



*Bio Instruments S.R.L.*

**SENSORS AND SYSTEMS  
FOR MONITORING GROWING PLANTS**

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**LT-xT-V**  
**(LT-1T-V / LT-12T-V / LT-4T-V)**  
*Leaf Temperature Sensor*

***Quick Start Guide***



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

Version: 3.0

# 1 Introduction

The LT-1T-V, LT-12T-V, and LT-4T-V leaf temperature sensors contain a subminiature touch probe that measures absolute temperature of a leaf or air. 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 a standard 0.5-meter cable to the waterproof in-cable signal conditioner. The output cable standard length is 3.5 m, and it is customizable at ordering. Every sensor is tuned and calibrated within the measurement range. The tolerance range is  $\pm 0.08$  °C.

Output: 0 to 2 Vdc.

**LT-1** — a single probe sensor.

**LT-12** — a single probe sensor with a lightweight open-work holder for suspension of another standard LT-1 probe at a certain distance below the LT-12 probe. When installed on a plant leaf, the LT-12 probe measures the leaf temperature, and the LT-1 probe, which is suspended below, measures the air temperature outside the boundary layer near the measurement point on the leaf. That realizes a remarkable possibility to measure correctly the temperature difference between the leaf and air in a close vicinity.

**LT-4** — a four-probe sensor.

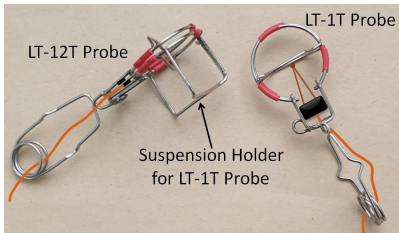
## 2 Installation

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

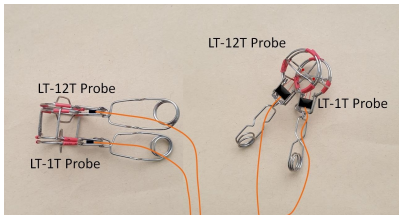
*Secure the sensor's cable on plant stem with adhesive band in order to prevent occasional movement of the sensor.*

# LT-12 sensor

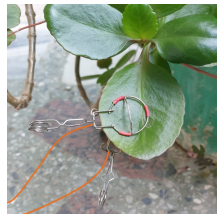
The outline of the LT-1 and LT-12 probes is illustrated in the Figures below.



(a) LT-12 and LT-1 Probes



(b) The coupled LT-12 and LT-1 Probes



(c) The coupled probes on a leaf

Figure 1: LT-12 and LT-1 Probes

## 3 Connection

**The sequence and correctness of the connection must be observed!** The shield shall be grounded at the data loggers side or connected to the 'minus' contact of the power source.

### Connection order

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1	White	Ground
2	Black	Shield
3	Yellow	Voltage Output 0 to 2 Vdc
4	Red	Power V1: 2.8 to 12 Vdc V2: 5.0 to 16 Vdc

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## 4 Power

The sensors are to be powered from an external regulated power supply with 2.8 to 12 Vdc output voltage (V1 modification) or 5 to 16 Vdc (V2 modification).

## 5 Calibration equations

$$T = 25 \times U,$$

where:

$T$  — measured temperature, °C

$U$  — output voltage, V

## 6 Calibration table

U, V	T, °C
0.0	0.0
0.2	5.0
0.4	10.0
0.6	15.0
0.8	20.0
1.0	25.0
1.2	30.0
1.4	35.0
1.6	40.0
1.8	45.0
2.0	50.0

## 7 Specifications

Measurement range	0 to 50 °C
Instrumental accuracy	<0.15 °C
Tolerance range	±0.08 °C
Analog linear output	0 to 2 Vdc
Excitation time	70 ms
Output auto update time	5 s
Supply voltage	V1: 2.8 to 12 Vdc V2: 5 to 16 Vdc
Current consumption	6 mA max.
Probe weight	1.6 g
Contact area of thermistor	About 1 mm <sup>2</sup>
Probe dimensions	50 × 20 × 10, mm
Protection index	IP64
Cable length	Customized (4 m total standard length)

## 8 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, and phone number along with a description of your problem.



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