

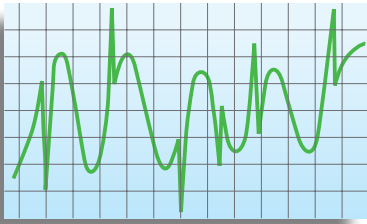


UNIQUE AT HEART

Electrodynamic voltage regulators

IREM *Ministab-Sterostab*

Power supply quality



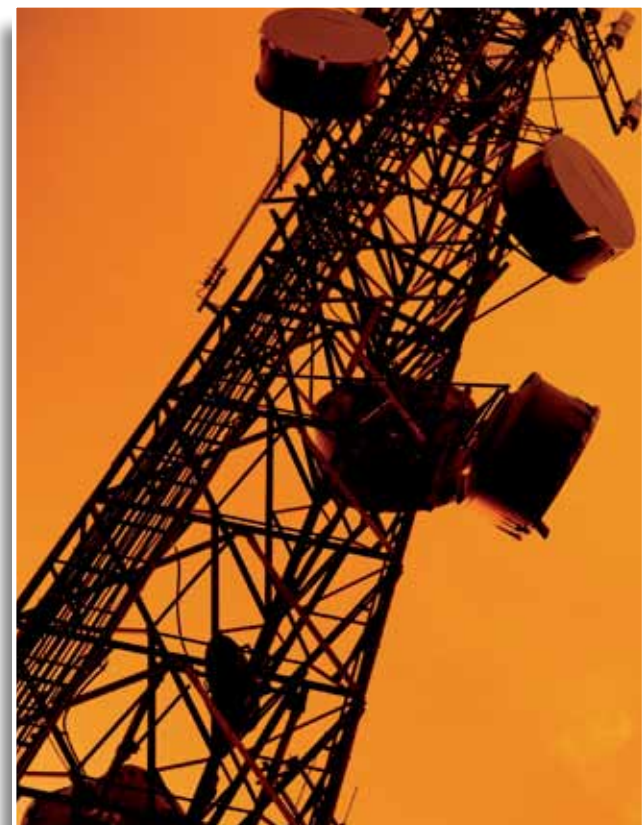
The electric energy producers generate a correct voltage. However, failures on the distribution lines, atmospheric discharges, continuous load variations and disturbances generated by the users make it impossible to guarantee always a steady voltage within the tolerance bandwidth stipulated in the supply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



IREM proposal



A



B

Ministab e Sterostab 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. Ministab and Sterostab 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.



D



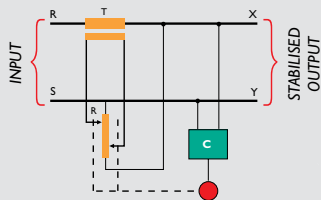
E (outdoor)



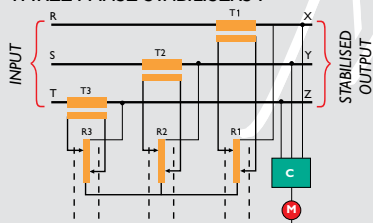
E (indoor)

Operating principle

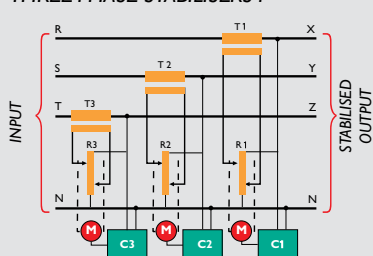
SINGLE-PHASE STABILISERS M



THREE-PHASE STABILISERS T



THREE-PHASE STABILISERS Y



T = series transformer
R = variable autotransformer
C = electronic control circuit
M = servomotor

General features



F Toroidal variable transformer used in Ministab models



G Linear variable transformer used in Sterostab models

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:

- **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%;
- **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.

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 Ministab and Sterostab in an already existing plant does not require a new calculation of the protections.

Operating temperature up to +40°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, period of activity in which more than 430,000 stabilisers have been manufactured.

Compliance to Standards: Electro Magnetic Compatibility 2004/18/EC and following amendments; Low Voltage Electrical Equipment 2006/95/EC and following amendments.

Optional fittings

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



Prevent 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.



Ministab and Sterostab: unique at heart for more than 50 years

Natural air convection cooling *



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 IREM 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.

Actual power

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



* on IP21 models

Square section linear variable transformer

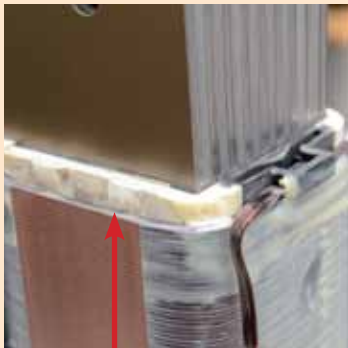


The linear variable transformers are the heart of IREM Sterostab voltage regulators.

They are the most extraordinary, particularly sophisticated to manufacture and technically worked out component.

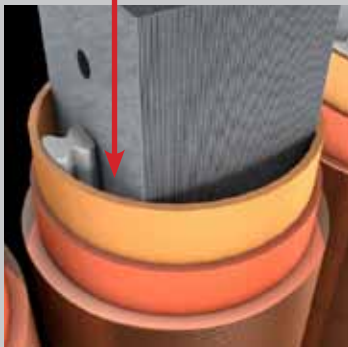
As a matter of fact the mobile contact ensuring the stabilisation is flown by currents of some tens of Ampere.

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.

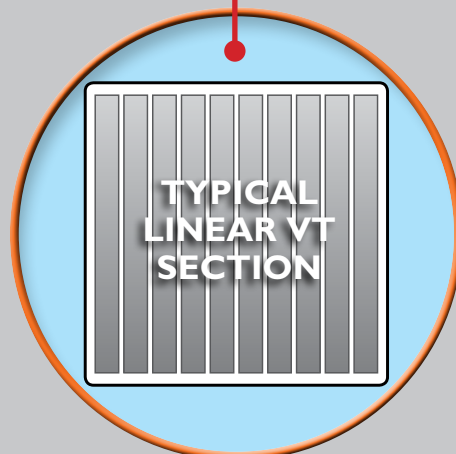
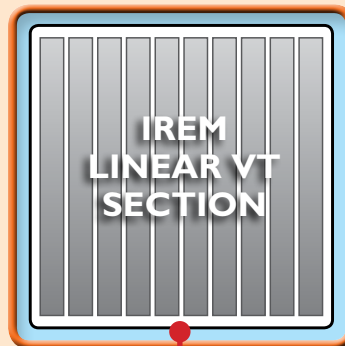


Copper winding of linear variable transformers used in STEROSTAB AVRs

Low magnetic permeability area



Copper winding of traditional linear variable transformers



IREM. Experience and Quality

IREM is a leading company in the manufacture of electromechanical and electronic equipment for the control of the mains power in the following sectors:

- **powering of discharge lamps for professional applications;**
- **protection of electric users against line disturbances;**
- **luminous flux regulation in lighting plants;**
- **power generation by hydroelectric turbines.**



Since its foundation in 1947, IREM has gained wide recognition due to the reliability and innovative content of its high-tech products. A reliable company deserving the Oscar-ward. In 1992, in Los Angeles, **Mario Celso** - founder of IREM - was granted the “**Scientific-Technical Award**” by the Academy of Motion Picture Arts and Sciences. Two production plants, a philosophy based on “quality upgrading” as the company’s primary concern and direct export exceeding 70% of the global turnover are a warranty of continuity and development.

Experience, quality and professional skill: these are the factors that permitted IREM to achieve in 1993 the certification of its quality system in compliance with **UNI EN ISO 9001** standard, a further confirmation of IREM commitment to permanent improvement to ensure the maximum satisfaction of the customer and its capacity to guarantee:

- a constant quality standard
- precision and repeatability of all working processes
- dropping of acceptance control at the customer’s plant
- identification and traceability of a product through the years.

In year 2000, IREM obtained the certification of its environment management system according to **UNI EN ISO 14001** standard. This certification is a firm demonstration of the company’s will to protect the environment not just through its products, but also via precise patterns of behaviour.

In 2014, the company management system has obtained the certification of conformity to **BS OHSAS 18001** Standard which sets out the minimum requirements for occupational health and safety management.



IREM SpA a socio unico - Via Abegg 75 - 10050 Borgone - Torino - ITALY
Tel. ++39 011 9648211 - Fax ++39 011 9648222
e-mail: irem@irem.it - www.irem.it