



***Bio Instruments S.R.L.***

SENSORS AND SYSTEMS  
FOR MONITORING GROWING PLANTS

**SD-5L, SD-6L  
SD-10L**

*Stem Micro-Variation Sensors*



[www.phyto-sensor.com](http://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.

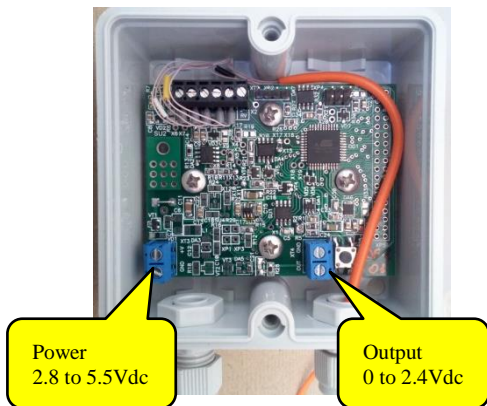
Plant growth and water balance affect diurnal behavior of stem diameter. The growth rate depends on a vegetation stage and environmental conditions. The diurnal variations represent mostly fluctuations of water content in plants. Two diameter-based indices are commonly used for evaluating plant water 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. Standard cable length between sensor and signal conditioner is 2 meter. The output cable length should be specified in the order if required.

## **Connection**

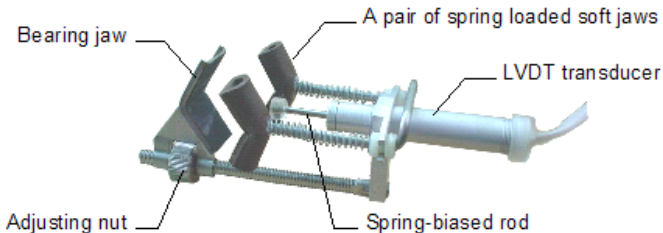
Please use a four-core cable with 3 to 6 mm outer diameter.

The connection ports are shown in the picture below.



Maximal length of the output cable is 10 m.

## 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.



### ***Calibrations table***

V	mm	
	SD-5, SD-6	SD-10
0,000	0,000	0
2,400	5,000	10,000

## ***Calibrations equations***

$$\underline{SD-5/6L} \text{ model:} \quad \Delta D = 2.0833 \times U$$

$$\underline{SD-10L} \text{ model:} \quad \Delta D = 4.1667 \times U$$

Where  $\Delta D$  – stem diameter variations  
 $U$  – output voltage in Volts

Response time is 0.25 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 5.5 Vdc output voltage.

## ***Customer Support***

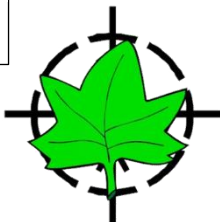
If you ever need assistance with your sensor, or if you just have questions or feedback, please e-mail at [support@phyto-sensor.com](mailto:support@phyto-sensor.com). Please include as part of your message your name, address, phone, and fax number along with a description of your problem.

## **Specifications**

<b>Model</b>	<b>SD-5L</b>	<b>SD-6L</b>	<b>SD-10L</b>
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 2.4 Vdc		
Supply voltage	2.8 to 5.5 Vdc@30mA max.		
Output auto update time	5 s		
Excitation time	0.25s		
Protection index	IP 64		
Cable length between probe and signal conditioner	2 m		



Datasheets



Phyto-Sensor Group

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