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ENVIROMUX-WSS-I10/50

Arctic Wind Speed Sensor

Operation Manual

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WIND SPEED SENSOR
OPERATION MANUAL

GENERAL INFORMATION

1.1. The Wind Speed Sensor uses a highly rugged, anti-icing three-cup anemometer assembly and simple magnet-reed switch assembly to produce a contact closure whose frequency is proportional to wind speed.

1.2. The Sensor Cable has a quick-connect connector with vinyl-jacketed, shielded cable.

Table 1-1
Wind Speed Sensor Specifications

1.3 Performance Characteristics

Maximum Operating Range	0-60 meters/sec or 0-125 mph
Starting Speed	.5 meters/sec or 1 mph
Calibrated Range	0-50 meters/sec or 0-100 mph
Accuracy	±1.5% or 0.25 mph
Temperature Range	-50°C to +85°C

1.4 Distance Constant*

Standard Aluminum Cup Assembly	Less than 15 feet

*The distance traveled by the air after a sharp-edged gust has occurred for the anemometer rate to reach 63% of the new speed.

1.5 Electrical Characteristics

Output Signal	Contact closure at frequency F = .5589 (V-1) (V = wind speed in mph)

1.6 Physical Characteristics

Weight	1.5 pounds
Finish	Black anodized
Mounting Fixtures	Use with 191 Crossarm
Cabling	Two-conductor Cable part number 1805-xx, where -xx is the length in feet.

2. INSTALLATION

2.1. Wind Speed Sensor Installation

A. Check to see that the cup assembly rotates freely (threshold, bearing check).

B. Install the sensor in the end of the mounting arm (the end without the bushing).

C. Apply a small amount of silicone grease to the set screws to prevent “freezing up” in adverse environments. Tighten the locking set screws; do not over-tighten.

D. Connect the cable assembly to the keyed sensor receptacle and tape it on the mounting arm.

2.2 Wiring

A. The cable assembly contains two wires. Typical installation hookup is shown in Figure 2-1. See also ENVIROMUX-WSS-Ixx wiring instruction manual.

3 OPERATIONAL CHECK-OUT

Wind Speed Sensor Check-Out

A. Slowly spinning the anemometer cup assembly will produce a series of pulses. To verify the sensor output, monitor this signal with an ohmmeter. Inspect the cup assembly for loose cup arms or other damage. The cup assembly cannot change calibration unless a mechanical part has come loose or has been broken.

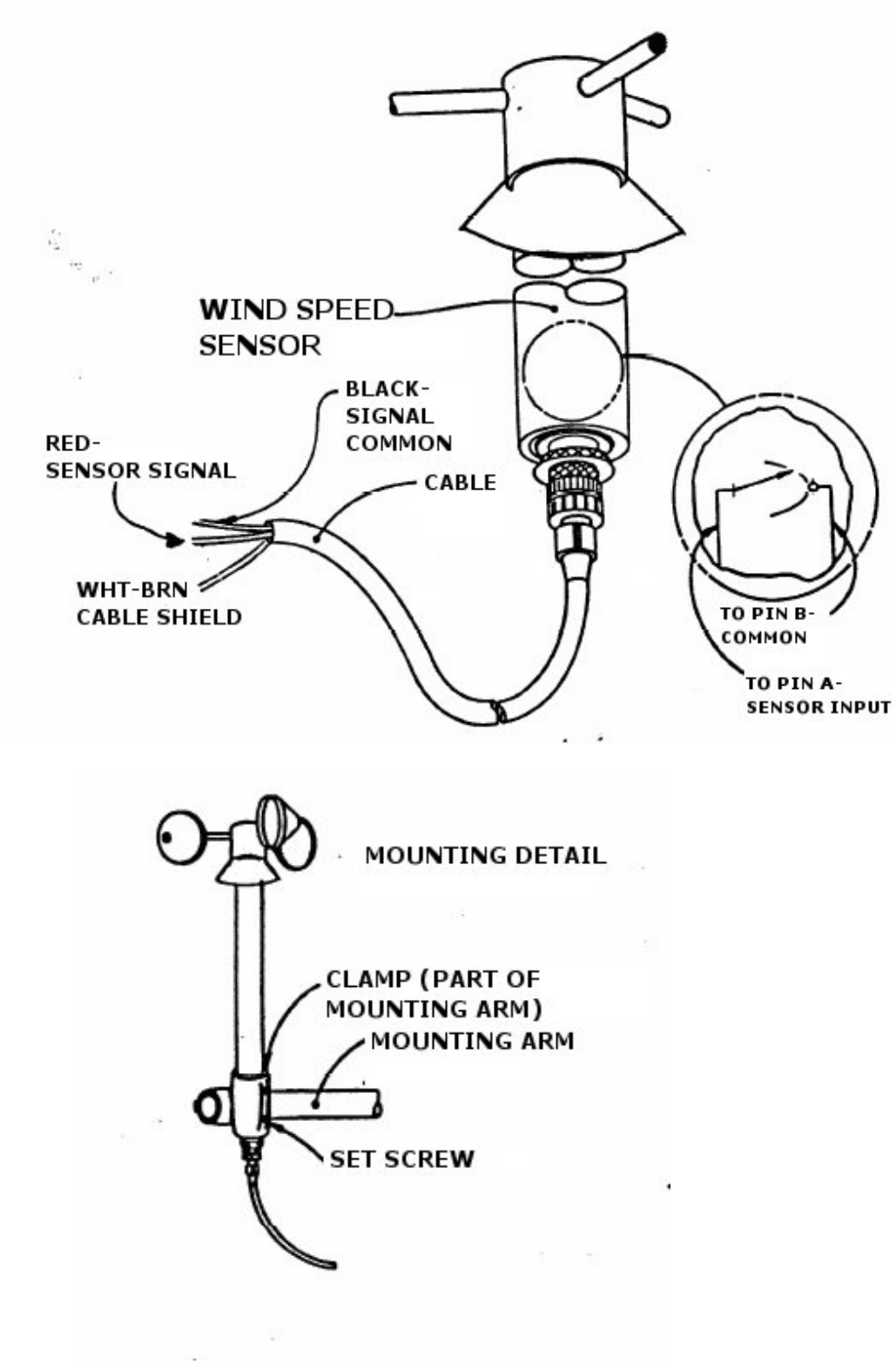


Figure 2-1 Typical Installation

Table 3-1: Model Wind Speed Sensor Calibration

WIND VELOCITY VS OUTPUT REQUENCY

Speed in Miles/Hour

V mph	RPS	F Hz
10	2.515	5.030
20	5.310	10.619
30	8.104	16.208
40	10.899	21.797
50	13.693	27.386
60	16.488	32.975
70	19.282	38.564
80	22.077	44.153
90	24.871	49.742
100	27.666	55.331
110	30.460	60.920
120	33.255	66.509

SPEED IN METERS/SEC

V mps	RPS	F Hz
2.5	1.284	2.567
5.0	2.846	5.693
7.5	4.409	8.819
10.0	5.972	11.945
12.5	7.535	15.071
15.0	9.098	18.197
17.5	10.661	21.323
20.0	12.224	24.449
22.5	13.787	27.575
25.0	15.350	30.701
27.5	16.913	33.827
30.0	18.476	36.953
32.5	20.039	40.079
35.0	21.602	43.205
37.5	23.165	46.331
40.0	24.728	49.457
42.5	26.291	52.583
45.0	27.854	55.709
47.5	29.417	58.835
50.0	30.980	61.961
52.5	32.543	65.087
55.0	34.106	68.212
57.5	35.669	71.338
60.0	37.232	74.464

RPM VS WIND SPEED

RPM	MPS	MPH	F Hz
100	3.113	6.964	3.333
200	5.779	12.928	6.667
300*	8.446	18.892	10.000
400	11.112	24.856	13.333
500	13.778	30.820	16.667
600*	16.444	36.785	20.000
700	19.110	42.749	23.333
800	21.777	48.713	26.667
900	24.443	54.670	30.000
1000	27.109	60.641	33.333
1100	29.775	66.605	36.667
1200	32.441	72.569	40.000
1300	35.108	78.533	43.333
1400	37.774	84.497	46.667
1500	40.440	90.461	50.000
1600	43.106	96.426	53.333
1700	45.772	102.390	56.667
1800*	48.438	108.354	60.000

* STANDARD CALIBRATOR TEST POINTS

V mph = (RPM/16.767) + 1

V mps = (RPM/37.5067) + 0.44704

Based on equation f=.5589 (V – 1)
where f is the output frequency.
V is wind speed miles per hour.

RPS = cup revolution per second.
1 MPH = 0.44707 meters/sec.

4 MAINTENANCE AND TROUBLESHOOTING

General Maintenance Schedule*

6-12 Month Intervals:

A. Inspect sensor for proper operation per Section 3.0.

B. Replace the Wind Speed Sensor bearings in extremely adverse environments per Section 4.5.

12-24 Month Intervals:

A. Replacement of sensor bearings.

*Schedule is based on average to adverse environments.

Table 4-1: Troubleshooting Table

Symptom	Probable Cause	Remedy
No sensor output	Faulty reed switch	Replace reed switch
On sensor output below 2 mph	Faulty bearings	replace bearings

Wind Speed Sensor: 6-12 Month Periodic Service

A. At the crossarm assembly, disconnect the Sensor Cable from the Sensor (leave the cable secured to the crossarm) and remove the Sensor from the crossarm assembly.

B. Loosen the two set screws and remove the anemometer cup assembly.

C. Visually inspect the anemometer cups for cracks and breaks, and then make sure that each is securely attached to the cup assembly hub.

D. Inspect the Sensor for any signs of corrosion and dust buildup.

E. Rotate the Sensor shaft hub assembly to make sure that it turns freely and that the Sensor bearings are not damaged. Make sure that the magnet assembly is not contacting the reed switch.

F. A moisture vent is located on the base of the Sensor. Make sure that this vent is unobstructed.

G. Re-install Sensor as per installation procedure (Section 2.0) and verify proper operation using procedures in Section 3.0.

Wind Speed Sensor General Assembly (refer Assembly Drawing)

The following steps cover basic disassembly:

A. At the crossarm assembly, disconnect the Sensor Cable from the Sensor (leave the cable secured to the crossarm) and remove the Sensor from the crossarm assembly.

B. Loosen the two set screws and remove the anemometer cup assembly.

C. Remove the three (3) flathead screws at the top of the Sensor and lift out the bearing mount assembly.

Reed Switch Replacement Procedure

Use the following procedure to replace Sensor Reed Switch:

A. Remove bearing mount assembly as per Section 4.3.

B. Unsolder the 15-16 wires on the ends of the Reed Switch (10), un-solder, and remove the switch from the two mounting terminals (13).

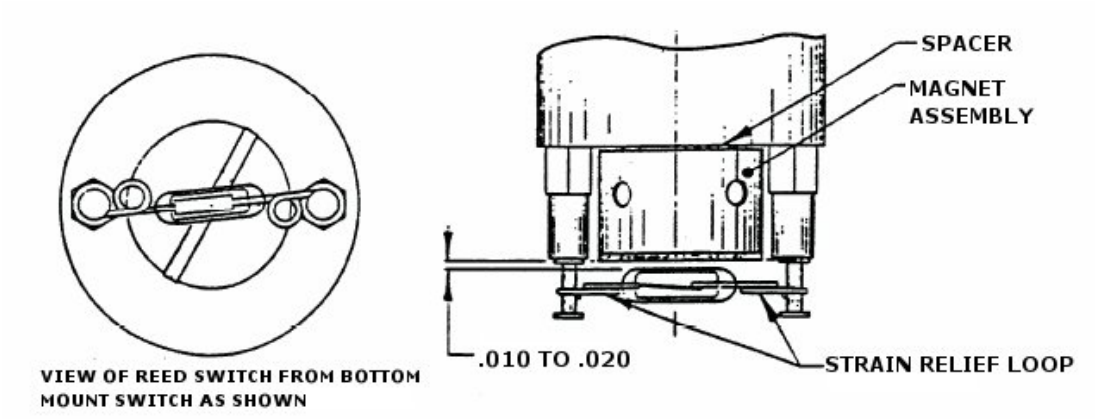
C. Solder the new switch onto the sides on the switch mounting terminals, taking care not to stress the point where the leads enter the glass reed switch body. Measure the distance between the bottom of the rotating magnet and the top of the switch envelope, as shown in Figure 4-1. The spacing should measure between 0.010 and 0.020 of an inch.

D. Spin the shaft and verify switch operation by listening for faint sound of switch closures. Monitor the output on the translator module and spin shaft for an upscale indication. If switch seems to falter, adjust switch slightly closer to magnet.

E. If possible, connect the shaft to an 1800-RPM motor, use flexible coupling, and verify an output of 108 mph with a 50% duty cycle.

F. Reassemble Sensor by reversing procedure.

Figure 4-1: REED SWITCH INSTALLATION



Bearing Replacement Procedures

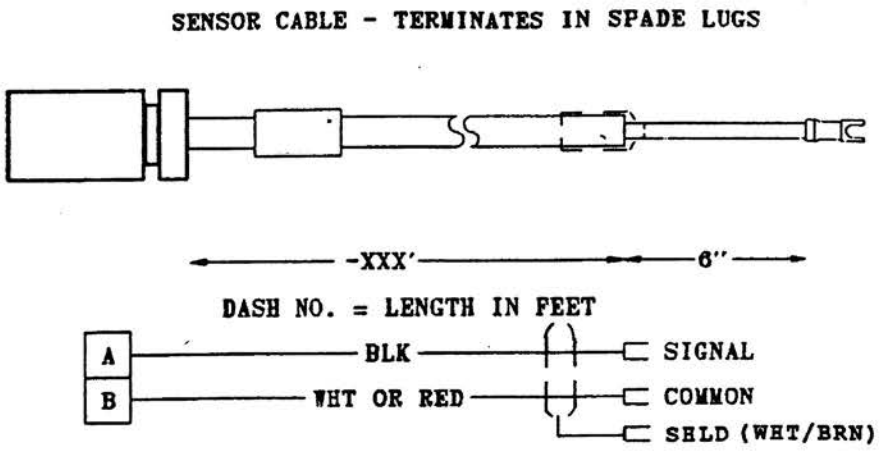
The bearings used in Sensor are special stainless steel ball bearings with a protective shield. Bearings are lubricated and sealed. Do not lubricate bearings as the lubrication will attract dust and will form dust/oil glue. Use the following procedure for bearing replacement:

A. Remove bearing mount assembly as per Section 4.3.
B. Loosen set screws (21) in magnet assembly (4), lift shaft (7) and collar (3) up and out of bearing mount (2). Be sure to retain lower spacer (19).
C. Insert a right-angle type of tool, such as an Allen wrench into bearing, cock it slightly to one side and remove bearing. Remove both bearings.
D. Install new bearings. Be careful not to introduce dirt particles into bearings. CLEAN HANDS ONLY! DO NOT ADD LUBRICATION OF ANY KIND.
E. Reassemble the Sensor in reverse order. Be sure to include spacers (19) over the bearings when replacing the shaft in the bearing mount. After the magnet assembly (4) has been tightened, a barely perceptible amount (0.007) of endplay should be felt when the shaft is moved up and down.

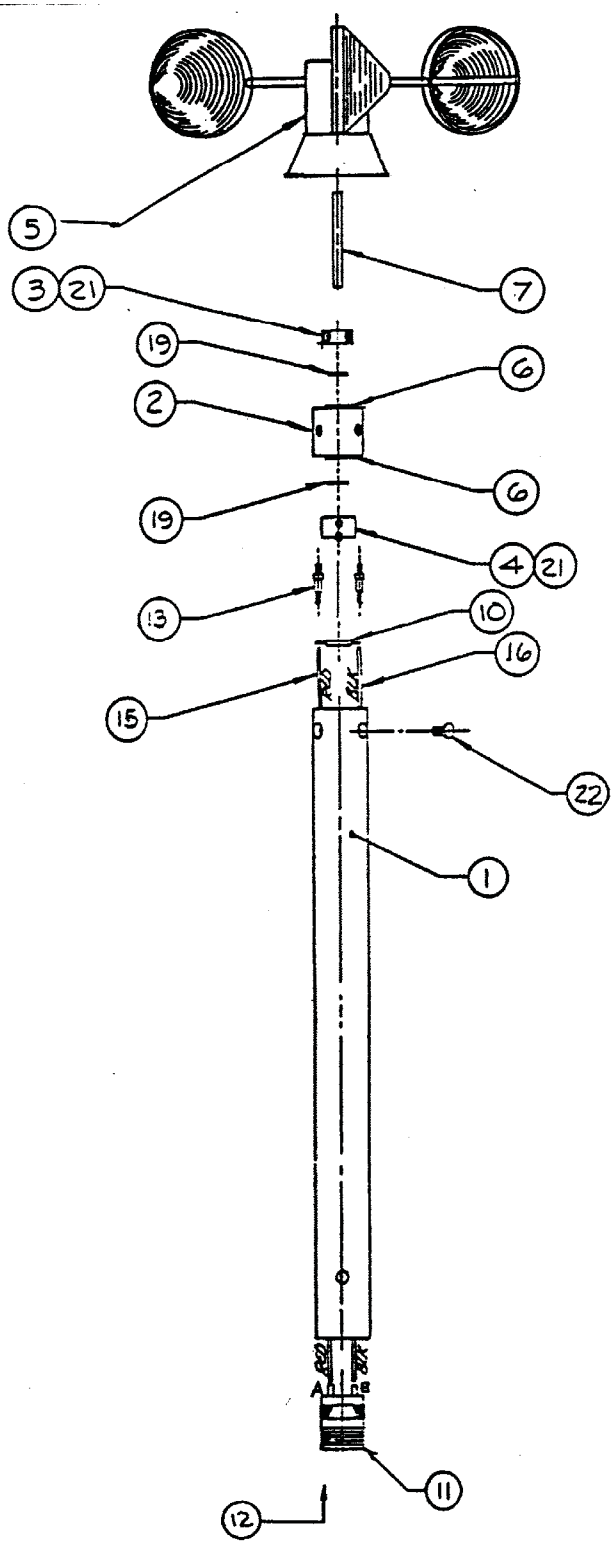
Table 4-2: REPLACEABLE PARTS LIST

ITEM #	DESCRIPTION
1	WS SUPPORT
2	BEARING MOUNT
3	COLLAR
4	MAGNET ASSEMBLY
5	CUP ASSEMBLY (ALUM)
6	BEARING
7	SHAFT
10	SWITCH REED
12	CAP FOR CONNECTOR
13	TERMINAL HH SMITH
19 *	SPACER
21	SET SCREW 4-40X 1/8
22	FLAT HD. 4-40X ¼ SCREW

* SPACER NO LONGER USED



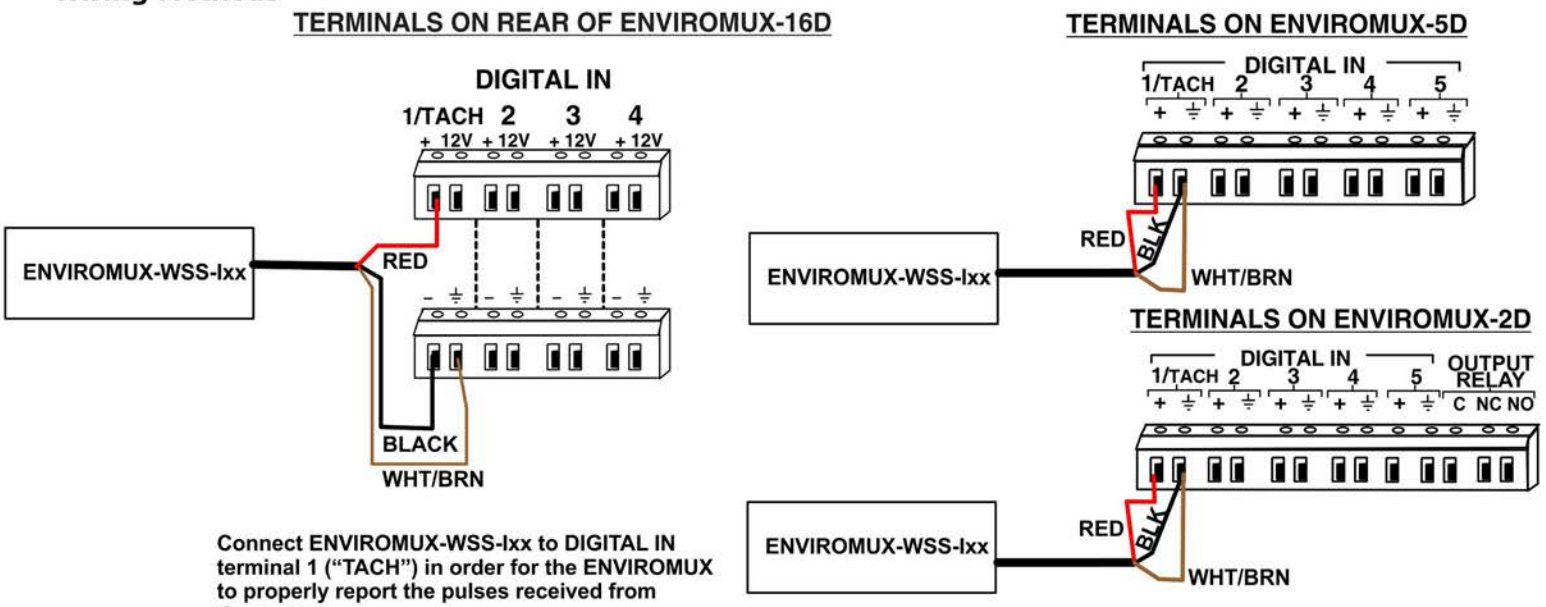
Cable Wiring Diagram



EXPLODED VIEW

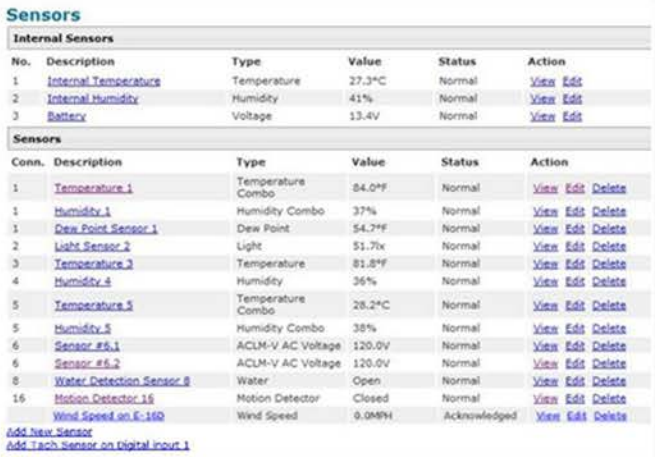
Installation to ENVIROMUX-2D/5D/16D

Wiring Methods



Connect ENVIROMUX-WSS-Ixx to DIGITAL IN terminal 1 ("TACH") in order for the ENVIROMUX to properly report the pulses received from the sensor.

Configuration



Sensors

Internal Sensors

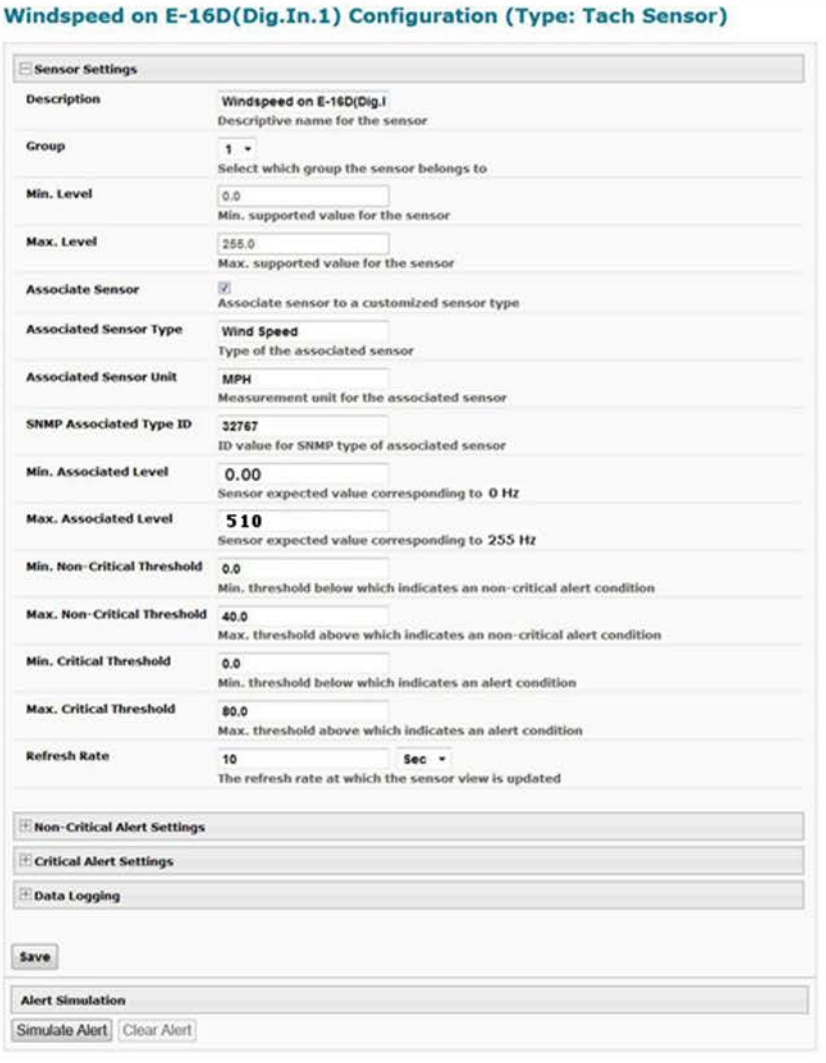
No.	Description	Type	Value	Status	Action
1	Internal Temperature	Temperature	27.3°C	Normal	View Edit
2	Internal Humidity	Humidity	41%	Normal	View Edit
3	Battery	Voltage	13.4V	Normal	View Edit

Sensors

Conn.	Description	Type	Value	Status	Action
1	Temperature 1	Temperature Combo	84.0°F	Normal	View Edit Delete
1	Humidity 1	Humidity Combo	37%	Normal	View Edit Delete
1	Dew Point Sensor 1	Dew Point	54.7°F	Normal	View Edit Delete
2	Light Sensor 2	Light	51.7lx	Normal	View Edit Delete
3	Temperature 3	Temperature	81.8°F	Normal	View Edit Delete
4	Humidity 4	Humidity	36%	Normal	View Edit Delete
5	Temperature 5	Temperature Combo	28.2°C	Normal	View Edit Delete
5	Humidity 5	Humidity Combo	38%	Normal	View Edit Delete
6	Sensor #6.1	ACLM-V AC Voltage	120.0V	Normal	View Edit Delete
6	Sensor #6.2	ACLM-V AC Voltage	120.0V	Normal	View Edit Delete
8	Water Detection Sensor 8	Water	Open	Normal	View Edit Delete
16	Motion Detector 16	Motion Detector	Closed	Normal	View Edit Delete
	Wind Speed on E-16D	Wind Speed	0.0MPH	Acknowledged	View Edit Delete

Add New Sensor
Add Tach Sensor on Digital Input 1

Click on "Add Tach Sensor...." under Monitoring -> Sensors



Windspeed on E-16D(Dig.In.1) Configuration (Type: Tach Sensor)

Sensor Settings

Description	Windspeed on E-16D(Dig.I Descriptive name for the sensor
Group	1 Select which group the sensor belongs to
Min. Level	0.0 Min. supported value for the sensor
Max. Level	255.0 Max. supported value for the sensor
Associate Sensor	☑ Associate sensor to a customized sensor type
Associated Sensor Type	Wind Speed Type of the associated sensor
Associated Sensor Unit	MPH Measurement unit for the associated sensor
SNMP Associated Type ID	32767 ID value for SNMP type of associated sensor
Min. Associated Level	0.00 Sensor expected value corresponding to 0 Hz
Max. Associated Level	510 Sensor expected value corresponding to 255 Hz
Min. Non-Critical Threshold	0.0 Min. threshold below which indicates an non-critical alert condition
Max. Non-Critical Threshold	40.0 Max. threshold above which indicates an non-critical alert condition
Min. Critical Threshold	0.0 Min. threshold below which indicates an alert condition
Max. Critical Threshold	80.0 Max. threshold above which indicates an alert condition
Refresh Rate	10 Sec The refresh rate at which the sensor view is updated

Non-Critical Alert Settings

Critical Alert Settings

Data Logging

Save

Alert Simulation

Simulate Alert | Clear Alert

Then configure the sensor to provide wind speed readings and send alerts