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## **GEMINI**

**SINGLE-PHASE STATIC VOLTAGE STABILISERS**

## **AQUARIUS**

**THREE-PHASE STATIC VOLTAGE STABILISERS**

USER'S MANUAL  
MAT178 August 2021

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**CONFORMITY DECLARATION**

The Manufacturer,



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under its own responsibility and in the person of its Legal Representative

**DECLARES**

that the products:

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

identified with the names:

**GEMINI (CODE SXXXXXXXXXXXXXXX) - SINGLE-PHASE**  
**AQUARIUS (CODE SQXXXXXXXXXXXXXX) - THREE-PHASE**

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: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.

### 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, fuel, PCB, PCT, liquids 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 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.
FAILURE TO CARRY OUT 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.

DANGER	INDICATIONS
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 performed 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 the 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 the external control panel. 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 (89/656/EEC and 89/686/EEC). The Manufacturer strongly recommends dressing suitably, avoiding clothes that might be 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	Electrocution
	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

		USER	MAINTAINER	DANGER	CONSEQUENCE
	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 STABILISER DESCRIPTION

The stabilisers 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.

	GEMINI (1-ph.)	AQUARIUS (3-ph.)
DESIGN	Based on the maximum input current	
REGULATION PRINCIPLE	IGBT static switches	
REGULATION ACCURACY	Continuous (without steps)	
REGULATION SPEED	Within one half-wave	
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	n.a.	up to 100%
INPUT NEUTRAL WIRE AVAILABILITY	n.a.	necessary

### 5.1 MAIN COMPONENTS

- **'Buck/boost' transformer.** Allows for adding or subtracting the voltage necessary to compensate for the mains fluctuation.
- **IGBT microprocessor-based control and regulating board.** The control circuit compares the output voltage value to the set one. When the percentage variation is higher than desired, the control board generates the compensation necessary to bring back the output voltage within the nominal range.

In the PLUS configuration, the units include also:

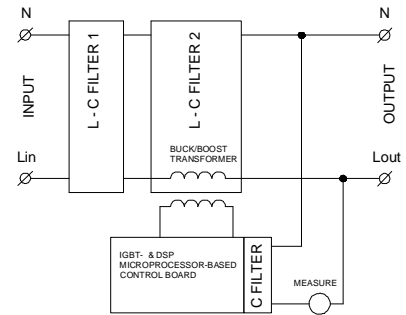
- **Input manual bypass.** Enables the stabiliser segregation in case of due maintenance.
- **Input automatic circuit breaker.** Protection against short-circuit.

**5.2 WORKING PRINCIPLE**

The board receives the supply voltage as an input and provides with an output voltage that is variable in terms of amplitude and phase (in phase or in opposition to the input). Value and phase are such that, when suitably added to the mains voltage via the buck/boost transformer, they result in having an output voltage stabilized to the desired value. The buck/boost transformer is supplied a sine-wave in phase or in opposition depending on whether an addition or a subtraction of voltage is necessary. The amplitude is chosen automatically by the software.

The system is also provided with filters to eliminate interference between the mains and the control board:

- **L-C Filter 1** (choke and capacitors) – intercepts the noise (both in common and differential mode) from the mains;
- **L-C Filter 2** (buck/boost transformer leakage reactance and capacitors) – intercepts the noise created by the control board chopper and the differential noise to and from the mains;
- **C Filter** (capacitors); intercepts the noise created by the control board chopper and the differential noise from the measuring circuit.



**5.3 PROTECTIONS**

TYPE	FUNCTION	BASIC	PLUS
MIN/MAX VOLTAGE RELAY	Protection against output voltage higher or lower than the nominal value	✓	✓
THERMOSTAT	The thermostat is mounted on the card to control the internal temperature and generates an alarm in case of overheating. The thermostat is set to 65°C (with 5°C hysteresis) on the microprocessor. This threshold cannot be altered.	✓	✓
EMI/RFI FILTRE	Protection against electromagnetic noise and radio-frequency interference	✓	✓
CLASS II SURGE ARRESTORS	Protection on the output line against operational overvoltage	✓	✓
FUSES	Control board protection (20A 6.3x38) Radiator fan protection (1A 5x20)	✓	✓
INPUT AUTOMATIC CIRCUIT BREAKER	Protection against short-circuit by cutting out the unit supply	✗	✓
MANUAL BYPASS SWITCH	Stabiliser segregation for maintenance or repair	✗	✓

**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 some basic requirements. Be sure that:

- the floor or surface is flat and can withstand the weight of the unit;
- the installation room dimensions and airing system are such that heat generated by the stabiliser can be disposed of. Otherwise, a cooling systems must be arranged;
- the lighting system is suitable for performing normal functioning operations and maintenance routines;
- the earthing circuit complies with the relevant applicable rules and regulations;

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

- corrosive, explosive or 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.

**Leave enough space around the unit for carrying out connections, maintenance and inspecting operations.**

Check that anti fire devices are available in the area.

**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.**

**Note** The installation of co-ordinated differential circuit breakers upstream and downstream the unit is under the sole responsibility of the site manager. Said differential circuit breakers are not included in the unit.

### 6.2.1 SUPPLY

The supplying data must be in conformity with the technical data specified in the nameplate.

The stabiliser is protected against short-circuit through an input automatic circuit breaker.

The installation of a co-ordinated differential circuit breaker upstream the stabiliser is recommended. Further differential circuit breakers can be installed downstream the stabiliser and co-ordinated with the input one.

### 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.

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 yellow/green 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 compliance with the enforced regulations. Depending on the phase cable cross-section, the earth wire cross-section shall respect the table below:

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

**Note** In case a not standardised cross-section value is found, choose the nearest larger one.

**⚠ 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 terminations.

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

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

## 6.3 START-UP

ACTIVITY	EFFECT
SUPPLY THE REQUIRED VOLTAGE	Power circuit, auxiliary circuits, control board and instrumentation are energised
CHECK OUTPUT VOLTAGE STABILISATION ON EACH PHASE	Indications on the digital voltmeter (in which case the software version is displayed for a few seconds) or on the digital network analyser
PUT THE LOAD ON CIRCUIT	check that the output voltage regulation is steady. 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 SETTING

**⚠ DANGER** DANGEROUS VOLTAGE IS PRESENT 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 ON THE STABILISER OR THE CONTROL BOARD. THE LARGER ADJUSTMENT MUST BE PERFORMED BEFORE THE FINER ONE.

The adjusting options are described by the dip-switches and trimmers tables in the control card chapter.

## 6.5 INSTRUMENTATION

The type of instrument provided varies with the type of stabiliser:

STABILISER	INSTRUMENT	DISPLAY
1-phase	Digital voltmeter	Fixed voltage value (alternate with the alarm symbol in case of alarm)
3-phase	3-ph. digital analyser Digital alarm display	Voltage, current and power via the scrolling keys on the instrument. The voltmeters are used as alarm indicators

## 7 MAINTENANCE

**⚠ 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 stabiliser must undergo a simple but regular maintenance scheduling. The recommended frequency is 12 months, but the maintenance 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 interrupting device upstream the stabiliser (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.

WHAT	HOW
STABILISER IN GENERAL	Clean all components by removing dust and dirt with dry compressed air.
FANS	Check the regular functioning of the cooling fans. Check that the airflow coming out from the outlets 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.
COUPLINGS AND CONNECTIONS	Check the tightness for mechanical couplings and all the electrical connections.

## 8 MICROPROCESSOR-BASED CONTROL CARD

### 8.1 OPERATION

The control card (one for each phase) is specifically designed for the static stabiliser. The card is basically a single-phase inverter that generates the voltage destined to the series buck/boost transformer. Said voltage, combined with the input one, allows for maintaining the stabiliser output voltage to a stable level through a closed loop control. The board manages voltage regulation, measurement of the electrical parameters and alarms. Depending on the unit rating, two different cards are used: **LR (Low Rating)** and **HR (High Rating)**.

**Note** For the software and parameters updating procedure and means, please contact the Service Dept..

### 8.2 RESPONSE SPEED

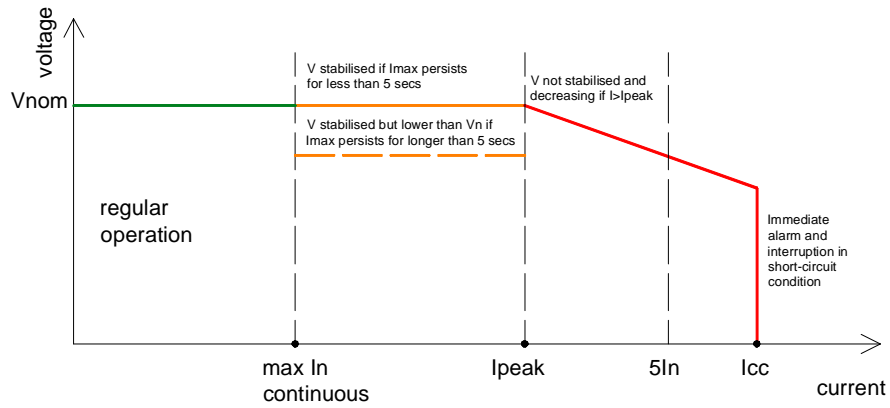
The control card reads the output voltage and calculates the rms value. If this value differs from the desired one, a correction is introduced by adding or subtracting a suitable voltage via the buck-boost transformer through a PWM command. The rms voltage is calculated every half-cycle: the response is therefore very fast, but the correction is applied smoothly in order to avoid oscillations in the system. The standard configuration, valid in most situations, is:

	LR CARD	HR CARD
ENSURED REGULATION WITHIN FIRST HALF- CYCLE	12.5%	25%
RESPONSE SPEED FOR THE ENTIRE REGULATION	5 cycles	4 cycles

### 8.3 RESPONSE SPEED IN RELATION TO THE INPUT VOLTAGE VARIATION

INPUT VOLTAGE VARIATION [%]	INPUT VOLTAGE VARIATION RANGE IN RELATION TO $V_{NOM}=230V$	RESPONSE SPEED WITHIN FIRST HALF-CYCLE
± 30	299 – 161 V	17V / 10msec
± 20	276 – 184 V	11V / 10msec
± 15	264 – 196 V	8,5V / 10msec

### 8.4 CURRENT MANAGEMENT



**Continuous current:** current that can be provided for an unlimited time.

**Peak current ( $I_{peak}$ ):** current that can be provided for a limited time. After that time, the protections will intervene.

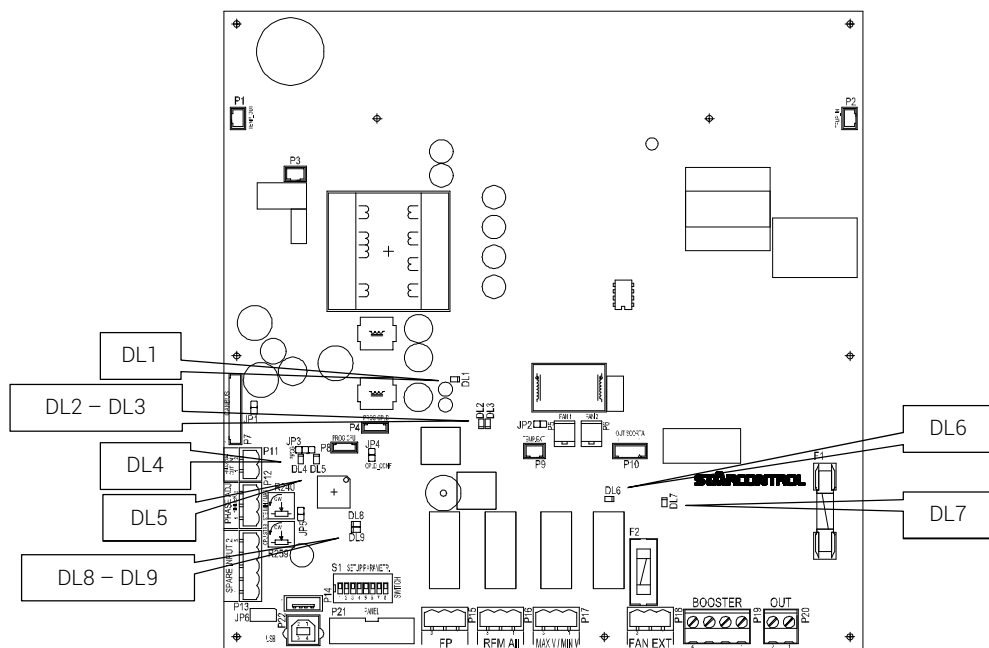
**Short-circuit current ( $I_{cc}$ ):** high and uncontrolled increase output of the current flowing from the control board towards the buck/boost transformer. It can be divided into two categories:

- **peak** ( $5 \times I_n$ ): the system does not regulate but operates
- **serious situation:** the system goes into arrest very quickly (a matter of microseconds). The short-circuit current is acknowledged as such when it reaches 10 times the nominal value, so that load peaks ( $I_p$  to 5 times  $I_n$ ) can be dealt without interruption.

### 8.5 LR CONTROL CARD (MOUNTED ON UNITS UP TO GEMINI 20-15 AND AQUARIUS 60-15)

**Note** The control board software is set during the testing routine and cannot be altered by the final user.

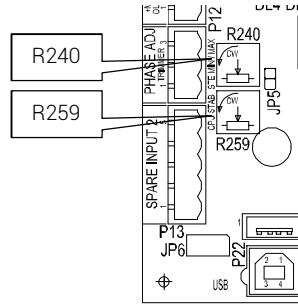
#### 8.5.1 LED MEANING



REF	COLOUR	PARAMETRE	ON	OFF	FLASHING
DL1	green	12Vdc supply	present	absent	-
DL2	green	3.3Vdc supply	present	absent	-
DL3	green	5Vdc supply	present	absent	-
DL4	red	data serial programming on CPU	programming	normal	-
DL5	yellow	CPU programmimg clock	programming	normal	-
DL6	yellow	Fan relay activation	Relay on	Relay off	-
DL7	red	Cabinet fan relay fuse	Fuse blown	fuse OK	-
DL8	yellow	CPU status	CPU stop	CPU stop	CPU running
DL9	red	CPU alarm	Alarm	No alarm	-

**8.5.2 TRIMMERS**

**⚠ DANGER** DUE TO THE PRESENCE OF DANGEROUS VOLTAGE ON THE BOARD, ALWAYS USE INSULATED TOOLS AND GLOVES. Rotate the trimmers gently without applying too much force.



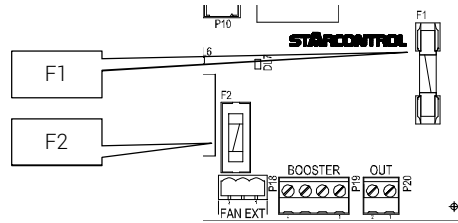
REF.	PARAMETER	NOTE
R240 (%)	Regulation speed	Adjust in order not to have system oscillation during the regulation operation. The trimmer alters the parameter DP.deltaDutyRamp (parameter 39 in the 'Work setup' menu) which represents the maximum regulation variation per half-cycle. By moving the trimmer, the system correction speed increases or decreases. The achievable variation is $\pm 100$ in relation to the default value (equal to 250, so the range is 150 to 350) and it is expressed in milliseconds ( $\pm 1000 =$ from -100% to +100% regulation). The ramp value is limited to 50 minimum. The trimmer adjusts the whole range in one turn: by turning it anti-clockwise, the regulation is faster.
R259 (V)	Min/max voltage alarm fine regulation	Allows for a slight alteration of the high/low voltage thresholds which generate the relevant alarm. The altered value is the one pre-set via software, corresponding to the trimmer central position. The variation is double (x2) or half (x0.5) at the extremities of the trimmer. The trimmer adjusts the whole range in one turn: by turning it anti-clockwise, the alarm is more sensitive.

**8.5.3 FUSES**

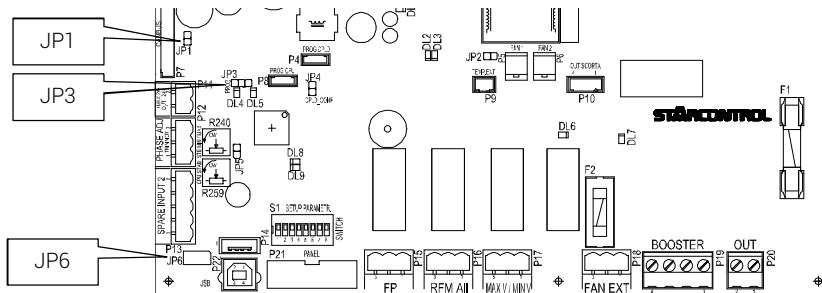
The board is fitted with:

- F1: no. 1 6.3x32 20A 500V fast fuse (protection against short-circuit)
- F2: no. 1 5x20 6.3A 250V fast fuse (protection of the fan)

If a fuse blows, switch the board off and replace the fuse with an equivalent one.

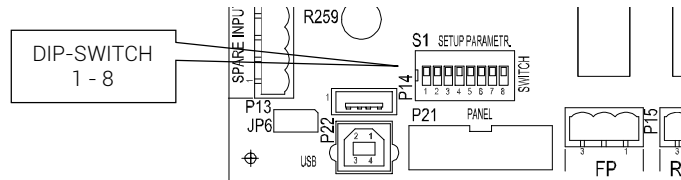


**8.5.4 JUMPER CONFIGURATION**



REF	PARAMETRE	POSITION	DEFAULT
JP1	CAN BUS (NM) termination	1-2: termination in 2-3: termination not in	Termination not in
JP3	CPU programming	1-2: ICD programming 2-3: TTL 5V serial	TTL serial
JP6	Spare input 5..8	1-8: input 5; 2-7: input 6 3-6: input 7; 4-5: input 8	NOT MOUNTED

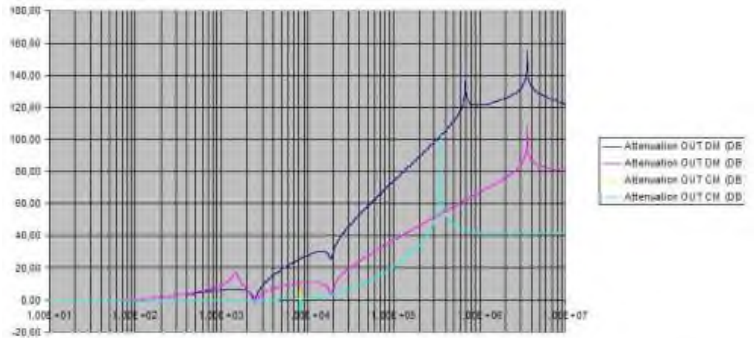
**8.5.5 DIP SWITCH CONFIGURATION**



REF	PARAMETRE	POSITION	DEFAULT
DIP1 DIP2	Selection of the rms voltage to stabilize Not active if the value is set via software. They become active if the configuration is altered.	DIP1    DIP2    TARGET Vac OF    OFF    210 ON    OFF    220 OFF    ON    230 default ON    ON    240	ON
DIP3	Enabling of target regulation via external potentiometer	ON= enabled / OFF= disabled	OFF
DIP4	Acoustic alarm disabling Internal buzzer and siren (if present) are disabled	ON= alarms disabled / OFF= alarms enabled	OFF
DIP7	Automatic regulation disabling. The control board switches to manual position and does not respond automatically to input voltage variations. It will add/subtract a voltage manually set by the user via a serial line.	ON= enabled / OFF= disabled	OFF
DIP8	Min/max voltage alar enabling. Enables the generation of an alarm if the output voltage goes beyond the nominal range for a set time. The threshold is adjustable through the trimmer and a software parametre.	ON= enabled / OFF= disabled	ON

**8.5.6 FILTRE CHARACTERISTICS**

The static stabiliser run by a LR card is fitted with an input EMI filter which deal with both common mode and differential mode noise. The presence of an inductive element (buck/boost transformer) and two capacitors, provides for an additional  $\pi$  filtre for differential mode noise, even if the actual transformer inductance depend on the conditions at the moment (regulating situation). The curves are obtained taking into consideration only the leakage inductance, which constitutes the worst case with lower filtering effect. The attenuation curves in the figure are obtained (expressed in dB with 50  $\Omega$  as load and line impedance).

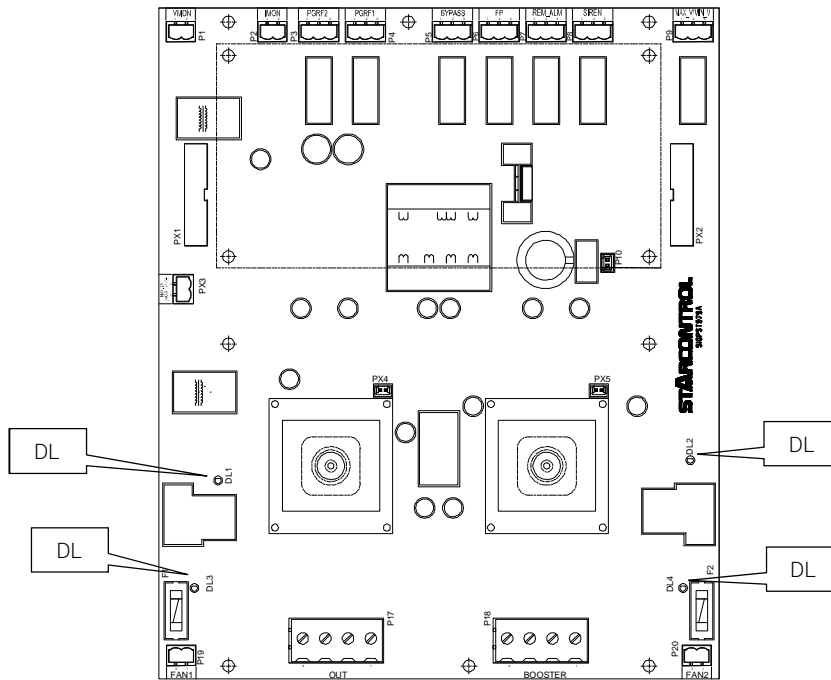


**8.6 HR CONTROL CARD (MOUNTED ON THE UNITS STARTING FROM GEMINI 30-15 AND AQUARIUS 90-15)**

It includes a base module (card A) and a top one (card B).

**Note** The control board software is set during the testing routine and cannot be altered by the final user.

**8.6.1 CARD A: LED MEANING**

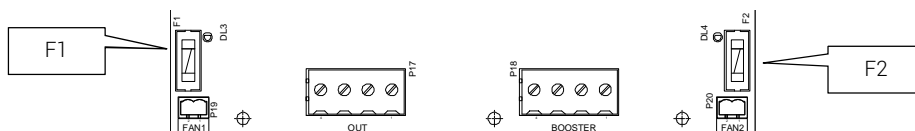


REF	COLOUR	PARAMETER	ON	OFF	FLASHING
DL1	green	Fan 1 relay activation	Relay ON	Relay OFF	-
DL2	green	Fan 2 relay activation	Relay ON	Relay OFF	-
DL3	red	Fuse F1 status (fan 1 relay)	F1 blown	F1 OK	-
DL4	red	Fuse F2 status (fan 2 relay)	F2 blown	F2 OK	-

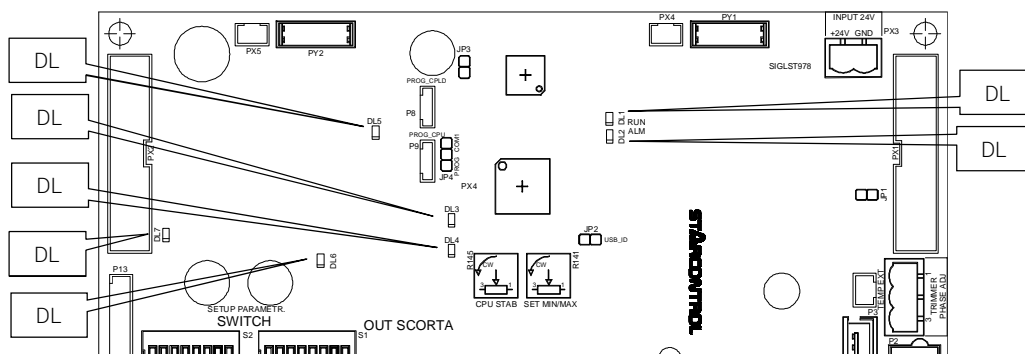
**8.6.2 CARD A: FUSES**

The board is fitted with two 5x20 10A 250V fast fuses (F1 and F2)

If a fuse blows, switch the board off and replace the fuse with an equivalent one.



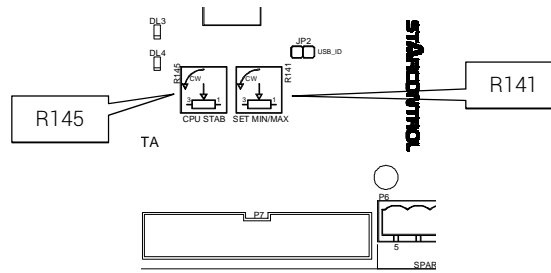
**8.6.3 CARD B: LED MEANING**



REF	COLOUR	PARAMETER	ON	OFF	FLASHING
DL1	yellow	CPU status	CPU Stop	CPU Stop	CPU working normally
DL2	red	CPU alarm	alarm	no alarm	-
DL3	yellow	CPU programming clock	programming	normal use	-
DL4	red	Data serial programming on CPU	programming	normal use	-
DL5	green	3.3Vdc supply	present	absent	-
DL6	green	5Vdc supply	present	absent	-
DL7	green	12Vdc supply	present	absent	-

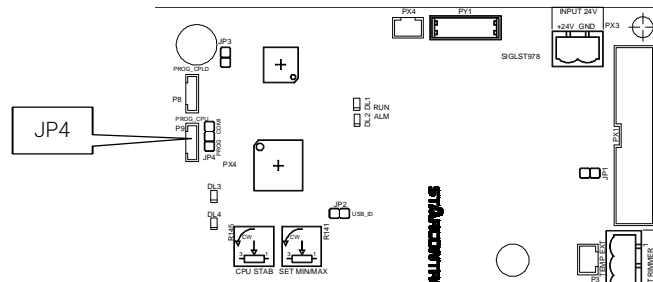
**8.6.4 CARD B: TRIMMERS**

**⚠ DANGER** DUE TO THE PRESENCE OF DANGEROUS VOLTAGE ON THE BOARD, ALWAYS USE INSULATED TOOLS AND GLOVES. Rotate the trimmers gently without applying too much force.



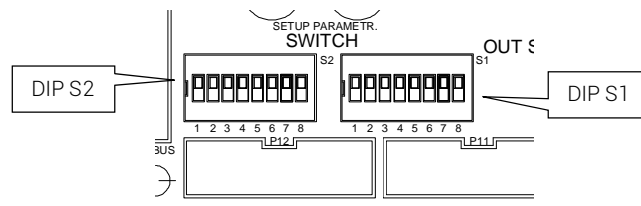
REF.	PARAMETER	NOTE
R145 (%)	Regulation speed	Adjust in order not to have system oscillation during the regulation operation. The trimmer alters the parameter DP.deltaDutyRamp (parameter 39 in the 'Work setup' menu) which represents the maximum regulation variation per half-cycle. By moving the trimmer, the system correction speed increases or decreases. The achievable variation is ±100 in relation to the default value (equal to 250, so the range is 150 to 350) and it is expressed in milliseconds (±1000 = from -100% to +100% regulation). The ramp value is limited to 50 minimum. The trimmer adjusts the whole range in one turn: by turning it anti-clockwise, the regulation is faster.
R141 (V)	Min/max voltage alarm fine regulation	Allows for a slight alteration of the high/low voltage thresholds generating the relevant alarm. The altered value is the one pre-set via software, corresponding to the trimmer central position. The variation is double (x2) or half (x0.5) at the extremities of the trimmer. The trimmer adjusts the whole range in one turn: by turning it anti-clockwise, the alarm is more sensitive.

**8.6.5 CARD B: JUMPER CONFIGURATION**



REF	PARAMETRE	POSITION	DEFAULT
JP4	CPU programming	1-2: ICD programming 2-3: TTL 5V serial	2 - 3

**8.6.6 CARD B: DIP SWITCH CONFIGURATION**



SW1	PARAMETRE	POSITION	DEFAULT
DIP1 DIP2	Selection of the voltage to be stabilised Not active if the value is set via software. They become active if the configuration is altered.	DIP1    DIP2    TARGET Vac OF    OFF    210 ON    OFF    220 OFF    ON    230 default ON    ON    240	OFF ON
DIP3	Enabling of target regulation via external potentiometer	ON= enabled OFF= disabled	OFF
DIP4	Acoustic alarm disabling Internal buzzer and siren (if present) are disabled	ON= alarms disabled OFF= alarms enabled	OFF
DIP7	Automatic regulation disabling The control board switches to manual position and does not respond automatically to input voltage variations. It will add/subtract a voltage manually set by the user via a serial line.	ON= enabled / OFF= disabled	OFF

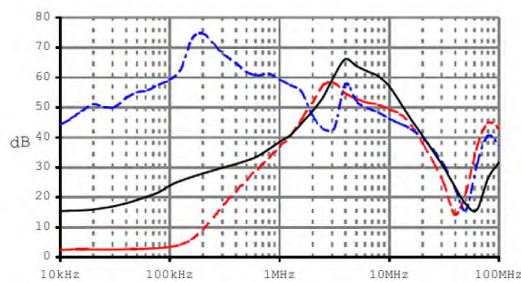
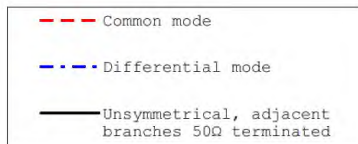
SW1	PARAMETRE	POSITION	DEFAULT
DIP8	Min/max voltage alar enabling Enables the generation of fan alarm if the output voltage goes beyond the nominal range for a set time. The threshold is adjustable through the trimmer and a software parametre.	ON= enabled / OFF= disabled	ON

SW2	PARAMETRE	POSITION	DEFAULT
DIP1	Input 5 (spare)		OFF
DIP2	Input 6 (spare)		OFF
DIP3	Input 7 (spare)	ON= enabled / OFF= disabled	OFF
DIP4	Input 8 (spare)	ON= alarms disabled / OFF= alarms enabled	OFF
DIP5	MASTER/SLAVE	ON = SLAVE / OFF = MASTER	OFF
DIP7	RS485 termination	ON= term. Inserted / OFF= term. not inserted	OFF
DIP8	CAN BUS termination	ON= term. Inserted / OFF= term. not inserted	OFF

**8.6.7 FILTRE CHARACTERISTICS**

The static stabiliser run by a HR card is fitted with an input EMI/RFI filter which deal with both common mode and differential mode noise. The typical attenuation is shown by the curves below:

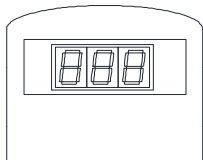
TYPICAL FILTER ATTENUATION



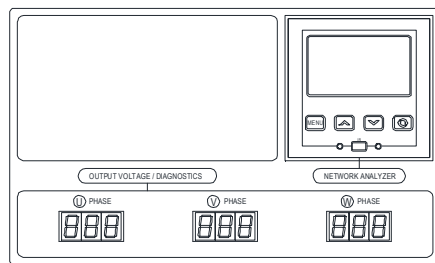
**9 ALARMS & SERVICE**

**Prior to starting any inspection, always check that the stabiliser is correctly connected to the mains.**

In case of alarm, a writing such as A01, A02... appears on the display. In three-phase units, there is a display for each phase. The table below deciphers the alarms and indicates the corrective actions.



Single-phase unit display



Three-phase unit display



example

**9.1 ALARMS**

SIGNAL	ALARM TYPE	ACTIVE RELAY	DESCRIPTIONE	NOTES
A01	SHORT-CIRCUIT	REM ALL LR: term. P16 HR: term. P7	Short-circuit condition detected. The regulation stops and the control board goes into bypass mode. The output voltage matches the input one.	Check the applied load and/or the relevant connecting cables. Depending on the entity of the phenomenon, there might be internal damage. Re-start the unit with caution.
A02	OVERCURRENT	REM ALL LR: term. P16 HR: term. P7	Higher than nominal current detected. The regulation stops and the control board goes into bypass mode. The output voltage matches the input one.	The applied load is too high. The origin could be a peak, the connection of too many loads at the same time or simply an excessive continuous load. Decrease the connected load. Check also that the power factor (cosphi) is not too low, in which case a power factor correction system might be necessary.
A03	BYPASS	MIN_MAX LR: term. P17 HR: term. P9	System in automatic bypass. The regulation stops and the control board goes into bypass mode. Min/max voltage relay activation. The output voltage matches the input one.	



SIGNAL	ALARM TYPE	ACTIVE RELAY	DESCRIPTIONE	NOTES
A04	OVERHEATING	REM ALL LR: term. P16 HR: term. P7	Excessive temperature detected inside the cabinet.	
A05	INTERNAL OVERHEATING	REM ALL LR: term. P16 HR: term. P7  MIN_MAX LR: term. P17 HR: term. P9	The temperature detected on the board (i.e. the highest temperature between VIN and VOU) exceeds the alarm threshold. VIN and VOU temperature is read by two sensors mounted on the heat-sink. The regulation stops and the control board goes into bypass mode. Min/max voltage relay activation. The output voltage matches the input one.	Check the correct ventilation of the unit (not hindered air-flow, fan operation, absence of overloading, ambient temperature, etc.). In tough conditions, arrange a system to aid the ventilation.
A06	MIN VOLTAGE	REM ALL LR: term. P16 HR: term. P7  MIN_MAX LR: term. P17 HR: term. P9	Output voltage lower than the threshold for a given time either because on internal failure or due to the input voltage being too low to be stabilized.	Wait for the output voltage to go back within the nominal range.
A07	MAX VOLTAGER	REM ALL LR: term. P16 HR: term. P7  MIN_MAX LR: term. P17 HR: term. P9	Output voltage higher than the threshold for a given time either because on internal failure or due to the input voltage being too high to be stabilized.	
A09	INTERNAL FAN OFF	REM ALL LR: term. P16 HR: term. P7	Internal fan lock detected on the basis of the absorbed current.	The internal fans could be worn out, dirty or stuck. Clean and check the rotation. Depending on the model, these fans might not be assembled
A10	'WATCH DOG'	REM ALL LR: term. P16 HR: term. P7	The 'watch dog' is a device inside the DSP microprocessor provided with specific software to monitor the correct operation of the control board. In case of failure, it generates an alarm procedure and the automatic restoration. The regulation stops and the control board goes into bypass mode. The output voltage matches the input one.	There might be several different origins, but very often they are consistent with high EMI noise (lightning, surges, etc.).
A12	POWER FAIL	REM ALL LR: term. P16 HR: term. P7	Low power supply to the control board and generation of a signal inside the control board activating the Power fail status. The regulation stops and the control board goes into bypass mode. The output voltage matches the input one.	Check the 230Vac supply and the connection to the control board..
A13	CABINET FAN OFF	REM ALL LR: term. P16 HR: term. P7	Fuse intervention detected. Generic alarm indication.	Controllare la ventola dell'armadio e il fusibile F2 sulla scheda di controllo.
A16	FAILED COMMUNICATION BETWEEN CARD AND TERMINAL		Failed serial communication between control card and digital voltmètre.	Check the control card supply voltage and the connections to the digital voltmètre.

## 9.2 ALARM SIGNAL TRANSFER

**Note** The REM\_ALL Remote Alarm relay activates when **at least one** of the alarm conditions listed in the table in paragraph 9.1 occurs. The remote signal could therefore indicate the presence of several simultaneous alarms

The output contacts are designed for 3Amps maximum current (at 230Vac 50Hz or 24Vdc). The contacts are isolated between each other.

### 9.2.1 LR CARD

RELAY	TERMINAL	DESCRIPTION	
REM_ALL	P16 pin 1: common pin 2: NO contact pin 3: NC contact	generic alarm	
MAX V/MIN V	P17 pin 1: common pin 2: NO contact pin 3: NC contact	min/max voltage alarm	

**9.2.2 HR CARD – A (BASE)**

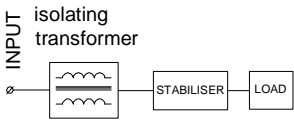
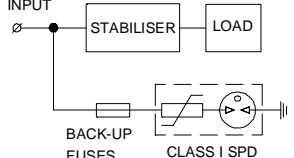
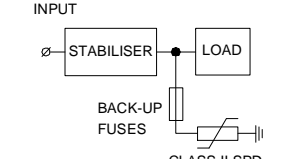
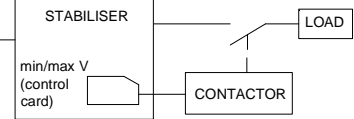
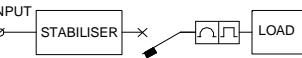
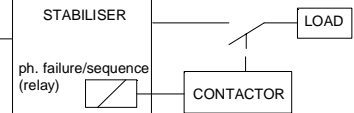
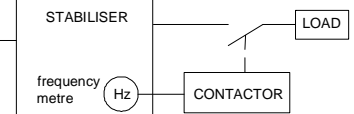
RELAY	TERMINAL	DESCRIPTION	
REM_ALL	P7 pin 1: common pin 2: NO contact pin 3: NC contact	generic alarm	
MAX V/MIN V	P9 pin 1: common pin 2: NO contact pin 3: NC contact	min/max voltage alarm	

**9.3 SERVICE**

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>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.</p> <p><b>WARNING. This circuit does not protect against short circuit.</b></p>	
<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>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****GEMINI**

	GEMINI	GEMINI PLUS
Voltage regulation	IGBT controlled	
Selectable output voltage*	220-230-240V	
Output accuracy	± 0.5%	
Frequency	50/60Hz ±5%	
Admitted load variation	0 - 100%	
Cooling	Forced ventilation	
Ambient temperature	-25/+45°C	
Storage temperature	-25/+60°C	
Max relative humidity	95%	
Admitted overload	150% 2sec.	
Harmonic distortion	None introduced	
Cabinet colour	RAL 9005	
Protection degree	IP 21	
Instrumentation	Output digital voltmeter (also for alarm indication)	
Installation	Indoor	
Overvoltage protection	Output class II varistor	Output class II surge arrestor
Other protections	- Automatic by-pass protection	- Input circuit breaker - Automatic by-pass protection - Manual maintenance by-pass

\* The output voltage can be adjusted by choosing one of the indicated values. Such choice sets the new nominal value as a reference for all the stabiliser parameters.

**RATINGS IN RELATION TO THE INPUT VARIATION PERCENTAGE**

±15%	±20%	±25%	±30%
10	7	5	4
15	10	7	5
20	15	10	7
30	20	15	10
40	30	20	15

TYPE		INPUT VARIATION [%]	RATED POWER [kVA]	INPUT VOLTAGE RANGE ** [V]	MAX INPUT CURRENT* [A]	RATED OUTPUT CURRENT* [A]	EFF. [%]	CORR. TIME	DIMENSIONS W X D X H [mm]	WEIGHT [kg]
GEMINI	PLUS	±20%/±15%								
ES7-20	ESP7-20	±20	7	184-276	38	30	>98	1/2 cycle	300x560x300	32
ES10-15	ESP10-15	±15	10	195-265	51	45				
ES10-20	ESP10-20	±20	10	184-276	54	43			410x530x1200	57
ES15-15	ESP15-15	±15	15	195-265	76	65				
ES20-15	ESP20-15	±15	20	195-265	102	87			410x680x1200	80
ES20-20	ESP20-20	±20	20	184-276	109	87				
ES30-15	ESP30-15	±15	30	195-265	153	130			410x680x1200	95
ES30-20	ESP30-20	±20	30	184-276	163	130				
ES40-15	ESP40-15	±15	40	195-265	205	174				
GEMINI	PLUS	±30%/±25%								
ES4-30	ESP4-30	±30	4	161-300	25	17	>98	1/2 cycle	300x560x300	32
ES5-25	ESP5-25	±25	5	172-288	29	22				
ES5-30	ESP5-30	±30	5	161-300	31	22			300x560x300	40
ES7-25	ESP7-25	±25	7	172-288	40	30				
ES7-30	ESP7-30	±30	7	161-300	44	30			410x530x1200	57
ES10-25	ESP10-25	±25	10	172-288	57	43				
ES10-30	ESP10-30	±30	10	161-300	62	43			410x680x1200	80
ES15-25	ESP15-25	±25	15	172-288	87	65				
ES15-30	ESP15-30	±30	15	161-300	93	65	410x680x1200	95		
ES20-25	ESP20-25	±25	20	172-288	116	87				

\*\* Referred to Vnom = 230V

**AQUARIUS**

	AQUARIUS	AQUARIUS PLUS
Voltage stabilisation	Independent phase control	
Voltage regulation	IGBT controller	
Selectable output voltage *	220-230-240V (L-N) 380-400-415V (L-L)	
Output accuracy	± 0.5%	
Frequency	50/60Hz ±5%	
Admitted load variation	0 - 100%	
Cooling	Forced ventilation	
Ambient temperature	-25/+45°C	
Storage temperature	-25/+60°C	
Relative humidity	95%	
Admitted overload	150% 2sec	
Harmonic distortion	none introduced	
Colour	RAL 9005	
Enclosure protection degree	IP 21	
Instrumentation	Output digital multimeter Phase digital alarm indicator	
Installation	Indoor	
Overvoltage protection	Output class II varistors	Output class II surge arrestors
Other protections	- Automatic by-pass protection	- Input circuit breaker - Automatic by-pass protection - Manual maintenance by-pass

\* The output voltage can be adjusted by choosing one of the indicated values. Such choice sets the new nominal value as a reference for all the stabiliser parameters.

**RATINGS IN RELATION TO THE INPUT VARIATION PERCENTAGE**

±15%	±20%	±25%	±30%
30	20	15	10
45	30	20	15
60	45	30	20
90	60	45	30
120	90	60	45

TYPE		INPUT VARIATION [%]	RATED POWER [kVA]	INPUT VOLTAGE RANGE ** [V]	MAX INPUT CURRENT* [A]	RATED OUTPUT CURRENT* [A]	EFF. [%]	CORR. TIME	DIMENSIONS W X D X H [mm]	WEIGHT [kg]
AQUARIUS	PLUS	±20%/±15%								
ET20-20	ETP20-20	±20	20	320-480	36	29	>98	1/2 cycle	410x680x1200	130
ET30-15	ETP30-15	±15	30	340-460	51	43			410x680x1200	170
ET30-20	ETP30-20	±20	30	320-480	54	43			600x600x1600	200
ET45-15	ETP45-15	±15	45	340-460	76	65			800x600x1600	250
ET45-20	ETP45-20	±20	45	320-480	81	65			800x600x1600	300
ET60-15	ETP60-15	±15	60	340-460	102	87				
ET60-20	ETP60-20	±20	60	320-480	109	87				
ET90-15	ETP90-15	±15	90	340-460	153	130				
ET120-15	ETP120-15	±15	120	340-460	204	173				
AQUARIUS	PLUS	±30%/±25%								
ET10-30	ETP10-30	±30	10	280-520	20	14	>98	1/2 cycle	410x680x1200	130
ET15-25	ETP15-25	±25	15	300-500	29	22			410x680x1200	170
ET15-30	ETP15-30	±30	15	280-520	31	22			600x600x1600	200
ET20-25	ETP20-25	±25	20	300-500	39	29			800x600x1600	250
ET20-30	ETP20-30	±30	20	280-520	41	29			800x600x1600	300
ET30-25	ETP30-25	±25	30	300-500	57	43				
ET30-30	ETP30-30	±30	30	280-520	61	43				
ET45-25	ETP45-25	±25	45	300-500	86	65				
ET45-30	ETP45-30	±30	45	280-520	93	65				
ET60-25	ETP60-25	±25	60	300-500	116	87				

\*\* Referred to Vnom = 230V

### 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	FUSE STATUS

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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