Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

# SD-5T-V, SD-6T-V
# SD-10T-V

*Stem Micro-Variation Sensors*

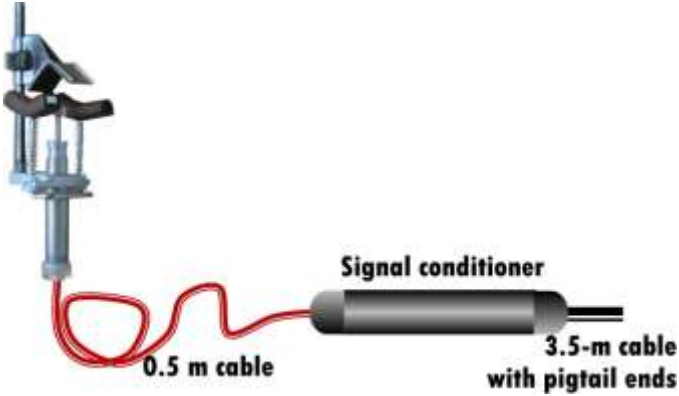
www.phyto-sensor.com

## *Introduction*

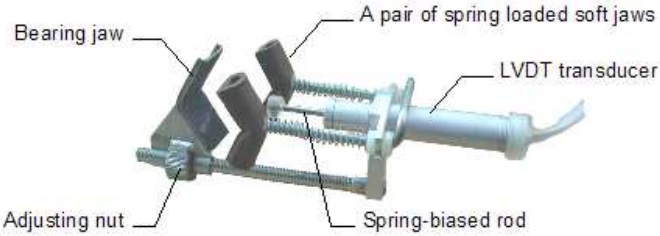
SD-type sensor is a highly precise incremental LVDT-based sensor for monitoring micro-variations of stem diameter in micron range.

Plant growth and water balance affect diurnal behavior of stem diameter. The growth rate depends on a vegetation stage and environmental conditions. The diurnal variations represent mostly fluctuations of water content in plants. Two diameter-based indices are commonly used for evaluating plant water status: daily contraction amplitude and trend of daily maxima. The SD-type sensor allows investigating effects of irrigation rate and other environmental factors on water balance and growth of plants.

The SD-type sensor consists of an LVDT probe mounted in special fixing brackets, and a DC powered signal conditioner.




### *Installation*

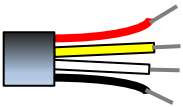



- Select an appropriate stem for sensor installation.
- Move the bearing jaw apart from LVDT transducer by rotating the adjusting nut.
- Locate the stem between the sensor's jaws.

- By rotating the adjusting nut, move the bearing jaw back until the jaws touch the stem.
- Continue rotation of the adjustment nut until then rod takes necessary position. If the stem is supposed to grow, the rational position is somewhere in the beginning of the rod's stroke. If the stem is supposed to shrink, choose a point somewhere at the end of the stroke. In other cases, leave the sensor somewhere in the middle between those two positions.
- Secure the sensor's cable on a stem to prevent occasional movement of the sensor.
- Readjust the sensor when its readings become close to 0 or 5 (10) mm.

## *Connection*

The connection diagram is shown below. The shield shall be grounded at the data loggers side or connected to the 'minus' contact of the power source.



Red: +Power
Yellow: Output 0 to 2 Vdc
White: Ground
Black: Shield

## *Calibrations table*

| V | mm | |
|---|---|---|
| | **SD-5, SD-6** | **SD-10** |
| 0,000 | 0,000 | 0 |
| 2,000 | 5,000 | 10,000 |

## *Calibrations equations*

*SD-5/6:* $\Delta D = 2.5 \times \mathbf{U}$

*SD-10:* $\Delta D = 5.0 \times \mathbf{U}$

Where $\Delta D$ – stem diameter variations in mm

**U** – output voltage in Volts.

Response time is 0.23 s (after applying the power). The output is updated every 5 s at continuous power.

## *Power*

The SD-sensors are to be powered from an external regulated power supply with:

2.8 to 12 Vdc (model _____-V1)

5 to 16 Vdc (model _____-V2)

***Specifications***

| Model | **SD-5T-V** | **SD-6T-V** | **SD-10T-V** |
|---|---|---|---|
| Measurement range | 0 to 5 mm | | 0 to 10 mm |
| Stem diameter range | 5 to 25 mm | 20 to 70 mm | |
| Resolution | < 0.002 mm | | |
| Operating temperature | 0 to 50°C | | |
| Temperature effect | <0.02% total stroke/°C | | |
| Analog linear output | 0 to 2 Vdc | | |
| Supply voltage | 2.8 to 12 Vdc(model V1)<br>5 to 16 Vdc(model V2)<br>10mA typ. | | |
| Output auto update time | 5 s | | |
| Excitation time | 0.3s | | |
| Protection index | IP 64 | | |
| Cable length | Customized (4 m total length standard) | | |

## *Customer Support*

If you ever need assistance with your sensor, or if you just have questions or feedback, please e-mail at support@phyto-sensor.com. Please include as part of your message your name, address, phone, and fax number along with a description of your problem.

Phyto-Sensor Group

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