

Properties:

- ✓ Symmetric 2-dimensional 45° tilt switch
- ✓ High resolution and accuracy
- ✓ Switching output for **warning** and **alarm** for each axis
- ✓ Robust, easy-to-mount metal housing
- ✓ Suitable for industrial use
 - IP rating: IP65/67
 - CE mark

Areas of application:

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



Function: The HNSC-D-01 tilt switch monitors tilt deviations from the horizontal around 2 axes (x-, y-axis). If a deviation occurs on an axis that is greater than the set warning switching point, the respective switching output switches to high level and the corresponding indicator LED signals a warning. If a deviation occurs on an axis that is greater than the set alarm switching point, the respective switching output switches to high level and the corresponding indicator LED signals an alarm. The switch **does not** differentiate between positive and negative deviation from the zero position.

The switching output only switches back to low level when the deviation falls below the alarm or warning switching point.

The switching hysteresis between the switch-on and switch-off points can be set between approx. 0.05° and 2.00° using the rotary potentiometer P1.

The cut-off frequency can be set between approx. 2 Hz and 50 Hz using the rotary potentiometer P2.

Variant Normally Closed: The tilt switch **HNSC-D-01-S** is a normally closed switch. In the regular operating state (no tilt deviation), the outputs are open (low level) and the LEDs do not light up.

Variant Normally Open: The tilt switch **HNSC-D-01-O** is a normally open switch. In the regular operating state (no tilt deviation), the outputs are closed (high level) and the LEDs light up.

Adjust switching points: Adjust the switching points: If switch S1.1 is set to ON when the supply voltage is switched on, the tilt switch goes into adjustment mode. The following measuring points can be adjusted, provided the corresponding switches are ON when adjustment mode is activated:

Adjust zero point	→ S1.2 to ON
Adjust X warning/alarm switching point	→ S1.3 to ON
Adjust y warning/alarm switching point	→ S1.4 to ON

Adjust zero point: First, LED2 flashes slowly. The zero point of the X-axis can now be adjusted. To do this, bring the device into the X zero position. Then set switch S1.2 to OFF. The device adopts the current value as the X zero point. LED2 now flashes quickly. Now set the zero point of the Y-axis. To do this, move the device to the Y zero position. Set switch S1.2 to ON. The device adopts the Y zero point. LED2 goes out, the zero point has been adjusted.

Adjust X-warning/X-alarm switching point: First, LED3 flashes slowly. The X-warning can now be set. To do this, place the device in the alarm X-position. Then set switch S1.3 to OFF. The device adopts the current value as the X-warning switching point. LED3 now flashes quickly. Now set the X-alarm. To do this, place the device in the X-alarm position. Set switch S1.3 to ON. The device adopts the X-alarm switching point. LED3 goes out, the X-warning/X-alarm switching points have been adjusted.

Adjust Y-warning/Y-alarm switching point: Same procedure as for X-axis, but with switch S1.4 and indicator LED4.

End adjustment: After finishing the adjustment, LED1 flashes, now S1.1 is OFF. The device switches to normal operating mode.

Mechanical Daten:

Material housing: Aluminium
 Protection class: IP65/IP67
 Size: 64 x 58 x 34 mm

Measuring range:

Measuring range X-axis: $-90^{\circ} \dots +90^{\circ}$
 Measuring range Y-axis: $-90^{\circ} \dots +90^{\circ}$
 Switching point X-axis: $0^{\circ} < \varphi_x < 45^{\circ}$; adjustable
 Switching point Y-axis: $0^{\circ} < \varphi_y < 45^{\circ}$; adjustable
 Hysteresis: $\approx 0,05^{\circ} \dots 2,00^{\circ}$; adjustable
 Cut-off frequency: $\approx 2 \dots 50$ Hz, adjustable

Accuracy:

Resolution: $0,025^{\circ}$
 Calibration of the zero point¹⁾: $\pm 0,05^{\circ}$
 Calibration accuracy of zero point¹⁾: $\pm 0,05^{\circ} + 1\%$ of the switching range

	Min.	Typ.	Max.	
Temperature drift (relative):	0,001	0,004	0,010	[°/K]
Temperature drift at 0° C:	0,025	0,100	0,250	[°]
Temperature drift at 50° C:	0,025	0,100	0,250	[°]
Temperature drift at -25° C:	0,050	0,200	0,500	[°]
Temperature drift at 85° C:	0,060	0,240	0,600	[°]

¹⁾ at room temperature (25°C)

Electrical Data:

Operating voltage V_s : 9-28 VDC
 Ripple max.: $< 10\%$
 Current consumption: < 40 mA
 Switching output: open collector
 Voltage output: $> V_s - 1,5$ V
 Max. output current: 250 mA per output,
 500 mA max. output load
 (all outputs simultaneously)

Connections:

Connection: M12 round plug, 8-pin
 or: Cable, shielded, 6-core (on request)

Status display:

LED1, yellow: Adjustment mode/X-warning
 LED2, yellow: Adjustment zero position/X-alarm
 LED3, yellow: X-adjustment/Y-warning
 LED4, yellow: Y-adjustment/Y-alarm

Operating condition:

Ambient temperature $-25^{\circ}\text{C} \dots 85^{\circ}\text{C}$

EMC:

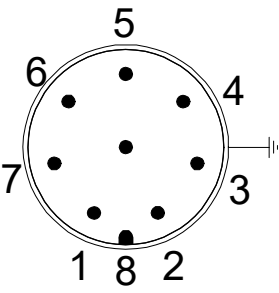
EU Directives: 2014/30/EU EMC-Directive,
 2011/65/EU RoHS-Directive
 Applied Standards: EN 61000-6-3:2007 + A1:2011/
 AC:2012 (emitted interference for
 residential, commercial and light-
 industrial environments),
 EN 61000-6-2:2005 + AC:2005-
 09 (immunity for industrial
 environments)

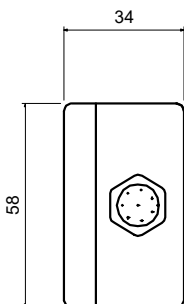
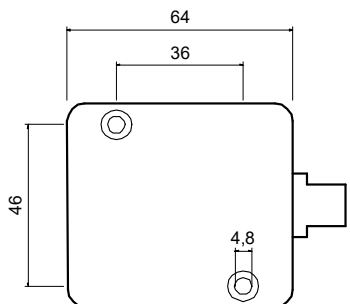
Functional safety:

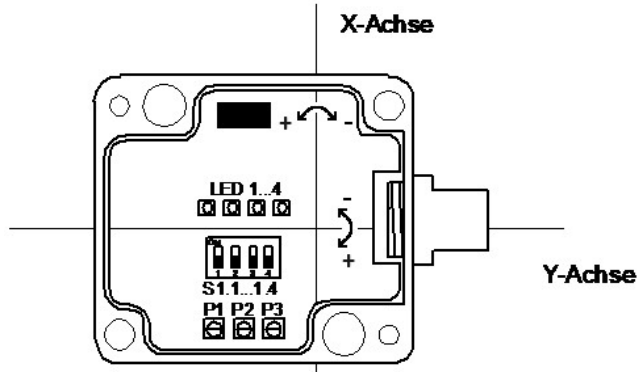
MTTFd: 699 Jahre
 Service life: 20 Jahre

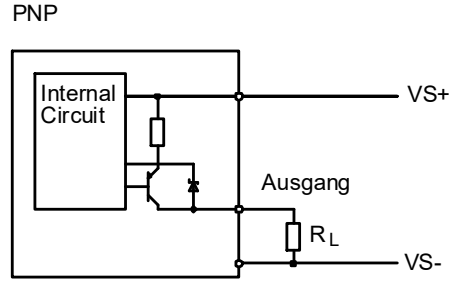
The MTTFd/service life values do not constitute binding quality and/or service life commitments; they are merely empirical values without binding character.

These values do not extend the limitation period for claims for defects or otherwise affect them in any way.

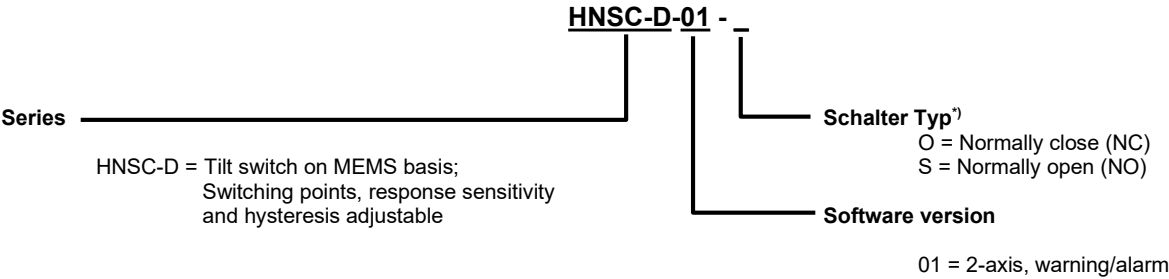
Pin assignment		
		
	Assignment	Color assignment when using the cable HKS-S115-PU/HKS-S116-PU
	7 VS+	blue
	5 VS-	gray
	8 Output warning X	red
	6 Output alarm X	pink
	4 Output warning Y	yellow
	2 Output alarm Y	brown
	3 NC (Not Connected)	green
	1 NC (Not Connected)	white

Installation dimensions	
	

Operating elements


Wiring of outputs (Warning X, Alarm X, Warning Y, Alarm Y)	
	<p>PNP</p> <p>Spannungsversorgung: 9...28 V DC Ausgangsstrom: max. 250mA Spannungsabfall bei 50mA: < 1,5V</p>

Order Code:



Accessories:

Type

Connector plug, straight	without cable
Connector plug, straight	with cable, (for pin assignment see above)
Connector plug, 90° angled	with cable, (for pin assignment see above)

Order designation

HKS-S115-00
HKS-S115-PU-...
HKS-S116-PU-....

The connection cables are available in different lengths: 2m, 5m, 10m, 15m, 20m, 25m.
Example: HKS-S115-PU-02, order designation for 2m; HKS-S116-PU-05, order designation for 5m

¹⁾ Specify cable length when ordering