



Aunilec[®]
Onduleurs • Redresseurs • Batteries

Protection and
energy saving

Certified

ISO 9001:2015
BUREAU VERITAS
Certification



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Company Aunilec

Aunilec - France (Guénange)

The Aunilec company was established in January 1999 in France with major plants in Italy, Spain and the Grand Duchy of Luxembourg. We became a worldwide company recognized in more than 40 countries.



European quality and reputation

Wide range of products

Custom made products

After sales service

Large stock

All over the world

The Aunilec products are protecting all over the world.



Company Aunilec



Training

Aunilec offers to all its customers business and technical training.

Installation and maintenance

Aunilec offers - in addition to standard instructions - specified technical documentation for installation and maintenance. This allow the technical and maintenance staff to save time on-site and minimize the source of error.

Assistance

Aunilec acknowledges its part of responsibility for all products during and after the terms of warranty period. We offer technical support and assistance together with our engineers.

Custom solutions

Besides standard solutions, we also offer custom-made solutions for special applications.



Company



Our concern is you!

Service level

Aunilec guarantees a high quality service in multibrand manufacturer and maintenance of all products related to the backup power, energy saving and energy conversion, such as UPS, battery charger, continuous power (circuit breaker operating light...) central emergency lighting source, stationary battery, power factor correction capacitor, rectifier and battery charger, stabilized power supply, DC-AC converter and DC-DC, industrial battery, transformer, voltage regulator and networks conditioner.

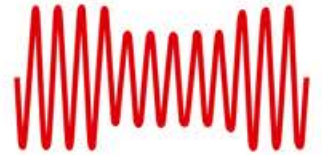
Our technical team offers several services:

- Maintenance contract
- Repair workshop (test platform)
- Battery Replacement
- Troubleshooting
- Commissioning
- Inverter Rental

Mains power faults

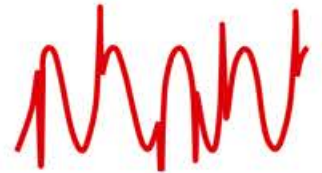
Voltage variations

Being subject to continual load variations, distribution lines are unable to supply perfectly even voltage levels. This is why any electrical equipment is built to accept shifts of at least $\pm 5\%$ as to the nominal value. As a matter of fact, electricity boards contractually provide for fluctuations up to $\pm 10\%$. However, this limit is often exceeded due to "slow variations" (voltage drops caused by under-dimensioned lines and overloads), "over-voltages" (considerable increases of the mains voltage value arising when industries drastically cut down their energy consumption), "fast variations" (drops caused by the connection of equipment such as: discharge lamps, punching machines, electric motors etc.).



Voltage spikes

These are very brief pulse disturbances extremely dangerous for the most sensitive equipment since the voltage values may reach thousands of volts. They are caused by several events, like e.g. switching of high voltage lines, connection of power factor correction capacitors, lightning, disconnection of loads with high reactive powers, and also by lower power loads such as photocopy machines and air conditioners connected to the same line powering the sensitive equipment. Spikes are not detectable by means of an ordinary voltmeter due to their short duration; however they are one of the main causes of failures and malfunctions.



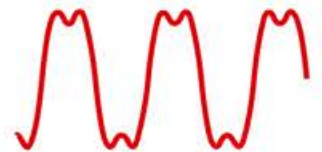
High frequency disturbances

They are very common and easily detected by anyone watching TV. They are the cause of the "snowstorm" effect and those fastidious lines that sometimes appear on the screen. They are caused by the sparks generated in the AC commutator motors, the "corona effect" on the high voltage lines, the igniters of luminous signs and burners, and by the magnetic fields irradiated by radio and TV stations. Line disturbances, also known as HF noise, do not generally create problems on electromechanical equipment, but can often damage a sensitive electronic equipment.



Harmonic distortions

They are caused by the ever increasing use of electrical equipment with non-linear absorption such as: rectifiers, converters, drives, switching power supplies. This fault can cause heavy overloads on lines and transformers, explosion of power factor correction capacitors, incorrect indications on measuring equipment and, generally speaking, the malfunction of any electrical equipment.



Blackout

This is the most obvious event (though less frequent) because everybody perceives it. It may happen accidentally on production plants or distribution lines, or it can be programmed to reduce energy consumption. There are also micro-interruptions, which may last between microseconds and a few tenths of milliseconds, caused by short circuits or line switching. These faults are not noticed by electromechanical equipment, but they can cause damage to an electronic equipment. The switching power supplies used in almost any electronic equipment can normally compensate interruptions lasting a few milliseconds. A longer blackout can cause loss of data, program cancellations and system failures.



Aunilec protection

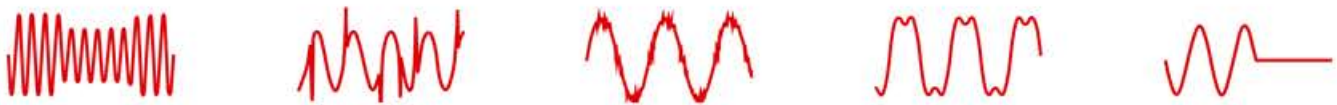
Protection against mains power faults

A wide range of devices is available to improve the power supply quality and ensure the best protection to professional equipment highly sensitive to electrical disturbances.

As a matter of fact, any equipment needs a correct powering to ensure its performance. When this condition is not complied with, there are failures, errors and premature ageing. To protect sensitive equipment, it is possible to have recourse to several devices which, depending on their characteristics, complexity and cost, ensure different levels of efficacy.

The choice should be made by assessing the degree of protection required, the entity of failures and the direct and indirect costs these may cause. It is therefore useful to know the most common electrical faults in order to adopt the most adequate protection and avoid inefficiency and failures.

Choosing the “right” protection



The dots alongside each range of products are a useful guide to find the most suitable equipment to ensure the required protection:



MAXIMUM DEGREE OF EFFICIENCY



GOOD DEGREE OF EFFICIENCY



PERFORMANCE ENSURED BY MEANS OF OPTIONAL DEVICES

Automatic voltage stabilisers - REG Series

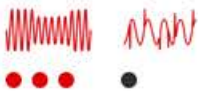


Automatic voltage stabilisers - REG M

Suitable for any type of load, they deliver a "true RMS" stabilised output voltage, even when strong harmonic distortions are present on the line. They are of simple but sturdy construction and are particularly suitable for those applications requiring:

- high reliability due to installation in areas with difficult access and/or subject to critical environment conditions;
- capability to compensate wide voltage variations, even up to $\pm 25\%$, $\pm 30\%$ or $+15\% -35\%$;
- high accuracy of the stabilised voltage;
- stabilisation of equipment with high inrush currents;
- simple and limited servicing.

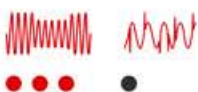
Standard versions in power range from 1 to 40 kVA.



Automatic voltage stabilisers - REG M-L

The basic characteristics are the same of the M models, the difference being in the higher precision: $\pm 0.5\%$. Thanks to their special casing they can be easily installed in 19" rack cabinets. The standard fittings include: circuit breaker, pilot lamp, voltmeter, "out of range" indicator and trimmer for the adjustment of the stabilised voltage.

Overload protection, electronic voltage relay and tripping coil can be supplied as optional protections. Available in single phase models with power rating from 3 kVA to 15 kVA.



Automatic voltage stabilisers - REG M/T/Y

These models have the same basic characteristics of the M models, but are available for higher powers. They are housed in metal cabinets and are fitted with voltmeter and pilot lamps. Upon request, they can be equipped with by-pass, soft start, overload protection, reversed phase sequence and phase failure protection, over/under voltage protections, digital network analyser, lightning arresters a.s.o. These models are a reliable, affordable and tested solution for problems caused by voltage variations on medium-high industrial plants.

A wide range of single-phase and three-phase models is available in the power range from 3 to 4750 kVA. These voltage regulators can be supplied in metallic cabinets with protection degree in IP21, IP54 or in "open frame" versions IP00 for installation into electric panels.

Electronic line conditioners - REG Series

Electronic line conditioners - REG TS/TST

These models offer a high protection level for sensitive electronic equipment connected to lines disturbed by voltage variations, high frequency interferences and voltage spikes.

They combine in one unit:

- spike suppressor;
- two RF filters;
- isolating transformer
- electronic voltage stabiliser.

They are also available in special versions for telecommunication, robotics and automation, suitable to supply 230V or 110V single-phase loads which are connected to three-phase lines without neutral.

The REG TS/TST range includes single-phase and three-phase models with power rating from 500 VA to 24 kVA.

Electrodynamic line conditioners - REG YAC

They ensure the highest protection level to high power sensitive equipment connected to electrical mains perturbed by voltage variations, high frequency interferences and voltage spikes.

The regulation system is based on magnetic components capable to withstand loads with high inrush currents.

The electronic components are used for the control board and to drive the magnetic parts stabilising voltage. Thanks to these features, the electrodynamic line conditioners ensure a high electromagnetic immunity and are very sturdy.

All REG YAC systems consist of:

- an input thermal-magnetic circuit breaker
- spike suppression,
- FR filter,
- a high attenuation isolation transformer,
- an electrodynamic voltage regulator.

The simple constructive design guarantees easy servicing which can also be performed by people with general knowledge in electrical installations. On request, they can be also equipped with the same fittings of REG TS/TST & REG YAC series.

It is also possible to supply single-phase and three-phase versions with input voltage different from the nominal output value. The REG YAC range includes three-phase models with power rating from 6 to 950 kVA.



Automatic voltage stabilisers - REG Series



Automatic stabilisers

REG stabilisers are particularly suitable for applications that require:

- high reliability. For example they can be installed in areas with difficult access, subject to critical environmental conditions due to cold, high temperatures, humidity, atmospheric discharges;
- capability to compensate wide mains voltage variations. This is a typical requirement of equipment installed in areas that are far from the distribution transformer substation and in fast developing countries.
- high precision of the stabilised voltage. Ideal condition for calibration and inspection stands, electric furnaces, professional lighting equipment;
- stabilisation of high power users or with high inrush currents like e.g. motors, air conditioners, compressors, pumps;
- simple and limited maintenance. Very important feature where it is difficult to find qualified personnel for servicing;
- wide range of models. According to the ambient conditions, the stabilisers can be supplied in enclosures with protection degree IP00, IP21, IP54 INDOOR, IP54 OUTDOOR.

Automatic voltage stabilisers - REG

The electric energy producers generate a correct voltage. However, failures on the distribution lines, atmospheric discharges, continuous load variations and disturbances generated by the users make it impossible to guarantee always a steady voltage within the tolerance bandwidth stipulated in the supply contract.

Very often this tolerance is insufficient for more sensitive equipment. Other times the mains voltage reaches levels that exceed the foreseen rated value by 15, 20 or even 30%.

Power supply and professional users

The voltage fluctuations are particularly treacherous interferences since they are not seen and can only be detected by using specific instrumentation. When such interferences are present, the electrical equipment seems to maintain correct operation but disguises serious problems that at times are beyond repair.

Even an ordinary light bulb, if overpowered by 10%, continues to give light, but halves its operating life; if underpowered by the same percentage it loses 30% of its brightness. The situation becomes much more serious in the case of voltage variations on more complicated equipment:

- a computer may become damaged or make unexpected errors;
- a laser cutting machine undergoes changes in the "laser beam mode", resulting in cutting burrs or the shutting off of the beam;
- an electric drive causes undesired changes in the speed of the powered motor and damage to the data storage and power terminals;
- an "electromedical" device gives incorrect results, wastes expensive reagents and loses the samples to be analysed.

Aunilec proposal

The REG stabilisers are registered names of two series of electrodynamic voltage stabilisers that offer a reliable and tested economic solution to inconveniences caused by voltage fluctuations. Their use is a real investment because the elimination of the inconveniences means a reduction in costs and an increase in productivity. Very often it is only necessary to avoid a few minutes machine downtime or just one failure to repay the cost of the stabilisers.

Automatic voltage stabilisers - REG Series

Operating principle

A motorised variable transformer supplies a series transformer the voltage -in phase or phase opposition- necessary to bring the mains to the rated value. The three-phase models are available in two versions:

REG-T models, which regulate on the average of the three phases and are suitable for balanced lines and a maximum load unbalance between the phases up to 50%;

REG-Y models that, having three separate control circuits, individually regulate each phase and ensure a high precision both in case of an important load unbalance between phases and asymmetrical input voltages.

General features

Range from 1 to 4750 kVA with compensation of input voltage fluctuations up to $\pm 30\%$ or greater upon request. Stabilisers with the following characteristics can be supplied:

- Single-phase: 100-110-115-120-127-200-220-230-240-265-277V
- Three-phase: 208-220-230-240-380-400-415-440-460-480-500V
- Frequency: 50 or 60 Hz

Accuracy at true RMS value of 0.5% to $\pm 1.5\%$, depending on model, even where strong harmonic distortions are present on the line. Correction speed. The advanced electronic control circuit ensures a fast response, from 11 to 50 ms/Volt depending on model.

Overload capacity up to 10 times the rated current for 10 milliseconds, 5 times for 6 seconds and 2 times for 1 minute.

Efficiency from 96% up to more than 98% depending on model. Insensitivity to power factor and load variations
Insensitivity to frequency variations up to $\pm 5\%$.

Waveform distortion is always less than 0.2% in any working condition. Impedance from 0.52 to 0.0015 ohm according to the model. It does not affect the line impedance. Therefore the installation of REG-T and REG-Y in an already existing plant does not require a new calculation of the protections.

Operating temperature up to $+40^{\circ}\text{C}$. Models suitable for operation at temperatures higher than 40°C are manufactured on request.

4 degrees of protection: IP00, IP21, IP54 INDOOR and OUTDOOR.

3 cooling systems according to the type of enclosure and the ambient conditions of the installation site:

- natural air convection for all IP21 models
- forced ventilation for IP54 models
- air conditioning for IP54 models installed in particularly hot and/or humid areas.

Reliability (MTBF) exceeding 500,000 hours. This is the result of the continuous improvements brought about since 1947. Compliance to Standards: Electro Magnetic Compatibility 2014/30/UE and following amendments; Low Voltage Electrical Equipment 2014/35/UE and following amendments.



**Toroidal variable transformer
used in REG-T models**



**Linear variable transformer used
in REG-Y models**

Automatic voltage stabilisers - REG Series

Optional fitting

They perform several functions, just to name a few:

- display of all electrical parameters;
- short circuit protection;
- overload protection;
- over/under voltage protection;
- reversed phase sequence / phase failure protection/indication;
- over temperature protection/indication;
- voltage spike suppression;
- high frequency attenuation;
- switching on back-up stabiliser;
- switching on emergency line;
- SOFT START;
- manual and/or automatic by-pass;
- galvanic separation and attenuation of common and transverse mode noise;
- automatic cut-off of unprivileged loads;
- programmed switching on/off of loads;
- storage of following parameters: electrical quantities, temperature, alarm status.

Remote control



It prevents the tripping of automatic protections of the stabiliser which would cause the interruption of the process, or, if these are not available, remove the alarm cause.

The communication module Power Meter activates the connection to a remote supervision centre, tablet and smart phone to supply real time information and historical data.

- Pop-up alert
- SMS plant alarm
- E-mail operating status
E-mail alarm



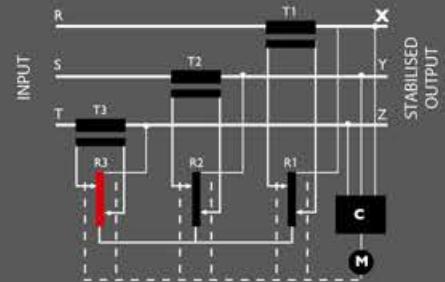
Filing of historical data

Data publication on the web

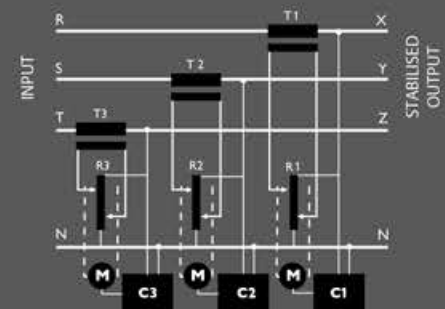
SINGLE-PHASE STABILISERS REG-M



THREE-PHASE STABILISERS REG-T



THREE-PHASE STABILISERS REG-Y



Automatic voltage stabilisers - REG Series

Cooling natural air convection

This is the distinctive characteristic of all models with protection degree IP21; it dramatically increases the reliability as the cooling of the magnetic components and the electronic control boards is ensured by natural convection without fans. Fans and the relevant filters must be constantly checked, cleaned and periodically replaced. Moreover, the absence of fans avoids sucking of dust which would deposit on the copper tracks reducing the contact surface between the electro-graphite rolls and the transformer tracks. As a consequence, this would cause roughness, sparks and copper smelting, phenomena that in the long run would damage the component and reduce its life expectancy. When the voltage is stable and the contact point is the same for several minutes, temperature can exceed 200°C. To avoid this problem, many manufacturers of voltage stabilisers install fans on the brush holder.

The pictures clearly show that NO fan is used in Aunilec variable transformers to cool down the contact point between brushes and turns.

This is possible thanks to the thermal dissipation being the result of:

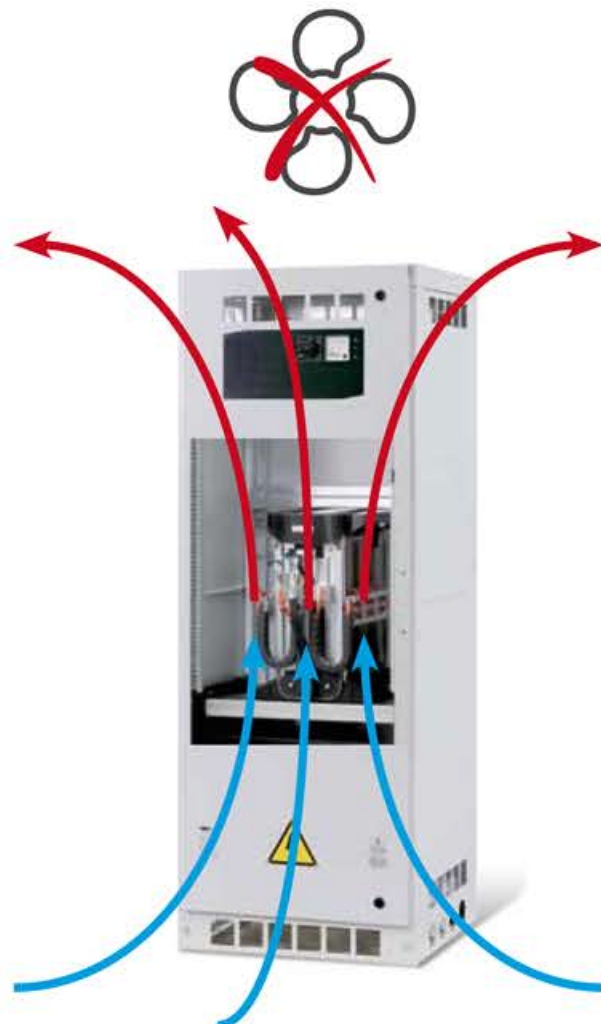
- the correct sizing and the high permeability of the magnetic cores;
- the low density of current flowing through the windings of the variable transformers, and consequently the reduced thermal dissipation;
- the square section of the linear variable transformers.



Square section linear variable transformer

Actual power

Power available 24h/day at an ambient temperature of 40°C and input voltage at the lowest level.



Automatic voltage stabilisers - REG Series

Square section linear variable transformer

The linear variable transformers are the heart of Aunilec REG series voltage regulators.

They are the most extraordinary, particularly sophisticated to manufacture and technically worked out component. As a matter of fact the mobile contact ensuring the stabilisation is flown by currents of some tens of Ampere.

The square section winding is characterised by a much higher "filling factor" than the typical round section winding.

The pictures show in both types of winding the large difference in surface existing between the copper winding and the magnetic sheet core. The smaller the surface, the smaller the leakage magnetic flux, which means higher efficiency and less heat to be dissipated.

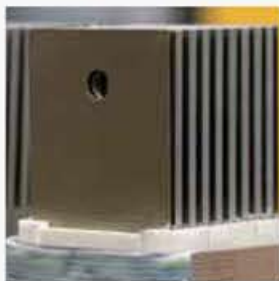
Low magnetic permeability area



Copper winding of linear variable transformers used in REG Series AVRs



Copper winding of traditional linear variable transformers



Aunilec linear vt section



Typical linear vt section

Automatic voltage stabilisers - REG Series

Warranty

Extended warranty to 5 years.



Reliability

The criteria used to dimension the electrical and electronic parts guarantees greatest reliability. The declared performance always consider the worst conditions simultaneously: nominal power with minimum input voltage of the mains and maximum ambient temperature for unlimited time.



Natural convection

The cooling is obtained in the IP21 models by natural convection into the air only. The total absence of fans (Fan-Free) increases the reliability of the product enormously and makes the use of filters, that would need constant maintenance, unnecessary.



Maintenance free

The voltage stabilisers Aunilec distinguish themselves by a long life, the absence of decline of the performance in time and reduce the necessity of maintenance thanks to their solid design and the superior quality of the materials used. In the IP21 models, characterized by the absence of fans, the maintenance of this critical component is reduced to zero. In the IP54 versions, the only maintenance necessary is the cleaning of the filters accordingly with the pollution of the environment of installation. In all models of this product line the moving mechanical parts do not have to undergo any process of periodical lubrication.



Broad range

Single phase voltage stabilisers in a range of 1 kVA up to 350 kVA
Three phase voltage stabilisers with the regulation of the average of the phases in a range of 3kVA up to 800kVA. Three phase voltage stabilisers with independent regulation of the phases in a range of 3kVA up to 4600kVA. Voltage range from 110V to 480V. All products are available in symmetrical configuration $\pm 10\%$, $\pm 15\%$, $\pm 20\%$, $\pm 25\%$, $\pm 30\%$ and an asymmetrical configuration -35% $+15\%$. All other configurations have to be requested.



Flexibility

The whole range of products presents an extremely high level of customizations, as well as the electrical specifications, the mechanical and esthetical ones. A technical staff, dedicated to "special" projects are able to satisfy the most demanding requests.



Short delivery times

The particular architecture of the voltage stabilisers Aunilec allow to satisfy in short time also the most demanding project by reducing the design and production time. Moreover, the modular system used for high power units simplifies transport and reduces time and cost.



Automatic voltage stabilisers - REG Series

REG-M SINGLE-PHASE

REG-M	1-40 kVA
REG-M	16-350 kVA

REG-T REG-Y THREE-PHASE

REG-T	common regulation of the 3 phases	3-31 kVA
REG-T	common regulation of the 3 phases	22-800 kVA
REG-Y	independent regulation of each phase	3-120 kVA
REG-Y	independent regulation of each phase	46-4750 kVA

General features	Single-phase		Three-phase			
	REG-M	REG-M	REG-T	REG-T	REG-Y	REG-Y
Toroidal variable transformer	*	-	*	-	*	-
Linear square section variable transformer	-	*	-	*	-	*
Natural air convection - fan free	vers.IP21	vers.IP21	vers.IP21	vers.IP21	vers.IP21	vers.IP21
Forced ventilation with fans	vers.IP54	vers.IP54	vers.IP54	vers.IP54	vers.IP54	vers.IP54
Forced ventilation with air conditioner	vers.IP54	vers.IP54	vers.IP54	vers.IP54	vers.IP54	vers.IP54
Electronic control	*	*	*	*	*	*
Output accuracy: ±1% RMS	*	*	*	*	*	*
Harmonic distortion	<0,2%	<0,2%	<0,2%	<0,2%	<0,2%	<0,2%
Admitted load variation up to 100%	*	*	*	*	*	*
Admitted overload: 200% x 1 mn	*	*	*	*	*	*
Ambient temperature: -10°C +40°C	*	*	*	*	*	*
Storage temperature: -20°C +60°C	*	*	*	*	*	*
Relative humidity: 90% non-condensing	*	*	*	*	*	*

Standard / Optional fittings	REG-M	REG-M	REG-T	REG-T	REG-Y	REG-Y
Pilot lamps	*	*	*	*	*	*
Tropicalised control boards	*	*	*	*	*	*
Alarm LEDs	*	*	*	*	*	*
Analog voltmeter	*	*	*	*	*	*
Digital network analyser	*	*	*	*	*	*
Remote control	*	*	*	*	*	*
USB port	*	*	*	*	*	*
RS485 port	*	*	*	*	*	*
Ethernet module	*	*	*	*	*	*
Storage of electrical parameters and alarms	*	*	*	*	*	*
CI.I lightning arresters	*	*	*	*	*	*
CI.II surge arresters	*	*	*	*	*	*
Short circuit protection	*	*	*	*	*	*
Overload protection	*	*	*	*	*	*
Over/under voltage protection	*	*	*	*	*	*
Reversed phase sequence / phase failure protection	*	*	*	*	*	*
Over temperature protection	*	*	*	*	*	*
Soft start	*	*	*	*	*	*
Manual by-pass	*	*	*	*	*	*
Automatic by-pass	*	*	*	*	*	*
Galvanic isolation	*	*	*	*	*	*
Neutral-point reactor	*	*	*	*	*	*
Input/output adapting transformer	*	*	*	*	*	*
Attenuation of common and transverse mode noise	*	*	*	*	*	*
Harmonic filter	*	*	*	*	*	*
Smart management of the plant	*	*	*	*	*	*
Modular system from REG-Y326 upwards	-	-	-	-	-	*

- * = standards
- = optional
- = not available

Automatic voltage stabilisers - REG Series

Optional fittings

DISPLAY OF ELECTRICAL PARAMETERS

Digital network analyser displaying input and output voltage, output current, frequency, power factor, active/reactive/apparent power, total harmonic distortion.

REMOTE MONITORING SYSTEM

Permits the remote monitoring of the electrical parameters as well as the acquisition of real time information and historical data. The analysis of this information and the alarm warnings allows to prevent the tripping of the AVR protections which would cause the interruption of the process or, if these are not available, to remove the cause of the alarm. Communication via USB port, RS485 port, Ethernet module (Modbus, SNMP protocol, BMS compatible).

STORAGE OF ELECTRICAL AND PHYSICAL PARAMETERS AS WELL AS ALARM CONDITIONS

All electrical measures are stored in the memory module every 15 minutes during 250 days. The recorded data can be downloaded and processed by means of the specific supervision software.

ATTENUATION OF VOLTAGE SPIKES

This function is performed by means of surge arresters which protect both the AVR and the load against overcurrent of atmospheric origin and overvoltages. The following protection devices are available:

- a.** Class I lightning arresters (IEC 62305) wave form 10/350µs 150kA total, 8/20 µs 150kA total, Up < 1.3kV, reaction time <100ns.
- b.** Combined class I+II surge arresters (IEC 62305), wave form 10/350µs 25kA total, 8/20 µs 120kA total, Up < 1.1kV, reaction time <100ns.
- c.** Class II surge arresters (IEC 60364-4-44), wave form 8/20µs 120kA total, Up < 1.3kV, reaction time <25ns.
- d.** Class III surge protection device (IEC 60364-4-44) wave form 8/20µs and 1,2/50µs 60kA total, Up < 1.2kV, reaction time <50ns.

SHORT CIRCUIT PROTECTION

Ensured by means of thermal magnetic circuit breaker or fuses in input.

EARTH LEAKAGE PROTECTION

Ensured by means of earth leakage circuit breaker.

OVERLOAD PROTECTION

Ensured by means of thermal magnetic circuit breaker, current relay or fuses in output.

OVER/UNDER VOLTAGE PROTECTION

Voltage relay with load cut-off by means of thermal magnetic circuit breaker or contactor.

REVERSED PHASE SEQUENCE / PHASE FAILURE PROTECTION

Voltage monitoring relay with load cut-off by means of thermal magnetic circuit breaker or contactor.

INTERNAL OVER TEMPERATURE PROTECTION

A sensor detects when the temperature exceeds the alarm threshold in the most critical point of the AVR. The signal can

- either activate the automatic by-pass or
- disconnect the AVR through a contactor or a thermal magnetic circuit breaker.

OUT OF RANGE FREQUENCY PROTECTION

A sensor detects when the frequency value exceeds the alarm threshold. It is possible to disconnect the AVR

- either by means of a contactor, or
- by means of a thermal magnetic circuit breaker with tripping coil in input.

ALARMS/INDICATIONS ON TERMINAL BOARD (DRY CONTACTS) IN CASE OF:

- Out of range voltage
- Out of range frequency
- Reversed phase sequence / phase failure
- Over temperature
- Overload
- Earth leakage
- Short circuit
- Exhausted surge arresters
- Disconnect switch activated

Automatic voltage stabilisers - REG Series

SOFT START

It ensures a stabilised power supply to the load immediately after a power failure. Often, after a blackout, a high voltage can be present on the line. The soft start is performed by a time delay relay and a contactor. Capacitors or battery packs are never used as these components are subject to periodical maintenance/replacement.

INTERNAL FUNCTIONAL BY-PASS

In the unlikely event of a failure of the AVR, the load will be directly powered from the mains. The internal functional by-pass is performed by

- e. manual by-pass switch capable to withstand a current equal to or higher than the max input current of the AVR
- f. 3 contactors which can be
 - automatically activated when the sensors detect a critical operating condition or in case of AVR failure,
 - manually activated by service people for maintenance purposes,
 - activated by the remote control centre through the supervision software (password protected).

MAINTENANCE BY-PASS

It is installed in a separate cabinet. The load is directly connected to the mains ensuring the operation in case of maintenance. It is performed by a manual by-pass switch capable to withstand a current equal to or higher than the max input current of the AVR.

ATTENUATION OF COMMON MODE AND TRANSVERSE MODE NOISE

By means of EMI/RFI filters.

NEUTRAL-POINT REACTOR

This is a magnetic component designed to create a clean neutral in those plants where neutral is not available or not stable.

DELTA-STAR ISOLATION TRANSFORMER

It ensures the galvanic isolation of the plant, attenuates common mode noise, creates a "clean neutral" and allows to transform the nominal voltage to the value required by the load.

ADAPTING TRANSFORMER

It allows to adapt the nominal mains voltage to the value required by the load.

HARMONIC FILTER

Can be active or passive.

POTENTIOMETER TO ADJUST THE NOMINAL OUTPUT VOLTAGE

Allows to adjust the output voltage within $\pm 5\%$ of the nominal value.

MANUAL OUTPUT VOLTAGE ADJUSTMENT

It permits to modify the output voltage value and perform the regulation manually.

SMART MANAGEMENT OF THE PLANT: AUTOMATIC SWITCHING ON A RESERVE STABILISER

After detecting a malfunctioning or a strange operation of the main stabiliser, the supervision module automatically switches the load on the reserve equipment.

AUTOMATIC SWITCHING TO AN EMERGENCY LINE

Connects the AVR to an emergency line after an abnormal condition of the main power supply has been detected by the supervision module.

DEVICE FOR UNPRIVILEGED LOAD SWITCHING-OFF

Automatically switches off unprivileged loads in case of overload or to achieve energy saving.

CONTROL MODULE FOR PROGRAMMED SWITCHING-ON / OFF OF LOADS

Capable to handle up to 8 lines, each of them can undergo 8 changes of state in 24 hours.

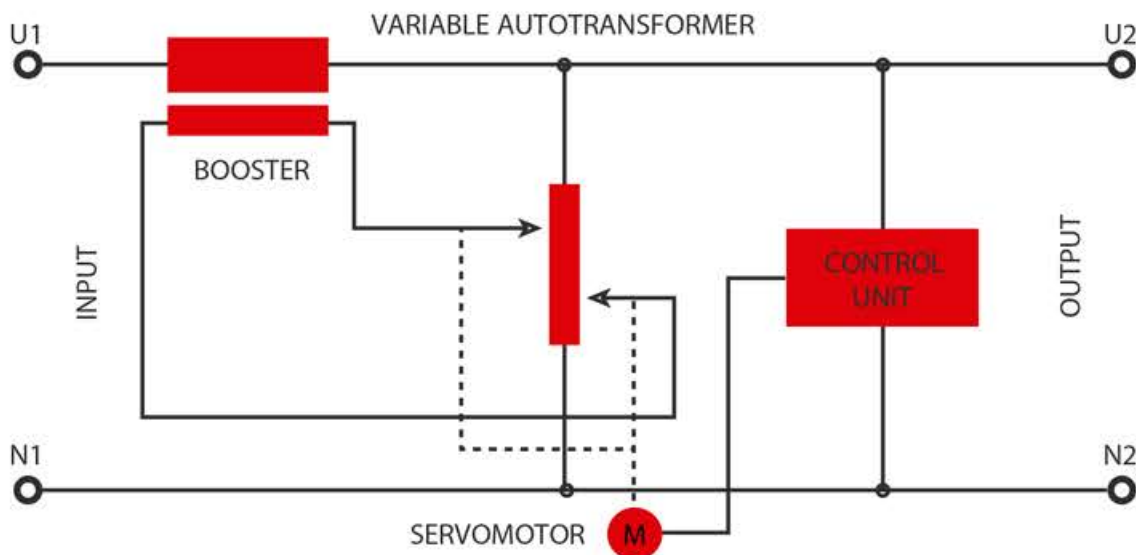
Automatic voltage stabilisers - REG Series

1PH automatic voltage stabilisers - REG-M models

The voltage regulator of REG-M series consists in a fully electronic control circuit, a motor driven variable autotransformer and a series transformer (booster).

The control circuit is connected on the output of the regulator. When the output voltage varies from the preset value, an unbalance is detected by the control circuit: this signal is amplified and operates the servo driven motor of the variable autotransformer which gives to the series transformer the additive or subtractive voltage necessary to have the correct output value.

The regulation of the output voltage is true RMS, therefore the voltage regulator is unaffected by possible harmonic distortions present on the supplying line. This type of voltage regulator has the advantage of having no mobile contacts or brushes in series to the line, as the regulation is directly made by the series transformers.



Voltage stabiliser
REG-M models

Automatic voltage stabilisers - REG Series

REG-M

SINGLE-PHASE

Power kVA	±10%	±15%	±20%	±25%	±30%	-35% +15%
1					REG-M204E-1	REG-M204E-1,1AS
1,5				REG-M204E-1.5		
2	REG-M204E-3	REG-M204E-2,5	REG-M204E-2		REG-M206E-2	REG-M206E-2,5AS
2,5						
3				REG-M206E-3	REG-M208E-3	
3,5			REG-M206E-4			REG-M208E-3,5AS
4		REG-M206E-5		REG-M208E-4		
5					REG-M210E-6	
6	REG-M206E-8		REG-M208E-6			REG-M210E-7AS
7		REG-M208E-7		REG-M210E-8		
8			REG-M210E-10		REG-M211E-10	
10	REG-M208E-10					REG-M211AN-10AS
12		REG-M210E-15		REG-M211E-12	REG-M212AN-12	REG-M212AN-14AS
14			REG-M211E-15			
15				REG-M212AN-15	REG-M213AN-16	
16	REG-M210E-20					REG-M213AN-17AS
17				REG-M213AN-18		
18		REG-M211E-22	REG-M212AN-21			
20					REG-M214AN-23	
21						REG-M214AN-25AS
22			REG-M213AN-25	REG-M214AN-30		
23						
25	REG-M211E-35	REG-M212AN-30				
30					REG-M216AN-33	
33						REG-M216AN-35AS
35		REG-M213AN-36	REG-M214AN-40			
36					REG-M216AN-43	
40	REG-M212AN-40				REG-M217AN-47	
43						REG-M217AN-50AS
47						
50	REG-M213AN-56	REG-M214AN-57				
56			REG-M216AN-60	REG-M217AN-60		
57					REG-M218AN-62	
59						REG-M218AN-70AS
60						
62						
70	REG-M214AN-87	REG-M216AN-83		REG-M218AN-78		
78			REG-M217AN-83			
80						
83					REG-M219AN-92	
87						REG-M219AN-103AS
92						
103			REG-M218AN-105	REG-M219AN-118		
105	REG-M216AN-117	REG-M217AN-117				
117						
118						
150		REG-M218AN-150	REG-M219AN-167			
167	REG-M217AN-177					
177		REG-M219AN-233				
233	REG-M218AN-233					
350	REG-M219AN-350					

A photograph of an industrial facility featuring several tall, cylindrical distillation columns. The scene is captured during sunset or sunrise, with the sky transitioning from a deep blue to a lighter, hazy blue. The columns are illuminated from the side, creating a warm, golden glow. Each column is equipped with various ladders, walkways, and pipes, indicating a complex industrial process. The overall composition is vertical, emphasizing the height of the structures.

TOP PROTECTION

Automatic stabilisers REG-M 1-40kVA



General characteristics

Mains	Single-phase
Nominal input voltage	220V or 230V or 240V (**)
Nominal output voltage	220V or 230V or 240V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>97%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP20-IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps

(**) to be specified on the order. Different voltage values available on request.

Optional fittings

- SHORT CIRCUIT PROTECTION
- OVERLOAD PROTECTION
- OVER/UNDER VOLTAGE PROTECTION
- SOFT START
- MANUAL OR AUTOMATIC BY-PASS
- TROPICALISED CONTROL BOARDS
- DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
- ISOLATION TRANSFORMER
- ADAPTING TRANSFORMER
- SURGE ARRESTERS
- IP54 INDOOR OR OUTDOOR VERSION

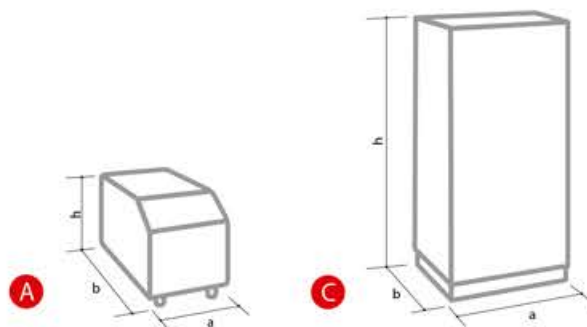
Automatic stabilisers REG-M 1-40kVA

REG-M

Single-phase 230V 50/60HZ, protection degree IP20-IP21

Model	Voltage variation %	Rated power KVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-M204E-1	±30	1	4,3	13	±1	18	210x450x200	A
REG-M204E-1,5	±25	1,5	6,5	14				
REG-M204E	±20	2	9	15				
	±15	2,5	11	18				
REG-M204E-3	±10	3	13	25	±1	30	235x410x240	A
REG-M206E-2	±30	2	8,7	20				
REG-M206E-3	±25	3	13	21				
REG-M206E	±20	4	17	23				
	±15	5	22	27				
REG-M206E-8	±10	8	35	33	±1	37	275x425x265	A
REG-M208E-3	±30	3	13	24				
REG-M208E-4	±25	4	17	25				
REG-M208E	±20	6	26	27				
	±15	7	30	30				
REG-M208E-10	±10	10	43	35	±1	55	290X505X285	A
REG-M210E-6	±30	6	26	24				
REG-M210E-8	±25	8	35	25				
REG-M210E-10	±20	10	43	27				
REG-M210E-15	±15	15	65	30	±1	70	560X396X320	A
REG-M210E-20	±10	20	87	35				
REG-M211E-10	±30	10	43	22				
REG-M211E-12	±25	12	52	24				
REG-M211E-15	±20	15	65	28	±1	110	650X470X1300	C
REG-M211E-22	±15	22	96	31				
REG-M211E-35	±10	35	152	36				
REG-M212AN-12	±30	12	52	20	±1	110	650X470X1300	C
REG-M212AN-15	±25	15	65	26				
REG-M212AN-21	±20	21	91	30				
REG-M212AN-30	±15	30	130	35				
REG-M212AN-40	±10	40	174	40				

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Automatic stabilisers REG-M 16-350kVA



General characteristics

Mains	Single-phase
Nominal input voltage	220V or 230V or 240V (**)
Nominal output voltage	220V or 230V or 240V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>97%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps

(**) to be specified on the order. Different voltage values available on request.

Optional fittings

SHORT CIRCUIT PROTECTION
OVERLOAD PROTECTION
OVER/UNDER VOLTAGE PROTECTION
SOFT START
MANUAL OR AUTOMATIC BY-PASS
TROPICALISED CONTROL BOARDS
DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
ISOLATION TRANSFORMER
ADAPTING TRANSFORMER
SURGE ARRESTERS
IP54 INDOOR OR OUTDOOR VERSION

Voltage stabilisers

REG-M 1-40kVA

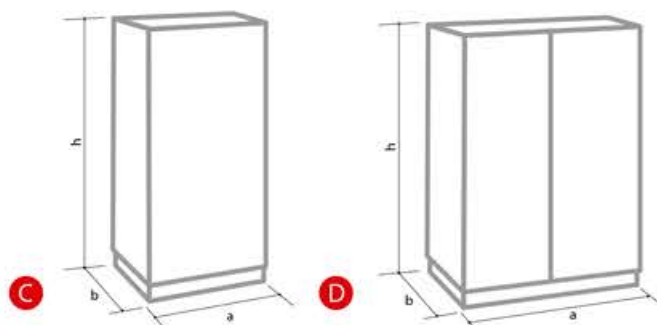
REG-M

Single-phase 230V 50/60HZ, protection degree P21

Model	Voltage variation %	Rated power KVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-M213AN-16	±30	16	70	8	±1	187	650x650x1300	C
REG-M213AN-18	±25	18	78	9				
REG-M213AN-25	±20	25	109	10				
REG-M213AN-36	±15	36	157	12				
REG-M213AN-56	±10	56	243	18	±1	235	650x650x1300	C
REG-M214AN-23	±30	23	100	18				
REG-M214AN-30	±25	30	130	19				
REG-M214AN-40	±20	40	174	21				
REG-M214AN-57	±15	57	248	24	±1	280	650x650x1800	C
REG-M214AN-87	±10	87	378	31				
REG-M216AN-33	±30	33	143	18				
REG-M216AN-43	±25	43	187	19				
REG-M216AN-60	±20	60	261	21	±1	340	650x650x1800	C
REG-M216AN-83	±15	83	361	24				
REG-M216AN-117	±10	117	509	31				
REG-M217AN-47	±30	47	204	22				
REG-M217AN-60	±25	60	261	24	±1	455	1100x650x1800	D
REG-M217AN-83	±20	83	361	26				
REG-M217AN-117	±15	117	509	29				
REG-M217AN-177	±10	177	770	31				
REG-M218AN-62	±30	62	270	20	±1	670	1100x650x1800	D
REG-M218AN-78	±25	78	339	21				
REG-M218AN-105	±20	105	457	23				
REG-M218AN-150	±15	150	652	26				
REG-M218AN-233	±10	233	1013	31	±1	1522		
REG-M219AN-92	±30	92	400	23				
REG-M219AN-118	±25	118	513	26				
REG-M219AN-167	±20	167	726	28				
REG-M219AN-233	±15	233	1013	30				
REG-M219AN-350	±10	350	1522	32				

REG-M 1-40kVA

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



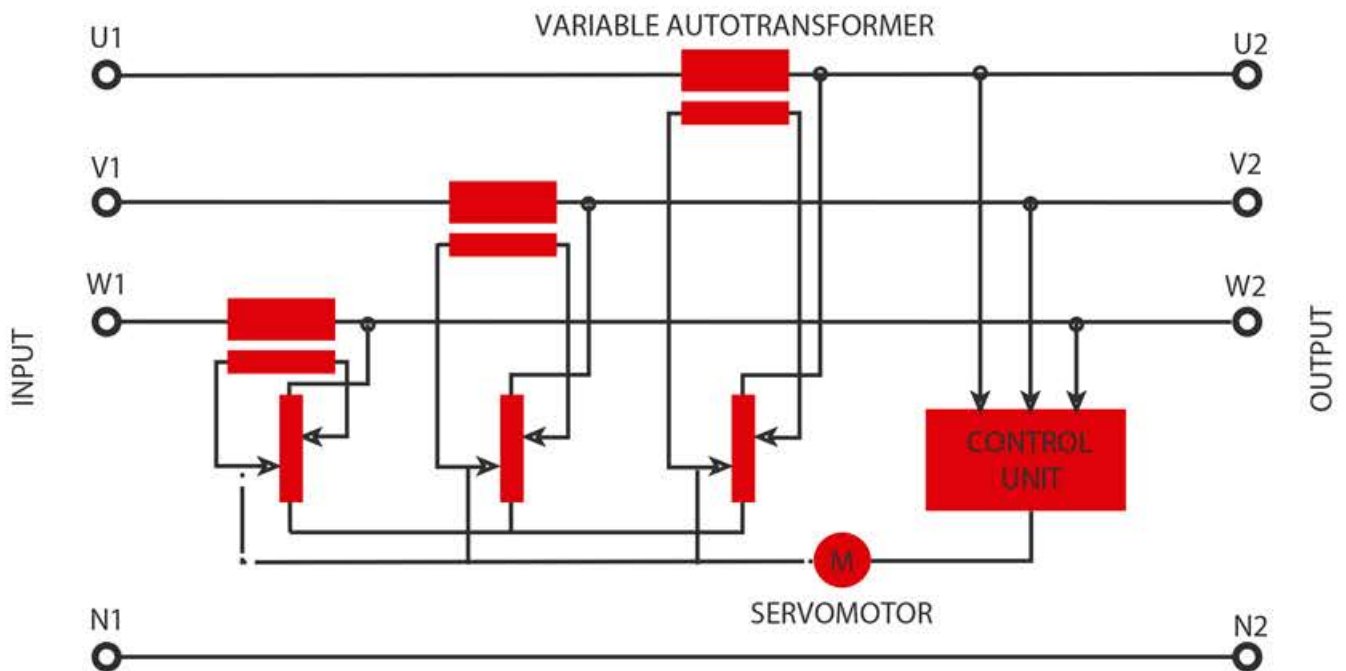
Automatic voltage stabilisers - REG Series

3PH automatic voltage stabilisers REG-T models common regulation of the 3 phases

The voltage regulator of REG-T series consists of a three phase variable autotransformer, a three phase series transformer, a low inertia servo driven motor and an electronic control circuit. The control circuit makes out the average of the voltage values on the three output phases, and makes a constant comparison between this average value and a perfectly steady reference signal. If the difference between the average value and the reference voltage overcomes the limits preset by the AVR precision, a error signal is given out.

This signal, which can be positive or negative depending on the voltage (if it is lower or higher than the nominal one), is amplified and operates the servo driven motor of the variable autotransformer which gives the additive or subtractive voltage necessary to bring the output voltage within the preset stabilisation limits.

The regulation of the output voltage is true RMS, therefore the voltage regulator is unaffected by possible harmonic distortion present on the supplying line. This type of voltage regulator is suitable for well-balanced input lines and a maximum load unbalance among the phases of 50%.



Automatic voltage stabiliser
REG-T three-phase

Automatic stabilisers REG-M 1-40kVA

REG-T THREE-PHASE

REG-M 1-40kVA

Power kVA	±10%	±15%	±20%	±25%	±30%
3	REG-T304E-9	REG-T304E-6	REG-T304E-5	REG-T304E-3,5	REG-T304E-3
3,5				REG-T306E-8	REG-T306E-7
5					
6					
7					
8					
9	REG-T306E-20	REG-T306E-15	REG-T306E-12	REG-T308AN-13	REG-T308AN-10
10					
12					
13					
15					
17	REG-T308AN-31	REG-T308AN-22	REG-T308AN-17	REG-T310AN-30	REG-T310AN-22
20					
22					
30					
31					
35	REG-T310AN-85	REG-T310AN-55	REG-T310AN-40	REG-T312AN-46	REG-T312AN-35
40					
46					
50					
55					
58	REG-T312AN-85	REG-T312AN-58	REG-T314AN-80	REG-T314AN-60	REG-T315AN-70
60					
70					
80					
85					
90	REG-T312AN-115	REG-T314AN-120	REG-T315AN-120	REG-T315AN-90	REG-T316AN-100
100					
115					
120					
135					
140	REG-T314AN-180	REG-T315AN-170	REG-T316AN-170	REG-T316AN-135	REG-T318AN-140
170					
180					
210					
240					
240	REG-T315AN-270	REG-T316AN-250	REG-T318AN-240	REG-T318AN-180	REG-T319AN-210
250					
270					
340					
360					
390	REG-T316AN-390	REG-T318AN-340	REG-T319AN-360	REG-T319AN-270	REG-T319AN-510
510					
540					
800	REG-T318AN-540				
	REG-T319AN-800				

Automatic stabilisers REG-T 3-31kVA



General characteristics

Mains	Three-phase
Nominal input voltage	380V or 400V or 415V (**)
Nominal output voltage	380V or 400V or 415V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted load unbalance	up to 50%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>98%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps

(**) to be specified on the order. Different voltage values available on request.

Optional fittings

SHORT CIRCUIT PROTECTION
OVERLOAD PROTECTION
OVER/UNDER VOLTAGE PROTECTION
REVERSED PHASE SEQUENCE / PHASE FAILURE PROTECTION
SOFT START
MANUAL OR AUTOMATIC BY-PASS
TROPICALISED CONTROL BOARDS
DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
ISOLATION TRANSFORMER
ADAPTING TRANSFORMER
SURGE ARRESTERS
IP54 INDOOR OR OUTDOOR VERSION

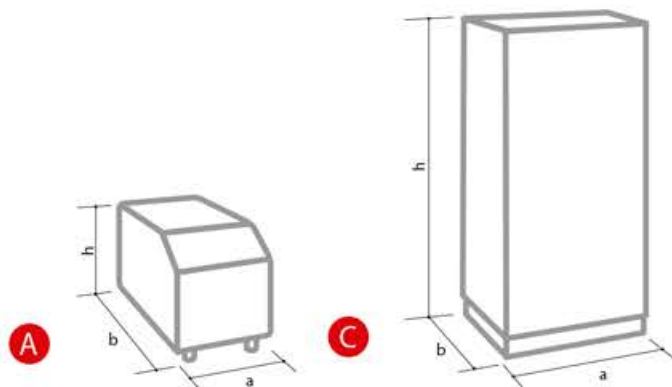
Automatic stabilisers REG-T 3-31kVA

REG-T

Three-phase 400V 50/60HZ, common regulation of the three-phases, protection degree IP20-IP21

Model	Voltage variation %	Rated power KVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-T304E-3	±30	3	4	13	±1	45	600x300x260	A
REG-T304E-3,5	±25	3,5	5	15				
REG-T304E	±20	5	7	18				
	±15	6	9	21				
REG-T304E-9	±10	9	13	30	±1	78	270x445x480	A
REG-T306E-7	±30	7	10	13				
REG-T306E-8	±25	8	11,5	15				
REG-T306E	±20	12	17	18				
	±15	15	22	21				
REG-T306E-20	±10	20	29	30	±1	125	650x470x1300	C
REG-T308AN-10	±30	10	14	15				
REG-T308AN-13	±25	13	19	16				
REG-T308AN-17	±20	17	25	18				
REG-T308AN-22	±15	22	32	21				
REG-T308AN-31	±10	31	45	21				

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Automatic stabilisers REG-T 22-800kVA



General characteristics

Mains	Three-phase
Nominal input voltage	380V or 400V or 415V (**)
Nominal output voltage	380V or 400V or 415V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted load unbalance	up to 50%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>98%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps

(**) to be specified on the order. Different voltage values available on request.

Optional fittings

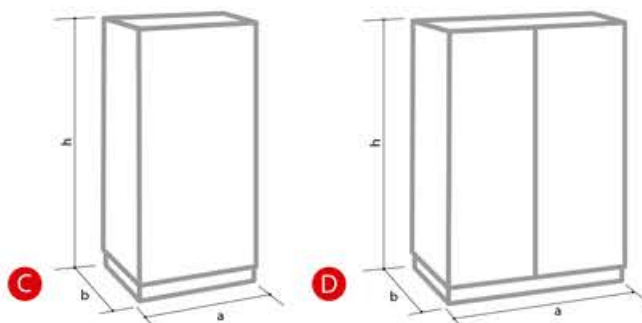
SHORT CIRCUIT PROTECTION
OVERLOAD PROTECTION
OVER/UNDER VOLTAGE PROTECTION
REVERSED PHASE SEQUENCE / PHASE FAILURE PROTECTION
SOFT START
MANUAL OR AUTOMATIC BY-PASS
TROPICALISED CONTROL BOARDS
DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
ISOLATION TRANSFORMER
ADAPTING TRANSFORMER
SURGE ARRESTERS
IP54 INDOOR OR OUTDOOR VERSION

Automatic stabilisers REG-T 22-800kVA

REG-T, three-phase 400V 50/60HZ, common regulation of the three-phases, protection degree IP21

Model	Voltage variation %	Rated power KVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-T310AN-22	±30	22	32	10	±1	250	650x650x1300	C
REG-T310AN-30	±25	30	43	11				
REG-T310AN-40	±20	40	58	13				
REG-T310AN-55	±15	55	79	14				
REG-T310AN-85	±10	85	123	18				
REG-T312AN-35	±30	35	51	10	±1	280	650x650x1300	C
REG-T312AN-46	±25	46	66	11				
REG-T312AN-58	±20	58	84	12				
REG-T312AN-85	±15	85	123	14				
REG-T312AN-115	±10	115	166	18				
REG-T314AN-50	±30	50	72	10	±1	355	650x650x1300	C
REG-T314AN-60	±25	60	87	11				
REG-T314AN-80	±20	80	115	12				
REG-T314AN-120	±15	120	173	14				
REG-T314AN-180	±10	180	260	18				
REG-T315AN-70	±30	70	101	14	±1	415	650x650x1800	C
REG-T315AN-90	±25	90	130	16				
REG-T315AN-120	±20	120	173	17				
REG-T315AN-170	±15	170	245	20				
REG-T315AN-270	±10	270	390	26				
REG-T316AN-100	±30	100	144	12	±1	630	1100x650x1800	D
REG-T316AN-135	±25	135	195	13				
REG-T316AN-170	±20	170	245	14				
REG-T316AN-250	±15	250	361	17				
REG-T316AN-390	±10	390	563	22				
REG-T318AN-140	±30	140	202	14	±1	900	1100x650x1800	D
REG-T318AN-180	±25	180	260	16				
REG-T318AN-240	±20	240	346	18				
REG-T318AN-340	±15	340	491	20				
REG-T318AN-540	±10	540	779	26				
REG-T319AN-210	±30	210	303	21	±1	1200	1100x1270x1800	D
REG-T319AN-270	±25	270	390	23				
REG-T319AN-360	±20	360	520	26				
REG-T319AN-510	±15	510	736	29				
REG-T319AN-800	±10	800	1155	32				

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



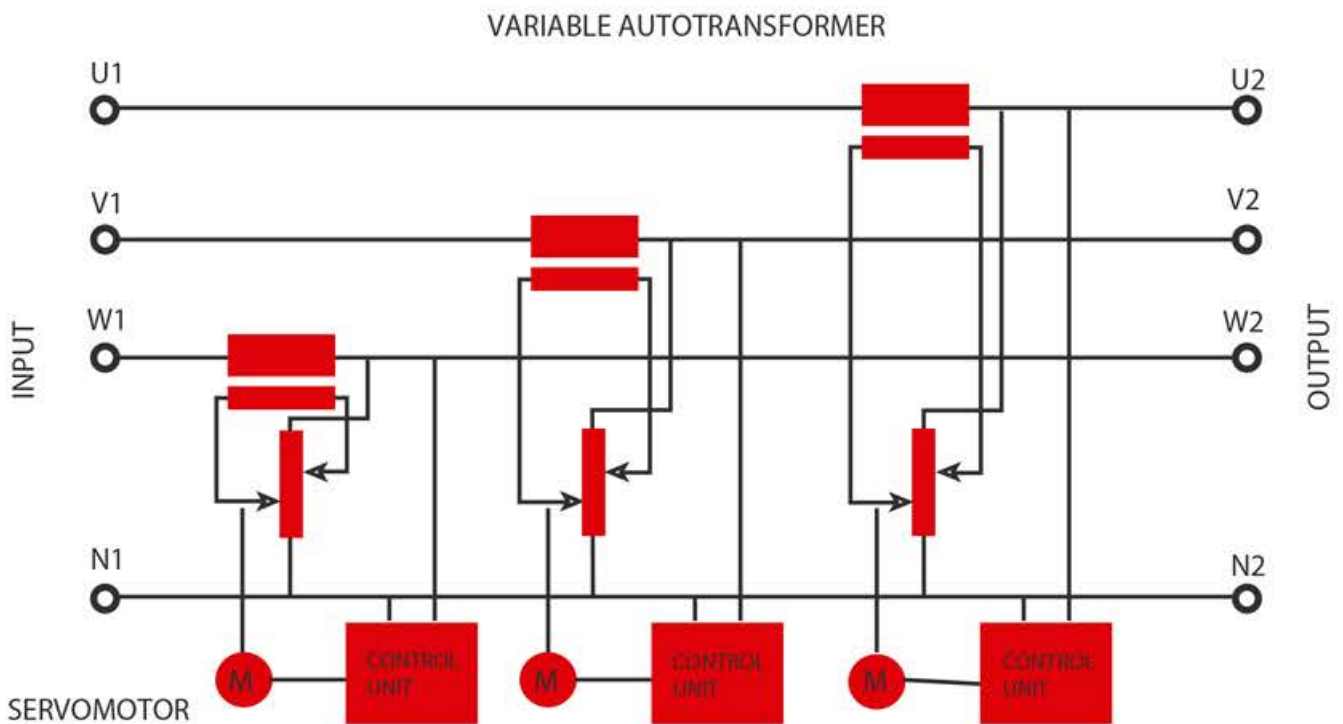
Automatic voltage stabilisers - REG Series

3PH automatic voltage stabilisers REG-Y models Independent regulation of each phase

The voltage regulator of REG-Y series consists in a fully electronic control circuit, a servomotor, a variable autotransformer and a series transformer (booster) on each phase. This system allows an independent regulation of the output voltage on each phase.

The control circuits are connected across the output of the regulator between phase and neutral. When the output voltage between phase and neutral varies from the pre-set value, an unbalance is detected by the control circuit; the signal is amplified and operates the servo driven motor of the variable autotransformer which gives the additive or subtractive voltage to the series transformer, necessary to have the correct output value.

The regulation of the output voltage is true RMS, therefore the voltage regulator is unaffected by possible harmonic distortion present on the supplying line. This type of voltage regulator has the advantage of having no mobile contacts or brushes in series to the line, as the regulation is directly made by the series transformers.



Automatic voltage stabiliser
REG-Y three-phase

Automatic voltage stabilisers - REG Series

3PH automatic voltage stabilisers REG-Y models Independent regulation of each phase

Further, the series transformers and the variable autotransformers are only dimensioned for the power necessary to make the adjustment, and not for the entire power.

The voltage regulator is unaffected by load value, load power factor, it does not introduce any harmonic distortion (<0.2%) and has a high efficiency. REG-Y series AVRs are suitable for unbalanced input voltage and load unbalance among phases up to 100%.

Neutral is essential for the proper operation of REG-Y series stabilisers. Therefore the input line must have 4 wires (3 phases + neutral). Should neutral not be available, it must be created by means of a neutral-point reactor or transformer to be installed before the AVR.

Aunilec REG-Y range



Automatic voltage stabilisers - REG Series

REG-Y THREE-PHASE

Power kVA	±10%	±15%	±20%	±25%	±30%	-35% +15%
3					REG-Y304AN-3	
3.3						REG-Y304AN-3,3AS
4.5						
6	REG-Y304AN-10	REG-Y304AN-8	REG-Y304AN-6	REG-Y304AN-5	REG-Y306AN-6	
7.5						REG-Y306AN-7,5AS
9					REG-Y306AN-9	
10					REG-Y308AN-9	
10.5						REG-Y308AN-10,5AS
12		REG-Y306AN-15	REG-Y306AN-12	REG-Y308AN-15		
15	REG-Y306AN-24		REG-Y308AN-18		REG-Y310AN-18	
18		REG-Y308AN-21		REG-Y310AN-24		REG-Y310AN-21AS
21			REG-Y310AN-30		REG-Y311AN-30	
24	REG-Y308AN-30					REG-Y311AN-30AS
30		REG-Y310AN-45		REG-Y311AN-36	REG-Y312AN-36	
36			REG-Y311AN-46	REG-Y312AN-45	REG-Y313AN-46	REG-Y312AN-40AS
40						
45						
46	REG-Y310AN-60					REG-Y313AN-50AS
50				REG-Y313AN-55		
55		REG-Y311AN-66	REG-Y312AN-60		REG-Y314AN-70	
60						REG-Y314AN-75AS
66						
70			REG-Y313AN-75	REG-Y314AN-100		
75	REG-Y311AN-105	REG-Y312AN-90			REG-Y316AN-100	
90						REG-Y316AN-105AS
100		REG-Y313AN-110	REG-Y314AN-120			
105						
110	REG-Y312AN-120			REG-Y316AN-130	REG-Y317AN-140	
120						REG-Y317AN-150AS
130						
140		REG-Y314AN-170				
150	REG-Y313AN-170		REG-Y316AN-180	REG-Y317AN-180		
170					REG-Y318AN-185	
175						REG-Y318AN-210AS
180						
185						
210	REG-Y314AN-260	REG-Y316AN-250		REG-Y318AN-235		
235			REG-Y317AN-250			
250					REG-Y319AN-275	
260						REG-Y319AN-310AS
275						
310	REG-Y316AN-350	REG-Y317AN-350	REG-Y318AN-315	REG-Y319AN-355		
315						
350					REG-Y320AN-410	
355						REG-Y320AN-440AS
410						
440	REG-Y317AN-530	REG-Y318AN-450	REG-Y319AN-500			
450				REG-Y320AN-530		
500					REG-Y322AN-550	
530						REG-Y322AN-560AS
550		REG-Y319AN-700				
560	REG-Y318AN-700		REG-Y320AN-710	REG-Y322AN-710	REG-Y323AN-700	
700						
710						REG-Y324AN-820AS
820					REG-Y324AN-825	
825						
890	REG-Y319AN-1050	REG-Y320AN-1000	REG-Y322AN-950	REG-Y323AN-890		
950					REG-Y326AN-960	
960						
1000				REG-Y324AN-1050		
1050						

Automatic voltage stabilisers - REG Series

REG-Y THREE-PHASE

Power kVA	±10%	±15%	±20%	±25%	±30%	-35% +15%
1100			REG-Y323AN-1180		REG-Y328AN-1100	
1180		REG-Y322AN-1350		REG-Y326AN-1250	REG-Y330AN-1250	
1250						
1350	REG-Y320AN-1570		REG-Y324AN-1420		REG-Y328AN-1420	REG-Y332AN-1380
1380						REG-Y334AN-1520
1420						
1520						
1570		REG-Y323AN-1680	REG-Y326AN-1650	REG-Y330AN-1600		
1600						REG-Y336AN-1660
1650						
1660						
1680				REG-Y332AN-1770		
1770			REG-Y328AN-1900			REG-Y338AN-1800
1800						
1900	REG-Y322AN-2100					
1930		REG-Y324AN-2000		REG-Y334AN-1950	REG-Y340AN-1930	
1950						
2000			REG-Y330AN-2130			REG-Y342AN-2070
2070				REG-Y336AN-2130		
2100						
2130		REG-Y326AN-2350				
2300				REG-Y338AN-2300		
2350			REG-Y332AN-2360			
2360	REG-Y323AN-2600			REG-Y340AN-2500		
2500						
2600		REG-Y328AN-2700	REG-Y334AN-2600			
2660				REG-Y342AN-2660		
2700			REG-Y336AN-2840			
2840						
3000	REG-Y324AN-3150	REG-Y330AN-3000				
3080			REG-Y338AN-3080			
3150						
3300		REG-Y332AN-3350				
3350			REG-Y340AN-3300			
3550	REG-Y326AN-3700		REG-Y342AN-3550			
3700		REG-Y334AN-3700				
4000		REG-Y336AN-4000				
4200	REG-Y328AN-4200	REG-Y338AN-4350				
4350						
4600	REG-Y330AN-4750	REG-Y340AN-4600				
4750						

Automatic stabilisers REG-Y 3-120kVA



General characteristics

Mains	Three-phase
Nominal input voltage	380V or 400V or 415V (**)
Nominal output voltage	380V or 400V or 415V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted load unbalance	up to 50%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>98%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps

(**) to be specified on the order. Different voltage values available on request.

Optional fittings

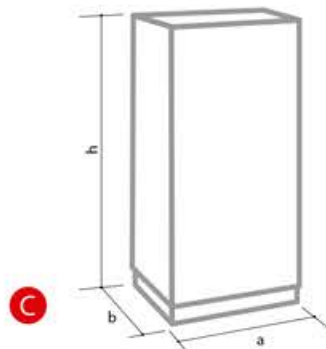
SHORT CIRCUIT PROTECTION
OVERLOAD PROTECTION
OVER/UNDER VOLTAGE PROTECTION
REVERSED PHASE SEQUENCE / PHASE FAILURE PROTECTION
SOFT START
MANUAL OR AUTOMATIC BY-PASS
TROPICALISED CONTROL BOARDS
DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
ISOLATION TRANSFORMER
ADAPTING TRANSFORMER
NEUTRAL-POINT REACTOR
SURGE ARRESTERS
IP54 INDOOR OR OUTDOOR VERSION

Automatic stabilisers REG-Y 3-120kVA

REG-Y, three-phase 400V 50/60HZ, independant regulation of each phases, protection degree IP21

Model	Voltage variation %	Rated power KVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-Y304AN-3	±30	3	4	13	±1	90	650x470x1300	C
REG-Y304AN-5	±25	5	7	14				
REG-Y304AN-6	±20	6	9	16				
REG-Y304AN-8	±15	8	11,5	18				
REG-Y304AN-10	±10	10	14	21				
REG-Y306AN-6	±30	6	9	11	±1	115	650x470x1300	C
REG-Y306AN-9	±25	9	13	12				
REG-Y306AN-12	±20	12	17	14				
REG-Y306AN-15	±15	15	22	16				
REG-Y306AN-24	±10	24	35	19				
REG-Y308AN-9	±30	9	13	13	±1	135	650x470x1300	C
REG-Y308AN-15	±25	15	22	14				
REG-Y308AN-18	±20	18	26	16				
REG-Y308AN-21	±15	21	30	18				
REG-Y308AN-30	±10	30	43	21				
REG-Y310AN-18	±30	18	26	13	±1	210	650x470x1300	C
REG-Y310AN-24	±25	24	35	14				
REG-Y310AN-30	±20	30	43	16				
REG-Y310AN-45	±15	45	65	18				
REG-Y310AN-60	±10	60	87	21				
REG-Y311AN-30	±30	30	43	13	±1	240	650x650x1300	C
REG-Y311AN-36	±25	36	52	14				
REG-Y311AN-46	±20	46	66	16				
REG-Y311AN-66	±15	66	95	18				
REG-Y311AN-105	±10	105	152	21				
REG-Y312AN-36	±30	36	52	14	±1	290	650x650x1300	C
REG-Y312AN-45	±25	45	65	15				
REG-Y312AN-60	±20	60	87	24				
REG-Y312AN-90	±15	90	130	28				
REG-Y312AN-120	±10	120	173	32				

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Automatic stabilisers REG-Y 46-4750kVA

REG-Y 46-4750kVA

General characteristics

Mains	Three-phase
Nominal input voltage	380V or 400V or 415V (**)
Nominal output voltage	380V or 400V or 415V (**)
Output accuracy	±1% RMS
Frequency	50/60 Hz ±5%
Admitted load variation	0 to 100%
Admitted load unbalance	up to 50%
Admitted overload	10 times the nominal power during 10 ms, 5 times during 6 s, 2 times for 1 minute
Harmonic distortion	<0,2%
Efficiency	>98%
Cooling	natural air convection
Colour	RAL 7035
Protection degree	IP21
Installation	indoor
Standard fittings	voltmeter, pilot lamps



(**) to be specified on the order. Different voltage values available on request.

Optional fittings

SHORT CIRCUIT PROTECTION
OVERLOAD PROTECTION
OVER/UNDER VOLTAGE PROTECTION
REVERSED PHASE SEQUENCE / PHASE FAILURE PROTECTION
SOFT START
MANUAL OR AUTOMATIC BY-PASS
TROPICALISED CONTROL BOARDS
DIGITAL NETWORK ANALYSER DISPLAYING THE ELECTRICAL PARAMETERS
ISOLATION TRANSFORMER
ADAPTING TRANSFORMER
NEUTRAL-POINT REACTOR
SURGE ARRESTERS
IP54 INDOOR OR OUTDOOR VERSION

Automatic stabilisers REG-Y 46-4750kVA

Aunilec 3PH AVR's of higher power are made in 3 sections in order to facilitate transport, handling, positioning and installation. This kind of structure has been designed as a solution to problems related to handling of extremely big loads not common in electrical systems. This solution particularly helps during preparation of the site, avoiding the use of expensive lifting equipment and building of special openings to access the technical room. The voltage stabiliser is made in separate sections corresponding to the single phase units which will be connected to the plant.

No further interconnection between the different AVR sections is required, therefore the installation is perfectly similar to the connection of a voltage stabiliser made in one single cubicle.

Each single phase unit includes all the control and regulation devices that determine its autonomous and independent operation.

In the unlikely event of a failure, this type of design limits the fault propagation, ensuring the best functionality and allows to act in a targeted and selective way on the component without having to operate on the other sections. In this case the solution allows to contain the periodic maintenance and repair costs.

REG-Y 46-4750kVA



Aunilec highlights

REDUCED SHIPPING COSTS

Smart solution to problems related to handling/shipping of bulky loads.

REDUCED MAINTENANCE COSTS

Easy intervention on one section ensuring the functionality of the other units.

EASIER HANDLING

Excellent solution avoiding the use of expensive lifting equipment and building of special openings to access the installation room.



Automatic stabilisers REG-Y 46-4750kVA

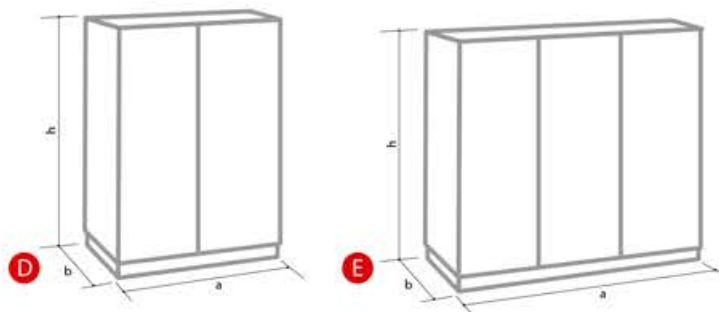
REG-Y, three-phase 400V 50/60HZ, independant regulation of each phases, protection degree IP21

Model	Voltage variation %	Rated power	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-Y313AN-46	±30	46	66	12	±1	470	650x650x1800	E
REG-Y313AN-55	±25	55	79	12				
REG-Y313AN-75	±20	75	108	14				
REG-Y313AN-110	±15	110	159	16				
REG-Y313AN-170	±10	170	245	13				
REG-Y314AN-70	±30	70	101	12	±1	560	1100x650x1800	E
REG-Y314AN-100	±25	100	144	12				
REG-Y314AN-120	±20	120	173	14				
REG-Y314AN-170	±15	170	245	16				
REG-Y314AN-260	±10	260	375	18				
REG-Y316AN-100	±30	100	144	12	±1	625	1100x650x1800	E
REG-Y316AN-130	±25	130	188	12				
REG-Y316AN-180	±20	180	260	14				
REG-Y316AN-250	±15	250	361	16				
REG-Y316AN-350	±10	350	505	18				
REG-Y317AN-140	±30	140	202	15	±1	780	1100x650x1800	E
REG-Y317AN-180	±25	180	260	16				
REG-Y317AN-250	±20	250	361	17				
REG-Y317AN-350	±15	350	505	20				
REG-Y317AN-530	±10	530	765	26				
REG-Y318AN-185	±30	185	267	11	±1	1200	1100x1270x1800	E
REG-Y318AN-235	±25	235	339	12				
REG-Y318AN-315	±20	315	455	13				
REG-Y318AN-450	±15	450	650	15				
REG-Y318AN-700	±10	700	1010	19				
REG-Y319AN-275	±30	275	397	16	±1	1540	1100x1270x1800	E
REG-Y319AN-355	±25	355	512	17				
REG-Y319AN-500	±20	500	722	19				
REG-Y319AN-700	±15	700	1010	22				
REG-Y319AN-1050	±10	1050	1516	27				
REG-Y320AN-410	±30	410	592	13	±1	1980	1100x1270x1950	E
REG-Y320AN-530	±25	530	765	14				
REG-Y320AN-710	±20	710	1025	16				
REG-Y320AN-1000	±15	1000	1443	21				
REG-Y320AN-1570	±10	1570	2266	24				
REG-Y322AN-550	±30	550	794	16	±1	3000	2150x1350x2150	E
REG-Y322AN-710	±25	710	1025	18				
REG-Y322AN-950	±20	950	1371	22				
REG-Y322AN-1350	±15	1350	1949	26				
REG-Y322AN-2100	±10	2100	3031	29				
REG-Y323AN-700	±30	700	1010	16	±1	4000	2150x1350x2150	E
REG-Y323AN-890	±25	890	1285	18				
REG-Y323AN-1180	±20	1180	1703	22				
REG-Y323AN-1680	±15	1680	2425	26				
REG-Y323AN-2600	±10	2600	3753	29				
REG-Y324AN-825	±30	825	1191	16	±1	4200	2150x1350x2150	E
REG-Y324AN-1050	±25	1050	1516	18				
REG-Y324AN-1420	±20	1420	2050	22				
REG-Y324AN-2000	±15	2000	2887	26				
REG-Y324AN-3150	±10	3150	4547	29				

Automatic stabilisers REG-Y 46-4750kVA

Model	Voltage variation %	Rated power kVA	Rated current A	Response time ms/V	Accuracy ±%	Weight kg	Dimensions a x b x h	Figure
REG-Y326AN-960	±30	960	1386	16	±1	5000	3 cabinets 1100x1270x1950	3E
REG-Y326AN-1250	±25	1250	1804	18				
REG-Y326AN-1650	±20	1650	2382	22				
REG-Y326AN-2350	±15	2350	3392	26				
REG-Y326AN-3700	±10	3700	5341	29	±1	5700	3 cabinets 1100x1270x1950	3E
REG-Y328AN-1100	±30	1100	1588	16				
REG-Y328AN-1420	±25	1420	2050	18				
REG-Y328AN-1900	±20	1900	2742	22				
REG-Y328AN-2700	±15	2700	3897	26	±1	6600	3 cabinets 1100x1270x1950	3E
REG-Y328AN-4200	±10	4200	6062	29				
REG-Y330AN-1250	±30	1250	1804	16				
REG-Y330AN-1600	±25	1600	2309	18				
REG-Y330AN-2130	±20	2130	3074	22	±1	7200	3 cabinets 1500x1350x2150	3E
REG-Y330AN-3000	±15	3000	4330	26				
REG-Y330AN-4750	±10	4750	6856	29				
REG-Y332AN-1380	±30	1380	1992	18				
REG-Y332AN-1770	±25	1770	2555	20	±1	8150	3 cabinets 1500x1350x2150	3E
REG-Y332AN-2360	±20	2360	3406	23				
REG-Y332AN-3350	±15	3350	4835	27				
REG-Y334AN-1520	±30	1520	2194	18				
REG-Y334AN-1950	±25	1950	2815	20	±1	8600	3 cabinets 1500x1350x2150	3E
REG-Y334AN-2600	±20	2600	3753	23				
REG-Y334AN-3700	±15	3700	5341	27				
REG-Y336AN-1660	±30	1660	2396	18				
REG-Y336AN-2130	±25	2130	3074	20	±1	9300	4 cabinets 2150x1350x2150	4E
REG-Y336AN-2840	±20	2840	4099	23				
REG-Y336AN-4000	±15	4000	5774	27				
REG-Y338AN-1800	±30	1800	2598	18				
REG-Y338AN-2300	±25	2300	3320	20	±1	9900	4 cabinets 2150x1350x2150	4E
REG-Y338AN-3080	±20	3080	4446	23				
REG-Y338AN-4350	±15	4350	6279	27				
REG-Y340AN-1930	±30	1930	2786	18				
REG-Y340AN-2500	±25	2500	3609	20	±1	10600	4 cabinets 2150x1350x2150	4E
REG-Y340AN-3300	±20	3300	4763	23				
REG-Y340AN-4600	±15	4600	6640	27				
REG-Y342AN-2070	±30	2070	2988	18				
REG-Y342AN-2660	±25	2660	3839	20	±1	10600	4 cabinets 2150x1350x2150	4E
REG-Y342AN-3550	±20	3550	5124	23				

Aunilec AVR's are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Automatic voltage stabilisers - REG Series

REG IP54 indoor models

Automatic voltage stabilisers with IP54 protection degree for indoor use.

All the IP21 models can be produced as IP54 versions, i.e. with special metallic cabinets protecting the stabilizer against dust and splash water.

According to the IP table established by the International Electro Technical Commission, the IP 54 rating means:

IP5x: protection against dust ingress

IPx4: protection against splash water from any direction.

These products are suitable for installation in dusty and very hot environments, but are not suitable for outdoor use being exposed to sunlight, to vandalism and intrusion attempts.

According to the ambient temperature and the quantity of dust present in the installation site, two possible cooling systems are possible: forced ventilation by fans or by air conditioners.

- Cooling by fans is effective when the ambient temperature does not exceed 40°C. The voltage stabilisers fitted with fans are identified by the suffix "AP".

- Cooling by air conditioner is recommended when the ambient temperature exceeds 40°C, with a high degree of humidity and/or in dusty conditions. The models fitted with air conditioner are identified by the suffix "AK".



REG IP54 outdoor models

Automatic voltage stabilisers with IP54 protection degree for outdoor use.

Compared to IP54 indoor models, these versions are made with:

- special metal enclosures protected by means of
 - cataphoresis treatment
 - epoxidic powder coating UV rays resistant
- no screws on the external side of the cabinet
- specific frame to anchor the stabilizer to the concrete base
- double top to protect against direct solar irradiation
- weather-proof protection filters.

Cooling is usually made by fans and the stabilisers are identified by the suffix "XP".

It is always necessary to mention the max ambient temperature in the order.



A photograph of a modern, multi-story glass skyscraper with a prominent cantilevered upper section. The building is set against a blue sky with light clouds. In the foreground, there is a paved walkway with a glass railing overlooking a landscaped area with small trees and shrubs. Other modern buildings are visible in the background.

Aunilec quality

Automatic voltage optimisers EcoREG series

Voltage optimisers



Automatic voltage optimisers

Automatic voltage stabilisation is a key function that sets EcoREG voltage optimisers apart from simple autotransformers, which also reduce voltage but cannot guarantee certain savings due to the continuous voltage variations of the mains.

In order to prevent the delivered voltage from dropping excessively low as a consequence of mains fluctuations, autotransformers can never provide maximum savings.



Power supply and professional users

A common misconception about VO is that a reduction in voltage will result in an increase in current and therefore power consumed will remain constant.

This is true for certain fixed-power loads, however most sites have a diversity of loads that will benefit to a greater or lesser extent with energy savings aggregating across a site as a whole.

The benefit to typical equipment at three phase sites is discussed next page.



Automatic voltage optimisers EcoREG series

THREE PHASE AC MOTORS: The three phase induction motor is one of the most common types of three phase loads and is used in many items of equipment including refrigeration, pumps, compressors, fans, air conditioning, conveyor drives and lifting systems. Overvoltage results in flux saturation of the iron core, wasting energy through eddy currents, increased hysteresis losses. The drawing of excessive current results in excess heat output from copper losses. The additional stress of overvoltage on motors will decrease motor lifetime. Avoiding overvoltage high enough to cause saturation does not reduce the motors running efficiency therefore substantial energy savings can be made through reducing iron and copper losses. However motors designed for the nominal voltage (e.g. 400V Ph-Ph or 230V Ph-N) should be able to cope with normal variation in voltage within the supply limits (+/-10%) without saturation, so these motors are unlikely to be running in saturation, so savings are small. Reducing voltage to an induction motor will slightly affect the motor speed as slip will increase, but speed is mainly a function of the supply frequency and the number of poles.

Motor efficiency is optimum at reasonable load (typically 75%) and at the designed voltage, and will fall off slightly with small variations either side of this voltage. Larger variations affect efficiency more. Very lightly loaded motors with loading of around 25% and small motors benefit most from reducing voltage. Motors driven by Variable Speed Drives will use the same power as before, but may draw more current, it should be noted that with reduced stored energy in the DC Bus capacitors, they may be more vulnerable to power dips.

SWITCHED MODE POWER SUPPLIES: Switched mode power supplies will use the same power as before, but will draw a slightly greater current to achieve this, with slightly increased cable losses, and slight risk of the increased current tripping MCBs.

LIGHTING: When lighting loads are in use for a high proportion of the time, energy savings on lighting equipment is extremely valuable. When voltage is reduced, incandescent lighting will see a large decrease in power drawn, as well as large decrease in light output and an increase in lifetime. Other types of lighting can also benefit from improved power quality, including systems with resistive or reactive ballasts. Fluorescent & discharge lighting is more efficient than incandescent lighting. Fluorescent lighting with conventional magnetic ballasts will see a reduced power consumption but also a reduced lumen output from the lamp.

Fluorescent lamps on modern electronic ballasts will use approximately the same power and give the same light. To provide the same wattage at the reduced voltage will require a greater current and increase cable losses. Lighting controllers and ballasts are responsible for generating high levels of harmonic distortion, which can be filtered with some types of voltage optimiser, therefore reducing the need for lighting controllers. A common concern is that some lighting will fail to strike at lower voltages. This should not occur since the aim of VO is not simply to reduce the voltage as far as possible, rather to bring it to the service level voltage at which it was designed to operate most efficiently.

HEATING: Heaters will consume less power, but give out less heat. Thermostatically controlled space or water heaters will consume less power while running, but will have to run for longer in each hour to produce the required output, resulting in no saving.



Automatic voltage optimisers EcoREG series

Aunilec proposal

Voltage optimisation is a term given to the systematic controlled reduction in the voltages received by an energy consumer to reduce energy use, power demand and reactive power demand. While some voltage "optimisation" devices have a fixed voltage adjustment, others electronically regulate the voltage automatically. Voltage optimisation systems are typically installed in series with the mains electrical supply to a building, allowing all its electrical equipment to benefit from an optimised supply. Overvoltage leads to sites using more electricity than needed, and as a result incurring higher electricity bills. The overvoltage is not only costly but can also be detrimental to equipment. Excess voltage produces additional noise, heat and vibration, causing stress on internal parts - especially to motors which are vulnerable to overheating and wear out more quickly. Aunilec EcoREG voltage optimisation system ensures that a building only receives and pays for the voltage that it actually needs, and no more.

Aunilec EcoREG Voltage Optimisers are available in power rating from 15 to 2600 kVA, single-phase and three-phase versions.

Voltage optimisation (VO):

The average voltage supply from many national grids around the world is often higher than the ideal operating voltage for most electrical equipment like lighting and motors. For example, a 230V linear appliance used on a 240V supply will take 4.3% more current and will consume almost 9% more electricity than at 230V. Sites fitted with a voltage optimisation system often achieve reductions in the region of 5 to 15% for energy consumption, costs and therefore carbon emissions!

The first step in voltage optimisation is to monitor and know your present incoming voltage levels, the Aunilec Energy Saving Meter allows you to determine this. Aunilec EcoREG Voltage Optimisers of "B" series are fitted with 2 digital network analysers.

These multimeters display all the electrical parameters measured, voltage, current, frequency, power, power factor, THD, etc. from the input mains and at the optimiser output. These multimeters have:

- Graphic LCD display 128x80 pixel, backlit
- 4 keys for display and setting
- quick and easy navigation
- texts for measurements, settings and messages in 5 languages
- true RMS measurements (TRMS)
- seamless data acquisition
- high accuracy.



Aunilec EcoREG Voltage Optimisers of "S" series, besides the standard equipment of the "B" series, are fitted with an additional display showing the energy saving achieved by the VO. The values displayed are calculated according to the method recommended by the VDE-AR-E 2055-1 Standard. The saving is displayed ensuring the accuracy of the metrological chain of measuring instruments.

Automatic voltage optimisers EcoREG series

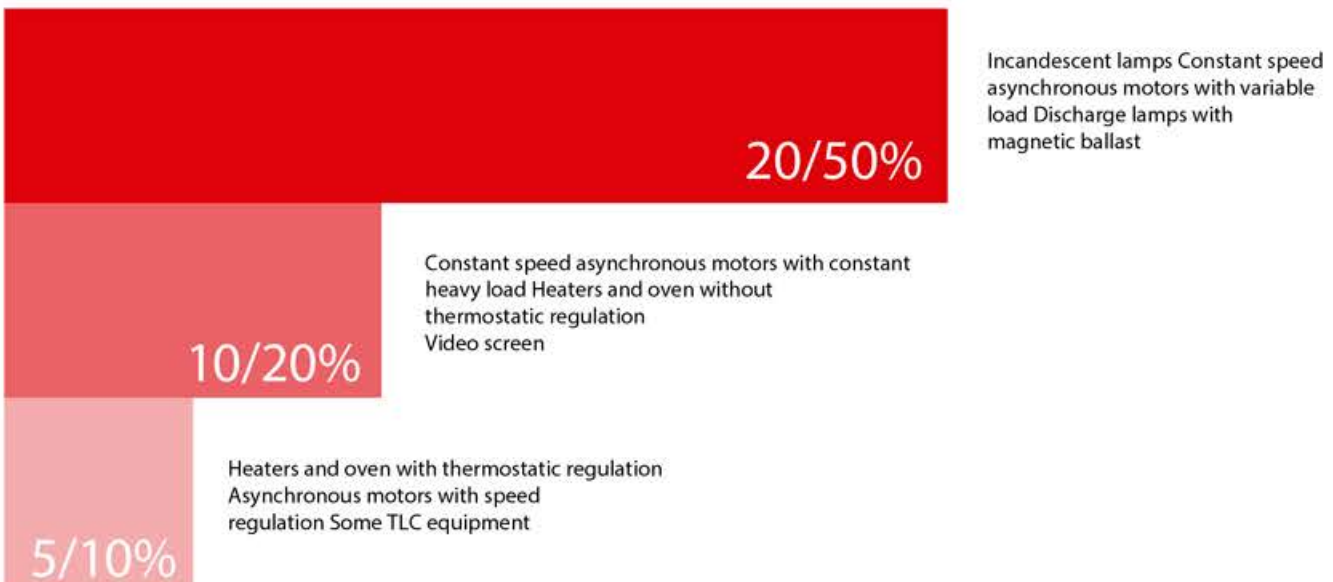
Saving and return on investment

There are many factors which contribute to saving energy and reduce the payback period:

- a.** Mains voltage which is not always close to rated value. Voltage is usually higher late at night: 10% higher than the rated value is a common condition. This level is often exceeded when the user is located near an electric substation. Saving increases to approximately 20% when the voltage exceeds 10% of the rated value.
- b.** Type of powered device. Some devices allow higher saving than others and some electric devices do not provide any significant saving at all.
- c.** Device use. The best results are obtained by using EcoREG in connection to motors with stall torque often lower than the maximum deliverable torque.
- d.** Overall consumption of devices powered by the voltage optimiser. The higher the power of the EcoREG voltage optimiser, the shorter its payback period.

Since not all the appliances and loads ensure the same saving, a careful analysis on their use is necessary to predict potential saving.

Sometimes, it may be advantageous to limit the use of EcoREG voltage optimisers to some devices to optimise the investment. The cost of the voltage optimiser will be usually paid off by the saved energy in a period ranging from two to five years.



Automatic voltage optimisers EcoREG series

HIGHLIGHTS

The dwindling fossil fuel reserves, the need to reduce carbon dioxide emissions and lower availability of financial resources has spurred energy production from renewable sources and strongly boosted the development of technology for optimising (limiting) electricity consumption.

EcoREG automatic voltage optimisers are one of the solutions offered by new technologies to users.

These devices comply with the requirements of IEC 60038 for electric equipment operating tolerances and supply an operating voltage which minimises consumption without impairing performance or reducing reliability.

IEC 60038 establishes that the electric equipment must be able to work correctly at an input voltage within $\pm 10\%$ of the nominal value, that is from 253V to 207V for single-phase devices and from 440V to 360V for three-phase devices.

This is an essential feature for all electric devices because energy producers establish that the supplied voltage may vary within these limits contractually.

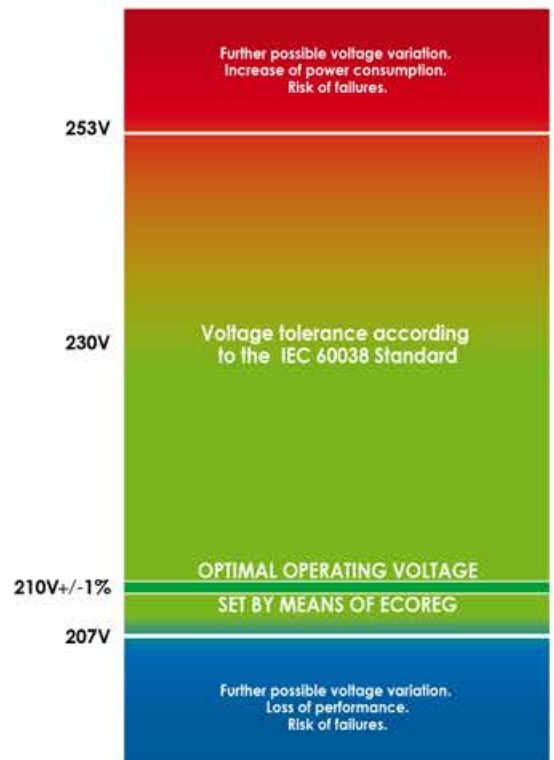
As a consequence, if a load is supplied at a value close to the lower operating tolerance limit (-10%) also when the mains voltage assumes the higher value established by contract (+10%), the difference between 253V and 207V in absolute terms is 18%.

This power supply difference allows to:

- a. obtain a significant saving of energy;
- b. extend the working life of electric equipment. EcoREG voltage optimisers prevent devices from being powered at higher values than the rated voltage. For example, it is a known fact that the life of sodium bulbs is reduced by 50% when they are powered at a voltage 10% higher than their rated value;
- c. secure a significant reduction of carbon dioxide emissions. This corresponds to approximately 630 g for every saved kWh of energy.

EcoREG automatic voltage optimisers deliver a stabilised voltage which can be set to the minimum tolerance established in IEC 60038, i.e. -10% (207V). This value is guaranteed also in presence of significant mains voltage variations. Interestingly, these devices are also excellent mains voltage stabilisers.

- Standard single-phase models can deliver a variable voltage from 230V to 207V with input voltage comprised in the 207-253V range.
- Standard three-phase models can deliver a variable voltage from 360/207V to 400/230V with input voltage comprised between 360/207V and 440/253V.



By means of potentiometers the OPTIMAL OPERATING VOLTAGE can be set according to the peculiar features of the connected loads. The minimum stabilised voltage is 207V.

Automatic voltage optimisers EcoREG series

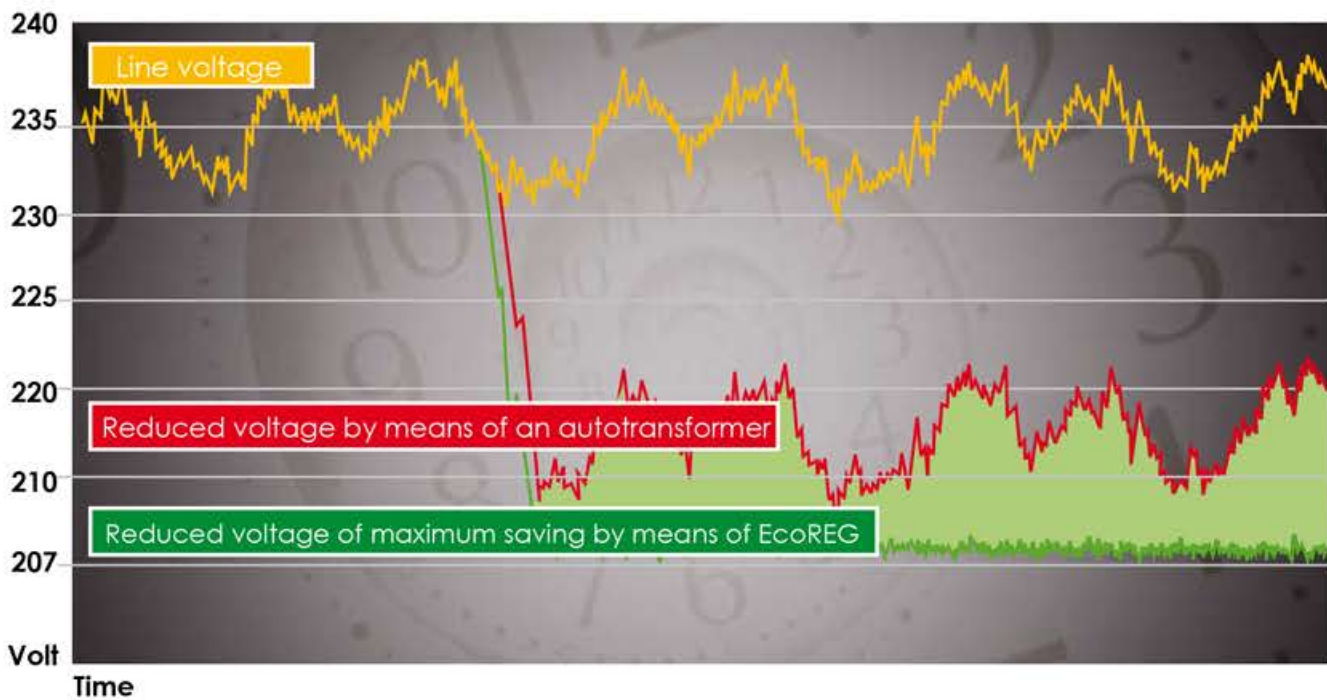
Models capable of broader input voltage variations may be built on demand. These may be needed because voltage may sometimes exceed the 10% tolerance specified in the supply contract.

Automatic voltage stabilisation is a key function that sets EcoREG voltage optimisers apart from simple autotransformers, which also reduce voltage but cannot guarantee certain savings due to the continuous voltage variations of the mains.

In order to prevent the delivered voltage from dropping excessively low as a consequence of mains fluctuations, autotransformers can never provide maximum savings.

The following diagram shows three different power supply possibilities with average absorbed power and saving for an electric motor.

The area included between the red and the green lines represents the maximum saving achievable by EcoREG compared to the autotransformer economisers.



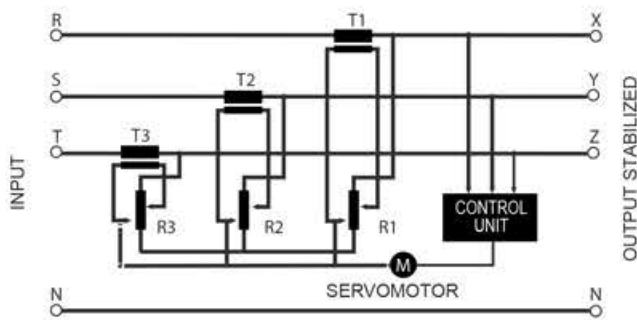
Voltage supply	Average voltage V	Average power kW	Saving kW	Saving %
Line voltage	234	159	0	0
Reduced voltage by means of an autotransformer	217	146	13	8.2
Reduced voltage by means of EcoREG	207	139	20	12.6

Automatic voltage optimisers EcoREG series

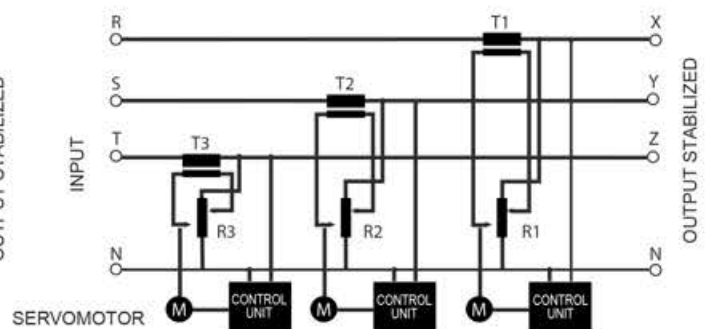
Operating principle

An electronic control circuit detects the voltage delivered by the voltage optimiser and compares it to a reference voltage. If the difference between the output voltage and the reference voltage exceeds the preset tolerance limits, an error signal is generated; this signal may be either negative or positive according to whether the output voltage is lower or higher than the preset value. This signal activates the servomotor which moves the mobile contacts (electrographite rollers / brushes) of the variable autotransformer thus changing the transformation ratio in order to supply the additive or subtractive voltage needed to restore the value within the predetermined limits to the primary winding of the series transformer. The root-mean-square value (RMS) of the output voltage is stabilised and consequently not affected by possible harmonic distortions present in the input mains. This regulation system has the advantage of not having mobile contacts in series to the power supply line.

AUTOMATIC VOLTAGE OPTIMISER WITH COMMON REGULATION OF THE 3 PHASES



AUTOMATIC VOLTAGE OPTIMISER WITH INDEPENDENT REGULATION OF THE 3 PHASES



General features

- Power range from 15 to 2600 kVA, in single-phase and three-phase version.
- Accuracy, $\pm 1\%$ RMS also in presence of high harmonic distortions.
- Overload capacity, 10 times the rated power for 10 ms, 5 times for 6 s, 2 times for one minute.
- Efficiency, Exceeding 98%.
- Power factor and load variation insensitivity. The accuracy and the regulation speed remain unaltered under any load condition (full load or no load, with inductive or capacitive loads).
- Frequency variation insensitivity.
- Harmonic distortions. The harmonic distortion is always maintained within 0.2% in any operating condition.
- Impedance. The installation of an Ecostab voltage optimiser in a pre-existing plant does not require a new calculation of the protections because the internal impedance of the optimiser does not significantly affect the line impedance.



Figure C

IP21



Figure E

Automatic voltage optimisers EcoREG series

General features

Operating temperature. EcoREG voltage optimisers are designed for operation at a maximum ambient temperature of 40°C in the most demanding conditions: continuous duty, full load and minimum input voltage. Models suitable for higher temperatures are manufactured on request.

Degree of protection. IP00, IP21, IP54 INDOOR and IP54 OUTDOOR.

Cooling system. All IP21 models are designed for natural air convection – FAN-FREE.

IP54 models are cooled by fans or by air conditioning depending on the ambient conditions.

Reliability. EcoREG voltage optimisers use the same technology and the same components as REG voltage stabilisers, that Aunilec has been manufacturing for over 60 years. The MTBF exceeding 500,000 hours is the result of Aunilec continuous improvement in technical aspects and production process.

Installation. The voltage optimiser is installed after the energy counter and before the electric users.

Standard fittings: Digital network analyser / energy meter, pilot lamps, potentiometer, alarm indication and dry contacts for connection to an external device for protection against: overload, over/under voltage.

Special versions. EcoREG voltage optimisers can be equipped on demand with special fittings in separate cabinet, like e.g.: maintenance bypass, thermal magnetic circuit breakers, surge/lightning arresters, harmonic filters.

Remote control. EcoREG voltage optimisers can be equipped with an optional monitoring system permitting the remote control via ETHERNET, INTERNET, GSM/GPRS.

Compliance with standards. EcoREG voltage optimisers comply with the following Directives:

- Electro Magnetic Compatibility 2014/30/UE and following amendments.
- Low Voltage Electrical Equipment 2014/35/UE and following amendments.

IP54

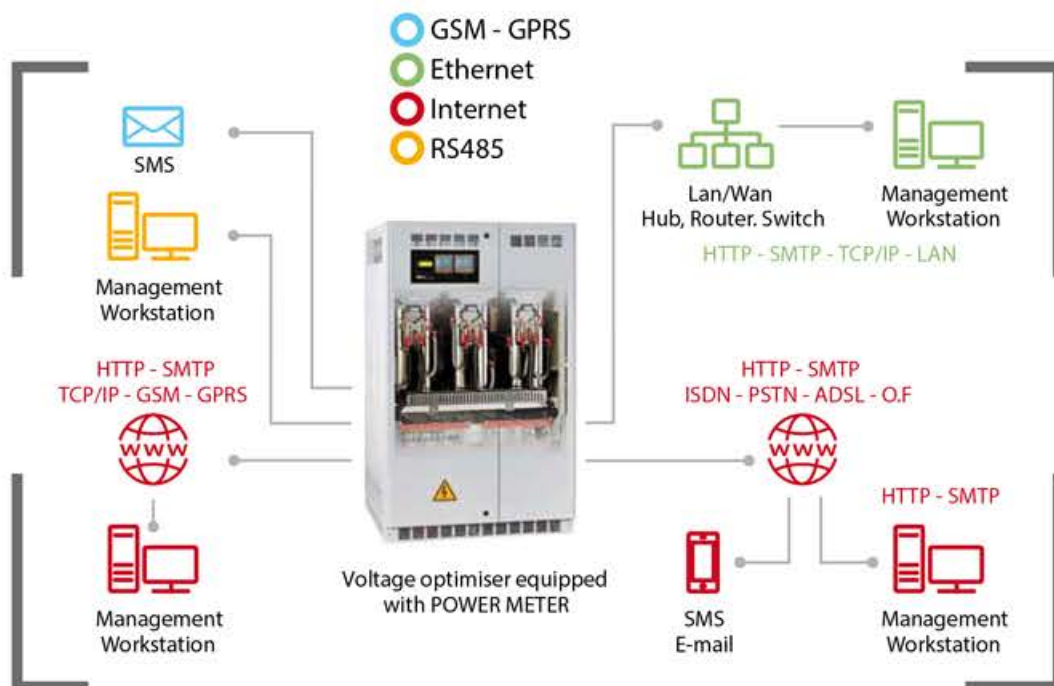


Outdoor model



Indoor model

Voltage optimisers



EcoREG B - single-phase M and three-phase T/Y

ECOREG M SINGLE-PHASE 230V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

Model	Rated power (KVA)	Input voltage variation (±%)	Output regulation range (%)	Response time (ms/V)	Output accuracy (%)	Weight (kg)	Dimensions a x b x h (mm)	Figure
ECOREG-M212AJ-24B	24	10	0 to -10	10	1	105	650x470x1300	C
ECOREG-M213AJ-32B	32	10	0 to -10	10	1	168	650x650x1300	
ECOREG-M214AJ-48B	48	10	0 to -10	21	1	220	650x650x1800	
ECOREG-M216AJ-63B	63	10	0 to -10	21	1	250		
ECOREG-M217AJ-95B	95	10	0 to -10	29	1	320		
ECOREG-M218AJ-130B	130	10	0 to -10	23	1	400	1100x650x1800	D
ECOREG-M219AJ-195B	195	10	0 to -10	33	1	625		

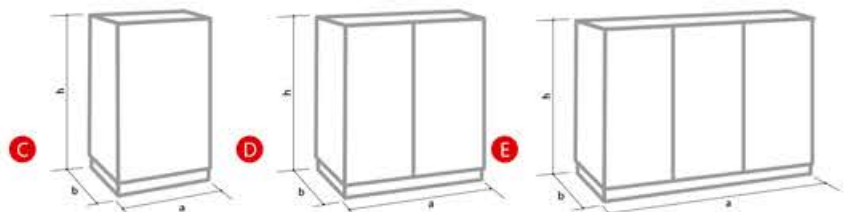
ECOREG T THREE-PHASE 400V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

Model	Rated power (KVA)	Input voltage variation (±%)	Output regulation range (%)	Response time (ms/V)	Output accuracy (%)	Weight (kg)	Dimensions a x b x h (mm)	Figure
ECOREG-T308AJ-20B	20	10	0 to -10	18	1	122	650x470x1300	C
ECOREG-T310AJ-50B	50	10	0 to -10	12	1	250	650x650x1300	
ECOREG-T312AJ-70B	70	10	0 to -10	12	1	280		
ECOREG-T314AJ-100B	100	10	0 to -10	12	1	320		
ECOREG-T315AJ-150B	150	10	0 to -10	17	1	415	650x650x1800	
ECOREG-T316AJ-200B	200	10	0 to -10	14	1	620	1100x650x1800	
ECOREG-T318AJ-300B	300	10	0 to -10	18	1	750	1100x1270x1800	
ECOREG-T319AJ-435B	435	10	0 to -10	26	1	1300		

ECOREG Y THREE-PHASE + N 400V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

ECOREG-Y306AJ-15B	15	10	da 0 a -10	14	1	120	650x470x1300	C
ECOREG-Y308AJ-20B	20	10	da 0 a -10	16	1	140		
ECOREG-Y310AJ-35B	35	10	da 0 a -10	16	1	210		
ECOREG-Y311AJ-60B	60	10	da 0 a -10	16	1	240		
ECOREG-Y312AJ-70B	70	10	da 0 a -10	24	1	290		
ECOREG-Y313AJ-95B	95	10	da 0 a -10	6	1	490	650x650x1800	D
ECOREG-Y314AJ-145B	145	10	da 0 a -10	12	1	560	1100x650x1800	
ECOREG-Y316AJ-190B	190	10	da 0 a -10	12	1	630		
ECOREG-Y317AJ-285B	285	10	da 0 a -10	17	1	780		
ECOREG-Y318AJ-390B	390	10	da 0 a -10	13	1	1100	1100x1270x1800	
ECOREG-Y319AJ-585B	585	10	da 0 a -10	19	1	1400	1500x1350x2150	
ECOREG-Y320AJ-850B	850	10	da 0 a -10	16	1	1950	2150x1350x2150	E
ECOREG-Y322AJ-1100B	1100	10	da 0 a -10	23	1	3000		
ECOREG-Y323AJ-1400B	1400	10	da 0 a -10	24	1	4000		
ECOREG-Y324AJ-1700B	1700	10	da 0 a -10	23	1	4200		
ECOREG-Y326AJ-2000B	2000	10	da 0 a -10	24	1	3x1670		
ECOREG-Y328AJ-2300B	2300	10	da 0 a -10	23	1	3x1900	1100x1270x1950	3E
ECOREG-Y330AJ-2600B	2600	10	da 0 a -10	26	1	3x2200	3 cabinets 1500x1350x2150	

Fittings: Alarm indication and dry contacts for connection to an external device for protection against: overload, over/under voltage Potentiometer to adjust the stabilised output voltage Digital network analyser and energy meter. Pilot lamp



EcoREG S - single-phase M and three-phase T/Y

ECOREG M SINGLE-PHASE 230V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

Model	Rated power (KVA)	Input voltage variation (±%)	Output regulation range (%)	Response time (ms/V)	Output accuracy (%)	Weight (kg)	Dimensions a x b x h (mm)	Figure
ECOREG-M212AJ-24S	24	10	0 to -10	10	1	105	650x470x1300	C
ECOREG-M213AJ-32S	32	10	0 to -10	10	1	168	650x650x1300	
ECOREG-M214AJ-48S	48	10	0 to -10	21	1	220	650x650x1800	
ECOREG-M216AJ-63S	63	10	0 to -10	21	1	250		
ECOREG-M217AJ-95S	95	10	0 to -10	29	1	320	1100x650x1800	D
ECOREG-M218AJ-130S	130	10	0 to -10	23	1	400		
ECOREG-M219AJ-195S	195	10	0 to -10	33	1	625		

ECOREG T THREE-PHASE 400V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

Model	Rated power (KVA)	Input voltage variation (±%)	Output regulation range (%)	Response time (ms/V)	Output accuracy (%)	Weight (kg)	Dimensions a x b x h (mm)	Figure
ECOREG-T308AJ-20S	20	10	0 to -10	18	1	122	650x470x1300	C
ECOREG-T310AJ-50S	50	10	0 to -10	12	1	250	650x650x1300	
ECOREG-T312AJ-70S	70	10	0 to -10	12	1	280		
ECOREG-T314AJ-100S	100	10	0 to -10	12	1	320		
ECOREG-T315AJ-150S	150	10	0 to -10	17	1	415	650x650x1800	D
ECOREG-T316AJ-200S	200	10	0 to -10	14	1	620	1100x650x1800	
ECOREG-T318AJ-300S	300	10	0 to -10	18	1	750		
ECOREG-T319AJ-435S	435	10	0 to -10	26	1	1300	1100x1270x1800	

ECOREG Y THREE-PHASE + N 400V 50/60HZ VOLTAGE OPTIMISERS - IP21 INDOOR MODELS

ECOREG-Y306AJ-15S	15	10	da 0 a -10	14	1	120	650x470x1300	C
ECOREG-Y308AJ-20S	20	10	da 0 a -10	16	1	140		
ECOREG-Y310AJ-35S	35	10	da 0 a -10	16	1	210		
ECOREG-Y311AJ-60S	60	10	da 0 a -10	16	1	240		
ECOREG-Y312AJ-70S	70	10	da 0 a -10	24	1	290	650x650x1300	
ECOREG-Y313AJ-95S	95	10	da 0 a -10	6	1	490		
ECOREG-Y314AJ-145S	145	10	da 0 a -10	12	1	560	1100x650x1800	D
ECOREG-Y316AJ-190S	190	10	da 0 a -10	12	1	630		
ECOREG-Y317AJ-285S	285	10	da 0 a -10	17	1	780		
ECOREG-Y318AJ-390S	390	10	da 0 a -10	13	1	1100	1100x1270x1800	
ECOREG-Y319AJ-585S	585	10	da 0 a -10	19	1	1400		
ECOREG-Y320AJ-850S	850	10	da 0 a -10	16	1	1950	1500x1350x2150	E
ECOREG-Y322AJ-1100S	1100	10	da 0 a -10	23	1	3000	2150x1350x2150	E
ECOREG-Y323AJ-1400S	1400	10	da 0 a -10	24	1	4000		
ECOREG-Y324AJ-1700S	1700	10	da 0 a -10	23	1	4200		
ECOREG-Y326AJ-2000S	2000	10	da 0 a -10	24	1	3x1670	3 cabinets	3E
ECOREG-Y328AJ-2300S	2300	10	da 0 a -10	23	1	3x1900	1100x1270x1950	
ECOREG-Y330AJ-2600S	2600	10	da 0 a -10	26	1	3x2200	3 cabinets 1500x1350x2150	

Fittings: Alarm indication and dry contacts for connection to an external device for protection against: overload, over/under voltage Potentiometer to adjust the stabilised output voltage

Digital network analyser and energy meter

Digital display and storage of energy saving in percentage and absolute value RS485, ETHERNET, USB port.

Pilot lamps

Aunilec voltage optimisers are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Line conditioners REG Series

Line conditioners



Line conditioners

Line conditioners have been designed to provide the highest level of protection to electrical appliances connected to distribution lines disturbed by sudden voltage variations, HF noises and spikes. Statistically, these phenomena represent more than 95% of electric anomalies that could be the cause of breakdowns and poor operation of any kind of appliance connected to distribution lines.



The range

The range is made up of models with powers that vary from 0.5 to 950 kVA and use two different voltage regulation technologies:

a. static switching technology for loads with single-phase absorption (up to 4 kVA) and three phase (up to 24 kVA)

b. electrodynamic regulation technology via series transformer and variable autotransformer for loads with three-phase absorption (up to 950 kVA).

The two regulation technologies and the wide range allow the most suitable regulation system to be supplied to meet the specific needs of the various kinds of appliances.

The standard models embody four different devices each one devoted to the compensation or attenuation of a specific electrical fault:

- a suppressor of voltage spikes
- a line filter
- a high attenuation isolating transformer
- a voltage regulator

Line conditioners REG Series

Aunilec proposal

REG-TS AND REG-TST ELECTRONIC LINE CONDITIONERS

They have specific performances to power electronic appliances with medium to low powers that require a particularly high stabilisation speed such as: process and numerical controls, robotics, medical equipment, telecommunications and computers.

The range is made up of standard models with powers ranging from 0.5 to 24 kVA. Furthermore, because the manufacturing criteria make these conditioners highly versatile, on request, versions can be designed with customised specifications for the most varied applications.

REG-YAC ELECTRODYNAMIC LINE CONDITIONERS

They provide a maximum level of protection to high power appliances, with high electromagnetic susceptibility, connected to distribution lines disturbed by sudden voltage variations, high frequency interferences and voltage spikes.

The regulation system is made up exclusively of magnetic components capable of supporting loads with high inrush currents. The use of electronic components is limited to the control of the mains and of magnetic components stabilising the voltage. Thanks to these features, the electromechanical line conditioners stand apart for their high electromagnetic immunity and for the reliability characterised by a MTBF longer than 500,000 hours. They are, therefore, particularly suitable for powering radio-TV transmitters, telephone systems, radar systems, motors, compressors, pumps, medical equipment, machine tools and so on.

Their constructive features ensure that maintenance can be carried out even by technical staff with only a basic knowledge of electrical installations.



REG-TS and REG-TST series



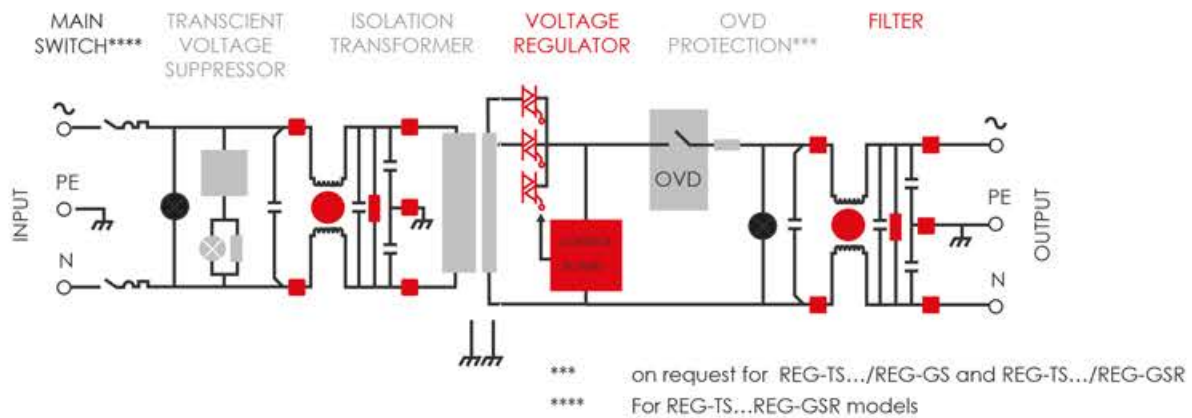
REG-YAC series

Line conditioners REG Series

REG-TS - Electronic line conditioners

The range is made up of single-phase models with powers ranging from 500 VA to 4 kVA. The noiseless operation, the compact size and fitness for use make them ideal for installation in offices and laboratories as well as in professional applications like automotive, chemical, food and telecommunications industry. It is a range that progressively extends following requests of customers with particular needs regarding voltage, dimensions, protection degree, engineering and specific needs including, for example, the need to:

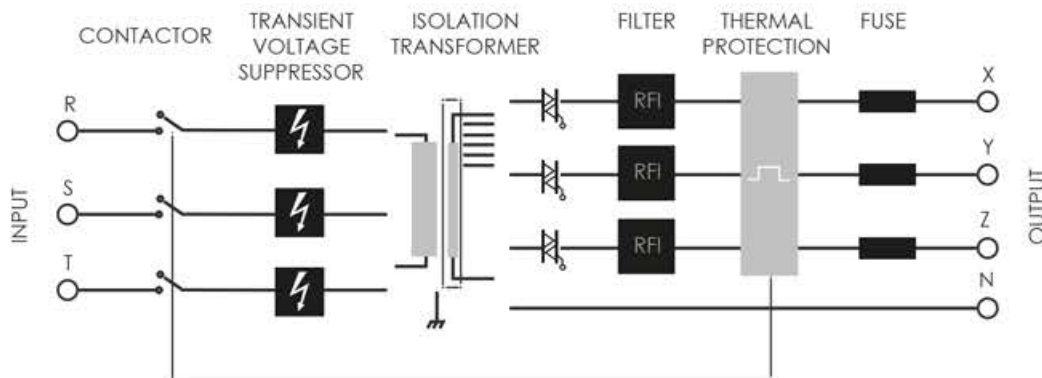
- connect single-phase 220, 230, 240 or 120 V loads to 500/400V lines without neutral.
- install these units inside electric switchgears or rack units
- have a range of "universal" appliances capable of delivering a 230V single-phase voltage powered by 440/400/220V 50 and 60 Hz three-phase distribution lines.



REG-TST - Electronic line conditioners

This is made up of three-phase models with power from 12 to 24 kVA. It is particularly suitable for powering NC machine-tool equipment, automation plants and telecommunications systems.

They are fitted with delta-star isolating transformer and create a "real neutral" and subsequently make it possible to have a single-phase 230V voltage using a three-phase 400V plant without neutral.



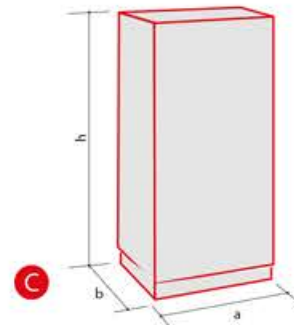
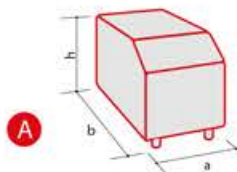
Line conditioners REG-TS, REG-TST Series

Electronic line conditioners REG-TS, REG-TST

Model	Power (KVA)	Number of phases	Input voltage V	Output voltage V	Rated current A	Standards fittings	Weight kg	Dimensions mm a x b x h	Figure
REG-TS50GS	0,5				2,17		21	380 x 315 x 216	
REG-TS75GS	0,75				3,26		28	380 x 315 x 216	
REG-TS100GS	1	1	230/400/440 ±15%	230 ±3%	4,35	FF, CF, CT, M	39	380 x 360 x 260	A
REG-TS200GS	2				8,7		49	400 x 460 x 295	
REG-TS400GS	4				17,39		60	400 x 460 x 295	
REG-TS75GSR	0,75				3,26		30	482 x 415 x 221	
REG-TS100GSR	1	1	230/400/440 ±15%	230V ±3%	4,35	FF, CF, CT, M	45	482 x 460 x 266	A
REG-TS200GSR	2				8,7		58	482 x 560 x 310	
REG-TS400GSR	4				17,39		68	482 x 560 x 310	
REG-TST12N	12				17,32		172	650 x 650 x 1300 1300	
REG-TST18N	18	3	400 ±15%	400 ±3%	26	I, L, F, M, BT, PT	295	650 x 650 x 1800 1800 1800 1800	C
REG-TST24N	24				34,64		375	650 x 650 x 1800 1818 1818 1800	

Fittings

- I = Main breaker
- IM = Thermal magnetic circuit breaker
- CF = Frequency selector 50/60 Hz
- L = "mains on" pilot lamps
- CT = Voltage selector
- F = Input fuse
- M = Terminal board connection
- FF = Ultra rapid output fuse
- BT = Electronic voltage relay (on request)
- PT = Thermal protection
- O = OVD protection



OTHER FEATURES

- Impedance: 0.3 to 11 Ohm depending on models
- No-load current: 40 to 700mA depending on models
- Total harmonic distortion: < 1%
- Operating temperature: -10°C +40°C
- Full load efficiency: >95%
- Audible noise: <40dB(A)



Line conditioners REG-TS, REG-TST Series

REG-TS, REG-TST



General features

TRANSIENT VOLTAGE SUPPRESSOR

This device is intended to limit transverse and common mode spikes exceeding the input voltage peak value. Transient voltage protection can also be effective on spikes of atmospheric origin over 6kV.

RFI FILTERS

They attenuate high frequency transverse and common mode interferences over 300 kHz.

ISOLATION TRANSFORMER

It is featured by low output impedance, insensitivity to load power factor, high attenuation and functional and dielectric isolation. The F thermal class transformer has a recessed concentric winding configuration to meet the impedance and power factor requirements. The double shielding allows a common mode attenuation higher than 110 dB up to 350 kHz and an insulation degree in compliance with relevant Standards. The creepage and clearance distances exceed 7 mm. The withstanding overvoltage at 50/60 Hz between primary and secondary exceeds 3750V. The isolation at fulmination pulse voltage is 8 kVolt.

ELECTRONIC VOLTAGE REGULATOR

The electronic voltage regulator stabilises the voltage permitting to attain, under every load condition, $\pm 3\%$ output voltage accuracy with very high efficiency without generating any EMI interference. Its main features are:

- response time lower than 2 ms/volt,
- insensitivity to load power factor,
- reduced dynamic impedance (0,5%),
- efficiency higher than 99%,
- "quasi-peak" output voltage sensing circuit which allows "data acquisition" in 10 ms and the compensation of wave form flattening caused by non linear loads,
- creepage and clearance distances exceeding 8 mm,
- mounting of power semiconductors with 2500 Volt internal insulation on isolated heatsinks.

OVERVOLTAGE PROTECTION

(on request for REG-TS.../REG-GS and REG-TS...REG-GR models)

A safety device which cuts off the load when the output voltage exceeds +14% the nominal voltage for more than 0,4 seconds.

CONFORMITY TO STANDARDS

REG-TS/TST line conditioners conform to the requirements of the most recent Electro Magnetic Compatibility Standards, and particularly 2014/30/UE and 2014/35/UE.

Electrodynamic line conditioners REG-YAC Series

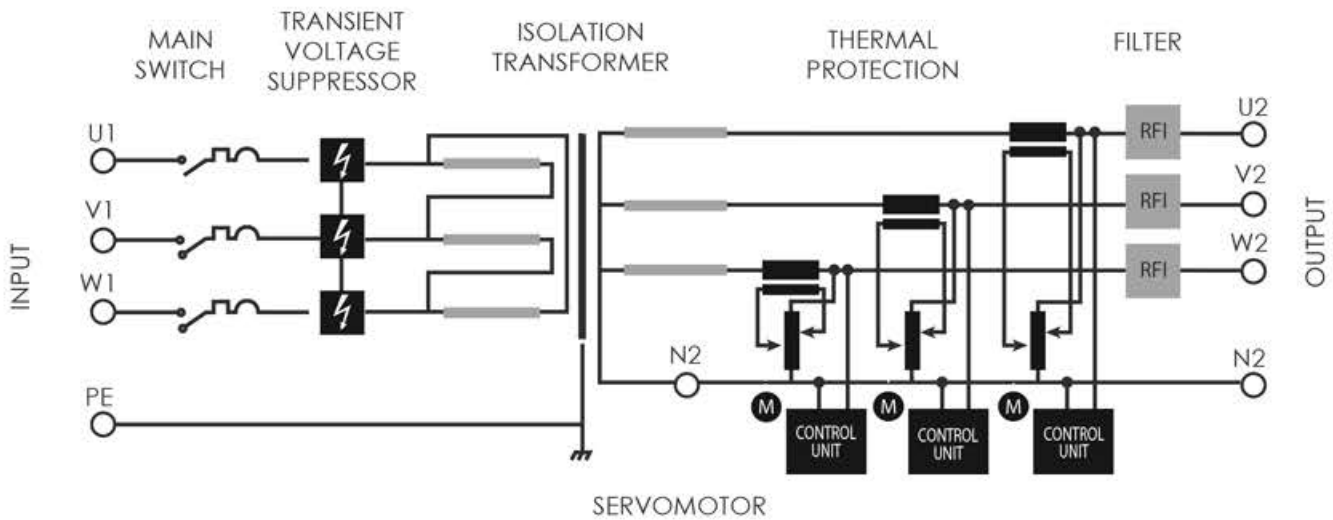
REG-YAC - Electrodynamic line conditioners

They provide a maximum level of protection to high power appliances, with high electromagnetic susceptibility, connected to distribution lines disturbed by sudden voltage variations, high frequency interferences and voltage spikes.

The regulation system is made up exclusively of magnetic components capable of supporting loads with high inrush currents. The use of electronic components is limited to the control of the mains and of magnetic components stabilising the voltage. Thanks to these features, the electromechanical line conditioners stand apart for their high electromagnetic immunity and for the reliability characterised by a MTBF longer than 500,000 hours.

They are, therefore, particularly suitable for powering radio-TV transmitters, telephone systems, radar systems, motors, compressors, pumps, medical equipment, machine tools and so on.

Their constructive features ensure that maintenance can be carried out even by technical staff with only a basic knowledge of electrical installations.



Electrodynamic line conditioners REG-YAC Series

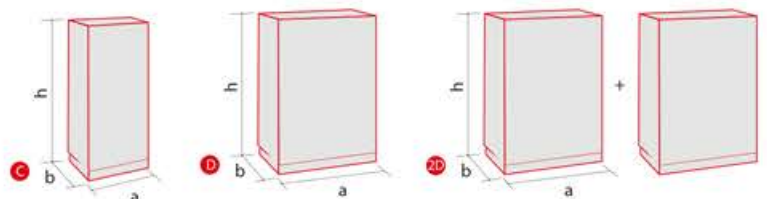
Electrodynamic line conditioners REG-YAC 3PH+N 230/400V 50/60Hz
Independent regulation of each phases

Model	Power (KVA)	Rated current A	Voltage variation %	Response time ms/V	Accuracy ±%	Standards fittings	Degree of protection IP	Weight kg	Dimensions mm a x b x h	Figure
REG-Y306AC-6	6	9	±30	11				250		
REG-Y306AC-8	8	12	±25	12				250	650x 650x1300	C
REG-Y306AC-11	11	16	±20	14	±1	V, L, HF, PS, IT, I	21	270		
REG-Y306AC-13	13	19	±15	16				300	650x650x1800	C
REG-Y306AC-19	19	27	±10	19				350		
REG-Y308AC-9	9	13	±30	13				330		
REG-Y308AC-12	12	17	±25	14				350	650x 650x1800	C
REG-Y308AC-16	16	23	±20	16	±1	V, L, HF, PS, IT, I	21	360		
REG-Y308AC-20	20	29	±15	18				370		
REG-Y308AC-27	27	39	±15	18				400		
REG-Y310AC-17	17	25	±30	13				420		
REG-Y310AC-21	21	30	±25	14				440	650x 650x1800	C
REG-Y310AC-28	28	40	±20	16	±1	V, L, HF, PS, IT, I	21	460		
REG-Y310AC-38	38	55	±15	18				500		
REG-Y310AC-58	58	84	±10	21				550		
REG-Y311AC-27	27	39	±30	13				540		
REG-Y311AC-32	32	46	±25	14				550	650x650x1800	C
REG-Y311AC-42	42	61	±20	16	±1	V, L, HF, PS, IT, I	21	560		
REG-Y311AC-58	58	84	±15	18				610		
REG-Y311AC-85	85	123	±10	21				700	1100x650x1800	D
REG-Y312AC-33	33	48	±30	14				620		
REG-Y312AC-42	42	61	±25	15				700		
REG-Y312AC-56	58	84	±20	24	±1	V, L, HF, PS, IT, I	21	720	1100x650x1800	D
REG-Y312AC-78	78	113	±15	33				740		
REG-Y312AC-110	110	159	±10	37				790		
REG-Y313AC-46	46	66	±30	11				580+420	1100x650x1800 + 650x650x1800	D+C
REG-Y313AC-55	55	79	±25	12				580+420		
REG-Y313AC-75	75	108	±20	14	±1	V, L, HF, PS, IT, I	21	580+500	1100x650x1800 + 1100x650x1800	2D
REG-Y313AC-110	110	159	±15	16				580+520		
REG-Y313AC-160	160	231	±10	18				580+700		
REG-Y314AC-70	70	101	±30	11				720+570	1100x650x1800 + 1100x650x1800	2D
REG-Y314AC-90	90	130	±25	12				720+610		
REG-Y314AC-115	115	166	±20	14	±1	V, L, HF, PS, IT, I	21	720+710		
REG-Y314AC-160	160	231	±15	16				730+870	1100x650x1800 + 1100x1270x1800	2D
REG-Y314AC-240	240	346	±10	18				730+930		
REG-Y316AC-95	95	137	±30	11				720+720	1100x650x1800 + 1100x650x1800	2D
REG-Y316AC-120	120	173	±25	12				720+780		
REG-Y316AC-160	160	231	±20	14	±1	V, L, HF, PS, IT, I	21	720+930	1100x650x1800 + 1100x1270x1800	2D
REG-Y316AC-215	215	310	±15	16				720+990		
REG-Y316AC-320	320	462	±10	18				720+1200		
REG-Y317AC-140	140	202	±30	15				830+900		
REG-Y317AC-170	170	245	±25	16				830+930	1100x650x1800 + 1100x1270x1800	2D
REG-Y317AC-230	230	332	±20	17	±1	V, L, HF, PS, IT, I	21	830+990		
REG-Y317AC-320	320	462	±15	20				830+1250		
REG-Y317AC-480	480	693	±10	26				830+1900	1100x650x1800 + 1500x1350x2150	2D
REG-Y318AC-185	185	267	±30	11				1200+1200		
REG-Y318AC-235	235	339	±25	12				1200+1450	2 x	
REG-Y318AC-315	315	455	±20	13	±1	V, L, HF, PS, IT, I	21	1200+1550	1100x1270x1800	2D
REG-Y318AC-430	430	621	±15	15				1200+1700		
REG-Y318AC-650	650	938	±10	19				1200+2280	1100x1270x1800 + 1500x1350x2150	2D
REG-Y319AC-275	275	397	±30	16				1500+1550	2 x	
REG-Y319AC-355	355	512	±25	17				1500+1750	1100x1270x1800	2D
REG-Y319AC-450	450	650	±20	19	±1	V, L, HF, PS, IT, I	21	1500+2150		
REG-Y319AC-630	630	909	±15	22				1540+2400	1100x1270x1800 + 1500x1350x2150	2D
REG-Y319AC-950	950	1371	±10	27				1540+2900		

Aunilec LCs are designed to deliver the declared power permanently (24/7) under the worst operating conditions, i.e. at full load, at minimum input voltage and max input current and at the declared ambient temperature.



Standard fittings:
V = Voltmeter
L = pilot lamps
HF = High frequency filter
PS = Spike protection
IT = Isolation transformer
I = Main breaker



Electrodynamic line conditioners REG-YAC Series

General features

TVP TRANSIENT VOLTAGE SUPPRESSORS

The protection against transient overvoltages generated by atmospheric discharges or by switching process is carried out by type 2 (cat. C) surge arresters complying with EN 61643-11/VDE 0675, part 6-11 characterised by a nominal discharge current (8/20) In of 40 (or 60) kA, by a discharge current with I_{max} impulse of 50 (or 110) kA, a Up protection level not greater than 1300 V and a response time tA shorter than 25 ns.

ISOLATION TRANSFORMER

This component, thanks to the electrostatic shield inserted between primary and secondary windings, ensures the galvanic separation and high attenuation of common mode noises. It is characterised by N delta-star configuration or F or N thermal class, low output impedance and insensitivity to the power factor. The insulation between primary and secondary, primary and shield, secondary and shield is greater than 3000 V during one minute.

ELECTRODYNAMIC VOLTAGE REGULATOR

It ensures the "true RMS" value of the voltage with $\pm 1\%$ output accuracy even in the presence of strong harmonic distortions.

The innovative control circuit, combined with the structural reliability of the electrodynamic stabilisation system, has the following characteristics:

- response time from 6 to 40ms/Volt, depending on the model
- overload capacity 10 times the nominal voltage for 10 milliseconds, 5 times for 6 seconds, twice for 60 seconds
- efficiency of 97-98%
- insensitivity to load power factor and load variations
- insensitivity to mains frequency variations, in $\pm 5\%$ range
- harmonic distortion introduced lower than 0.2% under any operating condition (virtually zero)
- internal impedance that varies, according to the models, from 0.52 to 0.0015 Ohm (it does not require a new sizing of the protections being irrelevant compared to the line impedance)
- sizing of the magnetic components aimed at limiting iron and copper losses in order to create a cooling system that only uses the natural convection. In fact, the use of fans requires maintenance, filter cleaning and replacement on average every two years.

RFI FILTERS

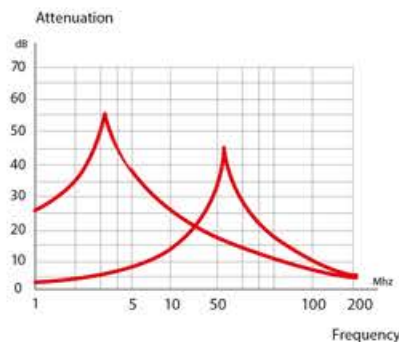
On the conditioners' output is installed a three phase filter for the suppression of electromagnetic interferences.

OPERATING TEMPERATURE

REG-YAC line conditioners are designed to operate properly with a maximum ambient temperature of +40°C under harsh conditions: continuous duty, full load, input voltage at minimum value.

CONFORMITY TO STANDARDS

REG-YAC line conditioners comply with the Standards contained in Directives: EMC and further amendments, Low Voltage 2014/30/UE and ETIC 2014/35/UE.



After sales service



Preventive
electronic
maintenance

Technical
assistance

Infrared
thermography

Analyse of
electrical networks

Aunilec[®]
Onduleurs • Redresseurs • Batteries



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