

# Single Phase Servo(LCD) User Guide V-01

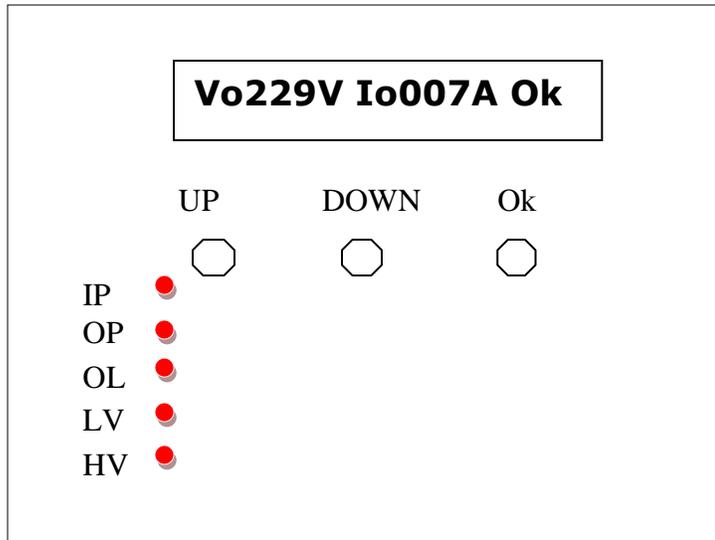
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## **1. Normal Operation**

This is the normal operating state of Servo. During normal operation servo corrects the output voltage to the set regulation voltage within regulation range.

### **Board Layout**



### **Legend**

- IP-Input Present
- OP-Output Present
- OL-Overload
- LV-O/p Low voltage
- HV-O/p-High voltage

This condition is achieved if the following conditions are met.

- ✓ The output voltage is below the set Hi CutOff.
- ✓ The output voltage is above the set Lo CutOff.
- ✓ Within the regulation range if the servo is already tripped due to Lo Cutoff or Hi Cutoff.
- ✓ The output current is within permissible range.

During normal operation the display switches between Page 1 and Page 2 every 5 seconds.

During normal operation

- Press and hold UP and DOWN Button together to **enter MENU mode**.
- Press UP Key to freeze display to Page 1,2 or 3.
- Press DOWN Key restart autoscrolling.

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## ➤ Page 1

**Vo229V Io007A SS**

- Vo indicates the output voltage and Io indicates output current.
- SS indicates the status

## ➤ Page 2

**Vi210V 50Hz OK"**

- Vi indicates the input voltage and 50Hz indicate the frequency.
- Io indicates the output current for R,Y and B phase respectively.

### Manual Scrolling.

- Press UP key to scroll pages 1 and 2.
- Press Down Key to start auto scrolling.

## 2. Configuration Setting.

Servo configuration parameters can be viewed and edited using MENU keys. Servo parameters are stored in EEPROM to avoid data loss during power failure. See explanation for each configuration parameter below.

- Press Menu and UP key together to enter configuration mode.
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<b>Configuration Parameters.</b>		<b>Range/ Default</b>
<b>SET_V</b>	This is the center value of R Phase voltage after correction.	0-255 230
<b>REG</b>	The range of voltage allowed during correction(40ms) .Eg: If SET_V =230 and REG=5 then output voltage will be 230+-5. ❖ REG value should be set with care. A low REG means better regulation, however there will be frequent variac movement and more wear and tear.	0-255 10
<b>DELAY</b>	Time taken(in Seconds) to switch servo ON after switch OFF or Trip due to High or low voltage. Press OK key to bypass	0-255 4

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	On delay. A value of 0 indicates manual mode(Servo will be switched ON only manually by pressing Ok Key.)	
<b>CTR</b>	Current multiplication factor. (To be used with external CT)	0-255 1
<b>LV1</b>	Low voltage trip point 1.	0-255 190
<b>LVT1</b>	Maximum time allowed in LV1 for each phase.	0-255 20
<b>LV2</b>	Low voltage trip point 2.	0-255 180
<b>LVT2</b>	Maximum time allowed in LV2 for each phase.	0-255 10
<b>LV3</b>	Low voltage trip point 3(Immediate trip within one second).	0-255 170
<b>HV1</b>	High voltage trip point 1.	100-355 240
<b>HVT1</b>	Maximum time allowed in HVT1 for each phase.	0-255 20
<b>HV2</b>	High voltage trip point 2.	100-355 250
<b>HVT2</b>	Maximum time allowed in HV2 for each phase.	0-255 10
<b>HV3</b>	High voltage trip point 3. (Immediate trip within one second).	100-355 255
<b>OL1</b>	Over load current point 1.	0-255 29
<b>OLT1</b>	Maximum time allowed in OL1 for each phase.	0-255 20
<b>OL2</b>	Over load current point 2.	0-255 32
<b>OLT2</b>	Maximum time allowed in OL2 for each phase.	0-255 10
<b>OL3</b>	Over load current point 3. (Immediate trip within one second).	0-255 35
<b>OL_MF</b>	Over Load multiplication factor. Multiplication factor for over load current OL1,OL2 and OL3 to enter value above 255A. Eg:If OL_MF = 2 and OL1=100,OL2=160,OL3=200 then it will be considered as OL1= 200A,OI2=320A,OI3=400A.	0-255 1
<b>REF_V</b>	Set voltage for voltage calibration.	0-255 200
<b>REF_I</b>	Set current for current calibration.	0-255 20
<b>I_FAC</b>	Do not change this value(Default=60)	0-255

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		60	
<b>eCODE</b>	Error Code of Last trip	0-255 0	
	<b>eCode</b>		<b>Description</b>
	0		Indicates no Error
	1		Servo tripped due Low voltage. (LV1).
	2		Servo tripped due Low voltage. (LV2)
	3		Servo tripped due Low voltage. (LV3)
	4		Servo tripped due High voltage. (HV1)
	5		Servo tripped due High voltage. (HV2)
	6		Servo tripped due High voltage. (HV3)
	7		Servo tripped due High current. (OL1)
8	Servo tripped due High current. (OL2)		
9	Servo tripped due High current. (OL3)		
<b>ePH</b>	Phase of last error (0=R,1=Y, 2=B)	0-255	
<b>eVAL</b>	Value(Voltage or Current ) of last Error **For current value should be multiplied by OL_MF.	0-255	
<b>xxxxx</b>	Not in Use	0-4	
<b>yyyyy</b>	Not in Use	0-1	

### 3. Menu Operation.

1. Press and hold UP and DOWN Button together.
  - LCD displays servo parameters as below.

SET\_V 230 230

2. Use UP/DOWN Key to scroll thru menu.
  - For example LV1 is set to 200volt.
  -

LV1 200 200

3. Press OK key if Parameter need to be changed.
  - For example to change LV1 press Ok key
4. Use UP/DOWN and OK key to change the parameter.
  - Use UP/DOWN key to change the first digit of parameter.
  - Use OK key to change the second digit.

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- Use the UP/DOWN and OK key combination to change all the three digits.

5. Use OK Key again to confirm the change and store the new parameter in EEPROM.



LV1 180 180
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## **4. How to set.**

Setting of LV and LVT parameters should be done with care. Proper setting of configuration of parameters would lead to better performance, lower tripping and longer life for servo.

### a. Low voltage settings(LV1,LVT1,LV2,LVT2,LV3)

Here low voltage trip voltage(LVx) and corresponding time to trip(LVTx) is configured. For example LV1=180 and LVT1 = 20, then servo will trip if output voltage stay below 180 volt continuously for 20 seconds. Kindly note the following while setting LV.

- Installation where voltage fluctuation is frequent LV should be set to low and LVT high.
- When heavy load(like motor) gets connected, there is a possibility that the output voltage may go below LV due to huge starting current. In this case if variac is slow then there is possibility of trip due to LV. The best option here is to keep LVT high, so servo corrects the voltage before trip.

### b. High voltage settings(HV1,HVT1,HV2,HVT2,HV3)

Here high voltage trip voltage(HVx) and corresponding time to trip(HVTx) is configured. For example HV1=240 and LVT1 = 20, then servo will trip if output voltage stay above 240 volt continuously for 20 seconds. Kindly note the following while setting LV.

- Installation where voltage fluctuation is frequent HVx should be set to high and HVTx high.
- If variac speed is low then there is a possibility that servo trip before high voltage is corrected. In this case a high HVTx would be ideal.

### c. Over Load settings(OL1, OLT1, OL2, OLT2, OL3)

Here overload trip current(OLx) and corresponding time to trip(OLTx) is configured. If load current exceeds OL x OL\_MF value for more than OLT seconds continuously then servo will trip.

For example consider a 5KVA servo.

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Load current at 100% load =  $5000/230 = 21.7$  Ampere.

So we can put OL1 at 22 Ampere as OL1. Let us put OLT1 = 60. In this case if load current stays above 22 ampere for 60 seconds continuously servo will trip assuming OL\_MF=1.

Load current at 120% load =  $5000/230 \times 120/100 = 26.0$  Ampere.

If we put OL2=26 and OLT1=20, then if load exceeds 120% for more than 20 seconds servo will trip.

Load current at 200% load =  $5000/230 \times 200/100 = 43.4$  Ampere. If we put OL3=43 (No OLT for OL3) then servo will trip instantly if load ever exceeds 200%.