



Bio Instruments S.R.L.

SENSORS AND SYSTEMS
FOR MONITORING GROWING PLANTS

LT-IRM

Infrared Leaf Temperature Sensor



Exclusively Distributed & Supported By:



edaphic scientific

environmental research & monitoring equipment

Introduction

The LT-IRM infrared temperature sensor offers intelligence in a rugged, easy-to-use package. Every sensor is individually tested and calibrated within the measurement range.

The LT-IRM probe comes in a weatherproof box with a holder.

Installing the sensor

Install LT-IRM as close as practical to view target foliage to be measured. Use the sensor's holder to mount the LT-IRM.

Please note that the LT-IRM has 5:1 field of view. The field of view is the ratio of the distance to the object being measured, and the diameter of the temperature measurement area. For example, if the thermometer has a field of view specification of 5:1, holding the thermometer 5 meters from the target will result in a meter diameter spot size (measurement area) on the target. Holding the thermometer 10 meters from the target will result in a measurement area of 2 meters, and so on.

Keep the sunlight at back of the sensor.

Remember that when you shine at an angle, the beam being cast will be oval, (similar to a flashlight beam) just something to bear in mind.

Hold the sensor so that the beam will not see the sky or soil, the confounding variables.

Selecting Outputs

The LT-IRM sensor has the following analog and digital outputs:

Analog: 0 to 2 Vdc, or 0 to 20 mA, or 4 to 20 mA, selected by jumpers;

Digital: RS232, or RS485, or SDI-12, or UART-TTL, selected by micro-switches.

Only one analog output and one digital output may be active at a time.

The appropriate positions of jumpers and switches are described below.

First, please choose a right output cable for connecting the sensor to a datalogger. The cable must be round with four wires for analog outputs and five wires for digital outputs. The maximal diameter of the cable is 6.5 mm. The cable length shall not exceed 10 m for all outputs except the current outputs and RS485 with about 1 km maximal length.

Run the cable through the appropriate inlet and connect accordingly:

- Power wires to XT1
- Analog output to XT6
- Digital output to the appropriate contact of the terminal XT2-XT5

Select the desired type of digital output by using the selector switch as follows:



RS232

Position 3-1



RS485

Position 2-1



SDI-12

Position 3-0



UART TTL

Position 2-0

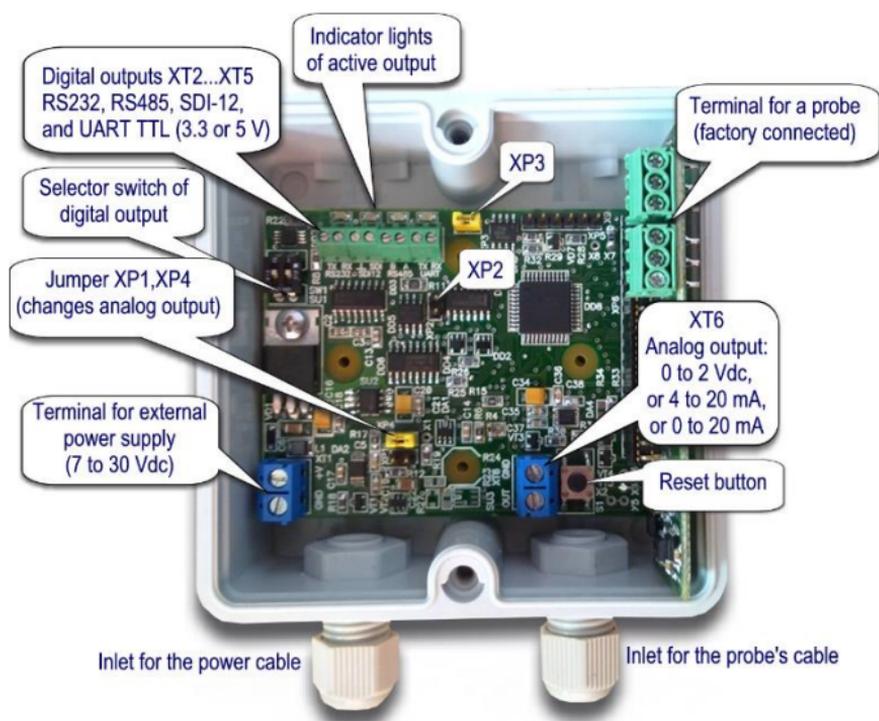


Figure 1. PCB

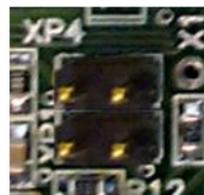
Select the desired type of analog output by appropriate position of the jumper XP1, XP4 as follows:



0 to 2 Vdc
Jumper on XP4



4 to 20 mA
Jumper on XP1



0 to 20 mA
No jumper

Jumper XP2 is used for the RS485 output if the sensor is the last chain in the line.

Jumper XP3 changes the level of the UART TTL output. If the jumper is on, the voltage level is 3.3 V; in case of no jumper, the voltage level is 5 V.

Power supply

The 7 to 30 Vdc@100 mA regulated power supply may be used for 0 to 2 V analog output, and for all digital outputs.

For current output (4 to 20, or 0 to 20 mA), the minimal power voltage shall be determined from the following conditions:

$$U > 0.24 R_2 + 0.02 R_1, \text{ and } U > 7 + 0.2 R_2$$

Where R_1 is the value of the input load resistor of the

datalogger, and R_2 is the power wires resistance.

Example: $R_1 = 500 \text{ Ohm}$, and $R_2 = 100 \text{ Ohm}$.

$$U > 0.24 \times 100 + 0.02 \times 500 = 12.4 \text{ V}$$

$$U > 7 + 0.2 \times 100 = 9 \text{ V}$$

Therefore, the minimal power voltage must be above 12.4 V.

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

- Analog outputs require at least 2 seconds excitation time for producing stable output signal.
- Digital outputs transmit output signal a second after application of power.

Data logging

Digital outputs have the following data format:
UART, Baud Rate = 9600, 8N1.

Decimal data format: XX.X (°C).

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

- Screened cables.

- Cables with low impedance.
- Twisted pair cables.
- Filtration of the signal with low cutoff frequency.
- Isolated power supply and data logger.
- Digital filtration of the signal.
-

Calibration table for linear analog outputs

0..2 V	4..20 mA	0..20 mA	Temperature °C
0 V	4 mA	0 mA	0
2 V	20 mA	20 mA	60

Maintenance:

The sensor's lens is protected by a special crystal window. Please maintain it clear for best accuracy of the sensor. Clean it with the use of soft cloth and a glass-cleaning agent, if necessary.

Specifications:

Measurement range: 0 to 60 °C

Absolute accuracy: ± 1.0 °C

Repeatability: ± 0.1 °C

Field of view: 5:1

Emissivity setting: 0.9

Spectral response: 5.5 to 14 µm

Ambient temperature: 0 to 50 °C

Sensor's dimensions (w/holder): 140H x 90W x 150D mm

Sensor's weight (approximate): 400 g

Protection index of the sensor: IP 54

Power requirements: 7 to 35 Vdc @ 50 mA max.

Output auto update time: 5 s

Support & Further Information Contact:

Edaphic Scientific Pty Ltd

www.edaphic.com.au

info@edaphic.com.au

Ph: 1300 430 928