OPERATING MANUAL

HD3901

Leaf wetness sensor

EN

V1.0

senseca

Contents

1 Introduction

The **HD3901** leaf wetness sensor detects the presence of condensation on its sensitive surface and has been designed to reproduce in an extremely accurate way the thermo-dynamic behavior of a leaf.

The leaf wetness degree is basic information in the agricultural and floriculture fields to determine the most appropriate phytosanitary treatment to prevent mold and fungal infections in general that can affect the plants and crops in the presence of condensation on the leaves.

The double sensitive surface allows to determine the wetness degree both on top and bottom of the leaf, an important feature to get accurate indications, being that the two sides of the leaf have different drying times.

To ensure a long duration of the sensor, the surface of the sensor is specially treated to resist to the atmospheric agents and to the chemical agents present in pesticide products.

The circuit board is protected inside a sealed housing made of plastic material, which allows achieving reliable measurements even in environments with high condensation.

Two 0.5...3 V analog outputs.

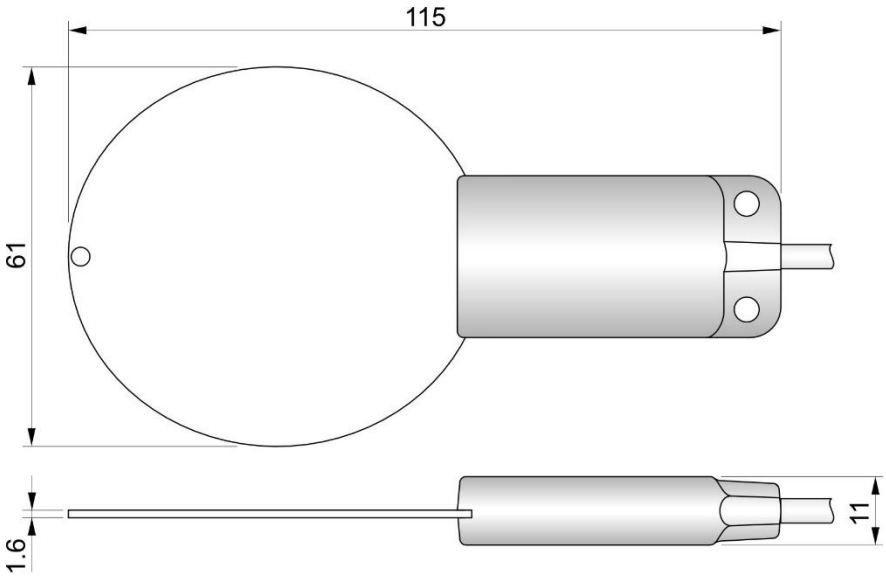
The sensor is supplied factory calibrated and does not require any calibration by the user.

Fixed connecting cable, length 5 m (HD3901.5) or 10 m (HD3901.10), ending with open wires.

2 Technical specifications

Measuring principle	Capacitive
Measuring range	0…100% of leaf area wetness
Accuracy	± 5%
Power supply	5…18 Vdc
Consumption	< 1 mA
Output	2 x analog 0.5…3 V
Operating temperature	-30…+60 °C
Cable	4 poles ending with open wires, length 5 or 10 m depending on the model
Materials	Housing: PP Sensitive area: copper grid on glass epoxy substrate
Weight	100 g approx. (including the 5 m cable)
Protection Degree	IP 67

Dimensions (mm)



3 Measuring principle

On the sensitive surface of the sensor, two grid shaped electrodes are placed. The sensor detects the change of the dielectric constant between the two electrodes caused by the presence of water drops on the surface.

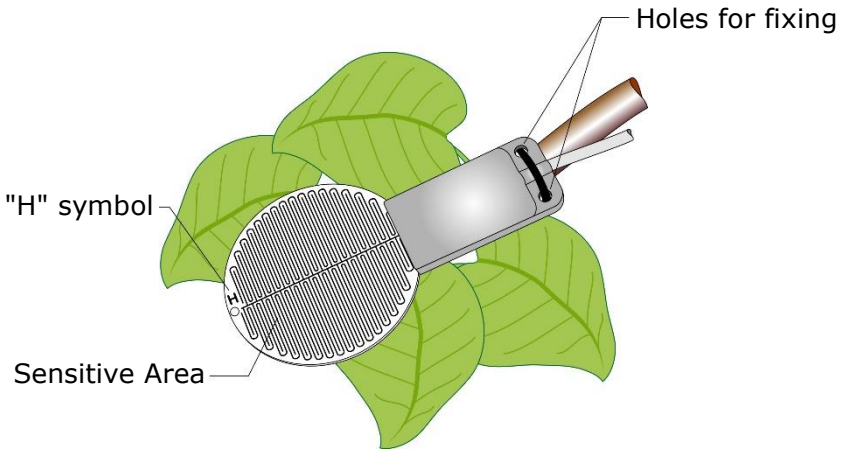
Thanks to its operation principle, the sensor can detect even the presence of small water droplets, unlike common sensors which are based on the resistance or conductivity measurement, which require that the drop of water to be detected between the two electrodes has a minimum size.

The construction materials and the white color of the sensitive surface have been chosen to simulate, in the most reliable way as possible, the thermal and radiative properties of a real leaf.

4 Installation

The sensor can be positioned inside the foliage of the plant (the optimal position depends on the type of plant, but preferably place it on the layer of the outer foliage) or it can be fixed to a meteorological station mast placed in proximity of the cultivation.

Place the sensor with the sensitive surface facing upwards and fix it with a clamp or screws using the two holes in the plastic support near the cable. One of the two sensitive surfaces is distinguished by the **H** (High) symbol placed near the hole at the end of the sensor. The two surfaces are functionally identical, but it is convenient to position the surface with the **H** symbol facing upwards to remember more easily the arrangement of the two surfaces.



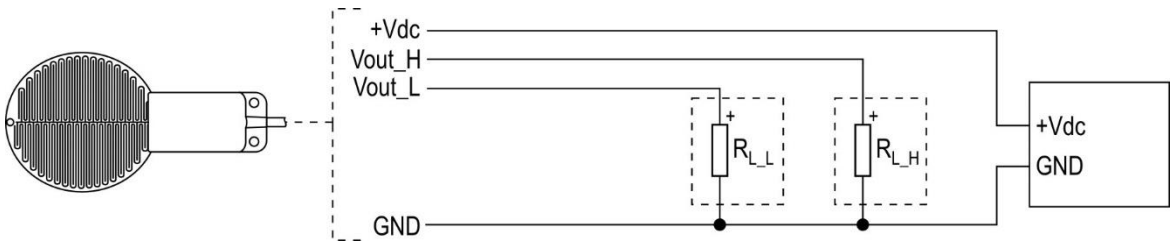
The sensor should be inclined at about 30÷45° with respect to the ground, so as to prevent the stagnation of condensation or rainwater on the sensitive surface and simulate the real condition of the leaf type of the cultivation under examination.

In case of installation on a meteorological station, fix the sensor to a proper angle stirrup.

Make sure that the sensitive surface is not in contact with leaves, branches or other objects.

4.1 Electrical connections

Wire color	Function
Red	+Vdc (Power supply positive)
White	+Vout_H (Positive of **upper** sensitive surface output, with **H** symbol)
Blue	+Vout_L (Positive of **lower** sensitive surface output, without **H** symbol)
Brown	GND



Load resistance RL > 10 kΩ.

Connect the cable shield to the negative of power supply.

To connect the sensor to a data logger with maximum input voltage lower than 3 V, place a resistive divider between the sensor and the data logger to reduce the input voltage of the data logger.

5 Measurement

The 0.5...3 V analog voltage output corresponds to 0...100% degree of wetness.

The degree (percentage) of wetness indicates how much sensitive surface is covered by the water compared to the total surface of the sensitive area.

Dynamics of the leaf wetness degree:

To detect the foliage wetting and/or drying time, connect the sensor to a data logger with at least two voltage analog inputs, then start the recording of the measurements in the data logger. By regularly checking the recorded data, it is possible to analyze and keep under control the time behavior of the foliage wetness degree.

6 Maintenance

The sensor does not require special maintenance.

We recommend a periodic cleaning of the sensitive surface with water and normal detergent in order to avoid the accumulation of antiparasitic substances or other elements present in the air that could alter the measurement of the sensor.

7 Safety instructions

The net radiometer proper operation and operating safety can be ensured only in the climatic conditions specified in this manual and if all standard safety measures as well as the specific measures described in this manual are followed.

Do not use the instruments in places where there are:

- Corrosive or flammable gases.
- Direct vibrations or shocks to the instrument.
- High-intensity electromagnetic fields, static electricity.

User obligations

The instrument operator shall follow the directives and regulations below that refer to the treatment of dangerous materials:

- EU directives on workplace safety.
- National law regulations on workplace safety.
- Accident prevention regulations.

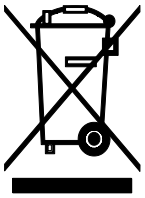
WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages.
The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased.
We reserve the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

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senseca.com

Senseca Italy S.r.l.
Via Marconi, 5
35030 Selvazzano Dentro (PD)
ITALY
info@senseca.com