

# APPLICATION NOTE

## *Weather Station Siting and Installation Tools*



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*This application note describes weather station site selection, sensor placement, and the required tools for installation and maintenance. This note is intended as a pre-purchase reference. More detailed information about weather station installation is provided by our Tripod, UT10, and UT30 installation manuals.*

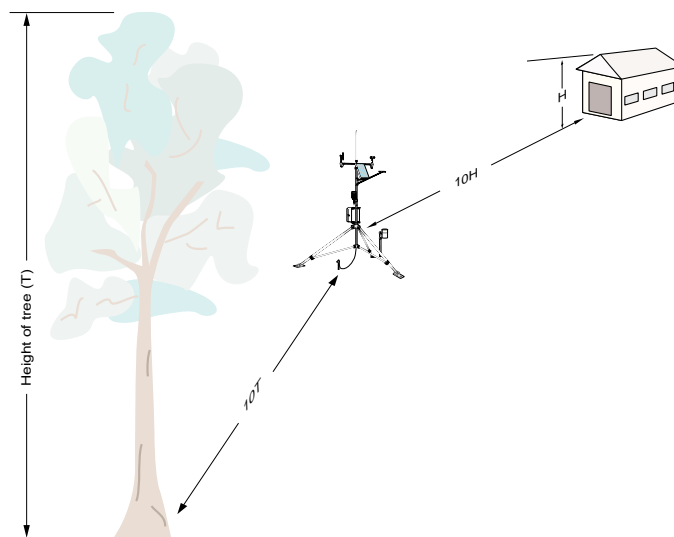
## **Siting and Exposure**

Selecting an appropriate site for the weather station is critical for obtaining accurate meteorological data. Typically, the site should represent the general area of interest, and be away from obstructions such as buildings and trees.

Guidelines condensed from the following publications:

- The State Climatologist (1985). Publication of the American Association of State Climatologists: Heights and Exposure Standards for Sensor on Automated Weather Stations, v. 9, No. 4, October, 1985.
- EPA (1987). On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013. Office of Air Quality Planning and Standards, Research Triangle Parks, North Carolina 27711.
- WMO (1983). Guide to Meteorological Instruments and Methods of Observation. World Meteorological Organization No. 8, 5th edition, Geneva Switzerland.

## Wind Speed and Direction



Wind sensors should be located over open level terrain. The EPA recommends the wind sensor be a distance of at least ten times the height of nearby buildings, trees, or other obstructions.

Standard measurement heights:

- 3.0 m  $\pm$  0.1 m recommended (AASC)
- 2.0 m  $\pm$  0.1 m, 10.0 m  $\pm$  0.5 m optional (AASC)
- 10.0 m (WMO and EPA)

## Temperature and Relative Humidity

The sensor should be housed in a ventilated radiation shield. The EPA recommends the sensor be no closer than four times an obstruction's height, at least 30 m from large paved areas, and located in an open level area that's at least 9 m in diameter. The open areas should be covered by short grass, or where grass does not grow, the natural earth.

Avoid these:

- large industrial heat sources
- rooftops
- steep slopes
- sheltered hollows
- high vegetation
- shaded areas
- swamps
- areas where snow drifts occur
- low places holding standing water after rains

Standard measurement heights:

- 1.5 m  $\pm$  1.0 m (AASC)
- 1.25 to 2.0 m (WMO)
- 2.0 m temperature (EPA)
- 2.0 m and 10.0 m for temperature difference (EPA)

## Precipitation

The AASC and EPA suggest tipping buckets be no closer than four times the height of an obstruction. The orifice of the gage must be in a horizontal plane, open to the sky, and above the level of in-splashing and snow accumulation. Typically, tipping buckets are sited on level ground covered with short grass or gravel.

Wind shields, such as those used by the National Weather Service, are recommended for open areas.

Standard measurement heights:

- 1.0 m  $\pm$  1.0 cm (AASC)
- 30.0 cm minimum (WMO, EPA)

## Solar Radiation

Pyranometers should be mounted away from shadows, reflective surfaces, and sources of artificial radiation. Mounting the pyranometer on the southernmost (northern hemisphere) part (either crossarm or pyranometer mounting arm) of the weather station should minimize shading from the other weather station structures. The height the sensor is mounted is not critical for the accuracy of the measurement. However, pyranometers mounted at heights of 3 m or less are easier to level and clean.

## Soil Temperature

The measurement site for soil temperature should be at least 1 m<sup>2</sup> and typical of the surface of interest. The ground surface should be level with respect to the immediate area (10 m radius).

Standard measurement depths:

- 10.0 cm  $\pm$  1.0 cm (AASC)
- 5.0 cm, 10.0 cm, 50.0 cm, 100.0 cm (WMO)

## Standard Tools for Installation and Maintenance

User-supplied key for enclosure lock  
Magnetic declination angle for site  
Tape measure:  
    12 feet (CM6 / CM10, UT10)  
    20 feet (UT30)  
Open-end wrenches: 3/8", 7/16", 1/2", (2) 9/16"  
Level:  
    12" to 24" (CM6 / CM10)  
    24" to 48" (UT10/UT30)  
Pliers  
Magnetic compass  
12" pipe wrench  
Hammer  
    Small sledge (CM10, UT30)  
    Claw (UT10)  
Felt-tipped marking pen  
Socket wrench and 7/16" deep well socket  
Allen wrench set (English units)  
Straight-bit screwdrivers (small, medium, large)  
Phillips head screwdrivers (small, medium)  
Small diagonal side-cuts  
Needle-nosed pliers  
Wire strippers  
Pocket knife  
Calculator  
Volt/Ohm meter  
Electrical tape  
6' stepladder  
Datalogger prompt sheet and manuals  
Station log and pen  
Wire ties and tabs  
Desiccant

### UT30 Only

Climbing harness  
Hard hats  
50' haul rope  
Crescent wrench  
"Channel-lock" pliers  
3/8" nut driver

## Special Tools for Installation Only

Lock for enclosure  
Shovel  
Rake  
Pick / digging bar  
Teflon tape or pipe dope  
Conduit and associated tools (as required)  
1/4" washers - often required as spacers for u-bolts (UT10/UT30)

### UT10 Only

Hand saw  
Materials for concrete form:  
    (4) 12" wood stakes  
    (1) 2" x 4" x 8" piece of lumber  
    (8) 8p double-head nails  
    (8) 16p double-head nails  
Concrete trowels  
    (2) 1.0 to 1.5" thick x 24" boards to support base above forms (optional)

### UT30 Only

(4) 12" wood stakes  
20' non-stretch line  
Wire rope cutters (hammer and cold chisel will work)

For B18 Base and UTEYE Anchors:

Pick or digging bar

Optional:

    Concrete form material: 2" x 4" lumber, stakes,  
    saw, hammer, nails, etc.

    Concrete trowels

For UTDUK Duckbill Anchors:

Sledgehammer

Highlift jack

Chain (to attach jack to anchor loops)

For RFM18 Base:

(3) anchors appropriate for mounting surface

(3) bolts and washers to secure base to anchors