# 1 Introduction

This section of the handbook will guide you through the operation of the electrical system.

Further technical details are contained in section 3 or in the supporting dealer technical manual available from www.sargentltd.co.uk

For the safe operation of all electrical equipment within your Leisure Vehicle it is important that you read and fully understand these instructions. If you are unsure of any point please contact your dealer / distributor for advice before use.

The system has a number of key components that you will need to be familiar with before attempting to use the system, these are:

- **The EC400 / EC450 series Power Supply Unit (PSU)** - a combined mains consumer unit and 12V controller located in the front locker or bed box area. On locker mounted caravan versions this unit also contains the provision for the Radio/CD head unit. The EC400 / EC450 series of power supply units include the EC400 range (horizontal units) and the EC450 range (vertical units), further details are contained later in this document.
- **The EC400 / EC450 series Control Panel (CP)** - a remotely located user control panel used to turn circuits on and off and to display battery and water tank information. This panel uses simple straightforward controls and reliable data communication to the PSU.
- **Road Light Fuse Box** - This small unit, which is unique to caravans, is located in the front bed box. The unit houses fuses for the road lighting circuits and supplies from the tow vehicle, and also has connectors for the optional alarm system and Automatic Trailer Control (ATC) unit.

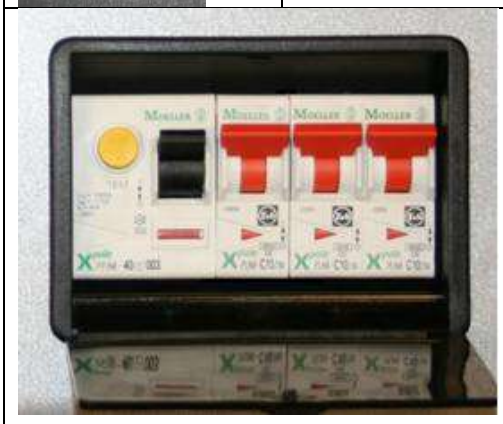
# 2 Using the System

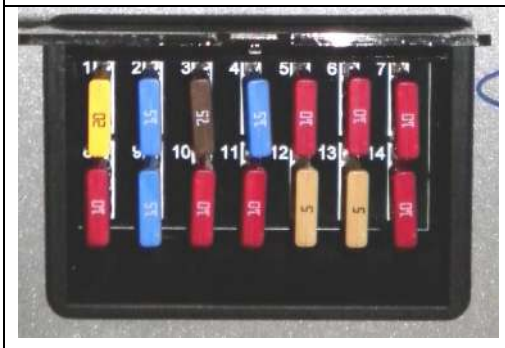
The PSU is located in the front offside locker area or front bed box in caravans, and in similar locations in motorhomes.

## *2.1 Power Supply Unit - Models*


A number of different PSU versions are used within the system and are shown above. The operation of each model is very similar and is detailed below.

## 2.2 Power Supply Unit – Component Layout

| 230V Components | |
|---|---|
|  | Red indicator – Reverse polarity indicator, lights up when the 230V supply polarity is reversed. |
| | Green push switch – Charger switch, this switch turns the 12V battery charger on or off. "In" is on "out" is off. |
| | Amber push switch – Space heater switch, this switch turns the 230V supply to the space heater / combination heater / central heating system on or off. In is on out is off. |
| | Clear push switch – Water heater switch, this switch turns the 230V supply to the separate water heater on or off. In is on out is off.<br>Note, If the vehicle contains a combined space & Water heater then this button is not used. |
|  | Black lever switch, far left – Residual Current protection Device (RCD) and main 230V on / off switch. |
| | Yellow button, far left – RCD test button. |
| | Red lever switches, right – 3 x 10A Miniature Circuit Breakers (MCB). Please note that installations with a 3KW Alde heating system will have 2 x 10A and 1x16A MCB's. |

| 12V Components | |
|---|---|
|  | Black push switch, far left – System shutdown switch, this switch turns the power control system on or off. In is on out is off. |
| | Yellow push button, top right – Select button, this button is used to scroll through the display items on the LCD screen. |
| | Red push button, bottom right – Set button, this button is used to change the setting of the displayed item on the LCD screen. |
|  | 12V DC circuit protection fuses. Fuse number 1 is top left; fuse number 14 is bottom, right. See section 3.5 for full fuse allocation details. |

## 2.3 Activating the System

The EC400 / EC450 system has a shutdown feature that should be used when the vehicle is in storage or is not being used for long periods of time. This allows the leisure electronics to be turned off when not required to save battery power. When in the off state the alarm and tracking system supplies are still active, most other supplies are turned off.

Before using the system please ensure the shutdown switch is in the system on position (button in).

## 2.4 Connecting to the Mains 230V supply and Safety checks

For your safety it is IMPORTANT that you follow these connections instructions each time your Leisure Vehicle is connected to a mains supply. This section assumes that the system is complete and that a Leisure battery has been installed (see 3.4).

A) **Ensure suitability of the Mains Supply**. Your Leisure Vehicle should only be connected to an approved supply that meets the requirements of BS7671 or relevant harmonised standards. In most cases the site warden will hold information regarding suitability of supply. If using a generator you also need to comply with the requirements / instructions supplied with the generator. Please note that some electronic generators may not be compatible with your leisure system. Further generator operational information is contained elsewhere in this manual.

B) **Switch the PSU internal Power Converter OFF**. Locate the green 'Charger' power switch on the PSU and ensure the switch is in the off position (button out) before connection to the mains supply.

C) **Connect the Hook-up Lead**. Firstly connect the supplied hook-up lead (orange cable with blue connectors) to the Leisure Vehicle and then connect to the mains supply.

D) **Check Residual Current Device operation**. Locate the RCD within the PSU and ensure the RCD is switched on (lever in up position). Press the 'Test' button and confirm that the RCD turns off (lever in down position). Switch the RCD back to the on position (lever in up position). If the test button failed to operate the RCD see section 3.10.

E) **Check Miniature Circuit Breakers**. Locate the MCB's within the PSU (adjacent to the RCD) and ensure they are all in the on (up) position. If any MCB's fail to 'latch' in the on position see section 3.10.

F) **Turn the PSU ON.** Locate the black 'Shutdown' button and ensure it is in the on position (press button in). Locate the green 'Charger' switch on the PSU and turn to the on position (press button in). The charger switch will illuminate when turned on.

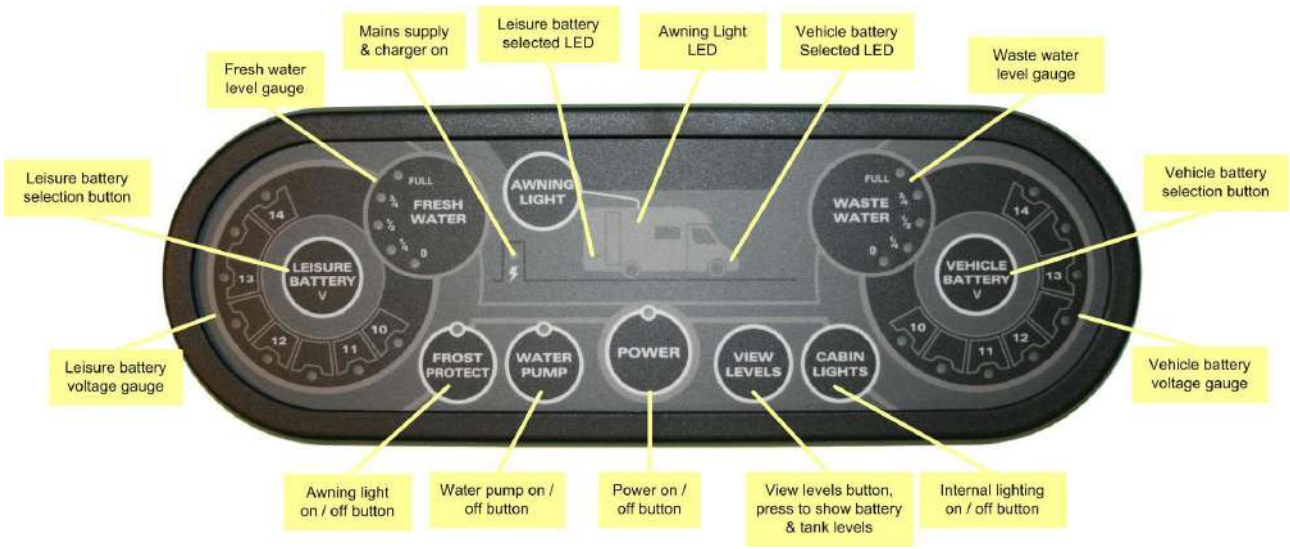
G) **Check correct Polarity**. Locate the 'Reverse polarity' indicator on the PSU and ensure that the indicator is NOT illuminated. If the indicator is illuminated see section 3.10.

H) **Check operation of equipment**. It is now safe to operate the 12v and 230v equipment.

## 2.5 Control Panel - Component Layout

Depending on your type of vehicle (caravan or motorhome) the control panel will vary in specification. Not all features are present in all vehicles. Please refer to the following diagrams to identify your control panel.

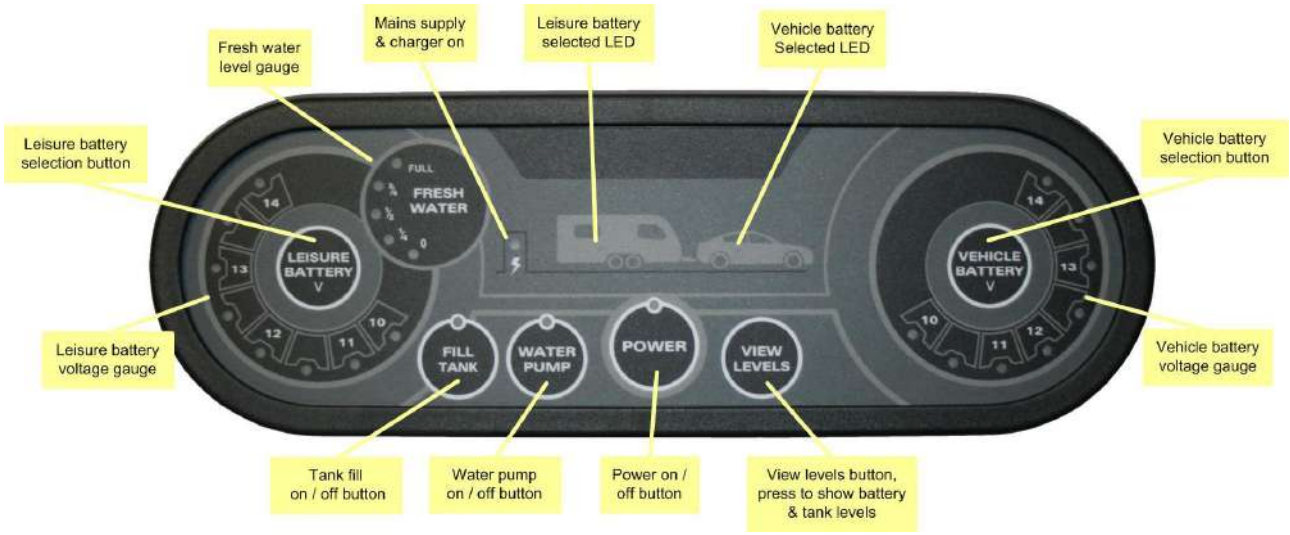
**Motorhome Control Panels**




EC467


EC462

**Caravan Control Panels**




EC451


EC447


EC442

## *2.6 Control Panel Operation*

- **Power Button**. Press the power button to turn the leisure power on. Press the button again to turn the power off. The adjacent LED will illuminate when the power is on, and also the voltage of the selected battery will be displayed on the voltage gauge.
- **Pump Button**. With the power on, press the pump button to turn the water pump on. Press the button again to turn the pump off. The adjacent LED will illuminate when the pump is on, and also the level of the water tank will be displayed on the water gauge.
- **View Levels**. To display the battery voltage levels and the water tank levels on the control panel gauges, press the levels button. The display will remain illuminated for 10 seconds. It is possible to lock the display 'on' to allow continuous display. This can be achieved by pressing and holding the view levels button for 2-3 seconds until you hear a beep. To turn this locked feature off, either press and hold the view levels button again for 2-3 seconds or turn the power off and back on.
- **Battery Select**. By default, the leisure battery is selected as the power source if no mains supply is present, or as the battery to be charged when the mains supply is available. To

change the selected battery, press the vehicle battery select button. The selected battery is indicated by an LED adjacent to the caravan or car logo (for caravans) or the LED's situated to the front (vehicle) or rear (leisure) of the motorhome logo (for motorhomes).

- **Mains on indication.** When connected to a 230v supply the LED with a "lightning strike" shown will be illuminated.
- **Charging when the vehicle engine is running.** When the vehicle engine is running both the vehicle battery and the leisure battery LED's will flash in unison to indicate that they are connected together and are being charged by the vehicle.
- **Tank Fill Button**. For some caravans, with the power on, press the tank fill button to turn the external filler pump on or off. Please ensure you switch the fill button off when the external tank is empty to prevent damage to the pump.
- **Cabin Lights Button**. For motorhomes, with the power on, press the cabin lights button to turn the main lighting supply on or off.
- **Awning Light Button**. For motorhomes, with the power on, press the awning light button to turn the awning light on or off.
- **Frost Protect Button**. For motorhomes if / when fitted, with the power on, press the frost protect button to turn on the water tank heating system. The adjacent LED will illuminate to show that the tank heating system is on.

## *2.7 Operation while driving*

The EC400 / EC450 system is designed to shutdown parts of the system while the engine is running. This is to meet Electro Magnetic Compatibility (EMC) regulations and to ensure the safe operation of the caravan or motorhome. This is indicated by the two battery LED's flashing together.

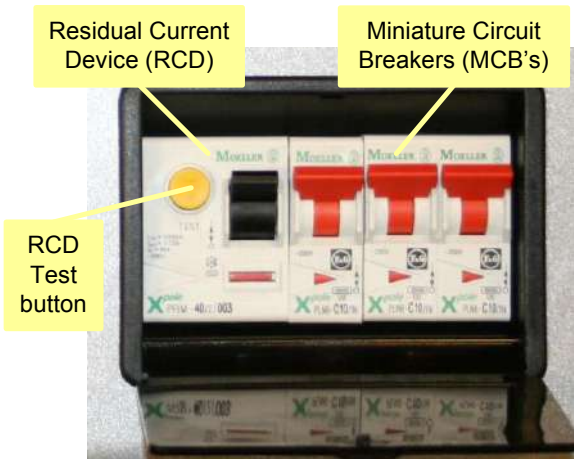
Please ensure the system shutdown switch on the PSU is in the "on" (button in) position before driving (see 2.3). This will ensure the electronic system is active and will therefore be able to control the charging process, supply the refrigerator and monitor other system circuits.

On motorhomes if / when fitted, designated 12v sockets, en-route reading lights and en-route heating will remain operational while the engine is running.

# 3 System Technical Information

The following section provides further technical information relating to the electrical system. You can also access the supporting technical manual from www.sargentltd.co.uk

## 3.1 Residual Current Device & Miniature Circuit Breakers




The Residual Current Device (RCD) is basically provided to protect the user from lethal electric shock. The RCD will turn off (trip) if the current flowing in the live conductor does not fully return down the neutral conductor, i.e. some current is passing through a person down to earth or through a faulty appliance.

To ensure the RCD is working correctly, the test button should be operated each time the vehicle is connected to the mains supply (see section 2.4)

The Miniature Circuit Breakers (MCB's) operate in a similar way to traditional fuses and are provided to protect the wiring installation from overload or short circuit. If an overload occurs the MCB will switch off the supply. If this occurs you should investigate the cause of the fault before switching the MCB back on.

The following table shows the rating and circuit allocation for the three MCB's

| MCB | Rating | Output Wire Colour | Description |
|---|---|---|---|
| 1 | 10 Amps | White | 230v Sockets |
| 2 | 10 Amps | White (Yellow for heater) | Extra 230v Sockets / Space Heater |
| 2 | 16 Amps | Yellow | Alde heating (EC470 PSU Only) |
| 3 | 10 Amps | Black (Blue for water heater) | Fridge / Water Heater / 12v Charger (internally connected) |

## 3.2 Battery Charger

The EC400 / EC450 system incorporates an intelligent three-stage battery charger / power converter.

During stage 1 the battery voltage is increased gradually while the current is limited to start the charging process and protect the battery. At stage 2 the voltage rises to 14.4V to deliver the bulk charge to the battery. When the battery is charged, the voltage is decreased at stage 3 to 13.6V to deliver a float charge to maintain the battery in the fully charged state. The charger can be left switched on continuously as required.

The battery charger / power converter also provides power to the leisure equipment when the mains supply is connected. This module supplies DC to the leisure equipment up to a maximum of 25 Amps (300 Watts), therefore the available power is distributed between the leisure load and the battery, with the leisure load taking priority as per the following example:

| Leisure load | Available power for battery charging |
|---|---|
| 5A | 20A |
| 10A | 15A |
| 15A | 10A |
| 20A | 5A |

**WARNING**

Under heavy loads the Charger case may become hot. ALWAYS ensure the ventilation slots have a clear flow of air. Do not place combustible materials against / adjacent to the Charger

## 3.3 Smart Charging

On **EC468** and **EC469** PSU's, the system incorporates a smart charge feature, which monitors both leisure and vehicle batteries and automatically adjusts and directs the charger power (and solar power if a solar panel is installed) to maintain the leisure and vehicle batteries at an optimal level.

## 3.4 Leisure Battery

### A) Type / Selection

For optimum performance and safety it is essential that only a proprietary brand LEISURE battery is used with a typical capacity of 75 to 120 Ah (Ampere / hours). A normal car battery is NOT suitable. This battery should always be connected when the system is in use.

The PSU is configured to work with standard lead acid leisure batteries, and in most cases is also compatible with the latest range of Absorbed Glass Matt (AGM) batteries. Before fitting non-standard batteries please check that the charging profile described in 3.2 is suitable for the type of battery by referring to the battery documentation or battery manufacturer.

Some vehicle installations can cater for two leisure batteries connected in parallel. In these cases it is recommended that two identical batteries are used.

The battery feed is fitted with an inline fuse between the battery and the electrical harness, and is usually located immediately outside the battery compartment or within 500mm of the battery. The maximum rating of this fuse is 20A per battery. If a single battery is fitted to a motorhome, this fuse may be increased to 40A, however if two batteries are fitted each battery should be fused at a maximum of 20A.

### B) Installation & Removal

Always disconnect the 230v mains supply and turn the PSU green charger switch to the off position (button out) before removing or installing the battery.

When connecting the battery, ensure that the correct polarity is observed (black is negative [-] and red is positive [+]) and that the terminals are securely fastened. Crocodile clips must not be used.

**WARNING**

Explosive gases may be present at the battery. Take care to prevent flames and sparks in the vicinity of the battery and do not smoke.

### C) Operation / Servicing

Under normal circumstances it should not be necessary to remove the battery other than for routine inspection of the terminals and "topping up" of the battery fluid where applicable. Please see instructions supplied with the battery.

Note: Do not over discharge the battery. One of the most common causes of battery failure is when the battery is discharged below the recommended level of approximately 10v. Discharging a battery below this figure can cause permanent damage to one or more of the cells within the battery.

To prevent over discharge, the EC400-450 system incorporates a battery protect circuit that warns the users and then disconnects the batteries when they fall below set values.

If the power is turned on and the leisure battery level falls below 9V a warning beep will be heard and the leisure battery gauge 10V LED will flash. To cancel the warning, press the levels button.

If the power is turned on and the vehicle battery level falls below 10.9V a warning beep will be heard and the vehicle battery gauge 10V LED will flash. To cancel the warning, press the levels button.

These warnings will not be repeated unless the power switch is turned off and on again. This is to ensure the warning does not become a nuisance.

| Battery | Voltage cut off | Action after cut off | Notes |
|---|---|---|---|
| Vehicle | 10.9v | Battery selection is changed from Vehicle battery to Leisure battery. If the leisure battery is below 9v then a further warning will occur (see below). | This cut off level is designed to protect the vehicle battery from over discharge. The 10.9v level ensures there is sufficient power in the battery to run the vehicle electronics and start the vehicle. This cut off only applies to power drawn from the battery by the leisure equipment; it will not protect the battery if you leave vehicle circuits switched on, such as the road lights. |
| Leisure | 9v | Power is turned off | This is an emergency cut off level to protect the battery from severe damage. You should not rely on this cut off level during normal operation, but manage your power consumption to a discharge level of 10v.<br>This cut off only applies to power drawn from the battery by the leisure equipment that is controlled by the control panel power switch; it will not protect the battery from discharge by permanently connected equipment. |

## *3.5 12 Volt DC Fuses*

**WARNING**

When replacing fuses always replace a fuse with the correct value. NEVER replace with a higher value / rating as this could damage the wiring harness. If a replacement fuse 'blows' do not keep replacing the fuse as you could damage the wiring harness. Please investigate the fault and contact your dealer.

The following table shows the fuse allocation for the 15 fuses fitted to the PSU. Please note that fuses are dependant on PSU versions, so not all fuses may be present.

| Fuse | Rating | Fuse Colour | Description |
|---|---|---|---|
| 1 | 20 Amps | Yellow | * Motorhome Fridge 12V |
| 2 | 15 Amps | Blue | * Motorhome Towing |
| 3 | 7.5 Amps | Brown | * Motorhome Marker Lights |
| 4 | 15 Amps | Blue | * Motorhome Fridge D+ |
| 5 | 10 Amps | Red | Extractor Fans / Heating Systems |
| 6 | 10 Amps | Red | 12V Sockets / TV Amp / ***Radio |
| 7 | 10 Amps | Red | Front Internal Lights |
| 8 | 10 Amps | Red | Water Pumps / Toilet |
| 9 | 15 Amps | Blue | * Electric Step |
| 10 | 10 Amps | Red | * Motorhome Tank Heaters |
| 11 | 10 Amps | Red | ** Auxiliary Supplies |
| 12 | 5 Amps | Tan | Electronics / Fridge / Alarm |
| 13 | 5 Amps | Tan | Oven Ignition / * Water Heater |
| 14 | 10 Amps | Red | Rear Internal Lights |
| 15 | 25 Amps | Clear | Charger (fitted internally to PSU) |

* Where Applicable / When Fitted

** Motorhome Awning / Entry lights / Map lights / Enroute Heating / Compressor Fridge / Travel Skts / Bathroom lights

*** Caravan Radio Supply / Motorhome Bathroom lights

The following table shows details of the fuse(s) located at the Leisure battery. See also 3.4A

| Fuse | Rating | Fuse Colour | Description |
|---|---|---|---|
| Battery 1 | 20 Amps | Yellow | Fuse remotely located near battery |
| Battery 2 | 20 Amps | Yellow | Fuse remotely located near battery 2 (where fitted) |

The following table shows details of the fuse(s) located at the Road Light fuse box (caravans only)

| Fuse | Rating | Fuse Colour | Description |
|---|---|---|---|
| 1 | 20 Amps | Yellow | Fridge Supply 12V |
| 2 | 5 Amps | Tan | Left Hand Tail Lights |
| 3 | 5 Amps | Tan | Right Hand Indicators |
| 4 | 5 Amps | Tan | Fog Lights |
| 5 | | | Spare location |
| 6 | 20 Amps | Yellow | Car Battery Supply 12V |
| 7 | 5 Amps | Tan | Right Hand Tail Lights |
| 8 | 5 Amps | Tan | Left Hand Indicators |
| 9 | 7.5 Amps | Brown | Stop Lights |
| 10 | 5 Amps | Tan | Reverse Lights |

## *3.6 Solar Charge Management*

**EC468** and **EC469** PSU's incorporate a built-in solar charge management feature, which will control the input from a separate solar panel and regulator. Depending on the charge state of the batteries, the solar power will be directed to the required battery, and continuously monitored to ensure optimum operation. For this system to operate intelligently, the shutdown button should be left switched on. If the shutdown button is turned off then the solar panel will charge the vehicle battery only.

## *3.7 System Status and Configuration display*

On the **EC449, 468 & 469** PSU, the unit contains an LCD display and two control buttons that allow system information to be viewed or settings changed.

Press the top yellow 'select' button to change the item being viewed. Press the bottom red 'change' button to change the setting.

Both buttons work on a continuous loop, so if you want to return to an item or setting keep pressing the button until the required item is reached.

The **EC468** and **EC469** PSU's also contain a status display unit that can be used to view system information. Press the top yellow 'select' button to change the item being viewed.

## *3.8 Water System Operation*

The control panel pump button operates the internal (onboard) water pump. This pump will draw water from the internal (onboard) water tank (if fitted) or the external water inlet, depending on the position of the manual supply selector valve.

The system also incorporates a separate powered water inlet that can be used with an external filler pump to fill the internal (onboard) water tank (if fitted).

The water tanks (fresh & waste, where fitted) incorporate a level warning feature to warn the user when the fresh water level drops below 25% or when the waste water level reaches 100%.

If the water pump power is turned on and the fresh water level drops to below 25% a warning beep will be heard and the fresh gauge empty LED will flash. To cancel the warning, press the levels button.

If the water pump power is turned on and the waste water level rises to full (100%) a warning beep will be heard and the waste gauge full LED will flash. To cancel the warning, press the levels button.

These warnings will not be repeated unless the water pump power switch is turned off and on again. This is to ensure the warning does not become a nuisance.

## 3.9 Frost Protection

On vehicles fitted with water tank frost protection, the control panel frost protect switch can be used to turn the feature on or off.

With protection on, the system monitors the tank water temperature and water level and will control the tank heaters accordingly. If the fresh or waste water levels are less than 25% the appropriate heater will be turned off to prevent overheating or damage to the element.

There are two types of system employed, both working in a very similar way. One system uses heaters with built-in thermostats; the other uses separate temperature probes in the tank. Both types switch on at 4-5C and off at 8-10C

## 3.10 Electric Step Operation

On vehicles fitted with an electric step, this is operated by a button near the entry door. Press and release the button to move the step in or out. One press of the button will move the step out, a further press will move the step in again.

If the engine is started the step will move in automatically, after a short warning buzzer. If this operation fails due to an obstacle a buzzer will sound continuously to warn that the step is still out, and therefore requires your attention.

## 3.11 Warnings and Alerts

If the vehicle engine is started whilst the caravan or motorhome is connected to the 230v supply, a warning beep will be heard. This is to warn you to remove the 230v supply before driving away.

When the vehicle engine is running both the vehicle battery and the leisure battery LED's will flash in unison to indicate that they are connected together and are being charged by the vehicle.

Step operation (motorhomes only), if the engine is started with the step in the out position, the step will move in automatically, after a short warning buzzer. If this operation fails due to an obstacle a buzzer will sound continuously to warn that the step is still out, and therefore requires your attention.

Low water level and waste tank, if the fresh water level drops to below 25% a warning beep will be heard and the fresh gauge empty LED will flash. To cancel the warning, press the levels button. If the waste water level rises to full (100%) a warning beep will be heard and the waste gauge full LED will flash. To cancel the warning, press the levels button.

Low voltage warning and cut off, if the power is turned on and the leisure battery level falls below 9V a warning beep will be heard and the leisure battery gauge 10V LED will flash. To cancel the warning, press the levels button. If the power is turned on and the vehicle battery is selected (being used) and the level falls below 10.9V a warning beep will be heard and the vehicle battery gauge 10V LED will flash. To cancel the warning, press the levels button.

## 3.12 Common Fault Table

| Fault | Possible Cause | Proposed Fix |
|---|---|---|
| No 230 volt output from PSU | Connecting lead between the site and Leisure Vehicle not connected | Check and connect lead as per 2.4C |
| | RCD switched off | Reset RCD as per 2.4D |
| | RCD not operating correctly | Check supply polarity; if the RCD continues to fail contact your Dealer as there is probably an equipment or wiring fault. |
| | MCB switched off | Reset MCB by switching OFF (down position) then back ON (up position), if the MCB continues to fail contact your Dealer as there is probably an equipment or wiring fault. |
| | No or deficient supply from site | Contact site Warden for assistance |
| | Other fault | Contact your Dealer |

| Fault | Possible Cause | Proposed Fix |
|---|---|---|
| Reverse Polarity light is illuminated on PSU | Mains Supply reversed? | The reverse polarity light is designed to illuminate when the Live and Neutral supply has been reversed / crossed over. If the light illuminates there is a problem with the site supply or the cable connecting the supply to your vehicle. The light is designed to work on UK electrical supplies (where the neutral conductor is connected to earth at the sub station). If you are using your vehicle outside the UK this light may illuminate when no fault exists. In these cases consult the site warden for advice. |
| | Generator being used | 'The Reverse Polarity warning light is on when using my Generator'.<br>This is a normal side effect when using some types of generator. Instead of connecting the neutral conductor to earth, some generators centre tap the earth connection making both neutral and live conductors 110v above earth. This 110v difference causes the neon polarity indicator to illuminate. In most cases it is still safe to use the generator, but please consult the generator handbook for further information. |
| Control Panel Problems | Control Panel has no display | Check batteries and fuses, turn PSU shutdown switch and charger switch on and ensure mains supply is connected.<br>Check control panel connecting lead at PSU and behind Control Panel<br>Contact your Dealer |
| | 12v Power turns off | Battery protect feature has operated to protect the Vehicle battery and or the Leisure battery. See 3.4C<br>Engine has been started, all equipment has been disconnected to meet EMC requirements. See 2.7 |
| | Control Panel locked / erratic function | Observe control panel handling instructions<br>Control panel software may have crashed. Reboot control panel by turning off the PSU isolate switch. Wait 30 seconds then turn the switch back on. |
| No 12 volt output from PSU | No 230v supply | Check all above |
| | Charger not switched on | Turn charger switch on, switch will illuminate |
| | Battery not connected and / or charged | Install charged battery as per 3.4 |
| | Power button on control panel not switched to on | Turn power on at control panel |
| | Battery flat / Battery fuse blown | Recharge battery, check fuses, check charging voltage is present at battery |
| | Fuse blown | Check all fuses are intact and the correct value fuse is installed as per fuse table |
| | Equipment switched off / unplugged | Check equipment is switched on and connected to the 12v supply |
| | PSU overheated / auto shutdown operated | Reduce load on system. Allow PSU to cool down. PSU will automatically restart when cool. |
| | Other fault | Contact your Dealer |
| Pump not working | Fuse blown | Replace fuse with correct value as per fuse table. |
| | Pump turned off | Turn pump on by pressing the pump button at the control panel. |
| | Setting incorrect | Both the internal and external pump feeds are controlled from the control panel. To alter the setting of the pump switch see section 3.8<br>Ensure the setting matches your desired requirement. |

## *3.13 Contact details*

Sargent Electrical Services Limited, provide a technical help line during office hours. Please contact 01482 678981 if you require technical help. For out of hour support please refer to the tech support section of the Sargent web site www.sargentltd.co.uk

# 4 Technical Data & Approvals

## *4.1 Caravan Equipment – EC440,445,448,449 PSU & EC441,442,443,446,447,451 Control Panel*

| Outline Specification | | |
|---|---|---|
| INPUT 230v | 230 Volts / 0 to 16 Amps | + / - 10% |
| OUTPUT 230v | RCD protected, 3 x MCB outputs of 10A<br>Separate switched channels for water heater, space heater and charger | |
| INPUT 12v | 2 x 20A battery inputs via 2 x 4 way connectors | |
| OUTPUT 12v | 25A total output via multiple switched channels protected by 14 fused outputs | |
| CHARGER | Input 220-240 Volts AC +/- 10%, Frequency 50 Hz +/- 6%, Current 3A max.<br>DC Output 13.6 to 14.4 Volts nominal, Current 25 Amps max (300 Watts).<br>Overall size (HxWxD) 50 x 250 x 135mm | Fixing centres 128*128mm<br>1.2kg |
| Signal INPUT | 4 x Fresh water level, 1 x Engine running, plus multiple vehicle connections | Fresh water negative sensed |
| Data IN / OUT | CANBUS Data communication and power to Control Panel via 6 way connector | |
| IP rating | IP31 | |
| Operating temperature | Ambient 0 to 35° Centigrade<br>PSU case temperature with full load 65° C Max | Automatic shutdown and restart if overheated / overloaded |
| Dimensions | | |
| EC449, EC448 PSU | Overall size (HxWxD) 395 x 205 x 170mm<br>Clearances 75mm above, 50mm left & right | Weight 3.05 Kg |
| EC442, EC447 Control Panel | Overall size (HxWxD) 87 x 250 x 15mm<br>Cut-out size (HxW) 70 x 233mm | Fixing centres 130*75mm<br>Weight 114 g |

## *4.2 Motorhome Equipment - EC460,465,468,469,470 PSU & EC461,462,466,467 Control Panel*

| Outline Specification | | |
|---|---|---|
| INPUT 230v | 230 Volts / 0 to 16 Amps | + / - 10% |
| OUTPUT 230v | RCD protected, 3 x MCB outputs of 10A<br>Separate switched channels for water heater, space heater and charger<br>EC470 2 x 10A MCB Outputs & 1 x 16A MCB Output | |
| INPUT 12v | 2 x 20A battery inputs via 2 x 4 way connectors | |
| SOLAR INPUT | 1 x Dedicated solar panel input (20 to 100W panel) via a 2 way connector | |
| OUTPUT 12v | 25A total output via multiple switched channels protected by 14 fused outputs | |
| CHARGER | Input 220-240 Volts AC +/- 10%, Frequency 50 Hz +/- 6%, Current 3A max.<br>DC Output 13.6 to 14.4 Volts nominal, Current 25 Amps max (300 Watts).<br>Overall size (HxWxD) 50 x 250 x 135mm | Fixing centres 128*128mm<br>1.2kg |

| | | |
|---|---|---|
| Signal INPUT | 4 x Fresh water level, 4 x Waste water level, 1 x Engine running, plus multiple vehicle connections | Fresh water negative sensed<br>Waste water negative sensed |
| Data IN / OUT | CANBUS Data communication and power to Control Panel via 6 way connector | |
| IP rating | IP31 | |
| Operating temperature | Ambient 0 to 35° Centigrade<br>PSU case temperature with full load 65° C Max | Automatic shutdown and restart if overheated / overloaded |
| Dimensions | | |
| EC468, EC469 PSU | Overall size (HxWxD) 315 x 195 x 150mm<br>Clearances 75mm above, 50mm left & right | Weight 2.9 Kg |
| EC462, EC467 Control Panel | Overall size (HxWxD) 87 x 250 x 15mm<br>Cut-out size (HxW) 70 x 233mm | Fixing centres 130*75mm<br>Weight 114 g |

## 4.3 Approvals

System: BSEN 1648-1, BSEN1648-2 compliant, BS7671: 2008 compliant

Residual Current Device: RCD 40A 30mA trip to BS EN 61008

Miniature Circuit Breakers: MCB's type C 6000A breaking capacity to BSEN 60898

Electro Magnetic Compatibility (EMC) directive 2004/108/EC Certificate CE20071224-1

Integrated Charger: BS EN 60335-1/2.29, 2006/95EC, IEC61000-3.2/3:1995, 1.

Low Voltage Directive: 2006/95EC TUV-014900-A1, EN55022, Class B, EN55024/ Level 2

## 4.4 Declaration of Conformity

*Equipment:* Leisure Power Control System

*Model name: EC440,445,448,449 EC441, 442,443,446,447,451, EC460,465, 468,469,470, EC461,462,466,467*

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced approvals. The unit complies with all essential requirements of the Directives.

| *Signed:* | *Name:* | *Position:* | *Manufacturer:* |
|---|---|---|---|
| | I L Sargent | Technical Director | Sargent Electrical Services Ltd<br>Unit 39, Tokenspire Business Park<br>Woodmansey, Beverley<br>East Yorkshire, United Kingdom |
| *Date:* | | | |