

TLK100

TILT SWITCH

MEMS technology switching output inclinometer



L.4 - DS0014 R00 TLK100



CHARACTERISTICS

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



ADVANTAGES

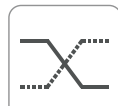
- Rugged housing
- High accuracy
- Reliability and long service life for outdoor applications
- Easy installation and cost saving
- Designed for harsh environmental conditions
- Relay, NPN or PNP output



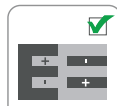
High protection level



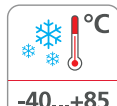
Shock/vibration resistant



Redundancy output



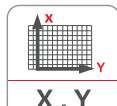
Reverse polarity protection



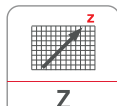
Wide range temperature



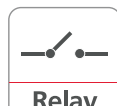
MEMS sensors technology



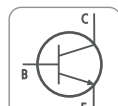
Horizontal version



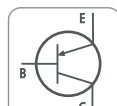
Vertical version



Relay output



NPN output



PNP output



Directive 2011/65/EU



EU conformity

The company reserves the right to make any kind of design or functional modification at any moment without prior notice.

TLK100

TILT SWITCH

MEMS technology switching output inclinometer



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.



L4 - DS0014 R00 TLK100



Agricultural machinery



Construction



Earth moving



Handling and lifting

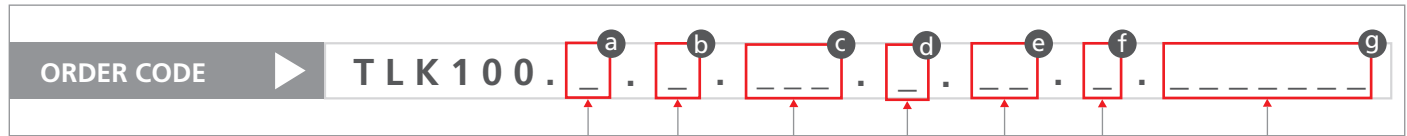
TLK100

TILT SWITCH

MEMS technology switching output inclinometer



PRODUCT CODE



- 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.)
15 ◀ = 2x Relay (N.C.)
16 ◀ = 1x Relay (N.O.)
17 ◀ = 2x Relay (N.O.)
18 ◀ = 1x Open collector NPN
19 ◀ = 2x Open collector NPN
37 ◀ = 1x Open collector PNP
38 ◀ = 2x 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
10 ◀ = Male flange connector M12, 8-pin
11 ◀ = Wire connector 8 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	Thresholds	Output 2 Switching rule
0211D0311D	◀ O	X1 = ±2.1° Y1 = ±3.1°	X < -X1 or X > X1 or Y < -Y1 or Y > Y1		
0211D0311D-05I2D0411D	◀ O	X1 = ±2.1° Y1 = ±3.1°	X < -X1 or X > X1 or Y < -Y1 or Y > Y1	X2 = ±5.2° Y2 = ±4.1°	X < -X1 or X > X1 or Y < -Y1 or Y > Y1
9015D	◀ V	Z1 = 90.5°	Z < 0 or Z > Z1		
9015D-100I2D	◀ V	Z1 = 90.5°	Z < 0 or Z > Z1	Z2 = 100.5°	Z < 0 or Z > Z2
9015D	◀ V1	Z1 = ±90.5°	Z < -Z1 or Z > Z1		
9015D-100I2D	◀ V1	Z1 = ±90.5°	Z < -Z1 or Z > Z1	Z2 = ±100.5°	Z < -Z2 or Z > Z2

TLK100

TILT SWITCH

MEMS technology switching output inclinometer



TECHNICAL SPECIFICATION

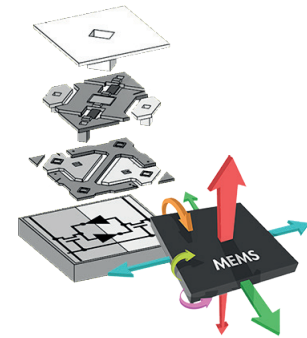
Measuring range	Up to $\pm 60^\circ$ for dual axis type $\pm 180^\circ$ and 0 ... 360° for single axis type
Linearity (Ta = 25 °C)	$\pm 0.5\%$ FS
Resolution	0.01°
Temperature range	-40°C ... +85°C
Temperature drift	± 0.01 °/°C typ.
Protection class	IP67 (acc. to EN 60529)
Switch-ON/OFF Delay time	0 s (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

ELECTRICAL CHARACTERISTICS

Power supply	9 ... 30 V DC
Current consumption	12V \leq 18 mA (with relay coil energized) 24V \leq 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	$> 1 \times 10^5$ 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

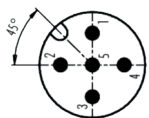
OPERATING PRINCIPLE

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.



L4 - DS0014 R00 TLK100

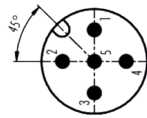
NPN / PNP ELECTRICAL CONNECTION M12 X 5 PINS



Pinout

	Flange connector	Wire connector
1	+Vin	WH
2	GND	BU
3	NPN / PNP 1	BK
4	NPN / PNP 2*	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**

REDUNDANT RELAY ELECTRICAL CONNECTION M12 X 5 PINS



Pinout

	Flange connector
1	+Vin
2	GND
3	Relay 1 COM
4	Relay 1 N.O. / N.C.
5	Relay 2 COM*
6	Relay 2 N.O. / N.C.*
7	Zero**
8	Serial program



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!
* = Only for redundant versions, output type 19 & 38. In all other cases leave unconnected.
** = Connect to +Vin for 2s to set zero point

TLK100

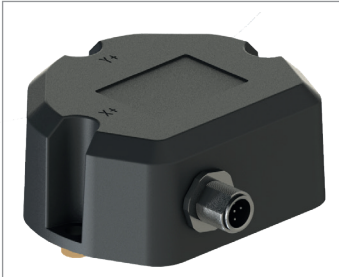
TILT SWITCH

MEMS technology switching output inclinometer



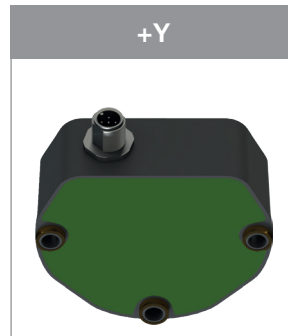
COUNTING DIRECTION

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.



L4 - DS0014 R00 TLK100

Single axis



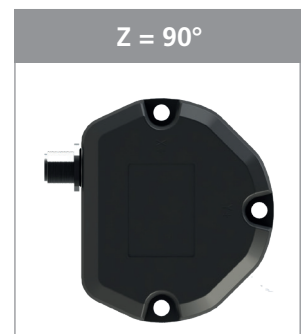
TLK100 single axis inclinometer

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°)

V1 (± 180°)



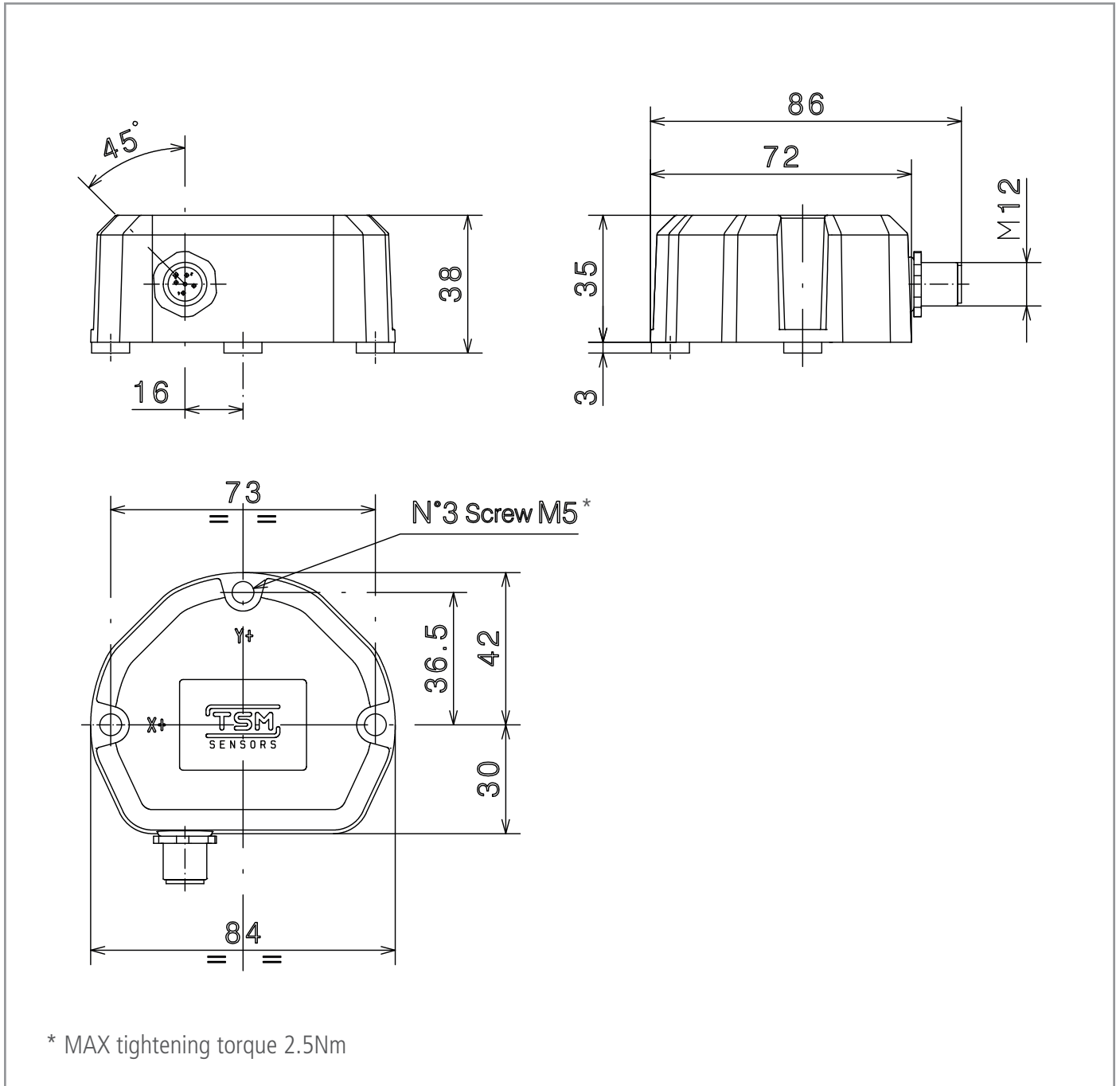
TLK100

TILT SWITCH

MEMS technology switching output inclinometer



DIMENSIONS [mm]



L4 - DS0014 R00 TLK100

TLK100

TILT SWITCH

MEMS technology switching output inclinometer



DIMENSIONS [mm]

