

# PowerWAVE EL 100XA (500–3000 VA)

## User Manual



# CONTENTS

CHAPTER 1 – SAFETY WARNINGS.....	4
1.1 DESCRIPTION OF SYMBOLS USED IN THIS MANUAL.....	4
1.2 GENERAL WARNINGS.....	4
1.3 BATTERY SAFETY .....	5
CHAPTER 2 – GENERAL DESCRIPTION.....	6
2.1 INTRODUCTION.....	6
2.2 FUNCTIONAL DESCRIPTION.....	7
2.3 MODES OF OPERATION.....	8
2.3 COMPONENT DESCRIPTION .....	9
2.3.1 CABINET .....	9
2.3.2 POWER MODULE.....	10
2.3.3 FRONT PANEL.....	10
2.3.3.1 FRONT PANEL MENU DESCRIPTIONS.....	11
2.3.3.2 AUDIBLE ALARMS.....	13
2.3.4 TEST SWITCH .....	13
CHAPTER 3 – INSTALLATION .....	14
3.1 INTRODUCTION.....	14
3.2 ACCEPTING DELIVERY.....	14
3.2.1 REPORTING DAMAGE.....	14
3.2.2 STORAGE .....	14
3.2.3 UNPACKING INSTRUCTIONS.....	15
3.3 INSTALLATION.....	16
3.3.1 ENVIRONMENTAL CONSIDERATIONS.....	16
3.3.2 CLEARANCES.....	16
3.3.4 CABLE CONSIDERATIONS .....	17
3.3.5 INRUSH CURRENT.....	17
3.3.6 CABLE SPECIFICATION .....	18
3.3.7 ELECTRICAL PLANNING .....	18
3.3.8 CABLINING PROCEDURE.....	18
3.3.8.1 SAFETY NOTES.....	18
3.3.8.2 TERMINAL CONNECTIONS.....	19
3.3.9 BATTERY INSTALLATION.....	21
3.3.9.1 EL1005 BATTERY INSTALLATION .....	22
3.3.9.2 EL1012 BATTERY INSTALLATION .....	22

---

3.3.9.3 EL1030 BATTERY INSTALLATION .....	23
CHAPTER 4 – OPERATION INSTRUCTIONS .....	24
4.1 START UP .....	24
4.2 SHUT DOWN.....	24
CHAPTER 5 – MAINTENANCE INSTRUCTIONS .....	25
5.1 EMERGENCY LIGHTING MAINTENANCE.....	25
5.2 SCHEDULED MAINTENANCE .....	26
CHAPTER 6 – TROUBLE SHOOTING .....	27
6.1 ALARM TABLE.....	28
CHAPTER 7 – COMMUNICATION .....	29
7.1 INTRODUCTION.....	29
7.1.1 SYSTEM TEST (ST) – OPTIONAL EXTRA .....	29
7.1.2 DRY PORT CONTACTS - INCLUDED .....	29
7.1.3 SNMP CARD – OPTIONAL EXTRA.....	29
CHAPTER 8 – TECHNICAL SPECIFICATION .....	30
8.1 GENERAL SPECIFICATIONS .....	30
8.2 RECTIFIER SPECIFICATIONS .....	30
8.3 BATTERY SPECIFICATIONS .....	31
8.4 INVERTER SPECIFICATIONS .....	31
8.5 BYPASS SPECIFICATIONS .....	32
8.6 HEAT DISSIPATION (At nominal load and voltage) .....	32
8.7 MECHANICAL SPECIFICATIONS .....	32

## CHAPTER 1 – SAFETY WARNINGS

Read the following safety information carefully before you install or operate the KOHLER PowerPro ELXA Static Inverter (SI) equipment and keep this manual within easy access of the equipment for future reference.

### 1.1 DESCRIPTION OF SYMBOLS USED IN THIS MANUAL



**WARNING:** The warning symbol is used where there is danger of an electrical shock, equipment damage or personal-injury.



**CAUTION:** The caution symbol is used to highlight important information to avoid possible equipment malfunction or damage.

### 1.2 GENERAL WARNINGS



**WARNING:** Be aware that the output from this equipment can be energized when the unit is not connected to a mains supply, even when the input AC power is disconnected



**WARNING:** The PowerPro ELXA assembly and peripheral equipment must be installed and commissioned by suitably qualified and trained personnel who are aware of the potential shock hazards.



**WARNING:** The PowerPro ELXA must be supplied by a grounded outlet. Do not operate the unit without a ground source.



**WARNING:** To reduce the risk of electric shock:

- Do not insert any object into ventilation holes or other openings
- Do not remove any equipment cover – the unit does not contain any user-serviceable parts. Refer all servicing requirements to qualified service personnel.
- Always disconnect the PowerPro ELXA from the mains power supply before you install a computer interface signal cable. Reconnect the power only after the signalling interface connections have been made



**WARNING:** To reduce the risk of fire:

- Install this equipment in a temperature and humidity controlled indoor area free of conductive contaminants.
- If a fuse ruptures always replace it with a fuse of the same type and rating.

## 1.3 BATTERY SAFETY



**WARNING:** The battery is not isolated from the mains voltage. Hazardous voltage may occur between the battery terminals and ground.



**WARNING:** A battery can present a risk of electric shock or burn from high short circuit currents. Always take the following precautions when working on batteries:

- Remove watches, rings or other metal objects.
- Use tools with insulated handles.



**WARNING:** The PowerPro ELXA system uses recyclable batteries:

- The batteries contain lead and pose a hazard to the environment and human health if not disposed of properly.
- If you replace the batteries you must dispose of the used batteries in accordance with local environmental laws and regulations.



**WARNING:** Heed the following warnings concerning battery handling:

- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or mutilate the batteries. They contain an electrolyte which is toxic and harmful to the skin and eyes.
- If electrolyte comes into contact with the skin, the affected area should be washed immediately with clean flowing water.
- The internal energy source (the battery) cannot be de-energized by the user.



**WARNING:** When changing the batteries, install the same number and same type of batteries.

## CHAPTER 2 – GENERAL DESCRIPTION

### 2.1 INTRODUCTION

The PowerPro ELXA is a high performance Emergency Lighting Static Inverter (SI) system, designed to deliver complete emergency lighting protection for a range of applications, in accordance with European BS EN50171 specification.

#### Key features

High performance, single phase input and single phase output, modular static inverter system ranging from 0.5kVA to 3kVA.

- Microprocessor Controlled
- Automatic restart of load after inverter shutdown
- Smart AVR function (Two buck / boost modes)
- Wide input range 184V~285V
- Pure Sine Wave Output
- High overload capacity (120% continuous)
- Overload and Short Circuit Protection
- Over temperature protection
- Generator compatible & Cold-start capable
- Full function of LCD display with Audible Alarm
- Smart battery management with large charger; wet battery compatible
- Intelligent double stages of charging control
- System and battery test ability
- High battery recharging current
- Battery current-limit
- Deep discharge protection
- Alarm relay contacts
- RS232 communication port
- Remote Monitoring Panel (Optional)
- SNMP Adapter (Optional)
- MODBUS Adapter (Optional)
- AS400 Card (Optional)

#### Optional features

- Input/output transformer
- Internal maintenance bypass switch
- DC Earth leakage protection
- High IP rating
- Other voltage options

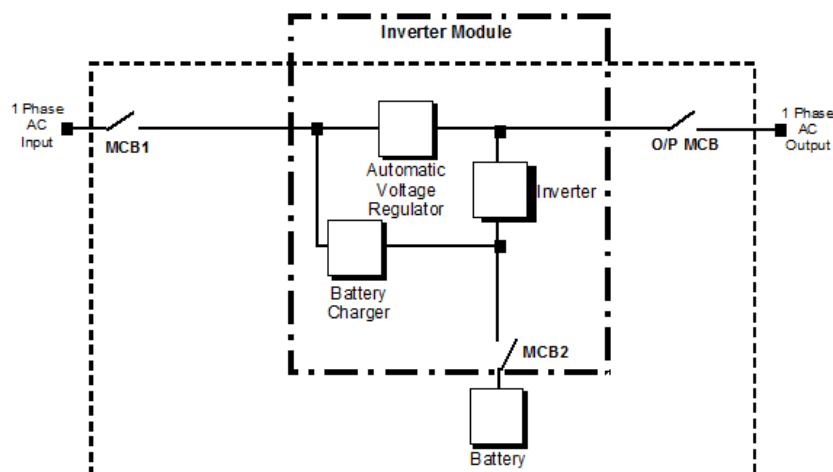
#### Model Range

	EL1005XA	EL1012XA	EL1030XA
Power Rating Kva/Kw	0.5/ 0.4	1.2 / 1.0	3 / 2.4
Input AC Voltage	220/230/240 (1Ph + N + PE)		

## 2.2 FUNCTIONAL DESCRIPTION

The PowerPro ELXA is a modular Static Inverter (SI) comprising power module, distribution and batteries in one cabinet.

All components are all accessed from the front of the cabinet with all power connections located at the top of the PowerPro ELXA cabinet.



**Figure 2.1.** Electrical Block Diagram

<b>MCB1</b>	: Mains Input Circuit Breaker.
<b>MCB3-8</b>	: Output Circuit Breaker.
<b>MCB2</b>	: Battery DC Circuit Breaker.

**AVR:** The first stage of the concept uses a single phase controlled automatic voltage regulator as a form of surge protector. An AVR monitors the voltage constantly to deal with both dips and spikes. This feature includes “Buck” and “Boost” technology to output regulated and controlled voltage at a selectable figure.

**CHARGER:** In ELXA Series EL INVERTERS, a controlled charger is used to produce DC voltage for both charging the batteries.

**BATTERIES:** Batteries are used as reserve DC power supply for the Inverter in case of mains failure. Batteries are connected in series to obtain a DC supply. Batteries are discharged by the inverter during mains failure. The discharged batteries are re-charged by the Rectifier on a constant voltage / current limiting basis, if AC mains power is available.

**INVERTER:** The Inverter converts the DC BUS voltage supplied by the batteries into a well regulated, fully digital controlled AC voltage with fixed voltage and frequency.

The output of the inverter is used to supply the critical loads connected to the EL INVERTER output.

**STATIC TRANSFER SWITCH (STS):** This is an electronically controlled transfer switch, which enables the critical load to be connected either to inverter output or to by-pass power source. During normal operation, the load is supplied by the mains output, in case of a mains disturbance or a mains failure the load is automatically transferred to the inverter source.

## 2.3 MODES OF OPERATION

### Changeover mode

When operating in the 'changeover' mode the rectifier is turned on to provide battery charging. The inverter is turned on and operating on standby (off load). The bypass-side of the static switch is turned on to connect the SI OUTPUT to the AC INPUT via the internal bypass line.

If the utility supply fails, the static switch will transfer the SI OUTPUT to the inverter within 10ms. However, as the utility supply is in a failed state the rectifier is inoperative and the inverter will be powered solely from the batteries (see Figure 2.5).

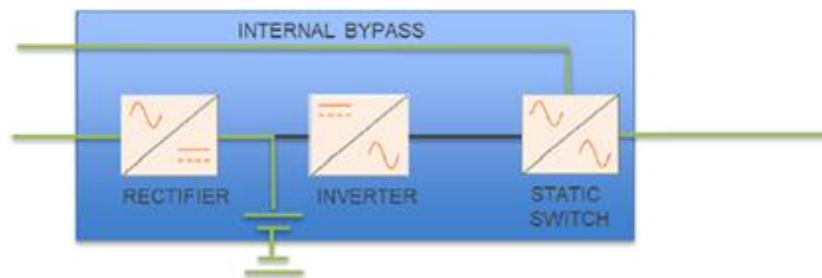


Figure 2.2

### On battery operation

If the mains supply fails, the rectifier turns off but the inverter will continue to operate from battery power until the batteries reach their end-of-discharge voltage; at which point the inverter will shut down and disconnect the SI OUTPUT supply.

If the AC INPUT supply is restored before the batteries are fully discharged, the rectifier will turn on automatically to once again power the inverter and recharge the batteries.

The whole process of switching between rectifier and battery power is totally transparent to the emergency luminaires.



## 2.3 COMPONENT DESCRIPTION

### 2.3.1 CABINET

The PowerPro ELXA cabinet, shown in Figure 2.7, comprises a power module, distribution, batteries and test panel.

All components can be fitted/removed from the front of the cabinet, making side and rear access unnecessary for servicing or repair.

All the AC and DC power cables are connected to terminals located on the top of the cabinet and two gland plates are provided for top cable entry.



Figure 2.3

### 2.3.2 POWER MODULE

The power module is shelf-mounted.

### 2.3.3 FRONT PANEL

The front panel of EL-Inverter, consisting of a LCD display, 3 function keys, TEST ON LED, Test button, allows the complete monitoring of the EL-Inverter status. By using the function keys operator can move on menus.

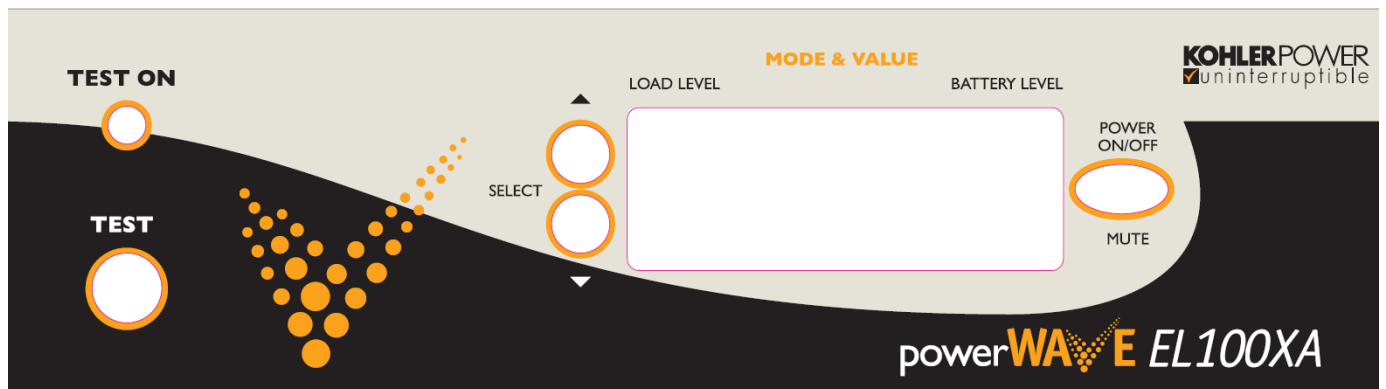


Figure 2.4

**LED :** If “Test On” lamp is lit maintenance test is active.

There are three function keys on front panel these are MAIN CONTROL ON/OFF BUTTON, UP/DOWN SELECT keys help moving on menus.

**NOTE :** The main control on/off button will provide test function at normal mode, but will become the alarm-reset function in battery mode.

### 2.3.3.1 FRONT PANEL MENU DESCRIPTIONS

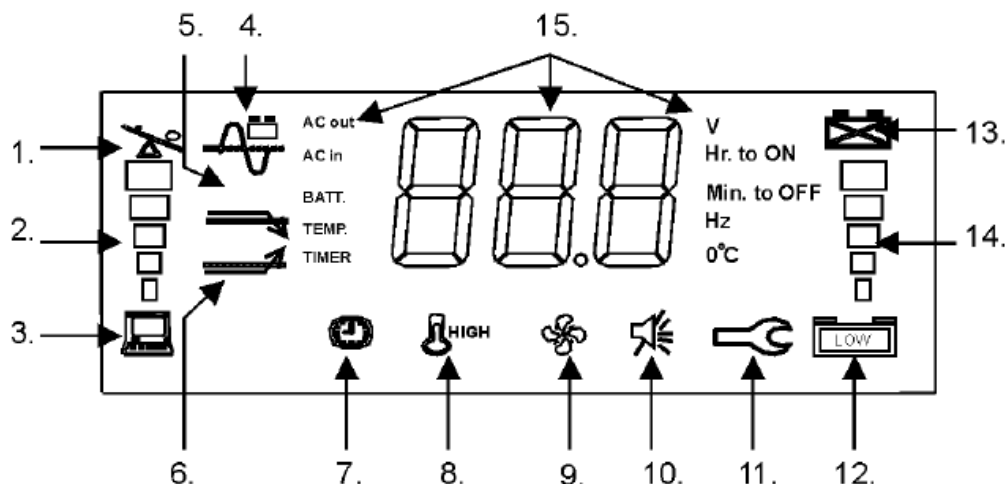
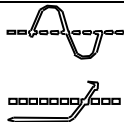










Figure 2.5

No.	Symbol	Indication	Description
1.		Over load	The loading exceeds the rating of Inverter.
2.		Load level	The higher the loading, the more bars will illuminate.
3.		Inverter is loaded	The Inverter is supplying a load.
4.		Normal mode	1) The sine wave symbol will display steadily without battery symbol when Inverter is in the normal mode.
		Battery mode	2) The sine wave symbol and battery symbol will blink when the Inverter is in back-up (inverter) mode.
		Test mode	3) The sine wave symbol will display steadily with blinking battery symbol when the Inverter is in testing mode.
5.		Buck mode	The AVR (Auto Voltage Regulator) is reducing the output voltage of the Inverter (when the input voltage is too high), and the sine wave symbol, as mentioned in item 4, will also display steadily to indicate that the output is in the normal mode.

6.		Boost mode	The AVR is increasing the output voltage of the Inverter (when the input voltage is too low), and the sine wave symbol, as mentioned in item 4, will display to indicate it is in the normal mode
8.		Thermal alarm	The temperature inside the Inverter is over 55°C. If the user does not reduce the load, the temperature will continue to rise and the Inverter will shut down automatically at 60°C.
9.		Fan is in "High speed"	The symbol will display whenever the cooling fan is running (or high speed), and will disappear when it is off (or low speed).
10.		Silence mode	The audible alarm has been silenced. To reset the alarm in Back-up mode, push the control button (not available during low battery level or abnormal condition).
11.		Inverter fault	The Inverter has failed and must be repaired. Contact a qualified service person.
12.		Battery normal	1) In normal operation, this symbol indicates a charged battery.
		Battery low	2) When the battery charge level is low, the word "LOW" will be added to the symbol.
13.		Battery replacement	The battery has failed and must be replaced. The battery is checked each time the Test Function is executed.
14.		Battery voltage level	1) The higher the battery voltage, the more bars will illuminate. 2) When the Inverter is charging the battery, the battery symbol and the level indicator will blink together.

15.	<b>Mode</b>	<b>Value</b>	<b>Description</b>
	AC out	V	AC output voltage.
	AC in	V	AC input voltage.
	AC out	Hz	AC output frequency.
	BATT.	V	DC battery voltage.
	TEMP.	°C	Inverter internal temperature.
Selection Button for mode & value  All the operation data will be displayed on LCD screen. By selecting the required mode (upward or downward), the related value will be displayed.			

### 2.3.3.2 AUDIBLE ALARMS

During a utility failure or fault operation, the EL-Inverter emits a beeping sound for warning. In back-up mode, the alarm can be silenced by pushing the “MAIN CONTROL ON/OFF BUTTON” button. However, the warning of low battery will still sound, urging the user that the load will be lost.

**Basic Indication Table:**

	STATUS	ALARM
Idle mode	Utility Good	No Beep
	Utility outage	No Beep
	Timer on, (refer to Item 5.5)	No Beep
Normal / Back-up mode	Normal (Utility good)	No Beep
	Back-up (No load)	One beep every 4 sec (alarm can be silenced).
	Back-up (Loaded)	2 beeps every 8 sec. (alarm can be silenced).
	Battery Low	4 beeps per sec (alarm can Not be silenced).
Abnormal Condition	Over load	Continuous alarm (alarm can Not be silenced).
	UPS fault	Every other 2 sec., 32 beeps in 2 sec (alarm can Not be silenced).
	Thermal alarm	Every other 2 sec., 32 beeps in 2 sec (alarm can Not be silenced).

### 2.3.4 TEST SWITCH

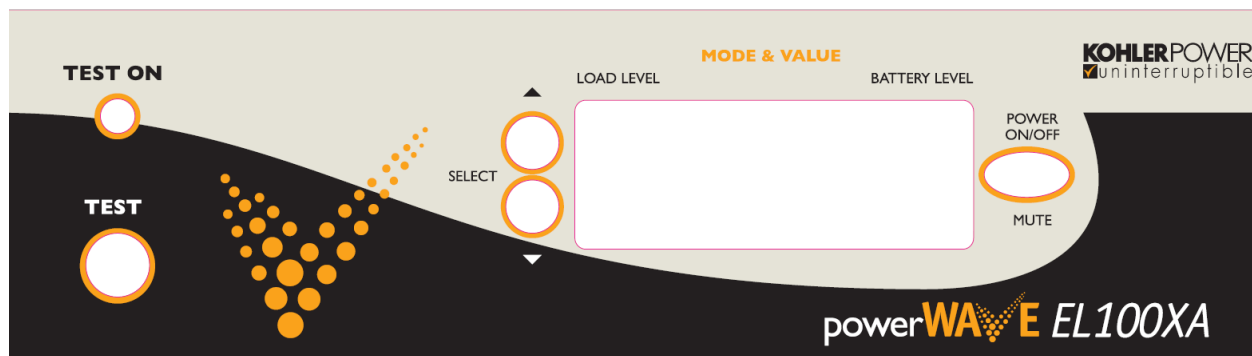
If the EL-Inverter is in normal operation, it is supplying the load by the incoming utility supply. In the case of a failure in this supply, the output is connected to the static inverter output. This transfer operation is performed internally by the control logic of the Inverter.

The operation of the EL-Inverter can be controlled externally; the unit can be forced to supply the output by the Inverter and batteries. This can be achieved by turning the TEST button.

**Note:** When the equipment is switched into the Test mode, the red “TEST ON” LED will be lit.

The TEST Button or the external test loop can be used for testing the machine’s operation and performance; it can also be used to maintain the EL-Inverter’s loads.

**WARNING:** When the TEST button has been used, it is important that it is switched off so the EL-Inverter can return to a standby operation and the batteries are recharged.



## CHAPTER 3 – INSTALLATION

### 3.1 INTRODUCTION



**WARNING:** All the operations described in this chapter must be supervised by suitably qualified personnel and all aspects of the electrical installation must be carried out by an authorised electrician.

KOHLER will take no responsibility for any personal injury or material damage caused by incorrect cabling or operation, or any installation activities that are not carried out in strict accordance with the instructions contained in this manual



**WARNING:** Once the PowerPro ELXA system is installed it must be commissioned by an engineer approved by KOHLER, or one of its service agents, before it is powered-up.

KOHLER will take no responsibility for any personal injury or material damage caused by the application of electrical power to this equipment before it has been fully commissioned.

### 3.2 ACCEPTING DELIVERY

The PowerPro ELXA cabinet is shipped on a purpose-built pallet that is easy to move with a forklift or a pallet truck. The power modules, batteries and other accessories are shipped separately



**CAUTION:** Observe the following precautions when off-loading and moving the cabinet:

- Always keep the packages in an upright position.
- Do not drop the equipment.
- Do not stack the pallets.

The cabinet is bolted to the shipping pallet and packed in a cardboard sleeve that is designed to protect it from mechanical and environmental damage. Further protection is provided by wrapping the equipment with a plastic sheet.

Before you accept the shipment ensure that the received package(s) correspond to the description shown in the delivery documentation and carefully examine the packing containers for signs of physical damage

#### 3.2.1 REPORTING DAMAGE

Claims for shipping damage must be filed immediately when found, and the carrier must be informed of ALL claims within seven days of receipt of the equipment. If the equipment is to be stored for longer than seven days before it is installed, you should unpack it and inspect it for signs of internal damage before you put it into storage. Note that some optional equipment packages might be shipped inside the cabinet and these too should be checked for damage.

If the equipment is damaged you should store the packing materials for further investigation

#### 3.2.2 STORAGE

If you plan to store the PowerPro ELXA prior to its installation it should be kept upright (preferably in its original shipping packaging) in a clean, dry environment with a temperature between -25°C to +60°C and RH <93%. If the storage period is likely to exceed seven days the packaging should be removed and the cabinet inspected for shipping damage before it is placed into storage. If there is no apparent damage you should refit the packaging or cover the cabinet with a dust-cover to prevent the ingress of dust and dirt.

Batteries that are intended for external rack-mounting will be shipped in a separate package and should be stored under the environmental conditions stipulated above.

### 3.2.3 UNPACKING INSTRUCTIONS



**WARNING:** The cabinet, battery cabinet (optional) and battery packages are heavy and may tip during unpacking unless the unpacking instructions are not followed closely.

If the shipment is received in good order then unpack the PowerPro ELXA cabinet as follows:

1. Remove the plastic sheeting and cardboard sleeve covering the cabinet.
2. Remove the anchor bolts securing the cabinet to the pallet then lift and remove the cabinet from the pallet.
3. Retain the packaging materials for possible future shipment.
4. Examine the cabinet for any sign of damage and notify your supplier immediately if any damage is found.
5. Remove any internal protective packaging.
6. When the cabinet is placed in its final location, install the 4kVA power modules and secure them in place.
7. Install a blanking plate to the front of any shelves that have no power module fitted.

#### Batteries



**CAUTION:** The system batteries must ALWAYS be installed by the commissioning engineer.

The batteries are shipped in a separate package and should remain in their packing until required by the KOHLER service engineer when the system is commissioned.

Battery life depends very much on the ambient temperature, and optimum battery life will be obtained if the batteries are stored and operated at a temperature of 20°C.



**WARNING:** If the system is delivered without batteries, KOHLER will not accept responsibility for any damage or equipment malfunctioning caused by the incorrect storage, installation or connection of batteries carried out by third parties.

### **3.3 INSTALLATION**

#### **3.3.1 ENVIRONMENTAL CONSIDERATIONS**

A certain amount of pre-planning will help provide a trouble-free installation process. You should consider the following guidelines when planning the installation location and operating environment.

1. The route to the installation location must allow the equipment to be transported in an upright position.
2. The floor at the proposed installation site and en-route from the off-loading point must be able to safely support the weight of the cabinet/battery equipment, plus fork lift or trolley jack during transit.
3. The cabinet requires sufficient front and rear clearance to enable cooling airflow, as described below.
4. All maintenance, servicing and user operation can be carried out from the front of the cabinet, but rear access is required for connecting the AC and DC power cables.
5. An ambient temperature of 20°C is necessary to achieve the recommended battery life span.
6. The cooling air entering the cabinet must not exceed +40°C.
7. The floor material should be non-flammable and strong enough to support the heavy load.
8. In summary, the system should be installed in a location where:
  - a) Humidity (< 93%) and temperature is ideally 20°C.
  - b) Fire protection standards are respected.
  - c) Cabling can be performed easily.
  - d) A minimum 800mm front accessibility is available for service or periodic maintenance.
  - e) Adequate cooling air flow is available.
  - f) The air conditioning system can provide a sufficient amount of air cooling to keep the room at, or below, the maximum desired temperature (where used).
  - g) No dust or corrosive/explosive gases are present.
  - h) The location is vibration free.

#### **3.3.2 CLEARANCES**

Cooling air enters from the right hand side of the cabinet and exhausts from the left hand side.

- a) You should provide a minimum of 800mm clearance at the front of the cabinet to allow the power module(s) to be removed/installed.
- b) You should provide a minimum of 250mm at both sides.
- c) The cabinet does not require any rear clearance for cooling purposes so it can be installed immediately to the wall.



### 3.3.4 CABLE CONSIDERATIONS

It is the customer's responsibility to design and install the PowerPro ELXA supply and distribution circuits, and provide all the external fuses, switchgear and cables required to connect the cabinet's AC INPUT and SI OUTPUT supplies. The information provided in this section should assist you in the planning and preparation of the power cabling.

The AC INPUT terminals should be connected to a utility mains LV-switchgear panel and protected by a circuit breaker or fused isolator.

Similarly, the SI OUTPUT terminals should be connected to the load equipment via a suitably protected load distribution panel.

The Maximum recommended output circuit breakers sizes tested as per EN50171 are specified in the following table.

	B2	B4	B6
EL1005XA	FITTED	YES	
EL1012XA	YES	FITTED	
EL1030XA	YES	YES	FITTED

Table 3.1

### 3.3.5 INRUSH CURRENT

Special Consideration should be taken when installing luminaires with very high inrush characteristics.

The Inrush Current of LED Luminaires is determined by the driver (s) and is not proportional to the luminaire wattage or running current, LED luminaire inrush currents can be as high as 400 times the running current for a very short period of time.

Further information regarding LED inrush currents can be found by accessing the "LIA Technical Statement LIA TS35" from the LIA website ([www.thelia.org.uk](http://www.thelia.org.uk)).

The table below provides some details regarding the maximum recommended inrush currents for luminaires:

QTY OF MODULES	Maximum Inrush Current
EL1005XA	15A
EL1012XA	15A
EL1030XA	21A

Table 3.2

If higher inrush levels are expected KOHLER can provide Inrush Current Limiter for LED lighting Drivers.

Rated at maximum 16A continuous power they can be installed within lighting distribution panels.

### 3.3.6 CABLE SPECIFICATION

All cables and protective devices must be selected in accordance with national and local regulations and codes of practice (e.g. BS7671:2008 or relevant country standards) to suit the maximum capacity of the system, as shown in the table below.

**NOTE:** If you install a system containing fewer than six power modules with a view to increasing the system capacity it at a later date as your load increases, you should consider using cables rated for the maximum system rating at the outset. This will simplify the future update process and avoid having to shut-down the system at a later date to replace the power cables. ALL power modules have internal fuse protection

		EL1005X A	EL1012X A	EL1030X A
INPUT	Maximum Input Current (A)	10	13.5	25
	Recommended Cable Size) (mm <sup>2</sup> )	6	6	6
	Internal Input MCB Fitted	10A Type C	16A Type C	25A Type C
OUTPUT	Maximum Output Current	2	5	10.5
	Recommended Cable Size (mm <sup>2</sup> )	4	4	4
	Internal Output MCB Fitted	6 x 2A Type B	6 x 4A Type B	6 x 6A Type B
BATTERY	Maximum DC Current	28	28	100
	Suggested Cable Size (mm <sup>2</sup> )	6	10	25
	Internal DC Protection Fitted	32A MCB	32A MCB	100A FUSE

Table 3.3

### 3.3.7 ELECTRICAL PLANNING

All electrical power connections are made to terminals located on the rear of the cabinet near the top. Gland plates are fitted to the top and bottom of the cabinet immediately above the power terminals to allow either top or bottom cable entry.

If the cabinet is to be installed in a location with restricted rear access, you should ensure that suitably-contained power cables are available before the cabinet is moved to its intended final position

### 3.3.8 CABLINING PROCEDURE

#### 3.3.8.1 SAFETY NOTES

Please ensure you read and understand the following safety notes before you begin the electrical installation.

1. All the operations detailed in this section must be performed or supervised by a qualified, authorised electrician.
2. Once the electrical installation is completed the initial system start-up must be performed by a qualified engineer, trained and authorised by Uninterruptible Power Supplies Ltd..
3. Do not connect the system if there is water or moisture present.
4. When working on the input power cables, you must ensure that the AC INPUT supply is isolated at the mains switchgear panel and, where possible, locked out. Warning notices should be posted where applicable to prevent the inadvertent operation of the LV supply isolator(s).
5. Ensure the following conditions are met prior to starting work on the equipment:
  - a) No mains voltage is present from the mains switchgear panel.
  - b) All loads are shut down and disconnected.

### 3.3.8.2 TERMINAL CONNECTIONS

All Terminal connections can be found at the front of the cabinet as per figure 3.1.

#### **Input / Output Cables**

The AC cabling for the Inverter must be completed by an Approved Electrician or route can be provided at an additional cost from KOHLER.

#### **Battery Cables**

The DC cabling for the battery system(s) must be completed by an KOHLER engineer or one of its approved service agents. The customer installation team is only responsible for providing any necessary containment for the DC cables.



**WARNING:** Do not attempt to fit the batteries, complete the battery wiring, or close the battery isolator

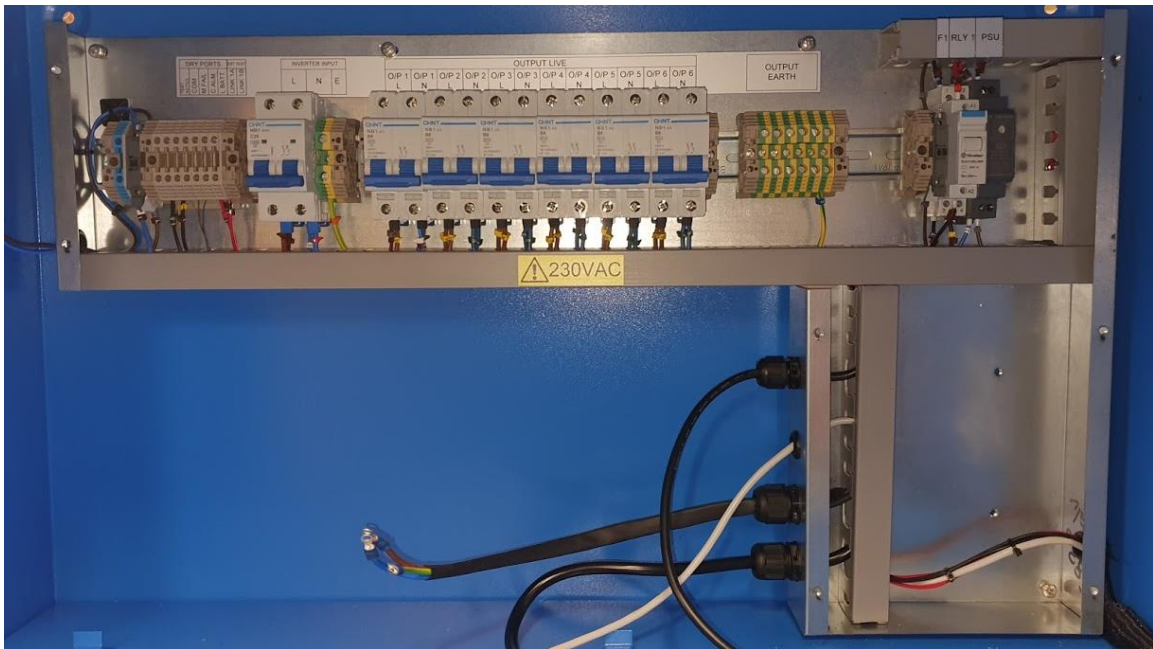
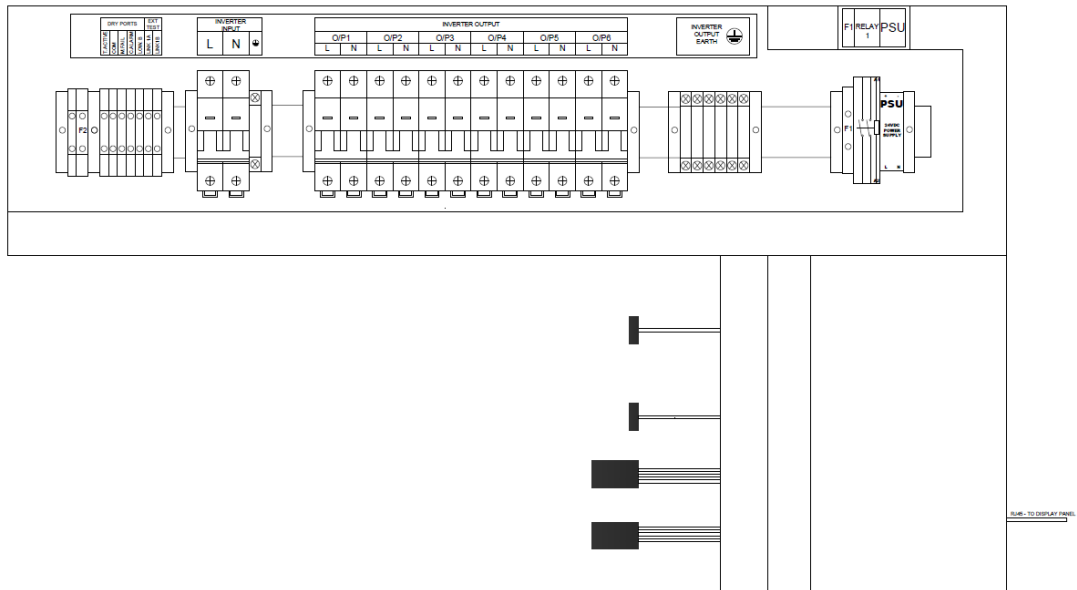


Figure 3.1

### 3.3.9 BATTERY INSTALLATION

**WARNING!!!** Be careful while connecting batteries.

**ATTENTION!!!** Ensure the battery circuit breaker is in the “0” position before making the connection for the battery installation.

The batteries associated with the EL-Inverter equipment are usually mounted on purpose-built battery shelves within the Chassis Cabinet. Sealed, maintenance-free batteries are normally used in this type of installations.

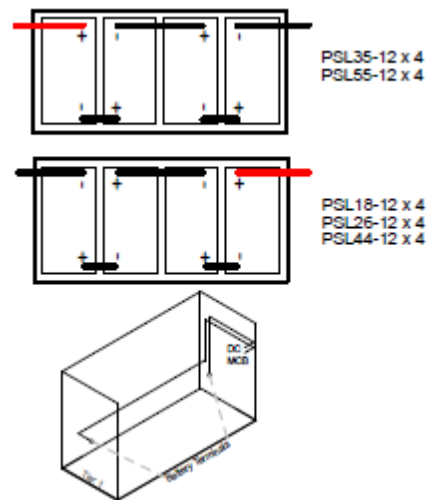
Where battery racks are used, they should be sited and assembled in accordance with the battery manufacturer's recommendations. In general, batteries require a well-ventilated, clean and dry environment at reasonable temperatures to obtain efficient battery operation.

In general, a minimum space of 10 mm must be left on all vertical sides of the battery block. A minimum clearance of 10 mm should be allowed between the cell surface and any walls. A clearance of minimum 100 mm should be allowed between the top of the cells and the underside of the shelf above (this is necessary for monitoring and servicing the cells). All metal racks and cabinets must be earthed. All live cell connections must be shrouded.

1. Unpack each battery and check its terminal voltage. If any battery has terminal voltage less than 12.5VDC, it must be charged before continuing.
2. Please check the battery connecting hardware and continue the following in respect to the battery cable kit drawing.
3. Ensure the insulating membrane is in place on each shelf.
4. Please locate suitable number of batteries at each shelf.
5. Start locating the batteries from bottom to the top of the chassis.
6. Be careful about the connection between the batteries polarities.
7. After interconnecting the batteries, connect the (+) and (-) poles to the battery DC MCB1 & 2 inside the EL-Inverter. Be careful to connect the batteries correctly and ensure the following:
  - a. Check the voltage and polarity of the battery at the input of DCMCB 1 & 2 before it is closed.
  - b. Close MCB3 before starting the EL-Inverter.

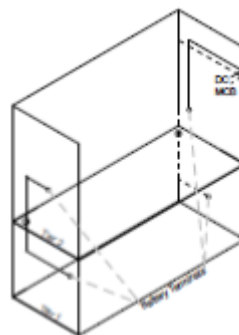
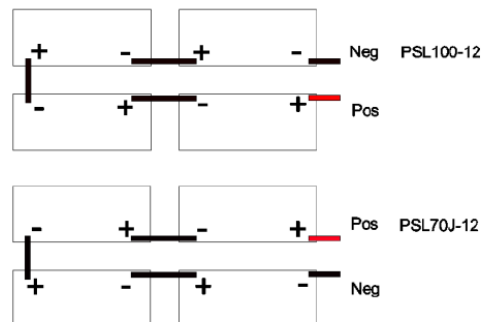
### 3.3.9.1 EL1005 BATTERY INSTALLATION

The ELXA 1005 system can only contain 1 x string of 4 x 12Volt batteries on one shelf. The drawing below shows the typical layout of the shelf inside the unit.



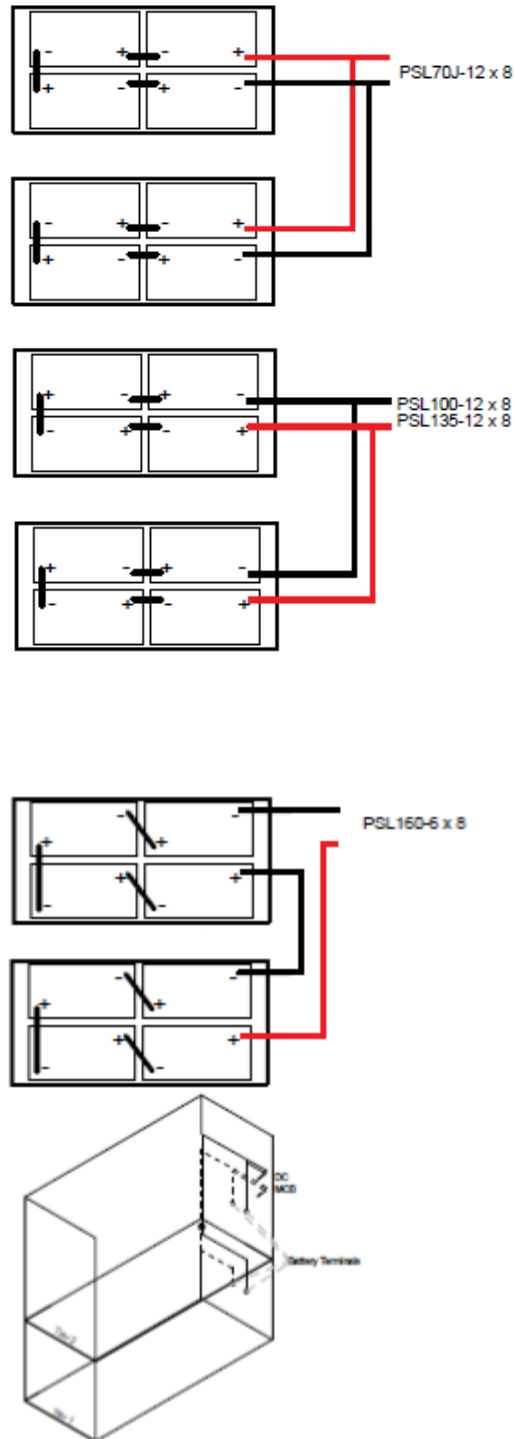
### 3.3.9.2 EL1012 BATTERY INSTALLATION

The ELXA1012 system can only contain 1 x string of 4 x 12Volt batteries located on two shelves. The drawing below shows the typical layout of the shelf inside the unit.



### 3.3.9.3 EL1030 BATTERY INSTALLATION

The ELXA 1030 system can only contain 2 x string of 4 x 12 Volt batteries or 1 x string of 8 x 6 Volt batteries. The drawing below shows the typical layout of the shelf inside the unit.



## CHAPTER 4 – OPERATION INSTRUCTIONS

### 4.1 START UP

1. Battery switch MCB2 must be on. (“ON” position).
2. Turn MCB1 (Input) switch into “ON” position.
3. Turn required output MCB’s (Output) switches into “ON” position.
4. The equipment will start automatically when AC input is detected.

**WARNING:** Mains voltage will now be present at the output.

### 4.2 SHUT DOWN

1. Hold the front screen MAIN CONTROL ON/OFF BUTTON for 4 seconds, this will shut the equipment off and display “off” on the front display.

**Note:** When the equipment is switched off, if mains are still available the batteries will continue to charge.

2. Turn all Output MCB’s (Output) switches into “OFF” position.
3. Turn MCB2 (Battery) switch into “OFF” position.
4. Turn MCB1 (Input) switch into “OFF” position.



## CHAPTER 5 – MAINTENANCE INSTRUCTIONS

The PowerPro ELXA does not contain any user-serviceable parts, so day-to-day maintenance requirements are minimal other than to ensure that the operating environment is kept cool and dust free. A clean operating environment will help maximise the useful working life and reliability of both the PowerPro ELXA and its batteries.

### 5.1 EMERGENCY LIGHTING MAINTENANCE

The PowerPro ELXA system should be maintained as per the regulations set out in EN50172 Standards

- Log Book Should be kept on site indicating all testing / inspection reports as detailed within the standard
- Daily – Indicators of central power supply should be visually inspected for operation
- Monthly – All luminaires and exit signs should be put into test and transferred to the central battery supply. The Central Battery system should be put into test and all luminaires checked for operation.  
After return to normal operation the central battery system should be checked for normal operation.
- Annually – The specific Monthly test should be conducted for the full duration of the system. After restart the charging of the batteries should be fully checked for operation. Certificate / Test sheet should be recorded within the logbook.

## 5.2 SCHEDULED MAINTENANCE

It is essential that the PowerPro ELXA cabinet and batteries receive regular preventative maintenance to maximise both the useful working life and system reliability. When the system is commissioned, the commissioning engineer will leave a service record book with the customer that will be used to log its full service history.

We recommend that the system is maintained every Twelve months (visit frequency should be increased dependent on environment conditions) by an KOHLER Trained engineer, or approved service agent, who will complete the following:

### 5.2.1 Preventative maintenance inspection

Preventative maintenance inspections form an integral part of all Extended Warranty Agreements (maintenance contracts) offered by KOHLER.

During a preventative maintenance inspection the engineer will check and validate:

- site environmental conditions
- integrity of electrical installation
- cooling airflow
- load characteristics
- integrity of alarm and monitoring systems
- operation of all installed options.

### 5.2.2 Battery maintenance and testing

The battery installation should be inspected on a regular basis, not exceeding 12-months. Traditional VLRA battery testing and maintenance consists of:

- checking and recording the open-circuit battery voltage
- verifying that the float charging voltage is correct
- inspecting all battery terminals and connections for corrosion
- inspecting all batteries for cracks, leaks or swelling
- checking the integrity of the inter-cell connections
- removing any materials and cleaning around the equipment
- carry out a full battery check.

## CHAPTER 6 – TROUBLE SHOOTING

EL-Inverter contains complicated electronic control circuits. In order to locate any fault occurring circuits, an advanced knowledge about the circuitry and its operation principles must be known. The aim of this section is to give the knowledge required at the first intervention.

There is no practical way to locate any possible fault. Most of the faults do not cause a loss of supply to the loads. Generally, the EL-Inverter operates normally or switches into by-pass mode. But in order to determine any change in load or the system the parameters must be recorded regularly as mentioned previously.

Generally, the output voltage can deviate 2% from the predefined values. If values differ more than this percentage then reasons must be investigated.

The following general structure must be systematically followed while trying to indicate the error:

**Fault determination:** First step is to record the messages, indicator panel LEDs, operating parameter values and last status of switches. This must be done before attempting to press any button.

**Fixing interventions:** After recording all indications, check the meaning of the fault and alarm messages using “The operator control indicator panel”. If anything relates, follow the related procedure.

## 6.1 ALARM TABLE

Problem	Possible Cause	Action to Take
Inverter has no reaction while AC is connected	<ol style="list-style-type: none"> <li>1. No AC input</li> <li>2. Fuse on inverter module tripped.</li> <li>3. Fuse on rear signal plate blown.</li> </ol>	<ol style="list-style-type: none"> <li>1. Test and check the external AC circuit.</li> <li>2. Re-engage fuse.</li> <li>3. Replace fuse.</li> </ol>
Power output is normal; Inverter emits continuous beep, status LCD shows "overload".	Inverter is over loaded.	Shut down Inverter system and remove load.
No power output, Inverter emits continuous beep, LCD shows "overload".	Inverter has shut down due to severe overload.	Remove loads from the Inverter system, press button to reset the buzzer, and restart the Inverter.
Inverter does not provide expected run time.	<ol style="list-style-type: none"> <li>1. Excessive loads connected at Inverters output.</li> <li>2. Battery is weak and cannot provide enough capacity.</li> </ol>	<b>Do not operate the Inverter, and leave the Inverter on AC supply for 10 hours. Retest the run time, if the Inverter system still cannot provide expected run time, battery should be replaced.</b>
Main Control Button on front panel does not work.	<ol style="list-style-type: none"> <li>1. The CPU inside Inverter is not running correctly.</li> <li>2. Button damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disconnect AC input using MCB1 &amp; push the "Main Control" button for 15 seconds to reset the UPS.</li> <li>2. Shut down all loads, Battery and AC input to the Inverter system to let it shut down automatically, and call for service.</li> </ol>
To push button for testing under AC mode, Inverter emits urgent beep and LCD display shows "battery replacement" at the same time.	Battery is weak and should be replaced.	Replace batteries.
Inverter cannot be turned on.	<ol style="list-style-type: none"> <li>1. Battery polarity wrong.</li> <li>2. Inverter fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check battery connection.</li> <li>2. Call for service.</li> </ol>
Inverter starts but LCD screen doesn't work.	<ol style="list-style-type: none"> <li>1. Front display inactive.</li> </ol>	<ol style="list-style-type: none"> <li>1. Restart the machine disconnecting mains and battery atleast three times.</li> <li>2. Call for service.</li> </ol>

## CHAPTER 7 – COMMUNICATION

### 7.1 INTRODUCTION

The PowerPro ELXA system offers a range of interfaces that can be connected to external facilities management and monitoring systems. Many of these options are factory fitted and must be requested at the time of order.

#### 7.1.1 SYSTEM TEST (ST) – INCLUDED

The System Test (ST) facility is used to test the PowerPro ELXA operation on battery power and terminals must be normally closed. In this case, if the connection between the ST terminals goes open-circuit it turns off the rectifier and the load is operated from the inverter using the standby battery power.

The ST function can be connected to a local or remote operating device (switch). The ST terminals send an internal 24V signal internally and therefore no voltage can be applied to the circuit.

When using a remote test facility they should be connected using a screened cable with 1 pair (0.5 mm<sup>2</sup>) and maximum length of 100m.

*Note: If an external ST circuit is not required, a link must be fitted to the ST terminals.*

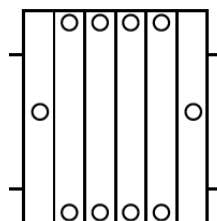
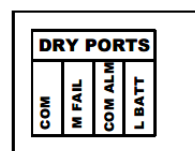
#### 7.1.2 DRY PORT CONTACTS - INCLUDED

The PowerPro ELXA provides three hard-wired 'system status' outputs that can be used to drive remote signalling and/or monitoring facilities. These outputs are switched by volt-free relay contacts and are normally open (closed on activation). The contacts are rated for 110VAC (0.5A) or 24VDC.

As shown in Figure 7.2, the four switched alarm outputs are:

- Mains Failure
- Common alarm
- Battery voltage low

Connections to these terminals are via the 4 provided Din-Rail terminals



#### 7.1.3 SNMP CARD – OPTIONAL EXTRA

Simple Network Management Protocol (SNMP) is a world-wide, standardised communication protocol that can be used to monitor any network-connected device via a simple control language and display the results in an application running within a standard web browser.

An SNMP card is a factory fitted option, designed to house a Modem/Ethernet SNMP adapter card, is located on top of the power module if fitted.

The SNMP adapter card contains an RJ-45 Ethernet connector which allows the PowerPro ELXA to be connected to a network using a standard CAT-5 network cable. Once connected, the system management software agent that is preinstalled in the SNMP adapter monitors the PowerPro ELXA operation and outputs its data in SNMP format to the connected network.

The communication exchanged between the PowerPro ELXA and network enables event/alarm emails, server shut down (with optional licenses) and other tasks to be performed. It can also be integrated with BMS software over a local area network (LAN) for SNMP or Modbus information over IP.

The SNMP adaptor requires a PC with terminal connections, and for normal operation at least one Ethernet connection.

## CHAPTER 8 – TECHNICAL SPECIFICATION

### 8.1 GENERAL SPECIFICATIONS

Model	EL1005XA	EL1012XA	EL1030XA
Nominal Output Rating ( CosØ : 0,8 ) kVA	0.5kVA	1.25kVA	3kVA
Nominal Output Rating ( CosØ : 1 ) W	400 Watts	1000 Watts	2400 Watts
Audible Noise			
Efficiency (Load Dependant)	Upto 83% Inverter Mode / Upto 98% Changeover Mode		Upto 86% Inverter Mode / Upto 98% Changeover Mode
Operating Temperature ( Ambient )	0-40 °C		
Altitude	<1000 meters (Above Sea level)		
Ventilation	Forced		
Relative Humidity	< 90%		
Protection Degree	IP 20		
Standards	EN 62040-1, EN 62040-2, EN 61000-2-2, EN 61000-3-2, EN 61000-4-2 EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8 EN 50171		
Transport	Packaged and On Pallet		

### 8.2 RECTIFIER SPECIFICATIONS

Model	EL1005XA	EL1012XA	EL1030XA
Nominal Input Voltage	230 VAC 1 phase + N		
Max Input current (A) per phase @100% resistive load, No charge current.	2.3A	5.2A	12.6A
Max Input current (A) per phase @100% resistive load, Full charge current.	6A	9A	24.6A
Input MCB Fitted to Cabinet	Type C 10A	Type C 16A	Type C 25A
Input Frequency Range	47 – 55Hz		
Input Power Factor	>0.99		
Input Voltage range	140 – 310 Vac		
Input THDi	<5%		
Input Protection	Fuses, Voltage & Frequency tolerance, Input power limit,		

### 8.3 BATTERY SPECIFICATIONS

Model	EL1005XA	EL1012XA	EL1030XA
Battery Type	Sealed Lead Acid - maintenance Free		
Number of Blocks	4 x 12V Batteries		
Number of Cells	360		
Float voltage	54Vdc		
Battery Cut Off voltage	40Vdc		
Charger Max (A)	15A	15A	45A
Battery Installation	Internal		
Battery Test Automatic	Standard every 6 days		
Battery Protection	Polarity Protection/ Short Circuit Protection / Fuses		

### 8.4 INVERTER SPECIFICATIONS

Model	EL1005XA	EL1012XA	EL1030XA
Nominal Output Voltage	230 VAC 1 phase + N		
Output Frequency	50 Hz		
Output Frequency Tolerance - Free Running - Line Synchronized	$\pm 3 \%$ $\pm 10 \%$		
Overload Capability	120% Load :Continuous 125-150% Load : 1 min >150% Load : By pass		
Harmonic Distortion	< 5 %		
Crest Factor	3/1		
Output Waveform	Sine Wave		
Short Circuit Protection	Electronic Short Circuit Protection		

## 8.5 BYPASS SPECIFICATIONS

Primary Components	Electronic Relay Switch
Nominal Voltage -V	230 VAC 1 phase + N
Nominal Frequency - Hz	50 Hz $\pm$ 5%
Retransfer : Changeover mode to Inverter	Automatic
Overload Capability	150 – 200 % Continuously
Manual By-Pass	Without Interruption

## 8.6 HEAT DISSIPATION (At nominal load and voltage)

Model	EL1005XA	EL1012XA	EL1030XA
Watts	100	250	600

## 8.7 MECHANICAL SPECIFICATIONS

Model	EL1005XA	EL1012XA	EL1030XA
Dimension (h x w x d)	850 x 750 x 250	1250 x 750 x 250	1250 x 750 x 400
Wiegth (without battery) kgs	35	40	50
Protection Level	IP20		
Colour	Blue		