



Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

LT-xM (LT-1M, LT-4M)

Leaf Temperature Sensors

Quick Start Guide



Series 5000

phyto-sensor.com

Introduction

The LT sensor is a subminiature touch probe that measures absolute temperature of a leaf. The lightweight stainless steel wire clip holds a high precision glass encapsulated thermistor, which is about a millimeter in diameter. Small size of the probe and its special design provide almost negligible disturbance of the natural leaf temperature. The thermistor is connected to the clip by thin 0.15 mm leads to minimize heat conduction and response time. All conductors are proofed to avoid corrosion under the wet operating conditions.

The probe is connected by the cable to the waterproof in-cable signal conditioner inside. Every sensor is tuned and calibrated within the measurement range. The tolerance range is $\pm 0.08^{\circ}\text{C}$.

The LT-4 sensor has 4 probes.

Installation

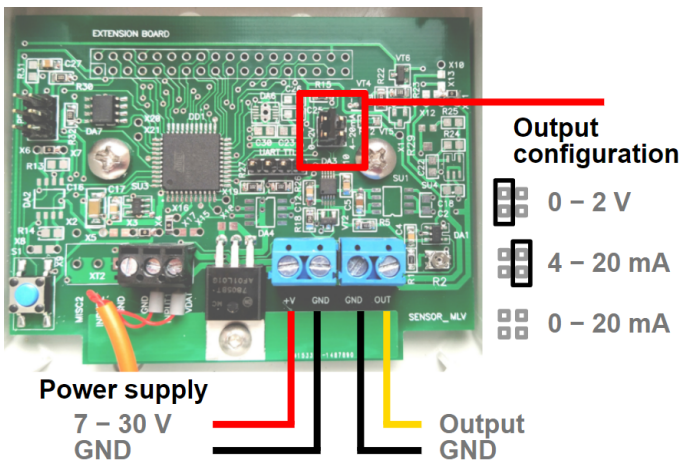
Open the clip and attach the sensor to a leaf. Thermistor should be placed at the lower shady side of the leaf.

Secure the sensor's cable on plant stem with adhesive band in order to prevent occasional movement of the sensor.

Connection

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

The connection diagram is shown in the picture below (modification of the output is determined by appropriate jumpers):



First, please choose a right output cable for connecting the sensor to a datalogger. The cable must be round with four wires. The maximal diameter of the cable is 6.5 mm. The cable length shall not exceed 10 m for 0 to 2 Vdc output (model LT-xM) and with about 1 km maximal length for 4 to 20 mA or 0 to 20 mA output (model LT-xMi).

Power supply

The 7 to 30 Vdc @ 13 mA (+20 mA for current output) regulated power supply may be used.

In case of using the intermittent power supply, please respect the following recommendations:

When using analog outputs, all possible measures for reducing instrumental errors shall be undertaken:

- Screened cables.
- Cables with low impedance.
- Filtration of the signal with low cutoff frequency.
- Digital filtration of the signal.

Calibration equations

0 to 2 Vdc Output

$$T = 25 \times U$$

4 to 20 mA Output

$$T = 3.125 \times I - 12.5$$

0 to 20 mA Output

$$T = 2.5 \times I$$

where:

T — measured temperature, °C

U — output voltage, V

I — output current, mA

Calibration table

U, Volts	I, mA 4 to 20	I, mA 0 to 20	T, °C
0.0	4.0	0.0	0.0
0.2	5.6	2.0	5.0
0.4	7.2	4.0	10.0
0.6	8.8	6.0	15.0
0.8	10.4	8.0	20.0
1.0	12.0	10.0	25.0
1.2	13.6	12.0	30.0
1.4	15.2	14.0	35.0
1.6	16.8	16.0	40.0
1.8	18.4	18.0	45.0
2.0	20.0	20.0	50.0

Specifications

Measurement range		0 to 50°C
Outputs		0 to 2 Vdc 4 to 20 mA, 0 to 20 mA
Instrumental accuracy		< 0.15°C
Output auto update time		5 s
Excitation time		80 ms
Supply voltage		7 to 30 Vdc
Current consumption		< 13 mA (+20 mA for current output)
Number of probes	<i>LT-1</i>	1
	<i>LT-4</i>	4
Probe weight		1.6 g
Contact area of thermistor		About 1 mm ²
Probe dimensions		50 × 20 × 10 mm
Protection index		IP64
Cable length between probe and signal conditioner		1 m

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.

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