



TMS/TMM22

The rugged all-rounder for inclination measurement

INCLINATION SENSORS

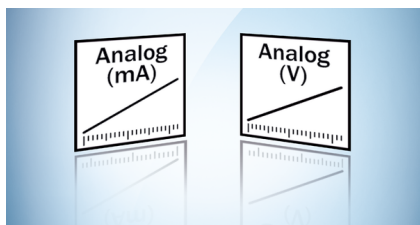
SICK
Sensor Intelligence.

Advantages



Very flexible integration

The TMS/TMM22 transmits its precise inclination data to the system control via a linearized analog signal. For maximum compatibility, the sensor is available with common analog interfaces 0 to 10 V and 4 to 20 mA. The interface can also be individually adapted to the respective requirements in line with customer requests. Currently in planning: An extension to include digital interfaces such as IO-Link and CANopen. To make system integration as simple as possible, the sensor cable, which is permanently connected to the housing, is available either with a straight or angled M12 male connector, with open strands or a customized solution.



The TMS/TMM22 is available with the following interfaces as standard: 0 to 10 V, 4 to 20 mA.



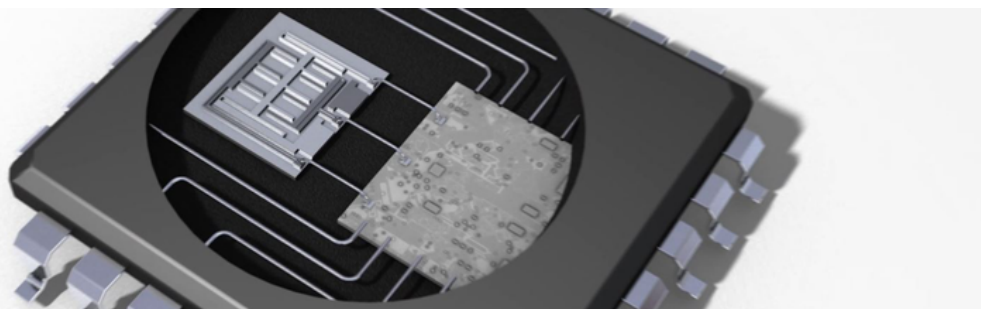
Flexible system integration thanks to common M12 male connector, as a variant with open strands or as a special design.



Compact design: At just 38.8 mm x 30 mm x 10.4 mm, the TMS/TMM22 fits easily into almost any application.



Simplest integration: The TMS/TMM22 fits effortlessly into existing systems thanks to its compact design, diverse interfaces and connection types.



More performance per volume

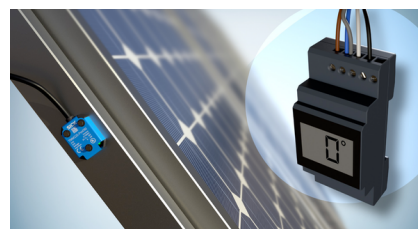
The TMS/TMM22 owes its compact dimensions and reliable measured values to so-called MEMS technology: The integrated acceleration sensor determines the inclination value by means of redundantly constructed microelectromechanical systems (MEMS) using the smallest capacitance changes between two silicon components. The measured value is then converted into a voltage signal and passed on to the system. The advantage: Thanks to MEMS technology, the TMS/TMM22 is wear-free, very durable, maintenance-free and resistant to vibrations and shocks.



This is how non-contact inclination measurement with MEMS technology works.



The TMS/TMM22 permanently ensures a error tolerance of only $\pm 0.25^\circ$.



With the preset function, the sensor can be set to zero by the customer and thus quickly put into operation.



Thanks to powerful MEMS technology, the TMS/TMM22 inclination sensor offers great precision with excellent cost-effectiveness.



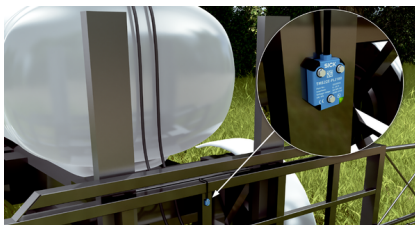
At home in countless applications

The TMS/TMM22 enables the integration of reliable inclination data in a range of price-sensitive applications. For example, the sensor is ideal for sun tracking in photovoltaic systems. The inclination measurement forms the basis for exact alignment of the photovoltaic modules as well as for the control and correction of corresponding tracking systems. Since even a devi-

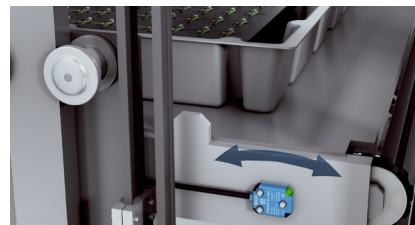
ation of 1° from the ideal angle significantly reduces the energy yield, a high degree of precision is required in addition to economic efficiency. In mobile and logistics applications, the TMS/TMM22 minimizes the risk of operational faults, ensuring maximum reliability.



The automated tracking of photovoltaic modules in large solar parks can be implemented very economically thanks to direct inclination measurement with the TMS/TMM22.



Thanks to IP69K and compact dimensions, the sensor is ideally suited for simple leveling tasks in mobile machines.



With a height of only 10 mm, the TMS/TMM22 fits easily into vertical storage systems with limited space, where it reliably detects one-sided or uneven loading of trays.



Whether in the solar industry, mobile machines or automated guided vehicle systems, the TMS/TMM22 performs simple leveling tasks and inclination measurements reliably and with a high level of economic efficiency.



Very tough

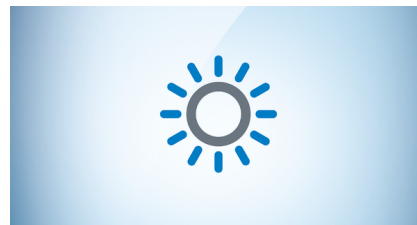
To ensure that neither dust nor moisture can damage the electronics of the TMS/TMM22, these are enclosed in a dust- and waterproof unit during housing injection molding. Together with the rugged MEMS technology, this makes the inclination sensor extremely rugged. That means high temperature fluctuations, harsh ambient conditions or high-pressure cleaning with water jets do not pose any real challenges for it. Thanks to a permanently integrated cable, the TMS/TMM22 is approved according to enclosure rating IP69K. The laser inscription on its housing defies even consistently high UV radiation, meaning the sensor can be clearly identified at any time. Due to the 3-hole mounting, it sits optimally and can thus provide measured values of the highest quality.



Ideal for extreme conditions: The fully-encapsulated electronics ensure enclosure ratings IP66, IP68 and IP69K.



The type label remains clearly legible at all times, even when exposed to constant sunlight, moisture or dust.



Strong temperature fluctuations or high UV exposure do not affect the accuracy of the inclination measurements.



Whether used in deserts, with continuous vibrations or in high-pressure cleaning – thanks to its rugged design, the TMS/TMM22 delivers consistently precise measured values, even under the most demanding conditions.



Technical data overview

| | | |
|--------------------------------|--|-------------------------------------|
| Number of axis | 1 / 2 (depending on type) | |
| Communication interface | Analog, 4...20 mA Analog, 0...10 V Analog, 0...5 V | |
| Measurement range | 1-dimensional | 80° ... 360° (depending on type) |
| | 2-dimensional | ± 10° ... ± 90° (depending on type) |
| Housing material | Plastic (PA12), glass-fiber reinforced | |
| Connection type | Cable, 5-wire, with male connector, M12, 5-pin, 1 m Cable, 5-wire, with male connector, M12, 5-pin, 0.3 m Cable, 5-wire, with male connector, M12, 5-pin, 5 m Cable, 5-wire, 3 m Cable, 5-wire, 10 m Cable, 5-wire, 0.3 m Cable, 5-wire, 1.5 m Cable, 5-wire, 5 m | |
| Accuracy | | |

Product description

The TMS22 (single-axis) and TMM22 (dual-axis) inclination sensors provide cost-effective, high-precision inclination measurements. The foundation for this is powerful MEMS technology, which scores points with a error tolerance of $\pm 0.25^\circ$ and excellent repeatability. The measured values are output via a linearized analog signal. In order to meet the highest requirements in terms of resistance for outdoor applications such as PV systems, the sensor electronics are embedded directly into the housing during injection molding. Therefore, TMS/TMM22 devices comply with the regulations according to enclosure rating IP66, IP68 or IP69K. The compact design with a height of just 10,4 mm also makes nearly unlimited integration options possible.

At a glance

- Measuring range of up to 360° (1-axis) or up to $\pm 90^\circ$ (2-axis)
- Wear-free MEMS technology for consistently high precision and signal quality
- Measurement accuracy: $\pm 0.25^\circ$
- Analog interfaces 0 to 10 V and 4 to 20 mA available or customizable
- Enclosure ratings IP66, IP68 and IP69K
- Preset function for zeroing during installation

Your benefits

- Precise one- or two-dimensional inclination measurement for cost-sensitive applications
- Maximum reliability thanks to rugged sensor design with dust- and waterproof enclosed electronics
- High measuring certainty throughout the entire measuring range even under demanding ambient conditions thanks to optimized interference suppression
- Can be easily integrated into a wide range of applications thanks to the compact dimensions
- Analog output signal ensures maximum compatibility in industrial environments
- Constant status information of the sensor thanks to visual LED feedback

Fields of application

- Photovoltaics and solar thermal energy
- Mobile agricultural and forestry machinery
- Vertical storage systems
- Crane and lifting technology
- Automated guided vehicle systems
- Construction machinery and special-purpose vehicles
- Wind power plants

Ordering information

Other models and accessories → www.sick.com/TMS_TMM22

- **Communication interface:** Analog
- **Communication Interface detail:** 4...20 mA
- **Housing material:** plastic (PA12), glass-fiber reinforced

| Number of axis | Measuring range | Type | Part no. |
|----------------|-----------------|---------------|----------|
| 1 | 80° | TMS22E-PKH080 | 1120743 |
| | | TMS22E-PKH090 | 1122883 |
| | 360° | TMS22E-PKN090 | 1116342 |
| | | TMS22E-PKG360 | 1116340 |
| | | TMS22E-PKH360 | 1123685 |
| | | TMS22E-PKL360 | 1121701 |
| 2 | ± 10° | TMM22E-PKH010 | 1116334 |
| | | TMM22E-PKG045 | 1122884 |
| | ± 45° | TMM22E-PKH045 | 1116335 |
| | | TMM22E-PKJ045 | 1117972 |
| | | TMM22E-PKK045 | 1116343 |
| | | TMM22E-PKN045 | 1122616 |
| | | TMM22E-PKH060 | 1116336 |
| | ± 60° | TMM22E-PKJ060 | 1117973 |
| | | TMM22E-PKF090 | 1120612 |
| | ± 90° | TMM22E-PKG090 | 1116345 |
| | | TMM22E-PKH090 | 1116338 |
| | | TMM22E-PKJ090 | 1118561 |

- **Communication interface:** Analog
- **Communication Interface detail:** 0...10 V
- **Housing material:** plastic (PA12), glass-fiber reinforced

| Number of axis | Measuring range | Type | Part no. |
|----------------|-----------------|---------------|----------|
| 1 | 120° | TMS22E-PLG120 | 1120611 |
| | 180° | TMS22E-PLJ180 | 1116341 |
| 2 | ± 10° | TMM22E-PLH010 | 1116303 |
| | | TMM22E-PLH045 | 1116332 |
| | ± 45° | TMM22E-PLH060 | 1116333 |
| | | TMM22E-PLG090 | 1116575 |
| | ± 60° | TMM22E-PLH090 | 1116337 |
| | | TMM22E-PLM090 | 1121189 |

- **Communication interface:** Analog

| Number of axis | Measuring range | Housing material | Type | Part no. |
|----------------|-----------------|--|---------------|----------|
| 2 | ± 45° | Plastic (PA12), glass-fiber reinforced | TMM22E-PNK045 | 1121327 |

SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

WORLDWIDE PRESENCE:

Contacts and other locations –www.sick.com