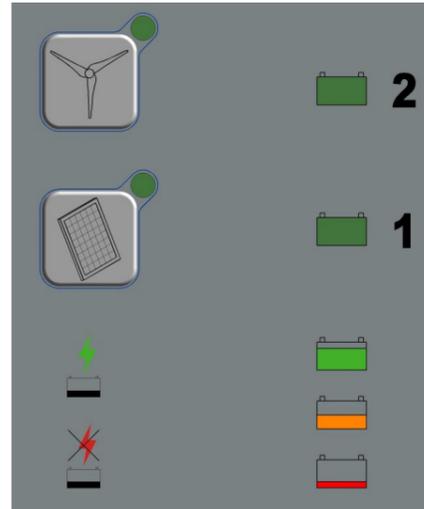


# Rutland 1200 Commissioning and Operation

## Commissioning— it is important to follow this sequence!

1. Electrical Connection— connect BAT2 first if used, followed by BAT1. The controller automatically self configures to operate at 12V or 24V according to the battery voltage . The WG and PV buttons are red.
2. Raise the turbine and secure the mounting pole firmly in an upright position or release the blades to run if tied off. Uncover solar panels. The charge controller default start position is OFF and the wind and solar inputs hold the turbine in the electronic stall position to prevent current from flowing.
3. Switch On— Press and hold the WG turbine ON/OFF button for 3 seconds to release the electronic stall. The LED will change from solid red to the current operating status. Repeat for the PV ON/OFF button. Charging will commence automatically as wind and solar energy are available.

**IMPORTANT:** In service BAT1 must always remain connected to provide power to the controller. DO NOT install any switches, relays, VSRs, fuses etc that can even momentarily disconnect the battery. If the battery needs to be disconnected follow the **Procedure to Shutdown and Start the Turbine and Solar Panel.**



Optional Equipment:

Rutland 1200 Remote Display –Part No: CA-07/02



View system performance parameters:

- wind and solar charge Amps and Watts
- battery 1 and 2 Voltages and % of charge
- charging status; Bulk or Float
- accumulated ampere hours of charge

**1200 Reprogrammer –Part No: CA-07/04**

A PC link wire and software on a USB to alter various parameters for different battery types.

## Rutland 1200 Hybrid MPPT Charge Controller

Marlec Part No: CA-07/01

### Part 2—Controller Installation

Installation and Operation  
12V and 24V Models



## Guide to Operation—LED Indicators

Battery LEDs	Battery Status
	Battery is not connected or Voltage is too low to power the controller. Note: BAT1 LED is always lit when connected to a battery
	Flashing. Battery is fully charged. Controller is in regulation mode, turbine and PV are voltage limited. Turbine speeds are reduced.
	>13V or >26V
	12-13V or 24-26V
	<12V or <24V
	Flashing. <11V or < 22V, recommend disconnect loads or charge batteries separately
Button LEDs	Charging Status
	No charge output voltage detected
	Charging by renewable power
	Flashing. Standby Mode, insufficient output voltage detected
	Flashing. Automatic shutdown from Electronic Stall Protection Mode
	PV or WG are manually shutdown Press button for 3 seconds to release and run

View more detailed system performance with the optional remote display.

## Brief Guide to Operating Features

**MPPT**—Maximum Power Point Tracking. The controller incorporates this technology on both the wind turbine and solar inputs, optimising the power production of both in low wind and light levels to increase daily energy yields.

**Multi-Stage Charging**—The controller is programmed to deliver Bulk, Absorption and Float phases of charge to ensure batteries reach and maintain full capacity. The use of the temperature sensors for **Temperature Compensation** and the **Remote Battery Sensor** facility maximise this feature and prolong battery life.

### Electronic Stall Protection Modes:

**High Winds and Over Temperature**— If excessive currents or internal temperatures are reached the turbine is stalled by the charge controller. Under these conditions the “WG Button” flashes red until it automatically restarts. This can be manually re-set but is not normally recommended.

**PV Over-Current & Temperature Protection**—This is activated if the 20A current rating of the PV panels is exceeded, downsize the PV panel if necessary. The solar control must be manually reset, press and hold the “PV Button” for 3 seconds. If the over-temperature condition is activated the controller automatically re-sets itself. Under both these conditions the “PV Button” flashes red.

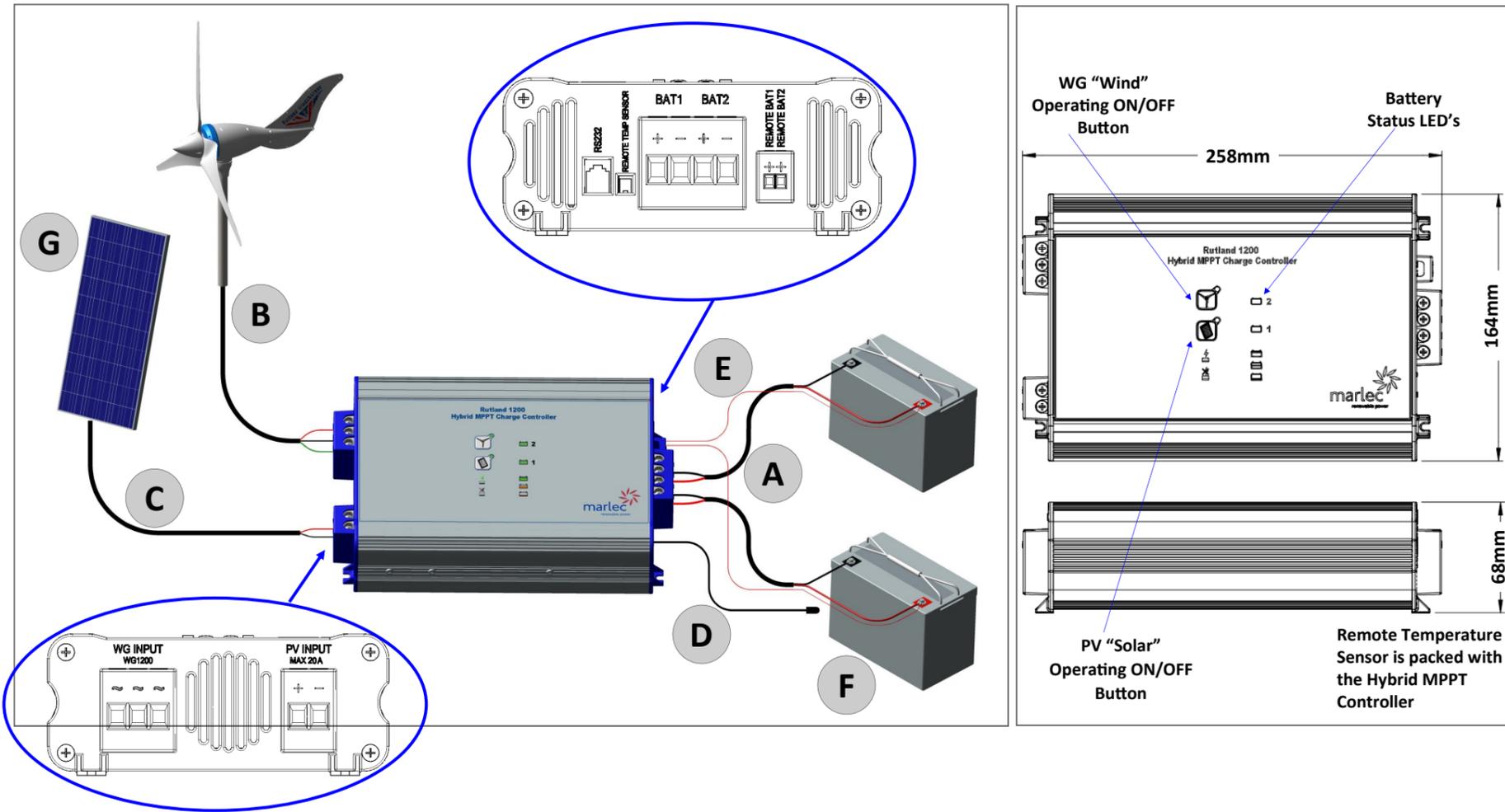
**Procedure to Shutdown and Start the Turbine and Solar Panel** - Each button is used respectively to start and shutdown operation. To activate press and hold each button in turn for a continuous 3 seconds , the WG LED flashes red during soft stall of the turbine and is shutdown when solid red. The batteries may now be disconnected, to reconnect install BAT2 first if fitted.

**Resetting the System**—In the event that the system has to be re-set ensure that the controller WG and PV switches are set to OFF , solid red, so they are shutdown. Remove the positive connection from BAT 1 then reconnect. Once connected BAT 1 must always remain connected to provide power to the controller.

To find out more about how your Rutland 1200 can charge other battery types visit [www.marlec.co.uk](http://www.marlec.co.uk)

Visit [www.marlec.co.uk/support](http://www.marlec.co.uk/support) to see video installation and operating guides.

# Rutland 1200 Controller Installation and Electrical Connection



Cable Specifications Description:	Cable Length:	Minimum Cable Sizes:	
		mm <sup>2</sup>	AWG
<b>A Controller to Battery Cables</b>			
Rutland 1200 Only – up to 35A DC	1.5m	6	10
Rutland 1200 & 20A Solar - up to 55A DC	1.5m	10	8
<b>B Turbine to Controller Cables - Use 3 stranded cables of equal size: 12V Systems</b>			
0-5m		2.5	14
0-10m		4	12
10-20m		6	10
20-30m		10	8
<b>24V Systems</b>			
0-50m		4	12
50-75m		6	10
75-100m		10	8

<b>C Solar PV to Controller Cables</b> - Use 2 stranded cables suitably sized to minimise losses. Refer to PV panel instructions or visit <a href="http://www.marlec.co.uk">www.marlec.co.uk</a> for further advice. Terminals accept up to 16mm <sup>2</sup>	1.5m Supplied with Controller
<b>D Remote Temperature Sensor</b>	1.5m Supplied with Controller
<b>E Remote BAT 1 &amp; 2 Voltage Sensing Wires</b> —single conductor. Optional to fit but recommended if battery cables are >1.5m long	0.5 to 0.75mm to battery + terminal only

F Minimum Battery Capacity @ C20 Rate		
Charge Source Options	12V	24V
Rutland 1200 Only	175Ah	85Ah
Rutland 1200 & 10A Solar	225Ah	110Ah
Rutland 1200 & 20A Solar	275Ah	135Ah

G Solar PV Panel Specifications	Never exceed these PV panel ratings
Maximum Current on 12V or 24V battery systems Permissible configurations: 12V PV panel charging 12V battery 24V* PV panel charging 12V battery 24V* PV panel charging 24V battery * from a single 24V panel or 2 x 12V panels in series	20 Amps  Nominally 250W Nominally 250W Nominally 500W
Maximum <b>Open Circuit Voltage (Voc)</b> of PV array over entire operating temperature range	50V
Minimum maximum power point voltage (Vmpp) at STC	12V panels — 15V 24V panels — 30V

## Install The Controller and Cables



During installation the turbine must be restrained from turning and PV panels must be covered.

1. Fix the Rutland 1200 Charge Controller to a vertical surface as shown using 4 screws in a weatherproof environment. See H
2. Install the selected power cables from the turbine and solar panels to the controller. Strip back 10mm of insulation on all power cables. The turbine 3 phase cables have no polarity to observe but ensure solar panels are correctly connected + and -
3. Prepare cables to make a direct connection from the controller to the batteries but DO NOT connect to the battery at this time. The controller is internally fused but note that reverse polarity connection to the battery will cause permanent damage.  
*IMPORTANT: DO NOT install any switches, relays, VSRs, fuses etc in the cables that can even momentarily disconnect the battery. Avoid additional connections or terminations in the battery lines. Any interruption to the BAT 1 power supply whilst wind or solar charging will damage the controller.*
4. Installation of sensing wires is highly recommended for most efficient charging through the bulk, absorption and float phases. Important information about sensing wires:

**Remote Temperature Sensor** — When installed the temperature compensation feature is activated and voltage regulation settings are automatically adjusted to ensure batteries are fully charged whatever the local temperature. Temperature compensation is disabled if not fitted.

**Remote Battery Voltage Sensing Wires**—if not connected the BAT1 and BAT2 terminal voltage is used for sensing the battery voltage. Any voltage drop associated with long cable distances (>1.5m) will reduce the accuracy of the charging regime.

## H Controller Orientation

