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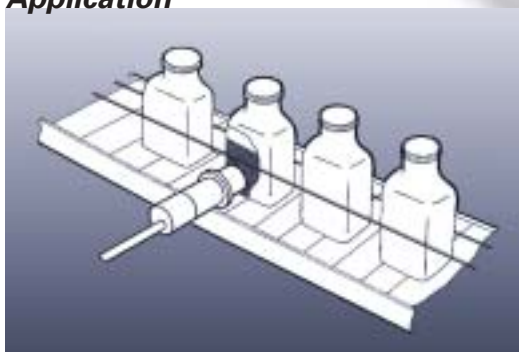
Capacitive high temperature sensor

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Installation dimensions and accessories

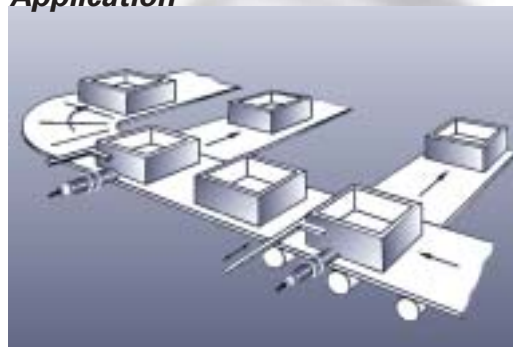
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Application



Liquid level within a plastic or glass container

Application



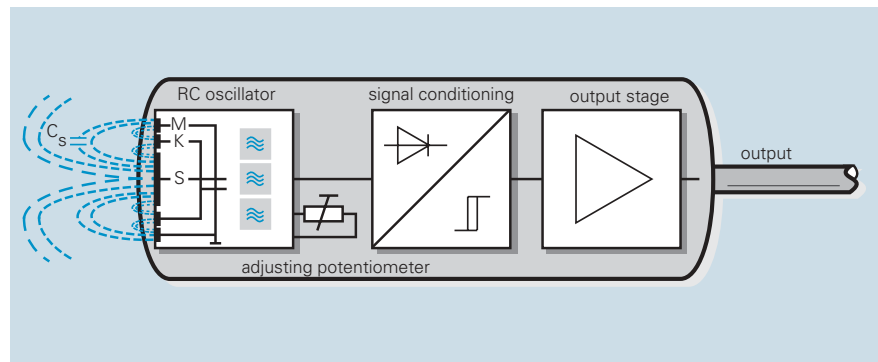
Product presence verification during packaging and assembly operations

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Design and mode of operation

Theory of operation



The RC oscillator starts up when the sensitive capacitance C_s of the sensing element is affected by an external object. The internal change in current is detected by an adjustable trigger which controls the sensor output.

Cause of change in capacitance C_s

- Proximity to **conductive objects**

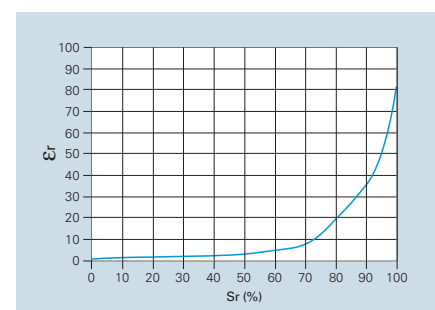
If an object of conductive material is located within the sensing distance of the sensor, it will form two series connected capacitances with sensor areas S and M. The series connected capacitances are much larger than the capacitance of the undamped oscillator. Maximum sensing distance can be achieved with conductive objects like metals, water etc..

- of **non-conductive objects**

If a non-conductive object is moved into the sensor field, the field will be amplified in relation to the relative permittivity (ϵ_r) of the material to be detected and thus increase capacitance C_s . As from a relative permittivity of $\epsilon_r = 81$ (water), sensing distances can be achieved that are equivalent to those for conductive materials. The sensing distance is reduced for materials with a lower ϵ_r .

Material	Relative permittivity (ϵ_r)
Air, vacuum	1
Paper	1,2 - 3
Paraffin oil	2,2
PVC	3
Glass	3 - 5
Wood	2 - 7
Marble	8,4 - 14
Alcohol	25
Methanol	33,5
Water	81

Sensing distance in relation to ϵ_r



Close range shielding

The capacitive sensor responds to all materials whose relative permittivity ϵ_r is greater than 1 (air, vacuum). This means that dirt deposits and moisture on the sensor surface are also detected. In order to avoid this unwanted effect, Baumer sensors have been equipped with an additional compensating electrode (K).

This electrode is used to generate an electric field close to the sensor surface which counteracts the main field. A field free area is produced in proximity to the electrode in which objects may be located without being detected by the sensor. Although this design is a very effective solution to the problem of unwanted switching it is not completely foolproof.



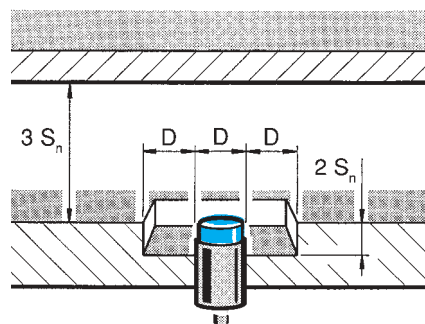
Mounting instructions

○ unshielded (non-flush) mounting

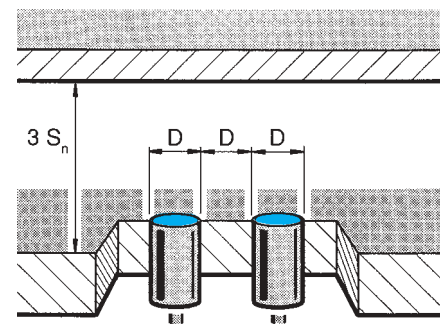
● shielded (flush) mounting

When installing unshielded capacitive sensors, they must be mounted such that there is no interfering material within a certain perimeter around the active face. This perimeter has a radius of $2 \times$ the diameter of the sensing head. Unshielded capacitive sensors are insensitive to soiling as well as condensation on the sensing head. They are especially suited for the detection of conductive target materials like metals, water etc.

Shielded capacitive sensors may be flush-mounted in metal and other materials. They are especially suited for the detection of non-conductive target materials, such as plastics, wood, glass, etc. As compared to unshielded versions, shielded sensors have a slightly increased sensitivity to soiling and condensation on the sensor's face.



- unshielded (non-flush) mounting



- shielded (flush) mounting