

SINGLE-PHASE ELECTRONIC VOLTAGE STABILIZER

SEM 05-12



INTRODUCTION

1. You should read this manual to be able to use your regulator for a longer time.
2. Please keep the user's manual in an easily accessible place for future reference.
3. Please apply all instructions one by one.
4. Do not use your device without grounding.
5. Please do not make any operation you are unsure about, otherwise your device may get damaged.

ATTENTION

1. Never open the cover of device. There are no parts that the user may interfere within the device.
2. You should ensure that no foreign objects shall enter into the ventilation holes and these holes should not be blocked.
3. The regulator should not be used over its power.
4. Cables to be connected to the regulator should be chosen at a size mentioned in the manual.
5. The temperature and moisture at the place where the device will be used must be at a suitable value given at "Technical Specifications" section.

INDEX

1.	INTRODUCTION OF STABILIZER	3
2.	PHYSICAL PROPERTIES OF THE STABILIZER	3
3.	TECHNICAL SPECIFICATIONS OF STABILIZER	4
4.	BLOCK DIAGRAM	5
5.	PROTECTION UNITS	5
6.	INSTALLING STABILIZER	6
7.	LCD DISPLAY AND LCD DISPLAY MENUS	10
8.	DETECTING AND ELIMINATING MALFUNCTION	14
9.	PERIODICAL MAINTENANCE	14
10.	WARRANTY	15

1. INTRODUCTION OF STABILIZER

These are electronic voltage regulators produced to prevent the appliances in residences, workplaces, factories, etc. from getting damage due to voltage drops or voltage rises encountered in mains voltage for various reasons and get maximum efficiency from these appliances.

SEM Static Voltage Stabilizers are produced of high quality semi-contactor materials that can operate with high efficiency under extreme and fast voltage changing conditions. Thus, it has extremely high speed response (500 VAC/sec.) SEM Static Voltage Stabilizers, controls via microprocessor controlled cards and regulates via thyristors. That ensures very high regulation speed compare to other type stabilizers. It does not contain any moving part, maintenance is not needed and has long-life period. It works reliably at extremely dusty, vibrationly and humid environments. There is no noise while operation. It has small, light and modular structure.

When the device needs to make a correction, since it makes correction at every zero pass of the main supply sign, it will not even cause an interruption during correction times. Since there are no deformations in the output sign, it demonstrates a full performance in the operation of all electronic devices.

SEM Series Static Regulators are designed and produced in a manner to easily feed non-linear loads and devices with motors needing a high start current. Thus, operation of devices that attract momentary or peak current is ensured free of problems.

It has a simple and an understandable monitor.

Its assembly and maintenance is easy thanks to its modular structure.

SEM Static Voltage Stabilizer is a high technologic solution for operation of your sensitive devices without any problem wherever the main supply is not trusted. Produced of high quality semi-conductor materials, that can operate with high efficiency under extreme& fast voltage changing conditions.

2. PHYSICAL PROPERTIES OF THE STABILIZER

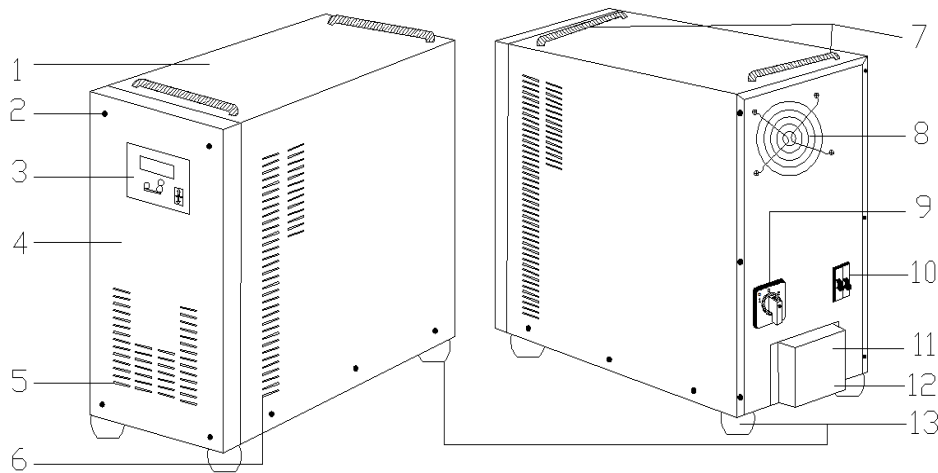


Figure-1: Physical Properties

1. Upper and Side Cover
2. Cover Screws
3. Front Panel
4. Front Cover
5. Front Cooling Holes
6. Side Cooling Holes
7. Carrying Handle (not available for 2-3Kva)
8. Cooling Fans
9. Manuel By-Pass Switch (not available for 2-3Kva)
10. Input Thermal Magnetic Switch
11. Input Connection Terminal
12. Output Connection Terminal
13. Regulator Legs

3. TECHNICAL SPECIFICATIONS OF STABILIZER

Nominal power	Models available from 5 to 40KVA
Power factor	1.0
Input voltage	230V c.a. single phase (1P + N)
Input voltage variation in standard versions	from 172V to 265V (-25%+15%)
Optional versions on request	input range $\pm 15\%$, $-35\%+15\%$, $-50\%+15\%$
Input frequency	50/60Hz $\pm 5\%$
Output voltage	230V c.a. single phase
Current available in output	based on power delivered, see table
Output voltage accuracy	Standard $\pm 2\%$ (o $\pm 3\%$ o $\pm 1\%$ based on input range) Accuracy option available based on input range $\pm 1\%$ o $\pm 0.5\%$
Adjustment	thyristors
Adjustment speed	500V / sec. (2/1000 sec/V)
Efficiency at full load	> 97%
Max harmonic distortion	3%
Permissible load variation	from 0 to 100%
Overload permitted	3' at 110-125% of load 10" at 126-150% of load 0.2" over 151% of load
Environment Temperature	from -10°C to +40°C
Relative humidity	up to 90% non-condensing
Altitude	up to 2000m above sea level without power reduction
Ventilation	Forced air (rear fan)
Noise	< 50dB (A) at 1m. 100% of load
Color	RAL7035

Protections:

Automatic shutdown with output contactor for high/low voltage or overload
Automatic shutdown for overtemperature, short circuit, thyristor failure
Input circuit breaker

Display indications:

Input voltage
Output voltage
Output frequency
Load percentage
Overtemperature warning
Out of range voltage warning
Information on technical service
Failure event recording

Code	Nominal power	rated current	Dimension W x D x H cm	Weight KG.
E.SEM05	5KVA	22 A	20x41x37	25
E.SEM06	7.5KVA	32 A	27x45x46	30
E.SEM07	10KVA	43 A	27x45x46	40
E.SEM08	15KVA	65 A	27x45x46	55
E.SEM09	20KVA	87 A	27x45x46	70
E.SEM11	30KVA	130 A	31x52x52 *	95
E.SEM12	40KVA	174 A	31x52x52 *	120

* dimensions may vary based on component availability and costs at the time of production

4. BLOCK DIAGRAM

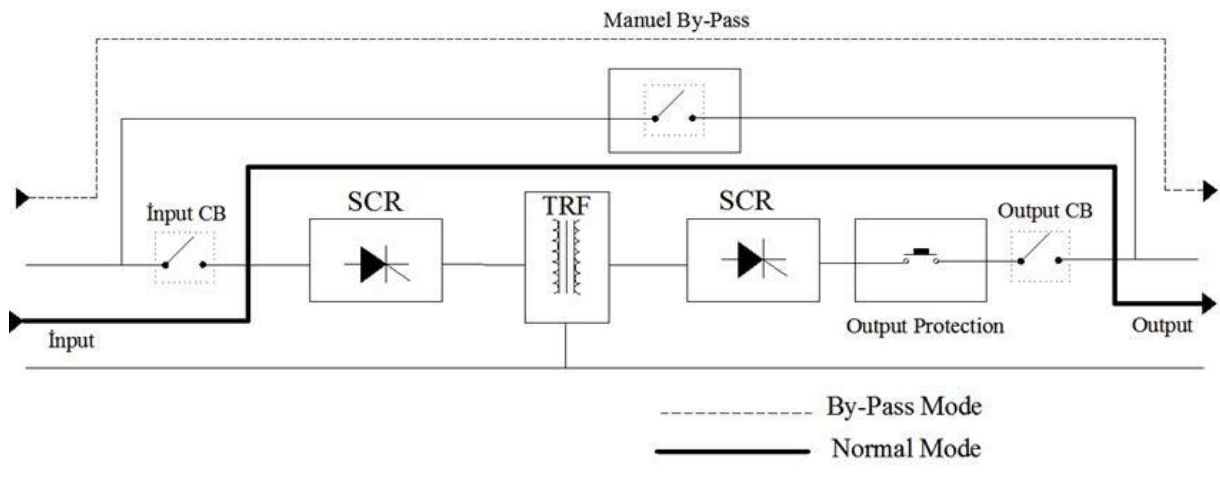


Figure-2: Stabilizer Block Diagram

5. PROTECTION UNITS

Output Voltage Protection: When Output Voltage goes beyond the limits of “OUTPUT PROTECTION RANGE” defined in TECHNICAL SPECIFICATIONS, it interrupts the output. Either “OPL FAULT” or “OPH FAULT” will appear on the front panel. To turn off the stabilizer through output voltage protection, the output voltage should remain out of “OUTPUT PROTECTION RANGE” for 1-5 seconds. The protection is not activated in case of transient drops and rises. After the output voltage returns to the normal value, the stabilizer allows 30 seconds and then reactivates automatically. The values of output protection values and on/off durations will be adjusted as fixed in manufacturing process.

Input Voltage Protection: When Input Voltage goes beyond the limits of “INPUT PROTECTION RANGE” defined in TECHNICAL SPECIFICATIONS, the regulator interrupts the output. Either “INZ FAULT”, “INL FAULT” or “INH FAULT” will appear on the front panel. To turn off the stabilizer through input voltage protection, the input voltage should remain out of “INPUT PROTECTION RANGE” for 1-5 seconds. The protection is not activated in case of transient drops and rises. After the input voltage returns to the normal value, the stabilizer allows 30 seconds and then reactivates automatically. The values of input protection values and on/off durations will be adjusted as fixed in manufacturing process.

Current Protection: When current over device capacity is drawn from the stabilizer, the output contactor will be released by means of electronic control boards and power supplied to the loads will be interrupted. In case of overload, the warning of “OVERLOAD” will appear on Front panel.

The duration of interruption with respect to the status of overload is provided below:

- In case of overload within the range of 101% - 125%, 3 minutes
- In case of overload within the range of 126% - 150%, 10 seconds
- In case of overload over 150%, 0.2 seconds

At the end of standby duration, the stabilizer interrupts the output. Either “OVL FAULT” or “SCF FAULT” will appear on the front panel. The stabilizer allows 30 seconds and then reactivates. As long as overload continues, intervention of the user is required as the on/off loops will continue.

Fuse Protection: In case over-current is drawn from the stabilizer, the output is short-circuited or electronic protection remains unsatisfactory, (optional) thermal magnetic fuses are available in input and output (optional) of the stabilizer to protect the stabilizer.

Overheat Protection: In case the temperature inside the cabinet of the stabilizer goes far beyond or Thyristor module assembly overheats, overheat protection is available to prevent the stabilizer from getting damaged. Overheat protection operates within two gradual. In cases where ambient temperature is low and load is slight, cooling fans are not activated as the stabilizer is cooled via natural air circulation. In case the interior temperature of the stabilizer exceeds 50 °C, cooling fans are activated and ensures that the stabilizer is cooled. In case interior temperature of the cabinet exceeds 80 °C for any reason such as high ambient temperature, overload of the stabilizer, malfunction of fans, etc., the stabilizer will turn off upon activation of overheat protection. “OVT FAULT” warning will appear on the front panel. Once temperature inside the cabinet of the stabilizer returns to the normal values, the stabilizer is re-operated automatically.

Thyristor Malfunction Protection: In case the switching components (thyristors) maintaining the regulation of output voltage fail, the operation of the stabilizer should be avoided as output voltage will be an undesired value. For this, Thyristor malfunctions will be detected through specific circuits in control boards, and the stabilizer will be deactivated in case of malfunction in any Thyristor. “CZF FAULT” warning will appear on the front panel. In case of malfunction, Thyristors will always be monitored; in case the malfunction is eliminated, the stabilizer reactivates automatically; in case the malfunction is not fixed by itself, the intervention of technical service is needed.

6. INSTALLING STABILIZER

A. UNPACKING

1. Before using the stabilizer that package of which is damaged or not available, call technical service.
2. The package of the stabilizer should be opened carefully and necessary precautions should be taken to avoid damage to the device in it.
3. After opening the package, whether the stabilizer was damaged during transportation should be inspected. To do this, switch, MCB fuses and etc. on the stabilizer will be inspected, and broken or removed parts will be observed. Whether the monitor on the front panel is damaged will be checked.
4. To ensure that electrical connections are not damaged, the stabilizer will be checked physically.
5. In case any slam or thud is released inside the stabilizer, do not operate the device considering the possibility of damage. Contact the technical service.
6. Before installing the stabilizer, always contact authorized service or have the installation of the device carried out by qualified technical personnel.

B. TRANSPORTING THE STABILIZER

1. When transporting the stabilizer, exactly follow the written warnings and markings on the package.
2. The stabilizer should be moved using a conveying pallet appropriate for the weight indicated on the package.
3. When moving the stabilizer, avoid crashing, dropping and shocks. When transporting and moving, the stabilizer should be carried accordingly, avoiding exposure to water, dust and hazardous chemicals.

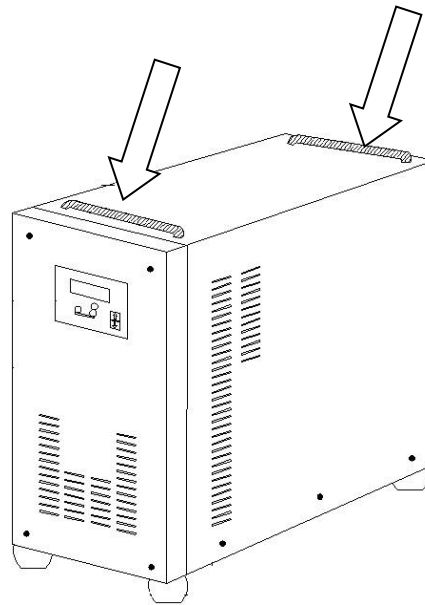


Figure-a

- a-) When you open the package of the unit, please check the unit whether there is any damaging points or not on the unit.
- b-) You can lift the unit with the carrying handle that is shown in figure-a , .
- c-) Don't try to lift the units from another places of the unit ,if you carry the units apart from the places that shown in figure-a can be damaged to the units.
- d-) Please put the unit will be perpendicular to the ground slowly. If you put the units to the ground fastly and hardly, the unit can be damaged
- e-) The place must be strong as much as lifting the unit weight.

C. PLACE SELECTION

- 1- For smooth operation of cooling system of the stabilizer, the room where the stabilizer is installed should be ventilated.
- 2- Make sure to hold the stabilizer at least 25 cm apart from the nearest object.
- 3- Note that the ambient where the stabilizer is present has convenient environment mentioned at "TECHNICAL SPECIFICATIONS"
- 4- Select the places that are neither extremely dusty nor extremely damp and will not lead to corrosion for the stabilizer.
- 5- Do not use the stabilizer in the places where inflammable and explosive materials are present.
- 6- Choose places where no liquid is possible to splash or drip on the stabilizer.

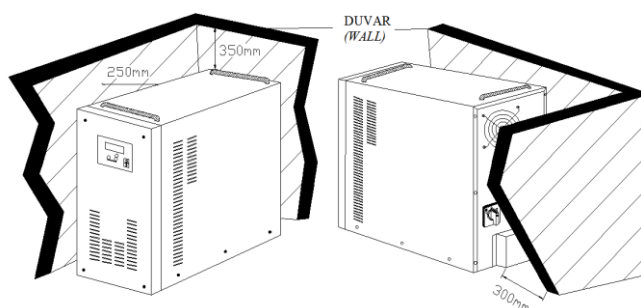


Figure-3: Place Selection

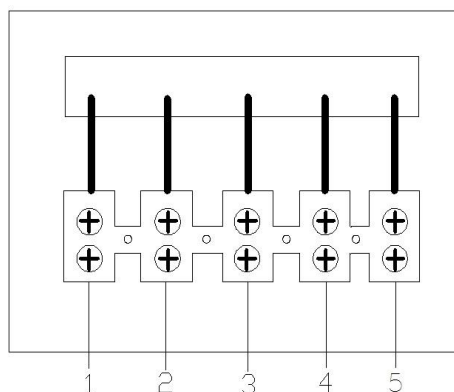


Figure-4: Input - Output Electrical wiring diagram

1. Input Phase
2. Input Neutral
3. Output Phase
4. Output Neutral
5. Earth

ELECTRICAL CONNECTION

To connect the stabilizer to electrical installation of the building, an easy-accessible Input circuit breaker device should be available in the electrical installation of the building. The values of this circuit breaker device are provided in the following table. Before the stabilizer is activated, this circuit breaker device should be disabled.

A circuit breaker device can be deployed between the stabilizer output and loads. The values of this circuit breaker device are provided in the following table. Before the stabilizer is activated, this circuit breaker device should be disabled.

MODEL	POWER	INPUT	OUTPUT	INPUT WIRING	OUTPUT WIRING	NEUTRAL WIRING	EARTH WIRING
SEM05	5	32	25	10	8	10	10
SEM06	7,5	50	32	16	10	16	16
SEM07	10	63	50	21	16	21	21
SEM08	15	100	80	35	25	35	35
SEM09	20	125	100	45	35	45	45
SEM11	30	180	125	60	45	60	60
SEM12	40						

COMPENSATION AND STABILIZER

Below stated notes about COMPENSATION BOARDS should be paid attention to during the stabilizer connection is being made.

1. During the engagement of the Stabilizer, it must definitely be checked whether if there is a compensation board within the electrical system of the Stabilizer or not. If there is a compensation board, below stated technical values related to the compensation board should be learned from the manufacturer or implementing company.
 - a. Total power of the compensation board.
 - b. The power of the biggest capacitor bank that is engaged in one level at the compensation board.
 - c. The highest capacitor power that can be engaged at once – at the same time by the compensation board.
 - d. Information about at which part of the installation does the compensation board is connected.
 - e. Maximum reactive power of the customer if it is measured. In the condition that all the loads are working, the total capacitor power that is engaged by compensation board.
2. The Stabilizers can be connected in two different ways according to the position of the compensation board.
 - a. The Stabilizers can be connected to the input of the system (Figure-a). In this case the Compensation board will be connected to the output of the Stabilizers. Before activating the system, below stated point should be paid attention to.

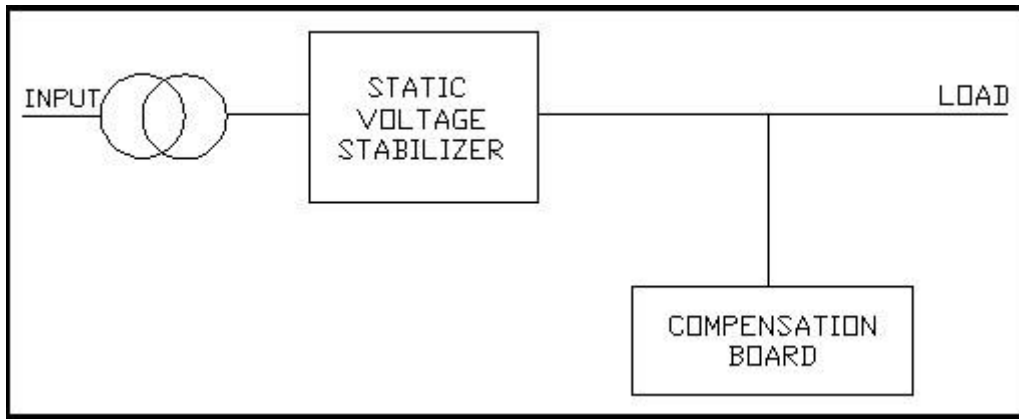


Figure-a: Connection of the Stabilizers to the Compensation Board beforehand

- I. While the capacitor groups at the compensation system are being engaged, they pull INRUSH current which is increasing in direct proportion to their total power. When these currents are added to the INRUSH currents that are pulled by the loads, they pose a risk for the THYRISTOR units that are used in static voltage stabilizers.
- II. Capacitor groups at the compensation board should be checked in order the thyristor units not to get damaged. At the compensation board; the biggest capacitor power should not pass the 10-15 % of the Stabilizers power. (Ex: If the Stabilizers is 100 KVA, the highest capacitor power that could be engaged at once-at the same time in the compensation system must be 10-15 KVAR.) If the capacitor power that is engaged at the same time is high, it must be provided that the compensation board engages the capacitor groups gradually or the Stabilizers that is at the upper stage power should be preferred. Otherwise the Stabilizers can get harmed.
- III. The Stabilizers units are composed of Transformers, condensers and thyristors that possess different values and different properties. These materials have reactive power consumptions or reactive effects that change according to their properties. Total reactive effect of the Stabilizers varies according to the input voltage value, output voltage value, load amount and to the reactive properties of the loads. Total reactive effect of the Stabilizers is guessed to be between the ranges of 1 % - 5 %. However, since this effect appears ahead of the compensation system, it can not be measured and can not be corrected by compensation system.
- IV. Since in this connection structure active power will continuously be pulled from the Stabilizers, the Stabilizers will work at the highest performance/efficiency. As less reactive power is pulled, so the efficiency will be higher.

b. The Stabilizers can be connected to compensation board forward (Figure-b). In this case reactive power will be pulled from the Stabilizers. Before activating the system, points stated below should be paid attention to.

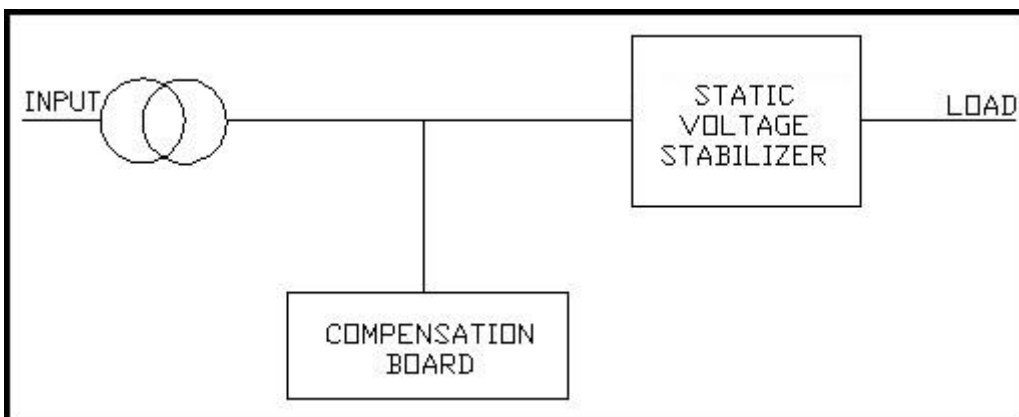


Figure-b: Connection of the Stabilizers to Compensation Board forward.

- I. Since there will not be any reactive compensation unit between the Stabilizers and the loads, all of the reactive power will be pulled through the Stabilizers.
- II. While the power detection is being made for the Stabilizers, total reactive power of the system should be measured and it should be added to the active power. (Ex: If the total active power of the customer is 100 KVA and the reactive proportion is 30 % when the compensation board is disengaged, the lowest static voltage stabilizer that can be advised for this customer should be 130 KVA.)
- III. In condition that the Stabilizers is directly connected to the loads, the pulled reactive power creates additional losses. Therefore, at the systems where the Stabilizers is connected compensation board forward, total loss of the Stabilizers will be much higher than the catalogue values.

- IV. Since the % load indicators of the Stabilizers or the standard clip ampere meter only measure the active power, over warm-up will be monitored although low load is measured at the Stabilizers. The reason of the warm-up is the reactive power consumption.

In case that the energy efficiency of the customer is important, this structure, at which the Stabilizers is connected compensation board forward, decreases the efficiency, so it should not be preferred.

D. OPERATING THE STABILIZER

1. For the stabilizer, an easy-accessible Input circuit breaker should be available in the electrical installation of the building. This circuit breaker should be thermal magnetic fuse with the appropriate value. Before commissioning the device, disconnect input voltage using this circuit breaker.
2. An Output Circuit Breaker is recommended to be settled between the stabilizer and the loads to be connected to stabilizer. This circuit breaker should be thermal magnetic fuse with the appropriate value. Before commissioning the device, turn off this output circuit breaker.
3. Before commissioning the stabilizer, it should be checked whether the installation is convenient. Input and output cables should have an appropriate capacity, and neutral and grounding connections should be made accordingly. Measure Phase-Neutral value of input voltage and Neutral-Grounding voltage via a multi-meter. Check whether any short-circuit or leakage occurs.
4. There is earthed plug of appropriate value at the input of Stabilizer. Put that plug in to a appropriated socket at your electrical network. Input Phase-Neutral connection should be done properly to obtain a reliable operation of stabilizer. You may check that as following; put in input plug to main supply's socket. Pull down input fuse of stabilizer. Check by an AVO meter if there is any voltage between phase/ neutral and neutral/earth terminals of stabilizer's output plug. If there is any voltage at that terminals, reverse the input plug. After putting in the input plug in right position, switch on the input fuse of stabilizer. Operate the stabilizer.
5. When the device is energized, LCD Display shall operate. Input voltages, Output voltages, status information, fault information, etc. of the device shall be checked through LCD Display. These information and values are described in menu of "LCD DISPLAY" in detail.
6. Input-Output voltage values viewed on LCD Display of the stabilizer shall be the same as label values on the device and the values indicated on section of "TECHNICAL SPECIFICATIONS". If the values read on LCD Display are different than the label values or the values indicated in section of "TECHNICAL SPECIFICATIONS", turn off the device and contact technical service.
7. When the stabilizer is operated for the first time, the light "FAULT" on LCD panel shall come on. If input voltage is normal, light "INPUT" shall come on. If values of output voltage are normal and in case of no error warning on the stabilizer, light "OUTPUT" shall come on after allowing approximately 30 seconds and the output shall be energized.
8. Measure the voltage values in Output plugs via AC voltage measuring position of a multi-meter. Check whether the measured value is the same as the values viewed on LCD display. In case of mismatch between the measure values and viewed values, contact technical service.
If the measure values are normal, put in the loads' plug to output sockets of stabilizer.
Check whether the phase/neutral position of plugs
9. To avoid an error in output cable fittings or in load connections from damaging the stabilizer, it is recommended to operate the loads via mains supply. Put in loads's plugs to mains supply socket. Operate your load. (MANUEL-BYPASS feature is not existing at that models.)
If no fuse in the stabilizer or distribution fittings has blown and the loads are operating in normal condition, it means that no problem exists on output cable fittings. Deactivate the loads, put loads' plugs in to stabilizer's output socket.
10. After retesting that output voltage values of the stabilizer are correct, energize the connected loads by turning on Output circuit breaker. The residual loads are supplied by safe energy provided by the stabilizer.
11. After the loads are energized, check the values of "LOAD %: XXX" in menu 2 on LCD panel. These values indicate the power (%) drawn from stabilizer. This value must be below 100%. If the power drawn from stabilizer is above 100%, it means that the stabilizer is overloaded. After a while, the stabilizer will be deactivated releasing warning of "OVERLOAD". If the power drawn is above 100%, turn off the stabilizer, split the redundant loads from output of the stabilizer, and re-perform the tests above.
12. Estimate the power drawn from stabilizer by measuring the actual current value drawn from the stabilizer using AC current measuring position of a multi-meter. Check whether the measured value is the same as the value viewed on LCD Display. In case of mismatch between the measure values and viewed values, contact technical service.
13. In case of no fault warning on LCD display of the stabilizer, the commissioning operation of the device has been completed.
14. Check safe operation conditions and environment conditions of the device. Recheck the connection cables. Close the covers of the device.

E. TURNING STABILIZER OFF:

1. For emergency power-off, turn off the Input circuit breaker or Input fuse of the stabilizer.
2. In case of no emergency cases, turn off the devices connected to the stabilizer before turning off the stabilizer. When turning off the stabilizer it's output will be de-energized.
3. Once you turn off the stabilizer, all information on LCD Display will disappear. If you turn off the stabilizer due to a fault or if you are required to inform technical service personnel, record all information on LCD Display before turning off the stabilizer.
4. To operate the devices connected to the stabilizer via mains supply, put the loads' plugs in to main supply sockets. After that, the loads are not under protection of stabilizer.
5. Turn off the input fuse of the stabilizer. Your stabilizer is now turned off.

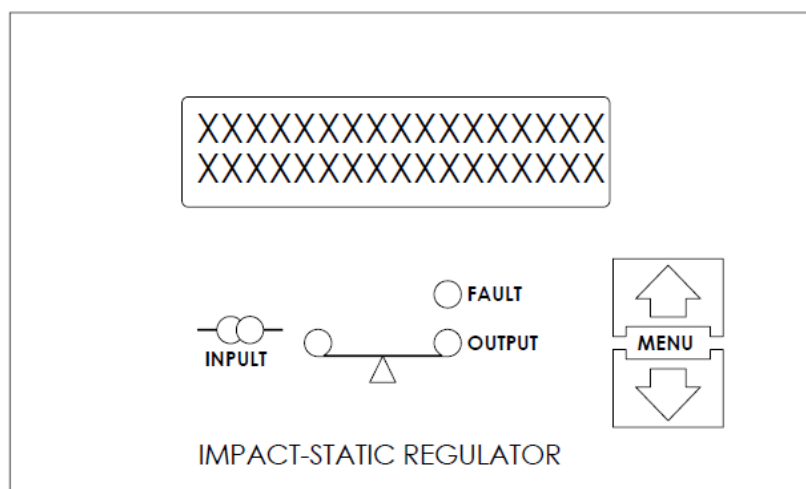
6. Even after turning off the stabilizer, connection terminals and fuses in it will still have high voltage in hazardous levels. Therefore, individuals except authorized personnel shall never open the covers of the device and split the connections of input, output, etc.
7. In case of no problem with the stabilizer, follow the instructions in the section of "OPERATING" if you want to turn it on again.

CAUTION

Always make and check the earth connection. Never operate the stabilizer without earth connection. Earth-Neutral voltage should be less than 3 Volts.

7. LCD DISPLAY AND LCD DISPLAY MENUS

1. LCD Display



- 1st row is the status row. It gives information about operation status.
 - In second row of LCD display, "INPUT-V", "OUTPUT-V", "LOAD %", "FREQ.", "TEMP.", "ERROR" information is available. You can access this information via CONTROL buttons.
 - INPUT LED: This LED lights up in case input voltage is available and within tolerance limits. (green)
 - FAULT LED: This LED lights up in case of any warning and failure. (red)
 - OUTPUT LED: It lights up in case output voltage is within normal limits. (green)
- Use the buttons to move through the menus.

Figure-5: LCD Display

2. LCD DISPLAY MENUS:

MENU view-1:

S	V	S	:	O	N							M	:	1	
O	u	t	p	u	t	:		X	X	X		V			

First Line: The first row is the status row. "SVS ON" indicates that the stabilizer operates normally. When there is any "FAILURE" or "WARNING" on stabilizer, it is shown at that row. This menu view is the default screen. When the stabilizer runs, Menu view-1 will appear on the screen as default screen.

Second Line: OUTPUT: Indicates the voltage value between Output and Neutral.

MENU view-2:

S	V	S	:	O	N							M	:	2	
I	n	p	u	t	:			X	X	X		V			

First Line: The first row is the status row. "SVS ON" indicates that the stabilizer operates normally. When there is any "FAILURE" or "WARNING" on stabilizer, it is shown at that row.

Second Line INPUT: Indicates the voltage value between Input and Neutral

MENU view-3:

S	V	S	:	O	N							M	:	3	
L	o	a	d				:	%		X	X	X			

First Line : The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line: LOAD %: It gives the value of the power drawn from output in percent

MENU view-4:

S	V	S	:	O	N							M	:	4	
F	r	e	q	.			:		X	X	X		H	z	

First Line: The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line: FREQ: Indicates the frequency of the input voltage

MENU view-5:

S	V	S	:	O	N							M	:	5	
T	e	m	p	.			:		N	o	r	m	a	l	

First Line: The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line: TEMP: Indicates whether the interior temperature of the stabilizer is normal. If TEMP is “NORMAL”, then it means that the temperature is lower than 70°C. In case “OVT” appears, it means that the temperature is higher than 70°C and the stabilizer is switched off due to overheat.

MENU view-6:

S	V	S	:	O	N							M	:	6	
E	r	r	o	r		M	e	n	u		>	>			

First Line: The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line: Error Menu: This menu is where you can enter the error codes list. To enter the error codes list, press down button for 5 seconds.

a) **Sub Menu view-1:**

E	r	r	o	r		M	e	n	u		>	>			
E	r	r	o	r		1	:		

First Line: The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line: Error codes list: The first error code you see with number 1 is the latest error code. To see other error codes press down or up button.

Clear Error Records: Press down button for 5 second to go back to previous screen. When you are at previous screen press and hold down button. Dont release the button, It will enter to error codes list again, keep holding the button for 5 seconds more to clear the error codes.

MENUview-7:

S	V	S	:	O	N							M	:	7	
S	e	t		M	e	n	u		>	>					

First Line: The first row is the status row. “SVS ON” indicates that the stabilizer operates normally. When there is any “FAILURE” or “WARNING” on stabilizer, it is shown at that row.

Second Line Set Menu: This screen is where you can enter the output voltage and tolerance settings menu. To enter these settings press and hold the down button for 5 seconds.

!!!Do not change if it is not necessary!!!

a) **Sub Menu view-1:**

S	e	t		M	e	n	u		>	>		M	:	7	
>		O	u	t		V	a	l	.	:	2	2	0		v

Output Setting: On this screen you can change the output voltage level. To change the output voltage, press and hold down button for 5 seconds. The arrow sign (>) will return to equal sign (=). Press up and down arrows to change the setting. After you have brought the setting to desired level, press and hold the down arrow for 5 seconds to change the equal sign (=) to arrow sign (>). The setting is not saved yet. To save the setting refer to C) Sub menu view-4 part.

b) **Sub Menu view-2:**

S	e	t		M	e	n	u		>	>		M	:	7	
>		O	f	f	s	e	t		.	:			7		v

Output Voltage Tolerance: Press up arrow to come to this screen. On this screen you can change the output voltage tolerance. To change this setting, press and hold the down arrow button for 5 seconds. The arrow sign (>) will return to equal sign (=). Press up and down arrows to change the setting. After you have brought the setting to desired level, press and hold the down arrow for 5 seconds to change the equal sign (=) to arrow sign (>). The setting is not saved yet. To save the setting refer to C) Sub menu view-4 part.

a) **Sub Menu view-3:**

S	e	t		M	e	n	u		>	>		M	:	7	
>		S	e	t		F	r	e	q	:	5	0		H	z

On this screen you can change the working frequency of the device. Set this value to your mains voltage frequency. To change this setting, press and hold the down arrow button for 5 seconds. The arrow sign (>) will return to equal sign (=). Press up and down arrows to change the setting. After you have brought the setting to desired level, press and hold the down arrow for 5 seconds to change the equal sign (=) to arrow sign (>). The setting is not saved yet. To save the setting refer to C) Sub menu view-4 part.

CAUTION: If frequency is not set same as mains voltage frequency correctly, there can be deviations form expected output voltage values.

C) Sub Menu view-4:

S	e	t		M	e	n	u		>	>		M	:	7	
>		S	a	v	e		a	n	d		E	x	i	t	

Save and Exit: Press up arrow to come to this screen. On this screen you can save the settings which are made in previous menus. Press and hold down button for 5 seconds to save the settings. If saving is done successfully, it will be written on the screen.

LCD DISPLAY WARNING MESSAGE

Message		Explanation of Messages
Message Code	Meaning	
REGULATOR ON	REGULATOR ON	Indicates that every functions of stabilizer is normal and it operates.
REGULATOR OFF	REGULATOR OFF	Indicates that device does not operate due to a failure in the stabilizer.
OVL	OVERLOAD	If the current drawn from stabilizer is more than 100 %
OVT	OVERTEMP	Inside temperature of stabilizer is heated more than 80° C
INZ	THERE IS NOT INPUT VOLTAGE	Indicates that there is not electricity at stabilizer's input or input voltage is under 50 VAC instantly.
INL	INPUT VOLTAGE LOW	Indicates that input voltage is under than "input voltage protection range" (VAC)
INH	INPUT VOLTAGE HIGH	Indicates that input voltage is higher than "input voltage protection range" (VAC)
INPUT	INPUT VOLTAGE VALUES	Indicates input phase as Phase/Neutral AC voltage value
SCF	SHORT CIRCUIT	Indicates that output of regulator is short circuit or there is a overload conditions higher than %200 at output.
SWF	INPUT SQUARE PULSE	Indicates that there is not input square pulse on the microcontroller, there is an extreme deformity at sinus wave
OPH	OUTPUT VOLTAGE HIGH	Indicate that output voltage is higher than "Output Voltage Protection Range" (VAC)
OPL	OUTPUT VOLTAGE LOW	Indicates that output voltage is lower than "Output Voltage Protection Range" (VAC)
OPZ	OUTPUT VOLTAGE ZERO	Indicates that output voltage is zero
OUTPUT	OUTPUT VOLTAGE VALUES	Indicates output phase as Phase/Neutral AC voltage value
LOAD %	OUTPUT CURRENT	Output current is shown up with percent value
FREQUENCY	FREQ	Indicates input frequency as Hz. value.
TOC	THYRISTOR OPEN CIRCUIT	There is an open circuit on the thyristor group
CZF	THYRISTOR SHORT CIRCUIT	There is an short circuit on the thyristor group.

8. DETECTING AND ELIMINATING MALFUNCTION

MALFUNCTION		ELIMINATING MALFUNCTION
TYPE OF MALFUNCTION	POSSIBLE CAUSE	
NO OUTPUT	Either input voltage is "0" (zero) or there is failure at input frequency	Check input voltage and frequency by an AVO meter
	Input voltage is under or over limits mentioned at "TECHNICAL SPECIFICATIONS" title	Check input voltage by an AVO meter.
	Power supply unit of control board has failure	Check the fuses on control board. Check connection terminals and sockets.
	Any thyristor at power unit is failing	Check the thyristor failed. Call technical service.
NO INPUT	Input fuse on stabilizer or on distribution board is off or failed.	Check input fuse on stabilizer and on distribution board. Measure the voltage by an AVO meter.
	INPUT fuse on control board is blew or INPUT feedback transformer is failed.	Check the fuses on control boards. Call technical service.
	Cooling fan may be faulty	Check whether fan runs. If not, switch off the device, and call service.
OVER TEMP	The ambient of the device may be extremely hot.	Eliminate the environmental factors causing overheat.
COMMUNICATION FAULT	Display board failure	Check display board. Call technical service.
	Lack of communication between front panel and control board	Check flex cables and sockets between control board and display whether there may be loose or broken.
DEVICE EMITTING ODOR	Formation of lacquer odour due to heat in transformers	The isolation lacquer of transformers may odour for a while. The odour will leave in 1-2 weeks. That is not a failure
	Burnings due to over-current and overheat in cables within device	There would be any failure which can't determined. Call technical service
	Burnings due to over-current and overheat in transformers of device	There would be any failure which can't determined. Call technical service
EMITTING ACOUSTIC NOISE	There might be a failure at cooling fan	Check whether fan runs. If not, switch off the device, and call service.

9. PERIODICAL MAINTENANCE

Since the stabilizer is formed of completely semi-conductor materials, that is, since there are no moving parts, its maintenance is too easy and uncomplicated. Therefore, you need not open the cover of device for maintenance.

Below operations will be suitable for periodical maintenance.

1. First, the devices connected to the stabilizer are turned off. The input of the stabilizer is cut off by pulling the both the fuse on the panel and the input MCB on it.
2. The stabilizer's dust is removed by a moist cloth.
3. It is checked whether or not there is looseness in the connection parts of the stabilizer. If there is, it will be squeezed. Otherwise, it will cause a failure in the device after a while.
4. Check to ensure that there are no object that will prevent the ventilation of the stabilizer.
5. The stabilizer will be operated again by pulling up input fuse. (The device is turned to ON position)

6. It is checked whether or not the device ventilator operates
7. By a measurement device, input and output indicators of the device are read. It is determined whether or not these devices are within normal values.
8. When operating the devices connected to the stabilizer in order, the output voltage is continually followed up. It is checked whether or not the output voltage is within normal limits.
9. The output current is read by the help of an ampere meter. It is checked whether or not this values is within normal limits.
10. The output voltage is again read after about 1 hour and it is compared to normal values.
11. The measurements made by the measurement devices are compared to the values on the monitor. It is tested for calibration of monitor

10. WARRANTY

Dear Customer,

Thank you for purchasing a NAICON product. We hope that you be satisfied.

If the product fails in warranty period, please contact your dealer or call +39 02 950031 or go to www.naicon.com/elsist. Before contacting your dealer or authorized service network, we recommend that you read the operating and maintenance manual carefully.

With this warranty, NAICON warrants the product to be free from defective in materials or workmanship for 2 years, as of the original delivery date.

If there are material or manufacturing defects during the warranty period, NAICON affiliates, Authorized Service Centers or authorized resellers located in the UE region will repair or (at NAICON discretion) replace the defective product or components under the terms and conditions below, without any charge for labor or spare parts costs. NAICON reserves the right (in its sole discretion) to replace the components of defective products or low cost products with assembled parts or new or refurbished products. Guarantee is applied only if the equipment is returned F.O.T. our factory

Conditions.

1. This warranty will be valid only if the defective product is returned together with the sales invoice.

NAICON reserves the right to refuse warranty service in the absence of such documents or if the information contained therein is incomplete or illegible.

2. This warranty does not cover the costs and / or any damages and / or defects resulting from any modifications or adjustments made to the product, without prior written permission from NAICON, in order to adapt the product to local technical or safety standards in countries other than those for which the product was originally designed and manufactured.
3. This warranty will be void if the model or serial number indicated on the product has been modified, deleted, removed or otherwise illegible.
4. Are excluded from the warranty:
 - Periodic maintenance and repair or replacement of parts subject to normal wear and tear.
 - Any modification or modification to the product, without prior written permission from NAICON to enhance performance than those described in the User and Maintenance Manual
 - All costs of technical staff support and any transport from the customer's address to Assistance Center and vice versa as well as all the risks involved.
 - Damages due to:
 - a) Improper use, including but not limited to: (a) the use of the product for any purpose other than the intended use or failure to observe the NAICON instructions for correct use and maintenance of the product, (b) installation or use of the product not complying with the Technical or Safety standards in the country in which it is used.
 - b) Repairs by unauthorized personnel or by the Customer himself.
 - c) Accidental events, lightning, floods, fires, incorrect ventilation or other causes not attributable to NAICON.
 - d) Defects of the equipment or equipment to which the product was connected.
5. This warranty does not affect the buyer's rights established by applicable national laws nor the Customer's rights to the reseller arising out of the sales contract.

Unless authorized by the manufacturer, reproduction of any part of this manual is prohibited. Our equipment, built with the utmost care and with selected components, is controlled by NAICON Quality Services. However, if you notice any anomalies, please inform us by calling +39 02-950031 specifying serial number and model of the device, which are printed on the identification plate at the rear side of the AVR. NAICON Assistance Service is also available to collect requests, comments, suggestions, if any.

In case of failure:

Contact our Customer Service Center at +39 02 95 0031, and verify the AVR malfunction.

If the products returned to NAICON were OPERATING or if they were delivered without our permission or for out-of-warranty products, they will be returned to the customer by charging a cost that will depend on the country where will be shipped.



Naicon

UNIT



Diloc



Elsist



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