

Point Dendrometer **ZN11-O_x-WP**

The **ZN11-O-WP** is a point dendrometer with a ring-shaped frame offered in different sizes to optimally fit small stems. On request, the frame can be equipped with up to three sensors.

Diameter frames: 100 mm (**ZN11-O₁₀₀**), 80 mm (**ZN11-O₈₀**), 60 mm (**ZN11-O₆₀**).

Weight: 120-160 g

Components: Ring-shaped carbon fibre frame (CFK), 3 stainless steel screws, 1 electronic displacement sensor (linear motion potentiometer).

Power supply: 5V DC (stabilised).

Output: 0-5V DC, single ended measurement.



Voltage-Sensitivity: 1 mV = 4.0 μm

Temperature-Sensitivity: xx $\mu\text{m } ^\circ\text{C}^{-1}$

What is detected?

Diurnal stem radius fluctuations are mainly influenced by changes of the thickness of living tissues of the bark (mainly phloem cells). The thickness changes depend on the hydration status of the bark. While water is withdrawn from the bark through transpiration during the daytime, at night the tissue is replenished. As a result of this cycle, the diameter decreases during the day and increases at night. Over a period of weeks and months, this diurnal rhythm is altered by growth. New layers of xylem cells irreversibly increase the

radius, particularly during wet periods in the growing season. An additional but smaller contribution comes from tensions within the wood and the growth and death of the phloem cells. In winter, ice formations in the wood induce strong decreases of the stem radius.

Advantages in comparison to other products

- No disturbances by deformations of the dead outermost layer of the bark, induced by temperature and air-humidity (a general argument in favour of point dendrometers and against band dendrometers).
- Minimal sensitivity to temperature and other weather impacts due to the circular construction of the frame and the weatherproof electronic displacement-sensor allow for more accurate measurements.
- The spot of measurement is not influenced by the mounting screws because it is not in the horizontal line of the anchor points.
- Compatibility to most logging systems and easy to power with a stable 5V DC supply.
- Easy to mount. The only tool needed is a screw driver.
- Minor disturbance of the tree stem.
- Weatherproof materials.
- Constructed, produced and tested by experts in tree physiology. Made in Switzerland.

Mounting principle

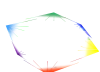
The electronic part of the ZN11-O_x-WP is mounted on a circular carbon fibre frame (CFK) which is fixed to the stem by three screws. A sensing rod is pressed slightly against the tree stem by a spring. The combination of weatherproof materials and a solid three-point anchorage on the stem surface make it possible to precisely detect changes in the stem radius with a resolution of less than 1 μm .

Mounting instruction

1. Dismantle the two screws on one side of the frame.
2. Enclose the stem, branch or root section with the frame and torque the two screws of the frame.
3. Clear the spot on the bark on which the sensor head is placed from rough, dead parts of bark. Use a knife, a chisel or sandpaper but never cut into the living part of the bark.
4. Adjust the distance between the potentiometer and the stem. Place the sensing rod on the bark. Ensure that the sensing rod is pointing towards the centre of the stem.
5. Place the three screws tightly on the bark surface (no drill wholes necessary). Make sure the frame is not moving anymore after fixing the screws.
6. Connect the **brown** wire to a stabilised +5V DC power supply, the **yellow** (and **green**) wire to GND, and the **white** wire to the data logger.

Maintenance

Put a droplet of WD-40 on the moveable sensor rod twice a year.



References *stem radius fluctuations* ...

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... about other dendrometer types and related methods

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