

USER'S MANUAL



ELECTRONIC VOLTAGE STABILISER

RE3

General index

1. INTRODUCTION.

1.1. ACKNOWLEDGEMENT LETTER.

2. INFORMATION FOR SAFETY.

2.1. USING THIS MANUAL.

2.1.1. Conventions and used symbols.

3. QUALITY AND STANDARD GUARANTEE.

3.1. DECLARATION OF THE MANAGEMENT.

3.2. STANDARD.

3.3. ENVIRONMENT.

4. OVERVIEW.

4.1. VIEWS.

4.1.1. Equipment views.

4.1.2. Legend corresponding to the equipment views.

4.2. PRODUCT DEFINITION.

4.2.1. Nomenclature.

4.3. PRESENTATION.

4.4. DESCRIPTION OF THE STABILIZER

4.5. QUALITY PERFORMANCES.

4.6. OPERATING PRINCIPLE

4.7. OPTIONS.

4.7.1. Output current and power measurements and overload.

4.7.2. Maximum-minimum voltage protection.

4.7.2.1. Manual/Automatic operating.

4.7.3. Manual Bypass.

4.7.4. Communication module and dry contacts.

4.7.5. Budgeted dry contact version to terminal strip.

4.7.6. SICRES Ethernet communication card.

4.7.7. Galvanic isolation transformer.

4.7.8. Other regulation ranges.

4.7.9. External manual Bypass panel.

5. INSTALLATION.

5.1. TO KEEP IN MIND DURING THE INSTALLATION.

5.2. EQUIPMENT RECEPTION.

5.2.1. Unpacking, contents checking and inspection.

5.2.2. Storage.

5.2.3. Unpacking.

5.2.4. Relocation till the installation place.

5.2.5. Location.

5.3. CONNECTION.

5.3.1. Connection of the input terminals.

5.3.2. Connection of the output terminals.

5.3.3. Connection of the main protective earth .

5.3.4. Connection of communication module.

5.3.5. Connection of the dry contacts terminal strip.

5.3.6. SICRES Ethernet communication card.

5.3.7. Connection between an external manual Bypass panel, stabilizer and loads.

6. OPERATING.

6.1. CONTROLS BEFORE COMMISSIONING.

6.2. START UP AND SHUTDOWN OF THE STABILIZER.

6.2.1. Start up.

6.2.2. Stabilizer shutdown.

6.3. MANUAL BYPASS, OPTION.

6.3.1. Power supply to the loads from mains through the manual Bypass.

6.3.2. Power supply to loads from the stabilizer.

6.4. MANUAL BYPASS PANEL, OPTION.

6.4.1. Power supply of the loads from mains with manual Bypass panel.

6.4.2. Power supply to loads from the stabilizer.

6.5. START UP AND SHUTDOWN OF AN EQUIPMENT WITH THE MAXIMUM-MINIMUM VOLTAGE PROTECTION, OPTION.

6.5.1. Start up.

6.5.1.1. Automatic version (MR).

6.5.1.2. Manual version (M).

6.5.1.3. Cancelling / Activating the Maximum-minimum protections.

6.5.2. Shutdown the stabilizer.

7. CONTROL PANEL WITH LCD AND SYNOPTIC WITH LEDS.

7.1. CONTROL PANEL: OPTICAL LED INDICATORS, LCD AND ACOUSTIC ALARM.

7.1.1. Acoustic alarm.

7.2. BASIC FUNCTIONS OF THE KEYPAD AND NOTES.

7.3. DESCRIPTION OF THE SCREENS.

7.3.1. «Start» screen menu (Screen 0.0).

7.3.2. «Measurement» menus (Screen 1.0).

7.3.3. «Alarms» menu (Screen 2.0).

7.3.4. «Data logger» menu (Screen 3.0).

7.3.5. «General parameters» menu (Screen 4.0).

7.3.6. «Output setting» menu (Screen 5.0)⁽⁵⁾.

7.3.7. «Dry contact setting» menu (Screen 8.0)^{(5) and/or (6)}.

7.3.8. «Serial nr and Password» menu (Screen 9.0).

7.4. LED SYNOPTIC: OPTICAL INDICATIONS.

8. MAINTENANCE, WARRANTY AND SERVICE.

8.1. BASIC PREVENTIVE MAINTENANCE GUIDE.

8.2. WARRANTY CONDITIONS.

8.2.1. Warranty terms.

8.2.2. Out of scope of supply.

8.3. TECHNICAL SERVICE NETWORK.

9. ANNEXES.

9.1. GENERAL TECHNICAL FEATURES OF STANDARD EQUIPMENTS.

1. INTRODUCTION.

1.1. ACKNOWLEDGEMENT LETTER.

We would like to thank you in advance for the trust you have placed in us by purchasing this product. Read this instruction manual carefully in order to be familiarized with its contents, because, as much as you know and understand the equipment the highest will be your satisfaction and safety levels and their features will be optimized too.

We remain at your entire disposal for any further information or any query you should wish to make.

Yours sincerely,

SALICRU

- The equipment here described **can cause important physical damages due to wrong handling**. This is why, the installation, maintenance and/or fixing of itself must be done by our staff or qualified **personnel exclusively**.
- Although we have made every effort to guarantee a complete and accurate information in this user's manual, we are not responsible for any errors or omissions that may exist.
The images included in this document are mere illustrations and they could not represent the part of the equipment exactly, therefore they are not contractual. Nevertheless, differences that could exist will be alleviated or solved with the correct labelling of the equipment.
- According to our policy of constant evolution, **we reserve the right to modify the specifications, operating or described actions in this document without forewarning**.
- **Any reproduction, copy or third party concession, modification or partial or in whole translations** of this manual or document, in any format or media, **is prohibited without the previous written authorization of our firm**, being reserved the full and exclusive ownership right over it.

2. INFORMATION FOR SAFETY.

2.1. USING THIS MANUAL.

The generic information of the equipment is supplied in digital format in a CD-ROM, and it includes among other documents the own user's manual of the system and the EK266*08 document concerning to **«Safety instructions»**. Before doing any action over the equipment regarding installation or commissioning, change of location, setting or handling, read them carefully.

This user's manual is intended to provide information regarding the safety and to give explanations about the procedures for the installation and operating of the equipment. Read them carefully and follow the stated steps in the established order.



Compliance as regards to “Safety instructions” is mandatory, being the user the legal responsible regarding to its observance and application.

The equipments are delivered duly labelled for the correct identification of any their parts, which combined with the instructions described in this user's manual, allows the end-user to make any operating of both installation and commissioning, in an easy and ordered way without doubt. When an equipment differs from the one shown in figures of section 4, additional annexes will be edited if they were deemed appropriate or necessary. Generally, they will be delivered in hardcopy.

Finally, once the equipment is installed and operative, for future requests or doubts that could arise, it is recommended to keep the CD-ROM documentation in a safe place with easy access.

The following terms are used in the document indistinctly to be referred to:

- **«RE3, equipment, stabilizer, voltage stabilizer or unit»**.- Electronic voltage equipment stabilizer.
- **«T.S.S.»**.- Technical Service and Support.
- **«client, fitter, operator or end-user»**.- are used indistinctly and by extension, to be referred to the fitter and/or operator which will make the corresponding actions, being responsible the same person about the actions to take on behalf of himself.
- In case of installations with IT neutral regime, the switches, circuit breakers must break the NEUTRAL a part from the three lines.

2.1.1. Conventions and used symbols.

Some symbols can be used and shown in the equipment and/or in the description of this user's manual.

For more information, see section 1.1.1 of EK266*08 document as regards to **«Safety instructions»**.

3. QUALITY AND STANDARD GUARANTEE.

3.1. DECLARATION OF THE MANAGEMENT.

Our target is the client's satisfaction, therefore this Management has decided to establish a Quality and Environmental policy, by means of installation a Quality and Environmental Management System that becomes us capable to comply the requirements demanded by the standard ISO 9001 and ISO 14001 and by our Clients and concerned parts too.

Likewise, the enterprise Management is committed with the development and improvement of the Quality and Environmental Management System, by means of:

- The communication to all the company about the importance of satisfaction both in the client's requirements and in the legal and regulations.
- The Quality and Environmental Policy diffusion and the fixation of the Quality and Environment targets.
- To carry out revisions by the Management.
- To provide the needed resources.

3.2. STANDARD.

The **RE3** product is designed, manufactured and commercialized in accordance with the standard **EN ISO 9001** of Quality Management Systems and certified by SGS body. The **CE** marking shows the conformity to the EEC Directive by means of the application of the following standards:

- **2014/35/EU**. - Low Voltage Directive (LVD).
- **2014/30/EU**. - Electromagnetic Compatibility (EMC).
- **2011/65/EU**. - Restriction of Hazardous Substances in electrical and electronic equipment (RoHS).

In accordance with the specifications of the harmonized standards. Standards as reference:

- **IEC/EN 62103**. - Electronic equipments for use in power installations.
- **IEC/EN 61000-6-4**. - Electromagnetic compatibility. Generic norm of emission. Industrial environment.
- **IEC/EN 61000-6-2**. - Electromagnetic compatibility. Generic norm of immunity. Industrial environment.



In case of any modification or intervention over the equipment by the end-user, the manufacturer is not responsible.



This is an equipment of class A. This equipment, in domestic environment can cause radio interferences, in such case the end-user must take the appropriate measures.



Declaration of conformity CE of the product is at the client disposal under previous request to our headquarters offices.

3.3. ENVIRONMENT.

This product has been designed to respect the Environment and manufactured in accordance with the **ISO 14001 norm**.

Equipment recycling at the end of its useful life:

Our company commits to use the services of authorised societies and according to the regulations, in order to treat the whole recovered product at the end of its useful life (contact your distributor).

Packaging:

To recycle the packaging, follow the legal regulations in force, in accordance with the particular norm of the country where the equipment is installed.

4. OVERVIEW.

4.1. VIEWS.

4.1.1. Equipment views.

Tables from 1 to 4 show the standardised models with their typical features: dimensions and weight, as well as the correlation with the illustrations from Fig. 1 to 12.

Model	Power (kVA)	⁽⁰⁾ Dimen. (mm) D. x W. x H.	Weight (kg)	Nr of case or cabinet	Nr fig.
RE3 M 0.3-2	0.3	355 x 250 x 190	6	Case nr 1	1
RE3 M 0.6-2	0.6		6		
RE3 M 1-2	1		9		
RE3 M 2-2	2	535 x 270 x 395	19	Case nr 2	2
RE3 M 3-2	3		22		
RE3 M 4.5-2	4.5		35		
RE3 M 6-2	6	590 x 340 x 585 ⁽¹⁾	44	Case nr 3	6
RE3 M 9-2	9		58		
RE3 M 12-2	12		67		
RE3 M 15-2	15	905 x 460 x 705 ⁽¹⁾	69	Case nr 4	8
RE3 M 20-2	20		103		
RE3 M 25-2	25		127		
RE3 M 30-2	30		154		
RE3 M 40-2	40		170		
RE3 M 50-2	50		186		

Table 1. Single phase RE3 of 220/220, 230/230 or 240/240V with input window of $\pm 15\%$.

Model	Power (kVA)	⁽⁰⁾ Dimen. (mm) D. x W. x H.	Weight (kg)	Nr of case or cabinet	Nr fig.
RE3 T 3-4	3	535 x 270 x 395	32	Case nr 2	5
RE3 T 6-4	6		61		
RE3 T 9-4	9	590 x 340 x 585 ⁽¹⁾	68	Case nr 3	7
RE3 T 15-4	15	905 x 460 x 705 ⁽¹⁾	80	Case nr 4	9
RE3 T 20-4	20		117		
RE3 T 30-4	30		164		
RE3 T 45-4	45	905 x 460 x 705 ⁽¹⁾	225	Case nr 4	9
RE3 T 60-4	60		260		
RE3 T 75-4	75	850 x 615 x 1320	317	Cabinet nr 1	11
RE3 T 100-4	100		343		
RE3 T 125-4	125		438		
RE3 T 150-4	150	850 x 815 x 1320	650	Cabinet nr 1	11
RE3 T 200-4	200	850 x 815 x 2120	850		
RE3 T 250-4	250		1150	Cabinet nr 2	12

Table 2. Three phase RE3 of 3x380/3x380, 3x400/3x400 or 3x415/3x415V with input window of $\pm 15\%$.

Communication between the equipment and the user is done through the optical led indications or control panel with LCD, depending on the model of the equipment. For more information see section 7 of this document.



The nameplate of the equipment shows the main features and parameters that concerns to the electrical installation. Act accordingly.

Model	Power (kVA)	⁽⁰⁾ Dimen. (mm) D. x W. x H.	Weight (kg)	Nr of case or cabinet	Nr fig.
RE3 M 0.3-2T	0.3	355 x 250 x 190	12	Case nr 1	2
RE3 M 0.6-2T	0.6		15		
RE3 M 1-2T	1		17		
RE3 M 2-2T	2	535 x 270 x 395	32	Case nr 2	3
RE3 M 3-2T	3		40		
RE3 M 4.5-2T	4.5		63		
RE3 M 6-2T	6	590 x 340 x 585 ⁽¹⁾	76	Case nr 3	6
RE3 M 9-2T	9	905 x 460 x 705 ⁽¹⁾	136	Case nr 4	8
RE3 M 12-2T	12		144		
RE3 M 15-2T	15		156		
RE3 M 20-2T	20		201		
RE3 M 25-2T	25	850 x 615 x 1320	247	Cabinet nr 1	10
RE3 M 30-2T	30		292		
RE3 M 40-2T	40		368		
RE3 M 50-2T	50	444			

Table 3. Single phase RE3 of 220/220, 230/230 or 240/240V with input window of $\pm 15\%$ and isolation transformer.

Model	Power (kVA)	⁽⁰⁾ Dimen. (mm) D. x W. x H.	Weight (kg)	Nr of case or cabinet	Nr fig.
RE3 T 3-4T	3	535 x 270 x 395	54	Case nr 2	5
RE3 T 6-4T	6	905 x 460 x 705 ⁽¹⁾	108	Case nr 4	9
RE3 T 9-4T	9		123		
RE3 T 15-4T	15		168		
RE3 T 20-4T	20	905 x 460 x 705 ⁽¹⁾	199	Case nr 4	9
RE3 T 30-4T	30		304		
RE3 T 45-4T	45	850 x 615 x 1320	469	Cab. nr 1	11
RE3 T 60-4T	60		566		
RE3 T 75-4T	75	850 x 815 x 2120	629	Cabinet nr 2	12
RE3 T 100-4T	100		769		
RE3 T 125-4T	125		1051		
RE3 T 150-4T	150	1050 x 815 x 2120	1221	Cabinet nr 3	12
RE3 T 200-4T	200		1628		
RE3 T 250-4T	250	1900			

Table 4. Three phase RE3 of 3x380/3x380, 3x400/3x400 or 3x415/3x415V with input window of $\pm 15\%$ and isolation transformer.

⁽⁰⁾ The terms «D. x W. x H.» correspond to the maximum dimensions in mm of «Depth x Width x Height» and those assembled parts included as standard in them, which protrude the case or cabinet frame and they are essential for the correct operating or your safety, like: switches, terminal covers, bottom base (foot or plinth), casters, ...

⁽¹⁾ The total height of the equipments corresponding to Fig. 6 , 7 and 8 do not include the lifting lugs. The height of the lifting lug is 45 mm, add it to the stated height in each model to get the total height.

The stated dimensions in table from 1 to 4 correspond to both models standard and with isolation transformer. They may differ when the manual bypass switch is built in, which is drawn in all the illustrations (Fig. 1 to 12).

Those models in cabinet, they are represented the most extreme version as regards to terminals or connection points, foreseen through the own copper rods of the input switch and manual bypass switch option, while depending on each model they could differ in order to have terminals instead and/or to not have manual bypass switch.

As user interface there is a led synoptic or LCD panel, as Fig. 1 to 12 show.

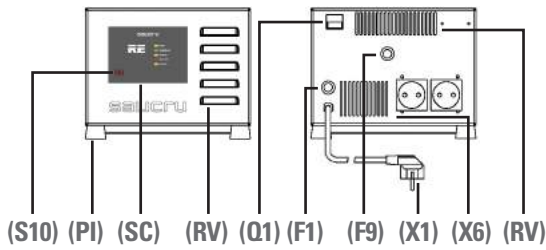


Fig. 1.

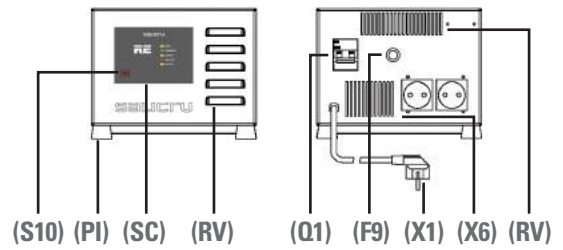


Fig. 2.

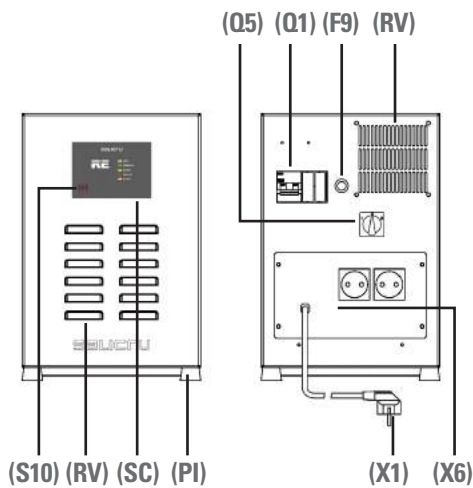


Fig. 3.

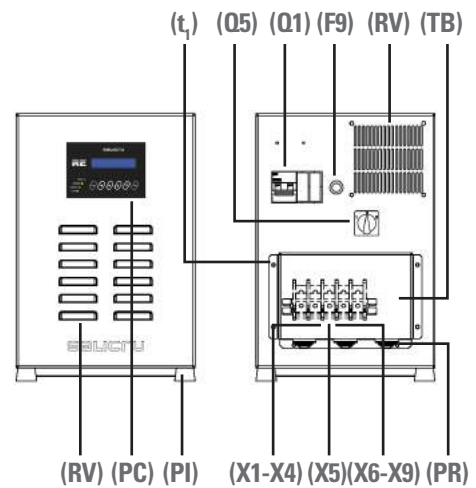


Fig. 4.

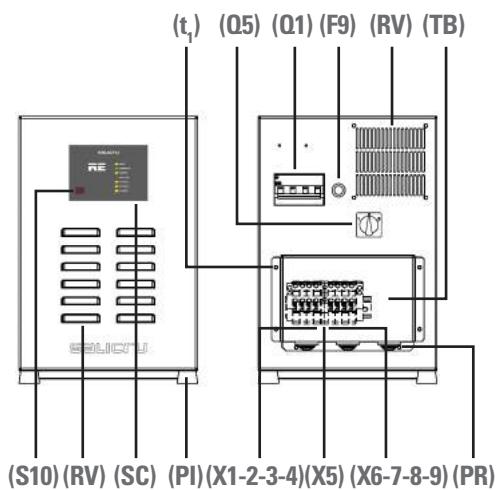


Fig. 5.

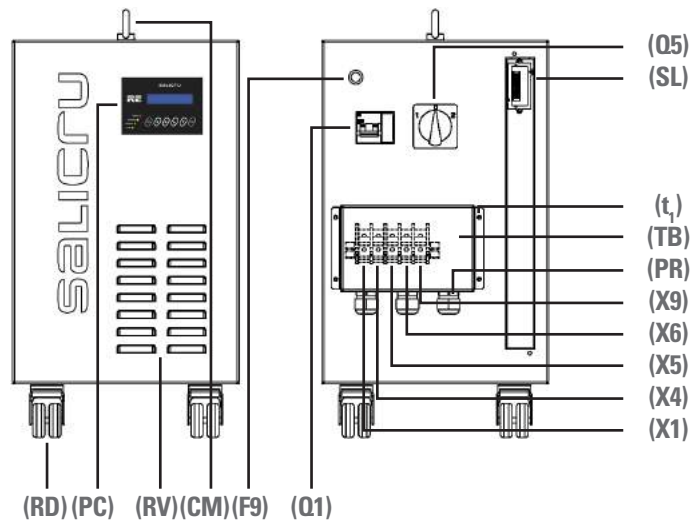


Fig. 6.

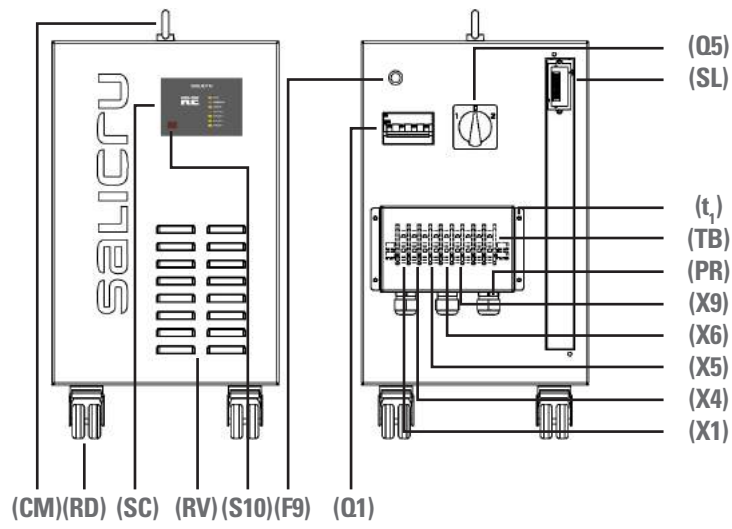


Fig. 7.

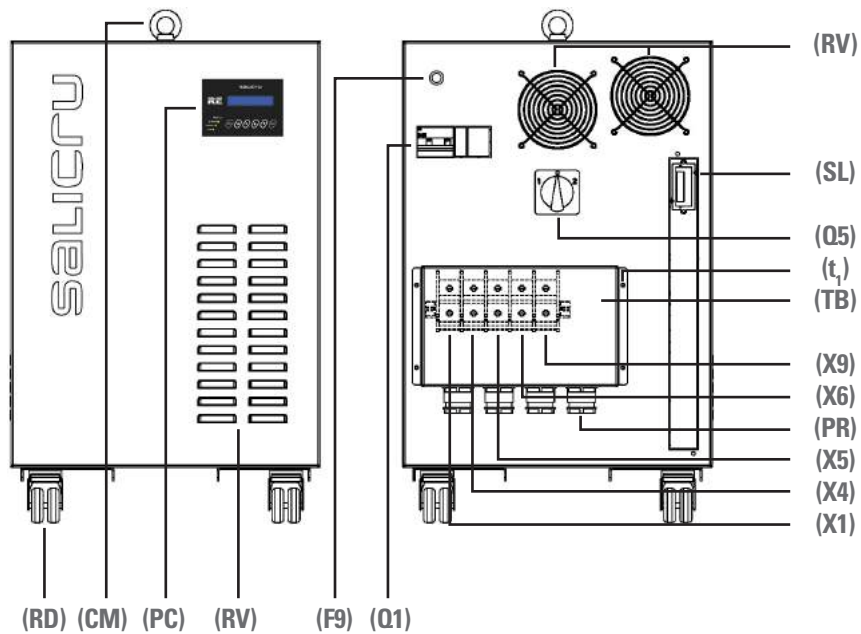


Fig. 8.

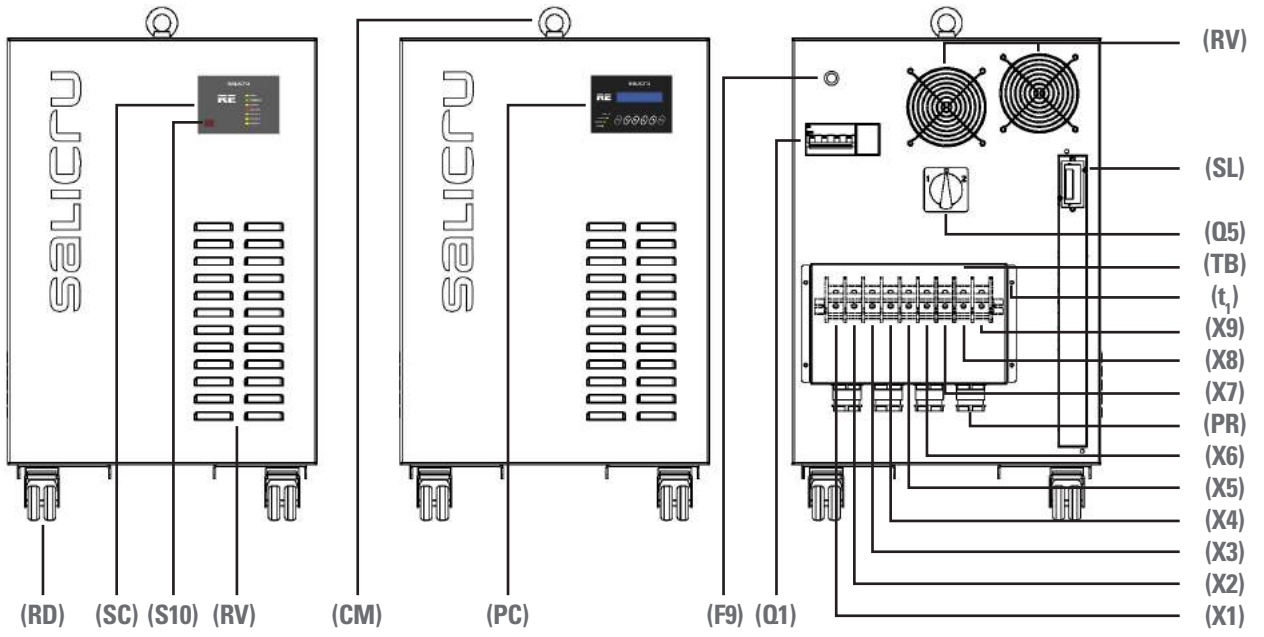


Fig. 9.

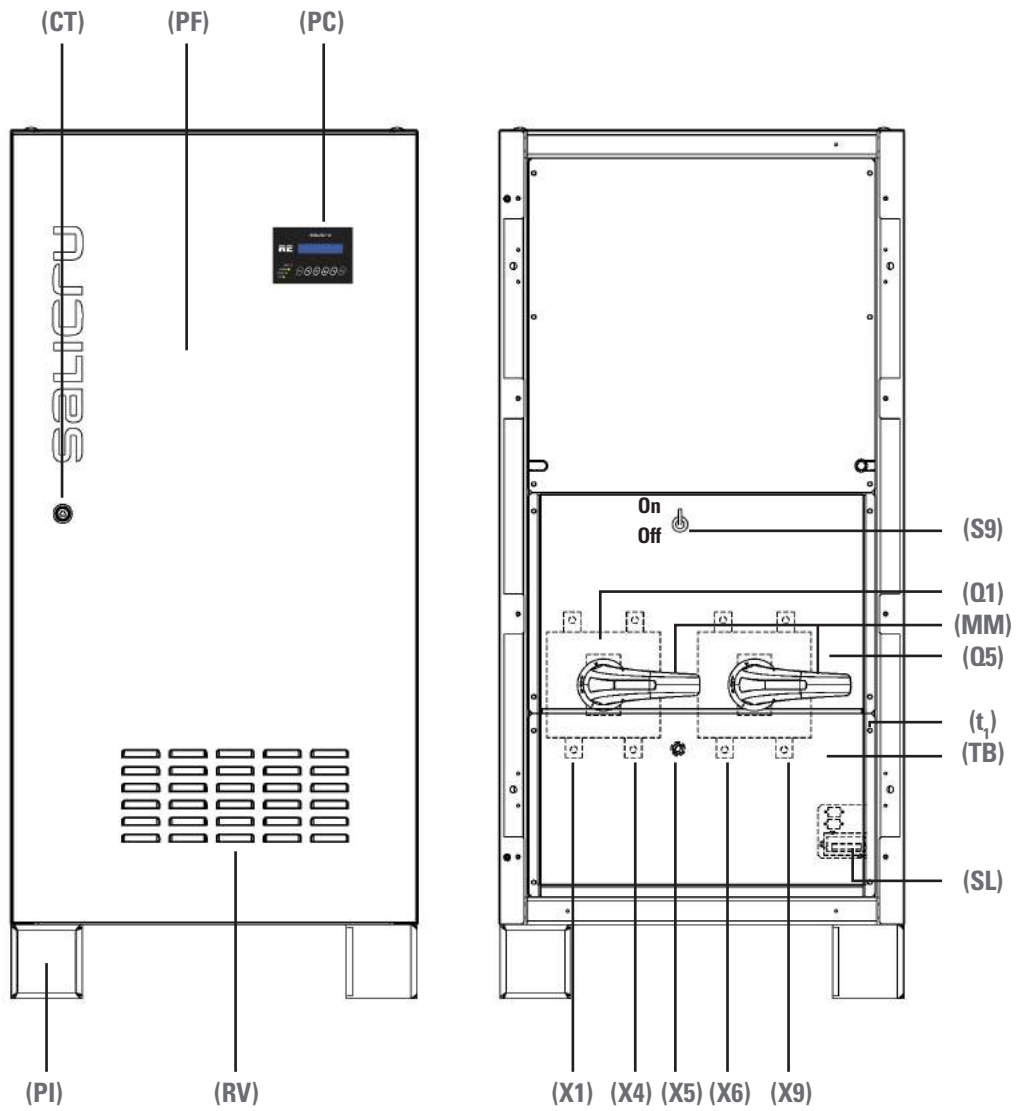


Fig. 10.

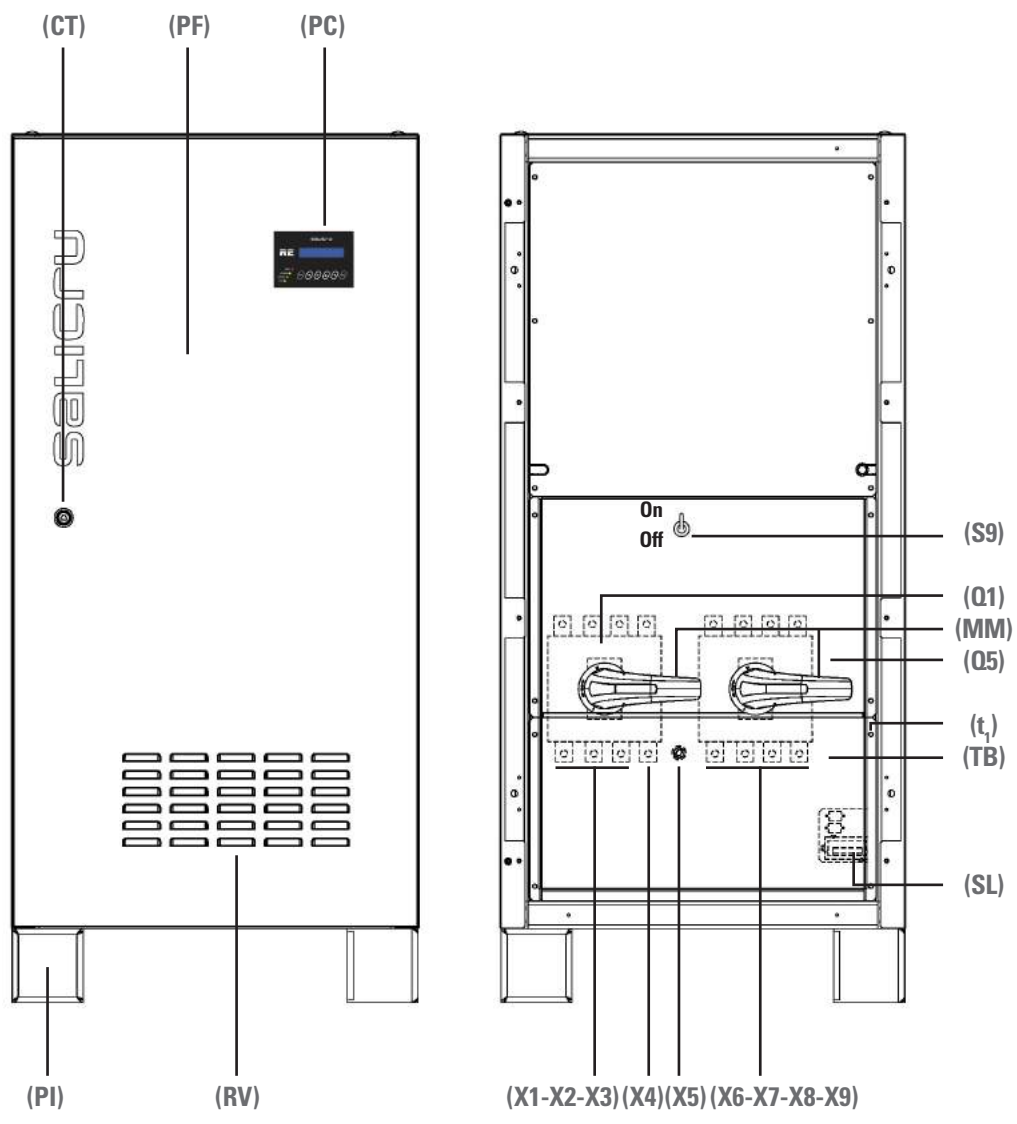


Fig. 11.

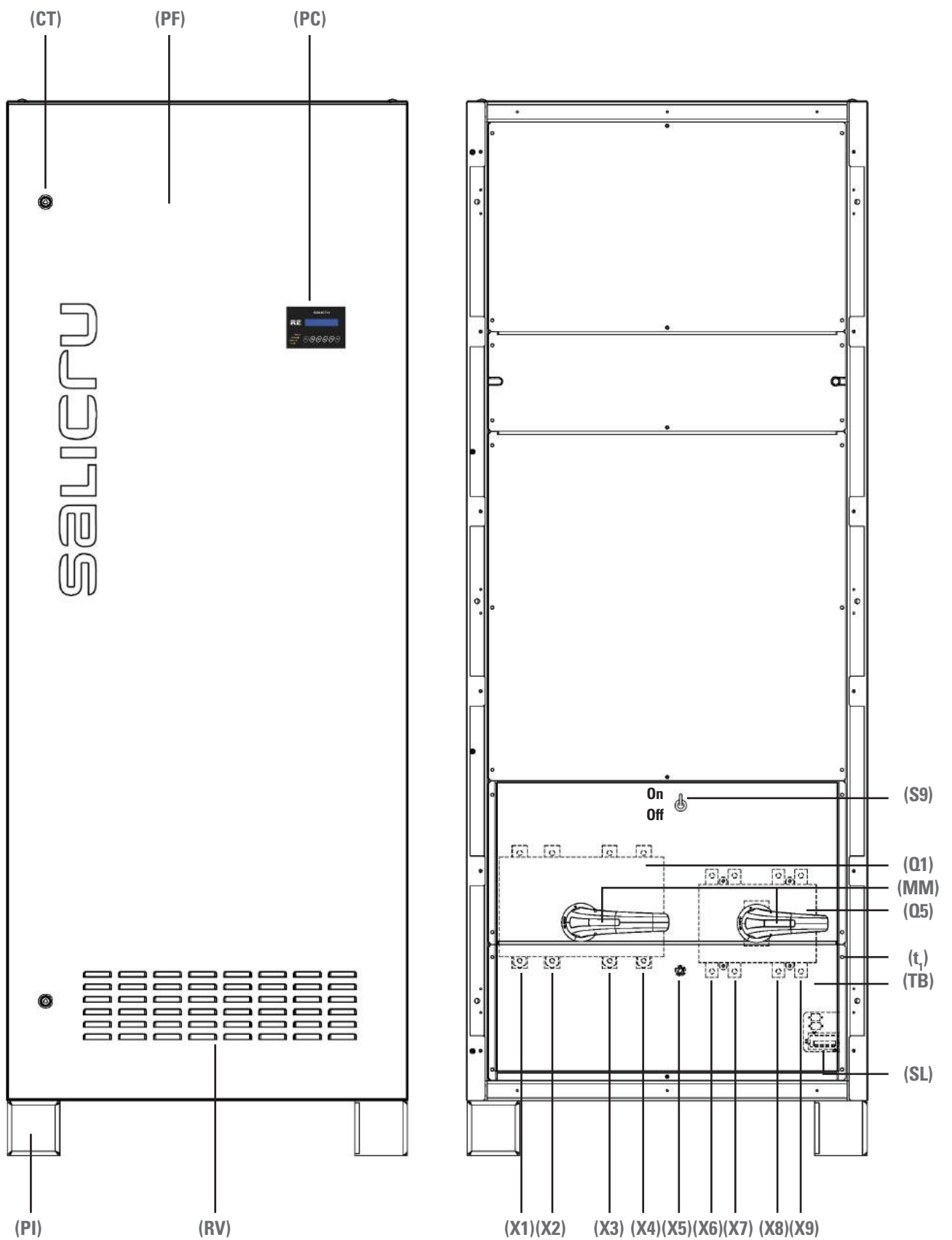




Fig. 12.

4.1.2. Legend corresponding to the equipment views.





Connection parts:

- (X1)** Input power cord or input terminal of phase R.
- (X2)** Input terminal phase S.
- (X3)** Input terminal phase T.
- (X4)** Input neutral terminal N. ⁽²⁾
- (X5)** Main earthing  and earth bonding  with load or loads.
- (X6)** Outlets or output terminal phase U.
- (X7)** Output terminal phase V.
- (X8)** Output terminal phase W.
- (X9)** Output neutral terminal N.

Protection and manoeuvring parts:

- (F1)** Input fuse. It is available in those models with low power rate built in case Nr 1.
- (F9)** Fuse to cancel the max-min protection voltage. Equipments in case only.
- (Q1)** Switch, circuit breaker switch, input fuse switch or holder, depending on the model.
- (O5)** Manual bypass switch.
- (S9)** «On/Off» signal switch to cancel the Maximum-minimum voltage protection. Equipments in cabinet only.
- (S10)** Manual rearming button of Maximum-minimum voltage protections. Not available in equipments with MR protection type (automatic) or equipments with control panel **(PC)**, where this function is done digitally through one of the submenus.

Control panel with LCD **(PC)**:

- (a)** «FAULT» indicator. Red colour.
- (b)** «BYPASS» indicator. Yellow colour.
- (c)** «OPERAT.» indicator. Green colour.
- (d)** «COM.» indicator. Yellow colour.
- (e)** LCD panel.
- (f)** «ENT» key.
- (g)** «ESC» key.
- (h)** Upward key «».
- (i)** Backward key «».
- (j)** Right key «».
- (k)** Left key «».

Optical indications, led synoptic **(SC)**:

- (I)** «INPUT» indicator. Yellow colour.
- (m)** «POWER ON» indicator. Green colour.
- (n)** «OUTPUT» indicator. Yellow colour.
- (o)** «MAX / MIN» indicator. Red colour.
- (p)** «BYPASS» indicator. Yellow colour.
- (q)** «BYPASS R» indicator. Yellow colour.
- (r)** «BYPASS S» indicator. Yellow colour.
- (s)** «BYPASS T» indicator. Yellow colour.

Other parts, abbreviations and auxiliary elements.

- (CM)** Lifting lugs for equipments in case.
- (CT)** Lock with ratchet or cam with handle, for front cabinet door. It can have locking system with key **(LL)**.
- (LL)** Key for locking - unlocking **(CT)**.
- (MM)** Manoeuvring handle switch.
- (PC)** Control panel with LCD.
- (PF)** Front cabinet door.
- (PI)** Leveller parts, cabinet plinth.
- (PR)** Cable glands or bushing to pass the cables. In higher power rate equipments, it is left a slot to pass the connection cables.
- (RD)** Swivel casters with brake in case models nr 3 and 4.
- (RG)** Terminal strip for IR option (control panel dry contacts).
- (RV)** Cooling grids. Natural cooling and in some models, it is forced.
- (SC)** LED synoptic.
- (SL)** Slot for Ethernet communication SICRES card. It is not available in both models with case Nr 2 and models with led synoptic (the own SICRES card is an option).
- (TB)** Terminal protection cover.
- (TT)** Top cabinet covers.
- (t)** Screws for fixing the terminal cover **(TB)**.

⁽²⁾ Three phase equipments with isolation transformers do not have terminal for the neutral, so the circuit breaker or switch will be three poles instead of four poles.

It does not apply to those equipments that have the Manual Bypass switch option, because the neutral is essential to feed the loads from the input when it is on Bypass position (position 1).

4.2. PRODUCT DEFINITION.

4.2.1. Nomenclature.

RE3 T 20-4TMR-BM R IR WCO ±25% A 3x220V EE595328

EE*	Particular customer specifications.
3x220V	Nominal voltage of the equipment. Omit for 3x400 V or 230 V.
A	Output current transducers.
±25%	Input voltage range, if it is different from ±15 %.
CO	"Made in Spain" marking in the equipment and packaging (customs issue).
W	Neutral equipment brand.
IR	Control panel dry contact with LCD to terminals.
I	COM card.
R	19-inch rack format.
BM	Manual Bypass (internal)
MR	Max.-Min protection. Output voltage with automatic rearming.
M	Max.-Min protection. Output voltage with manual rearming.
MRS	Max.-Min protection. Output voltage with automatic rearming and overload protection.
T	Isolation transformer, as standard located at the output and with delta/star connection.
4	First character of the phase to phase voltage, if it is three phase or phase to neutral if it is single phase.
20	Power in kVA.
M	Single phase equipment.
T	Three phase equipment.
RE3	Series of the electronic stabilizers family.

4.3. PRESENTATION.

Basically the RE3 stabilizer has been mainly designed to supply electronic loads, which need a constant power supply over time, so, they do not support any voltage fluctuation, unless it is inside the output window. The RE3 Voltage Stabilizers are fully static and with independent phase regulation for three phase equipments, the response time is lower than 100 ms and with an output accuracy of ±2,5 %. So, they are equipments that combine a very high response time with a high output accuracy.

All the equipments are supplied as a single entity in a metallic enclosure, where the connection power supply cables of the equipment and output are duly identified. Depending on the power of the stabilizer and the included options, the connections are made to terminals directly or through the own terminals of the switch or switches.

The single line diagram of single phase stabilizer is shown in Fig. 13. For a three phase stabilizer, consider it like a three single phase equipments connected among themselves, but with only one led synoptic or control panel.

4.4. DESCRIPTION OF THE STABILIZER

«RE3» Voltage Stabilizers series are equipments with independent phase regulation, so it means that every single phase is treated through an Electronic Control Card individually, and at the same time it is managed by a micro controller of last generation, which controls the stabilizer operating. The equipment has a static Bypass in each phase, which allows shifting all the load to mains in case of any incidence and/or failure, protecting itself and avoiding a break in the power supply to the loads.

The equipment has optical indicators at the front based on lighting emitting diodes, which inform about its status. In addition, most of the RE3 models has a control panel with LCD, which allows checking the input/output voltage and frequency at any time. As an option, the control panel has the following measurements: output current, total active and apparent power and total load percentage per phase. All these measurements involve the availability of current transducers in each output phase. To know in detail the information of the LCD panel and the meaning of the LED indicators see the corresponding section of this manual (section 7).

Although the standard input voltage range is ±15 %, under request it is possible to manufacture equipments with wider input voltage ranges, up to ±30 % (input window regulation).

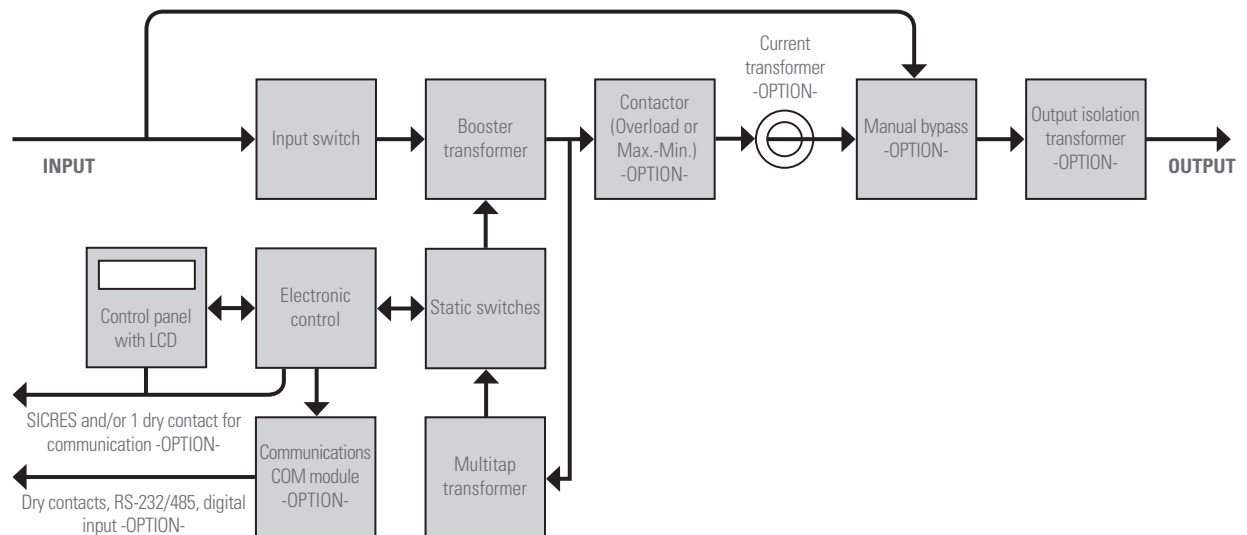


Fig. 13. RE3 single line diagram with booster.

The voltage stabilizer provides protection against unexpected changes, irregularities, increasing and decreasing of mains voltage by means of an accurate voltage stabilization.

Input fuses or circuit breaker switches provide a protection to the load and the stabilizer against sustained overloads. The cooling depends on the model and IP protection degree, so it can be natural or forced in order to keep stable the internal temperature.

The equipment can include Maximum and Minimum voltage protections, supplying the needed control signal to break the output by means of a contactor, which can be fitted at the factory as an option, when the voltage exceeds the allowed limits or there is a mains failure. In order to keep protection against sudden voltage fluctuations, the supplied signal is delayed a few seconds.

It is also possible to include an option, which breaks the output of the stabilizer in case of overload. In this case, the output current transducers must be included, to provide this overload measurement.

The stabilizer can include the Manual Bypass option, which is not ready to be manoeuvred with load. It allows supplying the loads during the maintenance tasks or stabilizer faults.

Regarding the communications, to highlight that the equipments with control panel has a slot, which allows inserting the SICRES Ethernet card. Under request, the communication of the stabilizer can be increased by one programmable dry contact connected to a terminal strip and even to install a communication module with two serial channels and 5 additional dry contacts, provided that the control panel must be included.

4.5. QUALITY PERFORMANCES.

- Wide range of powers for single and three phase installations.
- Output accuracy better than 2,5 %.
- Independent phase regulation.
- Input regulation range of ± 15 % as standard, being able to increase them up to ± 30 %.
- High efficiency, better than 97 %.
- High response time (<100 ms).
- Overload up to 200 % of the nominal for 1 minute.
- Tolerant to a wide range of power factors.
- Wide operating temperature range (-10 °C.. $+45$ °C).
- Immune to the harmonic voltages of mains; stabilization according to the true root mean square (TRMS).
- Nil harmonic voltage reinjection.
- Control panel with LCD to manage the equipment. In low power rate models, it is changed by a led synoptic.
- Control and output voltage setting by means of microprocessor. Stable operation even with load and/or voltage fluctuations.
- Solid static bypass controlled by microprocessor.
- Optimal mechanical design, easier maintenance.
- Lack of electromechanical parts.
- High robustness and reliability (high MTBF).
- Silent operating.
- Recyclable materials in more than 80 %.
- Built manual bypass in the equipment, under request.
- Other available communication ports: RS-232/485 and dry contact (communication module).

4.6. OPERATING PRINCIPLE

Each phase is based on a multitap autotransformer, compensator or Booster transformer, an electronic control card (U.E.) with microprocessor, powerful static switches and an automatic solid state bypass.

The secondary of the Booster transformer is supplied through the voltage got from each tap of the secondary of the autotransformer, which is supplied from mains through the switch directly. This tap is connected to the Booster through a solid state switched managed by the electronic control card, in such way that the primary voltage of the Booster that provides the selected taps, will make a voltage in the secondary of the Booster, which will be added in phase shifting or counter phase shifting, correcting the fluctuations in the mains voltage.

If the input voltage exceeds the range of the equipment, the output regulation will reach till its maximum or minimum correction and from this point the voltage differential will be added or subtracted to the output directly, less those equipments that include the Maximum-Minimum output voltage protection (see section 4.7.2), where its triggering will avoid supplying the loads out of range, but on the contrary they will not be fed when the limits are exceeded.

So, for example, an equipment of $3 \times 400 \text{ V} \pm 15 \%$ ($3 \times 340.. 460 \text{ V}$) and with no Maximum-minimum protection option, when the input voltage is $3 \times 330 \text{ V}$ the output voltage supplied to the loads will be $3 \times 390 \text{ V}$. The differential between the lower limit input voltage range ($3 \times 340 \text{ V}$) and the voltage applied to the input terminals ($3 \times 330 \text{ V}$) is 10 V . This lack of voltage that the stabilizer cannot correct, will be subtracted from the nominal output voltage ($3 \times 400 \text{ V}$) because the output voltage cannot be stabilizer beyond the design ranges, therefore the loads will be fed at $3 \times 390 \text{ V}$.

Equipments with wide input range than the standard $\pm 15 \%$, can be purchased being able to reach up to $\pm 30 \%$.

The Electronic Control Card is the one in charge of managing the decisions: through a reference voltage, which is recorded in a EEPROM, it is monitoring the output voltage of the equipment constantly, in order to trigger the power semiconductors (thyristors) depending on voltage to compensate the output voltage fluctuation.

Models with lower power, the ones fitted in the case Nr 1, do not have Booster. In these equipments, one of the taps of the autotransformer is connected to the output directly, through the own semiconductor, which is selected by the Electronic Control Card depending on the input voltage fluctuation. The selected tap will be the most suitable to get the optimal output voltage, which meets with the requested specifications.

4.7. OPTIONS.

The options described in sections 4.7.4, 4.7.5 and 4.7.6 are only available in those equipments with control panel with LCD.

4.7.1. Output current and power measurements and overload.

The RE3 stabilizer does not include the output current measurement as standards. This option includes one or three output current transducers, depending on the type of the equipment, single or three phase. With this option, several additional measurement will be displayed in the LCD of the control panel, like:

- One or three output currents, depending if the equipment is single or three phase.
- One or three active output powers, depending if the equipment is single or three phase.
- One or three apparent output powers, depending if the equipment is single or three phase.
- One or three output load percentages, depending if the equipment is single or three phase.
- One or three output power factors, depending if the equipment is single or three phase.

By including this output current transducers, over current and overload alarms are also available. So in case of exceeding the nominal currents or powers of the stabilizer, they will be triggered.

4.7.2. Maximum-minimum voltage protection.

Basically it is a detector of maximum and minimum voltage, which is fitted at the output of any stabilizer, either if it is single phase or three phase, and it analyses at any time the output voltage of the own equipment. If the output voltage is inside the $\pm 7 \%$ range (standard range), or others, from the nominal, the equipment supplies voltage and feeds the load connected to the device.

In case the output voltage is out of range, the detector will break the power supply to the loads. There are two standardised versions of protections: manual and automatic rearming. In those cases that it is needed to cancel this protection and avoid the output break when the voltage is out of $\pm 7 \%$ range, or others, from the output nominal voltage, there is a fuse holder or switch (depending on the model). After cancelling the protection, the equipment works as standard stabilizer, so it means if the input voltage is inside the range of the equipment, the output voltage will be the nominal one and if the input voltage is out of the preset range, the output will be proportional.

This optional can be set in different ways:

1. Maximum-minimum input or output voltage protection (by default at the output).
2. Maximum, minimum or maximum-minimum protection (by default Maximum-minimum).
3. Manual or automatic rearming of the Maximum-minimum protection (by default is automatic).

Ranges define the maximum-minimum protection window are only for this purpose, preset value $\pm 7 \%$.

4.7.2.1. Manual/Automatic operating.

- Manual.

When the equipment is out of the preset range, the output contactor is opened, so the output voltage is broken. Although the voltage comes back inside the range, the system will not supply output voltage till it is manually rearmed by means of the corresponding screen in the manoeuvring submenu.

Models without control panel, there is a button in the same synoptic of the equipment. This button is used to rearm manually the protection.

In any case, the rearming will not be kept, if the voltage is not inside the preset limits.

- Automatic.

The system supplies output voltage meanwhile it is inside the preset limits, but if it is out, it will not supply voltage. The stabilizer will shift from one situation to the other one automatically, no human intervention is required, but there is a rearming delay time, which by default is 15 s, even though other values can be set at factory.

4.7.3. Manual Bypass.

The manual Bypass option is based on a cam switch of three positions, which allows selecting between the position «1», where the output is connected to the stabilizer input directly (Bypass) and the position «2», where the output is connected to the output of the equipment directly. The shifting between one position and the other will always be with break through the position «0», so it means that the output is broken during the switching.

4.7.4. Communication module and dry contacts.

The communication module has different ways of communication with the external world and 5 dry contacts for alarming. For more information, check the user's manual EN030*.

4.7.5. Budgeted dry contact version to terminal strip.

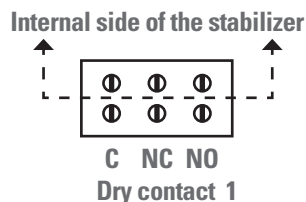


Fig. 14. Dry contact terminal strip layout.

If the end-user needs only an alarm, there is a dry contact built in the own control panel, which can be set to any alarm, on condition that the dry contact is not set any other alarm and it is not used for any internal management of any requested function. The dry contact is supplied to a terminal strip, with the layout stated in Fig. 14. Keep in mind that the maximum applicable voltage and current are 250 V AC 6A.

4.7.6. SICRES Ethernet communication card.

All the stabilizers are supplied with a slot to insert the option SICRES communication card. This card can be inserted from factory or later on.

All the information as regards to this option is described in the user's manual EK764*00 supplied with the CD together with the own SICRES card.

4.7.7. Galvanic isolation transformer.

Between the input and output, an isolation transformer with separate windings and low capacity primary-secondary, can be inserted. It adds an extra feature to the own of the stabilizer. The main advantage of this option is the input/output galvanic isolation, which get, with the own benefits that it means, the electrical noise attenuation coming from mains (in general noises created by machines, industrial equipments, switching transients, storms, etc.). The isolation transformer can be of two types: normal, with an attenuation in common mode higher than 40 dB, and ultra-isolation with three shields, which achieve an attenuation higher than 120 dB. Unless it is stated, both types of transformers are built in at the output.

Three phase RE3 with galvanic isolation transformer does not require input neutral, the output one is generated by itself. Connect this neutral to the earth to referred it.

4.7.8. Other regulation ranges.

The standard regulation range of the equipments is $\pm 15\%$. Under request, the stabilizers can be supplied with different regulation ranges and up to $\pm 30\%$, they can be asymmetrical.

4.7.9. External manual Bypass panel.

The purpose of this option is to isolate the equipment from mains and loads electrically. Therefore, the maintenance tasks or the equipment fixing can be done with no break of energy to the loads, at the same time, unexpected risks are avoided to the technical staff.

The basic difference between this option and the built in manual bypass, is its better operability, because it allows the total disconnection of the equipment from the own installation.

Fig. 15 shows a Panel with input and output switched, being able to have them or not depending on the requested in the purchase order.

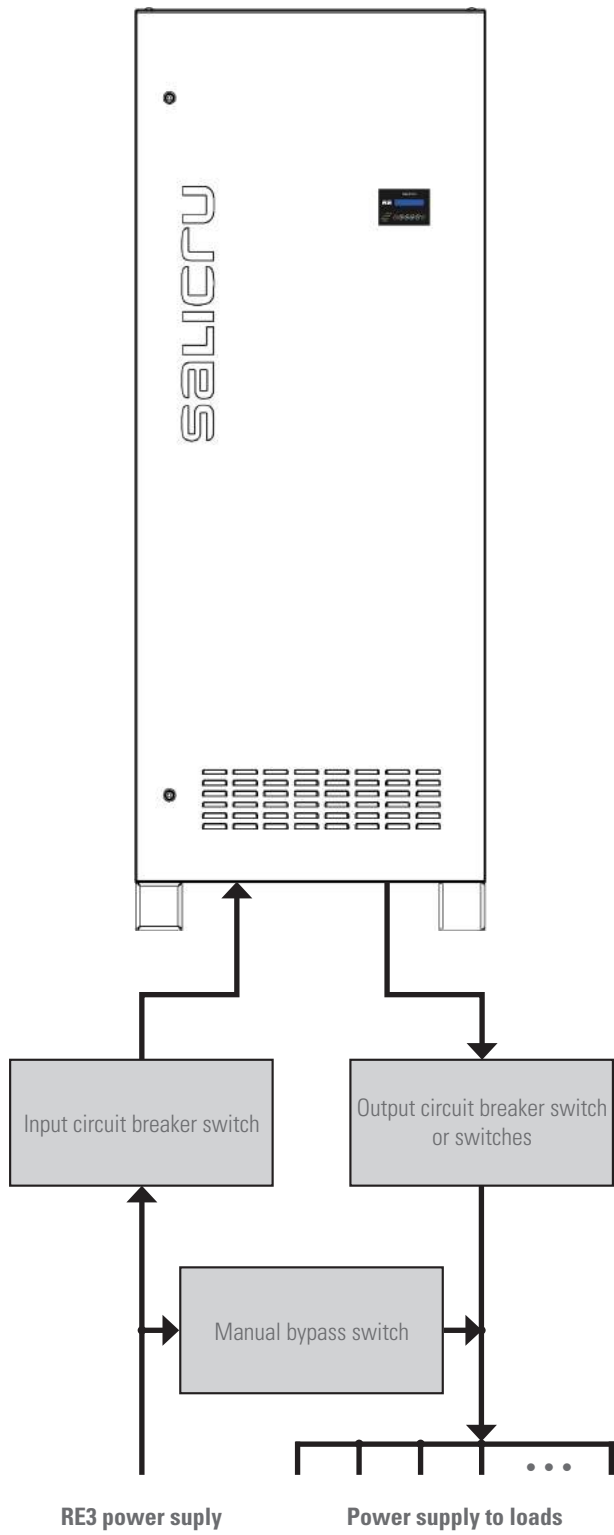





Fig. 15. Example of single line diagram of manual Bypass panel with input and output switches included.

5. INSTALLATION.




-  Read and respect the Safety information, which is described in section 2 of this document. To obviate some indications described in it, can cause serious accidents or very serious injuries to persons in direct contact or in the vicinity, as well as failures in the equipment and/or loads connected to it.
- Check that the nameplate data are the required ones by the installation.
- A wrong connection or manoeuvring, can cause failures in the stabilizer and/or loads connected to it. Read this instructions carefully and follow the stated steps in the established order.
-  The equipment must be installed by **qualified personnel** and it can be used by personnel with no specific training, just with the own use of this «User's manual».
-  All the equipment connections, including the control ones (interface, remote panel, ...), will be done with all the switches in rest and with no mains present (power supply switch to the equipment turned «Off»).

5.1. TO KEEP IN MIND DURING THE INSTALLATION.

- As connection elements of the equipment to mains and loads, and depending on the power rate of the equipment, it will have one of the following possibilities:
 - Power cord with plug and outlets to connect the loads.
 - Terminals to connect the equipment to mains and loads.
 - Power to the equipment through the own copper rods of the input switch and terminals or copper rods to connect the loadsWhen the manual Bypass switch is included, loads will be connected to a particular terminals or over the own copper rods of the switch.
- As regards to the connection point of the main earthing cable and earth bonding terminal, the equipments have a terminal or stud, less those double cabinets, which have two earth connection points, one to connect the main protection earth cable from mains and the other one to bond the earth of the loads.
- In those models with LCD control panel, as standard it provides a slot to insert the Ethernet SICRES card (option), the following communication ports can be supplied, less those equipments built in cases (Fig. 1 to 5):
 - 1 dry alarm contact wired to a terminal strip.
 - Communication module, which includes up to 2 serial ports, 5 programmable dry alarm contacts, 1 digital input. For more information see EN030* document.
- In the nameplate of the equipment, it is printed the maximum input current (it corresponds to the nominal power with the minimum input voltage regulation) and the nominal

output. To calculate the input current, it has also been considered the own efficiency of the equipment.

The overload conditions are considered as a nonpermanent and exceptional operating mode.

- If some input or output peripherals are going to be added, like transformers or autotransformers, the currents stated on their own nameplates must be considered, in order to put the suitable cross cable section, by respecting the Local and/or National Low Voltage Electrotechnical Regulation.
 - The cross cable section must be considered according to the own terminals of the switches fitted in the protection panel, in such way that they are properly clamped in all their section for an optimal contact between both parts.
 - The line that supplies the stabilizer must have an input protection, which allows breaking it to make the wiring with no voltage, otherwise it could mean a danger for the fitters. It is recommended to equip the installation with a protection panel with, apart from the input protection, including both an output and manual Bypass switches. Under request, it can be supplied or you can opt by manufacturing it by yourself, keeping in mind the information supplied in the documentation CD.
- In the user's manual instructions, it is described the operating to start up and shutdown the equipment, considering that the installation already has a complete protection panel like the recommended one. Omit the not available protection manoeuvring or switch.
-  In the supplied documentation together with this user's manual and/or in its CD-ROM, it is available the information as regards to the «Recommended installation». In it, the wiring diagram, the protection size and minimum cross cable sections are shown, keeping in mind the nominal operating voltage. All the values are calculated for a **maximum total cable length of 30 m** between the protection panel, equipment and loads.
 - For longer lengths correct the cross cable sections to avoid the dropping voltage, by respecting the Regulation or standard corresponding to the country.
 -  The size and type of protection to fit, will be the stated in the information stated in the «Recommended installation», supplied together with this user's manual in the documentation CD-ROM.
 - The neutral regime from the input to the output are identical for the RE3 voltage stabilizers «with no galvanic isolation».
 -  When the equipment has a galvanic isolation transformer, as an option or built in from factory or even installed by yourself, either at the input or output of the equipment there will be protections against indirect contacts (residual current device) at the output of each transformer, because in case there were an electrical shock in the secondary, due to its own isolation feature it will avoid the tripping of the protections installed upstream of the transformer (output of the isolation transformer).
 - A reminder, all the isolation transformers, built in or supplied from factory, has the output neutral connected to the

earth through a cable bridge between the neutral terminal and earth. In case it was required to have the output neutral isolated, remove this bridge taking the needed cautions stated in the local and/or national low voltage regulations.

- In case of installing the equipment in IT neutral regime, the switches and circuit breakers must break the NEUTRAL a part from the phases.

5.2. EQUIPMENT RECEPTION.

5.2.1. Unpacking, contents checking and inspection.

- To unpack it, see section 5.2.3.
- When receiving the equipment, check that no damages have occurred during transport (impacts, falls, ...) and the features of the equipment corresponds with the stated in the purchase order, so it is recommended to unpack the equipment for an initial visual inspection.
- In case of observing damage, make the appropriate claims to your supplier or in lack of it to our firm.



Do not start up any equipment when external damages have been observed.

- Also check that the data in the nameplate stucked in the packaging and the equipment, correspond to the one stated in the purchase order, so it will be needed to unpack it (see section 5.2.3). Otherwise, make the nonconformity as soon as possible, quoting the serial number of the equipment and the reference in the delivery note.
- Check the contents in the packaging:
 - The own equipment.
 - The user's manual in electronic format (CD-ROM).
- Once the reception is finished, it is better to pack the panel again till its commissioning, in order to protect it against mechanical impacts, dust, dirt, etc...

5.2.2. Storage.

- The equipment storage, will be done in a dry and cool place, protected from rain, dust and water jets or chemical agents. It is advisable to keep the equipment inside its original packaging because it has been designed to guarantee the maximum protection during transport and storage.
- Respect the storage features of the equipment stated in section 9.

5.2.3. Unpacking.

- Depending on the model of the equipment the packaging has:
 - Cardboard enclosure or wooden one under request, expanded polystyrene corners (EPS) or polyethylene foam (EPE), plastic bag and polyethylene bands.

- Wooden pallet, cardboard enclosure or wooden one depending on the case, expanded polystyrene corners (EPS) or polyethylene foam (EPE), plastic bag and polyethylene bands.

Models in cabinets (Fig. 10 to 12) are supplied with no pallet, unless by sea or it is requested explicitly in the P.O.

All materials are recyclable; so if they are going to be disposed, do it in accordance with the regulations in force. It is recommended to keep the packaging, in case it was needed in future.

- Proceed to unpack the equipment, depending on the case is:
 - For models with complete cardboard packaging with or without pallet:
 - Cut the bands.
 - Open the flaps.
 - In case of wooden packaging, open it by means of the needed tools.
 - Remove the corners.
 - Remove the equipment from inside the packaging.
 - Remove the equipment from inside the plastic bag.
 - For models with lifting lugs and casters.
 - Cut the bands.
 - Remove the cardboard enclosure by pulling up from it as it was a cover or in case of wooden packaging by dismantling it with the needed tools. In this last case, it is not needed to cut the previous bands because they are not available.
 - Remove the corners.
 - Remove the plastic bag that protects it. The equipment is bare over a cardboard base of honeycomb type, which is used as an absorbing shock, and at the same time it is over a wooden pallet. In these cases there are two lifting lugs to make easier the fitting handling and the subsequent pallet removing.
 - For models in cabinet.
 - Cut the bands.
 - Remove the cardboard enclosure by pulling up from it as it was a cover or in case of wooden packaging by dismantling it with the needed tools. In this last case, it is not needed to cut the previous bands because they are not available.
 - In those models with cardboard enclosure, remove the plastic bag, which is a protection against dust and dirt.

In those models with wooden packaging, download the equipment with an electrical forklift or similar and remove the plastic bag, which is a protection against dust and dirt.



To lift the cabinet, do not use slings or chains because they can damage the cabinet or even the equipment could tip over.

5.2.4. Relocation till the installation place.

- For the equipments in the case, the Fig. 1 to 6 make the location in the most suitable means, keeping in mind the weight in tables 1 to 4.

- Models in cases according to Fig. 7 to 9. has four casters, which make easier their movement till the location.

Nevertheless, if the reception area is far from the installation place, it is recommended to move the equipment by using a pallet jack or the most suitable transport means, taking care about the distance between both points.

If the distance is important, it is recommended to move the equipment completely packed till the installation place and later on unpack it.

- To move those models in cabinet (Fig. 10 to 12), use a pallet jack or forklift. Its floor standing base is designed to be used with these means.

5.2.5. Location.

- Locate the equipment paying attention to the indications and recommendations stated in the safety instructions EK266*08.
- Those equipments with casters block the brake in all of them.

5.3. CONNECTION.

- This equipment is suitable to be fitted in power supplies with TT, TN-S, TN-C or IT configurations, keeping in mind the particular specifications of the used system and the national electrotechnical regulation of the country of destination.

- Cross cable sections used to supply both the equipment and loads, will be in accordance with the stated currents in the nameplate stucked in the equipment, by respecting the Low Voltage Electrotechnical Regulation or the norms in the corresponding country.

- The installation will be ready with input protections, sized to the currents stated in the nameplate of the equipment at least, with Residual Current Device and circuit breaker with the same characteristic stated in the «Recommended installation» document.

For equipments connected to an IT power supply neutral regime, the protection will be four poles in order to break the three phases and neutral in the same manoeuvring.

The overload conditions are considered as a nonpermanent

and exceptional operating mode, so these currents will not be kept in mind to size the protections.

- The output protection will be a circuit breaker with the characteristic stated in the corresponding «Recommended installation» document.

- Depending on the stabilizer model, some control connections can be accessible from the back of the equipment directly. Nevertheless all power connections are placed at the back of the unit behind a protection cover and for those models in cabinet, it is needed to open the front door previously.

When finishing the corresponding tasks, the cover will be fitted back with its fixing screws and those models in cabinet, the front door will be closed by means of the mechanisms provided for.

- It is recommended to use end terminals in the cables connected to the power strip terminals.
- Check the correct torque in the connection screws of the power strip terminals.

5.3.1. Connection of the input terminals.

- As this is an equipment with protection against electrical shocks of class I, it is mandatory to connect the main protection earth cable (connect main earth), being sure that it is done before supplying voltage to the input terminals.

- Depending on the stabilizer model, the power supply can be done in different ways:

Equipments according to Fig. 1 to 3. Connect the plug **(X1)** of the input power cord to a wall outlet with protective earth.

Equipments according to Fig. 4 to 12. Connect the power supply cables to the input terminals **(X1)** and **(X4)** in single phase equipments or **(X1)**, **(X2)**, **(X3)** and **(X4)** in three phase equipments, **by respecting the phase rotation of phase R or phases R-S-T and neutral** stated in the labelling of the equipment and this manual. If the phase rotation is not respected, serious faults can happen in the equipment.






In three phase equipments with isolation transformer, it is not available the neutral terminal **(X4)**.

In the illustrations from Fig. 10 to 12 are mere examples to show the direct connection about the manoeuvring mechanism. Those models with terminals, the connection order will not differ from the stated in Fig. 10 to 12, unless it is otherwise stated in the equipment labelling.

- In case of any discrepancy between the labelling and the instructions of this manual, the labelling will always prevail.

5.3.2. Connection of the output terminals.

-  As this is an equipment with protection against electrical shocks of class I, it is mandatory to connect the main protection earth cable (connect main earth ) , being sure that it is done before supplying voltage to the input terminals.
- Depending on the model of stabilizer the connection to loads can be done in different ways:
 - Equipments according to Fig. 1 to 3. There are two outlets (**X6**) with protective earth. Connect the load or loads to them, keeping in mind the nominal power of the equipment.
 - Equipments according to Fig. 4 to 12. Connect the power cords of loads to the output terminals (**X6**) and (**X9**) in single phase equipments or (**X6**), (**X7**), (**X8**) and (**X9**) in three phase equipments, **by respecting the phase rotation of phase U or phases U-V-W and neutral** stated in the labelling of the equipment and this manual.

 Pay attention to the neutral connection of a three phase equipment with star configuration, because in case it is connected a phase instead, the load will suffer an over voltage that could damage it.



In three phase equipments with delta output, the neutral terminal is not available (**X9**).

Depending on the model of stabilizer the connection of the loads or loads to the equipment will be physically done to a terminals or directly to the copper rods of the own manual bypass switch (optional), if the equipment has it. In the illustrations from Fig. 10 to 12 are mere examples of a direct connection over the manoeuvring mechanism. Those models with terminals, the order to connect the cables will not vary as regard to the stated one in Fig. 10 to 12, unless the labelling of the equipment states it.

- In case of any discrepancy between the labelling and the instructions of this manual, the labelling will always prevail.
- Regarding the output protection of the stabilizer, it is recommended to distribute the power into four lines, at least. Each one of them will have a circuit breaker sized to a quarter of the nominal power. This type of outgoing distribution will allow that in case of any fault, which makes a short-circuit, in any machine connected to the equipment, affects to the faulty line only.

The rest of connected loads will have available the continuity, because it will only trips the protection of the affected line by the short-circuit.

5.3.3. Connection of the main protective earth .

-  As this is an equipment with protection against electrical shocks of class I, it is mandatory to connect the main protection earth cable (connect main earth ) , being sure that it is done before supplying voltage to the input terminals.

- Make sure that any load connected the stabilizer is only connected to the protective earth of this equipment. The fact of not limiting the earth of the load or loads to this **single point**, can create back feed loops to the earth that could degrade the supplied energy.

- Although the equipment has one or two protective earth terminals, they are always joined to the stabilizer ground.

- By default the stabilizer that includes isolation transformer, it is located at its output. These equipments do not require input neutral, but they have an output neutral created by the own isolation transformer for the loads.

By default this neutral is supplied referred to the earth through a cable as bridge mode between the neutral and protective earth terminals. Remove this cable for floating installations (no reference needed).

5.3.4. Connection of communication module.

- In the communication manual EN030, the connection parts are defined and described. Make the corresponding connections.

5.3.5. Connection of the dry contacts terminal strip.



- In section 4.7.5 it is stated that there is a signal or alarm supplied through terminal strip.

Use the suitable cross cable section for the voltage and current, keeping in mind the maximum power that the contacts can handle.

5.3.6. SICRES Ethernet communication card.

To connect the SICRES card, keep in mind the indications of user's manual EK764*00 supplied in the CD-ROM together with the own SICRES.

5.3.7. Connection between an external manual Bypass panel, stabilizer and loads.

-  As this is an equipment with protection against electrical shocks of class I, it is mandatory to connect the main protection earth cable (connect main earth ) , being sure that it is done before supplying voltage to the input terminals.

- The connections between the manual Bypass panel with the power supply, the stabilizer and loads will be different depending if it is based in a single switch panel (see Fig. 16), in case there are additional protection switches (see Fig. 17) or if the panel has a double switch (see Fig. 18).

To have or not an output switch, the connection will not differ.

- The manual Bypass panel will be connected to the power supply, the stabilizer and loads, **by respecting the phase or phases, neutral and protective earth rotation** stated in the labelling of all of them.

- In case of any discrepancy between the labelling and the instructions of this manual, the labelling will always prevail.

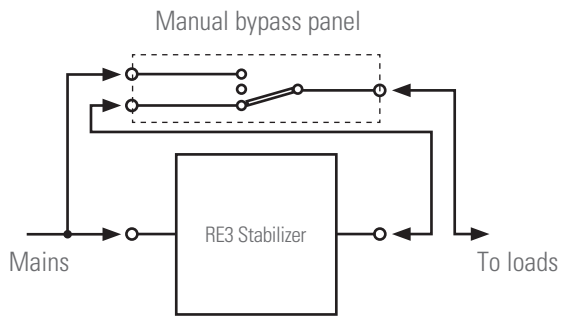


Fig. 16. Connection of a stabilizer with a manual Bypass panel with single switch.

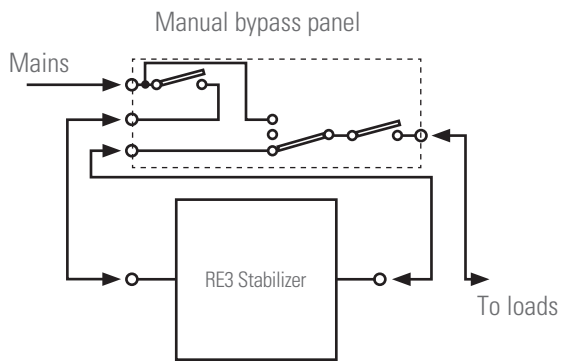


Fig. 17. Connection of a manual Bypass panel with single switch and protections.

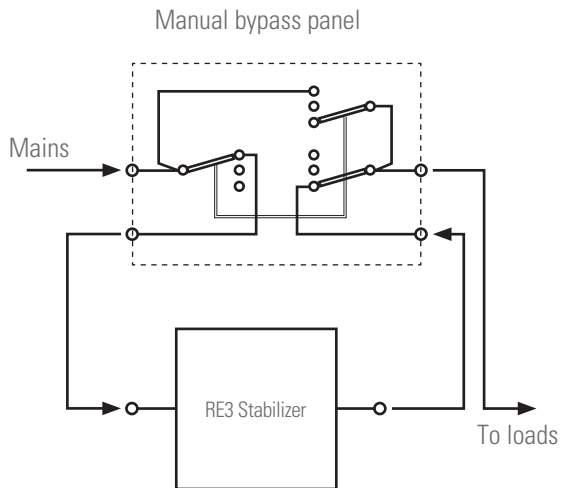


Fig. 18. Connection of a stabilizer with a manual Bypass panel with double switch.

6. OPERATING.

6.1. CONTROLS BEFORE COMMISSIONING.

- Make sure that all connections have been done properly and with the correct torque, by respecting the labelling of the equipment and the instructions in section 5.

- Check that the stabilizer start up switch **(Q1)** is turned to «0» or «Off».

In equipments with low power and «On/Off» rocker switch **(Q1)** and fuse **(F1)**, check that the fuse is placed into the fuse holder.

- In equipments with the manual Bypass switch option **(Q5)**, it is supplied in «0» position from factory (Out of service). Turn the switch to position «2» (Stabilizer).

In case the switch **(Q5)** was located into the position «1» (Bypass), turn it to position «2» (Stabilizer).

- Check that the loads are turned off.

6.2. START UP AND SHUTDOWN OF THE STABILIZER.

6.2.1. Start up.

- Depending on the model of stabilizer, it has a synoptic with led indications or a control panel with LCD with some optical indicators.

For any information as regards for them, check section 7 of this manual.

- Turn to position «I» or «On» the input and/or output switches located in the protection panel.

- Depending on the model turn the rocker switch, input circuit breaker or switch **(Q1)** of the stabilizer to position «I» or «On», and wait for 10 sec. before starting up the load or loads.

- In equipments with control panel select the desired language to display the messages in the LCD screen, through the «General parameters» menu (see section 7.3.5). The factory preset language is «Spanish».

- Start up the load or loads, when the set is in operation.

If the stabilizer includes isolation transformer, the loads a part from the output stabilization will be benefited by a clean and electrical noise attenuation power supply too.

6.2.2. Stabilizer shutdown.

- Depending on the model of stabilizer, it includes a synoptic with led indicators or LCD panel with some optical indicators.

For more information as regards to the synoptic, consult section 7 of this manual.

- Shutdown the load or loads.

- Turn the rocker switch, input circuit breaker or input switch of the stabilizer **(Q1)** to position «0» or «Off», according to the available model.



Do not use the input circuit breaker of the stabilizer **(Q1)** as general shutdown or start up switch and absolutely **NEVER use it** for this function when it is a switch, because it is not built in to break the output with load power.

- Turn the input and/or output switches located in the protection panel to «0» or «Off».


6.3. MANUAL BYPASS, OPTION.

6.3.1. Power supply to the loads from mains through the manual Bypass.

- Shutdown the load and stabilizer according to section 6.2.2.

- Turn the manual Bypass option camswitch **(Q5)**, to position «1» (Bypass). The stabilizer will be out of service in order to allow its maintenance or fixing in case of fault.

- Start up the loads, they will be supplied from mains directly. If the stabilizer has isolation transformer, the loads will be supplied from the output of the transformer, in order to have the intrinsic features of itself.

-  While the manual Bypass camswitch can't be turned on/off with load, **it is reminded** that any action over itself will make a break in the power supply to the loads, because it is break before make type and also it goes through the position «0».

6.3.2. Power supply to loads from the stabilizer.

Once the maintenance or fixing tasks have been finished and the put the stabilizer in operation again, proceed as follows:

- Shutdown the loads.
- Turn the manual Bypass option camswitch **(Q5)**, to position «2» (Stabilizer).
- Start up the stabilizer according to section 6.2.1.

6.4. MANUAL BYPASS PANEL, OPTION.

- In the start up and shutdown procedure of the equipment are quoted the actions to make in the input and/or output switches of the protection panel of the stabilizer.

The manual Bypass panel option can include only one of these switches, a part from the own Bypass camswitch, so the start up and shutdown procedure of the stabilizer with Bypass panel, if it is included, it is implicit described in the own start up and shutdown procedures when it is referred to them.

6.4.1. Power supply of the loads from mains with manual Bypass panel.

- Shutdown the loads and stabilizer according to section 6.2.2.

- Turn the manual Bypass switch to position «I» or «On».
- Start up the loads, they are supplied from AC mains directly.

6.4.2. Power supply to loads from the stabilizer.

- Shutdown the loads.
- Turn the manual Bypass switch to position «0» or «Off».
- Start up the stabilizer according to section 6.2.1.

6.5. START UP AND SHUTDOWN OF AN EQUIPMENT WITH THE MAXIMUM-MINIMUM VOLTAGE PROTECTION, OPTION.

It is considered the Maximum-Minimum voltage is fitted at the output of the stabilizer. In case it is installed at the input, proceed in the same way.

6.5.1. Start up.

- Depending on the model of stabilizer, it includes a synoptic with led indicators or LCD panel with some optical indicators.
For more information as regards to the synoptic, consult section 7 of this manual.
- Turn to position «I» or «On» the input and/or output switches located in the protection panel.
- Depending on the model turn the rocker switch, input circuit breaker or input switch (**Q1**) of the stabilizer to position «I» or «On».
- In equipments with control panel select the desired language to display the messages in the LCD screen, through the «General parameters» menu (see section 7.3.5). The factory preset language is «Spanish».
- Depending on the available type of protections in the equipment, (M) or (MR), proceed as sections 6.5.1.1 or 6.5.1.2 state.

6.5.1.1. Automatic version (MR).

- After 15 sec. (time preset from factory and setable by the **T.S.S.**) of turning the input switch (**Q1**) to «I» or «On» and if the voltage is inside the preset range, the equipment will supply stabilized output voltage. On the other hand, if the stabilised voltage is out of range, the output voltage of stabilizer will be zero. It will be shifted from one status to the other one automatically.

In any case, those equipments with control panel (**PC**) and Maximum-Minimum output protections, the voltage can be checked at any time, because the measurements are taken at the output of the stabilizer and before the contactor of the optional.

- Start up the load or loads. The set is ON.

6.5.1.2. Manual version (M).

If the stabilizer voltage is inside the range, such voltage will be at the output. On the other hand, if the voltage is out of range, the output voltage of the stabilizer will be zero. To restore the previous status, it will be needed a manual rearming.

- For equipments with control panel (**PC**) with LCD:
 - ❑ The manual activation of the protections can be done through the screen 0.2 of the control panel (see Fig. 20). It might happen that the contactor is no turned on and so the output voltage is not supplied. This is why the output voltage is out of the preset range; repeat this step.

In any case, those equipments with control panel (**PC**) and Maximum-Minimum output protections, the voltage can be checked at any time, because the measurements are taken at the output of the stabilizer and before the contactor of the optional.

In any case, if it is not possible to turn the output protection of the equipment on, try it after some time because the voltage could be out of range.

- For equipments with synoptic control (**SC**):
 - ❑ Press the button (**S10**) for a few seconds till the equipment supplies stabilized output voltage. It might happen that after releasing the pressure over it, so the output voltage to loads is not supplied. This is why the output voltage is out of the preset range, or the time of pressure over the button (**S10**) has not been enough; repeat this step.

- Start up the load or loads. The set is in operation.

6.5.1.3. Cancelling / Activating the Maximum-minimum protections.

- All the equipments include an element to cancel these protections, nevertheless depending on the metallic enclosure of the stabilizer (case or cabinet) it is done through a fuse or small switch of two positions.
- To cancel them, fit the fuse inside the fuseholder (**F9**), which is included together with the equipment in those models in box or select the position «Off» in the switch (**S9**) in equipments in cabinet.
- To activate then, proceed in reverse order. Remove the fuse from the fuseholder (**F9**) or select the position «On» by means of the switch (**S9**).

6.5.2. Shutdown the stabilizer.

- Proceed as it is described in section 6.2.2.

7. CONTROL PANEL WITH LCD AND SYNOPTIC WITH LEDS.

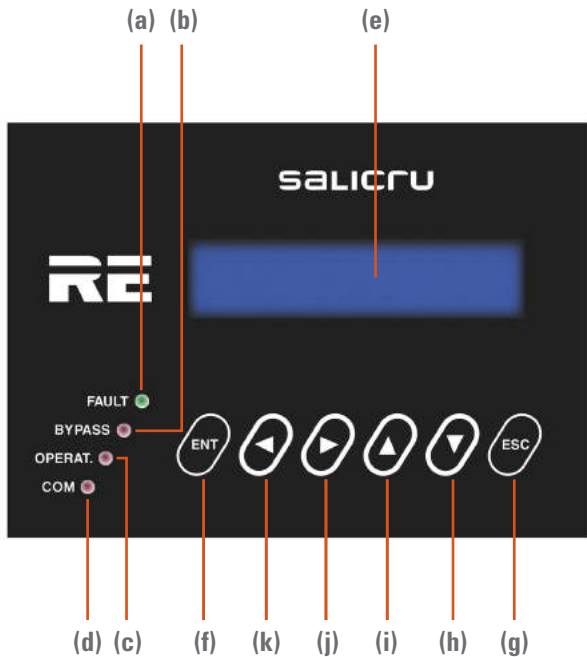


Fig. 19. Control panel with LCD.

7.1. CONTROL PANEL: OPTICAL LED INDICATORS, LCD AND ACOUSTIC ALARM.

- (a) Red colour led indicator «FAULT». It lights when the equipment is on Bypass, due to fault, overload, static bypass manually forced or forced by software. Also, it lights due to an over temperature, input/output voltage too high or too low alarms.
- (b) Yellow colour led indicator «BYPASS». It lights when the unit is on Bypass.
- (c) Green colour led indicator «OPERAT.». It lights when the equipment is set properly and on normal operating mode.
- (d) Yellow colour led indicator «COM». It blinks, meanwhile the communication is present between the control of each phase and the LCD panel.
- (e) LCD panel of 2x16 characters.

Leds from control panel light when their respective function is triggered.

7.1.1. Acoustic alarm.

The equipment has an acoustic alarm, which is triggered with any of the alarms displayed in the LCD panel. The alarm can be silenced when it is acknowledged by means of pressing the key «ENT» for each the active alarms.

It is not possible to silent the acoustic alarm for both all the alarms and permanently.

7.2. BASIC FUNCTIONS OF THE KEYPAD AND NOTES.

- (f) Key «ENT».
 - (g) Key «ESC».
 - (h) Upward key «▼».
 - (i) Backward key «▲».
 - (j) Move to right key «▶».
 - (k) Move to left key «◀».
- Use the upward «▼» and backward «▲» keys to browse through the main tree menu.
 - Use the right «▶» left «◀» keys to browse through the screens of the menu.
 - Key «ENT» has several functions depending on the menu we are:
 - To enter into the submenus.
 - Press the key «ENT» to change the setting figure. The figures in the screen blink.

With the keys «▶» - «◀» select the character to change and with the keys «▼» - «▲» select the right figure to validate or with the keys «▶» - «◀» select the right option depending on the case. To confirm press «ENT». The next field will blink, in order to continue changing proceed in the same described way or press «ESC» to escape.

 - To validate the measurements or parameters.
 - To acknowledge an alarm.
 - The «ESC» key allows to go back to main screen (**Screen 0.1**) directly, with just only one press, unless we are changing the value of any parameter, in which we will have to press twice, one for escape from the changing (value in blinking mode) another one to go to main screen.
 - Fig. 20 shows the screen map completely exploded and it is shown the basic and advanced user level.
 - As a reference mode, each screen has a numbering in it right bottom corner, which is used for its later functional description.
 - The second note in its left bottom corner, means that it belongs to an option or there is level restriction:
 - No note, these screens are visible by the end-user.
 - (3) Measurement option, related with including the AC current transducer/s.
 - (4) Maximum-minimum voltage option.
 - (5) Screens hidden by a password (safety level for advanced end-user). It avoids that non-authorized personnel can change any setting. For any needed change or modification please contact with our **T.S.S.**
 - (6) Hidden by password and pending of implementation.
 - Some screens shows a determined quantity of characters «—». Each one of them means a character and so the maximum length of the field will be stated by the quantity of them in.

7.3. DESCRIPTION OF THE SCREENS.

7.3.1. «Start» screen menu (Screen 0.0).

Screen 0.0

Basic screen that is displayed when starting up the equipment and it shows the time (HH:MM), date (DD-MM-YY) and the status of the equipment, which will follow the message sequence: START UP, CONNECTING, BYPASS OUTPUT, NOMINAL OUTPUT.

In case of communication failure between the electronic control or controls and the control panel of the LCD, the message CONNECTING... will be displayed till the communication is restored permanently.

Also this screen is displayed when pressing «ESC» to escape from any of the rest menus or submenus from LCD control panel.

Screen 0.1

Static bypass condition, with three possible options:

- Manual forcing of the static bypass:
- ON - activated.
- OFF - deactivated.

Screen 0.2 ⁽⁴⁾

Through this screen, in those equipments that include this option with version (M), the manual rearming of the Maximum-minimum input or output voltage protection is activated. The automatic option (MR) does not require any intervention. There are two possible status:

- OFF - Maximum-minimum contactor to OFF (no voltage at the output of the stabiliser).
- ON - Manual rearming order of the protections. It will be automatically established to OFF when the output voltage goes out of the preset limits.

Screen 0.3

It shows the status of the communications between each electronic control and LCD control panel and the phase, which it is communicated:

The first field based on 9 characters shows through the first or three first characters located at the right, for a single phase or three phase respectively, the controls communicated with the control panel, by displaying:

- 0 = No communication.
- 1 = Communication.

The second field in the lower right corner and by means of one character, it shows the number of the phase, which it is communicating (1 phase R, 2 phase S and 3 phase T). In a single phase equipment, there will be only one electronic control.

7.3.2. «Measurement» menus (Screen 1.0).

To access from main screen to it, press once the upward key «▼». By means of the key «▶» there is access to the different submenus of measurements, being able to move free from one to the other by means of «▶» or «◀».

The figure showed in the right top corner of each screen of this menu, shows the number of phase, to which belong the displayed measurements: 1 (phase R), 2 (phase S) and 3 (phase T).

To visualize the measurements of a particular phase, press «ENT», select the number of phase (1-2-3 for R-S-T) by means of the keys «▼» or «▲» and validate with «ENT». Next press «ESC» to escape and press «▼» to go back to the menu «Measurements».

Screen 1.1

Input voltage and frequency submenu.

Screen 1.2

Output voltage supplied to loads submenu. This screen and the 1.3 are mutually exclusive.

Screen 1.3 ⁽³⁾

Output voltage and current supplied to loads submenu, when the AC current transducers are included. This screen and the 1.2 are mutually exclusive.

Screen 1.4 ⁽³⁾

Apparent (kVA) and active (kW) powers supplied to loads submenu, as well as type of it (Resistive, L = Inductive, C = Capacitive) with its power factor.

Screen 1.5 ⁽³⁾

Submenu of load percentage which is supporting the equipment.

Screen 1.6

Submenu of heatsink (DIS), tap transformer (T) and booster transformer (B) temperatures.

Screen 1.8

Submenu of control firmware version of each phase.

Screen 1.9

Submenu of internal ambient temperature of the equipment in °C.

7.3.3. «Alarms» menu (Screen 2.0).

To access from main screen to it, press twice the upward key «▼». By means of the key «▶», it is displayed the most recent alarm, being able to move free from one to the other by means of «▶» or «◀».

In case there are no more alarms, it will not possible to move forward with the key «▶».

Fig. 20 shows only one alarm as a mere example, but in practice some alarms can be displayed, those ones that are active and ordered in the order of appearance. In table 9, all the possible alarms in the LCD panel are shown.

Screen 2.1

Example: Active alarm and number of phase, which is active.

7.3.4. «Data logger» menu (Screen 3.0).

To access from main screen to it, press three times the upward key «▼». By means of the key «▶» there is access to the first log screen of alarms, starting from the most recent one of the data logger (200 logs as maximum), being able to move free from one to the other by means of «▶» or «◀».

In case of no logs, it will not be possible to move with the key «▼».

Screen 3.1 ⁽⁵⁾

It allows to clear the data logger by selecting the variable YES.

Screen 3.2

Example of alarm log of the equipment:

Day (DD/MM), sf the alarm has been activated or deactivated (ACT/DES), quantity of affected phases (M:x), time of the alarm (HH:MM) and alarm code - reference.

7.3.5. «General parameters» menu (Screen 4.0).

To access from main screen to it, press four times the upward key «▼». By means of the key «▶» there is access to the several screens of the general parameters, being able to move free from one to the other by means of «▶» or «◀».

Screen 4.1

Regarding the clock of the equipment. It has to be set according to its structure of (HH:MM:SS), by setting the summer time (DST) or the winter time (--). In the same way, set the date (DD:MM:20YY) and weekday, during the commissioning or later on. The system will work automatically when having the reference data, but it will not log the changes of DST in the screen.

Screen 4.2

The LCD contrast can be set for an optimal visualization.

Screen 4.3

Language setting: Spanish, English, French, Hungarian.

Screen 4.4 ⁽⁵⁾

Regarding the external RS-232 communication parameters.

Screen 4.5 ⁽⁵⁾

Regarding the external communication parameters by means of RS-485.

List of displayed alarms in the LCD panel	Description	Level of restriction	Alarm code and abbreviation of the alarm displayed in the data logger	
OVERLOAD	Output overload alarm	(03)	01	OVERLD
BYPASS	Output voltage through the static bypass	Any	02	BYPASS
LOW INPUT V.	Low input voltage alarm		03	VinLOW
HIGH INPUT V.	High input voltage alarm		04	Vin.HI
LOW OUTPUT V.	Low output voltage alarm		05	Vo.LOW
HIGH OUTPUT V.	High output voltage alarm		06	Vo.HI
TEMP. 1 ALTA	High temperature 1 alarm (heatsink)		07	TEMP.1
TEMP. 2 ALTA	High temperature 2 alarm (choke)		08	TEMP.2
P. DEVICE ERR. 1	Semiconductor failure 1 (short-circuited)		09	PDEV.1
P. DEVICE ERR. 2	Semiconductor failure 2 (Opened)		10	PDEV.2
BYPASS FAULT	Bypass fault alarm		11	F.BYP.
BLOCKING ALARM	Alarma equipo bloqueado		13	BLOC.
MANUAL BYPASS	Output voltage through the internal manual bypass, optional	If it has the option included	14	M.BYP.
HIGH LEAKAGE CURRENT	Earth leakage current alarm > than the preset, when the option is included		16	I.LEAK
MAX-MIN DETECT. ACTIVATED	No output voltage due to the Maximum-minimum detection out of range	(04)	22	MAXMIN

Table 5. Displayed messages in the LCD panel (PC).

Screen 4.6 ⁽⁵⁾

DST (Daylight Saving Time) for Europe, AUTOMATIC/MANUAL and displayed in the screen as AUTO/MAN..

With this selection, the daylight saving time can be activated or not in the equipment in AUTOMATIC way for Europe area, which will add one hour in summer or subtract one hour in winter.

7.3.6. «Output setting» menu (Screen 5.0) ⁽⁵⁾.

The screens of this menu belongs to the advanced end-user safety level. It is needed to enter the respective password in the screen 9.0 to see them.

With the screens of this menu activated, press 5 times the upward key «▼», till reaching the screen 5.0. By means of the key «▶» there is access to only one setting screen.

Screen 5.1 ⁽⁵⁾

In this screen it is entered the nominal output reference of the equipment, without changing the own values supplied at the output terminal power strip.

7.3.7. «Dry contact setting» menu (Screen 8.0) ⁽⁵⁾ and/or ⁽⁶⁾.

The screens of this menu belongs to the advanced end-user safety level. It is needed to enter the respective password in the screen 9.0 to see them.

To access from main screen to it, press the needed times the upward key «▼» till reaching the screen 8.0. By means of the key «▶» there is access to the different screens of the dry contact settings, being able to move free from one to the other by means of «▶» or «◀».

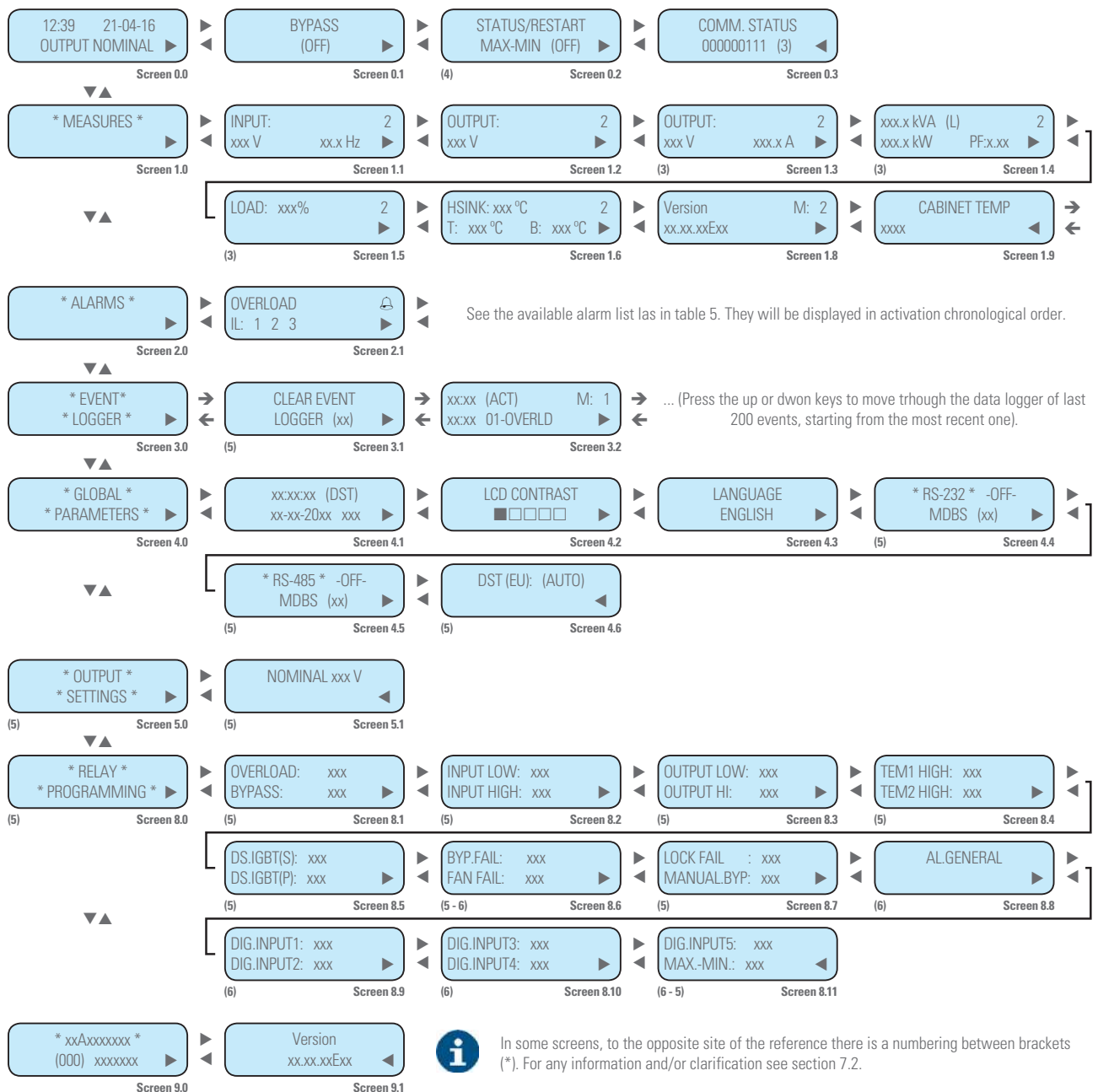


Fig. 20. Screen tree of the control panel (PC).

This menu and its screens are not useful for the end-user, in case the equipment does not include the COM option, so do not consider them in that case. Also, some dry contacts can only be set in case of including the optional element, like the overload and Max-Min relay, which means to include the AC current transducers and the Maximum-minimum protections.

Screens 8.1 to 8.11 ^{(5) and/or (6)}.

To each one of the alarms or status of table 5, can be linked with one of the dry contacts of the communication module, the ones defined as standard are stated in the own user's manual of the communication module (see document EN030*).

7.3.8. «Serial nr and Password» menu (Screen 9.0).

To access from main screen to it, press the needed times the upward key «▼» till reaching the screen 9.0, where it is stated the serial number of the equipment and the «Password» which allows the displaying and corresponding access to the settings can be entered, through the screens of advanced end-user level restriction level. In case of requiring the original setting from factory, contact with our **T.S.S.**

By means of the key «▶» there is access to the next screen of this menu, being able to move free from one to the other by means of «▶» or «◀».

Screen 9.1

LCD firmware version.

7.4. LED SYNOPTIC: OPTICAL INDICATIONS.

- (I) «INPUT» indicator. Yellow colour.
It lights when supplying voltage to the input terminals.
- (m) «POWER ON» indicator. Green colour.
It lights when turning the input switch «On».
- (n) «OUTPUT» indicator. Yellow colour.
It lights to show that there is output voltage in a standard equipment.
- (o) «MAX / MIN» indicator. Red colour. In operation when the equipment include the option only.
It lights when the Maximum-minimum voltage protections are triggered. In this condition, there is no voltage at output terminals, but the «OUTPUT» led can be on, because it is connected before of the Maximum-minimum contactor.
For the same Maximum-minimum input protections, all the leds less the «INPUT» will be off, in case the «MAX / MIN» led is triggered.
- (p) «BYPASS» indicator. Yellow colour.
RE3 single phase only.
- (q) «BYPASS R» indicator. Yellow colour.
- (r) «BYPASS S» indicator. Yellow colour.

- (s) «BYPASS T» indicator. Yellow colour.

If any of the «BYPASS» leds light, it means an overload or fault. To shutdown the equipment completely, reduce the load connected at the output terminals and start it up again.

In case of persisting this situation, contact with the Technical Service and Support (**T.S.S.**). The equipment can still be connected, it does not stabilize, but supplies output voltage and clean of electrical noises in those models with isolation transformer.

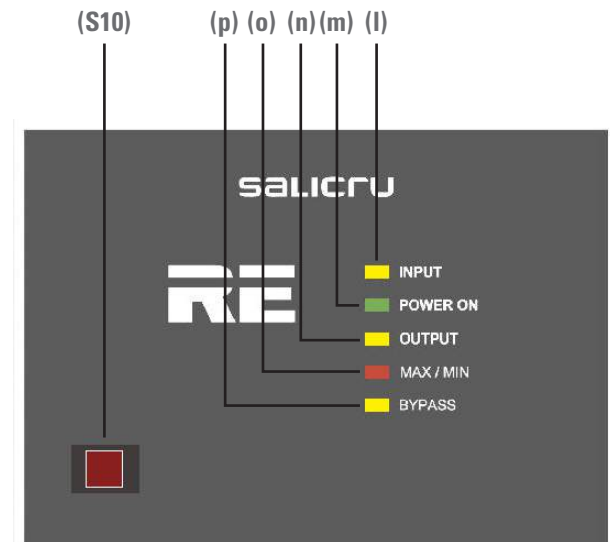


Fig. 21. Led synoptic for RE3 single phase equipment.

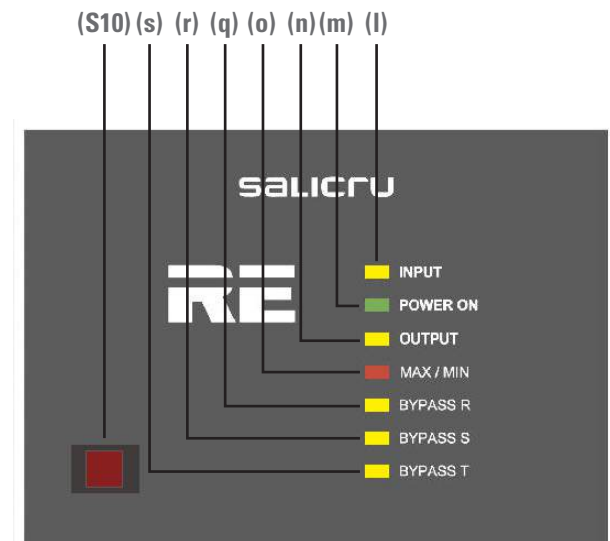


Fig. 22. Led synoptic for RE3 three phase equipment.

8. MAINTENANCE, WARRANTY AND SERVICE.

8.1. BASIC PREVENTIVE MAINTENANCE GUIDE.

Using properly the RE3, they do not need so much attention. Nevertheless, it is recommended a yearly periodic inspection due to the electrical and environmental operating conditions of the stabilizer.

Contact with the **T.S.S.** only, in case of permanent activation of the led **(p)** or leds **(q)** and/or **(r)** and/or **(s)** of «Bypass» and after checking that this is not due to an overload, because the electronic card of the phase or phases with this led means failure. If the stabilizer has isolation transformer, the loads will be supplied through it in order to have the benefit of the intrinsic features.



Contact with our Technical Service and Support (**T.S.S.**) in order to repair the equipment.

For any other problem or doubt about the stabilizer, contact with our (**T.S.S.**).

8.2. WARRANTY CONDITIONS.

8.2.1. Warranty terms.

In our website, you will find the warranty conditions for the acquired product, also in it you will be able to log it. It is recommended to make it as soon as possible in order to include it in the database of our Technical Service and Support (**T.S.S.**). Among other advantages, it will be easier to make any regular paperwork to take actions the **T.S.S.** in case of an hypothetical fault.

8.2.2. Out of scope of supply.

Our firm is not forced by the warranty, in case it is appreciated that the fault of the product does not exist or it was caused by a wrong use, negligence, wrong installation and/or checking, non-authorized fixing or modification attempts, or any other cause beyond of the intended purpose, or due to an accident, fire, lightnings or other danger. In any case, neither it will cover the compensations due to claim damages.

8.3. TECHNICAL SERVICE NETWORK.

The coverage, both national and international, of the Technical Service and Support (**T.S.S.**), can be found in our Website.

9. ANNEXES.

9.1. GENERAL TECHNICAL FEATURES OF STANDARD EQUIPMENTS.

Input	
Voltage	Single phase 220 / 230 or 240 V (phase + neutral and PE) Three phase 3x380 / 3x400 / 3x415 V (3 phases + neutral and PE) Other voltages or configurations under request
Range	± 15 % as standard and under request up to ± 30 %
Frequency	48.. 63 Hz
Output	
Voltage	Single phase 220 / 230 or 240 V (phase + neutral and PE) Three phase 3x380 / 3x400 / 3x415 V (3 phases + neutral and PE) Other voltages or configurations under request
Accuracy	Better than ± 2,5 %
Frequency	48.. 63 Hz
Distortion	Nil
Response time	100 ms
Efficiency	> 97 %
Permissible overload admissible	200 % for 1 minute
Regulation	Independent per phase
Led synoptic or control panel with LCD, depending on the model of stabilizer	
With led synoptics	4 leds for single phase equipments or 6 for three phase equipments + 1 for the Maximum-minimum protection option.
With LCD control panel	LCD of 2x16 characters + 4 status leds
Communications	
RS232 serial port / Slot for SICRES	Option / Standard
Programmable dry contact of the control panel to terminal strip	Option
SICRES card	Option
Communication module (see EN030*)	Option
Options	
Output current transducers	To measure the output current, powers and overloads
Maximum-minium voltage protection	In versions with automatic (MR) or manual (M) rearming
Manuak Bypass switch	Integrated in the equipment
Galvanic isolation transformer	Electrical noise attenuation on common mode > 40 dB
Galvanic ultraisolation transformer with three shields	Electrical noise attenuation on common mode > 120 dB
Generals	
Operating temperature	- 10.. + 45 °C
Storage temperature	- 20.. + 85 °C
Cooling	Natural or forced cooling depending on the model
Relative humidity	Up to 95 % non-condensing
Maximum operating altitude	2.400 m. a.s.l.
Dimensions and weights	See table 1 to 4 according to model
Mean Time Between Failures (MTBF)	60.000 h
Mean Time To Repair (MTTR)	30 min
Acoustic noise	In models with natural cooling <45 dB(A) and models with forced cooling <65 dB(A)
Protection degree	IP20
Standards	
Safety	IEC/EN 62103
Electromagnetic compatibility (EMC)	EN/IEC 61000-6-4; EN/IEC 61000-6-2
Marking	CE
Certifier body	SGS
Quality and environmental management	ISO 9001 and ISO 140001

Table 6. General technical specifications.



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A series of horizontal dotted lines for writing, starting from the first line below the icon and continuing down the page.



A series of 23 horizontal dotted lines extending across the page, providing a template for writing or drawing.