DAKER DK Plus
1 kVA - 2 kVA - 3 kVA

Manuel d'installation • Installation manual

Part. LE09705AB-06/17-01 GF

Table of Contents

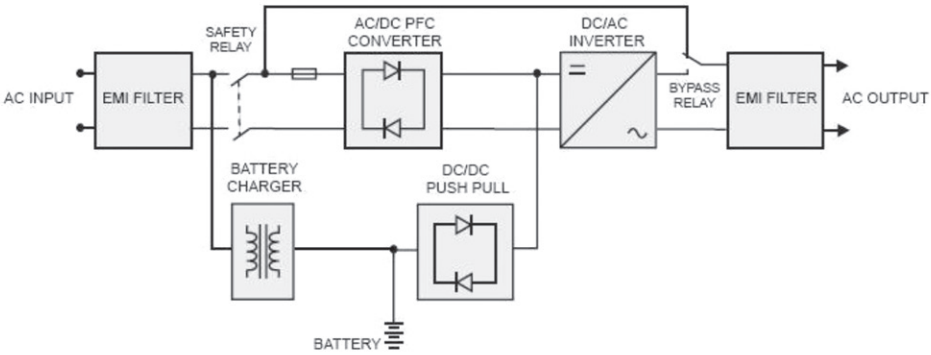
1 Introduction

Congratulations on your recent LEGRAND purchase!

ATTENTION

It is necessary to read the whole manual carefully before doing any operation.
DAKER DK Plus must be used only in residential, commercial industrial environments.

The following diagram illustrates the architecture of the UPS system:



The major modules consist of:

- An AC-to-DC power converter (rectifier) with PFC control circuit.
- A DC-to-AC high frequency inverter.
- A battery charger.
- A battery bank.
- A DC-to-DC push/pull converter control circuit.
- A static bypass loop.
- Input and output EMI filters.

1.1 Use of the manual

This manual must be kept in a safe, dry place and must always be available for consultation.

The manual reflects the state of the art when the equipment was put onto the market. This publication conforms to the standards current on that date; the manual cannot be considered inadequate when new standards come into force or modifications are made to the equipment.
The version of the manual updated to its latest release is available on the Internet from the website http://www.ups.legrand.com

INDICATION
The installation manual is an integral part of the equipment supplied and must therefore be kept for its entire lifetime. In case of need (for example in the case of damage that even partially compromise its consultation) a new copy must be requested from the Manufacturer, quoting the publication code on the cover.

1.2 Guarantee terms

The terms of the guarantee may vary depending on the country where the UPS is sold. Check the validity and duration with LEGRAND's local sale representative.

The Manufacturer declines all indirect or direct responsibility arising from:
- failure to observe the installation instructions and use of the equipment which differs from the specifications in the installation manual;
- use by personnel who have not read and thoroughly understood the content of the installation manual;
- use that does not comply with the specific standards used in the country where the equipment is installed;
- modifications made to the equipment, software, functioning logic unless they have been authorized by the Manufacturer in writing;
- repairs that have not been authorized by the LEGRAND Technical Support Service;
- damage caused intentionally, through negligence, by acts of God, natural phenomena, fire or liquid infiltration.

1.3 Copyright

2 Safety Instructions

This section contains important safety instructions that should always be followed during the installation, use and maintenance of the UPS.

- This product should be installed in compliance with installation rules, preferably by a qualified electrician. Incorrect installation and use can lead to risk of electric shock or fire. Before carrying out the installation, read the instructions and take account of the product's specific mounting location. Do not open up, dismantle, alter or modify the device except where specifically required to do so by the instructions. All Legrand products must be opened and repaired exclusively by personnel trained and approved by Legrand. Any unauthorised opening or repair completely cancels all liabilities and the rights to replacement and guarantees. Use only Legrand brand accessories.
- If any visible damage is found on the product during the unpacking operation, do not install the UPS but repack the unit and return it to your reseller or distributor.
- Before operating the UPS or connecting any load equipment, ensure the UPS is connected to a properly grounded electrical supply.
- The load applied must not exceed the one indicated on the type label of the UPS.
- The ON/OFF button of the UPS does not electrically isolate the internal parts. To isolate the UPS, unplug it from the mains power socket.
- Do not attempt to open or disassemble the UPS; there are no user replaceable parts. Opening the case will void the warranty and introduces the risk of electric shock even when the mains plug is disconnected.
- The mains socket outlet that supplies the UPS shall be installed near the UPS and shall be easily accessible.
- Do not plug non-computer-related items such as medical, life-support and house electric equipments to the UPS output.
- Do not plug laser printers to the UPS output because they have a high start-up current.
- The UPS has its own internal energy source (batteries). If the UPS is switched on when no AC power is available, there is hazardous voltage at the output sockets.

The batteries inside the UPS are not user-replaceable. Servicing of batteries must be performed only by electrical hazard authorized personnel.

CAUTION: A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

a) Remove watches, rings or other metal objects.

b) Use tools with insulated handles.

c) Wear rubber gloves and boots.

d) Do not lay tools or metal parts on top of batteries.

e) Disconnect the charging source prior to connecting or disconnecting battery terminals.

f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock.

The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

CAUTION: Do not dispose of batteries in a fire. The batteries may explode.

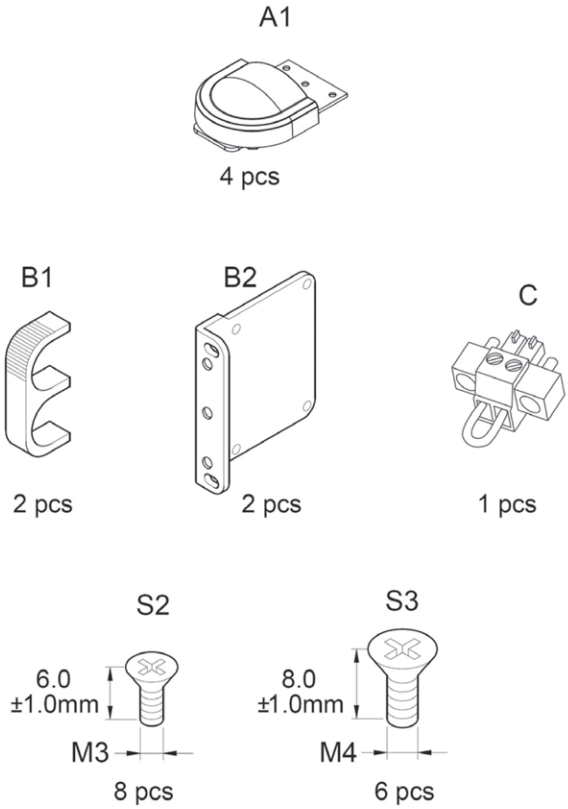
CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

- This UPS has dangerous high voltages on its input and output connections. Contact with these voltages may be life threatening.
- In case of emergency, immediately turn off the equipment and disconnect the power cord from the AC power supply to disable the UPS.
- Do not allow any liquid or any foreign object to enter the UPS.
- The UPS is intended for indoor installation in a ventilated, controlled indoor environment with a range of temperature between 0°C (+32°F) and +40°C (+104°F) and non-condensing humidity between 20% and 80%.
- Do not install the UPS in locations with sparks, smoke and hazardous gas or where there is water and excessive humidity. Dusty, corrosive, and salty environments can damage the UPS.
- Do not plug the UPS input into its own output.
- Do not attach a power strip or surge suppressor to the UPS.
- Do not cover the cooling vents and keep a clearance of 20 cm beyond the UPS rear panel. Avoid exposing it to direct sunlight or installing it near heat emitting appliances.
- Unplug the UPS prior to cleaning and do not use liquid or spray detergent.
- Do not place the UPS near equipments that generate strong electromagnetic fields and/or near equipments that are sensible to electromagnetic fields.

WARNING
All the UPSs are category C2 products according to the EN 62040-2. In a residential environment, these equipments may cause radio interference, in which case the user may be required to take additional measures.

3.1 Package content

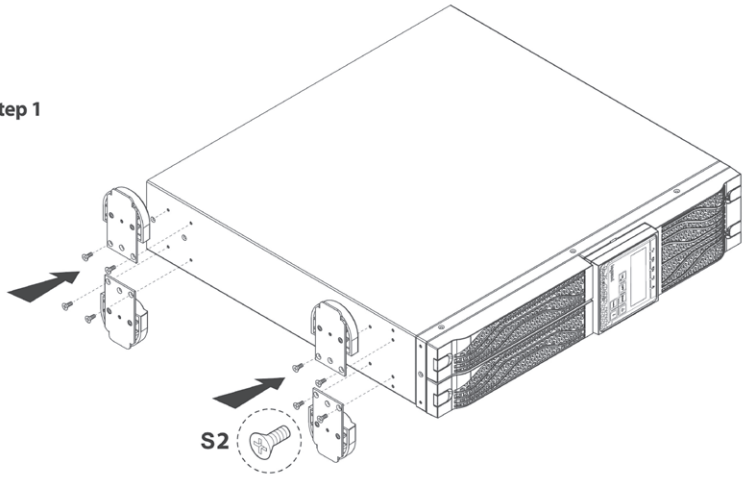
Check for the following package content:
- installation manual;
- 2 x IEC output cable;
- 1 x IEC input cable;
- 1 x USB communication cable;
- tower/rack accessories kit as shown in the following figure:



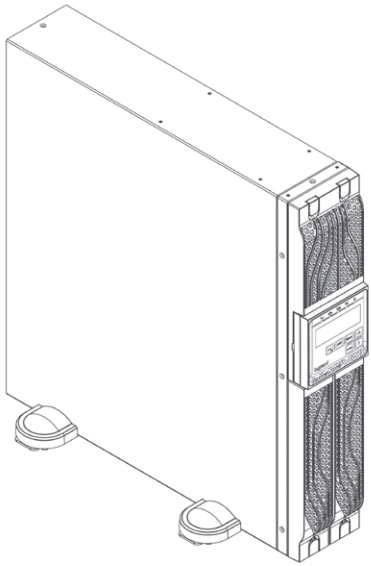
3.2 Tower configuration setup

3.2.1 UPS

Step 1

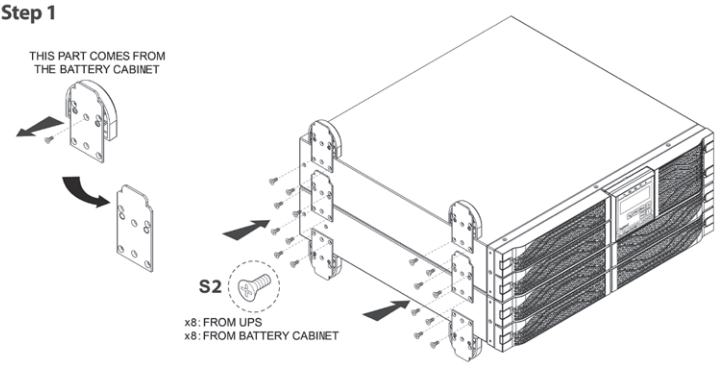


Step 2

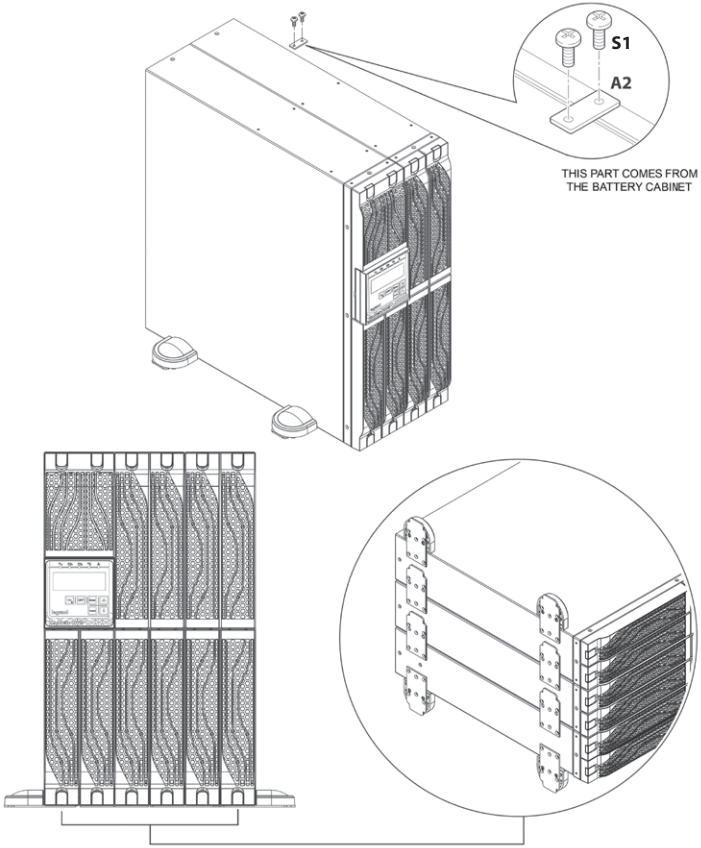


3.2.2 UPS + battery cabinet (optional)

Step 1

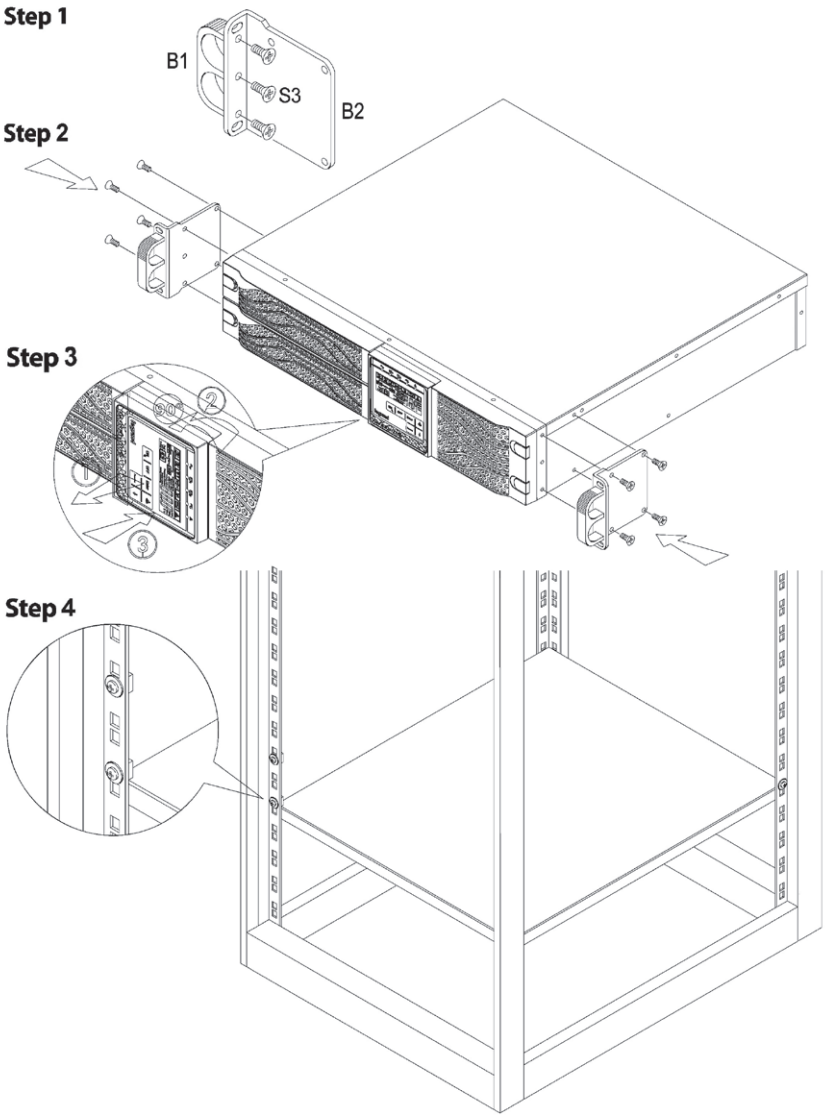


Step 2

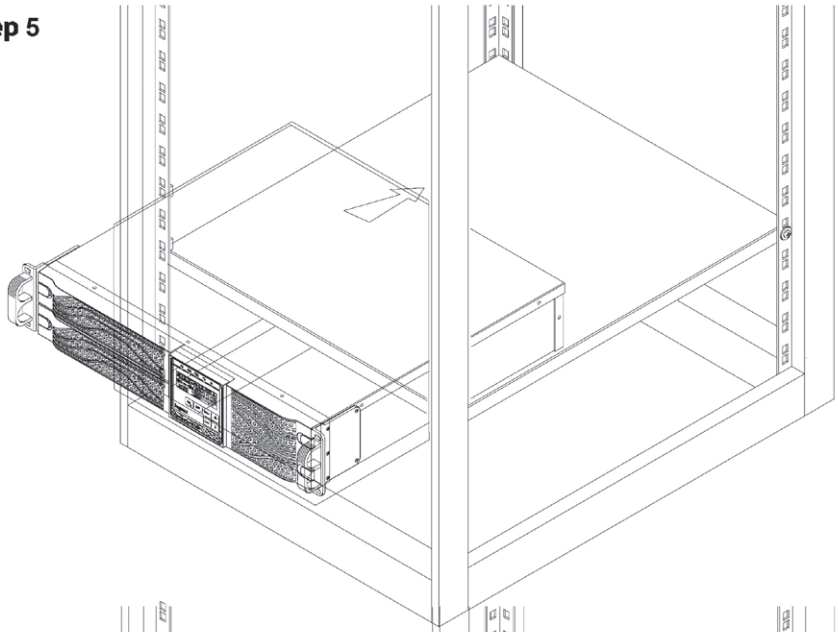


3.3 Rack configuration setup

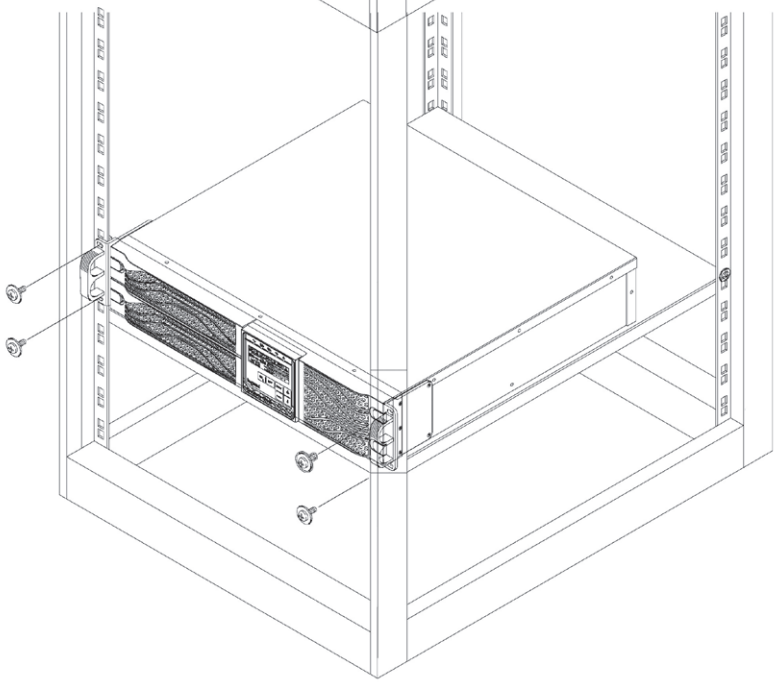
INDICATION
For the rack configuration setup it is also possible to use the rack support bracket kit 3 109 52. In this case, follow the instruction sheet contained in the kit.



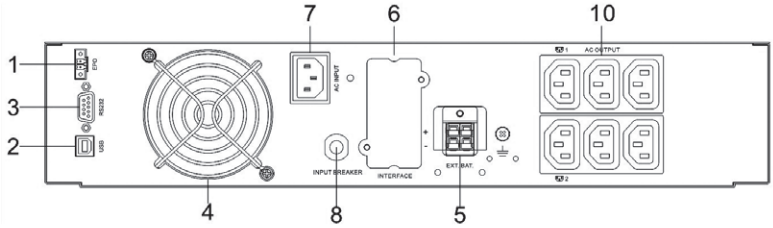
Step 5



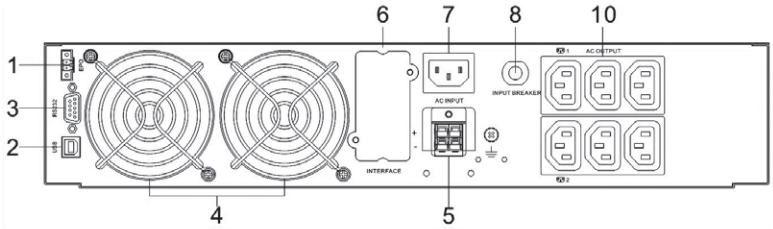
Step 6



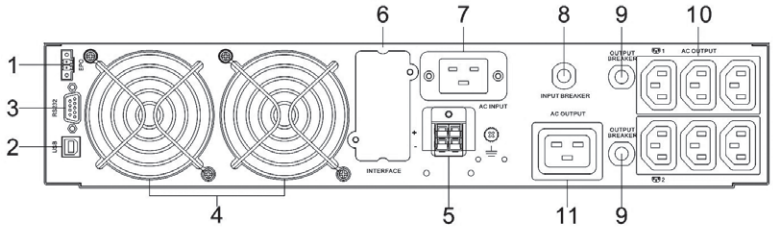
3.4 Rear panel



3 101 70



3 101 71



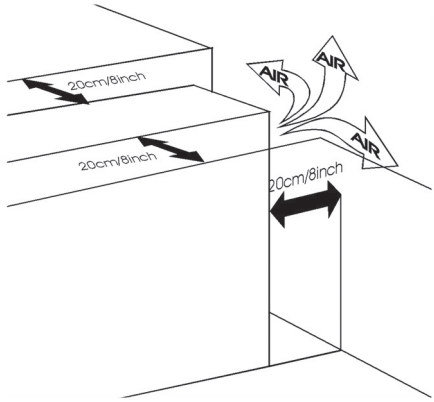
3 101 72

1. Emergency Power Off (EPO)
2. USB port
3. RS-232 port
4. Cooling fans
5. External battery connector
6. SNPM slot
7. AC input connection outlet
8. Input circuit breaker
9. Output circuit breakers
10. IEC 10A outlets
11. IEC 16A outlet

3.5 Installation procedure

WARNING
Read the safety instructions on chapter 2 before installing the UPS.

1. Position the UPS so that the cooling fans are not obstructed, as visible in the following figure:

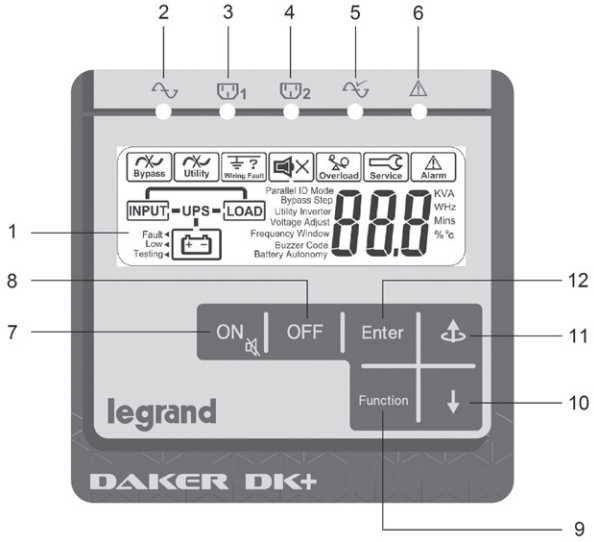


2. Connect the IEC input and output cables provided to the appropriate outlets.
3. Connect the loads to the IEC output cables, ensuring that the switches of the various loads are in the off position.
4. Plug the UPS input cable into a main socket with a suitable voltage and current.

4 Operation

4.1 Control Panel

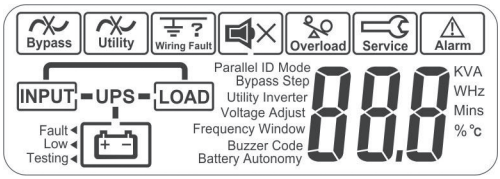
4.1.1 LCD Panel



ITEM	DESCRIPTION
①	Display
②	The steady green LED indicates that the mains voltage is within the admittable input voltage range (160 V – 288 V). The LED blinks if the mains voltage is below that acceptable range (120 V – 159 V).
③ ④	The green LEDs indicate that the programmable outlets 1 and 2 are activated
⑤	The green LED blinks if the UPS is in bypass mode. The steady green LED indicates that the UPS is in ECO mode.
⑥	The steady red LED indicates that there is an alarm
⑦	UPS power ON/Silence alarm
⑧	UPS power OFF
⑨	Special functions access menu
⑩	Go to the next screen
⑪	Go to the previous screen or change the setting of the UPS.
⑫	Confirm a changed setting

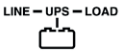
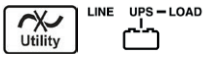
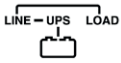
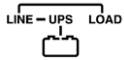
EN

4.1.2 Display description



SIGN	DESCRIPTION
Bypass	Bypass Fault
Utility	Utility Input Fault
Wiring Fault	Site wiring Fault
	Buzzer Silent
Overload	Overload
Service	UPS Service mode (reserved for LEGRAND Technical Support Service)
Alarm	Alarm
INPUT UPS LOAD	UPS operation diagram
888 KVA WHz Mins % °C	3-Digit Measurement Display
	Measured item
Fault ◄	Battery fault
Low ◄	Battery low
Testing ◄	Battery test

4.2 Operating modes

UPS OPERATING MODE	LEDs/DISPLAY INDICATION	BUZZER
NORMAL MODE on-line, double conversion	**LEDs:** steady , , **DISPLAY:** 	No sound
STORED ENERGY MODE The loads are supplied through the batteries connected to the UPS	**LEDs:** steady , , **DISPLAY:** 	Beep every second
BYPASS MODE The loads are supplied directly from the mains. The UPS does not protect the loads. The UPS is in bypass mode after a setting shortcut (paragraph 4.7), a generic alarm or a prolonged overload in normal mode.	**LEDs:** steady , , **DISPLAY:** 	Beep every two seconds
ECO MODE The loads are supplied directly from the mains through the automatic bypass circuit inside the UPS. The output voltage and frequency are the same as the mains.	**LEDs:** steady , , , **DISPLAY:** 	No sound
CVCF 50/60 The UPS maintains constant the output voltage and the output frequency to 50 Hz or 60 Hz according to the setting	**LEDs:** steady , , **DISPLAY:** 	No sound

See also paragraph 4.6 to set the operating mode.

4.3 Start-up procedure

4.3.1 Normal mode

1. Make sure the input breaker is not tripped. If it is, reset it.
2. Plug the UPS input cable into the mains socket.
3. The UPS turns to the standby mode in 5 seconds. The green LED lights up if the input voltage is within the admittable range and the fans spin. The battery charger is active. In this condition the loads are not powered. The display looks like the following figure:

4. Press ON and hold it until the buzzer sounds twice.

   The green LEDs 1 2 light up. The display looks like the following figure:

5. The start-up procedure is completed. Make sure that the batteries are fully charged or that the UPS has been plugged to the wall receptacle at least for 4 hours before connecting the loads.

4.3.2 Cold start

1. Make sure the internal batteries or the external battery cabinets are connected to the UPS.
2. Press ON and hold it until the buzzer sounds twice; then release the key. The display looks like the following figure:

3. Press ON again and hold it until the buzzer sounds twice. If the second key confirmation is not completed within 10 seconds, the UPS does not perform the cold start and shuts off.

4. Few seconds after the second key confirmation, the UPS turns on in stored energy mode and the loads are powered. The alarm LED ⚠ and the green LEDs 1 2 light up. It is audible an intermittent sound alarm.

The display looks like the following figure:

5. The start-up procedure is completed. If the UPS is not plugged to the mains outlet, the loads are powered till the end of the backup time.

INDICATION

The output frequency is the same that there was at the input before the UPS was shutdown. The default value is 50 Hz but if before the UPS shutdown the input frequency was 60 Hz, then the output frequency after the cold start will be 60 Hz.

4.4 Shutdown

1. Press and hold OFF until the buzzer sounds twice.
2. The UPS stops powering the loads and turns to the standby mode. The green LEDs 1 2 switch off. The ventilating fans continue spinning.
3. Unplug the UPS from the wall receptacle if there is still input voltage. After 10 seconds, the fans stop working and the UPS completely shuts down.

4.5 UPS Measurements

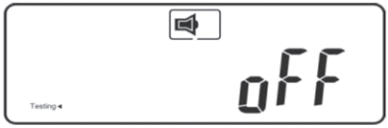
After the UPS is turned on, it is possible to check the UPS measurements by pressing ↑ or ↓.

The display sequence is:
- AC input voltage;
- AC input frequency;
- output voltage;
- output frequency;
- load percentage;
- output current;
- battery voltage;
- battery autonomy;
- UPS internal temperature.

4.6 UPS settings

After the UPS is turned on, it is possible to check the UPS settings by pressing Function. The different parameters can be scrolled pressing ↓.

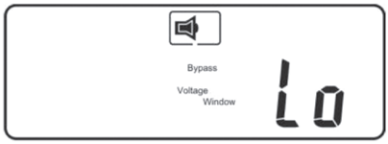
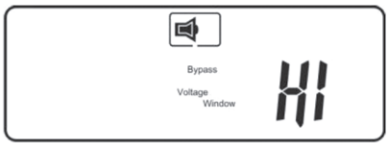
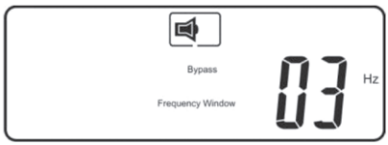
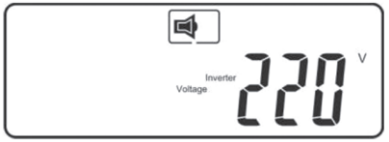
While the UPS is powering the loads, it is possible to change only two parameters:

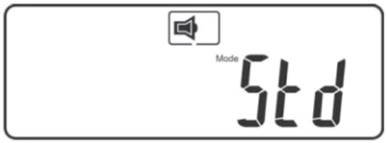
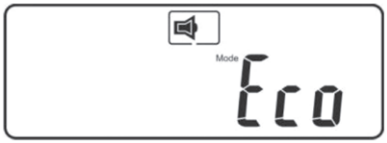
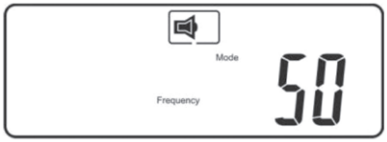
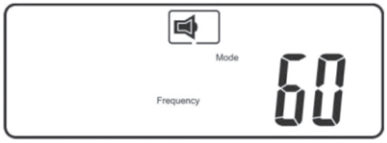
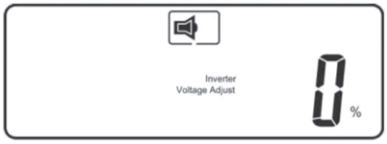
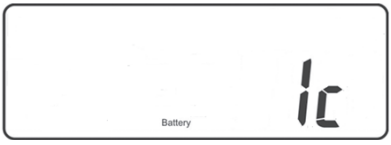
PARAMETER	SETTING	DISPLAY
BUZZER	ON	
	OFF	
BATTERY TEST	OFF	
	ON	

Follow this procedure to change the buzzer setting:
- press the Function. The buzzer setting is displayed;
- press ↑ to select ON or OFF;
- confirm the choice by pressing Function.

The battery test can be performed to check the optimal operation of the batteries. The test can be performed only after the batteries are fully charged, the mains is available and the UPS is powering the loads. Follow this procedure to perform the battery test:
- press Function;
- press ↓ to display the battery test setting;
- press ↑ to select ON. The UPS transfers to stored energy mode for 10 seconds. During the test, the loads are always powered with no voltage dip;
- if at the end of the test the UPS transfers back to normal mode without any alarm code, the batteries are still working properly.

To change all the other settings, the UPS must be in standby mode. In this condition the loads are not powered, therefore all the needed settings must be performed before turning on the UPS. Follow this procedure to change the UPS settings:
- press simultaneously ON and ↓ for approximately three seconds, until the buzzer sounds twice. The LCD displays the first setting indicated in the next table (“buzzer”);
- all the different settings can be scrolled pressing ↓;
- except for the buzzer and the battery test, all the other settings may be changed by pressing ↑;
- after changing settings, scroll to the “End” screen and then press Enter to save all changes;
- the UPS restarts automatically. However, it is also suggested to remove the mains for at least 30 seconds.

PARAMETER	SETTING	DISPLAY
BUZZER *(this setting can't be changed with this procedure)*	**ON**	
	OFF	
BATTERY TEST *(this setting can't be changed with this procedure)*	**OFF**	
BYPASS VOLTAGE RANGE	**LOW** The bypass voltage range is set to ±15% of the selected output voltage	
	HIGH The bypass voltage range is set to ±10% of the selected output voltage	
BYPASS FREQUENCY RANGE	**± 1 Hz** **± 3 Hz** If during the normal functioning the bypass frequency goes beyond the setting, the UPS enters in lock mode (alarm and output disconnected)	
OUTPUT VOLTAGE	**200 V** **208 V** **220 V** **230 V** **240 V**	

PARAMETER	SETTING	DISPLAY
OPERATING MODE (see paragraph 4.2)	**NORMAL MODE**	
	ECO MODE	
	CVCF 50 Hz	
	CVCF 60 Hz	
OUTPUT VOLTAGE ADJUSTMENT	**0 %** **- 1 %** **- 2 %** **- 3 %** **+ 3 %** **+ 2 %** **+ 1 %** If during the normal functioning of the UPS the output voltage is slightly below or above the desired value, this setting allows to adjust it	
EXTERNAL BATTERY CABINETS	**1c - 9c** Select the number of external battery cabinets connected to the UPS	

PARAMETER	SETTING	DISPLAY
END SCREEN	Press Enter to save all changes	

INDICATION

If the UPS is connected to one or more battery cabinets, it is necessary to set their number to forecast a realistic backup time. This can be done from the display of the UPS or by using the software "UPS Setting Tool".

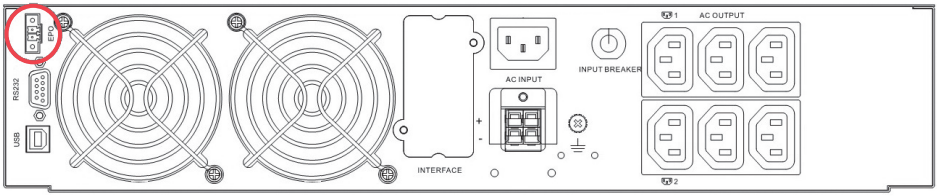
4.7 Settings shortcuts

There are two settings shortcuts:

- Bypass Mode: while the UPS is in normal mode (on-line, double conversion) press ON and simultaneously for approximately three seconds, until the buzzer sounds twice. The UPS transfers from normal mode to bypass mode. During this functioning mode, the bypass LED blinks and the buzzer sounds intermittently. Press again ON and simultaneously until the buzzer sounds twice to return to normal mode.
- Eco Mode: while the UPS is in normal mode (on-line, double conversion) press and simultaneously for approximately three seconds, until the buzzer sounds twice. The UPS transfers from normal mode to eco mode. During this functioning mode, the bypass LED is on. Press again and simultaneously until the buzzer sounds twice to return to normal mode.

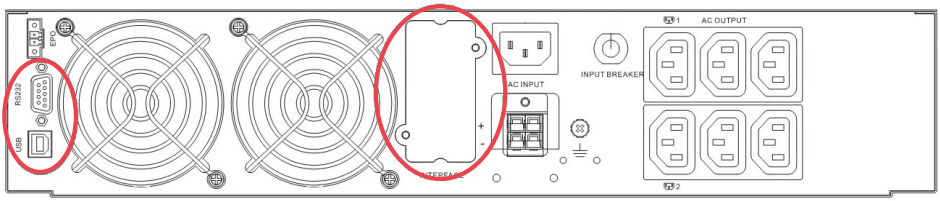
4.8 Emergency Power Off (EPO)

The UPS has an external normally closed contact that can be opened to activate the immediate stop of the UPS.
The EPO terminal is at the back of the UPS and it is needed for the functioning of the UPS.



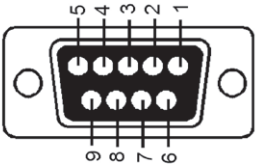
4.9 Communication devices

The UPS has one RS232 serial port, one USB port and one SNMP slot.

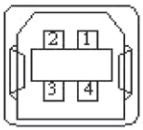


Only one communication interface at a time can control the UPS, according to the following priority:
1) optional interface card;
2) USB;
3) RS232.

The following figures show the pinout of the RS232 and USB interfaces:



Pin 3: RS-232 Rx
Pin 2: RS-232 Tx
Pin 5: Ground



Pin 1: VCC (+5V)
Pin 2: D-
Pin 3: D+
Pin 4: Ground

It is possible to download some free of charge software from the website http://www.ups.legrand.com

The software can be used for the following functions:
- display of all the operations and diagnostic data in case of problems (UPS Communicator);
- setup of special functions (UPS Setting Tool). For instance, the UPS has two programmable outputs for less critical loads. These sockets may be disabled or timed during stored energy mode to ensure the supply of the more critical loads;
- automatic shutdown of the local computer (UPS Communicator).

5 Troubleshooting

INDICATION	DIAGNOSTIC	SOLUTION
Fault LED ⚠ Check the error code on the display *(see error code table)*	Er05, Er39  intermittent sound alarm	The batteries don't work properly. Check for proper battery connection and measure battery voltage to ensure that batteries are charged. Recharge the batteries for 8 hours. If the problem persists or if it is necessary to replace them, contact the LEGRAND Technical Support Service.
	Er12  continuous alarm sound	Disconnect some non-critical loads from the UPS output until the overload ceases. Check if there is any short-circuit between the output cables due to a faulty insulation. Replace the cables if necessary.
	Site wiring/Ground fault 	Check if the power cord is properly plugged, respecting the "L" and "N" wires. If not, re-plug the cord on the socket turning it of 180°. If the power cord is properly plugged, check if the ground-neutral voltage exceeds the limits.
	Er11, Er14 intermittent sound alarm	Verify that the ventilating fans work properly. If the problem persists or if it necessary to replace them, contact the LEGRAND Technical Support Service.
	other error codes	Check the error code table. If the problem persists, contact the LEGRAND Technical Support Service.
The UPS doesn't work in stored energy mode or the backup time is shorter than its intended performance.	-	If the backup time remains unsatisfactory after 8 hours of battery charging, contact the LEGRAND Technical Support Service.
The UPS is working normally but the loads are not powered	-	Check that all power cords are properly connected. If the problem persists, contact the LEGRAND Technical Support Service.

5 Troubleshooting

INDICATION	DIAGNOSTIC	SOLUTION
The UPS switches into stored energy mode and then back into normal mode when a connected device is turned on or the UPS switches back and forth between the two modes.	-	A power strip could be connected to the UPS. Do not use it. See also if there is any damage to the utility wall receptacle or if the cord plug is faulty. Replace them if needed. If the problem persists, contact the LEGRAND Technical Support Service.
Strange noise or smell	-	Shut down immediately the UPS. Disconnect the mains and contact the LEGRAND Technical Support Service.

Error code table

ERROR CODE	MEANING
Er05	Battery weak or faulty
Er06	Output short-circuit
Er07	EPO mode
Er11	UPS over-temperature
Er12	Inverter overload
Er14	Fans out of order
Er28	Bypass overload
Er39	Battery problem during the start-up process of the UPS

6 Warehousing and dismantling

6.1 Warehousing

The UPS must be stored in an environment with a room temperature between +20°C (+68°F) and +25°C (+77°F) and humidity less than 90% (not condensing).
The batteries installed inside the UPS are lead/acid sealed and do not require maintenance (VRLA). The batteries should be charged for 12 hours every 3 months by connecting the UPS to the utility supply. Repeat this procedure every two months if the storage ambient temperature is above +25°C (+77°F).

CAUTION
The UPS must never be stored if the batteries are partially or totally discharged.
LEGRAND is not liable for any damage or bad functioning caused to the UPS by wrong warehousing.

6.2 Dismantling

DANGER
Dismantling and disposal operations may only be done by a qualified electrician. These instructions are to be considered indicative: in every country there are different regulations with regard to the disposal of electronic or hazardous waste such as batteries. It is necessary to strictly adhere to the standards in force in the country where the equipment is used.
Do not throw any component of the equipment in the ordinary rubbish.

Batteries must be disposed of in a site intended for the recovery of toxic waste. Disposal in the traditional rubbish is not allowed.
Apply to the competent agencies in your countries for the proper procedure.

Pb

WARNING
A battery may constitute a risk of an electric shock and high short-circuit current.
When working on batteries, the prescriptions indicated in chapter 2 are to be adhered to.

It is important to dismantle the various parts the UPS consists of. For these operations, Personal Protective Equipment must be worn.
Sub-divide the components separating the metal from the plastic, from the copper and so on according to the type of selective waste disposal in the country where the equipment is dismantled.

If the dismantled components must be stored before being properly disposed, be careful to keep them in a safe place protected from atmospheric agents to avoid soil and groundwater contamination.

For the disposal of electronic waste it is necessary to refer to the industry standards.

7 Technical specifications

	3 101 70	3 101 71	3 101 72
General characteristics			
Nominal power (VA)	1000	2000	3000
Active Power (W)	900	1800	2700
Technology	on-line, double conversion, VFI-SS-111		
Waveform	sinusoidal		
Bypass	internal automatic bypass external maintenance bypass (optional)		
Input characteristics			
Connection	10 A, IEC 320-C14	10 A, IEC 320-C14	16 A, IEC 320-C20
Rated voltage	230 V		
Range of voltage	from 160 V to 288 V at full load		
Rated frequency	50 / 60 Hz ± 5 %		
Maximum current	6,8 A	13,6 A	20,0 A
Total harmonic distortion of the current	THDi < 7% at full linear load and normal voltage		
Power factor	≥ 0.99 (with full linear load)		
Number of phases	Single phase		
Output characteristics			
Outlets	(6) 10 A, IEC 320-C13	(6) 10 A, IEC 320-C13	(6) 10A, IEC 320-C13 + (1) 16A IEC 320-C19
Rated voltage	230 V ± 1% adjustable to 200/208/220/230/240 V		
Rated frequency	50 / 60 Hz ± 0,1%		
Crest factor	3:1		
Total harmonic distortion of the voltage	< 3% at full linear load < 7% at full non-linear load		
Efficiency	up to 90%	up to 91%	up to 92%
Overload capacity	105% continuous 120% for 30 seconds 150% for 10 seconds		
Number of phases	Single phase		
Batteries and battery charger characteristics			
Number of batteries	3	6	6
Battery type	Lead-acid sealed without maintenance (VRLA)		
Unitary capacity	12 Vdc - 7.2 Ah	12 Vdc - 7.2 Ah	12 Vdc - 9 Ah

	3 101 70	3 101 71	3 101 72
Rated Battery Voltage	36 Vdc	72 Vdc	72 Vdc
Backup time with 50% linear load	> 10 min	> 10 min	> 8 min
Battery extension	Yes		
Maximum charge current	2.1 Adc	1.5 Adc	1.5 Adc
Recharge time (to 90%)	4 hours		
Communication and management			
Screen and signalling	six pushbuttons and five LEDs for real-time control of the status and the main parameters of the UPS		
Communications ports	RS232 and USB Connector for network interface		
Software	Software for Windows and Linux environments is available in order to: - displaying all the functioning and diagnostic data in case of problems; - setup of special functions. Download a copy free of charge from the website http://www.ups.legrand.com		
Protections	Against overloads and short-circuit Backfeed Emergency Power Off (EPO) Overtemperature		
Mechanical characteristics			
Dimensions W x H x D (mm)	440 x 88 (2U) x 405	440 x 88 (2U) x 600	
Net weight (kg)	16	29,5	30
Environmental conditions			
Operating temperature	+20 °C to +40 °C +32 °F to +104 °F		
Operating relative humidity	20% to 80% (non-condensing)		
Storage temperature	+20 °C to +25 °C + 68 °F to +77 °F		
Noise level at 1 m	< 50 dB		
IP code	IP 21		
Heat dissipation (BTU/h)	490	654	818
Reference directive and standards			
Safety	2014/35/EU Directive EN 62040-1		
EMC	2014/30/EU Directive EN 62040-2		
Performance and test requirements	EN 62040-3		

8 Battery replacement

WARNING : A battery can present a risk of electrical shock and high short circuit current. Only electrical hazard authorized personnel and service personnel are authorized to replace the batteries. Before the replacement, it is mandatory the reading of chapter 2.
Batteries may only be replaced with the same number and type. Batteries must be brand new and the voltage difference between the strings must be less than 1V.
If the battery brand is different from the one originally installed by Legrand, the estimated battery autonomy indicated on the display of the UPS may not be reliable.

INDICATION

Follow the instructions in the appendix at the end of the manual.

DAKER DK Plus
5 kVA - 6 kVA - 10 kVA

Manuel d'installation • Installation manual

Part. LE09706AB-08/17-01 CT

Table of Contents

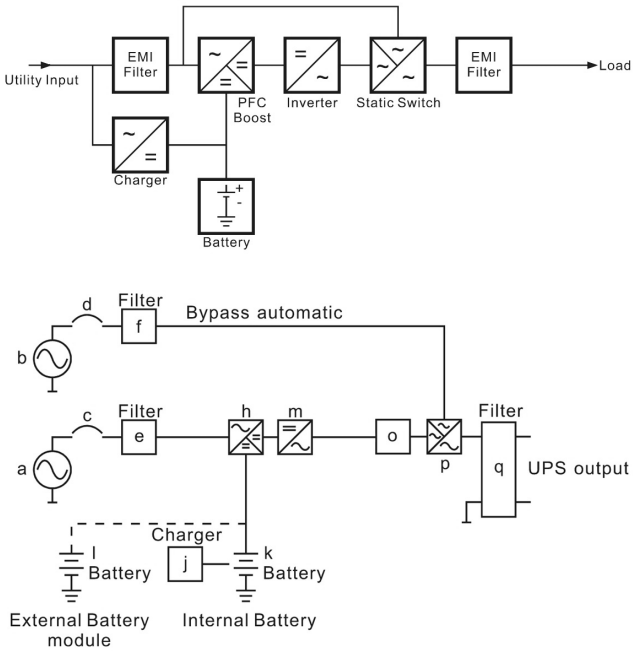
1 Introduction

Congratulations on your recent LEGRAND purchase!

ATTENTION

It is necessary to read the whole manual carefully before doing any operation.
DAKER DK Plus must be used only in residential, commercial and industrial environments.

The following diagrams illustrate the architectures of the UPS system in case they have single or dual input (dual input available only for the 10000 VA single-phase model 3 101 77):



The major modules consist of:

- An AC-to-DC power converter (rectifier) with PFC control circuit.
- A DC-to-AC high frequency inverter.
- A battery charger.
- A battery bank.
- A DC-to-DC push/pull converter control circuit.
- A static bypass loop.
- Input and output EMI filters.

1.1 Use of the manual

This manual must be kept in a safe, dry place and must always be available for consultation.

The manual reflects the state of the art when the equipment was put onto the market. This publication conforms to the standards current on that date; the manual cannot be considered inadequate when new standards come into force or modifications are made to the equipment.
The version of the manual updated to its latest release is available on the Internet from the website http://www.ups.legrand.com

INDICATION
The installation manual is an integral part of the equipment supplied and must therefore be kept for its entire lifetime. In case of need (for example in the case of damage that even partially compromise its consultation) a new copy must be requested from the Manufacturer, quoting the publication code on the cover.

1.2 Guarantee terms

The terms of the guarantee may vary depending on the country where the UPS is sold. Check the validity and duration with LEGRAND's local sale representative.

The Manufacturer declines all indirect or direct responsibility arising from:
- failure to observe the installation instructions and use of the equipment which differs from the specifications in the installation manual;
- use by personnel who have not read and thoroughly understood the content of the installation manual;
- use that does not comply with the specific standards used in the country where the equipment is installed;
- modifications made to the equipment, software, functioning logic unless they have been authorized by the Manufacturer in writing;
- repairs that have not been authorized by the LEGRAND Technical Support Service;
- damage caused intentionally, through negligence, by acts of God, natural phenomena, fire or liquid infiltration.

1.3 Copyright

2 Safety Instructions

This section contains important safety instructions that should always be followed during the installation, use and maintenance of the UPS.

- This product should be installed in compliance with installation rules, preferably by a qualified electrician. Incorrect installation and use can lead to risk of electric shock or fire. Before carrying out the installation, read the instructions and take account of the product's specific mounting location. Do not open up, dismantle, alter or modify the device except where specifically required to do so by the instructions. All Legrand products must be opened and repaired exclusively by personnel trained and approved by Legrand. Any unauthorised opening or repair completely cancels all liabilities and the rights to replacement and guarantees. Use only Legrand brand accessories.
- If any visible damage is found on the product during the unpacking operation, do not install the UPS but repack the unit and return it to your reseller or distributor.
- Before operating the UPS or connecting any load equipment, ensure the UPS is connected to a properly grounded electrical supply.
- The load applied must not exceed the one indicated on the type label of the UPS.
- The ON/OFF button of the UPS does not electrically isolate the internal parts. To isolate the UPS, unplug it from the mains power socket.
- Do not attempt to open or disassemble the UPS; there are no user replaceable parts. Opening the case will void the warranty and introduces the risk of electric shock even when the mains plug is disconnected.
- Make sure the UPS is completely turned off when it is transported.
- The mains socket outlet that supplies the UPS shall be installed near the UPS and shall be easily accessible.
- Do not plug non-computer-related items such as medical, life-support and house electric equipments to the UPS output.
- The UPS has its own internal energy source (batteries). If the UPS is switched on when no AC power is available, there is hazardous voltage at the output sockets.
- **The batteries inside the UPSs 3 101 73 and 3 101 74 are not user-replaceable**. Servicing of batteries must be performed only by electrical hazard authorized personnel.

CAUTION: A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

a) Remove watches, rings or other metal objects.

b) Use tools with insulated handles.

c) Wear rubber gloves and boots.

d) Do not lay tools or metal parts on top of batteries.

e) Disconnect the charging source prior to connecting or disconnecting battery terminals.

f) Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock.

The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

CAUTION: Do not dispose of batteries in a fire. The batteries may explode.

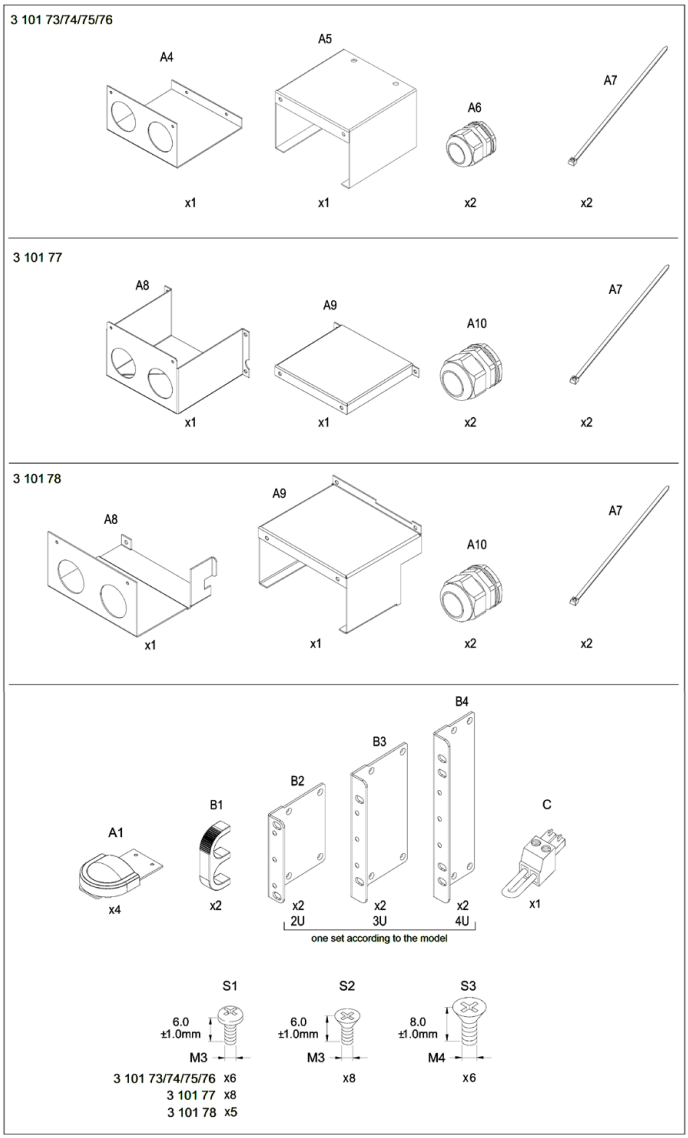
CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

- This UPS has dangerous high voltages on its input and output connections. Contact with these voltages may be life threatening.
- In case of emergency, immediately turn off the equipment and disconnect the power cord from the AC power supply to disable the UPS.
- Do not allow any liquid or any foreign object to enter the UPS.
- The UPS is intended for indoor installation in a ventilated, controlled indoor environment with a range of temperature between 0°C (+32°F) and +40°C (+104°F) and non-condensing humidity between 20% and 80%.
- Do not install the UPS in locations with sparks, flames, any other device that may cause sparks. smoke and hazardous gas or where there is water and excessive humidity. Dusty, corrosive, and salty environments can damage the UPS.
- Do not plug the UPS input into its own output.
- Do not attach a power strip or surge suppressor to the UPS.
- Do not cover the cooling vents and keep a clearance of 20 cm beyond the UPS rear panel. Avoid exposing it to direct sunlight or installing it near heat emitting appliances.
- Unplug the UPS prior to cleaning and do not use liquid or spray detergent.
- Do not place the UPS near equipments that generate strong electromagnetic fields and/or near equipments that are sensible to electromagnetic fields.

WARNING
All the UPSs (except the 3 101 78) are category C2 products according to the EN 62040-2. In a residential environment, these products may cause radio interference, in which case the user may be required to take additional measures.
The UPS 3 101 78 is a category C3 product according to the EN 62040-2. It is for commercial and industrial application in the second environment. Installation restrictions or additional measures may be needed to prevent disturbances.

3.1 Package content

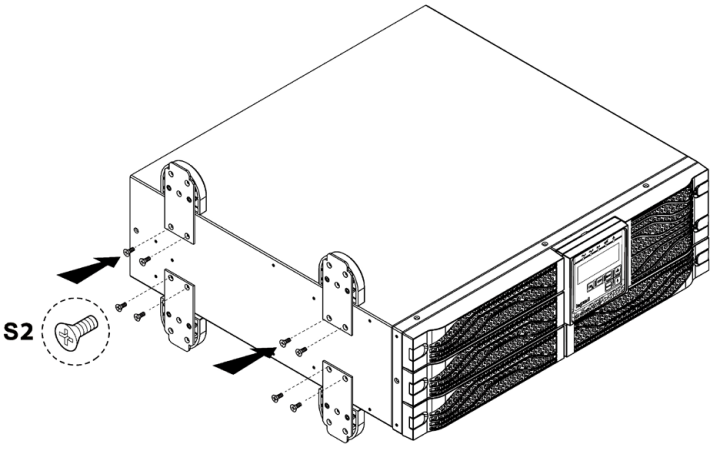
Check for the following package content:
- installation manual;
- 1 x USB communication cable;
- accessories kit as shown in the following figure:



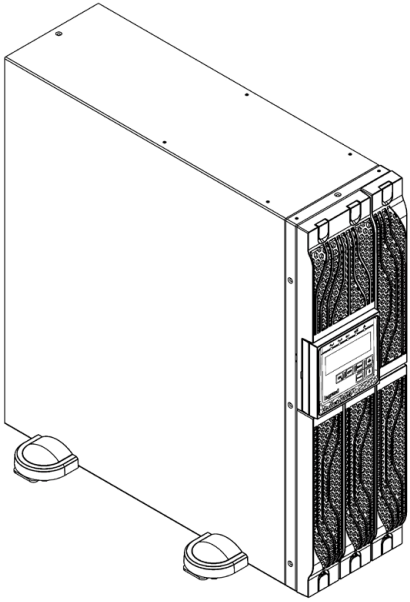
3.2 Tower configuration setup

3.2.1 UPS

Step 1

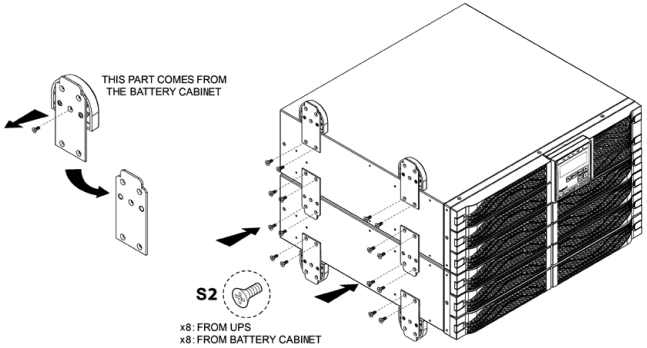


Step 2

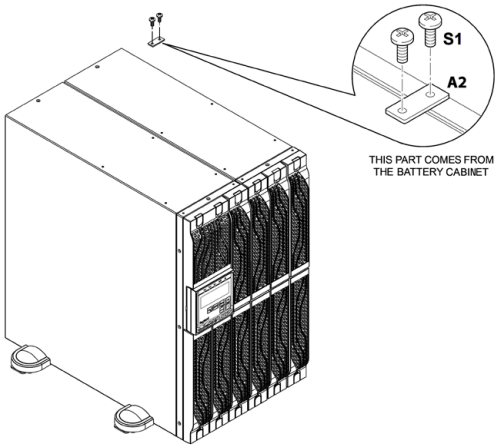


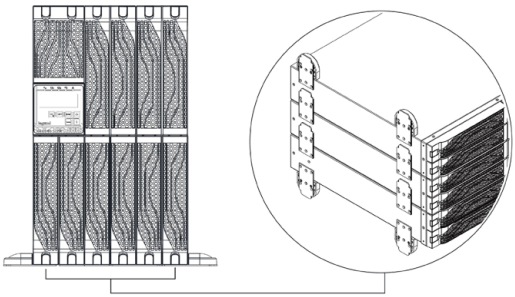
3.2.2 UPS + battery cabinet (optional)

Step 1



Step 2



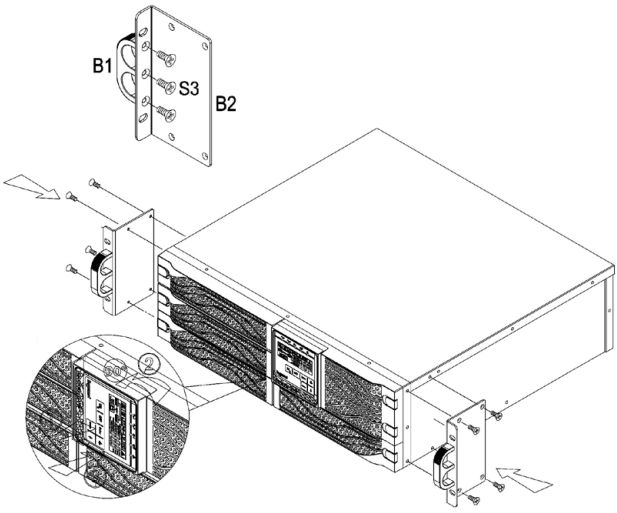


3.3 Rack configuration setup

INDICATION
For the rack configuration setup it is also possible to use the rack support bracket kit 3 109 52. In this case, follow the instruction sheet contained in the kit.

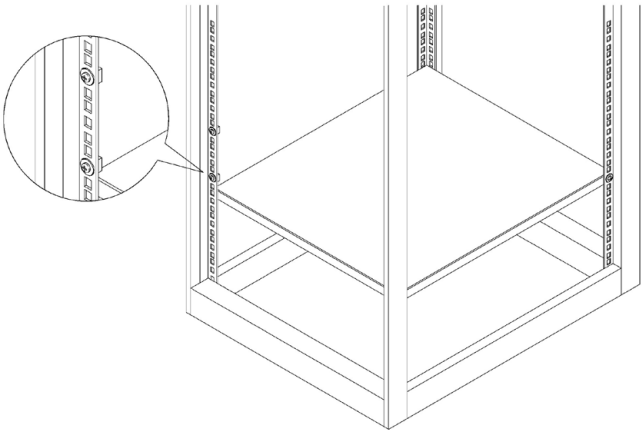
Step 1

Step 2

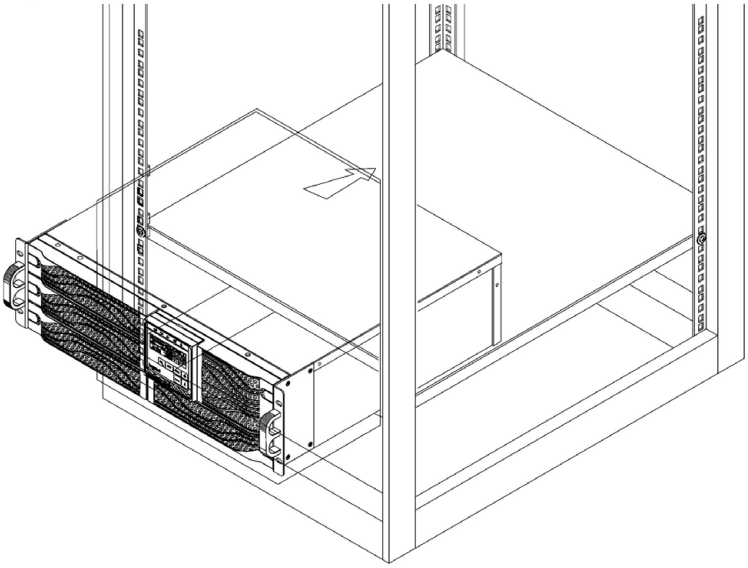


Step 3

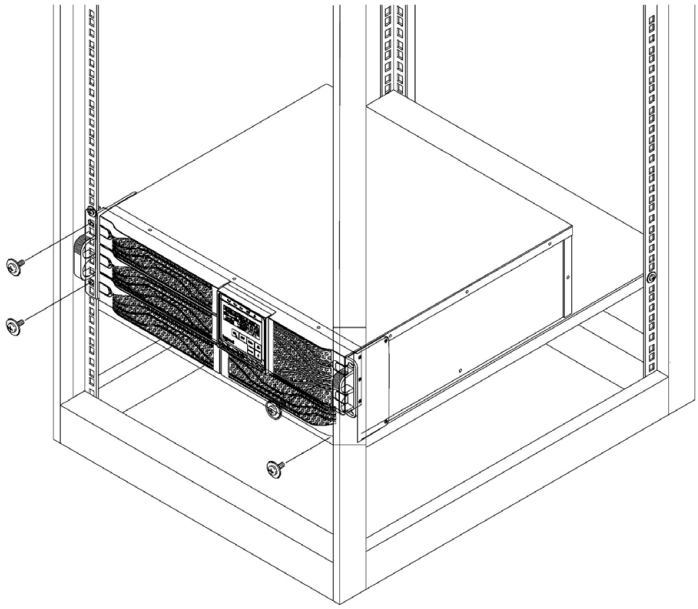
Step 4



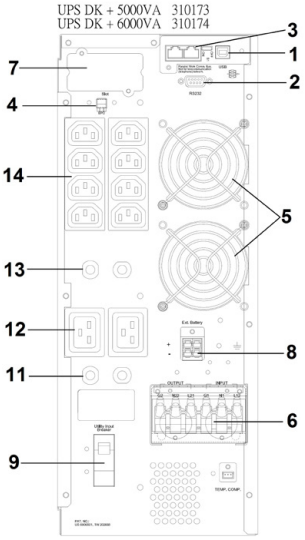
Step 5

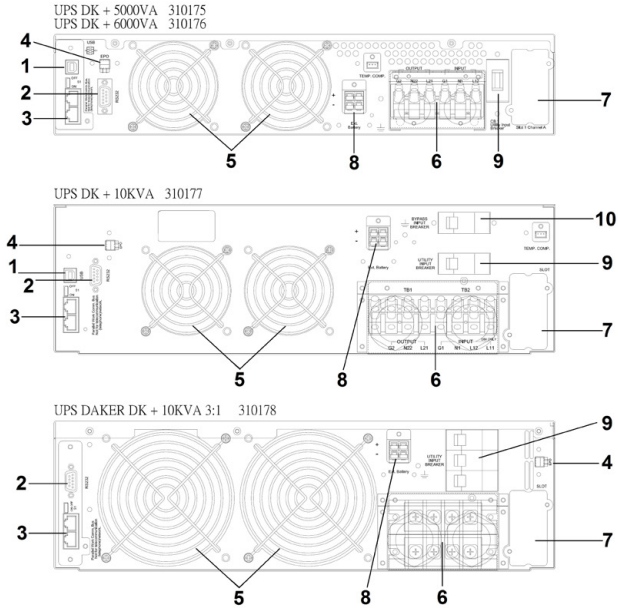


Step 6



3.4 Rear panel



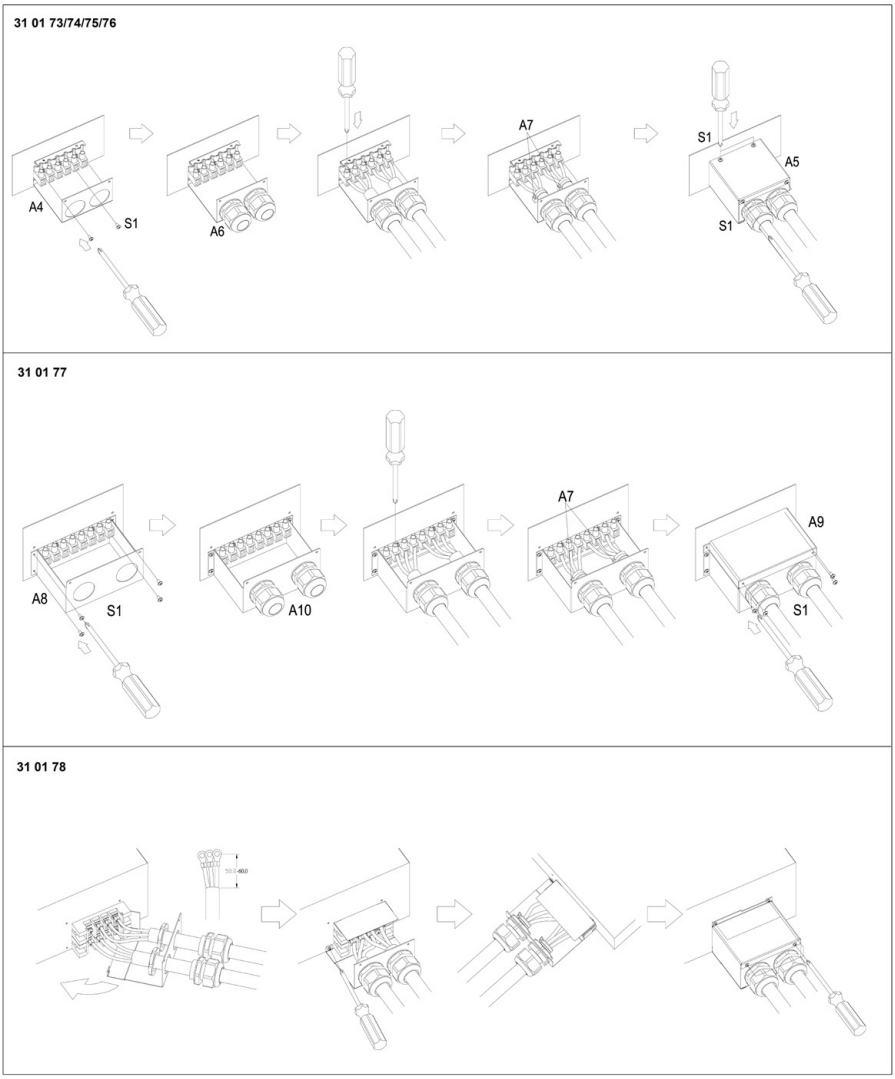


1. USB port
2. RS-232 port
3. CAN Bus Connection Ports for Parallel System
4. Emergency Power Off (EPO)
5. Cooling fans
6. Input/Output terminal strip
7. SNMP slot
8. External battery connector
9. Utility input breaker
10. Bypass input breaker
11. IEC 16A output circuit breakers
12. IEC 16A outlets
13. IEC 10A output circuit breakers
14. IEC 10A outlets

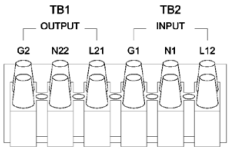
3.5 Installation procedure

WARNING
Read the safety instructions on chapter 2 before installing the UPS.

1. Connect the input and output cables according to the following instructions:



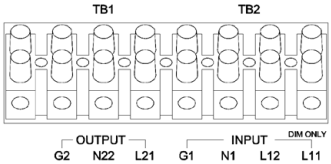
UPS DK + 5000VA 310173
UPS DK + 6000VA 310174
UPS DK + 5000VA 310175
UPS DK + 6000VA 310176



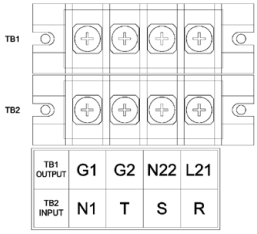
TB1: output
L21-N22: output line connection
G2: output ground connection

TB2: input
L12-N1: input line connection
L11-N1: bypass line connection (only for the UPS 3 101 77 that is dual input. If there is not a separate bypass line, it is necessary to connect L11 to L12)
G1: input ground connection
N1-T-S-R: three-phase input line connection (only for the UPS 3 101 78)

UPS DK + 10KVA 310177



UPS DAKER DK + 10KVA 310178



Cable section recommended for input/output wires
(unipolar cables in PVC laying in the air with operating temperature of 70°C)

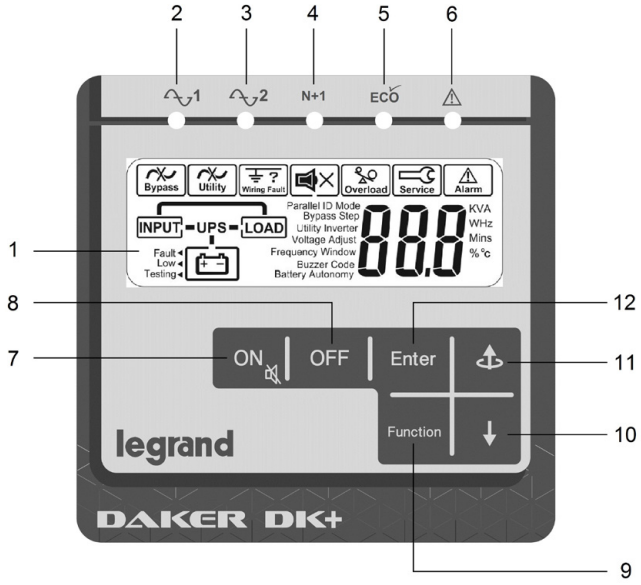
Model	Maximum current	Conductor section
3 101 73/75	27.5 A	AWG #10 or 6 mm^2
3 101 74/76	33 A	AWG #10 or 6 mm^2
3 101 77	56 A	AWG #6 or 16 mm^2
3 101 78	54.3 A	AWG #6 or 16 mm^2

CAUTION
The choice of the type and section of the connecting wires must be done as indicated in the National standards where the UPS is installed and it is the responsibility of the installation engineer.

2. Position the UPS so that the cooling fans are not obstructed and keep a clearance of 20 cm beyond the UPS rear panel.
3. Connect the output cables to the loads, ensuring that the breakers of the various loads are in the OFF position.
4. Connect the UPS input cables to a distribution panel with a suitable voltage and current.

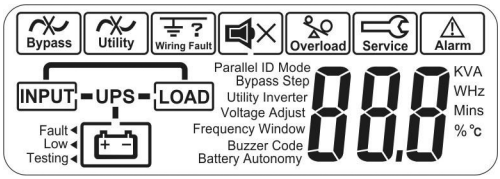
4.1 Control Panel

4.1.1 LCD Panel



ITEM	DESCRIPTION
①	Display
②	The steady green LED indicates that the mains voltage is within the admittable input voltage range. The LED blinks if the mains voltage is below that acceptable range.
③	The steady green LED indicates that the bypass line is present
④	The steady green LED indicates that the UPS is able to run under redundancy mode
⑤	The steady green LED indicates that the UPS is in ECO mode
⑥	The steady red LED indicates that there is an alarm
⑦	UPS power ON/Silence alarm
⑧	UPS power OFF
⑨	Special functions access menu
⑩	Go to the next screen
⑪	Go to the previous screen or change a setting.
⑫	Confirm a changed setting

4.1.2 Display description



SIGN	DESCRIPTION
Bypass	Bypass Fault
Utility	Utility Input Fault
	Buzzer Silent
Overload	Overload
Service	UPS Service mode (reserved for LEGRAND Technical Support Service)
Alarm	Alarm
INPUT UPS LOAD	UPS operation diagram
KVA WHz Mins % °c	3-Digit Measurement Display
	Measured item
Fault ◄	Battery fault
Low ◄	Battery low
Testing ◄	Battery test

4.2 Operating modes

UPS OPERATING MODE	LEDs/DISPLAY INDICATION	BUZZER
NORMAL MODE on-line, double conversion	**LEDs:** steady 1, 2 **DISPLAY:** LINE – UPS – LOAD	No sound
STORED ENERGY MODE The loads are supplied through the batteries connected to the UPS	**LEDs:** fixe ⚠ **DISPLAY:** Utility LINE UPS – LOAD	Beep every second
BYPASS MODE The loads are supplied directly from the mains. The UPS does not protect the loads. The UPS is in bypass mode when it is in standby, after a generic alarm or a prolonged overload in normal mode.	**LEDs:** steady 1, 2 **DISPLAY:** LINE – UPS LOAD	No sound (with the UPS in standby) Beep every two seconds (after a prolonged over-load or another generic alarm)
ECO MODE The loads are supplied directly from the mains through the automatic bypass circuit inside the UPS. The output voltage and frequency are the same as the mains.	**LEDs:** steady 1, 2 ECO **DISPLAY:** LINE – UPS LOAD	No sound
CVCF 50/60 The UPS maintains constant the output voltage and the output frequency to 50 Hz or 60 Hz according to the setting **WARNING** Only the UPS 3 101 77 can be used in this mode (turning off the bypass input breaker)	**LEDs:** steady 1 **DISPLAY:** LINE – UPS – LOAD	No sound

See also paragraph 4.6 to set the operating mode.

4.3 Start-up procedure

4.3.1 Normal mode

1. Install all the cables and the terminal block cover according to the instructions on paragraph 3.5.
2. Check that the load breakers, the UPS utility input breaker and bypass input breaker (if present) are in the "OFF" position.
3. Turn ON the power breaker of the distribution panel and the UPS breakers. The LEDs ∿1 and ∿2 show that the input and bypass line are present and the fans spin up. The display visualizes fig. 1 followed by fig. 2 if the pre-startup of the UPS is successful.

Fig. 1

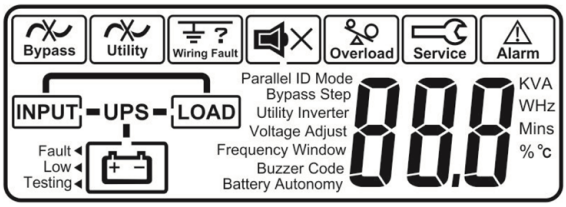
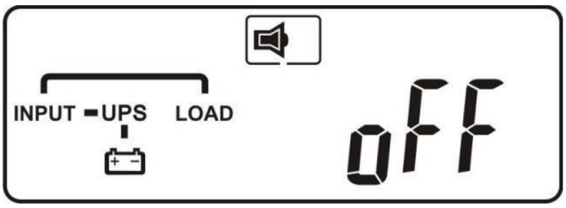


Fig. 2



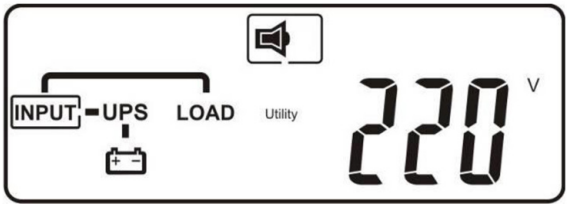
WARNING

When the UPS is in standby, the battery charger is active and the bypass line powers the loads.

4. Proceed to choose the desired UPS settings as described in paragraph 4.6.

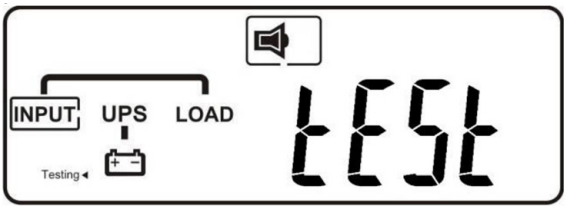
5. Press ON and hold it until the buzzer sounds twice. The display changes from fig. 2 to fig. 3.

Fig. 3



The UPS is in self-test mode. During the self-test mode, the UPS remains in stored energy mode for some seconds. The display changes from fig. 3 to fig. 4.

Fig. 4



If the self test is successful, the display changes from fig. 4 to fig. 5 and then to fig. 6.

Fig. 5

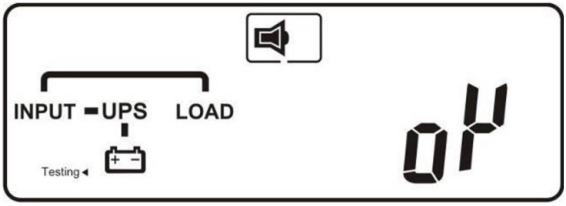
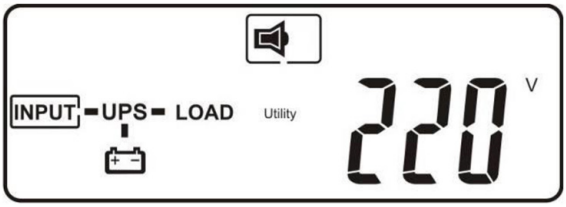
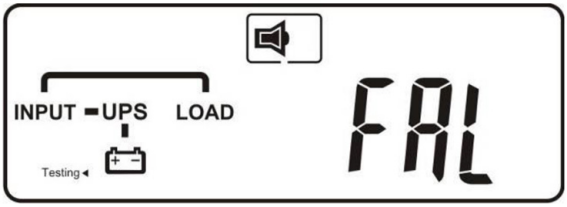


Fig. 6



If the self test is not successful, the display changes from fig. 4 to fig. 7. An error code or error status appears on the screen.

Fig. 7

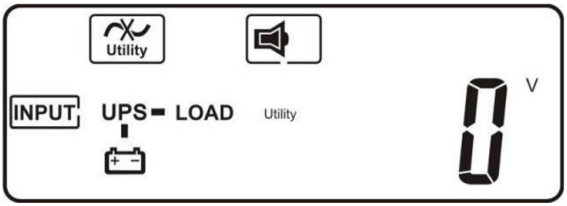


6. The start-up procedure is completed. Make sure that the batteries are fully charged or that the UPS has been connected to the input line for at least 8 hours before turning on the load breakers.

4.3.2 Cold start

1. Make sure the internal batteries or the external battery cabinets are connected to the UPS.
2. Press ON and hold it until the buzzer sounds twice. Then release the key. The display looks like the following figure:

3. Press ON again and hold it until the buzzer sounds twice. If the second key confirmation is not completed within 10 seconds, the UPS does not perform the cold start and shuts off.
4. Few seconds after the second key confirmation, the UPS turns on in stored energy mode and the loads are powered. The red alarm LED ⚠ lights up. It is audible an intermittent sound alarm. The display looks like the following figure:



5. The start-up procedure is completed. The loads are powered till the end of the backup time. If later the input line is available, the UPS turns to the set operating mode.

INDICATION
The output frequency corresponds to the input frequency before the UPS was shutdown. The default value is 50 Hz; however if before the input frequency was 60 Hz, then the output frequency after the cold start will be 60 Hz.

4.4 Shutdown

1. Press and hold OFF until the buzzer sounds twice.
2. The UPS stops powering the loads and turns to bypass mode.

WARNING
When the UPS is in standby, the bypass line powers the loads.

3. Turn off the UPS utility input breaker and bypass input breaker (this is available only in the UPS 3 101 77). After some seconds, the fans stop working and the UPS completely shuts down.

4.5 UPS Measurements

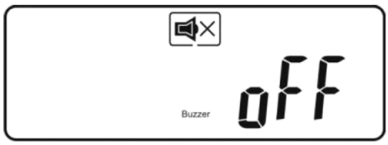
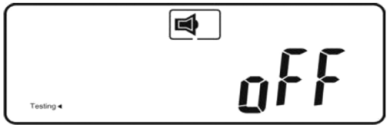
After the UPS is turned on, it is possible to check the UPS measurements by pressing  or  .

The display sequence is:
- AC input voltage;
- AC input frequency;
- output voltage;
- output frequency;
- load percentage;
- output current;
- battery voltage;
- battery autonomy (this parameter is not available on the UPS 3 101 78);
- UPS internal temperature.

4.6 UPS settings

After the UPS is turned on, it is possible to check the UPS settings by pressing Function. The different parameters can be scrolled by pressing ↓.

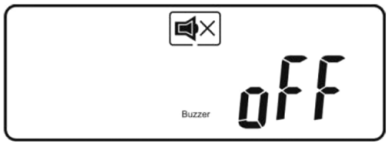
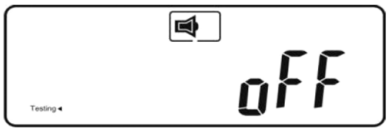
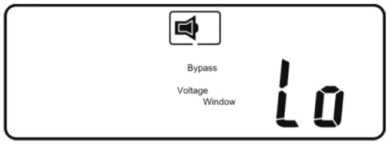
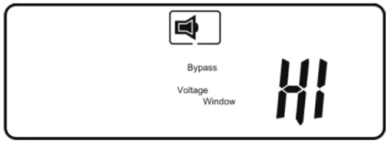
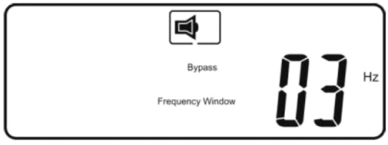
While the UPS is powering the loads, it is possible to change only two parameters:

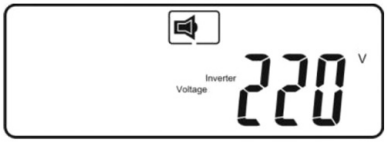
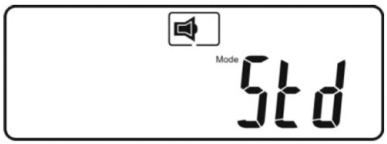
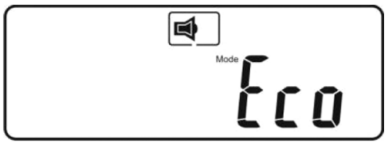
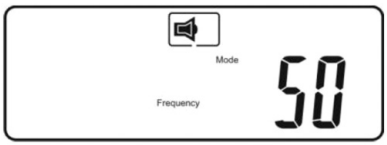
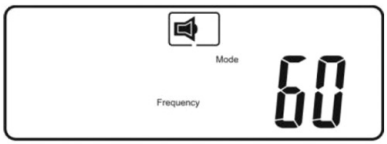
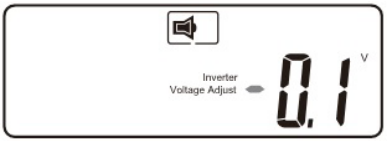
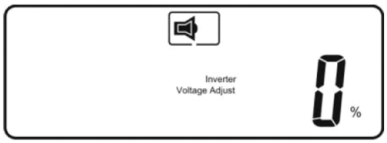
PARAMETER	SETTING	DISPLAY
BUZZER	ON	
	OFF	
BATTERY TEST	OFF	
	ON	

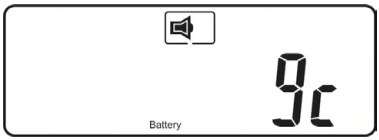
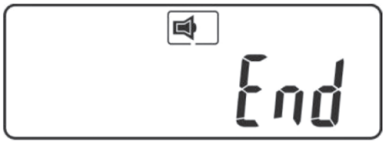
Follow this procedure to change the buzzer setting:
- press Function. The buzzer setting is displayed;
- press ▲ to select ON or OFF;
- confirm the choice by pressing Function.

The battery test can be performed to check the optimal operation of the batteries. The test can be performed only after the batteries are fully charged, the input line is present and the UPS is powering the loads. Follow this procedure to perform the battery test:
- press Function;
- press ▼ to display the battery test setting;
- press ▲ to select ON. The UPS transfers to stored energy mode for 10 seconds. During the test, the loads are always powered with no voltage dip;
- if at the end of the test the UPS transfers back to normal mode without any alarm code, the batteries are still working properly.

To change all the other settings, the UPS must be in standby mode. In this condition the loads are powered. Therefore all the needed settings must be performed before turning on the external output breaker.
Follow this procedure to change the UPS settings:
- press simultaneously ON and ▼ for approximately three seconds, until the buzzer sounds twice. The LCD displays the first setting ("buzzer");
- all the different settings can be scrolled pressing ▼;
- except for the buzzer and the battery test, all the other settings may be changed by pressing ▲;
- after changing settings, scroll to the "End" screen and then press Enter to save all changes;
- the UPS restarts automatically. However, it is also suggested to remove the mains for at least 30 seconds.

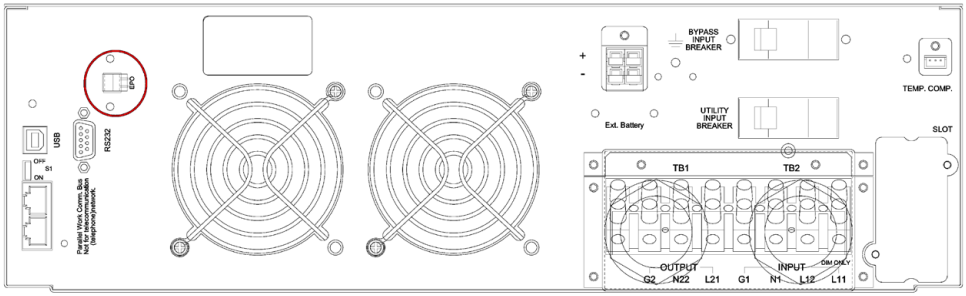
PARAMETER	SETTING	DISPLAY
BUZZER *(this setting can't be changed with this procedure)*	**ON**	
	OFF	
BATTERY TEST *(this setting can't be changed with this procedure)*	**OFF**	
BYPASS VOLTAGE RANGE	**LOW** The bypass voltage range is set to ±15% of the selected output voltage	
	HIGH The bypass voltage range is set to ±10% of the selected output voltage	
BYPASS FREQUENCY RANGE	**± 1 Hz** **± 3 Hz** If the bypass frequency is - within the set range: the output frequency follows the bypass frequency; - out of the set range but within ±10 Hz: the output frequency follows the default setting (50 or 60 Hz); - beyond the default setting of ±10 Hz: the UPS turns to stored energy mode.	

PARAMETER	SETTING	DISPLAY
OUTPUT VOLTAGE	**200 V** **208 V** **220 V** **230 V** **240 V**	
OPERATING MODE *(see paragraph 4.2)*	**NORMAL MODE**	
	ECO MODE	
	CVCF 50 Hz **ATTENTION** Only the UPS 3 101 77 can be used in this mode (turning off the bypass input breaker)	
	CVCF 60 Hz **ATTENTION** Only the UPS 3 101 77 can be used in this mode (turning off the bypass input breaker)	
OUTPUT VOLTAGE ADJUSTMENT	3 101 73, 3 101 74, 3 101 75, 3 101 76, 3 101 77 **± 6.0 V with a resolution of 0.1 V** 3 101 78 **± 3 % with a resolution of 1 %** If during the normal functioning of the UPS the output voltage is slightly below or above the desired value, this setting allows to adjust it	 

PARAMETER	SETTING	DISPLAY
EXTERNAL BATTERY CABINETS	**1c - 9c** Select the number of external battery cabinets connected to the UPS ***INDICATION*** This parameter cannot be set on the UPS 3 101 78	
END SCREEN	Press Enter to save all changes	

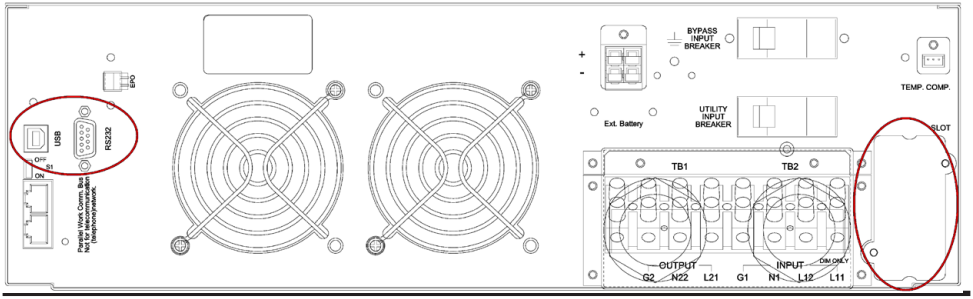
4.7 Emergency Power Off (EPO)

The UPS has an external normally closed contact that can be opened to activate the immediate stop of the UPS.
The EPO terminal is at the back of the UPS and it is needed for the functioning of the UPS.



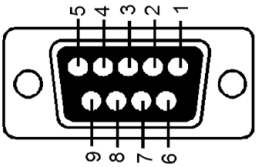
4.8 Communication devices

The UPS has one RS232 serial port, one USB port (not available on 3 101 78) and one SNMP slot.

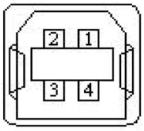


Only one communication interface at a time can control the UPS, according to the following priority:
1) optional interface card;
2) USB;
3) RS232.

The following figures show the pinout of the RS232 and USB interfaces:



Pin 3: RS-232 Rx
Pin 2: RS-232 Tx
Pin 5: Ground



Pin 1: VCC (+5V)
Pin 2: D-
Pin 3: D+
Pin 4: Ground

It is possible to download some free of charge software from the website http://www.ups.legrand.com

The software can be used for the following functions:
- display of all the operations and diagnostic data in case of problems (UPS Communicator);
- setup of special functions (UPS Setting tool);
- automatic shutdown of the local computer (UPS Communicator).

5 Troubleshooting

INDICATION	DIAGNOSTIC	SOLUTION
Fault LED  Check the error code on the display *(see error code table)*	Er05, Er39  intermittent sound alarm	The batteries don't work properly. Check for proper battery connection and measure battery voltage to ensure that the batteries are charged. Recharge the batteries for 8 hours if necessary. If the problem persists or if it is necessary to replace them, contact the LEGRAND Technical Support Service.
	Er12  continuous alarm sound	Disconnect some non-critical loads from the UPS output until the overload ceases. Check if there is any short-circuit between the output cables due to a faulty insulation. Replace the cables if necessary.
	Er11, Er14 intermittent sound alarm	Verify that the ventilating fans work properly. If the problem persists or if it necessary to replace them, contact the LEGRAND Technical Support Service.
	Er 24	When the UPS is in CVCF mode, it is not possible to have the bypass line. This operating mode is available only on the model 3 101 77.
	other error codes	Check the error code table. If the problem persists, contact the LEGRAND Technical Support Service.
The UPS doesn't work in stored energy mode or the backup time is shorter than its intended performance.	-	If the backup time remains unsatisfactory after 8 hours of battery charging, contact the LEGRAND Technical Support Service.
The UPS is working normally but the loads are not powered	-	Check that the output cables are properly connected and the external output breaker is turned on. If the problem persists, contact the LEGRAND Technical Support Service.

5 Troubleshooting

INDICATION	DIAGNOSTIC	SOLUTION
Strange noise or smell	-	Shut down immediately the UPS. Turn off the distribution panel breaker and the utility input breaker. Contact the LEGRAND Technical Support Service.

Error code table

ERROR CODE	MEANING
Er05	Battery weak or faulty
Er06	Output short-circuit
Er07	EPO mode
Er11	UPS over-temperature
Er12	Inverter overload
Er14	Fans out of order
Er24	CVCF mode with Bypass input
Er28	Bypass overload
Er39	Battery problem during the start-up process of the UPS

6 Warehousing and dismantling

6.1 Warehousing

The UPS must be stored in an environment with a room temperature between 0°C (+32°F) and +50°C (+122°F) and humidity less than 90% (not condensing).
The UPSs Daker DK Plus 3 101 73 et 3 101 74 must be stored in an environment with a room temperature between +20°C (+68°F) and +25°C (+77°F) to ensure an optimal battery life.
The batteries installed inside the UPS are lead/acid sealed and do not require maintenance (VRLA).
The batteries should be charged for 12 hours every 3 months by connecting the UPS to the utility supply and switching on the utility input breaker located on the UPS rear panel. Repeat this procedure every two months if the storage ambient temperature is above +25°C (+77°F).

CAUTION

The UPS must never be stored if the batteries are partially or totally discharged.
LEGRAND is not liable for any damage or bad functioning caused to the UPS by wrong warehousing.

6.2 Dismantling

DANGER

Dismantling and disposal operations may only be done by a qualified electrician. These instructions are to be considered indicative: in every country there are different regulations with regard to the disposal of electronic or hazardous waste such as batteries. It is necessary to strictly adhere to the standards in force in the country where the equipment is used.
Do not throw any component of the equipment in the ordinary rubbish.

Batteries must be disposed of in a site intended for the recovery of toxic waste. Disposal in the traditional rubbish is not allowed.
Apply to the competent agencies in your countries for the proper procedure.

Pb

WARNING

A battery may constitute a risk of an electric shock and high short-circuit current.
When working on batteries, the prescriptions indicated in chapter 2 are to be adhered to.

It is important to dismantle the various parts the UPS consists of. For these operations, Personal Protective Equipment must be worn.
Sub-divide the components separating the metal from the plastic, from the copper and so on according to the type of selective waste disposal in the country where the UPS is dismantled.
If the dismantled components must be stored before being properly disposed, be careful to keep them in a safe place protected from atmospheric agents to avoid soil and groundwater contamination.
For the disposal of electronic waste it is necessary to refer to the industry standards.

7 Technical specifications

	3 101 73	3 101 74
General characteristics		
Nominal power (VA)	5000	6000
Active Power (W)	5000	6000
Technology	on-line, double conversion, VFI-SS-111	
Waveform	sinusoidal	
Bypass	internal automatic bypass external maintenance bypass (optional)	
Transfer time AC to DC	0 ms	
Input characteristics		
Input connection	Terminal strips	
Rated input voltage	230 V	
Range of input voltage	from 176 V to 280 V at full load	
Rated input frequency	50 / 60 Hz ± 5 %	
Maximum input current	27.5 A	33 A
Total harmonic distortion of the input current	THDi < 3%	
Input power factor	≥ 0.99 (with full linear load)	
Number of input phases	Single-phase	
Output characteristics		
Outlets	(8) 10A, IEC 320-C13 + (2) 16A IEC 320-C19 + terminal strips	
Rated output voltage	230 V ± 1% adjustable to 200/208/220/230/240 V	
Rated output frequency	50 / 60 Hz ± 0,1%	
Crest factor	3:1	

	3 101 73	3 101 74
Total harmonic distortion of the output voltage	< 3% at full linear load < 7% at full non-linear load	
Efficiency	up to 94%	
Overload capacity	101%-105% continuous 106%-120% for 600-30 seconds (linear decrease) 126%-150% for 30-0.16 seconds (linear decrease)	
Number of output phases	Single phase	
Batteries and battery charger characteristics		
Number of batteries	20	
Battery type	Lead-acid sealed without maintenance (VRLA)	
Unitary capacity	12 Vdc - 5 Ah	
Rated Battery Voltage	240 Vdc	
Backup time with 50% linear load	> 5 min	
Battery extension	Yes	
Maximum charge current	1.86 A	
Recharge time (to 90%)	4 hours	
Communication and management		
Screen and signalling	six pushbuttons and five LEDs for real-time control of the status and the main parameters of the UPS	
Communications ports	RS232 and USB Connector for network interface	
Software	Software for Windows and Linux environments is available in order to: - displaying all the functioning and diagnostic data in case of problems; - setup of special functions. Download a copy free of charge from the website http://www.ups.legrand.com	
Protections	Electronic circuits against overloads and short-circuit Backfeed Emergency Power Off (EPO) Overtemperature	

7 Technical specifications

	3 101 73	3 101 74
Mechanical characteristics		
Dimensions W x H x D(mm)	440 x 176 (4U) x 680	
Net weight (kg)	60	
Environmental conditions		
Operating temperature	0 °C to +40 °C +32 °F to +104 °F	
Operating relative humidity	20% to 80% (non-condensing)	
Storage temperature	+20°C to +25°C +68°F to +77°F	
Noise level at 1 m	< 50 dB	
IP code	IP 21	
Heat dissipation (BTU/h)	892	1300
Reference directive and standards		
Safety	2014/35/EU Directive EN 62040-1	
EMC	2014/30/EU Directive EN 62040-2	
Performance and test requirements	EN 62040-3	

	3 101 75	3 101 76	3 101 77	3 101 78
General characteristics				
Nominal power (VA)	5000	6000	10000	10000
Active Power (W)	5000	6000	10000	9000
Technology	on-line, double conversion, VFI-SS-111			
Waveform	sinusoidal			
Bypass	internal automatic bypass external maintenance bypass (optional)		external bypass line (dual input)	internal automatic bypass external maintenance bypass (optional)
Transfer time AC to DC	0 ms			
Input characteristics				
Input Connection	terminal strips			
Rated input voltage	230 V			380 V
Range of input voltage	from 176 V to 280 V at full load			from 305 V to 485 V at full load
Rated input frequency	50 / 60 Hz ± 5 %			
Maximum input current	27.5 A	33 A	56 A	54 A
Total harmonic distortion of the input current	THDi < 3%			
Input power factor	≥ 0.99 (with full linear load)			≥ 0.9 (with full linear load)
Number of input phases	Single-phase			Three-phase
Output characteristics				
Outlets	terminal strips			
Rated output voltage	230 V ± 1% adjustable to 200/208/220/230/240 V			
Rated output frequency	50 / 60 Hz ± 0,1%			

7 Technical specifications

	3 101 75	3 101 76	3 101 77	3 101 78
Crest factor	3:1			
Total harmonic distortion of the output voltage	< 3% at full linear load < 7% at full non-linear load			
Efficiency	up to 94%			up to 90%
Overload capacity	101%-105% continuous 106%-120% for 600-30 seconds (linear decrease) 126%-150% for 30-0.16 seconds (linear decrease)			
Number of output phases	Single phase			
Battery charger characteristics				
Rated Battery Voltage	240 Vdc			
Maximum charge current	1.86 Adc			
Recharge time (to 90%)	4 hours			
Communication and management				
Screen and signalling	six pushbuttons and five LEDs for real-time control of the status and the main parameters of the UPS			
Communications ports	RS232 and USB (USB not available on 3 101 78) Connector for network interface			
Software	Software for Windows and Linux environments is available in order to: - displaying all the functioning and diagnostic data in case of problems; - setup of special functions. Download a copy free of charge from the website http://www.ups.legrand.com			
Protections	Electronic circuits against overloads and short-circuit Backfeed Emergency Power Off (EPO) Overtemperature			
Mechanical characteristics				
Dimensions W x H x D(mm)	440 x 88 (2U) x 680		440 x 132 (3U) x 680	
Net weight (kg)	25		28	

	3 101 75	3 101 76	3 101 77	3 101 78
Environmental conditions				
Operating temperature	0 °C to +40 °C +32 °F to +104 °F			
Operating relative humidity	20% to 80% (non-condensing)			
Storage temperature	0 °C to +50 °C +32 °F to +122 °F			
Noise level at 1 m	< 50 dB			
IP code	IP 21			
Heat dissipation (BTU/h)	892	1300	1636	1636
Reference directive and standards				
Safety	2014/35/EU Directive EN 62040-1			
EMC	2014/30/EU Directive EN 62040-2			
Performance and test requirements	EN 62040-3			