



Note the unit can be supplied in vertical or horizontal versions, and in a black or silver finish.

EC160 Power Supply Unit Installation & User Instructions

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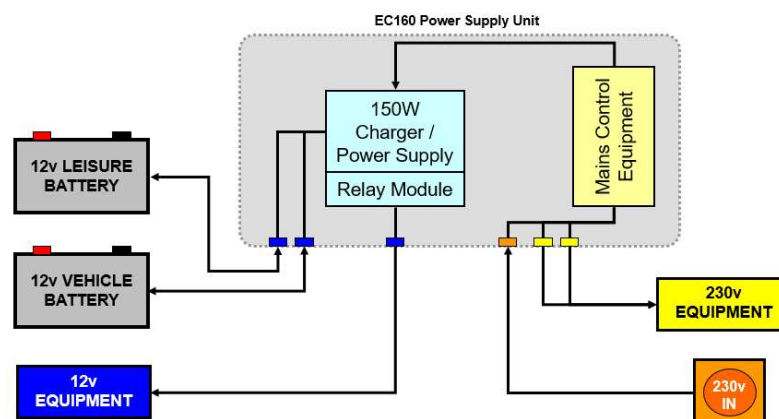
Mon – Thu: 8:00am to 4:30pm
Fri: 8:00am to 12:00pm

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EC160 Power Supply Unit

1 System Overview

The following diagram shows the typical configuration of the EC160 system which provides connectivity to the ancillary components in the vehicle.



2 Installation

2.1 Location & Mounting

Choose a location for the EC160 unit which will provide adequate airflow into the cooling vents (see section 6.1 for recommended clearances). Ensure there is convenient access to the protective fuses, RCD and MCB's. mount the unit horizontally (or vertically if the vertical version) and fix in position using the four fixing holes provided.

2.2 Power Wiring

WARNING

This equipment must be installed by a competent person or qualified electrician. Install in accordance with all national and local electrical wiring regulations and codes

Installation wiring diagrams are provided for reference and cover motorhome and caravan installations (see Section 6.5 – 6.9). You should use wiring of an appropriate cross-sectional area to suit the circuit design. 230V and 12V wiring should be run separately and never clipped or tied together. All mains 230V wiring should be installed by a competent person and must meet the requirements of BS7671 (IEE Wiring Regulations, Requirements for Electrical Installations) and should be tested before use.

A) 230V Wiring

230V Input – A 2-metre cable is supplied pre-fitted to the EC160 unit. Route this cable to the rear of mains inlet socket (not supplied) and attach Live, Neutral & Earth connections. This cable must not be joined or extended, the earth within the cable must be one continuous piece from the inlet to the PSU.

230V Outputs - The mains output connections use quick-connect blocks. Cable conductors should be stripped to 10mm. To insert a cable, press the release button by hand or use a cross point screwdriver to press the button. With the button pressed, insert the cable into the hole and then release the button. Check that the cable is secure and the connection is correct. Route cable around to the mains appliances, clipping the cable at suitable intervals.

Earth Bond - Connect a 4mm earth bond cable to the earth stud provided on the chassis of the EC160 unit, run cable to the vehicle chassis and then gas pipe (if fitted). The connection to the chassis must include a safety warning label to meet BS7671 requirements.

See section 6.9 for installation diagram

B) 12V Wiring

Connect cabling to screw terminal block on rear of unit, then route cable to each appliance as shown in the following diagrams:

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For Caravans with a 13-pin socket – see Section 6.6
For Caravans with a 7-pin socket – See section 6.7
For Motorhomes – See Section 6.8 & 6.9

C) 12V Fridge Connections

Two types of fridges are generally available for use in caravans and motorhomes. Depending on which type is being used will determine the best position to connect 12V power from the EC160 unit.

Absorption – Also known as 3-way fridges, this type can be powered from a 12V Battery, 230V Mains or LPG gas. They are more suitable for prolonged use away from a mains supply and are generally fitted by manufacturers. As they require a large amount of power when operating from a 12V supply (typically up to 15 Amps) it is recommended they are powered from the vehicle battery only whilst the engine is running.

Compressor – This type can be powered from a 12V Battery and sometimes 230V Mains. They are more suitable for DIY fitment in smaller vehicles such as camper vans and require less power when operating from a 12V supply (typically up to 5 Amps). For this reason, they can be connected directly to the leisure battery (via a fuse), so they can be used whilst driving or stationary.

See sections 6.8 & 6.9 for recommended supply connections for each fridge and vehicle type.

D) Split Charge Relay

The PSU includes a split charge relay to enable charging of the leisure battery from the vehicle supply whilst the engine is running. To enable this please ensure an 'engine running' (D+) signal is connected to the SPLIT input terminal.

E) EMC Isolation Relay

The PSU also includes an EMC isolation relay which switches off 12V equipment whilst the engine is running. It is a legal requirement to isolate equipment that is not approved for use whilst the vehicle is in motion. This ensures such items as an oven igniter cannot interrupt or affect vehicle systems. To enable this please ensure an 'engine running' (D+) signal is connected to the EMC input terminal.

3 Power Supply Unit Details

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 EC160 PSU front panel layout.



EC160 Power Supply Unit

WARNING

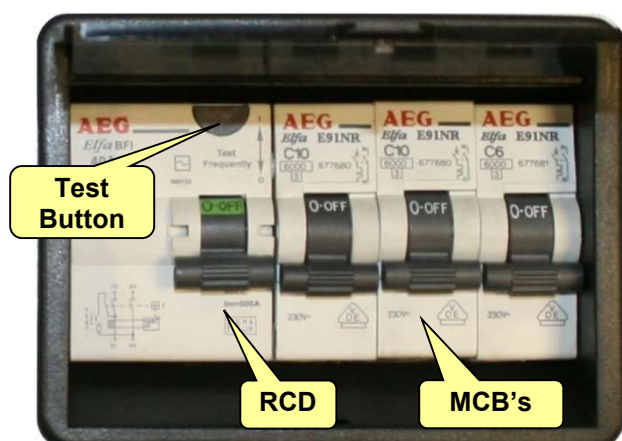
Under heavy loads the EC160 PSU case may become hot. ALWAYS ensure the ventilation slots have a clear flow of air. Do not place combustible materials against / adjacent to the EC160 PSU. The PSU will shutdown if overheated and will restart automatically when cool.

3.1 Battery Charger / Power Converter

The EC160PSU incorporates a fixed voltage battery charger / power converter. The battery charger / power converter also powers the leisure equipment when the mains supply is connected. This module supplies 13.8V DC to the leisure equipment up to a maximum of 12 Amps (155 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
3A	9A
6A	6A
9A	3A
12A	0A

3.2 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 5.1)

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 suggested circuit allocation for the three MCB's

MCB	Rating	Wire Colour	Suggested Allocation
1	10 Amps	White	230V Sockets
2	10 Amps	Yellow	230V Heater
3	6 Amps	Blue	Fridge / Water Heater / 12V Charger (internally connected)

3.3 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 6 fuses fitted to the EC160PSU.

Fuse	Rating	Fuse Colour	Suggested Allocation
1	5 Amps	Tan	12V Permanent circuits e.g., Radio
2	10 Amps	Red	12V Water Pump

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3	15 Amps	Blue	12V Fridge
4	20 Amps	Red	12V Charger (internally connected)
5	10 Amps	Red	12V Lighting circuits
6	10 Amps	Red	12V Auxiliary circuits e.g., Sockets, TV amp, Igniters

3.4 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 EC160PSU is designed to charge standard lead acid leisure batteries, however it may be used with Gel batteries depending on their composition. Please consult the battery documentation for further advice.

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.

B) Installation & Removal

Always disconnect the 230V mains supply and turn the EC160PSU 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) Operation / Servicing

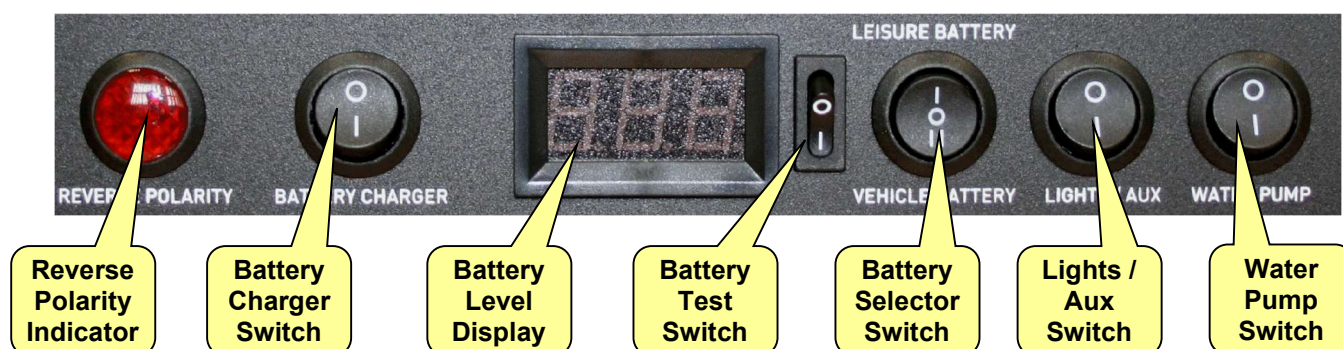
Under normal circumstances it should not be necessary to remove the battery other than for routine inspection of the terminals and "topping up" of the battery fluid where applicable. Please see instructions supplied with the battery.

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.

4 Controls & Indicators

4.1 Layout and Buttons

The following diagram shows the front panel layout and button functions for the EC160 unit.



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4.2 Operation

Symbol	Function	Description
	Battery Charger switch	This switch turns on (or off) the integrated battery charger. Before charging, ensure the Leisure or Vehicle battery is selected (see below)
	Water Pump power switch	This switch turns on power to the internal water pump ready for use. It can be used to turn off the pump over night to avoid any noise from the pump.
	Lights / Auxiliary power switch	This switch turns the Lighting and other Auxiliary circuits on (or off).
	Leisure / Vehicle Battery Selector switch	This switch is used to select the Leisure battery or Vehicle battery as the source of 12V power. It can also be used to isolate 12V power by placing the switch in the Off (O) position.
	Battery Level Display	Displays the voltage of the currently selected battery. To display the voltage press switch to the On (I) position. See section 4.3 for advice on when to re-charge the battery.
	Reverse Polarity indicator	This indicator will illuminate if the incoming mains supply is reversed (see section 5.1G for more information)

4.3 Battery Level Display

Voltage reading	Battery Status	Action
12.2 – 14.4	Good	None required.
11.4 – 12.2	Fair	Recharge if heavy loads are to be used.
10.9 – 11.4	Flat	Recharge as soon as possible.
Less than 10.9	Poor	Recharge immediately to avoid battery damage.

5 Operational & Safety Information

5.1 Connecting to the Mains supply - 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.

- 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. Please note that some electronic generators may not be compatible with your leisure system.

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- B) **Switch the Power Supply Unit internal Battery Charger Off.** Locate the Battery Charger power switch on the PSU 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 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 5.2.
- 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 5.2.
- F) **Turn the PSU ON.** Locate the battery select switch (Vehicle / Leisure) and switch to the leisure position to select the leisure battery. If the installation is in a motorhome or caravan with the car attached, then the switch can be moved to the vehicle position to use the vehicle battery if required. Now locate the battery charger switch and switch to the On (I) position. The battery charger will now start to charge the selected battery.
- G) **Check correct Polarity equipment.** Locate the 'Reverse Polarity' indicator on the PSU and ensure that the indicator is NOT illuminated. If the indicator is illuminated then this could be caused by a reversed supply, portable generator being used or faulty hook up cable. In this case, please seek expert advice.
- H) **Check operation of equipment.** It is now safe to operate the 12V and 230V equipment. Depending on how the system has been wired, the Lights / Aux switch will operate the lighting circuits (this switch is often used as the master lights switch) and the auxiliary circuits e.g., 12V sockets, TV amplifier, heater and oven igniters etc. The pump switch is used to operate the water pump (and also in many cases the toilet flush pump).

5.2 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 5.1C
	RCD switched off	Reset RCD as per 5.1D
	RCD not operating correctly	Check supply polarity, Reverse Polarity indicator will illuminate if supply is reversed. 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 faults	Contact your Dealer
No 12-volt output from PSU	No 230V supply	Check all above
	Charger not switched on	Switch charger switch on (I) position
	Battery not connected and / or charged	Install charged battery as per 3.4
	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 faults	Contact your Dealer

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Fault	Possible Cause	Proposed Fix
Pump or Lights not working	Fuse blown	Replace fuse
	Pump or Lights turned off	Turn pump or Lights on by pressing appropriate button to (I) position on EC160 front panel

6 Technical Data & Approvals

6.1 Outline Specification

INPUT 230V	230 Volts / 0 to 16 Amps via 2 metre pre-wired lead	+ / - 10%
OUTPUT 230V	RCD protected, 3 x MCB outputs of 10, 10 and 6A via 3 x 6-way quick-connect terminals	
INPUT 12V	2 x 15A battery inputs via screw terminals	
OUTPUT 12V	15A total output protected by 5 fused outputs via screw terminals	
Integrated CHARGER	Input 220-240 Volts AC +/- 10%, Frequency 50 Hz +/- 6%, Current 3A max. DC Output 13.8 Volts nominal, Current 12 Amps max (155 Watts).	
Signal INPUTS	1 x Split Charge via screw terminal 1 x EMC Isolation via screw terminal	From vehicle D+ signal
Operating temperature	Ambient 0 to 35° Centigrade PSU case temperature with full load 65° C Max	Automatic shutdown and restart if overheated / overloaded
Dimensions	Overall size (HxWxD) 300 x 150 x 205mm Panel cut-out size (HxW) 285 x 132mm Clearances 30mm above, 30mm left & right	Weight 2.2 Kg

6.2 Approvals

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

Residual Current Device: LVD Directive - BSEN 61008

Miniature Circuit Breakers: LVD Directive - BSEN 60898

Integrated Charger Module: LVD Directive - EN60950-1:2006+A11:2010+A12:2011+A2:2013

EMC Directive - EN 55022:2010, EN 61000-3-2:2014, EN 61000-3-3:2013, EN 55024:2010, EN61000-4-2:2009, EN 61000-4-3:2006+A1:2008+A2:2010, EN 61000-4-4:2012, EN 61000-4-5:2014, EN 61000-4-6:2014, EN 61000-4-8:2010, EN 61000-4-11:2004

6.3 Declaration of Conformity

Equipment: Leisure Power Control System

Model name: EC160

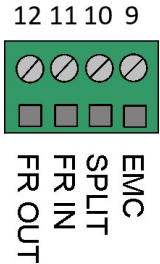
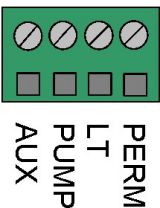
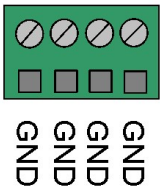
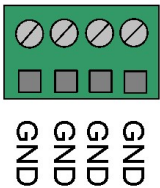
I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced approvals. The unit complies with all essential requirements of the Directives.

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: 25 th May 2015			

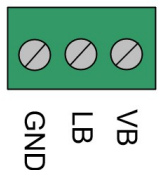
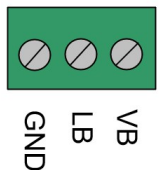
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6.4 Electrical Connections – Power Supply Unit

A) 12V Power Connectors

	Pin	Function	Fuse	Wire Colour
	12	Fridge 12V Input	-	RED
	11	Fridge 12V Output	15A	RED
	10	Split Charge 12V Input	-	BLACK
	Pin	Function	Fuse	Wire Colour
	8	Auxiliary 12V Output	10A	YELLOW
	7	Pump 12V Output	10A	PURPLE
	6	Lights 12V Output	10A	SLATE
	Pin	Function	Fuse	Wire Colour
	4	GND	-	WHITE
	3	GND	-	WHITE
	2	GND	-	WHITE
	Pin	Function	Fuse	Wire Colour
	1	GND	-	WHITE
	2	GND	-	WHITE
	3	GND	-	WHITE

B) 12V Battery Connector

	Pin	Function	Fuse	Wire Colour
	3	GND	-	WHITE
	2	12V Leisure Battery	15A	BROWN
	1	12V Vehicle Battery	15A	GREEN

C) 230V Output Connectors

	Pin	Function	MCB	Wire Colour
	1	230V Live Output	10A	BROWN
	2	230V Live Output	10A	BROWN
	3	Earth	-	GREEN/YELLOW
	4	Earth	-	GREEN/YELLOW
	5	230V Neutral Output	10A	BLUE
	6	230V Neutral Output	10A	BLUE

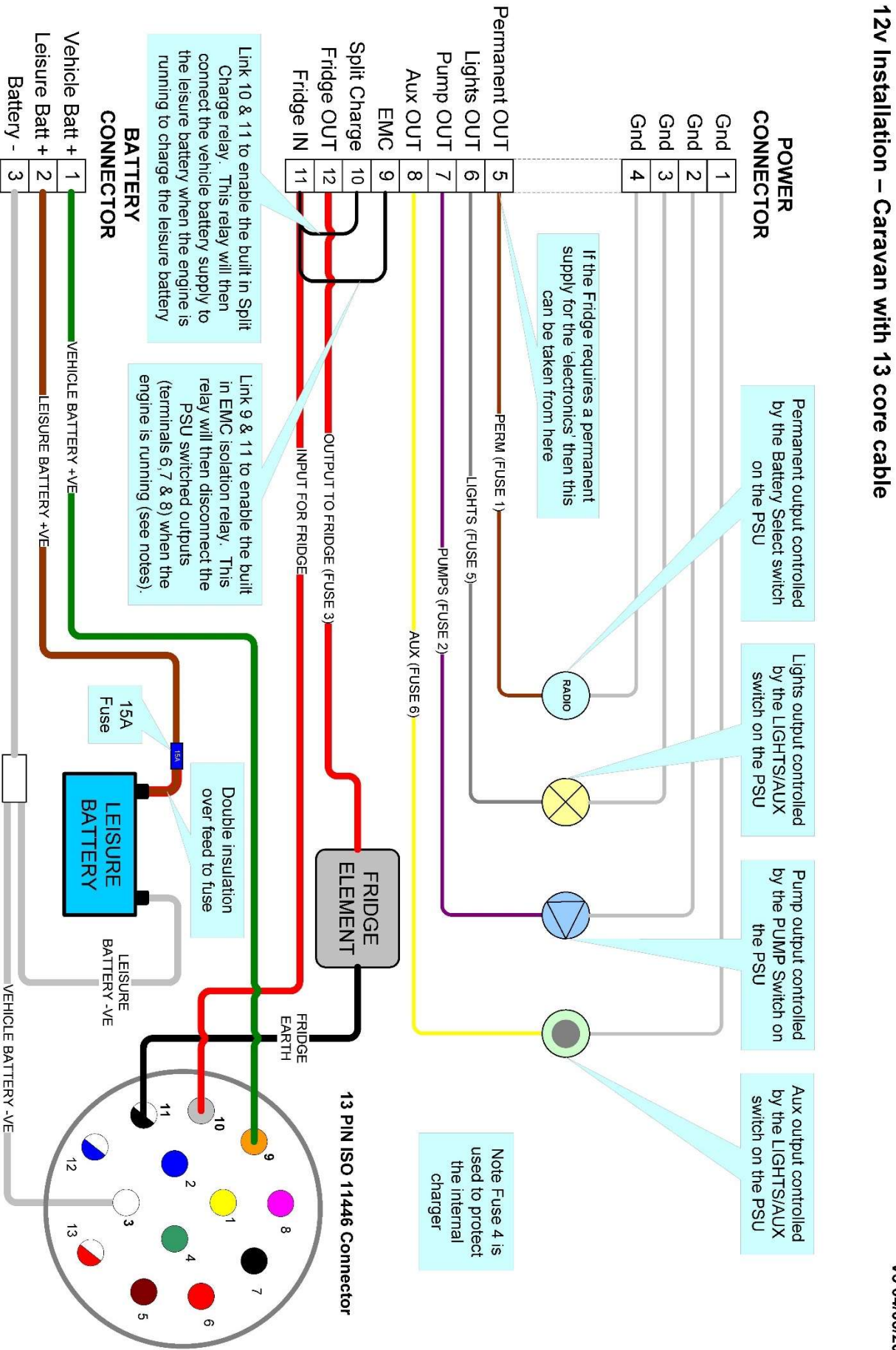
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MCB2 Output 7 8 9 10 11 12 	Pin	Function	MCB	Wire Colour
	7	230V Live Output	10A	BROWN
	8	230V Live Output	10A	BROWN
	9	Earth	-	GREEN/YELLOW
	10	Earth	-	GREEN/YELLOW
	11	230V Neutral Output	10A	BLUE
	12	230V Neutral Output	10A	BLUE
MCB3 Output 13 14 15 16 17 18 	Pin	Function	MCB	Wire Colour
	13	230V Live Output	6A	BROWN
	14	230V Live Output	6A	BROWN
	15	Earth	-	GREEN/YELLOW
	16	Earth	-	GREEN/YELLOW
	17	230V Neutral Output	6A	BLUE
	18	230V Neutral Output	6A	BLUE
	Pin	Function	MCB	Wire Colour
	-	Earth Bond	-	GREEN/YELLOW

While every effort has been made to ensure the accuracy and completeness of this document, no guarantee is given against errors or omissions. This document may be updated / improved over time therefore please check with your dealer / supplier for update information or visit www.sargentltd.co.uk

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6.5 12V Wiring – Caravans (13-Pin socket)

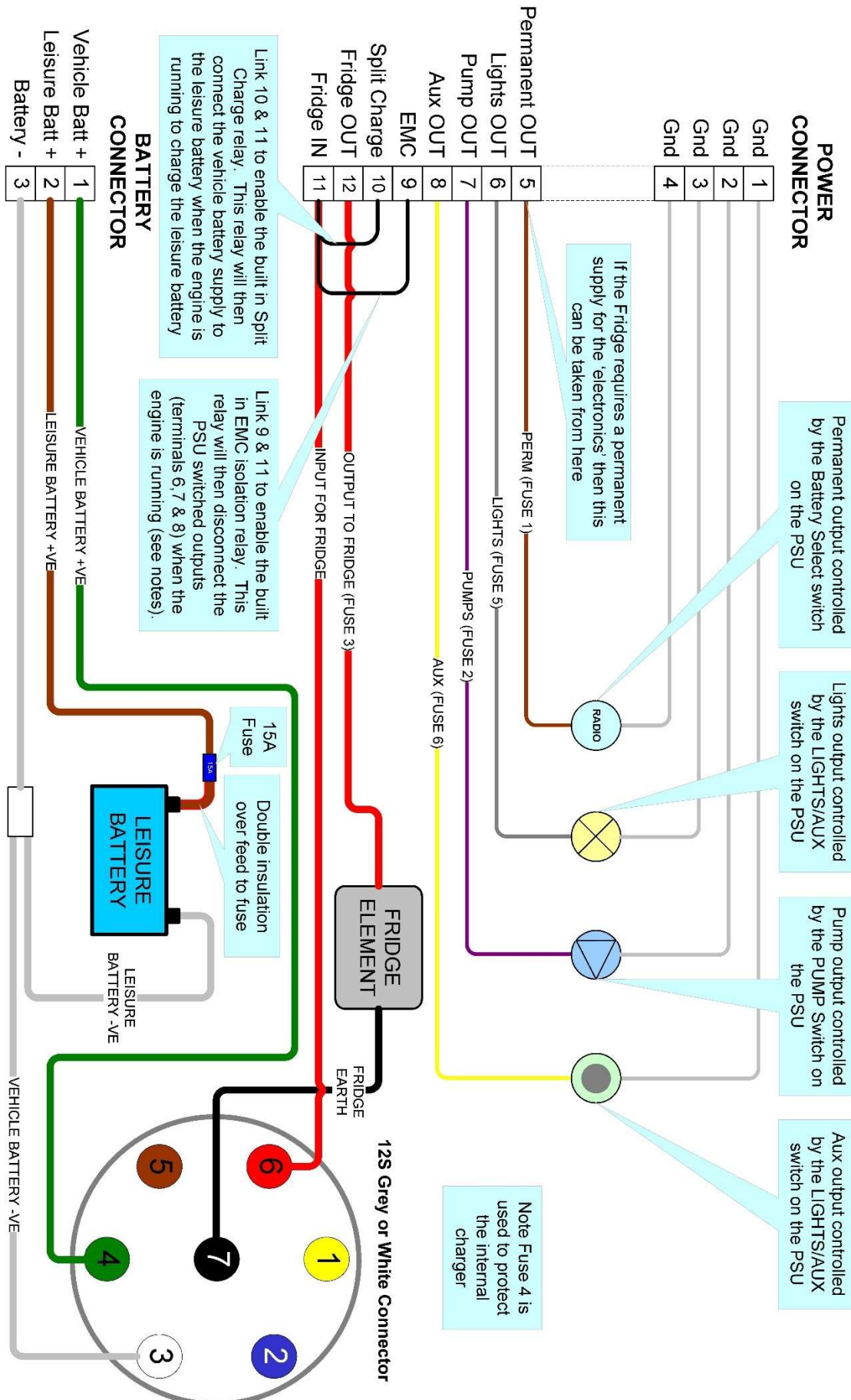


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6.6 12V Wiring – Caravans (7-Pin Socket)

12v Installation – Caravan with 12S 7 core cable

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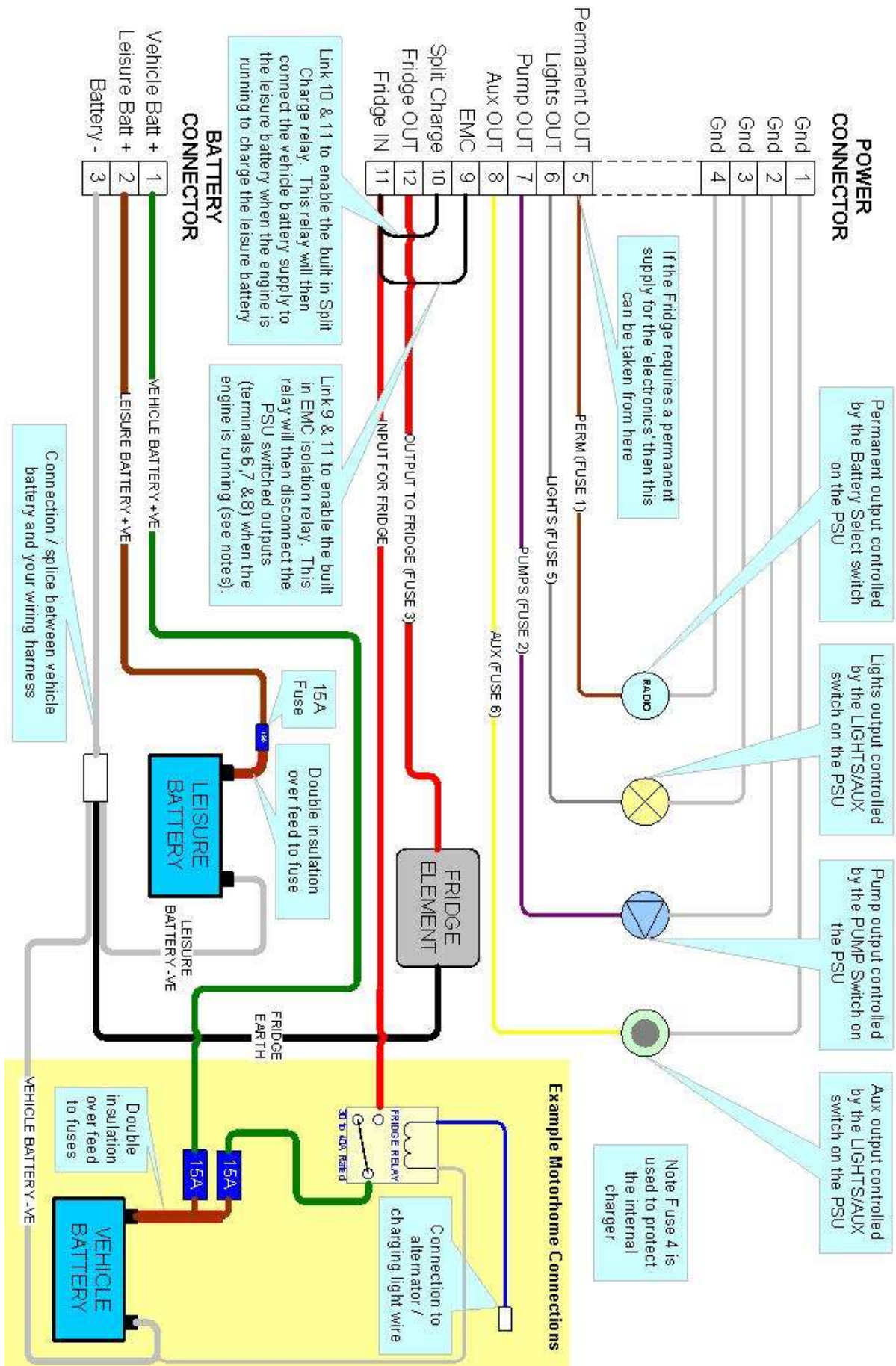


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6.7 12V Wiring – Motorhomes (Absorption fridge)

12v Installation – Motorhome Installation with Absorption Fridge Relay with Alternator connection

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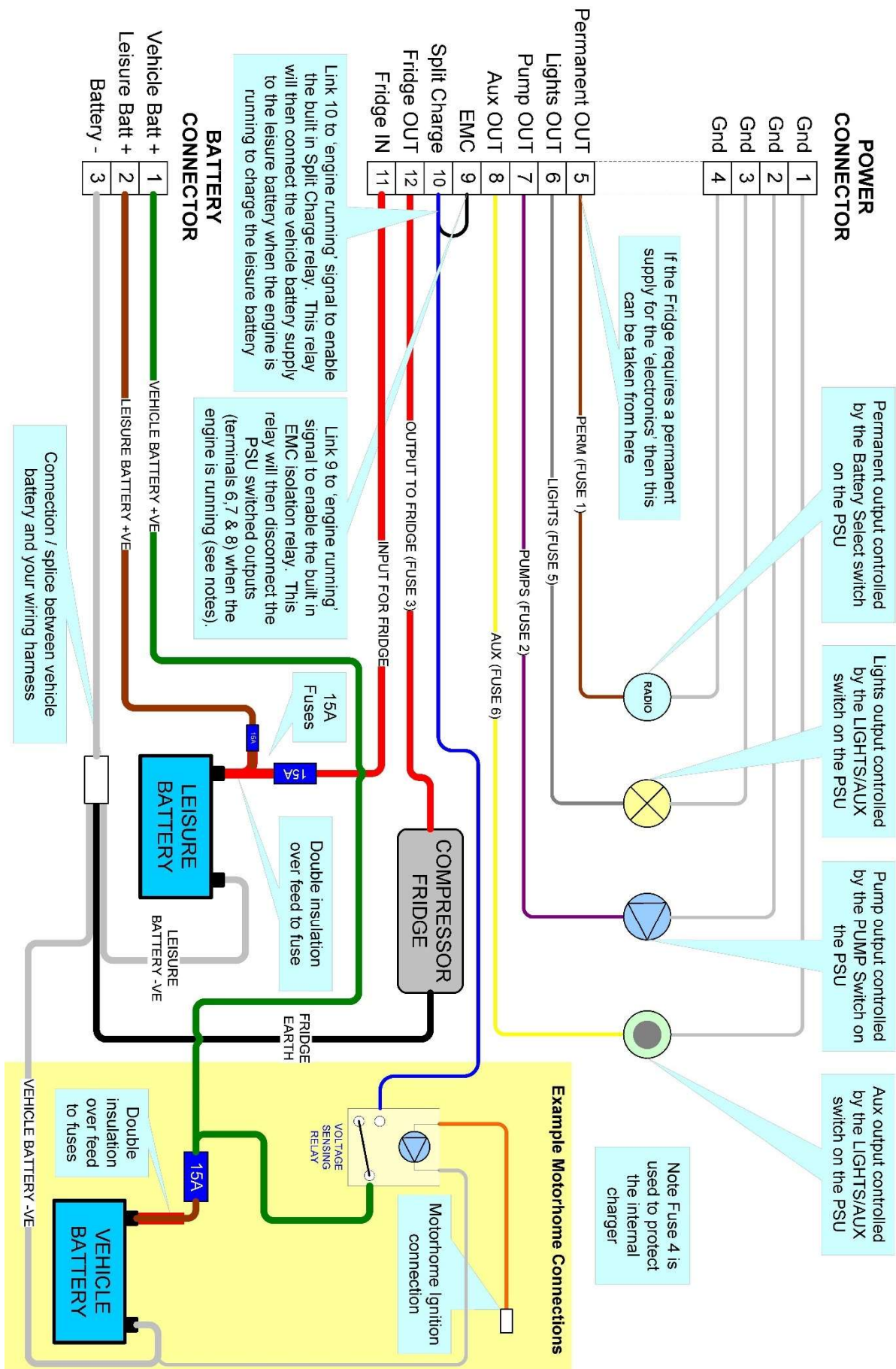


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6.8 12V Wiring – Motorhomes (Compressor fridge)

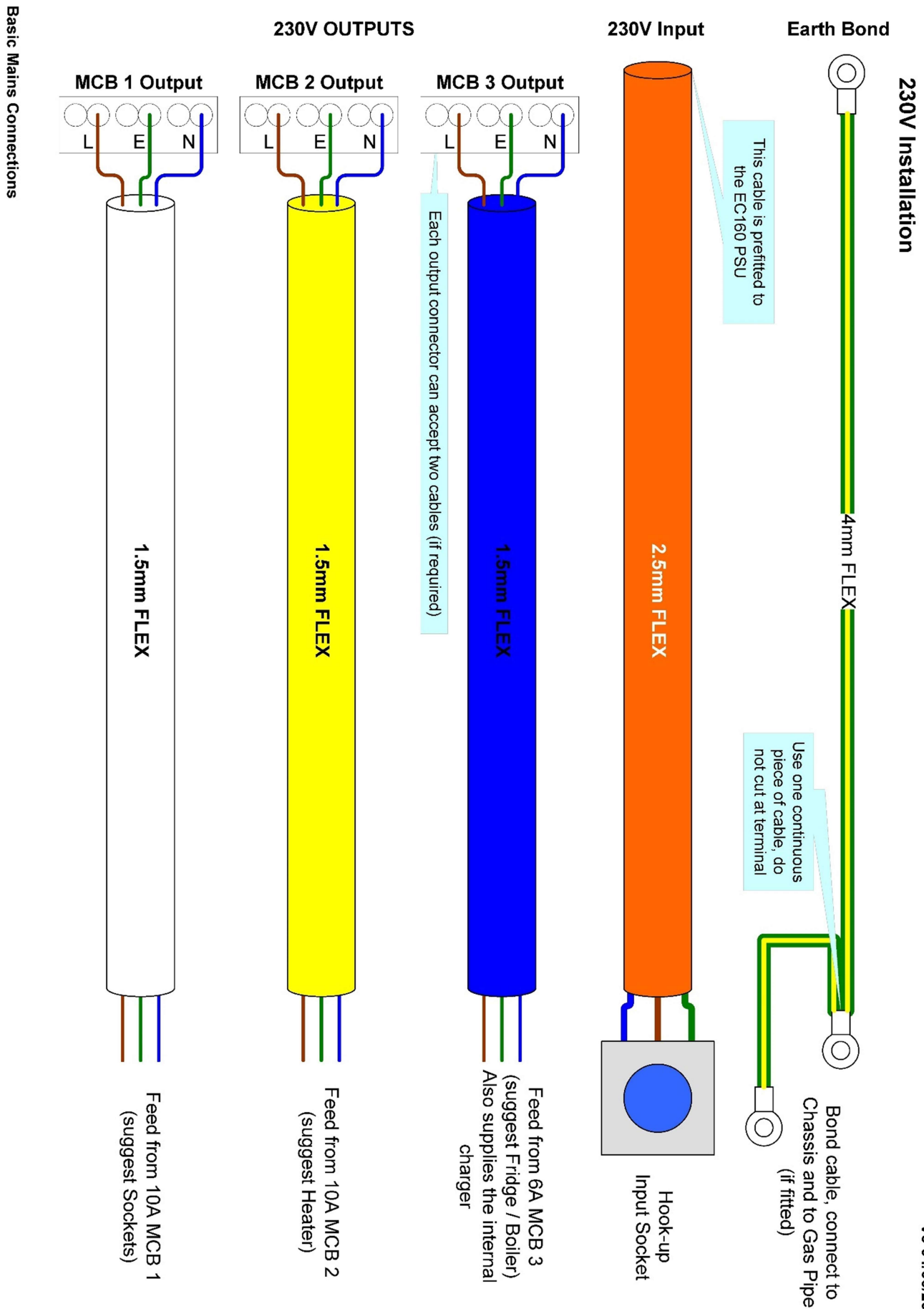
12v Installation – Motorhome Installation with Compressor Fridge & Voltage Sensing Relay

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6.9 230V Wiring – Caravans & Motorhomes



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