GILL
INSTRUMENTS

User Manual

MetPak

MetPak Part: 1723-1B-2-111

Foreword

Thank you for purchasing the MetPak manufactured by Gill Instruments Ltd. To achieve optimum performance we recommend that you read the whole of this manual before proceeding with use.

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

Guarantee

For terms of guarantee, please contact your supplier.

Warranty is void if the coloured Wind Sensor security seal is damaged or broken, or the Wind Sensor transducer caps have been damaged.

Trademarks

Microsoft and Windows are registered trademarks of Microsoft Corporation.

All other brands and product names are trademarks or registered trademarks of their respective owners.

Cautions and Notes

The following symbols are used in this guide:

> **CAUTION. This indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.**

> **NOTE.** This indicates important information to help you make the best use of this product.

Applicable Parts

MetPak Part 1723-1B-2-111

Contents

Figures

Tables

1. Introduction

MetPak

MetPak is a compact and lightweight multi-sensor instrument that measures the most essential weather parameters. Gill ultrasonic technology, as used in the proven WindSonic instrument, measures wind speed and direction. Temperature and Humidity are measured and Dewpoint calculated using an industry standard probe housed in a naturally aspirated radiation shield. Barometric pressure is measured using an industry standard sensor.

The instrument is supplied with digital ASCII RS232/RS422/485 (2 wire point to point) and digital SDI-12 outputs. NMEA 0183 output is also configurable. An electrical hub box is fitted to the mounting bracket allowing convenient termination of all electrical cables.

The instrument uses a rugged mounting clamp that attaches to any vertical pipe from 30mm to 58mm (2.3") diameter.

An electrical hub box is fitted to the mounting bracket for termination of data and power cables.
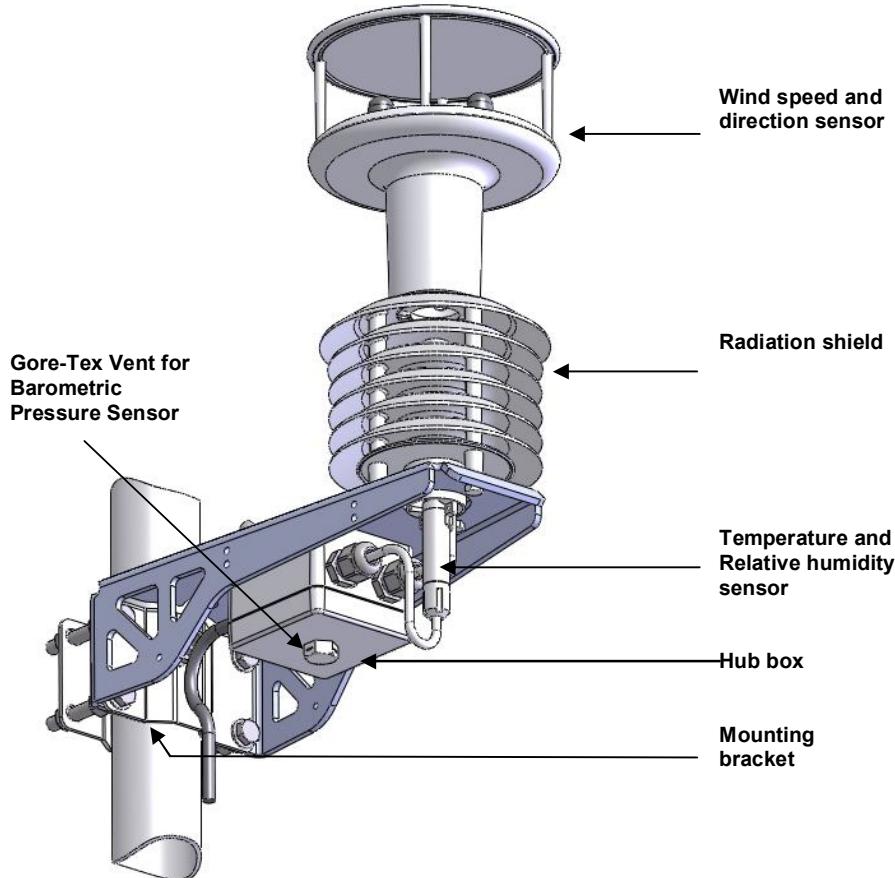
Figure 1   MetPak

1.1   Principle of Operation

1.1.1   Wind Speed and Direction Sensor

The MetPak uses the WindSonic wind speed and direction sensor. The WindSonic 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 can then be calculated from the differences in the times of flight on each axis. This calculation is independent of factors such as temperature.

NORTH MARKER ARROWS
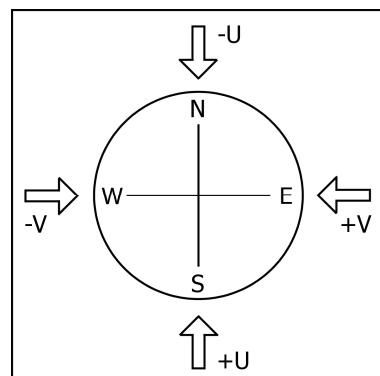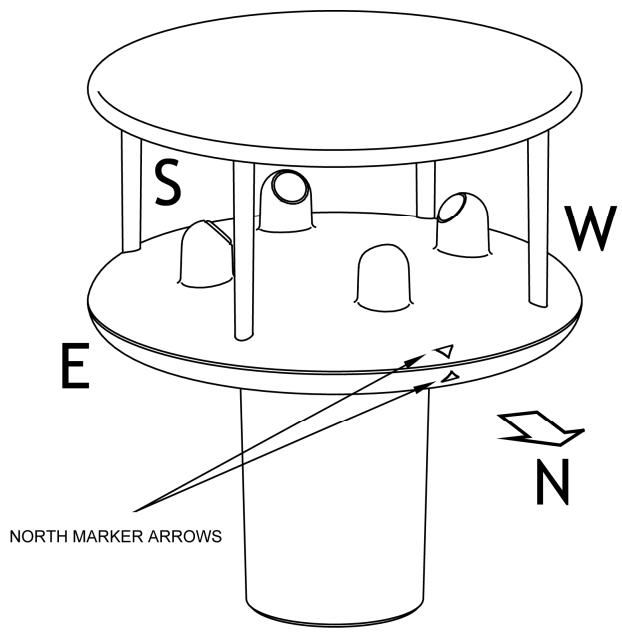
Figure 2 Compass points

Figure 3 shows the compass point and polarity of U and V if the wind components along the U and V axis are blowing in the direction of the respective arrows.

1.1.2 Radiation Shield

The Multi-Plate Radiation Shield protects temperature and relative humidity sensors from error-producing solar radiation and precipitation. This shield relies on a combination of plate geometry, material and natural ventilation to provide effective shielding.

1.1.3 Temperature and Relative Humidity Sensor with Dewpoint Output

The Rotronic HygroClip module is a complete instrument, with integrated temperature compensation. Calibration data is maintained within the integrated electronics. It provides digital output signals for Relative Humidity, Temperature and Dewpoint to the MetPak Hub box.
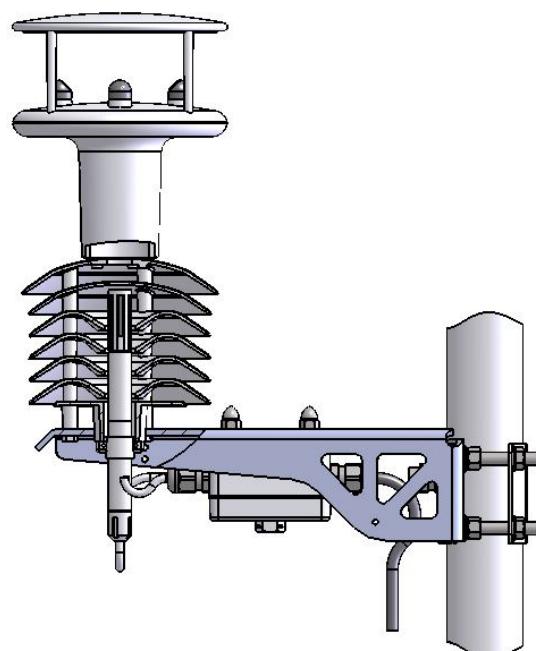
Figure 3   Position of Temperature and Relative Humidity Probe in the Radiation Shield

1.1.4 Barometric Pressure

Barometric pressure output is provided by a solid-state device fitted on to the circuit board in the MetPak hub box. Vent to atmosphere is via a Gore-Tex® filter, which protects the pressure sensor from the effects of wind and rain.

1.2   Abbreviations

Table 1 Abbreviations

Item	Meaning
ASCII	American Standard Code for Information Interchange
C	Centigrade
CAL	Calibration
CD	Compact Disc
COM	Communications
CR	Carriage Return
CSV	Comma Separated Variable
ETX	End of String
F	Fahrenheight
FPM	Feet per Minute
HF	High Frequency
HPA	Hecto-Pascals
HTML	Hyper Text Markup Language
Hz	Hertz
IMM	International Maritime Mobile
In Hg	Inches of Mercury
K	Kelvin
KPH	Kilometres per Hour
KTS	Knots
LF	Line Feed
M Bar	Milli Bars
Max	Maximum
MF	Medium Frequency
Min	Minimum
Mm Hg	Millimetres of Mercury
MPH	Miles per Hour
MS	Microsoft
MS	Metres per Second
NMEA	National Marine Electronics Association
NSEW	North South East West
NVM	Non-Volatile Memory
PC	IBM compatible Personal Computer
ROM	Read Only Memory
RS232	Communications standard
RS422	Communications standard
Rx	Receive
RXD	Received Data
SDI-12	Serial – Data Interface standard for microprocessor based sensors
STX	Start of String
Tx	Transmit
TXD	Transmitted Data
VHF	Very High Frequency
WIMWV	Wind Instrument Mean Wind direction and Velocity
WIXDR	Wind Instrument Cross track error Dead Reckoning
WMO	World Meteorological Organisation

2. Installation

MetPak has been designed to meet and exceed the stringent standards listed in its specification (see Para 6.1).

2.1 Pre-Installation Checks

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

■ Ensure the MetPak will not be affected by other equipment operating locally, which may not conform to current standards, e.g. radio/radar transmitters, generators etc.

■ Avoid mounting in the plane of any radar scanner – a vertical separation of at least 2m should be achieved.

■ When installing MetPak near radio transmitting antennas, ensure that the mounting position fulfills the following minimum separations (all round):

■ VHF IMM – 1m

■ MF/HF – 5m

■ Satcom – 5m (avoid likely lines of sight)

■ Use cables recommended by Gill (see Para 2.2.3). If cables are cut and re-connected incorrectly (perhaps in a junction box) then EMC performance may be compromised if cable screen integrity is not maintained.

■ Avoid earth loops – wire the system in accordance with these installation guidelines.

■ Ensure that the power supply operates to the MetPak specification (see Para 6.1) at all times.

■ Avoid turbulence caused by surrounding structures that will affect the accuracy of the sensors such as trees, masts and buildings. The WMO make the following recommendations. 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.

■ Keep away from building exhaust vents, machinery and motors.

2.1.1 Spare Parts

1723-10-051	RS232 to USB 1.8M configuration cable.
1723-PK-024	Pressure Sensor Filter Spares kit.
1723-PK-025	Hygroclip Filter Replacement Kit (2 Filters).

2.2   Installation

2.2.1   Bench system test

Prior to physically mounting the MetPak in its final location, we strongly recommend that a bench system test is 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 set up at this stage.

2.2.2   Equipment Required

1723-1B-2-111 MetPak set for RS232 communication (factory default setting).

1723-10-051   MetPak RS232 to USB 1.8M configuration cable with integral 5v power or alternatively use RS232, RS232 converter and separate 5v to 30 dc power supply.

ES-U-1001-A   EasySynch RS232 to USB adaptor or equivalent (if not using Gill part 1723-10-051) or connect directly to an RS232 COM port.

Power Supply 5V to 30Vdc at 50mA if required.

Belden 9503 3 pair cable (if not using Gill Part 1723-10-051), length as required.

Gill MetView Software supplied on the MetPak CD or download from .http://www.gill.co.uk/main/software.html

2.2.3   Cabling

Communication Cabling

MetPak has five communication connection options:

- USB (using the 1.8m Gill USB cable, Part No. 1723-10-051).
- RS232
- RS422
- RS485 (two wire point to point)
- SDI-12

It is important that the cable is appropriate for the chosen communication network. The following sections describe the recommended types and maximum lengths of cable in each case.

> **NOTE.** A 15-metre, 6-pair cable (wires stripped at each end) suitable for RS232/RS422/485 or SDI-12 communication is available from Gill Instruments (Part No. 1723-10-053).

Cable Type

Wire type: 24AWG

Wire size: 7x32 AWG.

Cable outer diameter: 6-8mm (to match the hub box gland).

For RS422/485 operation the cable should contain twisted pairs screened to match the application.

The following table shows an example manufacturers' reference; other manufacturers' equivalents can be used.

Table 2 Recommended Belden cable types

Application	No. of Pairs	Belden Ref.
SDI-12 or RS485	2	9729
Digital RS232	3	9503
Digital RS422	4	9504

Cable length

The maximum cable length is dependent on the chosen communication method.

The following table shows the maximum cable lengths for the supported communication protocols at the given baud rates, using the recommended cable. If any problems of data corruption etc are experienced, then a slower baud rate should be used. Alternatively, a higher specification cable can be tried.

Table 3 Maximum cable lengths for supported communication networks

Communication format	Baud rate	Max. cable length
RS232	19200	6.5M
RS422/RS485	19200	1000M
SDI-12	1200	90M

Cabling (unused wires)

Any unused wires in the connecting cables should be connected to ground preferably at the user equipment end.

Cabling protection

The Cable should be secured:

- With cable clamps or equivalent at regular intervals such that the hub box cable gland does not support the cable weight.
- Away from the mounting bolts to prevent chaffing of the cable.

NOTE. Install appropriate strain relief support to the cable. If possible, pass the cable through the mounting pole.

Earthing

To ensure correct operation and for maximum protection from lightning, a separate lightning rod system is recommended to protect the system.

You can also earth the MetPak through its mountings or by connecting a grounding cable (minimum of 6mm² copper wire) to a spare MetPak metalwork bolt hole. Clean off any paint that might prevent a good connection.

When you connect the communications cable ensure that the screen has a connection to the hub box case.

Routing Cables through the Hub Box Glands

NOTE: The MetPak Hub Box cable glands contain spring loaded metal leaves that are designed to make a ground contact with cables that have an overall braid screen. Care is therefore required when inserting and removing cables through the glands to prevent damage to the metal leaves.

2.2.4   Communication connections

To connect MetPak:

1.   Open MetPak hub box by unfastening the four screws.

2.   Locate connector J5 (see Figure 4). Carefully pull the connector off its circuit board pins.

3.   Strip the cable wires to 8mm.

4.   Pass the cable through one of the gland nuts.

5.   Connect your cable as shown in the following diagrams:

- Gill USB Cable   Figure 5
- RS232   Figure 6
- RS422   Figure 7
- RS485   Figure 8
- SDI-12   Figure 9

6.   Ensure the cable screen is grounded through the hub box gland metalwork.

7.   After connection, securely tighten the gland nut to prevent moisture ingress.

NOTE. Ensure that MetPak is configured for the chosen communications method.

J4 Pin 1   J5 Pin 8   J5 Pin 1   Hex Terminal Post

J1 Pin 6   J5, showing RS232 to USB Configuration Cable Wires
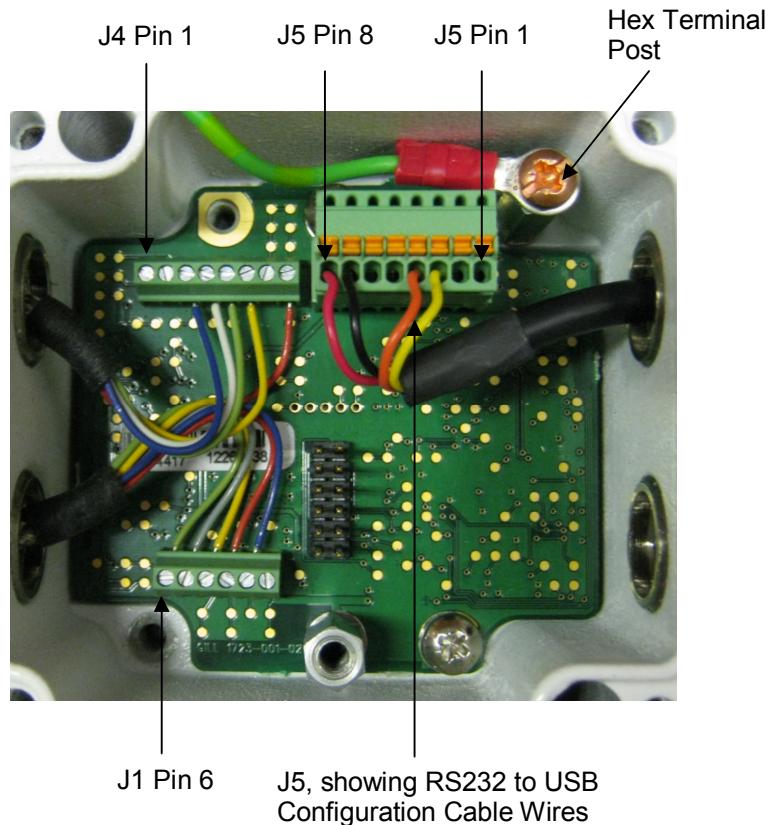
Figure 4   Internal view of the MetPak

USB Lead Connection (COMMS set for RS232)
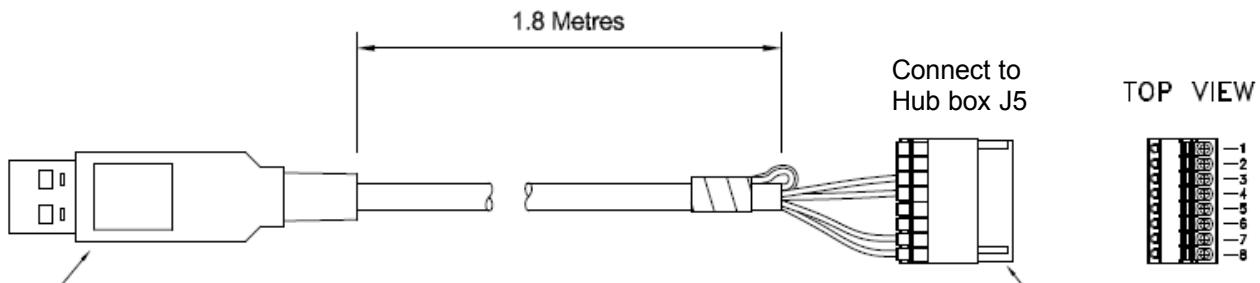
Connecting MetPak to a PC USB port using the Gill Configuration Cable 1723-10-051.

J5 Pin	1	2	3	4	5	6	7	8
Colour	None	None	Yellow	Orange	None	None	Black	Red

Figure 5   Connection of Gill USB Cable (Part No. 1723-10-051)

NOTE:- If upon connecting the USB lead to a PC the driver is not found by the PC, then the appropriate driver to match the PC Windows version may be downloaded from:-

http://www.ftdichip.com/Drivers/VCP.htm

Digital Output RS232 Connections (COMMS set for RS232)

This is the MetPak default communication configuration setting.

J5 Hub Box 8 Way Push fit Block		3 Pair Cable	PC 9 Way D Type Connector	
Signal names	**Pin nos.**		**Pin No's**	**Signal Names**
RS232 TX	3	→	2	RXD
RS232 RX	4	←	3	TXD
Signal Ground	2		5	Sig Gnd
Chassis Ground	Terminal Post	Screen wires	NA	Chassis Gnd
Supply -ve	7	←	−	DC Power supply
Supply +ve	8	←	+	
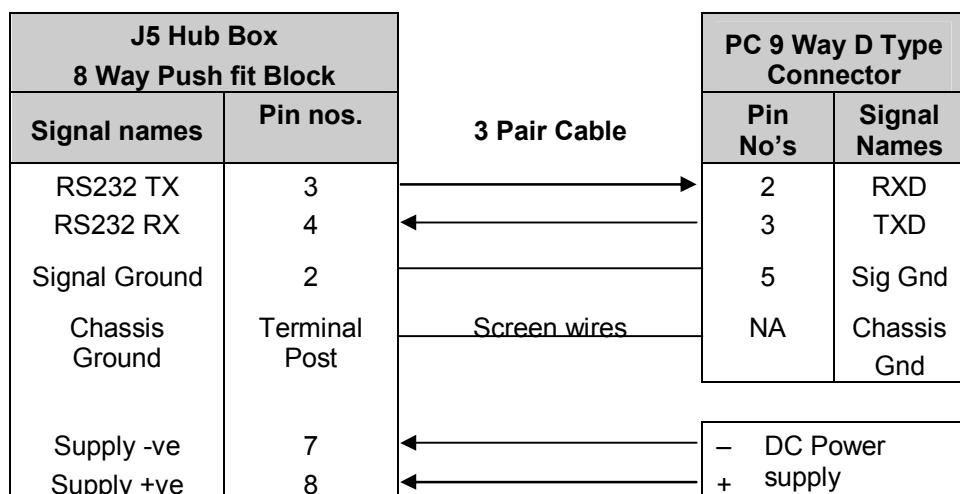
Figure 6   RS232 connections

Digital Output RS422 Connections (COMMS set for RS422)

This is not the default communications setting; ensure the MetPak has been configured for this output requirement before wiring to a user device.

J5 Hub Box 8 Way Push fit Block		4 Pair Cable	RS422 to RS232 or USB Converter
Signal Names	**Terminal Nos.**		**Signal Names**
RS422 TX +	6		RX +
RS422 TX –	3		RX –
RS422 RX +	5		TX +
RS422 RX –	4		TX –
Signal Ground	2		Signal Ground
Chassis Ground	Terminal Post	Screen wires	Chassis ground
Supply –ve	7		– DC Power
Supply +ve	8		+ Supply
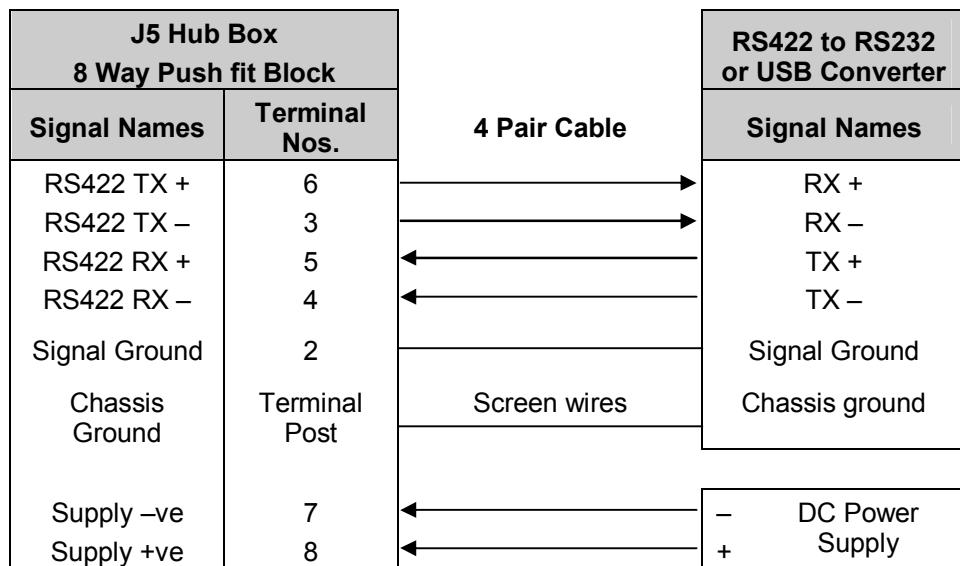
Figure 7   RS422 connections

Digital Output RS485S 2 Wire Point to Point Connections (COMMS set for RS485P2W)

This is not the default communications setting; ensure the MetPak has been configured for this output requirement before wiring to a user device.

Note that is not possible to network other devices on this 2-wire RS485 link.

J5 Hub Box 8 Way Push fit Block		2 Pair Cable	RS485 to RS232 or USB Converter
Signal Names	**Terminal Nos.**		**Signal Names**
RS485 TX +	6		RS485TX/RX+
RS485 RX+	5		
RS485 TX –	3		RS485TX/RX–
RS485 RX –	4		
Signal Ground	2		Signal Ground
Chassis Ground	Terminal Post	Screen wires	Chassis ground
Supply -ve	7		– DC Power
Supply +ve	8		+ Supply
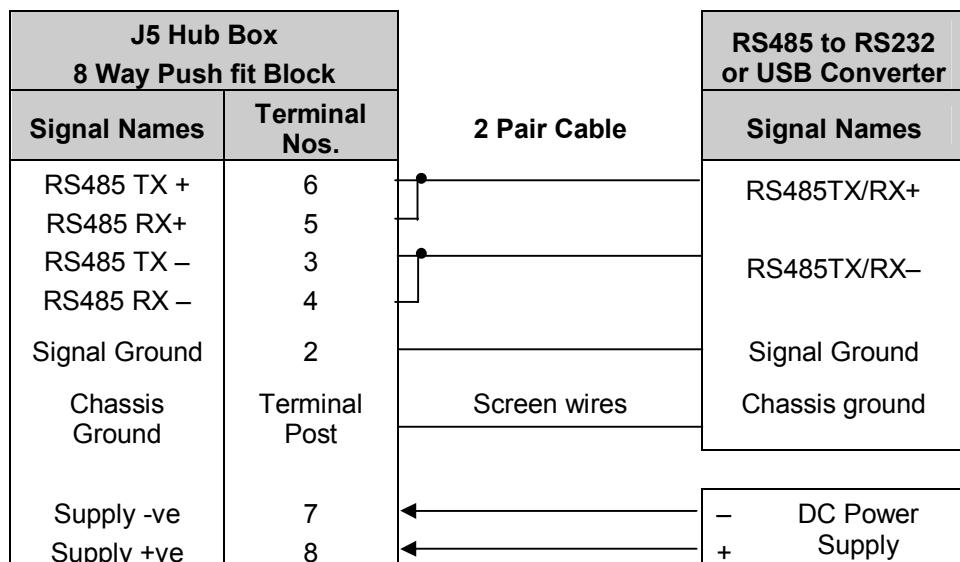
Figure 8   RS485 Connections

Digital Output SDI-12 Connections (COMMS set for SDI-12)

This is not the default communications setting; ensure the MetPak has been configured for this output requirement before wiring to a user device.

J5 Hub Box 8 Way Push fit Block		2 Pair Cable	SDI-12 Device
Signal Names	**Terminal Nos.**		**Signal Names**
SDI-12	1	←——————→	SDI-12
Signal Ground	2	———————	Signal Ground
Chassis Ground	Terminal Post	Screen wires	Chassis ground
Supply -ve	7	←———————	− DC Power Supply
Supply +ve	8	←———————	+
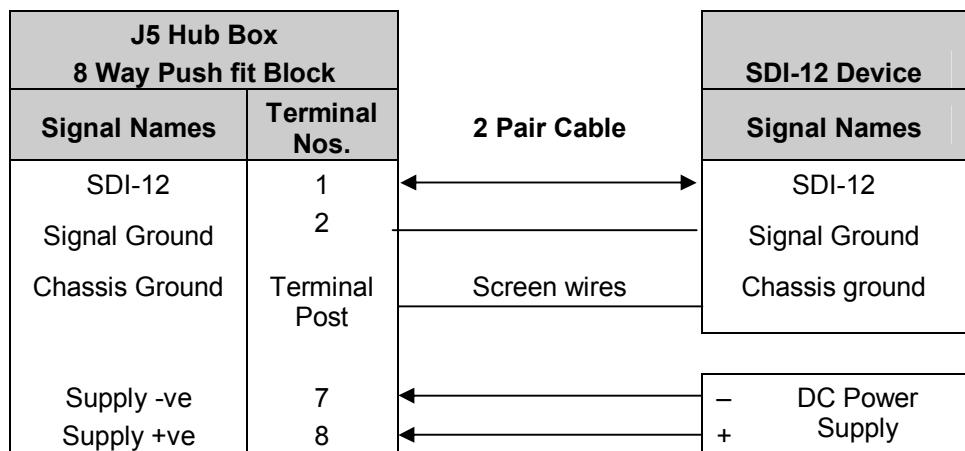
Figure 9   SDI-12 connections

2.2.5 Mounting MetPak

MetPak uses a mounting clamp suitable for attaching to a vertical pipe with a diameter of 30-58mm. When mounting the MetPak, consider the position, orientation and alignment of the unit.

Note that the mounting pipe should first be degreased and when assembling the MetPak clamp assembly the outer clamp nuts need to be tightened evenly to a torque figure of 3 Nm.

The moving plate part of the clamp needs to be reversed for poles below 38 mm diameter.

Position

It is the responsibility of the customer to ensure that the MetPak is mounted in a position clear of any structure, including the mounting post, which may obstruct the airflow or induce turbulence.

> ⚠️ **CAUTION. Do NOT mount the MetPak in close proximity to high-powered radar or radio transmitters. A site survey may be required if there is any doubt about the strength of external electrical noise.**

The temperature and humidity probe is mounted inside the radiation shield as shown in Figure 3.

Orientation

Normally, the MetPak is mounted on a vertical pole, ensuring a horizontal Measuring Plane, (see Figure 10).

For indoor use the unit may be mounted with the Measurement Plane set to any required orientation.

Alignment

The MetPak Wind Sensor should be aligned to point to North, or any other reference direction – for example, the bow of a boat.

There are two arrows, a coloured rectangle, and an alignment notch to aid alignment.

> ℹ️ **Note.** It is usually simpler to work first with a compass at ground level and identify a suitable landmark and it's bearing.

Interference

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

See Para 2.1 for guideline details.
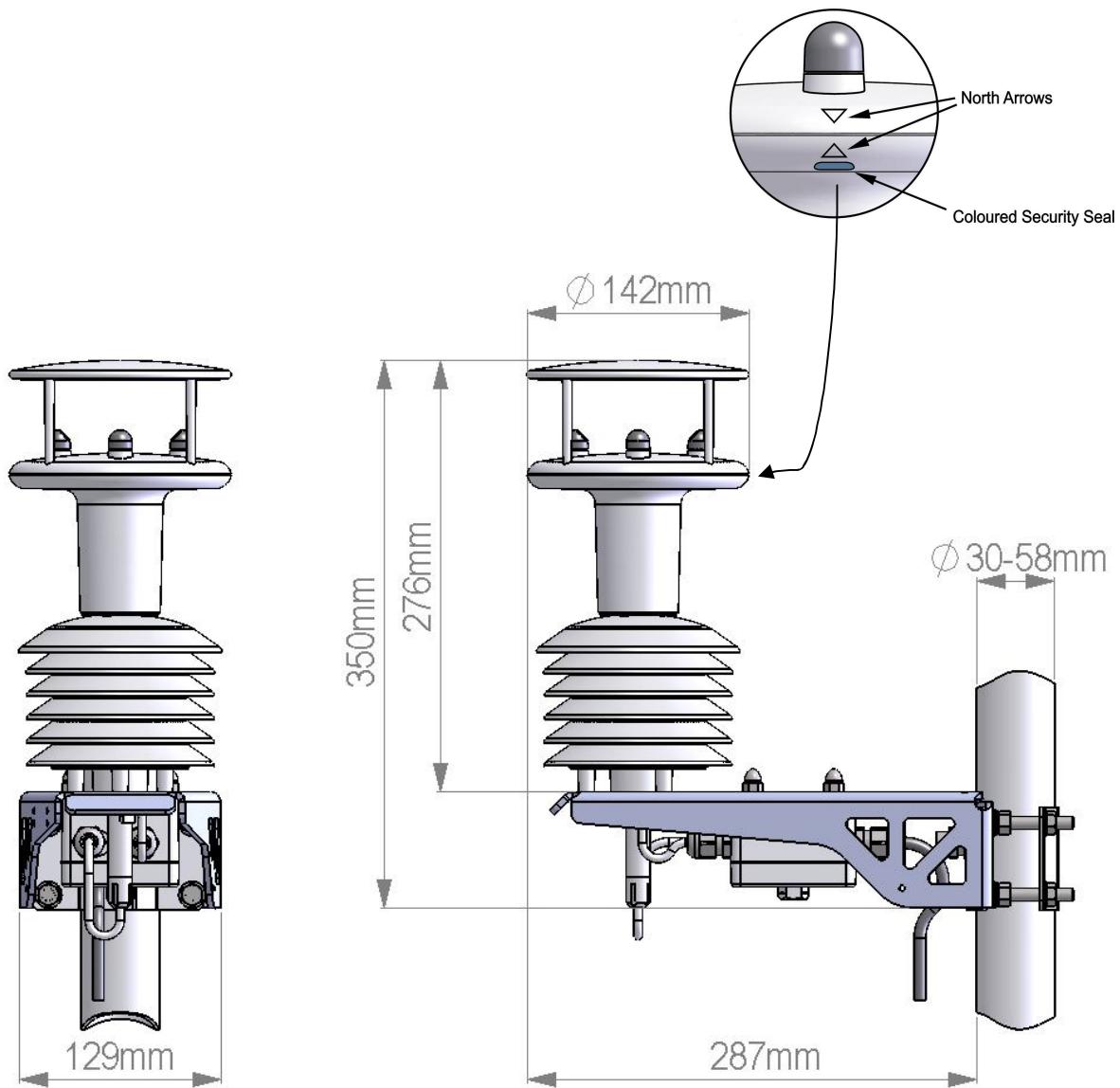
Figure 10   Correct mounting position for MetPak

Note that the mounting pipe should first be degreased and when assembling the MetPak clamp assembly the outer clamp nuts need to be tightened evenly to a torque figure of 3 Nm.

The moving plate part of the clamp needs to be reversed for poles below 38 mm diameter.

Suitable Pole Diameter 30mm to 58mm (1.2 to 2.3 inches).

3. Operation

This section provides an overview of the installation and operation of MetPak. For more detailed information about any of the steps, use the references to other sections of this manual.

3.1 Start Guide

Decide how you are going to connect MetPak to your PC or communications network. MetPak supports the following options:

- USB connection using Gill's RS232 to USB 1.8M configuration cable (includes integral 5V power supply). To order, contact your dealer quoting part number: 1723-10-051).

  > **NOTE.** You could use an equivalent RS232-USB adapter such as EasySynch RS232 to USB adaptor.

- RS232 connection using standard cable and PC COM port. Separate 5V to 30V dc power supply also required.

- RS422 using RS232 converter.

- RS485 2 wire point-to-point communication using suitable converter (note RS485 2 wire point-to-point is not compatible with MetView Software).

- SDI-12 connection (note SDI-12 is not compatible with MetView Software).

  > **NOTE.** MetPak is pre-configured for RS232 communication (factory setting). If you want to use an alternative communication protocol, you will need to set up the unit using an RS232 connection (with an appropriately wired cable), change the setting), shut the unit down, attach a cable for the new communication type, and then restart the unit.

1. Unpack MetPak. Check that you have the following:

   - MetPak unit (Part No. 1723-1B-2-111).

   - Gill MetView, MetSet Software and Manual supplied on the CD.

   If any parts are missing, please contact your dealer.

2. Open the hub box by unfastening the four retaining screws. Locate the connector: J5 (see Figure 4). Carefully pull the connector block from its pins.

3. Prepare the communications cable by stripping the wires to a length of 8mm. Feed the prepared cable through one of the two available ports on the side of the hub box.

4. Connect the cable to J5 as described on page 9 for your chosen communications method.

5. Carefully press J5 onto its circuit board pins.

6. Replace the top on the connection box. Tighten the gland on the connection port to seal the cable in place.

7. If you are carrying out a bench test, continue to step 13. When you have finished testing, return to Step 10.

8. Ensure that if using a mounting pole that it has been degreased in the area where the MetPak will be positioned.

9. Position the MetPak against the mounting post (see page 13), fit the mounting kit bracket and tighten sufficiently to hold the unit in place but allowing it to be rotated or moved up and down the pole.

10. Check the orientation and alignment of the unit (see page 13).

11. Check the height of the unit and ensure it is clear of any obstructions, including the mounting post, that could interfere with MetPak's measurements (see page 13).

12. Tighten the mounting bracket nuts evenly to a torque of 3Nm to hold the unit firmly in place.

13. Connect the communications cable to your PC or network device.

14. Place the MetPak CD in your PC's CD drive and install MetView.

3.2   MetView

MetView Software allows you to view the MetPak data graphically and has a simple data logging facility.

Before you can use MetView, check that MetPak is correctly connected to a COM or USB port on your PC (see Para 2.2.4).

NOTES: MetView is compatible with RS232 and RS422 connected units only.

MetView will not read NMEA data strings.

3.2.1   Opening MetView

Click on the MetView button on your PC's desktop or choose:

Start > Programs > MetView > MetView

The MetView Control Centre window is displayed

Scan Button– If MetPak transmit and receive wires are connected to the PC then use the Scan button to connect to MetView.

Connection is Receive Only Tick Box – Use if the MetPak connection to the PC has only transmit wires connected and a MetSet version of its current device settings is available to upload to MetView. Select 'Connection is Receive only' tick box and click on the Scan button. Upload a MetSet generated Device file from a PC location as directed.

Figure 11   Opening MetView Screen

3.2.2   Scanning for Devices

To set up communicate between MetView and a connected MetPak:

1.   Click on the **Scan** button to search the available COM ports for MetPak devices.

Figure 12   Scanning for MetPak Devices

When a device is found, MetView obtains the MetPak configuration settings and then retrieves and displays MetPak data.

3.2.3   The MetView Console

When connected correctly, MetView displays its data-monitoring console. This consists of five gauges showing: Temperature, Humidity, Pressure, Wind Speed and Wind Direction. There is also a digital readout of Dew Point. Buttons beneath each of the gauges allow you to choose the displayed units and other options. Each gauge also shows the maximum and minimum values recorded during the current session. The wind speed gauge also shows the maximum gust speed.

Note: MetView will not show data if the unit is set for NMEA or SDI-12 formats.
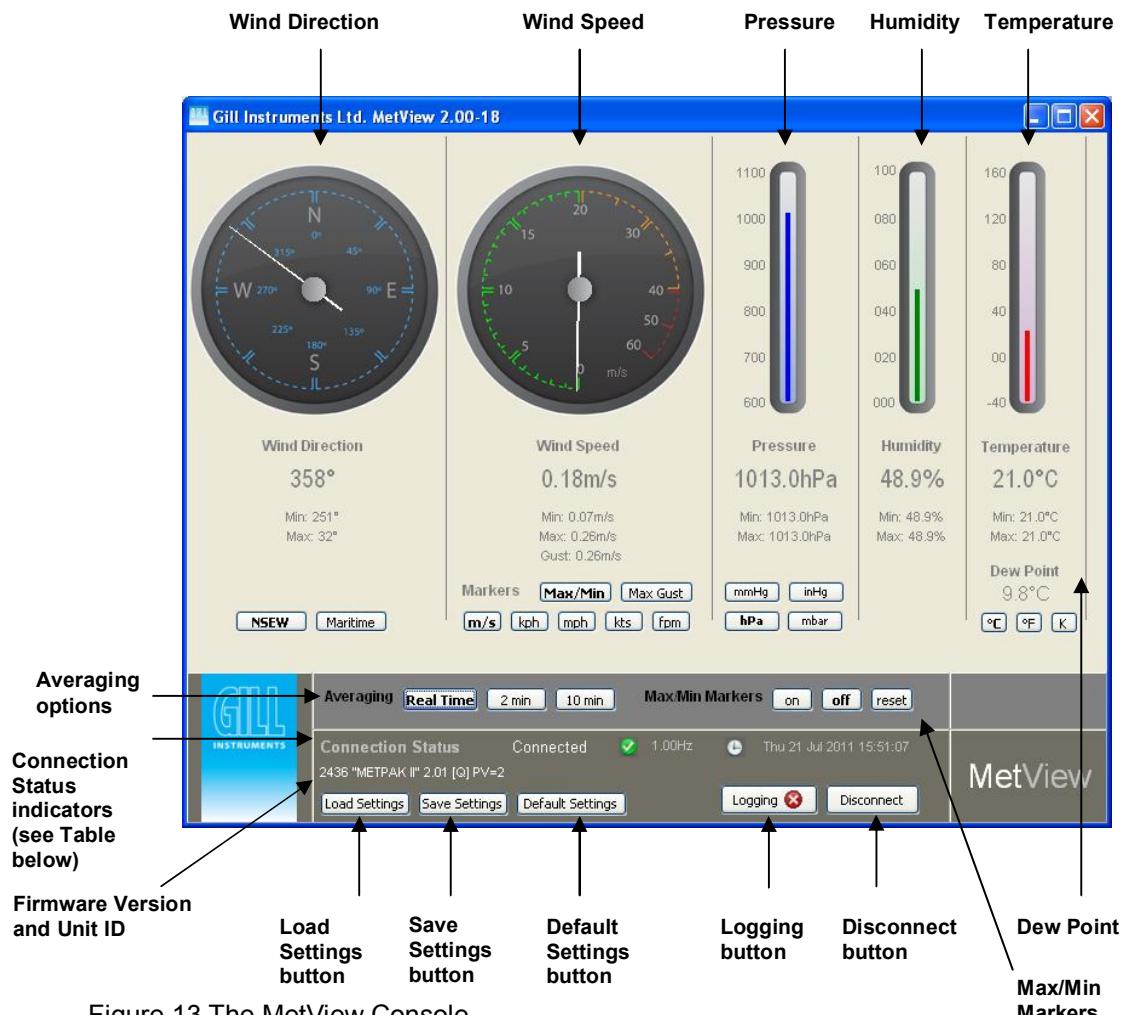
Figure 13 The MetView Console

Connection Status

Table 4 Connection status indicators

Reading	Function
Green Background Tick	Indicates MetPak logging or communicating correctly with MetView along with reading the MetPak firmware version.
Red Background Cross	Indicates MetPak not logging or not connected/communicating to MetView.
1.00Hz	Indicates the output rate of the MetPak when connected. Reads when the unit is communicating correctly with MetView.
Thu 21 Jul 2011 15:51:07	Real Time PC date and time indication.

3.2.4 MetView Console Display Options

MetView Console buttons can convert data from the MetPak to read different units or scale settings. This does not alter the actual MetPak configuration.

Units shown in **bold** denote default settings

Table 5 MetView scale and unit options

Gauge	Function
Wind Direction	Use buttons to choose from two display styles: **NSEW** or Maritime
Wind Speed Markers	Use buttons to add markers on the gauge for **Max/Min** or Max Gust.
Wind Speed	Use buttons to choose from five wind speed units: **m/s**, kph, mph, kts, fpm
Pressure	Use buttons to choose from pressure scales: **hPa**, mbar, inHg, mmHg
Humidity	Displays Max and Min values during current session in **%**
Temperature & Dew Point	Use buttons to choose from three temperature scales: **°C**, °F, K

Table 6 MetView averaging options

Setting	Function
Real Time	Choose this button for no averaging
2 Min	Select for 2 minute rolling average of all sensor readings
10Min	Select for 10 minute rolling average of all sensor readings

Table 7 Max/min markers

Setting	Function
Off	Maximum and Minimum Markers on all gauges turned off
On	Maximum and Minimum Markers on all gauges turned on
Reset	Reset all Gauge Maximum/Minimum Markers and all digital Maximum/Minimum reading at will

Table 8 MetView Screen Settings Options

Setting	Function
Save Settings	Will Save all the current MetView screen settings to a file for later retrieval if required.
Load Settings	Will load and update the MetView screen with a previously saved setting.
Default Settings	Will return all MetView screen settings to factory default.

3.2.5   MetView Gauge Ranges and Graphs

Gauge Range Settings.

MetView Pressure, Humidity and Temperature Gauge ranges may be changed to view changes in conditions more visibly.

Note, These changes only affect MetView settings and do not affect the MetPak output.

For instance if the typical temperature measurement range required is from +10 degrees to +40 deg C then the temperature gauge range can be adjusted to reflect this.

Place the mouse pointer over the Temperature display gauge and double click to bring up the Set Gauge Range screen. Change Max and Min readings to required values, e.g. +10 min and +40 max.

Click on Set.

The Temperature gauge range will be updated to reflect the change.
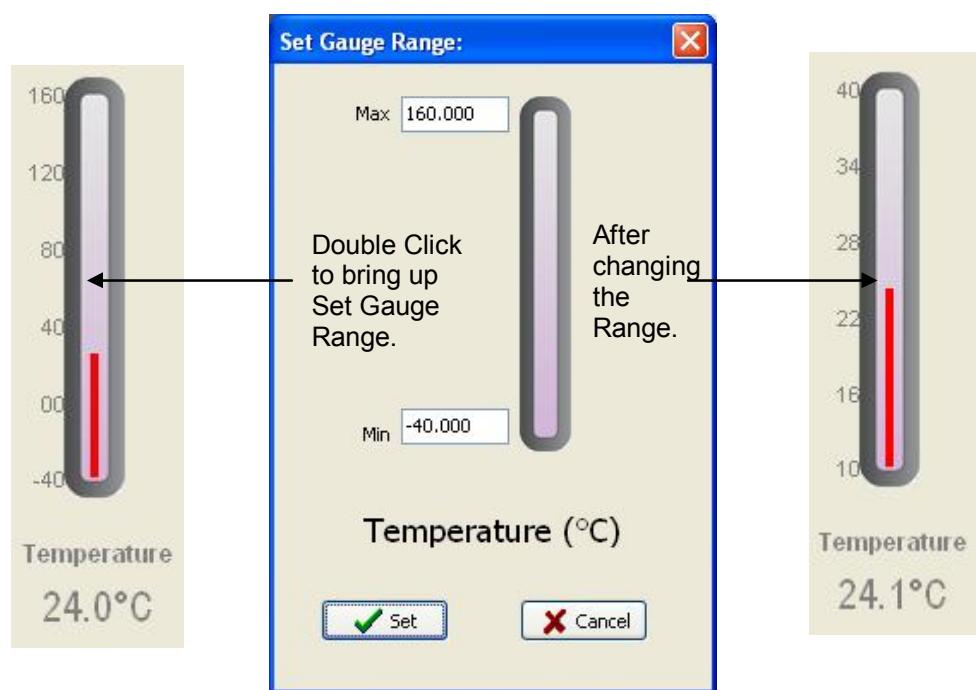
Figure 14   MetView Gauge Range

Graphs

MetView allows data detected over the last minute, last 1 hour and last 24 hours to be accessed and shown on a graph.

Note. Data is only shown up to the time when the graph function is selected, the graph is not updated once opened. Data is collected from the time that MetView is opened and reading data from a MetPak.

Double Click on the reading to bring up the graph.
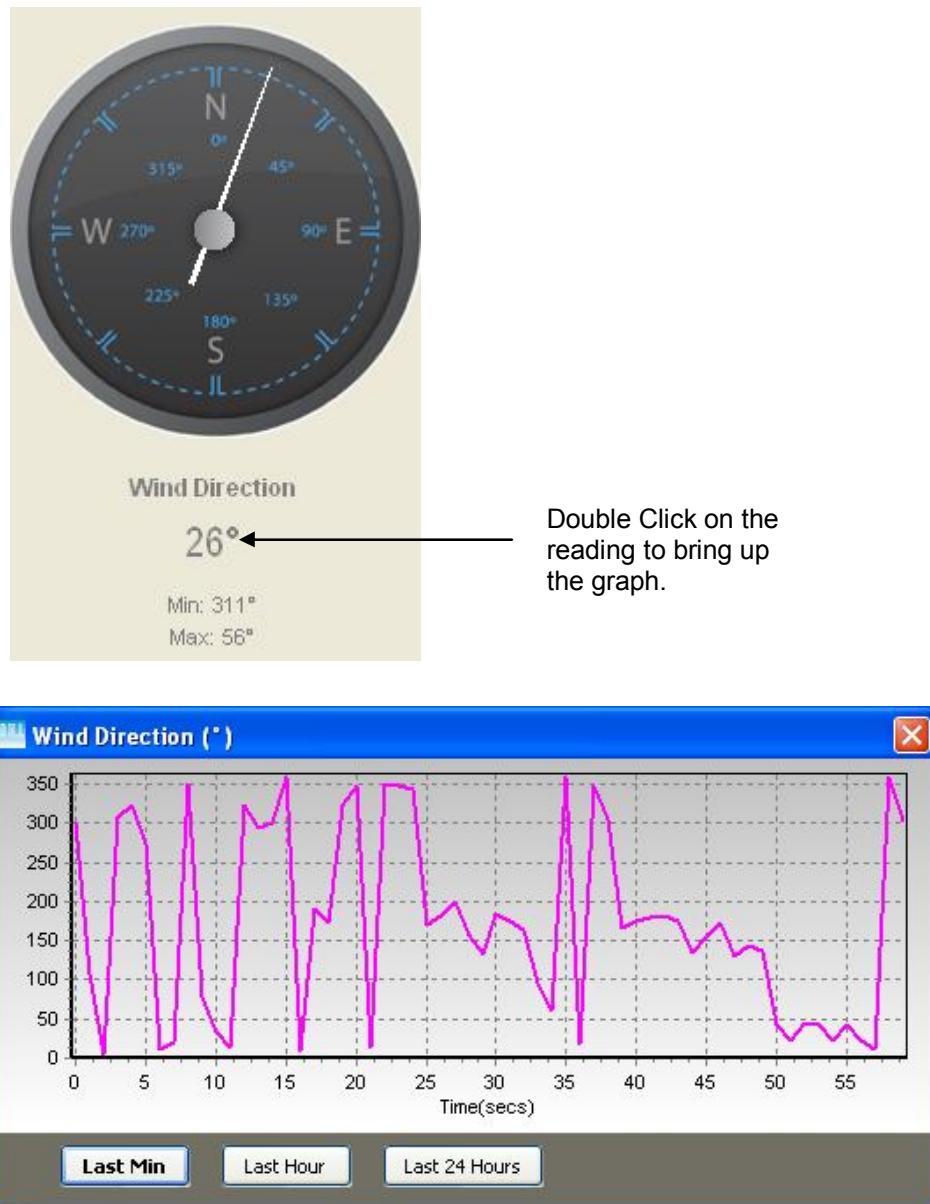
Click on the Last Min, Last Hour or Last 24 Hours buttons as required to view data.

Figure 15   MetView Graph

3.2.6   Data logging

> **NOTE.** MetView logs data based on the MetPak configuration not on the MetView console settings.

To log MetPak data, click on the **Logging** button on the MetView console. The *Logging* dialog box is displayed.
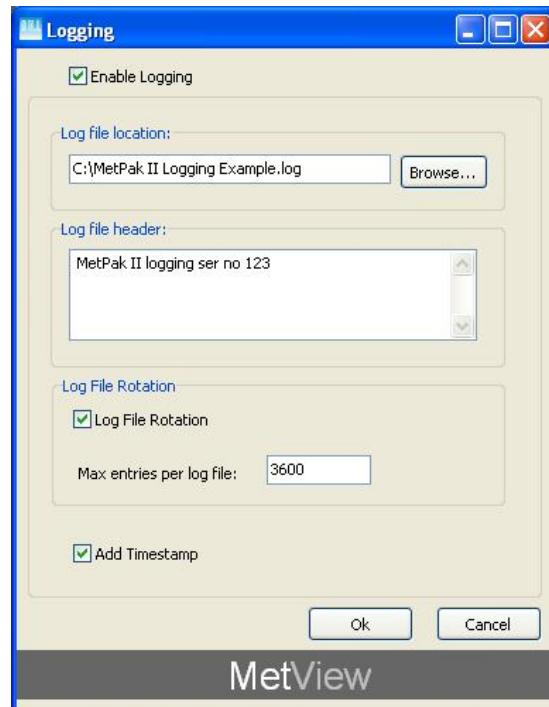
Figure 16   Setting up data logging

Setting up a logging file

1.   Select **Enable Logging** to start logging to a file.

2.   Identify the name and location for the logging file:

Log File location	Click on the **Browse** button to identify the folder where you want to store the data file. Enter the name of the file.
Log file header	If required type some notes on the data that is to be recorded which will appear at the top of the saved data log file.

3.   Choose from the following additional options:

Log File Rotation	Set up segmented logging with each logged file length determined by the number entered in the text box below. The figure 3600, for example, means that each log file length will be 3600 lines of data. Maximum entries per log file is limited to 65535 and a maximum of 2048 log files can be created.
Add Timestamp	Adds the date and time to the logged data file taken from the PC clock.

To start logging

1. Check that the **Enable Logging** option is selected.

2. Click on the **OK** button to commence logging and return to the console.

> **Note.** To show that data is being recorded, the Logging button's icon changes to a green tick:
>
> Logging active   Logging stopped

To stop logging

To turn off logging:

1. Click on the **Logging** button on the MetView console. Clear the **Enable Logging** check box.

2. Click on the **OK** button. If logging has stopped, the Logging button shows a red background cross instead of the green background tick (see above).

Understanding logged data

Logged data is stored to a file with a **.log** extension. This can be viewed in any text/HTML editor or spreadsheet application.
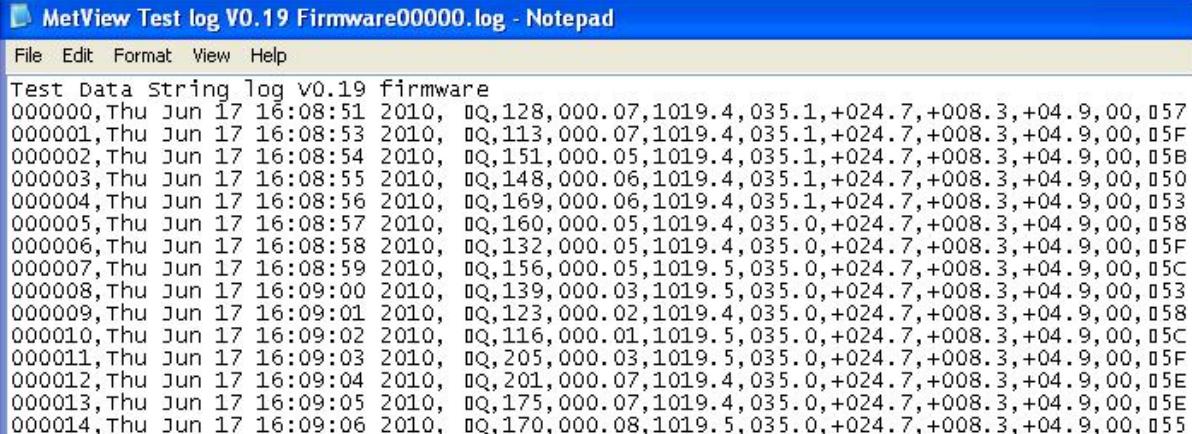
Figure 17   A typical data log (viewed in Windows Notepad)

Each entry in the default file format consists of the following:

000001 Thu Jun 17 16:08:53 2010,□Q,113,000.07,1019.4,035.1,+024.7,+008.3,+04.9,00,□5F

- ■   Line Number
- ■   Date/time stamp
- ■   Node letter
- ■   Wind direction
- ■   Wind speed
- ■   Pressure
- ■   Humidity
- ■   Temperature
- ■   Dewpoint
- ■   Supply voltage
- ■   Status code
- ■   Checksum
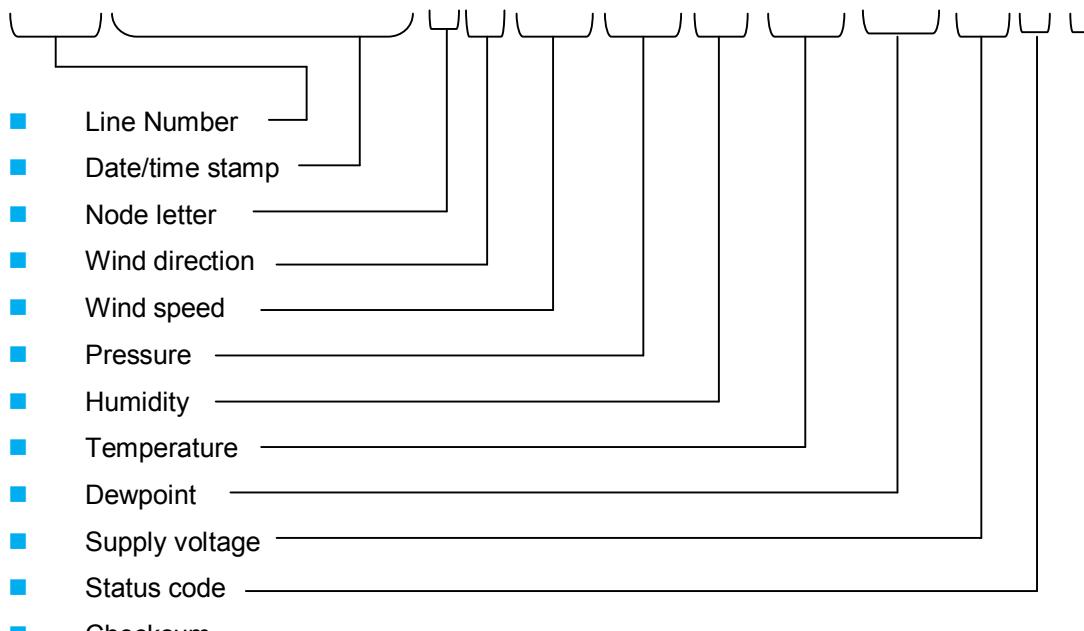
3.3   Configuring MetPak

MetPak can be configured using:

- Gill MetSet or a terminal program such as Windows HyperTerminal.
- Gill Wind software used as a Terminal Program only.

The default configuration settings are listed in the following table.

Table 9 Default configuration settings

Setting	Function
Comms Levels	RS232
Baud Rate	19200
Data Connection	Data Bits 8, Parity None, Stop Bits 1, Flow Control None.
Node ID	Q
Output rate	1Hz
Message Mode	Continuous
ASCII Set Up	Carriage return and line feed, Echo on
North Alignment	0
Sensor WindSpeed	On
Wind Speed Units	MS (Metres/Second)
Temperature Sensor	On
Temperature Units	C (Degrees Celsius)
Dewpoint Sensor	On
Dewpoint Units	C (Degrees Celsius)
Pressure Sensor	On
Pressure Units	Hecto Pascals
Humidity Sensor	On
Humidity Units	%
Report Format	Node, Polar (Wind Direction and Wind Speed), Pressure, Humidity, Temperature, Dewpoint, Volts, Status, Checksum.
Status Message Output	On
Report Message Output	On
Units Message Output	On
Inputs Message Output	On
Output Sentence	Comma Separated Variable

Example Default ASCII Data String:

<STX>Q,170,000.08,1019.5,035.0,+024.7,+008.3,+04.9,00,<ETX>55 & (CR,LF)

- STX
- Node letter
- Wind direction
- Wind speed
- Pressure
- Humidity
- Temperature
- Dewpoint
- Supply voltage
- Status code
- ETX
- Checksum
- Carriage Return/Line Feed
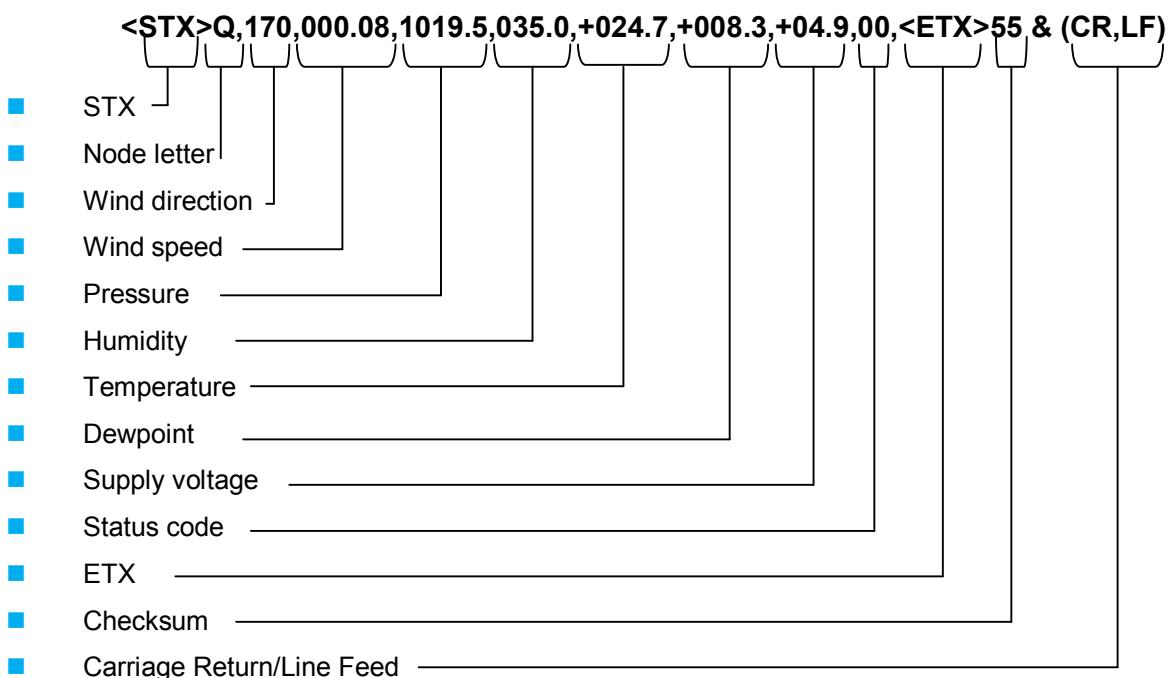
NOTES:

<STX> is the Start of String character (ASCII value 2).

<ETX> is the End of String character (ASCII value 3).

Checksum, the 2 digit Hex Checksum sum figure is calculated from the Exclusive OR of the bytes between (and not including) the STX and ETX characters.

NOTE. Switch on Time.

Upon switching on the MetPak, allow 9.5 seconds to elapse before data is output.

3.3.1 Configuring MetPak using MetSet

Before you use MetSet check that MetPak is correctly connected to a COM or USB port on your PC.

NOTE: MetSet is compatible with RS232 and RS422 connected units only.

Click on the MetSet button on your PC's desktop or choose:

Start > All Programs > MetSet > MetSet

The MetSet Control Centre window is displayed. If you have more than one MetPak connected to your PC, MetSet, by default, selects the first device detected.

For most applications it is recommended to click on the MetSet **Connect and Read** button.

MetSet interrogates the MetPak and returns a summary of the device settings.

Connect the MetPak unit output to MetSet and read its configuration settings

Connect the MetPak unit output to MetSet without reading its configuration settings

Disconnect MetPak unit and create MetPak unit device settings using MetSet Offline

Not Used

MetSet supported products list
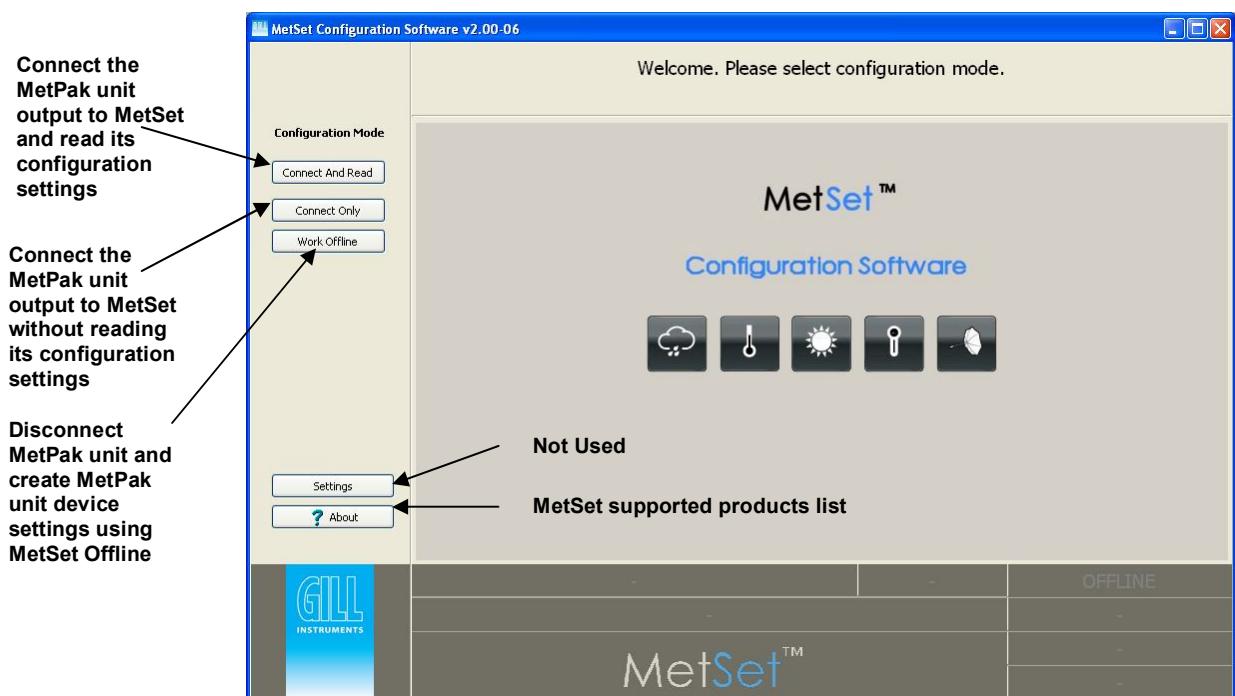
Figure 18   Opening MetSet Screen

Summary of Device Settings Screen

MetSet interrogates the MetPak and returns a summary of the device settings.

Note that MetSet also saves a copy of this screen to the connected PC as a Session Report File that can be accessed from the following destination.

C:\Program Files(X86)\Gill Instruments\MetSet\SessionReports

Close Summary of Device Settings screen to go to the Editing screens.


```
Summary of Device Settings

SETTINGS ARE AS FOLLOWS:

    COMMS : RS232
    (BAUD) : 19200
    NODE : Q
    OUTFREQ : 1HZ
    MSGMODE : CONT
    ASCTERM : CRLF
    ECHO : ON
    ALIGN : 0
    SENSOR WIND : ON
    UNITS WIND : MS
    SENSOR TEMP : ON
    UNITS TEMP : C
    SENSOR DEWPOINT : ON
    UNITS DEWPOINT : C
    SENSOR PRESS : ON
    UNITS PRESS : HPA
    SENSOR RH : ON
    UNITS RH : %
    REPORT : NODE POLAR PRESS RH TEMP DEWPOINT VOLT STATUS
    PUPMSG STATUS : ON
    PUPMSG REPORT : ON
    PUPMSG UNITS : ON

 Note changes to BAUD and COMMS settings will
 take place after next power-up.
```

Close

Figure 19   Summary of MetPak Device Settings using MetSet

3.3.2   MetSet Editing Screen

When connected correctly a MetSet editing screen is available to read configuration settings, change configuration settings, save MetPak configuration settings to a PC file location, upload MetPak configuration settings from a PC file and view the MetPak raw data string output.

MetSet Editing Screens

MetPak Unit Device Setting Options

View MetPak Unit Raw Data Output String

Return to opening MetSet Screen

Source of MetSet Data

Serial Number   **Connection Status**
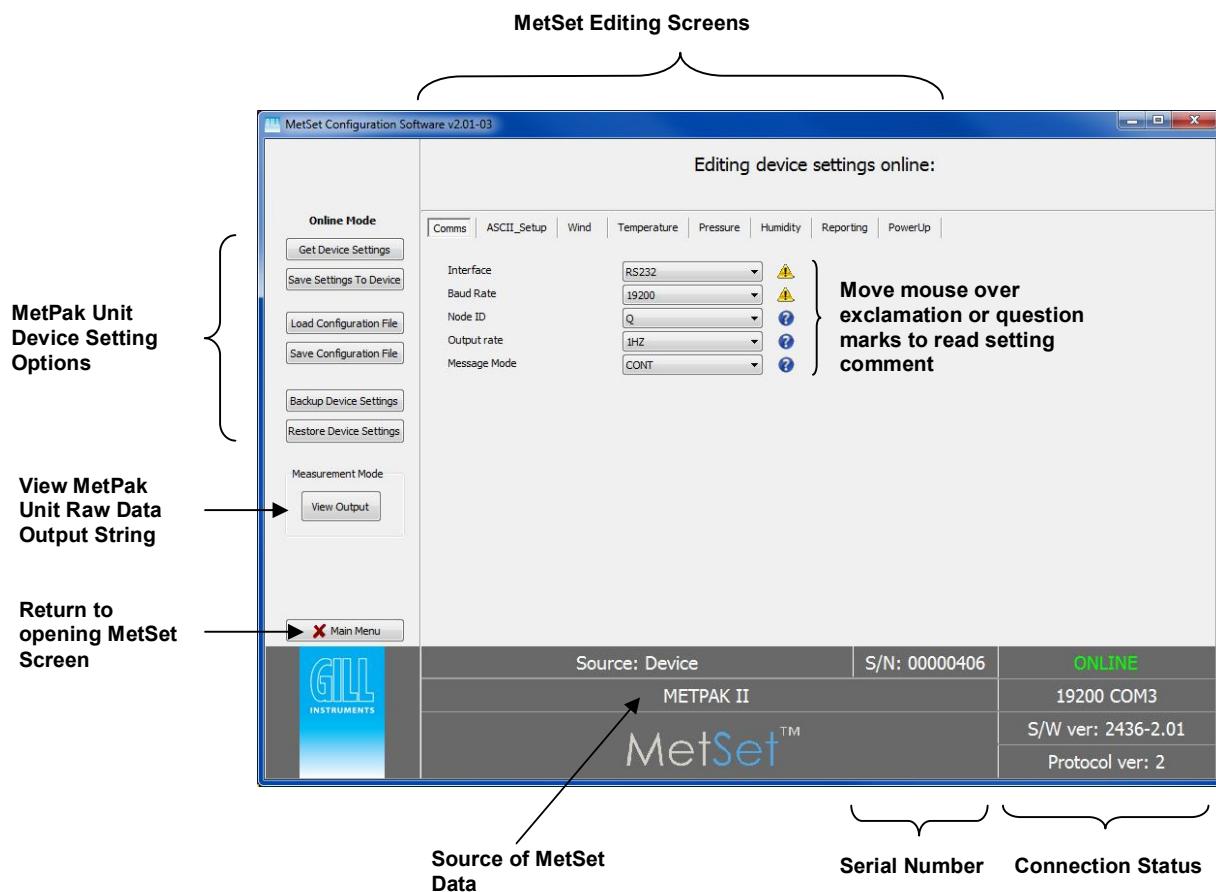
MetSet Connection Status Information.

Reading	Function
S/N:00000406	MetPak serial number.
ONLINE	ONLINE in green indicates the MetPak has been successfully connected to MetSet. OFFLINE in Grey indicates that MetSet is being used without a MetPak in communication with MetSet.
19200 COM 3	19200 is a report on the MetPak Baud rate setting. COM 3 is a report on the MetPak COM Port connection number.
S/W ver 2436-2.01	2436 is the MetPak Firmware number 2.01 is the firmware revision. Protocol Version 2 (Gill internal reference).
Source:Device	MetSet reads 'Device' when the source of the data that MetSet has retrieved has come from the MetPak. MetSet reads 'File' when the source of data has come from a saved file. MetSet reports on the connected MetPak device (METPAK) and reads the unit Serial Number (S/N: 00000406).

line Mode Settings.

	Online Mode Buttons	Function
Online Mode	Get Device Settings	MetSet retrieves the MetPak Unit Configuration settings.
Get Device Settings	Save Settings to Device	MetSet configuration settings are saved to a connected MetPak Unit.
Save Setings To Device		
Load Configuration File	Save Configuration File	When selected MetSet edit settings are saved to a PC file location.
Save Configuration File	Load Configuration File	When selected MetSet retrieves a MetSet edit PC file and updates MetSet with these settings.
Backup Device Settings	Back Up Device Settings	When selected the MetPak Unit configuration settings are transferred to MetSet and then to a file location selected on a PC.
Restore Device Settings	Restore Device Settings	When selected MetSet retrieves a MetPak Unit configuration setting from a PC file, loads it into the MetPak Unit and updates the MetSet edit settings.
Measurement Mode		
View Output	Measurement Mode View Output	Click on View Output to view the raw ASCII MetPak Unit data string scrolling at the output rate. (View only feature). E.g. ⌐Q,014,000.06,1011.2,042.1,+023.0,+009.4,+12.0,00,└ 40
✖ Main Menu	✖ Main Menu	Click here to go back to the opening MetSet screen

MetSet Editing Screens.

Click on any page to select set up parameters.

The Comms Page can be used to Select:-

Interface:- **RS232**, RS422, RS485 (point to point) and SDI-12.

Baud Rate:- 4800, 9600, **19200**, 38400 or 57600 (1200 auto selected with SDI-12 setting).

Node ID:- A to P, **Q** to Z.

Output Rate:- 0.25Hz to **1Hz**.

Message Mode:-**Continuous** or Polled.

NOTE: When COMMS or Baud Rate settings are changed and Saved to Device a warning is issued by MetSet. These setting changes will not become active until the MetPak power is turned off and turned on again. The connecting device will then also need its Comms and Baud rate settings changed to match the MetPak.

The ASCII Set Up Page can be used to select:-

Termination:- **CRLF** or CR

Echo:- **ON** or OFF.

The Wind Page can be used to select:-

Comms	ASCII_Setup	Wind	Temperature	Pressure	Humidity

North Alignment	0_____	❓
Sensor Windspeed	ON ▼	❓
Wind speed Units	MS ▼	❓
No-Direction Wind Speed	0.00	❓

North Alignment from **0**-359 degrees.

Sensor WindSpeed **ON** or OFF.

Wind Speed Units **MS,** KTS, MPH, KPH, FPM.

(Metres/Second, Knots (Nautical miles/hour), Miles/Hour, Kilometres/Hour, Feet/Minute).

No-Direction Wind Speed **0.00** (Minimum at which Direction readings are updated).

The Temperature Page can be used to select:-

Comms	ASCII_Setup	Wind	Temperature	Pressure	Humidity

Temperature Sensor	ON ▼	❓
Temperature Units	C ▼	❓
Dew point Sensor	ON ▼	❓
Dew point units	C ▼	❓

Temperature Sensor **ON** or OFF

Temperature Units **C,** K or F (Centigrade, Kelvin, Fahrenheit)

Dew Point Sensor **ON** or OFF

Dew Point Units **C**, K or F

The Pressure Page can be used to select:-

Comms	ASCII_Setup	Wind	Temperature	Pressure	Humidity

Pressure Sensor	ON ▼	❓
Pressure Units	HPA ▼	❓

Pressure Sensor **ON** or OFF

Pressure Units **HPA**, MB, MMHG, INHG

(Hecto Pascals, Milli-Bars, Millimetres Mercury, Inches Mercury).

The Humidity Page can be used to select:-

Comms	ASCII_Setup	Wind	Temperature	Pressure	Humidity

Humidity Sensor	ON ▼	❓
Humidity Units	% ▼	❓

Humidity Sensor **ON** or OFF

Humidity Units **%**

The Reporting Page can be used to select:-

Report Format **FULL**, all sensors are selected to be output.

Report Format USERDEF, Allows sensors to be selected and change the order of their output in the data string.

Report Format NMEA (see Para 3.3.4).

Parameters to report are as follows:-

Select Parameters to Report using the drop down menus

NODE,DIR,SPEED,PRESS,RH,TEMP,DEWPOINT,VOLT,STATUS.

Report parameters can be selected in any order or on or off in USERDEF.

The Power Up Page can be used to select:-

Status Message Output **ON** or OFF.

   (E.g. METPAK OPTION R 2436 VB.39, STARTUP: OK)

Report Message Output **ON** or OFF.

   (e.g. NODE,DIR,SPEED,PRESS,RH,TEMP,DEWPOINT,VOLT,STATUS,CHECK)

Units Message Output **ON** or OFF

   (e.g.   -,DEG,MS,HPA,%,C,C,MM,V,-,-   = CONFIGURED)

NOTE:

Once all settings have been chosen then save Edited Page Settings to MetPak Base Station by clicking on 'Save Settings to Device' this will change the MetPak Base Station configuration to reflect the new MetSet settings.

3.3.3 Configuring MetPak using HyperTerminal

> **NOTE.** . This section describes the procedure using Windows HyperTerminal. Alternatively Gill Wind Software (http://www.gill.co.uk/main/software.html) can be used a Terminal Emulator (note Tools feature not applicable). Select the required COM port and click on OK, the required 19200 Baud Rate is already selected (or use the Baudrate drop down) then continue as from step 7.

Setting Up HyperTerminal

To configure MetPak using HyperTerminal:

1. Select an available Com port and connect the MetPak unit.

2. Run **Hypertrm.exe**
    (Typically accessed via
    Start | All Programs | Accessories | Communications | Hyperterminal).

3. Select **New Connection** from the **File** menu.

4. Enter a name for the connection, for example *MetPak* and, optionally, select an icon to represent it. Click on the **OK** button.

5. In the *Connect To* dialog box, change *Connect Using* to *COMX* (where *X* is the number of the selected COM port). Click on the **OK** button.

6. In the *COMX Properties* dialog box, adjust the *Port settings* to match the MetPak unit's settings. The default settings are :

    - Bits per second   19200
    - Data bits   8
    - Parity   None
    - Stop bits   1
    - Flow Control   None

7. Click on the **OK** button.

Message Reporting

MetPak has two reporting modes:

- Continuous mode

In continuous mode (the default) MetPak reports continuously. So, if you have set up the connection correctly, you should now see data strings scrolling across the HyperTerminal window. For example:

> Q,113,000.07,1019.4,035.1,+024.7,+008.3,+04.9,00,♥5F

- Polled mode

If the unit has been set to polled mode (see MSGMODE command in Table 10), type ?Q (where Q is the unit node letter) to prompt one line of the data string. Note, allow 9.5 seconds after switching on the unit before sending a poll command.

When polled, allow 570 milli-seconds for the unit to respond with a line of data. If the MetPak detects a pressure/temperature/humidity sensor fault then allow 4 seconds for an error data output.

Entering MetPak setup mode

To enter the unit's setup mode:

- ■ If the unit is in continuous reporting mode, type *.
- ■ If the unit is in polled mode, type *Q (where Q is the unit node letter).

The MetPak unit stops reporting sensor measurements and reporting (if in continuous mode) and responds with the following message:

SETUP MODE

The unit is now ready to receive configuration commands.

Returning to measurement mode

Type **Q** and press **Enter**. (exit from SETUP mode and return to measurement mode). The MetPak unit returns to measurement mode and begins reporting data (if set up for continuous mode).

Polling for Data

The MetPak unit must be set for Message Mode Poll using MetSet software (Comms Page).

A line of data will be output upon receipt of a ? followed by the Node ID (default Q).

It is recommended not to use letters A to F as these characters can appear in the checksum in the data string.

Notes:-

In Polled mode the unit MUST be allowed 9.5 seconds after switch on to be operational before the ? and Node letter are used to enable polling or it will be missed.

When in polled mode, when data is requested allow 570 milli-seconds for the unit to respond with a line of data.

If the MetPak detects a pressure/temperature/humidity sensor fault then allow 4 seconds for an error data output.

Polled mode can only be used for point to point communications; it is not possible to network units on to a common bus (except in SDI-12 mode).

Configuring commands for MetPak

Table 10   MetPak configuration commands

Command	Parameters	Description and examples
*	*	Used to place the unit into a SETUP mode so that User Commands may be sent to change unit settings.
*A-Z	*A | Z	If the unit is in Polled mode this command is used to place the unit into a SETUP mode so that User Commands may be sent to change unit settings. Where Q is the default node letter but may be set between A to Z. It is however recommended not to use letters A to F as these characters can appear in the checksum in the data string.
?A-?Z	?A to ?Z	?A - ?Z Retrieves a line of data from a MetPak set for Polled mode with a Node identifier set to A to Z. **Note. The unit MUST be allowed 9.5 seconds from switch on to be operational before the ? is used to enable polling, or it will be missed. When polled, allow 570mS for the unit to respond with a line of data. If the MetPak Unit detects a pressure/temperature/humidity sensor fault then allow 4 seconds for an error data output.**

Command	Parameters	Description and examples
ALIGN	0 | 359	Align, sets and reports the degree offset applied to wind direction data read from the MetPak. ALIGN <no parameter> returns the current value ALIGN 0 Sets North Alignment to 0°.
ASCTERM	 CR CRLF	Sets ASCII output string terminator. ASCTERM <no parameter> returns the current value ASCTERM CR - ASCII output string terminator is <CR>. ASCTERM CRLF terminator set to <CR><LF>.
BAUD	4800 9600 19200 38400 57600	Sets the serial interface baud rate. Selection must be confirmed with a letter B. Parity selection and duplex operation is optional BAUD <no parameter> returns the current value Example: to change 19200 baud to 4800 Baud: Type BAUD 4800 and press Enter. Change the terminal baud rate to 4800. Type B and press Enter. Completes the 4800-baud selection.
COMMS	RS232 RS422 RS485P2W SDI12	Sets the serial interface communication protocol. COMMS <no parameter> returns the current value. To change to RS422 operation: Type COMMS RS422 and press Enter. (the Comms setting will remain unchanged allowing further settings to be changed and data viewed until the system is powered down and restarted). **NOTE: The hardware connections will need to be changed to match the new Comms setting.**
ECHO	OFF ON	Character echo can be enabled or disabled. If enabled, received characters are only echoed while in interactive mode. ECHO <no parameter> returns the current value.
EXIT		Used to change the unit from SETUP mode to Measurement mode (alternatively type Q or QUIT)
HELP		Lists commands that are currently available.
MSGMODE	 CONT POLL	Sets the message-reporting mode. MSGMODE <no parameter> returns the current value. MSGMODE CONT - messages reported continuously. MSGMODE POLL - messages only reported when requested by the user (polled mode - see "?" command).
NODE	A | B |C to | Z	Sets the unit Node address for unit recognition or Polling. NODE <no parameter> returns the current value. NODE A sets unit Node to A etc.
NODIR	NODIR X.XX	Sets a minimum velocity (in 0.01m/s steps). If the velocity is equal or less than this value then wind direction information is not displayed. This only affects polar output formats and the maximum value that can be set is 5.00. NODIR <no parameter> returns the current value (default 0.00). NODIR 0.50 sets the unit to not report wind direction at or below 0.50m/s.
OUTFREQ	1/4HZ 1/2HZ 1HZ	Sets the unit data output rate in continuous mode. OUTFREQ<no parameter> returns the current value. OUTFREQ 1/4HZ -sets the unit to output 1 reading every 4 seconds.
PUPMSG	 STATUS | ON | OFF	Unit powers up in the state as define by parameter. PUPMSG (power up message) <no parameter> returns the current value, e.g. *STATUS, REPORT, UNITS.* PUPMSG STATUS - displays a firmware issue status message on power up e.g. *METPAK 2436 V2.01 STARTUP OK* PUPMSG STATUS OFF or ON– unit does not display (OFF) or does display (ON) a firmware issue status message on power up.

MetPak User Manual
© Gill Instruments Ltd

Command	Parameters	Description and examples
PUPMSG cont	REPORT | ON | OFF	PUPMSG REPORT - displays a header showing currently reported parameters e.g. *NODE,DIR,SPEED,PRESS,RH,TEMP,DEWPOINT,VOLT,STATUS,CHECK* PUPMSSG REPORT OFF or ON-unit does not display (OFF) or does display (ON) a header showing currently reported parameters.
	UNITS | ON | OFF	PUPMSG UNITS -displays a header showing the units of each field in the data output report. e.g. *-,DEG,MS,HPA,%,C,C,V,-,-* PUPMSG UNITS OFF or ON - does not display (OFF) or does display (ON) a header showing the units of each field in the data output report. **NOTE.** There is a power up message in polled mode unless turned off. Power up message is displayed when the unit is being powered up excepting if it has been deactivated. **When the System is powered up allow for 9.5 seconds before the 1st line of Sensor data is output.**
Q or QUIT		Used to change the unit from SETUP to Measurement mode (see also EXIT)
REPORT		Defines a reporting string. REPORT <no parameter> returns the current value, e.g. *NODE,DIR,SPEED,PRESS,RH,TEMP,DEWPOINT,VOLT,STATUS,CHECK*
	FULL	REPORT FULL - all instrument readings are output in the following default order: ˥ Q,225,000.02,1023.4,041.8,+023.5,+009.8,+04.9,00,50 (Node, Direction, Wind Speed, Pressure, Humidity, Temperature, Dewpoint, Volts, Status, Checksum).
	NODE	REPORT NODE – reports the unit Node letter (default Q)
	DIR	REPORT DIR reports Polar Direction and Checksum only.
	SPEED	REPORT SPEED reports Polar Speed and Checksum only.
	U-AXIS or V-AXIS	REPORT U-AXIS or REPORT V-AXIS reports U Axis Wind Speed or V Axis Wind Speed and Checksum only.
	PRESS TEMP RH DEWPOINT VOLT STATUS NMEA.	REPORT PRESS -reports Pressure and Checksum only. REPORT TEMP - reports Temperature and Checksum only. REPORT RH - reports Relative Humidity and Checksum only. REPORT DEWPOINT reports Dewpoint and Checksum only. REPORT VOLT - reports Supply Voltage and Checksum only. REPORT STATUS - reports MetPak Unit status codes and Checksum only. REPORT NMEA – reports Wind (WIMWV data), Temperature, Relative Humidity and Barometric pressure (WIXDR data) in NMEA 0183 format. The MetPak Unit data string can be set up in any order with the required sensor outputs. For instance, if it is required to output data in the order Pressure, Polar Wind, Temperature, Humidity, Status. Type REPORT PRESS POLAR TEMP RH STATUS and press Enter. Gives ˥ *1023.4,319,000.05,+023.5,038.3,00,1D* **NOTE.** A Hex Checksum figure will always be reported.
SERIAL		Used to report the MetPak serial number. e.g. 00000008
SWVER		Returns the MetPak Unit Firmware version e.g. SWVER = 2436 V2.01
UNITS		Valid values are dependent on sensor type. A UNITS command with no parameter shall display a line of test showing the selected units of the current output string. Changes the output units for an individual sensor. UNITS <no parameter> - returns the current value, e.g. e.g. UNITS = -,DEG,MS,HPA,%,C,C,V,-,-
	WIND PRESS TEMP DEWPOINT RH	UNITS WIND MS - selects metres/second for the wind reading. UNITS PRESS HPA - Selects hectoPascals for the pressure reading. UNITS TEMP C - selects centigrade for temperature reading. UNITS DEWPOINT C - selects centigrade for dewpoint reading. UNITS RH % - selects percentage for relative humidity See Table 11 for a list of unit abbreviations.

Table 11   Abbreviations used in UNIT configuration command

UNITS measurement parameter	Unit	Abbreviation
WIND	Metres per Second	MS
	Nautical Miles per Hour	KNOTS
	Miles per Hour	MPH
	Kilometres per Hour	KPH
	Feet per Minute	FPM
TEMP and **DEWPOINT**	Celsius	C
	Fahrenheight	F
	Kelvin	K
PRESS	HectoPascals	HPA
	MilliBars	MB
	Inches of Mercury	INHG
	Millimetres of Mercury	MMHG
RH	Relative Humidity	%

3.3.4   Configuring MetPak for NMEA Output.

To configure a MetPak for RS422, 4800 Baud and NMEA 0183 output:

1.   Place the MetPak into SETUP MODE as detailed on page 35.

2.   Type **REPORT NMEA** and press Enter.

3.   Type **BAUD 4800** and press Enter.

4.   Type **COMMS RS422** and press Enter. Until the unit is restarted, the COMMS setting will remain unchanged.

5.   Shut down the MetPak unit.

6.   Change the hardware connections for RS422.

7.   Restart the MetPak unit.

`Example NMEA data string produced at the output rate (default every 1Hz):-

$WIMWV,008,R,000.09,N,A*0C
$WIXDR,C,+023.0,C,TEMP,P,1.0199,B,PRESS,H,039.6,P,RH*33

The NMEA data string comprises of: -

$WIMWV,008,R,000.09,N,A*0C,<CR>,<LF>
Where: -

$WIMWV	Wind Instrument Mean Wind direction and Velocity
008	Wind Direction
R	Wind Measurement **R**elative to the North Marker
000.09	Wind Speed
N	Knots (NMEA output fixed to Knots measurement only)
A	Acceptable measurement (V is a void fail measurement)
OC	Hex CheckSum

And
$WIXDR,C,+023.0,C,TEMP,P,1.0199,B,PRESS,H,039.6,P,RH*33,<CR><LF>

Where: -

$WIXDR	Wind Instrument Cross track error Dead Reckoning
C	Type of Sensor (Temperature)
+023.0	Temperature Reading
C	Temperature Reading in Degrees Centigrade
TEMP	Name of Temperature Sensor
P	Type of Sensor (Pressure)
1.0199	Pressure Reading in Bars.
B	Pressure Units of Measure (Bars)
PRESS	Name of Pressure Sensor
H	Type of Sensor (Humidity)
039.6	Humidity Reading in Percent
P	Humidity Units of Measure (Percent)
RH	Name of Relative Humidity Sensor
33	Hex CheckSum

<CR> is a Carriage return character (ASCII hex value d)
<LF> is a Line Feed Character (ASCII hex value a)
Checksum, the 2 digit Hex Checksum sum figure is calculated from the Exclusive OR of the bytes between (and not including) the $ and * characters.

3.3.5   Configuring MetPak for SDI-12

To configure a MetPak unit for SDI-12:

1. Connect a MetPak to a PC as described in Para 2.2.4.
2. Open MetSet as described on Para 3.3.1.
3. Click on the Edit Comms page and select SDI-12 from the drop down menu.
4. Click on Save Settings to Device on the Online Mode Menu.
5. Power down the MetPak unit.
6. Change the hardware connections for SDI-12.
7. Power up the MetPak unit.

3.3.6   SDI-12 Commands

SDI-12 Command Summary

- ?!   Unit Address (default is 0).
- aAb!   Change unit address (a = 0)
- aM!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Humidity (%).
- aM1!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Dewpoint (degrees C).
- aM2!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec) and a 2 digit Status Code.
- aM3!   Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Dewpoint (Degrees C).
- aM4!   Pressure (Hecto Pascals/millibars).
- aM5! to aM8!   For future use.
- aM9!   Power Supply Voltage (Volts).
- aMC!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Humidity (%) and CRC.
- aMC1!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (degrees C) and CRC.
- aMC2!   Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), a 2 digit Status Code and CRC.
- aMC3!   Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (Degrees C) and CRC.
- aMC4!   Pressure (Hecto Pascals/millibars) and CRC.
- aMC5! to aMC8!   For future use.
- aMC9!   Power Supply Voltage (Volts) and CRC.
- aD0!   Request a line of the above data.

SDI-12 Command Details

Command	Description	Response	Example
?!	Unit Address	a<CR><LF>	0<CR><LF>
aAb!	Change the unit address a = 0, the default. b = the new address.	b<CR><LF>	1<CR><LF>
aM!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees-C), Pressure (Hecto Pascals/millibars) and Humidity (%).	atttn<CR><LF> a is unit identifier. ttt is time in seconds. n is number of data values. Measurement command to retrieve a reading of the maximum time the MetPak will take to complete a measurement, have data ready and the number of data values.	00055<CR><LF> 0 is unit identifier. 005 is 5 sec. measurement. 5 is the number of data readings (Direction, Speed, Temperature, Pressure and Humidity).
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><humidity><CR><LF>	0+220+000.01+021.6+1013.0+041.9<CR><LF>
aM1!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Dewpoint (degrees C).	atttn<CR><LF>	00055<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><dewpoint><CR><LF	0+357+000.03+021.6+1013.0+008.0<CR><LF>
aM2!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec) and a 2 digit Status Code.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><status><CR><LF>	0+029+000.01+00<CR><LF>
aM3!	Temperature (degrees C), Humidity (%), Dewpoint (Degrees C).	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<temp><humidity><dewpoint><CR><LF	0+21.6+041.0+0007.8<CR><LF>
aM4!	Pressure (Hecto Pascals/millibars).	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<pressure><CR><LF>	0+1013.0<CR><LF>
aM9!	Power Voltage (Volts)	atttn<CR><LF>	00011<CR><LF>
0D0!	Retrieve a line of the above data.	a<voltage><CR><LF>	0+12.5<CR><LF>

Command	Description	Response	Example
aMC!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees-C), Pressure (Hecto Pascals/millibars) Humidity (%) and CRC.	atttn<CR><LF> a is unit identifier. ttt is time in seconds. n is number of data values. Measurement command to retrieve a reading of the maximum time the MetPak will take to complete a measurement, have data ready and the number of data values.	00056<CR><LF> 0 is unit identifier. 005 is 5 sec. measurement. 6 is the number of data readings (Direction, Speed, Temperature, Pressure, Humidity and CRC).
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><humidity><CRC><CR><LF>	0+139+000.06+022.2+1017.8 +042.7+00BIQ<CR><LF>
aMC1!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (degrees C) and CRC.	atttn<CR><LF>	00056<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><dewpoint><CRC><CR><LF	0+140+000.06+022.2+1017.7 +009.0+00D{Z<CR><LF>
aMC2!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), a 2 digit Status Code and CRC.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><status><CRC><CR><LF>	0+098+000.04+00@sh<CR><LF>
aMC3!	Temperature (degrees C), Humidity (%), Dewpoint (Degrees C) and CRC.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<temp><humidity><dewpoint><CRC><CR><LF	0+022.2+042.7+009.0LV{<CR><LF>
aMC4!	Pressure (Hecto Pascals/millibars) and CRC.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<pressure><CRC><CR><LF>	0+1017.8GM <CR><LF>
aMC9!	Power Voltage (Volts) and CRC	atttn<CR><LF>	00011<CR><LF>
0D0!	Retrieve a line of the above data.	a<voltage><CRC><CR><LF>	0+12.2K@R<CR><LF>

3.3.7   Safe Mode

Summary

The MetPak Safe Mode provides a means of recovering communication with the MetPak whatever configuration setting may have been made. For instance if the unit has been set for SDI-12 operation Safe Mode can be used to change the communication option back to RS232, RS422 or RS485.

Connection

Connect the MetPak for RS232 communication as detailed on Page 10, Figure 6.

Method

Note at this stage the MetPak supply to be switched off.

Open a Terminal program e.g. Gill WIND Software (http://www.gill.co.uk/main/software.html) or Windows HyperTerminal

Note if using Gill Wind Software that the Tools features are not applicable.

Open Gill Wind Software.

Serial Port: Set the drop down menu to the required COM Port Connection.

Click on the **OK** button.

**Baudrate**:   Set the drop down menu to **4800** Bauds.

A blank Wind Terminal screen will be opened.

Hold down the * key on the keypad.

**With the * key still held down, apply power to the MetPak.**

This will result in placing the unit into SAFE MODE.

Press Enter to start a new line (Ignore illegal command line).
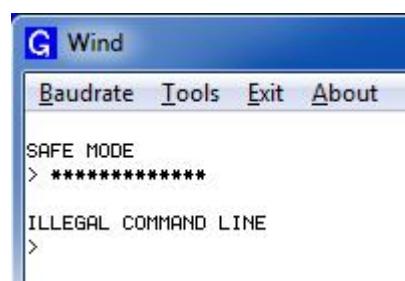
To now change communication from SDI-12 to RS232.

Type COMMS RS232 and press Enter.
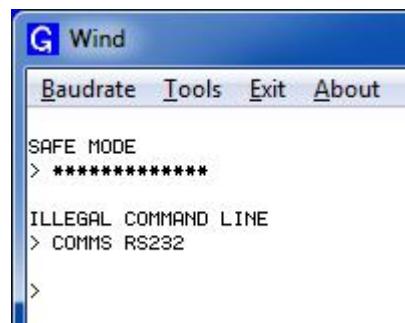
Type Q and press Enter to exit Safe Mode.

Data will now scroll on screen.

Note however for RS232 changes to take place the unit must be powered down and back up again.

Close the 4800 baud rate Wind or HyperTerminal Program.

Power down the MetPak and re-apply power.

Open a new Wind or HyperTerminal program at **19200-baud** rate.

RS232 data will now scroll on screen at the MetPak default 19200-baud rate**.**
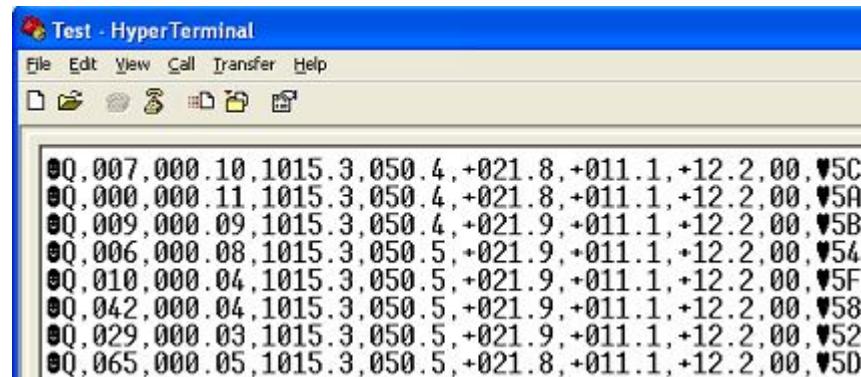
The * command can now be used if required to place the unit into SETUP mode and make any other changes to the MetPak configuration.

4.1   Fault-Finding

Common Problems

Table 12   Common problems and their solution

Symptom	Solution
No output	Check DC power to MetPak, cable and connections. Check communications settings of the MetPak and host system match, including correct Com port. Check that the unit is in Continuous mode. Check that in-line communication devices are wired correctly. NOTE: It is usual for the MetPak TX + to be connected to converter device RX +. If appropriate use Safe Mode to attempt to obtain communication with the MetPak.
Corrupted output	Check that the communication settings of the MetPak and host system match. Try a slower baud rate. Check cable lengths and type of cable.
One way communication	Check that the wiring is in accordance with the manual.
Unexpected Temperature /Dewpoint readings	Check that the Temperature and Dewpoint units of measure (C, F, K) settings are correct on power up.
Unexpected Wind readings	Check that the Wind Sensor units of measure (m/s, knots, kph, ft/min, mph) settings are correct on power up.
Unexpected Temperature/Dewpoint and Humidity readings	Check that the HygroClip filter is clean.
Unexpected Barometer Readings	Check that the Hub Box Gortex filter is not blocked.
Status code not 00 or A	See Table 13

Table 13   Status codes as output with the MetPak data string

Code	Status	Condition
00	OK	No fault conditions detected in measurement period.
A	Acceptable data (NMEA Mode)	No fault conditions detected in measurement period.
01	Wind Sensor Axis 1 failed	U Axis blocked or faulty.
02	Wind Sensor Axis 2 failed	V Axis blocked or faulty.
04	Wind Sensor Axis 1 and 2 failed	U and V axis blocked or faulty
08	Wind Sensor NVM error	Non Volatile Memory checksum failed, data could be uncalibrated.
09	Wind Sensor ROM error	Read Only Memory checksum failed, data could be uncalibrated.
0B	Wind Sensor reading failed.	Wind Sensor faulty.
10	HygroClip error	HygroClip faulty.
20	Dewpoint error	Hub Pec faulty.
40	Humidity error	HygroClip faulty.
66	Wind Sensor Power	Check Wind Sensor is powered
67	Wind Sensor RS232 Communications	Check RS232 communication wiring
80	Pressure Sensor Warning	Pressure sensor reading not available/unit faulty.
XX	More than one fault	Fault condition that can be the sum of 0B,10, 20 or 40. e.g 1B would mean that both the Wind Sensor (0B) and HygroClip (10) were faulty.
V	Void Data, Wind Sensor reading failed. (NMEA Mode)	Wind Sensor faulty.

4.2 Servicing

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

1.   Check all cables and connectors for continuity, bad contact, corrosion etc.

2.   Carry out a bench test as described in the next section.

Contact your supplier if a fault persists.

4.3 Bench Tests

Carry out a bench test as follows:

1.   Connect the MetPak unit to the host PC and power supply, using a known working test cable.

2.   Check that the unit is correctly configured by going into Set Up mode (see page 35).

3.   Check for normal output data, and that the Status Code is OK – 00 or A.

4.   If the status code is other than 00 or A, refer to Table 13 for a list of 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.   Check for output changes in temperature and relative humidity sensor (the fan will also cause small changes in these properties.

5. Maintenance

Wind Sensor General (WindSonic)

If there is any build-up of deposits 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.

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.

UV Shield (RM Young Model 41003)

If there is any build-up of deposits 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.

HygroClip for Temperature, Humidity and Dewpoint (Rotronic Model HC2-S3-GI)

For extreme environments such as maritime installations, chemical plants or other areas of high pollution or contamination, Gill highly recommend replacement of the temperature and humidity probe filter every 6 months to ensure proper performance.
Corroded, discoloured or clogged dust filters should be replaced.

If the filter is not replaced it is very likely you will see elevated humidity levels with time and if this is allowed to develop for a longer period of time it can lead to permanent damage on the electronics of the temperature probe due to the very high moisture content and corrosive effect of the pollutant or salt.

Rotronic Temperature and Humidity filter replacement:

The Rotronics polycarbonate dust filter screw-on cap is available from:-
Gill Instruments   Part Number   1723-PK-025 (2 filters).
Rotronic   Part Number   NSP-PCW-PE (1 filter).

If you need to replace the dust filter cap, carefully unscrew it and withdraw carefully avoiding contact with the Temperature and Humidity circuit board. When re-fitting the filter cap, ensure the circuit board connections are not bent.

Consideration should be given to an annual calibration check of the HygroClip sensor by the manufacturer.

If you are replacing the whole cartridge, unscrew the metal ferrule and return the probe to Rotronic for calibration. Refer to the Rotronic Website for more details:

http://www.rotronic-humidity.com/content/meta/kontakt.php

Filter

Ferrule

NOTE. If you return the sensor to a HygroClip supplier for exchange, please request that the return unit has the dewpoint feature enabled.

Barometer (on Hub PCB)

The Barometer device is maintenance-free, however, if required observe the following with regard to the central Hub box screw cap Gore-Tex® filter.

Pressure Sensor Filter Replacement:

There is a small venting filter for the pressure sensor of the MetPak located on the 'Hub' box lid which ensures proper conditions are present in the MetPak 'hub' box for pressure measurements without allowing any moisture or other damaging pollutants into the box. This filter is made from Gore-Tex® material and is designed to last a long time without replacement, however, Gill do recommend that this filter is replaced every 24 months to ensure proper operation of the pressure sensor and to keep the electronics inside the 'hub' box dry.

If you do not replace the filter every 24 months you may start to see elevated or erroneous readings of the pressure sensor with time and this behaviour can be corrected by replacement of the Gore-Tex® filter unit.

The Gore-Tex® filter kit is available from:-

Gill Instruments   Part Number   1723-PK-024.

To replace the filter, unscrew the 4 screws retaining the hub box lid. Remove the existing Gore-Tex filter and M12 Nut. Fit and secure the new filter with the nut provided. Re-fit the 4 lid screws.

Should you be uncertain as to how often you should be replacing the filters for your application or if you wish to discuss this in more detail please contact Gill support and we will be able to provide a recommendation for you.

Spare Parts

1723-10-051	RS232 to USB 1.8M configuration cable (both units).
1723-PK-024	Pressure Sensor Filter Spares kit.
1723-PK-025	Hygroclip Filter Replacement Kit (2 Filters).

Returning the MetPak

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. An RMA number should be obtained from Gill Instruments first if returning directly to Gill Instruments.

6.1   Specification

Wind Measurement	
Parameters	Polar Wind Speed & Direction or U and V Vectors
Units of Measurement	m/s, knots, mph, kph, ft/min

Wind Speed	
Range	0-60m/s (0-134mph)
Accuracy	$\pm$ 2% @12m/s
Resolution	0.01m/s (0.02mph)
Threshold	0.01m/s (0.02mph)

Wind Direction	
Range	0-359 Degrees – No dead band
Accuracy	$\pm$ 3°@12m/s
Resolution	1°

Air Temperature	
Type	Pt100 1/3 Class B
Range	-35°C to + 70°C
Accuracy	$\pm$0.1°C
Resolution	0.1°C (0.1°F)
Units of Measure	°C or °F

Relative Humidity	
Range	0-100%
Accuracy	$\pm$0.8%@23°C
Resolution	0.1%
Units of Measure	% RH

Dew Point	
Resolution	0.1°C (0.1°F)
Accuracy	$\pm$0.15°C (23°C ambient temp @20°C dew point)
Units of Measure	°C or °F

Barometric Pressure	
Range	600 to 1100hPa
Accuracy	±0.5hPa
Resolution	0.1hPa
Units of Measure	hPa, mbar, mmHg, lnHg
Compensated for Temperature dependency –20°C to +70°C	

Outputs	
Digital Outputs	RS232, RS422, *RS485 (*2 wire point to point) or SDI-12
Baud Rates	1200 (SDI-12), 4800-57600 (ASCII RS232, RS422, *RS485)
Protocols	ASCII, SDI-12 V1.3 or NMEA 0183
Data Output	0.25, 0.5, 1 Hz or Polled Mode
MetPak Status	Status codes provided within the data message string

Power Supply	
Input voltage (RS232, RS422, RS485)	4.5v to 30v dc
Current	16mA at 12v (default setting)
Input voltage (SDI-12)	9.6v to 16v dc (12v nominal)
Current	6.5mA

Environmental	
Protection Class	IP65
EMC	EN 61326
Operating Temperature	-35°C to +70°C
Storage Temperature	-40°C to +80°C
Humidity	0-100%

Mechanical	
External Construction	Bracket, Anodised Aluminium (for WindSensor and Hygroclip mountings).
Fittings	Stainless steel 316 bracket fittings supplied for clamping unit to a vertical pipe of diameter 30mm to 58mm.
Overall Dimensions	350mm x 287mm x 142mm (excluding bracket clamp)
Weight	2.1kg (including bracket)

Software	
MetView Display	Free Software providing the means of displaying data and logging data
MetSet Configuration	Free Software providing the means of configuration of the MetPak

6.2   Hub PCB Connections

The following tables summarise the connections for:

- HygroClip (Factory connections).
- WindSonic Anemometer (Factory connections MetPak)
- RS232/RS422/RS485 and SDI-12 communications (User Connections)

Connection details are also found on the hub box lid.

Table 14   **HygroClip connections (6-way connector J1)**

Connector J1	Wire Colour	Signal Name
1	-	No Connection
2	Blue	RXD from HygroClip UART
3	Red	TXD to HygroClip UART
4	Yellow	Analogue 0V (Not Used)
5	Grey	Supply/Signal 0V
6	Green	Supply +ve (+3.3V DC)

Table 15   **MetPak WindSonic anemometer connections (8-way connector J4)**

Connector J4	Wire Colour	Signal Name
1	-	No Connection
2	-	No Connection
3	Blue	RS232 TX+ Anemometer Output to Hub
4	White	RS232 RX+ Hub Output to Anemometer
5	Green	Signal 0v
6	Yellow	Supply 0v
7	-	No Connection
8	Red	Supply +ve (4.5v to 30V dc)

Table 16   **PC communications (8-way connector, J5)**

Connector J5	Signal Name
1	SDI-12 TX/RX
2	Signal 0V
3	**RS232 TX-**, (or RS422/485 TX-) HUB to user
4	**RS232 RX-**, (or RS422/485 RX-) User to HUB
5	RS422/485 RX+, User to HUB
6	RS422/RS485 TX+, HUB to User
7	**Supply 0v**
8	**Supply +ve (4.5v to 30v dc)**

> NOTE. J2, a 12-way expansion board connector and J3, a 5-way connector are not used in the current version

6.3 Electrical Conformity Certificate

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

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

MetPak Weather Station

Manufactured by: Gill Instruments Ltd

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 harmonised standards:

Emissions   EN61326
Immunity   EN61326 (excludes 150kHz to 250kHz)

Signed by: *ACR Stickland*

A.C.R. Stickland – Director

Date of issue: 20/12/2012

Place of issue: Gill Instruments Ltd
Saltmarsh Park, 67 Gosport Street,
Lymington, SO41 9EG, UK

Gill Instruments Limited
Saltmarsh Park,
67 Gosport Street,
Lymington,
Hampshire.
SO41 9EG
Tel: +44 (0) 1590 613500
Fax: +44 (0) 1590 613501
E-mail: anem@gill.co.uk
Website: www.gill.co.uk

nqa.
ISO 9001
Registered