



Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

FI-XSM

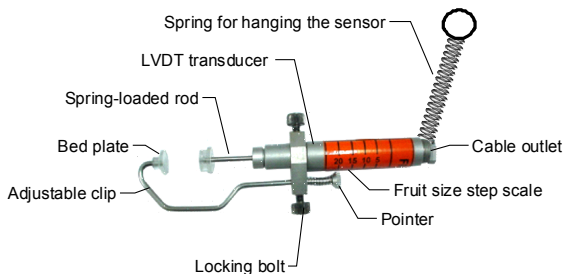
*Fruit Growth Sensor
(for 4 to 30 mm fruits)*



Introduction

The FI-XSM sensor is designed for monitoring growth of extra small rounded fruits, 4 to 30 mm in diameter.

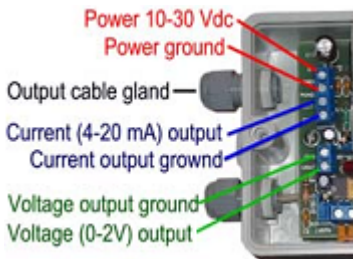
The sensor includes a linear displacement transducer (LVDT) provided with a special clip for positioning the sensor on a fruit under study. The LVDT stroke is 10 mm while the bed plate position may be adjusted to the fruit size within 3 to 30 mm.



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:



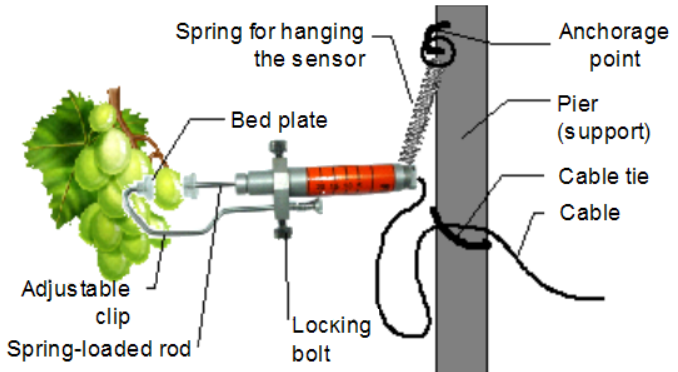
Connection scheme

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

Figure below illustrates a proper positioning of the sensor on a plant.



A stationary pier (support) is to be used for positioning the sensor and its cable. At first, adjust the sensor's clip to the fruit diameter by using a step scale located on the sensor's body.

1. Hang the sensor in the vicinity of the fruit using the attached hanging spring.
2. Free locking bolt and move the adjustable clip apart from LVDT transducer. Move the clip back until both a bed plate and a cup of the spring-loaded rod touch the fruit. Continue to move the clip until the pointer reaches the next closest line of the step scale. Fix the locking bolt.

The bedplate must have a firm contact to the fruit surface, which is opposite to the spring-loaded rod. Thus, the fruit is slightly gripped between the bed plate and the rod's cup.

The hanging spring holds the sensor and pulls it slightly backward, providing necessary position of the bedplate, which has to be in close contact with the fruit surface all the time. In this case, the rod moves forward and backward, relatively to the bedplate, following variations of fruit diameter.

The cable shall be secured also as it is shown in the picture.

The actual fruit size may be evaluated as a sum of a sensor reading and a step scale value indicated by the pointer.

Calibrations table

V	mA	mm
0.000	4.000	0.000
2.000	20.000	10.000

Calibrations equations

FI-XSM model: $\Delta D = 5 \times U$

FI-XSMi model: $\Delta D = 0.625 \times I - 2.5$

Where ΔD – fruit diameter variations

U – output voltage in Volts

I – output current in mA

Specifications

Measurement linear range (LVDT stroke)	0 to 10 mm	
Adjustable range of fruit diameter	4 to 30 mm	
Output	FI-XSM FI-XSMi	0 to 2 VDC 4 to 20 mA
Resolution	0.005 mm (w/filter)	
Operating temperature	0 to 50 °C	
Temperature effect	< 0.02% total stroke / °C	
Supply voltage	10 to 30 VDC	
Power	FI-XSM FI-XSMi	1.5 W max 2 W max
Overall dimensions, mm	110 × 40 × 15	
Protection index	IP 64	
Cable length between probe and signal conditioner	1 m	



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