Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

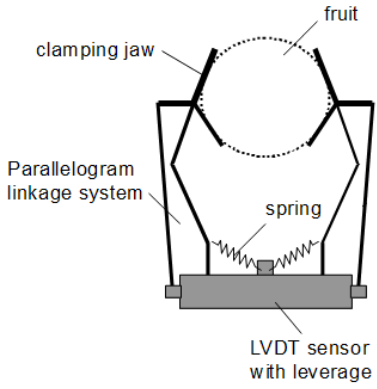
# FI-LM, FI-LMi
# FI-MM, FI-MMi
# FI-SM, FI-SMi

*Fruit Growth Sensors*


www.phyto-sensor.com

## *Introduction*

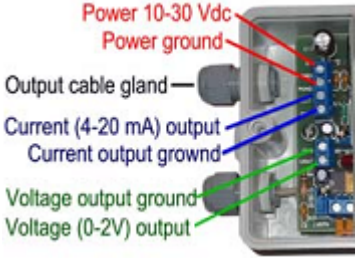
A series of absolute displacement sensors provides recording both size and growth rate of intact rounded fruits in three diameter ranges within 7 to 160 mm. Original parallelogram design of moving arms provides firm and straight positioning of the sensor's flaps on a fruit under study The FI-type sensor consists of an LVDT transducer mounted in a special clip, 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:



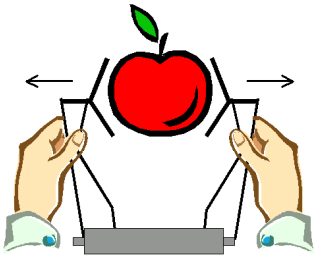

*Connection scheme*

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.

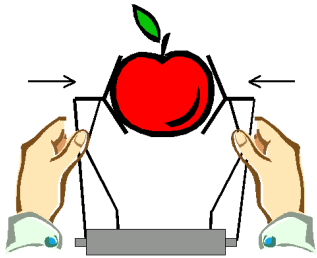
**For models supplied with the optional output cable,** please refer to a wiring diagram attached to the sensor.

## *Installation*

- Choose a fruit for attaching the sensor.
- Move clamping jaws apart so as the sensor can hold the fruit in the desired position.



*1*



*2*

- Check if the sensor holds the fruit firmly and cannot easily slide down with application of gentle force.
- Secure the sensor's cable on a stem to prevent occasional movement of the sensor.
- Check the position of the sensor regularly.

## *Calibrations table*

| | | D, mm | | |
|---|---|---|---|---|
| **V** | **mA** | ***FI-LM*** ***FI-LMi*** | ***FI-MM*** ***FI-MMi*** | ***FI-SM*** ***FI-SMi*** |
| 0.000 | 4.000 | 30.00 | 15.00 | 7.00 |
| 2.000 | 20.000 | 160.00 | 90.00 | 45.00 |

## *Calibrations equations*

***FI-LM*** *model:* D = 65×**U** + 30

***FI-LMi*** *model:* D = 8.125×**I** – 2.5

***FI-MM*** *model:* D = 37.5×**U** + 15

***FI-MMi*** *model:* D = 4.6875×**I** – 3.75

***FI-SM*** *model:* D = 19×**U** + 7

***FI-SMi*** *model:* D = 2.375×**I** – 2.5

Where **U** – output voltage in Volts
**I** – output current in mA

## *Specifications*

| | FI-LM | FI-MM | FI-SM |
|---|---|---|---|
| Measurement range, mm | 30 to 160 | 15 to 90 | 7 to 45 |
| Resolution, mm | 0.065 | 0.038 | 0.019 |
| Sensitivity, mV/mm | 15.4 | 26.7 | 52.6 |
| Output FI-L/M/SM<br>FI-L/M/SMi | 0 to 2 VDC<br>4 to 20 mA | | |
| Operating temperature | 0 to 50 ℃ | | |
| Temperature effect | < 0.02% total stroke/℃ | | |
| Excitation time | 5 s | | |
| Noise | < 1 mV w/filter, 1 kHz cutoff | | |
| Supply voltage | 10 to 30 VDC | | |
| Power FI-L/M/SM<br>FI-L/M/SMi | 1.5 W max<br>2 W max | | |
| Protection index | IP 64 | | |
| Cable length between probe and signal conditioner | 1 m | | |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