1 INTRODUCING THE EC200 ELECTRONIC CONTROL SYSTEM

With the use of new technology and an innovative approach to user interfacing, the EC200 Power Control System provides a complete control solution for a wide range of leisure vehicles.

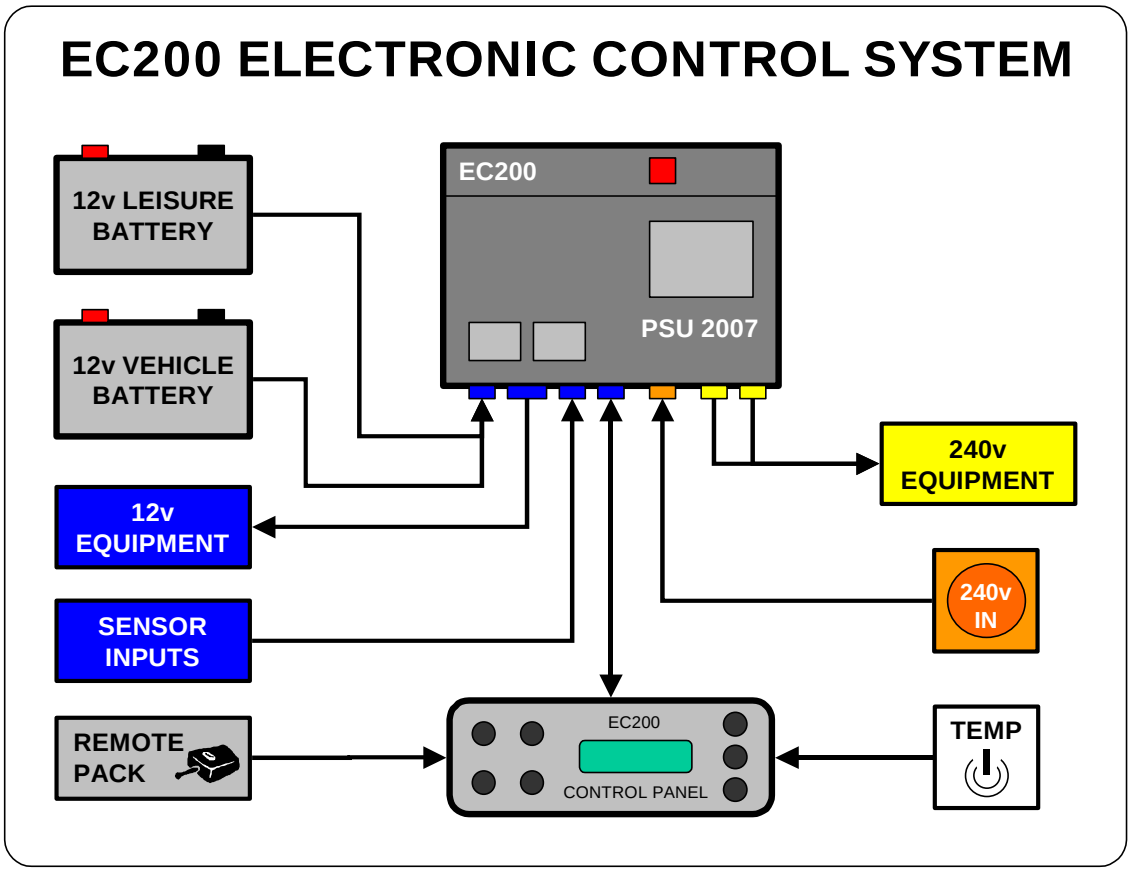
The microprocessor controlled digital system allows the user to control equipment and view / edit system information from a user-friendly control panel that incorporates a liquid crystal '**ALPHA-NUMERIC'** display.

The built in 'intelligence' prevents over discharge of the vehicle battery, allows greater control of the water system and has a built in alarm clock / event timer to control equipment in the absence of the user. With the addition of an optional plug-in remote control pack the Power and Auxiliary functions can be operated by a key fob controller.

The system meets relevant UK legislation, including the requirements of BS7671, EN1648-1 and -2. Further technical data is contained in section 5.

2 SYSTEM OVERVIEW

The following diagram shows the components that make-up the EC200 system. The system basically comprises a Power Supply and control Unit (PSU2007) that houses the Mains 240v protection equipment, a 200 watt 12v charger / power supply, and power control / protection for the 12v equipment. The PSU2007 is connected to a Digital Control Panel via a data cable.

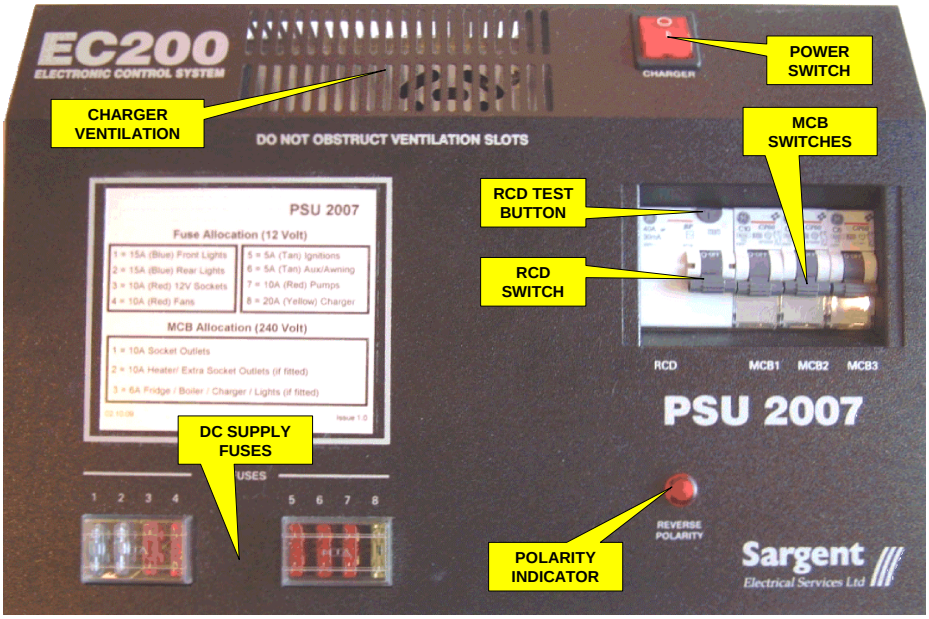


3 POWER SUPPLY UNIT – SYSTEM OPERATION

3.1 INTRODUCTION

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 following diagram shows the PSU2007 layout.



WARNING

Under heavy loads the PSU2007 case will become hot. ALWAYS ensure the ventilation slots have a clear flow of air. Do not place combustible materials against / adjacent to the PSU2007. The PSU will shutdown if overheated and will restart automatically when cool.

3.2 MAINS CONNECTION

For your safety it is **IMPORTANT** that you follow these connections instructions each time your Leisure Vehicle is connected to a mains supply.

A) **Ensure suitability of the Mains Supply**. Your Leisure Vehicle should only be connected to an approved supply that meets the requirements of BS7671. 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.

B) **Switch the PSU2007 internal Charger unit OFF**. Locate the red 'Charger' power switch on the PSU2007 and ensure the switch is in the OFF (0) position 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 PSU2007 and ensure the RCD is switched on (lever in up position). Press the 'TEST' button and confirm that the RCD is turned 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 3.4.

E) **Check correct Polarity**. Locate the 'Reverse Polarity' indicator on the PSU2007 and ensure that the indicator is NOT illuminated. If the indicator is illuminated see section 3.4.

F) **Check Miniature Circuit Breakers**. Locate the MCB's within the PSU2007 (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 3.4.

G) **Turn the PSU2007 ON**. Locate the red power switch on the PSU2007 and turn to the ON (I) position. The switch will illuminate when turned on.

H) **Check operation of equipment**. It is now safe to check the operation of the 12v and 240v equipment.

3.3 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.

It is recommended that the leisure battery is always 'in circuit' when the system is in use.

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.

B) Installation & Removal

Always disconnect the 240v mains supply and turn the PSU 2007 charger switch to the OFF (0) position 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) 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 10.5v. Discharging a battery below this figure can cause permanent damage to one or more of the cells within the battery.

3.4 FAULT TABLE

Fault	Possible Cause	Proposed Fix
No 240 volt output	Connecting lead between the site and Leisure Vehicle not connected	Check and connect lead as per 3.2.C Check also input connector at the base of the PSU 2007
	RCD switched off	Reset RCD as per 3.2.D
	RCD not operating correctly	Check supply polarity; if the RCD continues to fail contact your Dealer, as there is probably a wiring or equipment 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 a wiring or equipment fault.
	No or deficient supply from site	Contact site Warden for assistance
	Other fault	Contact your Dealer
No 12 volt output	No 240v supply	Check all above
	Charger not switched on	Switch charger switch on (I) position, switch will illuminate
	Battery not connected and / or charged	Install charged battery as per 3.3.B

	Power switch 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 shown in 3.5
	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 internal temperature is below 35° C
	Other fault	Contact your Dealer
Control Panel Problems	Control Panel has no display	Check batteries, turn PSU2007 charger switch on, and ensure mains supply is connected. Check control panel connecting lead at PSU2007 and behind Control Panel Contact your Dealer
	12v Power turns off	Battery save feature has operated to protect the Vehicle battery and the Leisure battery is flat (see section 4.4) Engine has been started, all equipment has been disconnected to meet EMC requirements
	Control Panel display corrupt / erratic function	Observe control panel handling instructions Reboot control panel by removing control panel bezel, removing two fixing screws, and unplugging the control panel connecting lead. Wait 30 seconds then reconnect and re assemble. (Alternatively, turn PSU off, remove leisure battery fuse(s) and remove vehicle supply fuse [located in 4-way fuse box under bonnet])
	Control Panel contrast poor	Observe control panel handling instructions Remove control panel as above but do not unplug. Carefully adjust contrast preset on back of control panel using jewellers screwdriver
	Control Panel current reading incorrect	Contact dealer for current calibration process

3.5 FUSE / MCB TABLE

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 contact your dealer.

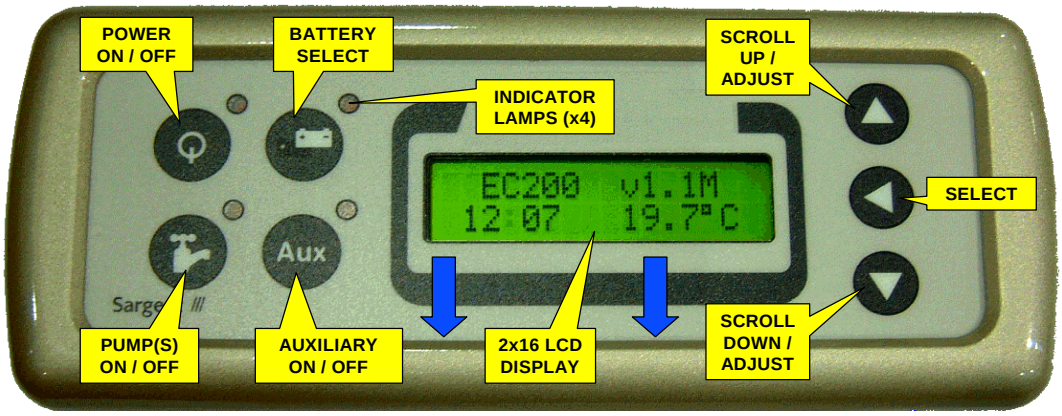
Fuse	Rating	Fuse Colour	Wire Colour	Description
1	15 Amps	Blue	Slate	Front Lights
2	15 Amps	Blue	Pink	Rear Lights
3	10 Amps	Red	Yellow / White	12v Sockets
4	10 Amps	Red	Black / tracer	Fans
5	5 Amps	Tan	Yellow / Green	Heater / Hob / Other Ignitions (if fitted)
6	5 Amps	Tan	Slate / Red	Aux / Awning Light
7	10 Amps	Red	Green / tracer Purple	Water Pumps / Toilet
8	20 Amps	Yellow	*	Charger (internally connected)
Battery	20 Amps	Yellow	Brown / Blue	Fuse remotely located near battery

MCB	Rating	Wire Colour	Description
1	10 Amps	White	240v Sockets
2	10 Amps	White (Yellow for heater)	Extra 240v Sockets / Heater
3	6 Amps	Black (Blue for water heater)	Fridge / Water Heater / 12v Charger (internally connected)

4 CONTROL PANEL OPERATION

4.1 Layout and Buttons

The following diagram shows the control panel layout.



Note: to remove the decorative bezel, **pull down** and **lift forward** as indicated by the blue arrows.

Item	Function	Options / Notes
Power ON / OFF	Use to turn the main power on and off	The adjacent LED is illuminated when the power is ON
Battery SELECT	Use to select the Leisure or Vehicle battery as the supply source	The adjacent LED is illuminated when the VEHICLE battery is selected; by default the Leisure battery is selected and is indicated by the battery select LED off.
Pump ON/ OFF	Use to turn the water pump(s) power on and off (see section 4.3)	The adjacent LED is illuminated when the pump power is ON
Aux ON / OFF	Use to turn the Auxiliary power on and off (see manufacturers handbook for detail of what items are operated by the auxiliary function)	The adjacent LED is illuminated when the auxiliary power is ON
Scroll UP ?	Use to scroll the display up (settings section of the menu) (see section 4.3)	Note: the menu screens operate in a continuous loop, therefore you can use either the UP or DOWN buttons to move to any screen
Scroll DOWN ?	Use to scroll the display down (readings section of the menu) (see section 4.2)	
Select ?	Use to select a menu item within the settings section (see section 4.2 & 4.3)	Use to move to the next setting, when entering alarm / event times

Note: the display backlight operated for approximately 6 seconds after any key press.

4.2 Menu Functions - Readings section

Display	Description	Options / Notes
EC200 v1.1H 12:00 23.9°C	Main Control Panel display showing model number (EC200), software version number (v1.1), specification (H), current time (12:00) and Internal temperature (23.9°C) in centigrade	The addition of a asterisk (*) in the top left of the display indicates that the alarm is set The addition of a hash (#) in the top right of the display indicates that the event timer is set
Leisure Battery 12.5v (Good)	Voltage reading and battery condition description for the on-board leisure battery	< 10.9 = (Poor) 10.9 to 11.8 = (Fair) 11.9 to 14.4 = (Good)
Vehicle Battery 13.3v (Good)	Voltage reading and battery condition description for the vehicle battery See section 4.4 for details of the Vehicle Battery save feature	< 10.9 = (Poor) 10.9 to 11.8 = (Fair) 11.9 to 14.4 = (Good)
Fresh Water 25% Full	Water level in the fresh water tank (5 measurement levels)	0% < ¼ Full (Empty) 25% >= ¼ Full 50% >= ½ Full 75% >= ¾ Full 100% = Full
Waste Water 0% Full	Water level in the waste water tank (2 measurement levels)	0% < ½ Full 50% >= ½ Full (optional) 100% = Full
External Temp 26.5°C	External temperature (in degrees centigrade) as measured by the external temperature probe *[Only available in H specification systems]*	
Battery Current 5.4 Amps	Current (in Amps) being drawn from or charged into the selected battery *[Only available in H specification systems]*	Negative figure (-) = current being drawn from the selected battery Positive figure = current being used to charge the selected battery

4.3 Menu Functions - Settings section

Display	Description	Options / Notes
Pump Select? <Internal>	Shows the currently selected pump that will be operated by pressing the pump on / off switch (TAP symbol)	<INTERNAL> = The internal pump will be operated by the pump switch

	Use the select button (?) to change	<EXTERNAL> = The External pump will be operated by the pump switch <BOTH> = Both the Internal and External pumps will be operated simultaneously by the pump switch
Water Tank Fill? **<Start 1 Min>**	Allows operation of the External pump for a period of one minute (for filling the internal tank from the external tank) Use the select button (?) to START (or STOP)	Will have no effect if the External pump is already switched on (see above) Will not operate if the Internal (Fresh) water tank is showing 100% Full
Clock Set? **12:00**	Access to set the internal clock Press the select button (?) to select HOUR Use the up / down (? ?) buttons to change Press the select button (?) to select MINUTE Use the up / down (? ?) buttons to change Press the select button (?) to exit	Please note the clock uses a 24 hour cycle
Alarm Set? **12:00**	Access to set the alarm clock Press the select button (?) to select HOUR Use the up / down (? ?) buttons to change Press the select button (?) to select MINUTE Use the up / down (? ?) buttons to change Press the select button (?) to exit	Please note the alarm uses a 24 hour cycle
Alarm = Off	Shows the alarm clock status (on / off) Press the select button (?) to switch between OFF or ON	The addition of a asterisk (*) in the top left of the main display indicates that the alarm is set
Set Event Timer?	Access to set the event timer Press the select button (?) to select HOUR ON Use the up / down (? ?) buttons to change Press the select button (?) to select MINUTE ON Use the up / down (? ?) buttons to change Press the select button (?) to select HOUR OFF Use the up / down (? ?) buttons to change Press the select button (?) to select MINUTE OFF Use the up / down (? ?) buttons to change Press the select button (?) to exit *[Only available in H and M specification systems]*	Please note the event timer uses a 24 hour cycle The event timer is used to switch the control panel power on and off in the absence of the user / occupier. See section 4.5 for further details.
Event Timer =Off **12:00 till 12:00**	Shows the event timer status (OFF / ON) and the current On and Off times Press the select button (?) to switch between OFF or ON *[Only available in H and M specification systems]*	The addition of a hash (#) in the top right of the main display indicates that the event timer is set

4.4 Warning Messages

Vehicle Battery Dangerously Low	This WARNING display indicates that the Vehicle battery voltage is low (10.9 volts or less). The panel will beep for one minute and then switch over to the Leisure battery to prevent draining the Vehicle battery.	You can switch over to the Leisure battery immediately (and cancel the beep) by using the battery selector switch
System disabled Engine started!	This WARNING display indicates that the system has been disabled because the vehicle engine is running	EMC (Electro Magnetic Compatibility) directive 89/336/EEC requires that electrical accessories within the vehicle are disconnected while the vehicle is in motion

4.5 Event Timer example

The event timer is designed to allow the leisure vehicle user to turn the 12v power on or off (same as using the control panel power button) without being in the vehicle. This allows lights or other equipment to be turned on or off at a predetermined time.

Example - to turn on one interior light at 11.00pm

Ensure the clock is set to the correct time

Scroll to the 'Set Event Timer?' screen

Following the instruction in section 4.3, set the ON time to 23:00 and the OFF time to 24:00

Scroll to the 'Event Timer=' screen and select ON

Scroll to the main control panel display and ensure a hash (#) is displayed in the right of the display

Turn all lights and 12v equipment off in the vehicle except the light that you want the event timer to automatically switch on

Turn the 12v power off on the control panel

Exit the vehicle

At 11:00pm (23:00) the control panel will switch the 12v power on and therefore any equipment that was left switched on will be turned on. The 12v power will be switched off at Midnight (24:00).

5 TECHNICAL DATA & APPROVALS

5.1 Outline Specification

INPUT 230v	230 Volts / 0 to 16 Amps	+ / - 10%
OUTPUT 230v	RCD protected, 3 x MCB outputs of 10, 10 and 6A via 2 x 9 way connectors	
INPUT 12v	2 x 20A battery inputs via a single 6 way connector	
OUTPUT 12v	20A total output via 4 x 16A switched channels protected by 7 fused outputs via a 15 way connector	
Integrated CHARGER	Input 110-240 Volts AC +/- 10%, Frequency 50 Hz +/- 6%, Current 3.15A max. DC Output 13.5 Volts nominal, Current 16 Amps max (200 Watts).	
Signal INPUT	4 x Fresh water level, 2 x Waste water level, 1 x Engine running via a 8 way connector	Fresh water negative sensed Waste water negative sensed
Data IN / OUT	Data communication and power to Control Panel via 20 way IDC header connector	
IP rating	IP31	
Operating temperature	Ambient 0 to 35° Centigrade PSU case temperature with full load 65° C Max	Automatic shutdown and restart if overheated / overloaded

5.2 Dimensions

PSU2007	Overall size (HxWxD) 240 x 370 x 110mm	Fixing centres 210 x 360mm
	Clearances 75mm above, 20mm below, 50mm left & right	Weight 3.2 Kg
CONTROL PANEL	Overall size (HxWxD) 80 x 193 x 40mm	Fixing centres 175mm
	Cut-out size (HxW) 60 x 165mm	Weight 170 g

5.3 Approvals

System: BSEN 1648-1, BSEN1648-2 compliant, BS7671: 2001 compliant

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

Miniature Circuit Breakers: MCB's (10 & 6A) type C 6000A breaking capacity to BSEN 60898

Electro Magnetic Compatibility (EMC) directive 89/336/EEC

Integrated Charger: BS EN 60335-1/2.29, 89/336/EEC, IEC61000-3.2/3:1995, EMC certificate 5172TC 3rd party tested.

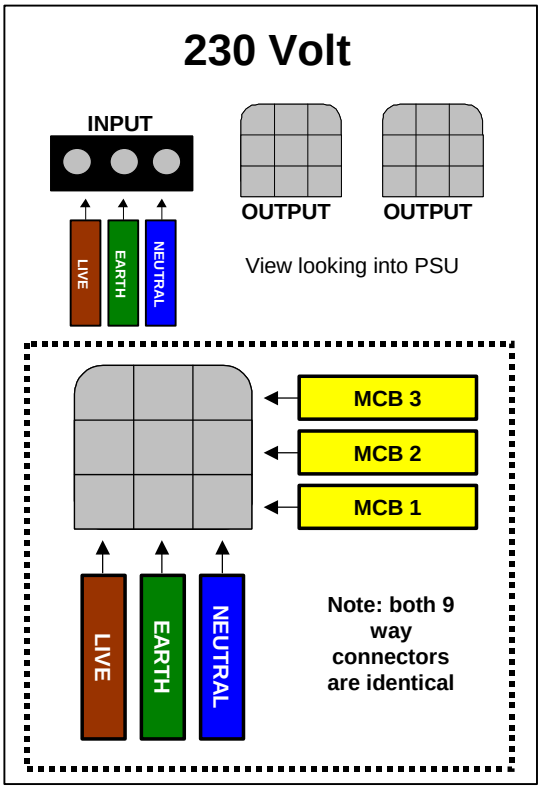
5.4 Declaration of Conformity

Equipment: Leisure Power Control System *Model name:* PSU2007 / EC200 -STD / -DLX / -STD SW

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 Unit 39, Tokenspire Business Park Woodmansey Beverley East Yorkshire United Kingdom
Date:			

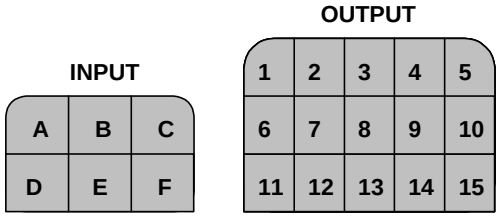
5.5 Electrical Connection



12 Volt

View looking into PSU

Pin	Description	Wire Colour
1	Fresh sensor 75% (¾) full	ORANGE
2	Fresh sensor 25% (¼) full	WHITE
3	Fresh sensor 100% full	GREEN
4	Fresh sensor 50% (½) full	BLUE
5	Waste sensor 50% (½) full	Not in use by current customers
6	Waste sensor 100% full	PURPLE / RED
7	Engine running signal (from alternator)	RED / YELLOW
8	Earth	WHITE / ORANGE



View looking into PSU

A	Leisure Batt.	5	Ext Pump
B	Vehicle Batt.	6	Rear Lights
C	Earth	7	Rear Lights
D	Leisure Batt	8	Toilet Pump
E	Vehicle Batt	9	<Spare>
F	Earth	10	12v Sockets
		11	Front Lights
1	Hob Ign.	12	Front Lights
2	<Spare>	13	Auxiliary
3	Radio	14	Fans
4	Int Pump	15	Fire Ign.