

Ultrasonic Anemometer

(Part 1390-PK-240)

Doc No: 1390-PS-0046

Issue 2 (Applies to firmware 2387 6.07 onwards).



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1. FOREWORD

Thank you for purchasing the WindObserver Remote Head (RH) 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.

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2. INTRODUCTION

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

Alternatively, the WindObserver RH 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) and Tunnel formats, and as either a Continuous output or Polled (requested by host system), detailed in full in Section 7 Message Formats & Options.

3. FAST TRACK SET-UP

If you are in a hurry to try out the WindObserver RH, 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 RH, 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 RH.

4. SPECIFICATION

Measurement

Message Output Rate	1, 2, 4, 5, 8, 10Hz
Parameter Formats	UV, Polar, NMEA, Tunnel
Units	m/s, Knots, MPH, KPH ft/min
Block Averaging	1-3600 seconds
Averaging (RWA)	Adjustable averaging for Road Weather Applications

Wind Speed

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

Direction

Range	0 - 359°
Accuracy	± 2° @12m/s
Resolution	1°
Dead Band	None

Digital Output

Communication	RS422, full duplex, RS485 2 wire network facility
Baud rates	1200, 2400, 4800, 9600, 19200, 38400
Format	8 data bits, odd, even or no parity, 1 stop bit
Anemometer Status	Supplied as part of standard message

Power Requirements

Anemometer	9-30V DC (30mA @ 12V DC) Reverse voltage protected
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Dimensions

Size	See manual Page 25 for dimensions
Weight	2.3kg (Total)

Materials

External Construction	Head and Body are Stainless Steel 316 Cable is Thermo rubber coated galvanised steel (flexible conduit with a minimum bend radius of 50mm)
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Environmental

Moisture protection	IP66 (EN60529)
Operating temperature	-20°C to +70°C to EN60068-2-1 and EN 60068-2-2
Humidity	0-100% (95% RH at 40°C to EN60068-2-30)
Precipitation	300mm/hr
Vibration	EN60068-2-6:2008 Frequency range: 5 to 150Hz Maximum acceleration level: 10m/s ² Number of sweep cycles/axis: 20 Number of Axis tested: 3
EMC	EN 61326-2-1:2013

Standards

Traceable to UK national standards

Site Calibration

None required. (See Section 10.6.3 Zero Wind Check)

5. PRE-INSTALLATION

5.1. Equipment supplied

- WindObserver Remote Head.
- and 19 Way Connector Installation Kit, Gill Part 1390-10-163 (see Para 5.4).
- and Stainless Steel Clamp, Gill Part 030-06700 (two supplied).
- and Stainless Steel Bracket, Gill Part 030-06701 (two supplied).

5.1.1 WindObserver RH Part Number.

The Gill Instruments order part number is 1390-PK-240.

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
Integrity Check Chamber	1277-00-052
19 way Connector kit	1390-10-163

5.2. Packaging

Whilst the WindObserver RH 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 RH.
- Gill WindDisplay.

Other equipment with I/O compatibility to the WindObserver RH for example a Data Logger.

- Networking - Multiple WindObserver RH 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 10 and can be downloaded free from:- <http://www.gillinstruments.com/main/software.html>
- A Terminal software program such as HyperTerminal, Tera Term or PuTTY.

Cable and Junctions Box

To connect between the WindObserver RH and the host system. The unit is supplied with a base mounted connector system

5.4. Connector and Cable Assembly.

The WindObserver RH has a 19 way connector base, supplied with a mating 19 way connector.

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

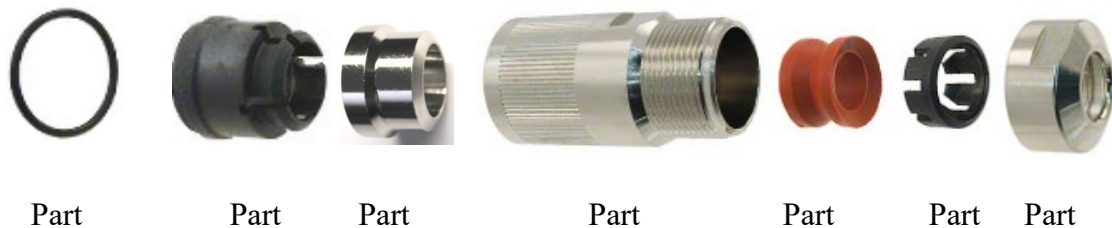
A set of assembly instructions are supplied with the connector together with:-

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 (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 026-02663).

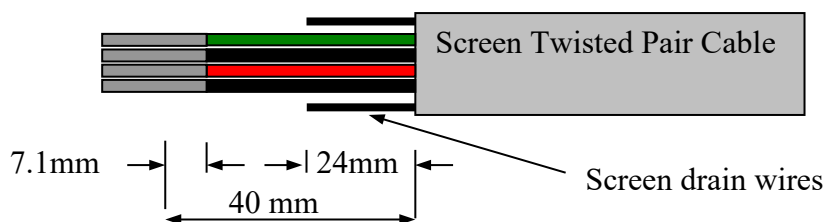
Trim back the cable outer and twisted pair screen sleeves 40mm (see diagram below).

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

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

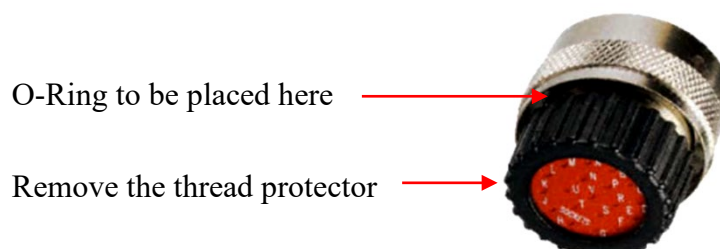
Solder the wires to the bucket contacts (will take 14awg to 26awg wire).

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 14 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.

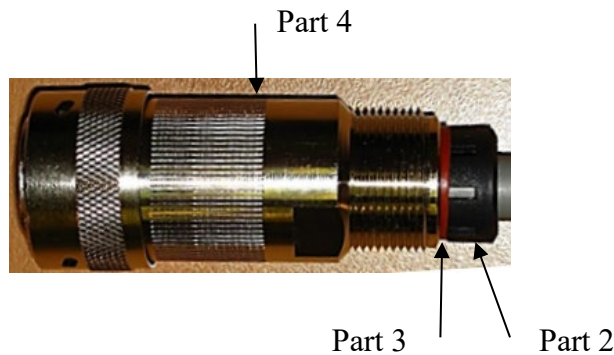
Once contacts are in position pass part 6 up the cable and into position as shown below.

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.

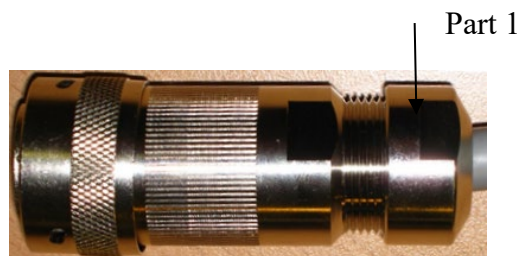


Now screw in part 4 and torque up to a value of 10Nm.



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

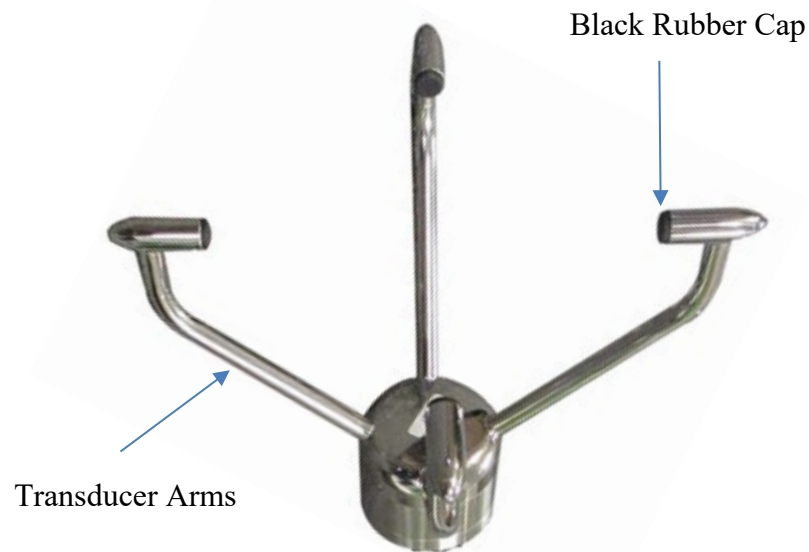
Now screw in item 1, the clamp nut, over parts 2 and 3 and onto the housing and torque up to a value of 10Nm.



6. INSTALLATION

Do NOT remove the black “rubber” transducer caps.

Take care not to knock the four Transducer arms. All the time the WindObserver RH 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 RH is NOT an IS device.

Warranty is void if the unit case is removed.

6.1. Installation Guidelines

The WindObserver RH has been designed to meet and exceed the stringent standards listed in its specification. Operating in diverse environments all over the world, WindObserver RH 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 RH 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 RH specification at all times.

Avoid turbulence caused by surrounding structures that will affect the WindObserver RH measurement 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 RH 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 10.6.*

6.3. Cabling

6.3.1 Cable type

A RS422 compatible cable should be used, with the number of twisted pairs matching the application.

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

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

No. of Pairs	Gill ref.	Belden ref.	Batt electronics ref.	Cable Gauge
2	-	9729	91071	24
3	026-02660	9730	91030	24
4	026-03156	9728	91199	24

6.3.2 Cable length

The typical RS422 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.

6.3.3 Cabling and junction box

The cable type from the WindObserver RH 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 connector does not support the cable weight.

6.4. Power supplies

Sensor Supply: -

Voltage	9V to 30V dc.
Current	30mA Average. 50mA Max @12V dc.

The WindObserver RH 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 or digital 0V to the screen or earth.

Digital 0V should be used in conjunction with RS422 TX/RX lines in order to improve noise immunity.

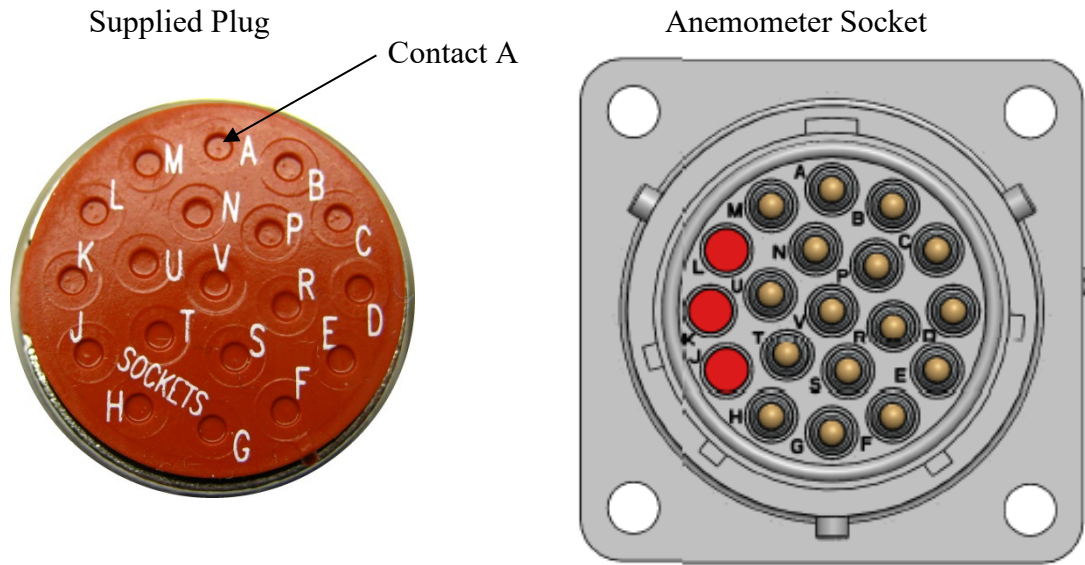
6.5.1 Earthing or grounding

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.

The Head unit or the Body of the unit (but not both) **MUST** be connected to an appropriate grounding point with a minimum of 6mm² copper wire, via the M5 base screws.

The power/communication cable screens must be joined with any cable screen continuing from the unit's cable via a junction box.

6.5.2 View of the WindObserver RH base connector



WindObserver RH 19 way connector and cable connections

19 Way Connector Terminal Letter	Signal Designation
P	RS422 TXB (+)
C	RS422 TXA (-)
U	RS422 RXB (+)
V	RS422 (RXA (-)
R	Supply V+
D	Supply V -
M	Digital 0v
N	Not Used (Isolate)
A	Not Used (Isolate)
B	Not Used (Isolate)
H	Not Used (Isolate)
G	Not Used (Isolate)
E	Not Used (Isolate)
F	Not Used (Isolate)
T	Not Used (Isolate)
S	Not Used (Isolate)
L No Connection	Not Used (Isolate)
K No Connection	Not Used (Isolate)
J No Connection	Not Used (Isolate)

6.5.3 Default Settings

The factory default settings are:

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

Plus RWASHORT 10 and RWALONG 60.

See also Para 8.6.

This will result in the unit reporting a data string as follows:-

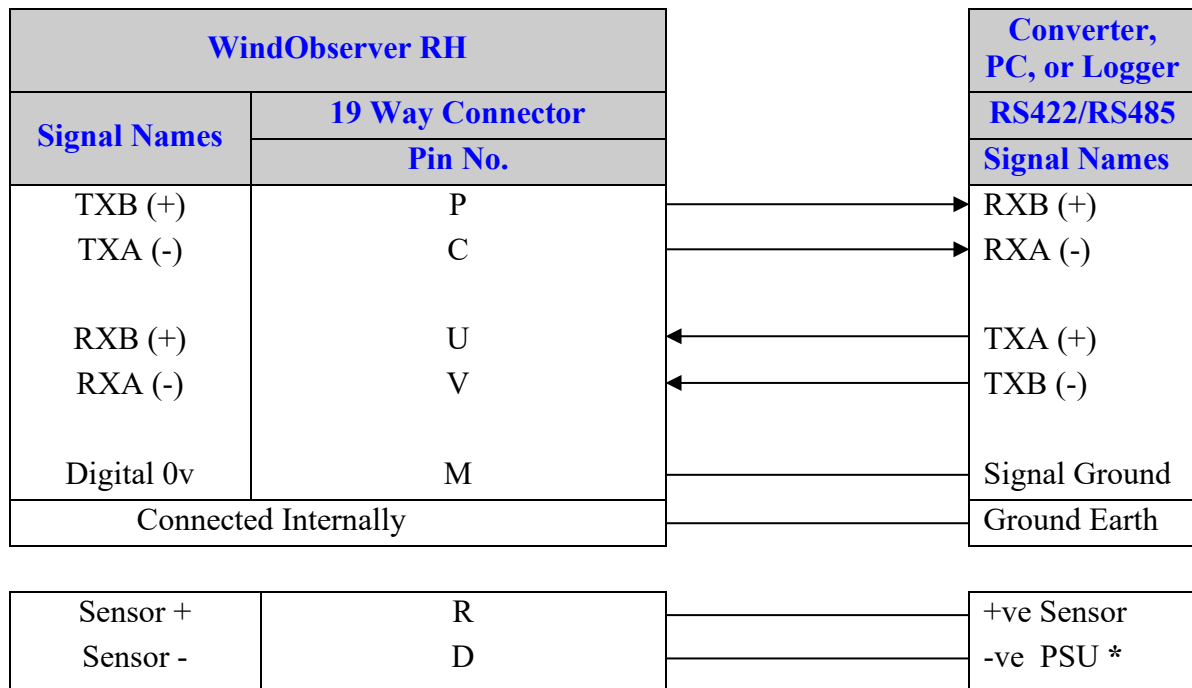
A,135,001.92,M,00,03.

Comprising of

Unit Designator, Wind Direction, Wind Speed, Wind Units of Measure (Metres/sec), Status Code and Checksum.

6.5.4 Connecting to a PC with a RS422 or RS485 4 wire connection

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.



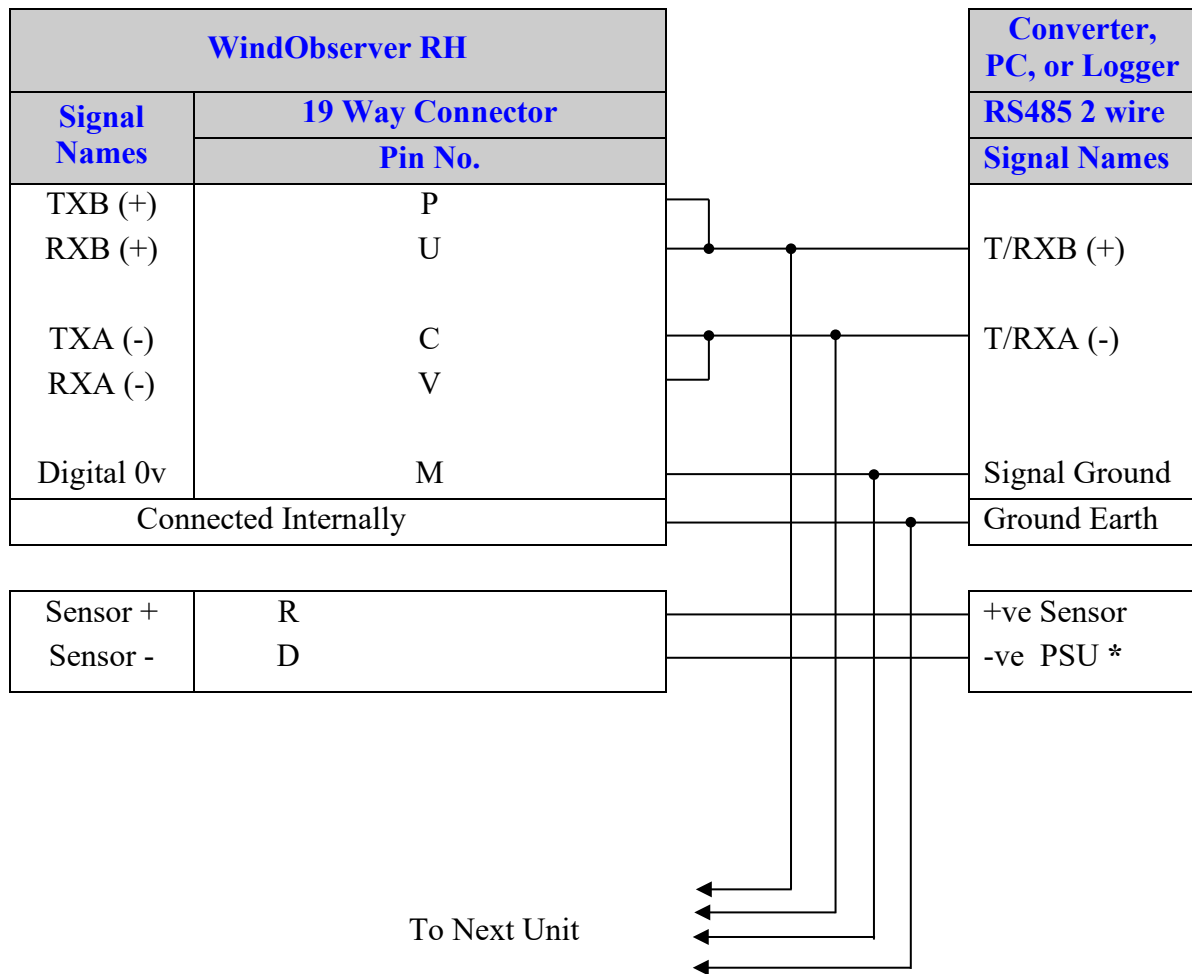
* For Power Supply Information see Section 6.4.

6.5.5 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.

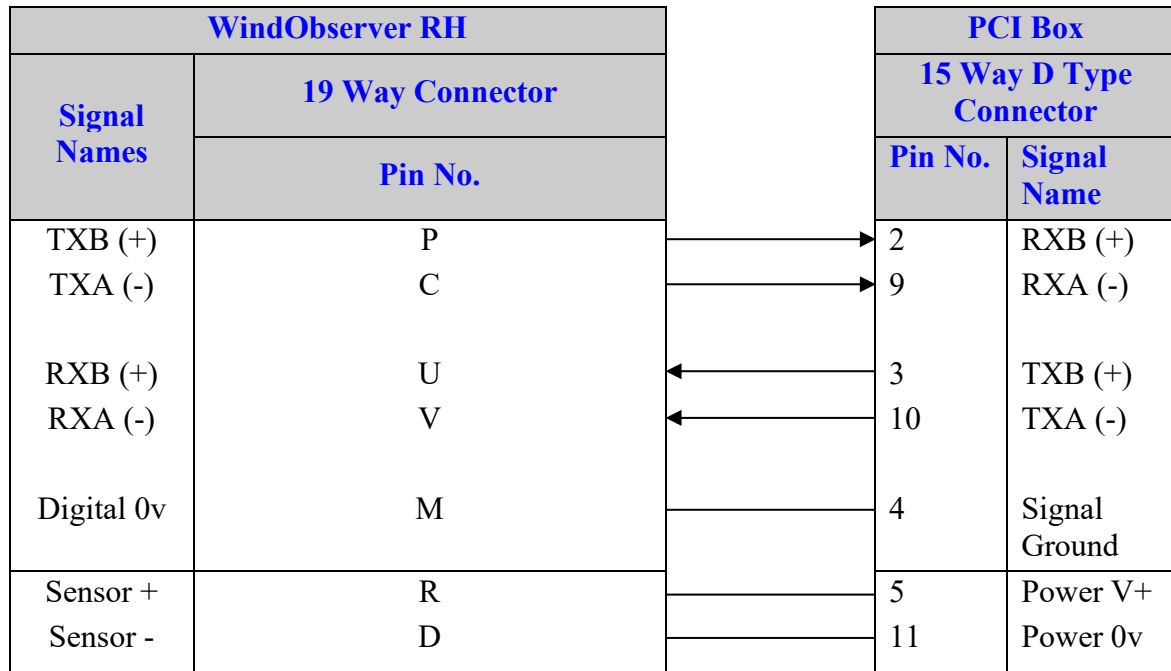
6.6. Indoor Power and Communications Interface (Part 1189-PK-021)

The desktop PCI is intended for use in a protected environment and provides interfacing and power to a single anemometer.

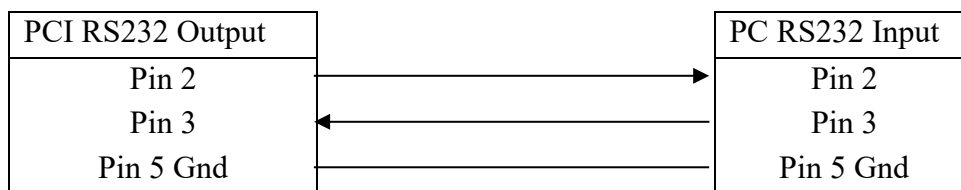
The PCI is not intended for outdoor use.

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

6.6.1 Connecting to a PCI Unit with RS422 input



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

6.6.2 PCI Electrical Power Requirements

- 1) 100Vac – 120Vac, 10VA for the 115V switch position
- 2) 200Vac – 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

6.6.3 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	Not used	
7	Not used	
8	Not used	
9	RS422_RXA (-)	
10	RS422_TXA (-)	
11	Supply V-	
12	Not used	
13	Not used	
14	Not used	
15	Not Used	

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

Pin	Designation	(Example Plug MH Connectors MHD9-DM9P-K)
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

Pin	Designation	(Example Plug MH Connectors MHD9-DM9P-K)
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

Pin	Designation	(Example MH Connectors MHD9-DM9S-K)
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	

6.6.4 PCI Operation.

There are three Red LED's on the PCI front panel.

When the PCI box is powered the Power LED will illuminate.

When a WindObserver RH is connected as above to the PCI box and is set to output continuous data the PCI box RX LED will flash on/off at the WindObserver RH output rate thus giving a good indication that the unit output is wired to the PCI box correctly and outputting RS422 data correctly.

If the PCI RS 232 connection is connected to a computer then when a terminal programme is opened and commands sent by a PC keypad or program to the PCI box its TX LED will illuminate intermittently indicating a good connection between the PC and PCI box.

6.7. Using the WindObserver RH with a WindDisplay

Introduction

The WindObserver RH is designed to interface with a WindDisplay unit to provide a complete wind speed and direction system. To interface to the WindDisplay the WindObserver must be set for NMEA (M5) and 4800 (B2) configuration settings.

WindObserver RH Configuration settings would be:-

A0 B2 C1 E1 F1 G0000 J1 K1 L1 M5 NA O1 P1 T1 U1 V1 X1 Y1 Z1

Wind Display Part numbers are:-

Gill Part	Supply Voltage	Data Format	Baud Rate
1086-PK-120	100v to 240v AC	NMEA	4800
1086-PK-121	18v to 32v DC	NMEA	4800

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).

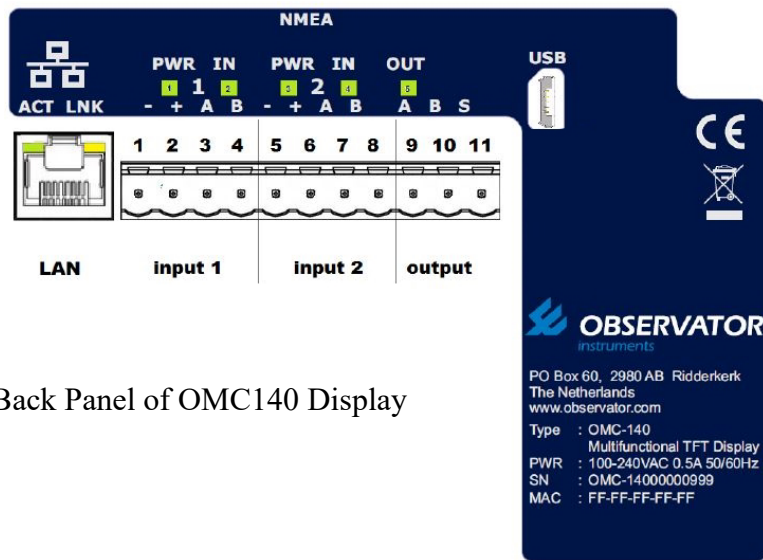


Meteorological WindDisplay

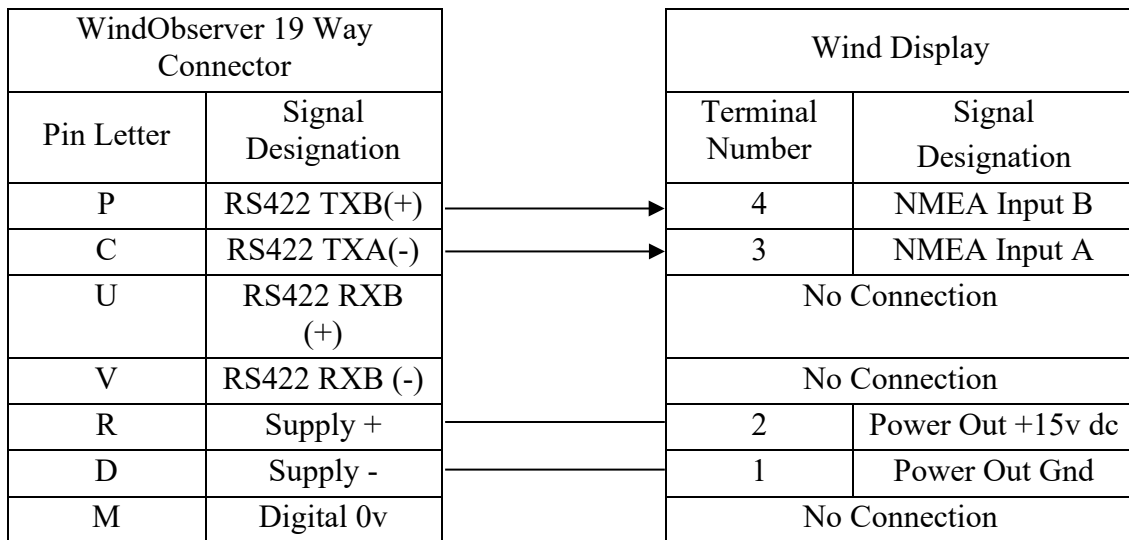
NOTES:-

The WindDisplay can only be used a WindObserver RH set for NMEA mode.
If required the WindDisplay can provide power for the WindObserver circuitry.

WindObserver and Display Connection Details.



Wiring Connections



For Power Supply Information see Section 6.4.

See Section 8, Configuring for further details.

6.8. Mechanical installation

6.8.1 Location

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

Do NOT mount the WindObserver RH 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).

6.8.2 Orientation

Normally the WindObserver RH is mounted with transducer arms vertical and with the body/cable exit at the bottom.

However the Head Assembly may be mounted in any orientation. If inverted use the X command if required (see Para 8.6).

6.8.3 Head Alignment

Normally the anemometer remote head should be set to point to North (or to another known reference direction), using the North Spar, which can be identified from the dot alignment indicator on the Instrument Remote Head as shown below.

Since all wind measurements are made relative to the North Spar, it is important to use only the North Spar for alignment and not the marker dot.

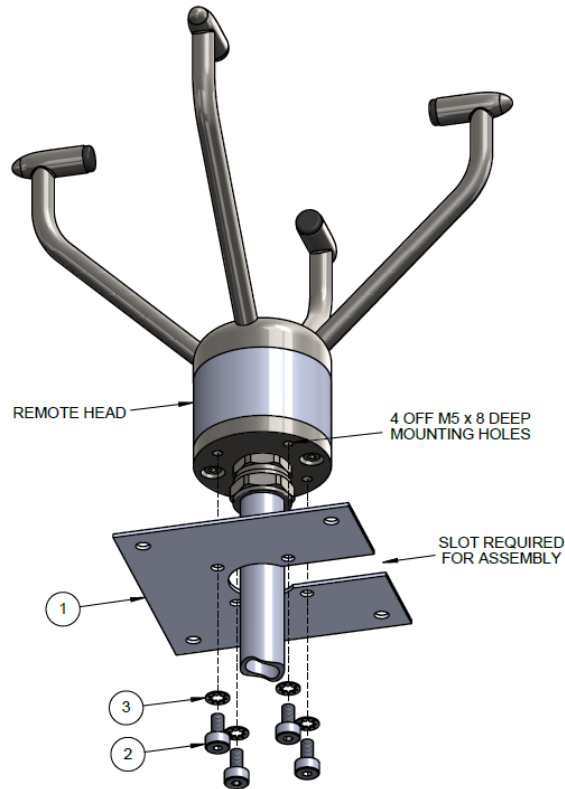
If the unit is used in a tunnel, (and the Tunnel format is used), the unit would normally be aligned with the N – S axis in the horizontal plane.



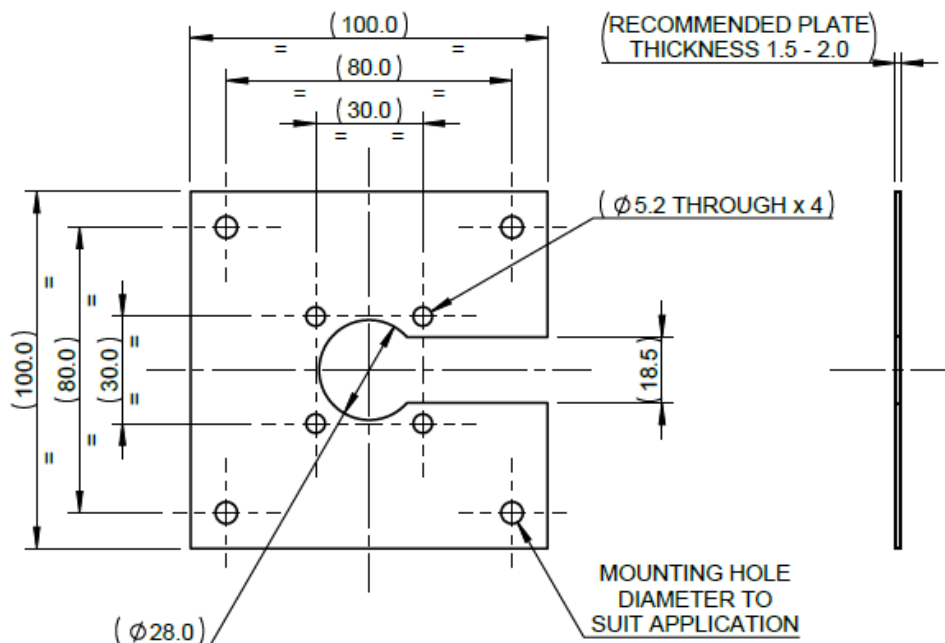
6.8.4 Mounting the Head Assembly

6.8.4.1 Normal Mount

A suggested Stainless Steel Mounting Plate Adaptor (not supplied) is shown as follows:-

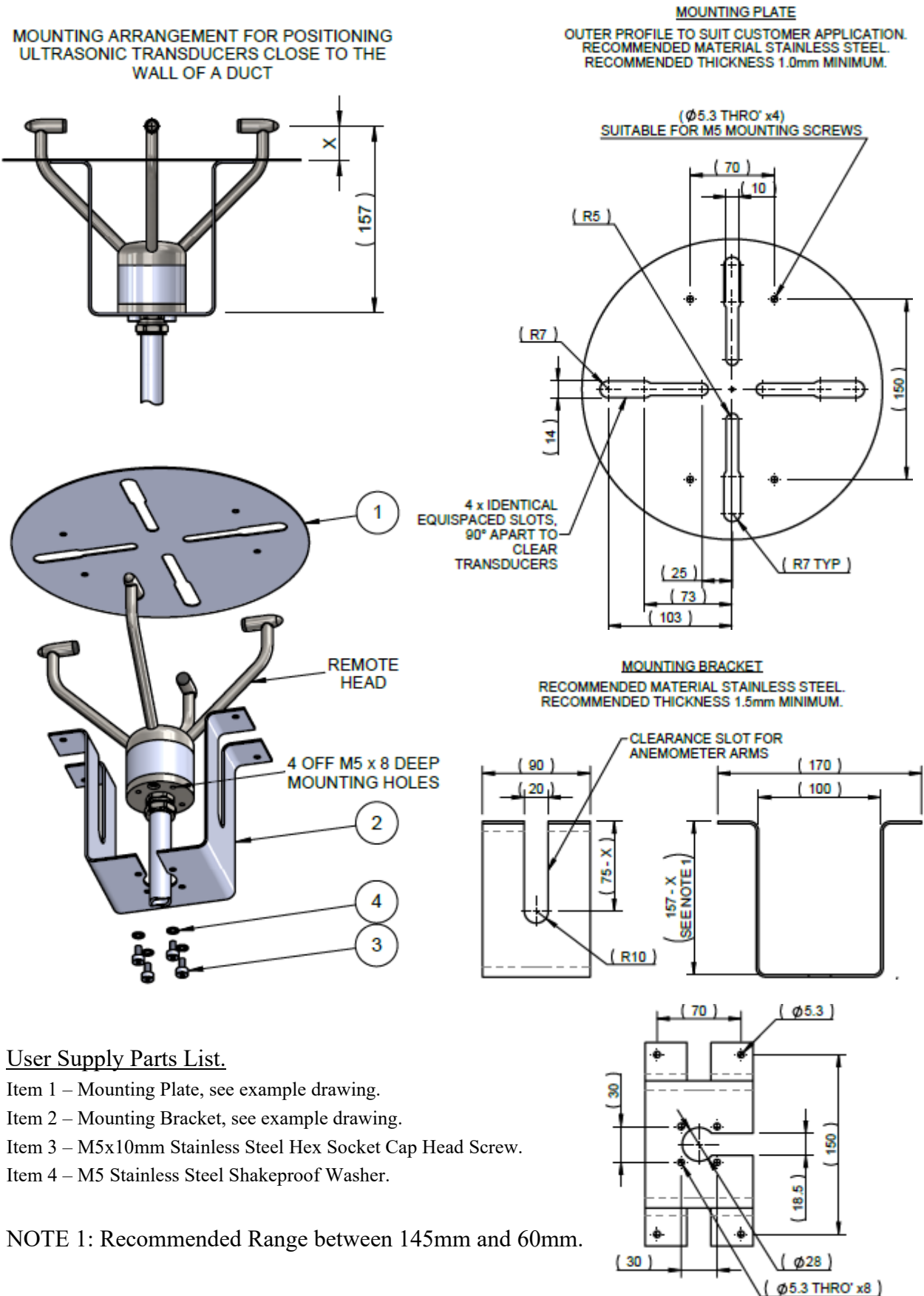


Item No.	Description	Qty
1	Mounting Plate	1
2	M5 x 10mm Long Stainless Steel Hex Socket Cap Head Screw	4
3	M5 Stainless Steel Shake proof Washer	4



6.8.4.2 Wall or Duct Mounting Mount

A suggested method of mounting the Remote head for use in a duct or against a wall is shown as follows:-



User Supply Parts List.

- Item 1 – Mounting Plate, see example drawing.
- Item 2 – Mounting Bracket, see example drawing.
- Item 3 – M5x10mm Stainless Steel Hex Socket Cap Head Screw.
- Item 4 – M5 Stainless Steel Shakeproof Washer.

NOTE 1: Recommended Range between 145mm and 60mm.

6.8.5 Mounting the Body Assembly using Supplied Hose Clamps

Hose clamps are supplied with the unit in order to retain the Electronics body of the WindObserver to a flat surface.

Fitting and using the supplied Clamps/Brackets.

Position the two Hose Clamps centrally 5cm from each end of the electronic cylinder as per the diagram.

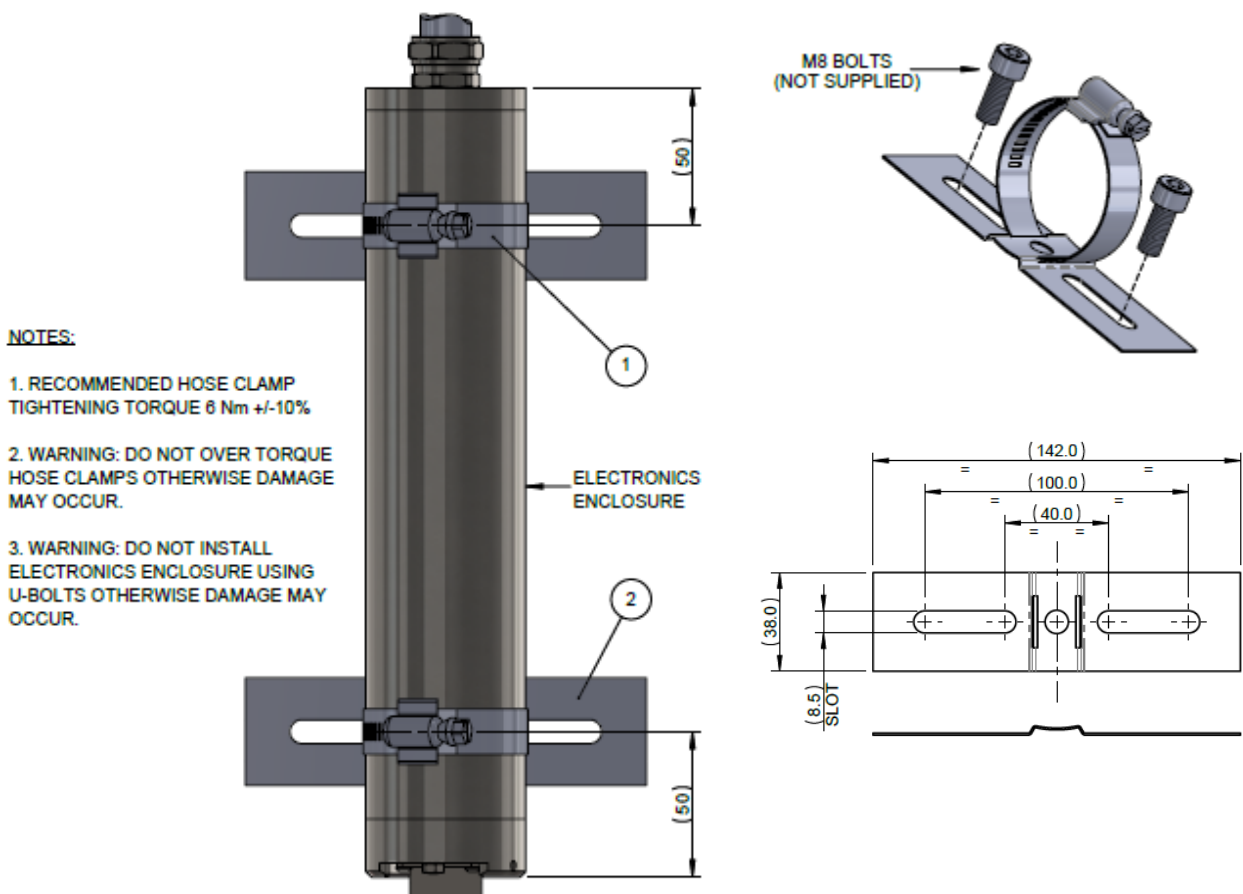
Tighten the Hose Clamps using a torque screwdriver or spanner to 6NM +/-10%.

Secure the Hose Clamp Brackets to the mating surface using M8 Bolts (not supplied).

NOTES:

It is essential to follow the recommended clamping torque figure to prevent deforming of the electronic cylinder and ingress of water through the cylinder top and bottom seals.

Use of U Bolts or alternative clamps to secure the body of the cylinder could invalidate the unit warranty and lead to damage/sealing issues within the electronics cylinder.



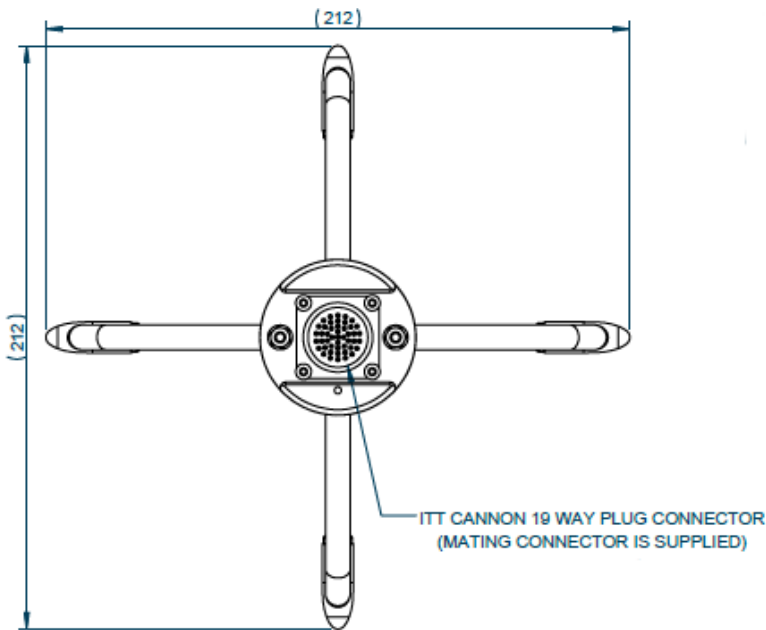
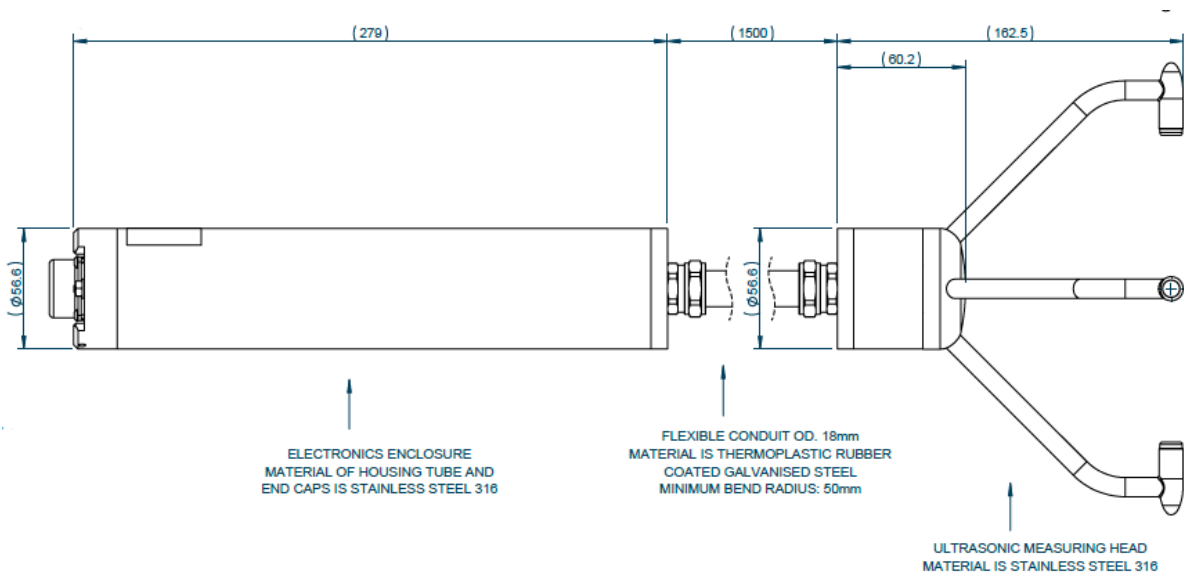
Item 1 - Stainless Steel Hose Clamp

Gill Part 030-06700 (two supplied).

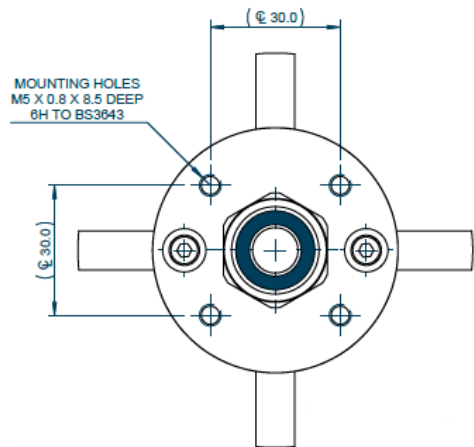
Item 2 – Stainless Steel Hose Clamp Bracket

Gill Part 030-06701 (two supplied).

6.8.6 WindObserver RH outline dimensions



View showing the 19 way connector on the underside of the Electronics Body



View showing four mounting holes on the underside of the Remote Head

7. MESSAGE FORMATS & OPTIONS

On first applying power to the WindObserver RH, it will be in ‘Measurement Mode’, and will output wind measurement information within 3 seconds 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 8 CONFIGURING for details of how this is done.

The factory default Configuration settings are shown here in **bold** For example [M2](#).

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.

7.2.1 Output Formats Table

Output format	Output (see Notes below)	Configuration code
ASCII UV	Continuous	M1
	Polled	M3
ASCII Polar	Continuous	M2
	Polled	M4
ASCII Tunnel	Continuous	M12
ASCII Tunnel	Polled	M13
NMEA	Continuous	M5
Binary Tunnel	Continuous	M6
Binary UV short	Continuous	M7
Binary Polar	Continuous	M8
ASCII Polar	Continuous Averaged	M15
ASCII Polar	Polled Average	M14

Notes:-

1. Continuous Output: In this mode the unit continuously outputs a burst of RS422 level data (the frequency determined by the output rate setting). After the burst of data and until the next data burst the data lines revert to a high impedance state.
2. Polled Output: In this mode the data lines are in a high impedance state until the unit is polled for data. Upon receipt of a poll command the unit outputs a burst of data at RS485 levels and then reverts to a high impedance state until the next poll command receipt.

7.2.2 Low wind speeds

By default 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

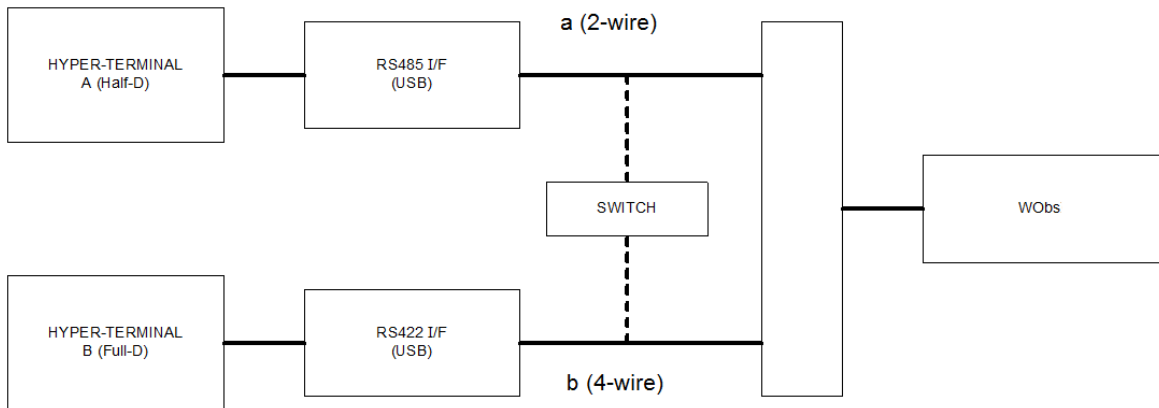
Gill Proprietary Network

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 RH 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 RH 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)

There are two digital averaging options:-

7.6.1 G Command for Block Averaging.

Using the G Command in association with modes other than M14, M15 and polled modes. The Averaging Period can be set from '0' to 3600 seconds, the default setting is G0000. 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 G0000 then G Command block averaging will be disabled.

If G is set to G0001 then effectively the averaging will result in a block average output once every second as though the unit were set for G0000 and 1Hz output rate (P1 setting). The G Command (G2 to G3600) will override any P command output rate setting.

For instance if the unit is set for G0025 then every 25 seconds there will be a single result output that provides the average of the wind direction and magnitude data over the last 25 seconds.

A,219,000.78,M,00,0D

A,202,000.79,M,00,06

A,207,001.22,M,00,0C

A,220,000.48,M,00,04

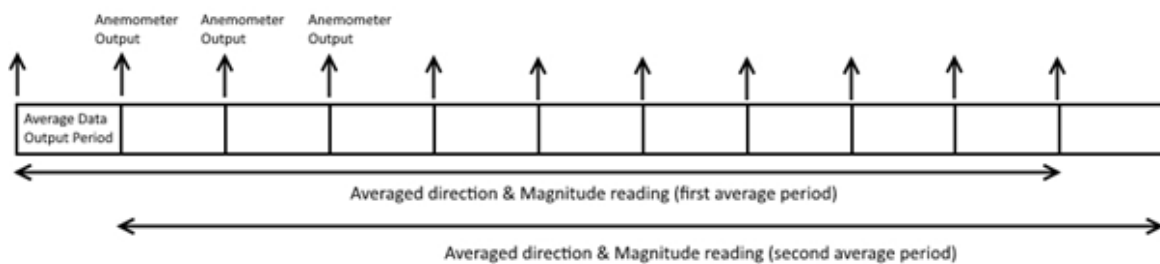
7.6.2 Modes 14 and 15 Road Weather Averaging (RWA).

The averaging is implemented with reference to the following standard:

- Guide to Meteorological Instruments and Methods of Observation – World Meteorological Organization WMO-No8 seventh edition 2008 ISBN 978-92-63-10008-S

The direction and magnitude outputs are derived from the vector sum of U and V over the RWALONG averaging period (default 10 minutes in P1).

The gust output is derived from the vector sum of U and V over 3 readings (3 seconds in P1), and the max gust is the maximum of the gust value over the RWASHORT period (default 60 seconds in P1). The max gust value is reset to zero at the end of each RWASHORT period.



RWA Default settings are:-

P (Output rate Hz) = 1
RWASHORT = 60
RWALONG = 10

Therefore:

Anemometer output period = $60/1 = 60$ seconds (the WindObserver will output a reading every 60 seconds).

Averaged direction and magnitude reading = $10 \times 60 = 600$ seconds (this is the time the readings will be averaged over).

When the average building period has been completed, the average reported thereafter will be a rolling average derived from the last averaged direction and magnitude time period.

Mode 15 – Averaging Data in Continuous mode.

Averaged Digital Data Output comprises of.

<Start of String>, Unit Identifier, Mode, Averaged Direction, Averaged Magnitude, Units, Maximum Gust Direction, Maximum Gust Magnitude, Status, <End of String>, Checksum.

e.g.

0A,M15,293,000.03,M,338,000.05,51,47

(status code 51 shows measurement average building, non-heat enabled units only).

0A,M15,198,000.04,M,088,000.39,00,4B

(status code 00 code shows measurement average building period complete and normal operation, non-heat enabled units only).

Principle set up commands associated with this averaging mode are:-

Px: - Measurement Rate, (P1) this command sets the underlying measurement rate 1Hz.

RWASHORT xx: - Short Term Number, where xx is a number from 10 to 60.

RWALONG xx: - Long Term Number, where xx is a number from 1 to 10.

The Averaged Data Output period in seconds is:-

$$\frac{\text{RWASHORT Number}}{\text{Measurement Rate (P Setting Hz value)}}$$

Therefore with the RWASHORT number set for 60 (default) and P command set for 1Hz (P1 default) the unit will output a rolling averaged reading every 60 seconds.

The Averaged Direction and Magnitude reading is based on:-

$$\text{RWALONG Number} * \text{Averaged Data Output period.}$$

Therefore if the RWALONG number is 10 (default) and Averaged Data Output Period is 60 seconds, then the rolling averaged Direction and Magnitude data is calculated over rolling 600 readings.

```

0A, M15, 293, 000.03, M, 338, 000.05, 51, ♡47
0A, M15, 301, 000.03, M, 304, 000.04, 51, ♡43
0A, M15, 299, 000.03, M, 285, 000.02, 51, ♡4D
0A, M15, 303, 000.02, M, 336, 000.02, 51, ♡47
0A, M15, 291, 000.03, M, 200, 000.64, 51, ♡48
0A, M15, 291, 000.02, M, 301, 000.03, 51, ♡48
0A, M15, 243, 000.04, M, 172, 001.52, 51, ♡42
0A, M15, 236, 000.03, M, 090, 000.08, 51, ♡44
0A, M15, 243, 000.03, M, 099, 000.09, 51, ♡4E
0A, M15, 198, 000.04, M, 088, 000.39, 00, ♡4B
0A, M15, 180, 000.04, M, 099, 000.09, 00, ♡41
0A, M15, 180, 000.03, M, 345, 000.03, 00, ♡4E

```

The Maximum Gust Direction is the direction of the maximum gust measured over the short term output period. Gust is generated from a rolling 3s average of the short term output period, and reset at the end of short term output period.

The maximum Gust Magnitude is the magnitude of the maximum gust measured over the short term output period. Gust is generated from a rolling 3s average of the short term output period, and reset at the end of short term output period.

Notes:-

Whenever the unit is powered up then until the unit has reached its minimum long term averaging interval the status code will read 51 (Measurement Average Building).

The G Command setting has no effect on Mode 14 and Mode 15 Settings.

Mode 14 – Averaging Polled Mode

See Mode 15 for data output format and command explanations.

For ease of use before changing to this Mode set all other WindObserver parameters first including:-

Px:- Measurement Rate, (P1) this command sets the underlying measurement rate of 1Hz.

RWASHORT xx: - Short Term Number, where xx is a number from 10 to 60.

RWALONG xx: - Long Term Number, where xx is a number from 1 to 10.

Once set for Mode 14, to Poll for averaged data use the ? command followed by the unit designator A (default setting, ensure capitol letter used).

The polled mode commands available in this mode are:

Description	Command	WindObserver response
Enable Polled Mode	?	(None)
WindObserver Unit Identifier (N)	A.....Z	Output generated
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 identifier (capitol letter) sent to retrieve a line of data.

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

When polled with the Mode 14 factory default RWA Long and Short settings the WindObserver (set for default 1Hz output) will output the last valid 10 minute wind speed and direction average, updated every minute along with last valid 1 minute Gust magnitude.

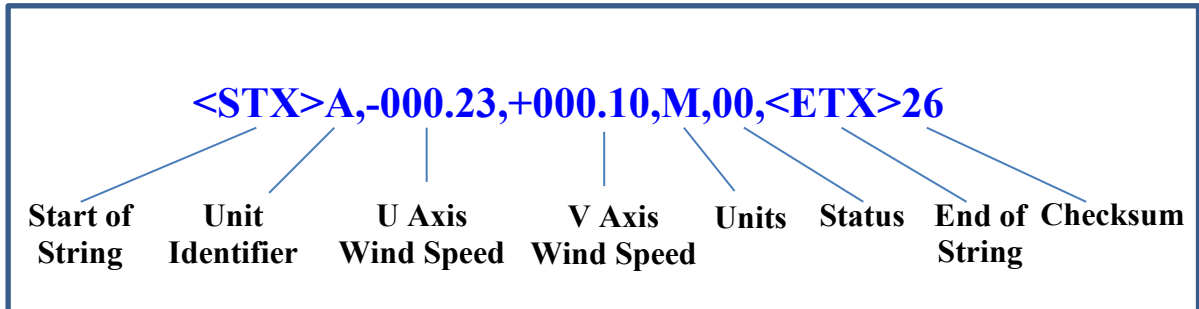
Notes

If the unit is powered up and polled before the unit has reached its minimum averaging interval the status code will read 51 (Measurement Average Building).

```
0A,M15,293,000.03,M,338,000.05,51,♥47
0A,M15,301,000.03,M,304,000.04,51,♥43
0A,M15,299,000.03,M,285,000.02,51,♥4D
0A,M15,303,000.02,M,336,000.02,51,♥47
0A,M15,291,000.03,M,200,000.64,51,♥48
0A,M15,291,000.02,M,301,000.03,51,♥48
0A,M15,243,000.04,M,172,001.52,51,♥42
0A,M15,236,000.03,M,090,000.08,51,♥44
0A,M15,243,000.03,M,099,000.09,51,♥4E
0A,M15,198,000.04,M,088,000.39,00,♥4B
0A,M15,180,000.04,M,099,000.09,00,♥41
0A,M15,180,000.03,M,345,000.03,00,♥4E
```

7.7. ASCII message format (UV, Polar and Tunnel)

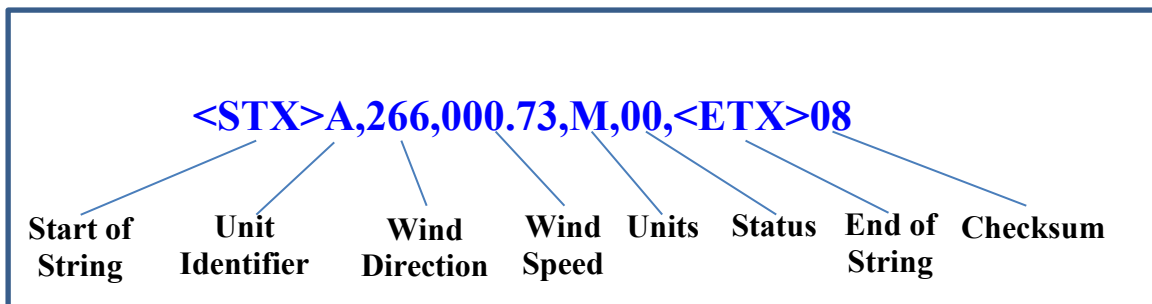
7.7.1. ASCII UV format



Where

Start of string (STX)	ASCII value 2												
Unit identifier	Letter A – Z (default A)												
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	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Value</th> <th style="text-align: left;">Units</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>Metres per second (m/s)</td> </tr> <tr> <td>N</td> <td>Knots (knots)</td> </tr> <tr> <td>P</td> <td>Miles per hour (MPH)</td> </tr> <tr> <td>K</td> <td>Kilometres per hour (kph)</td> </tr> <tr> <td>F</td> <td>Feet per minute (fpm)</td> </tr> </tbody> </table>	Value	Units	M	Metres per second (m/s)	N	Knots (knots)	P	Miles per hour (MPH)	K	Kilometres per hour (kph)	F	Feet per minute (fpm)
Value	Units												
M	Metres per second (m/s)												
N	Knots (knots)												
P	Miles per hour (MPH)												
K	Kilometres per hour (kph)												
F	Feet per minute (fpm)												
Status	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Value</th> <th style="text-align: left;">Status</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>OK</td> </tr> <tr> <td>Any other value</td> <td>Warning or fault condition - see Section 9.5</td> </tr> </tbody> </table>	Value	Status	00	OK	Any other value	Warning or fault condition - see Section 9.5						
Value	Status												
00	OK												
Any other value	Warning or fault condition - see Section 9.5												
End of string (ETX)	ASCII value 3												
Check sum	Exclusive OR of all characters between Start of String and End of String reported as ASCII hex.												

7.7.2. ASCII 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 7.7 ASCII UV format

7.7.3. 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 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 identifier sent to retrieve a line of data.

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

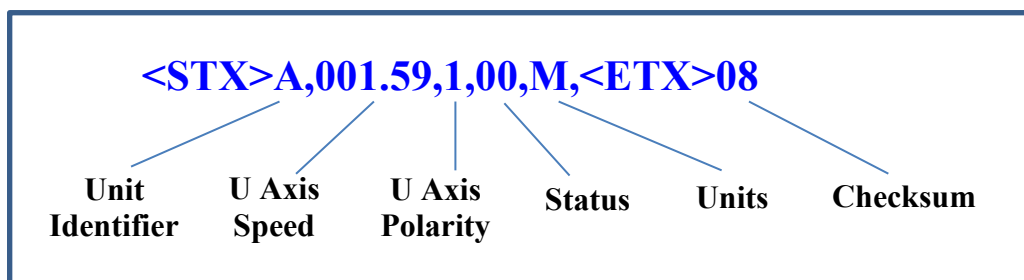
When in polled mode the system will respond to the data command within 30mS with the last valid data sample as calculated by the Output rate (P Mode Setting).

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

7.7.4. 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)

Unit Identifier

Letter A – Z (**default A**)

U Axis Speed

U axis Wind Speed

U Axis Polarity

U axis Wind Direction Polarity

where 0 (–U vector) is a wind from the North Direction

Or 1 (+U vector) is a wind from the South direction.

All other parameters

See Section 7.7 *ASCII UV format*

7.8. Binary message format (UV, Polar and Tunnel)

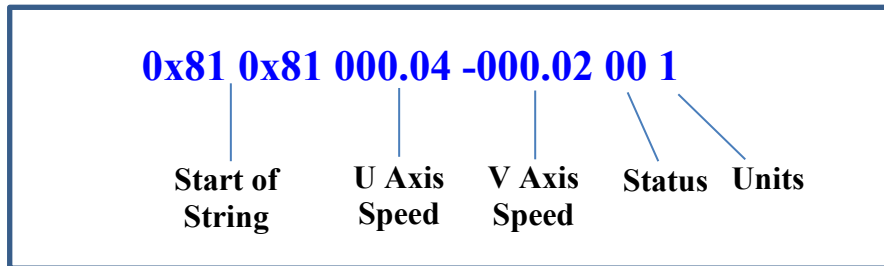
Data is output in twos-compliment format

Example: "-2" decimal = "FFFE" hex.

so MSB (FF) = 255 decimal

and LSB(FE) =254 decimal

7.8.1. Binary UV format



Where:-

Start of String	0x81 0x81												
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)												
Status	<table border="0"> <tr> <td>Value</td> <td>Status</td> </tr> <tr> <td>00</td> <td>OK</td> </tr> <tr> <td>Any other value</td> <td>Warning of fault condition <i>See Section 10.5</i></td> </tr> </table>	Value	Status	00	OK	Any other value	Warning of fault condition <i>See Section 10.5</i>						
Value	Status												
00	OK												
Any other value	Warning of fault condition <i>See Section 10.5</i>												
Units	<table border="0"> <tr> <td>Value</td> <td>Units</td> </tr> <tr> <td>1</td> <td>Metres per second m/s)</td> </tr> <tr> <td>2</td> <td>Knots (knots)</td> </tr> <tr> <td>3</td> <td>Miles per hour (MPH)</td> </tr> <tr> <td>4</td> <td>Kilometres per hour (kph)</td> </tr> <tr> <td>5</td> <td>Feet per minute (fpm)</td> </tr> </table>	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)
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)												

UV Binary Data format:-

Byte offset	Value
0	0x81
1	0x81
2	U_MSB
3	U_LSB
4	V_MSB
5	V_LSB
8	STATUS
9	UNITS

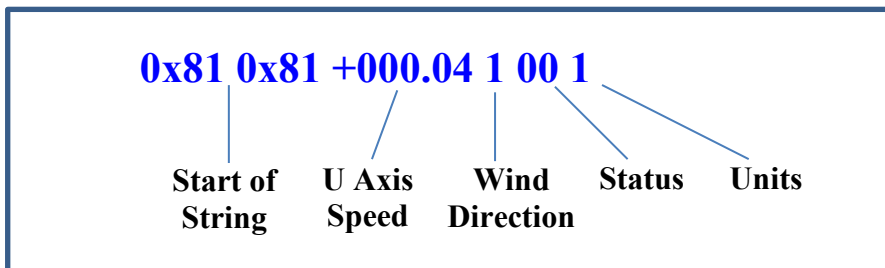
7.8.2. Binary Polar format



Where

Wind Speed	In increments of 0.01 units (\pm MMM.MM)
Wind Direction	In degrees relative to North (DDD)
All other parameters	See Section 7.8 <i>Binary UV format</i>

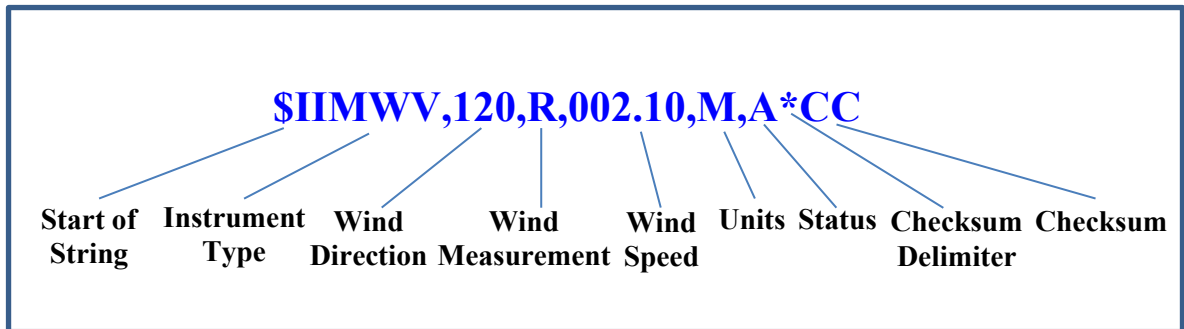
7.8.3. Binary Tunnel format



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 7.8 *Binary UV format*

7.9. NMEA Format



Where

Start of String	\$	
Instrument Type	Prefix	Name
	IIMVV	Integrated Instrumentation Wind Speed and Angle
	WIMWV	Weather Instruments Wind Speed and Angle
Wind Direction	In degrees relative to North (DDD)	
Wind Measurement	R	Relative wind measurement
Wind Speed	In increments of 0.01 units (\pm MMM.MM)	
Units	Value	Units
	M	Metres per second (m/s)
	N	Knots (knots)
	P	Miles per hour (MPH)
	K	Kilometres per hour (kph)
	F	Feet per minute (fpm)
Status	A	Acceptable measurement
	V	Void measurement
Check sum	Exclusive OR of all characters between '\$' and '*' reported as ASCII hex.	

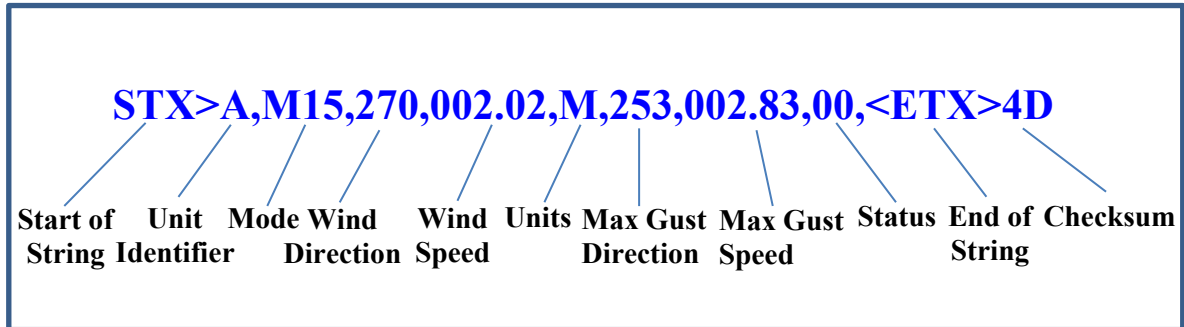
A typical WindObserver RH configuration suitable for NMEA would be:

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

Consult specification NMEA 0183 version 4 (available on the web) www.nmea.org for complete interface details.

7.10. Averaging Format (Modes 14 and 15)

See also Para 7.6.2.



Where:-

Start of string	ASCII value 2	
Unit Identifier	Letter A – Z (default A)	
Mode	M14	Polled Averaging
	M15	Continuous Output Averaging
Wind Direction		In degrees relative to North (DDD) settable average of direction in degrees.
Wind Speed		In increments of 0.01 units (\pm MMM.MM), settable average of speed in m/s.
Units	M	Metres per Second
	N	Knots
	P	Miles per Hour
	K	Kilometres per Hour
	F	Feet per Minute
Max Gust Direction		In degrees relative to North (DDD)
Max Gust Speed		In increments of 0.01 units (\pm MMM.MM)
Status	Value	Status
	00	OK
	51	Means that the averaging is incomplete
	Any other value	Warning or fault condition - see Section 10.5
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.	

8. CONFIGURING

The WindObserver RH can be configured using Terminal emulator software such as HyperTerminal, Tera Term or Putty.

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 10 and can be downloaded from: -<http://www.gillinstruments.com/main/software.html>.

8.1. Configuring using HyperTerminal

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

1. Connect the WindObserver RS422 output to a PC via an RS422 to USB converter.
2. Run Hyperterm.exe.
3. Create a New Connection (File → New Connection).
4. Enter a **Name** (e.g. WindObserver RH).
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 RH 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.
- ! Disables poll.
- ? & Anemometer replies with Unit identifier.
- *N Enters Configuration Mode (from Polled mode).

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 RH responds with the current configuration settings.

Or factory default settings for a WindObserver RH 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 RH.

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

The WindObserver RH 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 – Not Applicable to WindObserver RH

A0 default.

Bx - Baud Rate

Setting	Configuration code
2400	B1
4800	B2
9600	B3
19200	B4
38400	B5
1200	B6

To change the Baud rate when using HyperTerminal: -

E.g. 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 a new HyperTerminal connection and set the 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- Not Applicable to WindObserver RH

C2 default.

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

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

Item	Command code	Typical response
Serial No.	D1	18320001
Software version	D2	6.05
Current Unit configuration	D3	A0 B3 C1 E1 F1 G0000 J1 K1 L1 M2 NA O1 P1 T1 U1 V1 X1 Y1 Z1
Anemometer power supply voltage	D5	+29.8
Integrity check	D6	See Para 10.6 Bench Tests

Ex - Full Duplex/Half Duplex Mode

Setting	Configuration code
Full duplex	E1
Half duplex	E2

Note: - Refer also to Para 7.3 Networking Configuration details.

Fx - Data and Parity Options

Setting	Configuration code
8 bits, no parity, 1 stop bit	F1
8 bits, even parity, 1 stop bit	F2
8 bits, odd parity, 1 stop bit	F3

Note: If changing to F2, using a terminal program then when in configuration mode Type F2 and press Enter, close the terminal program and open a new one with F2 Even parity settings, then type F and press Enter.

G0000 to G3600 - Averaging (Digital Outputs only)

Setting	Configuration code
Averaging (Default)	G0000

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

Jx – Not Applicable to WindObserver RH

J1 default.

Kx – NMEA Settings

Setting	Configuration code
NMEA string “IIMWV”	K1
NMEA string “WIMWV”	K2

Lx - ASCII Message Terminator

Setting	Configuration code
CR LF	L1
LF	L2

Mx to Mxx - Message Format

Output format	Configuration code
ASCII UV Continuous	M1
ASCII Polar Continuous	M2
ASCII UV Polled (tri-state) *	M3
ASCII Polar Polled (tri-state) *	M4
NMEA Continuous	M5
Binary Tunnel Continuous	M6
Binary UV Continuous	M7
Binary Polar Continuous	M8
ASCII Tunnel Continuous	M12
ASCII Tunnel Polled (tri-state) *	M13
ASCII Polar Polled Averaged	M14
ASCII Polar Continuous Averaged	M15

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

Nx – Unit Identifier

Item	Options	Command
Unit Identifier	A... -(A to Z)	N<A>

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)	O1
Fixed Field	O2

Example data strings:-

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

Px - Output Rate

Outputs per second	1	2	4	5	8	10
Configuration code	P1	P3	P2	P4	P5	P6

Q- Measurement Mode

See Section 8.3.

RWASHORT XX (Short term number).

Where XX = 10 to 60, associated with Mode 14 and Mode 15 averaging.

60 default.

RWALONG XX (Long term number).

Where XX = 1 to 10, associated with Mode 14 and Mode 15 averaging.

10 default.

Tx – Not Applicable to WindObserver RH

T1 default.

Ux – Digital Output Units

Units	metres/sec (m/s)	knots (knots)	miles / hour (MPH)	kilometre/hour (kph)	feet / minute (fpm)
Configuration code	U1	U2	U3	U4	U5

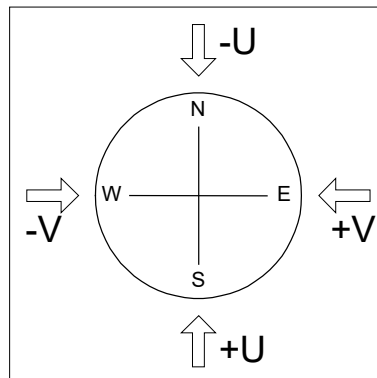
Vx - Vertical Output Padding

Setting	Configuration code
Disable vertical output padding	V1
Enable vertical output padding	V2

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).

The following figure 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.



UV Polarity

Yx – Not Applicable to WindObserver RH.

Y1 default.

Zx – Not Applicable to WindObserver RH.

Z1 default.

9. VIEW AND LOG DATA WITH WINDVIEW SOFTWARE

9.1. Introduction

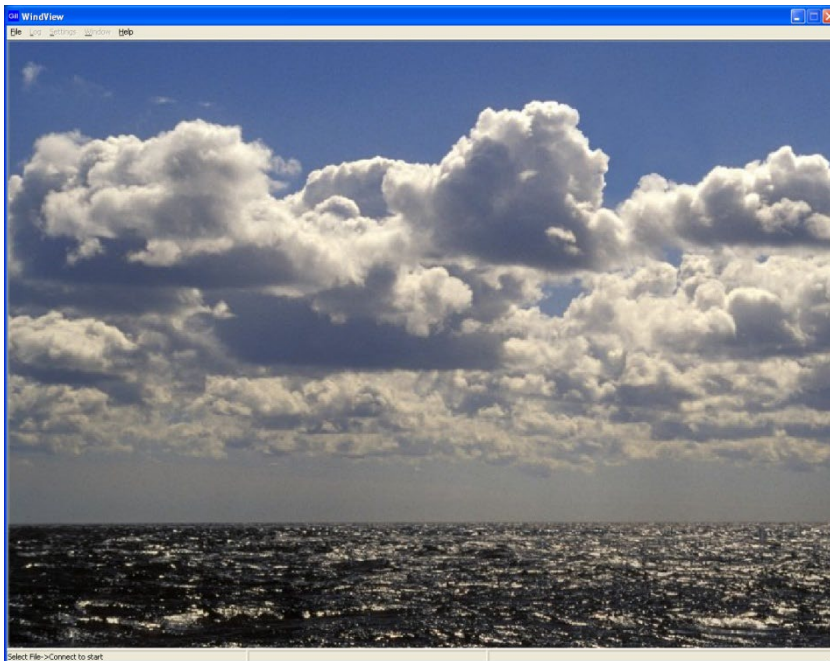
Gill WindView Software can be downloaded from

<http://gillinstruments.com/main/software.html>

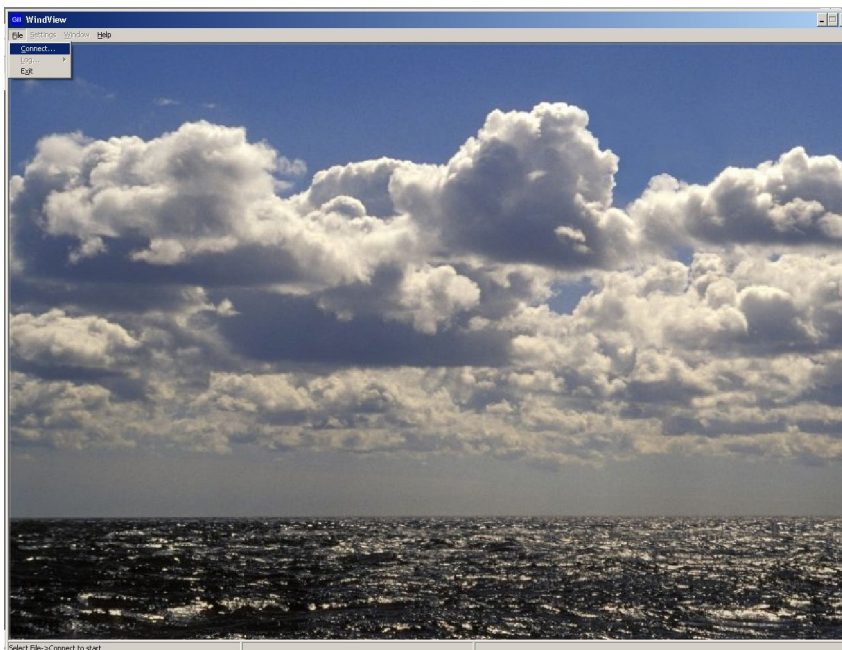
Gill Wind View will run on PC's with Windows XP to Windows 10 operating systems.

9.2. Connect to an Instrument using Gill WindView Software

Open WindView Software.



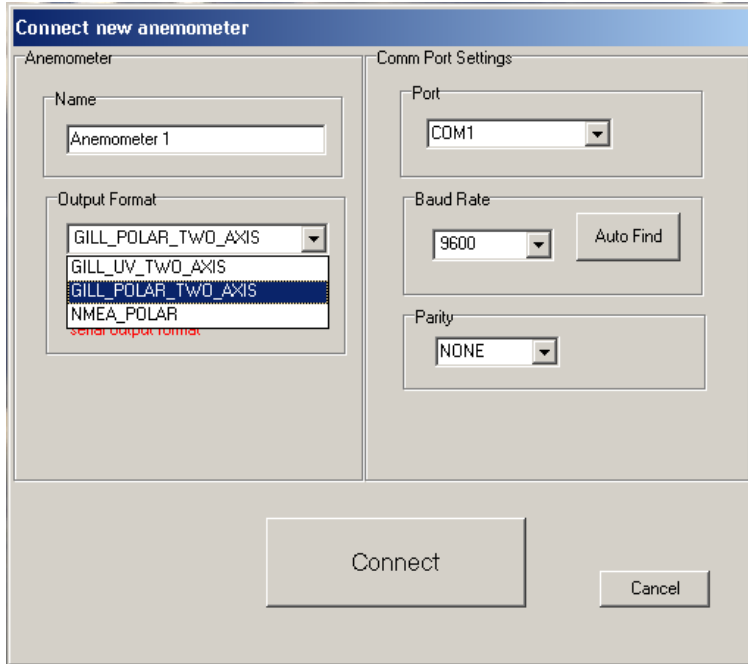
Select File/Connect.



The default connection name is Anemometer 1, it can be re-named if required.

Select the Output Format to match the Sensor format i.e. the WindObserver default format is Gill Polar (2 axis).

If the WindObserver were set for UV or NMEA output then choose the appropriate format setting from the drop down menu.

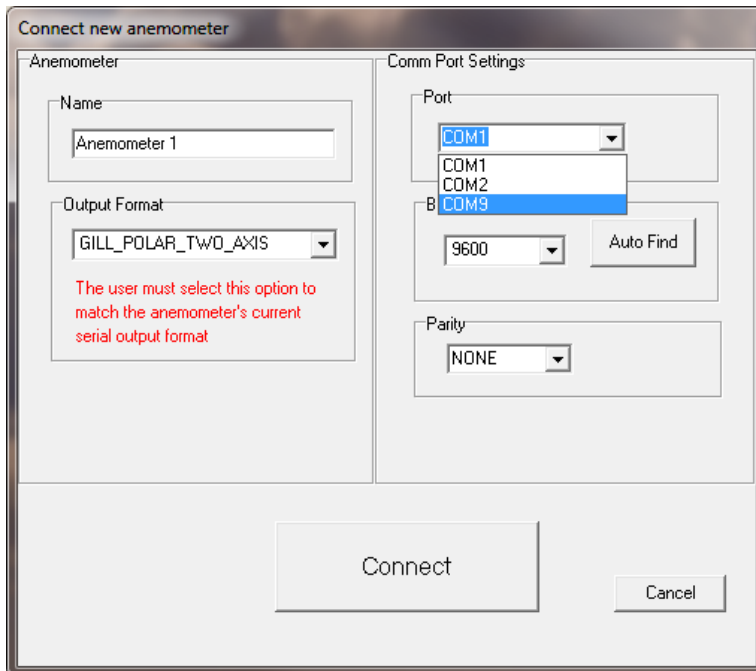


From the Port drop down menu select the PC COM Port to which the WindObserver is connected to e.g. COM 9.

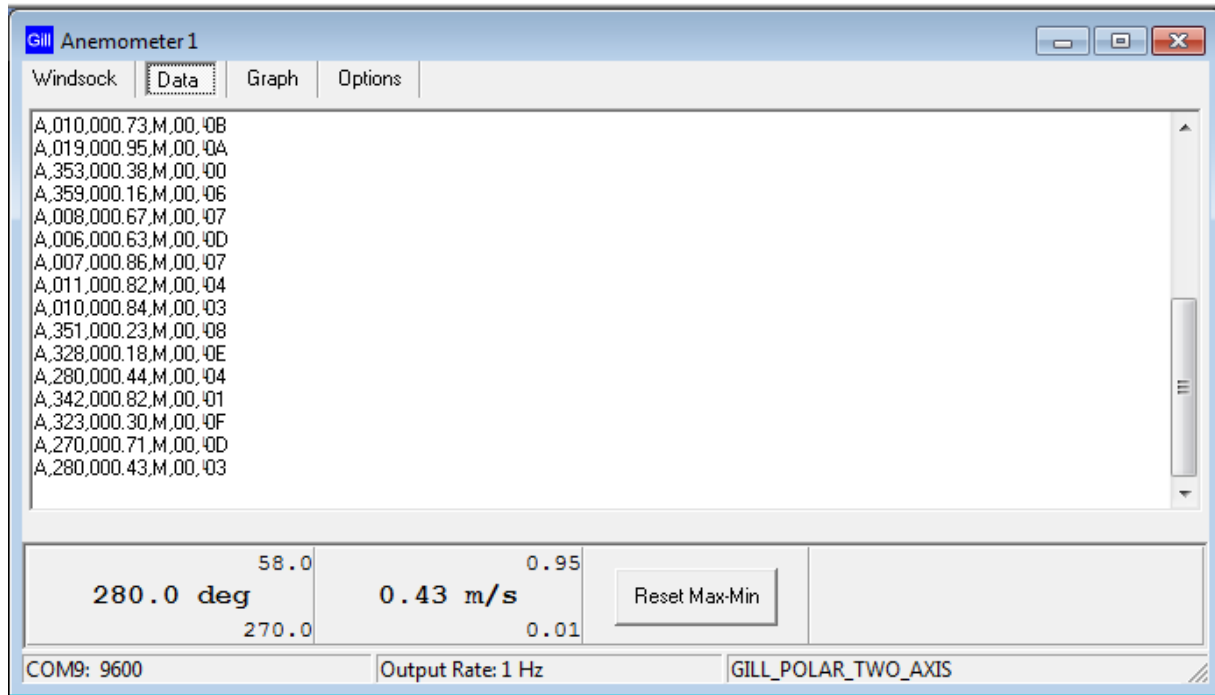
Select the Baud rate setting from the drop down menu to match that of the WindObserver, the WindObserver default baud rate is 9600 baud.

Leave Parity setting at None.

Click on Connect.



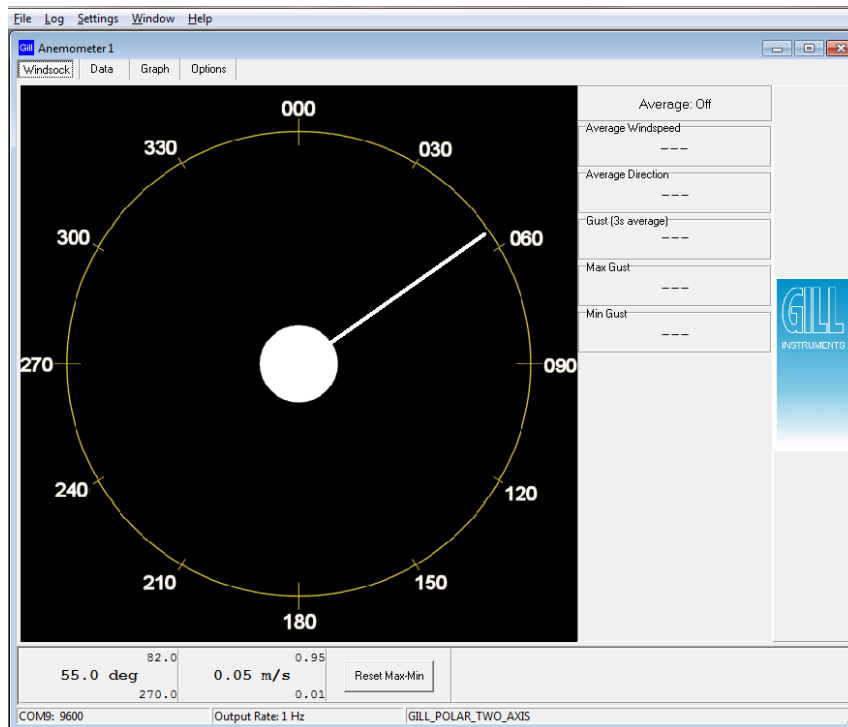
The Data button screen will show the WindObserver data scrolling on screen updated at the WindObserver Output rate.



9.3. WindSock Function

Click on the WindSock button to give a Direction display and digital readout of Direction and Wind Speed:-

On screen Maximum and Minimum readings of Wind speed and Directions are also displayed digitally and can be reset using the Reset Max/Min button.



9.4. Logging Data.

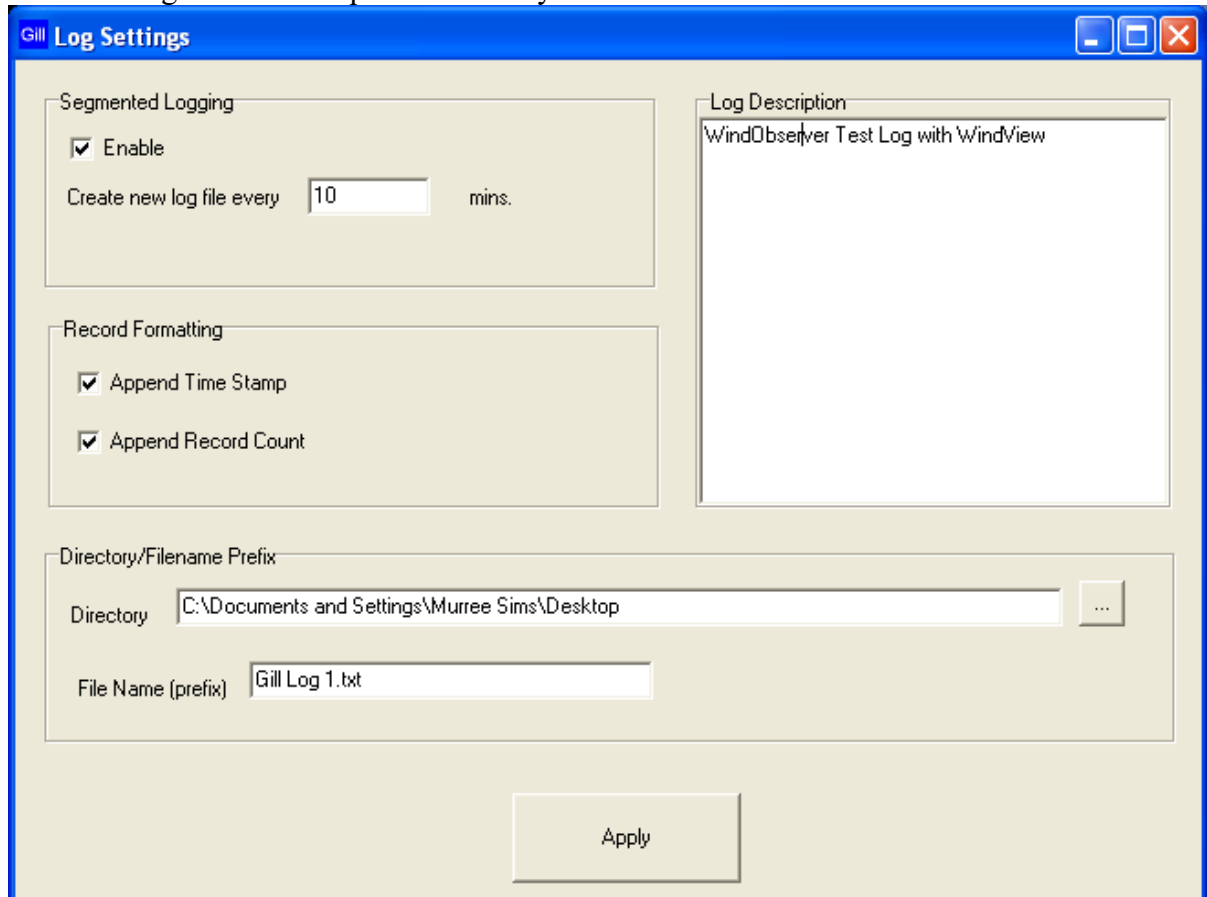
To Log WindObserver data, from the WindView top menu select Settings/Logging. If segmented log files are required tick the Enable box and select the length of each log file.

Tick the Record Formatting box options for Appending PC Time and Date Stamp and sequential line numbering as required.

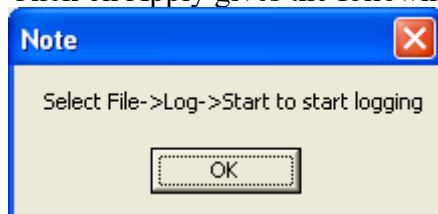
Date and Time are taken from the PC clock.

The Log Description box allows a free text file header to be added to the log file.

Save the Log file to the required Directory.



Click on Apply gives the following screen, click on OK:-



To Start Logging.

From the top menu select Log.

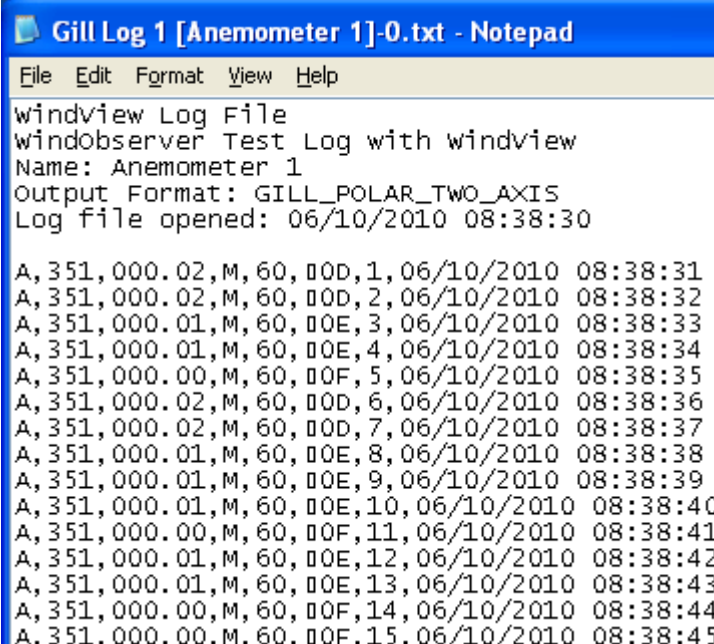
Click on Log/Start to commence logging.

To Stop Logging.

From the top menu select Log.

Click on Log/Stop to stop logging.

The logged data is saved to a PC text file that can be opened with Notepad or equivalent and the following example illustrates the saved time/date stamped WindObserver data.
Note: The Data and time information are taken from the PC Clock.



```
Gill Log 1 [Anemometer 1]-0.txt - Notepad
File Edit Format View Help
windview Log File
windObserver Test Log with windview
Name: Anemometer 1
Output Format: GILL_POLAR_TWO_AXIS
Log file opened: 06/10/2010 08:38:30

A,351,000.02,M,60,00D,1,06/10/2010 08:38:31
A,351,000.02,M,60,00D,2,06/10/2010 08:38:32
A,351,000.01,M,60,00E,3,06/10/2010 08:38:33
A,351,000.01,M,60,00E,4,06/10/2010 08:38:34
A,351,000.00,M,60,00F,5,06/10/2010 08:38:35
A,351,000.02,M,60,00D,6,06/10/2010 08:38:36
A,351,000.02,M,60,00D,7,06/10/2010 08:38:37
A,351,000.01,M,60,00E,8,06/10/2010 08:38:38
A,351,000.01,M,60,00E,9,06/10/2010 08:38:39
A,351,000.01,M,60,00E,10,06/10/2010 08:38:40
A,351,000.00,M,60,00F,11,06/10/2010 08:38:41
A,351,000.01,M,60,00E,12,06/10/2010 08:38:42
A,351,000.01,M,60,00E,13,06/10/2010 08:38:43
A,351,000.00,M,60,00F,14,06/10/2010 08:38:44
A,351,000.00,M,60,00F,15,06/10/2010 08:38:45
```

The logged Wind Data .txt file can be imported into Microsoft Excel if it is required to manipulate the data or graph plot the data.

10. MAINTENANCE & FAULT-FINDING

10.1. 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.

10.2. Servicing

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

Opening the unit or breaking the security seals 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.

10.3. Fault-finding

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

10.4. 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 RH and change configuration settings.

Initial Set Up.

The WindObserver RH RS422 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 RH.

Ensure the Terminal program is set for 19200 baud,

Hold down the PC keyboard * key and turn on the WindObserver RH Power Supply.

The words SAFE MODE should appear on the terminal screen.

If not then power down the WindObserver RH, 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).

10.5. Status (error) codes

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

Code	Status	Condition
00	OK	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 (non-heat enabled units only).
V	NMEA data Void	Invalid data output

10.6. Bench Test

10.6.1. Data Tests

1. Couple the WindObserver RH 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 e.g. 00 or A (for NMEA format).
4. If the status code is other than these, refer to Section 10.5 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.

10.6.2. 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 RH 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 RH head and not touched or moved during the test. This test is only valid if undertaken with an ICC purchased from Gill.

10.6.3. 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 RH. The ICC must be retained using the strips provided. Then:

1. Ensure that the WindObserver RH 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.

10.6.4. Alignment Check

Ensure the ICC is assembled correctly on the WindObserver RH. 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 RH 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.

10.7. 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.

11. APPENDICES

11.1. Glossary & Abbreviations

Item	Meaning
CAL	Calibration
CR	Carriage Return
CRLF	Carriage Return Line Feed
CSV	Comma Separated Variable
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	National Marine Electronics Association standard for interfacing marine electronic navigational devices
No:	Number
NVM	Non-Volatile Memory
O/P	Output
PCB	Printed Circuit Board
RH	Remote Head
ROM	Read Only Memory
RS232	Communications standard
RS422	Communications standard
RS485	Communications standard
RTS	Request To Send
RWA	Road Weather Averaging
RX	Receive
RXD	Received Data
S/W	SoftWare
SEC	SECOnd

Item	Meaning
STX	Start of string character
TERM	TERMinal
TX	Transmit
TXD	Transmitted Data
+VE	Positive
-VE	Negative
Wind	Gill software used as a Terminal Program to configure WindObserver RH
WindView	Gill software used as a Graphical Viewing and logging Program with WindObserver RH
WRT	With Respect To

11.2. Guarantee

For terms of guarantee contact your supplier or refer to the Gill Instruments Terms & Conditions here:

<https://gill.group/wp-content/uploads/Gill-Group-Company-Terms-Conditions-of-Sale-9170-0003-Issue-02-March-20..pdf>

Warranty is void if any part of the electronics assembly is dismantled, damaged, broken or the transducer caps have been damaged.

11.3. Principle of operation

The WindObserver RH 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.

