

USER MANUAL
MRG/MST33 SERIES
STATIC VOLTAGE REGULATOR

10-150 KVA

AG-SD-108

Rev. No:1/Rev. Date:10.02.2016



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About the Manual

This Manual is prepared for the users of MRG/MST33 Series 10-150 KVA static voltage regulator.

Companion Manuals

For more info about this device and its options, please visit www.elektroiz.com.tr

Updates

Visit www.elektroiz.com.tr for updates. Always use the latest manual.

Shipment

Carrying vehicles or handling accessories must have enough features and characteristics to carry UPS's weight.



DO NOT LIFT HEAVY DUTY WEIGHT WITHOUT HELP



<18 kg (<40 lb)



32–55 kg (70–120 lb)



18–32 kg (40–70 lb)



>55 kg (>120 lb)



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1 SAFETY AND WARNINGS

1.1 Warnings

This manual must be read before installing the MRG/MST33 series voltage regulator. The device can be installed and started only by Elektroiz authorized personnel.

Installation or start-up by unauthorized personal may cause damage to the device and serious injury or death.

The regulator is designed to be used in continuous vertical fixed position applications.



THE REGULATOR MUST BE USED WITH GROUND CONNECTION.

Connect the ground cable before connecting the mains.

Ground currents may be as high as 30mA



THE INPUT BREAKER MUST BE SET OFF POSITION, THE VOLTAGE REGULATORS MAIN/REGULATOR BREAKER MUST SET THE "0" POSITION BEFORE MAINTENANCE.

Service-Maintenance

All servicing and maintenance is done internally. All parts in the device can be serviced and replaced only by a trained technician.



Preventative maintenance is recommended at least once a year from the installation by authorized technical personnel. (This service will be provided for a fee by our authorized ELEKTROİZ personnel.)

Fire extinguishing equipment must be kept nearby the regulator.

1.2 Clearance and Access

Clearance

There must be spaces at least 1 meter for regulators fans around. Should not be permanent or temporary use within the limits specified. Otherwise, the regulator performance will decrease.

Access

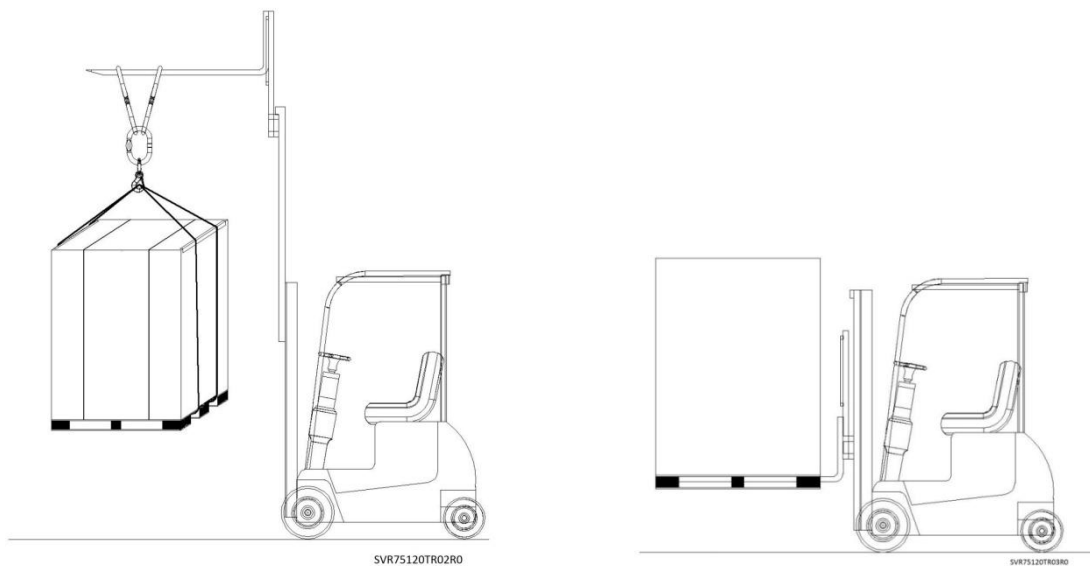
Operator reaches regulator via front, side and top panel on 10-150 kVA regulator. , enough area must be left for operator.

1.3 Storage

Regulator should be kept in a room or area where is protected from excessive moisture and heat before commissioning. Regulator cabinets must be kept in the original packaging.

1.4 Shipment

Carrying vehicles must have be equipped properly and have features and characteristics sufficient to carry regulator.



The regulator device shipment must be done on pallets.

Cabinet is equipped with four-wheel. In this way, it can be placed by moving easily. These wheels are to be used on smooth surfaces only.

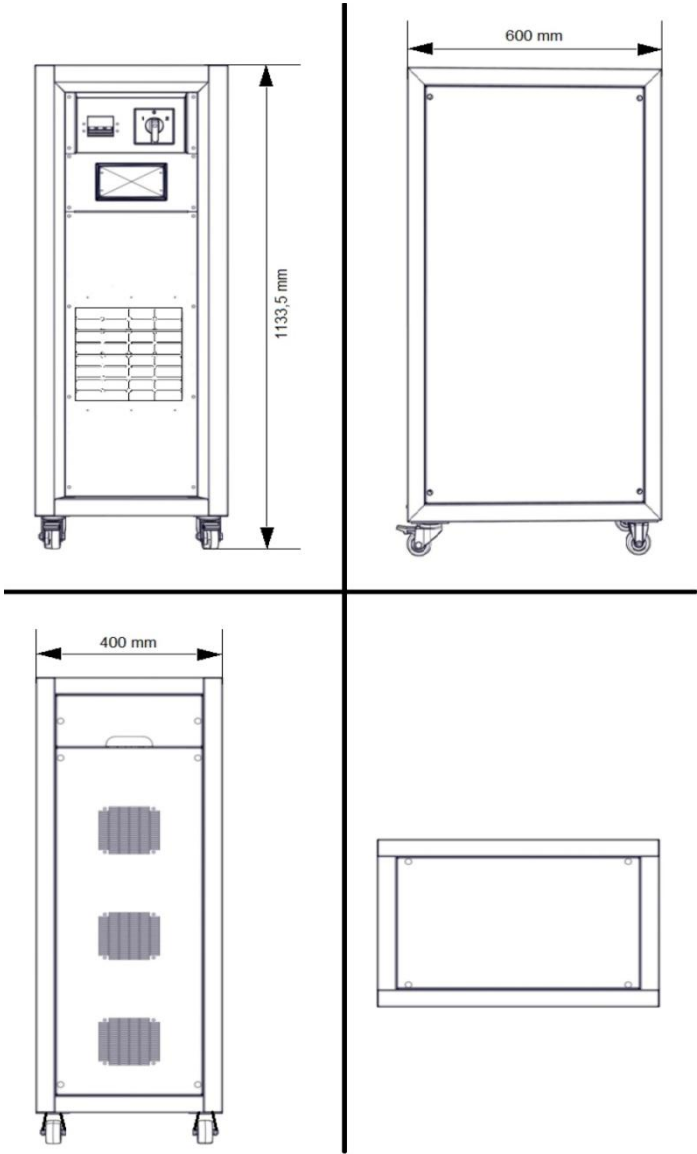
The front wheels of regulator must be locked after positioning properly. The rear side wheels are fixed.

Move the regulator as rarely as possible.

2 PRODUCT DESCRIPTION

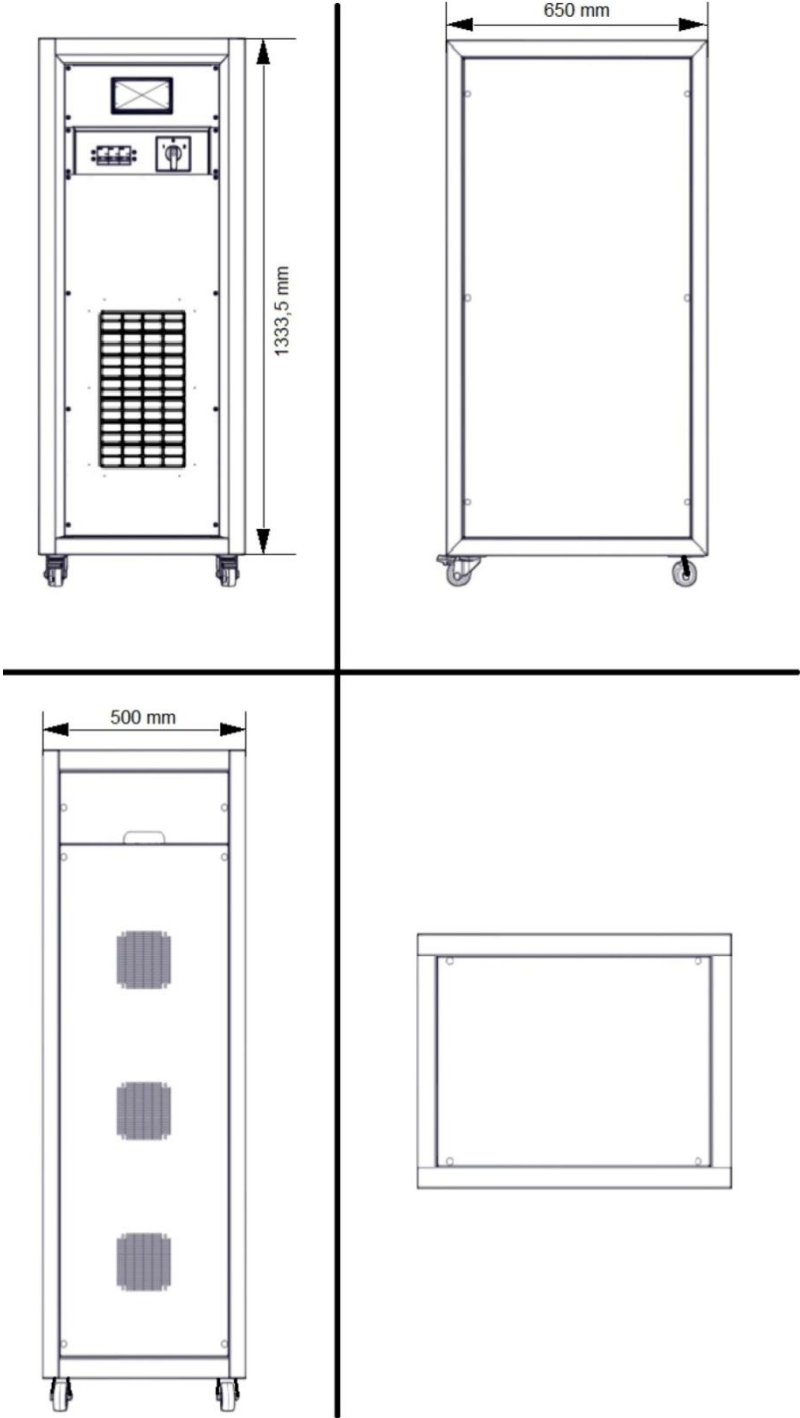
Elektroiz MRG/MST33 static voltage regulators are extensive input voltage ranged regulator which controlled by microprocessor. MRG/MST33 are high efficiency and high speed static voltage stabilizers.

General View



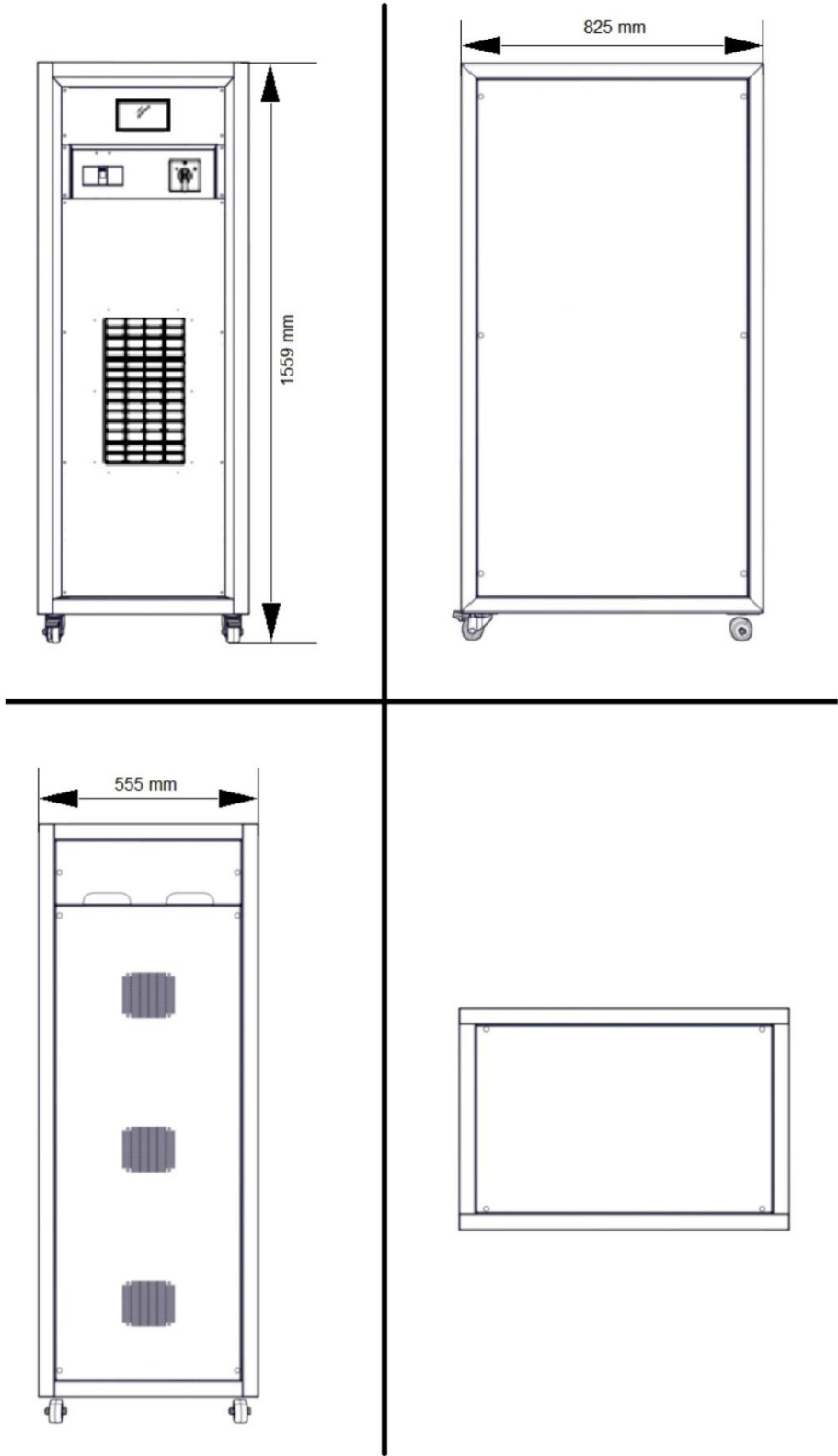
10-30KVA

MRG/MST33 Series STATIC VOLTAGE REGULATOR 10-150kVA



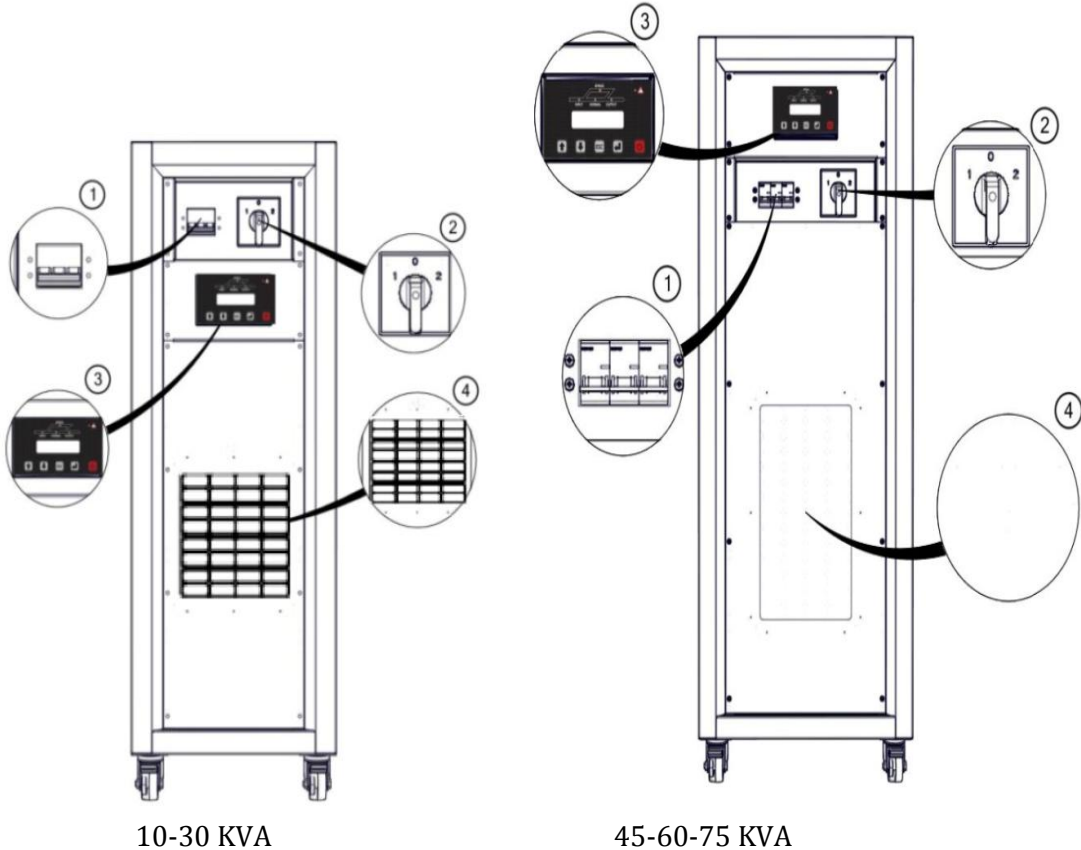
45-60-75 KVA

MRG/MST33 Series STATIC VOLTAGE REGULATOR 10-150kVA

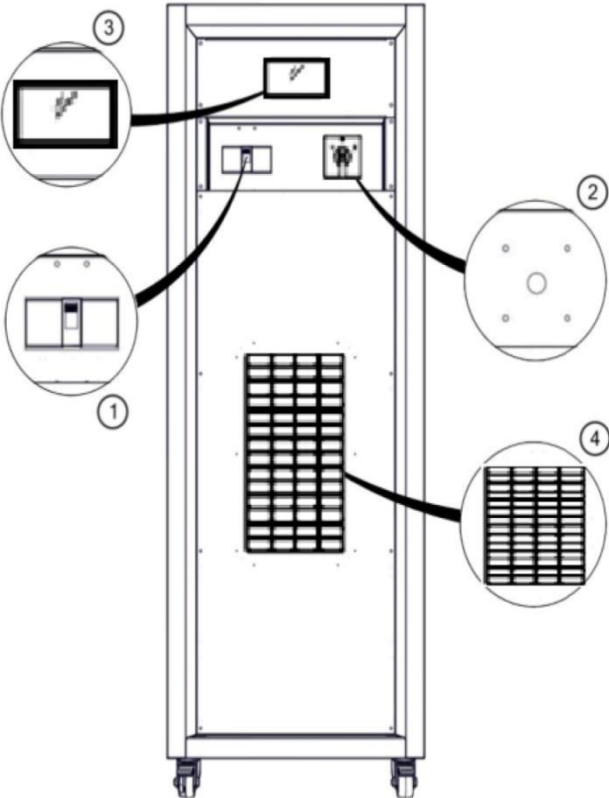


100-120-150 KVA

Front View



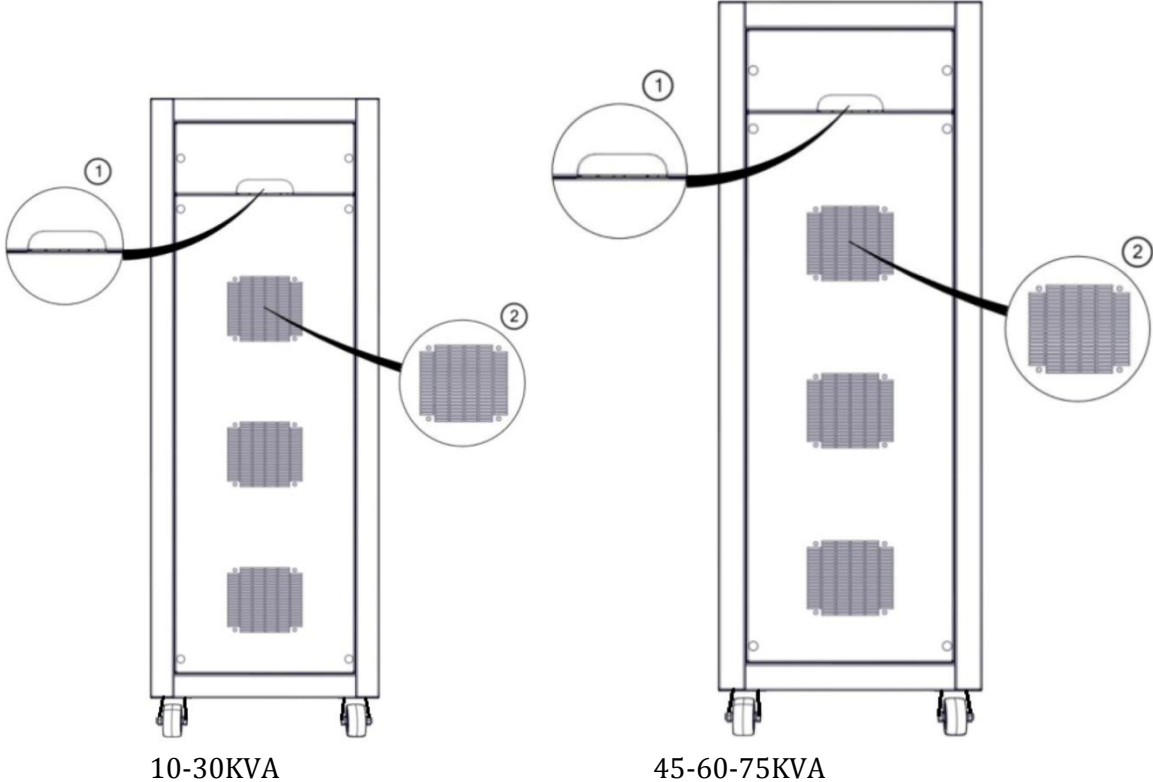
MRG/MST33 Series STATIC VOLTAGE REGULATOR 10-150kVA



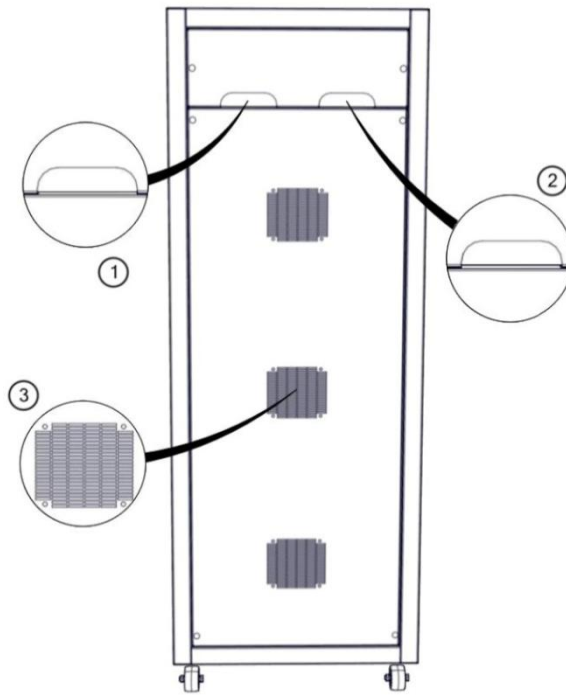
100-120-150 KVA

1	Input Breaker
2	Bypass/Regulator Breaker
3	Users Panel
4	Evacuation Channel

Rear View



1	Load/Main Connectors Terminal
2	Evacuation Channel

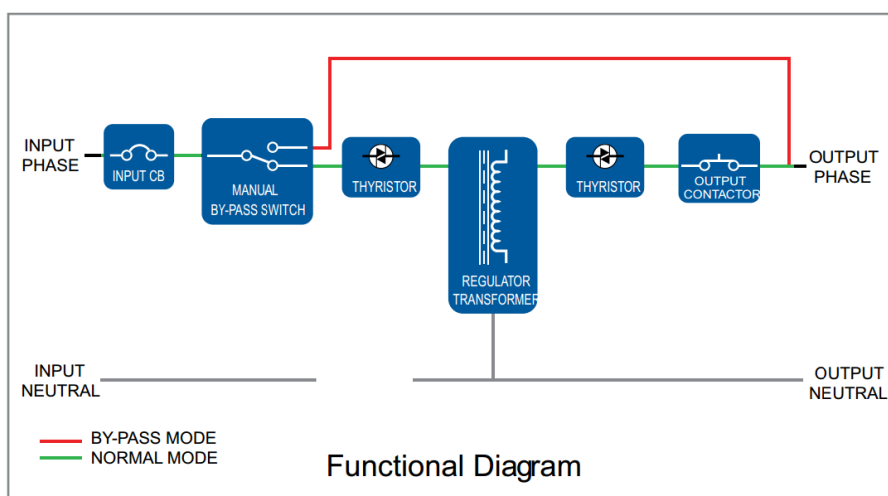


100-120-150KVA

1-2	Load/Main Connectors Terminal
3	Evacuation Channel

2.1 General Information

General operation topology of MRG/MST33 Series can be recognized as follows:



MRG/MST33 Series Static Voltage Regulator Functional Diagram

MRG/MST33 Series Static Voltage Regulator (SVR) transfers the electrical energy from the main supply to output and monitors output voltage magnitude continuously.

If there is a distortion in the output voltage according to a desired output voltage value, the microcontroller unit selects the appropriate input-output windings of the transformer immediately and then semiconductor power switches (thyristors) and ends of the windings connect the SVR input-output for stay in appropriate values.

Thus Static Voltage Regulator (SVR), the voltage magnitude of the corresponding additional energy generated by the electrical energy received from the network, by adding to its network voltage amplitude (or removing) obtains an output voltage magnitude between set points

2.2 Regulators Operation Modes

MRG/MST33 series operated in the following modes:

- Normal Mode
- Mechanical Bypass Mode

2.2.1 Normal Mode

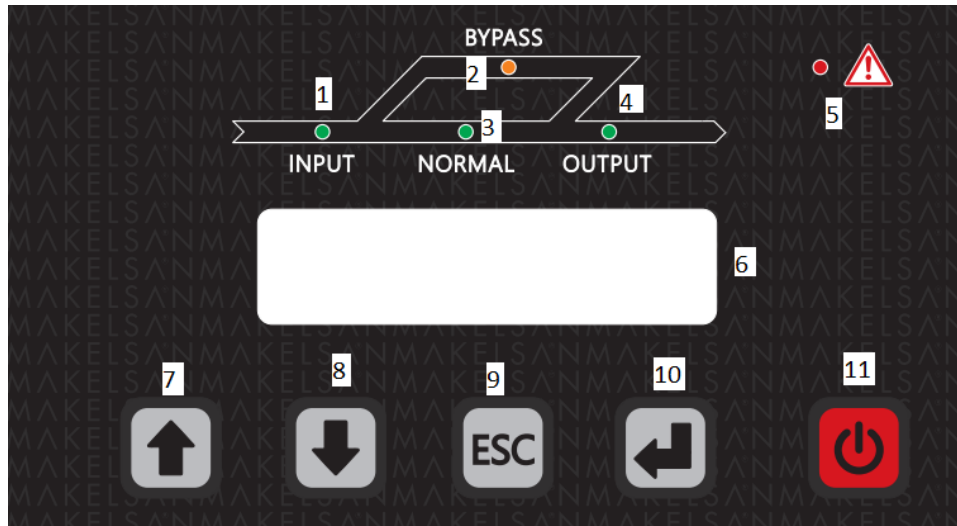
In this mode, regulator feeds the load through the regulated voltage.

2.2.2 Mechanical Bypass Mode

Operator sets main position to Main/Regulator breaker for operating mechanical bypass mode. In this mode; the maintenance bypass load is directly or mains power for the loss of energy of the load during faults

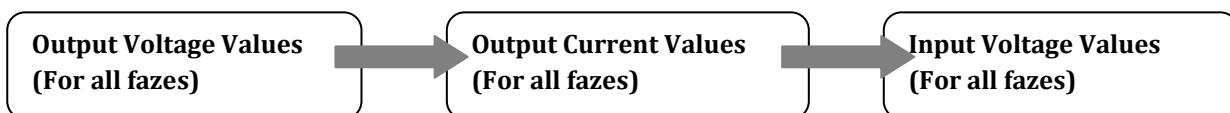
2.3 User Panel

User panel consists of mimic diagram, LCD screen, ON/OFF button and menu keys. The regulator can be controlled via this panel.



1	Input Led: Flashes while the main within out of limits. Illuminates when main is normal.
2	Bypass Led: Illuminates while the loads are fed through bypass line.
3	Normal Led: Illuminates while the loads are fed through regulator works.
4	Output Led: Flashes while the main within the limits and output breaker works.
5	Alarm/Warning Led
6	LCD Display
7-10	Menu Keys
11	ON/OFF Button

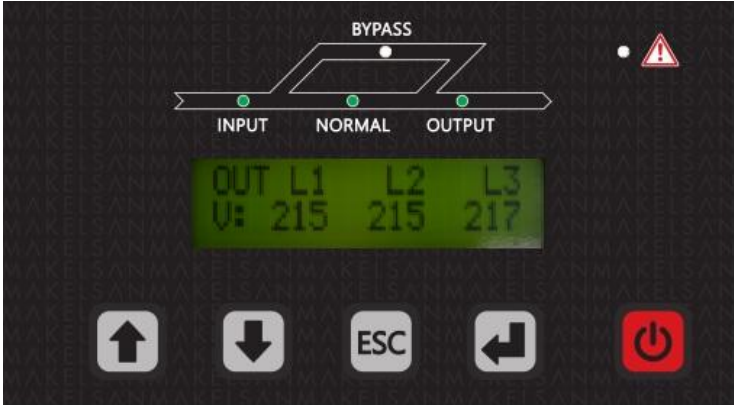
Menu Flow Chart



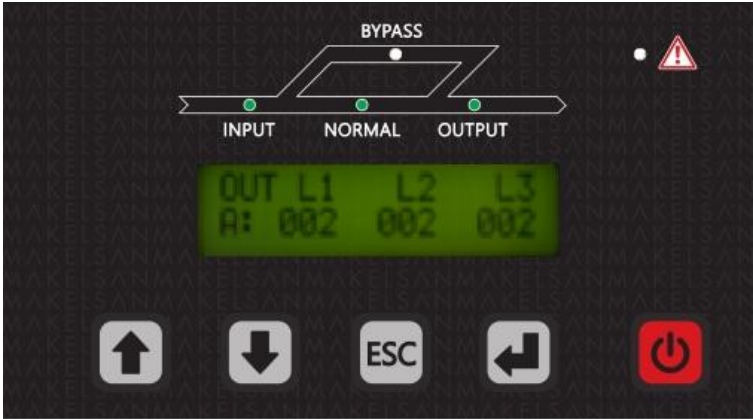
2.3.1 Opening Screen

When the front panel monitor is turned on, firstly opening screen is observed. Output voltage, output current, input voltage (for all fazes) can be observed here. If no button is pressed for 5 minutes, system returns to the opening screen. Use up and down keys to see output voltage, output current and input voltage.

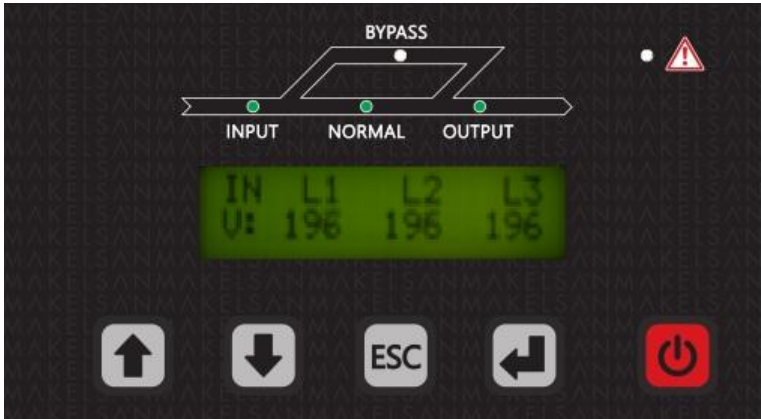
- **Output Voltage (L1, L2, L3)**



- **Output Current (L1, L2, L3)**



- **Input Voltage (L1, L2, L3)**



3 INSTALLATION

This section contains the warnings and control actions that must be performed before the REGULATOR start-up. Additionally, you will find here important information about the REGULATOR cabins transportation, positioning and connections.

3.1 Warnings



The regulator must be installed by a certified electrician of Elektroiz. The warranty is valid only for the regulator installed by a certified electrician of Elektroiz.

Proper safety gear must be used to protect the skin and the eyes from electrical arcs.

ESD-protected rubber gloves should be used.

Remove any metal accessories (ring, watch, etc.) before working on the device.

Regulator needs three phase and four cable (+ground) supply system for input. This supply system type is confirmed as IEC60364-3 standards.

3.2 Pre-installation check up

Before installation of the regulator the following control actions must be taken, these first and most important steps will secure the accurate operation of the product.

- Check if any damage was done to the regulator during transportation. Report any damages instantly.
- Make sure that model power rating is right. Check the regulator label for the actual power rating.

3.3 Positioning

The regulator is designed for the indoor use. Keep the device in a cool and dry place, with the air flow, humidity and temperature values must be within the specified range.

In the 10-150 kVA MRG/MST33 series, fresh air enters the device from the front and goes out from the fans on the rear side of the device. Care must be taken in order not to cover the air entrance and exit spots. Regulator must be positioned on a place where it is protected from water etc. contact risks.

If the area is dusty, optional filters must be used for such environment. These filters usage must be done as per instructions document.

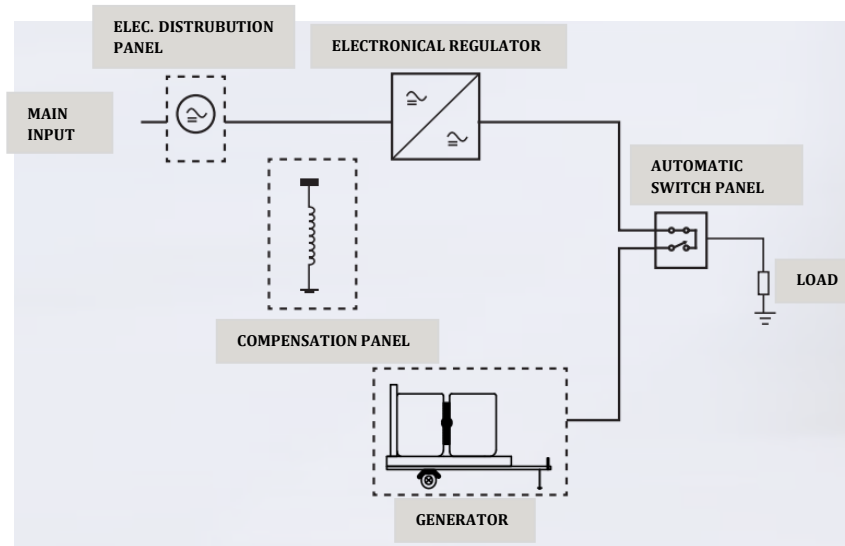
Climate must be provided to reach the maximum level of performance of regulator.

3.4 Transportation Type of Cabinets

Carrying vehicles or handling accessories must have enough features and characteristics to carry regulator's weight.

Cabinet is equipped with four-wheel. In this way, it can be placed by moving easily. These wheels are to be used on smooth surfaces only.

3.5 Mains and Load Connections



Recommended connections of MRG/MST33 Series Static Voltage Regulator

3.5.1 External Protection

To protect the AC inputs, thermal magnetic breakers or V type breakers must be installed on the distribution board.

Over current protecting must be installed on mains input distribution board and fuses must be chosen 135% higher rated than the ones given in the table below. Fuses must be C-type.

Ground leakages flow to the ground through the EMI filters on the input and the output of the regulator. Makelsan recommends the use of 30mA rated relays for handling leakage currents.

Those relays must also be:

- Resistant to both positive and negative DC pulses,
- And not sensitive to transient currents.
- Must be sensitive to currents which is average between 0,03-1 A.

3.5.2 Cabling and fuse configuration

Full load input and output currents must be reviewed for proper cabling and fuse selection.

Regulator Power	Input Cable Size	Output Cable Size	Ground Cable Size	Input Fuse Value	M. Bypass Fuse Value	Output Fuse Value
10KVA	4×6mm ²	4×6mm ²	1×10mm ²	3×25A	4×25A	3×25A
15KVA	4×6mm ²	4×6mm ²	1×10mm ²	3×25A	4×25A	3×25A
22.5KVA	4×10mm ²	4×10mm ²	1×16mm ²	3×32A	4×32A	3×32A
30KVA	4×16mm ²	4×16mm ²	1×25mm ²	3×40A	4×40A	3×40A
45KVA	4×25mm ²	4×25mm ²	1×35mm ²	3×63A	4×63A	3×63A
60KVA	4×35mm ²	4×35mm ²	1×50mm ²	3×80A	4×80A	3×80A
75KVA	4×50mm ²	4×50mm ²	1×70mm ²	3×80A	4×80A	3×80A
100KVA	4×70mm ²	4×70mm ²	1×95mm ²	3×150A	4×150A	3×150A
120KVA	4×95mm ²	4×95mm ²	1×120mm ²	3×200A	4×200A	3×200A
150KVA	4×120mm ²	4×120mm ²	1×150mm ²	3×225A	4×225A	3×225A

The length of the cable must not be over 5 meters. Maintenance bypass fuse that is only for using by Makelsan service technician and have to be locked.

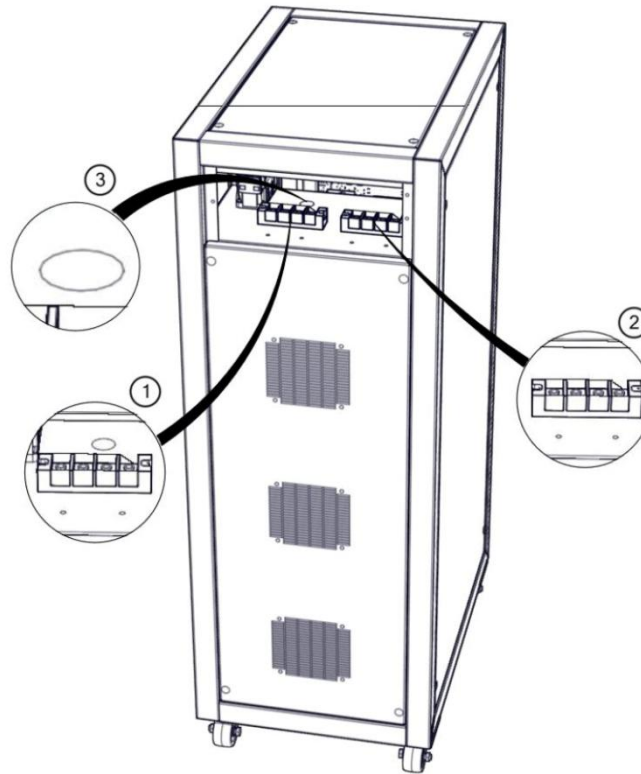
It should be noted that with non-linear loads, neutral current may rise up to 1.5 times the phase current

3.5.3 Cable connections

All electrical connections of the regulator are made from the front side of the device.



ATTENTION! 3 pole-circuit breakers (switch) are used for the input and output of regulator, Neutral line must not be interrupted.

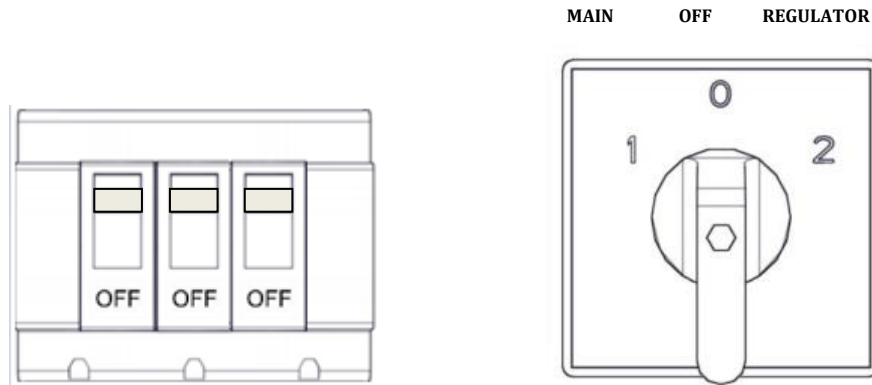


1	Load Connectors Terminal
2	Main Connectors Terminal
3	Ground Connection

Electrical Connections

Read the following steps to connect the cables properly:

1. Turn **OFF** all the distribution board breakers (both input and output distribution boards) to make sure that the load and mains are completely disconnected from any cable.
2. Connect the ground cable.
3. Make sure that the circuit breakers are **OFF**. The use of these circuit breakers is explained on the operation section.



Input and Bypass breakers are OFF.

4. Connect the input cables;

- R to INPUT L1,
- S to INPUT L2,
- T to INPUT L3,
- N (Neutral) to INPUT N.

5. Check the phase sequence.

6. Repeat steps 4-5 for output cables.



Make sure that the loads are isolated from the regulator output if they are not ready to be connected.



Make sure that the cables are connected properly before regulator is started. Additionally, check if there is galvanic isolation transformers at input of regulator and consider the local directions.



Check the grounding before starting the regulator. Wrong works or grounding on regulator or other devices of installation may be hazardous. Wrong works and grounding may damage regulator and another system on the installation.

4 OPERATION

4.1 Operation Procedure

You can find information about circuit breaker, first start-up, setting mechanical bypass, turning regulator off in this section.

4.1.1 Circuit Breakers

There are 1 input breaker (CB1) and one main/regulator choosing breaker (CB2) on the front side of the regulator.

4.1.2 First start-up

- 1.** Turn all circuit breakers OFF position.
- 2.** Take CB1 breaker ON position.
- 3.** Take CB2 breaker to 2.REGULATOR position.
- 4.** Check the regulator has switched to normal operation mode, via mimic diagram LEDs and LCD panel.
- 5.** The loads which are connected to regulator can be turned on.
- 6.** After all these steps, check that load is fed through regulator via mimic diagram. In a contrary situation, check regulator total and phase loads.

4.1.3 Setting Mechanical Bypass

When the voltage regulator to do maintenance or experiencing a fault condition on the mechanical bypass mode, power is transferred from the main.

For this; loads in the voltage regulator output is disabled. Input switch sets OFF. The main supply / regulator selector switch (rotary switch) sets "MAIN" position. Then input switch sets ON again.

4.1.4 Performing a Complete Shutdown

1. Turn off the loads connected to the device.
2. Turn OFF respectively the CB1 and CB2 breakers.



MAKE SURE THAT THERE ARE NO CRITICAL LOADS ON THE REGULATOR OUTPUT BEFORE PERFORMING A COMPLETE SHUTDOWN.

4 TABLE of TECHNICAL SPECIFICATIONS

- For standard voltage regulator

ZMODEL	MRG/MST 330010	MRG/MST 330015	MRG/MST 330022,5	MRG/MST 330030	MRG/MST 330045	MRG/MST 330060	MRG/MST 330075	MRG/MST 330100	MRG/MST 330120	MRG/MST 330150	
Capacity (kVA)	10	15	22,5	30	45	60	75	100	120	150	
INPUT											
Input Voltage	380 VAC (phase-phase)										
Input Voltage Correction Interval	275-450 VAC (phase-phase)										
Operation Frequency	50Hz ±10%										
Input Current (Max.)(A)	17	26	38	50	75	99	124	165	198	248	
OUTPUT											
Output Voltage	380 VAC (phase-phase)										
Output Voltage Tolerance	±3%					±5%					
Correction Speed	500 V/sn										
Output Frequency	Same as mains										
Output Current (A)	12	12	27	36	55	73	91	121	146	182	
Overloading	125% : 10minute, 150% : 1minute.										
Output Protection	Short Circuit, over-load, over-temperature, over and low voltage protections										
GENERAL											
Topology	Microprocessor controlled, semi conductor electronic static structure										
Total Efficiency	>97%										
Mechanical By-Pass	Main/regulator choosing breaker										
Display	2x16 LCD Display										
Working Temperature	0°C~40°C										
Storage Temperature	-25°C~60°C										
Protection Level	IP20										
Cabin Colour	Anti-Static paint protection RAL 9005										
Relative Humidity	%0-95										
Working Altitude	<1000m										
Acoustic Level	<50dB				<55dB			<60dB			
Net Weight	76	95	112kg	120kg	175kg	203kg	233kg	277kg	320kg	369kg	
Dimension (WxDxH) (mm)	400x600x1133				500x650x1333			555x825x1559			

MRG/MST33 Series STATIC VOLTAGE REGULATOR 10-150kVA

- For Wide -range input voltage regulator

MODEL	MRG/MST 330010	MRG/MST 330015	MRG/MST 330022,5	MRG/MST 330030	MRG/MST 330045	MRG/MST 330060	MRG/MST 330075	MRG/MST 330100	MRG/MST 330120	MRG/MST 330150	
Capacity (kVA)	10	15	22,5	30	45	60	75	100	120	150	
INPUT											
Input Voltage	380 VAC (phase-phase)										
Input Voltage Correction Interval	190-476 VAC (phase-phase)										
Operation Frequency	50Hz ±10%										
Input Current (Max.)(A)	25	38	57	76	114	152	190	253	303	379	
OUTPUT											
Output Voltage	380 VAC (phase-phase)										
Output Voltage Tolerance	±4%										
Correction Speed	500 V/sn										
Output Frequency	Same as mains										
Output Current (A)	12	18	27	36	55	73	91	121	146	182	
Overloading	125% : 10minute, 150% : 1minute.										
Output Protection	Short Circuit, over-load, over-temperature, over and low voltage protections										
GENERAL											
Topology	Microprocessor controlled, semi conductor electronic static structure										
Total Efficiency	>97%										
Mechanical By-Pass	Main/regulator choosing breaker										
Display	2x16 LCD Display										
Working Temperature	0°C~40°C										
Storage Temperature	-25°C~60°C										
Protection Level	IP20										
Cabin Colour	Anti-Static paint protection RAL 9005										
Relative Humidity	%0-95										
Working Altitude	<1000m										
Acoustic Level	<50dB			<55dB				<60dB			
Net Weight	76	95	112kg	120kg	175kg	203kg	233kg	277kg	320kg	369kg	
Dimension (WxDxH) (mm)	400x600x1133				500x650x1333			555x825x1559			

7 CONTACT INFORMATION



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