Properties:

- ✓ Measuring range +/-90°
- ✓ Average resolution and accuracy
- ✓ Areas of application:
  - Housing protection class: IP67
  - CE marking

Areas of application:

- ✓ Lifting platforms and access equipment
- ✓ Agricultural and forestry machinery
- ✓ Commercial vehicles, tail lifts
- ✓ Crane and lifting technology

Function: The **high precision** version of the HNSC-C series monitors tilt deviations from the horizontal around a tilt axis (X-axis). If a tilt deviation occurs on the X-axis that is greater than the switching angle, a switching operation takes place. The tilt switch will only return to the previous operating state when the tilt deviation falls below the defined switching angle again.
An indicator LED in the housing signals the state of the switching output (the switching output 1 in the case of changeover switches). The switching point is preset according to customer specifications in a range between 3° tilt and 45° tilt (see order key). The switching hysteresis between the turn-on and turn-off angles is approximately 2° tilt. The measurement cut-off frequency is approximately 5 Hz.

Special advantages: The design of the tilt switches in the HNSC-C series is implemented exclusively based on analogue electronic components. This allows the switch to achieve very high values regarding its safety-relevant data (MTTFd) for calculating the Performance Level (PL) in a machine or system – for example, using the software tool SISTEMA.
The avoidance of programmable components in the HNSC-C series offers additional advantages when using the switch in safety-relevant applications, as the influence of software errors can be eliminated when considering potential sources of failure.

Customer specific variants: Customized Variants: The switching hysteresis and cut-off frequency of the switch are based on many years of experience but can be customized according to the specific application.

Mechanical data:

Housing material:	Plastic
Dimensions (L x W x H):	40 x 20 x 20 mm

Measuring range[1]:

Measuring range X-axis:	-90°...+90°
Switching point X-axis:	According to customer specifications in the range between 3° and 45° tilt

Accuracy:

Accuracy:	+/- 0.5°
Hysteresis:	2° +/- 0.5°
Cut-off frequency:	5 Hz
Measuring principle:	MEMS

	Min.	Typ.	Max.
Temperature drift (relative):	0.002	0.010	0.020 [°/K]
Temperature drift at 0 °C:	0.050	0.250	0.500 [°]
Temperature drift at 50 °C:	0.050	0.250	0.500 [°]
Temperature drift at -25 °C:	0.100	0.500	1.000 [°]
Temperature drift at 70 °C:	0.090	0.450	0.900 [°]

[1] The properties specified here refer to a switching point of 5° tilt. For a different switching point, the values may vary slightly.

Electrical data:

Operating voltage UB:	9-30 VDC
Rated voltage:	24 VDC
Ripple:	< 15%
Rated current:	250 mA
Quiescent current:	< 5 mA

Environmental conditions:

Temperature range:	-25 °C ... 70 °C
Protection class:	DIN IP 67

EMC:

EU Directives:	2014/30/EU EMC Directive, 2011/65/EU RoHS Directive
Applied standards:	EN 61000-6-3:2007 + A1:2011/ AC:2012 (Emissions for residential, commercial, and light industrial areas), EN 61000-6-2:2005 + AC:2005-09 (Immunity for industrial areas)

Functional safety:

MTTFd:	2,237 years (Normally Open/Normally Close) 2,194 years (Changeover)
Service life:	20 years

The specification of the MTTF / service life value does not constitute binding quality and/or durability commitments; these are merely empirical values without binding character.

These value specifications do not extend or otherwise influence the limitation period for warranty claims.

Output Variants:

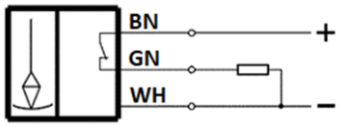
Normally Close (NC) PNP

Output/ Interface:
Switch type: Normally Close (NC)

Connections:
Connections: Cable, 3-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output (PNP)

Connection diagram:



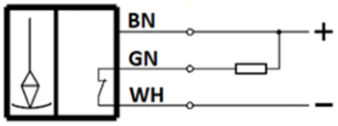
Normally Close (NC) PNP

Output/ Interface:
Switch type: Normally Open (NO)

Connections:
Connections: Cable, 3-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output (NPN)

Connection diagram:



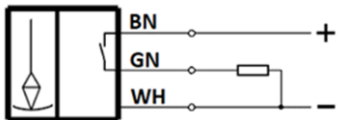
Normally Open (NO) PNP

Output/ Interface:
Switch type: Normally Open (NO)

Connections:
Connections: Cable, 3-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output 1 (PNP)
yellow: Switching output 2 (PNP)

Connection diagram:



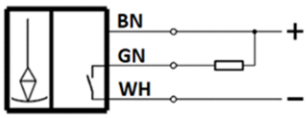
Normally Open (NO) NPN

Output/ Interface:
Switch type: Normally Open

Connections:
Connections: Cable, 3-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output 1 (NPN)
yellow: Switching output 2 (NPN)

Connection diagram:



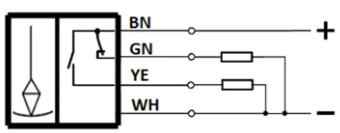
Changeover PNP

Output/ Interface:
Switch type: Changeover
Switch output 1 Normally Close (NC)
Switch output 2 Normally Open (NO)

Connections:
Connections: Cable, 4-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output 1 (PNP)
yellow: Switching output 2 (PNP)

Connection diagram:



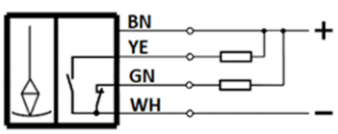
Changeover NPN

Output/ Interface:
Switch type: Changeover
Switch output 1 Normally Close (NC)
Switch output 2 Normally Open (NO)

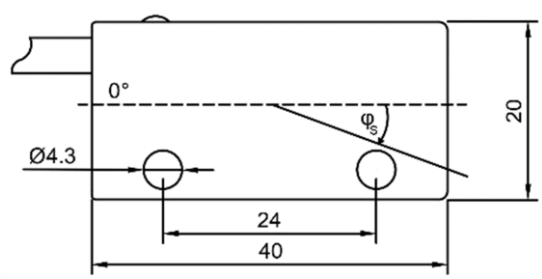
Connections:
Connections: Cable, 4-wire, length 0.5 m (alternatively upon request up to a maximum of 3 m)

Connection assignment:
brown: Supply +
white: Supply –
green: Switching output 1 (NPN)
yellow: Switching output 2 (NPN)

Connection diagram:



Installation dimensions



The reference plane for the specified switching angle is the bottom side of the housing.

Order Key:

HNSC-C- _ _ - _ - _ _ _ - HP

Series
HNSC-C = Tilt switch with switching output

Switching angle *)
03…45 = Switching angle in degrees of tilt

High Precision
HP = Accuracy +/- 0.5°

Switching output *)
PNP = Switching output, PNP, Open Collector
NPN = Switching output, NPN, Open Collector

Switch type *)
O = Normally Close
S = Normally Open
W = Changeover

***) Please specify the desired characteristics of the switch when ordering:**

Example: HNSC-C-***08***-O-PNP-HP, order designation for a switching angle of 8° tilt, switch type Normally Open, and switching output PNP. Please include the desired cable length (max. 3 m) when ordering.