

# At a glance

## Инклинометри



### 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 operations.

Inclination is defined as the relative angular tilt to the horizon or perpendicular. Inclinometers use the local gravity respectively acceleration of gravity as a reference to measure angular tilt. The measuring principle is similar to that of perpendicular drop, whereby the mass is directly related to the gravitational field. Following this principle, inclinometers use mechanical pendulums, bending beams or liquids like in water-levels.

TURCK inclinometers incorporate a micro-mechanical pendulum based on MEMS technology (Mikro Elektro Mechanic Systems). The core piece is a capacitive sensor element consisting of two parallel arranged plate electrodes with a dielectric in the middle.

The dielectric of this differential capacitor is designed as a resilient pendulum. If the position of the sensor changes, the dielectric in the middle moves, causing the capacitance ratio between both electrodes to change. This change in capacitance is exactly measured and processed to detect the angular tilt.

The extremely rugged TURCK inclinometers are also suited for fast production sequences and withstand impacts. The standard product portfolio comprises rectangular shaped, biaxially operating inclinometers Q20L60, with angular ranges of  $\pm 10^\circ$ ,  $\pm 45^\circ$  and  $\pm 60^\circ$ . It also includes devices with analog voltage, current or ratiometric output as well as 20 mm uniaxial versions with freely adjustable measuring range  $0^\circ \dots 360^\circ$  and analog or digital output.

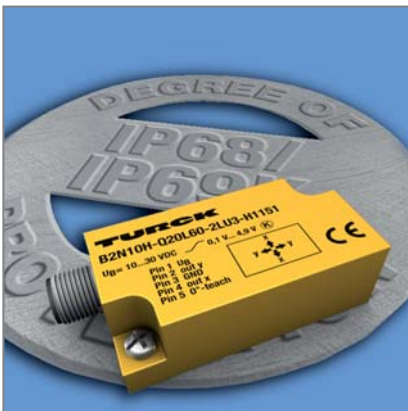
The Q42 complementing the product range, features a standard CANopen interface (CiA DS-301). These sensors provide baud rates of 10 kbps up to 1Mbps, high sampling rates and bandwidths as well as parameterizable vibrostability.

# Our strenghts - Your advantages



## High repeatability

The Q20L60 series is the right solution for high-precision applications, operating with a repeatability of 0.1% f.s. Q20L60 and Q42 inclinometers both feature a resolution of up to 0.04°.



## High protection rating

The sensors are IP68 and IP69K protected, fulfilling high requirements such as:

- 24 hrs. continuous storage at +70 °C
- 24 hrs. continuous storage at -25 °C
- 7 days submersed, depth 1m
- 10 thermal shock changes from +70 °C to -25 °C, dwell cycle per temperature 1 hour
- Suited for high pressure steam-jet cleaning acc. to DIN 40050-9, following EN 60529



## 360° freely selectable range

The uniaxial inclinometers operate over the full angular range of 360°. The required measuring range is set via teach adapter. Select the start value and press the teach adapter VB2-SP3 for 1 sec. Then select the end value and press the teach adapter for 3 seconds.

# advantages



## Compact CANopen interface

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



## Easy setting of zero point

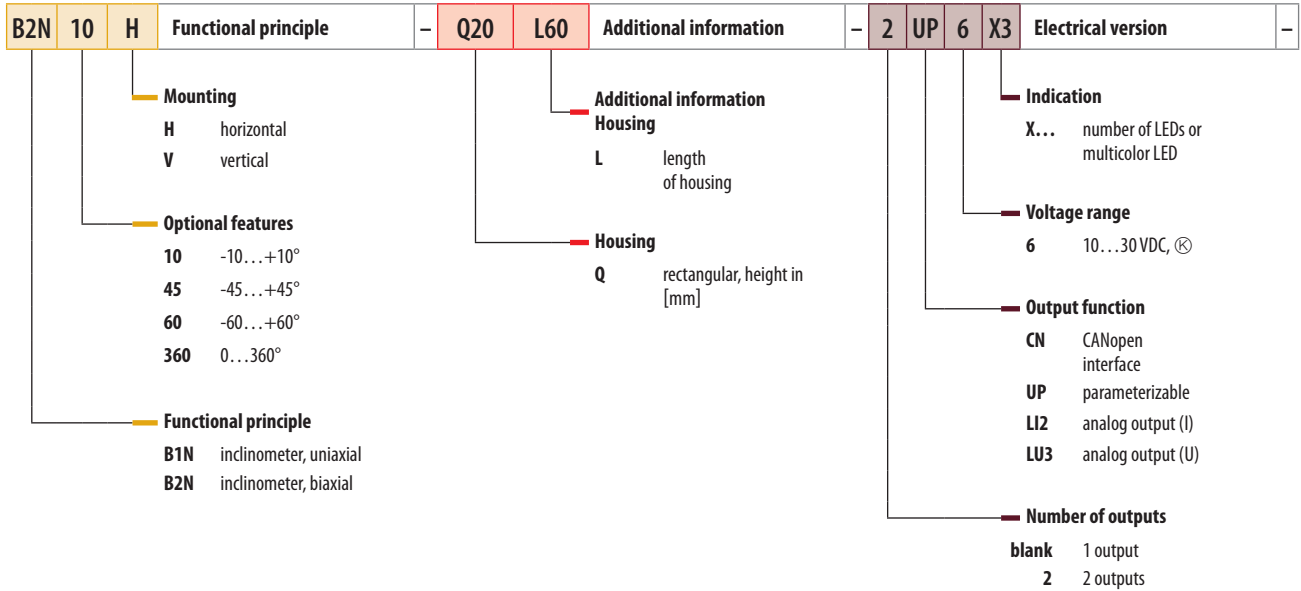
The home position (zero point) is easily set with the teach adapter VB2-SP3. Move the sensor in the wanted position, press the teach adapter for just 1 second and the sensor is calibrated!



## Programmable switchpoints

The inclinometer with digital output features two programmable switchpoints that can be set with the teach adapter TX1-Q20L60. Different positions at cranes and utility vehicles are thus detected and monitored for example.

# Type code





# Inclinometers for all applications



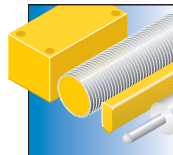
The standard product portfolio comprises rectangular shaped, biaxially operating inclinometers Q20L60, with angular ranges of  $\pm 10^\circ$ ,  $\pm 45^\circ$  and  $\pm 60^\circ$ . It also includes devices with analog voltage, current or ratiometric output as well as 20 mm uniaxial versions with freely adjustable measuring range  $0^\circ \dots 360^\circ$  and analog or digital output.

The Q42 complementing the product range, features a standard CANopen interface (CiA DS-301). These sensors provide baud rates of 10 kbps up to 1 Mbps, high sampling rates and bandwidths as well as a parameterizable vibro-stability.

## Features

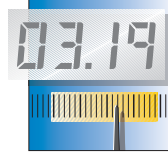
- Compact rectangular design
- High-speed measurement
- Sensitive and precise
- Long-term stable and reliable
- Zero-offset compensation
- High protection classes IP68 and IP69K
- Extremely robust
- Simple alignment
- Adjustable measuring range
- Adjustable switchpoints

## Properties



### Design

Compact housing, 20 x 42 mm



### Measuring ranges

Angular ranges  $\pm 10^\circ$ ,  $\pm 45^\circ$ ,  $\pm 60^\circ$ ,  $\pm 85^\circ$  and  $360^\circ$



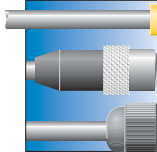
### Materials

Rugged plastic housings, fully encapsulated, chemical-resistant



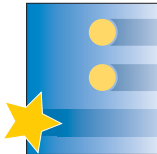
### Electrical versions

Digital as well as analog current and voltage outputs



### Electrical connections

M12 x 1 plug connection for simple installation



### Special features

Zero point setting

## Q20L60 – Voltage output 0.1...4.9 V



<b>General data</b>			
<b>Dimensions</b>	30 x 20 x 60 mm	<b>Ambient temperature</b>	-30...+70 °C
<b>Voltage output</b>	0.1...4.9 V	<b>Protection class</b>	IP68 / IP69K
<b>Operating voltage</b>	10...30 VDC	<b>Material housing</b>	PC

### Types and data – selection table

Type	Measuring range	Absolute accuracy (at 25 °C)	Temperature coef- ficient typical	Resolution	w	d
B2N10H-Q20L60-2LU3-H1151	-10...10°	0.3 °	0.01 °/K	0.04 °	w133	d562
B2N45H-Q20L60-2LU3-H1151	-45...45°	0.5 °	0.03 °/K	0.1 °	w133	d562
B2N60H-Q20L60-2LU3-H1151	-60...60°	0.5 °	0.03 °/K	0.14 °	w133	d562
B2N85H-Q20L60-2LU3-H1151	-85...85°	0.5	0.03 °/K	0.14 °	w133	d562

## Q20L60 – Current output 4...20 mA



<b>General data</b>			
<b>Dimensions</b>	30 x 20 x 60 mm	<b>Ambient temperature</b>	-30...+70 °C
<b>Current output</b>	4...20 mA	<b>Protection class</b>	IP68 / IP69K
<b>Operating voltage</b>	10...30 VDC	<b>Material housing</b>	PC

### Types and data – selection table

Type	Measuring range	Absolute accuracy (at 25 °C)	Temperature coef- ficient typical	Resolution	w	d
B2N10H-Q20L60-2LI2-H1151	-10...10°	0.3 °	0.01 °/K	0.04 °	w134	d562
B2N45H-Q20L60-2LI2-H1151	-45...45°	0.5 °	0.03 °/K	0.1 °	w134	d562
B2N60H-Q20L60-2LI2-H1151	-60...60°	0.5 °	0.03 °/K	0.14 °	w134	d562
B2N85H-Q20L60-2LI2-H1151	-85...85°	0.5 °	0.03 °/K	0.14 °	w134	d562

## Q20L60 – Ratiometric voltage output



<b>General data</b>			
<b>Dimensions</b>	30 x 20 x 60 mm	<b>Ambient temperature</b>	-30...+70 °C
<b>Ratiometric output voltage</b>	2...98 % U <sub>b</sub>	<b>Protection class</b>	IP68 / IP69K
<b>Operating voltage</b>	4.75...5.25 VDC	<b>Material housing</b>	PC

### Types and data – selection table

Type	Measuring range	Absolute accuracy (at 25 °C)	Temperature coefficient typical	Resolution	w	d
B2N60H-Q20L60-2LU5-H1151	-60...60°	0.5 °	0.03 °/K	0.14 °	w133	d562
B2N10H-Q20L60-2LU5-H1151	-10...10°	0.3 °	0.01 °/K	0.04 °	w133	d562
B2N45H-Q20L60-2LU5-H1151	-45...45°	0.5 °	0.03 °/K	0.1 °	w133	d562
B2N85H-Q20L60-2LU5-H1151	-85...85°	0.5 °	0.03 °/K	0.14 °	w133	d562

## Q20L60 – Adjustable measuring range



<b>General data</b>			
<b>Dimensions</b>	30 x 20 x 60 mm	<b>Operating voltage</b>	10...30 VDC
<b>Measuring range</b>	0...360°	<b>Ambient temperature</b>	-30...+70 °C
<b>Absolute accuracy (at 25 °C)</b>	0.5 °	<b>Protection class</b>	IP68 / IP69K
<b>Temperature coefficient typical</b>	0.03 °/K	<b>Material housing</b>	PC
<b>Resolution</b>	0.14 °		

### Types and data – selection table

Type	Current output	Voltage output	w	d
B1N360V-Q20L60-LI2-H1151	4...20 mA	-	w135	d563
B1N360V-Q20L60-LU3-H1151	-	0.1...4.9 V	w136	d563

## Q20L60 – Two programmable switchpoints



<b>Type</b>	B1N360V-Q20L60-2UP6X3-H1151	<b>Operating voltage</b>	10...30 VDC
<b>Dimensions</b>	30 x 20 x 60 mm	<b>Ambient temperature</b>	-30...+70 °C
<b>Measuring range</b>	0...360°	<b>Protection class</b>	IP68 / IP69K
<b>Output</b>	programmable, 2 x PNP	<b>Material housing</b>	PC
<b>Absolute accuracy (at 25°C)</b>	0.5°	<b>Wiring diagram</b>	w137
<b>Resolution</b>	0.14°	<b>Dimension drawing</b>	d564

## Q42 – CANopen interface



<b>General data</b>			
<b>Dimensions</b>	52 x 42 x 68 mm	<b>Ambient temperature</b>	-40...+80 °C
<b>Absolute accuracy (at 25°C)</b>	0.1°	<b>Protection class</b>	IP68 / IP69K
<b>Temperature coefficient typical</b>	0.008 °/K	<b>Material housing</b>	PA
<b>Operating voltage</b>	10...30 VDC		

### Types and data – selection table

Type	Resolution	Measuring range	<span style="background-color: #008000; color: white; padding: 2px;">w</span>	<span style="background-color: #ff0000; color: white; padding: 2px;">d</span>
B2N10H-Q42-CNX2-2H1150	0.05°	-10...+10°	w138	d565
B2N45H-Q42-CNX2-2H1150	0.1°	-45...+45°	w138	d565
B2N60H-Q42-CNX2-2H1150	0.1°	-60...+60°	w138	d565

