

STARLOG

Wind Monitor Instrument

Model 6533



User Manual Supplement
6246

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1. INTRODUCTION

The Wind Monitor Instrument (Model 6533A) is a high performance wind speed and direction sensor designed specifically for air quality measurements. It is manufactured by RM Young Company. With modifications by UNIDATA, it may be used with any of the data loggers in the STARLOG range.



This supplement describes the installation and operation of the Wind Monitor.

1.1. OPERATING PRINCIPLES

The Wind Monitor combines simplicity and lightweight corrosion resistant construction with low threshold, fast response and excellent fidelity.

The wind speed sensor is a four blade helicoid propeller. Propeller rotation produces an AC sine wave voltage signal with frequency directly proportional to wind speed. Slip rings and brushes are not used. A micro-power interface circuit, housed in a convenient junction box on the mounting post, converts the AC sine wave to a 5V digital signal, suitable for connection to a Data Logger.

The wind direction sensor is a lightweight vane with sufficiently high damping ratio and low aspect ratio to assure excellent fidelity in rapidly fluctuating winds.

Vane position is sensed by a precision conductive plastic potentiometer. With a known excitation voltage applied to the potentiometer, the output signal is directly proportional to the azimuth angle.

[■] Transducer 1			
Description:	Wind Speed		
Output:	Count (Hz)	Min: 0	Max: 255
Scale:	Scale $ax + b$	a: 0.098	b: 0
Formula:	none		
Channel:	c1		
Title:	Speed		
Units:	m/s		
Using:	##.#		OK Cancel

Wind Speed Transducer

[■] Transducer 2			
Description:	Wind Direction		
Output:	Analog Voltage (Min: 0	Max: 2500
Scale:	None	a: 0	b: 360
Formula:	none		
Channel:	a ¹		
Title:	Dirn		
Units:	Deg		
Using:	###		OK Cancel

Wind Direction Transducer

2. USING THE WIND MONITOR IN A STARLOG SCHEME

The Model 6533A Wind Monitor can be connected to a STARLOGGER, Portable or MACRO Data Logger to provide valuable wind speed and wind direction data in a STARLOG Data Logging System.

To use the Wind Monitor in a Data Logging System, you first define what and when to log using STARLOG Software. Data sensed by the Instrument is then logged according to the *Data Logging Scheme* you define.

STARLOG Software runs on an IBM-compatible computer and is Windows-based. Using drop-down menus and pop-up menus, you can easily define a Scheme, then load it into a Logger, and sometime later, unload the data to your computer, display it (as a plot or a list) on the screen, or print it out. You can also have a look at data as it is being logged by using Test Mode.

This section explains how to create and use a STARLOG wind speed and wind direction Scheme using Software Version 3.0. See the STARLOG Users Manual 6245 for more details. (For Version 2 usage notes see Appendix A.)

2.1. Choosing a Data Logger

You can use any Data Logger in the STARLOG range.

2.2. Adding an Instrument

To create a Scheme for monitoring wind speed and wind direction, open the **Scheme Editor** , then use the **Instruments** window to add the Wind Monitor.

6533A Wind Monitor Instrument

If the Wind Monitor doesn't appear in the Instrument list, you must add it using the **Instrument Editor**. Transducer details are shown on the next page.

The Wind Monitor Instrument has two transducers : wind speed and wind direction.

2.3. Set Counter Channel Prescale to Equal Scan Rate

The wind speed output is connected to one of the counter channels. The prescale value of this counter channel should be set to equal the scan rate of the logger. The same scaling can then be used for all scan rates.

3. INSTALLATION

The Wind Monitor Instrument is made of UV stabilized plastic with stainless steel and anodized aluminium fittings. All bearings are stainless steel precision grade. Instruments purchased from UNIDATA have been modified to include a different printed circuit board (Model 6088) within the junction box. (The original PCB, which has been removed from the instrument, is included.)

3.1. Placement of the Instrument

It is usually wise to install the instrument away from or above anything which disturbs airflow. The R.M. Young manual states: "As a general rule, the air flow around a structure is disturbed to twice the height of the structure upwind, six times the height downwind, and up to twice the height of the structure above ground."

3.2. Mounting

The Instrument mounts on a standard one inch (1") pipe using a stainless steel band clamp. On the mounting post assembly, there is a junction box which contains electronic circuitry to convert the Instrument's output so that the logger can read it. Wires from the logger enter this box through a cable gland.

A second ring with band clamp, called an orientation ring, is provided so the instrument can be removed for maintenance and re-installed without loss of wind direction reference.

3.3. Grounding

It is essential to properly ground the instrument. This can be achieved by connecting the mounting post to a good earth ground. Either use a metal mounting pipe grounded in earth, or, if you use a mast or tower set in concrete, use grounding rods.

Alternatively, within the junction box, the terminal labelled Earth can be used to connect a good earth ground.

3.4. Connections

There are seven screw terminal blocks on a small printed circuit board (PCB 6088A) inside a junction box on the mounting assembly. Each terminal is labelled. To connect the instrument to a Data Logger, refer to the connections table below. You may use any analog channel for the azimuth signal, and any counter channel for the wind speed signal. However, the connections shown below are for a1 and c1 respectively.

Terminal	Usage	STARLOGGER & PDL		MACRO Data Logger	
		Pin	Term	Pin	Term
earth	Connect to a good earth ground close to the instrument.				
micropower	constant voltage supply	PDL-16 S-18	PDL-1 S-43	30*	7*
digital ground	logger common (ground)	23	2	28	42
direction signal	analogue input channel (a1) or (A1) of Macro	2	36	2	36
UPS/Power	5V output power from logger	13	17	18	49
wind speed signal	counter input channel (c1) or (C1) of Macro	12	7	29	3

* The Wind Monitor requires a constant voltage supply obtained through any counter channel on the MACRO. In this example, we used Counter 3.

3.5. Wind Direction Output

The azimuth signal output varies between 0 and 2.5V, depending on the wind direction, ie, 0 is 0° and 5 is 360°. There is, however, a dead band of approx. 5° between 355 and 0.

3.6. Using an Instrument Purchased Elsewhere

For instruments not purchased through Unidata, the printed circuit board must be changed for one manufactured by Unidata. Otherwise, the wind speed signal is not of a suitable voltage level. This circuit board is the same size and the wire connections are exactly the same. Therefore, changing one for the other is straight forward. The terminal blocks have similar functions except that the block labelled WS REF on the original PCB is now labelled BATTERY. This is now used to provide a constant supply for the electronics on the new PCB.

4. SPECIFICATIONS

Wind Speed

Range: 0 to 60 metres/sec (130 mph)
Gust survival: 100 metres/sec (220 mph)
Accuracy: speed ± 2 m/s (0.4 mph)
Threshold: propeller 1.0 m/s (2.2 mph)
Output signal: 8 or 16 bit counter channel
3 pulses per revolution
0.098 m/s per Hz

Wind Direction

Range: 360° mechanical, 355° electrical (5° open)
Accuracy: $\pm 3^\circ$
Threshold: vane - 0.5 m/s (1.0 mph) at 10° displacement,
0.7 m/s (1.6 mph) at 5° displacement
Output signal: 1 analog channel
0 to 2.50V calibrated
0 to 359°

Sensor Interface

Operating Temp.: -20 to 60°C
Output signals: 0-2.50V dc full scale (direction)
5.00V square wave
Power: 5V dc (4mA from logger)

Cable (optional)

Type: 8 core (Model 6600F)
Length: 30m (max.)

Line Driver (optional)

Operating temp: -20 to 60°C
Output signals: 4-20mA full scale
Power: 12-30 V dc

Power: 5V dc from logger
Mounting: standard 1 inch pipe
Size: 38cm H x 65cm L, propeller 20cm
Weight: 0.7 kg (1.5 lbs)

Appendix A

Using STARLOG Version 2 Software

The following information is for those using STARLOG Version 2 software to create and maintain a wind monitoring scheme with the Model 6533A Wind Monitor. See the Users Manual 6203 for complete details on using STARLOG Version 2 software.

To create a Scheme for monitoring wind speed and wind direction, select the **Create a Scheme** option from the Main Menu. During the course of defining your scheme, use the **Add an Instrument** option to add the Wind Monitor.

In most cases with Version 2 software, the Wind Monitor won't appear in the Instrument list when you are creating a Scheme. Therefore, you must add it using the **Maintain Instruments** option in the Main Menu.

The instrument's Model Number and Description are:

6533A Wind Monitor Instrument

This instrument has two transducers : wind speed and wind direction.

If connected to a Macro Logger, you will want to define them as shown below.

If using a STARLOGGER or PDL, then define the transducers as:

Edit a Transducer	
Transducer Description	Wind Speed
Input Channel	C1 counter 1 (16 bits)
Input Channel Range counts	0 to 65535
Transducer Range counts	0 to 65535
Transducer Scaling / Formula	0 GAIN 0.098
Title for Reports	Speed
Units of Result	m/s
Using String	##.#

Edit a Transducer	
Transducer Description	Wind Direction Result
Input Channel	h1 analog 1 (16 bit)
Input Channel Range mV	0 to 5000
Transducer Range mV	0 to 5000
Transducer Scaling / Formula	0 to 360
Title for Reports	Dirn
Units of Result	Deg
Using String	###

Wind Speed	c1	(8 bit)
Input Channel Range	0 to 255	
Transducer Range	0 to 255	
Transducer Scaling	0 gain 0.098	
Title	Speed	
Units	m/3	
Using String	##.#	

Wind Direction	a1	(8 bit)
Input Channel Range	0 to 2550	
Transducer Range	0 to 2550	
Transducer Scaling	0 to 360	
Title	Dirn	
Units	Deg	
Using String	###	

A.1. Set Counter Channel Prescale to Equal Scan Rate

The wind speed output is connected to one of the counter channels. The prescale value of this counter channel should be set to equal the scan rate of the logger. The same scaling can then be used for all scan rates.

A.2. Special Program Required for Average Wind Speed

Users of STARLOG Software Version 2.1 and below who want to log average wind direction or other factors available through the Extended Wind Package (Model 6504X) require a special log program. This program converts the single wind direction signal into two vectors, similar to UNIDATA's Model 6504-FS Wind Speed and Wind Direction Instrument.

Appendix B

Previous Version of Wind Monitor

Models sold prior to 1997 (with PCB6088A) output a 5V signal for wind direction.

The azimuth signal output varies between 0 and 5V, depending on the wind direction, i.e., 0 is 0° and 5 is 360°. There is however, a dead band of approximately 5° between 355 and 0.

If you use a Model 6004 STARLOGGER or Model 6003 Portable Data Logger with these earlier versions of Wind Monitor, you will need a 2:1 Voltage Divider (Model 6104A) which halves the 5V output signal to fit within the analog input channel range (0 to 2.5V).

If using a Model 7000 MACRO Data Logger, the voltage divider is not required. However, ensure that the Output channel is scaled 0 to 5000.

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