



## Tilt sensor N3

The robustly designed N3 tilt sensor has a high impact and vibration resistance so is frequently used for tilt measurement in construction machinery, industrial trucks and adverse industrial environments. The N3 tilt sensor also has a high resolution and repeating accuracy. It can be easily programmed and the neutral position adjusted with the corresponding infrared remote control.

### Product characteristics

- Long service life and reliability thanks to the mechanics-free MEMS technology
- The analogue output signals can be combined with additional switching points
- Tilt range up to  $\pm 60^\circ$
- IP67 protection class
- Operating range from  $-40^\circ\text{C}$  to  $+70^\circ\text{C}$
- Analogue current or voltage output, or volt free switching output via relay
- Depending on the angle, resolution up to  $0.04^\circ$
- Adjustment of the neutral position possible through remote control
- Selectable switch-on and switch-off delay at the switching output

**Technical drawing**

IMAGE 1/6

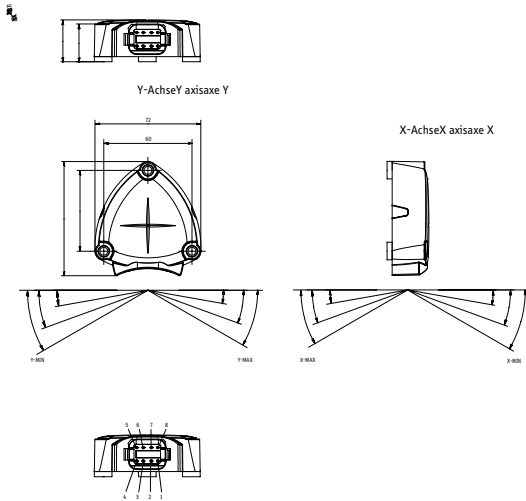


IMAGE 2/6

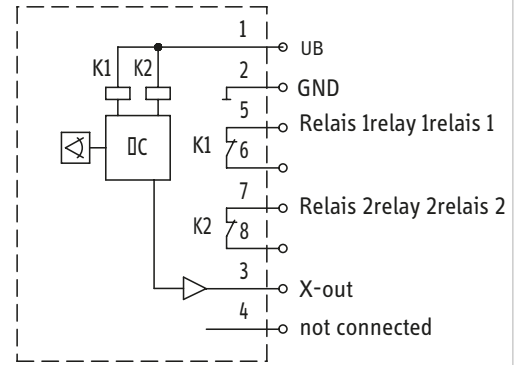


IMAGE 3/6

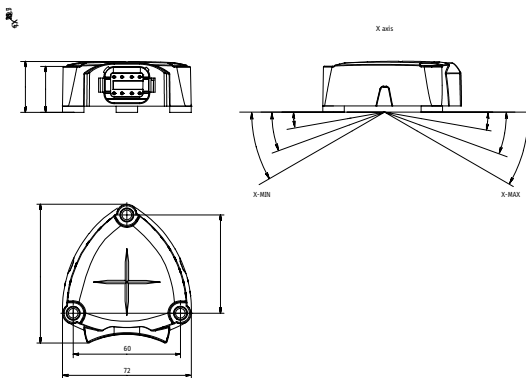


IMAGE 4/6: NOTE: IF MOUNTED VERTICALLY, IT IS POSSIBLE TO MEASURE THE TILT ON EITHER THE X-AXIS OR Y-AXIS.

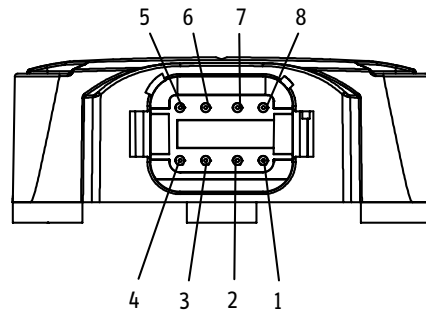


IMAGE 5/6: THE BLOCK CIRCUIT DIAGRAM DEPICTS THE SENSOR WITH THE SWITCHED-ON OPERATING VOLTAGE IN THE ZERO POSITION.

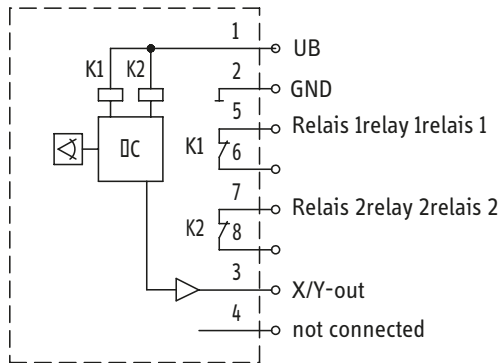


IMAGE 6/6

**Product options**

IMAGE 1/3

**ORDERING KEY**

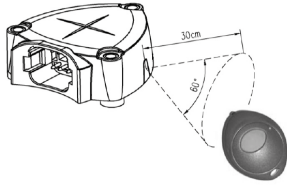
HS			Tilt sensor 120°, single axis	Note
			<b>Housing/Installation</b>	
A			Horizontal X-axis (Deutsch, 8-pin)	
B			Vertical X-axis (Deutsch, 8-pin)	
E			Vertical Y-axis (Deutsch, 8-pin)	
			<b>Outputs</b>	
A			Analogue	
D			Switching output	
K			Combined (analogue + switching output)	
			<b>Analogue output signal</b>	
		0	no signal	
		1	4 ... 20mA	
		2	0.5 ... 4.5mA	
			<b>Relay (switching output) *</b>	* Omitted if "analogue" is selected for output
		B	2x relay (N.C.)	
			<b>Connection type relay (switching output) *</b>	* Omitted if "analogue" is selected for output
		4	Relay 1 = X1/X3	
			Relay 2 = X2/X4	for housing/Installation
		6	Relay 1 = X1	X-axis
			Relay 2 = X3	
		8	Relay 1 = Y1/Y3	
			Relay 2 = Y2/Y4	for housing/Installation
		9	Relay 1 = Y1	Y-axis
			Relay 2 = Y3	
			<b>Switch-on delay time (switching output) *</b>	* Omitted if "analogue" is selected for output
		A	No delay	
		B	0.5s	
			<b>Switch-off delay time (switching output) *</b>	* Omitted if "analogue" is selected for output
		A	No delay	
		B	0.5s	
			<b>Angle rate* for analogue output signal</b>	* please specify when ordering
			± 5°, ± 10°, ± 15°, ± 20°, ± 25°, ± 30°, ± 40°, ± 45°, ± 60°	
			<b>Other angle rates on request</b>	
			(Within ±1.5° ... ±60°)	
			<b>Switching points for the switching outputs (standard)</b>	
			+X1 = 5°	
			+X2 = 10°	
			-X3 = 5°	
			-X4 = 10°	
			+Y1 = 5°	
			+Y2 = 10°	
			-Y3 = 5°	
			-Y4 = 10°	
			<b>More switching points on request</b>	
			(Within ±1.5° ... ±60°)	

IMAGE 2/3

Optional
<b>Housing/Installation</b>
horizontal X-axis (cable connection with a length of 1m, 3m, 5m, 10m)
vertical X-axis (cable connection with a length of 1m, 3m, 5m, 10m)
vertical Y-axis (cable connection with a length of 1m, 3m, 5m, 10m)
<b>Relay (switching output)</b>
1x relay (N.C.)
1x relay (N.O.)
2x relay (N.O.)
<b>Connection type relay (switching output)</b>
Relay 1 = X1/X3 (for housing/Installation X-axis)
Relay 1 = Y1/Y3 (for housing/Installation Y-axis)
<b>Switch-on delay time (switching output)</b>
1.5s
2s
<b>Switch-off delay time (switching output)</b>
1.5s
2s
<b>More output signals, cable lengths, delay times on request</b>

IMAGE 3/3

**Infrared remote control for neutral position adjustment IR-NG501**



All tilt sensors are preprogrammed with a neutral position. If required, the neutral position can be adjusted using an infrared remote control. During this adjustment, the current inclination angle is defined as the neutral position.

## Electrical data

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Max. switching voltage	-			48 V DC	
Max. switching current	-			1 A	
Max. switching power	-			30 W	
Polarity reversal protection	yes				
Output signal min.	-	0.5 V DC	-		0.5 V DC
Output signal max.	-	4.5 V DC	-		4.5 V DC
Output signal min.	4 mA	-		4 mA	-
Output signal max.	20 mA	-		20 mA	-
Output signal - centre position/zero position	-	2.5 V DC	-		2.5 V DC
Output signal - centre position/zero position	12 mA	-		12 mA	-
EMC immunity (Norm)	ISO 11452-5:2000 ISO7637-2:2004				
EMC emission (Norm)	DIN EN 55025:2003				
Operating voltage min.	10 V DC				
Operating voltage max.	30 V DC				
Current consumption	24 mA		36 mA		
Load resistance min.	-	10000 Ohm	-		10000 Ohm
Load resistance max.	200 Ohm	-		200 Ohm	-
Short-circuit resistance to GND	no				
Short-circuit resistance to supply	no				
Linearity error	typ. +-1 %				
Repeating accuracy	<= 25°:0,2°, >25°:0,5 °				
Signal update rate	100 Hz				
Technology	MEMS				
Number of measurement axes (Number)	1				

## Electrical data

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Angle measuring range	(Selectable in 5° increments) $\pm 5^\circ \dots \pm 60^\circ$				
Initialisation time after power on/start-up time	500 ms				
Switching points	-		(Selectable in 0.5° increments) $\pm 1.5^\circ \dots \pm 60^\circ$		
Zero justification	$\pm 5^\circ$				
Vibration filter	40 Hz				
Switching output	-		2x NO		
Connection type (switching output)	-		Selectable		
Outputs	4...20mA	0,5...4,5V	Relay	4...20mA + relay	0,5...4,5V + relay
MTTF	29.7 a	29.3 a	29.7 a		29.3 a
Resolution	$\leq 25^\circ: \leq 0,04^\circ, > 25^\circ: \leq 0,14^\circ$				
Temperature coefficient	0.008°/K				

## Material information

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Housing material	Housing top: PBT; Housing cover: PC				

## Environmental conditions

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Protection class	IP67 DIN EN 60529				
Operating temperature min.	-40 °C				
Max. operating temperature	70 °C				
Min. storage temperature	-40 °C				
Max. storage temperature	85 °C				
Min. cable temperature range, moving	-10 °C		-5 °C		-40 °C
Max. cable temperature range, moving	105 °C			80 °C	
Min. cable temperature range, fixed installation	-30 °C			-40 °C	
Max. cable temperature range, fixed installation	105 °C			80 °C	
Shock resistance (Norm)	DIN IEC 68 Teil 2-27				
Vibration resistance (Norm)	DIN IEC 68 Teil 2-6 DIN IEC68-2-64				
Impact resistance (Norm)	max. 50 g				
ESD insulation resistance (Norm)	ISO 10605:2008				

## Installation

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Torque for fastening screws	6 N m				
Weight	100 g				

## Connection

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
Connector type	Deutsch 8 pol.				
Cable length	Variable (1m, 3m, 5m, 10m)				
Connection	Deutsch, 8-pin / cable outlet				

## Approvals

Attribute	N3.A1...	N3.A2...	N3.D0....	N3.K1....	N3.K2....
CE label	yes				