

UNINTERRUPTIBLE POWER SUPPLY



UPS series KESSUPS 51RT 750VA - 3kVA



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1. Introduction

1.1. Acknowledgement letter

We would like to thank you in advance for the trust you have placed in us by purchasing this product. Read this instruction manual carefully before starting up the equipment and keep it for any possible future consult that can arise.

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

Yours sincerely

KESS Power Solutions GmbH

- ❑ The equipment here described can cause important physical damages due to wrong handling. This is why, the maintenance and/or fixing of the here described equipment must be done by our staff or specifically authorised.
- ❑ According to our policy of constant evolution, we reserve the right to modify the specifications in part or in whole without forewarning.
- ❑ All reproduction or third party concession of this manual is prohibited without the previous written authorization of our firm.

1.2. Using this manual

The target of this manual or publication is to provide information regarding the safety and to give explanations about the procedures for the installation and operating of the equipment. This manual and rest of support documentation has to be read carefully before installing, location change, setting or any handling of any kind, including the start up and shutdown operation.

Keep this document for future consults.

In the next pages, the “equipment” and “KESS Support-Team” terms, are referred to the Uninterruptible Power Supply or UPS and Service and Technical Support respectively.

1.2.1. Conventions and used symbols

Some or all the symbols of this section can be used and shown in the equipment and/or in the description of this document. It is advisable to be familiar with them and understand their meaning.



«Danger of electrical discharge» symbol. Pay special attention to it, both in the indication on the equipment and in the paragraph referred to this user's manual, because it contains features and basic information for person safety. To not respect these indications can result in serious incidents or even death due to electrical discharges.



«Warning» symbol. Carefully read the indicated paragraph and take the stated prevention measures, so it contains basic safety instructions for persons. To not respect such instructions can

cause serious incidents. Those indications with “CAUTION” symbol content features and basic instructions for safety of the things. To not respect such instructions can damage the goods.



«Precaution» symbol. Read the paragraph text and take the stated preventive measures, it contains the basic instructions and features for the equipment safety. To not respect these indications can create material damages on the own equipment, installation or loads.



«Notes of information» symbol. Additional topics that complement the basic procedures. These instructions are important for the equipment use and its optimum efficiency.



«Main protective earthing terminal» symbol. Connect the earth cable coming from the installation to this terminal.



«Earth bonding terminal». Connect the earth cable coming from the load and the external battery cabinet to this terminal.



Preservation of the environment: The presence of this symbol in the product or in their associated documentation states that, when its useful life is expired, it will not be disposed together with the domestic residuals. In order to avoid possible damages to the environment, separate this product from other residuals and recycle it suitably. The users can contact with their provider or with the pertinent local authorities to be informed on how and where they can take the product to be recycled and/or disposed correctly.



Alternating Current A.C..



Direct Current D.C..




Recycle.

1.2.2. For more information and/or help


For more information and/or help of your specific unit, contact our KESS Support-Team.




1.2.3. Safety instructions

- Check the data of the nameplate are the required by the installation.
-  Never forget that the UPS is a generator of electrical energy, therefore the user has to take precautions against direct and indirect contacts.

Its energy source, a part from the AC mains, lies on the batteries, usually included in the same case or cabinet that the equipment electronics. However, some models and/or extended back up times, batteries can be supplied in a separate case or cabinet.

If the batteries are connected to the equipment and their protections are switched “On”, whenever they are, it is irrelevant if the UPS is or not connected to mains, as well as the status of the mains protection. The outlets or output power blocks will supply voltage meanwhile the battery set has energy.


-  Compliance as regards to “Safety instructions” is mandatory, being the user the legal responsible regarding to its observance and application. Read them carefully and follow the stated steps in the established order, keep them for future consults that may arise.

-  If the instructions are not in total or partial and in special referred to the safety, do not carry on with the installation or commissioning tasks, because there could be a risk on your safety or on the other/s persons, being able to make serious injuries even death, also it can cause damages to the equipment and/ or to the loads and installation.
-  The local electrical regulations and the different restrictions of the client's site can invalidate some recommendations included in the manuals. When discrepancies exist, the user has to comply the local regulations.
-  The equipments provided with power cord with plug and outlets can be connected and used by personnel without any kind of experience.
- A person is defined as qualified, if it has experience of assembling, commissioning and perfect control operating of the equipment, if he has the requirements to do the job and has read and understand all the things described in this manual, in particular the safety indications. Such preparation is considered only valid if it is certified by our KESS Support-Team.
- Place the equipment the closest to the power supply and loads to be supplied, leaving an easy access if it were needed an urgent disconnection.
- Warning labels should be placed on all primary power switches installed in places away from the equipment to alert the electrical maintenance personnel of the presence of a UPS in the circuit



The label will bear the following text or an equivalent one:


Before working in this circuit.

- Isolate the Uninterruptible Power System (UPS).
- Check the voltage between all terminals including the protective earth.

 Risk of voltage feedback from UPS.

1.2.3.1. General safety warnings


- All connections and disconnections of the cables from the equipment, including the control ones, will be done with no power supply and the switches on rest, position «On» or «Off».
- Shutdown the equipment completely by switching «Off» the button of the control panel first. Next disconnect the cable or by switching «Off» the input circuit breaker of the installation.
 -  The indiscriminate manoeuvring of the switches may involve production losses and/or equipment damages. Consult the documentation before doing any action.
-  Pay special attention to the labelling of the equipment that warns about the «Electrical shock hazard». Inside the equipment there are dangerous voltages, never open the enclosure, the access has to be done by qualified staff. In case of maintenance or fault, consult our KESS Support-Team.
- Cross cable sections used to supply the equipment and loads, will be according to the nominal current stated in the nameplate label of the equipment, and respecting the Low Voltage Electro-technical Regulations or standards of the country.

Use approved cables only.
-  Protection Earth cable of the UPS drives the leakage current of the load devices. An isolated earth cable has to be installed as part of the circuit that supplies the equipment. Cross cable section and its features will be same as the power supply cables, but with green colour with or without the yellow strip.


All outlets of the UPS has an earth bonding, duly connected and those equipments with power blocks there is an exclusive terminal for the load earth connection. When an outgoing dis-

tribution is done, i.e power strips, it is essential that they have an earth terminal connected to each one of them.

It is essential that the cables that supplies the loads have the earth connection cable.

-  The protection earth must be connected to the frame or metallic chassis of any electrical equipment (in our case to the UPS, battery cabinet or case and loads), assuring that it is done before connecting the input voltage.

Check the quality and availability of the earth, it has to be between the defined parameters by the local or national regulations.

- For the smallest devices (the ones connected with the foreseen power cord with plug), the user has to check the wall outlet corresponds with the type of supplied plug, with earth duly installed and connected to the local protection earth.
-  During the normal UPS operation, the power cord cable can't be disconnected from wall outlet, because the protection earth of the own UPS would be disconnected and also the earth from the loads connected to the output.

For this reason, the general protection earth cable of the building or switchgear panel that supplies the UPS will not be disconnected.

- Check that the sum of the leakage currents of the UPS and connected load/s do not exceed over 3,5mA.
- The installation will have input protections sized to the currents of the equipment and stated in the nameplate label (RCD devices type B and circuit breakers with C characteristic or any other equivalent one).

Overload conditions are considered as a nonpermanent an exceptional operating mode, so these currents will not be kept in mind when sizing the protections.


- Do not overload the UPS by connecting loads with inrush consumptions at its output, like laser printers.
- Output protection will be done with a circuit breaker of C characteristic or an equivalent one.

It is recommended to distribute the output power, into four lines as minimum. Each one of them will have a protection circuit breaker sized to the quarter of the nominal power. This kind of outgoing distributions will allow that any fault in any device connected to the equipment, that makes a short-circuit, will affect to the line with the faulty device only. An uninterruptible power supply will be guaranteed to the rest of connected loads, due to the protection tripping of the affected line by the short-circuit only.

- When replacing a fuse, do it for another of the same type, characteristics format and size.
- Under any concept the input power cord will be connected to the output of the equipment, either directly or through other ways.
- All the equipments have an auxiliary terminal strip to install an external emergency power off button (EPO), and it will belong to the user property.


The contact is preset from factory as normally open, so the button must be switched to close the circuit and the voltage to the loads is broken. To establish the power supply to the loads again, the EPO button must be deactivated.

EPO doesn't affect to the power supply of the equipment, it only breaks the power supply to the loads as a safety measure.


-  When supplying input voltage to a UPS with fitted in or separate static bypass, although the inverter is still turned «Off» (deactivated) it doesn't mean that at the output there will not be voltage.

So, to do it, the input and static bypass switches will have to be turned «Off».

Put warnings of danger and/or emergency switches if the safety Standards require it in your particular installation.

-  It is possible that the UPS supplies output voltage through the manual bypass to those equipments that incorporate it either standard or optional, so it will have to be considered as regards to safety. If it is necessary to break the output supply of the equipment in this situation, deactivate the outgoing distribution protection or in case of lack of it the general protection of the distribution panel that feeds the UPS.
- All power supply electrical cables have to be fixed to the equipments and loads, interfaces, etc., to unmovable parts and in the way to avoid treads, trips on them or fortuitous pulls.
- CHASSIS or RACK mounted equipments are destined to be installed in a predetermined set to be done by professionals.
 - ☐ The installation has to be designed and executed by qualified personnel, who will be the responsible to apply the safety and EMC regulations and standards that controls the particular installations where the product is destined.
 - ☐ The equipments assembled in CHASSIS do not have enclosure protection, even the power blocks are unprotected.
 - ☐ Some RACK mounted equipments do not have the power blocks protected.
- Never manipulate the equipment with wet hands.

1.2.3.2. To keep in mind

-  Do not try to dismantle or change any part of the equipment, if this action is not contemplated in this document. Manipulation inside the UPS due to any modification, reparation or any other cause, can make an electrical discharge of high voltage and it is restricted to qualified staff only. Do not open the equipment.

A part from the implicit stated risks, any action that make the modification, internal or external of the equipment or just only the simple intervention inside of itself, which is not stated in this document, it can expire the warranty.

- If it is observed that the UPS exhausts smoke or toxic gas, shut-down it immediately and disconnect it from the power supply. This kind of fault can cause fire or electrical discharge. Contact our KESS Support-Team.
- In case of an accidental equipment dropping or if the enclosure is damaged, do not start it up under any concept. This kind of fault can cause fire or electrical discharge. Contact our KESS Support-Team.
- Do not cut, manipulate the electrical cables, do not put heavy objects over them too. Any of these actions could cause a short-circuit and make a fire or electrical discharge.

Check that the electrical cables of connection, plugs and outlets are in good conditions.

- When moving an equipment from a cold place to a warm environment and vice versa, it can cause condensation (small water drops) in the external and internal surfaces. Before installing a moved equipment from another place or even packaged, the equipment will be left for a minimum time of two hours in the new location before making any action, with the purpose of adapting it to the new environmental conditions and avoid the possible condensations.





The UPS has to be completely dry before starting any installation task.
- Do not store, install or expose the equipment in corrosive, wets, dusty inflammable or explosive environments and never outdoors.

- Avoid to locate, install or store the equipment in a place with direct sunlight or high temperatures. Batteries could be damaged.


In the exceptional case and long exposition to intense heat, batteries can cause filtrations, overheating or explosions, which can cause fires, burn or other injuries. High temperatures can also make deformation in the enclosure.

- The location will be spacious, airy, away from heat sources and easy access.
- Do not obstruct the cooling grids by entering objects through themselves or other orifices.
- Leave as minimum space of 25 cm in the equipment peripheral.
- Do not put materials over the equipment or parts that obstruct the correct visualization of the synoptic.
- Be careful to not wet it, because it is not waterproof. Do not allow entering any kind of liquids in. If accidentally the outside of the machine comes into contact with liquids or salt air, dry it with a soft and absorbent cloth.
- To clean the equipment, wipe over a damp cloth and then dry it. Avoid sprinkling or spillage that could enter through the slots or cooling grids, which may cause fire or electric shock.

Do not clean the equipments with products that could have alcohol, benzene, solvent or other inflammable substances, or they are abrasive, corrosive, liquids or detergent.

- Be careful to not lift heavy loads without help, according to the following recommendations:
 - ☐  , < 18 kg.
 - ☐  , 18 - 32 kg.
 - ☐  , 32 - 55 kg.
 - ☐  , > 55 kg.
- UPSs are electronic equipments, so they will be treated as they are:
 - ☐ Avoid shocks.
 - ☐ Avoid jolting or bouncing of the UPS, like those produced by moving the equipment on a hand truck and move on an uneven or wavy surface.
- UPS transport will be done packaged inside its original packaging in order to prevent it from shock and impact and by means of the suitable type of packaging (carton box, pallet packaging, ...) and appropriate to its weight.
- Although the physical location of the elements can differ from the illustrations in this manual in some cases, the correct labelling correct the possible doubts and makes easy its comprehension.

1.2.3.3. Safety warning regarding batteries

-  The manipulation and connection of the batteries shall be done and supervised by personnel with battery knowledge only.

Before doing any action, disconnect the batteries. Check that no current is present and there is not dangerous voltage in the DC BUS (capacitors) or in the endpoint of the battery set terminals.

Battery circuit is not isolated from input voltage. Dangerous voltages can be found between the terminals of the battery set and the earth. Check that there is not any voltage at the input before take any action over them.


- When faulty batteries are replaced, the complete battery set has to be replaced, less exceptional cases in new equipments, were due to manufacturing faults it will only be re-

placed the defective ones.

The replacement will be done by another one of the same type, voltage, capacity, quantity and brand. All of them has to be of the same brand.

- Generally, the used batteries are sealed lead acid of 12V and maintenance free (VRLA).
- Do not reuse the faulty batteries. There could be an explosion or burst any battery with the involved problems and issues that could happen.
- Generally supplied batteries are installed in the same cabinet, case or rack of the equipment. Depending on the power, autonomy or both, they can be supplied separately from the equipment in another cabinet, case or rack, with the interlink cables among them. Do not modify its length.
- In those equipments requested without batteries, their acquisition, installation and connection of themselves will be done by the end-user and under his responsibility. Data concerning the batteries as regards to quantity, capacity and voltage, are stated in this battery label stucked beside the nameplate of the equipment. Respect these data, battery connection polarity and the supplied circuit diagram strictly.

For an optimum and efficient operating, the battery set has to be located as close as possible to the equipment.

-  The battery voltage can involve the risk of electric shock and can produce high short circuit currents. Observe the following preventive measures before manipulating any terminal block identified in the labelling as «Batteries»:
 - ☐ Disconnect the corresponding protection elements.
 - ☐ When connecting a battery cabinet to the equipment, respect the cable's polarity and colour (red-positive; black-negative) indicated in the manual and in the corresponding labelling.
 - ☐ Wear rubber gloves and shoes.
 - ☐ Use tools with insulated handles.
 - ☐ Take off watches, rings or other metal objects.
 - ☐ Do not place metal tools or objects over the batteries.
 - ☐ Never manipulate with your hands or through conducting objects, do not short either the battery terminal block of the equipment or the own from the batteries.
- In order to avoid a complete discharge of the batteries and as a safety measure after a long blackout of the commercial mains and when ending the working day, proceed to the load shutdown and then to the equipment too, by following the operating described in this «User's manual».
- When the equipment and/or battery module has a protection through a fuse and it is needed to be replaced, it will always be done by another one with the same dimension, type and size.
- For long periods of disconnection, consider that the equipment has to be connected once a month for 10 hours as minimum, in order to charge the batteries, so the irreversible degradation of itself is avoided. On the other hand, in case of storing an equipment, it will be done in a fresh and dry place, never outdoors.
- Never short the battery terminals as it involves a high risk. It involves the detriment of the equipment and batteries.
- Avoid mechanical efforts and impacts.
- Do not open or mutilate the battery. Spilled electrolyte is harmful and toxic to the skin and eyes.
- Do not dispose the batteries in a fire and high temperatures. The batteries may explode.
- In case of contact of the acid with parts of the body, wash immediately with plenty water and call urgently the nearest medical service.

- Batteries involve a serious risk for the health and for the environment. Their disposal should be done according to the existing laws.

2. Quality and standard guarantee

2.1. Standard

The KESSUPS 51RT product is designed, manufactured and commercialized in accordance with the standard EN ISO 9001 of Quality Management Systems. The **CE** marking shows the conformity to the EEC Directive by means of the application of the following standards:

- 2006/95/EC Low voltage directive.
- 2004/108/EC Electromagnetic Compatibility directive (EMC).

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

- EN-IEC 62040-1. Uninterruptible power supply (UPS). Part 1-1: General and safety requirements for UPS's used in accessible areas by end users.
- EN-IEC 60950-1. IT equipments. Safety. Part 1: General requirements.
- EN-IEC 62040-2. Uninterruptible power supply (UPS). Part 2: EMC requirements.



The manufacturers responsibility is excluded in the event of any modification or intervention in the product by the customer's side.



This is a product for its use in commercial and industrial applications, so restrictions and additional measures can be needed in the installation to prevent perturbations.



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

2.2. Environment

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

Equipment recycling at the end of its useful life:

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

Packaging:

To recycle the packing, follow the legal regulations in force.

Batteries:


The batteries mean a serious danger for health and environment. The disposal of them must be done in accordance with the standards in force.

3. Presentation














3.1. Views

3.1.1. Equipment views

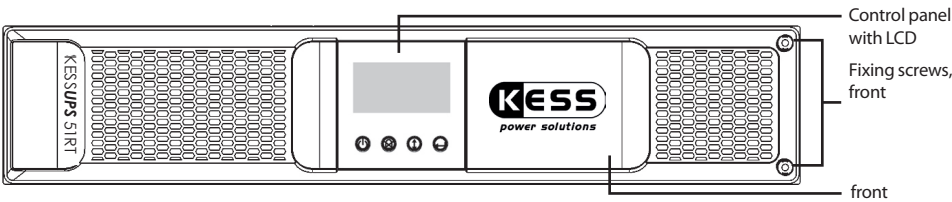
Figures from 1 to 3 are showing the illustrations of the equipment according to the format of the enclosure and related to the power of the model. Nevertheless and due to the constant evolution of the product, several discrepancies or small contradictions can arise. If you have any doubt, the labelling on the equipment will always prevail.

 In the nameplate stuck in the equipment, all the data referred to the main features of the equipment can be checked. Act in accordance with the installation.

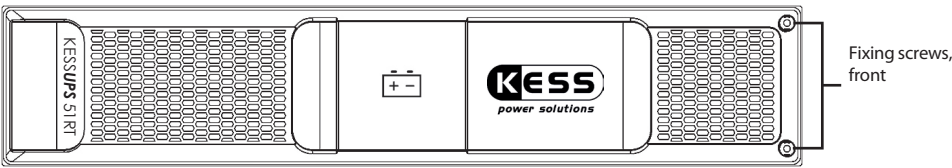
3.1.2. Legend corresponding to the equipment views

Symbol and their meaning			
Symbol	Meaning	Symbol	Meaning
	Warning		Earth
	Electrical shock		Alarm silenced
	UPS ON / Battery test		Overload
	UPS OFF		Battery
	UPS on Standby or shutdown		Recycling
	Alternating (AC)		Keep the UPS in a well ventilated place
	Direct (DC)		

Tab. 1. Used symbology in the equipment and/or this manual.



Front view KESSUPS 51RT



Front view battery module for KESSUPS 51RT

Fig. 1. Front view models from 0,75 to 3 kVA and battery modules for extended back up times.

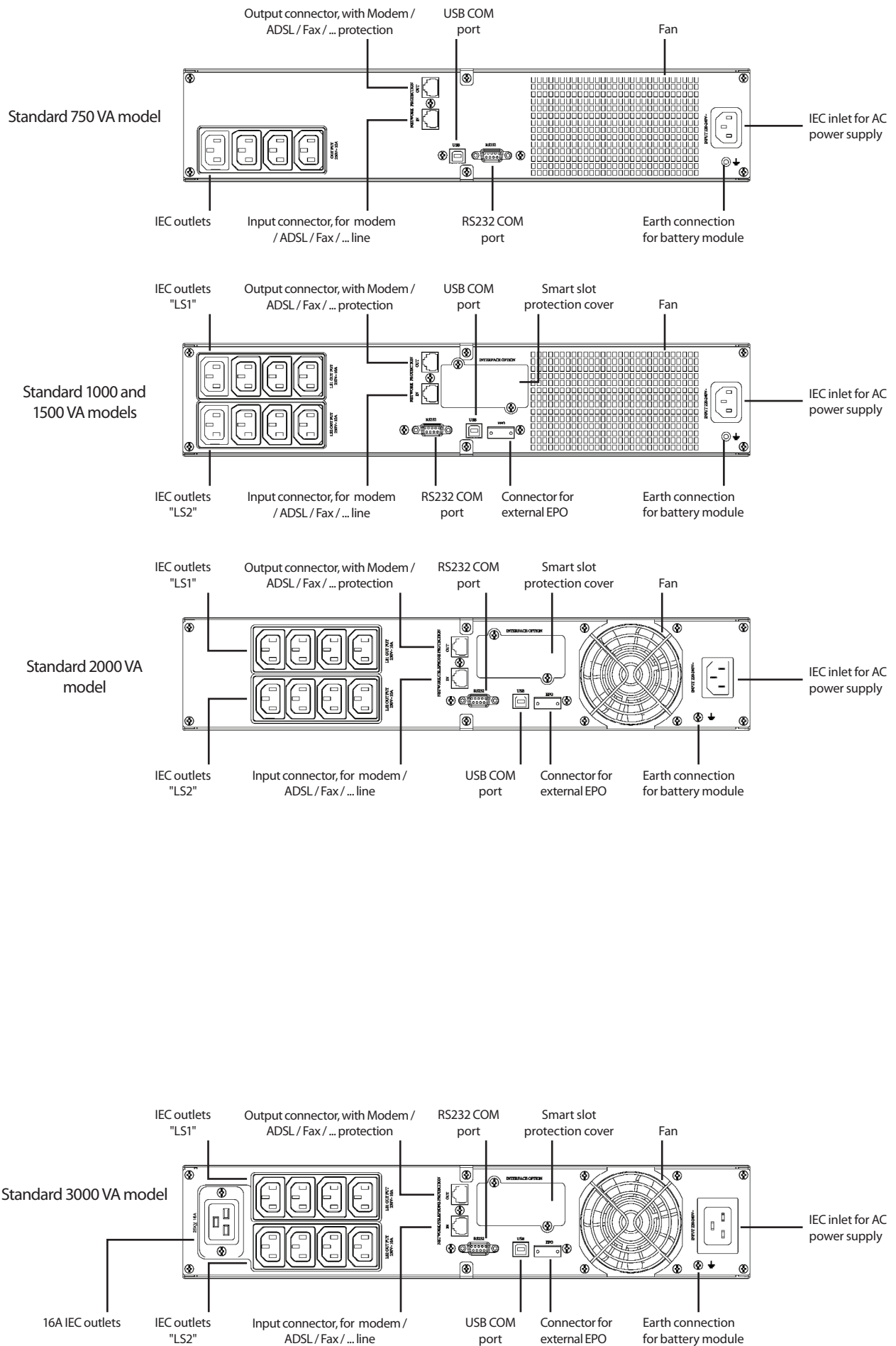
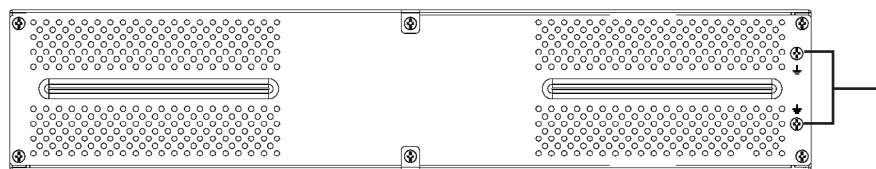


Fig. 2. Rear view according to the model and power rate of the equipments.

Battery module



The connection of the battery module with the equipment and/or with other module is done through the front. To do it, it will be needed to remove the front trim of all the racks, to have access to the connectors ready for this purpose.

Fig. 3. Rear view of the battery modules for extended back up times.

3.2. Description and operating principle

This user's manual describes the installation and operating of the Uninterruptible Power Supply (UPS) from KESSUPS 51RT series, for power ranges between 750 and 3000VA.

These Line Interactive equipments with pure sinewave output, are designed to protect the most critical electronic devices against problems of the power supply like undervoltages, peaks, brownouts, noise in the line and electrical mains fault.

Among other applications, we can quote, PCs, servers, workstations, and other IT networks devices.

The design allows both the rack-mounting assembling with 2U height to be fitted in 19" cabinet, previous installation of the side metallic support with L shape and tower format by using the plastic supports as a plinth.

The UPS has a front panel with LCD and four buttons (Start up switch, Silent/UPS test, Setting and Enter) allow an easy monitoring: Configuration and control, AC input line, inform about the wiring fault and the load status. It also includes two LCD bar graphs, one indicates the battery charge level and the other one the level of the load connected at its output. Each bar is divided into five parts, which each one is equivalent to 20% of the total value.

The equipment has four acoustic alarms (Back up time mode -discharge of the battery-, low battery - end of back up time-, overload and UPS fault). By means of the Silent/UPS test button located at the front panel, the acoustic alarm can be deactivated or to initiate the autotest procedure.

The KESSUPS 51RT equipments are fed from AC commercial mains and supply AC energy at their output through the IEC outlets installed at the rear side of the equipment. In case the power supply is correct, the load/s are fed through the stabilizer with «Boost» and «Buck» technology.

In case of mains fault or voltage and/or frequency out of the acceptable range, load/s will be fed from the batteries through the inverter for a determined time, depending on the model, battery charge level and the own load connected at the output.

For models higher than 750 VA, it is possible to increase the standard back up time of the equipments, by connecting additional modules and/or to optimise the recharging time of the accumulators, by fitting chargers with better quality performances.

All the power range has serial and USB communication ports for communication and equipment control. The serial port supports the di-

rect communications with a server and the protocol is according to a RS-232 interface.

Also, all models have RJ-45 connectors for modem / ADSL / Fax line protection.

Likewise, the models from 1000 VA have:

- EPO connector, to install the option and external by the own user, of an emergency power off button.
- Smart slot to install one of the following communication cards:
 - ☐ AS-400 relay interface, with DB9 connection.
 - ☐ SNMP for controlling the equipment via Web

This manual is applicable to the standardized and stated models in table 2.

3.2.1. Main features

- Control by microprocessor with high reliability.
- Design of high frequency.
- Stabilizer with «Boost» and «Buck» technology.
- Selectable output range and line sensitivity.
- Cold start.
- Standard communication ports: RS-232 and USB.
- Possible communication extend through the slot.
- Extended back up time by means of the battery modules for models higher than 750 VA.
- Protection against overload, short-circuit and overtemperature.
- Design 2 in 1, as 19" rack with 2 U height or Tower.

3.3. Options

Depending on the selected configuration, the equipment can include any of the following options:

3.3.1. Isolation transformer

The isolation transformer, provides a galvanic isolation that allows isolating the output from the input completely.

The installation of an electrostatic shield between the primary and secondary windings of the transformer provides a high level of attenuation of the electrical noises.

The isolation transformer can be installed at the input or output of the UPS from KESSUPS 51RT series and it will always be located out from the equipment enclosure.

3.3.2. External maintenance manual bypass

The purpose of this option is to isolate electrically the equipment from mains and critical loads, without breaking the power supply to the loads. Therefore, in this way the maintenance or fixing tasks can be done in the equipment with no interruption on the power supply energy to the protected system, at the same time that unnecessary risks are avoided to the technical staff.

3.3.3. Integration in IT networks by means of the SNMP adaptor

The big IT systems based on LANs and WANs that integrate servers with different platforms, they have to include an easy way of controlling and management at the manager system disposal. This facility is got through the SNMP adapter, which is well-known by the main software and hardware manufacturers.

The available SNMP option for KESSUPS 51RT series is a card to be inserted into the slot that the UPS has on its rear side.

The connection of the UPS with the SNMP is internal meanwhile the connection between the SNMP and the IT network is done through a RJ45 connector 10 base.

3.3.4. AS400 card

See section 4.3.6.3.

3.3.5. MODBUS protocol

The big IT systems based on LANs and WANs, many times they require that the communication with any device has to be integrated in the IT network and it has to be done by means of an industrial standard protocol.





One of the most used industrial standard protocols in the market is the MODBUS protocol. KESSUPS 51RT series is also ready to be integrated in this type of environments through the external "SNMP card" device with MODBUS protocol.

3.3.6. Extensible rail kit for rack cabinet assembling


There is available only one model of telescopic guide kit for all models, suitable for any type of rack cabinet.

These guides allow installing any unit of the KESSUPS 51RT equipment and their possible battery modules, in case of extended back up times, as it was a rack with its respective cabinet.

4. Installation

- Check the Safety instructions, from section 1.2.3.
- Check that the data in the nameplate are the required by the installation.
- A wrong connection or manoeuvring, can make faults in the UPS and/or loads connected to itself. Read carefully the instructions of this manual and follow the stated steps in the established order.
-  The equipments can be installed and used by personnel with no specific training just with the help of this «Manual».
-  All connections of the equipment including the control (interface, remote panel, ...), will be done with the switches at rest and no voltage present (UPS power supply switch to «Off»).
-  Never forget that the UPS is an electrical energy generator, so the user has to take the needed cautions against direct and indirect contacts.
- Under request, we are able to supply a manual bypass panel.
-  Battery circuit is not isolated from input voltage. Hazardous voltages can be found between the battery terminals and earth. Check that there is not input voltage before doing any intervention on them.

4.1. To be considered in the installation


- All the range has a power cord with plug for input and IEC outlets for output, as connection parts for power. The rest of connections are done through the connectors, including the connection of the equipment with the battery module (it is not available on equipments below 1000VA).
- Cross cable section of the bypass, input and output lines, will be calculated from the current stated in the nameplate of each equipment, and respecting the Local and/or National Low Voltage Electrotechnical Regulations.
- Protections of the switchgear panel, will have the following features:
 - ☐ For input line, type B for RCD devices and C characteristic for circuit breakers.
 - ☐ For the output (load feeding), C characteristic for circuit breaker.Regarding the size, they will be as minimum to the currents stated in the nameplate of each UPS.
- In the nameplate of the equipment there are only printed the nominal currents as it is stated in the safety standard EN-IEC 62040-1. To calculate the input current, the power factor and the efficiency of the equipment have been considered. Overload conditions are considered as nonpermanent and exceptional operating mode.
- If peripherals are added to the input and/or output like transformers or autotransformers to the UPS, the currents stated in the own nameplates of those elements has to be considered in order to use the suitable cross sections, by respecting the Local and/or National Low Voltage Regulation.
-  When an equipment incorporates a galvanic isolation transformer, as standard, as an option or either installed by yourself, either at the UPS input or output or at all of them, protections against indirect contact has to be fitted in (residual current device) at the output of each transformer, because due to its specification of isolation it will prevent the triggering of the protections fitted in the primary of the transformer in case of

electrical shock in the secondary (output of the isolation transformer).

- Remind you that all external isolation transformers already installed or supplied from factory, has the neutral of the secondary connected to earth by means of a cable bridge between both terminals. If it were required an isolated output neutral, remove this cable bridge, keeping the precautions stated in the respective local and/or national low voltage regulations.
- All the UPSs have batteries inside the same rack enclosure of the equipment. Battery protection is made by means of fuse and internal, so it is not accessible by the end-user.
Battery modules have internal protections by fuse, and they are not accessible by the end-user too.


4.2. Reception of the equipment

4.2.1. Unpacking, content checking and inspection


- To unpack, see section 4.2.3.
- On receiving the device, make sure that it has not suffered any damage in transport (impact, drop, ...) and its features correspond with the ones in the order, so it is recommended to unpack the UPS and make a first visual inspection.
- In case of observing damages, make all pertinent claims to the transport agency or in their lack to our company.
 -  Never start up an equipment when external damages can be observed.
- Also check that the data in the nameplate stucked in the packaging and in the equipment, correspond to the ones stated in the order, so it is required to unpack it (see section 4.2.3). Otherwise, make a nonconformity as soon as possible, by quoting the serial number of the equipment and references in the delivery note.
- Check the contents of the packaging. Depending, if we are checking an equipment or battery module, the contents will vary.
 - ☐ Equipment:
 - The own equipment.
 - Quick guide in paper.
 - 1 power cord for input connection -schuko plug and IEC connector-.
 - 2 cables for output connection with IEC connectors.
 - 1 communication cable USB.
 - 4 plastic pieces to be joint two by two to fit the UPS in vertical position.
 - Two metallic pieces with L shape to adapt the equipment to rack format.
 - ☐ Battery module:
 - The own equipment.
 - 1 connection cable for protection earth, to link the equipment and module.
 - 2 plastic pieces to adapt the supports of vertical installation of the UPS and batteries (battery modules for equipments up to 3 kVA only).
 - 1 metallic piece and bolt to joint the battery module with the equipment on tower format.

- Once the reception is finished, it is advisable to pack the UPS and the battery module/s again till its commissioning in order to protect it against mechanical shocks, dust, dirt, etc...

4.2.2. Storage

- Storage of the equipment will be done in a dry place, safeguard from rain, protected from dust, water jets or chemical agents. It is advisable to keep the equipment and the battery pack/s, into their original packages, which have been designed to assure the maximum protection during the transport and storage.
-  In general and less in special cases, the UPS has sealed lead-calcium batteries and should not be stored for more than 12 months.
- After this period of time, connect the equipment to mains and together with battery module/s, if any, start it up according to the instructions described in this manual and charge them for 2 hours from floating level.
- Finally, shutdown the equipment, disconnect it and fit the UPS and batteries in their original packaging.
- Do not store the devices where the ambient temperature exceeds above 50°C or below -15°C, otherwise it may degrade the electrical characteristics of the batteries.

4.2.3. Unpacking

- The packaging of the equipment consists of a cardboard enclosure, expanded polystyrene corner pieces (EPS) or polyethylene foam (EPE), polyethylene sleeve and band, all of them are recyclable materials; therefore they should be disposed according to current regulations. We recommend to keep the packaging in case its use is necessary in the future.
- Proceed as follows:
 - ☐ Cut the strips of cardboard enclosure.
 - ☐ Remove the accessories (cables, supports, ...)
 - ☐ Remove the equipment or battery module from the packaging, keeping in mind that it is needed the help of a second person depending on the weight of the model.
 - ☐ Remove the protection corners from the packaging and the plastic bag.
-  Do not leave the plastic bag at the children hand, due to the risk that it means.
- ☐ Check the equipment before proceeding and in case damages where confirmed, contact with the supplier or in lack of it with our firm.

4.2.4. Vertical assembling -tower type- or rack

- All the UPSs from KESSUPS 51RT series are designed to assemble the equipment as tower format -vertical position of the equipment- or rack -horizontal position- for its installation in 19" cabinets.
- Follow the instructions stated in the sections related to any of both possibilities, attending the particular configuration of your equipment.
- Figures from 4 to 9 show as an example the graphics of an equipment. These illustrations are only for help and orientation in the steps to follow and they are not particular for any model, although in practice, the actions to make are the same for all models.
- Nevertheless when the generic illustrations differ, there will be new illustrations to show it.

- All the instructions relating to connections will detailed later on, less those ones regarding the battery connection. Therefore, this section will only describe the works linked with the assembling.

4.2.4.1. Removing or fitting the cover

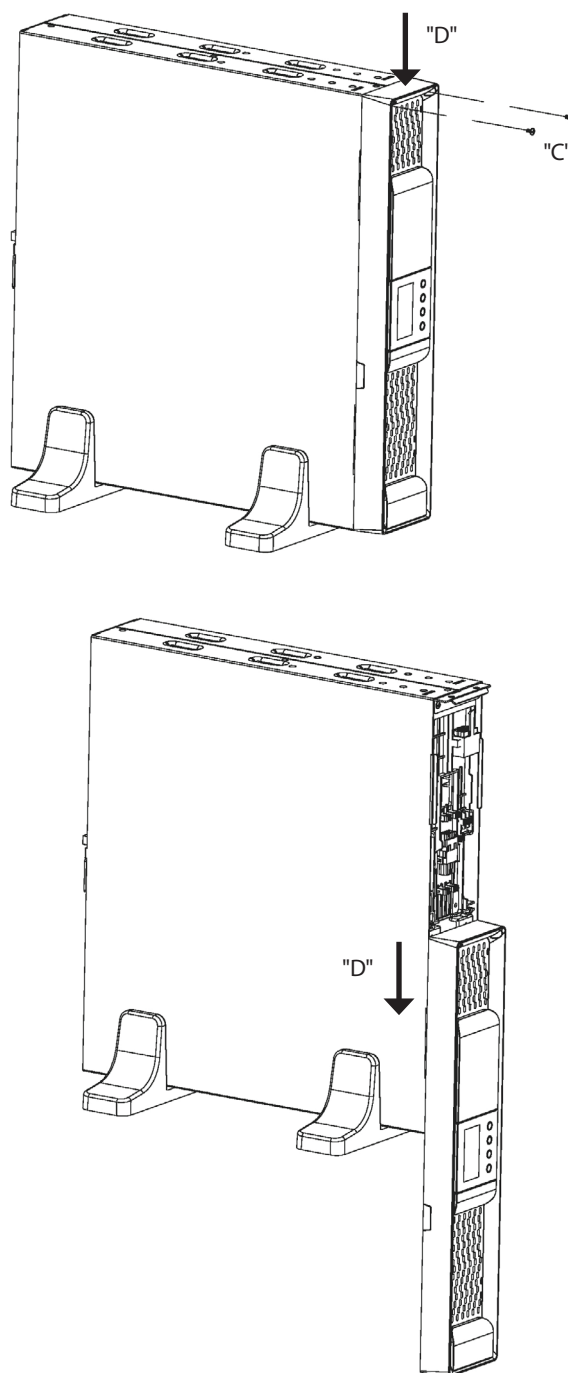


Fig. 4. Taking out the front cover.

- To take off the front cover, proceed as follows (see figure 4):
 - ☐ Remove the two fixing screws "C" from front cover.
 - ☐ Move the front cover to "D" direction, by applying a hard and moderated knock on its side (side without screws), to free the trim entered into the metallic frame.

The front is free, but still joint to the equipment through the connection bus of the control panel.
- To put the front cover back, proceed in the reverse way to its removing.

4.2.4.2. Rotation of control panel with LCD panel.

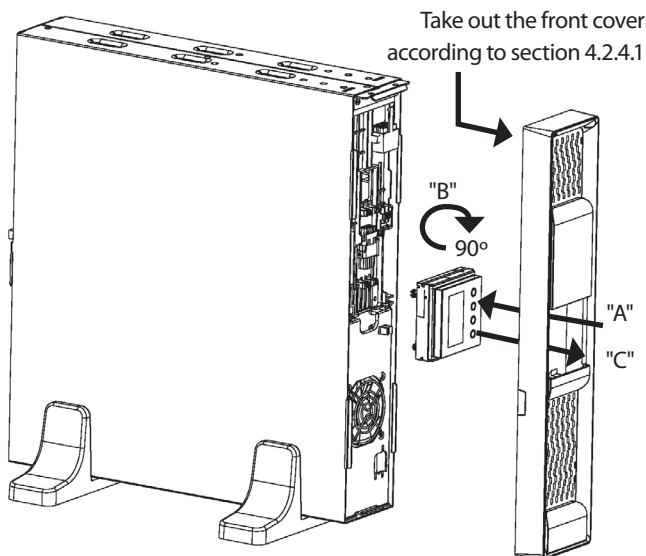


Fig. 5. Rotation of the control panel with LCD over the front cover.

- To make easier the message reading when the equipment is vertically installed, it is advisable to rotate 90° clockwise the control panel with LCD (see figure 5).
- Also, it is advised to rotate the control panel, if any tower type equipment requires to be assembled as rack. Consider that the rotation of the control panel will be counter clockwise.
- Proceed as follows:
 - ☐ Remove the front cover as it is stated in section 4.2.4.1
 - ☐ Slightly open the nails of the four trims that hold the control panel with LCD to the front cover to free it and push inward "A" to separate both parts.
 - ☐ Rotate it 90° on clockwise "B" and insert it again into the front cover till click it "C". Check the correct closing of the fixing nails.
 - ☐ Put the front cover back, in the reverse way as its removing (see section 4.2.4.1).

4.2.4.3. Vertical assembling -tower type-

- Rotate the control panel according to section 4.2.4.2.
- Take the 4 plastic pieces "A" with angle shape supplied with the equipment and joint them two by two till obtain two supports or stabilizers "B".
- Put the UPS vertical between the two stabilizers supports "B" (see figure 6).

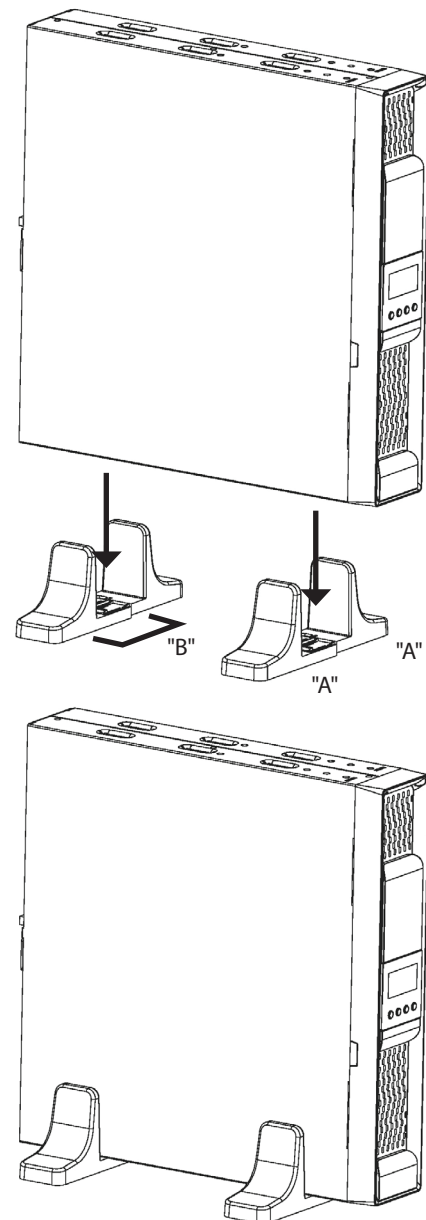


Fig. 6. Vertical -tower type- assembling.

4.2.4.4. Vertical assembling -tower type- , with extended back up time (battery module)

- The description of this section is based on an equipment with only one battery module (see figure 7). For a higher quantity of modules proceed to the connection among them.
- Rotate the control panel of the equipment according to section 4.2.4.2.
- Take the 4 plastic pieces "A" with angle shape and supplied with the UPS and the two supplied with the battery module "B", and joint them till obtain two supports or stabilizers "C" to hold the equipment and battery module.
- Put the UPS and battery module on vertical position between the stabilizers supports "C".
- Fix the "D" metallic piece that joint UPS and battery module by means of the supplied screws "E".
- Regarding the connections of the UPS with the battery module, make the following steps, but reading section 4.3.3 previously:
 - ☐ Connect the supplied earth joint cable "F", between the UPS and battery module.

- ❑ Remove the front cover of the equipment and battery module, as it is described in section 4.2.4.1.
- ❑ Take the extensible cable with connector "H" of the battery module and connect it with the "G" connector of the equipment.

To connect it with other battery modules, there is the "J" connector. Take the extensible cable with "H" connector of the beside battery module and connect it to the "J" connector of the previous one. Repeat the same steps for a high quantity of modules.

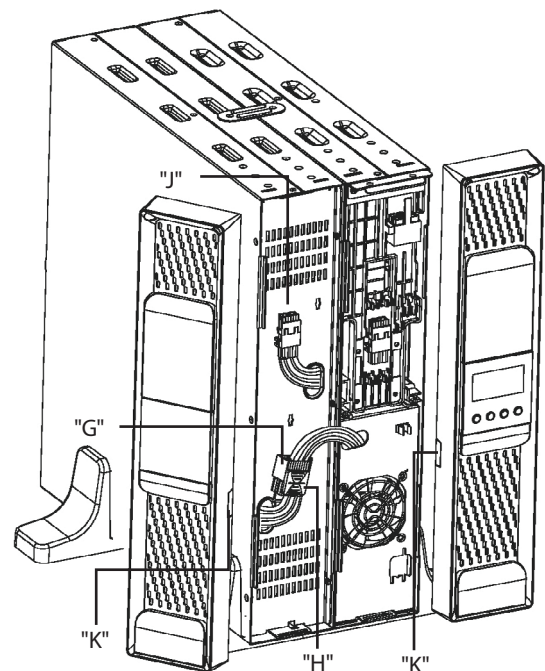
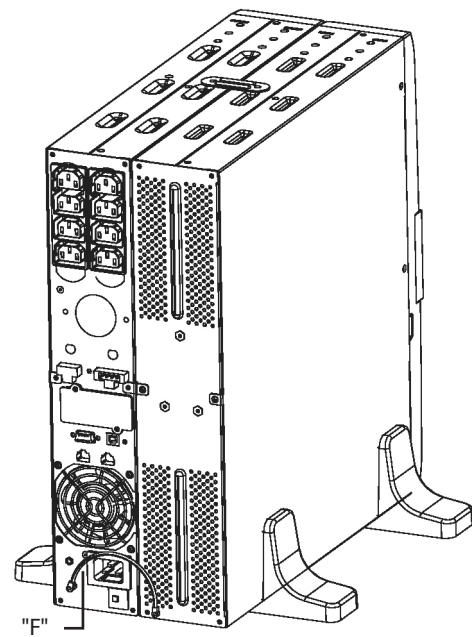
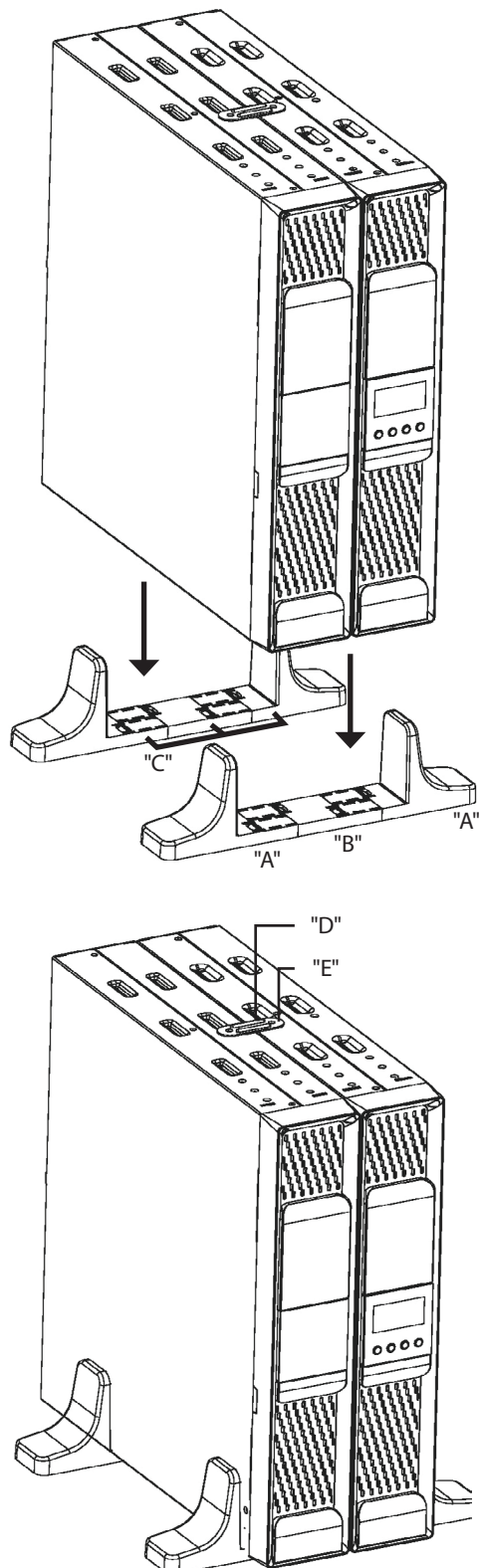


Fig. 7. Model in vertical -tower type- assembling with extended back up time (battery module).

- ❑ In the side of each front cover, there are the "K" trims as a notch to go the cables through it with the battery modules. Break the needed trims to pass the connection bus.
- ❑ Put the front cover back of the equipment and battery module, as it is stated in section 4.2.4.1.

4.2.4.5. 19" rack cabinet assembling

- All models can be installed in a 19" rack cabinet, attending the height of each one of them is 2 units.
- Proceed as follows (see figure 8):
 - ❑ Fix both adaptor angles "A" of the equipment as rack, to its side by means of the supplied screws.
 - ❑ Put a UPS in a rack cabinet, it is needed to have the side internal rail as support mode "C". In lack of them and under request, a rails can be supplied as a guide, to be

installed by the end user. Make the assembling at the required height, assuring the correct torque of the fixing screws.

- ☐ Face the equipment over the rails and enter it to the bottom.

Depending on the model of the equipment and as a result of the weight, it is recommended to make the installation works by two persons, and even more when they are done on the top and bottom of the cabinet.

- ☐ Fix the equipment to the frame of the cabinet by means of the screws "B".

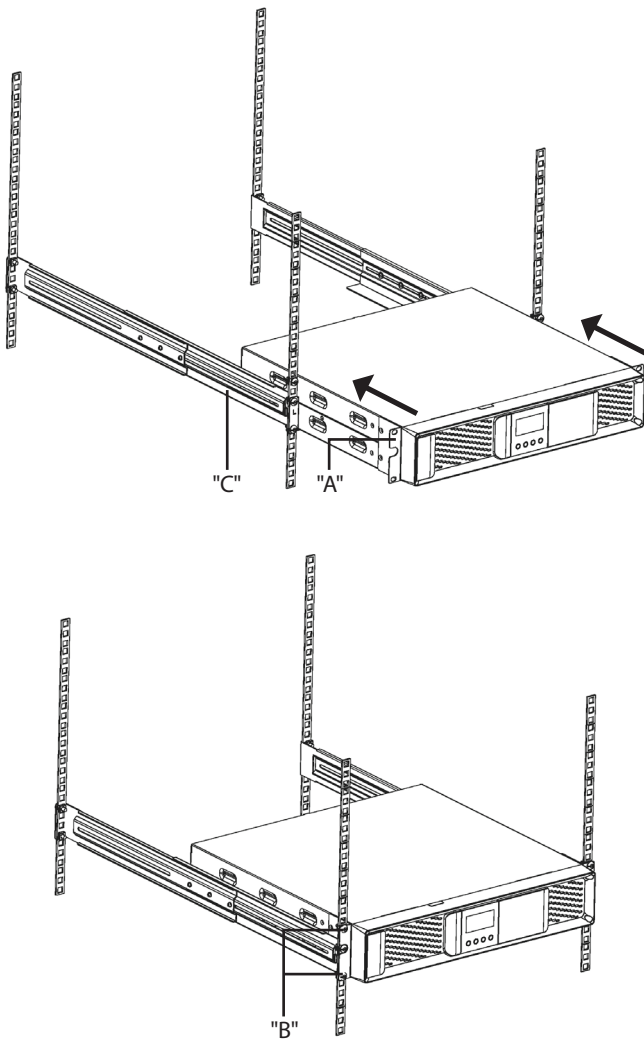


Fig. 8. 19" rack cabinet assembling.

4.2.4.6. 19" rack cabinet assembling, with extended back up time (battery module)

- This section describes a single equipment with only one battery module (see figure 9). For higher quantity of modules reproduce the connection procedure among them.
- All models can be installed in a 19" rack cabinet, attending the height of each one of them is 2 units.
- Proceed as follows:
 - ☐ Fix both adaptor angles "A" to the equipment and to the battery module as rack, on their side, by means of the supplied screws.

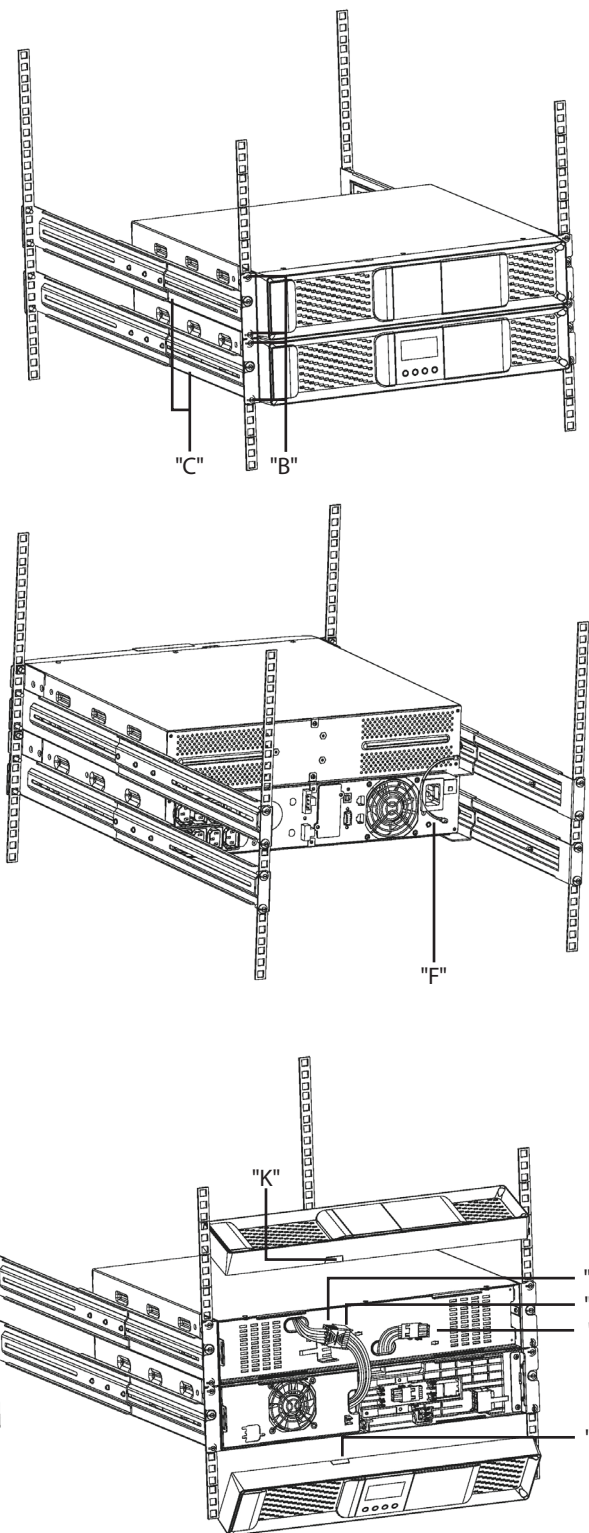


Fig. 9. Model in rack-mounting format in 19" cabinet, with extended back up time (battery module).

- ☐ Put a UPS in a rack cabinet, it is needed to have the side internal rails as support mode "C". In lack of them and under request, a universal rails can be supplied as a guide, to be installed by the end user. Make the assembling at the required height, assuring the correct torque of the fixing screws.
- ☐ Face the equipment over the rails and enter it to the bottom. Proceed in the same way for the battery module.

Depending on the weight of model of the equipment and battery module, it is recommended to make the installation works by two persons.

- ❑ Fix the equipment to the frame of the cabinet by means of the screws "B".


- Regarding the connections of the UPS with the battery module, make the following steps, but reading section 4.3.3 previously:

- ❑ Connect the supplied earth joint cable "F", between the UPS and battery module.
- ❑ Remove the front cover of the equipment and battery module, as it is described in section 4.2.4.1.
- ❑ Take the extensible cable with connector "H" of the battery module and connect it with the "G" connector of the equipment.

To connect it with other battery modules, there is the "J" connector. Take the extensible cable with "H" connector of the beside battery module and connect it to the "J" connector of the previous one. Repeat the same steps for a high quantity of modules.

- ❑ In the side of each front cover, there are the "K" trims as a notch to go the cables through it with the battery modules. Break the needed trims to pass the connection bus.
- ❑ Put the front cover back of the equipment and battery module, as it is stated in section 4.2.4.1.


4.3. Connection

-  Cross cable section used in the power supply of the equipment and loads to feed, will be sized according to the nominal current stated in the nameplate stuck on the equipment, by respecting the Low Voltage Electrotechnical Regulations or norms of the corresponding country.

- Installation will have the suitable input protections sized to the current of the equipment and stated in the nameplate of the equipment (residual current devices type B and circuit breaker with C characteristic or any other equivalent one).

Overload conditions are considered as a nonpermanent an exceptional operating mode, so these currents will not be kept in mind when sizing the protections.



- Output protection will be done with a circuit breaker of C characteristic or any other equivalent one.

 The equipments can be installed and used by personnel with no specific training, just with only help of this «Manual».




- To insert the option cards, it is needed to remove the fixing screws of the smart slot and the own cover.

When finalising the corresponding tasks, the cover will be installed and its fixing screws again.

4.3.1. Connection of input




-  As this is a device with class I protection against electric shocks, it is essential to install a protective earth conductor (connect earth()). Connect the conductor before connecting the power supply to the input power block.
- Take the power cord with schuko plug and IEC connector and connect the IEC connector to the UPS inlet. Next insert the schuko plug to the AC mains outlet.

4.3.2. Connection of the IEC outlets



-  As this is a device with class I protection against electric shocks, it is essential to install a protective earth conductor (connect earth()). Connect the conductor to the terminal, before connecting the power supply to the input power block.
- All the equipments have female IEC outlets, in greater or lesser numbers depending on the power rate of the equipment:
 - ❑ Models up to 750 VA: 1 group of 4 IEC outlets of 10A.
 - ❑ Models of 1 and 2 kVA: 2 groups of 4 IEC outlets of 10A labelled as LS1 and LS2, which can be set through the control panel and/or Win Power.
 - ❑ Models of 3 kVA: 2 groups of 4 IEC outlets of 10A labelled as LS1 and LS2, which can be set through the control panel and/or Win Power, plus a IEC connector of 16A.
-  Loads can be connected to the IEC outlets, meanwhile the features of the equipment and IEC outlets limitations are not exceeded, otherwise there will be sudden blackouts in the power supply of the connected loads at the output.
- If besides of the critical loads, it is required to connect lagging loads of high consumption, like laser printers or CRT monitors, the inrush currents of these peripherals will be kept in mind in order to avoid blocking the equipment under the worst conditions.

It is better to not connect the loads of this kind, due to the high quantity of energy resources they take from the UPS.

4.3.3. Connection of the external batteries (extended back up time)

-  As this is a device with class I protection against electric shocks, it is essential to install a protective earth conductor (connect earth()). Connect the conductor to the terminal, before connecting the power supply to the input power block.
-  To not respect the stated indications in this section and the safety instructions 1.2.3 means a high risk of electrical discharge and even the death.
- All the standard UPSs have batteries in the same enclosure. Battery protection is done by internal fuses and not accessible for the end-user.

Battery modules have internal protections for the batteries too and they are not accessible for the end-user.

-  Before starting the connection between the battery module/s and the equipment, check that the equipment and loads are in "Off" position.
Likewise when batteries are installed by the own user, the fuse or switch has to be turned off.
- Connection terminals of external batteries with the equipment are done with a polarised Anderson connector. This connector is not available in models up to 750 VA.
-  Each battery module is independent for each equipment. It is completely forbidden to connect two equipments to the same battery module.

4.3.4. Connection of main input earth terminal (⚡) and the earth bonding terminal (⚡)

- As this is a device with class I protection against electric shocks, it is essential to install a protective earth conductor (connect earth(⚡)). Connect the conductor to the terminal, before connecting the power supply to the input power block.
- Make sure that all the loads connected to the UPS are only connected to the protective earth bonding terminal (⚡). The fact of not restricting the earthing of the load or loads and/or the batteries case/s or cabinet/s to this single point will create a return loops to earth which will affect the quality of the supplied power.
- All terminals identified as earth bonding (⚡), are joined together, to the main protective earthing terminal (⚡) and to the frame of the device.

4.3.5. EPO terminals in UPSs > 750 VA (Emergency Power Off)

- All UPSs have two terminals to install an external button, for Emergency Power Off (EPO).
- As an illustration mode, figure A, it is shown a connector of two pins.
- By default, the equipment is supplied from factory with the EPO circuit as open (NO). So, the UPS will break the output power supply, emergency power off, when opening the circuit:
 - Either by removing the female connector inserted in the plinth. This connector has a cable bridge to close the circuit (Fig. A).

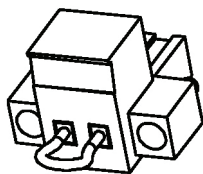


Fig. A

- Or by turning on the external button installed and belonging to the end-user. The connection in the button has to be in normally closed because it will open the circuit when turning it on.
- To restore the normal operating mode of the UPS, the connector with the cable bridge has to be fitted back in the terminal strip or to deactivate the EPO button and later on to cancel the EPO status in the control panel . The equipment will be operative.

4.3.6. Communication port

4.3.6.1. RS232 and USB interface

- Communication line (COM) is a very low voltage circuit of safety. To preserve the quality, it has to be installed separate from other lines that have dangerous voltages (energy distribution line).
- RS232 and USB interfaces are used by the monitoring software and firmware updating.
- It is not possible to use both ports at the same time.

- Signal pin-out of the DB9 connector are shown in table 4. In the connector, the RS-232 signal and dry contacts through optocouplers can be found, not available on model KESSUPS 51RT 750VA. RS232 port consists in a serial data transmission, so an important quantity of information can be sent through a communication cable of 3 wires.

Pin #	Description	Input / Output
1 (*)	Low battery	Output
2	RXD	Input
3	TXD	Output
5 (**)	GND / common	-
8 (*)	Mains fault	Output

(*) Normally open dry contacts (NO), maximum applicable voltage and current is 30V DC and 1A.
Not available on model KESSUPS 51RT 750VA .

(**) GND for RS232 and common for dry contacts.

Tab. 2. Pin-out of the RS232 and optocouplers dry contact in the DB9 connector.

- USB communication port is compatible with the USB 1.1 protocol for communication software.

4.3.6.2. Smart slot

- UPSs have a unique slot, hidden rear the cover stated in the views of the equipment as "Smart slot", and allows inserting any of the following options cards:
 - SNMP for control via Web.
 - AS400 (for more details see the next section).
- For more information, contact our KESS Support-Team or our nearest distributor.

4.3.6.3. AS400 Interface with DB9 output (option)

- Communication line (COM) is a very low voltage circuit of safety. To preserve the quality, it has to be installed separate from other lines that have dangerous voltages (energy distribution line).
- UPS has a dry contact card for the AS400 communication protocol, it provides digital signals in a free potential way, with a maximum applicable voltage and current of 240 V ac or 30 V dc and 1A. Pin-out of the DB9 connector are stated in figure 10 and detailed in table 3.
- The most common use of this type of ports is to provide the needed information for the closing file software.
- For more information, contact our KESS Support-Team or our nearest distributor.

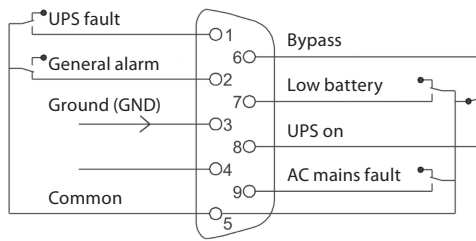


Fig. 10. AS400 dry contact pin-out.


Description	Pin-out	Input/output
UPS fault	1	Output
General alarm	2	Output
Ground (GND)	3	Input
Common	5	Input
Bypass	6	Output
Low battery	7	Output
UPS "On"	8	Output
AC mains fault	9	Output

Tab. 3. AS400 dry contacts alarms.

Installation

- Remove the screws that fix the protection cover of the slot of the equipment and the own cover.
- Take the AS400 card and insert it into the smart slot. Make sure that it is well connected, so the resistance that the own connector inside the slot makes has to be overcome.
- Fix the card with the previous removed screws.
- Connect the DB9 connector from AS400 with the peripheral to be communicated.

4.3.6.4. Protection against transient voltages for modem / ADSL / Fax / ... lines

-  Communication line (COM) is a very low voltage circuit of safety. To preserve the quality, it has to be installed separate from other lines that have dangerous voltages (energy distribution line).
- Connect the main line for the modem / ADSL / Fax /... to the RJ45 connector of the equipment, labelled as "Input".
- Connect the own modem / ADSL / Fax /... to RJ45 connector of the equipment, labelled as "Output".

4.3.7. Software

- Free software download - WinPower.

WinPower is a UPS monitoring software, which makes a user-friendly interface of monitoring and management. This software supplies an auto Shutdown for a system based on several PCs in case of an electrical blackout. With this software, the end-users can monitor and manage any UPS in the same IT network, through the RS232 or USB communication port, never mind the distance between them.

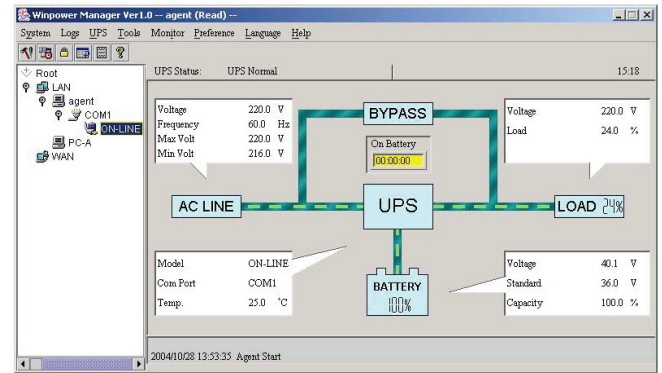


Fig. 11. Main screen of the monitoring software.

- Installation procedure:

- ☐ Go to website:

<http://www.kess.at>



- ☐ Choose the operating platform that you need and follow the instructions described in the web site to download the software.

- ☐ When downloading the needed files from Internet, enter the following licence to install the software:

511C1-01220-0100-478DF2A .

When the computer is rebooted, WinPower software will be shown as an icon with plug shape and green colour in the system tray, near the clock.

4.3.8. Considerations before commissioning with load connected

-  It is recommended to charge the batteries for 2 hours as minimum before using the UPS for first time. When supplying voltage to the equipment, the battery charger will automatically work.
-  Nevertheless, those equipments with extended back up time and with no additional battery charger, it is recommended to charge the batteries of each battery module for 2 hours.
- Although the equipment can work without charging the batteries during the stated time without any problem, the risk of a long blackout has to be valued during the first operating hours and the available autonomy time in the UPS.
- Do not start up the equipment and loads completely till chapter 6 states it.

Nevertheless, when it is done, it will be done gradually to avoid any problem, as minimum in the first commissioning.

- If inductive loads with big inrush current apart from sensitive ones are required to be connected like laser printers or CRT monitors, keep in mind the start inrush currents of these peripherals in order to avoid that the equipment becomes blocked under the worst conditions.

It is better to not connect the loads of this kind, due to the high quantity of energy resources that are taken from the UPS.

5. Operating

5.1. Start up

5.1.1. Controls before commissioning

- Make sure that all the connections have been made properly, respecting the labelling of the equipment and the instructions of chapter 4.
- Check that the UPS is turned Off (shutdown).
- Be sure that all the loads are turned «Off».




Turn off the connected loads before starting up the UPS, and start up the loads one by one, when the UPS is started up only. Before shutdown the UPS, check all the loads are out of service (Off).

- It is very important to proceed in the established order.
- For UPS view, see figures 1 to 3.


5.2. UPS start up and shutdown

5.2.1. Initial UPS start up

- Check that the power supply connection is correct.
- Connect the power cord from UPS input to mains power supply. The LCD panel lights and shows the UPS status, "STBY" (Wait mode).
- Press over the start up key  for more than 3 seconds. The UPS will shift to "NORM" mode (Line mode).
- Check that there are not any alarm or warning activated in the UPS screen and in case of them fix them before proceeding (consult the troubleshooting guide).
- In case of having battery modules connected to the equipment, it is needed to set the complete system (UPS - quantity of battery modules), see section 6.1.6.4.
- To change or modify other factory preset values, consult section 6 of this document.
- In the initial start up, the UPS auto-senses the input frequency and established it as the standard one.

In extreme cases it can happen, although is almost not possible, that the mains frequency is very high or low from the nominal and takes as a default value the wrong one. Check the frequency in the control panel and repeat the procedure if this circumstance would occur.


5.2.2. UPS start up, with mains present

- For the daily start up of the equipment, press over the start up key  for more than 3 seconds, the acoustic alarm will beep for 1 sec. and the UPS will start up.
- Fan will be started up and the LCD from control panel will show the status of the equipment.
- After several seconds, the UPS is established on "NORM" (Line mode). If the mains voltage is wrong, the UPS will shift to battery mode "BATT", with no break in the power supply to


the outlets.

- Start up the load/s, without overloading the equipment.


5.2.3. Start up of the UPS, with no mains present

- Press over the start up key  for more than 3 seconds, the acoustic alarm will beep for 1 sec. and the UPS will start up. Fan will be started up and the LCD from control panel will show the status of the equipment.
- After several seconds, the UPS is established on battery mode "BATT". If mains is restored, the UPS will shift to line mode "NORM", with no break in the power supply to the outlets.
- Start up the load/s, without overloading the equipment.

5.2.4. UPS shutdown, with mains present

- Shutdown the load/s.
- Press over the start up key  for more than 3 seconds to shutdown the inverter. Several seconds after, the LCD panel is shutdown and the complete equipment will be out of service.
- Outlets will be with no voltage.

5.2.5. UPS shutdown, with no mains present

- Shutdown the load/s.
- Press over the start up key  for more than 3 seconds to shutdown the UPS. Several seconds after, the LCD panel is shutdown and the complete equipment will be out of service.
- Outlets will be with no voltage.

6. Control panel

6.1. Functionalities

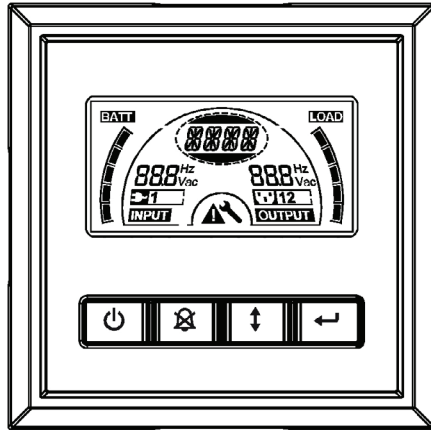


Fig. 12. Control panel view.

The UPS has a graphic screen with LCD panel with four keys and two colour backlight, blue and red. It is used the blue colour as backlight with black text. When any critical alarm of the equipment is triggered, the light changes to red (see table 6).

6.1.1. Button functions

Button	Function	Description
	Start up and shutdown ON / OFF	<u>To start up or shutdown the equipment:</u> Press the key for more than 3 sec.. <u>To escape from fault mode:</u> Turn off the input protection from mains or unplug the schuko plug from the wall outlet and press this key for more than 2 seconds.
	UPS test, acoustic alarm silencer	<u>To do a battery test:</u> Hold this key pressed for more than 3 seconds. <u>To do the battery lifetime test:</u> Hold this key pressed for more than 10 seconds. <u>To deactivate the acoustic alarm:</u> Press this key for one second.
	Selection	Press this key to select the setting value, one by one.
	Enter	<u>Enter into the setting mode:</u> Hold this key pressed for more than 3 seconds. <u>Change settings:</u> Hold this key pressed for more than 1 second. The equipment allows setting the blinking parameters and the characters chain. <u>Confirm settings:</u> Hold this key pressed for 1 second. <u>Escape from setting mode:</u> Hold this key pressed for 3 seconds or the key ON/OFF for 0,5 seconds.

Tab. 4. Functionality of the control panel keypad.

- Make sure that batteries are completely charged before doing any corresponding test.
- The following critical alarms do not allow deactivating the own acoustic alarm:

Low battery, Fan fault, internal Over temperature in the equipment and battery fault or damaged.

- The acoustic alarm can be deactivated when beeping, but it will be activated again as soon as a new alarm is triggered.

6.1.2. Acoustic alarms

Code	Condition	Modulation	Alarm silent function
BATT	Warning	Every 4 sec.	It can be silenced
BTOP	Warning	Every 1 sec.	It can be silenced
TEST	Warning	Every 2 sec.	It can be silenced
OPVH	Fault	Continuous	It can be silenced
OPVL	Fault	Continuous	It can be silenced
OPST	Fault	Continuous	It can be silenced
OVL	Warning	Every 1 sec.	It can be silenced
BATH	Warning	Continuous	It can be silenced
BATL	Warning	Every 1 sec.	It can't be silenced
OVTP	Warning	Every 1 sec.	It can't be silenced
OVTP	Fault	Continuous	It can't be silenced. It is silenced when temperature decreases.
FNLK	Fault	Continuous	It can't be silenced. It is silenced when fan works.
BTWK	Warning	Continuous	It can be silenced

Tab. 5. Acoustic alarms. Condition and modulation.

6.1.3. UPS status and colour of the LCD panel, depending on the condition

By means of an abbreviated chain of 3 to 4 characters (code), in the LCD panel is displayed the status of the equipment.










The following table 6 shows the corresponding description to each letter sequence or chain.

Code	Condition	Description	LCD colour
STBY	Status	UPS working on Standby.	Blue
IPVL	Status	Input voltage too low.	Blue
IPVH	Status	Input voltage too high.	Blue
IPFL	Status	Input frequency too low.	Blue
IPFH	Status	Input frequency too high.	Blue
NORM	Status	UPS working on line mode.	Blue
AVR	Status	UPS working on stabilizer mode.	Blue
BATT	Warning	UPS working on battery mode.	Blue
BTOP	Warning	Battery disconnected.	Red
TEST	Warning	UPS working on battery life / function test.	Blue
OPVH	Fault	Battery mode with output voltage too high.	Red
OPVL	Fault	Output voltage is too low.	Red
OPST	Fault	Short-circuit at the output.	Red
OVL	Warning	Overload.	Red
BATH	Warning	Battery voltage is too high.	Red
BATL	Warning	Battery voltage is too low.	Red

Code	Condition	Description	LCD colour
OVTP	Fault	Fault due to internal temperature too high.	Red
FNLK	Fault	Fan is faulty or doesn't work.	Red
BTWK	Warning	Battery faulty or damaged.	Red

Tab. 6. UPS status and LCD panel colour depending on the condition.

6.1.4. Graphics displayed in the LCD panel

Icon	Description	Function
	Input voltage and frequency.	It displays the voltage and frequency values of the input.
	Input plug indicator.	The icon is displayed in the screen, if the mains is inside the permissible range of the equipment.
	Output voltage and frequency.	It displays the voltage and frequency values of the output.
	Output plug indicator.	The UPS has two outlets groups, > 750 VA models. In the icon is displayed when their respective outlets have voltage.
	UPS status / User setting screen.	Acronym chain of the status mode. They display the condition of the equipment (see table 6). Acronym chain of the values. They displays the options of the user setting (see table 8).
	Warning indicator.	It is activated as warning fault mode or alarm in the equipment.
	Setting or configuration.	It is activated when the equipment is on setting or configuration mode.
	Battery level graph.	It displays the battery charge level in %, which is equal to the available energy capacity. The bar is divided into five parts, each part corresponds to a 20 % of the total capacity of the battery set.
	Load level graph.	It displays the load level connected at the output of the equipment in %, equivalent to the power consumed in real time. The bar is divided into five parts, each part corresponds to a 20 % of the load or nominal power of the equipment.

Tab. 7. Button or control panel keypad functionality.

6.1.5. User settings

By means of an abbreviated chain of 2 to 4 characters (code), the configurable parameters are displayed in the LCD panel.

Table 8 shows the corresponding description to each one of these letters sequences or chain, as well as the possible selectable variables or values.

Code	Description	Values
OPV	Output voltage selection.	(220)=220V (230)=230V (240)=240V
AV	Input voltage type	(000)=Normal range (001)=Wide range (002)=Gen set
EBM	External battery module	0 - 9 it is the quantity of battery modules
TEST	Auto test.	(000) Deactive (001) Active
AR	Automatic restart.	(000) Deactive (001) Active
GF	Green mode.	(000) Deactive (001) Active
BZ	Acoustic alarm control.	(000) Deactive (001) Active
LS1	IEC outlets group 1 (not available in equipments < 1 kVA)	(000) Deactive (001) Active
LS2	IEC outlets group 2 (not available in equipments < 1 kVA)	(000) Deactive (001) Active

Tab. 8. UPS status and character chain description.

6.1.6. Explanations about the user settings and other ones

6.1.6.1. Operating modes

- Normal range: In this mode, the input voltage range is $\pm 20\%$.
- Wide range: In this mode, the input voltage range is from $+20\%$ to -30% .
- Gen mode: On this mode the load is transferred to battery mode (inverter output), when frequency is higher than the upper and lower threshold, of 40 and 80 Hz respectively.
- Battery mode (inverter output): When the UPS is working out from the range or during a blackout, the acoustic alarm beeps every four seconds. Also the LCD panel displays the "BATT" indication, corresponding to the status of the equipment to show the UPS operating mode -Battery mode-.

If on this condition, the battery capacity is low, the alarm beeps once per second and the LCD panel displays the "BATL" indication.

- Standby mode.

When the UPS is shutdown and it remains connected to the wall outlet, it will be on standby mode. In the LCD panel will display "STBY" to show that the power supply to the loads is not available. On this mode the battery will be charged, if it was needed.

6.1.6.2. IEC outlet groups


- It is possible to set the status (active or deactive) of the both available connector groups LS1 and LS2, at any time and separately.









This function is not available in equipments < 1 kVA, because there is only one IEC connector group.





- To set the IEC outlet group through the LCD panel of the equipment, proceed as follows:

- 1.- Enter into the configuration mode.

Press the key  for more than 3 seconds and the UPS will shift to setting mode.

- ❑ 2.- Select the configuration elements.
Press the key  to select the configurable elements stated in table 8 and go forward or backward till reaching "LS1" or "LS2" as it is required.
- ❑ 3.- Validate the configuration element.
When the LCD panel displays "LS1" or "LS2", press the key  for more than one second to enter into the element to set. The values of the variables blink (blinking mode).
- ❑ 4.- Select the configuration value.
Press the key  to select the configuration value. Select the value (001) or (000) to set the desired IEC outlet group, as turned on or off respectively.
- ❑ 5.- Confirm the configuration.
Press the key  for one second, the UPS will return to the previous point 2.
- ❑ 6.- Escape from setting mode.
Press the key  for 3 seconds or the key  for 0,5 seconds, to escape from the setting mode.

When the LCD panel displays "GF", press the key  for more than one second to enter into the element to set.








- ❑ 4.- Select the configuration value.
Press the key  to select the configuration value.
Select the value (001) to activate function.
- ❑ 5.- Confirm the configuration.
Press the key  for one second, the UPS will return to the previous point 2.
- ❑ 6.- Escape from setting mode.
Press the key  for 3 seconds or the key  for 0,5 seconds, to escape from the setting mode.

6.1.6.3. Setting the UPS to connect it with "n" battery modules



- In order to be sure that the LCD panel displays the correct remaining capacity of the batteries, the available quantity of battery modules has to be set and updated when facing any modification, otherwise the displayed data will not be real.



Models < 1 kVA do not have connectors to extend the back up time.

- Proceed as follows:
 - ❑ 1.- Enter into the configuration mode.
Press the key  for more than 3 seconds and the UPS will shift to setting mode.
 - ❑ 2.- Select the configuration elements.
Press the key  to select the configurable elements stated in table 8 and go forward or backward till reaching "EBM".
 - ❑ 3.- Validate the configuration element.
When the LCD panel displays "EBM", press the key  for more than one second to enter into the element to set.
 - ❑ 4.- Select the configuration value.
Press the key  to select the quantity of battery modules available for the UPS.
 - ❑ 5.- Confirm the configuration.
Press the key  for one second, the UPS will return to the previous point 2.
 - ❑ 6.- Escape from setting mode.
Press the key  for 3 seconds or the key  for 0,5 seconds, to escape from the setting mode.

6.1.6.4. Setting the "Green" function

- If this function is activated, the UPS disable the output when it is on battery mode when it is not detected a minimum of consumption. By default, this feature is deactivated, if it is needed to modify it, proceed as follows:
 - ❑ 1.- Enter into the configuration mode.
Press the key  for more than 3 seconds and the UPS will shift to setting mode.
 - ❑ 2.- Select the configuration elements.
Press the key  to select the configurable elements stated in table 8 and go forward or backward till reaching "GF".
 - ❑ 3.- Validate the configuration element.

7. Maintenance, warranty and service

7.1. Maintenance of the battery

- Pay attention to the safety instructions regarding battery and the stated in section 1.2.3.3
- The equipment from KESSUPS 51RT series only requires a minimum maintenance. The used battery in the standard models is lead acid, sealed, VRLA and maintenance free. These models require a minimum of reparations. The only requirement is to charge the UPS regularly, in order to prolong the battery lifetime. Meanwhile, it is connected to the power supply, never mind if the UPS is ON or OFF, it will keep the batteries charged.
- The UPS has to be charged once, every 4 or 6 months if it has not been used for long time.
- In hot areas, battery has to be charged every 2 months. The charging time has to be 12 hours as minimum.
- Under normal conditions, the battery lifetime is from 3 to 5 years 25° C. In case that the battery was not in good conditions, it has to be replaced before. This replacement has to be done by qualified staff.
- Always replace them with the same quantity and type.
- Do not replace one battery only. All batteries have to be replaced at the same time and following the instructions of the manufacturer.
- Usually, the batteries should be charged and discharged every 4 or 6 months. The charging would be started after a UPS shutdown due to a low battery (discharging). Charging time for standard UPS should be 12 hours as minimum.

7.1.1. Notes for installing and replacing the batteries

- If it is needed to replace the connection of any wire, purchase original parts through authorised distributors or service centres in order to avoid overheating or sparks with risk of fire because the size could not be enough.
- Do not short the + and - poles of the batteries, there is risk of fire or electrocution.
- Be sure that there is no voltage before touching the batteries. Battery circuit is not isolated from the input circuit. Hazardous voltages can be found between the battery and earth terminals.
- Even with the input circuit breaker switch from protection panel is turned off, the internal parts of the UPS are still connected to the batteries, so there are hazardous voltages inside.
Therefore, before doing any reparation or maintenance task, the internal battery fuses and/or the interlink connections between them and the UPS, have to be removed.
- Batteries have hazardous voltages. The battery maintenance and replacement have to be done by qualified personnel and familiarised with them. Nobody else can manipulate them.

7.2. UPS Trouble Shooting guide

If the UPS doesn't work properly, check the information given by the LCD of the control panel, according to the models and power of the equipment. Try to solve the problem by means of the established steps in the tables 9 and 10. In case the problem persists, consult our KESS Support-Team.

When it is needed to contact our KESS Support-Team, provide the following information:

- UPS model and serial number.
- Date when the problem occurred.
- Complete description of the problem, including the information given by the LCD panel and the status of the alarms.
- Power supply condition, type of load and the level connected to the UPS, ambient temperature, cooling conditions.
- Information of the batteries (capacity and battery quantity), if the equipment is -with external batteries-.
- Other informations that you may think are important.

7.2.1. FAQ. Acoustic alarms

Acoustic alarm	Possible cause	Solution
Beep every 4 seconds.	The equipment is on battery mode	Check the input voltage and/or the power cord is connected to the AC wall outlet.
Beep every second with LCD from control panel with "BATL" indication.	Low battery voltage.	Save the tasks in process and shutdown the load/s and the UPS.
Beep every second with LCD from control panel with "OVL" indication.	Overload at the output.	Check the load level connected at the output and proceed to remove the exceeded one, keeping in mind the critical loads.
LCD panel is still on red colour	UPS fault.	Consult our KESS Support-Team

Tab. 9. Acoustic alarms.

7.2.2. FAQ. General indications

Problem	Possible cause	Solution
The equipment doesn't start up when pressing the corresponding key.	Internal fuse blown.	Consult our KESS Support-Team
The equipment is ON but the loads do not have power supply	Jumpers at the output are not connected properly.	Connect the output jumpers.
	There is no voltage in the outlets.	Check LS1 and LS2 (not available in models < 1 kVA), are selected from "001" to "000".
Back up time is too short.	Battery is low or the load level is very low.	Recharge the battery for 24 hours as minimum.
	Battery is depleted or damaged	Consult our KESS Support-Team to replace it.
Continuous alarm and LCD in red colour.	Equipment fault	Consult our KESS Support-Team

Tab. 10. Troubleshooting guide. Warning indications.

7.3. Warranty conditions

The limited warranty only applies to those products that you acquire for commercial or industrial use in the normal development of your business .

7.3.1. Covered product

KESSUPS 51RT.

7.4. Description of the available maintenance and service contracts

For the UPS series KESSUPS 51RT additional warranty services are available as an option.

Also preventive maintenance and service contracts are available.

For further details contact your sales partner or KESS Power Solutions GmbH. Contact details at the last page of this document.

8. Annexes

8.1. Main general specifications

Models:	KESSUPS 51RT				
Available powers (kVA / kW)	0.750 / 0.675	1 / 0.9	1.5 / 1.35	2 / 1.8	3 / 2.7
Technology	Line interactive with sinewave output				
Input					
Permissible power factor of the laods	0.9				
Cold start (from batteries)	Yes, by default with 50 Hz frequency				
Input topology	Single phase				
Quantity of wires	3 wires - Phase R(L) + Neutral (N) and earth				
Voltage	220 / 230 / 240 V AC				
Voltage range	176 ÷ 288 V AC				
Transfer voltage:					
- To battery due to low voltage mains	176 / 184 / 192 V AC (±4 %) -Normal-; 154 / 161 / 168 V AC (±4 %) -Wide ranges-				
- Return from battery due to voltage restored	186 / 194 / 202 V AC (±4 %) -Normal-; 164 / 171 / 178 V AC (±4 %) -Wide ranges-				
- Limit voltage Boost	198 / 207 / 216 V AC (±4 %)				
- Return voltage Boost	206 / 215 / 255 V AC (±4 %)				
- Limit voltage Buck	233 / 243 / 254 V AC (±4 %)				
- Return voltage Buck	225 / 236 / 246 V AC (±4 %)				
- To battery due to high voltage mains	264 / 276 / 288 V AC (±4 %)				
Protection range against overvoltages	L-N: 320V 460 Joules / 6500 A				
Input frequency range - Normal	(45 - 55 / 55 - 65 Hz) (±0,1 Hz); Autosensing				
Input frequency range - Genset mode	40 - 70 Hz				
Output					
Power factor	0.9				
Power (kVA)	0.750	1	1.5	2	3
Power (kW)	0.675	0.900	1.350	1.8	2.7
Wave shape	Pure sinewave				
Nominal voltage	220 / 230 / 240 V AC, selectable				
Voltage accuracy (battery mode)	± 5 %				
Voltage THD linear load	< 10 %		< 3 %		
Voltage THD non-linear load	< 12 %		< 6 %		
Frequency	With mains present, synchronised to nominal of the input (45-55 / 55-65 Hz)				
	Free running (battery mode) 50 / 60 ±0.1 Hz				
Permissible load power factor	0.5 to 1 inductive				
Transfer time					
Line mode to battery mode (normal mode)	2 - 6 ms.				
Line mode to battery mode (Genset mode)	13 ms as maximum				
Efficiency at full load:					
Line mode with charged battery	98 %			96 %	98 %
Buck mode with charged battery	> 95 %				
Boost mode with charged battery	> 92 %				
Battery mode	82 %				
Overload on line mode	110 % ± 10 % : 3 min.		110 - 118 % : 3 min.		
	150 % ± 10 % : 0,2 sec.		119 - 160% : 0,2 sec.		
Overload on battery mode	≥ 110 % ± 10 % : 30 sec.		≥ 110 % ± 6 % : 30 sec.		
	≥ 120 % ± 10 % : 0,1 sec.		≥ 120 % ± 6 % : 0,1 sec.		
Crest factor	3:1				
Generals					
Cold start	Yes				
Green mode	Yes (selectable)				
IEC inlet connectors	10 A				
IEC outlet connectors	4 x IEC 10A	8 x IEC 10A (4 x LS1 + 4 x LS2) + 1 IEC 16 A (3kVA UPS only)			
Communication ports	2 (RS232 -DB9- and USB, mutually exclusive)				
Dry contacts (*)	Yes, through optocouplers (low battery and mains fault). Included in the same connector as the RS232 port.				
Protection connectors for Modem / ADSL / Fax	1 input / 1 output				
Installation connector for external EPO	No	Yes			
Slot for COM option cards	No	Yes			

Models:	KESSUPS 51RT				
Available powers (kVA / kW)	0.750 / 0.675	1 / 0.9	1.5 / 1.35	2 / 1.8	3 / 2.7
Option cards (to insert into the slot)	No	AS400, SNMP, remote management internet or intranet			
Monitoring software	WinPower (free download)				
Line mode	< 40 dB				< 45 dB
Acoustic noise at 1 m on battery mode	< 45 dB				< 50 dB
Operating temperature	0.. +40 °C				
Storage temperature	-15.. +50 °C				
Storage temperature with no batteries	-20.. +70 °C				
Operating altitude	≤ 1500 m (0.. +40 °C)				
	1501 - 3000 m (0.. +35 °C)				
Relative humidity	0-95 % non-condensing				
Protection degree	IP20				
UPS dimensions -Depth x Width x Height- (mm)	436 x 438 x 86.5 (2U)			608 x 438 x 86.5 (2U)	
Bat. dimensions -Depth x Width x Height- (mm)	-	436 x 438 x 86.5 (2U)		608 x 438 x 86.5 (2U)	
UPS weight (kg)	13	14	18.5	28	29
Battery modules weight (kg)	-	20.5		33.5	
Safety	EN-IEC 62040-1; EN-IEC 60950-1				
Electromagnetic compatibility (EMC)	EN-IEC 62040-2				
Marking	CE				
Quality system	ISO 9001 and ISO 140001				

(*) Not available on models KESSUPS 51RT 750VA.

Tab. 11. General technical specifications.



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