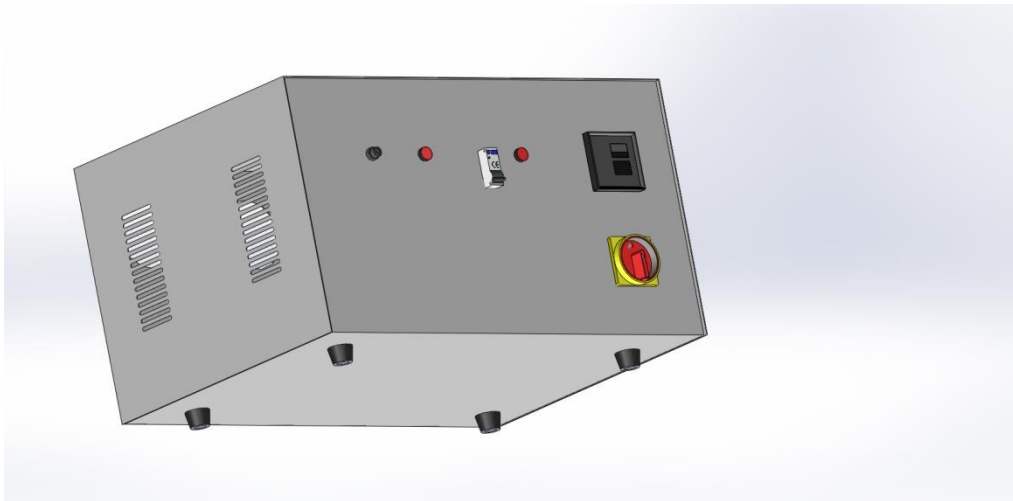




LEGA ENERJI ELEKTRONIK SAN VE TIC LTD STI

www.legaups.com

1-50 KVA SINGLE-PHASE SERVO STABILIZER



INSTRUCTIONS FOR USE

SERVO SINGLE-PHASE VOLTAGE REGULATOR



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.

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- ▶ **Abbreviations and Imagery**

- AVR: Fully Automatic Voltage Regulator**

- V: Volt (Voltage)**

- A: Ampere (Current)**

- P: Watt (Power)**

- ▶ **Manual Bypass**

- Mains (1) : The bypass load is fed from the mains.**

- Regulator (2) : The load is fed from the device.**

- ▶ **Environments that aren't suitable for the operation of the AVR**

- Detrimental fume /Powder /Abrasive Powder**

- Moisture**

- Explosive Dust**

- Extreme Temperature Changes**

- Bad Ventilation**

- Intense Electromagnetic Fields**

- Insects**



1 Safety



Information relating to safety of LEGA 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.



- ▶ Please read this booklet in order to use the regulator for a longer life.
- ▶ The warranty document is given with this booklet. It has three copy. When the device is been commissioning, the warranty document is confirmed by relevant institution and then third copy is sent to manufacturer.
- ▶ Please put the manual user in a place where can be reached in the future keep.
- ▶ 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.
- ▶ Please don't use your device before grounding.
- ▶ The cover of the regulator must not be opened. In the device isn't any part that the user can interfere.
- ▶ Please shouldn't be used your device above its power.
- ▶ The temperature and humidity at the place where the regulator is used must be the proper value.
- ▶ Please pay attention to provide ventilation and be distance over 20 cm between the device and the closest object in order to work cooling system of device properly.
- ▶ Device must be properly packaged for transport.
- ▶ Please, do not lift heavy loads without help.



<18 kg (<40 lb)



18–32 kg (40–70 lb)



32–55 kg (70–120 lb)



>55 kg (>120 lb)

2 Description of System

Preventing any surges and drops and all irregularities in mains voltage and regulating the voltage LEGA Servo Automatic Voltage Regulator electro-mechanically 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.

LEGA 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 thristers 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 as an option Output Current values are displayed digitally 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. Proper fuses have been used to protect both load and Digital EPM against Short Circuit and Over Currents. Device is internally cooled by fan. Single-phase models are naturally cooled thanks to special internal structure.



3 Attention



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.

3.1 Handling



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

3.2 Storing

Device must be stored in a dry environment away from any heaters and direct sunlight at temperature between $-25\text{ }^{\circ}\text{C}$ and $+55\text{ }^{\circ}\text{C}$.

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

3.3 Placement

Device must be placed in;

- ▶ With no direct sunlight;
- ▶ Dry; and
- ▶ Away from heating elements and well-ventilated place.
- ▶ Please select dusty and non-corrosive locations for the device.
- ▶ Please do not use the device where flammable or explosive materials are present.

Moreover:

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

Regulator may operate in environment temperatures between $0\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.



3.4 Connections



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



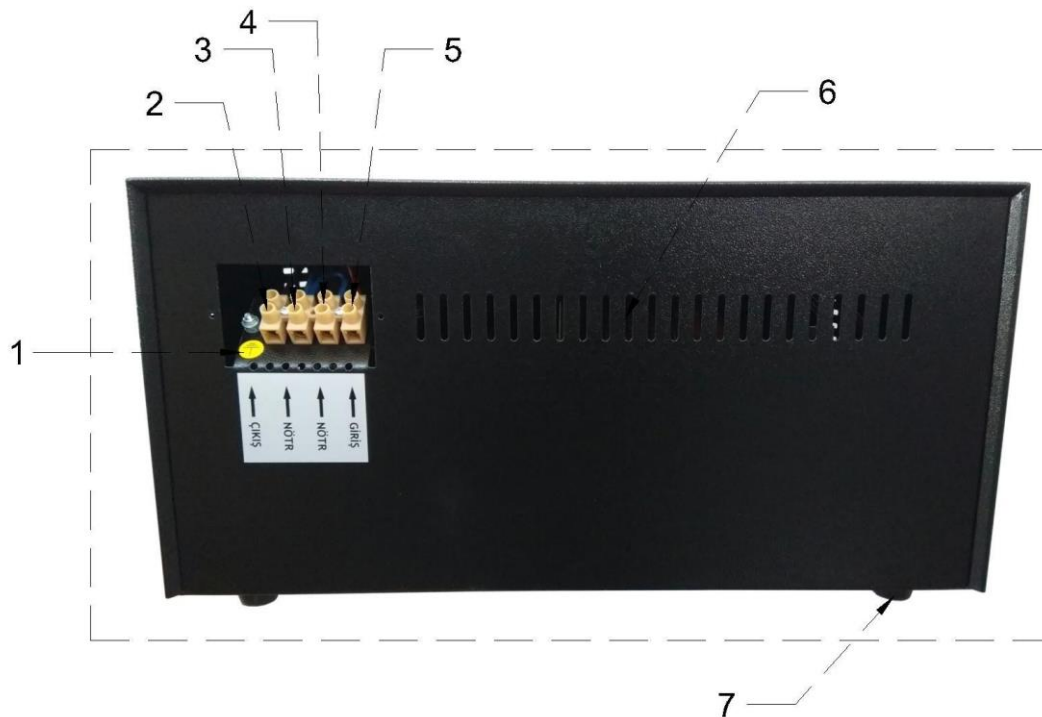
When device is switched from cold to hot, air humidity may concentrate inside. In such a case wait for at least two hours before making connections because it will be highly dangerous.

Connection terminals of device are either on front or back face. Cover on terminals must be disassembled to make connections.

4 INSTALLATION

SINGLE-PHASE CONNECTION UP TO 1 KVA – 50 KVA

4.1



1	Chassis earthing connections
2	Output connections
3	Neutral connections
4	Neutral connections
5	Input connections
6	Fans
7	Device carrying feet

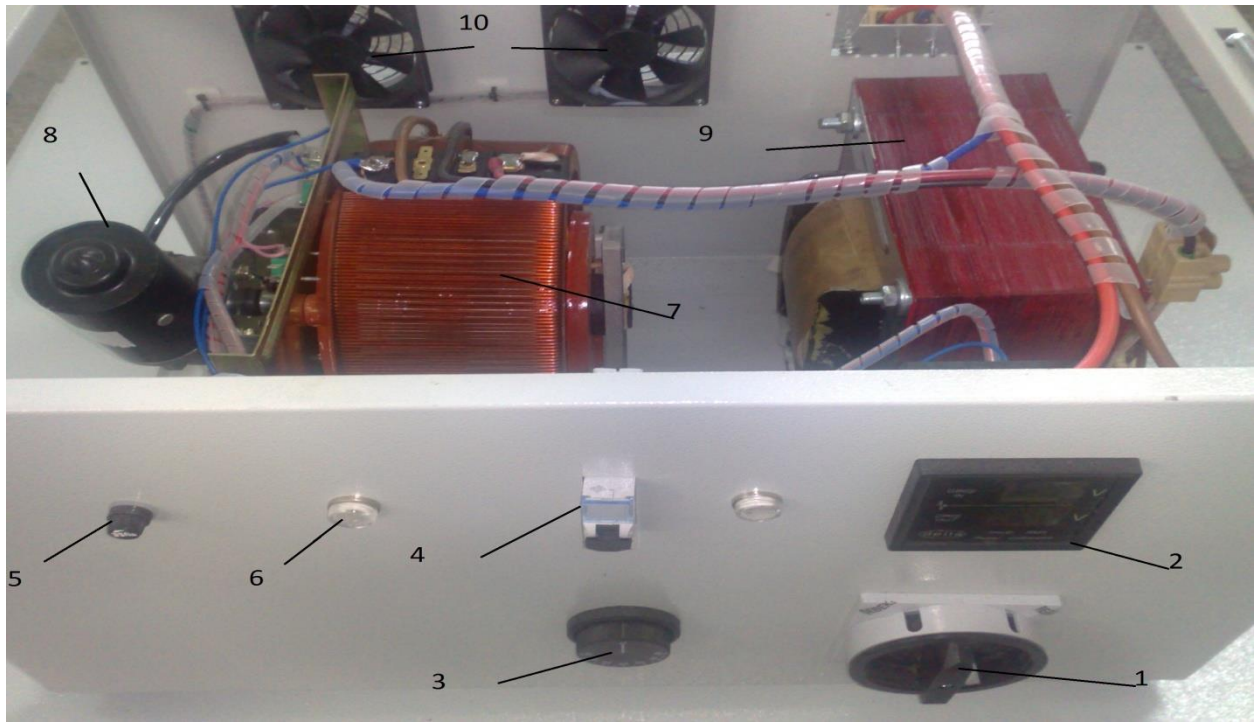


FIGURE- A

UP TO 1 KVA –50 KVA

NO	SEMI-PRODUCT'S NAME
1	PAKO SWITCH
2	DIGITAL VOLTMETER
3	THERMOSTAT
4	W AUTOMATION
5	FUSE
6	SIGNAL LED
7	VARIAC
8	SERVO ENGINE
9	BOOSTER
10	FAN
11	SERVO CARD

4.2 INPUT-OUTPUT AND GROUND CONNECTION PRINCIPLE

Input cable diameter is selected depend on power and input cable is connected from mains to input terminal point of the backside of the regulator.

Neutral cable is connected to mains neutral point to Stabilizer backside neutral point terminal.

Output cable diameter is also selected depend on power and connected from load to stabilizer backside output point terminal.

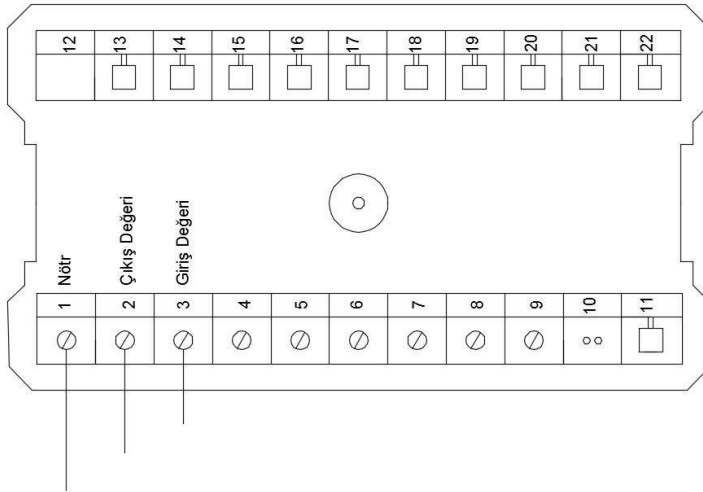
Ground cable is connected to stabilizer backside point to ground.

Lamp1 and lamp2 and output position are according to selectable input circuit breaker (pako) and input fuse position.

4.3 INPUT / OUTPUT INDICATION



Dijital Voltmetre



The connection diagram of the input/output display is as shown below:

1. Neutral
2. Output
3. Input



5 OPERATING

Pako position	Input fuse	Lamp1	Lamp2	output
mains	ON	OFF	ON	ON bypass
	OFF	OFF	OFF	OFF
0	ON	OFF	OFF	OFF
	OFF	OFF	OFF	OFF
stabilizer	ON	ON	ON	ON stabilizer
	OFF	OFF	OFF	OFF



6 Technical Specifications and Information

Technical Specifications												
MODEL	1101	1102	1103	1105	1107	1110	1115	1120	1125	1130	1140	1150
Power kVA	1	2	3.5	5	7.5	10	15	20	25	30	40	50
REGULATOR INPUT												
In.Vol.Correct.Interval	160 - 260 VAC											
In.Vol.Working Interval	90 - 285 VAC											
Operation Frequency	47...65 Hz											
Line Input Protection	Overcurrent, Low and High voltage protection											
REGULATOR OUTPUT												
Output Voltage	220 VAC RMS \pm % 2											
Overloading	10 Sec. % 200 Load											
Correction Speed	~ 90 Volt / Sec.											
Upturn Period	~ 90 Volt / Sec. (160 VAC - 260 VAC)											
Output Protection	Protects load by opening the circuit when overburden, short circuit occurs.											
WORKING PRINCIPLE												
	Servo Motor, Microprocessor Controlled, Full Automatic											
GENERAL												
Cooling	Smart Fan System											
Measured Value Monitor.	TRUE RMS Panel Voltmeter (74x74 mm) output voltage and line voltage monitorization											
Total Harmonic Distortion	-											
Total Efficiency	> % 96											
Mechanical By-Pass	"Manually Controlled Line - PAKO SWITCH Selects Voltage Regulator" Switch Turn On / Off											
Protection Level	IP 20 // IP 25											
ENVIRONMENTAL												
Working Temperature	-10 °C / 50 °C											
Storage Temperature	- 25 °C / +60 °C											
Relative Humidity	< % 90, DIN (40040)											
Working Altitude	< 2000 m.											
Acoustic Level	< 50 dB (1 metersquare)											
Documents	CE // TÜV Austria Hellas (ISO 9001)											
DIMENSIONS (cm)												
HxWxD (cm)	23 x 42 x 23		27 x 45 x 35		27 x 55 x 35		32x60x40		85 x 50 x 50		85 x 50 x 70	
Weight (kg)	15	16	29	40	47	55	75	125	136	163	180	210



7 Device Properties

LEGA Servo-Controlled voltage regulators consist of regulating toroid 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.

7.1. Wide power range: single-phase production from 1 kVA up to 50 KVA

7.2. Voltage field:

Standard; 160/250/220 V single-phase

275/450/380 V three-phase

Special regulators: 140/240/220 V single-phase

242/415/380 V three-phase

120/240/220 V single-phase

208/415/380 V three-phase

7.3. Regulation speed rate : 90 V/sec..

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

7.5. Efficiency: Efficiency is better than 98% since LEGA regulators and transformers consist of high-quality silicon sheet and B-ef class conductive materials.

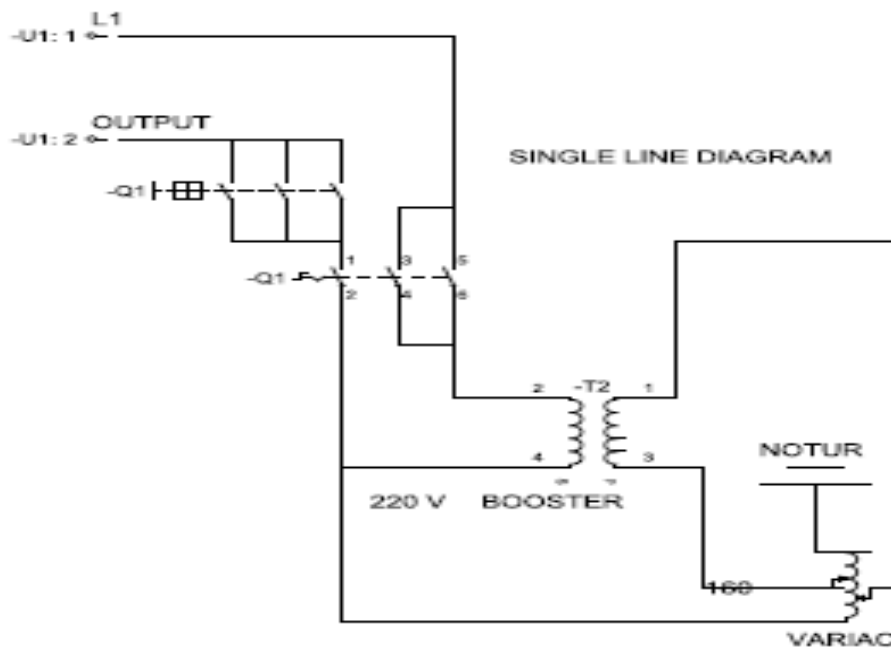


7.6. Working temperature: Unless regulators are used in acidic and humid environments, working temperature may be up to 50°C. Additional cooling system is applied for temperatures over such degree.

7.7. Over voltage and phase protection unit (optional): Cut off the output at sudden low and high input voltage (when the regulator is out of setting field). Continuously, monitors the mains voltage and automatically opens the output when it enters the regulator setting field. It prevents low or high voltage in case of any fault that may occur in the regulator. It completely closes the output so that the used devices are not damaged. It prevents the regulator from operating for a long time (cut off the output voltage) in a faulty manner and allows the user to be warned. It will prevent other malfunctions in the regulator. It keeps the regulator constantly checking the output voltages so that it provides to be in compliance with the standards.

7.8. By-Pass system: 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 with 2x and 6x pole reversion switches.

7.9. Regulator Principle Diagram:

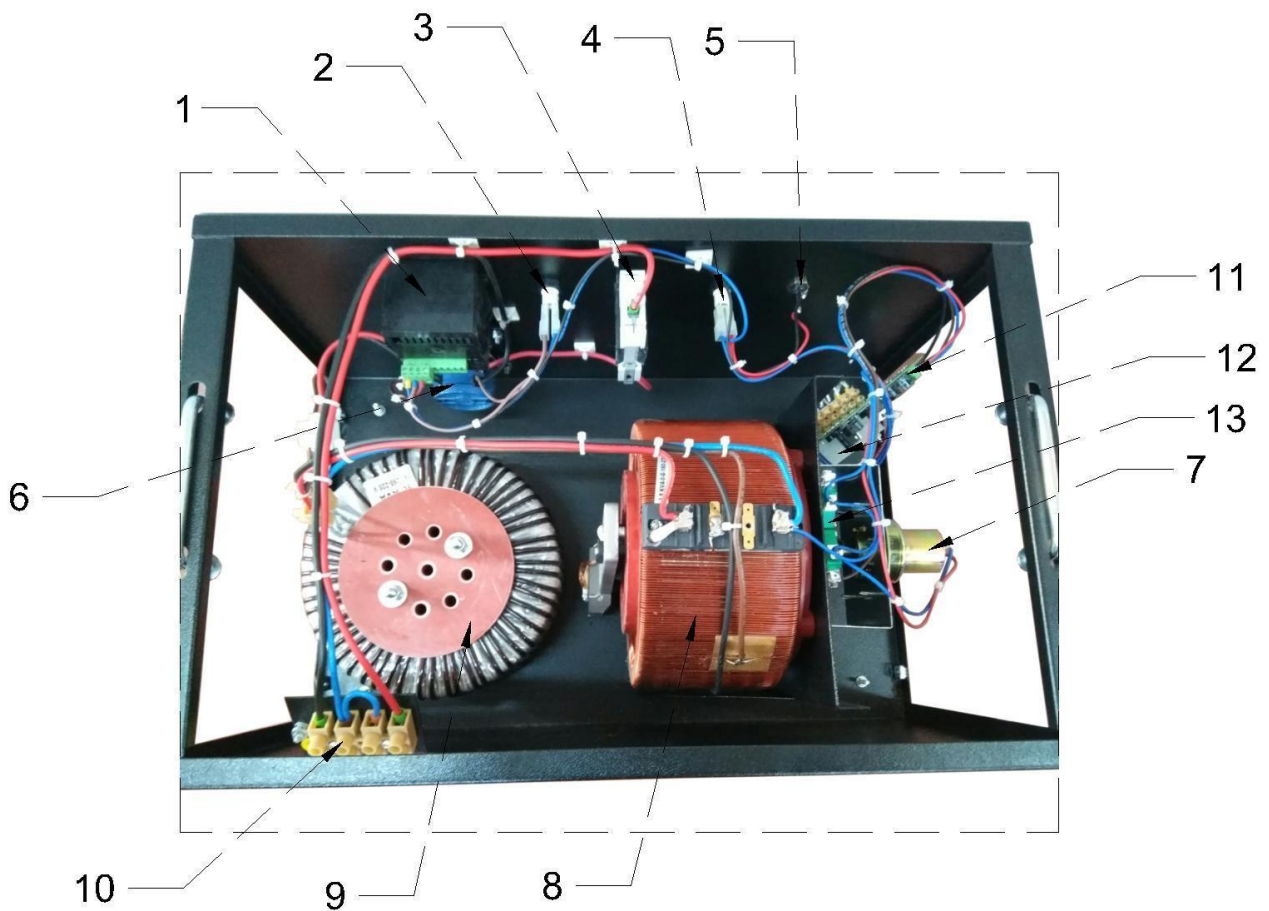


7.10 Device Advantages

- Quality and long lasting
- Safe and tried system
- Quiet operation, high efficiency
- Distortion – free output
- Steady and uninterrupted feeding
- Broad correction range, high precision



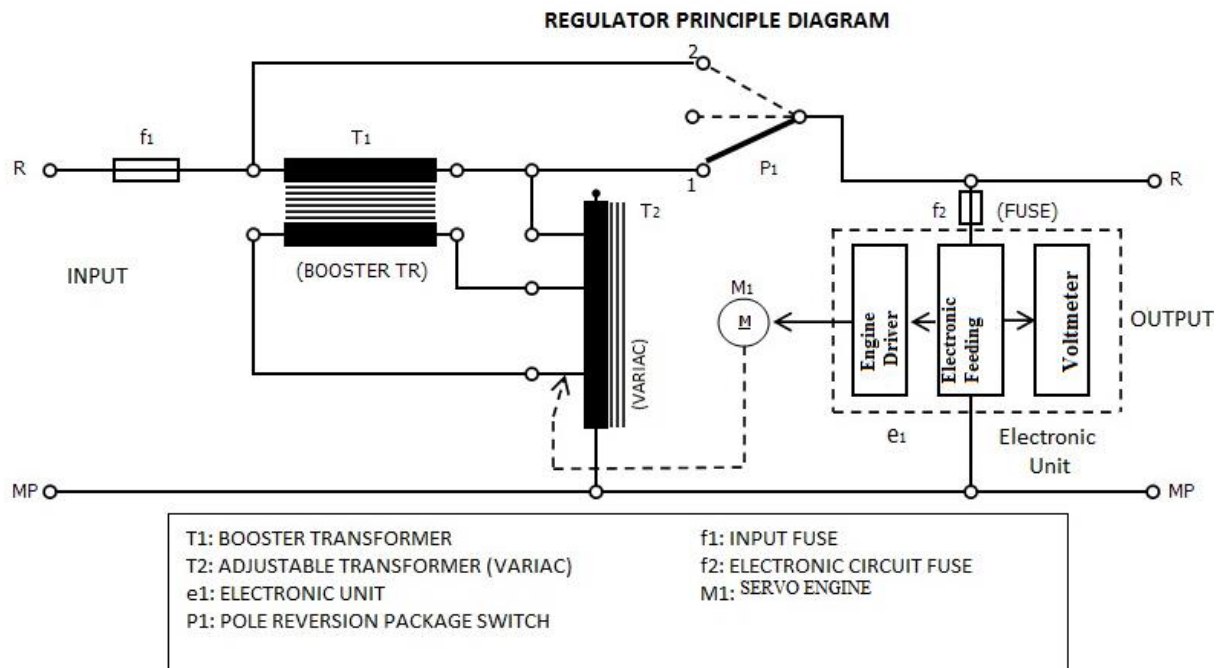
8 Internal Of AVR & Possible Problem and Solutions



1	Display(Input – Output Voltage Voltmeter)
2	Input Signal Light
3	Input Circuit Breaker
4	Output signal Light
5	Fuse
6	By-Pass/Pako Switch
7	DC Engine
8	Variac Transformer
9	Booster Transformer (Troidal TR)
10	Input and Output Terminal

11	Control Card
12	Circuit Transformer
13	Limit Switch

Regulator Principle Diagram:

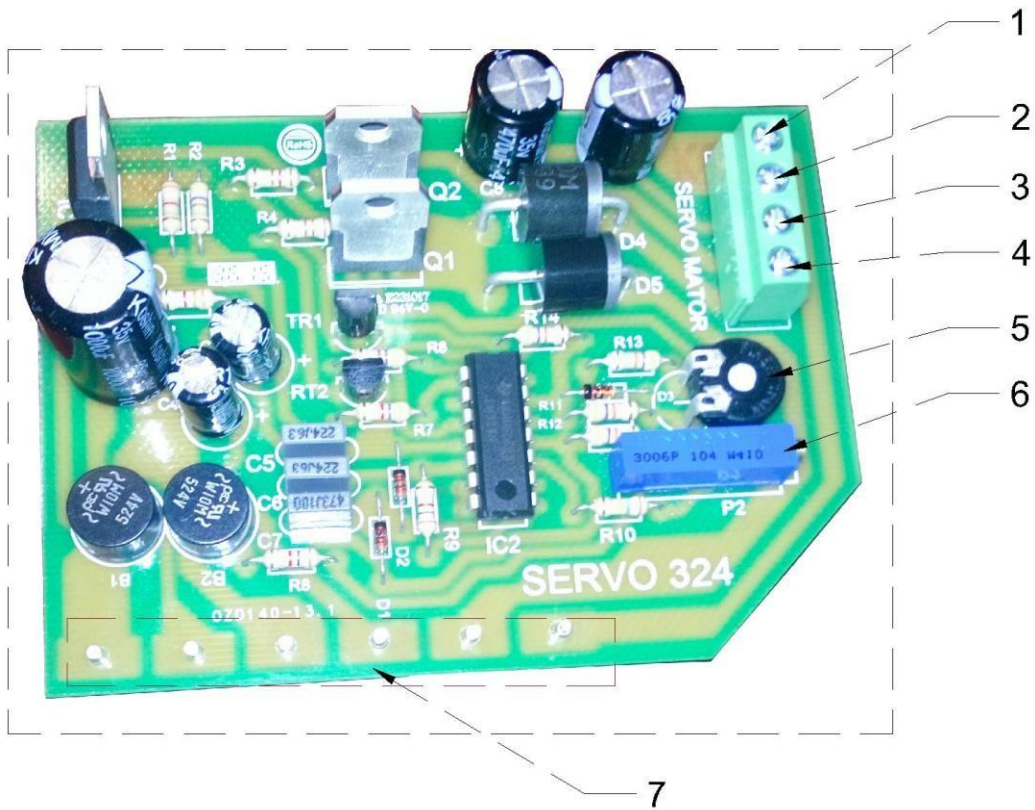


POSSIBLE PROBLEMS AND SOLUTIONS;

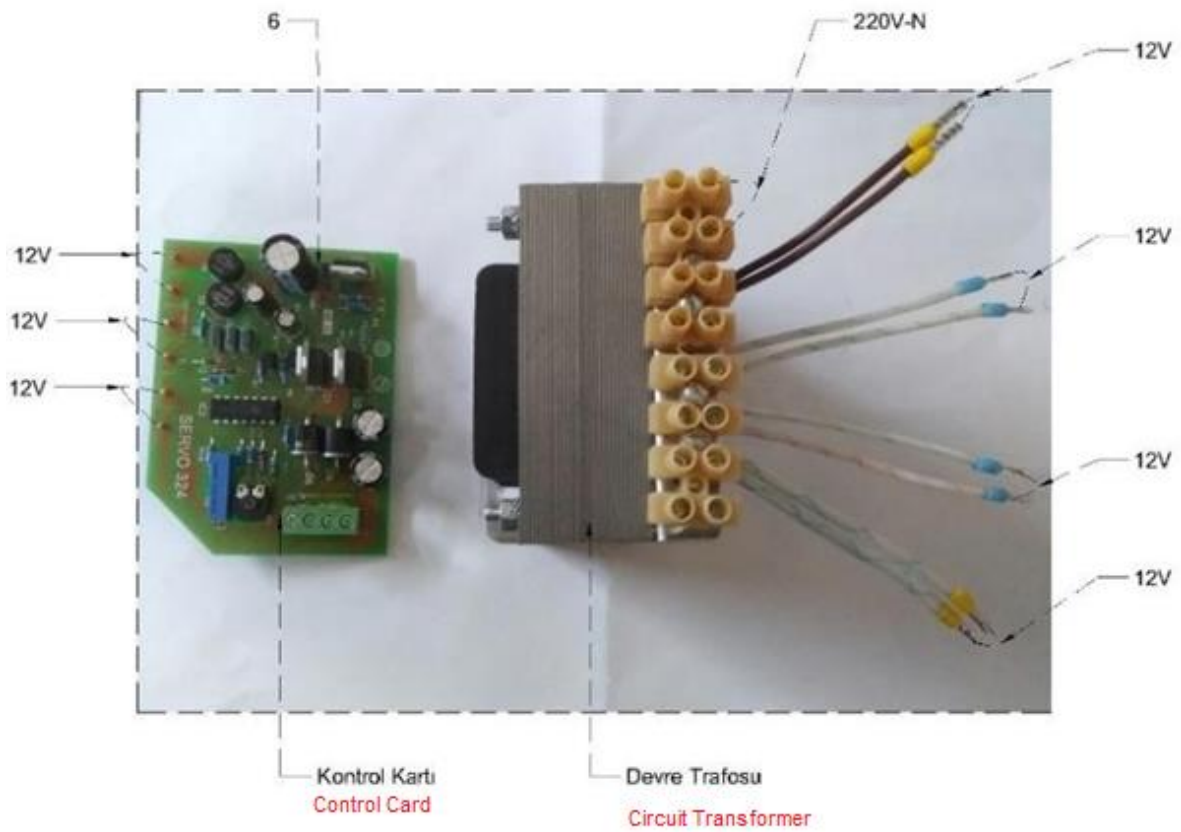
Problem	Possible Cause	Solution
Voltmeter does not show right	Voltmeter defective	If voltmeter is digital, check socket; if it is analog, replace.
	Electronic card defective	Check neutral connection, if problem persists please inform Technical Service
Smell emanates from device	Overloading available	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 and off sometimes	If device is protected	Make sure neutral and phases are correct.
	If device is not protected	It must be drawing excessive ampere. 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.
<u>IMPORTANT NOTICE:</u> Any interventions to device must only be made by qualified individuals.		



9 Installation Of Control Card



1	Engine
2	Limit Switch (Common Tip)
3	Limit Switch-1
4	Limit Switch-2
5	Output Voltage Sensitivity Settings
6	Output Voltage Settings
7	Connection Pins of Circuit Transformer



10 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.