7.5 kVA - 15 kVA UPS with input filter option User's and Installation Manual

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User's and Installation Manual

1013549
Revision A

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General

This manual completes the main User's and Installation manual of 7.5 - 15 kVA UPS when the UPS is provided with the input filter option.
The input filter option is the fifth harmonic filter with the serial chokes and it's connected to the rectifier input. The filter reduces the input current distortion to 10% level (THDI).
Please read first the main manual (1010896) and install the UPS according this instruction.

1. Installation

1.1 Environment

All the requirements concerning environment described in this chapter (Installation) or chapter 3 (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 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.

1.2 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/cm²)	Distributed loading (kg/m²)
7.5 kVA	270(230)/265	1.0(0.8)/1.0	900 (770)/900
10 kVA	270(230)/265	1.0(0.8)/1.0	900(770)/900
15 kVA	270/265	1.0/1.0	900/900

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

1.3 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 installation inspection and initial start up of the UPS must be carried out by service engineer from the manufacturer or from an agent authorised by the manufacturer.

The UPS unit has the following power connections:

- 3-phase and N and ⏚ connection for rectifier input
- 3-phase and N and ⏚ connection for bypass input
- 3-phase and N and ⏚ connection for load output
- +, - and ⏚ connection for the battery

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

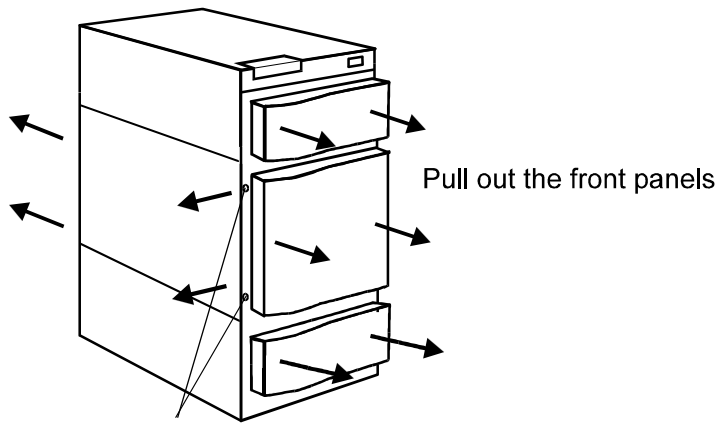

Fig. 1. Removing the front panels and opening the left side panel.

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 3 or 4. The figure depends on if you use two cable or single-cable input.

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 unit is 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 should be connected in accordance with figure 3 or 4. The figure depends on if you use two-cable or single-cable input.
6. Remove the front panels and open the left side panel (Fig. 1).
7. If two cable installation is considered, the interconnection wires between the rectifier and the bypass input terminals must be removed. The interconnection wires are labelled L1, L2, L3.
8. Connect input cables and output cables to the UPS (Fig 2).
   Note: Make sure that the neutral of bypass input is properly connected.
9. Make sure that the UPS unit output cable is connected to the load.
10. Also connect the computer and alarm connections according to chapter 7 of main manual. These connections are behind the upper front panel.
11. If an external bypass switch will be used, take first contact to your dealer.

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

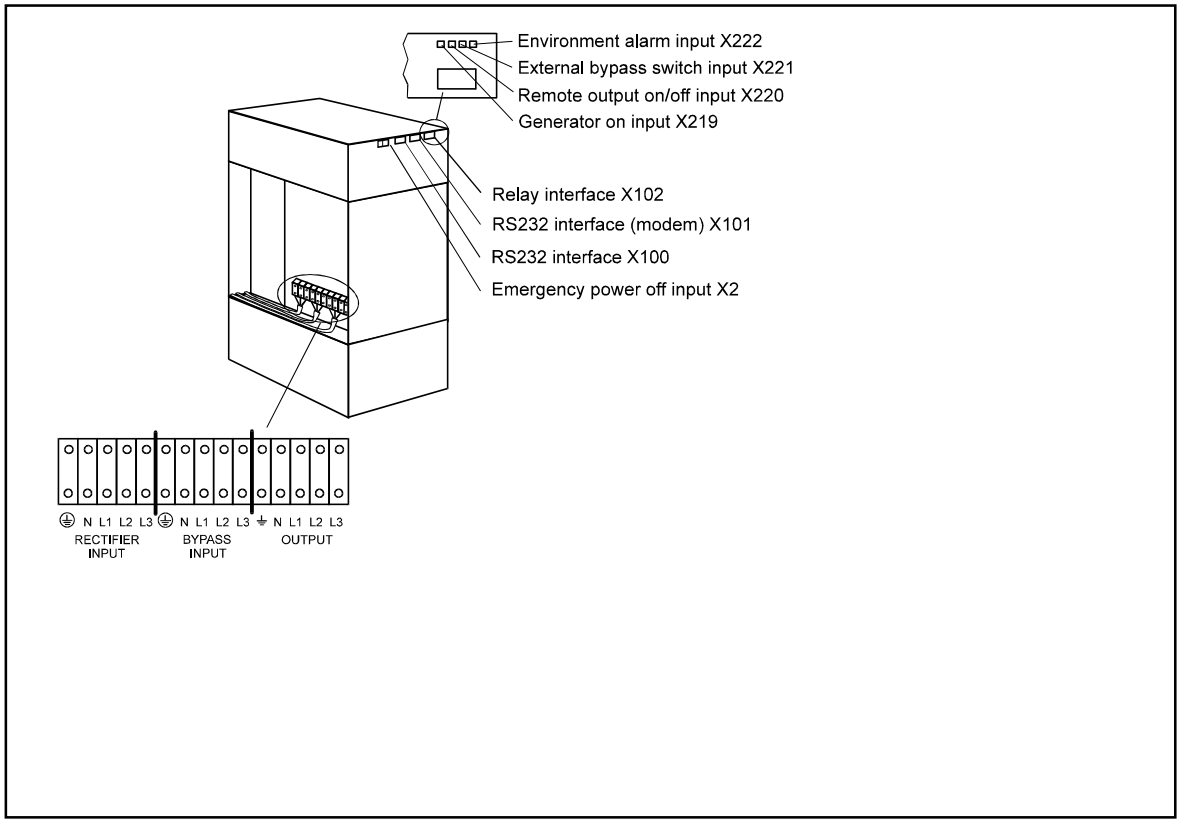

Fig. 2. UPS connection locations

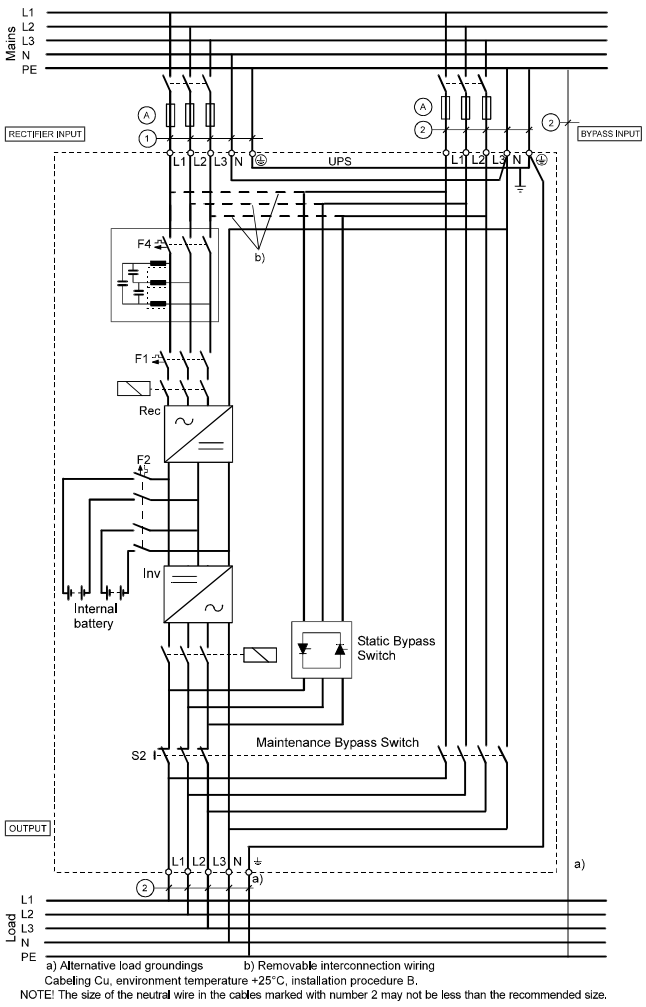

Fig. 3. Five-wire installation of UPS units from 7.5 to 15 kVA with two-cable input.

UPS	Fuse A	Cable1	Cable2
7.5 kVA	16 A	2.5 mm²	2.5 mm²
10 kVA	16 A	2.5 mm²	2.5 mm²
15 kVA	25 A	6 mm²	6 mm²

Table 2. Fuse and cable dimensions for five wire installations of UPS units 7.5 to 15 kVA using two-cable input. Note that the fuse letters and the cable numbers refer to the letters/numbers in figure 3.

NOTE!
In case of many single phase loads the size of neutral wire in the input and output cables must be sized according to the neutral current, at least one step bigger cable (2.5 mm² → 6mm², 6 mm² → 10 mm²).

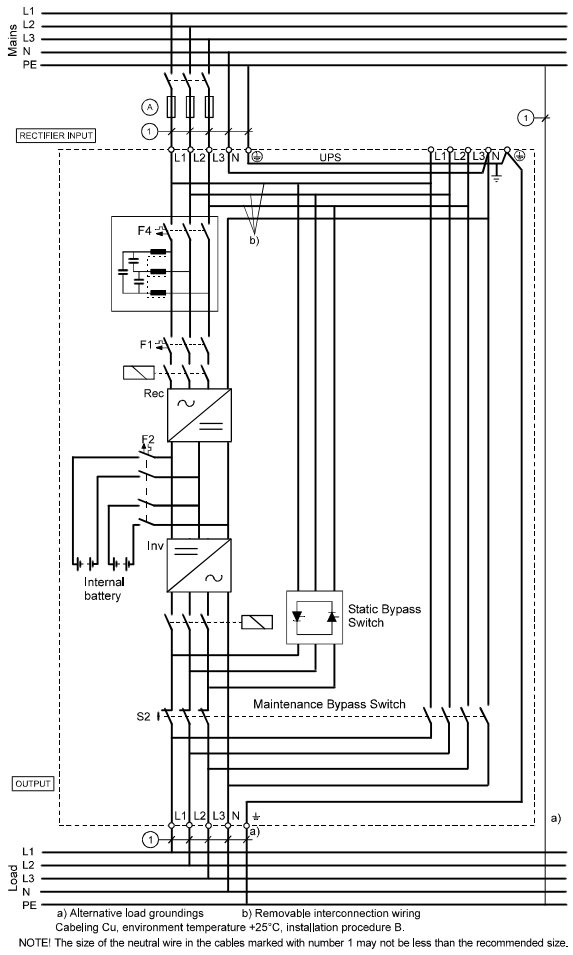

Fig. 4. Five-wire installation of UPS units from 7.5 to 15 kVA with single-cable input.

UPS	Fuse A	Cable 1
7.5 kVA	16 A	2.5 mm²
10 kVA	16 A	2.5 mm²
15 kVA	25 A	6 mm²

Table 3. Fuse and cable dimensions for five-wire installations of UPS units from 7.5 to 15 kVA using single-cable input. Note that the fuse letters and the cable numbers refer to the letters/number in figure 4.

NOTE!
In case of many single phase loads the size of neutral wire in the input and output cables must be sized according to the neutral current, at least one step bigger cable (2.5 mm² → 6mm², 6 mm² → 10 mm²).

External battery connections

The UPS is 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 personel only.

2. User's guide to operations

This chapter contains the necessary information on how to use the UPS. 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 runs automatically.

Initial start up is always performed by a service engineer 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 unit will function properly, can not be guaranteed.

During commissioning the manufacturer's representative will train the users to operate the UPS system.

2.1 Starting up the UPS

Make sure that UPS installation has been carried out correctly and UPS ground has been connected. Figure 5 shows the location of the switches and breakers.

Starting up the UPS

- Remove the front panels of UPS. Fig. 1.
- Turn the circuit breakers F4, F1 and F2 to ON-position
- Start the UPS by turning the main switch S1 to "I" position

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

- If the maintenance bypass switch S2 is in ON-position, turn it to OFF-position (normal position)
- Reinstall the front panels

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.

- Remove the front panels of the UPS. Fig. 1.
- Turn the maintenance bypass switch S2 to OFF-position (normal position)
- 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 breakers F4 and F1 to ON-position, so that the UPS will continue to operate in normal mode after the mains returns.
- Reinstall the front panels

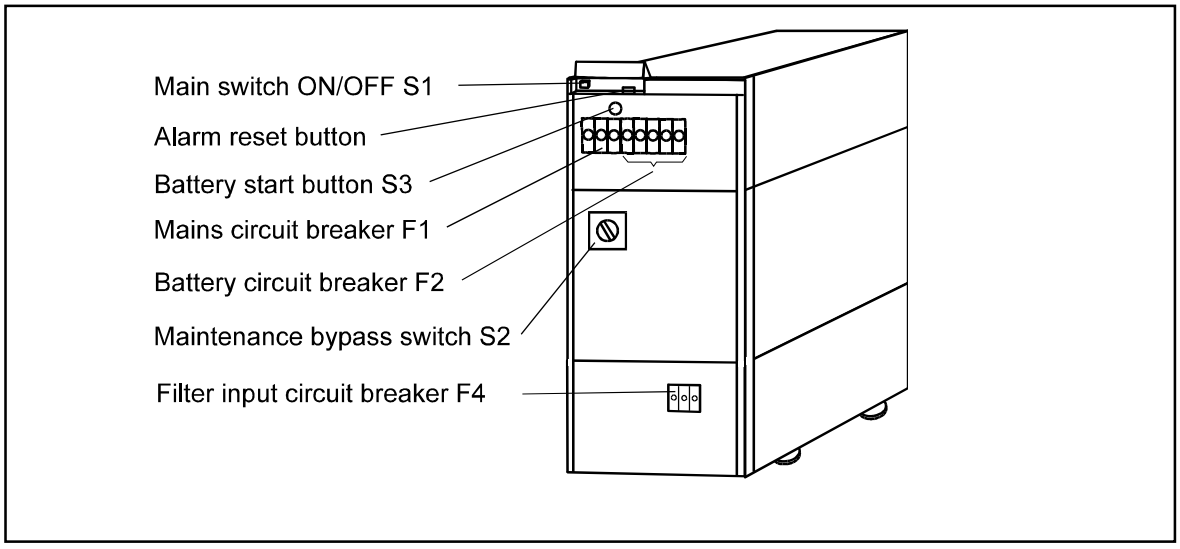

Fig. 5. Starting up and shutting down switches. (Front panels are removed.)

2.2 Shutting down the UPS

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

Shutting down procedure:

Remove the front panels of UPS. Fig. 1.

- Turn the maintenance bypass switch S2 to the ON-position.
- Turn the main switch S1 to “ ⏻ “ position
- Turn the circuit breakers F1, F2 and F4 to “ 0 “ position
- The UPS stops supplying power and it will be disconnected internally from the batteries.

NOTE!
The load receives its power directly from the power line through the maintenance bypass switch. High voltage is still present in some parts of the UPS.

3. 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	50/60 Hz selectable
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 typical
2.7 Input current distortion	< 10 % (THD), 10 kVA and 15 kVA units with full load

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	50/60 Hz, selectable
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, 1.0, 2.0, 3.0 Hz/sec, selectable
3.6 Over load	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)

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 µP 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 S

5. Standards

5.1 Safety	IEC 950, EN 50091-1
5.2 Emissions	EN 50091-2 Class A
5.3 Immunity	EN 50091-2

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

Output power	7.5 kVA 5.25 kW	10.0 kVA 7.0 kW	15.0 kVA 10.5 kW
Backup time (standard/long life batteries)	18(10) /20 min	14(7) / 16 min	7 / 9 min
Output peak current	3x65 A	3x65 A	3x65 A
Efficiency	89%	90%	91%
Power dissipation	650 W	800 W	1100 W
DC-voltage (stand./long life bat.)	2x288(2x192)/ 2x252	2x288(2x192)/ 2x252	2x288/2x252
Number of batteries (stand./long life)	2x24(2x16)/2x21	2x24(2x16)/2x21	2x24/2x21
Weight (kg) (stand./long life bat.)	270(230)/265	270(230)/265	270/265
Width (mm)	400	400	400
Depth (mm)	750	750	750
Height (mm)	1000	1000	1000

External battery cabinets

	BAT A	BAT B	BAT L	BAT XL
Battery type	standard	standard	long life	long life
DC-voltage	2x288 V	2x288 V	2x252 V	2x252 V
Batteries	2x24 x 7 Ah	2x24 x 2 x 7 Ah	2x21 x 7.3 Ah	2x21 x 2 x 7.3 Ah
Weight kg	180	315	170	290
Width (mm)	400	400	400	400
Depth (mm)	750	750	750	750
Height (mm)	710	710	710	710