

INSTRUCTION MANUAL



05103, 05106, and 05305
R.M. Young Wind Monitors

Revision: 7/05

Warranty and Assistance

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05103, 05106, and 05305 R.M. Young Wind Monitors

1. Introduction

These notes provide information for interfacing Campbell Scientific's dataloggers to the R.M. Young 05103 Wind Monitor, 05106 Wind Monitor Marine, and 05305 Wind Monitor AQ. The 05305 Wind Monitor AQ is a high performance version of the Wind Monitor that is designed specifically for air quality measurements. Wiring is identical for all models. R.M. Young's instruction manual, included with the sensor, contains sensor specifications, operating principles, installation and alignment guide, and calibration information. Multiplier and offset values in the Campbell Scientific notes are based on calibration data obtained from the R.M. Young Wind Monitor manual.

2. Mounting Requirements

The Wind Monitor mounts to a vertical piece of 1" IPS schedule 40 (1.32" O.D.) pipe. (See Figure 2-1.) A band clamp at the base of the sensor is tightened to secure the sensor to the pipe.

Campbell Scientific supplies a 12" length of unthreaded pipe for mounting the wind monitor to Campbell Scientific's 019ALU Crossarm Sensor Mount (Figure 2-2).

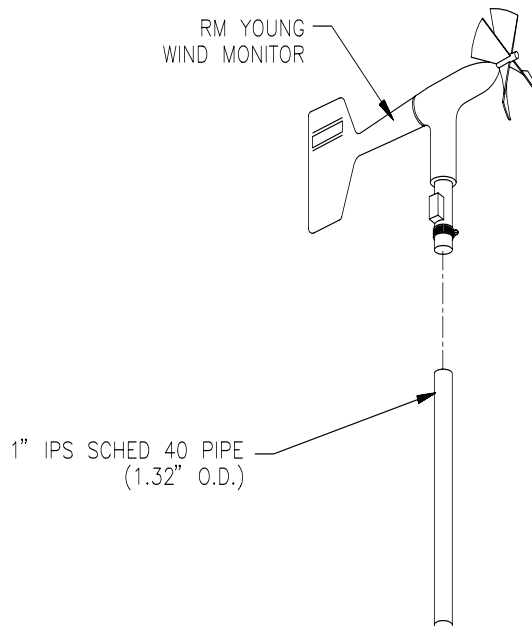


FIGURE 2-1. Wind Monitor Mounted to a Vertical Pipe

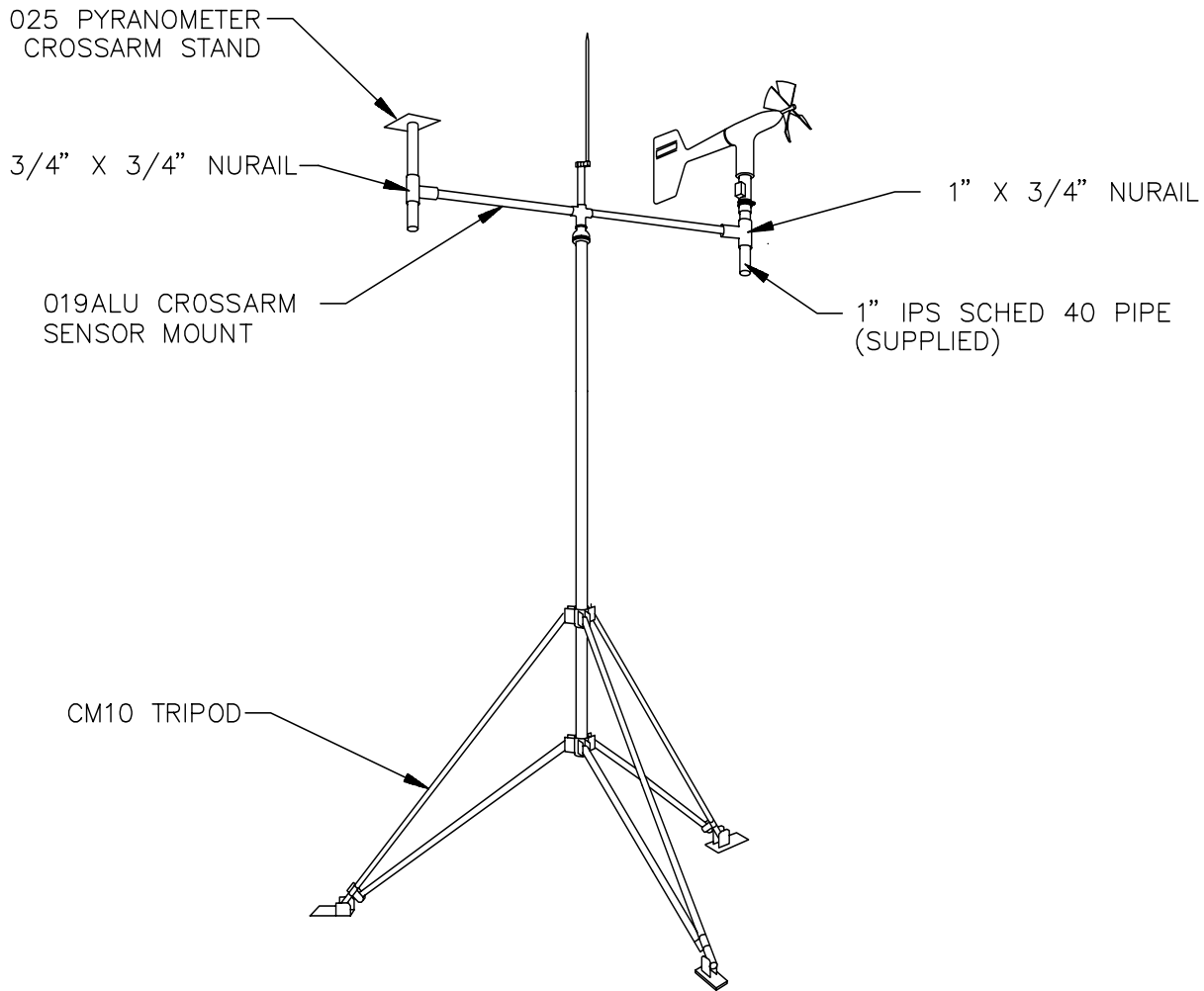


FIGURE 2-2. Wind Monitor Mounted to Campbell Scientific's 019 Crossarm Mount

3. Sensor to Datalogger Wiring

Wire the Wind Monitor leads to the datalogger (see Figure 3-1).

NOTE

The black outer jacket of the cable is Santoprene[®] rubber. This compound was chosen for its resistance to temperature extremes, moisture, and UV degradation. However, this jacket will support combustion in air. It is rated as slow burning when tested according to U.L. 94 H.B. and will pass FMVSS302. Local fire codes may preclude its use inside buildings.

Signal	CR7, 21X, CR23X, CR200, CR1000 CRBasic Dataloggers	CR10(X), CR510	Wind Monitor with Black Cable (P/N 9721)
WSPD (REF)	$\frac{\pm}{\pm}$ or G	G	Black
WDIR (REF)	$\frac{\pm}{\pm}$ or G	AG	White
WDIR (SIG+)	H or L (Analog Channel)	H or L (Analog Channel)	Green
WDIR (EX+)	Excitation	Excitation	Blue
WSPD (SIG+)	Pulse	Pulse	Red
Shield	$\frac{\pm}{\pm}$ or G	G	Clear

FIGURE 3-1. Wind Monitor Connections to Campbell Scientific Dataloggers

4. Programming

This section is for users who write their own datalogger programs. A datalogger program to measure this sensor can be created using Campbell Scientific's ShortCut Program Builder software. You do not need to read this section to use ShortCut.

4.1 Wind Speed

Wind speed is measured with the pulse count instruction. The wind vector instruction is used to calculate average wind speed and direction. With the pulse count instruction, specify a low level AC configuration, discarding counts from excessive intervals, and the result in Hz. With this configuration, the pulse count instruction divides the number of counts during the execution interval by the interval in seconds before applying the multiplier and offset.

The expression for wind speed (U) is:

$$U = MX + B$$

where

M = multiplier

X = number of pulses per second

B = offset

Table 4-1 lists the multipliers to obtain miles/hour or meters/second when the pulse count instruction is configured to provide its result in Hz. The helicoid propeller has a calibration that passes through zero; use an offset of zero (Gill, 1973; Baynton, 1976).

TABLE 4-1. Wind Speed Multiplier (With Configuration Code 21*)		
Model	Miles/Hour Output	Meters/Second Output
05103 or 05106	0.2192	0.0980
05305	0.2290	0.1024
*When configuration code 11 is used, the multiplier above is divided by the execution interval in seconds.		

NOTE

21Xs without OSX PROMS and CR7s without OS7 PROMS (dataloggers purchased prior to March 1989 and August 1991 respectively, and not updated) do not have the option of outputting frequency in hertz. Program Instruction 3 with configuration code 11 (pulses per execution interval). The multiplier from Table 4-1 is divided by the execution interval in seconds to obtain the multiplier used with code 11. For example, with a 10-second execution interval, the multiplier for meters/second with the 05103 would be $0.0980/10 = 0.0098$. The offset remains zero.

4.2 Wind Direction Instruction Code

The wind direction sensor is a potentiometer that is measured as a “half bridge”. The output ranges from 0 mV at 0 degrees to the excitation voltage at 355 degrees. In dataloggers programmed with Edlog (CR10X, CR23X, etc.), measure the wind direction with Instruction 4 (Excite, Delay, and Measure). CR200 series dataloggers use the ExDelSE instruction and other CRBasic dataloggers use the BRHalf instruction. In general, a delay of 1 (0.01 seconds) is sufficient when lead lengths are less than 100 feet. If the cable is 100 to 1000 feet, use a delay of 5 (0.05 seconds). The wind direction potentiometer has a five degree deadband between 355 and 360 degrees; therefore, the maximum signal is at 355 degrees. The result of the BRHalf instruction prior to applying the multiplier is measured mV/Excitation mV; therefore, the multiplier is 355. The other measurement result is the measured mV; the multiplier with these instructions is $355/\text{Excitation Voltage}$. The offset is zero. The parameters to be used with each datalogger are listed in Table 4-2.

TABLE 4-2. Parameters for Wind Direction			
	CR10(X), CR510, CR200	CR7, 21X, CR23X	CR1000, CR200, CR5000, CR9000
Measurement Range	2500 mV, slow	5000 mV, slow	2500 mV, fast
Excitation Voltage	2500 mV	5000 mV	2500 mV
Multiplier	0.142 deg/mV	0.071 deg/mV	355 deg (mV/VmV)
Offset	0	0	0


```

'CR1000
'Created by SCWIN

'Declare Variables and Units
Public WS_ms
Public WindDir

Units WS_ms=meters/second
Units WindDir=Degrees

'Define Data Tables
DataTable (Table1,True,-1)
    DataInterval (0,60,Min,0)
    WindVector (1,WS_ms,WindDir,FP2,False,0,0,0)
    FieldNames("WS_ms_S_WVT,WindDir_D1_WVT,WindDir_SD1_WVT")
EndTable

'Main Program
BeginProg
    Scan (5,Sec,1,0)
        '05103 Wind Speed & Direction Sensor measurements WS_ms_2 and WindDir_2:
        PulseCount (WS_ms,1,2,1,1,0.098,0)
        BrHalf (WindDir,1,mV2500,2,1,1,2500,True,0,_60Hz,355,0)
        If WindDir>=360 Then WindDir=0
        'Call Data Tables and Store Data
        CallTable (Table1)
    NextScan
EndProg

```

5. Maintenance and Repairs

R.M. Young suggests the anemometer bearings be inspected at least every 24 months. Please refer to the R.M. Young manual for maintenance information.

Contact R.M. Young's customer service department directly to obtain repair cost estimates and authorization for return of the unit. Their phone number is (231) 946-3980.

6. References

Gill, G.C., 1973: The Helicoid Anemometer Atmosphere, II, 145-155.

Baynton, H.W., 1976: Errors in Wind Run Estimates from Rotational Anemometers Bul. Am. Met. Soc., vol. 57, No. 9, 1127-1130.

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