KEOR LP
1, 2, 3 kVA

Manuel d'installation • Installation manual

Part. LE07360AC-10/17-01 GF

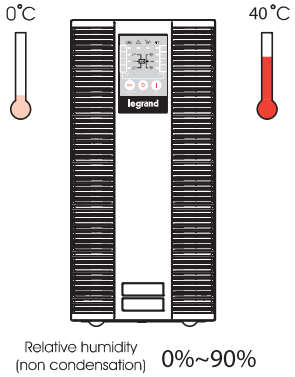
Index

1 Introduction

The Keor LP is an Uninterruptible Power Supply (UPS) designed for home, commercial and industrial application. This manual contains information for users of the Keor LP 1,2,3 kVA models. You are advised to read carefully this handbook and the safety instruction sheet included in the packaging before installing your uninterruptible power supply, meticulously following the instructions given herein. In case of problems with the UPS, please read this manual before contacting the technical support;
Please download the latest version of the manual from the website: www.ups.legrand.com

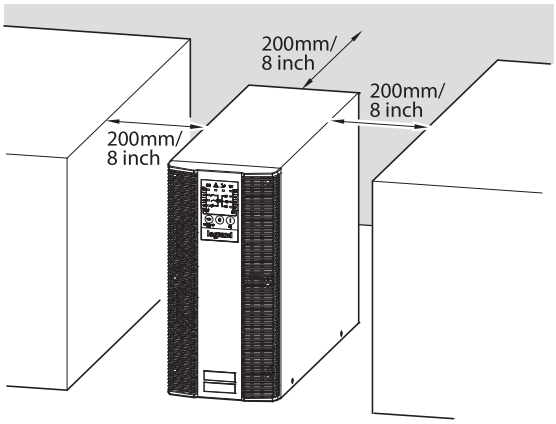
2 Condition of use

- The UPS has been designed to supply data processing equipment; The load applied must not exceed the one indicated on the rear label of your UPS.
  Ensure that the input voltage of the UPS matches the utility supply voltage. Use a certified input power cable with the correct plugs and sockets for the system voltage.
- The ON/OFF button of your UPS does not electrically isolate the internal parts. To isolate your UPS unplug it from the mains power socket.
- Do not open the UPS container since there may be parts inside with dangerously high voltage even when the mains plug is disconnected; there are no parts inside that the user can repair.
- The front control panel is provided for manual operations; Do not press on the panel with sharp or pointed objects.
- The UPS Keor LP has been designed to work in closed, clean rooms where there are no inflammable liquids or corrosive substances and where it is not too damp.
- Do not place near equipments that generate strong electro-magnetic fields and/or near equipments that are sensible to electro-magnetic fields. (engines, floppy disks, speakers, adapters, monitors, video, etc...)
- Do not pour any liquid on the UPS or inside the UPS.
- Do not place the UPS in humid environment or near liquid, such as water, chemical solution…
- Do not expose the UPS to the direct sunlight or any heat sources.
  Ensure that the installation site is free from excessive dust and the ambient temperature and humidity are within the specified limits.



Do not place the UPS in a dusty or corrosive environment or near any flammable objects.
This UPS is not designed for outdoor use.

- Keep the ventilation slits clean to dissipate the heat of the UPS.
  To prevent overheating of the UPS keep all ventilation openings free from obstruction, and do not place anything on top of the UPS. Keep the UPS rear panel 20 cm away from the wall or other obstructions



- Use grounded power cable to connect the UPS to the mains supply.

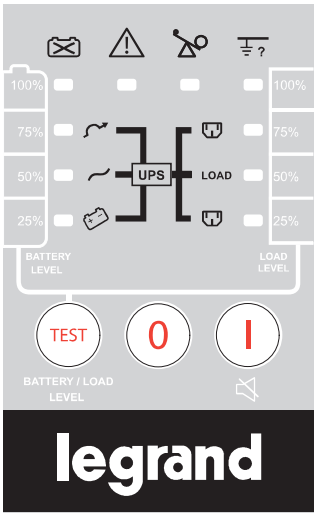
This UPS is equipped with an EMI filter. To prevent potential leakage current hazards ensure that the AC mains supply is securely grounded.

- Install the UPS close to the mains socket that supply it.The socket must be easily accessible.
- Do not plug laser printers into the UPS because of their high start-up current.
- Do not plug house electric equipments, such as hair dryer, air conditioner, and refrigerator into the UPS outlets.

- Always switch off the UPS and disconnect the batteries when relocating the UPS. Be aware that, even when disconnected, charged batteries present a possible electric shock hazard.
- The UPS should be recharged every 2-3 months if unused. When installed and being used the batteries will be automatically recharged

Storage

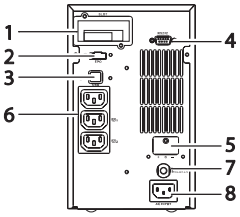
If the UPS is unused for an extended period of time it must be stored in a moderate climate.
The batteries should be charged for 12 hours every three months by connecting the UPS to the utility supply and switching on the input breaker located on the UPS rear panel. Repeat this procedure every two months if the storage ambient temperature is above 25°C.



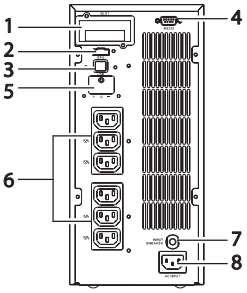
Control Key	Symbol	Description
ON	I	a. UPS Power-On Switch (Press and hold until the buzzer beeps.) b. Alarm silence c. Error Code Display Mode After an alarm, press to mute the alarm buzzer and show an Error Code. (Do not hold for > 1 second.)
OFF	0	UPS Power-Off Switch (Press and hold until the buzzer beeps.)
Self-Test	TEST BATTERY / LOAD LEVEL	a. Commands the UPS to perform self-testing (Press and hold until the buzzer beeps.) b. Battery/Load Test Mode (Do not hold for > 1 second.)
Manual Bypass	I + TEST BATTERY / LOAD LEVEL	Press the "ON" key and "Self-Test" key simultaneously for three seconds to transfer from "Inverter to Bypass" (The bypass LED will continuously blink and the buzzer will beep intermittently.) or "Bypass to Inverter" when the UPS is in on-line mode and the Bypass Voltage is Normal.

LED Indicator	Symbol	Description
Normal Mode LED		1. Steadily on indicates normal utility voltage. Blinking indicates insufficient utility voltage for the full load. Off indicates abnormal utility voltage. 2. In Battery/Load Test Mode indicates battery capacity is 50%.
Battery Mode LED		1. Indicates load supplied by battery power. 2. In Battery/Load Test Mode indicates battery capacity is 25%.
Bypass Mode LED		1. Indicates load supplied by bypass. 2. In Battery/Load Test Mode indicates battery capacity is 75%.
Battery Bad/Weak LED		1. Indicates low battery power or faulty battery bank. 2. In Battery/Load Test Mode indicates battery capacity is 100%.
Fault LED		1. Steadily on indicates fault or abnormal condition. 2. Blinking indicates LED Panel in Error Code Function Mode.
Overload LED		1. Indicates UPS is overloaded. 2. In Error Code Mode indicates Error Code 16.
Site wiring fault LED		1. Indicates live and neutral lines are connected wrongly or high neutral-ground voltage. 2. In Battery/Load Test Mode indicates load capacity is 100%. 3. In Error Code Mode indicates Error Code 8.
Outlet1 LED		1. Indicates UPS Outlets 1 are enabled and ready to supply loads. (This function is optional.) 2. In Battery/Load Test Modeindicates load capacity is 75%. 3. In Error Code Mode indicates Error Code 4.
Load LED	LOAD	1. Indicates UPS outlets are enabled and ready to supply loads. 2. In Battery/Load Test Mode indicates load capacity is 50%. 3. In Error Code Mode indicates Error Code 2.
Outlet2 LED		1. Indicates UPS Outlets 2 are enabled and ready to supply loads. (This function is optional.) 2. In Battery/Load Test Mode indicates load capacity is 25%. 3. In Error Code Mode indicates Error Code 1.

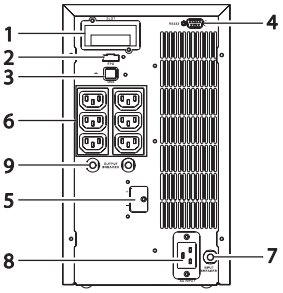
4 Rear panel



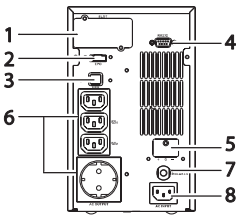
3 101 54



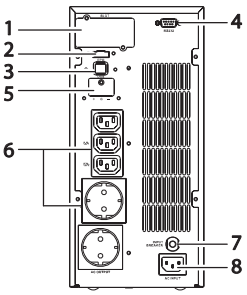
3 101 56



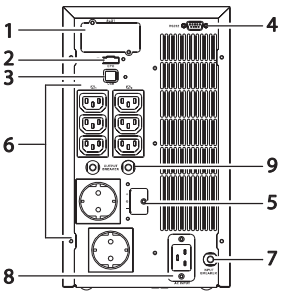
3 101 58



3 101 55



3 101 57



3 101 59

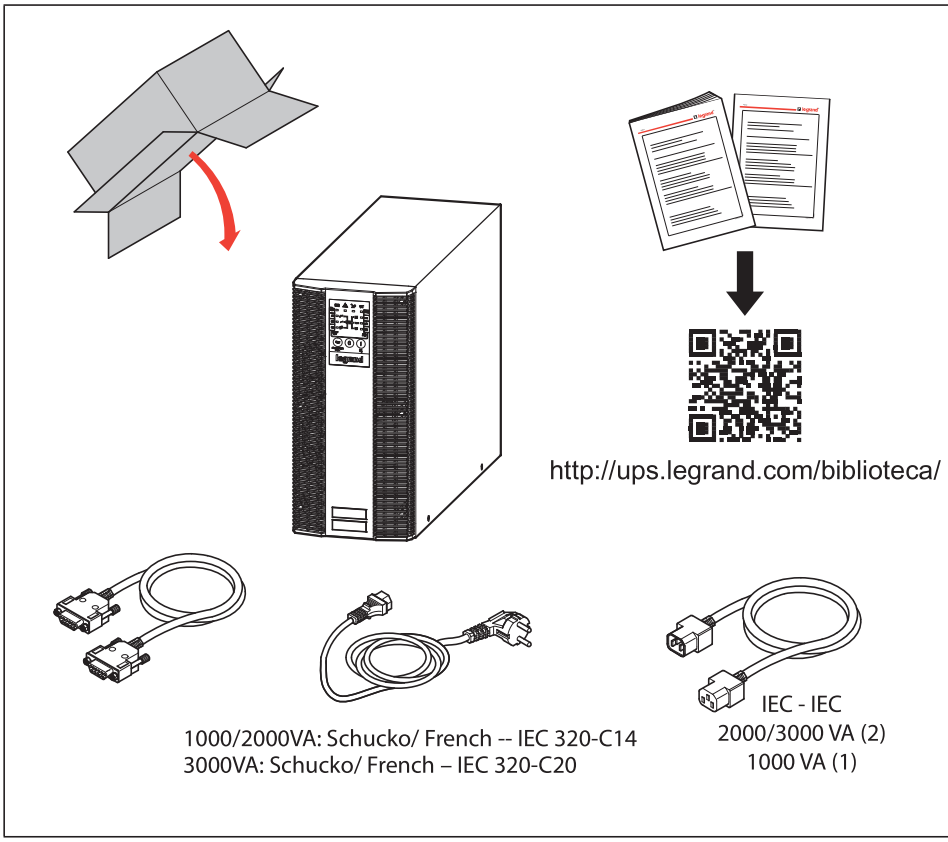
1. Slot for optional communication cards
2. Emergency Power Off (EPO) dry contact signal inputs
3. NA
4. RS-232 port
5. External battery connector
6. AC outlets
7. Utility input circuit breaker
8. AC power connection socket
9. Output circuit breaker for two outlets

5 Installation

Unpacking

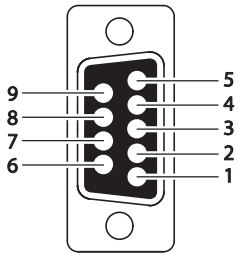
Inspect the UPS upon receipt

After removing the packing foam please be careful handling the UPS while it is still in the plastic bag and check for the following standard package contents :



The following main connections are available on the rear of the uninterruptible power supply :
- Output sockets (6) and input connector (8).
- Socket for connecting computer serial interface RS232 (9 female pins) [4]: required when using the diagnostic and shutdown management software.
- Presetting for the connection of additional batteries [5].

True RS-232
Pin Assignments:



Baud Rate	2400 bps
Data Length	8 bits
Stop Bit	1
Parity	None

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

EPO
Pin Assignments:

1	2

1 = REPO+
2 = Ground

To enable the EPO function short pins 1 and 2.

Proceed to the installation as follows :

Please read the condition of use contained in this manual before installing the UPS.

Start

Normal AC mode

1. Before commencing ensure that the grounding is connected properly.
2. Ensure that the utility voltage matches the input voltage window of the UPS.
3. Connect the UPS main power cord into the utility AC power source receptacle, that has to be placed near the UPS and easily accessible.
4. Switch on the AC power source. All of the LEDs on the front panel display will flash once after

five seconds. At the same time, the fan at the front of the UPS will start operating.

5. Press and hold the ON button (I) for approximately one second to start the UPS. The buzzer will beep and the LED indicators ~, $\square_1$, $\square_2$ and LOAD will shine after 1-5 seconds. The start-up procedure is now completed, and the UPS outlets are ready to supply power to the load.
6. It is advisable to perform a battery mode test before connecting the loads to the UPS to ensure that the batteries are working properly. To do this, switch off the AC power source when the UPS is on. The LED on the front panel display will turn off, the LED will shine, and the buzzer will pulsate, indicating that the UPS is in Battery Mode. Connect a non-critical load to the UPS outlets to confirm that the batteries are supplying power. Repeat the test by switching on and off the AC power source to ensure that the UPS is functioning properly.

Self Testing in AC Mode

After the UPS has been successfully started in AC mode, press and hold the Self-Test button (TEST) for five seconds until the buzzer beeps. The LED will shine to indicate that the self-test is in progress. When the self-test is completed the UPS will return to AC mode. If there were no faults or abnormal conditions then the ⚠ and LEDs will turn off.

Note: the main function of self testing is to run a discharge test on the batteries.

Battery mode (Cold Start)

This UPS can be switched on without the presence of an AC power source.

Press and hold the ON button (I) until the buzzer beeps. Release and then within the next 10 seconds press and hold the same button a second time. The UPS will perform its start-up procedure. The LEDs , $\square_1$, $\square_2$ and LOAD will shine after 1-5 seconds, and the buzzer will pulsate to indicate successful power-on.

Note: Ensure that the UPS batteries are pre-charged for at least four hours by simply connecting the AC power cord to the utility receptacle.

Shutdown

AC mode

Press and hold the OFF button (O) for five seconds until the buzzer beeps. The UPS will cut the power supply to the outlets. The ventilating fans will continue to operate. Switch off the AC power source. The ventilating fans will stop. The UPS is now completely shut down.

DC mode

Press and hold the OFF button (O) for five seconds until the buzzer beeps. The UPS will cut the power supply to the outlets. The LEDs will turn off, and the ventilating fans will stop after ten seconds and the ±BUS discharge is below 42 V. The UPS is now completely shut down.

Beep Codes

The following table contains common UPS statuses with their beep codes.

UPS Status	Beep Code
UPS faulty, Inverter shut down. All functions inhibited.	Long Continuous Beep
Control keypad error	Long Continuous Beep
UPS faulty, loads continue to be supplied via Inverter or Bypass.	Single beep every two seconds
In battery mode	Single beep once per second
Battery low	Quick and short successive beeps
Confirm RS-232 port receiving	Two quick and short beeps
Service mode okay	One quick and short beep

UPS System Block Diagram

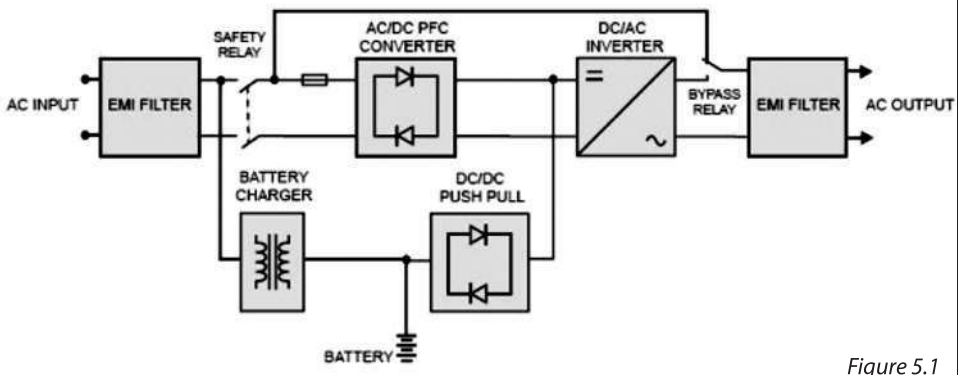


Figure 5.1

Figure 5.1 illustrates the True On-Line Double Conversion architecture of the UPS system. The major modules consist of:

1) AC-to-DC power converter (rectifier) with PFC control circuit
2) DC-to-AC high frequency inverter
3) Smart battery charger
4) Bank of stationary, maintenance-free batteries
5) DC-to-DC push/pull converter control circuit
6) Static bypass loop
7) Input and output EMI filters

The table below provides a summary of the UPS operating modes under various utility AC power source and battery conditions.

Utility Condition	UPS Operating Mode	LEDs
Normal	Working power starts after approximately 5 seconds, LEDs on the panel will blink and fans will start. Press the ON button (I) for 1-5 seconds. The UPS starts up normally.	~ LED ON $\square_1$ LED ON $\square_2$ LED ON LOAD LED ON
Abnormal (under or over voltage or absent)	Rectifier and charger stop operating. Battery discharges via DC-DC boost circuit and supplies Inverter. Loads continue to receive supply from Inverter. Alarm buzzer beeps. UPS now in **battery mode.**	~ LED OFF LED ON
Utility abnormal or absent, and battery voltage low	Rectifier and charger stop operating. Battery discharges via DC-DC boost circuit and supplies Inverter. Alarm buzzer beeps quickly, indicating battery power low and Inverter may stop supplying soon.	~ LED OFF LED ON ⚠ LED ON

When Utility is Normal

The operating mode of the UPS under normal utility conditions is illustrated as follows.

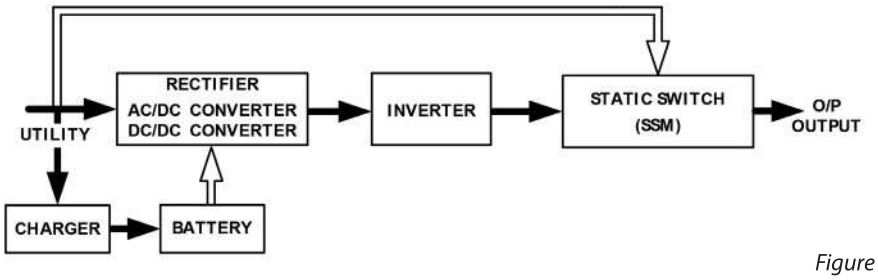


Figure 5.2

When the utility is normal the AC source is rectified to DC and fed into the charger to charge the batteries and partially fed into the inverter. The inverter reverts the DC to a cleaned and pure AC to supply energy to the load connected. The LEDs ~ , $\square_1$, $\square_2$ and LOAD will shine.

When Utility is Abnormal or Absent

The operating mode of the UPS under abnormal utility conditions is illustrated as follows.

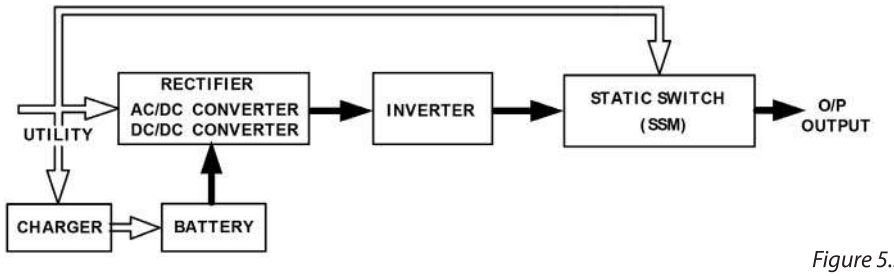


Figure 5.3

1. When the utility is abnormal the UPS will direct the battery energy automatically to the Inverter without delay and turn off the charger and AC/DC converter. The inverter reverts DC to AC to supply energy to the output load connected without interruption. The ⏀ LED will shine.
2. When the utility returns to normal the UPS will turn on the AC/DC converter, turn off the DC/DC converter, and switch the charger to charging mode. This is the same operating mode as in Figure 5.2.
3. During a utility outage the UPS will work as illustrated in Figure 5.3. When the batteries are low the buzzer will beep continuously until the batteries are completely cut off. The low-battery protection of the UPS will cut off the battery supply at a preset threshold to avoid over-draining the batteries.
4. The UPS will restart automatically when the utility is available, with the same status as in Figure 5.2.

Overload Condition

The operating mode of the UPS when overloading occurs is illustrated as follows.

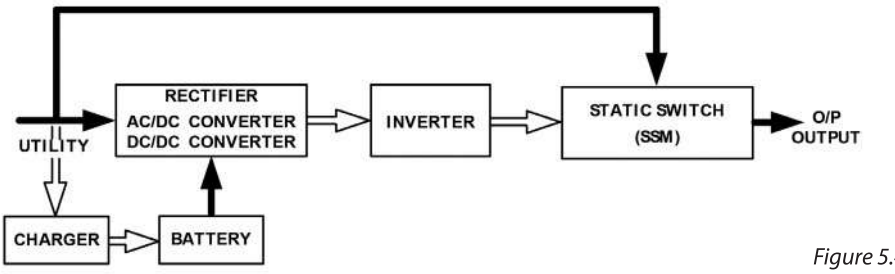
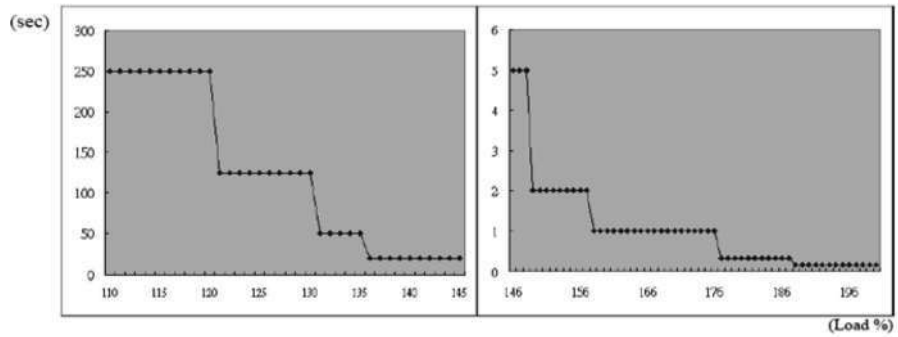


Figure 5.4

1. Generally, modern electronics and IT equipment generate an inrush current when switching on. The amount of inrush current varies from equipment to equipment, sometimes as high as six times rated capacity, other times negligible. To prevent severe damage to its inverter caused by the inrush produced by the loads, the UPS is equipped with an electronic overload-protection feature as standard. If the UPS is loaded over 150% of capacity it will switch into bypass mode until the load is less than 105%. Then the UPS will switch back to Inverter mode automatically.
2. The UPS Bypass loop is also equipped with overload protection. Its overload capacity is illustrated by the graphs and table below.



Load (%)	110~120	121~130	131~135	136~145	146~148	149~157	158~176	177~187	188<
Delay Time (Sec)	250	125	50	20	5	2	1	0.32	0.16

Inverter Failure

Output load short circuit when supplied via inverter

If the output load is short-circuited while supplied via inverter, the UPS will shut down the inverter automatically and cut the supply to the loads. The Fault LED will shine, and the buzzer will beep continuously. The UPS will not switch on automatically after the short-circuit condition is eliminated. The UPS must be restarted manually. (Refer to section 'Start Up in Normal AC Mode'.)

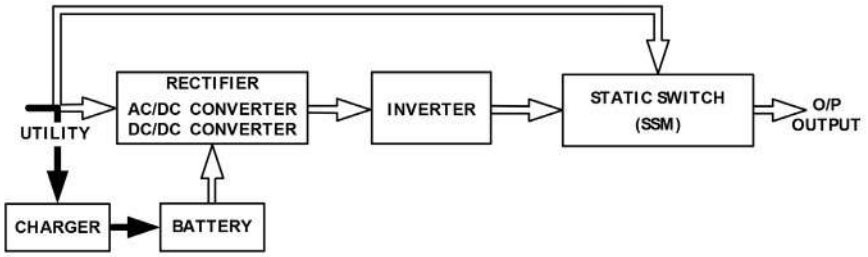


Figure 5.5

Overheating

If the UPS overheats when the utility is normal it will switch into bypass mode. The UPS will switch back to inverter mode when the overheating is eliminated. If overheating occurs when the utility is abnormal the buzzer will beep continuously and the Fault ⚠ will shine. The UPS will cut off supply to the loads.

Inverter Current or Voltage Out of Tolerance

If the UPS inverter delivers over-current or out-of-tolerance voltage to its outlets then the UPS is out of order. The UPS will switch into bypass mode when the utility is normal. The Utility ~ LED, Bypass ~ LED, and Fault ⚠ LED will shine.

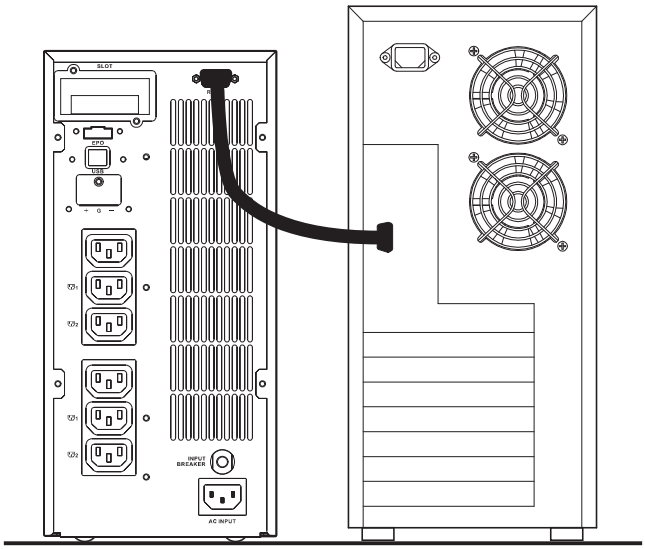
If these two fault conditions occur when the utility is abnormal the UPS will cut off the supply to its outlets, and the Fault ⚠ LED will shine.

7 UPS software

From the website www.ups.legrand.com it is possible to download UPS software.
This software can be used for the following functions:
- Automatic shutdown of the local computer
- UPS parameters reading

Connection

It is possible to to use RS-232 communication
Connect a male RS-232 connector to the UPS communication port.
Connect the female RS-232 connector to the computer.



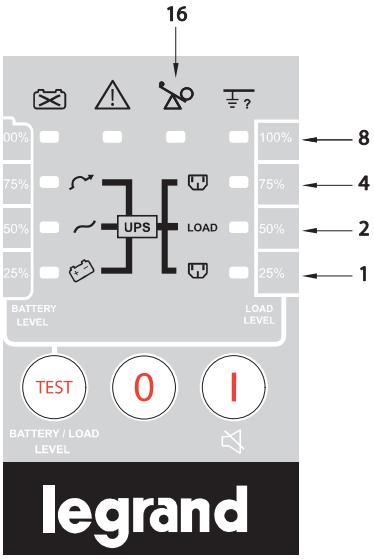
Troubleshooting

Problem	Check Items	Solution
Fault LED **Read the error code* (see next page) displayed by the combination of LEDs, and verify the fault as follows.**	1. Er05,Er24	1. Check for proper battery connection. Measure battery voltage to ensure that batteries are charged and healthy. Recharge batteries for 8 hours if necessary. Simulate utility outage to verify that UPS is able to provide DC backup. Otherwise consult your local dealer right away.
	2. Overload	2. Disconnect some non-critical loads from the UPS output until the overload ceases. Check if there is any short circuit between cables due to broken cable insulation. Replace the cables if necessary.
	3. Er11 (UPS Over Temperature)	3. Remove any objects obstructing the ventilation louvers. Verify that the cooling fans are working properly. Contact your local dealer to replace the fans if necessary.
	4. Site wiring/ Ground fault	4. Check if the "L" and "N" phases of the utility AC source have been wrongly wired or if the Ground-Neutral voltage exceeds the limits.
	5. Er14 (Fans out of order)	5. Verify that the ventilating fans are functioning properly. Do not attempt to replace the fans yourself. Contact your local dealer for replacement.
	6. Other error codes	6. Consult your local dealer for assistance.
UPS fails to provide battery backup or its backup time is shorter than its intended performance.		If the backup time remains unsatisfactory after 8 hours of charging please contact your local dealer for battery replacement.
UPS is normal, but there is no output to the load.	Check that all power cords are properly connected.	If the problem persists consult your local dealer for technical assistance.

Problem	Check Items	Solution
The UPS switches into battery mode and then back into utility mode when a connected device is turned on, or the UPS switches back and forth between battery and utility modes.	1. A power strip is connected to the UPS. See if there is any damage to the utility wall receptacle or if the cord plug is faulty.	1. Do not use the power strip. 2. Replace the wall receptacle/cord plug.
Strange noise or smell		Immediately shut down the whole system. Disconnect the power from the UPS and call for service.
UPS is unable to provide backup power.		Check that the battery connectors are fully engaged. Allow the batteries to recharge if they are weak. If the problem persists after recharging replace the batteries. If the problem still persists consult your local dealer for technical assistance.

Error Codes

When the Fault LED ⚠ is lit press the ON button ⏻ briefly to check the error code.
The error codes 1, 2, 4, 8, and 16 are represented by the four bar LEDs 25%, 50%, 75%, and 100%, and the Overload LED.
Each LED represents a number as shown in the figure below.
For example, if the 25%, 50%, and 100% bar LEDs are lit, the error code is therefore 8 + 2 + 1 = 11, or Er11, which indicates that the UPS is over-temperature.



Code	Meaning
Er05	Battery weak or faulty
Er06	Output short-circuited
Er07	EPO mode
Er11	UPS over-temperature
Er12	Inverter overload
Er24	Utility low (< 160 V) or battery disconnected
Er28	Bypass overload

9 Technical features

MODEL	ITEM		3 101 54 3 101 55	3 101 56 3 101 57	3 101 58 3 101 59
Capacity	VA		1000 VA	2000 VA	3000 VA
	Power Factor		when input voltage is 210~240Vac PF=0.9 (900/1800/2700W) when input voltage is 185~260Vac PF=0.8 (800/1600/2400W) when input voltage is 160~300Vac PF=0.7 (700/1400/2100W)		
Input	Voltage Rating		110/140/160-300 VAC (Based on load percentage 0-25% / 25-50% / 50-100%)		
	Frequency Rating		45-65 Hz		
	Phase		Single phase with ground		
	Power Factor		0.98 (with full linear load)		
	Generator Input		Supported		
	Input Connection		10 A, IEC 320-C14		16A, IEC 320-C20
Output	Voltage		230 V		
	Voltage Regulation		within ±1% until low-battery warning		
	Frequency (Synchronized Range)		3 Hz or 1 Hz (selectable)		
	Frequency (Battery Mode)		50/60 Hz ±0.1% unless synchronized to line		
	Current Crest Ratio		3:1		
	Harmonic Distortion		< 3% at full linear load < 7% at full non-linear load		
	Output Waveform		Pure sine wave		
	Outlets	Version A	3 x IEC 320-C13 (310154)	6 x IEC 320-C13 (310156)	6 x IEC 320-C13 (310158)
		Version B	3 x IEC 320-C13 + 1 FR (310155)	3x IEC 320-C13 + 2FR (310157)	6 x IEC 320-C13 + 2 FR (310159)

9 Technical features

MODEL	ITEM		3 101 54 3 101 55	3 101 56 3 101 57	3 101 58 3 101 59
Output	Overload Capacity (tolerance +/-1%)	Line mode	<105% continuous 106-120% for 30 seconds 121-150% for 10 seconds >150% Immediately transfer to bypass. Buzzer continuously alarms.		
		Battery mode	<105% continuous 106-120% for 30 seconds 121-150% for 10 seconds >150% Immediately shuts down. Buzzer continuously alarms.		
		Bypass mode	<105% continuous 106-120% for 250 seconds shuts down 121-130% for 125 seconds shuts down 131-135% for 50 seconds shuts down 136-145% for 20 seconds shuts down Buzzer continuously alarms.		
Efficiency	Line mode		90%		
	Battery mode		85%		
	ECO mode		96%		
Battery	Battery type		12 V/7.2 Ah Sealed, non-spillage, maintenance-free, lead acid		
	Number of batteries		2	4	6
	Rated Battery Voltage		24 VDC	48 VDC	72 VDC
	Backup time (Half Load)	PF=0.7	> 8 min	>9 min	> 10 min

MODEL	ITEM	3 101 54 3 101 55	3 101 56 3 101 57	3 101 58 3 101 59
Battery	Recharge time (to 90%)	3hr		
DC start		Yes		
Self Diagnostics		By panel button or software control		
Front Panel	LED	Load Level/Battery Level/ Battery Mode/ Normal Mode/ Bypass Mode/ Self-Test/ Weak/Bad Battery/Site Wiring Fault/ Fault/ Overload		
	Button	ON (Alarm Silence)/ OFF (Test/Level Button)		
Audible Alarm	Battery Mode	Sounds once every 1.5 seconds		
	Low Battery	Sounds once every 0.2 seconds		
	Overload	Sounds once every 3 seconds		
	Normal alarm	Sounds once every 3 seconds		
	Fault	Continuous tone		
Protection	Short Circuit	Bypass mode : Fuse Normal Mode : Output Breaker/Electronic Circuit Battery Mode : Output Breaker/Electronic Circuit		
	Battery	ABDM		
	EPO	UPS shuts down immediately.		
	Over Temperature	Normal Mode :Transfer to Bypass Mode Battery Mode : UPS shuts down immediately.		

9 Technical features

MODEL	ITEM	3 101 54 3 101 55	3 101 56 3 101 57	3 101 58 3 101 59
Physical	Unit Dimensions (HxWxD in mm)	236 × 144 × 367	322 x 151 x444	322 × 189 × 444
	Weight	10kg	16.5kg	22.5kg
Environmental	Operating Temperature	0-40°C		
	Noise Level	< 50 dBA		
	Relative Humidity	0-90% (without condensation)		
Interface	Interface Type	RS-232 , EPO		
	Slots	Dry contact, SNMP		
Other function		Static Bypass		
		Peroidic Battery test		
Standards and Certifications	Safety	EN 62040-1-1		
	EMC	EN 62040-2		
	Markings	CE		