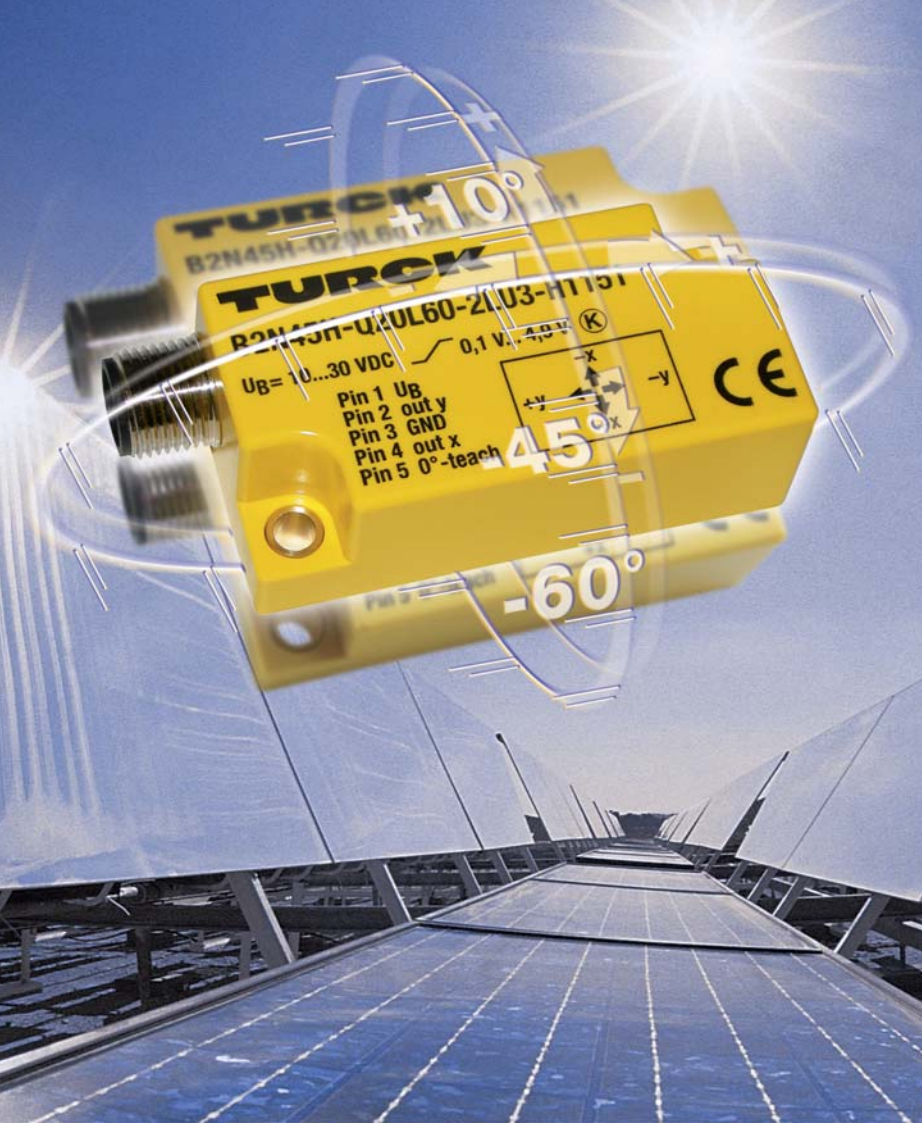


TURCK

Industrial
Automation

INCLINOMETERS



Sense it! Connect it! Bus it! Solve it!

Inclinometers – Solutions for many applications

No matter if applied in harvesters, agricultural and construction machinery, in vehicles and airplanes or in machines, robots and solar plants: Sensors for measuring and monitoring inclination are universally applicable and help to improve the safety and efficiency of operation processes.

The TURCK inclinometer series Q20L60 and Q42 are also suitable for fast production sequences and withstand impacts. High precision and sensitivity are guaranteed through a proven micro-mechanical capacitive measuring element. These sensors are not only highly reliable, the rugged design and the easy handling pay off as well.



Functional principle

The TURCK inclinometers incorporate a micro-mechanical pendulum based on MEMS technology (Mikro Elektro Mechanic Systems).

The pendulum consists of two parallel arranged 'plate' electrodes with a dielectric placed in the middle. If DC voltage is applied on both plates they are charged until the potential difference between the two plates is equal to the applied voltage.

The deflexion caused by acceleration produces a measurable change of capacitance between the resilient element and the related electrode.



High accuracy

With a repeatability of 0.1% f.s., our inclinometers are the right solution for high-precision applications. Q20L60 and Q42 inclinometers feature a resolution of 0.01°.



Compact versions

The very small Q20L60 as well as the rectangular version Q42 can be mounted in all utility vehicles, agricultural and forestry machinery, in crane and hoisting technology as well as in the sector of industrial automation.



**Solution 1:
Biaxial, $\pm 10^\circ$, $\pm 45^\circ$, $\pm 60^\circ$,
 $\pm 85^\circ$ with analog output**

The standard product portfolio comprises reshaped inclinometers Q20L60, biaxial, with angular ranges of $\pm 10^\circ$, $\pm 45^\circ$, $\pm 60^\circ$ and $\pm 85^\circ$. They are available with analog voltage, current or ratiometric output. To achieve an optimal starting position, you simply adjust the zero point via teach adapter.

**Solution 2:
Uniaxial, 360° with adjustable measuring range**

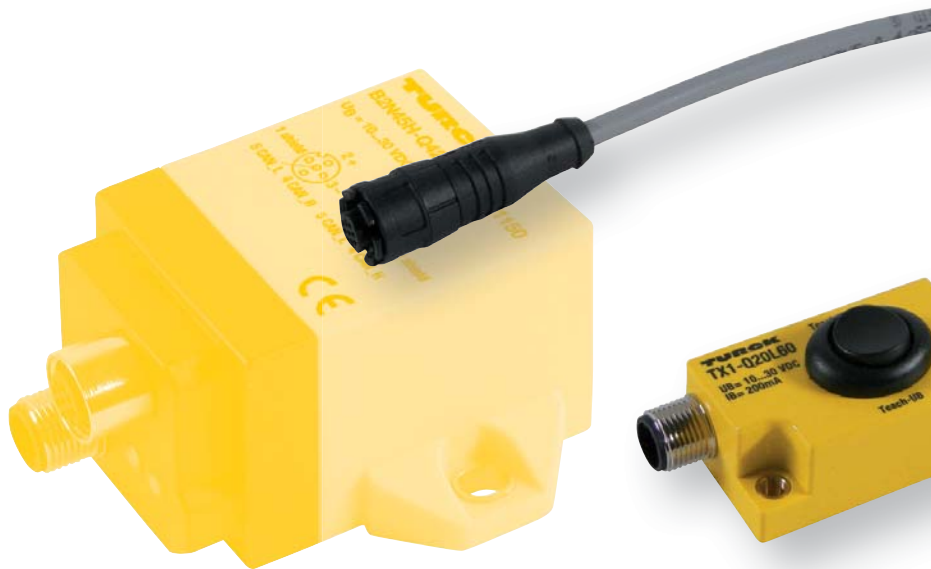
Is the angular range of standard inclinometers not wide enough? Do you need devices that are individually tailored to your needs? Then choose the versions with extended functionality. They are the perfect solution for you. Inclinometers that adapt perfectly to your requirements! The version with adjustable measuring range permits adjustments over the entire angular range of 360° . The desired range of inclination is taught within seconds with the teach adapter VB2-SP3.

The uniaxial sensor is available as Q20L60 version with analog current or voltage output.

**Solution 3:
Uniaxial, 360° with two programmable switchpoints**

The version with switching output is also adjustable according to the full angular range of 360° . The uniaxial inclinometer Q20L60 features two programmable switchpoints for limit value monitoring.

Switch ON/OFF points, travel paths and hysteresis are easily taught, using the teach adapter TX1-Q20L60.



High protection classes

IP68 and IP67:

- 24 hrs. continuous storage at $+70^\circ\text{C}$
- 24 hrs. continuous storage at -25°C
- 7 days submersion, depth 1m
- 10 thermal shock changes from $+70^\circ\text{C}$ to -25°C dwell cycle 1h



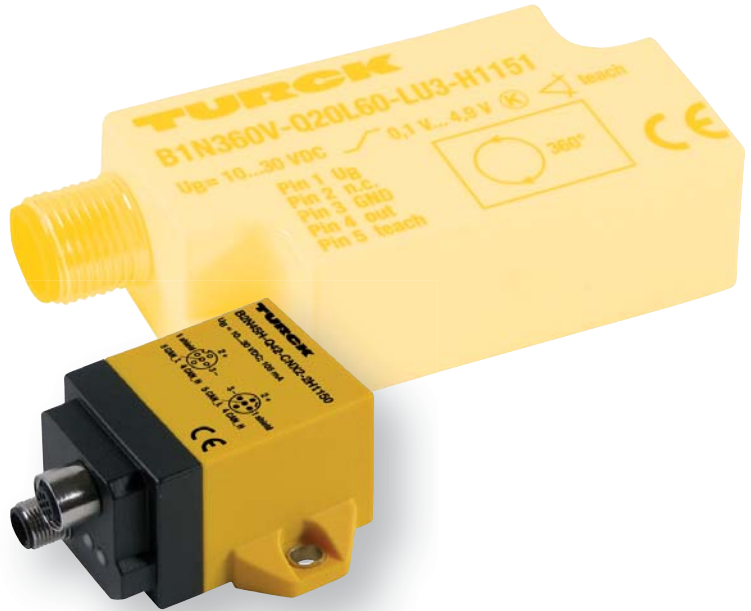
Zero point setting

The home position (zero point) is easily set with the teach adapter VB2-SP3. Move the sensor in the wanted position, press the teach adapter for just 1 second and the sensor is calibrated



Solution 4: Biaxial, $\pm 10^\circ$, $\pm 45^\circ$, $\pm 60^\circ$ with CANopen interface

The newcomer Q42 features a standardized CANopen interface (acc. to CiA DS-301/CiA DSP-410). All measured values and parameters are accessible via the object directory (OV).



Solution 5: Uniaxial, 360° with CANopen interface

The product portfolio is complemented by the 360° version with CANopen interface. Measured values and parameters are accessible and adjustable via the object directory (OV).

The individual configuration can be stored in the internal non-volatile storage (EEPROM). The following CANopen functions are available:

- Transmit data object (TP01) with four operating modes:
 - Individual polling via Remote-Transmit-Request-Telegram (RTR)
 - Cyclic transmission per time interval
 - Event-driven transmission triggered by angular change
 - Synchronized transmission after receipt of SYNC telegram

- Service-data object (Standard-SDO)
- Error message via emergency object (EMCY) supported by:
 - General error register (Error Register)
 - Manufacturer specific status-register (Manufacturer Status)
 - Error list (Pre-defined Error Field)
- Monitoring functions Heartbeat as well as Nodeguarding/Lifeguarding
- Memory and recovery function of all parameters (Store and Load Parameter Field)
- Indication of status and error via two-color LED (acc. to CiA CR-303-3)
- Adjustment of node ID as well as baud rate via OV
- Freely configurable cutoff frequency (digital filter)
- Configuration of the minimal change of angle for TDO1 send event
- Optional monitoring of internal device temperature
- Direction control of inclination



Programmable switchpoints

The inclinometer with digital output features two switchpoints, programmable via teach adapter TX1-Q20L60. Different positions of crane arms and utility vehicles can be detected and monitored for example.

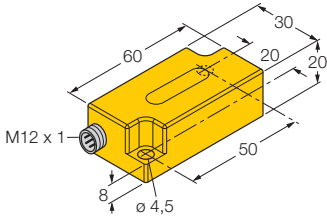


Compact CANopen interface

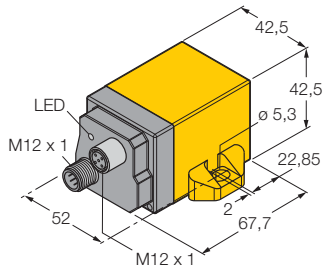
Our inclinometers with CANopen interface (CiA DS-301) provide baud rates of 10 kbps up to 1Mbps, high sampling rates and bandwidths as well as a parameterizable vibrostability.



Overview



Type-code	Measuring range	Resolution	Output	Temperature-range
B2N10H-Q20L60-2Li2-H1151	$\pm 10^\circ$	$\leq 0.04^\circ$	biaxial, 4...20 mA	-30...+70 °C
B2N45H-Q20L60-2Li2-H1151	$\pm 45^\circ$	$\leq 0.1^\circ$		
B2N60H-Q20L60-2Li2-H1151	$\pm 60^\circ$	$\leq 0.14^\circ$		
B2N85H-Q20L60-2Li2-H1151	$\pm 85^\circ$	$\leq 0.14^\circ$		
B2N60H-Q20L60-2Li2-H1151/S97	$\pm 60^\circ$	$\leq 0.14^\circ$		-40...+70 °C
B2N10H-Q20L60-2LU3-H1151	$\pm 10^\circ$	$\leq 0.04^\circ$	biaxial, 0.1...4.9 V	-30...+70 °C
B2N45H-Q20L60-2LU3-H1151	$\pm 45^\circ$	$\leq 0.1^\circ$		
B2N60H-Q20L60-2LU3-H1151	$\pm 60^\circ$	$\leq 0.14^\circ$		
B2N85H-Q20L60-2LU3-H1151	$\pm 85^\circ$	$\leq 0.14^\circ$		
B2N60H-Q20L60-2LU3-H1151/S97	$\pm 60^\circ$	$\leq 0.14^\circ$		-40...+70 °C
B2N85H-Q20L60-2LU3-H1151/S97	$\pm 85^\circ$	$\leq 0.14^\circ$		
B1N360V-Q20L60-2Li2-H1151			uniaxial, 4...20 mA	
B1N360V-Q20L60-2LU3-H1152	360°	$\leq 0.14^\circ$	uniaxial, 0.1...4.9 V	
B1N360V-Q20L60-2UP6X3-H1153			uniaxial, adjustable switchpoints	



B2N10H-Q42-CN2-2H1150	$\pm 10^\circ$	$\leq 0.05^\circ$	biaxial, CANopen	-30...+70 °C
B2N45H-Q42-CN2-2H1150	$\pm 45^\circ$	$\leq 0.1^\circ$		
B2N60H-Q42-CN2-2H1150	$\pm 60^\circ$	$\leq 0.1^\circ$		
B2N360V-Q42-CN2-2H1150	360°	$\leq 0.01^\circ$	uniaxial, CANopen	



Technical data

	Analog/switchpoints	CANopen
Absolute accuracy (at 25 °C)	$\pm 0.5^\circ$	$\pm 0.1^\circ$
Temperature coefficient	0.03°/K	0.008°/K
Operating voltage	10...30 VDC	10...30 VDC
Housing material	Plastic, PC	Plastic, PA12-GF30
Electrical connection	Connector, M12 x 1	Connector, M12 x 1
Vibration stability	55 Hz (1 mm)	55 Hz (1 mm)
Shock resistance	30 g (11 ms)	30 g (11 ms)
Protection class	IP68/IP69K	IP68/IP69K

Product range

Our solutions for your requirements

Biaxial with analog output

- $\pm 10^\circ, \pm 45^\circ, \pm 60^\circ$
- Current 4 ... 20 mA
- Voltage 0.1 ... 4.9 V
- Ratiometric voltage

Uniaxial 360° with analog output

- Current 4 ... 20 mA
- Voltage 0.1 ... 4.9 V
- Measuring range, adjustable

Uniaxial 360° with two switchpoints

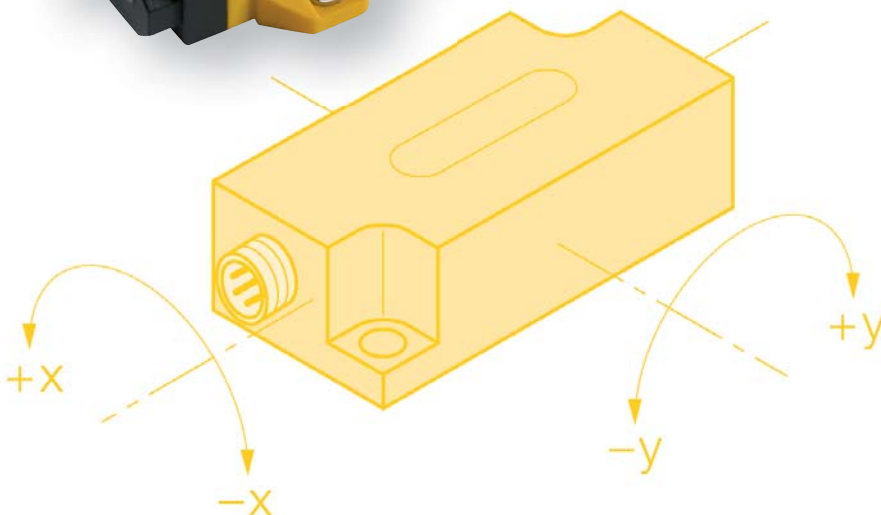
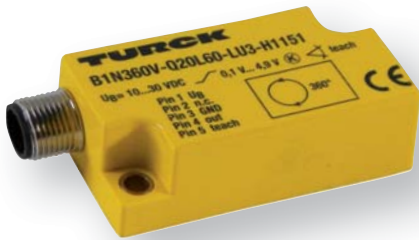
- Two switchpoints, adjustable
- Hysteresis, adjustable
- Travel path, adjustable
- Switch state indication by LEDs

Biaxial with CANopen interface

- $\pm 10^\circ, \pm 45^\circ, \pm 60^\circ$

Uniaxial with CANopen interface

- $\pm 360^\circ$



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