Inclination sensors:
Highest accuracy -
at any position

ONE NAME. ALL SOLUTIONS.
Versatile solutions for every position

Inclination sensors measure the tilt angle of an object in relation to the gravitational field of the earth. The field of use of these sensors in the industrial sector is growing constantly, so they make an important contribution to safety improvement. The sensors cover a wide spectrum of applications. Possible uses range from work platforms, excavators and cranes, drills, oil and gas extraction to stage technology. These systems are used to regulate and ensure the safety of people and machinery and are thus an important prerequisite for operating industrial equipment.

Inclination sensors have a wide range of applications

Mobile machinery
Tecsis inclination sensors measure the tilt angle of mobile machinery. The measurement range is customizable to meet any requirement. The sensors are dirt and moisture resistant.

Oil and gas extraction
With their Ex and IECEx certification, these robust inclination sensors are perfect for the use in harsh environments. They provide precise measurements – even in the most demanding conditions. The sensors are fitted with a solid salt water resistant housing and are highly shock resistant.

Wind turbines
In order to optimize the use of the wind speed and directions tecsis inclination sensors measure the optimal angle and position of the rotor blades.

Solar parks
Tecsis inclination sensors guarantee the perfect angle of solar panels to the sun and thus increase the efficiency of the system. Maximum precision can be achieved, even within small measuring ranges.
Measuring every angle with the highest accuracy

tecsis inclination sensors are specifically tailored to meet our customers’ requirements. The sensors are characterized by their highly precise technique and accuracy. The inclination sensors are made of stainless steel or saltwater-proof aluminum. Their excellent damping behavior detecting fast angle changes precisely. Customized versions with special electrical connections, measuring ranges or other options are possible due to the modular design.

<table>
<thead>
<tr>
<th>Model</th>
<th>N1101</th>
<th>N1301</th>
<th>N1201</th>
<th>N2101</th>
<th>N131C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>standard</td>
<td>redundant</td>
<td>PL d, hardware Cat.2</td>
<td>XYZ (XY, YZ, XZ)</td>
<td>flame proof enclosure Ex d</td>
</tr>
<tr>
<td>Measuring range</td>
<td>0...90°, 0...180°, 0...360°, others on request</td>
<td>0...90°, others on request</td>
<td>various measuring ranges up to max. -45°...+45° freely selectable, 2 axes freely selectable (X, Y, Z direction)</td>
<td>0...360°, others on request (individual inclination range for example 0...+90°, -90°...+150°)</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>&lt;0.3% over the entire measuring range</td>
<td>&lt;0.3% over the entire measuring range</td>
<td>&lt;0.3% over the entire measuring range</td>
<td>&lt;0.3% over the entire measuring range</td>
<td>&lt;0.3% over the entire measuring range</td>
</tr>
<tr>
<td>Linearity</td>
<td>0...360°: &lt;0.1% of F.S. 0...100°: &lt;0.1°</td>
<td>0...360°: &lt;0.1% of F.S. 0...100°: &lt;0.1°</td>
<td>0...360°: &lt;0.1% of F.S. 0...100°: &lt;0.1°</td>
<td>within the measuring range -10°...+10°: &lt;0.05° from the measuring range -10°...+10°: &lt;0.1°</td>
<td>0...360°: &lt;0.1% of F.S. 0...100°: &lt;0.1°</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>&lt;0.05°</td>
<td>&lt;0.05°</td>
<td>&lt;0.05%</td>
<td>within the measuring range -10°...+10°: &lt;0.03° from the measuring range -10°...+10°: &lt;0.05°</td>
<td>&lt;0.05%</td>
</tr>
<tr>
<td>Resolution</td>
<td>&lt;0.01°</td>
<td>&lt;0.01°</td>
<td>&lt;0.01°</td>
<td>&lt;0.01°</td>
<td>&lt;0.01°</td>
</tr>
<tr>
<td>Transverse inclination error</td>
<td>&lt;10°: &lt;0.05° &lt;45°: &lt;0.20°</td>
<td>&lt;10°: &lt;0.05° &lt;45°: &lt;0.20°</td>
<td>&lt;10°: &lt;0.05° &lt;45°: &lt;0.20°</td>
<td>&lt;10°: &lt;0.05° &lt;45°: &lt;0.20°</td>
<td>&lt;30°: &lt;0.15° &lt;45°: &lt;0.20°</td>
</tr>
<tr>
<td>Temp. influence</td>
<td>0.0016%/K</td>
<td>0.0016%/K</td>
<td>0.0016%/K</td>
<td>0.0016%/K</td>
<td>0.0016%/K</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>cable, M8x1, M12x1 others on request</td>
<td>cable, MIL, M12x1 others on request</td>
<td>cable, MIL, M12x1 others on request</td>
<td>cable, MIL, M12x1 others on request</td>
<td>connection cable (10m, open end) others on request</td>
</tr>
<tr>
<td>Protection type</td>
<td>IP67</td>
<td>IP69K</td>
<td>IP67</td>
<td>IP67</td>
<td>IP67/IP68</td>
</tr>
</tbody>
</table>

The benefits at a glance:
- Resolution 0.01°
- Small transverse inclination error (<0.05°)
- Enhanced EMC immunity up to 200 V/m
- Inclination rate of change up to 5°/s within the specifications
- No acceleration of gravity failure
- Temperature range -40°C ... +85°C
- High shock and vibration resistance
- Ex-certification
- Protection type IP 67 up to IP 69K
- Salt spray test acc. DIN EN 60068-2-52
- Customized measuring ranges and outputs
- 4...20 mA, CANopen® others on request
tescis measuring technology –
facing the future with the highest safety

The operating principle: high precision liquid-based inclination sensors

tescis inclination sensors feature an innovative operating principle. The sensor consists of two semi-circular electrodes at the front and a circular electrode on the back of the sensing unit. The space between these is half-filled with a dielectric liquid. As gravitation ensures the liquid always remains in the same position, even if the sensor moves, a measurement can be taken of the variation in capacitance determined by the position of the electrodes. This difference in capacitance is measured and analyzed electronically.

Advantages over other methods

• Genuine 360° measurement
• Unbeatable measurement accuracy, unaffected by global variations in gravity
• Very low temperature coefficient effect
• High shock resistance
• Small transverse inclination error
• High resistance to high-frequency broadband disturbances, such as structure-borne noise, for example
• Excellent price/performance ratio

Find out more about our products at: www.tecsis.com

Measurement technology is a matter of trust

tescis stands for engineering expertise and technological superiority in the field of measurement. Our customers include leading concerns and small businesses for whom we provide worldwide local support. To aid our customers, we have a policy of constant product optimization, a “zero fault” philosophy and top-quality partner organizations.

tescis GmbH
Carl-Legien-Straße 40–44
63073 Offenbach am Main
Germany
Phone: +49 (0)69 5806-0
Fax: +49 (0)69 5806-7788
E-Mail: info@tecsis.com
www.tecsis.com