

## Tilt sensor N5

The N5 tilt sensor with CAN-Bus interface is available as a CANopen or SAEJ1939 variant. It has a high impact and vibration resistance so is frequently used for tilt measurement in construction machinery, industrial trucks and adverse industrial environments. The N5 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
- Inclination range single axis 360°, or double axis 180
- Up to 4 additional, freely configurable switching points
- Switch-on/switch-off delay per switching point selectable
- Adjustment of the zero position via CAN bus, or IR remote control
- Protection class IP67
- Temperature resistant from -40 °C to +85 °C
- Deutsch or M12 plug
- Daisy chain – looping through the CAN signal without additional T-distributors
- Compact, flat and outdoor-suitable housing
- Stack mounting for redundancy

**Technical drawing**

IMAGE 1/5

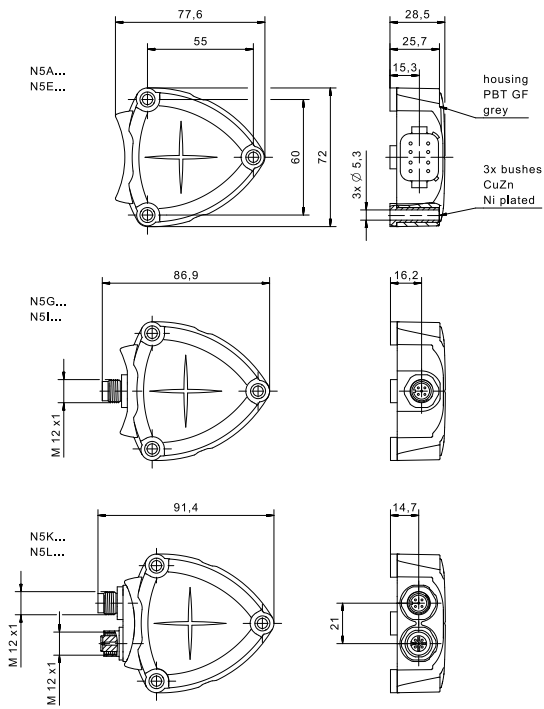
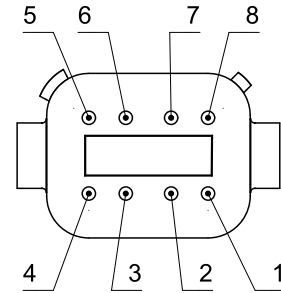


IMAGE 2/5

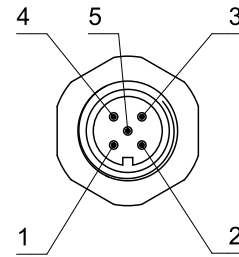
N5A...  
 N5E...

male Deutsch DT06-8S



N5G...  
 N5I...

male M12



N5K...  
 N5L...

male M12

female M12

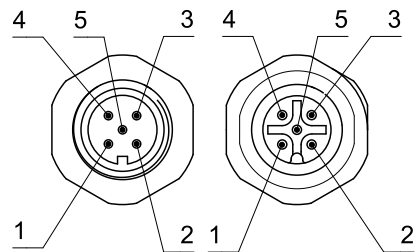
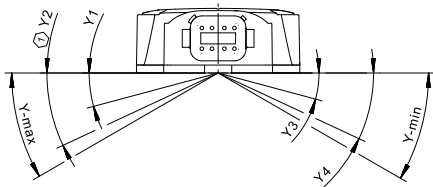


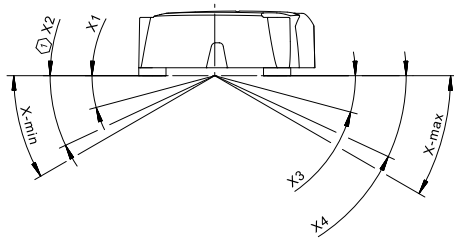
IMAGE 3/5

N5A...  
 N5G...  
 N5K...

180° (±90°) horizontally mounted Y-axis



180° (±90°) horizontally mounted X-axis

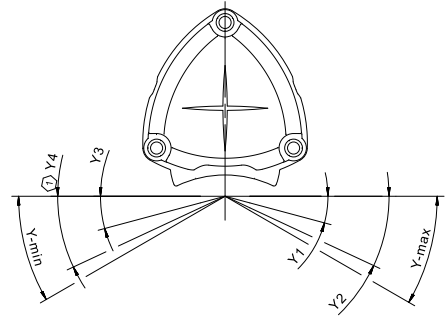


① Only available at N5A...

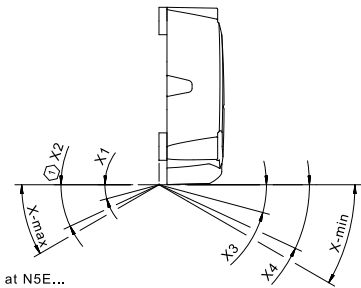
IMAGE 4/5

N5E...  
 N5I...  
 N5L...

360° (±180°) vertically mounted Y-axis

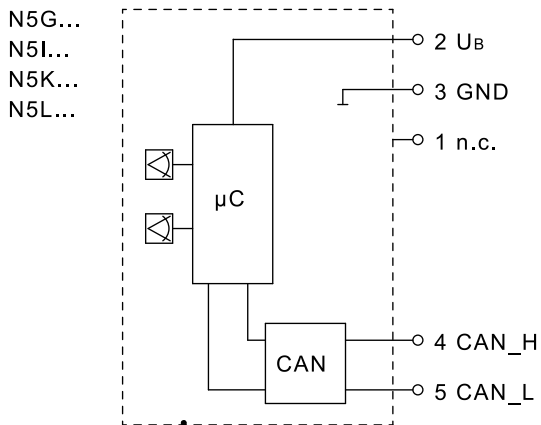
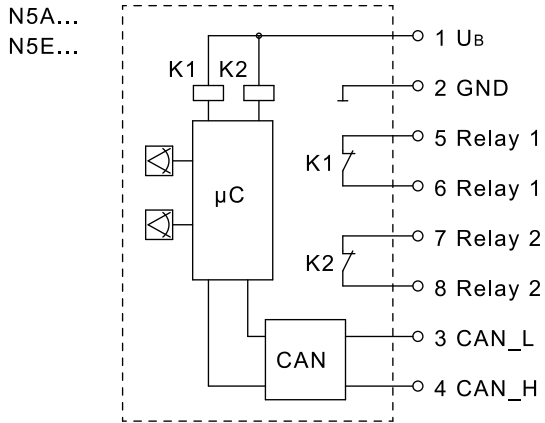


120° (±60°) vertically mounted X-axis



① Only available at N5E...

IMAGE 5/5





## Electrical data

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
Max. switching voltage	-	48 V DC	-	48 V DC	-	48 V DC
Max. switching current	-	1 A	-	1 A	-	1 A
Max. switching power	-	30 W	-	30 W	-	30 W
Polarity reversal protection	yes					
Resolution	0.014 °					
Operating voltage min.	9 V DC					
Operating voltage max.	32 V DC					
Current consumption	100 mA					
Short-circuit resistance to GND	yes	no	yes	no	yes	no
Short-circuit resistance to supply	yes	no	yes	no	yes	no
Repeating accuracy	< 0,3 °					
Signal update rate	200 Hz					
Technology	MEMS					
Number of measurement axes (Number)	2		2 (X, Y) Z-axis for signaling the installation position		2	
Angle measuring range	180 °				360/120 °	
Initialisation time after power on/start-up time	500 ms					
Switching points	-	Selectable from ±1.5° ...±90 °	-	Selectable from ±1.5° ...±90 °	-	Selectable from ±1.5° ...±180 °
Zero justification	±60°					
Vibration filter	25 Hz					
Fieldbus system	CAN					
Protocol	J1939		CANopen		J1939	
Node ID / Source Address	0xE2		0x20		0xE2	
Transmitting cycle	10 ms					
Baud rate	250 kBit/s					

## Electrical data

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
<b>Bus terminating resistor</b>	no					
<b>MTTF</b>	57.6 a					
<b>Switching output</b>	-	2x NO	-	2x NO	-	2x NO
<b>Outputs</b>	CAN J1939	CAN J1939 + relay	CANopen	CANopen + relay	CAN J1939	CAN J1939 + relay
<b>Turn-on delay</b>	-	Selectable (0...2 s in 0.5s increments)	-	Selectable (0...2 s in 0.5s increments)	-	Selectable (0...2 s in 0.5s increments)
<b>Turn-off delay</b>	-	Selectable (0...2 s in 0.5s increments)	-	Selectable (0...2 s in 0.5s increments)	-	Selectable (0...2 s in 0.5s increments)
<b>Connection type (switching output)</b>	-	Selectable	-	Selectable	-	Selectable
<b>Temperature coefficient</b>	$\pm 0,02^{\circ}/K$					
<b>Linearity error</b>	$< \pm 0,4^{\circ}$					

## Electrical data

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
Max. switching voltage	-	48 V DC			-	
Max. switching current	-	1 A			-	
Max. switching power	-	30 W			-	
Polarity reversal protection	yes					
Resolution	0.014 °					
Operating voltage min.	9 V DC					
Operating voltage max.	32 V DC					
Current consumption	100 mA					
Short-circuit resistance to GND	yes	no			yes	
Short-circuit resistance to supply	yes	no			yes	
Repeating accuracy	< 0,3 °					
Signal update rate	200 Hz					
Technology	MEMS					
Number of measurement axes (Number)	2			2 (X, Y) Z-axis for signaling the installation position	2	
Angle measuring range	360/120 °		180 °		360/120 °	
Initialisation time after power on/start-up time	500 ms					
Switching points	-	Selectable from ±1.5°...±180 °			-	
Zero justification	±60°					
Vibration filter	25 Hz					
Fieldbus system	CAN					
Protocol	CANopen		J1939	CANopen	J1939	CANopen
Node ID / Source Address	0x20		0xE2	0x20	0xE2	0x20
Transmitting cycle	10 ms					



## Electrical data

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
<b>Baud rate</b>	250 kBit/s					
<b>Bus terminating resistor</b>	no					
<b>MTTF</b>	57.6 a					
<b>Switching output</b>	-	2x NO	-			
<b>Outputs</b>	CANopen	CANopen + relay	CAN J1939	CANopen	CAN J1939	CANopen
<b>Turn-on delay</b>	-	Selectable (0...2 s in 0.5s increments)	-			
<b>Turn-off delay</b>	-	Selectable (0...2 s in 0.5s increments)	-			
<b>Connection type (switching output)</b>	-	Selectable	-			
<b>Temperature coefficient</b>	$\pm 0,02^{\circ}/K$					
<b>Linearity error</b>	$< \pm 0,4^{\circ}$					

## Electrical data

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
Max. switching voltage	-			
Max. switching current	-			
Max. switching power	-			
Polarity reversal protection	yes			
Resolution	0.014 °			
Operating voltage min.	9 V DC			
Operating voltage max.	32 V DC			
Current consumption	100 mA			
Short-circuit resistance to GND	yes			
Short-circuit resistance to supply	yes			
Repeating accuracy	< 0,3 °			
Signal update rate	200 Hz			
Technology	MEMS			
Number of measurement axes (Number)	2	2 (X, Y) Z-axis for signaling the installation position	2	
Angle measuring range	180 °		360/120 °	
Initialisation time after power on/start-up time	500 ms			
Switching points	-			
Zero justification	±60°			
Vibration filter	25 Hz			
Fieldbus system	CAN			
Protocol	J1939	CANopen	J1939	CANopen
Node ID / Source Address	0xE2	0x20	0xE2	0x20
Transmitting cycle	10 ms			
Baud rate	250 kBit/s			
Bus terminating resistor	no			

## Electrical data

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
MTTF	57.6 a			
Switching output	-			
Outputs	CAN J1939	CANopen	CAN J1939	CANopen
Turn-on delay	-			
Turn-off delay	-			
Connection type (switching output)	-			
Temperature coefficient	$\pm 0,02^{\circ}/K$			
Linearity error	$< \pm 0,4^{\circ}$			

## Material information

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
Housing material	Housing top: PBT; Housing cover: PC					

## Material information

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
Housing material	Housing top: PBT; Housing cover: PC					

## Material information

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
Housing material	Housing top: PBT; Housing cover: PC			

## Environmental conditions

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
<b>Protection class</b>	IP67 DIN EN 60529					
<b>Operating temperature min.</b>	-40 °C					
<b>Max. operating temperature</b>	85 °C					
<b>Min. storage temperature</b>	-40 °C					
<b>Max. storage temperature</b>	105 °C					
<b>Shock resistance (Norm)</b>	500 m/s <sup>2</sup> ;; 100 shocks per axis, DIN EN 60068-2-27					
<b>Vibration resistance (Norm)</b>	Sine Vibration: 100 m/s <sup>2</sup> ;; 19h, DIN EN 60068-2-6 Random Vibration: 80,1 m/s <sup>2</sup> ;; 24h, DIN EN 60068-2-64					
<b>Impact resistance (Norm)</b>	max. 50 g					
<b>EMC Agricultural and forestry machines (Norm)</b>	DIN EN ISO 14982 pulse 5b: max. voltage 65 V (absolute), functional status C for pulse 1 and 4					
<b>EMC Earth-moving and building construction machinery (Norm)</b>	DIN EN ISO 13766-1 pulse "load dump": max. voltage 65 V (absolute)					
<b>EMC Industrial trucks (Norm)</b>	DIN EN 12895					

## Environmental conditions

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
<b>Protection class</b>	IP67 DIN EN 60529					
<b>Operating temperature min.</b>	-40 °C					
<b>Max. operating temperature</b>	85 °C					
<b>Min. storage temperature</b>	-40 °C					
<b>Max. storage temperature</b>	105 °C					
<b>Shock resistance (Norm)</b>	500 m/s <sup>2</sup> ;; 100 shocks per axis, DIN EN 60068-2-27					
<b>Vibration resistance (Norm)</b>	Sine Vibration: 100 m/s <sup>2</sup> ;; 19h, DIN EN 60068-2-6 Random Vibration: 80,1 m/s <sup>2</sup> ;; 24h, DIN EN 60068-2-64					
<b>Impact resistance (Norm)</b>	max. 50 g					
<b>EMC Agricultural and forestry machines (Norm)</b>	DIN EN ISO 14982 pulse 5b: max. voltage 65 V (absolute), functional status C for pulse 1 and 4					
<b>EMC Earth-moving and building construction machinery (Norm)</b>	DIN EN ISO 13766-1 pulse "load dump": max. voltage 65 V (absolute)					
<b>EMC Industrial trucks (Norm)</b>	DIN EN 12895					

## Environmental conditions

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
Protection class	IP67 DIN EN 60529			
Operating temperature min.	-40 °C			
Max. operating temperature	85 °C			
Min. storage temperature	-40 °C			
Max. storage temperature	105 °C			
Shock resistance (Norm)	500 m/s <sup>2</sup> ;; 100 shocks per axis, DIN EN 60068-2-27			
Vibration resistance (Norm)	Sine Vibration: 100 m/s <sup>2</sup> ;; 19h, DIN EN 60068-2-6 Random Vibration: 80,1 m/s <sup>2</sup> ;; 24h, DIN EN 60068-2-64			
Impact resistance (Norm)	max. 50 g	max. 50g		
EMC Agricultural and forestry machines (Norm)	DIN EN ISO 14982 pulse 5b: max. voltage 65 V (absolute), functional status C for pulse 1 and 4			
EMC Earth-moving and building construction machinery (Norm)	DIN EN ISO 13766-1 pulse "load dump": max. voltage 65 V (absolute)			
EMC Industrial trucks (Norm)	DIN EN 12895			

## Installation

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
Torque for fastening screws	6 N m					
Weight	100 g					

## Installation

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
Torque for fastening screws	6 N m					
Weight	100 g					

## Installation

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
Torque for fastening screws	6 N m			
Weight	100 g			

## Connection

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
Connection	Deutsch 8-pol.					

## Connection

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
Connection	Deutsch 8-pol.		M12x1 5-pol.			

## Connection

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
Connection	2 x M12x1 5pol.			

## Approvals

Attribute	N5ACJ...	N5ACJB...	N5ACO...	N5ACOB...	N5ECJ...	N5ECJB... ▶
CE label	yes					

## Approvals

Attribute	N5ECO...	N5ECOB...	N5GCJ...	N5GCO...	N5ICJ...	N5ICO... ▶
CE label	yes					

## Approvals

Attribute	N5KCJ...	N5KCO...	N5LCJ...	N5LCO...
CE label	yes			