MiniMet Installation Manual

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Skye Instruments Ltd.

Skye Instruments is based in the UK and we are very proud to be celebrating being in business since 1983. Our products are designed and built in the UK. We have a very wide product base and our sensors & systems are used for plant & crop research; micro-climate, global climate change studies; environmental monitoring and controlled environment installations.

Products include light sensors & systems, weather monitoring sensors, automatic weather stations, plant research systems, soil and water research systems.

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Please be aware that the information in this manual was correct at time of issue, and should be 100% relevant to the accompanying product. We take great pride in our ever-evolving range of products, which means that sometimes the product may change slightly due to re-design.

If you have any queries, please do not hesitate to contact our technical team by any of the methods above.

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MiniMet Installation

1. INTRODUCTION

This manual describes the mounting of Skye sensors and dataloggers on masts, poles or walls, and suggests suitable installation locations to enable the most accurate measurements to be taken.

Each component part of the system to be installed is described in its own chapter, some of which may not be applicable to your system. The final assembly is described in Section 17.

A section is included on the care and maintenance of your system, please see Section 18. Skye Instruments also offer service / maintenance / recalibrations by post worldwide. On site engineer service visits are available directly from Skye in the UK, please contact your local Skye distributor for details of an on site service in your own country.

All instruction manuals are available on a CD supplied with the order and on our website www.skyeinstruments.info.

2. CHOOSING A SUITABLE LOCATION FOR AN AUTOMATIC WEATHER STATION

The ideal location for installing an automatic weather station would be a flat area of short kept grassland, minimum 10m x 10m in size, fenced and surrounded by a larger flat area with no height obstructions in the near vicinity.

Very few locations meet these ideal conditions, so the following guidelines should be used when choosing a suitable installation site.

2.1 Ground Based Installations

The weather station mast can be fixed into a grassy surface using guylines and pegs, or can be bolted or concreted in place for a more permanent fixture, using the guylines as steadying structures. The area required for a concrete base can be seen in Appendix 2.

The standard mast height is 2m, although other heights, either higher or lower may be more suitable to your own application. If there are any tall obstructions nearby, such as trees or buildings, make sure that the mast is placed at least twice the distance away of the height of the tallest obstruction. See Appendix 3.

Most sensors will be mounted on a central pole, but a raingauge is fixed at a distance of 3-4m from the base of the pole. Usually the raingauge is pegged or bolted to the ground so that the collecting rim is at a height of 50-60 cm above the ground. However, if a solid fence is to surround the weather station in a small area, this may interfere with rain collection, and in this case the raingauge should be raised so that its top rim should be at least as high as the top of the fence.

It is not always essential to enclose the weather station with a fence, but it is advisable in many cases, to prevent physical interference and damage to cables laying on the ground. A minimum area to be considered should be around 5 x 5 m.

If theft or vandalism may be a problem, a surrounding fence is advised. A large notice saying 'Danger - High Voltage' or such similar message should deter most intruders, even though there actually is no danger at all!

2.2 Roof Top Installations

In applications where there is no suitable open space, or it is more convenient for mains power or permanent linking to the PC, the weather station can be installed on the roof of building. The highest point of the tallest building should be chosen if at all possible.

Again, the standard mast height is 2 m, but the actual pole height should be chosen according to the immediate surroundings and obstructions, for example other buildings, tall trees, chimneys, exhausts etc. The same rule applies in that the mast should be placed at least twice the distance away, of the height of the tallest obstruction. See Appendix 3.

A 3m pole can be fixed to the side of the building, such as in a TV aerial installation, so that the lower 1 m is bolted to the wall, and the top 2m is projected above the roof top. This can be done to the side of a flat roofed building, or at the apex of the roof as appropriate.

If there is a handrail around the roof which is sturdy enough to prevent a person falling off, this could be used to clamp the 2m mast in place.

Alternatively, a 2m pole can be attached to the roof top itself. The exact method will depend on the fabrication of each roof, as usually the roof surface cannot be punctured by bolts etc. Sometimes a large metal plate is used as a mast base, which is then weighted down with concrete blocks.

Your mast pole may have been supplied in one, two or more pieces. If it is in one single piece you may ignore Section 3.1 and proceed to Section 3.2. If your pole is in more than one piece, following the joining instructions in Appendix 4 before proceeding.

3 MAST ASSEMBLY

3.1 Joining Instructions for a Mast supplied in more than one Section

There will be three small brass bars supplied for each joint required, each with 2 drilled and tapped holes, and fixing bolts and washers.

Fix a brass bar into each of the three holes at the end of one of the mast sections, using the bolts and washers, so that half of each bar is protruding. See Appendix 4.

Locate the protruding brass bars into the drilled end of the second mast section and bolt together to form a single length. See Appendix 4.

Repeat with further mast sections as necessary.

3.2 Erection of Mast on Grass or Soft Ground

Items required: pole, base plate, tent pegs, guylines with locking ring, large guy pegs, (mallet, spirit level - not supplied).

Place the aluminium base plate in position and insert the tent pegs only far enough to stop it moving - it may be necessary to adjust this finally.

Pass the guyline locking ring over the pole to about halfway. If the pole has been made up of two sections, make sure the locking ring is above the joining bolts. Place the bottom of the pole over the raised centre of the base plate.

Lay out the guylines at 120 degrees from each other, and at an angle of about 45 degrees out from the vertical pole. Undo the shackles at the end of the guylines, so that there is enough adjustment for tightening later. Drive the large 45 cm 'T' pegs into the ground at the end of each guyline and attach.

Adjust the guyline tautness by locking the ring into place, driving the 'T' pegs fully into the ground at the correct angle (90° to the guyline), and turning the shackles to tighten, keeping the mast pole as vertical as possible. Tighten the locking nuts on the shackles once the guylines are tight.

Finally, move the mast base plate slightly into position if necessary, so that the pole is fully vertical (use a spirit level). Drive home the tent pegs to secure.

3.3 Erection of Mast on a Concrete Base

3.3.1 Bottom Section Buried in Concrete

Items required: pole, guylines with locking ring, large guy pegs, (mallet, spirit level - not supplied, although a MiniMet Installation Toolkit is available for purchase – please enquire).

Usually a 3 m pole is supplied, the lower 1m for burying in concrete, resulting in a 2 m mast.

Firstly, at the chosen mast location, dig a hole 1 m deep and approximately 0.5 m diameter. Place the pole in the centre of the hole - if it has been joined from 1m + 2m sections, keep the jointed section nearest the top. Fill around the pole with fresh concrete. Leave the concrete to fully harden.

Pass the guyline locking ring over the top of the pole to about halfway. If the pole has been made up of two sections, make sure the locking ring is above the joining bolts.

Lay out the guylines at 120 degrees from each other, and at an angle of about 45 degrees out from the vertical pole. Undo the shackles at the end of the guylines, so that there is enough adjustment for tightening later. Drive the large 45 cm 'T' pegs into the ground (90 ° angle to the guylines) at the end of each guyline and attach.

Adjust the guyline tautness by locking the ring into place, driving the 'T' pegs fully into the ground at the correct angle (90° to the guyline), and turning the shackles to tighten, making sure the mast pole is vertical using the spirit level. Tighten the locking nuts on the shackles.

Finally check all adjustments to ensure the guylines are taut.

3.3.2 Mast Bolted to a Concrete Base

Items required: pole, base plate, guylines with locking ring, large guy pegs, (concrete bolts, mallet, spirit level - not supplied, although a MiniMet Installation Toolkit is available for purchase – please enquire).

Firstly prepare the concrete base according to the dimensions in Appendix 1 and leave to fully harden. There are two options for fixing the guylines, these may be driven into grass or soft ground around a central, small 20 cm square concrete base, or they can be bolted into the concrete if it is the full 1.6 m square area.

Place the aluminium base plate in position (note this isn't fully central if using a large 1.6 m base - see Appendix 1). Drill holes for the fixing bolts and secure.

Pass the guyline locking ring over the pole to about halfway. If the pole has been made up of two sections, make sure the locking ring is above the joining bolts. Place the bottom of the

pole over the raised centre of the base plate.

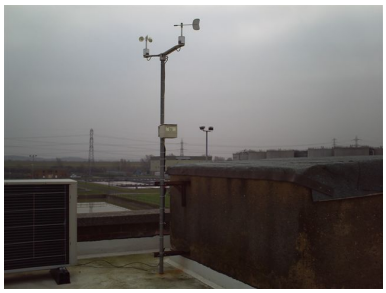
Lay out the guylines at 120 degrees from each other, and at an angle of about 45 degrees out from the vertical pole. Undo the shackles at the end of the guylines, so that there is enough adjustment for tightening later.

If bolting the guylines to the concrete, drill holes for the fixing bolts at the end of the guylines and attach.

If using pegs into soft ground, drive the large 45 cm 'T' pegs into the ground at the end of each guyline and attach.

Adjust the guyline tautness by locking the ring into place, (driving the 'T' pegs fully into the ground if appropriate), and turning the shackles to tighten, making sure the mast pole is vertical using the spirit level.

3.4 Erection of Mast on Roof Top



As each installation will have differing circumstances, there are no standard instructions for this section. Please contact Skye or your local distributor for advice or an installation quotation.

3.5 Erection of Mast on a Wall

Again each installation will have differing circumstances, but Skye can supply T&K Brackets for this type of installation.

3.6 10 Metre Retractable Mast

- The mast is made up of 5 tubular aluminium sections.
- The bottom tube is 2 metres long and the other four tubes are 2.2 metres long.
- The diameters have been chosen so that the tubes will telescope into each other.

- The bottom tube is the largest diameter and does not exceed 50 mm.
- The top tube is the smallest in diameter and does not exceed 38 mm.
- The wall thickness of the tube is not less than 2 mm.

3.6.1 Parts List for Mast :-

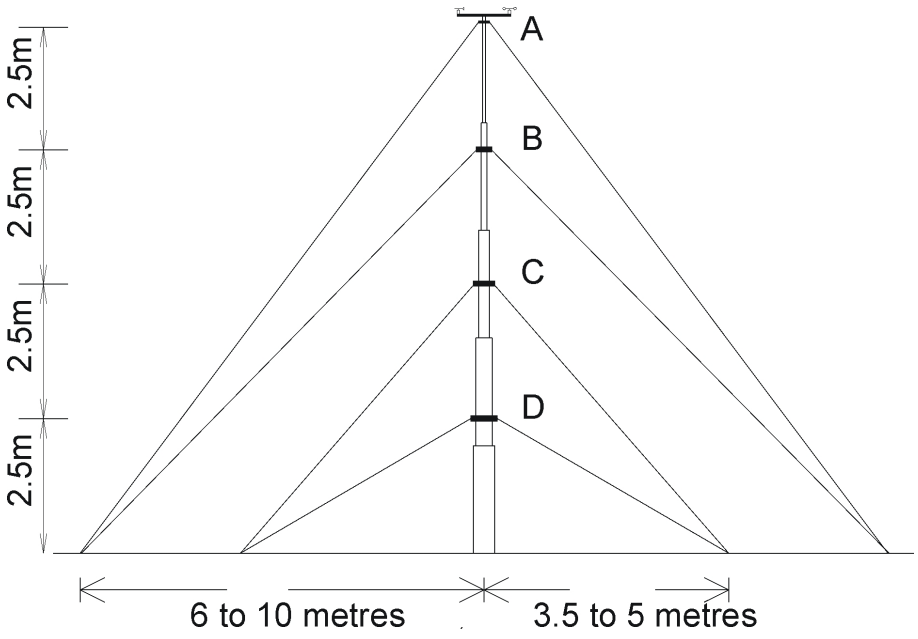
1	x	BASE PLATE
4	x	SMALL BASE PLATE PEGS
5	x	MAST SECTIONS
4	x	LOCKING COLLARS
4 sets	x	GUYLINES 3 guys per set fitted to a guyline ring, 3mm diameter galvanised steel wire rope (min. breaking load 0.538 tonnes), with adjustable straining screws
12	x	LARGE GUYLINE PEGS
1	x	TEMPORARY GUYLINE SET (3 ropes and 3 small pegs)

The mast baseplate should be held in place by the small pegs if used on soft ground or bolted in place if used on a concrete base.

The large guyline pegs are intended for use in soft ground. If the guylines are to be anchored to a concrete base then a suitable ring or eyebolt should be fixed to the concrete instead (please see Appendix 14)

Straining screws are attached to the lower end of the guylines. These can be hooked onto the large guyline pegs, or it can be hooked to the ring or eyebolt if used on a concrete base.

3.6.2 10 metre mast schematic



The mast will be erected as indicated in the sketch on the previous page.

This is not a scale drawing but is intended to show how the mast would look when fully erected.

Three guylines come from each guyline ring. The guylines from the top two rings are anchored at points close to each other on the ground. These points should ideally be 10 metres from the base of the mast, but not less than 6 metres away. The guylines coming from the two lower rings are anchored at points close to each other which should be 5 metres away from the base of the mast but not less than 3 metres.

3.6.3 Erection of 10 Metre Mast

a) Pre-Installation Assembly
(Can be done before going to the installation site)

1. Lay the mast on the ground and extend the sections. You will see that the lower end of each section has been marked with a cross hatch pattern using a permanent marker pen - this is to show the maximum safest extension length. Extend the mast sections until the marked areas are just not visible.

2. Gently finger tighten the guyline rings at the very top of the mast, and at 7.5m, 5m and 2.5m heights. Mark top and bottom position of the guyline ring with a permanent marker pen (for later reference).

3. Loosen the guyline rings and compress the mast, making sure the screws on the locking collars are approximately in line (this will aid erection later).

b) Installation On Site
(do not attempt to erect on a windy day)

1. Lay the compressed mast on the ground.

2. Fit the dual wind arm mount to the top of the pole, using the reducing adapter (usually already fitted into the mounting).

3. Fit the wind sensors to the dual wind arm mount – note the direction of the NORTH sticker for later positioning. (It will be useful to line up the wind arm mount with locking collar screws when raising the sections later). Attach the rotor and vane to the wind sensors.

4. Position the mast base plate at the installation spot and secure to ground with pegs (or bolts as appropriate).

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5. Drive the large guyline pegs about halfway into the (or fix bolts as appropriate), at 4.85m, 5.15m, 9.85m and 10.15m (approximately) from the mast base plate, 3 at each distance at 120 degrees circular spacing, (one for each guyline rope). Pegs should be fixed at an angle of approximately 45 degrees pointing away from the base plate.

6. Place the compressed mast onto the base plate. Rotate so that the windvane sensor NORTH marker is facing North, and the dual wind arm mount and locking collar screws are facing east / west (use a magnetic compass).

7. Use the temporary rope guylines supplied to hold the compressed mast vertical (using the small tent pegs). The temporary rope guylines are fitted by placing the small fixed loop in each guyline rope over the hooks in the collar on the bottom section of the mast. Then with the mast held vertical (use a spirit level) the other end of the guylines can be fixed using the small pegs supplied. The guylines can be tightened to hold the mast firmly by pulling the free end of the guyline. When the mast is in position tie a knot in the rope guyline's free end to stop it slipping.

8. Begin raising the mast sections one at a time. Use a free standing ladder or platform so that the top of the lowest section can be easily reached. This mast is intended to be extendable to a maximum of 10 metres. Under no circumstances should the mast be extended to a position where the cross-hatch marks on the extending sections come into view.

a) Raise the topmost section first – gradually about 0.5m at a time, use the locking collar to temporarily hold. Secure the wind sensor cables with cable ties at each interval.

b) Secure the guyline ring in the position marked in Pre-installation Assembly. Uncoil the wire guyline ropes so they are accessible from the ground later.

c) Continue raising until the cross hatch pattern is reached, and then lower slightly so that it is no longer visible. Rotate the mast section so that the protruding wind arm mount is still in line with the locking collar screws.

d) Finally tighten the locking collar.

e) Repeat with each next section in turn, from top to bottom. If it is windy during the installation, get some helpers to hold the longest guy ropes to prevent excessive movement of the topmost sections in the wind until secured.

9. Begin to secure the permanent guylines set by set, starting from the lowest (shortest) set.

a) Unscrew to extend the straining screws at the end of each guyline and hook them to the D shackle on each large tent peg or bolt (hook facing upwards)

b) Gently fasten all 3 guylines in the set and check the mast is still exactly vertical

before using the straining screws to tighten the guylines – do not overtighten – remember that metal expands and contracts with temperature. If installation takes place in the hottest season of the year, the guylines will contract and shorten as it cools, so make sure the guylines are not over strained.

c) Make sure the mast is exactly vertical by using the spirit level and adjusting the straining screws.

d) Repeat with each set of guylines finishing with the topmost, longest set.

10. When the mast has been fully erected remove the temporary guylines and pegs.

c) Fitting the 10 metre mast to a concrete base

Please refer to Appendix 14 which shows the plan for a concrete base.

There is a centre concrete block and six others set out as shown in the plan. The dimensions do not have to be exactly as shown but can be varied to suit the site. The inner set of blocks should be between 3.5 and 5 metres from the centre and the outer set of blocks should be between 6 and 10 metres from the centre.

The mast fits into a socket in a base plate which should be bolted down to the centre block.

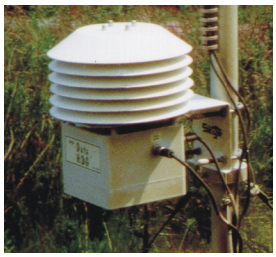
The guylines should be attached to eyebolts fixed into the other concrete blocks. There should be two eyebolts fixed into each block. These can be fixed in place at the time the mast is erected. If 'eye' rings are going to be set in the concrete at the time of pouring they should be 13mm i.d. and 25mm o.d.

If the eyebolts are to be fixed into the concrete when the mast is erected it will of course be necessary to drill into the blocks. This will normally be done using a cordless drill and will require a suitable mains socket nearby in order to recharge the drill batteries.

3.6.4. Mounting of datalogger and sensors

The installation of the datalogger and sensors is the same as for other masts, please see section 4

4 MOUNTING THE DATAHOG OR MINIMET



If your DataHog or MiniMet logger has integral or built in relative humidity and / or air temperature sensors, please follow instructions in Section 5

If your DataHog or MiniMet logger simply has sockets to plug in external sensors, a short arm pole mount can be used to install it. If you have purchased your logger directly from Skye, the mounting bracket will have already been fitted to the instrument for you. If you have purchased the items separately, please follow these instructions.

Unscrew the 4 screws on the underside of the datalogger and remove the base, you will see the instrument case has a 'double skin'. There are four mounting holes outside the inner compartment, one in each corner, which are used for attaching either the radiation screen (for integral RH & Air temperature DataHogs) or bracket (for DataHogs without integral RH & Air temperature).

DataHogs with integral RH & Air Temperature.
Undo the 4 screws on the white, protruding pillars on the flat underside of the radiation screen, and use these to screw the instrument case to the screen. You will need a small, long screwdriver for this job. Note that even though the instrument casing is square, the mounting holes are not squarely placed.

All Types of DataHog.
Tighten the four mounting screws securely but gently, and replace the instrument base. TAKE CARE to orientate the base correctly to prevent damage to the soft rubber 'O' ring seal, especially avoiding the battery ribbon and battery clips.

The bracket has four mounting holes on the flat back plate, suitable for bolting to a wall or vertical surface. It is supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. Use plastic cable ties to prevent cable movement and damage from rubbing.

5. RADIATION SCREENS FOR RELATIVE HUMIDITY AND AIR TEMPERATURE SENSORS / LOGGERS

Radiation screens have a dual purpose. Firstly, they provide shading for the air temperature sensor and secondly, it provides a physical protection for the delicate relative humidity transducer, located at the probe tip next to the temperature sensor.

DataHog with Integral RH and Air Temperature.
This has a specially designed, white aluminium reflecting screen, is naturally aspirated and has no direct line of sight path to allow reflected radiations to cause errors in the temperature measurement.

If you have purchased your radiation screen with a RH / temperature probe, or DataHog or MiniMet with integral RH / temperature sensors directly from Skye, the screen will have already been fitted to the instrument for you, ready for mounting.

If you have purchased the items separately, please follow these instructions to fit the radiation screen to your instrument.

Unscrew the 4 screws on the underside of the probe or datalogger and remove the base, you will see the instrument case has a 'double skin'. There are four mounting holes outside the inner compartment, one in each corner, which are used for attaching the radiation screen.

Undo the 4 screws on the white, protruding pillars on the flat underside of the radiation screen, and use these to screw the instrument case to the screen. You will need a small, long screwdriver for this job. Note that even though the instrument casing is square, the mounting holes are not squarely placed.

Tighten these four mounting screws securely but gently, and replace the instrument base. TAKE CARE to orientate the base correctly to prevent damage to the soft rubber 'O' ring seal, especially avoiding the battery ribbon and battery clips in the case of DataHog or MiniMet datalogger.

The bracket has four mounting holes on the flat back plate, suitable for bolting to a wall or vertical surface. They are supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. Use plastic cable ties to prevent cable movement and damage from rubbing.

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Separate RHT+ Probe

The RHT+ probe is usually supplied already mounted in its radiation screen with integral mounting bracket. If they have been supplied separately, the it is a very easy process to fit the RHT+ into the screen. The screen is fitted with a silicon diaphragm into which you push the probe. This diaphragm holds the probe securely in place. The radiation screen is supplied with a set of 'V' bolts, bolts, nuts & end caps, which are used to fasten the screen to the pole. The cable from the probe is then plugged into the socket labelled 'RH & Air Temperature'.
Use the supplied plastic cable ties to prevent cable movement and damage from rubbing.

All RH and Temperature Units

RH / air temperature sensors should be mounted in a position where air may freely circulate through the radiation screen, and are not near any hot or radiating objects if possible. The effects of mounting on a metal mast pole should be minimal, and should not cause any noticeable errors.

If your RH and air temperature is integral to the DataHog or MiniMet logger, then it will probably also have various sockets around the grey box for plugging in other sensors.

Protective Covers

There are instances when the RHT+ probe will have a protective cover over the end. These are used to protect the RH sensing element, which is located inside the PTFE housing, from damage due to a corrosive environment, such as chemical dust and salt spray.

6. LEVELLING UNITS FOR LIGHT SENSORS

The aluminium levelling unit holds any of the Skye light and radiation sensors securely in place and can be levelled to ensure that the top of the sensor is mounted horizontally. This is essential for accurate and repeatable measurements, as the sensors have a 180 degree hemispherical light acceptance area, the lower horizon of which must be level to ensure only incident light is received and to prevent reflection from the ground also being measured.

There are two styles of levelling unit. One where the light sensor is placed in a central holder with its cable passing through the provided opening, and secured with the 2 nylon screws. The levelling unit can then be attached to a pole / wall mount, or be sat on any flat surface to facilitate levelling using the three nylon bolts with locking wing nuts, and the level bubble. The other levelling unit does not have the central holder. Instead the sensor is fixed to a flat levelling unit with an M6 screw from underneath.

There are 2 more nylon bolts supplied for fixing to either a long or short arm mounting bracket. The brackets have four mounting holes on the flat back plate, suitable for bolting to a wall or vertical surface. They are supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. See Appendix 5 for assembly of mounting brackets.

Plug and screw up (do not over-tighten) the light sensor connector into the DataHog or MiniMet logger socket marked LIGHT and use plastic cable ties to prevent cable movement and damage from rubbing.

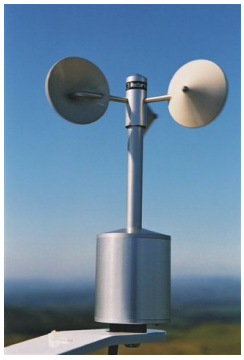
Light sensors should be mounted in a fully open area, so that no shadow or shade will fall across its surface at any time of day or at any sun angle. In general, mount facing directly southwards in the northern hemisphere, or directly northwards in the southern hemisphere, to ensure that the sensor is always pointing towards the direction of the sun.

For accurate measurements it is important to ensure that the levelling unit is level. As this sensor is usually mounted quite high up on the mast, use a mirror to view the level bubble on the unit and adjust accordingly.

7. MOUNTING WIND SENSORS

It is essential to install wind sensors in an open area, away from obstacles which may cause disturbances or eddies in the natural wind patterns. If you have followed the described guidelines for erecting the mast, this should ensure accurate wind measurements will be taken.

7.1 Vector Wind Sensors



To attach the rotor vanes to the body of the anemometer sensor, first remove the plastic protective cap from the spindle and push the rotors firmly on. You will feel a slight 'click' as the ball bearing locates, locking the rotor in place. To remove the rotor vanes, it is necessary to turn the entire assembly upside down so that gravity releases the ball bearings. Push the rotors upwards (towards the main body) and they are easily taken off. Replace the protective plastic cap over the spindle during transit or storage.

To attach the directional vane to the body of the windvane sensor, first remove the plastic protective cap from the spindle. This sensor has a single ball bearing which must be positioned exactly to secure the vane in place. You will see a notch near the end of the spindle which must be aligned with the ball bearing, just visible inside the vane cap. (It is located under the 'e' in 'Vector' on the label of the vane). Align and push the vane firmly on. You will feel a slight 'click' as the ball bearing locates, locking the vane arm in place. To remove the vane, it is necessary to turn the entire assembly upside down so that gravity releases the ball bearing. Push the vane upwards (towards the main body) and it is easily taken off. Replace the protective plastic cap over the spindle during transit or storage.

IMPORTANT – the windvane sensor must be mounted accurately against a reference to north, the use of a magnetic compass is advised. There is a large letter N on the windvane main body with an arrow which must be orientated towards north. Rotate the wind vane arm so that the shorter, round end is above the N and the arrow. Orientate the whole windvane body so that the arm, N and arrow are all facing actual north. When the sensor is in the position it will be measuring wind coming FROM a northerly direction.

7.1.1 Single Vector Wind Sensors

Wind sensors are usually placed at the highest point on the mast, although in some applications there will be multiple wind sensors set at different height levels.

For a single sensor, for example one anemometer, the sensor is fitted to the mast pole top using a mast cap. This aluminium cup type cap will fit over and fix to a pole of maximum diameter 38 mm. Simply screw the wind sensor to the mast cap using the screw on the underside of the sensor, fitting the large black spacing washer between the sensor and the fixture. Place over the top of the mast and secure in place using the two locking bolts.

Plug and screw up (do not overtighten) the anemometer connector into the DataHog or MiniMet logger socket marked WIND SPEED and use plastic cable ties to prevent cable movement and damage from rubbng.

If multiple wind sensors are to mounted singly at different heights, each can be fitted to a long arm bracket by using the same screw and spacer washer on the underside of the sensor. Then mount the bracket on the pole at the required height by means of the 'U' bolts provided. These can be fitted to masts up to 50 mm maximum diameter. Always use plastic cable ties to prevent cable movement and rubbing.

7.1.2 Vector Anemometer plus Windvane

The white painted aluminium dual arm wind arm bracket is designed to mount two wind sensors at the top of the mast pole of maximum diameter 38 mm, with minimal disturbance to each other.

Screw one wind sensor to each end of the dual wind arm using the screw on the underside of the sensor, fitting the large black spacing washer between the sensor and the wind arm. Place the central cap over the top of the mast and secure in place using the two locking bolts.

Plug and screw up (do not overtighten) the anemometer and windvane sensor connectors into the DataHog or MiniMet logger socket marked WIND DIRECTION and use the white plastic cable ties supplied to prevent cable movement and damage from rubbing.

7.2 Environmental Measurements Combined Wind Speed and Direction Sensors

1. As this assembly is best sited as high up the mast as possible, without causing interference to any of the other instruments, it is easier to assemble the instrument and bracket first and then slide it over the top of the mast and secure.

2. Using two M6 bolts and washers, affix the larger plate with the two 'V' shaped channels to the

instrument arm. The 'V' channels should be facing away from instrument.

3. Place the two 'U' bolts through the bracket. The 'U' should mate with the 'V' on the bracket.

4. Place one washer then one M6 nut on each thread.

5. Next place one white spacer over each thread.

6. The adapter plate is next placed over the threads taking care that the box faces outermost with the wires coming out of the bottom of the box.

7. Lastly, place one washer, one M6 nut and one end cap over the ends of each thread.

8. The complete assembly can now be slid over the top of the mast.

9. IMPORTANT. The instrument body has an 'N' printed on the side. Using a compass, align the 'N' so that it is pointing NORTH.

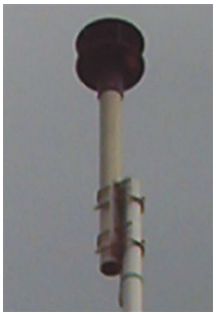
10. When the sensor is in this position, it will be measuring wind coming FROM a northerly direction.

11. The M6 nuts can now be tightened to secure the assembly to the mast.

12. Plug and screw up (do not overtighten) the sensors connectors into the DataHog or MiniMet logger sockets marked WIND SPEED and WIND DIRECTION respectively.

13. Use plastic cable ties to prevent cable movement and damage from rubbing.

7.3 Windsonic Wind Sensor



1. As this assembly is best sited as high up the mast as possible, without causing interference to any of the other instruments, it is easier to assemble the instrument and bracket first and then slide it over the top of the mast and secure.

2. Plug and screw up (do not overtighten) the cable to the bottom of the instrument.

3. Slide the adapter collar over the cable and up to the base of the instrument, being careful to align the three Allen screws in the instrument case with the three holes in the collar.

4. Tighten each Allen screw just enough to hold the collar in place.

5. Pass the cable through the supplied short section of tube.

MiniMet Installation

6. Now slide the tube up into the collar and tighten all three Allen screws to secure the instrument.

7. Using two 'U' bolts, affix the adapter plate to the other end of the tube. Tighten with one washer and one nut over each thread.

8. Loosely fit the remaining two 'U' bolts to the other side of the adapter plate.

9. This whole assembly can now be slid over the top of the mast.

10. IMPORTANT. The instrument body has an 'N' printed on the side. Using a compass, align the 'N' so that it is pointing NORTH.

11. When the sensor is in this position, it will be measuring wind coming FROM a northerly direction.

12. The 'U' bolt nuts can now be tightened to secure the assembly to the mast.

13. Plug and screw up (do not overtighten) the sensors connectors into the DataHog or MiniMet logger socket marked WINDSONIC.

14. Use plastic cable ties to prevent cable movement and damage from rubbing.

8. RAINGAUGES

It is essential to the accurate collection of rainfall that the tipping bucket gauge should be mounted level. An aluminium base plate is provided for this purpose, which can be pegged into soft ground, or bolted to a permanent surface.

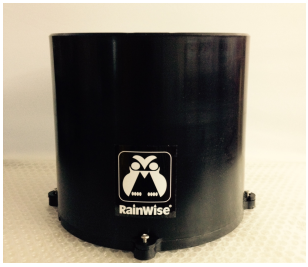
8.1 Environmental Measurements Raingauge ARG100

Firstly, remove the raingauge funnel collecting top by unscrewing the 3 plastic screws on its sides. Screw the 3 threaded pillars into the aluminium base plate so that the ends are flush with the underside of the plate, and secure with the locking nuts. Screw a white plastic knurled adjusting nut onto each of the pillars, about halfway down its length. Feed the raingauge base over the 3 pillars, feed on the white spacers and the final adjusting nut on top. See Figure 5.

Use the 6 adjusting nuts to level the raingauge base using the built-in level bubble as a guide and replace the raingauge funnel top.

The raingauge is fitted with 6m cable, so that it can be installed about 4m away from a 2m high mast. Plug and screw up (do not overtighten) the raingauge connector into the socket labelled RAINGAUGE on the DataHog or MiniMet logger. Run the cable down the pole and / or the guy ropes, securing with plastic cables to prevent movement and cable rubbing.

8.2 Rainwise Raingauge



1. It is essential to the accurate collection of rainfall that the tipping bucket gauge should be mounted level.

2. The raingauge is fitted with a 6m cable, so that it can be installed about 4m away from a 2m high mast.

3. Loosen the four screws on the outside of the raingauge and twist to separate the two halves of the instrument. Put the top to one side.

4. Screw the four threaded pillars into the aluminium base plate so that the ends are flush with the underside of the plate and secure with the four locking nuts.

5. Screw a white plastic knurled adjusting nut onto each of the pillars, about halfway down its length.

6. Feed the raingauge base over the four pillars.

7. Feed on the white spacers and the final white plastic knurled adjusting nuts.

8. The plate can now be positioned and pegged down to the ground using the four tent pegs.

9. With the aid of a spirit level, adjust the four white plastic knurled nuts to ensure the instrument is level.

10. The top half can now be screwed back on.

11. Plug and screw up (do not overtighten) the raingauge connector into the DataHog or MiniMet logger socket marked RAINGAUGE.

12. Run the cable down the pole and / or the guy ropes. Use plastic cable ties to prevent cable movement and damage from chafing.

8.3 Mounting Raingauges on Longarm Brackets type SKM 229.

1. It is essential to the accurate collection of rainfall that the tipping bucket gauge should be mounted level.

2. Using two M6 bolts, line up and attach the raingauge base plate to the longarm bracket.

3. On the underside of the bracket, attach one washer and one nut to each bolt and tighten.

4. The bracket can now be fixed to the mast using the three 'V' bolts, nylon washers, nuts and end caps.

5. Screw the threaded pillars into the aluminium base plate so that the ends are flush with the underside of the plate and secure with the locking nuts.

6. Screw a white plastic knurled adjusting nut onto each of the pillars, about halfway down its length.

7. Separate the raingauge and put the top to one side.

8. Feed the raingauge base over the pillars.

9. Feed on the white spacers and the final white plastic knurled adjusting nuts.

10. With the aid of a spirit level, adjust the white plastic knurled nuts to ensure the instrument is level.

11. The top half of the raingauge can now be replaced.

MiniMet Installation

12. Plug and screw up (do not overtighten) the raingauge connector into the DataHog or MiniMet logger socket marked RAINGAUGE.

13. Use plastic cable ties to prevent cable movement and damage from rubbing.

9. MOUNTING THE BAROMETER / AIR PRESSURE SENSOR

The barometer is usually mounted using a short arm bracket. If you have purchased the sensor plus its accessory directly from Skye, the bracket will already have been fitted to the instrument for you, ready for mounting.

If you have purchased the items separately, please follow these instructions to fit the mounting bracket to your sensor.

Unscrew the 4 screws on the top of the barometer casing and remove the top, you will see the instrument case has a 'double skin'. There are four mounting holes outside the inner compartment, one in each corner, which are used for attaching the mounting bracket. Screw the instrument case to the screen using the supplied nuts and bolts. You will need a small, long screwdriver for this job. Note that even though the instrument casing is square, the mounting holes are not squarely placed.

Tighten these four mounting screws securely but gently, and replace the instrument top. TAKE CARE to orientate the top correctly to prevent damage to the soft rubber 'O' ring seal.

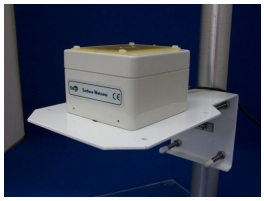
The short arm bracket has four mounting holes on its back plate, suitable for bolting to a wall or vertical surface. It is supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. See Appendix 5.

Plug and screw up (do not overtighten) the barometer sensor connector into the DataHog or MiniMet logger socket marked AIR PRESSURE and use plastic cable ties to prevent cable movement and damage from rubbing.

Barometer sensors can be mounted at almost any position. Sensors SKPS 800 and 810 are fully temperature compensated and can be installed in any exposed site without loss of accuracy. The barometer SKPS 820 is not temperature compensated, so care should be taken to install this sensor in a sheltered place, such as on the side of a building, in a glasshouse or shed, where extremes of temperature will not affect measurements too greatly.

All Skye barometer sensors measure absolute air pressure at their installed site. If air pressure relative to sea level is to be measured, the altitude of the installed site must be taken into account. This can be done directly in the DataHog loggers, by adjusting the zero offset for the sensor calibration factor in software. The calculation instructions for this, and for using with other dataloggers is given in the barometer manual.

10. MOUNTING A SURFACE WETNESS SENSOR



The surface or leaf wetness sensor is usually mounted using a long or short arm bracket, depending on the requirements of the installation. If you have purchased the sensor plus its accessory directly from Skye, the bracket will already have been fitted to the instrument for you, ready for mounting.

If you have purchased the items separately, please follow these instructions to fit the mounting bracket to your sensor.

Unscrew the 4 screws on the top (grid side) of the surface wetness sensor casing and remove the top, you will see the instrument case has a 'double skin'. There are four mounting holes outside the inner compartment, one in each corner, which are used for attaching the mounting bracket. Screw the instrument case to the screen, using the supplied nuts and bolts You will need a small, long screwdriver for this job. Note that even though the instrument casing is square, the mounting holes are not squarely placed.

Tighten these four mounting screws securely but gently, and replace the instrument base. TAKE CARE to orientate the top correctly to prevent damage to the soft rubber 'O' ring seal.

The bracket has four mounting holes on its back plate, suitable for bolting to a wall or vertical surface. It is supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. See Appendix 5.

Plug and screw up (do not overtighten) the surface wetness sensor connector into the DataHog or MiniMet logger socket marked Surface Wetness (or 0-2 V on some DataHogs) and use plastic cable ties to prevent cable movement and damage from rubbing.

The surface wetness sensor can be mounted at any height or angle, according to the surface under study, which it is simulating. For example, vertically to simulate an exposed, painted wall, or at an angle typical of leaf angle in a crop. Most typically, it is mounted horizontally for convenience.

11. INSTALLING TEMPERATURE PROBES

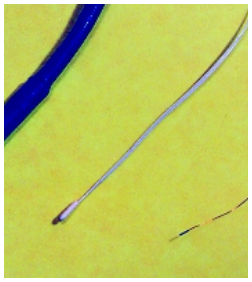
11.1 Soil Temperature Probes

These probes are supplied ready to be inserted into the ground. The sensing element is located 2cm from the tip of the probe, so this needs to be sited at the depth at which you wish to measure the soil temperature.

If the ground sample to be monitored is soft, simply push the probe into the surface to the required measurement depth. If the ground is harder or stony, it may be necessary for a small hole to be made before inserting the probe.

Plug and screw up (do not overtighten) the temperature sensor connector into the DataHog or MiniMet logger socket marked TEMPERATURE. Run the cable down the pole and / or the guy ropes, securing with plastic cables to prevent movement and cable rubbing.

11.2 Grass Temperature Probes



These utilise the same element as 11.1 but the sensing element is not covered - it is left exposed for a faster response. The wire from the element is connected to the standard sensor cable, terminating in a plug, which is screwed into the DataHog socket labelled TEMPERATURE.

These sensors can either be 'pegged' down on the grass, or mounted inside our radiation screen which has been specially designed for grass temperature measurements (SKRS 090). The purpose of mounting the sensors inside a screen is to minimise the effect of direct sun heating up the sensing element.

11.2.1 Assembly of the Radiation Screen

1. Screw two threaded pillars into each aluminium skid plate so that the ends are flush with the underside of the skid plate.

2. Place one long and one short white nylon spacer over each pillar.

3. Site the dish with the four sets of parallel holes and sticky pads over the pillars.

4. Ensure that the sticky pads are facing DOWN towards the skid plates

5. Place another long white nylon spacer over each pillar.

MiniMet Installation

6. Now place the second dish over the pillars followed by another set of long white nylon spacers. One on each pillar.

7. Place the third dish over the pillars and secure the assembly with the four white plastic knurled adjusting nuts.

8. Remove the backing paper off the three sticky pads on the underside of the bottom dish.

9. Apply the sensor over the sticky pads, ensuring that the white tip is pointing towards the centre of the dish, but arched slightly down and not actually touching the dish.

10. Use four plastic cable ties, laced through the corresponding four holes in the dish, to further secure the cable leading from the sensor.

11. The assembly can now be sited in the desired location.

12. Push the four tent pegs, one at each end of each skid plate, firmly onto the ground to secure the assembly.

13. Plug and screw up (do not overtighten) the sensor connector into the DataHog or MiniMet logger sockets marked GRASS TEMPERATURE.

14. Route the cable down the mast or a guyline. Use plastic cable ties to prevent cable movement and damage from rubbing.

12. INSTALLING SOIL MOISTURE TENSIOMETERS

Tensiometers require careful filling with boiled (and cooled) deionised water before installation. A bore must be made in the soil, the instrument inserted and gaps 'backfilled' with a soil slurry to ensure good contact. We would recommend the use of an auger, which can be purchased from Skye. Please see the Tensiometer manual for full details.

Plug and screw up (do not overtighten) the tensiometer connector into the DataHog or MiniMet logger socket marked TENSIOMETER. Run the cable down the pole and / or the guy ropes, securing with plastic cables to prevent movement and cable rubbing.

13 EVAPORATION PAN

The EVPAN Evaporation Pan is a standard Class A type for measurement of water evaporation. It is normally installed on a wooden platform set on the ground in a grassy location. The pan is filled with water and exposed to represent an open body of water. The pan is filled to within 2.5 inches of the top of the pan. The evaporation rate can be measured by manual readings or automatically recorded with the EVIG/1 evaporation gauge and a Skye DataHog or MiniMet datalogger.

The EVIG/1 Evaporation Gauge is used to determine the evaporation rate by measuring the changing water level in the Class A Evaporation Pan. The sensor consists of a float, pulley, and counterweight attached to a precision 1000-ohm potentiometer mounted through a gear assembly in a weatherproof housing. The triangular base plate is equipped with three levelling screws and a bubble level. The potentiometer produces a resistance output proportional to the position of the float which can be automatically recorded using the Skye DataHog or MiniMet data logger. The gauge can be placed directly in the pan, or connected to the pan using supplied stainless steel pipe and fittings.

The cable from the gauge is screwed into the socket on the DataHog labelled Evaporation Pan. Run the cable down the pole and / or the guy ropes, securing with plastic cables to prevent movement and cable rubbing.

Please refer to the separate manual for this product for full instructions.

14. MOUNTING THE SOLAR HOG POWER SUPPLY

This chapter describes the mounting of the Solar Hog power supply for DataHog and MiniMets dataloggers. To mount the solar power source for the GSM/GPRS remote link options, please see Section 16.

The Solar Hog optional solar power source contains its own rechargeable batteries which can permanently power the DataHog or MiniMet system. A bracket is incorporated in the Solar Hog's design which has four mounting holes on its back plate, suitable for bolting to a wall or vertical surface. It is supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. See Appendix 5.

The Solar Hog requires a fairly clear view of the sun and sky in order to be able to charge its batteries. Hence it should be mounted in a southerly direction in the Northern Hemisphere, or a northerly direction in the Southern Hemisphere. However, if the DataHog or MiniMet system also contains a light or solar radiation sensor, this sensor must take priority over positional placing, and must not be obscured. It is acceptable for the Solar Hog to be shaded for a short time during the day, as the sun passes overhead and above the light sensor, but preferably this shouldn't happen when the sun is highest, around midday. So the Solar Hog should not be installed directly underneath the light sensor, but at about 45 degrees to the side, so that it receives strong early morning or strong late afternoon sunshine, which is usually sufficient to keep all batteries charged.

Plug and screw up (do not overtighten) the Solar Hog 8 pin connector into the DataHog or MiniMet logger socket marked RS232 and use plastic cable ties to prevent cable movement and damage from chafing.

The RS232 socket is used for connecting the logger to the PC. There is a secondary RS232 socket on the Solar Hog which must now be used for the computer connection, so that the solar power supply to the logger is not interrupted.

15. INSTALLING THE MAINSHOG POWER SUPPLY

As each mains powered installation will be slightly different, this is just a general guide.

The MainsHog contains a transformer which provides a 12 V supply to the DataHog or MiniMet logger. As it contains full mains voltages, the MainsHog housing itself is not suitable for an outdoor installation and is usually placed near the connecting PC.

The cable running from the MainsHog to the datalogger has two purposes, it not only takes power to the logger, but also acts as the data connection cable.

15.1 Standard MainsHog

If the distance between the MainsHog and the DataHog or MiniMet is less than 50m, you will have been supplied with a standard Mains Hog version.

Connect the unit to the 110V or 220V mains supply as appropriate, preferably near a PC. Run the long cable out to the DataHog or MiniMet datalogger, connect and screw up (do not overtighten) the 8 pin connector into the logger socket marked RS232. Install the long cable carefully to prevent cable movement and damage from chafing.

To link the DataHog or MiniMet to the PC, connect the 1m datalead and USB Serial/USB converter between the RS232 socket on the MainsHog unit, and a USB port of the computer. Install and run SkyeLynxComms (please refer to the separate manual).

15.2 Mains Hog with Signal Boosters

If the distance between the MainsHog and the DataHog or MiniMet is greater than 50m, you will probably have purchased the MainsHog version with Signal Boosters. In which case you will also have a second outdoor unit fitted with a mounting bracket, ready to install out with the datalogger.

Install the outdoor unit near the DataHog or MiniMet. The mounting bracket has four holes on its back plate, suitable for bolting to a wall or vertical surface. It is supplied as standard with a pair of 'V' bolts, washers, nuts and end caps used for fixing to a pole or mast up to a maximum diameter of 50 mm. Plug in and screw up (do not overtighten) the 8 pin connector on the short cable into the logger socket marked RS232. Use plastic cable ties to prevent cable movement and damage from chafing.

Connect the long cable between the MainsHog and the outdoor unit as described in the instruction manual. Install this cable carefully to prevent cable movement and damage from chafing. Connect the MainsHog unit to the 110V or 220V mains supply as appropriate, preferably near a PC.

MiniMet Installation

To link the DataHog or MiniMet to the PC, install the 1m datalead between the RS232 socket on the MainsHog unit, and the serial port of the computer. Install and run the Skye software as instructed in the manual.

16. INSTALLING THE GSM/GPRS REMOTE LINK

This module allows the remote connection of the DataHog or MiniMet logger via the GSM/GPRS digital mobile telephone network. Whilst the two systems use different mobile phone technology and operate in different ways, installation on the mast is the same.

Please refer to the separate GPRS manual for full details of how this system works.

The GSM/GPRS module housing itself is usually installed near the base of an outdoor mast, using the fitted mounting bracket and supplied bolts, spacers, washers, nuts and end caps. In most cases the GSM/GPRS housing will already be fitted to its mast bracket, but please see Appendix 7 if assembly is required.

16.1 GSM/GPRS Remote Link (excluding Solar Panel)

Appendix 8 shows the mounting of the GSM/GPRS housing and bracket onto the pole.

Locate the black cable with a round 8 pin plug coming from the base of the GSM/GPRS housing. Connect and screw up (do not overtighten) this plug into the DataHog or MiniMet logger socket marked RS232.

The antenna is already connected inside the GSM/GPRS housing. The antenna and bracket just need fixing to the mast. The antenna needs to be mounted on the mast as high as possible, see Appendix 15

To connect the 12V battery, first locate the white cable coming from the base of the GSM/GPRS housing. Connect the red spade connector (brown wire) to the positive terminal of the battery. Connect the black spade terminal (blue wire) to the negative terminal. A plastic sheet is provided which can be bent over the battery and pegs to the ground, to give some protection from the weather (see Appendix 15)

Use plastic cable ties to protect all cables from movement and damage from chafing.

16.2 GSM/GPRS Remote Links with a Solar Power Source

If this option has been purchased, the solar panel may be mounted back-to-back with the GSM/GPRS module housing. In some cases, if the GSM/GPRS unit has been installed in a shaded site, it may be necessary to install an additional mast nearby to mount the solar panel.

Appendix 9, 10 and 11 show the order in which to assemble the GSM/GPRS housing and solar panel on one pole. The main brackets are mounted first, (Appendix 9), the solar panel hinged bracket second (Appendix 10), and finally the solar panel itself is attached (Appendix 11)

MiniMet Installation

The solar panel hinged bracket can be angled according the to installation site latitude (a guide is latitude + 15 degrees, e.g. for the UK, tilt the solar panel at 52 + 15 = 67 degrees from the horizontal).

The solar panel itself either slides sideways onto the 2 restraining bolts or is bolted on.

To install the solar panel on the same mast as the GSM/GPRS module, first **COVER THE SOLAR PANEL**. Then slip the bolts around the mast within the GSM/GPRS module's spacers, and then attach the spacers and solar bracket. The end result will be the 2 sets of bolts neatly interlaced between both spacers.

Connect the solar power cable, through the cable gland, into the GSM/GPRS module housing. Please see GSM or GPRS manual for connection details. Tighten the cable gland to seal.

Use plastic cable ties to protect the cable from movement and damage from rubbing. Finally Remove the cover on the solar panel.

17. FINAL SYSTEM ASSEMBLY

This chapter simply summarises the entire system assembly, but as each installation will be slightly different and incorporate different combinations of sensors, it is only meant as a general overview.

Firstly, the mast should be erected as described in Chapter 3. Secondly, attach the GSM/GPRS unit if one has been purchased. Then attach sensors and components starting from the bottom and finishing with the highest.

Generally, wind sensors need to be at the highest point of the mast, and light sensors require a clear view of the sunward sky, so these sensors require most consideration of their placing on the mast. Other sensors are less critical in their placing.

17.1 Standard MiniMet Assembly

Appendix 13 shows a typical MiniMet weather station installation, with the standard Solar Hog option. The raingauge is ground mounted and the soil temperature inserted into the soil. The Solar Hog is usually mounted about halfway up the pole, facing towards the sun. A barometer can be mounted next highest, its orientation is not critical.

The light or solar radiation sensor on its long arm pole mount can now be mounted so that the top of the sensor is approximately at the height of the top of the pole, and orientated North or South as appropriate.

The DataHog or MiniMet incorporating the RH and air temperature probes are usually placed opposite the light sensor, to counter each other's weight. The short arm pole mount on the logger means that it is possible to place the top of the radiation screen also at the height of the top of the pole.

If the RH and air temperature sensors are separate from the datalogger, mount this on its long arm bracket lower than the light sensor, to ensure that it does not obscure any sunlight from the sensor.

Finally, the wind sensor(s) are placed over the top of the pole using the pole cap mount.

Run cables up and down the pole as necessary, using gaps between the pole and the 'U' bolts, cable ties and the supplied adhesive cable tidy to secure cables.

17.2 GSM/GPRS MiniMet Assembly

Appendix 12 shows a diagram of a typical GSM or GPRS assembly.

MiniMet Installation

The GSM/GPRS module housing can be mounted on the lower half of the pole. If supplied, the GSM/GPRS solar power supply can also be mounted opposite it.

The raingauge is ground mounted and the soil temperature inserted into the soil.

A barometer can be mounted just above halfway up the pole, its orientation is not critical.

The light or solar radiation sensor on its long arm pole mount can be mounted so that the top of the sensor is approximately at the height of the top of the pole, and orientated North or South as appropriate.

The DataHog or MiniMet incorporating the RH and air temperature probes are usually placed opposite the light sensor, to counter each other's weight. The short arm pole mount on the logger means that it is possible to place the top of the radiation screen also at the height of the top of the pole.

If the RH and air temperature sensors are separate from the datalogger, mount this on its long arm bracket lower than the light sensor, to ensure that it does not obscure any sunlight from the sensor.

Finally, the wind sensor(s) are placed over the top of the pole using the pole cap mount.

Run cables up and down the pole as necessary, using gaps between the pole and the 'V' bolts, cable ties and the supplied adhesive cable tidy to secure cables

18 CALIBRATION AND MAINTENANCE FOR MINIMET WEATHER STATIONS

1. DATAHOG2 DATALOGGER

The logger should never be used outdoors without either a sensor plug or blanking dustcap fitted to any of its sockets. Periodic check that all are in place is advisable.

An annual check / replacement of the internal batteries (if fitted) should be made, and the 'O' ring lid seal replaced.

The logger itself should be periodically checked that the electronics is recording accurately. This can be done by Skye or by applying known voltages, currents or digital pulses into the logger inputs and checking the logger's measurements.

2. RELATIVE HUMIDITY SENSOR

Theses sensors are recommended to be calibrated annually.

The sensor (or DataHog2 logger with integral sensors) can be returned to Skye or the RH recalibration kit (SKH 1092 or 1093) provides equipment for the user to make their own recalibrations using the saturated salt solution technique.

The radiation screen and mounting should be kept clean to ensure good air flow over the sensor tip.

3. AIR TEMPERATURE

Theses sensors are recommended to be calibrated annually.

Sensors can be returned to Skye or can be checked by a direct comparison against a reference thermometer in a controlled environment.

The radiation screen and mounting should be kept clean to ensure good air flow over the sensor tip.

4. SOLAR RADIATION, UV AND LIGHT SENSORS

The light collecting surface of these sensors should be kept clean by gently wiping with a damp cloth. Do not use solvents. Care must be taken not to scratch this surface.

These sensors require recalibration every 2 years, return to Skye is recommended for accurate calibration. Pyranometer sensors can be calibrated by a direct comparison against a Reference Pyranometer under clear sky conditions. Other sensors require calibration using an optical bench

fitted with a reference lamp.

5. WIND SPEED

These wind speed rotors are initially calibrated in a wind tunnel by comparison with a standard reference rotor calibrated to national standards (NPL).

As long as the physical shape or form of these calibrated parts does not change, (i.e. by physical damage to the rotor) then the sensor calibration does not change to any measurable degree as l ong as the bearings are allowing free movement. A bearing check is recommended annually, with a bearing change recommended at a minimum of every 2-3 years.

6. WIND DIRECTION

The position of the wind vane relative to the electrical potentiometer inside is calibrated and fixed at the time of manufacture.

As long as the physical shape or form of the wind vane and its spindle does not change (i.e. by physical damage), then the sensor calibration does not change to any measurable degree as long as the bearings are allowing free movement. A bearing check is recommended annually, with a bearing change recommended at a minimum of every 2-3 years.

7. BAROMETER

Recalibration is recommended annually. Sensors can be returned to Skye or can be checked by a direct comparison against a reference.

8. RAINGAUGE

The raingauge top should be kept free of debris at all times. In dusty environments it may be necessary to clean the funnel filter regularly.

These gauges can be easily recalibrated by adding an exact volume of water. Full instructions are given in the sensor manual.

19 ANNUAL SERVICE CONTRACTS

CONTRACT 1

Return to base service.
Includes:
Calibration / operation check and fit new batteries for DataHog datalogger
Recalibration of 1 sensor annually (for example RH sensor)
Recalibration of 1 sensor biennially (for example solar radiation sensor)
Spares and new filter for raingauge

All instrument transfer by courier. Disconnection and reconnection of sensors and logger to system to be done by user

CONTRACT 2

Annual 'health check' service
One site visit by engineer to undertake:
Calibration / operation check and fit new batteries for DataHog datalogger
Recalibration of 1 sensor annually (for example RH sensor)
Recalibration of 1 sensor biennially (for example solar radiation sensor)
Clean radiation screen to ensure free air flow over sensors
Clean and fit spares and new filter to raingauge
Check total system for integrity
Full telephone support

PRE-PAID CONTRACT 2

Pre-paid CONTRACT 2 annual 'health check' service - Ideal if further funding isn't available in the future

CONTRACT 3

Annual 'health check' service plus emergency call out within 5 working days
One site visit by engineer to undertake:
calibration / operation check and fit new batteries for DataHog datalogger
Recalibration of 1 sensor annually (for example RH sensor)
Recalibration of 1 sensor biennially (for example solar radiation sensor)
Clean radiation screen to ensure free air flow over sensors
Clean and fit spares and new filter to raingauge
Check total system for integrity

One emergency call out visit within 5 working days
Full telephone support

MiniMet Installation

CONTRACT 4

Annual 'health check' service plus emergency call out within 2 working days
one site visit by engineer to undertake:
calibration / operation check and fit new batteries for DataHog datalogger
Recalibration of 1 sensor annually (for example RH sensor)
Recalibration of 1 sensor biennially (for example solar radiation sensor)
Clean radiation screen to ensure free air flow over sensors
Clean and fit spares and new filter to raingauge
Check total system for integrity

One emergency call out visit within 2 working days
Full telephone support

CONTRACT 5

Biennial or Triennial 'health check' service of WindHog System
one site visit by engineer to undertake:
calibration / operation check of WindHog system
Replacement of Lid Gasket and Gel pack in DataHog2 and Remote Signal Booster
Replacement of Wind Speed Sensor Bearings (years 2, 4 & 6)
Replacement of Wind Vane Bearings (years 2, 4 & 6)
and Potentiometer (year 6 or year 8)
Clean system (each visit)
Check total system for integrity (each visit)
Full telephone support all year

PLEASE NOTE:

For all maintenance contracts repairs outside manufacturers warranty terms and conditions and any additional call out visits charged at cost.

20 SOFTWARE

a) Installed MiniMets without GSM/GPRS or a cable link to a computer

To offload the data from this type of installation, the MiniMet needs to be visited with a laptop computer and the RS232 to serial data lead which was supplied with your station.

The software you will require is SkyeLynxComms. This needs to be pre-installed on your laptop. Please refer to the separate manual for SkyeLynxComms.

The data offlooaded is a text file. This file can then be used in the office with readily available software, such as Excel, for manipulating the data and drawing graphs. For computers running Windows XP and earlier, we can offer SkyeLynx Deluxe Graphing Package.

b) Installed MiniMets with a cable link to a computer, but without GSM/GPRS

There are two options for this installation depending on whether you require just the data, or if you would like a 'Live Display' of the weather on your computer.

i) Data only.

You will need SkyeLynxComms installed on the PC attached to the MiniMet. Offload the data as and when you require. Again, the data is a text file and can be used with software such as Excel for manipulating the data and drawing graphs. For computers running Windows XP and earlier, we can offer SkyeLynx Deluxe Graphing Package.

ii) Live Display

For this option you will need to purchase from Skye the DHSU utility.
The MiniMet DataHog sends a datastring at the logging interval set in the DataHog configuration. The datastring shows the readings of each channel at the time it was sent. So, if your dataHog is configured for 10 minute logging, then a datastring showing the readings will be sent every 10 minutes.

DHSU will be 'listening' on the Comm Port connected to your MiniMet and when it detects the datastring, the software will display it on the computer screen and store the datastring in a day file.

eg.

Day files will then accumulate, which you can, again, use in programmes such as Excel for historical analysis.

If you require 'Live Display' with 1 month of historical data then you can purchase Weather Display & Weather Display Live from www.weather-display.com These programmes also use the datastring 'picked up' by DHSU and are suitable for use with the Skye DataHogs. Please note, that you will also require DHSU.

c) Installed MiniMets with GPRS

These stations operate in a different way and 'offloading data' is not required. The MiniMet automatically sends the data over the internet by TCP/IP protocol to a server with a public IP address. www.minimet.co.uk is the Skye server, and customers using this server will be given their own user name and password for access to their data.
Access to data only is provided as part of the cost of the MiniMet, but a 'DataPlus Service', which gives 'Live Display' of the weather and one month of historical data in graphical format, is offered for a reasonable annual charge.

There is a separate manual for GPRS MiniMets.

d) Installed MiniMets with GSM

These will be MiniMets purchased before 2014. They use Circuit Switched Data (CSD) technology,

which, although still available from some cellular network providers, has generally been replaced by GPRS. It is difficult to obtain SIM cards enabled for CSD.

Suitable software for these installations will be SkyeLynx Auto and SkyeLynx Deluxe, but only for PCs running Windows XP and earlier.

21 TROUBLESHOOTING

Our website www.skyeinstruments.com has a comprehensive Technical Support Section.

Our website www.skyeinstruments.info includes all product manuals and datasheets.

Please visit http://www.skyeinstruments.com/customer-technical-support/.

APPENDIX 1
LIST OF TOOLS REQUIRED FOR INSTALLATION
(AVAILABLE FOR PURCHASE AS ACC/20)

1. Nutspinner M6/10mm A/F
2. Screwdriver 75 x No. 1 Phillips
3. Screwdriver 75 x 3mm parallel tip
4. Cutters 140mm
5. Screwdriver chubby flat
6. Club hammer 2.5lb
7. Allen keys 3mm
8. 6" adjustable spanner
9. Compass
10. Small spirit level
11. 10mm ring spanner
12. No. 2 Phillips screwdriver
13. 13mm ring spanner
14. Small inspection mirror
15. Tube silicon grease
16. 30 x locking cable ties

APPENDIX 2
CONCRETE BASE FOR A 2M MAST

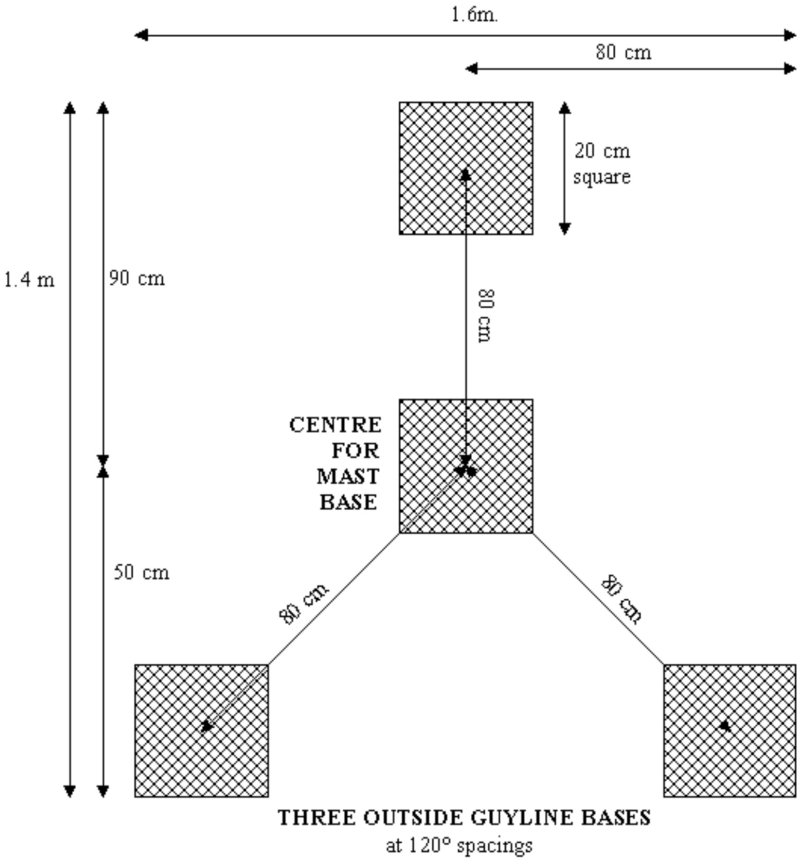
Preparation of a concrete base for 2m mast and guylines installation

There are two options for a concrete base:

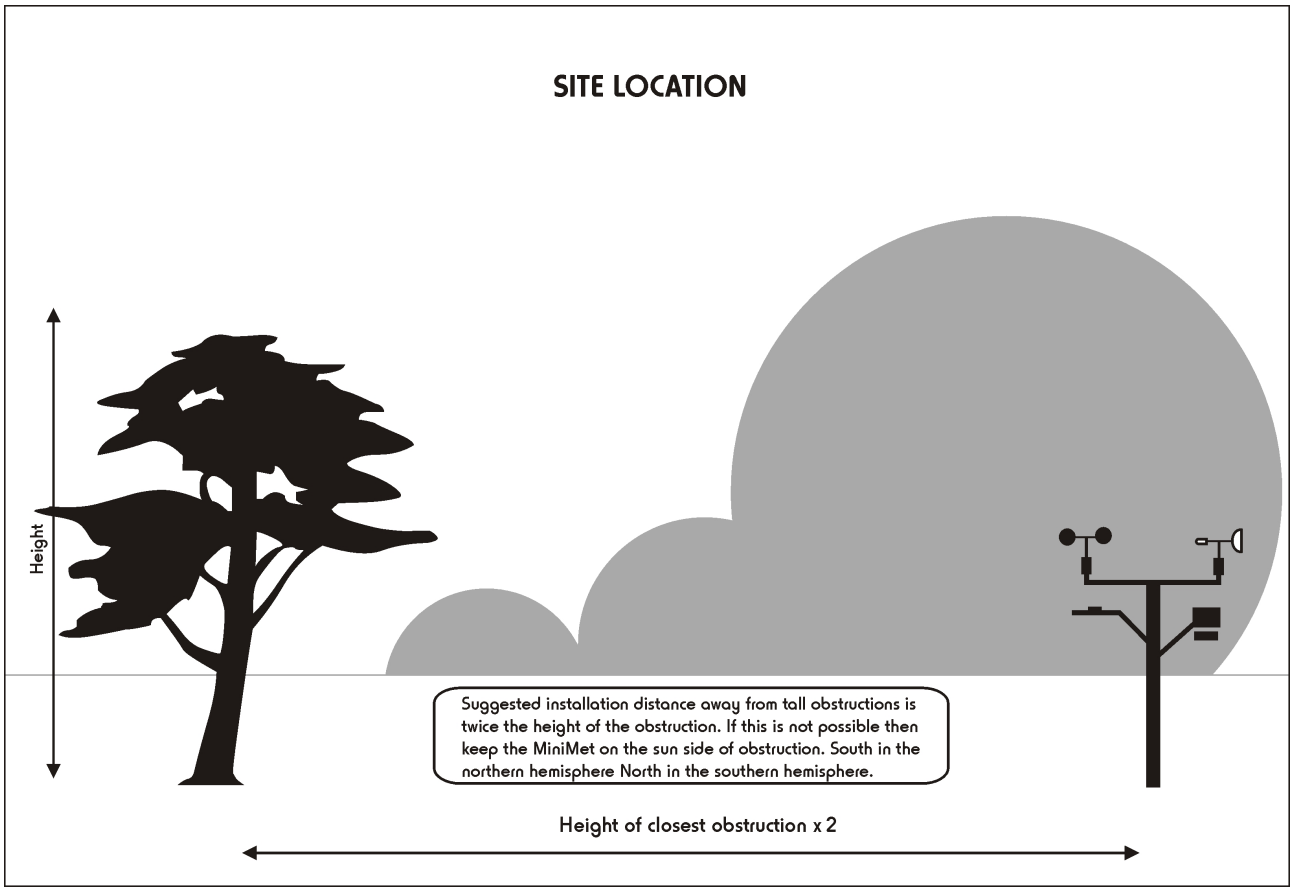
1.one large rectangular area of 1.6 x 1.4 m

2.four smaller square areas of 20 x 20 cm, one for the base of the mast and one each for the 3 guylines (see drawing below).

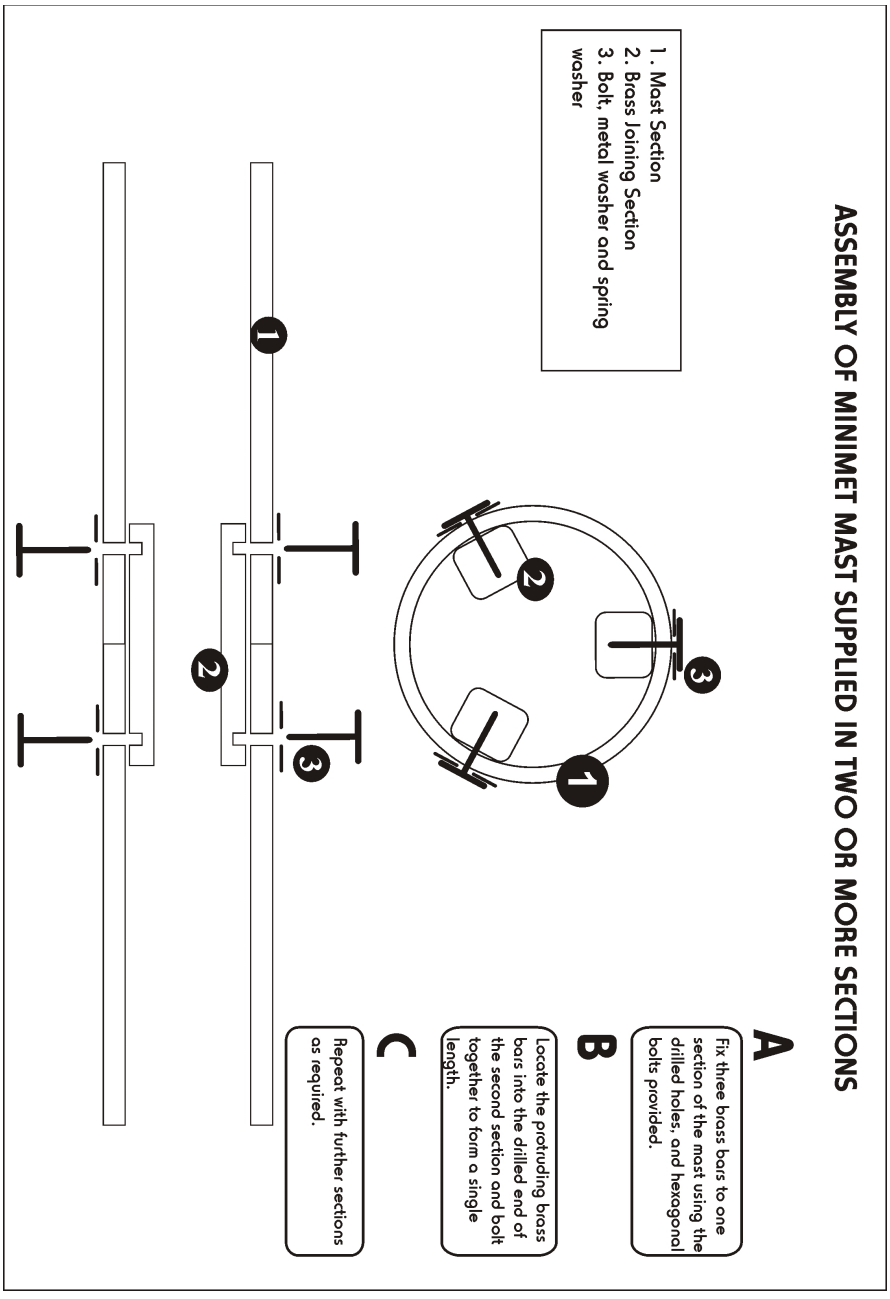
The standard recommended depth for these concrete areas is 50-60 cm. However, depending on ground type at the installation site, it may be necessary to increase this depth. Each location should be individually assessed.



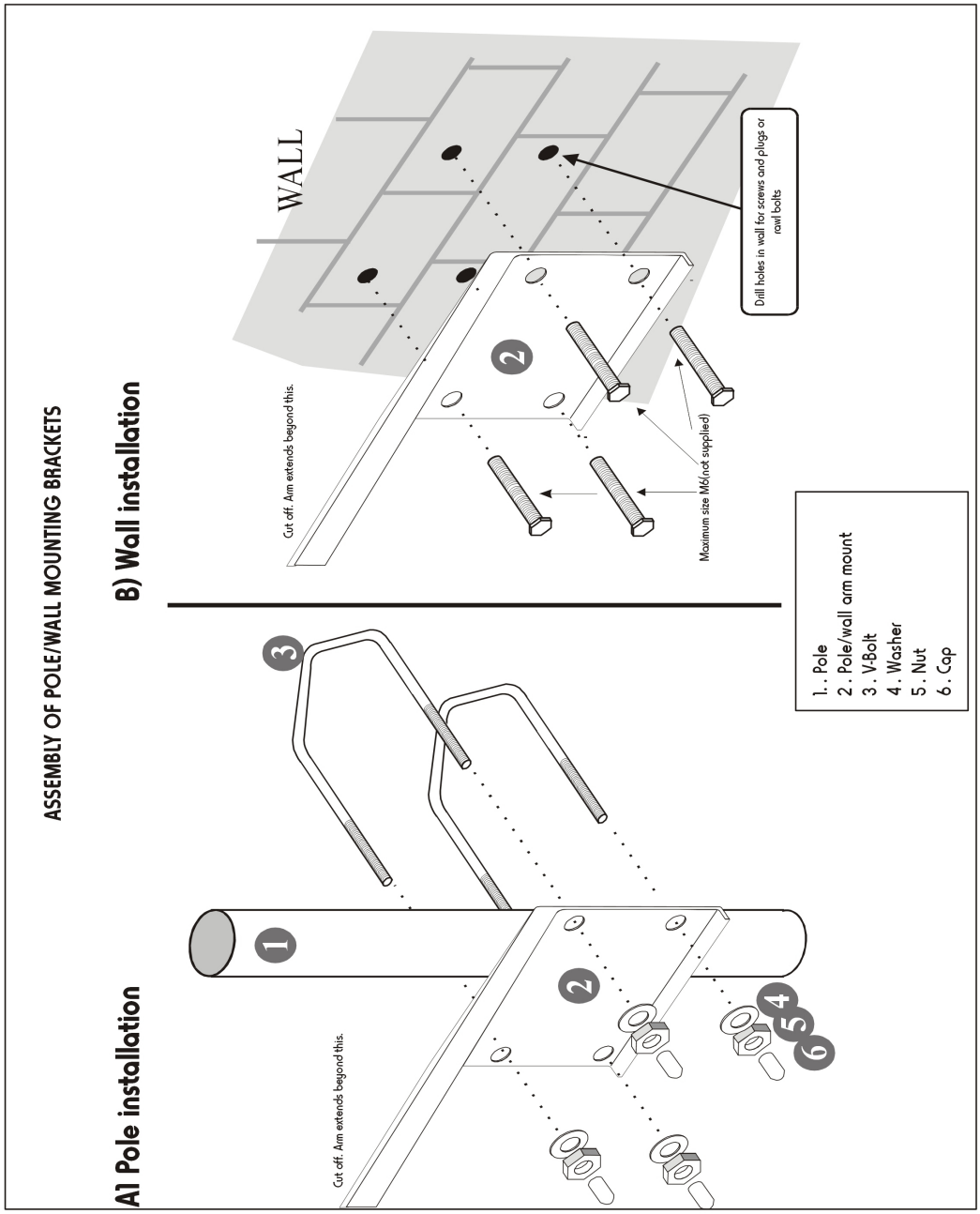
APPENDIX 3
SITE LOCATION



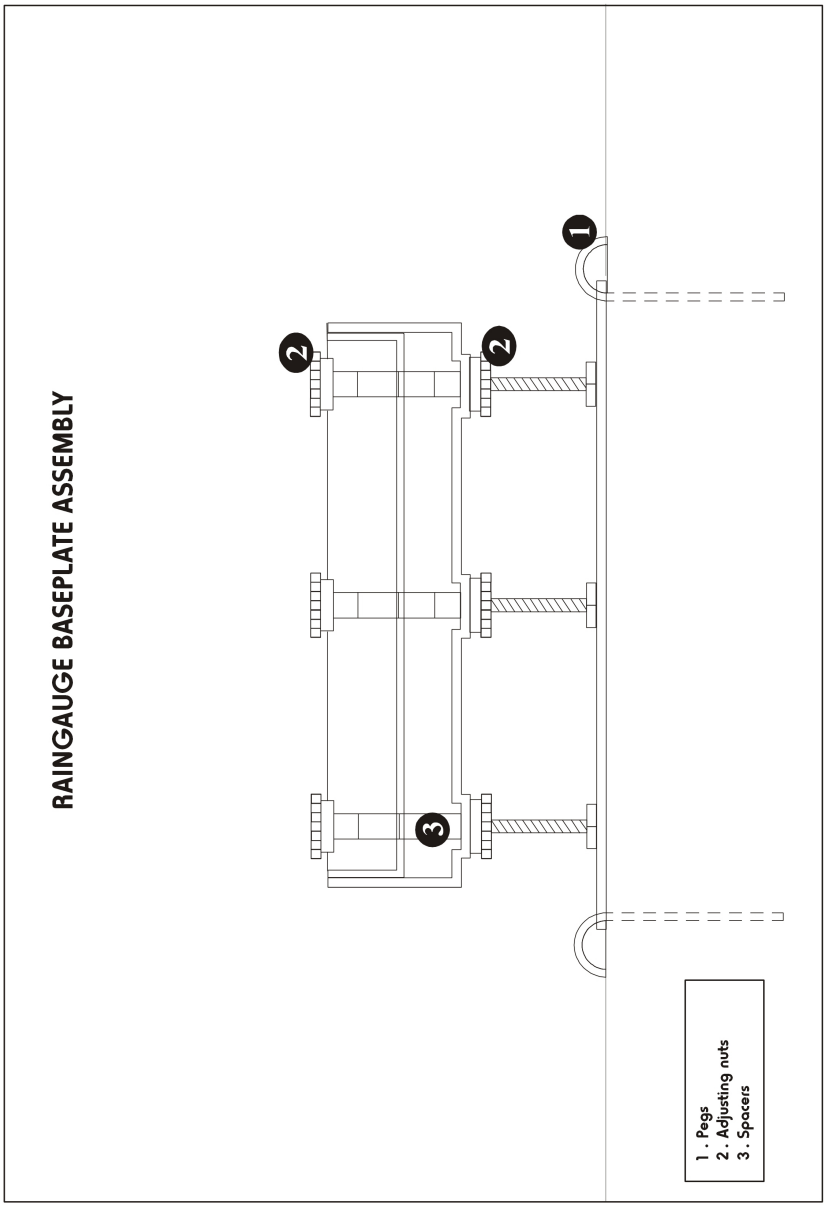
APPENDIX 4
ASSEMBLY OF MAST SUPPLIED IN MORE THAN ONE SECTION



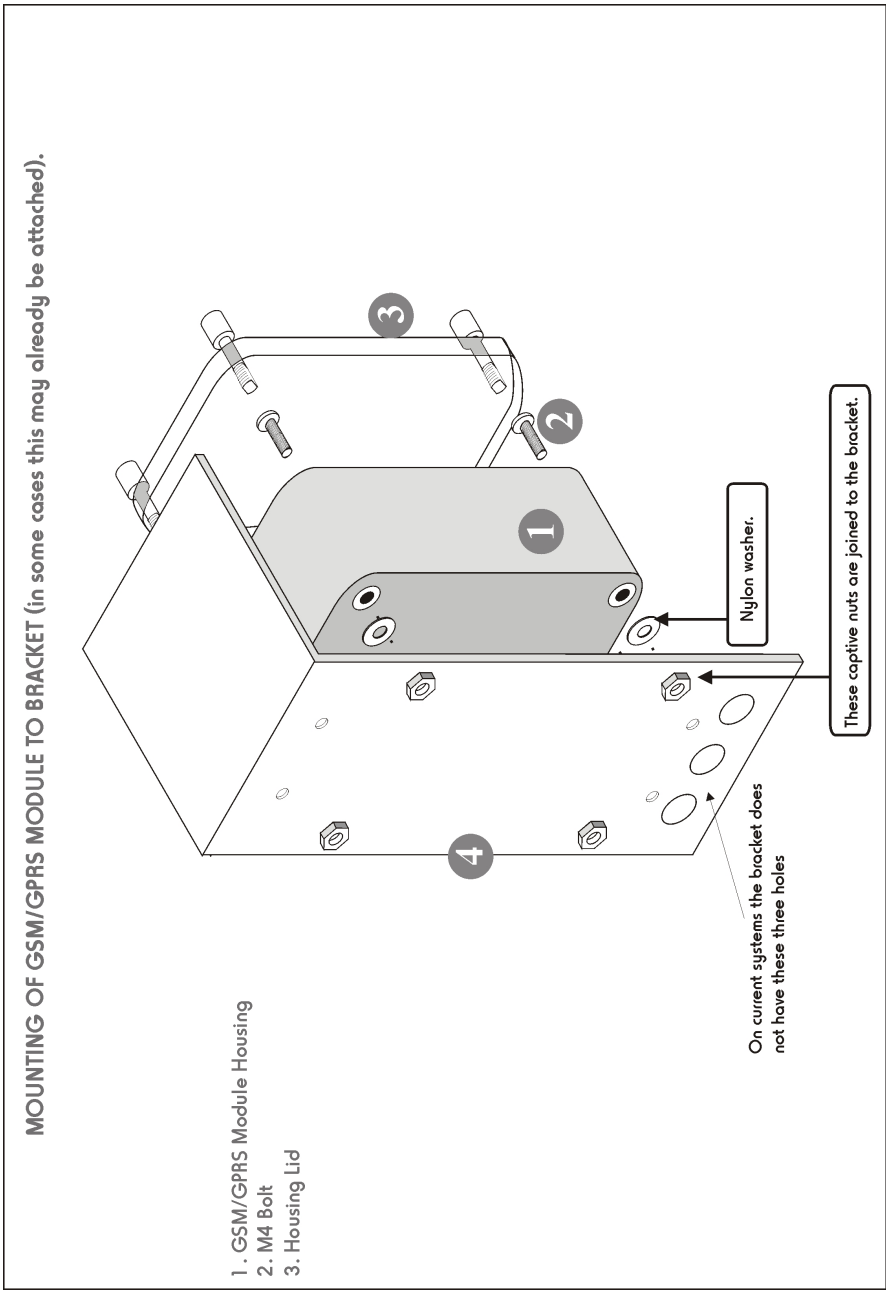
APPENDIX 5
ASSEMBLY OF POLE/WALL MOUNTING BRACKETS



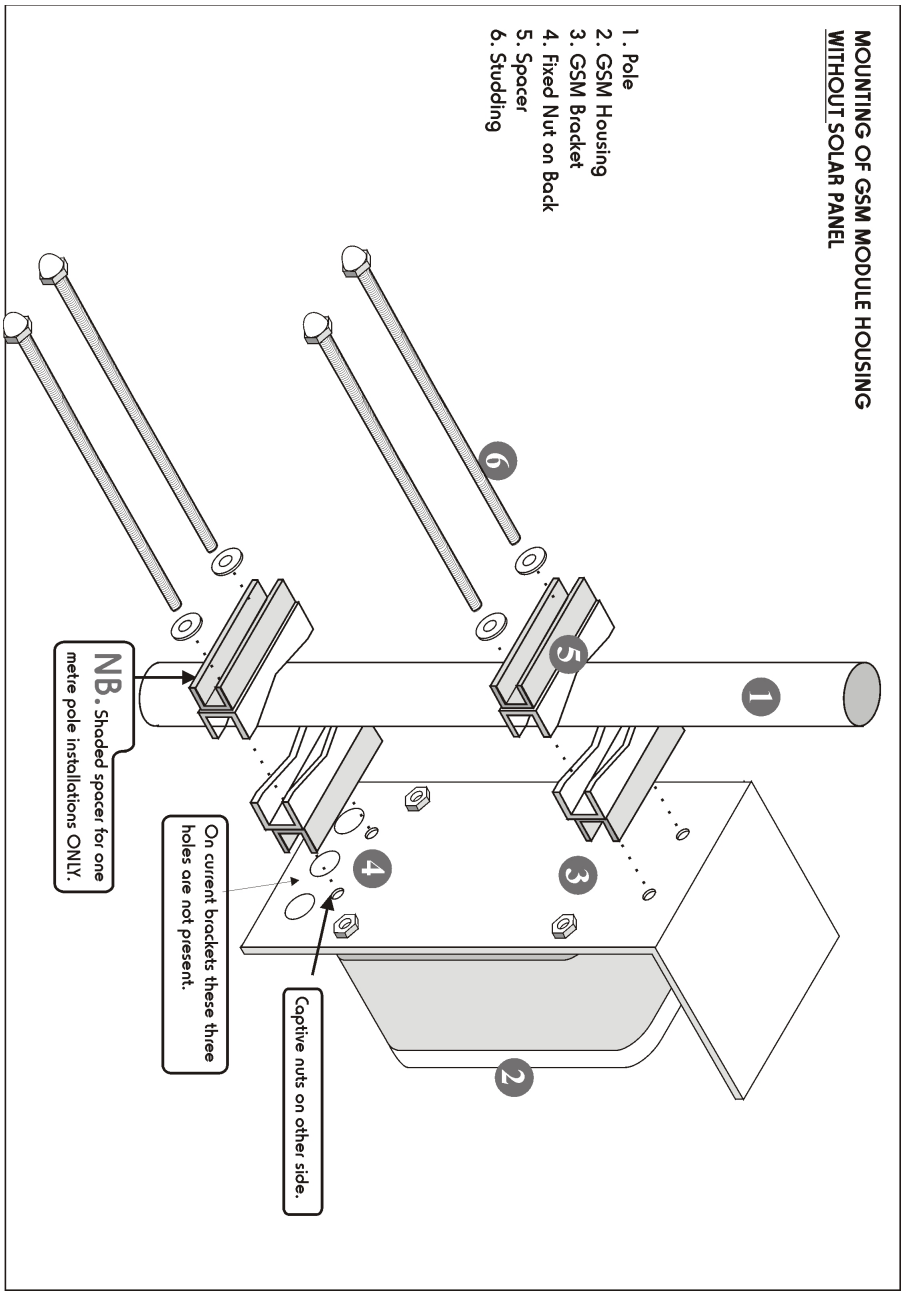
APPENDIX 6
RAINGAUGE BASEPLATE



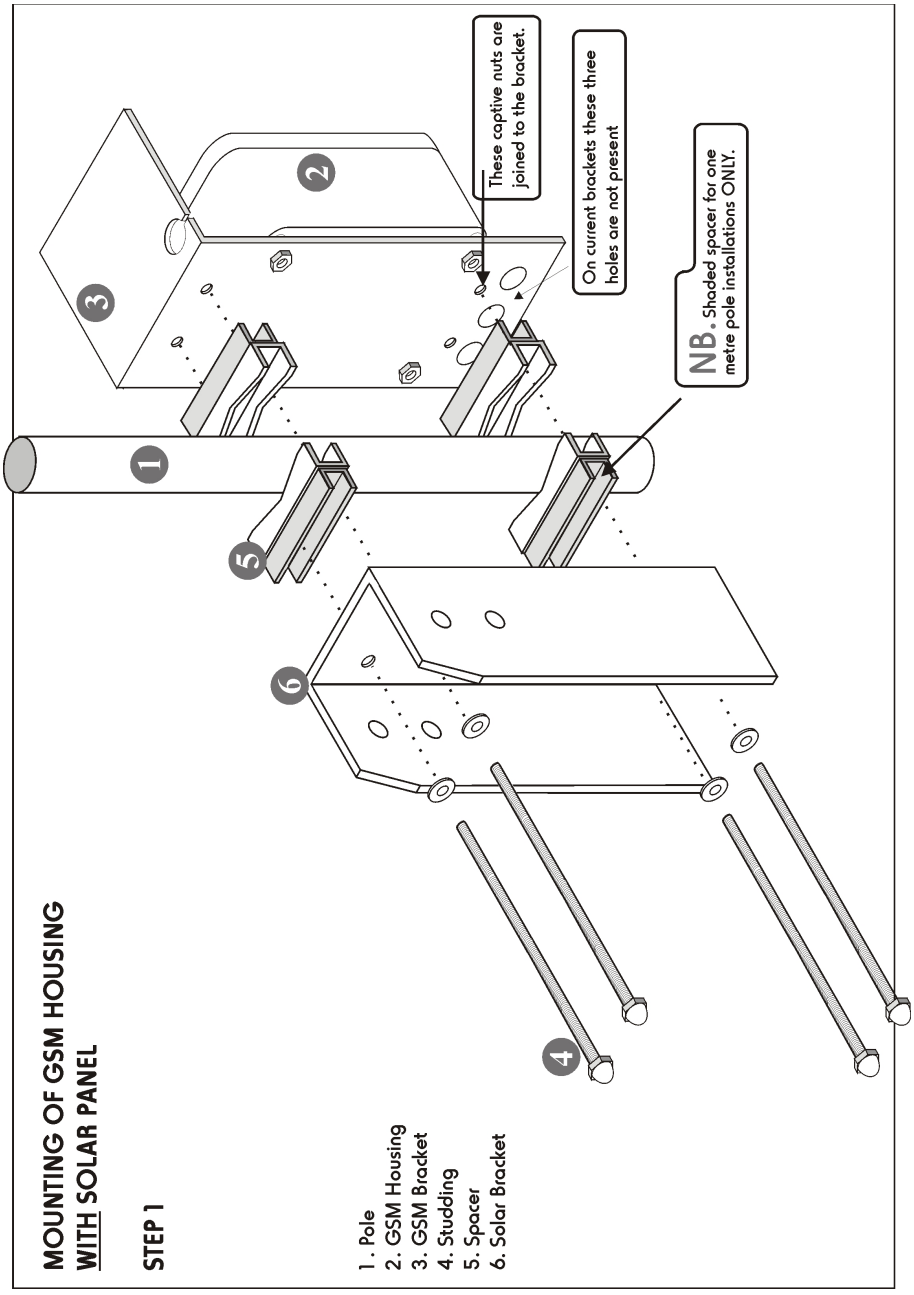
APPENDIX 7
MOUNTING OF GSM/GPRS ENCLOSURE TO BRACKET



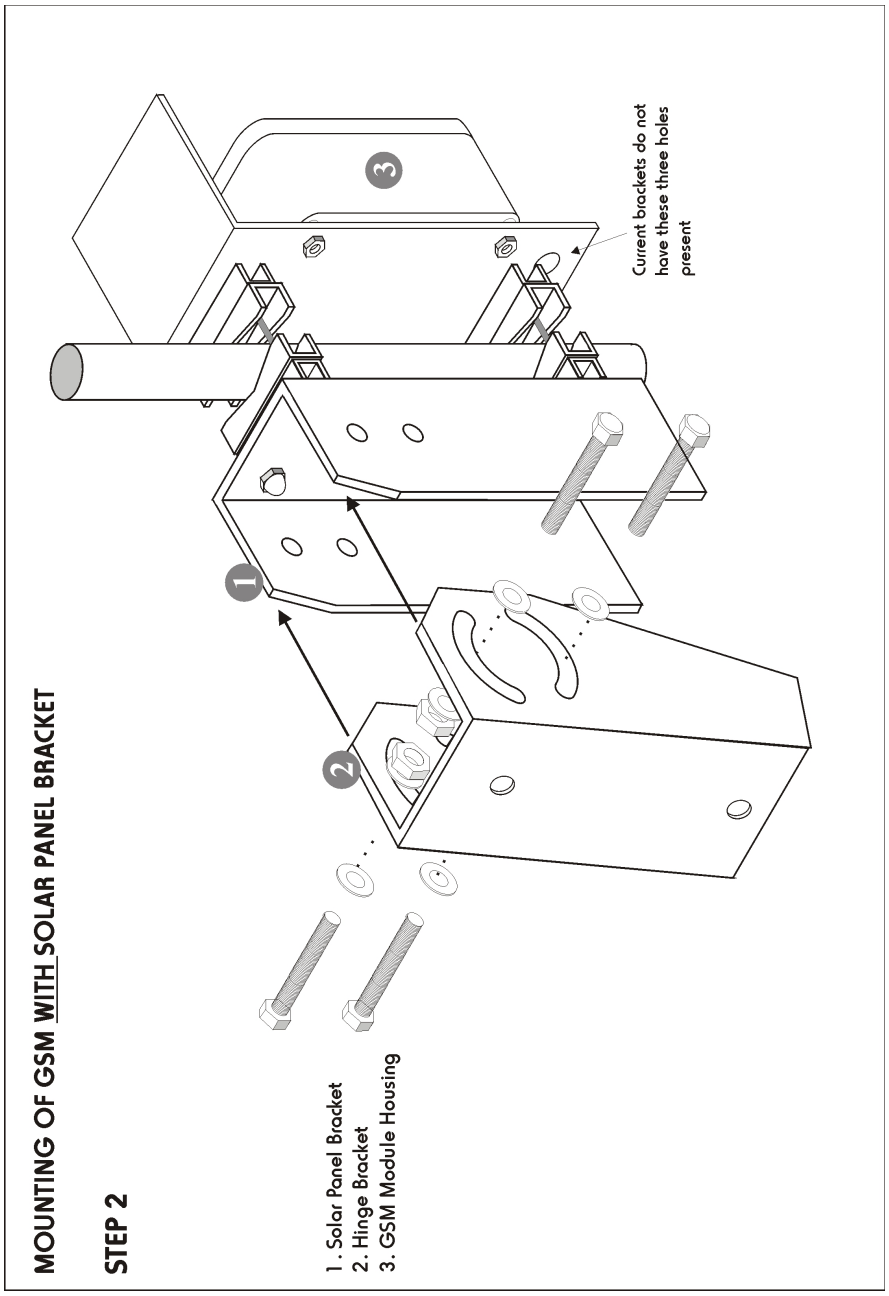
APPENDIX 8
MOUNTING THE GSM/GPRS MODULE ON THE MAST (NO SOLAR PANEL)



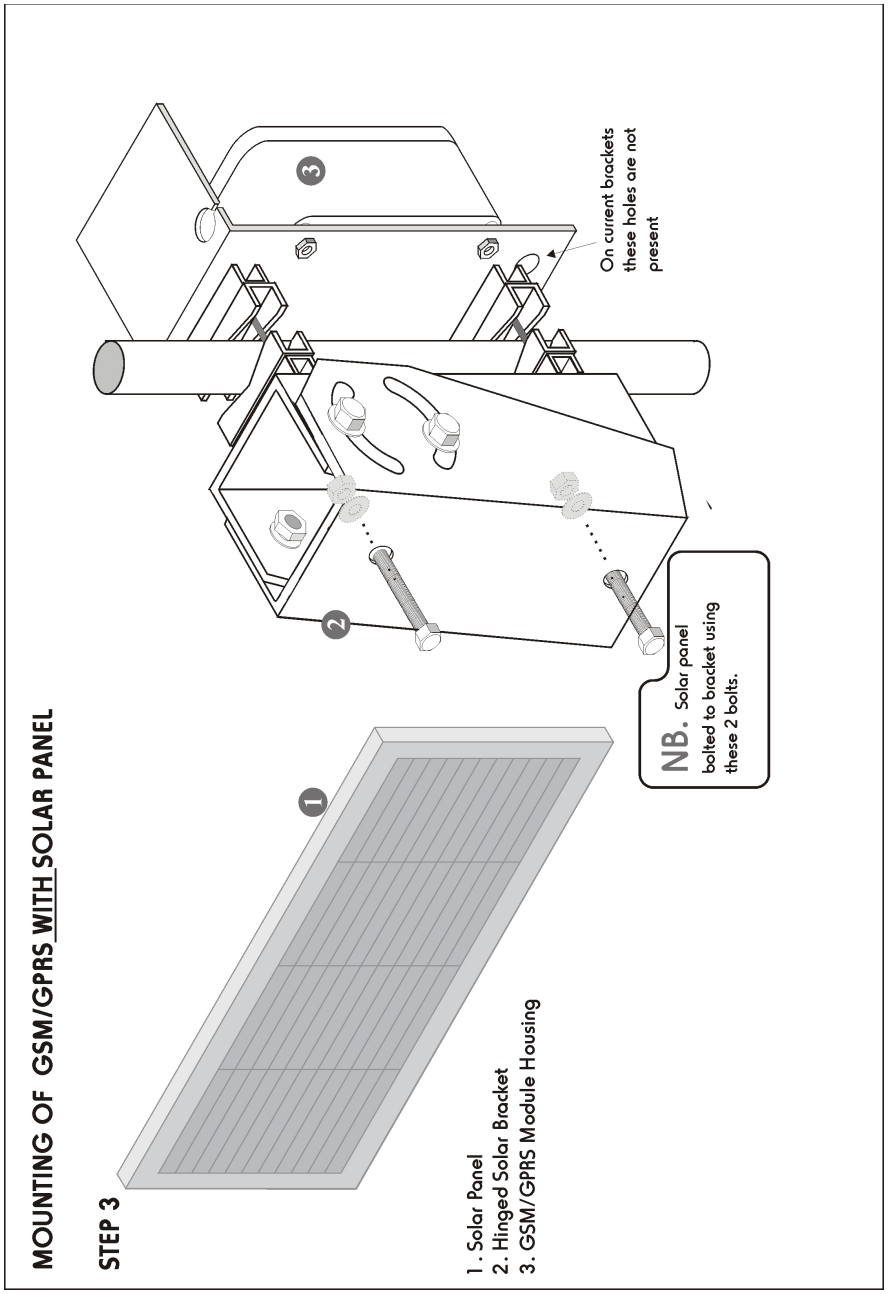
APPENDIX 9
MOUNTING OF THE GSM/GPRS UNIT ON THE MAST WITH A SOLAR PANEL – STEP 1



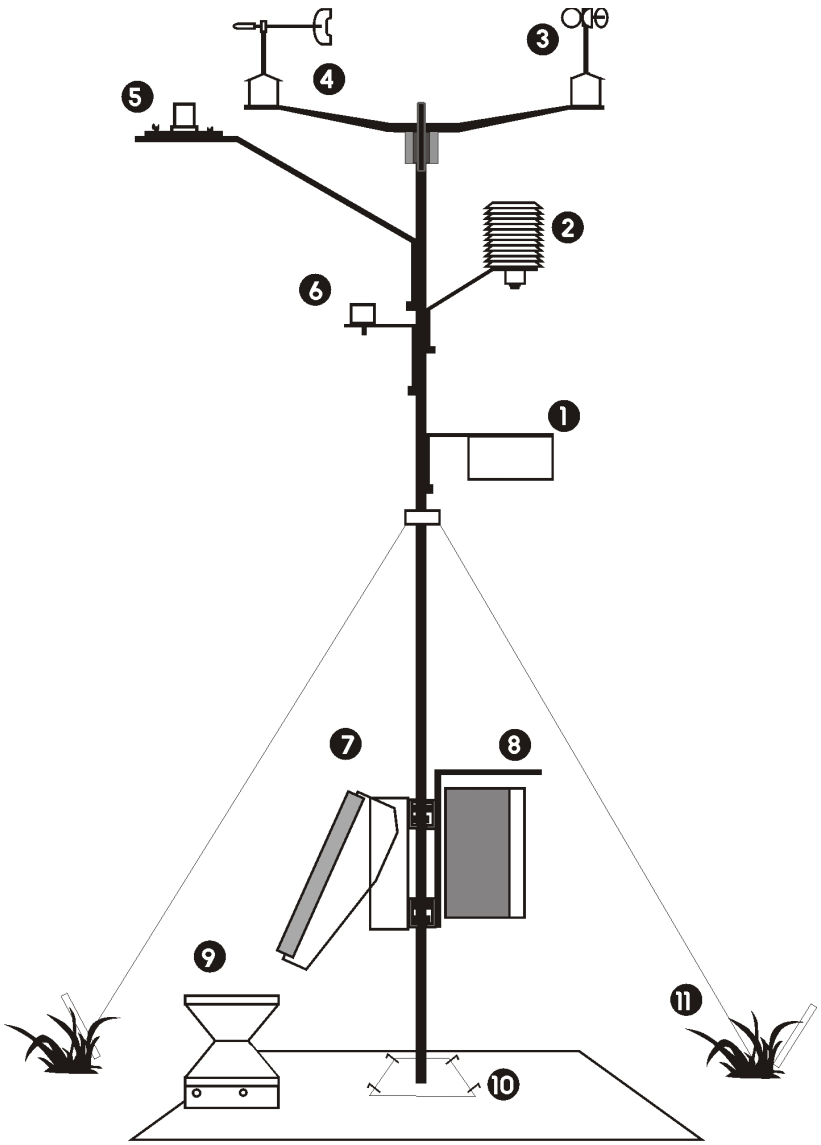
APPENDIX 10
MOUNTING OF THE GSM/GPRS UNIT ON THE MAST WITH A SOLAR PANEL
STEP 2



APPENDIX 11
MOUNTING OF GSM/GPRS UNIT ON THE MAST WITH A SOLAR PANEL
STEP 3



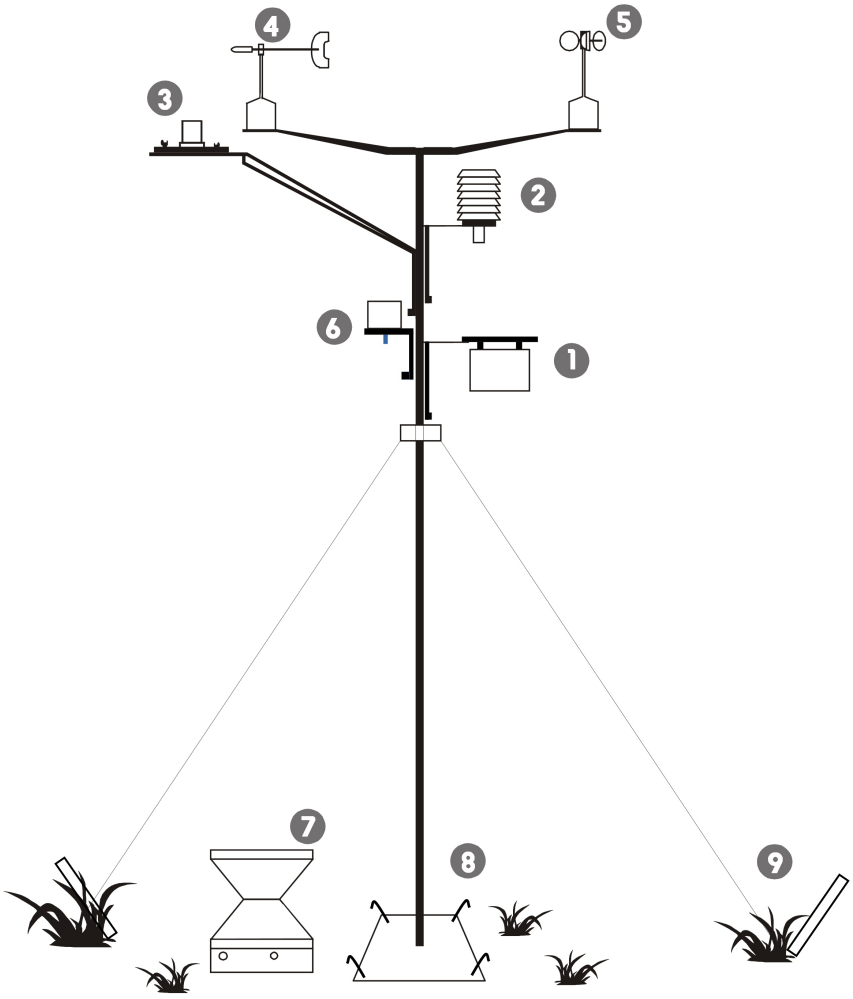
APPENDIX 12
TYPICAL MINIMET INSTALLATION WITH GSM/GPRS



1 - DataHog/MiniMet Datalogger on a short arm bracket
2 - RH/Air Temperature Sensors in Radiation Screen on a short arm pole mount
3 - Wind Vane on a dual arm pole mount
4 - Anemometer on a dual arm pole mount
5 - Light Sensor - usually a Pyranometer - on a long arm pole mount
6 - Barometer on a short arm pole mount
7 - 10, 20 or 30 watt solar panel & pole mount
8 - GSM/GPRS Unit
9 - Raingauge on a base plate
10 - Mast, baseplate & pegs
11 - Guylines

APPENDIX 13
TYPICAL MINIMET INSTALLATION WITHOUT GSM/GPRS

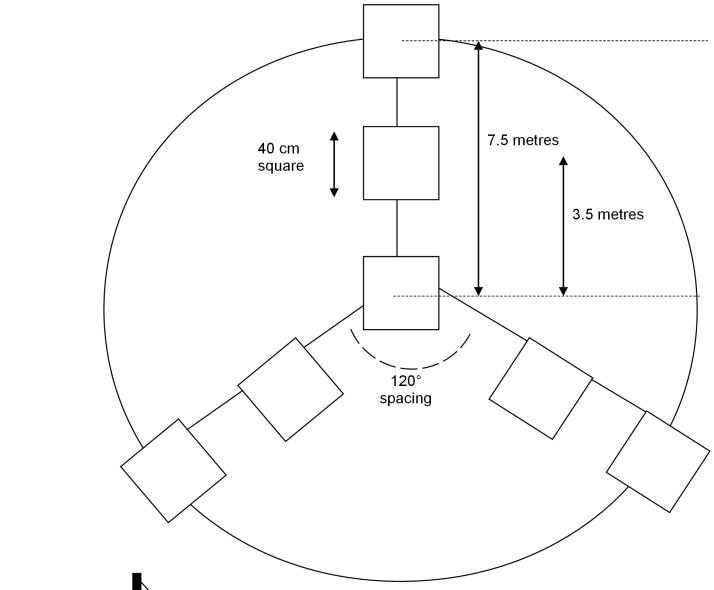
TYPICAL MINIMET INSTALLATION



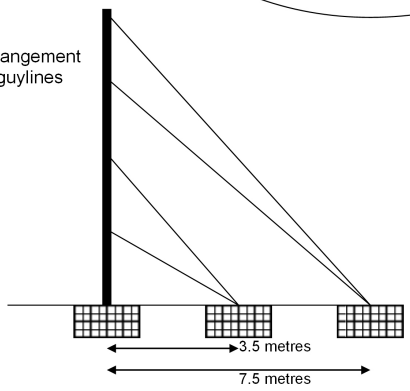
1. DATAHOG2 / MINIMET datalogger
2. RH/temperature sensors in radiation screen and short arm pole Mount
3. Pyranometer sensor on levelling unit and long arm pole mount
4. Windvane on dual arm pole mount
5. Anemometer on dual arm pole mount
6. Barometer
7. Raingauge
8. Baseplate with pegs for soft ground
9. Guylines with pegs for soft ground

APPENDIX 14

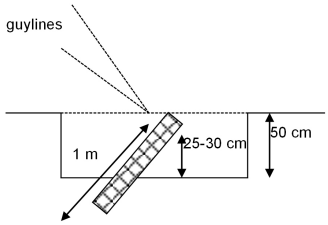
PLAN FOR CONCRETE BASE FOR 10M MAST



Arrangement
of guylines



If ground is loose or unstable, drive a stake (angle iron or scaffold pole) into the hole before pouring concrete



APPENDIX 15
FITTING THE BATTERY COVER

FITTING THE BATTERY COVER

1. Battery
2. Plastic Cover
3. Pegs