SINGLE-PHASE ELECTROMECHANICAL VOLTAGE STABILIZER

SEM-EM 05-12





Important Notice!

Thank you for preferring us. Your product has been designed to protect your sensitive devices for years.

This manual contains very important information both as to specifications, installation, and operation of regulator and as to safety of regulator and related loads. It is essential to thoroughly read and understand the manual and follow instructions for proper and safe operation and maximum performance of product.

Read completely and thoroughly the manual prior to installation!



Keep the manual for future reference!

Symbols Used



Indicates special attention in manual.



Indicates life-critical instructions.



Indicates damage to device and/or injury to user.

Superior Performances Safety



Information relating to safety of Servo Regulator and devices connected thereto as well as the safety of user has been detailed as follows. However, installation shall not start before reading the entire manual.



- When device is switched from cold to hot, air humidity may concentrate inside. In such a case wait for at least two hours because operation will be highly dangerous.
- Device must be operated in an environment equipped with all specifications mentioned in "installation" section of manual.
- Make sure the spaces left around the device for ventilation are not blocked.
- Be careful not to allow any foreign substances (liquid or solid) penetrate into device.
- Device must be connected by authorized service technician.
- Earthing connections must be made.
- Connections against fire danger must be made with proper section of cables. All cables must be insulated and laid in a manner to prevent stumbling.
- No loads must be connected to output of device that exceed its power.
- Device may only be repaired by authorized service technician.
- In case of emergency, (damage to cabin, front panel or connections, penetration of foreign substances into device etc.) device must be shut down immediately and input voltage must be disconnected and authorized service must be informed.

Device must be properly packaged for transport

2 Description of System



Preventing any surges and drops and all irregularities in mains voltage and regulating the voltage, Servo Automatic Voltage Regulator electromechanically cuts off output voltage in any surges and drops outside setting zone thanks to electronically provided protection and prevents any related possible damages (cut-off option).

Regulator is used safely for computer system, fax, photocopy and laboratory devices, domestic and business illumination, complete flat and office feeds, manufacturing houses and workshops.

15-50kVA version

Servo Regulators, precisely, rapidly and safely regulate Output Voltage through serial booster transformers connected to the mains and precise

variac and Microprocessor Controlled Digital Controlling Unit. In order to hold Output Voltage at desired level with the least error, Servo System provides DC motor by triggering with thristrs at suitable level.

Regulators also offer the user accurate and precise Input/output Voltage, Frequency and Current Values (option) with Digital Display feature.

Phase protection is produced upon demand (cut-off option) and output voltage is cut-off with contactor whenever no low input voltage, high input voltage and any phase is available. In order to prevent from any influence by spikes 2 seconds of delay is available between pulling and releasing times of contactor. Moreover, regulator is equipped with manual by-pass switch and on/off features.

Input Voltage, Output Voltage, Output Frequency and Output Current values are digitally shown on display. Front panel allows remote display on if any voltage occurs at output with available signal lamps and if output voltage is either high or low within limits and at the same time dry contact information (optional). Proper fuses have been used to protect both load and Digital EPM against Short Circuit and Over Currents. Device is internally cooled by fan. Some single-phase models are naturally cooled thanks to special internal structure.

Installation



 Examine the device once you receive. Although device is properly packed, it may get damaged during transportation. If there is any damage on packaging, contact transporter.



Check if customizations you demanded upon ordering have been made before starting up the device.

2.1 Handling

Device must be properly packaged for handling. Therefore, it is highly recommended to keep the original packaging.

2.2 Storing

Device must be stored in a dry environment away from any heaters and direct sunlight at temperature between–25 °C and +55 °C.

Relative humidity in the environment must be between 20% and 95% (non-condensable).

2.3 Placement

Device must be placed in;

- With no direct sunlight
- Dry location
- Away from heating elements and in a well-ventilated place.

Moreover:

- > Environment must not contain extreme dust and
- Surfaces of device containing vents must be at a distance of at least 20 cm. from any obstructions

Regulator may operate in environment temperatures between 0 °C and +50 °C.

2.4 Connections



Connections may only be made by authorized service technicians. Any attempts by user to make connections may threaten life.



When device is switched from cold to hot, air humidity may concentrate inside. In such a case wait for at least two hours before making connections because it will be highly dangerous.

Connection terminals of device are either on front or back side. Cover on terminals must be removed to make connections and should be reassembled after the connection.

2.4.1 SINGLE-PHASE CONNECTION

Connections are described below. Please follow the order below while making the connections.

UP TO 10 KVA



2.4.2 DESCRIPTION OF INTERNAL PARTS

NO	PART NAME
1	TOROIDAL TRANSFORMER
2	BOOSTER TRANSFORMER
3	LIMIT SWITCHES
4	DC MOTOR
5	DD CIRCUIT BREAKER
6	POWER RELAY
9	REG./LIN. SIGNAL LED
10	FUSE
11	DIGITAL VOLTMETER









From 15kVA

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2.4.3 Earth Connection

15

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Servo Regulator must be connected to earth.

PROTECTION FUSE OF METER

METER / SETUP DISPLAY

Servo regulator's input earth terminal must be connected to a high-quality (low resistance) earth line.

Loads must be earth connected via output earthing terminal.

2.4.4 Input Connection

A bipolar automatic circuit breaker connected on phase and neutral lines must be added to main switchboard to connect Servo Regulator and a residual current relay must be installed.

To install an automatic fuse at equivalent values with input fuse of device on switchboard will be appropriate.

Protection threshold value of residual current relay in the input of Servo Regulator must be the total of 30 mA and residual currents of loads connected to Servo Regulator output.

Current values recommended as above are given only considering Servo Regulator on the automatic fuse in question. Otherwise, both values must be recalculated considering all devices on the same fuse.



Any modifications on switchboard must be performed by an authorized service technician on electrical installations.

After necessary modifications, switch automatic fuse on switchboard to "0" position and connect phase to INPUT terminal through fuse on switchboard and neutral to NEUTRAL terminal.



Make sure to switch automatic fuse on switchboard to "0" before starting to connect input cables.



Minimum section of cables between switchboard and Servo Regulator must be selected according to the power of device. In case of selecting small sections, there may be a risk of fire.

2.4.5 Output Connection

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In case Servo Regulators are to supply more than a few independent loads, it is recommended to use different fuses and residual current relays for each load. When each load is connected to Servo Regulator through each and every fuse according to its respective current, in case of a short circuit on any of the loads, short circuited fuse blows and other loads do not get affected by this case thanks to short circuit protection property of device.



Make sure input, output automations and automatic fuses on switchboards are in "0" position before starting to make output connections.

Loads are connected to OUTPUT, NEUTRAL and output earthing terminals on switchboard of Servo Regulator.



Sections of cables between Servo Regulator and loads must be selected according to its respective current.



Maximum power contracted by loads connected to Servo Regulator must not exceed nominal power of Servo Regulator.

3 Starting Up and Switching Off

3.1 Starting Up

After making the connections as described above, all you have to do to start up the device is to switch all fuses and automations on switchboard to "ON" position, switch on the circuit breaker marked "STABILIZER" and then device will automatically start if mains voltage is above a certain value.

3.2 Switching Off

Turn off the circuit breaker marked "STABILIZER", Switches and Fuses to "0" position to switch off the device. If maintenance and etc. operations will be performed on Servo regulator without cutting the power of loads connected to the device, turn switch LINE to ON position



3.3 Operating the Device

3.3.1 Operating from Regulator

Operating from regulator is possible only if mains voltage is between certain limits. While Servo Regulator is operating in this mode, it processes mains voltage and supplies the loads with a voltage equal to mains nominal value. Detailed information about mains voltage range the device may operate within is given in section "Input Voltage Tolerance".

3.3.2 Operating from Mains (BYPASS)

Transferring voltage on input to output through a mechanical switch on Servo Regulators is called "bypass". Bypass feature is generally used to separate Servo Regulator from input and output without deactivating the loads during maintenance.

To activate the manual bypass switch ON the "LINE" circuit breaker, at the same time the main "STABILIZER" circuit breaker will turn OFF as it is interlocked to it.

3.4 Operation under Abnormal Situations

3.4.1 Overload

Connecting loads exceeding nominal power of device output is called "overloading".

Device keeps powering the loads exceeding nominal power in regulator mode until fuses blow.

Be careful not to overload the device for safe operation.

3.4.2 Short Circuit on Output

Device forces the fuse on device to blow acting as a source of current upon any short circuits on output. Short circuit disappears upon blowing of fuse and other loads are protected against getting affected by this situation.



Each and every load must be connected to circuit through different fuses selected according to nominal current to enable device properly perform short circuit protection function.

3.5 Indicators

3.5.1 Display (EPM Display)

Output Voltage, Input Voltage, load current, frequency and other values are displayed on display.

MSC-72-03G» Series is a new generation Wi-Fi Servo voltage regulator driver module. It can also be used for different purposes (such as a Laboratory Variac energy analyzer). The device is produced in a 72x72 mm plastic standard case.

Front Panel

On the front of the device, there are three three-digit seven-segment displays, four information LEDs, and three control keys.



On device Wi-Fi control screen, a few parameters are displayed on the front panel . It is necessary to use keys to monitor different parameters. The bottom screen of the device shows two different parameters.

• When the SET button is briefly pressed, the CURRENT LED lights up and the lower display shows the current value passing through the regulator's input.

• When the DOWN key is pressed briefly, the Fr-Hz LED lights up, the lower display shows the mains frequency.

View memory

The device saves all parameter limits it sees in

permanent memory. In order to see some of these on the device's own screen, if the bottom screen of the device is in the frequency display mode, if the UP key is pressed for a short time, the device enters the data record display mode, and the commas of the third segments of all screens begin to flash. The display shows the data saved since the last memory reset.

- Upper display: input voltage maximum value.
- Center display: the minimum value of the input voltage before the output contact is disconnected.
- Lower display: the maximum value of the current measured from the input.

While in this mode, pressing the TOP key again,

OUTPUT

OUT.ON

CURR.T

мsс

72-03G

SET

WI-FI

v 28

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- Upper display: The number of times the output is turned off due to excessive input voltage.
- Middle display The number of times the output is turned off due to low input voltage.
- Lower display The number of times the output is turned off due to excessive input current.

When the device is in this position, when you press the UP ▲ button again, the device returns to normal operation. Alternatively, press the DOWN ▼ button to reset the records and return to the normal operating mode.

After the device is energized

Under normal conditions, after the device is energized, the device brings the output voltage of

the regulator within the setting limit. The output contact release timer starts counting down. Meanwhile, the LED OUT.ON flashes. After the output contact is activated, the LED OUT.ON will be on continuously.

Mechanical limiting switch in the device has been used. While the variac coal is based on the lower or upper limit in the regulator, the comma mark *in the third* digit of the middle display will light up. From this to the engine driving the variac, the run-time limitation timer checks for error conditions in the engine release. If the device detects that the output voltage of the regulator does not reach the setting environment in normal time, it cuts off the voltage supplied to the motor and lights the comma mark in *the second digit of the middle display*.

the third digit of the lower display starts flashing while the device is in overcurrent conditions .

Module settings

The device is fully tuned and calibrated at the factory and does not need additional configuration. Some users may need to customize their own settings. The device provides 40 configurable parameters that can by modified by the users to suit their needs.

Reset to factory settings

After the settings of the device are changed, if necessary, the device can be sent to the factory settings at any time. To return to the factory settings, first unscrew the fuse on the front panel, this will switch off the display. Wait for 5 seconds, and then keep the middle button pressed while screwing back the display fuse thus powering it. After **«888» appears on the** screen, release the key.

Р	Description	ACCEPTED VALUES	FACTORY SETTING	
P01	Output voltmeter calibration			
P02	Input voltmeter calibration			
P03	Current transformer ratio			
P04	Ammeter calibration			
P05	Overload protection value			
P06	Delay time of the current protection	1 : 999 s	60	
P07	The number of restarts of the device in case of overload.	0 : 999	3	

List of configurable parameters. It is symbolically named P01 ... P40.

DUS	Massurement of surrent from input or output	1=input	1	
PU0	Measurement of current norm input of output	2=output	T	
P09	Output overvoltage protection value	230 : 300V	245 on 250 off	
P10	Delay time while protecting the output from high voltage	0 : 999 s	5	
P11	Output undervoltage protection value	165 : 200V	195 on 175 off	
P12	Delay time while protecting the output from undervoltage	0 : 999 s	10	
P13	Frequency over protection value Hz	55 : 99 Hz	65	
P14	Frequency lower protection value Hz	40 : 47 Hz	45	
P15	Delay time when doing frequency protection	1 : 999 s	5	
P16	Delay time when applying voltage to the circuit	1 : 999 s	5	
P17	Desired voltage at output	200 : 250V	230	
P18	Output voltage sensitivity	0.9 : 20V	2.1	
P19	Automatic expansion of output voltage sensitivity according to the number of motor shaking	16 : 255	32	
P20	Auto-sensitivity auto-enlargement memorized	0 not register 1 register	1	
D21	Let the engine be used in the project, let it be	0 not driven	1	
F 21	driven	1 driven	1	
P22	Motor braking time in milliseconds	0 : 999 ms	120	
P23	Engine acceleration value	0:99	10	
P24	Time to detect that the mechanism does not move	0 : 999 s	50	
P25	If the input voltage is low, the point at which the			
	coal must stop before the mechanical switch			
P26	ne point at which the coal must stop before the			
027	Time for forced change of output voltage is high	0.000.0	F	
P27	Forced change voltage range of output voltage	0.3993	5	
P20	Porced change voltage range of output voltage	0.3000	0	
P29	voltage display	0 : 999 s	1	
		1 = DVR-M1		
P30	Regulator serial version	2 = classic	1	
		3 = variac		
P31	Activate WI-FI network	1 = active	1	
		0 = not active		
D 22	The password is composed by eight digits	12345678	1 * * * * * * *	
P32		1,2,3,4,5,6,7,8	* * * * * * *	
P33	Second digit password	1,2,3,4,5,6,7,8	**0****	
P34	Fourth digit password	t password 1,2,3,4,5,6,7,8		
r35	Fourth digit password	<u>1,2,3,4,5,0,7,8</u> <u>1,2,2,4,5,7,8</u> <u>****5***</u>		
r30	Sixth digit password	1,2,3,4,3,0,7,ð	****	
P3/	Soventh digit password	1,2,3,4,3,0,7,8 1,22,75,67,0	579 *****7*	
F 30	Fighth digit password	1,2,3,4,3,0,7,8 1,22,75,670	******	
r39	Lightin uigh password Descword for factory softings backup, Bafara	±,2,3,4,3,0,7,ð	õ	
P40	making any changes to this parameter you must	0 · 000	78	
	contact the manufacturer of this device	0.555	,0	

Changing factory settings in service mode.

Before changing the parameter, you need to know in advance what the change will lead to. Below is a more comprehensive description of the parameters.

«P01», While calibrating **«P02»**, and **«P04»**, the numbers on the screen become unstable because the electronic harmonic filter is temporarily turned off in the device.

1) The input voltage should be between 200...250 volts.

2) Output voltage should be between 200...250 volts.

3) Whatever the power of the device is, the current value passing through the device at that moment should be close to half of the device power.

4) In addition, there must be a TRUE RMS device that can control these values correctly. .

«P01» Output voltmeter calibration: This parameter is simultaneously the reference value of the output volt and the setting of the compulsory electronic stop point of the mechanism. While in this program, while pressing the "UP" or "DOWN" key once, the output parameter will change between 0.4 and 1 volt.

«P02» Input voltmeter calibration : Apart from the input voltmeter indication, it is the setting of the compulsory electronic stop point of the mechanism. While in the program, when the «UPPER» or «LOWER» key is pressed once, the input parameter will change between 0.4 and 1 volt.

«P03» Current transformer ratio : When using a mini current transformer, it is always necessary to pass a 2.5 mm diameter cable through the middle of the mini current transformer. If the current is higher than 10 amperes, it is necessary to add a parallel conductor, which can transmit full current, to the cable passing through the middle of the mini current transformer. When using additional conductors, it is necessary to choose such a ratio that the current felt from the 2.5 mm cable passing through the middle of the mini current transmitted on average at full load of the device.

If the current value passing through the middle of the mini current transformer is high, especially at startup loads, the lower screen «ER3» warning appears. "ER3" means that the current value to the microprocessor is so high that the microprocessor cannot see the full dimensions of the signal. In the «PO3» program, the ratio of the cable added in parallel to the cable missed from the middle of the mini current transformer is recorded and a value that multiplies the ratio is created accordingly. When the cable locations from the current transformer to the MULTIMETER card are incorrect, the device does not measure the current or sees very little value.

« P04» Ammeter calibration: The built-in ammeter circuit can precisely measure the current from >1% to 100%. If the current measured is over 999 Amps, the display in its last digit will show "H", for example 1.0H. This means that the data must be multiplied by 1000.

«P05» Overcurrent protection value: The power of the device is selected according to the formula divided by the minimum input voltage of the regulator, and the reduction of the reactive power factor of the load is taken into account.

«P06» Delay time of protection current . (Factory ...60 seconds) 1 ... 999 seconds.

«P07» Number of re-energizing loads in case of overcurrent: This parameter **If it is 0, if the set** button is not pressed after the power comes on, the device will not power the output. If this value is 3, if the power is not cut off or the **set** button is not pressed after the current protection is activated three times, the contact will not be energized.

«P08» Measuring current from input and output: The measuring point of the amperage. (*Factory* 1, 1 input ... 2 output) Depending on the design, the current transformer can be connected to the input or output of the voltage regulator.

Entering the factory settings change mode.

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To enter the factory settings change mode, press and hold the "SET" button while the device is operating normally. The device starts counting down from 5 to 0. You have to hold down the "SET" button until the countdown reaches 0. At the end of the count, the screen will appear as in Figure 2.1

After that, select the program to be changed on the lower screen by using the " \blacktriangle " " \triangledown " keys. When the program number to be changed appears on the lower third screen, press the "SET" button again. The parameter to be changed will start flashing.

Change values using the "▲" or "▼" keys. After selecting the required variables, press the "SET" button again. The parameter will stop flashing. Then use the "▲" or " ▼" keys to select another



FIG. 2-1

parameter that needs to be changed. If no button is pressed for 10 seconds after the desired changes are made, the device saves the modified change (if any) in its memory and automatically returns to normal operating mode.

3.5.2 Lamps

There are 2 lamps on panel. If single lamp is on, it means by-pass mode and if both lamps are on, it means regulator mode.

«MSC-72-03S» CONNECTION SCHEME

«MSC-72-03S» Connection Diagram

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- (1) « MOTOR AC» AC current for DC Motor (6V......36V)
- (2) « SW 1» Cable from switch
- (3) Cable from « SW 2» Switch
- (4) « RELAY 1 ». Relay open contact 1.5A 250V
- (5) « RELAY 2 » . Relay open contact 2. 5A 250V
- (6) **«V SUPPLY ».** Electronic module AC supply 145-310v.
- (7) **«V REG »**. Control and set point of output voltage 0-310.
- (8) **«VINPUT»**. The control point of the input voltage is 0-310.
- (9) «NEUTRAL» . Mains Neutral wire.
- (10) «CURRENT NEUTRAL» . Neutral wire of current transformer.
- (11) **«CURRENT 0...10 mA 1v »**. Wire from current transformer.

« MSC-7203S » Wi-Fi



From computer, tablet , phone control providing Wi-Fi connection

Wi-Fi Network feature is definitely the biggest advantage of this device among servo voltage regulator devices.

By connecting to the Wi-Fi network of this device using any browser on a computer, tablet or smartphone, it can monitor and control many parameters of the voltage regulator or allow changes to be made. Find and select "RG..." access point in Wi-Fi Settings from any device. Enter the password "12345678" to connect. After your device is connected to the Wi-Fi Network, in the browser address bar enter the follwing address **http://192.168.4.1**. Then press enter. Your device will connect to the access point, Main control page and device control will open. Enumerating data on the connected device .



Description of the enumeration of data on the connected device.

- 1. output voltage.
- 2. Input voltage.
- 3. Load in amps.
- 4. Frequency of the mains voltage.
- 5. The percent load on the device.
- 6. output power. kW
- 7. Description line of the automatic output circuit breaker.
- 8. Description line of manual output circuit breaker.
- 9. Reset or activate memory comment line.
- 10. Turkish language selection button.
- 11. English language selection button.
- 12. Russian language select button.
- 13. Arabic language selection button.
- 14. French language selection button.
- 15. Counter active work online page.
- 16. Reset memory, enable or disable write to memory.
- 17. Output voltage circuit breaker 'Manual'.
- 18. Output voltage circuit breaker "Automatic"

Data saved after the last memory of the device was reset.

- 19. Lowest load in kW.
- 20. Number of power cuts at overload.
- 21. The largest load seen by the device in kW.
- 22. The lowest load seen by the device after the last reset is "in percent".
- 23. "Percentage" is the highest load seen by the device after the last reset.
- 24. Maximum load in percent.
- 25. Number of trips due to low frequency of the mains supply voltage.
- 26. Number of trips due to high frequency of mains supply voltage.
- 27. The lowest frequency of the mains supply voltage.
- 28. The highest frequency of the mains supply voltage.
- 29. Number of trips to protection caused by high load current.
- 30. Lowest load current in amps.
- 31. Maximum load current in amps.
- 32. Number of de-energized due to low voltage (<65 V)
- 33. The lowest input voltage with the contactor still open.
- 34. The highest input power voltage.
- 35. The number of times the device is turned off due to a low output voltage.
- 36. The number of times the output is turned off due to the high output voltage.
- 37. lowest output voltage.
- 38. The highest output voltage.
- 39. IP address line.

4 Important Points in Regulator Use

Automatic Servo Voltage Regulators are used to prevent precise devices from failing under bad electrical network conditions. Users with such bad network conditions use Regulator to transfer to devices a regular electrical network.

An electrical network professionally installed within a building is installed by selecting proper quality and thickness of conductive and in accordance with necessary earthing and distribution principles. Any users willing to create regular electrical network with the use of a regulator must pay attention to certain points in making the connections between devices to be supplied by the Regulator. Otherwise, user's health and device's integrity may not be guaranteed.

- Regulator must be connected to electrical network by an authorized service technician using proper sections of cables and as described in installation section.
- Regulator must be connected to an "earthed" switchboard providing the current capacity written on the label on back panel.
- Any device supplied by a socket/switchboard, which is not or poorly earthed, pose a danger of electrical shock to user and the risk of failure of electronic circuits is high.
- Some building electrical installations may show earthed sockets but may contain two-lined (phase and neutral) sockets. Either earth terminals of such sockets may not have been connected to protection earth or connected to neutral terminal instead. In case where no current flows through neutral line, protection may be on earth level. Since neutral voltage will be more different than protection earth level as such sockets or any parallel sockets are loaded, human health and safety of supplied equipment are in danger.

5 Maintenance

If you would like to clean the device, please follow the instructions below:

- Switch off the loads
- Turn all fuses and switch on device to "0" position.
- Wipe the device with a damp-dry cloth.
- Do not keep any inflammable and heat affected materials around the device (under, above, in front, back or on sides of device).
- Device's environment must be at normal room temperature values and if possible device should not be exposed to direct sunlight and left or used in humid or damp environments.
- Operating environment must be free of any rodents and insects.
- Doors of device must not be opened other than in Authorized Service station.
- Device must not be exposed to any impacts or high temperature causing deformation on external box.
- Any later modifications on electrical installation of device must be suitable to device power.
- External appearance of device must be checked once a month.
- Painting of device must be checked once a year.
- Switches and cables of device must be checked once a month.

Make sure no liquid or solid foreign substances penetrate into device.



Do not use cleaning powder or any other substances that may damage plastic parts.

Servo-Controlled voltage regulators consist of regulating toroidal transformer (variac), auxiliary transformer and servo-motor commanding variable transformer and electronic circuits commanding such motor according to output voltage.

Thanks to its fast-responding time controlling system, DC motor sequence with high-startup torque rapidly regulates even small voltage changes on input. When input voltage is outside operating limits, output voltage is automatically adjusted to desired value by limit-control system and servo motor is deactivated by controlling circuit. Upon completion of regulation, motor is disconnected from energy through electronic braking circuit to enable silent operation.

<u>1.Wide power range</u>:, Single-phase production from 5 kVA up to 50KVA.

2.Voltage field:

Standard; 230 single-phase -25% + 15% (from 172V to 264V)

Special regulators:

3.Regulation speed rate : 80 V/sec.

4.Output deviation: Unless regulator is used over its own power, no deviations occur on output.

5.Efficiency: Efficiency is better than 95% since regulators and transformers consist of high-quality silicon sheet and B-F class conductive materials.

<u>6.Working temperature</u>: Unless regulators are used in acidic and humid environments, working temperature may be up to 50°C. Additional cooling system is applied for temperatures over such degree.

6 Technical Specifications and Data

MODEL SEM-EM	05	06	07	08	09	11	12	13
Power (KVA/KW)	5/5	7.5/7.5	10/10	15/15	20/20	30/30	40/40	50/50
INPUT								
Input voltage		230Vac 1ph + N						
Voltage range	172Va	ac ~ 264Vac (-	25%+15%) [al	tre gamme di	sponibili su ri	chiesta, quali	110-240 e 18	0-280]
Input frequency	47 : 64 Hz							
OUTPUT								
Output voltage	230Vac (adjustable 200:250V)							
Output accuracy	± 1%							
Output current (A)	22	32	43	65	86	130	173	217
Power factor	1							
Acceptable overload			200	9% load 10" –	101:150% loa	d 2'		
Output frequency		47 : 64 Hz (same as input frequency)						
Resonse time				< 1.5/1	000 sec			
Regulation speed		80V / sec						
Efficiency		min. 95%						
Display	Digital instrument with output voltage/current reading on each phase and status signals (mains, bypass)							
PROTECTIONS								
Input protection	Automatic circuit breaker							
Output protection	Short circuit, over current, low-high voltage, via output contactor							
By-Pass	Manual By-pass included							
MCB output		Optional						
OTHER DATA								
Cooling	Natural ventilation							
Protection	IP20 (other protection grades available on request)							
Max ambient temp.	-10° C ~ +50° C							
Altitude	Up to 1000 mt with no derating							
Relative humidity	96% (without condensation)							
Acoustic pressure	< 30dB < 50dB							
PHYSICAL CHARACTERISTICS								
Color		RAL7035						
Dim. WxDxH cm	33x3	5x56	38x40x61		50x51x86	1	50x61x86	60x124x115
Weight kg.	35	38	50	55	110	140	150	260

Dimensions and weights are indicative only and can be changed at any time without notice

<u>7.Over voltage and phase protection unit (optional)</u>: Cuts off the output in case where any of phases is gone during over voltage deviations (low-high) and allows output again upon finding the desired voltage. User may deactivate protection unit with its respective on device.

<u>8.By-Pass system</u>: Regulators provide by-pass through high-quality switches. In case of any failure, regulator may be transferred to the mains through switch without any operation on installation

8.1 Regulator Principle Diagram:



POSSIBLE PROBLEMS AND SOLUTIONS

Problem	Possible Cause	Solution		
Voltmeter does not show right	Voltmeter is defective	If voltmeter is digital, check socket; if it is analog, replace.		
	Electronic card is defective	Check neutral connection, if problem persists please inform Technical Service		
Smell emanates from device	Overloading is available	Check loads on phase, switch device to Mains position and inform Technical Service.		
Device does not indicate voltage	If device is protected	Check fuse switch. Phase may be cut off, may not be neutral or voltage is not within operating range.		
	If device is not protected	Fuse switch may be burned off or defective, voltmeter may be defective. Report technical service		
Device turns on	If device is protected	Make sure neutral and phases are correct.		
and off sometimes	If device is not protected	There may be excessive ampere drawing. Voltage may be outside current limits.		
Sounds coming from device	Overloading is available, motor connection may be loose	 Turn device to mains positions, please contact your dealer or Service Center. Provide Service Center with following information: -Device Serial Nr. and KVA, -Date of occurrence of problem. 		
IMPORTANT NOTICE: Any interventions to device must only be made by gualified individuals.				





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