The British Power Conversion Company

BPC630-01
POWERMASTER SERVO
USER MANUAL

CONTENTS

CHAPTER 1 – SAFETY WARNINGS

Read the following safety information carefully before you install or operate the BPC PowerMaster ServoStatic Inverter (SI) equipment and keep this manual within easy access of the equipment for future reference.

1.1 DESCRIPTION OF SYMBOLS USED IN THIS MANUAL

WARNING: The warning symbol is used where there is danger of an electrical shock, equipment damage or personal injury.

CAUTION: The caution symbol is used to highlight important information to avoid possible equipment malfunction or damage.

1.2 GENERAL WARNINGS

WARNING: Be aware that the output from this equipment can be energized when the unit is not connected to a mains supply, even when the input AC power is disconnected

WARNING: The PowerMaster Servo assembly and peripheral equipment must be installed and commissioned by suitably qualified and trained personnel who are aware of the potential shock hazards.

WARNING: The PowerMaster Servo must be supplied by a grounded outlet. Do not operate the unit without a ground source.

WARNING: To reduce the risk of electric shock:

- Do not insert any object into ventilation holes or other openings
- Do not remove any equipment cover – the unit does not contain any user-serviceable parts. Refer all servicing requirements to qualified service personnel.
- Always disconnect the PowerMaster Servo from the mains power supply before you install a computer interface signal cable. Reconnect the power only after the signalling interface connections have been made

WARNING: To reduce the risk of fire:

- Install this equipment in a temperature and humidity controlled indoor area free of conductive contaminants.
- If a fuse ruptures always replace it with a fuse of the same type and rating.

CHAPTER 2 – GENERAL DESCRIPTION

2.1 INTRODUCTION

The PowerMaster Servo AVR is an advanced electrical device meticulously designed to provide protection to sensitive electronic equipment from potentially damaging brownouts and overvoltage occurrences. Its innovative microprocessor controller enables swift and accurate detection and regulation of voltage fluctuations, thus preventing any disruptions or damages to connected devices.
With its wide-ranging input voltage options, the PowerMaster Servo can seamlessly adapt to a plethora of electronic equipment, including delicate computer systems, ensuring a consistent power supply under any circumstances. Furthermore, the AVR boasts a sophisticated time-delay function, effectively shielding connected devices from power-back surges and consecutive starts, thereby extending the lifespan of such devices.

Model Range

	PMS105-160/260	PMS110-160/260
Power Rating Kva/Kw	5 / 4	10 / 8
Input AC Voltage	220/230/240 (1Ph + N + PE)	

2.2 FUNCTIONAL DESCRIPTION

The PowerMaster Servo is an automatic voltage regulator that protects voltage fluctuations from the incoming supply affecting your load and is designed to maintain a constant set voltage at all times. It will regulate an incoming voltage range of 160V-250V and will provide a steady 230V output.

This can be monitored using the front display panel showing the input/output voltages and the output current/frequency.

2.3 COMPONENT DESCRIPTION

2.3.1 CABINET

The PowerMaster Servo cabinet, shown in Figure 2.5, is a floor mounted system with all terminals at the rear.

System comprises of a Input MCB, bypass switch and display panel.

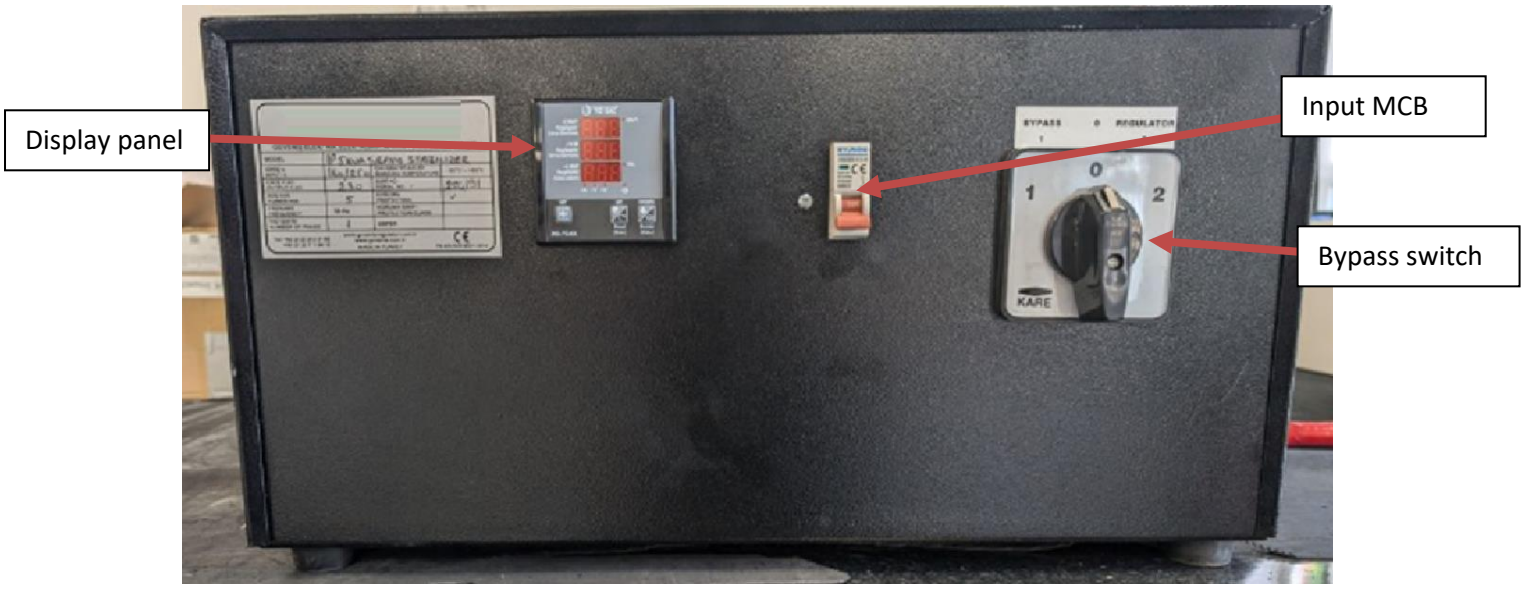
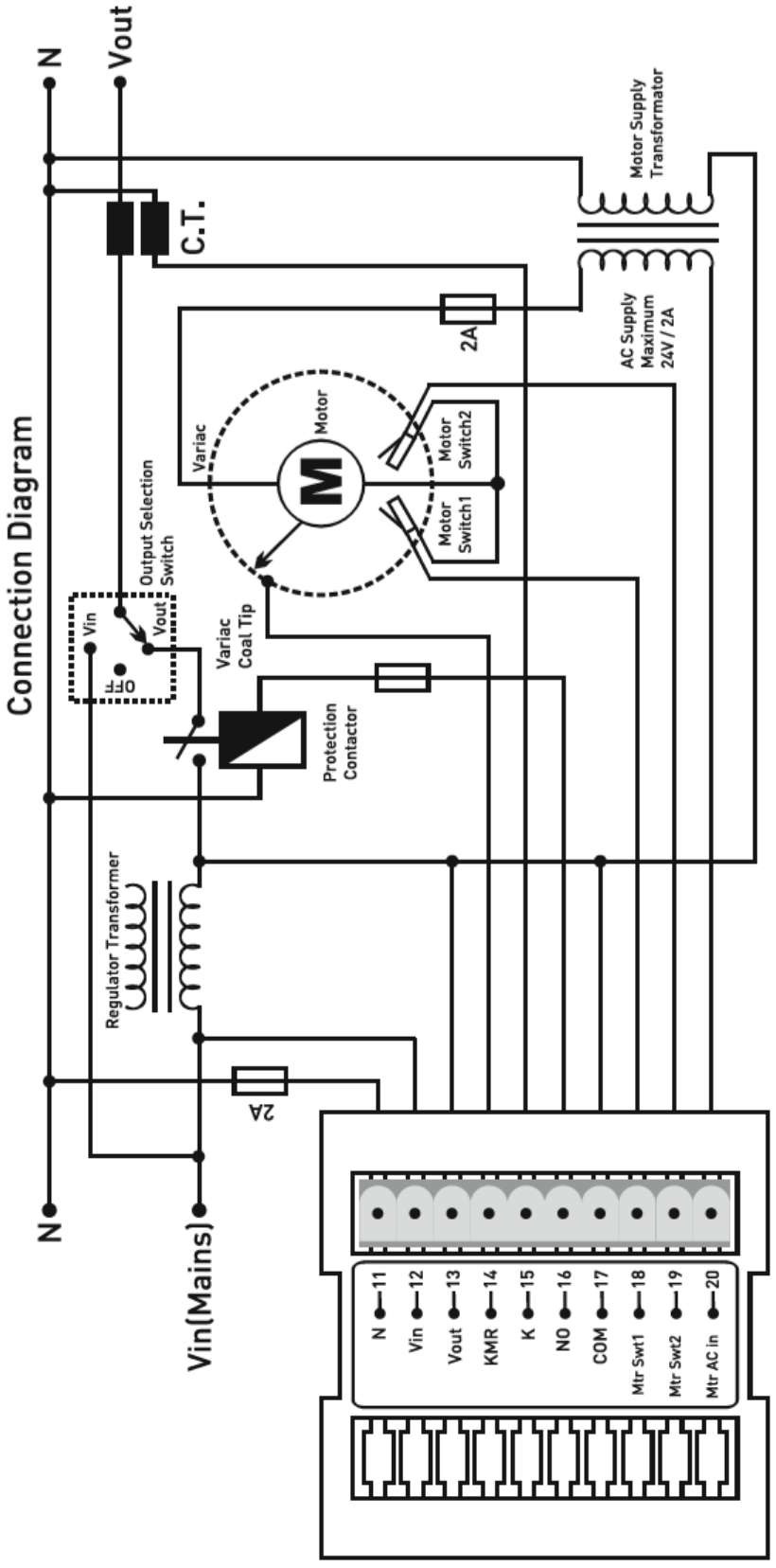


Figure 2.5A – 4kVA

2.3 SYSTEM SCHEMATIC



2.3 DISPLAY

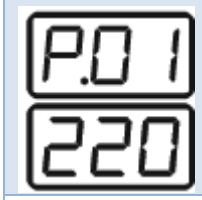
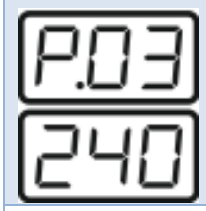
The Display shows mains input/output voltages and regulator output current at the same time. In addition, the Display controls the servo motor to keep the output voltage constant and at the desired value. There is protection and audible alarm depending on regulator output voltage and current.

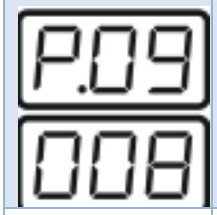
The display has 3 buttons:

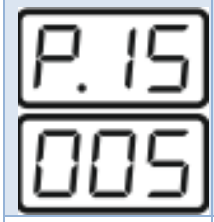
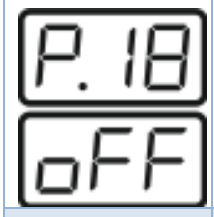
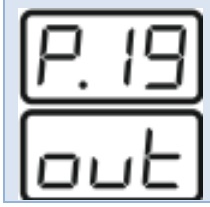
Used to navigate menus.

Used to navigate menus. Can also be held down to show output frequency on display.

Used to select and confirm settings. Can also be held down for 5 seconds to enter the settings menu, shown below:

MENU	DESCRIPTION	FACTORY VALUE	SETTING RANGE
	Regulator output voltage set value. This parameter sets the desired output voltage from the regulator.	220V	100V - 260V
	Regulator output voltage tolerance value. Motor output remains constant when the output voltage is higher than (P01 - P021 and less than (P.01 + P.02). It is used in order to prevent the motor from moving continuously in sudden voltage fluctuations.	5V	1V - 10V
	Regulator output upper protection voltage. When the regulator output voltage rises above the set regulator output upper protection voltage value, the device de-energised the relay. The OUT led turns off and the ">V" led turns on.	240V	Off - 110V - 240V
	Regulator output lower protection voltage. When the regulator output voltage falls below the set regulator output lower protection voltage value, the device de-energised the relay. The OUT led turns off and the "<V" led turns on.	180V	Off - 90V – 270V
	Time to enter voltage protection. The regulator output voltage determines the time to wait for the device to de-energised the relay by entering the protection after the regulator output goes above the upper protection voltage value or goes below the lower protection voltage value. If the voltage is out of normal after the time expires, the relay is de-energised. If the voltage returns to normal within this period, the device does not de-energize the relay.	3sec	1sec – 20sec

	Time to step out of voltage protection. The regulator output voltage determines the time to wait for the device to exit the protection (energised the relay) after reaching 5V below the set regulator output upper voltage value or 5V above the lower voltage value. After the time expires, the relay is energised if the voltage is at normal values. If the voltage goes out of normal values within this period, the device does not energise the relay.	5sec	1sec – 20sec
	Slow motion area. When the difference between the output voltage (Vout) and P.01 reaches P.02 + P.07 or the difference is lower than this value, the device enters the slow motion field and moves the motor at the slow motion speed value (P.10).	10V	1V – 30V
	Slow motion speed value. When the device is in the slow motion area, the motor is moved according to the slow motion speed value until the regulator reaches the set voltage. This value cannot be set higher than the normal motion speed value. Slowest 1 - - Fastest 10	2	1 - 10
	Normal motion speed value. When the device is not in the slow motion range, it moves according to the normal moving speed value. This value cannot be set lower than the slow motion speed value. Slowest 1 - - Fastest 10	8	1 - 10
	Coal protection time. When the mains voltage is constant, the regulator charcoal column remains stable for a long time, causing copper wires to overheat and damage over time. This parameter determines the maximum time that the coal column will remain constant. After the time is up, the motor is moved up to P1 ± P2 value to change the location of the coal column. If this parameter is set to "0", this feature is disabled.	7min	0min - 60min
	P.11: Regulator output protection current (overload). When the regulator output current rises above the set regulator output upper protection current value, the device de-energised the relay. The OUT led turns off and the ">A" led turns on.	120A	Off – 1A – 120A
	Time to enter current protection. The regulator output current determines the time to wait for the device to de-energised the relay by entering the protection after the regulator output goes above the upper protection current value or goes below the lower protection voltage value. If the current is out of normal after the time expires, the relay is de-energised. If the current returns to normal within this period, the device does not de-energize the relay.	3sec	1sec - 20sec
	Time to out of current protection. The regulator output current determines the time to wait for the device to exit the protection [energised the relay) after reaching 0,5A below the regulator output protection current value. After the time expires, the relay is energised if the current is at normal values. If the current goes out of normal values within this period, the device does not energise the relay.	Off	Off – 1sec – 999sec

	Automatic reset number for current protection. This parameter determines how many times the device will reset the system after the regulator enters the output upper protection current fault. At the end of this number, the device needs to be reset manually to get out of the current error state.	Off	Off – 1 - 10
	Opening Time. If the current and voltage values are at normal values when the device is energized, the relay is energized at the end of the time specified here, otherwise the relay does not energize. This time is shown as a countdown on the display when the device is energized. It does not affect regulator control.	5sec	1sec – 60sec
	Buzzer active/passive. While the buzzer feature is active; In the event of a fault (Voltage and Current) buzzer operates. This feature can be activated/deactivated by pressing the buzzer button on the device for 3 seconds while out of the menu. When the buzzer feature is passive, the buzzer led on the device goes off, while it is active, it lights on. Factory value: on (Active) Setting range: off - on	On (active)	
	Change password. Determines the password value for entering the menu. When this value is "oFF", access 0 to the menu is done without password. If a value is entered, this password must be entered to enter the menu. Factory value: off (Passive) Setting range: off - 001 - 999	Off (passive)	Off – 001 - 999
	Version information. Shows the software version of the device.		
	Exit the menu. Used to exit the menu.		

CHAPTER 3 – INSTALLATION

3.1 INTRODUCTION

WARNING: All the operations described in this chapter must be supervised by suitably qualified personnel and all aspects of the electrical installation must be carried out by an authorised electrician.
BPC Energy Ltd. will take no responsibility for any personal injury or material damage caused by incorrect cabling or operation, or any installation activities that are not carried out in strict accordance with the instructions contained in this manual

WARNING: Once the PowerMaster Servo system is installed it must be commissioned by an engineer approved by BPC Energy Ltd, or one of its service agents, before it is powered-up.
BPC Energy Ltd. will take no responsibility for any personal injury or material damage caused by the application of electrical power to this equipment before it has been fully commissioned.

3.2 ACCEPTING DELIVERY

CAUTION: *Observe the following precautions when off-loading and moving the cabinet:*
- *Always keep the packages in an upright position.*
- *Do not drop the equipment.*
- *Do not stack the pallets.*

The cabinet is bolted to the shipping pallet and packed in a cardboard sleeve that is designed to protect it from mechanical and environmental damage. Further protection is provided by wrapping the equipment with a plastic sheet.

Before you accept the shipment ensure that the received package(s) correspond to the description shown in the delivery documentation and carefully examine the packing containers for signs of physical damage

3.2.1 REPORTING DAMAGE

Claims for shipping damage must be filed immediately when found, and the carrier must be informed of ALL claims within seven days of receipt of the equipment. If the equipment is to be stored for longer than seven days before it is installed, you should unpack it and inspect it for signs of internal damage before you put it into storage. Note that some optional equipment packages might be shipped inside the cabinet, and these too should be checked for damage.

If the equipment is damaged, you should store the packing materials for further investigation.

3.2.2 STORAGE

If you plan to store the PowerMaster Servo prior to its installation it should be kept upright (preferably in its original shipping packaging) in a clean, dry environment with a temperature between -25°C to +60°C and RH <93%.

If the storage period is likely to exceed seven days, the packaging should be removed, and the cabinet inspected for shipping damage before it is placed into storage. If there is no apparent damage you should refit the packaging or cover the cabinet with a dust-cover to prevent the ingress of dust and dirt.

3.2.3 UNPACKING INSTRUCTIONS

WARNING: The cabinet, battery cabinet (optional) and battery packages are heavy and may tip during unpacking unless the unpacking instructions are not followed closely.

If the shipment is received in good order, please unpack the PowerMaster Servo as follows:

1. Remove the plastic sheeting and cardboard sleeve covering the cabinet.
2. Remove the anchor bolts securing the cabinet to the pallet then lift and remove the cabinet from the pallet.
3. Retain the packaging materials for possible future shipment.
4. Examine the cabinet for any sign of damage and notify your supplier immediately if any damage is found.
5. Remove any internal protective packaging.
6. When the cabinet is placed in its final location, install the 4kVA power modules and secure them in place.
7. Install a blanking plate to the front of any shelves that have no power module fitted.

3.3 INSTALLATION

3.3.1 ENVIRONMENTAL CONSIDERATIONS

A certain amount of pre-planning will help provide a trouble-free installation process. You should consider the following guidelines when planning the installation location and operating environment.

1. The route to the installation location must allow the equipment to be transported in an upright position.
2. The floor at the proposed installation site and en-route from the off-loading point must be able to safely support the weight of the cabinet/battery equipment, plus fork lift or trolley jack during transit.
3. The cabinet requires sufficient front and rear clearance to enable cooling airflow, as described below.
4. All maintenance, servicing and user operation can be carried out from the front of the cabinet, but rear access is required for connecting the AC power cables.
5. The cooling air entering the cabinet must not exceed +40°C.
6. The floor material should be non-flammable and strong enough to support the heavy load.

In summary, the system should be installed in a location where:

a) Humidity (< 93%) and temperature is ideally 20°C.

b) Fire protection standards are respected.

c) Cabling can be performed easily.

d) A minimum 600mm front accessibility is available for service or periodic maintenance.

e) Adequate cooling air flow is available.

f) The air conditioning system can provide a sufficient amount of air cooling to keep the room at, or below, the maximum desired temperature (where used).

g) No dust or corrosive/explosive gases are present.

h) The location is vibration free.

3.3.2 CLEARANCES

A clearance of 200mm should be provided around all side of the unit to allow airflow.

3.3.4 CABLE CONSIDERATIONS

It is the customer's responsibility to design and install the PowerMaster Servo supply and distribution circuits, and provide all the external fuses, switchgear and cables required to connect the cabinet's AC INPUT and SI OUTPUT supplies. The information provided in this section should assist you in the planning and preparation of the power cabling.

The AC INPUT terminals should be connected to a utility mains LV-switchgear panel.

Similarly, the SI OUTPUT terminals should be connected to the load equipment via a suitably protected load distribution panel.

3.3.6 CABLE SPECIFICATION

All cables and protective devices must be selected in accordance with national and local regulations and codes of practice (e.g. BS7671:2008 or relevant country standards) to suit the maximum capacity of the system, as shown in the table below.

NOTE: *Input Maximum Current includes 100% load @ 230V.*

PowerMaster Servo		
	5kVA	10kVA
Input		
Max Current (A)	17.0	34.1
Min Cable Size (mm^2)	4	
Output		
Max Current (A)	17.4	34.8
Min Cable Size (mm^2)	4	
Earth Connection		
Min Cable Size (mm^2)		

Table 3.2

3.3.7 ELECTRICAL PLANNING

All electrical power connections are made to terminals located on the rear of the cabinet near the top.

If the cabinet is to be installed in a location with restricted rear access, you should ensure that suitably-contained power cables are available before the cabinet is moved to its intended final position

3.3.8 CABLINING PROCEDURE

3.3.8.1 SAFETY NOTES

Please ensure you read and understand the following safety notes before you begin the electrical installation.

1. All the operations detailed in this section must be performed or supervised by a qualified, authorised electrician.
2. Once the electrical installation is completed the initial system start-up must be performed by a qualified engineer, trained and authorised by BPC Energy.
3. Do not connect the system if there is water or moisture present.
4. When working on the input power cables, you must ensure that the AC INPUT supply is isolated at the mains switchgear panel and, where possible, locked out. Warning notices should be posted where applicable to prevent the inadvertent operation of the LV supply isolator(s).
5. Ensure the following conditions are met prior to starting work on the equipment:
    a) No mains voltage is present from the mains switchgear panel.
    b) All loads are shut down and disconnected.

3.3.8.2 TERMINAL CONNECTIONS

5kVA TERMINATIONS

Terminal connections can be found at the REAR of the unit as per figure 3.1A.

Figure 3.1A

CHAPTER 4 – OPERATION INSTRUCTIONS

4.1 START UP

1. Turn on the input mains supply:

2. Close Input MCB

    - Display will power on

3. Turn Bypass switch to “REGULATOR”

    - The machine will fully power on and begin regulating the output.

    - The “OUT” LED will illuminate.

4. The PowerMaster Servo has now started up.

4.2 SHUT DOWN

1. Turn Bypass Switch to “0”
    - The machine will power down and no longer give an output.
2. Open Input MCB
    - Display will power off
    - “OUT” LED will de-illuminate
3. The PowerMaster Servo is now fully shut down.

4.3. BYPASS

1. Turn bypass switch to “BYPASS”

    -NOTE: in turning the bypass switch to “BYPASS” the switch will first go into the “0” – off state, this will cause a break in the output of the system. Then it when switched onto “BYPASS” the output will resume.

CHAPTER 5 – MAINTENANCE INSTRUCTIONS

The PowerMaster Servo does not contain any user-serviceable parts, so day-to-day maintenance requirements are minimal other than to ensure that the operating environment is kept cool and dust free. A clean operating environment will help maximise the useful working life and reliability of the PowerMaster Servo.

5.2 SCHEDULED MAINTENANCE

It is essential that the PowerMaster Servo cabinet receive regular preventative maintenance to maximise both the useful working life and system reliability. When the system is commissioned, the commissioning engineer will leave a service record book with the customer that will be used to log its full-service history.

We recommend that the system is maintained every Twelve months (visit frequency should be increased dependent on environment conditions) by an BPC Energy Ltd. Trained engineer, or approved service agent, who will complete the following:

5.2.1 Preventative maintenance inspection

Preventative maintenance inspections form an integral part of all Extended Warranty Agreements (maintenance contracts) offered by BPC Energy Ltd.

During a preventative maintenance inspection, the engineer will check and validate:

- Site environmental conditions
- Integrity of electrical installation
- Cooling airflow
- Load characteristics
- Integrity of alarm and monitoring systems
- Operation of all installed options.

CHAPTER 6 – TROUBLE SHOOTING

The PowerMaster Servo will generate a visual alarm on the display panel when it detects an abnormality with the output.

6.1 ALARM TABLE

ALARM	DESCRIPTION
>A	OUTPUT OVER CURRENT
>V	OUTPUT OVER VOLTAGE
<V	OUTPUT UNDER VOLTAGE

CHAPTER 8 – TECHNICAL SPECIFICATION

INPUT VOLTAGE	**160-250V AC**
OUTPUT VOLTAGE	220V
INPUT FREQUENCY	50Hz
OUTPUT SENSITIVITY	<1.5%
VOLTAGE CHANGE SPEED	75V/s
EFFICIENCY	98%
OPERATING TEMPERATURE RANGE	0 C° + 55 C°