CONNECTING COMPETENCE. SCHRACK TECHNIK

USER MANUAL



UNINTERRUPTIBLE POWER SUPPLY

Series AVARA MLT

USMLT 10, 12, 15, 20 kVA

3 phase input / 3 phase output

On Line / Double Conversion (VFI) Technology

INTRODUCTION

Thank you for choosing this product.

Our company is specialized in the design, development and production of uninterruptible power supplies (UPS).

The UPS described in this manual is a high-quality, meticulously-designed product, built to guarantee the best performance.

This manual contains detailed instructions on how to use and install the product.
For information on how to use your equipment to its full potential, this manual should be kept close at hand beside the UPS and READ BEFORE STARTING TO WORK ON IT.

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In order to improve the product, the manufacturers reserve the right to make changes to it at any time and with no notice.

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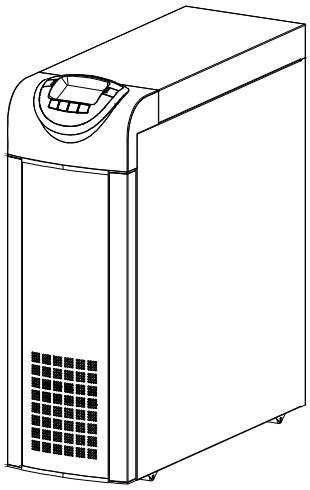
USMLT

The UPS units of the ***USMLT*** 10 – 12 – 15 – 20 kVA range (VFI-SS-111 type) have been designed using the latest technology available today so as to guarantee users maximum performance. The use of the new control PCBs based on multiprocessor architecture (DSP + µP inside) together with high frequency IGBT technology offers excellent performance both in the input stage (absorbed current harmonic distortion ≤ 3%) and in output (output voltage distortion ≤ 1%).
Thanks to these and many other features plus the easy-to-use design, the ***USMLT*** represents a new reference standard in the three-phase UPS sector.

Depending on user requirements, there are two different versions available:

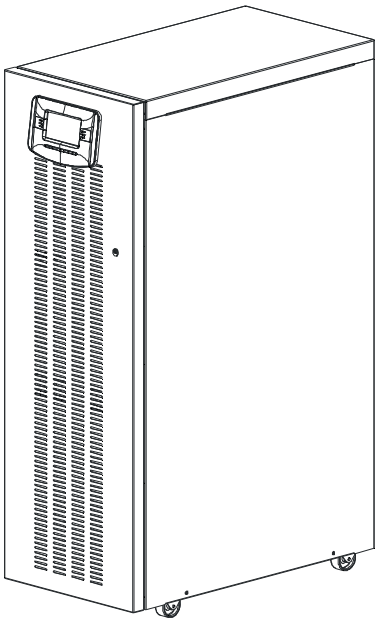
USMLT 10/20

The ***USMLT version*** stands out by its compact size and new, modern design. These features make it suitable for any environment.



USMLT10/20 X

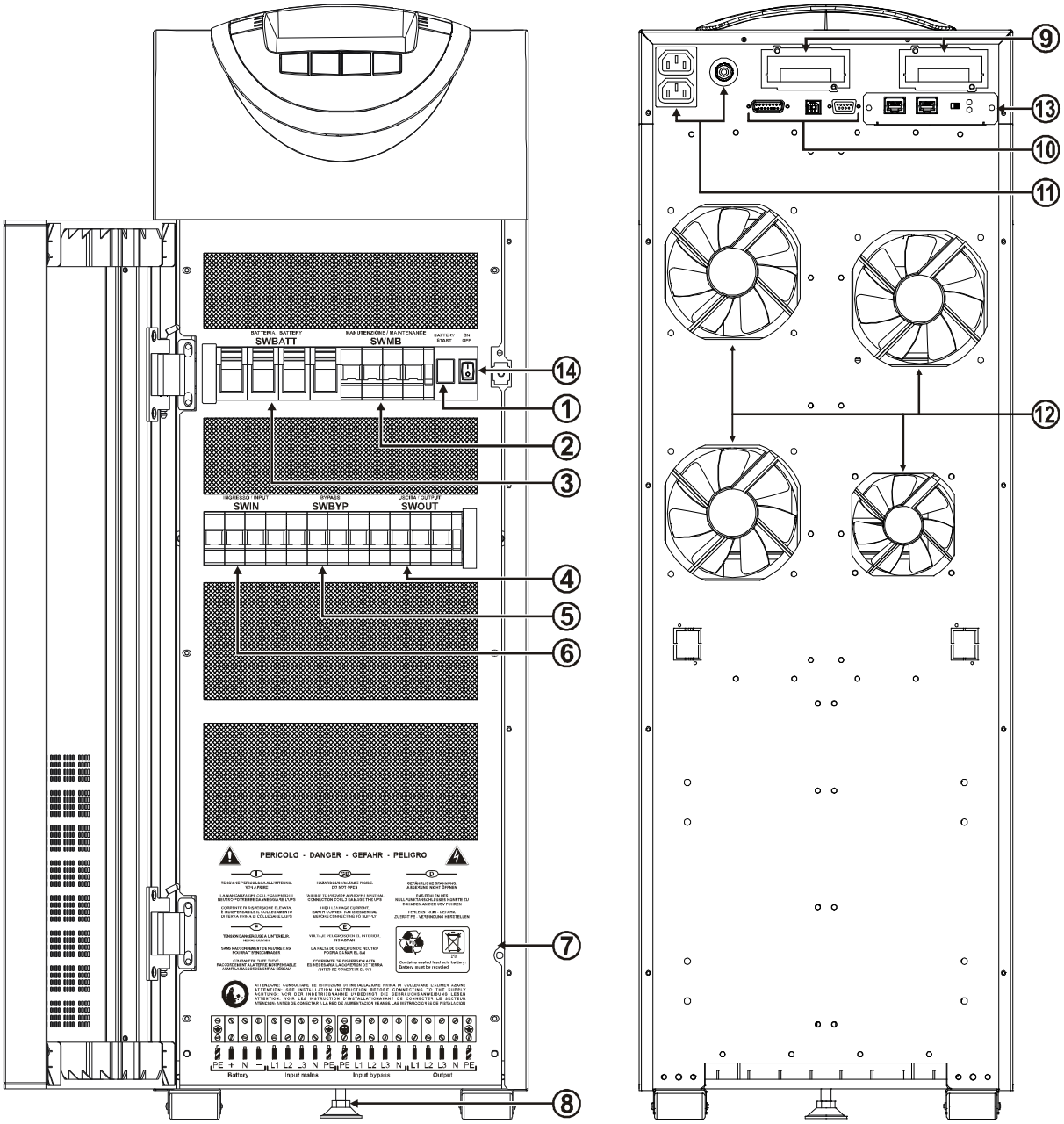
The ***USMLT X version***, offers longer autonomy than the ***USMLT*** version, thanks to the possibility to double the number of batteries inside the cabinet.



		10 kVA	12 kVA	15 kVA	20 kVA
Nominal power		10000 VA 9000 W	12000 VA 10800 W	15000 VA 13500 W	20000 VA 18000 W
Output power factor		0.9	0.9	0.9	0.9
Weight (with batteries)	***USMLT 10/20***	180 Kg	182 Kg	190 Kg	195 Kg
	USMLT 10/20 X	305 Kg	310 Kg	315 Kg	320 Kg
W x D x H	***USMLT 10/20***	320 x 840 x 930 mm			
	USMLT 10/20 X	440 x 850 x 1320 mm			

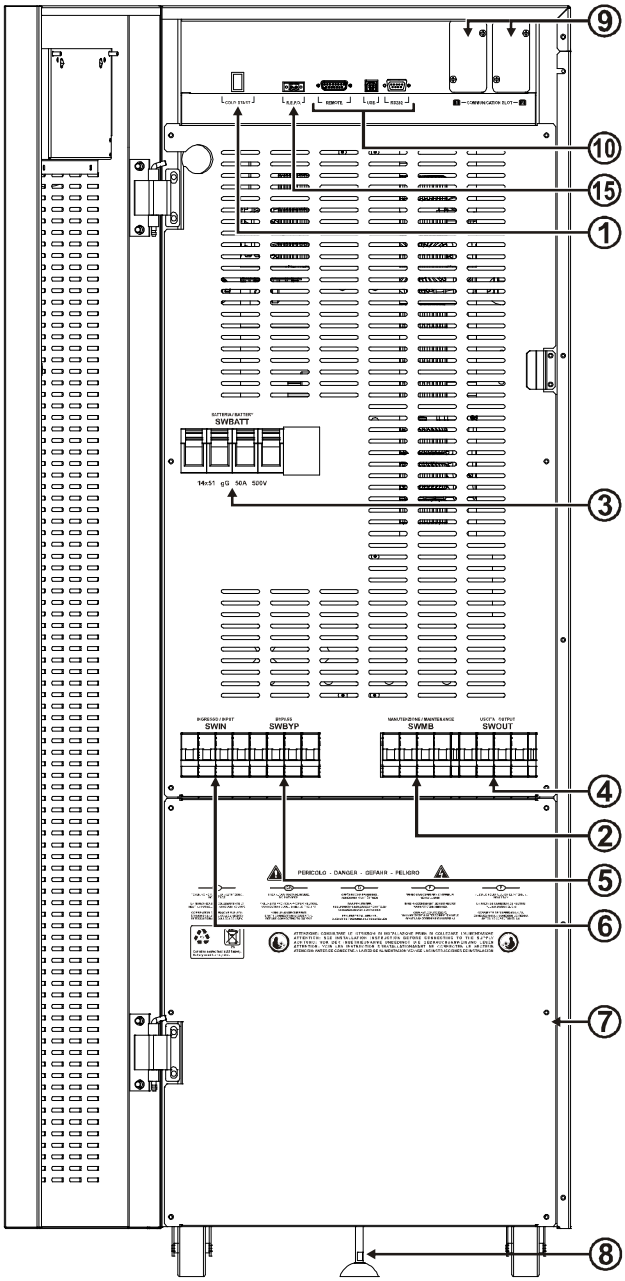
Accessories	Battery cabinets – Communication boards – Remote mimic panel

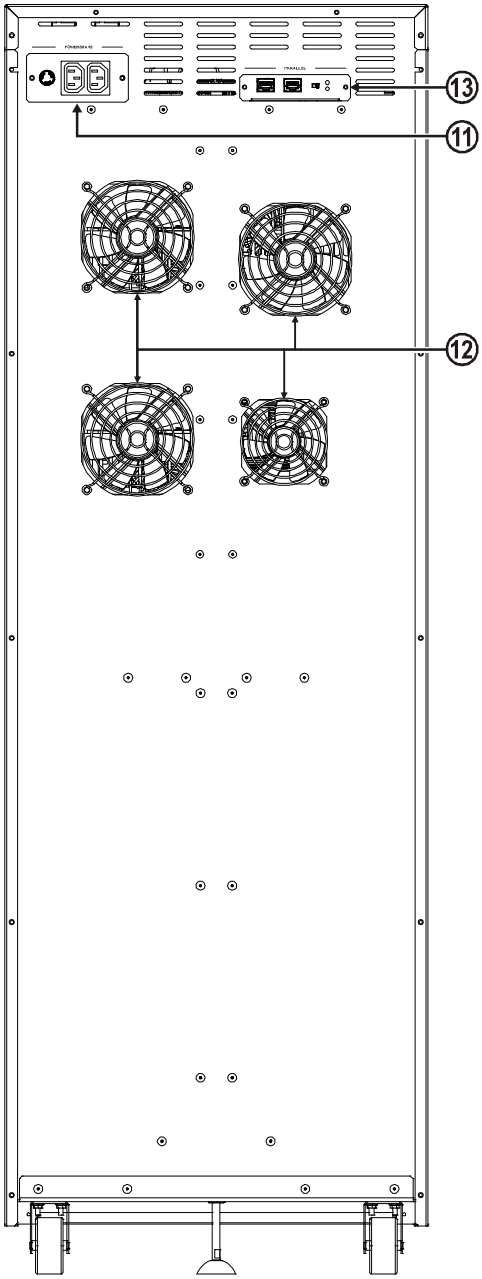
USMLT 10/20 UPS VIEWS



1	Battery start button (COLD START)	8	Brake rod
2	Manual bypass switch	9	Slots for accessory communication cards
3	Battery fuse holder isolator	10	Communication ports (AS400, USB, RS232)
4	Output switch	11	Powershare sockets (10A max. total on the two sockets) and relative protection
5	Separate bypass switch (optional)	12	Ventilation fans
6	Input switch	13	Parallel PCB (optional)
7	Terminal cover panel	14	1/0 main power switch

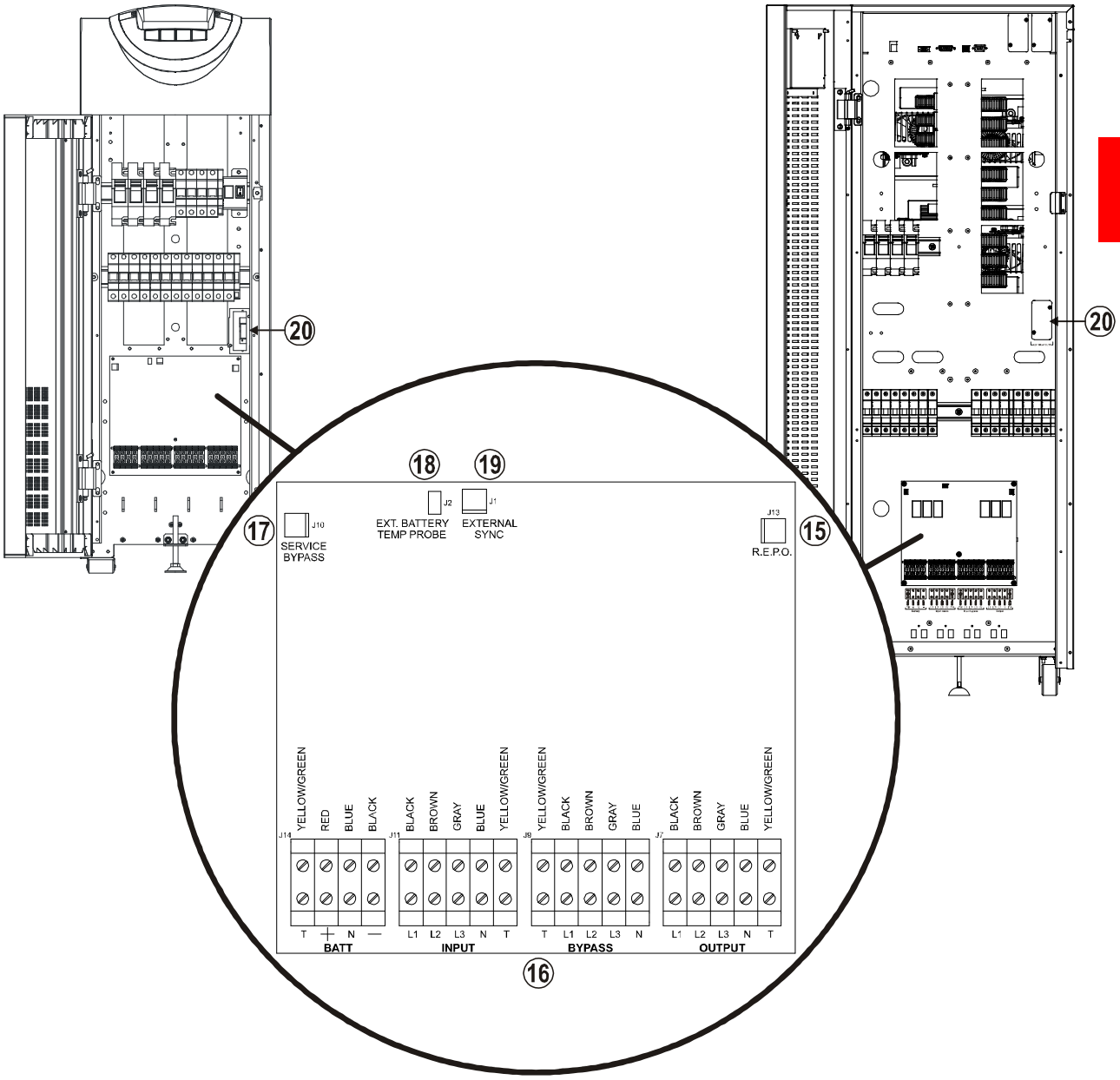
USMLT 10/20 X UPS VIEWS





1. Battery start button (COLD START)
2. Manual bypass switch
3. Battery fuse holder isolator
4. Output switch
5. Separate bypass switch (optional)
6. Input switch
7. Terminal cover panel
8. Brake rod
9. Slots for accessory communication cards
10. Communication ports (AS400, USB, RS232)
11. Powershare sockets (10A max. total on the two sockets) and relative protection
12. Ventilation fans
13. Parallel PCB (optional)
15. Remote Emergency Power Off (R.E.P.O.)

VIEW OF THE UPS CONNECTIONS



15 Connection for the R.E.P.O command (Remote Emergency Power Off)
(see previous page for the ***USMLT 10/20 X*** *version*)

16 Power connections: BATTERY, INPUT, SEPARATE BYPASS (optional), OUTPUT

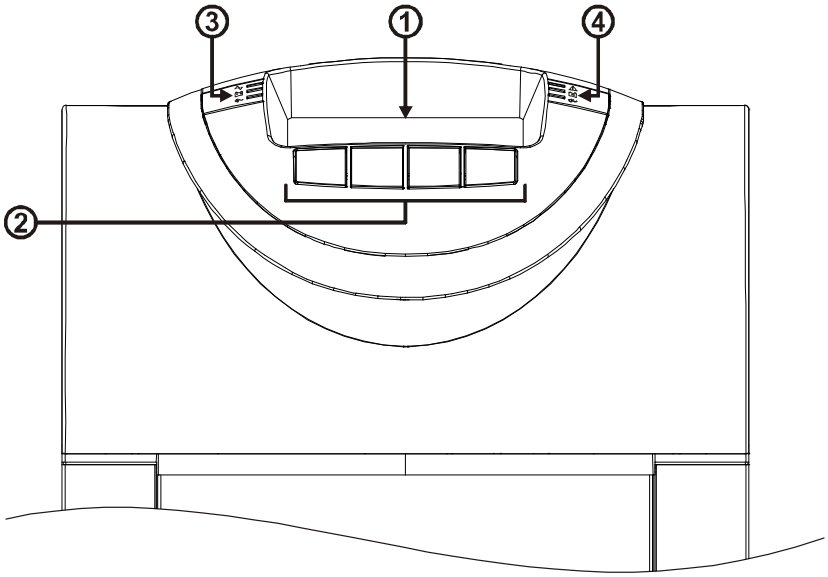
17 Connection for remote maintenance bypass command

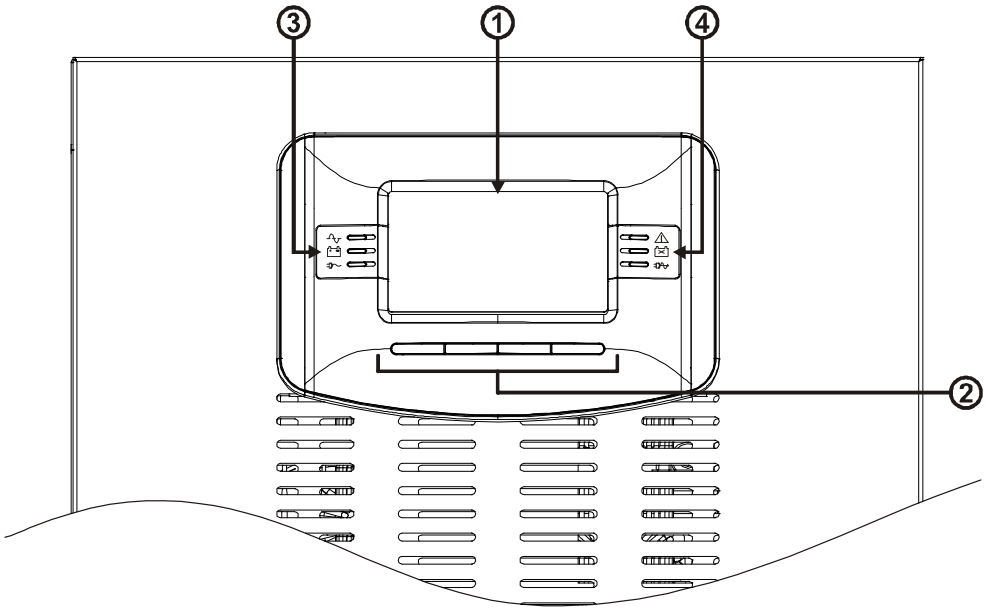
18 Connection for external Battery Box temperature probe

19 Connection for external synchronization signal

20 Slot for power relay board

VIEW OF THE CONTROL PANEL





① Graphic display

② Function keys *

③ Left-hand LEDs area:

- Mains power LED
- Battery power LED
- Load on bypass LED

④ Right-hand LEDs area:

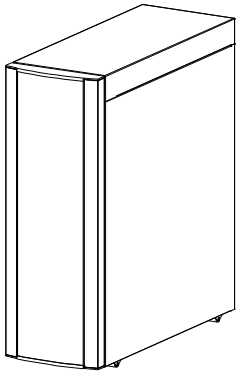
- Stand-by / alarm LED
- Battery low LED
- ECO mode LED

* The function of each key is indicated at the bottom of the display and varies according to the menu used.

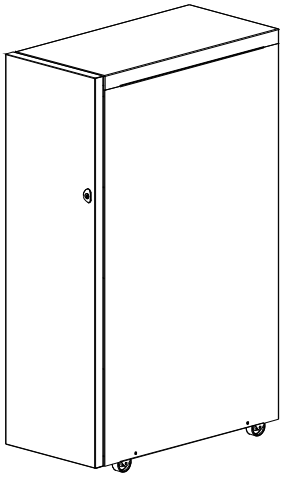
BATTERY BOX (OPTIONAL)

THE BATTERY BOX IS AN OPTIONAL ACCESSORY. THIS UPS RANGE HAS BATTERY BOX VERSIONS OF THE SAME SIZE AND MATCHING STYLE.

The Battery Box contains batteries that increase the operating time of the UPS during prolonged black-outs. The number of batteries contained in it will vary according to the type of UPS to which the Battery Box is to be installed. The utmost attention must be paid to ensure that the battery voltage of the Battery Box corresponds to that supported by the UPS.

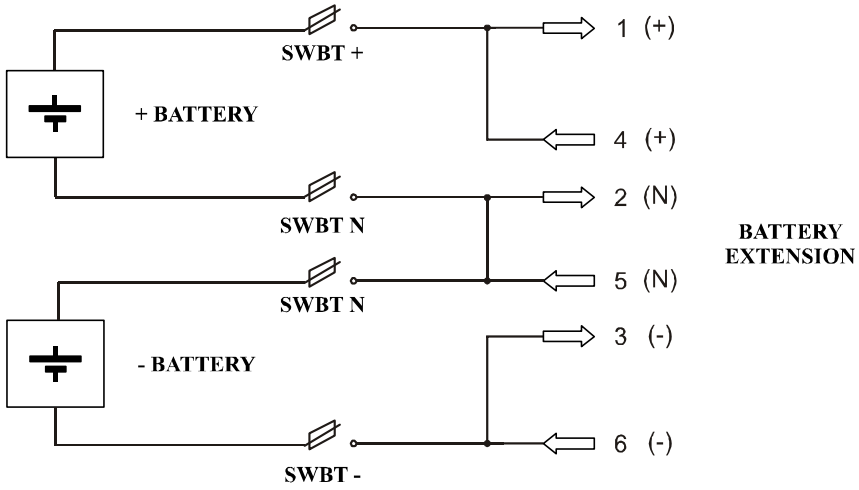


USMLT 10/20



USMLT 10/20 X

Additional Battery Boxes may be connected in a chain to obtain the desired autonomy time during a power failure. This series of Battery Box contains two separate strings of batteries, one with a positive voltage and the other with a negative voltage with respect to the neutral terminal (N).
The basic diagram for the Battery Box is shown here below.



USMLT 10/20	BB480-A5	BB480-M5
Rated voltage	240 + 240 Vdc	240 + 240 Vdc
Weight	150Kg	270Kg
W x D x H	320 x 840 x 930 mm	

USMLT 10/20 X	BB480X-M5	BB480X-M7	BB480X-M3	BB480X-M6
Rated voltage	240 + 240 Vdc	240 + 240 Vdc	240 + 240 Vdc	240 + 240 Vdc
Weight	300 Kg	390 Kg	395 Kg	400 Kg
W x D x H	400 x 815 x 1320 mm			

SEPARATE BYPASS INPUT (OPTIONAL)

THE DI (OPTIONAL) VERSION OF THE UPS SERIES HAS SEPARATE BYPASS AND INPUT LINES.

The UPS series with separate Bypass ensures a separate connection between the input and bypass lines.
The UPS output is synchronised with the bypass line so as to safeguard against incorrect voltage changeovers in the alternate phases, in the event of automatic bypass or closing of the maintenance switch (SWMB).

INTERNAL TRANSFORMER

THE OT (OPTIONAL) VERSION OF THE UPS SERIES DIFFERS FROM THE STANDARD VERSION IN THAT IT USES AN ISOLATION TRANSFORMER INSTEAD OF THE BATTERIES.

This series of UPS uses an isolation transformer connected to the UPS output terminals.
NOTE: A separate bypass line is supplied on this UPS version.

The transformer is connected to the UPS output terminals, so the values displayed are those of the quantities measured upstream of the transformer.



The presence of the transformer inside the UPS modifies the system neutral arrangements.

The installation of a remote maintenance bypass parallel to the UPS is incompatible with inclusion of the transformer. In any event, if the remote maintenance bypass is inserted, make sure, at the time the remote bypass switch is closed, that the UPS is isolated from the system by opening the input and/or output switches.

ADDITIONAL INTERNAL BATTERY CHARGERS

THE AC (OPTIONAL) VERSION OF THE UPS SERIES DIFFERS FROM THE STANDARD VERSION IN THAT SOME ADDITIONAL BATTERY CHARGERS ARE USED INSTEAD OF THE BATTERIES.

This series of UPS must be used together with an external Battery Box and is suitable for applications requiring long back-up times.
NOTE: A separate bypass line is supplied on this UPS version.

The additional internal battery charger cards are powered directly on mains power and have pseudo-sinusoidal wave form absorption.



If the input switch is closed but the I/O switch is open (UPS switched off) the battery chargers operate independently. Open the input switch (SWIN) to totally shutdown the UPS and the additional battery chargers.

AC Version	10 kVA	12 kVA	15 kVA	20 kVA
Nominal voltage	240 + 240 Vdc			
Current in addition to that supplied by the internal battery charger	6A@240Vdc			

INSTALLATION

ALL THE OPERATIONS DESCRIBED IN THIS SECTION ARE TO BE PERFORMED EXCLUSIVELY BY QUALIFIED STAFF.
The company declines all liability for damage caused by incorrect connections or operations not described in this manual.

STORING THE UPS AND THE BATTERY BOX

The storage room must respect the following conditions:

Temperature: 0°÷40°C (32°÷104°F)

Relative humidity: max. 95%

PREPARING FOR INSTALLATION

PRELIMINARY INFORMATION

UPS models		10 kVA	12 kVA	15 kVA	20 kVA
Rated power		10000 VA	12000 VA	15000 VA	20000 VA
Working temperature		0 ÷ 40 °C			
Max. relative humidity during operation		90 % (non-condensing)			
Max. height of installation		1000 m at rated power (-1% Power for every 100 m above 1000 m) max 4000 m			
W x D x H	***USMLT 10/20***	320 x 840 x 930 mm			
	USMLT 10/20 X	440 x 850 x 1320 mm			
Weight (w/ batteries)	***USMLT 10/20***	180 Kg	182 Kg	190 Kg	195 Kg
	USMLT 10/20 X	305 Kg	310 Kg	315 Kg	320 Kg
Power dissipated at rated resistive load (pf=0.9) and with battery as buffer *		0.63 kW 540 kcal/h 2150 B.T.U./h	0.75 kW 645 kcal/h 2560 B.T.U./h	0.86 kW 740 kcal/h 2940 B.T.U./h	1.15 kW 990 kcal/h 3930 B.T.U./h
Power dissipated at rated distortion load (pf=0.7) and with battery charged *		0.49 kW 420 kcal/h 1670 B.T.U./h	0.58 kW 500 kcal/h 1980 B.T.U./h	0.67 kW 580 kcal/h 2290 B.T.U./h	0.90 kW 775 kcal/h 3070 B.T.U./h
Flow rate of fans for removing heat from installation room **		340 mc/h	400 mc/h	460 mc/h	615 mc/h
Current leak to earth ***		< 5 mA			
Isolation protection		IP20			
Cable input		From bottom / on rear			

* *3.97 B.T.U./h = 1 kcal/h*

** *To calculate the air flow rate, the following formula may be used: Q [m3/h] = 3.1 x P_{diss} [Kcal/h] / (t_a - t_e) [°C]*
P_{diss} is the power expressed in Kcal/h dissipated by all the devices installed in the installation environment.
ta= ambient temperature, te=outside temperature. To take leaks into account, the value obtained should be increased by 10%.
The table shows an example of a flow rate with (t_a - t_e)=5°C and a rated resistive load (pf=0.9).
(Note: This formula is applicable if ta>te, only; if not the UPS installation requires an air-conditioning system).

*** *The leakage current of the load is to be added to that of the UPS on the earth wire.*

ELECTROMAGNETIC COMPATIBILITY

This UPS product conforms to the current electromagnetic compatibility (EMC) regulations (C2 class). It may cause radio interference in the home environment. The user may have to adopt supplementary measures.
This product is for professional use in industrial and commercial environments. Connections to USB and RS232 connectors must be made with the cables provided, or at least with shielded cables less than 3 metres long.

INSTALLATION ENVIRONMENT

When choosing the site in which to install the UPS and the Battery Box, the following points should be taken into consideration:

- Avoid dusty environments
- Check that the floor is level and capable of withstanding the weight of the UPS and the Battery Box
- Avoid cramped environments that could impede the normal maintenance activities
- The relative humidity should not exceed 90%, non-condensing
- Check that the ambient temperature, with the UPS running, remains between 0 and 40°C



The UPS may be operated with an ambient temperature of between 0 and 40°C. The recommended working temperature for the UPS and the batteries is between 20 and 25°C. In fact, if the battery has an average life of 5 years with a working temperature of 20°C, the life is halved if the working temperature is increased to 30°C.

- Avoid installing the equipment in places exposed to the direct sunlight or hot air

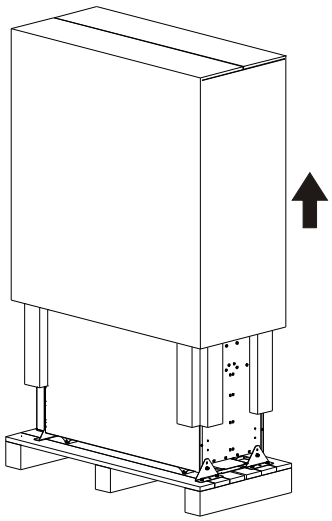
To keep the temperature of the installation room within the range indicated above, there must be a system for eliminating the dissipated heat (the UPS kW / kcal/h / B.T.U./h dissipation values are shown in the table on the previous page). The methods that may be used are:

- *Natural ventilation*
- *Forced ventilation*, recommended if the outside temperature is less (e.g. 20°C) than the temperature at which the UPS or Battery Box is to be operated (e.g. 25°C)
- *Air-conditioning system*, recommended if the outside temperature is higher (e.g. 30°C) than the temperature at which the UPS or Battery Box is to be operated (e.g. 25°C)

REMOVING THE UPS AND THE BATTERY BOX FROM THE PALLET

USMLT 10/20 VERSION

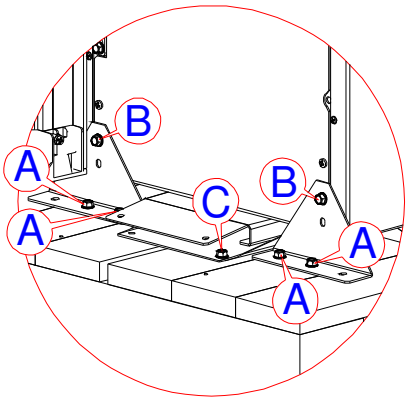
- Cut the straps and remove the cardboard box by sliding it upwards



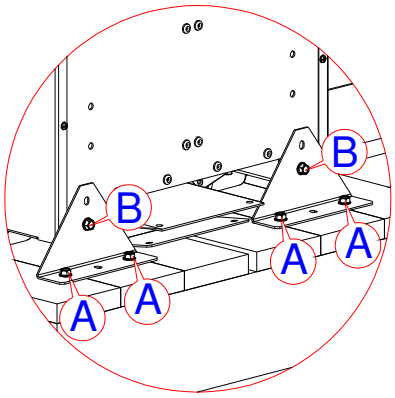
- Remove the accessory box and side blocks.
  NOTE 1: You will find the accessory box either inside the door of the UPS or on top of the UPS.

- Open the door and remove the slides.
  NOTE 2: The slides are fixed to the pallet by a screw (marked C in the figure).

FRONT VIEW

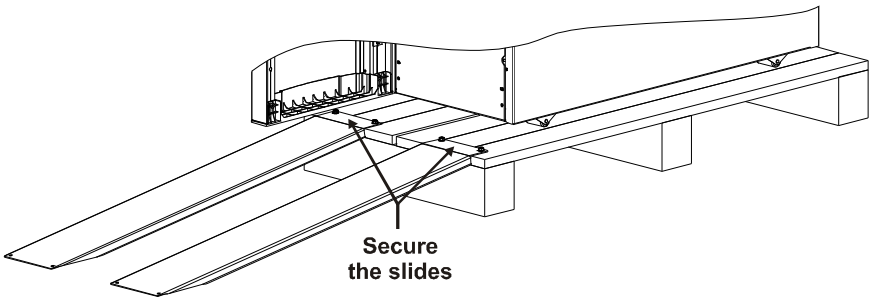


REAR VIEW



- Remove the 4 brackets securing the UPS to the pallet (the screws are marked A and B in the figures).

- Using 4 of the previously removed screws (type A) secure the slides to the pallet (as shown). Push the UPS from the rear off the pallet with great care. **Make sure that the door is closed before doing this**

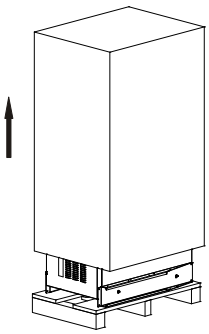


NOTE: All parts of the packaging should be kept for future use.

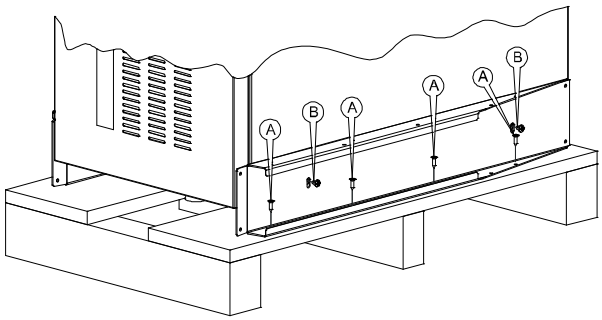
USMLT 10/20 X VERSION

WARNING: IN ORDER TO AVOID DAMAGE TO PERSONS AND/OR TO THE MACHINES, PLEASE FOLLOW SCRUPULOUSLY THE INDICATIONS GIVEN BELOW.

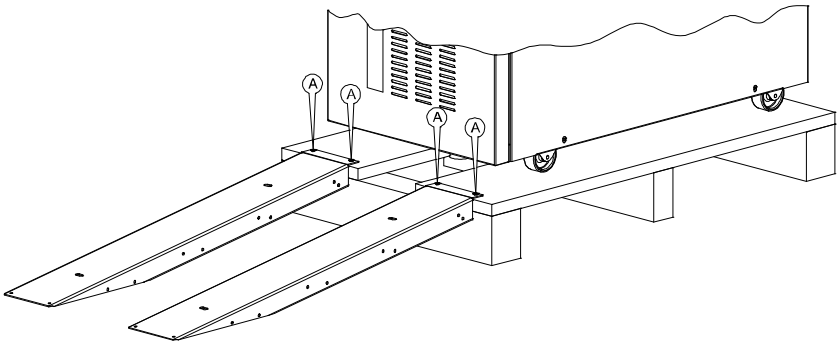
SOME OF THE FOLLOWING OPERATIONS REQUIRE TWO PEOPLE.



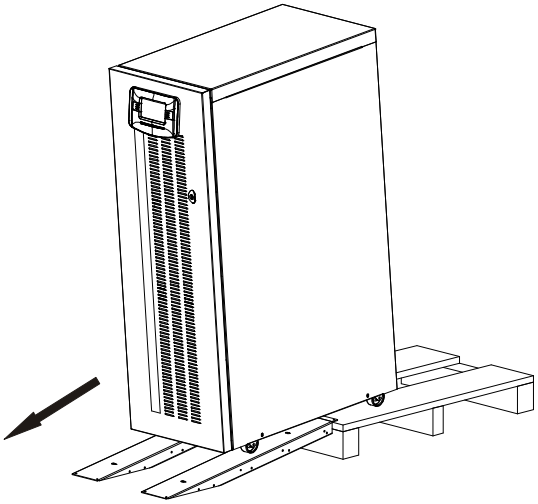
- Cut the straps and slide the cardboard box off the unit pulling upwards. Remove the packaging.
- Remove the box containing the accessories.
  NOTE: The box of accessories may be inside the packaging or behind the UPS door.



- Remove the two brackets securing the UPS to the pallet by loosening screws A and B.



- Once removed, the two brackets can be used as ramps. Fasten the ramps to the pallet using the screws A and making sure to align them with the wheels of the unit.



- Turn the feet as far as they will go in order to increase the distance between the unit and the pallet.
- Make sure that the door is properly closed.
- **<u>WARNING</u>: to unload the UPS from the pallet, we recommend that you push it down the ramps from behind, taking every precaution and accompanying the unit along the ramps to the floor. In view of the weight of the machine, this operation should be carried out by two people.**

NOTE: We advise you to keep all the parts of the packaging for future use.

PRELIMINARY CHECK OF CONTENTS

Having opened the package, start by checking the contents.

UPS	BATTERY BOX (optional)
Metal slides, Guarantee document, User manual, Cd-rom containing the UPS management software, Serial connecting cable, 4 battery fuses (to be inserted in the "SWBATT" fuse holders), Front door key (***USMLT 10/20 X*** *version only*)	Metal slides, Guarantee document, Cable for connecting the Battery Box to the UPS (***USMLT 10/20*** *version only*), 4 battery fuses (to be inserted in the "SWBATT" fuse holders), Front door key (***USMLT 10/20 X*** *version only*)

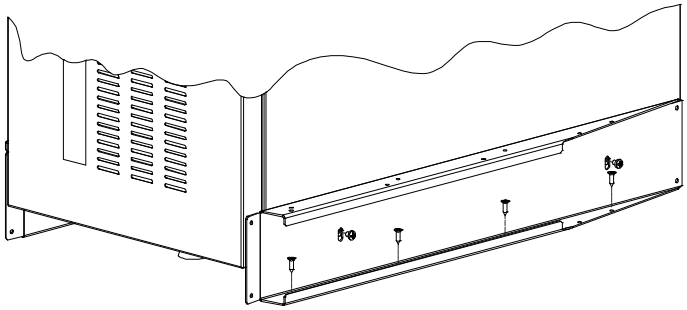
INSTALLING THE UPS AND THE BATTERY BOX

When installing the equipment, the following points should be considered:

- The wheels are to be used exclusively for fine positioning, and thus for small distances only.
- The plastic parts and the door are not to be used for gripping or pushing the UPS.
- Sufficient space should be left in front of the equipment for it to be turned on/off and maintenance operations to be performed on it (≥ 1.5 mt)
- The rear part of the UPS should be set at least 30 cm from the wall, to enable the air blown by the ventilation fans to flow away correctly
- No objects should be left on its top surface

Having set the equipment in position, secure it by engaging the brake rod (see "Front Views of the UPS" point 8) situated below the connecting terminals.

(USMLT 10/20 X version only): In seismic areas or for mobile systems, the brackets used to fasten the unit to the pallet (ramps) can be reused to anchor the UPS to the floor (see the figure below). In normal conditions, the brackets are not necessary.



STEPS TO BE TAKEN TO GAIN ACCESS TO THE TERMINALS OF THE UPS / BATTERY BOX

The operations indicated below are to be performed with the UPS disconnected from the mains powers, turned off and with all the switches and fuse holders of the equipment open.

Follow the instructions provided below to open the UPS:

- Open the door
- Remove the terminal and switches cover (see "Views of the UPS" ref. 7)

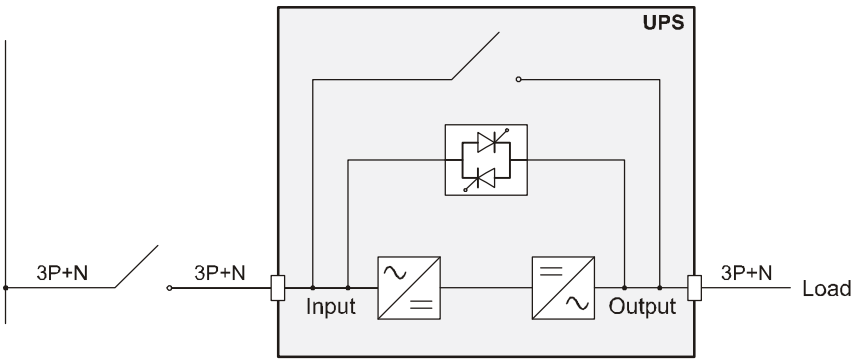
Having completed the installation operations inside the equipment, replace the terminal cover and close the door.

ELECTRICAL CONNECTIONS

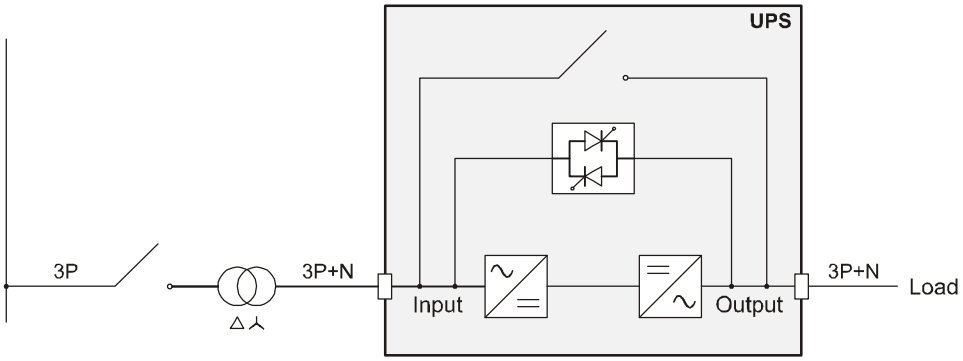
WARNING: a 4-wire three-phase distribution system is required.
The UPS must be connected to a power supply line made up of 3 phases + neutral + PE (protective earth) of TT, TN or IT type. Therefore, the phase rotation must be respected.
Optional TRANSFORMER BOXES to convert the distribution systems from 3 wires to 4 wires are available.

WIRING DIAGRAMS FOR CONNECTING TO THE ELECTRICAL SYSTEM

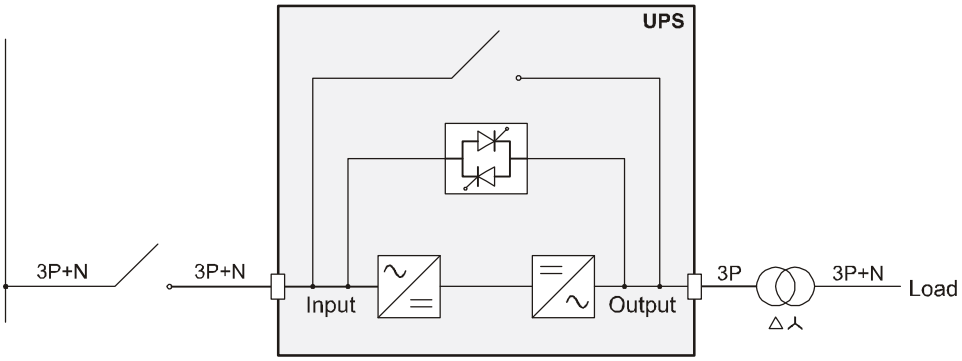
UPS without any variation in neutral condition



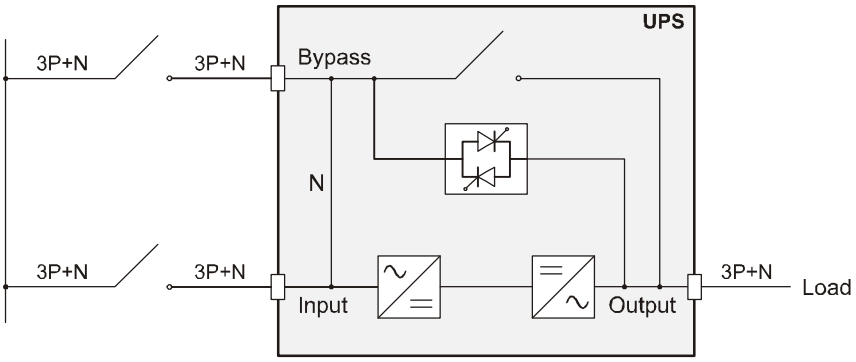
UPS with galvanic isolation at input



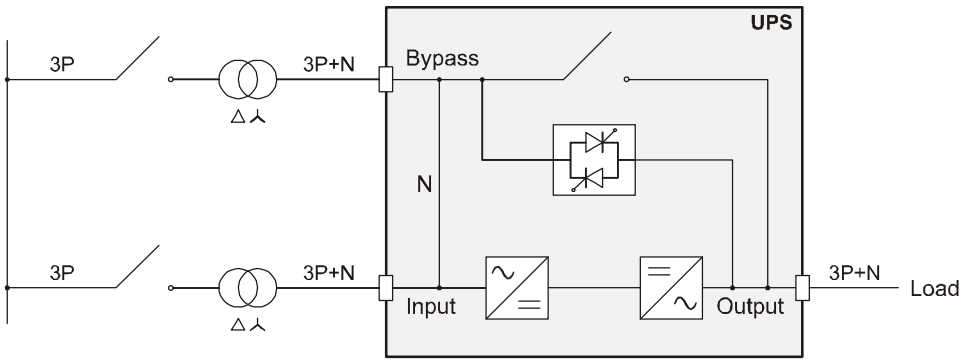
UPS with galvanic isolation at output



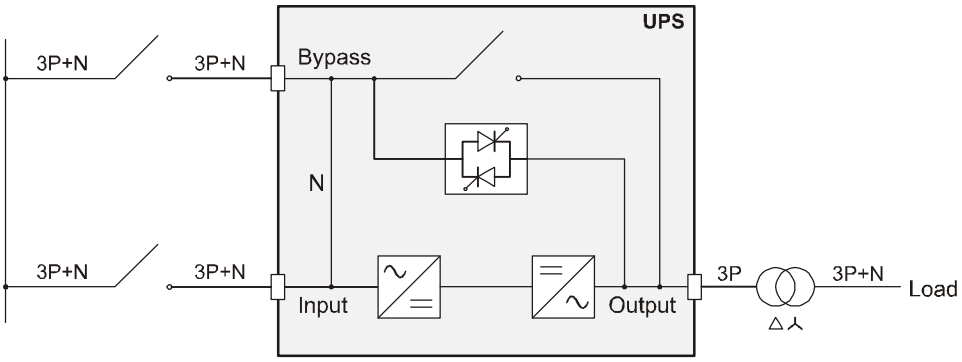
UPS without any variation in neutral condition and with separate bypass input



UPS with galvanic isolation and with separate bypass input

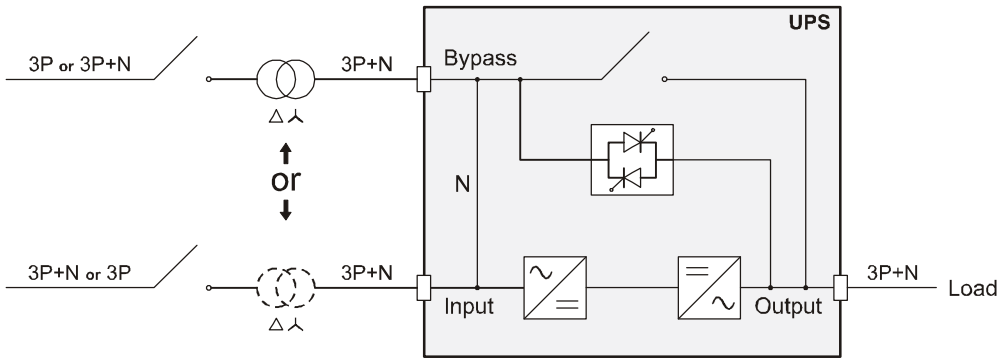


UPS with galvanic isolation at output and separate bypass input

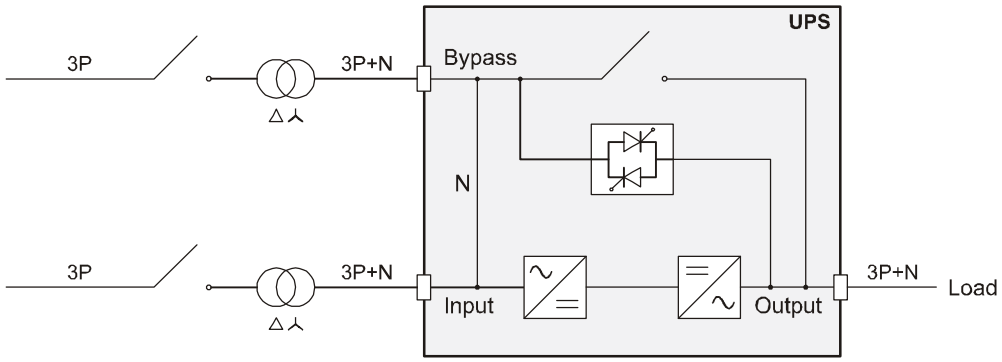


Separate bypass:
if the separate bypass option is present, protective devices must be present on both the main power supply line and the bypass line.
Note: the neutral of the input line and that of the bypass are commoned inside the equipment, so they must refer to the same potential. If the two power supplies were different, an isolation transformer would have to be used on one of the inputs.

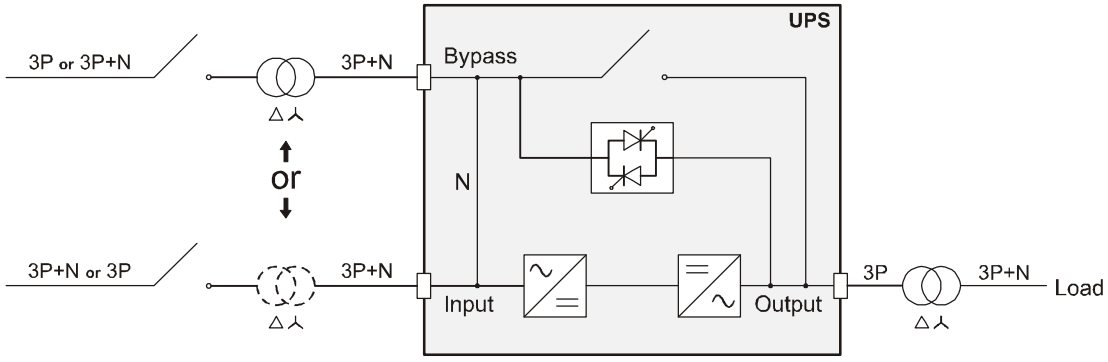
UPS without any variation in neutral condition and with separate bypass input connected to independent power supply line



UPS with separate bypass input on independent power supply line and with galvanic isolation at input



UPS with separate bypass input connected to independent power supply line and with galvanic isolation at output



INTERNAL PROTECTIVE DEVICES OF THE UPS

The table below shows the sizes of the isolators of the UPS and the sizes of the battery fuses (SWBATT): these devices are accessible from the front of the UPS.
There are also indications about the internal fuses (not accessible) protecting the input and output lines and the maximum input and rated output currents. To install the UPS, see the block diagram in the "USE" section of the "Description" paragraph.
Fuses are to be replaced with ones of the same size and the characteristics indicated in the table below.

	Isolators and internal protective devices						
UPS mod.	Non-automatic switches		Fuses				
[kVA]	UPS input / Separate bypass	UPS output / Maintenance	Rectifier input fuse	Battery fuse	Output fuse	Input current [A] **	Output current [A]
	SWIN / SWBYP (optional)	SWOUT / SWMB		SWBATT		Max *	Rated
10	40A(4P)	40A(4P)	25A FF 500V (6.3x32)	32A gG 400V (10x38)	25A FF 500V (6.3x32)	20A	15A
12	40A(4P)	40A(4P)	25A FF 500V (6.3x32)	32A gG 400V (10x38)	25A FF 500V (6.3x32)	24A	17A
15	63A(4P)	63A(4P)	2 x 20A FF 500V (6.3x32)	50A gG 400V (14x51)	2 x 20A FF 500V (6.3x32)	29A	22A
20	63A(4P)	63A(4P)	2 x 20A FF 500V (6.3x32)	50A gG 400V (14x51)	2 x 20A FF 500V (6.3x32)	38A	29A

* *The max. input current refers to a rated load (PF = 0.9) and an input voltage of 346V, and a battery charger charged with 4A.*

** *In versions with additional internal battery chargers (optional), the maximum input current on lines L2 and L3 must be increased by 7A.*

SHORT CIRCUIT

If a failure occurs on the load, the UPS protects itself by limiting the value and duration of the current output (short-circuit current). These values also depend on the operating status of the UPS at the time of the failure; there are two different cases:

- UPS in NORMAL OPERATION: the load is switched instantaneously to the bypass line ($I^2t=11250A^2s$): the input line is connected to the output without any internal protection (blocked after t>0.5s)
- UPS in BATTERY OPERATION: the UPS protects itself by providing a current equivalent to about 1.5 times the rated current for 0.5s and turns itself off after this time has elapsed

BACKFEED

The UPS has internal protection against backfeed through metal separating devices.
There is an output on the relay board (optional) for activating a releasing device to be installed upstream from the UPS.



The UPS has an internal device (redundant bypass power supply) which, when a failure occurs on the machine, activates the bypass automatically, thus keeping the load powered without any internal protection and without any limitation to the power supplied to the load.
Under these emergency conditions, any disturbance present on the input line will affect the load.
See also the "USE" section of the "Redundant Auxiliary Power Supply for Automatic Bypass" paragraph.

EXTERNAL PROTECTIVE DEVICES

MAGNETOTHERMAL

As explained previously, the UPS has protection devices for output faults as well as for internal faults.
In order to set up the power line, install a magnetothermal switch upstream from the UPS with intervention curve B or C. Please follow the indications in the table below:

	Automatic external protective devices	
UPS mod.	Mains input	Separate bypass input (optional)
10 kVA	40A	40A
12 kVA	40A	40A
15 kVA	63A	63A
20 kVA	63A	63A

If the protective device upstream from the UPS interrupts the neutral wire, it must also interrupt all the phase wires at the same time (four-pole switch).

Output protections (recommended values for discrimination)		
Normal fuses (GI)	In (Nominal current)/7	In (Nominal current)/7
Normal switches (C curve)	In (Nominal current)/7	In (Nominal current)/7
Ultra-fast fuses (GF)	In (Nominal current)/2	In (Nominal current)/2

DIFFERENTIAL

In versions with no input separation transformer, the neutral from the mains power supply is connected to the UPS output neutral; as a result, there will be no change to the neutral arrangements of the installation:

THE UPS INPUT NEUTRAL IS CONNECTED TO THE UPS OUTPUT NEUTRAL
THE DISTRIBUTION SYSTEM THAT POWERS THE UPS IS NOT MODIFIED BY THE UPS

The neutral condition is only modified if an isolation transformer is present or when the UPS works with a neutral isolated upstream.
Make sure that the equipment is connected correctly to the input neutral because as damage may be caused to the UPS.

During operation with the mains supply present, a differential switch (RCD) at the input to the UPS will activate should a fault occur on the output side as the output circuit is not isolated from the input circuit.
In any case, other differential switches may still be installed on the output, preferably in coordination with those present at the input.
The differential switch located upstream must have the following characteristics:

- Differential current adjusted to the sum of UPS + Load; we recommend a suitable margin be kept to prevent unwanted activation (100mA min. - 300mA recommended)
- Type B or type A
- Delay of at least 0.1s

CROSS SECTION OF THE CABLES

We recommend the INPUT/OUTPUT and BATTERY cables be passed under the UPS.
To determine the minimum cross section of the input and output cables, see the table below:

	Cross section of cables (mm2)*								
	INPUT mains / separate bypass (optional)			OUTPUT			BATTERY** (optional)		
kVA	PE	L1/L2/L3	N	PE	L1/L2/L3	N	PE	+/-	N
10	4	2.5	4	4	2.5	4	4	4	4
12	6	4	6	6	4	6	6	6	6
15	6	4	6	6	4	6	6	6	6
20	10	6	10	10	6	10	10	10	10

* *The cross sections indicated in the table refer to a maximum length of 10 metres*

** *The maximum length of the cables for connecting the Battery Box (optional) is 3 metres*

Note: the maximum cross section of the cables that may be inserted in the terminal board is:

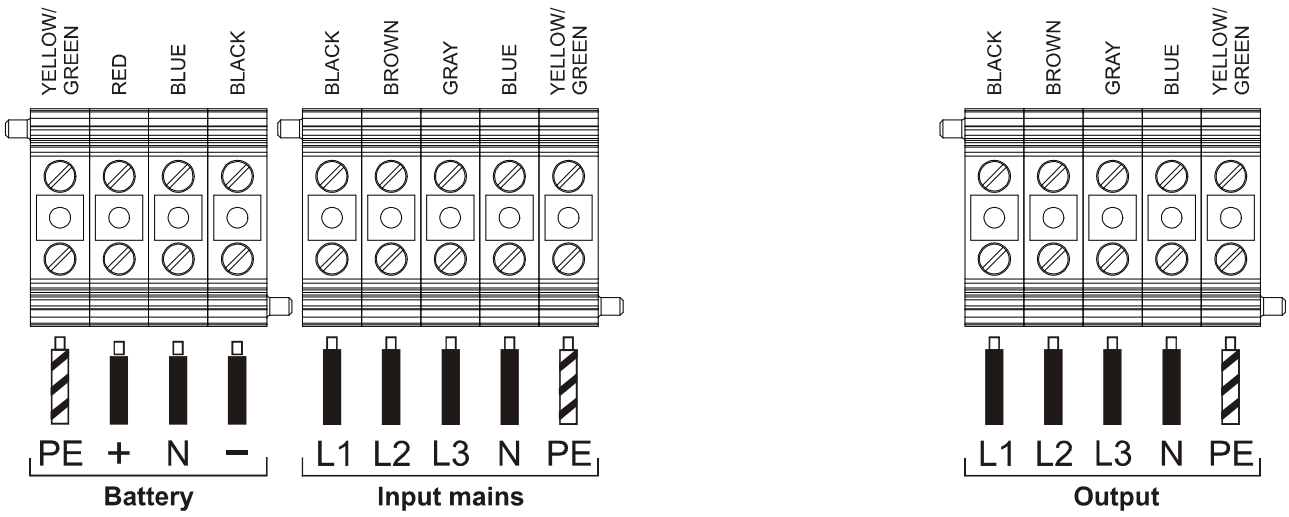
- 10mm2 for cables with lugs
- 16mm2 for bare cables

CONNECTIONS

The first wire to be connected is the protective earth wire, which is to be inserted in the terminal marked PE. During operation the UPS must be connected to the earthing system

Connect the input and output cables to the terminal board as indicated in the figure below:

THE INPUT NEUTRAL MUST ALWAYS BE CONNECTED
DO NOT CONNECT THE OUTPUT NEUTRAL TO THE INPUT NEUTRAL



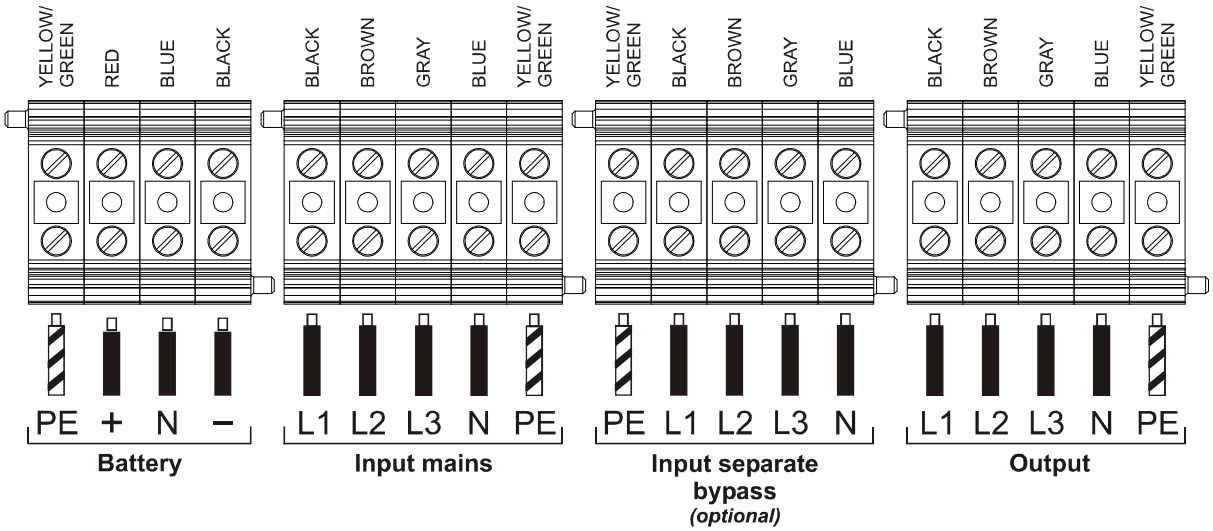
Note: the connections to the BATTERY module must only be made if the Battery Box *(optional)* is present.

CONNECTIONS OF THE MODEL WITH SEPARATE BYPASS

The first wire to be connected is the protective earth wire, which is to be inserted in the terminal marked PE. During operation the UPS must be connected to the earthing system

Connect the input and output cables to the terminal board as indicated in the figure below:

THE INPUT AND BYPASS NEUTRALS MUST ALWAYS BE CONNECTED.
THE INPUT AND BYPASS LINES MUST REFER TO THE SAME NEUTRAL POTENTIAL.
DO NOT CONNECT THE OUTPUT NEUTRAL TO THE INPUT OR BYPASS NEUTRAL.



Note: the connections to the BATTERY module are only to be made if the *(optional)* Battery Box is present.

R.E.P.O.

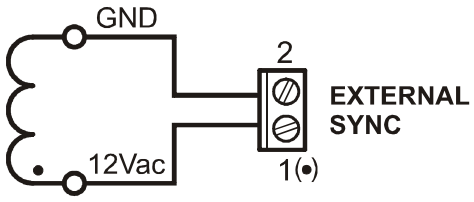
This isolated input is used to turn off the UPS remotely in case of emergency.
The UPS is supplied from the factory with the “Remote Emergency Power Off” (R.E.P.O.) terminals short-circuited (see "View of UPS connections” ref.15). If it is to be installed, remove the short-circuit and connect to the normally closed contact of the stop device using a cable that provides a double isolation connection.
In case of emergency, by activating the stop device, the R.E.P.O. control is opened and the UPS enters stand-by mode (see “USE” section), and powers off the load completely.

The R.E.P.O. circuit is self-powered with SELV type circuits. No external power supply voltage is therefore required. When it is closed (normal condition), a maximum current of 15mA is present.

EXTERNAL SYNC

This non-isolated input is used to synchronise the inverter output with an appropriate signal coming from an external source.
For the installation:

- use an isolation transformer with an isolated single-phase output (SELV) comprised in the range 12-24Vac with ≥ 0.5VA power
- connect the transformer secondary to the "EXTERNAL SYNC" terminal (see "View of UPS connections” ref.19) using a double isolation cable with a 1mm^2 cross-section. Make sure to respect the polarisation as in the figure below.



After installation, activate the command using the advanced configuration software UPSTools provided on the CD-ROM shipped with the UPS system.

CONNECTING THE REMOTE MAINTENANCE BYPASS

An additional maintenance bypass may be installed on a peripheral switchboard, for example, to enable the UPS to be replaced without interrupting the power supply to the load.

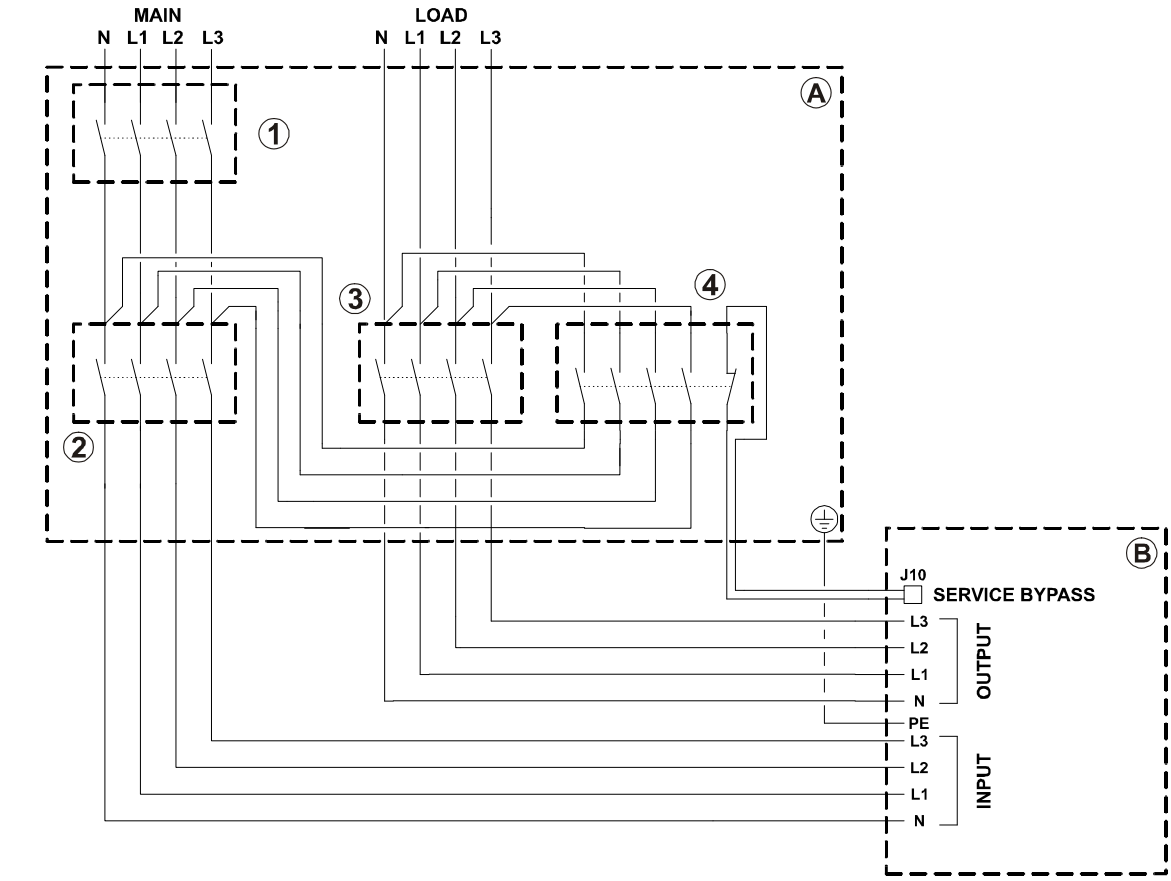
It is absolutely essential to connect the "SERVICE BYPASS" terminal (see "View of UPS connections" ref. 17) to the auxiliary contact of the SERVICE BYPASS switch. Closing the SERVICE BYPASS switch (4) opens this auxiliary contact which informs the UPS that the maintenance bypass has been activated. If this connection is not present, the power supply to the load may be shut off and the UPS damaged.

NOTES: Use cables with a cross section that conforms to the indications given in "Cross Section of the Cables ".

Use a double insulated cable with a cross section of 1mm2 to connect the "SERVICE BYPASS" terminal to the auxiliary contact of the remote maintenance bypass isolator.

Whenever the UPS is equipped with internal isolation transformer, check the compatibility between the *"remote maintenance bypass"* and the neutral arrangement in the electrical plant.

REMOTE MAINTENANCE BYPASS INSTALLATION DIAGRAM ON THE THREE-PHASE-THREE-PHASE MODEL



Ⓐ Peripheral switchboard

Ⓑ Internal connections of the UPS

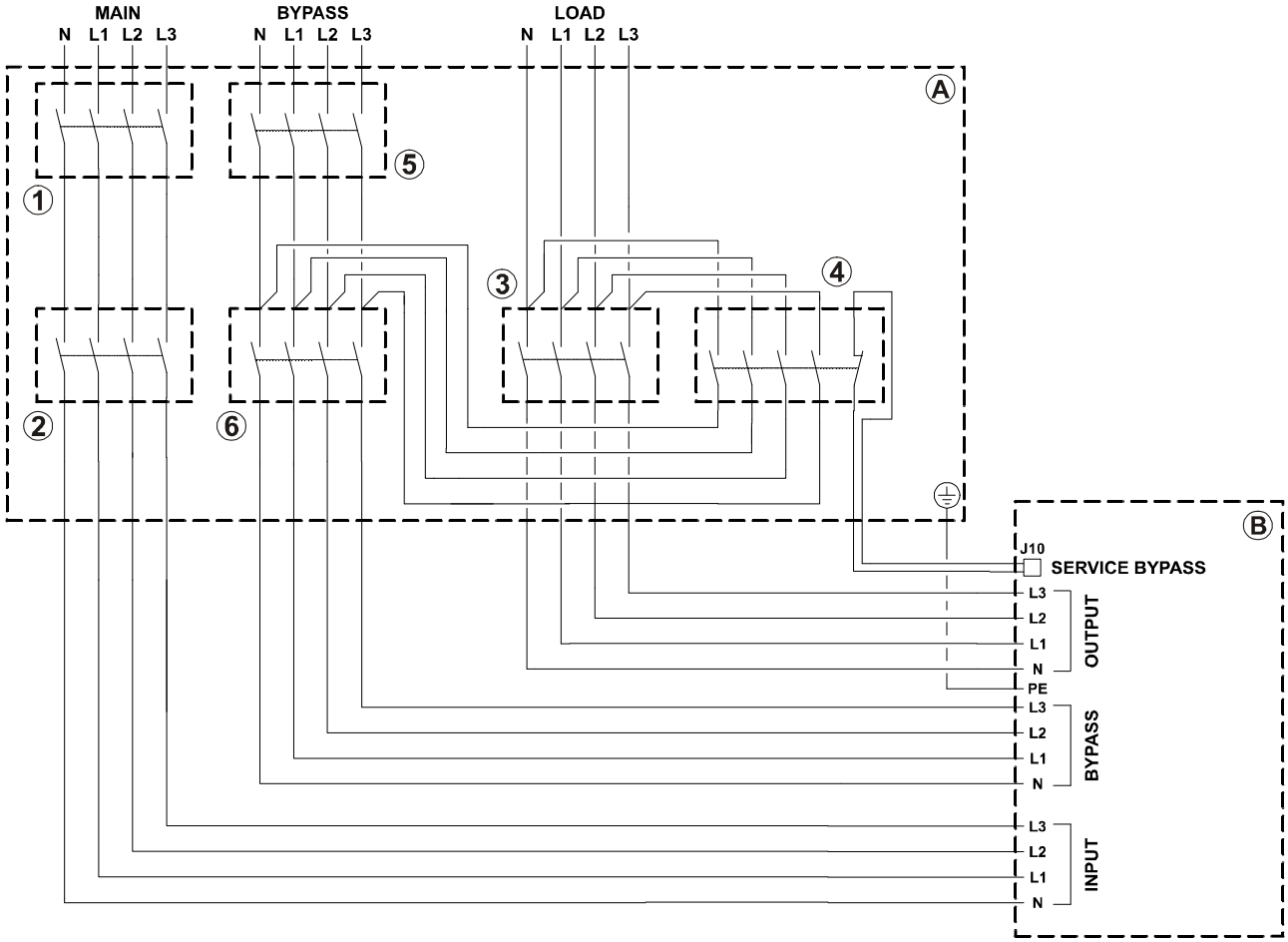
① LINE switch: automatic circuit breaker, must conform to the indications given in "External Protective Devices "

② INPUT switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS"

③ OUTPUT switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS"

④ SERVICE BYPASS switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS" equipped with a normally closed auxiliary contact

REMOTE MAINTENANCE BYPASS INSTALLATION DIAGRAM ON THE THREE-PHASE-THREE-PHASE WITH SEPARATE BYPASS MODEL



Ⓐ Peripheral switchboard

Ⓑ Internal connections of the UPS

① MAIN LINE switch: automatic circuit breaker, must conform to the indications given in "External Protective Devices "

② INPUT switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS"

③ OUTPUT switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS"

④ SERVICE BYPASS switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS" equipped with a normally closed auxiliary contact

⑤ BYPASS LINE switch: automatic circuit breaker, must conform to the indications given in "External Protective Devices "

⑥ BYPASS INPUT switch: isolator conforming to the indications given in "Internal Protective Devices of the UPS"

CONNECTING THE BATTERY BOX TO THE UPS



THE CONNECTION BETWEEN THE UPS AND THE BATTERY BOX MUST BE MADE WITH THE DEVICES POWERED OFF AND UNPLUGGED FROM THE MAINS

UPS POWER-OFF PROCEDURE:

- Turn off all devices connected to the UPS or use the remote bypass option (if installed).
- Turn off the UPS following the relevant power-off procedure (see the “USE” section of the “Powering off the UPS” paragraph).
- Open all the isolators and fuse holders present in the UPS.
- Isolate the UPS completely from the electricity network by opening all the external protective devices situated on the input and output lines
- Wait a few minutes before proceeding to work on the UPS.
- Remove the terminal cover of the UPS (see "Operations to access the UPS/Battery Box terminals).

CONNECTING THE BATTERY BOX:

- Check that the battery voltage of the Battery Box corresponds to that allowed by the UPS (check the data plate on the Battery Box and the manual of the UPS)
- **IMPORTANT:** make sure that the fuse holders of the UPS and the Battery Box are open.
- Remove the terminal cover of the Battery Box (see "Operations to access the UPS/Battery Box terminals).
- Connect the earth terminals of the UPS and the Battery Box using the yellow/green wire of the cable provided.
- Connect the terminals to the UPS and the Battery Box:
  - terminals marked with the **+** symbol with the red cable
  - terminals marked with the **N** symbol with the blue cable
  - terminals marked with the **–** symbol with the black cable

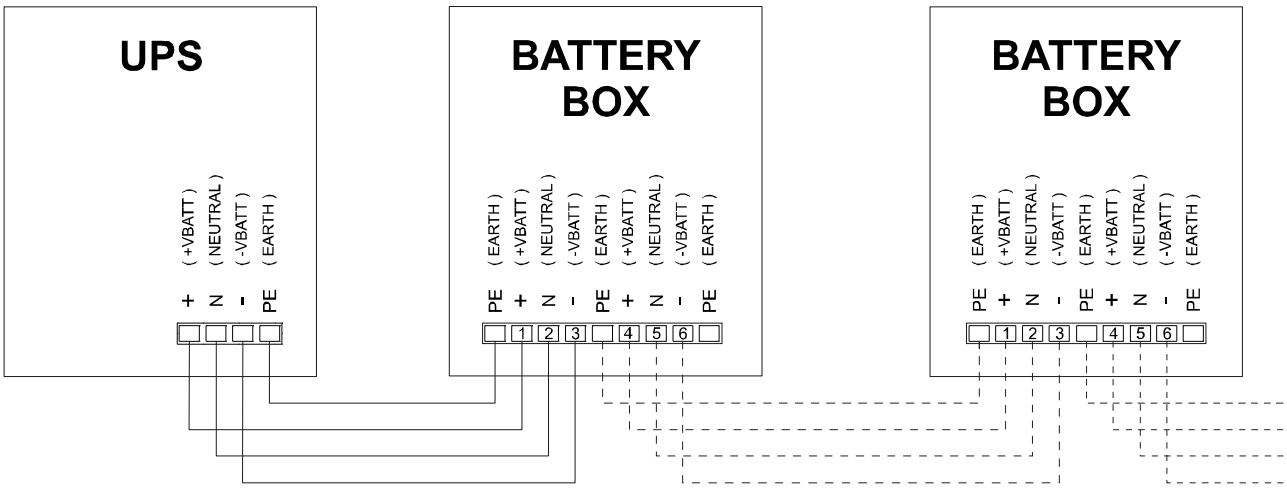
  respecting the correspondence indicated by the symbols print on the terminal cover of the Battery Box and the UPS.
- Reposition the terminal covers removed previously.

CHECKING INSTALLATION:

- Insert the fuses in the SWBATT fuse holders of the Battery Box.
- Close the SWBATT fuse holders of the Battery Box and the UPS.
- Carry out the UPS power-on procedure described in this manual.
- After about 30 sec., check that the UPS is working properly: simulate a black-out by opening the SWIN input isolator of the UPS. The load must continue to be powered, the “battery power” LED must light up on the control panel of the UPS, and the latter will emit a beep at regular intervals. When the SWIN input isolator is closed again, the UPS must resume operation on mains power.

MULTIPLE EXPANSIONS

Several Battery Boxes can be connected in a cascade to ensure prolonged autonomy. The connections should be made as shown here below:



<u>WARNING (only for single UPS)</u>: No more than one UPS may be connected to each Battery Box or to more than one Battery Box connected in a cascade.

SETTING THE RATED BATTERY CAPACITY – SOFTWARE CONFIGURATION

Having installed one or more BATTERY BOXES, the UPS must be set up to update the rated capacity value (total Ah of batteries inside the UPS + external batteries).
This setting should be made using the advanced configuration software *UPSTools*, present on the CD-ROM provided with the UPS or directly from the control panel of the UPS.

Installing and running *UPSTools*:

- Follow the installation and operating instructions given in the software manual present in the *UPSTools* folder of the CD-ROM.

Making the setting from the display

Set the rated battery capacity following the indications given in the “USE” chapter.

EXTERNAL TEMPERATURE PROBE

This **NON ISOLATED** input may be used to measure the temperature inside a remote Battery Box.

The special kit provided by the manufacturers must be used: any methods not conforming to specifications may cause faults or breakdowns in the equipment.

To install, connect the cable included in the special kit to the "EXT BATTERY TEMP PROBE" connector (see "View of the UPS Connections" ref. 3).
After installation, enable the external temperature measuring function using the advanced configuration software *UPSTools* present on the CD-ROM provided with the UPS.

REMOTE PANEL (OPTIONAL)

The remote panel enables the remote monitoring of the UPS and gives a real time detailed summary of the machine status. The device ensures that the operator can control the electrical values of the mains power, outputs, batteries, etc. and locate any alarm conditions.

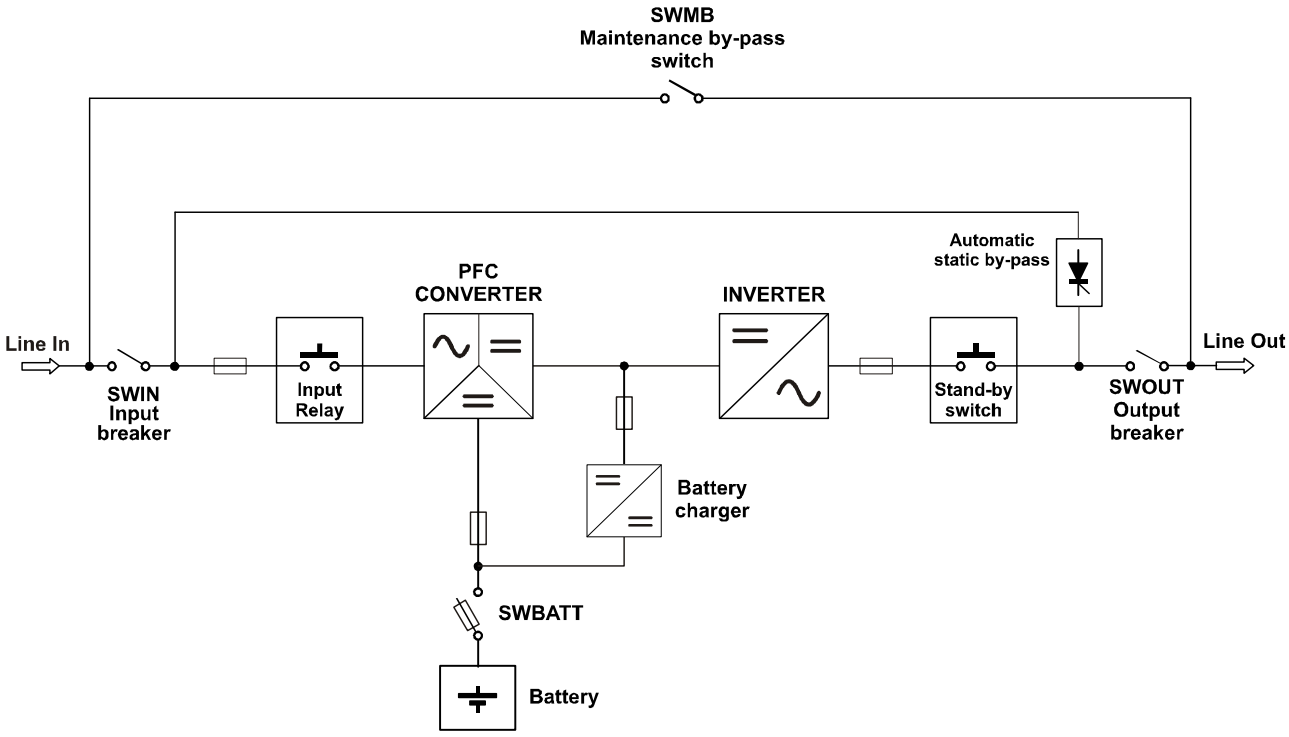


For further information regarding the connection and use of this device, please refer to its apposite manual.

DESCRIPTION

The purpose of a UPS is to ensure a perfect power supply voltage for the devices connected to it irrespective of whether mains power is present or not. Once connected and powered, the UPS generates a sinusoidal alternating voltage with a stable amplitude and frequency, irrespective of the changes and/or variations occurring on the electricity network. For as long as the UPS receives energy from the mains, the batteries are kept charged under the control of the multiprocessor board. This board also controls continuously the amplitude and frequency of the mains voltage, the amplitude and frequency of the voltage generated by the inverter, the load applied, the internal temperature and the state of efficiency of the batteries.

The block diagram below shows each of the parts that make up the UPS.



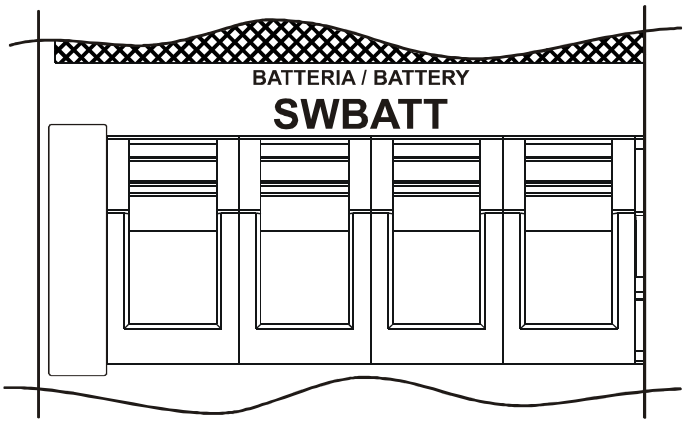
Block diagram of the UPS

IMPORTANT: Our UPS are designed and produced for long life even under the severest conditions. Remember however that they are electrical power equipment items and as such are in need of periodic checks. Besides, some components have a life cycle of their own and must therefore be checked at regular intervals and may need to be replaced, where due to the conditions: in particular, the batteries, fans and in some cases the electrolytic capacitors.
It is recommended to implement a preventive maintenance program, using manufacturer authorised and trained service personnel.
Our Technical Servicing department is at your disposal to discuss the different personalized preventive maintenance options with you.

PRELIMINARY OPERATIONS

- **Visual check of the connection**
  Check that all the connections have been made strictly following the indications given in the "Connections" paragraph.
  Check that the "1/0" button is in its "0" position (see "Front Views of the UPS" point 5).
  Check that all the isolators are open.

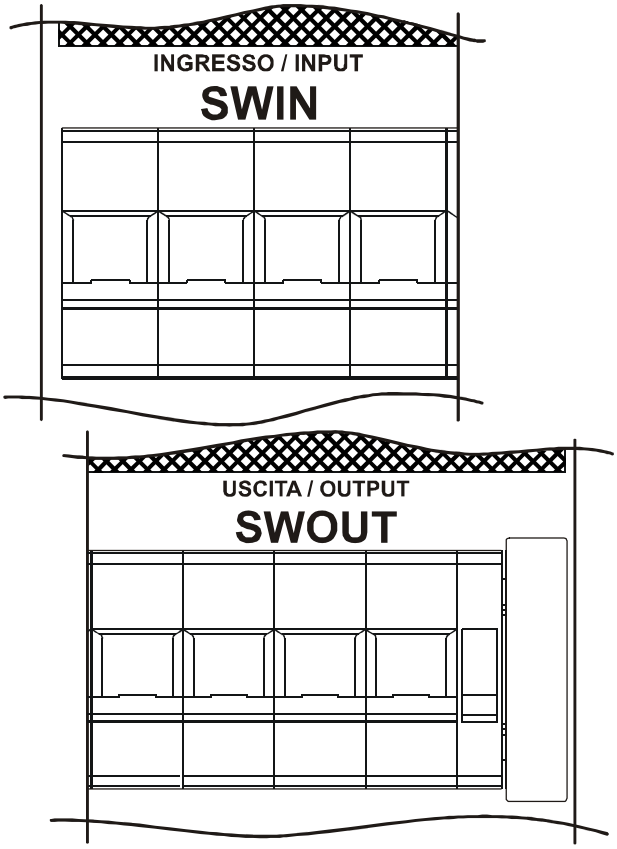
- **Close the battery fuse holders**
  Close the 4 battery fuse holders (SWBATT) present in the position indicated in the figure below.



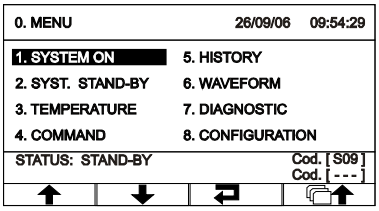
WARNING: if a battery expansion (Battery Box) has been installed incorrectly (by not following the information as provided in the "Connecting the Battery Box to the UPS" paragraph) this can lead to the battery fuses becoming damaged. If this happens, contact the customer services department immediately to avoid further damage to the UPS. Note: - When the fuses are closed, small arc flashes may occur due to the charge of the capacitors present inside the UPS. This is normal and does not cause faults and/or damage.

- **Power on the UPS**
  Close the protective devices upstream from the UPS.

- **Close the input and output isolators**
  Close all the input (SWIN) and output (SWOUT) isolators except for the maintenance isolator (SWMB), which is to remain open.
  Note: if the separate bypass option is present, close also the bypass isolator (SWBYP).


INGRESSO / INPUT
SWIN
USCITA / OUTPUT
SWOUT

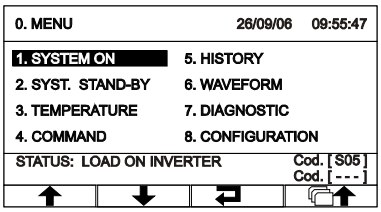
POWERING ON FOR THE FIRST TIME



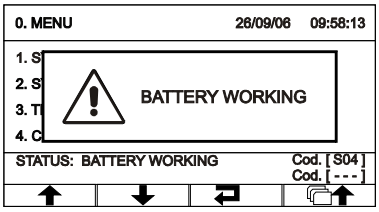
➢ If present, set the “1/0” switch to “1” and wait for a few seconds. Check that the display is turned on and the UPS enters "STAND-BY" mode.

Check that no error messages appear indicating that the input cables do not respect the correct phase direction. In this case, the following operations should be performed:

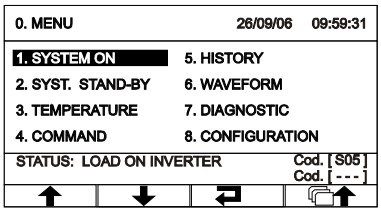
- Switch off the UPS by moving the “I/0” switch to “0” (if present), and open all the input and output disconnecting switches.
- Wait for the display to go off.
- Open the battery fuse holders.
- Open all the protective devices upstream from the UPS
- Remove the panel covering the input terminal board
- Correct the position of the input wires so that the phase direction is respected.
  only if the separate bypass option is present: check which terminal board (input and/or bypass) the error code shown on the display corresponds to (see the “Alarm Codes” paragraph); correct the position of the wires of the terminal board indicated so that the phase direction is respected
- Close the panel again
- Repeat the power-on operations including the "preliminary operations"



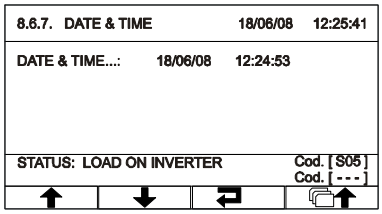
➢ Press ↵ to enter the start menu. Choose Yes when prompted to confirm. Press ↵ to confirm and wait for a few seconds. Check that the UPS is set with the load powered by the inverter.



➢ Open the input switch (SWIN) and wait for a few seconds. Check that the UPS goes into battery-powered mode and that the load is still powered correctly. A beep should be heard approximately every 7 seconds.



➢ Close the input switch (SWIN) and wait for a few seconds. Check that the UPS is not in battery-powered mode and that the load is powered correctly by the inverter.



➢ To set the Date and Time, access menu 8.6.7 (see “Display menus”). Use the up/down arrows (↑↓) to set the desired value and then confirm with the ↵ key to move to the next field. To save the new settings, go back to the previous menu by pressing the key.

POWERING ON FROM THE MAINS

- Power the UPS by closing the SWIN input switch and leaving the SWMB maintenance switch open; if present, set the “1/0” switch to “1”.
  After a few moments, the UPS is turned on, the capacitors are precharged and the "Lock / stand-by" LED blinks: The UPS is in stand-by mode.
- Press the ↵ button to access the power-on menu. When prompted to confirm, select “YES” and press the ↵ button again. All the LEDs around the display light up for about 1 sec. and a beep is emitted. The message “START UP” appears on the display to inform the user of the beginning of the start up sequence which ends with transition of the UPS to load powered by the inverter.

POWERING ON FROM THE BATTERY

- If present, set the “1/0” switch to “1”.
- Hold the “Cold Start” key down for about 5 seconds. The UPS will start and the display will light up.
- Press the ↵ button to gain access to the power-on menu. When prompted to confirm, select “YES” and press the ↵ again. All the LEDs around the display light up for about 1 sec. and the buzzer starts to beep once about every 7 seconds.

Note: if the sequence described above is not executed within 1 min., the UPS turns itself off to avoid discharging the batteries unnecessarily.

POWERING OFF THE UPS

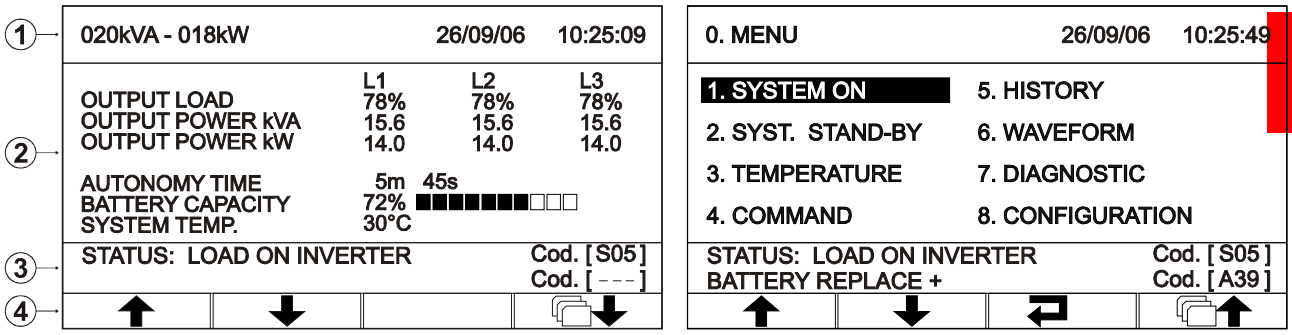
From the main menu, select the “SYSTEM STBY” item and press ↵ to gain access to the submenu and press it again to confirm the operation. To shut down the UPS completely, set the “1/0” switch (if present) to “0” and open the SWIN input switch.



***Note**: during prolonged periods of inactivity, it is good practice to shut down the UPS using the “1/0” switch (if present); open the input and output switches and lastly, with the UPS off, open the battery fuse holders.*

GRAPHIC DISPLAY

At the centre of the control panel there is a large graphic display, which provides, in the foreground and in real time, a detailed overview of the current status of the UPS. Directly from the control panel you can turn the UPS on/off, view the electrical values of the mains, output, battery, etc.,[1] and make the main machine settings.
The display is divided into four main areas, each with its own specific function.



Sample screens of the graphic display
(screens are only indicative, the data shown may not reflect the actual situation)

① GENERAL INFORMATION

Area of the display that shows the date and time permanently, and, depending on the screen, the model of the machine or the title of the menu currently active.

② VIEW DATA / BROWSE MENUS

Main area of the display used to view the UPS measurements (updated constantly in real time), and to access the various menus that may be selected by pressing the relevant function keys. Once the desired menu has been selected, this part of the display will show one or more pages containing all the data related to the menu chosen.

③ UPS STATUS/ ERRORS – FAULTS

Area indicating the operating status of the UPS.
The first line is always active and constantly shows the current status of the UPS; The second is only active when an error and/or fault occurs on the UPS and indicates the type of error/fault that has occurred.
On the right, each line indicates the code corresponding to the event in progress.

④ KEY FUNCTIONS

Area divided into four boxes, each one corresponding to the function key below it. According to the menu active at that moment, the display shows the function for the corresponding key in the relevant box.

Key Symbols

To gain access to the main menu

To return to the previous menu or screen

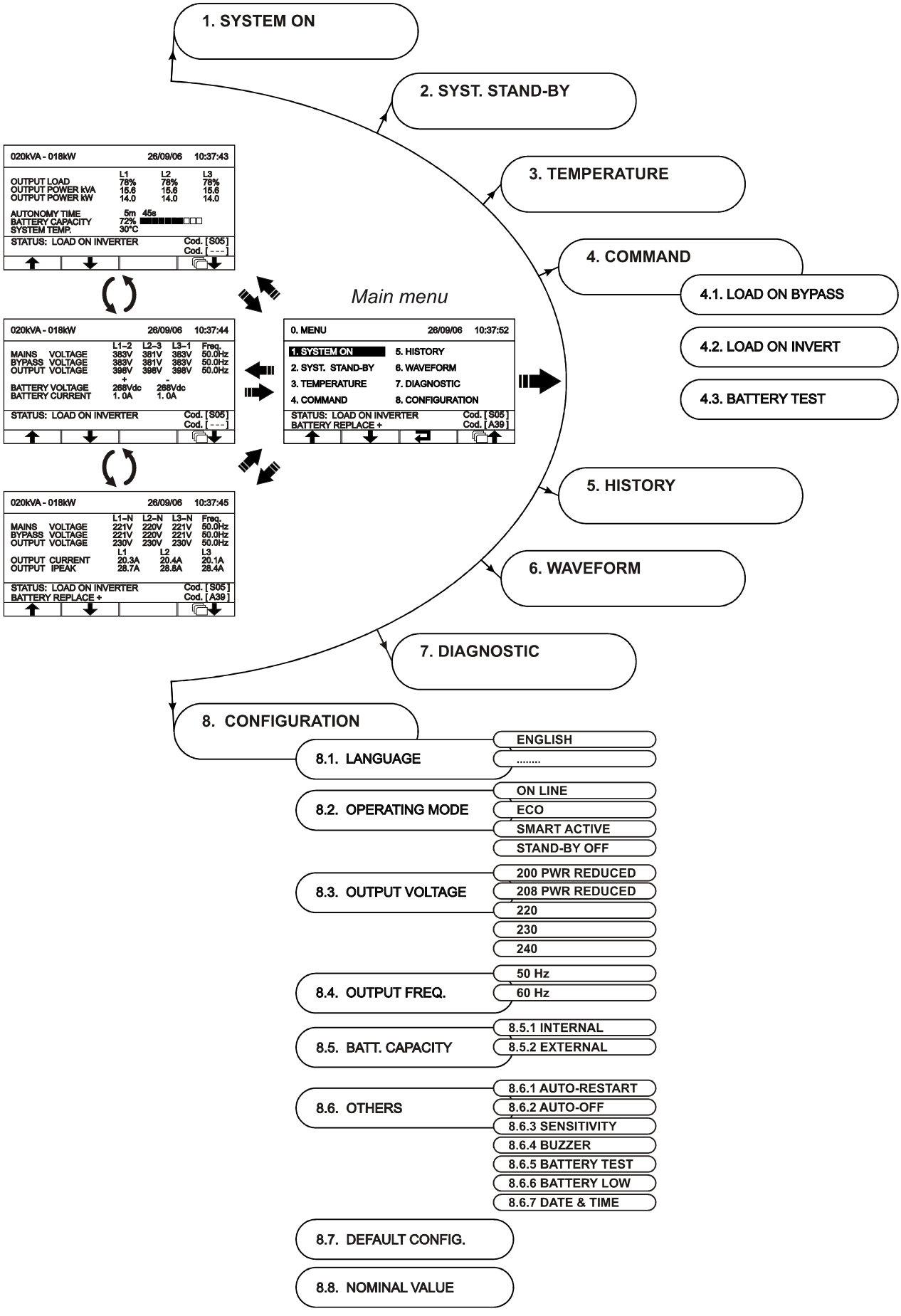
To scroll through the various items on a menu or move from one page to another while viewing data

To confirm a selection

To temporarily silence the buzzer (hold down for more than 0.5 sec.).
To cancel a programmed switching-on/off (hold down for more than 2 sec.)

(1) *The precision of the measurements is: 1% for voltage measurements, 3% for current measurements, 0.1% for frequency measurements.*
The indication of the autonomy time left is an ESTIMATE; so it should not be considered to be a perfectly accurate tool.

DISPLAY MENUS



OPERATING MODES

The mode that guarantees maximum protection for the load is ON LINE mode, in which the energy for the load is converted twice and is generated perfectly sinusoidal at the output with the frequency and voltage set by the fine digital control of the DSP irrespective of the input (V.F.I.). *
In addition to the traditional, double-conversion ON LINE operating mode, the following modes may be selected:

- ECO (LINE INTERACTIVE)
- SMART (SMART ACTIVE)
- STBYOFF (STAND-BY OFF)

In order to optimize efficiency, in ECO mode, the load is normally powered from the bypass. If the mains voltage exceeds the allowed tolerance limits, the UPS switches to normal, double-conversion ON LINE mode. About five minutes after it has returned within the tolerance limits, the load is switched back to bypass.

If you are not sure which operating mode (ON LINE or ECO) to choose, the UPS may be set in SMART ACTIVE mode in which, according to statistical data on the quality of the power supply mains, the UPS autonomously decides the mode it is to enter.

Finally, in STAND-BY OFF mode, the UPS is set to operate only in an emergency:
when the mains power is present, the load is powered off while, in the event of a black-out, the load is powered by the inverter via the batteries, and is then powered off again when mains power is restored. The activation time is less than 0.5 sec.

MAINTENANCE BYPASS (SWMB)



WARNING: Maintenance work inside the UPS is to be performed exclusively by qualified staff. Inside the UPS there may be a voltage present even when the input, output and battery switches are open. Removal of the UPS panels by non-qualified staff may result in injury to the operator and damage the equipment.

Below is a list of the operations to be performed in order to carry out maintenance work on the equipment without shutting off the power supply to the load:

- The UPS must power the load via the automatic bypass or the inverter, with the mains voltage present.

  N.B.: If the UPS is in battery power mode, activating the maintenance bypass entails shutting off the power supply to the load.
- Close the maintenance bypass isolator (SWMB) situated behind the door: in this way, the input is short-circuited with the output.
- Open the input switches (SWIN), output switches (SWOUT) and battery fuse holders (SWBATT) situated behind the door: The signal panel is turned off. Wait for the electrolytic capacitors on the power board to discharge (about 15 minutes) and then proceed to perform the maintenance operations.
  N.B.: During this phase, with a load powered via the maintenance bypass, any disturbance on the power supply line of the UPS will affect the devices powered (The load is connected directly to the mains. The UPS is no longer active).

Having completed the maintenance operations, proceed as follows to restart the UPS:

- Close the input and output isolators, and the battery fuse holders. The signal panel is reactivated. Turn on the UPS again from the “SYSTEM ON” menu. Wait for the sequence to be completed.
- Open the maintenance bypass: the UPS resumes normal operation.

* The rms value of the output voltage is set by the fine control of the DSP irrespective of the input voltage while the frequency of the output voltage is synchronized (within a tolerance range that may be set by the user) with the input voltage to enable the bypass to be used. Outside this range, the UPS desynchronizes and returns to the rated frequency and the bypass may no longer be used (free running mode).

REDUNDANT AUXILIARY POWER SUPPLY FOR AUTOMATIC BYPASS

The UPS is equipped with a redundant auxiliary power supply that enables the UPS to run on an automatic bypass even when a failure occurs in the main auxiliary power supply. If a fault occurs in the UPS shutting off the main auxiliary power supply, the load is powered by the automatic bypass. The multiprocessor board and the control panel are not powered so the LEDs and the display are off.

PROGRAMMABLE AUXILIARY SOCKET (POWER SHARE)

The UPS has an output socket that enables the load applied to it to be disconnected automatically under certain operating conditions. The events that determine the automatic disconnection of the Power share socket may be selected using the configuration software UPSTools (see the **Configuration software** and **UPS Configuration** paragraphs).
For example, the socket can be disconnected after a given time of battery operation, or when the battery low prealarm threshold is reached or an overload occurs.



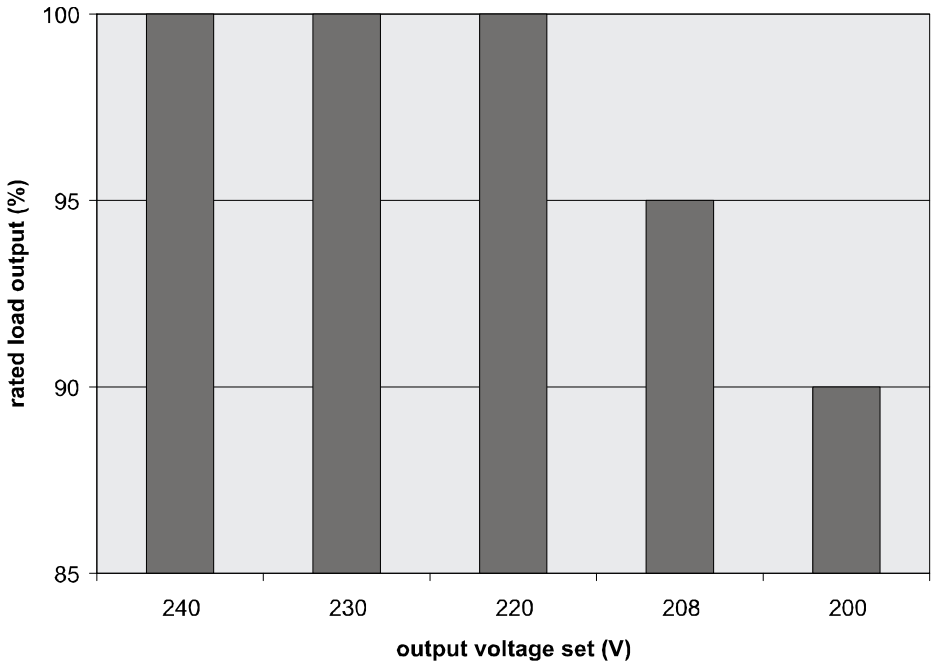
***Safety notes**: when the UPS is switched on, if the output switch (SWOUT) is opened, the Power share socket will remain connected to the mains.*
If the manual bypass switch (SWMB) is inserted, the output switch (SWOUT) is opened and when the UPS is shutdown, the socket will be disconnected.

POWER WALK-IN

The UPS has a Power Walk-in mode which can be enabled and configured using the software *UPS Tools*. When the mode is enabled and mains power is restored after a period of battery operation, the UPS starts to draw progressively from it so as not to stress (due to the peak) any generating set installed upstream. The transient time may be set from 1 to 30 seconds. The default value is 10 seconds. During the transient, the necessary power is drawn in part from the batteries and in part from the mains, maintaining sinusoidal absorption. The battery charger is turned on again once the transient has passed.

REDUCING THE LOAD (TO 200V AND 208V)

If the output voltage is set to 200V and 208V (see “Configuring the UPS” paragraph), the maximum power output of the UPS is reduced with respect to its rated value, as shown in the graph below:


100
95
90
85
rated load output (%)
240
230
220
208
200
output voltage set (V)

CONFIGURING THE UPS

The table below illustrates all the possible settings at your disposal to tailor the UPS to best satisfy your needs.

CP (Control Panel) = Indicates that the configuration can be changed not only from the configuration software but also from the control panel.

SW (Software) = Indicates that the configuration may only be changed from the configuration software.

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE SETTINGS	MOD.
Output frequency	Selects rated output frequency	50 Hz	• 50 Hz • 60 Hz	***CP***
Output voltage	Selects rated output voltage (Phase / Neutral)	230V	• 200V * • 208V * • 220V • 230V • 240V • 220 ÷ 240 in steps of 1V (via software only)	***CP***
Operating mode	Selects one of the 5 operating modes	ON LINE	• ON LINE • ECO • SMART ACTIVE • STAND-BY OFF • FREQUENCY CONVERTER (via software only)	***CP***
Power off due to minimum load	Automatically powers off UPS in battery operation, if the load is less than 5%	Disabled	• Enabled • Disabled	***CP***
Autonomy limitation	Sets the maximum time of operation on battery power	Disabled	• Disabled (complete battery discharge) • 1 ÷ 65000 in steps of 1 sec.	***SW***
Battery low prealarm	Sets the estimated autonomy time left for battery low warning	3 min.	1 ÷ 255 in steps of 1 min.	***SW***
Battery test	Sets the time interval for automatic battery test	40 hours	• Disabled • 1 ÷ 1000 in steps of 1 hour	***SW***
Maximum load alarm threshold	Selects the user overload limit	Disabled	• Disabled • 0 ÷ 103 in steps of 1%	***SW***
Sound alarm	Selects the operating mode of the sound alarm	Reduced	• Normal • Reduced: does not sound when bypass is activated momentarily	***CP***
Auxiliary socket (power share)	Selects the operating mode of the auxiliary socket	Always connected	• Always connected • Disconnected after *n* seconds of battery operation • Disconnected *n* seconds after the end of discharge alarm signal • ... (see manual of UPSTools)	***SW***
Battery expansion	Sets the Ah installed (external battery extension)	0 Ah	Min.: 0 - Max.: 999 (in steps of 1 unit)	***CP***
Language	Selects the display language	English	• English • Italian • German • French • Spanish	***CP***

Date and Time	Set the date and time	--	--	***CP***

FUNCTION	DESCRIPTION	DEFAULT	POSSIBLE SETTINGS	MOD.
Advanced Functions				
Input frequency tolerance	Selects the allowed input frequency range for the switch to bypass and synchronization of the output	± 5%	• ± 0.25% • ± 0.5% • ± 0.75% • ± 1 ÷ ±10 in steps of 1%	***SW***
Bypass voltage thresholds	Selects the voltage range allowed for the switch to bypass	Low: 180V High: 264V	Low: 180 ÷ 200 in steps of 1V High: 250 ÷ 264 in steps of 1V	***SW***
Bypass voltage thresholds for ECO	Selects the allowed voltage range for operation in ECO mode	Low: 200V High: 253V	Low: 180 ÷ 220 in steps of 1V High: 240 ÷ 264 in steps of 1V	***SW***
Activation sensitivity for ECO	Selects the activation sensitivity for operation in ECO mode	Normal	• Low • Normal • High	***CP***
Power supply of load in stand-by	Power supply of load on bypass with UPS off (stand-by status)	Disabled (load NOT powered)	• Disabled (not powered) • Enabled (**powered**)	***SW***
Bypass operation	Selects operating mode of bypass line	Enabled / High sensitivity	• Enabled / High sensitivity • Enabled / Low sensitivity • Disabled with input / output synchronization • Disabled without input / output synchronization	***SW***
Inverter synchronization (External Sync)	Selects the source of synchronization for the inverter output	From bypass line	• From bypass line • From external input	***SW***
Power-on delay	Selects the pause time for automatic reactivation after mains power has been restored	5 sec.	• Disabled • 1 ÷ 255 in steps of 1 sec.	***CP***
Power Walk-in	Enables the mode for gradual return to mains power	Disabled	• Enabled • Disabled	***SW***
Duration of Power Walk-in	Sets the duration of the gradual return to mains power (only if Power Walk-in is enabled)	10 sec	Min.: 1 sec. - Max.: 30 sec.	***SW***
Speed of synchronization between inverter and bypass line	Selects the speed of synchronization between the inverter and the bypass line	1 Hz/sec	• 0.5 Hz/sec • 1 Hz/sec • 1.5 Hz/sec • 2 Hz/sec	***SW***
External temperature probe (*optional*)	Enables reading of the external temperature probe	Not enabled	• Not enabled • Enabled	***SW***

** When these output voltage values are set, the output power of the UPS is reduced (see "Reducing the Load (to 200V and 208V)" paragraph)*

COMMUNICATION PORTS

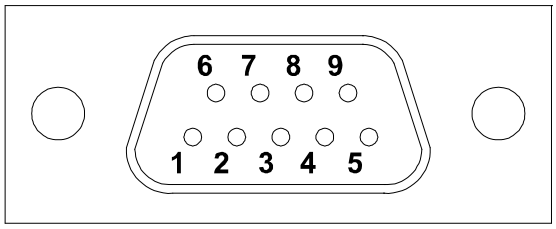
The UPS is supplied with the following communication ports (see “Views of the UPS):

- Serial port available with RS232 connector and USB connector.
  NOTE: the use of one connector automatically excludes the other.
- Port AS400
- Expansion slots for additional COMMUNICATION SLOT interface boards

On the front, covered by the terminal-cover, there is another expansion slot for the power relay board (4 programmable contacts, 250Vac, 3A)

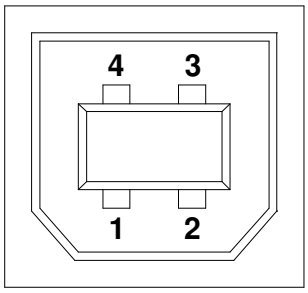
RS232 AND USB CONNECTORS

RS232 CONNECTOR



PIN #	NAME	TYPE	SIGNAL
1		IN	
2	TX	OUT	Serial line TX
3	RX	IN	Serial line RX
4			
5	GND	POWER	
6		OUT	
7			
8	+15V	POWER	Isolated power supply 15V±5% 80mA max
9	WKATX	OUT	ATX power supply wake-up

USB CONNECTOR



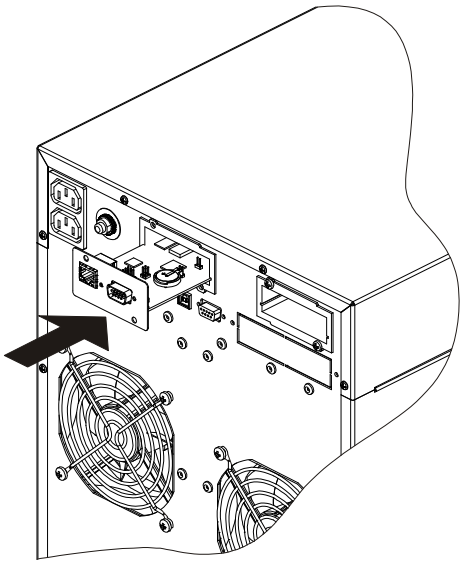
PIN #	SIGNAL
1	VBUS
2	D-
3	D+
4	GND

COMMUNICATION SLOTS

The UPS is equipped with two expansion slots for accessory communication boards that enable the equipment to communicate using the main communication standards.
Some examples:

- Second RS232 port
- Serial duplicator
- Ethernet agent with TCP/IP, HTTP and SNMP protocol
- RS232 + RS485 port with JBUS / MODBUS protocol

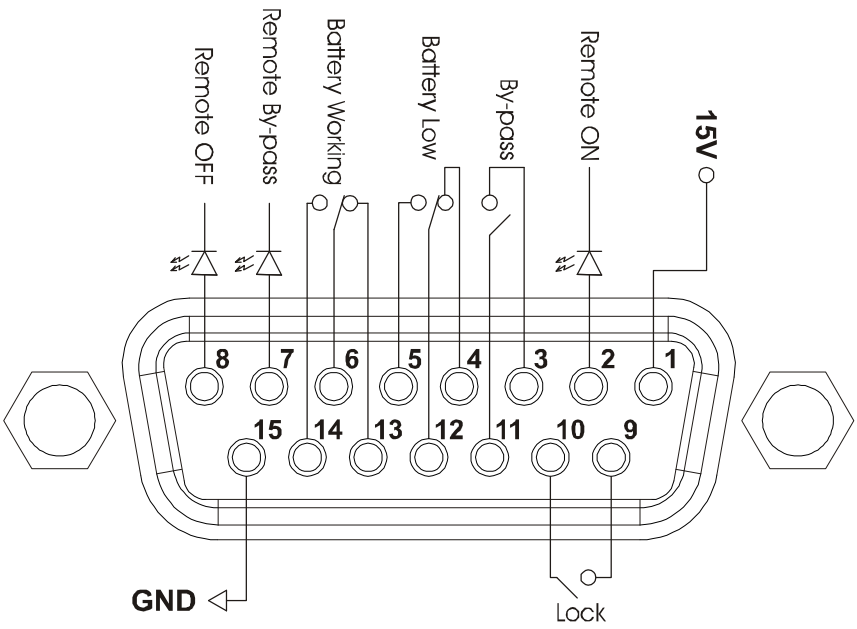
For further information on the accessories available, visit the web site.



SCHRACK TECHNIK

AS400 PORT

AS400 PORT



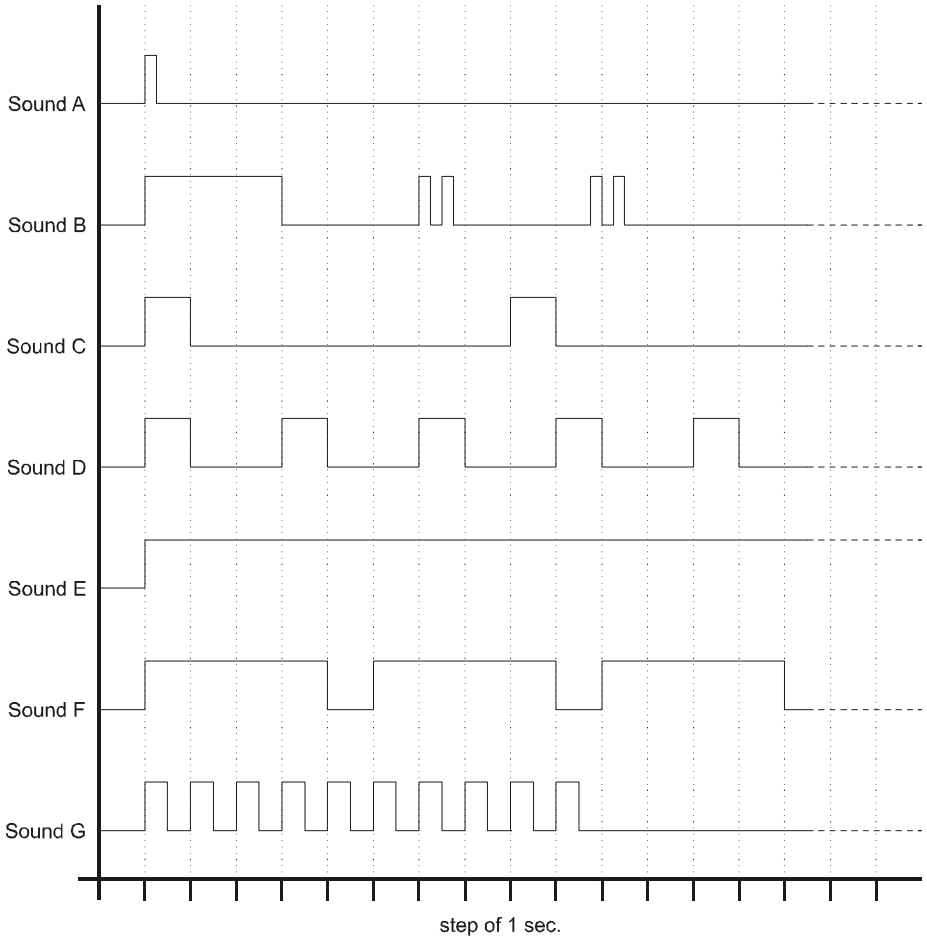
PIN #	NAME	TYPE	FUNCTION
1	15V	POWER	Isolated auxiliary power supply, +15V±5% 80mA max
15	GND	POWER	Ground to which the isolated auxiliary power supply (15V) and the remote commands (Remote ON, Remote BYPASS, Remote OFF) refer
2	REMOTE ON	INPUT #1	When pin 2 is connected to pin 15 for at least 3 seconds, the UPS is turned on
8	REMOTE OFF	INPUT #2	When pin 8 is connected to pin 15, the UPS is powered off instantly
7	REMOTE BYPASS	INPUT #3	When pin 7 is connected to pin 15, the power supply of the load switches from inverter to bypass. For as long as the connection remains, the UPS continues to operate from the bypass even if the input mains voltage is shut off. If the jumper is removed when the mains voltage is present, the UPS resumes operation from the inverter. If the jumper is removed when there is no mains voltage present, the UPS resumes operation from the battery
4,5,12	BATTERY LOW	OUTPUT #1	Indicates that the batteries are about to run out when contact 5/12 is closed (1)
6,13,14	BATTERY WORKING	OUTPUT #2	Indicates that the UPS is running on battery power when contact 6/14 is closed
9,10	LOCK	OUTPUT #3	When the contact is closed, indicates that the UPS is locked (1)
3,11	BYPASS	OUTPUT #4	When the contact is closed, indicates that the load is powered via the bypass

N.B.: The figure shows the contacts present inside the UPS, capable of carrying a max. current of 0.5A to 42Vdc.
The position of the contacts shown in the figure is with no alarm or signal present.

(1) *The output may be programmed using the configuration software.*
The function indicated is selected by default (factory setting)

BUZZER

The status and faults of the UPS are signalled by the buzzer, which will emit a sound modulated according to the operating conditions of the UPS.
The various kinds of sound are described here below:



Sound A: The signal is emitted when the UPS is turned on or off using the relevant buttons. A single beep confirms power-on, activation of the battery test, cancellation of the programmed power-off. When the power-off button is kept pressed, the buzzer emits the sound A quickly four times, before confirming power-off by emitting a fifth beep.

Sound B: The signal is emitted when the UPS switches to bypass to compensate for the surge current due to the activation of a distorting load.

Sound C: The signal is emitted when the UPS switches to battery operation before the battery low signal (sound D). Possibility of silencing the report (see paragraph “Graphic Display”)

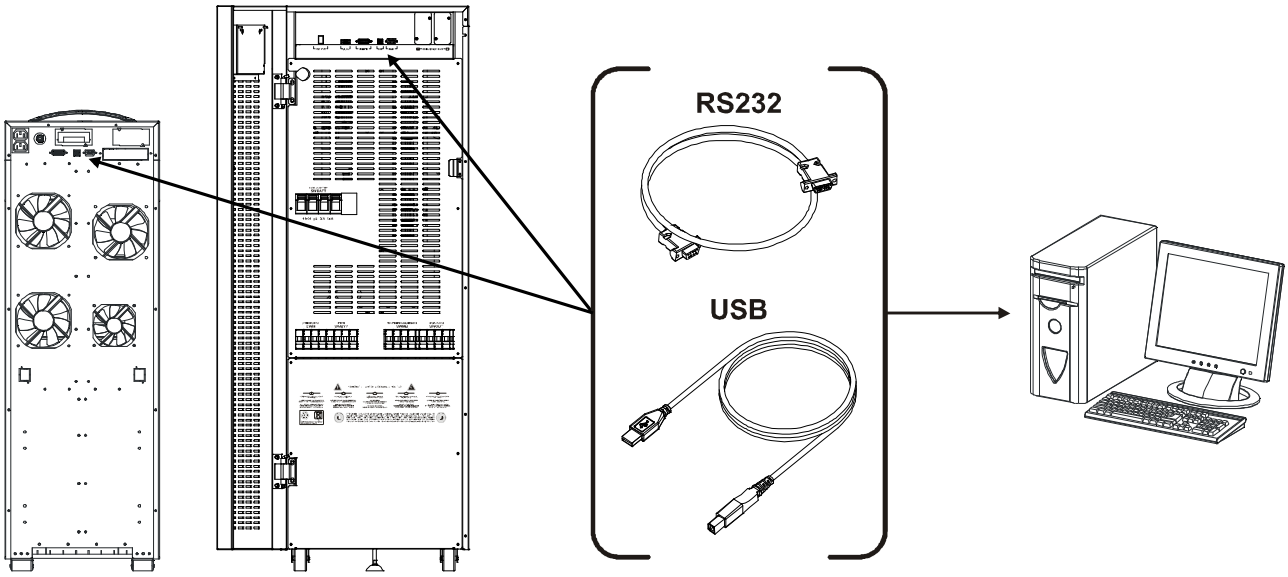
Sound D: The signal is emitted during battery operation when the battery low alarm threshold is reached. Possibility of silencing the report (see paragraph “Graphic Display”)

Sound E: This signal is emitted in the presence of an alarm or lock.

Sound F: This signal is emitted if the battery overvoltage fault occurs

Sound G: This type of signal is emitted when the battery test fails. The buzzer emits ten beeps. The alarm signal is maintained by the “batteries to be replaced” LED lights up.

SOFTWARE



MONITORING AND CONTROL SOFTWARE

The monitoring software ensures an effective and user-friendly management of the UPS, displaying all the most important items of information such as the input voltage, load applied and battery capacity.
It can also automatically perform shutdown operations, send e-mails, sms and network messages when specific user-selected events occur.

Installation operations:

- Connect the RS232 communication port of the UPS to a COM communication port of the PC via the serial cable provided* or connect the USB port of the UPS to a USB port of the PC using a standard USB cable *.
- Insert the CD-Rom provided and select the desired operating system.
- Follow the instructions given by the installation program.
- For more detailed information on how to install and use the software, consult the manual present in the *Manuals* folder of the CD-Rom provided.

To check for a more recent version of the software, visit the web site.

CONFIGURATION SOFTWARE

The software **UPSTools** enables the parameters of the UPS to be configured using the RS232 serial port.
For a list of the possible settings at your disposal, see the ***Configuring the UPS*** paragraph.

Installation operations:

- Connect the RS232 communication port of the UPS to a COM communication port of the PC using the serial cable provided*.
- Follow the installation instructions provided in the software manual present in the *UPSTools* folder of the CD-Rom provided.

To check for a more recent version of the software, visit the web site.

* *We recommend the use of a cable no longer than 3 metres.*

TROUBLESHOOTING GUIDE

Irregular operation of the UPS is very often not an indication of a fault but is simply caused by simple problems or distractions.
We therefore recommend you consult the table here below, which provides some information that will help you to solve the most common problems.



WARNING: *the table below frequently recommends the use of the maintenance BYPASS. We remind you that before restoring the UPS to operation, you must make sure that it is on and* ***not in STAND-BY****. If the UPS is in this latter mode, turn on the UPS by accessing the "SYSTEM ON" menu and wait for the power-on sequence to be completed before removing the maintenance BYPASS.*
For further details ***read the procedures described in the maintenance BYPASS (SWMB)*** *paragraph.*

NOTE: For a detailed explanation of the codes listed in the table, see the "STATUS/ALARM CODES" paragraph.

PROBLEM	POSSIBLE CAUSE	SOLUTION
The UPS WITH THE MAINS VOLTAGE PRESENT, DOES NOT ENTER STAND-BY MODE (THE RED LOCK/STAND-BY LED DOES NOT BLINK, NO BEEP IS EMITTED AND THE DISPLAY IS NOT TURNED ON)	NO CONNECTION WITH INPUT TERMINALS	Connect the mains to the terminals as indicated in the installation paragraph
	NO NEUTRAL CONNECTION	The UPS cannot work without a neutral connection. WARNING: If this connection is missing, damage could be caused to the UPS and/or the load. Connect the mains to the terminals as indicated in the Installation paragraph.
	1/0 SWITCH BEHIND DOOR IS SET TO 0	Set the switch to 1 (if present)
	ISOLATOR BEHIND DOOR (SWIN) IS OPEN	Close the isolator
	MAINS VOLTAGE NOT PRESENT (BLACKOUT)	Check that the mains voltage is present. If necessary, power on the UPS from the battery to power the load.
	PROTECTIVE DEVICE UPSTREAM ACTIVATED	Reset the protective device. Warning: check that there is no overload or short-circuit at the output of the UPS.
THE LOAD IS NOT POWERED	NO CONNECTION WITH OUTPUT TERMINALS	Connect the load to the terminals
	ISOLATOR BEHIND DOOR (SWOUT) IS OPEN	Close the isolator
	UPS IS IN STAND-BY	Execute the power-on sequence
	STAND-BY OFF MODE IS SELECTED	The mode must be changed. In fact, STAND-BY OFF (emergency) mode only powers the loads when a black out occurs.
	UPS FAILURE AND AUTOMATIC BYPASS OUT OF ORDER	Insert the maintenance bypass (SWMB) and call your local service centre
THE UPS RUNS ON BATTERY POWER EVEN WHEN THE MAINS VOLTAGE IS PRESENT	PROTECTIVE DEVICE UPSTREAM ACTIVATED	Reset the protective device. WARNING: Check that there is no overload or short circuit at the output of the UPS.
	INPUT VOLTAGE OUTSIDE TOLERANCE LIMITS FOR MAINS OPERATION	Problem caused by the mains. Wait for the input mains voltage to return within the tolerance limits. The UPS will return automatically to mains operation.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS C01	THE JUMPER IS MISSING FROM THE R.E.P.O. CONNECTOR (J13, REF. 15 - "VIEW OF THE UPS CONNECTIONS") OR IS NOT INSERTED CORRECTLY	Assemble the jumper or check that it is inserted correctly.
THE DISPLAY SHOWS C02	MAINTENANCE BYPASS ISOLATOR (SWMB) CLOSED	Open the isolator (SWMB) situated behind the door.
	THE JUMPER IS MISSING FROM THE TERMINALS FOR THE REMOTE MAINTENANCE BYPASS (J10, REF. 17 - "VIEW OF THE UPS CONNECTIONS")	Insert the jumper
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A30, A32, A33, A34 AND THE UPS WILL NOT START	AMBIENT TEMPERATURE < 0°C	Heat the environment, wait for the heat sink temperature to rise above 0°C and then start up the UPS
	FAULT IN TEMPERATURE PROBE ON HEAT SINK	Activate the maintenance bypass (SWMB), turn the UPS off and on again and exclude the maintenance bypass. If the problem persists, call your local service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F09, F10	FAULT IN THE INPUT STAGE OF THE UPS	Activate the maintenance bypass (SWMB), turn the UPS off and on again. Exclude the maintenance bypass. If the problem persists, call your local service centre
	PHASE 1 HAS A VOLTAGE MUCH LOWER THAN THE OTHER TWO PHASES.	Open SWIN, turn the UPS from the battery, wait for the end of the sequence and close SWIN
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F11, F14, F15, F16, F17, L06, L07, L08, L09, L14, L15, L16, L17, L18, L19, L20, L21, L22	FAULTY LOADS APPLIED	Remove the load. Insert the maintenance bypass (SWMB), and turn the UPS off and then on again. Exclude the maintenance bypass. If the problem persists, call your local service centre
	FAULT IN THE INPUT OR OUTPUT STAGE OF THE UPS	Activate the maintenance bypass (SWMB) and turn the UPS off and then on again. Exclude the maintenance bypass. If the problem persists, call your local service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F03, F04, F05, A08, A09, A10	NO CONNECTION ON ONE OR MORE PHASES	Check the connections to the terminals
	INTERNAL PROTECTIVE FUSES BLOWN ON THE PHASES OR INPUT RELAY BROKEN	Call your local service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F42, F43, F44, L42, L43, L44	THE INTERNAL PROTECTION FUSES ON THE BATTERIES HAVE BLOWN	Call the nearest service centre.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A13, A14, A15	PROTECTIVE DEVICE UPSTREAM FROM THE BYPASS LINE OPEN (ONLY IF BYPASS IS SEPARATE)	Reset the protective device upstream. WARNING: check that there is no overload or short circuit at the output of the UPS
	BYPASS ISOLATOR OPEN (SWBYP ONLY IF BYPASS IS SEPARATE)	Close the isolator situated behind the door.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F19, F20	BATTERY CHARGER FAULT	Open the battery fuse holders (SWBATT), insert the maintenance bypass (SWMB) and shut down the UPS completely. Switch on again and if the fault persists, contact the nearest technical support centre.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A26, A27	BATTERY FUSES BLOWN OR FUSE HOLDER ISOLATORS OPEN	Replace the fuses or close the isolators (SWBATT). WARNING: if necessary, we recommend fuses be replaced with others of the same type (see Internal Protective Devices of the UPS)
THE DISPLAY SHOWS THE CODE S06	THE BATTERIES ARE DISCHARGED; THE UPS WAITS FOR THE BATTERY VOLTAGE TO EXCEED THE THRESHOLD SET	Wait for the batteries to recharge or force power on from the System On menu
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F06, F07, F08	INPUT RELAY LOCKED	Activate the maintenance bypass (SWMB), turn off the UPS, open SWIN and call your local service centre.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: L01, L10, L38, L39, L40, L41	FAULT IN: ▪ TEMPERATURE PROBE OR UPS COOLING SYSTEM ▪ MAIN AUXILIARY POWER SUPPLY ▪ STATIC BYPASS SWITCH	Activate the maintenance bypass (SWMB), turn the UPS off and then on again. Exclude the maintenance bypass. If the problem persists, call your local service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A22, A23, A24, F23, L23, L24, L25	THE LOAD APPLIED TO THE UPS IS TOO HIGH	Reduce the load to below the 100% threshold (or user threshold for the code A22, A23 or A24)
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: L26, L27, L28	SHORT CIRCUIT AT OUTPUT	Power off the UPS. Disconnect all the devices connected to the phase concerned by the short circuit. Power menu the UPS on again. Reconnect the devices one by one until the faulty one is identified.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: A39, A40 AND THE RED "BATTERIES TO BE REPLACED" LED IS ON	THE BATTERIES HAVE FAILED THE PERIODIC EFFICIENCY TEST	The batteries of the UPS should be replaced in that they are no longer able to maintain the charge for a sufficient time to ensure the required autonomy. **Warning: The batteries are to be replaced by qualified staff**
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F34, F35, F36, L34, L35, L36	▪ AMBIENT TEMPERATURE OVER 40°C ▪ HEAT SOURCES CLOSE TO THE UPS ▪ VENTILATION SLITS OBSTRUCTED OR TOO CLOSE TO WALLS	Activate the maintenance bypass (SWMB) without powering off the UPS; in this way, the fans cool the heat sink more quickly. Eliminate the cause of the overtemperature and wait for the temperature of the heat sink to drop. Exclude the maintenance bypass.
	FAULT IN TEMPERATURE PROBE OR UPS COOLING SYSTEM	Insert the maintenance bypass (SWMB) without turning off the UPS so that the fans, continuing to run, cool the heat sink more quickly and wait for the temperature of the heat sink to drop. Turn the UPS off and then on again. Exclude the maintenance bypass. If the problem persists, call your local service centre
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: F37, L37	▪ AMBIENT TEMPERATURE IS OVER 40°C ▪ HEAT SOURCES CLOSE TO THE UPS ▪ VENTILATION SLITS OBSTRUCTED OR TOO CLOSE TO WALLS ▪ FAULT IN THE TEMPERATURE PROBE OR BATTERY CHARGER COOLING SYSTEM	Eliminate the cause of the overtemperature. Open the battery fuse holder isolators (SWBATT) and wait for the temperature of the battery charger heat sink to drop. Close the battery fuse holders. If the problem recurs, call your local service centre. WARNING: never open the SWBATT fuse holders during battery operation.
THE DISPLAY SHOWS ONE OR MORE OF THE FOLLOWING CODES: L11, L12, L13	BREAKDOWN OR MALFUNCTIONING OF THE STATIC BYPASS	Activate the maintenance bypass (SWMB), switch the UPS off and then on again. Exclude the maintenance bypass. If the fault persists, contact the nearest technical support centre
THE DISPLAY SHOWS NOTHING OR PROVIDES INCORRECT INFORMATION	THE DISPLAY HAS POWER SUPPLY PROBLEMS	Activate the maintenance bypass (SWMB), shut down the UPS completely and wait for a few seconds. Switch the UPS on again. Exclude the maintenance bypass. If the problem persists, contact the nearest technical support centre.
THE DISPLAY IS OFF, THE FANS ARE OFF BUT THE LOAD IS POWERED	DUE TO A FAULT IN THE AUXILIARIES, THE UPS IS IN BYPASS SUPPORTED BY THE REDUNDANT POWER SUPPLY	Activate the maintenance bypass (SWMB), shut down the UPS completely and wait for a few seconds. Try to switch on again. If the display does not light up or the sequence fails, contact the nearest technical support centre and leave the UPS in manual bypass mode.

STATUS / ALARM CODES

Using a sophisticated self-diagnostic system, the UPS can check and indicate on the display panel its status and any errors and/or faults that have occurred during its operation. When a problem arises, the UPS signals the event by showing the code and corresponding type of alarm on the display.

- **Status:** indicates the current status of the UPS.

CODE	DESCRIPTION
S01	Precharging
S02	Load not powered (stand-by status)
S03	Power-on phase
S04	Load powered by bypass line
S05	Load powered by inverter
S06	Battery operation
S07	Waiting for batteries to recharge
S08	Economy mode enabled
S09	Ready for power on
S10	UPS locked – load not powered
S11	UPS locked – load on bypass
S12	BOOST stage or battery-charger locked – load not powered

- **Command:** indicates that a command has been activated.

CODE	DESCRIPTION
C01	Remote power-off command
C02	Remote load on bypass command
C03	Remote power-on command
C04	Battery test running
C05	Manual bypass command
C06	Emergency power-off command
C07	Remote battery charger power-off command
C08	Load on bypass command

- **Warning:** messages that refer to a specific configuration or operation of the UPS.

CODE	DESCRIPTION
W01	Battery low warning
W02	Programmed power-off enabled
W03	Programmed power-off command imminent
W04	Bypass disabled
W05	Synchronization disabled (UPS in Free running mode)

- **Anomaly:** “minor” problems that do not bring the UPS to a halt but affect its performance or inhibit the use of some of its functions.

CODE	DESCRIPTION
A03	Inverter Desynchronized
A04	External synchronism failed
A05	Overvoltage on input line of Phase1
A06	Overvoltage on input line of Phase2
A07	Overvoltage on input line of Phase3
A08	Undervoltage on input line of Phase1
A09	Undervoltage on input line of Phase2
A10	Undervoltage on input line of Phase3
A11	Input frequency outside tolerance limits
A13	Voltage on bypass line of Phase1 outside tolerance limits
A14	Voltage on bypass line of Phase2 outside tolerance limits
A15	Voltage on bypass line of Phase3 outside tolerance limits
A16	Bypass frequency outside tolerance limits
A18	Voltage on bypass line out of range
A19	Overcurrent peak on output Phase 1
A20	Overcurrent peak on output Phase2
A21	Overcurrent peak on output Phase 3
A22	Load on Phase1 > user-defined threshold
A23	Load on Phase2 > user-defined threshold
A24	Load on Phase3 > user-defined threshold
A25	Output isolator open
A26	Positive branch batteries missing or battery fuses open
A27	Negative branch batteries missing or battery fuses open
A29	System temperature probe faulty
A30	System temperature < 0°C
A31	System temperature too high
A32	Temperature of heat sink 1 < 0°C
A33	Temperature of heat sink 2 < 0°C
A34	Temperature of heat sink 3 < 0°C
A35	Internal battery temperature probe faulty
A36	Internal battery overtemperature
A37	External battery temperature probe faulty
A38	External battery overtemperature
A39	Positive branch batteries to be replaced
A40	Negative branch batteries to be replaced

➢ **Fault:** more critical problems than “Anomalies” in that, if they persist, they may bring the UPS to a halt.

CODE	DESCRIPTION
F01	Internal communication error
F02	Incorrect input phase direction.
F03	Input fuse of Phase1 broken or input relay blocked (will not close)
F04	Input fuse of Phase 2 broken or input relay blocked (will not close)
F05	Input fuse of Phase3 broken or input relay blocked (will not close)
F06	Input relay of Phase1 blocked (always closed)
F07	Input relay of Phase2 blocked (always closed)
F08	Input relay of Phase3 blocked (always closed)
F09	Precharge of positive branch capacitors failed
F10	Precharge of negative branch capacitors failed
F11	BOOST stage anomaly
F12	Incorrect bypass phase direction.
F14	Sine wave of inverter phase1 distorted
F15	Sine wave of inverter phase2 distorted
F16	Sine wave of inverter phase3 distorted
F17	Inverter stage anomaly
F19	Positive battery overvoltage
F20	Negative battery overvoltage
F21	Positive battery undervoltage
F22	Negative battery undervoltage
F23	Overload at output
F26	Output relay of Phase1 blocked
F27	Output relay of Phase2 blocked
F28	Output relay of Phase3 blocked
F29	Output fuse of Phase1 blown
F30	Output fuse of Phase2 blown
F31	Output fuse of Phase3 blown
F32	Battery charger stage anomaly
F33	Output fuse of battery charger blown
F34	Heat sink overtemperature
F37	Battery charger overtemperature
F42	BOOST battery 1 fuse blown
F43	BOOST battery 2 fuse blown
F44	BOOST battery 3 fuse blown

- **Lock:** indicate a breakdown of the UPS or one of its parts. Locks are normally preceded by an alarm signal. In the event of a fault and resultant breakdown of the inverter, the inverter will be switched off and the load will be powered by the bypass line (this procedure is excluded for breakdowns caused by high and persistent overloads and by short circuits).

CODE	DESCRIPTION
L01	Incorrect auxiliary power supply
L02	One or more internal cables disconnected
L03	Phase 1 input fuse broken or input relay locked (will not close)
L04	Phase 2 input fuse broken or input relay locked (will not close)
L05	Phase 3 input fuse broken or input relay locked (will not close)
L06	BOOST stage overvoltage positive
L07	BOOST stage overvoltage negative
L08	BOOST stage undervoltage positive
L09	BOOST stage undervoltage negative
L10	Static bypass switch fault
L11	L1 bypass output breakdown
L12	L2 bypass output breakdown
L13	L3 bypass output breakdown
L14	Phase1 inverter overvoltage
L15	Phase2 inverter overvoltage
L16	Phase3 inverter overvoltage
L17	Phase1 inverter undervoltage
L18	Phase2 inverter undervoltage
L19	Phase3 inverter undervoltage
L20	Direct voltage at output of inverter or Sine wave of Phase1 inverter distorted
L21	Direct voltage at output of inverter or Sine wave of Phase2 inverter distorted
L22	Direct voltage at output of inverter or Sine wave of Phase3 inverter distorted
L23	Overload at output of Phase1
L24	Overload at output of Phase2
L25	Overload at output of Phase3
L26	Short circuit at output of Phase1
L27	Short circuit at output of Phase2
L28	Short circuit at output of Phase3
L29	Phase 1 output fuse broken or output relay locked (will not close)
L30	Phase 2 output fuse broken or output relay locked (will not close)
L31	Phase 3 output fuse broken or output relay locked (will not close)
L34	Heat sink Phase 1 overtemperature
L35	Heat sink Phase 2 overtemperature
L36	Heat sink Phase 3 overtemperature
L37	Battery charger overtermperature
L38	Temperature probe of heat sink Phase 1 faulty
L39	Temperature probe of heat sink Phase 2 faulty
L40	Temperature probe of heat sink Phase 3 faulty
L41	Temperature probe of battery charger faulty
L42	BOOST battery 1 fuse blown
L43	BOOST battery 2 fuse blown
L44	BOOST battery 3 fuse blown

TECHNICAL DATA

UPS Models	10 kVA	12 kVA	15 kVA	20 kVA
Input stage				
Rated voltage	380-400-415 Vac Three-phase with neutral (4 wires)			
Rated frequency	50-60Hz			
Accepted tolerance for input voltage without activation of battery (for 400Vac)	±20% @ 100% load -40% +20% @50% load			
Accepted tolerance for input frequency without activation of battery (for 50/60Hz)	±20% 40-72Hz			
Technology	IGBT high frequency with PFC control, independent digital average current mode on each input phase			
Input current harmonic distortion	THDi ≤ 3 % (7)			
Input power factor	≥0.99			
Power Walk-in	Programmable from 5 to 30 sec. in steps of 1 sec.			
Output stage				
Rated voltage (1)	380/400/415 Vac Three-phase with neutral (4 wires)			
Rated frequency (2)	50/60Hz			
Rated apparent output power	10kVA	12kVA	15kVA	20kVA
Rated active output power	9kW	10.8kW	13.5kW	18kW
Output power factor	0,9			
Short circuit current	1,5x In for t>500ms			
Precision of output voltage (with respect to output voltage 400Vac)	± 1%			
Static stability (3)	± 0.5%			
Dynamic stability	± 3% resistive load (4)			
Output voltage harmonic distortion with standardized linear and distorting load	≤1% with linear load ≤3% with distorting load			
Crest factor allowed at rated load	3:1			
Precision of frequency in free running mode	0.01%			
Inverter overloads @ PFout = 0.8 (Resistive load)	115% continuously 125% 10 min 150% 1 min 168% 5 sec >168% 0.5 sec			
Inverter overloads @ PFout = 0.9 (Resistive load)	110% 10 min 133% 1 min 150% 5 sec >150% 0.5 sec			
Bypass overload	110% continuously 133% 60 minutes 150% 10 minutes >150% 2 sec			
Technology	IGBT high frequency with multiprocessor digital control (DSP+µP), voltage/current based on signal processing methods with feed forward			
Battery charger stage				
Rated voltage	±240Vdc			
Maximum recharging current (5)	6A			
Battery charger algorithm	Two levels with temperature compensation			
Technology	Analogue switching current mode under the control of the µP (PWM regulation of charging voltage and current)			
Tolerance of input voltage for recharging at maximum current	345-480Vac			

UPS Models		10 kVA	12 kVA	15 kVA	20 kVA
Dimensions and weight					
W x D x H	***USMLT 10/20***	320 x 840 x 930 mm			
	USMLT 10/20 X	440 x 850 x 1320 mm			
Weight without batteries	***USMLT 10/20***	80 Kg	82 Kg	90 Kg	95 Kg
	USMLT 10/20 X	105 Kg	110 Kg	115 Kg	120 Kg
Weight with batteries	***USMLT 10/20***	180 Kg	182 Kg	190 Kg	195 Kg
	USMLT 10/20 X	305 Kg	310 Kg	315 Kg	320 Kg
Modes and efficiency values					
Operating modes		True on line double conversion ECO mode Smart Active mode Stand-by Off (Emergency) Frequency Converter			
AC/AC efficiency in on line mode		≥93.5%		≥94%	
AC/AC efficiency in Eco mode		≥98%			
DC/AC efficiency in autonomy mode		≥92.5%		≥93.5%	
Miscellaneous					
Noise		≤48dB(A)		≤52dB(A)	
Color		RAL 7016			
Ambient temperature [6]		0 – 40 °C			

(1) *To maintain the output voltage within the range of precision indicated, it may have to be recalibrated after a long period of operation*

(2) *If the mains frequency is within ± 5% of the selected value, the UPS is synchronized with the mains. If the frequency is outside the tolerance limits or running on the battery, the frequency is the value selected ±0.1%*

(3) *Mains/Battery @ load 0% -100%*

(4) *@ Mains / battery / mains @ resistive load 0% / 100% / 0%*

(5) *The recharging current is regulated automatically according to the capacity of the battery installed*

(6) *20 – 25 °C for maximum battery life*

(7) *@ 100% load & THDv ≤ 1%*

Battery Box (*USMLT 10/20*)	BB480-A5	BB480-M5
Battery		
Rated voltage per branch	240 Vdc	
No. batteries / V	40 / 12	80 / 12
Miscellaneous		
Ambient temperature [1]	0 – 40 °C	
Humidity	<95% non-condensing	
Protective devices	Overcurrent – Short circuit	
W x D x H	320 x 840 x 930 mm	
Weight	150 Kg	270 Kg

Battery Box (*USMLT 10/20 X*)	BB480X-M5	BB480X-M7	BB480X-M3	BB480X-M6
Battery				
Rated voltage per branch	240 Vdc			
No. batteries / V / Ah	80 / 12 / 9	120 / 12 / 7	80 / 12 / 12	120 / 12 / 9
Miscellaneous				
Ambient temperature [1]	0 – 40 °C			
Humidity	<95% non-condensing			
Protective devices	Overcurrent – Short circuit			
W x D x H	400 x 815 x 1320 mm			
Weight	300 Kg	390 Kg	395 Kg	400 Kg

(1) *20 – 25 °C for maximum battery life*

CONNECTING COMPETENCE.

THE COMPANY

HEADQUARTERS

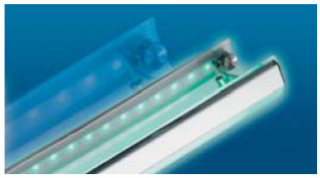
SCHRACK TECHNIK GMBH
Seybelgasse 13, 1230 Wien
TEL +43(0)1/866 85-0
FAX +43(0)1/866 85-1560
E-MAIL info@schrack.com















AUSTRIAN QUARTERS

CARINTHIA
Ledererstraße 3
9020 Klagenfurt
TEL +43(0)463/333 40-0
FAX +43(0)463/333 40-15
E-MAIL klagenfurt@schrack.com

UPPER AUSTRIA
Franzosenhausweg 51b
4030 Linz
TEL +43(0)732/376 699-0
FAX +43(0)732/376 699-20
E-MAIL linz@schrack.com

SALZBURG
Bachstraße 59-61
5023 Salzburg
TEL +43(0)662/650 640-0
FAX +43(0)662/650 640-26
E-MAIL salzburg@schrack.com

STYRIA, BURGENLAND
Kärntnerstraße 341
8054 Graz
TEL +43(0)316/283 434-0
FAX +43(0)316/283 434-64
E-MAIL graz@schrack.com

TYROL
Richard Bergerstraße 12
6020 Innsbruck
TEL +43(0)512/392 580-0
FAX +43(0)512/392 580-30
E-MAIL innsbruck@schrack.com

VORARLBERG
Wallenmahd 23
6850 Dornbirn
TEL +43(0)5572/238 33-0
FAX +43(0)05572/238 33-14
E-MAIL dornbirn@schrack.com

VIENNA, LOWER AUSTRIA, BURGENLAND
Seybelgasse 13
1230 Wien
TEL +43(0)1/866 85-500
FAX +43(0)1/866 85-441
E-MAIL wien@schrack.com

NETZWERKTECHNIK
Seybelgasse 13, 1230 Wien
TEL +43(0)1/866 85-180
FAX +43(0)1/866 85-136
E-MAIL netzwerktechnik@schrack.com

LICHTTECHNIK
Seybelgasse 13, 1230 Wien
TEL +43(0)1/866 85-543
FAX +43(01)/866 85-561
E-MAIL lichttechnik@schrack.com

SCHRACK COMPANIES

BELGIUM
SCHRACK TECHNIK B.V.B.A
Twaalfapostelenstraat 14
BE-9051 St-Denijs-Westrem
TEL +32 9/384 79 92
FAX +32 9/384 87 69
E-MAIL info@schrack.be

CROATIA
SCHRACK TECHNIK D.O.O.
Zavrtnica 17
HR-10000 Zagreb
TEL +385 1/605 55 00
FAX +385 1/605 55 66
E-MAIL schrack@schrack.hr

POLAND
SCHRACK TECHNIK
POLSKA SP.Z.O.O.
ul. Annopol 3
PL-03-236 Warszawa
TEL +48 22/331 48 31
FAX +48 22/331 48 33
E-MAIL se@schrack.pll

ROMANIA
SCHRACK TECHNIK SRL
Str. Simion Barnutiu nr. 15
RO-3700 Oradea
TEL +40 259/435 887
FAX +40 259/412 892
E-MAIL schrack@schrack.ro

SERBIA
SCHRACK TECHNIK D.O.O.
Kumodraska 260
YU-11000 Beograd
TEL +38 1/11 309 2600
FAX +38 1/11 309 2620
E-MAIL office@schrack.co.yu

SLOVAC REPUBLIC
SCHRACK TECHNIK SPOL. SR.O.
Langsfeldova 2
SK-03601 Martin
TEL +42 1/43 422 16 41
FAX +42 1/43 423 95 56
E-MAIL martin@schrack.sk

SLOVENIA
SCHRACK TECHNIK D.O.O.
Glavni trg 47
SLO-2380 Slovenj Gradec
TEL +38 6/2 883 92 00
FAX +38 6/2 884 34 71
E-MAIL schrack.sg@schrack.si

CZECH REPUBLIC
SCHRACK TECHNIK SPOL. SR.O.
Dolnomecholupska 2
CZ-10200 Praha 10 – Hostivar
TEL +42(0)2/810 08 264
FAX +42(0)2/810 08 462
E-MAIL praha@schrack.cz

HUNGARY
SCHRACK TECHNIK KFT.
Vidor u.
H-1172 Budapest
TEL +36 1/253 14 01
FAX +36 1/253 14 91
E-MAIL schrack@schrack.hu

MAN_USV_USMLT_10-20kVA_EN_2008_11
0MNUTT2RUD

WWW.SCHRACK.COM