

Product Information NSK-157, -357, -358

FOOD

Continuous level sensor NSK



Application

- Continuous level monitoring in metallic vessels up to 3 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)
- For media with homogeneous conductivity

Application examples

- Continuous level monitoring in small vessels down to 100 mm in height
- Level control in the pre-pressure vessel to ensure a constant pressure
- Level measurement in small pressurized vessels

Hygienic design/process connection

- Use of Negele 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
- All materials that contact the product are FDA-compliant
- Sensor made entirely of stainless steel, insulator made of PEEK
- Other process connections:
Tri-Clamp, dairy flange, DRD, Varivent, APV-Inline, BioControl
- Compliant with 3-A Sanitary Standard 74-06

Special features/advantages

- No calibration necessary when media is changed due to potentiometric measurement principle
- Defined position of cable gland
- Defined output signal for dry alarm
- Galvanic insulation between supply and output voltage

Options/accessories

- High temperature version up to 140 °C (with spacer option)
- PFA rod insulation if the sensor is mounted from the top (necessary for spraying, highly adhesive or film-forming media)
- Mounting from the bottom
- Electrical connection with M12 plug/pre-assembled cable

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.

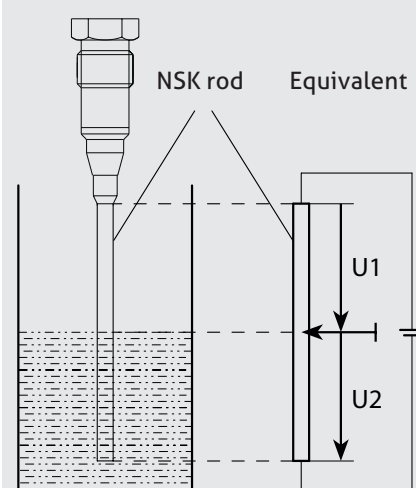
Authorizations



Level sensor NSK-157



Functional principle



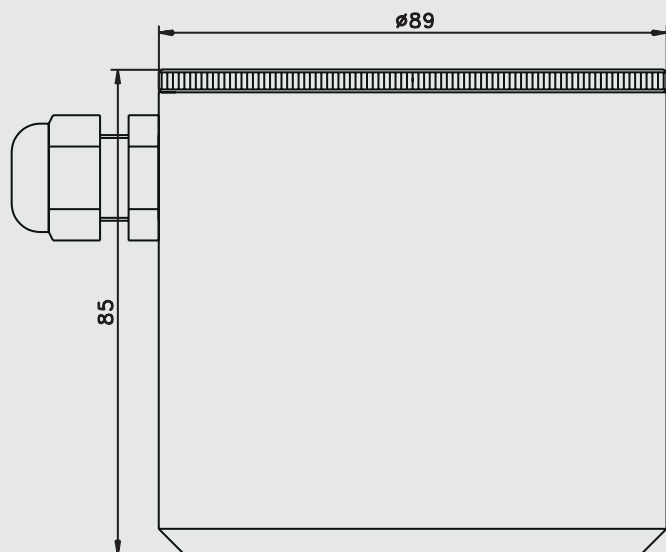
Specification		
Process connection	thread	CLEANadapt G1/2" or G1" hygienic on the sensor
Process pressure		max. 10 bar
Tightening torque	G1/2" G1"	max. 10 Nm max. 20 Nm
Materials	connecting head thread connector insulating part rods	stainless steel 1.4305 stainless steel 1.4301 PEEK (FDA approval number: 21 CFR 177.2415) stainless steel 1.4404, $R_a \leq 0.8 \mu\text{m}$, $\varnothing 6 \text{ mm}$ or 10 mm
Temperature range	ambient storage process CIP/SIP cleaning	0...50 °C -40...85 °C -10...100 °C -10...140 °C for 30 min (option H50) -10...140 °C for 60 min (option H90) 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	2 x cable gland cable connection	M16 x 1.5, 2-pin, 1.5 mm ² M12 plug, 1.4301, 4-pin
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, process connection G1")

Intended use

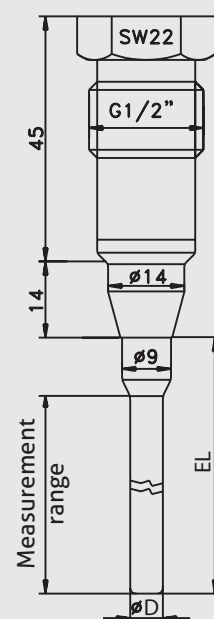
- Not suitable for applications in potentially explosive areas.
- Not suitable for applications in safety-relevant system parts (SIL).



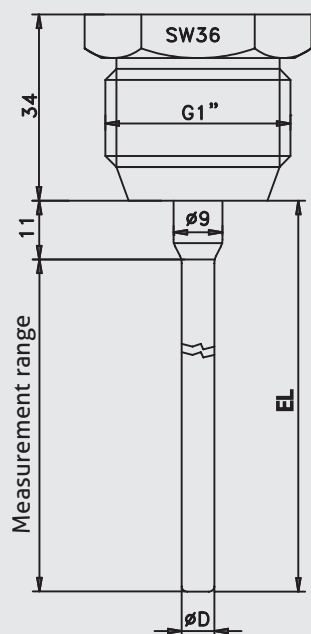
Dimensional drawing of head



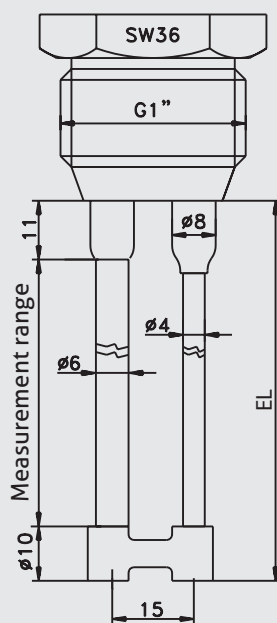
Dimensional drawing NSK-157



Dimensional drawing NSK-357.1



Dimensional drawing NSK-357.2



Dimensional drawing NSK-358

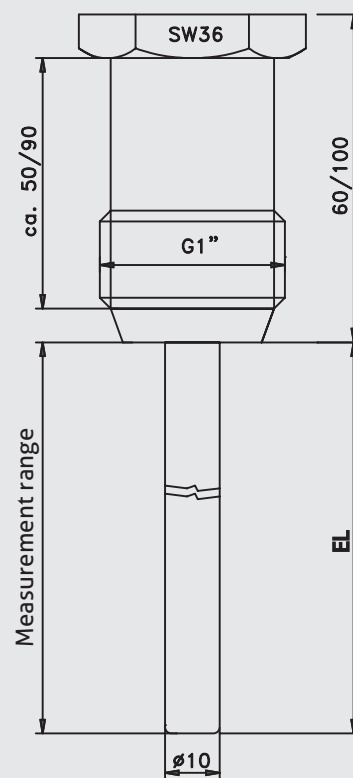
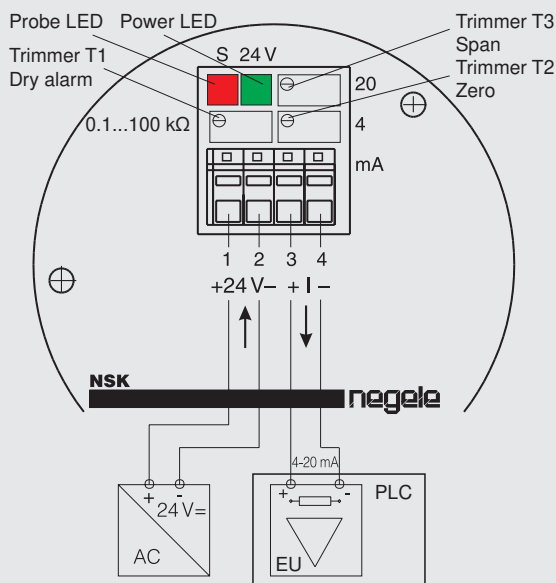


Table: Rod diameter D

Type	NSK-157 NSK-357.1	NSK-357.2	NSK-358
Rod length EL	100...500 mm	200...1500 mm	500...3000 mm
ø D rod	6 mm	6 mm measuring rod 4 mm GND rod	10 mm

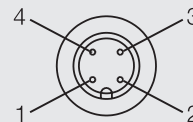
Electrical connection of NSK with cable gland

View from top (lid open)



Electrical connection of NSK with M12 plug

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



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.



Sensor calibration

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

Zero adjustment

- Connect the power supply as shown in the drawing
- Connect the current meter to the output
- Fill the vessel up to the lowest point of the sensor rod
- Set the current output to 4 mA by using T2

Span adjustment

- 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 span 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 shown 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	

Mechanical connection/installation



- **Attention:** The electrode rod cannot be shortened.
- Use only Negele weld-in systems to ensure that the measurement point functions properly.
- If a single rod version, NSK-157, -357.1/... and -358/..., 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 turndown rate is 70% of the rod length (e.g. rod length 1000 mm: max. turndown to 700 mm).

Notice on mounting position/CIP



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

For use if strong adhesions are expected between the upper rod end and vessel lid (e.g. in case of short circuits due to spraying or highly adhesive media or cleaning solution film, etc.).

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

- Insulation length: 30 mm
- Please note: Measurement is not possible in the insulated area

Version "U" with the sensor mounted at the bottom:
for installation into the bottom of the vessel.

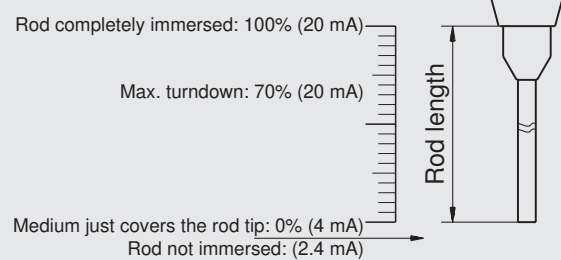
Version "O" with the sensor mounted at the top:
for installation into the top of the vessel.

Notice on steps during CIP

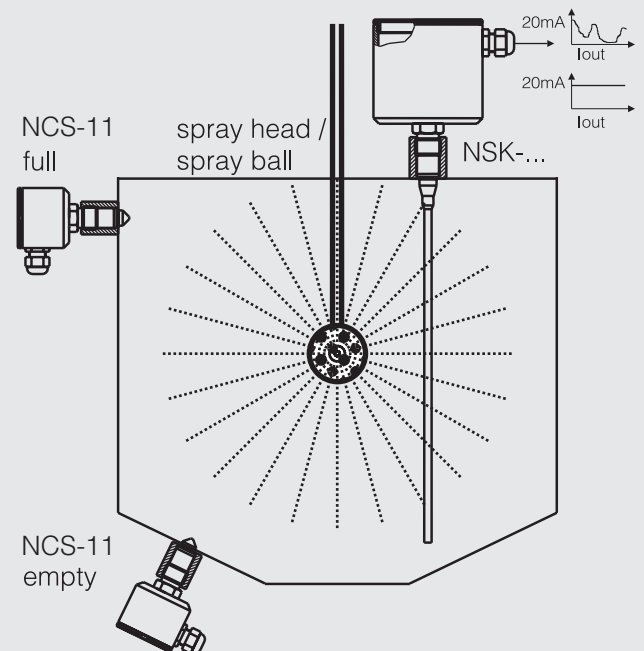


Depending on the installation circumstances (distance to the tank wall, alignment of the spray head, ...), the output signals of the NSK probe may not be suitable to control the CIP process. It is therefore recommended to use additional limit switches (such as from the NCS series) to control the CIP 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-157.1, -357.1, -357.2, -358 conform to the 3-A Sanitary Standard.
- The sensors are designed for CIP/SIP cleaning. Maximum 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.
- The mounting position, the 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
- Protect against solar radiation
- Avoid mechanical shock and vibration
- Storage temperature -40...+85 °C
- Relative humidity maximum 98%

Reshipment

- Sensors must be clean and must not be contaminated with hazardous media and/or heat-conductive paste. Note the cleaning information!
- To avoid damage to 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 EMC

Applicable guidelines:

- Electromagnetic Compatibility Directive 2004/108/EC
- The CE label confirms compliance of this product with the applicable EC directives.
- You are responsible for guaranteeing compliance of the entire equipment with the EMC directives.

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.

Tank linearization and digital indicator PEM-DD

Application area/use

The process-controlled build-in measuring device PEM-DD is an evaluation device for a diverse range of measurement tasks related to level measurement. Among other things, it can be used for tank linearization and is designed for connection to level sensors with an analog output 0/4 .. 20 mA. A control input enables the correction of the actual value. The display can be freely defined on the front keypad. Additional devices can be operated using the optional, freely adjustable analog output.

A full product overview can be found in the PEM-DD product information.

Processor digital indicator PEM-DD

Tank linearization with universal transmitter NCI-45

Application area/use

The universal transmitter NCI-45 is a compact DIN rail device that features both a current/voltage input and output. The input can be connected directly to a level sensor. By applying the metering-by-discharge method, the transmitter is then used for tank linearization and the values/parameters are programmed using the Blue Control software.

A full product overview can be found in the NCI-45 product information.

Universal transmitter NCI-45



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 (optional press ring)	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-15 (Process connection CLEANadapt G1/2" hygienic, only for single rod version)

NSK-35 (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 select length in steps of 10 mm, e.g.: 220, 230, 240, etc., max. length 3000 mm.

(special length 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)

High temperature version

X (without)

H50 (with 50-mm spacer, process temp. up to 140 °C for 30 min, formerly option "H")

H90 (with 90-mm spacer, process temp. up to 140 °C for 60 min)

Electrical connection

X (cable gland M16 x 1.5)

M12 (M12 plug 1.4305)

NSK-35 **7.2 /** **500-HAST /** **OI /** **H50 /** **M12**

Accessories

PVC cable with M12 connection, 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

