

# **SERVO CONTROLLED VOLTAGE STABILIZERS**

## **STEADYVOLT**

### **INSTRUCTION MANUAL**

## **Purpose**

Voltage Stabilizer units are used primarily for two applications, Mains Conditioning and Process Control

### **Mains Conditioning**

In situations where the mains supply voltage fluctuates beyond the normally accepted tolerance limits, problems can arise with the reliability, operational function and life expectancy of equipment.

Steadyvolt Servo Stabilizers are designed to overcome these problems by providing a stable supply for trouble free operation of electrical equipment.

### **Process Control**

Steadyvolt units can also be used to provide stable voltages where the normal fluctuations in mains tolerance are not considered operationally acceptable, such as for long term testing of electrical goods at specific voltages.

They can be used for regulating operational processes such as the accurate speed of a pump or the temperature of a heating element.

Alternatively they may be used to provide a stable supply to sensitive electronic equipment that require voltage tolerances to be maintained well inside the normal supply distribution levels.

## **General Operation**

The Steadvolt units consists of a motorised variac either used directly to supply the load, or in combination with an isolation transformer in a Buck-Boost configuration. The output of the unit is controlled automatically with a feedback sensing circuit that operates the motor drive unit on the variac to prevent over voltage or under voltage situations. The units respond to input mains fluctuations restoring the output voltage smoothly back within the operating tolerance. Typical recovery rates are 35V/sec. The units also have under voltage and over voltage tripping to disconnect the output in the event the input fluctuation exceeds the designed limits for more than 5 seconds.

## **General Specification**

### **Single Phase**

Input Voltage Range		215V to 265V
Output Voltage		240V
Regulation / Stability		±1%
Restore Rate		35V/second .
Regulation Control	Standard Optional	RMS True RMS
Operating Frequency		47Hz to 53Hz
Motor		AC Synchronous 60 RPM 3Kg cm Torque
Motor Supply		190V to 290V Single Phase
Cooling		AN
Enclosed		IP22

### **Three Phase**

Input Voltage Range		370V to 460V
Output Voltage		415V
Regulation / Stability		±1%
Restore Rate		60/second
Regulation Control	Standard Optional	RMS True RMS
Type		Balanced
Operating Frequency		47Hz to 53Hz
Motor		AC Synchronous 60 RPM 3Kg cm Torque
Motor Supply		190V to 290V Single Phase
Cooling		AN
Enclosed		IP22

## **Basic Features**

Very high efficiency, > 98% on load

Introduces no waveform distortion.

Unaffected by power frequency variation between 47 to 53 Hz.

Unaffected by load power factor condition.

Large short time overload handling capacity. This is very necessary for taking care of the starting surge of induction Motors.

Stepless continuous voltage correction.

Fully solid state Electronic IC Control.

AC mains operated, very reliable, low speed high torque, instant start stop, reversible, permanent Magnet Synchronous motor with special damping circuits to ensure superior dynamic response. Its starting, running and stalling currents are the same thereby making the motor burn proof when stalled forcibly for long periods.

Very close tolerance of the Output voltage i.e. within +/- 1% of the set voltage.

The output voltage can be set between 220-240 volts for single phase units or 380-415V for three phase units by means of the potentiometers provided on the front panel. However it should be noted that the input range over which the unit will operate normally will change with the adjustment

Auto and manual switches provided for testing the unit and also for setting output voltage in case of Auto/Control Card failed.

Analogue Voltage meters with selector switches for input, output and phase monitoring

### **Optional Features (At extra cost)**

In addition to the standard design features listed in the previous section we also offer a range of additional items

Power-On-Delay.

After switching ON the MCB on the front panel, power is supplied to the connected load after a delay of approximately 5 sec, during this time delay the output voltage is stabilized, thus ensuring that initial abnormal voltage is not supplied to the connected load.

Output Trip

If the output voltage goes beyond +/- 5V of the set output voltage for approximate 5 sec then the output trips, disconnecting the supply to the connected load, thus ensuring that connected load is not supplied with abnormal voltage.

True RMS regulation control

Digital Voltmeters and Ammeters.

Audible Alarm to indicate Input high/low & Output high/low and other fault conditions.

Surge & spike suppressor for filtering input noise and spikes.

Over current, MCB, protection and Residual current, RCD, protection

## **TECHNICAL DESCRIPTION**

Principle of Operation.

The unit contains a regulation control PCB card that continuously senses the output voltage of the unit. The card compares this voltage to a reference voltage using a comparator circuit which is used to switch relays controlling the mains supply to the drive motor on the variac. The reference voltage is adjusted higher or lower by the comparator circuit output to prevent the motor drive from continuously oscillating around a fixed voltage point.

Auto/Manual Modes of Operation.

### Auto Mode.

Normal operation is with the unit set in Auto-mode. The stabilizer continuously controls the output to maintain the output voltage within tolerance limits via the Regulation Control PCB

### Manual Mode.

Manual mode is provided as a means to test and adjust the stabilizer.

Switch the "Auto/Manual" switch to manual and simultaneously switch the increase switch to make the voltage rise. As the output goes high the LED indicator should glow. Repeat the process for the decrease switch and the other phases of a three phase unit.

After testing return the switches to the Auto Mode and check the voltage returns to the required level

The unit is provided with adjusting potentiometers on the front panel to set the required output voltage. The potentiometers have a locking nut to maintain the setting. To adjust the output voltage place a voltmeter across the output terminals of a single phase stabilizer or between the neutral and one of the line voltages of a three phase unit. Place a screwdriver into the slot of the potentiometer knob and gently loosen the locking nut. Carefully turn the potentiometer knob with the screwdriver until the voltage reading is within the required tolerance. Holding the knob firmly in place with the screwdriver tighten the locking nut taking care not to let the tightening action turn the potentiometer. For three phase units repeat the process for the other two phases

### High / Low Voltage Trip Option

To check the operation of the under and overvoltage trip, set the unit up in automatic mode with the output set normally and turn the voltmeter selector switch to read either the output on a single phase unit or one of the output phases of a three phase unit. Switch the "Auto/Manual" switch to manual and simultaneously switch the "increase" switch to make the voltage rise, after 5 seconds the unit should trip out repeat the process with the "decrease" adjustment switch.

## INSTALLATION

### Inspection

When taking delivery of the stabilizer from the transporter please check for damages in the packing. If the packing is found in a damaged condition please mark the delivery documentation to indicate this and report such damage to your supplier.

Inspect the unit before use for signs of damage to the case, control switches and panel meter. In the event of finding any damage do not use the unit.

### Connection

Stud terminals are provided for connection of input and output cables. Ensure all connections to these studs are properly tightened

Ensure all cables used to connect to the unit to the supply and the load are suitably rated for the currents and voltages.

The unit is supplied with partially punched gland holes that can be pressed out as required for cable access to the unit. Use cable glands to secure the input and output cables through the gland holes to prevent damage to the cables during operational life

For three phase units ensure that the correct phase sequence is maintained from input through to the output.

Ensure the input lead is properly earthed to the enclosure on the stud provided and that the earth is continued through to the output cable for complete safety

Provide a proper neutral lead to the input ensuring the earth to neutral voltage is less than 3 volts

After wiring ensure all access panels are properly secured to prevent accidental contact with live electrical parts. Voltage stabilizers operate at mains voltages and contact is potentially lethal.

Connection to the unit should follow the current wiring colour convention

#### Single Phase

Live  
Neutral  
Earth

Brown Wire  
Blue Wire  
Green / Yellow Wire

#### 3 Phase

Line 1  
Line 2  
Line 3  
Neutral  
Earth

Brown Wire  
Grey Wire  
Black Wire  
Blue Wire  
Green / Yellow Wire

Care should be taken with 3 phase units when connecting to mains systems with old style Red, Yellow, Blue, Black line wiring colours not to connect the Line 3 to the old Black Neutral or the Blue Neutral to the old Blue phase line wire

Ensure that such wiring is carried out by suitably qualified personnel

## **Service**

Remove the cover of the unit a regular intervals and inspect the surface of the variac commutator for dirt and pitting of the track. Clean the track by lightly rubbing with fine emery paper

Inspect the condition of the carbon brush for cracks and chips. If damaged replace the bush, a spare has been supplied with the unit and further spares can be purchased from the retailer who sold the unit

Ensure the cover is properly re-secured after servicing to prevent the possibility of electric shock

**WHEN REMOVING THE BACK COVER FOR ANY SERVICING OPERATION ENSURE THE UNIT IS DISCONNECTED FROM THE MAINS SUPPLY**

All servicing work should be conducted by suitably qualified personnel

## **Disposal**

At the end of the service life of the unit ensure it is properly disposed of in keeping with the environmental legislation current at the time for the recovery and recycling of materials.