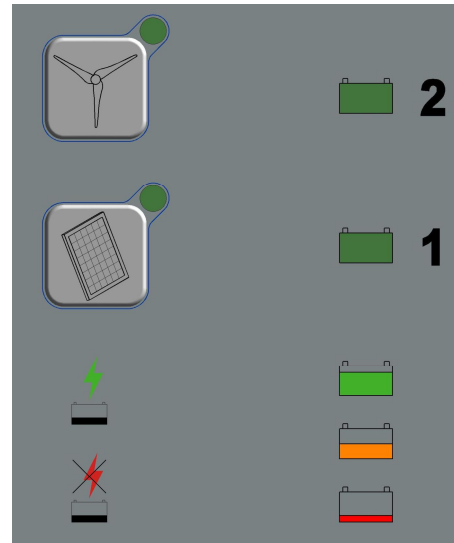


Rutland 1200 Commissioning and Operation

Commissioning

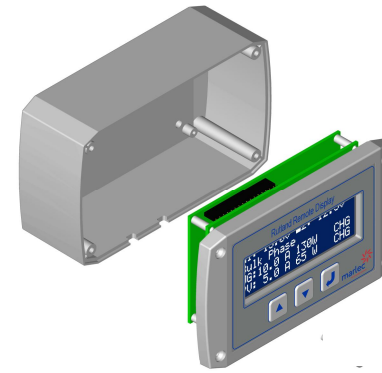
1. Raise the turbine and secure the mounting pole firmly in an upright position. Uncover solar panels. The charge controller default start position is OFF and the wind and solar inputs hold the turbine in the electronic stall position to prevent current from flowing.
2. Final Electrical Connection—connect BAT2 first if used, followed by BAT1. The controller automatically self configures to operate at 12V or 24V according to the battery voltage and the WG and PV buttons are red.
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



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

Ask your dealer for details or visit www.marlec.co.uk

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Rutland 1200 Wind Turbine & Hybrid MPPT Controller

Installation and Operation
Part 2—Controller Installation

12V and 24V Models



Doc No: SM-469 Iss D.1 Part 2 10.04.17

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 runs very slowly
	>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 and is automatically released to resume charging. Under these conditions the “WG Button” flashes red.

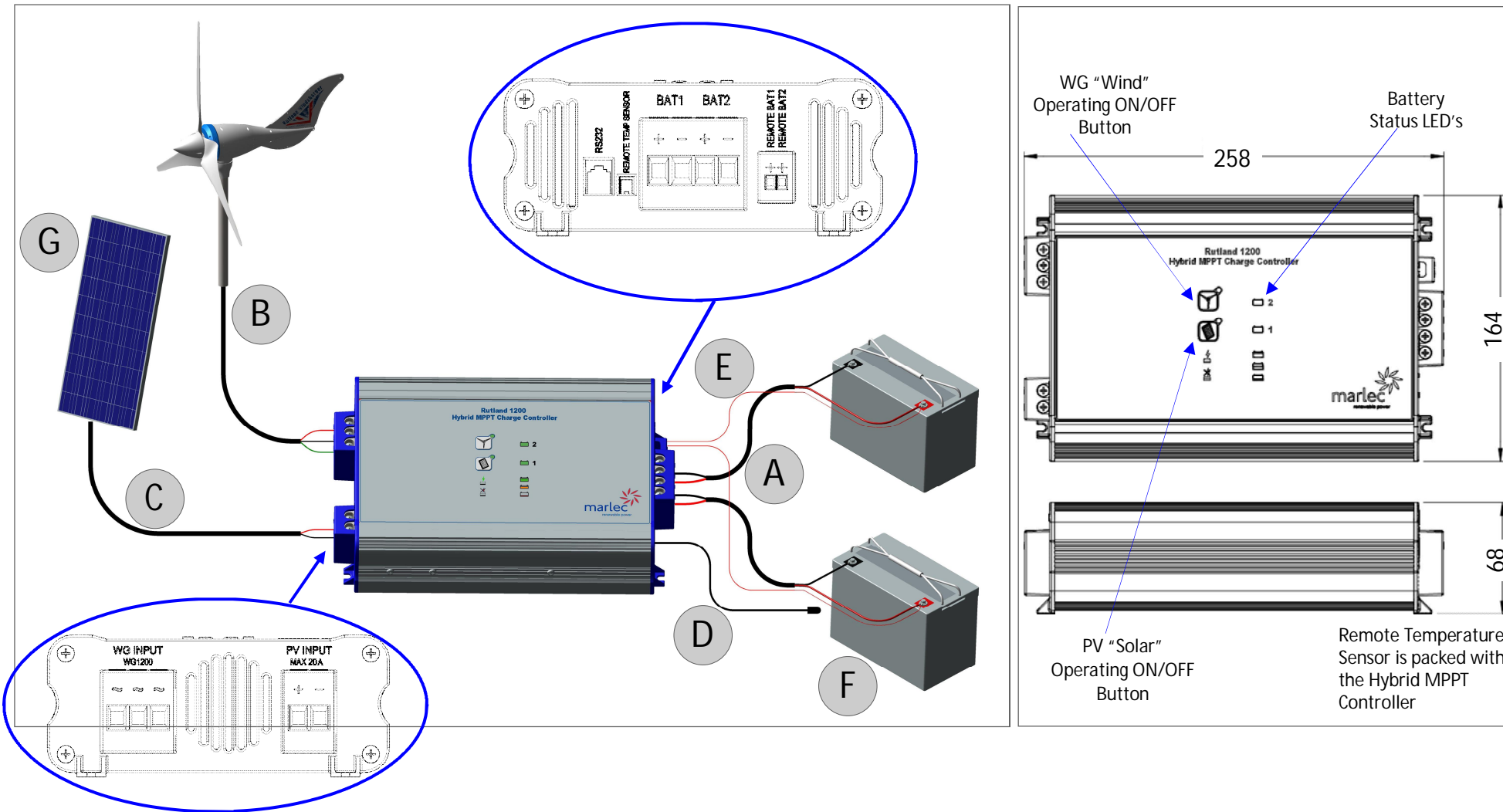
PV Over-Current & Temperature Protection—This is activated if the 20A current rating of the PV panels is exceeded, downsize the PV panel if necessary. The solar control must be manually reset, press and hold the “PV Button” for 3 seconds. If the over-temperature condition is activated the controller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

Visit 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 ²	AWG
A Controller to Battery Cables			
Rutland 1200 Only – up to 35A DC	1.5m	6	10
Rutland 1200 & 20A Solar - up to 55A DC	1.5m	10	8
B Turbine to Controller Cables - Use 3 stranded cables of equal size: 12V Systems	0-10m	4	10
	10-20m	6	8
	20-30m	10	6
	30-50m	16	4
	50-75m	4	10
	75-100m	6	8
	24V Systems	10	6
C Solar PV to Controller Cables - Use 2 stranded cables suitably sized to minimise losses. Refer to PV panel instructions. Use as large cable as possible, terminals accept up to 16mm ²			
D Remote Temperature Sensor	1.5m Supplied with Controller		
E Remote BAT 1 & 2 Voltage Sensing Wires—single conductor. Optional to fit but recommended if battery cables are >1.5m		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	

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.

G Solar PV Panel Specifications	
Maximum Current on 12V or 24V battery systems Permissible configurations:	20 Amps
12V PV panel charging 12V battery	Nominally 250W
24V* PV panel charging 12V battery	Nominally 250W
24V* PV panel charging 24V battery	Nominally 500W
* from a single 24V panel or 2 x 12V panels in series	
Maximum Open Circuit Voltage (Voc) of array over entire operating temperature range	50V
Minimum maximum power point voltage (Vmpp) at STC	12V panels — 15V 24V panels — 30V

