

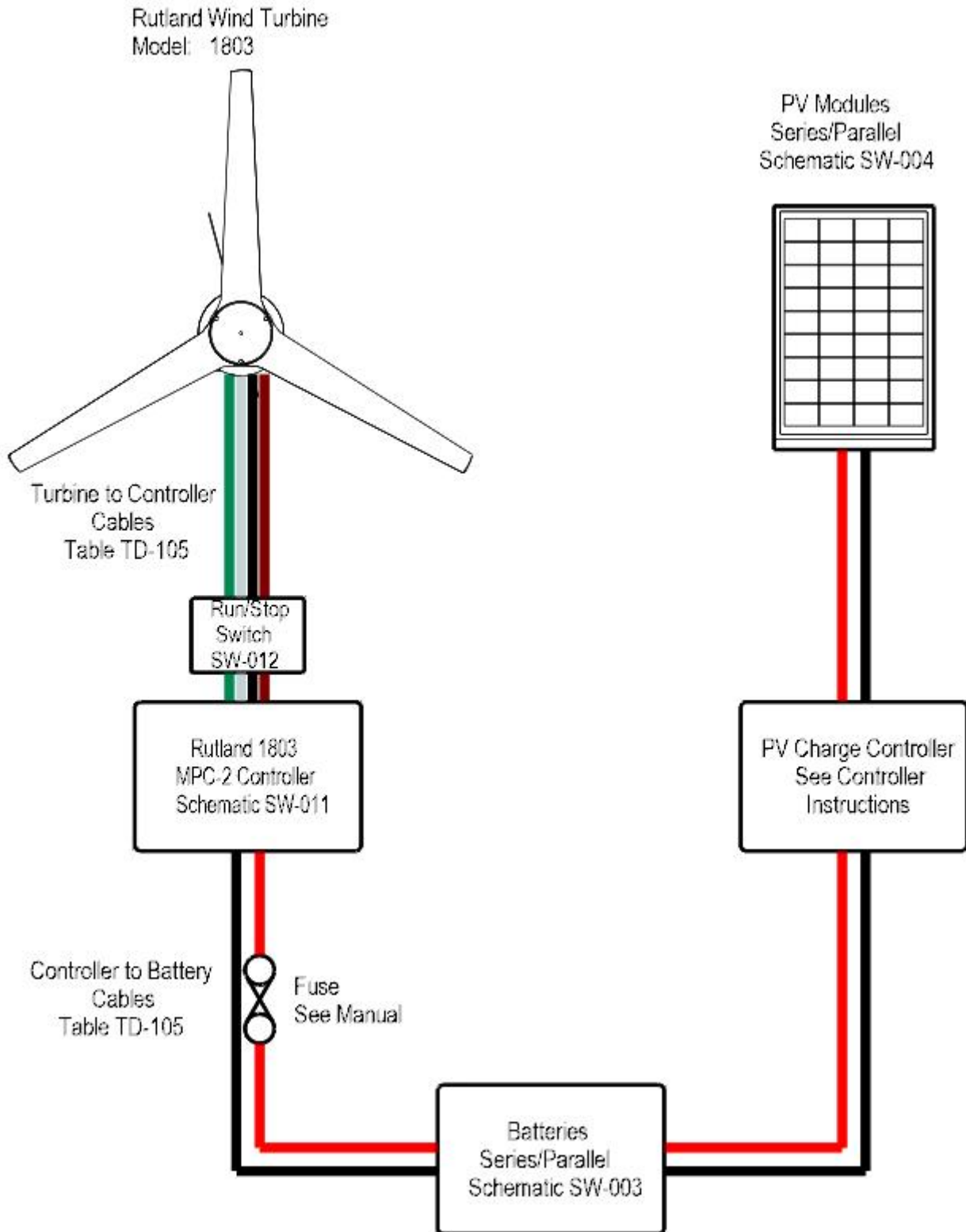
# Rutland FM1803-2 Furlmatic Windcharger

Turbine & MPC2 Controller  
Installation & Owner's Manual



### GENERAL SCHEMATIC

*Note: The schematic also shows an optional solar panel charging system connected in parallel to the same battery bank.*



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## INTRODUCTION

Congratulations and thank you for purchasing your Rutland 1803-2 Wind Turbine with MPC2 Charge Controller. Our range of Rutland Wind Turbines are renowned for reliable, quiet and efficient service and have been used worldwide by sailors and off-grid power specialists since 1978. The utmost of care goes into the manufacture of all our products in our ISO9001 approved UK factory.

It is essential that the turbine and controller are installed in accordance with these instructions and failure to comply invalidates the warranty. To ensure you get the very best out of the Rutland 1803-2 please read and understand this manual before commencing installation and operating the wind turbine and charging system.

The FM1803-2 Furlmatic turbine is designed to provide a direct current (DC) power supply via a battery bank for low voltage equipment, inverters etc in professional and off grid applications. It is essential to the turbine's operation that it is installed on a stable vertical pole on land to ensure that the furling mechanism efficacy is maintained in service.

Note: The selected turbine must match the battery voltage of the system.

### General Guidelines and Warnings

*Safety is the primary concern during both installation and operation of your wind turbine. You should familiarise yourself with the risks associated with electrical and mechanical installation and if in doubt seek professional advice. The key safety risk factors to be assessed are:*

#### *The rotating turbine – Risk of injury to persons*

- Install the turbine at a location and height where persons cannot interfere with the path of the blades. No attempt to access the turbine should be made until it has been restrained from turning, if possible lower the tower to ground level.*
- Never allow the turbine to run disconnected from the controller and batteries. Use the RUN/STOP switch if fitted or built in stall switch to stop power production of the turbine. The turbine speed will eventually reduce to an idle for safer access to the turbine or batteries.*
- Do not allow the turbine to run with damaged blades, replacement parts are available at [www.marlec.co.uk](http://www.marlec.co.uk)*

#### *Handling DC voltages and batteries – Risk of electric shock*

- Never make live connections to the controller. Eg: High open circuit voltages generated by a rotating turbine will permanently damage electronics. Lower or stop the turbine to prevent operation. Similarly, battery cables must be wired into the controller without being connected to the battery.*
- Observe correct polarity to avoid permanent damage to equipment.*
- Do not open electronic equipment during live operation.*
- Always use cable suitable for carrying the expected currents and ensure good quality electrical connections to avoid arcing and fire risks. The use of smaller cables will cause system overload and damage the generator. See Table 1.*
- Damages as a consequence of failure to follow these guidelines will invalidate the warranty.*

### General warnings

- *The generator is fitted with rare earth magnets which can be damaged by heavy handling. The main generator assembly should be treated with care during transit and assembly.*
- *Do not adjust the settings on the controller without reference to the manufacturer.*

*Working at height—use suitable equipment. Effect as much of the installation at ground level as possible and choose a calm day to install the turbine.*

*If in doubt refer to your dealer, a competent electrical engineer or the manufacturer.*

## CHECK YOU HAVE RECEIVED

Three (3) Aerofoil Blades and 9 nuts and bolts

Main Generator Assembly

Tail Fin assembly and Fixings

Nose Cone and fixing screws

Control Unit – *Check that the voltage indicated on the connection label and the side of the housing corresponds with your battery voltage.*

Temperature Sensor – *packed with control unit*

3 Way Connector Block

In the event of loss or damage, consult your dealer or the manufacturer.

## WHAT YOU WILL NEED

Tools

Suitable wire stripper

Small terminal screwdriver

Phillips (cross-head) screwdriver

2 x 13mm spanners or sockets

36mm spanner or socket

17mm spanner or socket

8mm Socket key

Other Items You Will Need

Run/Stop Switch supplied separately from Marlec (optional)

Mounting tower & winch or other suitable lifting/pulling equipment

Cables

Batteries & terminals

Connector blocks (as determined by your total system)

Suitable fixings for wall mounting the control unit.

Sensor cables (optional)

Please complete the system details and serial numbers in the maintenance schedule (Appendix A). This information is important & should be kept safe & available if contacting the manufacturer for advice or technical information.

## SITING THE WINDCHARGER

The location and height of the tower for the wind turbine will be a major factor in the overall performance, energy yield and lifetime of the system. The smooth flow of wind over land is often interrupted by a multitude of obstructions causing wind shear and turbulence.

Wind shear describes the interference between the fast-moving upper air and the slow-moving air close to the ground and the resulting decrease in average wind speed as one gets closer to the ground. Turbulence is caused by the wind passing over obstructions such as trees and buildings.

Both wind shear and turbulence diminish with height and can be overcome simply by locating the turbine high above them in an area as free as possible from disturbed wind flow. Bear in mind that downwind obstructions can be as detrimental to performance as upwind obstructions (Fig.1).

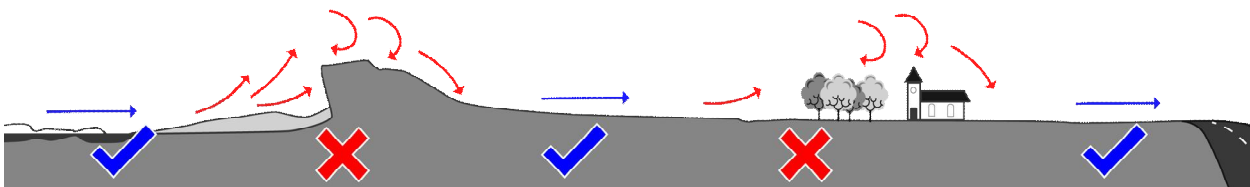


Fig.1

## SYSTEM DESCRIPTION AND PRINCIPLE OF OPERATION

### Aerofoil Blades & Rotor

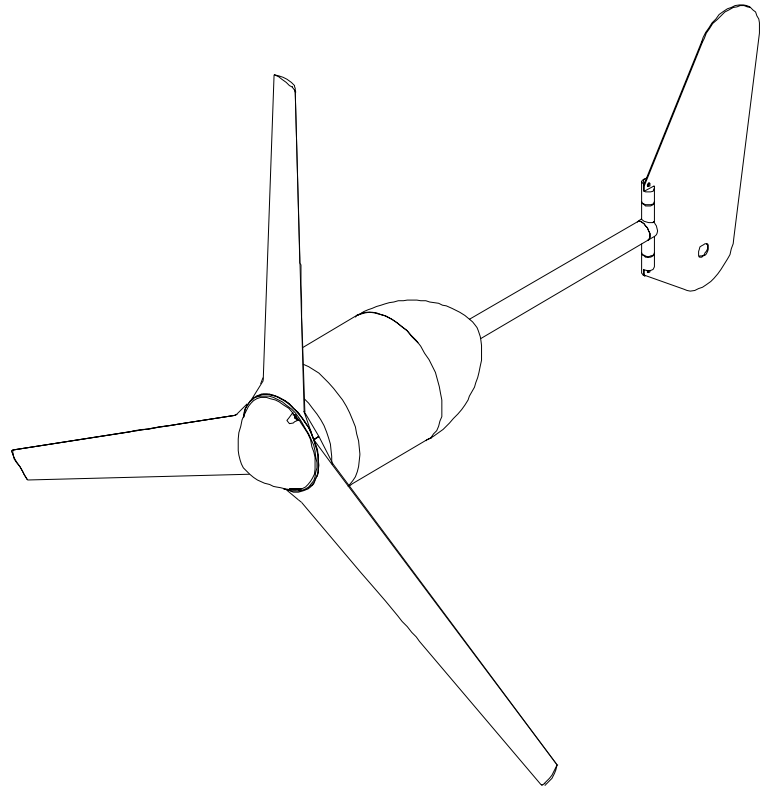
The 1803 rotor consists of 3 aerofoil blades rigidly fixed to a hub. The blades are at an optimum fixed pitch for variable speed operation over a wide wind speed range. A nose cone attaches to the rotor plate and directs the flow of wind.

### Generator

The rotor is rigidly attached to the generator shaft providing direct drive to the 3-phase brushless permanent magnet ac generator, producing variable frequency ac at approx. 120v L-L under normal conditions. Note: the generator must not be allowed to run open circuit since high voltages can be generated.

### Yaw System

The complete wind generator assembly is mounted on yaw bearings allowing free rotation on its vertical axis to enable it to respond to changes in wind direction. The yaw assembly also includes a slipring & brush system to transmit the generated current to the fixed transmission cable while allowing free 360° yaw rotation. The post adaptor is designed to be fixed to the mounting pole and the cable exits to the inside of the mounting pole.



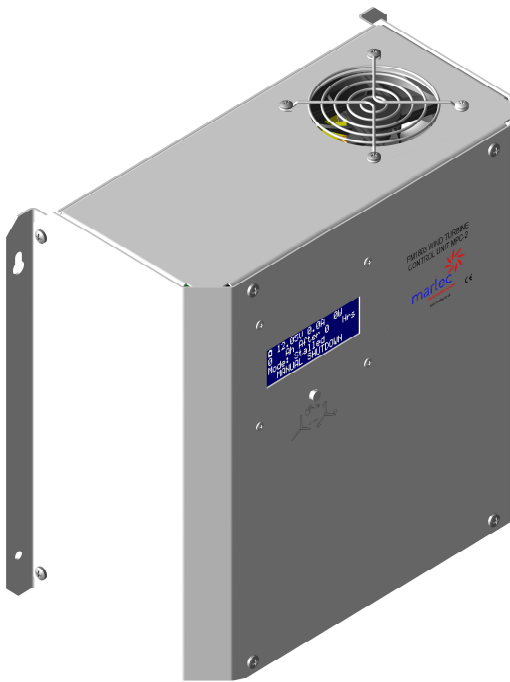
### Tail Assembly

The inclined tail fin is hinged to the rigid tail boom on durable sleeve bearings. It must be installed and maintained at the 15° inclination for effective furling.

The tail is designed to direct the turbine into the main direction of wind at wind speeds up to approx. 35mph. Above this the automatic 'furling' mechanism will turn the turbine at an angle to the wind to protect the generator, turbine & supporting structure from severe winds. During furling the output power will be reduced. When the high wind subsides, the tail assembly will automatically return the turbine to normal operation. In turbulent conditions the system may be seen to repeat this cycle many times.

## Control Unit

The 1803 MPC2 control unit controls the operation of the FM1803-2 wind generator & protects the battery bank from overcharge. Key features of the controller are:



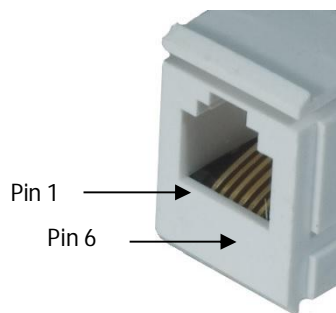
- The 3-phase transformer and full wave bridge rectifier convert the raw generated 3 phase ac to dc at a level corresponding to the battery voltage.
- The microcontroller based electronic control unit monitors the battery voltage, charge current & temperature.
- Low and High wind modes to optimise performance depending on windspeed - at pre-set levels the controller will switch the generator between these modes.
- When the battery voltage reaches a level indicating fully charged, the controller switches the generator to 'stalled' mode

causing the generator RPM to reduce to a slow idle, preventing further power being generated into the battery bank. When the battery voltage falls to a lower pre-set limit, the control unit will automatically switch back to 'charge' mode. Note: *Unless otherwise specified at the time of order, the limits will be set for lead acid batteries (upper limit 2.4v/cell & lower limit 2.08v/cell @ 25°C). If other types of battery are to be used or other settings are required, contact Marlec for advice on factory setting or the interface cable and PC app.*

- Remote NTC Temperature Sensor – Temperature compensation ensures that the battery voltage switching points are automatically adjusted for ambient temperature to maintain optimum battery performance. A sensor is supplied and can be connected at the control unit with the tip positioned at the batteries. Temperature compensation is applied only when the sensor is connected.
- A push button switches between Run and Stall when held for >3 seconds. When in any stalled mode the turbine runs at a slow idle preventing power from being produced. When MANUAL SHUTDOWN is selected the LCD built-in backlight will be permanently on to alert the user.
- A digital LCD display shows battery voltage, charge current, generated power, operating mode & warnings. The built-in backlight remains on for 1 minute when the button is pressed once.
- If a battery is not connected, the control unit will default to stall mode and will not be operational.



- Remote Voltage Sensing feature – enables the user to connect fine wires to the battery terminals over the distance to a battery located more than 2m cable distance away. See Table 1. This senses actual battery voltage and the controller charges and regulates based on this reading overcoming any voltage drop that may occur in the battery cables. *Note: Do not undersize longer battery cables' current carrying capacity.*
- Remote Shutdown Connection feature – volt free contacts e.g. switch or relay contacts connected across these terminals, provide a method of remotely shutting down the turbine. Closed contacts to shut down the turbine, open contacts to run the turbine. The LCD displays "REMOTE SHUTDOWN" when activated.
- The control unit has a built-in cooling fan which will only operate when the internal temperature of the control unit exceeds a pre-set level. This will only normally operate during periods of high generated power levels.
- A RJ11 Serial Data output is provided for connection of other devices e.g. Computer which can read serial data. This requires a special interface cable and PC app. Some operating parameters can be changed using bespoke PC app, contact the manufacturer. The pins are configured as follows:



Pin	Function
1	Do not use
2	TX
3	GND
4	RX
5	+5v 100mA Output
6	Do Not Use

Please Note: The output signal level is 5V, to interface with RS232 levels, eg for a PC, a line driver may be required.

- Baud Rate 115200
- 8 data Bits
- No parity
- 1 stop bit

Battery Voltage: Text string "Batv" immediately followed by Integer value of voltage x 100 (\*)

WG Current : Text String "Amps" immediately followed by integer value of current x 100 (\*)

Mode : Text String "Mode" immediately followed by integer value.

- 0 = Run
- 1 = Manual Shutdown
- 2 = Over Voltage
- 3 = Rectifier Over Temperature
- 4 = Transformer Over Temperature
- 5 = Remote Shutdown

\* ie 12.42 volts is output as 1242

## MOUNTING TOWER

The Rutland 1803-2 is designed to fit inside a round tube with an internal diameter of 81mm.

A suitable mounting pole can be erected using 80mm (3") galvanised (medium) tube to BS1387 a minimum height of 6.5m, 10m or greater is recommended. The tube must be supported by a minimum of 2 sets of four guy lines.

The attachment points for the guy lines to the tower should be securely fixed to the tower.

- All items should be galvanised or stainless steel for protection against corrosion.
- Where guy lines are looped, the loop must incorporate a thimble and be fitted with a minimum of three rope grips.
- All ground fixings must be made suitable according to the ground conditions.

Pivot type towers are recommended as these allow for easier installation and lowering for access to the wind generator for maintenance. A form of pivoting tower is suggested in Fig 2. Non-guyed lattice and pole type pivoting towers are available, for further details contact the dealer or manufacturer.

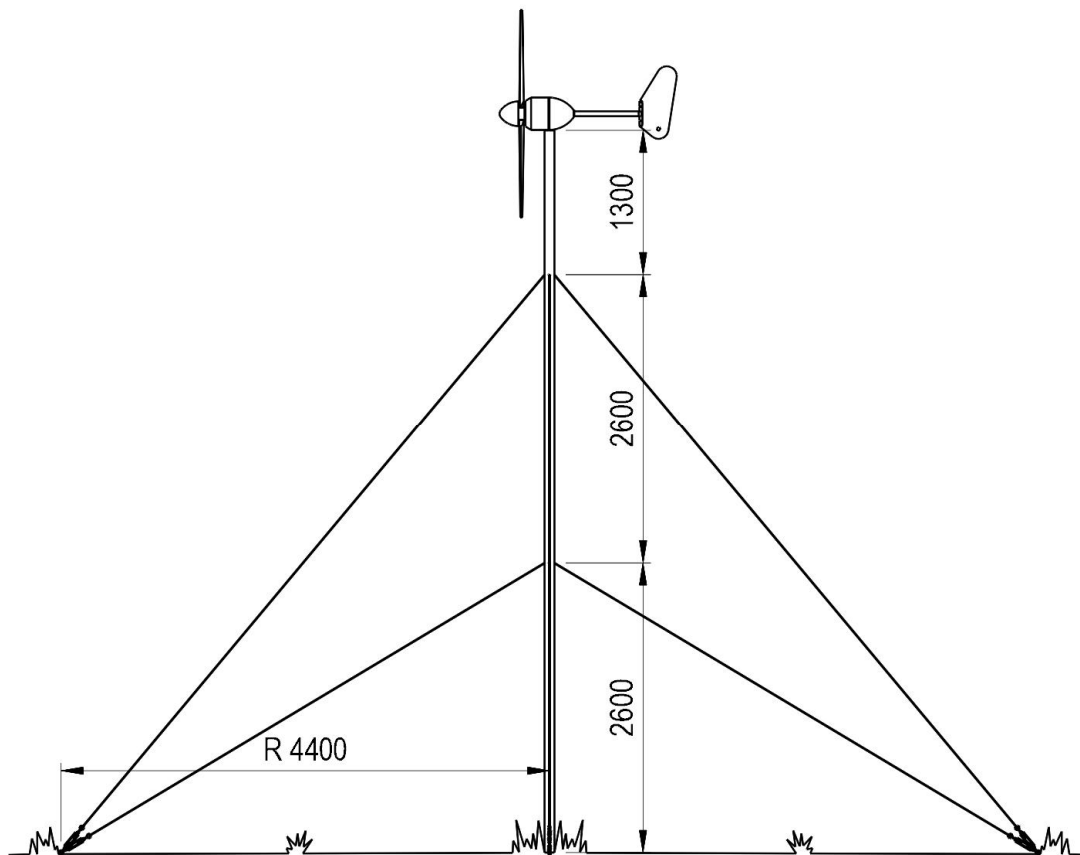


Fig 2. Typical Tower

# ASSEMBLY AND INSTALLATION OF THE TURBINE

## Blade & Hub Assembly

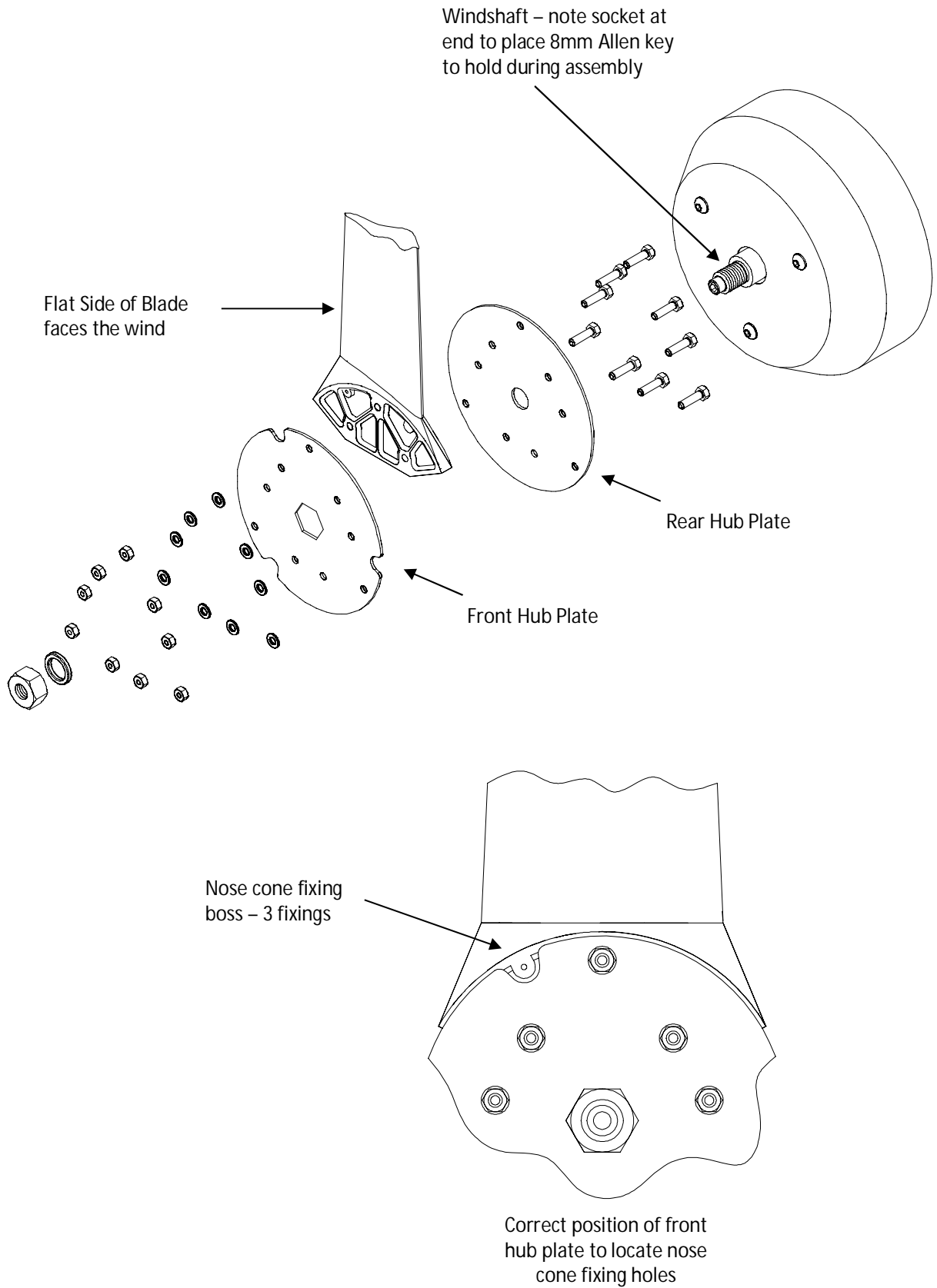


Fig 3. Blade Hub Assembly

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**Blade & Hub Assembly continued**

1. Prepare the rotor assembly - assemble the 3 turbine blades between the hub front and rear plates, inserting the bolts through the rear plate, ensuring the flat side of the blade faces the front plate. Fit all 9 bolts, washers & Ny lock nuts provided & secure tightly. Ensure the 3 cut outs around the edge of the front plate align with the nose cone fixing bosses.
2. Fit the rotor assembly onto the windshaft.
3. Put the spring washer over the end of the windshaft, it will pass through the hexagonal hole in the front plate.
4. Thread the M24 nut onto the threaded end of the windshaft, until it just comes up against the front plate.
5. Pull the rotor assembly forward slightly & rotate as necessary to align the hexagonal hole in the front plate over the M24 nut.
6. Rotate the whole rotor assembly clockwise to thread the nut onto the windshaft. The windshaft can be held using an 8mm Allen key in the socket in the end of the windshaft. Alternatively hold the rotor assembly still & rotate the windshaft anticlockwise using the 8mm Allen key in the socket in the end of the windshaft.
7. Tighten the rotor onto the shaft to a torque of 30 - 50Nm, until the spring washer is compressed, the rotor is secure & the rear plate is located against the shoulder on the windshaft. Check the rotor for free rotation.
8. Fit the nose cone in position on the front of the rotor and secure in place with the 3 No10 x 9.5mm screws provided.

*Alternatively, the turbine and nose cone can be fitted after mounting the generator assembly to the tower.*

## Tail Assembly

Insert the tail fin assembly into the end of the tail boom, aligning the threaded holes in the tail mounting with the clearance holes in the tail boom. Insert the two M10 x 14 Hex Head and Tab Washers, to secure the tab washers bend and press the short tab against a flat on each screw head. Bend the long tab so that it follows the circumference of the pole, tap lightly with a mallet to maintain the curve, this prevent screws from working loose in service. Tighten to a torque of 20Nm.

*Note: When fitted, the tail fin will be inclined 15° to the vertical. This must be maintained to ensure effective operation of the furling mechanism in high winds.*

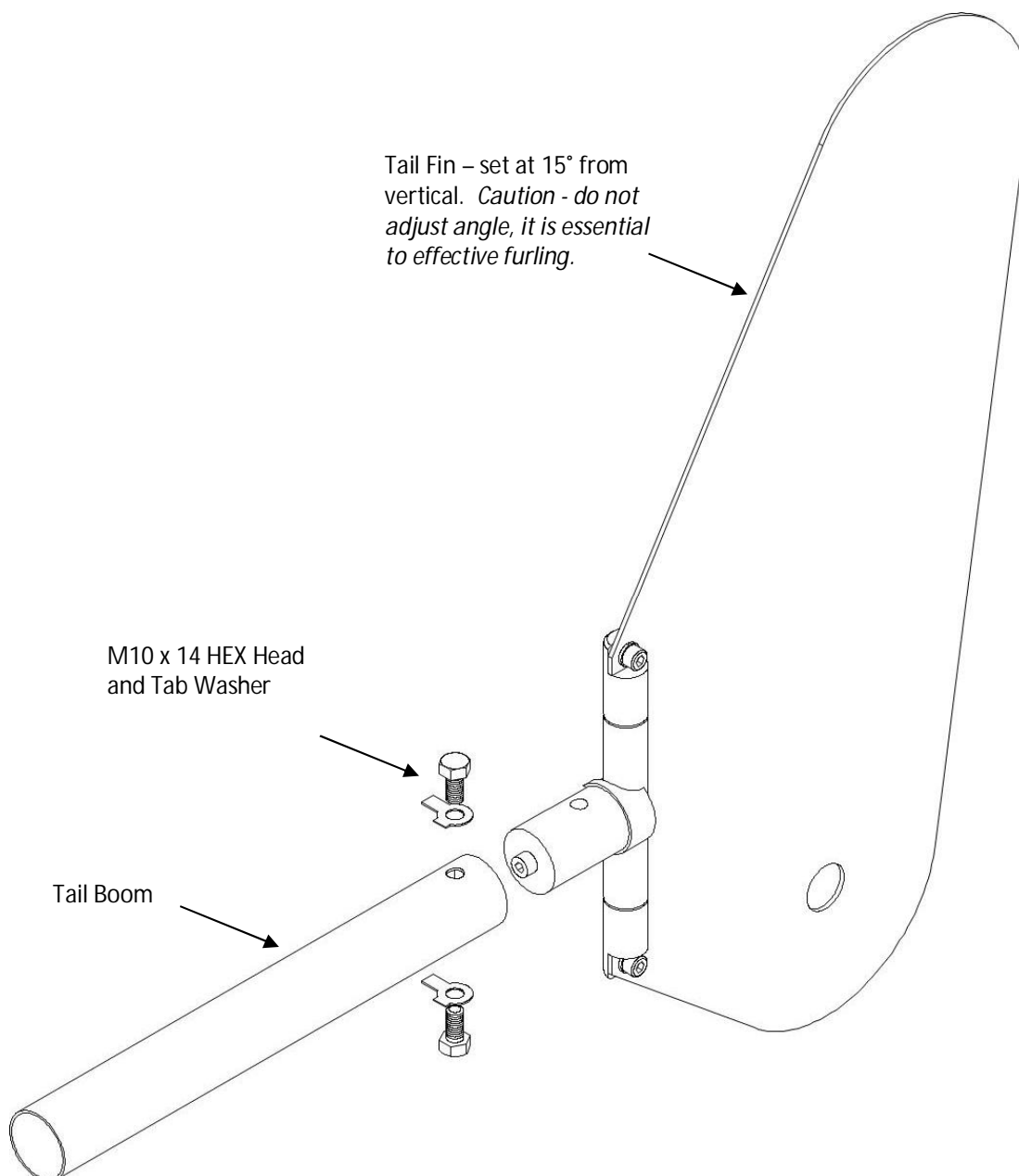


Fig 4. Tail Assembly

## Tower Preparation

The post adaptor fitted to the 1803-2 is designed to fit inside a standard 81mm (3") internal diameter tube. The adaptor is provided with a flat on one side to clear the weld seam on seamed pipe.

1. Mark and centre-punch four positions diametrically opposite, at 45° to the pipe seam if necessary, 20mm from the top of the tube.
2. Drill four holes 12.5mm in diameter on centre-punch positions & remove burrs.
3. Ensure that the top section of the mounting pole is no more than 90mm outside diameter. This is essential to ensure that blade running clearance is achieved. This top section may then be securely attached to a wider supporting structure.

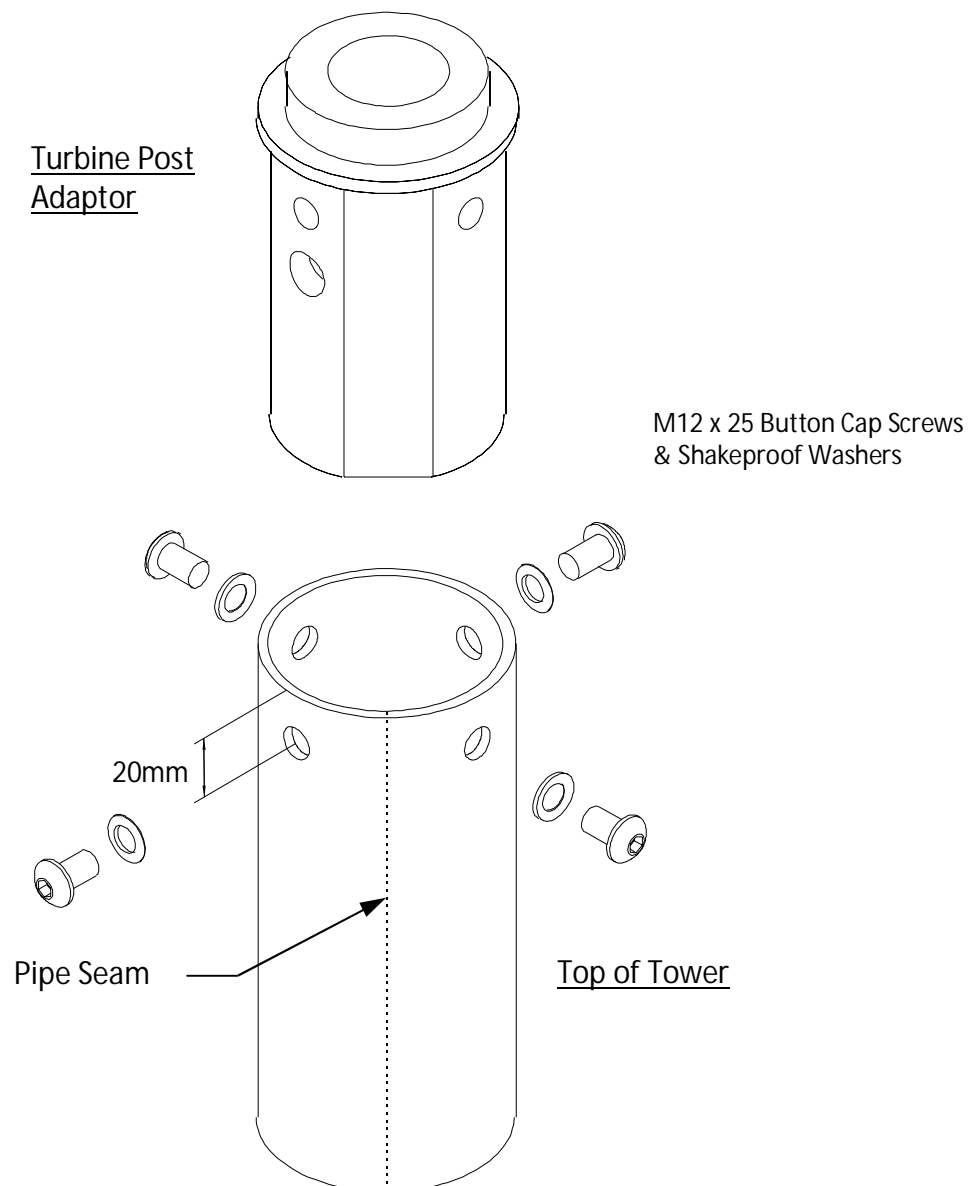


Fig 5. Tower Preparation

## Control Unit Installation

Mount the unit as shown below securely to a wall or other vertical surface, using the mounting holes provided (hole centres are 285mm W x 205mm H), in a suitable location allowing for cable entries in the base of the unit. The cable entries are fitted with blanking grommets, these can be pierced or replaced with 20mm gland fittings. Follow these guidance notes:

- Install the control unit as close as possible to the batteries, 2m length of the main battery leads is recommended as a maximum.
- The unit should be protected from battery fumes from vented batteries.
- The control unit is fan cooled and ventilation of a minimum of 10cm is required above and below the unit. These vents must not be covered or obstructed.
- The unit is not weatherproof and therefore must be suitably protected indoors.

If selected, position and install the RUN/STOP Switch at a convenient location for shutting down the turbine in the event the control unit needs to be isolated.

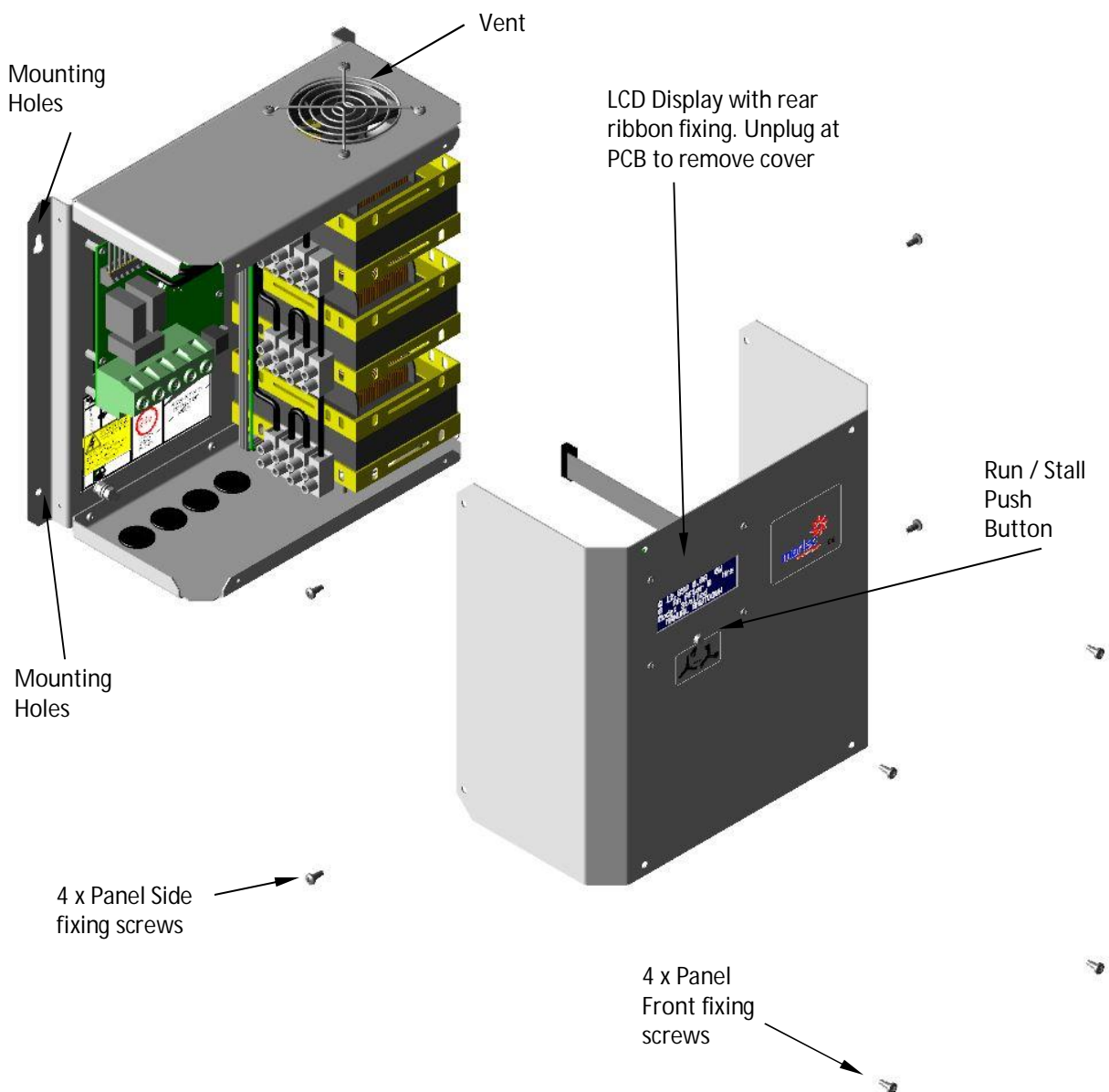
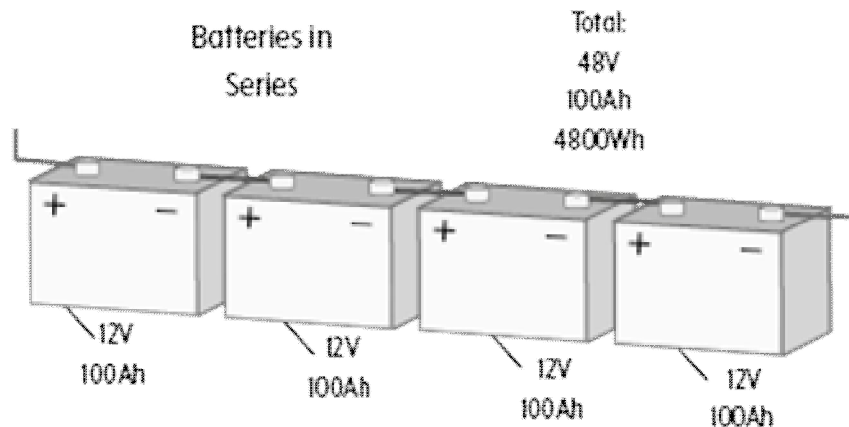
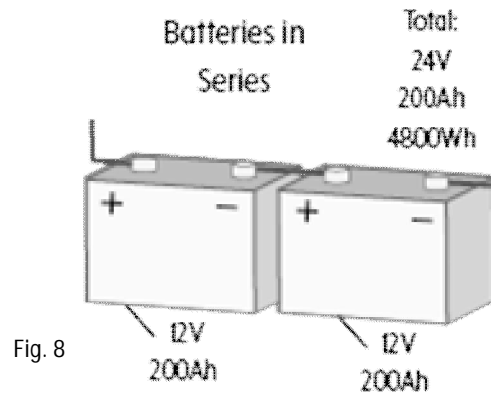
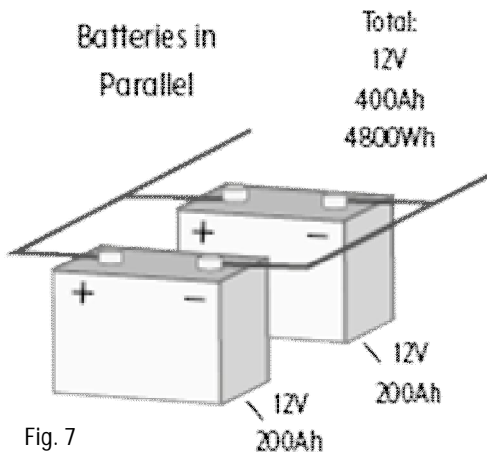


Fig 6. Control Unit

## BATTERIES

Ensure the voltage indicated on your controller corresponds with your battery voltage!



Batteries are the most important part of a battery charging system and capacity should be sized according to the load requirements and provide at least 3 days reserve. This will reduce cycling, prolong the life of the battery and ensure system reliability during periods of low wind. *If in doubt about battery sizing, contact your dealer or the manufacturer.*

Follow these guidelines:

- Deep Cycle batteries which are specifically designed for good performance in terms of charge/discharge cycles must be used.
- Suitable battery chemistries include lead acid sealed, non-sealed, Absorbed Glass Mat or Gel. Other types can be used but may require different regulating voltage settings. These can be factory set when ordering or using a Marlec interface cable and PC app.
- Minimum battery capacities recommended: 400Ah @12v, 200Ah @24v, 100Ah @48V.
- Only batteries of similar type, capacity and ideally the same manufacturer should be connected in series or parallel.
- Permanent connections should always be made to the battery terminals. Never use crocodile clips or similar devices. Battery terminals should be well greased with petroleum jelly or similar.

Batteries may be linked as follows:

- In parallel to increase amp hours (Fig.7).
- In series to increase voltage (Fig.8).
- A combination of series & parallel to achieve desired voltage & capacity.



## CABLE SPECIFICATION

Follow the guidelines for cable sizes in the table below. The type of cable is dependent on the type of installation and national or local wiring regulations. All cables must be suitably protected from mechanical damage.

All cables & installation should be in accordance with IEE Wiring regulations

Table.1

Turbine to Controller			
Type	4 equally sized stranded cores. <i>Note the FM1803 is 3 phase AC output and the connection sequence is in any order and colour. The earth connects to the earthing point in the controller.</i>		
Specification	Cable Run	Minimum Cable Size	
	(m)	(mm <sup>2</sup> )	AWG
	Up to 50	1.5	16
	Up to 100	2.5	14
	Up to 150	4	12
	Up to 250	6	10
Controller to Battery			
Type & Specification	2 separate cores black - and red +, stranded cable. Minimum 10mm <sup>2</sup> and ≤ 1.5m length.		
Remote Temperature Sensor	1.5m cable supplied with controller		
Remote Voltage Sensing Wires	A pair of conductors 0.5 to 0.75mm from the battery terminals to the controller. Optional to fit where >1.5m battery cables are used.		
Caution! System performance and safety are compromised if smaller cable sizes are installed and there is risk of electrical damage in high winds.			

## FUSES

A suitably rated fuse may be fitted in the battery "+" line to protect the cables against damage arising from any accidental reverse polarity connection at the battery.

**WARNING!** – This fuse will not protect the control unit's electronics from the high currents that flow from a reverse polarity event, permanent damage is likely. Note also that a blown fuse will cause the turbine to run open circuit resulting in further damage to the control unit and turbine. Place this warning at the fuse: **DO NOT REMOVE FUSE UNLESS THE TURBINE IS STALLED.**

Table 2.

System Voltage	Minimum Fuse Rating
12V	100A
24V	50A
48V	25A

## ELECTRICAL CONNECTION

1. Using the cable selected (see Table 1), pass the cable through the inside of the tower & route to the control unit. Leave enough length of cable protruding from the top of the tower to enable easy connection to the wind generator.
2. If selected install the separately supplied Run/Stop Switch following the wiring diagram Fig 9 at a suitable location close to the control unit or convenient for shutting down the turbine in the event the control unit needs to be isolated. Set it at the STOP position.
3. Remove the fixing screws from the control unit front panel, see Fig 6. As the panel lifts away unplug the LCD connection ribbon cable from the PCB in the main housing.
4. Using the cables selected pass each through the grommets holes in the base of the control unit. The grommets can be replaced by M20 glands if preferred. Ensure the battery cables are not yet connected to the battery, i.e. DO NOT MAKE LIVE CONNECTIONS
5. Make the connections following Figs. 10 and 11. Note that some connections are optional. It is vital to observe correct polarity when connecting the battery cables otherwise serious damage will result.
6. Offer up the front panel to the main unit and re-connect the display ribbon cable. Re-fit the control unit front panel.
7. Proceed to joining the turbine fitted cables to the connecting cable at the top of the tower.

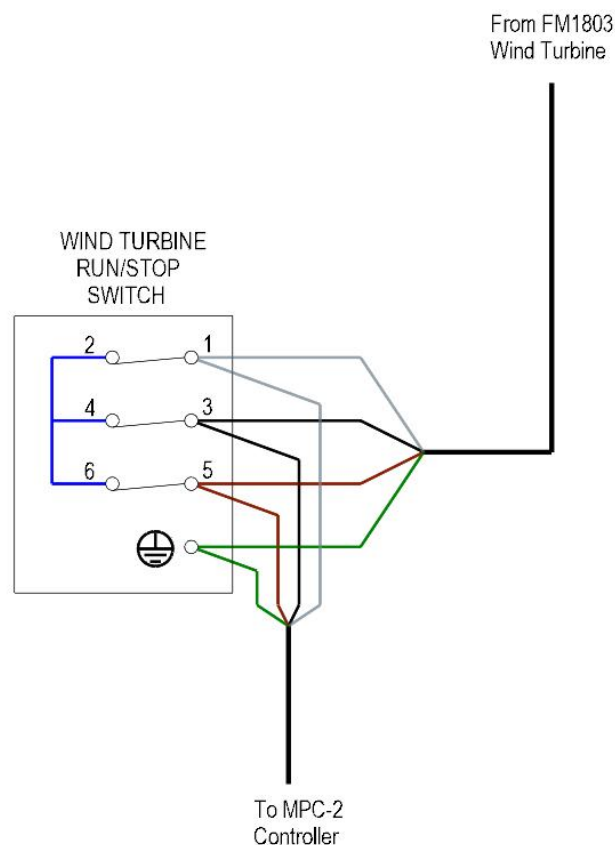


Fig 9. Run/Stop Switch Connections (optional)

### CONTROL UNIT WIRING

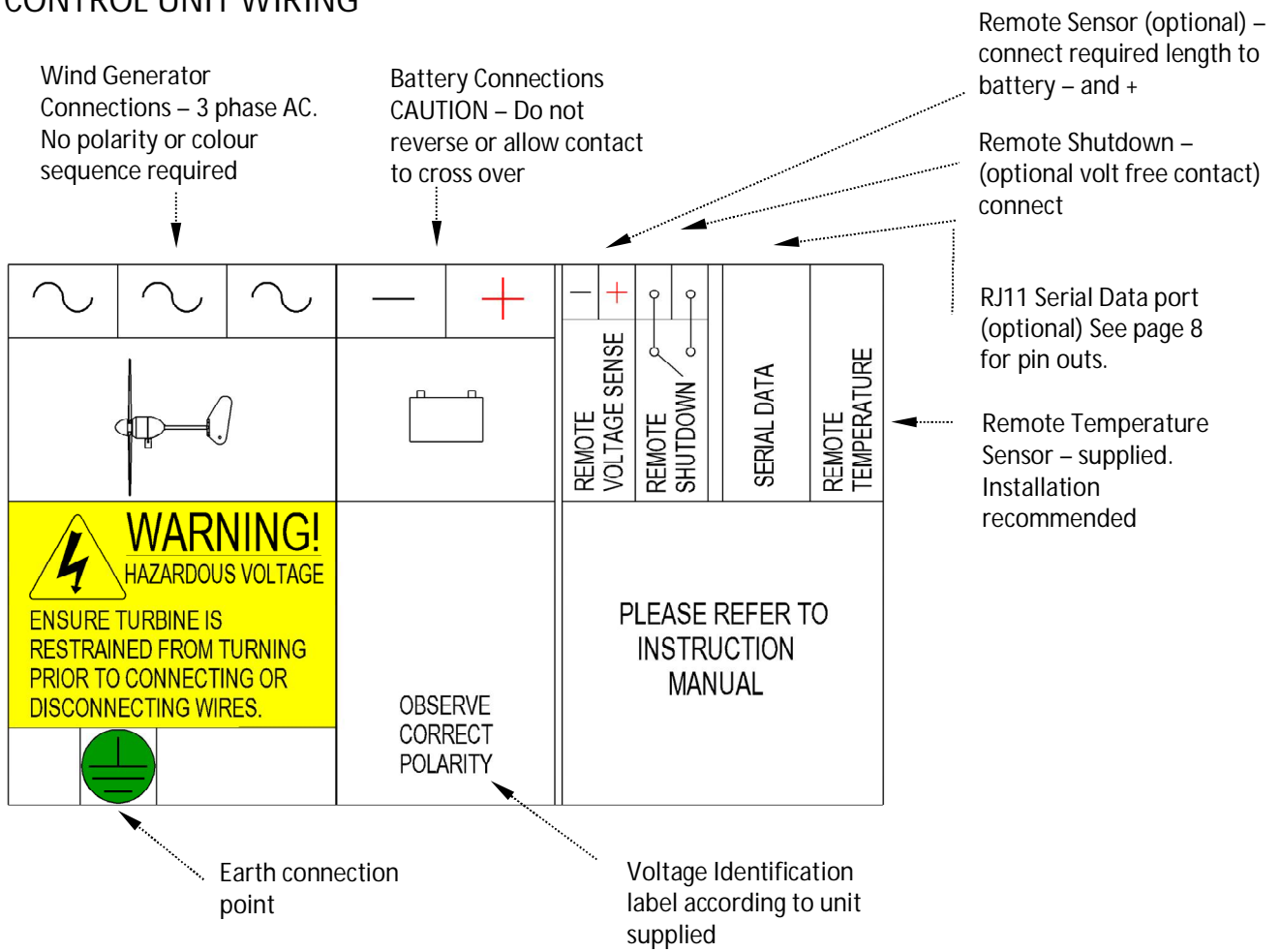


Fig 10. 12v, 24v & 48v Control Unit Connections Label

### FM1803 MPC-2 Controller Connections

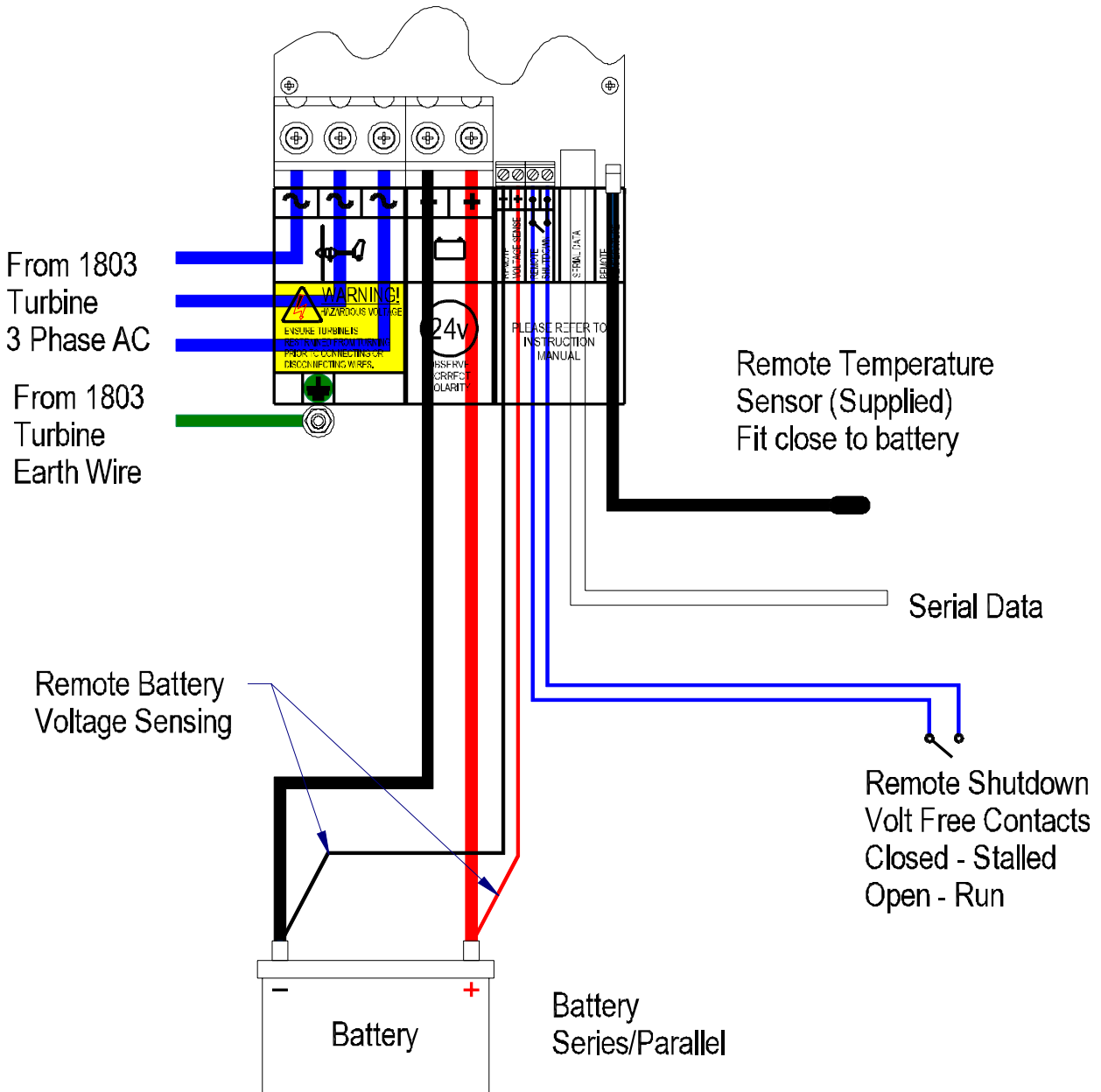


Fig 11. Control Unit Connections

## FITTING THE GENERATOR TO THE TOWER

1. Connect the wind generator flying leads to the cable protruding from the tower using the connector block supplied or another suitable connector. The generator output is 3 phase ac and earth. *The 3 phases may be connected in any sequence.*
2. Wrap the connection with insulation tape to secure/protect from the environment. *It is recommended that cable restraint is fitted to prevent the weight of cable applying excessive load to the connections, a simple method of achieving this is shown in Fig 12.*

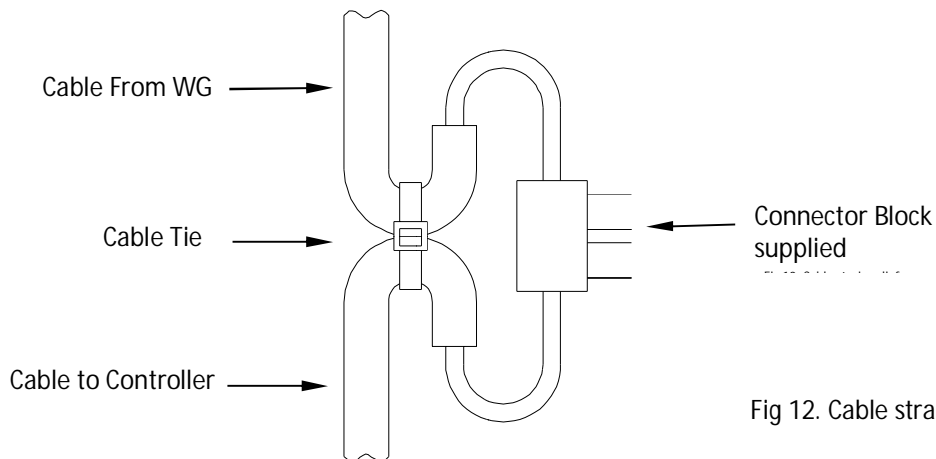


Fig 12. Cable strain relief

3. Carefully locate the wind generator post adaptor into the top of the tower ensuring the flat on the post adaptor aligns with the pipe seam if necessary.
4. Push the adaptor into the tower while the cable is gently pulled from the tower base to ensure it is not trapped, continue until the post adaptor is fully inserted into the tower and the fixing holes align.
5. Secure the wind generator to the tower using the four M12 x 25mm screws and shake proof washers provided. Tighten using an 8mm Allen key.

### Final Mechanical Check

1. Check the tightness of the blade screws and nose cone.
2. Check the free rotation of the hub and yaw axis.
3. Check for free movement of the tail fin.

## UP AND RUNNING

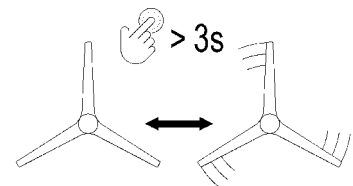
Before raising and securing the wind generator, check that:

- All final mechanical checks have been made.
- The cable is not trapped.
- All electrical connections are secure and safe.
- The RUN/STOP Switch (if fitted) is in the STOP position.
- The battery cables and connectors are prepared but are not fitted to the batteries.

1. The wind generator can now be raised into position. *Take care to avoid all moving parts when raising and lowering the wind generator.*
2. When raised, secure the structure firmly in an upright position. The performance of the turbine's furling mechanism is impaired if the pole is not vertical in service.  
Note: The turbine defaults to the stalled position at start up for safety so it will run at a slow idle only at this stage.
3. Connect the battery cables to the battery terminals using suitable permanent connections. It is vital to observe correct polarity when connecting the batteries otherwise serious damage will result.
4. At power up, the LCD backlight will switch on and a brief introduction screen displays system voltage detected, serial number & firmware revision. The controller starts in manual shutdown mode, with the turbine stalled then defaults to the screen below (battery voltage will be as the system connected). The backlight remains on and the message 'MANUAL SHUTDOWN' flashes on line 4.



5. Set the RUN/STOP Switch to the RUN position if fitted.
6. On the control unit front panel press and hold the Run/Stall push button for >3 seconds to start the turbine. The control unit will switch to auto run mode and when there is enough wind the turbine will accelerate.



LCD Display Features Explained (as shown above):

Line 1: Battery symbol showing approximate level of charge, Instantaneous Battery voltage, Charge current & Watts.

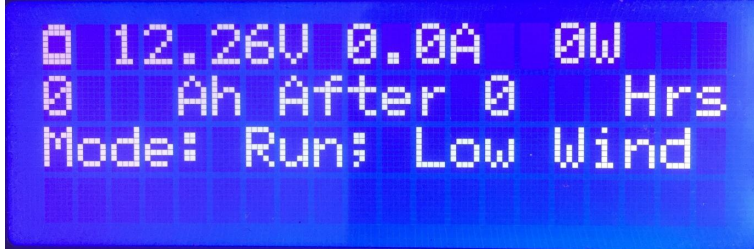
Line 2: Accumulated charge Ampere Hours and elapsed time since last power on, refreshed once per minute. If the power to the control unit is disconnected, the Ah and elapsed time reset to zero.

Line 3: Current operating mode. Stalled, Run, Low Wind, High Wind.

Line 4: Warnings & other messages.

**OPERATION EXPLAINED**

Backlight - When in auto run mode, the backlight will switch off after 1 minute, a short press of the Run/Stall button will switch the backlight on & restart the 1 minute time delay. When MANUAL SHUTDOWN is activated the backlight remains on to alert the user.



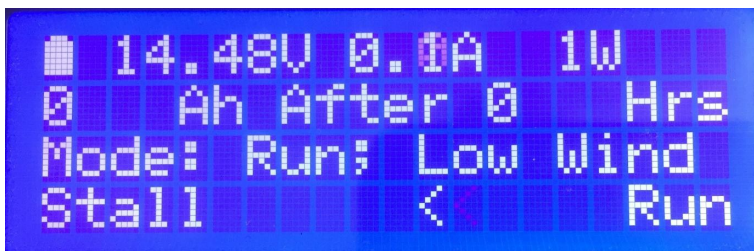
The turbine is currently operating in: auto Run, Low Wind mode.

Low/High Wind Modes - If there is sufficient wind and the charge current reaches the level for the controller to switch to high wind mode, the bottom line of the display will show 'Low >>> High', with an arrow moving from left to right to indicate that the controller is about to switch to high wind mode. If the current level remains until the arrow reaches 'High' the controller will switch to high wind mode and will indicate 'High Wind' on the display.

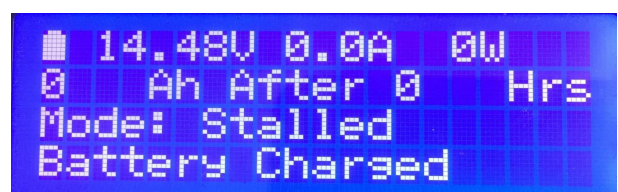
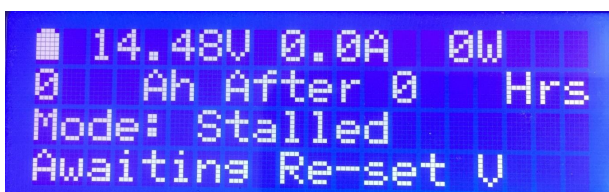
If the current drops to the level to activate low wind mode, the bottom line will display with a left moving arrow to show it is about to change to low wind mode, when it changes 'Low Wind' will display this on the screen.

Manual Shutdown - At any time while the turbine is running, if Run/Stall button is pressed for >3 seconds, the controller will enter 'MANUAL SHUTDOWN' mode and stall the turbine, the display backlight will light and remain lit. This mode overrides all other modes.

Batteries Fully Charged - When the battery voltage has charged to the max level, the bottom line displays an arrow moving from right to left to indicate the turbine will change from Run to Stall if the battery remains at this level until the arrow reaches 'Stall'.



The turbine has now stalled as indicated on the screens below. The bottom line alternates between 'Battery Charged' & 'Awaiting Re-set V'. When the battery voltage falls to the re-set voltage, the bottom line will show an arrow moving left to right from Stall to Run, when it reaches 'Run', the turbine will re-start and resume charging.



Awaiting Re-set V – Once fully charged the system remains stalled until the battery voltage level reaches a lower limit for auto re-starting. Re-start can be manually invoked by 1 short press of the Run/Stall button when the backlight is on, i.e. 2 short presses when the backlight is off.

Other Modes/messages:

Low voltage - The bottom line of the screen will flash WARNING: LOW BATTERY. Charging continues but the batteries may require additional charge for the given loads.

Over Temperature - The control unit has built in sensors to protect against over temperature, the cooling fan will automatically switch on when the sensors detect a high temperature within the controller components. If an over temperature occurs, the turbine will stall & the source of the over temperature will display on the screen, when the over temperature subsides, the control unit will resume normal operation & re-start the turbine. The backlight will switch on & remain on for the duration of the warning.

Remote Shutdown

If the remote shutdown contacts are closed, the turbine will stall & 'REMOTE SHUTDOWN' will flash on the bottom line of the display.

RUN/STOP SWITCH – separately supplied and connected

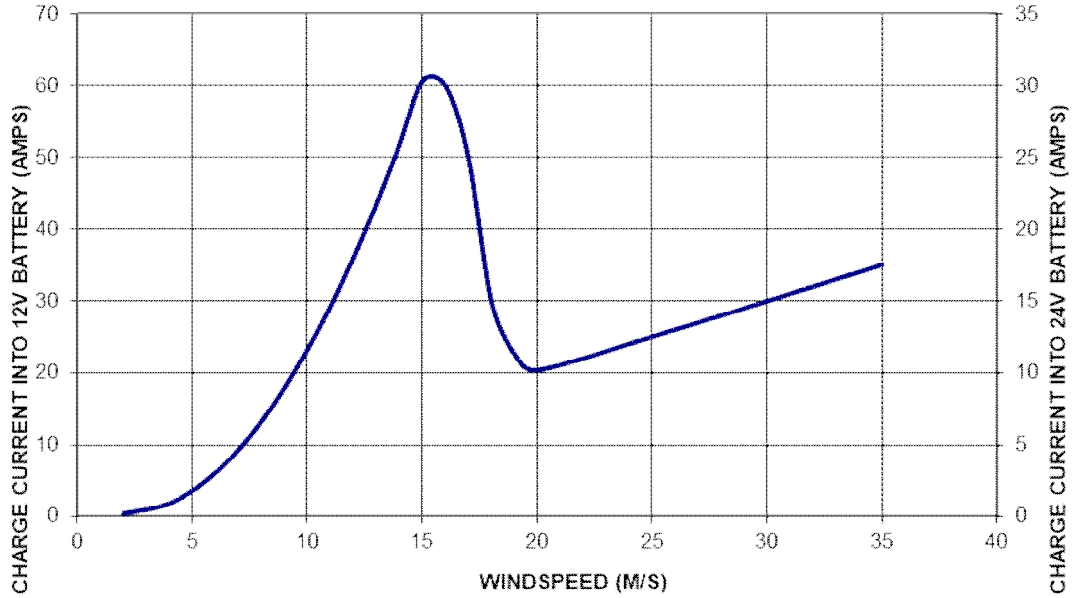
This switch should be fitted to enable the user to shutdown the turbine enabling the control unit to remain connected to the battery. If the control unit needs to be removed, set the STOP position to hold the turbine in a stall position.



**SPECIFICATION AND PERFORMANCE**

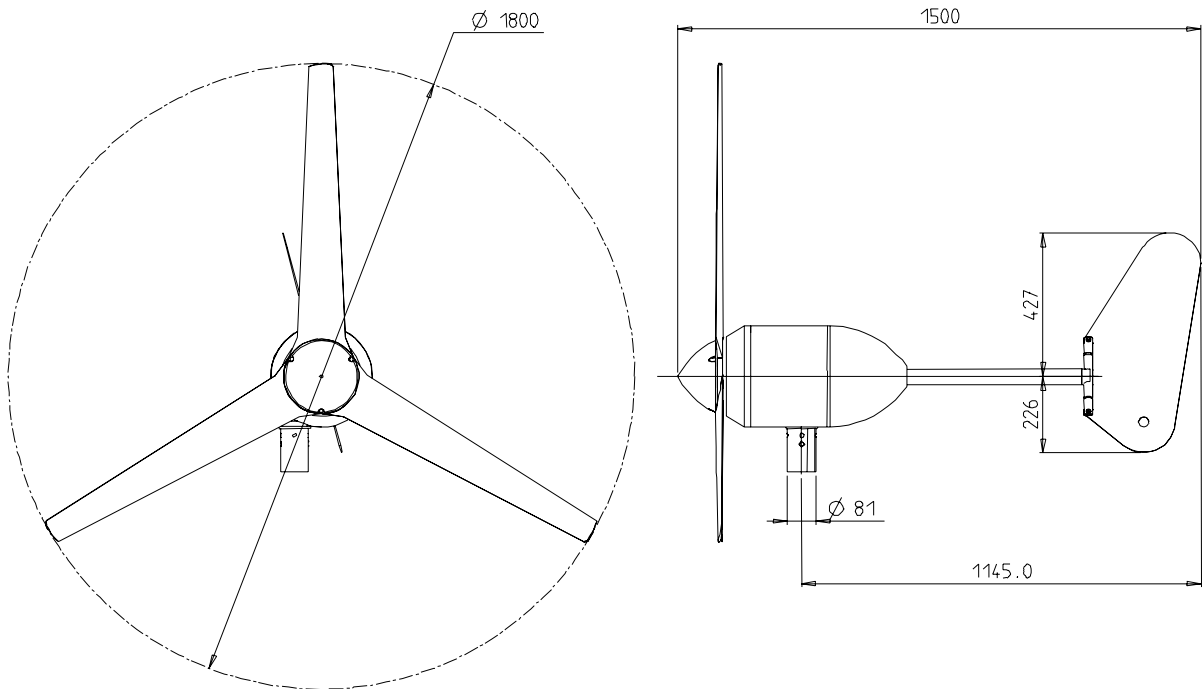
*The curve shown below is for ideal, non-turbulent wind conditions; this may not be achieved in some installations.*

**CHARGE CURRENT v WINDSPEED**



*Note: Charge current (Amps) of the 48V is calculated by "24V charge current x 0.5"*

**Outline Dimensions (mm)**



Tower Top Weight: 35.32Kg	Shipping Dimensions:
Controller Dimensions: 310x290x147mm 12Kg	1 pallet: 1200x675x520mm 74Kg

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## INSPECTION AND MAINTENANCE

To ensure long trouble free service from your 1803-2 wind generator, it is important to determine a suitable inspection & maintenance schedule. Maintenance intervals and requirements are specific to individual installations & site conditions & therefore must be determined by the user during the first year of service.

It is recommended that during the first year following installation that inspections & necessary maintenance are carried out at 3, 6 & 12 months, the results of which are used to determine future scheduled maintenance. A maintenance schedule sheet is provided for convenience. It is recommended that the maintenance schedule is completed & kept safe, & available if contacting the manufacturer for advice or technical information.

From the findings of the 3, 6 & 12 months inspections, the user should determine a suitable service interval.

Before inspection, the turbine should either be lowered to the ground or secured to prevent the generator from turning. To stop the generator from turning proceed as follows:

- Operate the RUN/STOP Switch to the STOP position if fitted. The turbine rpm reduces to a slow idle.
- Press and hold the Run/Stall button for >3 seconds. If the separate RUN/STOP switch is not fitted the turbine rpm reduces to a slow idle.
- Whilst the generator is in "stall" mode, it can be lowered to the ground or blades restrained from turning.

Note: For safety reasons maintenance should not be attempted during strong winds.

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## TROUBLESHOOTING

In the unlikely event that your Rutland 1803-2 should develop a defect, the turbine should either be lowered to the ground or secured to prevent the blades from turning before the following inspection is carried out.

1. Read the 'Electrical Connection' and 'Up and Running' sections and be satisfied that your system complies.
2. If your Rutland 1803-2 fails to turn, turns slowly or produces low output, check the following:
  - Is there sufficient wind? The Rutland 1803-2 needs 3m/s wind speed to start charging. The wind speed across the turbine blades may be greatly reduced in a built-up area compared with weather reports.
  - Is the controller button set to Run? Check the LCD and press the button for 3 seconds to see what mode is entered.
  - Is the battery fully charged? Check the LCD battery voltage levels and operating mode information. Note that once fully charged the system remains stalled until the battery voltage level reaches a lower limit for auto re-starting. Re-start can be manually invoked by 1 short press of the run/stall button when the backlight is on, i.e. 2 short presses when the backlight is off.
  - Is a battery connected to the control unit? Check that a battery voltage displays on the LCD.
  - Is the battery in good condition? Check the voltage and electrolyte level of each battery.
  - Check electrical continuity throughout the system, especially look for corrosion and poor connections in cable joints and connector blocks.
  - Check the brushes and slipring for wear or damage. To inspect the brushes, remove the nacelle by removing the three fixing screws and slide nacelle backwards towards the tail fin. The brushes and slipring can be inspected. Remove any black deposits from slipring with emery paper.
  - Check hub for free rotation with generator disconnected from control unit. If the hub does not rotate freely, check for a possible short circuit in the wiring. If no wiring fault is found refer to your dealer or manufacturer.

If in doubt, refer to your dealer or manufacturer.

### FM1803-2 Maintenance Schedule (1st 12 months)

System Details			
<b>Generator Serial Number</b>		<b>System Voltage</b>	
<b>Control Unit Serial Number</b>		<b>Battery Capacity</b>	
		<b>Battery Type</b>	
		<b>Tower Height</b>	
Remarks			

<b>Date of Installation</b>		<b>Service Interval</b>	
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Check	3 months		6 months		12 months	
	Date	Remarks	Date	Remarks	Date	Remarks
<b>Blade Bolts</b>						
<b>All other nuts &amp; bolts</b>						
<b>Turbine for smooth free rotation</b>						
<b>Yaw axis for smooth free rotation</b>						
<b>Tail hinge for smooth free rotation</b>						
<b>General Condition</b>						
<b>Tower assembly condition</b>						
<b>Guy wire tension (if applicable)</b>						

### FM1803-2 Maintenance Schedule

System Details			
<b>Generator Serial Number</b>		<b>System Voltage</b>	
<b>Control Unit Serial Number</b>		<b>Battery Capacity</b>	
		<b>Battery Type</b>	
		<b>Tower Height</b>	
Remarks			

<b>Date of Installation</b>		<b>Service Interval</b>	
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Check	Date	Remarks	Date	Remarks	Date	Remarks
<b>Blade Bolts</b>						
<b>All other nuts &amp; bolts</b>						
<b>Turbine for smooth free rotation</b>						
<b>Yaw axis for smooth free rotation</b>						
<b>Tail hinge for smooth free rotation</b>						
<b>General Condition</b>						
<b>Tower assembly condition</b>						
<b>Guy wire tension (if applicable)</b>						

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## 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 defective and are 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 Company Limited, Rutland House, Trevithick Road, Corby, Northamptonshire, NN17 5XY, England, or to an authorised Marlec agent.

The Warranty is made void in the event of improper installation, owner neglect, misuse, damage caused by flying debris or natural disasters including lightning strikes and hurricane force winds. This Warranty is made void 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 any unauthorised components.

Manufactured in the UK by:  
Marlec Eng. Co Ltd  
Rutland House, Trevithick Rd, Corby, NN17 5XY  
[www.marlec.co.uk](http://www.marlec.co.uk)

