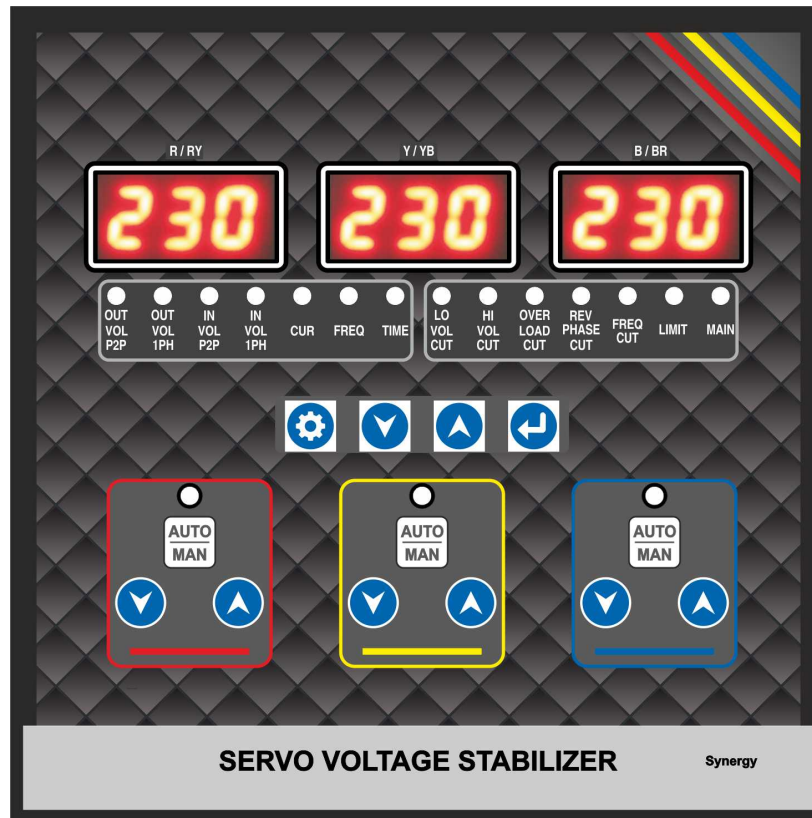


USER MANUAL
SYNERGY (Three Phase) MODEL



SALIENT FEATURES OF ADVANCE Model

- ***Voltage single phase and Phase to Phase for input and output***
- ***Under Voltage Protection***
- ***Over Voltage Protection***
- ***Overload Protection***
- ***Frequency (Under/Over) Protection***
- ***Reverse Phase Protection***
- ***User Friendly Interface.***
- ***SMD Technology***
- ***Software Calibration***
- ***Display Hold feature***

This manual is divided into four parts. These four parts are as follows:

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2. *Programming Mode*-----6
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4. *Wiring Diagram*-----11

All these four parts are explained as follows:

1. Normal (Running) Operation Mode

SYNERGY THREE PHASE MODEL panel for servo control card has triple display to show R/Y/B phase voltages and as well as phase to phase voltage. It has micro push button switches for user friendly interface. This model displays following three parameters:

1. OUTPUT VOLTAGE PHASE TO PHASE
2. OUTPUT VOLTAGE SINGLE PHASE FOR R/Y/B
3. INPUT VOLTAGE PHASE TO PHASE
4. INPUT VOLTAGE SINGLE PHASE FOR R/Y/B
5. CURRENT
6. FREQUENCY
7. REAL TIME CLOCK (For data logging feature)
8. INPUT VOLTAGE

These parameters keep coming one by one along with relevant LED indication at left window set. In right LED window, we see power status related information. Out of these parameters, if we do not want to see some parameters, then we can program it for NO. This we shall see in programming part of this manual

LED INDICATIONS:

In the right display window panel, in the last, there is mains indicator. It represents relay or contactor for output voltage. With green light, it means, output relay is ON and red light means, output relay is OFF. And when it is blinking that means relay is about to turn ON and it is in tdr time. Apart from this, adjacent to this there is limit indicator. Also there are fault indicators for Low cut off, High Cut off, Overload cutoff, frequency cut off, reverse phase cut off. Then there is indicator for Auto mode and Manual mode individually for every phase. Red LED indicate, it is in auto mode and green color LED indicates, it is in Manual Mode.

There are fault indicators LED.

- LOW CUT OFF
- HIGH CUT OFF
- OVERLOAD CUT OFF
- FREQUENCY CUT OFF
- REVERSE PHASE CUT OFF

And then there is indicator for Auto Mode above Auto push button and there is Manual Mode indicator above Manual push button. Apart from this there is indicator for Low Limit and one indicator for High Limit.

PUSH BUTTONS:

There are seven push buttons. As mentioned, these push buttons are

- SET / ESC
- DOWN
- UP
- ENTER
- AUTO / MANUAL – R PHASE
- BUCK
- BOOST.
- AUTO / MANUAL – Y PHASE
- BUCK
- BOOST.
- AUTO / MANUAL – B PHASE
- BUCK
- BOOST.

Output Set Voltage:

To see the set output voltage, press the **SET** button. Now the display shows SET VOLT and right window shows set voltage. For changing the set voltage, press **UP** or **DOWN** button to reach at desired set voltage.

If we press SET button again then it comes out of set voltage mode or otherwise, if we do not press any button for some time, then it automatically comes out of it. Or otherwise also enter button can be pressed.

After having gone through front panel layout, let us see it's operation.

In normal operation there are two modes in which this unit can be operated for every individual phase.

AUTO MODE:

This is mode which normally is used. In this mode desired output voltage can be set and then the card gives command to motor to move so as to achieve the desired output voltage.

MANUAL MODE:

This mode can be done individually for every phase. This mode can be entered in by pressing the **AUTO / MANUAL** button and keeping it pressed continuously for three seconds. In

this way it detects a genuine press for **MANUAL** button. This way, it toggles from AUTO to MANUAL or MANUAL TO AUTO mode.

In this mode the desired output voltage is achieved by pressing **BUCK** or **BOOST** key below the manual button. Here it does not correct the output voltage when there is fluctuation in the incoming power supply.

2. Programming Mode

To enter in programming, press **SET** for longer duration approx. three seconds. Display shows **Lo Cut**. Now it has entered in programming mode.

There are different settings which can be set in this mode. And the parameters can be changed by pressing enter button. With the help of **UP** and **DOWN** button parameter values can be changed. To come out of programming button, just press **SET** button and it escapes out of programming mode. Here left display shows the parameter and right display shows the value set. These settings are:

• Low voltage cut off set	Display shows-	Lo Cut
• High voltage cut off set	Display shows-	Hi Cut
• Hysteresis	Display shows-	SET HYS
• CT Ratio	Display shows-	SET Ctr (When cur. is used)
• Overload Current	Display shows-	SET Cur
• Time delay relay set (TDR)	Display shows-	Del ON
• Lo Cut Off Delay	Display shows-	Lo Off
• Hi Cut Off Delay	Display shows-	Hi Off
• Overload Cut Off Delay	Display shows-	Cur Off
• Reverse Phase Requirement	Display shows-	Rev Phase YES
• FRE Lo Cut Off	Display shows-	Fre Lo
• FRE Hi Cut Off	Display shows-	Fre Hi
• Buzzer ON/OFF	Display shows-	Buj YES
• Output Phase to Phase	Display shows-	OUT P2P YES
• Input Phase to Phase	Display shows-	IN P2P YES
• Input Phase Voltage	Display shows-	IN 1Ph YES
• Current	Display shows-	Cur YES
• Frequency	Display shows-	FRE YES
• CLOCK	Display shows-	CLOC - YES

Low Voltage cut off:

This value can be changed from 100V to 220V or as required. Whenever there is any fluctuation present in the power supply to the extent that output voltage has turned out to be below this set voltage range then as per timings programmed, relay switches OFF.

High Voltage cut off:

This value can be changed from 220V to 280V or as required. Whenever there is any fluctuation present in the power supply to the extent that output voltage has turned out to be above this set voltage range then relay switches OFF.

Hysteresis:

Hysteresis can be programmed from 1V to 15V or as required. It is used to minimize hunting of motor when there is a lot of fluctuation in the power supply. In this case we allow a min. and max. band for the servo motor to operate. For example if hysteresis is set at 4V and auto set voltage is 225V then servo motor will not take action between 221V—229V. In this way hunting of motor is avoided at places where there is lot of voltage fluctuations.

C T Ratio:

There are two models available for current 100A and 5A.

For 100A, this Option of CT Ratio will not appear. Through this CT straight away 100 A current can be passed through. There is no requirement of any other external CT. If current requirement is more than 100A, then other option is used which is 5A. In this case, already 5A CT is already there and an external CT is required as per current requirement. You must select a CT in such a way that it has a ratio of 5 Amp current in secondary at full load of CT's Primary Current. Primary approximately 1.5 times of full load current. For example for

150A full load current CT 200/5 - Ratio 30
200A full load current CT 200/5 - Ratio 40
500A full load current CT 500/5 - Ratio 100

Now the ratio of this CT is to be fed to the controller. Now in CT program this ratio as mentioned above. For example, if CT is 100/5, ratio to be programmed 20.

Set Current:

This is a current that sets the maximum current which can be drawn from the system. In this setting this value is fed here. Whatever is the cut off current, program it straightway here. For example if a CT of 100A/5A is used then it has a CT ratio of 20. And required set current is say 70A. Then value fed in CUR will be 70. As an example if a CT of 500A/5A is used then it has a CT ratio of 100. And required set current is say 380 A. Then Cur value fed will be 380

ON Delay Timer Relay:

This value can be programmed from 1 sec to 180 sec or as required. Whenever the output voltage goes beyond the low and high voltage range or load current exceeds the set limit or some other conditions, the relay switches off. When the output voltage has reached in this range and now this much time (which has been programmed in ON delay timer) is introduced and after this the relay turns ON.

Low Cut OFF Delay:

This value can be programmed as seconds or as required. Whenever the output voltage goes below the low cut off voltage some time may be required before the relay switches off. This gives some time so that voltage may be normal before this time. For example if motor starts then voltage dips and recovers soon as the motor picks up speed or servo regulates the voltage. So relay turns OFF, if voltage continuously remains below this voltage for this much time and then turns OFF. And at cut off also there is an indication of this cut off at the panel.

High Cut OFF Delay:

This value can be programmed as seconds or as required. Whenever the output voltage goes above the high cut off voltage some time may be required before the relay switches off. This gives some time so that voltage may be normal before this time. For example if motor stops, then voltage may rise and recovers soon as servo regulates the voltage. So relay turns OFF, if voltage continuously remains above this voltage for this much time and then turns OFF. And at cut off also there is an indication of this cut off at the panel.

Overload Cut OFF Delay:

This value can be programmed as seconds or as required. Whenever the current goes above the set current, some time may be required before the relay switches off. This gives some time so that current may be normal before this time. For example if motor starts, then there is surge in current as high in rush current. And this current comes down as motor picks up the speed. So relay turns OFF, if current continuously remains above this set current for this much time and then turns OFF. And at cut off also there is an indication of this cut off at the panel.

Reverse Phase Option → YES or NO :

Once entered in this setting it Reverse phase **YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then reverse phase protection is ON and if NO is selected then this protection is OFF. And at cut off also there is an indication of this cut off at the panel.

Low Frequency Cut OFF:

In this setting, lower side of allowed limit of frequency is set. If frequency goes below this set limit, then frequency cut off happens. And at cut off also there is an indication of this cut off at the panel.

High Frequency Cut OFF:

In this setting, higher side of allowed limit of frequency is set. If frequency goes above this set limit, then frequency cut off happens. And at cut off also there is an indication of this cut off at the panel.

Buzzer Option → YES or NO :

Once entered in this setting it shows buj **YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then buzzer is ON and if NO is selected then buzzer is mute.

Display Option → Output Voltage Phase to Phase:

Once entered in this setting it displays **Out P2P YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Output Voltage phase to phase** otherwise it will not.

Display Option →Input Voltage Phase to Phase:

Once entered in this setting it displays **In P2P YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Input Voltage** otherwise it will not.

Display Option →Input Voltage:

In the same way again it displays **In 1Ph YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Input Voltage** otherwise it will not.

Display Option →Current:

In the same way again it displays **Cur YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Current** otherwise it will not.

Display Option →Frequency:

In the same way again it displays **Fre YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Frequency** otherwise it will not.

Display Option →Clock:

In the same way again it displays **Cloc YES** and it has two options: a) Yes b) No which can be done by pressing **UP & DOWN** buttons. If selected Yes then it will show **Clock** otherwise it will not. This option is available in data logging model only.

Note:

- At any point of time in Programming mode, by pressing SET button, this mode can be exited to Normal mode.
- It has an auto exit function that means if no key is pressed for some time in Programming Mode then it will come out of it automatically.
- If panel is turned OFF in between programming, then values programmed away not save.

3. Calibration Mode

Some times, we see that voltage readings displayed at panel does not match with the readings displayed by our standard meters. And there is a mismatch. So here this calibration can be done which is software based.

For this, press UP key button in Y Phase window for three seconds and it enters in calibration mode. So in display, it shows Calibration. And then it shows OUT R. So here output voltage of R phase can be calibrated with the help of UP/DOWN button. We make it match with standard meter. Again press the Enter button, it shows OUT Y. Here in a similar way calibrate output voltage of Y phase with the help of UP/DOWN button. In the same way calibrate rest of parameters as Output B Phase / Input R Phase / Input Y Phase/ Input B Phase / Current R Phase / Current Y Phase / Current B Phase.

Note:

- At any point of time in Programming mode, by pressing SET button, this mode can be exited to Normal mode.
- It has an auto exit function that means if no key is pressed for some time in Calibration Mode then it will come out of it automatically.
- If panel is turned OFF in between calibration, then values programmed may not save.

Disclaimer:

Features / Specifications mentioned above are for tentative indications and explanations. However research and design is a continuous process which keep evolving and changing over a period of time or it may have already changed. It may change as per customized requirements. And there could be some differences between model to model. Users of advised to go through their own systems checkup and settings.

4. Wiring Diagram

