



Data Sheet

Windcharger systems

RS stock number 304-5006, 304-5012, 304-5028, 304-5034

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.

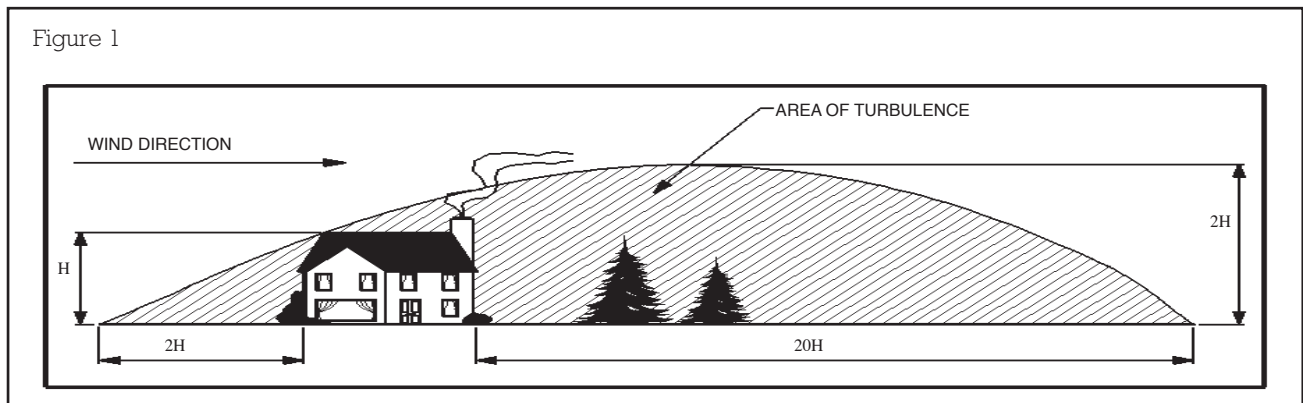
The smooth flow of wind over land and water is often interrupted by a multitude of obstructions causing wind shear and turbulence.

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).

Figure 1



On board systems

913 Type RS stock no. 304-5012

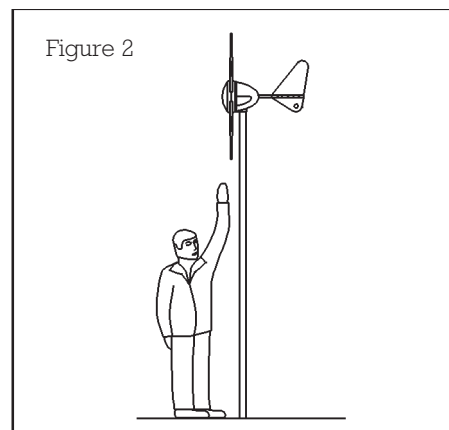
The wind generator should be mounted in a safe position, a minimum of 2.3 metres (7.6 feet) above the deck and away from other obstacles which could interfere with the blades or tail assembly (Figure 2).

The Rutland 913 is designed to fit inside an aluminium or stainless steel tube with an internal diameter of 41mm.

The external diameter of the pole **MUST NOT** exceed 48.5mm. Larger section poles must not be used as this will reduce the tower to blade clearance. In high wind conditions this could cause damage to the windcharger by allowing the blade to come into contact with the mounting pole.

Suitable tubes: Stainless steel 1 3/4" 16 SWG
Aluminium 1 1/8" 10 SWG

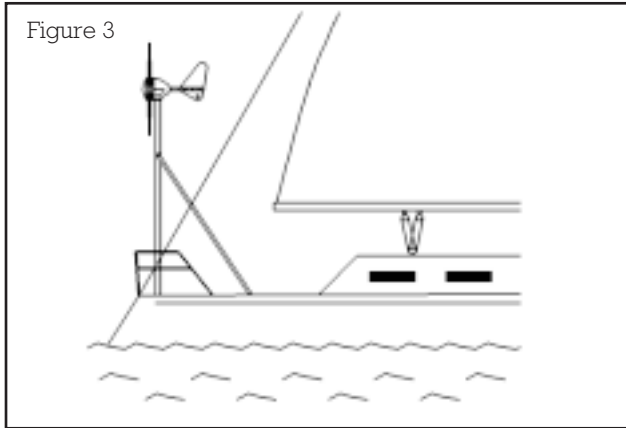
Figure 2



We suggest the following mountings according to preference and site conditions:-

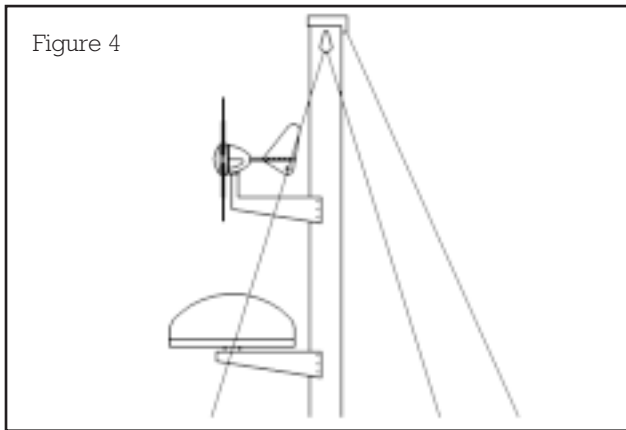
● Pushpit (Figure 3)

A suitable pole mounted to the deck with deck plates and guy ropes is the most popular method of mounting the Windcharger on yachts.



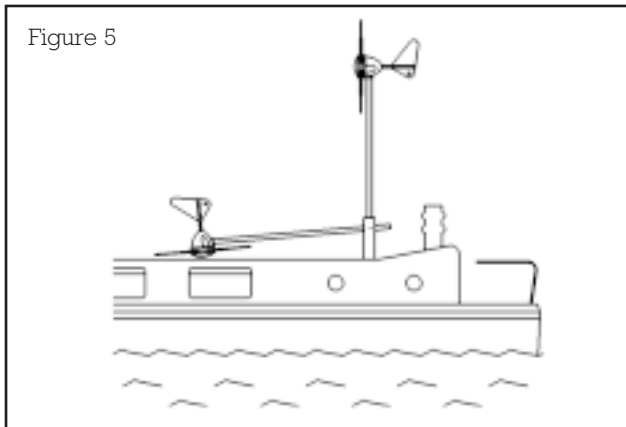
● Mizzen (Figure 4)

Mizzen mounting is suitable on larger yachts, taking advantage of greater wind flow the higher the wind turbine is mounted.



● River Boats (Figure 5)

A pivot pole is ideal for river boats as the Windcharger can easily be raised and lowered.



Land based systems

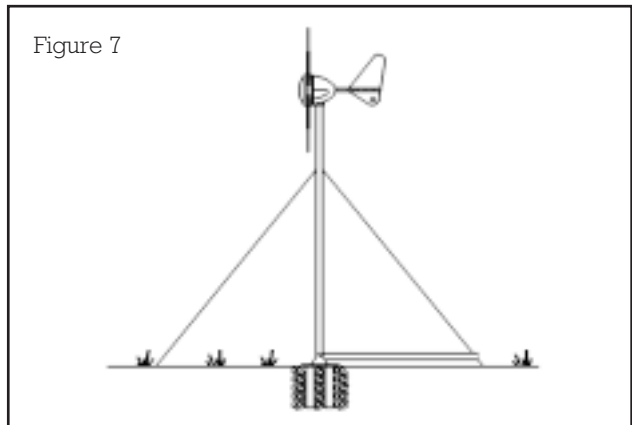
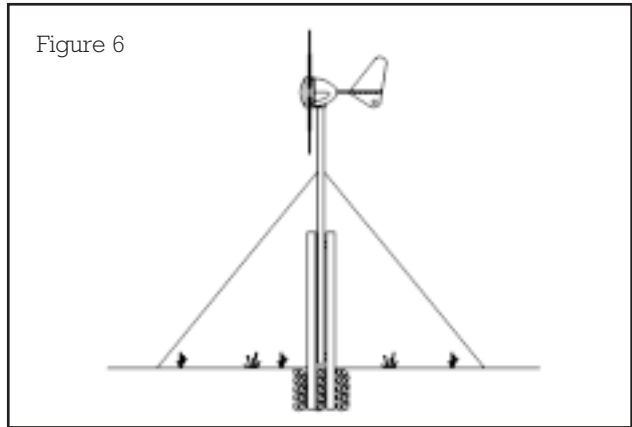
The Rutland 913 is designed to fit inside an aluminium, stainless or steel tube with an internal diameter of 41mm.

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.

We suggest pivot type towers as these allow for easier installation and lowering for access to the wind generator. Two forms of pivot tower are suggested in Figures 6 & 7.

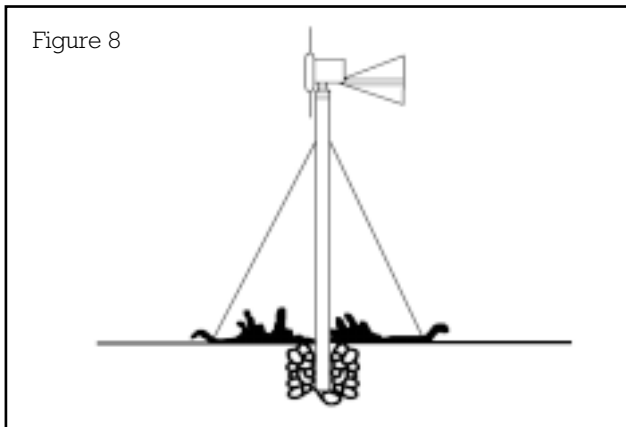


Tower considerations

The FM910 mode, **RS** stock no. 304-5006, is designed to fit over a 61mm outside diameter steel tube of at least 5mm wall thickness (standard 2" bore water pipe).

You may choose according to preference and site conditions between;

- a) Pivot pole supported by guy ropes (Figure 7)
- b) A permanent tower supported by guy ropes (Figure 8)



Suggested Tower Constructions

A suitable mounting tower can be erected using a 6.5 metre (21 feet) length of 61mm O/D; (2") I/D galvanised heavy duty water pipe to BS no. 1387. The tube must be a continuous length and be supported by a minimum of four guy lines as shown in Figure 8.

The attachment points for the guy lines to the tower should be securely welded after removing local areas of galvanised material. Protection should be reinstated to these areas when welding has been completed.

- The guy wires should be a minimum of 4mm in diameter
- The shackles should be a minimum 5mm.
- Rigging screws should be 5mm in diameter.
- All items should be galvanised or stainless steel for protection against the weather.

Where guy lines are looped, the loop must incorporate a thimble and be fitted with a minimum of three rope grips.

Batteries

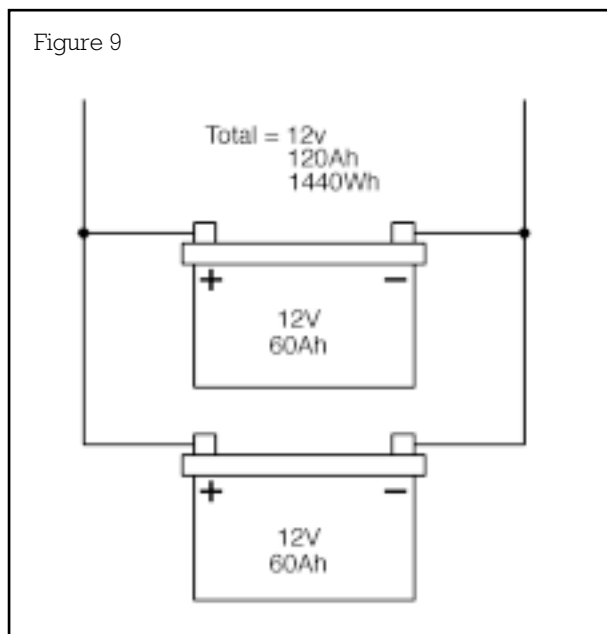
Leisure/Deep Cycle batteries are specifically designed for good performance in terms of charge/discharge cycles. Batteries are the most important part of your battery charging system and should be sized according to your load requirements and provide at least 3 days reserve capacity. This will reduce 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 (**RS** stock no. 304-5028) or RWS200 (**RS** stock no. 304-5034) is fitted to prevent battery overcharging in strong winds and is essential with gel/sealed batteries.

Batteries may be linked in parallel to increase amp hours (Figure.9).

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.

Table 1

Cable Run (m)	Cable Size (mm ²) 12 Volt
0-20	2.5
21-30	4
31-45	6
46-80	10

System configurations

Figure 10 Basic wiring schematic

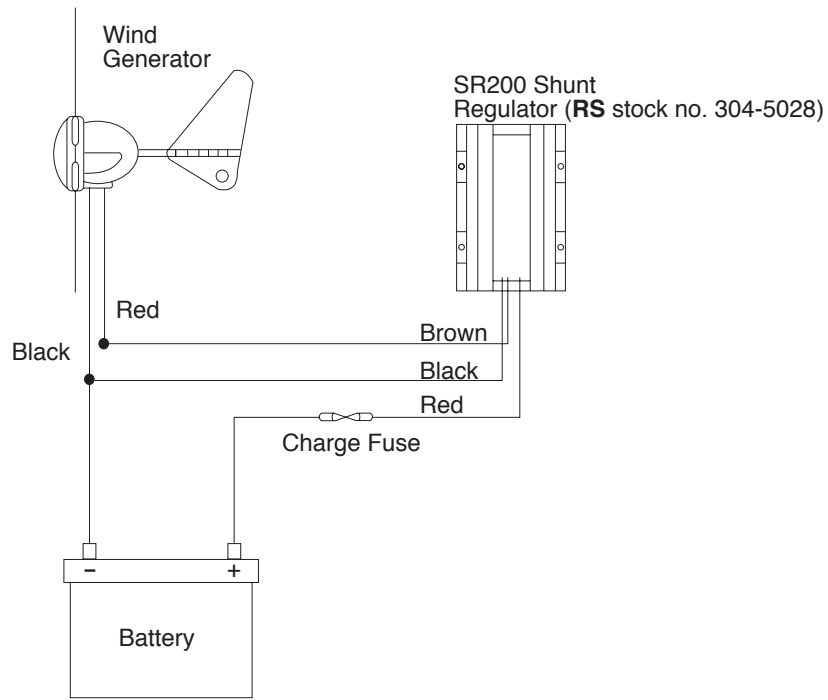


Figure 11 Basic wiring schematic including Solar Array

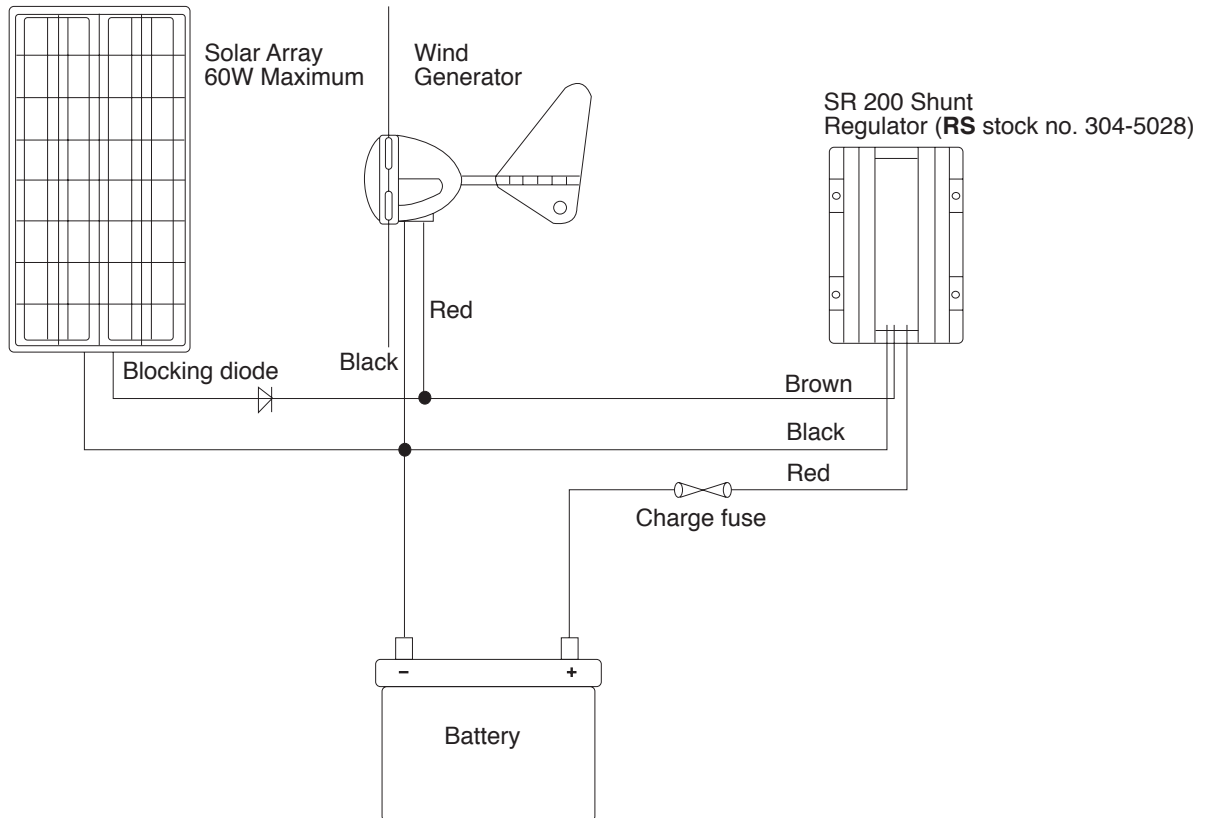


Figure 12 Basic wiring schematic Solar Array >60W

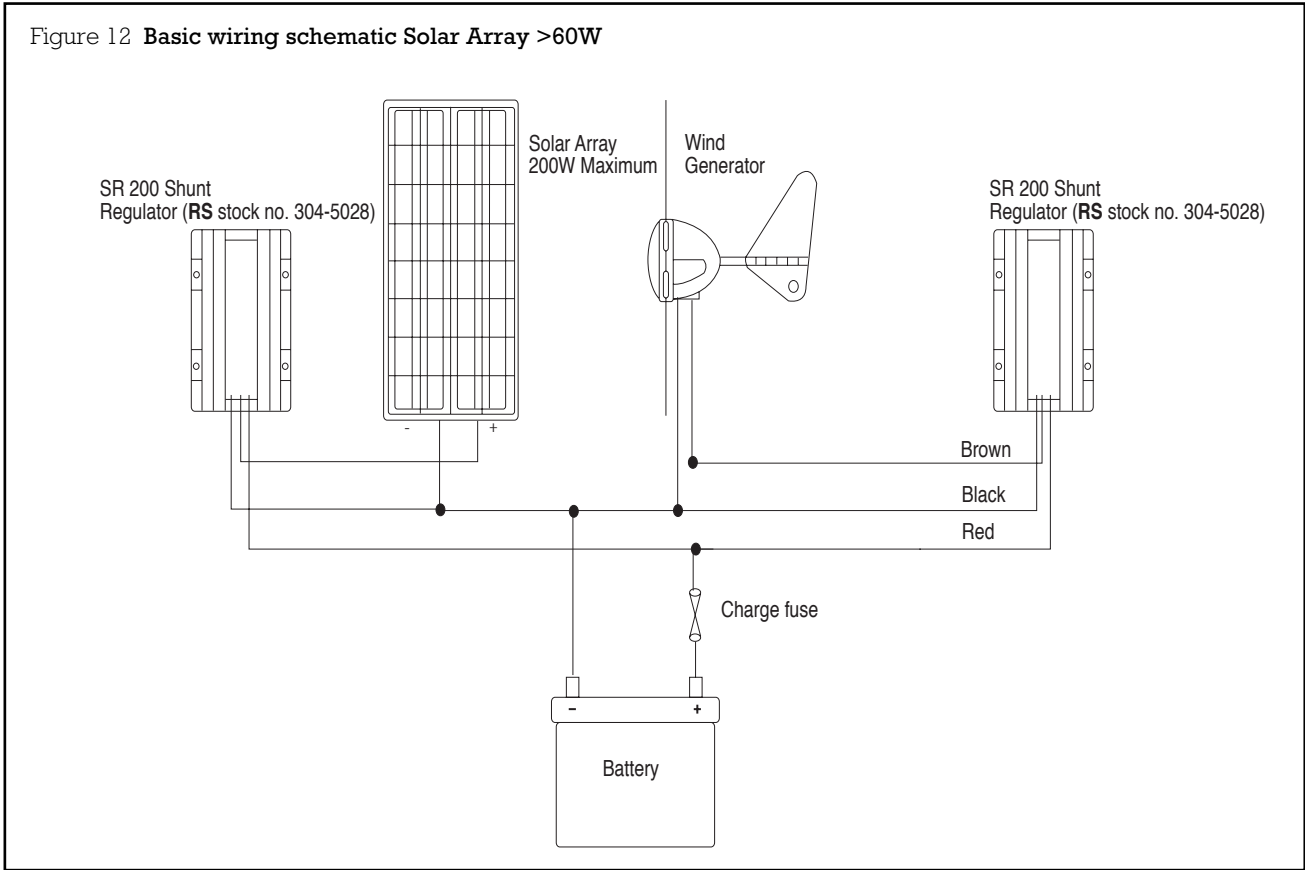


Figure 13 Basic wiring schematic Charge Splitter

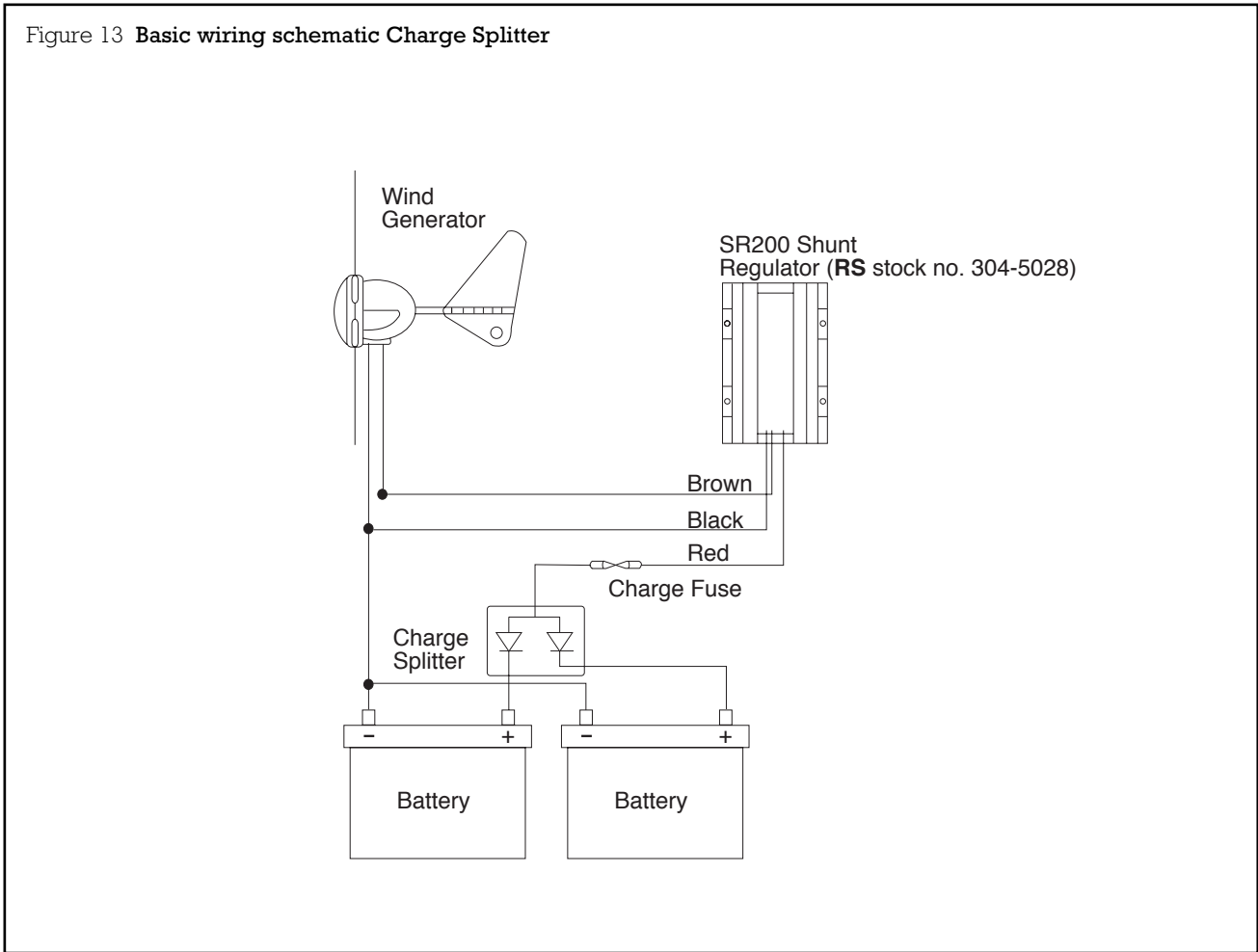
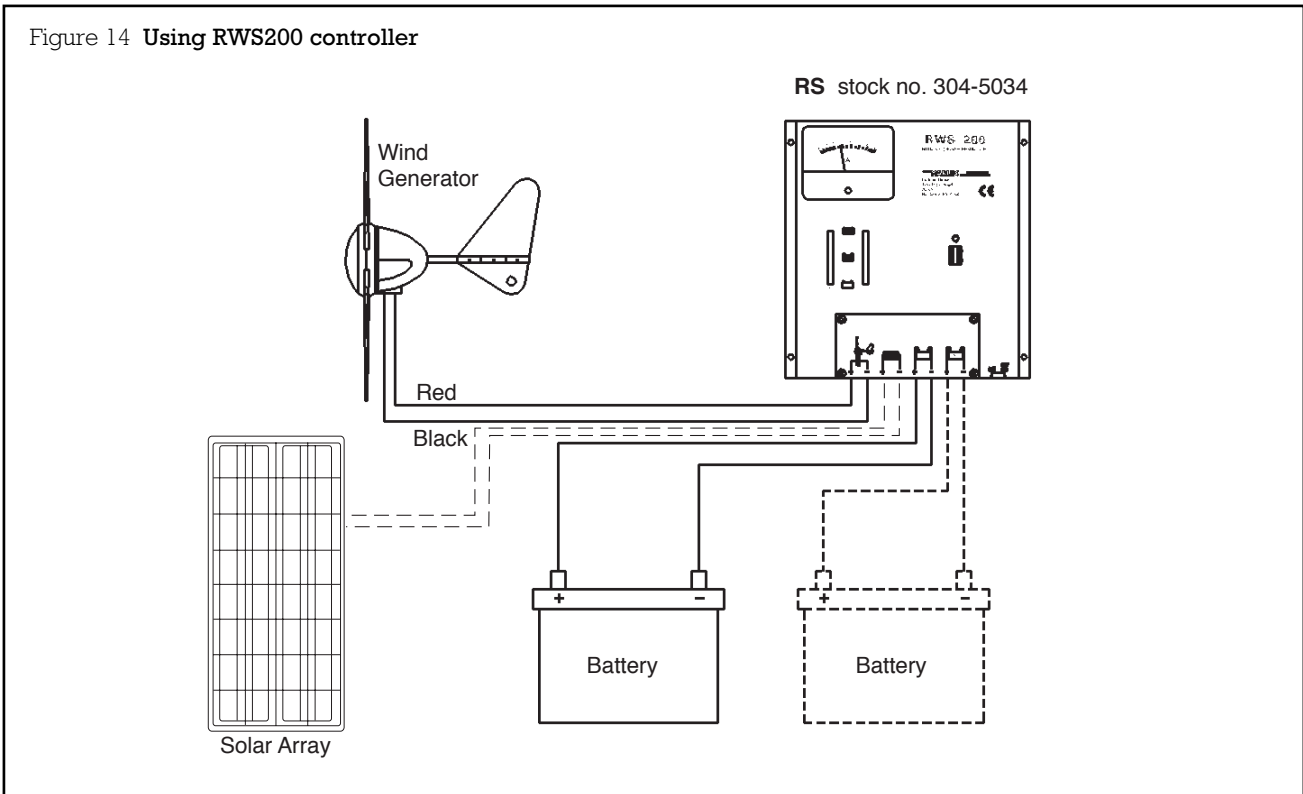


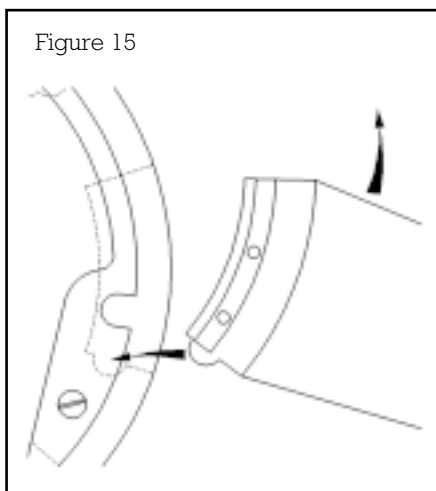
Figure 14 Using RWS200 controller



Assembly and installation of the Windcharger

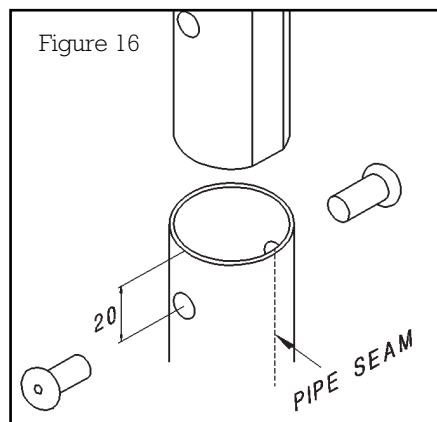
Blade Assembly (Figure 15)

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.** Secure each blade with two of the special self-tapping screws provided fitted from the rear. On the 913 model a cut-out in the nacelle makes this possible.
4. Fit the remaining blade screws from the front of the generator hub.
5. Check tightness of all screws. (Do not over-tighten).
6. Fit the plastic nose dome in position on the front of the generator hub and secure in place with the three nylon screws provided. (913 model only)



**Fitting generator to the tower (Figure 16)
913 type (RS stock no. 304-5012)**

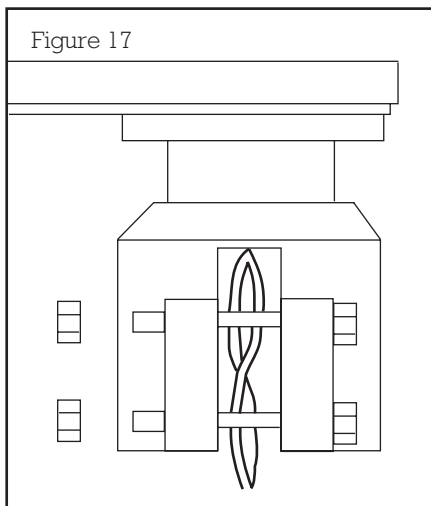
1. The post adaptor fitted to the 913 is designed to fit inside a standard 41mm internal diameter tube. The adaptor is provided with a flat on one side to clear the weld seam on seamed pipe.
2. Mark and centre-punch two positions diametrically opposite, at 90° to the pipe seam if necessary, 20mm from top of the tube.
3. Drill two holes 10.5mm in diameter on centre-punch positions.
4. Position the Windcharger on the tower ensuring the flat on the post adaptor aligns with the pipe seam if necessary. Two M10 x 16mm screws and shakeproof washers are provided for securing once the cables are installed.



Fitting generator to tower (Figure 17)

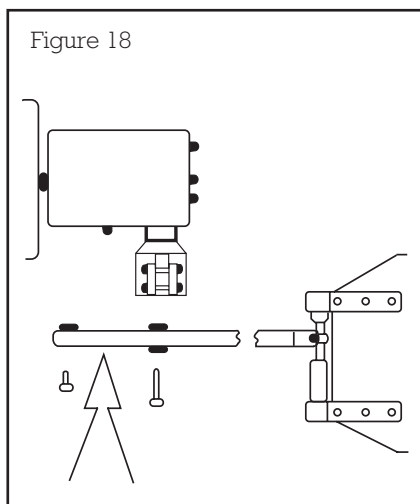
910 Type (RS stock no. 304-5006)

1. Ensure that the 4 clamping bolts in the tower mounting casting are fully slackened.
2. Push the appropriate end of the tower onto the mounting casting of the main generator assembly.
3. At the same time ease the main output leads down the middle of the tower, ensuring that the conductors are not trapped between the mounting case and the tower.
4. With the generator assembly fully engaged on the tower, secure with the 4 clamping bolts on the mounting casting, using the 10mm spanner.



Tail fin assembly (Figure 18)

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



Final Mechanical Check

1. Check the tightness of blade screws and nose dome.
2. Check the free rotation of the hub and yaw axis.

Do not raise the Windcharger at this stage, the turbine must be connected to the battery before the blades are allowed to turn in the wind.

Electrical connection

1. Run the cable selected (see Table 1) down the inside of the pole.
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

Wrap the connection with insulation tape to secure/protect from environment. Alternatively join the cable using a latching-type plug and socket.

3. Reposition and secure the wind generator to the tower using the screws and shakeproof washers provided. Tighten using the 6mm Allen key provided.
4. Final Electrical Connection:

Select one of the systems configurations and follow the manual provided with the SR200 or RWS200.

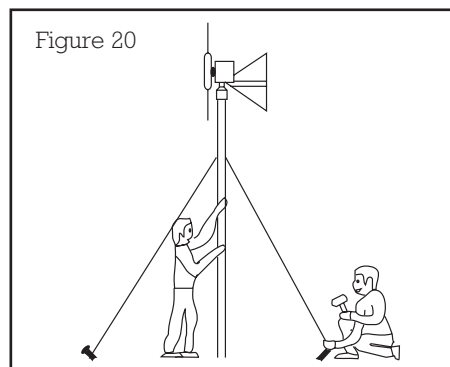
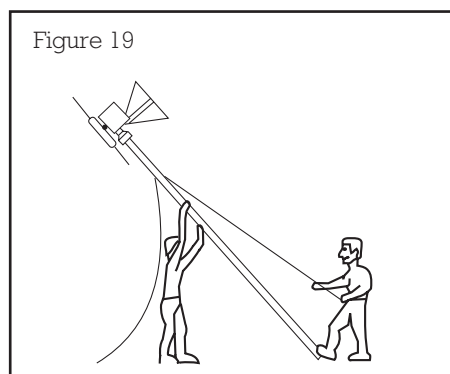
CAUTION: When connecting the Shunt Regulator the heat sink (black aluminium part) will be at positive potential (LIVE) therefore care should be taken not to inadvertently allow the negative battery cable to make contact with the heat sink as this will effectively short circuit the battery, with the associated risk of fire and burns. Thus when connecting the regulator to the battery always connect the negative lead first and then the positive lead.

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 particularly between the generator and the top of the pole.
3. All electrical connections are secure and safe.

The wind generator can now be raised into position. (Figure 19). 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 (Figure 20).



Troubleshooting

Before inspection the turbine should be lowered to the ground or tied to prevent the generator from turning.

Read the Electrical Connection section and be satisfied that you system complies.

Read the Up and Running section and be satisfied that all checks have been carried out.

If your windcharger fails to turn or produces low output, check the following:

1. Is there sufficient wind? The windcharger needs over 4mph windspeed to start charging.
2. Are the blades fitted correctly? Refer to Section 5.1.
3. Is the battery in good condition? Check the voltage and electrolyte level of each battery.
4. Check brushes for wear and damage.
5. Check slipping condition. Remove any black deposits with emery paper. Heavy deposits and reduced power indicate reverse connection to the battery has been made.

To inspect the brushes on the 913 model, remove the nacelle backwards towards the tail fin. The brushes and slipping can be inspected by removing the four self-tapping screws fixing the brush holder assembly in place. Remove any black deposits from slipping with emery paper. Heavy deposits and reduced power indicate a possible reverse connection to the battery.

- 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 you dealer or manufacturer
- Remove the SR200/RWS200 from the charging circuit and connect the windcharger direct to the battery via an ammeter. 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.

WARNING!

1. When turning, the windcharger is capable of generating very high voltages. Extreme caution must be exercised at all times to avoid electrical shock.
2. No attempt to repair the system should be made until the wind generator is restrained from turning.
3. The windcharger is fitted with ceramic magnets which can be easily damaged by heavy handling. The main generator assembly should be treated with care during transit and assembly.
4. It is essential to observe the proper polarity when connecting the windcharger into an electrical circuit. Reverse connection will damage the windcharger and incorrect installation will invalidate the warranty. Please note that the 15amp fuse supplied must be fitted to protect the machine.
5. If in doubt refer to your dealer, a competent electrical engineer or the manufacturer.