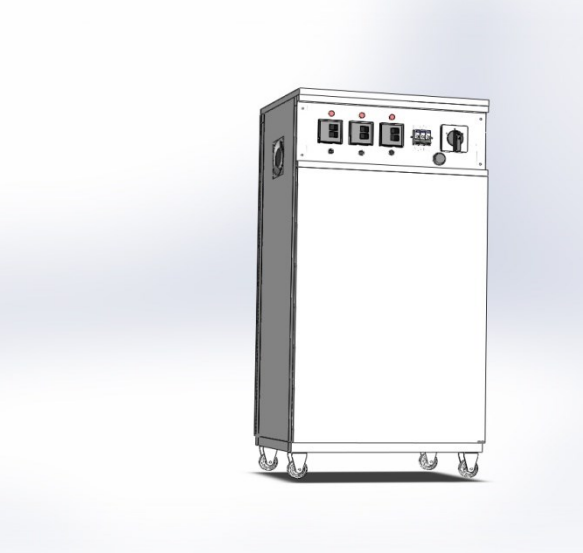
Tescom® HELLAS

Your Reliable Partner for Uninterruptible Power

3-150 KVA THREE-PHASE SERVO REGULATOR



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.

CE

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1.Definition of System

2.Installation

3.Starting Up and Switching Off

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Safety



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.
- 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 Description of System

Preventing any surges and drops and all irregularities in mains voltage and regulating the voltage TESCOM 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.

TESCOM 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.

2 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; and
- Away from heating elements and 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.

Regulator may operate in environment temperatures between 0 °C and +40 °C.

2.4 Connections

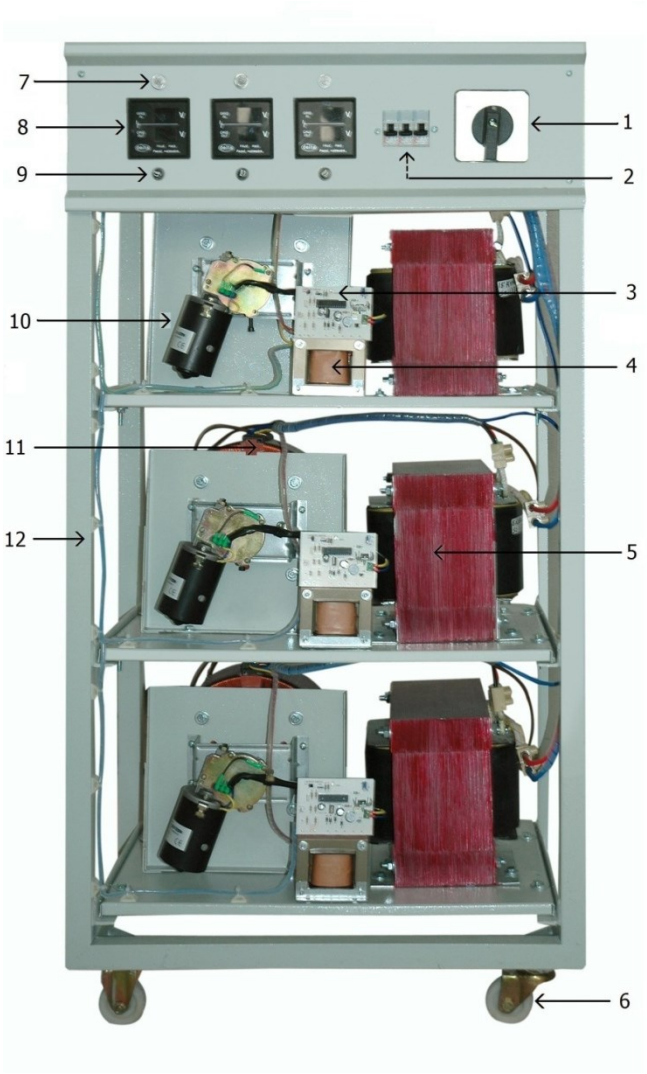
Connections may only be made by authorized service technicians. Any attempts by user to make connections may threaten life.

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 face. Cover on terminals must be disassembled to make connections.

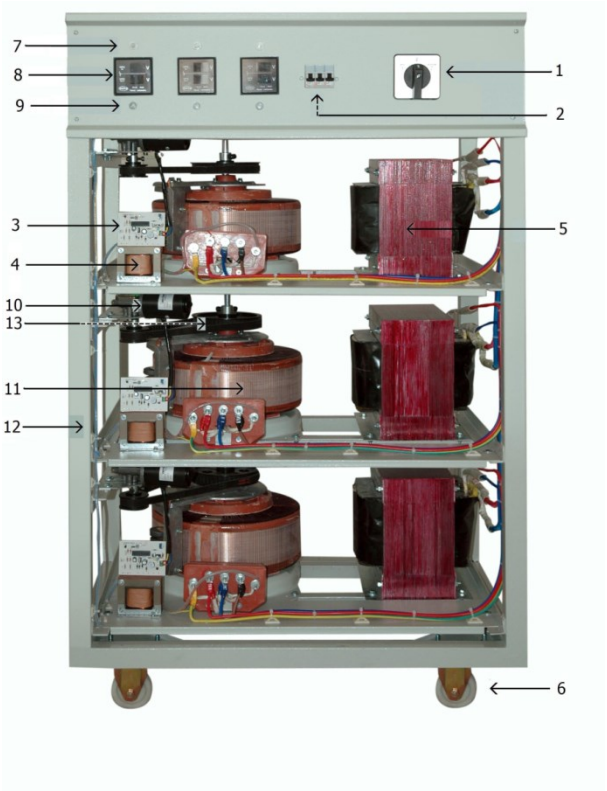
SINGLE-PHASE CONNECTION UP TO 3 KVA – 150 KVA

2.4.1



Picture	
3 KVA – 45 KVA	
NO	**SEMI MANUFACTURED**
1	PAKO SWITCH
2	W FUSE
3	ELECTRONIC CARD
4	CIRCUIT TRANSFORMER
5	FEEDING TRANSFORMER
6	WHEEL
7	SIGNAL LED
8	VOLTMETER
9	(FUSE)
10	SERVO MOTOR
11	VARIAC
12	MAIN CHASSIS
14	FAN (ON DOOR)

2.4.2



Picture	
60 KVA – 150 KVA	
NO	**SEMI MANUFACTURED**
1	PAKO SWITCH
2	W FUSE
3	ELECTRONIC CARD
4	CIRCUIT TRANSFORMER
5	FEEDING TRANSFORMER
6	WHEEL
7	SIGNAL LED
8	VOLTMETER
9	(FUSE)
10	SERVO MOTOR
11	VARIAC
12	MAIN CHASSIS
14	FAN (ON DOOR)

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

2.4.3 Earth Connection

Servo Regulator must be earth connected.

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 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.

2.4.5 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.

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

3.2 Switching 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.

4 Operation

4.1 Operating the Device

4.1.1 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".

4.1.2 Operating from Mains (BYPASS)

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

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

4.2 Operation under Abnormal Situations

4.2.1 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.

4.2.2 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.

4.3 Indicators

4.3.1 Display (EPM Display)

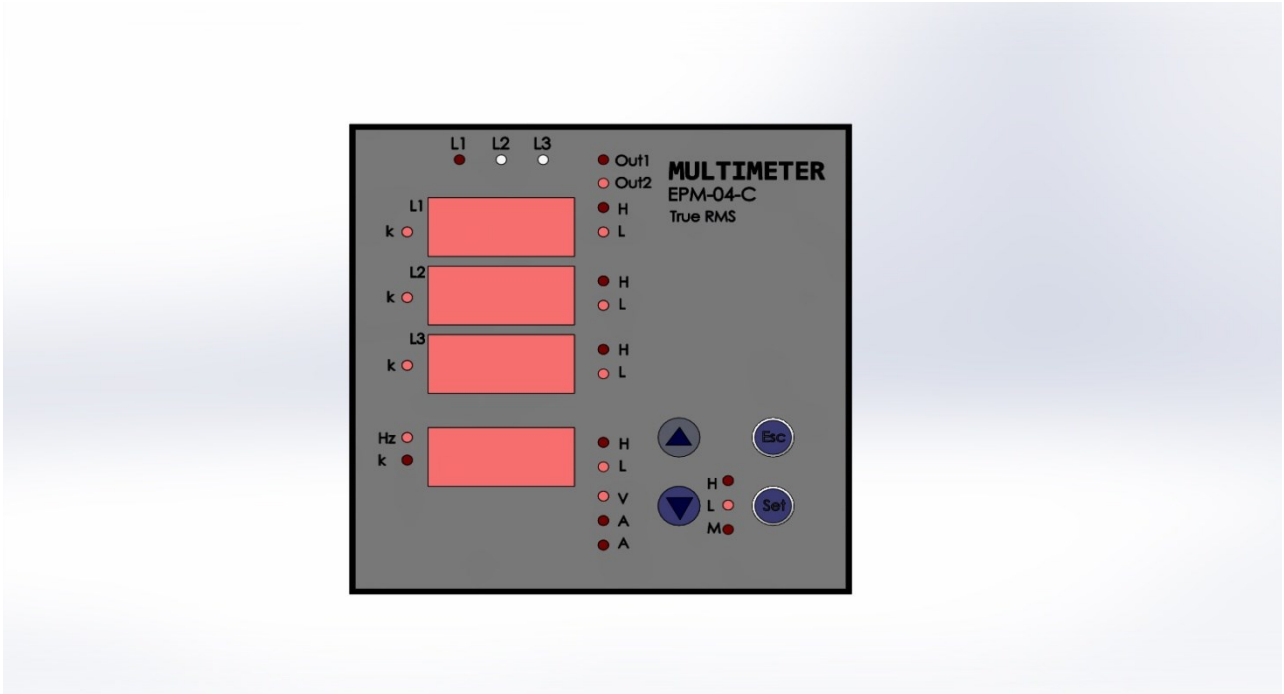
Output Voltage, Input Voltage values are displayed on display.

4.3.1.1 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.

EPM-04-C INTRODUCTION AND USE

Device is manufactured as phase and current protected as optional which feature prevents the supplied devices from getting damaged by shutting down the system in case where device is subjected to overcurrent loading or one or two voltage is not available. Such current and phase values are factory set according to the power of device and are not needed to be changed.



Nevertheless if it is required to change, press and hold set button and a pin code will appear in 3 seconds. Enter (1234) and press upper arrow and enter (curh1) section. Enter max. current for device and press and hold Esc key until yes appears on screen. Then press set key and save the selection. Voltage values are factory set as low voltage 180volts and high voltage 245 volts. If you want to change such settings, press up and down keys (spuolh1) and enter desired voltage values. Press Esc key until yes appears on screen and then save with set key.

5 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.

6 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.

7 Technical Specifications and Data

Technical Specifications

MODEL	33003	33006	33010	330015	330020	330030	330045	330060	330075	330100	330120	330150
Power kVA	3	6	10,5	15	22,5	30	45	60	75	100	120	150
REGULATOR INPUT												
In.Vol.Correct.Interval	275 - 450 VAC											
In.Vol.Working Interval	155 - 490 VAC											
Operation Frequency	47...65 Hz											
Line Input Protection	Overcurrent, Low and High voltage protection											
REGULATOR OUTPUT												
Output Voltage	380 VAC RMS ± %2											
Overloading	10 Sec. % 00 Load											
Correction Speed	~ 90 Volt / Sec.											
Upturn Period	~ 90 Volt / Sec. (160 VAC - 250 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.	DELTA 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)	110 x 50 x 44					119 x 60 x 44		140 x 85 x 64			163 x 90 x 69	
Weight (kg)	55	65	120	135	154	183	237	330	356	456	545	565

TESCOM 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.

1.**Wide power range**: three-phase production from 3 kVA up to 150 KVA

2.**Voltage field**:

Standard;	160/250/220 V single-phase
Special regulators:	140/240/220 V single-phase
	120/240/220 V single-phase

3. **Regulation speed rate** : 80 V/sec..

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

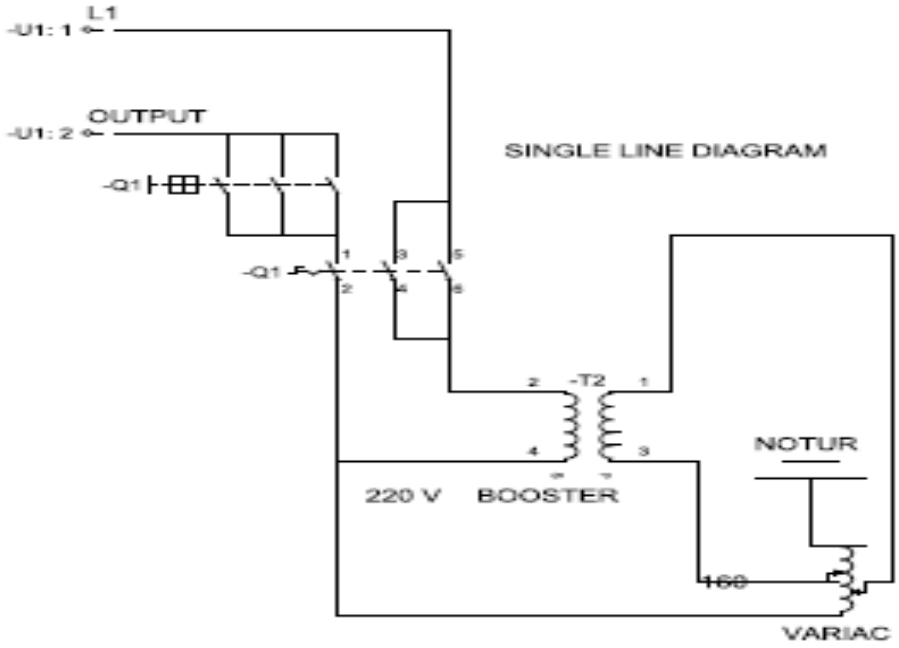
5.**Efficiency**: Efficiency is better than 95% since TESCOM regulators and transformers consist of high-quality silicon sheet and B-ef class conductive materials.

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.

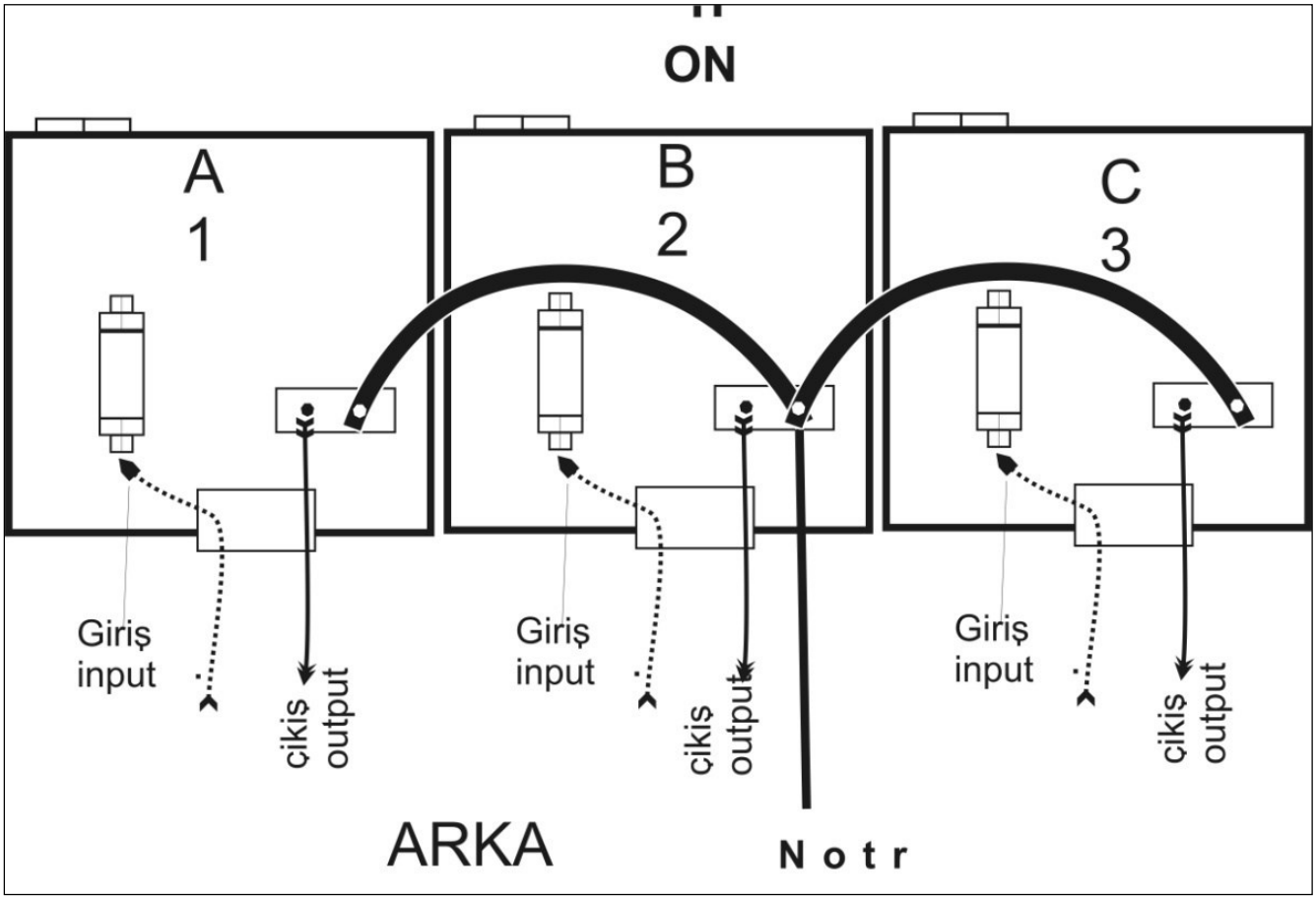
7.**Over voltage and phase protection unit (optional)**: Cuts off the output in case where any of phases is gone during over voltage deviations (low-high) and allows output again upon finding the desired voltage. User may deactivate protection unit with its respective on device.

8.**By-Pass system**: 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.

8.8 Regulator Principle Diagram:

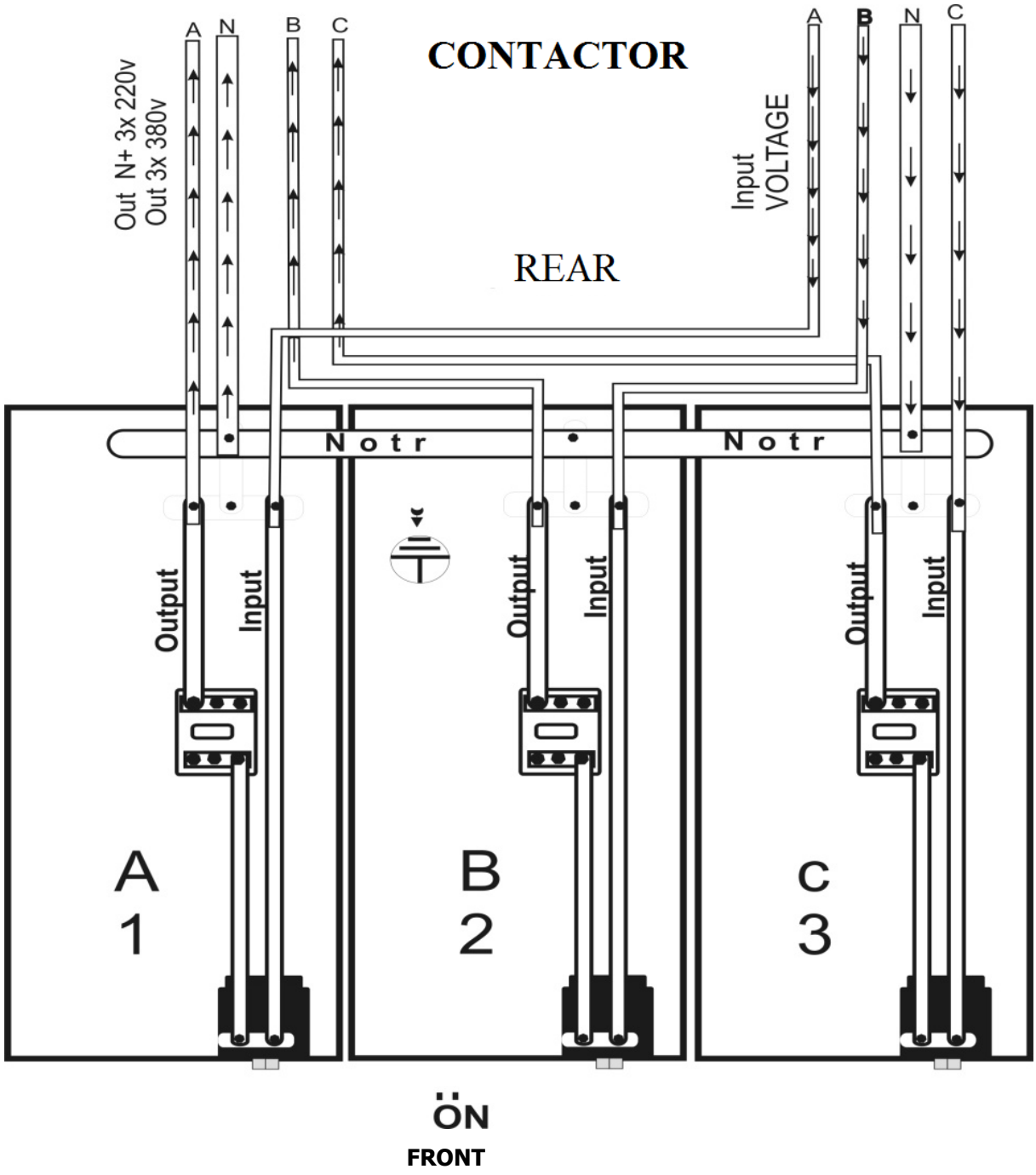


FRONT

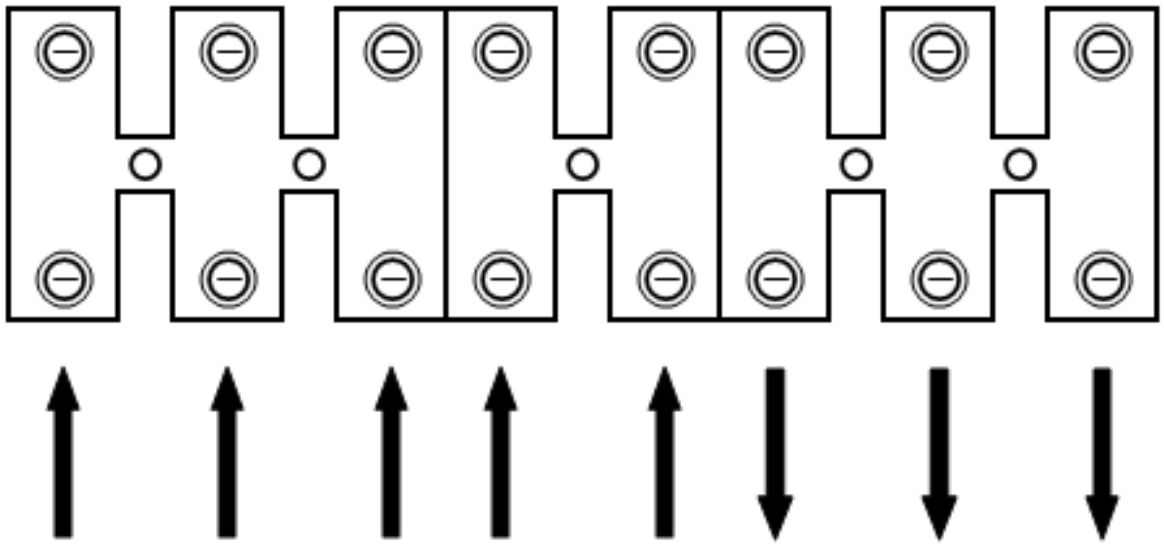


REAR

3 PCS THREE-PHASE CONNECTION SCHEMA WITHOUT CONTACTORS (DRAWING 1)

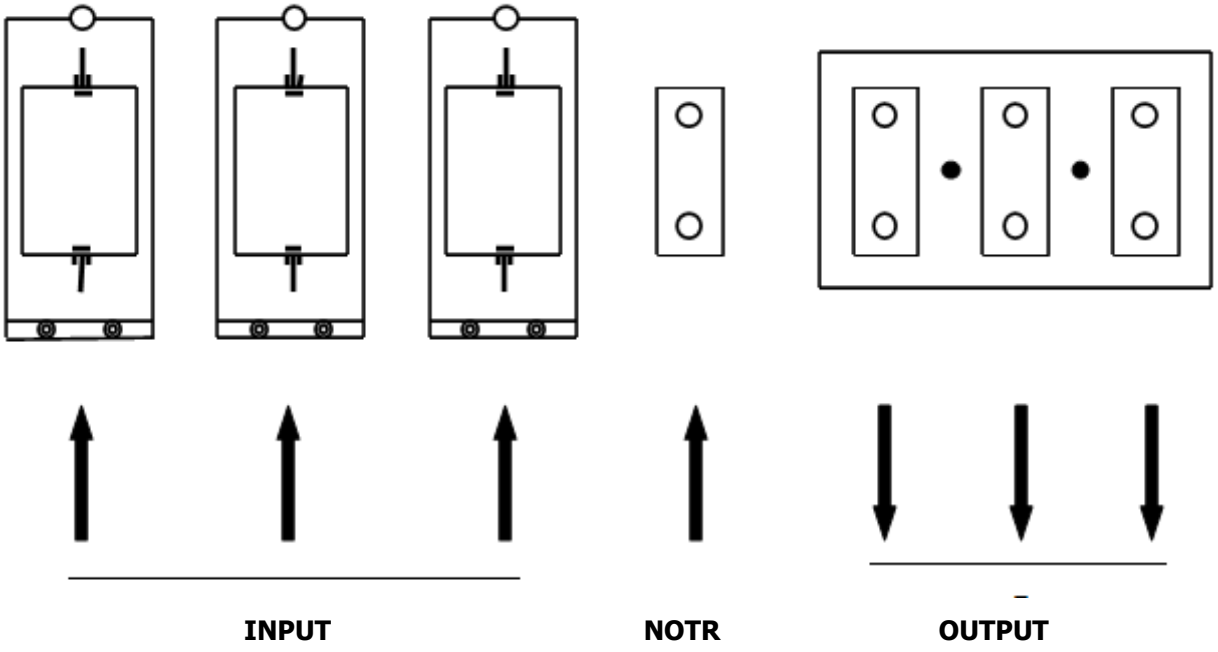


3 PCS THREE-PHASE CONNECTION SCHEMA (DRAWING 2)



1 **INPUT** **NOTR** **OUTPUT**

THREE-PHASE 3 KVA - 45 KVA CONNECTION SCHEMA



8 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 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.
IMPORTANT NOTICE: Any interventions to device must only be made by qualified individuals.		

9 Superior Performances

High quality and long lasting materials.

Safe and tried system

Silent operation. High efficiency.

Undistorted output.

Stable and uninterrupted supply.

Wide regulation range. High precision.