



# **AUTOMATIC VOLTAGE REGULATORS**

## **Monophase AVR**

**3- 50kVA**

**1 Phase Input- 1 Phase Output**

**AUTOMATIC VOLTAGE REGULATORS  
USER'S MANUEL**



## IMPORTANT NOTICES!

Dear User;

This manual contains information about features of Voltage Regulator (AVR), installation, operation and the loads connected to the AVR, safety information, use of the AVR, operation principles, settings and measurements (calibrations), detection and troubleshooting.



Read the instructions carefully before the installation.



Keep manual in case you need as an Application Source!



COMPANY reserves the right to change the contents and information in this document without notice.

This Voltage Regulator is designed to meet the requirements specified CE/ISO9001 Standards.

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## Safety Instructions



Information relating to safety of TESCOM 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.

- 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

# 1. General Instructions

## 1.1 Handling and Shipping

Be careful when handling loads. Do not carry heavy loads without help. Move wheeled devices on smooth and unobstructed surfaces.



- Devices weighing more than 20 kg are not manpower; It can be transported by forklift with the blades entering from the bottom.
- Regulators should not be dropped or hit while being transported.
- Transport the regulator as packaged until it reaches the place where it will be installed.
- After the package is opened, it should be examined whether the device has been damaged during transportation. For this, the package switch, compact switch and W-automatic on the device are examined, and attention is paid to the broken or disassembled parts. It is checked whether the monitor on the front panel is damaged.
- Before using the product with damaged packaging or without packaging, call the technical service.

## 1.2 Location

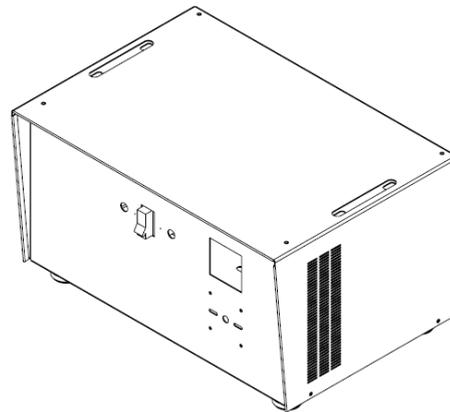
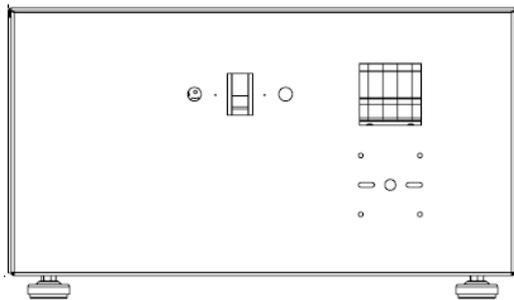


Fig.-1 1phase servo regulator

## Non-Suitable Operating Enviroments for AVR;



- Harmful smoke, dust, abrasive dust.
- Moisture, steam, rainy/bad weather conditions
- Excessive temperature changes
- Lack of ventilation
- Direct/ indirect exposure to radiation heating thru any other sources
- Severe electromagnetic field
- Harmful radioactive level
- Insects, fungus
- The AVR can operate at ambient temperatures between  $-10\text{ }^{\circ}\text{C}/ + 50\text{ }^{\circ}\text{C}$ .
- The relative humidity at ambient must be between 20%-95%.
- Make sure the floor is strong enough to carry the system weight.,
- There must be at least 20 cm distance between device surfaces containing ventilation.

### 1.3 Storage

- AVR can be stored at a temperature of  $-25\text{ }^{\circ}\text{C}$  to  $+60\text{ }^{\circ}\text{C}$ , far away from heaters and in a dry environment.
- The relative humidity at ambient must be between 20%-95%.
- Check the AVR power compliance of total load to be connected to AVR and line.
- The AVR must be stored in a dry and moisture-proof environment before commissioning.

## 2. Introduction the Automatic Voltage Regulator (AVR)

### 2.1 Introduction

Tescom TVR 11 Series Servo Voltage Regulators provide safe energy for your loads in areas where your network is irregular or where the power supply voltage is unstable, such as a generator. By keeping the voltage within certain tolerances, it offers full protection against the risk of damage caused by excessive fluctuations in voltage.

Voltage Regulators Microcontrollers are electromechanical type smart devices with processors. For this reason, it can be used safely and smoothly in sensitive electronic devices that require constant voltage. Voltage Regulators work with measurement technique based on true RMS value. Thus, it always produces a stable output voltage with very fast correction, without being affected by sudden changes in input mains voltage and waveform distortions. With their perfect regulation, they provide the necessary protection in environments where irregular voltage is used, such as generators or industrial electricity, without being affected by the power factor of the load and the harmonic disturbances of the mains voltage.

Device advantages; It consists of quality and long-lasting materials, safe and tried system, silent operation and high efficiency, distortion-free output, stable and uninterrupted feeding, wide correction range and high sensitivity.

With the microprocessor control, the necessary signals of the desired regulation are transmitted to the dc motor. The DC motor provides movement in the direction of adding or subtracting voltage for regulation on the variac to which it is mechanically connected. This supplied voltage is transferred to the differential auxiliary transformer (booster transformer). As a result, electronically controlled stable voltage is provided in the output voltage against voltage changes.



Fig.-23-15 kVA servo regulator

It has a clear LCD screen. Input-output voltages, frequency and load percentage information can be seen on the screen instantly. It can show warning information and store it in its memory.

The product you have chosen is under warranty for two years within the specified conditions. Keep your warranty card approved by the Authorized Dealer to show it to our service in case of malfunction. This is in the interest of the consumer for the convenience of the transactions to be made.

In this manual, the introduction, use, maintenance and rules to be followed of the Monophase Fully Automatic Servo Model regulators purchased from our company are introduced.

## 2.2 Structure and Working Principle

Variac (thyridal transformer) for adjusting the voltage,

- Power (boost) transformer,
- Supply transformer,
- Variac engine,
- Control card
- Display panel,
- Current transformer,
- Mains-Regulator Selector Switch
- Contactor (optional)

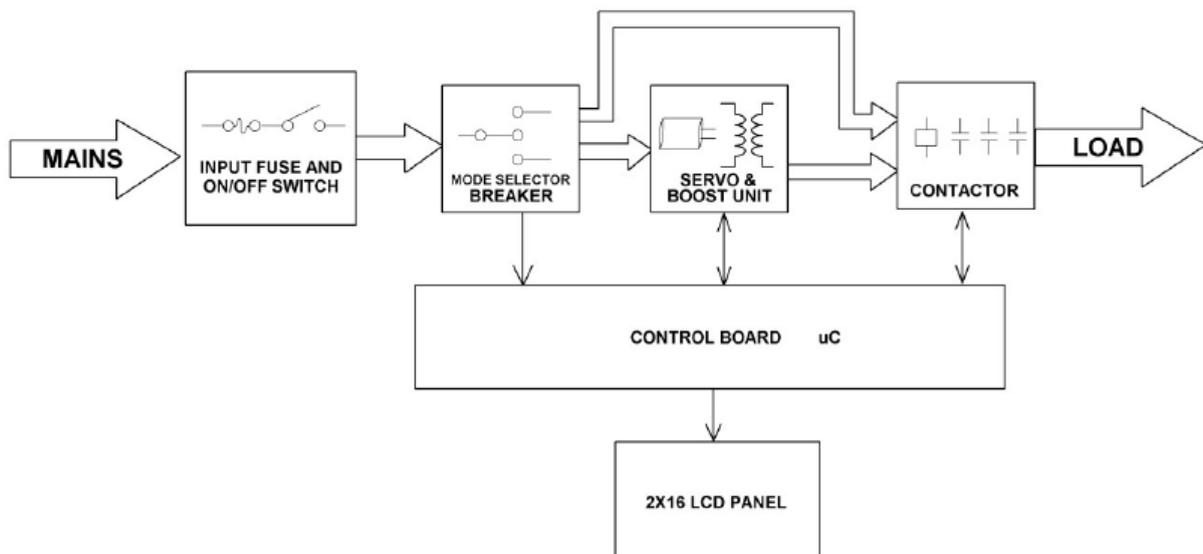


Fig.-3 Regulator block diagram

The Servo Regulator consists of the variable Transformer (Varyac), which provides voltage regulation, the Servo Motor that controls the auxiliary transformer, and the Electronic Board that controls this motor according to the output voltage.

If the normal mains input voltage drops or rises, the electronic control circuit detects it precisely and quickly starts the servo motor. The motor moves the tuned transformer (Varyac) to the right or left according to this signal it receives and moves the primary winding of the Booster transformer by giving voltage to the network or in the opposite direction. The voltage produced in the secondary winding is reflected as an addition or subtraction to the input voltage of the grid. Thus, it tries to keep the output voltage that may occur in input voltage fluctuations at the desired sensitivity at the output with a tolerance of  $\pm 1\%$ , and the safe

operation of the device is ensured with other auxiliary equipment. The control system with DC motor array with fast response time and high starting torque quickly corrects even small voltage changes at the input. When the Servo Motor input voltage goes out of the operating limits, the output voltage is automatically adjusted to the desired value by the limit switches and deactivated by the control circuit.

## **2.3 Technical Specifications**

### **2.3.1 Device Features and Basic Information**

Servo-Controlled voltage regulators; It consists of toroidal transformer (variac), auxiliary transformer, servo-motor controlling variable transformer and electronic circuits that control this motor according to output voltage.

With its fast response time control system, the DC motor array with high starting torque quickly corrects even small voltage variations at the input. Servo-Motor is deactivated by the control circuit by automatically adjusting the output voltage to the desired value by the limit-control system when the input voltage goes out of the operating limits. When the regulation is completed, the energy of the motor is cut off with the help of the electronic braking circuit and it works silently.

**1. Wide Power Range:** Monophase generation from 3 kVA to 50 KVA.

**2. Input voltage correction range:**

Standard;160-260VAC (Optional:90-285 VAC) monophase

**3. Regulation Rate:** 90V/sec

**4. Output Deviation:** As long as the regulator is not used over its power, there is no deviation from the output.

**5. Efficiency:** Efficiency is better than 96% since TESCOM regulators and transformers consist of high-quality silicon sheet and B-ef class conductive materials.

**6. Operating Temperature:** Regulators shall be used up to 50 ° C unless there is acidic and humid environment. Extra cooling system also applied for the hot environments over this temperature.

**7. Overvoltage and Phase Protection Unit (Optional):** 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.

**8. By-Pass system:** By-pass operation is realized thru high quality pako switches. In case of any fault, the regulator can be transferred to the Line with the 2x and 6x pole changeover switches without any operation.

## 2.3.2 Technical Specifications Table

Pf:1,0

MODEL	TVR 1103	TVR 1105	TVR 1107	TVR 1110	TVR 1115	TVR 1120	TVR 1125	TVR 1130	TVR 1140	TVR 1150	
Power (kVA)	3	5	7,5	10	15	20	25	30	40	50	
<b>INPUT</b>											
Input voltage correction range	160- 260 / 90 - 285 VAC (Optional)										
Operation frequency	47...65 Hz										
Line input protection	Over current, low and high voltage protection										
Input at current	18	30	45	61	91	121	152	182	242	303	
<b>OUTPUT</b>											
Output Voltage	220 / 230 / 240 VAC RMS $\pm$ %1										
Overloading	10 Sn. %200 load										
Correction speed	~ 90 Volt / Sec.										
Upturn period	~ 90 Volt / Sn. ( 160 VAC - 260 VAC)										
Output protection	Protects load by opening the circuit when overburden, short circuit occurs.										
Current at output	14	23	34	45	68	91	114	136	182	227	
<b>GENERAL</b>											
Working principle	Servo Motor, Microprocessor Controlled, Full Automatic										
Cooling	Smart fan system										
Measured Value Monitor	TESCOM TRUE RMS Panel Voltmeter (74x74mm) output voltage and line voltage monitorization										
Total efficiency	> %96										
Mechanic By-pass	Available										
Protection level	IP 20 // IP 54 (Optional)										
<b>ENVIRONMENTAL</b>											
Operating temperature	-10°C / 50°C										
Storage temperature	-25°C / 60°C										
Relative humidity	< %90, DIN ( 40040 )										
Altitude	< 2000 m.										
Acoustic level	< 50 dB (1m <sup>2</sup> )										
Standards	CE / ISO 9001										
<b>DIMENSIONS</b>											
WxDxH (cm)	56x39x32					52x65x68			50x62x85		
Weight (kg)	28	30	34	47	55	95	110	130	155	180	
Optional 0,8 output power factor (PF) option											
(*) Optional different protection class option											

Pf:0,8

MODEL	TVR 1103	TVR 1105	TVR 1107	TVR 1110	TVR 1115	TVR 1120	TVR 1125	TVR 1130	TVR 1140	TVR 1150	
Power (kVA)	3	5	7,5	10	15	20	25	30	40	50	
<b>INPUT</b>											
Input voltage correction range	160- 260 / 90 - 285 VAC (Optional)										
Operation frequency	47...65 Hz										
Line input protection	Over current, low and high voltage protection										
Input at current	16	24	36	48	72	96	120	144	192	240	
<b>OUTPUT</b>											
Output Voltage	220 / 230 / 240 VAC RMS $\pm$ %1										
Overloading	10 Sn. %200 load										
Correction speed	~ 90 Volt / Sec.										
Upturn period	~ 90 Volt / Sn. (160 VAC - 260 VAC)										
Output protection	Protects load by opening the circuit when overburden, short circuit occurs. (optional)										
Current at output	11	18	27	36	54	72	90	108	144	180	
<b>GENERAL</b>											
Working principle	Servo Motor, Microprocessor Controlled, Full Automatic										
Cooling	Smart fan system										
Measured Value Monitor	TESCOM TRUE RMS Panel Voltmeter (74x74mm) output voltage and line voltage monitorization										
Total efficiency	> %96										
Mechanic By-pass	Available										
Protection level*	IP 20*										
<b>ENVIRONMENTAL</b>											
Operating temperature	-10°C / 50°C										
Storage temperature	-25°C / 60°C										
Relative humidity	< %90, DIN ( 40040 )										
Altitude	< 2000 m.										
Acoustic level	< 50 dB (1m <sup>2</sup> )										
Standards	CE / ISO 9001										
<b>DIMENSIONS</b>											
WxDxH (cm)	56x39x32				52x65x68				50x62x85		
Weight (kg)	28	30	34	47	55	95	110	130	155	180	
Optional 1,0 output power factor (PF) option											
(*) Optional different protection class option											

\*The data given in the chart is for information only. It can be changed without prior notice.

## **2.4 Scope**

It covers power regulators from 3 KVA to 50 KVA. Unless otherwise stated in the test report; ISO90001/CE is applied. It covers current local official specifications.

## **2.5 Liability**

The user or the responsible person can safely use the regulators we manufacture by following this instruction. Please read this instruction for the validity of the warranty conditions and for your life and property safety.

Malfunctions that may occur due to misuse, damages that may occur during transportation, short circuit, lightning strike and failure to comply with this instruction are out of the Warranty Coverage. Maintenance and repairs of regulators are carried out in our Authorized Service.

## **2.6 Service and Spare Parts**

Domestic repair service is only provided by our Authorized Service. Please inform our Factory's Technical Service for fault notification. Our Customer Complaints department will guide you and the authorized personnel of our factory will determine for the necessary expertise on-site, in our Service or in our Factory. You can obtain spare parts or additional equipment from our Service or Factory. Regulators will last longer as long as they are protected from short circuit and overvoltage pulses without exceeding their rated power and under suitable ambient conditions.

## **2.7 Impacts on Human and Environmental Health**

Like all power tools, regulators can cause a severe fire if they fail. Their location should be isolated from human habitats. Since it is an electrical device, its covers should not be opened by unqualified persons. There is a risk of electric shock and danger to life when the covers are open. Before opening the covers, the power of the device must be cut off. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. In addition, children should be supervised to ensure that they do not play with the appliance.

## 2. Installing the Automatic Voltage Regulator (AVR)

### 2.1 3kVA -50kVA Front Panel View and Rear Panel View

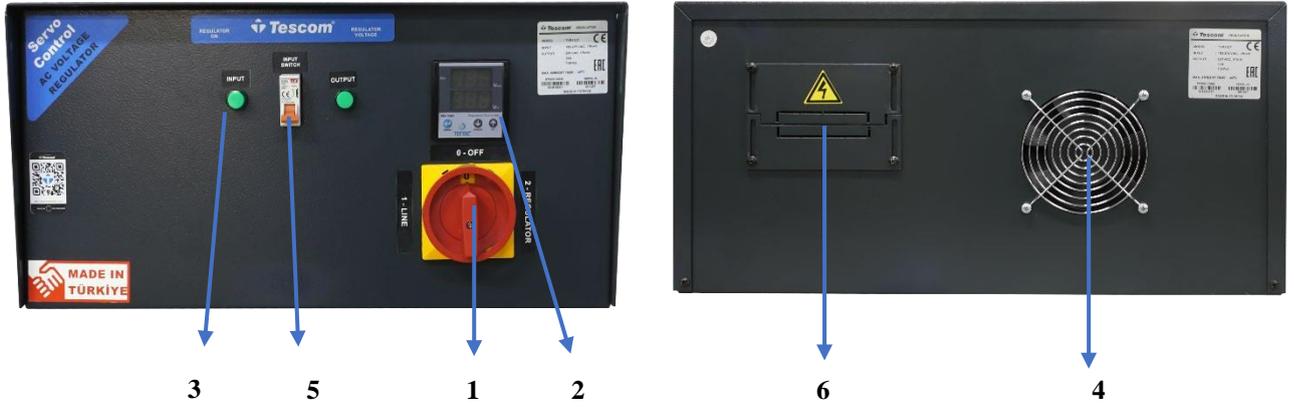


Fig.-4 Regulator 3-15kVA



Fig.-5 Regulator 20-50kVA

1	Cam Switch (Line-Regulator)
2	Monitoring
3	Fuses
4	Fan
5	Input Switch
6	Input / Output / Neutral Connection

## **2.2 Electrical Connection**

Connections can only be made by authorized service technicians. Any attempt by the user to establish a connection can be life threatening. Before connecting the input cables, make sure the Automatic fuse in the distribution panel at “OFF” position.

The device monitors from cold to heat, air humidity can condense from its temperature. In such a case, wait at least two hours before connecting because it will be very dangerous.

Connection terminals of the AVR located at rear side. Remove the terminal cover to access the input and output connection terminals of the Three Phase receiver devices. After removing the cover, route the earth, input and output cables through holes located below cable connection points

### **Earth Connection:**

For safety, the ground connection of the device must be done. Perform PE ground connections before connecting any other cable.

AVR's PE (Earth) must be connected to high quality Earth line (low resistance)The connection of the load must be done through the output Earthing screw.

### **Input-Output and Neutral Connections:**

The modifications on the panel must be carried out by the authorized technical personnel. Before connecting the input cables, make sure the Automatic fuse in the distribution panel at “OFF” position.

### **Input Connection**

A bipolar automatic fuse 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.

### **Output Connection:**

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.

Be sure to cut off the mains electricity while making the connection. Make sure to connect the mains phases to the input terminals of the regulator.

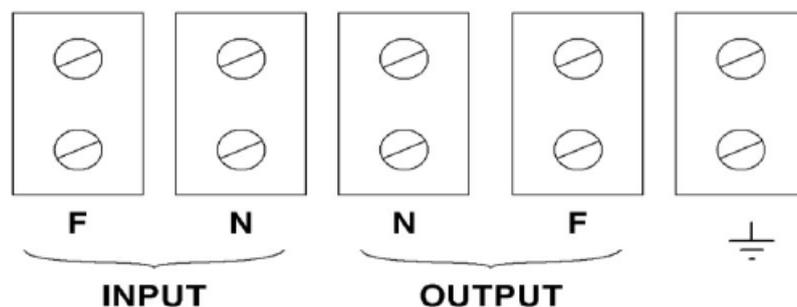


Fig.-6 Connection diagram

### 2.3 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.

## **2.4 Commissioning the Regulator**

- Device connections must be made by qualified persons in line with their technical information.
- There must be a ground line against electrical leakages in the environment where the regulator operates.
- After the regulator is connected to the installation, turn the Pako Switch on the regulator to the 0 (zero) position. Keep the W automaton in the off position. (It is closed when the lever is down) Use an upper section of the cables you have determined while choosing the connection cables, in this way, you can minimize the line losses.
- When putting the regulator into operation, first raise the arm of the W Automaton. In the second step, turn the Pako Switch of your regulator to the Regulator position. The regulator will activate and start working.
- When you want to deactivate the regulator and use the mains network, set the Paco Switch of your regulator to the "LINE" position.

### **3. Turning The Device “On” And “Off”**

- Make sure properly done earth connection before energized the device.
- Make sure the electrical connections are done properly.
- The device should not be operated under load.
- If the device do not work long time change the position of the input and output fuses to “0” position.
- Input and output electric wirings must be suitable for the device power and nominal current.
- Do not prevent air flow of the device.
- Do not place things flammable and liquid materials near the working environment of the device.

#### **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.

Make sure that the regulator is energized by turning the input fuse or switch on the regulator input supply panel to the "ON" position. Set the Pako Switch on the device to the "Regulator" position. Panels open with a beep. Make sure the output voltage is correct. Make sure that the load is fed from the regulator by turning the output supply fuse or the switch on the distribution panel to the "ON" position.

#### **3.2 Operating from Mains (BYPASS)**

Transferring voltage on input to output through a mechanical switch on Servo Regulators is called “by-pass”.

Turn all your devices connected to the regulator and the output supply fuse or switch on the distribution panel to the “OFF” position. Set the input fuse or input switch on the regulator to the "OFF" position. Set Pako Switch on the device to “Mains/Bypass” position. Make sure that the load is fed through the mains/bypass by putting the output supply fuse or switch on the distribution panel to the “ON” position.

Bypass feature is generally used to separate Servo Regulator from input and output without deactivating the loads during maintenance.

#### **3.3 Operation under Abnormal Situations**

##### **3.3.1 Overloading**

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.

### 3.3.2 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.

### 3.3 Turning The Device On

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 and then device will automatically start if mains voltage is above a certain value.

### 3.4 Turning The Device Off

Turn the Switch 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 to Mains position.

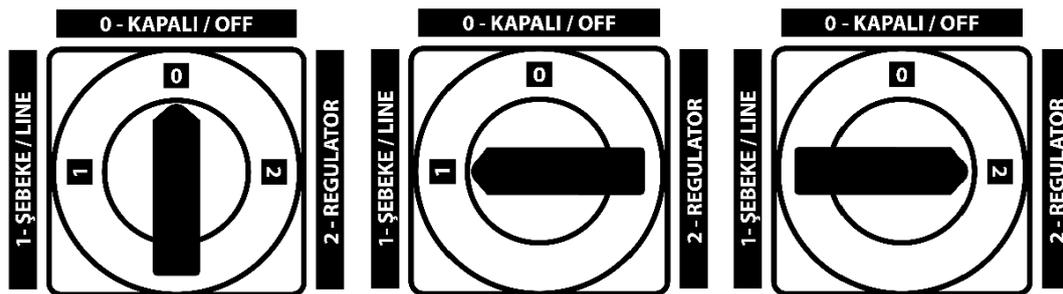


Fig.-7 Regulator Pako Switch Working Positions

### 3.5 Indicators

#### 3.5.1 Display

It has a simple and clear LCD monitor. Input-output voltages and frequency information can be seen instantaneously on the LCD.

#### RG-72K

It shows the mains input voltage and regulator output voltage simultaneously. The regulator controls the servo motor to keep the output voltage constant. It has voltage control and audible warning depending on regulator output voltage.



Fig.-8 RG-72K

Press the set button to enter the menu. Use the up/down buttons to switch between the parameters in the menu. To change the parameter, press the set button after reaching the desired parameter and see the 1st display flashing. Then enter the value you want to set with up/down buttons and press set button to save the value change. To exit the menu, go to P. out parameter and press set button.

**1st Display:** Displays the regulator output voltage.

**2nd Display:** Displays the regulator input(mains) voltage.

**Menu:** From the home screen, press the Menu key for 3 sec. To enter the menu.

**Up:** It is used to return to the previous menu and increase the value.

**Down:** Used to go to the next menu and decrease the value

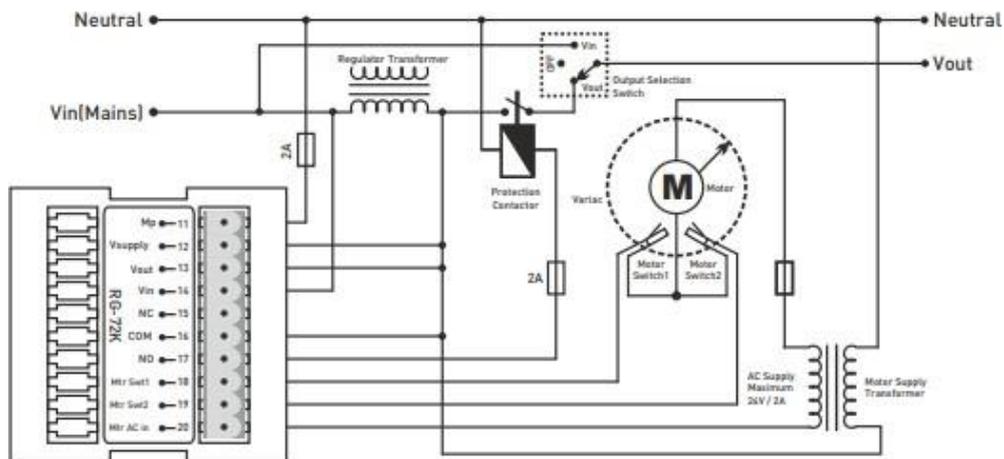


Fig.-9 RG72K Connection Form

**For other detailed technical information, please review Annex-B.**

**Annex-B contains the following information about the RG72K Multimeter;**

- Connection Diagram
- Usage of Device and Working Principle
- Maintenance
- Warnings
- RG-72K Menu Structure

## **4. Maintenance**

### **4.1 Rules for Maintenance, Repair and Use**

1. There should be no flammable or heat-affected materials around the device (bottom, top, front, back and sides).
2. The environment where the device is located should be at normal room temperature values, it should not be exposed to direct sunlight if possible, it should not be left or used in damp and humid environments.
3. Water and similar liquid substances should not enter the device.
4. The working environment should be free from rodents and insects.
5. The covers of the device should not be opened except at the Authorized Service station.
6. The device should not be exposed to impacts or high temperatures that cause deformation in the outer box.
7. Modifications made later in the electrical installation of the device must be in accordance with the power of the device.
8. The external appearance of the device should be checked once a month.
9. The paint of the device should be checked once a year.
10. The switches and cables of the device should be checked once a month.

### **4.2 Errors That May Occur in Use**

1. In case of any electrical leakage, the ground line should be checked.
2. If the device is loaded more than the usage capacity; overheating and odor are seen, check whether the usage capacity and the incoming load are suitable.
3. If odor and heat are observed, the device should not be used and the service should be contacted.
4. In case of water and similar liquid substances entering the device, the device input energy should be cut off for safety reasons.
5. If the device connection cables are damaged by rodents or other factors, the device should not be used and the cables should be replaced by qualified persons.
6. If the device does not give energy by signaling frequently, the service should be contacted for the capacity.

### 4.3 Possible Problems And Solutions

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
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 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	Aşırı yüklenme vardır, Motor bağlantısı gevşek olabilir.	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.
<b>IMPORTANT NOTICE:</b>		
Any interventions to device must only be made by qualified individuals		

### 4.4 Matters Not Covered by the Warranty

1. After the delivery of the goods to the consumer, malfunctions caused by transportation, shipment, dropping and impact, breaking and scratching of the outer surfaces,
2. Incorrect use and application of incorrect voltage, or interventions by unauthorized persons and natural disasters are not covered by the warranty.

## **APPENDICES**

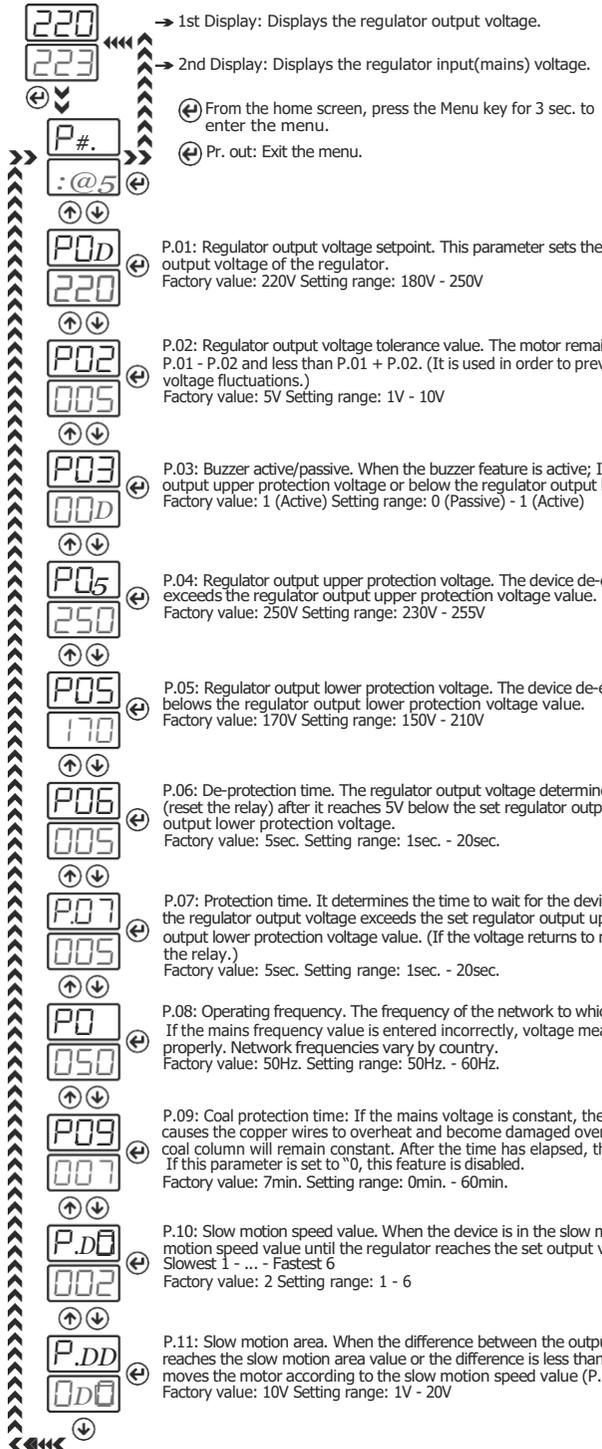
### **ANNEX-A**

#### **Warranty Conditions**

- 1.** The warranty period starts from the delivery date of the goods and is 2 (two) years.
- 2.** All parts of the product, including all parts, are under the guarantee of our company.
- 3.** If the product fails within the warranty period, the repair period is added to the warranty period. The repair time of the goods is a maximum of 20 working days. This period starts from the date when the product is notified to one of the seller, dealer, agency, representative, importer or manufacturer-manufacturer if there is no service station for the product. If the defect of the goods is corrected within 15 days, the importer or the manufacturer-manufacturer has to allocate another good with similar characteristics to the use of the consumer until the repair of the good is completed.
- 4.** In the event that the product malfunctions due to material, workmanship or assembly faults within the warranty period, it will be repaired free of charge under the labor cost, spare part cost or another name.
- 5.** Despite the consumer's right to repair, the goods;
  - Within one year, provided that it remains within the warranty period determined from the date of delivery to the consumer; More than two repetitions or different failures occurring more than four times within the specified warranty period, or the total of different failures being more than six, and these failures rendering the inability to use the product permanent.
  - Exceeding the maximum time required for repair,
  - In case the company's service station is not a service station, it is determined by a report to be drawn up by the seller, dealer, agency, representative, importer or manufacturer-manufacturer of the product that the product cannot be repaired. defect, where it is possible to replace the consumer goods free of charge, a refund or discount on the defect rate may be requested.
- 6.** Defects arising from the use of the product contrary to the terms in the user manual are not covered by the warranty.
- 7.** For problems that may arise regarding the Warranty Certificate, the Ministry of Industry and Trade, General Directorate of Protection of Consumer and Competition can be applied to.

## RG-72K / RG-96K Menu Structure

Press the set button to enter the menu. Use the up/down buttons to switch between the parameters in the menu. To change the parameter, press the set button after reaching the desired parameter and see the 1st display flashing. Then enter the value you want to set with up/down buttons and press set button to save the value change. To exit the menu, go to P. out parameter and press set button.



→ 1st Display: Displays the regulator output voltage.

→ 2nd Display: Displays the regulator input(mains) voltage.

⊖ From the home screen, press the Menu key for 3 sec. to enter the menu.

⊖ Pr. out: Exit the menu.

P.01: Regulator output voltage setpoint. This parameter sets the output voltage of the regulator.  
Factory value: 220V Setting range: 180V - 250V

P.02: Regulator output voltage tolerance value. The motor remains stationary when the output voltage is greater than P.01 - P.02 and less than P.01 + P.02. (It is used in order to prevent the motor from moving continuously during small voltage fluctuations.)  
Factory value: 5V Setting range: 1V - 10V

P.03: Buzzer active/passive. When the buzzer feature is active; If the regulator output voltage is higher than the regulator output upper protection voltage or below the regulator output lower protection voltage, buzzer will operate.  
Factory value: 1 (Active) Setting range: 0 (Passive) - 1 (Active)

P.04: Regulator output upper protection voltage. The device de-energized the relay when the regulator output voltage exceeds the regulator output upper protection voltage value.  
Factory value: 250V Setting range: 230V - 255V

P.05: Regulator output lower protection voltage. The device de-energized the relay when the regulator output voltage belows the regulator output lower protection voltage value.  
Factory value: 170V Setting range: 150V - 210V

P.06: De-protection time. The regulator output voltage determines the time to wait for the device to exit the protection (reset the relay) after it reaches 5V below the set regulator output upper protection voltage or 5V above the regulator output lower protection voltage.  
Factory value: 5sec. Setting range: 1sec. - 20sec.

P.07: Protection time. It determines the time to wait for the device to enter the protection and de-energized the relay after the regulator output voltage exceeds the set regulator output upper protection voltage value or belows the regulator output lower protection voltage value. (If the voltage returns to normal within this period, the device will not de-energized the relay.)  
Factory value: 5sec. Setting range: 1sec. - 20sec.

P.08: Operating frequency. The frequency of the network to which the regulator is connected is entered in this parameter. If the mains frequency value is entered incorrectly, voltage measurements and regulator control will not be performed properly. Network frequencies vary by country.  
Factory value: 50Hz. Setting range: 50Hz. - 60Hz.

P.09: Coal protection time: If the mains voltage is constant, the long time the regulator coal column remains constant causes the copper wires to overheat and become damaged over time. This parameter specifies the maximum time the coal column will remain constant. After the time has elapsed, the coal column is moved by moving the motor. If this parameter is set to "0", this feature is disabled.  
Factory value: 7min. Setting range: 0min. - 60min.

P.10: Slow motion speed value. When the device is in the slow motion area, the motor is moved according to the slow motion speed value until the regulator reaches the set output voltage.  
Slowest 1 - ... - Fastest 6  
Factory value: 2 Setting range: 1 - 6

P.11: Slow motion area. When the difference between the output voltage and the regulator output voltage set value reaches the slow motion area value or the difference is less than this value, the device enters the slow motion area and moves the motor according to the slow motion speed value (P.10).  
Factory value: 10V Setting range: 1V - 20V

## REGULATOR CONTROL RELAY

### General

It shows the mains input voltage and regulator output voltage simultaneously. The regulator controls the servo motor to keep the output voltage constant. It has voltage control and audible warning depending on regulator output voltage.

### Usage of Device and Working Principle

Make the connections according to the connection diagram. When the device is energized, the first display shows the regulator output voltage and the second display shows the regulator input (mains) voltage. If the regulator output voltage is between P.04 (regulator output high protection voltage) and P.05 (regulator output low protection voltage), the relay (Out) led will light and switch to the contact output NO terminal. If the regulator output voltage is not between P.04 and P.05, the device counts up to P.07 (protection time), then the relay led goes off, the contact output switch to the NC terminal and the device sounds a buzzer. When the regulator output voltage returns between P.04 and P.05, the regulator counts up to P.06 (de-protection time), then the relay led turns on and switch to the contact output NO terminal. If the regulator output voltage is between (P01 + P02) and (P01 - P02), the device does not output to the motor.

Note: When the difference between the input and output voltage is below 3V, the buzzer will not activate. (In case of bypass)

### Maintenance

Switch off the device and release from connections. Clean the trunk of device with a swab. Don't use any conductor or chemical might damage the device. Make sure device works after cleaning.

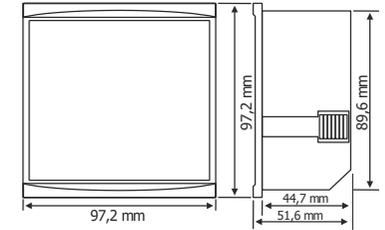
### Warnings

- Please use the device according to the manual.
- Don't use the device in wet. Include a switch and circuit breaker in the assembly.
- Put the switch and circuit breaker nearby the device, operator can reach easily.
- Mark the switch and circuit breaker as releasing connection for device.

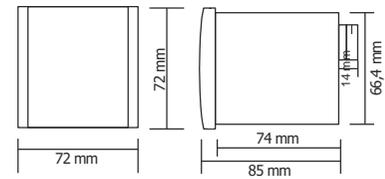
Note: If the motor is moving in the opposite direction, reverse the motor switch 1 (18) and motor switch 2 (19) connections.

## RG-72K and RG-96K ENG

### Dimensions for RG-96K



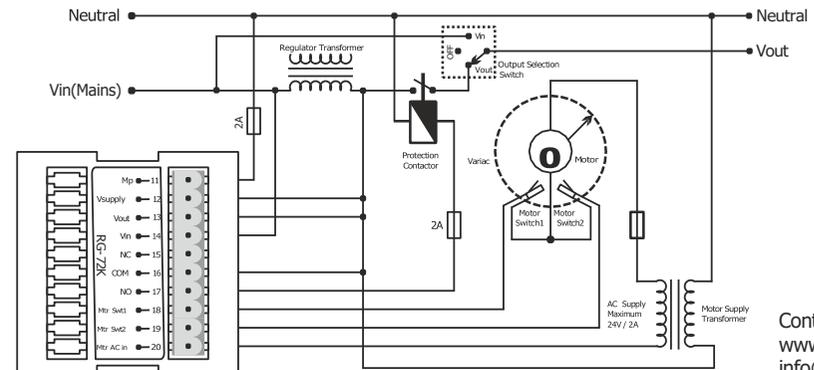
### Dimensions for RG-72K



### Tecnical Specifications

Supply (Un)	: 220V AC 50/60Hz.
Operating Range	: Un x (0,8 - 1,2)
Operating Power	: 6VA
Measurement Range	: 1V - 300V (L-N)
Measurement Accuracy	: ±%1
Contact	: 250V/5A AC (1250W) (Resistive Load)
Motor Outputs	: 24V/2A AC
Operating Temp.	: -20°C. +55°C
Display	: 14mm LED Display (20mm in RG-96K) 14mm LED Display + LED
Connection Type	: Plug-in terminal
Cable Diameter	: 1,5mm <sup>2</sup>
Weight	: 0,240Kg. (RG-96K) 0,190Kg. (RG-72K)
Panel Hole Sizes	: 91x91mm (RG-96K) 68x68mm (RG-72K)
Protection Class	: IP41 (Front panel), IP00 (Body)
Operating Altitude	: 2000m

### Connection Diagram



Contact:  
www.tense.com.tr  
info@tense.com.tr