

Product Information NSK-187, -387, -388

FOOD

Continuous level sensor NSK



Application

- Continuous level monitoring in metallic vessels up to 2.5 m in height
- Ideal for highly adhesive and pasty media
- Two-rod version available for plastic vessels
- Min. conductivity 1 $\mu\text{S}/\text{cm}$ (e. g. distilled water)

Application examples

- Continuous level monitoring in small vessels down to 200 mm in height
- Level control in the pre-pressure vessel to ensure a constant pressure

Hygienic design/Process connection

- Use of Negele's weld-in sleeve EMZ-352 or EMZ-132 results in a hygienic measurement point that is easy to sterilize and has a minimum of flow resistance (3-A certificate, EHEDG permit).
- CIP/SIP cleaning up to 143 °C
- FDA-compliant sensor materials
- Sensor made entirely of stainless steel, insulator made of PEEK
- Other process connections:
Tri-Clamp, dairy flange, DRD, Varivent, APV-Inline, BioControl
- Conforms to 3-A Sanitary Standard 74-06

Special features/Advantages

- No calibration necessary when media is changed due to potentiometric measurement principle
- Separate transmitter with current output 4...20 mA
- Defined output signal for dry alarm

Options/Accessories

- PFA rod insulation if the sensor is installed from the top
- Installation from the bottom side

Functional principle

The potentiometric measuring principle measures the change in the voltage ratio between the electrode rod of the sensor and the metallic wall of the filled tank. An electric flow field arises in the medium due to the conductivity of the medium and its capacitive properties. This gives rise to a voltage ratio that is proportional to the immersed part of the rod. Because only the ratio of the voltages is considered, the properties of the medium, in particular the electrical conductivity, do not enter into the measurement result.

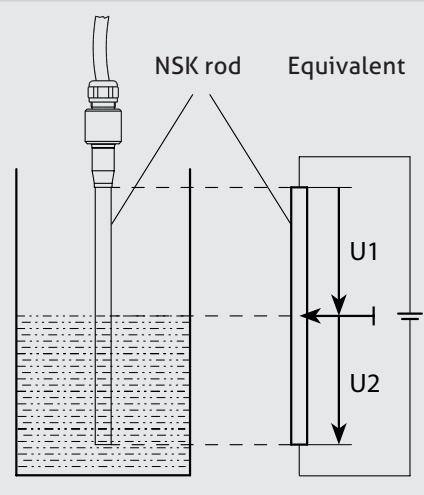
Authorizations



Level sensor NSK-187



Functional principle



Specification		
Process connection	thread	CLEANadapt G1/2" or G1" hygienic on the sensor
Process pressure		max. 10 bar
Tightening torque	G1/2" G1"	max. 10 Nm max. 20 Nm
Materials	head thread connection insulating part rods coating (optional)	stainless steel 1.4305 stainless steel 1.4301 PEEK (FDA approval number: 21CFR177.2415) stainless steel 1.4404, $R_a \leq 0.8 \mu\text{m}$, $\varnothing 6 \text{ mm}$ or 10 mm PFA (FDA approval number: 21CFR177.2440, 21CFR177.1550)
Temperature range	ambient storage process CIP/SIP cleaning	0...70 °C -40...85 °C -10...100 °C 143 °C max. 30 min
Resolution		$\leq 1.0\%$ of upper range value (= rod length)
Linearity		$\leq 1.0\%$ of upper range value (= rod length)
Response time		< 50 ms
Power supply		18...36 V DC
Output	signal ohmic resistance dry alarm	analog 4...20 mA, 2-wire loop max. 500 Ω 2.4 mA
Electrical connection	cable gland optional for power supply sensor	M16 x 1.5, 1.5 mm ² M12-plug, 1.4301, 4-pin cable LIYY (oil resistant), 5 x 0.75 mm ² max. length: 1.5 m (or shorter)
Protection class	with M12 plug with cable gland	IP 69 K IP 67
Weight	head rod	approx. 1600 g 400 g ($\varnothing 10 \text{ mm}$, length 650 mm, G1" process connection, incl. cable)

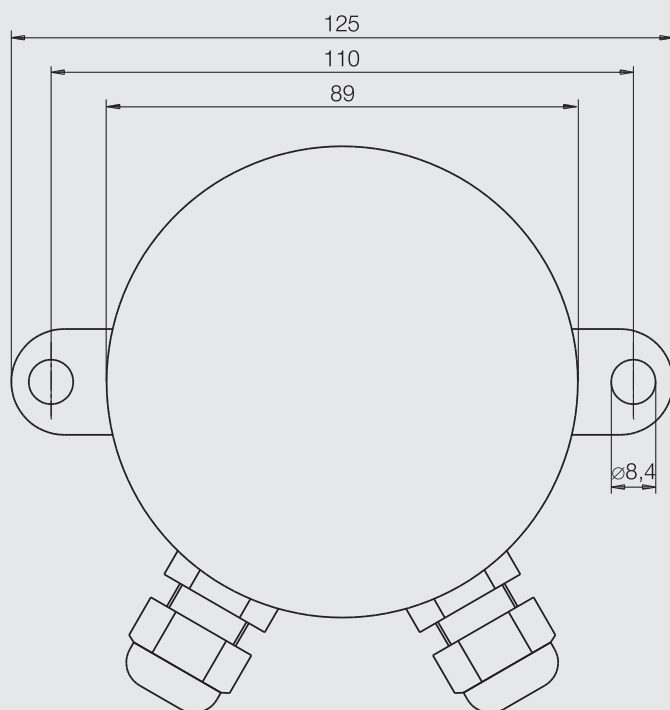
Intended use

- Not suitable for applications in potentially explosive areas.
- Not suitable for applications in safety-relevant system parts (SIL).

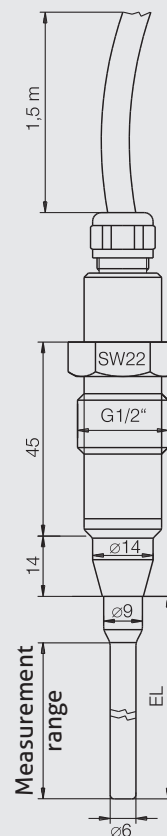


Dimensional drawing electronic

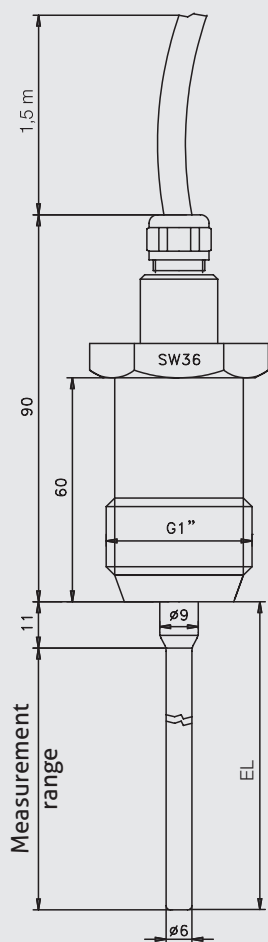
Height h = 85 mm



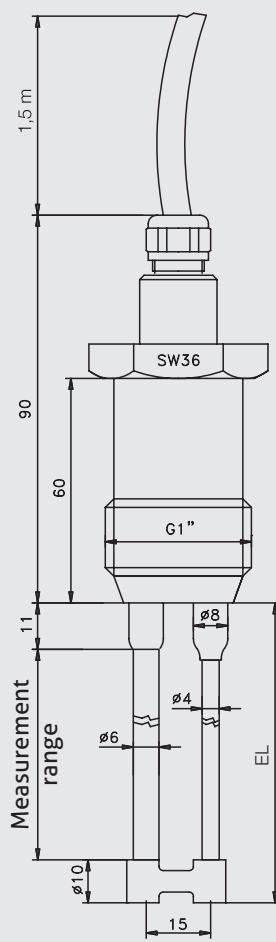
Dimensional drawing NSK-187



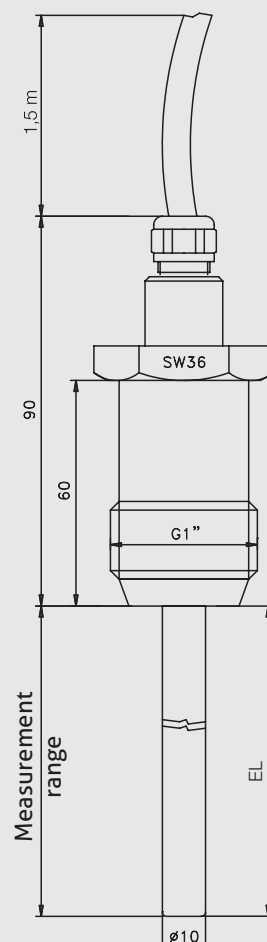
Dimensional drawing NSK-387.1



Dimensional drawing NSK-387.2

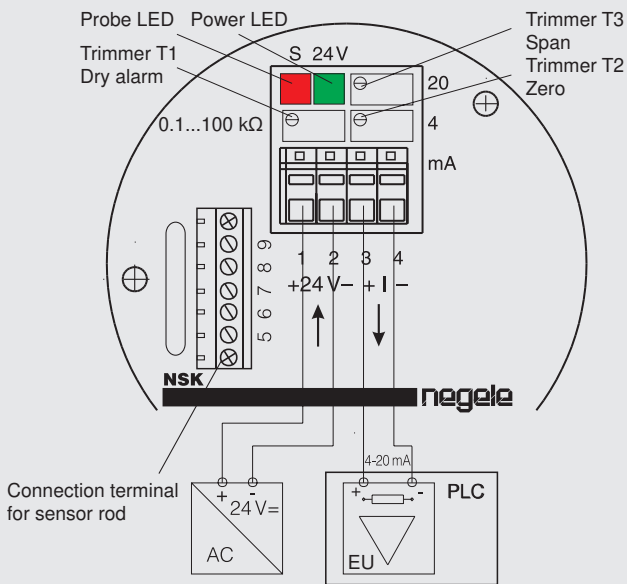


Dimensional drawing NSK-388



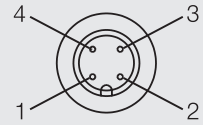
Electrical connection of NSK-E

view from top (lid open)

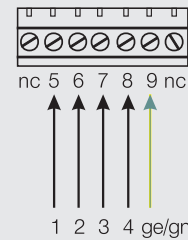


Electrical connection of NSK-E with M12 plug

1: brown	+ power supply
2: white	+ output 4...20 mA
3: blue	- output
4: black	- power supply



Sensor rod connection



Sensor rod cable (5 x 0.75 mm²)

Notice on electrical connection



To ensure proper functioning, the power supply cable and the signal cable should be shielded and grounded at the electrical control box on one side.

Adjustment of zero and gain

The sensor is calibrated at the factory. Normally, no further calibration is necessary. If it should nevertheless be necessary to calibrate the sensor, proceed as follows.

Zero point

- Connect the power supply as shown in the drawing
- Connect the current meter to the output
- Fill the vessel until the lower rod tip is just immersed in the medium
- Set the current output to 4 mA by using the zero point trimmer T2

Gain

- Connect the power supply as shown in the drawing
 - Connect the current meter to the output
 - Fill the vessel up to the maximum level
 - Use gain trimmer T3 to set the current output to 20 mA
- Please note that the maximum turndown rate is 70% of the rod length (e.g. rod length 1000 mm: max. turndown to 700 mm).

Adjustment of the dry alarm

Normally, no calibration is necessary. If calibration should nevertheless be necessary, use the media with the lowest conductivity to set the sensitivity.

- Connect the power supply as shown in the drawing
- Fill the vessel with the medium with the lowest conductivity until the lower rod tip is just immersed in the medium
- Take note of the red probe LED "S" (see the "NSK dry alarm" table)
 - If the LED is off, turn trimmer T1 to the right until the LED flashes (status 2)
 - If the LED is always on, turn trimmer T1 to the left until the LED flashes (status 4)
 - If the LED is flashing, check the pulse-pause ratio, which should ideally look like status 3 in the table below

Table: NSK dry alarm

Status	LED S	4-20 mA	0.1...100 kΩ
1.		2,4 mA	
2.		4-20 mA	
3.		4-20 mA	
4.		4-20 mA	

Notice on installation



- **Attention:** The electrode rod cannot be shortened.
- Use only Negele weld-in systems to ensure that the measurement point functions properly.
- Different sensor rods and electronics generally cannot be combined at will.
- If a single rod version, NSK-187, -387.1/... and -388/..., is in use, the sensor rod should be nearly parallel to the vessel wall to avoid linearity errors. If this is not possible, the Negele indicator, PEM-DD, can be used to achieve a suitable linearity.

Notice on turndown



Please note that the maximum turn down rate is 70% of the measurement range (see dimensional drawings on page 3).

Notice on mounting position



Version "OI" with the sensor positioned at top with insulation:

For use if strong adhesions are expected between the upper rod end vessel lid (e.g. for spraying, very adhesive media or for short circuit via cleaning solutions etc.).

When using in installations with CIP cleaning, always select the version "OI" with insulation

- Insulation length: 30 mm
- Please notice: Measurement is not possible in the area of the insulation.

Version "U" with the sensor positioned at the bottom:

for installation into the bottom of the vessel.

Version "O" with the sensor positioned at the top:

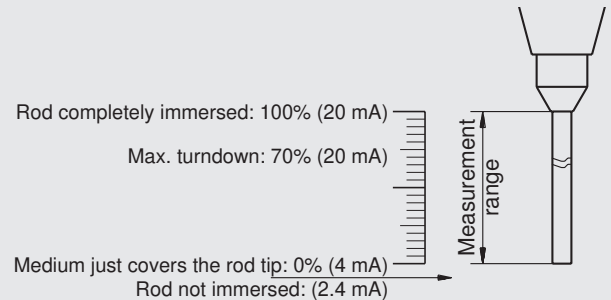
for installation into the top of the vessel.

Note on CIP processes

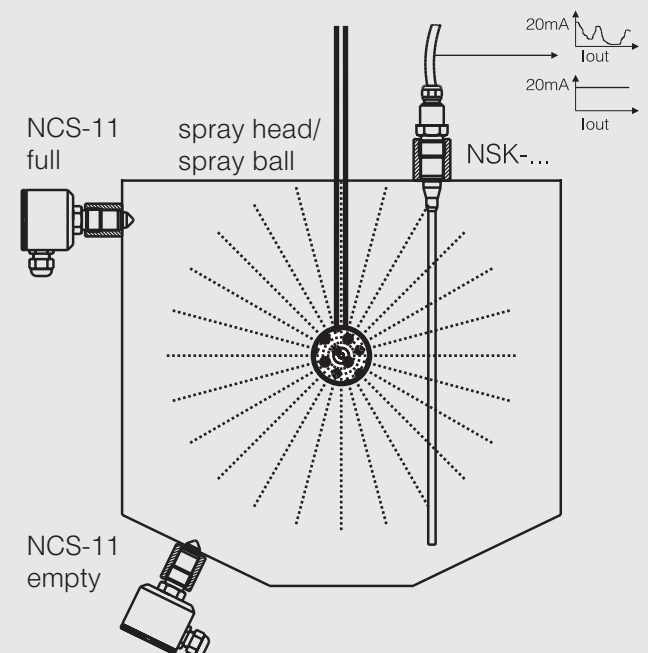


Depending on the installation circumstances (distance to the tank wall, alignment of the spray head, etc.), the output signals of the NSK probe may not be suitable to control the CIP process. It is therefore recommended to use additional limit switches (such as from the NCS series) to control the CIP process.

Diagram of immersion depth



Recommended configuration for CIP



Conditions for a measuring point according to 3-A Sanitary Standard 74-06



- The sensors NSK-187.1, -387.1, -387.2, -388 conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP/SIP cleaning at a maximum temperature of 143 °C for 30 minutes.
- Only permitted with the **CLEANadapt** build-in system (EMZ, EMK, Adapter AMC and AMV).
- When using the EMZ and EMK weld-in sleeves, the weld must comply with the requirements of the current 3-A Sanitary Standard.
- Mounting position: The mounting position, self-draining properties and the position of the leakage hole must be in accordance with the current 3-A Sanitary Standard.

Transport/Storage

- Do not store outside
- Store in an area that is dry and dust-free
- Do not expose to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -40...+85 °C
- Relative humidity maximum 98 %

Reshipment

- Sensors shall be clean and must not be contaminated with dangerous media and/or heat-conductive paste! Note the cleaning information!
- To avoid damage of the equipment, use suitable transport packaging only.

Cleaning/Maintenance

- When using a pressure washer, do not point the nozzle directly at the electrical connections.

Standards and guidelines

- Compliance with the applicable regulations and directives is mandatory.

Notice on conformity

- Applicable guidelines:
- Electromagnetic Compatibility Directive 2004/108/EC
 - The CE label confirms compliance of this product with the applicable EC directives.
 - You have to guarantee the compliance of all guidelines applicable for the entire equipment.

Disposal

- This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
- Give the instrument directly to a specialized recycling company and do not use the municipal collecting points.



Process connections

A complete overview of the available process adapters can be found with the CLEANadapt product information.

Weld-in sleeves

G1/2"					
	Cylindrical sleeve	Cylindrical sleeve with tell-tale hole	Weld-in sleeve with collar	Cylindrical sleeve with weld-in ring	Weld-in ball
	EMZ-132 * (for vessels)	EMZ-131 * (for vessels with leakage detection)	EMK-132 * (for thick-walled vessels)	EMS-132 * (for installation on pulled-out pipes)	KEM-132 * (for sloped installation)

Weld-in sleeves and adapter

G1"					
	Cylindrical sleeve	Cylindrical sleeve with tell-tale hole	Cylindrical sleeve with weld-in ring	DRD (press ring optional)	BioControl
	EMZ-352 * (for vessels thick / thin)	EMZ-351 * (for vessels with leakage detection)	EMS-352 * (for installation on pulled-out pipes)	AMK-352/50 (only one size)	AMB-352/50 and AMB-352/65 from DN40 up to DN100

* Deliverable with 1.4435 material and 3.1 inspection certificate on request.

Order code

NSK-18 (Process connection CLEANadapt G1/2" hygienic, only for single rod version)

NSK-38 (Process connection CLEANadapt G1" hygienic)

Number of rods, diameter

7.1 (single rod, rod length max. 500 mm, ø 6 mm)

7.2 (double rod, only with G1" process connection, rod length min. 200 mm/max. 1500 mm)

8 (single rod, only with G1" process connection, rod length min. 500 mm/max. 3000 mm, ø 10 mm)

Rod length EL

Please specify length in steps of 10 mm, e.g.: 220, 230, 240 etc., max. length 3000 mm.

(special lengths in 1-mm steps on demand.)

100...3000 (material: 1.4404)

100...3000-HAST (material: Hastelloy C)

Mounting position and rod insulation

Attention: Observe the "Mounting position" notice on page 5.

OI (installation from top, PFA insulated)

U (installation from bottom, without insulation)

O (installation from top, without insulation)

Electrical connection

X (cable gland M16 x 1.5)

M12 (M12 plug 1.4305)

NSK-38 7.2 / 500-HAST / OI / M12

Accessories

PVC cable with M12 connection, made of 1.4305 (303), IP 69 K, unshielded

M12-PVC / 4-5 m PVC cable 4-pin, length 5 m

M12-PVC / 4-10 m PVC cable 4-pin, length 10 m

M12-PVC / 4-25 m PVC cable 4-pin, length 25 m

PVC cable with M12 connection, nickel-plated brass, IP 67, shielded

M12-PVC / 4G-5 m PVC cable 4-pin, length 5 m

M12-PVC / 4G-10 m PVC cable 4-pin, length 10 m

M12-PVC / 4G-25 m PVC cable 4-pin, length 25 m

CERT / 2.2

factory certificate 2.2 acc. to EN10204
(only product contacting surface)

PVC cable with M12 connection

