

MEMS-based vs. Fluid-based inclination measurement Comparison of two different inclination measurement principles

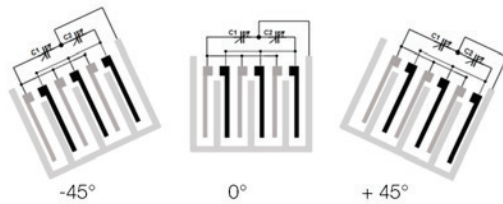
What is the difference between MEMS- and Fluid-based inclination measurement?

How it works

MEMS-based

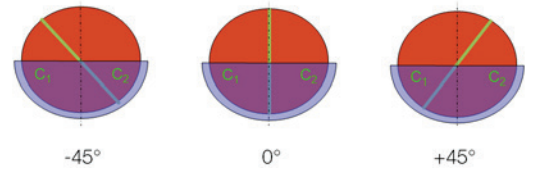
Both work with a capacitive measurement principle: Capacity is changing in accordance to the angle of the sensor, which is a measure for the inclination.

Many inclination sensors measure the inclination angle with the help of MEMS-Chips. These compact chips contain micro-mechanical structures which, under the influence of gravitational force, move according to the inclination. The only variable is the distance between the capacitor plates and the fixed base.



VS Fluid-based

The Fluid-based measuring cell consists of four capacitors and is filled with a special fluid that works as the dielectric. The only variable is the amount of fluid between the capacitor plates



Strengths

- Less influence of minor vibrations
- Lower price than Fluid-based measurement
- Dual-axis measurement possible with one sensor

- Good resolution
- High accuracy over the entire measurement and temperature range
- Best price/performance ratio

Challenges

- Temperature drift
- Not suitable under strong vibrations and accelerations

- Higher price than MEMS-based measurement
- Partly huge misalignments under parasitic acceleration

Common applications

MEMS-based Inclination Sensors

- Mobile Equipment – Control of retractable arms or platform leveling
- Packaging - Tension control
- Drive Technology (Hydraulics)

Fluid-based Inclination Sensors

- Medical Equipment – Positioning of radiation treatment tables
- Solar Power - Positioning parabolic troughs
- Wind Power – Monitoring tower tilt

Typical examples



BSI Q41 and BSI R65 Inclination Sensors (MEMS-based)



BSI R11 Inclination Sensors (Fluid-based)