Product Information NSL-M-00, NSL-M-01 **FOOD**

Continuous Level Sensor NSL-M

Range of application

- Continuous level measurement in metallic vessels up to 3 m in height
- Ideal for adhesive and pasty media
- Level measurement of foaming media
- Minimum product conductivity typically from 50 µS/cm (available on request for lower values)
- Hygienic substitute for float sensors

Application examples

- Process such as balance tanks and fillers
- Level measurement in storage vessels
- Level monitoring in pressurized vessels

Hygienic design/Process connection

- By using Negele build-in system **CLEANadapt** a hygienic, gap free and easy sterilizable installation will be achieved.
- Process connection G1/2" and G1" hygienic, G1" standard thread or Tri-Clamp, adapters for milk pipe (DIN 11851), Varivent, DRD, ... available (see product information CLEANadapt)
- EHEDG certified hygienic process connection with CLEANadapt fitting
- Conforming to 3-A Sanitary Standard
- Product contacting materials compliant to FDA
- Sensor made of stainless steel (protection class IP 69 K)
- CIP-/SIP-cleaning up to 143 °C / max. 120 minutes

Features

- Compact and robust sensor with minimal size ratio
- 2-wire sensor with 4...20 mA output signal
- No adjustment after media change due to potentiometric measurement principle
- Individual parameter adjustment or programming via PC interface
- Mounting in vessels is possible from bottom and from top
- Mounting on the side is possible with angeled sensor
- Current signal for measurement range, dry signal and error signal adjustable

Options/Accessories

- Pre-assembled connecting cable for M12-plug
- Programming adapter MPI-200 with PC software

Function 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 electrical 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. Using a second, patent-pending measuring procedure, the sensor also provides information on the submersion state of the electrode rod. This system analyzes electrical resonance properties to detect foam and suppress it partly in the results, and to reliably prevent erroneous measurements due to adhesions.

Authorizations

FDA · CERTIFIED EHEDG TYPE EL · 3-A 74-06

Government-funded

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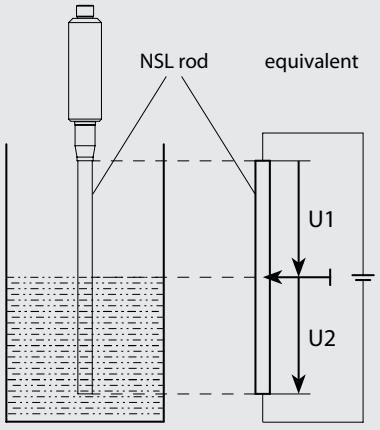
Federal Ministry of Economics and Technology

on the basis of a decision by the German Bundestag

ZIM impulse für wachstum Zentrales Innovationsprogramm Mittelstand

Level sensor NSL-M-00

Function principle

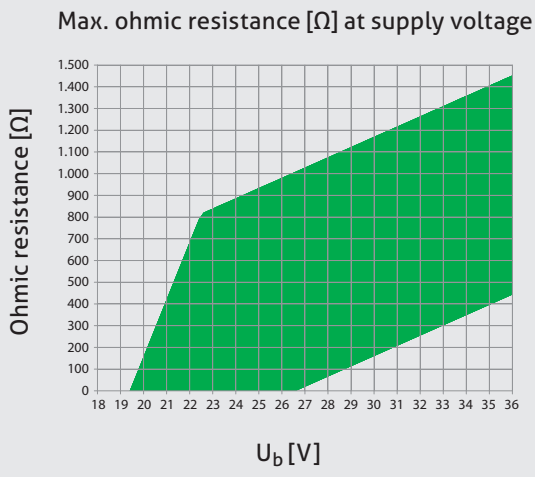


Specification		
Rod lenght EL	product contacting	50...3000 mm
Measurement range MB		20...199 mm (rod diameter 6 mm) 200 mm (rod diameter 10 mm)
Process connection	thread fixed Tri-Clamp	CLEANadapt G1/2", G1" hygienic torque: 10 Nm max. Tri-Clamp 1...1½", 2", 3"; Varivent Type F, Type N
Process pressure		max. 16 bar
Materials	head adapter isolating part rod	stainless steel 1.4305 stainless steel 1.4301 PEEK (FDA approval number: 21 CFR 177 2415) stainless steel 1.4404, $R_a \leq 0.8$ µm
Temperature range	ambient storage process CIP-/SIP-cleaning	0...70 °C -40...85 °C -10...140 °C 143 °C max. 120 min
Resolution	rod length > 500 mm rod length < 500 mm	< 0.1 % of upper range value (= rod length) < 0.5 mm
Accuracy	media with conductivity > 50 µS/cm (e.g. beer, milk, beverages) media with conductivity < 50 µS/cm	< 1% of rod length On request since dependent on installation situation and tank design
Linearity*		< 1.0 % of upper range value (= rod length)
Reproducibility*	rod length > 500 mm rod length < 500 mm	< 0.2 % of upper range value (= rod length) < 1.0 mm
Temperature drift	at 25 °C	≤ 0.1 %
Response time		< 100 ms
Electrical connection	supply protection class output signal ohmic resistance	18...36 V DC M12-plug, 1.4301, 4-pin IP 69 K analog 4...20 mA, galvanic separated to housing, 2-wire loop see table
Weight		550 g with rod length 1.5 m

* For homogenous media at constant temperature

Possible parameter/Settings	
4...20 mA current signal	
Underrange	3.80; 3.95; 4.00 mA
Overrange	20.00; 20.05; 20.50 mA
Warning and Failure signal (e.g. dry run)	3.80; 3.95; 4.00 mA 20.00; 20.05; 20.50; 21.00; 21.20 mA
Level measurement	
Zero/Gain	-50...50 % / 50...150 %
Damping	0; 0.1; 0.2; 0.5; 1; 2; 5 s

Ohmic resistance

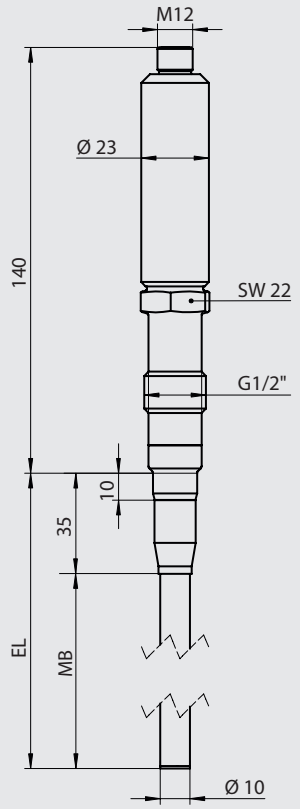


Rod diameter

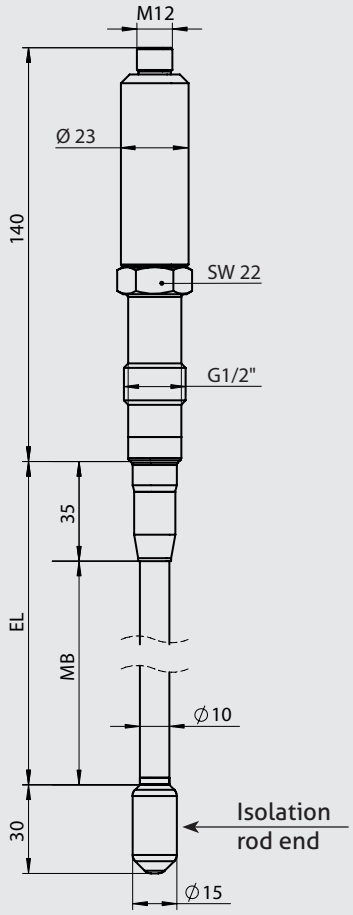
Rod diameter is depending on rod length (EL). For exact diameter see adjoining chart.

Rod diameter	
EL	**Ø D**
50...199 mm	6 mm
200...3000 mm	10 mm

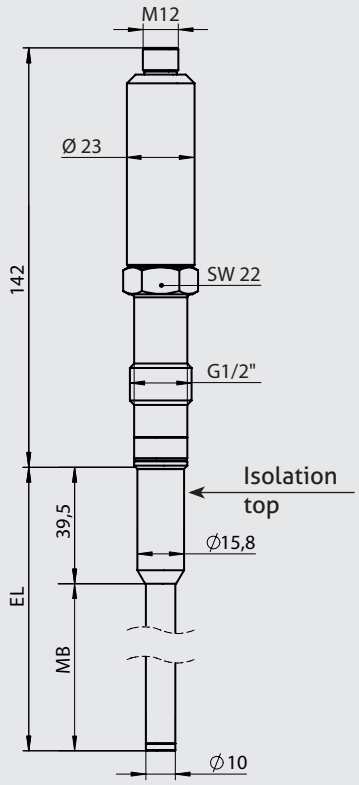
NSL-M ... / 10 / S0 / ..., EL ≥ 200 mm



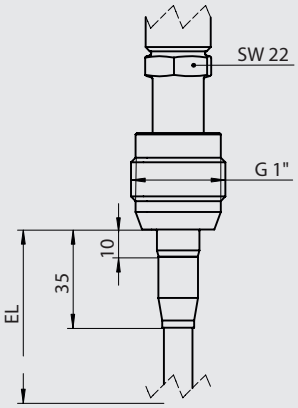
NSL-M with isolation at rod end, EL ≥ 200 mm



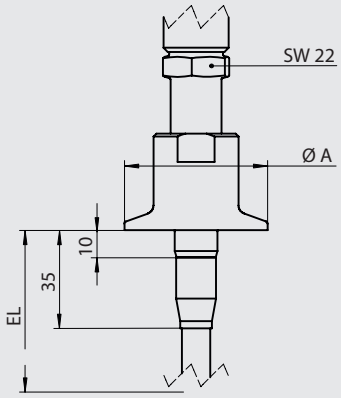
NSL-M with isolation at top, EL ≥ 200 mm



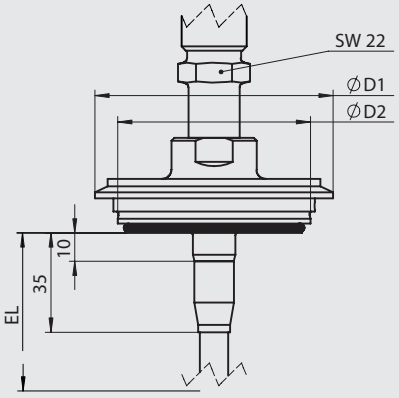
NSL-M ... / 10 / S1 / ...



NSL-M ... / 10 / TCx / ...



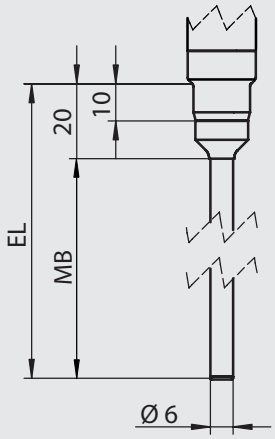
NSL-M ... / 10 / Vx / ...



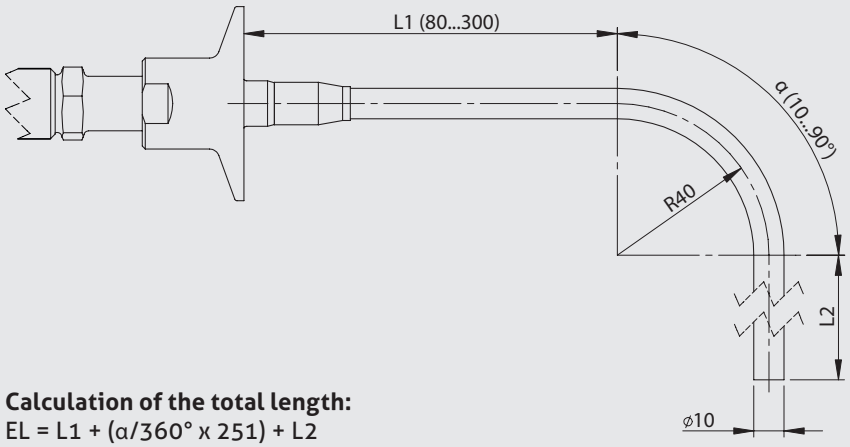
Tri-Clamp diameter	
Type	**Ø A**
TC1	50.5 mm
TC2	64.0 mm
TC3	91.0 mm

Varivent dimensional table			
Type	**Varivent Type**	**D1 [mm]**	**D2 [mm]**
V25	F	66	50
V40	N	84	68

NSL-M ... / 6 / S0 / ..., EL < 200 mm



Angled version NSL-M-01 / ... / 10 / TCx / ...



Calculation of the total length:
EL = L1 + (α/360° x 251) + L2

Conventional usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipment (SIL).

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

- The sensors NSL-M conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 143 °C / 120 minutes.
- Only with the build-in system **CLEANadapt** (EMZ, EMK, Adapter AMC and AMV) allowed.
- Using the weld in sleeve EMZ, EMK the weld must comply to the requirements of the current 3-A Sanitary Standard.
- Mounting position, self draining and the position of the leackage hole must be in accordance to current 3-A Sanitary Standard.

Mounting position

If NSL-sensor is mounted into a vessel, there is a range of 20 mm or 35 mm (from sealing edge on) where no level can be measured. The 4 mA resp. 20 mA signal starts with the bottom bevel seam of the rod.

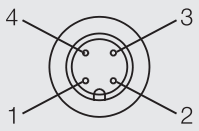
Cable with M12-plug and LED

The NSL sensor is a 2-wire sensor with 4...20 mA output signal. Use of a cable with internal LEDs will cause a measurement error!

M12-plug with LED

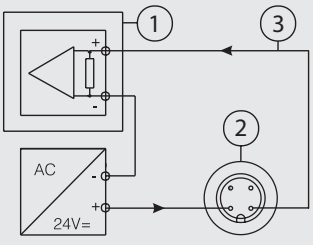
Configuration M12-plug

1: +supply
2: -supply 4...20 mA
3: data link to PC interface, must not be connected
4: data link to PC interface, must not be connected



Connecting 2-wire system

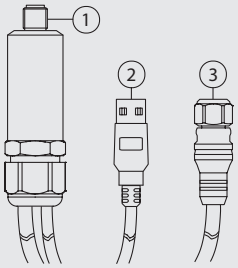
1: PLC
2: M12-plug
3: 4...20 mA current loop



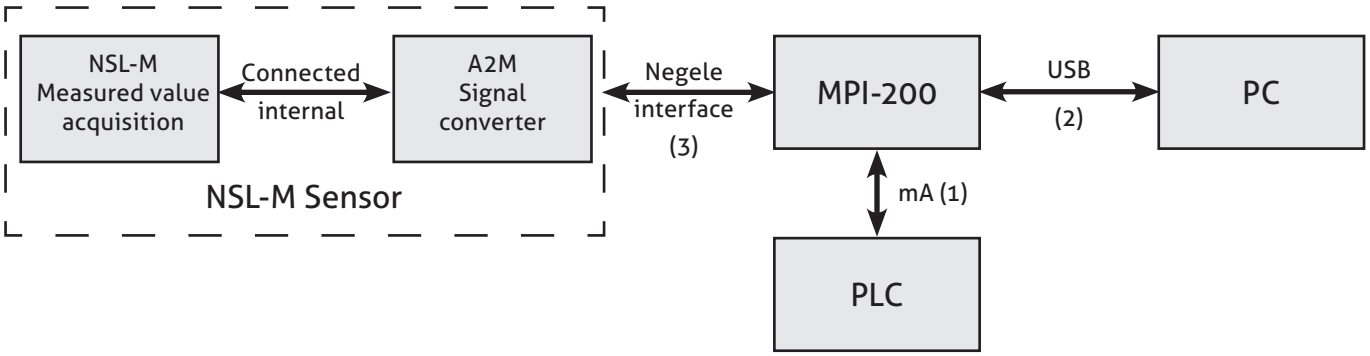
Programming adapter MPI-200

Connection of programming adapter MPI-200

1: External power supply via M12-plug (optional)
2: USB port for connection to PC incl. power supply if not supplied external
3: Connection cable to NSL-sensor



Signal flow while parametrization



Adjustment of NSL parameters

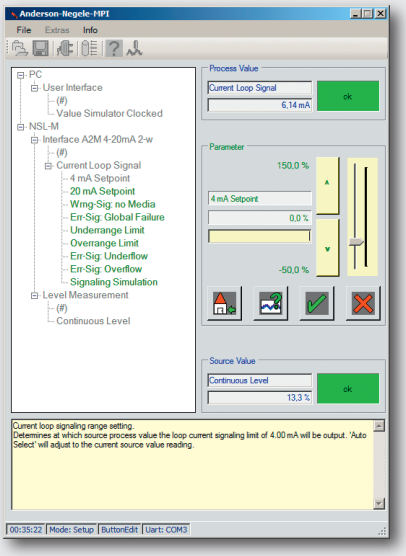
Using the PC based software and the programming adaptor MPI-200 the following NSL-M parameters can be adjusted or changed in situ (with vessel) or alternatively on the bench (in simulaton mode): e.g.

4...20 mA Signal
· Level for (4 / 20) mA output signal
· Warning signal "dry run"
· Error signal "failure"
· Signallimit for under- and overrange
· Error signal "over- and underflow"
· Signal simulation (3.80...21.20 mA)

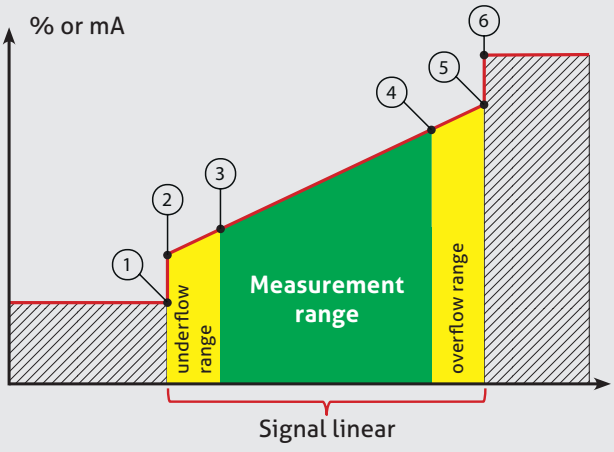
Level Measuring
· Level zero/offset
· level slope/gain
· Damping/filter
· Physical Unit

Mounting Position

Configuration software



Parameter/Signal sequence



1: Error signal: underflow
2: Underflow limit
3: 4 mA-setpoint
4: 20 mA-setpoint
5: Overflow limit
6: Error signal: overflow

Warning signal: dry run
· Sensor is not immersed into a media
· Signal can be adjusted from 3.8 up to 21.2 mA

Note

- A list of the parameter settings in the level switch is supplied with the device. These parameter settings and those changed by the user can be printed out in the software using the MPI-200 programming adapter.
- When making settings, note the help texts in the MPI software. They provide useful information on changing the selected parameter.

The default setting of the NSL-M level switch is for operation with aqueous media without requiring special adjustments. In highly critical media it may be necessary to make adjustments to some of the parameters (the parameter can be found under the path specified below):

Adjustment of the sensitivity/foam detection

In case of foam or adhesions to the lower end of the switch (4 mA signal)

Setup Menu

→ **NSL-M**

→ **Level Measurement**

→ **Dry Run Detection**

→ **Sensitivity Optimization**
Set to the desired value of the parameter list

Prevention of signal jumps in turbulent media

To damp signal jumps at the lower end of the sensor (4 mA signal)

Setup Menu

→ **NSL-M**

→ **Level Measurement**

→ **Continuous Level**

→ **Damping**
Select t_{90} time

Note

Some parameters are password-protected.
The password can be obtained from the Anderson-Negele hotline if needed.

Transport/Storage

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -40...+85 °C
- Relative humidity maximum 98 %

Reshipment

- Sensors and process connection shall be clean and must not be contaminated with dangerous media and/or heat-conductive paste! Note the advice for cleaning!
- Use suitable transport packaging only to avoid damage of the equipment!

Cleaning/Maintenance

- In case of using pressure washers, dont't point nozzle directly to electrical connections!

Standards and Guidelines

- You have to comply with applicable regulations and directives

Advice to EMC

Applicable guidelines:
- Electromagnetic compatibility 2014/30/EC
- The accordance with applicable EU-guidelines is confirmed with CE-labeling of the device.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

Disposal

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

Order code

NSL-M-00 (Potentiometric level sensor for food application, 2-wire technology, straight version)

Rod lenght EL, choose length 50...3000 mm in 10 mm raster, intermediate sizes in 1-mm steps on request

0050...3000 (material 1.4404)

Rod diameter
- **06** (Ø 6 mm, up to rod length 199 mm)
- **10** (Ø 10 mm, from rod length 200 mm)

Process connection version
- **S0** (CLEANadapt G1/2" hygienic)
- **S1** (CLEANadapt G1" hygienic)
- **TC1** (Tri-Clamp 1...1½")
- **TC2** (Tri-Clamp 2")
- **TC3** (Tri-Clamp 3")
- **V25** (Varivent Typ F, DN25)
- **V40** (Varivent Typ N, DN40/50)

Surface roughness

- **8** ($R_a \leq 0.8$ µm)

Material certificate
- **0** (no certificate, standard)
- **Z** (with 3.1 material certificate for 1.4404)

Installation position
- **0** (installation from top)
- **U** (installation from bottom)
- **6** (installation from top with isolation)

Output signal

- **A2M** (4...20 mA, analog, 2-wire)

Electrical connection

- **M12** (M12-plug 1.4305)

Isolation at rod end
- **X** (without, standard)
- **PK** (with PEEK isolation)

Parameter configuration
- **X** (standard)
- **S** (write out details)

NSL-M-00/	**1500/**	**10/**	**S0/**	**8/**	**O/**	**U/**	**A2M/**	**M12**	**X/**	**X**

Order code

NSL-M-01 (Potentiometric level sensor for food application, 2-wire technology, angled version)

Rod lenght EL, choose length 80...1500 mm in 10 mm raster, intermediate sizes in 1-mm steps on request

0080...1500 (Material 1.4404)

Process connection version
- **TC1** (Tri-Clamp 1...1½")
- **TC2** (Tri-Clamp 2")
- **TC3** (Tri-Clamp 3")
- **V25** (Varivent type F, DN25)
- **V40** (Varivent type N, DN40/50)

Surface roughness

8 ($R_a \leq 0{,}8$ µm)

Material certificate
- **O** (no certificate, standard)
- **Z** (with 3.1 material certificate for 1.4404)

Installation position
- **O** (installation from top)
- **U** (installation from bottom)

Output signal

A2M (4...20 mA, analog, 2-wire)

Electrical connection

M12 (M12-plug 1.4305)

Isolation at rod end
- **X** (without, standard)
- **PK** (PEEK isolation)

Details on angled version 01
- **80...300** (length L1 in mm)
- **10...90** (angle α in °)

Parameter configuration
- **X** (standard)
- **S** (write out details)

NSL-M-01/	1500/	TC1/	8/	O/	U/	A2M/	M12	X/	100-90/	X

Accessories

PVC-cable with M12-connection made of 1.4305, IP 69 K, unshielded
M12-PVC / 4-X m PVC-cable 4-pin, length 5, 10, 25 m

PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded
M12-PVC / 4G-X m PVC-cable 4-pin, length 5, 10, 25 m

Programming adapter
MPI-200 Incl. PC software

CERT/2.2 factory certificate 2.2 acc. to EN 10204 (only product contacting surface)

Isolation top

Isolation rod end

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