Spänningsstabilisatorer
Voltage Stabilisers

Allmänt
General information

INTRODUCTION & TECHNOLOGY

IMPORTANCE OF VOLTAGE STABILISERS

The increase of voltage sensitive equipment has determined a continuous **request** for means able to guarantee the supply of steady voltage independently from mains variation.

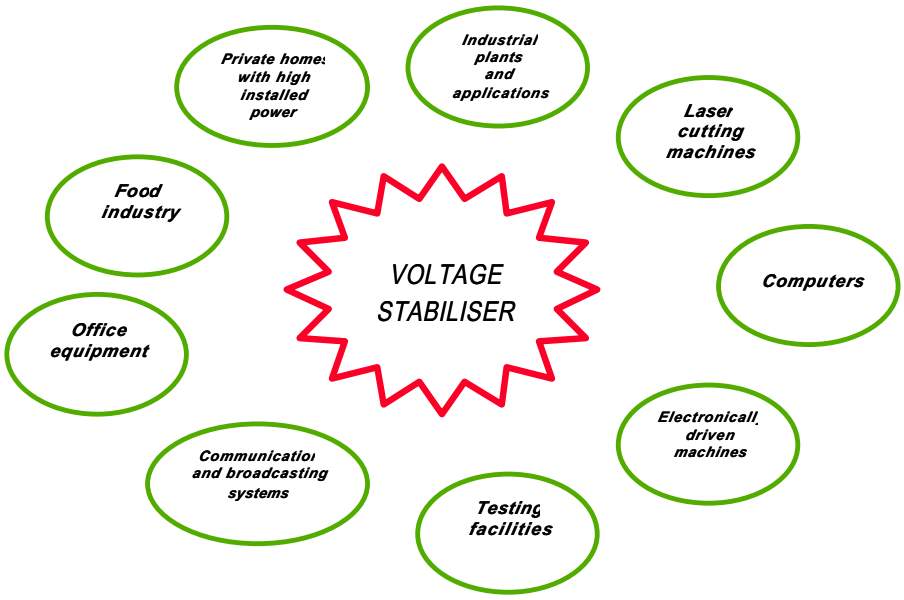
Loss of data, defective products, security failure, machinery faults and inaccurate information are only a few examples of possible problems due to unstable supply.

The voltage stabiliser has proved to be an efficient **answer** in order to prevent from potential damages due to input voltage fluctuation.

Installing a voltage stabiliser is often the solution to ensure continuity and quality of production.

USE OF A VOLTAGE STABILISER

A typical voltage stabiliser is able to respond to changes in the voltage level called **sags (voltage drops)** and **surges (voltage peaks)** on the input line.
Sags might be due to undersized distribution lines, connection of large loads to the network, ground faults.
Surges might be generated by disconnection of large loads, increased voltage at the generating plant, atmospheric events.
The duration of such phenomena depends on the cause and is not easily predictable.
Sags are generally more common especially where the distribution is not wide and efficient.
Other disturbances like spikes, transients, high frequency noise and harmonic distortion have to be treated with the addition of specific filtering systems.
The good functioning of the majority of electrical and electronic equipment depends on the supply voltage correctness and steadiness. Nowadays, many industrial and private users are subject to long-lasting fluctuations that can be inconvenient or even dangerous..



COMPARISON WITH A UPS SYSTEM

The type of utilisation described before pushes towards the choice of a voltage stabiliser instead of a UPS in order to have:

- Lower costs
- High power availability
- Wider input variation ranges
- Overload capacity up to 2In
- Inrush current capacity up to 10In
- Higher reliability and ruggedness
- Absence of batteries and consequent easy storage and handling
- Negligible harmonic distortion because of the use of electronic components only in auxiliary circuits
- Service continuity

CHOICE OF A VOLTAGE STABILISER

Generally speaking, a stabiliser can be chosen on the basis of a few elements:

1. NUMBER OF PHASES
2. RATED VOLTAGE
3. INPUT VARIATION RANGE
4. TYPE OF REGULATION
5. RATED POWER
6. INSTALLATION

Once these six points have been established, any other optional request can be dealt with separately.

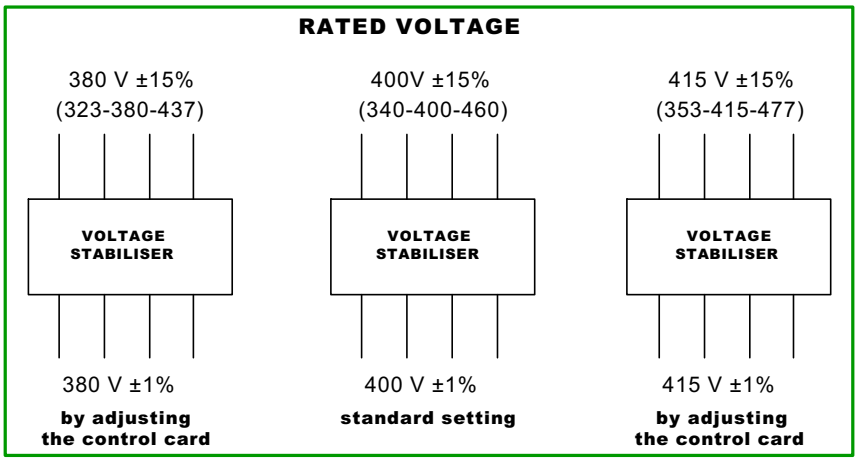
1. Number of phases

The stabiliser number of phases depends on the type of load:
One 1-phase load: 1-phase stabiliser
Combination of several 1-phase loads or 3-phase loads: 3-phase stabiliser or a 1-phase stabiliser on each load.
3-phase load: 3-phase stabiliser

2. Rated voltage

Always detect the nominal voltages that are supposed to be present at the input and at the output of the stabiliser. In case of 3-phase systems, provide with the line-to-line voltage value.
Since there are different nominal voltages around the world, do not assume that YOUR nominal voltage is automatically known.

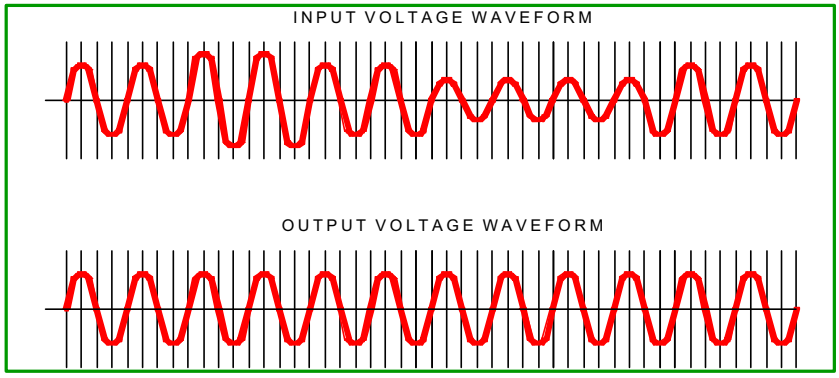
The standard voltage stabiliser can operate with the following rated voltage:



3. *Input variation range*

It's a key information for the choice and the design of the stabiliser.
Establish the nature of the oscillation of the input voltage and **always keep a safety margin on such percentage** The standard production can include stabilisers for symmetrical and asymmetrical input variation range. If the input voltage variation goes beyond the rated range, the difference between real and rated variation is transferred onto the output.

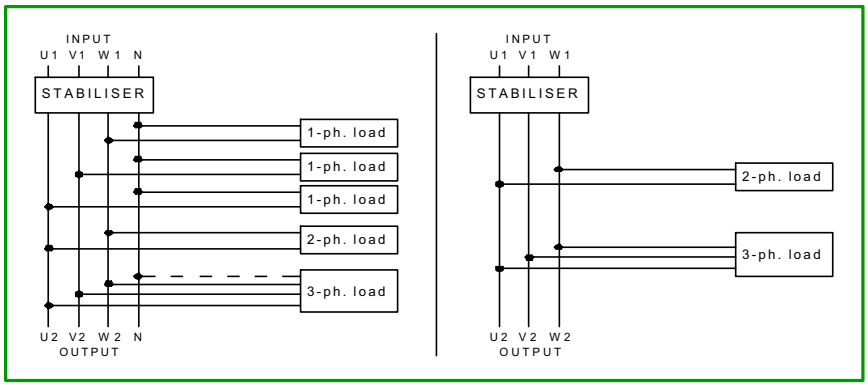
For example: rated input variation ±15% rated output accuracy ±1%
abnormal variation ±20% output accuracy ±6%



4. *Type of regulation*

The three-phase voltage regulation can be performed in two different ways:

- independently on each phase. Used for 3-phase loads and 1-phase loads with until 100% unbalance and unbalance input voltage rated. In this configuration the voltage stabiliser requires the neutral wire presence.
- averaged on the three phases. Used for 3-phase loads and 2-phase loads with 50% maximum unbalance and balance input voltage rated. In this configuration the voltage stabiliser does not require the neutral wire presence.



5. *Rated power*

Establish the power required to supply your load system and **consider an extra safety margin** for a possible future expansion.
A voltage stabiliser power is expressed in kVA (kilovoltamperes), whilst load power is often given in kW (kilowatts). The link between these two measuring units is provided by the power factor (cosφ):

$$kVA = \frac{kW}{\cos\varphi}$$

Remember the following:
kVA = load voltage x load current (single-phase)
kVA = $\sqrt{3}$ x phase to phase load voltage x load current (three-phase)

If the power factor or the load power in kW cannot be easily established, measure the absorbed currents in order to allow for a correct design of the stabiliser.
All the stabilisers are designed for the maximum input current.

6. *Installation*

In order to provide with the best machine, it is recommended to inform about the installation condition. It is necessary to know:
- IP protection degree
- Indoor or outdoor installation
- Installation site altitude and climatic properties
- Ambient temperature
- Possible environmental hazards such aggressive atmosphere, exposure to chemical components and so on.

AVAILABLE RANGE

ORTEA's voltage stabiliser production covers an extensive range of standard types:
- Single-phase electrodynamic line from 0.2 kVA to 100 kVA (VEGA, ANTARES and LYBRA)
- Three-phase electrodynamic line from 2 kVA to 4000 kVA (ORION, SIRIUS, TAURUS, ARIES and DISCOVERY)
- Single-phase static line from 0.5 kVA to 10 kVA (GEMINI)
- Three-phase static line from 3 kVA to 1000 kVA (AQUARIUS and ODYSSEY)

ADVANTAGES

Choosing an electromechanical voltage stabiliser means:
- Smooth and reliable regulation
- Up to ±0.5% output accuracy
- Admitted inrush current up to 10In
- Negligible introduction of harmonic distortion
- High efficiency
- High ratings

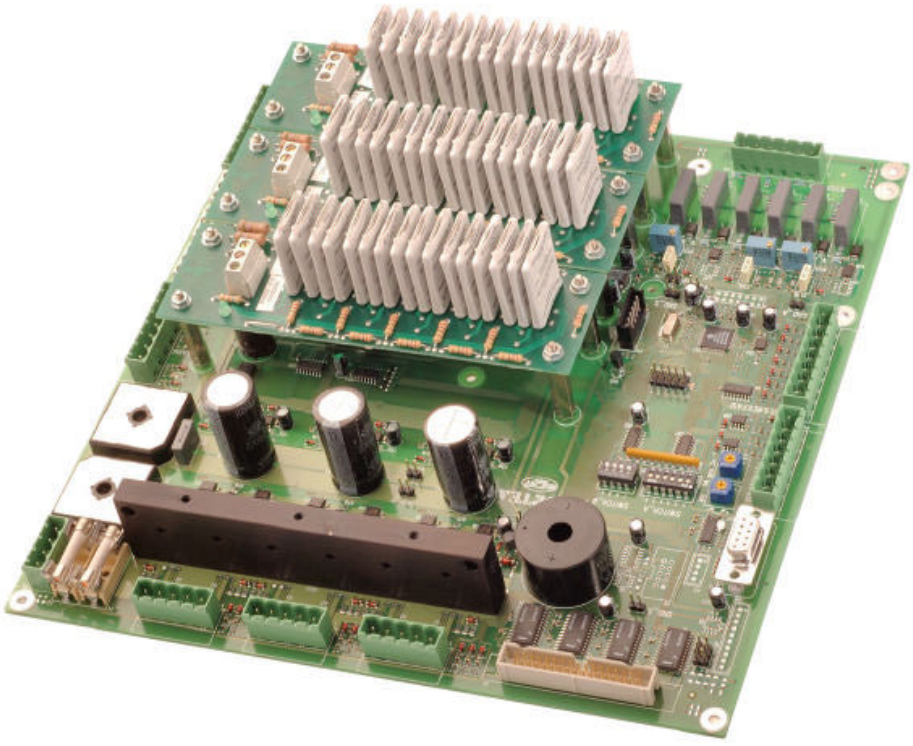
PERSONAL SAFETY

Access to the equipment can only be obtained by opening or dismantling the metal enclosure using appropriate tools: therefore, protection against direct contact inherently complies with IP21 class.
Inside the equipment there are dangerous voltages.
Access to the components for installation, setting, inspection and maintenance must be granted only to qualified personnel in charge of it.
The stabiliser must not function without the earth connection.
A circuit breaker should be installed upstream to the equipment in accordance with the requirements of IEC364 (CEI 64-8) "Electrical installations".
The stabiliser must be used exclusively on the purpose for which it had been designed and built.
Any other utilisation has to be considered as inappropriate and therefore dangerous.
The Company will not to be held liable for possible damages to people, animals and belongings due to incorrect use or installation.

ELECTRODYNAMIC STABILIZERS WITH DIGITAL CONTROL

DESCRIPTION OF THE UNIT

The stabilising system is designed to operate with rated voltage in accordance with IEC 38 and is expected to be connected between main power supply and load.
The purpose is to supply the loads a stabilised voltage having an input voltage variable with respect to the rated value. The highest input current is obtained with the minimum rated voltage; as the output voltage is stabilised within a close range, the output current is considered to be constant.
Stabilisation takes place on the 'rms' value of the voltage and is not affected by harmonic distortion in the mains.
The stabiliser can operate with a load variation range from 0 to 100%; the response time depends on the input voltage percentage variation and on the type of design (indicatively, it can vary between 11 and 32msec/V).
The voltage stabiliser is not affected by the load power factor and since regulation is performed without chopping the voltage sine wave, neither an appreciable harmonic distortion nor a phase displacement are introduced on the downstream line.
The equipment is housed in a metal enclosure with RAL7035/RAL7032 finish and IP21 protection class, suitably sized according to power rating. Depending on the model, The stabilisers are cooled by air (natural or aided convection) or oil, depending on the type.
When the input variation percentage is –25%, -30% or –45% the unit is provided with a special component (super capacitor) able to adjust automatically the output voltage to the minimum value after a failure in the mains.
Such device prevents from possible damages to the user due to the potentially high voltages that might occur when the rated supply is re-established.



MAIN COMPONENTS

The main components of the stabiliser are:

1. *Buck/boost transformer*

   The booster transformer is a standard dry-type transformer; the secondary winding is connected in series to the mains while the primary winding is supplied by the voltage regulator.

2. *Voltage regulator*

   The voltage regulator consists of an autotransformer with continuously variable transformer ratio. The voltage intake varies depending on the contact position; therefore the voltage supplied to the transformer primary winding also varies. The voltage across the regulator contacts (and consequently that on the secondary winding of the buck/boost transformer) is either in phase or in opposition to the supply voltage, and it is therefore added or subtracted to the supply voltage, thus compensating its variations

3. *AUXLIARY CIRCUIT WITH MICROPROCESSOR*

   The **DSP** microprocessor-based control circuit (specific for fully digital drives) compares the output voltage value to the adjusted one. When the percentage variation is too high, the control drives the voltage regulator gearmotor. By doing so the regulator rollers change their position thus varying the voltage drawn and supplied to the buck/boost transformer primary winding.
   All the described activities are performed automatically

The voltage stabiliser can operate with input and output voltages different from the rated voltage. Such setting can be performed at the factory or at the Customer's premises by adjusting the dip-switch mounted on the electronic control card within the allowed range and according to the instructions described in the handbook. In the SIRIUS and TAURUS stabilisers, such setting can be performed by communicating directly with the microprocessor from a PC (through an RS232 interface). If the rated output voltage differs from the input voltage, a suitable step-up or step-down autotransformer should be installed in the equipment. However the voltage stabiliser can work just as well after accepting that the range of input voltage variation is not symmetric.

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Since 1969, ORTEA SpA is a leading manufacturer of voltage stabilisers, magnetic components and electrical equipment. Such position has been reached thanks to the sound professional skills of its staff.
Thirty-five years in the business and ongoing technical research have made ORTEA competitive and technologically up-to-date. A close co-operation between design, production and marketing, allows for the needs of a constantly growing number of customers to be satisfied. A constant attention to market developments, pushes the company towards the improvement of established products and the design of new ones. Beyond the standard products, ORTEA is organised to be extremely flexible in developing and manufacturing special equipment according to user's specification thanks to the experience gained by the Company over its many years of applied technological development. Such development now includes sophisticated computer hardware and software that enable the technical staff to drawing up and examining electrical and mechanical designs for each "custom product" on a quick and cost-effective basis. The belief that product quality and customer satisfaction are the basis for a modern organisation led to the implementation of an ISO 9001:2000 approved Quality System.