Minnesota Pollution Control Agency

**STANDARD OPERATING PROCEDURES**

**Meteorological Monitoring Stations**

**AMBIENT AIR MONITORING PROGRAMS**

**Rev. 2 8/2013**

**Standard Operating Procedures**

**Meteorological Monitoring Stations**

Revision 2

August 1, 2013

APPROVALS:

Author:

Date: 8/1/13

Air Quality Supervisor:

Date:

Air Quality Coordinator:

Date:

Quality Assurance Supervisor:

Date:

Quality Assurance Coordinator:

Date:



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**1.0 PURPOSE OF SOP**

This SOP was designed to describe the procedures used for measurement of wind speed, wind direction, air temperature, relative humidity and barometric pressure.

**2.0 EQUIPMENT DESCRIPTION**

The display data logger is designed to accept a variety of standard sensors. Measurements include wind speed, wind direction, air temperature, relative humidity, rainfall and barometric pressure.

**2.1 Parts of the Met Station (as needed)**

• Wind speed sensor

• Wind direction sensor

• Cross arm assembly

• Humidity/Temperature sensor

• Tripod

• Ground stake

• Ground strap

• Barometer

**3.0 EQUIPMENT OPERATION**

In order to operate the Met Station, it is necessary to assemble, calibrate and perform maintenance on each sensor individually.

**3.1 Wind Speed Sensor**

The Wind Speed Sensor uses a durable 3-cup anemometer assembly or propeller assembly and simple magnet-reed switch to produce a series of contact closures whose frequency is proportional to wind speed.

*3.1.1 Installation*

1. Check to see that the cup or propeller assembly rotates freely.

2. Install the sensor into the fitting on the end-mounting assembly or arm.

3. Apply a small amount of silicone grease to the set screws to prevent ‘freezing up’

in corrosive environments. Tighten the locking setscrews but do not over tighten.

4. Connect the Cable Assembly to the connector receptacle on base of sensor.

Secure the cable to the mounting arm using cable ties or tape.

*3.1.2 Calibration*

1. Spinning the anemometer cup or propeller assembly will produce a series of pulses. To verify sensor output, monitor this signal with either a plug-in Translator Module,

Datalogger or an Ohmmeter. Spin slowly and monitor output signal. A

windspeed calibrator may be used to check operation at different RPM points.

2. Inspect the wind speed cup assembly for loose cup arms or other damage to the propeller. The assembly cannot change calibration unless a mechanical part has come loose or has been broken.

*3.1.3 Maintenance*

General Maintenance Schedule

6-12 month intervals:

1. Inspect sensor for operation.

2. Replace Wind Speed Sensor bearings in extremely adverse environments.

12-24 month intervals:

1. Replacement of sensor bearings.

24-36 month intervals:

1. Replacement of sensor bearings.

**3.2 Wind Direction Sensor**

The Wind Direction Sensor uses a lightweight, air-foil vane and a potentiometer to produce an output that varies proportional to wind direction.

*3.2.1 Calibration*

1. Using a GPS or compass to read due North, rotate the vane until the vane is pointing North. If using a magnetic compass for this procedure, be sure to account for magnetic declination. Lock the vane in this position. Turn the sensor until the data logger also reads North.

2. To check the voltage, rotate the vane in a clockwise direction to increase the voltage output up to the 360º point. After it reaches the 360º point the voltage will start to drop until it reaches 0º. Once the voltage reads 0º, lock the vane to the sensor. Turn vane to East, South and West compass points and verify corresponding degrees (90, 180, 270) on the datalogger.

*3.2.2 Maintenance*

General Maintenance Schedule

6-12 month intervals:

1. Inspect sensor for proper operation.

24-36 month intervals:

1. Remove and replace sensor potentiometer.

2. If necessary, send sensor to manufacturer for a complete factory overhaul of sensor.

**3.3 Relative Humidity/Temperature Sensor**

The Relative Humidity/Temperature Sensor is an extremely accurate and sensitive sensor which simultaneously measures relative humidity and temperature.

*3.3.1 Calibration*

1. The Relative Humidity Sensor has been calibrated at the factory and will not change unless damaged. To check for proper operation of the sensor it is advised that the output signal be checked against a local service facility. Exact correlation is not to be expected due to atmospheric and geographical variations. On site performance can be verified with a hand held relative humidity measuring standard.

2. The Temperature Sensor should be compared to a precision NIST traceable thermometer for actual readings.

*3.3.2 Maintenance*

General Maintenance Schedule

6-12 month intervals:

1. Inspect sensors for proper operation.

2. Clean Relative Humidity sensor element according to owner’s manual.

**3.4 Barometric Pressure Sensor**

The Barometric Pressure Sensor uses an active solid-state device to sense barometric pressure. Self-contained electronics provide a regulated voltage to the solid state sensor and amplification for the signal output.

*3.4.1 Calibration/Maintenance*

1. Inspect pressure inlet port occasionally to insure it is free of obstruction. Verify Barometric reading on the site Datalogger is within 2mmhg of a precision NIST traceable field barometric pressure sensor. No other periodic maintenance or calibration is required.

2. Inspect sensor for proper operation.

**4.0 ADDITIONAL INFORMATION**

A more detailed equipment and procedure manual is available from manufacturer and in the EPA QA handbook for Air Measurement Systems; Volume IV: Meteorological Measurements Version 2.0