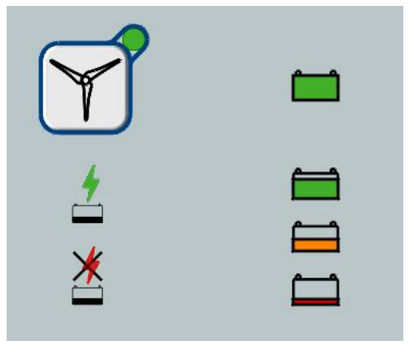
Step 2 — Rutland 1200 Commissioning and Operation

Commissioning– it is important to follow this sequence!

1. Electrical Connection — connect the battery. The controller automatically self configures to operate at one voltage, either 12V or 24V according to the battery connected. The 48V model is dedicated to 48V usage. Batteries must be at a minimum of 11V or 22V or 44V. The WG button illuminates solid red.
2. Raise the turbine and secure the mounting pole firmly in an upright position or release the blades to run if tied off. The charge controller default start position is OFF and the wind turbine is held 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, see table below. Charging commences automatically as wind energy is available.

   IMPORTANT: In service the battery 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. Battery connections are fused within the controller. If the battery needs to be disconnected follow the Procedure to Shutdown and Start the Turbine.



Guide to Operation—LED Indicators

Battery LED	Battery Status
	Battery is not connected or Voltage is too low to power the controller.
	Flashing. Battery is fully charged. Controller is in regulation mode and the turbine is voltage limited. Turbine speeds are reduced.
	>13V or >26V or > 53V
	12-13V or 24-26V or 48-52V
	<12V or <24V or < 48V
	Flashing. <11V or < 22V or <44V. Recommend disconnect loads or charge batteries separately
Button LED	**Charging Status**
	No charge output voltage detected
	Flashing. Standby Mode, insufficient output voltage detected
	Charging by renewable power
	WG is manually shutdown Press button for >3 seconds to release and run
	Flashing. Automatic shutdown from Electronic Stall Protection Mode
View more detailed system performance with the optional remote display.	

Limited Warranty

The Marlec Engineering Company Limited Warranty provides free replacement cover for all defects in parts and workmanship for 24 months from the date of purchase. Marlec's obligation in this respect is limited to replacing parts which have been promptly reported to the seller and are in the seller's opinion defective and so found by Marlec upon inspection. A valid proof of purchase is required to make a warranty claim.

Defective parts must be returned by prepaid post to the manufacturer Marlec Engineering Co Ltd, Rutland House, Trevithick Rd, Corby, Northamptonshire, NN17 5XY, England or to an authorised Marlec agent.

This Warranty is invalid in the event of improper installation, owner neglect, mis-use, damage caused by flying debris or natural disasters including lightning strike and hurricane force winds. This warranty is invalid where a non- Terrain or furling model is installed on land. This Warranty does not extend to support posts, inverters, batteries or ancillary equipment not supplied by the manufacturer.

No responsibility is assumed for incidental damage. No responsibility is assumed for consequential damage or loss. No responsibility is assumed for damage caused by user modification to the product or the use of unauthorised components.

Manufactured in the UK by
Marlec Eng Co Ltd
Rutland House, Trevithick Rd, Corby, NN17 5XY
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CE

Doc No: SM-403 Iss A 01.02.21

Rutland 1200 MPPT Terrain Charge Controller

12/24V or 48V Models

Marlec Part No: CA-07/06 & CA-07/07

Installation and Operation

(To be read in conjunction with turbine manual)

Brief Guide to Operating Features

MPPT—Maximum Power Point Tracking. The controller incorporates MPPT technology which optimises power production in low wind speeds to increase daily energy yields in more typical wind ranges.

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 facilities maximise this feature and assist in prolonging battery service 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 (see below instruction) but is not normally recommended.

Procedure to Shutdown and Start the Turbine - The turbine (WG) button is used to start and shutdown operation. To activate press and hold the button for a continuous >3 seconds , the WG LED flashes red during soft stall of the turbine and is shutdown when solid red. Note: Follow this procedure first in the event the batteries need to be disconnected.

Resetting the System or Disconnecting the Battery Bank — To manually re-set the controller or disconnect the batteries first follow the Procedure to Shutdown as above and ensure that the controller WG button is solid red. Remove the battery + terminal temporarily and reconnect it to re-set the system or leave the batteries disconnected as required. This should be done at the battery terminals and not at the controller to avoid any live reconnections that may cause damage. Ensure the battery is reconnected before switching the turbine to run.

Controller Power Supply - The battery must always remain connected to provide power to the controller. Batteries should not be allowed to fall below minimum levels 11V, 22V or 44V according to system voltage.

To find out more about how your Rutland 1200 can charge other battery types visit www.marlec.co.uk

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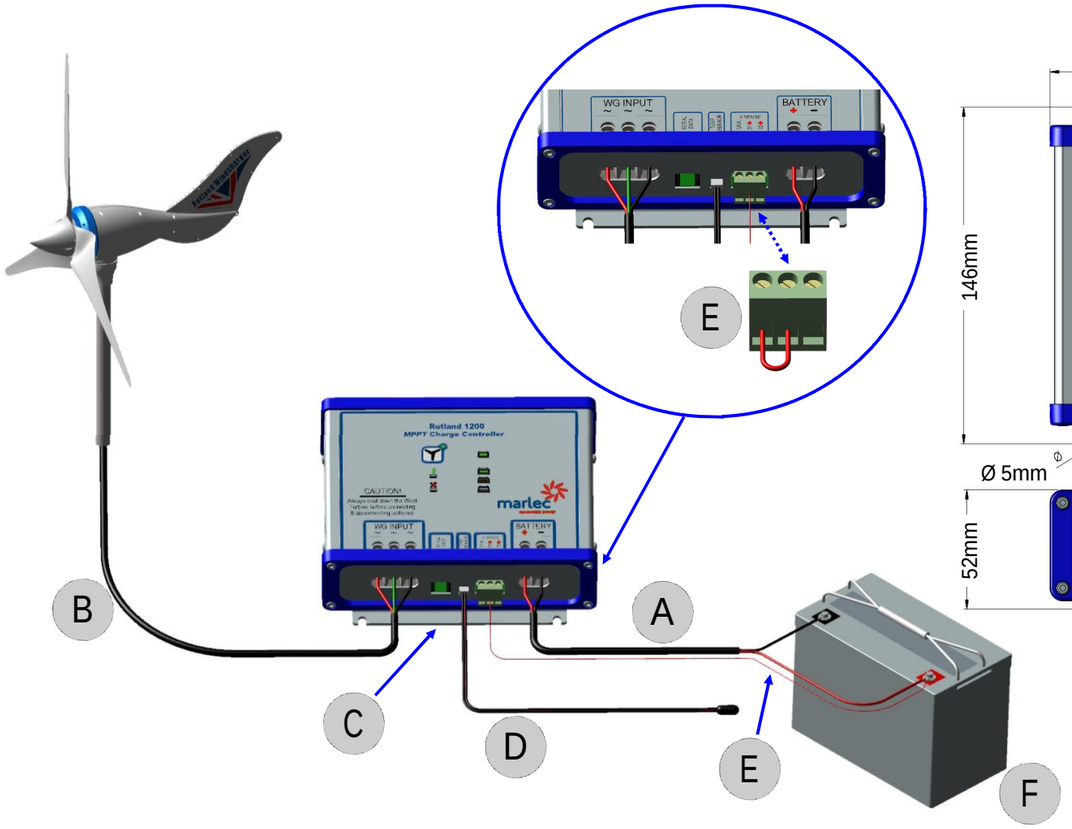
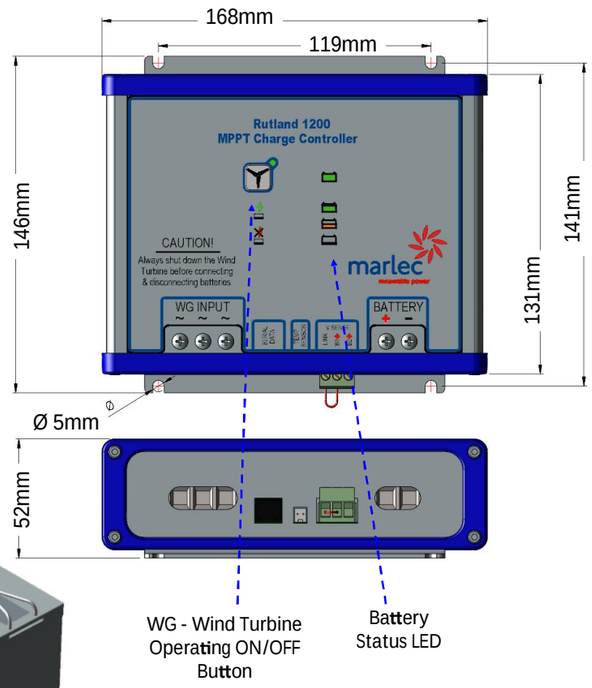
Step 1 — Rutland 1200 Terrain Controller Installation and Electrical Connection





Install The Controller and Cables

⚠ During installation the turbine must be restrained from turning.

1. Fix the Rutland 1200 Charge Controller to a vertical surface as shown using 4 screws in a ventilated weatherproof environment. *See G*
2. Install the selected power cables from the turbine to the controller. Strip back 10mm of insulation on all power cables. The turbine 3 phase cables have no polarity to observe. *See B*
3. Prepare cables to make a direct connection from the controller to the battery. Install the cables to the controller but DO NOT connect onto the battery at this time. The controller is internally fused but note that reverse polarity connection to the battery will cause permanent damage. *See A 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 battery power supply whilst wind charging will damage the controller!*
4. Installation of sensing wires is highly recommended for most efficient charging through the bulk, absorption and float phases. *See D & E*
   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 Wire—if not connected the Controller's BATTERY terminal voltage is used to sense the battery voltage. Any voltage drop associated with long cable distances (>1.5m) will reduce the accuracy of the charging regime. Terminal block E is removable for convenience. Remove the link wire and install a single wire from position B1 to battery bank + terminal. Notes: B2 is used where a separate charge splitter is fitted to the output and a 2nd battery voltage can therefore be sensed. The link wire OR a sensor cable is required for operation.

Read in conjunction with the Rutland 1200 Turbine Installation manual. Find more information at www.marlec.co.uk

Cable Specifications

Description:	Cable Length:	Minimum Cable Sizes: mm²	AWG
A Controller to Battery Cables			
Rutland 1200 – up to 35A DC	1.5m	6	10
B Turbine to Controller Cables - Use 3 x stranded cables of equal size:			
12V Systems	1-10m	4	12
	10-20m	6	10
	20-30m	10	8
24V & 48V Systems	0-50m	4	12
	50-75m	6	10
	75-100m	10	8
Caution! Do not undersize these cables as damage will occur! Controller WG Input and Battery terminals accept up to 16mm² cables.			
C RJ11 Socket for connection of optional Remote Display or user's own serial data collection. Also connect the Marlec Controller Interface Cable and PC App for programming of Voltage parameters and auto shutdown which may be required for other battery types, eg Lithium.			
D Remote Temperature Sensor	1.5m Supplied with Controller (in same carton)		
E Remote BAT Voltage Sensing Wire—Optional to fit but recommended if battery cables are >1.5m long. Remove link wire and install a single wire from position B1 to battery bank + terminal. Notes: B2 is used where a separate charge splitter is fitted to the output and a 2nd battery voltage can therefore be sensed. The link wire OR a sensor cable is required for operation.	0.5 to 0.75mm		

F Battery Specifications

Gel, AGM or Lead Acid Types of Minimum Capacity @ C20 Rate for charging from the Rutland 1200 Turbine. Increase capacity where other energy sources also charging, eg solar panels.

12V	24V	48V
175Ah	85Ah	50Ah

Note: Other battery chemistries may require voltage and operating parameter adjustments. Contact Marlec or your dealer for the Marlec Controller Interface Lead and PC App.

G Controller Orientation - maintain air gap in service.