

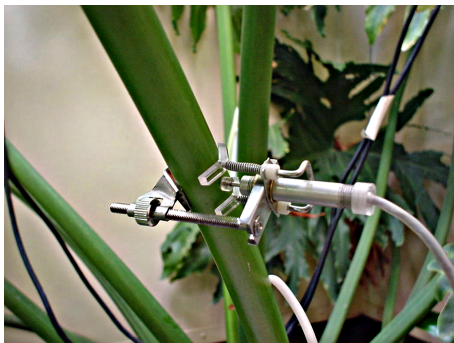


Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

SD-5M, SD-5Mi
SD-6M, SD-6Mi

Stem Micro-Variation Sensors



Introduction

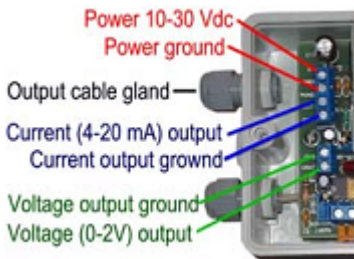
SD-type sensor is a highly precise incremental LVDT-based sensor for monitoring micro-variations of stem diameter in micron range.

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 1 meter. The output cable length should be specified in the order if required.

Connection

For models supplied without output cable, please use a four-core cable with 3 to 6 mm outer diameter. The connection diagram is shown in the picture below:

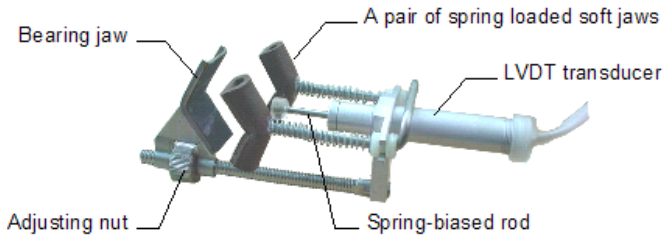


Connection scheme

Maximal length of the output cable is 10 m for sensors with voltage output and up to 200 m for sensors with 4 to 20 and 0 to 20 mA output.

For models supplied with the optional output cable, please refer to a wiring diagram attached to the sensor.

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 mm.



Calibrations table

V	mA	mm
0.000	4.000	0.000
2.000	20.000	5.000

Calibrations equations

SD-5/6M model: $\Delta D = 2.5 \times U$

SD-5/6Mi model: $\Delta D = 0.3125 \times I - 1.25$

Where ΔD – stem diameter variations

U – output voltage in Volts

I – output current in mA

Specifications

	SD-5P	SD-6P
Measurement range	0 to 5 mm	
Stem diameter range, mm	5 to 25	20 to 70
Output	SD-5/6M	0 to 2 VDC
	SD-5/6Mi	4 to 20 mA
Resolution	< 0.002 mm (w/filter)	
Operating temperature	0 to 50 °C	
Temperature effect	< 0.02% total stroke/°C	
Supply voltage	10 to 30 VDC	
Power	SD-5/6M	1.5 W max
	SD-5/6Mi	2 W max
Protection index	IP 64	
Cable length between probe and signal conditioner	1 m	



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