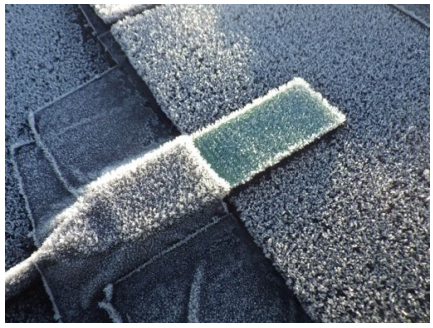
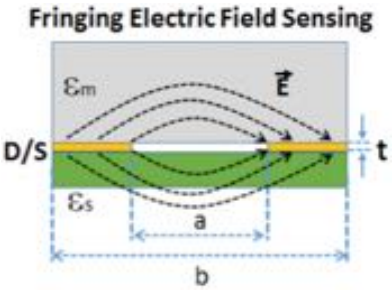


Condensation Sensor Datasheet

General Description

The SMT Condensation Sensor is used to detect the presence of condensation, frost, or ice using dielectric based capacitance sensing.

Horizontal planar sensing elements couple to water ions through a fringing electric field. When condensation or frost forms on the sensing grid, the electric field passes through the ions, which act as the dielectric medium of the capacitor.



Ions on the top of the electrodes (D/S) have a dielectric constant εm, and the dielectric material of εs is the substrate of the sensing electrodes.

Based on these changes the capacitance can then be calculated.

Typical Applications

- Condensation detection
- Ice or frost detection
- Capacitive moisture detection
- Moisture monitoring in masonry

Features

- Sensor outputs linear voltage when in contact with condensation, frost, ice, snow, and/or rain
- Sensing element can be activated on either side of the sensor. Element on the top side is active by default.
- Integrated thermistor and external bead thermistor available. External thermistor is used if temperature of a specific surface is required.
- Mounting hole in centre of PCB.
- Electronics are sealed and are suitable for outdoor monitoring.
- Low profile allows the sensor to be inserted into a thin slot in masonry.
- Compatible with SMT Industrial WiDAQ and A2/A3 data acquisition units.
- Capacitance sensor element using SMT moisture detection tape is available. Calibration data has been developed for masonry moisture content monitoring.

Ordering Information	
Condensation sensor with 6' audio jack	COND-002-006
Condensation sensor with 30' leaded cable	COND-001-030

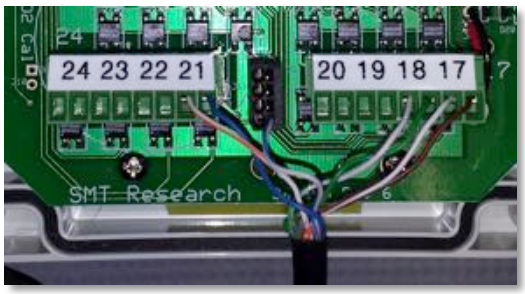
Specifications	
Input Voltage (max)	5V
Measurement Time	10ms
Output Voltage Range	100mv to 1500mv
Operating Temperature	-20ºC to 60ºC
Dimensions	85mm x 25mm

No.	Audio Cable	CAT5	Function
1	Red	Blue	V+
2	Black	Blue/White	Ground
3	Green	Orange/White	V output
4	White	Brown Pair	External Temp
5	---	Green Pair	Internal Temp

Connection to A3 4R4V

Connect the wires to an A3 4 Resistance/ 4 Voltage unit as shown below.

Input	Input Type	Wire Color	Function
17-20	Resistance	Brown Pair	Temperature MF52
21-24 pin 1	Voltage	Blue	5V Power
21-24 pin 2	Voltage	White/Orange	Condensation
GND	Ground Bar	White/Blue	Ground



To connect to the ground bar, simply push the white/blue wire into the circular slot. To release a wire from the ground bar push a small slot screwdriver into the slot adjacent to the wire you wish to release, gently pull on the wire and it will be released. Any pin on the ground bar can be used.

Recommend using external thermistor if temperature is required (brown pair). The thermistor on the condensation sensor is not required for compensation, connecting the thermistor is optional.

Setup in BiG/Analytics

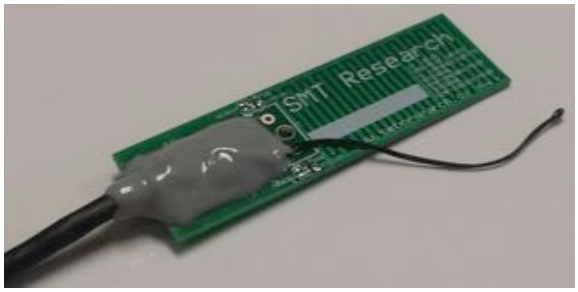
Sensor readings are in microvolts. No conversion factor is available; therefore leave the sensor type as *unknown*.

Operation Principles

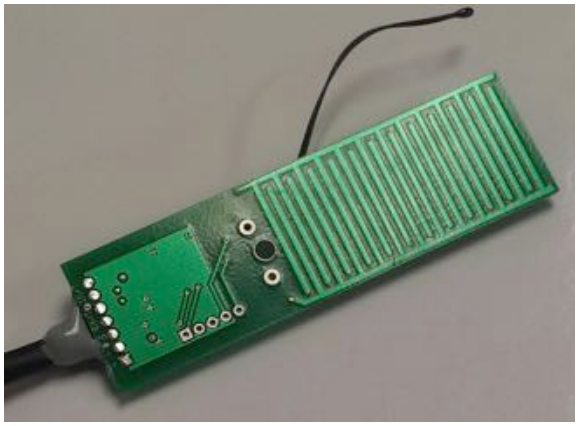
The Condensation Sensor measures the fringing electric field of a zone that spans approximately *5mm* from the upper surface of the sensor.

The dielectric constant of water (~80) and ice (~5) is higher than that of air (~1), so the measurement is dependant on the presence of moisture or frost on the sensor's surface.

The sensors output (µV) is proportional to the dielectric constant in the measurement zone. and therefore proportional to the amount of water or ice on the surface.



Top side sensing element (default)



Bottom side sensing element

Interpreting Data

Finite states have been characterized with respect to specific conditions.

Readings of the various conditions were characterized in the following table:

	Dry	Condensation	Rain	Ice	Snow	Frost
Temperature		>0ºC	>0ºC	<0ºC	<5ºC	<5ºC
Sensor	<160mV	160-300mV	400-800mV	155-500mV	1-1.5V	>200mV
Dewpoint						<-0.1ºC

As condensation develops, the voltage will increase greater than 160mV. Once it is greater than 300mV it typically begins to converge into water droplets.

The ranges indicated may vary as debris collects on the surface. It is recommended to clean the surface with isopropyl alcohol and inspect regularly.

The following graph shows the water weight vs voltage output. This includes water on other portions of the sensor and not just the sensing surface.

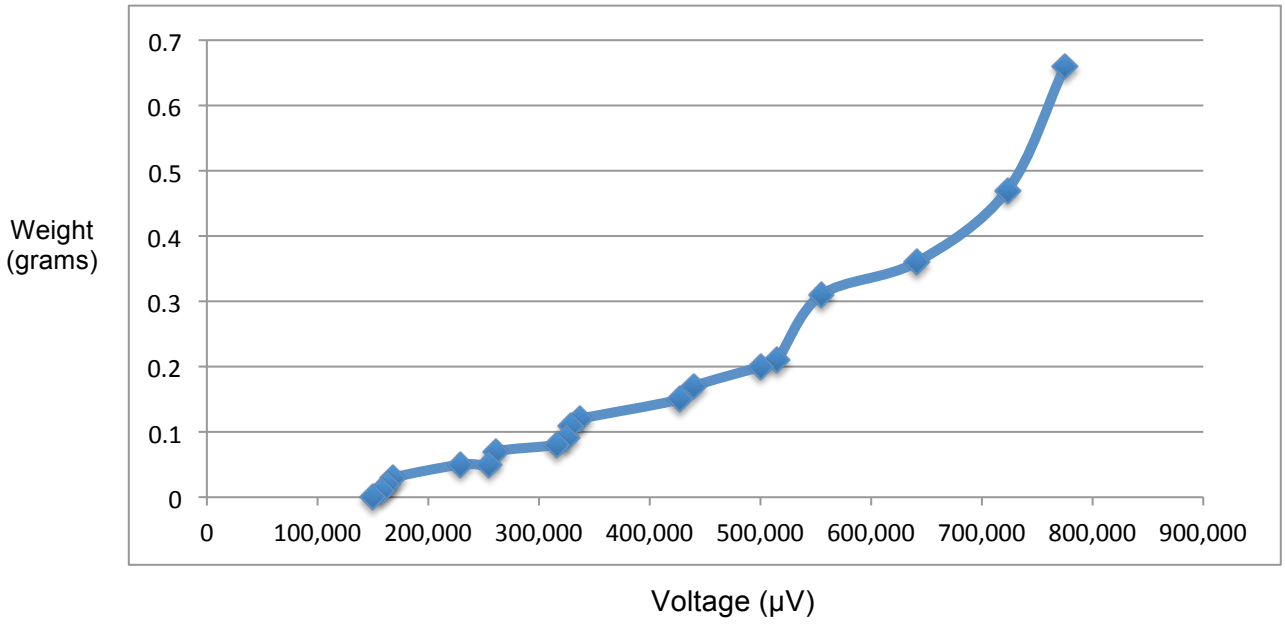


Figure 1 Water Weight vs Sensor Voltage Output