USER MANUAL

UNINTERRUPTIBLE POWER SUPPLIES (UPS)

SLC TWIN PRO2 T UL

6 and 10 kVA

salicru

General index

1. INTRODUCTION.

1.1. THANK YOU LETTER.

We thank you in advance for the trust placed in us in the purchasing of this product. Read this instruction manual carefully in order to familiarise yourself with its content, since the more you know and understand the device the greater your satisfaction, level of safety and optimisation of its functionalities will be.
We remain at your disposal for any additional information or queries that you may wish to make.

Yours sincerely.

SALICRU

- The device described here **is capable of causing significant physical injury if improperly handled**. For this reason, its installation, maintenance and/or repair must be carried out exclusively by our staff or **qualified personnel**.
- Although no effort has been spared to ensure that the information in this user manual is complete and accurate, we accept no liability for any errors or omissions that may exist.
  The images included in this document are for illustrative purposes and may not exactly represent the parts of the device shown; therefore they are not contractual. However, any divergence that may arise will be remedied or solved with the correct labelling on the unit.
- Following our policy of constant evolution, **we reserve the right to modify the characteristics, operations or actions described in this document without prior notice**.
- **Reproduction, copying, assignment to third parties, modification or total or partial translation** of this manual or document, in any form or by any means, **without previous written permission by us is prohibited**, with the company reserving full and exclusive property rights over it.

2. SAFETY INFORMATION.

2.1. USING THIS MANUAL.

The documentation of any standard equipment is available to the customer on our website for download **(www.salicru.com)**.

- For devices 'powered by socket,' this is the website for obtaining the user manual and **'Safety Instructions'** EK266*08.
- For devices with 'permanent connection' via terminals, a CD-ROM or pen drive containing all necessary information for connection and startup, including **'Safety Instructions'** EK266*08, may be supplied with it.

Before carrying out any action on the device relating to its installation or startup, change of location, configuration or handling of any kind, carefully read the safety instructions.
The purpose of the user manual is to provide information regarding safety and explanations of the procedures for installation and operation of the equipment. Read them carefully and follow the steps indicated in the order established.

Compliance with the 'Safety Instructions' is obligatory, with the user being legally responsible for observing and applying them.

The device is delivered properly labelled for correct identification of each of its parts, which, together with the instructions described in this user manual, allows installation and startup operations to be performed in a simple and organised manner without any doubts whatsoever.
Finally, once the equipment is installed and operating, it is recommended to save the documentation downloaded from the website, CD-ROM or pen drive in a safe and easy-to-access place, for any future queries or doubts that may arise.
The following terms are used interchangeably in the document to refer to:

- **'SLC TWIN PRO2 T UL,' 'TWIN PRO2 T,' 'TWIN T,' 'PRO2 T,' 'device,' 'unit' and 'UPS'** - Uninterruptible power supply. Depending on the context of the phrase, it can refer either to the actual UPS itself or to the UPS and the batteries, regardless of whether or not it is all assembled in the same metal enclosure.
- **'Batteries' or 'accumulators'** - Bank or set of elements that stores the flow of electrons by electrochemical means.
- '**T.S.S.**' - Technical Service and Support.
- '**Customer,' 'installer,' 'operator' or 'user'** - These are used interchangeably and by extension to refer to the installer and/or operator who will carry out the corresponding actions, and the same person may be responsible for carrying out the respective actions when acting on behalf, or in representation, of the above.

2.1.1. Conventions and symbols used.

Some symbols may be used and appear on the device, batteries and/or in the context of the user manual.
For more information, see Section 1.1.1 of the **'Safety Instructions'**document EK266*08.

3. QUALITY ASSURANCE AND STANDARDS.

3.1. STATEMENT BY THE MANAGEMENT.

Our goal is customer satisfaction, therefore this Management has decided to establish a Quality and Environment Policy, through the implementation of a Quality and Environmental Management System that will enable us to comply with the requirements demanded in the **ISO 9001** and **ISO 14001** and also by our Customers and Stakeholders.
Likewise, the management of the company is committed to the development and improvement of the Quality and Environmental Management System, through:

- Communication to the entire company of the importance of satisfying both the customer's requirements as well as legal and regulatory requirements.
- The dissemination of the Quality and Environment Policy and the setting of the Quality and Environment objectives.
- Conducting reviews by the Management.
- Providing the necessary resources.

3.2. STANDARDS.

The SLC TWIN PRO2 T is designed, manufactured and sold in accordance with Quality Management Standard **EN ISO 9001**.

The **EC** marking indicates conformity with EU Directives:

- **2014/35/EU** - Low voltage safety.
- **2014/30/EU** - Electromagnetic compatibility [EMC]
- **2011/65/EU** - Restriction of the use of hazardous substances in electrical and electronic equipment [RoHS]

In accordance with the specifications of harmonised standards:

- **EN-IEC 62040-1**. Uninterruptible power supplies [UPS]. Part 1.1: Safety requirements.
- **EN-IEC 62040-2**. Uninterruptible power supplies [UPS]. Part 2: Electromagnetic compatibility [EMC] requirements.

WARNING:
SLC TWIN PRO2 T UL 6 and 10 kVA. This is a category C3 UPS. This is a product for commercial and industrial application in the second environment; Installation restrictions or additional measures may be necessary to avoid disturbances. It is not appropriate to use this device in basic life support applications [BLS], where a failure of the former can render vital equipment out of service or significantly affect its safety or effectiveness. It is also not recommended in medical applications, commercial transport, nuclear installations, or other applications or loads, where a failure of the product can lead to personal or material damage.

The EC declaration of conformity of the product is available to the customer upon express request to our offices.

And **UL, CSA and FCC** markings in accordance with the specifications of standards:

- **UL 1778**
- **CSA C22.2 NO.107.3.-14**
- **FCC part 15 Subpart B**

ELECTROMAGNETIC COMPATIBILITY WARNING (FCC):

- **SLC TWIN PRO2 T UL 6 and 10 kVA**. This UPS has been tested and meets the limits for a Class B digital device, pursuant to the FCC Part 15 standard. These limits are defined to provide reasonable protection against harmful interference when the device operates in a commercial environment.
  This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this UPS in a residential environment may cause harmful interference, in which case the user must correct the interference at their own expense.

The manufacturer is not liable in the event of modification or intervention on the device by the user.

WARNING CONCERNING BATTERIES (UL):

- Maintenance of the batteries must be carried out or supervised by personnel who have knowledge of the batteries and the necessary precautions.
- Batteries should not be replaced by the operator or user.
- When changing batteries, replace them with the same type and number.
- **Caution:**: Do not dispose of batteries in fire, as they may explode.
- **Caution:** Do not open or break apart batteries. The electrolyte discharged can be harmful to the skin and eyes. It can be toxic.
- **Caution:** Batteries can pose a risk of electrocution and cause a high short-circuit current. The following precautions should be observed when working with them:
  - **a.** Remove any watches, rings or other metal objects.
  - **b.** Use tools with insulated handles.
  - **c.** Wear gloves and rubber boots.
  - **d.** Do not leave tools or metal objects on top of the batteries.
  - **e.** Disconnect the power source before connecting or disconnecting the battery terminals.
  - **f.** Determine whether the battery is accidentally earthed. If so, disconnect the power source. Contact with any part of a battery that is earthed can cause electrocution. The likelihood of electrocution can be reduced if such connections are eliminated during installation and maintenance (applicable to devices and battery cabinets that do not have a power circuit connected to earth).

3.3. UKCA PRODUCT MARK AND UK AUTHORIZED REPRESENTATIVE.

UK CA product marking indicates that this UPS has been evaluated by Salicru and is deemed to comply with safety, health and environmental protection requirements.

The UK CA Declaration of Conformity is available upon request. For copies of of the UKCA Declaration of Conformity, please contact Salicru or check our website: www.salicru.com

UK Authorised Representative
Indele Limited
7 Bell Yard,
WC2A 2JR,
London

3.4. ENVIRONMENT.

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

Recycling of the device at the end of its useful life:

Our company undertakes to use the services of authorised and regulatory companies to treat the set of products recovered at the end of their useful life (contact your distributor).

Packaging:

For the recycling of the packaging there must be compliance with the legal requirements in force, in accordance with the specific regulations of the country where the device is installed.

Batteries:

Batteries pose a serious danger to health and the environment. The disposal of them shall be carried out in accordance with the laws in force.

4. PRESENTATION.

4.1. VIEWS.

4.1.1. Views of the device.

Figures 1 and 2 show illustrations of the devices in their single enclosure format for both powers. However, because the product is constantly evolving, discrepancies or slight contradictions may arise. If in any doubt, the labelling on the device itself will always prevail.

The nameplate of the device shows all of the values relating to its main properties and characteristics. Act accordingly for its installation.

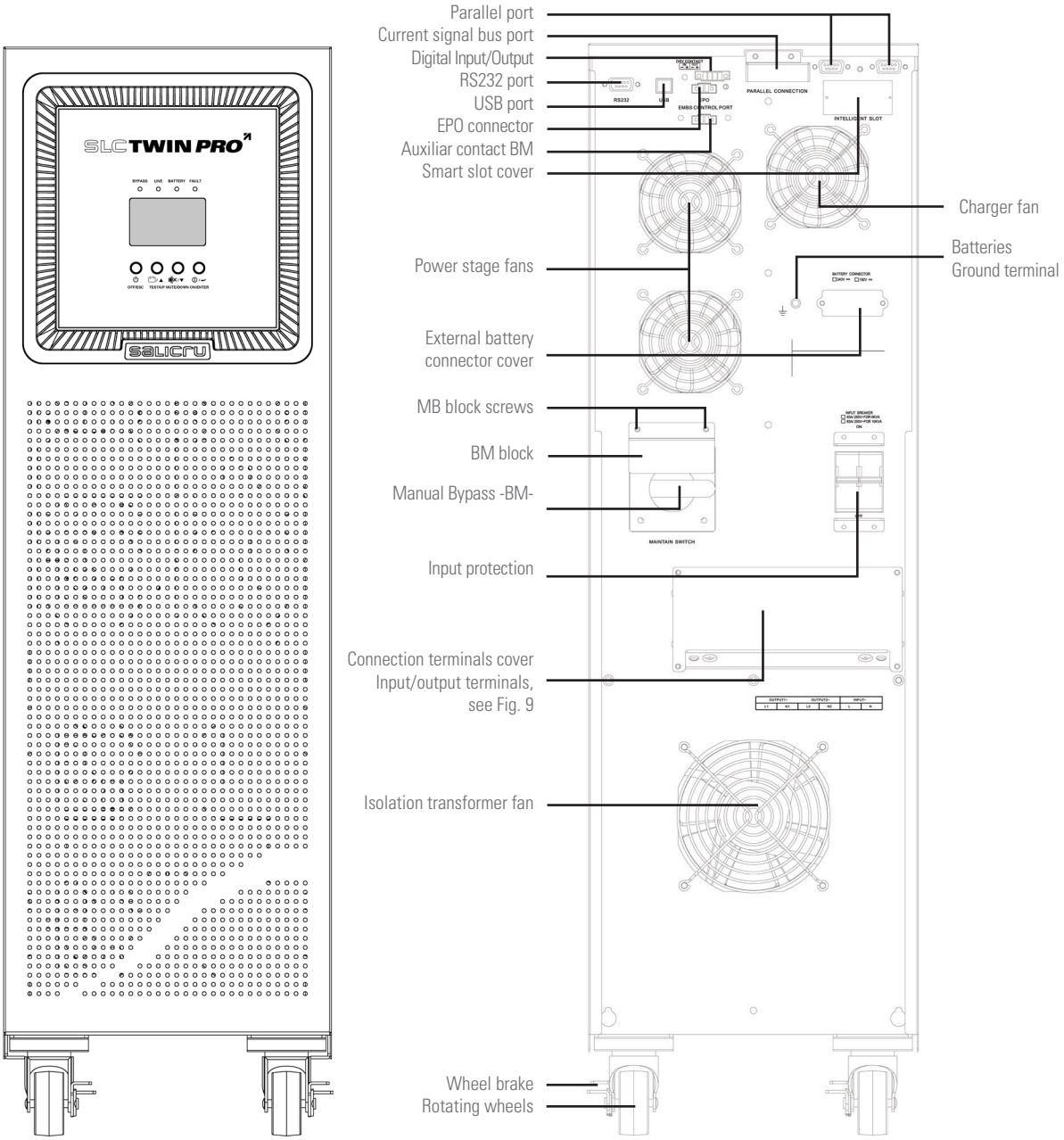
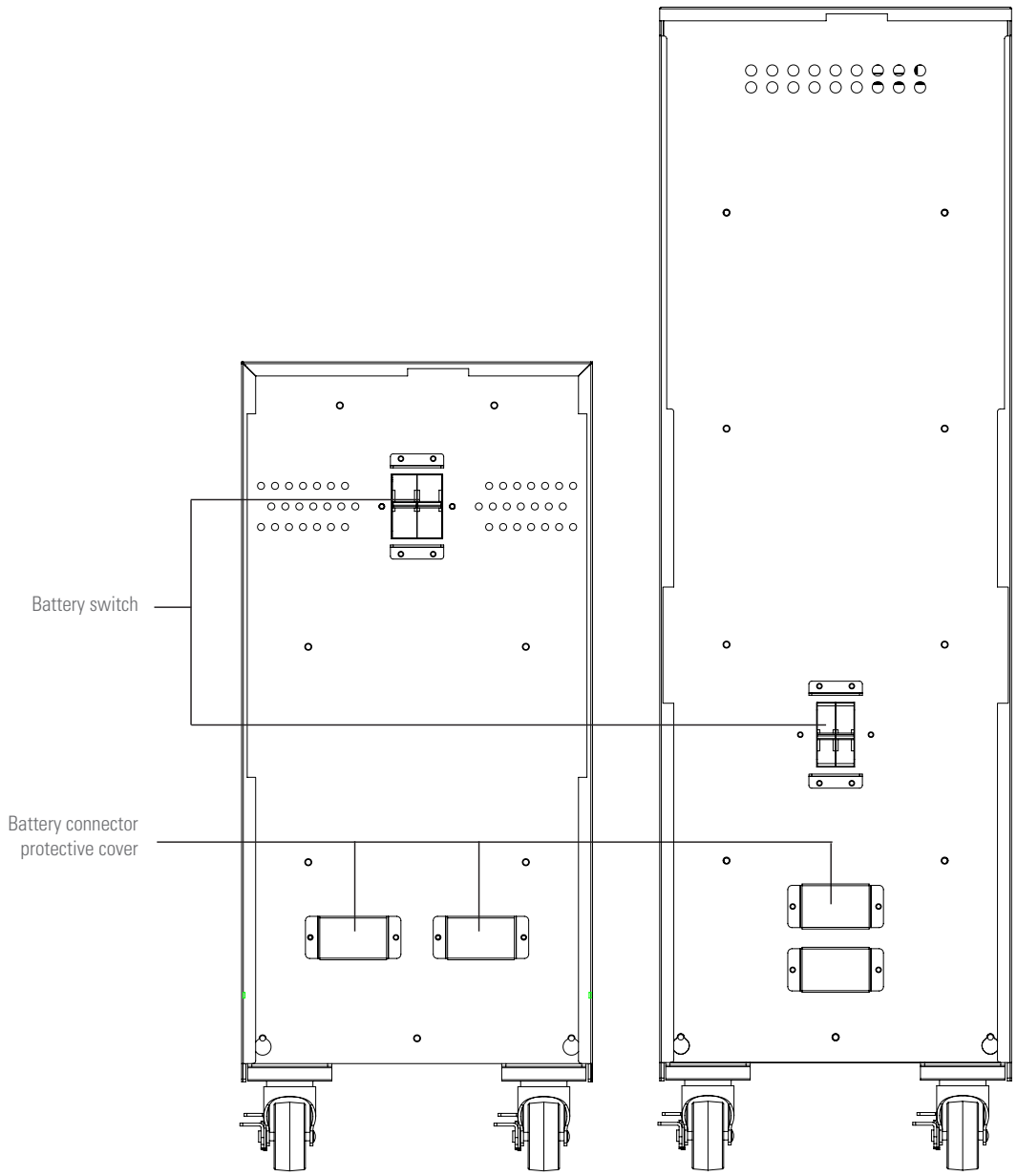


Fig. 1. Front and rear view of 6 and 10 kVA models.



Battery module with 2x20 elements and 50 A protection.

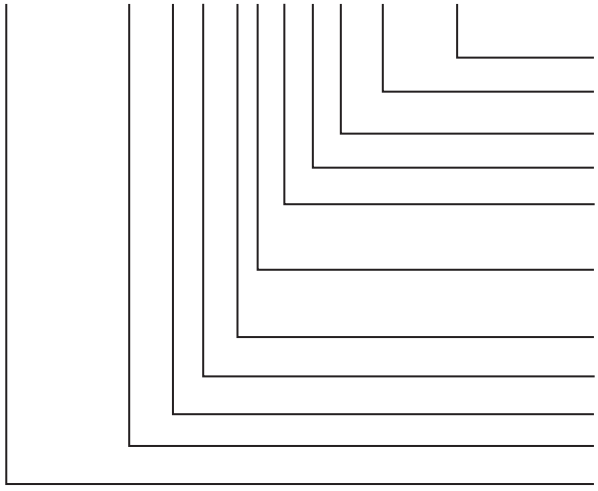
Battery module with 3x20 elements and 50 A protection.

Fig. 2. ***Rear view of battery modules.***

4.2. DEFINITION OF THE PRODUCT.

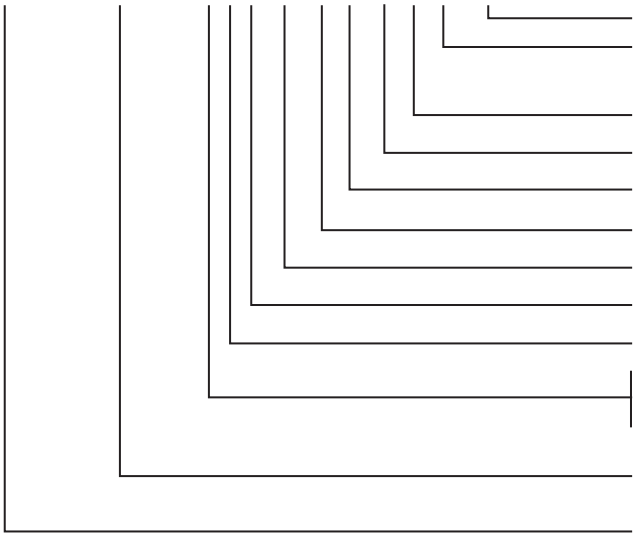
4.2.1. Nomenclature.

SLC-6000-TWIN PRO2 T B1 UL WCO 0/AB147 208V EE521925



EE521925	Special customer specifications.
208V	Output voltage if not 220/230/240V AC.
147	Last three digits of the battery code.
AB	Letters of the battery family from our code.
0/	Device without batteries but with the necessary accessories to install them.
CO	'Made in Spain' marking on UPS and packaging (for customs purposes).
W	Private-label device.
UL	Marking reference.
B1	Batteries external to the UPS and extra charger.
TWIN PRO2 T	Input/output configuration, single-phase.
6000	Power in VA.

MOD BAT TWIN PRO2 2x3AB147 3x40A UL WCO EE521925



EE*	Special customer specifications.
CO	'Made in Spain' marking on UPS and packaging (for customs purposes).
W	Private-label device.
UL	Marking reference.
40A	Protection size.
3x	Number of fuses in parallel. Disregard for one.
147	Last three digits of the battery code.
AB	Initials of the battery family.
3	Number of batteries in one branch.
2x	Number of branches in parallel. Disregard for one.
0/	Battery module without them, but with the necessary accessories to install them.
TWIN PRO2	Battery module series.
BATT MOD	Battery module.

Note regarding batteries:

The abbreviation B1 indicated in the nomenclature refers to batteries:

B1 Device with extra battery charger. The UPS is supplied without batteries and without the accessories (screws and electric cables) corresponding to the batteries specified in the model. On request, it is possible to supply these accessories, which are necessary to connect them with each other and with the device itself.

For devices ordered without batteries, their purchase, installation and connection will always be at the expense of the customer and **under their responsibility**. The data concerning the batteries in terms of number, capacity and voltage are indicated on the battery label affixed to the side of the device rating plate, **strictly observe** these data and the connection polarity of the batteries.

4.3. OPERATING PRINCIPLE.

This manual describes the installation and operation of SLC TWIN PRO2 T UL series UPSs as devices that can operate independently or connected in parallel without the need for a centralised bypass, and which ensure optimum protection at any critical load, maintaining the supply voltage of the loads between the specified parameters, without interruption, during failure, deterioration or fluctuations in the electric mains supply, in the two available models (6kVA and 10kVA), enabling the model to be adapted to the needs of the end user.

SLC TWIN PRO2 T UL series UPSs incorporate a galvanic isolation transformer in the same enclosure of the device, which means larger dimensions and a greater unit weight compared to the same model without isolation transformer **(see Tab. 1)**. This transformer has a double winding in the secondary to obtain different voltages depending on whether 120 V or 240 V is chosen. Thanks to their PWM (pulse width modulation) and double-conversion technology, SLC TWIN PRO2 T UL series UPSs are

compact, cool, silent and high performance.
The double converter principle eliminates all mains power disturbances. A rectifier converts the AC current of the mains into DC current, thereby maintaining optimum battery charge level and powering the inverter, which, in turn, generates a suitable AC sine-wave voltage for continuously powering the loads. In the event of failure of the UPS's mains power, the batteries supply clean power to the inverter.
The design and construction of the SLC TWIN PRO2 T UL series UPS has been carried out in accordance with international standards.
These devices allow expansion through the connection of up to 3 additional modules with the same power in parallel in order to obtain redundancy, e.g. N+1- or increase in the capacity of the system.
Thus, this series has been designed to maximise the availability of critical loads and to ensure that your business is protected from variations in power distribution line voltage, frequency, electrical noise, cuts and micro-cuts. This is the primary goal of SLC TWIN PRO2 T UL series UPSs.
This manual applies to the standardised models shown in Tab. 1.

4.3.1. Notable features.

- Genuine on-line with double-conversion technology and output frequency separate from the mains.
- Output power factor 1 and pure sine waveform, suitable for almost all kinds of load.
- Input power factor > 0.99 and high overall efficiency > 0.94. Greater energy savings and lower user wiring costs, as well as low distortion of the input current, which reduces pollution in the power supply network.
- Great adaptability to the worst conditions of the mains. Wide input voltage, frequency and waveform ranges, thus avoiding excessive dependence on limited battery power.
- Battery charging current up to 4 A to reduce battery recharging time.
- N+X redundant parallel connection to increase reliability and flexibility. Maximum 3 devices in parallel.
- Selectable high-efficiency mode > 93% ECO MODE. Energy savings, economically beneficial to the user.
- Possibility of starting the device without mains power supply or discharged battery. Regarding this last aspect, the backup will be as reduced as the batteries are discharged.
- Intelligent battery management technology is very useful for extending the life of accumulators and optimising recharge times.
- Standard communication options via the RS-232 serial port or USB port.
- Control of emergency power off **(EPO)**.
- Interface between user and device through easy-to-use control panel with LCD screen and LED indicator lights.
- Optional network connectivity cards available to improve communication capabilities.

Model	Type	In. / Out.	Dimensions (d x w x h) mm	Weight (kg)
SLC-6000-TWIN PRO2 T UL	Std.	I / I	625 x 250 x 826	117
SLC-10000-TWIN PRO2 T UL				142
SLC-6000-TWIN PRO2 T UL B1	Long backup			70
SLC-10000-TWIN PRO2 T UL B1				88

Tab. 1. ***Standardised models, dimensions and weights.***

4.4. OPTIONAL EXTRAS.

Depending on the configuration chosen, the device can include any of the following options:

4.4.1. Exterior manual maintenance bypass.

The purpose of this option is to electrically isolate the device from the mains and the critical loads without cutting the power to the latter. In this way, maintenance or repair operations on the device can be carried out without interruptions to the power supply of the protected system, while preventing unnecessary hazards for technical personnel.
The basic difference between this option and the manual bypass integrated into the UPS's own enclosure consists of greater operability, since it allows total disconnection of the UPS from the installation.

VERY IMPORTANT. In this **SLC TWIN PRO2 T UL** series, which incorporates a galvanic isolation transformer in the same enclosure as the device, the supply of the load must be interrupted before transferring to maintenance bypass so as not to short-circuit the windings of the transformer.

4.4.2. Communication card.

The UPS features a slot at the rear for inserting one of the following communication cards.

4.4.2.1. Integration into computer networks using an SNMP adapter.

Large computer systems based on LANs and WANs that integrate servers in different operating systems must provide the system manager with ease of control and administration. This facility is obtained through an SNMP adapter, which is universally supported by the main software and hardware manufacturers.
Connection of the UPS to the SNMP is internal while that of the SNMP to the computer network is made through an RJ45 10 base connector.

4.4.2.2. RS-485 modbus.

Large computer systems based on LANs and WANs often require that communication with any element that is integrated into the computer network be made through a standard industrial protocol.
One of the most used standard industrial protocols on the market is the MODBUS protocol. The SLC TWIN PRO2 T UL series is also ready to be integrated into this type of environment through the 'SNMP mini card' adapter with MODBUS protocol or the RS-485 modbus card described in the options documentation.

4.4.2.3. Relay interface.

- The UPS has, as an option, a relay interface card that provides digital signals in the form of potential-free contacts, with a maximum applicable voltage and current of 240 V AC or 30 V DC and 1A.
- This communication port enables dialogue between the device and other machines or devices through the relays supplied in the terminal block arranged on the same card, with a single common terminal for all of them.
  From the factory, all contacts are normally open and can be changed one by one, as indicated in the information supplied with the optional extra.
- The most common use of these types of ports is to provide the necessary information to the file-closing software.
- For more information, contact our **T.S.S.** or our nearest distributor.

5. INSTALLATION.

- Read and respect the Safety Information, described in Chapter 2 of this document. Failure to obey some of the instructions described in this manual can result in a serious or very serious accident to persons in direct contact or in the vicinity, as well as faults in the device and/or loads connected to it.
- In addition to the device's own user manual, other documents are supplied on the CD-ROM or documentation pen drive. Consult them and strictly follow the indicated procedure.
- Unless otherwise indicated, all actions, instructions, guidelines and notes are applicable to the devices, whether or not they form part of a parallel system.

5.1. RECEPTION OF THE DEVICE.

- It is dangerous to handle the device on the pallet, as it could overturn and cause serious impact injuries to operators and/or entrapment. Pay attention to section 1.2.1. of the safety instructions -EK266*08- in all matters relating to the handling, movement and siting of the unit.
- Use the most suitable means to move the UPS while it is packed, with a pallet jack or forklift.
- Any handling of the device must be carried out in accordance with the weights shown in the technical specifications according to the model, indicated in Chapter '9. Annexes'.

5.1.1. Reception, unpacking and contents.

- Reception. Check that:
  - ❒ The data on the label affixed to the packaging corresponds to that specified on the order. Once the UPS is unpacked, check the previous data with those of the device nameplate.
    If there are discrepancies, report the issue as soon as possible, citing the device's manufacturing number and delivery note references.
  - ❒ It has not suffered any mishaps during transportation (packaging and impact indicator in perfect condition).
    Otherwise, follow the protocol indicated on the label attached to the impact indicator, located on the packaging.
- Unpacking.
  - ❒ To check the contents, it will be necessary to remove the packaging.
    Complete the unpacking according to the procedure of section 5.1.3.
- Contents.
  - ❒ The device itself.
  - ❒ The user manual in CD-ROM or pen drive format.
  - ❒ 1 communications cable.
  - ❒ 2 cables for parallel connection, current and signal bus.
  - ❒ 1 female connector for the connection of the external EPO, with an insulated cable functioning as a jumper to close the circuit (inserted into its connector counterpart).
- Once the reception is completed, it is advisable to re-pack the UPS until it is put into service in order to protect it against mechanical shock, dust, dirt, etc.
- The packaging of the device consists of a wooden pallet, cardboard or wooden box, depending on the item, expanded polystyrene corners, polyethylene cover and strapping, all of which are recyclable materials. When the packaging requires disposal, it must be carried out in accordance with current laws.
  We recommend keeping the packaging for at least 1 year.

5.1.2. Storage.

- The device storage shall be done in a dry, ventilated place and protected from rain, dust, water splashes or chemical agents. It is advisable to keep each device and battery unit in its original packaging, as it has been specifically designed to ensure maximum protection during transportation and storage.
- For devices that contain Pb-Ca batteries, the charging times indicated in Tab. 2 of document EK266*08 regarding the temperature to which they are exposed, must be respected, otherwise the warranty may be invalidated.
- After this period, connect the device to the mains together with the battery unit if applicable, start it according to the instructions described in this manual and charge for 12 hours.
  In parallel systems, it is not necessary to interconnect devices before battery charging. Each of them can be treated independently to charge them.
- Then shut down the device, disconnect it and store the UPS and batteries in their original packaging, noting the new date for recharging the batteries.
- Do not store the devices where the ambient temperature exceeds 50ºC or drops below -15ºC, as this may cause degradation of the electrical characteristics of the batteries.

5.1.3. Unpacking.

- The packaging of the equipment consists of wooden pallet, carton or wood envelope according to cases, polystyrene foamed corners [EPS] or polyethylene foam [EPE], polyethylene sheath and strap, all recyclable materials; so if you are going to get rid of them you must do it according to the laws in force. We recommend storing the packaging in case it should be used in the future.
- To unpack the device, follow the sequence in Figure 3 (cut the straps of the cardboard packaging and lift it off as if it were a cover or dismantle it with the necessary tools if it is made of wood); remove the corners and plastic cover. This will leave the UPS standing on the pallet.

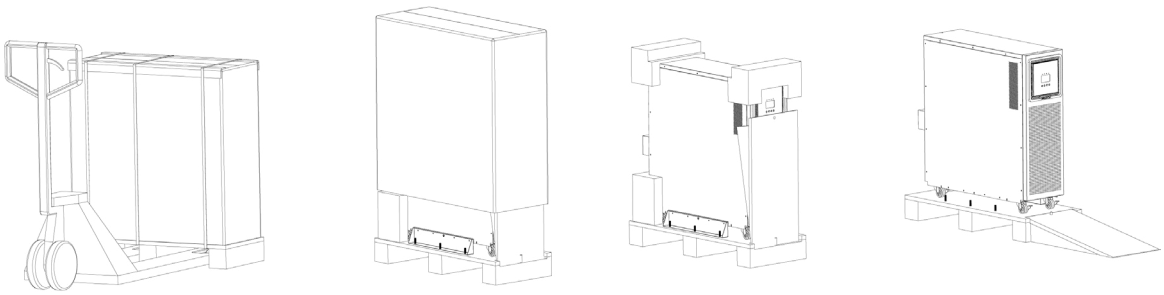


Fig. 3. Unpacking sequence

- The device is attached to the wooden pallet at the factory by means of an L-shaped metal piece (stabilising brackets) located on each side.
- Remove the screws that join the piece to the pallet and device [see Fig. 4 and 5].
- ⚠ Before removing the device, withdraw the stabilising brackets so that they do not hinder the process and bend when impacting against the wooden ramp, which can cause damage to the structure of the device enclosure.
- Position the ramp as shown in Figure 3 and remove the device from the pallet.

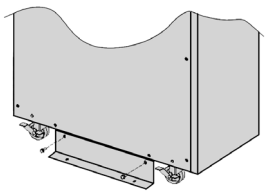


Fig. 4.

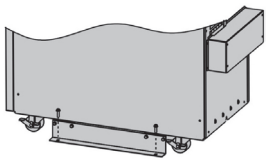


Fig. 5.

5.1.4. Transport to the site.

- All devices have four wheels (with mechanical locking), so it is easy to move it to the installation site once unpacked.
  If the reception area is far from the installation site, however, it is recommended to transport the UPS by means of a pallet jack or the most appropriate method considering the distance between the two points.
  If the distance is considerable, it is recommended to transport the device in its packaging to the installation site and then unpack it.

5.1.5. Siting, immobilising and considerations.

5.1.5.1. Siting for single devices.

- Fig. 6 shows, by way of example, typical cases depending on the model. That which consists of a single enclosure (UPS with batteries inside) and that with the UPS with batteries in a separate enclosure or extended backup.
  - ❒ For correct ventilation of the device, it is necessary to leave its surroundings free from obstructions. Respect the minimum distances indicated in Tab. 1 of section 1.2.1 of document EK266*08 (Safety instructions), in which the values for distances A, B, C and D are indicated depending on the power of each device.
    For the battery enclosures, maintain similar distances to those for the UPS that makes up the system.
  - ❒ It is recommended to leave an additional 75 cm free on the sides to enable maintenance and repair interventions **(T.S.S.)** or the necessary clearance of the connection cables to facilitate the forward movement of the device.

  For extended backups with more than one enclosure, it is recommended to place one on each side of the device and, in the case of a greater number of battery enclosures, repeat the same sequence.

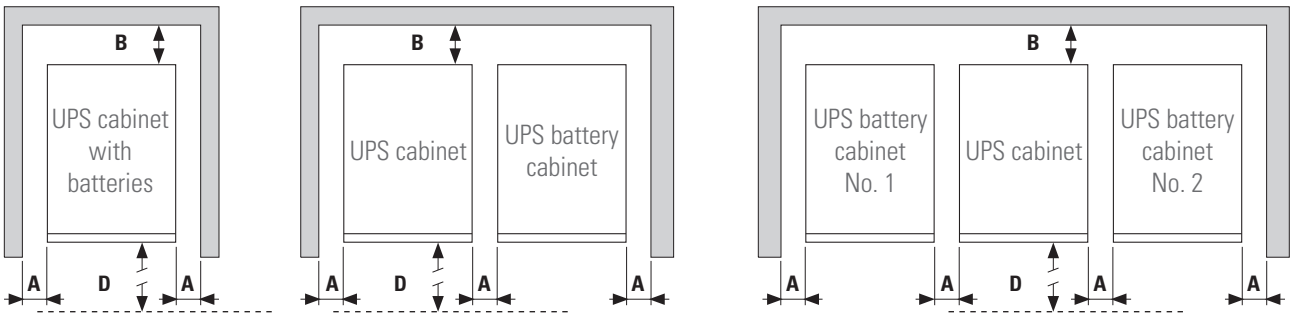


Fig. 6. Minimum peripheral distances for UPS ventilation.

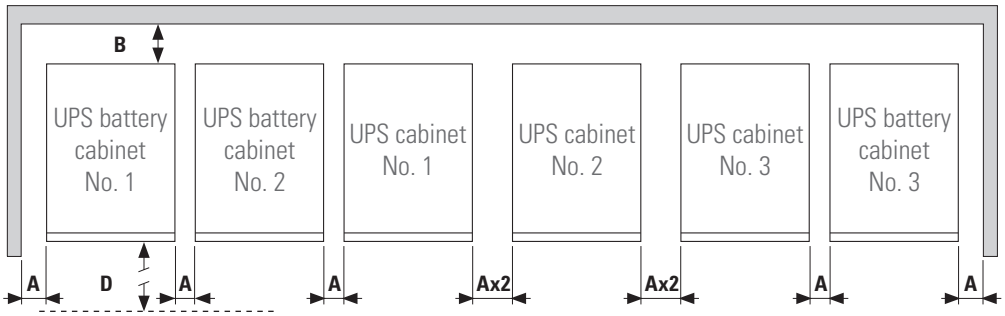


Fig. 7. Minimum peripheral distances for parallel system ventilation.

5.1.5.2. Siting for parallel systems.

- Fig. 7 shows an example of three devices in parallel with their respective battery enclosure. For systems with two units in parallel and/or more battery modules, proceed accordingly depending on each case.
  Likewise, disregard in the illustration battery modules when the system does not have them.
  The number assigned to each device in Fig. 7 is only for numerical purposes within the illustration.
- For correct ventilation of the device, it is necessary to leave its surroundings free from obstructions. Respect the minimum distances indicated in Tab. 1 of section 1.2.1 of document EK266*08 (Safety instructions), in which the values for distances A, B, C and D are indicated in relation to the power of the UPS.
  For the battery enclosures, maintain similar distances to those for the UPS.

5.1.5.3. Immobilising the device.

- The device features wheels with a brake. To immobilise the device, it is recommended to engage the brake once the device is positioned in its final location.

5.1.5.4. Preliminary considerations before connection.

- In the description of this manual, reference is made to the connection of terminals and switch operations that are only available in some versions or devices with extended backup. Ignore the related operations if your unit does not feature them.
- Follow and respect the instructions described in this section referring to the installation of a single device or a system in parallel.
- Protection or external manual bypass board:
  - ❒ The system will have at least one short-circuit protection on the UPS's power supply line.
  - ❒ It is advisable to have an external manual bypass board fitted with input, output and manual bypass protections in single systems.
  - ❒ For parallel systems, **it is essential** to have a distribution or manual bypass board. The board's circuit breakers must be able to isolate a UPS from the system in the event of a fault and power the loads with the others, either during periods of preventative maintenance or during breakdown and repair.
- Upon request, we can supply an external manual bypass board for a single device or parallel system.
  You can also choose to manufacture it, taking into account the version and configuration of the device or system available and the documentation contained in the CD-ROM or pen drive relating to 'Recommended installation'.
- In the documentation supplied with this user manual and/or on the CD-ROM or pen drive, information is available on 'Recommended installation' for each input and output configuration. This documentation includes wiring diagrams and information about the sizes of the protections and the minimum cross sections of cables connected to the device according to their rated working voltage. All values are calculated for a **maximum total cable length of 30 m** between the distribution board, device and loads.

- ❒ For longer lengths correct the cross sections to avoid voltage drops, respecting the regulations or standards corresponding to the country.
- ❒ In the same documentation and for each configuration, information for 'N' units in parallel, as well as backfeed protection characteristics, is available.

- In parallel systems, the length and cross section of the cables that run from the distribution or manual bypass board to each UPS and from these to the board will be the same for all of them without exception.
- The cross section of the cables must always be considered in relation to the size of the terminals of the switches, so that they are correctly fastened across their entire cross section for optimum contact between the two elements.
- Only rated currents are printed on the nameplate of the device as indicated by the EN-IEC 62040-1 safety standard. For the calculation of the input current, the power factor and the device's own performance have been considered. Overload conditions are considered a non-permanent and exceptional working mode, and will not be taken into account in the application of the protections. Do not connect appliances or devices which may overload the UPS to the terminals and/or outlets, such as motors.
- If peripheral input, output or bypass elements such as transformers or autotransformers are added to the UPS or parallel system, the currents indicated on the nameplates of these elements must be taken into consideration in order to use the appropriate cross sections, in compliance with local and/or national low voltage electrotechnical regulations.
- When a galvanic isolation transformer is added to a UPS or parallel system as an optional extra, as standard or independently, either on the input line, at the output or both, it must be fitted with protection against indirect contact (differential circuit breaker) at the output of each transformer, since, due to its own insulation properties, it will prevent the tripping of the protections placed on the primary of the isolation transformer in case of electric shock on the secondary (output of the isolation transformer).
- We remind you that all the isolation transformers installed or factory supplied, have the output neutral earthed through a jumper between the neutral terminal and earth. If the isolated output neutral is required, this jumper must be removed, taking the precautions indicated in the respective local and/or national low voltage regulations.
- This device is suitable for installation in networks with TT, TN-S, TN-C or IT power distribution systems, taking into account at the time of installation the particularities of the system used and the national electrical regulations of the destination country.
- The TWIN PRO2 T features terminals for the installation of an external emergency power off button **(EPO)** or, failing that, a single device must be installed to cut the power supply to the loads in any operating mode.

5.1.5.5. Preliminary considerations before connection, regarding the batteries and their protections.

- All standard UPSs incorporate the batteries in the same enclosure as the device, except the B1s. In the first, battery protection is by means of internal fuses and is not accessible to the user.
- Accumulator enclosures or modules also have battery protections and in this case in duplicate. A number of internal ones with fuses not accessible to the user and others with two-pole circuit breaker or fuses. IMPORTANT FOR SAFETY: If batteries are installed independently, the accumulator bank must be fitted with a two-pole circuit breaker or disconnect fuses of the size indicated in Tab. 3.
- Inside the battery module, there are HAZARDOUS VOLTAGES with risk of electric shock, so it is classified as a RESTRICTED ACCESS AREA.
- Do not handle the fuse holder or battery circuit breaker when the device is running. These mechanisms **are not load disconnect type**.
- If the mains power of the device or parallel system is cut for longer than a simple intervention and it is expected that it will be out of service for a prolonged period time, the system must be shut down completely.
- The battery circuit is not isolated from the input voltage. Dangerous voltages can occur between the terminals of the battery bank and the earth. Check that there is no input voltage before intervening on the terminals.

5.1.5.6. Connection elements.

- All of the device's electrical connections are made from the back of each unit:
  - ❒ Connection of input and output terminals. Remove the fixing screws of the protective cover and the cover itself to access the terminals.
  - ❒ Connection of the UPS to the battery modules using a connector.
    - – Device and battery module with connector. Remove the screws and 'BATTERY CONNECTOR' cover. These covers will not be fitted again, put them away.
    - – Device with battery terminals. Arranged next to the AC power terminals.
    - – Battery module with terminals. Remove the screws and the connections protective cover.
  - ❒ Immediate communication connectors:
    - – DB9 for RS-232.
    - – USB for communication as peripheral.
    - – For connection to external EPO button.
  - ❒ Control connections for parallel systems, DB15 and analogue current signal connectors. Remove the screws and protective cover to access the last ones.
  - ❒ Slot for the integration of one of the optional electronic communication units. Remove the fixing screws and plastic cover to enable it to be inserted.
- After making the connections, replace all covers and fixing screws before proceeding with startup operations to prevent possible accidents caused by direct contact.

- It is recommended to use cable-end sleeves on all of the ends of the cables connected to the terminals, especially those with power (input, output and batteries).
- Check that the terminal screws are correctly tightened.

5.2. CONNECTIONS.

Remove the protective cover from the terminal block at the back of the UPS. The arrangement of the terminals of the terminal block is as follows:

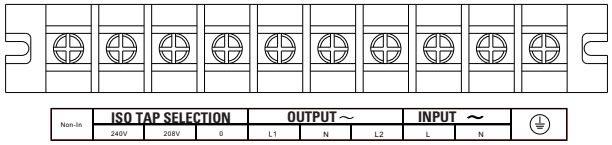
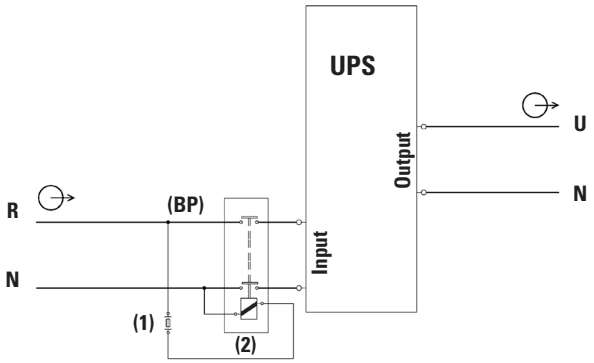


Fig. 8. Arrangement of the terminals of the terminal block (Remove terminal cover)

5.2.1. Connection of the input terminals to the AC mains.

- As the device has class I protection against electric shock, it is essential to install a protective earth cable [⏚]. Connect this conductor to the terminal before supplying voltage to the input terminals.
- Pay attention to the 'Recommended installation' documentation mentioned in section 5.1.5.4., which specifies cable sections, sizes and characteristics of the protections, etc.



Backfeed protection connection for TWIN PRO2 T UL.

(BP) Automatic backfeed protection system external to the UPS (EN-IEC 62040-1).

(1) General purpose 600V AC / 1A type F fuse or fuses.

(2) 400V AC bipolar or tetrapolar contactor with minimum spacing between contacts of 1.4 mm and 230V AC coil with the minimum current indicated on the nameplate of the UPS.

For parallel systems, each device must have its own separate backfeed protection.

Fig. 9. Backfeed protection wiring diagram.

- In accordance with safety standard EN-IEC 62040-1, the facility must be equipped with an automatic backfeed protection system, such as a contactor, which prevents the appearance of hazardous voltage or power on the UPS input line during a mains failure [see Fig. 9].
  The standard applies indiscriminately to each of the UPSs in a parallel system.
- There can be no derivation of the line that goes from the backfeed protection to the UPS, as this would breach the safety standard.
- Warning labels shall be affixed to all primary power switches installed in areas remote from the device to alert electrical maintenance personnel of the presence of a UPS in the circuit.
  The label shall bear the following text or an equivalent:

Before working on the circuit.
- Isolate the uninterruptible power supply system **(UPS)**.
- Check the voltage between all terminals, including the protective earth.

Risk of UPS return voltage.

- Connect the input cables to the respective terminals according to the configuration of the available device [see Fig. 9].
  For systems in parallel, it will be necessary to repeat the connections that go from the panel to each device.
  - ❒ Connect the power cables to input terminals R and N, **respecting the order of the phases and the neutral** indicated on the labelling of the device and in this manual. Failure to do so may result in faults and/or anomalies.

- If the input voltage is 240 V, the jumper must be inserted between the ISO TAP selection 0 and 240 V terminals, as shown in Fig. 10:

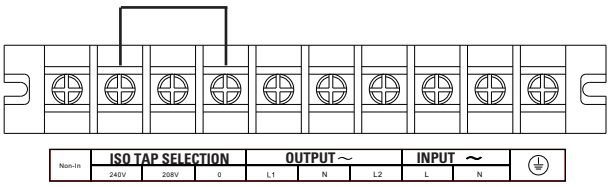


Fig. 10. Wiring for input voltage of 240 V.

- If the input voltage is 208 V, install the jumper between ISO TAP selection 0 and 208, as shown in Fig. 11:

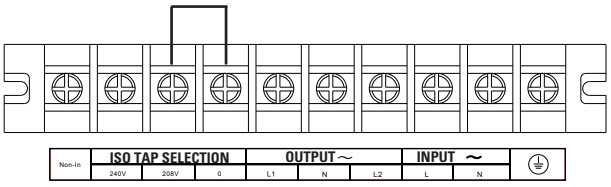


Fig. 11. Wiring for input voltage of 208 V.

VERY IMPORTANT: In this case, where the input voltage is 208 V, the output voltage must be set to 208 V to have 240 V or 120 V at the output of the transformer.

5.2.2. Connection of the load or loads to the output terminals.

- As the device has class I protection against electric shock, it is essential to install a protective earth cable [⏚]. Connect this conductor to the terminal before supplying voltage to the input terminals.
- Pay attention to the 'Recommended installation' documentation mentioned in section 5.1.5.4., which specifies cable sections, sizes and characteristics of the protections, etc.

- Connect the loads to output terminals L1, N, L2, **respecting the order of the phase and neutral** indicated in the labelling of the device and in this manual [see Fig. 8]. Failure to do so may result in faults and/or anomalies in the UPS and/or load or loads.

5.2.2.1. Output configurations depending on the connection of the secondary windings of the isolation transformer.

Option 1

There are two sets of 120V outputs in L1-N and L2-N. Each set can provide 50% of the rated power of the UPS [Fig. 12].

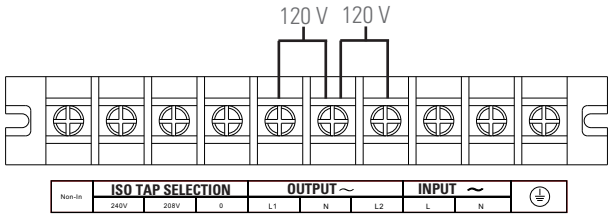


Fig. 12. Output configuration with two sets of 120 V.

Option 2

There is an output of 240 V in L1-L2 [Fig. 13].

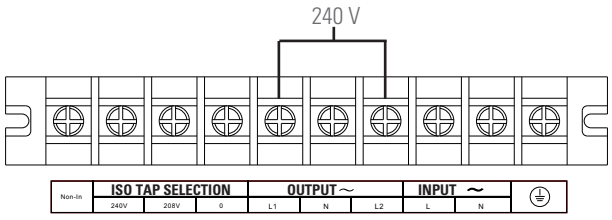


Fig. 13. Configuration with an output of 240 V.

- The output voltage selected corresponds to that supplied by the inverter, which is what powers the primary of the transformer. In the event of measuring the voltage in the secondary (output terminals of the device), there may be slight discrepancies in relation to the intercalation of the transformer between the inverter and the output terminals of the UPS.

- **To consider for preventing transformer faults.** The device features alerts and alarms that act preventively to safeguard the functional integrity of the inverter or static bypass when rated power thresholds are exceeded, overload.

  The galvanic isolation transformer, which forms part of the UPS assembly, is however the component that is most likely to suffer irreversible damage due to bad practices, such as not observing the limitation indicated below:
  - Connection of the two coils: each of which can individually supply 50% of the total power of the UPS.
  - There is a high risk of burning out one of them if loads greater than 50% of the rated power of the UPS are applied.
    Example: The case of a total power of 80% connected to the output, with a distribution of 65% on one of the coils and the remaining 15% on the other. Although in this case there is no apparent overload, due to the distribution, the overloaded winding will burn out without any overload detection.

  Therefore, to prevent risks, it is necessary to install a circuit breaker at the output of the transformer or one for each output, depending on the type of connection used.
- The safety instructions state that all galvanic isolation transformers supplied are delivered with the output neutral terminal connected to earth by means of a cable functioning as a jumper.
  With this device, however, due to the availability of a double secondary winding, the different connection modes of these and the distribution system required by the user **(IT or TN)**, the output of the supplied transformer is floating **(IT)**.
  In all cases, the installer must act accordingly, observing the regulations or legislation of the country.
  - ❒ For IT distribution systems, with floating output, the UPS will be equipped with an insulation monitoring system (monitoring of the first insulation fault).
  - ❒ For TN distribution systems, protections against indirect contact (differential circuit breaker) must be installed at the output of the isolation transformer, since, due to its own insulation characteristics, it will prevent the tripping of the protections installed at the input of the UPS in the event of electric shock in the secondary (output of the isolation transformer).
    Fig. 14 shows how to reference the transformer output to earth for **Option 1** and **Option 2**.
- As added value, it should be noted that in emergency Bypass mode (manual Bypass), used during preventative maintenance services or in the event of UPS failure, the direct voltage of the mains is applied to the input of the isolation transformer, meaning that the loads are powered in this situation with an output voltage that is cleaner and more attenuated in terms of electrical noise and disturbances.

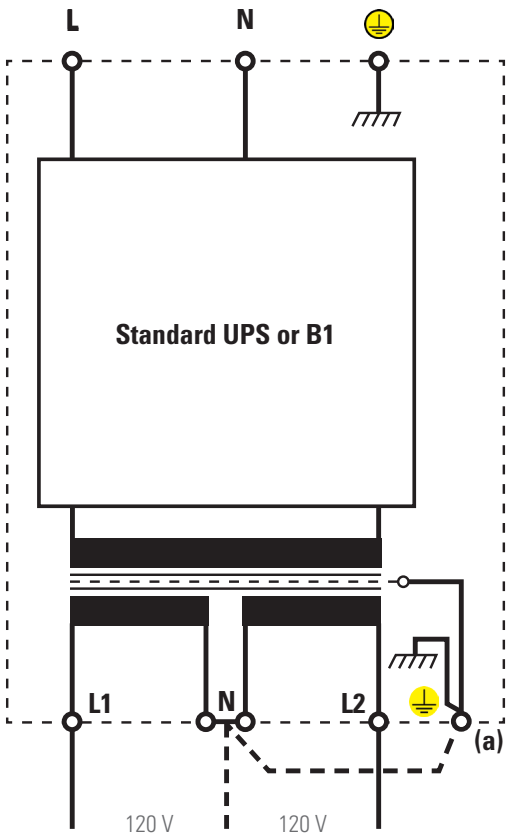


Fig. 14. Connection options of the UPS' outputs

WARNING!

- Follow all of the instructions related to device connection, startup and shutdown indicated in the instruction manual of the standard device.
- Before connecting a battery module to a UPS, check that the voltage of both, shown on the back of each unit next to the respective connectors, is the same.
- It is necessary to install a bipolar circuit breaker or another device between the UPS and the battery module.
- Do not attempt to modify the standard model for conversion as B1, external batteries with more powerful charger. Any alteration of the device not only **invalidates the warranty, but also represents a major safety hazard for people and property** because of the possibility of electric shock, explosion or fire.
- Do not connect the internal battery pack of the standard model to an external battery module. The type of battery and/or voltage may be different. **If they are connected together, there is a risk of electric shock or fire!**.

- For systems in parallel, it will be necessary to repeat the connections that go from the panel to each device.
  Whenever there are discrepancies between the labelling and the instructions in this manual, the former must take precedence.
- With regard to the protection to be placed at the exit of the distribution board or manual bypass, we recommend the distribution of the output power in at least four lines. Each of them will have a magneto thermal protection switch of adequate value. This type of output power distribution will ensure that a fault in any of the machines connected to the device that causes a short circuit does not affect more than the line that is faulty.
  The remaining connected loads will have continuity assured due to the tripping of the protection only in the line affected by the short circuit.

The size of the output protection indicated in the recommended installation documentation is that dimensioned for the load connected to the output terminals.

- Replace the protective cover of the terminal block.

5.2.3. Connection to the external batteries and backup extension.

- As the device has class I protection against electric shock, it is essential to install a protective earth cable [⏚]. Connect this conductor to the terminal before supplying voltage to the input terminals.
- Respect the guidelines indicated in this section and those referring to the batteries in safety instructions EK266*08, section 1.2.3. Failure to do so could result in electric shock which could even cause death.
- Before starting the connection process between the battery module or modules and the device, check that the input switch of the UPS and the protection of the battery module or modules are set to 'Off'.
- The battery module has been designed for your device. The capacity or number of elements that make

it up must not be modified under any circumstances.
In addition, due to the high internal potential of DC voltage, there is a high risk of electric shock or electrocution with very serious consequences for health and life.

- Do not connect battery modules to each other or to a UPS with different potential (value indicated on the back of each unit).
- Tab. 4 specifies the physical connection between the UPS and the battery module or modules.

Model	Batteries ($U_{element}$ x No.) = U_{rated} / U_{float}	Two-pole switch	
		Voltage DC (V)	Current (A)
SLC-6000-TWIN PRO2 T UL	(12 V x 20) = 240 V / 275 V	440	32
SLC-10000-TWIN PRO2 T UL			50

Tab. 2. Characteristics of the protection to be installed in user-owned battery modules.

- All standard UPSs incorporate the batteries in the same cabinet as the device, except the B1s. In all of them, battery protection is by means of internal fuses and is not accessible to the user.
  Accumulator enclosures or modules also have battery protections and in this case in duplicate. A number of internal ones with fuses not accessible to the user and other two-pole ones with circuit breaker or disconnector with accessible fuses for this one.
- ⚠ IMPORTANT FOR SAFETY: If batteries are installed independently, the accumulator bank must be fitted with fuses or a two-pole circuit breaker with the characteristics indicated in Tab. 3.
- The connection of the UPS to the battery module must be made using the supplied cable hose, first connecting one end to the terminals or connector of the UPS and the other to the terminals or connector of the battery module. As an example, see Fig. 16.
  - ❒ In the case of connectors, there is no possibility of error as they are of the polarised type.
  - ❒ ⚠ For connection to terminals, respect the polarity indicated on the labelling of each element and in this manual, and the colour of the cables (red for positive, black for negative and green-yellow for earth).
- When more than one battery module is supplied for each UPS, the connection between them and it will be in parallel.

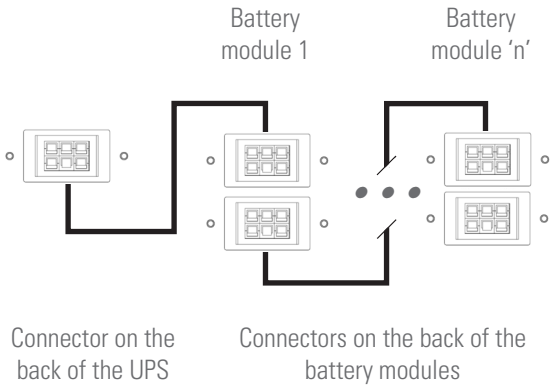


Fig. 15. Example of connection between UPS and battery modules, through connectors.

- All battery modules have two connectors or groups of terminals to simplify connection to the UPS and other modules in parallel, in extended backups.
- In models with terminals, always respect the established colour and polarity cable convention (positive red and negative black).
- ⚠ Each battery module is independent for each device. **It is strictly forbidden to connect two devices to the same battery module**.

Model	Connection mode with batteries	
	In the UPS	In external battery module
SLC-6000-TWIN PRO2 T UL	Connector	
SLC-10000-TWIN PRO2 T UL		

Tab. 3. Connection mode between UPS and battery modules.

5.2.4. Connection of the earth bonding terminal ⏚.

- ⚠ As it is a device with protection against class I electrical shock, it is essential to install the protective earth cable. Connect this conductor to the terminal before supplying voltage to the input terminals.
- Make sure that all of the loads connected to the UPS are only connected to its ⏚ earth bonding terminal. Failure to limit the earthing of the load or loads and battery module or modules to this **single point** will create earth return loops that will degrade the quality of the power supplied.
- All terminals identified as earth bonding ⏚ are linked together and to the earth of the device.
- ⚠ Never under any circumstances disconnect the earth cable from the building and/or the UPS.

5.2.5. Terminals for EPO (emergency power off).

- The UPSs have two terminals for the installation of an external emergency power off **(EPO)** output button.
- The device is dispatched from the factory with its EPO circuit set to closed **(NC)** by default. In other words, the UPS will cut the output power supply, emergency power off, when the circuit is opened:

- ❒ Either by removing the female connector from the socket where it is inserted. This connector has a cable connected as a jumper that closes the circuit [see Fig. 17-A].
- ❒ Or by pressing the button external to the device belonging to the user installed between the terminals of the connector [see Fig. 17-B]. The connection on the button must be in the normally closed contact **(NC)**, so it will open the circuit when activated.

- The opposite functionality can be selected through the communications software.
  Except for specific cases, we advise against this type of connection in view of the purpose of the EPO button, since it will not act upon an emergency request if either of the two cables that run from the button to the UPS are disconnected.
  By contrast, this anomaly would immediately be detected in a closed EPO circuit, with the inconvenience of an unexpected cut in the powering of the loads, but a guarantee of effective emergency functionality.
- To recover the normal operating state of the UPS, it is necessary to insert the connector with the jumper in its receptacle or deactivate the EPO button. The device will be operational.

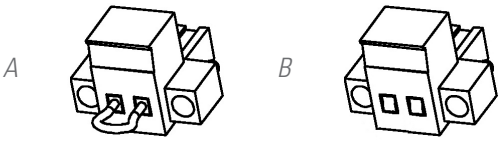


*Fig. 16. **Connector for external EPO.***

- ⚠ Fig. 17-A: In the case of a parallel system, individual contacts must be used. Do not join the EPO contacts with each other under any circumstances.

5.2.6. Parallel connection.

5.2.6.1. Introduction in redundancy.

N+X is usually the most reliable power structure. N represents the minimum number of devices that the total load needs; X represents the number of redundant devices, that is, the number of faulty UPSs that the system can simultaneously allow. The higher X is, the greater the reliability of the system. For occasions where reliability is essential, N+X will be the optimum mode.
Up to 3 devices can be connected in parallel to configure a shared output and power redundancy.

5.2.6.2. Installation and parallel operation.

- ⚠ The COM communications line is a very low voltage safety circuit.
  To preserve the quality, it must be installed separately from other lines carrying dangerous voltages (power distribution line).
- ⚠ Pay attention to the 'Recommended installation' documentation mentioned in section 5.1.5.4., which specifies cable sections, sizes and characteristics of the protections, etc.

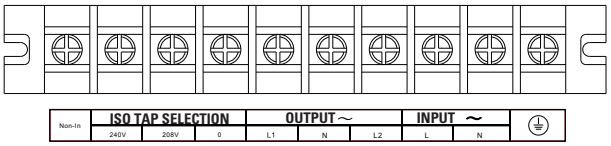


*Fig. 17. **Physical arrangement of the terminals of the terminal block***

- ⚠ The Non-In terminals of each of the UPSs that make up the parallel system must be connected to each other. If this connection is not made, the UPSs will fail because this terminal acts as an internal reference for the devices connected in parallel.

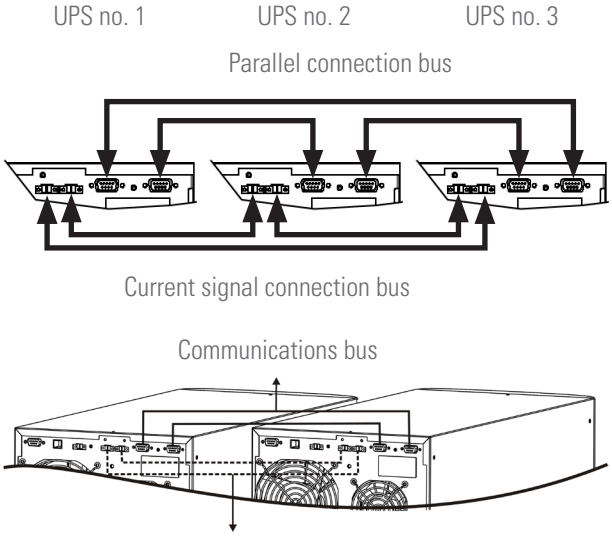


*Fig. 18. **Communication and current signal bus connection.***

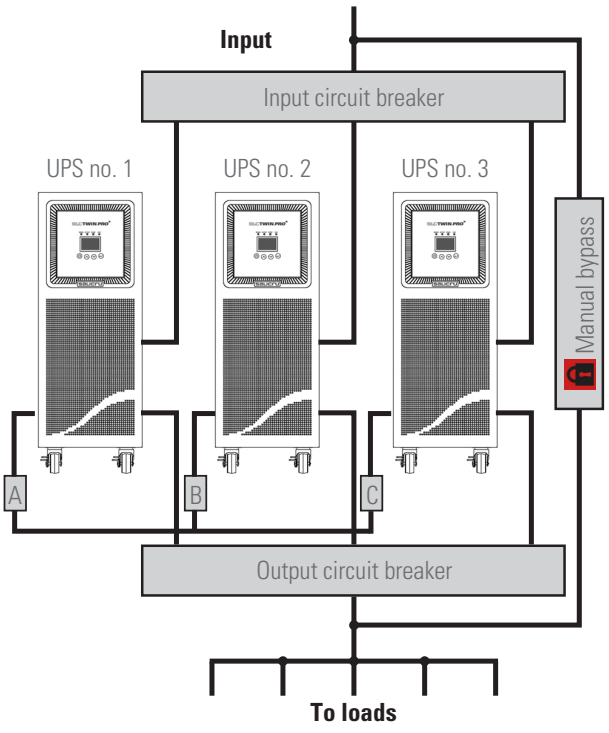


*Fig. 19. **Parallel installation of a distribution board with manual bypass.***

- A, B and C: Non-isolated Neutral terminal line disconnectors **(Non-in)**. They should only be opened for maintenance work or disconnection/connection of a UPS from the system.

- **Parallel connection bus**. Use the 15-wire signal cable with mesh and DB15 connectors at the ends to connect a maximum of 3 devices. Each hose has a male and a female connector at the ends, which must be connected between two correlative devices. It is imperative to close the bus loop in parallel.
  The length of the parallel cable is about 1.5 meters and should not be prolonged under any circumstances due to the risk of interferences and failures in the communication that this would entail.
- **Current signal connection bus**. Use the hose with connectors at the ends to join the devices and close the current bus when connecting two consecutive devices through the connectors, as shown in Fig. 18. Lastly, close the bus loop between the last and first devices.
  The length of the cable is 1.5 metres and should not be prolonged under any circumstances due to the risk of communication interference and failure that this would entail.

Fig. 18 shows an installation with three devices in parallel. Proceed by closing the communications bus and current signal bus.

- When installing the system in parallel, it is necessary to provide it with a board equipped with individual input and output protections, as well as a manual bypass with mechanical locking, see Fig. 19.
  For further information, see section 5.1.5.4. for descriptions of the manual bypass board and 'Recommended installation' instructions.
- Follow the procedures established in the previous sections of this chapter for connecting the input and output to the loads.
- Follow the procedure established in the previous sections of this chapter for connecting the battery modules of devices with backup extension.
- In parallel systems, the length and cross section of the cables that run from the distribution board to each UPS and from the UPSs to the board will be the same for all of them without exception.
  In the worst of conditions, the following deviations must be strictly observed:
  - ❒ When the distance between the UPSs in parallel and the circuit breaker board is less than 20 metres, the difference in length between the input and output cables of the device must be less than 20%.
  - ❒ When the distance between the UPSs in parallel and the circuit breaker board is more than 20 metres, the difference in length between the input and output cables of the device must be less than 10%.

5.2.7. RS-232 and USB communications port

- The COM communications line is a very low voltage safety circuit. To preserve the quality, it must be installed separately from other lines carrying dangerous voltages (power distribution line).
- The RS-232 and USB interfaces are useful for the monitoring software and updating the firmware.
- It is not possible to use both the RS-232 and USB ports at the same time.
- Tab. 4 shows the signal assignment of the RS-232 in the female DB9 connector. The RS-232 port consists of the transmission of serial data in such a way that a large amount of information can be sent through a communication cable with only 3 wires.
- The USB port is compatible with the USB 1.1 protocol for communication software.

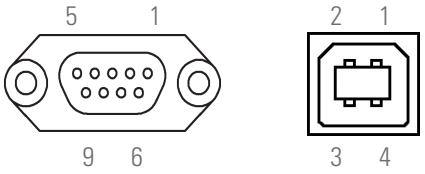


Fig. 20. DB9 connectors for RS-232 and USB.

Pin #	Ref.	Description	Input / Output
2	RS-232	TXD (serial data transmission)	Output
3	RS-232	RXD (serial data reception)	Input
5	RS-232	RS-232 signal earth	GND

Tab. 4. Pinout of the DB9 connector, RS232.

5.2.8. Smart slot for the integration of an electronic communication unit.

- Optional electronic communication units include:
  - ❒ Relay interface to terminals, not programmable.
  - ❒ SNMP adapter.
  - ❒ RS-485 modbus adapter.
- The corresponding documentation is supplied with each option. Read it before starting installation.

Installation.

- Remove the protective cover from the device's slot.
- Take the corresponding electronic unit and insert it into the reserved slot. Make sure that it is properly connected, for which it is necessary to overcome the resistance caused in the connector located in the slot.
- Make the necessary connections in the terminal block or connectors available according to each case.
- Fit the new protective cover supplied with the relay interface card and secure it with the screws from the old cover.
- For more information, contact our **T.S.S.** or our nearest distributor.

5.2.9. Software.

- **Download of free ViewPower software.**
  ViewPower is a UPS monitoring software which provides a user-friendly interface for monitoring and control. It features an auto shutdown function for systems consisting of several PCs in case of power failure. The software enables users to monitor and control any UPS in the same LAN through an RS-232 or USB communications port, regardless of how far away they are from each other.
- **Installation procedure:**
  - ❒ Go to the web page:
    http://support.salicru.com
  - ❒ Select the required operating system and follow the instructions described on the web page to download the software.

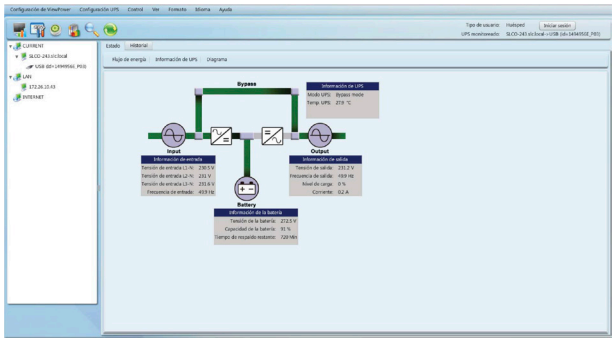


Fig. 21. View of the ViewPower monitoring software's main screen.

5.2.10. Considerations before startup with connected loads.

- ⚠ It is recommended to charge the batteries for at least 12 hours before using the UPS for the first time.
  - ❒ For this, it will be necessary to supply voltage to the device and set the circuit breaker at the back to 'On.' The battery charger will work automatically.
  - ❒ For the battery modules.
    For the models with batteries external to the device or backup extension modules, it will also be necessary to set the fuse or circuit breaker of the batteries arranged between each one to 'On'.
- Although the device can operate correctly without charging the batteries for the specified 12 hours, the risk of a prolonged power cut during the first hours of operation and the UPS's available backup time should be assessed.
- Do not start up the device and loads completely until indicated in Chapter 6.
  When it is done, however, it should be carried out gradually to avoid possible difficulties, if not at the first startup.
- If, in addition to the more sensitive loads, it is necessary to connect high-consumption inductive loads, such as for laser printers or CRT monitors, the starting up of these peripherals will need to be taken into account to prevent the device from crashing.

6. OPERATION.

6.1. STARTUP.

6.1.1. Checks before startup.

- Make sure that all connections have been made correctly and with sufficient torque, respecting the labelling of the device and the instructions in Chapter 5.
- Check that the UPS and battery module or modules switches are 'Off'.
- Make sure that all loads are 'Off'.

  Shut down the connected loads before starting the UPS and start the loads, one by one, only when the UPS is running. Before shutting down the UPS, check that all of the loads are 'Off'.
- It is very important to proceed in the established order.
- For views of the UPS, see Figures 1 and 2.
- Fig. 19 shows a conceptual representation of a distribution board with manual bypass for a parallel system, representative for a single device, with the number of switches adapted.

6.2. UPS STARTUP AND SHUTDOWN.

6.2.1. UPS startup with mains voltage.

- Check that the power connection is correct.
- Supply voltage to the device (set the input protection of the distribution board or manual bypass to 'On'). If the board has an output switch, set it to 'On'.
- Set the battery switch to 'On' (models B0 and B1).
- Set the UPS's input circuit breaker to 'On'.

  The output terminals will have voltage through the device's internal static bypass block.

  The fan or fans, depending on the model, will start to function.

  Then the main start screen will be displayed after a test of the device.
- Press startup button ⏻ for more than 0.5 seconds, the audible alarm will sound for 1 second and the UPS will start up.
- After a few seconds, the UPS will be in 'Normal mode'. If the mains voltage is incorrect, the UPS will switch to 'Battery mode', without interrupting the power supply at the output terminals.
- Start the load or loads, making sure that the rated power of the device is not exceeded.

6.2.2. UPS startup without mains voltage.

- If it has a distribution board, set the input and output protections to 'On'.
- Set the battery switch to 'On' **(model B1)**.
- Set the device's input circuit breaker to 'On'.
- Press startup button ⏻ for more than 0.5 seconds, the audible alarm will sound for 1 second and the UPS will start up.

  The fan or fans, depending on the model, will start to function.

  Then the main start screen will be displayed after a test of the device.

  It is necessary to press the 'ON' button for a second time for more than 0.5 seconds after about 5.. 7 seconds have elapsed since the first press.
- After a few seconds, the UPS will be in 'Battery mode', meaning that its charge level and therefore available residual backup, as well as the risks associated with operating in this mode, must be taken into consideration.

  If the mains voltage returns, the UPS will transfer to 'Normal mode' without interrupting the power supply at the output terminals.
- Start the load or loads, making sure that the rated power of the device is not exceeded.

6.2.3. UPS shutdown with mains voltage.

- Shut down the load or loads.
- Press button ⏻ for more than 0.5 seconds to shut down the inverter. The audible alarm will sound for 1 second. The device will be set to 'Bypass mode'.

  The output terminals will have voltage through the device's internal static bypass block.
- To cut the output voltage of the UPS, set the circuit breaker switch on the back to 'Off' or simply set the input and output protections of the UPS's distribution board to 'Off'.

  A few seconds later, the LCD screen turns off and the entire device will be out of service.

6.2.4. UPS shutdown without mains voltage.

- Shut down the load or loads.
- Press button ⏻ for more than 0.5 seconds to shut down the inverter. The audible alarm will sound for 1 second. The device will leave the output terminals without voltage.

  A few seconds later, the LCD screen turns off and the entire device will be out of service.
- To leave the assembly completely isolated, set the input and output switches of the board to 'Off'.

6.3. MANUAL BYPASS SWITCH (MAINTENANCE).

The manual bypass integrated into all SLC TWIN PRO2 T UL devices is very useful, but improper use can have irreversible consequences both for the UPS and the loads connected to its output. It is therefore important to observe the switching operations described in the following sections.

In the absence of mains voltage, it is not possible to operate in this mode.

6.3.1. Transfer to maintenance bypass.

- The procedure to go from normal operation to maintenance bypass is the same for single devices and parallel systems, except for the number of actions:

❒ If you activate the switching mechanisms (circuit breakers and/or switches) in a different order to that indicated, **it** may cause the UPS to fail.

IMPORTANT. In this SLC TWIN PRO2 T UL series, which incorporates a galvanic isolation transformer in the same enclosure as the device, the supply of the load must be interrupted before transferring to maintenance bypass so as not to short-circuit the windings of the transformer.

- Step 1. Switch the device**(s)** to bypass.
  - ❒ For a single device.
    - – Press button ⏻ for more than 0.5 seconds to shut down the inverter. The audible alarm will sound for 1 second. The device will be set to 'Bypass mode'.
  - ❒ For a parallel system.
    - – Press button ⏻ on all of the UPSs for more than 0.5 seconds to shut down the inverter in all of them. The audible alarm will sound for 1 second. The devices that make up the current parallel system will switch to 'Bypass mode'.
- Step 2. Set the general output circuit breaker of the distribution board to OFF to disconnect the loads
- Step 3. Set the input circuit breaker of each device to OFF. At this point, check that the devices turn off
- Step 4. Set the output circuit breaker of each device to OFF
- Step 5. Set the non-isolated Neutral disconnector of each device to OFF
- Step 6. Remove the mechanical lock on the distribution board's manual bypass switch or disconnector and set it to ON. The loads are repowered through the manual bypass of the distribution board. Perform the necessary maintenance tasks.

6.3.2. Transfer to normal operation.

- The procedure to go from maintenance bypass to normal operation is the same for single devices and parallel systems, except for the number of actions:
  - ❒ If you activate the switching mechanisms (circuit breakers and/or switches) in a different order to that indicated, **it may cause the UPS to fail.** In parallel systems, perform the same operation on each device.

IMPORTANT. Similarly, supply of the load must be interrupted before transferring from maintenance bypass to normal operation so as not to short-circuit the windings of the transformer.

- Step 1. Set the distribution board's manual bypass disconnector to OFF and reassemble the mechanical lock. Caution: The loads stop being powered
- Step 2. Set the non-isolated Neutral disconnector of each device to ON
- Step 3. Set the input circuit breaker of each device to ON. At this point, check that the devices turn on in bypass
- Step 4. Set the output circuit breaker of each device to ON
- Step 5. Set the general output circuit breaker of the distribution board to ON to repower the loads
- Step 6. Press the startup button for more than 0.5 seconds, the audible alarm will sound for 1 second and the inverter will start up. For a parallel system, do the same for all of the UPSs and each of them will begin the startup.

6.4. OPERATING PROCEDURE FOR A PARALLEL SYSTEM.

- The operating procedure established here is for devices with a configuration determined by factory default.
- Check that the load or loads and/or the output circuit breakers of the distribution board are 'Off'.
- Set the input circuit breakers of the distribution board or manual bypass and each UPS to 'On'.
  The UPSs supply output voltage from the internal static bypass of each unit. Observe the LCD screen of the control panel for any warnings or error information. Measure the output voltage at the terminals of each UPS separately to check that the voltage difference between them is less than 1 V. If the difference is greater than 1 V, check the connection and the associated instructions.
- If everything is correct, proceed. Press startup button ⏻ for more than 0.5 seconds on all of the UPSs and each of them will start up. All of the UPSs will transfer to 'Normal mode'. Measure the output voltage at the terminals of each UPS separately to check that the voltage difference between them is less than 0.5 V. If the difference is greater than 1 V, the UPSs will need to be adjusted (contact **T.S.S.**).
- If everything is correct, proceed. Press shutdown button ⏻ for more than 0.5 seconds on all of the UPSs and each of them will begin to shut down the device.
  Set the input circuit breakers of the distribution board or manual bypass to 'On'. The output terminals of the distribution board will be under potential through the static bypass of the device.
- Press startup button ⏻ for more than 0.5 seconds on all of the UPSs and each one of them will begin to start up in order to finally leave the system in parallel operation in 'Normal mode'.
- Start the load or loads.
- Do not leave a floating UPS with respect to the others. There must always be a connection between the reference terminals **(Non-In)**. Do not open the reference disconnectors of one or more UPS while it is running because this will cause the UPS to fail and the connected loads to stop.

6.5. HOW TO INTEGRATE A NEW UPS INTO AN OPERATIONAL PARALLEL SYSTEM, OR A UPS IN SINGLE MODE.

- The steps to follow are for the addition of a device to a system with two units. To incorporate a device into a system with only one UPS, proceed in the same way.
- The distribution board must have input and output switches for each UPS and reference disconnectors, in addition to the one for the manual bypass. Otherwise, it will be necessary to adapt the board or acquire a new one if it has not been previously anticipated.
- Since it is necessary to change the parallel bus connection to incorporate the new device into the system (cable with DB15 connectors), it will be necessary to switch the powering of the loads to the manual bypass.

Proceed as follows:

- Step 1. Transfer the system to maintenance bypass following the steps described in section 6.3.1.
- Step 2. Incorporate the new UPS into the system following the procedure established in section 5.2.9.2 to leave it in the same conditions as the rest.
- Step 3. Disconnect the communication bus between the first and last device, and reconnect it including the new UPS. The bus must be closed for proper operation.
- Step 4. Transfer the system to normal operation following the steps described above in section 6.3.2.

6.6. HOW TO REPLACE A FAULTY UPS IN AN OPERATIONAL PARALLEL SYSTEM.

- The steps to follow to replace a UPS in a system consisting of two or three units are the same as those for incorporating a device, except for the difference in the type of action to be carried out. Proceed accordingly as described in section 6.5.

7. CONTROL PANEL WITH LCD.

7.1. CONTROL PANEL.

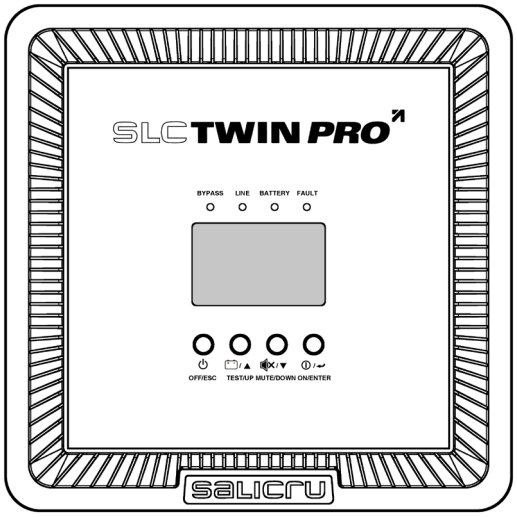


Fig. 22. View of the control panel.

Button	Description
⏻ / ↵ or *'ON / ENTER'*	ON. Press this button for more than 0.5 seconds to start up the UPS [device inverter].
	ENTER. Press this button to confirm a selection from the settings menu.
⏻ or *'OFF / ESC'*	OFF. When the device is running and it is necessary to stop it, press this button for more than 0.5 seconds.
	ESC. Press this button to return to the last settings menu.
🔋 / ▲ or *'TEST / UP'*	TEST. Press this button for more than 0.5 seconds to perform a battery test when it is working in AC or CF mode **(*)**
	UP. Press this button to display the next screen of the settings menu.
🔇 / ▼ or *'MUTE / DOWN'*	MUTE ALARM. Press this button for more than 0.5 seconds to mute the audible alarm (see section 6.2.3.2).
	DOWN. Press this button to display the previous screen of the settings menu.
🔋 / ▲ or *'TEST / UP'* + 🔇 / ▼ or *'MUTE / DOWN'*	UP + DOWN. Press both buttons simultaneously for more than 1 second to enter and exit the settings menu.

(*) CF. Working mode as UPS with frequency converter function. With this selection activated, the static bypass is disabled.

Tab. 5. Functionality of the control panel buttons.

- The UPS incorporates a control panel in which the following elements are available:
  - ❒ Four buttons or keys with the functionalities described in Table 6.
  - ❒ A backlit LCD with messages represented as text or graphics which appear in black on a blue screen.
  - ❒ Four LEDs that provide the following information:
    - Bypass **(yellow)**.
    - Line **(green)**.
    - Battery **(yellow)**.
    - Fault **(red)**.

    Table 6 shows the individual function of each of them or their interaction with others in relation to the state of the UPS.

7.2. FUNCTIONALITY OF THE LEDS.

State of the UPS	LEDs			
	Bypass	Line	Battery	Fault
UPS startup	●	●	●	●
No output mode	○	○	○	○
Bypass mode	●	○	○	○
AC mode	○	●	○	○
Battery mode	○	○	●	○
CF mode	○	●	○	○
ECO mode	●	●	●	○
Battery test	●	●	○	○
Fault	○	○	○	●

●: LED illuminated permanently.
○: LED off.

Tab. 6. Function of the LEDs.

7.2.1. Audible alarms.

Description	Alarm modulation or tone	Mute
State of the UPS		
Bypass mode	One beep every 2 minutes.	Yes
Battery mode	Beep every 4 seconds.	
Fault	Continuous.	
Warning		
Overload	2 beeps every second.	Yes
Other	Beep every 1 seconds.	
Faults		
All	Continuous.	Yes

Tab. 7. Audible alarms. Condition and modulation or tone.

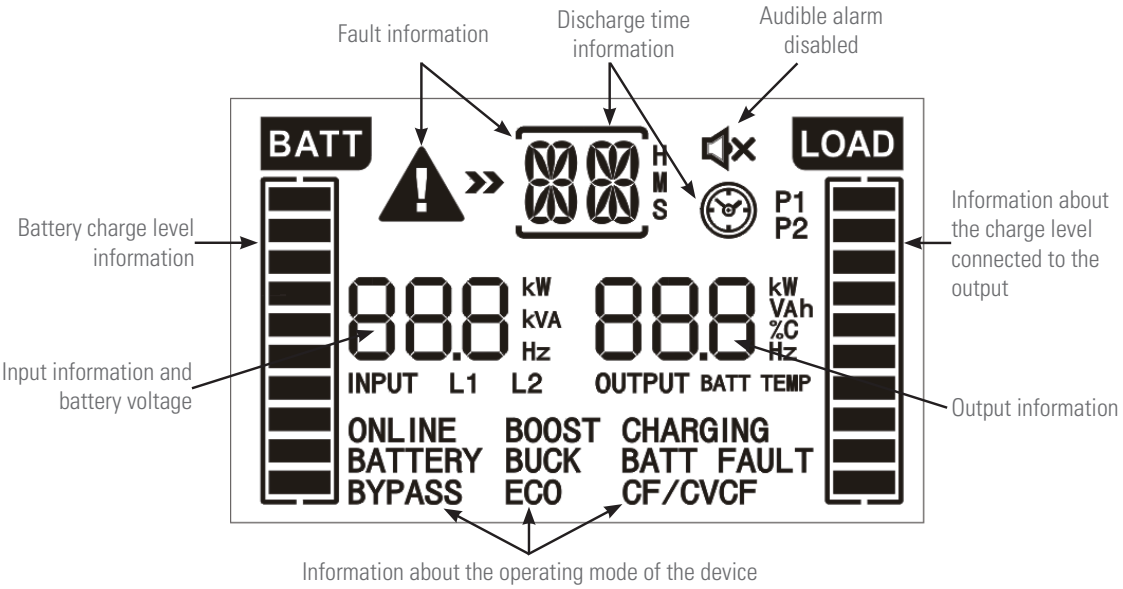
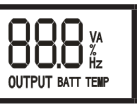


Fig. 23. Control panel with LCD.

7.2.2. Messages shown on the LCD.

Display	Function
Backup time information.	
	Indicates the backup time. H - Hours, M - Minutes, S - Seconds.
Fault information.	
	Indicates as a warning that a fault has occurred.
	Indicates a numerical code from the settings menu shown in Table 9 of Section 7.5.
Audible alarm information.	
	Indicates that the audible alarm is disabled.
Information on output voltage.	
	Indicates the error or fault codes shown in table 13 of section 7.7
Information about the charge level connected to the output.	
	Indicates the charge level connected to the output as a %, by displaying four equivalent segments respectively in the following proportion: 0-25 %, 26-50 %, 51-75 % and 76-100 %.
Information about programmable outputs	
P1	Indicates that the programmable outputs are activated.
Information about the operating mode of the device.	
BATTERY	Indicates that the device is supplying output voltage from the battery (battery mode).
BYPASS	Indicates that the device is activated in ECO mode.
ECO	Indicates that the device is supplying output voltage from the bypass (ECO mode).
ONLINE	Indicates that the inverter is working.
P1	Indicates that the output is activated.

Information about battery charge level.	
	Indicates the battery charge level as a %, by displaying four equivalent segments respectively in the following proportion: 0-25 %, 26-50 %, 51-75 % and 76-100 %.
BATT FAULT	Indicates that the battery is not connected.
	Indicates low battery voltage level.
Information about input and battery voltage.	
	Indicates the input voltage, frequency or battery voltage. V AC - Input voltage, V DC - Battery voltage, Hz - Input frequency.

Tab. 8. Instructions shown on the LCD of the control panel.

7.3. MEANING OF THE ABBREVIATIONS SHOWN ON THE CONTROL PANEL DISPLAY.

Code	Message on display	Meaning
ENA	ENA	Enabled.
DIS	dIS	Disabled.
ATO	AtO	Automatic.
BAT	bAt	Battery.
NCF	nCF	Normal mode (not for CF work mode).
CF	CF	CF work mode.
SUB	SUb	Subtract.
ADD	Add	Add.
ON	ON	Startup.
OFF	OFF	Shutdown.
FBD	Fbd	Forbidden.
OPN	OPn	Permitted.
RES	RES	Reserved.
N.L	n.L	Neutral loss.
CHE	CHE	Check.
OP.V	OP.U	Output voltage
PAR	PAR	Parallel, 001 refers to the first.
EPO	EP	Emergency power off.
FR	FR	Frequency.
OPL	OPL	Load percentage.
R	R	R phase.
S	S	S phase.
T	T	T phase.

Tab. 9. Abbreviations shown on the LCD.

7.4. SETTINGS ON CONTROL PANEL WITH LCD.

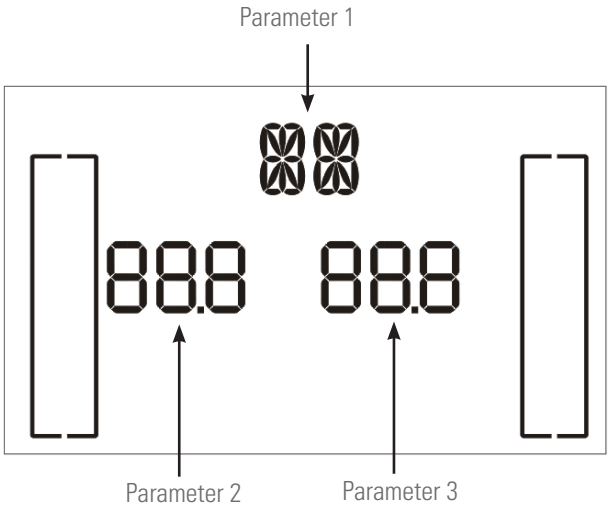


Fig. 24. Arrangement of the parameters on the LCD.

- Parameter 1: Code of the settings menu. See Table 9 for correlation with its descriptive.
- Parameters 2 and 3 are the configuration or value options for each settings menu.

Select buttons 'Down' or 'Up' to change the menus or parameters.

All of the parameter settings are only saved when the UPS is shut down in normal mode with the internal or external batteries connected, depending on each case. (Normal shutdown means the shutdown of the input circuit breaker with the device in bypass or without output voltage - depending on whether or not the static bypass is enabled).

Code	Description	Bypass mode / No output mode	Mode AC	ECO mode	Mode CF	Battery mode	Battery test
01	Output voltage.	YES	-	-	-	-	-
02	Output frequency.	YES	-	-	-	-	-
03	Reserved	-	-	-	-	-	-
04	Reserved	-	-	-	-	-	-
05	ECO enable/disable mode.	YES	-	-	-	-	-
06	Reserved	-	-	-	-	-	-
07	Reserved	-	-	-	-	-	-
08	Bypass mode setting.	YES	YES	-	-	-	-
09	Maximum battery discharge time setting.	YES	YES	YES	YES	YES	YES
10	Reserved	-	-	-	-	-	-
11	Reserved.	-	-	-	-	-	-
12	Startup without batteries.	YES	YES	YES	YES	YES	YES
13	Reserved	-	-	-	-	-	-
14	Reserved	-	-	-	-	-	-
15	Reserved	-	-	-	-	-	-
16	Reserved	-	-	-	-	-	-
17	External BATT MOD setting.	YES	-	-	-	-	-
18	Battery capacity setting	YES	-	-	-	-	-

Tab. 10. List of parameter 1 codes. Description and settings depending on work mode.

7.4.1. View of the settings menus, according to the parameter 1 code.

- **Code 01** Output voltage.

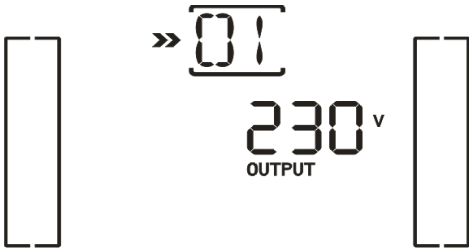


Fig. 25.

❒ Parameter 3 setting: Output voltage.
It is possible to choose one of the following output voltage values between phase 1 and neutral 2 - with connection between phase 2 and neutral 1 made in order to prevent each winding from having half of the voltage:
– 208, 220, 230 or 240 V.

- **Code 02** Output frequency.

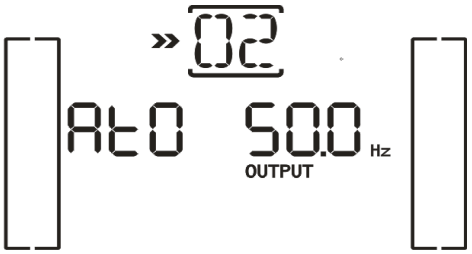


Fig. 26.

❒ Parameter 2 setting: Output frequency.
It is possible to choose one of the following values:
– 50 Hz, 60 Hz or ATO.
With ATO selected, the output frequency is auto-detected according to the normal input at the time of connection of the device to the mains.
If it is between 46 and 54 Hz, it will be set at 50 Hz, and, if it is between 56 and 64 Hz, at 60 Hz. The factory default setting is ATO.

❒ Parameter 3 setting: Frequency mode.
Output frequency in CF mode or not CF mode setting. It is possible to choose between two options:
– CF. Sets the UPS to CF mode. With this option activated, the output frequency is set to 50 or 60 Hz based on the parameter 2 selection. The input frequency can be 46 to 64 Hz.

– NCF. Sets the UPS to normal mode [not CF mode]. With this option activated, the output frequency is set at 50 or 60 Hz synchronised with the input frequency based on the parameter 2 selection and its range.
If the parameter 2 selection is 50 or 60 Hz, it will be transferred to battery mode (powering loads) when the frequency is not respectively between 46 and 54 Hz or 56 and 64 Hz.

Fig. 27.

(*) If ATO is selected in parameter 2, parameter 3 will display the current frequency.

- **Code 03** Reserved.

Fig. 28.

❒ Reserved for future options.

- **Code 04** Reserved.

Fig. 29.

❒ Reserved for future options.

- **Code 05** ECO mode, enable/disable.

Fig. 30.

❒ Parameter 3 setting: Activates or deactivates the ECO function.
– DIS. ECO function disabled.
– ENA. ECO function enabled.
If the ECO function is disabled, the voltage and frequency range for ECO mode can be adjusted, but there is no point unless the function itself is enabled.

- **Code 06** Reserved.

Fig. 31.

❒ Reserved for future options.

- **Code 07** Reserved.

Fig. 32.

❒ Reserved for future options.

- **Code 08** Bypass mode setting.

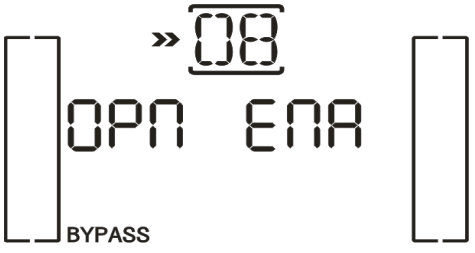


Fig. 33.

❒ Parameter 2 setting.
  – OPN. Bypass permitted. When selecting this option, the UPS will operate in bypass mode, provided that selection in bypass settings (parameter 3) has been enabled/disabled.
  – FBD. When selecting this option, operation in bypass mode is forbidden in any condition.

❒ Parameter 3 setting:
  – ENA. Bypass enabled. When selected, bypass mode is enabled.
  – DIS. Bypass disabled. If selected, automatic bypass is permitted but not manual switch to bypass.
  At this point, manual switch to bypass is understood as being that which users perform on the UPS. For example, pressing the OFF button on the front of the device when it is in AC mode transfers the load to the static bypass.

- **Code 09** Maximum battery discharge time setting.

Fig. 34.

❒ Parameter 3 setting:
  – DIS, default value. Disables the battery discharge time protection and the backup time will depend on the capacity of the batteries.
  – 000 ~ 999. Sets maximum backup time. The UPS will turn off automatically once it has elapsed to protect the batteries. In some III/II models and depending on the firmware version, it can be set to 990 minutes [16.5 h] instead of DIS.

- **Code 10** Reserved.

Fig. 35.

❒ Reserved for future options.

- **Code 11** Reserved.

Fig. 36.

❒ Reserved for future options.

- **Code 12** Enabling/disabling the hot standby function.

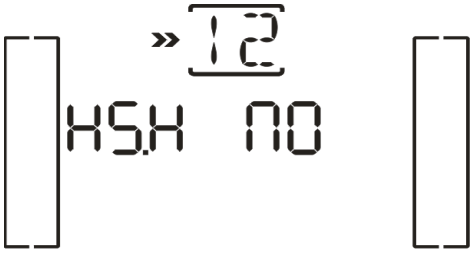


Fig. 37.

❒ Parameter 2 setting. HS.H
  – Enabling or disabling the Hot standby function.

❒ Parameter 3 setting:
  – YES: The Hot standby function is enabled after the mains are restored even without the batteries being connected to the UPS.
  – NO: The Hot standby function is disabled. The UPS operates in normal mode. It will not restart if the batteries are not connected to the UPS.

- **Code 13** Reserved.

Fig. 38.

❒ Reserved for future options.

- **Code 14** Reserved.

Fig. 39.

❒ Reserved for future options.

- **Code 17** External BATT MOD setting.

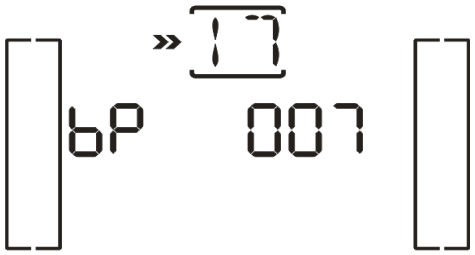


Fig. 40.

❒ Parameter 3 setting: Sets the number of external BATT MOD.
  – 0-7: the setting allows values between 0-7. The default setting is 0.

- **Code 18** Battery capacity for correct calculation of backup.

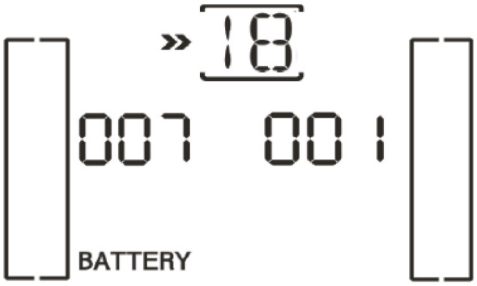


Fig. 41.

❒ Parameter 2 setting:
  – Indicates battery capacity. The following values can be selected: 7, 9, 10, 12, 17, 26, 40, 65, 100 Ah.

❒ Parameter 3 setting:
  – Indicates number of parallel battery branches. It can be set to between 1 and 6.

7.5. OPERATING MODE / DESCRIPTION OF STATE.

Table 10 shows the screens displayed on the LCD of the control panel [state] for the different operating modes.

1. If the UPS is in normal operation, three screens will be displayed to represent the input and output voltage, the input and output frequency, and the output load.
2. In correctly configured parallel UPS systems, the acronym 'PAR' will be displayed in the place of the parameter 2 variable and the number corresponding to the device of the system in parallel in parameter 3. The 'MASTER' UPSs will be assigned as '001' by default and the slaves '002' and '003' respectively. The assigned numbers can be modified dynamically during operation.

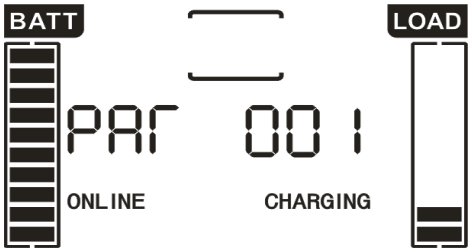
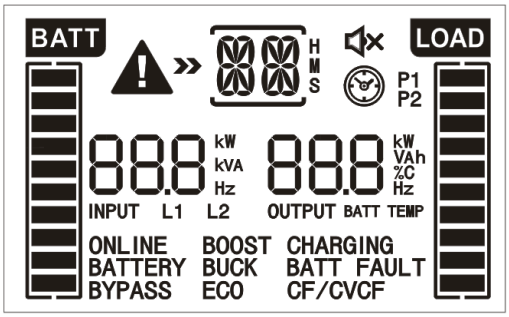
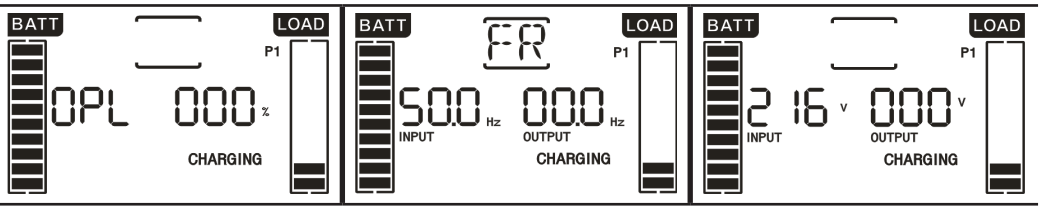
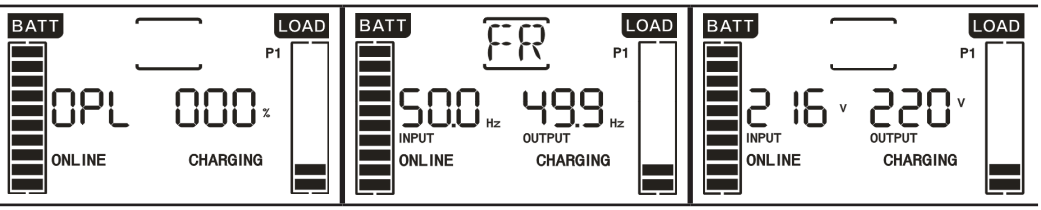
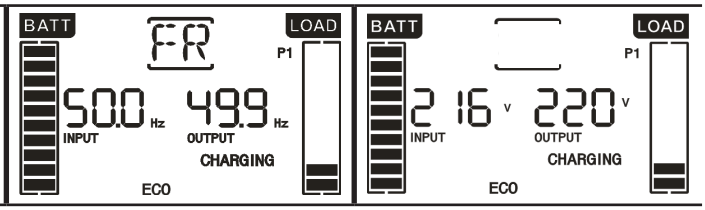
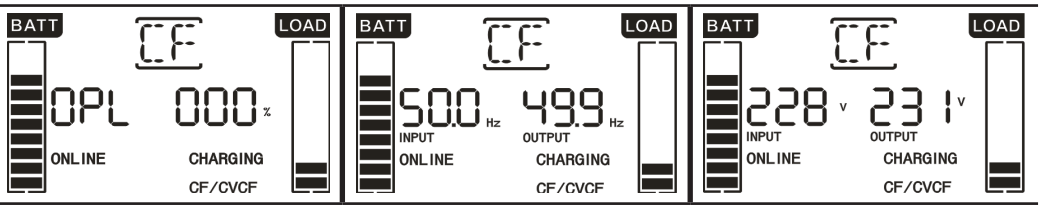
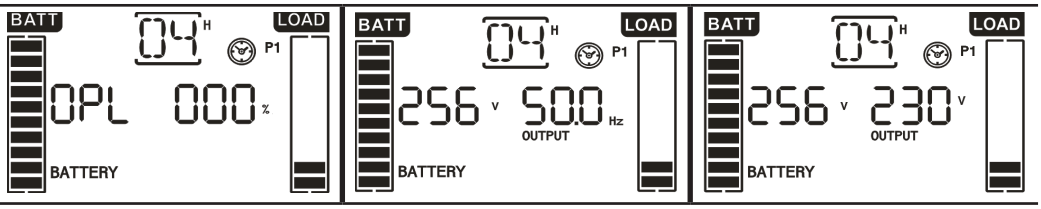
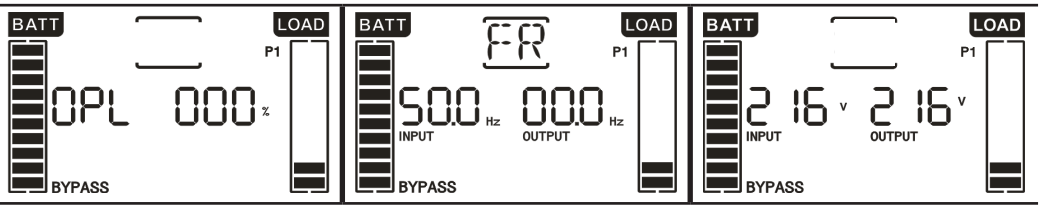
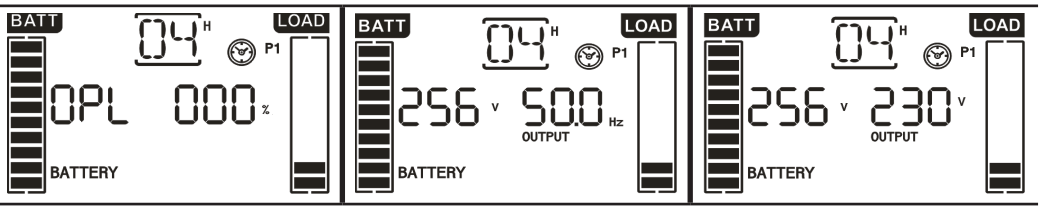
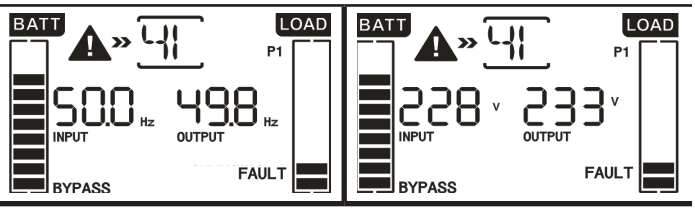


Fig. 42. Parallel system screen.

Operating mode / state		
UPS startup	Description.	When the UPS is started, the display screen of this mode is displayed for a few seconds to initialise the CPU and system.
	LCD.	
No output mode	Description.	If the bypass voltage / frequency is out of range or the bypass is disabled (or prohibited), the UPS will enter no output mode with the inverter running or shut down. The UPS does not supply output voltage. The audible alarm modulated every two minutes is audible.
		
AC mode	Description.	If the input voltage is within the range of the device, the UPS will supply stable AC sine-wave voltage to the load or loads, and charge the batteries.
		
ECO mode	Description.	If the input voltage is within the regulation ranges and ECO mode is activated, the UPS supplies the output voltage from the bypass in ECO mode (energy saving).
		
CF mode	Description.	When the output frequency is selected as CF in parameter 3 of the settings menu code 02, the inverter supplies a constant output frequency (50 or 60 Hz). In this way, the UPS will not supply bypass output voltage, but will charge the batteries.
		
Battery mode	Description.	When the input / frequency voltage is not within the predefined range of the device or there is an AC mains failure, the UPS powers the loads from the batteries for a limited time due to their own capacity and activates the audible alarm modulated every 4 seconds.
		

Operating mode / state		
Bypass mode	Description.	When the input voltage is within the predefined range of the device and the bypass is enabled, when the UPS is switched off, the device enters bypass mode. The audible alarm modulated every two minutes is activated.
		
Battery test	Description	With the UPS in AC mode or CF mode, press the 'TEST' button for more than 0.5 seconds. The audible alarm will beep and the battery test will start. In the electric flow diagram of the display, the line between I / P and the inverter icon flashes for information purposes. This test is useful to check the battery state.
		
Error or fault state	Description	When an error or fault is detected in the UPS, the inverter will lock. The fault code will be displayed on the screen and the ⚠ icon will illuminate. Table 13 shows the error or fault codes and the correlation with the description.
		

Tab. 11.Operating modes.

7.6. WARNING OR ALERT CODES.

Code	Warning or alert description
01	Battery disconnected.
07	Overcharge in the battery.
08	Battery low.
09	Output overload.
0A	Fan fault.
0B	EPO activated.
0D	Overtemperature.
0E	Charger fault.
10	L1 input fuse open.
21	The line voltages of devices connected in parallel are different
22	The bypass voltages of devices connected in parallel are different
33	Device locked in bypass after 3 successive overloads in 30 minutes
3A	Maintenance switch cover open.
3D	Bypass not available.
3E	Startup fault.
41	Bypass not available.
42	Overtemperature in UPS output power transformer. Applicable to models with transformer with two secondaries 110/220 Vac.
44	Loss of redundancy due to shutdown of one of the UPSs belonging to the N+X parallel system.
45	Loss of redundancy due to overload in N+X parallel system.
46	Battery test not passed

Tab. 12.Warning or alert code.

7.7. ERROR OR FAULT CODES.

Code	Error or failure description
01	DC bus startup fault.
02	DC bus overvoltage.
03	DC bus undervoltage.
04	DC bus imbalance.
11	Inverter soft start fault.
12	High voltage in the inverter.
13	Low voltage in the inverter.
14	Inverter output short-circuited.
1A	Negative power fault at the output.
21	Battery thyristor short-circuited.
24	Inverter relay short-circuited.
2A	Battery charger short-circuited
31	CAN communication fault.
36	Output current in parallel system unbalanced
41	Overtemperature.
42	CPU communication fault.
43	Output overloaded.
60	Inverter overcurrent
63	Inverter waveform incorrect
6A	Battery startup fault.
6B	PFC current fault in battery mode.
6C	DC Bus voltage change too fast.
6D	Current sensor failure
6E	Power supply fault
77	Overtemperature in output transformer

Tab. 13.Error or fault code.

7.8. WARNING OR ALERT INDICATORS.

Code	Icon (flashing)	Audible alarm
Low battery voltage.		Modulated every second.
Overload.		Modulated twice per second
Battery disconnected.		Modulated every second.
Battery overcharge.		Modulated every second.
EPO activated.		Modulated every second.
Fan fault / Overtemperature.		Modulated every second.
Charger fault.		Modulated every second.

Tab. 14.Warning or alert indicators.

8. MAINTENANCE, WARRANTY AND SERVICE.

8.1. BATTERY MAINTENANCE.

- Pay attention to all of the safety instructions concerning batteries indicated in section 1.2.3. of manual EK266*08.
- The service life of the batteries greatly depends on the ambient temperature and other factors such as the number of charges and discharges, as well as their depth.
  The service life is designed to be between 3 and 5 years if the ambient temperature is between 10 and 20ºC. Different types of battery with different service lives are available upon request.
- The **SLC TWIN PRO2 T UL** UPS series requires only minimal maintenance. The battery used in the standard models is lead acid, sealed, valve regulated and maintenance free. The only requirement is to charge the batteries regularly to extend their life expectancy.
  While the UPS is connected to the mains supply, whether or not it is running, it will keep the batteries charged and also offer protection against overcharge and overdischarge.

8.1.1. Notes for the installation and replacement of the battery.

- If it is necessary to replace the connection of any cable, make sure that original materials are acquired through authorised distributors or service centres in order to prevent fire hazards such as overheating or sparks due to insufficient gauge.
- Do not short-circuit the + and - poles of the batteries, danger of electrocution or fire.
- Ensure that there is no voltage before touching the batteries. The battery circuit is not isolated from the input circuit. There may be dangerous voltages between the battery terminals and earth.
- Even if the input circuit breaker is disconnected, the internal components of the UPS are still connected to the batteries, meaning that dangerous voltages are present.
  Because of this, before carrying out any repair or maintenance work, remove the internal battery fuses and/or disconnect the connection connectors between them and the UPS.
  Since the battery circuit is not isolated from the input voltage, there is a risk of discharge with dangerous voltages between the battery terminals and the earth terminal, and, in turn, through the earth (any metal part of the cabinet, including mounts and fittings).
- The batteries contain dangerous voltages. Maintenance and replacement of the batteries should be carried out by qualified personnel familiar with them. No other person should handle them.

8.2. UPS TROUBLESHOOTING GUIDE.

If the UPS does not work properly, check the information shown on the LCD screen of the control panel, according to device models and power. Try to resolve the issue using the steps shown in Tab. 16. If the issue persists, contact our Technical Service and Support **(T.S.S.)**.
If it is necessary to contact our Technical Service and Support **T.S.S.**, provide the following information:

- UPS model and serial number.
- Date on which the issue occurred.
- Full description of the issue, including information provided by the LCD or LEDs and state of the alarm.
- Power supply conditions, type of load and level of load applied to the UPS, ambient temperature, ventilation conditions.
- Battery information (capacity and number of batteries), if the device is **(B1)**.
- Any other information considered relevant.

8.2.1. Troubleshooting guide.

Symptom	Possible cause	Solution
No alarms or indications on the LCD and mains voltage normal.	The power cables are not connected correctly.	Check that the power cables are firmly connected to the mains.
Icon ⚠ and warning code EP flash on the LCD and the audible alarm beeps every second.	The EPO function is activated.	Close the EPO signal circuit to deactivate it.
Icon ⚠ and the **BATT FAULT** message flash on the LCD and the audible alarm beeps every second.	The internal or external battery is not correctly connected.	Check whether all batteries are correctly connected.
Icons ⚠ and LOAD flash on the LCD and the audible alarm beeps twice a second.	UPS overloaded.	Remove/shut down the excess loads at the output of the UPS.
	UPS overloaded. Appliances connected to the UPS are directly powered by the mains through the bypass.	Remove/shut down the excess loads at the output of the UPS.
	After repeated overloads, the UPS is locked in bypass mode. Connected appliances are powered directly by the mains.	First remove/shut down the excess loads at the output of the UPS. Then shut down the UPS and restart it.
Display of fault code 43. Icon LOAD lights up on the LCD and the audible alarm beeps continuously.	The UPS is overloaded for a long time and the device is locked. The UPS shuts down automatically.	Remove/shut down the excess loads at the output of the UPS and restart it.
Display of fault code 14, the audible alarm beeps continuously.	The UPS shuts down automatically due to a short circuit at the UPS output.	Check whether the output connection and/or appliances connected to its output are short-circuited.
One of the following fault codes, 01, 02, 03, 04, 11, 12, 13, 14, 14.1A, 21, 24, 35, 36, 41, 42 or 43, is displayed on the LCD and the audible alarm beeps continuously.	An internal fault in the UPS has occurred. Two possible situations: 1. The load is still powered, but through the bypass of the UPS. 2. The load is not powered.	Contact your distributor.
The battery backup time is much shorter than the rated value.	The batteries are not fully charged.	Charge the batteries for at least 7 hours and then check their capacity. If the problem persists, consult your distributor.
	The batteries are defective.	Contact your distributor to replace the battery.
Icon ⚠ and the **TEMP** message flash on the LCD and the audible alarm beeps every second.	The fan is locked or does not work; or the temperature of the UPS is very high.	Check the fans and contact your distributor.

Tab. 15.Troubleshooting guide.

8.3. WARRANTY CONDITIONS.

8.3.1. Terms of the warranty.

On our website, you will find the warranty conditions for the product you have purchased where you can also register it. It is recommended to do so as soon as possible to include it in the database of our Technical Service and Support **(T.S.S.)**. Among other advantages, it will streamline any regulatory procedures for the intervention of **T.S.S.** in the event of a fault.

8.3.2. Exclusions.

Our company will not be bound by the warranty if it notices that the defect in the product does not exist or was caused by improper use, negligence, improper installation and/or verification, attempts at unauthorised repair or modification, or any other cause beyond the intended use, or by accident, fire, lightning or other hazards. Nor shall it cover any compensation for loss or damage.

8.4. TECHNICAL SERVICES NETWORK.

Information about our national and international Technical Service and Support **(T.S.S.)** centres can be found on our website.

9. ANNEXES.

9.1. GENERAL TECHNICAL SPECIFICATIONS.

Models:	**TWIN PRO2 T UL**	
Available power ratings (kVA / kW) (**)	**6 / 6**	**10 / 10**
Technology	**On-line double-conversion, PFC, double DC bus**	
Rectifier		
Input type	Single-phase	
Number of cables	3 cables - Phase-Phase or Phase-Neutral and earth	
Rated voltage	208 / 220 / 230 / 240 V AC	
Input voltage range with 100% load	176.. 276 V AC	
Input voltage range with 50 % load	110.. 300 V AC	
Transfer voltage range:	At full load	
- Mains voltage low	176 V AC (±3 %)	
- Return of low mains	186 V AC (±3 %)	
- Mains voltage high	276 V AC (±3 %)	
- Return of high mains	266 V AC (±3 %)	
Frequency	50 / 60 Hz (auto-detectable)	
Input frequency range	± 4 Hz (46.. 54 / 56.. 64 Hz) ± 10%	
Power factor	≥ 0.99 (at full load)	
THDi	< 4%	
Inverter		
Technology	PWM	
Waveform	Pure sine wave	
Rated voltage	208 / 220 / 230 / 240 V AC *	
Output voltage accuracy	± 2 %	
THD linear load voltage	< 2 %	
THD non-linear load voltage	< 6 %	
Frequency	With mains present, synchronised to rated input (46.. 54 / 56.. 64 Hz)	
	With mains absent, in backup mode 50 / 60 ± 0.1 Hz	
Frequency synchronous speed	1 Hz/sec	
Power factor	1	
Permissible load power factor	0.5.. 1 inductive	
Transfer time, inverter to battery	0 ms.	
Transfer time, inverter to bypass	0 ms.	
Transfer time, inverter to ECO	0 ms.	
Transfer time, ECO to inverter	< 10 ms.	
Performance at full load, in line mode with battery 100% charged	> 90 %	
Performance at full load, in ECO mode	> 95 %	
Overload line mode	100.. 110 %, 10 min. / > 110.. 130 %, 60 sec / > 130 %, 1 sec	
Overload battery mode	100.. 110 %, 30 sec / > 110.. 130 %, 10 sec / > 130 %, 1 sec	
Crest factor	2.6:1	
Number of parallelable devices	Up to 3 UPSs.	
Static bypass		
Type	Mixed (thyristors in antiparallel + relay)	
Rated voltage	208 / 220 / 230 / 240 V AC	
Rated frequency	50 / 60 Hz ±4 Hz	
Overload	< 130%, constant	
	> 130 %, 60 sec	
Batteries		
Voltage / capacity	12 V DC / 7 Ah	12 V DC / 9 Ah
Number of batteries in series / group voltage	20 / 240 V DC	
Number of battery banks	1	
End of backup voltage alarm	10.2 V DC / 204 V DC	
Internal battery charger		
Charge type	I / U (constant current / constant voltage)	
Constant current / constant voltage	1/2/4 A depending on model / 273 V DC (13.65 V DC elem.)	
Float voltage, element / group	13.65 V CC / 273 V CC	
Maximum charging current	4 A	
Recharge time	7 hours to 90%	
Voltage/temperature compensation	– 20 mV / ºC per battery from 25 ºC	

Models:	TWIN PRO2 T UL	
Available power ratings (kVA / kW) (**)	**6 / 6**	**10 / 10**
Optional internal battery charger (B1)		
Maximum charging current	4 A	
General		
Communication ports	DB9 RS-232 and USB, mutually exclusive	
Monitoring software	ViewPower (free download)	
Noise level at 1 m.	< 58 dB	
Operating temperature	0.. 40 ºC	
Storage temperature	0.. 35 ºC	
Storage temperature without batteries	– 15.. + 60 ºC	
Operating altitude	2,400 masl	
Relative humidity	0.. 95 % non-condensing	
Protection rating	IP20	
Dimensions - Depth x Width x Height (mm) / B1	631 x 250 x 826	
Weight (kg) - standard device -	117	142
Weight (kg) - B1 device -	70	88
Safety	IEC 62040-1; UL1778 ; CSA C22.2	
Operation	VFI in accordance with EN 62040-3	
Electromagnetic compatibility (EMC)	IEC 62040-2 ; CFR47 FCC Part15, Subpart B, Class A	
Marking	CE - TÜV - FCC	
Quality system	ISO 9001 and ISO 140001	

(*) Reduction of power to 90% for 208 V devices and devices in parallel.

(**) As a frequency converter, the power supplied will be 60 % of the rated.

Tab. 16.General technical specifications.

9.2. GLOSSARY.

- **AC.** Alternating current is electric current in which the magnitude and direction vary cyclically. The waveform of the most commonly used alternating current is that of a sine wave, since this achieves a more efficient transmission of energy. In certain applications, however, other periodic waveforms are used, such as triangular or square.
- **Bypass.** Manual or automatic, this is the physical connection between the input of an electrical device and its output.
- **DC.** Direct current is the continuous flow of electrons through a conductor between two points with different potential. Unlike AC, in DC, electrical loads always circulate in the same direction from the point of greatest potential to the lowest. Although DC is commonly identified as a continuous current (for example, that supplied by a battery), any current that always maintains the same polarity is continuous.
- **DSP.** Digital signal processor. A DSP is a processor or microprocessor-based system that has a set of instructions, hardware and optimised software for applications that require numerical operations at very high speed. Because of this, it is especially useful for the processing and representation of analogue signals in real time: in a system that works in this way **(real time)** samples are usually received from an analogue/digital converter **(ADC)**.
- **Power factor.** The power factor, PF, of an AC circuit is defined as the ratio between active power, P, and apparent power, S, or as the cosine of the angle formed by the current and voltage factors, designated in this case as cos !, where ! is the value of the angle.
- **GND.** This stands for GROUND or EARTH and, as the name indicates, refers to the potential of the surface of the Earth.
- **EMI filter.** Filter capable of significantly reducing electromagnetic interference **(EMI)**, which is the disturbance that occurs in a radio receiver or in any other electrical circuit caused by electromagnetic radiation coming from an external source. Electromagnetic interference is also known as radio frequency interference **(RFI)**. This disturbance can interrupt, degrade or limit the performance of the circuit.
- **IGBT.** An insulated gate bipolar transistor is a semiconductor device that is generally used as a controlled switch in power electronics circuits. This device possesses the characteristics of the gate signals of field effect transistors with the capacity for high current and low saturation voltage of the bipolar transistor, combining an isolated FET gate for input and control and a bipolar transistor as a single switch in a single device. The IGBT's excitation circuit is similar to that of the MOSFET, while the conducting characteristics are similar to those of the BJT.
- **Interface.** In electronics, telecommunications and hardware, an interface (electronics) is the port (physical circuit) through which signals are sent or received from one system or subsystem to another.
- **kVA.** A volt-ampere is the unit used for apparent power in electrical current. In DC, it is practically equal to real power but, in AC, it can differ from this depending on the power factor.
- **LCD.** Liquid crystal display, a device invented by Jack Janning, who was an employee of NCR. It is an electrical system for data presentation formed by 2 transparent conductive layers and a special crystalline material in the middle (liquid crystal) which have the ability to orientate light as it passes through.

- **LED.** Light-emitting diode, a semiconductor device **(diode)** that emits light that is almost monochromatic, that is to say, it has a very narrow spectrum when it is polarised directly and is penetrated by an electric current. The colour **(wavelength)** depends on the semiconductor material used in the construction of the diode, and can vary from ultraviolet, passing through the visible light spectrum, to infrared, the latter called IRED (infra-red emitting diode).
- **Circuit breaker.** A circuit breaker is a device capable of interrupting the electrical current of a circuit when it exceeds certain maximum values.
- **On-line mode.** A device is said to be on-line when it is connected to a system, is operative, and normally has its power supply connected.
- **Inverter.** An inverter is a circuit used to convert DC into AC. The function of an inverter is to change a DC input voltage to a symmetrical AC output voltage, with the magnitude and frequency desired by the user or designer.
- **Rectifier.** In electronics, a rectifier is the element or circuit that converts AC into DC. This is done by using rectifier diodes, whether solid state semiconductors, vacuum valves or gaseous valves, such as those containing mercury vapour. Depending on the characteristics of the AC power that they use, they are classified as single-phase when they are powered by a mains phase or three-phase when they are powered by three phases. Depending on the type of rectification, they can be half wave when only one of the half cycles of the current is used or full wave when both half cycles are used.
- **Relay.** A relay is an electromechanical device that functions as a switch controlled by an electrical circuit in which, by means of an electromagnet, a set of one or several contacts is activated to enable other independent electrical circuits to be opened or closed.
- **SCR.** Silicon controlled rectifier, commonly known as a thyristor, a 4-layer semiconductor device that works as an almost ideal switch.
- **THD.** Total harmonic distortion. Harmonic distortion occurs when the output signal of a system does not equal the signal that entered it. This lack of linearity affects the waveform because the device has introduced harmonics that were not in the input signal. Since they are harmonic, that is to say, multiples of the input signal, this distortion is not so dissonant and is less easy to detect.

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Information about our technical service and support network (T.S.S.), sales network and warranty is available on our website:
www.salicru.com

Product Range
Uninterruptible Power Supplies (UPS)
Stabilisers - Step-Down Light Dimmers
Power Supplies
Static Inverters
Photovoltaic Inverters
Voltage Stabilisers

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