

Dendrometer Sensor

User Guide

The dendrometer sensor allows the researcher to observe micrometer scale changes in tree stem size. To get the best results, follow the mounting procedure described below.

Parts of the dendrometer

1. Sensor Housing
2. Mounting Bracket
3. Sensor Head
4. Data Cable
5. Mounting Rod

Identifying the tree

The stem of almost any tree can be studied, but there here are some guidelines for selecting an appropriate tree.

- The stem that will host the sensor should be at least 10cm in diameter.
- The bark of the tree shouldn't be so thick or irregular that you will not be able to position the sensor head on the desired tissue (i.e., Chestnut Oak).
- You may need to remove enough bark to access the tissue you want to measure but take care not to damage your subject.
- If using the Mini Field Station with WiFi, you will want to select a tree within range of your WiFi access point.

Positioning your sensor

Where you place your sensor on the tree is important. Generally, the following guidelines should be used.

- If measuring the trunk of a tree, you should generally position your sensor at the standard breast height (1.3m above the ground).
- The sensor must be placed on the shady side of the tree. This would generally be the north side of the tree in the northern hemisphere and the south side in the southern hemisphere. Thermal expansion from direct sun will obscure your results.

- For the most accurate results, you will drill your guide whole a little off center so that your sensor head will be centered on the tree.

Mounting Procedure

1. Select your tree.
2. Using a drill, create a guide hole (~3mm diameter) approximately 3cm into the tree. This depth will largely depend on your estimate of the depth of the heartwood. The goal is to anchor the mounting rod into this tissue.
3. Remove the bit from the drill and insert the Mounting Rod in the drill as if it were a bit.
4. Place the Mounting Rod into the guide hole and slowly drive the Rod into the tree.
5. Place a nut onto the rod approximately 3/4cm from the tree.
6. Place the Sensor Assembly on the Rod with the sensor plunger facing the tree.
7. Add the second nut to the rod.
8. Check the compression off the Sensor Head of the dendrometer. The Sensor Head should be slightly compress (~2mm). Use the inner nut to adjust the compression of the Sensor Head. Once properly positioned, lock this in place by tightening the outer nut.
9. Insert the Data Cable into one of the channel connectors on your Mini Field Station (channel 1, if the only sensor).
10. Measure the diameter of the tree either with a DBH measuring tape or a regular measuring tape and converting circumference to diameter ($d = c/\pi$). Also note the date and time of this measurement as you will need it to convert sensor readings to diameter. If using a WiFi Mini Field Station, EcoSensorNetwork can do this calculation for you.

Video: <https://www.youtube.com/watch?v=2qL8BRYJmrc>

Troubleshooting

There is no data on ESN.

- Data is recorded at the top of the hour, so you must wait until after then to see data.
- Data will not be recorded until you activate your device through ESN (though it will be recorded to the SD card).
- WiFi is not connecting.

Data on ESN is always less than ~70

- The sensor needs to be adjusted and repositioned closer to the tree.

Data on ESN is always > 24000

- The sensor needs to be adjusted and repositioned further from the tree.