TLK100

TILT SWITCH

MEMS technology switching output inclinometer

L.4 - DS0014 R02 TLK100 - 05/03/25

CHARACTERISTICS

- MEMS technology
- High protection level and wide temperature range
- High temperature stability
- Resolution up to 0.01°
- Single axis range ±180° or 0 ... 360°
- Dual axis range up to ± 60°
- Status LED

ADVANTAGES

- Rugged housing
- High accuracy
- Reliability and long service life for outdoor applications
- Easy installation and cost saving
- Designed for harsh enviromental conditions
- Relay, NPN or PNP output

IP67 — High protection level

Shock/vibration resistant

Reverse polarity protection

-40...+85 °C — Wide range temperature

MEMS — MEMS sensors technology

X , Y — Horizontal version

Z — Vertical version

Relay — Relay output

NPN output

PNP output

RoHS compliant — Directive 2011/65/EU

CE — EU conformity

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PRODUCT DESCRIPTION

A tilt switch is a switching output inclinometer that toggles the output status when the tilt value exceeds the pre-set threshold.

TLK100 is the new family of tilt sensors, based on MEMS technology, capable of working in extreme conditions and hard environments, subjected to sharp movements, shocks and high vibrations.

The availability of numerous options guarantees the maximum flexibility in choice and makes it ideal for many application such as: window cleaning platforms, aerial platforms, lifting platforms and firefighter ladders.

Thanks to the high protection class, the sensor is perfectly suited for use in humid or polluted conditions, furthermore, the compact and flat design well-fit the tight installation spaces.

Agricultural machinery

Construction

Earth moving

Handling and **lifting**

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Top Sensors Manufacture

PRODUCT CODE

ORDER CODE ▶ T L K 1 0 0 . _ (a) . _ (b) . _ _ _ (c) . _ (d) . _ _ (e) . _ (f) . _ _ _ _ _ _ _ (g)

a Power supply range

2 ◂ = 9 ... 30 V DC

b Axis type

O ◂ = Dual axis (floor mounting)

V ◂ = Single axis - unipolar (wall mounting)

V1 ◂ = Single axis - bipolar (wall mounting)

c Measurement range

XXX ◂ = 0 ... XXX deg (for axis type V)

XXX ◂ = ± XXX deg (for axis type O and V1)

d Output type

14 ◂ = 1x Relay (N.C.)

16 ◂ = 1x Relay (N.O.)

18 ◂ = 1x Open collector NPN

37 ◂ = 1x Open collector PNP

e Connections

1 ◂ = Male connector M12x5, PUR cable 30cm

2 ◂ = Male flange connector M12, 5-pin

4 ◂ = Wire connector 5 poles 300 mm

f Switching points type

NP ◂ = Not programmable

PP ◂ = Programmable

g Switching points thresholds

aaIbbD ◂ = Threshold values are defined with the following coding rule:

"**aa**" is the integer part of the value
"**bb**" is the decimal part.

The dash char (-) separates threshold values of the outputs.

Examples:

Order code	Axis type	Thresholds	Output 1 Switching rule
02I1D03I1D	**O**	X1 = ±2.1° Y1 = ±3.1°	X < -X1 or X > X1 or Y < -Y1 or Y > Y1
02I1D03I1D-05I2D04I1D	**O**	X1 = ±2.1° Y1 = ±3.1°	X < -X1 or X > X1 or Y < -Y1 or Y > Y1
90I5D	**V**	Z1 = 90.5°	Z < 0 or Z > Z1
90I5D-100I2D	**V**	Z1 = 90.5°	Z < 0 or Z > Z1
90I5D	**V1**	Z1 = ±90.5°	Z < -Z1 or Z > Z1
90I5D-100I2D	**V1**	Z1 = ±90.5°	Z < -Z1 or Z > Z1

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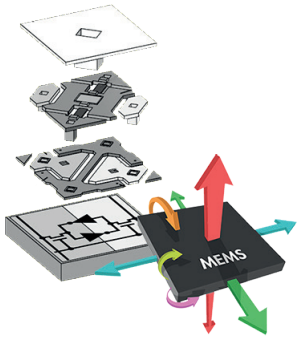
TECHNICAL SPECIFICATION

Measuring range	Up to ±60° for dual axis type ±180° and 0 ... 360° for single axis type
Linearity (Ta = 25 °C)	±0.5% FS
Resolution	0.01°
Temperature range	-40°C ... +85°C
Temperature drift	±0.01 °/°C typ.
Protection class	IP67 (acc. to EN 60529)
Switch-ON/OFF Delay time	0 s (Customizable from 0 to 10 s)
Hysteresis	1° (Customizable)
Housing	Polybutylene terephthalate
Weight approx.	225 g
Shock resistance	acc. to EN 60068-2-27 50 G, 11 ms, 100 shocks per axis Axis : X, Y, Z
Vibration resistance	acc. to EN 60068-2-6 10 ... 500 Hz, 10g, 2h per axis Axis : X, Y, Z

OPERATING PRINCIPLE

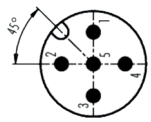
MEMS, or Micro Electro-Mechanical System, is a chip-based technology where sensors are composed of proof masses sprung between capacitive plates. Each mass act like a moving plate of a variable capacitor formed by an array of interlaced 'fingers'.
When the sensor is tilted, the mass moves changing the distance between the plates and therefore the capacitance. By measuring the capacitance variation the angle value can be detected.



ELECTRICAL CHARACTERISTICS

Power supply	9 ... 30 V DC
Current consumption	12V ≤ 18 mA (with relay coil energized) 24V ≤ 9 mA (with relay coil energized)
Max. switching voltage	48 VDC/VAC
Max. switching current	1.5 A
Max. switching power	30 W
Endurance @ 30 VDC, 1 A (resistive), 25 °C, 1 Hz	>1x10^5 operations
Electromagnetic compatibility	acc. to EN 61000-6-2, EN 61000-6-4
EU Conformity	EMC directive 2014/30/EU RoHS directive 2011/65/EU + 2015/863/EU

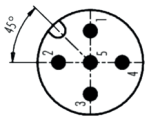
NPN / PNP ELECTRICAL CONNECTION M12 X 5 PINS



Pinout

	Flange connector	Wire connector
1	+Vin	WH
2	GND	BU
3	NPN / PNP 1	BK
4	n.c.*	GY*
5	Serial program / Zero**	BN**

SINGLE RELAY ELECTRICAL CONNECTION M12 X 5 PINS



Pinout

	Flange connector	Wire connector
1	+Vin	WH
2	GND	BU
3	Relay 1 COM	BK
4	Relay 1 N.O. / N.C.	GY
5	Serial program / Zero**	BN**

The device is protected against reverse polarity of power supply (Pin 1 and 2). No protection to incorrect connection of all the other pins. Applying a voltage to other pins, can damage the device!
* = PIN MARKED n.c. MUST NOT BE CONNECTED.
** = Connect to +Vin for 2s to set zero point

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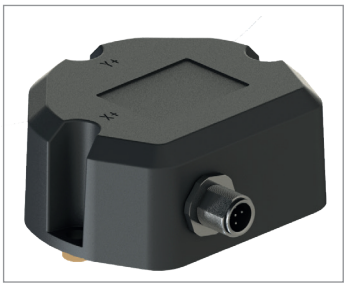
COUNTING DIRECTION

Dual axis



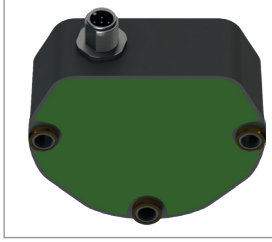
TLK100 dual axis inclinometer

The 2-dimensional tilt sensor must be mounted with the base plate in horizontal position, i.e. parallel to the horizontal line.
The sensor can be tilted to both the X and Y axes at the same time.
A separate measure is provided for each axis.

+X

-X

+Y



-Y

Single axis

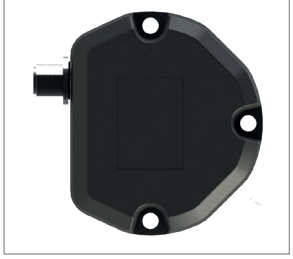
TLK100 single axis inclinometer

The 1-dimensional tilt sensor must be installed with the base plate in vertical position, i.e. Z-axis perpendicular to the force of gravity.

The default "zero point" position is the one shown in the following images.

V (0...360°)

Z = 90°

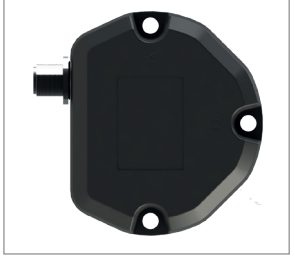


Z = 270°

V1 (± 180°)

Z = -90°

Z = 90°



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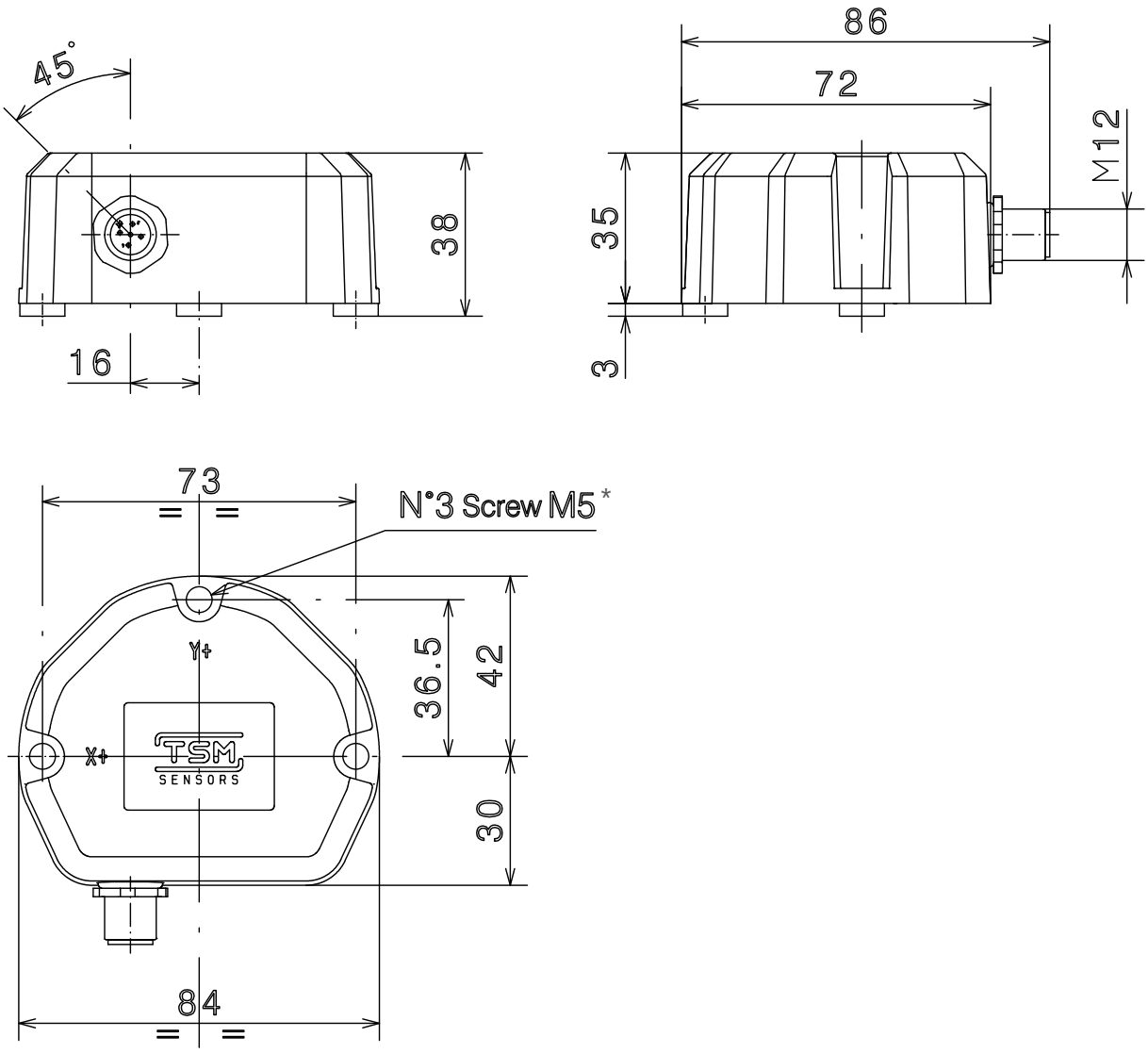
DIMENSIONS [mm]



* MAX tightening torque 2.5Nm

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