# ORION Y PLUS

## three-phase VOLTAGE STABILISER

## USER'S HANDBOOK

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## INDEX



**ANNEXES:**

TECHNICAL DATA SHEET
SCHEMATICS
DIGITAL ANALYSER HANDBOOK

# 1 SAFETY INSTRUCTIONS

The stabiliser must not function without the earth connection.
It is recommendable to put a circuit breaker with differential current release on the stabiliser input line in compliance with the IEC364 Standard 'Electrical installations'
Further circuit breakers with differential current release can be put on the output line and co-ordinated with the one on the input line.
Do not work without safety tools like isolating footboard, isolating gloves, etc.
If any fuses need to be replaced, use new ones of same type and capacity.
Follow carefully the instructions given in the present handbook.
**WARNING**: the stabiliser must be used exclusively on the purpose for which it has been designed and built. Installation must be done according to the instructions provided with the present handbook. Any other utilisation has to be considered as inappropriate and therefore dangerous. The Company will not to be held liable for any damages to people, animals and belongings due to incorrect use or installation.
The stabiliser cannot be accessed without opening the cubicle with specific means. The protection against direct contact is therefore inherently obtained.
However, all the potentially dangerous inner components are provided with further protections against contact.
**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 stabiliser from the mains.**
For any necessity, please contact the nearest authorised 'Technical Service Centre'.
File carefully this handbook for further use.

# 2 INTRODUCTION

Please refer to the attached Data Sheet for a complete list of the stabiliser characteristics.
The present handbook deals only with the standard stabilisers. If optional devices such as by-pass switch, circuit breakers, etc are provided, please refer to the attached relevant technical sheets.

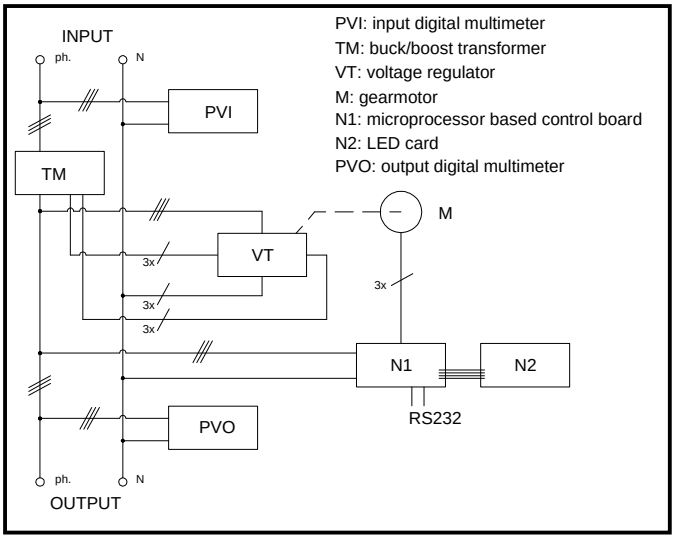
## *2.1 Assembly description*

The stabilisers are designed and built in compliance with the 2006/95/EEC (Low Voltage) and 2004/108/EEC (Electromagnetic Compatibility) European Directives with regard to the CE marking requirements.
The stabiliser is designed to be connected between the mains and the user; its main features are:

- use with asymmetrical input supply and single-phase loads or unbalanced three-phase loads;
- functionality based on the 'rms voltage' and not on the average one. This type of control can supply the load a correctly stabilised voltage even with non-sinusoidal waves, frequently found in habitual applications. Said waveforms are caused by the presence of (for example) converters with partialization of the wave, transformers with saturated core, non-linear loads, pulses, connecting or disconnecting transients, etc. All these phenomena generate distortions (harmonics) that alter the original voltage waveform.
- regulation performed independently on each single phase (referring to the neutral, which must be available and connected);
- fully functioning with load charge variable from 0 to 100% and 100% phase unbalance.
- up to 30% harmonic content admitted on the load current. In case of higher percentage, the stabiliser must be derated.
- insensitivity to the load power factor
- absence of generation of noticeable harmonic distortions in the output voltage.

## *2.2 Main components and working principle*

The main components of the equipment are a three-phase 'buck/boost' transformer, three motorised single-phase autotransformers with continuously variable transformer ratio (voltage regulator) and an electronic control circuit. A representation of the system is shown in the picture.
The control circuit compares the output voltage value to the adjusted one. When the percentage variation is too high, the control drives the voltage regulator gearmotor. By doing so the regulator rollers change their position thus varying the voltage drawn and supplied to the buck/boost transformer primary winding. 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




## *2.3 Protections & signals*

The provided electric protections are:

- Motor rotation stop due to regulation reaching the limit switches (top and bottom);

- Motor rotation failure due to short-circuit;
- Motor short-circuit;
- Maximum and minimum line voltage;
- Phase overcurrent;
- Circuit breaker with thermal and magnetic release to protect against overload and short circuit on the voltage regulators.

  **WARNING:** this protection works *only* on the voltage regulators 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 remote contact available in the terminal block.
- Ambient thermostat (set to 60°C) mounted on the control board that activates the overheating condition alarm;
- Ambient thermostat (set to 45°C) that activates the cabinet fans;
- fuse series positioned on the auxiliary circuits, on the voltmeter lines and on the motor supplying circuits;
- two 10A 5x20 fuses (F1-F2) mounted on the control electronic board;

The intervention of any of the above mentioned protections is signalled by luminous and acoustic alarms.

## *2.4 DSP microprocessor-based control board*

The control board runs the voltage stabiliser thoroughly by regulating each phase independently. However, the voltage drawn across the voltage regulator rollers can also be adjusted manually via external push buttons or voltage setting potentiometers. The board also monitors the output currents and generates an alarm in case of overcurrent.
Under normal working conditions, the output voltage is maintained stable with an accuracy equal to ±0.5% in relation to the rated voltage. The control of the stabiliser is totally performed through a software that digitalises all the parameters (full digital control). The DSP microprocessor (Digital Signal Processor) reads line voltage, settings, motor currents and inputs and drives directly the motor by imposing direction and speed. On the basis of the motor current, the board elaborates also the protections against overload and short-circuit for the motor itself.
*Because of the presence of miniaturised components, in order to avoid micro-fractures the board must not be bent.*
The control board is provided with an additional signalling card connected to the control board via a flat wire (P1 terminal block).

### *2.4.1 Motor stop or overload*

The system is provided with a protection that estimates whether the motor (and relevant kinematic mechanism) is either in overload condition or blocked. The thermal energy (function of the current) released in a certain time is measured and if the value exceeds a set threshold, an alarm is generated.

### *2.4.2 Short-circuit*

The board is provided with a phase-to-phase short-circuit alarm for each motor. Filtering devices operate in order to avoid unnecessary intervention. The board's resistance to a short-circuit depends on the nature of the phenomenon.

### *2.4.3 PC board management*

In order to access the menu that runs the system, create a serial connection between the board and a PC and start a communication program such as, for example, Hyper-Terminal®. This program is part of the standard Windows® package and can be launched with the sequence:

**START → ACCESSORIES → COMMUNICATION**

When using the program for the first time, the connection file must be created. Type in a file name (for example, 'STAB') in the dialog window that appears at the beginning. Under the voice 'Connect', choose the serial port to be used (for example, COM1)) and press OK. Now set the following parameters:

- Bit per second: 115200
- Data Bit: 8
- Parity: none
- Stop Bit: 1
- Flux control: Xon/Xoff

Press OK and save the connection file (choose 'Save' from the 'File' menu). Once the file has been created, every time the program is initiated press the space bar, choose 'Open' from the 'File' menu and choose the 'STAB' file.
On the PC screen, the window shown below appears:

```
- STABILISER -

1- TARGET  (0)
2- MAINTENANCE
3- FAN TEST
4- LED TEST
5- ALARMS
6- INFO
```

- By pressing the '1' key, the target output voltage to be reached and stabilised can be set. If the target set with the PC is nil, the control board will use the values set by means of the dipswitches DIPSW1 and DIPSW2 (see the dip-

switch table later in this manual)

- By pressing the ‘2’ key, the maintenance status is displayed;

```
- MAINTENANCE -

WORKING HOURS MOTOR U: 150 - 25 MAINT.(100))
WORKING HOURS MOTOR V: 155 - 30 MAINT.(100)
WORKING HOURS MOTOR W: 147 - 22 MAINT.(100)
POWER ON HOURS       : 185 - 45 MAINT.(9000)

X- EXIT
```

For each type of maintenance, the menu shows the counters: total working hours, number of hours from last performed maintenance and setup value (within brackets).

- By pressing the ‘3’ key, it is possible to program the start of the cabinet fans and the overheating alarm.

```
- FAN SETUP -

1- TEMPERATURE T1   (3000)
2- TEMPERATURE T2   (3500)
3- TEMPERATURE T3   (4000)
A- TEMPERATURE ALARM (6000)

X- EXIT
```

This menu allows for four temperature thresholds to be set (in increasing sequence). When the temperature reaches threshold T1, the first fan is activated. At temperature threshold T2, the second fan is added and so on. When the temperature goes beyond the alarm threshold, the alarm is generated. The temperature thresholds are set in hundredths of Celsius degree.
Before an event can be cancelled, a three degree hysteresis must be taken into account. In the following example, the fan is started when the temperature goes beyond 30°C. The same fan will be stopped only when the temperature decreases to 27°C.

- By pressing the ‘24’ key, the LEDs test cycle is started. The LEDs on the control panel switch on sequentially for a functional check.
- By pressing the ‘5’ key the active alarms are displayed with a brief description. The alarm messages currently managed are:
  - ‘Max current’
  - ‘By pass’
  - ‘Fan off’
  - ‘Overheating probes’
  - ‘Phase U short curr.’
  - ‘Phase U Vout min’
  - ‘Phase U Vout max’
  - ‘Phase U blockage’
  - ‘Overheating inter’
  - ‘Phase V short curr.’
  - ‘Phase V Vout min’
  - ‘Phase V Vout max’
  - ‘Phase V blockage’
  - ‘Phase W short curr.’
  - ‘Phase W Vout min’
  - ‘Phase W Vout max’
  - ‘Phase W blockage’

  In addition, the status of the maintenance to be performed is shown by means of a hexadecimal parameter.
- By pressing the ‘6’ key, the status of the system is displayed by showing the following information about the motors:

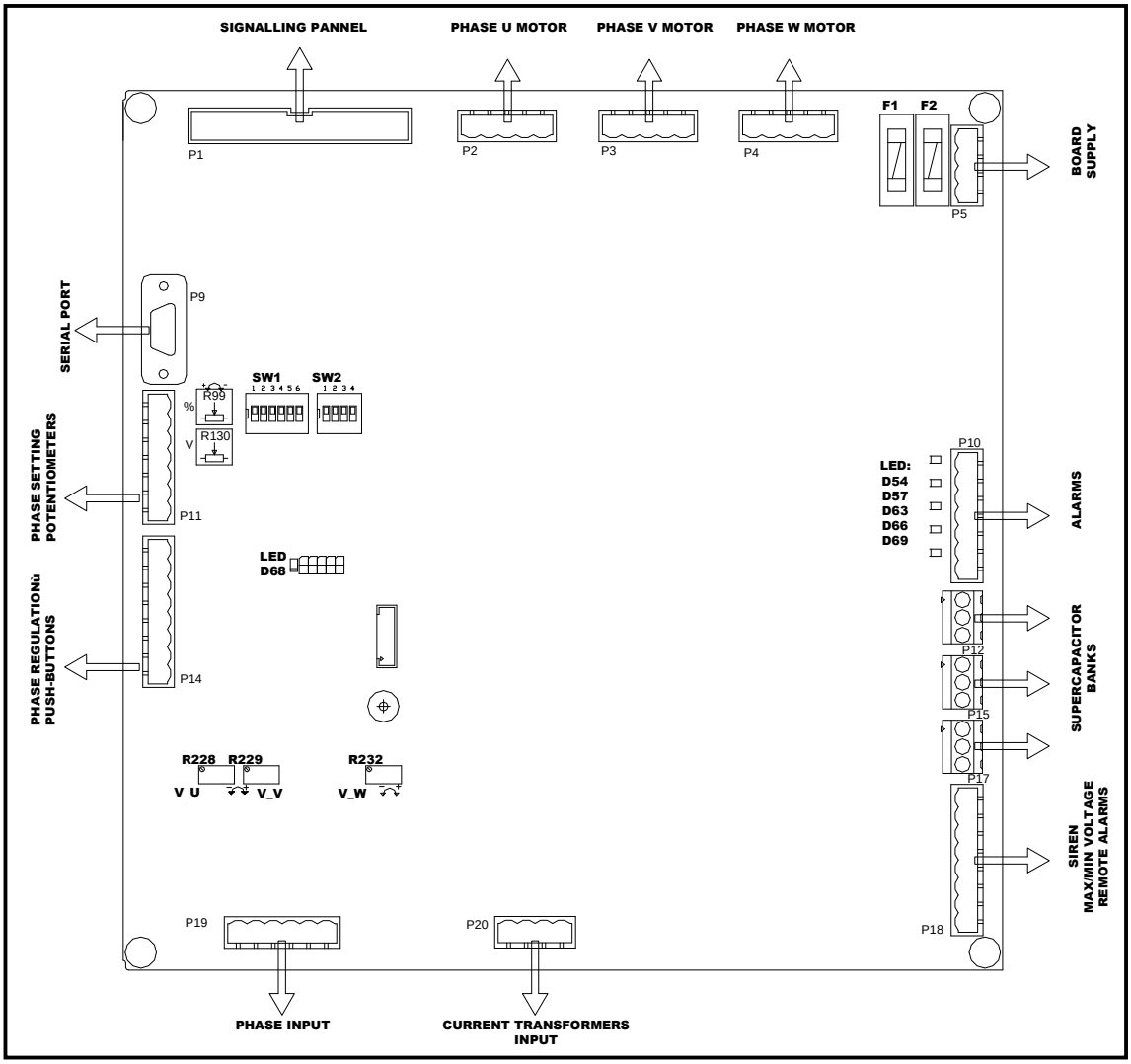
```
- AUTOMATIC - T 21.80  (0C17)

---- MOTOR U ----
 V.MIN 216 - (bin 3309)
 V.MAX 243 - (bin 3731)
 Kp 281
 VMot  3 - (bin 53)  VTRGT 230 - (bin 3520)
 MaxCnt Over 0 - Short 0
 ERR I 0
 Current 2.7
 MOVING SEC.657

---- MOTOR V ----
 V.MIN 216 - (bin 3309)
 V.MAX 243 - (bin 3731)
 Kp 281
 VMot  4 - (bin 66)  VTRGT 230 - (bin 3520)
 MaxCnt Over 0 - Short 0
 ERR I 0
 Current 3.2
 MOVING SEC.782

---- MOTOR W ----
 V.MIN 216 - (bin 3309)
 V.MAX 243 - (bin 3731)
 Kp 281
 VMot  4 - (bin 64)  VTRGT 230 - (bin 3520)
 MaxCnt Over 0 - Short 0
 ERR I 0
 Current 2.7
 MOVING SEC.644
```

A sketch of the motherboard is shown below.




### *2.4.4 Motherboard LEDs*

The table below resumes the information provided by the LEDs fitted on the motherboard.

| Ref. | Colour | Function | ON | OFF | Flashing |
|---|---|---|---|---|---|
| **D68** | yellow | board status | board failure | board failure | **board working correctly** |
| **D54** | red | inactive input | - | X | - |
| **D57** | red | inactive input | - | X | - |
| **D63** | red | overcurrent alarm | alarm condition | correct functioning | - |
| **D66** | red | stabilisation off alarm input | alarm condition | correct functioning | - |
| **D69** | red | overheating alarm input | correct functioning | alarm condition | - |

### *2.4.5 Control board connecting terminal blocks*

The connectors mounted on the control board are listed in the table below.

| Ref. | Type | Description |
|---|---|---|
| **P1** | Flat 34-pole male | Signalling card |
| **P2** | 6-pole male | U phase motor |
| **P3** | 6-pole male | V phase motor |
| **P4** | 6-pole male | W phase motor |
| **P5** | 4-pole male | Card supply |

| Ref. | Type | Description |
|---|---|---|
| **P9** | 9-pole female | RS232 (COM1) |
| **P10** | 7-pole male | Alarm input |
| **P11** | 7-pole male | Phase regulation potentiometers |
| **P12** | 3-pole screw term. block | Supercapacitors |
| **P14** | 8-pole male | Phase regulation push-buttons |
| **P15** | 3-pole screw term. block | Supercapacitors |
| **P17** | 3-pole screw term. block | Supercapacitors |
| **P18** | 8-pole male | Alarm outputs (relay) |
| **P19** | 6-pole male | **Phase input – dangerous voltage** |
| **P20** | 4-pole male | CT input |

### *2.5 Signalling card*

The card (connected to the motherboad via a flat wire) is provided with control LEDs for each phase and with alarm LEDs. The phase indications provided are listed in the table below (starting from the top one):

| Position | Colour | Function |
|---|---|---|
| **1** | Flashing green | Card supplied and functioning |
| **2** | red | Increase limit switch |
| **3** | yellow | DC motor in increasing mode |
| **4** | yellow | DC motor in decreasing mode |
| **5** | red | Decrease limit switch |

Positioned on the right side of the phase signals, the alarm LEDs indicate a malfunctioning situation. Any abnormal functioning generates an acoustic alarm as well. The alarm indications provided are listed in the table below (starting from the top one):

| Position | Function |
|---|---|
| **1** | Output voltage below the set minimum threshold |
| **2** | Output voltage above the set maximum threshold |
| **3** | Output current above the set maximum threshold |
| **4** | Stabilisation OFF |
| **5** | Internal overheating |

The maximum and minimum voltage alarms on one or more phases are signalled also by the relevant phase control LED colour change from flashing green to fixed orange. A push-button for silencing the alarm is mounted underneath the red LEDs. In case of failure, the relevant LED switches on and the buzzer and an internal siren start. By pressing the silencer for a few seconds, the audible alarms stop whilst the visible one stays on if the failure is permanent. The light reset takes place only when the alarm condition has stopped. Press the push-button for a few seconds in order to switch the LED off. The Dip-switch 4 (see the relevant table later in this manual) on the control board allows for the audible alarms to be cut out.
It is advisable to transfer the alarm signals to a manned workstation. To do that, use the (NC) – 018 (NO) – 019 (C) terminals positioned in the auxiliary terminal-block mounted on the cubicle door inner side.

### *2.6 Settings*

**WARNING**: dangerous voltage is present inside the stabiliser and the control board. For this reason, the described settings must be performed only by personnel that has been trained, qualified and therefore made aware of the involved risks, Adequate 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.

**NOTE.** In order to cancel the alarms and, more generally, to restore the normal functioning, the stabiliser must have been switched off for at least five minutes. If the amendment of some settings is absolutely necessary, use insulated tools and conform with the enforced safety regulations.

### *2.6.1 Trimmer*

**NOTE**: the trimmers are set during the testing session at the company. It is strongly recommended NOT to alter such settings.

| Ref. | Symbol | Parameter | Notes |
|---|---|---|---|
| **R232** | V_W | W phase trim | Set in order to get the desired voltage on phase W (*) |
| **R229** | V_V | V phase trim | Set in order to get the desired voltage on phase V (*) |
| **R228** | V_U | U phase trim | Set in order to get the desired voltage on phase U (*) |
| **R99** | % | Regulation stability | Set in order not to have oscillation in the system while regulating |
| **R130** | V | min/max voltage alarm trim | Allows for the min/max voltage alarm thresholds to be slightly altered. The modified value is the one pre-set with the software (6% $V_{nom}$) and it is maintained at the trimmer central position. At the extremities of the trimmers, the pre-set values are twice or half the value chosen via software. For example, if the threshold set with the software is 6%, the variation available with the trimmer is between 3% and 12%. |

(*) the regulation performed with the trimmers is added to the software setting.

### *2.6.2 Dip switch*

<table>
<tr><th>Ref.</th><th>Parameter</th><th>Position</th><th>Default</th></tr>
<tr><td>SW1 DIP1<br>SW1 DIP2</td><td>Selection of the voltage to be stabilised.<br>If the voltage is set via software, the dip-switched are disabled</td><td><table><tr><th>DIP1</th><th>DIP2</th><th>TARGET Vac</th></tr><tr><td>OFF</td><td>OFF</td><td>210</td></tr><tr><td>ON</td><td>OFF</td><td>220</td></tr><tr><td>OFF</td><td>ON</td><td>230</td></tr><tr><td>ON</td><td>ON</td><td>240</td></tr></table></td><td>DIP1 = OFF<br>DIP2 = ON</td></tr>
<tr><td>SW1 DIP3</td><td>Enabling each motor regulation by means of external potentiometers.<br>The full-scale value is set with the software</td><td>ON = enabled<br>OFF = disabled</td><td>OFF</td></tr>
<tr><td>SW1 DIP4</td><td>Acoustic alarms disabling.<br>Internal buzzer and external siren are cut off.</td><td>ON = acoustic alarms off<br>OFF = acoustic alarms on</td><td>OFF</td></tr>
<tr><td>SW1 DIP5<br>SW1 DIP6</td><td>Roller saving function regulation</td><td><table><tr><th>DIP5</th><th>DIP6</th><th>Behaviour</th></tr><tr><td>OFF</td><td>OFF</td><td>Fast regulation with more movements</td></tr><tr><td>ON</td><td>OFF</td><td>Fast intermediate</td></tr><tr><td>OFF</td><td>ON</td><td>Slow intermediate</td></tr><tr><td>ON</td><td>ON</td><td>Slow regulation with fewer movements</td></tr></table></td><td>OFF</td></tr>
<tr><td>SW2 DIP1</td><td>Minimum regulation enabling.<br>Activates the voltage resetting to the minimum value in case of blackout (operation performed by means of auxiliary supercapacitors);</td><td>ON = enabled<br>OFF = disabled</td><td>OFF</td></tr>
<tr><td>SW2 DIP2</td><td>Min/max voltage alarm enabling.<br>Enables the generation of an alarm in case the output voltage is out of range for at least 10 seconds. The threshold is set with the trimmer R130 and with a software parameter.</td><td>ON = enabled<br>OFF = disabledi</td><td>ON</td></tr>
</table>

## *2.7 Instrumentation*

### *2.7.1 Input digital network analyser*

Allows for input line to be monitored. The operating instructions concerning the network analyser can be found in the relevant document attached to this handbook.

### *2.7.2 Output digital network analyser*

Allows for the stabiliser functioning to be monitored together with the output line. The operating instructions concerning the network analyser can be found in the relevant document attached to this handbook.

Three terminals identified by 017, 018 and 019 are available for the connection in the auxiliary terminal block positioned inside the cubicle door bearing the control panel.
With such connection all the electrical values and the graphs concerning voltages, currents and powers can be transmitted to a remote PC. The plant can therefore be monitored in real time.

# 3 INSTALLATION & COMMISSIONING

## *3.1 Site choice*

Check the stabiliser condition at the moment of delivery; in case of damages occurred during the haulage, verify that the stabiliser is suitable for a normal functioning.
Install the assembly in a level area.
Avoid direct heat and contact with liquid, flammable or corrosive substances.
Do not to clog the cabinet air openings.
If the installation room is small or insufficiently aired, a cooling system for the disposal of the heat produced by the stabiliser must be arranged.
The stabiliser should not operate in case of:

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

## *3.2 Accessibility*

| | |
|---|---|
| Required space at the front: | 800 - 1000mm |
| Required space at the rear: | 300mm (800mm advisable for inspection and maintenance) |
| Required space at the sides: | 600mm (advisable for inspection and maintenance) |
| Access to input/output terminals: | front |
| Access to cabinet fans: | rear panel inner side |

## *3.3 Supply*

The supplying line must be in conformity with the technical data specified in the attached Data Sheet.
The stabiliser is not protected against short-circuit or overload. In compliance with the enforced safety regulations, at the moment of installation the stabiliser must be provided with protections as follows:
***Short-circuit –*** connect on the input line either a circuit breaker with fuses or a circuit breaker with automatic release. The maximum activation current must depend on the highest input current (see attached Data Sheet)
***Overload –*** connect on the output line a protection (thermal and/or magnetic). The maximum activation current must depend on the highest output current (see attached Data Sheet) and on the load properties.
In addition, it is advisable to add a co-ordinated differential current relay.

If the 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 stabiliser is switched off for maintenance or internal failure.

If the load is thought to be sensitive to voltages outside the rated range, the addition of the 'soft start' circuit is strongly recommended. With said device, the load is disconnected in case of under or overvoltage.

## *3.4 Connections*

Open the cubicle and locate the main parts and the connection points. Remove the accidental contact protections.
Prepare the connection cables/bars with regard to the current values and make them go through the bottom side of the cubicle. The very first operation is to connect the earth wire to the terminal identified by PE, GRD or ⏚ .
Connect the assembly to the mains, trying to avoid kinks and accidental contact between the cables and the electric components. Connect the cables according to the indications written on the terminations.
*The neutral wire must be available and connected to the relevant terminals.*
Check the tightness of the connections.

## *3.5 Start-up and operating checks*

Supply the rated voltage. As a consequence, the following parts are supplied:

- power circuit
- auxiliary circuits
- DSP control board
- Input & Output digital network analysers

The input and output values can now be read on the analyser displays: check that they comply with the rated ones.
The equipment is now ready for use. Connect the load and check on the network analyser that the output voltage regulation is steady and that the circulating currents do not exceed the rated values.

# 4 MAINTENANCE

Access to the components for installation, setting, inspection and maintenance must be granted only to qualified personnel in charge of it. Every maintenance operation must be done while the stabiliser is disconnected from the mains. Any operation must be carried out in compliance with the habitual rules concerning personal safety and the use of adequate protective tools.

### *4.1 Generalities*
Like any other electromechanical assembly provided with moving parts, the voltage stabiliser requires maintenance.
The intervention should be repeated approximately every 6-8 months or more frequently in case of highly polluted environment or heavy duty cycle. Clean transformers and all electro-mechanical components by removing dust, dirt and rust with appropriate means. Check periodically that the electrical connections are tight and clean and that mechanical fixtures and coupling are steady. DO NOT use any lubricants for the voltage regulator moving contacts.
Check regularly that the air inlets and outlets are not clogged.

### *4.2 Cooling fans*
Check the regular functioning of the cooling fans positioned on the rear panel of the cubicle.
Such operation can be carried out without disconnecting the voltage regulator 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.

### *4.3 Rollers and relevant guides*
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. Manually move the rollers slowly and carefully in order to prevent from possible damages and check that their movement is smooth and uniform. The width of the contact surface must not be larger than the width of a turn of the winding. Verify that the roller guides are in good condition by lifting the rollers and checking the following points:

- uniformity of the force necessary to lift the rollers
- continuity and regularity of the movement
- uniformity of the contact pressure when the rollers are placed back on the winding surface:

If necessary, replace them with original spare ones.

### *4.4 Transmission belt*
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.

### *4.5 Tightening and connections*
Check that the screws connecting the transmission components to their relevant shafts are correctly tightened. Check also all the electrical connections.

## 5 TROUBLESHOOTING
Access to the internal components must be granted only to qualified personnel in charge of it.
Any operation that might require the stabiliser to be energised must be carried out in compliance with the habitual rules concerning personal safety and the use of adequate protective tools.

Prior to starting any inspection, always check that the stabiliser is correctly connected to the mains.
The reference documentation is provided by the user's handbook and the schematic relevant to each stabiliser.

| ANOMALY | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| No output voltage | Incorrect input/output connection | Check all the connections |
| | External protection intervention | Check the external protections |
| | Defective buck/boost transformer | Ask for repairing or replacement |
| The instruments do not display any indications | Damaged or defective instrument | Replace with spare instrument |
| | FU8 fuse intervention | Replace the blown out fuse with equivalent one |
| All the supply LEDs off | Input phases absence | Check the input line |
| | Intervention of two amongst FU4-5-6 fuse or intervention of the FU50-51 fuse on the control board | Replace the blown out fuses with equivalent ones |
| One ore more supply LED off | Absence of one or more phases | Check the input line. NOTE: in this situation, the supercapacitors set the regulator voltage to the minimum |
| Suspected LED failure | Damaged or defective component | Run on a PC the LED test routine that checks all the indications. If the Led is really defective, replace the signalling card |
| Output phase inversion | Input/output terminals U-V-W sequence not respected | Check and correct the connections. The voltage stabiliser cannot perform any phase inversion. |
| Abnormal voltage | Supplying line problem | Check the supply |

| ANOMALY | POSSIBLE CAUSE | REMEDY |
|---|---|---|
| display | Select the phase voltage function. If the values displayed are nil, then the FU1-2-3 (input) or FU7-8-9 (output) fuses have intervened. | Replace the blown out fuses with equivalent ones |
| No stabilisation | Card not supplied (D68 LED on board fixed yellow or switched off) | Check that at the P5 terminal block the voltage is 22Vac. If the voltage is nil, check the FU4-5-6 fuses and the correct functioning of the TC1 auxiliary transformer (380/22V). |
| | Control board failure (D68 LED on board fixed yellow or switched off) | If the board is correctly supplied, but not functioning check the FU50-51 fuses mounted on board. If they are not blown out, then the board is defective and must be replaced. |
| | One or more motor jammed (signalled by the orange colour of the relevant phase LED) | Check whether the origin is mechanical or electrical by manually moving the carriage bearing the rollers (win the initial considerable friction). This operation MUST be performed when the stabiliser is not energised. If the carriage moves, the problem is electrical. Check if there is a short-circuit on the motor supply. |
| | Activation of the circuit protecting the voltage regulators due to overload or damaged on the regulators (“Stabilisation off” signal) | Eliminate the overload origin and/or repair/replace the damaged group of rollers |
| | Intervention of the fuses mounted on the control board (FU50-51) or on the supplying line (FU4-5-6) | Replace the blown out fuses with equivalent ones and/or check the correct functioning of the TC1 auxiliary transformer (400/22V). |
| Carriage to the end limit position | One or more rollers wearing off or breaking | Locate the damaged component and replace with an original spare part |
| | One or more rollers detached 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 because of the activation of the circuit protecting the voltage regulators. | Eliminate the overload external origin or repair/replace the damaged group of rollers |

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

In the unlikely event of malfunctions or faults, please contact our Technical Department and ask for assistance.