

# Tilt switches

N3 / N4.....

## MEMS technology, one or two axis

- + long lifetime and highly reliability due to mechanism-free MEMS technology
- + combinable output signals
- + one or two axis measurement
- + tilt range up to  $\pm 60^\circ$
- + high protection class IP67
- + operating temperature range  $-40^\circ\text{C}$  to  $+70^\circ\text{C}$  ( $-40^\circ\text{F}$  to  $+158^\circ\text{F}$ )
- + current or voltage output, or switching output via relay
- + depending on the angle, resolution up to  $\leq 0.04^\circ$
- + with versions with switching output, switch-on and turn-off delay selectable



## Use

Typical applications are on window cleaning platforms, aerial platforms, lifting platforms and firefighter ladders. Due to high protection class IP67, the sensor is perfectly suited for use under damp or polluted conditions. The functioning principle is based on a micro-electromagnetic system (MEMS), whereby the sensor has a very compact and flat design and is therefore particularly well-suited for tight installation spaces.

## Options

Sensor type N3 is designed for a one-axle measurement, type N4 for a two-axle measurement. Both tilt switches can be specified for a variety of applications, meaning, for example, that the choice between an analog output signal (current and voltage) or switching outputs (relay) exists. In addition, the two output types can be combined. Depending on the requirements, a turn-on and turn-off delay can be defined at the switching output. The electrical connection is done by cable or with a Deutsch connector plug.



Tilt switch with cable outlet

The relevant corresponding technical documents will be supplied with the product. Certain product descriptions can be similar therefore please ensure that you have the latest version of documentation for your specific product prior to any use.

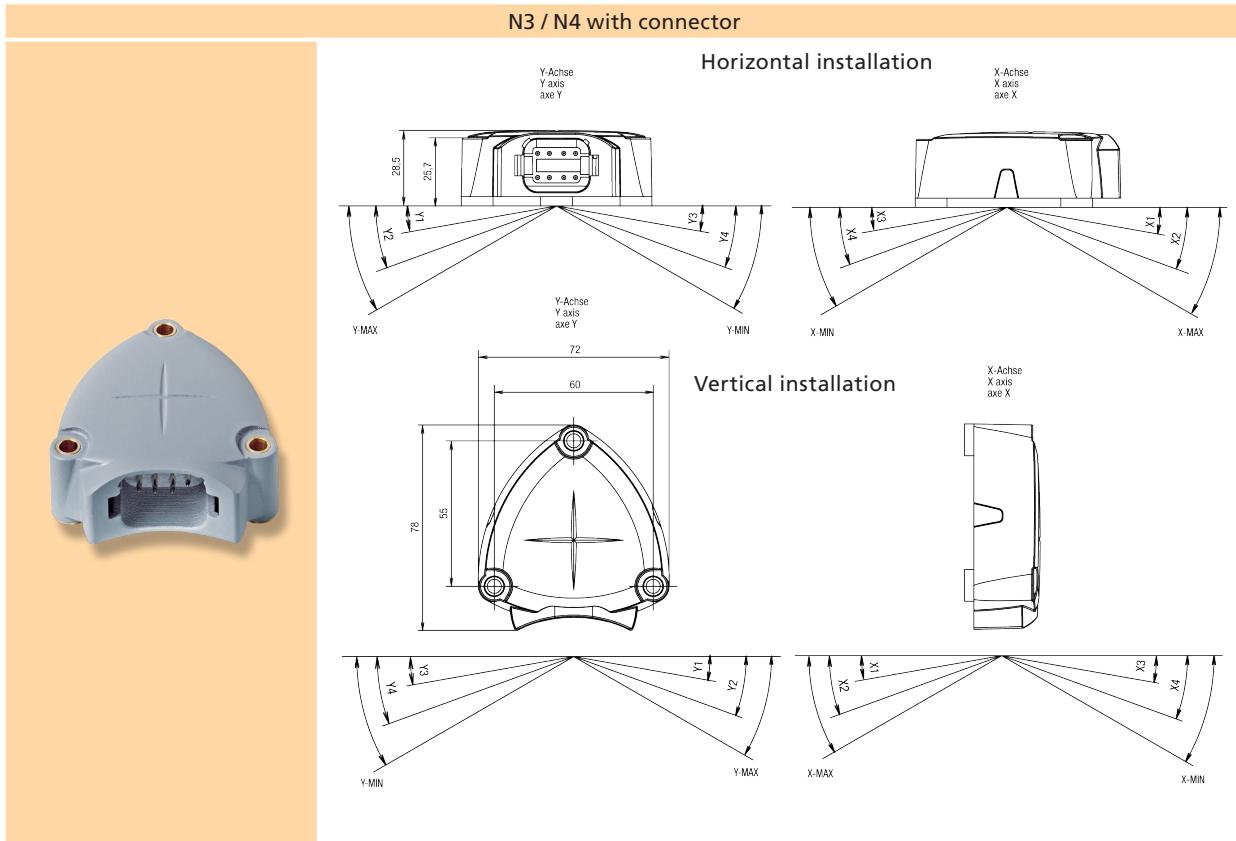
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## Mechanical assembly



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## Installation dimensions

Installation size	78 x 72 x 28.5 mm
Mounting	screw connection 3x Ø 5.3 mm holes

## Key mechanical data

Technology	MEMS*
Ambient temperature	-40°C to +70 °C (-40°F to +158°F)
Storage temperature	-40°C to +85°C (-40°F to +185°F)
Protection class	IP67 DIN EN 60529
Material	upper housing part: PBT; housing lid: PC
Connection	cable or Deutsch connector

\* The MEMS technology is a micro-mechanical, capacitive sensor element made from two adjacent plate capacitors. The middle plate is used by both plate capacitors at once and is designed as a micro-mechanical spring-loaded pendulum. The movement of the pendulum changes the capacitance ratio of two plate capacitors.

## Key electrical data

	Analog	Switching output
Tilt range	± 5° ... ± 60°	± 1.5° ... ± 60°
Operating voltage	10 ... 30 VDC	10...30 VDC
Operating current	32 mA typical	16mA typical; 12mA/relay typical
Output signal	$U_{out} = 0.5 \dots 4.5 \text{ V}$	relay
	$I_{out} = 4 \dots 20 \text{ mA}$	relay
Load resistance	$U_{out} = \text{min. } 10 \text{ k}\Omega (R_i = 100 \Omega)$	---
	$I_{out} = U_B > 15 \text{ V: max. } 500 \Omega$	---
	$U_B < 15 \text{ V: max. } 200 \Omega$	---
Switching voltage	---	max. 48 VDC
Switching current / power	---	max. 1 A / 30 W/VA
Delay time (on/off)	---	selectable (0 ... 2000 ms)
Switching points	---	selectable
Zero justification	max. ± 5°	
Resolution, angle ≤ 25°	≤ 0.04°	
Resolution, angle > 25°	≤ 0.14°	
Linearity error, angle ≤ 25°	± 1% from angle rate typical	
Linearity error, angle > 25°	± 1% from angle rate typical	
Repeating accuracy, ≤ 25°	0.2°	
Repeating accuracy, > 25°	0.5°	
Sensor offset temperature drift	0.008°/K	
Current step offset temperature drift	± 1% typical	
Voltage step offset temperature drift	± 0.25% typical	
Vibration filter	limit frequency typically 40 Hz (can be changed on request)	
Signal update rate	approx. 100 Hz	
Startup time	≤ 500 ms	

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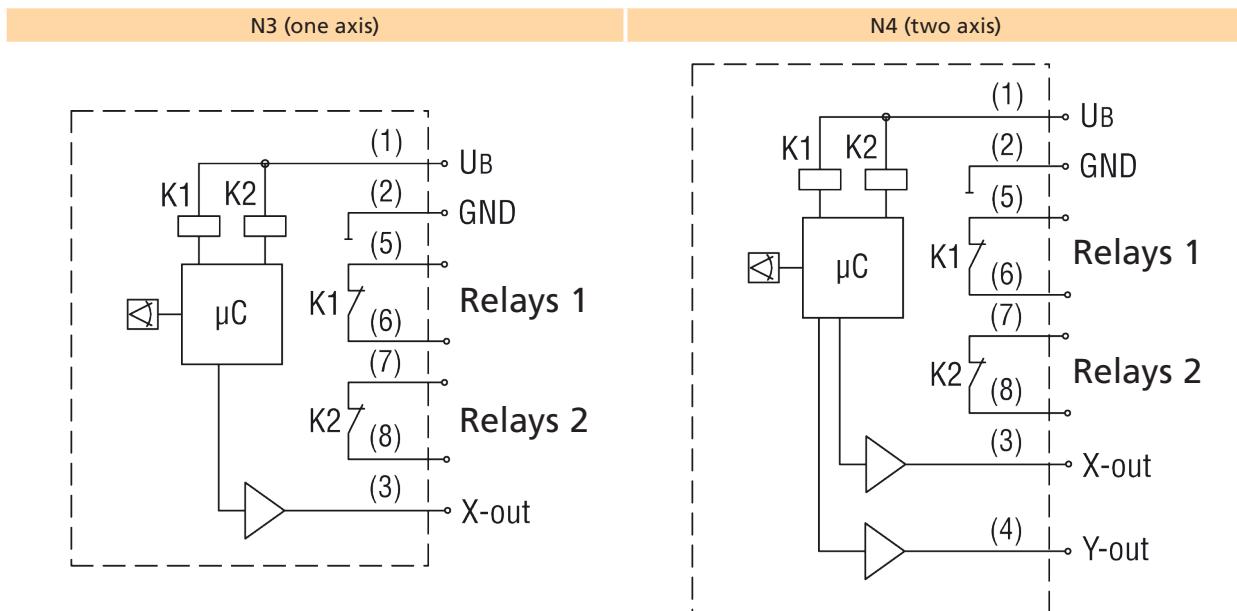
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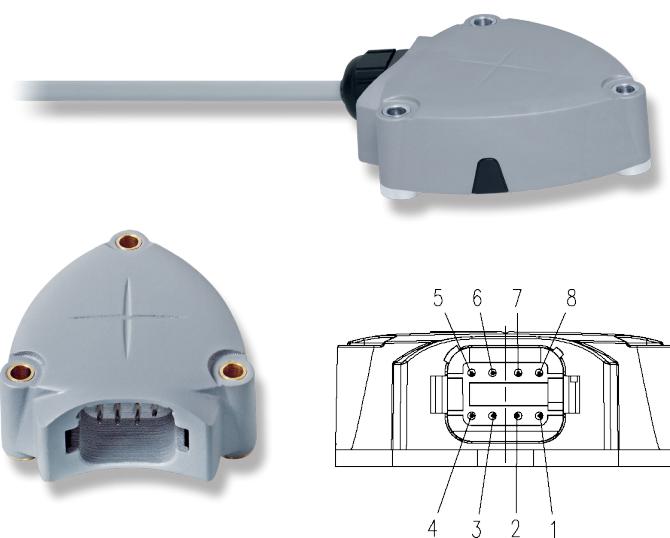
## Wiring



Contact form is selectable (N.O.(normally open) or N.C.(normally close)).  
Block circuit diagram is depicted with switched-on operating voltage in the zero position

## Connection type

Cable	consisting of 8x Ø 0.5 mm <sup>2</sup> wire, 1000 ± 30 mm length
Connector	8-pin Deutsch DT06-8S
8-pin Deutsch connector	Compatible elobau cable sets part no.: L1HC00.B



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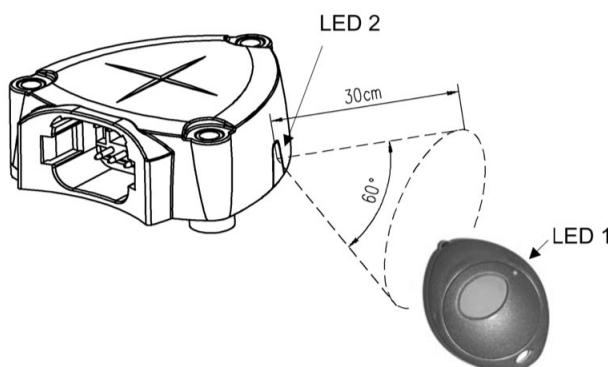
## Neutral position adjustment

All tilt sensors are preprogrammed with a neutral position. The user can adjust the neutral position using a infrared remote control, if required. During this adjustment , the current inclination angle is defined as the neutral position.

Defining the neutral position:

Shortly press the button on the infrared remote control to activate the IR-control. LED 1 lights up briefly to indicate readiness of operation. Then press the button for longer than two secounds to transmit a data signal to the tilt sensor. LED 1 flashes rapidly to indicate that the transmission is in progress. (If the button is not pressed within eight secounds, the remote control is deactivated and will have to be reactivated by pressing the button again.) LED 2 on the tilt sensor flashes briefly three times to confirm that the correct receipt of the data signal.

**The neutral position can only be adjusted within a minute after the operating voltage has been applied.**



Infrared remote control:  
article number: IR-NGS01

The infrared remote control has to be pressed in the space of the detection range of the tilt sensor as shown in the figure.

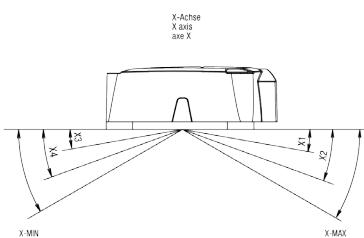
## Specifications of your tilt switch

One axis:

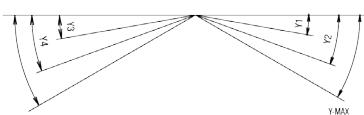
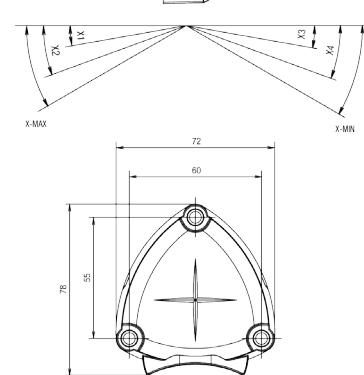
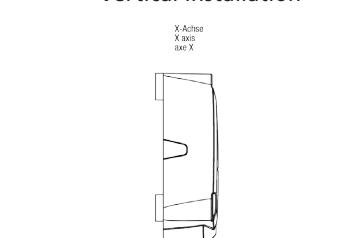
**N3**

Angle rate analog
angle rate: _____ °
( $\pm 5^\circ \dots \pm 60^\circ$ )
Digital switching points
switching points ( $\pm 1.5^\circ \dots \pm 60^\circ$ )
+X1 _____ °
+X2 _____ °
- X3 _____ °
- X4 _____ °

Horizontal installation



Vertical installation



### Infrared remote control (IR-NGS01)

<input type="checkbox"/> yes	quantity: _____
<input type="checkbox"/> no	

**K**



### Numbers

assigned by elobau

### Switch-off delay\*

<input type="checkbox"/> A = without	<input type="checkbox"/> B = 0.5 s
<input type="checkbox"/> C = 1 s	<input type="checkbox"/> D = 1.5 s
<input type="checkbox"/> E = 2 s	

### Switch-on delay\*

<input type="checkbox"/> A = without	<input type="checkbox"/> B = 0.5 s
<input type="checkbox"/> C = 1 s	<input type="checkbox"/> D = 1.5 s
<input type="checkbox"/> E = 2 s	

### Interconnection type (X / Y)\*

<input type="checkbox"/> 4 = relay 1 : X1/X3
relay 2 : X2/X4
<input type="checkbox"/> 5 = relay 1 : X1/X3
<input type="checkbox"/> 6 = relay 1 : X1
relay 2 : X3
<input type="checkbox"/> 7 = relay 1 : Y1/Y3
<input type="checkbox"/> 8 = relay 1 : Y1/Y3
relay 2 : Y2/Y4
<input type="checkbox"/> 9 = relay 1 : Y1
relay 2 : Y3

### Relay\*

<input type="checkbox"/> A = 1x relay (N.C.(normally close))
<input type="checkbox"/> B = 2x relays (N.C.(normally close))
<input type="checkbox"/> C = 1x relay (N.O.(normally open))
<input type="checkbox"/> D = 2x relays (N.O.(normally open))

### x-axis output signal

<input type="checkbox"/> 0 = no signal
<input type="checkbox"/> 1 = 4...20 mA
<input type="checkbox"/> 2 = 0.5...4.5 V

### Outputs

<input type="checkbox"/> A = analog
<input type="checkbox"/> D = switching output
<input type="checkbox"/> K = combined

### Housing / installation / connection

<input type="checkbox"/> A = horizontal (Deutsch)
<input type="checkbox"/> B = vertical (Deutsch)
<input type="checkbox"/> C = horizontal (cable)
<input type="checkbox"/> D = vertical (cable)
<input type="checkbox"/> E = vertical y-axis (Deut.)
<input type="checkbox"/> F = vertical y-axis (cable)

### Compatible cable set

<input type="checkbox"/> Deutsch DT06-8S part no.: L1HC00.B
_____ m (1 - 10m in 1m steps)

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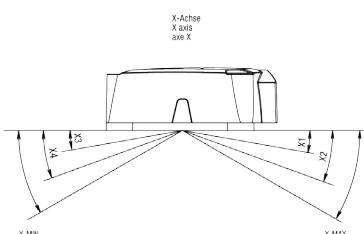
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Two axis:

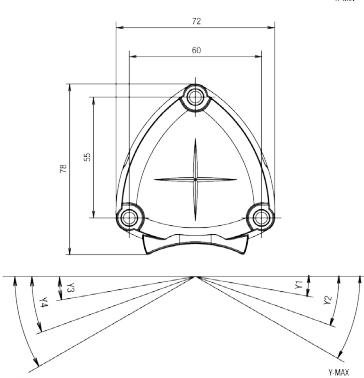
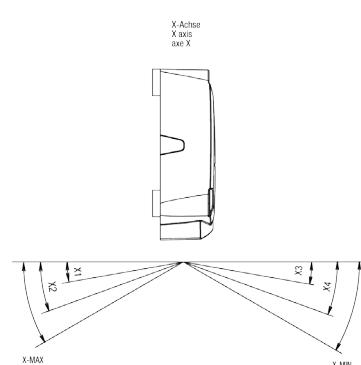
**N4**

Angle rate analog
angle rate: _____ °
( $\pm 5^\circ \dots \pm 60^\circ$ )
Digital switching points
switching points ( $\pm 1.5^\circ \dots \pm 60^\circ$ )
+X1 _____ ° +Y1 _____ °
+X2 _____ ° +Y2 _____ °
- X3 _____ ° - Y3 _____ °
- X4 _____ ° - Y4 _____ °

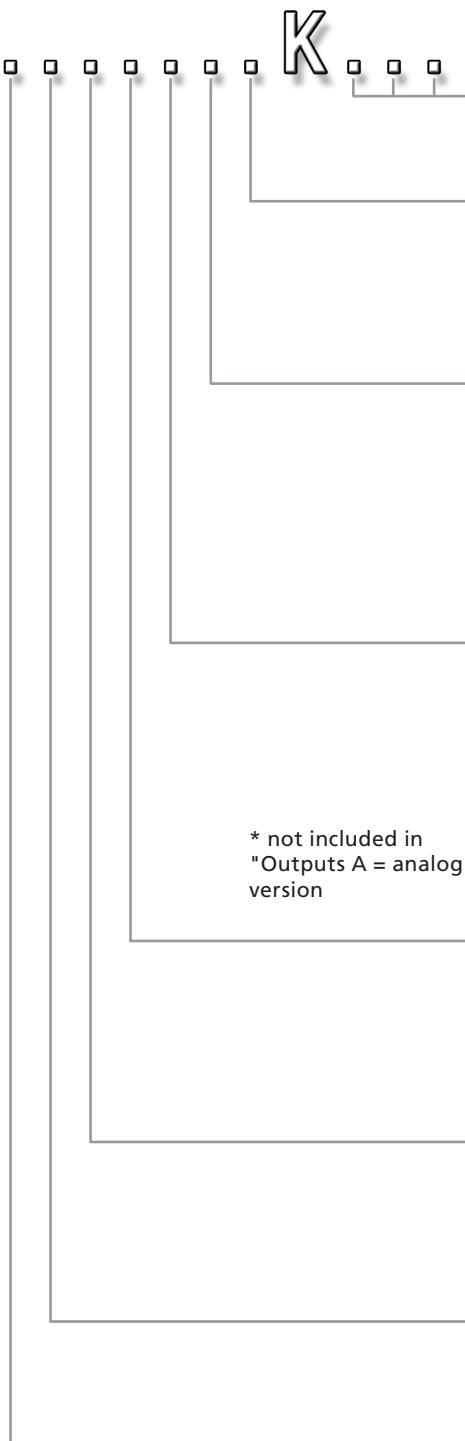
Horizontal installation



Vertical installation



<input type="checkbox"/> yes	quantity: _____
<input type="checkbox"/> no	



\* not included in  
"Outputs A = analog"  
version

Numbers	
assigned by elobau	
<input type="checkbox"/>	A = without
<input type="checkbox"/>	B = 0.5 s
<input type="checkbox"/>	C = 1 s
<input type="checkbox"/>	D = 1.5 s
<input type="checkbox"/>	E = 2 s

Switch-off delay*	
<input type="checkbox"/>	A = without
<input type="checkbox"/>	B = 0.5 s
<input type="checkbox"/>	C = 1 s
<input type="checkbox"/>	D = 1.5 s
<input type="checkbox"/>	E = 2 s

Switch-on delay*	
<input type="checkbox"/>	A = without
<input type="checkbox"/>	B = 0.5 s
<input type="checkbox"/>	C = 1 s
<input type="checkbox"/>	D = 1.5 s
<input type="checkbox"/>	E = 2 s

Interconnection type*	
<input type="checkbox"/>	1 = relay 1 : X1/X3 Y1/Y3
<input type="checkbox"/>	2 = relay 1 : X1/X3 relay 2 : Y1/Y3
<input type="checkbox"/>	3 = relay 1 : X1/X3 Y1/Y3 relay 2 : X2/X4 Y2/Y4
<input type="checkbox"/>	4 = relay 1 : X1/X3 relay 2 : X2/X4

Relay*	
<input type="checkbox"/>	A = 1x relay (N.C.(normally close))
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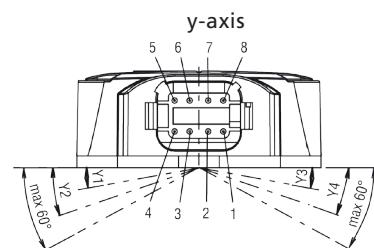
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<input type="checkbox"/>	D = vertical (cable)

Compatible cable set	
<input type="checkbox"/>	Deutsch DT06-8S part no.: L1HC00.B
_____ m (1 - 10m in 1m steps)	



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## Your product enquiry

**Quantity** \_\_\_\_\_ **Batch size** \_\_\_\_\_

**Batch size** \_\_\_\_\_

Name/first name

Company

Address

Postal code/town

## Country

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## Notes, questions, other