1. Introduction

This User's manual gives basic information about 20 - 80 kVA, uninterruptible power supplies: 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 installations 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

A UPS (Uninterruptible Power Supply) 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 for 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.

The 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.
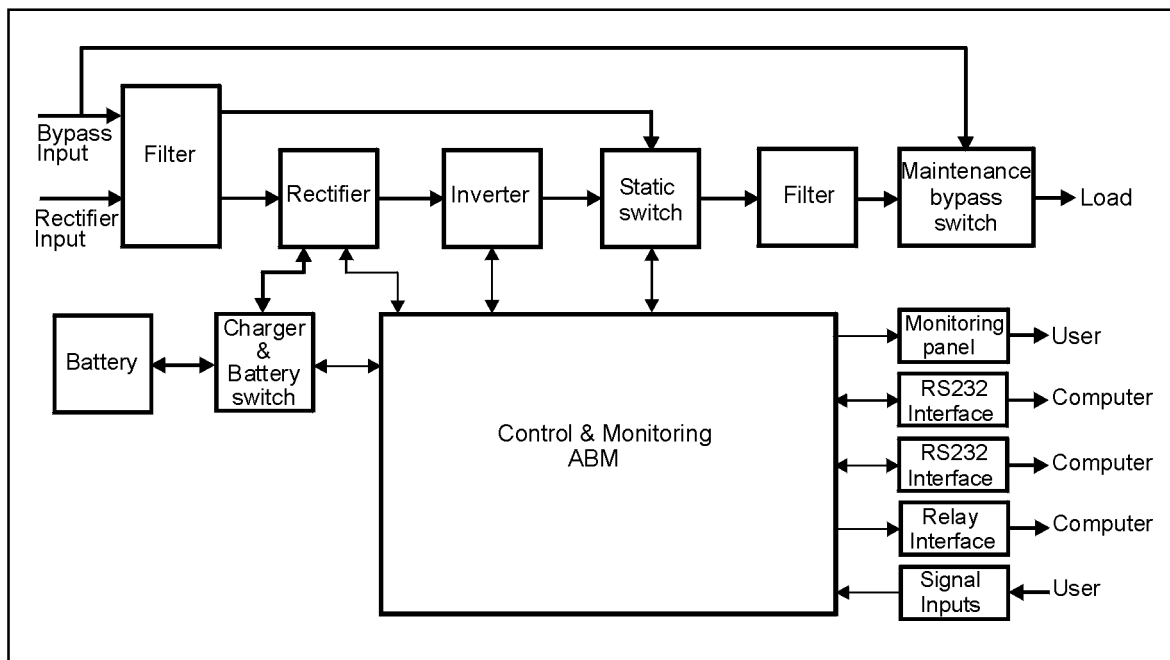
2.1 General description

This 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.

UPS block diagram shown in fig. 1, consists of several modules each having its own functions:

- 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.

- 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 new Efficiency Optimizer function allows the static switch to transfer the load to the bypass line also when the mains power is smooth and free from disturbances. See below for more information about this new feature.

- 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 testing. 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 the utility, the load and the UPS itself. The information can be used in a computer to ensure total protection of software and data.

- Maintenance bypass switch is used to bypass the UPS during maintenance or service.

Figure 1. Block diagram of the UPS.

Efficiency Optimizer

In addition to the traditional on-line operation mode this UPS features the Efficiency Optimizer function - a new feature adding real cost effectiveness to the UPS. It minimises the power loss and reduces power consumption. The UPS automatically switches between bypass and on-line mode according to the utility power condition. Whenever there are imperfections in the mains supply the UPS feeds power in on-line mode. When mains power is smooth and free from disturbances the UPS switches automatically to bypass mode for maximum efficiency. If needed, UPS detects all mains imperfections in a fraction of a second and turns back to on-line mode. As a result the UPS reaches up to 98% average efficiency. The Efficiency Optimizer function is standard in this UPS and can easily be activated via the serial interface port during initial start up by the service engineer. The UPS can of course run permanently in traditional on-line mode if prefered. All models of 20 - 80 kVA UPSs run in the traditional on-line mode as default.

2.2 System configuration

The UPS system consists of the UPS device itself and the external backup battery. 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 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:

•   Output isolation transformer
•   10% input filter (THDI)
•   External battery cabinets
•   Remote display unit (ViewUPS)
•   Alarm extension unit
•   LanQuattro
•   Connect UPS (SNMP adapter)

Table 1. describes UPS equipment backup times of battery options related to the UPS ratings.

UPS Output power	Internal Batteries	BAT D	BAT E	BAT F	2xBAT E
UPS 20 kVA/14 kW	12(7) min	25 min	45 min	90 min	110 min
UPS 30 kVA/21 kW	7 min	15 min	28 min	55 min	65 min
UPS 40 kVA/28 kW	-	10 min	19 min	35 min	45 min
UPS 50 kVA/35 kW	-	7 min	13 min	25 min	35 min
UPS 60 kVA/42 kW	-	-	10 min	20 min	28 min
UPS 80 kVA/56kW	-	-	-	11 min	15 min

Table 1.

The backup times are for standard batteries and long life batteries.
The backup times indicated in parentheses are for units with battery banks of 32 pcs battery system.
See the dimensions of the UPS series and different battery options in figure 2.

Figure 2. Dimensions of the UPS and the battery cabinets.

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 heavy weight of the cabinets and the high energy battery bank the equipments 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 a service engineer from the manufacturer or from an agent authorised by the manufacturer.

⚡ **WARNING!**

The UPS is not provided with automatic backfeed isolation. A readily accessible disconnect device must be installed in the fixed wiring. See chapter 6.5.

User operations

The only user operations permitted are:

- Starting up and shutting down the UPS unit (not the initial start up).
- Operating the user interface.
- Connecting data interface cables.
- Monitoring the UPS with LanSafe III or PowerVision 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 with a forklift.
Do not stack the pallets.

Because of the high energy stored within batteries, the UPS and the battery cabinet 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 all the packing materials and shipping cartons.

*   The equipment must be inspected for damage after 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 list 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 3):

Figure 3. Unloading 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 10 mm clearance on the left side and 150 mm on the right side of 20-30 kVA UPS and 10 mm on the right side of 40-80 kVA UPS. 250 mm clearance is needed at the rear of the UPS and 500 mm on top of the UPS for ventilation, see figures 4a and 4b. 1000 mm clearance is needed in the front of the UPS for servicing.
- Maintain clearance at front of the UPS for service and user operations.
- The extra battery is preferred to be installed next to the UPS.

Figure 4a. Ventilation and space requirements for 20 - 30 kVA UPS.

Figure 4b. Ventilation and space requirements for 40 - 80 kVA UPS.

6.2 Floor loading

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

The strength of the installation surface must be adequate for point and distributed loadings given in table 2.

UPS modules	Weight (kg)	Point loading (kg/cm²)	Distributed loading (kg/m²)
UPS 20-30 kVA + with internal batteries	490(400)	7.2(5.9)	1550(1265)
UPS 20-30 kVA w/o batteries	210	3.1	520
UPS 40 kVA w/o batteries	230	3.6	565
UPS 50-60 kVA w/o batteries	260	4.0	635
UPS 80 kVA w/o batteries	280	4.3	680
Battery modules	**Weight (kg)**	**Point loading (kg/cm²)**	**Distributed loading (kg/m²)**
Bat D	550	8.1	1830
Bat E	815	12.0	1990
Bat F	1390	10.4	1705

Table 2. The UPS floor loading of UPS modules and battery cabinets.
The numbers indicated in parentheses are for 20 kVA units with battery banks of 32 pcs battery system.

6.3 Installing 20 - 30 kVA UPS and battery cabinets

When installing external battery cabinets to the UPS, which includes the internal battery bank, an additional circuit breaker is needed for the battery connection. The circuit breaker will not be included in the external battery cabinet and the circuit breaker has to be ordered separately. Only one circuit breaker is needed per one UPS no matter how many external battery cabinets are connected.

The circuit breaker (F4) will be installed inside the UPS on the right side of the input/output terminals. See figure 7.

The circuit breaker will include four-part plug that has to be connected to the plugs X8-X9 beside the rectifier input terminals. See figure 7.

⚡ **WARNING!**

Battery plugs X8-X9 are connected direct to the internal battery bank and contain high DC-voltage.

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Connect the plugs X8-X9 of the breaker to the plugs X8-X9 of UPS.

Cables from the battery cabinet will be connected straight to the circuit breaker. See figures 5b and 5c.

If the UPS is without the internal battery bank, the circuit breaker F4 is not needed. The cables of the external battery bank can be connected direct the battery breaker F2. Before connecting the cables of external battery cabinet to F2 remove the cables which are assembled at F2 from below. See figures 5b and 5c.

If external battery cabinets are installed, it is located next to UPS and on the left side of the UPS. Remember to leave 10 mm space between the cabinets. On the right side of UPS is needed 150 mm space. See figure 5a.

Each battery cabinet has temperature measurement and the cable from battery cabinet has to be connected to terminal X6 (male) beside the input/output terminals. See figure 7. Cable routing is under the cabinets. When several external cabinets are used the temperature information from battery cabinets has to be linked together. See figures 5b and 5c. The temperature sensor is located under the roof of the battery cabinet.

Cabling between UPS and battery cabinet is done through the cable entries in the bottom of the cabinets. Take care that the battery cables which are outside the UPS and the external battery cabinet are protected with the casing tube. If connecting several D and E battery cabinets the cabinet connections should be according figure 5b. Battery connections with battery cabinet F should be done according figure 5c.

Figure 5a. Locating 20 - 30 kVA UPS modules and battery cabinets.

Figure 5b. Connecting battery cabinets D and E to the 20-30 kVA UPS.

Figure 5c. Connecting battery cabinet F to the 20-30 kVA UPS.

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6.4 Installing 40 - 80 kVA UPS and battery cabinets

External battery cabinets should be installed next to UPS and the cabinets should be bolted together by using the metal plates provided with external battery cabinets.
See figure 6a.

Before connecting UPS and battery cabinets together the left side plate of the battery cabinet have to be removed. Do not remove the UPS cabinet side plates.

When connecting battery cabinets together with the connection plates delivered with battery cabinets (figure 6a) remove both side plates between the cabinets.

Each battery cabinet has temperature measurement and the cable from battery cabinet has to be connected to terminal X6 (male) beside the input/output terminals. See figure 8. Cable routing is under the cabinets. When several external cabinets are used the temperature information from battery cabinets has to be linked together. See figures 6b and 6c. The temperature sensor is located under the roof of the battery cabinet.

Cabling between UPS and battery cabinet is done through lower part of UPS right side. If connecting several D and E battery cabinets the cabinet connections should be according figure 6b. Battery connections with battery cabinet F should be done according figure 6c.

Figure 6a. Connecting battery cabinet to 40-80 kVA UPS module. (Front panels of battery cabinets disconnected)

Figure 6b. Connecting battery cabinets D and E to 40-60 kVA UPS.

Figure 6c. Connecting battery cabinet F to 40-80 kVA UPS.

6.5 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 and extra battery cabinet 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

- +, -, N and PE connection for external batteries

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

The UPS is provided with a single phase 230 V power supply for use with internal modem or portable computer. Connection is at terminal X5. This power supply is protected with an automatic 10 A fuse F3. See figure 7 or figure 8 according to UPS power.

The UPS is provided with temperature sensor connections for the optional isolation transformer and input filter. Terminal X7 is for the transformer and terminal X12 is for the input filter. These terminals are located beside the input/output terminals. See figure 7 or 8. For more information see the installation instruction of the transformer or input filter option.

Figure 7. 20-30 kVA UPS connection locations

Figure 8. 40-80 kVA UPS connection loactions and cable routings

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 9 for 20-30 kVA systems and figure 10 for 40-80 kVA systems.

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.

    Since the UPS does not have automatic backfeed isolation 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 figures 9 - 10 according to the UPS power.

6. If two cable installation is considered, the interconnection wires between the rectifier and the bypass input terminals must be removed.

7. Connect input cables and output cables to the UPS.
    Note: Make sure that the neutral of the bypass input is properly connected.

8. Make sure that the UPS unit output cable is connected to the load.

9. Also connect the computer and alarm connections according chapter 7.
    These connections are behind the door.

10. If an external bypass switch will be used, contact your dealer first.

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.

Figure 9. Five-wire installation of UPS units from 20 to 30 kVA with <u>two-cable</u> input.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B	Cable C	Cable D*
20 kVA	35 A	35 A	100 A	10 mm²	10 mm²	10 mm²	16 mm²
30 kVA	50 A	50 A	100 A	10 mm²	10 mm²	10 mm²	16mm²

Table 3. Fuse and cable dimensions for five wire installations of UPS units from 20 to 30 kVA using two cable input. Note that the fuse numbers and the cable letters refer to the numbers/ letters in figure 9. Slow gG/gL fuses should be used to protect cables.

*Please note that the battery cables are delivered with the external battery cabinets to install the external battery cabinet next to the UPS. Cables with higher current capacity are needed if the external battery cabinets or racks are installed with a distance from the UPS.

Figure 10. Five-wire installation of UPS units from 40 to 80 kVA with two-cable input.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B	Cable C	Cable D*	Cable E
40 kVA	63 A	63 A	100 A	16 mm²	16 mm²	16 mm²	16 mm²	16 mm²
50 kVA	80 A	80 A	100 A	25 mm²	25 mm²	25 mm²	16 mm²	25 mm²
60 kVA	100 A	100 A	100 A	35 mm²	35 mm²	35 mm²	16 mm²	25 mm²
80 kVA	125 A	125 A	125 A	50 mm²	50 mm²	50 mm²	16 mm²	25 mm²

Table 4. Fuse and cable dimensions for five-wire installations of UPS units from 40 to 80 kVA using two cable input. Note that the fuse numbers and the cable letters refer to the numbers/ letters in figure 10. Slow gG/gL fuses should be used to protect cables.

*Please note that the battery cables are delivered with the external battery cabinets to install the external battery cabinet next to the UPS. Cables with higher current capacity are needed if the external battery cabinets or racks are installed with a distance from the UPS.

7. Computer and alarm connections

An interface for direct communication with your computer system is supplied in the UPS unit. The interface consists of two RS232 serial data interfaces, four potential free relays and four programmable inputs for building alarms. These interfaces are located behind the door. Communication cables connected to these terminals should be connected to cable holders on the cover plate behind the door and routing of these cables should be under the door (See figure 11).

Figure 11a. Communication connections of 20-30 kVA UPS

Figure 11b. Communication connections of 40-80 kVA UPS

The UPS is designed to fully comply with LanSafe III and PowerVision software. If any software not provided by the manufacturer is used, the pin configuration should be verified.

With the UPS is delivered a relay adapter circuit board which converts the 16 pin relay interface X102 to a 15-pin male D-sub terminal. See figure 11.
This adapter needs to be used when connecting options like Alarm Extension Unit to the UPS.

⚠ **NOTE**

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

Connecting the UPS to a computer

The 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

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 below the meaning of the pins. The RS232 must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

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

Table 5. 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 6. RS232 connection (X101) for the computer, 9-pin male D-sub.

Potential free relay interface

This relay interface consists of four potential free relays providing complete isolation between the UPS and the computer (X102, see figure 12).
The following information is available from these relays.
Pin 16 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.

	Pin numbers. connected in X102	System state
Line failure	2 - 3 1 - 3	Line ok Line failure
UPS bypassed	4 - 6 5 - 6	Inverter supply Bypass supply
Low battery	8 - 9 7 - 9	Battery normal Battery low
UPS on/ok or UPS Alarm	10 - 12 11 - 12	UPS on/ok UPS alarm

Figure 12. Relay interface of the UPS.

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 60950, EN 50091-1-1). The relay contacts must not be galvanically connected to any mains connected circuits. Reinforced insulation to the mains is required.

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 X4 (see figure 11).

The pins of connector X4 have been connected together. When this connection is open, the logic circuitry will immediately shut down the UPS, thus preventing the power from supplying the load. In order to have the UPS running again the pins of connector X4 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.

Programmable Inputs

The UPS communication device includes four programmable inputs (X219, X220, X221, X222) for building alarms. These inputs can be for example informing when UPS gets power from generator, shutting down and starting up inverter remotely or turning to bypass mode remotely. These inputs can be activated by connecting the two pins together of the particular terminal.

These programmable inputs have the following default values:

Generator On Input X219

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 (see figure 11). In normal operations the pins of X219 are not be connected together. When the connection between these pins are connected together by floating contacts of the generator control device, the logic circuitry in the UPS will prevent the transfer to unstable power source. When the unit is delivered the connection on terminal X219 will be open.

Remote Output On/Off Input X220

The remote output on/off input is used to turn off the output of the UPS from a distance. Remote output on/off wires are connected on terminal X220 (see figure 11).

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 be turned off and also the static bypass line will be turned off. In order to turn on the inverter and the static bypass line the connection between these pins have to be opened.

External Bypass Switch Input X221

If the UPS system is equipped with an external bypass switch, its status can be monitored by the UPS via terminal X221. The external bypass switch auxiliary contact wires are connected on terminal X221 (see figure 11).
If an external bypass switch will be used, contact your dealer first.

Environment Alarm Input X222

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 (see figure 11). When this alarm is activated it will be indicated to the user through RS232 ports.

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. 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 representative will train the users to operate the UPS system.

8.1 Starting up the UPS

Make sure that UPS installation has been carried out correctly and line, neutral and protective earth inputs have been connected. Figures 7 and 8 show the location of the switches and breakers. The UPS is also provided with a battery start up possibility. When the following start up is done the UPS will also start up if the input power line is not available or acceptable. In this case the UPS will be in battery mode supplying power from the battery bank.

8.1.1 Starting up 20 - 30 kVA UPS

- Open the door of UPS.
- Check that S1 is in off position
- Check that the maintenance bypass switch S2 is Bypass ON position.
  (In the battery start up the maintenance bypass switch has to be in Bypass OFF position.)
- Turn the circuit breakers F1 and F2 (and F4 if installed) to ON-position
- Start the UPS by turning the main switch S1 to "On" position

The UPS will now check its internal functions. The UPS starts after 10 - 15 s.

- Check that the yellow ⟶○→ LED is lit. (This LED is not lit in the battery start up.)
- Turn the maintenance bypass switch S2 to Bypass OFF-position. (Not needed in the battery start up.)
- Close the door.

Figure 13a. Starting up and shutting down switches of 20-30 kVA UPS. (Front door opened.)

8.1.2 Starting up 40 - 80 kVA UPS

- Open the door of UPS.
- Check that S1 is in UPS OFF position.
- Check that the maintenance bypass switch S2 is either in UPS or BYPASS position. When the starting up is done without input power line, the maintenance bypass switch shall be in UPS position.
- Turn the circuit breakers F1 and F2 to ON-position.
- Start the UPS by turning the main switch S1 to "UPS ON" position.

The UPS will now check its internal functions, synchronise to mains and start supplying power to the output. The UPS starts after 10 - 30 s.

- Check that the green ⌇ LED is lit.
- If the maintenance bypass switch S2 is in BYPASS position turn it to UPS position.
- Close the door.

Figure 13b. Starting up and shutting down switches of 40-80 kVA UPS.

8.2 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:

- Check from the display that the unsynchronised alarm is not active.
  Press "Menu" button and see the UPS status by pressing ↵ and ↓buttons.
- Open the door of UPS.
- Turn the maintenance bypass switch S2 to the BYPASS position.
- Turn the main switch S1 to UPS OFF position.
- Turn the circuit breakers F2 and F1 to OFF position (and F4 in 20-30 kVA UPS if installed).
- 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. DC fans might be running after shutdown procedure due to capacitors.

8.3 Control panel functions

The monitor panel shows the status of UPS operation with four LED indicators and with a LCD screen. The display also generates audible alarm if the user should be alerted.

This green LED is lit when there is voltage at the output terminals and when the UPS is in normal or static bypass mode.

This yellow LED is lit when the UPS is operating in battery mode. When this LED is blinking the battery voltage is low and only few minutes of backup time is left.

This yellow LED is lit when the UPS is on and is operating in bypass mode.

This red LED is lit when a situation in the UPS requires immediate action.

The LCD screen informs the user the status and type of the UPS, measurements of performance and the alarms.

Operation of the display can be controlled with the push buttons under the display. With MENU-button you get to the menu and with the ↓ and ↑ arrows you can move throught the options in the menu and with ↵ button you can select the function and move to submenu.

Figure 14. Control panel

8.3.1 Normal display

The Normal display shows the UPS type. The panel automatically returns to this display state from any other display state after a delay time of 1 to 2 minutes from last display state change.

20 kVA - 80 kVA UPS
User's and Installation Manual

8.3.2 Menu display

The following display choices can be selected in the Menu display by scrolling through menu with ↓and ↑ buttons and pressing ↵ button:

• UPS Status
• Meters
• Battery Status
• Alarm log
• UPS parameters
• UPS Identification
• Reset Button
• Display Data

If Menu button is pressed the panel will return to Normal display.

8.3.2.1 UPS Status display

UPS Status display will indicate the current operation mode of the UPS on the top row of the display. The display will automatically come to this display state if there is some abnormal operation in the unit. If there is active alarm in the unit it will be indicated on the bottom row. Pressing ↓button will transfer the display to Active Alarms display. Here all the active alarms can be scrolled through with the ↓button and return to UPS Status display can be made with ↑ button.

When an active alarm appears on the display also an audible alarm is generated. This audible alarm can be silenced by pressing any button.

Pressing Menu button will return the display to Menu display.

8.3.2.2 Meters display

The Meters display will inform various measurements of the UPS. Different measurements can be selected with ↓and ↑ buttons. Following measurement information is available:

• Output voltage, shows AC voltage of each output phase
• Output current, shows current of each output phase
• Output power, shows power in kW of each output phase
• Output frequency, unit is Hz
• Bypass voltage, shows bypass line voltages of each phase
• Input voltage, shows recifier input line voltages of each phase
• Battery voltage, shows DC voltage of both positive and negative battery string
• Battery current, shows battery current of both positive and negative battery string
• Internal temp, shows temperature inside the UPS, unit is °C.
• Batt backup time, shows the battery backup time in minutes. If backup time is more than 90 minutes the display shows 9999.

Pressing Menu button will return the display to Menu display.

8.3.2.3 Battery Status display

The Battery Status display informs in what mode of operation the ABM (Advanced Battery Management) is.

Pressing Menu button will return the display to Menu display.

8.3.2.4 Alarm Log display

The Alarm Log display will indicate the 8 latest alarms of the UPS and also the time when each alarm has happened. The time shown (days hrs:min:sec) is the time between concecutive alarms. The alarms can be viewed by pressing the ↓ button. Pressing Menu button will return the display to Menu display.

8.3.2.5 UPS parameters display

The UPS Parameters display will inform the values of the operational parameters of the UPS. These parameters are to be changed only by service personnel of the manufacturer or by a representative of an agent authorised by the manufacturer. The parameter value changes are password protected.

The values of different parameters can be viewed by the ↓ and ↑ buttons. The display will indicate first the parameter number (Pxx) and after that the value of the parameter (Vyy). Pressing Menu button will return the display to Menu display.

8.3.2.6 UPS Identification display

This display informs the UPS type, unit serial number and unit part number. These options can be scrolled through ↓ and ↑ buttons.

Pressing Menu button will return the display to Menu display.

8.3.2.7 Reset button

Selecting this function will reset alarms that are not autoresetting. It will also return the unit to normal mode if the unit has locked to bypass due to too many transfers to bypass assuming transfer back to normal operation is enabled.

Pressing Menu button will return the display to Menu display.

8.3.2.8 Display Data

This display shows information about the display software: revision, compilation date and check sum. To adjust the contrast or select a different language push ↵ button down during three seconds. These options can be scrolled throuhg ↑ and ↓ buttons.

Pressing Menu button will return the display to Menu display.

8.4 Using the maintenance bypass switch

The UPS unit is provided with a maintenance bypass switch. This switch is used to bypass the UPS during maintenance or servicing.

Maintenance bypass switch is located behind the door.

The maintenance bypass switch is a three position switch having the following positions:

UPS - normal position, input power is supplied to rectifier and bypass inputs and when the UPS is turned on inverter/static switch is suppling power to the load. In 20-30 kVA units OFF-position.

BYPASS- the UPS is mechanically bypassed and the load is supplied from the bypass input power line. This position allows testing of the UPS without disturbing the load. In 20-30 kVA units OFF position. When the 20-30 kVA UPS is turned off and the maintenance bypass switch is in bypass position, the UPS is isolated from the input and output power lines.

MAINTENANCE-only in 40-80 kVA units. The UPS is mechanically bypassed and the load is supplied from the bypass input power line. When the UPS is turned off and the maintenance bypass switch is in maintenance position the UPS is isolated from the input and output power lines. Also the neutral is isolated from the electronic parts. This position allows servicing of the unit.

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

> ⚠ **WARNING!**
>
> If the input frequency is not correct and the UPS is not synchronised to mains, the use of the maintenance bypass switch will cause a short break in the output voltage.

Going to the bypass mode

Before going to bypass made check from the display that the unsychronised alarm is not active. Press "Menu" button and see the UPS status by pressing ↵ button.
Turn the maintenance bypass switch into the 'Bypass'-position.

Going to the Service mode (only in 40-80 kVA UPSes)

Shut down the UPS according shutting down procedure in chapter 8.2.
Turn the maintenance bypass switch to the 'Maintenance' position.

Returning to normal mode

If the maintenance bypass switch is in 'Maintenance' position (only in 40-80 kVA UPSes) turn the maintenance bypass switch into the 'Bypass' position.
Start up the UPS according start up instructions in chapter 8.1.

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.

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 remarkably, the UPS will indicate this by audible and visual alarms.

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 service engineer from the manufacturer of by an agent authorised by the manufacturer.

Scrapping the UPS

Before scrapping UPS or its battery cabinet, battery bank and the 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.

> ⚠ **WARNING!**
>
> 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.

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	20 kVA, 30 kVA, 40 kVA, 50 kVA, 60 kVA, 80 kVA; at p.f. 0,7, inductive or non linear load
1.2 Technology	Double conversion online topology with automatic bypass switch and maintenance bypass switch. Voltage and Frequency Independent operation: Class VFI-SS-111 by IEC 62040-3

2. Input

2.1 Rated voltage	220/380, 230/400, 240/415 Vac; three phase input (3xL+N+PE)
2.2 Voltage range	170/294-279/484 VAC without depleting battery 20-50 kVA and 80 kVA 180/312-279/484 VAC without depleting battery 60 kVA 196/336-279/484 VAC full charge capability
2.3 Rated frequency	50/60 Hz
2.4 Frequency range for rectifier	45 - 65 Hz
2.5 Nominal/max input current	20 kVA 3 x 21 A / 3 x 30 A 30 kVA 3 x 36 A / 3 x 45 A 40 kVA 3 x 47 A / 3 x 65 A 50 kVA 3 x 60 A / 3 x 80 A 60 kVA 3 x 70 A / 3 x 93 A 80 kVA 3 x 97 A / 3 x 125 A
2.6 Input power factor	> 0.96 (Cosphi 1)

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 1% static < ± 1% with 100% unbalanced load < ± 5% dynamic at 100% load change Recovery time < 1 ms
3.3 Voltage distortion	< 1 % 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 ± 0.05 Hz Slew rate 0.5, 2.5, 6 Hz/sec, selectable

3.6 Over load	101% to 110% for 10 minutes (online)
	111 - 125% for 60 sec (online)
	126 - 150% for 30 sec (online)
	151 - 170% for 5 sec (online)
	125% continuous (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
	15 000 m during transportation

4.4 Humidity	15 ... 90% RH, non-condensing
4.5 Audible noise	< 55 dB(A) at 1 meter distance 20-30 kVA
	< 60 dB(A) at 1 meter distance 40-60 kVA
	< 65 dB(A) at 1 meter distance 80 kVA
4.6 Protection class	IP 21 S

5. Standards

5.1 Safety	IEC 60950, EN 50091-1-1 (1996)
5.2 Emissions	EN 50091-2 (1995)
5.3 Immunity	EN 50091-2 (1995)

Output power	20 kVA 14 kW	30 kVA 21 kW	40 kVA 28 kW	50 kVA 35 kW	60 kVA 42 kW	80 kVA 56 kW
Output rated current	3x29 A	3x43 A	3x58 A	3x72 A	3x87 A	3x116 A
Output peak current (300 ms)	3x115 A	3x115 A	3x128 A	3x190 A	3x190 A	3x250 A
Efficiency (p.f.07)	94%	94%	93%	93%	93%	93%
Power dissipation	1100 W	1300 W	2100 W	2600 W	3100 W	3900 W
DC-voltage	2x288 (2x192) V	2x288 V	2x288 V	2x288 V	2x288 V	2x288 V
Internal batteries	2x48x7 Ah (2x32x7 Ah)	2x48x7 Ah	-	-	-	-
Weight	490 (400) kg	490 kg	230 kg	260 kg	260 kg	280 kg
Width	520 mm	520 mm	520 mm	520 mm	520 mm	520 mm
Depth	788 mm	788 mm	788 mm	788 mm	788 mm	788 mm
Height	1530 mm	1530 mm	1530 mm	1530 mm	1530 mm	1530 mm

The number indicated in parentheses are for units with battery banks of 32 pcs battery system.

External battery cabinets with standard sealed lead-acid batteries and with long life batteries.

	BAT D	BAT D WIDE	BAT E	BAT F
DC-voltage	2x288 V	2x288 V	2x288 V	2x288V
Batteries	2x24x24 Ah	2x24x24 Ah	2x24x38 Ah	2x24x65 Ah
Weight	550 kg	580 kg	815 kg	1390 kg
Width	382 mm	520 mm	520 mm	1034 mm
Depth (mm)	788 mm	788 mm	788 mm	788 mm
Height (mm)	1530 mm	1530 mm	1530 mm	1530 mm

Note!
Battery cabinet F consists of two cabinets but total width is 1034 mm.

Technical specifications

Rating	7.5 kVA	10 kVA	15 kVA
Part number	PW9305-7.5I-N	PW9305-10I-N	PW9305-15I-N
Capacity (VA/Watts)	7.5 / 5.25	10 / 7	15 / 10.5
Dimensions WxDxH (mm)	400x750x700	400x750x700	400x750x700
Weight (kg)	180	180	220
Input connection	Hardwired	Hardwired	Hardwired
Output connection	Hardwired	Hardwired	Hardwired
Typical runtime (Full load)	18 min	14 min	7 min
(Half load)	40 min	30 min	18 min

Rating	20 kVA	30 kVA	40 kVA	50 kVA	60 kVA	80 kVA
Part number	PW9305-20I-N	PW9305-30I-N	PW9305-40I-NX	PW9305-50I-N	PW9305-60I-N	PW9305-80I-N
Capacity (VA/Watts)	20 kVA/14 kW	30 kVA/21 kW	40 kVA/28 kW	50 kVA/35 kW	60 kVA/42 kW	80 kVA/56 kW
Dimensions WxDxH (mm)	520x788x1530	520x788x1530	520x788x1530	520x788x1530	520x788x1530	520x1530x788
Weight (kg)	400	490	230	260	260	280
Input connection	Hardwired	Hardwired	Hardwired	Hardwired	Hardwired	Hardwired
Output connection	Hardwired	Hardwired	Hardwired	Hardwired	Hardwired	Hardwired
Typical runtime (Full load)	12 min	7 min	10 min (ext. bat)	7 min (ext. bat)	10 min (ext. bat)	12 min (ext. bat)
(Half load)	30 min	18 min	25 min	20 min	28 min	30 min

Operational	
Nominal input voltage (VAC)	220/380, 230/400, 240/415 VAC three-phase
Input voltage range	170/294 to 279/484 VAC (7.5/10/15 kVA); 170/294 to 275/476 VAC (20/30 kVA); 170/294 to 279/484 VAC (40/50 kVA); 180/312 to 279/484 VAC (60 kVA);
Operating frequency	50/60 Hz (45 to 65 Hz)
Input power factor	0.96
Input current distortion	10% THDi with input filter
Nominal output voltage	220/380, 230/400, 240/415 VAC three-phase
Output voltage regulation	±1% static, 100% unbalanced load accepted; ±5% dynamic at 100% load change, <1 ms recovery time
Overload capacity	101-110% for 10 min (online); 111-125% for 1 min (online); 126-150% for 30 sec (online); 150-170% for 5 sec (online); 1000% for one cycle (bypass)
Efficiency	93-94% with rated non-linear load; 97% with Efficiency Optimizer™
User interface	
LCD display	Multilingual LCD display showing measurements of performance and alarms (ViewUPS optional with 7.5/10/15 kVA models)
LED	UPS On, On battery, On bypass, Alarm (7.5/10/15 kVA models also On line, Overtemperature, Service; additionally 4 LEDs for load bar and overload)
Standard communication ports	2xRS232 for local support, one with modem support; 4xrelay contacts: UPS OK/Alarm, Line failure, Low battery, UPS bypassed; 4xprogrammable inputs: Generator on, External bypass, Inverter on/off, Environment alarm; 1xEmergency power off input
Optional	20/30/40/50/60 kVA models: Parallel capacity/redundancy systems (max. 4 modules), External battery cabinets and high capacity charger; Output transformer; Input 10% THD filter; Remote ViewUPS (LCD display); ConnectUPS (SNMP adapter); LanQuattro (4xRS232 data manager) 7.5/10/15 kVA models: Parallel redundancy systems (max 2 modules), External battery cabinets and high capacity charger, Output transformer, Input 10% THD filter, ViewUPS (LCD display), ConnectUPS (SNMP adapter), LanQuattro (4xRS232 data manager)
Environmental	
Operating temperature	0°C to +40°C
Storage temperature	-25°C to +40°C
Altitude	<1000 m
Audible noise at 1 metre	50 dB (7.5/10/15 kVA) 55 dB (20/30 kVA) 60 dB (40/50/60 kVA)
Certification	
Quality System	ISO 9001
Markings	CE / CCA / GOST
Safety	EN 50091-1-1: 1996; IEC 60950
EMC	EN 50091-2: 1995

NOTE: Cirquits for 3N30 Page 1
Cirquits for 3N30NHS Page 2

Internal battery

Neg   A12   Pos

External battery cabinet

BYPASS INPUT 3×400V 50Hz

UPS OUTPUT 3×400V 50 Hz

RECTIFIER INPUT 3×400V 50 Hz

OFF/ON SWITCH S1

DISPLAY BRD A11

A10 LOGIC BOARD

Ext batt cabinet temp sensor
RS1
RS2 Modem
Relay inter-face
Emerg. power on off
Gener. inv on/off inp
Remote Bypass Sw. inp
Extern. Envir-onment alarm inp.
Trafo over temp
Filter over temp
Bypass back-feed
External charger enable

X5 service outlet

Title	SCHEMATIC DRAWING		No	Rev
	MAIN CIRCUITS		10 13 284	G1
	3N30			
Checked JSa	Approved 03.02.99/TT	Loc FIN	Size A3	Page 1/2

POWERWARE

Internal battery

Neg   A12   Pos

External battery cabinet

X8   X9   PE

NOTE: Cirquits for 3N30 Page 1

Cirquits for 3N30NHS Page 2

UPS OUTPUT
3×400V
50 Hz

BYPASS INPUT
3×400V
50Hz

X2

L1   X11   X29
L2   X10   X28
L3   X9   X27
N

A9/1 RFI

J3/P3   J4/P4   J6/P6
J5/P5

F2   L1   L2   BOOST A4

V12   V13   V14

UPS OUTPUT

BYPASS INPUT

RECT AND STATIC SW MODULE   A2

L1   B1   X21   X3   L11   X3   L1
L2   B2   X20   X2   L12   L2
L3   B3   X19   X1   L13   L3

St Sw BRD A2/A1   X4   E7   X14   RFI A9/3

E1-E6   F3   F5   F4

P1/J1   N

INVERTER A6

V8   V5 V6 V7   V9

RC1   C7   RC2   C8

+ CHARGER   R1   R2   X30   X40   X4   X20   X7

BOOST BRD A4/A7   A4/A4   POS SN. BRD

V11   X3

B1   B7   X18   X1   X3   X12

C9   C11   C10 C12

X302P   X202P   X102P

V3   V2 V1

B100   J1/P1   L5   L6

A6/A6   SNUB. BRD

S2 OUTPUT TRIPPING SWITCH

Neutral   X13

- CHARGER   X17   10   X1

B2   X5

BATTERY CHARGER   A1

V10   X2   C13   C14 C15   C16

A4/A5   NEG SN. BRD

L3   L4   B6

A4

INVERTER BRD A6/A3   X1   K2

B200   L7   L8

B300   L10   L9

C2 C4 C6   C1 C3 C5

X15 X9 X19 X108 X8 X21

OFF/ON SWITCH S1

S1 70°C   S2 80°C

X12   X6   X22

3   4
1   2

S2 80°C   S1 70°C   N

J7/P7   J8/P8

S1 70°C   S2 80°C   X111   X112   F3

DISPLAY BRD A11   X4   X216   6   A300 I/O -BRD   X2   10

X1 X2 X7 X110   X208 X209   X8 X206 X207

A10 LOGIC BOARD

A5 I/O -CONNECT BRD   X3 X4   X2

Parallel UPS

X3 X100 X101 X102 X4   X219   X204 X210   X107 X108

X6 X100 X101 X102 X4   X219 X220 X221 X222   X7 X12

Ext batt cabinet temp sensor   RS1   RS2 Modem   Relay inter-face   Emerg Gener. power on inp.   Remote inv on/off inp   Extern. Bypass Sw. inp   Envir-onment alarm inp.   Trafo over temp   Filter over temp   Bypass back-feed   External charger enable

X5 service outlet

RECTIFIER INPUT
3×400V
50 Hz

X1   F1   A9/2 RFI   K1

L1   X7   X25
L2   X6   X24
L3   X5   X23
N   X8   X26

J2/P2   J1/J2

POWERWARE

Title SCHEMATIC DRAWING
MAIN CIRCUITS
3N30 NHS

Checked JSa   Approved 03.02.99/TT   Loc FIN

No 10 13 284   Rev G1

Size A3   Page 2/2

733

708

744
4 pcs

714
2 pcs

713
2 pcs

713

744

723

724

707

730
2 pcs

743
8055433

702

722
AT CAA
CAA:SSA

720

735
4 pcs

726
2 pcs

718

1014087
F1 F2

1009961

705

744
10 pcs

753
1014862

754 1015081

734
3 pcs

710

729
4 pcs

735
4 pcs

755
2 pcs

719 NOT FOR NHS

735
3 pcs

Rev/ECO no:
E/12290 IN

Rev/ECO no:
A/11905 TK   C/12062 IN
B/11963 AV   D/12120 VK

POWERWARE

Title	ASSEMBLY:	H130	
	COVERPLATES	No	Rev
	3N30	10 13 865	E
Checked JKe	Approved VK 11.03.1999	Loc FIN	Size A3	Page 1 / 1

8 pcs C1~8

786

734 6 pcs

Rev/ECO no:

Rev/ECO no: A/11905 TK

8055 433

1010 487

3 BROWN
4 BLUE
1 BROWN
2 BLUE

1013 113

S1

1006 840

S1

1014 116

3 pcs
1009 859

1009 859

YELLOWGREEN

GROUNDING BOLT

8055 433

2 pcs
1012 115

1009 860
2 pcs

S2   010487

X5

8055 433

$O = ◎$ $☆ = ◉$

		Rev/ECO no:

Rev/ECO no:

B/12062 IN	
A/11905 TK	
C/12120 VK	
D/12443 Tt	

ASSEMBLY:

Approved VK 15.03.1999
3N30
Checked JKet
Title

POWERWARE

1002 443
9 pcs

1013 105

2

1

1011 589

1009 859
12 pcs

1011 209

1011 589

1011 209

1009 859
5 pcs

1013 490

3

1011 209

POWERWARE	Title ASSEMBLY:		H 020
	MODULES		No	Rev
	3N30		10 13 861	D
	Checked JKet	Approved VK 15.03.1999	Loc FIN	Size A3	Page 1 / 1

BILL OF MATERIAL FOR PRODUCT **1014084j** **page 1**

FINAL 3N30 ASSY

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000296	CAPAC PRO 60uF 450V M12 AL	8.000	C1-8
1000704	LABEL UPDATE RECORD STICKER A4	1.000	701
1000924	HINGE PART3 OF HINGES/CABINETS	2.000	714
1001190	LABEL INSPECT STATUS STICKER	1.000	702
1002443	SCREW T HEX M5x8 DIN7500D	14.000	734
1005239	CLAMP FLAT CABLE CLIP W31xH6mm	2.000	726
1006840	SCREW FLAT M5x10 PZ DIN 965	3.000	733
1009859	SCREW K M5x12 PZ DIN6902A+6905	38.000	744
1009860	SCREW K M5x16 PZ DIN6902A+6905	9.000	730
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	735
1010876	PANEL 3N45 SIDE A3	2.000	707
1010880	ASSY 3N45 DOOR A3	1.000	705
1011216	SWITCH 3N45 START 2-POS	1.000	S1
1011356	PLATE 3N45 HINGE INNER A4	2.000	713
1012061	LOCK LATCH LIFT&TURN 62-70-11	1.000	724
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	4.000	725
1012201	PANEL BAT-E ROOF A3	1.000	708
1012460	LATCH 3N45 DOOR A4	1.000	723
1012610	PLATE 3N45 CABLE LEAD THROU A4	1.000	710
1013109	PLATE 3N30 SWITCH MOUNTING A3	1.000	711
1013112	PLATE 3N30 LOGIC BOARD COV. A4	1.000	715
1013113	PLATE 3N30 DISPLAY COVER A3	1.000	716
1013115	PANEL 3N30 RIGHT FRONT A3	1.000	717
1013117	PLATE 3N30 LOWER COVER A3	1.000	718
1013284	D SCHEMA 3N30 MAIN CIRCUITS A3	.000	
1013296	PLATE 3N30 BYPASS SHIELD A4	1.000	719
1013541	ASSY 3N30 AC-CAP MOUNT A4	1.000	706
1013543	PLATE 3N30 SHIELD A4	1.000	712
1013603	CLAMP CABLE TIE ANCHOR SNAP-IN	26.000	742
1013629	PLATE 3N30 SLOT COVER FUSE A4	1.000	720
1013630	PLATE 3N30 IEC-C. SLOT COVERA4	.000	721
1013798	D TEST REPORT 3N30 FINAL A4	.000	
1013848	D WIRING 3N30 EL CAP+CAP A3	.000	
1013852	D TIE 3N30 EL CAP+CAP A3	.000	
1013853	D TIE 3N30 LOGIC&RECTIFIER A3	.000	
1013854	D WIRING 3N30 LOG&CHARGER A3	.000	
1013856	D WIRING 3N30 BATT CONNECTS A3	.000	
1013858	D TIE 3N30 EM FANS A3	.000	
1013861	D ASSY 3N30 DWG MOD TO CHASSA3	.000	
1013862	D TIE 3N30 EM FLAT CABLE A3	.000	
1013865	D ASSY 3N30 EM PANELS 1 A3	.000	
1013866	D ASSY 3N30 EM CHOKES A3	.000	
1013867	D WIRING 3N30 MOD&CHOKES A3	.000	
1013869	D ASSY 3N30 EM EL-CAP A3	.000	
1013870	D WIRING 3N30 MOD&CHOKES A3	.000	
1013871	D WIRING 3N30 MOD&CHOKES A3	.000	
1013872	D ASSY 3N30 EM AC-CAP A3	.000	
1013873	D ASSY 3N30 EM SWITCH MOUNT A3	.000	
1013874	D ASSY 3N30 EM PANELS A3	.000	
1013876	D TIE 3N30 EM MODULES A3	.000	

FINAL 3N30 ASSY

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1013877	D TIE 3N30 EM CAPAC A3	.000	
1013878	D ASSY 3N30 COVER PLATES A3	.000	
1013895	D TIE 3N30 CABLES EM-BM A3	.000	
1013951	PLATE 3N30 SLOT COVR WIDE FUA4	1.000	722
1014040	SET 3N30 CABLE LINE PLACE 1	1.000	
1014041	SET 3N30 CABLE LINE PLACE 2	1.000	
1014042	SET 3N30 CABLE LINE PLACE 4	1.000	
1014087	LABEL 3N30 TERMINALS A4	1.000	
1014116	LABEL 3N30 WARNING A4	1.000	703
1014121	SET 3N30 FLAT CABLES	1.000	
1014176	D ASSY 3N30 TERM BLOCK A3	.000	
1014602	CONNE ACC 75A RET. PIN 110G19	3.000	751
1014603	TUBE INSUL DIAM 50mm DIN40621	.140	752
1014624	LABEL WARNING 3N30 A4	1.000	750
1014862	PLATE 3N30 BACK UPPER A3	1.000	753
1015081	PLATE 3N30 BACK LOWER no-filA3	1.000	754
1015170	PLATE 3N20-30 COVER	2.000	755
1019500	D TEST INSTR 3N80 FINAL FIN A4	.000	
1019501	D TEST INSTR 3N80 FINAL ENG A4	.000	
1123189	SCREW HEX M6X40 8.8 A1 ISO4017	1.000	728
1263040	SCREW HEX M6X10 TENSILOCK	4.000	729
4040306	WASHE PLAIN M6 Fe ISO 7089	1.000	737
4313064	WASHE LOCK-SER M6 FE DIN6798A	2.000	739
6342006	NUT HEX M6 G8 A2 ISO 4032	2.000	741
8005150	TIE CABLE L=102mm W=2.5mm	50.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.600	743
8055457	TIE CABLE L=172mm W=4.6mm	50.000	

303

2 pcs
316

2 pcs
313

312

330
5 pcs

309
16 pcs

A1

302

325
2 pcs

325
2 pcs

314

315

317

300
prog/ohjelma
1012462

326
label/tarra
1012462

325

328

317

329

13 pcs
310

A10

4 pcs
311

324

323

325

prog/ohjelma
1013832
1015187 NHS

301

326

label/tarra
1013832
1015187 NHS

label/tarra
1014172
1018280 NHS

326

300

prog/ohjelma
1014172
1018280 NHS

333

317

315

1014087

TYPE PLATE

1019961

318
3 pcs

316

306

332

330
5 pcs

331

X4

321
2 pcs

male

female

320
4 pcs

305

322 4 pcs

X102
3p

X102
4p

X2-19
2p

X220
2p

X221
2p

X222
2p

$O = \oslash$ $\stackrel{\star}{=} = \oslash$

	Title		H120	
POWERWARE	ASSEMBLY:			
	LOGIC & CHARGER PCBA		No	Rev
	3N30		10 13 844	D
	Checked JKet	Approved VK 10.03.1999	Loc FIN	Size A3	Page 1 / 2

Rev/ECO no:		
	C/12120 VK	D/12761 jS
	A/11905 TK	B/11969 JKet
Rev/ECO no:		

POWERWARE	Title ASSEMBLY:			H120		
	LOGIC & CHARGER PCBA			No 10 13 844		Rev D
	3N30					
	Checked JKe	Approved VK 10.03.1999	Loc FIN	Size A3	Page	2 / 2

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT   **1014079e**
SUBAS 3N30 LOGIC&CHARGER MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002443	SCREW T HEX M5x8 DIN7500D	3.000	318
1002549	LABEL MATERIAL TYPE PLATE	.150	326
1003470	BUSH SNAP-IN d 33mm HOLE 38mm	1.000	331
1004944	SCREW K M4x8 PZ DIN7985A+6907	4.000	316
1004946	CABLE 1.5mm2 H07V2-K 90°C BLCK	.060	
1005548	SCREW K M4x16 DIN7985+6798	3.000	315
1008512	SCREW K M3x8 DIN7985+6798	4.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	1.000	319
1009961	LABEL WARNING GENERAL ENG A3	1.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	317
1010748	ICCPU PIC16C74A-20/P 40PIN	2.000	300
1011355	HEATS 3N45 PROFILE CHARGER A4	1.000	302
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	1.000	308
1012124	SCREW D-SUB UNC4-40/M3 L=4.5mm	4.000	320
1012127	CONNE 2P MALE 5,08mm PANEL	1.000	X4
1012155	ICCPU H8/3337 PLCC 84P I2C OPT	.000	301
1012462	D PROG 3N30/60 DC CONTROL	.000	
1012470	SPACR M4(10) I/I L30 FeZn Av7	1.000	312
1012471	SPACR M4(6) I/I L30 PA66	2.000	313
1012493	CONNE 3P PLUG 5.08 BL3	4.000	(X102)
1013108	PLATE 3N30 FRONT A3	1.000	303
1013111	PLATE 3N30 CONNECTOR MOUNT. A3	1.000	305
1013295	SPACR M4(8) I/S L30 FeZn Av7	1.000	328
1013603	CLAMP CABLE TIE ANCHOR SNAP-IN	10.000	330
1013701	PCBAS 3N30-80 CHARGER WO PROG	1.000	A1
1013832	D PROG 3N30 MAIN CONTROL	.000	
1013844	D ASSY 3N30 DWG LOGIC&CHARG A3	.000	
1013952	PLATE 3N30 CABLE L. COVER D0A4	1.000	306
1014038	SET 3N30 CABLE LOGIC&REC BOARD	1.000	
1014172	D PROG 3N30 MEASUREMENT	.000	
1014531	SCREW PZ M4x65 Fe ISO 7045	2.000	314
1014585	PCBAS 3N30/60 LOGIC WO PROG	1.000	A10
1015187	D PROG 3N30 NHS MAIN CONTROL	.000	(NHS)
1017751	RESIS 4K7 50W 5% AL	2.000	R1,R2
1018280	D PROG 3N20-60NHS MEASUREMENT	.000	NHS Oscar
1019760	D ASSY 3N60 CHARGR BRD&HEATSA3	.000	
2001241	CLAMP CAPACITOR MOUNTING	1.000	329
2223035	SCREW CYL M3X6 M4.6 ZNA1 217	2.000	321
2224008	SCREW SLOTTED M2.5X10 ISO1207	4.000	322
2901001	LIST RUBBER "U"-RIBBON	.200	332
4040304	WASHE PLAIN M4 Fe ISO 7089	1.000	324
4313042	WASHE LOCK-SER M4 FE DIN6798A	5.000	325
6342004	NUT HEX M4 G8 A2 ISO 4032	2.000	323
8051088	CONNE 4P PLUG 5.08 BL4 12593.6	1.000	(X102)
8051092	CONNE 2P PLUG 5.08 BL2 12591.6	4.000	(X219-222)
8063123	SPACR NYLON L=12.7mm LCBS-8	17.000	310,311
8063124	SPACR NYLON L=28.6mm LCBS-18	16.000	309
8080226	INSUL TUBE d3mm L25mm NEOPREN	2.000	
8090012	SPACR M4 L15 Ms	1.000	333

Rev/ECO no:

Rev/ECO no:

A/11905 TK

B/12162 MA

Note:
Page 1 for 3N30
Page 2 for 3N30NHS

Huom:
Sivu 1 3N30
Sivu 2 3N30NHS

104 103

112 2 pcs

3 pcs 106

K1

112 3 pcs

K2

105

2 pcs 111

S2

3 pcs 111

13 pcs 110

108 3 pcs

114 3 pcs

109 8 pcs

A9

3 pcs 112

104

F1

F2

106

107

113 4 pcs

F3

X5

101

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POWERWARE

Title	ASSEMBLY:		H060	
	RFI & MBS		No	Rev
	3N30		10 13 843	B
Checked JKe	Approved VK 08.03.1999	Loc FIN	Size A3	Page 1/2

NHS

Note:

Page 1 for 3N30
Page 2 for 3N30NHS

Huom:

Sivu 1 3N30
Sivu 2 3N30NHS

3 pcs (106)

(104)(103)

(112) 2 pcs

(K1)

(112) 3 pcs

(K2)

(105)

2 pcs (111)

(80)

3 pcs (111)

(108) 3 pcs

13 pcs (110)

(109) 8 pcs

(114) 3 pcs

(104)

3 pcs (112)

(A9)

(F1)

(F2)

(106)

(107)

(70) 2 pcs

(F3)

(X5)

(101)

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Rev/ECO no:

A/11905 TK   B/12162 MA

POWERWARE

Title	ASSEMBLY:		H060	
	RFI & MBS		No	Rev
	3N30		10 13 843	B
Checked JKe	Approved VK 08.03.1999	Loc FIN	Size A3	Page 2 / 2

POWERAWARE OY
BILL OF MATERIAL FOR PRODUCT   **1014086 B**
SUBAS 3N30 RFI & MBS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002443	SCREW T HEX M5x8 DIN7500D	8.000	112
1003470	BUSH SNAP-IN d 33mm HOLE 38mm	1.000	107
1010408	SCREW K M4x8 PZ DIN6902A+6905	5.000	111
1011214	CONNE PE-RAIL 6x35mm2 TS35	1.000	105
1012041	CONNE 10A 250V FEM SNAP-IN IEC	1.000	X5
1013110	PLATE 3N30 DIVIDER A3	1.000	101
1013185	PCBAS 3N30 RFI	1.000	A9
1013295	SPACR M4(8) I/S L30 FeZn Av7	3.000	108
1013302	FUSE MCB 50A 400VAC 3P D-CURV	1.000	F1
1013303	FUSE MCB 63A 220VDC/1P 4P 24V	1.000	F2
1013304	SWITCH MBS 63A 5P CO + AUX NO	1.000	S2
1013305	CONTA 3PH 55A COIL 24VDC	2.000	K1-2
1013542	PLATE 3N30 CONTACTOR MOUNT A4	1.000	103
1013544	RAIL 3N30 TERM.BLOCK SHORT A4	2.000	104
1013603	CLAMP CABLE TIE ANCHOR SNAP-IN	13.000	110
1013843	D ASSY 3N30 DWG RFI & MBS A3	.000	
1013849	D WIRING 3N30 MBS A3	.000	
1013850	D WIRING 3N30 RFI&MBS MOD A3	.000	
1013851	D TIE 3N30 RFI&MBS MOD A3	.000	
1014033	SET 3N30 CABLE MBS	1.000	
1014034	SET 3N30 CABLE RFI	1.000	
1014145	D TIE 3N30 EM RFI&MBS A3	.000	
1014146	D WIRING 3N30 EM RFI&MBS A3	.000	
1014173	CONNE 10A 250V FEM SNAP-IN IEC	1.000	X5
1014231	FERRI RING 30x15x11.5 Al 34uH	3.000	
1014779	FERRI RING 16x10x6.5 Al >5000nH	3.000	
2000208	FUSE CB 10A 250VAC 1P 6.3x0.8	1.000	F3
2541068	PLATESCE. B4.8*16 FEZN D7982	4.000	113
4313042	WASHE LOCK-SER M4 FE DIN6798A	3.000	114
8004939	CONNE ACC END CLAMP TS35 RAIL	4.000	106
8030844	FERRI RING 36x23x15 5800nH 25%	2.000	
8063124	SPACR NYLON L=28.6mm LCBS-18	8.000	109

Rev/ECO no:

Rev/ECO no:

A/11905 TK

B/12378 Tt

252

263 4 pcs

262 4 pcs

261 4 pcs

251

259 8 pcs

260 8 pcs

C13

C9

C14

C10

C15

C11

C16

C12

254

253

257

258

261 16 pcs

256 4 pcs

255

261 4 pcs

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Title ASSEMBLY:		H040
EL.CAP.		No	Rev
3N30		10 13 845	B
Checked JKe	Approved VK 09.02.1999	Loc FIN	Size A3	Page 1 / 1

POWERWARE

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014080b**
SUBAS 3N30 EL CAP MOUNTING

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	8.000	C9-16
1008599	INSUL SHEET D 75mm d 12.2mm A4	8.000	260
1009859	SCREW K M5x12 PZ DIN6902A+6905	24.000	261
1013106	PLATE 3N30 CHOKE COVER A3	1.000	252
1013118	PLATE 3N30 CAP.MOUNTING A4	1.000	251
1013467	RAIL 3N30 CURR GND CAP/REC A4	1.000	253
1013469	RAIL 3N30 CURR - CAP/REC A4	1.000	254
1013472	RAIL 3N30 CUR + CAP/INV/RECA4	1.000	255
1013474	RAIL 3N30 CURR +/- CAP A4	4.000	256
1013475	RAIL 3N30 CURR - CAP/INV A4	1.000	257
1013476	RAIL 3N30 CURR GND CAP A4	1.000	258
1013845	D ASSY 3N30 DWG EL CAP MOUNTA3	.000	
1014035	SET 3N30 CABLE C9-16 CAPAC EL	1.000	
2001241	CLAMP CAPACITOR MOUNTING	4.000	262
7980015	NUT M12 NYLON FOR EL.CAPAC	8.000	259
8005156	TIE CABLE L=381mm W=4.6mm	4.000	263

HUOM!
Kulmapalojen kierteet on
oltava nuolien suuntaiset!

1002443
32 pcs

1011346
8 pcs

1010868
2 pcs

1012198
4 pcs

9514160
8 pcs

4313105
8 pcs

1264120
8 pcs

1002443
16 pcs

1013105

115
115
119

204

1010866
4 pcs

1012610

1263040
4 pcs

9514161
8 pcs

1014210

6342008
2 pcs

4220083
2 pcs

4040308
2 pcs

2x

1004944
12 pcs

1002443
12 pcs

1010867
2 pcs

1011674

6 pcs
1011685

6 pcs
1010870

HUOM!
Laitteen jalat säädettävä
samalle tasolle kuin pyörät!

1263560
2 pcs

1012836
2 pcs

6 pcs
1011256

4220083
2 pcs

4040308
2 pcs

1014223

9513639
4 pcs

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Title	ASSEMBLY:		Tolerances ±0.5	
	FRAME CABINET		No	Rev
POWERWARE	3N30		10 13 847	C1
Checked JKet	Approved VK 06.03.1999	Loc FIN	Size A3	Page 1/1

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014081c**
FRAME 3N30 CABINET

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002443	SCREW T HEX M5x8 DIN7500D	60.000	
1004944	SCREW K M4x8 PZ DIN7985A+6907	12.000	
1010866	RAIL 3N45 VERTICAL 1412 mm A3	4.000	
1010867	RAIL 3N45 SIDE LOWER 675mm A3	2.000	
1010868	RAIL 3N45 SIDE UPPER 675mm A3	2.000	
1010870	AXLE 3N45 WHEEL A4	6.000	
1011256	WHEEL 3N45 YKI-70 N	6.000	
1011346	RAIL 3N45 BATT SLIDE A3	8.000	
1011674	PACKM 3N20-60 PALLET UPS A3	1.000	
1011685	PLATE 3N45 WHEEL HOLDER A4	6.000	
1012198	RAIL BAT-E FRONT/REAR 433mmA4	4.000	
1012610	PLATE 3N45 CABLE LEAD THROU A4	1.000	
1012836	SCREW MSN M8x50 8.8 ISO8677	4.000	
1013105	PLATE 3N30 MODULE MOUNTING A3	1.000	
1013847	D ASSY 3N30 FRAME CABINET A3	.000	
1014210	PLATE 3N30 BOTTOM A4	1.000	
1014223	PLATE 3N30 FOOT A4	2.000	
1263040	SCREW HEX M6X10 TENSILOCK	4.000	
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	4.000	
1264120	SCREW HEX M10x30 8.8A1 ISO4017	8.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	8.000	
4220083	WASHE SPRING 8.1 M FE SINK	8.000	
4313105	WASHE LOCK-SER M10 FE DIN6798A	8.000	
6342008	NUT HEX M8 G8 A2 ISO 4032	4.000	
9513639	FOOT ADJUSTABLE M12x60 TEKAMA	4.000	
9514160	ANGLE PIECE OUTER (A) F	8.000	
9514161	ANGLE PIECE INNER (B) F	8.000	

Rev/ECO no:

A/11905 TK

A10/X209 — P8/J8
A10/X208 — P7/J7

L4
L1

A4
BLUE
BROWN
X10 X10
E1 E2

S2 — 80°C
BROWN — S2
BLUE
S1
BROWN
BLUE — S1
70°C
A4
A5

A5
E3

A7
+ +
BLUE
BROWN
−
−
+

L2
L3

X10

A6L3
A6 L3 3
BLUE
BLUE
A3
N Rail

S2 — 80°C
BROWN — S2 — A10/X207
BLUE
A6L2
L2 2
S1
BROWN — S1 — A10/X206
BLUE
70°C
A6L1
L1 1

K2L3
Y
L2
Y
L1
Y

3
2
1

BLUE
N Rail
BLUE — N Rail

X10 X10
E4 E5

X10

E1/N E2/N E3/N E4/N E5/N E6/N
E1/L E2/L E3/L E4/L E5/L E6/L

L5
L7
L9

L6
L8
L10

RC1 RC2

C1 C2 C3

OUT L1
OUT L2
OUT L3

BROWN
BLUE

RC+
RC−

C8
C7

1
2
3

E6
A2/A1

S2 — 80°C
BROWN
BLUE — S2

S1
BROWN
BLUE — S1
70°C

B-BROWN
−
+
BLUE
BROWN
BLUE

K1
L1 L2 L3
T1 T2 T3

K2
L1 L2 L3
T1 T2 T3

A9/X29 A9/X28 A9/X27
BLUE BLUE BLUE

F2+
A1/X4,X5
F2−

OUT L1
OUT L2
OUT L3

A9/X21
A9/X20
A9/X19

Rev/ECO no:

H100
No 10 13 871
Rev A
Size A3 Page 1 / 1
Approved VK 15.03.1999 Loc FIN
Checked JKet
Title 3N30
ASSEMBLY:

EXIDE
ELECTRONICS

Note:
Page 1 for 3N30
Page 2 for 3N30NHS

Huom:
Sivu 1 3N30
Sivu 2 3N30NHS

C9-16/N

A3/X21

V5 V6 V7

K1
coil
BROWN
K2
coil
BROWN
BLUE

L1 L2 L3
L1 L2 L3

T1 T2 T3

A2/L3 out
A2/L2 out
A2/L1 out
C9-16/N

A1/X12

BLUE

T1 T2 T3

A2/L1
A2/L2
A2/L3

A1/X18
V8+
V9-

A10/X8
BLUE
BLUE

A1/X6
BROWN
BLUE
BLUE

X19
X20
X21
X22
X23
X24
X25
X26
X27
X28
X29

A9

X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11

BLUE

BROWN
RED

L1 L2 L3 C C+ C- C+ C-

A10/X203
A1/X1
A2/L3 in
A2/L2 in
A2/L1 in
BROWN
BLUE

BROWN BLUE

F1
F2

BLUE

X2L3
X2/N
BLUE
X2L1
X2L2

17
9 13
5 19
15
1 11 10 14
7 6 18
2 20
3 12 16
8
4 X3L3
X3L2
X3L1
X3/N
BLUE
BLUE
BLUE

F3

X5
X5/N

P1
J1
X3/N

P2
J2
X2/N

THIS DRAWING CONTAINS PROPRIETARY INFORMATION OF POWERWARE AND MAY NOT, IN WHOLE OR IN PART, BE DUPLICATED OR DISCLOSED OR USED FOR MANUFACTURE OF ANY PART DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF POWERWARE.

Rev/ECO no:
B1/12817 JS
A/11905 TK
B/12162 MA

Title	ASSEMBLY: WIRING		H060/H050	
	RFI & MBS		No	Rev
	3N30		10 14 146	B1
Checked JKe	Approved VK 17.03.1999	Loc FIN	Size A3	Page 1 / 2

POWERWARE

NHS

A3/X21

C9-16/N

V5 V6 V7

BROWN

K1

coil

BROWN

K2

coil

BLUE

A1/X18

A2/L3 out
A2/L2 out
A2/L1 out

A1/X12

V8+

V9-

C9-16/N

T1
T2
T3

BLUE

A10/X8

BLUE
BLUE

L1

L2

L3

BROWN

RED

L1
L2
L3
C

A1/X6

BLUE

BROWN

BLUE

X19

X20

X21

X22

A9

T1
T2
T3

A2/L1

A2/L2

A2/L3

BLUE

C+
C-
C+
C-

BLUE

A2/L3 in
A2/L2 in
A2/L1 in

A1/X1

BROWN

BLUE

X23

X24

X25

X26

X27

X28

X3

X2

X1

X4

X5

F1

BLUE

X29

X6

X7

BLUE

X8

X9

F2

X10

X11

BLUE

L11

L12

Y/G

P1

ASENNETAAN
MYÖHEMMIN
ASSEMBLED
LATER

L13

J1

F3

P2

X5/N

BLUE

X3/N

X5

J2

X2/N

Rev/ECO no:

B1/12817 JS

Rev/ECO no:

A/11905 TK

B/12162 MA

POWERWARE

Title	ASSEMBLY: WIRING	H060/H050		
	RFI & MBS	No		Rev
	3N30	10 14 146		B1
Checked JKe	Approved VK 17.03.1999	Loc FIN	Size A3	Page 2 / 2

2541075
6 pcs

L2   L1
L4   L3

1973321
2 pcs

1003470
2 pcs

2541075
9 pcs

1005549
4 pcs

L6   L5
L8   L7
L10   L9

INVERTER

RECTIFIER

L2   L1

L4   L3

L6   L5

L8   L7

L10   L9

POWERWARE

Title	ASSEMBLY AND WIRING		H020		
	CHOKES		No		Rev
	3N30		10 13 842		C
Checked JKet	Approved VK 07.03.1999	Loc FIN	Size A3	Page 1 / 1	

$4 \times$

Battery
24 pcs / 16 pcs

603
18 pcs / 12 pcs

602 80 pcs / 48 pcs

24 x batterie

16 x batterie

613
2 pcs

601

Rev/ECO no:	B/12120 VK
	A/11905 TK
Rev/ECO no:	

Rev B

No 10 13 864 Page 1 / 2

R130

Size A3 Loc FIN

Title ASSEMBLY:
Batteries
3N30

Approved VK 23.02.1999
Checked JKet

POWERWARE

16 x batterie

24 x batterie

4

16 x batterie

24 x batterie

BLUE

POS BAT

J6
J5

RED

See shelf
Katso hylly 4

3

See shelf
Katso hylly 4

2

NEG BAT

BLACK

J4
J3

BLUE

See shelf
Katso hylly 4

1

4
3
2
1

8 pcs
604

BLUE

605

J6
J5

RED

BLACK

J4
J3

BLUE

Rev/ECO no:

Rev/ECO no: A/11905 TK   B/12120 VK

Title	ASSEMBLY:		R140	
POWERWARE			No	Rev
	3N30		10 13 864	B
Checked JKe	Approved VK 23.02.1999	Loc FIN	Size A3	Page 2 / 2

Rev/ECO no:

Pb

CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus- and minus-poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1012421	100mm	12
2.	1012422	300mm	48
3.	1013439	650mm	1
4.	1013440	650mm	1
5.	1013441	650mm	1
6.	1013442	650mm	1

Battery replacement information

Battery type:	7Ah 12V
Battery Part Number:	1012409
Two battery strings	
Number of batteries string 1 :	2 x 16
Number of batteries string 2 :	2 x 16
Nominal voltage of each battery string:	192VDC
Nominal capacity of the battery string C_{20} :	14Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

J5   J6

⑤   ⑥

②

①

J3   J4

③   ④

1014188A

NITTO 500+PVC FILM

Colour: silver
          black text
          without frames

EXIDE
ELECTRONICS

Title	LABEL 3N30 BAT WIRING DRAWING		No		Rev
	2 x 192 VDC		10 14 188		A
	3N30				

Checked VK	Approved 04.03.1999 JKet	Loc FIN	Size A4	Page 1 / 1

Rev/ECO no:

J5   J6

⑤   ⑥

②   ①

J3   J4

③   ④

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus- and minus-poles can be opposite to the drawing, due to design of batteries.

Use joint grease in the poles of the batteries (Dinitrol paste).

nr.	p/n	length	pcs
1.	1012421	100mm	20
2.	1012422	300mm	72
3.	1013439	650mm	1
4.	1013440	650mm	1
5.	1013441	650mm	1
6.	1013442	650mm	1

Battery replacement information

Battery type:	7Ah 12V
Battery Part Number:	1012409
Two battery strings	
Number of batteries string 1 :	2 x 24
Number of batteries string 2 :	2 x 24
Nominal voltage of each battery string:	288VDC
Nominal capacity of the battery string C_{20} :	14Ah

WARNING! Batteries present energy and chemical hazard. For safety and disposal instructions, please refer to the Service Handbook.

1014047A

NITTO 500+PVC FILM

Colour: silver
black text
without frames

EXIDE
ELECTRONICS

Title
LABEL 3N30 BAT WIRING DRAWING

2 x 288 VDC

3N30

No
10 14 047

Rev
A

Checked	VK	Approved	25.01.1999 JKet	Loc	FIN	Size	A4	Page	1 / 1

Rev/ECO no:

Pb

CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus- and minus-poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1014315	170mm	28
2.	1014316	1100mm	2
3.	1014320	1200mm	1
4.	1014321	850mm	1
5.	1014322	1200mm	1
6.	1014323	500mm	1

Battery replacement information

Battery type:	13Ah 12V
Battery Part Number:	1014500
Two battery strings	
Number of batteries string 1 :	16
Number of batteries string 2 :	16
Nominal voltage of each battery string:	192VDC
Nominal capacity of the battery string C_{20} :	13Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

J5 J6

J3 J4

1014498A

NITTO 500+PVC FILM

Colour: silver
         black text
         without frames

Title	LABEL 3N30NL BAT32 WIRING DRAWING						
	192 VDC				No		Rev
EXIDE ELECTRONICS	3N30				10 14 498		A
	Checked VK	Approved 14.04.1999 JKet		Loc FIN	Size A4	Page	1 / 1

Rev/ECO no:

Pb

CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus- and minus-poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1014315	170mm	42
2.	1014316	1100mm	4
3.	1014320	1200mm	1
4.	1014321	850mm	1
5.	1014322	1200mm	1
6.	1014323	500mm	1

Battery replacement information

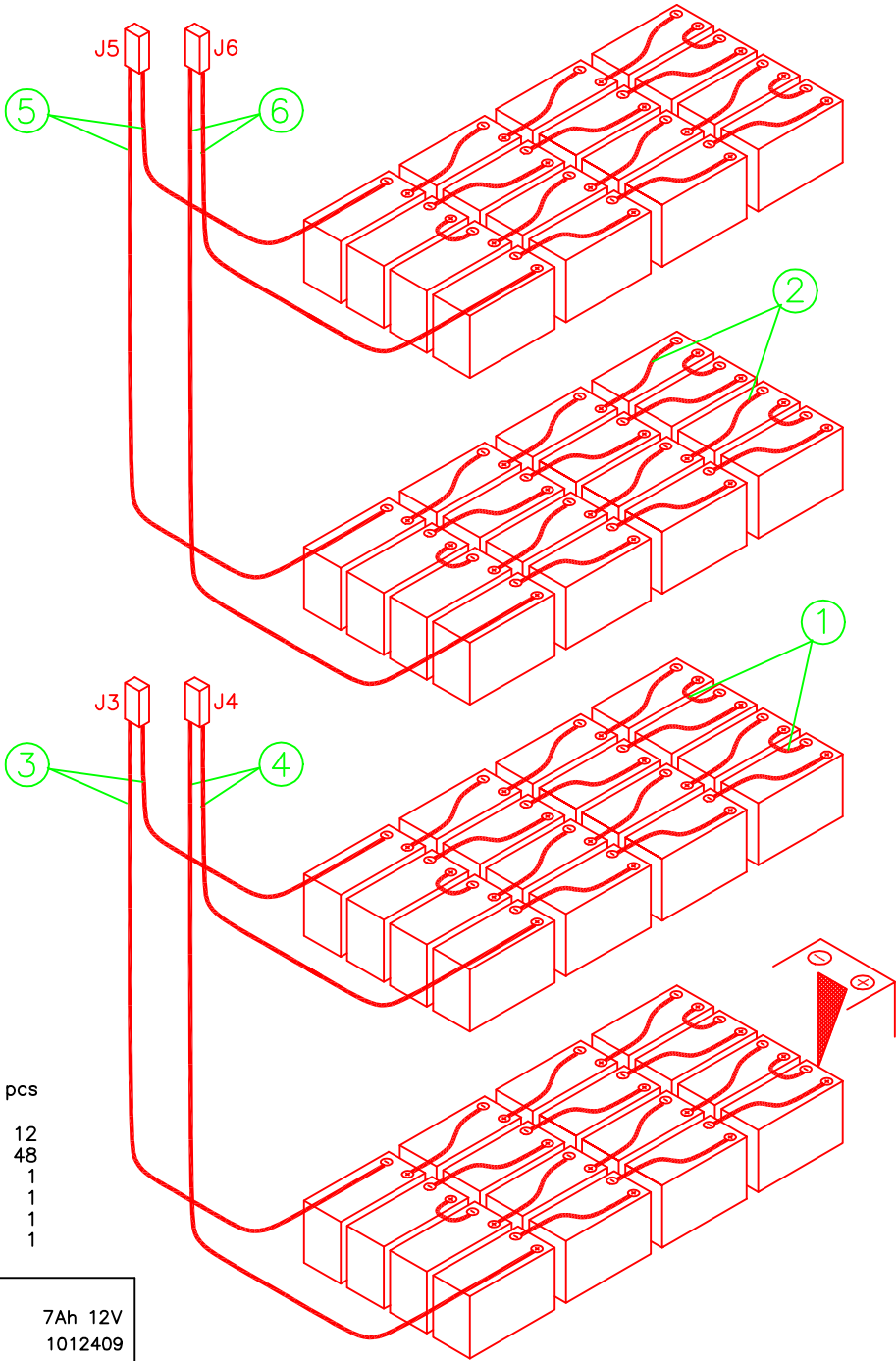| Battery type:	13Ah 12V
Battery Part Number:	1014500
Two battery strings	
Number of batteries string 1 :	24
Number of batteries string 2 :	24
Nominal voltage of each battery string:	288VDC
Nominal capacity of the battery string C_{20} :	13Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

J5 J6
5   6

J3 J4
3

4

2

1

1014499A

NITTO 500+PVC FILM

Colour: silver
        black text
        without frames

EXIDE
ELECTRONICS

Title
LABEL 3N30NL BAT48 WIRING DRAWING

288 VDC

3N30

Checked	VK	Approved	14.04.1999 JKet	Loc	FIN	Size	A4	Page	1 / 1

No
10 14 499

Rev
A

Circuits for 3N60NHS on page 2

NOTE: Parts with reference designators in parenthesis are not used in PW9305-40i-NX unit

BYPASS INPUT 3x400V 50Hz

Temp sensor

BATTERY CABINET

BATTERY CONNECTION

POS BOOST/ STATIC SWITCH A2/2

MECH BYPASS

UPS OUTPUT 3x400V 50 Hz

RECTIFIER INPUT 3x400V 50Hz

MAINTENANCE BYPASS UPS

NEG BOOST/ RECTIFIER A3/2

POS BOOST/ STATIC SWITCH A2/1

INVERTER L1

INVERTER L2

INVERTER L3

BATTERY CHARGER BRD A1

BOOST BOARD A4

A3/1 NEG BOOST/ RECTIFIER

OFF/ON SWITCH S1

STATIC SWITCH BRD A8

DISPLAY BRD A11

A10 LOGIC BRD

RS1	RS2 Modem	Relay interface	Emerg power off	Gener. on inp.

Remote inv on/off inp.

Extern. Bypass Sw. inp

Environment alarm inp.

Trafo over temp

Filter over temp

Bypass back-feed

External charger enable

Rev/ECO no:		
G/12507 IS	H/12730 jS	
E/12291 TS	F/12366 IN	
C/12160 VK	D/12167 MA	
A/12043 TT	B/12128 VK	

Circuits for 3N60NHS

Temp sensor

BATTERY CABINET

BATTERY CONNECTION

BYPASS INPUT 3x400V 50Hz

A9/1 RFI

POS BOOST/ STATIC SWITCH A2/2

POS BOOST/ STATIC SWITCH A2/1

NEG BOOST/ RECTIFIER A3/2

INVERTER L1

INVERTER A6/A3 CONTROL 2 BRD

INVERTER A6/A2 CONTROL 1 BRD

INV SNUB. BRD A6/A1

+DC
−DC

A6

BATTERY CHARGER BRD A1

BOOST BOARD A4

POS SNUB. BRD A2/A1

NEG SNUB. BRD A3/A1

INVERTER L2 A7

INVERTER L3 A8

RECTIFIER INPUT 3x400V 50Hz

A9/2 RFI

OFF/ON SWITCH S1

A3/1 NEG BOOST/ RECTIFIER

PHASE1
PHASE2
PHASE3

RFI A9/3

STATIC SWITCH BRD A8

UPS OUTPUT 3x400V 50 Hz

OUTPUT TRIPPING SWITCH

service outlet

DISPLAY BRD A11

I/O BRD A300

I/O-CONNECT BRD A5

Parallel UPS

RS1
RS2 Modem
Relay interface
Emerg power off
Gener. on inp.
Remote inv on/off inp.
Extern. Bypass Sw. inp
Environment alarm inp.
Trafo over temp
Filter over temp
Bypass backfeed
External charger enable

A10 LOGIC BRD

POWERWARE

CAPACITORS

9 pcs to 3N60
6 pcs to 3N40 (see below)

✳ PARTS NOT ASSEMBLED TO UPS 3N40 NX

C14

C11

A6

A7

A1

A8

E1/2

E3/4

E5/6

F8

A3

9 pcs
1009859

9 pcs
1009859

✳ PLATE CHOKE COVER AND
CAPACITORS ATTACHMENT
FOR 3N40NX

Rev/ECO no:

Rev/ECO no:

A/12025 AVa   C/12523 HT
B/12139 VK   D/12753 IN

POWERWARE	Title ASSEMBLY:	I 080	
	INVERTER MODULES	No	Rev
	3N40- 3N60	10 14 948	D
	Checked TK	Approved 30.08.1999 AV	Loc FIN	Size A3	Page 1 / 2

THIS DRAWING CONTAINS PROPRIETARY
INFORMATION OF POWERWARE AND MAY NOT,
IN WHOLE OR IN PART, BE DUPLICATED OR
DISCLOSED OR USED FOR MANUFACTURE OR
ANY PART DISCLOSED HEREIN WITHOUT THE
PRIOR WRITTEN PERMISSION OF POWERWARE.

A3

3 pcs
1009859

A2

3 pcs
1009859

Rev/ECO no:				
A/12025 AVa	B/12139 VK	C/12523 HT	D/12753 IN	

POWERWARE

Title ASSEMBLY:	I 080		
BOOST MODULES	No		Rev
3N40−3N60	10 14 948		D
Checked TK	Approved 30.08.1999 AV	Loc FIN	Size A3	Page 2 / 2

Rev/ECO no:

E/12605 IN
F/12768 IN

C/12167 MA
D/12395 Tt

A/12025 AVa
B/12139 VK

B1

1002 443
4 pcs

B2
B3
1014 611

1019 144

1002 443
5 pcs

C1
C2
C3
C4
C5
C6

1014 375

1009 860
2 pcs

K1

1002 443
3 pcs

1002 443
3 pcs

1002 443
3 pcs

1014 642

A8

8063 123
9 pcs

1012 970

POWERWARE

Title	ASSEMBLY :	I 100	
	LOWER ASSEMBLY PLATE	No	Rev
	3N40-80	10 14 950	F
Checked TK	Approved 08.09.1999 AV	Loc FIN	Size A3	Page 1 / 1

4 pcs
1002443

1012464

2 pcs
2541075

WARNING!
POSSIBILITY OF
HAZARDOUS VOLTAGE
AT HEATSINK AND FANS

REPLACE USED PARTS
ONLY WITH ORIGINAL
SPARE PARTS
(FANS, ETC.)

NOTE!
CABLING AND CABLE
FASTENERS MUST BE
RESTORED TO ORIGINAL
SHAPE AFTER SERVICE
WORK

1014116A

POWERWARE

Title	ASSEMBLY:	I 110		
	LOGIC & CHARGER MOUNTING PLATE TO CHASSIS	No		Rev
	3N40−80	10 14 951		J
Checked TK	Approved 28.09.1999 AV	Loc FIN	Size A3	Page 1 / 4

POWERWARE

Title ASSEMBLY:	I 110		
CABLE TIES FOR FLAT CABLES	No		Rev
3N40−80	10 14 951		J
Checked TK	Approved 05.10.1999 AV	Loc FIN	Size A3	Page 2 / 4

POWERWARE

Title	ASSEMBLY:	I 110		
	CABLE TIES	No		Rev
	3N40−80	10 14 951		J
Checked TK	Approved 20.09.1999 AV	Loc FIN	Size A3	Page 3 / 4

A10

A1

POWERWARE

X219–222 · X102 · X101 · X100 · EPO · A11/X4

X101 · X100 · X4 · X216

BLUE · BROWN

X219

BROWN BLUE — A1/X9
BLACK X2
X3 BROWN BLUE — X10

X8 BLUE — Rail N
X7 BLUE
X1
BLUE BROWN X6 — S1/1–2

X9
X9

X203 BROWN BLUE
X202 BROWN BLUE

X207 X206 X205 X210 X209 X208
X125 X124 X123
X112 X105 X104 X103
X204

BLUE BROWN · BLUE BROWN · BLUE · BLUE BLUE BLUE

A8/X4
X1/A6
X1/A7
X1/A8

X11 · X13 · Rect S2 · Rect S1 · A6/X9 · A7/X9 · A8/X9

X15
X19
X17/A1
X1/A4

X9
X18
BROWN BLUE BLUE BROWN
X12
K1/COIL

A10/X2 X9
BLUE BLACK BROWN

X22 BROWN BLUE
S1/5–6

X8 · X5 BAT– · X4 BAT+ · X3
–DC · X7 N · +DC

A8/Rail – · A8/Rail N · A8/Rail + · Bat – · Bat +

X6 BLUE BLACK BROWN X20
X8 Rail N BLUE
X1 BLUE BLACK BROWN
X8 YG

BILL OF MATERIAL FOR PRODUCT **1014248L**

FINAL 3N60 ASSY

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000704	LABEL UPDATE RECORD STICKER A4	1.000	
1000924	HINGE PART3 OF HINGES/CABINETS	2.000	
1001190	LABEL INSPECT STATUS STICKER	1.000	
1002443	SCREW T HEX M5x8 DIN7500D	30.000	
1003549	SPACR NYLON L=9,5mm LCBS-6	2.000	
1005239	CLAMP FLAT CABLE CLIP W31xH6mm	6.000	
1006840	SCREW FLAT M5x10 PZ DIN 965	5.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	64.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	6.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1011356	PLATE 3N45 HINGE INNER A4	2.000	
1012061	LOCK LATCH LIFT&TURN 62-70-11	1.000	
1012112	PLATE 3N45 SHIELD A4	1.000	
1012464	PLATE 3N45 HINGE BAR A3	1.000	
1012474	INSUL 3N45 INVERT CURR RAIL A3	2.000	
1012610	PLATE 3N45 CABLE LEAD THROU A4	1.000	
1012970	PCBAS 3N60P STATIC SWITCH	1.000	A8
1014116	LABEL 3N30 WARNING A4	1.000	
1014262	SET 3N60 CABLE ELEC 2	1.000	
1014264	CONTA 3PH 115A COIL 24VDC	1.000	K1
1014267	SET 3N60 CABLE ELEC 3	1.000	
1014273	SET 3N60 CABLE ELEC 4	1.000	
1014330	D TEST REPORT 3N60 FINAL A4	.000	
1014333	D SCHEMA 3N60 MAIN CIRCUITS	.000	
1014375	PLATE 3N60 CONTACTOR SUPP. A4	1.000	
1014633	PLATE 3N60 FRONT COVER A3	1.000	
1014640	PLATE 3N60 BYPASS SHIELD PC A4	1.000	
1014642	PLATE 3N60 SWITCH BOARD SUP.A3	1.000	
1014948	D ASSY 3N60 DWG I080 A3	.000	
1014950	D ASSY 3N60 DWG I100 A3	.000	
1014951	D ASSY 3N60 DWG I110 A3	.000	
1015170	PLATE 3N20-30 COVER	2.000	
1015234	PLATE 3N60 BREAKER SHIELD A3	1.000	
1015455	LATCH 3N60 DOOR A4	1.000	
1017448	PCBAS 3N20-80 BOOST BOARD	1.000	A4
1018612	D WIRING 3N60 DWG I040 A3	.000	
1019023	PLATE 3N80 SIDE A3	1.000	
1019024	PANEL 3N80 RIGHT FRONT A3	1.000	
1019034	PLATE 3N80 ROOF A3	1.000	
1019040	PLATE 3N80 FRONT A3	1.000	
1019083	PLATE 3N80 UPS BACK A3	1.000	
1019085	PANEL 3N80 SIDE A3	2.000	
1019193	ASSY 3N80 DOOR A3	1.000	
1019306	PLATE 3N80 REC BOARD MOUNT1 A4	1.000	
1019307	PLATE 3N80 REC BOARD MOUNT2 A4	1.000	
1019342	ASSY 3N80 RAIL CURR BUSSB+ A4	1.000	
1019344	ASSY 3N80 RAIL CURR BUSSB- A4	1.000	
1019347	ASSY 3N80 RAIL CURR BB-N A4	1.000	
1019500	D TEST INSTR 3N80 FINAL FIN A4	.000	
1019501	D TEST INSTR 3N80 FINAL ENG A4	.000	

FINAL 3N60 ASSY

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1019508	D ASSY 3N80 DWG I080 A3	.000
1019518	D ASSY 3N80 DWG I120 A3	.000
1019900	D ASSY 3N60 DWG I080 A3	.000
1019901	D ASSY 3N60 DWG I080 A3	.000
1019935	D ASSY 3N40-80 DWG I110 A3	.000
1263040	SCREW HEX M6X10 TENSILOCK	4.000
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	1.000
2541075	SCREW T HEX M5X12 DIN7500D	2.000
4040308	WASHE PLAIN M8 Fe ISO 7089	1.000
4313082	WASHE LOCK-SER M8 FE DIN6798A	1.000
8005150	TIE CABLE L=102mm W=2.5mm	50.000
8055433	INSUL EDGE PROTECT T57 BLACK	.300
8055457	TIE CABLE L=172mm W=4.6mm	50.000
8063123	SPACR NYLON L=12.7mm LCBS-8	9.000

6 pcs
2223035

A11

1012093

A11

3 pcs
2224004

4 pcs
1011684

prog/ohjelma
1012822

1011686

label/tarra
1012822

MENU

1011481

Rev/ECO no:
E/12443 Tt
F/12768 IN

Rev/ECO no:
A/12025 AV
B/12087 MA
C/12135 MA
D/12221 AV

POWERWARE

Title
ASSEMBLY:
DISPLAY
3N60

I 120

No
10 14 952

Rev
F

Checked
TK
Approved
30.08.1999 AV
Loc
FIN
Size
A3
Page
1 / 1

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014256e**
SUBAS 3N60 LOGIC&CHARGER

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001560	LABEL MATERIAL A4	.015	
1002549	LABEL MATERIAL TYPE PLATE	3.000	
1003188	HANDL l=120mm h=40mm, Al NATUR	1.000	
1004944	SCREW K M4x8 PZ DIN7985A+6907	2.000	
1004946	CABLE 1.5mm2 H07V2-K 90°C BLCK	.060	
1005239	CLAMP FLAT CABLE CLIP W31xH6mm	3.000	
1005548	SCREW K M4x16 DIN7985+6798	3.000	
1008512	SCREW K M3x8 DIN7985+6798	4.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	2.000	
1009961	LABEL WARNING GENERAL ENG A3	.180	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1010748	ICCPU PIC16C74A-20/P 40PIN	2.000	
1011216	SWITCH 3N45 START 2-POS	1.000	S1
1011355	HEATS 3N45 PROFILE CHARGER A4	1.000	
1012124	SCREW D-SUB UNC4-40/M3 L=4.5mm	4.000	
1012127	CONNE 2P MALE 5,08mm PANEL	1.000	X4
1012155	ICCPU H8/3337 PLCC 84P I2C OPT	.000	
1012184	INSUL FOIL 0.19x110x280 A4	1.000	
1012221	LABEL 3N45 TERMINALS A4	1.000	
1012462	D PROG 3N30/60 DC CONTROL	.000	
1012463	D PROG 3N45 MEASUREMENT	.000	
1012470	SPACR M4(10) I/I L30 FeZn Av7	1.000	
1012471	SPACR M4(6) I/I L30 PA66	2.000	
1012472	LABEL 3N45 WARNING A4	1.000	
1012493	CONNE 3P PLUG 5.08 BL3	4.000	(X102)
1013295	SPACR M4(8) I/S L30 FeZn Av7	2.000	
1013701	PCBAS 3N30-80 CHARGER WO PROG	1.000	A1
1014257	SET 3N60 CABLE LOGIC&CHARGER	1.000	
1014270	SET 3N60 FLAT CABLES	1.000	
1014585	PCBAS 3N30/60 LOGIC WO PROG	1.000	A10
1014800	D PROG 3N60-80 MAIN CONTROL	.000	
1014952	D ASSY 3N60 DWG I120 A3	.000	
1015268	D PROG 3N60 NHS MAIN CONTROL	.000	NHS
1017751	RESIS 4K7 50W 5% AL	2.000	R1,R2
1018280	D PROG 3N20-60NHS MEASUREMENT	.000	NHS Oscar
1019039	PLATE 3N80 SLEDGE FRONT A3	1.000	
1019559	ASSY BAR 3N80 INSULATION A4	1.000	
1019760	D ASSY 3N60 CHARGR BRD&HEATSA3	.000	
1019904	D ASSY 3N40-80 DWG I120	.000	
1019954	SCREW PZ M4x55 Fe ISO 7045	2.000	
2001241	CLAMP CAPACITOR MOUNTING	2.000	
2223035	SCREW CYL M3X6 M4.6 ZNA1 217	2.000	
2224008	SCREW SLOTTED M2.5X10 ISO1207	4.000	
2368405	SCREW T X M5X10 FE/ZN DIN7500	12.000	
4040304	WASHE PLAIN M4 Fe ISO 7089	1.000	
4313042	WASHE LOCK-SER M4 FE DIN6798A	6.000	
6342004	NUT HEX M4 G8 A2 ISO 4032	2.000	
8051088	CONNE 4P PLUG 5.08 BL4 12593.6	1.000	(X102)
8051092	CONNE 2P PLUG 5.08 BL2 12591.6	4.000	(X219-222)
8063124	SPACR NYLON L=28.6mm LCBS-18	25.000	
8080226	INSUL TUBE d3mm L25mm NEOPREN	2.000	

1005548
8005155
8005396
2 pcs
8055433
1014229
1010408
4040306
2 pcs
8050561
2 pcs
1002443
6342006
2 pcs
1014654
4313064
2 pcs
1010408
8050561
C31
2 pcs
1000195
1000436
1263120
8005155
2 pcs
8005150
5797752
2 pcs
C28
2 pcs
1002443
1014402
Kts. sivu 2
See page 2
1015159
1014637
Sulakkeen mukana
Delivered with Fuse
F1
1011437
1003835
8030844
8055457
1000195
8004939
2 pcs
1003848
2 pcs
2368405
1010889
F3
X5
2 pcs
Sulakkeen mukana
Delivered with Fuse
Assembled on line (pos I 020)
Kootaan linjalla (pos I 020)
1002443 4 pcs
1015084
1014639
8005150
2 pcs
1010497
1010496
F2
5797752
2 pcs
2001241 2 pcs (3N80)
8005155
2 pcs
2 pcs
2541075
1010181 (3N80)
2 pcs
1014238
1010888
Sulakkeen mukana
Delivered with Fuse
4 pcs

Rev/ECO no:
C/12477 Ak
D/12640 IN
A/12025 AVa
B/12160 MA

Title	ASSEMBLY:	I 070
POWERWARE	BREAKER MOUNTING PLATE	No 10 14 947	Rev D
	3N40−80	
Checked TK	Approved 07.10.1999 AV	Loc FIN	Size A3	Page 1 / 3

K1/L1-L3

RFI/X1,X4

1010408

L1
L2
L3

Y/G

F1

BROWN

F3

Y/G

BLUE

X5

BLUE   BLUE   BLUE

BLUE

BLUE

F2

AUXP N
AUXP N
BATT +
BATT −

Rev/ECO no:

Rev/ECO no:

A/12025 AVa
B/12160 MA
C/12477 Ak
D/12640 IN

POWERWARE

Title ASSEMBLY:	I 070	
BREAKER MOUNTING PLATE	No	Rev
3N40-80	10 14 947	D
Checked TK	Approved 07.10.1999 AV	Loc FIN	Size A3	Page 2 / 3

Cable ties
Nippusiteet

Cable ties
Nippusiteet

POWERWARE	Title ASSEMBLY: BREAKER MOUNTING PLATE 3N60				
	Checked JKet		No 10 14 947 Rev D		
	Approved 01.04.2002 IN		Page 3 (3)		

BILL OF MATERIAL FOR PRODUCT   **1014253 C**
SUBAS 3N60 BREAKERS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000195	CONNE TERM BLOCK 35mm2 BLUE	3.000	
1000197	CONNE ACC END PLATE 35mm2 GREY	1.000	
1000436	CONNE ACC JUMPER 2 POLE 35mm2	1.000	
1002443	SCREW T HEX M5x8 DIN7500D	8.000	
1003835	BUSH OPEN/CLOSED INSIDE d20mm	1.000	
1003848	CONNE TERM BLOCK 2.5mm2 GREY	1.000	
1005548	SCREW K M4x16 DIN7985+6798	1.000	
1006221	CAPAC RFI 4.7nF 250V Y p10/15	6.000	C27-32
1010179	SCREW PZ M3x16 Fe ISO 7045	2.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1010496	CONNE MALE CONTACT 20-14AWG	1.000	
1010497	CONNE 2P HOUSING MALE PLUG	1.000	
1010888	PLATE 3N45 RIGHT LEG A3	1.000	
1010889	PLATE 3N45 LEFT LEG A3	1.000	
1011211	MCB 100A 415VAC 3P	1.000	F1
1011212	FUSE MCB 100A 750VDC/4P 24VDC	1.000	F2
1011437	PLATE 3N45 AUX CONNECTOR A4	1.000	
1012041	CONNE 10A 250V FEM SNAP-IN IEC	1.000	X5
1014229	PLATE 3N60 CONTACTOR ATTCH. A3	1.000	
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000	
1014260	SET 3N60 CABLE BREAKERS	1.000	
1014637	RAIL 3N60 BREAKERS ATTACH A4	1.000	
1014639	TUBE INSUL DIAM 6mm VSR 10	.250	
1014794	FUSE MCB 100A 750VDC/4P 24VDC	1.000	F2
1014947	D ASSY 3N60 DWG I070 A3	.000	
1015084	PLATE 3N60 BREAKER SUPP. A4	1.000	
1015159	PCBAS 3N60 YCAP	1.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
1973320	CONNE 12x4mm2 TERMINAL BLOCK	1.000	
2000208	FUSE CB 10A 250VAC 1P 6.3x0.8	1.000	F3
2368405	SCREW T X M5X10 FE/ZN DIN7500	2.000	
2541075	SCREW T HEX M5X12 DIN7500D	2.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	2.000	
5797752	BLIND RIVET TAP D56	3.000	
5797752	BLIND RIVET TAP D56	4.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	1.000	
8004939	CONNE ACC END CLAMP TS35 RAIL	2.000	
8005150	TIE CABLE L=102mm W=2.5mm	2.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	4.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	5.000	
8020255	CAPAC PAP 4,7nF 250VAC Y 20%	2.000	C28,31
8030844	FERRI RING 36x23x15 5800nH 25%	2.000	
8055396	INSUL BUSH 642353A/1 8/22MM	1.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8055433	INSUL EDGE PROTECT T57 BLACK	.150	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8055457	TIE CABLE L=172mm W=4.6mm	1.000	
8055457	TIE CABLE L=172mm W=4.6mm	2.000	

6342005
4 pcs

4313051
4 pcs

4040305

S2

1009860
4 pcs

1263120

1010408
11 pcs

1012470
11 pcs

A9

8055433

2000283

1010408
11 pcs

S2

1011214

1010408
2 pcs

1012524
2 pcs

4040306

6342006
2 pcs

4313064
3 pcs

1014228

1014237

1002443
3 pcs

NOTE!
Poista PE ja N merkinnät
Remove PE and N markings

1002443
3 pcs

8005156

1014238

8080293

1004936
4 pcs

L1 L2 L3 N
X2 BYPASS INPUT
L1 L2 L3 N
K1 RECTIFIER INPUT
N L1 L2 L3
X3 UPS OUTPUT

1012221

1014496

1014497

1014496

1003011

1014496

1014497

1014496

1001559
2 pcs

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Rev/ECO no:

Rev/ECO no:

A/12025 AVa

C/12167 MA

B/12139 VK

D/12395 Tt

POWERWARE	Title ASSEMBLY DRAWING	I 040	
	CONNECTOR & MOUNTING PLATE	No	Rev
	3N60	10 14 944	D
	Checked TK	Approved 27.09.1999 AV	Loc FIN	Size A3	Page 1 / 2

FOR NHS ONLY

1012364
8052620
1009886 4 pcs
1018319
1010408 11 pcs
1263120
1012221
1012470 11 pcs
8055433
A9
2000283
1010408 11 pcs
1011214
1012524 2 pcs
4040306
6342006 2 pcs
1010408 2 pcs
4313064 3 pcs
1014237
1002443 3 pcs
1014228

NOTE!
Poista PE ja N merkinnät
Remove PE and N markings

L1 L2 L3 N
X2 BYPASS INPUT
X1 RECTIFIER INPUT N L1 L2 L3
X3 UPS OUTPUT N L1 L2 L3

1002443 3 pcs
1014238
8005156
1014496
1014497
1012221
1014496
1017541
8080293
1003011
1004936 4 pcs
8004939 3 pcs

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POWERWARE

Rev/ECO no:

THIS DRAWING CONTAINS PROPRIETARY INFORMATION OF POWERWARE AND MAY NOT, IN WHOLE OR IN PART, BE DUPLICATED OR DISCLOSED OR USED FOR MANUFACTURE OF ANY PART DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF POWERWARE.

Rev/ECO no:

A/12025 AVa
B/12139 VK
C/12167 MA
D/12395 Tt

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014255 b1**
SUBAS 3N60 MBS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001559	CONNE ACC END CLAMP WEW 35	2.000	
1002443	SCREW T HEX M5x8 DIN7500D	6.000	
1003011	CONNE ACC JUMPER 2 POLE 50mm2	1.000	
1004936	HOLDE STRAIN RELIEF d 26-30mm	4.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	4.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	24.000	
1011214	CONNE PE-RAIL 6x35mm2 TS35	1.000	
1012221	LABEL 3N45 TERMINALS A4	.000	
1012470	SPACR M4(10) I/I L30 FeZn Av7	11.000	
1012524	BUSH OPEN/CLOSED INSIDE d10mm	2.000	
1014228	PLATE 3N60 CONNECTOR ATTCH. A3	1.000	
1014237	RAIL 3N60 TERM. BLOCK ATTCH.A4	1.000	
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000	
1014258	PCBAS 3N60 RFI BOARD	1.000	A9
1014269	SET 3N40-60 CABLE MBS	1.000	
1014368	SWTCH 150A 3PH+AUX CHANGE OVER	1.000	S2
1014496	CONNE TERM BLOCK 50mm2 GREY	9.000	
1014497	CONNE TERM BLOCK 50mm2 BLUE	3.000	
1014944	D ASSY 3N60 DWG I040 A3	.000	
1018613	D WIRING 3N60 MBS I040 A3	.000	
1018614	D WIRING 3N60 TERMINAL I040 A3	.000	
1018615	D WIRING 3N60 RFI BOARD I040A3	.000	
1018616	D 3N60 CABLING I040 A4	.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
2000283	LABEL VDE GROUNDING STICKER #	1.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	1.000	
4313051	WASHE LOCK-SER M5 FE DIN6798A	4.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	3.000	
6342005	NUT HEX M5 G8 A2 ISO 4032	4.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	2.000	
8005156	TIE CABLE L=381mm W=4.6mm	1.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.400	
8080293	PACKM PLASTIC BAG 160x250 MING	1.000	

HUOM!
Kulmapalojen kierteet on
oltava nuolien suuntaiset!

1010868
2 pcs

8055433

1002443
2 pcs

2541075
2 pcs

1012198
4 pcs

1014239

9514160
8 pcs

1011710

4313105
8 pcs

1002443
4 pcs

1002443
6 pcs

1006840
6 pcs

1013948
2 pcs

1264120
8 pcs

1002443
10 pcs

1012194

1011257
2 pcs

1002443
6 pcs

1006840
6 pcs

1010866
4 pcs

9514161
8 pcs

1263040
4 pcs

1004944
12 pcs

1014635

1002443
8 pcs

1014802

9513639
4 pcs

1010867
2 pcs

1011685
6 pcs

1010870
6 pcs

1011256
6 pcs

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Rev/ECO no:

C/12321 VK

A/12025 AVa   B/12139 VK

Rev/ECO no:

Title ASSEMBLY:		Tolerances ±0.5	
FRAME CABINET		No	Rev
3N60		10 14 941	C

POWERWARE

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2541 075
2 pcs

1014 799

1014 781

1014 641

1014 243

1009 886
3 pcs

1002 443
4 pcs

1002 443
7 pcs

1006 840
6 pcs

1002 443
2 pcs

1009 859
3 pcs

1006 840
6 pcs

1009 859

1009 860

2001 241

3 pcs
2001 241

1009 886

1012 975

1011 674

1012 954

1002 443
5 pcs

1014 223

4220 083
2 pcs

1002 443
4 pcs

1263 560
2 pcs

4040 308
2 pcs

6342 008
2 pcs

1002 443
4 pcs

4220 083
2 pcs

1012 836
2 pcs

4040 308
2 pcs

× 2

HUOM!
Laitteen jalat säädettävä
samalle tasolle kuin pyörät!

○ = ◎
● = ◎   ☆ = ◎

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014249c**
FRAME 3N60 CABINET

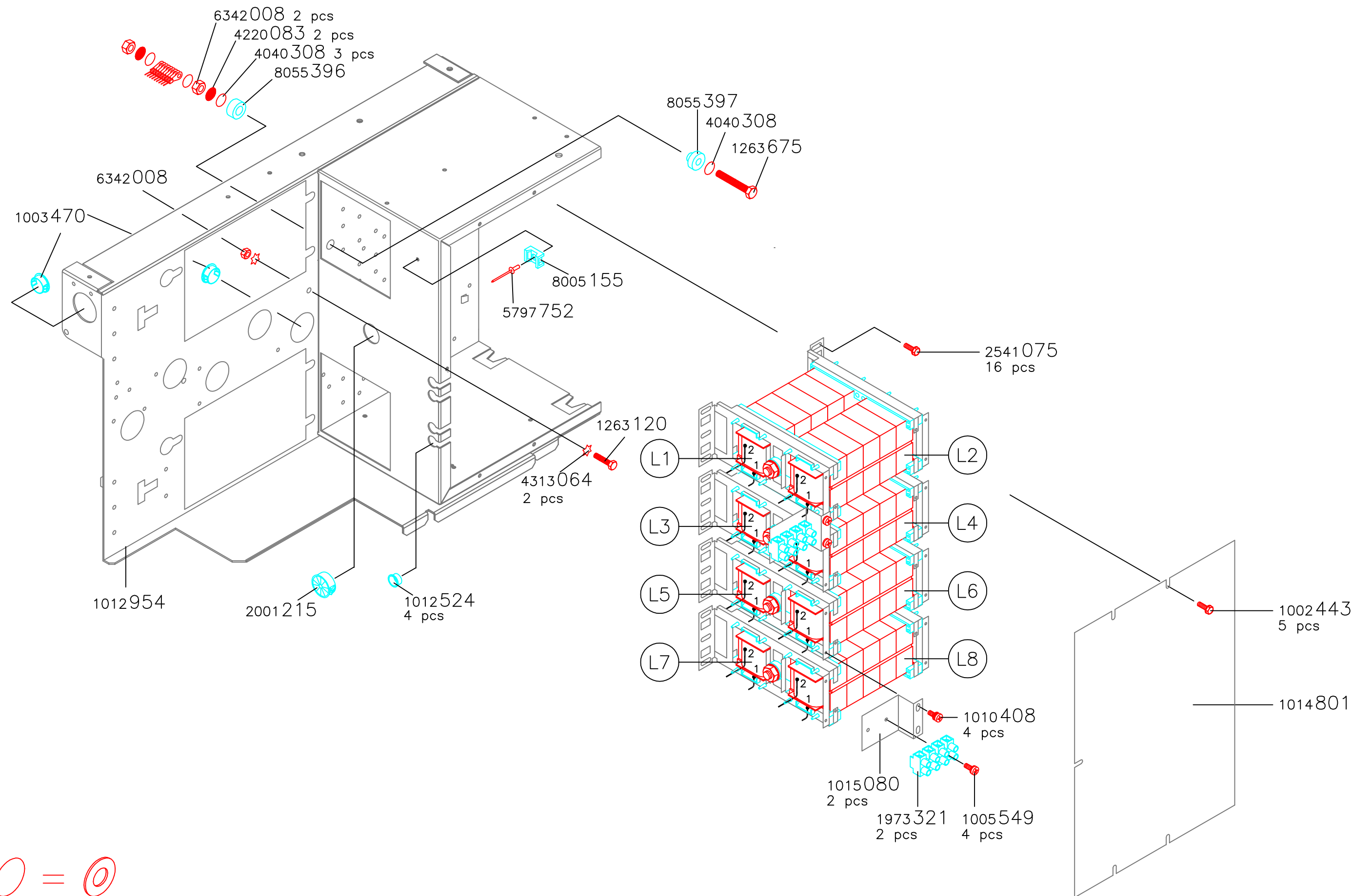| PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002443	SCREW T HEX M5x8 DIN7500D	58.000	
1004944	SCREW K M4x8 PZ DIN7985A+6907	12.000	
1006840	SCREW FLAT M5x10 PZ DIN 965	24.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	4.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	1.000	
1009886	SCREW K M5x10 PZ DIN6902A+6905	6.000	
1010866	RAIL 3N45 VERTICAL 1412 mm A3	4.000	
1010867	RAIL 3N45 SIDE LOWER 675mm A3	2.000	
1010868	RAIL 3N45 SIDE UPPER 675mm A3	2.000	
1010870	AXLE 3N45 WHEEL A4	6.000	
1011256	WHEEL 3N45 YKI-70 N	6.000	
1011257	RAIL EXTENSION SLIDE DZ0531	2.000	
1011674	PACKM 3N20-60 PALLET UPS A3	1.000	
1011685	PLATE 3N45 WHEEL HOLDER A4	6.000	
1011710	PLATE 3N45 HORIZONAL SLIDE A3	1.000	
1012194	PLATE 3N45 BAT-E BOTT UPPER A4	1.000	
1012198	RAIL BAT-E FRONT/REAR 433mmA4	4.000	
1012836	SCREW MSN M8x50 8.8 ISO8677	4.000	
1012954	PLATE 3N60 LOWER SLEDGE A3	1.000	
1012975	PLATE 3N60 LOWER CHOKE BOX A3	1.000	
1013948	PLATE 3N45 SLIDERAIL SUPP. A3	2.000	
1014223	PLATE 3N30 FOOT A4	2.000	
1014239	PLATE 3N60 CROSS SLIDE A3	1.000	
1014243	PLATE 3N60 SLEDGE SUPPORT A4	1.000	
1014635	PLATE 3N60 FLANGE BLIND A4	1.000	
1014641	PLATE 3N60 UPPER SLEDGE A3	1.000	
1014781	PLATE 3N60 UPPER CHOKE BOX A3	1.000	
1014799	PLATE 3N60 UPPER SUPPORT A4	1.000	
1014802	PLATE 3N60 BOTTOM LOWER A4	1.000	
1014941	D ASSY 3N60 DWG I010 A3	.000	
1263040	SCREW HEX M6X10 TENSILOCK	4.000	
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	4.000	
1264120	SCREW HEX M10x30 8.8A1 ISO4017	8.000	
2001241	CLAMP CAPACITOR MOUNTING	4.000	
2541075	SCREW T HEX M5X12 DIN7500D	4.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	8.000	
4220083	WASHE SPRING 8.1 M FE SINK	8.000	
4313105	WASHE LOCK-SER M10 FE DIN6798A	8.000	
6342008	NUT HEX M8 G8 A2 ISO 4032	4.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
9513639	FOOT ADJUSTABLE M12x60 TEKAMA	4.000	
9514160	ANGLE PIECE OUTER (A) F	8.000	
9514161	ANGLE PIECE INNER (B) F	8.000	

E9

4 pcs
1010669

4 pcs
4313042

1014641

18 pcs
2541075

7 pcs
1002443

L9   L10
L11   L12
L13   L14
L15   L16
L17   L18
L19   L20

C15
C16
C17
C18
C19
C20
C21
C22
C23

E7

E8

1012524
12 pcs

1973321
3 pcs

1005549
6 pcs

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POWERWARE	Title ASSEMBLY:		I 020		
	INVERTER FILTER		No		Rev
	3N60		10 14 942		C
	Checked TK	Approved 06.09.1999 AV	Loc FIN	Size A3	Page 1 / 3

6342008 2 pcs
4220083 2 pcs
4040308 3 pcs
8055396

8055397
4040308
1263675

6342008

1003470

8005155

5797752

2541075
16 pcs

1263120

4313064
2 pcs

L1 L2
L3 L4
L5 L6
L7 L8

1002443
5 pcs

1012954

2001215

1012524
4 pcs

1010408
4 pcs

1015080
2 pcs

1973321
2 pcs

1005549
4 pcs

1014801

Rev/ECO no:

C/12321 VK
A/12025 AVa
B/12139 VK

Rev/ECO no:

Title	ASSEMBLY DRAWING		I 020	
	RECTIFIER MOD & CHOKES		No	Rev
	3N60		10 14 942	C
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POWERWARE

RECTIFIER

INVERTER

L1 L2
L3 L4
L5 L6
L7 L8

L9 L10
L11 L12
L13 L14
L15 L16
L17 L18
L19 L20

POWERWARE	Title ASSEMBLY : WIRING		I 020		
	CHOKES		No		Rev
	3N60		10 14 942		C
	Checked TK	Approved 06.09.1999 AV	Loc FIN	Size A3	Page 3 / 3

B1

B2

B3

1014611

12 pcs
2545021

POWERWARE

Title	ASSEMBLY:		I 090		
	TRANSFORMERS B1 – B3		No		Rev
	3N40-80		10 14 949		C
Checked TK	Approved 07.10.1999 AV	Loc FIN	Size A3	Page	1 / 1

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014244e**
SUBAS 3N60 FILTER PARTS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000296	CAPAC PRO 60uF 450V M12 AL	9.000	C15-23
1000304	TRAFO CUR. 2/4/600A 0,4A 10VA	3.000	B1-3
1002443	SCREW T HEX M5x8 DIN7500D	12.000	
1003470	BUSH SNAP-IN d 33mm HOLE 38mm	2.000	
1005549	SCREW K M4x25 DIN7985+6798	10.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	6.000	
1010153	SCREW PZ M4x60 Fe ISO 7045	15.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1010669	SCREW PZ M4x45 Fe ISO 7045	12.000	
1011209	FANCW 119x119x38 44l/s 230V .5	8.000	E1, 3, 5, 7-
1011209	FANCW 119x119x38 44l/s 230V .5	8.000	10, 12
1011589	FANCC 119x119x38 44l/s 230V .5	5.000	E2, 4, 6, 11,
1011589	FANCC 119x119x38 44l/s 230V .5	5.000	13
1012257	PLATE 3N45 FAN MOUNTING A3	2.000	
1012524	BUSH OPEN/CLOSED INSIDE d10mm	16.000	
1013012	PLATE 3N30 FAN HOLDER A3	5.000	
1014259	SET 3N60 CABLE INVERTER FILTER	1.000	
1014611	PLATE 3N60 TRANSFORM. HOLDER A4	1.000	
1014665	CAPAC PRO 15uF 630VDC M8 AL	6.000	C1-6
1014801	PLATE 3N60 CHOKE COVER LOWERA4	1.000	
1014942	D ASSY 3N60 DWG I020 A3	.000	
1014949	D ASSY 3N60 DWG I090 A3	.000	
1015080	PLATE 3N60 CONNE HOLDER A4	2.000	
1015189	CHOKES A3 SUBAS 3N60 RECTIFIER	4.000	L1-8
1015190	CHOKES A3 SUBAS 3N60 INVERTER	6.000	L9-20
1019144	PLATE 3N80 CAPACITOR ATTCHA3	1.000	
1019276	ASSY 3N80 CAPACITOR ATTACH A4	1.000	
1019308	PLATE 3N80 CHOKE COVER UPPERA3	1.000	
1019382	SPACR M6 L25 S/S PA66 A4	6.000	
1019894	D ASSY 3N60 DWG I090 A3	.000	
1019895	D ASSY 3N40-80 DWG I090 A3	.000	
1019907	D ASSY 3N60 DWG I090 A3	.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
1263675	SCREW HEX M8X55 M8.8 ISO4014	1.000	
1973321	CONNE 12x16mm2 TERMINAL BLOCK	2.170	
2001215	INLET PST D=28MM BLACK #	1.000	
2364004	WASHE WAVE M6 KBA FE ZINK	6.000	
2541075	SCREW T HEX M5X12 DIN7500D	34.000	
2545021	PLATESCE. AB2.9*9.5 FEZN D7981	12.000	
4040304	WASHE PLAIN M4 Fe ISO 7089	4.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	4.000	
4220083	WASHE SPRING 8.1 M FE SINK	2.000	
4313042	WASHE LOCK-SER M4 FE DIN6798A	31.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	8.000	
5797752	BLIND RIVET TAP D56	1.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	12.000	
6342008	NUT HEX M8 G8 A2 ISO 4032	4.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	1.000	
8052457	FUSE 160A 240V UR 160LET	3.000	F6, 7, 8
8055396	INSUL BUSH 642353A/1 8/22MM	1.000	
8055397	INSUL BUSH 642353A/2 8/22MM	1.000	
8090011	SPACR M4 L10 FeZn	4.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1018617a1**
PW9305-40I-NX-0

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
05146746-03	SOFTWARE SUITE	1.000
1006726	CABLE SIGNAL RS232	1.000
1009917	SAFETY MANUAL	1.000
1009964	LABEL WARNING GENERAL EUROPEA3	1.000
1009965	LABEL WARNING 9/10k EUROPE A3	1.000
1010201	PACKM PLASTIC BAG FOR A4 DOC	1.000
1012361	PCBAS 3N45 D-SUB ADAPTER BOARD	1.000
1012418	SUBAS PACKM 3N45E/F	1.000
1012428	LABEL 3N60 FRONT PANEL PRIMEA4	1.000
1015543	USER'S MAN 20-60kVA GENERIC A4	1.000
1017443	BASIC 3N40	1.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017443a1**

BASIC 3N40

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1017457	SUBAS 3N40 EM	1.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017457d**
SUBAS 3N40 EM

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1012125	SUBAS 3N20-80 DISPLAY	1.000	A11
1012155	ICCPU H8/3337 PLCC 84P I2C OPT	1.000	
1014249	FRAME 3N60 CABINET	1.000	
1014253	SUBAS 3N60 BREAKERS	1.000	
1014256	SUBAS 3N60 LOGIC&CHARGER	1.000	
1017445	FINAL 3N40 ASSY	1.000	
1017446	SET 3N40 PCBAS	1.000	
1017447	SUBAS 3N40 FILTER PARTS	1.000	A4
1017451	SUBAS 3N40 POS BOOST MODULE	1.000	A2
1017452	SUBAS 3N40 NEG BOOST+REC MOD	1.000	A3
1017453	SUBAS 3N40 INVERTER MODULE	3.000	
1017482	SUBAS 3N40 MBS	1.000	
1019386	FRAME 3N80 CABINET	1.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1017445d**   **page1**

FINAL 3N40 ASSY

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000194	CONNE TERM BLOCK 35mm2 GREY	3.000	
1000704	LABEL UPDATE RECORD STICKER A4	1.000	
1000924	HINGE PART3 OF HINGES/CABINETS	2.000	
1001190	LABEL INSPECT STATUS STICKER	1.000	
1002443	SCREW T HEX M5x8 DIN7500D	30.000	
1003549	SPACR NYLON L=9,5mm LCBS-6	2.000	
1005239	CLAMP FLAT CABLE CLIP W31xH6mm	6.000	
1006840	SCREW FLAT M5x10 PZ DIN 965	4.000	
1006840	SCREW FLAT M5x10 PZ DIN 965	5.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	64.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	6.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	
1010876	PANEL 3N45 SIDE A3	2.000	
1010878	PLATE 3N45 FRONT A3	1.000	
1010880	ASSY 3N45 DOOR A3	1.000	
1011356	PLATE 3N45 HINGE INNER A4	2.000	
1012061	LOCK LATCH LIFT&TURN 62-70-11	1.000	
1012112	PLATE 3N45 SHIELD A4	1.000	
1012119	ASSY 3N45 RAIL CURR BUSSB- A4	1.000	
1012120	ASSY 3N45 RAIL CURR BUSSB+ A4	2.000	
1012201	PANEL BAT-E ROOF A3	1.000	
1012464	PLATE 3N45 HINGE BAR A3	1.000	
1012474	INSUL 3N45 INVERT CURR RAIL A3	2.000	
1012610	PLATE 3N45 CABLE LEAD THROU A4	1.000	
1012970	PCBAS 3N60P STATIC SWITCH	1.000	A8
1013456	D TEST INSTR 3N45/60 CAA TESA4	.000	
1014116	LABEL 3N30 WARNING A4	1.000	
1014235	PLATE 3N60 UPS BACK A3	1.000	
1014264	CONTA 3PH 115A COIL 24VDC	1.000	K1
1014267	SET 3N60 CABLE ELEC 3	1.000	
1014273	SET 3N60 CABLE ELEC 4	1.000	
1014331	D TEST INST 3N60 INV MOD E	.000	
1014332	D TEST INST 3N60 INV MOD FI	.000	
1014333	D SCHEMA 3N60 MAIN CIRCUITS	.000	
1014375	PLATE 3N60 CONTACTOR SUPP. A4	1.000	
1014384	PLATE 3N60 HOLDER FOR BREAK.A4	1.000	
1014508	PLATE 3N60 REC BOARD MOUNT1 A4	1.000	
1014509	PLATE 3N60 REC BOARD MOUNT2 A4	1.000	
1014633	PLATE 3N60 FRONT COVER A3	1.000	
1014637	RAIL 3N60 BREAKERS ATTACH A4	1.000	
1014640	PLATE 3N60 BYPASS SHIELD PC A4	1.000	
1014642	PLATE 3N60 SWITCH BOARD SUP.A3	1.000	
1014879	PANEL 3N60 RIGHT FRONT A3	1.000	
1014948	D ASSY 3N60 DWG I080 A3	.000	
1014950	D ASSY 3N60 DWG I100 A3	.000	
1014951	D ASSY 3N60 DWG I110 A3	.000	
1015170	PLATE 3N20-30 COVER	1.000	
1015234	PLATE 3N60 BREAKER SHIELD A3	1.000	
1015455	LATCH 3N60 DOOR A4	1.000	
1015571	USE INSTR 3N60 BURN-IN TESTER	.000	

FINAL 3N40 ASSY

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1017448	PCBAS 3N20-80 BOOST BOARD	1.000	A4
1018760	D TEST INSTR 3N40 FINAL FIN A4	.000	
1018761	D TEST INSTR 3N40 FINAL ENG A4	.000	
1018762	D TEST REPORT 3N40 FINAL A4	.000	
1018848	SET 3N40 CABLE ELEC 2	1.000	
1019023	PLATE 3N80 SIDE A3	1.000	
1019024	PANEL 3N80 RIGHT FRONT A3	1.000	
1019034	PLATE 3N80 ROOF A3	1.000	
1019040	PLATE 3N80 FRONT A3	2.000	
1019083	PLATE 3N80 UPS BACK A3	1.000	
1019085	PANEL 3N80 SIDE A3	2.000	
1019193	ASSY 3N80 DOOR A3	1.000	
1019306	PLATE 3N80 REC BOARD MOUNT1 A4	1.000	
1019307	PLATE 3N80 REC BOARD MOUNT2 A4	1.000	
1019342	ASSY 3N80 RAIL CURR BUSSB+ A4	1.000	
1019344	ASSY 3N80 RAIL CURR BUSSB- A4	2.000	
1019347	ASSY 3N80 RAIL CURR BB-N A4	2.000	
1019508	D ASSY 3N80 DWG I080 A3	.000	
1019518	D ASSY 3N80 DWG I120 A3	.000	
1019900	D ASSY 3N60 DWG I080 A3	.000	
1019901	D ASSY 3N60 DWG I080 A3	.000	
1019935	D ASSY 3N40-80 DWG I110 A3	.000	
1263040	SCREW HEX M6X10 TENSILOCK	4.000	
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	1.000	
2541075	SCREW T HEX M5X12 DIN7500D	2.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	1.000	
4313082	WASHE LOCK-SER M8 FE DIN6798A	1.000	
8004939	CONNE ACC END CLAMP TS35 RAIL	2.000	
8005150	TIE CABLE L=102mm W=2.5mm	50.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8055457	TIE CABLE L=172mm W=4.6mm	50.000	
8063123	SPACR NYLON L=12.7mm LCBS-8	9.000	
9514158	WASHE BUTTON 4KM-3073 F	2.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1017451b**
SUBAS 3N40 POS BOOST MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	4.000	C7-10
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	11.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	
1010505	LABEL BAR CODE	1.000	
1011675	PCBAS 3N30-60 POS SNUBBER BRD	1.000	A1
1011738	RAIL 3N45 Cu BOOST CAP +N A4	1.000	
1011739	RAIL 3N45 Cu BOOST CAP + A4	1.000	
1011751	PLATE 3N45 CAP MOUNTING REC A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1012121	ASSY 3N45 RAIL CURR BOOST- A4	1.000	
1012122	ASSY 3N45 RAIL CURR BOOST+ A4	1.000	
1012123	ASSY 3N45 RAIL CURR BOOSTN A4	1.000	
1012476	INSUL 3N45 BOOST CURR RAIL A4	1.000	
1014226	HEATS 3N60 POS BOOST A3	1.000	
1014266	SET 3N60 CABLE POS BOOST	1.000	
1014505	RAIL CURRENT 2x6.6mm HOLE A4	3.000	
1014945	D ASSY 3N60 DWG I050 A3	.000	
1018688	IGBT 2x300A 600V HALF BRIDGE	1.000	V11
1018814	SENSR THERMO 060°C C49°C NC	1.000	S2
1018876	SENSR THERMO 065°C C55°C NC	1.000	S1
1263050	SCREW HEX M6X12 8.8 A1 ISO4017	9.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	
2364004	WASHE WAVE M6 KBA FE ZINK	9.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	MITSU
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	
8005150	TIE CABLE L=102mm W=2.5mm	2.000	
8040403	THYRI MOD 130A 1600V	3.000	V12-14

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017452b**
SUBAS 3N40 NEG BOOST+REC MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S2
1009859	SCREW K M5x12 PZ DIN6902A+6905	11.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	17.000	
1010505	LABEL BAR CODE	1.000	
1011676	PCBAS 3N30-60 NEG SNUBBER BRD	1.000	A1
1011740	RAIL 3N45 Cu BOOST CAP -N A4	1.000	
1011741	RAIL 3N45 Cu BOOST CAP - A4	1.000	
1011743	RAIL 3N45 CURR RECTIFIER A4	2.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1012476	INSUL 3N45 BOOST CURR RAIL A4	1.000	
1013768	THYRI MOD 105A 1600V	2.000	V8,9
1014227	HEATS 3N60 NEG BOOST+RECT A3	1.000	
1014381	DIODE MOD 100A 1600V	3.000	V5-7
1014945	D ASSY 3N60 DWG I050 A3	.000	
1018688	IGBT 2x300A 600V HALF BRIDGE	1.000	V10
1018814	SENSR THERMO 060°C C49°C NC	1.000	S1
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	MITSU
2364004	WASHE WAVE M6 KBA FE ZINK	3.000	MITSU
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	MITSU
8005150	TIE CABLE L=102mm W=2.5mm	2.000	

INVERTER

1017450

L11   L12

RECTIFIER   1017449

L8

L1   L2   L11/1
                                                     L12/1

L15   L16

                          1973321   L15/1
                          3 pcs   L16/1

L5   L6

                                                     L19/1
                                                     L20/1

L19   L20

                                          1005549
                                          6 pcs

Rev/ECO no:

A/12507 HT

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6342 008 2 pcs
4220 083 2 pcs
4040 308 3 pcs
8055 396

8055 397
4040 308
1263 675

6342 008

1003 470

8005 155

1263 120

5797 752

2541 075
6 pcs

4313 064
2 pcs

1014 637

L1   L2

8004 939
2 pcs

1008 027
4 pcs

L5   L6

1002 443
2 pcs

1012 954

2001 215

1012 524
2 pcs

1002 443
5 pcs

1014 801

Rev/ECO no:

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A/12507 HT

4 pcs
1010669

E9

4 pcs
4313042

1014641

9 pcs
2541075

L12

L11

L16

7 pcs
1002443

L15

C15

C17

1012524
6 pcs

L19

L20

C18

C20

C21

1973321
3 pcs

1005549
6 pcs

C23

$\bigcirc = \odot$

$\bullet = \odot$ $\star = \otimes$

Rev/ECO no:

Rev/ECO no:

A/12507 HT

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1017453b**
SUBAS 3N40 INVERTER MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	2.000	C12, 13
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1008599	INSUL SHEET D 75mm d 12.2mm A4	2.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S2
1009859	SCREW K M5x12 PZ DIN6902A+6905	19.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	10.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	9.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	
1011436	PLATE 3N45 MOUNT INV CAP A4	1.000	
1011729	RAIL 3N45 CURR INVERT NEUT. A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	2.000	
1013768	THYRI MOD 105A 1600V	1.000	V3
1014148	HEATS 3N60 INVERTER A3	1.000	
1014191	RAIL 3N60 CURR INVERT - ALTA4	1.000	
1014268	SET 3N60 CABLE INVERTER MODULE	1.000	
1014308	INSUL 3N60 INVERT CURR RAIL A4	2.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C26
1014506	RAIL 3N60 CURR INVERT + ALTA4	1.000	
1014507	PLATE 3N60 BOARD HOLDER A3	1.000	
1014525	SPACR NYLON L=18mm SNAP-IN PCB	2.000	
1014803	INSUL 3N60 SHEET INV A4	1.000	
1014946	D ASSY 3N60 DWG I060 A3	.000	
1015052	RAIL CURRENT 2x5.5mm HOLE A4	1.000	
1015078	SPACR NYLON L=19.1 SNAP-IN PCB	7.000	
1015079	SPACR M3/M3 I/I L20 FeZn Av7	1.000	
1015130	ASSY 3N60 RAIL CUR.INV.ALT.A4	1.000	
1015591	SPACR M4 L40 S/I PA66	1.000	
1018684	IGBT 2x200A 1200V HALF BRIDGE	1.000	V2
1018814	SENSR THERMO 060°C C49°C NC	1.000	S1
1018846	PCBAS 3N40-60 INVERTER CNTRL 1	1.000	A2
1019338	D ASSY 3N40 DWG I060 A3	.000	
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	1.000	A2
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	
2364004	WASHE WAVE M6 KBA FE ZINK	3.000	
4040303	WASHE PLAIN M3 Fe SS ISO 7089	2.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	
7980015	NUT M12 NYLON FOR EL.CAPAC	2.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017447b** **page1**

SUBAS 3N40 FILTER PARTS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000296	CAPAC PRO 60uF 450V M12 AL	6.000	C15, 17, 18,
1000296	CAPAC PRO 60uF 450V M12 AL	6.000	20, 21, 23
1000304	TRAFO CUR. 2/4/600A 0,4A 10VA	3.000	B1-3
1002443	SCREW T HEX M5x8 DIN7500D	37.000	
1003470	BUSH SNAP-IN d 33mm HOLE 38mm	2.000	
1005549	SCREW K M4x25 DIN7985+6798	10.000	
1006840	SCREW FLAT M5x10 PZ DIN 965	12.000	
1008027	CONNE TERM BLOCK 16mm2 GREY	4.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	14.000	
1010153	SCREW PZ M4x60 Fe ISO 7045	15.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1010669	SCREW PZ M4x45 Fe ISO 7045	12.000	
1011209	FANCW 119x119x38 44l/s 230V .5	6.000	E1, 3, 5, 9,
1011209	FANCW 119x119x38 44l/s 230V .5	6.000	10, 12
1011589	FANCC 119x119x38 44l/s 230V .5	5.000	E2, 4, 6, 11,
1011589	FANCC 119x119x38 44l/s 230V .5	5.000	13
1012524	BUSH OPEN/CLOSED INSIDE d10mm	20.000	
1012836	SCREW MSN M8x50 8.8 ISO8677	2.000	
1013012	PLATE 3N30 FAN HOLDER A3	5.000	
1014184	SPACR M5/M6 S/I L34 PA66 A3	6.000	
1014259	SET 3N60 CABLE INVERTER FILTER	1.000	
1014611	PLATE 3N60 TRANSFORM.HOLDER A4	1.000	
1014637	RAIL 3N60 BREAKERS ATTACH A4	1.000	
1014665	CAPAC PRO 15uF 630VDC M8 AL	6.000	C1-6
1014801	PLATE 3N60 CHOKE COVER LOWERA4	1.000	
1014936	ASSY 3N60 CAPACITOR ATTACH A4	1.000	
1014949	D ASSY 3N60 DWG I090 A3	.000	
1015080	PLATE 3N60 CONNE HOLDER A4	2.000	
1017449	SUBAS 3N40 RECTIFER CHOKES A3	2.000	L1, 2, 5, 6
1017450	SUBAS 3N40 INVERTER CHOKES A3	3.000	L11, 12, 15,
1017450	SUBAS 3N40 INVERTER CHOKES A3	3.000	16, 19, 20
1018360	ASSY 3N40 CONNECTION RAIL A4	6.000	
1018437	ASSY 3N40 UPPER BOX COVER A4	1.000	
1018815	D ASSY 3N40 DWG I020 A3	.000	
1019144	PLATE 3N80 CAPACITOR ATTCHA3	1.000	
1019893	D ASSY 3N60 DWG I090 A3	.000	
1019895	D ASSY 3N40-80 DWG I090 A3	.000	
1019907	D ASSY 3N60 DWG I090 A3	.000	
1263050	SCREW HEX M6X12 8.8 A1 ISO4017	6.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	2.000	
1263675	SCREW HEX M8X55 M8.8 ISO4014	1.000	
1973321	CONNE 12x16mm2 TERMINAL BLOCK	2.170	
2001215	INLET PST D=28MM BLACK #	1.000	
2001241	CLAMP CAPACITOR MOUNTING	4.000	
2364004	WASHE WAVE M6 KBA FE ZINK	6.000	
2541075	SCREW T HEX M5X12 DIN7500D	36.000	
2545021	PLATESCE. AB2.9*9.5 FEZN D7981	12.000	
4040304	WASHE PLAIN M4 Fe ISO 7089	4.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	

SUBAS 3N40 FILTER PARTS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
4040308	WASHE PLAIN M8 Fe ISO 7089	8.000	
4220083	WASHE SPRING 8.1 M FE SINK	4.000	
4313042	WASHE LOCK-SER M4 FE DIN6798A	31.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	8.000	
4313082	WASHE LOCK-SER M8 FE DIN6798A	2.000	
5797752	BLIND RIVET TAP D56	1.000	
6342008	NUT HEX M8 G8 A2 ISO 4032	5.000	
8004939	CONNE ACC END CLAMP TS35 RAIL	2.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	1.000	
8052457	FUSE 160A 240V UR 160LET	3.000	F6,7,8
8055396	INSUL BUSH 642353A/1 8/22MM	1.000	
8055397	INSUL BUSH 642353A/2 8/22MM	1.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017482a**
SUBAS 3N40 MBS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000194	CONNE TERM BLOCK 35mm2 GREY	9.000	
1000195	CONNE TERM BLOCK 35mm2 BLUE	3.000	
1001559	CONNE ACC END CLAMP WEW 35	2.000	
1002443	SCREW T HEX M5x8 DIN7500D	6.000	
1003011	CONNE ACC JUMPER 2 POLE 50mm2	1.000	
1004936	HOLDE STRAIN RELIEF d 26-30mm	4.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	4.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	24.000	
1011179	SWITCH 115A 3PH+AUX CHANGE OVER	1.000	S2
1011214	CONNE PE-RAIL 6x35mm2 TS35	1.000	
1012221	LABEL 3N45 TERMINALS A4	.000	
1012470	SPACR M4(10) I/I L30 FeZn Av7	11.000	
1012524	BUSH OPEN/CLOSED INSIDE d10mm	2.000	
1014228	PLATE 3N60 CONNECTOR ATTCH. A3	1.000	
1014237	RAIL 3N60 TERM. BLOCK ATTCH.A4	1.000	
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000	
1014258	PCBAS 3N60 RFI BOARD	1.000	A9
1014269	SET 3N40-60 CABLE MBS	1.000	
1014944	D ASSY 3N60 DWG I040 A3	.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
2000283	LABEL VDE GROUNDING STICKER #	1.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	1.000	
4313051	WASHE LOCK-SER M5 FE DIN6798A	4.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	3.000	
6342005	NUT HEX M5 G8 A2 ISO 4032	4.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	2.000	
8005156	TIE CABLE L=381mm W=4.6mm	1.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.400	
8080293	PACKM PLASTIC BAG 160x250 MING	1.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1018848c**
SET 3N40 CABLE ELEC 2

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1011754	CABLE 3N45 E1-E8 INV MODULE A4	4.000
1011898	CABLE 3N45 INV CHOKE-INVMOD A4	3.000
1011900	CABLE 3N45 INV CHOKE-INV X7 A4	3.000
1014424	CABLE 3N60 AUXP-RAIL RECT N A4	2.000
1014443	CABLE 3N60 F6 - F4/L1 A4	1.000
1014444	CABLE 3N60 F7 - F4/L2 A4	1.000
1014445	CABLE 3N60 F8 - F4/L3 A4	1.000
1014446	CABLE 3N60 F4/L1 - V10/1 A4	1.000
1014447	CABLE 3N60 F4/L2 - V11/1 A4	1.000
1014448	CABLE 3N60 F4/L3 - V12/1 A4	1.000
1014806	CABLE 3N60 INV N RAIL-NPOLE A4	2.000
1014807	CABLE 3N60 INV +RAIL-BOOST+ A4	1.000
1014808	CABLE 3N60 INV -RAIL-BOOST- A4	1.000
1018851	CABLE 3N40 RECT L2/4-NBOOST A4	2.000
1018852	CABLE 3N40 RECT L6/8-PBOOST A4	2.000
1018853	CABLE 3N40 RECT L5/7-RECT+ A4	2.000
1018854	CABLE 3N40 RECT L1/3-RECT- A4	2.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1017446b**
SET 3N40 PCBAS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1011675	PCBAS 3N30-60 POS SNUBBER BRD	.000	1 EA
1011676	PCBAS 3N30-60 NEG SNUBBER BRD	.000	1 EA
1012056	PCBAS 3N30-60 DISPLAY WO PROG	.000	1 EA
1012084	PCBAS 3N45 REMOTE TEMP.SENSOR	.000	1 EA
1012361	PCBAS 3N45 D-SUB ADAPTER BOARD	.000	1 EA
1012970	PCBAS 3N60P STATIC SWITCH	.000	1 EA
1013701	PCBAS 3N30-80 CHARGER WO PROG	.000	1 EA
1014258	PCBAS 3N60 RFI BOARD	.000	1 EA
1014585	PCBAS 3N30/60 LOGIC WO PROG	.000	1 EA
1015159	PCBAS 3N60 YCAP	.000	1 EA
1017448	PCBAS 3N20-80 BOOST BOARD	.000	1 EA
1018846	PCBAS 3N40-60 INVERTER CNTRL 1	.000	3 EA
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	.000	3 EA

BATTERY CABINET

Temp sensor
X1
X2
F2 F1

Temp sensor
X1
X2
F2 F1

BATTERY CABINET

BYPASS INPUT
3x400V
50Hz

X2
A9/1 RFI
L1 X11 X29
L2 X10 X28
L3 X9 X27
N X8 X26

5 6
7 8
17 18
25,27 26,28

MAINTENANCE BYPASS UPS
S2

C31
J1/P1
F2
C28

BATTERY CONNECTION
C2 C1
C3
X6
C28

X6
X10
X9

NEG BOOST/ RECTIFIER
A3/2

L5 L6
L7 L8

B7

POS BOOST/ STATIC SWITCH
A2/1

S3
S2
S1

+DC
N
−DC

INVERTER L1
INVERTER A6/A3 CONTROL 2 BRD
X200 X201
INVERTER A6/A2 CONTROL 1 BRD
X5 X6

A6

C11 C12
C13 C14
V1

S1 S2
V2

C29 C30
X3

L9
L10
L11
L12

X1 X9 X100 X101
N
20

V3

POS BOOST/ STATIC SWITCH
A2/2

V12

PHASE1
B1

MECH BYPASS
S2

UPS OUTPUT
3x400V
50 Hz

X3
X21 X3 L1

BATTERY CHARGER BRD
A1

V8
V5 V6 V7
C4
C5
C6
X4
X5

X1 X3 X13

E12,13

POS SNUB. BRD
A2/A1

C28
V11
X3

X3
X2
X1

INVERTER L2
A7

L13 L14
L15 L16
X3
V3
20
N

V13
PHASE2
B2

RFI A9/3

11 12
9 10
X20 X2 L2
X16/3

BOOST BOARD
A4

X20
X7

X12
X17 X1
10

X30
X40b

NEG SNUB. BRD
A3/A1

V10
X2
C10
C9
X1
S3
X3

E10,11

INVERTER L3
A8

L17 L18
L19 L20
X3
V3
20
N

V14
PHASE3

B3

13 14
15 16
X19 X1 L3
X16/1

X18
X12
X6
X22
X15 X9 X19 X8
N

V9

A3/1 NEG BOOST/ RECTIFIER

S2
S1

C25 C23
C26 C24
C21 C19 C17 C15
C22 C20 C18 C16
E5
E6 E3 E4
E14

STATIC SWITCH BRD
A8
X10 X9 X8
X4

29,31 30,32
22,24 21,23
X22 X4 N
PE

F3

OFF/ON SWITCH
S1

RECTIFIER INPUT
3x400V
50Hz

X1
A9/2 RFI
L1 X7 X25
L2 X6 X24
L3 X5 X23
N

F1
K1

L1 L2
L3 L4

3 4
1 2
26 3

DISPLAY BRD
A11
X4b X216
X6

X3
X210
1 2

X1 X2 X7

X8 X208 X209
X125 X103

A10 LOGIC BRD

X104 X105
X123 X124

X112

X203
X202

X5 service outlet

X100 X101 X102 X4
X100 X101 X102
RS1 RS2 Relay Emerg
Modem inter- power
face off

X219
X219 X220 X221 X222
Gener. Remote inv Extern. Envir-
on inp. on/off inp. Bypass onment
Sw. inp alarm
inp.

X204 X210 X107 X108
X7 X13
Trafo Filter Bypass External
over over back- charger
temp temp feed enable

POWERWARE

Title
SCHEMATIC DRAWING
MAIN CIRCUITS
3N80
No 10 19 388
Rev B
Checked EP
Approved 24.01.02/TT
Loc FIN
Size A3
Page 1 / 2

Circuits for 3N80NHS

BATTERY CABINET

Temp sensor
X1
X2
F2 F1

Temp sensor
X1
X2
F2 F1

BATTERY CABINET

BYPASS INPUT 3x400V 50Hz

X2

A9/1 RFI
L1 X11 X29
L2 X10 X28
L3 X9 X27
N X8 X26
J2/P2

BATTERY CONNECTION

J1/P1
F2
C31
C28

NEG BOOST/ RECTIFIER A3/2

L5 L6
L7 L8
B7

POS BOOST/ STATIC SWITCH A2/1

INVERTER L1
POS BOOST/ STATIC SWITCH A2/2

A6
INVERTER A6/A3 CONTROL 2 BRD
X200 X201
INVERTER A6/A2 CONTROL 1 BRD
X5 X6
X1 X9 N X100 X101
20

+DC
N
-DC

C11 C12
C13 C14
V1
S1 S2
V2
C29 C30
X3
L9 L10 L11 L12
V3
F6
V12
PHASE1 B1

INVERTER L2
A7

X3
L13 L14 L15 L16

INVERTER L3
A8

X3
L17 L18 L19 L20

RFI A9/3
L21
L22
L23

UPS OUTPUT 3x400V 50 Hz

X21 X3 L1
X2 L2
L3
X1
X20
X4 N

BATTERY CHARGER BRD A1

V8
V5 V6 V7
C4 C5
C6
X1 X3 X13

BOOST BOARD A4
V9 C1
X5 X20 X7 X12

POS SNUB. BRD A2/A1
C28
V11
X3 X2 X1

NEG SNUB. BRD A3/A1
V10
X2 X2

S3
S2
S1
S3
S2
S1

C3

E12,13
E10,11

RECTIFIER INPUT 3x400V 50 Hz

A9/2 RFI F1
L1 X7 X25
L2 X6 X24
L3 X5 X23
N

K1

X18
X12
X6
X22
X15 X9 X19 X8
N

OFF/ON SWITCH S1

DISPLAY BRD A11
X4 X216

I/O BRD A300
X2

3
4
1
2

L1 L2
L3 L4
26 3

B6

A3/1 NEG BOOST/ RECTIFIER

N
Ø

C25 C23 E5 C21 C19 C17 C15
C26 C24 C22 C20 C18 C16

PHASE2 B2
V13
F7
20
N

PHASE3 B3
V14
F8
20

STATIC SWITCH BRD A8
X10 X9 X8 X21
X4

E15
E2
E1
X16
X22

OUTPUT TRIPPING SWITCH S2

PE

F3

service outlet X5

X203 X202

I/O-CONNECT BRD A5
X2
X3b X4b
Parallel UPS
10

X100 X101 X102 X4
X219
X100 X101 X102
9 16
RS1 RS2 Modem
Relay interface
Emerg power off
X219 X220 X221 X222
Gener. inp.
Remote on/off inp.
Extern. inv Bypass Sw. inp
Enviroment alarm inp.

X204 X210 X107 X108
X7 X13
X11 X13
Trafo over temp
Filter over temp
Bypass back-feed
External charger enable

X1 X2 X7
X210
X8 X208 X209
X125 X103
X104 X105
X123 X124
X112

A10 LOGIC BRD

Rev/ECO no:
A/12640 TT
B/12730 jS

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POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019220a**
PW9305-80I-N-0

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
05146746-03	SOFTWARE SUITE	1.000	
1006726	CABLE SIGNAL RS232	1.000	
1009917	SAFETY MANUAL	1.000	
1009964	LABEL WARNING GENERAL EUROPEA3	1.000	
1009965	LABEL WARNING 9/10k EUROPE A3	1.000	
1010201	PACKM PLASTIC BAG FOR A4 DOC	1.000	
1012361	PCBAS 3N45 D-SUB ADAPTER BOARD	1.000	
1012418	SUBAS PACKM 3N45E/F	1.000	
1012428	LABEL 3N60 FRONT PANEL PRIMEA4	1.000	
1015543	USER'S MAN 20-60kVA GENERIC A4	1.000	
1019119	BASIC 3N80	1.000	
1019137	D PROD TREE PW9305-80I-N-0 A4	.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019119a**
BASIC 3N80

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1019118	SUBAS 3N80 EM	1.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019118a**
SUBAS 3N80 EM

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1012125	SUBAS 3N20-80 DISPLAY	1.000	A11
1012155	ICCPU H8/3337 PLCC 84P I2C OPT	1.000	
1019221	SUBAS 3N80 FILTER PARTS	1.000	A4
1019222	SUBAS 3N80 NEG BOOST+REC MOD	1.000	A3
1019223	SUBAS 3N80 POS BOOST MODULE	1.000	A2
1019224	FINAL 3N80 ASSY	1.000	
1019225	SUBAS 3N80 INVERTER MODULE	3.000	A6-8
1019226	SUBAS 3N80 BREAKERS	1.000	
1019227	SUBAS 3N80 MBS	1.000	
1019386	FRAME 3N80 CABINET	1.000	
1019390	SUBAS 3N80 LOGIC&CHARGER	1.000	
1019441	SET 3N80 PCBAS	1.000	

F6
E7
F7
E8
F8

1019 275

1019 314
3 pcs

E1/2
E3/4
E5/6

9 pcs
1009 859

C14
C11
A6
A7
A1
A8

9 pcs
1009 859

Rev/ECO no:

Rev/ECO no:

A/12640 HT

A3

A2

1009859
6 pcs

POWERWARE

Title	ASSEMBLY:	I 080		
	BOOST MODULES	No		Rev
	3N80	10 19 608		A
Checked IN	Approved 12.04.2002 HT	Loc FIN	Size A3	Page 2 / 3

1002443
2 pcs

1019142

1002443
3 pcs

1009859
2 pcs

2000283

Rev/ECO no:

Rev/ECO no:

A/12640 IN

POWERWARE	Title	ASSEMBLY:		I 080		
		MOK & FUSE PLATE		No		Rev
		3N80		10 19 608		A
	Checked JKet	Approved 21.03.200 IN	Loc FIN	Size A3	Page 3 / 3

X11　X10　X9　X8　X7　X6　X5　X4　X3　X2　X1

BLUE

BLUE

L1	L2	L3	N	N	L1	L2	L3	N	L1	L2	L3
X2 BYPASS INPUT				X1 RECTIFIER INPUT				X3 UPS OUTPUT			

Rev/ECO no:

Rev/ECO no:

A/12640 HT
B/12784 JK

POWERWARE

Title	ASSEMBLY: WIRING	I 040		
TERMINAL		No		Rev
3N80		10 19 636		B
Checked JK	Approved 15.08.2002 IN	Loc FIN	Size A3	Page 1 / 2

FOR NHS ONLY

BLUE X8

X4 BLUE

L21 L22 L23

X11 X10 X9 X7 X6 X5

J2/P2

BLUE

BLUE

1 ON

N 0 OFF

L1	L2	L3	N	N	L1	L2	L3	N	L1	L2	L3
X2 BYPASS INPUT				X1 RECTIFIER INPUT				X3 UPS OUTPUT			

Rev/ECO no:

Rev/ECO no:
A/12395 Tt
B/12784 JK

POWERWARE

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019226a**
SUBAS 3N80 BREAKERS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000195	CONNE TERM BLOCK 35mm2 BLUE	4.000	
1000197	CONNE ACC END PLATE 35mm2 GREY	1.000	
1000436	CONNE ACC JUMPER 2 POLE 35mm2	2.000	
1002443	SCREW T HEX M5x8 DIN7500D	8.000	
1003835	BUSH OPEN/CLOSED INSIDE d20mm	1.000	
1003848	CONNE TERM BLOCK 2.5mm2 GREY	1.000	
1005548	SCREW K M4x16 DIN7985+6798	1.000	
1010181	WASHE PLAIN LARG M4 Fe ISO7093	2.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1010496	CONNE MALE CONTACT 20-14AWG	1.000	
1010497	CONNE 2P HOUSING MALE PLUG	1.000	
1010888	PLATE 3N45 RIGHT LEG A3	1.000	
1010889	PLATE 3N45 LEFT LEG A3	1.000	
1011437	PLATE 3N45 AUX CONNECTOR A4	1.000	
1012041	CONNE 10A 250V FEM SNAP-IN IEC	1.000	X5
1014229	PLATE 3N60 CONTACTOR ATTCH. A3	1.000	
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000	
1014637	RAIL 3N60 BREAKERS ATTACH A4	1.000	
1014639	TUBE INSUL DIAM 6mm VSR 10	.250	
1014947	D ASSY 3N60 DWG I070 A3	.000	
1015084	PLATE 3N60 BREAKER SUPP. A4	1.000	
1015159	PCBAS 3N60 YCAP	1.000	
1019112	MCCB 160A 415VAC 3P	1.000	F1
1019113	MCCB 160A 750VDC/4P 24VDC	1.000	F2
1019351	SET 3N80 CABLE BREAKERS	1.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
1973320	CONNE 12x4mm2 TERMINAL BLOCK	1.000	
2000208	FUSE CB 10A 250VAC 1P 6.3x0.8	1.000	F3
2001241	CLAMP CAPACITOR MOUNTING	2.000	
2368405	SCREW T X M5X10 FE/ZN DIN7500	2.000	
2541075	SCREW T HEX M5X12 DIN7500D	2.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	2.000	
5797752	BLIND RIVET TAP D56	4.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	1.000	
8004939	CONNE ACC END CLAMP TS35 RAIL	2.000	
8005150	TIE CABLE L=102mm W=2.5mm	2.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	3.000	
8020255	CAPAC PAP 4,7nF 250VAC Y 20%	2.000	C28,31
8030844	FERRI RING 36x23x15 5800nH 25%	2.000	
8055396	INSUL BUSH 642353A/1 8/22MM	1.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8055457	TIE CABLE L=172mm W=4.6mm	2.000	

1011 209
1010 669
2 pcs
4313 042
2 pcs
E15
1013 119
2 pcs
1002 443
2 pcs
1019 602 1010 609
1013 119
2 pcs

4313 051
4 pcs
6342 005
4 pcs
1019 110
S2
1010 408
11 pcs
4040 305
4 pcs
1012 470
11 pcs
1019 228
A9

NOTE!
ASSEMBLED LATER
HUOM!
ASENNETAAN
HYÖHEMMIN

1009 860
4 pcs

1263 120

8055 433

1010 408
11 pcs

S2

1012 524
2 pcs
4313 064
3 pcs
1010 408
6 pcs
6342 006
2 pcs
4040 306
2 pcs

1014 228

1019 583

1002 443
3 pcs
1019 630
1014 237
1002 443
3 pcs
1014 238
8005 156
8080 293

1015 496

L1 | L2 | L3 | N | N | L1 | L2 | L3 | N | L1 | L2 | L3
X2 BYPASS INPUT | X1 RECTIFIER INPUT | X3 UPS OUTPUT

1019 314
1001 559
2 pcs

1015 497
1015 496
1015 497
1015 496

1004 936
4 pcs

O = ⊚   ☆ = ⊛

POWERWARE

Title ASSEMBLY DRAWING
CONNECTOR & MOUNTING PLATE
3N80
I 040
No
10 19 513
Rev
B
Checked JK   Approved 26.02.2002 IN   Loc FIN   Size A3   Page 1 / 2

Rev/ECO no:
A/12640 IN
B/12784 JK

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FOR NHS ONLY

1011 209
E15
1010 669
2 pcs
4313 042
2 pcs
1019 602
1010 609
1010 408
11 pcs

1013 119
2 pcs
1013 119
2 pcs

1012 470
11 pcs

1019 228
A9

1002 443
2 pcs
1018 319

NOTE!
ASSEMBLED LATER
HUOM!
ASENNETAAN
HYÖHEMMIN

1263 120
1009 886
4 pcs

8055 433

1010 408
11 pcs

1019 314
L2/P2

1263 590
2 pcs

4040 308
4 pcs

4220 083
2 pcs

6342 008
2 pcs

1012 524
2 pcs

1012 364

4313 064
3 pcs

1010 408
6 pcs

6342 006
2 pcs

8052 620

4040 306
2 pcs

1014 228

1019 583

1002 443
3 pcs

1014 237

1002 443
3 pcs

1019 630

X2 BYPASS INPUT					X1 RECTIFIER INPUT					X3 UPS OUTPUT		
L1	L2	L3	N	N	L1	L2	L3	N	L1	L2	L3

1014 238

8005 156

8080 293

1015 496

1015 497

1015 496

1019 813

1004 936
4 pcs

S2

1001 559
2 pcs

Kytkimen mukana
Delivered with switch
2 pcs

● = ◉   ○ = ◎   ☆ = ⚙

Rev/ECO no:

A/12640 IN

B/12784 JK

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1019227b**
SUBAS 3N80 MBS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001559	CONNE ACC END CLAMP WEW 35	2.000	
1002443	SCREW T HEX M5x8 DIN7500D	6.000	
1004936	HOLDE STRAIN RELIEF d 26-30mm	4.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	4.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	28.000	
1012470	SPACR M4(10) I/I L30 FeZn Av7	11.000	
1012524	BUSH OPEN/CLOSED INSIDE d10mm	2.000	
1014228	PLATE 3N60 CONNECTOR ATTCH. A3	1.000	
1014237	RAIL 3N60 TERM. BLOCK ATTCH.A4	1.000	
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000	
1015496	CONNE TERM BLOCK 95mm2 GREY	9.000	
1015497	CONNE TERM BLOCK 95mm2 BLUE	3.000	
1019110	SWTCH MBS 3x150A+200A + 2xAUX	1.000	S2
1019228	PCBAS 3N80 RFI BOARD	1.000	A9
1019314	LABEL 3N80 TERMINALS A4	.000	
1019411	SET 3N80 CABLE MBS	1.000	
1019513	D ASSY 3N80 DWG I040 A3	.000	
1019519	D WIRING 3N80 MBS I040 A3	.000	
1019583	PLATE 3N80 RFI-BOARD HOLDER A3	1.000	
1019630	RAIL 3N80 CURR TERM JUMPER A4	1.000	
1019636	D WIRING 3N80 TERMINAL I040 A3	.000	
1019640	D WIRING 3N80 RFI BOARD I040A3	.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
4040305	WASHE PLAIN M5 Fe ISO 7089	4.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	2.000	
4313051	WASHE LOCK-SER M5 FE DIN6798A	4.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	3.000	
6342005	NUT HEX M5 G8 A2 ISO 4032	4.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	2.000	
8005156	TIE CABLE L=381mm W=4.6mm	10.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.400	
8055457	TIE CABLE L=172mm W=4.6mm	5.000	
8080293	PACKM PLASTIC BAG 160x250 MING	1.000	

X21 — 1019425

STL2 — 1019420
1019419 — STL1
BLUE
(MBS) 1014450
BROWN

X20 — 1019426

X19 — 1019427

1019421 — STL3

N-pole — 1019428

N-pole — 1019412

X22 — 1019429

BLUE
1014452 — S2/3-4 | 3 | 4
BROWN

OUTL1 — 1019416

X29 — 1019422
1019423 — X28

OUTL2 — 1019417

OUTL3 — 1019418

X27 — 1019424

1019413
1019430 — X22
1019413
1019413

1019415 — X26

1019521 — X26

BROWN
2 | 1 | S2/1-2 — 1014452
BLUE

Rev/ECO no:

Rev/ECO no:

A/12640 IN

Title ASSEMBLY: WIRING		I 040	
MBS		No	Rev
3N80		10 19 519	A
Checked JKet	Approved 28.02.2002 IN	Loc FIN	Size A3	Page 1 / 1

POWERWARE

POWERWARE

Title	WIRING		I 100		
	CAPAC, FUSES AND THYRISTORS		No		Rev
	3N80		10 19 631		B
Checked IN	Approved 04.04.2002 HT	Loc FIN	Size A3	Page 1 / 3	

Rev/ECO no:
A/12640 HT
B/12807 IN

A10/X208-209

BLACK
RED

E10
E11

BLUE
BROWN
RED
BLACK
X1 X2 X3

BROWN
BLUE

−DC

NEG
A3/1

70°C
BLUE
BROWN
70°C
BLUE
BLUE
BROWN
BLUE
BROWN
80°C

BROWN
YELLOW
RED
BLUE
BLUE

V9

BLUE
BROWN
X12

A1/X17

A4

X2

BLUE

− RAIL

BLUE N−POLE
N
BLUE N−POLE

X13
BROWN
BLUE

X3

+ RAIL

BROWN
YELLOW
RED
BLUE

V8

BLUE

80°C
BROWN
BLUE
BROWN

70°C
BROWN
BLUE

L2
L4
L1
L3

V9−
V9−

V8+
V8+

E12
E13

BLUE
BROWN
BLACK
RED
BROWN
BLUE
X1 X2 X3

+DC

POS
A2/1

BLUE
70°C

A9/X16

E15

BLACK
RED

A10/X208-209

L8
L6
L5
L7

Rev/ECO no:

Rev/ECO no:
A/12640 HT
B/12807 IN

POWERWARE

Title WIRING:		I 100	
BOOST PCBA		No	Rev
3N80		10 19 631	B

| Checked IN | Approved 04.04.2002 HT | Loc FIN | Size A3 | Page 2 / 3 |

POWERWARE	Title	D WIRING 3N80 DWG I040		
	Checked VK		No	10 19 631 Rev B
	Approved IN	27.9.2002	Page	3 (3)

POWERWARE

Rev A
No 10 19 658
Page 1 / 2
Size A3
Loc FIN
FIN
Approved 16.04.2002 HT
Checked IN
I 080

Title
WIRING:
INVERTERS
3N80

E9
BROWN
BLUE

Section A6 / X105/A10

E1—8
X105/A10
E2
BROWN BLUE
E1
BROWN BLUE
A6
E1—8
A2
A3
X3
C11 C12 C13 C14
N
+
−
80°C
70°C
V1
V2
V3
X7
F6
V12
C15—23
C15—23
C15—23
C15—23
BLUE
BLUE
BROWN
C15
C16
C17
C18
L9
L10
L11
L12
E7
BLUE BROWN

Section A7 / X104/A10

E1—8
X104/A10
E4
BROWN BLUE
E3
BROWN BLUE
A7
E1—8
A2
A3
X3
C11 C12 C13 C14
N
+
−
80°C
70°C
V1
V2
V3
X7
F7
V13
BLUE
C15—23
C15—23
C15—23
C19
BLUE
BROWN
C20
C21
C22
L13
L14
L15
L16
E8
BLUE BROWN

Section A8 / X103/A10

E1—8
X103/A10
E6
BROWN BLUE
E5
BROWN BLUE
A8
E1—8
A2
A3
X3
X3/A1
X7/A1
X8/A1
C11 C12 C13 C14
N
+
−
80°C
70°C
V1
V2
V3
X7
F8
V14
F8
BROWN
BLUE
C15—23
C15—23
BLUE
BLUE
BLUE
BROWN
C23
C24
C25
C26
L17
L18
L19
L20
+ RAIL
N-POLE
− RAIL
BROWN BLUE
E14

Rev/ECO no:
Rev/ECO no:
A/12640 HT

4313064
2 pcs

1019382
2 pcs

F6 1019439

4040306
2 pcs

2364004
2 pcs

6342006
4 pcs

1009859
6 pcs

1019276

C15

C16

C17

C18

C19

C20

C21

C22

C23

C24

C25

C26

1019314

1019308

1012257
2 pcs

4040304
4 pcs

4313042
8 pcs

1010669
8 pcs

4313042
4 pcs

8090011
4 pcs

F7

E8

F8

E7

8055433

F6 160A 240V UR

F7 160A 240V UR

F8 160A 240V UR

BLUE
BROWN
E13 C15-26
BLUE C15-26
X7 C15-26
C15-26
C15-26

X3
BLUE
BROWN
E13 C15-26

BLUE C15-26
X7 C15-26

X3
BLUE
BROWN
E13 C15-26

C15-26
X3
BLUE C15-26
X7 C15-26
C15-26

O = ⊙
● = ⊙   ☆ = ⊙

Rev/ECO no:
A/12640 IN
B/12766 IN

1013012

4313042
3 pcs

1010153
3 pcs

(E1)(E3)(E5)
1011209

(E2)(E4)(E6)
1011589

1013012

4313042
3 pcs

1010153
3 pcs

(E10)(E12)
1019116

(E11)(E13)
1019117

☆ = ⊙

POWERWARE	Title ASSEMBLY :		I 090	
	FANS E1-E6, E9-E12		No	Rev
	3N80		10 19 510	B
	Checked JK	Approved 22.02.2002 IN	Loc FIN	Size A3	Page 2 / 2

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT   **1019221b**
SUBAS 3N80 FILTER PARTS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000296	CAPAC PRO 60uF 450V M12 AL	12.000	C15-26
1000304	TRAFO CUR. 2/4/600A 0,4A 10VA	3.000	B1-3
1002443	SCREW T HEX M5x8 DIN7500D	12.000	
1003470	BUSH SNAP-IN d 33mm HOLE 38mm	2.000	
1005549	SCREW K M4x25 DIN7985+6798	10.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	8.000	
1010153	SCREW PZ M4x60 Fe ISO 7045	15.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	8.000	
1010669	SCREW PZ M4x45 Fe ISO 7045	12.000	
1011209	FANCW 119x119x38 44l/s 230V .5	8.000	E1, 3, 5, 7, 8
1011209	FANCW 119x119x38 44l/s 230V .5	8.000	9, 14, 15
1011589	FANCC 119x119x38 44l/s 230V .5	3.000	E2, 4, 6
1012257	PLATE 3N45 FAN MOUNTING A3	3.000	
1012524	BUSH OPEN/CLOSED INSIDE d10mm	16.000	
1013012	PLATE 3N30 FAN HOLDER A3	5.000	
1014611	PLATE 3N60 TRANSFORM.HOLDER A4	1.000	
1014665	CAPAC PRO 15uF 630VDC M8 AL	6.000	C1-C6
1014949	D ASSY 3N60 DWG I090 A3	.000	
1015080	PLATE 3N60 CONNE HOLDER A4	2.000	
1017449	CHOKES A3 SUBAS 3N40 RECTIFER	4.000	L1-8
1017450	CHOKES A3 SUBAS 3N40 INVERTER	6.000	L9-20
1019116	FANCW 119x119x38 63l/s 24VDC	2.000	E10, 12
1019117	FANCC 119x119x38 63l/s 24VDC	2.000	E11, 13
1019144	PLATE 3N80 CAPACITOR ATTCHA3	1.000	
1019276	ASSY 3N80 CAPACITOR ATTACH A4	1.000	
1019308	PLATE 3N80 CHOKE COVER UPPERA3	1.000	
1019352	SET 3N80 CABLE INVERTER FILTER	1.000	
1019382	SPACR M6 L25 S/S PA66 A4	6.000	
1019439	FUSE 180A 240V UR 180LET	3.000	F6, 7, 8
1019510	D ASSY 3N80 DWG I090 A3	.000	
1019586	PLATE 3N80 CHOKE COVER LOWERA4	1.000	
1019647	D ASSY 3N80 DWG I020 A3	.000	
1019682	SCREW HEX M8X60 M8.8 ISO4014	1.000	
1019895	D ASSY 3N40-80 DWG I090 A3	.000	
1263120	SCREW HEX M6X25 8.8 A1 ISO4017	1.000	
1973321	CONNE 12x16mm2 TERMINAL BLOCK	2.170	
2001215	INLET PST D=28MM BLACK #	1.000	
2364004	WASHE WAVE M6 KBA FE ZINK	6.000	
2541075	SCREW T HEX M5X12 DIN7500D	34.000	
2545021	PLATESCE.AB2.9*9.5 FEZN D7981	12.000	
4040304	WASHE PLAIN M4 Fe ISO 7089	4.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	4.000	
4220083	WASHE SPRING 8.1 M FE SINK	2.000	
4313042	WASHE LOCK-SER M4 FE DIN6798A	31.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	8.000	
5797752	BLIND RIVET TAP D56	1.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	12.000	
6342008	NUT HEX M8 G8 A2 ISO 4032	4.000	
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	1.000	
8055396	INSUL BUSH 642353A/1 8/22MM	1.000	
8055397	INSUL BUSH 642353A/2 8/22MM	1.000	
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8090011	SPACR M4 L10 FeZn	4.000	

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1019390c**
SUBAS 3N80 LOGIC&CHARGER

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001560	LABEL MATERIAL A4	.015	
1002549	LABEL MATERIAL TYPE PLATE	3.000	
1003188	HANDL l=120mm h=40mm, Al NATUR	1.000	
1003549	SPACR NYLON L=9,5mm LCBS-6	30.000	
1004944	SCREW K M4x8 PZ DIN7985A+6907	2.000	
1004946	CABLE 1.5mm2 H07V2-K 90°C BLCK	.060	
1005239	CLAMP FLAT CABLE CLIP W31xH6mm	3.000	
1005548	SCREW K M4x16 DIN7985+6798	3.000	
1008512	SCREW K M3x8 DIN7985+6798	4.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	2.000	
1009961	LABEL WARNING GENERAL ENG A3	.180	
1010180	SCREW PZ M4x6 Fe ISO 7045	1.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1010748	ICCPU PIC16C74A-20/P 40PIN	2.000	
1011216	SWTCH 3N45 START 2-POS	1.000	S1
1011355	HEATS 3N45 PROFILE CHARGER A4	1.000	
1012124	SCREW D-SUB UNC4-40/M3 L=4.5mm	4.000	
1012127	CONNE 2P MALE 5,08mm PANEL	1.000	X4
1012155	ICCPU H8/3337 PLCC 84P I2C OPT	.000	
1012184	INSUL FOIL 0.19x110x280 A4	1.000	
1012462	D PROG 3N30/60 DC CONTROL	.000	
1012463	D PROG 3N45 MEASUREMENT	.000	
1012472	LABEL 3N45 WARNING A4	1.000	
1012493	CONNE 3P PLUG 5.08 BL3	4.000	(X102)
1013295	SPACR M4(8) I/S L30 FeZn Av7	1.000	
1013701	PCBAS 3N30-80 CHARGER WO PROG	1.000	A1
1014257	SET 3N60 CABLE LOGIC&CHARGER	1.000	
1014270	SET 3N60 FLAT CABLES	1.000	
1014585	PCBAS 3N30/60 LOGIC WO PROG	1.000	A10
1014800	D PROG 3N60-80 MAIN CONTROL	.000	
1014952	D ASSY 3N60 DWG I120 A3	1.000	
1017751	RESIS 4K7 50W 5% AL	2.000	R1,R2
1018280	D PROG 3N20-60NHS MEASUREMENT	.000	NHS Oscar
1019039	PLATE 3N80 SLEDGE FRONT A3	1.000	
1019314	LABEL 3N80 TERMINALS A4	1.000	
1019559	ASSY BAR 3N80 INSULATION A4	1.000	
1019760	D ASSY 3N60 CHARGR BRD&HEATSA3	.000	
1019904	D ASSY 3N40-80 DWG I120	.000	
1019954	SCREW PZ M4x55 Fe ISO 7045	2.000	
2001241	CLAMP CAPACITOR MOUNTING	2.000	
2223035	SCREW CYL M3X6 M4.6 ZNA1 217	2.000	
2224008	SCREW SLOTTED M2.5X10 ISO1207	4.000	
4040304	WASHE PLAIN M4 Fe ISO 7089	1.000	
4313042	WASHE LOCK-SER M4 FE DIN6798A	9.000	
6342004	NUT HEX M4 G8 A2 ISO 4032	5.000	
8005157	CLAMP CABLE TIE ANCHOR 15*10mm	1.000	
8051088	CONNE 4P PLUG 5.08 BL4 12593.6	1.000	(X102)
8051092	CONNE 2P PLUG 5.08 BL2 12591.6	4.000	(X219-222)
8080226	INSUL TUBE d3mm L25mm NEOPREN	2.000	
8090011	SPACR M4 L10 FeZn	2.000	

HUOM!
Kulmapalojen kierteet on
oltava nuolien suuntaiset!

1010868
2 pcs

8055433
3 pcs

1002443
2 pcs

2541075
2 pcs

1012198
4 pcs

1014239

8 pcs
9514160

1011710

8 pcs
4313105

8 pcs
1264120

4 pcs
1002443

6 pcs
1002443

2 pcs
1013948

6 pcs 1006840

6 pcs
1002443

1014238

2 pcs
1011257

5797752
3 pcs

1019574

2 pcs
1010408

1011214

NOTE!
Poista PE ja N merkinnät
Remove PE and N markings

6 pcs
1002443

6 pcs
1006840

1019558

4 pcs
1263040

3 pcs
1002443

4 pcs
1010866

8 pcs
9514161

1004944
12 pcs

1014635

1002443
12 pcs

1019557

2 pcs
1010867

4 pcs
9513639

6 pcs 1011685

6 pcs 1010870

6 pcs 1011256

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Title	ASSEMBLY:		Tolerances ±0.5	
POWERWARE	FRAME CABINET		No	Rev
	3N80		10 19 564	A
Checked JKet	Approved 15.03.2002 IN	Loc FIN	Size A3	Page 1 / 2

Rev/ECO no:

Rev/ECO no: A/12640 IN

2541075
2 pcs

1014799

1019263

1014781

1006840
6 pcs

1002443
7 pcs

2541075
5 pcs

1009859

1006840
6 pcs

1009859
2 pcs

2001241
5 pcs

1009886
3 pcs

1012975

1011674

1019230

1002443
5 pcs

1002443
4 pcs

1014223

4220083
2 pcs

1263560
2 pcs

4040308
2 pcs

6342008
2 pcs

4220083
2 pcs

4040308
2 pcs

1012836
2 pcs

X 2

HUOM!
Laitteen jalat säädettävä
samalle tasolle kuin pyörät!

○ = ◎
● = ◎   ☆ = ◎

Rev/ECO no:

Rev/ECO no: A/12640 IN

POWERWARE

Title ASSEMBLY:	Tolerances ±0.5	
CHOKE BOXES	No	Rev
3N80	10 19 564	A

| Checked JKet | Approved 15.03.2002 IN | Loc FIN | Size A3 | Page 2 / 2 |

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1019386a**
FRAME 3N80 CABINET

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1002443	SCREW T HEX M5x8 DIN7500D	55.000
1004944	SCREW K M4x8 PZ DIN7985A+6907	12.000
1006840	SCREW FLAT M5x10 PZ DIN 965	24.000
1009859	SCREW K M5x12 PZ DIN6902A+6905	3.000
1009886	SCREW K M5x10 PZ DIN6902A+6905	3.000
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000
1010866	RAIL 3N45 VERTICAL 1412 mm A3	4.000
1010867	RAIL 3N45 SIDE LOWER 675mm A3	2.000
1010868	RAIL 3N45 SIDE UPPER 675mm A3	2.000
1010870	AXLE 3N45 WHEEL A4	6.000
1011214	CONNE PE-RAIL 6x35mm2 TS35	1.000
1011256	WHEEL 3N45 YKI-70 N	6.000
1011257	RAIL EXTENSION SLIDE DZ0531	2.000
1011674	PACKM 3N20-60 PALLET UPS A3	1.000
1011685	PLATE 3N45 WHEEL HOLDER A4	6.000
1011710	PLATE 3N45 HORIZONAL SLIDE A3	1.000
1012198	RAIL BAT-E FRONT/REAR 433mmA4	4.000
1012836	SCREW MSN M8x50 8.8 ISO8677	4.000
1012975	PLATE 3N60 LOWER CHOKE BOX A3	1.000
1013948	PLATE 3N45 SLIDERAIL SUPP. A3	2.000
1014223	PLATE 3N30 FOOT A4	2.000
1014238	RAIL 3N60 C-RAIL 430MM A4	1.000
1014239	PLATE 3N60 CROSS SLIDE A3	1.000
1014635	PLATE 3N60 FLANGE BLIND A4	1.000
1014781	PLATE 3N60 UPPER CHOKE BOX A3	1.000
1014799	PLATE 3N60 UPPER SUPPORT A4	1.000
1019230	PLATE 3N80 LOWER SLEDGE A3	1.000
1019263	PLATE 3N80 UPPER SLEDGE A3	1.000
1019557	PLATE 3N80 BOTTOM LOWER A4	1.000
1019558	PLATE 3N80 BOTTOM UPPER A4	1.000
1019564	D ASSY 3N80 DWG I010	.000
1019574	PLATE 3N80 CABLE HOLDER A4	1.000
1263040	SCREW HEX M6X10 TENSILOCK	4.000
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	4.000
1264120	SCREW HEX M10x30 8.8A1 ISO4017	8.000
2001241	CLAMP CAPACITOR MOUNTING	5.000
2541075	SCREW T HEX M5X12 DIN7500D	9.000
4040308	WASHE PLAIN M8 Fe ISO 7089	8.000
4220083	WASHE SPRING 8.1 M FE SINK	8.000
4313105	WASHE LOCK-SER M10 FE DIN6798A	8.000
5797752	BLIND RIVET TAP D56	3.000
6342008	NUT HEX M8 G8 A2 ISO 4032	4.000
8055433	INSUL EDGE PROTECT T57 BLACK	.900
9513639	FOOT ADJUSTABLE M12x60 TEKAMA	4.000
9514160	ANGLE PIECE OUTER (A) F	8.000
9514161	ANGLE PIECE INNER (B) F	8.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019441a**
SET 3N80 PCBAS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR	
1011675	PCBAS 3N30-60 POS SNUBBER BRD	.000	1	EA
1011676	PCBAS 3N30-60 NEG SNUBBER BRD	.000	1	EA
1012056	PCBAS 3N30-60 DISPLAY BOARD	.000	1	EA
1012084	PCBAS 3N45 REMOTE TEMP.SENSOR	.000	1	EA
1012361	PCBAS 3N45 D-SUB ADAPTER BOARD	.000	1	EA
1012970	PCBAS 3N60P STATIC SWITCH	.000	1	EA
1013701	PCBAS 3N30-80 CHARGER	.000	1	EA
1013702	PCBAS 3N30 LOGIC	.000	1	EA
1014186	PCBAS 3N60 INVERTER CNTRL 1	.000	3	EA
1014187	PCBAS 3N60 INVERTER CNTRL 2	.000	3	EA
1014258	PCBAS 3N60 RFI BOARD	.000	1	EA
1014265	PCBAS 3N60 BOOST BOARD	.000	1	EA
1014512	PCBAS 3N60 INV SNUBBER BRD	.000	3	EA
1014585	PCBAS 3N30/60 LOGIC BLANCO	.000	1	EA
1015159	PCBAS 3N60 YCAP	.000	1	EA
1017448	PCBAS 3N20-80 BOOST BOARD	.000	1	EA
1018846	PCBAS 3N40-60 INVERTER CNTRL 1	.000	3	EA
1019228	PCBAS 3N80 RFI BOARD	.000	1	EA
1019310	PCBAS 3N80 NEG SNUBB&PSU BRD	.000	1	EA
1019384	PCBAS 3N80 POS SNUBB&PSU BRD	.000	1	EA
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	.000	3	EA
1019460	PCBAS 3N40-80 INVERTER CNTRL 2	.000	3	EA

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019392c**
SET 3N80 CABLE ELEC 2

PART NUMBER	DESCRIPTION		QUANTITY	DESIGNATOR
1011754	CABLE 3N45 E1-E8 INV MODULE	A4	4.000	
1011754	CABLE 3N45 E1-E8 INV MODULE	A4	6.000	
1019393	CABLE 3N80 AUXP-RAIL RECT N	A4	2.000	
1019394	CABLE 3N80 F6 - F4/L1	A4	1.000	
1019395	CABLE 3N80 F7 - F4/L2	A4	1.000	
1019396	CABLE 3N80 F8 - F4/L3	A4	1.000	
1019397	CABLE 3N80 INV N RAIL-NPOLE	A4	2.000	
1019398	CABLE 3N80 INV +RAIL-BOOST+	A4	1.000	
1019399	CABLE 3N80 INV -RAIL-BOOST-	A4	1.000	
1019612	CABLE 3N80 E15-A9/X16	A4	1.000	

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1019400e**
SET 3N80 CABLE ELEC 3

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1014417	CABLE 3N60 K1 - RECT X12 A4	1.000	
1014418	CABLE 3N60 +BAT G-BOOST X13 A4	1.000	
1014419	CABLE 3N60 -BAT G-BOOST X12 A4	1.000	
1014422	CABLE 3N60 C1-3 - RAIL - A4	1.000	
1014423	CABLE 3N60 C4-6 - RAIL + A4	1.000	
1014648	CABLE 3N60 B1-X8 CURR TRAFO A4	1.000	
1014649	CABLE 3N60 B2-X9 CURR TRAFO A4	1.000	
1014650	CABLE 3N60 B3-X10 CUR TRAFO A4	1.000	
1014658	CABLE 3N60 POS BOOST OT A4	1.000	
1014659	CABLE 3N60 NEG BOOST OT A4	1.000	
1014826	CABLE 3N60 C4-6 - N POLE A4	1.000	
1014827	CABLE 3N60 C1-3 - N POLE A4	1.000	
1014846	CABLE 3N60 JUMP N/P BOOST OTA4	1.000	
1019401	CABLE 3N80 K1/T1 - RECT L1 A4	1.000	
1019402	CABLE 3N80 K1/T2 - RECT L2 A4	1.000	
1019403	CABLE 3N80 K1/T3 - RECT L3 A4	1.000	
1019531	CABLE 3N80 BOOST/S3-A2-3/X3 A4	2.000	
1019553	CABLE 3N80 E10-13-A2-3/X1 A4	2.000	
1019687	CABLE 3N80 REC X4/5- +/- BATA4	1.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019431a**
SET 3N80 CABLE ELEC 4

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1011794	CABLE 3N45 INV L3/N-LOG X7 A4	1.000
1011836	CABLE 3N45 REC X3/7/8- +/N/-A4	1.000
1011950	CABLE 3N45 INV L3 N-RECT X20A4	1.000
1014371	CABLE 3N60 A6/X9-A10/X123 A4	1.000
1014372	CABLE 3N60 A7/X9-A10/X124 A4	1.000
1014373	CABLE 3N60 A8/X9-A10/X125 A4	1.000
1014449	CABLE 3N60 A1 X1/X6-X8/L1-3 A4	1.000
1014451	CABLE 3N60 X202/203/X18-X9 A4	1.000
1014644	CABLE 3N60 BATC OT X6 - X10 A4	1.000
1014645	CABLE 3N60 LOGIC X3-X10 A4	1.000
1014646	CABLE 3N60 LOGIC X204-X11 A4	1.000
1014647	CABLE 3N60 TRAFO OT X7-X11 A4	1.000
1014655	CABLE 3N60 GROUND 1000mm A4	1.000
1015545	CABLE 3N60 LOGIC X210-X13 A4	1.000
1015546	CABLE 3N60 FILTR OT X12-X13 A4	1.000
1019432	CABLE 3N80 X1/X2 JUMPER A4	3.000
1019433	CABLE 3N80 A6/V3 - F5/L1 A4	3.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019552a**
SET 3N80 CABLE POS BOOST

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1011754	CABLE 3N45 E1-E8 INV MODULE A4	6.000
1011913	CABLE 3N45 RECT IGBT SC A4	2.000
1014455	CABLE 3N60 BYPASS GA/KA/RC A4	3.000
1014456	CABLE 3N60 BYPASS GB/GK/RC A4	3.000
1018528	CABLE 3N60/EBCU IGBT INV/RECA4	2.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019352b**
SET 3N80 CABLE INVERTER FILTER

PART NUMBER	DESCRIPTION		QUANTITY DESIGNATOR
1014848	CABLE 3N60 A6-8/X3 - C15-23	A4	3.000
1014849	CABLE 3N60 E7-9 -C15-23	A4	3.000
1019364	CABLE 3N80 C15-26 - RAIL N	A4	3.000
1019365	CABLE 3N80 C15-26 - INV X7	A4	3.000
1019613	CABLE 3N80 E14-F8	A4	1.000

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019351d**
SET 3N80 CABLE BREAKERS

PART NUMBER	DESCRIPTION	QUANTITY DESIGNATOR
1011919	CABLE 3N45 GROUND 800mm A4	1.000
1011920	CABLE 3N45 F3-SERVICE OUTLETA4	1.000
1011921	CABLE 3N45 MBS RFI/X1,X4-F3 A4	1.000
1014654	CABLE 3N60 GROUND 700 mm A4	1.000
1015745	CABLE 3N60 F2 TO FRAME A4	1.000
1015756	CABLE 3N60 C28-N CONNECTOR A4	1.000
1019353	CABLE 3N80 F2+ - BATT POS A4	1.000
1019354	CABLE 3N80 F2- - BATT NEG A4	1.000
1019355	CABLE 3N80 F2 JUMPER A4	2.000
1019356	CABLE 3N80 RFI/X25- F1/L1 A4	1.000
1019357	CABLE 3N80 RFI/X24 - F1/L2 A4	1.000
1019358	CABLE 3N80 RFI/X23 - F1/L3 A4	1.000
1019359	CABLE 3N80 F1/L1 - K1/L1 A4	1.000
1019360	CABLE 3N80 F1/L2 - K1/L2 A4	1.000
1019361	CABLE 3N80 BAT CONN N-AUXP NA4	1.000
1019362	CABLE 3N80 BAT CONN N-AUXP NA4	2.000
1019362	CABLE 3N80 BAT CONN N-AUXP NA4	1.000
1019363	CABLE 3N80 BAT N RFI LOOP A4	2.000
1019363	CABLE 3N80 BAT N RFI LOOP A4	1.000

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1019411e**
SET 3N80 CABLE MBS

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1014452	CABLE 3N60 MBS AUX/BAT CB-X9	1.000	A4
1014653	CABLE 3N60 GROUND 1800 mm	1.000	A4
1019356	CABLE 3N80 RFI/X25- F1/L1	1.000	A4
1019357	CABLE 3N80 RFI/X24 - F1/L2	1.000	A4
1019358	CABLE 3N80 RFI/X23 - F1/L3	1.000	A4
1019412	CABLE 3N80 MBS28-AUX POLE N	1.000	A4
1019413	CABLE 3N80 MBS 23 - MBS 32	3.000	A4
1019415	CABLE 3N80 RFI/X26-MBS 27	1.000	A4
1019416	CABLE 3N80 MBS 3-UPSOUT L1	1.000	A4
1019417	CABLE 3N80 MBS 9-UPSOUT L2	1.000	A4
1019418	CABLE 3N80 MBS 15-UPSOUT L3	1.000	A4
1019419	CABLE 3N80 MBS 6-STSWITCH L1	1.000	A4
1019420	CABLE 3N80 MBS 8-STSWITCH L2	1.000	A4
1019421	CABLE 3N80 MBS18-STSWITCH L3	1.000	A4
1019422	CABLE 3N80 MBS 5 - RFI/X29	1.000	A4
1019423	CABLE 3N80 MBS 7 - RFI/X28	1.000	A4
1019424	CABLE 3N80 MBS 17 - RFI/27	1.000	A4
1019425	CABLE 3N80 MBS 4 - RFI/X21	1.000	A4
1019427	CABLE 3N80 MBS 16 - RFI/X19	1.000	A4
1019428	CABLE 3N80 MBS 24-AUXPOLE N	1.000	A4
1019429	CABLE 3N60 RFI/X32-MBS 22	1.000	A4
1019430	CABLE 3N80 RFI/X22-MBS 23	1.000	A4
1019521	CABLE 3N80 RFI/X26-MBS 31	1.000	A4
1019547	CABLE 3N80 GROUND 450 mm	1.000	A4
1019698	CABLE 3N80 INPUT/BYPASS-X8	1.000	A4

Insulation sheet

Add label 1017159B to 3N30,3N45,3N60 and 3N80

UNIT	R110
3N30	x
3N45	
3N60	
3N80	

X=assembled
P/N: 1017159B

R110 N. A. in 3N45,3N60 and 3N80

C11/V30 and V23/V146 together with glue

Marked wires to B and D

Glue wires to transformer

EPO AUX

Remove pins 2 and 4 from X1 and X6.

Soldered

Glue

Mountain clip

Other pairs similarly: V4-R401-V5, V10-R403-V11

DC FAN

BAR CODE

BATT+ +DC

BATT- -DC

BYPASS

BULK ASSEMBLIES

K1,2,3,4 not washable

Assembly of N3,4,19, V47,75

Assembly of V21,44

1. Screw M3x8
2. Lock washer
3. Flat washer
4. Nut M3
5. Insulating insert TO-220
6. Insulating bush l=2.7
7. Insulating insert TO-218
8. Insulation sheet
9. Screw M3x12

Mounting torque of semiconductors in TO-247/SOD93 case 0.5 $^{+0.1}_{-0}$ Nm

B3

V57-60 V70-74

Assembly of R3-6,304-306 R37,40,46,51-56 and R110

7±1mm

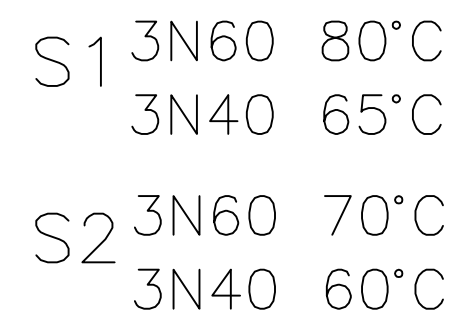Lead length 0.8 — 2.6 mm

Parts marked with ✳ not assembled

THIS DRAWING CONTAINS PROPRIETARY INFORMATION OF POWERWARE AND MAY NOT, IN WHOLE OR IN PART, BE DUPLICATED OR DISCLOSED OR USED FOR MANUFACTURE OF ANY PART DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF POWERWARE.

	Rev/ECO no:		
H/12284 IN	I/12368 IN	J/12649 Pk	
F/12199 VK	G/12227 AV		
K/12745 JS	L/12789 Pk		
L1/12840 Pk			

POWERWARE

Title ASSEMBLY DRAWING
CHARGER BOARD
3N30-80

No 10 10 779
Rev L1

Checked VK
Approved 27.01.1998 EB
Loc FIN
Size A3
Page 1 / 1

Schematic drawing
Charger board
3N30-3N80

POWERWARE

CHECKED EP   APPROVED 11.06.02 JP   LOC FIN   SIZE A3   PAGE 1/3

NO 10 10 780   REV 1

POWERWARE

TITLE	Schematic drawing		NO		REV
	Charger board		10 10 780		I
	3N30-3N80				
CHECKED EP	APPROVED 11.06.02 JP	LOC FIN	SIZE A3	PAGE 2/3	

Parts marked with ✳ not assembled

BAR CODE

Assembly of
R1–4,R8,R9,R17,R18,
R185,R186,R190–193,
R292,R293,R230,R231

OR Assembly of
R1–4,R8,R9,R17,R18

7±1mm

Assembly of B6,B7

Assembly of N6

1. Screw M3x8
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating sheet
6. Insulating bush L=2.7
7. Tapping screw AB 3.5x9.5

Mounting torque of semiconductors in TO-220/247/264 case 0.5 $^{+0.1}_{-0}$ Nm

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 – 2.6 mm.

Lead length

Rev/ECO no:

C/12620 Pk
A/12506 PKu
B/12578 Pk

POWERWARE

Title		No		Rev
Boost Board				
Assembly Drawing		10 18 723		C
3N20, 3N30, 3N40, 3N60, 3N80				

| Checked | EP | Approved | 09.08.2001 PKu | Loc | FIN | Size | A4 | Page | 1 / 1 |

	CURRENT LIMIT								GATE RESISTORS			
Negative Boost	R242	C100	R30	R230	R185	R186	R192	R292	R4	R3	R2	R1
Positive Boost	R246	C120	R31	R231	R190	R191	R193	R293	R18	R17	R9	R8
1013177C 20-30kVA	1k00	1n0	N.A.	N.A.	1k00	11k0	N.A.	N.A.	N.A.	38R3	38R3	82R5
1014265A 40-60kVA	2k15	470p	N.A.	N.A.	2k15	14k7	N.A.	N.A.	12R1	12R1	12R1	82R5
1017448 20-30kVA	1k00	1n0	4k64	11k0	1k47	N.A.	11k0	N.A.	N.A.	N.A.	14R7	82R5
1017448 40 NX	1k00	1n0	4k64	11k0	1k47	14k7	N.A.	23k7	6R8	N.A.	N.A.	N.A.
1017448 40-60kVA	1k00	1n0	4k64	11k0	N.A.	14k7	N.A.	N.A.	6R8	10R	14R7	82R5
1017448 80kVA	1k00	1n0	4k64	N.A.	N.A.	N.A.	11k0	N.A.	6R8	10R	14R7	82R5

N.A.=NOT ASSEMBLED

* MARKED COMPONENTS: SEE VALUES ON TABLE

TITLE	Schematic drawing
	Boost board
	3N20-3N80

NO 10 14 672   REV E

| CHECKED si | APPROVED 16.01.02 JP | LOC FIN | SIZE A3 | PAGE 1/1 |

10 03 549
(2 pcs)

10 12 112

10 14 509

10 17 448

10 10 408
Screw K M4×8 Pz
(2 pcs)

1 2 3 4 5 6

A B C D E F G H

Rev/ECO no: REV REV REV
Rev/ECO no: REV REV REV
REV REV REV
REV REV REV

POWERWARE_

Title	Assembly Drawing		METRIC		
	Boost Board _		No 1020018		Rev A
Checked —	Approved 27.09.2002 NB	Loc FIN	Size A4	Page 1/1	

Add sticker here
instead of the
marked place
on PCB

V25

X5

HS2

R8

CHOKE

V14

C41

C35

-DC

TP12

1

TP9

1

R7

R55 R54 R53 R52

C34

BAR CODE

CHOKE

C31

C33

-DC

R42 R41 R40 R39

12,7

R6

TP10

N

1

N

R5

C3

C22

C32

V10

B1 E1 SHORT

NOTE! DO NOT BEND
PINS OF R39–42 ON
THE SOLDER SIDE!

Assembly of V25

①②   ⑤   ②③④

1. Screw M3x12
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert TO–247

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

Lead length 0.8 – 2.6 mm

Rev/ECO no:

Rev/ECO no:

A/11994 VK

B/12241 IN

POWERWARE

Title				
Assembly drawing				
Neg. Snubber Board		No		Rev
3N30,3N45,3N60		10 11 660		B
Checked VK	Approved 12.01.1998 EB	Loc FIN	Size A4	Page 1 / 1

GND

R39 R40 R41
21R5 21R5 21R5

1 2 TP10
CONN.PIN2

FET MODULE3/B   DSEI30-06A

GND 3

V10
MODULE

DIODE DSEI30-06A

V14

R42
21R5

R 1% 2W5 R 1% 2W5 R 1% 2W5 R 1% 2W5

C33
1N 1600V

C PRO 1N 1600V

C31
1N
1600V

CHOKE

1 CHOKE

C PRO 1N 1600V

CHOKE

1 2 TP12
CONN.PIN2

HEATS 18K/W TO220
HS2

V25 DIODE DSEI30-06A

DSEI30-06A

C PRO 1U 630V

C41
1U
630V

C PRO 100N 630V
C32

C PRO 1U 630V
C22

C PRO 1U 630V
C3

100N
630V

1U
630V

1U
630V

R54
21R5
R55
21R5

R 1% 2W5 R 1% 2W5 R 1% 2W5 R 1% 2W5

R53 21R5
R52 21R5

2

-DC

4×50R   5W

CONN MOLEX3/B
X5

3
2
1

C PRO 1N 1600V   C PRO 1N 1600V

C34
1N
1600V

C35
1N
1600V

-DC

1 2 TP9
CONN.PIN2

R5 R6 R7 R8

RES/90/5W

-DC

OR
ORIGO

Add sticker here
instead of the
marked place
on PCB

NOTE! DO NOT BEND
PINS OF R28—31 ON
THE SOLDER SIDE!

R1 C2   C1
R2   C4
                    +DC
R3 C40   TP11
        V15   N
R4   TP13
        CHOKE   C15 C16
X4   TP8
        R27 R43 R45 R47
HS1
V24

V9

B2 E2 SHORT
+DC
12.7
R28 R29 R30 R31

N

BAR CODE

CHOKE

C17
C18

Assembly of V24

① ②   ⑤ ② ③ ④

1. Screw M3x12
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert TO—247

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

Lead length 0.8 — 2.6 mm

Rev/ECO no:

Rev/ECO no:
A/11993 VK
B/12241 IN

POWERWARE

Title	Assembly drawing			No		Rev
	Pos. Snubber Board				10 11 659	B
	3N30,3N45,3N60					
Checked VK	Approved 12.01.1998 EB		Loc FIN	Size A4	Page 1 / 1	

+DC

R28 R29 R30
21R5 21R5 21R5

+DC
1 2 TP11
CONN.PIN2

R31
21R5

RES/90/5W

FET MODULE3/B

+DC 3

V9
MODULE

C PRO 1N 1600V

C PRO 1N 1600V

CHOKE

1 2 TP8
CONN.PIN2

DIODE DSEI30-06A
V24

CONN.MOLEX3/B
X4
3
2
1

C17
1N
1600V

C18
1N
1600V

1

CHOKE

C PRO 100N 630V

C PRO 1U 630V

C PRO 1U 630V

C4

C1

C2

100N
630V

1U
630V

1U
630V

B2

R47 21R5
R45 21R5
R43 21R5
R27 21R5

DSEI30-06A
HS1
HEAT5 18K/W T0220

R1 R2 R3 R4
4×50R 5W

E2

V15

C PRO 1N 1600V

C PRO 1N 1600V

C15
1N
1600V

C16
1N
1600V

GND
1 2 TP13
CONN.PIN2

C PRO 1U 630V
C40
1U
630V

GND

DIODE DSEI30-06A

DSEI30-06A

OR
×1 ORIGO

SHORT

R29
R28
R27
R26

B2 E2

C16
C15

V1

+DC   N   CHOKE

Assembly of V13

① ② ⑤ ⑥ ② ③ ④

1. Screw M3x8
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert
6. Insulating bush l=2.7

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

+DC
TP1

C18

R33
R32
R31
R30

HS2

C20

C17

CHOKE

V14

R24

C22 TP3 N
V2 TP2

R23

C21

C19

Assembly of V12,V14

① ② ⑤ ② ③ ④

1. Screw M3x12
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert TO-247

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

R38

R34   R35   R36   R37

HS1

V8
V7
R11
R10
R14
R13
R12
R9
R8
R6
V6

V12

R25

C14

V11

C8

V9

V10

C9

C2   C5

C1

R3 R2 R1

N1

C7   C3

C13   C6

R7 R5
V5

V4

Assembly of R15.R16,R17,R23,R24

7±1mm

T1 1   12

R17
HS3

R16

C4 V13

R15
R4

6   7

R21
R22

N2   X3

R19 R20 R18

C11   X2

C12   C10   X1

BAR CODE

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 — 2.6 mm.

Lead length

POWERWARE

Title POS SNUBBER

ASSEMBLY DRAWING

3N80

Checked EP   Approved 25.01.2002 Pk   Loc FIN

No
10 19 383

Rev
1

Size A4   Page 1 / 1

Rev/ECO no:

Rev/ECO no: 1/12643 Pk

TITLE	Schematic drawing					
	POS.SNUBB & PSU 3N80			NO	10 19 334	REV A
CHECKED HM	APPROVED 14.02.02 JP	LOC FIN	SIZE A4	PAGE 1 / 1		

POWERWARE

C16
C15

R26
R27
R28
R29

SHORT

CHOKE

−DC

N

E1

B1

V1

HS2

R33

C18

N

TP1

V14

R32
R31

CHOKE

R30

C17
−DC

TP2

TP3

C20

R24

V2

C21 C22

R23

C19

R37

R36

R35

R34

R38

C2
R15

C5

C1
N1

V8
V7
R11
R10
R14
R13
R12
R9
R8
R6
V6

V12

HS1

R25

C14

R3
R2
R1

R16

C3

C7

C8

V11

C6

+

V9

R17

R5

V5 R7

C13

C9

V10

V4

R21
R22

C11

HS3

V13

R4

X3

+

R18
R20
R19

N2

C12

C4

X2

T1

1

6

7

12

X1

+

C10

BAR CODE

Assembly of V13

① ② ⑤ ⑥ ② ③ ④

1. Screw M3x8
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert
6. Insulating bush l=2.7

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

Assembly of V12,V14

① ② ⑤ ② ③ ④

1. Screw M3x12
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert TO−247

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

Assembly of R15.R16,R17,R23,R24

7±1mm

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 − 2.6 mm.

Lead length

Rev/ECO no:

Rev/ECO no:

1/12642 Pk

POWERWARE

Title	NEG SNUBBER					
	ASSEMBLY DRAWING			No		Rev
	3N80			10 19 309		1
Checked EP	Approved 25.01.2002 Pk		Loc FIN	Size A4	Page	1 / 1

Rev/ECO no:

A/12677 Pk

N
TP1-1 TP1-2

N

V1
600V/600A

3

V2
DSEI30-06A

1

CHOKE

2

-DC

R26 2IR5 R27 2IR5 R28 2IR5 R29 2IR5

C15
1N
1600V

C16
1N
1600V

CHOKE
TP2-1 TP2-2

HS2
V14
DSEI30-06A

C19
1u
630V

C20
100N
630V

C21
1u
630V

C22
1u
630V

R30 2IR5 R31 2IR5 R32 2IR5 R33 2IR5

C17
1N
1600V

C18
1N
1600V

-DC
TP3-1 TP3-2

R34 4R7 5W R35 4R7 5W R36 4R7 5W R37 4R7 5W

R38
22R 5W

R23
1R FUSIBLE

R24
1R FUSIBLE

X3-2

C11
100N

R19
10K0

R21
9K09

N2
TL431

3

1

2

R22
21K5

X3-1

R20
1K00

R18
1K00

R15
75K0

R16
75K0

R17
75K0

V9
120V 5W

V10
120V 5W

R4 10R0

HS3

C4
470pF

V13
MUR1520

X2-1 +
X1-1
FAN

V4
CNY17-II

5 1

4 6 2

R5
100K

C14
100pF 500VDC

R25
21R5

V11
BYV26C

C13
100pF

R6
21R5

V6
BYV27-200

R7
4R7

C5
100N

C6
100UF
35V

V5
24V 1W3

V7
1N4446

R11
100R

HS1
D
G
V12
IRFPE50
S

10
T1-B
3

1
T1-C
7

6

C10
470UF
35V

C12
470N

X2-2 -
X1-2

1
T1-A
12

N1
7
VCC
Out 6

2 VFB
1 Comp
8 Vref
4 RR/CR Isense 3
5 GND
UC3844

C3 22N

R2
46K4

R3
10K0

R1
12K1

C2
100N

C1
1N

C7
1N

R8
1K00

R9
464R

R10
10K0

V8
18V 1W3

R12
4R7

R13
4R7

R14
4R7

C8
22N
630V

C9
470N
250V X2

BOOST MODULE CODE: 10 13 189

Rev/ECO no:

Rev/ECO no:
A/11905 TK
B/12120 VK
C/12335 HT

1011675 POS SNUB
1011676 NEG SNUB

BLUE

A4

80°C

S2

S1

70°C

A5

A7

BLUE

Rev/ECO no:

C/12335 HT

Rev/ECO no:

A/11905 TK

B/12120 VK

POWERWARE

Title	ASSEMBLY:		H080		
	BOOST MOD		No		Rev
	3N30		10 13 838		C
Checked JKe	Approved VK 08.03.1999	Loc FIN	Size A3	Page 2 / 2	

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1013189d**
SUBAS 3N30 BOOST MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002411	SPACR M4 L13 Ms	2.000	507
1005550	SCREW K M3x6 DIN7985+6798	4.000	521
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	7.000	514
1009860	SCREW K M5x16 PZ DIN6902A+6905	8.000	513
1009886	SCREW K M5x10 PZ DIN6902A+6905	6.000	515
1010086	SPACR M5(10) L13 Ms AV12	6.000	509
1010180	SCREW PZ M4x6 Fe ISO 7045	3.000	517
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	516
1010505	LABEL BAR CODE	1.000	523
1011675	PCBAS 3N30-60 POS SNUBBER BRD	1.000	A4
1011676	PCBAS 3N30-60 NEG SNUBBER BRD	1.000	A5
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	4.000	510
1013173	PLATE 3N30 REC.BOARD SUPPORTA4	1.000	501
1013174	PLATE 3N30 REC.BOARD FOOT A4	2.000	502
1013295	SPACR M4(8) I/S L30 FeZn Av7	2.000	508
1013314	HEATS 3N30 PROFIL RECT MOD A3	1.000	500
1013477	ASSY 3N30 RAIL CUR GND REC A4	1.000	503
1013478	ASSY 3N30 RAIL CUR GND R/C A4	1.000	504
1013479	ASSY 3N30 RAIL CUR -REC/CAPA4	1.000	505
1013480	ASSY 3N30 RAIL CUR +RECCAP A4	1.000	506
1013838	D ASSY 3N30 DWG BOOST MOD A3	.000	
1015594	IGBT 1x200A 600V CHOP POS.SIDE	1.000	V11
1015595	IGBT 1x200A 600V CHOP NEG.SIDE	1.000	V10
1017448	PCBAS 3N20-80 BOOST BOARD	1.000	A7
2364003	WASHE WAVE M5 KBA FE ZINK	8.000	520
4040305	WASHE PLAIN M5 Fe ISO 7089	2.000	519
4313042	WASHE LOCK-SER M4 FE DIN6798A	4.000	518
8005153	CLAMP FLAT CABLE 16P ADH.	1.000	522
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	2.000	512
8055433	INSUL EDGE PROTECT T57 BLACK	.100	524
8063123	SPACR NYLON L=12.7mm LCBS-8	2.000	511

POSITIVE BOOST MODULE CODE: 10 14 247

✳ PARTS NOT ASSEMBLED TO UPS 3N40NX

MITSUBISHI IGBT

4040 306
2364 004
1263 060

4040 306
2364 004
1263 060

7980 015
4 pcs

1011 751

4 pcs
1008 599

C10

C8   C9

C7

1010 408
2 pcs

1012 115
3 pcs

1263 050
9 pcs

2364 004
9 pcs

1009 860
3 pcs

1014 505
3 pcs

V12
V13
V14

1009 860
6 pcs

ROE 20
BHC 17

1012 121
1012 123
1012 122

1009 859
8 pcs

1019 391

NOTE!

S1 3N60 80°C
    3N40 65°C

S2 3N60 70°C
    3N40 60°C

1010 505

Label code:
1014 247

80 °C

V11

1019 303

1019 304

1014 226

S1

BLUE

S2

8005 150

A1

C25

TOSHIBA IGBT

1019 307

70 °C

BLUE

BROWN

1005 550
4 pcs

S1−2

209

1009 860
4 pcs

1009 859

1010 408
2 pcs

1012 117

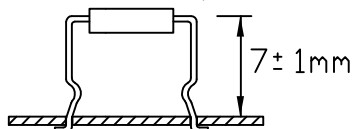Ei asenneta varaosamoduliin!
Not for spare part module!

◯ = ◎   ∫ = ◖

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Rev/ECO no:
E/12753 IN

Rev/ECO no:
A/12025 AVa
B/12139 VK
C/12378 Tt
D/12507 HT

NEGATIVE BOOST & RECTIFIER MODULE CODE: 10 14 246

✳ PARTS NOT ASSEMBLED TO UPS 3N40NX

NOTE!

MITSUBISHI IGBT

$S1$ 3N60 80°C
       3N40 60°C

$S2$ 3N60 90°C
       3N40 70°C

1012 115
3 pcs

1009 860
3 pcs

1009 859
8 pcs

1011 743

1009 860
10 pcs

V8

V5
V6
V7
V9

1014 227

1010 505

Label code:
1014246

80 °C

4040 306
2364 004
1263 060

4040 306
2364 004
1263 060

V10

1019 305

1019 302

BLUE

1009 860
4 pcs

BLUE

BLUE

BROWN

BROWN

90 °C

S1

S2

1005 550
4 pcs

S1-2

S1-2

S1-2

S1-2

208

Ei asenneta varaosaduliin!
Not for spare part module!

1019 306

1010 408
2 pcs

1012 117

TOSHIBA IGBT

1009 859

A1

C24

✳

O = ⊘   ⊘ = ⊘

76 54   76 54   76 54   76 54   76 54
3   2
1   1   1   1   1

Rev/ECO no: E/12753 IN

Rev/ECO no: C/12378 Tt   D/12507 HT   A/12025 AVa   B/12139 VK

POWERWARE

Title ASSEMBLY :		I 050	
NEGATIVE BOOST & RECTIFIER		No	Rev
3N60		10 14 945	E
Checked TK	Approved 27.09.1999 AV	Loc FIN	Size A3	Page 2 / 2

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014247c**
SUBAS 3N60 POS BOOST MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	4.000	C7-10
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S1
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S2
1009859	SCREW K M5x12 PZ DIN6902A+6905	11.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	
1010505	LABEL BAR CODE	1.000	
1011675	PCBAS 3N30-60 POS SNUBBER BRD	1.000	A1
1011751	PLATE 3N45 CAP MOUNTING REC A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1012121	ASSY 3N45 RAIL CURR BOOST- A4	1.000	
1012122	ASSY 3N45 RAIL CURR BOOST+ A4	1.000	
1012123	ASSY 3N45 RAIL CURR BOOSTN A4	1.000	
1014226	HEATS 3N60 POS BOOST A3	1.000	
1014266	SET 3N60 CABLE POS BOOST	1.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C25
1014495	IGBT 2x600A 600V HALF BRDG	1.000	V11
1014505	RAIL CURRENT 2x6.6mm HOLE A4	3.000	
1014945	D ASSY 3N60 DWG I050 A3	.000	
1019303	RAIL 3N80 Cu BOOST CAP + A4	1.000	
1019304	RAIL 3N80 Cu BOOST CAP -N A4	1.000	
1019391	INSUL 3N80 CURR RAIL A4	1.000	
1263050	SCREW HEX M6X12 8.8 A1 ISO4017	9.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	
2364004	WASHE WAVE M6 KBA FE ZINK	9.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	MITSU
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	
8005150	TIE CABLE L=102mm W=2.5mm	2.000	
8040403	THYRI MOD 130A 1600V	3.000	V12-14

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014246b**
SUBAS 3N60 NEG BOOST+REC MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	11.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	17.000	
1010505	LABEL BAR CODE	1.000	
1011676	PCBAS 3N30-60 NEG SNUBBER BRD	1.000	A1
1011743	RAIL 3N45 CURR RECTIFIER A4	2.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1013768	THYRI MOD 105A 1600V	2.000	V8,9
1014227	HEATS 3N60 NEG BOOST+RECT A3	1.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C24
1014381	DIODE MOD 100A 1600V	3.000	V5-7
1014495	IGBT 2x600A 600V HALF BRDG	1.000	V10
1014945	D ASSY 3N60 DWG I050 A3	.000	
1019302	RAIL 3N80 CURR BOOST -N A3	1.000	
1019305	RAIL 3N80 Cu BOOST CAP - A4	1.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	MITSU
2364004	WASHE WAVE M6 KBA FE ZINK	3.000	MITSU
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	MITSU
8052803	SENSR THERMO 090°C C70°C NC UL	1.000	S2

POSITIVE BOOST MODULE CODE: 10 19 223

7980015
4 pcs

1011751

4 pcs
1008599

C10

C8

C9

1010408
2 pcs

1263060
9 pcs

2364004
9 pcs

4040306
9 pcs

1012115
3 pcs

1009860
3 pcs

C7

1012121

1012123

1012122

1009859
8 pcs

1014505
3 pcs

V14

V13

V12

1009860
6 pcs

Label code:
1019223

1010505

1019391

V11

1019303

1014226

80 °C

70 °C

BLUE

1019304

8005150

A1

C25

S1

S3

BROWN

BROWN

BLUE

1009860
4 pcs

4040306 3 pcs

2364004 3 pcs

1263060 3 pcs

1019307

70 °C

BLUE

S1-2

S3

X3

S2

1005550
6 pcs

209

8063124
2 pcs

1010408
4 pcs

1012117

O = O   O = O

L3

V14

L2

V13

L1

V12

Ei asenneta varaosamoduliin!
Not for spare part module!

POWERWARE

Rev/ECO no:

Rev/ECO no:

A/12640 HT

B/12753 IN

Title ASSEMBLY :		I 050	
POSITIVE BOOST MODULE		No	Rev
3N80		10 19 524	B
Checked IN	Approved 18.03.2002 HT	Loc FIN	Size A3	Page 1 / 2

NEGATIVE BOOST & RECTIFIER MODULE CODE: 10 19 222

1009860
3 pcs

1012115
3 pcs

1263050
2 pcs

1009859
6 pcs

2364004
2 pcs

4040306
2 pcs

1019577
2 pcs

V8

1014227

1010505

Label code:
1019222

1009860
10 pcs

S3

S1

V5

V6

V7

V9

70 °C

70 °C

V10

1019305

1019302

1012117

4040306 3 pcs

2364004 3 pcs

1263060 3 pcs

Ei asenneta varaosamoduliin!
Not for spare part module!

BLUE

BLUE

1009860
4 pcs

BROWN

1019306

8063124
2 pcs

1010408
2 pcs

BLUE

S3

X3

A1

8063123
2 pcs

BLUE

BROWN

S1-2

BROWN

80 °C

1005550
6 pcs

S1-2

S1-2

C24

S2

S1-2

208

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Rev/ECO no:

Rev/ECO no:

A/12640 HT

B/12753 IN

V8	V5	V6	V7	V9
7 6 5 4	7 6 5 4	7 6 5 4	7 6 5 4	7 6 5 4
3				
2	−			2
1	+			1
+	L1	L2	L3	−

○ = ◎   ○ = ◑

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019223a**
SUBAS 3N80 POS BOOST MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S1
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1009633	SENSR THERMO 070°C C60°C NC UL	2.000	S2, S3
1009859	SCREW K M5x12 PZ DIN6902A+6905	8.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	4.000	
1010505	LABEL BAR CODE	1.000	
1011751	PLATE 3N45 CAP MOUNTING REC A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1012121	ASSY 3N45 RAIL CURR BOOST- A4	1.000	
1012122	ASSY 3N45 RAIL CURR BOOST+ A4	1.000	
1012123	ASSY 3N45 RAIL CURR BOOSTN A4	1.000	
1014226	HEATS 3N60 POS BOOST A3	1.000	
1014266	SET 3N60 CABLE POS BOOST	1.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C25
1014495	IGBT 2x600A 600V HALF BRDG	1.000	V11
1014505	RAIL CURRENT 2x6.6mm HOLE A4	3.000	
1019114	CAPAC ELE 4400uF 470VDC M12	4.000	C7-10
1019303	RAIL 3N80 Cu BOOST CAP + A4	1.000	
1019304	RAIL 3N80 Cu BOOST CAP -N A4	1.000	
1019307	PLATE 3N80 REC BOARD MOUNT2 A4	1.000	
1019384	PCBAS 3N80 POS SNUBB&PSU BRD	1.000	A1
1019391	INSUL 3N80 CURR RAIL A4	1.000	
1019503	THYRI MOD 160A 1600V	3.000	V12-14
1019524	D ASSY 3N80 DWG I050 A3	.000	
1019552	SET 3N80 CABLE POS BOOST	1.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	12.000	
2364004	WASHE WAVE M6 KBA FE ZINK	12.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	12.000	
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	
8005150	TIE CABLE L=102mm W=2.5mm	1.000	
8063123	SPACR NYLON L=12.7mm LCBS-8	2.000	
8063124	SPACR NYLON L=28.6mm LCBS-18	2.000	

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019222a**
SUBAS 3N80 NEG BOOST+REC MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1009633	SENSR THERMO 070°C C60°C NC UL	2.000	S1, S3
1009859	SCREW K M5x12 PZ DIN6902A+6905	6.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	17.000	
1010505	LABEL BAR CODE	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB .A4	1.000	
1014227	HEATS 3N60 NEG BOOST+RECT A3	1.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C24
1014381	DIODE MOD 100A 1600V	3.000	V5-7
1014495	IGBT 2x600A 600V HALF BRDG	1.000	V10
1019302	D RAIL 3N80 CURR BOOST -N A3	1.000	
1019305	RAIL 3N80 Cu BOOST CAP - A4	1.000	
1019306	PLATE 3N80 REC BOARD MOUNT1 A4	1.000	
1019310	PCBAS 3N80 NEG SNUBB&PSU BRD	1.000	A1
1019524	D ASSY 3N80 DWG I050 A3	.000	
1019577	RAIL 3N80 CURR RECTIFIER A4	2.000	
1263050	SCREW HEX M6X12 8.8 A1 ISO4017	2.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	
2364004	WASHE WAVE M6 KBA FE ZINK	5.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	5.000	
8040403	THYRI MOD 130A 1600V	2.000	V8,9
8063123	SPACR NYLON L=12.7mm LCBS-8	2.000	
8063124	SPACR NYLON L=28.6mm LCBS-18	2.000	

Rev/ECO no:

Rev/ECO no:

B/12210 VK

C/12332 HT

1008 318

1014 314
2 pcs

2 pcs
1015 227

1013 093 4 pcs

1015 228

8055 397 2 pcs

4040 308 2 pcs

1008 999 2 pcs

– 1,5 kv Testausjännite AC
– Liitos on pystyttävä
  tarkistamaan, rikkomatta
  eristettä.
– Temperature class 155 °C
– UL 94 V–2

– 1,5 kv Testing voltage AC
– Junction must be able to check without
  breaking the insulator.
– Temperature class 155 °C
– UL 94 V–2

Tightening torque for the nuts is 2.8Nm

O = ⊚

	Title	ASSEMBLY DRAWING				
POWERWARE		RECTIFIER CHOKES			No	Rev
		3N30, 3N60			10 15 189	C
	Checked JK	Approved 30.12.1999 VK	Loc FIN	Size A3	Page 1 / 1	

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1015189c**
CHOKES A3 SUBAS 3N60 RECTIFIER

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1008318	ROD M8x201mm Zn12+Cr A4	1.000	
1008999	NUT M8 HEX LOCK NYLON DIN985	2.000	
1013093	HOLDE 3N60 CHOKES UL94 V-2 A3	4.000	
1014314	HOLDE CHOKE ASSY 2xEE65+2mm A3	2.000	
1015227	CHOKE 3N60 70A 100uH 5xEE65 A4	2.000	L1-8
1015228	CONNE BUTT SPLICE 10-10mm2	1.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	2.000	
8055397	INSUL BUSH 642353A/2 8/22MM	2.000	

6342008 2 pcs
4220083 2 pcs
4040308 3 pcs
8055396

8055397
4040308
1019683

6342008

1004159

2001241
1002443

2541075
16 pcs

1263120

4313064
2 pcs

L1 L2
L3 L4
L5 L6
L7 L8

1019586

1002443
5 pcs

E14

4313042
4 pcs

1010669
2 pcs

4040304
2 pcs

1012954

2001215

1012524
4 pcs

4313042
2 pcs

8090011
2 pcs

POWERWARE

Title	ASSEMBLY DRAWING		I 020	
	RECTIFIER MOD & CHOKES		No	Rev
	3N80		10 19 647	A
Checked IN	Approved 15.04.2002 HT	Loc FIN	Size A3	Page 2 / 2

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1017449c**
SUBAS 3N40 RECTIFER CHOKES   A3

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1008999	NUT M8 HEX LOCK NYLON DIN985	2.000	
1013093	HOLDE 3N60 CHOKES UL94 V-2 A3	4.000	
1014314	HOLDE CHOKE ASSY 2xEE65+2mm A3	2.000	
1014625	CABLE 16mm2 H07V2-K90°C BLACK	1.450	
1017923	CHOKE 94A 90uH 6xEE65 A4	2.000	L1-6
1018678	CONNE BUTT SPLICE 12-16mm2	1.000	
1018678	CONNE BUTT SPLICE 12-16mm2	3.000	
1018679	ROD M8x220mm Zn12+Cr A4	1.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	2.000	
8050665	LUG CABLE 6-16 DIN 46234	2.000	
8050675	LUG CABLE 10-16 DIN 46234	2.000	
8055397	INSUL BUSH 642353A/2 8/22MM	2.000	

UPS OUTPUT

BYPASS INPUT

V12 V13 V14
GA GB   GA GB   GA GB

BAR CODE

Add sticker here instead of the marked place on PCB

Add label 1013985

Assembly of R4-12,17,18, 22-28,58-63

7±1mm

* = NOT ASSEMBLED

Remove center pin from X1, X2, X3

1. Screw M3x12
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating sheet
6. Insulating bush

Mounting torque of semiconductors in TO-220/247/264 case 0.5 $^{+0.1}_{-0}$ Nm

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 — 2.6 mm.

Lead length

Assembly of A3

① ② ⑤ ⑥ ② ③ ④

POWERWARE	Title STATIC SWITCH PCBA			No 10 10 660	Rev E
	ASSEMBLY DRAWING				
	3N15, 3N30				
	Checked EP	Approved 14.04.1997 VK	Loc FIN	Size A4	Page 1 / 1

Bypass In L1
Bypass In L2
Bypass In L3

X4 MBypass1
X4 MBypass2
X4 MBypass3

UPS Output L1
UPS Output L2
UPS Output L3

Uout Inv1
Uout Inv2
Uout Inv3

X5 FASTON 6.3
X6 FASTON 6.3
X7 FASTON 6.3

MIout1 X4 3 / MUout1 2
MIout2 X4 7 / MUout2 6
MIout3 X4 11 / MUout3 10

V12 GB FET MODULE1 GA
V13 GB FET MODULE1 GA
V14 GB FET MODULE1 GA

RC1 CAP.10x20.5/9M
RC2 CAP.10x20.5/9M
RC3 CAP 10x20.5/9M

R47 100K R46 100K R48 2K61 C23 10N
R50 100K R49 100K R51 2K61 C24 10N
R53 100K R52 100K R54 2K61 C25 10N

R37 100K R38 100K R39 2K61 C20 10N
R42 100K R40 100K R41 2K61 C21 10N
R45 100K R43 100K R44 2K61 C22 10N

R31 100R R32 100R C17 1U
R33 100R R34 100R C18 1U
R35 100R R36 100R C19 1U

	R32	R34	R36
3N15	–	–	–
3N30	X	X	X

X = ASSEMBLED

VDD
R1 3K16
X4 Bypass thy R2 1K00 C1 10N

C13 100N
A1-D 4069 A1-E 4069 A1-F 4069
R29 3K16 C12 100P R30 3K16
CTR 7 A2 4024 CT=0 CT=< 4024
A1-A 4069 A1-B 4069 A1-C 4069

EF326 T1-A C10 470N C11 10U 25V
T1-D V3 BYV27-100 C26 470N
T1-C V4 BYV27-100 C27 470N
T1-B V5 BYV27-100 C28 470N
EF325 T2-A
T2-D V10 BYV27-100 C29 470N
T2-C V9 BYV27-100 C30 470N
T2-B V8 BYV27-100 C31 470N

R3 21R5 V2 56V 1W3 C2 470P
V1 IRFD110 R55 10R0
R16 21R5 V7 56V 1W3 C6 470P
V6 IRFD110 R56 10R0

4x46R4 R58 R4 R5 R6 R13 100R X1 V12 GA / V12 GB
4x46R4 R59 R7 R8 R9 C3 10N R14 100R X2 V13 GA / V13 GB
4x46R4 R60 R10 R11 R12 C4 10N R15 100R X3 V14 GA / V14 GB
C5 10N
4x46R4 R61 R18 R17 R23 C7 10N R21 100R
4x46R4 R62 R25 R24 R26 C8 10N R19 100R
R65 N.A. 4x46R4 R63 R28 R22 R27 C9 10N R20 100R
C32 N.A. R64 N.A. C33 N.A.

HS1 HS2 MISNK 6K/W TO220
X4 13 14 5 9 15 16 Backup supply
R57 N.A. C15 1U A3 LM7812 C16 100N V11 1N4446

EXIDE ELECTRONICS

TITLE Schematic drawing
3-Phase St.switch board
3N15/3N30
CHECKED JSa APPROVED 15.01.99 JP LOC FPS
NO 10 10 474 REV D SIZE A3 PAGE 1/1

Assemble R65
instead of V16

Assembly of R72-74

R72,73,74

R28,32,39

Lead length

NOTE! Remove two middle pins of X1-3

Parts marked with * not assembled

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 - 2.6 mm.

INV.TRIP

INV.TRIP

BAR CODE

Rev/ECO no:

Rev/ECO no:

3/12006 VK

A/12066 TT

POWERWARE

Title	Assembly drawing		No		Rev
	Static switch		10 12 969		A
	3N60				
Checked IS	Approved 29.06.1999 VK	Loc FIN	Size A4	Page 1 / 1	

Bypass In L1

Bypass In L2

Bypass In L3

MBypass1

MBypass2

MBypass3

MUout1

MUout2

MUout3

MIout1

MIout2

MIout3

Bypass thy

Aux supply

Backup supply

Inv trp

Inv.trip

GND

BP En

Vref.

+12V

4 pcs (555) (553) 4 pcs

(551)

(560) POWERWARE

TARRASSA P/N
PN IN STICKER
1013191

(580)

NOTE
xxxxx
xxxxx

(555) 10 pcs

(552) 2 pcs

(557) 13 pcs

80 °C
(S2)

(559) 4 pcs

(S1)

70 °C

(V14)
(V13)
(V12)

(V9)
(V7)
(V6)
(V5)
(V8)

6 pcs
(555)

(640)
(558)
(630)

(F5)
(620)
(610)
1013362
(600)

(F4)
1013361

(620)
(610)
(600)

(F3)
1013360

(A2)

1014023

1013390

1013365

1013389

1013363
1013364

(650)

1013388

$\bigcirc$ = $\bigcirc$

$\bigstar$ = $\bigcirc$

Rev/ECO no:
A/11905 TK
B/12024 IN

Rev/ECO no:

Title ASSEMBLY :		H080	
ST.SW.MOD		No	Rev
3N30		10 13 839	B
Checked JKe	Approved VK 08.03.1999	Loc FIN	

POWERWARE

Size A3   Page 1 / 3

appendix to page 1, not for prod. line
liite sivulle 1, ei tuotantolinjalle

Rev/ECO no:

Rev/ECO no:
A/11905 TK
B/12024 IN

POWERWARE

Title	ASSEMBLY :	H080	
	ST.SW.MOD	No	Rev
	3N30	10 13 8393	B
Checked JKe	Approved VK 09.02.1999	Loc FIN	Size A3	Page 2 / 3

Rev/ECO no:

Rev/ECO no:

A/11905 IN

B/12024 IN

A10/X209 — P8/J8

A10/X208 — P7/J7

A4

A5

S2 — 80°C — BROWN — BLUE — S2

S1 — BROWN — BLUE — S1 — 70°C

A2/A1

1
2
3

BLUE BLUE BLUE

80°C
S2 — BROWN — BLUE — S2

S1 — BROWN — BLUE — S1 — 70°C

−
+

POWERWARE

Title ASSEMBLY:		H080	
ST.SW. MOD		No 10 13 839	Rev B
3N30			
Checked JKe	Approved VK 08.03.1999	Loc FIN	Size A3	Page 3 / 3

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1013191 B**
SUBAS 3N30 RECT&ST. SWITCH MODU

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	4.000	559
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1009408	DIODE MOD 80A 1600V	3.000	V5-7
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	3.000	650
1009860	SCREW K M5x16 PZ DIN6902A+6905	20.000	555
1009886	SCREW K M5x10 PZ DIN6902A+6905	13.000	557
1010151	SPACR M5(10) L13 Ms AV8	3.000	554
1010476	PCBAS 3N15 STATIC SWITCH	1.000	A2
1010505	LABEL BAR CODE	1.000	560
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	4.000	553
1013315	HEATS 3N30 PROFIL THYR MOD A3	1.000	551
1013483	RAIL 3N30 CUR THYRIST/DIOD A4	2.000	552
1013839	D ASSY 3N30 DWG THYR MOD A3	.000	
1013934	SPACR M5(10)/M6 S/I L34 MsAv12	3.000	630
1014037	SET 3N30 CABLE BOOST&ST.SWITCH	1.000	
1014184	SPACR M5/M6 S/I L34 PA66 A3	3.000	640
1014883	LABEL 3N30 FUSE STATIC SW A4	1.000	580
1014900	FUSE 80A 240V UR BOLT 80LET	3.000	F3, F4, F5
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	6.000	600
2364003	WASHE WAVE M5 KBA FE ZINK	6.000	558
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	620
4313064	WASHE LOCK-SER M6 FE DIN6798A	6.000	610
8040394	THYRI MOD 95A 1600V	5.000	V8-9, 12-14

A10/X1

X15

X19 — A10/X7

A1
CHARGER BOARD

X17

A2/X1

X18
BLUE
BROWN — F2
BLUE
BROWN — K1
X12

X9 — A10/X2

BLUE
BLACK
BROWN

P7/Rect/S1 70°C
P8/Rect/S2 80°C
Filter Ot X12
Inv/S1 70°C
Inv/S2 80°C
Trafo Ot X7

BLUE   BLUE
BROWN   BROWN

X204
X208 X209 X210 X205 X206 X207

A1/X15

X111
X112

X203   BROWN — S2/1-2
        BLUE

S1/1-2
X6
X1   BROWN
      BLUE

X3/X1

A2/X4

A1/X19 — BLUE — X7
Rail N — BLUE — X8

X6   BROWN
BatTemp   BLUE
          X3

A10
LOGIC BOARD

X219

X2
A1/X9 — BLUE
        BLACK
        BROWN

X216   X4 X100   X101   X102

A11/X4 EPO X100   X101

X102

X219-222

X219

S1/5-6

X22
BROWN
BLUE

X8   X5   X4   X3
        X7

X6   BLUE   X1   BLUE
     BLACK   BLACK
     BROWN   BROWN

Rail -
Rail N
Rail +
Bat -
Bat +

A0/X23-25

A9/X27-29

YG

Rev/ECO no:

THIS DRAWING CONTAINS PROPRIETARY
INFORMATION OF POWERWARE AND MAY NOT,
IN WHOLE OR IN PART, BE DUPLICATED OR
DISCLOSED OR USED FOR MANUFACTURE OR
ANY PART DISCLOSED HEREIN WITHOUT THE
PRIOR WRITTEN PERMISSION OF POWERWARE.

Rev/ECO no: C/12127 VK
A/11905 TK
B/11969 JK

POWERWARE

Title ASSEMBLY: WIRING   H110
LOGIC & CHARGER PCBA
3N30   No   Rev
                                10 13 854   C
Checked JK   Approved VK 10.03.1999   Loc FIN   Size A3   Page 1 / 1

Add sticker here instead of the marked place on PCB.

BAR CODE

Rev/ECO no:

Rev/ECO no:

4/11862 VK

✱ = NOT ASSEMBLED

1. Screw M3x10
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating sheet
6. Insulating bush I=2.7
7. Tapping screw AB 3.5x9.5

Assembly of A2, A3, V75

Assembly of B100, 200, 300

Mounting torque of semiconductors in TO−220/247/264 case 0.5 $^{+0.1}_{-0}$ Nm

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 − 2.6 mm.

Lead length

Title	INVERTER PCBA		
EXIDE ELECTRONICS	ASSEMBLY DRAWING	No 10 13 176	Rev 4
	3N30		
	Checked JSa	Approved 15.12.1998 VK	Loc FIN	Size A3	Page 1 / 1

X1 Adaptive Hyst1 1

R112 2K15
V103 1N4446
R111 1K00
V101 MPS2222A
V102 1N4446
C106 470N
R110 2K15
R109 2K15
R108 681R
C102 220P

Hall offset
R107 1K
CCW
R106 11K0
R134 4K22
R132 12K1
R133 3K83
VCC

VCC
C100 470N
R105 10K0
R103 4K64
R104 68K1
C104 100N
TP100
TP100
C103 2N2
A100 LM311
C105 100N
TP100

R101 2K15
R102 2K15
C101 220P
R114 100K
R113 21K5
R170 2K15
R115 147R
V170 6V8
V171 6V8
C107 2N2

B100 CSLA2DH HALL2

VCC
C120 470N
V108 1N4446
R139 12K1
A102-C 4093
V109 1N4446
R140 12K1
A102-A 4093
A102-D 4093
C117 220P
C118 220P
P

VCC
C119 100N
R141 681R
R142 1K00
A104 DIL8
V110 MPS2907A
R143 681R
R144 1K00
A105 DIL8
V111 MPS2907A

R165 14R7
V106 MJE243
V113 R146 N.A. 31R6
V112 MJE253
R145 14R7
R151 N.A. RES
C126 1N
C128 100N
C121 1U
X100 1 G 2 E
C122 1U

C129
V107 MJE243
V117 R149 N.A. 31R6
V116 MJE253
R148 14R7
R152 N.A. RES
R166 14R7
C127 1N
C124 1U C123 1U
X101 2 G 1 E
R150 3K16
R147 3K16
A B C D E F

Voltage Feedback L1
X102 1 2

X103 1 2 N.A.
R164 0R0
R163 562K
R119 31K6
R162 10K0
C114 2U2
V114 V115 1N4446
VCC
C115 470N
A101-A LT1013
C131 470P
R156 1K47
R120 31K6
R121 2K15
R122 147K
R123 147K
C113 1N
C110 1N

R159 100K
R160 100K
R161 2K15
C108 1N
R116 464K
V104 V105 8V2 8V2
R157 215K
R117 21K5
R158 100K
R118 5K62
C130 2U2
C109 10N
A101-B LT1013
C116 470N VEE

Output DC
R128 100K CCW VEE
C111 100N
R129 4M7 RES

R130 21K5

X1 Sineref1 14 13
R131 100R
C112 10N

X1 MUOutInv1 12 11
R127 100K
R126 100K
R125 2K61
C125 10N

X1 Adaptive Hyst2 2
Sineref2 16
GND 15
MUOutInv2 10
GND 9
Control B
Aux Supply: Upper gate G.I.H
Lower gate D.F.E

X1 Adaptive Hyst3 3
Sineref3 18
GND 17
MUOutInv3 8
GND 7
Control C
Aux Supply: Upper gate J.L.K
Lower gate D.F.E

Component names:
Control A 1XX
Control B 2XX
Control C 3XX

EXIDE ELECTRONICS

TITLE Schematic drawing
Inverter control A
3-Phase Inverter 3N30
CHECKED JR
APPROVED 24.04.2002 EB
LOC FIN
NO 10 12 859
REV C
SIZE A3
PAGE 2/2

Assembly of R1–30

7±1mm

The original length of uncut leads max. 4.5mm accepted.

The length of the other leads 0.8 – 2.6mm.

Lead length 0.8 – 2.6 mm

$*$ = NOT ASSEMBLED

R33
R34
R26
R8
R7
R6
R5

L3

TP2

L3

C4

C3

DC−

TP10

C10

DC−

DC+

V1

DC+

TP1

R25
R1
R2
R3
R4
R31
R32

C1

C2

C20

C16

C15

R37
R38
R28
R16
R15
R14
R13

C9

C8

C17

L2

TP3

L2

DC−

DC+

V2

R27
R9
R10
R11
R12
R35
R36

C6

C7

C21

C18

R39
R40
R29
R20
R19
R18
R17

C12

C11

C19

BAR CODE

L1

DC−

DC+

V3

R21
R23
R22
R24
R30
R41
R42

L1

TP4

C13

C14

C5

Rev/ECO no:

Rev/ECO no:
4/11863 VK
A/11894 VK

EXIDE ELECTRONICS

Title	ASSEMBLY DRAWING			
	INVERTER SNUBBER BOARD		No	Rev
	3N30		10 13 182	A
Checked JSa	Approved 09.11.1998 VK	Loc FIN	Size A4	Page 1 / 1

DC+

DC+ TP1
CONN PIN2

FET MODULE3/A

3
V1-A
C PRO 1N 1600V
C1
1N 1600V
C2 C PRO 1N 1600V
R32 N.A.
R1 R2 R3 R4 R25 R31
5×21R5
N.A.

L3
TP2
CONN PIN2

5×21R5
R33 N.A.
R5 R6 R7 R8 R26
R34 N.A.

2
V1-B
C3 C PRO 1N 1600V
C4 C PRO 1N 1600V
1N 1600V

FET MODULE3/A

3
V2-A
C PRO 1N 1600V
C6
1N 1600V
C7 C PRO 1N 1600V
R36 N.A.
R9 R10 R11 R12 R27 R35
5×21R5
N.A.

L2
TP3
CONN PIN3

5×21R5
R14 R16 R37 N.A.
R13 R15 R28
R38 N.A.

2
V2-B
C8 C PRO 1N 1600V
C9 C PRO 1N 1600V
1N 1600V

FET MODULE3/A

3
V3-A
C PRO 1N 1600V
C11
1N 1600V
C12 C PRO 1N 1600V
R40 N.A.
R17 R18 R19 R20 R29 R39
5×21R5
N.A.

L1
TP4
CONN PIN2

5×21R5
R22 R24 R41 N.A.
R21 R23 R30
R42 N.A.

2
V3-B
C13 C PRO 1N 1600V
C14 C PRO 1N 1600V
1N 1600V

DC-

DC- TP10
CONN PIN2

C PRO 1U 630V
C10
180N
1000V
C PRO 330N 1000V
C17
330N
1250V
C PRO 330N 1000V
C16
330N
1250V

C PRO 180N 1000V
C15
100N
1000V
C PRO 330N 1000V
C19
330N
1250V
C PRO 330N 1000V
C18
330N
1250V

C PRO 1U 630V
C5
180N
1000V
C PRO 330N 1000V
C20
330N
1250V
C PRO 330N 1000V
C21
N.A.

O
ORIGO

EXIDE
ELECTRONICS

TITLE	Schematic drawing		
	3-Phase Snubber board	NO	REV
	3N30	10 12 862	A
CHECKED JSa	APPROVED 21.01.99 JP	LOC FIN	SIZE A3	PAGE 1/1

Rev/ECO no:

Rev/ECO no:

1/12630 Pk

Sticker 1015790

Assembly of B100

Parts marked with ✳ not assembled

Assembly of N1

1. Screw M3x8
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert
6. Insulating bush l=2.7

7. Tapping screw AB 3.5x9.5

Mounting torque 0.5 $^{+0.1}_{-0}$ Nm

Assembly of R2,R109,R131,
R133,R136,R138,R147,R148

7±1mm

Assembly of B100

Open sides towards board edges

Lead length 0.8 — 2.6 mm

POWERWARE

Title			
INVERTER CNTRL 1			
ASSEMBLY DRAWING	No		Rev
3N40—80	10 19 458		1
Checked EP	Approved 11.02.2002 Pk	Loc FIN	Size A4 Page 1 / 1

POWERWARE

TITLE	Schematic drawing			
	Inverter Cntrl 1		NO	REV
	3N40-3N80		10 19 456	1
CHECKED EP	APPROVED 04.02.02 JP	LOC FIN	SIZE A3	PAGE 1/2

CURRENT LIMIT | HALL OFFSET | GATE

Inverter Cntrl 1	R1	R2	R3	R4	R103	R108	R109	R110	R133 R138	R134 R139	R147 R148	R131 R136	R132 R137
10194571 40NX.80kVA	12k1	16k2	N.A.	N.A.	8k25	14k7	61k9	13k3	N.A.	14R7	10R	21R5	N.A.
10194571 40-60kVA	12k1	N.A.	N.A.	N.A.	8k25	14k7	N.A.	13k3	31R6	14R7	N.A.	N.A.	N.A.

N.A.=NOT ASSEMBLED

* MARKED COMPONENTS: SEE VALUES ON TABLE

POWERWARE

TITLE Schematic drawing
Inverter Cntrl 1
3N40-3N80

NO 10 19 456
REV 1

CHECKED EP
APPROVED 04.02.02 JP
LOC FIN
SIZE A3
PAGE 2/2

Inv.alarm
(Thermal Switch on Heatsink)

Inv.shutdown
(Thermal Switch on Heatsink)

Inverter En

Adaptive Hyst

Hall offset

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1019457_1**   **page1**
PCBAS 3N40-80 INVERTER CNTRL 1

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
0000000	PART NOT ASSEMBLED	.000	B101
0000000	PART NOT ASSEMBLED	.000	C33, 36, 39,
0000000	PART NOT ASSEMBLED	.000	C113, 119,
0000000	PART NOT ASSEMBLED	.000	C126, 301,
0000000	PART NOT ASSEMBLED	.000	R3, 4, 35,
0000000	PART NOT ASSEMBLED	.000	R111,
0000000	PART NOT ASSEMBLED	.000	R132, 137,
0000000	PART NOT ASSEMBLED	.000	R141-144,
0000000	PART NOT ASSEMBLED	.000	R301, 304,
0000000	PART NOT ASSEMBLED	.000	R305, 307,
0000000	PART NOT ASSEMBLED	.000	R308,
0000000	PART NOT ASSEMBLED	.000	V300, 301,
0000000	PART NOT ASSEMBLED	.000	X2
1000272	CAPAC EST 2,2uF 50VDC 10% p5mm	2.000	C3, 5
1002398	CAPAC ELE 10uF 25V 5x11 p2	7.000	C12, 13
1002398	CAPAC ELE 10uF 25V 5x11 p2	7.000	C28-31
1002398	CAPAC ELE 10uF 25V 5x11 p2	7.000	C300
1002415	ICCOM LM311 PLASTIC	1.000	N100
1002552	DIODE 2A 200V 25NS SOD57	8.000	V10-13, 15,
1002552	DIODE 2A 200V 25NS SOD57	8.000	17-19
1002581	RESIS FUSE 3R3 0.25W 5%	2.000	R32, 40
1003656	INSUL SPACER 3-3.3mm FOR LED	1.000	(H100)
1005577	CAPAC EST 22nF 63VDC 5% p=5mm	2.000	C42, 48
1007180	ZENER 56V 1W3 5% DO-41	1.000	V16
1007334	CONNE 3P MALE HEADER .100" PCB	3.000	TP5-7
1007335	CONNE 5P MALE HEADER .100" PCB	1.000	TP100
1007380	TRANN 0.6A 40V TO-92 MPS2222A	3.000	V20, 103,
1007380	TRANN 0.6A 40V TO-92 MPS2222A	3.000	108
1007381	TRANP 0.6A -60V TO-92 MPS2907A	3.000	V106, 111,
1007381	TRANP 0.6A -60V TO-92 MPS2907A	3.000	112
1007389	TRAFO FRD 5W 12/6/6V EFD20ULA4	1.000	T2
1007399	MFETN 1A 100V 0.6 ohm IRFD110	2.000	V9, 14
1007908	CAPAC EST 1nF 100VDC 10% 5mm	3.000	C1, 8, 9
1007909	CAPAC EST 2.2nF 100VDC 10% 5mm	2.000	C102, 104
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	C10, 17, 47
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	100, 105-6
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	112, 114,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	116, 118,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	120, 122,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	15.000	124, 127-8
1008865	SENSR CURRENT HALL 235A PCB	1.000	B100
1010088	ICOPT 2500Vrms HCPL-3120 UL	2.000	V119, 120
1010482	TRAFO FRD 5W 12/2x24V EFD20 A4	1.000	T1
1010516	ICOPA DUAL DIL LT1013	1.000	N3
1010661	CAPAC EST 10nF 63V 5% p5mm	4.000	C2, 4, 11,
1010661	CAPAC EST 10nF 63V 5% p5mm	4.000	111
1010839	SCREW PZ M3x10 Fe ISO 7045	1.000	(N1)
1010910	TRANN 4A 100V TO-126 MJE243	2.000	V113, 116
1010911	TRANP 4A -100V TO-126 MJE253	2.000	V114, 117
1012045	CONNE 8P MALE LOCKING G3.96mm	1.000	X8
1012143	STICKER BAR CODE FOR PCBAS	1.000	

PCBAS 3N40-80 INVERTER CNTRL 1

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1013101	CONNE 15P MALE 1ROW 2,54mm	1.000	X4
1013826	PCBRD 3N60 INVERTER CNTRL 1	1.000	
1014232	CONNE FLAT CBL 20P MALE 180°SR	1.000	X1
1014604	ICPWM DIL-8 UC3845A PLASTIC	2.000	N4, N5
1014674	RESIS 10R 5W 5% WW RAD p5.08mm	2.000	R44, 45
1015790	STICKER 3N60 INV CTRL PCBA HAL	.010	
1019456	D SCHEMA 3N40-80 INV CNTRL 1	.000	
1019458	D ASSY 3N40-80 INV CNTRL 1 BRD	.000	
2540043	SCREW TAPP. AB 3.5x9.5 DIN7981	2.000	(B100)
4040303	WASHE PLAIN M3 Fe SS ISO 7089	2.000	(N1)
4313032	WASHE LOCK-SER M3 FE DIN6798A	1.000	(N1)
6342003	NUT HEX M3 SS ISO 4032	1.000	(N1)
8002204	INSUL SPACER T05/18/92/98	5.000	(V103, 106,
8002204	INSUL SPACER T05/18/92/98	5.000	108, 111,
8002204	INSUL SPACER T05/18/92/98	5.000	112)
8002405	LED GREEN 30mA 3mcd 3mm T1	1.000	H100
8002520	ZENER 8.2V 0W5 5% DO-35	3.000	V3, 4, 109
8002536	ZENER 6.8V 0W5 5% DO-35	2.000	V1, 2
8003712	CAPAC RC-CIRCUIT 0.1uF 100ohm	1.000	RC1
8010001	RESIS 10R0 0.4W 1% MET	2.000	R147, 148
8010002	RESIS 0R0 0.4W MAX 3A/10mOHM	2.000	R18, R300
8010015	RESIS 14R7 0.4W 1% MET	2.000	R134, 139
8010035	RESIS 21R5 0.4W 1% MET	7.000	R33, 34, 39,
8010035	RESIS 21R5 0.4W 1% MET	7.000	R43, 70,
8010035	RESIS 21R5 0.4W 1% MET	7.000	R131, 136
8010055	RESIS 31R6 0.4W 1% MET	2.000	R133, 138
8010089	RESIS 100R 0.4W 1% MET	4.000	R11, 41, 42
8010089	RESIS 100R 0.4W 1% MET	4.000	R52
8010107	RESIS 147R 0.4W 1% MET	1.000	R5
8010118	RESIS 215R 0.4W 1% MET	2.000	R48, 54
8010153	RESIS 681R 0.4W 1% MET	4.000	R47, 106
8010153	RESIS 681R 0.4W 1% MET	4.000	127, 129
8010162	RESIS 1K00 0.4W 1% MET	7.000	R38, 115,
8010162	RESIS 1K00 0.4W 1% MET	7.000	121-122,
8010162	RESIS 1K00 0.4W 1% MET	7.000	128, 130,
8010162	RESIS 1K00 0.4W 1% MET	7.000	306
8010175	RESIS 1K47 0.4W 1% MET	1.000	R20
8010180	RESIS 2K15 0.4W 1% MET	11.000	R9, 22, 53,
8010180	RESIS 2K15 0.4W 1% MET	11.000	R101, 102,
8010180	RESIS 2K15 0.4W 1% MET	11.000	R114, 116,
8010180	RESIS 2K15 0.4W 1% MET	11.000	R117, 123,
8010180	RESIS 2K15 0.4W 1% MET	11.000	R302, 309
8010183	RESIS 16K2 0.4W 1% MET	1.000	R2
8010186	RESIS 2K61 0.4W 1% MET	1.000	R27
8010190	RESIS 3K16 0.4W 1% MET	5.000	R124-6,
8010190	RESIS 3K16 0.4W 1% MET	5.000	R135, 140
8010194	RESIS 4K64 0.4W 1% MET	4.000	R49, 50,
8010194	RESIS 4K64 0.4W 1% MET	4.000	R104, 120
8010198	RESIS 13K3 0.4W 1% MET	1.000	R110
8010199	RESIS 12K1 0.4W 1% MET	3.000	R1, 118, 119
8010200	RESIS 5K62 0.4W 1% MET	1.000	R15
8010201	RESIS 8K25 0.4W 1% MET	1.000	R103

PCBAS 3N40-80 INVERTER CNTRL 1

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
8010206	RESIS 6K81 0.4W 1% MET	1.000	R46
8010207	RESIS 11K0 0.4W 1% MET	1.000	R113
8010209	RESIS 10K0 0.4W 1% MET	5.000	R16, 36, 51,
8010209	RESIS 10K0 0.4W 1% MET	5.000	R79, 107
8010210	RESIS 14K7 0.4W 1% MET	1.000	R108
8010212	RESIS 31K6 0.4W 1% MET	2.000	R19, 21
8010213	RESIS 21K5 0.4W 1% MET	2.000	R12, 13
8010215	RESIS 56K2 0.4W 1% MET	1.000	R146
8010217	RESIS 68K1 0.4W 1% MET	1.000	R105
8010219	RESIS 100K 0.4W 1% MET	7.000	R6, 8, 10, 14

Sticker
1015790

Assembly of B200

Parts marked with ✳ not assembled

Assembly of R2,R209,R231,
R233,R236,R238,R247,R248

7±1mm

7. Tapping screw AB 3.5x9.5

Assembly of B200

Open sides towards board edges

Lead length 0.8 — 2.6 mm

Rev/ECO no:

Rev/ECO no:

1/12631 Pk

POWERWARE

Title			No		Rev
INVERTER CNTRL 2					
ASSEMBLY DRAWING			10 19 461		1
3N40—80					
Checked EP	Approved 12.02.2002 Pk	Loc FIN	Size A4	Page 1 / 1	

BAR CODE

"SNIPP OFF RESISTORS
ACC.TO INV.CNTRL1"

GND/CC/TRIM/HALL/AH

HALL
OFFSET

OUTPUT
0V

EXIDE ELECTRONICS

TITLE	Schematic drawing				
	Inverter Cntrl 2		NO	10 19 459	REV 1
	3N40-3N80				
CHECKED EP	APPROVED 04.02.02 JP	LOC FIN	SIZE A3		PAGE 1/1

CURRENT LIMIT | **HALL OFFSET** | **GATE**

		R1	R2	R3	R4	R203	R208	R209	R210	R233 R238	R234 R239	R247 R248	R231 R236	R232 R237
Inverter Cntrl 2														
10194601	80kVA	12k1	16k2	N.A.	N.A.	8k25	14k7	61k9	13k3	N.A.	14R7	10R	21R5	N.A.
10194601	40-60kVA	12k1	N.A.	N.A.	N.A.	8k25	14k7	N.A.	13k3	31R6	14R7	N.A.	N.A.	N.A.

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019460_1**   **page1**
PCBAS 3N40-80 INVERTER CNTRL 2

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
0000000	PART NOT ASSEMBLED	.000	C36, 213,
0000000	PART NOT ASSEMBLED	.000	C36, 213,
0000000	PART NOT ASSEMBLED	.000	C36, 213,
0000000	PART NOT ASSEMBLED	.000	B201
0000000	PART NOT ASSEMBLED	.000	C219, 225-6
0000000	PART NOT ASSEMBLED	.000	C219, 225-6
0000000	PART NOT ASSEMBLED	.000	C219, 225-6
0000000	PART NOT ASSEMBLED	.000	C36, 213,
0000000	PART NOT ASSEMBLED	.000	R2-4, 37
0000000	PART NOT ASSEMBLED	.000	R2-4, 37
0000000	PART NOT ASSEMBLED	.000	R2-4, 37
0000000	PART NOT ASSEMBLED	.000	C219, 226
0000000	PART NOT ASSEMBLED	.000	R209-211
0000000	PART NOT ASSEMBLED	.000	R209-211
0000000	PART NOT ASSEMBLED	.000	R209-211
0000000	PART NOT ASSEMBLED	.000	R3, 4, 37,
0000000	PART NOT ASSEMBLED	.000	231-2, 236,
0000000	PART NOT ASSEMBLED	.000	231-2, 236,
0000000	PART NOT ASSEMBLED	.000	231-2, 236,
0000000	PART NOT ASSEMBLED	.000	R211, 232,
0000000	PART NOT ASSEMBLED	.000	237, 241-5
0000000	PART NOT ASSEMBLED	.000	237, 241-6
0000000	PART NOT ASSEMBLED	.000	237, 241-6
0000000	PART NOT ASSEMBLED	.000	R237,
0000000	PART NOT ASSEMBLED	.000	V215, 218
0000000	PART NOT ASSEMBLED	.000	V215, 218
0000000	PART NOT ASSEMBLED	.000	V215, 218
0000000	PART NOT ASSEMBLED	.000	R241-244
0000000	PART NOT ASSEMBLED	.000	
0000000	PART NOT ASSEMBLED	.000	
0000000	PART NOT ASSEMBLED	.000	TP8-9
0000000	PART NOT ASSEMBLED	.000	TP8-9
0000000	PART NOT ASSEMBLED	.000	
0000000	PART NOT ASSEMBLED	.000	
0000000	PART NOT ASSEMBLED	.000	
1002398	CAPAC ELE 10uF 25V 5x11 p2	6.000	C37-40
1002398	CAPAC ELE 10uF 25V 5x11 p2	6.000	C300-1
1002415	ICCOM LM311 PLASTIC	1.000	N200
1002552	DIODE 2A 200V 25NS SOD57	4.000	V14-17
1002581	RESIS FUSE 3R3 0.25W 5%	1.000	R32
1003656	INSUL SPACER 3-3.3mm FOR LED	1.000	(H200)
1007334	CONNE 3P MALE HEADER .100" PCB	2.000	TP8-9
1007335	CONNE 5P MALE HEADER .100" PCB	1.000	TP200
1007380	TRANN 0.6A 40V TO-92 MPS2222A	2.000	V203, 208
1007381	TRANP 0.6A -60V TO-92 MPS2907A	3.000	V206, 211,
1007381	TRANP 0.6A -60V TO-92 MPS2907A	3.000	212
1007399	MFETN 1A 100V 0.6 ohm IRFD110	1.000	V9
1007909	CAPAC EST 2.2nF 100VDC 10% 5mm	2.000	C202, 204
1007910	CAPAC EST 100nF 63VDC 5% p5mm	9.000	205, 206
1007910	CAPAC EST 100nF 63VDC 5% p5mm	9.000	212, 214,

PCBAS 3N40-80 INVERTER CNTRL 2

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1007910	CAPAC EST 100nF 63VDC 5% p5mm	9.000	216, 218,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	9.000	220, 222,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	9.000	224
1008865	SENSR CURRENT HALL 235A PCB	1.000	B200
1010088	ICOPT 2500Vrms HCPL-3120 UL	2.000	V219, 220
1010469	CONNE 4P MALE HEADER .100" PCB	1.000	TP200
1010482	TRAFO FRD 5W 12/2x24V EFD20 A4	1.000	T2
1010661	CAPAC EST 10nF 63V 5% p5mm	1.000	C211
1010661	CAPAC EST 10nF 63V 5% p5mm	1.000	
1010910	TRANN 4A 100V TO-126 MJE243	2.000	V213, 216
1010911	TRANP 4A -100V TO-126 MJE253	2.000	V214, 217
1012143	STICKER BAR CODE FOR PCBAS	1.000	
1012904	CONNE 15PIN SOCKET 1ROW 2,54mm	1.000	X4
1013828	PCBRD 3N60 INVERTER CNTRL 2	1.000	
1015790	STICKER 3N60 INV CTRL PCBA HAL	.010	
1019459	D SCHEMA 3N40-80 INV CNTRL 2	.000	
1019461	D ASSY 3N40-80 INV CNTRL 2 BRD	.000	
2540043	SCREW TAPP. AB 3.5x9.5 DIN7981	2.000	(B200)
8002204	INSUL SPACER TO5/18/92/98	5.000	(V201, 203,
8002204	INSUL SPACER TO5/18/92/98	5.000	206, 211,
8002204	INSUL SPACER TO5/18/92/98	5.000	212)
8002405	LED GREEN 30mA 3mcd 3mm T1	1.000	H200
8002520	ZENER 8.2V 0W5 5% DO-35	1.000	V209
8010001	RESIS 10R0 0.4W 1% MET	2.000	R247, 248
8010015	RESIS 14R7 0.4W 1% MET	2.000	R234, 239
8010035	RESIS 21R5 0.4W 1% MET	2.000	R36, 38
8010035	RESIS 21R5 0.4W 1% MET	4.000	R36, 38,
8010035	RESIS 21R5 0.4W 1% MET	4.000	R231, 236
8010055	RESIS 31R6 0.4W 1% MET	2.000	R233, 238
8010118	RESIS 215R 0.4W 1% MET	1.000	R33
8010153	RESIS 681R 0.4W 1% MET	1.000	R206
8010153	RESIS 681R 0.4W 1% MET	3.000	R206, 227,
8010153	RESIS 681R 0.4W 1% MET	3.000	229
8010162	RESIS 1K00 0.4W 1% MET	7.000	215, 221,
8010162	RESIS 1K00 0.4W 1% MET	5.000	215, 221,
8010162	RESIS 1K00 0.4W 1% MET	7.000	222, 227-30
8010162	RESIS 1K00 0.4W 1% MET	5.000	222, 228,
8010162	RESIS 1K00 0.4W 1% MET	5.000	230
8010180	RESIS 2K15 0.4W 1% MET	7.000	R1, 201-2,
8010180	RESIS 2K15 0.4W 1% MET	6.000	R201, 202,
8010180	RESIS 2K15 0.4W 1% MET	7.000	214, 216-7,
8010180	RESIS 2K15 0.4W 1% MET	6.000	R214, 216,
8010180	RESIS 2K15 0.4W 1% MET	7.000	223
8010180	RESIS 2K15 0.4W 1% MET	6.000	R217, 223
8010183	RESIS 16K2 0.4W 1% MET	1.000	R2
8010190	RESIS 3K16 0.4W 1% MET	5.000	R224-6,
8010190	RESIS 3K16 0.4W 1% MET	5.000	235, 240
8010194	RESIS 4K64 0.4W 1% MET	2.000	R204, 220
8010198	RESIS 13K3 0.4W 1% MET	1.000	R210
8010199	RESIS 12K1 0.4W 1% MET	2.000	R218, 219
8010199	RESIS 12K1 0.4W 1% MET	3.000	R1, 218, 219
8010201	RESIS 8K25 0.4W 1% MET	1.000	R203

PCBAS 3N40-80 INVERTER CNTRL 2

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
8010203	RESIS 7K50 0.4W 1% MET	1.000	R208
8010204	RESIS 17K8 0.4W 1% MET	1.000	R203
8010207	RESIS 11K0 0.4W 1% MET	1.000	R213
8010209	RESIS 10K0 0.4W 1% MET	2.000	R34, 207
8010210	RESIS 14K7 0.4W 1% MET	1.000	R208
8010215	RESIS 56K2 0.4W 1% MET	1.000	R246
8010217	RESIS 68K1 0.4W 1% MET	1.000	R205
8010222	RESIS 61K9 0.4W 1% MET	1.000	R209
8010230	RESIS 215K 0.4W 1% MET	1.000	R245
8012372	TRIMM 1K 0W5 TYPE Y CERMET	1.000	R212
8020003	CAPAC CER 220pF 200VDC 20% p5	4.000	C201, 203,

NOTE! DO NOT BEND
LEADS OF C3-4, R27-31,
R43, R45, R47, R52-55
ON THE SOLDER SIDE!

ADD BAR CODE LABEL HERE
INSTEAD OF THE MARKED PLACE ON PCB

Parts marked with ✳ not assembled

The original length of uncut leads max. 4.5 mm accepted.
The length of the other leads 0.8 — 2.6 mm.

Lead length

Rev/ECO no:

Rev/ECO no:
B/12241 IN
C/12325 VK

POWERWARE

Title	Assembly drawing		No		Rev
	Inverter Snubber Board		10 14 513		C
	3N60				
Checked IS	Approved 28.06.1999 VK	Loc FIN	Size A4	Page 1 / 1	

+DC

+DC
[1|2] TP11

R39   R40 R41
21R5   21R5 21R5   R42
                        21R5

+DC 3
V10
MODULE

C31
1N
1600V   C33
             1N
             1600V   CHOKE
                        [1|2] TP12
1   CHOKE

C35   C34
1N   1N
1600V   1600V
2
-DC

R52   R54
21R5   21R5

R53 R55
21R5 21R5

R30   R29
21R5 21R5

R31   R28
21R5   21R5

C1
N.A.

C18
1N
1600V   C17
             1N
CHOKE   1600V   CHOKE
                        [1|2] TP8
+DC 3
V9
MODULE
1

B2

E2
2
-DC

C16   C15
1N   1N
1600V   1600V

R27   R47
21R5   21R5

C3   C4   C2
100N   180N   N.A.
1000V   1000V

-DC
[1|2] TP9

R43 R45
21R5 21R5

-DC

EXIDE
ELECTRONICS

TITLE Schematic drawing
Inv.Snubber board
Nautilus 3N60

NO
10 13 831

REV
B

CHECKED EB   APPROVED 13.02.2001 VK   LOC FIN   SIZE A4   PAGE 1/1

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014512b**
PCBAS 3N60 INV SNUBBER BRD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
0000000	PART NOT ASSEMBLED	.000	C1, C2
1000392	CAPAC PRO 100nF 1000VDC p27.5	1.000	C3
1007900	CAPAC PRO 1nF 1600VDC 5% RM15	8.000	C15-18,
1007900	CAPAC PRO 1nF 1600VDC 5% RM15	8.000	31, 33-35
1012143	STICKER BAR CODE FOR PCBAS	1.000	
1013563	CAPAC PRO 180nF 1000VDC 5%27.5	1.000	C4
1013830	PCBRD 3N60 INV SNUBBER BRD	1.000	
1013831	D SCHEMA 3N60 INV SNUBBER B A4	.000	
1014513	D ASSY 3N60 INV SNUBBER BRD A4	.000	
1014815	D UPGRADE 3N60 INV SNUBBER A4	.000	
8010035	RESIS 21R5 0.4W 1% MET	16.000	R27-31,
8010035	RESIS 21R5 0.4W 1% MET	16.000	39-42,
8010035	RESIS 21R5 0.4W 1% MET	16.000	43, 45, 47,
8010035	RESIS 21R5 0.4W 1% MET	16.000	52-55
8051815	CONNE MALE HEADER ROW 32 PIN	.250	TP8, 9, 11,
8051815	CONNE MALE HEADER ROW 32 PIN	.250	12

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4 pcs 4 pcs
412 408
401
423
V3
S2 80 °C
420 4 pcs
S1 70 °C
413 12 pcs
V2
V1
418
419
3 pcs
6 pcs
407
3 pcs
403
419
3 pcs
407
3 pcs
A6
419
3 pcs
407
3 pcs
414 9 pcs
404

4 pcs
413
409 2 pcs
A3
417 2 pcs
405 2 pcs
410 4 pcs
402
415 2 pcs
421
422 2 pcs
RC 2 pcs
416 411 406 417
416

	Title ASSEMBLY :	H090	
EXIDE ELECTRONICS	INVERTER MOD	No 10 13 837	Rev A
	3N30		
	Checked JKe	Approved VK 08.03.1999	Loc FIN	Size A3	Page 1 / 2

Rev/ECO no:

Rev/ECO no:

A/11905 TK

A6

L3 3

L2 2

L1 1

BLUE

BLUE

80°C

S2

BROWN

S2   A10/X207

BLUE

BLUE

BROWN

S1   A10/X206

BLUE

70°C

BLUE

BLUE

A3

3

2

1

RC1   RC2

Title	ASSEMBLY:				H090	
	INVERTER MOD				No	Rev
EXIDE ELECTRONICS	3N30				10 13 837	A
	Checked JKet	Approved VK 15.03.1999		Loc FIN	Size A3	Page 2 / 2

POWERWARE OY

BILL OF MATERIAL FOR **PRODUCT** **1013190d**
SUBAS 3N30 INVERTER MOD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002411	SPACR M4 L13 Ms	2.000	405
1005550	SCREW K M3x6 DIN7985+6798	4.000	420
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	16.000	413
1009860	SCREW K M5x16 PZ DIN6902A+6905	4.000	412
1009886	SCREW K M5x10 PZ DIN6902A+6905	9.000	414
1010086	SPACR M5(10) L13 Ms AV12	9.000	407
1010179	SCREW PZ M3x16 Fe ISO 7045	2.000	421
1010180	SCREW PZ M4x6 Fe ISO 7045	2.000	416
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	415
1010505	LABEL BAR CODE	1.000	423
1011718	CAPAC RC-CIRC 0.47uF X2, 47ohm	2.000	RC1,2
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	4.000	408
1013069	HEATS 3N30 PROFIL INV MODUL A3	1.000	401
1013172	PLATE 3N30 INV.BOARD SUPPORTA3	1.000	402
1013175	PCBAS 3N30 INVERTER	1.000	A3
1013181	PCBAS 3N30 INV SNUBBER	1.000	A6
1013295	SPACR M4(8) I/S L30 FeZn Av7	2.000	406
1013307	IGBT 2x150A 1200V HB	3.000	V1-3
1013481	ASSY 3N30 RAIL CUR -INV/CAPA4	1.000	403
1013482	ASSY 3N30 RAIL CUR +INV/CAPA4	1.000	404
1013837	D ASSY 3N30 DWG INVERTER MODA3	.000	
1014036	SET 3N30 CABLE INVERTER MOD	1.000	
1973320	CONNE 12x4mm2 TERMINAL BLOCK	1.000	422
2364003	WASHE WAVE M5 KBA FE ZINK	12.000	419
4040305	WASHE PLAIN M5 Fe ISO 7089	3.000	418
4313042	WASHE LOCK-SER M4 FE DIN6798A	4.000	417
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	2.000	411
8063123	SPACR NYLON L=12.7mm LCBS-8	6.000	409,410

INVERTER MODULE CODE: 10 17 453

1010408
2 pcs

1008599

7980015

1011436

C13
C12

1012115
3 pcs

1009860
3 pcs

1010505

Label code:
1017453

1014148

V3
1009860
2 pcs

1015052

1009859

1014360

1011729

1009860
4 pcs

1014308
2 pcs

1014507

1009859
2 pcs

1005550
4 pcs

V2

S2 70°C

1014506

X6

BLUE
BROWN
X5
BLUE
BROWN

1015078
7 pcs

S1 60°C

1005550

1014191

8055433

A2

C26

2364004
3 pcs

1015130

4040306
3 pcs

1263060
3 pcs

$\bigcirc$ = $\bigcirc$ $\bigcirc$ = $\bigcirc$

Rev/ECO no:

Rev/ECO no: A/12605 HT

INVERTER MODULE CODE: 10 17 453

BLUE

BROWN

X6

BLUE

BROWN

X5

BLUE

X8/1-3

BROWN

BROWN

X8/6-8

BLUE

BROWN

BLUE

BROWN

BLUE

X101/X201

X100/X200

BLUE

BROWN

BLUE

BLUE

BROWN

BLUE

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017453b**
SUBAS 3N40 INVERTER MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	2.000	C12, 13
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1005550	SCREW K M3x6 DIN7985+6798	4.000	
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1008599	INSUL SHEET D 75mm d 12.2mm A4	2.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S2
1009859	SCREW K M5x12 PZ DIN6902A+6905	19.000	
1009859	SCREW K M5x12 PZ DIN6902A+6905	10.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	9.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	2.000	
1011436	PLATE 3N45 MOUNT INV CAP A4	1.000	
1011729	RAIL 3N45 CURR INVERT NEUT. A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB . A4	2.000	
1013768	THYRI MOD 105A 1600V	1.000	V3
1014148	HEATS 3N60 INVERTER A3	1.000	
1014191	RAIL 3N60 CURR INVERT - ALTA4	1.000	
1014268	SET 3N60 CABLE INVERTER MODULE	1.000	
1014308	INSUL 3N60 INVERT CURR RAIL A4	2.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C26
1014506	RAIL 3N60 CURR INVERT + ALTA4	1.000	
1014507	PLATE 3N60 BOARD HOLDER A3	1.000	
1014525	SPACR NYLON L=18mm SNAP-IN PCB	2.000	
1014803	INSUL 3N60 SHEET INV A4	1.000	
1014946	D ASSY 3N60 DWG I060 A3	.000	
1015052	RAIL CURRENT 2x5.5mm HOLE A4	1.000	
1015078	SPACR NYLON L=19.1 SNAP-IN PCB	7.000	
1015079	SPACR M3/M3 I/I L20 FeZn Av7	1.000	
1015130	ASSY 3N60 RAIL CUR. INV. ALT. A4	1.000	
1015591	SPACR M4 L40 S/I PA66	1.000	
1018684	IGBT 2x200A 1200V HALF BRIDGE	1.000	V2
1018814	SENSR THERMO 060°C C49°C NC	1.000	S1
1018846	PCBAS 3N40-60 INVERTER CNTRL 1	1.000	A2
1019338	D ASSY 3N40 DWG I060 A3	.000	
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	1.000	A2
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	3.000	
2364004	WASHE WAVE M6 KBA FE ZINK	3.000	
4040303	WASHE PLAIN M3 Fe SS ISO 7089	2.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	3.000	
7980015	NUT M12 NYLON FOR EL. CAPAC	4.000	
7980015	NUT M12 NYLON FOR EL. CAPAC	2.000	

INVERTER MODULE CODE: 10 14 252

1010408
2 pcs

7980015
4 pcs

1011436

1008599
4 pcs

C14
C13
C12
C11

1012115
3 pcs

1009860
3 pcs

1010505

Label code:
1014252

1014148

V3

1009860
2 pcs

1009860
8 pcs

1009859
2 pcs

V1

N
1011729

1009859
2 pcs

1014507

1005550
4 pcs

S2

V2

1015052

1014803

1014308

80°C

1015078
7 pcs

S1

1014190

70°C

X6

1014189

1012117
2 pcs

BLUE
BROWN
X5
BLUE
BROWN

1005550

8055433

1015079

4040303 2 pcs

A2

1014525

1005550

A1

C26

1014626

1015591

1010408

1009859
14 pcs

A3

$O = \oslash$

POWERWARE

THIS DRAWING CONTAINS PROPRIETARY
INFORMATION OF POWERWARE AND MAY NOT,
IN WHOLE OR IN PART, BE DUPLICATED OR
DISCLOSED OR USED FOR MANUFACTURE OF
ANY PART DISCLOSED HEREIN WITHOUT THE
PRIOR WRITTEN PERMISSION OF POWERWARE.

INVERTER MODULE CODE: 10 14 252

BLUE
BROWN
X6

BLUE
BROWN
X5

BLUE
BROWN
X8/1-3
BROWN
X8/6-8
BLUE

X101/X201
X101/X201
X100/X200
X100/X200

BROWN
BLUE
BROWN
BLUE

BROWN
BROWN
BLUE
BLUE

BROWN
BLUE

BROWN
BLUE

BLUE
BROWN

BROWN
BLUE
BLUE
BLUE

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT **1014252d**
SUBAS 3N60 INVERTER MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000297	CAPAC ELE 3300uF 450VDC M12	4.000	C11-14
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	19.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1011436	PLATE 3N45 MOUNT INV CAP A4	1.000	
1011729	RAIL 3N45 CURR INVERT NEUT. A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1012117	RAIL 3N45 CURR U-MOD PCB . A4	2.000	
1013307	IGBT 2x150A 1200V HB	2.000	V1,2
1013768	THYRI MOD 105A 1600V	1.000	V3
1014148	HEATS 3N60 INVERTER A3	1.000	
1014189	RAIL 3N60 CURR INVERT - A4	1.000	
1014190	RAIL 3N60 CURR INVERT + A4	1.000	
1014268	SET 3N60 CABLE INVERTER MODULE	1.000	
1014308	INSUL 3N60 INVERT CURR RAIL A4	2.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	1.000	C26
1014507	PLATE 3N60 BOARD HOLDER A3	1.000	
1014512	PCBAS 3N60 INV SNUBBER BRD	1.000	A1
1014525	SPACR NYLON L=18mm SNAP-IN PCB	2.000	
1014626	ASSY 3N60 RAIL CUR.INV.EXT. A4	1.000	
1014803	INSUL 3N60 SHEET INV A4	1.000	
1014946	D ASSY 3N60 DWG I060 A3	.000	
1015052	RAIL CURRENT 2x5.5mm HOLE A4	1.000	
1015078	SPACR NYLON L=19.1 SNAP-IN PCB	7.000	
1015079	SPACR M3/M3 I/I L20 FeZn Av7	1.000	
1015591	SPACR M4 L40 S/I PA66	1.000	
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	1.000	A2
1019460	PCBAS 3N40-80 INVERTER CNTRL 2	1.000	A3
4040303	WASHE PLAIN M3 Fe SS ISO 7089	2.000	
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	

Rev/ECO no:

Rev/ECO no:

B/12210 VK

C/12332 HT

1010627

1013010
2 pcs

2 pcs
1015226

1013093 4 pcs

1015229

8055397 2 pcs

4040308 2 pcs

1008999 2 pcs

- 1,5 kv Testausjännite AC
- Liitos on pystyttävä tarkistamaan, rikkomatta eristettä.
- Temperature class 155 °C
- UL 94 V-2

- 1,5 kv Testing voltage AC
- Junction must be able to check without breaking the insulator.
- Temperature class 155 °C
- UL 94 V-2

Tightening torque for the nuts is 2.8Nm

O = O   ☆ = ⊙

POWERWARE

Title	ASSEMBLY DRAWING		
	INVERTER CHOKES	No	Rev
	3N30, 3N60	10 15 190	C

| Checked JK | Approved 30.12.1999 VK | Loc FIN | Size A3 | Page 1 / 1 |

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT   **1015190c**
CHOKES A3 SUBAS 3N60 INVERTER

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1008999	NUT M8 HEX LOCK NYLON DIN985	2.000	
1010627	ROD M8x175mm Zn12+Cr A4	1.000	
1013010	HOLDE CHOKE ASSY 2xEE65+4mm A3	2.000	
1013093	HOLDE 3N60 CHOKES UL94 V-2 A3	4.000	
1015226	CHOKE 3N60 40A 110uH 4xEE65 A4	2.000	L9-20
1015229	CONNE BUTT SPLICE 6-6mm2	1.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	2.000	
8055397	INSUL BUSH 642353A/2 8/22MM	2.000	

INVERTER MODULE CODE: 10 19 225

1010 408
2 pcs

7980 015
4 pcs

1011 436

C14

C13

C12

1008 599
4 pcs

C11

1012 115
3 pcs

1009 860
3 pcs

1010 505

Label code:
1019225

1014 148

1009 860
8 pcs

V1

V3

1009 860
2 pcs

1009 859
2 pcs

1015 052

1009 859
8 pcs

N

1011 729

1014 507

1009 859
2 pcs

1005 550
4 pcs

S2

2364 004
2 pcs

4040 306
2 pcs

1263 050
2 pcs

1014 803

1014 308

1014 190

X6

1015 078
7 pcs

S1

80°C

V2

BLUE
BROWN

X5

70°C

1014 189

BLUE
BROWN

1005 550

8055 433

A2

1014 525

1015 079

4040 303 2 pcs

1005 550

C26

1014 626

1015 591

4040 306 4 pcs

2364 004 4 pcs

1263 060 4 pcs

1010 408

A3

$O = \textcircled{0}$ $\int = \textcircled{0}$

Rev/ECO no:

A/12640 IN

Title	ASSEMBLY :		I 060	
	INVERTER MOD		No	Rev
POWERWARE	3N80		10 19 523	A
Checked JKet	Approved 28.02.2002 IN	Loc FIN	Size A3	Page 1 / 2

INVERTER MODULE CODE: 10 19 225

BLUE
BROWN
X6

BLUE
BROWN
X5

BLUE
X8/1-3
BROWN

BROWN
X8/6-8
BLUE

X101/X201

BROWN
BLUE
X101/X201

BLUE
BROWN
X100/X200

BROWN BROWN
BLUE
BLUE

BLUE
BROWN

BROWN
BLUE

BROWN
BLUE

BLUE
BROWN

BLUE
BLUE

X100/X200

Rev/ECO no:

Rev/ECO no:
A/12640 IN

POWERWARE

Title ASSEMBLY :		I 060	
INVERTER MOD		No	Rev
3N80		10 19 523	A
Checked JKet	Approved 28.02.2002 IN	Loc FIN	Size A3	Page 2 / 2

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1019225a**
SUBAS 3N80 INVERTER MODULE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1005550	SCREW K M3x6 DIN7985+6798	6.000	
1008005	SENSR THERMO 080°C C70°C NC UL	1.000	S2
1008599	INSUL SHEET D 75mm d 12.2mm A4	4.000	
1009633	SENSR THERMO 070°C C60°C NC UL	1.000	S1
1009859	SCREW K M5x12 PZ DIN6902A+6905	12.000	
1009860	SCREW K M5x16 PZ DIN6902A+6905	13.000	
1010408	SCREW K M4x8 PZ DIN6902A+6905	3.000	
1011436	PLATE 3N45 MOUNT INV CAP A4	1.000	
1011729	RAIL 3N45 CURR INVERT NEUT. A4	1.000	
1012115	BUTTON 3N45 HEAT SINK MOUNT A4	3.000	
1013768	THYRI MOD 105A 1600V	1.000	V3
1014148	HEATS 3N60 INVERTER A3	1.000	
1014189	RAIL 3N60 CURR INVERT - A4	1.000	
1014190	RAIL 3N60 CURR INVERT + A4	1.000	
1014268	SET 3N60 CABLE INVERTER MODULE	1.000	
1014308	INSUL 3N60 INVERT CURR RAIL A4	2.000	
1014376	CAPAC PRO 2uF 1000VDC 5%	2.000	C26
1014507	PLATE 3N60 BOARD HOLDER A3	1.000	
1014525	SPACR NYLON L=18mm SNAP-IN PCB	2.000	
1014626	ASSY 3N60 RAIL CUR.INV.EXT. A4	1.000	
1014803	INSUL 3N60 SHEET INV A4	1.000	
1015052	RAIL CURRENT 2x5.5mm HOLE A4	1.000	
1015078	SPACR NYLON L=19.1 SNAP-IN PCB	7.000	
1015079	SPACR M3/M3 I/I L20 FeZn Av7	1.000	
1015591	SPACR M4 L40 S/I PA66	1.000	
1019114	CAPAC ELE 4400uF 470VDC M12	4.000	C11-14
1019115	IGBT 2x200A 1200V HB	2.000	V1,2
1019457	PCBAS 3N40-80 INVERTER CNTRL 1	1.000	A2
1019460	PCBAS 3N40-80 INVERTER CNTRL 2	1.000	A3
1019523	D ASSY 3N80 DWG I060 A3	.000	
1263050	SCREW HEX M6X12 8.8 A1 ISO4017	2.000	
1263060	SCREW HEX M6x14 8.8 A1 ISO4017	4.000	
2364004	WASHE WAVE M6 KBA FE ZINK	6.000	
4040303	WASHE PLAIN M3 Fe SS ISO 7089	2.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	
7980015	NUT M12 NYLON FOR EL.CAPAC	4.000	

4 pcs
1010669

4 pcs
4313042

E9

1014641

18 pcs
2541075

L9
L10
L11
L12
L13
L14
L15
L16
L17
L18
L19
L20

1012524
12 pcs

7 pcs
1002443

C15
C16
C17
C18
C19
C20
C21
C22
C23
C25
C24
C26

F6
E7
F7
E8
F8

$\bigcirc$ = $\circledcirc$

$\bullet$ = $\circledcirc$ $\stackrel{\bigstar}{}$ = $\circledcirc$

Rev/ECO no:

Rev/ECO no:
A/12640 HT

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1017450b**
SUBAS 3N40 INVERTER CHOKES A3

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1008999	NUT M8 HEX LOCK NYLON DIN985	2.000	
1011971	CABLE 10mm2 BLACK HO7V2-K 90°C	1.500	
1011971	CABLE 10mm2 BLACK HO7V2-K 90°C	1.200	
1013093	HOLDE 3N60 CHOKES UL94 V-2 A3	4.000	
1014313	HOLDE CHOKE ASSY 2xEE65+6mm A3	2.000	
1014314	HOLDE CHOKE ASSY 2xEE65+2mm A3	2.000	
1015228	CONNE BUTT SPLICE 10-10mm2	1.000	
1015228	CONNE BUTT SPLICE 10-10mm2	3.000	
1017919	CHOKE 53A 100uH 6xEE65 A4	2.000	L9-20
1018679	ROD M8x220mm Zn12+Cr A4	1.000	
4040308	WASHE PLAIN M8 Fe ISO 7089	2.000	
8050650	LUG CABLE 6-10 DIN 46234	2.000	
8055397	INSUL BUSH 642353A/2 8/22MM	2.000	

Marked wire to F

BAR CODE

Component side
Solder side

Cable AWG18 (0.75mm2)
Total length 40 ± 1 mm

Assembly after
PCBA test

TP205

Solder joint
together with
tin

R288
R75
V211
V210

R288
V215
R287

Same for R283, 284 and V216
         R279, 280 and V217
         R291, 292 and V218

Assembly of N2,N3,N6,V44,V47

① ② ⑤ ⑥ ② ③ ④

1. Screw M3x8
2. Flat washer
3. Lock washer
4. Nut M3
5. Insulating insert TO-220
6. Insulating bush I=2.7
7. Screw BZ3.5x6.5

Mounting torque of semiconductors on TO-220 case $+0.5 \atop -0$ Nm

The length of leads 0.8 — 2.6 mm.

Lead length

Parts not assembled marked with *

Assembly of R34,37,72,260,272

7± 1mm

Rev/ECO no:
G/12090 VK
H/12283 IN
E/11962 VK
F/12004 VK

Rev/ECO no:
C/11750 EB
D/11961 VK
A/11691 EB
B/11725 EB

POWERWARE	Title	ASSEMBLY DRAWING			
		LOGIC BOARD		No	Rev
		3N30,3N60		10 11 340	H
	Checked VK	Approved 05.02.1998 EB	Loc FIN	Size A3	Page 1 / 1

X112/15
X112/16

HS2

N2 LM7812
7812

TP1
HS3

+12V

C23
470N

+5V OK   +/-12V OK

H18   H16

R25   R24
1K00   1K00

+15V X1 11
BYV27-200 V26
BYV27-200 V36
TP1

X1 13

(Backup supply)

C18
470N

E

C19 C21

1000U
35V

470N

7805
N3
LM7805

TP1
+5V
V28 V29 TP1

C24
470N

1N4446
1N4446

V31
18V

GND X1 10
12
14

N   N
X7 X8

C273
10U
25V

C26   C22
470N 470N

7912
N4
LM7912

C25   C27   V30
470N 470N 1N4446

-12V

-15V X1 15
17

+12V

R72
10R
FUSIBLE

D10-D
4001
14
12
13
7
11

D10-A
4001
1
2
3

D10-B
4001
5
6
4

D10-C
4001
9
8
10

R70   C56   R71
10K0   100P 10K0

C55
100N

1F

T3

1E

V61
IRFD110

V62
56V 1W3

R67 215R   C52 100P
BYV27-200 V63
7

R73
10K0

C57
100N

H

BYV27-200 V64
6

R74
10K0

C58
100N

I
J

BYV27-200 V65
5

R75
10K0

C59
100N

K
M

BYV27-200 V66
8

R76
10K0

C60
100N

N
O

P

Epo Aux

R37
10R FUSIBLE

R34
10R FUSIBLE

Epo loop

R33
2K15

X2
1

+20V

HS6

+12V
VDD
TP3

N6
LM7812

R39
1K47

V47 HS8

R36
1K47

V44 HS7

X4
EPO LOOP

C1
100N

N5
INPUT FB
OUTPUT GND

R27 5K62

X100
6

L2

C36
1000U
35V

C37
470N

V34
12V

1N4446

V48

V23
12V

V45

1N4446

V39
SB150

C12
470U
35V

X2
3

C30
100N

V49

R38
6R8

X216
1

C168
470N

X216
2
GND

R5
10K0

V24

1N4446

1N4446

V46

V35
15V
1W3

C109
470N

X102
15 VDD

X102
14 GND

R35
10R0

RS GND
TP3

R32
2K15

C6 N.A.

N7
N.A.
OUTPUT INPUT
FB
N.A.
GND

R20
N.A.

C3
470N

N1
UC3845A
VCC
VFB Out
Comp
Vref
Isense
RR/CR
Gnd

R1 10K0

C2
1N

R2 10R0 C4 470N

V27
BYV27-200

V25
BYV27-200

V32
BYV27-200

C5
470N

V33
6V8
1W3

R4 46R4

-5V
TP3

VSS

POWERWARE

TITLE   Schematic drawing
3-Phase Logic board
3N30/3N45/3N60

CHECKED IS   APPROVED 08.12.00 JP   LOC FIN

NO 10 11 339   REV H

SIZE A3   PAGE 1/3

POWERWARE

BILL OF MATERIAL FOR PRODUCT   **1014585c**   **page1**
PCBAS 3N30/60 LOGIC BLANCO

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
0000000	PART NOT ASSEMBLED	.000	C6,
0000000	PART NOT ASSEMBLED	.000	C6,
0000000	PART NOT ASSEMBLED	.000	C251-253
0000000	PART NOT ASSEMBLED	.000	C251-253,
0000000	PART NOT ASSEMBLED	.000	K5
0000000	PART NOT ASSEMBLED	.000	C318
0000000	PART NOT ASSEMBLED	.000	N7,
0000000	PART NOT ASSEMBLED	.000	K5,
0000000	PART NOT ASSEMBLED	.000	R20,
0000000	PART NOT ASSEMBLED	.000	N7,
0000000	PART NOT ASSEMBLED	.000	R179-181,
0000000	PART NOT ASSEMBLED	.000	R20,
0000000	PART NOT ASSEMBLED	.000	R192, 193,
0000000	PART NOT ASSEMBLED	.000	R179-181,
0000000	PART NOT ASSEMBLED	.000	R200, 201,
0000000	PART NOT ASSEMBLED	.000	R192, 193,
0000000	PART NOT ASSEMBLED	.000	R297-299
0000000	PART NOT ASSEMBLED	.000	R200, 201,
0000000	PART NOT ASSEMBLED	.000	V135, 317
0000000	PART NOT ASSEMBLED	.000	R297-299,
0000000	PART NOT ASSEMBLED	.000	V135, 317
0000000	PART NOT ASSEMBLED	.000	R312,
0000000	PART NOT ASSEMBLED	.000	R316-318
0000000	PART NOT ASSEMBLED	.000	V135, 317,
0000000	PART NOT ASSEMBLED	.000	V323
1000124	ICOPT 5000VRMS HI-GAIN CNW139	14.000	V300-307,
1000124	ICOPT 5000VRMS HI-GAIN CNW139	14.000	V313-316,
1000124	ICOPT 5000VRMS HI-GAIN CNW139	14.000	V400, 401
1000377	DIODE 1A 50V DO-41 SCHOTTKY	4.000	V39, 312,
1000377	DIODE 1A 50V DO-41 SCHOTTKY	4.000	V132, 138
1000409	RESIS 6R81 0.4W 1% MET	1.000	R38
1000489	CHOKE 0.8ADC 335UH RM6 A4	1.000	L2
1001968	RESIS FUSE 10R 0.25W 5%	4.000	R34, 37,
1001968	RESIS FUSE 10R 0.25W 5%	4.000	R72, 260
1002398	CAPAC ELE 10uF 25V 5x11 p2	3.000	C156, 271,
1002398	CAPAC ELE 10uF 25V 5x11 p2	3.000	C273
1002415	ICCOM LM311 PLASTIC	1.000	N309
1002479	ICSOC 84-POLE PLCC	1.000	D312
1002493	CRYST 20MHz RS MAX 20ohm HC18U	1.000	G3
1002494	RESIS NETWORK 8x10K SIP-9	1.000	R129
1002552	DIODE 2A 200V 25NS SOD57	10.000	V25, 26, 27,
1002552	DIODE 2A 200V 25NS SOD57	10.000	V32, 63-66,
1002552	DIODE 2A 200V 25NS SOD57	10.000	V134, V36
1003811	SCREW BZ3.5x6.5 DIN7981 BN1016	2.000	
1003930	ICLIN HEX PRECIS LIMITER L9700	2.000	V310, 407
1004407	RELAY 8A 250VAC 1CO COIL 12VDC	6.000	K1-4
1004407	RELAY 8A 250VAC 1CO COIL 12VDC	6.000	K6-7
1004546	BUZZR 4kHz 12V 75dB d14xh7.5	1.000	B1
1005331	ICOPA DUAL LM358A PLASTIC	1.000	N319
1006329	INSUL FOR CRYSTAL HC18U&HC49U	2.000	(G1, 3)
1006918	RESIS NETWORK 8x220k 2% SIP-9	1.000	R130

PCBAS 3N30/60 LOGIC BLANCO

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1007180	ZENER 56V 1W3 5% DO-41	1.000	V62
1007334	CONNE 3P MALE HEADER .100" PCB	1.000	TP3
1007335	CONNE 5P MALE HEADER .100" PCB	1.000	TP1
1007380	TRANN 0.6A 40V TO-92 MPS2222A	8.000	V100, 106,
1007380	TRANN 0.6A 40V TO-92 MPS2222A	8.000	V112, 130,
1007380	TRANN 0.6A 40V TO-92 MPS2222A	8.000	V133, 137
1007380	TRANN 0.6A 40V TO-92 MPS2222A	8.000	V321, 322
1007399	MFETN 1A 100V 0.6 ohm IRFD110	2.000	V61, 125
1007480	ICMOS QUAD LINE RECEIVR MC1489	3.000	D208-210
1007908	CAPAC EST 1nF 100VDC 10% 5mm	6.000	C2, 140,
1007908	CAPAC EST 1nF 100VDC 10% 5mm	6.000	C145, 149,
1007908	CAPAC EST 1nF 100VDC 10% 5mm	6.000	C71, 72
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C1, 30, 55,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C57-60,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C100-108,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C114, 127-
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C130, 133,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C147, 148,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C151, 155,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C159, 161,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C165-167,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C169,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C238, 248,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C250,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C255-264,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C270, 272,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C274-275
1007910	CAPAC EST 100nF 63VDC 5% p5mm	50.000	C300
1008178	CONNE 2P MALE HEADER .100" PCB	2.000	TP105, 106
1008817	SCREW PZ PT K3.5x8 LN1441	2.000	(X3)
1008817	SCREW PZ PT K3.5x8 LN1441	2.000	ENTRELEC
1009717	SCREW PZ PT K2.2x8 LN1442	2.000	(X3)
1009717	SCREW PZ PT K2.2x8 LN1442	2.000	PHOENIX
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	C113, 117,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	C113, 117,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	C113, 117,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	119, 121,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	119, 121,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	119, 121,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	123, 125,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	123, 125,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	123, 125,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	134-135,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	134-135,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	134-135,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	162-163,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	162-163,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	162-163,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	170, 235,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	235, 249,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	170

PCBAS 3N30/60 LOGIC BLANCO

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	239-240,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	239-240,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	235,249,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	244-245,
1010661	CAPAC EST 10nF 63V 5% p5mm	16.000	244-245,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	239-240,
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	249
1010661	CAPAC EST 10nF 63V 5% p5mm	17.000	244-245,
1010749	ICSOC 40-PIN DIL PITCH 15,24mm	1.000	D211
1010751	CRYST 16MHz AT HC-49/U-4H	1.000	G1
1010752	ICMEM EEPROM 24C32 8-PIN PDIP	1.000	D317

1 OVERVIEW

This document describes operations of the Powerware 9305 (Prime) 20-80 kVA series UPS. The alarms and ABM procedure of the unit are also presented. The document is valid for the main control firmware revisions H/I (20-30kVA standard/parallel), or F/J (40-80kVA standard/parallel) and later.

The following documents of 9305 are also available:
- 1011496   UPScode II serial interface protocol
- 1012200   Front/remote panel functional description
- 1012864   The logic board hardware description
- 1013269   Parallel for redundancy system functional description

2 GENERAL

The Powerware 9305 series 20-80 kVA unit is a double conversion on-line UPS with the external backup battery, LCD front panel, two RS232 interface ports, relay interface port, programmable input port, and with optional output isolation transformer, and input filter. The unit can operate in both single and parallel operation mode selectable by the `UPPM` parameter `P28`.

The 9305 series 20-80 kVA UPS control logic can be configured by the software for the power ratings below:
- 20 kVA / 14 kW
- 25 kVA / 17.5 kW
- 30 kVA / 21 kW
- 35 kVA / 24.5 kW
- 40 kVA / 28 kW

- 45 kVA / 31.5 kW
- 50 kVA / 35 kW
- 60 kVA / 42 kW
- 80kVA / 56 kW

The power rating is selected by the configuration bits in the non-volatile memory, when the control firmware is the same for all units.

Operation of 9305 consists of startup, inverter operation, bypass operation, shutdown, and the logic PCBA testing routines. The main diagram is presented in the following.

3 STARTUP

When the UPS is started by turning the main switch `S1` to "On" position, the microcontrollers are initialized, and UPS power rate, parameter values, and measurement calibration values are read from the EEPROMs. In case of an incorrect calibration value checksum, the default calibration values are used and *configuration error* alarm is given. If the test mode jumper in connector `X106` is connected, the PCBA test routine will be executed.

Checksum of the identification data (power rate, part and serial numbers, type string) is also tested. Incorrect checksum will cause the startup is interrupted and *configuration error* alarm is generated.

Bypass phase rotation is checked if the voltages exist. Later on when the unit is running, the phase rotation will be tested after every bypass voltage break. Wrong phase rotation prevent bypass operation, or if the unit starts up with the mechanical bypass switch `S2` in "Bypass" position, the *rotation error* condition disable transfers to the inverters. In parallel operation mode the condition will cause the startup is interrupted.

Before lifting of the DC bus voltages, the auxiliary power supply is enabled and the battery circuit breaker state is checked. Startup of the unit is halted if the battery CB is open and it has been tripped by the microcontroller (in order to prevent a total battery discharge due to a very long line break). The startup can be continued by closing the circuit breaker or by turning the main switch off and back on.

3.1 Normal startup

The normal startup procedure is carried out, if at least one of the rectifier input voltages is more than 175V. The DC bus voltages are lifted up using the start relays and battery charger on the rectifier board. The startup procedure is the following:

- Start relays `K1` and `K3` are closed
- Waiting delay of 30 ms
- Start relays `K2` and `K4` are closed
- Waiting delay of 60 ms
- Battery charger is turned on
- DC voltages are waited to be more than 230V and rising speed less than 2V in 2 s

When the above voltage conditions are met and at least 9 s has gone from the auxiliary power supply turn on, the battery charger is turned off and start relays are opened. Input contactor `K1` is closed in about 100 ms.

3.2 Battery startup

The battery startup routine is executed when the rectifier input voltages are not acceptable (<176V), but the battery voltages are high enough (>262V). The routine is identical with the normal startup procedure except the DC bus voltage condition and control of the input contactor. Battery charger and start relays are turned off when the DC voltages exceed battery voltages – 30V level. Battery thyristors are controlled on in about 100 ms.

3.3 Rectifier and inverter turn on

Rectifier is started about 200 ms after the input contactor closing or battery thyristor turn on. The DC bus voltages must be over 365V in a second, otherwise the *rectifier failure* alarm is generated and the startup is interrupted. The voltages must be also below 405V, before the startup is continued. Nominal DC bus voltage level is 390V. In case of the battery startup, the input contactor will be closed as soon as the rectifier has started properly.

Before the inverters are turned on, the synchronization is waited for at most 25 s (not at battery startup and in wireless load sharing (paralleling) mode). *Inverter failure* alarm is given and startup is interrupted, if the inverter output voltages are not in window in 200 ms from enabling of the inverters.

The mechanical bypass switch S2 in "BYPASS" position (not in parallel operation mode), or active external bypass switch input X221 (not in wireless load sharing (paralleling) mode) will cause the inverters are shut off and bypass operation is initiated. Otherwise, the inverter output (contactor in 20-30kVA, thyristors in 40-80kVA units) is turned on and inverter operation is started (in normal mode).

In parallel operation mode, when the mechanical bypass switch S2 in "UPS" position, there are four different options for a startup of the parallel units:
1) The unit is forced to the bypass via the communication cable between the units: The bypass operation is started without any waiting delay.
2) U_{out}=0, and the bypass is available: The bypass operation is started after the delay of 35 s.
3) U_{out}=0, and the bypass is not available: The inverter operation is initiated after the delay of 0 min (unit #1), 1 min (unit #2), 2 min (unit #3), or 3 min (unit #4). This is made to prevent simultaneous startup of the units.
4) UPS output voltages present: The inverter operation is initiated after the delay of 4 s (unit #1), 20 s (unit #2), 40 s (unit #3), or 60 s (unit #4).

The UPSs can be named as Parallel Unit #1-4 by the UPPM parameter P28.

In parallel operation mode the DC bus voltages must be below 400V and the inverter outputs must be phase locked to output voltages (if they are present) for 200 ms before the output of the unit can be enabled. As long as the output synchronization is performed, the output frequency of the other unit is forced to the nominal.

4 INVERTER OPERATION

During the inverter operation the load receives its power from the inverters through the rectifier input line (normal operation), or when this is not available, by using the backup batteries (battery operation). The batteries are charged according to the ABM procedure.

4.1 Battery operation

Battery operation is initiated (battery thyristors are turned on), if one of the following conditions occur:
- DC bus voltage is under 340V (normally due to the rectifier input voltage break)
- Neutral failure
- Input filter over temperature
- Rectifier input voltage over 307V and the UPPM parameter P33=01
- Forced battery operation by the UPPM service parameter P19
- Average of three input voltages is detected to be less than 100V when parallel operation mode is selected, and two units are operating in parallel

The battery charger is turned off, and "UPS on battery" status is given via the front panel display. The input contactor K1 is opened, if the operation is caused by the neutral failure, filter over temperature, rectifier input over voltage, service parameter, or <140V inputs in parallel mode. The unit is on battery for at least three seconds.

When the DC bus voltages have been more than 340V, the input line voltages high enough (and less than 285V) for three seconds, and any of the above conditions does not exist, the battery operation is ended by controlling the battery thyristors off. Thyristor commutation is ensured by turning off the rectifier for 7 ms. Minimum average rectifier input voltages required to end the battery operation with different loads are presented in the table 1. It also describes the voltage levels needed for each battery charger current limits.

Table 1. Minimum required rectifier input voltages

Load level % of nominal	For the charger turn on with different current limits			For end battery operation (charger stays off)
	Max (≈ 8 A)	≈ 4 A	Min (≈ 0.5 A)	
0…40	116V	110V	107V	104V
41…60	143V	136V	130V	127V
61…80	171V	161V	153V	150V
81…100	200V	187V	177V	174V
101…110	-	-	-	191V
111...125	-	-	-	217V

Battery operation is not allowed when the batteries are disconnected, disabled by the UPPM parameter P13, or battery over voltage condition is detected. Battery circuit breaker is tripped, if the battery over voltage has not disappeared in 60 s after the chargers turn off.

Powerware
Company Confidential
PW9305 series 20 – 80 kVA
Control logic functional description
1012938d
7 (50)

4.2 Transfer to bypass

Transfer to bypass is always done, if
- Mechanical bypass switch S2 is in "BYPASS" position (not in parallel operation mode)
- External bypass switch input X221 is active (connector shorted, not read in wireless load sharing (paralleling) mode)
- Forced bypass operation by UPPM service parameter P19
- Forced bypass operation by other UPS (in parallel operation mode)

Transfer to bypass is done, if the bypass is acceptable and one of the following conditions occur:
- In the efficiency optimizer mode, when the bypass has been ok for 1...99 minutes (selectable by the UPPM parameter P23) [1]
- On battery, and bypass operation selected by the UPPM parameter P25 to be the first in priority [1]
- Overload [1]
- DC bus over voltage (>460V)
- Rectifier failure [2]
- DC bus voltage below 250V [2] (if battery operation enabled or parallel operation mode selected), or 340V (if disabled)
- Internal data bus failure [2]
- Auxiliary contact failure [2]
- Battery voltage below the low limit (252V) for 10 s (60 s in parallel operation mode) [2]
- Input filter over temperature when the batteries are disconnected [2]
- Rectifier over temperature shutdown input active [2]
- Inverter over temperature shutdown input active [2]
- Inverter output out of window [3]
- Short circuit between output phases [3]
- Inverter output contactor/thyristor/fuse failure [3]

[1] These conditions do not cause a transfer to bypass when a transfer inhibit is effective caused by too many transfers (3...5) from the bypass a minute due to bad bypass condition.

[2] When parallel operation mode is selected, and two units are operating in parallel, these will cause a shutdown of the unit.

[3] After a transfer from bypass to the inverters, output condition is not checked during the first 10...20 ms.

When the transfer inhibit is valid, the overload condition causes a transfer to the bypass after the delay of 10 min, 60 s, 30 s, or 5 s depending on a load level (see section 4.3). The transfer inhibit is automatically reset once an hour and when the "Reset button" is selected in the front panel.

Unsynchronized transfer to the bypass is made through the break of 4 ms.

4.3 Shutdown reasons on inverter

Inverter and output contactor/thyristors are always controlled off, if one of the following conditions occur:

- Output transformer over temperature for 5 minutes
- "Remote output on/off" input `X220` active (connector shorted)
- Conditional shutdown input in the relay port active during the battery operation and the shutdown delay has expired
- `UPPF` command received during the battery operation and the shutdown delay has expired
- `UPPC` or `UPPD` command received and the shutdown delay has expired
- Static switch failure in parallel operation mode
- One of the reasons in 4.2, when parallel operation mode is selected, and two units are operating in parallel

Inverter and output contactor/thyristors are controlled off, when the bypass is not acceptable and one of the following conditions occur:

- Input filter over temperature when the batteries are disconnected
- Rectifier over temperature shutdown input active
- Inverter over temperature shutdown input active
- Battery voltage below the low limit (252V) for 60 seconds
- Battery voltage very low (<202V)
- Inverter output out of window for 300 ms [1] [2]
- Short circuit between output phases for 300 ms [1] [2]
- Average of the UPS output voltage half period below 140V for 300 ms while the inverter output voltages are ok (Inverter output thyristor failure)
- Load 102...110 % for 10 minutes
- Load 111...125 % for 60 seconds
- Load 126...150 % for 30 seconds
- Load over 150 % for 5 seconds [2]

All the controls are turned off, if the bypass is not acceptable and one of the conditions below is effective:

- DC bus over voltage (>460V)
- Neutral failure for 300 ms when the battery operation is disabled [1] [2]

All the controls are turned off and the battery circuit breaker is tripped, if the bypass is not acceptable and one of the conditions below is effective:

- Rectifier failure
- DC bus voltage below 250V
- EPO input `X4` is active

[1] Inverter output contactor/thyristors are turned off 5 ms after the inverter, if a shutdown due to this condition.

[2] DC bus voltage regulation values are dropped to 340V during the delay.

In parallel operation mode the mechanical circuit breaker `F4` in the output of the unit is tripped if the output is shut off due to a UPS alarm condition.

4.4 Bypass acceptance

The bypass line is not accepted if at least one of the following conditions is effective:
- Bad bypass condition caused a transfer from bypass less than three seconds ago
- Bypass undervoltage (default limit 195V, selectable by `UPPM` parameter `P16`)
- Bypass over voltage (default limit 253V, selectable by `UPPM` parameter `P16`)
- Bypass under or over frequency (default limits ±5Hz from the nominal, selectable by the EEPROM value)
- Static switch failure
- Phase rotation error
- Phase rotation not checked
- Neutral failure
- "Generator on" input `X219` active (connector shorted)
- Unit operates in EL mode
- Parallel bus failure
- Bypass operation is disabled by other unit in parallel operation mode
- Wireless load sharing (paralleling) mode is selected by the `UPPM` parameter `P29`

Last bypass voltage period out of the limits (<170V or >280V) prevent a transfer to bypass only when load is more than 100% of nominal, transfer to bypass delay expire in efficiency optimizer mode, or if rectifier input break occur and bypass operation is selected to be in higher priority.

Unsynchronized transfers to the bypass can be disabled by the `UPPM` parameter `P24`. Bypass phase rotation is checked after every bypass input voltage break.

4.5 EL operation mode

The UPS can be set in the EL (emergency lighting) operation mode by the `UPPM` parameter `P30` (disabled in parallel mode). The differences to the normal operation are:
- Transfers to the bypass and the alarms related to the bypass are disabled
- Mechanical bypass switch `S2` and external bypass `X221` inputs are not read
- Synchronization to the bypass is not tried, and the status is always "synchronized"
- Bypass phase rotation is not checked
- Input contactor `K1` is open while operating on the inverter (the contactor is opened 50 ms before the inverter output is turned on)
- Output of the unit is shut off immediately when the "remote output on/off" input `X220` is shorted (like the normal unit does)
- Waiting delay of 60 minutes for input voltage return is not used in the shutdown routine ("Ups Off") but the rectifier stays on until the battery voltage drops to the low limit
- Output is turned on in about 800 ms when the "remote output on/off" input `X220` is opened and more than 3 s has gone from the shutdown
- In case of the battery shutdown, the output of the unit can not be turned on until the input voltages have been acceptable for 5 s

5 BYPASS OPERATION

When the bypass operation is started, the inverters are shut off, and the bypass thyristors are controlled on concurrently (in an unsynchronized transfer there is a delay of 4 ms between the controls). The output contactor K1 (in 20-30kVA units) is opened or output thyristors are turned off (in 40-80kVA units) only when the unit is forced to the bypass, or the *inverter failure* condition occur.

The battery charger is shut off for a few seconds due to a battery disconnection checking. Then the batteries are continued to charge according to the ABM procedure. The unit is on bypass for at least five seconds if the bypass stays to be acceptable. In 40-80kVA units the inverters are re-enabled and tested when a transfer to the inverters will be done in three seconds.

In parallel operation mode, at least one of the bypass sources has to be available so that the units can operate on bypass. The bypass control signal of the communication bus is used to inform about a transfer. Operation on bypass is ended and a transfer to the inverters is done when both (all) units are ready to do so.

5.1 Forced bypass operation

When the mechanical bypass switch S2 is in "BYPASS" position, external bypass switch input X221 is active, the unit is forced to bypass by the UPPM service parameter P19 or by other unit in parallel operation mode, the bypass operation is continued even if the bypass voltages would disappear. However, the *neutral failure* alarm will cause a shutdown of the unit (all controls are turned off). *Static switch failure* condition will generate the alarm, and after that, if S2 is turned to "UPS" position, an immediate shutdown of the unit since the output contactor is open (20-30kVA units), or a transfer to the inverters (40-80kVA units).

A second after a forcing to the bypass is ended, the phase rotation is checked, and a second later, the inverters and output contactor are tested. If everything is in order, the output contactor is closed, and a transfer to the inverters is done in about 10 seconds.

In 40-80kVA UPSs (not in parallel mode), the mechanical bypass switch in "MAINTENANCE" position will cause the battery circuit breaker is tripped and all controls are turned off.

5.2 Bypass battery operation

Bypass battery operation is initiated (battery thyristors are turned on), if one of the following conditions occur:
- DC bus voltage goes under 340V during the bypass operation (normally due to the rectifier input voltage break)
- Rectifier input voltage over 307V and the `UPPM` parameter `P33=01`
- Bypass operation is selected by the `UPPM` parameter `P25` to be the first in priority during the rectifier input voltage break
- Forced bypass operation and the input contactor `K1` is controlled to be open by the `UPPM` service parameter `P19`

The bypass battery operation will be ended (battery thyristors are turned off), when the rectifier input voltages have been high enough (see table in section 4.1) but less than 285V, and the DC bus voltages more than 340V for three seconds. The operation is not allowed when the batteries are disconnected, or battery over voltage condition is detected. Battery circuit breaker is tripped, if the battery over voltage has not disappeared in 60 s after the chargers turn off.

5.3 Transfer to the inverters

An immediate transfer from the bypass to the inverters is done, if one of the conditions below occur:
- Bypass voltage out of window in the efficiency optimizer mode
- Bypass undervoltage (default limit 195V, selectable by `UPPM` parameter)
- Bypass over voltage (default limit 253V, selectable by `UPPM` parameter)
- Last bypass voltage period out of the limits (<170V or >280V)
- Neutral failure
- Static switch failure
- Parallel bus failure

When the bypass stays to be acceptable, a transfer to the inverter is made as soon as the inverter synchronizes with the bypass and none of the following conditions has been effective for 5 seconds:
- Overload
- Transfer inhibit due to too many transfers (3...5) from the inverters a minute (this is automatically reset once an hour and when the "Reset button" is selected in the front panel)
- Battery voltage below the alarm level (<264V, selectable by the `UPPM` parameter `P05`)
- Rectifier input voltage(s) too low (<150V) [1]
- Internal data bus failure
- Rectifier over temperature alarm input active [1]
- Rectifier over temperature shutdown input active
- Inverter over temperature alarm input active [1]
- Inverter over temperature shutdown input active
- Input filter over temperature [1]
- Auxiliary contact failure
- Efficiency optimizer mode selected

[1] When parallel operation mode is selected, and two units are operating in parallel, these do not prevent a transfer from bypass to the inverters.

Bypass condition is not checked during the first 10 ms on bypass. Bypass operation will be disabled for three seconds, if a transfer from the bypass to the inverters is done due to bad bypass condition.

Transfer to the inverters is not allowed, if at least one of the following conditions is effective:
- Rectifier failure
- Inverter failure
- Inverter output contactor/thyristor/fuse failure
- Phase rotation error
- Mechanical bypass switch `S2` in "BYPASS" position
- External bypass switch input `X221` active (connector shorted)

- Forced bypass operation by the UPPM parameter P19
- Forced bypass operation by other UPS (in parallel operation mode)

5.4 Shutdown reasons on bypass

Bypass thyristors are turned off, if one of the following conditions occur:
- Output transformer over temperature for 5 minutes
- "Remote output on/off" input X220 active (connector shorted)
- UPPC or UPPD command received and the shutdown delay has expired
- Neutral failure when the mechanical bypass switch is in "BYPASS" position

Bypass thyristors are turned off, if one of the following conditions occur when parallel operation mode is selected, and two units are operating in parallel:
- Battery voltage below the low limit (252V) for 60 s
- Rectifier failure
- DC bus voltage below 250V
- Inverter failure
- Inverter output contactor/thyristor/fuse/MCB failure
- Phase rotation error
- Internal data bus failure
- Auxiliary contact failure
- Rectifier over temperature shutdown input active
- Inverter over temperature shutdown input active

Bypass thyristors are turned off, if a transfer to the inverters is not allowed and one of the following conditions occur:
- Bypass undervoltage (default limit 195V, selectable by UPPM parameter)
- Bypass over voltage (default limit 253V, selectable by UPPM parameter)
- Last bypass voltage period out of the limits (<170V or >280V)
- Static switch failure

EPO and the mechanical bypass switch S2 is in "MAINTENANCE" position (in 40-80kVA units) will cause the battery circuit breaker is tripped and all controls are turned off.

In parallel operation mode the mechanical circuit breaker F4 in the output of the unit is tripped if the output is shut off due to a UPS alarm condition.

5.5 "No UPS" operation

This routine is carried out when the units are not operating in parallel, and the "normal" bypass operation is not possible due to the *rectifier failure*, or since the battery voltages are below the low limit for 60 s on bypass, or when the DC voltage is below 250V (e.g. the both line and battery circuit breakers are open). The bypass thyristors are on, but the rectifier, battery charger, battery thyristors, inverters, and inverter output contactor/thyristors are controlled off, and the input contactor `K1` is opened.

Transfer back to the bypass operation is done, if the rectifier is in order, and when the rectifier input voltages return. The DC bus voltages are lifted and the rectifier is started using the start relays and battery charger as in the normal startup procedure (section 3.1).

Since a transfer to the inverters is not possible during the "No UPS" operation, the reasons mentioned in section 5.4 will always effect a shutdown of the unit.

6 SHUTDOWN ROUTINES

6.1 UPS output off

This routine is initiated when the inverters and inverter output contactor/thyristors (or bypass thyristors) are turned off due to a shutdown command, an alarm condition, or if the batteries are exhausted. In case of an alarm condition, the routine generate the shutdown reason to the front panel and the serial interfaces. If the shutdown command is received or a shutdown is done because of empty batteries, re-enabling of the output is waited.

In parallel operation mode, the bypass control and bypass prohibition signals on the communication bus are inactivated and not used after that when the output is turned off.

The rectifier, battery charger, battery thyristors, and auxiliary power supply are turned off, and the input contactor is opened, if one of the conditions below is effective:
- Rectifier failure
- DC bus voltage very low (<250V)
- DC bus over voltage (>460V)
- Neutral failure

Chargers are also disabled, if
- Batteries disconnected
- Battery over voltage detected
- Charger over temperature
- Rectifier over temperature shutdown input active

Battery circuit breaker is tripped, if
- Rectifier failure
- DC voltage very low (<250V)
- Battery over voltage not disappeared in 60 s after charger turn off
- Battery voltages are below the low limit again (<252V)
- Battery startup is interrupted before the rectifier turn on

Inverter, and inverter output are turned back on (to "Inverter Operation"), when the output has been off for at least 10 s and the rectifier input voltages have been acceptable for 3 seconds, if the shutdown is done because of
- Battery voltage below the low limit (252V) for 60 seconds
- Overload or output out of window condition in parallel operation mode while the unit was on battery with active "loss of redundancy" or "UPS disabled" alarm
- "Remote output on/off" input `X220`
- Conditional shutdown input in relay port
- `UPPF` command

The `UPPD` command will cause the output of the unit is not re-enabled until the `UPPU` command is received (and the output been off for 10 s, and the input voltages acceptable for 3 s). After the `UPPC` command, the UPS output is re-enabled when the restart delay set by the `UPCD` command is expired (and the output been off for 10 s, and the input voltages acceptable for 3 s).

In case the rectifier input voltages have been too low continuously for 60 minutes after the unit's shut off:

- Rectifier and battery thyristors are turned off and input contactor is opened
- Restart of the unit is made (if enabled) via the software reset when the input voltages have been ok for 5 s
- Battery circuit breaker is tripped if the voltage drops to the low limit again (<252V)

Total shutdown of the unit is done, if one of the following conditions occur during the "UPS off" routine:

- Battery voltages are below the low limit again (<252V)
- EPO input X4 is active
- Mechanical bypass switch S2 is turned in "MAINTENANCE" position (40-80kVA)
- Main switch S1 is turned to "Off" position

6.2 Total shutdown

This routine is carried out, if the main switch S1 is turned off, EPO input X4 is active, the mechanical bypass switch S2 is turned in "MAINTENANCE" position (in 40-80kVA units), or when the battery voltages have degraded below the low limit again in the "UPS off" routine.

All controls are turned off. EPO, and S2 in "MAINTENANCE" position (in 40-80kVA UPSs) will cause the battery circuit breaker is also tripped.

The shutdown reason is alarmed if there is voltage in the rectifier or bypass input ($\Rightarrow$ aux power for μC) until main switch S1 is turned off. After that when S1 is turned back on, a restart of the unit is done via the software reset.

7 GENERAL TASKS

There are several tasks which are continuously done when the unit is operating. They are handled with one HITACHI's H8/3334 (or H8/3337) flash microcontroller (D312), and two Microchip's PIC16C74 microcontrollers (D2, and D211), and listed below.

- Advanced battery management (Appendix B) (D312)
- Alarm status updating (alarms are described in Appendix A) (All)
- Analog measurements conversion, filtering and calibration (All)
- Battery capacity calculation (D312)
- Bypass window comparison (D312)
- Dallas bus handling (D312)
- I²C bus communication (All)
- Input status reading (All)
- Inverter output window comparison (D312)
- Rectifier control (D2, D312)
- Sine references for the inverters (D312)
- Synchronization to the bypass line (D312)
- Load share in parallel operation mode (D312)
- User interface handling (alarm relays, front panel, serial interfaces) (D211, D312)

7.1 Analog measurements

The analog measurements are continuously converted by all three microcontrollers. The conversion results are filtered, and scaled before use in the firmware. The scaling values are calibrated at startup of the unit by the values read from the EEPROMs. The analog measurements are presented in the table below.

Table 2. Analog measurements in 20-80kVA units.

Measurement	Microcontroller	Type	Measurement range
Rectifier input voltages L1, L2, and L3	D2	AC	0 … 429V
Bypass input voltages L1, L2, and L3	D312	AC	0 … 312V
Battery voltages positive and negative side	D2	DC	0 … 400V
Battery charge currents positive and negative side	D2	DC	0 … 13A
DC bus voltages positive and negative side	D2	DC	0 … 550V
Inverter output voltages L1, L2, and L3	D312	AC	0 … 312V
UPS output voltage L1	D312, D211	AC	0 … 347V
UPS output voltages L2 and L3	D211	AC	0 … 347V
UPS output current L1	D312, D211	AC	0 … 305A [1] / 0…352A [2]
UPS output currents L2 and L3	D211	AC	0 … 305A [1] / 0…352A [2]

[1] 20-30kVA
[2] 40-80kVA

UPS output power (kW) for L1, L2, and L3 is calculated by multiplying output voltage and current samples together and filtering the product. Output delta power of phase L1 (used for load sharing in parallel operation mode) is determined from the output voltage and current samples measured by D312.

Battery discharge current is determined from the output power and battery voltage values. Output frequency is provided from the variable which corresponds to the length of the inverter output voltage cycle.

UPS cabinet temperature is measured through the Dallas bus by the temperature sensor `B219` (DS1820) on the logic board.

7.2 Battery capacity and backup time

The battery capacity value used for the battery backup time estimation is updated at intervals of 10 s. The capacity is stored in the logic board EEPROM before a total shutdown of the unit, and read from there in the startup procedure. The capacity correction calculations are done on the basis of Yuasa NP24-12 discharge characteristics for all 63 battery options from 2 to 4200Ah in relation to total battery capacity.

During the ABM charging and floating cycles, the capacity is increased by the amount of lower charge current (from the positive or negative side) until the nominal capacity is reached. At the resting state, the battery capacity value stays to be unchanged. When the batteries are discharged, the capacity is decreased with the amount of higher calculated discharge current.

The battery backup time is estimated when the battery thyristors are controlled on, and more than five seconds has gone from the beginning of discharge. If the power is taken from the rectifier input line and the batteries at the same time, the estimated backup time is too low due to the battery discharge current calculated from output power and battery voltage. Maximum backup time displayed is 90 minutes.

7.3 Bypass window comparison

The bypass input window comparison is continuously done by comparing samples of the bypass input voltages to the values of ideal sine table in the firmware. Center of the reference is at 225V, and a maximum acceptable error from the reference (=window size) is ±27%. The window comparison is used for a bypass break detection in the efficiency optimizer mode.

The "bypass out of window" status is taken into account, if at least one bypass voltage has been outside of the window for 0.8 ms. The "bypass in window" condition is returned when all bypass voltages have been inside the window for 3.0 ms.

7.4 Inverter output window comparison

The inverter output window comparison is continuously done by comparing samples of the inverter output voltages to the values of ideal sine table in the firmware. Center of the reference is at 225V, and a maximum acceptable error from the reference (=window size) is ±32%. The "output out of window" status will cause a transfer to the bypass, or a shutdown after 300 ms if the bypass is not available.

The "output out of window" status is generated, if at least one inverter output voltage has been outside of the window for 1.5 ms. The "Inverter output in window" condition is returned when all inverter voltages have been inside the window for 2.5 ms (on bypass) or 10 ms (not on bypass).

7.5 Sine references

The sine references for phases 1 and 2 are generated by reading the values from the sine reference tables multiplied with the regulation value corresponding to output voltage of 220V, 230V, or 240V before sending to the PWM1 and PWM0 outputs. The values are updated at intervals of about 140 μs. Sine reference for phase 3 is made by summing references for phases 1 and 2 and inverting the output.

The amplitude of sine references which is also output voltage calibration is controlled with trimmer pots `R149`, `R155` and `R161`.

7.6 Synchronization

In 20-80kVA UPSs the inverter output synchronization to the bypass voltage phase 1 is carried out with the zero crossing comparator `N309` through the FTIA input (in normal mode). In parallel operation mode the zero crossing points of the bypass sources of the UPSs are summed in the parallel bus and put into FTID inputs to ensure identical synchronization information between the units.

The synchronization window size, selectable by the `UPPM` parameter, is ±0.5Hz (default in parallel operation mode), ±2.0Hz (default in normal mode), or ±1.0Hz. This means the output is tried to synchronize to the bypass line, if the input frequency is not more than ±0.5, ±2.0, or ±1.0Hz from the nominal. Otherwise, the output frequency is set to the nominal.

The synchronization speed (frequency slew rate) on inverter can be also selected by the `UPPM` parameter. The output is phase locked to the bypass line, if the frequency slew rate is less than 0.5Hz/s (default), 2.5Hz/s, or 7.5Hz/s. On the bypass, the slew rate is always in its maximum 7.5Hz/s. In parallel operation mode the maximum synchronization speed is 0.5Hz/s.

Synchronization and transfers to the bypass can be disabled by shorting the "Generator on" input `X219`.

APPENDIX A – ALARMS

Active alarms and shutdown reasons in 20-80kVA units are indicated by the LCD display, LEDs, and the buzzer in front panel of the unit, via the relay interface and two RS232 serial data interfaces. Alarms, that are not permanent, are automatically reset when the condition disappear (after that they can be seen only from the alarm log). They are marked as "Autoresetting".

The following terms are used to separate operation of the unit in the different operational modes and situations:

Normal mode	Operation of the normal stand-alone unit
Parallel operation mode	Operation of the unit configured in parallel operation mode (regardless of the number of the units running)
Single unit	Operation of the normal unit or in parallel operation mode when only one UPS is running
Units in parallel	Operation when the units are operating in parallel

The alarms with their indications are presented in the following. The reason that has caused the alarm, and consequences after the alarm are also shortly described.

Notes:
- The battery voltage limits are correct only for 48 battery units
- Due to the front panel buzzer, the logic board buzzer is initially silenced but it can be enabled by the UPPM parameter P08
- Beeping sequences of the logic board buzzer are in brackets (LB: ...)
- Front panel buzzer beeping can be silenced by reading active alarms

Abnormal output voltage (at startup)

<u>Indication</u>

Display: "ABNORMAL OUTPUT VOLTAGE"
LEDs: "ALARM"
Buzzer: Continuous short beeps (LB: 1 short + 5 long, or 2 short + 5 long beeps)
Relays: Alarm
UPScode: STAT - OV

<u>Reason</u>

1) *Normal mode:* At least one of the UPS output voltages is detected to be more than 85V before the inverters and inverter output, or bypass thyristors are enabled.
   Parallel operation mode: One or two of the UPS output voltages is detected to be more than 85V before the inverters and inverter output, or bypass thyristors are enabled.
2) *Normal mode:* Highest of the UPS output voltages is detected to be more than 85V before the inverter output is enabled.

<u>Consequence</u>

1) Startup of the unit is interrupted.
   Parallel operation mode: Mechanical circuit breaker F4 in the output is tripped.
2) Transfer to bypass, if forced bypass operation or bypass is within the limits, otherwise startup of the unit is interrupted.

Auxiliary contact failure

<u>Indication</u>

Display: "AUXILIARY CONTACT FAILURE"
LEDs: "ALARM"
Buzzer: Continuous short beeps (LB: 4 short + 4 long beeps)
Relays: Alarm
UPScode: STAT – AC
Autoresetting.

<u>Reason</u>

1) Fuse resistor R260 on the logic board is broken.
2) Jumper is missing on connector X205 ("fan failure" input).
3) *Parallel operation mode:* Mechanical bypass switch input is detected to be in 'BYPASS' position.

<u>Consequence</u>

1) – 3) At startup: Startup of the unit is interrupted and in *parallel operation mode*, the mechanical circuit breaker F4 in the output is tripped.
1) & 2) *Single unit:* On inverter, a transfer to the bypass when possible. Otherwise stays on inverter. Transfer from the bypass to the inverters is not done until the alarm disappears or the bypass goes out of the limits.

Units in parallel: Output of the unit is turned off, and the mechanical circuit breaker `F4` in the output is tripped.

3) None.

Backup power supply failure

Indication

Display:	None
LEDs:	None
Buzzer:	LB: 3 short + 4 long beeps (even if `UPPM P08 = V02`)
Relays:	Alarm
UPScode:	None

Autoresetting.

Reason

Backup power supply is detected to be off or the voltage level is too low $\Rightarrow$ LCD panel and RS232 lines may be without electricity.

Consequence

None.

Batteries disconnected

Indication

Display:	"BATTERIES DISCONNECTED"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 5 short + 4 long beeps (battery fail alarm))
Relays:	Alarm
UPScode:	`STMF - BA`

Autoresetting.

Reason

Battery voltage(s) has dropped below 192V (low limit - 60V), or the voltage is below the limit after startup, and the unit is not on battery. After that, when the chargers have been started, the voltages have risen over 302V (2.10 V/cell) in less than 3 s. "Battery failure" alarm is also generated.

Consequence

Battery operation, and battery low and over voltage alarms are disabled. Chargers are not turned on, until the condition disappears. Batteries are considered to be connected again when the lower battery voltage exceed 192V level (low limit - 60V).

Battery failure

<u>Indication</u>

    Display: "BATTERY FAILURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 5 short + 4 long beeps)
    Relays: Alarm
    UPScode: `STAT - BY`
    Autoresetting.

<u>Reason</u>

1) Battery voltage(s) has dropped below 302V (2.10V/cell) before 7 days from the beginning of the ABM resting cycle has gone.
2) Battery voltage(s) has dropped below 192V (low limit - 60V)), or the voltage is below the limit after startup, and the unit is not on battery. After that, when the chargers have been started, the voltages have risen over 302V (2.10 V/cell) in less than 3 s. In this case, the "batteries disconnected" alarm is also generated.

<u>Consequence</u>

1) ABM charging cycle is initiated.
2) Battery operation is disabled.

Battery fuse failure

<u>Indication</u>

    Display: "BATTERY FUSE FAILURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps
    Relays: Alarm
    UPScode: `STAT - BF`
    Autoresetting.

<u>Reason</u>

Battery circuit breaker `F2` input is detected to be in open state.

<u>Consequence</u>

Startup of the unit is halted if the battery CB has been tripped by the microcontroller (in order to prevent a total battery discharge due to a very long line break). The startup can be continued by closing the circuit breaker or by turning the main switch off and back on.

Battery low limit

Indication

Display:	"BATTERY LOW LIMIT"
LEDs:	"ON BATTERY" is blinking
Buzzer:	Continuous short beeps (LB: 1 short + 2 long beeps when output off)
Relays:	Alarm
UPScode:	`STBL - 11, STAT - BL`

Autoresetting at startup after the input line return.

Reason:

Battery voltage(s) is below the low limit (252V, 1.75V/cell).

Consequence:

Single unit: Output of the unit is turned off in 60 seconds if the bypass is not acceptable. Restart after the rectifier input voltage return. Otherwise, a transfers to the bypass is done in 10 seconds.
Units in parallel: Output of the unit is turned off in 60 seconds. Restart after the rectifier input voltage return.

Battery overvoltage

Indication

Display:	"BATTERY OVERVOLTAGE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 2 short + 2 long beeps)
Relays:	Alarm
UPScode:	`STAT - BO`

Reason

Battery voltage(s) has been over 365V for 60 seconds, or between 340…365V for 10 minutes.

Consequence

Chargers are turned off. In case the voltage has been over 365V for 60 seconds, the battery circuit breaker is tripped.

Bypass unavailable

<u>Indication</u>

Display:	"BYPASS UNAVAILABLE"
LEDs:	None
Buzzer:	Silenced
Relays:	None
UPScode:	STAT - BX

Autoresetting.

<u>Reason</u>

At least one of the bypass voltages is out of the limits. This status is disabled when the UPPM parameter P32=00 or 02, and in 20-30kVA units if the mechanical bypass switch S2 is in "Bypass" position.

<u>Consequence</u>

Transfers to the bypass are disabled.

Cabinet overtemperature

<u>Indication</u>

Display:	"CABINET OVERTEMPERATURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 7 short + 3 long beeps)
Relays:	Alarm
UPScode:	STAT – CT

Autoresetting

<u>Reason</u>

Temperature inside the UPS cabinet has been more than 60°C (20-30kVA), or 47°C (40-80kVA) for 30 s.

<u>Consequence</u>

None.

Charger overtemperature

Indication

    Display: "CHARGER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 1 short + 3 long beeps)
    Relays: Alarm
    UPScode: STAT-HT
    Autoresetting.

Reason

Temperature of the charger heatsink is over 90°C.

Consequence

Chargers are turned off. Startup of the unit is interrupted.

Configuration error

Indication

    Display: "CONFIGURATION ERROR"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 6 short + 4 long beeps)
    Relays: Alarm
    UPScode: STAT-CE

Reason

1) Checksum of the calibration values is incorrect at startup of the unit (can be cleared by the "Reset button").
2) Checksum of the UPS identification data is incorrect at startup of the unit.
3) *Parallel operation mode:* At startup, the same parallel unit number is detected to be used by other UPS.
4) *Parallel operation mode:* At startup before inverter output is turned on, if output synchronization calibration is enabled (when it is assumed that calibration is not made or it is incorrect) and voltages are detected in the UPS output (other unit is on).

Consequence

1) Default calibration values are used.
2) - 4) Startup of the unit is interrupted.
     Parallel operation mode: Mechanical circuit breaker F4 in the output is tripped.

DC overvoltage

<u>Indication</u>

Display:	"DC OVERVOLTAGE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 3 short + 2 long, or 9 short + 5 long beeps)
Relays:	Alarm
UPScode:	STAT - DO

Autoresetting, if not starting up.

<u>Reason</u>

1) DC bus voltage(s) has been more than 460V at startup (9 +5 beeps).
2) DC bus voltage(s) has been more than 460V (3 + 2 beeps).

<u>Consequence</u>

1) Startup of the unit is interrupted and all controls are turned off.
2) Rectifier is turned off. Transfer to bypass, or shutdown of the unit if the bypass not acceptable. On bypass the rectifier is turned on when the DCs are below 425V. After that, if "DC overvoltage" condition is detected again => "rectifier failure".

DC undervoltage (shutdown)

<u>Indication</u>

Display:	"DC UNDERVOLTAGE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 4 short + 2 long beeps)
Relays:	Alarm
UPScode:	STAT - DU

<u>Reason</u>

Single unit: DC bus voltage(s) is below 250V during the inverter operation and the bypass is not acceptable.
Units in parallel: DC bus voltage(s) is below 250V during the inverter or bypass operation.

<u>Consequence</u>

Shutdown of the unit. Battery circuit breaker is tripped.

Emergency Power Off

Indication

    Display: "EMERGENCY POWER OFF"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 3 short + 1 long beeps)
    Relays: Alarm
    UPScode: STAT - EP

Reason

EPO input X4 is active (jumper removed).

Consequence

Shutdown of the unit. All controls are turned off, and battery CB is tripped.

Filter overtemperature

Indication

    Display: "FILTER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 9 short + 3 long beeps)
    Relays: Alarm
    UPScode: STAT - FT

Reason

Temperature of the input filter choke is over 150°C.

Consequence

Single unit: Battery operation is initiated and input relays are opened. Transfer to bypass operation, if the batteries are disconnected. Stays on bypass until the alarm or the bypass disappears. Output of the unit is turned off and the mechanical circuit breaker F4 in the output is tripped in *parallel operation mode,* if the batteries are disconnected and the bypass is not acceptable.
Units in parallel: Battery operation is initiated and input relays are opened. Output of the unit is turned off and the mechanical circuit breaker F4 in the output is tripped, if the batteries are disconnected.

Internal data bus failure

<u>Indication</u>

Display:	"INTERNAL DATA BUS FAILURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 11 short + 4 long beeps)
Relays:	Alarm
UPScode:	STAT - IB
Autoresetting.	

<u>Reason</u>

I²C bus arbitration has lost, or the bus has been continuously busy for 1 s.

<u>Consequence</u>

Single unit: Transfer to bypass when possible. Stays on bypass until the bus arbitration is found and the bus is free.
Units in parallel: Output of the unit is turned off and the mechanical circuit breaker F4 in the output is tripped.

Internal power supply failure (at startup)

<u>Indication</u>

Display:	"INTERNAL POWER SUPPLY FAILURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 7 short + 5 long beeps)
Relays:	Alarm
UPScode:	STAT - IP

<u>Reason</u>

+15V is missing or the voltage level is too low when 20 s has gone from a startup of the auxiliary power supply.

<u>Consequence</u>

Startup of the unit is interrupted.
Parallel operation mode: Mechanical circuit breaker F4 in the output is tripped.

Inverter (or output contactor/thyristor/fuse) failure

<u>Indication</u>

Display:	"INVERTER FAILURE" [1]
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 2 short + 5 long, or 9 short + 4 long beeps)
Relays:	Alarm
UPScode:	`STMF – IM` [1]

<u>Reason</u>

1) At startup inverter output voltages are not in window in 200 ms from the inverter turn on (inverter failure, 2 + 5 beeps).
2) At startup UPS output voltages are not over 140V in 300 ms from the output contactor/thyristors enable (output contactor/thyristor/fuse failure, 2 + 5 beeps).
3) On inverter UPS output voltage is below 140V while the inverter outputs are in window (output contactor/thyristor/fuse failure, 9 + 4 beeps).
4) 20-30kVA: On bypass, after the mechanical bypass switch has been turned to 'UPS' position (output contactor is still open), if there is voltage present in the inverter output before inverter is on (output contactor failure, 9 + 4 beeps), or the inverter outputs are not in window in a second from a startup of the inverters (inverter failure, 9 + 4 beeps). 40-80kVA: On bypass, three seconds before a "normal" transfer back to the inverters is done (output thyristors are off), if there is voltage present in the inverter output before inverter is on (output thyristor failure, 9 + 4 beeps), or the inverter outputs are not in window in one second from a startup of the inverters (inverter failure, 9 + 4 beeps).
5) On bypass when the output contactor/thyristors is controlled to be closed/on, if the inverter output voltage differs from the bypass voltage of the same phase for 20-30ms while the UPS output voltage meter stay normal (output contactor/thyristor/fuse failure).
6) *Parallel operation mode:* On inverter the output has been out of the window and wrong output current direction has been detected for 4 ms when bypass is not acceptable (inverter failure, 9 + 4 beeps).

<u>Consequence</u>

1) & 2) *Normal mode:* Transfer to bypass, if forced bypass operation or bypass is within the limits, otherwise startup of the unit is interrupted.
Parallel operation mode: Transfer to bypass, if forced bypass operation, otherwise startup of the unit is interrupted [2].
3) Transfer to bypass, if possible (locked to bypass). Otherwise, output of the unit is turned off in 300 ms [2].
4) & 5) *Single unit:* Locked to bypass, inverter operation is disabled.
Units in parallel: Output of the unit is turned off [2].
6) Output of the unit is turned off [2].

[1] The more detailed reason for the alarm can be read from the alarm log by the `UPSL` command.
[2] In *parallel operation mode,* the output shutdown causes the mechanical circuit breaker `F4` in the output to be tripped.

Inverter overtemperature (alarm)

Indication

    Display: "INVERTER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 3 short + 3 long beeps)
    Relays: Alarm
    UPScode: `STAT - IT`
    Autoresetting.

Reason

Temperature of the inverter heat sink is more than 70°C.

Consequence

When on bypass, a transfer to the inverters is not done until the alarm disappears or the bypass goes out of the limits.

Inverter overtemperature (shutdown)

Indication

    Display: "INVERTER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 5 short + 3 long beeps)
    Relays: Alarm
    UPScode: `STAT - IT`
    Autoresetting.

Reason

Temperature of the inverter heat sink is more than 80°C.

Consequence

Single unit: Transfer to bypass when possible, or output of the unit is turned off. Transfer from the bypass to the inverters is not done until the temperature has fallen below the alarm level (70°C - hysteresis), or the bypass goes out of the limits.
Units in parallel: Output of the unit is turned off, and the mechanical circuit breaker `F4` in the output is tripped.

Loss of redundancy

Indication

Display:	"LOSS OF REDUNDANCY"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 6 short + 2 long beeps)
Relays:	Alarm
UPScode:	STAT - LR
Autoresetting.	

Reason

Parallel operation/redundant mode: Output of the unit is on and number of the units running has been reduced. The alarm can be cleared by the "reset button".

Consequence

None.

Low battery voltage

Indication

Display:	"LOW BATTERY VOLTAGE"
LEDs:	"ON BATTERY" is blinking
Buzzer:	Continuous short beeps (LB: 1 short + 1 long beeps)
Relays:	Battery low
UPScode:	STBL - 11
Autoresetting.	

Reason

The battery voltage has dropped below the alarm limit 264V (1.83V/cell).

Consequence

When on bypass, a transfer to the inverters is not done until the alarm disappears or bypass goes out of the limits.

Neutral failure (alarm)

Indication

    Display: "NEUTRAL FAILURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 1 short + 4 long beeps)
    Relays: Alarm
    UPScode: STAT - NF
    Autoresetting.

Reason

Neutral fault has been detected.

Consequence

Battery operation is initiated, input contactor is opened, and transfer to bypass is disabled. After that the neutral condition is checked once a minute or when the "Reset button" is selected by closing the input contactor and returning to the line operation. If the neutral fault signal is active again, battery operation is restarted. If the neutral fault is not detected in 1...2 s, the alarm become inactive.

Neutral failure (shutdown)

Indication

    Display: "NEUTRAL FAILURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 7 short + 4 long, or 10 short + 5 long
                       beeps)
    Relays: Alarm
    UPScode: STAT - NF

Reason

1) Neutral fault condition has been detected at startup (10 + 5 beeps).
2) Neutral fault has been detected when on mechanical bypass (7 + 4 beeps).
3) Neutral fault has been active for 300ms, when battery operation is disabled (1 + 4 beeps).

Consequence

Shutdown of the unit (all controls are turned off), and the mechanical circuit breaker F4 in the output is tripped in *parallel operation mode*

Output failure

<u>Indication</u>

Display:	"OUTPUT FAILURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 2 short + 1 long beeps)
Relays:	Alarm
UPScode:	STAT - OW

<u>Reason</u>

1) *Parallel operation mode:* At startup, the other unit is detected via the communication cable while the output voltages are missing.
2) Inverter output has been out of window, or output phases shorted for 300 ms, when the bypass is not acceptable.

<u>Consequence</u>

1) Startup of the unit is interrupted.
2) Output of the unit is turned off.

Parallel operation mode: Mechanical circuit breaker F4 in the output is tripped.

Overload

<u>Indication</u>

Display:	"OVERLOAD"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 4 short + 1 long beeps)
Relays:	None
UPScode:	STAT - OL
Autoresetting.	

<u>Reason</u>

Load is more than 101% of nominal.

<u>Consequence</u>

Transfer to bypass when possible (see "overload shutdown" when the bypass not acceptable). Transfer from bypass to the inverters is not done until the alarm disappears or the bypass goes out of the limits.

Overload (shutdown)

Indication

Display:	"OVERLOAD"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 5 short + 1 long beeps)
Relays:	Alarm
UPScode:	STAT - OL

Reason

Bypass is out of the limits, and
1) Load has been 102...110% of nominal for 10 minutes.
2) Load has been 111...125% of nominal for 60 seconds.
3) Load has been 126...150% of nominal for 30 seconds.
4) Load over 150% for 5 seconds (LB: 2 short + 1 long beeps).

Consequence

Output of the unit is turned off.

Parallel bus failure

Indication

Display:	"PARALLEL BUS FAILURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 5 short + 2 long beeps)
Relays:	Alarm
UPScode:	STAT - PB

Reason

In *Parallel operation mode* with the communication cable installed between the units
1) At startup, if output voltages are present even if no units detected via the communication cable
2) Incorrect operation of bypass prohibition/communication signal on the communication bus detected.
3) Incorrect operation of bypass control on the communication bus detected.
This status is disabled in wireless load sharing (paralleling) mode.

Consequence

1) Startup of the unit is interrupted and the mechanical circuit breaker F4 in the output is tripped.
2) Transfers and synchronization to bypass are disabled. If detected on bypass, an immediate transfer to the inverters is done. The alarm can be cleared and the bypass re-enabled by pressing the "Reset button", if the communication between the units operate normally again and a number of the units running is the same than before the failure.

3) Transfers and synchronization to bypass are disabled. If detected on bypass, an immediate transfer to the inverters is done. In this case the alarm can be cleared by pressing the "Reset button" for 10 s or until the buzzer beeps twice.

Phase rotation error

Indication

Display:	"PHASE ROTATION ERROR"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 10 short + 4 long beeps)
Relays:	Alarm
UPScode:	STAT-PE

Autoresetting.

Reason

Bypass input phases are detected to be in wrong order. Phase rotation is checked at startup of the unit if there are bypass voltages present, and after every bypass voltage break.

Consequence

Parallel operation mode: At startup, startup of the unit is interrupted.
Single unit: Transfers to bypass are disabled. If detected on bypass, transfers to the inverters are disabled.
Units in parallel: Transfers to bypass are disabled. If detected on bypass, output of the unit is turned off.

Redundancy overload

Indication

Display:	"REDUNDANCY OVERLOAD"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps
Relays:	None
UPScode:	STAT-OR

Autoresetting.

Reason

Units in parallel, redundant mode: Load exceeds
- 20-30kVA: 50% of nominal + 400W, or 50% + 2A
- 40-80kVA: 50% of nominal + 500W, or 50% + 3A

for 15 s at least in one phase (in wireless load sharing mode two units are always assumed in operation).

Consequence

None.

Rectifier failure

<u>Indication</u>

Display:	"RECTIFIER FAILURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 8 short + 4 long beeps)
Relays:	Alarm
UPScode:	`STMF - RM`

<u>Reason</u>

1) At startup, if DC bus voltages are not over 230V when a minute has gone from closing of the start relays.
2) At startup, if DC bus voltages are not over 375V when a second has gone from the rectifier turn on.
3) During battery operation, if either or both DC voltages are below 310V and about same or lower than battery voltages for 100 ms.
4) On bypass, if DC over voltage condition is detected after the rectifier is turned back on.
5) Bad cable connection status received from the connector `X17`.

<u>Consequence</u>

1) & 2) *Normal mode:* Transfer to bypass if possible, all controls (except bypass thyristors, if the bypass is acceptable) are turned off and battery circuit breaker is tripped.
   Parallel operation mode: Startup of the unit is interrupted, all controls are turned off, and battery circuit breaker and the mechanical circuit breaker `F4` in the output are tripped.
3) – 5) *Single unit:* Transfer to bypass if possible, all controls (except bypass thyristors, if the bypass is acceptable) are turned off and battery circuit breaker is tripped.
   Units in parallel: Shutdown of the unit, all controls are turned off and battery circuit breaker and the mechanical circuit breaker `F4` in the output are tripped.

Rectifier overtemperature (alarm)

Indication

    Display: "RECTIFIER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 4 short + 3 long beeps)
    Relays: Alarm
    UPScode: `STAT-RT`
    Autoresetting.

Reason

Temperature of the rectifier heat sink is more than 70°C.

Consequence

When on bypass, a transfer to the inverters is not done until the alarm disappears or the bypass goes out of the limits.

Rectifier overtemperature (shutdown)

Indication

    Display: "RECTIFIER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 6 short + 3 long beeps)
    Relays: Alarm
    UPScode: `STAT-RT`
    Autoresetting.

Reason

Temperature of the rectifier heat sink is more than 80°C.

Consequence

Single unit: Chargers are turned off. Transfer to bypass when possible, or output of the unit is turned off. Transfer from the bypass to the inverters is not done until the temperature has fallen below the alarm level (70°C - hysteresis), or the bypass goes out of the limits.
Units in parallel: Chargers and output of the unit are turned off, and the mechanical circuit breaker `F4` in the output is tripped.

Static switch failure

Indication

Display:	"STATIC SWITCH FAILURE" [*]
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 2 short + 4 long beeps)
Relays:	Alarm
UPScode:	`STMF – SM` [*]

Reason

1) On bypass, at least one of the UPS output voltages differs from the bypass voltage for 15 ms.
2) *Parallel operation mode:* On inverter, the lowest of the three output powers is more than 3.5kW on the negative side and the highest power is more than 100W on the positive side for 100ms.

Consequence

1) Transfer to the inverter operation when possible, and transfers to bypass are disabled. Otherwise output of the unit is turned off.
2) Output of the unit is turned off, and the mechanical circuit breaker `F4` in the output is tripped.

[*] The more detailed reason for the alarm can be read from the alarm log by the `UPSL` command.

Transformer overtemperature (alarm)

Indication

Display:	"TRANSFORMER OVERTEMPERATURE"
LEDs:	"ALARM"
Buzzer:	Continuous short beeps (LB: 2 short + 3 long beeps)
Relays:	Alarm
UPScode:	`STAT - TT`
Autoresetting.	

Reason

Temperature of the output transformer is more than 120°C.

Consequence

None (see "Transformer overtemperature shutdown").

Transformer overtemperature (shutdown)

Indication

    Display: "TRANSFORMER OVERTEMPERATURE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 8 short + 3 long beeps)
    Relays: Alarm
    UPScode: STAT - TT
    Autoresetting.

Reason

Temperature of the output transformer has been more than 120°C for five minutes.

Consequence

Output of the unit is turned off.
Parallel operation mode: Mechanical circuit breaker F4 in the output is tripped.

Unsynchronized

Indication

    Display: "UNSYNCHRONIZED"
    LEDs: None
    Buzzer: Silenced
    Relays: None
    UPScode: STAT - US
    Autoresetting.

Reason

Inverter output is not synchronized to the bypass line. This status is disabled in wireless load sharing (paralleling) mode, and when the UPPM parameter P32=00 or 02.

Consequence

Transfers to bypass are disabled, if the UPPM parameter P24=00.

UPS disabled

<u>Indication</u>

    Display: "UPS DISABLED"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 6 short + 2 long beeps)
    Relays: Alarm
    UPScode: `STAT - UD`
    Autoresetting.

<u>Reason</u>

Parallel operation/capacity mode: Output of the unit is on and number of the units running has been reduced. The alarm can be cleared by the "reset button".

<u>Consequence</u>

None.

UPS not supplying load

<u>Indication</u>

    Display: "UPS NOT SUPPLYING LOAD"
    LEDs: None
    Buzzer: Silenced
    Relays: None
    UPScode: `STAT - OD`
    Autoresetting.

<u>Reason</u>

Parallel operation mode: Output of the unit is off but the output voltage is detected (other unit is on), when this is used to force the 'UPS ON' LED of the front panel off.

<u>Consequence</u>

None.

UPS on battery

<u>Indication</u>

    Display: "UPS on battery"
    LEDs: "ON BATTERY"
    Buzzer: Silenced (LB: 5 s long beep when occurred, and then 2 short beeps a minute)
    Relays: Line failure
    UPScode: `STUF` - `11`
    Autoresetting.

<u>Reason</u>

Battery operation is initiated since one of the following conditions occur:
- DC bus voltage on either (or both) side has dropped below 340V (290V when the inverter output is out of window)
- neutral failure
- input filter over temperature
- rectifier input voltage over 307V and the `UPPM` parameter `P33=01`
- the unit has been forced on battery by the `UPPM` parameter `P19`
- average of three input voltages is detected to be less than 140V when parallel operation mode is selected, and two units are operating in parallel

<u>Consequence</u>

Stays on battery until the input line voltages have been high enough (see table in 4.1) for existing load, and any of the above conditions does not exist for three seconds.

UPS on bypass

<u>Indication</u>

    Display: "UPS on bypass"
    LEDs: "BYPASSED"
    Buzzer: Silenced (LB: 2 short beeps a minute if not in eff. opt. mode)
    Relays: Bypassed
    UPScode: `STBP` - `11`
    Autoresetting.

<u>Reason</u>

The load has been transferred to bypass.

<u>Consequence</u>

Transfer back to the inverters in five seconds (not in eff. opt. mode), if no alarms present that prevent inverter operation. Immediate transfer to the inverters, when bad bypass condition occur.

Utility overvoltage

<u>Indication</u>

    Display: "UTILITY OVERVOLTAGE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 2 short beeps a minute)
    Relays: Alarm
    UPScode: STAT - UO
    Autoresetting.

<u>Reason</u>

At least one of the bypass voltages is above the upper voltage limit, and the UPPM parameter P32=03. The status is disabled in 20-30kVA units when the mechanical bypass switch S2 is in "Bypass" position.

<u>Consequence</u>

Transfers to bypass are disabled.

Utility undervoltage

<u>Indication</u>

    Display: "UTILITY UNDERVOLTAGE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 2 short beeps a minute)
    Relays: Alarm
    UPScode: STAT - UU
    Autoresetting.

<u>Reason</u>

1) On inverter, one or two of the rectifier input voltages is less than 150V, and the UPPM parameter P32=02 or 03.
2) On bypass, at least one of the rectifier input voltages is less than 150V, and the UPPM parameter P32=02 or 03.
3) At least one of the bypass voltages is below the lower voltage limit, and the UPPM parameter P32=03.

The status is disabled in 20-30kVA units when the mechanical bypass switch S2 is in "Bypass" position.

<u>Consequence</u>

1) None.
2) Stays on bypass until the input voltages return or the bypass disappear.
3) Transfers to bypass are disabled.

Utility undervoltage shutdown

<u>Indication</u>

    Display: "UTILITY UNDERVOLTAGE"
    LEDs: "ALARM"
    Buzzer: Continuous short beeps (LB: 6 short + 1 long beeps)
    Relays: Alarm
    UPScode: STAT - UU

<u>Reason</u>

1) On bypass, when forcing to bypass is just ended but the inverters are not tested and output contactor/thyristors not turned on, and average of last bypass voltage period is detected to be out of the limits.
2) *Units in parallel:* Average of three input voltages is detected to be less than 100V when the batteries are disconnected.

<u>Consequence</u>

Output of the unit is turned off.

APPENDIX B – ABM

This section describes the Advanced Battery Management (ABM) functions in 20-80kVA UPSs.

1 Charging

UPScode: STBM(cr)(lf)
          CH(cr)(lf)

Charging cycle is initiated
- after every startup by main switch S1
- if discharging lasted continuously more than 10 s
- if cumulative dischargings exceeded 25 s
- when the battery voltage drops below 2.10V/cell (302V) during the resting cycle
- after 18 days without charge

The battery charger voltage is 2.28V/cell (329V). Maximum charging current is about 6A in 20-30kVA, or 8A in 40-80kVA units.

2 Floating

UPScode: STBM(cr)(lf)
          FT(cr)(lf)

Floating cycle of 48 hours is started
- when the battery voltages exceed 2.25V/cell (324V) during the charging cycle
- if charging cycle has lasted 12 hours

Batteries are always at the floating state when they are not discharged, if the ABM charging cycles are disabled by the UPPM parameter P13. External battery charger is controlled off when the battery voltages reach the level of 2.25V/cell.

The battery charger voltage is 2.28V/cell (329V).

3 Resting

UPScode: STBM(cr)(lf)
          RS(cr)(lf)

Resting cycle of 18 days is initiated after the floating cycle. During the resting cycle
- battery voltage level is not checked during the first 3 minutes
- *battery failure* is generated if battery voltage drops below 2.10 V/cell (302V) during the first 7 days (can be disabled by the UPPM parameter P13)
- chargers are off

The chargers are also turned off
- after startup of the unit due to a battery disconnection checking *
- after a transfer to bypass or back to inverter for about 5...15 seconds due to a battery disconnection checking *
- when the rectifier is off
- when the batteries are disconnected, or battery over voltage, charger over temperature, or rectifier over temperature alarm is detected

* Batteries are assumed to be disconnected if the battery voltage(s) has dropped below 192V (battery low limit - 60V), or the voltage is below the limit after startup (and the unit is not on battery), and after that when the chargers have been started, the voltages have risen over 302V (2.10V/cell) in less than 3 s. If the battery voltages do not drop within 5 seconds at all when the chargers are off and the voltages are more than 192V, the batteries are assumed to be connected and the chargers can be turned on.

4 Discharging

UPScode: STBM(cr)(lf)
          DI(cr)(lf)

During battery discharge
- chargers are off
- battery low alarm is generated when the battery voltage drops below 1.83V/cell (264V, selectable by the UPPM parameter)
- battery low limit alarm is generated when the battery voltage drops below 1.75V/cell (252V), and a minute later (or 5 s later if the battery voltage drops below 202V) output of the unit is turned off
- if the battery voltages have been below the low limit for 10 s and the bypass is acceptable, transfer to bypass is done

APPENDIX C – DOCUMENT HISTORY

Revision A, 11.9.1998

The first official revision of this document.

Revision B, 8.12.2000

Added new name for the product family – 9305.

Added references, functions, parameters, and alarms that are related to the parallel operation mode implementation.

Added 20, 50, and 60kVA units in the power rate references.

Added battery circuit breaker state checking in "STARTUP" section.

Added EL operation mode description.

Changed "Output thyristor failure" to be "Output contactor/thyristor/fuse/MCB failure".

Corrected numbering of the external inputs X219-222.

Modified condition of the "Battery overvoltage" alarm.

Added description of the "Bypass unavailable", "UPS not supplying load", "Utility under voltage", and "Utility undervoltage shutdown" statuses.

Changed "Cabinet over temperature" alarm limit from 38 to 42 °C.

Revision C, 8.5.2001

Modified description of the startup logic of the parallel system up to four units in "Rectifier and inverter turn on" section.

Added output breaker trip reasons in parallel mode in "Shutdown reasons on inverter" and "Shutdown reasons on bypass" sections.

Added overload/output out of window condition in parallel mode in "UPS output off" section.

Added exceptions of the new UPPM parameter P32 in "Bypass unavailable", "Unsynchronized", and "Utility under voltage" status descriptions.

Changed "Cabinet over temperature" alarm limit from 42 to 60 °C in 20-30kVA units.

Added new causes for "Output failure" and "Static switch failure" conditions in parallel mode.

Added description of the "UPS disabled", and "Utility over voltage" statuses.

Changed "Abnormal output voltage" limit from 50V to 85V.

Revision D, 11.12.2002

Added 80kVA unit in the power rate references.

Added high rectifier input voltage in the reasons to initiate the battery operation in the section "Battery operation".

Added `UPPM` parameter `P13` in the reasons to disable the battery operation in the section "Battery operation".

Added comment about the rectifier shutdown due to the battery thyristor commutation in the section "Battery operation".

Removed "bypass in window/out of window" state and demand of synchronization from the bypass acceptance criteria.

Added bypass under and over frequency limits to the bypass acceptance criteria.

Added comment in the "Bypass acceptance" section that bad bypass voltage period prevents a transfer to the bypass only in a few cases.

Added statement that the bypass window comparison is used only in the efficiency optimizer mode during the bypass operation.

Changed output thyristor control of 40-80kVA units to be the same as in 20-30kVA units in the sections "Bypass operation" and "Forced bypass operation".

Added comments "Synchronization and transfers to the bypass can be disabled by shorting the Generator on input `X219`" and "On the bypass, the slew rate is always in its maximum" in the section "Synchronization".

Changed filtering rate of the "Internal data bus failure" alarm from 15 ms to 1 s.

Corrected F4 to be UPS output breaker instead of inverter output breaker.

Added filtering time of 30 s in the "Cabinet over temperature" alarm.

Changed "Cabinet over temperature" alarm limit from 42 to 47 °C in 40-80kVA units.

Added tripping statement of the mechanical circuit breaker `F4` to the alarm descriptions that opens the breaker in parallel operation mode.

Changed decision method of the inverter output contactor/thyristor/fuse failure on the bypass when the output contactor/thyristors is controlled to be closed/on.

Added notice about 4 ms break in an unsynchronized transfer in the "Transfer to bypass" section.

Changed detection method of the static switch failure condition.

Added statement that the utility undervoltage is activated on the bypass, if at least one of the rectifier input voltages is missing.

Added comment about the mechanical bypass switch position to the "bypass unavailable", "utility overvoltage" and "utility undervoltage" alarms.

Schematic diagram 1011339
Bill of material   1010862
Assembly drawing 1011340

1.   **3N45 Logic board operation**

The task of the logic board of 3N45 is to take care of all logic operations of a
UPS and to provide a user interface. The board has two processors.
The main processor is Hitachi H8/3334YCP16 (H8/3337YCP16) operating at
16 MHz.
Main tasks are

- inverter control
- rectifier control by providing setpoint and other information to rectifier board
  processor
- charger control through rectifier board
- user interface with two serial interfaces
- user interface to the display unit through measurement processor
- working as a local I2C bus master and controls communication to slave
  processors, E2PROMs and charger DAC.

Then measurement processor is PIC 16C74A-20/P operating at 20 MHz.
Task are

- output voltage measurement with rectified - average method from all three
  phases
- output current measurement with RMS - method sampling at 5.5 kHz.
- output power calculation from voltage and current measurements
- auxiliary inputs i.e. mech by pass switch, temperature alarms
- to provide a serial channel for Hitachi to communicate to the display unit

Hitachi operation

Hitachi (D312) measures bypass line and inverter ouput voltages coming from
the inverter boards with analog channels AN0 - AN5. AC voltage is divided with
resistor networks R128, R129 and R130 and centered around 2.5 volts. Inputs are
protected with diode network V310.

Synchronizing signal is taken from bypass line 1 and fed through comparator N309
to Hitachi counter input FTIA.

Synchronized sine references are generated in processor using PWM0 output
to make sine reference for phase 2 and PWM1 to make sine reference for phase1.
PWM outputs are filtered with low pass coupled operational amplifier N313.
Sine reference for phase 3 is made by summing references for phase 1 and 2
and inverting the output (U1 + U2 + U3 = 0 => U3 = - (U1+U2)).

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The amplitude of sine references which is also output voltage calibration is controlled with trimmer pots R149, R155 and R161. DC offset is taken away with capacitors C141, C146 and C150. To make output voltage level adjustment the inverter boards must be connected.

Inverter Enable, Inverter Thyristor Enable, Bypass Thyristor Enable and Battery CB trip signals come from processor port P2 through buffer D314 which disables these signals if EPO signal is off. Signals are level adjusted to 12 volt level with V415.

Connector X106 is a test input pin for factory testing only.

Processor pin P9-4 provides a RESET signal to rectifier board through transistor V130.

Processor port P1 provides adaptive hysteresis control, buzzer operation and external charger control through buffer V416 (ULN2803A).

Processor port P9 -5 provides DALLAS bus for real-time clock D212 (DS 1994) and cabinet temperature measurement circuit B219 (DS 1820)
Additional temperature measurement circuits can be connected with connector X3. Optocouplers V308 and V309 are used to minimize external interference from outside cabling but the connector **DOES NOT** provide galvanic isolation.

The 2.5 volt reference for centering AC measurements is made from 5 volts by division and buffering with op. amp. N319.

Operational parameters and scaling values are in 4 kB E2PROM D317 (24C32), which is connected to Hitachi with I2C bus operating at 400 kbit/s, pins P9-7 for SDA and P8-6 for SCL signal.
Additionally I2C is connected to measurement processor in logic board and rectifier processor, charger DAC and E2PROM memory in rectifier board.

Reset signal is generated with voltage level detector N311 (MC34064) to Hitachi and measurement processor.

Output relays V121...V124 are connected to Hitachi port P3 through V408 (ULN 2803A) buffer.

ON/OFF switch is connected to X1 and wakes up processor program from P8-0.

Hitachi has two serial isolated serial channels. Port pins P5-0 and P5-1 support serial channel 1 TXD1 and RXD1 signals. Port pins P8-4 and P8-5 support serial channel 2 TXD2 and RXD2 signals. Additonal RTS nad DTR output signals are supported for channel 2 as well as DCD input signal to provide modem connections.

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Measurement processor operation

PIC 16C74A-20 is used to measure output voltages and currents from UPS using resistor dividers and centering the measurement around 2.5 volts.
Inputs are protected with diode network V407. Analog input AN0..5 are used.

Temperature alarms and other signals are connected to processor through input buffers D208, D209 and D210 (MC1489).

Additional inputs from connector X219 are optically SELV isolated with V313..V316 (CNW139).

 PIC provides an isolated serial channel which connects to display unit with connector X216. This channels receives and transmits normal async data to communicate and moves the data to and from Hitachi in I2C frames.

Power circuitry

Power is supplied from rectifier boardthrough connector X1. The board has linear controllers N2, N3 and N4 (7812, 7912 and 7805) to provide +-12 and +5 volts.

D10, V61 and T3 circuitry generates SELV isolated 12 volts to inputs connected to X219.

X2 connector gets isolated voltage from backup power supply and this is used in serial communications, display unit operation and EPO loop.
Negative voltage for RS-232 lines is generated with charge pump N1 (UC3845).

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Rev/ECO no:

Rev/ECO no:

L3 X1   L2 X2   L1 X3   N X4 H   L3 X5   L2 X6   L1 X7 I   N X8   L3 X9   L2 X10   L1 X11 F

D

UPS OUTPUT   C8   UPS INPUT   C13

BYPASS INPUT

X12   C10   R1 R2 R3 R4

X13   C6   C7 C9

AC FANS

X14   C20   R5 R6 R7 R8   C14 C15

X15 X17   G PE   C11   C12   R9 R10 R11 R12   C21 C22   C16   C17   C18

X16   C19

C28 C29 C30   C23   BAR CODE   C25   C26   PE B

C1   C2   C3   C4   C5

X18   C24   PE   C39   C42

FUSE

R20 R21   C27   C44 C45   C46 C47

R13 R14 R15 R16 R17 R18 R19   C35 C37 C38   C32   C43   C49

F1H250V   C31   C34 C36   C48

R22 R23   C40   C41

C33

R24 R25   FROM INVERTER OUTPUT   TO AC MCB   TO MBP SW

F1

K   X19   X20   X21   X22 C   X23   X24   X25 E   X26   X27   X28   X29 L

L3   L2   L1   N   L3   L2   L1   N   L3   L2   L1

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ELECTRONICS

Title Assembly drawing
RFI board
3N30

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X1–11, X19–X29
TIGHTENING TORGUE FOR THE UPPER NUT FOR THE CABLE SHOES 1 Nm
TIGHTENING TORGUE FOR THE BOTTOM NUT TO FIX THE SCREW 11 Nm

a
b
c
c
a
b
c
c
d

a. NUT HEX M6   6342006
b. WASHE LOCK–SER M6 4313064
c. WASHE PLAIN M6   4040306
d. SCREW HEX M6x25   1263120

NOTE! THE FERRITE TOROIDES MAY NOT STAY
LOOSE

L3 L2 L1 N   L3 L2 L1   L3 L2 L1
X1 X2 X3 X4   X5 X6 X7   X9 X10 X11
UPS OUTPUT   UPS INPUT   C13   BYPASS INPUT

X12   R1 R2   R3 R4

X13   C10   C16 C17 C18

X14   AC FANS   C3   C6   C26
      C2   C20
X15 X17   C44 C45 C47
                        BAR CODE
X16   C46   C48
      C28   L2   C23 C11 C12   PE C39   PE C42
X18   R13 R14 R15 R16 R17 R18 R19
                 C24   C35 C37 C38
      FUSE   C27
             R20 R21 C34 C36   C43
                 C31
      F1H250V   R22 R23   C40
                 C33
F1   R24 R25
      FROM INVERTER OUTPUT   TO AC MCB   TO MBP SW

L3 L2 L1 N   L3 L2 L1   L3 L2 L1
X19 X20 X21 X22   X23 X24 X25   X27 X28 X29

① ⑭   ②   ① ⑭   ②

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Title Assembly drawing
RFI board
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Rev/ECO no:

Bypass Input

X9 L3
X10 L2
X11 L1
X8 N
UPS Input
X5 L3
X6 L2
X7 L1

L1

C44 4N7 250V C42 47N 250V Y
C46 4N7 250V C45 47N 250V Y
C48 4N7 250V C47 47N 250V Y

C49 220N 250V X2
C41 220N 250V X2
C32 220N 250V X2

C27 220N 250V X2
C40 220N 250V X2
C43 220N 250V X2

C25 4N7 250V Y
C26 47N 250V Y

C34 4N7 250V C35 47N 250V Y
C36 4N7 250V C37 47N 250V Y
C38 4N7 250V C39 47N 250V Y

To MBP SW
X27 L3
X28 L2
X29 L1
X26 N
To AC MCB
X23 L3
X24 L2
X25 L1

R12 215K R11 215K
R8 215K R7 215K
R4 215K R3 215K
R10 215K R9 215K
R6 215K R5 215K
R2 215K R1 215K

C9 4N7 250V X
C15 4N7 250V X
C22 4N7 250V X
C18 2U2 250V X2
C17 2U2 250V X2
C16 2U2 250V X2
C21 4N7 250V X
C14 4N7 250V X
C7 4N7 250V X
C11 2U2 250V X2
C12 2U2 250V X2
C13 2U2 250V X2

UPS Output
X1 L3
X2 L2
X3 L1
X4 N

L2

C1 4N7 250V Y
C2 47N 250V Y
C3 4N7 250V Y
C4 47N 250V Y
C5 4N7 250V Y
C8 47N 250V Y
C20 1U 250V
C10 1U 250V
C6 1U 250V
C23 4N7 250V Y
C19 47N 250V Y

R13 562K
R14 562K
R19 562K R18 562K R17 562K R16 562K R15 562K

R20 215K R21 215K
C28 2U2 250V X2
R22 215K R23 215K
C29 2U2 250V X2
R24 215K R25 215K
C30 2U2 250V X2
C33 4N7 250V X
C31 4N7 250V X
C24 4N7 250V X

FUSE HOLDER 5X20
F1
X18 FUSE
F1H250V

From Inverter Output
X19 L3
X20 L2
X21 L1
X22 N

X17 N
Mains Socket for Service
X15 L3

Ac Fans
X13
X16
X14
X12

G
B PE
J
CHASSIS

C D F E H I
OR

BILL OF MATERIAL FOR PRODUCT **1015244a1**

PCBAS RFI BOARD 20-80KVA

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1002402	FUSE HOLDER 6,3A 250V 5x20PCB	1.000	F1
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C1, 3, 5, 7, 9
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C14, 15,
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C21-25, 31,
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C33, 34, 36,
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C38, 44, 46,
1006221	CAPAC RFI 4.7nF 250V Y p10/15	20.000	C48
1006226	CAPAC RFI 220nF 275V X2 p20/22	6.000	C27, C32, 40
1006226	CAPAC RFI 220nF 275V X2 p20/22	6.000	C41, 43, 49
1008183	CAPAC RFI 47nF 250V Y p20/22.5	11.000	C2, 4, 8, 19,
1008183	CAPAC RFI 47nF 250V Y p20/22.5	11.000	C26, 35, 37,
1008183	CAPAC RFI 47nF 250V Y p20/22.5	11.000	C39, 42, 45,
1008183	CAPAC RFI 47nF 250V Y p20/22.5	11.000	C47
1008184	CAPAC RFI 2.2uF 250V X2 p37.5	9.000	C11-13,
1008184	CAPAC RFI 2.2uF 250V X2 p37.5	9.000	C16-18,
1008184	CAPAC RFI 2.2uF 250V X2 p37.5	9.000	C28-30
1011358	CAPAC RFI 1uF 275V X2 p27.5	3.000	C6, 10, 20
1012132	PCBRD 3N30-80 RFI BOARD	1.000	
1012133	D SCHEMA 3N45 RFI BOARD	.000	
1012134	D ASSY 3N45 DWG RFI BOARD	.000	
1012143	STICKER BAR CODE FOR PCBAS	1.000	
8010230	RESIS 215K 0.4W 1% MET	18.000	R1-12,
8010230	RESIS 215K 0.4W 1% MET	18.000	R20-25
8010246	RESIS 562K 0.4W 1% MET	7.000	R13-19
8050947	CONNE 6.3x0.8 PCB MALE	2.000	X15, 17
8051806	CONNE 3P MALE LOCKING G3.96mm	5.000	X12-14, 16,
8051806	CONNE 3P MALE LOCKING G3.96mm	5.000	X18
8052250	FUSE F 1A/250V IEC127/I	1.000	

X1–11, X19–X29
TIGHTENING TORGUE FOR THE UPPER NUT FOR THE CABLE SHOES 1 Nm
TIGHTENING TORGUE FOR THE BOTTOM NUT TO FIX THE SCREW 11 Nm

a. NUT HEX M6   6342006
b. WASHE LOCK–SER M6   4313064
c. WASHE PLAIN M6   4040306
d. SCREW HEX M6x25   1263120

NOTE! THE FERRITE TOROIDES MAY NOT STAY
LOOSE

UPS OUTPUT
L3 X1   L2 X2   L1 X3   N X8
UPS INPUT
L3 X5   L2 X6   L1 X7
BYPASS INPUT
L3 X9   L2 X10   L1 X11

X12
X13
X14
X15 X17
X16
X18

AC FANS

FUSE

F1H250V

F1

C1 C2 C3 C28

L2

C10 C6 C20 C11 C12 C23 C24

C13
R1 R2 R3 R4

C16 C17 C18

PE C39
PE C42

R13 R14 R15 R16 R17 R18 R19
C35 C37 C38
C34 C36

R20 R21
R22 R23
R24 R25
C31 C33

BAR CODE

ADD BAR CODE
STICKER HERE
INSTEAD OF THE
MARKED PLACE
ON PCB

C26
C44 C45
C46 C47
C48

FROM INVERTER OUTPUT
L3 X19   L2 X20   X21   N X22
TO AC MCB
L3 X23   L2 X24   L1 X25
TO MBP SW
L3 X27   L2 X28   L1 X29

1   14   2   1   14   2

Rev/ECO no:

B/12241 IN

POWERWARE

Title	Assembly drawing				
	RFI board		No	10 15 266	Rev B
	3N30				
Checked JS	Approved 1.11.99 TT	Loc FIN	Size A3	Page 1 / 1	

X19-X29
TIGHTENING TORQUE FOR THE UPPER NUT FOR THE CABLE SHOES 1 Nm
TIGHTENING TORQUE FOR THE BOTTOM NUT TO FIX THE SCREW 11 Nm

NOTE! THE FERRITE TOROIDS MAY NOT STAY LOOSE

a. NUT HEX M6   6342006
b. WASHE LOCK-SER M6   4313064
c. WASHE PLAIN M6   4040306
d. SCREW HEX M6x25   1263120

X1-X11
TIGHTENING TORQUE FOR THE UPPER NUT FOR THE CABLE SHOES 10 Nm
TIGHTENING TORQUE FOR THE BOTTOM NUT TO FIX THE SREW 11 Nm

a. NUT HEX M6   6342006
b. WASHE LOCK-SER M6   4313064
c. WASHE PLAIN M6   4040306
d. SCREW HEX M6x25   1263120

ADD BAR CODE LABEL HERE INSTEAD OF THE MARKED PLACE ON PCB

* ASSEMBLY INSTRUCTION FOR CU RAIL 15

1. Thread all cables through ferrites
2. Then thread copper rail through
3. Then press other lug on copper rail
4. Fasten copper rail and cables to board

UPS OUTPUT
UPS INPUT
BYPASS INPUT

FROM INVERTER OUTPUT
TO AC MCB
TO MBP SW

Rev/ECO no:

Rev/ECO no: B/12241 IN

POWERWARE

Title ASSY DRAWING RFI BOARD
3N60

No 10 15 270   Rev B

Checked JS   Approved 3.11.99 TT   Loc FIN   Size A3   Page 1 / 1

Rev/ECO no:

Rev/ECO no:

A/12640 HT

B/12784 JK

POWERWARE

Title	WIRING:		I 040	
	RFI BOARD		No	Rev
	3N80		10 19 640	B
Checked IN	Approved 08.04.2002 HT	Loc FIN	Size A3	Page 1 / 2

X3L3 X3L2 X3L1 X3N X1L3 X1L2 X1L1 X2N X2L3 X2L2 X2L1

BLUE BLUE

UPS OUTPUT UPS INPUT BYPASS INPUT

AC FANS FUSE F1H250V

FROM INVERTER OUTPUT TO AC MCB TO MBP SW

14 12 2 23 32 F1L3 F1L2 F1L1 27 31 17 7 5

BLUE BLUE BLUE BLUE

FOR NHS ONLY

BLUE S2N

X1L3 X1L2 X1L1

BLUE P2 BLUE P2

X2L3 X2L2 X2L1

L3 X1   L2   L1 X3   N X4   L3 X5   L2 X6   L1 X7   N X8   N X8   L3 X9   L2 X10   L1 X11

X12
X13
AC FANS
X14
X15   X17
X16
X18
FUSE
F1H250V
F1

UPS OUTPUT   C8   C10   C6   C20   C23   C24

C2   C28   C29   C30

R20 R21 R31
R22 R23
R24 R25

FROM INVERTER OUTPUT

UPS INPUT   C13

R1 R2 R3 R4
R5 R6 R7 R8
C7 C9
C14 C15
R9 R10 R11
C21 C22

C11 C12
R14 R15 R16 R17 R18
C35   C36   C37   C38

PE   C39

PE   C42   C26
C16   C17   C18
C44 C45   C46   C47   C48

BYPASS INPUT

TO AC MCB   TO MBP SW

L3 X19   L2 X20   L1 X21   N X22   L3 X23   L2 X24   L1 X25   N X26   N X26   L X27   L2 X28   L1 X29

OUTL3 OUTL2 OUTL1

BLUE N-POLE BLUE N-POLE

F1L3 F1L2 F1L1

BLUE N-POLE BLUE N-POLE

STL3 STL2 STL1 X8

BLUE
BROWN

Rev/ECO no:					
A/12640 HT					
B/12784 JK					

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Rev/ECO no:

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1019228_1**
PCBAS 3N80 RFI BOARD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1012133	D SCHEMA 3N45 RFI BOARD	.000	
1015244	PCBAS RFI BOARD 20-60KVA	1.000	
1019522	FERRI RING 50x30x20 4800nH 25%	7.000	L1, L2
1019532	CABLE 3N80 RFI CHOKE 14 A4	2.000	14
1019533	CABLE 3N60 X3-RFI A4	9.000	3
1019534	CABLE 3N80 X2/N-RFI A4	2.000	10
1019535	CABLE 3N80 RFI CHOKE 1 A4	9.000	1
1019536	CABLE 3N80 RFI CHOKE 2 A4	4.000	2
1019569	D ASSY 3N80 RFI BOARD A3	.000	
1143140	SCREW HEX M6x30 8.8 A1 ISO4017	22.000	
4040306	WASHE PLAIN M6 Fe ISO 7089	88.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	44.000	
6342006	NUT HEX M6 G8 A2 ISO 4032	66.000	
8055457	TIE CABLE L=172mm W=4.6mm	1.000	(L2)

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POWERWARE

Title
ASSEMBLY DRAWING
DISPLAY BOARD "FLAT"
3N30,3N45,3N60

Checked VK
Approved 29.01.1998 EB
Loc FIN
Size A4
No 10 12 059
Page 1/1
Rev D

X8 soldered on solder side of PCB

H7

X8

ADD BAR CODE STICKER ON SOLDER
SIDE OF PCB

Components to be bent so that the
height from PCB is max 10mm

B1 not washable

B1

V5
C1
HS1
X5
V4
C21
N1
C2
C11
C3
C19
D2
V3 V6
R16
C18 C15 C12 C16
X1
X4

BAR CODE

R8   C25
R17
R15

R4

R11

X7   1

S5   S4   S3   S2   C23

H1
UPS ON
H4
ON BATTERY
H8
BYPASSED
H10
ALARM

R9   C9   C8   V2   *X2
X3
C4
V1 B2 *
R3
R2
C10   C13
G1

C14

D1

R7
R10
R12
C26 C6
C24 R5
C17
C20

D4
C5

R19 R18

D3
C7
R14 R13

Alternative for D4

Color stripe or wider lead
on cathode (C) side

C

S2-5 not washable

Parts not assembled marked with *

Assembly of N1

N1   HS1

5
4
3
2
1

22mm

1. Screw M3x10
2. Flat washer
3. Insulating insert TO-220
4. Lock washer
5. Nut M3

Lead length 0.8 - 2.6 mm

NOTE! Pack LCD H7 separately to the same package with PCBAS.

D1
HD64F3334
PLCC84_ILU

AN0
R8 31K6
R7 4K64
C9 100N

PW0 P4-6
R15 4K64
C25 100N
R17 1K21

PW1 P4-7
+5V
P12 PAD 0.8
R4-E 10K SIL9
R4-F 10K SIL9
R4-G 10K SIL9
R4-H 10K SIL9
R11-A 560R SIL9
R11-B 560R SIL9
R11-C 560R SIL9
R11-D 560R SIL9
R11-E 560R SIL9
R11-F 560R SIL9
R11-G 560R SIL9
R11-I 560R SIL9

FTIA
P6-0
P6-1 P22 PAD 0.8
P6-2
P6-3
P6-4
P6-5
P6-6
P6-7

H1 UPS ON
H4 ON BATTERY
H8 BYPASSED
H10 ALARM

P4-5 P21 PAD 0.8
P4-4 P16 PAD 0.8

P2-7 P15 PAD 0.8
P2-6 P46 PAD 0.8
P2-5 P45 PAD 0.8
P2-4
P2-3
P2-2
P2-1
P2-0

S4 PUSH BUTTON4
S3 PUSH BUTTON3
S2 PUSH BUTTON2

BUZZER1_ILU
B1
R9 4K64
V2 MPS2222A

P8-3
P8-2
P8-1
P9-3
P9-4 P13 PAD 0.8
P9-5 P14 PAD 0.8
P9-6

TEST
R2 4K64
X8 XA X7 X2

LCD LM016 PAD 0.7
C23 100N
GND
+5V
Vo
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7

AH1 P1-0
P1-1
P1-2
P1-3
AH2 P1-4
P1-5
P1-6
P1-7

RS-232
X4
CONN.PHONEJACK6/B

X1
CONN.PHONEJACK6/B
N.A.

C18 100N
C16 100N
C12 100N
C15 100N
C19 100N
D2 MAX3232
DIL16
Vcc

R4-A 10K SIL4
R4-B 10K SIL4
R4-C 10K SIL4
R4-D 10K SIL4

P27 PAN1 0.8
P28 PAN6 0.8
P29 PAN7 0.8

P5-0 TxD0
P5-1 RxD0
P6-0 TxD1
P6-1 RxD1

P4-0 P17
P4-1 P18
P4-2 P19
P4-3

VCC
NC
A0 SCL
A1 SDA
A2
GND
D3 24C32

R5 4K64
R13 4K64
R12 4K64
R3 4K64
R10 4K64

B2 DS1820 TO92

V1 N.A.
X3
CONN.PIN2
Dallas Bus

SDA P9-7
SCL P8-6

STBY Vpp Flash PG
MD1
C5 100N

R18 147K
R19 56K2
R14 4K64
D4 MAX6301 DIL8
PAD 1.0
C6 220N
C26 470P
RES
Xtal
C20 22P
G1 CRYST
16.00MHz
C17 22P
Extal

V3 1N4004
V4 N.A.
R16 1R FUSIBLE
C21 470N
RES/5M
U 7805
C2 470N
C3 470N
LM7805
C1 100N
V5
C24 100N

X5
CONN.DC.SOCKET
N.A.
V6 33V 1W3
C11 CAP.EL 5/6.5_ILU

HSINK3/90
HS1

P41 B3
P42 B4
P43
P44

MD0
NMI
Vcc5
Vcc
Vss

AVcc
C8 100N
C4 100N
AVss

C10 100N
C13 10U 35V
C14 100N

HOLE 3.2
HOLE 3.5
ORIGO

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1012056d** **page1**
PCBAS 3N30-60 DISPLAY BOARD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
0000000	PART NOT ASSEMBLED	.000	V1, 4, 5
0000000	PART NOT ASSEMBLED	.000	C11
0000000	PART NOT ASSEMBLED	.000	C11, 21
0000000	PART NOT ASSEMBLED	.000	X1, 3, 5
0000000	PART NOT ASSEMBLED	.000	V1, 4, 5
0000000	PART NOT ASSEMBLED	.000	V1, 4, 5
0000000	PART NOT ASSEMBLED	.000	X1, 3, 5
0000000	PART NOT ASSEMBLED	.000	X1, 3, 5
1002398	CAPAC ELE 10uF 25V 5x11 p2	2.000	C11, 13
1002398	CAPAC ELE 10uF 25V 5x11 p2	1.000	C13
1002479	ICSOC 84-POLE PLCC	1.000	(D1)
1002494	RESIS NETWORK 8x10K SIP-9	1.000	R4
1002581	RESIS FUSE 3R3 0.25W 5%	1.000	R16
1004546	BUZZR 4kHz 12V 75dB d14xh7.5	1.000	B1
1004552	SWTCH PUSHBUTTON 50mA 5V h=7.3	4.000	S2-5
1006329	INSUL FOR CRYSTAL HC18U&HC49U	1.000	(G1)
1007380	TRANN 0.6A 40V TO-92 MPS2222A	1.000	V2
1007910	CAPAC EST 100nF 63VDC 5% p5mm	18.000	C1, 2, 4, 5,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	17.000	C1, 4, 5,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	16.000	C1, 4, 5,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	18.000	C7-10,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	17.000	C7-10,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	16.000	C7-10,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	18.000	C12, 14-16,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	17.000	C12, 14-16,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	16.000	C12, 14-16,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	18.000	C18, 19,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	17.000	C18, 19,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	16.000	C18, 19,
1007910	CAPAC EST 100nF 63VDC 5% p5mm	18.000	C22-25
1007910	CAPAC EST 100nF 63VDC 5% p5mm	17.000	C22-25
1007910	CAPAC EST 100nF 63VDC 5% p5mm	16.000	C23-25
1008178	CONNE 2P MALE HEADER .100" PCB	1.000	X2
1010750	ICCPU H8/3334 PLCC 84P I2C OPT	1.000	D1
1010751	CRYST 16MHz AT HC-49/U-4H	1.000	G1
1010752	ICMEM EEPROM 24C32 8-PIN PDIP	1.000	D3
1010756	ICLIN THERMOMETER DS1820	1.000	B2
1010839	SCREW PZ M3x10 Fe ISO 7045	1.000	(N1)
1011419	LCD DISPLAY ALPHANUM 2x16CHAR	1.000	H7
1011499	ICTTL DUAL RS-232 TRANSM/RECEI	1.000	D2
1011502	RESIS NETWORK 8x1K SIP-9	1.000	R11
1011504	ZENER 24V 1.3W	1.000	V6
1012057	PCBRD 3N30-60 DISPLAY BOARD	1.000	
1012058	D SCHEMA 3N30-60 DISPLAY BRDA3	.000	
1012059	D ASSY 3N30-60 DISPLAY BOARDA4	.000	
1012062	CONNE 6P/6CTS TELEPH JACK PCB	1.000	X4
1012089	HEATS 20K/W FOR TO-220 M3	1.000	HS1
1012094	CONNE 14P MALE 1ROW 2,54mm	1.000	X7
1012095	CONNE 14P SOCKET 1ROW 2,54mm	1.000	X8
1012096	ICLIN UNDERVOLT SENS DS1233M55	1.000	N2
1012250	LED RED 10mA 12mcd 2mm AXL	1.000	H10

PCBAS 3N30-60 DISPLAY BOARD

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1012251	LED YELLOW 10mA 12mcd 2mmAXL	2.000	H4, 8
1012252	LED GREEN 10mA 12mcd 2mm AXL	1.000	H1
1012435	RESIS NETWORK 8x560R SIP-9	1.000	R11
1012458	ZENER 33V 1W3 5% DO-41	1.000	V6
1012517	ICLIN WATCHDOG MAX6301CPA	1.000	D4
1012633	D UPGRADE 3N30-60 DISPLAY BRA4	.000	
1016661	CRYST 16MHz AT HC-49/U-4H 30R	1.000	G1
4040303	WASHE PLAIN M3 Fe SS ISO 7089	1.000	(N1)
4313032	WASHE LOCK-SER M3 FE DIN6798A	1.000	(N1)
6342003	NUT HEX M3 SS ISO 4032	1.000	(N1)
8000212	RESIS FUSE 1R0 1/3W 5% NFR25	1.000	R16
8001602	CAPAC CER 22pF 500VDC 10% p5mm	2.000	C17, 20
8002400	LED RED 20mA 2mcd 3mm T1	1.000	H10
8002405	LED GREEN 30mA 3mcd 3mm T1	1.000	H1
8002409	LED YELLOW 20mA 2mcd 3mm T1	2.000	H4, 8
8002442	DIODE 1A 400V DO-41 1N4004	1.000	V3
8010164	RESIS 1K21 0.4W 1% MET	1.000	R17
8010194	RESIS 4K64 0.4W 1% MET	10.000	R2, 3, 5, 7,
8010194	RESIS 4K64 0.4W 1% MET	10.000	R9, 10,
8010194	RESIS 4K64 0.4W 1% MET	10.000	R12-15
8010212	RESIS 31K6 0.4W 1% MET	1.000	R8
8010213	RESIS 21K5 0.4W 1% MET	1.000	R8
8010215	RESIS 56K2 0.4W 1% MET	1.000	R19
8010234	RESIS 147K 0.4W 1% MET	1.000	R18
8020005	CAPAC CER 470pF 200VDC 20% p5	1.000	C26
8020201	CAPAC EST 220nF 63VDC 10% p5mm	1.000	C6
8020204	CAPAC EST 470nF 63VDC 10% p5mm	2.000	C3, 21
8020204	CAPAC EST 470nF 63VDC 10% p5mm	2.000	C2, 3
8040852	ICREG +5V 1A 4% TO-220 7805	1.000	N1
8041013	INSUL SILICON INSERT TO-220	1.000	(N1)

This document is a functional description of LCD Panel software 1012822 rev I.
Best viewed with Netscape Navigator ver 3 (or later) or Microsoft Internet Explorer ver 4 (or later).

Powerware Oy, Oct 22 2001 by RAK

LCD Panel Functional Description

Revision H

Contents

6. Firmware Revision Changes

7. UPScode II Concept

1. Display

1.1 Normal Display

```
Powerware Prime
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

In Normal Display the panel shows the UPS response for UPTP command. A response longer than 16 characters is splitted on two lines at the 16th character. If the UPS responds to UPID command, then the response is displayed on the bottom line from position 6 forward. (See UPScode Concept for command explanation.) If the UPS does not give any response to the UPTP command, the panel displays 'No data from UPS'.

The panel automatically returns to this display state from other display states after a delay time (1 - 15 min) from last display state change. Manually this state is selected by pressing **Menu** button in Menu state. For example, from Output Voltage display to Normal Display: Press **Menu** button to return to Menu state. Then press **Menu** button again.

If the audible alarm is on (UPS reports about an alarm), the panel automatically changes to UPS Status Display.

1.2 Menu

```
UPS status
```

UPS on
On batt
Bypassed
Alarm

| Menu | Up | Down | Select |

In Menu the panel shows display choices. User can select displayed data by scrolling through menu with **Up** or **Down** button and then pressing **Select**.

The choices are:

- 'UPS status'
- 'Meters'
- 'Battery status'
- 'Alarm log'
- 'UPS parameters'
- 'UPS identification'
- 'Reset button'
- 'Date/time set'
- 'Display data'

If **Menu** button is pressed, then the panel returns to Normal Display.

1.2.1 Menu: UPS Status Item

```
UPS status
```

UPS on
On batt
Bypassed
Alarm

| Menu | Up | Down | Select |

When selected, changes to UPS Status Display. This display gives information about the current status of the UPS.

1.2.2 Menu: Meters Item

Meters

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

When selected, changes to Meters Display. This display shows the various UPS measurements.

1.2.3 Menu: Battery Status Item

Battery status

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

When selected, changes to Battery Status Display. This display shows the current battery status.

1.2.4 Menu: Alarm Log Item

Alarm log

UPS on

On batt

Alarm

Menu	Up	Down	Select

When selected, changes to Alarm Log Display. This display requests and displays the alarm log of the UPS unit.

1.2.5 Menu: UPS Parameters Item

UPS parameters

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

When selected, changes to UPS Parameters Display. With this display UPS parameters can be read and set.

1.2.6 Menu: UPS Identification Item

UPS
identification

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

When selected, changes to UPS Identification Display. This display shows the identification information of the UPS unit.

1.2.7 Menu: Reset Button Item

```
Reset button
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

When selected, sends `UPR1 - UPR0` command sequence to UPS. While sending the sequence, displays "Resetting...". The interval between the commands can be lengthened by pressing select longer time. Minimum interval is about 0.5 seconds.

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1.2.8 Menu: Date / Time Set Item

```
Date/time set
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

When date and time has been set, the current setting is displayed on the bottom row toggling date and time every two seconds.

When selected, changes to Date And Time Setting Display. This display allows date and time setting.

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1.2.9 Menu: Display Data Item

```
Display data
```

UPS on
On batt

Menu	Up	Down	Select	Bypassed
				Alarm

When selected, changes to Display Data Display. This display shows various information about the LCD Display Panel unit.

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1.3 UPS Status Display

Top Row

The current operation mode of the UPS. The displayed text is one of the following, depending on the UPS operating state (see UPScode Concept for status explanation):

1. 'Normal operation'.
2. 'UPS on inverter'.
3. 'UPS on battery'.
4. 'UPS on bypass'.
5. 'No data from UPS'.
6. 'Not feeding load'.

The text may change while it is being displayed, if the state of the UPS changes.

Bottom row

If bypass mode is not available (STAT BX), and, in addition to possible unsynchronized to mains, there are no other alarms are active, text 'Bypass unavail.' is displayed. (In this situation, the 'unsynchronized'-status (STAT US) can not be seen from the LCD display.)

If UPS is unsynchronized to mains, but there are no other alarms are active, text 'Unsynchronized' is displayed.

If there are active alarms that cause Alarm LED being on, text 'alarms...' is displayed. Then **Down** button takes to Active Alarms Display.

Menu button causes return to Menu state.

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1.3.1 Status: Normal Operation

Normal operation

UPS on
On batt

| Menu | Up | Down | Select |

Alarm

UPS is operating normally: not bypassed nor on battery operation, no alarms.

1.3.2 Status: UPS on inverter

```
UPS on inverter
Alarms...
```

UPS on

On batt

Bypassed

Alarm

| Menu | Up | Down | Select |

UPS is communicating (the panel receives BTIME string) and UPS On LED is on and UPS is not bypassed nor on battery, but there is on active alarm: Alarm LED is on. Then **Down** button takes to Active Alarms Display.

1.3.3 Status: UPS On Battery

```
UPS on battery
Unsynchronized
```

UPS on

On batt

Bypassed

Alarm

| Menu | Up | Down | Select |

UPS is communicating (the panel receives BTIME string) and UPS On LED is on and UPS is not bypassed, but operating on battery: UPS reports STUF 11, or STBO 11.

1.3.4 Status: UPS On Bypass

```
UPS on bypass
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

UPS is communicating (the panel receives BTIME string) and UPS On LED is on, and UPS reports bypass operation: UPS reports STBP 11.

1.3.5 Status: No data from UPS

```
No data from UPS
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

UPS is not communicating: the panel does not receive any BTIME string.

1.3.6 Status: Not feeding load

```
Not feeding load
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

UPS is communicating (the panel receives `BTIME` string), but UPS On LED is off.

1.3.7 Active Alarms Display

When active alarms display is selected, the active alarms at that moment are stored, and the user scrolls through this stored alarm list using **Down** button.

After the last active alarm in the list, **Down** button again causes the storing of current alarm condition. If there are alarms that cause Alarm LED being on, the panel displays the first of these. If none of the alarms is active, then UPS Status Display is displayed.

```
BATTERIES            [ UPS on ]
DISCONNECTED         [ On batt ]
                     [ Bypassed ]
                     [ Alarm ]

[Menu]  [Up]  [Down]  [Select]
```

The displayed alarms are (see UPScode Concept for status explanation):

- 'LOW BATTERY VOLTAGE'. UPS sends STBL 11 status.
- 'UNSYNCHRONIZED'. UPS sends STAT/MF US status.
- 'BYPASS UNAVAILABLE'. UPS sends STAT/MF BX status.
- 'UPS NOT SUPPLYING LOAD'. UPS sends STAT/MF OD status.
- 'AUXILIARY CONTACT FAILURE'. UPS sends STAT/MF AC status.
- 'BATTERIES DISCONNECTED'. UPS sends STAT/MF BA status.
- 'BACKFEED CONTACT FAILURE'. UPS sends STAT/MF BC status.
- 'ABNORMAL BATTERY DISCHARGE'. UPS sends STAT/MF BD status.
- 'BATTERY FUSE FAILURE'. UPS sends STAT/MF BF status.
- 'BATTERY LOW LIMIT'. UPS sends STAT/MF BL status.
- 'BATTERY OVERTEMPERATURE'. UPS sends STAT/MF BT status.
- 'BATTERY OVERVOLTAGE'. UPS sends STAT/MF BO status.
- 'BYPASS FUSE FAILURE'. UPS sends STAT/MF BP status.
- 'ABNORMAL BATTERY RECHARGE'. UPS sends STAT/MF BR status.
- 'BATTERY FAILURE'. UPS sends STAT/MF BY status.
- 'CONFIGURATION ERROR'. UPS sends STAT/MF CE status.
- 'BATTERY CONVERTER FAILURE'. UPS sends STAT/MF CM status.
- 'CABINET OVERTEMPERATURE'. UPS sends STAT/MF CT status.
- 'DC OVERVOLTAGE'. UPS sends STAT/MF DO status.
- 'DC UNDERVOLTAGE'. UPS sends STAT/MF DU status.
- 'EMERGENCY POWER OFF'. UPS sends STAT/MF EP status.
- 'FAN FAILURE'. UPS sends STAT/MF FF status.
- 'LINE FREQUENCY HIGH'. UPS sends STAT/MF FH status.
- 'LINE FREQUENCY LOW'. UPS sends STAT/MF FL status.

- 'LOSS OF REDUNDANCY'. UPS sends STAT/MF LR status.
- 'FILTER OVERTEMPERATURE'. UPS sends STAT/MF FT status.
- 'GROUND FAILURE'. UPS sends STAT/MF GF status.
- 'CHARGER OVERTEMPERATURE'. UPS sends STAT/MF HT status.
- 'INTERNAL DATA BUS FAILURE'. UPS sends STAT/MF IB status.
- 'INVERTER FUSE FAILURE'. UPS sends STAT/MF IF status.
- 'INVERTER FAILURE'. UPS sends STAT/MF IM status.
- 'INVERTER OVERVOLTAGE'. UPS sends STAT/MF IO status.
- 'INTERNAL POWER SUPPLY FAILURE'. UPS sends STAT/MF IP status.
- 'INVERTER OVERTEMPERATURE'. UPS sends STAT/MF IT status.
- 'INVERTER UNDERVOLTAGE'. UPS sends STAT/MF IU status.
- 'INVERTER OFF'. UPS sends STAT/MF IV status.
- 'NEUTRAL FAILURE'. UPS sends STAT/MF NF status.
- 'OSCILLATOR FAILURE'. UPS sends STAT/MF OF status.
- 'OVERLOAD'. UPS sends STAT/MF OL status.
- 'REDUNDANCY OVERLOAD'. UPS sends STAT/MF OR status.
- 'ABNORMAL OUTPUT VOLTAGE'. UPS sends STAT/MF OV status.
- 'OUTPUT FAILURE'. UPS sends STAT/MF OW status.
- 'PARALLEL BUS FAILURE'. UPS sends STAT/MF PB status.
- 'PHASE ROTATION ERROR'. UPS sends STAT/MF PE status.
- 'RECTIFIER OFF'. UPS sends STAT/MF RE status.
- 'RECTIFIER FUSE FAILURE'. UPS sends STAT/MF RF status.
- 'RECTIFIER FAILURE'. UPS sends STAT/MF RM status.
- 'RECTIFIER OVERTEMPERATURE'. UPS sends STAT/MF RT status.
- 'STATIC SWITCH FAILURE'. UPS sends STAT/MF SM status.
- 'STATIC SWITCH OVERTEMPERATURE'. UPS sends STAT/MF ST status.
- 'TRANSFORMER OVERTEMPERATURE'. UPS sends STAT/MF TT status.
- 'UPS DISABLED'. UPS sends STAT/MF UD status.
- 'UTILITY OVERVOLTAGE'. UPS sends STAT/MF UO status.
- 'UTILITY UNDERVOLTAGE'. UPS sends STAT/MF UU status.
- 'INTERNAL VOLTAGE ERROR'. UPS sends STAT/MF VE status.

The active alarms are displayed in this order. The scrolling is done with **Down** button.

Menu button causes return to Menu state. **Up** button causes return to UPS Status Display.

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1.4 Meters Display

```
Output voltage
229   230   230
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

In the Meters Display the measurement data from UPS are displayed. Because of the 16 character limit for the displayed line, and the data received from UPS is 7 characters long (xxxx.xx), all following measurements use this scheme:

- *If the data from UPS is >= 1000.00, the integer part (4 characters) is displayed (*'1234'*),*
- *else if the data from UPS is >= 0100.00, the integer part (3 characters) is displayed with trailing space (*'123'*),*
- *else if the data from UPS is >= 0010.00, the integer part (3 characters), a dot, and the first decimal are displayed (*'12.3'*),*
- *else the integer part (1 character), a dot, and the two decimal characters are displayed (*'1.23'*).*

If the UPS does not send a measurement, then *if the measurement is phase 1 or a single measurement, then (*'. . . .'*), else space is displayed.*

The displayed data are (see UPScode Concept for measurements explanation):

- 'Output voltage'.
- 'Output current'.
- 'Output power   kW'.
- 'Output frequency'.
- 'Bypass voltage'.
- 'Input voltage'.
- 'Battery voltage'.
- 'Battery current'.
- 'Internal temp °C'.
- 'Batt backup time'.

The measurements are displayed in this order. The scrolling is done with **Up** or **Down** button. **Menu** button causes return to **Menu** state.

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1.4.1 Meters: Output Voltage

```
Output voltage
229   230   230
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

Displays MOUL1, MOUL2, and MOUL3 measurements. Unit = V. When **Select** is being pressed down, nominal output voltage NOUNN is displayed (if sent by UPS unit).

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1.4.2 Meters: Output Current

```
Output current
13.0 12.9 13.0
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

Displays `MOIL1`, `MOIL2`, and `MOIL3` measurements. Unit = A.

1.4.3 Meters: Output Power

```
Output power  kW
3.00 3.00 3.00
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

Displays `MOPL1`, `MOPL2`, and `MOPL3` measurements. Unit = kW. When **Select** is being pressed down, nominal output power `NOPNN` is displayed (if sent by UPS unit).

1.4.4 Meters: Output Frequency

```
Output frequency
50.0
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

Menu	Up	Down	Select

Displays `MOFFF` measurement. Unit = Hz. When **Select** is being pressed down, maximum `NOFHH` and minimum `NOFLL` of output frequency are displayed (if sent by UPS unit).

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1.4.5 Meters: Bypass Voltage

```
Bypass voltage
229   228   228
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

Displays `MPUL1`, `MPUL2`, and `MPUL3` measurements. Unit = V. When **Select** is being pressed down, nominal `NIUNN`, maximum `NIUHH` and minimum `NIULL` of bypass voltage are displayed (if sent by UPS unit).

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1.4.6 Meters: Input Voltage

```
Input voltage
229   228   228
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

Displays `MIUL1`, `MIUL2`, and `MIUL3` measurements. Unit = V. When **Select** is being pressed down, nominal `NIUNN`, maximum `NIUHH` and minimum `NIULL` of input voltage are displayed (if sent by UPS unit).

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1.4.7 Meters: Battery Voltage

```
Battery voltage
329    329
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

Displays `MBUPO` and `MBUNE` measurements if either one is sent from UPS, else displays `MBUUU` measurement. Unit = V. When **Select** is being pressed down, maximum `NBUHH` and minimum `NBULL` of battery voltage are displayed (if sent by UPS unit).

1.4.8 Meters: Battery Current

```
Battery current
0.00   0.00
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

Displays `MBIPO` and `MBINE` measurements if either one is sent from UPS, else displays `MBIII` measurement. Unit = A.

1.4.9 Meters: Internal Temperature

```
Internal temp °C
22.0
```

| UPS on |
| On batt |
| Bypassed |

Menu	Up	Down	Select

Displays `MUTE1` measurement. Unit = °C. When **Select** is being pressed down, maximum of internal temperature `NUTEH` is displayed (if sent by UPS unit).

1.4.10 Meters: Battery Backup Time

```
Batt backup time
29.0          min
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

Displays the `BTIME` measurement/calculation. Unit = min.

1.5 Battery Status Display

```
Battery
Discharging
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

In this first display the panel displays `STBM` status. In the following displays the battery info of up to 8 battery cabinets: temperature, aging index, installation date.

The scrolling is done with **Up** or **Down** button. **Menu** button causes return to Menu state.

1.5.1 Battery Status: Battery Charge Status

```
Battery
Discharging
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

The panel displays STBM status (see UPScode Concept for command explanation):

- 'Charging' when UPS sends STBM CH status.
- 'Floating' when UPS sends STBM FL status.
- 'Resting' when UPS sends STBM RE status.
- 'Discharging' when UPS sends STBM DI status.
- '....' when UPS does not send STBM status.

1.5.2 Battery Status: Info About Cabinet 1

```
Battery 1/8
22.4°C 1022 4Q99
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

The panel displays MBTE1 (battery temperature), MBIN1 (battery aging index) and BDAT1 (battery installation date) data (see UPScode Concept for command explanation).

1.5.3 Battery Status: Info About Cabinet 2

```
Battery 2/8
22.5°C 1122 4Q99
```

UPS on

On batt

LCD Panel

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Alarm

Menu Up Down Select

The panel displays MBTE2 (battery temperature), MBIN2 (battery aging index) and BDAT2 (battery installation date) data (see UPScode Concept for command explanation).

1.5.4 Battery Status: Info About Cabinet 3

Battery 3/8
22.3°C 1022 4Q99

UPS on

On batt

Bypassed

Alarm

Menu Up Down Select

The panel displays MBTE3 (battery temperature), MBIN3 (battery aging index) and BDAT3 (battery installation date) data (see UPScode Concept for command explanation).

1.5.5 Battery Status: Info About Cabinet 4

Battery 4/8
22.5°C 1112 4Q99

UPS on

On batt

Bypassed

Alarm

Menu Up Down Select

The panel displays MBTE4 (battery temperature), MBIN4 (battery aging index) and BDAT4 (battery installation date) data (see UPScode Concept for command explanation).

1.5.6 Battery Status: Info About Cabinet 5

```
Battery 5/8
22.3°C 98.0 2Q02
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel displays MBTE5 (battery temperature), MBIN5 (battery aging index) and BDAT5 (battery installation date) data (see UPScode Concept for command explanation).

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1.5.7 Battery Status: Info About Cabinet 6

```
Battery 6/8
22.4°C 102  2Q02
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel displays MBTE6 (battery temperature), MBIN6 (battery aging index) and BDAT6 (battery installation date) data (see UPScode Concept for command explanation).

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1.5.8 Battery Status: Info About Cabinet 7

```
Battery 7/8
22.2°C 100  2Q02
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel displays MBTE7 (battery temperature), MBIN7 (battery aging index) and BDAT7 (battery installation date) data (see UPScode Concept for command explanation).

1.5.9 Battery Status: Info About Cabinet 8

```
Battery 8/8
22.0°C 1006 4Q99
```

UPS on

On batt

Bypassed

Alarm

Menu Up Down Select

The panel displays MBTE8 (battery temperature), MBIN8 (battery aging index) and BDAT8 (battery installation date) data (see UPScode Concept for command explanation).

1.6 Alarm Log Display

```
Log mode:
Relative time
```

UPS on

On batt

Bypassed

Alarm

Menu Up Down Select

If the date and time has not been set, the time mode selection is skipped over and "Requesting alarm log..." is displayed immediately

When date and time has been set, user must select alarm time display mode before the alarm log is displayed. Choices are "Relative time" and "Real time". In relative time mode, the time stamp in each log item shows how much earlier the item was logged before the next newer one. In real time mode, the time stamp is converted to real time by the LCD Panel.

1.6.1 Alarm Log: Relative Time Selection

```
Log mode:
Relative time
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

This selection selects relative time display mode: `xxxd hh:mm:ss`.

1.6.1.1 Requesting Alarm Log

```
Requesting
alarm log...
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

The panel requests alarm log from UPS with `UPSL` command (see UPScode Concept for command explanation). After a few seconds the LCD panel receives the alarm log, or knows if the UPS does not support the `UPSL` command.

1.6.1.2 Alarm Log: Alarm Display

```
000d 01:12:34   1
OVERLOAD
```

UPS on

On batt

Bypassed

Menu   Up   Down   Select

Alarm

The alarm log displays the last 8 alarms the UPS has logged. Alarms are displayed one at a time, starting from the most current alarm.

Top Row

Alarm time: `days hours:minutes:seconds`. In case of the most current alarm: the time from now back to the logging time. In case of the older alarms: time from the previous (newer) alarm back to the logging time of the alarm.

At the end of the top row is the alarm number: 1 = the newest alarm, 8 = the oldest alarm.

Bottom Row

The bottom row displays the alarm. If the alarm text can not fit into the display, then at the end of the row is '>' character, and the rest of the text is displayed when **Select** button is pressed down.

With **Down** button the next alarm is displayed. The displayed time is now the time from the previous (newer) alarm back to the logging time of this alarm.

When **Down** button is pressed at the eigth alarm, the LCD paned requests the log from UPS again.

Menu button causes return to Menu state.

1.6.2 Alarm Log: Real Time Selection

```
Log mode:
Real time
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

This selection selects real time display mode: `yymmdd hhmmss`.

1.6.2.1 Requesting Alarm Log

```
Requesting
alarm log...
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel requests alarm log from UPS with `UPSL` command (see UPScode Concept for command explanation). After a few seconds the LCD panel receives the alarm log, or knows if the UPS does not support the `UPSL` command.

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1.6.2.2 Alarm Log: Alarm Display

```
990908 140833  1
OVERLOAD
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The alarm log displays the last 8 alarms the UPS has logged. Alarms are displayed one at a time, starting from the most current alarm.

Top Row

Alarm time: `yymmdd hhmmss` as year-month-day hour-minute-second.

At the end of the top row is the alarm number: 1 = the newest alarm, 8 = the oldest alarm.

Bottom Row

The bottom row displays the alarm. If the alarm text can not fit into the display, then at the end of the row is '>' character, and the rest of the text is displayed when **Select** button is pressed down.

With **Down** button the next alarm is displayed.

When **Down** button is pressed at the eigth alarm, the LCD paned requests the log from UPS again.

Menu button causes return to Menu state.

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1.6.3 Alarm Log: No Alarm Log

```
No alarm log
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

If the LCD panel does not get any response to the `UPSL` command, this text is displayed.

Menu button causes return to Menu state.

1.7 UPS Parameters Display

```
Requesting
parameters...
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel requests parameters from UPS with `UPPM 0` command (see UPScode Concept for command explanation). After a few seconds the LCD panel receives the parameters, or knows if the UPS does not support parameters.

1.7.1 Parameters: No Parameters

```
No parameters
```

| UPS on |
| On batt |

Bypassed

Menu   Up   Down   Select

Alarm

If the LCD panel does not get any (or correct) response to the UPPM command, this text is displayed. The UPS does not support parameters (or the communication had some interference).

Menu button causes return to Menu state.

1.7.2 Parameters: Parameter Display

```
Select parameter
P 00  V 00
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

The LCD panel displays one parameter at a time. The bottom row displays P parameter-number V parameter-value. To check the meaning of each parameter, a separate document for the UPS is needed. Scrolling through parameters is done with **Up** and **Down** buttons.

The value of the displayed parameter can be changed by pressing **Select** button.

Menu button causes return to Menu state.

1.7.3 Parameters: Parameter Change Password

```
Password:    A
```

UPS on

On batt

Bypassed

Alarm

Menu   Up   Down   Select

Before the parameter values can be changed, the correct password has to be given. A password character is entered by selecting it with **Up** and **Down** buttons and by pressing **Select** button.

After the correct password has been entered, parameter values can be changed as long as the LCD panel stays in parameters-menu. Incorrect password causes return to UPS Parameters Display.

Menu button causes return to parameter display.

1.7.4 Parameters: Parameter Change

```
Change value
P 00   V 00
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The value can now be entered by selecting it with **Up** and **Down** buttons and by pressing **Select** button.

Any value between 00 - 99 can be selected, but UPS does not necessarily accept it. Check the accepted values for each parameter from a separate document for the UPS.

Menu button causes return to parameter display.

1.8 UPS Identification Display

```
UPS type
Powerware Prime
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The panel displays (see UPScode Concept for command explanation):

1. 'UPS type'.
2. 'Serial nr'.
3. 'Part nr'.

The data are displayed in this order. The scrolling is done with **Up** or **Down** button. **Menu** button causes return to Menu state.

1.8.1 UPS ID: UPS Type

```
UPS type
Powerware Prime
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

UPS response for UPTP command. If the response doesn't fit on the second line (longer than 16), then the end of the first row is also used.

1.8.2 UPS ID: Serial Number

```
Serial nr
12345678
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

UPS response for UPSN 0 command with leading zeros (0) removed. If the response doesn't fit on the second line (longer than 16), then the end of the first row is also used.

1.8.3 UPS ID: Part Number

```
Part nr
654321
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

UPS response for `UPPN 0` command with leading zeros (`0`) removed. If the response doesn't fit on the second line (longer than 16), then the end of the first row is also used.

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1.9 Date And Time Setting

```
Date: 1999-09-08
Time: [24] 12:13
```

UPS on
On batt
Bypassed
Alarm

Menu	Up	Down	Select

The date and time are adjusted with **Up** and **Down** buttons and accepted with **Select** button.

At first displays the current date/time setting and blinks the year item of the date.

The year can be changed with **Up** and **Down** button. Possible values are 1999..2098. Correct year setting is accepted by pressing **Select** button. Now the month item begins to blink and it can be adjusted similarly. All date and time are stepped through this way. Hour display can be selected being 24-hour or 12-hour clock. Seconds are set zero after accepting minute setting.

The date and time setting is written into the panel memory only after setting the minute item and accepting it with **Select** button. Before that, the setting can be discarded by pressing **Menu** button. If date/time is set to be 1999-09-02 04:41 or earlier, then it means that the time has not been set: the time is not displayed at "Date/time set" menu item and alarm log is displayed only with relative time.

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1.10 Display Data

```
Revision G
May 15 2001
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

Displays information about the display software: revision, compilation date, check sum. By pressing **Select** for three seconds in this menu, the display unit configuration menu is displayed.

The scrolling is done with **Up** or **Down** button. **Menu** button causes return to Menu state.

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1.11 Display Unit Configration

```
Select language
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

The display unit can be configured with this menu. The configuration choices are:

- Display language selection: English, Finnish, Swedish, German, French, Spanish, Polish and Hungarian.
- LCD contrast adjustment.
- Restoring the factory configuration settings.

The scrolling is done with **Up** or **Down** button. With **Select** button the item is selected/set. **Menu** button causes return to Menu state.

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1.12 Error Display

```
LCD error # 1
```

| UPS on |
| On batt |
| Bypassed |
| Alarm |

| Menu | Up | Down | Select |

'`LCD error # xxx`' is displayed, when the unit has detected an error in internal operation. Normally should never come. With some errors, the **Select** is active and provides an escape from this error display. See 5. Error Codes.

1.13 Display Unit Test

The Display Unit Test is entered by pressing all buttons for 3 seconds. This test is used for testing the unit hardware.

The user can easily test the operation of the display, buttons and the LEDs. A separate test connector is needed to test the communication.

2. LEDs And Buzzer

2.1 UPS On LED

If UPS reports `STAT OD or STMF OD`, then the UPS ON LED is kept off. Else UPS ON LED is on when ever UPS reports that any of the MOUL1, MOUL2 or MOUL3 measurements is equal or more than 60 V (see UPScode Concept for measurements explanation).

The LED is off, when the panel gets no response from UPS.

2.2 On Battery LED

If UPS report STBL 11, then the On Battery LED is blinking. Else if UPS reports STUF 11, or STBO 11 then the LED is on (see UPScode Concept for status explanation).

2.3 Bypassed LED

If UPS reports STBP 11, then Bypassed LED is on (see UPScode Concept for status explanation).

2.4 Alarm LED

One or more of the UPS STAT or STMF status flags listed in Active Alarms Display causes Alarm LED to be on. Exceptions: the following flags do not turn the LED on:

- 'LOW BATTERY VOLTAGE'. UPS sends STBL 11 status.
- 'BYPASS UNAVAILABLE'. UPS sends STAT/MF BX status.
- 'UPS NOT SUPPLYING LOAD'. UPS sends STAT/MF OD status.
- 'UNSYNCHRONIZED'. UPS sends STAT/MF US status.

(see UPScode Concept for status explanation)

Display unit internal error also causes the Alarm LED to be on. See 1.12 Error Display.

2.5 Buzzer

The audible alarm is beeping, if the Alarm LED is active. Also, low battey voltage, STBL 11, causes the audible alarm.

The alarm is silenced, when any key is pressed. The audible alarm is started again, if a new alarm becomes active.

3. Push Buttons

3.1 Menu

Menu button causes return to menu, or if already in menu, return to Normal Display.

3.2 Up

Up button is used for scrolling selection items upwards.

3.3 Down

Down button is used for scrolling selection items downwards.

3.4 Select

Select button is used for selecting items.

4. Languages

The user has the following choices as the display language:

- English,
- Finnish,
- Swedish,
- German,
- French,
- Spanish,
- Polish,
- Hungarian.

The language is selected in display unit configuration menu.

Here is the translation table for each language:

Main menu texts

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
UPS status	UPSin tila	UPS status	UPS Status	Etat ASI
Meters	Mittausarvot	Mätvärden	Messwerte	Mesures
Battery status	Akuston tila	Batteri status	Batterie Status	Etat batter
Alarm log	Vikaloki	Larmlista	Alarm Log	Historique Alarmes
UPS parameters	UPSin parametrit	UPS parametrar	UPS Parameter	Parametres

UPS identification	UPSin tunnistetiedot	Identifiering av UPS	UPS Identifikation	Identificat ASI
Reset button	Resetointi-painike	Återställ larm	Reset Knopf	Reinitialis
Date/time set	Pvm/aika-asetus	Datum/tid inst.	Datum/Zeit einst	Reg. Date/H
Display data	Tietoa näytöstä	Info/inställning av display	Anzeigedaten	Information Affichage

UPS Status Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Normal operation	Normaalitoiminta	Normal funktion	Normalbetrieb	Mode normal
UPS on inverter alarms... ?	Kuorma suojattu hälyt... ?	UPS skyddar last larm... ?	Inverterbetrieb Alarms... ?	ASI sur ond Alarmes...?
Not feeding load	Ei syötä kuormaa	Matar inte last	Keine Ausgangspg	Sorties cou
UPS on battery Bypass unavail.	UPS akuilla Ei ohituskäyttöä	UPS i batt.drift Bypass ej möjlig	Batteriebetrieb Kein By Pass!	Sur batteri Bypass indi
UPS on bypass Unsynchronized	Ohitusverkolla Epätahdissa	UPS i bypass Osynkroniserad	By Pass Betrieb Asynchron	ASI sur byp Non synchro
No data from UPS	Ei dataa UPSilta	UPS-data saknas	Keine UPS-Daten	Aucune donn Onduleur

Active Alarms Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
LOW BATTERY VOLTAGE	AKUSTON JÄNNITE MATALA	LÅG BATTERI-SPÄNNING	BATTERIESPANNUNG ZU NIEDRIG	TENSION BATTERIES F
UNSYNCHRONIZED	EI TAHDISTUNUT VERKKOON	OSYNKRONISERAD	ASYNCHRON	NON SYNCHRO
BYPASS UNAVAILABLE	OHITUSVERKKO EI KÄYTÖSSÄ	BYPASS BLOCKERAD	BY-PASS NICHT VORHANDEN	BYPASS INDISPONIBL
UPS NOT SUPPYING LOAD	UPS EI SYÖTÄ KUORMAA	UPS SKYDDAR EJ LAST	UPS LIEFERT KEINEN STROM	ASI ALIMENT LA CHARGE
AUXILIARY CONTACT FAILURE	APUKOSKETINVIKA	FEL I HJÄLPKONTAKT	HILFSKONTAKT FEHLER	DEFAULT CON AUXILIAIRE
BATTERIES DISCONNECTED	AKUSTO EI KYTKETTY	BATTERI EJ INKOPPLAT	BATTERIEN ABGESCHALTET	BATTERIES DECONNECTEE
BACKFEED CONTACT FAILURE	TAKASYÖTTÖ-RELEVIKA	FEL I ÅTER-MATNINGSKRETS	FEHLER RÜCK-FLUSSKONTAKT	DEFAULT CON ANTI REINJE
ABNORMAL BATTERY DISCHARGE	AKUSTON PURKAUSVIKA	ONORMAL BATTERI-URLADDNING	BATTERIE-ENTLADEFEHLER	DECHARGE AN MALE BATTER
BATTERY FUSE FAILURE	AKUSTON SULAKEVIKA	BATTERISÄKRING UTLÖST	DEFEKT BATTERIE-SICHERUNG	DEFAULT FUS BATTERIES
BATTERY LOW LIMIT	AKUSTON JÄNNITE ALARAJALLA	URLADDAT BATTERI	BATTERIE UNTER-SPANNUNGSGRENZE	U-MINI BATT
BATTERY	AKUSTON	ÖVERSPÄNNING	BATTERIE	SURTENSION

OVERVOLTAGE	YLIJÄNNITE	BATTERI	ÜBERSPANNUNG	BATTERIES
BYPASS FUSE FAILURE	OHITUSVERKON SULAKEVIKA	BYPASS SÄKRING UTLÖST	DEFEKT BY-PASS-SICHERUNG	DEFAULT FUS BYPASS
ABNORMAL BATTERY RECHARGE	AKUSTON LATAUSVIKA	ONORMAL BATTERILADDNING	BATTERIE-LADEFEHLER	RECHARGE AN ALE BATTERI
BATTERY OVERTEMPERATURE	AKUSTON YLILÄMPÖ	HÖG TEMPERATUR BATTERI	BATTERIE ÜBERTEMPERATUR	SURCHAUFFE BATTERIES
BATTERY FAILURE	AKUSTOVIKA	FELAKTIGT BATTERI	BATTERIEFEHLER	DEFAULT BATTERIES
CONFIGURATION ERROR	KONFIGUROINTI-VIRHE	KONFIGURERINGS FEL	KONFIGURATIONS-FEHLER	ERREUR DE CONFIGURATI
BATTERY CONV-ERTER FAILURE	AKUSTOKONVERT-TERIVIKA	FEL I BATTERIKONVERTER	BATTERIESPANNUNG WANDLERFEHLER	DEFAULT CON ISSEUR CONT
CABINET OVERTEMPERATURE	LAITEKAAPIN YLILÄMPÖ	HÖG TEMPERATUR I UPS	GERÄTE ÜBERTEMPERATUR	SURCHAUFFE ARMOIRE
DC OVERVOLTAGE	DC:N YLIJÄNNITE	ÖVERSPÄNNING DC	DC-ÜBERSPANNUNG	SURTENSION
DC UNDERVOLTAGE	DC:N ALIJÄNNITE	UNDERSPÄNNING DC	DC-UNTERSPANNUNG	SOUSTENSION
EMERGENCY POWER OFF	HÄTÄSAMMUTUS	NÖDSTOPP AKTIVERAT	NOT AUS	ARRET URGEN
FAN FAILURE	TUULETINVIKA	FLÄKTFEL	VENTILATOR FEHLER	DEFAULT VENTILATEUR
LINE FREQUENCY HIGH	VERKON TAAJUUS KORKEA	HÖG NÄTFREKVENS	NETZFREQUENZ ZU HOCH	FREQUENCE H EN ENTREE
LINE FREQUENCY LOW	VERKON TAAJUUS MATALA	LÅG NÄTFREKVENS	NETZFREQUENZ ZU NIEDRIG	FREQUENCE E EN ENTREE
FILTER OVERTEMPERATURE	SUODATTIMEN YLILÄMPÖ	HÖG FILTER TEMPERATUR	FILTER ÜBERTEMPERATUR	SURCHAUFFE FILTRE
GROUND FAILURE	MAADOITUSVIKA	JORDNINGSFEL	SCHUTZLEITER FEHLER	DEFAULT DE
CHARGER OVERTEMPERATURE	LATURIN YLILÄMPÖ	HÖG TEMPERATUR I LADDARE	LADER ÜBERTEMPERATUR	SURCHAUFFE CHARGEUR
INTERNAL DATA BUS FAILURE	SISÄINEN DATAVÄYLÄVIKA	FEL I INTERN DATA BUS	INTERNER DATEN-BUS FEHLER	DEFAULT BUS DONNEES INT
INVERTER FUSE FAILURE	VAIHTOSUUNTAAJAN SULAKEVIKA	UTLÖST SÄKRING I VÄXELRIKTARE	DEFEKT WECHSEL-RICHTERSICHERUNG	DEFAULT FUS ONDULEUR
INVERTER FAILURE	VAIHTOSUUNTAAJA-VIKA	FEL I VÄXELRIKTARE	WECHSELRICHTER FEHLER	DEFAULT ONDULEUR
INVERTER OVERVOLTAGE	VAIHTOSUUNTAAJAN YLIJÄNNITE	HÖG UTSPÄNNING VÄXELRIKTARE	WECHSELRICHTER ÜBERSPANNUNG	SURTENSION ONDULEUR
INTERNAL POWER SUPPLY FAILURE	SISÄINEN APUJÄNNITEVIKA	FEL I INTERN POWER	INTERNER STROMAUSFALL	DEFAULT ALI TATION INTE
INVERTER OVERTEMPERATURE	VAIHTOSUUNTAAJAN YLILÄMPÖ	HÖG TEMPERATUR I VÄXELRIKTARE	WECHSELRICHTER ÜBERTEMPERATUR	SURCHAUFFE ONDULEUR
INVERTER UNDERVOLTAGE	VAIHTOSUUNTAAJAN ALIJÄNNITE	LÅG UTSPÄNNING VÄXELRIKTARE	WECHSELRICHTER UNTERSPANNUNG	SOUSTENSION ONDULEUR
INVERTER OFF	VAIHTOSUUNTAAJA EI KÄYNNISSÄ	VÄXELRIKTARE AVSTÄNGD	WECHSELRICHTER AUS	ONDULEUR AR
LOSS OF REDUNDANCY	REDUNDANTTISUUS MENETETTY	INGEN REDUNDANS	KEINE REDUNDANZ	PERTE DE REDONDANCE
NEUTRAL FAILURE	NEUTRAALIVIKA	FEL I NOLL-LEDARE	NULLLEITER FEHLER	DEFAULT DE NEUTRE

OSCILLATOR FAILURE	TAAJUUSVIKA	FEL I OSCILLATOR	OSZILLATOR FEHLER	DEFAULT OSCILLATEUR
OVERLOAD	YLIKUORMAA	ÖVERBELASTNING	ÜBERLAST	SURCHARGE
REDUNDANCY OVERLOAD	REDUNDANTTISUUS YLIKUORMITETTU	REDUNDANS ÖVERSKRIDEN	SYSTEM ÜBERLASTET	SURCHARGE REDONDANCE
ABNORMAL OUTPUT VOLTAGE	EPÄNORMAALI LÄHTÖJÄNNITE	ONORMAL UTSPÄNNING	FEHLERHAFTE AUSGANGSSPANNUNG	TENSION DE SORTIE ANOR
OUTPUT FAILURE	LÄHTÖVIKA	FEL I UTGÅNGSKRETS	AUSGANGSFEHLER	DEFAULT DE SORTIE
PARALLEL BUS FAILURE	RINNANKÄYNTI-VÄYLÄN VIKA	FEL I PARALLELL BUSS	PARALLELBUS FEHLER	DEFAULT DE PARALLELE
PHASE ROTATION ERROR	PYÖRIMISSUUNTA-VIKA	FEL FASFÖLJD	PHASENFEHLER	ERREUR ROTA DE PHASE
RECTIFIER OFF	TASASUUNTAAJA EI KÄYNNISSÄ	LIKRIKTARE AVSTÄNGD	GLEICHRICHTER AUS	REDRESSEUR ARRETE
RECTIFIER FUSE FAILURE	TASASUUNTAAJAN SULAKEVIKA	UTLÖST SÄKRING I LIKRIKTARE	DEFEKT GLEICH-RICHTERSICHERUNG	DEFAULT FUS REDRESSEUR
RECTIFIER FAILURE	VIKAANTUNUT TASASUUNTAAJA	FEL I LIKRIKTARE	GLEICHRICHTER FEHLER	DEFAULT REDRESSEURE
RECTIFIER OVERTEMPERATURE	TASASUUNTAAJAN YLILÄMPÖ	HÖG TEMPERATUR I LIKRIKTARE	GLEICHRICHTER ÜBERTEMPERATUR	SURCHAUFFE REDRESSEUR
STATIC SWITCH FAILURE	OHITUSKYTKIMEN VIKA	FEL I STATISK SWITCH	BY-PASS SCHALTER FEHLER	DEFAULT INT RUPTEUR STA
STATIC SWITCH OVERTEMPERATURE	OHITUSKYTKIMEN YLILÄMPÖ	HÖG TEMPERATUR I STATISK SWITCH	STAT. SCHALTER ÜBERTEMPERATUR	SURCHAUFFE RUPTEUR STA
TRANSFORMER OVERTEMPERATURE	MUUNTAJAN YLILÄMPÖ	HÖG TEMPERATUR I TRANSFORMATOR	TRANSFORMATOR ÜBERTEMPERATUR	SURCHAUFFE TRANSFORMAT
UPS DISABLED	UPS EI KÄYTÖSSÄ	UPS EJ TILLGÄNGLIG	UPS ABGESCHALTET	ASI INHIBE
UTILITY OVERVOLTAGE	VERKON YLIJÄNNITE	HÖG NÄTSPÄNNING	NETZ EINGANG ÜBERSPANNUNG	SURTENSION SECTEUR
UTILITY UNDERVOLTAGE	VERKON ALIJÄNNITE	LÅG NÄTSPÄNNING	NETZ EINGANG UNTERSPANNUNG	SOUSTENSION SECTEUR
INTERNAL VOLTAGE ERROR	SISÄINEN JÄNNITEVIKA	INTERNT SPÄNNINGSFEL	INTERNER SPANNUNGS FEHLER	ERREUR DE TENSION INT

Meters Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Output voltage	Lähtöjännite	Utspänning	Ausgangsspannung	Tension sor
Output current	Lähtövirta	Utström	Ausgangsstrom	Courant sor
Output power kW	Lähtöteho kW	Uteffekt kW	Ausgangsleistung	Puisance
Output fequency	Lähtötaajuus	Utfrekvens	Ausgangsfrequenz	Frequence s
Bypass voltage	Ohitusverkko V	Nät till bypass	By-Pass-Spannung	Tension byp
Input voltage	Tulojännite	Inspänning UPS	Eingangsspannung	Tension sec

Battery voltage	Akustojännite	Batterispänning	Batteriespannung	Tension bat
Battery current	Akustovirta	Batteriström	Batteriestrom	Courant bat
Internal temp °C	Sisälämpötila °C	Innertemp UPS °C	Interne Temp. °C	Temp. Inter
Batt backup time min	Varakäyntiaika min	Batt reservtid min	Überbrück.-Zeit min	Autonomie k

Battery Status Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Battery charging	Akusto varautuu	Batteri laddas	Batterie wird geladen	Batteries e charge
Battery floating	Akusto ylläpitovarautuu	Batteri underhålls-laddn	Batterie Erhaltungsladung	Batteries e maintien
Battery resting	Akusto lepää	Batteri vilar	Batterie im Ruhemodus	Batteries e repos
Battery discharging	Akusto purkautuu	Batteri urladdas	Batterie wird entladen	Batteries e decharge
Battery 1/8 °C	Akusto 1/8 °C	Batteri 1/8 °C	Batterie 1/8 °C	Batteries 1 °C
Battery 2/8 °C	Akusto 2/8 °C	Batteri 2/8 °C	Batterie 2/8 °C	Batteries 2 °C
Battery 3/8 °C	Akusto 3/8 °C	Batteri 3/8 °C	Batterie 3/8 °C	Batteries 3 °C
Battery 4/8 °C	Akusto 4/8 °C	Batteri 4/8 °C	Batterie 4/8 °C	Batteries 4 °C
Battery 5/8 °C	Akusto 5/8 °C	Batteri 5/8 °C	Batterie 5/8 °C	Batteries 5 °C
Battery 6/8 °C	Akusto 6/8 °C	Batteri 6/8 °C	Batterie 6/8 °C	Batteries 6 °C
Battery 7/8 °C	Akusto 7/8 °C	Batteri 7/8 °C	Batterie 7/8 °C	Batteries 7 °C
Battery 8/8 °C	Akusto 8/8 °C	Batteri 8/8 °C	Batterie 8/8 °C	Batteries 8 °C

Alarm Log Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Log mode: relative time	Ajannäyttö suhteellisena	Loggningssätt: relativ tid	Log Modus: relative Zeit	Mode journa temps relat
Log mode: real time	Ajannäyttö reaaliaikana	Loggningssätt: realtid	Log Modus: absolute Zeit	Mode journa temps reel
Requesting alarm log...	Haen vikalokia...	Efterfrågar larmlista...	Lade Alarm Log...	Chargement historique.
No alarm log	Ei vikalokia	Ingen larmlista	Keine Alarm Log Einträge	Pas d evene historique

UPS Parameter Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Requesting parameters...	Haen parametrejä...	Efterfrågar parametrar...	Lade Parameter...	Chargement des paramet
No parameters	Ei parametrejä	Inga parametrar	Keine Parameter vorhanden	Aucun param
Select parameter P 00 V 00	Valitse P 00 V 00	Välj parameter P 00 V 00	Parameter wählen P 00 V 00	Choix param P 00 V 00
Password: A	Salasana: A	Lösenord: A	Passwort: A	Code acces:
Change value P 00 V 00	Aseta arvo P 00 V 00	Ändra värde P 00 V 00	Wert ändern P 00 V 00	Modifier va P 00 V 00

UPS Identification Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
UPS type Powerware Prime	UPS-tyyppi Powerware Prime	UPS typ Powerware Prime	UPS Typ Powerware Prime	Modele ASI: Powerware P
Serial nr 1234 5678901234567890	Sarjanumero 1234 5678901234567890	Serienummer 1234 5678901234567890	Seriennr. 1234 5678901234567890	N. serie: 567890123 45
Part nr 1234567890123456	Osanumero 1234567890123456	Artikelnummer 1234567890123456	Gerätenummer 1234567890123456	Code articl 12345678901

Reset Button Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Resetting...	Resetoin...	Återställer...	Rückstellung...	Initialisat

Date And Time Setting

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Date: 2001-09-18 Time: [24] 12:13	Pvm: 2001-09-18 Klo: [24] 12:13	Datum:2001-09-18 Tid: [24] 12:13	Dat.: 2001-09-18 Zeit: [24] 12:13	Date :2001- Heure:[24]
Setting time...	Asetan aikaa...	Lagrar ny tid...	Zeit- einstellung...	Parametrage Horloge...

Display Data Display

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Revision H Jun 19 2001	Revision H Jun 19 2001	Revision H Jun 19 2001	Revision H Jun 19 2001	Revision H Jun 19 2001
Check sum = 128C	Check sum = 128C	Check sum = 128C	Check sum = 128C	Check sum =

Display Unit Configuration Menu

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Select language	Valitse kieli	Välj språk	Sprachwahl	Choix de la
Adjust contrast	Säädä kontrastia	Justera kontrast	Kontrast einstellung	Regler cont
Restore default configuration	Palauta oletus-konfiguraatio	Återställ grundvärden	Konfiguration der Basiswerte	Configurati par default

Configuration Display: Adjust Contrast

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
? /? : adjust ?: set	? /? : säädä ?: aseta	? /? : justera ?: lagra	? /? : Auswahl ?: OK	? /? : Regla ?: Validati

Configuration Display: Restore Factory Configuration

English	Finnish/suomi	Swedish/svenska	German/deutsch	French/fr
1234567890123456	1234567890123456	1234567890123456	1234567890123456	12345678901
Are you sure? ?=yes, MENU=no	Oletko varma? ?=kyllä, MENU=en	Är du säker? ?=ja, MENU=nej	Sind Sie sicher? ?=Ja, MENU=Nein	Confirmatic ?=Oui, MENU

5. Error Codes

Currently specified error codes are:

1. 1 - Internal RAM Error
2. 2 - Internal IIC Bus Error
3. 3 - Display Unit Configuration Error

5.1 Internal RAM Error

At reset the display processor checks the condition of internal RAM (random access memory). If an error is detected, the error code 1 is displayed.

5.2 Internal IIC Bus Error

The communication has failed in the internal IIC data bus, and the error code 2 is displayed. The cause may be a circuit error, but there is a possibility that this is caused by external electro-magnetic interference. By pressing **Select**, the display unit is restarted.

5.3 Display Unit Configuration Error

At reset the display unit configuration is checked. The configuration is stored into the internal non-volatile memory. If there is an error in the configuration, then the error code 3 is displayed. The configuration error may be caused by uninitialized non-volatile memory, or, a write failure while storing configuration data. By pressing **Select**, the display unit configuration is initialized to factory setting.

6. Firmware Revision Changes

6.1 Changes From Rev A to Rev B

Dec 1998

- The microprocessor changed from Hitachi H8/3334 to H8/3337. The firmware part number changed from 1011646 to 1012822. Revision B can not be run in H8/3334.
- In addition to **Menu** button, the move from Normal Display to Menu can now be done also with **Up** and **Down** buttons.
- The "Reset UPS" text in Menu is changed to more descriptive "Reset button".
- Alarm Log display has been added. Requests the log from UPS. Works only with UPSes, that respond to UPSL command.
- Parameter display/changing has been added.
- In UPS Status Display if there are active alarms: the display shows on the second line "alarms..." and down arrow (instead of "Active alarms" + arrow). Now the down arrow is above the **Down** button, which should be pushed to see the alarms.
- In UPS Status Display if UPS reports only both "bypass unavailable" and "unsynchronized", then only "Bypass unavail." is displayed.
- In Meters Display nominal values can be seen with **Select** key at some measurements.
- Removed DC voltage display from Meters Displays.
- In Meters Display the unit is displayed with
    - o Output power kW
    - o Internal temp °C
    - o Batt backup time min
- Now the LCD display knows a few status flags more: AC,BX,FT,OR,PB,UU,VE.

6.2 Changes From Rev B to Rev B1

Jan 1999

Fixed a bug that sometimes caused the program to get crazy when 1-2 min timeout changed back to normal display. With old hardware without the watchdog circuitry, the display died or reseted and continued working. In new hardware there is no broblem: the watchdog resets the display in these situations.

6.3 Changes From Rev B1 to Rev B2

Jan 1999

Fixed a bug which caused the program not to clear all the RAM, which caused problems in some processor individuals.

6.4 Changes From Rev B2 to Rev C

Sep 1999

Added real time function. Asks the date/time from UPS at power-on (UPSs don't support this at the moment). The date/time can also be set in menu "Date/time set" (when set, the panel tries to write setting into the UPS). When the date/time has been set, user can select either the original relative or the new real time display mode in alarm log display.

6.5 Changes From Rev C to Rev D

Sep 1999

- Added STAT/MF OD flag recognition. When STAT OD or STMF ODis sent by UPS, the green "UPS ON" LED is off. This status flag does not cause RED alarm LED, but the panel displays "UPS off" in the status panel.
- Menu item "Reset button": Added three dots to the end of the displayed text "Resetting...".
- Fixed a parameter setting password bug: If password typing was interrupted with Menu key, and then, (without returning to menu) a parameter was selected for changing again, the display was not cleared for password input. Fixed.

6.6 Changes From Rev D to Rev E

Dec 1999

- Added STAT/MF LR and STAT/MF BT flags recognition. Both cause an alarm, just like the most other alarms.
- Added submenus to "Battery status": Battery info (temperature, aging index, installation date) of 8 battery cabinets. This has been realized with a new UPScode command UPBS Battery status.
- Changed the two-minute timeout to return to normal display to fifteen minutes.

6.7 Changes From Rev E to Rev E1

May 2000

- Changed the CPU internal timer and baud rate settings so that the same firmware can be programmed also to H8/338 (in addition to H8/3337).

6.8 Changes From Rev E1 to Rev F

Mar 2001

- Changed the text "UPS off" to more general "Not feeding load", which is better for example when the unit is starting up.

6.9 Changes From Rev F to Rev G

May 2001

- Added the language selections: Finnish, Swedish and German.
- Added the contrast adjustment.
- Added the restoring of the default/factory settings.
- Extended the maximum length of the part number (UPPN) string to 16 characters.
- Added UPID command: response string is displayed in normal screen second line.
- Finds out the communication speed automatically (1200, 2400, 4800, 9600 or 19200).
- IIC bus failure causes the LCD error 2 and EEPROM initialization/check-sum error causes the LCD error 3.

6.10 Changes From Rev G to Rev H

June 2001

- Bugfix: Fixed parameter setting bug. If the parameter to be changed was selected too quickly without waiting the parameter value to appear on the screen, it was possible that the firmware set the wrong parameter value after pressing SELECT in the parameter value change display.
- Added the language selections: French, Spanish and Polish.
- Moved the password typing position to the end on the top row in parameter setting display. This was needed as French language did not fit to the previous space.

6.11 Changes From Rev H to Rev I

Oct 2001

- Added the Hungarian language selection.

7. UPScode II Concept

The LCD panel has been built to follow UPScode II Concept document 1002889 rev I.

Installation instruction of the Battery Breaker

Part number of the battery breaker kit 1014196.

The battery breaker is installed to 20-30 kVA UPS, when the external battery cabinet is connected to the UPS.

Before you install this breaker please read the instructions of the User' and Installation Manual which are for the external battery cabinets installation.

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

Install the breaker as follows.

1. Switch off the supply to the distribution point to which the UPS unit is to be connected. Make absolute sure that there is no power.

2. The battery breaker shall be installed inside the UPS to the right side of the input/output terminals. See the figure 6 of the User's and installation manual.

3. Check that the fuses of the external battery cabinet(s) are removed.

    Install the cables of the external battery cabinets to the circuit breaker and PE connector. Cut the lugs from the + and - cables before they are connected to the breaker.

    • Connect the earth cable to the PE terminal
    • Connect the battery plus cable to the left pole of the F4 breaker.
    • Connect the battery N- cable to one of the mid poles of the breaker.
      Check that the copper rail between the two mid poles of the breaker is properly connected.
    • Connect the battery minus cable to the right pole of the breaker.

4. The circuit breaker includes four-pole plug, which shall be connected to the battery plug X8-X9 of the UPS.

⚡ **WARNING!**

This battery plug is connected directly to the UPS internal batteries and contain high DC voltage.

---

5. Install the battery breaker to the unit and check that it is in OFF position.

6. Remove carefully the protection tube, which protects the UPS battery plug X8-X9. Note the voltage in these terminals.

7. Connect the plug of the breaker to the battery plug of the UPS. See the figure 1.

Figure 1.

8052315 FUSE CARTRIDGE
REPLACE USED PARTS ONLY WITH ORIGINAL SPARE PARTS

F1 +
F2 −
F3 +
F4 −

④
①
⑧ ⑤ ⑥ ⑦

TO UPS

WIRING OF THE PRINTED
CIRCUIT BOARD
INSIDE THE CABINET

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

1012084

X2

X1

⑨

(TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

NOTE

Plus− and minus−poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1011640	2700mm	2
2.	1011644	1200mm	10
3.	1011638	250mm	36
4.	1012540	1500mm	2
5.	1012214	4500mm	1
6.	1012215	4500mm	1
7.	1012216	4500mm	1
8.	1012218	4500mm	1
9.	1012217	4500mm	1

Battery replacement information

Battery type:	24Ah 12V
Battery Part Number:	1008055
Two battery strings in series	
Number of batteries per string:	24pcs
Nominal voltage of each battery string:	288VDC
Nominal capacity C_{20} of Battery string:	24Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

② ③

1012213 E

Rev/ECO no!
Rev/ECO no!
E/12107 TT
C/11729 TT
D/11772 TT

POWERWARE

Title	LABEL 3N45 BAT D WIRING DRAWING			
	BATTERY CABINET	No		Rev
		10 12 213		E
Checked JKet	Approved 16.04.1998 TT	Loc FIN	Size A4	Page 1 / 1

REPLACE USED PARTS ONLY WITH ORIGINAL SPARE PARTS
8052315 FUSE CARTRIDGE

F1 +
F2 −
F3 +
F4 −

① ④

⑧ ⑤ ⑥ ⑦

TO UPS

WIRING OF THE PRINTED
CIRCUIT BOARD
INSIDE THE CABINET

1012084

(TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

X2

X1

FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

⑨

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus− and minus−poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1011640	2700mm	2
2.	1011644	1200mm	10
3.	1011638	250mm	36
4.	1012540	1500mm	2
5.	1012214	4500mm	1
6.	1012215	4500mm	1
7.	1012216	4500mm	1
8.	1012218	4500mm	1
9.	1012217	4500mm	1

Battery replacement information

Battery type: 24Ah 12V
Battery Part Number: ☐ 1015874
                                     ☐ 1008055

Two battery strings in series
Number of batteries per string: 24pcs
Nominal voltage of each battery string:288VDC
Nominal capacity C_{20} of Battery string: 24Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

② ③

1015887 B

Rev/ECO no:

Rev/ECO no:
B/12243 IN

POWERWARE

Title	LABEL WIRING DRAWING		No		Rev
	BATTERY CABINET		10 15 887		B
	BAT-D-PAN24 / D-WIDE				
Checked JK	Approved 12.05.2000 VK	Loc FIN	Size A4	Page 1 / 1	

8052315 FUSE CARTRIDGE
REPLACE USED PARTS ONLY WITH ORIGINAL SPARE PARTS

F1 **+**
F2 **−**
F3 **+**
F4 **−**

⑧ ⑤ ⑥ ⑦

TO UPS

WIRING OF THE PRINTED
CIRCUIT BOARD
INSIDE THE CABINET

1012084

X2 ——— (TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

X1 ——— FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

⑨

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

NOTE

Plus− and minus−poles can
be opposite to the drawing,
due to design of batteries.

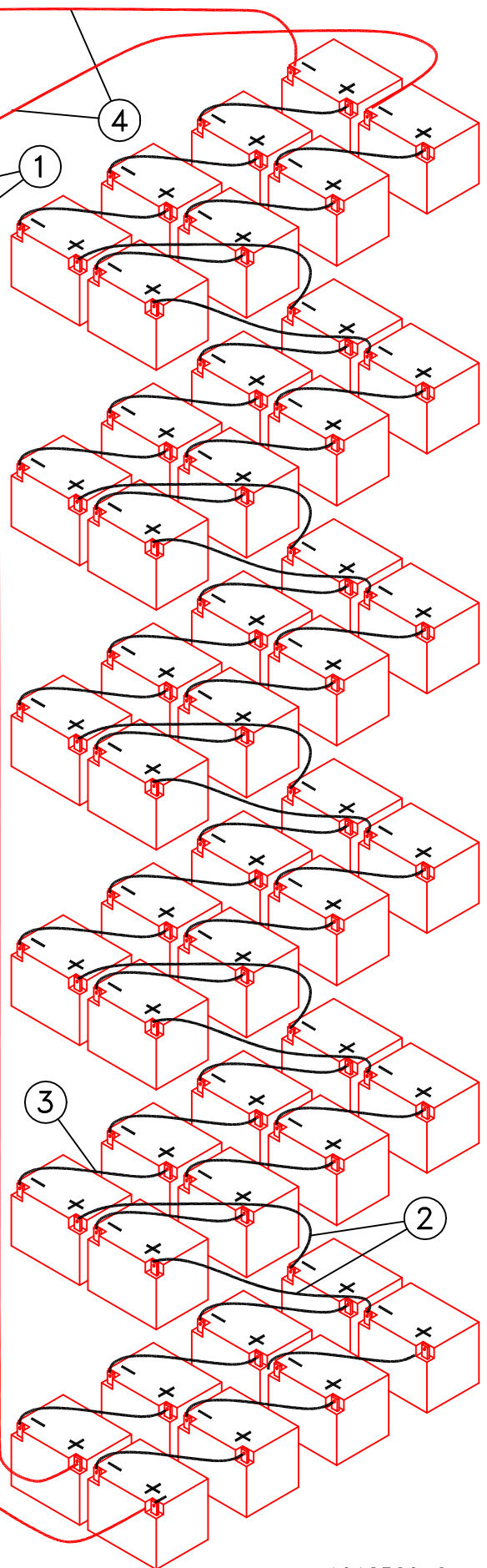Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1011640	2700mm	2
2.	1011644	1200mm	10
3.	1011638	250mm	36
4.	1011642	800mm	2
5.	1012214	4500mm	1
6.	1012215	4500mm	1
7.	1012216	4500mm	1
8.	1012218	4500mm	1
9.	1012217	4500mm	1

Battery replacement information

Battery type: 26Ah 12V

Battery Part Number: 1012891

Two battery strings in series

Number of batteries per string: 24pcs

Nominal voltage of each battery string: 288VDC

Nominal capacity C_{20} of Battery string: 26Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

1012977 B

Rev/ECO no:

Rev/ECO no:

B/12107 TT

POWERWARE

Title	LABEL 3N45 BAT DG WIRING DRAWING				
	BATTERY CABINET 26Ah Long Life		No 10 12 977		Rev B
Checked EB	Approved 17.08.1998 TT		Loc FIN	Size A4	Page 1 / 1

Loc FIN

Approved VK 30.03.1999

Title ASSEMBLY: CHASSIS
BATTERY CABINET D
3N45
Checked JKet

POWERWARE

9514161 8 pcs

1010869 4 pcs

1010868
2 pcs

9514160
8 pcs

4313105
8 pcs

1264120
8 pcs

1002443
48 pcs

1012106

1011346
12 pcs

1002443
10 pcs

1010866
4 pcs

1010867
2 pcs

1002443
10 pcs

1004944 12 pcs

1011674

6342008
2 pcs

4220083
2 pcs

4040308
2 pcs

1012836
2 pcs

1011685 6 pcs

1010870 6 pcs

1011256 6 pcs

1263560
3 pcs

4220083
3 pcs

4040308
3 pcs

1014223

1263040
4 pcs

9513639 4 pcs

1012610

1012108

2x

1002443 10 pcs

O = ⊘
● = ⊘
☆ = ⊕

6x

G
8 pcs

2001243 4 pcs

1002130
4 pcs

5797752
3 pcs

8005155
3 pcs

1012188

F1 +
F2 −
F3 +
F4 −

Y/G
RED
BLUE

TO UPS

Rev/ECO no:

Rev/ECO no:

B/12056 AV

A/11945 TK

Rev
B

2 / 5

T030, 040

No   10 13 250   Page

Size   A3   Loc   FIN

Title   ASSEMBLY: BATTERY SHELVES

BATTERY CABINET D

3N45

Approved   VK 30.03.1999

Checked   JKet

POWERWARE

9 pcs 6342008
9 pcs 4420083
9 pcs 4040308

1011683

1012365
5 pcs

1010211 8 pcs
2364003 8 pcs

9 pcs 4040308
9 pcs 1263610

1012364
4 pcs

2 pcs 1013835

1012222

1009961

4 pcs 6342006
4 pcs 4220063
4 pcs 4040306

8055585

9513137

1011491

8055433

4040305
6 pcs

4220053
6 pcs

1002443
12 pcs

1001792
6 pcs

1002443
4 pcs

5797752 2 pcs
8005155 2 pcs

4 pcs 8063123
1012084

1004431

5 pcs 4313064

5 pcs 1123189

6342006

4220063
4040306

4313064

4040305
4 pcs

4220053
2 pcs

1012254
2 pcs

$O = \emptyset$ $\emptyset = \emptyset$
$\bullet = \emptyset$ $\stackrel{\wedge}{\leftrightarrow} = \emptyset$

POWERWARE

Title ASSEMBLY: BATTERIES & FUSE HOLDERS	T030, 040	
BATTERY CABINET D	No	Rev
3N45	10 13 250	B
Checked JKet	Approved VK 30.03.1999	Loc FIN	Size A3	Page 3 / 5

Rev/ECO no:

Rev/ECO no:

A/11945 TK
B/12056 AV

Rev/ECO no:		Rev/ECO no:

POWERWARE

Title	ASSEMBLY: CABLE TIES		Rev B
	BATTERY CABINET D		
	3N45	Approved VK 30.03.1999	
	Checked JKet	Loc FIN	
T030, 040			
No 10 13 250			
Size A3		Page 4 / 5	

B/12056 AV
A/11945 TK

1010879

1002443
3 pcs

1013835

4 pcs
1002443

19 pcs
1002443

1001190

1010876

1002443
11 pcs

1010498

8052315
4 pcs

1011231

1002443
19 pcs

9514158
2 pcs

1004259
8 pcs

1012144

1014305
2 pcs

1012467
2 pcs

1009961

1002549

1012213

1011233

1012144

1010876

4 pcs
1002443

9514158
2 pcs

1004259
8 pcs

1005859
2 pcs

B/12056 AV
A/11945 TK
Rev/ECO no:
Rev/ECO no:

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1011472 G**
SET   BAT-D CABINET

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001792	SPACR M5 L10 FeZn	6.000	230
1002443	SCREW T HEX M5x8 DIN7500D	116.000	305
1004259	SCREW KOMBI M5x18+STARDIN933S	8.000	300
1004944	SCREW K M4x8 PZ DIN7985A+6907	12.000	310
1010866	RAIL 3N45 VERTICAL 1412 mm A3	4.000	150
1010867	RAIL 3N45 SIDE LOWER 675mm A3	2.000	140
1010868	RAIL 3N45 SIDE UPPER 675mm A3	2.000	145
1010869	RAIL 3N45 FRONT/REAR 295mm A4	4.000	135
1010870	AXLE 3N45 WHEEL A4	6.000	110
1010876	PANEL 3N45 SIDE A3	2.000	190
1010879	PANEL 3N45 ROOF A3	1.000	185
1011231	PLATE 3N45 BATT REAR A3	1.000	195
1011233	PANEL 3N45 BATT DOOR A3	1.000	200
1011256	WHEEL 3N45 YKI-70 N	6.000	115
1011346	RAIL 3N45 BATT SLIDE A3	12.000	210
1011491	PLATE BAT-D FUSE SELF A4	1.000	180
1011685	PLATE 3N45 WHEEL HOLDER A4	6.000	215
1012106	ASSY PLATE 3N45 BOTT UPPER	1.000	120
1012108	PLATE 3N45 BOTTOM LOWER A4	1.000	125
1012144	PLATE 3N45 CABINET DIVIDER A3	2.000	220
1012254	SPACR M5(10) L20 FeZn Av8	2.000	225
1012610	PLATE 3N45 CABLE LEAD THROU A4	1.000	130
1012836	SCREW MSN M8x50 8.8 ISO8677	4.000	320
1123189	SCREW HEX M6X40 8.8 A1 ISO4017	5.000	280
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	6.000	250
1263610	SCREW HEX M8X25 8.8 A1 ISO4017	9.000	255
1264120	SCREW HEX M10x30 8.8A1 ISO4017	8.000	165
2541075	SCREW T HEX M5X12 DIN7500D	12.000	
4040305	WASHE PLAIN M5 Fe ISO 7089	10.000	295
4040306	WASHE PLAIN M6 Fe ISO 7089	6.000	240
4040308	WASHE PLAIN M8 Fe ISO 7089	26.000	270
4220053	WASHE SPRING 5,1 M DIN127	6.000	290
4220063	WASHE SPRING 6.1 M DIN 127	5.000	285
4220083	WASHE SPRING 8.1 M FE SINK	17.000	265
4313051	WASHE LOCK-SER M5 FE DIN6798A	4.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	6.000	235
4313105	WASHE LOCK-SER M10 FE DIN6798A	8.000	170
5797752	BLIND RIVET TAP D56	28.000	315
6342006	NUT HEX M6 G8 A2 ISO 4032	6.000	275
6342008	NUT HEX M8 G8 A2 ISO 4032	13.000	260
9513639	FOOT ADJUSTABLE M12x60 TEKAMA	4.000	175
9514158	WASHE BUTTON 4KM-3073 F	4.000	205
9514160	ANGLE PIECE OUTER (A) F	8.000	155
9514161	ANGLE PIECE INNER (B) F	8.000	160

POWERWARE OY

BILL OF MATERIAL FOR PRODUCT   **1015470 c**
SUBAS BAT-D WIDE

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000704	LABEL UPDATE RECORD STICKER A4	1.000	
1001190	LABEL INSPECT STATUS STICKER	1.000	
1001560	LABEL MATERIAL A4	.150	
1002130	PACKM BAND 0.55*12 PRO MANUAL	29.000	
1002549	LABEL MATERIAL TYPE PLATE	3.000	
1003113	INSUL FOIL+TAPE .19x130x350 A4	2.000	
1011469	SET BAT-D CABLES	1.000	
1011674	PACKM 3N20-60 PALLET UPS A3	1.000	
1011681	D SCHEMA PWPM BAT-C -D A4	.000	
1011683	RAIL BAT-C-D-E Cu FUSES A4	1.000	
1012084	PCBAS 3N45 REMOTE TEMP.SENSOR	1.000	
1012175	SET BAT-E-F CABINET	1.000	
1012222	LABEL BAT-D FUSE MARKINGS A4	1.000	
1012364	FUSE HOLDER 1PH 00-SIZE 160A	4.000	
1012365	FUSE HOLDR SIDE PLATE 00-SIZE	5.000	
1012467	LABEL BAT-D-E-F WARNING ST A4	2.000	
1012924	RAIL BAT-F BATTERY SUPPORT A4	12.000	
1013835	INSUL FOIL+TAPE .19x130x280 A4	1.000	
1014223	PLATE 3N30 FOOT A4	2.000	
1014234	INSUL PT230FR 20X20X20	48.000	
1014305	LABEL BAT-D-E-F/3N30 WARNINGA4	2.000	
1015887	LABEL BAT-D-PAN24 WIRING ST A4	1.000	
1019958	D ASSY BAT-DW/E/F FRAME A3	.000	
1019960	D ASSY BAT-DW BATT. SHELVES A3	.000	
1019963	D ASSY BAT-D/DW/E FUSE HOLD A3	.000	
1019965	D ASSY BAT-D/DW/E/F CABLE T A3	.000	
1019966	D ASSY BAT-DW/E/F COVER PAN A3	.000	
2000283	LABEL VDE GROUNDING STICKER #	1.000	
2001243	FOOT SADH POLYURETHAN d22x10	120.000	
8052315	FUSE 100A 440VDC 00NH IEC 269	4.000	
8055585	CLAMP CABLE 185mm2 4xM6 24PPK5	2.000	
9513137	PLATE THREADED CABLE CLAMP F	1.000	

POWERAWARE OY
BILL OF MATERIAL FOR PRODUCT **1012188 C**
ASSY BAT-D SHELF   A3

PART NUMBER	DESCRIPTION	DESIGNATOR	QUANTITY
1011234	PLATE BAT-D SHELF	A3	1.000

REPLACE USED PARTS ONLY WITH ORIGINAL SPARE PARTS
8052315 FUSE CARTRIDGE

F1 +
F2 −
F3 +
F4 −

④
①

⑧ ⑤ ⑥ ⑦

TO UPS

WIRING OF THE PRINTED
CIRCUIT BOARD
INSIDE THE CABINET

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

1012084

X2

X1

⑨

(TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

③

②

NOTE

Plus− and minus−poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1012537	2200mm	2
2.	1012538	1200mm	10
3.	1012539	450mm	36
4.	1012540	1500mm	2
5.	1012214	4500mm	1
6.	1012215	4500mm	1
7.	1012216	4500mm	1
8.	1012218	4500mm	1
9.	1012217	4500mm	1

Battery replacement information

Battery type: 38Ah 12V

Battery Part Number: 7590106

Two battery strings in series

Number of batteries per string: 24pcs

Nominal voltage of each battery string: 288VDC

Nominal capacity C_{20} of Battery string: 38Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

1012520 C

Rev/ECO no:

Rev/ECO no:
B/11772 TT
C/12107 TT

POWERWARE	Title LABEL 3N45 BAT E WIRING DRAWING			
	BATTERY CABINET	No 10 12 520		Rev C
	Checked JKet	Approved 17.04.1998 TT	Loc FIN	Size A4	Page 1 / 1

REPLACE USED PARTS ONLY WITH ORIGINAL SPARE PARTS
8052315 FUSE CARTRIDGE

F1 +
F2 −
F3 +
F4 −

④

①

⑧ ⑤ ⑥ ⑦

TO UPS

WIRING OF THE PRINTED
CIRCUIT BOARD
INSIDE THE CABINET

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

1012084

X2 — (TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

X1 — FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

⑨

NOTE

Plus− and minus−poles can
be opposite to the drawing,
due to design of batteries.

Use joint grease in the
poles of the batteries
(Dinitrol paste).

nr.	p/n	length	pcs
1.	1012537	2200mm	2
2.	1012538	1200mm	10
3.	1012539	450mm	36
4.	1012540	1500mm	2
5.	1012214	4500mm	1
6.	1012215	4500mm	1
7.	1012216	4500mm	1
8.	1012218	4500mm	1
9.	1012217	4500mm	1

Battery replacement information

Battery type:	42Ah 12V
Battery Part Number:	1012892
Two battery strings in series	
Number of batteries per string:	24pcs
Nominal voltage of each battery string:	288VDC
Nominal capacity C_{20} of Battery string:	42Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

③

②

1012978 B

Rev/ECO no:

Rev/ECO no:			
A/11945 TK	C/12107 VK	E/12234 AV	G/12483 Tt
B/12056 AV	D/12229 AV	F/12243 IN	

HUOM!
Kulmapalojen kierteet on
oltava nuolien suuntaiset!

9514 161
8 pcs

1010 868
2 pcs

1012 198
4 pcs

4313 105
8 pcs

9514 160
8 pcs

1264 120
8 pcs

1002 443
48 pcs

1012 194

1011 346
12 pcs

1002 443
10 pcs

1010 866
4 pcs

1010 867
2 pcs

1002 443
10 pcs

1004 944   12 pcs

1011 674

6342 008
2 pcs

4220 083
2 pcs

1007 660
2 pcs

1012 836
2 pcs

1011 685   6 pcs

1010 870   6 pcs

1011 256   6 pcs

1263 560
2 pcs

1014 223

4220 083   4040 308
2 pcs   2 pcs

9513 639   4 pcs

2x

1002 443
6 pcs

1012 197

O = ◎

● = ◎   ☆ = ◎

POWERWARE

Title ASSEMBLY: CHASSIS
BATTERY CABINET E
3N30, 3N45, 3N60

Checked JKet

Approved VK 30.03.1999

Loc FIN

No 10 13 262

Size A3

Page 1 / 5

Rev G

Sisäkierre

Ulkokierre

Liitoksessa on käytettävä
akkujen mukana
toimitettavia pultteja
sekä aluslevyjä tai niitä
vastaavia kiinnityselimiä!

6x

8 pcs
G

36 pcs
2001243

1002130
4 pcs

1012189

1013603
3 pcs

Kiristys ohjeen
doc.1001601 alkaen rev.E-> mukaan

F1+
F2-
F3+
F4-
RED — Y/G
BLUE
TO UPS

9 pcs 6342008
9 pcs 4420083
9 pcs 4040308

1011683

1012365 5 pcs

1010211 4 pcs
4220063 8 pcs
4040306 8 pcs

9 pcs 4040308
9 pcs 1263610

1012364 4 pcs

2 pcs 1003113

1012222

1009961

4 pcs 6342006
4 pcs 4220063
4 pcs 4040306

8055585

9513137

4040305 6 pcs
4220053 6 pcs
1001792 6 pcs

2541075 12 pcs

1002443 4 pcs

8055433

1012199

4 pcs 8063123
1012084

2000283

5797752 2 pcs
8005155 2 pcs

4313051 4 pcs

4040305 4 pcs

4220063
4040306
4313064

1012254 2 pcs

5 pcs 4313064
6342006
5 pcs 1123189

THIS DRAWING CONTAINS PROPRIETARY INFORMATION OF POWERWARE AND MAY NOT, IN WHOLE OR IN PART, BE DUPLICATED OR DISCLOSED OR USED FOR MANUFACTURE OF ANY PART DISCLOSED HEREIN WITHOUT THE PRIOR WRITTEN PERMISSION OF POWERWARE.

Rev/ECO no: G/12483 Tt E/12234 AV F/12243 IN

Rev/ECO no: A/11945 TK B/12056 AV C/12107 VK D/12229 AV

THIS DRAWING CONTAINS PROPRIETARY
INFORMATION OF POWERWARE AND MAY NOT,
IN WHOLE OR IN PART, BE DUPLICATED OR
DISCLOSED OR USED FOR MANUFACTURE OF
ANY PART DISCLOSED HEREIN WITHOUT THE
PRIOR WRITTEN PERMISSION OF POWERWARE.

POWERWARE

Title
ASSEMBLY: CABLE TIES
BATTERY CABINET E
3N30, 3N45, 3N60

Checked
JKet

Approved
VK 30.03.1999

Loc
FIN

No
10 13 262

Size
A3

Page
4 / 5

Rev
G

1012 201

1009 859
3 pcs

1013 835

6 pcs
1009 859

19 pcs
1002 443

1001 190

1012 202

1009 859
11 pcs

1010 876

1010 498

8052 315
4 pcs

1004 259
2 pcs

9514 158
2 pcs

1012 144

1002 443
19 pcs

1010 876

6 pcs
1009 859

1014 305
2 pcs

1012 467
2 pcs

1009 961

1002 549

1015 888

1012 227

1012 144

9514 158
2 pcs

1004 259
2 pcs

1009 859
2 pcs

POWERWARE

Title
ASSEMBLY: COVER PLATES
BATTERY CABINET E

3N30, 3N45, 3N60

Checked
JKet

Approved VK 30.03.1999

Loc
FIN

Size A3

No
10 13 262

Page 5 / 5

Rev
G

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT **1012176 E**
#SUBAS BAT-E

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000704	LABEL UPDATE RECORD STICKER A4	1.000	45
1001190	LABEL INSPECT STATUS STICKER	1.000	50
1001560	LABEL MATERIAL A4	.150	55
1002130	PACKM BAND 0.55*12 PRO MANUAL	29.000	80
1002549	LABEL MATERIAL TYPE PLATE	3.000	35
1003113	INSUL FOIL+TAPE .19x130x350 A4	3.000	75
1003113	INSUL FOIL+TAPE .19x130x350 A4	2.000	75
1004431	LABEL GND-CONNECTION STICKR A4	1.000	40
1011674	PACKM 3N20-60 PALLET UPS A3	1.000	65
1011681	D SCHEMA PWPM BAT-C -D A4	.000	
1011683	RAIL BAT-C-D-E Cu FUSES A4	1.000	5
1012084	PCBAS 3N45 REMOTE TEMP.SENSOR	1.000	60
1012128	PLATE 3N45 SUPPORT PACKM A4	2.000	
1012174	SET BAT-E CABLES	1.000	
1012175	SET BAT-E-F CABINET	1.000	
1012222	LABEL BAT-D FUSE MARKINGS A4	1.000	
1012364	FUSE HOLDER 1PH 00-SIZE 160A	4.000	10
1012365	FUSE HOLDR SIDE PLATE 00-SIZE	5.000	15
1012467	LABEL BAT-D-E-F WARNING ST A4	2.000	95
1012520	LABEL BAT-E WIRING DWG A4	.000	
1012520	LABEL BAT-E WIRING DWG A4	1.000	
1013262	D ASSY BATTERY CABINET E A3	.000	
1013835	INSUL FOIL+TAPE .19x130x280 A4	1.000	
1014223	PLATE 3N30 FOOT A4	2.000	70
1014305	LABEL BAT-D-E-F/3N30 WARNINGA4	2.000	90
1015888	LABEL BAT-E-PAN38 WIRING ST A4	.000	
2000283	LABEL VDE GROUNDING STICKER #	1.000	40
2001243	FOOT SADH POLYURETHAN d22x10	216.000	85
8052315	FUSE 100A 440VDC 00NH IEC 269	4.000	20
8055585	CLAMP CABLE 185mm2 4xM6 24PPK5	2.000	30
9513137	PLATE THREADED CABLE CLAMP F	1.000	25

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1012175 G**
SET   BAT-E-F CABINET

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1001792	SPACR M5 L10 FeZn	6.000	230
1002443	SCREW T HEX M5x8 DIN7500D	156.000	305
1004259	SCREW KOMBI M5x18+STARDIN933S	4.000	300
1004944	SCREW K M4x8 PZ DIN7985A+6907	12.000	310
1009859	SCREW K M5x12 PZ DIN6902A+6905	2.000	105
1009961	LABEL WARNING GENERAL ENG A3	1.000	100
1010211	SCREW SOCK M6x16 FE DIN912	8.000	
1010498	TIE CABLE L=540mm W=7.5mm	1.000	
1010866	RAIL 3N45 VERTICAL 1412 mm A3	4.000	150
1010867	RAIL 3N45 SIDE LOWER 675mm A3	2.000	140
1010868	RAIL 3N45 SIDE UPPER 675mm A3	2.000	145
1010870	AXLE 3N45 WHEEL A4	6.000	110
1010876	PANEL 3N45 SIDE A3	2.000	190
1011256	WHEEL 3N45 YKI-70 N	6.000	115
1011346	RAIL 3N45 BATT SLIDE A3	12.000	210
1011685	PLATE 3N45 WHEEL HOLDER A4	6.000	215
1012144	PLATE 3N45 CABINET DIVIDER A3	2.000	220
1012189	ASSY 3N45 BATT SHELF E A3	6.000	325
1012194	PLATE 3N45 BAT-E BOTT UPPER A4	1.000	120
1012197	PLATE BAT-E BOTTOM LOWER A4	1.000	125
1012198	RAIL BAT-E FRONT/REAR 433mmA4	4.000	135
1012199	PLATE BAT-E FUSE SHELF A3	1.000	180
1012201	PANEL BAT-E ROOF A3	1.000	185
1012202	PLATE BAT-E REAR A3	1.000	195
1012222	LABEL BAT-D FUSE MARKINGS A4	1.000	330
1012227	PANEL 3N45 BAT-E DOOR A3	1.000	200
1012254	SPACR M5(10) L20 FeZn Av8	2.000	225
1012836	SCREW MSN M8x50 8.8 ISO8677	4.000	320
1013603	CLAMP CABLE TIE ANCHOR SNAP-IN	18.000	
1123189	SCREW HEX M6X40 8.8 A1 ISO4017	5.000	280
1263560	SCREW HEX M8X16 8.8 A1 ISO4017	6.000	250
1263610	SCREW HEX M8X25 8.8 A1 ISO4017	4.000	255
1264120	SCREW HEX M10x30 8.8A1 ISO4017	8.000	165
2364003	WASHE WAVE M5 KBA FE ZINK	8.000	
2541075	SCREW T HEX M5X12 DIN7500D	12.000	305
4040305	WASHE PLAIN M5 Fe ISO 7089	10.000	295
4040306	WASHE PLAIN M6 Fe ISO 7089	14.000	240
4040308	WASHE PLAIN M8 Fe ISO 7089	18.000	270
4220053	WASHE SPRING 5,1 M DIN127	2.000	290
4220063	WASHE SPRING 6.1 M DIN 127	13.000	285
4220083	WASHE SPRING 8.1 M FE SINK	14.000	265
4313051	WASHE LOCK-SER M5 FE DIN6798A	4.000	
4313064	WASHE LOCK-SER M6 FE DIN6798A	6.000	235
4313105	WASHE LOCK-SER M10 FE DIN6798A	8.000	170
5797752	BLIND RIVET TAP D56	2.000	315
6342006	NUT HEX M6 G8 A2 ISO 4032	6.000	275
6342008	NUT HEX M8 G8 A2 ISO 4032	8.000	260
8005155	CLAMP CABLE TIE ANCHOR 22*16mm	2.000	335
8055433	INSUL EDGE PROTECT T57 BLACK	.300	
8063123	SPACR NYLON L=12.7mm LCBS-8	4.000	340
9513639	FOOT ADJUSTABLE M12x60 TEKAMA	4.000	175
9514158	WASHE BUTTON 4KM-3073 F	4.000	205
9514160	ANGLE PIECE OUTER (A) F	8.000	155
9514161	ANGLE PIECE INNER (B) F	8.000	160

Connection of cabinets
Bat F 24batt   Bat F 24batt

temp   temp
sensor   sensor

X2   F1   F2 ⏚   X2   F1   F2 ⏚
X1   +   −   X1   +   −

8052315 FUSE CARTRIDGE
REPLACE USED PARTS ONLY WITH
ORIGINAL SPARE PARTS

④

⑨

+ F1
− F2

TO UPS

③

②

①

⑥ ⑦ ⑧   ⑨   ⑤   ⑩   ⑨

batt+   batt−
GND   GND
batt N

TO UPS

WIRING OF THE PRINTED CIRCUIT BOARD
INSIDE THE CABINET

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

1012084

X2

X1

⑥

(TO X1 /1012084
OF POSSIBLE NEXT
BATT CAB IN CHAIN)

FROM UPS LOGIC
PCBA X3 OR FROM
X2 /1012084 OF
PREVIOUS BATT CAB
IN CHAIN

NOTE
Plus− and minus−poles can   Use joint grease in the
be opposite to the drawing,   poles of the batteries
due to design of batteries.   (Dinitrol paste).

nr.	p/n	length	pcs	colour
1.	1012537	2200mm	1	black
2.	1012538	1200mm	5	black
3.	1012539	450mm	18	black
4.	1012540	1500mm	1	black
5.	1012554	4500mm	1	blue
6.	1012217	4500mm	2	white
7.	1012214	4500mm	1	red
8.	1012215	4500mm	1	blue
9.	1012218	4500mm	2	yellowgreen
10.	1012216	4500mm	1	black

Battery replacement information
Battery type: 65Ah 12V
Battery Part Number: 7590108
Number of batteries in series: 24pcs
Nominal voltage of battery string: 288VDC
Nominal capacity C_{20} of Battery string: 65Ah

⚠ WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

1012549 B

Rev/ECO no:

Rev/ECO no: B/12107 TT

POWERWARE

Title	WIRING DRAWING		No		Rev
	BATTERY CABINET F		10 12 549		B
	3N45 BAT−F 65Ah				

| Checked | JKet | Approved | 23.04.1998 TT | Loc | FIN | Size | A4 | Page | 1 / 1 |

Connection of cabinets
Bat F 24batt   Bat F 24batt

8052315 FUSE CARTRIDGE
REPLACE USED PARTS ONLY WITH
ORIGINAL SPARE PARTS

temp sensor   temp sensor

X2 F1 F2 ⏚   X2 F1 F2 ⏚
X1 +   −   X1 +   −

④

+ F1
− F2

⑨
TO UPS

③

⑥ ⑦ ⑧   ⑨ ⑤ ⑩   ⑨

batt+   GND   batt−
    batt N   GND
TO UPS

②

WIRING OF THE PRINTED CIRCUIT BOARD
INSIDE THE CABINET

①

Pb
CONTAINS
SEALED LEAD
BATTERY.
MUST BE
DISPOSED OF
PROPERLY.

1012084

X2 (TO X1 /1012084
     OF POSSIBLE NEXT
     BATT CAB IN CHAIN)

X1 FROM UPS LOGIC
     PCBA X3 OR FROM
     X2 /1012084 OF
     PREVIOUS BATT CAB
     IN CHAIN

⑥

NOTE
Plus− and minus−poles can   Use joint grease in the
be opposite to the drawing, poles of the batteries
due to design of batteries. (Dinitrol paste).

nr.	p/n	length	pcs
1.	1012537	2200mm	1
2.	1012538	1200mm	5
3.	1012539	450mm	18
4.	1012540	1500mm	1
5.	1012554	4500mm	1
6.	1012217	4500mm	2
7.	1012214	4500mm	1
8.	1012215	4500mm	1
9.	1012218	4500mm	2
10.	1012216	4500mm	1

Battery replacement information
Battery type: 70Ah 12V
Battery Part Number: 1012893
Number of batteries in series: 24pcs
Nominal voltage of battery string: 288VDC
Nominal capacity C_{20} of Battery string: 70Ah

WARNING! Batteries present energy
and chemical hazard. For safety and
disposal instructions, please refer to
the Service Handbook.

1012979 B

Rev/ECO no:

Rev/ECO no:
B/12107 TT

POWERWARE

Title	LABEL 3N45 BAT FG WIRING DRAWING			
	BATTERY CABINET 70Ah Long Life		No 10 12 979	Rev B
Checked EB	Approved 17.08.1998 TT	Loc FIN	Size A4	Page 1 / 1

HUOM!
Kulmapalojen kierteet on
oltava nuolien suuntaiset!

9514 161
8 pcs

1010868
2 pcs

1012 198
4 pcs

4313 105
8 pcs

1264 120
8 pcs

9514 160
8 pcs

1002 443
48 pcs

1011 346
12 pcs

1012 194

1002 443
10 pcs

1010 866
4 pcs

1010 867
2 pcs

1002 443
10 pcs

1004 944 12 pcs

1011 674

6342 008
2 pcs

4220 083
2 pcs

1007 660
2 pcs

1012 836
2 pcs

1011 685 6 pcs

1010 870 6 pcs

1011 256 6 pcs

1263 560
2 pcs

4220 083
2 pcs

4040 308
2 pcs

1014 223

9513 639 4 pcs

2x

1002 443
8 pcs

1012 197

O = ◎

● = ◎   ☆ = ◎

Rev/ECO no:	
A/11945 TK	C/12107 VK
B/12056 AV	D/12229 AV

Rev/ECO no:	
E/12234 AV	G/12483 Tt
F/12243 IN	

Sisäkierre

Ulkokierre

Pulttiliitos

RUUVILIITOS VOIDAAN LAITTAA MYÖS AKKU-LIITTIMEN TOISELTA PUOLEN

TAI

SILEÄLAIPPAINEN

Liitoksessa on käytettävä akkujen mukana toimitettavia pultteja sekä aluslevyjä tai niitä vastaavia kiinnityselimiä! Hammastettua pintaa ei saa käyttää suoraan kaapeli-kenkää vasten

6x

2001 243
6 pcs

4 pcs
(G)

1012 924
2 pcs

1002 443
4 pcs

1002 130
4 pcs

1012 189

1013 603
3 pcs

F1+
F2-

TO UPS

Kiristys ohjeen
doc.10 01 601 alkaen rev.E-> mukaan

POWERWARE

Title	ASSEMBLY: BATTERY SHELVES
	BATTERY CABINET F
	3N30, 3N45, 3N60
Checked	JKet
Approved	VK 30.03.1999
Loc	FIN
No	10 13 261
Size	A3
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Rev	G

1012365
3 pcs

4 pcs 6342008

4 pcs 4420083

4 pcs 4040308

1010211 4 pcs

4220063 8 pcs

4040306 8 pcs

1012364
2 pcs

4 pcs 4040308

4 pcs 1263610

1012222

2 pcs 1013835

1009961

4 pcs 6342006

4 pcs 4220063

4 pcs 4040306

8055585

9513137

8055433

1012199

4 pcs 8063123

1012084

2000283

5 pcs 4313064

5 pcs 1123189

5797752 2 pcs

8005155 2 pcs

6342006

4220063

4040306

4313064

4040305
6 pcs

4220053
6 pcs

1001792
6 pcs

2541075
12 pcs

1002443
4 pcs

4313051
4 pcs

4040305
4 pcs

1012254
2 pcs

$\bigcirc$ = $\bigcirc$ $\bigcirc$ = $\bigcirc$

● = $\bigcirc$ ✦ = $\bigcirc$

POWERWARE

Title
ASSEMBLY: CABLE TIES
BATTERY CABINET F
3N30, 3N45, 3N60

Checked
JKet

Approved
VK 30.03.1999

Loc
FIN

No
10 13 261

Size
A3

Page
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Rev
G

1012 201

1009 859
3 pcs

1013 835

6 pcs
1009 859

19 pcs
1002 443

1001 190

1010 876

1012 202

1009 859
11 pcs

1010 498

8052 315
2 pcs

1002 443
19 pcs

1004 259
2 pcs

9514 158
2 pcs

1012 144

1014 305
2 pcs

1012 467
2 pcs

1010 876

1012 144

1009 961

1002 549

1015 889

1012 227

6 pcs
1009 859

9514 158
2 pcs

1004 259
2 pcs

1009 859
2 pcs

POWERWARE

Checked JKet

Approved VK 30.03.1999

Title ASSEMBLY: COVER PLATES
BATTERY CABINET F
3N30, 3N45, 3N60

Loc FIN

Size A3

No 10 13 261

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Rev G

POWERAWARE OY

BILL OF MATERIAL FOR PRODUCT   **1011486 F**
SUBAS BAT-F

PART NUMBER	DESCRIPTION	QUANTITY	DESIGNATOR
1000704	LABEL UPDATE RECORD STICKER A4	1.000	45
1001190	LABEL INSPECT STATUS STICKER	1.000	50
1001560	LABEL MATERIAL A4	.150	55
1002130	PACKM BAND 0.55*12 PRO MANUAL	29.000	80
1002549	LABEL MATERIAL TYPE PLATE	3.000	35
1003113	INSUL FOIL+TAPE .19x130x350 A4	3.000	75
1004431	LABEL GND-CONNECTION STICKR A4	1.000	40
1011674	PACKM 3N45 PALLET UPS A4	1.000	65
1011681	D SCHEMA PWPM BAT-C -D A4	.000	
1011683	RAIL BAT-C-D-E Cu FUSES A4	1.000	5
1012084	PCBAS 3N45 REMOTE TEMP.SENSOR	1.000	60
1012128	PLATE 3N45 SUPPORT PACKM A4	2.000	
1012175	SET BAT-E-F CABINET	1.000	
1012222	LABEL BAT-D FUSE MARKINGS A4	1.000	
1012364	FUSE HOLDER 1PH 00-SIZE 160A	2.000	10
1012365	FUSE HOLDR SIDE PLATE 00-SIZE	3.000	15
1012467	LABEL BAT-D-E-F WARNING ST A4	2.000	95
1012549	LABEL BAT-F WIRING DWG A4	.000	
1012549	LABEL BAT-F WIRING DWG A4	1.000	
1012550	SET BAT-F CABLES	1.000	
1012924	RAIL BAT-F BATTERY SUPPORT A4	12.000	345
1013261	D ASSY BATTERY CABINET F A3	.000	
1013835	INSUL FOIL+TAPE .19x130x280 A4	3.000	75
1014223	PLATE 3N30 FOOT A4	2.000	70
1014305	LABEL BAT-D-E-F/3N30 WARNINGA4	2.000	90
1015889	LABEL BAT-F-PAN65 WIRING ST A4	.000	
2000283	LABEL VDE GROUNDING STICKER #	1.000	40
2001243	FOOT SADH POLYURETHAN d22x10	36.000	85
8052315	FUSE 100A 440VDC 00NH IEC 269	2.000	20
8055585	CLAMP CABLE 185mm2 4xM6 24PPK5	2.000	30
9513137	PLATE THREADED CABLE CLAMP F	1.000	25

Rev/ECO no:

Assembly of X1,2

Screw LN1442: K3.5x8 for "ENTRELEC" or K1.8x8 for "PHOENIX"

	EXIDE ELECTRONICS	Title ASSEMBLY DRAWING					
		REMOTE TEMPERATURE SENSOR			No		Rev
		3N45			10 12 087		1
		Checked VK	Approved 13.12.1998 EB	Loc FPS	Size A4	Page	1 / 1

SCHOTTKY SB150
V1 SB150

CONN.SL2/L

X1
1
R1
1R FUSIBLE
R 5% 1R FUSIBLE
1
X2

2

3

B1
DS1820
IC1 IN DS1820

1

ZENER 5V6
V2
5V6

C EST 100N 63VDC
C1
100N

+
C ELE 1000U 16V
C2
1000U 16V

X1
2
R2
1R FUSIBLE
R 5% 1R FUSIBLE
2
X2

A   B   C   D
x   x   x   x   HOLE 4.0
E
x   HOLE 6.5

1 INTERFACE PORT OPERATIONS

1.1 Pin assignments and functions

Powerware 9305 has two ports for RS232 serial communication:
1. Port X100 is a 9-pin female "UPS industry standard" port.
2. Port X101 is configured as a standard 9-pin male "PC type" DTE port. A standard 9 to 25 pin adapter can be used if needed.

RS232 interface X100 (female)			RS232 interface X101 (male)		
Pin	**Function**	**Serial interface function**	**Pin**	**Function**	**Serial interface function**
1	Input	**RS232 Serial input** Accepts commands in UPScode serial format	1	Input	**DCD** [1)] Data carrier detect
2	Output	**RS232 Serial output** UPS sends UPScode messages through this pin	2	Input	**RS232 Serial input** Accepts commands in UPScode serial format
4	Common	**RS232 Ground**	3	Output	**RS232 Serial output** UPS sends UPScode messages through this pin
8	Output	**Unregulated +20 Vdc** Voltage is present whenever the UPS is ON. Short circuit protected	4	Output	**DTR** [2)] Data terminal ready
9	Ground	**Chassis ground**	5	Common	**RS232 Ground**
			7	Output	**RTS** [2)] Request to send

[1)] The firmware does not currently use DCD signal.
[2)] DTR and RTS signals are connected together inside the UPS. The firmware toggles DTR/RTS off for two seconds, when hanging up a modem.

1.2 Communication parameters

The RS232 port has the following format:

Baud rate:	1200
Data bits:	8
Parity:	none
Start:	1 bit
Stop:	1 bit
Handshake:	Xon/Xoff

1.3 Operation parameters

The operational parameters are:

Operation Mode:	Standard/modem
Line Terminator:	cr+lf on output, cr on input

2 INTERFACE PROTOCOL

The UPScode interfacing protocol via RS232 line consists of automatic status message transmissions, UPS status reports upon request and other related functions and commands.

The Powerware 9305 can accept several commands from the host computer or from the alarm centre. In case the command by the UPS cannot be interpreted, the UPS will not respond anything.

Commands to the UPS can consist of one or two parts. The first part (first row) is the command. It has 4 ASCII characters followed by Line Terminator. The first two characters are always UP (UPs) and the other two the mnemonic of the specific command. If a command contains second part (second row), it is parameter connected to the command. It consists of ASCII characters followed by Line Terminator. The number of characters is not fixed.

The following is a description about UPScode commands and operations used in the Powerware 9305 series UPSs.

2.1 Status messages

2.1.1 Automatic status messages

The UPS status messages are automatically transmitted (if automatic messages are enabled) when the status of the UPS or remaining back up time changes.

Status message	Description	
STOK(cr)(lf) xx(cr)(lf)	UPS ON / OK xx: 00 NORMAL OPERATION 11 ABNORMAL OPERATION	Indicates the condition of the UPS. Normal means that utility is ok, battery is ok and UPS is in its normal state.
STUF(cr)(lf) xx(cr)(lf)	UTILITY FAILURE xx: 00 UTILITY OK 11 BATTERY OPERATION	Utility failure has occurred. UPS is protecting the load by using power from the batteries.
STBL(cr)(lf) xx(cr)(lf)	LOW BATTERY VOLTAGE xx: 00 BATTERY OK 11 BATTERY LOW	UPS has been using power from the batteries and battery voltage has decreased to the critical point.
STBP(cr)(lf) xx(cr)(lf)	UPS BYPASSED xx: 00 UPS ON-LINE 11 UPS BYPASSED	The load is supplied from the mains. UPS is not protecting the load.
STBM(cr)(lf) xx(cr)(lf)	BATTERY MANAGEMENT xx: CH CHARGING DI DISCHARGING FT FLOATING RS RESTING	The advanced battery management (ABM^{TM}) status is available with this message.
STAT(cr)(lf) xx(cr)(lf)	ATTENTION REQUIRED ON UPS xx: AC AUXILIARY CONTACT FAILURE BF BATTERY FUSE FAILURE BL BATTERY LOW LIMIT BO BATTERY OVER VOLTAGE BX BYPASS UNAVAILABLE BY BATTERY FAILURE CE CONFIGURATION ERROR CT CABINET OVER TEMPERATURE [1] DO DC OVER VOLTAGE DU DC UNDERVOLTAGE EP EMERGENCY POWER OFF FT FILTER OVER TEMPERATURE HT CHARGER OVER TEMPERATURE IB INTERNAL DATA BUS FAILURE IP INTERNAL POWER SUPPLY FAILURE IT INVERTER OVER TEMPERATURE LR LOSS OF REDUNDANCY NF NEUTRAL FAULT OD UPS NOT SUPPLYING LOAD [1] OL OVERLOAD OR REDUNDANCY OVERLOAD OV ABNORMAL OUTPUT VOLTAGE OW OUTPUT FAILURE PB PARALLEL BUS FAILURE PE PHASE ROTATION ERROR RT RECTIFIER OVER TEMPERATURE TT TRAFO OVER TEMPERATURE UD UPS DISABLED [1] UO UTILITY OVERVOLTAGE US UNSYNCHRONIZED UU UTILITY UNDERVOLTAGE	UPS condition is not normal. Operator attention or service may be required. This message is transmitted only when a condition occurs. If there are several problems at the same time, the STAT messages are sent one after another.
STMF(cr)(lf) xx(cr)(lf)	UPS MALFUNCTION. IMMEDIATE ATTENTION xx: BA BATTERY DISCONNECTED IM INVERTER FAILURE RM RECTIFIER FAILURE SM STATIC SWITCH FAILURE	UPS has serious malfunction. UPS shutdown and service is required. This message is transmitted only when a condition occurs. If there are several problems at the same time, the STMF messages are sent one after another.

`STEA(cr)(lf)` `xx(cr)(lf)`	ENVIRONMENT ATTENTION REQUIRED `xx: 01` ENVIRONMENT ALARM 1	Environment conditions are abnormal. Operator attetion may be required. This message is transmitted only when the condition occurs.
`BTIME(cr)(lf)` `tttt.00(cr)(lf)`	REMAINING BACK UP TIME `tttt` MINUTES	The calculated value is sent any time the UPS is supplying the load using power from the batteries. If the back up time can not be calculated, 9999 will be transmitted.

[1] These conditions are sent only by the 20-80kVA units.

2.1.2 Show status

All presently valid status messages as described in 2.1.1 can be requested by sending the command:

Command	Description
`UPSS(cr)`	SHOW STATUS

Example of response from UPS:

Status response	Comment
`STOK(cr)(lf)`	UPS ON / OK
`11(cr)(lf)`	`11` ABNORMAL OPERATION
`STUF(cr)(lf)`	UTILITY FAILURE
`11(cr)(lf)`	`11` BATTERY OPERATION
`STBL(cr)(lf)`	LOW BATTERY VOLTAGE
`00(cr)(lf)`	`00` BATTERY OK
`STBP(cr)(lf)`	UPS BYPASSED
`00(cr)(lf)`	`00` UPS ON-LINE
`STBM(cr)(lf)`	BATTERY MANAGEMENT
`DI(cr)(lf)`	`DI` DISCHARGING
`STAT(cr)(lf)`	ATTENTION REQUIRED
`US(cr)(lf)`	`US` UNSYNCHRONIZED
`BTIME(cr)(lf)`	REMAINING BACK UP TIME
`0008.00(cr)(lf)`	8 MINUTES

2.2 UPS status and measurements

The complete UPS status report can be requested by sending the command:

Command	Description
`UPDS(cr)`	DUMP STATUS

The UPS responds by transmitting the present status messages followed by the back up time message and the complete UPS measurement data. The status messages and back up time message are of the same form as described in 2.1.1.

The UPS measurement data consist of various measurements and calculated results of them. All of them consist of two parts. The first part (first row) is the title of the measurement. It has 5 ASCII characters followed by Line Terminator. The first character is always `M` (Measurement) the other four is a mnemonic description of the measurement.

The second part (2nd row) is the actual value of the measurement. It is presented in 7 ASCII characters with decimal dot and 2 decimals followed by Line Terminator. The possible negative polarity prefix is given as first character. The examples of the output are: `0220.00`(cr)(lf), `-022.00`(cr)(lf).

An example of an actual output is presented in the following.

Title	Description
`STOK`(cr)(lf)	UPS ON / OK
`00`(cr)(lf)	`00` NORMAL OPERATION
`STUF`(cr)(lf)	UTILITY FAILURE
`00`(cr)(lf)	`00` UTILITY OK
`STBL`(cr)(lf)	LOW BATTERY VOLTAGE
`00`(cr)(lf)	`00` BATTERY OK
`STBP`(cr)(lf)	UPS BYPASSED
`00`(cr)(lf)	`00` UPS ON-LINE
`STBM`(cr)(lf)	BATTERY MANAGEMENT
`CH`(cr)(lf)	`CH` CHARGING
`BTIME`(cr)(lf)	REMAINING BACK UP TIME
`9999.00`(cr)(lf)	UNKNOWN
`MIUL1`(cr)(lf)	INPUT VOLTAGE PHASE L1
`yyyy.yy`(cr)(lf)	actual measurement value
`MIUL2`(cr)(lf)	INPUT VOLTAGE PHASE L2
`yyyy.yy`(cr)(lf)	actual measurement value
`MIUL3`(cr)(lf)	INPUT VOLTAGE PHASE L3
`yyyy.yy`(cr)(lf)	actual measurement value
`MBUPO`(cr)(lf)	BATTERY VOLTAGE, POSITIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MBUNE`(cr)(lf)	BATTERY VOLTAGE, NEGATIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MBUUU`(cr)(lf)	BATTERY VOLTAGE
`yyyy.yy`(cr)(lf)	actual measurement value
`MBIPO`(cr)(lf)	BATTERY CURRENT, POSITIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MBINE`(cr)(lf)	BATTERY CURRENT, NEGATIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MBIII`(cr)(lf)	BATTERY CURRENT
`yyyy.yy`(cr)(lf)	actual measurement value
`MLUPO`(cr)(lf)	DC VOLTAGE, POSITIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MLUNE`(cr)(lf)	DC VOLTAGE, NEGATIVE
`yyyy.yy`(cr)(lf)	actual measurement value
`MPUL1`(cr)(lf)	BYPASS VOLTAGE PHASE L1
`yyyy.yy`(cr)(lf)	actual measurement value
`MPUL2`(cr)(lf)	BYPASS VOLTAGE PHASE L2
`yyyy.yy`(cr)(lf)	actual measurement value
`MPUL3`(cr)(lf)	BYPASS VOLTAGE PHASE L3
`yyyy.yy`(cr)(lf)	actual measurement value
`MOUL1`(cr)(lf)	OUTPUT VOLTAGE PHASE L1
`yyyy.yy`(cr)(lf)	actual measurement value
`MOUL2`(cr)(lf)	OUTPUT VOLTAGE PHASE L2
`yyyy.yy`(cr)(lf)	actual measurement value
`MOUL3`(cr)(lf)	OUTPUT VOLTAGE PHASE L3
`yyyy.yy`(cr)(lf)	actual measurement value

`MOIL1(cr)(lf)`	OUTPUT CURRENT (RMS) PHASE L1
`yyyy.yy(cr)(lf)`	actual measurement value
`MOIL2(cr)(lf)`	OUTPUT CURRENT (RMS) PHASE L2
`yyyy.yy(cr)(lf)`	actual measurement value
`MOIL3(cr)(lf)`	OUTPUT CURRENT (RMS) PHASE L3
`yyyy.yy(cr)(lf)`	actual measurement value
`MOPL1(cr)(lf)`	OUTPUT POWER (Real power kW) PHASE L1
`yyyy.yy(cr)(lf)`	actual measurement value
`MOPL2(cr)(lf)`	OUTPUT POWER (Real power kW) PHASE L2
`yyyy.yy(cr)(lf)`	actual measurement value
`MOPL3(cr)(lf)`	OUTPUT POWER (Real power kW) PHASE L3
`yyyy.yy(cr)(lf)`	actual measurement value
`MUTE1(cr)(lf)`	UPS TEMPERATURE (°C)
`yyyy.yy(cr)(lf)`	actual measurement value
`MOFFF(cr)(lf)`	OUTPUT FREQUENCY
`yyyy.yy(cr)(lf)`	actual measurement value

2.3 UPS nominal values and limits

The complete report of the UPS nominal values and operating limits can be requested by sending the command:

Command	Description
`UPDV(cr)`	DUMP VALUES

The UPS responds by transmitting the values of nominal electrical parameters and applicable limit. These values give information of the range of values to be expected. Internal logic of the UPS may use other limits to initiate control actions and diagnostic alarms as necessary.

Title	Description
`NIUNN(cr)(lf)`	INPUT VOLTAGE NOMINAL
`yyyy.yy(cr)(lf)`	value
`NIUHH(cr)(lf)`	INPUT VOLTAGE MAXIMUM
`yyyy.yy(cr)(lf)`	value
`NIULL(cr)(lf)`	INPUT VOLTAGE MINIMUM
`yyyy.yy(cr)(lf)`	value
`NBUHH(cr)(lf)`	BATTERY VOLTAGE MAXIMUM
`yyyy.yy(cr)(lf)`	value
`NBULL(cr)(lf)`	BATTERY VOLTAGE MINIMUM
`yyyy.yy(cr)(lf)`	value
`NBIHH(cr)(lf)`	BATTERY CHARGING CURRENT MAXIMUM
`yyyy.yy(cr)(lf)`	value
`NBILL(cr)(lf)`	BATTERY DISCHARGING CURRENT MAXIMUM
`yyyy.yy(cr)(lf)`	value
`NBAHN(cr)(lf)`	BATTERY CAPACITY (Ah)
`yyyy.yy(cr)(lf)`	value
`NOUNN(cr)(lf)`	OUTPUT VOLTAGE NOMINAL
`yyyy.yy(cr)(lf)`	value
`NOUHH(cr)(lf)`	OUTPUT VOLTAGE MAXIMUM
`yyyy.yy(cr)(lf)`	value
`NOULL(cr)(lf)`	OUTPUT VOLTAGE MINIMUM
`yyyy.yy(cr)(lf)`	value

```
NOPNN(cr)(lf)       OUTPUT POWER NOMINAL (kW) per phase
yyyy.yy(cr)(lf)     value
NOSNN(cr)(lf)       OUTPUT APPARENT POWER (kVA) NOMINAL per phase
yyyy.yy(cr)(lf)     value
NBTHH(cr)(lf)       BATTERY BACK UP TIME MAXIMUM DISPLAY
yyyy.yy(cr)(lf)     value
NUTEH(cr)(lf)       UPS TEMPERATURE (°C) MAXIMUM 1)
yyyy.yy(cr)(lf)     Value
NOFHH(cr)(lf)       OUTPUT FREQUENCY MAXIMUM
yyyy.yy(cr)(lf)     Value
NOFLL(cr)(lf)       OUTPUT FREQUENCY MINIMUM
yyyy.yy(cr)(lf)     value
```

[1] This value is sent only by the 20-80kVA units.

2.4 UPS command list

This command gives a listing of the supported UPScode commands.

Command	Description
UPCL(cr)	UPS COMMAND LIST

The UPS responds by sending a list of the commands recognized by this UPS.

UPS response
UPCD(cr)(lf)
UPDA(cr)(lf)
UPDS(cr)(lf)
UPDV(cr)(lf)
UPEA(cr)(lf)
UPHU(cr)(lf)
UPID(cr)(lf)
UPPC(cr)(lf)
UPPD(cr)(lf)
UPPF(cr)(lf)
UPPH(cr)(lf)
UPPM(cr)(lf)
UPPN(cr)(lf)
UPPU(cr)(lf)
UPR0(cr)(lf)
UPR1(cr)(lf)
UPRL(cr)(lf)
UPRP(cr)(lf)
UPSD(cr)(lf)
UPSL(cr)(lf)
UPSN(cr)(lf)
UPSP(cr)(lf)
UPSS(cr)(lf)
UPTP(cr)(lf)
UPCL(cr)(lf)

2.5 UPS service log

2.5.1 Dump service log

The history report of alarm conditions of the UPS is available with this command.

Command	Description
UPSL(cr)	UPS SERVICE LOG

The UPS responds by sending the 8 last alarm conditions of the UPS in the following format:

UPS response
ACSL(cr)(lf) DDDd HH:MM:SS   31 CHARACTERS MAXIMUM(cr)(lf) ... DDDd HH:MM:SS   OLDEST ALARM(cr)(lf) END(cr)(lf)

The newest alarm is sent first and the oldest alarm is sent last. Times are relative to the next (newer) alarm:
- first (newest) alarm: time from the alarm to the current moment
- other alarms: time from the alarm to the next (newer) alarm.

An example of an actual output is presented in the following.

UPS response		Description
ACSL(cr)(lf)		
002d 21:00:00	BYPASSED(cr)(lf)	UPS was bypassed 2 days 21 hours ago.
000d 00:00:37	LOW BATTERY VOLTAGE(cr)(lf)	Low battery voltage was 37 sec before bypass operation.
time unknown	UNSYNCHRONIZED(cr)(lf)	The time between UNSYNCHRONIZED and LOW BATTERY VOLTAGE alarms is unknown.
000d 00:04:04	BYPASSED(cr)(lf)	UPS transferred to bypass 4 min 4 sec before it was unsynchronized.
000d 00:00:35	INVERTER OVERTEMP(cr)(lf)	INVERTER OVERTEMP alarm came 35 sec before UPS was bypassed.
000d 05:10:00	BYPASSED(cr)(lf)	UPS was bypassed 5 hours 10 min before the overtemp alarm.
>285 days	BYPASSED(cr)(lf)	UPS was also bypassed more that 285 days ago.
000d 00:00:49	OVERLOAD(cr)(lf)	UPS was overloaded 49 sec before the BYPASSED alarm.
END(cr)(lf)		

2.5.2 Reset service log

The following command will initialize the service log in the non-volatile memory of the unit:

Command	Description
UPRL(cr) RESSERVLOG(cr)	RESET SERVICE LOG Security code

The ten character security code ensures, that the initialization is not done by mistake, when the interface is operated manually through a terminal or by line noise.

2.6 Identification commands

2.6.1 UPS type

The UPS type information is requested by sending the command:

Command	Description
UPTP(cr)	UPS TYPE

The unit responds by sending a string identifying the UPS type and the firmware revision of the UPS:

Title	Description
NNAME(cr)(lf)	UPS TYPE
pppp(cr)(lf)	pppp is an ASCII string of max. 20 characters.

2.6.2 UPS ID

The identification information is requested by sending the command:

Command	Description
UPID(cr)	UPS ID

The unit responds by sending an ID string of the UPS.

Title	Description
ACID(cr)(lf)	UPS ID
pppp(cr)(lf)	pppp is an ASCII string of max. 10 characters.

2.6.3 Serial number

Command	Description
UPSN(cr)	SERIAL NUMBER
0(cr)	

The serial number of the unit can be requested by sending this command followed by dummy argument 0(cr).

The UPS will acknowledge the command by transmitting:

Title	Description
ACSN(cr)(lf)	SERIAL NUMBER
ssss(cr)(lf)	ssss is an ASCII string (max 20 characters).

2.6.4 Part number

Command	Description
UPPN(cr) 0(cr)	PART NUMBER

The part number of the unit can be requested with this command followed by dummy argument 0(cr).

The UPS will acknowledge the command by transmitting:

Title	Description
ACPN(cr)(lf) ssss(cr)(lf)	PART NUMBER ssss is an ASCII string (max 12 characters).

2.7 Shutdown and startup commands

2.7.1 Shutdown delay

The shutdown delay time is the time from the issue of a shutdown command either by hardware contact or UPScode command, to the shutdown of the UPS output. Default value is 5 seconds.

The delay can be viewed or set by UPSD command. The following formats of the command are possible:

Command	UPS response	Description	
UPSD(cr) 0(cr)	ACSD(cr)(lf) ttt(cr)(lf)	SHUTDOWN DELAY	The present value ttt of the delay is requested.
UPSD(cr) ttt(cr)	ACSD(cr)(lf) ttt(cr)(lf)	SET SHUTDOWN DELAY ttt is the delay in seconds	The value of the delay is changed to ttt.

The second part (second row) of the command defines the command function:

- **View the delay:** second part is 0(cr). No change to the delay is done. The shutdown delay time presently in the memory of the UPS is transmitted in acknowledgement, where ttt is the delay in seconds.
- **Set the delay:** second part (ttt(cr)) is the time in seconds and the Line Terminator. The time is stored in the non-volatile memory of the unit. The new shutdown delay time is transmitted in acknowledgement.

2.7.2 Conditional shutdown

Command	Description
UPPF(cr) IJHLDMGCIU(cr)	POWER DOWN UPS (DURING LINE FAILURE) Security code

The command will cause the shutdown of the UPS output voltage after a delay set by the UPSD command during input line failure. The command can be cancelled before the shut down with UPPU command. The function of the UPPF command corresponds to the

hardware shutdown. The ten character security code ensures that a shutdown is not started by mistake when the interface is operated manually through a terminal or by line noise.

The UPS will re-enable the UPS output voltage after the input line voltage returns to "OK" condition.

2.7.3 Unconditional shutdown

Command	Description
UPPD(cr)	POWER DOWN UPS UNCONDITIONALLY
LGGNLMDPGV(cr)	Security code

The above command will cause the shutdown of the UPS output voltage after a delay set by the `UPSD` command regardless of the state of the input line status. The command can be cancelled before the shutdown with `UPPU` command.

The UPS will re-enable its output voltage only when `UPPU` command is received. If the input line voltage is "OK", the UPS output voltage is re-enabled immediately. Otherwise, the output voltage is re-enabled after the input line voltage returns.

2.7.4 Power cycle shutdown

Command	Description
UPPC(cr)	POWER CYCLE UPS
IJHLDMGCIU(cr)	Security code

The command will cause the shutdown of the UPS output voltage after a delay set by the `UPSD` command regardless of the state of the input line status. The command can be cancelled before the shut down with `UPPU` command. The UPS will re-enable the UPS output voltage after a delay set by the `UPCD` command or when the `UPPU` command is received, only if the input line voltage is "OK".

If the input line voltage is "failed" when the power cycle delay has expired, or when the `UPPU` command is received, the UPS will not re-enable the output voltage until the input line returns.

2.7.5 Power cycle delay

The power cycle delay time is the time from the shutting down of the output voltage with the `UPPC` command until re-enabling the output voltage. Default value is 15 seconds.

The delay can be viewed or set by `UPCD` command. The following formats of the command are possible:

Command	UPS response	Description	
UPCD(cr) 0(cr)	ACCD(cr)(lf) ttt(cr)(lf)	POWER CYCLE DELAY	The present value ttt of the delay is requested.
UPCD(cr) ttt(cr)	ACCD(cr)(lf) ttt(cr)(lf)	SET POWER CYCLE DELAY ttt is delay in seconds	The value of the delay is changed to ttt.

The second part (second row) of the command defines the command function:

- **View the delay:** second part is 0(cr). No change to the delay is done. The power cycle delay time presently in the memory of the UPS is transmitted in acknowledgement, where ttt is the delay in seconds.
- **Set the delay:** second part (ttt(cr)) is the time in seconds and the Line Terminator. The time is stored in the non-volatile memory of the unit. The new power cycle delay time is transmitted in acknowledgement.

2.7.6 Startup command

Command	Description
UPPU(cr)	CANCEL POWER DOWN COMMAND

This command cancels the UPPF, UPPC and UPPD commands during shutdown delay and re-enables the UPS output voltage immediately when the input line voltage is "OK".

2.8 Parameter setting command

The operational parameters can be viewed or set by `UPPM` command. The following formats of the command are possible:

Command	UPS response	Description	
UPPM(cr) 0(cr)	ACPM(cr)(lf) P01(cr)(lf) P02(cr)(lf) P03(cr)(lf) P04(cr)(lf) P05(cr)(lf) P06(cr)(lf) P07(cr)(lf) P08(cr)(lf) P09(cr)(lf) P13(cr)(lf) P16(cr)(lf) P18(cr)(lf) P19(cr)(lf) P20(cr)(lf) P23(cr)(lf) P24(cr)(lf) P25(cr)(lf) P26(cr)(lf) P27(cr)(lf) P28(cr)(lf) P29(cr)(lf) P30(cr)(lf) P31(cr)(lf) P32(cr)(lf) P33(cr)(lf)	PARAMETER LIST	A listing of the adjustable parameters is requested.
UPPM(cr) Pmm(cr)	ACPM(cr)(lf) PmmVnn(cr)(lf)	PARAMETER VALUE Parameter	The present value nn of the parameter mm is requested.
UPPM(cr) PmmVnn(cr)	ACPM(cr)(lf) PmmVnn(cr)(lf)	SET UPS PARAMETER Parameter and operation	The parameter mm value is changed to nn.

The second part (second row) of the command defines the command function:
- **List of all adjustable parameters:** second part is 0(cr). No change to any parameters is done. UPS lists all existing parameters in 9305.
- **A parameter value:** second part is Pmm(cr), where the first character is always P (Parameter) followed by the number of the parameter mm which value is requested. No change is done, but the value presently in the memory of the UPS is transmitted in acknowledgement: PmmVnn(cr), where mm is the number of the parameter and nn is the number of the operation.
- **Set a parameter value:** second part is Pmm, followed by V (Value), the number of the operation nn, and by Line Terminator. If the parameter number and operation value are correct, the new value for the parameter is stored in the non-volatile memory of the unit. The value of the parameter is transmitted in acknewledgement.

The operational parameters that can be viewed and set with `UPPM` command are:

mm	Parameter		nn	Operation
01	Battery size	7.5-15kVA	00	Unknown batteries, BTIME always '9999.00'
			01 [1]	7.0 Ah
			02-21	N x 7.0 Ah, N = {2, 3, ..., 21}
		20-80kVA	00 [2]	Unknown batteries, BTIME always '9999.00'
			01	2.0 Ah
			02	3.0 Ah
			03	4.0 Ah
			04	5.0 Ah
			05	6.0 Ah
			06	7.0 Ah
			07	8.0 Ah
			08	9.0 Ah
			09	10 Ah
			10	11 Ah
			11	12 Ah
			12	14 Ah
			13	15 Ah
			14	17 Ah
			15	19 Ah
			16	21 Ah
			17	24 Ah
			18	27 Ah
			19	30 Ah
			20	34 Ah
			21	38 Ah
			22	42 Ah
			23	48 Ah
			24	53 Ah
			25	60 Ah
			26	65 Ah
			27	76 Ah
			28	80 Ah
			29	96 Ah
			30	100 Ah
			31	114 Ah
			32	130 Ah
			33	152 Ah
			34	168 Ah
			35	180 Ah
			36	195 Ah
			37	225 Ah
			38	260 Ah
			39	285 Ah
			40	325 Ah
			41	360 Ah
			42	390 Ah
			43	450 Ah
			44	520 Ah
			45	560 Ah
			46	620 Ah
			47	700 Ah
			48	780 Ah
			49	870 Ah
			50	980 Ah
			51	1090 Ah
			52	1220 Ah
			53	1370 Ah
			54	1530 Ah
			55	1700 Ah
			56	1900 Ah
			57	2150 Ah
			58	2400 Ah
			59	2700 Ah
			60	3000 Ah
			61	3350 Ah
			62	3750 Ah
			63	4200 Ah

02	Modem communication test mode	00 [1] 01	The UPS calls to a service centre only when alarm condition occurs The UPS calls also if utility failure is detected
03	Output voltage	00 [1] 01 02	230 V 220 V 240 V
04	Output frequency [3]	00 01	50 Hz 60 Hz
05	Battery low alarm level	00 [1] 01 02	Nominal voltage level Higher level Lower level
06	Synchronization window	00 [4] 01 [1] 02	Narrow ± 0.5 Hz Wide ± 2.0 Hz ± 1.0 Hz
07	Operation mode of RS232 interface X101	00 [1] 01	The interface operates locally The interface operates remotely via modem
08	Audible alarm 7.5-15kVA	00 [1] 01 02	Sound ON Suppress line failure Suppress all alarms
	20-80kVA	00 01 02 [5]	Sound ON Suppress line failure Suppress all alarms
09	Line failure alarm delay	05 [1] 00-99	Relay, buzzer & UPScode status activated 5 seconds after failure Relay, buzzer & UPScode status activated after 0-99 seconds
13	ABM functions	00 [1] 01 02 03 04	All ABM functions enabled ABM battery charging cycles disabled Battery failure alarms disabled Battery failure alarms and ABM battery charging cycles disabled No batteries (battery operation and related alarms disabled)
16	Bypass limits	00 [1] $0h$ $l0$ lh	-15%...+10% of nominal voltage h = {1, 2, ..., 9}: low limit -2%, high limit defined by h, see below l = {1, 2, ..., 9}: high limit +2%, low limit defined by l, see below l, h = {1, 2, ..., 9}: l defines the low limit, h defines the high limit: l = 1 ⇒ -4% h = 1 ⇒ +4% of nominal voltage (UPPM P03) l = 2 ⇒ -6% h = 2 ⇒ +6% l = 3 ⇒ -8% h = 3 ⇒ +8% l = 4 ⇒ -10% h = 4 ⇒ +10% l = 5 ⇒ -12% h = 5 ⇒ +12% l = 6 ⇒ -14% h = 6 ⇒ +14% l = 7 ⇒ -16% h = 7 ⇒ +16% l = 8 ⇒ -18% h = 8 ⇒ +18% l = 9 ⇒ -20% h = 9 ⇒ +20%
18	Frequency slew rate [6]	00 [1] 01 02	Low, <0.5 Hz/s Normal, 2.5 Hz/s High
19	Service modes	00 [1] 01 02 03 04 05 06 [7]	Normal operation Battery operation (backfeed relay open) Bypass operation, inverter on Bypass operation, inverter off Bypass operation, inverter on, backfeed relay open Bypass operation, inverter off, backfeed relay open Output breaker trip command
20	UPS type string	00 [1] 01	Takes the response to UPTP command from non-volatile memory Sends "UPS" and firmware revision as response to UPTP command
23	Efficiency optimizer mode [6]	00 [1] 01-99	No efficiency optimizer mode Bypass must be synchronized and voltage level ok 1 - 99 min before transfer from inverter to bypass
24	Transfer acceptance [6]	00 [4] 01 [1]	Requires synchronization Transfers also while unsynchronized

25	Operational priority during rectifier input break	00 [1] 01	On battery On bypass
26	Shutdown commands	00 [1] 01	UPScode II shutdown commands enabled UPScode II shutdown commands disabled
27	Options installed	00 [1] 01 02 03	None Output transformer installed Input filter installed Output transformer and input filter installed
28	Paralleling enable/disable [3]	00 01 02 03 04	Single unit operation Parallel operation, unit #1 (shortest startup delay) Parallel operation, unit #2 Parallel operation, unit #3 Parallel operation, unit #4 (longest startup delay)
29	Load sharing mode [3]	00 [1] 01	Communication cable between the parallel units connected Wireless paralleling mode (bypass disabled)
30	EL operation mode [6]	00 [1] 01	Normal operation Unit operates in EL mode (bypass disabled)
31	Paralleling mode [8]	00 [1] 01	Parallel for redundancy Parallel for capacity
32	Utility alarms	00 01 02 03 [1]	No utility alarms (other than line failure) Bypass unavailable enabled (no alarm LED and relay) Utility under/overvoltage with alarm LED and relay enabled Bypass unavailable and utility under/overvoltage with alarm LED and relay enabled
33	Utility over voltage detection	00 [1] 01	High rectifier input voltage does not cause transfer to battery operation Transfer to battery operation when the rectifier input over voltage detected

[1] Default value.
[2] Default value in 20-80kVA units, if the battery size cannot be read from the battery cabinet(s).
[3] UPS restart is needed to have the changed parameter into use.
[4] Default value in parallel operation mode.
[5] Default value in 20-80kVA units (the parameter controls only the buzzer on the logic board).
[6] Use prohibited in parallel operation mode (default value is used).
[7] This parameter value is supported only by 20-80kVA units. Once the command has been executed, the parameter returns to its previous value.
[8] This parameter is supported only by 20-80kVA units.

2.9 Other Commands

2.9.1 Automatic messages ON/OFF

Command	Description
UPDA(cr)	DISABLE AUTOMATIC MESSAGES (DEFAULT)
UPEA(cr)	ENABLE AUTOMATIC MESSAGES

These commands can be used to enable/disable the sending of the automatic status messages described in 2.1.1. If the automatic messages are disabled, the commands UPSS and/or UPDS must be used to get the present UPS status.

2.9.2 Reset UPS parameters

Command	Description
UPRP(cr)	RESET PARAMETERS
RESUPSPARS(cr)	Security code

The command will cause the adjustable UPS parameters and delays to be reset or set to their default values (and stored in non-volatile memory of the unit).

The ten character security code ensures that an initialization is not started by mistake when the interface is operated manually through a terminal or by line noise.

After the UPRP command the UPS has been initialized as follows:

- 'Battery failure' alarming is reset to OK
- 'Configuration error' alarming is reset to OK
- Automatic status messages via RS232 are disabled
- The delays are set: UPSD = 5 s, UPCD = 15 s
- The UPSP password is cleared to null string
- The UPPH phone number is cleared to null string
- 7.5-15kVA: Battery size is reset to one battery string, the backup time is initialized to maximum
- 20-80kVA: Battery size is 'unknown', the backup time is always '9999.00' minutes
- The modem communication test mode is cleared to normal mode
- Output voltage is set to 230 V
- Battery low alarm level is set to nominal
- Synchronization window is set to ± 2.0 Hz (± 0.5 Hz in parallel operation mode)
- The RS232 interface X101 is set to local mode
- 7.5-15kVA: Buzzer audible alarms are enabled
- 20-80kVA: Logic board buzzer alarms are disabled
- Line failure alarm delay is 5 seconds
- ABM battery charging cycles are enabled
- Battery failure detection and alarming are enabled

- Bypass limits are set to -15%...+10% of nominal voltage
- Frequency slew rate is low
- Service modes are released
- Response to 'UPTP' command is taken from non-volatile memory
- Efficiency optimizer mode is turned off
- Unsynchronized transfers to bypass enabled (requires synchronization in parallel operation mode)
- Initiates battery operation at the rectifier input line break
- UPScode II shutdown commands enabled
- All utility alarms enabled
- Rectifier input voltage detection disabled

The UPRP command does not change the output frequency, setting of the installed options, the paralleling or EL mode selection.

2.9.3 Telephone number set

A complete command string for the modem can be set with this command. This string is stored in the non-volatile memory of the UPS and used to command the modem to call when needed. Example: ATDT 1234567.

The string can be viewed or set by UPPH command. The following formats of the command are possible:

Command	UPS response	Description	
UPPH(cr) 0(cr)	ACPH(cr)(lf) pppp(cr)(lf)	TELEPHONE NUMBER	The present command string pppp is requested.
UPPH(cr) pppp(cr)	ACPH(cr)(lf) pppp(cr)(lf)	TELEPHONE NUMBER SET Command string for modem with phone number to call, max 20 characters	The command string is changed to pppp.

The second part (second row) of the command defines the command function:
- **View the command string:** second part is 0(cr). No change in the command string is done. The string presently in the memory of the UPS is transmitted in acknowledgement.
- **Set the command string:** second part (pppp(cr)) is the ASCII string for modem with phone number to call and the Line Terminator. The string is stored in the non-volatile memory of the unit.

2.9.4 Password operations

When operating in modem communication mode via the RS232 interface X101 (described in 3.1) the UPS is set up to require a password before allowing access to the commands by which operations of the UPS can be changed (shutdown commands and delays, setting of UPS parameters, changing of phone number). However, all status messages, measurements, identification data, values of the parameters and shutdown delays can be checked without a password. In standard communication mode the password is not needed.

A password can be given or changed by UPSP command. The following formats of the command are possible:

Command	UPS response	Description	
UPSP(cr) PASSWD(cr)	(no response)	GIVE PASSWORD Password to allow access to all commands, max 10 characters.	The password 'PASSWD' is given.
UPSP(cr) OLD PASSWD(cr) UPSP(cr) NEW PASSWD(cr)	ACSP(cr)(lf) NEW PASSWD(cr)(lf)	CHANGE PASSWORD Old password New password	Changing the password from 'OLD PASSWD' to 'NEW PASSWD' in modem communication mode.
UPSP(cr) don't care(cr) UPSP(cr) NEW PASSWD(cr)	ACSP(cr)(lf) NEW PASSWD(cr)(lf)	CHANGE PASSWORD New password	Changing the password to 'NEW PASSWD' in standard communication mode.

The format of the command defines the command function:
- **Giving the password:** second part (PASSWD(cr)) is the password and the Line Terminator. The password is an ASCII string that is compared with the string stored in the non-volatile memory of the unit. The default value for the password is only (cr). If the password was accepted, then all commands are available until the modem connection is terminated. During a new connection the password has to be given again if needed.
- **Changing the password in modem communication mode:** second part (OLD PASSWD(cr)) is the old password to be changed; third part is UPSP(cr) again; fourth part (NEW PASSWD(cr)) is the new password of 10 characters maximum. If the new password includes more than 10 characters, password is not changed, and the UPS will send the old password in acknowledgement. Care should be taken to note the new password!
- **Changing the password in standard communication mode** (the old password is not needed)**:** second part can be anything, for example just (cr); third part is UPSP(cr) again; fourth part (NEW PASSWD(cr)) is the new password of 10 characters maximum. If the new password includes more than 10 characters, password is not changed, and the UPS will send the old password in acknowledgement. Care should be taken to note the new password!

The operation of the UPScode commands **in modem communication mode before a password has been received** is shown in the following table.

Commands that work normally	Read only commands [1]	Commands that are not in use
UPCL	UPCD	UPDA
UPDS	UPPH	UPEA
UPDV	UPPM	UPPC
UPHU	UPSD	UPPD
UPID		UPPF
UPPN		UPRL
UPPU		UPRP
UPR0		
UPR1		
UPSL		
UPSN		
UPSP		
UPSS		
UPTP		

[1] The value stored in the EEPROM can be requested but cannot be changed

2.9.5 Hang up connection

Command	Description
UPHU(cr)	HANG UP MODEM CONNECTION

In modem communication mode (RS232 interface X101) the above command will force the UPS end to hang up, and terminate the modem connection. The unit sends +++ ATH0 command to the modem and sets the DTR signal off for two seconds. This command can be given from either RS232 interface, the action is taken to the RS232 interface X101.

2.9.6 Alarm reset ON/OFF

Command	Description
UPR1(cr)	ALARM RESET ON
UPR0(cr)	ALARM RESET OFF

These commands can be used to reset inactive alarm conditions, silence the buzzer beepings, and perform other functions which can be done by a reset button. After the UPR1 command the UPS operates like the reset button is being pushed. The UPR0 command tells to UPS that the "reset button" is not pushed any more.

3 MODEM COMMUNICATION MODE

3.1 General

RS232 interface X101 can be used in two operation modes: in modem communication mode or in standard mode. The modem mode differs from the standard mode by the modem support and by the use of a password.

In modem mode the UPS dials by a modem to the service centre when specific UPS alarm conditions occur. The unit resets its receive buffer after connection to avoid loss of data received from computer's end and sends the hang up string to the modem when required. In addition, the UPS checks the commands and strings from the modem to see whether the connection is on or off.

A password is required before certain commands are accepted. The use of a password is described in 2.9.4.

In standard mode all UPScode commands are available without the password. This mode should be used when the computer has been connected directly to the UPS. The RS232 interface can be also used remotely via modem when operating in standard mode, but the 'automatic-dial-on-alarm' function, the password and other modem support functions are not available.

3.2 Modem initialization

The first step is to set up the modem which will be connected to RS232 interface X101. The settings should reflect the setup of the modem at the other end of the connection. For some modem types a program for automatic setup of the modem for service centre communication may be available.

The settings should be stored to the non-volatile memory when available. If the modem settings have been changed later on for some reason, the stored configuration can be returned by pressing the reset button in front panel of the unit when the UPS sends the `ATZ0` command to the modem (when RS232 interface X101 is in modem communication mode).

RS232 interface X101 is set to the modem communication mode by using the `UPPM` command with `P07V01` parameter.

Before communication, the line settings of the monitoring software are chosen as described in 1.2.

3.3 Operation

The operation in modem mode is similar to the standard mode after establishing a connection and sending the correct password to the UPS (password operations are described in 2.9.4).

3.3.1 Setting a telephone number

A connection, where the UPS calls the service centre is also possible after a telephone number with a command string has been stored to the non-volatile memory of the unit. The string (20 characters maximum) can be set by the `UPPH` command described in 2.9.3. The dialing command `ATDT` (or `ATDP`) is written in front of the phone number. The following is an example of the actual UPScode command.

Command	Description
`UPPH`(cr) `ATDT123456`(cr)	TELEPHONE NUMBER SET Command string with phone number to call.

The UPS will acknowledge by transmitting:

Title	Description
`ACPH`(cr)(lf) `ATDT123456`(cr)(lf)	TELEPHONE NUMBER Command string with phone number to call.

If the string in command received is `0`(cr), no change is done, but the command string presently in the memory of the UPS is transmitted in acknowledgement.

When dialing through a PBX, it may be necessary to wait for a second dial tone after sending the passing number to the outside line. Here follows two examples on how to resolve this problem.

Command	Description
`UPPH`(cr) `ATDT0,123456`(cr)	TELEPHONE NUMBER SET Command string with phone number to call.

With this string, the comma (`,`) causes pause of two seconds before dialing the number 123456.

Command	Description
`UPPH`(cr) `ATDT0W123456`(cr)	TELEPHONE NUMBER SET Command string with phone number to call.

In this example, the modem dials 0, waits (`W`) for a second dial tone and dials the number 123456.

3.3.2 Alarm conditions

The 9305 series unit calls to a service centre when one of the following UPS conditions occurs:

- Auxiliary contact failure   (`AC`)
- Batteries disconnected   (`BA`)

- Battery fuse failure   (BF)
- Battery over voltage   (BO)
- Battery failure   (BY)
- Configuration error   (CE)
- Cabinet over temperature [1]   (CT)
- DC over voltage   (DO)
- Filter over temperature   (FT)
- Charger over temperature   (HT)
- Inverter failure   (IM)
- Internal power supply failure   (IP)
- Inverter over temperature   (IT)
- Loss of redundancy   (LR)
- Neutral fault   (NF)
- Abnormal output voltage   (OV)
- Parallel bus failure   (PB)
- Rectifier failure   (RM)
- Rectifier over temperature   (RT)
- Static switch failure   (SM)
- Trafo over temperature   (TT)
- UPS disabled [1]   (UD)

[1] This alarm is supported only by the 20-80kVA units.

It is also possible to have the UPS make the call via modem (for testing purposes) when the utility failure (UF) condition occurs by setting the modem communication test mode parameter. This is done with the UPPM command with parameter P02V01 (use of the UPPM command is explained in 2.8). The default status of this feature is off.

3.3.3 Dialing operation

After an alarm condition has been detected, the UPS tries to establish a connection by sending the string set by the UPPH command to the modem. In case the connection cannot be performed at the first attempt, the unit makes two efforts more at intervals of one minute. Next three attempts are made 10 minutes after the alarm condition, and the last three in an hour from the alarm. Each attempt lasts about 50 seconds. The dialing procedure is presented in the following figure.

When the UPS has made all nine efforts, a connection is not tried until the next alarm is detected.

If a connection can be established, the unit sends status messages of the UPS in accordance with the UPScode II protocol. The following is an example of the actual alarm condition:

Status response	Comment
STOK(cr)(lf)	UPS ON / OK
11(cr)(lf)	11 ABNORMAL OPERATION
STUF(cr)(lf)	UTILITY FAILURE
00(cr)(lf)	00 UTILITY OK
STBL(cr)(lf)	LOW BATTERY VOLTAGE
00(cr)(lf)	00 BATTERY OK
STBP(cr)(lf)	UPS BYPASSED
00(cr)(lf)	00 UPS ON-LINE
STBM(cr)(lf)	BATTERY MANAGEMENT
RS(cr)(lf)	RS RESTING
STAT(cr)(lf)	ATTENTION REQUIRED
BY(cr)(lf)	BY BATTERY FAILURE
BTIME(cr)(lf)	REMAINING BACK UP TIME
9999.00(cr)(lf)	UNKNOWN

The connection can be terminated from the service centre by using the UPHU command (see 2.9.5), but if the UPS has not received a UPScode command for three minutes, the unit terminates the connection automatically by sending the hang up command to the modem.

Note. The connection established from the service centre is not terminated automatically by the UPS. The service centre can use UPHU command for termination.

3.4 Modem requirements

Modems used for communication between the 9305 series units and a computer have to be compatible with the Hayes AT command set and they should offer the modulation protocol V.22 of 1200 bps. A modem with a non-volatile memory that stores the configuration is recommended.

The error control (V.42 and MNP 4) or data compression protocols (V.42bis and MNP 5) are not normally needed, since the amount of data is not so great that these functions are necessary. The more special features modems have, the greater is the possibility that compatibility problems between different modems are found.

APPENDIX A: REVISION HISTORY

The changes from 1011496 rev A to 1011496 rev B

Added description of `UPPM` parameters `P01`, `P02`, `P05`, `P07`, `P08`, `P09`, `P13`, `P16`, `P18`, `P19`, `P20`, `P24`, and `P25`.

Added description of `UPPH`, `UPSP` and `UPHU` commands.

Added description of modem communication mode.

The changes from 1011496 rev B to 1011496 rev C

Added `STAT` messages `DU`, `EP`, `IB`, `IP`, `OV`, and `OW`.

Added `STEA` status message with `01` condition.

Added description of `UPR0` and `UPR1` commands.

Added 'Abnormal output voltage' (`IP`), and 'Internal power supply failure' (`OV`) alarms to modem call reasons.

The changes from 1011496 rev C to 1011496 rev D

Added `STAT` messages `AC` (auxiliary contact failure) and `CT` (cabinet over temperature) for PWPM45 series units.

Added `MUTE1` measurement (UPS temperature) in `UPDS` dump for PWPM45 series units.

Added `NUTEH` operating limit (UPS temperature maximum) in `UPDV` dump for PWPM45 series units.

Added battery size options of `UPPM` parameter `P01` for PWPM45 series units.

Changed default value of `UPPM` parameter `P08` for PWPM45 series units.

Added 'Auxiliary contact failure' (`AC`) and 'Cabinet over temperature' (`CT`) alarms to modem call reasons for PWPM45 series units.

The changes from 1011496 rev D to 1011496 rev E

Added `STAT` message `AC` (auxiliary contact failure) for PWPM15 series units.

Added `STAT` message `FT` (filter over temperature).

Added description of `UPSL`, and `UPRL` commands.

Added description of `UPPM` parameters `P26` and `P27`.

Added 'Auxiliary contact failure' (`AC`) alarm to modem call reasons for PWPM15 series units.

Added 'Filter over temperature' (`FT`) alarm to modem call reasons.

The changes from 1011496 rev E to 1011496 rev F

Added `STAT` message `PB` (parallel bus failure).

Added `MUTE1` measurement (UPS temperature) in `UPDS` dump for PWPM15 series units.

Added description of `UPPM` parameter `P28` (Paralleling mode).

Added notes in description of `UPPM` parameters `P06`, `P18`, `P23`, and `P24`.

Changed text "The `UPRP` command does not change ... the paralleling mode selection."

Added 'Parallel bus failure' (`PB`) alarm to modem call reasons.

The changes from 1011496 rev F to 1011496 rev G

Added description of `UPPM` parameter's `P19` value `V06` (Output breaker trip command) for PWPM60 series units.

Added `STAT` messages `LR` (loss of redundancy), `OD` (UPS not supplying load), `OR` (redundancy overload), and `UU` (utility undervoltage).

Added description of `UPPM` parameter `P29`.

Added 'Loss of redundancy' (`LR`) alarm to modem call reasons.

The changes from 1011496 rev G to 1011496 rev H

Added `STAT` message `BX` (bypass unavailable).

Added `STAT` message `BF` (battery fuse failure) for PWPM20-60 series units.

Added 'Battery fuse failure' (`BF`) alarm to modem call reasons for PWPM20-60 series units.

Added description of `UPPM` parameter `P30`.

The changes from 1011496 rev H to 1011496 rev I

Added `STAT` message `UD` (UPS disabled) for 20-60kVA units.

Added `STAT` message `UO` (utility overvoltage).

Added description of `UPID` command.

Changed description of `UPPM` parameter `P28` from "Paralleling mode" to "Paralleling enable/disable". Added parallel unit numbers 3 and 4.

Added description of `UPPM` parameter `P31` for 20-60kVA units.

Added description of `UPPM` parameter `P32`.

The changes from 1011496 rev I to 1011496 rev J

Added 80kVA product in the power rate references.

Added description of `UPPM` parameter's `P13` value `V04` (no batteries).

Changed the default value of `UPPM` parameter `P24` (transfer acceptance) from `V00` to `V01` (transfers also while unsynchronized) in single unit mode.

Added description of `UPPM` parameter `P33`.

The Powerware 9305 7.5 - 15 kVA firmware implementations

The implementation of the UPScode II interface commands described in this document is valid for Powerware 9305 7.5 - 15 kVA single unit firmware revisions M and later, and parallel firmware revisions I and later.

The UPScode II functions implemented in the parallel firmware revisions A to H can be found from the older revisions of this document.

The functions implemented in single unit firmware 1010454 revision M

Commands	Messages	Condition code or parameter
UPCD	ACCD	(Power cycle delay in seconds)
UPCL		(List of supported UPScode commands)
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BL,BO,BX,BY,CE,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)
	MUTE1	(UPS temperature)
	MOFFF	(Output frequency)
UPDV	NIUNN	(Input voltage nominal)
	NIUHH	(Input voltage max)
	NIULL	(Input voltage min)
	NBUHH	(Battery voltage max)
	NBULL	(Battery voltage min)
	NBIHH	(Battery charging current max)
	NBILL	(Battery discharging current max)
	NBAHN	(Battery capacity)
	NOUNN	(Output voltage nominal)
	NOUHH	(Output voltage max)
	NOULL	(Output voltage min)
	NOPNN	(Output power nominal, kW)
	NOSNN	(Output power nominal, kVA)
	NBTHH	(Battery back-up time displayed max)
	NOFHH	(Output frequency max)
	NOFLL	(Output frequency min)

```
UPEA
UPHU
UPPC
UPPD
UPPF
UPPH        ACPH        (Phone number, max 20 ch.)
UPPM        ACPM        P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27,
                        P30,P32,P33
UPPN        ACPN        (Part number, max 12 ch.)
UPPU
UPR0
UPR1
UPRL
UPRP
UPSD        ACSD        (Shutdown delay in seconds)
UPSL        ACSL        (8 last alarms + END)
UPSN        ACSN        (ID string , max 20 ch.)
UPSP        ACSP        (Password, max 10 ch.)
UPSS        STOK        00,11
            STUF        00,11
            STBL        00,11
            STBP        00,11
            STBM        DI,RS,FT,CH
            STAT        AC,BL,BO,BX,BY,CE,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,US,UU
            STMF        BA,IM,RM,SM
            STEA        01
            BTIME       (Back up time)
UPTP        NNAME       (UPS type string, max 20 ch.)
```

The functions implemented in parallel firmware 1013184 revisions I and J

Commands	Messages	Condition code or parameter
UPCD	ACCD	(Power cycle delay in seconds)
UPCL	(List of supported UPScode commands)	
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BL,BO,BX,BY,CE,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE,RT,TT,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)
	MUTE1	(UPS temperature)
	MOFFF	(Output frequency)

UPDV	NIUNN	(Input voltage nominal)
	NIUHH	(Input voltage max)
	NIULL	(Input voltage min)
	NBUHH	(Battery voltage max)
	NBULL	(Battery voltage min)
	NBIHH	(Battery charging current max)
	NBILL	(Battery discharging current max)
	NBAHN	(Battery capacity)
	NOUNN	(Output voltage nominal)
	NOUHH	(Output voltage max)
	NOULL	(Output voltage min)
	NOPNN	(Output power nominal, kW)
	NOSNN	(Output power nominal, kVA)
	NBTHH	(Battery back-up time displayed max)
	NOFHH	(Output frequency max)
	NOFLL	(Output frequency min)
UPEA		
UPHU		
UPID	ACID	(ID string, max 10 ch.)
UPPC		
UPPD		
UPPF		
UPPH	ACPH	(Phone number, max 20 ch.)
UPPM	ACPM	P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27, P28,P29,P30,P32
UPPN	ACPN	(Part number, max 12 ch.)
UPPU		
UPR0		
UPR1		
UPRL		
UPRP		
UPSD	ACSD	(Shutdown delay in seconds)
UPSL	ACSL	(8 last alarms + END)
UPSN	ACSN	(ID string , max 20 ch.)
UPSP	ACSP	(Password, max 10 ch.)
UPSS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BL,BO,BX,BY,CE,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE,RT,TT, UD,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
UPTP	NNAME	(UPS type string, max 20 ch.)

The Powerware 9305 20 - 30 kVA firmware implementations

The implementation of the UPScode II interface commands described in this document is valid for Powerware 9305 20 - 30 kVA single unit firmware revisions H and later, and parallel firmware revisions G and later.

The UPScode II functions implemented in the parallel firmware revisions A to F can be found from the older revisions of this document.

The functions implemented in single unit firmware 1013832 revision H

Commands	Messages	Condition code or parameter
UPCD	ACCD	(Power cycle delay in seconds)
UPCL		(List of supported UPScode commands)
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)
	MUTE1	(UPS temperature)
	MOFFF	(Output frequency)
UPDV	NIUNN	(Input voltage nominal)
	NIUHH	(Input voltage max)
	NIULL	(Input voltage min)
	NBUHH	(Battery voltage max)
	NBULL	(Battery voltage min)
	NBIHH	(Battery charging current max)
	NBILL	(Battery discharging current max)
	NBAHN	(Battery capacity)
	NOUNN	(Output voltage nominal)
	NOUHH	(Output voltage max)
	NOULL	(Output voltage min)
	NOPNN	(Output power nominal, kW)
	NOSNN	(Output power nominal, kVA)
	NBTHH	(Battery back-up time displayed max)
	NOFHH	(Output frequency max)
	NOFLL	(Output frequency min)

```
UPEA
UPHU
UPPC
UPPD
UPPF
UPPH        ACPH        (Phone number, max 20 ch.)
UPPM        ACPM        P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27,
                        P30,P32,P33
UPPN        ACPN        (Part number, max 12 ch.)
UPPU
UPR0
UPR1
UPRL
UPRP
UPSD        ACSD        (Shutdown delay in seconds)
UPSL        ACSL        (8 last alarms + END)
UPSN        ACSN        (ID string , max 20 ch.)
UPSP        ACSP        (Password, max 10 ch.)
UPSS        STOK        00,11
            STUF        00,11
            STBL        00,11
            STBP        00,11
            STBM        DI,RS,FT,CH
            STAT        AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,
                        US,UU
            STMF        BA,IM,RM,SM
            STEA        01
            BTIME       (Back up time)
UPTP        NNAME       (UPS type string, max 20 ch.)
```

The functions implemented in parallel firmware 1015187 revisions G and H

Commands	Messages	Condition code or parameter
UPCD	ACCD	(Power cycle delay in seconds)
UPCL		(List of supported UPScode commands)
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE, RT,TT,UD,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)

```
                  MUTE1          (UPS temperature)
                  MOFFF          (Output frequency)
    UPDV          NIUNN          (Input voltage nominal)
                  NIUHH          (Input voltage max)
                  NIULL          (Input voltage min)
                  NBUHH          (Battery voltage max)
                  NBULL          (Battery voltage min)
                  NBIHH          (Battery charging current max)
                  NBILL          (Battery discharging current max)
                  NBAHN          (Battery capacity)
                  NOUNN          (Output voltage nominal)
                  NOUHH          (Output voltage max)
                  NOULL          (Output voltage min)
                  NOPNN          (Output power nominal, kW)
                  NOSNN          (Output power nominal, kVA)
                  NBTHH          (Battery back-up time displayed max)
                  NOFHH          (Output frequency max)
                  NOFLL          (Output frequency min)
    UPEA
    UPHU
    UPID          ACID           (ID string, max 10 ch.)
    UPPC
    UPPD
    UPPF
    UPPH          ACPH           (Phone number, max 20 ch.)
    UPPM          ACPM           P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27,
                                 P28,P29,P30,P31,P32
    UPPN          ACPN           (Part number, max 12 ch.)
    UPPU
    UPR0
    UPR1
    UPRL
    UPRP
    UPSD          ACSD           (Shutdown delay in seconds)
    UPSL          ACSL           (8 last alarms + END)
    UPSN          ACSN           (ID string , max 20 ch.)
    UPSP          ACSP           (Password, max 10 ch.)
    UPSS          STOK           00,11
                  STUF           00,11
                  STBL           00,11
                  STBP           00,11
                  STBM           DI,RS,FT,CH
                  STAT           AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE,
                                 RT,TT,UD,UO,US,UU
                  STMF           BA,IM,RM,SM
                  STEA           01
                  BTIME          (Back up time)
    UPTP          NNAME          (UPS type string, max 20 ch.)
```

The Powerware 9305 40 - 80 kVA firmware implementations

The implementation of the UPScode II interface commands described in this document is valid for Powerware 9305 40 - 80 kVA single unit firmware revisions F and later, and parallel firmware revisions G and later.

The UPScode II functions implemented in the parallel firmware revisions A to F can be found from the older revisions of this document.

Commands	Messages	Condition code or parameter
The functions implemented in single unit firmware 1014800 revision F		
UPCD	ACCD	(Power cycle delay in seconds)
UPCL		(List of supported UPScode commands)
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)
	MUTE1	(UPS temperature)
	MOFFF	(Output frequency)
UPDV	NIUNN	(Input voltage nominal)
	NIUHH	(Input voltage max)
	NIULL	(Input voltage min)
	NBUHH	(Battery voltage max)
	NBULL	(Battery voltage min)
	NBIHH	(Battery charging current max)
	NBILL	(Battery discharging current max)
	NBAHN	(Battery capacity)
	NOUNN	(Output voltage nominal)
	NOUHH	(Output voltage max)
	NOULL	(Output voltage min)
	NOPNN	(Output power nominal, kW)
	NOSNN	(Output power nominal, kVA)
	NBTHH	(Battery back-up time displayed max)
	NOFHH	(Output frequency max)
	NOFLL	(Output frequency min)

```
UPEA
UPHU
UPPC
UPPD
UPPF
UPPH        ACPH        (Phone number, max 20 ch.)
UPPM        ACPM        P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27,
                        P30,P32,P33
UPPN        ACPN        (Part number, max 12 ch.)
UPPU
UPR0
UPR1
UPRL
UPRP
UPSD        ACSD        (Shutdown delay in seconds)
UPSL        ACSL        (8 last alarms + END)
UPSN        ACSN        (ID string , max 20 ch.)
UPSP        ACSP        (Password, max 10 ch.)
UPSS        STOK        00,11
            STUF        00,11
            STBL        00,11
            STBP        00,11
            STBM        DI,RS,FT,CH
            STAT        AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,NF,OD,OL,OV,OW,PE,RT,TT,UO,
                        US,UU
            STMF        BA,IM,RM,SM
            STEA        01
            BTIME       (Back up time)
UPTP        NNAME       (UPS type string, max 20 ch.)
```

The functions implemented in parallel firmware 1015268 revisions G - I

Commands	Messages	Condition code or parameter
UPCD	ACCD	(Power cycle delay in seconds)
UPCL	(List of supported UPScode commands)	
UPDA		
UPDS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE, RT,TT,UD,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
	MIUL1	(Input line voltage L1)
	MIUL2	(Input line voltage L2)
	MIUL3	(Input line voltage L3)
	MBUPO	(Battery voltage, positive)
	MBUNE	(Battery voltage, negative)
	MBUUU	(Battery voltage, smaller)
	MBIPO	(Battery current, positive)
	MBINE	(Battery current, negative)
	MBIII	(Battery current, larger)
	MLUPO	(DC voltage, positive)
	MLUNE	(DC voltage, negative)
	MPUL1	(Bypass voltage L1)
	MPUL2	(Bypass voltage L2)
	MPUL3	(Bypass voltage L3)
	MOUL1	(Output voltage L1)
	MOUL2	(Output voltage L2)
	MOUL3	(Output voltage L3)
	MOIL1	(Output current L1)
	MOIL2	(Output current L2)
	MOIL3	(Output current L3)
	MOPL1	(Output power L1, kW)
	MOPL2	(Output power L2, kW)
	MOPL3	(Output power L3, kW)
	MUTE1	(UPS temperature)
	MOFFF	(Output frequency)

UPDV	NIUNN	(Input voltage nominal)
	NIUHH	(Input voltage max)
	NIULL	(Input voltage min)
	NBUHH	(Battery voltage max)
	NBULL	(Battery voltage min)
	NBIHH	(Battery charging current max)
	NBILL	(Battery discharging current max)
	NBAHN	(Battery capacity)
	NOUNN	(Output voltage nominal)
	NOUHH	(Output voltage max)
	NOULL	(Output voltage min)
	NOPNN	(Output power nominal, kW)
	NOSNN	(Output power nominal, kVA)
	NBTHH	(Battery back-up time displayed max)
	NOFHH	(Output frequency max)
	NOFLL	(Output frequency min)
UPEA		
UPHU		
UPID	ACID	(ID string, max 10 ch.)
UPPC		
UPPD		
UPPF		
UPPH	ACPH	(Phone number, max 20 ch.)
UPPM	ACPM	P01,P02,P03,P04,P05,P06,P07,P08,P09,P13,P16,P18,P19,P20,P23,P24,P25,P26,P27, P28,P29,P30,P31,P32
UPPN	ACPN	(Part number, max 12 ch.)
UPPU		
UPR0		
UPR1		
UPRL		
UPRP		
UPSD	ACSD	(Shutdown delay in seconds)
UPSL	ACSL	(8 last alarms + END)
UPSN	ACSN	(ID string , max 20 ch.)
UPSP	ACSP	(Password, max 10 ch.)
UPSS	STOK	00,11
	STUF	00,11
	STBL	00,11
	STBP	00,11
	STBM	DI,RS,FT,CH
	STAT	AC,BF,BL,BO,BX,BY,CE,CT,DO,DU,EP,FT,HT,IB,IP,IT,LR,NF,OD,OL,OR,OV,OW,PB,PE, RT,TT,UD,UO,US,UU
	STMF	BA,IM,RM,SM
	STEA	01
	BTIME	(Back up time)
UPTP	NNAME	(UPS type string, max 20 ch.)

1. OPENING THE UPS CABINET

To gain access to the field serviceable components the following steps have to be done:

1.1 Disconecting power

Before opening and servicing the UPS cabinet transfer the critical load to maintenance bypass as follows:

1. Check from the display that the 'unsynchronised' alarm is not active.
2. Open the UPS door.
3. Turn the maintenance bypass switch S2 to *Bypass ON* - position.
4. Turn the main switch S1 to *UPS OFF*-position.
5. Turn the circuit breakers F2 and F1 to *0*-position.
6. Wait at least 5 minutes for the DC link to bleed down before continuing.

1.2 Removing the top panel

1. Disconnect the two screws from the display panel in the front of the unit.
2. Push the front of the top panel carefully upwards. Watch out for the cable between the display and logic board.
3. Disconnect the display cable from display board.
4. Push the top panel backwards and lift it away.

1.3 Removing the lower front plate

1. Disconnect the seven retaining screws of the lower front plate.
2. Remove the plate.

1.4 Removing the right front panel

1. Disconnect the three retaining screws and one bolt of the panel.
2. Push the panel upwards and pull the panel away.

1.5 Removing the side panels

1. Disconnect the four retaining screws from the front and four from the back of the UPS of the side panels.
2. Pull the side panel away.

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2. REPLACEMENT OF CIRCUIT BOARDS

When replacement of any of the circuit boards is needed first perform all the sections from 1.1. to 1.7. mentioned in this document **AND** disconnect the input/output neutral from the unit by opening plug J1P1/J2P2 inside the unit located on the right side of the maintenance bypass switch S2.

2.1 Replacement of the rectifier board
1. Remove the cables connected to the circuit board. Mark the cables if they are not marked.
2. Disconnect the circuit board grounding screw on the lower right corner of the board.
3. Disconnect the circuit board from the door.
4. Install new circuit board using reverse procedures.
5. Perform the calibrations according instructions in this document.

2.2 Replacement of boost circuit board
1. Remove the cables connected to the circuit board. Mark the cables if they are not marked.
2. Disconnect the cables going through the Hall sensors from the rectifier diode bridge. Remember to mark which cable goes through which Hall sensor and the cable direction.
3. Remove the circuit board by loosening the two screws beside the board. One screw on the top and one under the board. Remove the board.
4. Install new circuit board using reverse procedures. Pay special attention to the cables going through the Hall-sensors and the gate driver signal cables.
5. Perform the calibrations according instructions in this document.

2.3 Replacement of snubber circuit boards
1. Disconnect the fixing screws of the power modules. Mark the cables if they are not marked
2. Remove the circuit board.
3. Install new circuit board using reverse procedures.

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2.4 Replacement of the inverter board
1. Before removing inverter circuit board it is recommended to remove the inverter snubber board. See section 2.3 of this document.
2. Remove the cables connected to the circuit board. Mark the cables if they are not marked.
3. Disconnect the cables going through the Hall sensors to the contactor K2. Remember to mark which cable goes through which Hall sensor and the cable direction.
4. Disconnect the two screws on the right side of the inverter board and remove the board from its support plate.
5. Install new circuit board using reverse procedures. Pay special attention to the cables going through the Hall-sensors and the gate driver signal cables.
6. Perform the calibrations according instructions in this document.

2.5 Replacement of the logic board
1. Remove the logic board cover plate by disconnecting the six retaining screws of the plate.
2. Remove the cables connected to the circuit board. Mark the cables if they are not marked.
3. Disconnect the circuit board grounding screw on the lower right corner of the board.
4. Disconnect the circuit board from the door.
5. Move the processor chip(s) from the replaced board to the new board.
6. Install new circuit board using reverse procedures.
7. Perform the calibrations according instructions in this document.

3. CALIBRATION INSTRUCTIONS

After the change of rectifier, inverter and/or logic boards or modules, check and settings of the UPS by using the calibration sotware, **while the bypass switch still remains in position BYPASS "ON".**

The following tools are needed for adjustments and calibration:
- computer with serial port
- cable 1006726 between UPS and computer
- test program "9305 Cal" (or 93set and PWCON)
- V-meter DC/AC
- oscilloscope
- V – meter(mVAC) + shunt 15A 150mV (clamp A – meter rather unexact)
- dummy load 1.5 - 3kW (incl.cable)

Start the UPS and connect its data bus to the PC. Refer to test program (document 1015437), section 4 .

3.1 CALIBRATION AFTER INVERTER MODULE OR BOARD CHANGE

Read section "3. CALIBRATION INSTRUCTIONS"!

1. UPS output voltage

Measure the **UPS output voltages** at fuses (located on top of static switch board) F3 (L1), F4 (L2), F5 (L3) and adjust them with trimmers **R155** (L1), **R149** (L2) and **R161** (L3, SINE REF.) of the logic board, to **231 (221/241) ±0.1V**. Calibrate these voltages (UOUT) to be **adjusted (actual) value ±1V**. Check the wave forms with an oscilloscope (or via **interface box**, refer to test program, section 4.3.6).

Figure 1

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2. Inverter balance

Use the lowpass filter (connect via interface box, if available),when measuring the DC component from each UPS output phase(see "UPS output voltage", same measuring points). Adjust the **balance** to **0,0 mV (?5 mV)** with trimmers R 128 (OUTPUT DC - L1), R228 (L2), R328 (L3) of the inverter control board.

Lowpass filter:

Figure 2 (inside measuring interface box)

3. Inverter output current

After having made sure, that there are **NO** alarms active, turn the **bypass switch** back to position "UPS". Measure and if necessary recalibrate the output currents of each phase to be **actual value ±0.5A** .
If no load is available, connect dummy load (via shunt) to the same points mentioned under 3.1.1 ("UPS output voltage", F3 – F5) and calibrate the output currents (IOUT), while the bypass switch still is in position BYPASS "ON".

3.2 CALIBRATION AFTER RECTIFIER MODULE OR BOARD CHANGE

Read section "3. CALIBRATION INSTRUCTION"!

1. DC link voltage

On the rectifier board: Measure the **positive** DC bus voltage between terminals **X7** (neutral) and **X3** (positive) and the **negative** DC bus voltage between terminals **X7** and **X8** (negative). If necessary, **readjust** (UDC-REG) **AND recalibrate** the values (UDC) to be **?390 (?2) volts**.

2. Battery charger voltages

On the rectifier board: Measure the **positive** charger voltage between terminals **X7** and **X4** (positive) and the **negative** charger voltage between terminals **X7** and **X5** (negative). If necessary, **readjust** (UBATT-REG) **AND recalibrate** the values (UBATT) to be :

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| 32 batteries | +219 V and -219 V ±1 V |
| 48 batteries | +329 V and -329 V ±1 V |

Figure 3

3.3 CALIBRATION AFTER LOGIC BOARD CHANGE

Read section "3. CALIBRATION INSTRUCTIONS"!

After replacement of the logic board, write part number and serial number of the
UPS to the EEPROM (refer to test program, section 3).
Check and where necessary readjust and/or recalibrate the following values:

 - **Bypass voltages** (UBP) to be   **actual value ±2V**
 - **UPS output voltages** ?   refer to 3.1.1 of this instructions.
 - **UPS output currents** ?   refer to 3.3.3 of this instructions.
 - **UPS output power** (POUT) to be   **actual value ±0.1kW**
   The UPS output power usually adjusts itself as a result of the voltage/current
   Calibration. Check however, if it needs recalibration.

<table>
<tr><td rowspan="3">POWERWARE OY</td><td colspan="4">Title   Service Instructions PW 9305/20 – 30kVA</td></tr>
<tr><td>Checked   PK</td><td></td><td>No   1014789   Rev   B</td></tr>
<tr><td>Issued   RR</td><td>19.12.2001</td><td>Page   6 (6)</td></tr>
</table>

1. OPENING THE UPS CABINET

To gain access to the field serviceable components the following steps have to be done:

1.1 Disconecting power

Before opening the UPS cabinet transfer the critical load to maintenance by-pass as follows:
1. Check from the display that the 'unsynchronised' alarm is not active.
2. Open the UPS door.
3. Turn the maintenance bypass switch S2 to *Maintenance*-position ("F2" trips autom.).
4. Turn the main switch S1 to *UPS OFF*-position.
5. Turn the circuit breaker F1 to *0*-position.
6. Wait at least 5 minutes for the DC link to bleed down before continuing.

1.2 Removing the top cover

1. Remove the two screws from the display panel at the front of the unit.
2. Push the front of the top cover carefully upwards. Watch out for the cable between the display and logic board.
3. Disconnect the cable from the display board.
4. Push the top cover backwards and lift it away.

1.3 Removing the lower front plate

1. Remove the handle of the bypass switch *"S2"* by unscrewing it from the shaft.
2. Remove the five screws of the lower front plate.
3. Pull the lower part of the plate slightly towards you and lift it off.

1.4 Removing front panel

1. Remove the nine screws from the sledge door (upper cover plate), four to the left, fixed to the frame, and five to the right, fixed to the front panel.
2. Lift the front panel up until you feel its loosenig, than pull it towards you.

1.5 Removing the side panels

1. Unscrew the retaining bolts of the side panel at front and back of the Ups.
2. Remove the side panel by pulling it slightly upwards.

1.6 Opening the circuit breaker module

To be able to pull out the electronic sledge the circuit breaker module has to be lowered.
1. Remove the two srews of the circuit breaker module. Both are located at the upper corners of the moduls frame, one to the left, one to the right.
2. Lower the circuit breaker module down carefully.

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1015208c

1.7 Pulling out the electronic sledge

1. Before pulling out or pushing in the sledge, make sure that the four retaining bolts of the sledge door (upper cover plate) are in place.When pulling or pushing the sledge use only the handle to the left of S1.
2. Pull out the sledge carefully as far until it locks. A locking bolt at the lower right bar does insure, that the sledge cannot be pulled as far, to get the UPS in a mechanicly unstable condition.

1.8 Opening the electronic sledge door

1. Disconnect the four retaining bolts of the sledge door. All of them are located in a line from top to bottem to the left of the handle.
2. Open the sledge door carefully.

POWERWARE OY Finland	Title Service Instructions PW 9305 40 – 80kVA			
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2. REPLACEMENT OF CIRCUIT BOARDS

When replacement of any of the circuit boards is needed, first perform all the sections from 1.1. to 1.8. mentioned in this document. AFTER ANY REPLACEMENT OF A CIRQUIT BOARD, DUPLECHECK, THAT SREWS ARE FIXED AND CABLEs CONNECTED CORRECTLY!

2.1 Replacement of the rectifier or logic board
1. Before disconnecting any cables, make sure, that each one of them is marked with the correct label. Disconnect the cables.
2. Replace the cirquit board.
3. Move the processor chip(s) from the replaced board to the new board.
4. Perform calibrations according instructions in this document.

2.2 Replacement of inverter or boost circuit board
1. Before disconnecting any cables, make sure, that each one of them is marked with the correct label. Pay special attention to the "passing through direction" of the "hall sensor cables" and mark them accordinly. Wrongly assembled hall sensor cables will leed definitly to the distruction of semiconductors and cirquit boards.
2. Replace the cirquit board.
3. Perform the calibrations according instructions in this document.

2.3 Replacement of snubber circuit board
1. Remove the connecting screws to the power semiconductors.
2. Replace the snubber board.

2.4 Replacement of mains static switch board
The board is located behind the left side panel.
1. Before disconnecting any cables, make sure, that each one of them is marked with the correct label. Disconnect the cables.
2. Replace the cirquit board.

POWERWARE OY Finland	Title Service Instructions PW 9305 40 – 80kVA		
	Checked PK		No 1015208 Rev C
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3. CALIBRATION INSTRUCTIONS

After the change of rectifier, inverter and/or logic boards or modules, check and settings of the UPS by using the calibration sotware, **while the bypass switch still remains in position "MAINTENANCE".**

The following tools are needed for adjustments and calibration:

- computer with serial port (for redundant units: measuring interface card installed)
- cable 1006726 between UPS and computer
- test program "9305 Cal" (or 93set and PWCON)
- V-meter DC/AC
- oscilloscope (and/or measuring interface box incl.cables)
- shunt 15A 150mV (clamp A – meter)
- dummy load 3kW incl.cable

Start the UPS and connect its data bus to the PC. Refer to appendix of 9305 test program, section 4 .

3.1 CALIBRATION AFTER INVERTER MODULE OR BOARD CHANGE

Read "3. CALIBRATION INSTRUCTIONS"!
Note: The below mentioned procedures refer to inverter **control board 1 only**, inverter control board 2 does not need any adjustments or calibrations.

1. UPS output voltage
Measure the **UPS output voltages** and adjust them with trimmers R155 (L1), R149 (L2) and R161 (L3, SINE REF.) of the logic board, to **231 (221/241) ±0.1V**. Calibrate these voltages (UOUT) to be **adjusted (actual) value ±1V**. Check the wave forms with an oscilloscope or via measuring **interface box**, if available (refer to appendix, section 4.3.6).

2. Inverter balance
Use the lowpass filter (connect via interface box, if available),when measuring the DC component from each UPS output phase(see "UPS output voltage", same measuring points). Adjust the **balance** to **0,0 mV (±5 mV)** with trimmer R25 (OUTPUT DC) of each inverter control board **1**

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3. *Inverter output current*

After having made sure, that there are **NO** alarms active, turn the **bypass switch** back to position "UPS". Measure and recalibrate the output currents (IOUT) of each phase to be **actual value ±0.5A** .

If no load is available, connect dummy load (via shunt) to the same points mentioned under 3.1.1 ("UPS output voltage", F6 – F8) and calibrate the output currents (IOUT), while the bypass switch still is in position "MAINTENANCE".

3.2 CALIBRATION AFTER RECTIFIER MODULE OR BOARD CHANGE

Read "3. CALIBRATION INSTRUCTION"!

1. *DC link voltage*

On the rectifier board: Measure the **positive** DC bus voltage between terminals **X7** (neutral) and **X3** (positive) and the **negative** DC bus voltage between terminals **X7** and **X8** (negative). If necessary, **readjust** (UDC-REG) **AND recalibrate** the values (UDC) to be **±390 (±2) volts**.

2. *Battery charger voltages*

On the rectifier board: Measure the **positive** charger voltage between terminals **X7** and **X4** (positive) and the **negative** charger voltage between terminals **X7** and **X5** (negative). If necessary, **readjust** (UBATT-REG) **AND recalibrate** the values (UBATT) to be **±329 (±1) volts** .

3.3 CALIBRATION AFTER LOGIC BOARD CHANGE

Read "3.CALIBRATION INSTRUCTIONS"!

After replacement of the logic board, write part number and serial number of the UPS to the EEPROM (refer to appendix, section 3.
Check and where necessary readjust and/or recalibrate the following values:

- **Bypass voltages** (UBP) to be   **actual value ±2V**
- **UPS output voltages** ?   refer to 3.1.1 of this instructions.
- **UPS output currents** ?   refer to 3.3.3 of this instructions.
- **UPS output power** (POUT) to be   **actual value ±0.1kW**
  The UPS output power usually adjusts itself as a result of the voltage/current Calibration. Check however, if it needs recalibration.

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1015208c

Operational limits in 20- 80kVA

All the limits for AC measurements are given as RMS values.

Limit	Value	Description
Input voltage low limit	150V	Battery operation ends when all input voltages have been above this limit for 3 s (and DCs >340V).
Input voltage high limit	307V	Input contactor is opened and re-closed only, after the voltage has dropped below 285V

	48 batteries per string	{ 42 batteries per string }	(32 batteries per string)

Limit	Value	Description
Battery voltage 'batteries disconnected' limit	192V {161V} (108V)	'Batteries disconnected' alarm when lower battery voltage drops below this limit (low limit - 60V).
Battery voltage very low limit	202V {171V} (118V)	Immediate shutdown of the unit, if battery thyristors are on and bypass is disabled when lower batt voltage is below this value (low limit - 50V).
Battery voltage 'batteries connected' limit	242V {211V} (158V)	Batteries are considered to be connected again when lower battery voltage rise over this value (low limit - 10V).
Battery voltage low limit	252V {221V} (168V)	'Battery low limit' alarm and shutdown of the unit in 60 seconds if bypass is disabled, or transfer to bypass in 10 s when lower battery voltage is below this level during battery operation. If battery voltage drops again below the limit when on bypass or after the shutdown, battery thyristors are turned off (1.75V/cell).
Battery voltage alarm limit	264V {231V} (176V)	'Battery low' alarm (yellow led blinking), when batteries are considered to be connected and the battery voltage drops below this limit (1.83V/cell). Selectable by a parameter.
Battery voltage resting limit	302V {265V} (201V)	ABM resting cycle ends and charging begin when lower battery voltage drops below this limit (2.10V/cell). 'Battery failure' alarm if the voltage below the limit during the first 7 days of resting cycle.
Battery voltage charging limit	324V {284V} (216V)	ABM charging cycle ends and floating cycle begin when lower battery voltage exceeds this value (2.25V/cell).
Battery charger voltage	329V {288V} (219V)	Nominal voltage level of the battery chargers (2.284V/cell).
Battery over voltage limit	340/365V {298/320V} ..(227/244V)	'Battery over voltage' alarm if higher battery voltage has been 10 minutes (first value, 2,36V/cell) respective 60 seconds (second value, 2,535V/cell) above this level
Battery max charge current	6,5A 8A	Maximum battery charging current for 20-30kVA units. Maximum battery charging current for 40-80kVA units
DC voltage startup limit	230V	Input contactor is closed at startup when DC voltages are above this limit and their rising speed is less than 2V/2s.
DC voltage very low limit	250V	Transfer to bypass if possible or shutdown of the unit when lower DC bus voltage is below this limit.
DC voltage rectifier fault limit	310V	'Rectifier failure' alarm if lower DC voltage below this value and about same or less than battery voltage for 100ms when on battery.
DC voltage low limit	340V	Battery operation starts when lower DC voltage is below this limit. Transfer to bypass if battery operation is disabled. Battery operation ends when the DCs have been above the limit for 3 seconds (and input voltages > 150V).

DC voltage rectifier low limit	365V	'Rectifier failure' alarm if DC voltages are not above this limit in one second from the rectifier startup.
DC voltage normal level	390V	Normal DC bus voltage level.
DC voltage rectifier high limit	405V	Startup of the unit is not continued until DC voltages are below this value after the rectifier startup.
DC voltage rectifier high limit on bypass	425V	Rectifier is turned on on bypass if the DC voltages are below this level.
DC over voltage limit	460V	Rectifier is turned off and transfer to bypass if possible, or shutdown of the unit when higher DC voltage is above the level. 'Rectifier failure' alarm if 'DC over voltage' condition after rectifier restart on bypass.
Bypass voltage synch limit	100V	Minimum bypass voltage of phase L1 for synchronization
Bypass window low limit	165V	Bypass operation is disabled due to 'bypass out of window' condition when bypass voltage is below this level or if bypass is out of window for 0.8 ms while the unit is in efficiency optimizer mode.
Bypass period low limit	170V	Bypass operation is disabled if lowest average of the last bypass voltage period is below this value.
Bypass voltage low limit	195V	Bypass operation is disabled when lowest long term average of the bypass voltage is below this limit (selectable by a parameter).
Bypass voltage high limit	253V	Bypass operation is disabled when highest long term average of the bypass voltage is above this limit (selectable by a parameter).
Bypass period high limit	280V	Bypass operation is disabled if highest average of the last bypass voltage period is above this value.
Bypass window high limit	285V	While unit is in efficiency optimizer mode, the bypass operation is disabled due to 'bypass out of window' condition when bypass voltage is above this level or if bypass is out of window for 0.8 ms.
Inverter output window low limit	153V	'Inverter output out of window' condition when output voltage drops below this level or if output is out of window for 1.5 ms. Transfer to bypass or shutdown in 300 ms.
Inverter output window high limit	297V	'Inverter output out of window' condition when output voltage rises above this level or if output is out of window for 1.5 ms. Transfer to bypass or shutdown in 300 ms.
'UPS output voltage exist' limit	85V	'Abnormal output voltage' alarm if highest output voltage is above this level before inverter and output contactor, or bypass thyristors are enabled at startup.
UPS output voltage st sw fault limit	140V	'Static switch failure' alarm and shudown of the unit if UPS bypassed and output voltage drops below this value while bypass voltages are ok and output contactor is open.
Output current overload limit (per phase)	29A	20kVA: 'overload' when highest current above this value.
	36A	25kVA: 'overload' when highest current above this value.
	44A	30kVA: 'overload' when highest current above this value.
	58A	40kVA: 'overload' when highest current above this value.
	65A	45kVA: 'overload' when highest current above this value.
	72A	50kVA: 'overload' when highest current above this value.
	88A	60kVA: 'overload' when highest current above this value.
	115A	80kVA: 'overload' when highest current above this value.

Output power overload limit (per phase)	4,7kW	20kVA: 'overload' when highest current above this value.
	5,8kW	25kVA: 'overload' when highest current above this value.
	7.0kW	30kVA: 'overload' when highest current above this value.
	9,3kW	40kVA: 'overload' when highest current above this value.
	10.6kW	45kVA: 'overload' when highest current above this value.
	11,7kW	50kVA: 'overload' when highest current above this value.
	14.0kW	60kVA: 'overload' when highest current above this value.
	18,7kW	80kVA: 'overload' when highest current above this value.
Rectifier over temp alarm limit	70°	'Rectifier over temperature alarm' condition when temperature of the rectifier heat sink is above this limit.
Rectifier over temp shutdown limit	80°	'Rectifier over temperature shutdown' condition when temperature of the rectifier heat sink is above this limit. Transfer to bypass or shutdown of the unit and chargers off.
Charger over temperature limit	85°	'Charger over temp' alarm when temperature of the charger heat sink is above this value. Chargers are turned off.
Inverter over temp alarm limit	70°	'Inverter over temperature alarm' condition when temperature of the inverter heat sink is above this limit.
Inverter over temp shutdown limit	80°	'Inverter over temperature shutdown' condition when temperature of the inverter heat sink is above this limit. Transfer to bypass or shutdown of the unit.
Trafo over temperature limit	120°	'Trafo over temperature' alarm when temperature of the output transformer is above this limit. Shutdown of the unit if the alarm does not disappear in 5 minutes.
Input filter overtemperature	150°	Immediate transfer to battery operation, input contactor is opened.
Output frequency low limit for sychronisation to bypass	48.0Hz (58.0Hz)	Inverter output not synchronized with bypass line if input frequency is below this value (selectable by a software parameter). Output frequency is set to nominal.
Output frequency high limit for sychronisation to bypass	52.0Hz (62.0Hz)	Inverter output not synchronized with bypass line if input frequency is above this value (selectable by a software parameter). Output frequency is set to nominal.
Output frequency low limit for transfer to bypass	45.0Hz (55.0Hz)	Bypass operation is disabled, if input frequency is below this value (selectable by eeprom parameter). Output frequency is set to nominal.
Output frequency high limit for transfer to bypass	55.0Hz (65.0Hz)	Bypass operation is disabled, if input frequency is above this value (selectable by eeprom parameter). Output frequency is set to nominal.

Upgrade Instructions for Powerware Prime 7.5-15 kVA, 20-30 kVA, 25-45 kVA and 40-60 kVA

Purpose

The following installation instructions are for use with the field upgrading kits for Powerware Prime 7.5-60 kVA series.

The Upgrade kit includes the following items:

- 1 pc of New type plate, with the unit serial number and new input/output characteristics (completed in the factory)
- 1 pc of Password (Factory gives)
- 2 pcs of PW9305 Series Upgrade Report

Powerware 7.5-60 kVA Series units can be upgraded on site as follows:

From	To	Order code	Description
7.5 kVA	10 kVA	1012930	UPGRADE 7.5/10 kVA
7.5 kVA	15 kVA	1012931	UPGRADE 7.5/15 kVA
10 kVA	15 kVA	1012932	UPGRADE 10/15 kVA
20 kVA	30 kVA	1014679	UPGRADE 20/30 kVA
25 kVA	30 kVA	1012933	UPGRADE 25/30 kVA
25 kVA	45 kVA	1012934	UPGRADE 25/45 kVA
30 kVA	45 kVA	1012935	UPGRADE 30/45 kVA
40 kVA	50 kVA	1015222	UPGRADE 40/50 kVA
40 kVA	60 kVA	1015223	UPGRADE 40/60 kVA
50 kVA	60 kVA	1015224	UPGRADE 50/60 kVA

7,5 and 10 kVA units with the battery bank 32 pcs: in upgrade to 15 kVA models increase the number of batteries to 48 pcs.

20 kVA units with the battery bank 32 pcs: in upgrade to 30 kVA models increase the number of batteries to 48 pcs.

These upgrade kits are only for increasing of the UPS power, not for the change of UPS model.

The PW9305 Upgrade Report of the kit shall be used and the data fields shall be fulfilled according the steps of this document.

> **CAUTION !**
>
> Change the load to bypass mode.
> The installation of the upgrade kit should be done by qualified personnel only.

1 Unit data

Complete the customer and unit identification fields of the form with:

- Original unit type
- Unit serial number
- Original installation date
- The output rating (kVA) to which the UPS is going be upgraded

2 Customer data

Complete the customer fields of the form with:

- Customer
- Installation address
- Contact person & phone number

3 Installation & Environment

Inspect the installation and verify that the following are done according to the increased power rating:

- Input cabling and fuses
- Output cabling

Refer to the PW9305 User's and Installation Manual for the correct installation.

Complete the corresponding installation data fields of the form either with "OK" or, if any discrepancies were found, with the present cable and/or fuse size. Make a note to the Notes/recommendations section and inform the customer to take the corrective actions. Measure the room temperature and verify that it is within the recommended limits. Note that, when the UPS is upgraded, the maximum heat dissipation is also increased.

4 Type plate

Replace the type plate with the new one. Mark OK to corresponding field.
Return the old type plate to the factory.

5 Upgrading and calibration

Transfer the UPS to the bypass mode with the manual by-pass switch S2.
Connect the computer to the serial port of UPS and start the service program 93SET with command 93SET. Press "E" and follow the instructions of 93SET program. Write up the new part number and password to the memory of EEPROM. Shut down the UPS and start up again. Check that the new part number is in the memory of EEPROM.

6 Testing

Test the upgraded unit according to the Preventative Maintenance Instruction and mark OK to corresponding field.

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7   Notes/recommendations

If any discrepancies were found, write them down and inform the customer about them. The customer should take the corrective actions before bringing the UPS system to normal operation.

NOTE !

Exide cannot guarantee the safety of personnel or proper function of the unit
unless it is installed according to the PWPM User's and installation
Manual and according to its actual power rating.

Give one copy of the upgrading report to the customer. Send one copy to the factory logistics together with the old type plate. File one copy to your own records.

POWERWARE 9305   20-30 kVA SPARE PARTS

TERMS OF DELIVERY: EX WORKS ESPOO FACTORY
DELIVERY TIME: 2 WEEKS FROM ORDER

PART NUMBER	DESCRIPTION	REFERENCE to DWG 1013284
1013190*	INVERTER MODULE	
1013191*	RECTIFIER + STATIC SWITCH MODULE	
1013189*	BOOST MODULE	
1012125*	DISPLAY MODULE	
1014585N30	LOGIC CIRCUIT BOARD incl. software, stand. model	A10
1014585NHS30	LOGIC CIRCUIT BOARD incl. software, Hot Sync model	A10
1014585	LOGIC CIRCUIT BOARD w/o software	A10
1013701*	CHARGER BOARD incl. software	A1
1013175	INVERTER CIRCUIT BOARD	A6/A3
1017448	BOOST BOARD	A4/A7
1010476	STATIC SWITCH BOARD	A2/A1
1013185	RFI BOARD	A9
1011676	NEGATIVE SNUBBER BOARD	A4/A5
1011675	POSITIVE SNUBBER BOARD	A4/A4
1013181	INVERTER SNUBBER BOARD	A6/A6
1012056*	DISPLAY BOARD"FLAT" incl. software	A11
1012867	I/O BOARD Hot Sync model	A300
1013094	I/O CONNECT BOARD Hot Sync model	A5
1012361	D-SUB ADAPTER BOARD	
1013832	CONTROL SW FOR LOGIC BRD, stand. model , Main D312	
1015187	CONTROL SW FOR LOGIC BRD, Hot Sync model , Main D312	
1014172	CONTROL SW FOR LOGIC BRD, stand. model, measurement D211	
1018280	CONTROL SW FOR LOGIC BRD, Hot Sync model, measurement D211	
1012462	CONTROL SW FOR CHARGER BOARD, D2	
1012822	CONTROL SW FOR DISPLAY BOARD, D1	
1013307	INVERTER IGBT 2x150A 1200V	V1-V3
1015594	RECTIFIER BOOST IGBT 1x200A 600V, POSITIVE SIDE	V11
1015595	RECTIFIER BOOST IGBT 1x200A 600V, NEGATIVE SIDE	V10
1009408	RECTIFIER DIODE MODULE 80A 1200V	V5, 6, 7
8040394	RECT / STSW THYRI MODULE 95A 1600V	V8, 9, 12-14
1000296	CAPAC PRO 60uF 450V M12 AL	C1 - 8
1000297	CAPAC ELE 3300uF 450VDC M12	C9 - 16
1011589	FAN 119x119x38 44l/s 230V .5	E2, 5
1011209	FAN 119x119x38 44l/s 230V .5	E1,3,4,6,7
1009633	SENSR THERMO O70°C C60°C NC UL	S1
1008005	SENSR THERMO O80°C C70°C NC UL	S2
1011216	SWTCH START 2-POS	S1
1013304	SWTCH MBS 63 A 5P CO+AUX	S2
1013302	FUSE MCB 50A 400VAC 3P	F1
1013303	FUSE MCB 63A 220VDC/1P 4P 24VDC	F2
2000208	FUSE CB 10A 250VAC 1P 6.3x0.8	F3
1014900	FUSE 80A 240V UR BOLT	F3-5
1017751	RESISTOR 4K7 50W	R1,2
8052315	EXT BAT CAB FUSE CART 100A 440V 00-SIZE	F1, 2, 3, 4
1003781	EXT BAT CAB FUSE CART 125A 440V 1NH IEC269	F1, 2

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+ = repairable part   Approved 17.12.2002

PART NUMBER	DESCRIPTION	
1013305	CONTA 3PH 55A COIL 24VDC	K1, K2
1015189	CHOKE SUBAS RECTIFIER	L1 - 4
1015190	CHOKE SUBAS INVERTER	L5 - 10
8030844	FERRITE RING 36X23X15 5800 nH	
1014779	FERRITE RING 16X10X6.5 5000 nH	
1014173	CONNE 10A 250V FEM SNAP-IN IEC	X5
1000194	CONNE TERM BLOCK 35mm2 GREY	
1000195	CONNE TERM BLOCK 35mm2 BLUE	
1000196	CONNE TERM BLOCK 35mm2 Y/G	
1010876	PANEL SIDE	
1012201	PANEL ROOF	
1010880	PANEL DOOR	
1013115	PANEL 3N30 RIGHT FRONT	
1012061	LOCK LATCH 62-70-11	
1013487	BATTERY SHELF	
1014043	SET BATTERY CABLES	
1011685	PLATE WHEEL HOLDER	
1010870	AXLE WHEEL	
1011256	WHEEL YKI-70 N	
9513639	FOOT ADJUSTABLE M12X60 TEKAMA	

SPARE PART KITS

SPK/9305/20-30/A   COMPONENT LEVEL KIT A, standard model

PART NUMBER	DESCRIPTION	QTY/KIT
1014585N30	LOGIC CIRCUIT BOARD incl. Software	1
1013701*	CHARGER BAORD incl. Software	1
1013175	INVERTER CIRCUIT BOARD	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. Software	1
1013307	INVERTER IGBT 2x150A 1200V	2
1015594	RECTIFIER BOOST IGBT 1x200A 600V, POSITIVE SIDE	1
1015595	RECTIFIER BOOST IGBT 1x200A 600V, NEGATIVE SIDE	1
1009408	RECTIFIER DIODE MODULE 80A 1200V	1
8040394	RECT / STSW THYRI MODULE 95A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	4
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/20-30/A-HS COMPONENT LEVEL KIT A, Hot Sync model

PART NUMBER	DESCRIPTION	QTY/KIT
1014585NHS30	LOGIC CIRCUIT BOARD incl. Software	1
1013701*	CHARGER BAORD incl. Software	1
1013175	INVERTER CIRCUIT BOARD	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. Software	1
1012867	I/O BOARD Hot Sync model	1
1013307	INVERTER IGBT 2x150A 1200V	2
1015594	RECTIFIER BOOST IGBT 1x200A 600V, POSITIVE SIDE	1
1015595	RECTIFIER BOOST IGBT 1x200A 600V, NEGATIVE SIDE	1
1009408	RECTIFIER DIODE MODULE 80A 1200V	1
8040394	RECT / STSW THYRI MODULE 95A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	4
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/20-30/B   COMPONENT LEVEL KIT B

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+ = repairable part   Approved 17.12.2002

PART NUMBER	DESCRIPTION	QTY/KIT
1013175	INVERTER CIRCUIT BOARD	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1013307	INVERTER IGBT 2x150A 1200V	1
1015594	RECTIFIER BOOST IGBT 1x200A 600V, POSITIVE SIDE	1
1015595	RECTIFIER BOOST IGBT 1x200A 600V, NEGATIVE SIDE	1
1009408	RECTIFIER DIODE MOD 80A 1200V	1
8040394	RECT / STSW THYRI MODULE 95A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	2
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/20-30/M   MODULE LEVEL KIT M, Standard model

PART NUMBER	DESCRIPTION	QTY/KIT
1013190*	INVERTER MODULE	1
1013191*	RECTIFIER + STATIC SWITCH MODULE	1
1013189*	BOOST MODULE	1
1014585N30	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl.software	1
1013185	RFI BOARD	1
1017448	BOOST BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. Software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/20-30/M-HS MODULE LEVEL KIT M, Hot Sync model

PART NUMBER	DESCRIPTION	QTY/KIT
1013190*	INVERTER MODULE	1
1013191*	RECTIFIER + STATIC SWITCH MODULE	1
1013189*	BOOST MODULE	1
1014585NHS30	LOGIC CIRCUIT BOARD incl. software, Hot Sync model	1
1013701*	CHARGER BOARD incl.software	1
1013185	RFI BOARD	1
1017448	BOOST BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. Software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

+ = repairable part   Approved 17.12.2002

POWERWARE

POWERWARE 9305 40-60 kVA SPARE PARTS
POWERWARE 9305 40NX 40 kVA SPARE PARTS
POWERWARE 9305 80 kVA SPARE PARTS

TERMS OF DELIVERY: EX WORKS ESPOO FACTORY

PART NUMBER	DESCRIPTION	PART WHERE USED	40-60; 40 NX REFERENCE to DWG 1014333	80 REFERENCE to DWG 1019388
1017453*	INVERTER MODULE	40NX		
1014252*	INVERTER MODULE	40-60		
1019225*	INVERTER MODULE	80		A6-8
1017452*	NEGATIVE BOOST + RECTIFIER MODULE	40NX		
1014246*	NEGATIVE BOOST + RECTIFIER MODULE	40-60		
1019222*	NEGATIVE BOOST + RECTIFIER MODULE	80		A3
1017451*	POSITIVE BOOST MODULE	40NX		
1014247*	POSITIVE BOOST MODULE	40-60		
1019223*	POSITIVE BOOST MODULE	80		A2
1012125*	DISPLAY MODULE	40-60;40NX		
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	40-60;40NX;80	A10	A10
1014585NHS60	LOGIC CIRCUIT BOARD incl. software, Hot Sync mode	40-60;80	A10	A10
1014585	LOGIC CIRCUIT BOARD w/o software	40-60;40NX	A10	A10
1013701*	CHARGER BOARD incl. software	40-60;40NX;80	A1	A1
1013701	CHARGER BOARD w/o software	40-60;40NX;80	A1	A1
1014258	RFI BOARD	40-60;40NX	A9	A9
1019228	RFI BOARD	80	A9	A9
1014512	INVERTER SNUBBER BOARD	40-60	A6, 7, 8 / A1	A6, 7, 8 / A1
1014186	INVERTER CONTROL BOARD 1	40-60	A6, 7, 8 / A2	A6, 7, 8 / A2
1018846	INVERTER CONTROL BOARD 1	40NX	A6, 7, 8 / A2	A6, 7, 8 / A2
1019457	INVERTER CONTROL BOARD 1	80		A6, 7, 8 / A2
1014187	INVERTER CONTROL BOARD 2	40-60	A6, 7, 8 / A3	A6, 7, 8 / A3
1019460	INVERTER CONTROL BOARD 2	80		A6, 7, 8 / A3
1017448	BOOST BOARD	40-60;40NX;80	A4	A4
1011676	NEGATIVE SNUBBER BOARD	40-60;40NX	A3/A1	
1019310	NEGATIVE SNUBBER BOARD	80		A3/A1
1011675	POSITIVE SNUBBER BOARD	40-60;40NX	A2/A1	
1019384	POSITIVE SNUBBER BOARD	80		A2/A1
1012970	STATIC SWITCH BOARD	40-60;40NX;80	A8	A8
1012056*	DISPLAY BOARD"FLAT" incl. software	40-60;40NX;80	A11	A11
1012056	DISPLAY BOARD"FLAT" w/o software	40-60;40NX;80	A11	A11
1012867	I/O BOARD Hot Sync model	40-60	A10/2	A10/2
1013094	I/O CONNECT BOARD Hot Sync model	40-60	A12	
1012361	D-SUB ADAPTER BOARD	40-60;40NX;80		
1015159	YCAP BOARD	40-60;40NX;80		
1014800	CONTROL SW FOR LOGIC BRD, stand. model , Main	40-60;40NX;80		
1015268	CONTROL SW FOR LOGIC BRD, Hot Sync model , Ma	40-60		
1012463	CONTROL SW FOR LOGIC BRD, stand. model, meas	40-60;40NX;80		
1013340	CONTROL SW FOR LOGIC BRD, Hot Sync model, me	40-60		
1012462	CONTROL SW FOR RECTIFIER BOARD, D2	40-60;40NX;80		
1012822	CONTROL SW FOR DISPLAY BOARD, D1	40-60;40NX;80		
1013307	INVERTER IGBT 2x150A 1200V	40-60	V1,2	
1018684	INVERTER IGBT 2x200A 1200V	40NX	V2	
1019115	INVERTER IGBT 2x200A 1200V	80		V1,2
1014495	BOOST IGBT 2x600A 600V	40-60;80	V10,11	V10,11

PART NUMBER	DESCRIPTION

1018688	BOOST IGBT 2x300A 600V	40NX	V10,11	
1014381	RECTIFIER DIODE MODULE 100A 1600V	40-60;40NX;80	V5-7	V5-7
8040403	THYRI MODULE 130A 1600V	40-60;40NX;80	V12-14	V8,9
1013768	THYRI MODULE 105A 1600V	40-60;40NX;80	V8,9;V3	V3
1019503	THYRI MODULE 160A 1600V	80		V12-14
1014376	CAPAC PRO 2uF 1000V	40-60;40NX;80	C24,25,26	C24,25,26
1014665	CAPAC PRO 15uF 630Vdc	40NX;80	C1-6/40NX	C1-6
1000296	CAPAC PRO 60uF 450V M12 AL	40-60;40NX;80	C1-6,15-23	C15-26
1000297	CAPAC ELE 3300uF 450VDC M12	40-60;40NX	C7-14	
1019114	CAPAC ELE 4400uF 470VDC M12	80		C7-14
1006221	CAPAC RFI 4.7 nF 250V	40-60;40NX		
8020255	CAPAC PAP 4,7 nF 250 VAC 3P	80		C28,31
1011589	FANCC 119x119x38 44l/s 230V .5	40-60;40NX;80	E2,4,6,11,13	E2,4,6,13
1011209	FANCW 119x119x38 44l/s 230V .5	40-60;40NX;80	E1,3,5,9,11	E1,3,5,7-9,12
1019116	FANCW 119x119x38 63l/s 24Vdc	80		E10,12
1019117	FANCC 119x119x38 63l/s 24Vdc	80		E11,13
8052803	SENSR THERMO O90°C C70°C NC UL	40-60		
1009633	SENSR THERMO O70°C C60°C NC UL	40-60;40NX;80		
1008005	SENSR THERMO O80°C C70°C NC UL	40-60;80		
1018814	SENSR THERMO O60°C C49°C NC UL	40NX		
1018876	SENSR THERMO O65°C C55°C NC UL	40NX		
1011216	SWTCH 3N45 START 2-POS	40-60;40NX	S1	
1014368	SWTCH 150A 3PH+AUX CHANGE OVER	40-60	S2	
1011179	SWTCH 115A 3PH+AUX CHANGE OVER	40NX	S2	
1019110	SWTCH MBS 3X150A+200A + 2 X AUX	80		S2
1011211	FUSE MCB 100A 415VAC 3P	40-60;40NX	F1	
1019112	FUSE MCB 160A 415VAC 3P	80		F1
1014794	FUSE MCB 100A 750VDC/4P 24VDC	40-60;40NX	F2	
1019113	FUSE MCB 160A 750VDC/4P 24VDC	80		F2
2000208	FUSE CB 10A 250VAC 1P 6.3x0.8	40-60;40NX;80	F3	F3
1014601	FUSE MCB 100A 415 VAC 3P 24 V COIL	40-60	S2 Hot Sync	
8052457	FUSE 160 A 240 V UR	40-60;40NX	F6,7,8	
1019439	FUSE 180 A 240 V UR	80		F6,7,8
8052315	EXT BAT CAB FUSE CART 100A 440V 00-SIZE			
1003781	EXT BAT CAB FUSE CART 125A 440V 1NH			
1014264	CONTA 3PH 115A COIL 24VDC	40-60;40NX	K1	
1019111	CONTA 3PH 125A 415 V COIL 24VDC	80		K1
1013310	CHOKE 100uH 70A 5xEE65	40-60	L1 - 8	
1011406	CHOKE 70uH 65A 5xEE65	40-60	L9 - 20	
1017449	SUBAS 3N40 RECTIFIER CHOKES	40NX;80	L1,2,5,6	L1-8
1017450	SUBAS 3N40 INVERTER CHOKES	40NX;80	L11,12,15,16,19,20	L9-20
8030844	FERRITE RING 36x23x15 5800nH	40-60;40NX;80		
1000304	TRAFO CURRENT 200A/0,4A 10VA	40-60;40NX;80	B1-3	B1-3
1012041	CONNE 10A 250V FEM SNAP-IN IEC	40-60;40NX;80	X5	X5
1014496	CONNE TERM BLOCK 50mm2 GREY	40-60		
1014497	CONNE TERM BLOCK 50mm2 BLUE	40-60		
1000194	CONNE TERM BLOCK 35mm2 GREY	40NX		
1000195	CONNE TERM BLOCK 35mm2 BLUE	40NX		
1015496	CONNE TERM BLOCK 95mm2 GREY	80		
1015497	CONNE TERM BLOCK 95mm2 BLUE	80		

PART NUMBER	DESCRIPTION	
1010876	PANEL 3N45 SIDE	40-60;40NX
1019085	PANEL 3N80 SIDE	80
1014235	PLATE 3N45 REAR	40-60;40NX
1019083	PLATE 3N80 REAR	80
1012201	PANEL 3N45 ROOF	40-60;40NX
1019034	PANEL 3N80 ROOF	80
1010880	PANEL 3N45 DOOR	40-60;40NX
1019193	PANEL 3N80 DOOR	80
1014879	PLATE RIGHT FRONT	40-60;40NX
1019024	PLATE RIGHT FRONT	80
1011685	PLATE 3N45 WHEEL HOLDER	40-60;40NX;80
1010870	AXLE 3N45 WHEEL	40-60;40NX;80
1011256	WHEEL 3N45 YKI-70 N	40-60;40NX;80
9513639	FOOT ADJUSTABLE M12X60 TEKAMA	40-60;40NX;80
1011481	PANEL CONTROL	40-60;40NX;80
1012201	PANEL ROOF BAT CAB E AND F	40-60;40NX
1012202	PLATE REAR BAT CAB E AND F	40-60;40NX
8005150	TIE CABLE L=102mm W=2.5mm	40-60;40NX;80
8055457	TIE CABLE L=172 mm W=4.6mm	40-60;40NX;80
1003549	SPACR NYLON L=9,5 mm LCBS-6	40-60;40NX;80
8063124	SPACR NYLON L=28.6 mm LCBS-18	40-60;40NX;80
1014270	SET FLAT CABLES	40-60;40NX;80

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SPARE PART KITS

SPK/9305/40-60/A   COMPONENT LEVEL KIT A, standard model   PW9305 40-60 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1014512	INVERTER SNUBBER BOARD	1
1014186	INVERTER CONTROL BOARD 1	1
1014187	INVERTER CONTROL BOARD 2	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1013307	INVERTER IGBT 2x150A 1200V	2
1014495	BOOST IGBT 2x600A 600V	2
1014381	RECTIFIER DIODE MODULE 100A 1600V	1
8040403	STSW THYRI MODULE 130A 1600V	1
1013768	RECT / BAT THYRI MODULE 105A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/40-60/A-HS COMPONENT LEVEL KIT A, Hot Sync model   PW9305 40-60 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1014585NHS60	LOGIC CIRCUIT BOARD incl. software, Hot Sync mod	1
1013701*	CHARGER BOARD incl. software	1
1014512	INVERTER SNUBBER BOARD	1
1014186	INVERTER CONTROL BOARD 1	1
1014187	INVERTER CONTROL BOARD 2	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1012867	I/O BOARD Hot Sync model	1
1013307	INVERTER IGBT 2x150A 1200V	2
1014495	BOOST IGBT 2x600A 600V	2
1014381	RECTIFIER DIODE MODULE 100A 1600V	1
8040403	STSW THYRI MODULE 130A 1600V	1
1013768	RECT / BAT THYRI MODULE 105A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

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SPK/9305/40-60/B   COMPONENT LEVEL KIT B   PW9305 40-60 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1013701*	CHARGER BOARD incl. software	1
1014186	INVERTER CONTROL BOARD 1	1
1014187	INVERTER CONTROL BOARD 2	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1013307	INVERTER IGBT 2x150A 1200V	2
1014495	BOOST IGBT 2x600A 600V	2
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/40-60/M   MODULE LEVEL KIT M,   standard model

PART NUMBER	DESCRIPTION	QTY/KIT
1014252*	INVERTER MODULE	1
1014246*	NEGATIVE BOOST + RECTIFIER MODULE	1
1014247*	POSITIVE BOOST MODULE	1
1012125*	DISPLAY MODULE	1
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1014258	RFI BOARD	1
1017448	BOOST BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/40-60/M-H MODULE LEVEL KIT M, Hot Sync model   PW9305 40-60 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1014252*	INVERTER MODULE	1
1014246*	NEGATIVE BOOST + RECTIFIER MODULE	1
1014247*	POSITIVE BOOST MODULE	1
1012125*	DISPLAY MODULE	1
1014585NHS60	LOGIC CIRCUIT BOARD incl. software, Hot Sync mod	1
1013701*	CHARGER BOARD incl. software	1
1014258	RFI BOARD	1
1017448	BOOST BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

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SPK/9305/40NX/A COMPONENT LEVEL KIT A, standard model   PW9305 40NX kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1018846	INVERTER CONTROL BOARD 1	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1018684	INVERTER IGBT 2x200A 1200V	2
1018688	BOOST IGBT 2x300A 600V	2
1014381	RECTIFIER DIODE MODULE 100A 1600V	1
8040403	STSW THYRI MODULE 130A 1600V	1
1013768	RECT / BAT THYRI MODULE 105A 1600V	1
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/40NX/B COMPONENT LEVEL KIT B   PW9305 40NX kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1013701*	CHARGER BOARD incl. software	1
1018846	INVERTER CONTROL BOARD 1	1
1017448	BOOST BOARD	1
1011676	NEGATIVE SNUBBER BOARD	1
1011675	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1018684	INVERTER IGBT 2x200A 1200V	2
1018688	BOOST IGBT 2x300A 600V	2
1000296	CAPAC PRO 60uF 450V M12 AL	1
1000297	CAPAC ELE 3300uF 450VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

SPK/9305/40NX/M MODULE LEVEL KIT M,   PW9305 40-60 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1017453*	INVERTER MODULE	1
1017452*	NEGATIVE BOOST + RECTIFIER MODULE	1
1017451*	POSITIVE BOOST MODULE	1
1012125*	DISPLAY MODULE	1
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1014258	RFI BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1

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SPK/9305/80/A   COMPONENT LEVEL KIT A, standard model   PW9305 80 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1014512	INVERTER SNUBBER BOARD	1
1019457	INVERTER CONTROL BOARD 1	1
1019460	INVERTER CONTROL BOARD 2	1
1017448	BOOST BOARD	1
1019310	NEGATIVE SNUBBER BOARD	1
1019384	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1019115	INVERTER IGBT 2x200A 1200V	2
1014495	BOOST IGBT 2x600A 600V	2
1014381	RECTIFIER DIODE MODULE 100A 1600V	1
8040403	STSW THYRI MODULE 130A 1600V	1
1013768	RECT / BAT THYRI MODULE 105A 1600V	1
1019503	THYRI MODULE 160A 1600V	
1000296	CAPAC PRO 60uF 450V M12 AL	1
1019114	CAPAC ELE 4400uF 470VDC M12	1
1011589	FANCC 119x119x38 44l/s 230V .5	1
1011209	FANCW 119x119x38 44l/s 230V .5	1
1019116	FANCW 119x119x38 63l/s 24 VDC	1
1019117	FANCC 119x119x38 63l/s 24 VDC	1

SPK/9305/80/B   COMPONENT LEVEL KIT B   PW9305 80 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1013701*	CHARGER BOARD incl. software	1
1019457	INVERTER CONTROL BOARD 1	1
1019460	INVERTER CONTROL BOARD 2	1
1017448	BOOST BOARD	1
1019310	NEGATIVE SNUBBER BOARD	1
1019384	POSITIVE SNUBBER BOARD	1
1012970	STATIC SWITCH BOARD	1
1019115	INVERTER IGBT 2x200A 1200V	2
1014495	BOOST IGBT 2x600A 600V	2
1000296	CAPAC PRO 60uF 450V M12 AL	1
1019114	CAPAC ELE 4400uF 470VDC M12	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1
1019116	FANCW 119x119x38 63l/s 24 VDC	1
1019117	FANCC 119x119x38 63l/s 24 VDC	1

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SPK/9305/80/M   MODULE LEVEL KIT M,   PW9305 80 kVA

PART NUMBER	DESCRIPTION	QTY/KIT
1017252*	INVERTER MODULE	1
1019222*	NEGATIVE BOOST + RECTIFIER MODULE	1
1019223*	POSITIVE BOOST MODULE	1
1012125*	DISPLAY MODULE	1
1014585N60	LOGIC CIRCUIT BOARD incl. software, stand. model	1
1013701*	CHARGER BOARD incl. software	1
1019228	RFI BOARD	1
1017448	BOOST BOARD	1
1012056*	DISPLAY BOARD"FLAT" incl. software	1
1011589	FAN 119x119x38 44l/s 230V .5	1
1011209	FAN 119x119x38 44l/s 230V .5	1
1019116	FANCW 119x119x38 63l/s 24 VDC	1
1019117	FANCC 119x119x38 63l/s 24 VDC	1

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General

This manual completes the main User's and Installation Manual of 20-30 kVA UPS, when the UPS is provided with optional input filter.

The input filter option is the fifth harmonic filter with the serial choke and it's assembled to the rectifier input supply. Filter reduces the input current distortion to 10 % level (THDI) with full load.

Please read first the User's and Installation manual of the UPS and install the filter according to this manual.

1. Installation

1.1 Environment

All requirements concerning environment described in the User's and Installation manual of the UPS are same for the input filter option. If they are neglected the manufacturer cannot quarantee the safety of personnel during installation or use, or that the unit will function properly.

The filter is located beside the UPS cabinet.

The following space requirements must be met:

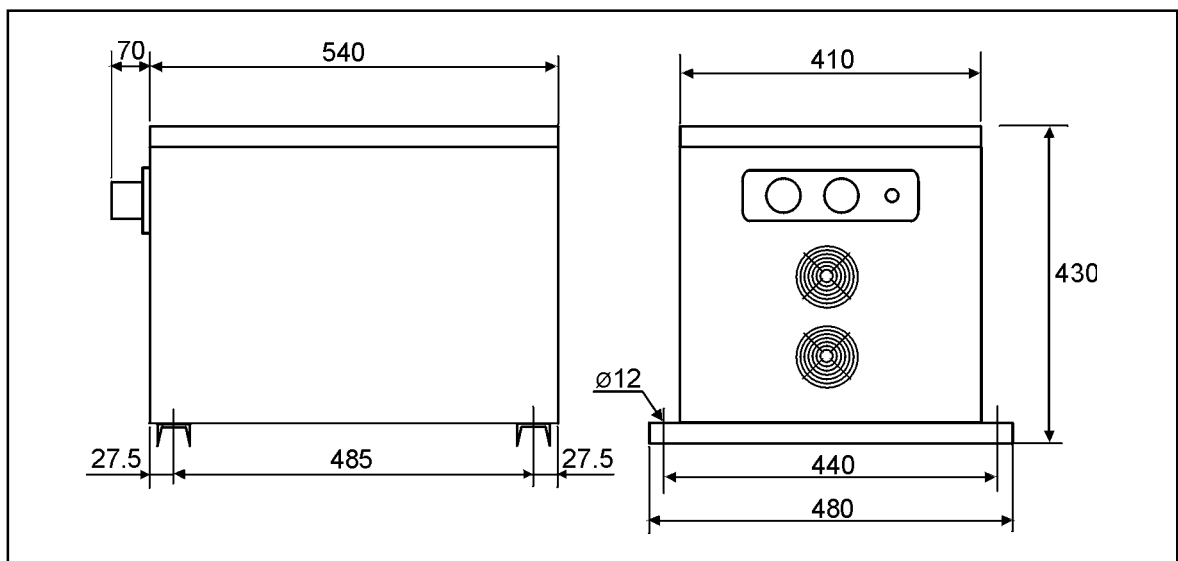100 mm clearance is needed at the rear side of the filter for ventilation. Maintain clearance at front and on top of the filter for installation and service.

1.2 Floor loading

When planning the installation the floor loading must be taken into consideration because of the weight of the filter cabinet.

Weight of filter cabinet: 100 kg
Distributed loading   345 kg/m2

Figure 1. Dimensions of the filter cabinet

1.3 Installation of input filter cabinet to the UPS system

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

1.3.1 Installation of input filter beside the UPS

The filter cabinet is installed beside the UPS cabinet to right or left side. The wiring between the mains and the filter input and between the filter output and the UPS rectifier input shall be connected according to the installation drawing, figure 3. Route the input/output cables of the filter trough the strain relief of the fair lead and connect them according to section Power connections 1.3.2.

1.3.2 Power connections

The connections order is as follows:

- Remove the top plate of the filter

- Connect the input mains cable to the terminal X5, L1, L2, L3, N and ⏚

- Connect the output cable of filter to the terminals X6 or X7 according to the UPS power.
  Connect the phase wires L1, L2, L3 to terminals X6 if the UPS is 30 kVA.
  Connect the phase wires L1, L2, L3 to terminals X7 if the UPS is 20 kVA.
  Connets neutral and ground wires to terminals N and ⏚ of the terminals X7. These are common for both outputs. See figure 2.

- Connect the terminal X1 (three poles) to
  terminal X2 if the UPS power is 20 kVA
  terminal X3 if the UPS power is 30 kVA
  See figure 2.

Mark the selected power on the type plate (square after rated current)

Filter cabinet is temperature monitored and connector of the temp. sensor is to be connected to the terminal X12 in the UPS, see figure 2 and 3.

Fig 2. Location of the terminals of the filter cabinet, top view.

Fig 3. Installation drawing of UPS unit with input filter.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B
20 - 30 kVA	50 A	50 A	100 A	10 mm²	16 mm²

1.3.3 Starting up the UPS with filter option.

Follow the starting up instruction of the main manual

After the starting up the UPS must be configured to operate with the input filter option. With UPPM command P27V02 the over temperature monitoring of filter is activated.

Starting up is always performed by a service engineer of the manufacturer or by a representative of an agent by the manufacturer.

2. Technical specifications with input filter option.

1. General

1.1 Rated power	20 kVA, 30 kVA at p.f. 0,7, inductive or non linear load

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 - 55 Hz

2.5 Nominal/max input current

20 kVA	3 x 21 A / 3 x 30 A
30 kVA	3 x 36 A / 3 x 45 A

2.6 Input power factor	0.96
2.7 Input current distortion	10% (THD), at full load

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 1% static < ± 1% with 100% unbalanced load < ± 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, 2.5, 6 Hz/sec, selectable
3.6 Over load	101% to 110% for 10 minutes (inverter) 111 - 125% for 60 sec (inverter) 126 - 150% for 30 sec (inverter) 1000% for one cycle (bypass)

3.7 Efficiency Ac - Ac		92% full load
3.8 Power dissipation	20 kVA	1200 W
	30 kVA	1400 W

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
	15 000 m during transportation

4.4 Humidity	15 ... 90% RH, non-condensing
4.5 Audible noise	< 55 dBA at 1 meter distance
4.6 Protection class	IP 21 S

5. Standards

5.1 Safety	EN 50091-1
5.2 Emissions	EN 50091-2
5.3 Immunity	EN 50091-2

6. Input filter

Dimensions:

W x D x H max.	480 x 605 x 430 mm
Weight	100 kg

General

This manual completes the main User's and Installation Manual of 40-60 kVA UPS, when the UPS is provided with optional input filter.

The input filter option is the fifth harmonic filter with the serial choke and it's assembled to the rectifier input supply. Filter reduces the input current distortion to 10 % level (THDI) with 60 kVA load.

Please read first the User's and Installation manual of the UPS and install the filter according to this manual.

1. Installation

1.1 Environment

All requirements concerning environment described in the User's and Installation manual of the UPS are same for the input filter option. If they are neglected the manufacturer cannot quarantee the safety of personnel during installation or use, or that the unit will function properly.

The filter is located beside the UPS cabinet.

The following space requirements must be met:

100 mm clearance is needed at the rear side of the filter for ventilation. Maintain clearance at front and on top of the filter for installation and service.

1.2 Floor loading

When planning the installation the floor loading must be taken into consideration because of the weight of the filter cabinet.

Weight of filter cabinet: 150 kg
Distributed loading 580 kg/m2

Figure 1. Dimensions of the filter cabinet

1.3 Installation of input filter cabinet to the UPS system

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

1.3.1 Installation of input filter

The filter cabinet is installed beside the UPS cabinet to right or left side. The wiring between the mains and the filter input and between the filter output and the UPS rectifier input shall be connected according to the installation drawing, figure 3. Route the input/output cables of the filter trough the strain relief of the fair lead and connect them according to section Power connections 1.3.2.

1.3.2 Power connections

The connections order is as follows:

• Remove the top plate of the filter

• Connect the input mains cable to the terminal X5, L1, L2, L3, N and ⏚

• Connect the output cable of filter to the terminals X6, L1, L2, L3 and PE

Filter cabinet is temperature monitored and connector of the temp. sensor is to be connected to the terminal X12 in the UPS, see figure 2 and 3.

Fig 2. Location of the terminals of the filter cabinet, top view.

Fig 3. Installation drawing of UPS unit with input filter.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B
40 kVA	63 A	63 A	100 A	16 mm²	16 mm²
50 kVA	80 A	80 A	100 A	25 mm²	16 mm²
60 kVA	100 A	100 A	100 A	35 mm²	35 mm²

1.3.3 Starting up the UPS with filter option.

Follow the starting up instruction of the main manual

After the starting up the UPS must be configured to operate with the input filter option. With UPPM command P27V02 the over temperature monitoring of filter is activated.

Starting up is always performed by a service engineer of the manufacturer or by a representative of an agent by the manufacturer.

2. Technical specifications with input filter option.

1. General

| 1.1 Rated power | 40 kVA, 50 kVA, 60 kVA at p.f. 0,7, inductive or non linear load |

2. Input

2.1 Rated voltage	220/380, 230/400, 240/415 Vac; three phase input
2.2 Voltage range 40 - 50 kVA 60 kVA	170/294 - 279/484 VAC without depleting battery 180/312 - 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 - 55 Hz

2.5 Nominal/max input current

40 kVA	3 x 47 A / 3 x 65 A
50 kVA	3 x 60 A / 3 x 80 A
60 kVA	3 x 70 A / 3 x 93 A

2.6 Input power factor	0.96
2.7 Input current distortion	13% (THD), at 60 kVA load

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 1% static < ± 1% with 100% unbalanced load < ± 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, 2.5, 6 Hz/sec, selectable

3.6 Over load		101% to 110% for 10 minutes (inverter)
		111 - 125% for 60 sec (inverter)
		126 - 150% for 30 sec (inverter)
		1000% for one cycle (bypass)

3.7 Efficiency Ac - Ac		92% full load

3.8 Power dissipation	40 kVA	2200 W
	50 kVA	2700 W
	60 kVA	3200 W

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
	15 000 m during transportation

4.4 Humidity	15 ... 90% RH, non-condensing
4.5 Audible noise	< 60 dBA at 1 meter distance
4.6 Protection class	IP 21 S

5. Standards

5.1 Safety	EN 50091-1
5.2 Emissions	EN 50091-2
5.3 Immunity	EN 50091-2

6. Input filter

Dimensions:

W x D x H max.	480 x 610 x 430 mm
Weight	150 kg

1. General

This manual completes the main User's and Installation Manual, when the 80 kVA UPS is provided with optional input filter.

The input filter cabinet contains both 3rd and 5th harmonic filters. It's assembled to the rectifier input supply. Filter reduces the input current distortion to 10% THD level with 80 kVA load.

Please read first the User's and Installation manual of the UPS and install the filter according to this manual.

1.1 Unpacking and incoming inspection

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

- The equipment must be inspected for damage after 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 list to verify that the shipment is complete. The equipment is thoroughly inspected at the factory. If there are no damages or discrepancies, the installation may proceed.

2. Installation

2.1 Environment

All requirements concerning environment described in the User's and Installation manual of the UPS are same for the input filter option. If they are neglected the manufacturer cannot quarantee the safety of personnel during installation or use, or that the unit will function properly.

The filter is located beside the UPS cabinet. There must be 100 mm clearance at the rear side of the filter for ventilation. Maintain clearance at front and on top of the filter for service purposes.

2.2 Floor loading

When planning the installation the floor loading must be taken into consideration because of the weight of the filter cabinet.

Weight of filter cabinet: 135 kg
Distributed loading 560 kg/m^2

Figure 1. Dimensions of the filter cabinet

2.3 Installation of input filter cabinet to the UPS system

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

Installation of input filter

The filter cabinet is installed beside the UPS cabinet to right or left side. Route the input and output cables of the filter cabinet trough the cable's lead-in. Connect them to correct input/output terminals, figure 2. The wiring between the mains and the filter input and between the filter output and the UPS rectifier input shall be connected according to the installation drawing, figure 3.

Power connections

The connections order is as follows:

• Remove the top panel of the filter cabinet

• Connect the input mains cable to the terminal X5, L1, L2, L3, N and ⏚

• Connect the output cable of filter to the terminals X6, L1, L2, L3 and PE

Filter cabinet is temperature monitored and connector of the temp. sensor is to be connected to the terminal X12 (see User's Manual) in the UPS, see figure 2 and 3.

Fig 2. Location of the terminals of the filter cabinet, top view.

Fig 3. Installation drawing of UPS unit with input filter.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B*
80 kVA	125 A	125 A	125 A	50 mm²	16 mm²

a) Removable interconnection wiring.
b) Cables with higher current capacity are needed if the external battery cabinets or racks are installed with a distance from the UPS.

NOTE! The size of the neutral wire may not be less than recommended size.

Cabling with 70°C copper wires, installation procedure B.

* Please note that the battery cables are delivered with the external battery cabinets to install the external battery cabinet next to the UPS.

Starting up the UPS with filter option.

Follow the starting up instruction of the main manual

After the starting up the UPS must be configured to operate with the input filter option. With UPPM command P27V02 the over temperature monitoring of filter is activated.

Starting up is always performed by a service engineer of the manufacturer or by a representative of an agent by the manufacturer.

3. Technical specifications with input filter option.

1. General

1.1 Rated power	80 kVA at p.f. 0,7, inductive or non linear load
1.2 Approvals	CE; Made in EU

2. Input

2.1 Rated voltage	220/380, 230/400, 240/415 Vac; three phase input
2.2 Voltage range	180/312 - 279/484 VAC without depleting battery 196/336 - 279/484 VAC full charge capability
2.3 Rated frequency	50 Hz with filter
2.4 Frequency range for rectifier	45 - 55 Hz with filter
2.5 Nominal/max input current	3 x 97 A / 3 x 125 A
2.6 Input power factor	0.96
2.7 Input current distortion	< 10% (THD), at 80 kVA load, 50 Hz

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 1% static < ± 1% with 100% unbalanced load < ± 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 ± 0.05 Hz Slew rate 0.5, 2.5, 6 Hz/sec, selectable
3.6 Over load	101% to 110% for 10 minutes (inverter) 111 - 125% for 60 sec (inverter) 126 - 150% for 30 sec (inverter) 151 - 170% for 5 sec (inverter) 1000% for one cycle (bypass)
3.7 UPS Efficiency	93% at full load (no filter)

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
	15 000 m during transportation

4.4 Humidity	15 ... 90% RH, non-condensing
4.5 Audible noise	< 65 dBA at 1 meter distance
4.6 Protection class	IP 21 S

5. Standards

5.1 Safety	EN 50091-1-1 : 1996 ; IEC 60950
5.2 EMC	EN 50091-2 : 1995

6. Input filter

6.1 Dimensions:	W 615 mm x D 480 mm x H 680 mm
6.2 Weight	135 kg
6.3 Filter heat dissipation	3.9 kW

General

This instruction completes the main User's and Installation manual of 20 – 30 kVA UPS when the UPS is provided with the transformer option.

Please read first the main User's and Installation manual (1013945) and install the transformer option according to this instruction to the UPS output terminals.

1. Installation

Environment

All the requirements concerning environment described in the technical specifications must be met. If they are neclected the manufacturer cannot quarantee the safety of personnel during installation or use, or that the unit will function property.

•   Install the UPS and battery cabinets according to the main instruction.
•   The following requirements are for the transformer cabinet.
   - Provide shelter from the elements (especially moisture)
   - Make sure that the ventilation and space requirement are met. On every side of the transformer cabinet 50 mm clearance is needed.
   - Maintain clearance at front of the transformer for installation and service.

Floor loading

When plannig the installation the floor loading must be taken into consideration because of the weight of the transformer cabinet.

Weight of the transformer cabinet   190 kg

Distributed loading   925 kg/m²

Fig. 1 Dimensions of the transformer cabinet

Installation of transformer cabinet to the UPS system

> ## ⚠️⚡ WARNING!
>
> **The UPS contains high voltage battery bank, which can injure or kill personnel and damage equipment.**

Transformer is installed beside the UPS cabinet to right or left side. The wiring between UPS and transformer cabinet and the load cables shall be connected according to the appropriate installation drawings. Wiring route is through the rear panel of UPS and through the fairlead of the transformer cabinet. See the power connections of transformer module in figure 2.

Transformer cabinet has temperature monitoring and the cable from the transformer option has to be connected to the terminal X7 in the UPS. Wiring through the rear panel of UPS. Length of the cable is 5 meters.

Fig. 2 Location of the terminals of the transformer cabinet, top view

Fig. 3 Five-wire installation of UPS units from 20 to 30 kVA with <u>two-cable</u> input.

Power	Fuse 1	Fuse 2	Fuse 3	Cable A	Cable B
20 - 30 kVA	50 A	50 A	100 A	10 mm²	16 mm²

Table 1. Fuse and cable dimensions for five wire installations of UPS units from 20 to 30 kVA using two cable input. Note that the fuse numbers and the cable letters refer to the numbers/letters in figure 3.

Fig. 4 Five-wire installation of UPS units from 20 to 30 kVA with single-cable input.

Power	Fuse 1	Fuse 2	Cable A	Cable B
20- 30 kVA	50 A	100 A	10 mm²	16 mm²

Table 2. Fuse and cable dimensions for five-wire installation of UPS units from 20 to 30 kVA using single cable input. Note that the fuse numbers and the cable letters refer to the numbers/letters in figure 4.

Starting up the UPS with transformer option

Follow the starting up instruction of the main manual.

After the starting up the UPS must be configured to operate with the output transformer. With UPPM command P27V01 the overtemperature monitoring of transformer cabinet is activated.

Starting up is always performed by a service engineer of the manufacturer or by a representative of an agent by the manufacturer.

2. Technical specifications with transformer module

1. General

1.1 Rated power	20 kVA, 30 kVA at p.f. 0,7, inductive or non linear load
1.2 Technology	On-line, double conversion topology with automatic bypass switch and maintenance bypass switch.
	Frequency independent operation.
1.3 Approvals	CE; Made in EU

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
2.4 Frequency range for rectifier	45 - 65 Hz
2.5 Nominal/max input current	
	20 kVA 3 x 21 A / 3 x 30 A 30 kVA 3 x 36 A / 3 x 45 A
2.6 Input power factor	0.96

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 2% static < ± 2% with 100% unbalanced load < ± 5% dynamic at 100% load change Response time 1 ms
3.3 Voltage distortion	< 2 % THD linear load < 8 % 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, 2.5, 6 Hz/sec, selectable
3.6 Over load	101% to 110% for 10 minutes (inverter) 111 - 125% for 60 sec (inverter) 126 - 150% for 30 sec (inverter) 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 15 000 m during transportation
4.4 Humidity	15 ... 90% RH, non-condensing
4.5 Audible noise	< 55 dBA at 1 meter distance
4.6 Protection class	IP 21 S

5. Standards

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

6. Transformer module

6.1 Connection	DznO
6.2 Dimensions:	WxDxH 450 x 570 x 550 mm
6.3 Weight	190 kg

Output power with transformer	20 kVA 14 kW	30 kVA 21 kW
Output peak current	3 x 130 A	3 x 130 A
Efficiency	89%	91%
Power dissipation	1700 W	1900 W
DC-voltage	2 x 288 (2x192) V	2 x 288 V

General

This instruction completes the main User's and Installation manual of 40 – 60 kVA UPS when the UPS is provided with the transformer option.

Please read first the main User's and Installation manual and install the transformer option according to this instruction to the UPS output terminals.

1. Installation

1.1 Unpacking and incoming inspection

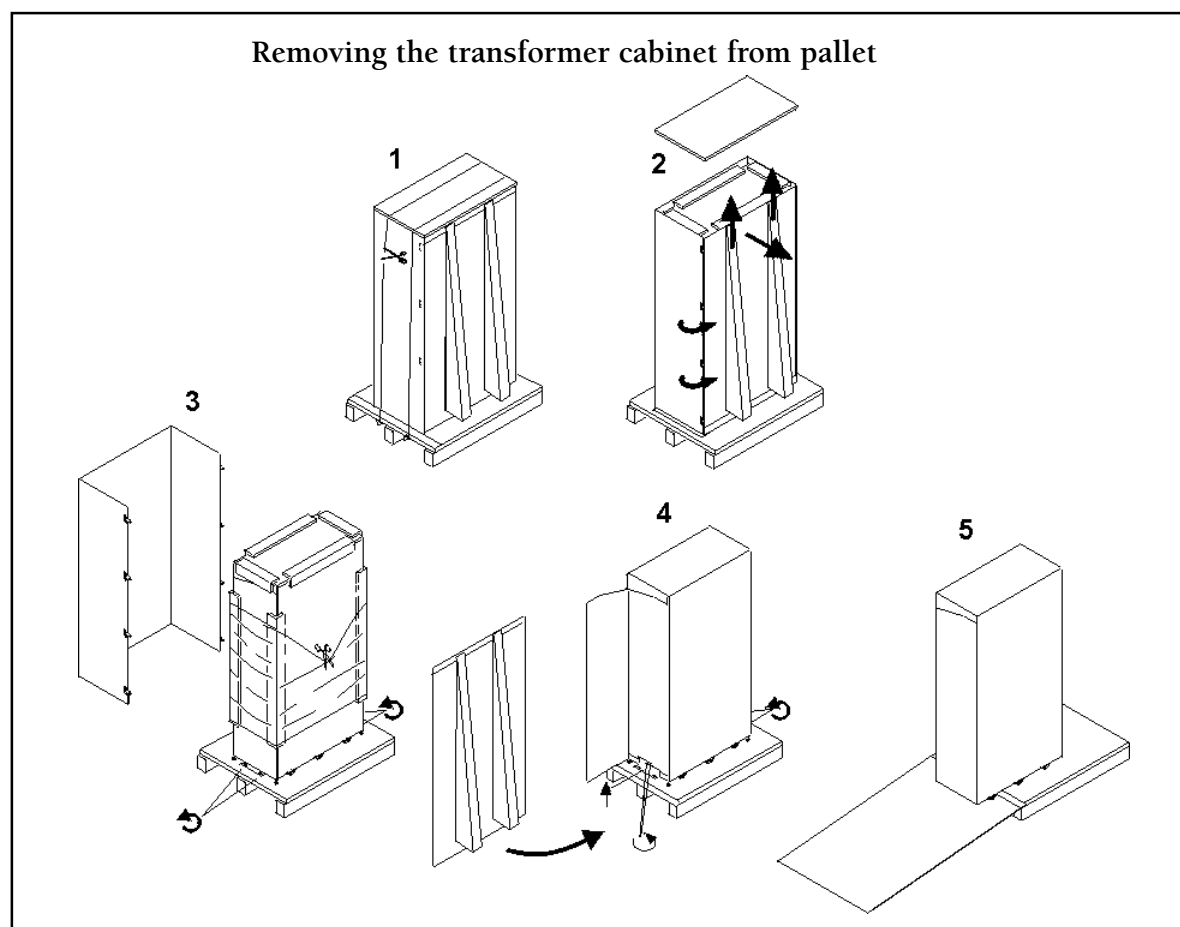Unpack the equipment and remove all the packing materials and shipping cartons.

*   The equipment must be inspected for damage after 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 list to verify that the shipment is complete. The equipment 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 1):

Removing the transformer cabinet from pallet

Fig. 1. Unloading the transformer cabinet

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Installation instruction for
40 - 60 kVA UPS with transformer option
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1.2 Moving

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

1.3 Environment

All the requirements concerning environment described in this chapter (Installation) or chapter 2 (Technical specifications) must be met. If they are neclected the manufacturer cannot quarantee the safety of personnel during installation or use, or that the unit will function properly.

• Install the UPS and battery cabinets according to the main instruction.
• The following requirements are for the transformer cabinet.
- Provide shelter from the elements (especially moisture)
- Make sure that the ventilation and space requirement are met. On every side of the transformer cabinet 50 mm clearance is needed.
- Maintain clearance at front of the transformer for installation and service.

1.4 Floor loading

When planning the installation the floor loading must be taken into consideration because of the weight of the transformer cabinet.

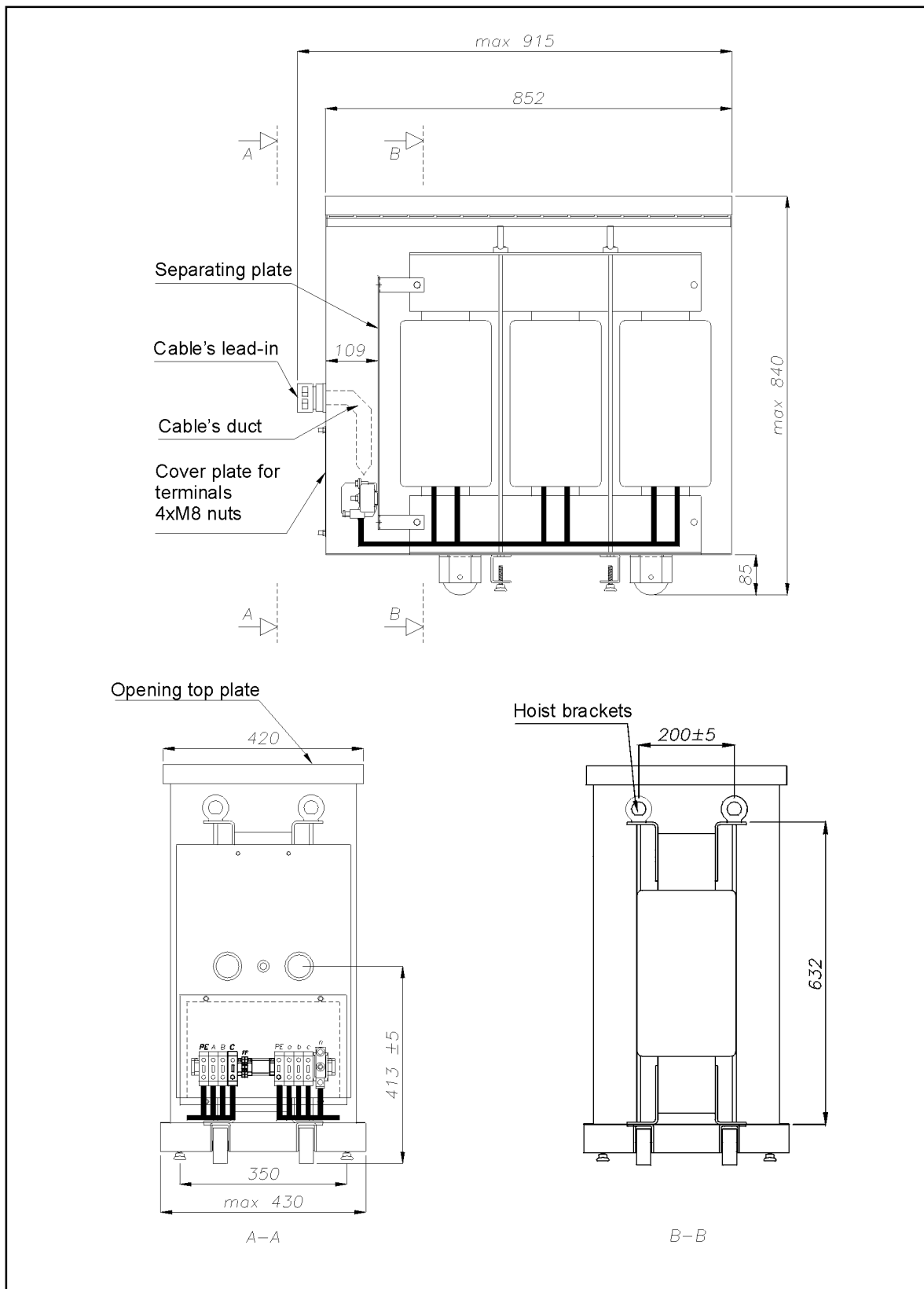Weight of the transformer cabinet   290 kg

Distributed loading   845 kg/m²

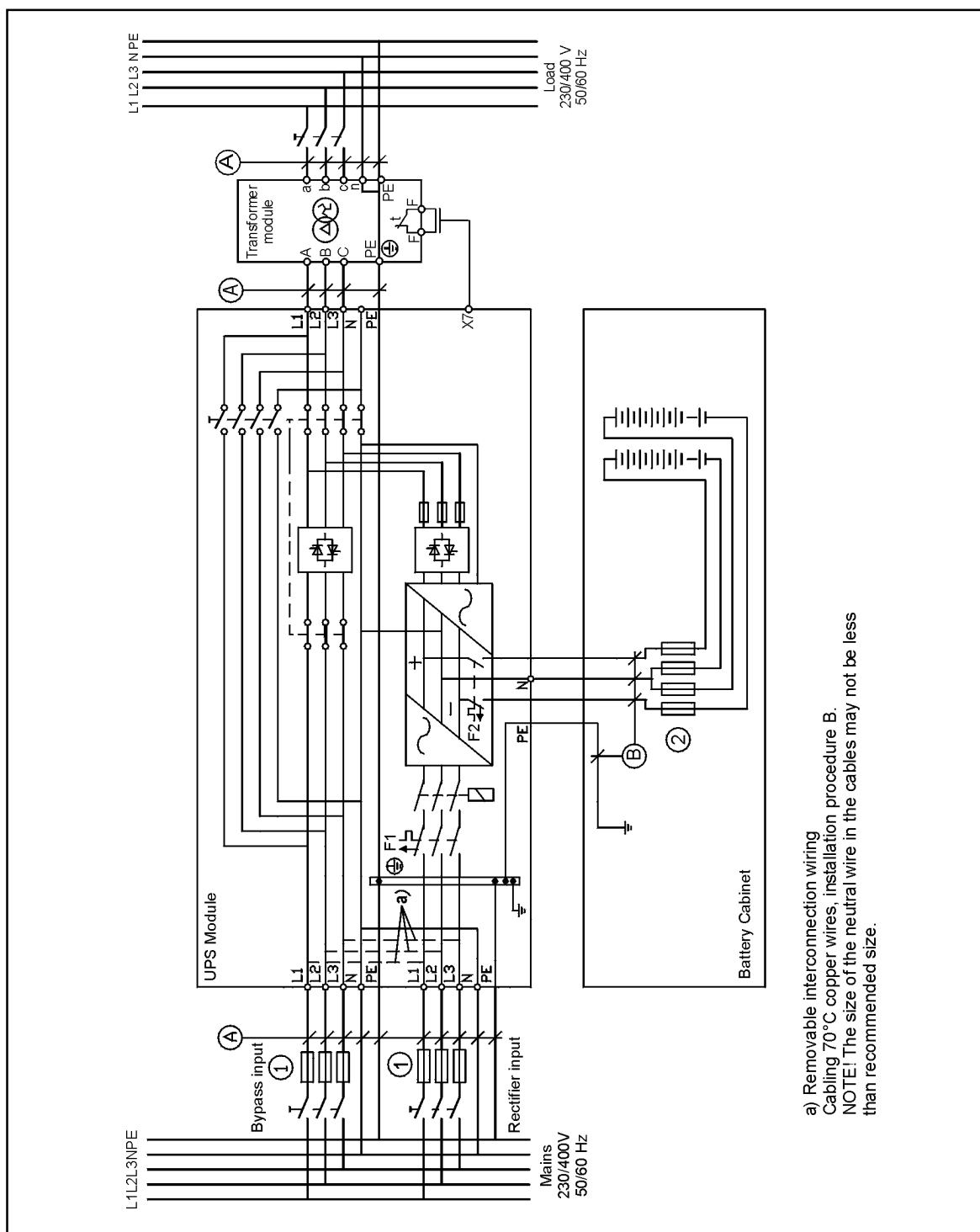## 1.5 Installation of transformer cabinet to the UPS system

Transformer is installed beside the UPS cabinet to right or left side. Power cables are routed through the cable's lead-in. The cover plate for cable terminals shall be opened to make correct connections. See the power connections of transformer module in figure 1. The connections between UPS and transformer shall follow the wiring drawing, figure 2 and 3.

Transformer cabinet has temperature monitoring and the cable from the transformer option has to be connected to the terminal X7 in the UPS. Wiring through the rear panel of UPS. Length of the cable is 5 meters.
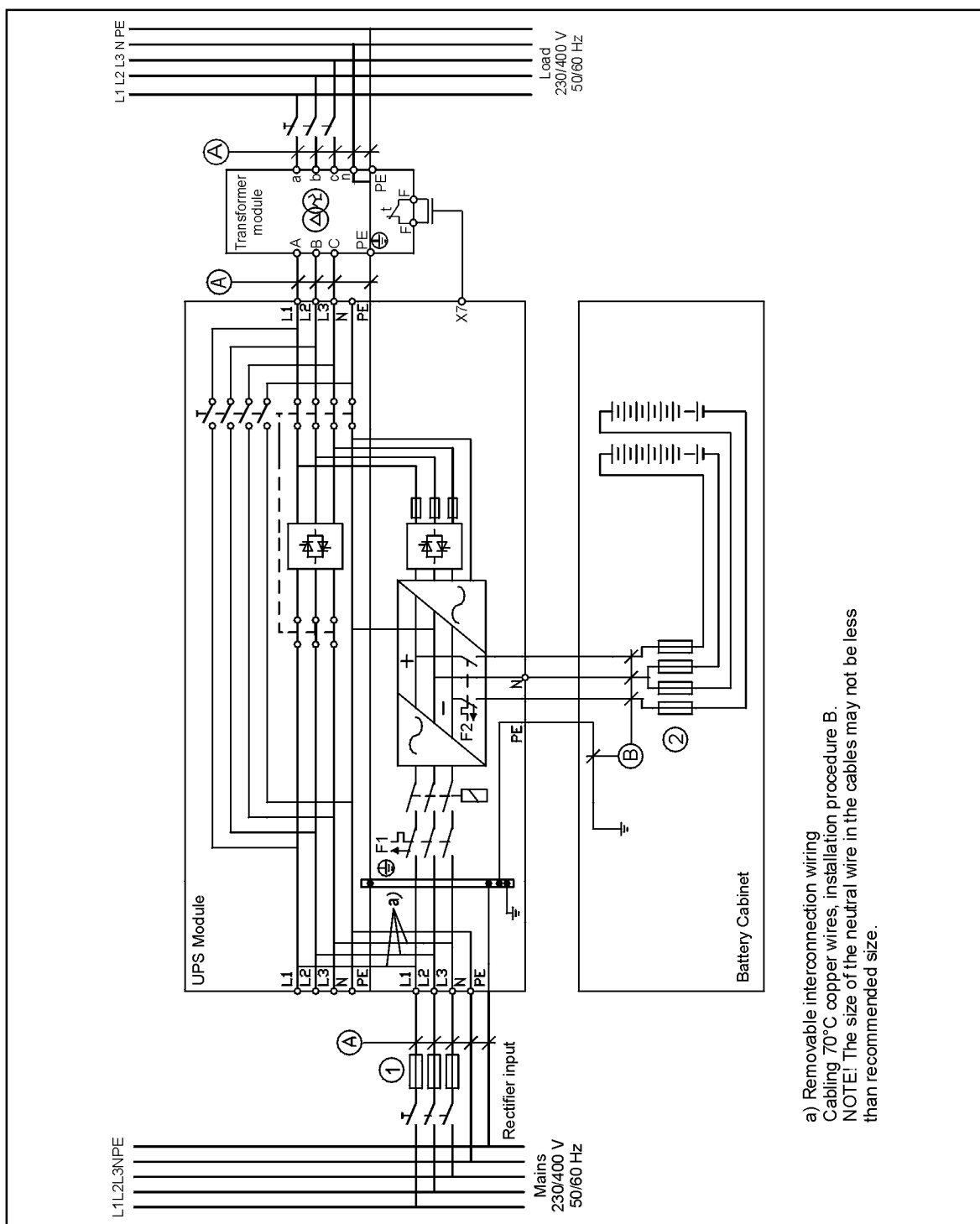
Fig. 2. Dimensions and location of the cable terminals in the transformer cabinet

Fig. 3 Five-wire installation of UPS units from 40 to 60 kVA with <u>two-cable</u> input.

Power	Fuse 1	Fuse 2	Cable A	Cable B
40 kVA	63 A	100 A	16 mm²	16 mm²
50 kVA	80 A	100 A	25 mm²	16 mm²
60 kVA	100 A	100 A	35 mm²	16 mm²

Table 1. Fuse and cable dimensions for five wire installations of UPS units from 40 to 60 kVA using two cable input. Note that the fuse numbers and the cable letters refer to the numbers/letters in figure 3.

Fig. 4 Five-wire installation of UPS units from 40 to 60 kVA with <u>single-cable</u> input.

Power	Fuse 1	Fuse 2	Cable A	Cable B
40 kVA	80 A	100 A	25 mm²	16 mm²
50, 60 kVA	100 A	100 A	35 mm²	16 mm²

Table 2. Fuse and cable dimensions for five-wire installation of UPS units from 40 to 60 kVA using single cable input. Note that the fuse numbers and the cable letters refer to the numbers/letters in figure 4.

1.6 Starting up the UPS with transformer option

Follow the starting up instruction of the main manual.

After the starting up the UPS must be configured to operate with the output transformer. With UPPM command P27V01 the overtemperature monitoring of transformer cabinet is activated.

Starting up is always performed by a service engineer of the manufacturer or by a representative of an agent by the manufacturer.

2. Technical specifications with transformer module

1. General

1.1 Rated power	40 kVA, 50 kVA and 60 kVA at p.f. 0,7, inductive or non linear load
1.2 Technology	On-line, double conversion topology with automatic bypass switch and maintenance bypass switch.
	Frequency independent operation.
1.3 Approvals	CE; Made in EU

2. Input

2.1 Rated voltage	220/380, 230/400, 240/415 Vac; three phase input
2.2 Voltage range 40 - 50 kVA	170/294 - 279/484 VAC without depleting battery
60 kVA	180/312 - 279/484 VAC without depleting battery
	196/336 - 279/484 VAC full charge capability
2.3 Rated frequency	50/60 Hz
2.4 Frequency range for rectifier	45 - 65 Hz
2.5 Nominal/max input current	40 kVA 3 x 47 A / 3 x 65 A
	50 kVA 3 x 60 A / 3 x 80 A
	60 kVA 3 x 70 A / 3 x 93 A
2.6 Input power factor	0.96

3. Output

3.1 Nominal voltage	220/380, 230/400, 240/415 VAC, selectable
3.2 Voltage regulation	< ± 2% static
	< ± 2% with 100% unbalanced load
	< ± 5% dynamic at 100% load change
	Response time 1 ms
3.3 Voltage distortion	< 2 % THD linear load
	< 8 % 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, 2.5, 6 Hz/sec, selectable

3.6 Over load   101% to 110% for 10 minutes (inverter)
                 111 - 125% for 60 sec (inverter)
                 126 - 150% for 30 sec (inverter)

                 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
                   15 000 m during transportation

4.4 Humidity   15 ... 90% RH, non-condensing
4.5 Audible noise   < 55 dBA at 1 meter distance
4.6 Protection class IP 21 S

5. Standards

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

6. Transformer module

6.1 Connection   Dzn0
6.2 Dimensions (W x D x H)   430 x 915 x 840 mm
6.3 Weight   290 kg

Output power with transformer	40 kVA 28 kW	50 kVA 35 kW	60 kVA 42 kW
Output peak current	3 x 200 A	3 x 200 A	3 x 200 A
Efficiency	89%	90%	90%
Power dissipation	3.5 kW	4.0 kW	4.4 kW
DC-voltage	2 x 288 V	2 x 288 V	2 x 288 V

When locating the EBCU to 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 EBCU is in use, there should be 100 mm clearance at the both sides and the rear of the EBCU for ventilation.

EBCU is located separately beside the UPS or it can be installed under the UPS or external battery cabinet.

5.2   Installation of EBCU beside the UPS

The length of cables allows the EBCU to be located 1 meter from UPS and external battery cabinet.

Fig 1. EBCU beside the UPS

When more than two external battery cabinets A or B are connected parallel, the battery cable from battery cabinet 1 is connected to battery cabinet 3 and so on.

5.3 Installation of EBCU under the UPS/battery cabinet:

Note the weight of UPS or battery cabinet when installing the EBCU under these cabinets.
If needed remove the batteries before installation.
Install the EBCU under the UPS or battery cabinets as follows:

• Lift the UPS / external battery cabinet so that all four feet and the wheels can be removed.

• Lift the UPS / external battery cabinet above the EBCU.

• Remove the front cover plate and both side plates of ECBU.

• Fix the EBCU to the UPS or battery cabinet by using four M10 screws, which will be installed to the holes of feet. The fixing screws M10 are delivered with EBCU.
See Fig 2.

• Reinstall the side plates of EBCU.

Fig. 2 Installation of EBCU under the UPS or battery cabinet.

5.4 Installation of signal cables

> ⚠ **WARNING**
>
> The UPS may contain high voltage internal battery bank, which can injure or kill personnel and damage equipment.

The control signal cable between the EBCU and UPS logic board is connected as follows:

- Remove front panels of UPS and the cover plate of the UPS circuit breakers.
- Remove the left side panels, the right side upper panel and the top plate of UPS.
- Install the signal cable from the front panel of EBCU (see fig 1 and 7) via the rear panel of UPS through the installation area to the terminal X121 on logic board of the single phase output UPS or to terminal X108 on the logic board of the three phase output UPS. Beside the terminals of X121 and X108 on logic board is marking "EXT CHARGER ". Signal cable should be connected to the cable holders on the cover plate of EBCU.
- Reinstall the top panel and upper side panels of UPS.

Potential free relay interface.

Behind the front cover plate of EBCU exists the two poles alarm relay terminal X42 . See Fig 7.

When the charger is running the relay is activated.

X42 contact	System state
Open	EBCU normal operation
Closed	Fault or EBCU shut down

5.5 Power connections

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

> ⚠️ **WARNING**
>
> **The EBCU contains high voltage and current, which can injure or kill personnel and damage equipment.**

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

UPS and the External battery cabinets are installed according to the installation manuals of the UPS and External battery cabinet.

The EBCU unit has the following power connections:

- Input power cable
  - for three phase input model EBCU/3/15:   3-phases and PE
  - for single phase input model EBCU/1/15:   1-phase, N and PE

- Output power cable: Plus (+) and minus (-).

Input and output cables are readily wired through the rear panel. Length of the input cable is 5 meters and output cable 1.5 meter.

Mains and load connections

1. Check that electrical connections to the installation site have been properly executed. Check fuse or circuit breaker ratings and cable dimensions against figures 3 – 6 The figure depends on the input of the charger (three phase or single phase) and the type of external battery bank.
    Fig 3. Three phase input charger with external battery cabinets A and B.
    Fig 4. Single phase input charger with external battery cabinets A and B.

    Fig 5. Three phase input charger with external battery bank.
    Fig 6. Single phase input charger with external battery bank.

2. Switch off the supply to the distribution point to which the EBCU is to be connected

3. For extra safety, also remove the fuses from the selected lines.

    Make absolutely sure that there is no power .

4 Connect the input cable to the distribution panel, which is for the EBCU.

5a) **Installation of the EBCU output cable to the external battery cabinets A or B:**
    Remove the cover plate on the rear panel of the external battery cabinet. See fig 1.
    Connect the terminals of the output cable of EBCU to the two connectors of the external battery cabinet.
    Connect the POS-marked terminals together.
    Connect the NEG-marked terminals together.
    Mount the metal plate of the battery cable to the rear panel of the external battery cabinet.

    The battery cabinet must be installed according to the Installation manual of the external battery cabinet.

5b) **Installation of EBCU output to the system where a separate battery bank is used without the UPS internal batteries:**
    The UPS must be provided with the cable kit for external battery cabinet.
    The code for the cable kit is 1008717.

    Remove the cover plate on the rear panel of UPS. See fig 1.
    Connect the terminals of the output cable of EBCU to the UPS installed battery connectors (connectors of cable kit).
    Connect the POS-marked terminals together.
    Connect the NEG-marked terminals together.
    Mount the cable lead through plate of the battery cable to the rear panel of the UPS.
    The external battery bank is connected directly the UPS battery breakers F2 and F3. See Fig 5 and 6.
    Remove the cables from the breaker F2 and F3, which are for internal batteries before connecting the battery cables of external battery bank.

6. Check that the signal cable is connected to logic board of UPS.

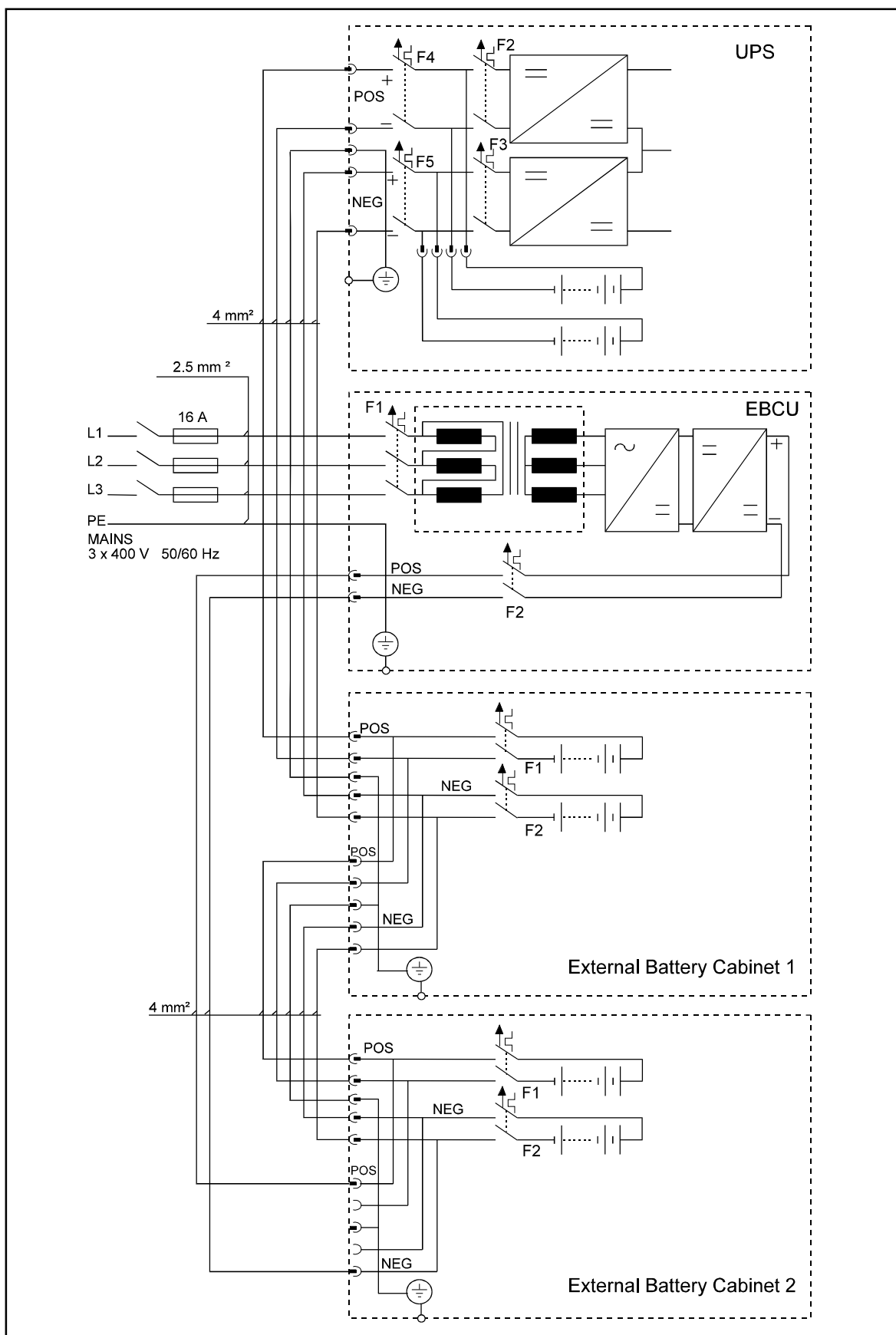7. If needed connect the alarm cable. See chapter 5.4

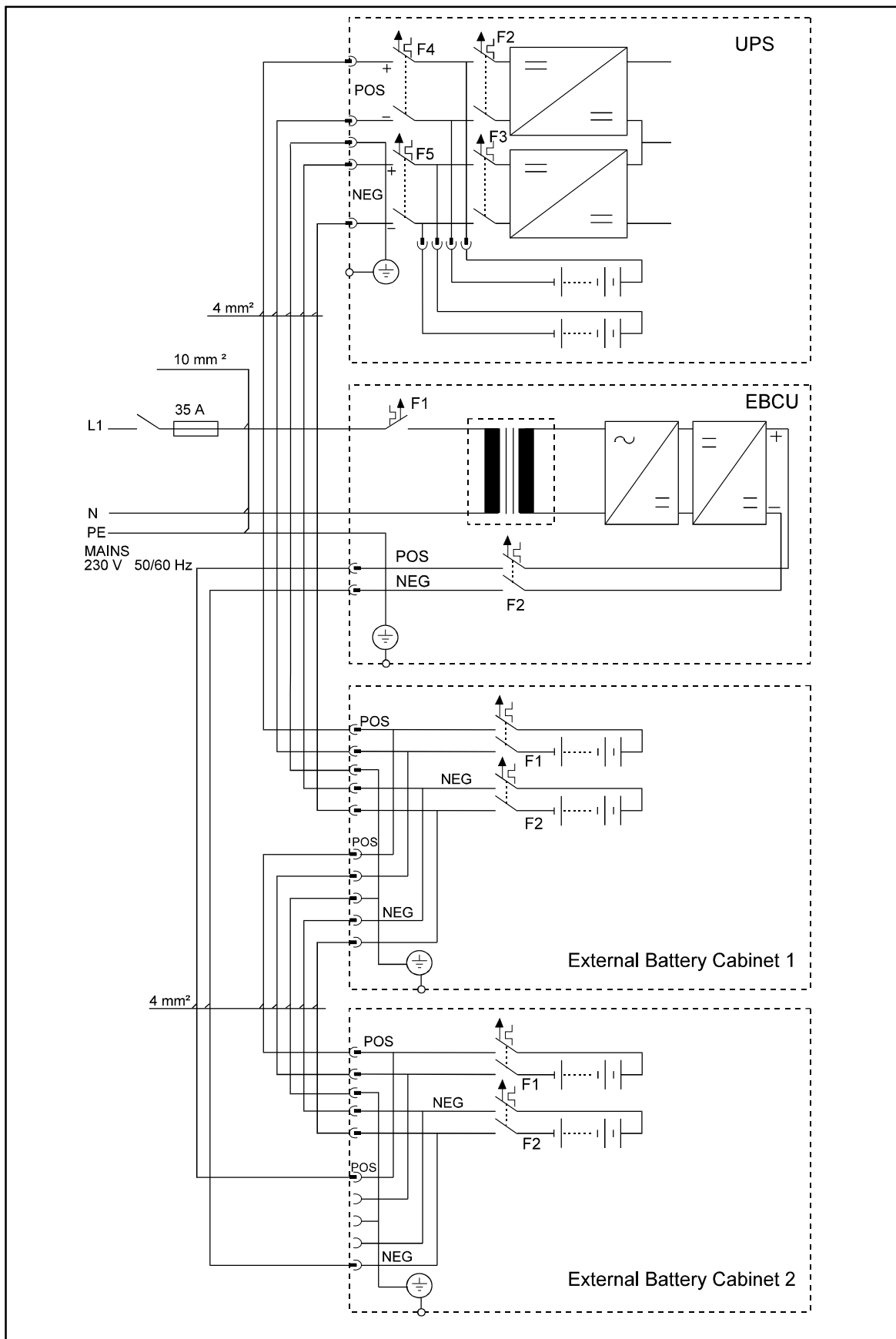Fig. 3. Installation drawing of EBCU with three phase input for external battery cabinets A and B.

Fig. 4. Installation drawing of EBCU with single phase input for external battery cabinets A and B.
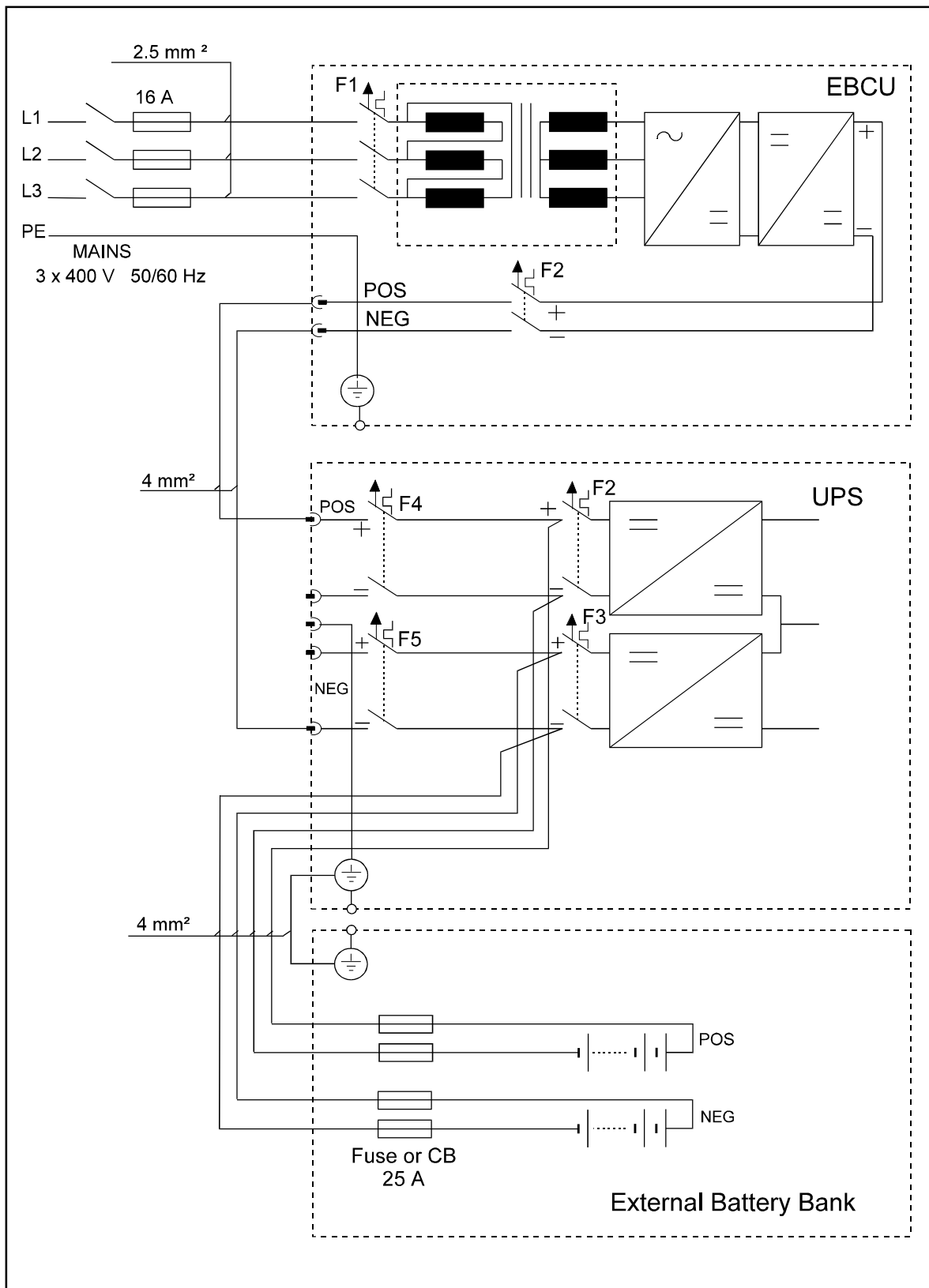
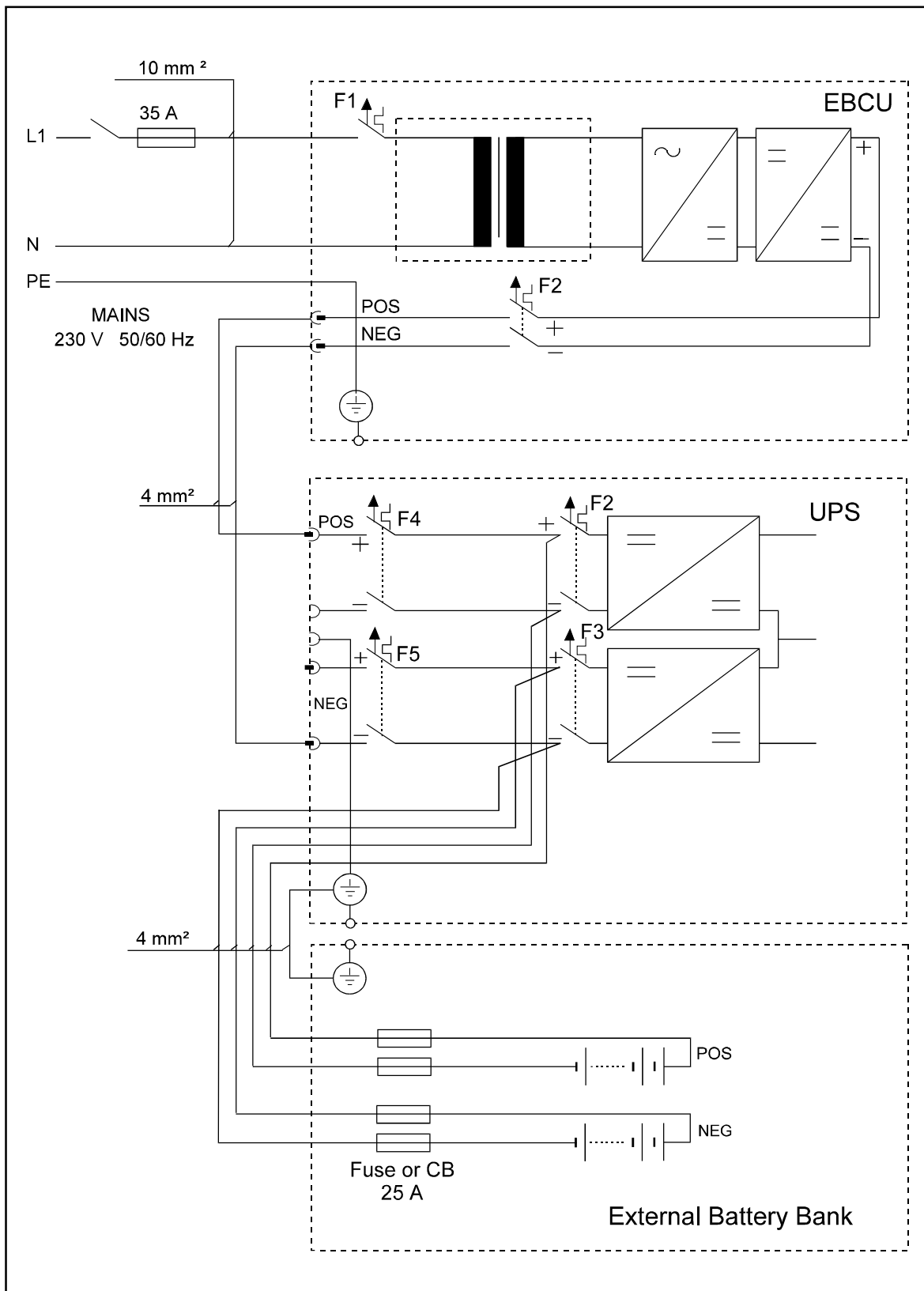Fig. 5. Installation drawing of EBCU with three phase input for the separate external battery bank.

Fig. 6. Installation drawing of EBCU with single phase input for the separate external battery bank.

6. Starting up the EBCU

Make sure that the EBCU installation has been carried out correctly. Figure 7 shows the location of the breakers.
UPS is started up according to the User's and installation manual of the UPS.
The initial start up of the EBCU or the output voltage adjustment must be carried out by service engineer from the manufacturer or from an agent authorised by the manufacturer.

6.1   Output voltage setting

The output voltage of the charger has been adjusted to 658 V, which is for 48 pcs12 V battery bank (288 cells). If the battery bank consists of 42 batteries, the voltage is changed during the first start up by using the PWCON service software.

The output current limit of the charger can be set to lower level, if it's needed to limit the input current. See the table of technical specifications, section 7. The adjustment of output current limit is done by using PWCON service software.

Starting up the EBCU

• Remove the front cover panel of EBCU.
• Turn the circuit breaker F1 to "1" position
• Turn the circuit breaker F2 to "1" position
• Check that yellow light is lit.
  Green lights are lit when UPS has given the starting up control signal to the EBCU
• After the first start up check that the output voltage of EBCU is correct for the battery bank (service engineer).
• Close the circuit breakers of the battery cabinets or the external battery bank.
  If the battery fuses are used, open the charger output breaker F2 before the fuses are installed.
• Reinstall the front cover panel of EBCU.

Shutting down the EBCU

• Remove the front cover panel of EBCU.
• Turn the circuit breakers F1 and F2 to "0" position
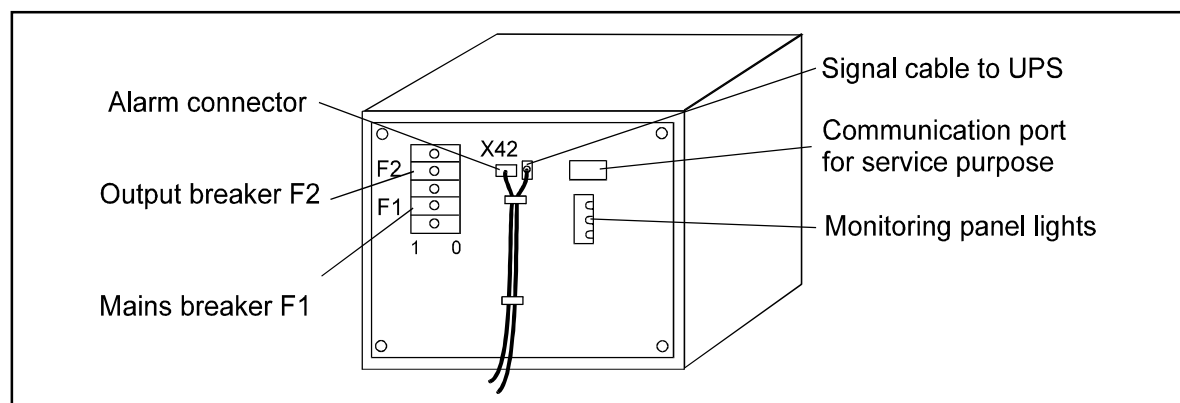• Reinstall the front cover panel of EBCU

Fig 7. EBCU from front view (Front cover panel removed)

7. Technical specifications

Input

Input voltage,   Single phase input   230 V ± 25 %

                        Three phase input   230/400 V ± 25 %

Input frequency   50/60 Hz

Input power factor,   Single phase input   0.99

                        Three phase input   0.94

Output

Output voltage   658 Vdc, for 2x144 cells
                                   (48 pcs 12 V batteries)
                         576 Vdc, for 2x126 cells
                                   (42 pcs 12 V batteries)

Output current   see table below

Environmental

Ambient temperature   0 to +40 °C operating

Ventilation   Fan cooling

Humidity   0-90% RH Non-condensing

Audible noise   < 50 dB(A) 1 m from front

Protection class   IP 21

Standards

Safety   EN 50091-1

EMC   EN50091-2 Class A

Immunity   EN50091-2

Physical dimensions

W*H*D   400*300*750 mm

Weight,   Single phase input model   80 kg

            Three phase input model   90 kg

Input and output currents:

Output current	Input current at 230 V	Input current at 400 V
3 ADC	10 AAC	3,5 AAC
5 ADC	16 AAC	6 AAC
10 ADC	30 AAC	10 AAC

User's and Installation Manual   1014205
                             External battery charger   Revision A

9305 TEST PROGRAM
for standard units
(service version)

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437	Rev D1
	Issued RR	6.5.2002	Page 1 (32)	

The test program is an additional information source to the test program **"9305 Cal"**. Numbers and values displayed in the different menu windows are symbolic, and shall therefore **not** be used as a reference. Aim values for UPSs can be found in their calibration instructions.

1. ICON

9305CAL_rev.K

- 9305 Cal : Test program for 9305 UPS family (7.5 – 60kVA)
- sw rev.(X): Test program's software revision.
- Double clicking the icon leads to the window "main menu".

2. MAIN MENU

	Title 9305 test program for standard units (service version)					
POWERWARE						
	Checked	Mh		No	1015437	Rev D1
	Issued	RR	6.5.2002	Page	4 (32)	

2.1 UPS Identification

Top left of the main menu (model, P/N and S/N) shows UPSs identification. See 3.1.1 for details.

.
2.2 UPS Status

Top middle of the main menu shows operation modes, battery conditions and alarm/status abbreviations.

2.3 UPS Measurements

The center of the main menu shows calibrated values, not actual values. For details see calibration instructions.

2.4 Product family

Lower right of the main menu shows the product family and the size of the UPS. For details see 2.

2.5 Data line status bar

Lower left to right of the main menu shows the data line status bar. Data line connection ok = green, connection interrupted = red.

2.6 Clean screen

Top right " CLEAN SCREEN " (ENTER) is only needed for some "older type" graphic accelerators, which do not support the "9305 CAL" test program. If the screen's visibility starts to deteriorate, press "ENTER" to refresh it.

3.MODEL F2 (main menu)

3.1 Read model (F2)

Reads UPSs model and displays P/N and S/N in the main menu.

3.2 Write new model (F3)

Is used for upgrades and repairs (in case of logic board change), asks for P/N, S/N and if upgrade, for the new code.

9305 TEST PROGRAM

3.2.1 Part number*:*

Requires P/N of UPS ?   upgrading, P/N of new size (model) UPS. Is the new
P/N rejected, update the modlist (see section 3.3).

3.2.2 Serial number

Requires S/N of UPS ?   usually stays the same when upgrading.

3.2.3 Upgrade code

Issued on request

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 7 (32)	

Ask for new update code from the factory. Have P/N and S/N of the updateable ready while asking.

Reseting UPS parameters...

Once all new data are entered, restart the UPS and check its data as a confirmation.

3.3 Update modlist (F4)

Is used to update the model list. List updates are usually announced by service Bulletin and distributed for the time being on a floppy disk (later on Internet).

F1 **COPY NEW MODLIST**   F2 **RESTORE OLD MODLIST**

ESC **CANCEL**

For updating the modlist, press "F5".

If the window shown above appears, check first of all, if the
Floppy disk containing the modest update file is insert properly
to drive "A" with "read only protection" OFF. Check if there are
any data on the disk in drive "A". Call service tech. support.

Return after the confirmation, that the update has been executed
to the main menu.

3.3.2 RESTORE OLD MODLIST (F2)

Is used to restore the old (current) modlist, if e.g. the update of the modlist
didn't succeed or the update process was accidentally initiated.

3.4 Read modlist (F5)

Displays the available 9305 models

Entering a valid part number and then clicking "SEARCH" (ENTER) will display the part number including the respective UPS model on top of the list.

3.4.1 MODLIST DETAILS (F1)

By clicking "DETAILS" (F1), basic data, standard option(s) and a window for project related features are displayed.

P/N: 1013994

TYPE STRING: 9305-30I-N-0

kVA RATING: 30

INPUT FILTER: NO

OUTPUT TRANSFORMER: NO

BATTERY VOLTAGE: 288

OTHER:

ESC
EXIT

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 12 (32)	

4. CALIBRATION, F3 (main menu)

Using function key F3 (main menu), the window seen below appears.

For each item, which can be selected from this window, there are one ore more submenus for calibration, adjustment and settings.

4.1 Calibration menu for standard units

Select any item from the submenu, except "PARALLEL" or items with ending "REG" (e.g. UOUT L1), and press OK.

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437	Rev D1
	Issued RR	6.5.2002	Page 13 (32)	

4.1.1 UPS measurement (VAC):   Measured value (UPS)

4.1.2 New value (VAC):   Measured value (DMM). Enter value manually and confirm with ENTER
.
4.1.3 Nominal calib. value: Nominal calibration value for current measurement.

4.1.4 Set nominal (F1):   Used, if nominal value is missing or wrong. For details see section 5.1 . Writes nom. calib. value to e²prom.

4.1.5 Current calib. value: Value stored in the e²prom.

4.1.6 New calib. value: Is calculated based on the difference between "UPS measurement" and New value" and the current calib. value.

4.1.7 Set new (F2):   Initiates a new setting, using the "New calib. value", storing the result in e²prom as shown below.

4.1.8 Product family: Displays UPS model and size.

4.2 Adjustment menu for standard units

The introduction of "Calibration menu for standard units" (3.3), covers most functional description of the following window. Therefore just the "regulator part" is explained. Select an item (sub menu 3.2) with the ending "REG" (e.g. UDC POS REG = regulator for positive bus voltage)

4.2.1 Change regulation value: Works like electronic trimmer changing in steps, like:

UDC…REG: ~ 2   V/step

UBATT…REG: ~ 0.77V/step

IBATT…REG: ~ 0.xxA/step

Explanation and use of other functions of this window, refer to section "3.3" .

5. *OPTIONS F5 (main menu)*

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 15 (32)	

5.1 NOMINAL VALUES F1

Writes all nominal values into the e²proms of rectifier and/or inverter. Nominal values can be seen in the "e²prom report" window, section 5.2 .

5.1.1 7.5 – 15kVA UNIT

The arrow (middle right) is used to select the UPS model.

5.1.2 20 – 60kVA UNIT

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 16 (32)	

20 – 60kVA units have e²proms on rectifier *and* logic board, in contrary to the 15kVA unit, where the e²prom is on the logic board.

Write default calibration values to EEPROM!
Use following file for default values
or select new from the list below.

C:\9305\TXT\N60230EE.TXT

EEPROM initialization for logic board p/n:1014585 or newer (default)

Are you sure?

Return	Esc
YES	NO

Text in window below confirms the data transfer.

Writing data to EEPROM.
AA9E > 00

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 17 (32)	

5.2 CREATE EPROM REPORT F4

```
  Esc          F1          F2
┌──────────┐ ┌──────────┐ ┌──────────┐
│   EXIT   │ │   SAVE   │ │  PRINT   │
└──────────┘ └──────────┘ └──────────┘

3N15 EEPROM REPORT                                      2.11.1999

MODEL:     Init-23071998F
PN:     0000000001010740
SN:     0000000000000681

Calibration values:
                      Value          Low limit      High limit
Input L1              E6/230         C8/200         FF/255          PASS
Input L2              E6/230         C8/200         FF/255          PASS
Input L3              E6/230         C8/200         FF/255          PASS
Bypass L1             E6/230         C8/200         FF/255          PASS
Bypass L2             E6/230         C8/200         FF/255          PASS
Bypass L3             E6/230         C8/200         FF/255          PASS
DC bus +              E6/230         C8/200         FF/255          PASS
DC bus -              E6/230         C8/200         FF/255          PASS
DC bus + reg. value   B7/183         A3/163         CB/203          PASS
DC bus - reg. value   B7/183         A3/163         CB/203          PASS
Battery + voltage     E6/230         C8/200         FF/255          PASS
Battery - voltage     E6/230         C8/200         FF/255          PASS
Battery + current     E6/230         A0/160         FF/255          PASS
Battery - current     E6/230         A0/160         FF/255          PASS
Output L1 voltage     E6/230         C8/200         FF/255          PASS
Output L2 voltage     E6/230         C8/200         FF/255          PASS
Output L3 voltage     E6/230         C8/200         FF/255          PASS
Output L1 current     E6/230         C8/200         FF/255          PASS
Output L2 current     E6/230         C8/200         FF/255          PASS
Output L3 current     E6/230         C8/200         FF/255          PASS
```

The chart above shows nominal values, low and high limits of a standard unit. The listed numbers in this chart are fictive. Once the UPS has been adjusted, the numbers below "Value" will have changed from nominal to calibrated values. The e²prom report is accepted, if the models P/N could be identified and all of the calibrations are within their limits.

5.2.1 SAVE (F1): Displays the saving location

```
┌────────────────────────────────────────────┐
│  Save file as:                               │
│                                              │
│  ┌─────────────────────────────────────┐    │
│  │ C:\9305\REPORT\ER.TXT               │    │
│  │                                     │    │
│  └─────────────────────────────────────┘    │
│                                              │
│        Enter          Esc                    │
│     ┌─────────┐    ┌─────────┐               │
│     │   OK    │    │ CANCEL  │               │
│     └─────────┘    └─────────┘               │
└────────────────────────────────────────────┘
```

5.3 Send UPPM to UPS (F2)

UPPM's are used, to (re)configure, update the UPS. A submenu displays the possible changes per item, shown below. Refer to the UPScode II serial interface protocol, 1011496.

Whenever configuring an UPS at site, remember to document it by updating the final test protocol and inform the responsible supervisor. *Restart the UPS after sending a UPPM*.

5.4 Reset UPS UPPMs by UPRP command F3

Resetting UPPMs will have the following consequences: See document "serial interface protocol" 1011496F, section 2.9.2 (page 18).

5.5 Set factory setting mode off (F5)

Shall be done after any communication between "Hot Sync Red. UPS's" and PC (for both units separately), to protect an uncontrolled use of UPS's RS232 ports. With standard units, the 9305 test program automatically sets the factory mode off, when closing down (exit).

POWERWARE	Title 9305 test program for standard units (service version)				
	Checked Mh		No	1015437	Rev D1
	Issued RR	6.5.2002	Page	20 (32)	

5.6 Alarm log (F6)

The "alarm log displays the latest 8 alarms in the sequence they appeared, last on top. Since the UPS has no active real time clock, the time listed, **is the time between two incidents. Example :**

000d 00:00:05 Neutral FAULT (third latest alarm) means: There was neutral failure detected, 18 seconds after UPS went to bypass operation.

Note: The time is displayed in **"d"** for days, hours, minutes and seconds. Always when **"unknown time"** is displayed, it means, that the UPS has been manually switched off before the incident

5.6.1 RESET ALARM LOG (F1)

Resets the alarm log of the UPS the PC is connected to.

POWERWARE	Title 9305 test program for standard units (service version)				
	Checked Mh			No 1015437 Rev D1	
	Issued RR		6.5.2002	Page 21 (32)	

9305 TEST PROGRAM

5.6.2 SAVE TO DISK (F2)

Please write the new name for the current service log data:

245527

ENTER
SAVE

ESC
CANCEL

5.6.2.1 Save (Enter) Stores the data in the folder

5.6.3 SHOW STORED DATA (F3)

245527

ENTER
SHOW

F1
DELETE

ESC
EXIT

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437	Rev D1
	Issued RR	6.5.2002	Page 22 (32)	

5.6.3.1 Show (Enter) Shows the content of the highlighted alarm log.

5.6.3.2 Delete (F1) Deletes the highlighted alarm log.

Before the selected alarm log can be deleted, the window below opens to remind of the following action.

POWERWARE	Title 9305 test program for standard units (service version)				
	Checked Mh		No 1015437		Rev D1
	Issued RR	6.5.2002	Page 23 (32)		

5.7 SET COM PORT

```
CHECK LIST
1. connect rs-cable in UPS and this computer
2. UPS is on (aux power on)
3. all others terminal programs are closed

              OK
```

Proceed according "CHECK LIST" and test COM PORT by pressing "F1".

```
COM PORT:1
TESTING...

     F1                 ESC
FIND COM PORT          EXIT
```

Save "COM PORT", see below.

```
USE/SAVE NEW COM PORT
   OK        Cancel
```

5.7 ABOUT (HOME)

Displays the test programs *P/N, S/N, revision and owner.*

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 25 (32)	

6. TERMINAL

The document 1011496 , serial interface protocol, describes the commands and messages.

Important ! After the use of the "TERMINAL" mode, close it's window,
otherwise the 9305 test program is blocked for further use !

POWERWARE	Title 9305 test program for standard units (service version)			
	Checked Mh		No 1015437 Rev D1	
	Issued RR	6.5.2002	Page 26 (32)	

7. PAUSE

Pauses the data communication between UPS and PC.

8. CONFIGURATION ERROR RESET (SHIFT + F10)

Data communication problems between UPS and PC can lead to a "checksum error". Update the checksum with SHIFT+ F10 (main menu) ? "OK".

POWERWARE	Title 9305 test program for standard units (service version)				
	Checked Mh			No 1015437 Rev D1	
	Issued RR		6.5.2002	Page 27 (32)	

9. *ERROR MESSAGES AND REMEDIES*

If an error message occurs, try to solve the problem according the displayed text in the message window. The following few examples shall inform about common error messages:

Refer to section 3.2, write new model F3 ----- no data connection to UPS. Check data cable, com port and com port settings.

Refer to section 3.2.3, UPGRADE CODE ----- get reconfirmation for the correct numbers of the code.

The test program doesn't know the identification data of the unit it is connected to. Refer to section 3.2, "read model" F2 .

POWERWARE	Title 9305 test program for standard units (service version)		
	Checked Mh	No 1015437 Rev D1	
	Issued RR 6.5.2002	Page 28 (32)	

Refer to section 3.5, Update modlist F4 ----- check, if there is a
floppy disk in drive "A" with the update information.

Modlists data has been corrupted or extinguished ----- reload the new
modlist data from floppy disk. Refer to section 3.5 .

Refer to section 5.1, NOMINAL VALUES F1 ----- message appears,
if data connection is interrupted or is faulty.

POWERWARE	Title 9305 test program for standard units (service version)		
	Checked Mh		No 1015437 Rev D1
	Issued RR	6.5.2002	Page 30 (32)

ERROR!
UPS doesn't return a parameter value.
Operation cancelled.

OK

Refer to section 5.3, Send UPPM to UPS F2 ----- data connection
between UPS and PC loose (bad).

Can't read EEPROM header!

Check:

-RS-cable in place
-aux power supply is on
-Com port setting is correct (press F10 to set com port)

OK

In menu option without proper data connection ---- proceed like
advised in the message window.

Can't read EEPROM!!!!

OK

Refer to section 8, CONFIGURATION ERROR RESET (SHIFT F10) -----
no data connection between UPS and PC.

NOTE: Cirquits for 3N30 Page 1
Cirquits for 3N30NHS Page 2

Internal battery

Neg   A12 Pos

External battery cabinet

BYPASS INPUT 3x400V 50Hz

UPS OUTPUT 3x400V 50 Hz

RECTIFIER INPUT 3x400V 50 Hz

BYPASS INPUT

RECT AND STATIC SW MODULE A2

BOOST A4

INVERTER A6

BATTERY CHARGER A1

DISPLAY BRD A11

OFF/ON SWITCH S1

A10 LOGIC BOARD

X3	X100	X101	X102	X4	X219			X204	X210	X107 X108
X6	X100	X101	X102	X4	X219 X220 X221 X222			X7	X12	

Ext batt cabinet temp sensor / RS1 / RS2 Modem / Relay interface / Emerg power off / Gener. on inp.inv on/off / Remote inv on/off inp / Extern. Bypass Sw. inp / Environment alarm inp. / Trafo over temp / Filter over temp / Bypass back-feed / External charger enable

POWERWARE

Title: SCHEMATIC DRAWING
MAIN CIRCUITS
3N30

Checked: JSa   Approved: 03.02.99/TT   Loc: FIN

No: 10 13 284   Rev: G1
Size: A3   Page: 1/2

Rev/ECO no:
G/12730 jS
G1/12817 jS
E/12291 TS
F/12366 IN
C/12127 VK
D/12162 MA
A/11905 TT
B/12069 IN

Internal battery

Neg   +   +   A12 Pos

External battery cabinet

X8   X9   PE

J3/P3   J4/P4   J6/P6
J5/P5

NOTE: Cirquits for 3N30 Page 1
Cirquits for 3N30NHS Page 2

UPS OUTPUT
3×400V
50 Hz

BYPASS INPUT
3×400V
50Hz
X2

L1
L2
L3
N

X11 X29
X10 X28
X9 X27

A9/1 RFI

BYPASS INPUT

UPS OUTPUT

V12
V13
V14

RECT AND STATIC SW MODULE   A2

L1   B1
L2   B2
L3   B3
St Sw BRD A2/A1

X21 X3
X20 X2
X19 X1

RFI A9/3

E7
X14

X22 X4
P1/J1

UPS OUTPUT
3×400V
X3

L11   L1
L12   L2
L13   L3

N

F2

L1 L2

B7

BOOST A4

E1-E6

F3   F5
F4

S2
OUTPUT TRIPPING SWITCH

PE

V5 V6 V7   V8

RC1
C7

RC2

V9

C8

X18   X1 X3

+ CHARGER

R1
R2

X30
X40

B1

X4

Neutral

- CHARGER

X20
X7

X17 X1

X13

BATTERY CHARGER A1

B2

X5

V10

INVERTER A6

V11

BOOST BRD A4/A7

A4/A4 POS SN. BRD

C9   C11
C10 C12

A4/A5 NEG SN. BRD

C13
C14   C16
C15

V3   V2 V1

SNUB. BRD A6/A6

INVERTER BRD A6/A3

X302
X202
X102

J1/P1   L5
L6
B100

L7
L8
B200

L9
L10
B300

C1 C2 C4 C6
C3   C5

K2

X1

RECTIFIER INPUT
3×400V
50 Hz

F1   A9/2 RFI   K1

X1
L1   X7 X25
L2   X6 X24
L3   X5 X23
N   X8 X26

J2/P2

OFF/ON SWITCH
S1

S1 70°C
S2 80°C

X12
X6
X22

X5 X9 X19 X108 X8 X21

L3
L4

B6

S1 70°C S2 80°C

A4

S1 70°C   S2 80°C

3   4

1   2

N
Ø

J7/P7   J8/P8

X1 X2 X7 X110

X208 X209   X8 X206 X207   X111

X112

A10 LOGIC BOARD

S1 70°C S2 80°C

X5 service outlet

F3

DISPLAY BRD A11

X4   6   X216

X6
A300 I/O -BRD
X2
10   X2

A5 I/O -CONNECT BRD
X2
X3   X4
Parallel UPS

X3 X100 X101 X102 X4   X219   X204 X210 X107 X108

X6 X100 X101 X102 X4   X219 X220 X221 X222   X7 X12

Ext batt cabinet temp sensor | RS1 | RS2 Modem | Relay interface | Emerg Gener. power on off | Remote on/off inv off inp | Extern. Bypass Sw. inp | Environment alarm inp. | Trafo over temp | Filter over temp | Bypass back-feed | External charger enable

Rev/ECO no:
G/12730 jS   G1/12817 jS
E/12291 TS   F/12366 IN
C/12127 VK   D/12162 MA
A/11905 TT   B/12069 IN

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Circuits for 3N60NHS on page 2

NOTE: Parts with reference designators in parenthesis are not used in PW9305-40i-NX unit

Temp sensor

BATTERY CABINET

BYPASS INPUT 3x400V 50Hz

RECTIFIER INPUT 3x400V 50Hz

UPS OUTPUT 3x400V 50 Hz

MECH BYPASS

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DISPLAY BRD A11

RS1 RS2 Modem Relay inter-face Emerg power off Gener. on inp. Remote inv on/off inp. Extern. Bypass Sw. inp Envir-onment alarm inp. Trafo over temp Filter over temp Bypass back-feed External charger enable

A10 LOGIC BRD

Title	SCHEMATIC DRAWING		No	Rev
POWERWARE	MAIN CIRCUITS		10 14 333	H
	3N60			
Checked TT	Approved 23.07.99/AN	Loc FIN	Size A3	Page 1/2

Circuits for 3N60NHS

Schematic drawing of the main circuits for the Powerware 3N60 NHS UPS system.

Title	SCHEMATIC DRAWING	
	MAIN CIRCUITS	
	3N60 NHS	

POWERWARE

No	Rev
10 14 333	H

| Checked | TT | Approved | 23.07.99/AN | Loc | FIN | Size | A3 | Page | 2/2 |

Circuits for 3N80NHS on page 2

BATTERY CABINET — Temp sensor — BATTERY CABINET

SCHEMATIC DRAWING
MAIN CIRCUITS
3N80

POWERWARE

Title

No: 10 19 388   Rev: B

Checked EP   Approved 24.01.02/TT   Loc FIN   Size A3   Page 1 / 2

Rev/ECO no:
A/12640 TT
B/12730 JS

Circuits for 3N80NHS

BATTERY CABINET — Temp sensor — X1 X2 — F2 F1
Temp sensor — X1 X2 — F2 F1 — BATTERY CABINET

BYPASS INPUT 3x400V 50Hz

BATTERY CONNECTION

INVERTER L1

POS BOOST/ STATIC SWITCH A2/2

A9/1 RFI

INVERTER A6/A3 CONTROL 2 BRD X200 X201

INVERTER A6/A2 X1 CONTROL 1 BRD X5 X6 X9 X100 X101

POS BOOST/ STATIC SWITCH A2/1

NEG BOOST/ RECTIFIER A3/2

BATTERY CHARGER BRD A1

BOOST BOARD

INVERTER L2 A7

RFI A9/3

UPS OUTPUT 3x400V 50 Hz

A9/2 RFI

OFF/ON SWITCH S1

INVERTER L3 A8

A3/1 NEG BOOST/ RECTIFIER

STATIC SWITCH BRD A8

OUTPUT TRIPPING SWITCH S2

RECTIFIER INPUT 3x400V 50Hz

DISPLAY BRD A11

I/O BRD A300

A10 LOGIC BRD

service X5 outlet

I/O-CONNECT BRD A5

Parallel UPS

RS1 RS2 Modem Relay inter-face Emerg power off Gener. on inp. Remote inv on/off inp. Extern. Bypass Sw. inp Envir-onment alarm inp. Trafo over temp Filter over temp Bypass back-feed External charger enable

POWERWARE

Title	SCHEMATIC DRAWING		No	Rev
	MAIN CIRCUITS		10 19 388	B
	3N80 NHS			
Checked EP	Approved 24.01.02/TT	Loc FIN	Size A3	Page 2/2

Rev/ECO no:

Rev/ECO no: A/12640 TT   B/12730 jS

Schematic drawing
Charger board
3N30-3N80

POWERWARE

TITLE	Schematic drawing	
	Charger board	
	3N30-3N80	
NO	10 10 780	REV 1
CHECKED EP	APPROVED 11.06.02 JP	LOC FIN
	SIZE A3	PAGE 1/3

TITLE	Schematic drawing		NO		REV
	Charger board		10 10 780		I
POWERWARE	3N30-3N80				
CHECKED EP	APPROVED 11.06.02 JP	LOC FIN	SIZE A3	PAGE 2/3	

	CURRENT LIMIT									GATE RESISTORS			
Negative Boost	R242	C100	R30	R230	R185	R186	R192	R292		R4	R3	R2	R1
Positive Boost	R246	C120	R31	R231	R190	R191	R193	R293		R18	R17	R9	R8
1013177C 20-30kVA	1k00	1n0	N.A.	N.A.	1k00	11k0	N.A.	N.A.		N.A.	38R3	38R3	82R5
1014265A 40-60kVA	2k15	470p	N.A.	N.A.	2k15	14k7	N.A.	N.A.		12R1	12R1	12R1	82R5
1017448 20-30kVA	1k00	1n0	4k64	11k0	1k47	N.A.	11k0	N.A.		N.A.	N.A.	14R7	82R5
1017448 40 NX	1k00	1n0	4k64	11k0	1k47	14k7	N.A.	23k7		6R8	N.A.	N.A.	N.A.
1017448 40-60kVA	1k00	1n0	4k64	11k0	N.A.	14k7	N.A.	N.A.		6R8	10R	14R7	82R5
1017448 80kVA	1k00	1n0	4k64	N.A.	N.A.	N.A.	11k0	N.A.		6R8	10R	14R7	82R5

N.A.=NOT ASSEMBLED

* MARKED COMPONENTS: SEE VALUES ON TABLE

POWERWARE	TITLE Schematic drawing	
	Boost board	NO 10 14 672
	3N20-3N80	REV E
CHECKED si	APPROVED 16.01.02 JP	LOC FIN	SIZE A3	PAGE 1/1

GND

R39 R40 R41
21R5 21R5 21R5

| 1 | 2 | TP10
CONN PIN2

FET MODULE3/B   DSE130-06A

GND 3

R42
21R5

V10
MODULE

DIODE DSE130-06A

V14

R 1% 2W5

R 1% 2W5

R 1% 2W5

R 1% 2W5

C33
1N 1600V

CHOKE

HEATS 10K/W TO220
HS2

| 1 | 2 | TP12
CONN.PIN2

V25 DIODE DSE130-06A

C 1U 630V
C41
1U
630V

C PRO 1N 1600V

C31
1N
1600V

CHOKE

1

C PRO 1N 1600V

DSE130-06A

C PRO 100N 630V   C PRO 1U 630V   C PRO 1U 630V
C32   C22   C3

4×50R   5W

2

-DC

R54
21R5
R55
21R5

R 1% 2W5

R 1% 2W5

R 1% 2W5

R 1% 2W5

R53 21R5
R52 21R5

CONN MOLEX3/B
X5
| 3 |
| 2 |
| 1 |

100N   1U   1U
630V   630V   630V

C PRO 1N 1600V   C PRO 1N 1600V

C34   C35
1N   1N
1600V   1600V

-DC

| 1 | 2 | TP9
CONN PIN2

R5 R6 R7 R8

RES/90/5W

-DC

OR
×| ORIGO

TITLE	Schematic drawing		NO			REV
EXIDE ELECTRONICS	Neg.Snubber board			10 11 648		A
	Nautilus 3N60					
CHECKED AN	APPROVED 30.04.99 JP	LOC FIN	SIZE A4		PAGE 1/1	

+DC

R28 R29 R30
21R5 21R5 21R5

+DC
1 2 TP11
CONN.PIN2

R31
21R5

RES/90/5W

R IX 2 MR5
R IX 2 MR5
R IX 2 MR5
R IX 2 MR5

CONN.MOLEX3/B
X4
3
2
1

FET MODULE3/B

+DC 3

V9
MODULE

C PRO IN 1600V

C17
1N
1600V

C PRO IN 1600V

C18
1N
1600V

CHOKE
1 2 TP8
CONN.PIN2

DIODE DSEI30-06A

V24

R1 R2 R3 R4
4×50R 5W

C PRO 100N 630V

C4

C PRO 1U 630V

C1

C PRO 1U 630V

C2

CHOKE

1

CHOKE

B2

E2

2

GND

V15

DIODE DSEI30-06A

DSEI30-06A

R IX 2 MR5
R IX 2 MR5
R IX 2 MR5
R IX 2 MR5

R47 21R5
R45 21R5
R43 21R5
R27 21R5

DSEI30-06A HS1
HEATS 18K/W TO220

100N
630V

1U
630V

1U
630V

C PRO 1600V

C15
1N
1600V

C PRO IN 1600V

C16
1N
1600V

GND
1 2 TP13
CONN.PIN2

C PRO 1U 630V

C40
1U
630V

OR
ORIGO

EXIDE
ELECTRONICS

TITLE Schematic drawing
Pos.Snubber board
Nautilus 3N60

NO
10 11 592

REV
A

CHECKED AN   APPROVED 30.04.99 JP   LOC FIN   SIZE A4   PAGE 1/1

POWERWARE

TITLE	Schematic drawing				
	POS.SNUBB & PSU 3N80			NO	REV
				10 19 334	A
CHECKED HM	APPROVED 14.02.02 JP		LOC FIN	SIZE A4	PAGE 1/1

THIS DRAWING CONTAINS PROPRIETARY
INFORMATION OF POWERWARE AND MAY NOT,
IN WHOLE OR IN PART,BE DUPLICATED OR
DISCLOSED OR USED FOR MANUFACTURE OF
ANY PART DISCLOSED HEREIN WITHOUT THE
PRIOR WRITTEN PERMISSION OF POWERWARE.

Schematic drawing — NEG.SNUBB & PSU 3N80

Bypass In L1

V12   GB   FET MODULE1
3
2
1
GA
RC1
CAP 1U×26.5/9M

R47 100K
R46 100K
R48 2K61
C23 10N

X4 MBypass1
4

X5
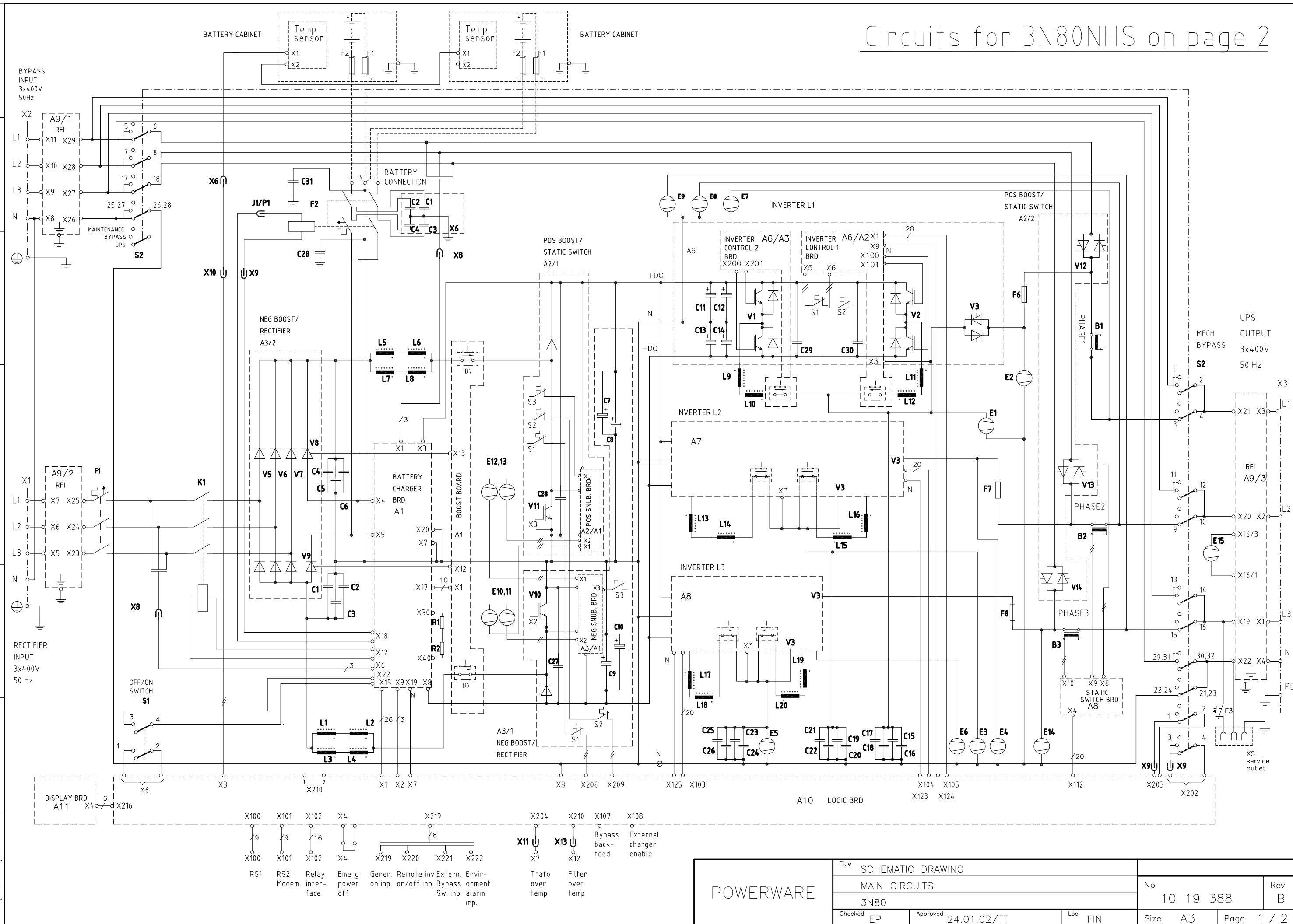FASTON 6.3   UPS Output L1
Uout Inv1
R37 100K
R38 100K
R39 2K61
C20 10N

CURRENT TRAFO4
R31 100R
R32 100R
C17 1U
MIout1 X4 3
MUout1 2

Bypass In L2

V13   GB   FET MODULE1
3
2
1
GA
RC2
CAP 1U×26.5/9M

R50 100K
R49 100K
R51 2K61
C24 10N

X4 MBypass2
8

X6
FASTON 6.3   UPS Output L2
Uout Inv2
R42 100K
R40 100K
R41 2K61
C21 10N

CURRENT TRAFO4
R33 100R
R34 100R
C18 1U
MIout2 X4 7
MUout2 6

Bypass In L3

V14   GB   FET MODULE1
3
2
1
GA
RC3
CAP 1U×26.5/9M

R53 100K
R52 100K
R54 2K61
C25 10N

X4 MBypass3
12

X7
FASTON 6.3   UPS Output L3
Uout Inv3
R45 100K
R43 100K
R44 2K61
C22 10N

CURRENT TRAFO4
R35 100R
R36 100R
C19 1U
MIout3 X4 11
MUout3 10
CONN FLAT16

	R32	R34	R36
3N15	–	–	–
3N30	X	X	X

X = ASSEMBLED

X4 Bypass thy
1

VDD
R1 3K16
R2 1K00
C1 10N

VDD
C13 100N

A1-D 4069
A1-E 4069
A1-F 4069
R29 3K16
C12 100P
R30 3K16

VDD
A2 4024
CTR 7
CT=0
4024

A1-A 4069
A1-B 4069
A1-C 4069
R55 10R0
R56 10R0

VDD
C10 470N
C11 10U 25V

V1 IRF D110
R3 21R5
V2 56V 1W3
C2 470P

V6 IRF D110
R16 21R5
V7 56V 1W3
C6 470P

T1-A EF32E
T1-D
V3 BYV27-100
4×46R4 R58 R4 R5 R6
C26 470N
R13 100R
X1 V12 GA / V12 GB

T1-C
V4 BYV27-100
4×46R4 R59 R7 R8 R9
C27 470N
R14 100R
X2 V13 GA / V13 GB

T1-B
V5 BYV27-100
4×46R4 R10 R11 R12
C28 470N
R15 100R
X3 V14 GA / V14 GB
C5 10N

C32 N A
R64 N A
C3 10N
C4 10N

T2-A EF32B
T2-D
V10 BYV27-100
4×46R4 R61 R18 R17 R23
C29 470N
R21 100R

T2-C
V9 BYV27-100
4×46R4 R62 R25 R24 R26
C30 470N
R19 100R

T2-B
V8 BYV27-100
4×46R4 R63 R28 R22 R27
C31 470N
R20 100R
R65 N A
C33 N.A.
C7 10N
C8 10N
C9 10N

HS1   HS2
HSINK BK/V 18228

X4 Backup supply
13
14
5
9
15
16
R57 N.A.
C15 1U
A3 LM7812
C16 100N
V11 1N4446

Bypass In L1 · U1B · BP1 · MBypass1 · MUout1 · MIout1

Bypass In L2 · U2B · BP2 · MBypass2 · MUout2 · MIout2

Bypass In L3 · U3B · BP3 · MBypass3 · MUout3 · MIout3

Bypass thy · BP En

Aux supply · Backup supply

Inv trp · Inv.trip

EXIDE ELECTRONICS	TITLE	Schematic drawing	NO	REV
		3N60P St.switch board	10 12 968	A
CHECKED AN	APPROVED 11.10.99 JP	LOC FIN	SIZE A3	PAGE 1/1

X1

19	N.C.
20	N.C.
23	+15V
24	
21	GND
22	
25	-15V
26	
6	Inverter En
5	
4	Inv Thy

HS2
A2 LM7812
TP5
C19 100N
C15 470N
VCC
C40 10U 25V
C18 470N
C41 10U 25V
C20 1U
C22 1U
A3 LM7912
HS1
V7 1N4446
V8 1N4446
TP5
VEE

R124 3R3
RES R135 N.A.
V64 1N4446
V63 1N4446
HS9
V134 1N4446
V75 MJE15031 TO220
R136 4K64
VEE
R25 3K16
R27 1K00
V9 MPS2907A
H1 GREEN
V119 1N4004
V155 3K16
V80 MPS2907
X21 Inverter contactor
R138 3K16
R137 2K15
V52 IRFP460
R154 121K
X13 N.A.
R153 6K81
V88 10V
C89 27000UF 35V CAP.SNAP 4M/35
R85
V180ZA1 VARISTOR/16MM
VEE

R28 1K00
R30 3K16
V10 8V2
V11 10V
R26 2K15
V12 MPS2222A
C21 10N
R39 3K16
R29 3K16
V+
V13 1N4446
A302-B
A102-B
4093
P

VCC
A4-A 14
A4-B
A4-C
4069
R31 3K16
R32 3K16
C23 100P
C24 100N
A5 4024 CTR 7
CT=0
CT=
4069
A4-D
A4-E
A4-F
V14 IRFD110

VCC
R36 3R3 FUSIBLE
V+
C25 470P
C26 1U
C27 1U
EFD20 T1
EFD20 T2
C38 N.A.

V15 BYV27-200
C28 22U 25V
TP6 G
C32 470P
R34 21R5
C29 22U 25V
TP6 H
V16 BYV27-200
TP6
V17 BYV27-200
C30 22U 25V
TP7 A
C39 N.A.
R38 N.A.
V18 BYV27-200
C31 22U 25V
TP7 B
TP7 C
V19 BYV27-200
C33 22U 25V
TP8 D
C37 470P
R35 21R5
C34 22U 25V
TP8 E
C42 1U
C43 1U
V20 BYV27-200
TP8 F
V21 BYV27-200
C35 22U 25V
TP9 J
C38 N.A.
R37 N.A.
V22 BYV27-200
C36 22U 25V
TP9 L
TP9 K

A B C D
HOLE 4.0
O ORIGO

EXIDE ELECTRONICS

TITLE Schematic drawing
3-Phase Inverter board
3N30
NO 10 12 859
REV C
CHECKED JR
APPROVED 24.04.2002 EB
LOC FIN
SIZE A3
PAGE 1/2

Component names:
Control A 1XX
Control B 2XX
Control C 3XX

X1 Adaptive Hyst1 1
X1 Sineref1 14 13
X1 MUOutInv1 12 11

X1 Adaptive Hyst2 2
Sineref2 16
GND 15
MUOutInv2 10
GND 9

Control B
Aux Supply: Upper gate G,I,H
Lower gate D,F,E

X1 Adaptive Hyst3 3
Sineref3 18
GND 17
MUOutInv3 8
GND 7

Control C
Aux Supply: Upper gate J,L,K
Lower gate D,F,E

Hall offset
R107 1K
CCW

R134 4K22
R132 12K1
R133 3K83
R106 11K0

C100 470N VCC
B100 CSLA2DH HALL2

R101 2K15
R102 2K15
C101 220P
C104 100N

R105 10K0
R103 4K64
R104 68K1
C103 2N2
C102 220P
R108 681R

A100 LM311
C105 100N
TP100

R114 100K
R113 21K5
R170 2K15
R115 147R
V170 6V8
V171 6V8
C107 2N2

R112 2K15
V103 1N4446
R111 1K00
C106 470N
V102 1N4446
V101 MPS2222A
R110 2K15
R109 2K15
V100 1N4446

VCC
C120 470N
V108 1N4446
R139 12K1
A102-C 4093 8 9 10
C117 220P
V109 1N4446
R140 12K1
A102-A 4093 2 1 3
C118 220P
A102-D 4093 12 13 14 11 7

A101-B LT1013
Output DC
R128 100K CCW
VEE
C111 100N
R129 4M7 RES

R159 100K
R160 100K
R161 2K15
C108 1N
R116 464K
V104 8V2
V105 8V2
R157 215K
R117 21K5
R158 100K
R118 5K62
C130 2U2
C109 10N

X103 N.A.
R164 0R0
R163 562K
R119 31K6
V114 1N4446
V115
R162 10K0
C114 2U2
VCC
C115 470N
A101-A LT1013
C131 470P
C113 1N
C116 470N VEE
C110 1N

R130 21K5
R131 100R
C112 10N

R156 1K47
R120 31K6
R121 2K15
R122 147K
R123 147K

R127 100K
R126 100K
C125 10N
R125 2K61

VCC
C119 100N
R141 681R
R142 1K00
A104 DIL8
R165 14R7
V106 MJE243
V113 N.A. R146 31R6
V112 MJE253
R145 14R7
C126 1N
C128 100N
C121 1U
R151 N.A. RES
R147 3K16
C122 1U
X100 1 2 G E

R143 681R
R144 1K00
A105 DIL8
R166 14R7
C129
C127 1N
V107 MJE243
V117 N.A. R149 31R6
V116 MJE253
R148 14R7
C124 1U
C123 1U
R152 N.A. RES
R150 3K16
X101 2 1 G E

Voltage Feedback L1
X102 1 2

V110 MPS2907A
V111 MPS2907A

A B C D E F

EXIDE ELECTRONICS

TITLE Schematic drawing
Inverter control A
3-Phase Inverter 3N30
CHECKED JR
APPROVED 24.04.2002 EB
LOC FIN
NO 10 12 859
REV C
SIZE A3
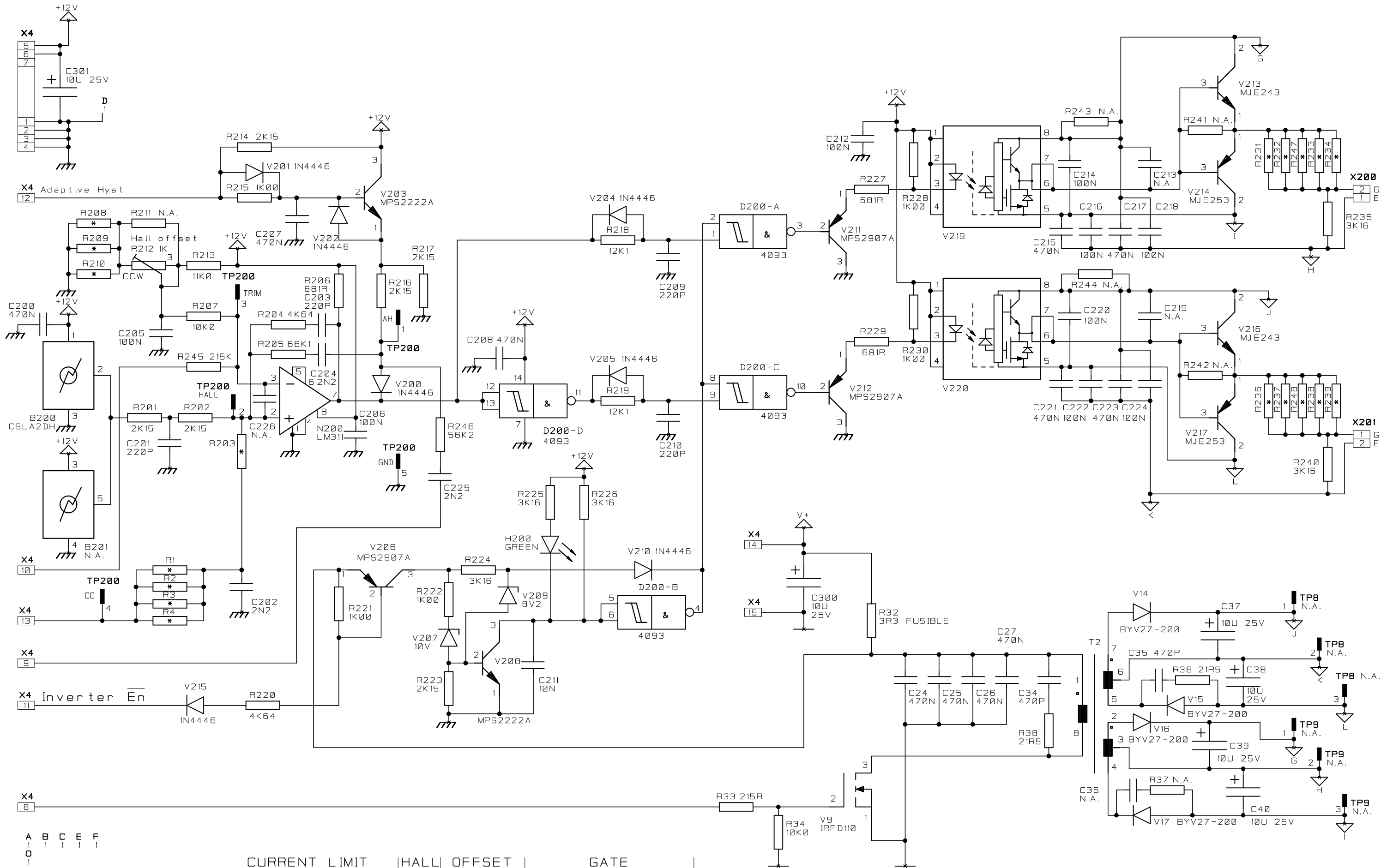PAGE 2/2

DC+

DC+ [1|2] TP1
CONN PIN2

FET MODULE3/A   3
C1   C PRO 1N 1600V
1N 1600V   C2   C PRO 1N 1600V
V1-A
R32 N.A.
R1 R2 R3 R4 R25 R31
5×21R5   N.A.

L3   [1|2] TP2
CONN PIN2
5×21R5   R33
R5 R6 R7 R8 R26 N.A.
R34 N.A.

V1-B   2
C3   C PRO 1N 1600V
1N 1600V   C4   C PRO 1N 1600V

DC-

FET MODULE3/A   3
C6   C PRO 1N 1600V
1N 1600V   C7   C PRO 1N 1600V
V2-A
R36 N.A.
R9 R10 R11 R12 R27 R35
5×21R5   N.A.

L2   [1|2] TP3
CONN PIN2
5×21R5
R13 R14 R15 R16 R28   R37 N.A.
R38 N.A.

V2-B   2
C8   C PRO 1N 1600V
1N 1600V   C9   C PRO 1N 1600V

C10   C PRO 1U 630V
180N 1000V
C17   C PRO 330N 1250V
330N 1250V
C16   C PRO 330N 1250V
330N 1250V

C15   C PRO 180N 1000V
100N 1000V
C19   C PRO 330N 1250V
330N 1250V
C18   C PRO 330N 1250V
330N 1250V

FET MODULE3/A   3
C11   C PRO 1N 1600V
1N 1600V   C12   C PRO 1N 1600V
V3-A
R40 N.A.
R17 R18 R19 R20 R29 R39
5×21R5   N.A.

L1   [1|2] TP4
CONN PIN2
5×21R5   R41
R21 R22 R23 R24 R30 N.A.
R42 N.A.

V3-B   2
C13   C PRO 1N 1600V
1N 1600V   C14   C PRO 1N 1600V

DC- [1|2] TP10
CONN PIN2

C5   C PRO 1U 630V
180N 1000V
C20   C PRO 330N 1250V
330N 1250V
C21   C PRO 330N 1250V
N.A.

0
ORIGO

EXIDE ELECTRONICS

TITLE   Schematic drawing
3-Phase Snubber board
3N30

CHECKED JSa   APPROVED 21.01.99 JP   LOC FIN

NO   10 12 862   REV A

SIZE A3   PAGE 1/1

CURRENT LIMIT | HALL OFFSET | GATE

Inverter Cntrl 1	R1	R2	R3	R4	R103	R108	R109	R110	R133 R138	R134 R139	R147 R148	R131 R136	R132 R137
10194571 40NX.80kVA	12k1	16k2	N.A.	N.A.	8k25	14k7	61k9	13k3	N.A.	14R7	10R	21R5	N.A.
10194571 40-60kVA	12k1	N.A.	N.A.	N.A.	8k25	14k7	N.A.	13k3	31R6	14R7	N.A.	N.A.	N.A.

N.A.=NOT ASSEMBLED

* MARKED COMPONENTS: SEE VALUES ON TABLE

POWERWARE	TITLE Schematic drawing		
	Inverter Cntrl 1	NO	REV
	3N40-3N80	10 19 456	1
	CHECKED EP APPROVED 04.02.02 JP LOC FIN	SIZE A3	PAGE 2/2

Inverter Cntrl 2		CURRENT LIMIT					HALL	OFFSET			GATE				
		R1	R2	R3	R4	R203	R208	R209	R210	R233 R238	R234 R239	R247 R248	R231 R236	R232 R237
10194601	80kVA	12k1	16k2	N.A.	N.A.	8k25	14k7	61k9	13k3	N.A.	14R7	10R	21R5	N.A.
10194601	40-60kVA	12k1	N.A.	N.A.	N.A.	8k25	14k7	N.A.	13k3	31R6	14R7	N.A.	N.A.	N.A.

+DC

+DC TP11 | 1 | 2 |

R39 R40 R41
21R5 21R5 21R5

R42
21R5

+DC 3

V10
MODULE

C31
1N
1600V

C33
1N
1600V

CHOKE
TP12 | 1 | 2 |

1 CHOKE

R30 R29
21R5 21R5

2

-DC

C35
1N
1600V

C34
1N
1600V

R31
21R5

R28
21R5

R52
21R5

R54
21R5

C1
N.A.

+DC 3

V9
MODULE

C18
1N
1600V

1 CHOKE

R53 R55
21R5 21R5

C17
1N
1600V

CHOKE
TP8 | 1 | 2 |

C3
100N
1000V

C4
180N
1000V

C2
N.A.

B2

E2

2

-DC

C16
1N
1600V

C15
1N
1600V

-DC

-DC TP9 | 1 | 2 |

R27
21R5

R47
21R5

-DC

R43 R45
21R5 21R5

POWERWARE

TITLE	Schematic drawing 3-Phase Logic board 3N30/3N45/3N60		NO 10 11 339	REV H
CHECKED IS	APPROVED 08.12.00 JP	LOC FIN	SIZE A3	PAGE 1/3

Labels and text on schematic:

Bypass Input

X9 L3
X10 L2
X11 L1
X8 N

UPS Input

X5 L3
X6 L2
X7 L1

UPS Output

X1 L3
X2 L2
X3 L1
X4 N

G
B
J
CHASSIS
PE

Ac Fans

X13
X16
X14
X12

To MBP SW

X27 L3
X28 L2
X29 L1
X26 N

To AC MCB

X23 L3
X24 L2
X25 L1

From Inverter Output

X19 L3
X20 L2
X21 L1
X22 N

Mains Socket for Service

X17 N
X15 L3

L1
L2

Title block:

EXIDE ELECTRONICS

TITLE	Schematic drawing	NO	REV
	3-Phase RFI board	10 12 133	1
	3N45		

| CHECKED EB | APPROVED 02.02.98 JP | LOC FIN | SIZE A3 | PAGE 1/1 |

Schematic drawing — Display board — 2 x 16 characters

EXIDE ELECTRONICS

NO 10 12 058   REV B   SIZE A3   PAGE 1/1

CHECKED EB   APPROVED 18.05.98 JP   LOC FIN

SCHOTTKY SB150
V1 SB150

CONN.SL2/L

X1
1

R1
1R FUSIBLE
R 5% 1R FUSIBLE

2

3

1
B1
DS1820
IC1 IN DS1820

C EST 100N 63VDC
C1
100N

C ELE 1000U 16V
C2
1000U 16V

1
X2

ZENER 5V6
V2
5V6

X1
2

R2
1R FUSIBLE
R 5% 1R FUSIBLE

2
X2

A   B   C   D
x   x   x   x   HOLE 4.0

E
x   HOLE 6.5