



WEATHER STATION INSTALLATION MANUAL v2.0

Last updated: January 25th, 2017

Summary: This manual describes the guidelines, best practices, and steps to site and install a complete TAHMO weather station.

Please also look at the installation videos available on <http://tahmo.org/resources/>

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Siting and installing your weather station

Step 1. Choose an appropriate location for your TAHMO weather station.

Guidelines for choosing an installation site:

Security: Stations should only be installed within secure compounds that have permanent security (e.g. perimeter fence, main gate of entry, and 24/7 security presence). Within the larger compound, a secondary security fence must be constructed (see photo below). The fence should adhere to the following specifications:

- Dimensions: 3m x 3m square and at least 1.5m high
- Materials: chain-linked or barbed wire fencing with either cedar or steel posts
- Gate: one side should have a metal lockable gate with padlock



Properly built security fence

Siting: To produce high-quality data, TAHMO stations should be installed in open areas away from buildings, trees, or any other object that may obstruct the sensors. The general rule is that the station should be installed at a **distance at least twice the height of any potential obstruction**. For example, a

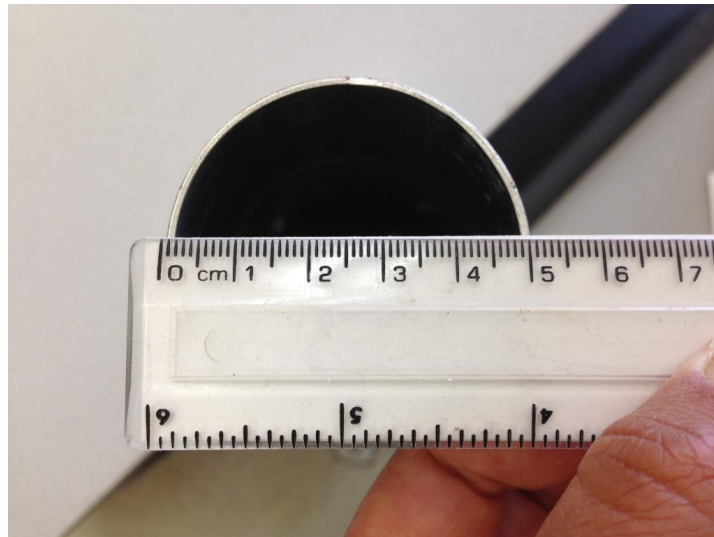
station should be installed at least 20 meters away from a building that is 10 meters tall. This is not always strictly possible but should be considered a guiding principle.

Step 2. Mount a post to hold up the weather station.

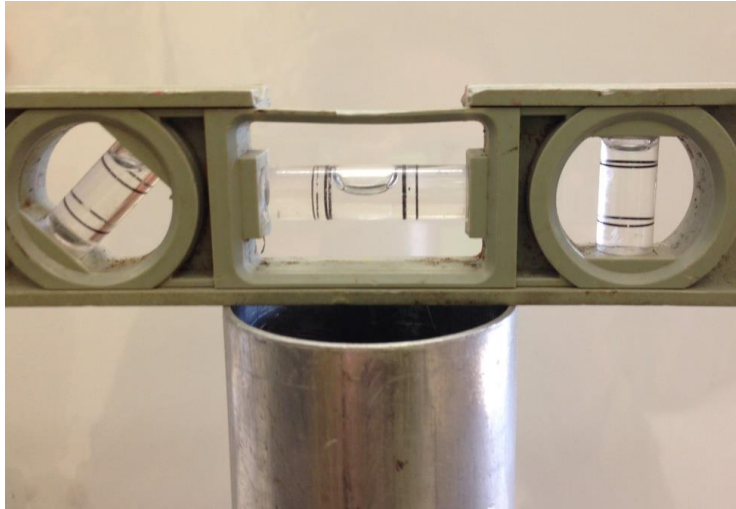
Guidelines for the mounting pole:

Each TAHMO station should be mounted at a height of 2 meters above ground level. The best solution for achieving this is to use a steel pipe. The outer diameter of the pipe must be 5 cm or 2 inches (based on the dimensions of the provided U-bolts). It is recommended to use a pipe 2.5 meters long, with 2 meters above ground and one half meter buried in concrete.

Double check that your pole is 5 cm in diameter before mounting it by testing the U-bolts provided to see if they fit around the pipe.



Mount the pipe as level as possible in the ground so that sensors resting on its top can also be easily be leveled.



Step 3. Ensure you have all of the appropriate materials to install the station in the field.

The TAHMO weather station kit should have the following sensors and logger:

- (1) Em60G data logger with 5 rechargeable batteries and 1 black antenna
- (1) Sensor suite ATMOS 41 (MA-4100)





Your kit should also include the following mounting pieces:

- (2) Black zip ties
- (1) Black antenna

Print a copy of this installation guide, including the checklists, to bring with you in the field.

Step 4: Mount the Sensor Suite on the post.

Make sure to orient the “N” sign on the sensor suite towards North



Step 5: Mount the EM60G data logger.

Mount the data logger on the post as close as possible to the sensor suite using the black zip ties. There should be just enough space for the antenna.

Make sure the solar panel faces towards the equator in order to achieve optimal recharge capacity.

Take the sensor suite cable and plug it into position 1 of the data logger. **Make sure to not pinch the cable in the enclosure and push the stereo connector all the way in.**

Step 6: Test sensor outputs and logger communication.

1. Insert a laptop to the data logger using the USB connector cable into the USB port on the data logger.
2. Open Zentra Utility Software and click "Connect". A window will open with the device connected to the window. Click "connect" again.

When connected to the device you should see the below screen with all the information regarding your device.

01/25/17 14:24:32 PM
Device Name: 06-00307
Firmware Version: 1.01.6
Device ID: 06-00307

Site Name:
Latitude: 46.751117
Longitude: -117.166694
Time Zone: UTC+01

Cellular: Uploads On

Configure

Test

Disconnect
Download New

Measurement Interval: minutes

Data Storage: 0.0% in use.

Approximately 1.4 years until overwriting old data

Barometer Readings:

Pressure: 97.39 kPa

Temperature: 19.8°C

P1: MA-4100 MicroEnvironment Monitor
n/s, 19.3°C, 0.40 Aw, 97.35 kPa, -87.0 °, 85.4 °, 1.02 max mm/hr, 18.5°C

Not available on this device.

P2: None Selected
0 W/m², 0.0 in, 0Counts, 0 km, 281° 0.2 km/h,
0.05 m/s, 19.3°C, 0.40 Aw, 97.35 kPa, -86.9 °,
85.2 °, 1.02 max mm/hr, 18.5°C

Not available on this device.

P3: None Selected

Not available on this device.

P4: None Selected

Not available on this device.

P5: None Selected

Not available on this device.

P6: None Selected

Not available on this device.

Not available on this device.

Not available on this device.

Not available on this device.

Not available on this device.

Scan

Select Ports

Ready

- In P1 you will see your sensor suite connected.
- When clicking “Scan” you will see the latest sensor reading
- When clicking on Measurement Interval you can modify the recording frequency. TAHMO always records data every 5 minutes. Below the Measurement Interval it shows how much time remains until the old data will be overwritten.
- By clicking the settings button next to the Device Name you can modify the Name of this Device We TAHMO prefer if the Device Name remains the same as the Device ID
- By clicking on the settings button next to the Site Name you can modify the site name. This is where we can choose a name for the site where the station installed.

Configuring and testing the cellular connection.

Configuring the cellular uploads. Normally all data loggers are preconfigured to send data once an hour. Unless there are specific reasons please keep these settings.

Before leaving the site always test the cellular connection by clicking on the button “Test”. A second window will open where you will need to click on “test” again.

Please record in the metadata the signal strength, the carrier and the success of the connection. If the test is not successful please write down precisely the Error message.



Note: For details on SIM card installation and changing APN settings on your logger, see the SIM card installation video and the guide Configuring an Em50G for a user-supplied SIM in this document. All documentation can be found on the TAHMO website under: <http://tahmo.org/resources/>

Downloading data

By clicking on the “**download new**” button you can download the data from the data logger.

Pre-departure 'To-do' Check List

- ☐ Call site, have contact of local official at your installation site.
- ☐ Discuss with site contact that you will need cement mix for a concrete base at the site and manual labor assistance to mount the pole when you arrive or before you arrive.
- ☐ Discuss with site contact that they are responsible for putting up wire fencing for the enclosure around each site. Communicate fencing guidelines.
- ☐ Prepare SIM card in your Em60G data logger (normally the sim cards are already installed – the list below is if you use a different sim card)
 - Double check that the SIM card is unlocked (no pin).
 - Install SIM card in data logger (use a telecom company identified as having good service in the region).
 - Add credit to SIM card or register card global coverage SIM with Rebecca (if local SIMs are not available).
 - Note password for remote access of SIM card in data logger (if Africell carrier is used).
 - Note SIM card information (phone number, carrier).
 - Connect your Em50G data logger to the ECH2O Utility software and conduct a communication test. If the communication test fails, check the APN settings for your carrier to ensure that they are set correctly. (See “Configuring an Em50G for a user-supplied SIM” for details on changing the APN settings on your data logger.)
- ☐ Get a GPS, compass, level, Philips screwdriver and a nut wrench to use during the installation
- ☐ Note the data logger ID number and password

List of items to bring on your installation:

- a. Compass (buy or use phone)
- b. GPS locator (phone or other)
- c. Level
- d. TAHMO weather station (sensor suite and data logger)
- e. USB connector
- f. 2.5 m long pole (50mm diameter) for mounting
- g. Computer with Zentra Utility installation software
- h. Philips screwdriver
- i. A small ladder or something to step on
- j. Concrete
- k. 4 wooden sticks
- l. string
- m. Adjustable wrench
- n. Measuring tape
- o. Pen
- p. Black zip ties

On-site reminders:

- ☐ Make sure the sensor suite is level by using the bubble level located under the sensor suite
- ☐ Use a compass to line up the sensor suite with North
- ☐ Record full metadata (phone GPS or Google earth).
- ☐ Fix antenna onto data logger
- ☐ Configure data logger:
 - Add site name
 - Check that the recording frequency is set to once an hour
 - Check that the recording frequency (measurement interval) is set to 5 minutes (check this box)
 - Conduct test communication (you may need to adjust the APN settings, see attached instructions)
- ☐ Take photos~!

Post-installation:

- ☐ Fill out the metadata for the new site
- ☐ Upload photos from your installation
- ☐ Check that the site is reporting

Additional security and maintenance guidelines

Local caretaker

Each station should be installed in a secure location where it will not be vandalized or tampered with. It is recommended to appoint a local caretaker of the station who can watch over it and also provide basic maintenance. The caretaker should have a key to the security fence gate.

Maintenance

Each TAHMO station should be checked at least once per month to ensure the sensors are clean. The rain gauge in particular should be cleaned (without using water) to remove leaves, dust, or other debris. If the station is installed in a vegetated area, all grass or brush should be cut and cleared within and around the fenced area.

Metadata Recording Worksheet

Details about the station and installation site are key pieces of information that made our weather observations useful. The following is a list of the information required to complete the metadata recording sheet for the new station.

Description	Data type	Example	Metadata notes from new site
Timestamp	STRING	9/9/2015 11:33	
Country	STRING	GHANA	
Site name	STRING	Benso SHS	
Data logger ID	STRING	5G0F4895	
Data logger password	STRING	gish-dowok	
Date of installation	STRING	8/17/2015	
Name(s) of installer(s)	STRING	Frank Ohene Annor	
TAHMO contact name	STRING	Frank Ohene Annor	
TAHMO contact phone	STRING	31617019834	
TAHMO contact email	STRING	annorfrank@yahoo.co.uk	
Site contact name	STRING	Joseph Drokow	
Site contact phone	STRING	2.33245E+11	
Site contact email	STRING	kadjnr001@gmail.com	
Latitude (decimal degrees)	NUMBER	5.1525726	
Longitude (decimal degrees)	NUMBER	-1.8815226	
Elevation (meters)	NUMBER	113	
SIM number	STRING	2.33553E+11	
SIM carrier	STRING	MTN	
Communication test results (out of five stars)	NUMBER	5	
Recording frequency (minutes)	NUMBER	5	
Reporting frequency (hours)	NUMBER	1	
Positioning system name	STRING	WGS84	
Time zone	STRING	(UTC+0:00) Greenwich Standard Time	
Mount height (meters)	NUMBER	2	
Station site type	STRING	Secondary school	

Sensors installed	STRING	PYR: solar radiation (W/m ²), DS-2: wind speed (m/s); wind direction (°), REC-1: precipitation (mm); electrical conductivity (mS/cm), VP-4: temperature (°C); relative humidity (%); barometric pressure (kPa)	
Notes	STRING	Head Teacher of BSHS is Kwaku Tsikata (Mobile No.: +233244046201). Farmers in the area grow Cocoa, Palm Tree and Rubber. Data should be used from the 18/08/2015.	
Station status	STRING	Active	

After returning from a site installation, record the metadata from your installation site using the google form, which is available on <http://tahmo.org/resources/>