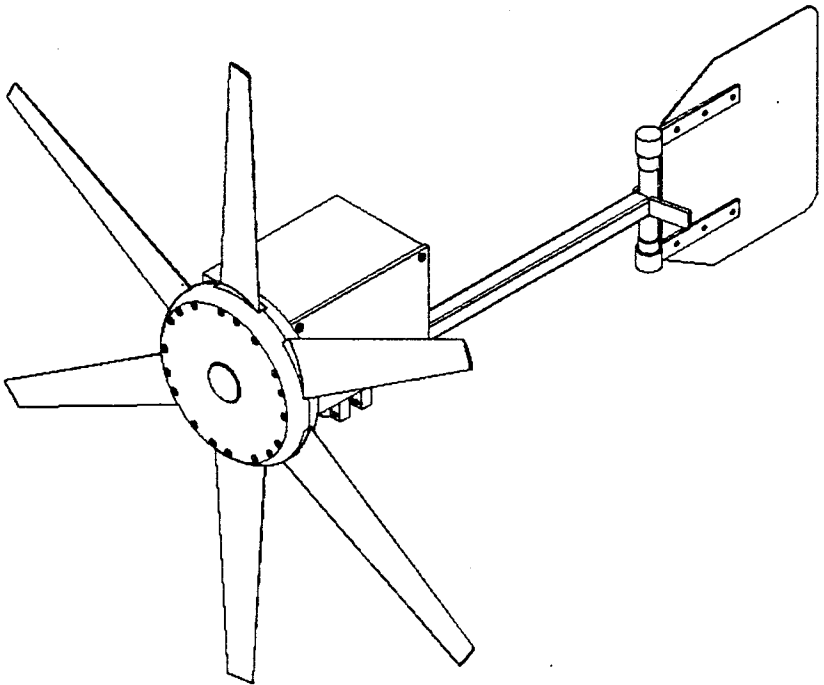


Rutland Furlmatic 910-3 Windcharger Owners Manual



Contents

	Page
INTRODUCTION.....	2
CHECK YOU HAVE RECEIVED.....	3
WHAT YOU WILL NEED.....	3
SITING THE WINDCHARGER.....	4
PRINCIPLE OF OPERATION.....	5
TOWER CONSTRUCTION.....	6
ASSEMBLY & INSTALLATION.....	7
Blade Assembly.....	7
Furlmatic Tail Assembly.....	8
BATTERIES.....	9
CABLE SPECIFICATION.....	10
ELECTRICAL CONNECTION.....	10
BASIC WIRING DIAGRAMS.....	11
FITTING GENERATOR TO THE TOWER.....	12
Final Mechanical check.....	12
UP AND RUNNING.....	13
SPECIFICATION AND PERFORMANCE.....	13
INSPECTION AND MAINTENANCE.....	14
TROUBLESHOOTING.....	15

INTRODUCTION

This manual contains important information concerning your Rutland Furlmatic 910-3 Windcharger and its installation and operation.

It is strongly recommended that you read this manual and familiarise yourself with its contents before installing and operating the Windcharger system.

The Rutland Furlmatic 910-3 Windcharger is designed to provide a direct current (DC) power supply via a battery bank for 12/24V equipment, lighting, etc. It is intended for professional and leisure applications which require battery charging at off-grid locations.

WARNING!

- *When turning, the Windcharger is capable of generating voltages in excess of the nominal voltage. Caution must be exercised at all times to avoid electric shock.*
- *No attempt to repair the system should be made until the wind generator is restrained from turning.*
- *The Windcharger is fitted with ceramic magnets which can be damaged by heavy handling. The main generator assembly should be treated with care during transit and assembly.*
- *It is essential to observe the correct polarity when connecting the Windcharger and all other components into an electrical circuit. Reverse connection will damage the Windcharger and incorrect installation will invalidate the warranty.*
- *The fuse supplied must be fitted to protect the system. (If the Wind generator is used in conjunction with the RWS200 Charge Controller, this fuse is already incorporated within the controller).*
- *If in doubt, refer to your dealer, a competent electrical engineer or the manufacturer.*

CHECK YOU HAVE RECEIVED

- 1 x main generator assembly
- 1 x tail assembly
- 24 x No. 10x25mm special self-tapping screws
- 6 x aerofoil blades
- 1 x fuse and fuse holder
- 1 x 2-way terminal 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
- Large flat blade screwdriver
- Pozi-drive or Philips (cross-head) screwdriver No2
- 10mm Spanner

Other Items You Will Need

- Tower/Mounting pole. (Page 6)
- Batteries. (Page 9)
- Battery terminals. (Page 9)
- Cable. (Page 10)
- Connector blocks (as determined by your total system)

Other Items You May Have Selected

- SR200 Regulator or RWS200 Charge Controller. (Page 10)
- Inter-connect unit. (Page 10)
- Cable kit

SITING THE WINDCHARGER

General Considerations

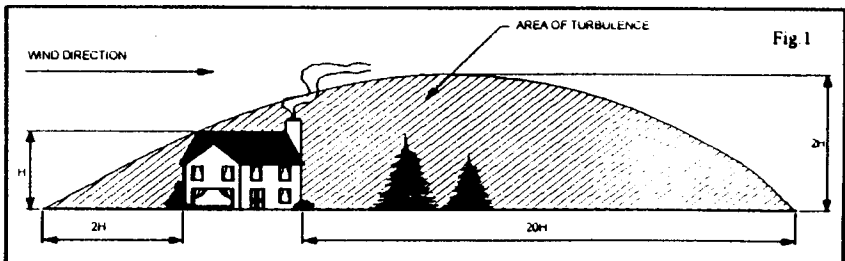
The location and height of the mounting pole or tower for your wind turbine will be the major factor in the overall performance of your system.

The smooth flow of wind over land and water 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 moored boats, trees and buildings. Both wind shear and turbulence diminish with height and can be overcome simply by putting the machine sufficiently high above them.

It is therefore essential that the wind generator should be located 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).



PRINCIPLE OF OPERATION

Generator

The 3 phase ac generator is driven directly by the aerofoil blades, rotating permanent magnets around the fixed stator winding. The variable frequency alternating current is rectified within the generator housing, and the resulting rectified current is transmitted via the sliprings and brushes at the yaw axis to the output cable.

Winding Over-Temperature Protection

The generator stator winding incorporates embedded thermal protection to protect the winding from damage due to over temperature during extreme winds. On reaching the thermal protection limit, the device will reduce generator output current to allow the winding to cool, whereupon normal performance will be resumed. If the thermal protection is active, the turbine may reduce to a slow rotational speed with a corresponding reduction in charge current, this is normal.

Furling Tail system

The tail assembly is designed to direct the turbine into the main direction of the wind at windspeeds up to approx 15m/s. Above this the automatic “furling” mechanism is activated to turn the generator at an angle to the wind to protect the turbine, generator and supporting structure from severe electrical and mechanical loads due to high winds. When the wind speed subsides, the tail assembly will automatically return the turbine to normal operation. In prolonged gusty & turbulent conditions, the system may be seen to repeat this cycle many times. Power will be reduced during furling. For effective operation of the furling system the machine must be sited to ensure it is as free as possible from turbulence.

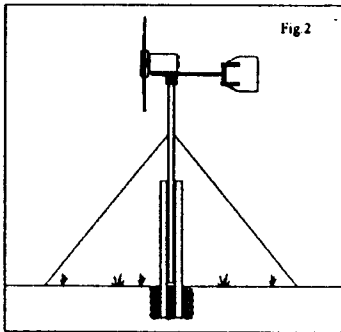
TOWER CONSTRUCTION

The Furlmatic 910-3 is designed to fit over a 61mm outside diameter steel tube. (Standard 2" bore water pipe.)

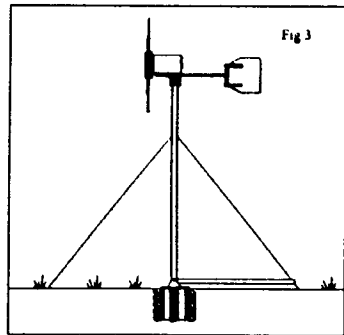
A suitable mounting pole can be erected using a 6.5 metre (21 feet) galvanised (medium) tube. The tube must be supported by a minimum of four guy lines.

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

- The guy wires should be a minimum of 4mm in diameter.
- The shackles should be a minimum of 5mm in diameter.
- Rigging screws should be a minimum of 5mm in diameter.
- 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 terrain.



Centre pivoted pole



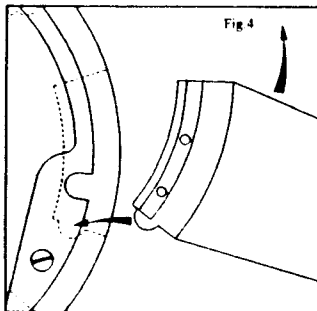
Base pivoted with gin pole

Pivot type towers are recommended as these allow for easier installation and lowering for access to the wind generator. Two forms of pivot tower are suggested in Figs 2 & 3. Non-guyed pivoting towers are available, for further details contact the dealer or manufacturer.

ASSEMBLY AND INSTALLATION OF THE WINDCHARGER

Blade Assembly (Fig.4)

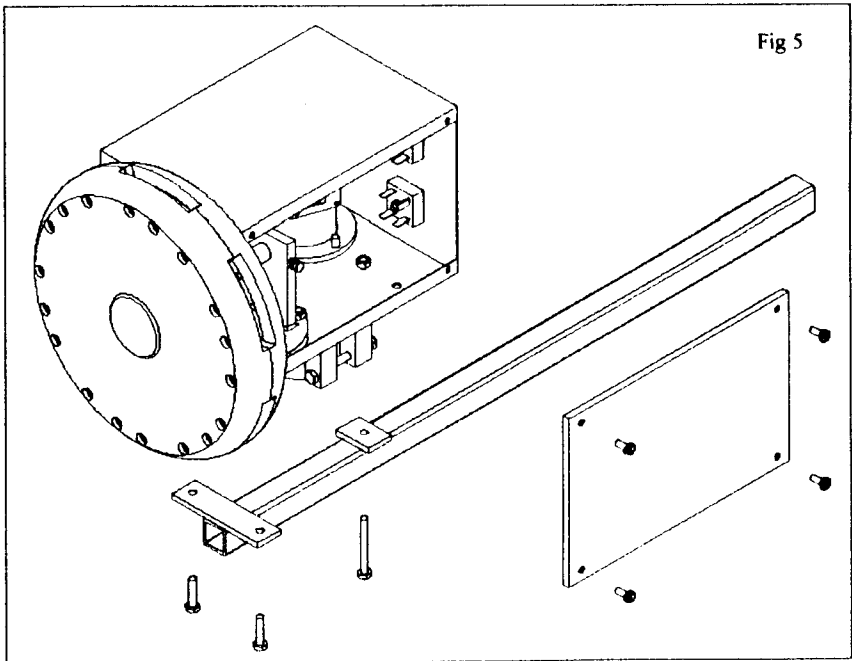
1. Place the generator assembly on a flat surface hub-side down.
2. Position blade as shown. **The blades will only fit one way round.** Insert the protrusion at the trailing edge of the blade root fixing first into socket to align with the corresponding recess in the blade socket. The blade can then be easily inserted with a lever action. Gentle assistance with a soft faced mallet may be required.
3. **Four screws are required for each blade.** First secure each blade with two of the special self-tapping screws provided.
4. Fit the remaining blade screws from the front of the generator hub.
5. Check tightness of all screws. (Do not over-tighten).



NB. IT IS IMPORTANT THAT 4 SCREWS PER BLADE ARE FITTED.

Furlmatic Tail Assembly (Fig 5)

1. Remove the cover from the main housing.
2. Remove the 2 M6 nuts and screws nearest the front (as shown in fig 5)
3. Remove the M6 nut, washer and bolt from tail.
4. Position tail assembly and replace 3 M6 screws (tighten front 2 before fitting nuts).
5. Fit M6 nuts and tighten using 10mm spanner.
6. Replace cover.



BATTERIES

Leisure/Deep Cycle batteries are specifically designed for good performance in terms of charge/discharge cycles. Batteries are the most important part of your battery charging system and should be sized according to your load requirements and provide at least 3 days reserve capacity. This will reduce cycling, prolong the life of the battery and ensure system reliability during periods of low wind.

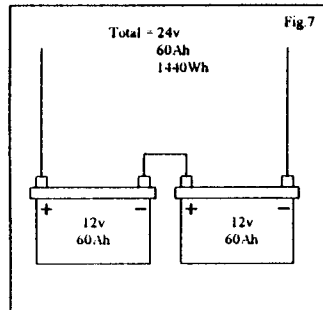
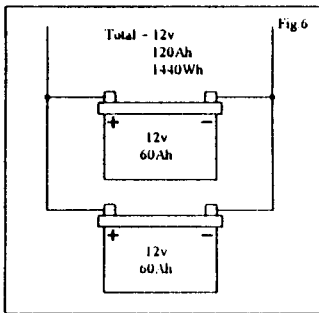
Permanent connections should always be made to the battery terminals. Never use crocodile clips or similar devices. Battery terminals should be well greased with petroleum jelly or similar.

We strongly recommend the SR200 or RWS200 is fitted to prevent battery overcharging in strong winds and is essential with gel/sealed batteries.

Batteries may be linked as follows:

- In parallel to increase amp hours (Fig.6).
- In series to increase voltage (Fig.7).

Red is + Positive
Black is - Negative



CABLE SPECIFICATION

The cable used for connection of the Windcharger to the batteries should be in accordance with table 1. The use of a smaller cable than recommended will reduce the performance of the charging system.

Cable kits are available from your dealer or the manufacturer.

10m x 2.5mm² including battery clips (CA-10/11)

20m x 2.5mm² including battery clips (CA-10/12)

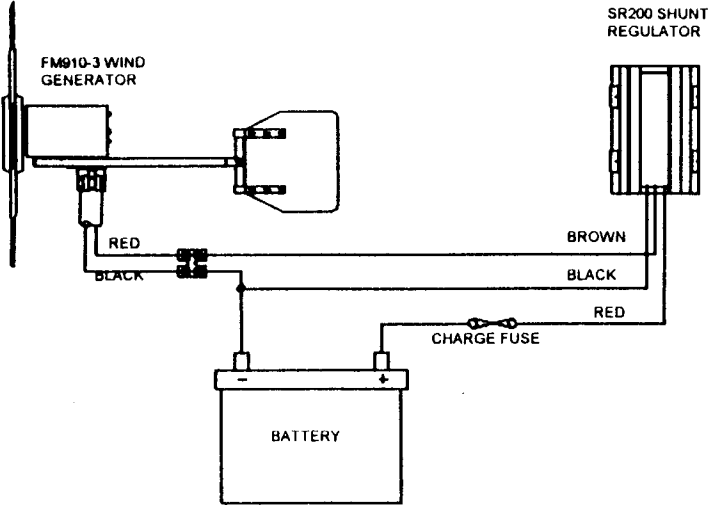
Cable Run (m)	Cable Size (mm ²)	Cable Size (mm ²)
	<u>12 Volt</u>	<u>24 Volt</u>
0-20	2.5	1.5
21-30	4	2.5
31-45	6	4
46-80	10	6

Table 1

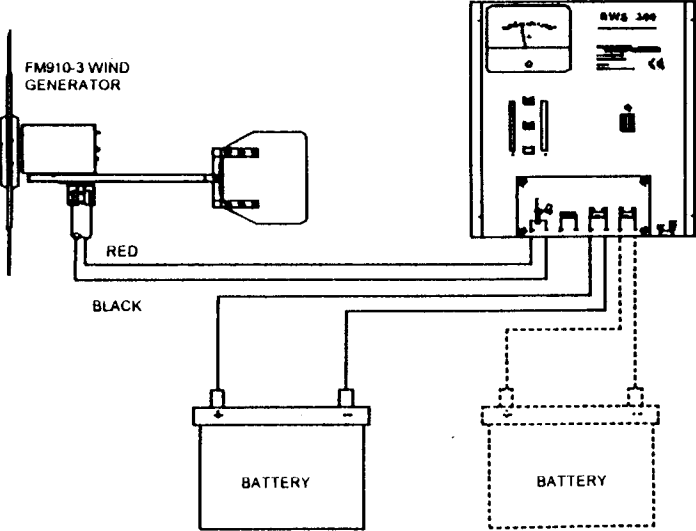
ELECTRICAL CONNECTION

1. Run the cable selected (see Table 1) down the inside of the pole.
2. Select one of the following 2 basic systems and follow the manual provided with the SR200 or RWS200.
 - If the SR200 is selected, a convenient Interconnect Unit (CA-11/24) is available to provide a simple & neat junction box for interconnection of the separate system components. The unit is internally pre-wired & can accommodate the charge fuse.

SR200 regulator and Fuse



RWS200 Controller



FITTING GENERATOR TO THE TOWER

1. Ensure the 4 clamping bolts in the tower mounting casting are fully slackened.
2. Connect the wind generator flying leads to the cable using the connector block supplied, taking care to observe polarity.

Red is + Positive

Black is - Negative

3. Wrap the connection with insulation tape to secure/protect from environment. Alternatively join the cable using a latching-type plug and socket.
4. Fit the Wind Generator post adaptor over the end of the mounting pole. At the same time ease the main output leads down the middle of the tower, ensuring that the cables are not trapped between the mounting casting and the tower.
5. With the generator assembly fully engaged on the tower secure the windcharger with the 4 clamping bolts on the mounting casting, using the 10mm spanner.

Final Mechanical Check

Ensure the system is properly assembled :

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

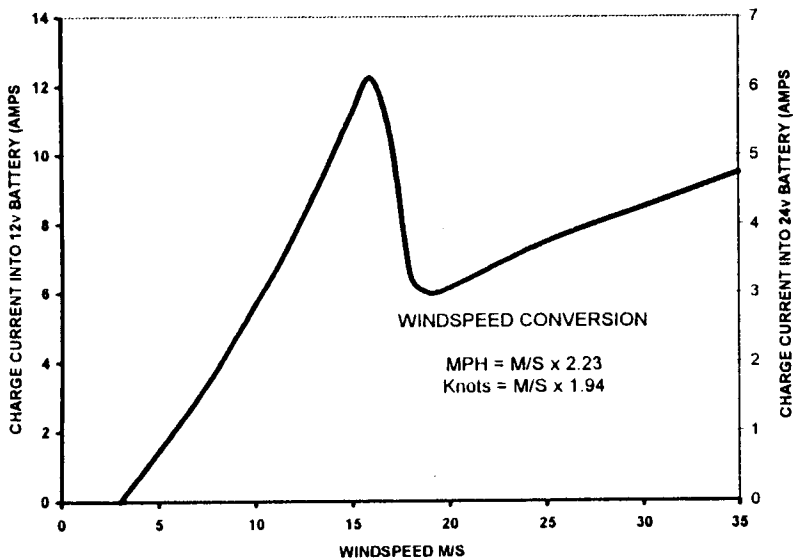
UP AND RUNNING

- Before raising and securing the wind generator, check that:
 1. All final mechanical checks have been made.
 2. The cable is not trapped.
 3. All electrical connections are secure and safe.
- The wind generator can now be raised into position.

Take care to avoid all moving parts when raising and lowering the wind generator.

- When raised, secure the structure firmly in an upright position. The performance of your Windcharger can be impaired if the pole is not vertical.

SPECIFICATION AND PERFORMANCE



INSPECTION AND MAINTENANCE

The Rutland Furlmatic 910-3 requires no scheduled maintenance but an annual inspection should be carried out to monitor the general condition of the system.

- Before inspection, the turbine should either be lowered to the ground or tied to prevent the generator from turning. To stop the generator from turning follow one of the procedures below:
 - 1) Lower the windcharger on its tower to the ground, coming to rest on a structure that will prevent the windcharger from striking the ground. Take care that all persons are clear of the area. The turbine will eventually slow down. Tie a blade to the mounting pole to prevent it from rotating.
 - 2) If the tail boom is safely accessible, using the tail boom, rotate the generator out of the wind, the turbine will eventually slow down. Tie a blade to the mounting pole to prevent it from rotating.
- Whilst the generator is stationary, the following routine checks should be performed:
 - 1) Check the blade screws for tightness.
 - 2) Check all other nuts, bolts and screws for tightness.
 - 3) Check the yaw axis for free rotation.
 - 4) Check the tail fin moves freely.
 - 5) Check tower assembly for condition.
 - 6) Check the tension of the guy wires if applicable. The tension of guy wires should be checked frequently during the first year.
 - 7) The unit can be wiped with a mild detergent and rinsed with water to remove dirt and debris.

TROUBLESHOOTING

In the unlikely event that your Rutland Furlmatic 910-3 should develop a defect, the turbine should either be lowered to the ground or tied to prevent the blades from turning before the following inspection is carried out.

1. Read the Electrical Connection (page 10) and Up and Running (page 13) and be satisfied that the system complies.
2. If your Furlmatic 910-3 fails to turn or produces low output, check the following:
 - **Is there sufficient wind?** The Furlmatic 910-3 needs 5mph wind speed to start charging. At wind speeds below this, the turbine may be turning but will produce no output. The wind speed across the turbine blades may be greatly reduced in a built-up area or where surrounded by trees compared with windspeeds quoted in weather reports.
 - **Is the battery in good condition?** Check the voltage and electrolyte level of each battery.
 - **Check electrical continuity** throughout the system, especially corrosion and poor connections in cable joins and connector blocks.
 - **Check the brushes and slipping for wear or damage.** To inspect the brushes, remove the cover plate on the side of the windshaft housing (white box) by removing the four fixing screws. Inspect the brushes and slipping positioned immediately above the yaw axis. Remove any black deposits from slipping with emery paper.
 - **Check hub for free rotation with generator disconnected from battery.** 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.
 - **Remove the SR200/RWS200** from the charging circuit and connect the Windcharger directly to the battery via an ammeter. Raise the wind generator to it's running position. If no charge current is measured and there is sufficient wind, contact your dealer or manufacturer. If charge current is normal the battery is fully charged or regulator is faulty.

Remember to always stop the wind generator from turning before making any connections or disconnection's.

If in doubt, refer to your dealer or manufacturer, quoting wind generator type and serial number.

A comprehensive fault finding manual is available from your dealer or the manufacturer : Document No SM2-127.

LIMITED WARRANTY

The Marlec Engineering Company Limited Warranty provides free replacement cover for all defects in parts and workmanship for 12 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 as having been in his opinion defective and are so found by Marlec upon inspection.

Defective parts must be returned by prepaid post to Marlec Engineering Company Limited, Rutland House, Trevithick Road, Corby, Northamptonshire, NN17 5XY, England, or to an authorised Marlec agent.

This Warranty is void in the event of improper installation, owner neglect or natural disasters and does not extend to support posts, inverters or batteries.

No responsibility is assumed for incidental or consequential damage, damage caused by the use of any unauthorised components.

No responsibility is assumed for non "furling" versions of the Rutland Windcharger (ie. the Standard and Marine generators) where Marlec or one of its authorised agents finds that a generator incorporating a furling device should have been used.

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