parallel: Output from 0 to double rating amperes at rating volts. (two sets of the main power supply)

3.3 CONSTANT VOLTAGE(CV)

- (1) Output voltage range: 0~30V, continuously adjustable
- (2) Line regulation: $\leq 1 \times 10^{-4} + 3\text{mV}$
- (3) Load regulation: $\leq 1 \times 10^{-4} + 3\text{mV}(\text{rating current} \leq 3\text{A})$
 $\leq 2 \times 10^{-4} + 3\text{mV}(\text{rating current} > 3\text{A})$
- (4) Ripple & noise: $\leq 1\text{mVrms}(5\text{Hz} \sim 1\text{MHz})$

3.4 CONSTANT CURRENT(CC)

- (1) Output current range: 0~3A, continual adjusting.
- (2) Line regulation: $\leq 2 \times 10^{-3} + 3\text{mA}$
- (3) Load regulation: $\leq 2 \times 10^{-3} + 3\text{mA}$
- (4) Ripple & noise: $\leq 1\text{mArms}$

3.5 TRACKING MODE

Parallel operation(CV):

Line regulation: $\leq 1 \times 10^{-4} + 3\text{mV}$

Load regulation: $\leq 1 \times 10^{-4} + 3\text{mV}(\text{rated current} \leq 3\text{A})$
 $\leq 2 \times 10^{-4} + 3\text{mV}(\text{rated current} > 3\text{A})$

Series operation(CV):

Line regulation: $\leq 1 \times 10^{-4} + 5\text{mV}$

Load regulation: $\leq 300\text{mV}$

3.6 CH3 OUTPUT SPECIFICATION

- (1) output range: 2.5~5.2V voltage, 1A current or fixed output 5V voltage, 3 A current.
- (2) Line regulation: $\leq 5\text{mV}$
Load regulation: $\leq 15\text{mV}$
Ripple & noise: $\leq 2\text{mVrms}$

3.7 AMMETER

- (1) Ammeter: two team 3 digits display ammeter.
- (2) Voltmeter: two team 3 digits display ammeter.
- (3) Precision: $\pm (0.5\% \times \text{RDG} + 2)$

4. THEORY OF OPERATION

The power supply consists of an AC input circuit and transformer; a bias supply consisting of an rectifier, filter, pre-regulator and reference voltage source; a main regulator circuit consisting of the main rectifier and filter, a series regulator, a current comparator, a voltage comparator, a reference voltage amplifier and a relay control circuit. The circuit element consists of integrated circuit U101, U102, U103, U104, U105, U108.

The circuit arrangement is shown as block diagram in Figure 1. The circuitry is discussed with reference to the block diagram function description. Single phase input power is applied to transformer through the input circuit.

Auxiliary rectifier D1021~1024 provides a bias voltage, filtered by capacitor C103, C104 for the pre-regulator. U101, U108 that provides a regulator voltage for elements of action.

The main rectifier, a full wave bridge rectifier provides the power which is filtered by capacitor, C1021 and then regulated via a series regulator and delivers to the output.

U105 acts as a current limiter. When current is over predetermined rating it is activated and decreases the current.

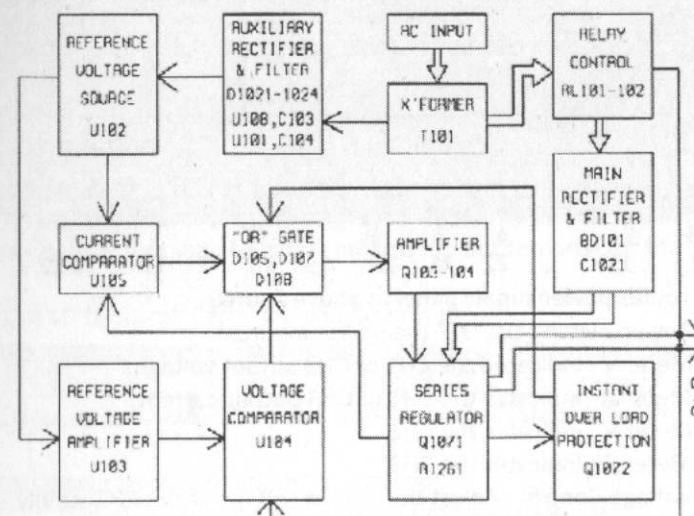
U102 provides a reference voltage for U103, U105. U103 is a inverter amplifier. U104 is a comparator amplifier which compares

reference voltage and feedback voltage, and then delivers to Q103, Q104, which then calibrates the output voltage.

Q113 is activated when the unit is overload. It controls Q103 current magnitude which limits the output current.

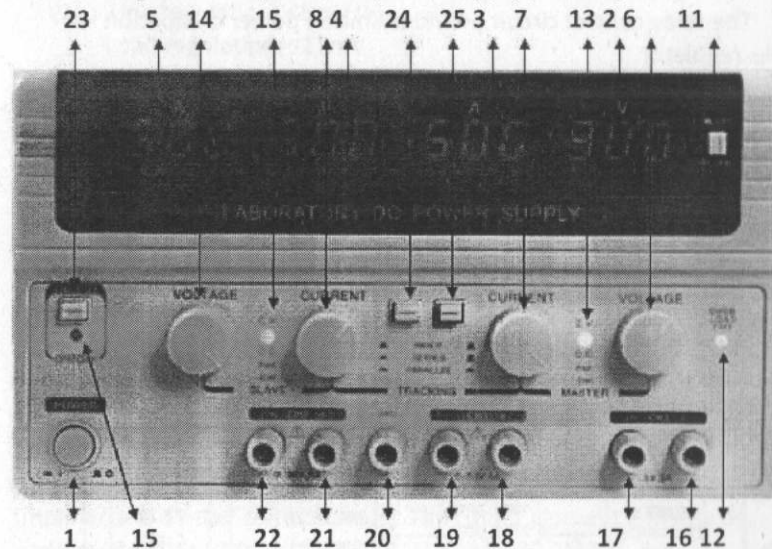
The relay control circuit provides limited power dissipation in series regulator.

Figure 1 Operation Principle figure



5. PANEL INTRODUCTION.

Figure 2 triple routes power supply panel figure



Triple routes power supply panel as above figure:

- (1) Power switch : ON/OFF the power input.
- (2) Meter V : Indicated the CH1 or CH3 output voltage.
- (3) Meter A : Indicates the CH1 or CH3 output current.
- (4) Meter V : Indicates the CH2 .
- (5) Meter A : Indicates the CH2.
- (6) Voltage Control : Adjust the output voltage of the CH1 supply, and as the adjustment control for the maximum output voltage of the CH2 supply when either parallel or series tracking operation.
- (7) Current Control : Adjust the output current of the CH1 supply, and as the adjustment control for the maximum output current of the CH2 supply when either parallel or series tracking operation.
- (8) Voltage Control : Adjust the output voltage of the CH2 supply when in independent operation.
- (9) Current Control: Adjust the output current of the CH2 supply.

- (10) Voltage Control: Adjust the output voltage of the CH3 supply
- (11) CH1/CH3 selects switch: Select CH1 or CH3 output voltage or current
- (12) Overload Indicator: Lights when CH3 output load is larger than rating value
- (13) CH1 CV&CC Indicator: The CV light (green light) is on when the CH1 supply is in the constant voltage operation, the CC light (red light) is on when the CH1 supply is in the constant current operation
- (14) CH2 CV&CC Indicator: The CV light (green light) is on when the CH2 supply is in the constant voltage operation, the CC light (red light) is on when the CH2 supply is in the constant current operation.
- (15) Output Indicator: Switch the light on.
- (16)+ output terminal: Positive polarity output terminal for the CH3
- (16)- output terminal: Negative polarity output terminal for the CH3
- (18)+ output terminal: Positive polarity output terminal for the CH1
- (19)- output terminal: Negative polarity output terminal for the CH1
- (20)GND terminal: Earth and chassis ground.
- (21)+ output terminal: Positive polarity output terminal for the CH2
- (22)- output terminal: Negative polarity output terminal for the CH2
- (23) Output switches: ON/OFF the output.
- (24),(25)Tracking model button, When both switches are disengaged (out), the unit is in the independent mode and the CH1 and CH2 power supplies are completely independent from each other; When the left switch(24) is engaged (in) and the right switch(25) is disengaged (out), the unit is in the Tracking series mode, maximum voltage of both supplies is set using the CH1 VOLTAGE controls. Also, in this mode of operation, the positive terminal (Red)

of the CH2 supply is connected to the negative terminal (Black) of the CH1 supply; When both switches are engaged (in), the unit is in the Tracking Parallel mode, the CH1 and CH2 supplies are wired together in parallel and both the maximum current and voltage are set using the CH1 controls. The CH1 and CH2 output can be used as two individual (but tracking) power supplies or just the CH1 output can be used as a 0 to double rating voltage supply with a 0 to double rating current capability.

Single DC power supply front panel Operation as follows:

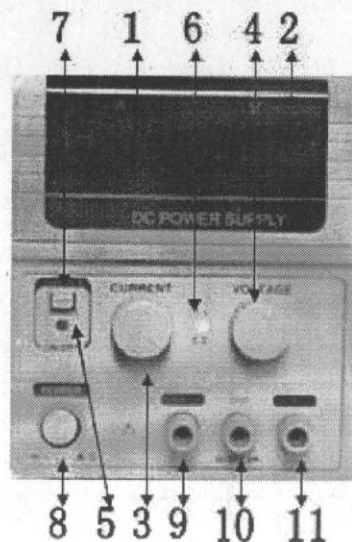


Figure 3-1 Single DC power supply front panel Operation

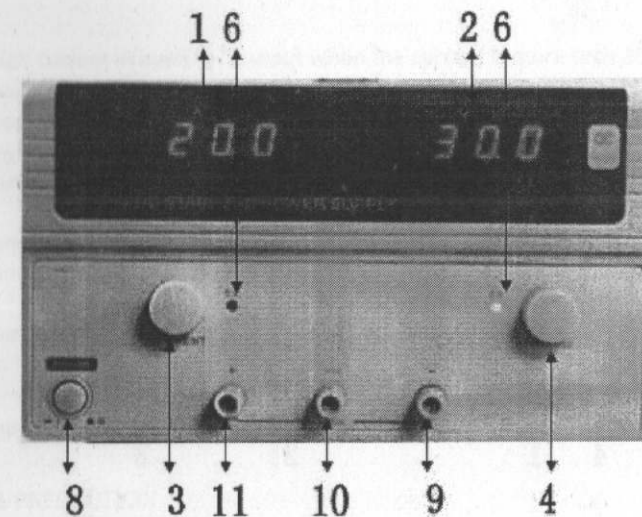


Figure 3-2 Single DC power supply front panel Operation

- (1) Meter A
- (2) Meter V
- (3) Adjust output current
- (4) Adjust output voltage
- (5) Output Indicator: Switch the light on
- (6) CV/CC indicator light, when on CV, the light is green, if on CC, the light is red.
- (7) Output switches: ON/OFF the output.
- (8) Power switch
- (9) Output negative terminal(—)
- (10) GND terminal
- (11) Output positive terminal(+)

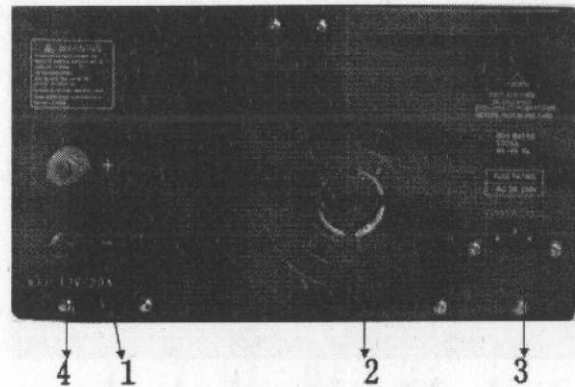


Figure 3-3 Single DC power supply back panel Operation

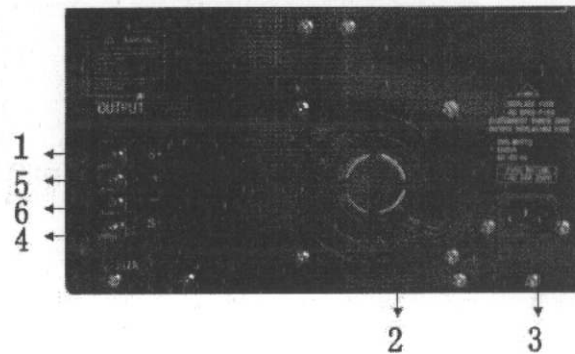


Figure 3-4 Single DC power supply back panel Operation

1. High current output: "+", output when the current is more than 10A
2. Radiator fan: Forced cooling the high power transistor
3. Electric outlet
4. High current output: "-", output when the current is more than 10A
5. Output "+" sample side: When the load far away from the instrument, the sample wire "+" connect here
6. Output "-" sample side: When the load far away from the instrument, the sample wire "-" connect here

6. OPERATION INSTRUCTIONS:

6.1 PRECAUTION

(1) AC input

AC input should be within the range of line voltage $220V \pm 10\%$, 50Hz.

WARNING. To avoid electrical shock, the power cord protective grounding conductor must be connected to ground.

(2) Installation

Avoid using the supply in a place where ambient temperature exceeds $40^{\circ}C$. The heat sink located at the rear of the supply must have sufficient air space for radiation.

(3) Output voltage overshoot

Voltage between output terminals never exceeds the preset value when the power is turned on or off, avoid the overshooting.

6.2 SETTING CURRENT LIMIT

(1) Determine the maximum safe current for the device to be powered.

(2) Temporarily short the (+) and (-) terminals of the power

supply together with a test lead.

(3) Rotate the VOLTAGE control away from zero sufficiently for the CC indicator to light.

(4) Adjust the CURRENT control for the desired current limit. Read the current value on the Ammeter.

(5) The current limit (overload protection) has now been preset. Do not change the CURRENT control setting after this step.

(6) Remove the short between the (+) and (-) terminals and hook up for constant voltage operation.

6.3 CV/CC TRAITS:

The working characteristic of these series Power Supplies is called a constant voltage/constant current automatic crossover type. This permits continuous transition from constant current to constant voltage modes in response to the load change. The intersection of constant voltage and constant current modes is called the crossover point. If the load is such that the power supply is operating in the constant voltage mode, a regulated output voltage is provided. The output voltage remains constant as the load increases, up until the point where the present current limit is reached. At that point, the output current becomes constant and the output voltage drops in proportion to further increases in load.

6.4 OPERATION MODE

(1) Independent Mode

The "CH1" and "CH2" supplies each provide a 0-30V rating volts output at up to rating current. This procedure covers the use of the CH1 and CH2 supplies only when they are used independently from each other. When used in the independent operating mode, the operation controls of the two power supplies are completely independent and either supply can be used individually or both can be used simultaneously (only one unit output).

(2) Series Tracking Mode

Set the power supplies to the Tracking series mode by engaging

the left switch and release the right switch, as the figure 4.

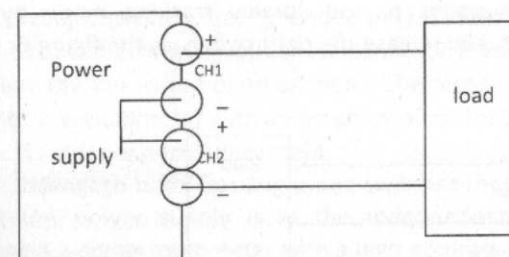


Figure 4 Single Supply

When the series tracking mode of operation is selected, the position (Red) terminal of the CH2 supply output is internally connected to the negative (black) terminal of the CH1 supply. In the series tracking mode, the maximum output voltage of both CH1 and CH2 supplies can be simultaneously varied with one control. The maximum supply voltage is automatically set to the same as the CH1 supply voltage and CH2 supply voltage being in series each other. In this case, the output voltage (across the two supplies) is actually double the displayed value. The actual output current would be the value read from the CH1/CH2 LED Display. Just like the figure 5 indicating.

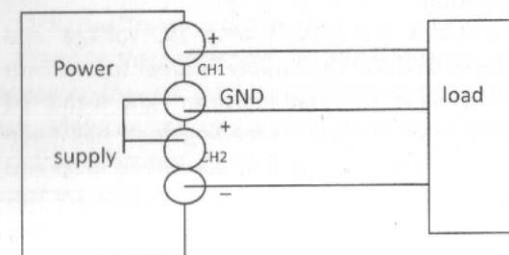


Figure 5 Positive and Negative Supply

(3) Parallel Tracking Mode

Set the power supplies to the parallel tracking mode by engaging the left switch and release the right switch, as the figure 6:

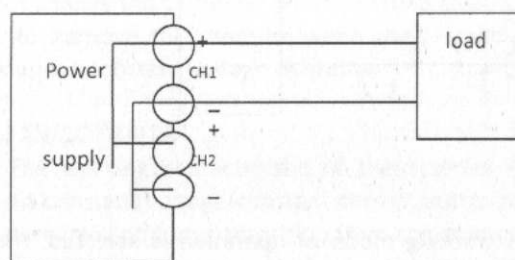


Figure 6 Parallel Tracking Operation

When the parallel tracking mode of operation is selected, the position (Red) terminal and negative (black) terminal of the CH1 supply output is internally connected to the position (Red) terminal and negative (black) terminal of the CH2 supply output. In this case, CH1 LED display shows the actual voltage value at the supply output terminal, as well as the double rated current output.

(4) CH3 Output Operation

The CH3 supply provides 2.2~5.2V 1 amp DC voltage and current output or the fixed 5V(3A). The supply is ideal for us with TTL circuits (5V Fixed). CH3 has an overload indicator light. If the red OVERLOAD indicator light is on, means exceeding load has been placed on the supply, it will cause voltage and current to drop and interfere the proper operation of the CH3 supply. To correct this situation, the load on the supply must be decreased until the indicator light is off.

7. ADJUSTMENTS

This unit was accurately adjusted at the factory before they go out. Readjustment is recommended only if repairs have been made in a circuit affecting adjustment accuracy or if you have a reason to believe the unit is out of adjustment. The recommended calibration device is a multimeter with an accuracy of $\pm 0.1\%$ DCV or better.

(1) Independent Adjustment

Disengage both Tracking mode switches (both switches out) so that the power supply is in the independent operating mode. Connect a digital multimeter with a high accuracy to measure the DC voltage at the output terminals of the CH1 (CH2) supply. Set the CH1 (CH2) VOLTAGE control to maximum (fully clockwise). Adjust trimmer potentiometer VR12 (VR22) on the circuit board for a reading as close to rating voltage $\times 1.05$ (on the multimeter) as possible. Set output on by adjusting the trimmer potentiometer VR11 (VR21) to the rated voltage.

Connect the unit to the load, and keep the load and external multimeter being in series. Rotate the CH1 (CH2) current control fully clockwise (maximum) and keep in running on CC (the indicator light is red.) Adjust VR13 (VR23) supply circuit board to obtain an output current of rating amps $\times 1.05$ (read on the meter or LED display). Adjust the CURRENT knob to the rated current (3A), Set output on by adjusting the trimmer potentiometer VR16 (VR26) to the rated current.

(2) Series Tracking Adjustment

When in the presetting, set the supply to Tracking series mode by engaging the left Tracking switch and releasing the right tracking switch. Measure the CH1 output value with the digital multimeter, and adjust trimmer potentiometer VR43 for a presetting output value of the CH2 as close to the reading of the CH1 as possible.

Rotate the output knob to test the output voltage of the CH1 and CH2, adjust trimmer potentiometer VR42 for the output value of the CH2 as close to the output voltage of the CH1 as possible. If it is not the same, repeat the above steps.

(3) Parallel Tracking Adjustment

Set the supply to Tracking parallel mode by engaging the right Tracking switch and releasing the left tracking switch.

A. Disengage both Tracking mode switches (both switches out) so that the power supply is in the independent operating mode.

B. Set the CH1 supply VOLTAGE and CURRENT controls to minimum (fully counterclockwise).

C. Connect the multimeter across the CH1 supply output terminals and measure the output current.

D. Set the CH1 supply VOLTAGE control to mid-range and adjust the CURRENT control to obtain an output current of rating amps (read on the multimeter). Do not change the CURRENT control setting after this step.

E. Engage both Tracking mode switches (both switches in), so that the power supply is in the parallel operating mode.

F. Set the CH2 supply CURRENT control to maximum (fully clockwise) and set the VOLTAGE control to mid-range.

G. Set output on by adjusting the trimmer potentiometer VR52 on the circuit board (located on the right side of the supply) to obtain an output current of double rating amps on the multimeter.

(4) CH3 Supply Adjustment

Connect the multimeter across the output terminals of the CH3 supply to read output voltage and adjust the VR34 to obtain reading of 2.2~5.2V on the multimeter. Adjust VR36 to the minimum.

A. Connect the multimeter across the output terminals of the CH3 supply to read output voltage and adjust the VR34 to obtain reading of 2.2~5.2V on the multimeter.

B. Turn VR34 on the main master circuit board fully counterclockwise.

C. Set output on by adjusting VR36 so that the CH3 meter also reads the double rating current.

D. Connect a variable load (load must be rated to handle a power of at least 30W) across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 1.5A.

E. Slowly adjust VR34 clockwise until the output voltage (read from the multimeter) drops 5mV to 6mV (start current limit point).

F. Connect a variable load (30W) across the output terminals and connect the multimeter to read the output current, then adjust the load on the multimeter to show an output current at 1.5A.

G. Adjust VR31 until the 1.2A

For further information, please contact to:

GENERAL POLYTRONIC SYSTEMS LIMITED.

14 Regents St. Brent

London NW10 5LG, UK

Tel: +44 (0) 20 8964 3600

E-mail: sales@gpslimited.com

Website: www.gpslimited.com