

**70-NET 50-60 kVA**

**UNINTERRUPTIBLE POWER SUPPLY SYSTEM  
THREE-PHASE OUTPUT**

**USER HANDBOOK**

10H52172UM01 - rev. 5

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The 70-NET may differ from the one displayed on the front cover.

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## 1. SAFETY

### 1.1. INTENDED USE

This device serves as an uninterruptible power supply (UPS) for connected loads. The device is in compliance with all relevant safety regulations concerning information technology equipment, including electronic appliances for use in an office environment.

In certain conditions, external battery packs are connected to the UPS; these may only be connected to the corresponding UPS device.

### 1.2. WARNING NOTICE



#### Warning

CHLORIDE considers the safety of personnel to be of paramount importance. For this reason it is essential that procedures relating to safety be studied before commencing work and properly adhered to thereafter.

- **The User or Operator** may only intervene in the operation of the UPS provided that the instructions laid out in "Normal and safe operation" on page 29 are strictly adhered to.
- **Installation**, as described in "Installation" on page 15 may only be carried out by **qualified technicians**.
- Even when all switches are off and isolators are open, hazardous voltages are present within the UPS; any operation that requires protection panels to be opened and/or removed may be carried out by **authorized technical personnel only**.

### 1.3. SAFETY NOTICES



#### Warning

Carefully read the following safety notices! Failure to observe the indications may endanger your life, your safety, the reliability of your device or the security of your data.

- Use only suitable packaging to transport the device (protect against jolts and shocks).
- If the equipment is moved from a cold environment to the operating room, moisture condensation may occur. Before commissioning the device, it must be completely dry. Therefore, an acclimatisation period of at least two hours is required.
- The equipment must be installed in accordance with the environmental conditions specified in "Environmental conditions" on page 12 and "Technical data" on page 55
- There is no button on the panel, and no switch inside the UPS, that completely isolates the device (UPS) from the mains. To ensure that the UPS is isolated, disconnect all the power cables.
- In case of interruption of the mains voltage, the external battery maintains the power supply to the load.
- Lay the cables so that no one can stand on, or trip over, them. When connecting the device to the power supply, follow the instructions in "Installation" on page 15. **Ensure that the live input source cannot accidentally be connected to the UPS during installation - see "Electrical preparations" on page 15 and "Normal and safe operation" on page 29.**
- Ensure that no foreign objects, such as pins, necklaces, paper clips, etc., are left inside the device.
- In case of emergencies (e.g. damaged case, controls or power cables, penetration by liquids or foreign materials), switch off the device, disconnect the power cables and contact the appropriate customer service representative.
- Do not connect equipment that may overload the UPS (e.g. laser printers) or demand DC-current (e.g. half-wave rectifiers).
- The sum of the leakage currents (protective conductor current) of the UPS and the connected devices may exceed 3.5 mA for all ratings. Ensure the UPS is connected to Earth before connecting the power cables.
- Do not connect or disconnect data transmission lines during thunderstorms.
- Emergency Power Off (E.P.O.) input - X8 - is located on the Connectivity Panel (see Fig. 11 on page 25). When this connection is open, the logic circuit will immediately shut down the UPS output (see Fig. 5.4 on page 27). In order to ensure that wiring installation safety complies to the European Har-

monized Document HD384-4-46 S1, an Emergency Switching Device (E.S.D.) shall be fitted downstream of the UPS.

- UPS not suitable for use with permanent IT grounding systems. In such conditions either the T, R, or LAM version should be installed



### Warning

For T, R and LAM versions only: Hazardous voltages are present on the transformers mounted in the battery compartment at the base of the UPS as soon as the unit is connected to the mains supply. This condition is independent of the operation of switches QS1-4.

- Certain components are live even with all UPS switches in "OFF," these must be labelled accordingly.
- This device is not equipped with its own mains separation device. You are, therefore, required to provide a mains separation device at the installation site.
- In order to guarantee safe working conditions, ensure all voltage sources are isolated before carrying out the power connections. ENSURE CORRECT POLARITY!
- The mains supply separation device must be fitted with a warning label that states: "Switch off the UPS supply prior to working on this system!"

## 1.4. OVERHEATING



### Warning

To avoid overheating inside the UPS, do not operate the unit with the rectifier running, the Inverter switched off and the Bypass switch open for extended periods.

## 1.5. EMERGENCY MEASURES



In order to conform to the European Standard EN62040-1-1 (par. 5.1.5) , a UPS must be fitted with an Emergency Power Off device (E.P.O.) that can be used to shut down the unit completely in the event of an emergency. 70-NET is equipped with a dedicated user input which is default configured to execute the EPO function. Refer to "Emergency Power Off (E.P.O.) - X8" on page 26 for instructions on how to install an E.P.O. button on this UPS.

### ► In the event of an emergency, press the EPO button immediately in order to shut down the entire system.

**If, for any reason, the EPO fails to switch off the UPS, proceed as follows:**

- Open the external mains separation device.
- Switch off the load
- NEVER ATTEMPT TO OPEN OR CLOSE THE UPS BATTERY SWITCH UNDER EMERGENCY CONDITIONS
- In case of fire, call the emergency personnel/fire brigade, who must put out any flames using an extinguisher appropriate to the batteries in use.
- NEVER ATTEMPT TO EXTINGUISH A FIRE USING WATER AS BATTERIES CARRY LIVE VOLTAGE AT ALL TIMES.

## 1.6. DANGER AREAS

When the UPS is closed, it is not possible to come into contact with live components. After removing the cabinet front door and safety panel, the connection terminals and bars, as well as exposed metal parts and other components carrying dangerous voltages are no longer protected against accidental contact!

**Warning**

The UPS contains capacitors which continue to store energy for a period of time after the device has been disconnected from the mains supply(ies) and battery. This voltage (> 400 V DC) is present at the battery terminals. For this reason, check that the UPS and the external mains separation device are switched off and the battery fuses removed. Before continuing work, measure the voltage at the battery terminals and at the mains input filter and wait until this has dropped to 0 V or wait at least 5 min. after disconnecting. Failure to do this can lead to severe electrical shock and even death.

**1.7. LEAKAGE CURRENTS****Warning**

Connect the PE safety conductor before connecting any other cables.

**1.8. RADIO FREQUENCY INTERFERENCE****Warning**

70-NET complies with EMC product standard EN\_50091-2 or EN\_55022 class RS. To avoid interference, installation restrictions may apply or additional measures may be required.

**1.9. BATTERIES - (EXTERNAL ONLY)**

Battery maintenance must be carried out by authorised personnel.

- The batteries installed in the battery extension kits contain electrolytic substances. Under normal conditions the containers are dry, but a damaged battery may leak electrolyte which can be dangerous in contact with the skin and cause irritation to the eyes. Should this happen wash the affected part with copious amounts of water and seek immediate medical advice.
- Voltage is present on the battery contacts at all times.
- Even when discharged a battery has the capacity to supply a high short circuit current, which, in addition to causing damage to the battery itself and associated cables, may expose the operator to the risk of burns.
- Battery voltages can be hazardous. The voltage of a single cell is not dangerous, however a number of such blocks, connected in series, can produce dangerous voltages. During maintenance, disconnect the battery blocks so that not more than five batteries are connected in series.
- The batteries are sealed "hermetically." Periods of storage or disuse may not exceed 6 months, at 20°C, without the batteries being recharged. If this period is exceeded it is essential that the battery be recharged, which requires that the UPS be switched on. Guarantee is void if these instructions are not followed. However, it is advised that recharging be carried out at least once every 4 months.
- Since new batteries often do not provide full capacity after an initial charge it may be necessary to carry out a number of discharge/recharge cycles before optimum performance is achieved.
- In order to protect the environment batteries must be disposed of in accordance with the regulations governing disposal of toxic and harmful waste.

**1.10. RE-PACKAGING**

To re-package, proceed as follows:

- ▶ Do not pack the equipment until at least six hours have elapsed since the last recharge.
- ▶ Place the equipment in bags made of a material sufficiently porous to allow it to breathe (e.g. 100µm polyethylene).
- ▶ Do not remove air from the packaging.





## 2. INTRODUCTION

This User's Manual contains information regarding the installation, operation and use of the Uninterruptible Power System (UPS) 70-NET

It is advised that this document be consulted before installation of the equipment, whose operation shall only be carried out by qualified personnel.

Thereafter, it shall be kept and referred to whenever it is necessary to carry out work on the UPS.

### 2.1. NOTES TO THE EC DECLARATION OF CONFORMITY

70-NET conforms to the following European directives:

#### 2006/95/EC

Directive of the council for adaptation of the legal regulations of the member states regarding electrical equipment for use within specific voltage limits, (superseding the 73/23/EC and successive amendments).

#### 89/336/EC

Directive of the council for adaptation of the legal regulations of the member states regarding electromagnetic compatibility, modified by directive 91/263/EC, 92/31/EC and 93/68/EC.

Conformity is established through compliance with the following standards:

- IEC 62040-1-1
- IEC 62040-3
- EN 50091-2

Additional information regarding adherence to these directives is included in the appendices NSR and EMC of the EU Declaration of Conformity. If needed, the EU Declaration of Conformity can be requested from CHLORIDE.

### 2.2. SYMBOLS AND PICTOGRAMS

The following symbols and pictograms are used in this handbook:



#### Warning

Indicates instructions which, if not observed, may result in danger to life, safety, the reliability of your device or data security.



#### Notice

Indicates additional information and tips.



Indicates a step that you must carry out.

### 2.3. TERMS USED

#### Service bypass

The switch that allows continuous supply to the load via the bypass input mains during maintenance work; also referred to as the maintenance bypass.

#### Electronic bypass

A thyristor switch which connects the load directly to mains in event of inverter overload; also referred to as a static switch or static bypass.

#### Qualified personnel

Personnel who are familiar with the installation, assembly, commissioning and operation of the product and are qualified to carry out the respective activities.

#### Display

The control panel comprises a liquid crystal, alphanumeric display, which provides diagnostic and operational information about the UPS.

### 2.4. DOCUMENTATION STRUCTURE

These instructions may be supplemented with additional sheets, describing specific extensions or options.



### 3. PREPARATION FOR USE

#### 3.1. TRANSPORT

The equipment must be kept upright at all times and handled with care, damage may be caused if dropped or subjected to severe impact. When moving the equipment with a forklift, secure it against tilting.

#### 3.2. DELIVERY AND STORAGE

The goods have been checked thoroughly before dispatch. On receipt check the packaging and ensure that the contents are undamaged. Any damage or missing parts must be reported to the supplier **within 8 days of delivery**.

#### 3.3. UNPACKING

The utmost care shall be taken when removing the packaging in order to avoid damaging the equipment. Check all packaging materials to ensure that no items are discarded. Once the packaging has been removed, the UPS shall be taken off the pallet by removing the protective panel (see Fig. 5 on page 15) and the retaining screws, as illustrated in Fig. 1 on page 11, and lifting it off using a fork lift (max width between forks - 540mm - Ref EN 1757). Note that the retaining brackets must not be unscrewed from the UPS feet. Note also, that when moving the pallet, the maximum distance between forks is 690mm.

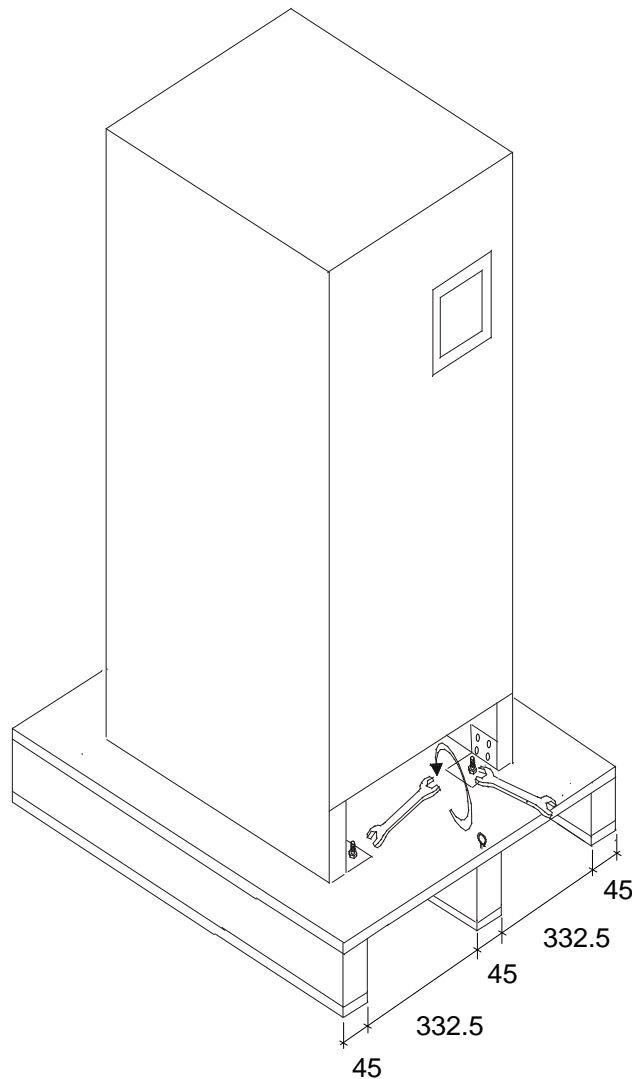


Figure 1 - Unpacking

If it is not intended that the UPS be used within seven days of delivery, attention shall be paid to the storage conditions.

- If the batteries or the equipment are to be stored they must be kept in a **clean, dry environment and away from extremes of temperatures**.

**3.4. ENVIRONMENTAL CONDITIONS**

The UPS must be installed vertically, on a level and even surface and in an area protected from extremes of temperature, water and humidity. Do not stack units and do not place objects on top of them. The operating temperature range of the UPS is 0 °C to 35 °C (40°C for maximum 8 hours continuous operation).

The ideal environmental temperature range is 15 °C to 25 °C. The battery life is defined at 20°C. Each increment of 10 °C above 25 °C reduces the expected life by 50%.

**Installation altitude**

The maximum operating altitude of the UPS, without derating, is 1000 m. At higher altitudes the load must be reduced according to para. 2.

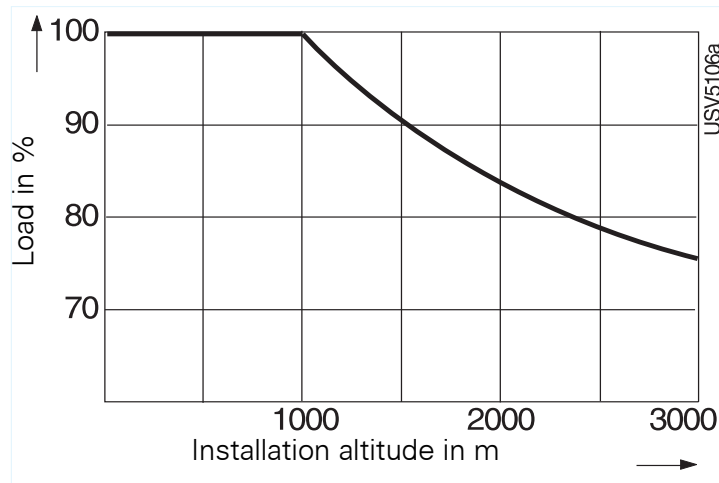


Figure 2 - Permissible load dependent on installation altitude

**3.5. ACCESS TO AREA**

The area must have sufficient space for installation manoeuvres to be carried out. Access doors must be wide enough to permit unobstructed transport of the device (See "Installation" on page 15.).

**3.6. INSTALLATION SITE**

The external dimensions of the UPS are as follows (refer also to "Technical data" on page 55):

Width (mm)	Depth (mm) <sup>1</sup>	Front panel (mm)	Height (mm) <sup>2</sup>
620	846	620	1780

<sup>1</sup> This figure includes the handle and front panel - without them the depth is 802mm.

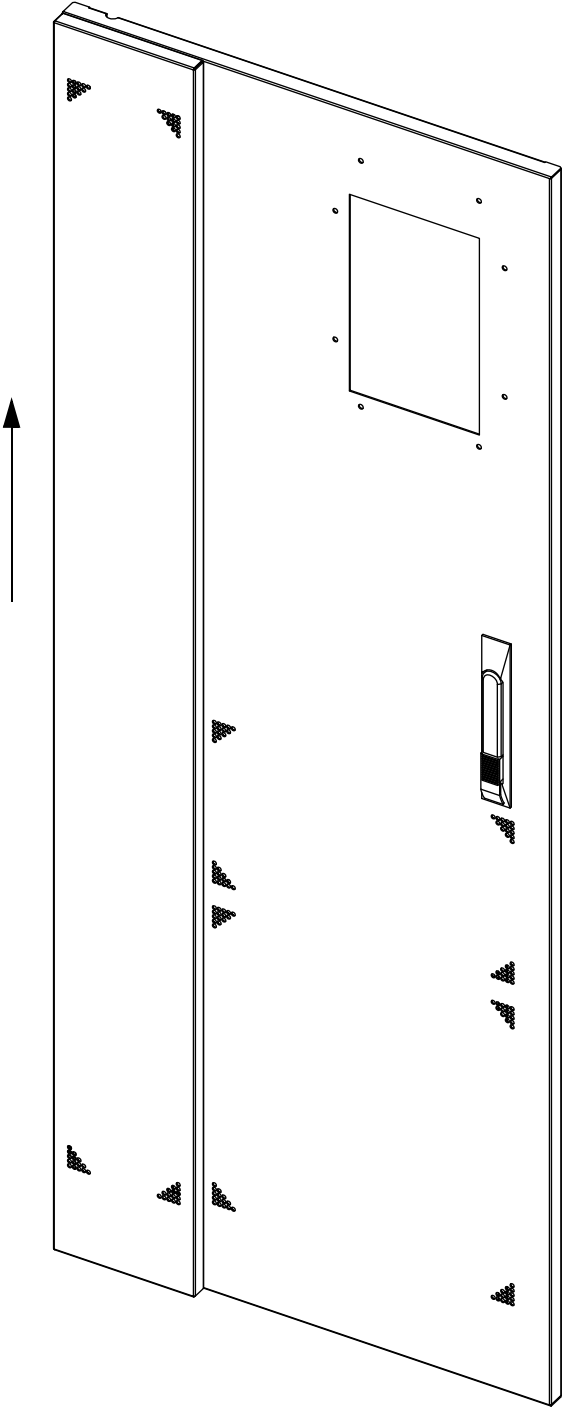
<sup>2</sup> Leave a minimum distance of 500mm between the top of the cabinet and the ceiling of the installation area.

- No rear wall-distance is required, unless the power cables are routed from above, in which case the distance must be at least equal to the bending radius of the cables in use.

**3.7. FRONT PANEL**

Leave additional space in front and to the side of the UPS, so that the front door can be opened through the full 180°.

- In order to open the door when other UPS or battery cubicles are installed adjacent to the unit, remove the detachable panel from the front door by sliding it off vertically (see Fig. 3):



*Figure 3 - Sliding front panel*



## 4. INSTALLATION

### 4.1. ELECTRICAL PREPARATIONS

In order to guarantee safe working conditions, ensure all voltage sources are isolated before carrying out the power connections. ENSURE CORRECT POLARITY!

**Ensure that the live input source cannot accidentally be connected to the UPS during installation.**



**Notice**

Installation may only be carried out by qualified technicians and in conformity with the applicable safety standards.

For electrical installation, the nominal current rating of the source must be observed.

### 4.2. PHYSICAL APPEARANCE

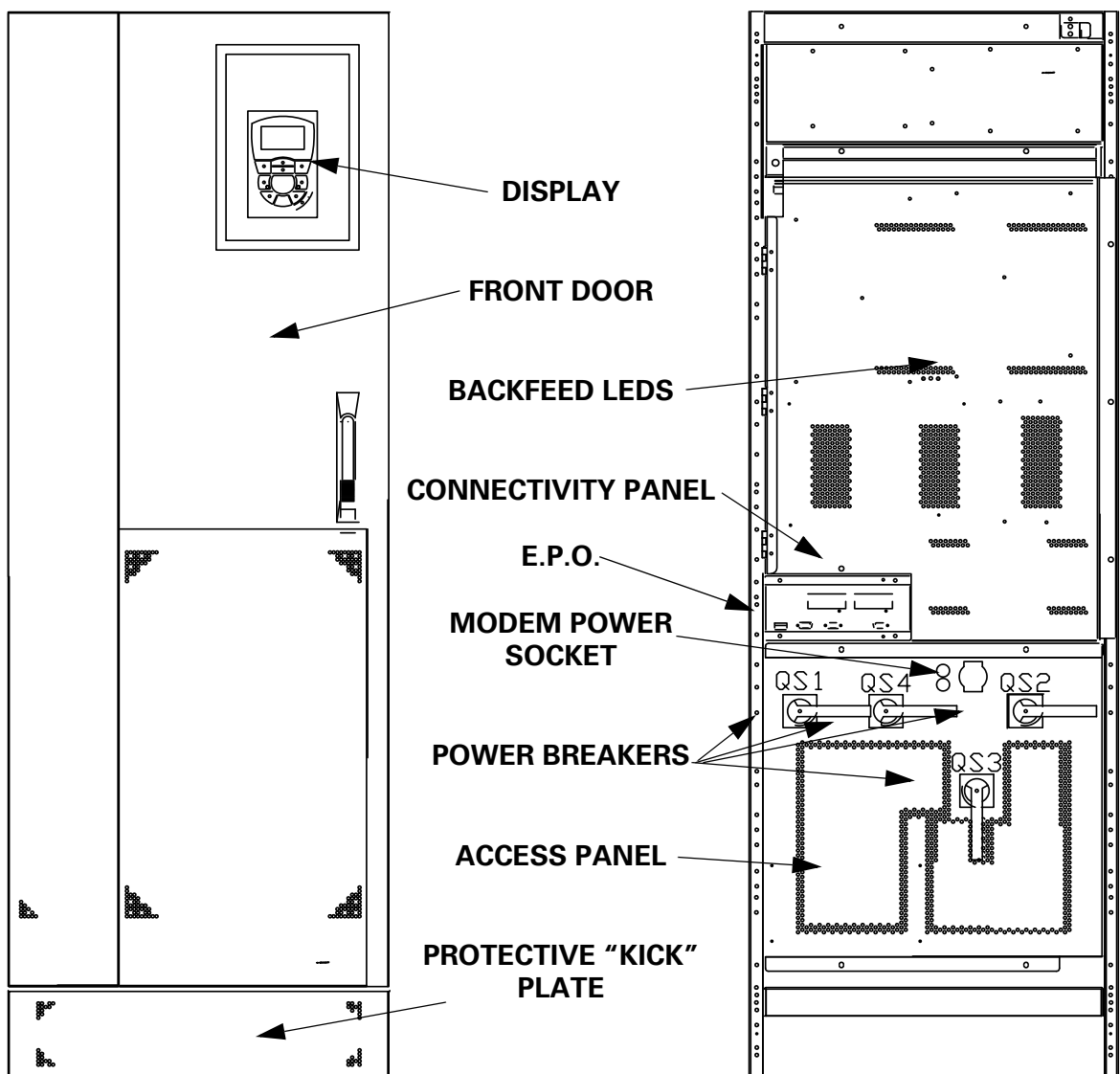


Figure 5 - Front view, with (left) and without (right) front door

### 4.3. CURRENTS AND SUGGESTED CABLE SIZES

Use cable cross section and fuses according to Table 1 on page 17. Connect the mains supply cables to the UPS terminals U, V, W and U1, V1, W1, N. Connect the load to UPS terminals U2, V2, W2, N. In the absence of a separate Bypass mains Supply, connect jumpers between U and U1, V and V1, W and W1. The conductor cross sections apply for maximum currents:

- 1). For PVC-insulated copper cables (at 70 °C).
- 2). When routed in conduits for electrical installations.
- 3). When air temperature surrounding the conduits does not exceed 30°C.
- 4). For cable lengths up to 30 m.
- 5). For stranded wires up to 35 mm<sup>2</sup> and for single wires above 35 mm<sup>2</sup>.



#### Notice

Should there be any variation in the conditions it will be necessary to verify whether the cable dimensions satisfy the requirements of IEC-287 and DIN VDE 0298. In cases where the cables are so long that they cause a drop in voltage of >3%, a larger dimension shall be selected.

If predominantly non-linear loads are present in your system, the neutral conductor (N) carries 1.6 times the current of the other conductors and should be dimensioned accordingly.

Routing of cables (e.g. mains cables, communication or data lines) to other equipment should be kept separate from that of the UPS (I/P, O/P, and external battery cables).

### 4.4. EXTERNAL PROTECTION DEVICES

This device is equipped with manual switches intended only for Service Bypass and Internal Service operations. It is, therefore, essential that the customer install external protection devices at the installation site. These must be installed near the unit and labelled as the mains separation devices for the UPS.

Any devices for protecting the cables external to the UPS must be installed upstream of the unit; such devices must be type GG/GL fuses.



#### Warning

The following label must be displayed on all switching devices installed in the same electrical system as the UPS, even when these are located at a distance from the area in which it is located (according to European standard EN 62040-1):

**ENSURE THAT THE UNINTERRUPTIBLE POWER SYSTEM IS ISOLATED BEFORE WORKING ON THIS CIRCUIT**



Table 1 indicates cable dimensions and the protection devices (fuses) which must be installed by the user to protect both these and the equipment.

**Table 1: Conductor cross sections and fuses of standard UPS**

<b>UPS devices</b> nominal power kVA	50	60
<b>Mains/Reserve Mains</b> min. conductor cross section [mm <sup>2</sup> ] recommended fuse/breaker[A]	25 80	35 100
<b>Load</b> min. conductor cross section [mm <sup>2</sup> ] max. permissible selective fuse for loads [A]	25 72	35 87
<b>Battery, external +, -</b> min. conductor cross section [mm <sup>2</sup> ] max. possible cross section [mm <sup>2</sup> ] recommended fuse/breaker <sup>a)</sup> [A]	35 50	50 70
<b>Neutral (N)</b> from mains/ to load <b>N, N2</b> oversize if non-lin. load[coefficient]	1.6	1.6
<b>Type of connector</b>	busbars - except for battery connections which are M8 terminals	

**Table 2: Conductor cross sections and fuses of UPS type T and LAM**

<b>UPS devices</b> nominal power [kVA]	50		60	
UPS version	T	LAM	T	LAM
<b>Mains/Reserve Mains</b> min. conductor cross section[mm <sup>2</sup> ] recommended fuse/breaker [A] connection: busbar hole fits for screw	25 100 M8x25	70 200 M8x25	35 125 M8x25	95 (2x25) 200 M8x25
<b>Load</b> min. conductor cross section[mm <sup>2</sup> ] max. permissible selective fuse for loads [A] connection: busbar hole fits for screw	25 50 M8x25	70 (2x25) 100 M8x25	25 63 M8x25	70 (2x25) 100 M8x25
<b>Battery, external +, -</b> min. conductor cross section [mm <sup>2</sup> ] max. possible cross section[mm <sup>2</sup> ] recommended fuse/breaker <sup>a)</sup> [A] type of connector	35 50 M8 terminals	35 50 M8 terminals	50 70 M8 terminals	50 70 M8 terminals
<b>Neutral (N) to load N2</b> oversize if non-lin. load [coefficient]	1.6			

<sup>a)</sup>Efen types available, contact CHLORIDE Technical support

**Table 3: Tightening torque**

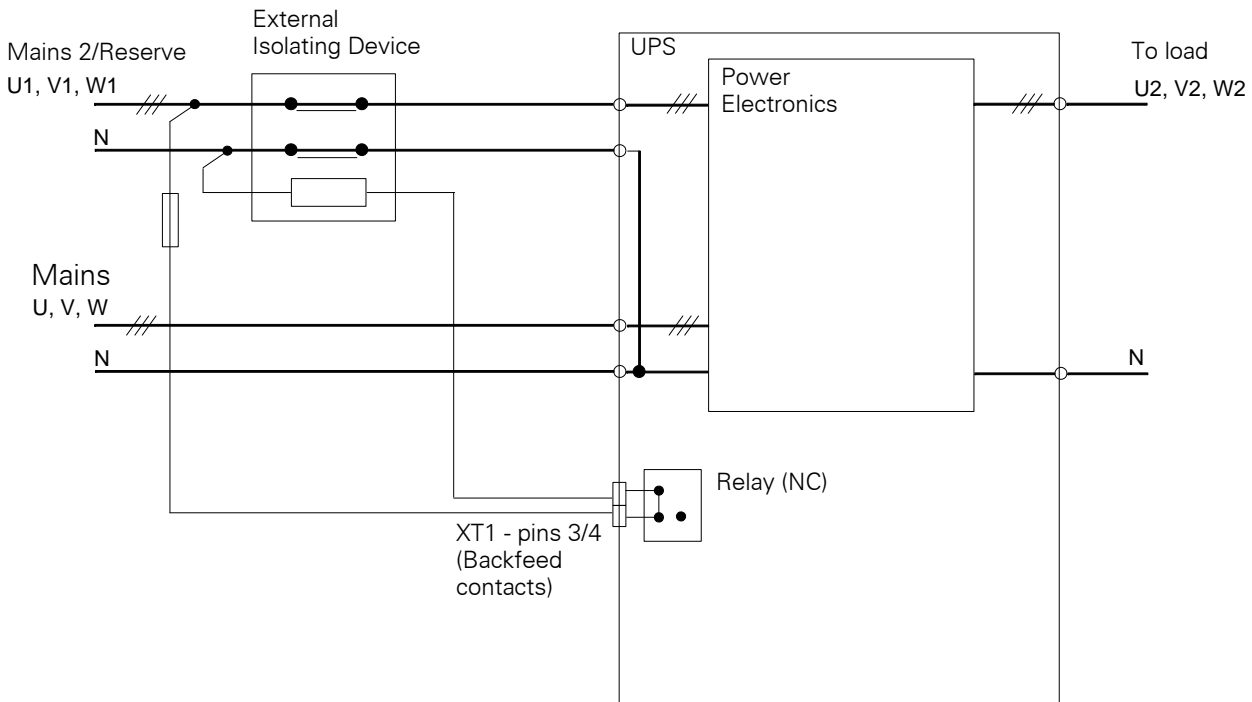
Screw size	Nm (+/-10%)
M8	20
M10	39
M12	68

**4.5. BACKFEED PROTECTION**

This feature prevents any potential risk of electric shock on the UPS bypass input AC terminals in the event of a Bypass static switch SCR failure. The control circuit includes a contact, that the customer can use to activate an external isolating device, such as an electromagnetic relay, or tripping coil, which will disconnect the bypass mains supply to the UPS when a backfeed is detected.

Such a device must be installed in the Bypass source line if two mains supplies are connected to the UPS - see para. 6 below.

The Backfeed contact is located at pins 3 and 4 of XT1 (see para. 7, para. 8, and Fig. 9 on page GB- 20).



*Figure 6 - Backfeed protection - External Isolating Device*

In double conversion mode (on line) and normal operating conditions this contact is closed (NC), whereas, when a backfeed is detected the contact is open.

This event is accompanied by warning message 48 on the LCD display - "Backfeed Protection Active". There are also two LEDs located on the secondary access panel (see Fig. 5 on page 15), the green one is illuminated during normal operating conditions (no backfeed), while the red one indicates that a backfeed has been detected.

To reset the backfeed logic, switch OFF the UPS for a few seconds (see "Switching the UPS OFF" on page 34).

In compliance with the Standard IEC/EN 62040-1, the external isolating device, which must be an air-gap isolator, in accordance with clause 5.1.4 of the aforementioned Standard, **IS NOT** supplied with the UPS.

**Common Mains Supply**

Where the UPS with the backfeed protection feature is supplied from a common mains, the two sources **must** be connected together (Mains 2/Reserve U1, V1, W1 to Mains 1 U, V, W and Mains 2/Reserve N to Mains 1 N, respectively) inside the Customer's mains distribution system, and **not** by connecting jumpers between the UPS input terminals.

**4.6. EXTERNAL ELECTRICAL CONNECTIONS**

In order to gain access to the external electrical connections it is necessary to open the front door of the UPS and remove the secondary access panel (see Fig. 5 on page 15). Connect the earth cable (PE) first at ⊕.

If PEN instead of PE and N is available (TN-C-S system), connect an isolated 25mm<sup>2</sup> jumper between ⊕ and PEN/N inside the UPS.

- ▶ 70-NET may only be used in installations where the Neutral is connected to Ground; for further information please contact CHLORIDE Technical Support.
- ▶ **Ensure that the UPS is isolated before removing panels.**

**4.7. POWER CONNECTIONS**

- ▶ **Ensure the correct phase sequence of the Input (Mains, Reserve) and Output power connections**

The power connections (see para. 7) on the front of the UPS are:

- U, V, W - MAINS INPUT
- U1, V1, W1 - RESERVE MAINS SUPPLY (only at the standard UPS type)
- U2, V2, W2 - UPS OUTPUT TO LOAD
- D-, C+ - BATTERY TERMINALS)
- EARTH ⊕
- NEUTRAL BAR (PEN/N)

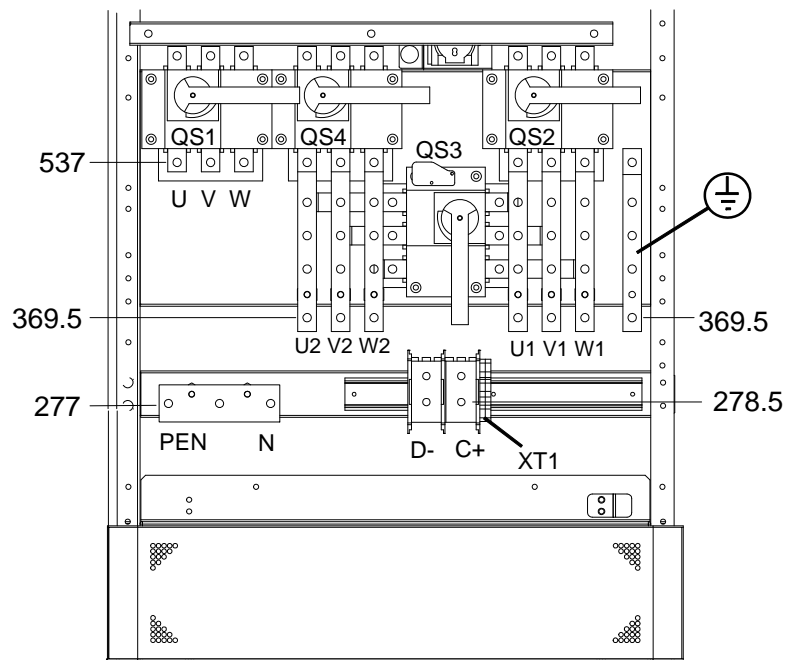


Figure 7 - Power connections standard UPS

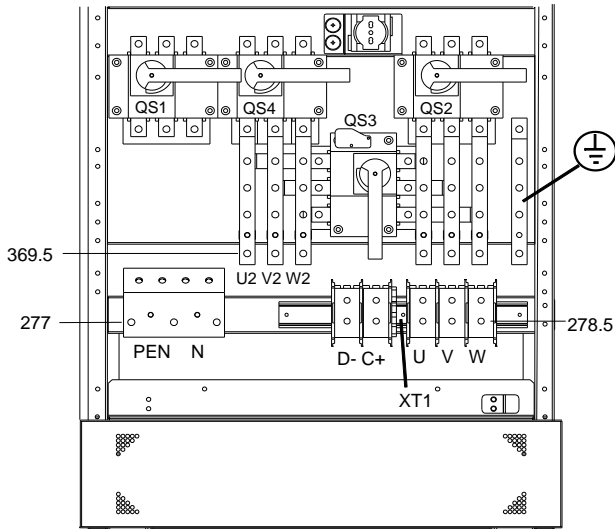


Figure 8 - Power connections T-type

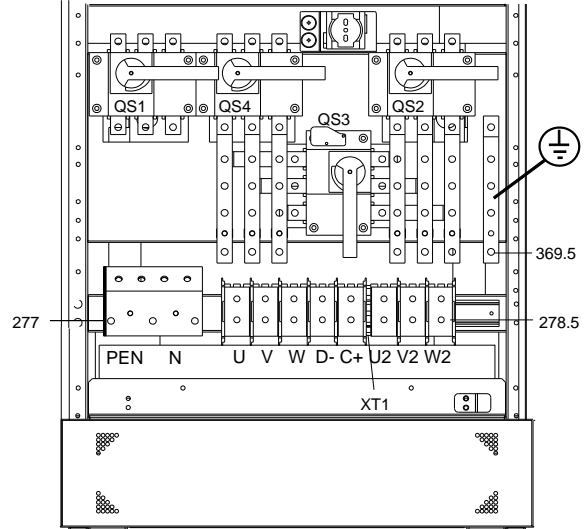


Figure 9 - Power connections LAM-type

#### 4.8. CONNECTING THE BATTERIES

- ▶ **The UPS is not equipped with an isolating device (fused switch, switch, etc.) for the battery DC power connection. Ensure that such a device is fitted either on the battery supply line, or in the battery cabinet.**
- ▶ In the case of Parallel UPS Systems (see chap. 8) with a common battery bank, an additional isolating device (switch) must be installed in the dedicated common battery connection to each individual UPS, so that system maintenance can be carried out correctly. In any event, we advise against using common battery solutions as they reduce the reliability of the system.
- ▶ Before connecting the batteries, please read the notice and warning label on the UPS or battery cubicle.



#### Notice

Full safety instructions concerning the use and maintenance of UPS batteries are provided in the appropriate battery manufacturers' manuals. The battery safety information contained in this section relates to key considerations which must be taken into account during the installation design process, and may affect the design outcome, depending on localised conditions.



#### Warning

Special care should be taken when working with the batteries associated with the 70-NET. When all batteries are connected together the overall voltage exceeds 500V. It is most important to ensure that the batteries are installed separately, in a purpose-designed, lockable, dedicated battery cabinet or battery room. Battery cabinet specifications can be found in "Battery Management Modules" on page 52 of this manual.



#### Warning

In the event of malfunction, the battery shelves and/or cabinet chassis or battery frames may become live!

**Notice**

The requirements of the EC directives are satisfied when battery cubicles are used with original accessories. If alternative batteries are used, you must ensure that the applicable EC directives are met and declare conformity. The UPS must still be parameterised with the service software and fitted with an all-pole disconnecting device and fuses, according to table 1 "Conductor cross sections and fuses of standard UPS". When dimensioning your battery cables, note the connection tolerances at terminals +/-.

**Warning**

ENSURE CORRECT POLARITY !

**Notice**

The most common battery type used in UPS installations is the valve regulated battery. Valve regulated cells are not sealed.

The amount of gas given off is less than for flooded cells, but when planning the battery installation, allowance must be made for adequate ventilation and heat dissipation.

Valve-regulated cells are not completely maintenance-free. They must be kept clean and their connections checked periodically to ensure they are tight, and that there is no evidence of corrosion.

It is inevitable that the batteries will lose some charge during transportation and storage; before attempting to carry out an autonomy test, ensure that the batteries are fully charged as this may take several hours.

Cell performance typically improves after a few discharge/recharge cycles.

**Notice**

The battery charger is configured for 240 cells valve regulated battery (2.27V/cell). The maximum recharge current setting is specified in tab. 10.1.3 (see: Max. batt. recharge current setting range: 240 cells @  $V_i/p = 340$  V and nominal load). Several charging methods, based on the type of battery, are available and can be configured by authorized personal only.

#### 4.9. CONNECTIONS BETWEEN BATTERY CUBICLES AND UPS

- The battery cubicle should be installed adjacent to the UPS (note the battery terminals are located on the right hand side of the UPS).
- Make the ground connections (PE).
- Connect the batteries with cables as suggested in Table 1 to terminals + (positive pole) and - (negative pole), and in accordance with the connection diagram.
- Connect the cable for the temperature sensor between terminals XT1.1 and XT1.2 of the UPS terminal block and terminals X1.1 and X1.2 of the battery cabinet (para. 10).
- Shielded temperature sensor lines must be used between the UPS cabinet and the battery cabinet for EMC interference suppression as specified by EN 50091-2 Class RS. The shielding is to be connected to the UPS. Secure the sensor in the battery cabinet using a cable clamp or similar device.
- Before the system starts, ensure that the UPS battery connections polarity is correct. Wrong connections can damage the system and endanger operator safety.

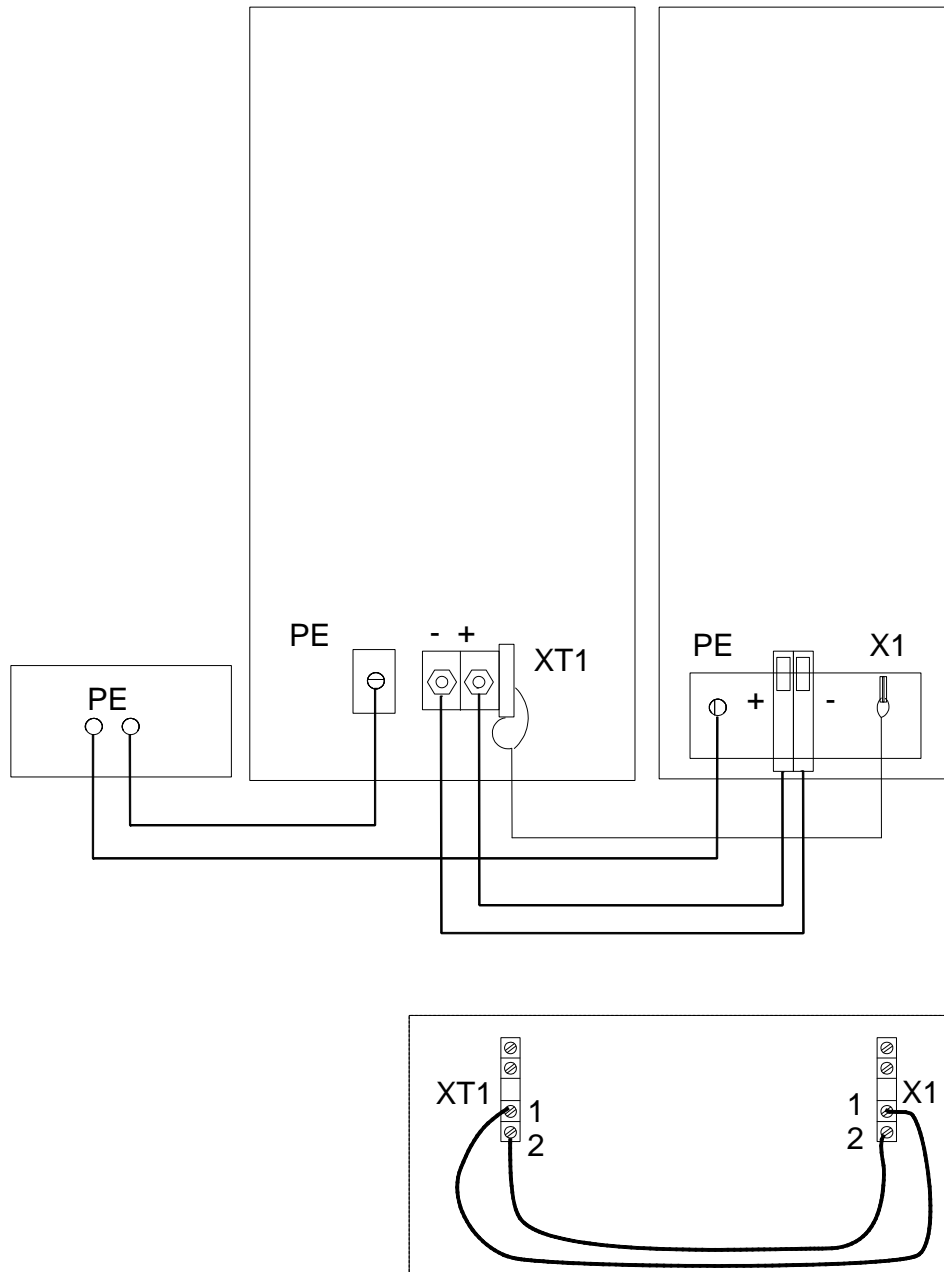


Figure 10 - External Battery Connections

#### 4.10. HANDLING THE BATTERIES

**Warning**

Batteries are a potential source of danger due to their electrical charge and chemical composition. Therefore observe the battery handling instructions of the manufacturer. These usually can be found in the material which accompanies the shipment.

#### Recharging batteries

**Notice**

When recharging, observe the indications on the packaging

#### Exchanging batteries

**Notice**

Before exchanging batteries, both the batteries in the cubicle, as well as those to be installed must be **fully charged**.

#### Connecting external batteries

**Warning**

If a battery has been disconnected and is to be reconnected, the battery isolator may only be reconnected after you have made certain that voltage with the correct polarity is present in the intermediate circuit (see Connecting the Batteries).





## 5. INTERFACES

70-NET is equipped with two slot card bays:

- a slot available for use with a connectivity option, typically ManageUPS Net SNMP Adapter. Refer to CHLORIDE Connectivity Solutions for more details about available expansion slot cards (XS3);
- a slot for the LIFE.net slot modem (see LIFE.net Software and Installation Instructions - 10H52127PAMC), this is fitted as standard (user removable) (XS6);

two standard serial interfaces:

- a RS232 COM interface configured for use with PPVIS or external connectivity solutions (X3) - this is available when the XS3 slot is empty, or when the MUN card is installed;
- a RS232 COM interface for data transfer protocol, modem or external connectivity solutions (X6) - this is not available when the slot modem is installed;
- an AS400 compatible contact interface for signal exchange (output - X7);
- an interface to allow emergency shut down of the Bypass, Inverter and Rectifier (EPO) (input - X8).;

All of which are located on the Connectivity Panel (see Fig. 11).

Also available are:

- external Battery Temperature sensor (input - XT1.1 and 2);
- Backfeed Protection activated (output - XT1.3 and 4);

The interfaces can be used for:

- Direct communication between UPS and computer;
- Integration of the UPS as client into a network via MopUPS or ManageUPS (see "AS400 Multiplex" on page 52)
- Transfer of operational states to external alarm systems

The required communication software and interface cables are available as options.

The interfaces can also be programmed via PPVIS (service software tool) for a wide range of functions. The serial interfaces are isolated and RS232 compatible.

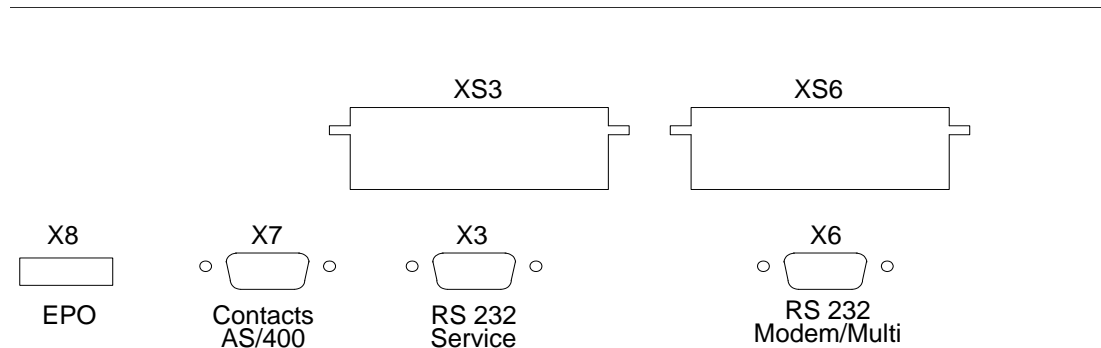


Figure 11 - Connectivity panel

### 5.1. SERIAL INTERFACES

70-NET is equipped with a voltage-free contact interface, compatible with IBM AS/400 and other computer types.

#### PPVis configured service interface - X3

The service interface is a 9-pin, female, D type connector for RS232 serial communications configured via the PPVis interface for monitoring and control software (PPVis).

The pin functions are as follows:

Pin	Description	Function
2	RXD	Receive RS232
3	TXD	Transmit RS232
5	Ground RS232	Signal ground RS232

**Standard COM interface - X6**

This interface, which is the LIFE default port, is a 9-pin, male, D type connector, the pin functions are as follows:

Pin	Description	Function
2	TXD	Send RS232
3	RXD	Receive RS232
5	RS232 GND	Signal ground RS232

The nominal rating of the potential-free contacts is 24V, 1A.

**5.2. VOLTAGE FREE CONTACT PORTS - X7**

70-NET is equipped with a 24 V, 1 A, voltage-free contact interface, compatible with IBM AS/400 and other computer types. This interface is a 9-pin, female, D type connector, the pin functions are as follows:

Pin	Description	Function
1	BYPASS ACTIVE (NC)	Bypass mode: contact open between pins 1 and 5
2	LOW BATTERY (NC)	Near end of discharge (in battery mode): contact open between pins 2 and 5
3	SUMMARY ALARM (NC)	UPS alarm: contact open between pins 3 and 5
4	AC FAIL (NC)	Mains failure: contact open between pins 4 and 5
5	COMMON	Common connection for all floating contacts
6	BYPASS ACTIVE (NO)	Bypass mode: contact closed between pins 6 and 5
7	LOW BATTERY (NO)	Near end of discharge (in battery mode): contact closed between pins 7 and 5
8	SUMMARY ALARM (NO)	UPS alarm: contact closed between pins 8 and 5
9	AC FAIL (NO)	Mains failure: contact closed between pins 9 and 5

**5.3. EMERGENCY POWER OFF (E.P.O.) - X8**

For the Emergency Power Off switch function, connect a switch, having the properties of an Emergency Off button, i.e. Normally Closed, held open mechanically when activated, max. connection length 50m, and min. wire cross section  $0.75\text{mm}^2$  between the contacts of X8 (not supplied). The interface is a 2 pole screw terminal connector for wires up to  $0.75\text{mm}^2$ .

To ensure that the installation wiring safety complies with the European Harmonized Document HD384-4-46 S1, an Emergency Switching Device (E.S.D.) must be fitted downstream of the UPS.

As soon as the emergency condition that triggered the switch has been resolved, switch off all UPS switches (input, output, battery disconnecter, and all external battery switches) and repeat the start-up procedure as described in "Normal and safe operation" on page 29.

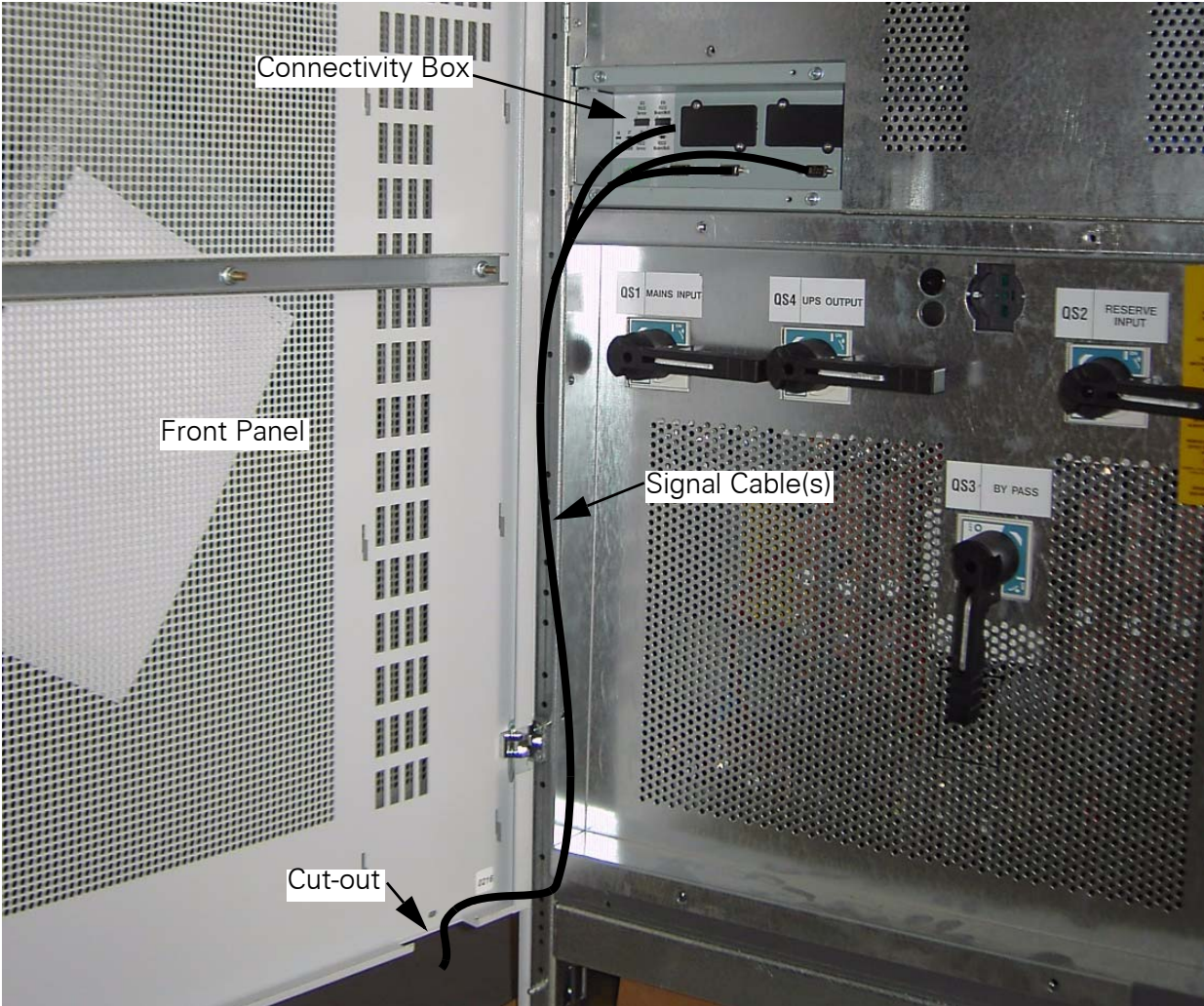
**Notice**

The interface cables must be shielded and located away from the power cables (min. 20 cm). The shield must be connected at both ends. Control and power cables must cross at a 90° angle.

5.4. SIGNAL CABLES

The various signal cables from the Connectivity Box can be routed through the bottom of the UPS via a cut-out in the front panel (see Fig. 12).

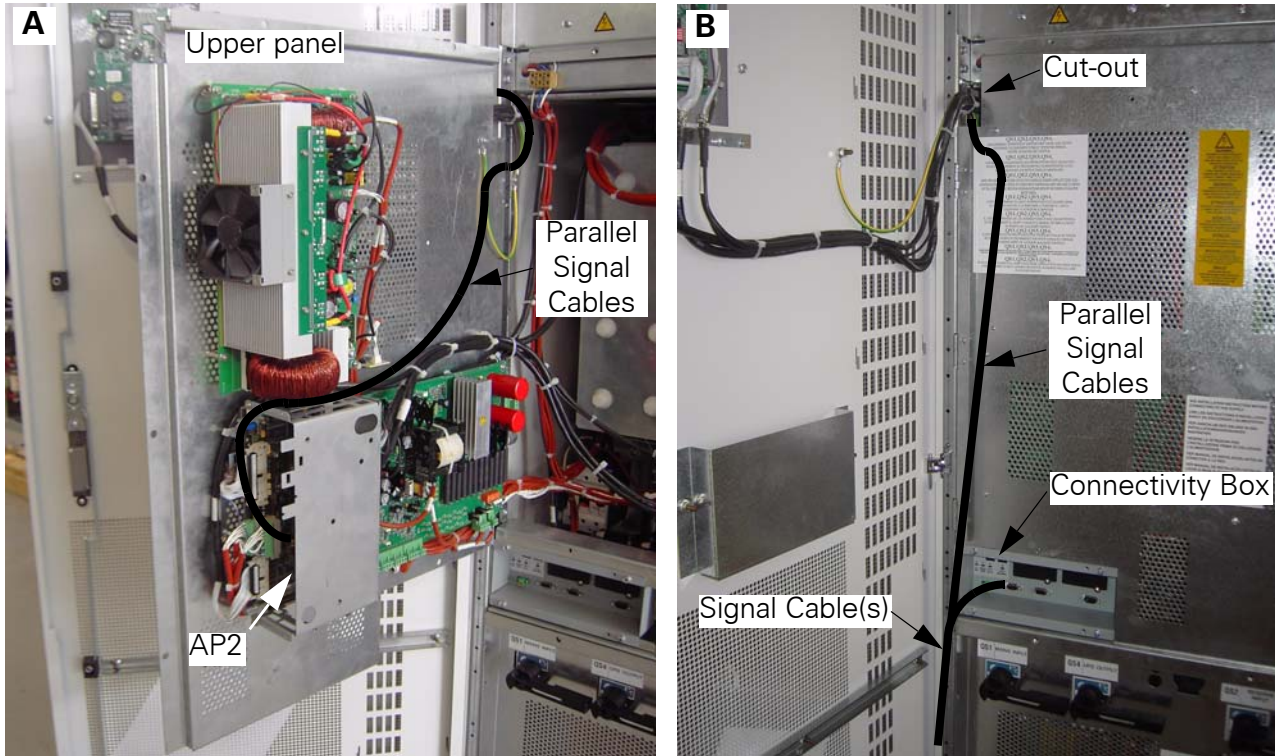
Figure 12 - Signal cable routing



**Parallel signals**

The Parallel Operating Board (POB) is installed in AP2, which is located behind the upper panel (see Fig. 13), the parallel cables must be routed behind the upper panel (see Fig. 13 - A), through the cut-out (see Fig. 12 - B) and down to join the signal cables from the Connectivity Box (see para 5.4 "Signal cables" and Fig. 12 on page 27).

*Figure 13 - Parallel signal cable routing - details*



## 6. NORMAL AND SAFE OPERATION

### 6.1. FUNCTION

The uninterruptible power supply (UPS) is connected between the mains and the electrical load. It protects the load from mains interruptions and power failures.

#### On-line Principle

70-NET operates according to the on-line principle. In on-line operation, the alternating voltage of the mains is converted into direct voltage. This DC voltage is used simultaneously to charge the battery and supply the inverter. The inverter converts the direct voltage into interference-free alternating voltage at a fixed frequency and amplitude, from which are supplied the connected loads. This protects the load from mains supply disturbances and provides a secure supply for electrical loads (PCs, network servers, multi-console systems). In case of a mains failure, the batteries provide uninterrupted power to the loads for a given period, dependent on battery capacity and connected load.

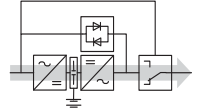


Figure 14 - UPS in on-line operation

#### Battery management

The battery is charged and discharged, as well as monitored, using a dedicated microprocessor control. This ensures battery lifetime is maximised. For details, see "Special features" on page 29.

#### Overload capacity

In the event of overload (e.g. > 150 % of nominal load) or inverter failure, the load is supplied directly by the mains supply via the automatic bypass. As soon as the system returns to normal operating conditions, it automatically switches back to inverter operation.

#### Communication

The UPS offers several interfaces for communication with computers. Further information is included in "Interfaces" on page 25.

### 6.2. SPECIAL FEATURES

#### Safe and reliable operation

- Real on-line functioning, i.e. complete de-coupling of the load from all anomalies in the mains supply
- The **Control Unit** (internal processor - **CU**) supports first class features of the UPS, i.e. vector control, highest flexibility and more.
- Electronic bypass increases the reliability of the electrical supply

#### Easy installation and operation

- Parameterisation using bundled PC software
- No requirement for presence of Operator during normal operation
- Simple LCD provides clear indication of status, load and battery quality, clear operating and display concept
- Event memory for fault analysis
- Fault display and audible signal

#### Battery management

- Automatic battery management ensures maximum battery life
- Automatic battery circuit test
- Temperature-dependent charging

#### Environment, EMC

- EMC limits values to comply with European regulations and standards
- Energy savings due to high efficiency
- Low noise level
- Special EMC filter for higher demands (optional)

**Modern technology**

- Interfaces with software for all operating systems
- IGBT power transistors
- Highly integrated digital electronics (ASICs)
- Especially well suited for computer loads

The UPS can also be used as a frequency converter for 50/60 Hz or vice versa.

**6.3. BLOCK DIAGRAM**

(see para. 15).

KEY TO SWITCHES:

- QS1 = MAINS INPUT SWITCH
- QS2 = ELECTRONIC BYPASS SWITCH
- QS3 = SERVICE BYPASS SWITCH
- QS4 = OUTPUT SWITCH
- QS5 = NEUTRAL BREAKER (for maintenance use only, unauthorised operation can result in loss of load supply)

**Components**

The UPS consists of the components:

- converter, consisting of rectifier, filter, booster and inverter with integrated battery charger
- filter for forming the three-phase sinusoidal output voltage
- electronic bypass
- reserve mains supply
- service bypass for disconnecting the Power Module during servicing, without interrupting the supply to the load
- EMC filter
- Galvanic Isolation (T Version) and 208V, 60Hz (LAM Version), both of which are optional.

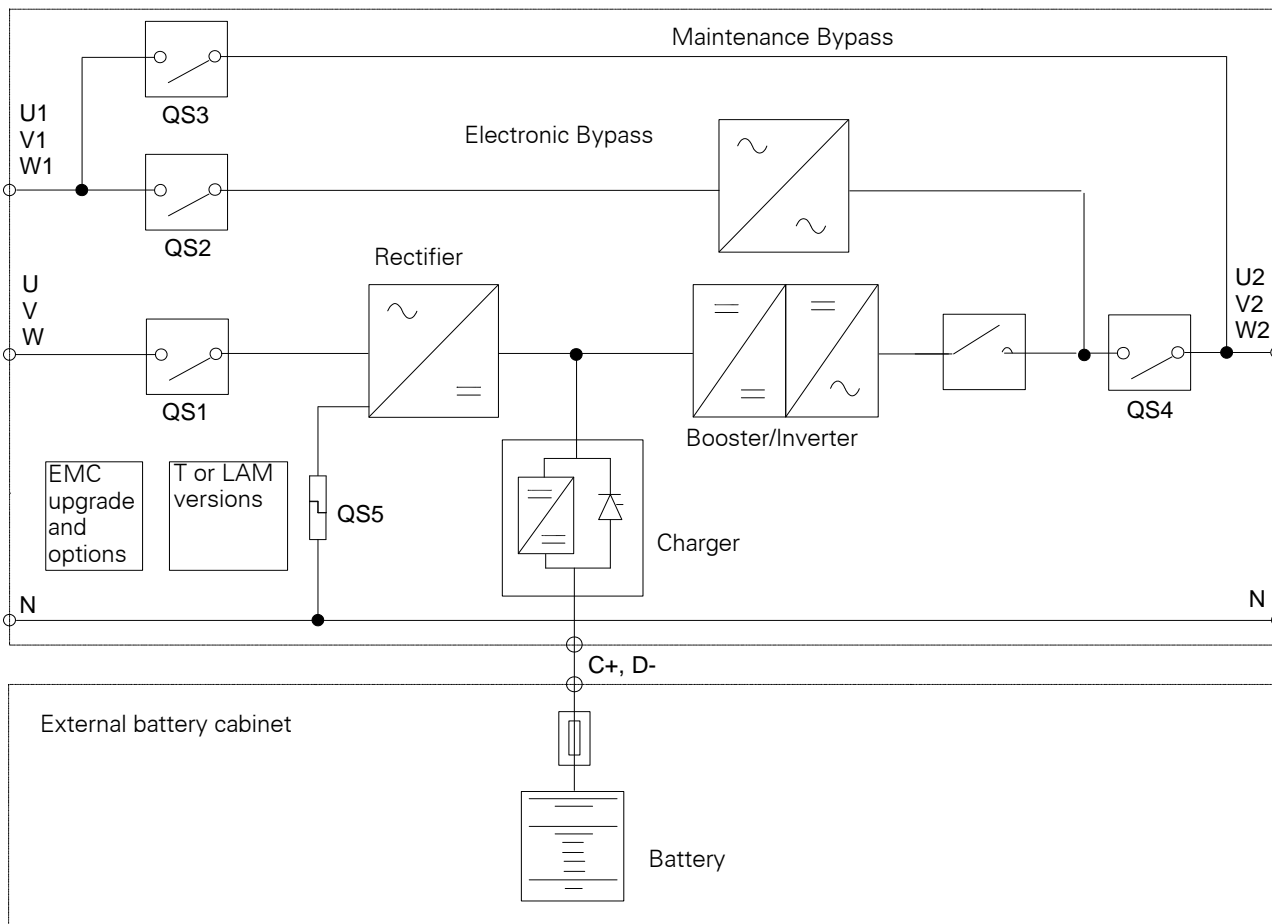


Figure 15 - UPS Overview

**6.4. MAINTENANCE BYPASS**

This is necessary for maintenance work, as well as for commissioning and putting in and taking out of service. With this mode selected, the loads continue to be supplied without interruption whatever switching actions are carried out. For Maintenance Bypass operation, the power switches QS1, QS2 and QS4 must be switched to the 0 (OFF) position, and QS3 must be switched to the 1 (ON) position. These switches are located on the front of the UPS. After having removed the front panel, the location of the switches can be seen, as in the following figures:

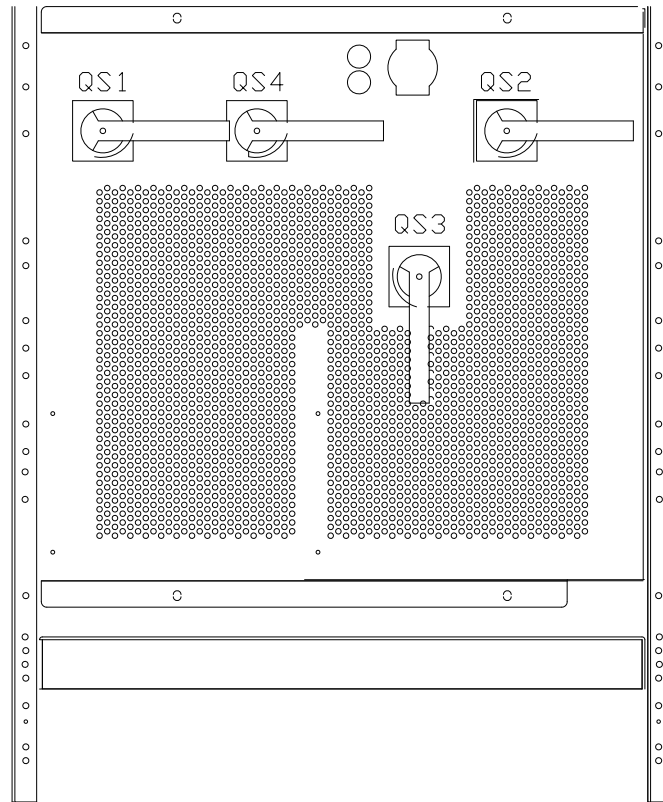


Figure 16 - Location of interruptors



**Warning**

During parallel operation of UPS units, the load switching function of the built-in service bypass can be carried out by an external switching device (see "Parallel operation" on page 47).

**6.5. OPERATING MODES**

The UPS has four different operating modes. These are described below.

**On-line operation**

Normal UPS operating mode. The connected loads are supplied from the mains via the Inverter. The batteries are charged as necessary.

The inverter reliably filters mains disturbances and provides a stable, interference-free supply to the load.

On the control panel, the "OK" LED is illuminated when the UPS is in on-line operation. In this operating mode, the UPS switches to battery operation if a mains failure occurs. If an overload or short circuit occurs at the UPS output, or if there is a fault in the inverter, the UPS switches to bypass operation.

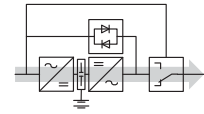


Figure 17 - Power flow in on-line operation

**Battery operation**

In this operating mode, the connected load is supplied from the batteries via the inverter.

In the event of power failure, battery operation is automatically activated and supplies the loads without interruption. If the power failure lasts longer than 30 s, the UPS signals a fault condition.

In battery operation, the "OK" (green) LED on the control panel and the "WARNING" (yellow) LED are flashing. From this operating mode, the UPS automatically returns to on-line operation within the backup time once the mains supply returns. If the power failure lasts longer than the loads can be supplied by the battery, the UPS provides relevant information via its interfaces. Computers can be automatically powered down with additional software (optional).

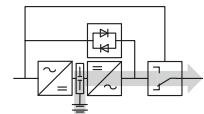


Figure 18 - Power flow in battery operation

**Bypass operation**

In this operating mode, the connected loads are supplied from the mains via the electronic bypass.

The electronic bypass serves to further ensure power to the loads. If an overload or short-circuit at the UPS output occurs, it is automatically activated to ensure uninterrupted power supply to the loads.

The "WARNING" (yellow) LED on the control panel illuminates.

From this operating mode, the UPS automatically returns to on-line operation after the fault is corrected. Bypass operation can also be specifically selected from the control panel with the key switch.

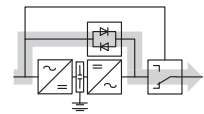


Figure 19 - Power flow in bypass operation

**Service bypass**

In this operating mode, the connected loads are supplied directly from the mains supply.

There is no supply to the Display/Control Panel in this condition.

The service bypass is used to supply the connected loads with voltage during maintenance work on the UPS.

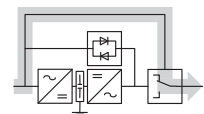


Figure 20 - Power flow in service bypass operation



## 6.6. COMMISSIONING

### Forming

If the UPS devices have not been used for a period of more than two years, it may be necessary to reform the electrolytic capacitors in the rectifier circuit. If the UPS devices are commissioned within two years of delivery (check nameplate), this action is not necessary.

▶ **Contact customer service if these capacitors need to be reformed.**

▶ **Carry out commissioning as follows:**

#### Switch on the UPS

- Check that the UPS is connected according to chapter 4 "Installation". For parallel operation please check "Parallel operation" on page 47.
- ensure that the ventilation grilles are unobstructed
- ensure the earth connection is in place
- ensure that any external switches are in the OFF (0) position
- ensure that **all external batteries are disconnected**
- in order to set-up special UPS parameters please download the appropriate Service software from the website: [www.masterguard.de](http://www.masterguard.de) and follow → "Service" → software download PPVis



#### Danger

*Do not connect any devices that may overload the UPS or draw direct current from it.*



#### Notice

*If these instructions are not observed correctly, problems may be experienced with the electrical supply.*

- Set the UPS to Maintenance Bypass operation (see "UPS operating procedures" on page 34).
- Connect a PC to the service interface X3 (see "PPVis configured service interface - X3" on page 25) and set the correct battery data, if necessary, using the software provided with the shipment.

#### Switch to on-line operation

- Set the UPS to On-line Operation (see "UPS operating procedures" on page 34).

The UPS is now in on-line operation and the loads are supplied from the inverter. Message 8 disappears from the display.

#### Connection of external batteries

Before the system starts, ensure that the UPS battery connections polarity is correct. Wrong connections can damage the system and endanger operator safety.

While the UPS is in normal operating mode, check that the battery charging voltage is present on the UPS side of the battery isolator.

#### ***Situation 1: DC voltage present***

- Ensure the polarity of the DC voltage on the battery side is the same as that on the UPS side.
- Insert the battery fuses and close the battery switch. Warning indicator 13 is extinguished on the display

#### ***Situation 2: No DC voltage present***

The UPS may be fitted with an upgraded charger module which detects reversed connect battery (feature: Battery Reverse Detection).

A charger having this feature provides charging only if the batteries are connected correctly. If no battery is connected, no charging voltage is present.

If the UPS already has this feature, proceed as follows:

- Connect the battery, via the battery breaker, directly to the charger
- If the polarity is correct, indicator 13 is extinguished on the display
- If the polarity is incorrect, indicator 13 remains illuminated - swap battery connectors over and try again.

**6.7. UPS OPERATING PROCEDURES**

Procedures refer to para. 15.

**Table 4: Switching the UPS ON**

Step	Action	Status
1	Switch QS1 to ON	
2	Switch QS2 to ON	
3	Switch QS4 to ON	Bypass Mode (load supplied from Bypass)
4	Connect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to ON	
5	Press Inverter ON on Display Panel (Fig. 21) for 5 seconds	Normal Mode (On Line)

**Table 5: Switching the UPS OFF**

Step	Action	Status
1	Press Inverter OFF on Display Panel (Fig. 21) for 5 seconds	Bypass Mode (load supplied from Bypass)
2	Disconnect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to OFF	
3	Switch QS4 to OFF	Load no longer supplied
4	Switch QS2 to OFF	
5	Switch QS1 to OFF	UPS OFF

**Table 6: Transfer from On-line to Maintenance Bypass operation**

Step	Action	Status
1	Press Inverter OFF on Display Panel (Fig. 21) for 5 seconds	Normal Mode (Automatic bypass)
2	Disconnect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to OFF	
3	Switch QS3 to ON	
4	Switch QS4 to OFF	Service Mode
5	Switch QS1 and QS2 to OFF	Maintenance Bypass Mode

**Table 7: Transfer from Maintenance Bypass operation to On-line mode**

Step	Action	Status
1	Switch QS1 and QS2 to ON - Await Bypass Mode ON	
2	Switch QS4 to ON	Service Mode
3	Switch QS3 to OFF	
4	Connect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to ON	
5	Press Inverter ON on Display Panel (Fig. 21) for 5 seconds	Normal Mode (On Line)

## 6.8. CONTROL PANEL AND DISPLAY

The control panel serves as the UPS user interface. An LCD informs the user about the operating status of the UPS.

A single-line diagram of the UPS is continuously displayed on the default page. The main functional blocks and power paths of the UPS are displayed using standard technical symbols, instantly communicating the overall status of the UPS. The same screen also permanently displays the output load percentage measurement, using three histograms (one for each output phase). When the UPS is not in normal operating mode, it is possible to access the "Warning and Alarm" summary page directly from the default page. Warnings and alarms are identified by text strings and codes. In battery operation, the display switches between warning code and estimated backup time (minutes).

After 30 seconds of inactivity (i.e. without buttons being pressed) the display reverts to the default page.

The text displayed by the LCD is available in English, Italian, French, German, Spanish, Portuguese, Turkish and Chinese, selectable by the user.

See the tables on the following pages for an overview of the Display Message Structure.


**Modifications and settings as shown below in menus 21/22/23 may only be carried out by appropriately qualified technicians. Settings should be tested only if the loads supplied by the UPS are non-critical.**

### OPERATING PROCEDURES

- **Start Inverter**

Press the Inverter ON  button for five seconds.

- **Stop Inverter**

Press the Inverter OFF  button for five seconds. An audible alarm will sound during this delay period.

- **Silencing Buzzer**

To silence the Buzzer press the Reset button momentarily

- **Fault Reset**

In order to restore normal operation of the UPS following a fault condition, after having corrected the situation causing the fault, press the Reset button for at least one second.

- **General Status LED**

Three LED indicators provide a quick, general understanding of the status of the UPS, as described below:

OK LED (green)

**Normal Operation**

When this light is on (not flashing), the system is running normally and neither warnings nor alarms are present. During mains failures (all other conditions at being nominal level), this LED will flash.

Warning LED (yellow) **Warning Condition(s) present**

This indication shall be activated by the presence of anomalous conditions, which could affect the nominal functioning of the UPS. These conditions are not originated with the UPS, but may be caused either by the surrounding environment or by the electrical installation (mains side and load side). It shall be possible to read the description of the active warning(s) by browsing the relevant LCD display menus.

Alarm LED (red)

**Alarm Condition**

When this light is on, immediate attention should be given to the severity of the alarm, and service should be called promptly. It shall be possible to read the description of the active alarm(s) by browsing the relevant LCD display menus.

## 6.9. INVERTER STOP/START PROCEDURES

In the course of operating the UPS, it may become necessary, for example in an emergency situation, to switch off the Inverter, this is done by pressing the Inverter Stop button (see Fig. 21 - on page 37) and observing the following procedures:

### Single UPS - Bypass normal

In this condition, press, and hold, the Inverter Stop button, for the first two seconds the buzzer sounds (tone #1 - continuous "beep"), if the button is released during this period the operation of the UPS is not affected and the Inverter remains on. After two seconds, the buzzer stops, and an warning message is indicated (warning and fault messages may be viewed by scrolling through the Display Menus as described in "Controls and messages" on page 38):

<p>INVERTER INVERTER OFF</p>
----------------------------------

at which point the Inverter is switched off, the load is supplied by the Bypass and the Inverter Stop button can be released

### Parallel UPS - Normal operation - Stop inverter

To switch off the Inverters of the UPS in a parallel system, press, and hold, the Inverter Stop button on each UPS control panel, one by one, the buzzer sounds (tone #1 - continuous "beep"), then, after two seconds, the message:

<p>UPS xxxkVA STOP IN STANDBY</p>
---------------------------------------

may be viewed (see "Controls and messages" on page 38), and the buzzer is silenced, while the Inverter continues to supply the load

Once the last Inverter Stop button has been pressed for two seconds, all the Inverters in the system switch off and the Load is transferred to the Bypass supply.

Until all the Inverters have switched off and the Load is transferred to the Reserve, the "STOP IN STANDBY" command may be reset on any, or all, of the UPS, by pressing the Inverter Start button on the control panel for a minimum of two seconds.

Refer also to "Warning and Fault indications" on page 41

### Parallel UPS - Start Inverter

To switch ON the Inverters of the UPS in a parallel system, press, and hold, the Inverter Start button on each UPS control panel, one by one, after two seconds, the message:

<p>UPS xxxkVA START IN STANDBY</p>
--

may be viewed (see "Controls and messages" on page 38).

Once the last Inverter Start button has been pressed, all the Inverters in the system switch ON and the Load is supplied from the Inverters.

Until all the Inverters have switched ON the "START IN STANDBY" command may be reset on any, or all, of the UPS by pressing and holding the Inverter Stop button on the control panel for a minimum of two seconds.

Refer also to "Warning and Fault indications" on page 41

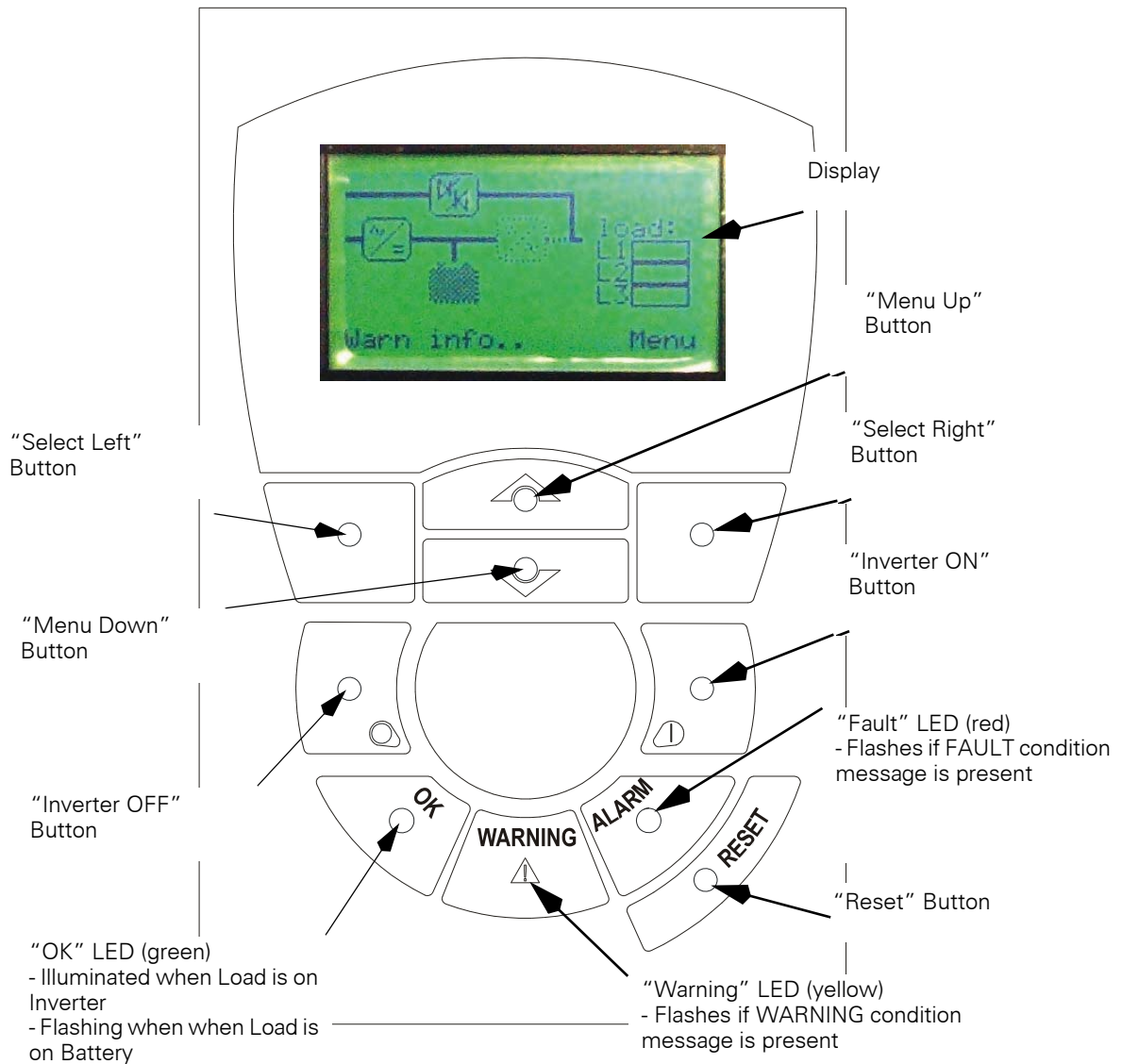


Figure 21 - Control Panel

The TEST / RESET button serves as a function control for the LEDs of the control panel and resets the UPS after the fault has been corrected. All LEDs on the control panel illuminate for approx. 1.5 s after pressing the button in normal operation (no warning or fault indicators present), followed by the last five warning indicators appearing one after the other in the two-digit display. If a fault occurs, pressing the button mutes the audible signal and, once the fault has been corrected, pressing the button brings the UPS into operation again.

The UPS can be manually switched between bypass and on-line operation using the keys "Inverter ON" (I) and "Inverter OFF" (O). A PC can be connected to the service plug (SERVICE) via the serial interface (RS232). Using the service software included with the unit, settings of the UPS can be changed and the UPS data can be queried.

**6.10. CONTROLS AND MESSAGES**

The display provides the following structure of windows. Each window has an dedicated number (see figure). By pressing the keys "menu up" or "menu down" a walk through the windows can be made. **If it is necessary to modify the settings in menus 21/22/23 the UPS must be switched to Automatic Bypass.**

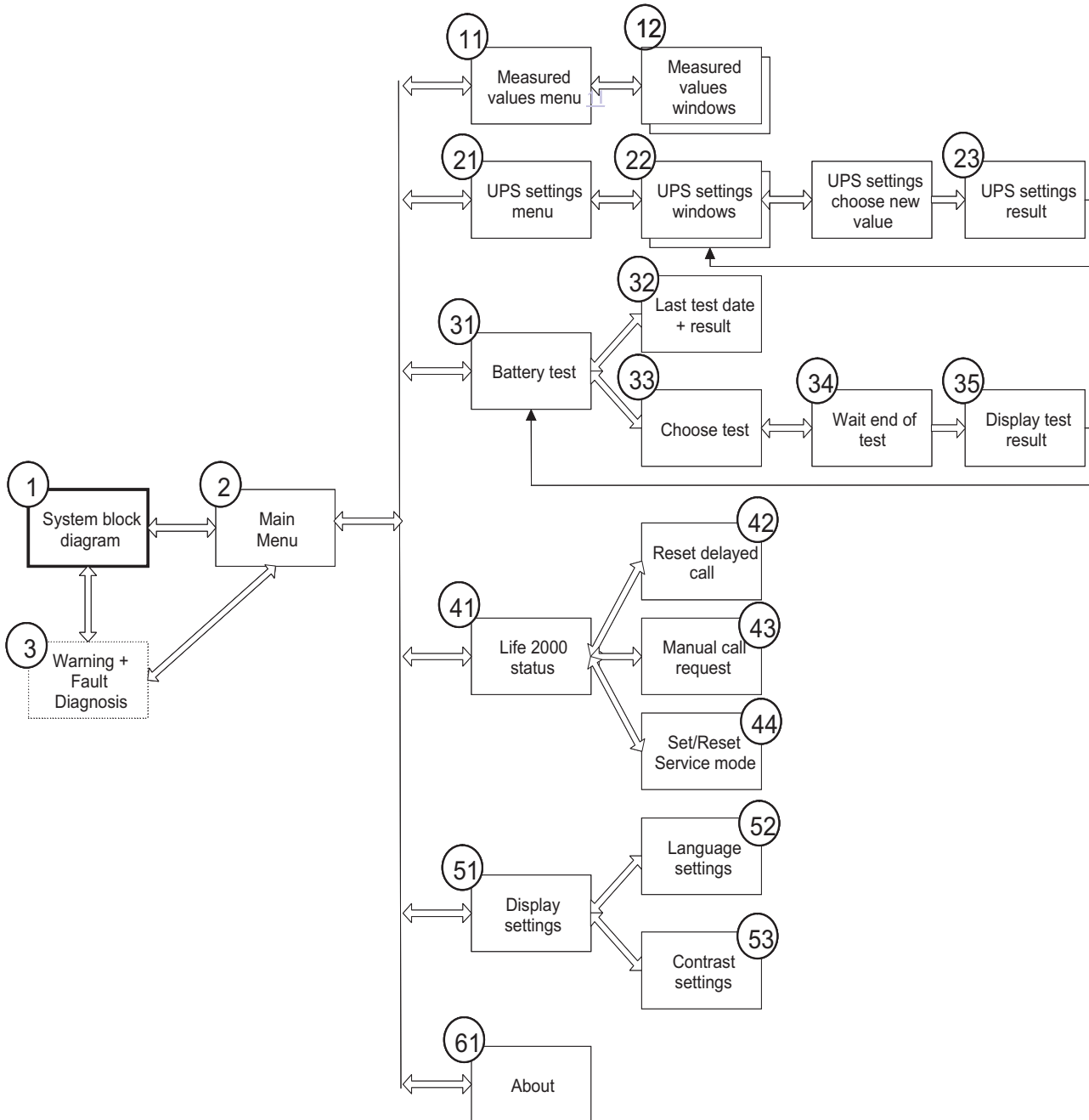


Figure 22 - - System block, main- and submenus

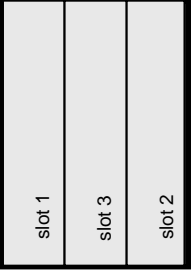
**Table 8: Displayed Text - System Block and Main Menu**

N°.	Description
1* SYSTEM STATUS	"Load"
	"Back-up: .. in minutes"
	Presentation of "System Block Diagram"
2* MAIN MENU	"Actual Values"
	"UPS Settings"
	"Battery Test"
	"LIFE"
	"Display Settings"
	"About"
3* WARNING/ FAULT DIAGNOSIS	For information on Warning and Fault messages, refer to para 6.11 "Warning and Fault indications"

**Table 9: Displayed Text - Sub Menus**

N°.	Description	
11* - MEASURED MENU	UPS Input	UPS Output
	DC Link	Battery
12* - MEASURED VAL- UES	V Mains L1	Real Power Out
	V Mains L2	Real Power Out L1
	V Mains L3	Real Power Out L2
	Mains Frequency	Real Power Out L3
	V interm. circ.	Tot. Real Power Out
	V interm. circ. +	App. Power Out L1
	V interm. circ. -	App. Power Out L2
	V Output L1	App. Power Out L3
	V Output L2	Tot. App. Power Out
	V Output L3	Overload Threshold
	Output Frequency	V Batt. per Cell
	I Output L1	Batt. Temp.
	I Outout L2	Batt. Current
	I Output L3	Actual Capacity
	Output Frequency	Hold up Time

**Table 9: Displayed Text - Sub Menus**

N°.	Description	
21* - UPS SETTING MENU	Input Contact	 <p data-bbox="1090 562 1305 645">Communi- cation box (CU4/POB/Profibus)</p>
	Output Contact	
	Optional Boards (comms. box slot numbers - see right)	
	Other	
22* - UPS SETTINGS MENU	Input Contacts	Function AK3
	Function EK1	On Delay AK3
	On Delay EK1	Off Delay AK3
	Off Delay EK1	Negate Output AK3
	Negate Input EK1	Function AK4
	Output Contacts	On Delay AK4
	Function AK1	Off Delay AK4
	On Delay AK1	Negate Output AK4
	Off Delay AK1	Optional boards
	Negate Output AK1	Board <b>in slot 3</b>
	Function AK2	Profibus Bus Addr.
	On Delay AK2	Profibus PZD5
	Off Delay AK2	Profibus PZD7, PZD8
Negate Output AK2	Profibus PZD9	
23* - SETTING VALUE AND RESET	Parameter cannot be changed, verify if UPS has to be in Bypass Mode	
31* - BATTERY TEST MENU	Test Status	Perform a Test
32* - BATTERY TEST STATUS (Window: Last Test Date and Result)	Last Test Result	
	Last Test Date	
	OK...	
	Failed...	
33* - BATTERY TEST START (Window: Choose Test)	10 Second Test	8 Minute Test
	1 Minute Test	10 Minute Test
	2 Minute Test	15 Minute Test
	4 Minute Test	20 Minute Test
	6 Minute Test	Autonomy Test
34* - BATTERY TEST in Progress (Window: Wait end of Test)	Capacity:	
	Remaining:	
	Autonomy	



**Table 9: Displayed Text - Sub Menus**

N°.	Description	
35* - BATTERY TEST RESULT (Window: Display Test Result)	Test not possible at this time	Result: OK
	Test Cancelled	Result: Failed
	Test passed	Measured Autonomy
41* - LIFE MENU (Window: LIFE Status)	LIFE not Active on this UPS	Wait Connection
	Next Call Date	Connected
	Next Call Time	Send LIFE Data
	Delayed call In (> Window 42)	Send Easy Data
	Connection Status	PPVIS Connection
	Call Type (> Windows 43)	Close in Progress
	Service Mode (> Window 44)	Call Rescheduled
	UPS not Connected	
42* - LIFE DELAYED	Reset Delayed Call?	
43* - LIFE MANUAL	Perform a Manual Call	
44* - LIFE SERVICE	Enter Service	Exit Service
51* - DISPLAY SETTINGS	Language	Contrast
52* - LANGUAGE SETTINGS	English/Deutsch/Français/Italiano/Spanish/Portuguese/Chinese	
53* - CONTRAST SETTINGS	Contrast: Up or Down	
61* - ABOUT	Manufacturer	LCD Firmware Date
	Type of UPS	CU Firmware part No.
	Website	CU Firmware Rev.
	LCD Firmware Part No.	CU Firmware Date
	LCD Firmware Rev.	

**6.11. WARNING AND FAULT INDICATIONS**

The UPS recognises and draws attention to a number of events occurring during operation. These events are divided into Warning and Fault indications. Whether the message is a warning or fault can be determined from the number which appears in the Warning/Fault Diagnosis page of the display, and the buzzer signals.

The buzzer has two different patterns, which indicate the type of warning active.

- **Pattern 1: long intervals** - This event is less serious. It is not essential that the cause be rectified immediately, unless otherwise specified in table "Warning indicators"
- **Pattern 2: short intervals** - This is a serious event. The cause should be rectified straight away to avoid a fault condition.

The buzzer is silenced automatically as soon as the cause of the event is rectified. It can also be silenced manually by pressing the button TEST/RESET.

**Warning indicators**

If a warning indication appears, the UPS continues to operate. The yellow LED ALARM illuminates on the control panel. A number between 1 and 31 appears in the display indicating the type of warning.

**Displayed Warnings**

The various possible warning indications are listed in the following table.

**Table 10: Warning indicators**

Warning indicator- Buzzer pattern	Cause	Corrective steps
1 - 2	temperature too high in device	lower temperature (e.g. with ventilation); if necessary, reduce load; ensure ventilation outlets are unobstructed.
2 - 1	power failure (bypass power failure) *	
3 - 1	power failure (converter)	
4 - 2	load too high	reduce load
5 - 2	low intermediate circuit voltage	
6 - 1	load too high	reduce load
7 - 2	wrong phase sequence	check phase sequence
8 - 1	service bypass is on	
9 - 1	Battery operation	
10 - 2	battery rest time exceeded **	switch off load directly
11 - 2	discharge battery **	reduce load
12 - 1	operating state: commissioning, initial charging, converter	exit operating state after commissioning, initial charging
13 - 1	battery switch not engaged	engage battery switch
14 - 1	fan lifetime exceeded	replace fan - call customer service
15 - 1	battery charger comms. failure	call customer service
19 - 1	Battery temperature out of tolerance	check ambient temperature
23 - 1	battery charger failure (from charger)	call customer service
24 - 1	battery charger failure (from CU41)	call customer service
*A power failure will only be indicated when the minimum time has been exceeded. **Messages may also appear if battery data have not been correctly entered. Call customer service.		

**Please inform customer service of the indicator number(s) and the illuminated LEDs.**

**Fault indications**

If a fault occurs, the affected UPS component is always switched off, and the UPS automatically switches to the best possible operating mode for supplying the loads; the red FAULT LED illuminates on the control panel. A number between 33 and 99 appears in the Warning/Fault Diagnosis page of the display indicating the type of fault. Fault indicators are also indicated by a continuous tone from the buzzer. If a fault occurs, proceed as follows:

**Acknowledge horn**

First acknowledge the horn by pressing the TEST/RESET button

**Correct fault**

Next correct the fault by following the indications in Table 11 on page 43.

If the fault cannot be corrected:

Call Customer Service: The customer service addresses are given on the last page of this manual.

**Acknowledge fault**

After the fault has been corrected, it must be acknowledged by pressing the TEST/RESET button again.

**Displayed Faults**

The various possible fault indicators are listed in the following table.

**Table 11: Fault Indications**

<b>Fault</b>	<b>Cause</b>	<b>Corrective steps</b>
33	temperature in converter too high	lower temperature (e.g. with ventilation); clean or replace filter mats (optional); check load and reduce if necessary; ensure ventilation outlets are unobstructed
37	overcurrent cut-off	check load or call customer service
39	overvoltage in intermediate circuit	check mains or call customer service (mains voltage too high; voltage peaks in mains; incorrect connection voltage)
40	EPO Active	
41	electronics defective	HW defective (CU) - call customer service
42	pre-charging failure	HW defective - call customer service
44	overcurrent cut-off	check load
46	UPS output out of tolerance	check load or call customer service
47	overload at device output	check load or call customer service
48	Backfeed Protection Active	Reset logic by switching OFF UPS for a few seconds - if condition persists call customer service
50	bypass defective	HW defective (bypass) - call customer service
51	bypass failure during changeover	HW defective (bypass) - call customer service
52	bypass overload	check load or call customer service
55	EPROM defective	HW defective (EPROM) - call customer service
57	EPROM defective	HW defective (EPROM) - call customer service
59	options board defective	HW defective - call customer service
61	signal error parallel op. board	call customer service
83	Battery Fault	Battery Test Failed - call customer service

► **Please inform customer service of the indicator number(s) and the illuminated LEDs. Fault indicators not listed in the table can only be corrected by customer service.**

**6.12. TROUBLESHOOTING****6.12.1. Rectification of Errors**

If, in spite of the high reliability of this device, problems should occur, please check the following points before contacting the responsible customer service representative:

Is the mains voltage present at the UPS input?

Is the input fuse defective or have circuit breakers tripped?

If you contact the responsible customer service representative, please have the following information ready:

- Device information = model, order no., series no. as per nameplate

- An exact description of the problem (what loads are being operated, does the problem occur regularly or sporadically etc.)

<b>Problem</b>	<b>Possible cause</b>	<b>Action</b>
No display No alarm (UPS switched off)	Main switch switched off	Switch on main switch
	No mains voltage present	Have mains inspected by qualified electrician
	Input fuse defective or input circuit breaker tripped	Replace with fuse of same type or reset circuit breaker. If the problem persists, contact the responsible customer service representative.
Green "OK" LED does not illuminate, buzzer sounds at intervals	No mains voltage present	UPS operation (see "Operating modes" on page 32)
Green "OK" LED does not illuminate when mains voltage present, buzzer sounds at intervals	Input fuse defective or input circuit breaker tripped	Replace with fuse of same type or reset circuit breaker. If the problem persists, contact the responsible customer service representative.
ALARM indicator illuminates, buzzer sounds continuously	UPS error	Contact the appropriate customer service representative
	Overheating	Reduce ambient temperature
Backup time less than that specified	The fuse switch of the battery extension(s) is in "OPEN" position.	Move the fuse switch to the "ON" position.
	Batteries are not completely charged	Charge batteries, See "Batteries - (external only)" on page 7. and test backup time. If the problem persists, contact the appropriate customer service rep.
	Batteries are defective	Contact customer service
	Charging device is defective	Contact customer service
OVERLOAD LED lit	Overload at UPS output	Reduce load to the permissible value
No communication between UPS and PC	Wrong serial connection cable	Check whether the correct cable has been used (standard modem/null modem cables are not permissible)
	Interface on the PC is being used by another process or is defective.	Check whether other software/service is accessing the interface on the PC; try selecting a different serial interface.
	Interference on the data cable	Lay cable differently.

## 7. MAINTENANCE

### 7.1. MAINTENANCE INTERVALS

Although there is no need to substitute UPS internal components regularly as a preventative measure at any point during its design life, depending on environmental conditions, specific components, more subject to aging (e.g. electrolytic capacitors, backup batteries, fans etc.), may require replacement on an occasional basis. Therefore, CHLORIDE recommends that regular maintenance checks be carried out on site by an authorized customer service. For further information please contact CHLORIDE customer service dept.

The UPS indicates when the end of a fan's lifetime has been reached (see Table 10 on page 42). A replacement fan is recommended.

### 7.2. DISPOSAL OF BATTERIES

When the useful lifetime of the batteries has expired, they must be replaced by the Customer Service representative responsible. Exhausted accumulator batteries are classified as "harmful toxic waste" and as such regulations demand that they be disposed of by an authorised recycling centre. The Customer service centre is fully equipped to deal with such batteries in accordance with regulations and with the greatest respect for the environment.

The typical useful lifetime of the battery is 3 to 5 years at 25° C ambient temperature; it is, however, dependent on the frequency and duration of mains failures.

### 7.3. REPLACING FANS

This operation may be carried out by authorized technical personnel only.

Ensure that the UPS is switched off and isolated from all sources of electrical energy before carrying out this operation.

### 7.4. SERVICE ADDRESSES

Onsite service is available world-wide. Service telephone and fax numbers can be found on the last page of this manual.

### 7.5. DECOMMISSIONING

#### Taking out of service

##### ***Switch to service bypass***

- Switch the UPS to Maintenance Bypass operation (see Table 6 on page 34)

##### ***Disconnect batteries***

- Open the battery isolator or battery switch if other external batteries are used.
- Before continuing work, measure the voltage at the battery terminals and at the mains input and wait until this has dropped to 0 V or wait at least 5 min. Failure to do this can lead to severe electrical shock and possibly death.

The UPS is now in maintenance bypass operating mode. The only voltage present is at the mains and load terminals. Qualified personnel may now carry out maintenance work while observing the corresponding safety measures.

##### ***Disconnect mains***

If the loads no longer need power, you may now open the external mains separation device for the UPS.

### 7.6. DISPOSAL

Within the EU, batteries and other devices must be disposed of by a certified disposal specialist. Outside the EU, disposal is to be performed in accordance with the applicable regulations for the given country.



## 8. PARALLEL OPERATION

Uninterruptible power supplies can be connected in parallel to increase power capacity or for additional safety (redundancy). If the UPS units are equipped with the additional POB (Parallel Operation Board) assembly, up to 8 of the same UPS blocks can be operated in parallel for increased power capacity or redundancy. Your UPS units are equipped with this option if the order number on the nameplate contains the letter "B" in the ninth position: CH70 xx-xxBxx-xxxx.

This feature can also be added at a later time and is, therefore, available as an option that can be installed in the field by qualified technical personnel.

A multiple-block system is automatically regulated and controlled via the controller of the individual UPS blocks. The available electronic bypasses in the individual blocks work together just as all the corresponding inverters and divide the load current between them. All necessary communication for parallel operation is carried out via a shielded 25 conductor cable. Each UPS block is shipped with a 5m long communication cable which is sufficient for most installation requirements.

When planning the system and during installation, power cables having the same length are to be used between the input distribution and the input terminals for the bypass and rectifier (U, V, W, - U1, V1, W1, N), as well as from the UPS outputs (U2, V2, W2, N) to the parallel connection point on the load side. Differences of 20% are allowed for power cable lengths of up to 20 m. For larger distances, cable lengths may not vary by more than 10%.

### 8.1. COMMISSIONING

Commissioning of multiple-block systems must be carried out by appropriately trained technicians.

### 8.2. SYSTEM CONFIGURATIONS

para. 23 illustrates the schematic diagram of a 4-block system with common battery and Service Bypass Switch (SBS). The SBS illustrated can be in 70-NET parallel systems where units are of standard, 400V type. If T-version units are used (see "T-version" on page 58) a correctly-configured transformer must be installed at the input of the SBS.

UPS blocks have been designed for use with separate batteries (para. 23). Where a common battery is used, the battery manager does not carry out autonomy time and capacity calculations.

### 8.3. COMMUNICATION BETWEEN THE UPS BLOCKS

UPS units exchange information between each other via the connector cable (25 pin connector) shipped with each unit. para. 24 displays the loop circuit which is electronically monitored. The communication cables are shielded and must be run separately and away from all power cables.

### 8.4. PARALLEL SWITCHING PROCEDURES

Procedures refer to Fig. 14 - on page 29.

**Table 12: Switch On procedure (all switches in "OFF")**

Step	Action	Status
	On each UPS:	
1	Switch QS1 to ON	
2	Switch QS2 to ON - Await Bypass Mode ON	
3	Switch QS4 to ON	Bypass Mode - Output voltage present
4	Connect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to ON	
	When the above steps have been completed for all the UPS in the parallel system:	
5	Press Inverter ON button on each UPS Display Panel (Fig. 19) for approx. 5 seconds, until all the Inverters are ON - at this point the Inverters synchronise and take over the Load	Normal Mode (On Line)

**Table 13: Parallel Switch Off procedure (UPS in On Line Mode)**

Step	Action	Status
	On each UPS:	
1	Press Inverter OFF on each UPS Display Panel (Fig. 19) for 5 sec, until all the Inverters are OFF - at this point the Load is supplied by the Bypass	Bypass Mode - Output voltage present
	Carry out the following steps for all the UPS in the parallel system:	
2	Disconnect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to OFF	
3	Switch QS4 to OFF	Load not supplied
4	Switch QS2 to OFF	
5	Switch QS1 to OFF	

**Table 14: Transfer from On-line to Maintenance Bypass operation**

Step	Action	Status
	On each UPS:	
1	Press Inverter OFF on each UPS Display Panel (Fig. 19) for 5 sec, until all the Inverters are OFF - at this point the Load is supplied by the Bypass	Bypass Mode
	Carry out the following steps for all the UPS in the parallel system:	
2	Switch QS3 to ON	
3	Switch QS4 to OFF	Service Mode
4	Disconnect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to OFF	
5	Switch QS1 and QS2 to OFF	Maintenance Bypass Mode

**Table 15: Transfer from Maintenance Bypass operation to On-line mode**

Step	Action	Status
	On each UPS:	
1	Switch QS1 and QS2 to ON - Await Bypass Mode ON	
2	Connect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to ON	
3	Switch QS4 to ON	Service Mode
4	Switch QS3 to OFF	
	When the above steps have been completed for all the UPS in the parallel system:	
5	Press Inverter ON on Display Panel (Fig. 19) for 5 seconds, until all the Inverters are ON - at this point the Inverters synchronise and take over the Load	Normal Mode (On Line)

**Table 16: Parallel Switch Off procedure (Bypass Mode)**

Step	Action	Status
	On each UPS:	
1	Disconnect the external battery by switching the battery separating device (see "Connecting the batteries" on page 20) to OFF	
2	Switch QS4 to OFF	Load not supplied
3	Switch QS2 to OFF	
4	Switch QS1 to OFF	



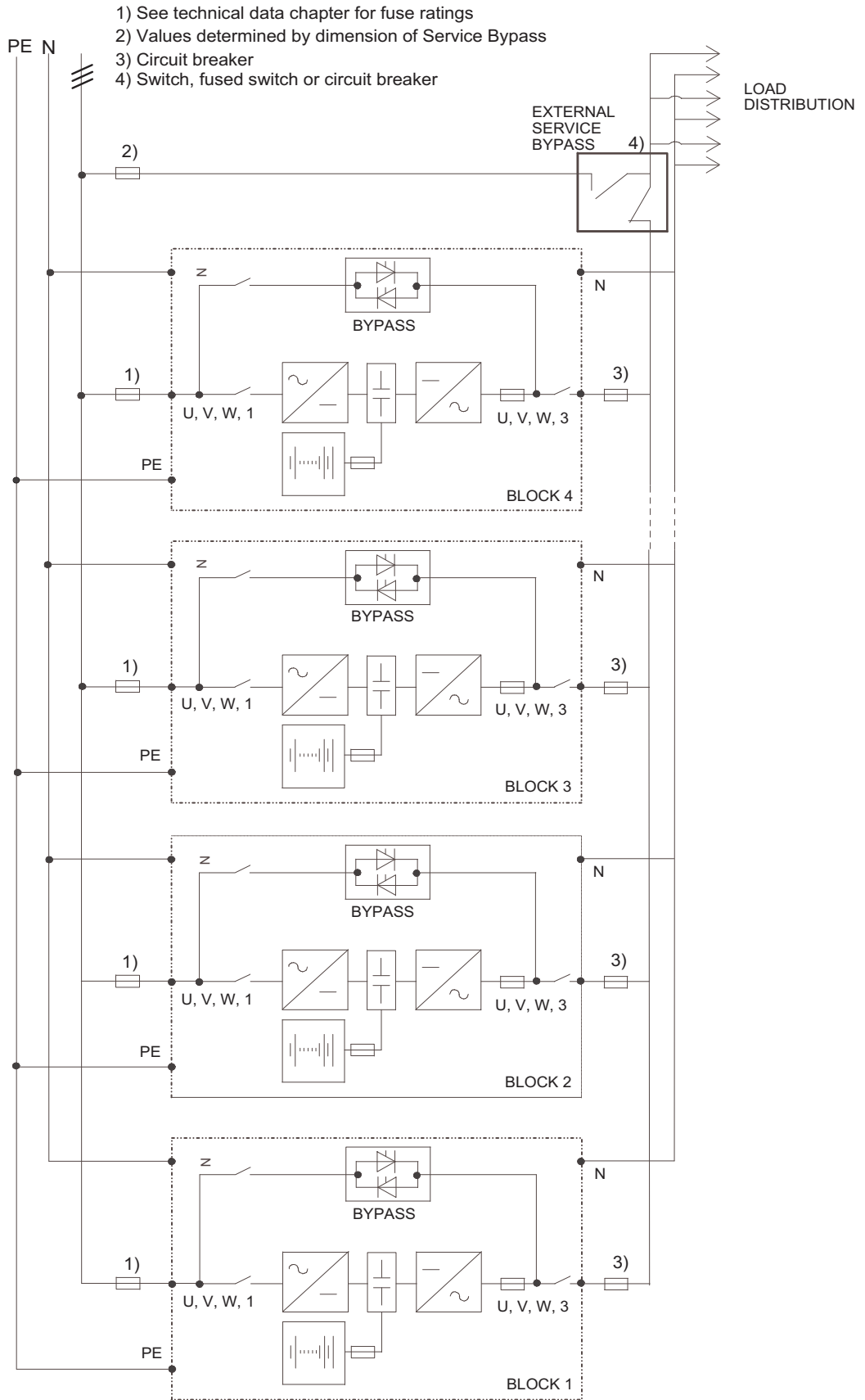


Figure 23 - Schematic diagram of a 4-block system

3) 25-way Sub-D plug cable

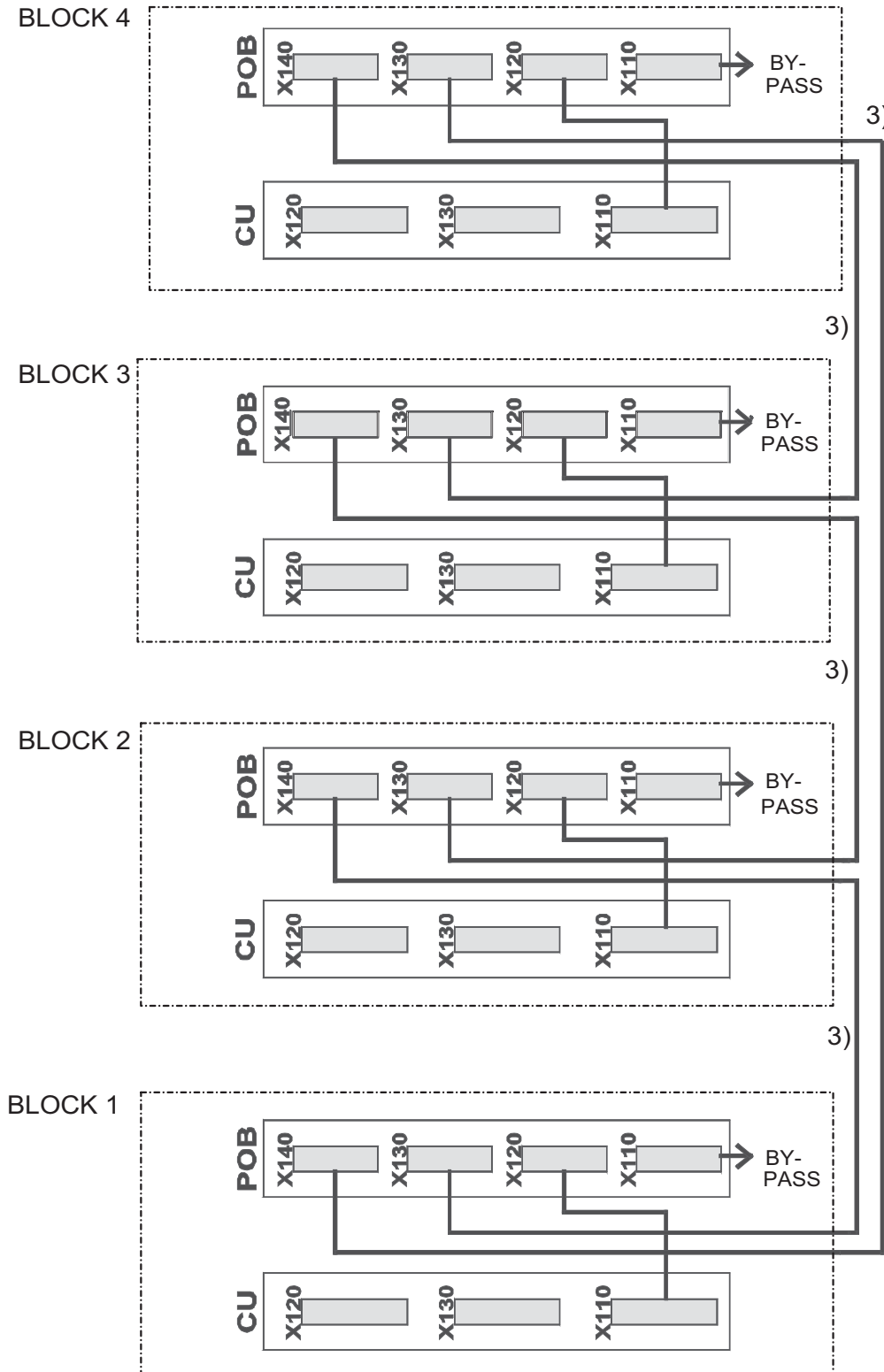


Figure 24 - Loop circuit for parallel UPS (25 pin connector)

## 9. OPTIONS

### 9.1. EXTERNAL BATTERIES

External battery solutions are available to increase the autonomy of operation of the UPS. These include the following components:

- Cubicle
- Disconnecting device
- Fuses
- Safety screen
- Power terminal block

Three cubicle sizes are available:

**Table 17: Empty battery cubicles**

	Width mm	Depth mm	Height mm	Net weight (kg)
Type A	820	858 <sup>1)</sup>	1780	220±35
Type B	1020	858 <sup>1)</sup>	1780	250±35

1) including front handle; without handle 830mm

### 9.2. EMPTY OPTIONS CUBICLE

A matching cubicle shall be available for customised applications such as:

- Input/Output voltage matching transformers
- Customised distribution boards
- Customised applications.

For available sizes please see the battery cubicles above

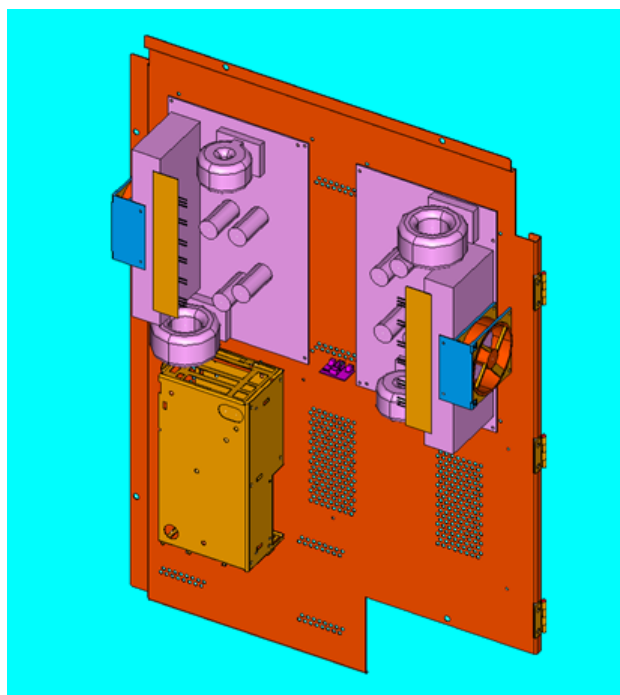
### 9.3. INPUT LOW THDI OPTION

For 70-NET 50 - 60kVA UPS a low input current distortion option is available, which reduces the THDi to less than 10%, without significantly affecting AC/AC efficiency. The option is housed inside the UPS cubicle.

### 9.4. EXTENDED BATTERY CHARGER

It is possible to increase the UPS battery recharging capacity by adding an additional battery charger to the standard one. This additional board is mounted inside the UPS cabinet, behind the upper safety panel:

*Figure 25 - Location of additional battery charger*



## 9.5. REMOTE ALARM UNIT

A remote alarm panel shall be available for the display of individual important messages of the UPS.

## 9.6. BATTERY MANAGEMENT MODULES

With measuring modules connected to the battery blocks, enhanced battery management shall be possible offering the following features:

- Measuring of the condition of each individual battery block by means of separate battery measuring modules (BMM)
- Analysis of each battery block through measuring of the minimum and maximum voltage values.

## 9.7. SHUTDOWN AND MONITORING SOFTWARE

### MopUPS<sup>PROFESSIONAL</sup>

The primary function of MopUPS<sup>PROFESSIONAL</sup> for Windows is to shut down the operating system of an unattended computer, safely, in the event of a power failure. All files are closed and directory pointers are written to disk while the system is supplied from UPS battery power.

MopUPS<sup>PROFESSIONAL</sup> for Windows provides this function and offers other features, useful to network administrators, including:

- Automated responses to a variety of events - E-mail, messaging, paging, running script files, etc.
- Logging of various events and UPS status information to files
- Real time viewing of site power and UPS status information
- Administrative shutdown for scheduling planned system shutdowns
- Control of UPS performance features - set restart to manual, silence alarms, adjust trip points
- Remote access and monitoring of UPS connected to remote servers on the network using Named Pipes or TCP/IP

## 9.8. SHUTDOWN SOFTWARE FOR COMPUTER INTERFACE PORT

### Network adaptor ManageUPS<sub>NET</sub>

ManageUPS<sub>NET</sub> (formerly known as the SNMP adapter) allowing UPS to be monitored and controlled over a network using TCP/IP protocol. The adapter allows:

- UPS monitoring from an NMS station using SNMP
- UPS monitoring from a PC using a Web Browser
- Notification of events via E-mail

## 9.9. AS400 MULTIPLEX

For connection between the UPS and an AS400 type computer, or similar, a 50 m cable, complete with the appropriate connectors, is available.

## 9.10. LIFE.NET

This option provides remote monitoring of the UPS, via a dedicated telephone line, to ensure maximum reliability for the duration of its operational life. The UPS automatically telephones the service centre at predefined intervals, to provide detailed information, which is analysed in order to predict any short term failures. In addition it is possible to control the UPS remotely.

Transmission of UPS data to one of the service centres is by modem and can be:

- ROUTINE: typically once a week
- EMERGENCY: when something goes wrong or when parameters are out of tolerance.
- MANUAL: when requested by the Customer
- BIDIRECTIONAL: when requested by the service centre

During the calls the service centre shall:

- Identify the connected UPS
- Recognize the kind of call
- Request the data stored in the UPS since the previous connection
- Request information from the UPS on line (selectable).

The storage of the data, and their subsequent analysis, permits the service engineer to compile a detailed report, that will be forwarded to the Customer periodically, with the aim of informing her/him of the condition of the UPS and of preventing potentially critical situations.

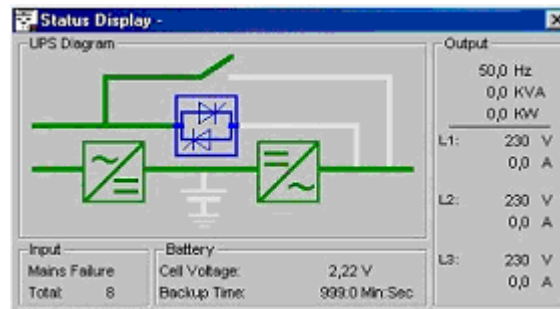
### Telephone switch for LIFE.net

The installation of this switch permits the Customer to use a telephone line, which is normally used for other purposes (fax or telephone), for LIFE.net.

### 9.11. PPVIS SURVEYS MONITORING SOFTWARE

The survey images displayed below supply the user with essential information on the connected UPS:

#### PPVis state indication - power flux survey



- Current state of components (UPS)
- Display of output voltage, UPS performance and load currents
- Number of power failures
- Battery cell voltage
- Available backup time

## 9.12. CONNECTIVITY

The following tables give details of the connectivity solutions which can be used in association with 70-NET. For port numbers, please refer to Chapter 5. For further information please refer to CHLORIDE Connectivity Solutions specifications. X3 and XS3 uses USS protocol, X6 and XS6 can be set to USS or LIFE.net protocol:

**Table 18:**

<b>Single Connectivity Solutions</b>			
Solution	Recommend. Port	Optional Port	Comments
ManageUPS <sub>NET</sub>	XS3 resp. X3	XS6 resp. X6	- Internal slot-in card - X6 External network adapter
MopUPS <sup>PROFESSIONAL</sup>	X3	X6	Serial port X3 or X6 may be used
PPVis	X3	X6	Serial port X3 or X6 may be used
LIFE.net Slot Modem	XS6	X6	Only serial port X6 may be used

**Table 19:**

<b>Simultaneous (up to 2) Connectivity Solutions</b>				
Solution	solution	ManageUPS <sub>NET</sub>	MopUPS <sup>PROFESSIONAL</sup>	LIFE.net
	Port no.	Port no.	Port no.	Port no.
ManageUPS <sub>NET</sub>	XS3	XS6	X6	XS6
MopUPS <sup>PROFESSIONAL</sup>	X3	XS6	X6	XS6
PPVis	X3		X6	XS6
LIFE.net Slot Modem	XS6			N/A

## 9.13. DUST FILTER

The option improves the protection degree of the air entrance from IP20 to IP30 for specific applications such as dusty environments. The filter shall be housed in the UPS cubicle .

## 10. TECHNICAL DATA

### 10.1. UPS DEVICES

UPS model		70-NET	
Power		50 kVA	60 kVA
Permissible ambient temperature	in operation	0° - 40°C - Load reduction at higher temperatures	
	Max. daily average (24 hrs)	35°C	
	Max. (8 hrs)	40°C	
	in storage	-30°C to +70°C	
Climate class according to IEC 721		Better than 3K2, however heed notices about installation site, check in accordance with IEC 68-2	
Immunity to electrical interference		IEC 801/-2/-3/-4/-5/-6	
EMC CLASS	standard	EN 50 091-2 Class RS	
<b>Degree of protection</b> acc. to EN 60 529	standard	IP20	
Humidity test		EN 068-2-56	
Overvoltage category		II (EN 60 950)	
Permissible pollution degree		2 (EN 60 950)	
Protection class		1 (with Earth conductor)	
Installation altitude		Up to 1000m above M.S.L., higher with load reduction (83% at 2000m; 76% at 3000m)	
Cabinet colour	standard	RAL 7035 (Light Grey)	
Dimensions		see "Installation site" on page 12	
Efficiency at 100% load	Digital Interactive mode [%]	98	
	Double conversion [%]	92	
Noise level acc. to DIN 45 635	[dB (A) at 1 metre]	<55 ± 2 dBA	
Net weight	[kg]	310±35	

**Input**

UPS input	Rating [kVA]	50	60
Mains supply for rectifier resp. reserve (bypass)		Separate/Common	
Mains voltage and tolerances [V]		3 AC/N 400 +15% / -25% (-30% with output derating) a)	
Nominal supply frequency	[Hz]	50/60 (selectable) +/- 10%	
Maximum input power	[kVA]		
	Float	45.8	54.9
	Recharge	51.1	60.2
	PF	> 0.95	
Max. current at 400V, basic batt. loading (1 charger)	[A]	71	85
Input current harmonic distortion		<25%	
Mains configuration		Symmetrical 3ph. mains, e.g. TN-C, TN-S, TN-C-S	

a) Derating: 75% Load

**External Battery**

UPS devices	Rating kVA	50	60
Nominal battery voltage	[V]	396	
External battery configuration			
Inverter input power	[kW]	44.0	52.7
I <sub>batt</sub> max. at final discharge	[A] <sub>DC</sub>	134	161
Charging current	[A] <sub>DC</sub>	10	



**Output**

UPS output	Rating [kVA]	50	60
Nominal voltage		3 AC/N - 400V, 380V, 415V - parameterisable	
Voltage tolerances	static	+/- 1% with balanced load +/- 3% with 50% unbalanced load +/- 4% with 100% unbalanced load (single phase)	
	dynamic	acc. IECEN 62040-3, KI.1 (VFI, SS, 111)	
Nominal frequency	[Hz]	50/60 +/- 10%	
Frequency tolerance	self-clocked	+/- 0.1%	
	line-clocked	+/- 2% (1, 3, 4% selectable)	
Frequency slew rate	[Hz/s]	<1 (adjustable from 0.1 to 2)	
Permissible non-linear load according to EN 50091-1		100%	
Overload capability (3-phase)	up to 5 min	1.25 x I <sub>nom</sub>	
	up to 30 s	1.5 x I <sub>nom</sub>	
Nominal apparent power	at [kVA] cos φ <sub>ind</sub> = 0.8	50	60
Nominal active power	[kW]	40	48
Nominal current	at 400 V, cos φ = 0.8 [A]	71	85

**Heat**

UPS	Rating [kVA]	50	60
Heat emission <sup>1)</sup> [W] at 100% load	Float	3500	4150
	Recharge	4000	4650
	idle [W]	800	
Airflow rate	[m <sup>3</sup> /h]	650	650
Electronic bypass: Max. overload current for 10ms	[A]	4000	4000

1) Conversion power loss in BTU[h] = P<sub>V</sub>[kW] \* 3412



**Notice**

Refer to the information provided on the rear of the device.

**10.2. SPECIAL VERSIONS**

70-NET can be customised to provide galvanic isolation and voltage adaption for specific load requirements. The following versions are available upon order:

**T-version**

70-NET-T includes an isolation transformer at the input. This transformer provides complete electrical isolation between the load and the input mains utility. Technical data differs according to the following table:

Description		Unit	Rating	
		kVA	50	60
Electrical Data				
INPUT	Voltage	Vrms	400, 3ph (+N), +15%, (-30% with derating)	
	Current (single phase)	Arms	85	100
	Frequency	Hz	50/60 (auto selection)	
OUTPUT	Power rating	kVA	50	60
		kW	40	48
	Voltage	Vrms	380, 400, 415, 3ph (+N)	
	Current @400Vrms	Arms	72	87
	Frequency	Hz	50/60 (auto selection)	
	Waveform	-	Sinusoidal	
Max. dissipation (@ nominal load; battery recharging)		W	6000	6750
Mechanical Data				
Dimensions		mm	see "Installation site" on page 12	
Net weight		kg	575±35	
Max. noise level (@1m)		dB	<58	

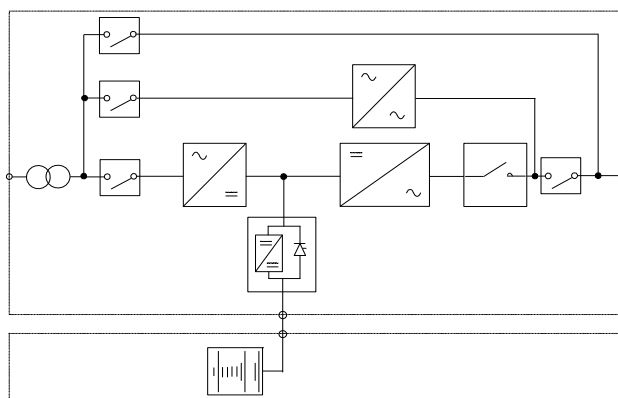


Figure 26 - T-Version

**R-version**

A further variation is the R version, intended for installation in environments, where the mains supply is particularly prone to voltage spikes. This version, known as 70-NET-R is equipped with the same components as the T version and additionally features

- overvoltage protection at the input ;
- dust filter

These devices are housed within the UPS cubicle.

For further information about the improved immunity of 70-NET-R to voltage surges, please contact CHLORIDE Technical Support.

**LAM-Version**

70-NET-LAM includes two internal transformers for isolation and voltage adaptation from 400V to 208/220V phase to phase. The Isolation Transformer is installed at the input and provides full electrical isolation and voltage adaptation (208/220 primary, 400V secondary), while the output auto-transformer allows voltage adaptation (400V primary, 208/220V secondary). Technical data differs according to the following table.

Description		Unit	Rating	
		kVA	50	60
Electrical Data				
INPUT	Voltage	Vrms	208/220, 3ph (+N), +15%, (-30% with derating)	
	Current (single phase)	Arms	165	198
	Frequency	Hz	60 ± 10%	
OUTPUT	Power rating	kVA	50	60
		kW	40	48
	Voltage	Vrms	208/220, 3ph (+N)	
	Current @208Vrms	Arms	139	167
	Frequency	Hz	60	
	Waveform	-	Sinusoidal	
Max. dissipation (@ nominal load; battery re-charging)		W	7200	8100
Mechanical Data				
Dimensions		mm	see "Installation site" on page 12	
Net weight		kg	710±35	
Max. noise level (@1m)		dB	<58	

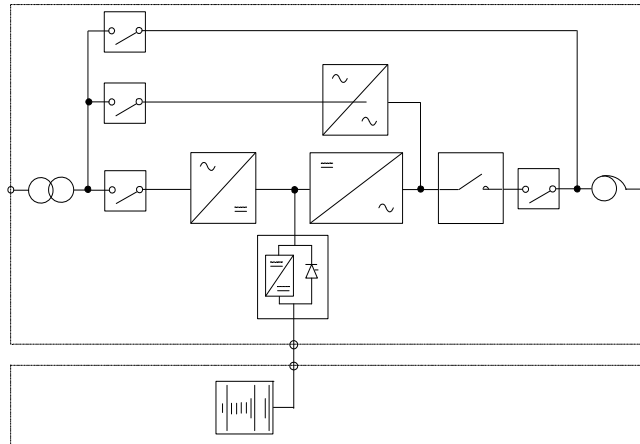


Figure 27 - LAM - Version