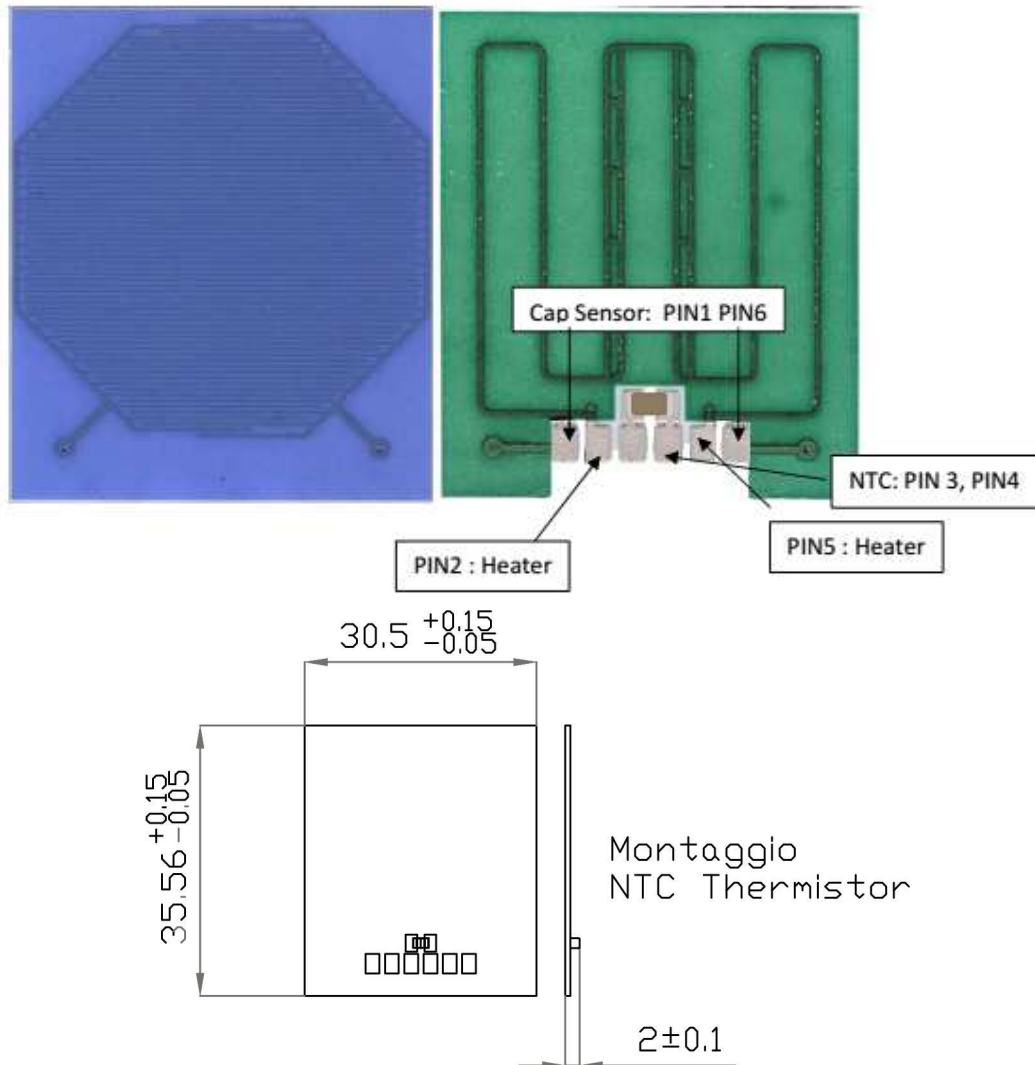


Aurel has developed a capacity sensor, component able to notice the presence of water on its surface. It's realized on ceramic substrate and thanks to its sensitivity area is able to change the capacity depending on the ratio water accumulated on it.



Picture 1: On left side, the sensitivity area. On the right side the heater.
The above dimensions have to be considered in mm.

The technology (glassy coverage of substrate) guarantees high reliability due to the great stability of the support and the inalterability of the surface "sensitive", also after cleaning with solvents and/or heavy external conditions of employment.

Moreover in presence of the water, the capacitance goes to high values compared to dry conditions and the ratio changing is over 400%.

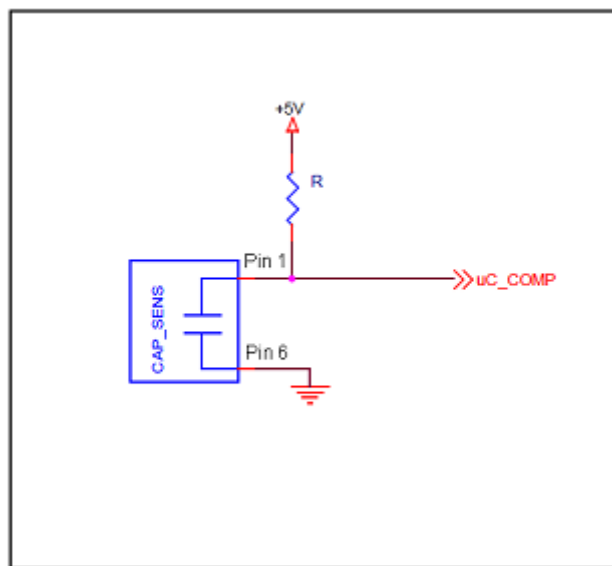
In the table_1 is shown how the capacitance changes in the ratio of percentage of the sensitive area when covered by water.

Technical features are subjected to change without notice. AUR°EL S.p.A doesn't assume any responsibility for damages due improper use.

Sensitive area	Capacitance	Ratio capacitance
(% Water)	(pF)	(%)
0	110 ($\pm 15\%$)	0
25	199	81
30	267	173
50	375	241
100	≥ 490	≥ 360

Table 1

In the picture number two is showed an example of schematic for the capacitive sensor.



Picture 2: The simplest hardware is a low cost microcontroller and few other parts

On the back side of the capacity sensor it is available a NTC temperature sensor with a nominal resistance value of 100k Ohm at 25°C.

The NTC components can be used to monitor the environment temperature and to control the heater against hard environmental condition as frost and dump deposits on the capacity area.

For the NTC component values refer to EPCOS/TDK P/N: B57471V2104J062 datasheet.

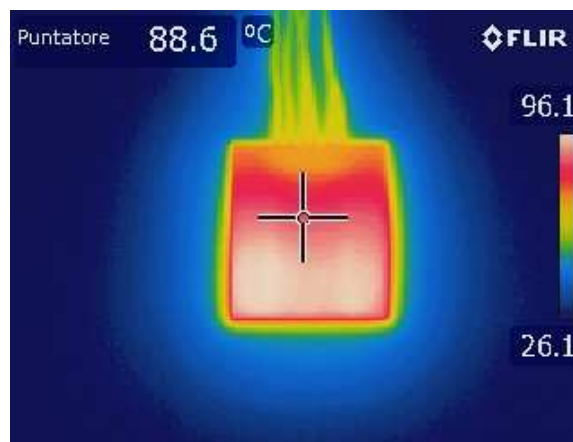
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Example of application

By using this technical specification:

- Voltage supply at 12 VDC
- Current consumption at 0,250 mA
- Environmental temperature: 25°C
- Power cables of length 20 cm.

Below the analysis with thermo camera:



Picture 2: It shows the temperature of the Capacity Sensor

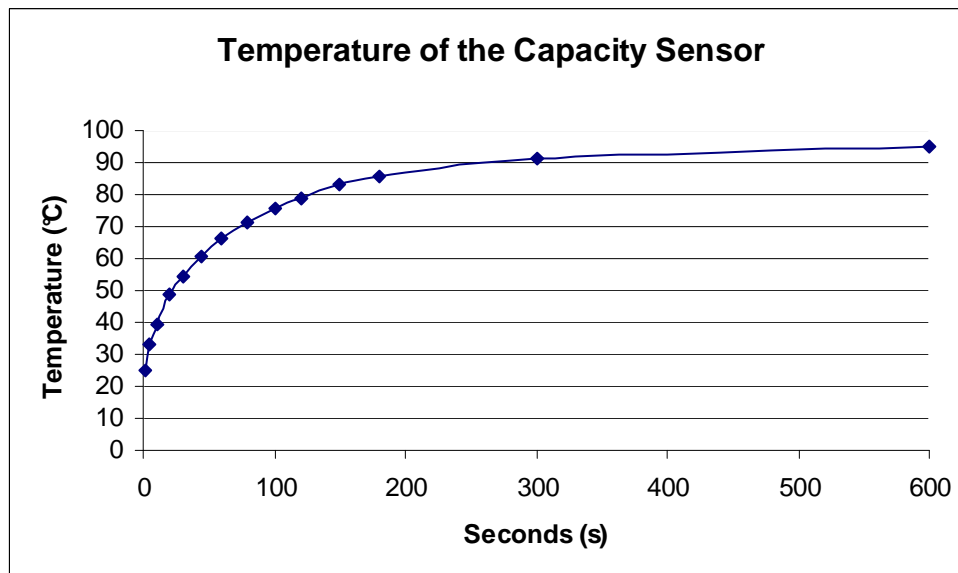


Diagram 1: It shows the behaviour of the temperature Vs time

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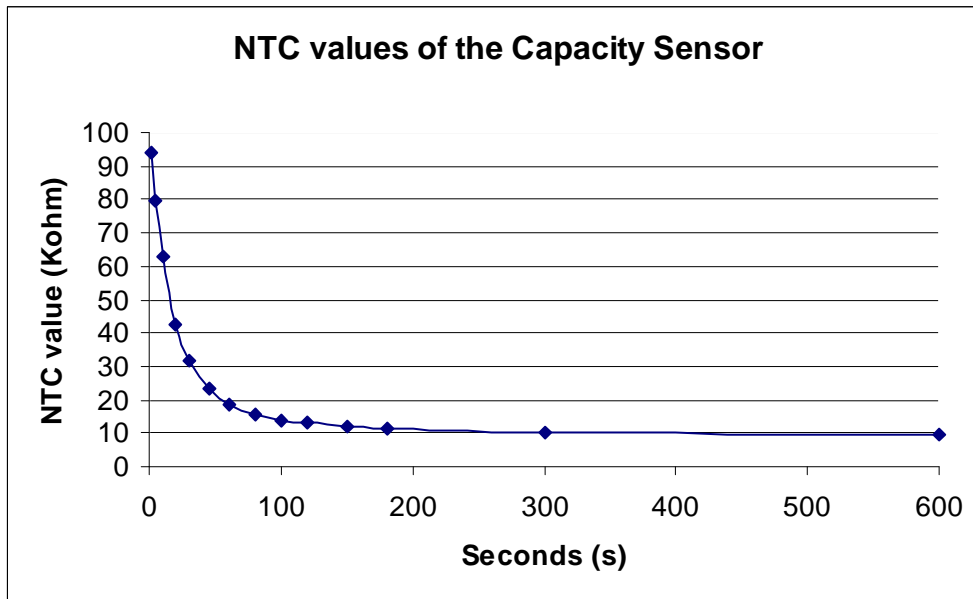


Diagram 2: It shows the behaviour of the NTC Vs time

Time (s)	NTC (KΩ)	Temperature (°C)
1	93,783	25,300
5	79,833	33,350
10	62,833	39,583
20	42,667	48,450
30	31,833	54,683
45	23,167	60,633
60	18,833	66,467
80	15,500	70,950
100	14,000	75,383
120	13,000	78,900
150	12,117	83,200
180	11,517	85,550
300	10,417	91,100
600	9,333	95,233

Table 2: It shows the behaviour of the NTC and the temperature Vs time

APPLICATION NOTE: By apply a drop of water after ten minutes in the same test conditions the capacitance and the NTC value goes to high values until the heater dries the surface; typically on average in about 45 seconds. When the surface is dry the capacitance and the NTC value goes back quickly to nominal values.

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NOTES: The capacity sensor has been tested without enclosure and with a working temperature of 25 °C.

Based on the above characteristics the customer has the possibility to design his own application.

The sensor can't support temperature higher than 200 °C , otherwise the soldering will be damaged.

Not to Be Used for Specification Purposes

The values contained herein are considered typical properties only and are not intended to be used as specification limits. The above characteristics are to be verified in customer application.

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