



# **WindObserver 65 Ultrasonic Anemometer**

**User Manual**

**Doc No. 1390-PS-0039**

**Issue 1**

**APPLIES TO PARTS**

**1390-65-X-XXX**

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WindObserver 65 Anemometer

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## 1. FOREWORD

Thank you for purchasing the WindObserver 65 manufactured by Gill Instruments Ltd. The unit has no customer serviceable parts and requires no calibration or maintenance. To achieve optimum performance we recommend that you read the whole of this manual before proceeding with use. Do **NOT** remove black “rubber” transducer caps.

Gill products are in continuous development and therefore specifications may be subject to change and design improvements without prior notice.

The information contained in this manual remains the property of Gill Instruments and should not be copied or reproduced for commercial gain.

## 2. INTRODUCTION

The Gill WindObserver 65 wind sensor is a very robust unit with no moving parts, outputting wind speed and direction. The units of wind speed, output rate and formats are all user selectable.

The WindObserver 65 is available with or without de-icing heating (recommended if icing is likely), and with or without analogue outputs.

The WindObserver 65 can be used in conjunction with a PC, data logger or other device, provided it is compatible with the RS422 output or the analogue outputs. Multiple units can be networked if required.

Alternatively, the WindObserver 65 is designed to connect directly to the Gill WindDisplay unit to provide a complete wind speed direction system.

The output message format can be configured in Polar, UV (2-axis), NMEA (0183 Version 3), Tunnel formats, and as either a Continuous output or Polled (requested by host system), detailed in full in Section 8 Message Formats & Options.

## 3. FAST TRACK SET-UP

If you are in a hurry to try out the WindObserver 65, are familiar with Gill equipment, and coupling to a PC using RS422, go to the following sections:

*Section 6 Installation*

*Section 7 Message Formats & Options*

*Section 8 Configuring*

After you have successfully set up the WindObserver 65, we strongly advise that you then go back and read the rest of the manual to ensure that you get the best results from the WindObserver 65.

## 4. SPECIFICATION

### Measurement

|            |                             |
|------------|-----------------------------|
| Output     | 1, 2, 4, 5, 8, 10Hz         |
| Parameters | UV, Polar, NMEA, Tunnel     |
| Units      | m/s, Knots, MPH, KPH ft/min |
| Averaging  | Flexible 1-3600 seconds     |

### Wind Speed

|            |                      |
|------------|----------------------|
| Range      | 0 - 65m/s (0-145mph) |
| Accuracy   | ±2% @ 12m/s          |
| Resolution | 0.01m/s              |
| Offset     | ±0.01m/s             |

### Direction

|            |          |
|------------|----------|
| Range      | 0 - 359° |
| Accuracy   | ± 2°     |
| Resolution | 1°       |

### Sonic Temperature Output

|       |                 |
|-------|-----------------|
| Range | -40°C to + 70°C |
|-------|-----------------|

### Anemometer Status

Supplied as part of standard message

### Starting Threshold

0.01 m/s

### Dead Band Wind Direction

None

### Power Requirement

|                    |   |
|--------------------|---|
| Anemometer only    | 9-30V DC (30mA @ 12V DC, non-analogue unit)<br>9-30V DC (50mA @ 12V DC, analogue unit)<br>Reverse voltage protected |
| Heating - Optional | Allow 3A @ 22v to 30v (max) AC rms or DC  |

### Digital Output

|               |                                      |
|---------------|--------------------------------------|
| Communication | RS422, full duplex, network facility |
| Baud rates    | 1200, 2400, 4800, 9600, 19200, 38400 |
| Formats       | 8 data, odd, even or no parity       |

### Analogue Output - Optional

|                     |  |
|---------------------|--|
| Quantity            | 3 (speed, direction, status, SOS or Sonic Temperature) |
| Scale               | Multiples of ± 10m/s up to ± 70m/s                     |
| Type                | ± 2.5V, 0-5V or 4-20mA                                 |
| V output resistance | 60 Ohms  |
| 4-20mA loading      | 10-300 Ohms  |

### Dimensions

|        |                                  |                            |
|--------|----------------------------------|----------------------------|
| Size   | See manual Fig 2b for dimensions |                            |
| Weight | WindObserver 65                  | 1.34kg (no mount or lead). |
|        | Base Mount Short                 | 0.63kg.                    |
|        | Base Mount Long                  | 1.05kg.                    |
|        | Pipe Mount                       | 1.06kg.                    |

### Materials

|                       |                     |
|-----------------------|---------------------|
| External Construction | Stainless Steel 316 |
|-----------------------|---------------------|

### Environmental

|                       |                                  |
|-----------------------|----------------------------------|
| Moisture protection   | IP66 (NEMA4X)                    |
| Operating temperature | -55°C to +70°C (heated version)  |
| Humidity              | 0% to 100% RH                    |
| Precipitation         | 300mm/hr                         |
| EMC                   | EN 61326-1:2006<br>EN 60945:2002 |

Icing MILSTD810E Method 521.1 Procedure 1

### Standards

Traceable to UK national standards

### Site Calibration

None required. (See Section 9.6 Zero Wind Check)

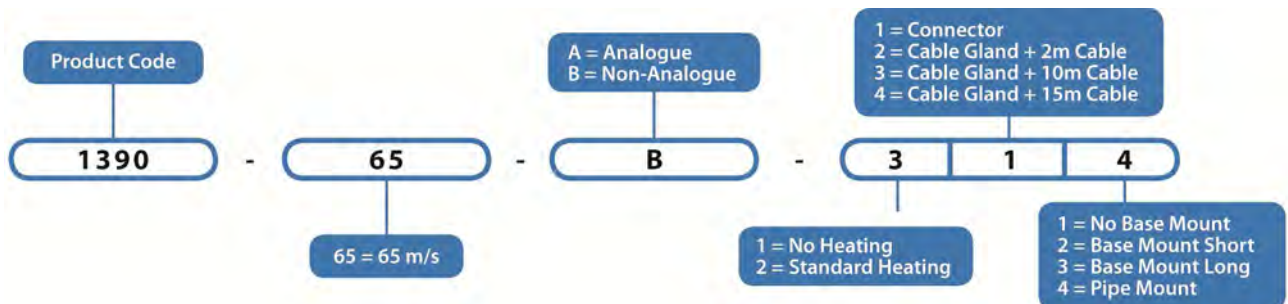
## 5. PRE-INSTALLATION

### 5.1. Equipment supplied

- WindObserver 65
- and Installation kit
- and WindObserver 65 User Manual on a CD (this manual).

#### 5.1.1 WindObserver 65 Part Numbers.

Available parts are as detailed below:-



Optional Extras:

| Item   | Part Number |
|--|-------------|
| Cable 3 Pair twisted and Shielded wires, 24awg, per metre. | 026-02660   |
| Cable 4 Pair twisted and Shielded wires, 24awg, per metre. | 026-03156   |
| Cable 9 Pair twisted and Shielded wires, 24awg, per metre. | 026-02663   |
| Integrity Check Chamber                                    | 1277-00-052 |
| 19 way Connector kit                                       | 1390-10-163 |
| Base Mount Short   | 1390-30-154 |
| Base Mount Long  | 1390-30-155 |
| Pipe Mount   | 1390-30-156 |

### 5.2. Packaging

Whilst the WindObserver 65 is being moved to its installation site, the unit should be kept in its packaging. Retain the packaging for use if the unit has to be moved or returned to Gill Instruments.



### 5.3. Installation requirements

**Host system** - One of the following:

- PC with an internal or external interface compatible with the RS422 output from the WindObserver 65.
- Gill WindDisplay.
- Other equipment with I/O compatibility to the WindObserver 65 option selected.

For example if the unit has Analogue outputs, a Data Logger, Chart Recorder, or PC fitted with an ADC card.

- Networking - Multiple WindObserver 65 units can be networked

**Software** - One of the following:

- Gill Wind Software used as a Terminal program only (Wizard and Sync Comms not applicable). Wind will run on PC's up to and including Windows 7 and can be downloaded free from:- <http://www.gill.co.uk/main/software.html>
- HyperTerminal (supplied with Windows™ 9x to XP).
- Other Terminal Emulation software packages

#### **Cable and Junctions Box**

To connect between the WindObserver 65 and the host system. The unit is supplied with a base mounted connector system or flying cable options (requiring a mast mounted junction box (not provided)) for onward connection.

If using a flying cable option it must be retained with a cable tie within 150mm of the base of the anemometer.

#### **Mounting Bracket**

The WindObserver 65 can be supplied with a short or long base mount to use with a mounting bracket (not provided). The WindObserver 65 can be attached to the bracket via the four tapped holes in the base mount fitted to the unit. Always ensure that the gasket supplied is fitted to the base of the anemometer mount.

It is important that the gasket supplied forms a watertight seal on the base of the anemometer.

In the event that the mounting bracket supplied by the customer is not flat or does not form complete support for the anemometer base; the customer must fit a mounting ring as shown in Figure 2.

#### **Mounting Pole**

The WindObserver 65 can be supplied with a pole mount that provides the option to attach to a pole with or without a thread (pole not provided). The WindObserver 65 can be retained to the pole via the three tapped holes in the pole mount fitted to the unit.

## 5.4. Connector and Cable Assembly.

The WindObserver 65 variant with a connector base is supplied with a mating 19 way connector.

Open the pack of connector parts supplied (Gill Part 1390-10-163).

A set of assembly instructions are supplied with the connector together with:-

| Table of Equivalent Part Numbers                       |               |                         |
|--|---------------|-------------------------|
| Part Name  | Gill Part No. | Cannon Trident Part No. |
| Connector head, 19 way                                 | 020-04464     | 192993-0054             |
| Metal backshell (7 pieces)                             | 020-04465     | 192993-0084             |
| Solder bucket contacts<br>(5 per pack, (4 –off packs)) | 020-04469     | 192900-0635             |

### Arrange Backshell (Gill Part Number 020-04465).

Pass parts 1-6 along the cable as per the diagram below.

(Note that the connector supplies the correct strain relief for cables with an outside diameter of 7.9 to 12.6mm).



### Prepare Cable (e.g. Gill Part 026-026643).

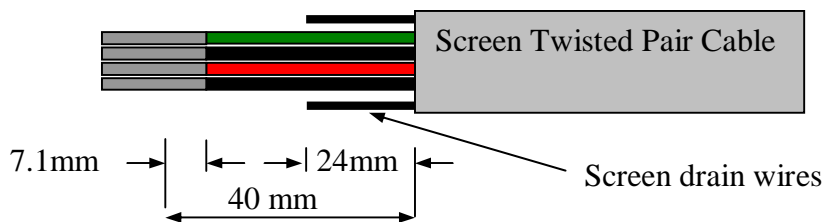
Trim back the cable outer and twisted pair screen sleeves 40mm (see diagram below).

Trim back the screen drain wires to a length of 24mm.

Strip back the connection wires by 7.1mm and tin solder.

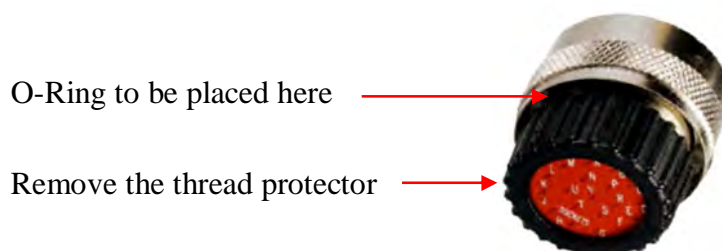
Solder the bucket contacts to the wires.

Unused wires should be cut back and insulated.



### Prepare Connector Head (Gill Part 020-04464).

Remove the connector thread protector and place the O-ring (part 7) into the groove of the connector head (020-04464).



Assemble Connector to the Cable.

Referring to Page 9 push connector contacts through the red connector head seal into the appropriate location, when in place there should be a click as the contact locks into position.

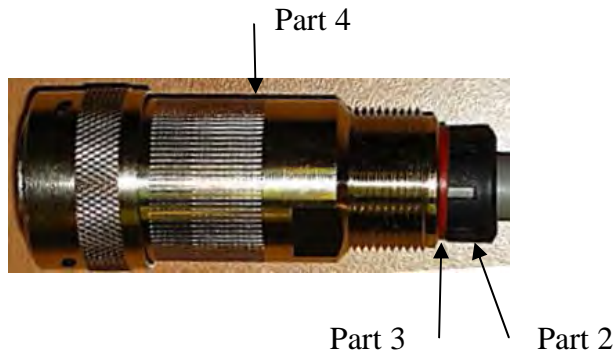
Once contacts are in position pass part 6 up the cable and into position as shown below.

**Note: if a connector pin needs removing use Cannon Extraction Tool, Manufacturer's Part 192922-1450.**

Fold and spread screen wires over part 6 and then push up part 5 as shown to clamp screen wires between Parts 5 and 6.



Now screw in part 4 and torque up to a value of 10Nm.



Pass parts 3 and 2, the cable seal and cable grip from the connector kit, along the cable to the housing.

Now screw in item 1, the clamp nut, over parts 2 and 3 and onto the housing and torque up to a value of 10Nm.



## 6. INSTALLATION

**Do NOT remove the black “rubber” transducer caps. Warranty is void if the Green security seal is damaged or removed.**

**Take care not to knock the four Transducer arms. All the time the WindObserver 65 is not in its final location, it should be protected from damage by keeping it in the original packaging as long as possible, treating it as a delicate instrument.**

**If an Intrinsically Safe (IS) device is required, the I.S. WindObserver must be used - the WindObserver 65 is NOT an IS device.**

**Warranty is void if the unit case is removed.**

### 6.1. Installation Guidelines

The WindObserver 65 has been designed to meet and exceed the stringent standards listed in its specification. Operating in diverse environments all over the world, WindObserver 65 requires no calibration or adjustment whatsoever.

As with any sophisticated electronics, good engineering practice should be followed to ensure correct operation.

- Always check the installation to ensure the WindObserver 65 is not affected by other equipment operating locally, which may not conform to current standards, e.g. radio/radar transmitters, boat engines, generators etc.

Guidelines –

- Avoid mounting in the plane of any radar scanner – a vertical separation of at least 2m should be achieved.
- Radio transmitting antennas, the following minimum separations (all round) are suggested
  - VHF IMM – 1m
  - MF/HF – 5m
  - Satcom – 5m (avoid likely lines of sight)
- Ensure the product is correctly earthed in accordance with this manual
- Use cables recommended by Gill, keeping the length below the maximum allowed (*See Section 6.3*) Where the cables are cut and re-connected (junction boxes, plugs and sockets) the cable screen integrity must be maintained, to prevent the EMC performance being compromised.
- Earth loops should not be created – earth the system in accordance with the installation guidelines. (*See Section 6.5*)
- Ensure the power supply operates to the WindObserver 65 specification at all times.

Avoid turbulence caused by surrounding structures that will affect the accuracy of the WindObserver 65 such as trees, masts and buildings. The World Meteorological Organisation makes the following recommendation:

- The standard exposure of wind instruments over level open terrain is 10m above the ground. Open terrain is defined as an area where the distance between the sensor and any obstruction is at least 10 times the height of the obstruction.

When installing the unit degrease the unit and hold with lint free gloves to reduce the build-up of deposits.

## 6.2. Bench system test

*Note: Prior to physically mounting the WindObserver 65 in its final location, we strongly recommend that a bench system test be carried out to confirm the system is configured correctly, is fully functional and electrically compatible with the selected host system and cabling (preferably utilising the final cable length). The required data format, units, output rate, and other options should also all be configured at this stage. If an Integrity Check Chamber (ICC) has been purchased refer to Section 9.6.*

## 6.3. Cabling

### Cable type

A RS422 compatible cable should be used, with the number of twisted pairs matching the application. If both the (optional) Heating and Analogue outputs are utilised, then a 9 pair cable is required.

**Generic description** – Twisted pairs with drain wire, screened with aluminised tape, with an overall PVC sheath. Wire size 7/0.2mm (24 AWG)

The table shows some suitable manufacturers' references; other manufacture's equivalents can be used.

**Table 1**

| No. of pairs | Gill ref. | Belden ref. | Batt electronics ref. |
|--------------|-----------|-------------|-----------------------|
| 2            | -         | 9729        | 91071                 |
| 3            | 026-02660 | 9730        | 91030                 |
| 4            | 026-03156 | 9728        | 91199                 |
| 6            | -         | 8778        | 91011                 |
| 9            | 026-02663 | 8774        | 91009                 |

### Cable length

The typical maximum length at 9600 baud is 1km (3200ft), using the recommended cable. If any problems of data corruption are experienced (due to, for example, a high local electrical 'noise' level), then a lower baud rate should be used. Alternatively, a thicker or higher specification cable can be tried. If a heated unit is used on longer cables than supplied, consideration should be given to powering the heater using lower gauge wire or paralleling wires to reduce volt drops.

### Cabling and junction box

If the WindObserver 65 unit is fitted with a flying 9 pair cable attached this must be terminated in a suitable terminal box to IP66 or better, fitted with glands to prevent moisture ingress.

The cable type from the terminal box to the host system must be as specified above. If any cable is to be exposed to mechanical damage, it must be enclosed in a suitable conduit or cable tray. The cable must be securely fixed with cable clamps or equivalent at regular intervals such that the WindObserver cable gland does not support the cable weight.

The gland area at the base of the WindObserver 65 **should not** be directly exposed to moisture, as whilst the gland is sealed when mated, the anemometer is vented to air at the base to avoid pressure build up. If an IP66 rating is essential or the unit is mounted other than 'right way up' **use the gasket** provided in the mounting kit.

## 6.4. Power supplies

### All WindObserver 65 units

#### Sensor Supply: -

|         |  |
|---------|--|
| Voltage | 9 to 30v DC  |
| Current | 30mA Average. 50mA Max @12v dc (non-analogue unit) |
| Current | 50mA Average, 65mA Max @ 12v dc (analogue unit)    |

- The WindObserver 65 has reverse polarity protection.

### Wind Observer II Units with Heating

#### Heater Supply: -

|         |                                |
|---------|--------------------------------|
| Voltage | 22V to 30V (max) AC RMS or DC. |
| Current | allow for 3A.                  |

- **The AC Supply must be isolated from Mains Supply.**
- The heating module requires a separate power supply.
- Heater Cable length should be minimised to avoid cable volt drops and ensure maximum voltage received at the Anemometer.
- The heating (H command) is enabled as a default condition. If heating is not required enabled then the H command must be set for H1.
- Each transducer is heated independently and will be active when ambient temperature drops below approximately +15°C each transducer will de-activate when +25°C threshold is reached.

The WindObserver 65 has reverse polarity protection.

## 6.5. Connections

**Important** Any cable wires not used should be isolated and grounded at the terminating equipment/user end.

**Do NOT connect the unit's 0V, heating –ve, analogue output 0V or digital 0V to the screen or earth.**

*On units with integral cable the screens of each pair are joined together inside the anemometer - these should be joined to the cable screen(s) of any further cable run. Avoid long grounding loops. Digital 0V should be used in conjunction with RS422 TX RX lines in order to improve noise immunity.*

### Earthing or grounding

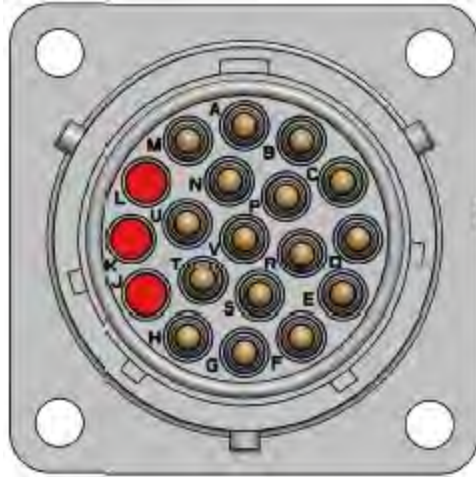
To ensure correct operation, and for maximum protection against lightning, the anemometer **MUST** be correctly earthed (grounded) via its mountings. Inadequate Earthing will degrade anemometer performance, particularly in the presence of radio frequency interference.

*See Fig 1 Suggested mounting bracket and Earthing (grounding) arrangements*

The unit **MUST** be connected to an appropriate grounding point with a minimum of 6mm<sup>2</sup> copper wire, via the M5 base screws. The cable screens must be joined with any cable screen continuing from the unit's cable via a junction box. The primary earth for the anemometer must be provided via the base screws and not via the cable screens.



## View of the WindObserver 65 base connector variant



**Table 2 - 19 way connector and cable connections**

| 19 Way Connector<br>Terminal Letter | Cable Gland Option |                | Signal Designation           |
|-------------------------------------|--------------------|----------------|------------------------------|
|                                     | Conductor          | Colour         |                              |
| P                                   | Pair 1             | Green          | RS422 TXB (+)                |
| C                                   | Pair 1             | Black          | RS422 TXA (-)                |
| U                                   | Pair 2             | White          | RS422 RXB (+)                |
| V                                   | Pair 2             | Black          | RS422 (RXA (-)               |
| R                                   | Pair 3             | Red            | Supply V+                    |
| D                                   | Pair 3             | Black          | Supply V -                   |
| M                                   | Pair 4             | Blue           | Digital 0v                   |
| N                                   | Pair 4             | Black          | Not Used (Isolate)           |
| A                                   | Pair 5             | Yellow         | Heater + * <sup>1</sup>      |
| B                                   | Pair 5             | Black          | Heater -* <sup>1</sup>       |
| H                                   | Pair 6             | Brown          | Analogue Ch 3 * <sup>2</sup> |
| G                                   | Pair 6             | Black          | Analogue 0v * <sup>2</sup>   |
| E                                   | Pair 7             | Orange         | Not Used (Isolate)           |
| F                                   | Pair 7             | Black          | Not Used (Isolate)           |
| T                                   | Pair 8             | White          | Analogue Ch 1 * <sup>2</sup> |
| S                                   | Pair 8             | Red            | Analogue Ch 2 * <sup>2</sup> |
| L No Connection                     | Pair 9             | Green          | Not Used (Isolate)           |
| K No Connection                     | Pair 9             | Red            | Not Used (Isolate)           |
| J No Connection                     | Not Applicable     | Not Applicable | Not Used                     |

\*<sup>1</sup> and <sup>2</sup> Note may not be functional - check model number and options fitted.

## Default Settings

The factory default settings are:

### Non - heated units

A0 B3 C1 E1 F1 G0000 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

### Heated units

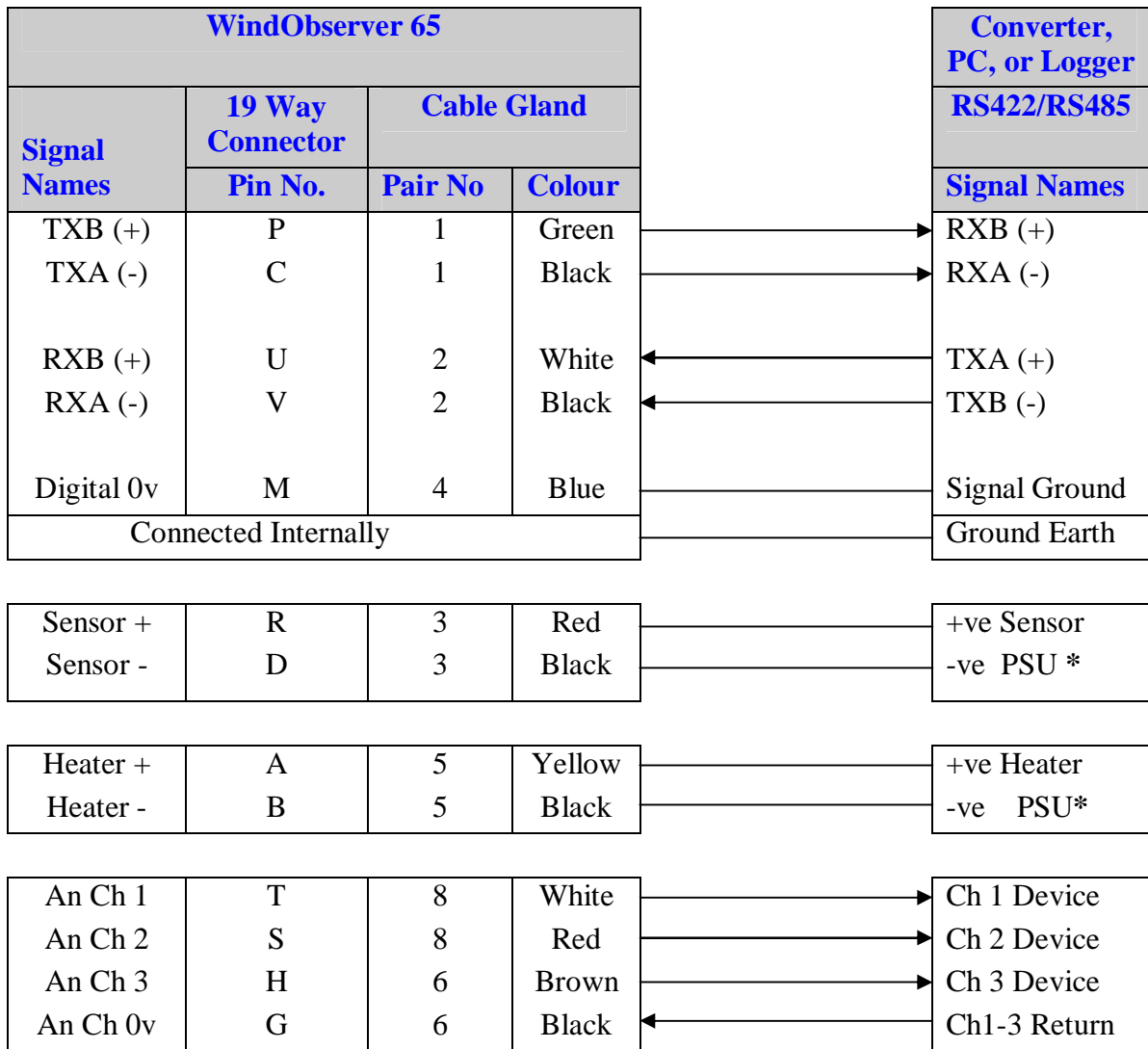
A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1

**Note** that Heating (H command) is enabled as a default condition. If heating is not required enabled then the H command must be set for H1.

*See Section 8 Configuring for further details*

## Connecting to a PC with a RS422 or RS485 input

The PC requires either an internal RS422 interface card, or an external RS422/485 to RS232 or USB converter, which will plug into the PC or host equipment.



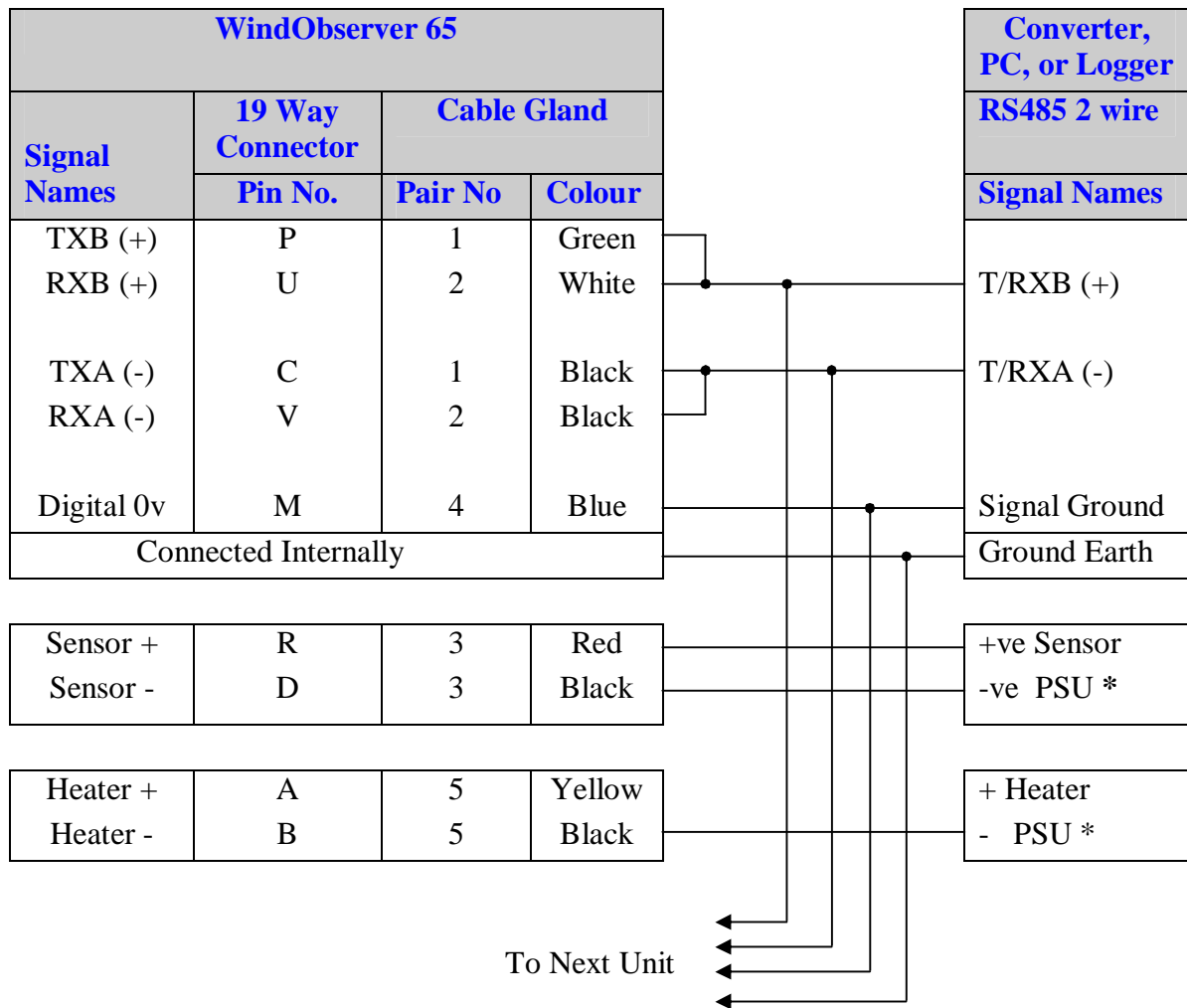
\* For Power Supply Information see Section 6.4.



## Networking units

Before coupling units into a network:

- Each device must be configured with a unique Unit Identifier (letter A to Z) however in multi drop systems it could be advised to avoid using letters A-F, KMN and P as they could appear in the data string.
  - Unit must be set for half duplex mode (E2 setting) see Para 7.3).
  - It must be configured to a tri-state polled mode [M3](#) or [M4](#).
- See also Section 8 - Configuring*



\*For Power Supply Information see Section 6.4.

**Note:** Each unit in the network will require its own power supplies.

## 6.6. Indoor Power and Communications Interface (Part 1189-PK-021)

The desktop PCI is intended for use in a protected environment and provides interfacing and power to a single anemometer (Note a separate supply is required for heating).

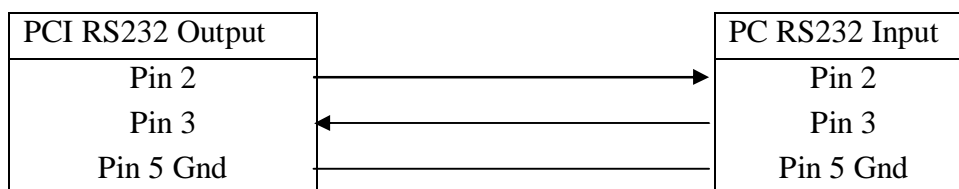
The PCI is not intended for outdoor use.

Note a mains connector lead only is supplied with the PCI Box.

### Connecting to a PCI Unit with RS422 input

| WindObserver 65 |                  |             |        | PCI Box                 |               |
|-----------------|------------------|-------------|--------|-------------------------|---------------|
| Signal Names    | 19 Way Connector | Cable Gland |        | 15 Way D Type Connector |               |
|                 | Pin No.          | Pair No     | Colour | Pin No.                 | Signal Name   |
| TXB (+)         | P                | 1           | Green  | 2                       | RXB (+)       |
| TXA (-)         | C                | 1           | Black  | 9                       | RXA (-)       |
| RXB (+)         | U                | 2           | White  | 3                       | TXB (+)       |
| RXA (-)         | V                | 2           | Black  | 10                      | TXA (-)       |
| Digital 0v      | M                | 4           | Blue   | 4                       | Signal Ground |
| Sensor +        | R                | 3           | Red    | 5                       | Power V+      |
| Sensor -        | D                | 3           | Black  | 11                      | Power 0v      |

To Connect the PCI RS232 Output (9 Pin D Type connector) to a PC RS232 9 way port to communicate with the sensor connect as follows:-



### Environmental

#### PCI Electrical Power Requirements

- 1) 100Vac – 120Vac, 10VA for the 115V switch position
- 2) 200 Vac – 250Vac, 10VA for the 230V switch position
- 3) 20-30Vdc, 120mA max (anemometer)  
8-15Vdc, 50mA max (interface)

3 Fuses protect the unit:

1. Externally accessible 315mA (T) for 115/230v operation
2. Internally accessible 500mA (T) AUX
3. Internally accessible 500mA (T) ANEM

## PCI Connector Pin and Cable assignments

### Anemometer connector – 15 way

| Pin | Designation               | (Example Plug MH Connectors MHD15-DM15P-K) |
|-----|---------------------------|--|
| 1   | Chassis                   | (e.g. RS Components 765-9494)              |
| 2   | RS422_RXB (+)             |  |
| 3   | RS422_TXB (+)             |  |
| 4   | Digital 0V, Signal ground |  |
| 5   | Supply V+                 |  |
| 6   | Analogue output V1        |  |
| 7   | Not used                  |  |
| 8   | Analogue output V2        |  |
| 9   | RS422_RXA (-)             |  |
| 10  | RS422_TXA (-)             |  |
| 11  | Supply V-                 |  |
| 12  | Analogue output V4        |  |
| 13  | Analogue 0V               |  |
| 14  | Not used                  |  |
| 15  | Analogue output V3        |  |

### Auxiliary Analogue Outputs – 9 way Plug

| Pin | Designation  | (Example MH Connectors MHD9-DM9S-K) |
|-----|--|-------------------------------------|
| 1   | Earth  | (e.g. RS Components 765-9488)       |
| 2   | Analogue Ground 1  |                                     |
| 3   | Analogue Ground 2  |                                     |
| 4   | Analogue Ground 3  |                                     |
| 5   | Analogue Ground 4  |                                     |
| 6   | Analogue Output 1 (direct connection to Anemometer Connector Pin 6)  |                                     |
| 7   | Analogue Output 2 (direct connection to Anemometer Connector Pin 8)  |                                     |
| 8   | Analogue Output 3 (direct connection to Anemometer Connector Pin 15) |                                     |
| 9   | Analogue Output 4 (direct connection to Anemometer Connector Pin 12) |                                     |

### DC Supply – 4 way

| Pin | Designation   | (Example Connector Amphenol CO91A) |
|-----|---------------|------------------------------------|
| 1   | Interface V+  | (e.g. T3301001)                    |
| 2   | Interface V-  |                                    |
| 3   | Anemometer V- |                                    |
| 4   | Anemometer V+ |                                    |

**RS 232 Output – 9 way Skt**

| <b>Pin</b> | <b>Designation</b> | <b>(Example Plug MH Connectors MHD9-DM9P-K)</b> |
|------------|--------------------|---|
| 1          | DCD                | (e.g. RS Components 765-9485)                   |
| 2          | RX data            |   |
| 3          | TX data            |   |
| 4          | DTR                |   |
| 5          | Signal Ground      |   |
| 6          | DSR                |   |
| 7          | RTS                |   |
| 8          | CTS                |   |
| 9          | RI                 |   |

**RS422 Network In – 9 way Skt**

| <b>Pin</b> | <b>Designation</b> | <b>(Example Plug MH Connectors MHD9-DM9P-K)</b> |
|------------|--------------------|---|
| 1          | Not connected      | (e.g. RS Components 765-9485)                   |
| 2          | Not connected      |   |
| 3          | Not connected      |   |
| 4          | RS422_RXA (-)      |   |
| 5          | Signal ground      |   |
| 6          | RS422_TXA (-)      |   |
| 7          | RS422_TXB (+)      |   |
| 8          | RS422_RXB (+)      |   |
| 9          | Chassis            |   |

**RS422 Network Out – 9 way Plg**

| <b>Pin</b> | <b>Designation</b> | <b>(Example MH Connectors MHD9-DM9S-K)</b> |
|------------|--------------------|--|
| 1          | Not connected      | (e.g. RS Components 765-9488)              |
| 2          | Not connected      |  |
| 3          | Not connected      |  |
| 4          | RS422_RXA (-)      |  |
| 5          | Signal ground      |  |
| 6          | RS422_TXA (-)      |  |
| 7          | RS422_TXB (+)      |  |
| 8          | RS422_RXB (+)      |  |
| 9          | Chassis            |  |

## 6.7. Analogue Connections

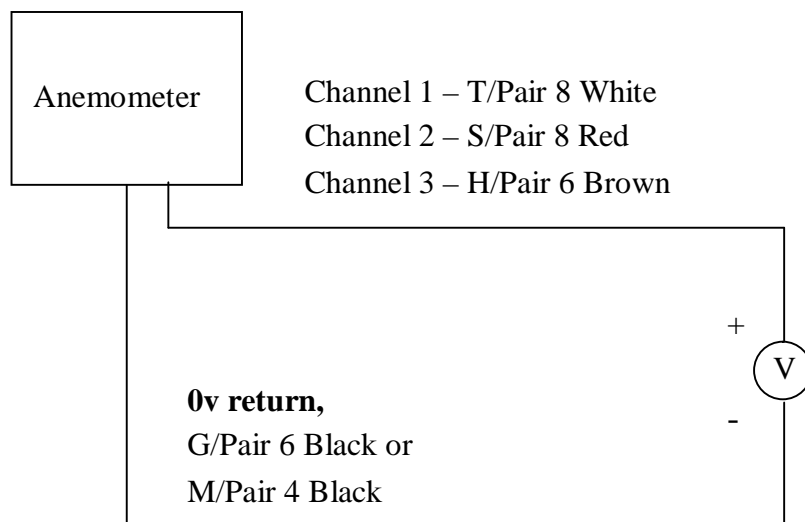
When using the analogue outputs it is advisable to use a low pass filter to remove any high frequency noise present.

The analogue signals can be susceptible to external interference if unprotected. The anemometer cable has individual screens covering each channel's signal wires. The continuing cable connected to the anemometer must be of equal or greater cross sectional area as the anemometer cable and must be individually screened or screened pairs.

Note that connections can also be made to a PC or other device as described in the preceding section.

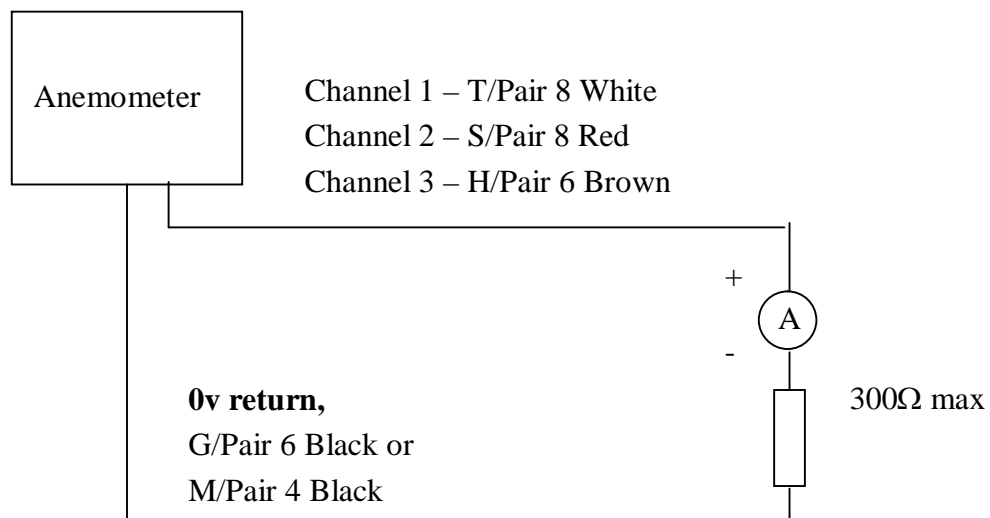
REFER TO SECTION 8.6 the T command selects Voltage or Current Output on Channels 1-3.

### Analogue Voltage Output Connections (5v or $\pm 2.5v$ )



### Analogue Connections for 4-20mA output

**Important – When using the current outputs, the output loads on each channel MUST be less than 300 ohms, including cable resistance.**



## 6.8. Using the WindObserver 65 with the Gill WindDisplay

The WindObserver 65 is designed to interface with the Gill WindDisplay unit to provide a complete wind speed and direction system. To interface to a non NMEA WindDisplay the WindObserver is set for Polar (M2) and 9600 (B3) configuration settings.

When coupled to a WindDisplay, the WindObserver 65 can be used as supplied, however if a fault occurs the WindDisplay may lock into the last valid reading. Re-configuring the WindObserver 65 to Fixed Field output (O2) will ensure that any fault is flagged on the WindDisplay.

After coupling to a WindDisplay, the Wind Speed units and the Averaging period can be selected using the WindDisplay controls. *See the WindDisplay User Manual.*

Note that although the WindDisplay can display wind speed in various units, these are calculated within the WindDisplay. The data coming to the WindDisplay **must** be in metres/sec (the factory default output setting).

**Figure 3 WindDisplays**



**Meteorological Display**



**Marine Display**

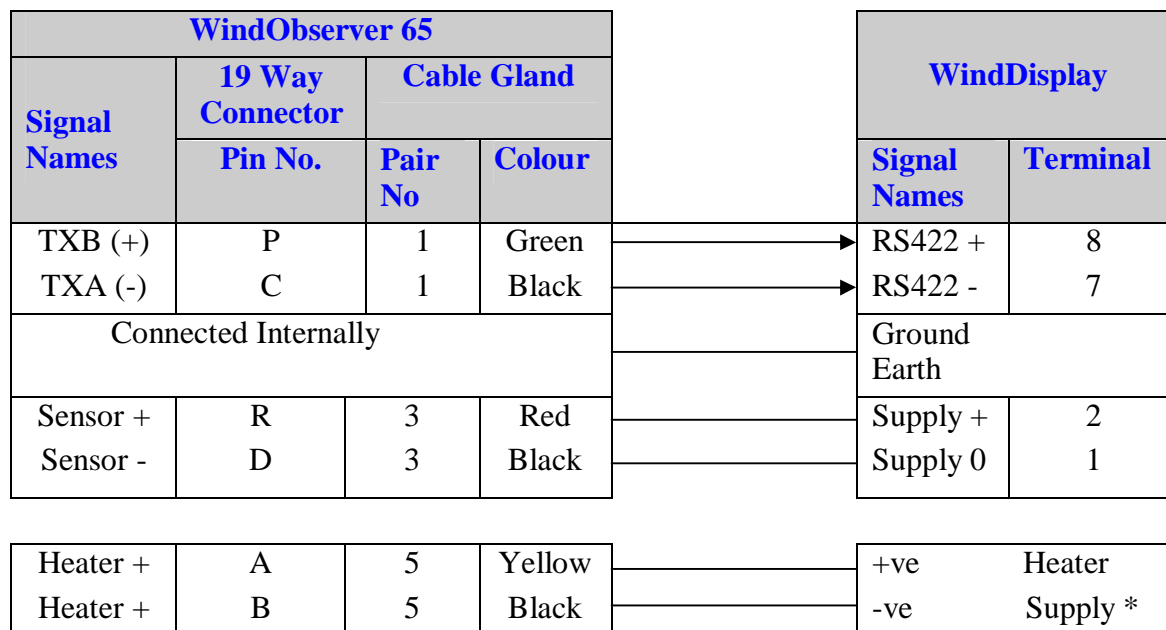
### NOTES:-

**If the WindDisplay is configured for NMEA mode then the WindObserver 65 must also be configured for NMEA mode and 4800-baud operation (configuration settings M5 and B2).**

**If required the WindDisplay can provide power for the sensor circuitry but not power for the heater circuitry.**

## Connecting to a Gill WindDisplay

Refer to the WindDisplay User Manual for the method of operation.



\*...For Power Supply Information see Section 6.4.

### Notes:-

See Section 8, Configuring for further details.

## 6.9. Mechanical installation

**Do NOT remove the black “rubber” transducer caps.**

**Take care not to knock the four Transducer arms.**

**Before installing, a bench system test is recommended.**

**All the time the WindObserver 65 is not in its final location, it should be protected from damage by keeping it in the original packaging as long as possible, treating it as a delicate instrument.**

**When installing the unit handle with lint free gloves and degrease the unit to reduce the build-up of deposits.**

### Location

It is important to ensure that the WindObserver 65 is mounted in a position clear of any structure, which may obstruct the airflow or induce turbulence.

Do NOT mount the WindObserver 65 in close proximity of high-powered radar or radio transmitters. A site survey may be required if there is any doubt about the strength of external electrical noise. (See Section 6.1)

### Orientation

Normally the WindObserver 65 is mounted vertically with the cable exit at the bottom.

Alternatively, the unit may be mounted in any orientation, but note that if the unit is mounted with the cable uppermost, the gasket provided in the mounting kit **must** be used or unit base sealed externally to prevent water penetration.

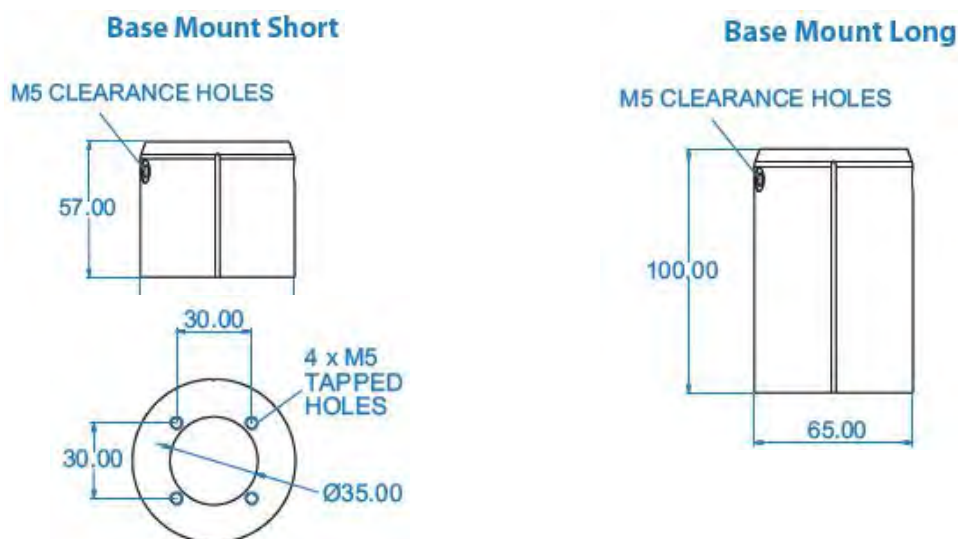
### Mounting bracket (Short and Long Mounts)

A suggested mounting bracket using Short or Long Mounts is shown in Fig 1.

It is recommended that the WindObserver 65 mounting bracket be manufactured from stainless steel 316, to prevent possible galvanic corrosion.

It is also recommended that the supplied gasket be always fitted to ensure IP66 rating and to prevent galvanic corrosion if the mounting bracket is not manufactured from stainless steel 316.

Stainless steel 316 fixings must be used.



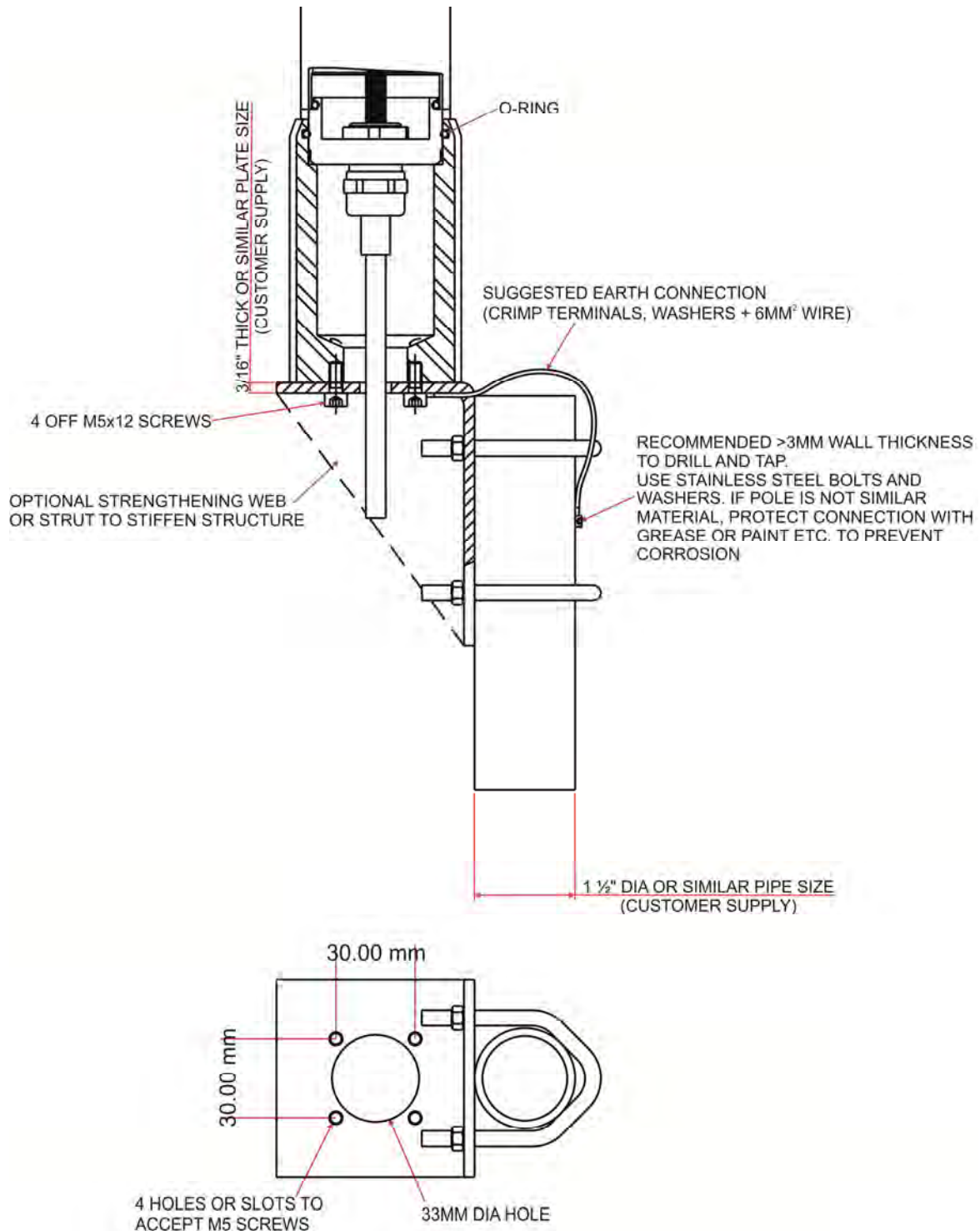


**Figure 1. Suggested mounting bracket and Earthing (grounding) arrangements**

The example shows a long mount fitted to a cable gland unit, a similar Earthing/ mounting arrangement can be used with short mounts and connector based units.

A mounting kit is supplied with the WindObserver 65 to allow assembly of the mount to the base of the WindObserver.

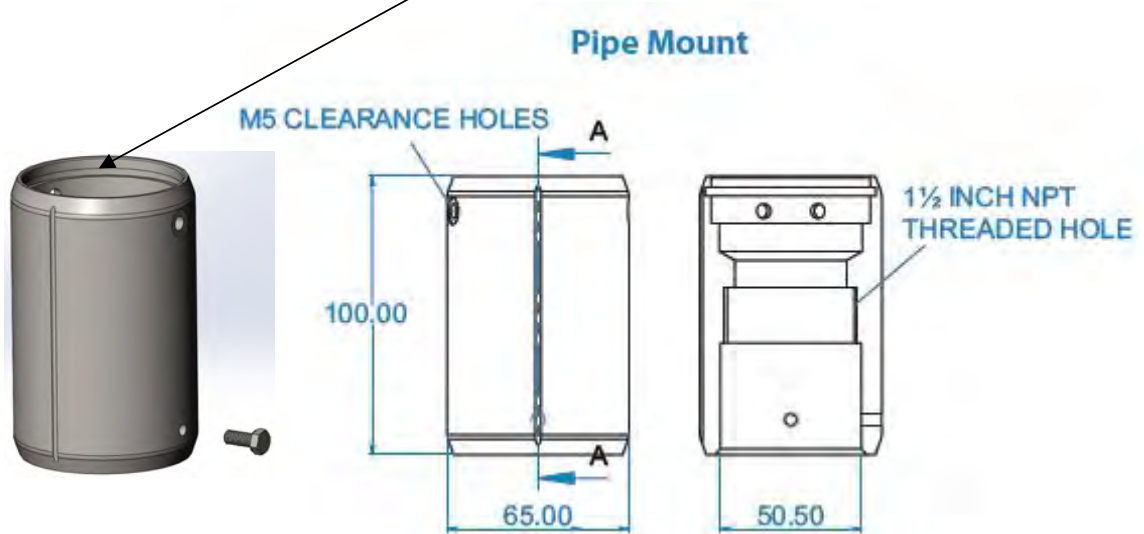
**Included in the supplied mounting kit is an O Ring Seal which must be fitted inside of the Base Mount.**



### Pipe Mounting (use with Pipe Mount)

The Pipe Mount base for the WindObserver 65 has the following dimensions.

**Included in the supplied mounting kit is an O Ring Seal which must be fitted inside of the Pipe Mount Base.**



The mounting pole dimension should be 50mm (1.97") diameter.

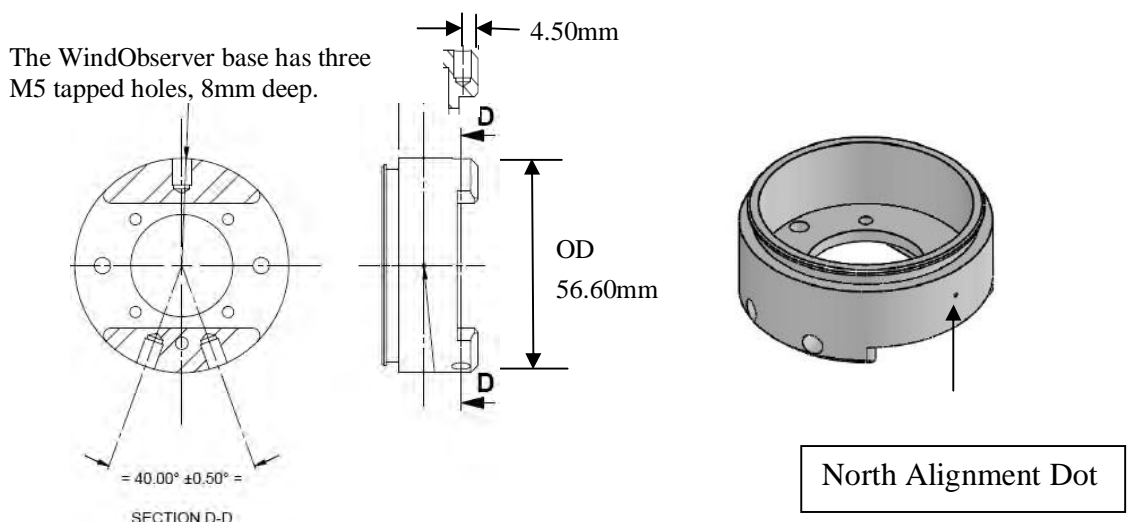
Three M5 x 12 hex screws are provided to secure the Pipe Mount to the WindObserver base.

Three M5 x 12 hex screws to secure the Pipe Mount to the pipe through M5 tapped holes in the Pipe Mount.

If a screw threaded pole is used it should be a 1.5 inch National Pipe Thread (NPT) type. It is recommended that the WindObserver mounting pole be manufactured from Stainless Steel 316, to prevent possible galvanic corrosion.

### Custom Mount (Use with WindObserver No Mount Option)

Although it is recommended that customers select a base mount option from Gill Instruments, should a customer wish to design their own mount then the WindObserver base dimension details for this are as follows:-

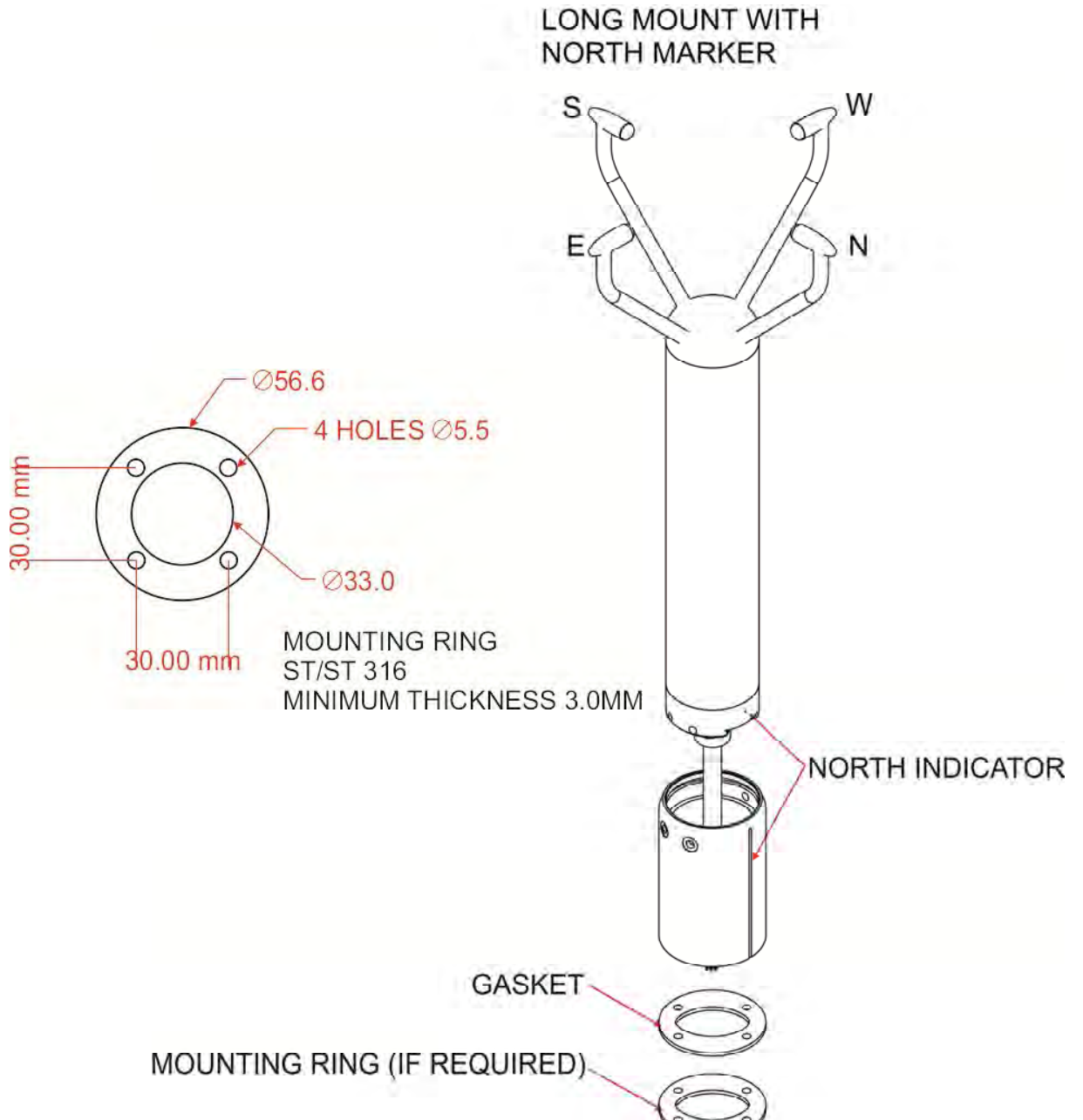


**Alignment**

The anemometer should be set to point North (or to another known reference direction), using the North Spar, which can be identified from the red dot alignment indicator on the base of the instrument. See *Figure 2a*.

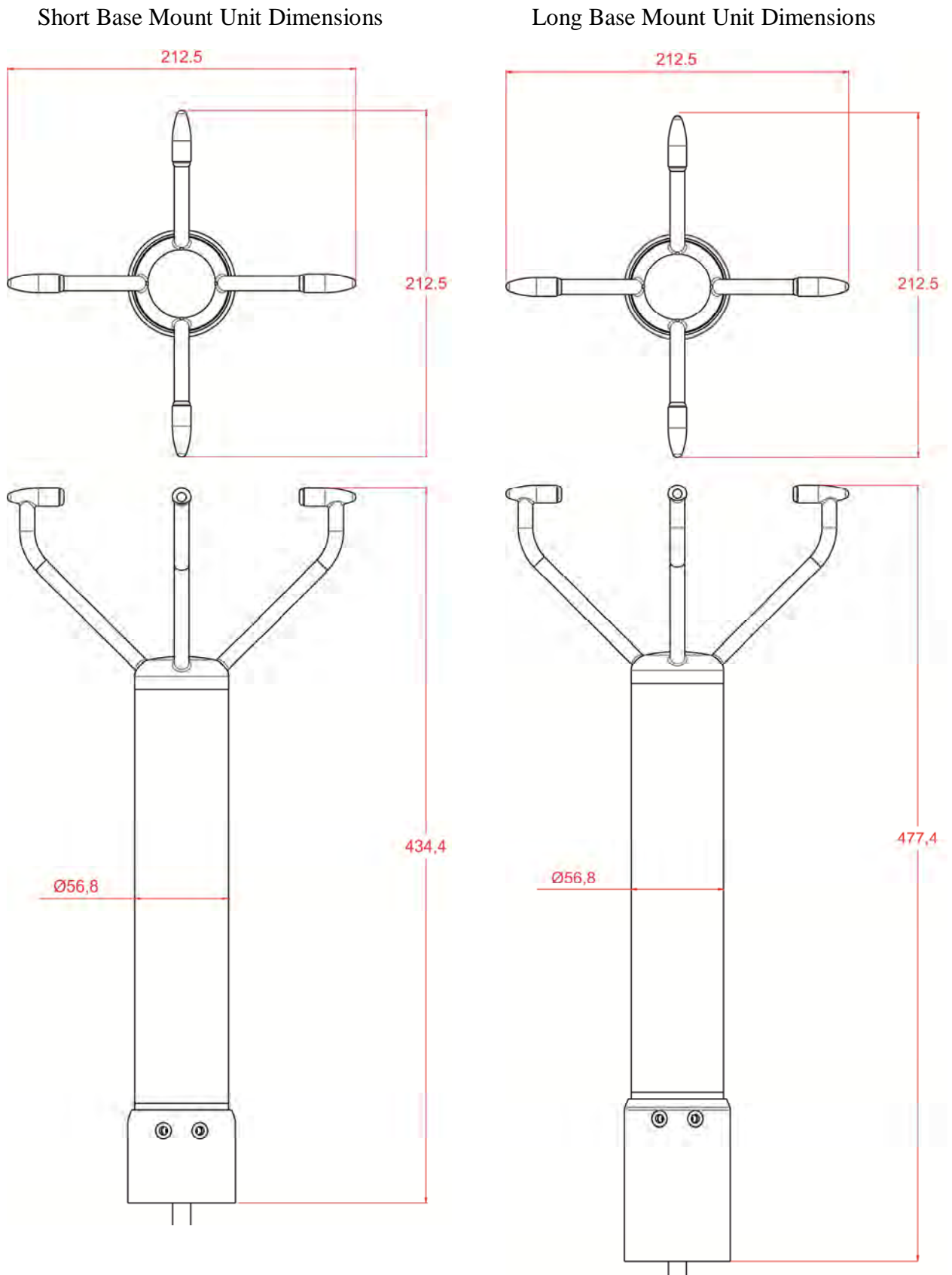
If the unit is used in a tunnel, (and the Tunnel format is used), the unit would normally be aligned with the N – S axis in the horizontal plane.

Figure 2a North Marker (Long Base Mount shown for illustrative purposes).

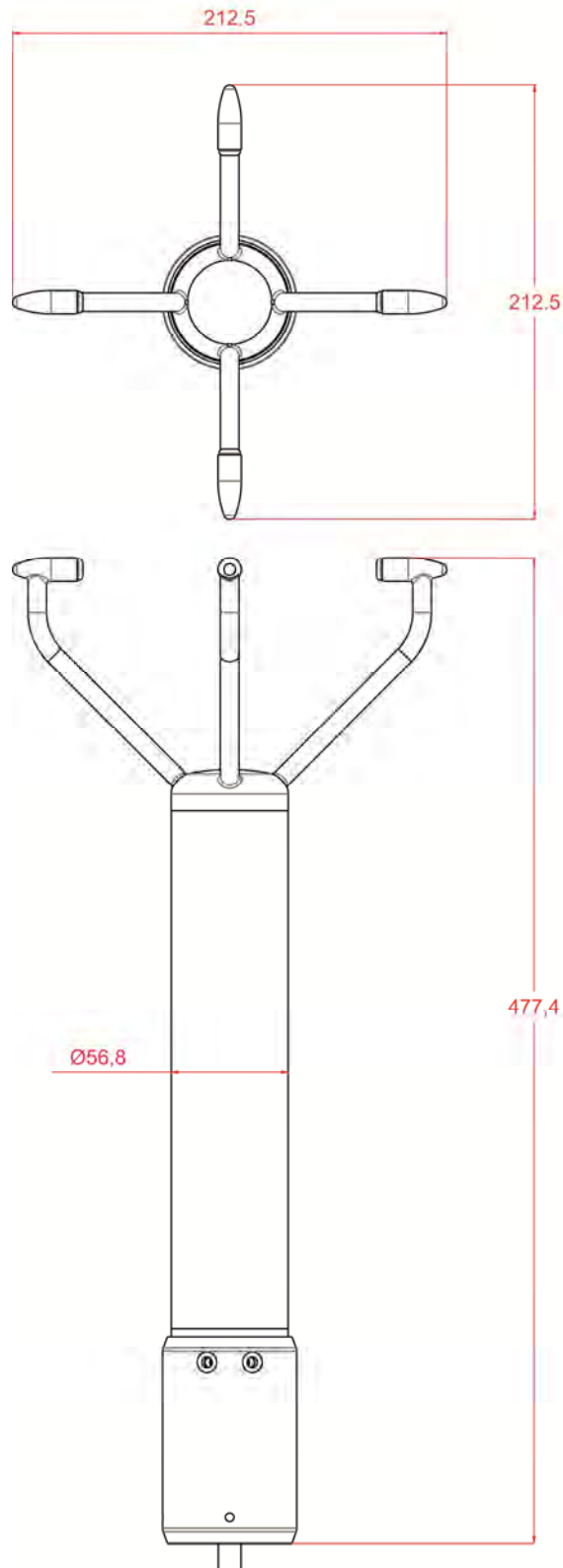


Pipe Mount units do not require the gasket and mounting ring.

Figure 2b WindObserver 65 outline dimensions



### Pipe Mount Unit Dimensions



## 7. MESSAGE FORMATS & OPTIONS

On first applying power to the WindObserver 65, it will be in ‘Measurement Mode’, and it will output wind measurement information in one of the formats as described below.

Setting the output format, units, other parameters, options and the communication settings are all carried out in the alternative ‘Configuration Mode’.

*See Section 9 CONFIGURING for details of how this is done.*

*The factory default settings are shown here in **bold**, and for convenience some ‘Configuration codes’ (as used to set the configuration) are shown in blue boxes.*

*For example [M3](#).*

### 7.1. Wind Speed format

The wind speed measurements can be output in one of the following formats:

UV, Polar, Customer formats (NMEA and Tunnel).

### 7.2. Output formats

The UV and Polar wind speed parameters are output in either ASCII or binary.

These parameters can be transmitted continuously or polled from the user.

Polar is also available in continuous NMEA format.

**Output Formats Table**

| Output format | Output       | Tri-state o/p     | Configuration code  |
|---------------|--------------|-------------------|---------------------|
| ASCII         | UV           | Continuous        | <a href="#">M1</a>  |
|               |              | Polled            | <a href="#">M3</a>  |
| <b>ASCII</b>  | <b>Polar</b> | <b>Continuous</b> | <a href="#">M2</a>  |
|               |              | Polled            | <a href="#">M4</a>  |
| ASCII         | Tunnel       | Continuous        | <a href="#">M12</a> |
| ASCII         | Tunnel       | Polled            | <a href="#">M13</a> |
| NMEA          |              | Continuous        | <a href="#">M5</a>  |
| Binary        | Tunnel       | Continuous        | <a href="#">M6</a>  |
| Binary        | UV short     | Continuous        | <a href="#">M7</a>  |
| Binary        | Polar        | Continuous        | <a href="#">M8</a>  |

### Low wind speeds

Whilst the wind speed is below 0.05 metres/sec, the wind direction will not be calculated, and the last known good direction figure is shown. All other output parameters will continue to update at the output rate.

## 7.3. Networking

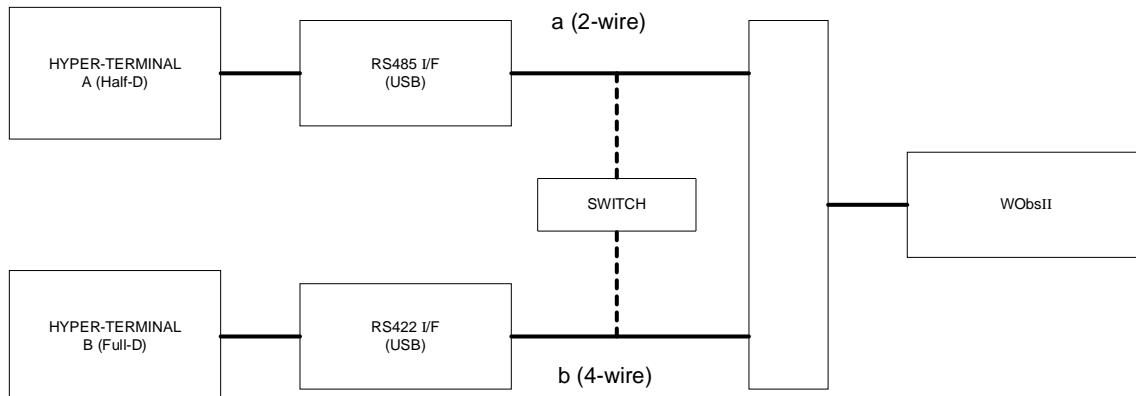
### Gill Proprietary Network

Each anemometer connected to the network **MUST** be given a unique Unit Identifier (Letters A to Z), and set to a polled tri-state mode (UV or Polar) ([M3](#), [M4](#) or [M13](#)).

In these modes the communications transmit line is tri-state unless the anemometer is responding to a command. If used in a multi drop system then it is recommended that Unit Identifiers A, B, C, D, E, F, K, M, N and P are not used.

Configuring WindObserver 65 for Half Duplex Operation.

- 1) Set up Two Terminals: One for RS485 Half Duplex and the other for RS422 Full Duplex.



One PC (with two USB ports) can be used for both Terminals, although two may be less confusing.

Note: Power must not be disconnected from the anemometer throughout this procedure.

- 2) Assuming the unit is set for Full Duplex, connect 9-way at [b] disconnect 9-way at [a]. Set Switch to position [b] (4 wire).
- 3) On Terminal B, enter CONFIGURATION MODE. Set Half Duplex (E2). The CONFIRM> prompt will appear.
- 4) Disconnect 9-way [b] and connect 9-way [a]. Set Switch to position [a] (2 wire).
- 5) On Terminal A, type "E" <ENTER> to confirm.
- 6) The unit should now be configured in Half Duplex mode.

Configuring WindObserver 65 for Full Duplex Operation.

- 1) Assuming the unit is set for Half Duplex, disconnect 9-way [b] and connect 9-way [a]. Set Switch to position [a] (2 wire).
- 2) On Terminal A, type "E1" to select Full Duplex. The CONFIRM> prompt will appear.
- 3) Disconnect 9-way [a] and connect 9-way [b]. Set Switch to position [b] (4 wire).
- 4) On Terminal B type "E" <ENTER> to confirm.

## 7.4. Units

The wind speed can be set to any of the following units:

| Unit                | Abbreviation |
|---------------------|--------------|
| Metres per sec      | m/s          |
| Knots               | knots        |
| Miles per hour      | MPH          |
| Kilometres per hour | kph          |
| Feet per minute     | fpm          |

## 7.5. Output rate

The output frequency can be set between 1 and 10 per second. The wind speed is sampled every 25ms, each axis being sampled sequentially. The following Table lists the possible outputs per second and the corresponding number of averaged samples. A 25ms sample period is used to process and output the results.

| Outputs per Second | Sample Average |
|--------------------|----------------|
| 1                  | 39             |
| 2                  | 19             |
| 4                  | 9              |
| 5                  | 7              |
| 8                  | 4              |
| 10                 | 3              |

## 7.6. Averaging (Digital Data)

The Averaging Period can be set from zero to 3600 secs. (1 hour). The default setting is zero. When averaging is enabled, data is output at a rate determined by the averaging period. The data is an average of valid data collected during the averaging period. If G is set to zero then averaging settings will be disabled.

## 7.7. Options

### Speed of Sound (SOS) and Temperature

Either or both of these parameters can be selected or disabled

Note that neither of these parameters is available in Tunnel or NMEA formats.

SOS is useful for calculating air temperature with a rapid response. Sonic temperature is derived from the SOS, based on an assumption of the composition of the atmosphere. Humidity will affect the result.

True temperature can be calculated by:

$$T = T_s \frac{1}{1+0.32 e/p}$$

Where

- T = True temperature (Kelvin)
- T<sub>s</sub> = Sonic temperature
- e = Vapour pressure of water in air
- p = absolute pressure of water in air



### **Heating (If fitted)**

Heating is autonomous and requires no set-up once activated.

### **45° Offset**

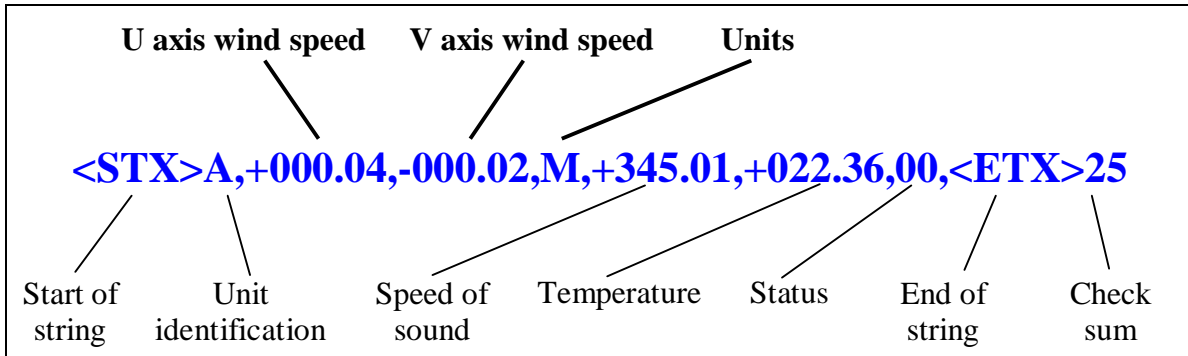
If required, the U axis can be offset +45° to the transducer axis.

### **Vertical Output Padding**

A dummy W vector is inserted to provide compatibility with any WindMaster that may be in a network.

## 7.8. ASCII message format (UV, Polar and Tunnel)

### ASCII UV format



Where

**U axis wind speed** In increments of 0.01 units ( $\pm UUU.UU$ )

**V axis wind speed** In increments of 0.01 units ( $\pm VVV.VV$ )

| <b>Units</b> | <b>Value</b> | <b>Units</b>              |
|--------------|--------------|---------------------------|
|              | M            | Metres per second (m/s)   |
|              | N            | Knots (knots)             |
|              | P            | Miles per hour (MPH)      |
|              | K            | Kilometres per hour (kph) |
|              | F            | Feet per minute (fpm)     |

**Start of string** ASCII value 2

**Unit identification** Letter A – Z (**default A**)

**Speed of sound** In metres per second (if enabled)

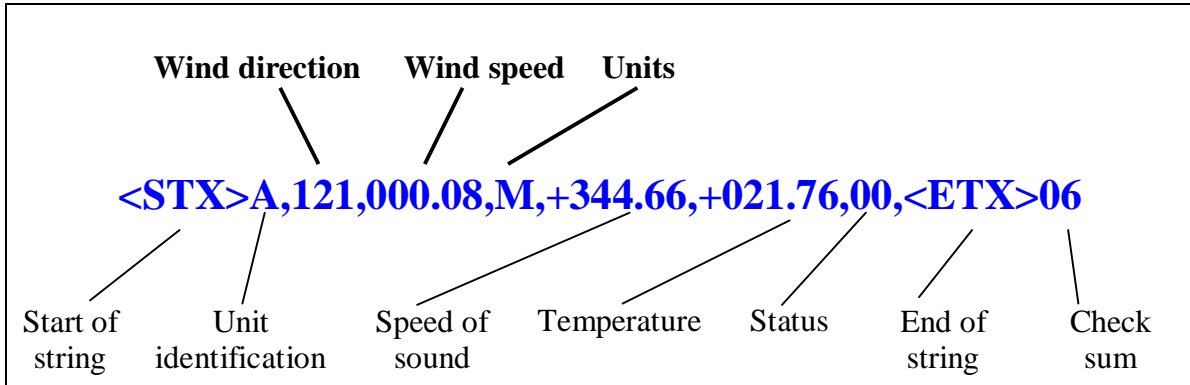
**Temperature** Sonic temperature in degrees C (if enabled)

| <b>Status</b> | <b>Value</b>    | <b>Status</b>                                   |
|---------------|-----------------|---|
|               | 0               | OK  |
|               | 60              | Heating enabled and OK if enabled               |
|               | Any other value | Warning or fault condition<br>- see Section 9.5 |

**End of string** ASCII value 3

**Check sum** Exclusive OR of all characters between Start of String and End of String reported as ASCII hex.

**ASCII Polar format**



Where

- Wind direction**                      In degrees relative to N (DDD)
- Wind speed**                              In increments of 0.01 units (±MMM.MM)

All other parameters              *See Section 7.8 ASCII UV format*

**ASCII Polled (UV and Polar)**

When in the Polled mode, an output is only generated when the host system sends a Poll signal to the WindObserver consisting of the WindObserver Unit Identifier – that is, the relevant letter A – Z.

The output formats are otherwise as described above.

The commands available in this mode are:

| Description                          | Command   | WindObserver response       |
|--------------------------------------|-----------|-----------------------------|
| WindObserver Unit Identifier         | A ..... Z | Wind speed output generated |
| Enable Polled mode                   | ?         | (None)                      |
| Disable Polled mode                  | !         | (None)                      |
| Request WindObserver Unit Identifier | &         | A ..... Z (as configured)   |
| Enter Configuration mode             | *<N>      | CONFIGURATION MODE          |

Where <N> is the unit identifier, if used in a multi-drop system then it is recommended that ID's A to F and KMNP are not used as these characters can be present in the data string.

It is suggested that in polled mode the following sequence is used for every poll for information.

?        Ensures that the Sensor is enabled to cover the event that a power down has occurred.

A-Z     Appropriate unit designator sent to retrieve a line of data.

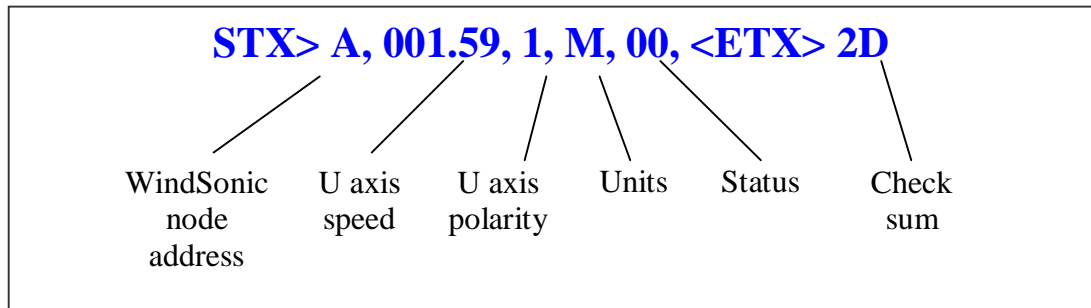
!        Sent to disable poll mode and reduce possibility of erroneous poll generation.

When in polled mode the system will respond to the data command within 30mS with the last valid data sample as calculated by the Output rate (P Mode Setting).

If the unit is powered down after use or upon switch on then allow 3 seconds from switch on before sending poll commands.

## ASCII format – Tunnel Mode

In this mode, the output is given as signed (i.e. positive or negative) speeds along the 'U' (= South – North) axis and direction as a 1 or 0.

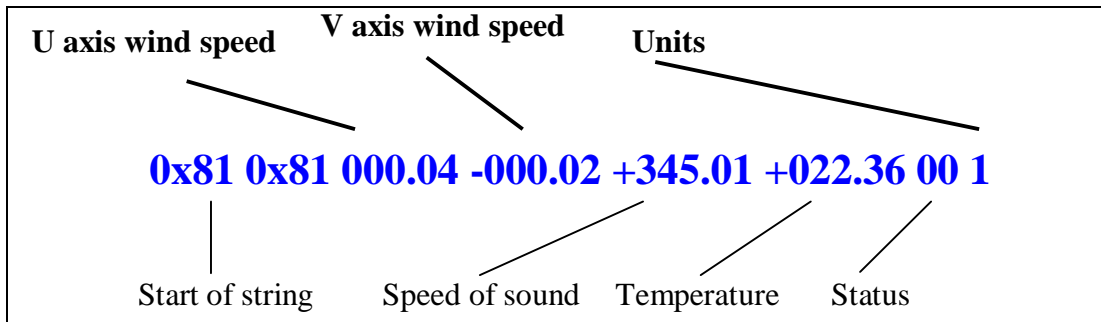


Where:

|                           |   |  |
|---------------------------|---|--|
| <STX>                     | = | Start of string character (ASCII value 2)  |
| WindObserver node address | = | Unit identifier  |
| U axis                    | = | U axis Wind Speed  |
| U axis                    | = | U axis Wind Direction Polarity<br>where 0 ( -U vector) is a wind from the North<br>direction or 1 (+U vector) is a wind from the South<br>direction. |
| All other parameters      | = | <i>See Section 7.8 ASCII UV format</i>   |

## 7.9. Binary message format (UV, Polar and Tunnel)

### Binary UV format



Where

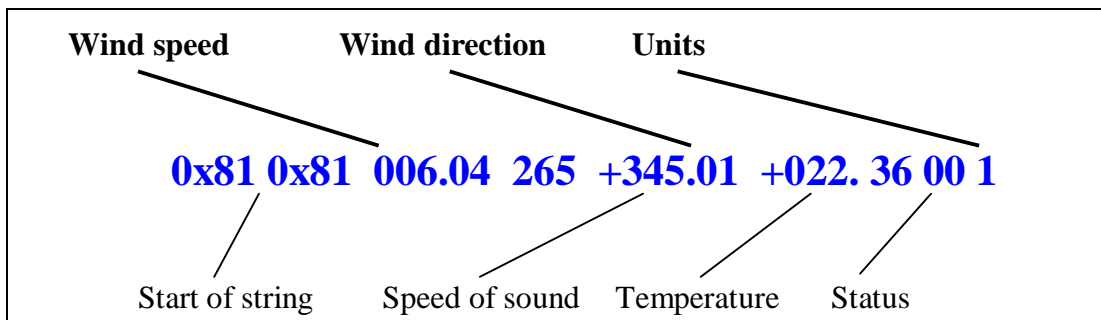
**U axis wind speed**      In increments of 0.01 units ( $\pm$ UUU.UU)  
**V axis wind speed**      In increments of 0.01 units ( $\pm$ VVV.VV)

| Units | Value | Units                     |
|-------|-------|---------------------------|
|       | 1     | Metres per second (m/s)   |
|       | 2     | Knots (knots)             |
|       | 3     | Miles per hour (MPH)      |
|       | 4     | Kilometres per hour (kph) |
|       | 5     | Feet per minute (fpm)     |

**Start of string**  
**Speed of sound**      In metres per second (if enabled)  
**Temperature**      Sonic temperature in degrees C (two's complement signed) (if enabled)

| Status | Value           | Status  |
|--------|-----------------|---|
|        | 0               | OK  |
|        | 60              | Heating enabled and OK                          |
|        | Any other value | Warning or fault condition<br>- see Section 9.5 |

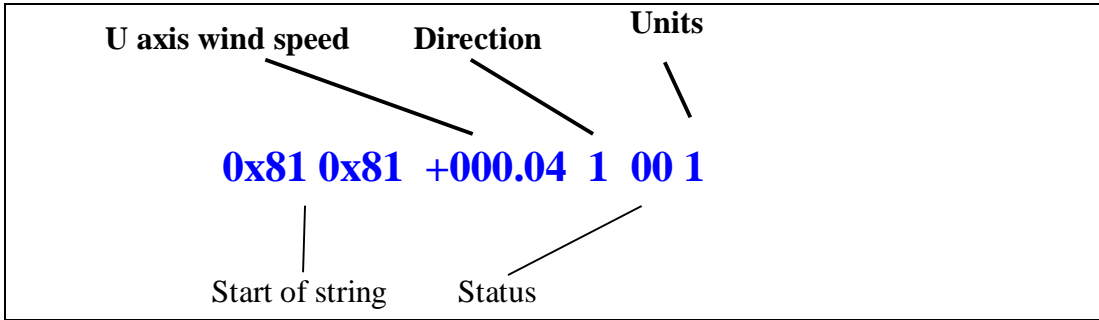
### Binary Polar format



Where

**Wind direction**      In degrees relative to N (DDD)  
**Wind speed**      In increments of 0.01 units ( $\pm$ MMM.MM)  
 All other parameters      See Section 7.9 *Binary UV format*

**Binary Tunnel format**



**U axis Wind speed**

In increments of 0.01 units ( $\pm$ MMM.MM)

**Direction** (along U axis)

**Value**

**Polarity**

1

+U

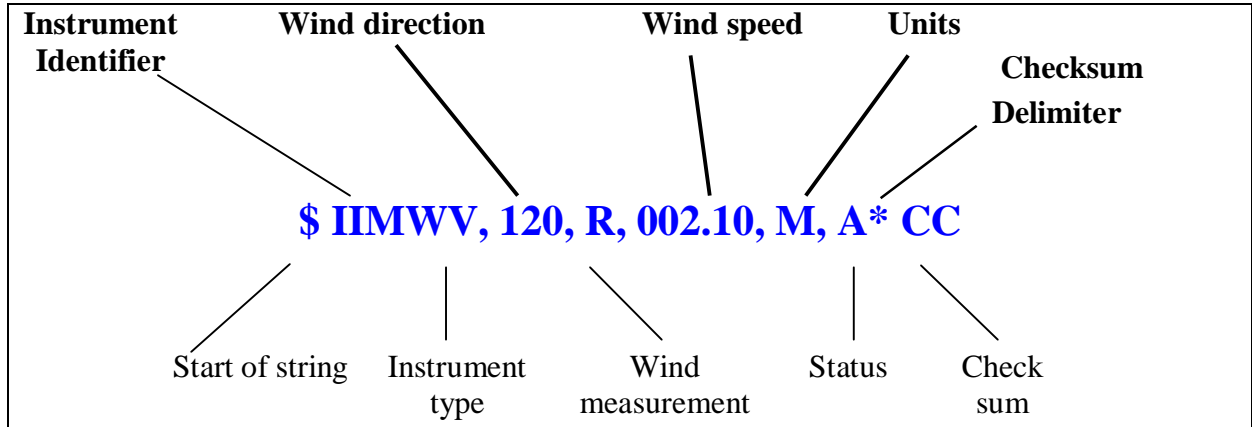
0

-U

Other parameters

See Section 7.9 *Binary UV format*

## 7.10. NMEA Format



Where

|                         |  |                              |
|-------------------------|--|------------------------------|
| <b>Wind direction</b>   | In degrees relative to N (DDD)   |                              |
| <b>Wind speed</b>       | In increments of 0.01 units ( $\pm$ MMM.MM)                                |                              |
| <b>Units</b>            | M  | Metres per second (m/s)      |
|                         | N  | Knots (knots)                |
|                         | P  | Miles per hour (MPH)         |
|                         | K  | Kilometres per hour (kph)    |
|                         | F  | <b>Feet per minute (fpm)</b> |
| <b>Start of string</b>  | \$   |                              |
| <b>Instrument type</b>  | IIMWV  |                              |
| <b>Wind measurement</b> | R  | Relative wind measurement    |
| <b>Status</b>           | A  | Acceptable measurement       |
|                         | V  | Void measurement             |
| <b>Check sum</b>        | Exclusive OR of all characters between '\$' and '*' reported as ASCII hex. |                              |

A typical WindObserver 65 configuration suitable for NMEA would be:

B2, E1, F1, G0, K1, L1, M5, O1, P1, U1.

Consult specification NMEA 0183 version 3 (available on the web) [www.nmea.org](http://www.nmea.org) for complete interface details.

## 7.11. Analogue outputs and options

*Analogue outputs are available as an option on the WindObserver 65.*

*See Section 6.5 for connection details, and Section 8.5 for configuring the analogue outputs.*

### Output modes

There are three analogue output channels which can be configured as either voltage (0 to 5v, or  $\pm 2.5v$ ), or current outputs (4 to 20mA). They are available simultaneously with the digital outputs.

### Channel outputs

The signals on the Channel outputs 1 and 2 are dependent on the Output format chosen. The signal on Channel 3 can be configured for either Status or Temperature.

| Output format                         | Channel 1 | Channel 2   | Channel 3                    |
|---------------------------------------|-----------|-------------|------------------------------|
| UV (M1, M3, or M7 (Binary))           | U         | V           | <b>Status</b> or Temperature |
| <b>Polar</b> (M2, M4, or M8 (Binary)) | Magnitude | Direction   |                              |
| NMEA (M5)                             | Magnitude | Direction   |                              |
| Binary Tunnel (M6)                    | U Speed   | U direction |                              |
| Tunnel (M12)                          | U Speed   | U Direction |                              |
| Tunnel (M13)                          | U Speed   | U Direction |                              |

### Status

If channel 3 is configured for Status, the output will be 0v (or 4mA) if the unit is in an OK condition. In a fault condition, error code 01, 02, or 04, the output will be +5v (or 0mA).

*See Section 9.5 for the list of Error Codes.*

### Temperature

If channel 3 is configured for Temperature, it reports the temperature if it is between  $-40$  and  $+70^{\circ}\text{C}$ , scaled from +0.7V to +5V (6.25mA to 20mA). Temperatures outside this range are reported as errors by setting the output to 0V (4mA).

### Tunnel mode

In Tunnel mode, Channel 1 represents the Wind Speed along the U Axis, Channel 2 gives the direction of the wind along the U axis, where a  $-U$  vector (=wind from the 'N' direction) is represented by 0v (or 4mA), and a  $+U$  vector (=wind from the 'S' direction) by 5v (or 20mA).

### Scaling

All analogue outputs are in m/s irrespective of the digital units of measurement setting and can be scaled to have a full-scale deflection of  $\pm 10$  to  $\pm 70$  units using the Z command.

In Polar mode the  $\pm$  sign should be ignored. Only the + sign is effective.

In all cases zero Wind Speed is represented by 0V or 4mA.

### Averaging

Analogue Outputs are not averaged when using the G command.



### Polar mode direction wraparound

The Wind Direction in Polar mode can be configured for either Standard (0 - 359°) or **Wraparound (0 - 539°)** options. If the Standard mode is used with a chart recorder, large swings of the recorder pen will be experienced each time the wind direction passes between 0 and 359°. Using the Wraparound mode, when the wind first changes from 0° to 359°, there will be a step change on the output, but after this first time the output will change smoothly each time the wind passes through 360°. (Similarly, the first time the wind veers from 539° to 180°, there will be a step change, after which the output will change smoothly).

| Wind direction (degrees) | Voltage output (V) |            | Current output (mA) |            |
|--------------------------|--------------------|------------|---------------------|------------|
|                          | Standard           | Wraparound | Standard            | Wraparound |
| 0                        | 0                  | 0          | 4.00                | 4.00       |
| 180                      | 2.5                | 1.67       | 12.00               | 9.33       |
| 360                      | 5.0                | 3.33       | 20.00               | 14.67      |
| 540                      | N/a                | 5.0        | N/a                 | 20.00      |

### Low wind speeds

Whilst the wind speed is below 0.05 metres/sec, the wind direction will not be calculated, all other output parameters will continue to update at the output rate.

The following Table shows Channel 1, 2 and 3 outputs with Polar Continuous, 4-20mA current outputs under various operating conditions.

| Condition  | Channel 1 (Wind Speed)                               | Channel 2 (Wind Direction)  | Channel 3 (Status)               |
|--|--|---|----------------------------------|
| Wind Speed, Greater Than 0.05m/s                         | Variable 4 to 20mA (value depends on Output scaling) | Variable 4 to 20mA (Value depends on Output scaling)                              | 4mA (Unit functioning correctly) |
| Wind Speed, Less Than 0.05m/s                            | Variable close to 4mA.                               | Outputs last known good/valid current reading until wind increases above 0.05m/s. | 4mA (Unit functioning correctly) |
| Any Wind Speed with Failure Codes Output 01, 02, 04 etc. | Fixed 4mA until fault clears.                        | Outputs last known good/valid current reading until fault clears.                 | 0mA (Failure code present)       |

### Cables.

If using 4-20mA outputs then cable length is limited to the resistance of the connecting cable (to and from the load) plus the load resistance which all together must be less than 300 ohms.

If using 0-5v output then consider volt drops on the cable that might impact on 0v and 5v readings. A 4-20mA system will be more noise immune and capable of longer cable runs.

## 8. CONFIGURING

The WindObserver 65 can be configured using Terminal emulator software such as HyperTerminal.

Alternatively it is possible to use Gill Wind Software as a Terminal program only (Wizard and Sync Comms not applicable). Wind will run on PC's up to and including Windows 7 and can be downloaded from:-<http://www.gill.co.uk/main/software.html>.

### 8.1. Configuring using HyperTerminal

**Note** – Other terminal emulators are configured in a very similar way.

1. Decide on an available Com port that you want to use (Usually Com1).
2. Run Hypertrm.exe (Typically accessed via Start → All Programs → Accessories → Communications → Hyperterminal).
3. Create a New Connection (File → New Connection)
4. Enter a **Name** (eg WindObserver 65) .
5. Change '**Connect Using**' to 'Direct to Com 1' (or other Com port as required)
6. Adjust the Port settings to match WindObserver settings. WindObserver default settings are :

**Bits per second** 9600

**Data bits** 8

**Parity** None

**Stop bits** 1

**Flow Control** (Handshaking) None

Click on OK and data similar to the following example will scroll on screen at the output rate:

© A, 229, 002.74, M, 00, ♥ 06

### 8.2. Entering Configuration mode

#### From Continuous mode

Type \*

#### From Polled mode

Type \*N - where N is the Unit Identifier.

*Note - the Unit Identifier must be entered as upper-case*

The WindObserver 65 responds with a CONFIGURATION MODE message, stops reporting wind measurements, and waits for a command (as detailed below).

### 8.3. Returning to Measurement mode

Type Q and press ENTER

If in **Continuous** mode, the anemometer responds with wind measurements immediately, continuing at the selected Sampling rate.

If in **Polled** mode,

- ? Enables poll
- N Polls anemometer (where N is the Unit identifier entered as upper-case)  
The anemometer replies with a single set of wind measurements
- & Anemometer replies with Unit identifier
- ! Disables poll

Note:- If the unit is in Polled Mode it is always best to interrogate the unit for data with a ? before the poll identifier to cater for the event that the power has been switched off or power interrupted.

If used in a multi drop system then it is recommended that Unit Identifiers A, B, C, D, E, F, K, M, N and P are not used.

## 8.4. Checking the configuration

We strongly recommend that, as a standard procedure, you use this command ( D3 ) prior to, and after, changing any settings. It shows the current settings for all the alterable settings. We suggest you note down your settings, so that you can easily return to them.

- Type \* Enters Configuration Mode (from Continuous mode)
- Or Type \*N Enters Configuration Mode (from Polled mode)

Type D3 and press ENTER The WindObserver 65 responds with the current configuration settings.

The factory default settings for a heated unit are: -

**A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1**

Or factory default settings for an unheated Unit are:-

**A0 B3 C1 E1 F1 G0000 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1**

To return to Measurement mode Type Q and press ENTER

How to change these settings is explained in the following sections.

## 8.5. Changing settings

To change a setting, first go into Configuration mode and then refer to the sections below. Enter the Configuration code of the new setting required, followed by ENTER.

If successful, the new setting will be echoed back as a message by the WindObserver 65.

For example, to change the message format to NMEA, Type M5 and press ENTER .

The WindObserver 65 will reply with M5. When the unit is returned to the Measurement mode Type Q and press ENTER, it will be in NMEA format.

Note: The factory-set (default) settings are shown in **bold** in the following sections.

## 8.6. Configuration Settings

### Ax - Speed of Sound (SOS) and Temperature

| Setting                          | Configuration code |
|----------------------------------|--------------------|
| <b>Disable both</b>              | <b>A0</b>          |
| Report SOS                       | A1                 |
| Report Sonic temperature         | A2                 |
| Report SOS and Sonic temperature | A3                 |

Note that neither of these parameters is available in Tunnel or NMEA formats.

### BX - Baud Rate

| Setting     | Configuration code |
|-------------|--------------------|
| 2400        | B1                 |
| 4800        | B2                 |
| <b>9600</b> | <b>B3</b>          |
| 19200       | B4                 |
| 38400       | B5                 |
| 1200        | B6                 |
| 300         | B7                 |

To change the Baud rate when using HyperTerminal: -

Eg. If set to B3 (9600 baud) and it is required to set to Baud rate to B2 (4800 baud).

Type **\*** to enter Configuration Mode.

Type **B 2** and press **ENTER**, (**Do not type any further commands at this stage**).

Close the 9600 Baud HyperTerminal connection.

Open HyperTerminal and set the new connection Baud Rate to 4800 baud.

Type **B** and press **ENTER**, the letter B will be shown followed by B2

Type **Q** and press **ENTER**, data will scroll at the new baud rate.

### Cx- Analogue Output Polar Mode Direction Wraparound

| Setting                      | Configuration code |
|------------------------------|--------------------|
| <b>Wraparound (0 - 539°)</b> | <b>C1</b>          |
| Standard (0-360°)            | C2                 |

**Dx- Diagnostic and Configuration Command (see also Section 10.6)**

Each of these commands causes a response from the WindObserver 65.

| Item                            | Command code       | Typical response  |
|---------------------------------|--------------------|---|
| Type and serial No.             | <a href="#">D1</a> | *12400001 (where * = E (Unheated unit), F = (Heated unit))                                  |
| Software version                | <a href="#">D2</a> | 6.01  |
| Unit configuration              | <a href="#">D3</a> | Current configuration:<br>A0 B3 C1 E1 F1 G0000 H2 J1 K1 L1 M2 NA O1 P1 T1<br>U1 V1 X1 Y1 Z1 |
| Analogue ID (if present)        | <a href="#">D4</a> | Analogue Active (if fitted) or No analogue fitted.  |
| Anemometer power supply voltage | <a href="#">D5</a> | +29.8   |
| Integrity check                 | <a href="#">D6</a> | See Para 10.6 Bench Tests   |

**Ex - Full Duplex/Half Duplex Mode**

| Setting     | Configuration code |
|-------------|--------------------|
| Full duplex | <a href="#">E1</a> |
| Half duplex | <a href="#">E2</a> |

Note: - Refer also to Para 8.3 Networking Configuration details.

**Fx- Data and Parity Options**

| Setting                         | Configuration code |
|---------------------------------|--------------------|
| 8 bits, no parity, 1 stop bit   | <a href="#">F1</a> |
| 8 bits, even parity, 1 stop bit | <a href="#">F2</a> |
| 8 bits, odd parity, 1 stop bit  | <a href="#">F3</a> |

**Gx to Gxxxx - Averaging (Digital Outputs only)**

| Setting             | Configuration code    |
|---------------------|-----------------------|
| Averaging (Default) | <a href="#">G0000</a> |

Enter the required averaging period in seconds as a four-figure number between 0000 and 3600.

**Hx - Heating (If fitted)**

Heating is autonomous and requires no set-up once activated.

| Setting   | Configuration code |
|-----------|--------------------|
| Disabled  | <a href="#">H1</a> |
| Activated | <a href="#">H2</a> |

**Jx - Analogue Power-up Tests**

| Setting  | Configuration code |
|--|--------------------|
| Disable analogue power-up tests on switch on             | <a href="#">J0</a> |
| <b>Enable single analogue power-up test on Switch on</b> | <a href="#">J1</a> |
| Enable continual cycling of analogue power-up tests      | <a href="#">J2</a> |
| Disable continual cycling of analogue power-up tests     | <a href="#">J3</a> |

Analogue Power up tests cycle: -

Analogue Output Voltage connections between 0v, 1.25v, 2.5v, 3.75v and 5v.

Analogue Output Current connections between 0mA, 5mA, 10mA, 15mA and 20mA

**Kx – NMEA Settings**

| Setting             | Configuration code |
|---------------------|--------------------|
| NMEA string “IIMWV” | <a href="#">K1</a> |
| NMEA string “WIMWV” | <a href="#">K2</a> |

**Lx - ASCII Message Terminator**

| Setting      | Configuration code |
|--------------|--------------------|
| <b>CR LF</b> | <a href="#">L1</a> |
| LF           | <a href="#">L2</a> |

**Mx to Mxx - Message Format**

| Output format                     | Configuration code  |
|-----------------------------------|---------------------|
| ASCII UV Continuous               | <a href="#">M1</a>  |
| <b>ASCII Polar Continuous</b>     | <a href="#">M2</a>  |
| ASCII UV Polled (tri-state) *     | <a href="#">M3</a>  |
| ASCII Polar Polled (tri-state) *  | <a href="#">M4</a>  |
| NMEA Continuous                   | <a href="#">M5</a>  |
| Binary Tunnel Continuous          | <a href="#">M6</a>  |
| Binary UV Continuous              | <a href="#">M7</a>  |
| Binary Polar Continuous           | <a href="#">M8</a>  |
| ASCII Tunnel Continuous           | <a href="#">M12</a> |
| ASCII Tunnel Polled (tri-state) * | <a href="#">M13</a> |

\* If units are to be networked, they MUST be given unique Unit Identifiers

**Nx - Node Address**

| Item                | Options               | Command           |
|---------------------|-----------------------|-------------------|
| <b>Node Address</b> | <b>A... -(A to Z)</b> | <b>N&lt;A&gt;</b> |

If used in a multi-drop system then it is recommended that ID's A to F and K, M, N and P are not used, as these characters can be present in the data string.

## Ox – ASCII Output Format (Output String Padding)

| Setting                        | Configuration code |
|--------------------------------|--------------------|
| Comma Separated Variable (CSV) | <a href="#">O1</a> |
| Fixed Field                    | <a href="#">O2</a> |

### Example data strings:-

| POLAR   | NMEA  |
|---|---|
| CSV data changing to error status code condition.         | CSV data changing to error status code condition.         |
| γ A,235,000.77,M,00, <sup>L</sup> 0A                      | \$IIMWV,191,R,000.55,M,A*19                               |
| γ A,,,M,04, <sup>L</sup> 24                               | \$IIMWV,,R,,M,V*29  |
| Fixed Field data changing to error status code condition. | Fixed Field data changing to error status code condition. |
| γ A,266,000.73,M,00, <sup>L</sup> 08                      | \$IIMWV,191,R,000.55,M,A*19                               |
| γ A,999,999.99,M,04, <sup>L</sup> 0A                      | \$IIMWV,999,R,999.99,M,V*07                               |

## Px - Output Rate

| Outputs per second | 1                  | 2                  | 4                  | 5                  | 8                  | 10                 |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Configuration code | <a href="#">P1</a> | <a href="#">P3</a> | <a href="#">P2</a> | <a href="#">P4</a> | <a href="#">P5</a> | <a href="#">P6</a> |

## Q- Measurement Mode

See Section 8.3.

## Tx - Analogue Output Voltage or Current settings (if fitted)

| Setting                  | Configuration code |
|--------------------------|--------------------|
| Voltage (0 to 5V)        | <a href="#">T1</a> |
| Voltage (-2.5V to +2.5V) | <a href="#">T2</a> |
| Current (4-20mA)         | <a href="#">T3</a> |

## Ux – Digital Output Units

| Units              | metres/sec (m/s)   | knots (knots)      | miles / hour (MPH) | kilometre/hour (kph) | feet / minute (fpm) |
|--------------------|--------------------|--------------------|--------------------|----------------------|---------------------|
| Configuration code | <a href="#">U1</a> | <a href="#">U2</a> | <a href="#">U3</a> | <a href="#">U4</a>   | <a href="#">U5</a>  |

## Vx- Vertical Output Padding

| Setting                         | Configuration code |
|---------------------------------|--------------------|
| Disable vertical output padding | <a href="#">V1</a> |
| Enable vertical output padding  | <a href="#">V2</a> |

**Xx - 45° Alignment Offset/Inverted Operation**

| Setting                              | Configuration code | Notes  |
|--------------------------------------|--------------------|--|
| Align U axis with transducer axis    | X1                 | X1. Aligns U axis with North/South axis.   |
| Align U axis +45° to transducer axis | X2                 | X2. This re-aligns both U&V and polarity 45° to transducer axis.   |
| Reverses Polar Direction             | X3                 | X3 reverses reported polar direction to allow the instrument to be mounted upside down. N.B. Does NOT affect UV alignment (Mode 1, 3). |
| Align @ 45° from North               | X4                 | X4 set polar alignment at 45 degrees from North when instrument is mounted upside down. Does NOT affect UV alignment (Mode 1, 3).      |

Figure 4 shows the polarity of U and V if the wind components along the U and V axis are blowing in the direction of the respective arrows.

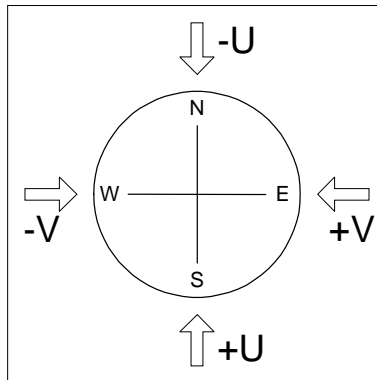


Figure 4 UV Polarity

**Yx – Analogue Output, Channel 3 (if fitted).**

| Setting     | Configuration code |
|-------------|--------------------|
| Status      | Y1                 |
| Temperature | Y2                 |

**Zx – Analogue Output Scaling (if analogue outputs fitted).**

| Setting            | ± 10 | ±20 | ±30 | ±40 | ±50 | ±60 | ±70 |
|--------------------|------|-----|-----|-----|-----|-----|-----|
| Configuration code | Z1   | Z2  | Z3  | Z4  | Z5  | Z6  | Z7  |



## 9. MAINTENANCE & FAULT-FINDING

### 9.1. Cleaning and Handling

When installing the unit handle with lint free gloves and degrease the unit to reduce the build up of deposits.

If there is any build up of deposit on the unit, it should be gently cleaned with a cloth, moistened with soft detergent. Solvents should not be used, and care should be taken to avoid scratching any surfaces. The unit must be allowed to defrost naturally after being exposed to snow or icy conditions, do NOT attempt to remove ice or snow with a tool.

**Do NOT remove black “rubber” transducer caps.**

### 9.2. Servicing

There are no moving parts or user-serviceable parts requiring routine maintenance.

Opening the unit or breaking the security seal will void the warranty and the calibration.

In the event of failure, prior to returning the unit to your authorised Gill distributor, it is recommended that:

- All cables and connectors are checked for continuity, bad contacts, corrosion etc.
- A bench test is carried out as described in Section 10.6.
- Contact your supplier for advice if failure persists.

### 9.3. Fault-finding

| Symptom  | Solution  |
|--|---|
| No output  | Check DC power to WindObserver 65, cable and connections.<br>Check comms settings of WindObserver 65 (as detailed in Section 8) and host system match, including correct Com port.<br>Check unit is in Continuous mode.<br>Check that in-line communication devices are wired correctly.<br>NOTE: It is usual for Anemometer TX + to be connected to converter device RX +. |
| Corrupted output   | Check comms settings of WindObserver 65 and host system match.<br>Try a slower baud rate.<br>Check cable lengths and type of cable.   |
| One way communication  | Check wiring is in accordance with the manual.  |
| Failed / Incorrect WindObserver 65 output, data invalid flag | Check that transducer path is not blocked.  |

## 9.4. Safe Mode

If a unit is received that will not communicate or the configuration settings are not known then Safe Mode can be used to establish communication with the WindObserver 65 and change configuration settings.

Initial Set Up.

The WindObserver 65 RS422 Pair 1 and Pair 2 TX and RX output connections (4 wires) are connected to a PC via an RS422 to RS232/USB Converter.

Open a Terminal program e.g. Windows HyperTerminal (or use Gill Wind Software as a Terminal program).

Select the required COM port.

Set the Baud rate to 19200 baud (if using the Wind Terminal program it opens at 19200 baud).

To Place the unit into Safe Mode.

Turn off the WindObserver 70/75.

Ensure the Terminal program is set for 19200 baud,

Hold down the PC keyboard \* key and turn on the WindObserver 70/75 Power Supply.

The words SAFE MODE should appear on the terminal screen.

If not then power down the WindObserver 70/75, hold the \* key and re-power sensor.

To now check the unit: -

Type D1 and press Enter, to see serial number.

Type D2 and Press Enter to see Firmware version.

Type D3 to see configuration settings,

```
SAFE MODE
D1
F922036
D1
D2
5.00
D2
D3
current configuration :
A0 B2 C1 E1 F1 00000 H2 J1 K1 L1 M5 NA O2 P1 T1 U1 V1 X1 Y1 Z1
```

Change settings if required.

Type Q and press Enter to go back into measurement mode.

If powering down the instrument and repowering and no change has been made to the baud rate (B command ) then open a new terminal program at the units original baud rate setting (the default setting would be 9600 Bauds).

## 9.5. Status (error) codes

The Status code is sent as part of each wind measurement message.

**Note:** Status Codes 60 to 65 are only applicable to a unit with the heating option.

| Code | Status   | Condition  |
|------|--|--|
| 00   | OK   | Sufficient samples in average period   |
| 60   | OK and heating enabled                         | Sufficient samples in average period   |
| A    | OK   | NMEA data Acceptable   |
| 01   | Axis 1 failed                                  | Insufficient samples in average period on U axis                             |
| 02   | Axis 2 failed                                  | Insufficient samples in average period on V axis                             |
| 04   | Axis 1 and 2 failed                            | Insufficient samples in average period on both axes                          |
| 08   | NVM error                                      | NVM checksum failed, data could be uncalibrated.                             |
| 09   | ROM error                                      | ROM checksum failed, data could be uncalibrated.                             |
| 51   | Measurement average building.                  | Data valid but warns that average period not reached when averaging used.    |
| 62   | Heating current tripped or electronic failure, | Valid data still output  |
| 63   | Heater Thermistor open circuit                 | Valid data still output.   |
| 65   | Heating element open circuit                   | Valid data still output, Heater Element or Heater PSU has dropped out/failed |
| V    | NMEA data Void                                 | Invalid data output  |

## 9.6. Bench Test

### Data Tests

1. Couple the WindObserver 65 to the host system and power supply, using a known working test cable.
2. Check that the unit is correctly configured by going into Configuration mode and using [D3](#) See Section 8.4 Checking the Configuration.
3. Check for normal output data, and that the Status Code is OK – 00, 60 or A (for NMEA format).
4. If the status code is other than these, refer to Section 9.5 Status (error) codes.
5. Use an office fan or similar to check that the unit is sensing wind, turning the unit to simulate changing wind direction and to check that both axes are functioning.
6. Note that this is a quick functional test. There are no calibration adjustments; the unit is designed NOT to require re-calibration within its lifetime. Gill has provided and Integrity Check, see next page for details.

## Use of an Integrity Check Chamber (Optional item)

The ICC is designed to:

1. Identify any gross changes in the head geometry that would affect the performance.
2. Provide a zero wind environment to confirm the WindObserver 65 zero calibration.

The ICC has been designed to be used in an indoor still air environment with an ambient temperature between 17°C and 23°C. When conducting the test it is important that the ICC is assembled on to the WindObserver 65 head and not touched or moved during the test.

This test is only valid if undertaken with an ICC purchased from Gill.

Note:- The Heater supply should be disconnected or turned off when using the ICC.

## Zero Wind Check

Configure your PC to run HyperTerminal and assemble the ICC by inserting the reflector cases and the two halves of the ICC onto the WindObserver 65. The ICC must be retained using the strips provided. Then:

1. Ensure that the WindObserver 65 is set in factory default mode. For Factory default settings see section 8.4.
2. Enter Measurement Mode and Record/View data

In still air wind speed measurements should not exceed 0.03m/s. If wind speed exceeds 0.03m/s contact Gill Instruments.

## Alignment Check

Ensure the ICC is assembled correctly on the WindObserver 65. Using HyperTerminal, enter Configuration Mode as described in Section 8.

Enter D6.

A typical report as shown below will be displayed.

```
D6
ALIGNMENT LIMITS: U=2424,2524
                  V=2434,2434
ALIGNMENT U:2474 *PASS*
ALIGNMENT V:2484 *PASS*
```

D6

If 'Refer to Manual' is shown check test temperature conditions are 17 to 23 deg C and tested under zero wind condition.

If there has been no significant changes to The WindObserver 65 head configuration then \*PASS\* will confirm correct operation.

Alterations to the head geometry can result in a \*FAIL\* or 'Insufficient Samples' message. If this occurs please contact Gill Instruments.

## 9.7. Returning Units

If the unit has to be returned, it should be carefully packed in the original packaging and returned to your authorised Gill distributor, with a full description of the fault condition.

## 10. APPENDICES

### 10.1. Glossary & Abbreviations

| Item                     | Meaning   |
|--------------------------|---|
| CAL                      | Calibration   |
| CR                       | Carriage Return   |
| CRLF                     | Carriage Return Line Feed   |
| CSV                      | Comma Separated Variable  |
| ENG                      | Engineering   |
| ESC                      | ESCAPE key on keyboard used to stop any process that is being executed                                  |
| ETX                      | End of string character   |
| FAC                      | Factory   |
| fpm                      | Feet per minute   |
| GND                      | GrouND  |
| HEX                      | HEXadecimal   |
| I/P                      | InPut   |
| IP66                     | Protection Classification   |
| KPH                      | Kilometres per Hour   |
| LF                       | Line Feed   |
| m/s                      | Metres per second   |
| MAG                      | MAGNitude - scalar reference to wind speed  |
| MAX                      | MAXimum   |
| MPH                      | Miles per Hour  |
| NEMA                     | National Electrical Manufacturers Association   |
| NMEA 0183<br>(version 3) | National Marine Electronics Association standard for interfacing marine electronic navigational devices |
| No:                      | Number  |
| NVM                      | Non-Volatile Memory   |
| O/P                      | Output  |
| PC                       | IBM compatible Personal Computer  |
| PCB                      | Printed Circuit Board   |
| POR                      | Power On Reset  |
| PROCOMM                  | Terminal emulator software package  |
| ROM                      | Read Only Memory  |
| RS232                    | Communications standard   |

| Item    | Meaning   |
|---------|---|
| RS422   | Communications standard                         |
| RS485   | Communications standard                         |
| RTS     | Request To Send                                 |
| RX      | Receive   |
| RXD     | Received Data                                   |
| S/W     | SoftWare  |
| SOS     | Speed Of Sound                                  |
| SEC     | SECond  |
| STX     | Start of string character                       |
| TERM    | TERMinal  |
| TX      | Transmit  |
| TXD     | Transmitted Data                                |
| +VE     | Positive  |
| -VE     | Negative  |
| WindCom | Gill software used to configure WindObserver 65 |
| WRT     | With Respect To                                 |

## 10.2. Guarantee

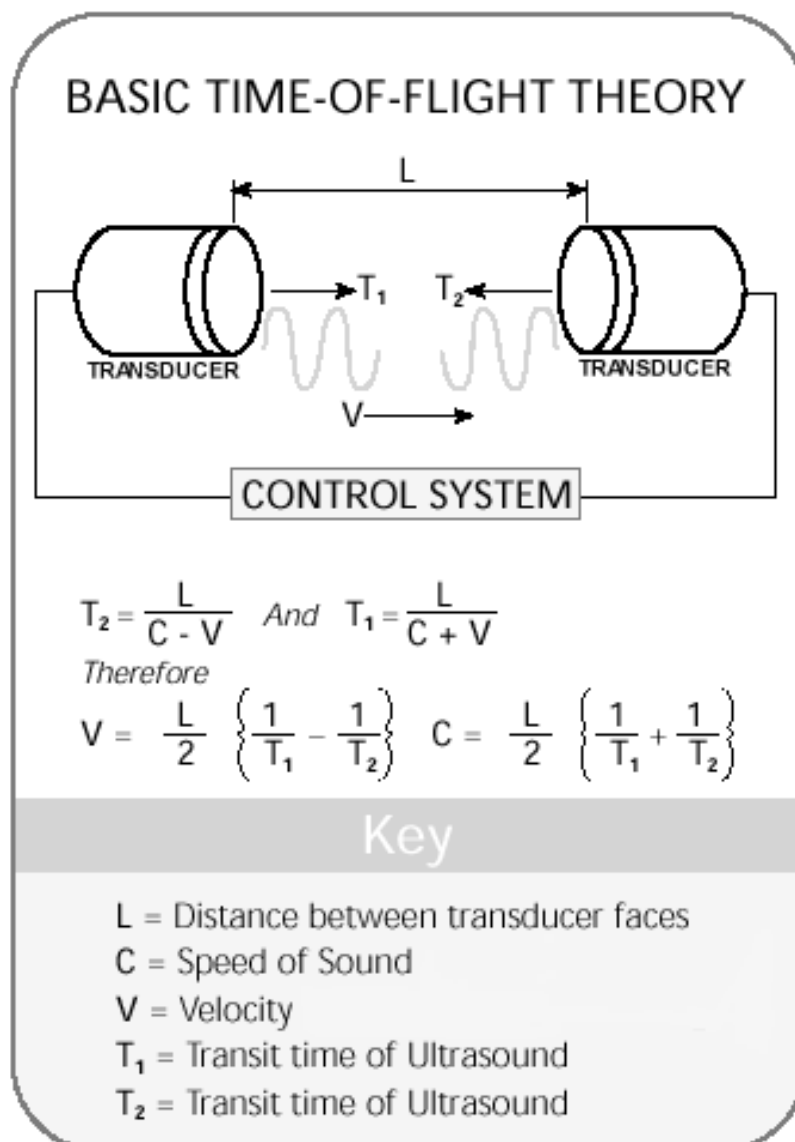
For terms of guarantee contact your supplier.

Warranty is void if the green security seal covering base nuts is damaged or broken, or the transducer caps have been damaged.

### 10.3. Principle of operation

The WindObserver 65 measures the times taken for an ultrasonic pulse of sound to travel from the North transducer to the South transducer, and compares it with the time for a pulse to travel from S to N transducer. Likewise times are compared between West and East, and E and W transducer.

If, for example, a North wind is blowing, then the time taken for the pulse to travel from N to S will be faster than from S to N, whereas the W to E, and E to W times will be the same. The wind speed and direction (and the speed of sound) can then be calculated from the differences in the times of flight on each axis. This calculation is independent of factors such as temperature.



## 10.4. Electrical Conformity

### EC DECLARATION OF CONFORMITY ACCORDING TO COUNCIL DIRECTIVE 2004/108/EC



We, Gill Instruments Ltd., declare our sole responsibility that the products:

**WindObserver 65 Ultrasonic Anemometer (Heated Variant)**  
**WindObserver 65 Ultrasonic Anemometer (Heated with Analogue Outputs Variant)**  
**WindObserver 65 Ultrasonic Anemometer (Non-Heated Variant)**  
**WindObserver 65 Ultrasonic Anemometer (Non-Heated with Analogue Outputs Variant)**

Manufactured by:

Gill Instruments Ltd

Saltmarsh Park  
67 Gosport Street  
Lymington, SO41 9EG

to which this declaration relates, are in conformity with the protection requirements of Council Directive 2004/108/EC on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based upon compliance of the product with the following harmonized standards:

EN60945:2002

EN61326:2006

Emissions Using EN60945 and EN55011  
Immunity Using EN61000-4-2 to EN61000-4-5  
EN61000-4-6 (Excluding 150kHz to 200kHz Conducted Immunity).  
EN61000-4-11

Signed by

A handwritten signature in black ink that reads "A.C.R. Stickland". The signature is written in a cursive style.

A.C.R. Stickland – Director

Date of issue: 19/09/2012

Place of issue: Gill Instruments Ltd  
Saltmarsh Park  
67 Gosport Street  
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