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# **VEGA-ANTARES**

***SINGLE-PHASE VOLTAGE STABILISERS***

# **ORION**

***THREE-PHASE VOLTAGE STABILISERS***

USER'S MANUAL  
MAT192 August 2021

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**CONFORMITY DECLARATION**

The Manufacturer,



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under its own responsibility

**DECLARES**

that the products:

**1-PHASE & 3-PHASE  
 VOLTAGE STABILISERS**

identified with the names:

**single-phase**  
**VEGA (code SVxxxxxxxxVxxxx)**  
**ANTARES (code SNxxxxxxxxNxxxx)**

**three-phase**  
**ORION (code SYxxxxxxxxYxxxx)**

provided that they are installed, maintained and used for the purpose for which they have been designed and built according to good professional practice and in conformity with the Manufacturer's instructions,

**COMPLY**with the requirements contained in the **CE** EUROPEAN DIRECTIVES:

- **2014/30/EU (EMC DIRECTIVE)**
- **2014/35/EU (LOW VOLTAGE DIRECTIVE)**
- **2011/65/EU (ROHS RECAST)**

as complying with the relevant parts of the Harmonised Standards:

- **EN 61439-1 (LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES. PART 1: GENERAL RULES)**
- **EN 61439-2 (LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES. PART 2: POWER SWITCHGEAR AND CONTROLGEAR ASSEMBLIES)**

The Manufacturer also

**DECLARES**

that the units are built with suitable quality components and that the manufacturing process is constantly verified in accordance with the Quality Control Plans which the Company applies in compliance with the **ISO9001:2015** Standard.

The Company's commitment towards environmental issues and safety at work matters is guaranteed by the certification of the Management System according to the ISO14001:2015 and **ISO45001:2018** Standards.

The General Sales Conditions, which include the warranty terms, can be downloaded either via the QR code or from the website [www.next.ortea.com](http://www.next.ortea.com)



## 1 INTRODUCTION

This Manual contains the information necessary to ensure correct operation of the unit, efficient maintenance program, avoidance of incorrect use and safety for the personnel involved with the unit performance. The voltage stabilisers described in this manual must be used exclusively for the purpose for which they have been designed and manufactured. Installation must be done according to the instructions provided with this handbook. Any other use has to be considered as inappropriate and therefore dangerous. The Manufacturer shall not be held liable for any damage to people and belongings due to incorrect use or installation. In case of doubt and for any other necessity, please contact the nearest authorised Service Centre. This Manual is as an integral part to the unit and the instructions therein must be carefully followed. File this manual and all the attached documentation for further consultation in a place available and known to the user and the maintenance personnel and keep it for the entire life of the unit.

**Note** Anytime a specific rating power is expressed, that is referred to the  $\pm 15\%$  input variation range. Check the tables in the "Ratings, schematics and dimensions" chapter to find the equivalent ratings.

### 1.1 INFORMATION PROPERTY

This Manual (including any attached document) is covered by copyright and the Manufacturer maintains all the reserved rights. It is compulsory to inform the Manufacturer's Head Office and ask for authorisation before proceeding with any release or reproduction. The Manufacturer shall not be held liable or responsible in any way for unauthorised copies, alterations or additions to the text or to the illustrated parts of this document. Any modification involving company logo, certification symbols, names and official data is strictly forbidden.

In order to obtain better performance, the product described in the present handbook can be altered at any date and without prior notice.


### 1.2 REFERENCE NORMATIVE

The units described in this Manual are designed and built in compliance with:


- 2014/35/EU (Low Voltage European Directive)
- 2014/30/EU (Electromagnetic Compatibility European Directive)
- applicable parts of the EN61439-1/-2 (Low-voltage switchgear and controlgear assemblies) Harmonised Standard

Furthermore, the Manufacturer's Managing System is compliant and duly approved according to:

- ISO9001:2015 (Quality)
- ISO14001:2015 (Environmental issues)
- ISO45001:2018 (Health & Safety at work)

 **WARNING** INFORMATION AND INSTRUCTIONS PROVIDED BY THIS MANUAL ADD TO AND NEITHER REPLACE NOR AMEND ANY STANDARDS, REGULATIONS, DECREES, DIRECTIVES OR LAWS CONCERNING ENVIRONMENTAL AND SAFETY AT WORK AWARENESS ENFORCED BOTH INTERNATIONALLY AND IN THE COUNTRY OF INSTALLATION.

### 1.3 DEFINITIONS

 **WARNING** MESSAGE RELEVANT TO POTENTIALLY HAZARDOUS SITUATIONS WHICH MIGHT INDUCE MINOR INJURIES IF IGNORED OR NEGLECTED. THE SAME SIGNAL CAN BE USED TO HIGHLIGHT HAZARDS WHICH MIGHT CAUSE DAMAGE TO THE UNIT OR TO POINT OUT IMPORTANT INFORMATION.

 **DANGER** MESSAGE RELEVANT TO POSSIBLE OR PROBABLE HAZARDOUS SITUATIONS WHICH MIGHT INDUCE SERIOUS HARM OR EVEN DEATH IF IGNORED OR NEGLECTED.

**Note** Additional information to better understand the unit operation.

## 2 ENVIRONMENTAL NOTES



With reference to the 2012/19/EU WEEE Directive (Waste of electric and electronic equipment), please be aware that the products described in this manual have been produced after August 13th 2015. The WEEE symbol (beside) on the product label and / or accompanying documents means that used electrical and electronic equipment must not be mixed with general household or municipal waste. At the end of their useful life, these products must be disposed of via suitable channels. Please refer to the current legislation in force in the Country of installation.

Professional users in the European Union must contact their dealer or supplier for further information.

The symbol is only valid in the European Union (EU). For disposal in countries outside of the European Union please contact the local authorities or dealer and ask for the correct method of disposal.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

The product does not contain CFCs, HCFCs, asbestos, oil (neither as a refrigerant nor as a lubricant), fuel, liquid or gaseous substances. Please recycle the packaging materials (cardboard and/or wood). At the end of the service, before disposing of the unit, remove the nameplate and make the appliance unusable by cutting the internal connections.

### 3 HEALTH & SAFETY

#### 3.1 NOTES FOR THE OPERATOR



**DANGER THE VOLTAGE INSIDE THE EQUIPMENT IS DANGEROUS. ACCESS TO THE COMPONENTS FOR INSTALLATION, SETTING, INSPECTION AND MAINTENANCE MUST BE GRANTED ONLY TO QUALIFIED PERSONNEL IN CHARGE OF IT AND INFORMED OF THE RELEVANT RISKS. BEFORE STARTING ANY OPERATION, DISCONNECT THE UNIT FROM THE MAINS.**

The following safety general instructions are based on experience and common sense, but cannot describe or foresee all the possible situations. Basic safety procedures must be continuously applied and known by whoever operates on the unit. In order to ensure full knowledge of properties and characteristics of the unit, this Manual must be read and comprehended by those who supervise, maintain and run the unit.

- Check that the unit is always properly earthed.
- Warn anybody who might be in the vicinity before energizing the unit.
- Always operate in good lighting.
- Do not allow unauthorized personnel to operate on the unit for no reason whatsoever.
- Always use suitable safety means such as isolating tools and footboards, isolating gloves, etc.
- NEVER operate the unit without the provided protections against accidental contact, unless specifically indicated in the maintenance instructions in this Manual. However, controls and maintenance routines that require the protections to be removed shall be under the User's full responsibility.
- Do not climb on top of the enclosure.
- Do not accumulate goods around or above the enclosure.

The unit is housed in an enclosure with screwed in panels. In normal working conditions, the unit must operate only when the enclosure is completely closed and cannot be accessed without opening the cubicle with specific means. The protection against direct contact is therefore inherently obtained. Any anomaly or alarm indication must be promptly signaled.

#### 3.2 NOTES FOR MAINTENANCE



**DANGER BEFORE ANY MAINTENANCE OR REPAIRING ROUTINE, DISCONNECT THE UNIT BY OPENING THE UPSTREAM GENERAL BREAKER AND LOCK IT WITH A PADLOCK, THE KEYS OF WHICH MUST BE KEPT BY THE MAINTENANCE SUPERVISOR UNTIL THE END OF THE PROCEDURE.**

- Do not perform maintenance while the unit is working. Only setting or checking operations through the provided instrumentation are allowed.
- Whenever possible, do not use hands instead of suitable tools to work on the unit.
- Do not use bars, cables, plates or internal components as support or handhold.
- Check that mechanical and electrical connections are properly tightened at the end of the maintenance routine.
- Do not remove, alter or damage nameplates, warnings of any identification tags or labels.
- Before re-energising, always restore the protection that might have been removed for maintenance.

In case of doubts on the operational features or on the necessary maintenance procedures, please contact the Manufacturer or an authorised Service Centre.

Tampering on the unit relieves the Manufacturer from any responsibilities and makes the User solely responsible towards the competent bodies concerning accident prevention. The Manufacturer disclaims all responsibility for:

- failure to follow the specified instructions
- modification (even slight) performed on the unit resulting in altering its operational features
- failure to comply with the health and safety at work measures
- use of not original spare parts (unless specifically authorized by the Manufacturer)


During maintenance and repairing procedures, the enclosure is likely to be open. Consequently, some residual dangers persist, due to the impossibility of eliminating the sources as implicit in the working procedures.

DANGER	INDICATIONS
CRUSHING	Handling the unit must be done exclusively by means of the tools described in the relevant chapter. Handling and lifting operations must be carried out by skilled and trained personnel only.
ELECTROCUTION	During normal working operation, the danger does not exist. Carry out maintenance routines only after having disconnected the unit. Should it be necessary to test an energized unit, segregate the area so that only skilled personnel can operate, still in compliance with all the health and safety requirements set forth by the Rules and Regulations enforced in the Country of installation.
FIRE	Open the upstream interrupting device and use CO <sub>2</sub> fire extinguishers. Do not use water to extinguish fire.
HUMAN ERROR	Installation, start-up, setting, inspection, maintenance and repairing operations must be carried out by skilled, qualified and authorized personnel only, informed of the relevant risks. Read this Manual carefully and thoroughly before operating on the unit. Altering its configuration or replacing one or more of its parts without the Manufacturer's authorization is strictly forbidden.

DANGER	INDICATIONS
FAILURE TO PERFORM MAINTENANCE	Carry out the maintenance routine as prescribed in this Manual. The Manufacturer shall not be held liable in any way for damage to people and belongings caused by failure in performing maintenance on the unit.
LACK OF INFORMATION	While carrying out the maintenance routine, ensure that the unit cannot be energised without the maintainer's awareness. To this purpose, padlock the upstream interrupting device and affix warning signs.

### 3.3 BEHAVIOUR

The personnel dealing with the unit shall operate strictly in conformity with the requirements set forth by the health and safety at work Rules and Regulations enforced in the Country of installation. Provided that everything is carried out according to the instructions in this Manual, the unit is designed in order to work and be maintained without risks for people or the environment. The voltage stabiliser is an automatic equipment that does not require maneuvering or command drives. However, personnel dealing with it must be aware of its characteristics, functioning features, signals and alarm indications, maintenance routines and troubleshooting procedures. The full comprehension of this Manual is therefore critical.

 **DANGER TAMPERING AND/OR UNAUTHORISED REPLACEMENT OF ONE OR MORE COMPONENTS, USING ACCESSORIES, TOOLS OR MATERIAL NOT RECOMMENDED AND/OR NOT APPROVED BY THE MANUFACTURER MIGHT BE DANGEROUS AND CAUSE ACCIDENTS. SAID ACTIONS RELIEVE THE MANUFACTURER FROM ANY CIVIL AND/OR PENAL RESPONSIBILITIES.**

#### 3.3.1 Correct behaviour


The User is protected against the risks related to the unit operation. The correct use allows for fully and safely exploiting its performance and can be obtained by:

- following the instructions provided by this use and maintenance Manual
- paying attention to the provided warnings and danger indications
- respecting the recommended maintenance frequency and keeping a record of the interventions
- disconnecting the unit in case of inspection, maintenance or repairing routines
- using suitable PPEs (Personal Protective Equipment) when dealing with the unit
- promptly informing the supervisor about operating anomalies (suspected malfunctioning, incorrect operation or failure; excessive noise; etc.) and if necessary putting the unit out of order.


#### 3.3.2 Incorrect behaviour

Any use that contrasts with what stated above and any of the operations listed below can be defined as incorrect:

- arbitrary alteration of the working parameters. In case changes are required, please contact the Manufacturer or an authorized Service Centre
- use of improper or unsuitable energy sources
- unit operated by insufficiently trained personnel
- failure to comply with the maintenance instructions or incorrect maintenance
- use of unsuitable or unauthorized not original spare parts
- alteration of the safety devices and/or unit tampering
- performance of inspection, maintenance or repairing routines without disconnecting the unit




 **WARNING THE MANUFACTURER SHALL NOT BE HELD LIABLE DUE TO ANY DAMAGE TO PEOPLE AND BELONGINGS ARISING FROM INCORRECT USE AS ABOVE DEFINED.**





The microprocessor-based control system detects data and anomalies, generating several alarms displayed by means of the LEDs on the control card. Only in single-phase units up to 15kVA, an alarm code is displayed on the digital voltmeter. The alarms are generally accompanied by an acoustic signal.


 **WARNING EXCLUDING OR BYPASSING IN ANY WAY THE ALARMS IS STRICTLY FORBIDDEN. THE MANUFACTURER DISCLAIMS ALL RESPONSIBILITY ON THE UNIT SAFETY IN CASE OF FAILURE TO RESPECT SAID BAN.**

### 3.4 PERSONAL PROTECTIVE EQUIPMENT (PPE)

While dealing with the unit, the user must have and use suitable PPEs, in conformity with the safety requirements enforced in the Country of installation and with the relevant European Directives. The Manufacturer strongly recommends to dress suitably, avoiding clothes that might get caught up, wide sleeves, synthetic material, scarves and ties. Necklaces, bracelets, metallic wristwatches and similar object should also be avoided. In the table below, the recommended PPEs are listed:




		USER	MAINTAINER	DANGER	CONSEQUENCE
	SAFETY SHOES	•	•	Bumping, tripping, slipping, crushing limbs	Bruises, abrasions, cuts, sprains, dislocations, fractures
	SAFETY GLOVES	•	•	Contact with sharp surfaces or edges	Bruises, abrasions, cuts
	SAFETY DIELECTRIC GLOVES		•	Contact with live parts when testing an energized unit	Elettrocution

		USER	MAINTAINER	DANGER	CONSEQUENCE
	HELMET		●	Bumps to the head in the presence of suspended loads or work inside the enclosure	Bruises, abrasions, cuts, concussion, fractures
	VISOR/GLASSES		●	Contact with liquids and projectile	Eye injury, eyesight loss or limitation
	ANTI-ARC VISOR		●	Contact with projectile and radiation from electric arc	Eye injury, eyesight loss or limitation
	GENERIC ANTI-DUST MASK		●	Particulate and/or dust inhalation	Respiratory disorders

 **WARNING** A VISITOR CAN APPROACH A WORKING UNIT ONLY IF THE LATTER IS COMPLETELY CLOSED. SHOULD THE INTERNAL COMPONENTS BE SHOWN, REGARDLESS OF THE PROTECTION AGAINST ACCIDENTAL CONTACT, THE UNIT WILL HAVE TO BE SWITCHED OFF. OTHERWISE, THE VISITOR SHALL BE MAINTAINED AT A SAFETY DISTANCE BY MEANS OF PHYSICAL BARRIERS.

## 4 HANDLING

### 4.1 PACKAGING

The units can be packaged either in cardboard boxes strapped to a pallet and wound in plastic film or in a wooden crate with seaworthy vacuum bag. Each unit is provided with a label indicating nominal data, consignee data and purchasing order details. The package bears the usual pictograms (; ; ) and, in case of wooden crate, the indication of the lifting points for chains or fork-lift trucks. With cardboard box packaging, anti-shock and anti-tilting indicators are also affixed.


### 4.2 RECEPTION

At reception, check the integrity of the packaging and the absence of evident damage occurred during transport. If the unit does not require immediate installation, store it with its original packaging. Once the good condition of the delivery has been established, unpack the unit and check it. In the unlikely event of damage, notify the Manufacturer in writing immediately.


### 4.3 STORAGE

Should the unit be stored, ensure that it is kept sheltered from rain or snow, excessive humidity, adverse climatic conditions (atmospheric pollution, saline atmosphere, parasites, etc.) at a temperature between -5°C and 40°C.

### 4.4 MOVING THE UNIT

 **WARNING** THE UNIT MUST BE KEPT IN VERTICAL POSITION, AS INDICATED ON THE PACKAGING. LAYING IT DOWN INTO A HORIZONTAL POSITION MIGHT SERIOUSLY DAMAGE THE INTERNAL COMPONENTS, ALTER THE MECHANICAL STABILITY AND COMPROMISE THE FUNCTIONALITY.

Unloading and moving operations are under the User's responsibility. Take the utmost care in order to avoid damage to whoever might be around the unit, to the unit itself and to belongings or other equipment on the installation site. Unloading and moving operations can be performed via cranes fitted with chains or lifting brackets or fork-lift trucks. The lifting devices must be suitable to the unit weight, in good conditions and regularly checked and maintained.

 **DANGER** HANDLING OPERATIONS MUST BE CARRIED OUT ONLY BY AUTHORISED, SUITABLY TRAINED PERSONNEL PROVIDED WITH THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT (PPE). ALWAYS OPERATE IN CONFORMITY WITH THE SAFETY AT WORK RULES AND REGULATIONS ENFORCED IN THE COUNTRY OF INSTALLATION AND WITH THE INSTRUCTION MANUALS OF THE TOOLS USED. THE MANUFACTURER SHALL NOT BE HELD LIABLE FOR ANY DAMAGE THAT MIGHT OCCUR TO PEOPLE OR BELONGINGS DUE TO FAILURE IN COMPLYING WITH WHAT STATED ABOVE DURING UNLOADING AND MOVING OPERATIONS.

## 5 DESCRIPTION

The units are designed and built in compliance with the European Directives concerning CE marking (Low Voltage Directive and Electromagnetic Compatibility Directive) and can be used in both A and B environments according to EN61439-1/2. The stabilisers are supposed to be connected between mains and user.

The main features are:

	SINGLE-PHASE	THREE-PHASE
DESIGN	Based on maximum input current	
REGULATION PRINCIPLE	based on the 'rms voltage' and insensitivity to harmonics in the mains	
ADMITTED LOAD RANGE	0 – 100%	
ADMITTED HARMONIC CONTENT IN LOAD CURRENT	30% max (In case of higher percentage, the stabiliser must be derated)	
LOAD POWER-FACTOR INFLUENCE	none	
OUTPUT VOLTAGE HARMONIC DISTORTION	None introduced	
TYPE OF REGULATION	single-phase	Independent on each phase
TYPE OF LOAD	single-phase	3-ph.; 2-ph.; 1-ph
ADMITTED LOAD UNBALANCE	-	up to 100%
INPUT NEUTRAL WIRE AVAILABILITY	-	necessary

### 5.1 MAIN COMPONENTS AND WORKING PRINCIPLE

The main components are:

- buck/boost transformer (except where not provided);
- motorised toroidal autotransformer with continuously variable transformer ratio (voltage regulator).
- microprocessor-based electronic control circuit.

The control circuit compares the output voltage value to the set 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. Being the secondary voltage of the buck/boost transformer in phase or in opposition to the supply, the voltage drawn from the regulator is added or subtracted to the mains voltage, thus compensating its variations. If the buck/boost transformer is not provided, the control board and the gearmotor move the rollers on the regulator in order to guarantee the output nominal voltage.

### 5.2 PROTECTIONS

TYPE	FUNCTION
LIMIT SWITCHES	Motor rotation stop due to regulation reaching the limit
MOTOR SUPPLY	Protection in case of short-circuit on the motor
MAX/MIN LINE VOLTAGE	The alarm (set to $\pm 6\%$ of the rated output voltage) is brought to a contact that can be used to activate a relay controlling a soft-start contactor. Said contactor could disconnect the load in case the output voltage was outside the set range and re-establish the connection once the voltage has decreased within a $\pm 3\%$ interval (still with regard of the rated value). Tripping and restore values are set on the microprocessor and cannot be altered.
CARD THERMOSTAT	The thermostat controls the internal temperature and generate an alarm in case of overheating. The thermostat is set to $65^{\circ}\text{C}$ (with a hysteresis of $5^{\circ}\text{C}$ ) on the microprocessor. This threshold cannot be altered.
ROOF FANS (3-PH. UNITS FROM 60KVA)	Activation via an adjustable thermostat (default setting: $35^{\circ}\text{C}$ )
AUTOMATIC CIRCUIT BREAKER	Protection against overload and short circuit on the voltage regulator. <b>WARNING:</b> this protection works only on the voltage regulator and does not provide for any interruption on the line supplying the load. The activation of said protection might cause a considerable reduction of the load voltage. If such effect is thought to be dangerous for the load, then interrupt the general supply by means of the min/max voltage contact.
FUSES	Auxiliary circuit protection
RE-SETTABLE FUSE	Electronic board protection
OUTPUT CIRCUIT BREAKER	Protection against overload and short-circuit (only for units without buck/boost transformer)

The intervention of the internal protections is signalled by the buzzer mounted on the control board. Said buzzer can be disabled via the JP3 jumper. If not disabled, the buzzer keeps ringing for the entire duration of the alarm condition.

**Note** When the input variation percentage is at least  $\pm 25\%$ , the unit is provided with capacitors able to adjust the output voltage to the minimum value after a failure in the mains. Such adjustment prevents from possible



*damage to the user due to the overvoltage that might occur when the rated supply is re-established.*

### 5.3 ALARM SIGNALS

Prior to starting any inspection, always check that the connection to the mains is correct.

When the additional card is provided, in case of alarm a writing such as A01, A02... appears on the display alternatively to the output voltage. The meaning of said writing is resumed in the table below. If the additional card is not fitted, then it is necessary to refer to the card LEDs.

AL.	ALARM	BUZZER	DL5 RED	DL1	DL2	NOTES
A01	Motor blockage due to: – Motor shaft seizing – Kinematic system dirty or stuck	YES	ON		ON	
A02	QM circuit breaker with thermal release (1-ph 20kVA; 25kVA)	YES	ON		ON	<i>Overload</i>
A03	Black-out. Return to minimum voltage	YES	ON RL1 relay open term. 1-2	ON		<i>Wait until the voltage returns within the rated range</i>
A04	Min voltage. $V_{out} < V_{set}$ due to internal failure or input voltage too low to be stabilised	YES	ON RL1 relay open term. 1-2	ON		<i>Wait until the voltage returns within the rated range</i>
A05	Max voltage. $V_{out} > V_{set}$ due to internal failure or input voltage too high to be stabilised	YES	ON RL1 relay open term. 1-2	ON		<i>Wait until the voltage returns within the rated range</i>
A06	Motor in end position. Situation can be: 1. Normal. The regulation is momentarily at the limit and the input voltage is outside the nominal range 2. Abnormal. The regulation is momentarily at the limit and the input voltage is inside the nominal range.	NO	ON			1. <i>wait for the regulator to change position</i> 2. <i>ask for assistance</i>
A07	Overheating	YES	ON		ON	<i>Check fan (if mounted), load and overall ventilation of the unit</i>
A09	Gearmotor supply	NO	ON			Contact the after-sale service
A16	The display card does not communicate with the control card due to: a. Flat wire disconnected b. Flat wire defective c. Display card defective	NO	OFF			a. Secure the connection b. Replace the flat wire c. Replace the display card

## 6 INSTALLATION AND COMMISSIONING



**DANGER** VOLTAGE STABILISERS OUTPUT LINES MUST NOT BE CONNECTED IN PARALLEL TO EACH OTHER.

### 6.1 SITE CHOICE

The installation site must comply with the basic requirements listed below:

- unless otherwise agreed upon, the ambient temperature must fall in the -25/+45°C range
- unless otherwise agreed upon, the maximum installation altitude is 1000mt a.s.l.
- the floor or surface must be flat and able to withstand the unit's weight;
- the installation room dimensions and the airing system must ensure that the generated heat can be disposed of. Otherwise, a cooling systems must be arranged;
- the lighting system must be suitable for normal operating and maintenance routines;
- the ground circuit must comply with the relevant applicable rules and regulations;

If not previously arranged during the contracting phases, the unit must not be commissioned in case of:

- explosive atmosphere;
- flammable atmosphere;
- presence of conductive dust in the environment;
- proximity to radiation sources;
- possibility of floods.

Avoid direct heat and contact with liquid, flammable or corrosive materials.

**Do not clog the cabinet air outlets and leave 150-200mm clearance to allow for the air to circulate.**

Check that anti fire devices are available in the area.

**Note** *Only for single-phase units up to (and including) 15kVA, wall-mount installation is allowed.*

### 6.2 ELECTRICAL CONNECTION



**DANGER** THE VOLTAGE STABILISER IS NOT AND MUST NOT BE USED AS A PROTECTING DEVICE FOR NEITHER THE PLANT NOR THE LOADS. THE ELECTRICAL CONNECTION MUST BE CARRIED OUT BY TRAINED AND QUALIFIED PERSONNEL, AWARE OF THE INVOLVED RISKS. ALWAYS USE SUITABLE TOOLS AND PERSONAL PROTECTIVE EQUIPMENT (PPE). THE OPERATIONS MUST BE CARRIED OUT IN CONFORMITY WITH THE RULES AND REGULATIONS ENFORCED IN THE COUNTRY OF INSTALLATION.

#### 6.2.1 Supply

The supplying line must comply with the nameplate technical data. The unit is not protected against short-circuit or overload. In compliance with the safety regulations in force, the installation should take place in a system fitted with:

- an interrupting device with capacity referred to the maximum input current upstream the unit
- an interrupting device with capacity referred to the output current downstream the unit

**The above mentioned circuit breakers are not included in the standard unit, but they can be provided as optional accessories.**

**Note** *The installation of a co-ordinated upstream and/or downstream differential circuit breaker may be done under the site manager's responsibility. Said differential circuit breakers are not included in the unit*

**Note** *If the load supply continuity is of paramount importance, it is advisable to install a by-pass circuit in order to allow for the load to be fed directly from the mains in case the unit is switched off for maintenance or internal failure.*

**Note** *If the load is thought to be sensitive to voltages outside the rated tolerance, the addition of an over/undervoltage protection system able to disconnect the load in said conditions is strongly recommended.*

#### 6.2.2 Connections

**Note** *The cross-section value of the cables/bars for the connection to mains and load falls entirely under the installer's responsibility. The Manufacturer shall not be held liable for any damage that might occur to people or belongings due to an incorrect choice.*

##### 6.2.2.1 1kVA & 2.5kVA single-phase stabiliser

Make the connections to the mains and to the users by means of the Schuko plug and sockets positioned on the front side of the enclosure. The two output sockets allow two separate users to be connected.



**WARNING** EACH OUTPUT SOCKETS IS SIZED FOR THE NOMINAL POWER. THE OVERALL CONNECTED POWER MUST NOT EXCEED THE NOMINAL POWER.

##### 6.2.2.2 Other stabilisers

Open the cubicle and locate main parts and connection points. Remove the accidental contact protections (if provided). Prepare the connection cables/bars with regard to the current values and make them go through the openings prepared on purpose. The very first operation is to connect the earth wire to the terminal identified by PE, GRD or ⊕.



**DANGER** THE EARTH CONDUCTOR MUST NEVER BE ELECTRICALLY INTERRUPTED NEITHER INSIDE NOR OUTSIDE THE UNIT.

The earth wire cross-section must be chosen in conformity to the regulations in force. Therefore, depending on the phase cable cross-section, the earth wire cross-section should respect the values in the table below:

PHASE CABLE CROSS-SECTION S [mm <sup>2</sup> ]	EARTH WIRE MIN CROSS-SECTION [mm <sup>2</sup> ]
$S \leq 16$	S
$16 < S \leq 35$	16
$35 < S \leq 400$	S/2
$400 < S \leq 800$	200
$S > 800$	S/4

**Note** If a not standardised cross-section is found, the nearest larger one should be chosen.

**⚠ WARNING** FOR THE CORRECT OPERATION OF A THREE-PHASE VOLTAGE STABILISER, THE NEUTRAL WIRE MUST BE AVAILABLE AND CONNECTED TO THE RELEVANT TERMINALS.

Connect the unit to mains and load, trying to avoid kinks and accidental contact between the cables and the electric components. Make the connections respecting the indications written on the I/O terminals, typically as follows:

	1-PH. (SINGLE INPUT RANGE)	1-PH. (DOUBLE INPUT RANGE)	3-PH. (SINGLE INPUT RANGE)	3-PH. (DOUBLE INPUT RANGE)
INPUT	U1 - N	U1.1 - U1.2 - N	U1 - V1 - W1 - N	U1.1 - V1.1 - W1.1 - N
OUTPUT	U2 - N		U2 - V2 - W2 - N	

The input neutral wire is connected to the output neutral wire. As a result, they might be connected to the same terminal.

**⚠ WARNING** WHEN THE STABILISER IS PROVIDED WITH TWO POSSIBLE FUNCTION MODES (DOUBLE INPUT VOLTAGE VARIATION RANGE), IT IS NECESSARY TO COMPLY WITH THE INDICATIONS ON THE TERMINALS. CHANGING THE INPUT VARIATION RANGE MEANS CHANGING THE UNIT RATED POWER AS WELL. THE TWO RANGES ARE ALTERNATIVE TO EACH OTHER AND MUST NOT BE CONNECTED CONTEMPORARILY.

**⚠ WARNING** BE SURE THAT PHASE AND NEUTRAL WIRE ARE CONNECTED TO THE RELEVANT TERMINALS. SWAPPING THE INPUT CONNECTION WITH THE OUTPUT ONE COULD CAUSE SERIOUS DAMAGE.

Check the tightness of the connections and carefully close the cabinet.

### 6.3 START-UP

1. Supply the required voltage. Power circuit, auxiliary circuits, control board and instrumentation are energized.
2. Check output voltage stabilisation on each phase by means of the indications on the digital voltmeter (in which case the software version is displayed for a few seconds) or on the digital network analyser
3. Put the load on circuit and check that the output voltage regulation is steady.
4. Check that the output current does not exceed the rated value of the relevant load (with regard to the chosen input voltage variation percentage).

### 6.4 SETTINGS

**⚠ DANGER** DANGEROUS VOLTAGE CAN BE FOUND INSIDE THE STABILISER AND THE CONTROL BOARD. FOR THIS REASON, ONLY TRAINED AND QUALIFIED PERSONNEL AWARE OF THE INVOLVED RISKS MUST PERFORM THE DESCRIBED SETTINGS. SETTING OPERATION MUST BE PERFORMED ONLY IF STRICTLY NECESSARY. SUITABLE TOOLS AND PROTECTIVE MEANS MUST BE USED WHEN PERFORMING THE DESCRIBED ACTIVITIES. READ THIS HANDBOOK COMPLETELY BEFORE STARTING ANY INTERVENTION. THE LARGER ADJUSTMENT MUST BE PERFORMED BEFORE THE FINER ONE.

#### 6.4.1 Output voltage larger adjustment - Dip-switches 1 - 2

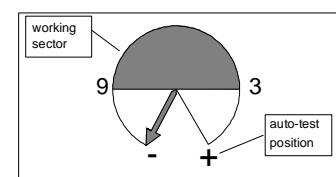
DIP-SWITCH 1	DIP-SWITCH 2	VOLTAGE
OFF	OFF	210V
OFF	ON	220V
ON	OFF	230V (default)
ON	ON	240V

#### 6.4.2 Output voltage finer adjustment - R46 Trimmer ('V')

Work on the adjusting screw with suitable tools and check the result on the voltmeter, taking into account the instrument response time. Higher output voltage values can be reached by clockwise turning the trimmer. The regulation range is  $\pm 5\%$ .

#### 6.4.3 Accuracy adjustment - R10 Trimmer ('%')

Set the trimmer by turning the screw in order to position it between 3 and 9 hours (see figure). Check the motor functioning: it should not cause the voltage regulator contact to hunt around a position. If the trimmer is turned to the maximum position (+), the card goes into auto-test mode. In this situation, the card makes the motor oscillate for about 15 seconds and the DL5 LED switches on. After the oscillating period, the motor stops and the system waits to be turned to a working position. As a warning indication, the LED flashes until the trimmer is moved from the maximum position.



**At the end of the adjusting operation, carefully close the enclosure.**

**6.5 INSTRUMENTATION**

<b>STABILISER</b>	<b>INSTRUMENT</b>	<b>DISPLAY</b>
1-phase $\leq$ 15kVA	Multi-function display	fixed
1-phase > 15kVA 3-phase	Digital multimeter	Voltage, current, powers, etc. See also the relevant manual

## 7 MAINTENANCE

### 7.1 FORWARD



**DANGER ACCESS TO THE INTERNAL COMPONENTS FOR INSTALLATION, SETTING, INSPECTION AND MAINTENANCE MUST BE GRANTED ONLY TO QUALIFIED PERSONNEL IN CHARGE OF IT AND INFORMED OF THE RELEVANT RISKS. ANY INTERVENTION MUST BE CARRIED OUT IN COMPLIANCE WITH THE HABITUAL RULES CONCERNING PERSONAL SAFETY AND USE OF ADEQUATE PROTECTIVE TOOLS.**

In order to ensure the performance throughout its life, the unit must undergo a simple but regular maintenance scheduling. The recommended frequency is 12 months, but the routine ought to be more frequent should it be required by other factors such as polluted environment or heavy duty cycle. Conforming to the recommended maintenance program ensures the correct functioning, thus preventing potentially dangerous failures.

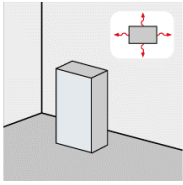
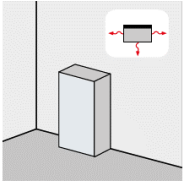
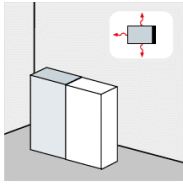
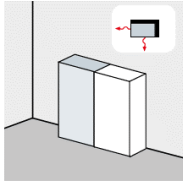
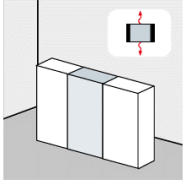
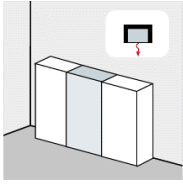


**DANGER EVERY MAINTENANCE OPERATION MUST BE DONE WHILE THE UNIT IS DISCONNECTED FROM THE MAINS.**

Before proceeding with the maintenance routine, check that the upstream interrupting device (disconnecting switch or circuit breaker) is open. Put on the unit a sign indicating the 'out of order' condition. Be sure that only the personnel necessary to the maintenance operations is dealing with the unit.

### 7.2 CONDITIONS FOR MAINTENANCE

Maintenance activities can be performed only if clearances are ensured around the unit.

UNIT TYPE	CONDITIONS TO PERFORM MAINTENANCE ACTIVITIES	
1-phase up to 15kVA	The cover must be removed.	
1-phase up to 35kVA 3-phase up to 45kVA	The cabinet is fitted with castor wheels. If the unit is sided by other cabinets, leave at the front enough space to move forward the unit so that the sides are also available.	
1-phase from 45kVA 3-phase from 60kVA	Beside the front (which is presumed to be clear) at least another side must be available. The possible configurations are:	
		4 clear sides Best configuration to perform maintenance.
		Front and sides clear. Maintenance possible (provided that the clearance is at least 600mm).
		Front, rear and 1 side clear. Maintenance possible if at least 600mm are available at the rear and the side. (In case of units made of more than one module, please contact Service).
		Front and 1 side clear. Maintenance possible if at least 600mm are available at the side. (In case of units made of more than one module, please contact Service).
		Front and rear clear. Maintenance possible (but potentially difficult) if at least 600mm are available at the rear.
		Only the front is clear. Maintenance impossible. The unit must be moved.

### 7.3 MAINTENANCE ACTIVITIES

WHAT	HOW
IN GENERAL	Clean all components by removing dust and dirt with dry compressed air. DO NOT use any lubricants for the voltage regulator moving contacts.
VOLTAGE REGULATOR	Check the regulator integrity and the smoothness of its surface. If necessary, clean the regulator surface with fine sand paper. Do not apply too much force on the surface in order to avoid damaging the regulator and its isolation. Blow the regulator with dry compressed air to clean from residual copper and then wipe with a clean dry cloth.
REGULATOR ROLLERS	Check that the regulator rollers are not broken, chipped, scratched or irregularly consumed (flat areas). The rollers must rotate freely while their support moves along the winding. By moving the rollers slowly, check that their movement is smooth and uniform. The width of the contact surface must not be larger than the width of two turns of the winding. If necessary, replace the worn out or damaged rollers by loosening the fixing screws, detach the L-shaped support and assemble a new spare one. (In single-roller regulators, the roller can be replaced without detaching the support).
FANS (IF APPLICABLE)	Check the regular functioning of the cooling fans. Such operation can be carried out without disconnecting the unit and without opening the cubicle: just check that the airflow coming out from the outlet openings is regular and not limited by dust or dirt. In case of malfunction or failure alarm, try to locate the origin of the fault and if necessary substitute the damaged fan.
FIXTURES AND CONNECTIONS	Check the tightness for mechanical fixtures, transmission components coupling and all the electrical connections.
BELT TENSION (IF APPLICABLE)	Check that the transmission belt is neither too tight (which would imply too much friction) nor too loose (ending in a possible fall of the belt itself). In order to do that, loosen the screws that fix the motor supporting plate. The clamping holes allow for little adjusting movements. Move the plate to adjust the belt tension and tighten the screws back in position.

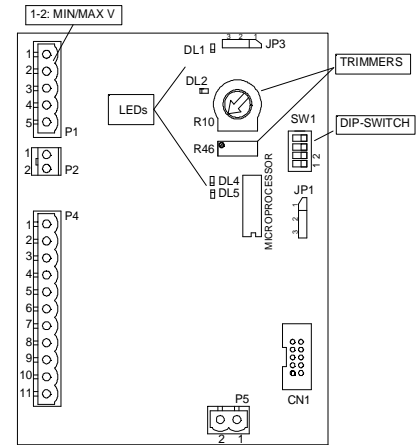
At the end of the maintenance intervention, be careful to:

- check that nothing is left inside the cabinet (tools, cloths, consumables, etc.);
- carefully re-position each and all the safety device that might have been removed;
- check the unit full functionality (including signals and alarms) before supplying the load;
- check the regular stabilisation after the load has been connected.

## 8 MICROPROCESSOR BASED CONTROL CARD

The control board runs the unit completely. The control is performed via a software that digitalises all the parameters (full digital control). In the stabilisers provided with digital voltmeter, the control board is connected via a flat wire to the signalling board, fitted with digital display showing output voltage and alarm conditions. For the other stabilisers, the signalling card can be requested and connected to the CN1 terminal block on the main control card in order to visualize the alarm conditions.

**In order to avoid micro-fractures of the miniaturised components, please be careful not to bend the card.**



### 8.1 SIGNALS

LED	COLOUR	PARAMETRE	STATUS	ALARM
DL1	red	Regular functioning	OFF	--
		Min/max voltage alarm	ON	A04-A05
DL2	red	Regular functioning	OFF	
		Alarm external to the card only for: - 1-ph.: 20kVA; 25kVA - 3-ph.: from 60kVA	ON	A01-A02 A07
DL4	green	CPU Regular functioning	flashing	--
		CPU irregular functioning	ON	--
DL5	red	Regular functioning	OFF	--
		R10 Trimmer in auto-test, waiting to be brought to normal working position	flashing	--
		Self-test running	ON	--
		General alarm (see alarm table) or regulation at end position	ON	--

### 8.2 TRIMMERS, DIP-SWITCHES AND JUMPERS

TRIMMER	FUNCTION
R10	accuracy adjustment
R46	output voltage fine adjustment

DIP-SWITCH	FUNCTION
1 - 2	output voltage setting
3 - 4	gearmotor setting

JUMPER	POSITION	FUNCTION
JP3	1 - 2	Alarm buzzer enabled (default)
	2 - 3	Alarm buzzer disabled
JP1	1 - 2	+10/-20% volt. alarm
	2 - 3	±6% volt. Alarm (default)

### 8.3 TERMINALS

BLOCK	TERM.	FUNCTION
P1	1 - 2	min/max voltage NC contact (see alarm signal table)
	3 - 4	-
	5	external alarm input
P2	1 - 2	return to min voltage
P4	1	earth
	2 - 3	-
	4 - 5	supply
	6 - 7	decrease mode end limit switch
	8 - 9	gearmotor
	10 - 11	increase mode end limit switch
P5	1 - 2	stab. output voltage - signal
CN1	-	additional card

## 9 TROUBLESHOOTING



**DANGER** ACCESS TO THE INTERNAL COMPONENTS MUST BE GRANTED ONLY TO QUALIFIED PERSONNEL IN CHARGE OF IT. ANY OPERATION THAT MIGHT REQUIRE THE UNIT TO BE ENERGISED MUST BE CARRIED OUT IN COMPLIANCE WITH THE HABITUAL RULES CONCERNING PERSONAL SAFETY AND THE USE OF ADEQUATE PROTECTIVE TOOLS. THE REPLACEMENT OF ANY PART MUST BE CARRIED OUT ONLY WHEN THE UNIT IS DE-ENERGISED.

In case of anomalies or failure of any component, check that all the instructions given in this manual have been followed. Interventions must be carried out promptly as soon as the issue arises in order to avoid an aggravation of the problem and the involvement of other components.

Prior to starting any inspection, always check that the connection to the mains is correct.

ANOMALY	POSSIBLE CAUSE	REMEDY
No OUTPUT VOLTAGE	<ul style="list-style-type: none"> <li>▪ Incorrect I/O connection</li> <li>▪ External protection intervention</li> <li>▪ Defective buck/boost transformer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Check all the connections</li> <li>▪ Check the external protections</li> <li>▪ Ask for repairing or replacement</li> </ul>
THE INSTRUMENT DOES NOT DISPLAY ANY INDICATIONS	<ul style="list-style-type: none"> <li>▪ Fuse intervention</li> <li>▪ Flat wire badly connected or defective</li> </ul>	<ul style="list-style-type: none"> <li>▪ Replace the blown out fuse with equivalent one</li> <li>▪ Restore the connection or replace the wire</li> </ul>
	Damaged or defective instrument	Replace with spare instrument
ABSENCE OF REGULATION	Tripping of differential or magneto-thermal protection	Check which protection tripped and why. Search and solve the abnormal condition that made the protection intervene.
	Malfunctioning auxiliary transformer of electric card feeding	Check the supply of: <ul style="list-style-type: none"> <li>- card auxiliary transformer (<math>V = V_{out}</math>). If the supply to the auxiliary transformer cannot be detected, the auxiliary circuit protection fuse has blown out: replace it with an equivalent one and locate the component that generates its intervention</li> </ul> control card (voltage between terminals P4.4 and P4.5 = 1/10 $V_{out}$ . For example, $V_{out} = 220V$ , $V_{45} = 22V$ ). If $V_{45}$ cannot be detected, the auxiliary transformer is defective and must be replaced with an equivalent one.
	Incorrect signal	Check the voltage across the terminals of the P5 terminal block on the card: <ul style="list-style-type: none"> <li>- Voltage <math>\neq</math> output voltage: the auxiliary circuit protection fuse has blown out: replace it and locate the component that causes the fuse intervention.</li> <li>- Voltage = output voltage: the origin of the fault must be searched for in the card itself or in the gearmotor and the transmission unit (joint, pulley/belt, chain)</li> </ul>
	Defective card	DL4 must always be flashing slowly. If DL4 is off, always on or flashing randomly, the card is defective. However, before proceeding with the replacement, switch off the unit, restart it and check again.
Defective mechanical transmission	If the voltage across the card terminals P4.8 and P4.9 is regular, check the following: <ul style="list-style-type: none"> <li>- Limit switch operation. In working situation, the limit-switches are Normally Closed. By disconnecting them from the electronic card and manually activating them, check their opening and closing operation. If the limit-switches are defective, replace them with equivalent ones</li> <li>- Motor. By touching the motor, feel the vibration indicating its rotation. More effectively, decouple the motor from the voltage regulator and watch if the shaft rotates. If the fault is actually in the motor, replace it with an original spare new one</li> <li>- mechanical connections between joints/pulleys and relevant shafts. Disconnect the unit, move the regulator contacts and check the movement of the transmission unit. The resistance opposed to the rotation is due to the gear reduction: to prevent from possible damage to the transmission components, move the roller slowly and carefully. If a problem in the transmission is detected, try to re-establish the correct connection between the joint/pulley and the shaft or replace the voltage regulator.</li> </ul>	



ANOMALY	POSSIBLE CAUSE	REMEDY
CARRIAGE TO THE END LIMIT POSITION	Wear or breakage of one or more rollers	Locate the damaged component and replace with an original spare part
	Roller detachment from the regulator surface	Re-establish the correct contact. Check the whole roller support and the spring functionality. If necessary, replace damaged or malfunctioning parts with original spare parts.
	Interruption of the line between voltage regulators and buck/boost transformer.	Eliminate the origin or repair/replace the damaged component
	Damaged or defective card	Replace the card with an original spare one

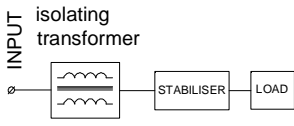
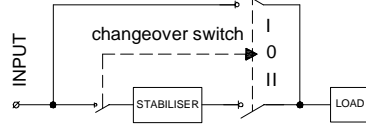
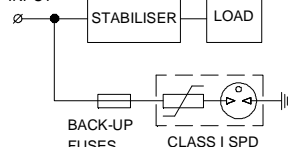
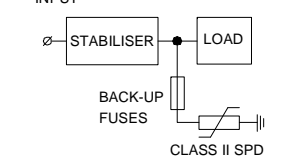
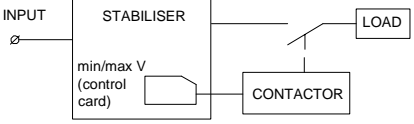
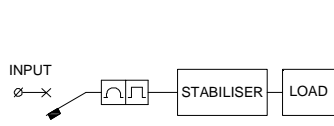
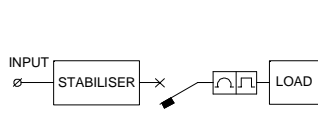
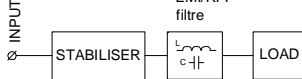
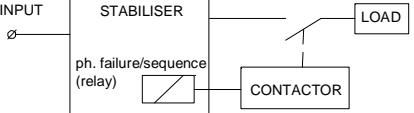
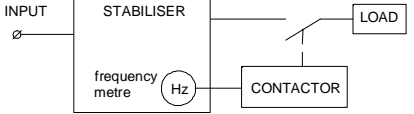
***If none of the previously described possibilities occurs or if it is not possible to detect the fault, ask for assistance.***

If the card does not work and a short-circuit is thought to be the fault origin, check the motor and the relevant wires. If the inspection has established that the card is defective, replace it with an original spare one. The new card will have to be set in relation to the type of motor assembled on the regulator.

For any queries (including the request for spare parts) please contact the nearest authorised Service facility or the Manufacturer's Service Dept. always mentioning type and factory code of the unit, serial number and Purchasing Order or Invoice Number.

**ACCESSORIES**

The selected items are integrated in the stabiliser.

<input type="checkbox"/>	<p><b>INPUT ISOLATING TRANSFORMER</b></p> <ul style="list-style-type: none"> <li>- Separation between the stabiliser (and its load) and the mains, with protection against overvoltage, which are discharged to ground via the electrostatic shield.</li> <li>- In 3-ph. systems, creation of a steady neutral point. The internal connections cancels third and triplen harmonics.</li> </ul>	
<input type="checkbox"/>	<p><b>MANUAL BYPASS</b></p> <p>Segregation of the stabiliser for maintenance or inspecting operations, without having to disconnect the load. In this situation, the load is supplied directly by the mains, but the voltage is not stabilized.</p>	
<input type="checkbox"/>	<p><b>CLASS I SPDs</b></p> <p>Input protection against external surges caused (for example) by lightning.</p>	
<input type="checkbox"/>	<p><b>CLASSE II SPDs</b></p> <p>Output protection against surges caused by transients or malfunctioning.</p>	
<input type="checkbox"/>	<p><b>OVER/UNDERVOLTAGE PROTECTION</b></p> <p>Over/undervoltage protection which trips automatically when the output voltage is outside range by disconnecting the load and re-connecting it once the voltage is regular again. <i>WARNING. This circuit does not protect against short circuit.</i></p>	
<input type="checkbox"/>	<p><b>INPUT AUTOMATIC CIRCUIT BREAKER WITH MAGNETIC AND THERMAL RELEASE</b></p> <p>Protection against overcurrent or short-circuit set to the maximum admitted input current. If the circuit breaker opens, the supply to the stabiliser is interrupted. Circuit breaker accessories:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> minimum voltage coil/release coil</li> <li><input type="checkbox"/> re-set coil</li> <li><input type="checkbox"/> motorised manœuvre</li> </ul>	
<input type="checkbox"/>	<p><b>OUTPUT AUTOMATIC CIRCUIT BREAKER WITH MAGNETIC AND THERMAL RELEASE</b></p> <p>Protection against overcurrent or short-circuit set to the rated output current. Circuit breaker accessories:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> minimum voltage coil/release coil</li> <li><input type="checkbox"/> re-set coil</li> <li><input type="checkbox"/> motorised manœuvre</li> </ul>	
<input type="checkbox"/>	<p><b>EMI/RFI FILTER</b></p> <p>Filtration of electromagnetic and radio-frequency interference to provide with cleaner output voltage.</p>	
<input type="checkbox"/>	<p><b>PHASE-FAILURE/SEQUENCE PROTECTION</b></p> <p>The protection intervenes when one or more phases fail or when the phase sequence is incorrect. If the condition lasts for more than a few seconds, an output contactor disconnects the load. When the rated supply is re-established, the load is automatically re-connected.</p>	
<input type="checkbox"/>	<p><b>FREQUENCY PROTECTION</b></p> <p>The protection intervenes when the supply frequency is outside the 47-65Hz range. If the condition lasts for more than a few seconds, an output contactor disconnects the load. When the rated supply is re-established, the load is automatically re-connected</p>	
<input type="checkbox"/>	<p><b>OTHER</b></p>	

**TECHNICAL DATA**

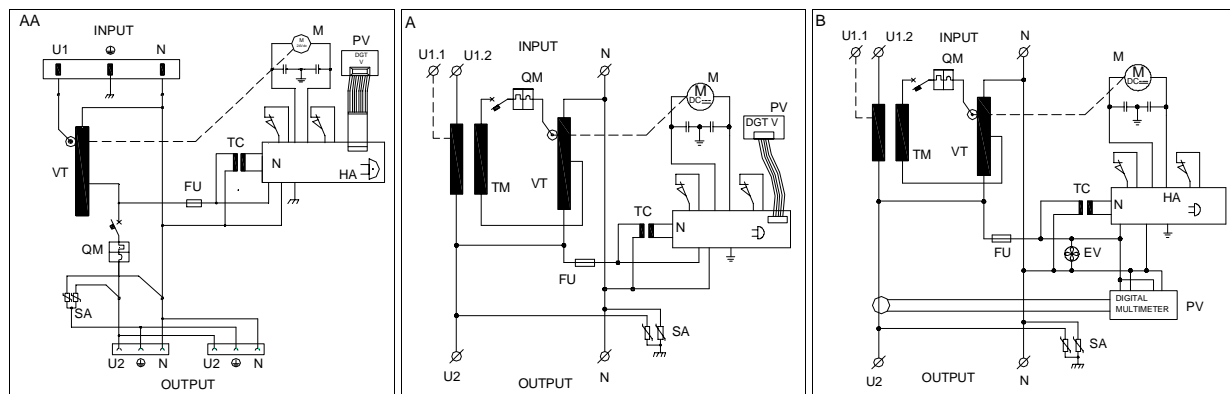


# RATINGS, SCHEMATICS AND DIMENSIONS

## SINGLE-PHASE

### Correlation between rating [kVA] and input voltage variation percentage

DIAGRAM	±15%	±20%	±25%	±30%	-25/+15%	-35/+15%	-45/+15%	DIMENSIONS [mm]
AA	1	0.7	0.5	0.3	0.7	0.5	0.3	300 x 460 x 300
	2.5	2	1.5	1	2	1.5	1	300 x 460 x 300
A	5	4	3	2	4	3	2	300 x 460 x 300
	7	5	4	3	5	4	3	300 x 560 x 300
	10	7	5	4	7	5	4	300 x 560 x 300
	15	10	7	5	10	7	5	300 x 560 x 300
	20	15	10	7	15	10	7	410 x 530 x 1200
B	25	20	15	10	20	15	10	410 x 530 x 1200
	35	25	20	15	25	20	15	410 x 680 x 1200
	45	35	25	20	35	25	20	600 x 600 x 1600
	60	45	35	25	45	35	25	600 x 800 x 1600
	80	60	45	35	60	45	35	600 x 800 x 1600
	100	80	60	45	80	60	45	600 x 800 x 1800
	135	100	80	60	100	80	60	600 x 800 x 1800

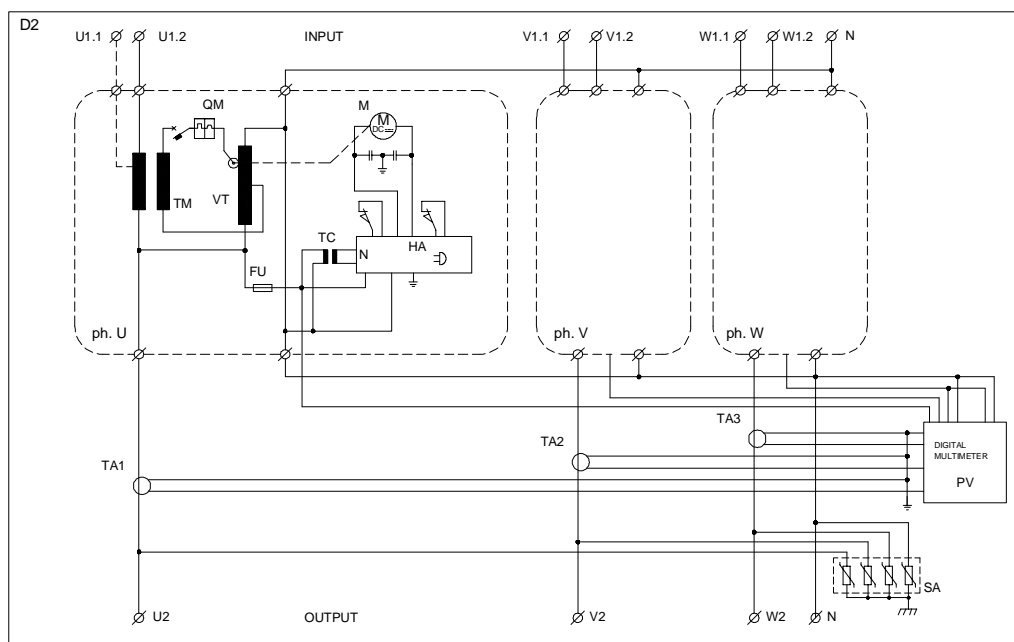
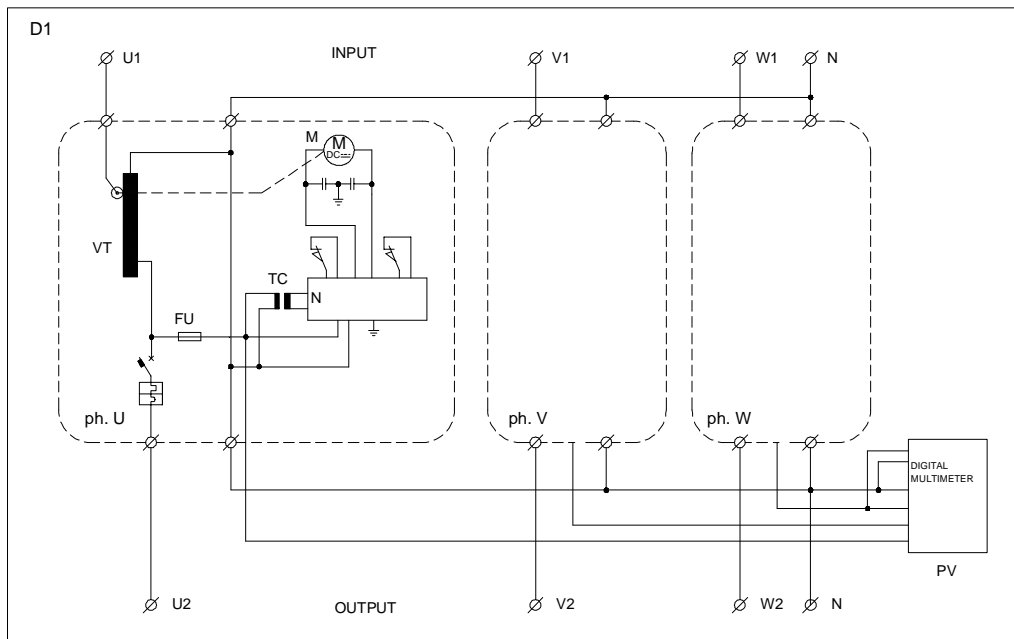


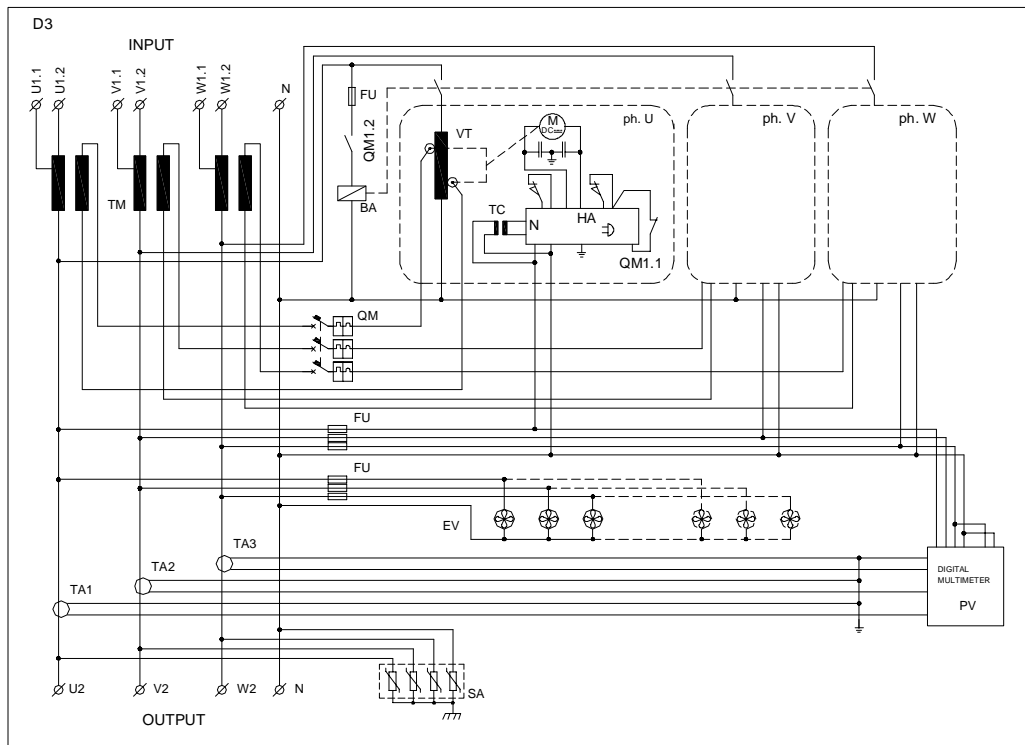
EV	fan
FU	fuse
HA	overload alarm
M	servomotor
N	control card
PV	instrumentation
QM	automatic circuit breaker
SA	Class II SPD
TA	current transformer
TC	auxiliary transformer
TM	buck/boost transformer
VT	voltage regulator

**THREE-PHASE**

**Correlation between rating [kVA] and input voltage variation percentage**


DIAGRAM	±15%	±20%	±25%	±30%	-25/+15%	-35/+15%	-45/+15%	DIMENSIONS [mm]
D1	5	4	3	2	4	3	2	410 x 530 x 1200
	10	7	4	3	7	4	3	410 x 530 x 1200
D2	15	10	7	4	10	7	4	410 x 530 x 1200
	20	15	10	7	15	10	7	410 x 680 x 1200
	30	20	15	10	20	15	10	410 x 680 x 1200
	45	30	20	15	30	20	15	410 x 680 x 1200
D3	60	45	30	20	45	30	20	600 x 600 x 1600
	80	60	45	30	60	45	30	600 x 800 x 1600
	105	80	60	45	80	60	45	600 x 800 x 1800
	135	105	80	60	105	80	60	600 x 800 x 1800





EV	fan
FU	fuse
HA	overload alarm
M	servomotor
N	control card
PV	instrumentation
QM	automatic circuit breaker
BA	contactor
SA	Class II SPD
TA	current transformer
TC	auxiliary transformer
TM	buck/boost transformer
VT	voltage regulator

### MAINTENANCE LOG

 **DANGER** ACCESS TO THE INTERNAL COMPONENTS FOR INSTALLATION, SETTING, INSPECTION AND MAINTENANCE MUST BE GRANTED ONLY TO QUALIFIED PERSONNEL IN CHARGE OF IT AND INFORMED OF THE RELEVANT RISKS. ANY INTERVENTION MUST BE CARRIED OUT IN COMPLIANCE WITH THE IN FORCE REGULATIONS CONCERNING PERSONAL SAFETY AND USE OF ADEQUATE PROTECTIVE TOOLS.

For a description of the maintenance procedures and frequency, please refer to the relevant Section in the User's Manual. In case of abnormal situations (such as polluting or aggressive environment), the maintenance frequency ought to be increased accordingly.

NOMINAL DATA			
TYPE	CODE	S/N	RATING

ORDINARY MAINTENANCE		
CLEAN	1	GENERAL
	2	FILTRE/VENTILATION AIR INLET
CHECK	3	MECHANICAL FIXTURES
	4	ELECTRICAL CONNECTIONS
	5	FAN OPERATION (WHEN APPLICABLE)
	6	VOLTAGE REGULATOR COPPER SURFACE STATUS
	7	VOLTAGE REGULATOR ROLLER SURFACE STATUS
	8	VOLTAGE REGULATOR BELT (WHEN APPLICABLE)

RECORD (TICK THE RELEVANT BOX)										
1	2	3	4	5	6	7	8	COMPANY	DATE	SIGNATURE

EXTRAORDINARY MAINTENANCE			
DESCRIPTION	COMPANY	DATE	SIGNATURE



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ORTEA SPA INTEGRATED MANAGING SYSTEM IS APPROVED BY LRQA ACCORDING TO  
ISO9001 ISO14001 ISO45001

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