

7.5 kVA - 15 kVA UPS
Parallel for Redundancy System
User's and Installation
Manual

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CONTENTS

1. Introduction	5
2. System description	5
2.1 General description	5
2.2 System configuration	7
3. Safety information	9
4. Shipping and storage	10
5. Unpacking and handling	10
5.1 Unpacking and incoming inspection	10
5.2 Moving	12
6. Installation	12
6.1 Environment	12
6.2 Floor loading	12
6.3 Power connections	13
7. Computer and alarm connections	18
8. User's guide to operations	21
8.1 Starting up the parallel for redundancy system	21
8.2 Shutting down the UPS	23
8.3 Control panel functions	23
8.4 Using the maintenance bypass swicth of the parallel module	24
9. Maintenance	25
9.1 Using the parallel module switches	25
10. Warranty	26
11. Technical specifications	27

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1. Introduction

This User's manual gives basic information about 7.5 - 15 kVA parallel for redundancy, uninterruptible power systems: their basic function, their features, how to use them, and what to do in case of trouble. Instructions for shipping, storing, handling and installing the equipment are also given.

The planning guidelines of this manual describe only the specific demands of UPS units. Local legislation and regulations for electrical instruction must be followed in the UPS installation.

This manual is mainly intended for the chief operator/system supervisor, electrical consultants and installation electricians.

The UPS system must be installed according to the instructions in this manual. Fixed installation may be performed by qualified personnel only. Failure to recognise the electrical hazards could prove fatal.

2. System description

UPS (Uninterruptible Power System) protects different types of sensitive electrical equipment: computers, workstations, sales terminals, critical instrumentation, telecommunications systems, process control systems, etc. The UPS protects them from problems associated with utility power of poor quality, or a complete loss of power.

Sensitive electrical equipment needs protection from electrical interference. Interference from outside the facility (such as lightning, power company accidents and radio transmissions) and interference from inside the facility (from motors, air conditioners, vending machines and arc welders, for example) can create problems in the AC power line to the sensitive equipment. The problems can be: power outage, low or high voltage, slow voltage fluctuation, frequency variations, differential and common-mode noise, transients, etc.

UPS cleans the utility AC power, maintains a constant voltage and if needed isolates the output to the critical load. These actions help to keep power line problems from reaching the critical system, where they can damage software and hardware and cause the equipment to operate erratically.

2.1 General description

This parallel for redundancy UPS system consists of two equal power size units and a common parallel module. Both UPSes are double conversion on-line units for protection of computer systems and other intelligent devices as measurement instruments and industrial automation applications. The units condition the raw mains and supply continuous, clean three-phase power to the critical systems. While feeding the load both UPSes will continue to supply clean power without any interruption at the UPS output.

The outputs of both UPSes are combined in the parallel module and then connected to the load. In normal operation the load is shared equally by both UPSes.

Nominal power rating of the parallel for redundancy system is the same as nominal power rating of one UPS. This enables one UPS to take care of the load even if the other UPS needs maintenance or service.

Figure 1 shows block diagram of the parallel for redundancy system. Parallel information connection between UPS1 and UPS2 informs the other unit about bypass availability and synchronisation. This parallel information between UPS1 and UPS2 is needed to be able to use without any risk the bypass power lines.

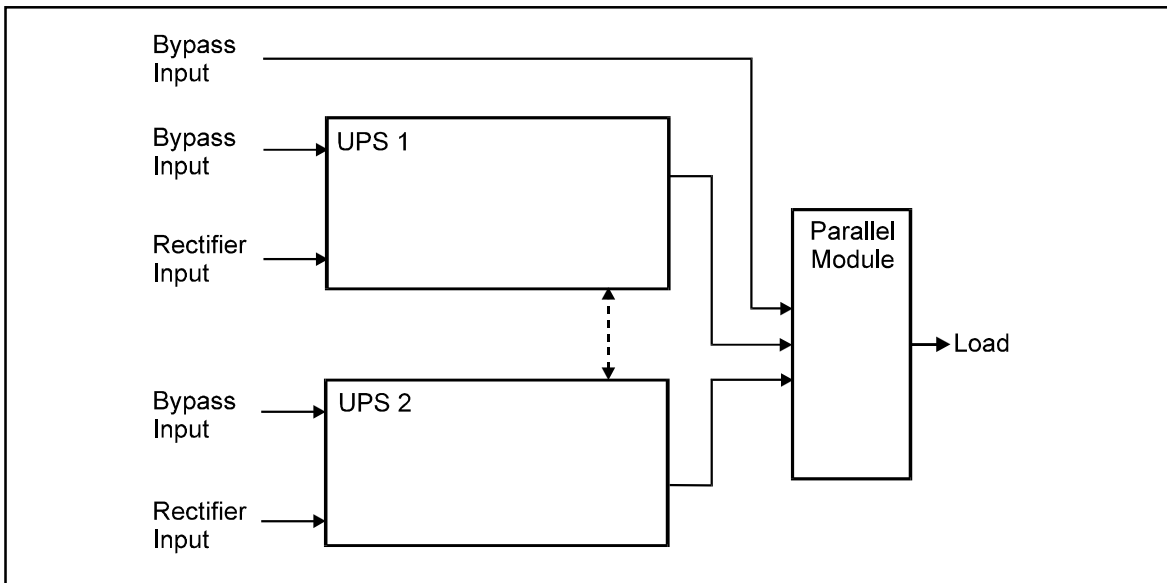


Fig. 1. Block diagram of the parallel for redundancy system

Both UPSes are identical having similar operation. UPS block diagram shown in fig. 2, consists of several modules each having its own functions:

This UPS is a double conversion on-line UPS for protection of computer systems and other intelligent devices such as measurement instruments and industrial automation applications. It conditions the raw mains and supplies continuous, clean three-phase power to the critical systems. While feeding the load the UPS also keeps the battery constantly charged. If utility power fails, the UPS will continue to supply clean power without any interruption at the UPS output.

If the power failure outlasts the backup time the UPS will shut down in order to prevent a total discharge of the battery. When the line voltage is restored the UPS will start up again automatically providing power to the critical load and charging the battery bank.

- Transients on the mains are reduced by an input filter.
- AC-power is rectified and regulated in the rectifier which provides the power to the inverter and the battery charger to keep the battery bank fully charged.
- The inverter converts the DC-power back to AC-power, which is delivered to the load through the parallel module.
- The static switch transfers the load to the bypass line when the inverter is overloaded or the inverter is not able to feed the load. The transfer to the static bypass as well as back to inverter mode happens simultaneously in both UPS units.
- The battery provides power to the load during a mains failure.
- The battery charger keeps the battery fully recharged.

- The battery switch determines the direction of the current to or from the battery. In normal mode the mains is supplying the load, the switch is open and the battery is kept fully recharged. When there is a failure in the mains supply, the switch is closed and the battery is feeding the load.
- The control and monitoring circuits with ABM-system (Advanced Battery Management) monitor and control the operation of the UPS-system including automatic battery test. They show the user the status of the system operation by visual and audible indicators. The UPS sends information about the system operation via potential free relay outputs and two serial data interfaces (RS232). (UPS can be shut down remotely via computer interface.) This information includes data about utility, load and the UPS itself. The information can be used in a computer to ensure total protection of software and data.

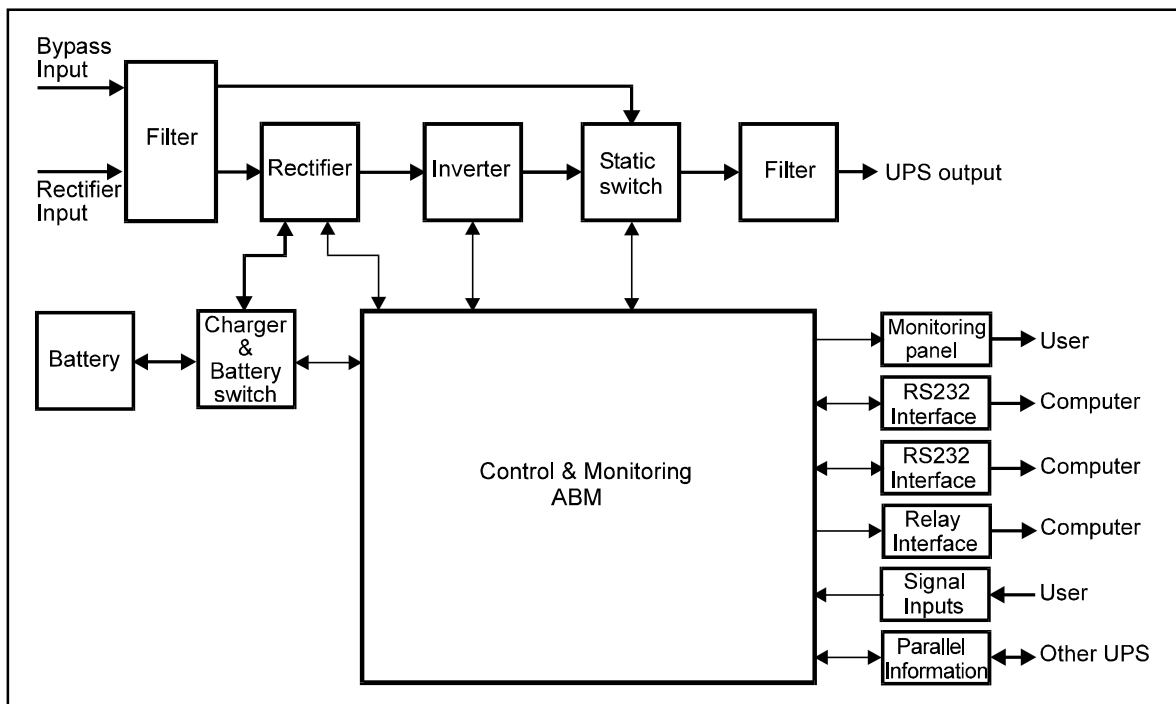


Fig. 2. Block diagram of the UPS.

2.2 System configuration

The parallel for redundancy UPS system consists of two equal power size UPS with internal backup battery and a common parallel module.

In addition, several options may be included in the system. The options are used to tailor a matching solution to fulfil the site and load requirements of the installation.

The main considerations in planning the UPS system are:

- The UPS system output power rating (VA) shall be specified according to the total power demand of the protected system. Some margin should be allowed for potential expansion of the protected system, and for possible inaccuracy in calculating or measuring the actual power requirement.
- The battery shall be sized according to the desired backup time. Note that the backup time is longer if the load is less than the nominal power rating of the UPS.

The following options are available:

- Input filter (THD 10%)
- External battery cabinets
- LCD monitor panel
- Remote status panel
- Alarm extension unit
- LanQuattro

The UPS series consists of the following UPS-systems:

Power	Backup time		Recharge time
	Single UPS	Redundant System	
7.5 kVA/5.25 kW	18 (10)/20 min	40(23)/50 min	5 h
10 kVA/7.0 kW	14 (7)/16	30(18)/37 min	5 h
15 kVA/10.5 kW	7/9 min	18/20 min	5 h

The backup times are for standard batteries 48 pcs. (or 32 pcs.) / long life batteries. See the dimensions of the UPS series and the parallel module in figure 3.

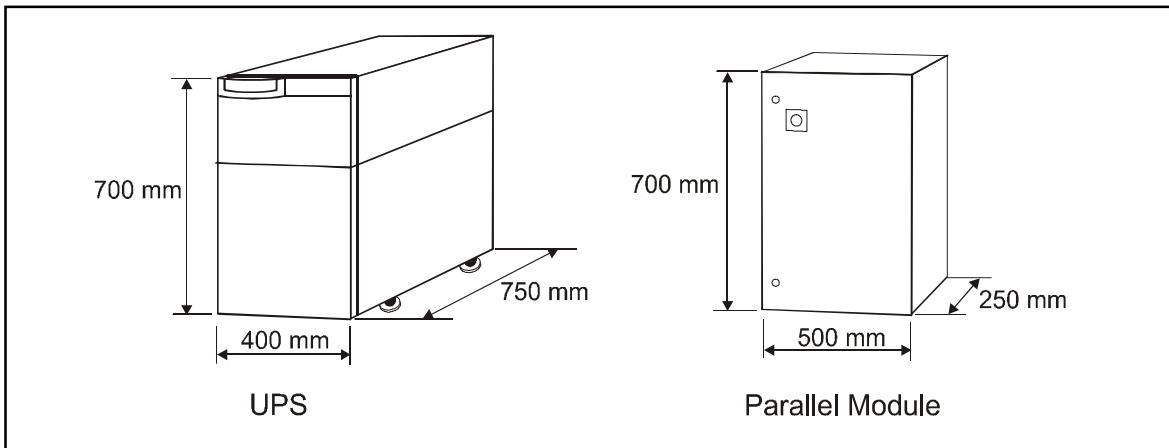


Fig. 3. Dimensions of one UPS and the parallel module.

3. Safety information

Since the UPS unit operates on line power and contains a bank of high-current backup batteries, the information in this chapter is important to all personnel involved.

Storage and transportation

Because of the high energy stored within the batteries, the UPS equipment must be handled with care. The UPS must always be kept in the position marked on the package and must not be dropped.

Installation

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a safety hazard. Do not place the UPS in an airtight room.

The UPS system must be installed according to the instructions in this manual. Installation may be performed by qualified personnel only. Failure to recognise the electrical hazards could prove fatal.



WARNING!

Do not open the UPS cabinet! Some components inside the UPS cabinet carry high voltages. To touch them may prove fatal. All operations inside the unit must be carried out only by service personnel from the manufacturer or from an agent authorised by the manufacturer.

User operations

The only user operations permitted are:

- Starting up and shutting down the UPS unit (not the initial start up).
- Using the maintenance bypass switch of the parallel module
- Operating the user interface.
- Connecting data interface cables.
- Monitoring the UPS with LanSafe III and FailSafe III software.

These operations must be performed according to the instructions in this manual. During any of these operations, the user must take greatest care, and perform only the prescribed operations. Any deviation from the instructions could be dangerous to the operator.

4. Shipping and storage

The UPS equipment is shipped on specifically designed pallets so that it is easy to move it with a forklift.

Do not stack the pallets.

Because of the high energy stored within batteries, the UPS must be handled with care. The UPS must always be kept in an upright position and must not be dropped.

Because of the heavy weight of the UPS system proper provision must be made for transportation. See technical specifications for dimensions and weights of the UPS.

If the UPS is not immediately installed the following must be remembered:

- The UPS should be stored in the original packing and shipping carton.
- The **recommended** storing temperature is between +15°C ... +25°C.
- The equipment must always be protected from moisture and weather.

If the UPS is stored for a longer period of time the batteries of the UPS should be charged for at least 8 hours every 6 months to maintain the battery condition.

5. Unpacking and handling

5.1 Unpacking and incoming inspection

Unpack the equipment and remove the packing materials and shipping cartons.

- The equipment must be inspected for damage during shipment. If damage has occurred during transit, all the shipping cartons and packing materials should be stored for further investigation. If the damage is visible a claim for shipping damage must be filed immediately.

To file a claim for shipping damage:

- The carrier must be informed within 7 days of receipt of the equipment.

The equipment must be checked against the packing slip to verify that the shipment is complete.

The UPS is thoroughly inspected at the factory. If there are no damages or discrepancies, the installation may proceed.

Removing the equipment from the pallet (see figure 4).

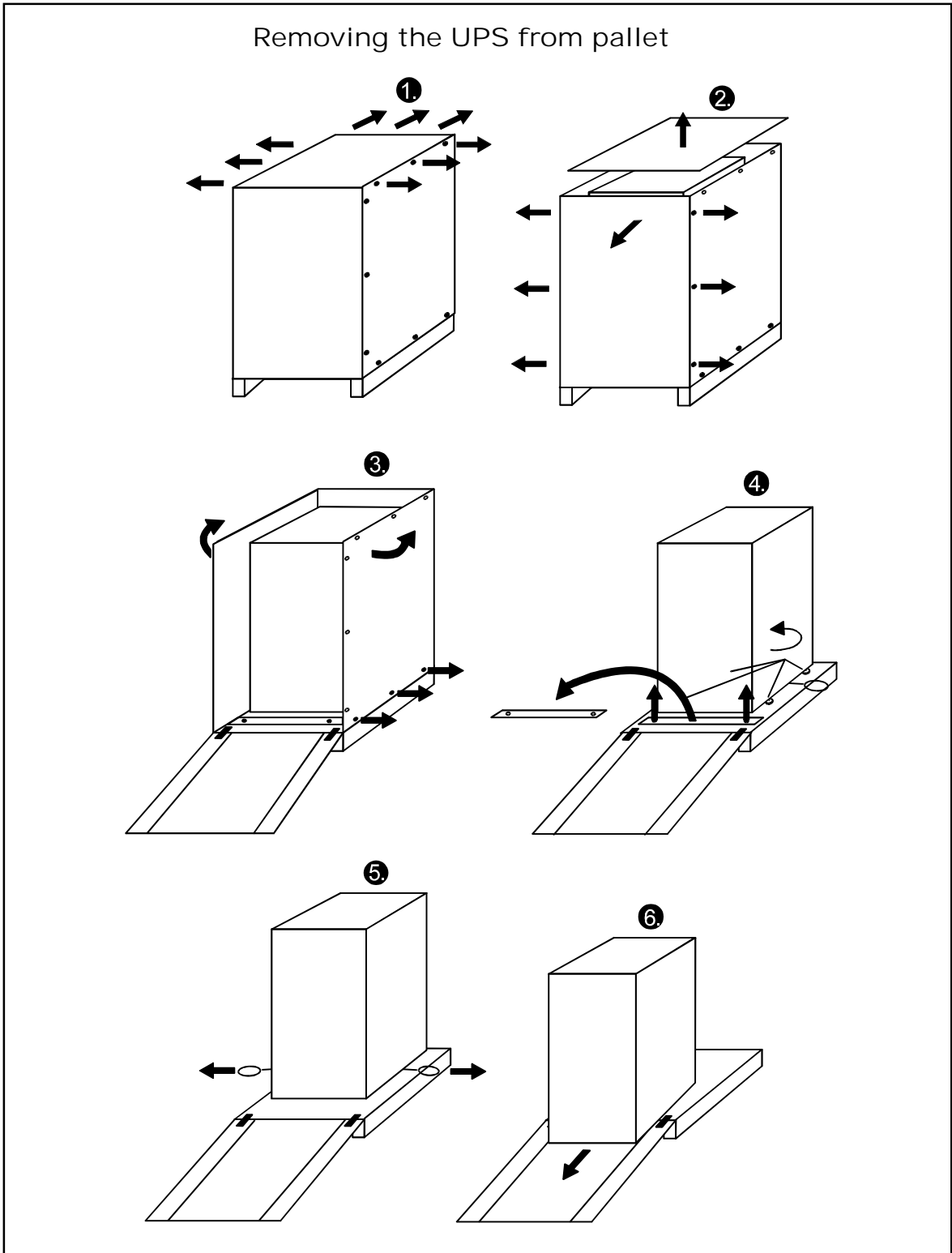


Fig. 4. Removing the UPS from pallet

5.2 Moving

The UPS units are equipped with castors, for easy movement. The unit is simply pushed into place. Because the UPS is heavy, it should be verified that surfaces on which it is moved are strong enough. When wheeling the UPS, be careful not to tilt it.

6. Installation

6.1 Environment

All the requirements concerning environment described in this chapter (Installation) or chapter 11 (Technical specifications) must be met. If they are neglected the manufacturer cannot guarantee the safety of personnel during installation or use, or that the unit will function properly.

When locating the UPS system and the battery options, the following points have to be remembered:

- Avoid temperature and humidity extremes. To maximise the life time of the batteries, an ambient temperature of 15°C to 25°C is recommended.
- Provide shelter from the elements (especially moisture)
- Make sure that ventilation and space requirements are met. When the UPS is in use, there should be 100 mm clearance at both sides and on top of the UPS. 100 mm clearance is needed at the rear of the UPS for ventilation. When the UPS is serviced there should be 500 mm free space for the left side panel of the UPS to be opened.
- If the unit is installed in a way that it is impossible to access the unit from the sides and from the top, must the input wiring of the unit make it possible to pull the unit “out” for service.
- Maintain clearance at front of the UPS for user operations.
- The parallel module is a wallmounted module and maximum distance from the UPSes is 2 m when using the cables delivered with the parallel module.
At least 600 mm of free space is needed in front of the parallel module to be able to open the door.
Maximum distance between the UPSes is 3m.
- The extra battery cabinet must be installed next to the UPS. The installation instructions for the external battery cabinet are delivered with the extra battery cabinet.

6.2 Floor loading

When planning the installation the floor loading must be taken into consideration because of the heavy weight of the UPS.

The strength of the installation surface must be adequate for point and distributed loadings given in table 1.

	Weight (kg)	Point loading (kg/cm ²)	Distributed loading (kg/m ²)
7.5 kVA	220(180)/215	0.8(0.6)/0.8	720(580)/720
10 kVA	220(180)/215	0.8(0.6)/0.8	720(580)/720
15 kVA	220/215	0.8/0.8	720/720

Table 1. The UPS series floor loadings (standard batteries 48 pcs. (or 32 pcs.)/long life batteries)

6.3 Power connections

The electrical planning and the UPS installation must be done by qualified personnel only.



WARNING!

The UPS contains high voltage and current which can injure or kill personnel and damage equipment.

The customer has to supply the wiring to connect the UPS to power lines.

The power cables between UPS and parallel module is supplied with the parallel module. The installation inspection and initial start up of the UPS system must be carried out by service personnel from the manufacturer or from an agent authorised by the manufacturer.

The UPS system has the following power connections:

- 3-phase and N and \ominus connection for rectifier inputs
- 3-phase and N and \ominus connection for bypass inputs for both UPSes and the parallel module
- 3- phase and N connection between UPS and parallel cabinet
- 3-phase and N and \oplus connection for load output
- +, - and \oplus connection for the battery

All input and output wiring of the UPS connects to the terminals located behind the left side panel. Wiring can be routed through the cable entry at the bottom or back of the UPS cabinet.

All input and output wiring of the parallel module is connected to the terminals behind the module door. Wiring is done from the bottom of the module.

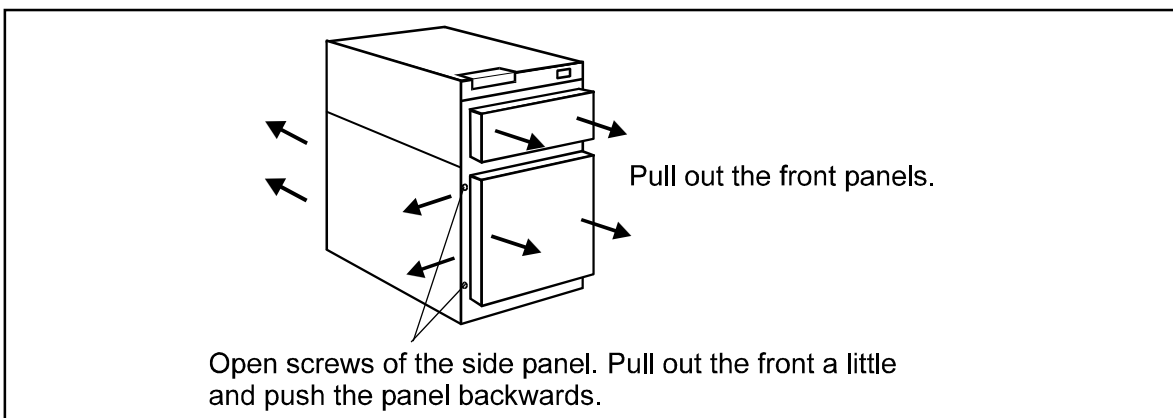


Fig. 5a. Removing the front panels and opening the left side panel.

Mains and load connections

The proper connection order is as follows:

1. Check that electrical connections to the installation site have been properly executed. Also check fuse or circuit breaker ratings and cable dimensions against figure 7 and table 2.
2. A readily accessible disconnect device must be incorporated in the fixed wiring. The disconnect device shall have a contact separation of at least 3 mm.

A warning label must be added on all primary power isolators installed remote from the UPS area to warn electrical maintenance personnel that the circuit feeds a UPS.

The warning label shall carry the following wording or equivalent:

ISOLATE UNINTERRUPTIBLE POWER SYSTEM (UPS) BEFORE WORKING ON THIS CIRCUIT

3. Switch off the supply to the distribution point to which the UPS units are to be connected.
4. For extra safety, also remove the fuses from the selected lines.
Make absolutely sure that there is no power.
5. The UPS units and the parallel module should be connected in accordance with figure 7.
6. Remove the front panels and open the left side panel of both UPS units (Fig. 5a).
7. Connect input cables and output cables to the UPSes (Fig 5b) and to the parallel module (Fig 6b).
Note: Make sure that the neutral of UPS input is properly connected. Pay special attention on the input phases. Phases 1, 2 and 3 have to be the same in pairs in UPS bypass inputs and parallel module bypass input. Correct phase rotation is not enough.
8. Make sure that the UPS unit output cable is connected to the parallel module.
9. Connect the parallel information cable between the UPS units. Connect the cable to terminal X4 on the parallel connection circuit board beside the input and output terminals (Fig 5b). The shield of the parallel information cable have to be grounded to the UPS frame from the other end of the cable. Connect the cable shield to the screw beside the parallel connection circuit board.
10. Connect the auxiliary contact information of the parallel module maintenance bypass switch to both UPSes with the cable delivered with the parallel module. Connection in UPS is to terminal X221 behind the relay interface (See fig. 5b). Make the connections according figure 7.
11. Also connect the computer and alarm connections according to chapter 7. These connections are behind the upper front panel.

The UPS system is now connected to the mains and to the load but there is no power. **Make sure that the connections are properly made.**

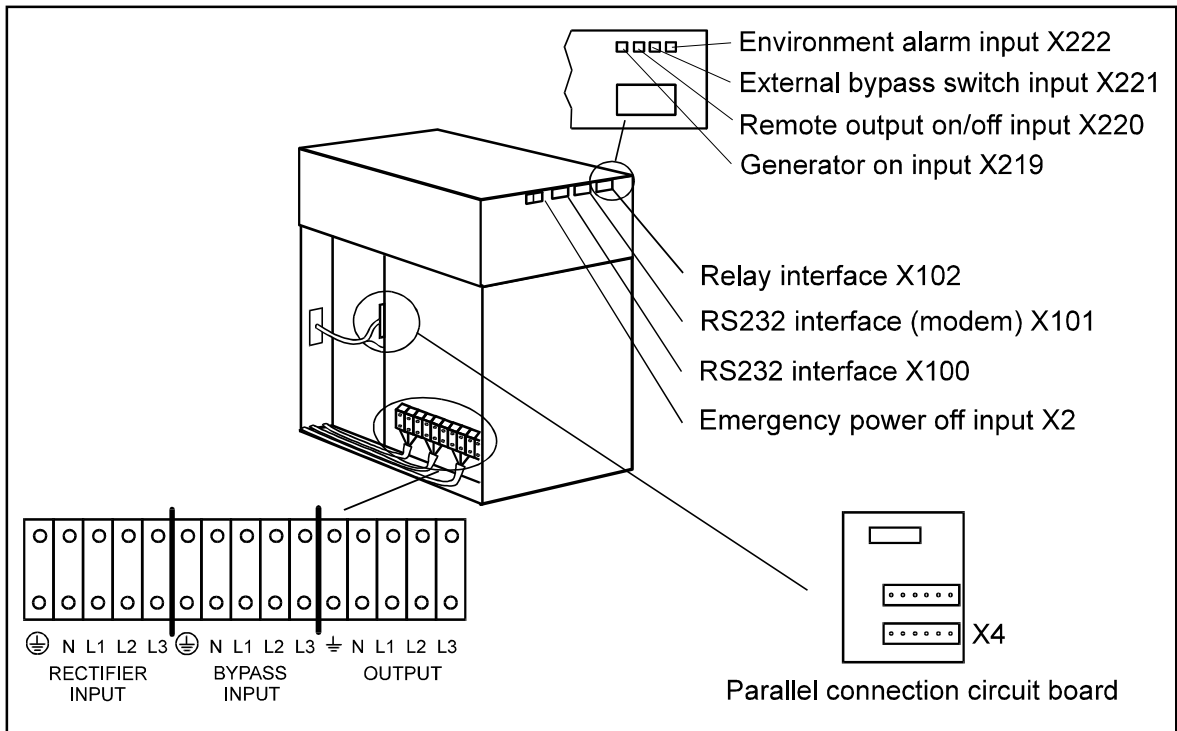


Fig. 5b. UPS connection locations

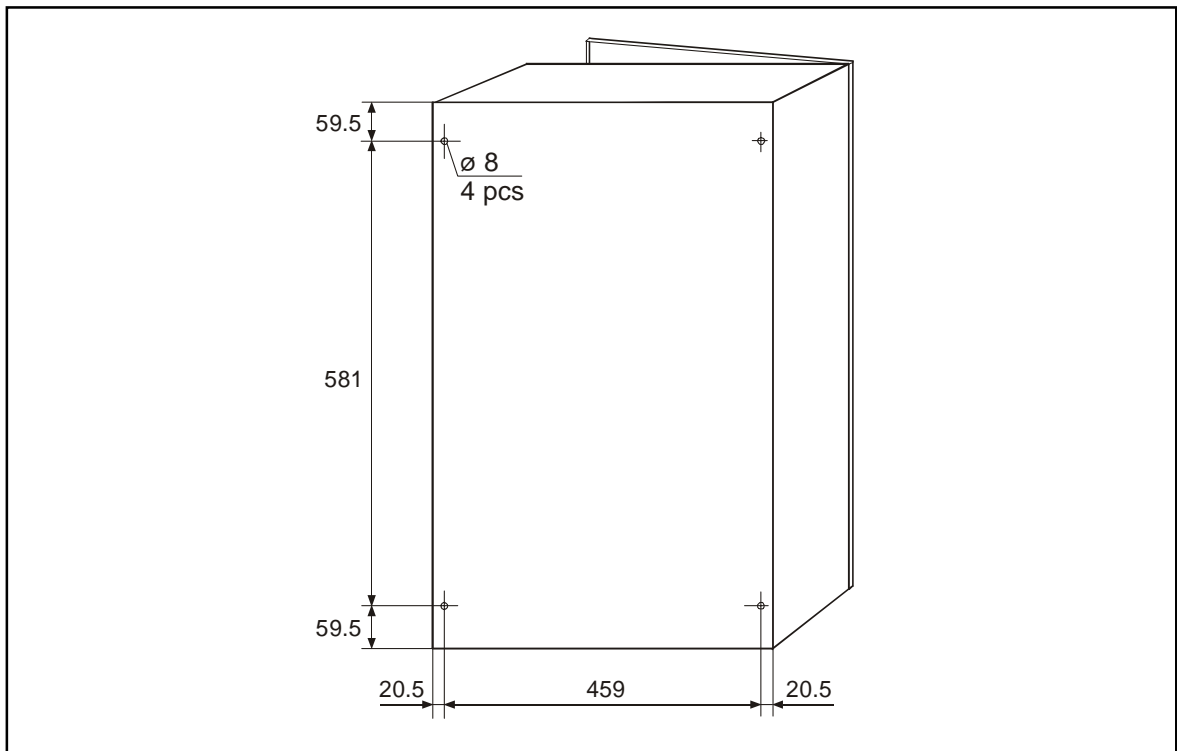


Fig. 6a. Parallel module mounting holes

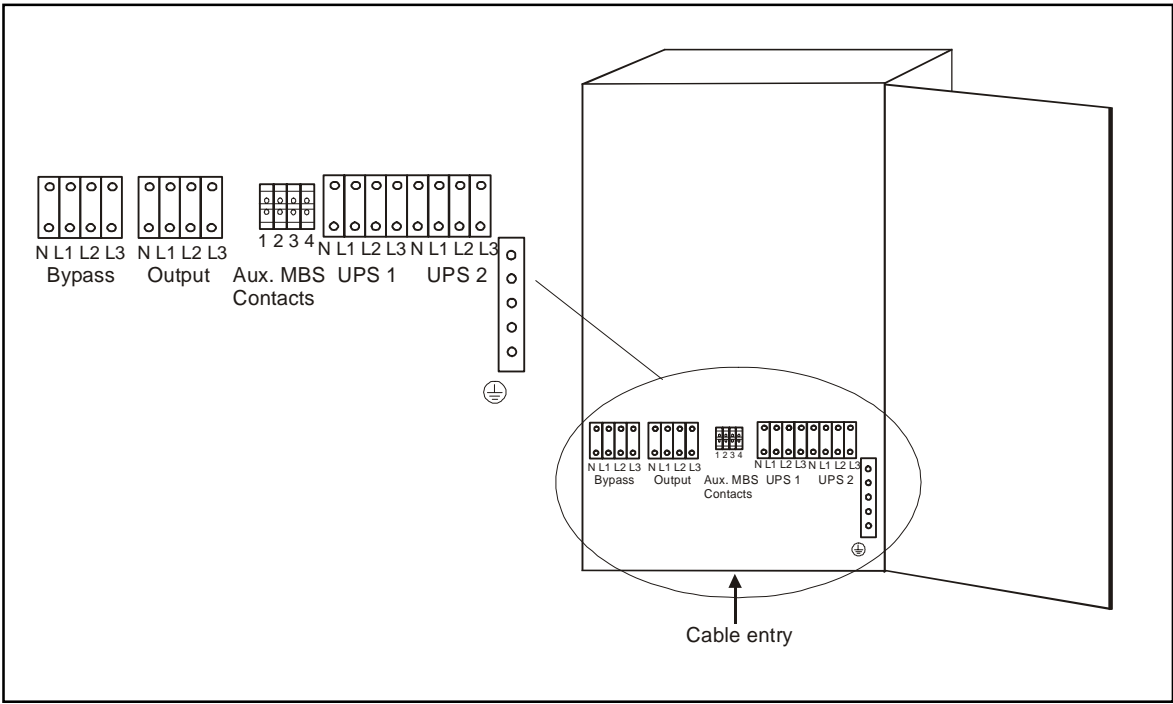


Fig. 6b. Parallel module connection locations

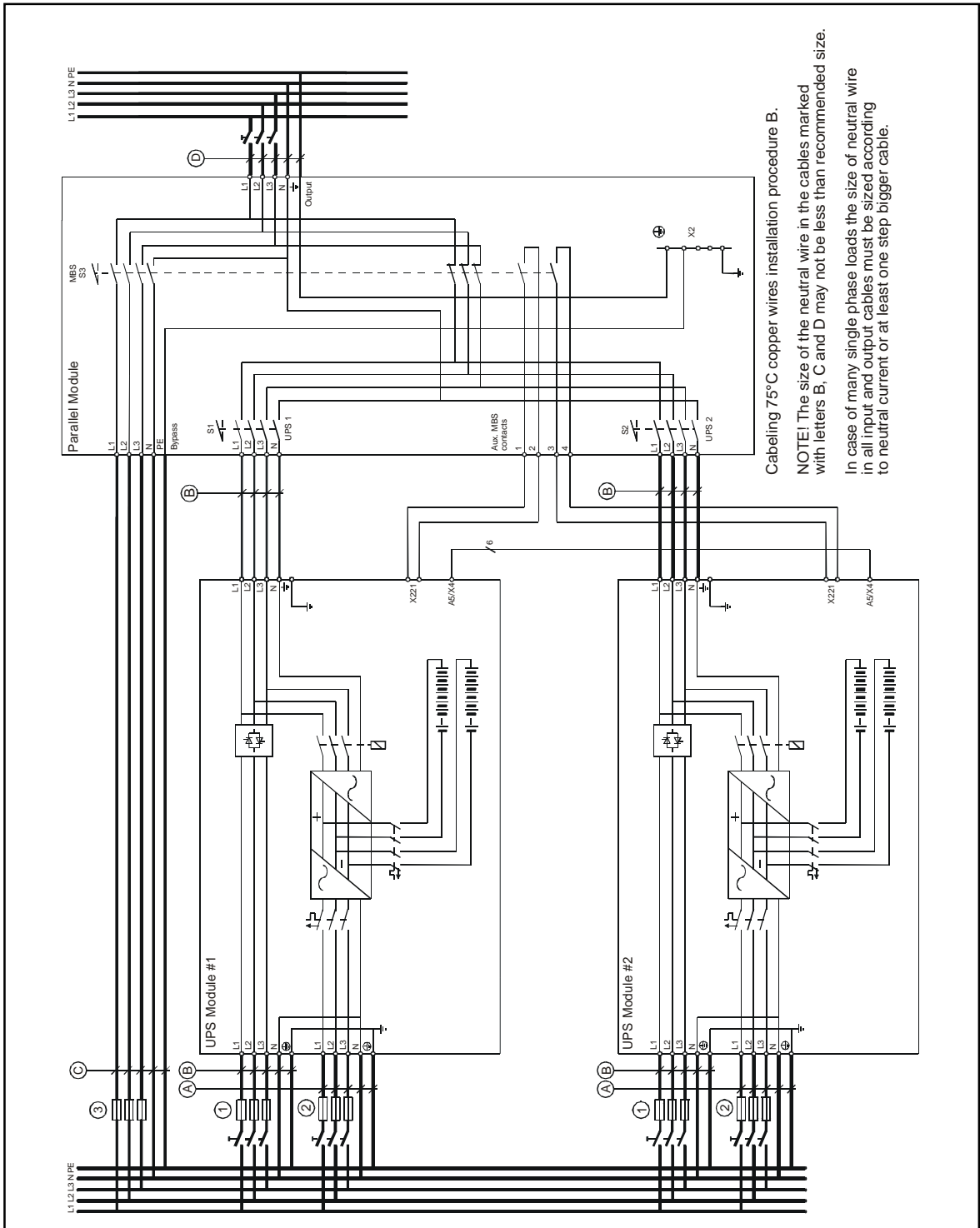


Fig. 7. Five-wire installation of parallel for redundancy system from 7.5 to 15 kVA

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B	Cable C	Cable D
7.5 kVA	16 A	16 A	16 A	2.5 mm ²	2.5 mm ²	6 mm ²	6 mm ²
10 kVA	16 A	16 A	16 A	2.5 mm ²	2.5 mm ²	6 mm ²	6 mm ²
15 kVA	25 A	25 A	25 A	6 mm ²	6 mm ²	6 mm ²	10 mm ²

Table 2. Fuse and cable dimensions for five wire installations of parallel for redundancy system from 7.5 to 15 kVA. Use gG -type fuses in the installation. Note that the fuse numbers and the cable letters refer to the letters/numbers in figure 7.

External battery connections

Both UPSes are provided with the connections for external battery cabinet. If external battery cabinet is used, see the installation manual of the battery cabinet, which is delivered with the cabinet. External battery cabinets include connection cables when connecting external battery cabinet next to UPS.

The installation of the external battery cabinet must be done by qualified personnel only.

7. Computer and alarm connections

An interface for direct communication with your computer system is supplied in the UPS units. The interface consists of two RS232 serial data interfaces, four potential free relays, emergency power off input and four programmable auxiliary inputs. Default values of these auxiliary inputs are: Generator on, Remote output on/off, External bypass switch and Environment alarm. These interfaces are located behind the upper front panel (see figure 5b). The UPS units are designed to fully comply with LanSafe III and PowerVision softwares.

The LanSafe III and PowerVision softwares can control/monitor both UPS units individually, not as a parallel for redundancy system.

If any software not provided by the manufacturer is used, the pin configuration should be verified.



NOTE

All connections mentioned in chapter 7 must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

Connecting the UPS to a computer

The optional UPS/PC communicating device is delivered as a complete solution package with accompanying Power Management Software. To connect the UPS to the computer, use the communication cable provided with the package. (Note: Do not use any other communication cable than the one provided with the UPS). Check from the software documentation that the platform running on your computer is supported. Follow the instructions of the Power Management Software to complete the installation. For other operating systems, SNMP and more advanced power protection solution combinations, please contact your local dealer.

RS232 serial data interfaces

Wiring of the serial data interfaces shall be routed behind front panel, NOT through cable entries of power connections.

The RS232 interface X100 uses 9-pin female D-sub connector and the interface X101 is 9-pin male D-sub connector. The information includes data about the utility, load and the UPS itself. The connector X100 is to be used with a computer connection and the other X101 with a computer and a modem connection. See tables 6 and 7 for meaning of the pins. The RS232 must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

Pin 1	Received data
Pin 2	Transmitted data
Pin 4	Signal ground
Pin 8	DC output
Pin 9	UPS ground

Table 4. RS232 connection (X100) for the computer, 9-pin female D-sub.

Pin 1	Data carrier detected
Pin 2	Received data
Pin 3	Transmitted data
Pin 4	Data terminal ready
Pin 5	Signal ground
Pin 7	Ready to send

Table 5. RS232 connection (X101) for the modem, 9-pin male D-sub.

Potential free relay interface

This relay interface uses a 15-pin male D-sub connector (X102, see figures 5b). The following information is available from these relays:

Pin 15 is the UPS shutdown input. User can send a high level for 5 seconds to turn off the UPS until proper voltage returns. It is active only when the UPS is in battery operation.

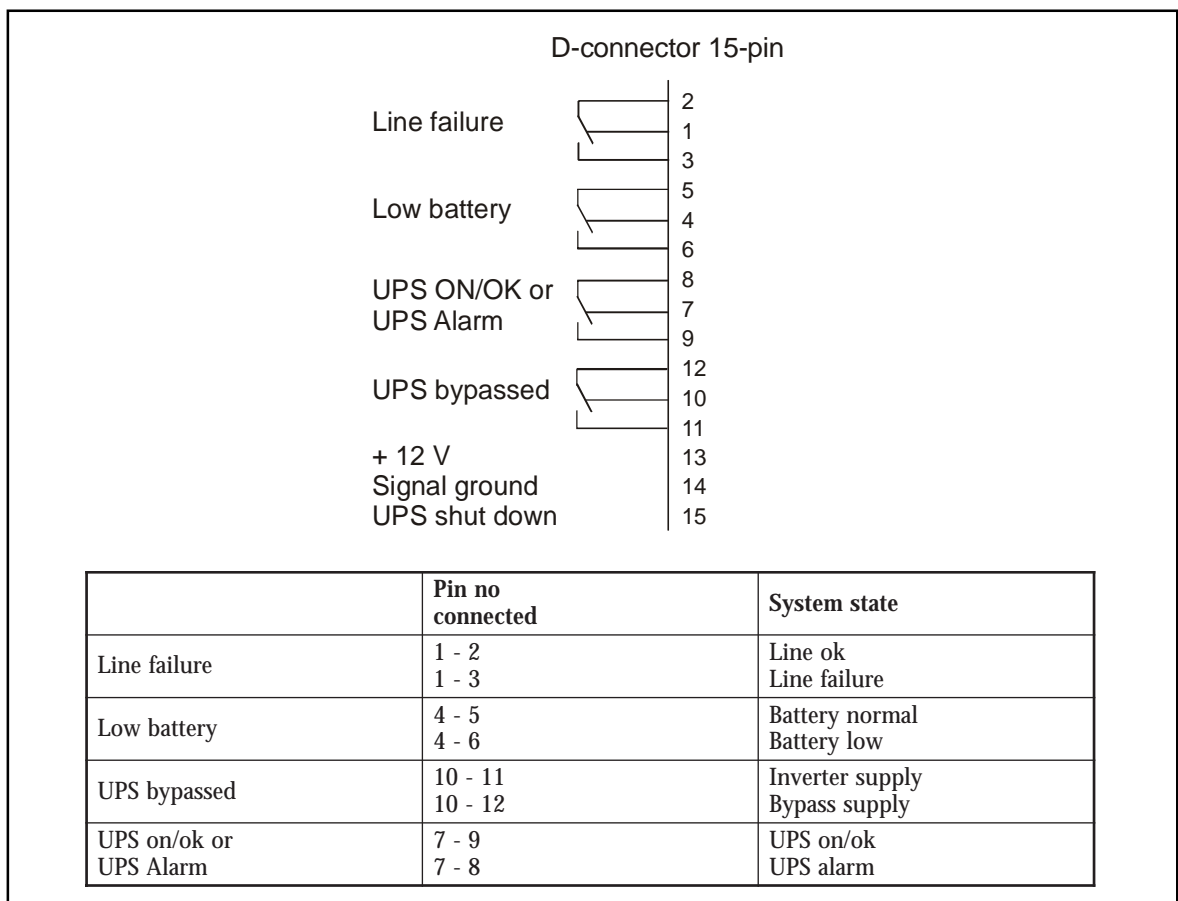


Fig. 8. Relay interface of the UPS (X102).

NOTE!

The relay contacts are rated for maximum 1 A/30 Vac or 0,2 A/60 Vdc. All relay outputs are galvanically isolated from the other circuits of the UPS (UPS standards IEC 950, EN 50091-1). The relay contacts must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

Emergency Power Off Input

This input is used to shut down the UPS from a distance. This feature can be used for emergency power down, or for shutting down the load and the UPS by thermal relay for instance in the event of room overtemperature. Remote shut down wires are connected on connector X2 (see figure 5b).

The pins of connector X2 have been connected together. When this connection is open, the logic circuitry will completely shut down the UPS, thus preventing the power from supplying the load. In order to have the UPS running again the pins of connector X2 have to be connected and the UPS manually started. The pins must be shorted in order to keep the UPS running. Maximum resistance is 10 ohm. The EPO must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

If the EPO input is used in both UPS units of the parallel for redundancy system the EPO terminals must not be connected in series. The EPO circuit in both units must be galvanically different circuit.

Generator On Input

The generator on input is used for inhibiting the transfer to static bypass line when the UPS is supplied by an unstable ac source.

The generator auxiliary contact wires are connected on terminal X219 behind Relay Interface connector X102 (see figure 5b). In normal operation the pins of X219 are not to be connected together. When the connection between these pins are connected together by floating contacts of the generator control device, the logic circuitry on the UPS will prevent the transfer to unstable power source. When the unit is delivered the connection on terminal X219 will be open.

If this input is used the information has to be connected to both UPS units.

External Bypass Switch Input

In parallel for redundancy units this signal input has to be connected to the auxiliary contact information of the mechanical bypass switch in the parallel module.

The external bypass switch auxiliary contact wires are connected on terminal X221 behind Relay Interface connector X102 (see figure 5b).

Remote Output On/Off Input

The remote output on/off input is used to shut down the inverter from a distance. Remote output on/off wires are connected on connector X220 behind Relay Interface connector X102 (see figure 5b).

The pins of connector X220 are not to be connected together in normal operation. When the connection between these pins are connected together by floating contact the inverter will turn off. In order to turn on the inverter the connection between these pins have to be opened.

Environment Alarm Input

The environment alarm input is used for connecting the UPS to your building alarms, such as overtemperature or smoke detector alarms.

The environment alarm input contact wires are connected on terminal X222 behind Relay Interface connector X102 (see figure 5b).

NOTE!

The programmable auxiliary inputs (Generator ON, External Bypass Switch, Remote Output On/Off, Environment Alarm) must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required for equipments and cables connected to these connections.

8. User's guide to operations

This chapter contains the necessary information on how to use the UPS units. The starting up and shutting down procedures described here are only used on a few occasions for example when preparing for a long term mains failure or changing the batteries. In normal operation the UPS units run automatically.

Initial start up is always performed by service personnel of the manufacturer or by a representative of an agent authorised by the manufacturer. Otherwise the safety of personnel during installation or use, or that the units will function properly, can not be guaranteed.

During commissioning the manufacturers representative will train the users to operate the UPS system.

NOTE!

The maintenance switches in the parallel module are used only by service personnel from the manufacturer or from an agent authorised by the manufacturer.

8.1 Starting up the Parallel for redundancy system

Make sure that UPS installations have been carried out correctly and ground connections of both UPS units and parallel module have been connected. Figure 9 shows the location of the switches and breakers of the UPS units and the parallel module.

In the parallel for redundancy system start up of the UPS units have to be performed one after another. It does not matter which UPS is started first.

Starting up the UPS

- Before starting up the UPSes check that the maintenance bypass switch of the parallel module is in the UPS position *)
- Remove the front panels of UPS. Fig. 5a.
- Turn the circuit breakers F1 and F2 to ON-position
- Start the UPS by turning the main switch S1 to "I" position
- Reinstall the front panels

The UPS will now check its internal functions, synchronise inverters and start supplying power to the output. The UPS starts after 3-4 minutes. During this start up the UPS ON LED is blinking.

When the UPS ON LED is lit the other UPS can be started up in the same way.

*) If the UPSes are necessary to start up the parallel system with the maintenance bypass switch in BYPASS position, turn the parallel system to the normal operation mode according to the section 8.4 of this manual.

Battery start

The UPS is provided with battery start function enabling start-up of the unit when the input lines are not available or acceptable. Read first the ahead normal start-up procedure.

- Remove the front panels of the UPS. Fig. 5a.
- Turn the battery circuit breaker F2 to ON-position
- Turn the main switch S1 to "I" position
- Start the UPS by pressing battery start button S3 for 2 seconds.
- Turn circuit breaker F1 to ON-position so that the UPS will continue to operate in normal mode after the mains returns.
- Reinstall the front panels

When the UPS ON LED is lit the other UPS can be started up in the same way.

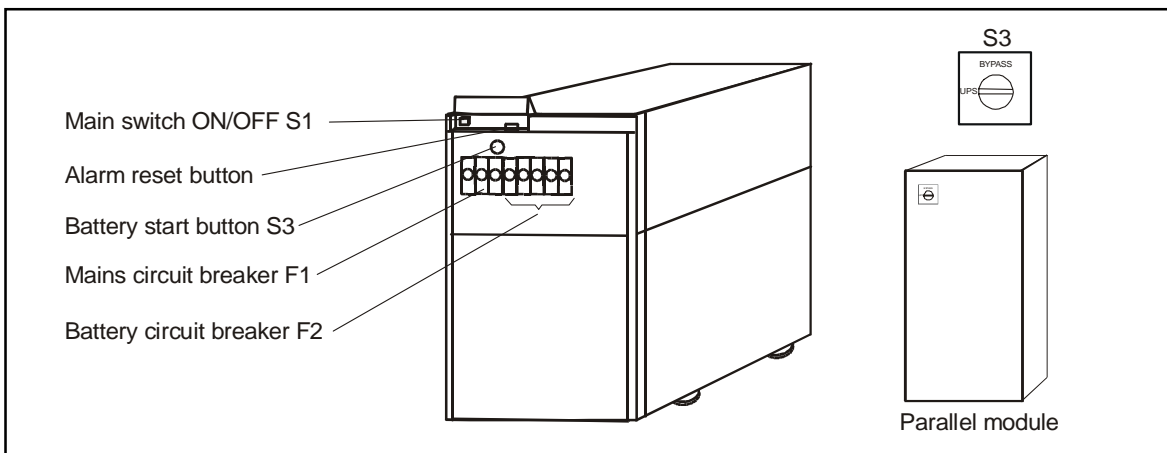


Fig. 9. Starting up and shutting down switches. (UPS front panels are removed.)

8.2 Shutting down a UPS

The UPS unit does not have to be shut down at the end of each day. The units are designed to cope with a continuous load from the day it is installed until a change is needed in the backup battery bank.

In parallel for redundancy system it is possible to shut down one UPS and still get UPS protected power for the load.

If both UPSes need to be shut down, but the load still needs to be powered, turn the maintenance bypass switch of the parallel module to the BYPASS position according to the section 8.4 of this manual.

Shutting down procedure:

Remove the front panels of UPS. Fig. 5a.

- Turn the main switch S1 to “ \cup ” position
- Turn the circuit breakers F1 and F2 to “0” position
- The UPS stops supplying power and it will be disconnected internally from the batteries.

NOTE!

High voltage is still present in some parts of the UPS and specially in the UPS output terminals because of the parallel UPS.

8.3 Control panel functions

The control panel shows the status of the operation and generates an audible alarm if the user should be alerted. See figure 10.

LED	LED is activated if:
UPS ON	UPS operates normally providing power to its outlets.
LINE ON	Utility mains voltage is used for feeding the load. When LED is off, the utility mains is too low, too high or missing or UPS is not synchronised to input power lines.
ON BATTERY	UPS is on battery operation. If the LED is blinking, the battery voltage is low and less than 2-3 minutes back-up time left.
BYPASSED	UPS is bypassed.

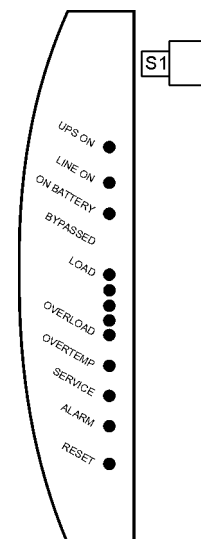


Fig.10. Control panel

LOAD	<p>The four LEDs show the load of a single UPS.</p> <p>One green LED: Output is on.</p> <p>Two green LEDs: The load is more than 40% of the nominal.</p> <p>Three green LEDs: The load is more than 60% of the nominal.</p> <p>When the third (60) green LED is blinking the UPS load is more than 50 % and the parallel for redundancy system is not redundant anymore.</p> <p>Four green LEDs: The load is more than 80% of the nominal.</p> <p>When the third (60) and fourth (80) green LEDs are blinking the UPS load is more than 80 % and the parallel for redundancy system is not redundant anymore.</p>
OVERLOAD	UPS is overloaded.
OVERTEMP	UPS is overheated.
SERVICE	Service of the UPS is needed.
ALARM	<p>The audible alarm is activated.</p> <p>Line failure, battery low, UPS by-passed, overload, overtemperature, service or UPS alarm.</p>

Operating switches

MAIN POWER SWITCH	Starts and stops the UPS.
I/⏻	
RESET	Resets the alarms and shuts down the audible alarm.

Normally the warnings given by the control panel do not mean that the output power is affected. Instead they are preventive warnings intended to alert the user.

8.4 Using the maintenance bypass switch of the parallel module

This switch is used to bypass the parallel system during maintenance or servicing. Maintenance bypass switch is located on the front panel of the parallel module.

The maintenance bypass switch has the following positions:

- UPS** normal position, the load is supplied from the UPS(es)
- BYPASS** the UPSes are bypassed and the load is supplied from the input power line.

NOTE!

This switch is used only on rare occasions. Using the switch does not cause any break in the output voltage, if the input voltage and frequency are accepted and the system is synchronised to the input mains.



WARNING!

If the input voltage or frequency is not correct and the UPS system is not synchronised to mains, the use of the maintenance bypass switch will cause a break in the output voltage.

Going to bypass mode

If the maintenance bypass switch needs to be used, it is recommended to check that the bypass input power is connected and present in the parallel module.

- Check that at least in one UPS the LINE ON LED is lit.
- Turn the maintenance bypass switch to BYPASS position.

Returning the normal mode

- Start up both UPSes according to the section 8.1 of this manual.
- Check that UPS ON and BYPASSED LEDs are lit in the front panel of UPSes
- Turn the maintenance bypass switch to UPS position.

9. Maintenance

All operations inside the unit must be carried out only by a service engineer from the manufacturer or from an agent, authorized by a manufacturer.

9.1 Using the parallel module switches

Even though the parallel module includes some switches, these are to be used only by service personnel from the manufacturer or from an agent authorised by the manufacturer.

The parallel module includes a maintenance bypass switch S3 (make before break type switch) and two maintenance switches S1 and S2 for disconnecting the UPS outputs during maintenance or service. See fig 11.

In the parallel for redundancy system one UPS can supply full load while the other UPS is serviced. It is not necessary to use the maintenance bypass switch.

When one UPS needs maintenance or service the procedure is the following:

- shut down the UPS that needs maintenance or service
- disconnect the same UPS output with maintenance switch S1 or S2 depending on which UPS has been turned off. If UPS1 needs service use maintenance switch S1 and if UPS2 needs service use maintenance switch S2.

When the UPS has been serviced and tested to be in order shut down the serviced UPS. Turn the maintenance switch of the serviced unit back to ON position and start up the UPS according instructions in section 8.1 in this manual.

When the UPS has been serviced and tested, turn the respective maintenance switch in the parallel module back to ON position and start up the UPS according to the instructions in section 8.1 in this manual.

Note

If it needed to transfer the load to bypass mode or return it to normal operation mode, see section 8.4 of this manual.

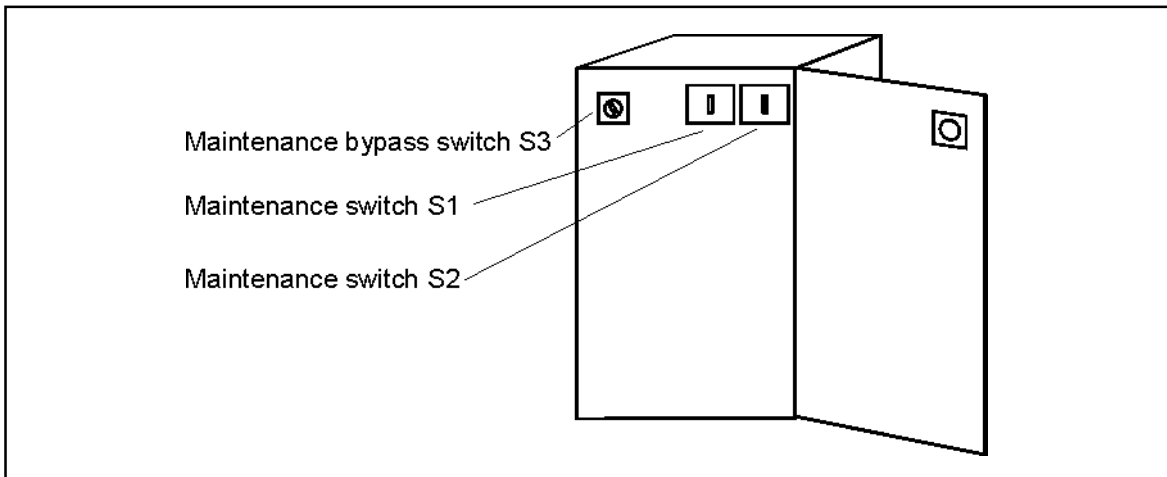


Fig. 11. Control switches of the parallel module


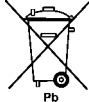
Battery maintenance

The condition of the batteries is crucial to correct operation of the UPS. The UPS units are provided with the automatic battery test ABM, which continuously controls the condition of the battery bank. When the capacity of the battery bank has decreased remarkable, the SERVICE LED starts blinking and audible alarm is activated.

In addition to the automatic battery test it is recommended that a battery discharge test is done once or twice per year. This test is recommended to be done together with the preventive maintenance by manufacturer service personnel. In the parallel for redundancy system it is possible to do a complete discharge test for one UPS without risking the load. The other UPS will stay in online mode and supply the full load in case of failure in the tested UPS.

Scrapping the UPS

Before scrapping UPS or its battery cabinet, battery bank and lithium battery on the logic board must be removed. Due to high energy and high voltage, removal of batteries is allowed only for authorised service personnel. Local requirements must be followed in battery recycling or discard.

	<p>WARNING!</p> <p>HAZARDOUS MATERIALS. Batteries may contain HIGH VOLTAGES, and CAUSTIC, TOXIC and FLAMMABLE substances. Batteries can injure or kill people and damage equipment if used improperly. DO NOT DISCARD unwanted batteries or battery material in the public waste disposal system. Follow ALL applicable, local regulations for storage, handling and disposal of batteries and battery materials.</p>	
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10. Warranty

The product is warranted against defects in material and workmanship for a period of 12 months from its original date of purchase.

11. Technical specifications

1. General

1.1 Rated power	7.5 kVA, 10 kVA, 15 kVA at p.f. 0,7
1.2 Technology	On-line, double conversion topology with automatic bypass switch and maintenance bypass switch Frequency independent operation.

2. Input

2.1 Rated voltage	220/380, 230/400, 240/415 Vac; three phase input
2.2 Voltage range	170/294 - 279/484 VAC without depleting battery 196/336 - 279/484 VAC full charge capability
2.3 Rated frequency	50 Hz
2.4 Frequency range for rectifier	45 - 65 Hz
2.5 Nominal/max input current	

Three phase

7.5 kVA	10 A / 14 A
10 kVA	12 A / 16 A
15 kVA	18 A / 22 A

2.6 Input power factor	0.96
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3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	± 1% static ± 5% dynamic at 100% load change Response time 1 ms
3.3 Voltage distortion	< 2 % THD linear load < 5 % THD non linear load
3.4 Frequency	50 Hz
3.5 Frequency regulation	Synchronisation to line, ± 0.5, ± 1.0 or ± 2.0 Hz selectable. Free-running ± 0.005 Hz Slew rate 0.5 Hz/sec
3.6 Over load, single UPS	101% to 110% for 10 minutes (inverter) 110 - 125% for 60 sec (inverter) 125 - 150% for 30 sec (inverter) 125% continuous (bypass) 150% for 10 min (bypass) 1000% for one cycle (bypass)
Over load, parallel system	200% continuous (system not redundant)
3.7 Power sharing difference	5% of nominal load

4. Environmental

4.1 Ambient temperature	0° ... +40°C operating +15°C ... +25°C recommended -25°C ... +55°C storage (without battery)
4.2 Ventilation	Fan cooling, temperature μ P monitored
4.3 Altitude	1000 m operating w/o derating 2000 m operating with 10% derating 15 000 m during transportation
4.4 Humidity	15 ... 95% RH, non-condensing
4.5 Audible noise	< 50 dBA at 1 meter distance
4.6 Protection class	IP 20

5. Standards

5.1 Safety	IEC 60950, EN 50091-1-1
5.2 Emissions	EN 50091-2 Class A
5.3 Immunity	EN 50091-2

	Single UPS			Parallel System		
Output power	7.5 kVA 5.25 kW	10.0 kVA 7.0 kW	15.0 kVA 10.5 kW	7.5 kVA 5.25 kW	10.0 kVA 7.0 kW	15.0 kVA 10.5 kW
Output peak current	65 A	65 A	65 A	130 A	130 A	130 A
Efficiency	92%	93%	94%	88%	91%	92%
Power dissipation	420 W	490 W	630 W	750 W	820 W	900 W
DC-voltage	2x288(2x192)	2x288(2x192)	2x288			
Number of batteries	2x24(2x16)	2x24(2x16)	2x24			
Weight (stand./long life bat.)	220(180)	220(180)	220			
Width	400 mm	400 mm	400 mm			
Depth	750 mm	750 mm	750 mm			
Height	700 mm	700 mm	700 mm			

The numbers indicated in parentheses are for units with standard battery banks of 32 batteries.

External battery cabinets

	BAT A	BAT B	BAT AL	BAT BL
Battery type	standard	standard	long life	long life
DC-voltage	2 x 288 V	2 x 288 V	2 x 288 V	2 x 288 V
Batteries	2 x 24 x 7 Ah	2 x 24 x 2 x 7 Ah	2 x 24 x 7 Ah	2 x 24 x 2 x 7 Ah
Weight	180 kg	315 kg	180 kg	315 kg
Width	400 mm	400 mm	400 mm	400 mm
Depth	750 mm	750 mm	750 mm	750 mm
Height	710 mm	710 mm	710 mm	710 mm

Parallel module

Weight	50 kg
Width	500 mm
Depth	250 mm
Height	700 mm

