Product Information NSL-F-00, NSL-FR-00, NSL-F-01, NSL-FR-01 **FOOD**

Potentiometric Level Sensor NSL-F

Application/intended use

- Continuous level monitoring in metallic vessels up to 3 m in height
- Ideally suited for highly 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

- Level monitoring in feed vessels
- Level measurement in storage tanks
- Content measurement in pressurized vessels

Hygienic design/process connection

- Hygienic process connection with CLEANadapt
- Conforming to 3-A Sanitary Standard for versions with DIRECTadapt
- All wetted materials are FDA-conform
- Sensor completely made of stainless steel
- Complete overview of process connections: see order code
- The Anderson-Negele CLEANadapt system offers a flow-optimized, hygienic and easily sterilizable installation solution for sensors.

Special features/advantages

- CIP/SIP cleaning up to 143 °C/120 min (289 °F/120 min)
- Protection class IP 69 K (with cable connection)
- Short response time for precise measured values with fast level changes
- Due to the potentiometric measuring principle, no new adjustment is necessary when changing the medium
- Insensitive to adhesion
- Adjustment of the display by means of the twistable sensor head
- Mounting in vessels from the below or above
- Installation from the side through curved rod possible
- Adjustable current signal for measurement range, dry run signal and error signal

Options/accessories

- Pre-assembled cable for M12 plug
- Programming adapter MPI-200 with PC software
- Display module Simple User Interface (SUI) and Large User Interface (LUI)
- Remote version with cable length up to 30 m

Communication

IO-Link 4...20 mA

Government-funded

Supported by:

Federal Ministry of Economics and Technology

on the basis of a decision by the German Bundestag

ZIM impulse für wachstum Zentrales Innovationsprogramm Mittelstand

Continuous level sensor NSL-F-00

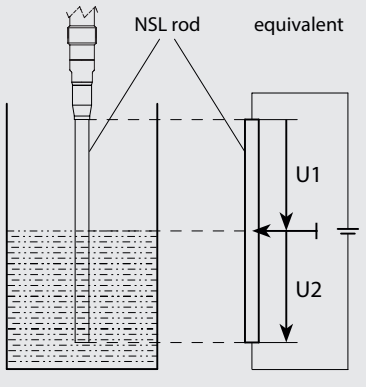
Head unit remote version (HUR)

Specification		
Rod lenght EL	Product contacting	3000 mm max. (NSL-F-00, NSL-FR-00) 1500 mm max. (NSL-F-01, NSL-FR-01)
Measurement range MB	NSL-F-00, NSL-FR-00 NSL-F-00, NSL-FR-00 NSL-F-01, NSL-FR-01	50...199 mm (rod diameter 6 mm) 200...3000 mm (rod diameter 10 mm) L2 see drawing on page 5 (rod diameter 10 mm)
Process connection	Thread Tri-Clamp Varivent	CLEANadapt G1/2", G1" hygienisch 1...1½", 2", 2½", 3" DN 10/15 (type B), DN 25 (type F), DN 40/50 (type N)
Process pressure		16 bar max.
Tightening torque		10 Nm
Materials	Connecting head Plastic cap/viewing window Threaded connector Insulating part Rod	Stainless steel 1.4308 (AISI CF-8) Polycarbonate Stainless steel 1.4305 (AISI 303) PEEK (FDA approval number: 21 CFR 177.2415) Stainless steel 1.4404, $R_a \leq 0.8$ µm
Temperature range	Ambient Storage temperature 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 the 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
Temperatur drift	At 25 °C	≤ 0.1 %
Response time		< 100 ms
Electrical connection	Cable gland Cable connection Supply Protection class	2x M16 x 1.5 2x M12 connector 1.4301 (AISI 304) 18...36 V DC IP 69 K
Communication	Analog Digital	2x Analog Output 4...20 mA, potential-free 1x Relay output (optional) IO-Link v1.1

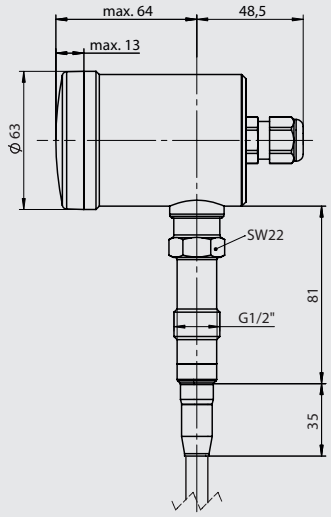
Functional principle

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 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 measuring procedure, the sensor also provides information on the submersion state of the electrode rod.

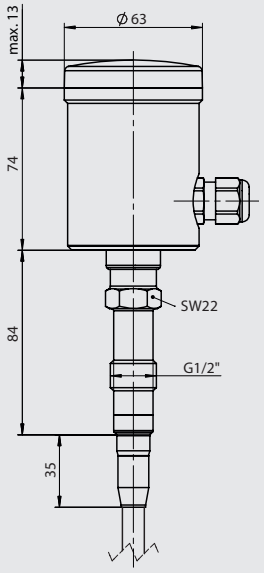
Functional principle



NSL-F ... with horizontal head



NSL-F ... with vertical head



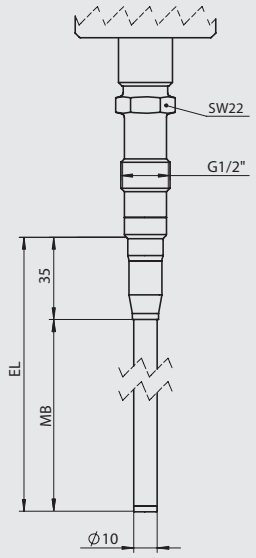
Rod diameter

Rod diameter is depending on rod length (EL). For exact diameter see below-mentioned tables.

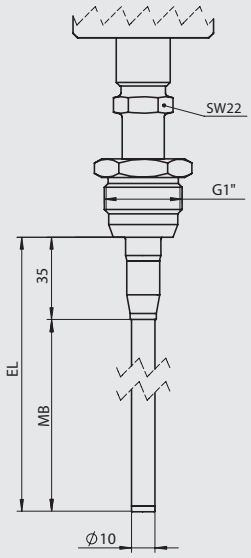
Rod diameter NSL-F-00, NSL-FR-00	
EL	**Ø D**
50...199 mm	6 mm
200...3000 mm	10 mm

Rod diameter NSL-F-01, NSL-FR-01	
EL	**Ø D**
400...1500 mm	10 mm

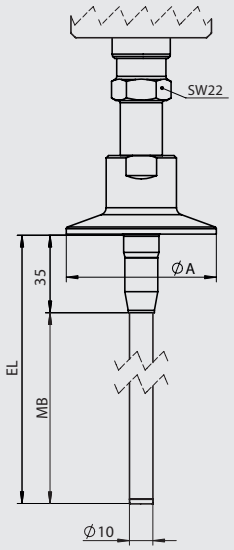
NSL-F-00/.../S00/... with EL ≥ 200 mm



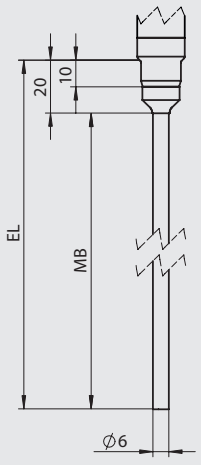
NSL-F-00/.../S01/... with EL ≥ 200 mm



NSL-F-00/... /TC1/... with EL ≥ 200 mm

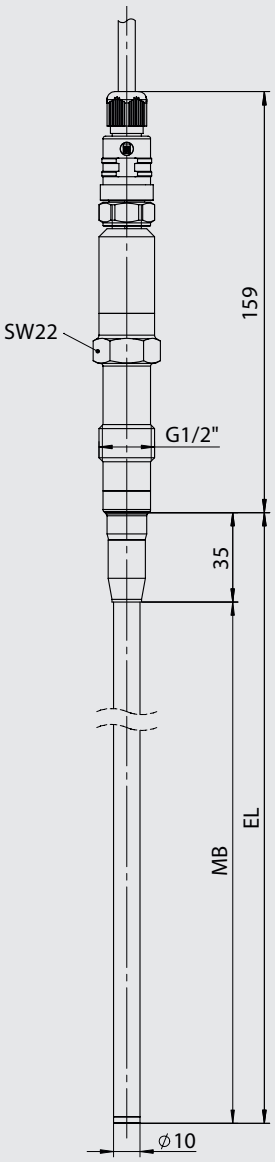


NSL-F-00/... with EL < 200 mm

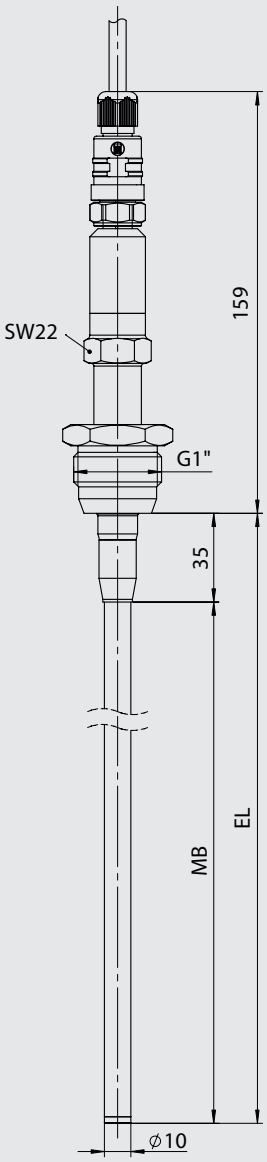


Tri-Clamp diameter	
Typ	**Ø A**
TC1	50.5 mm
TC2	64.0 mm
T25	77.5 mm
TC3	91.0 mm

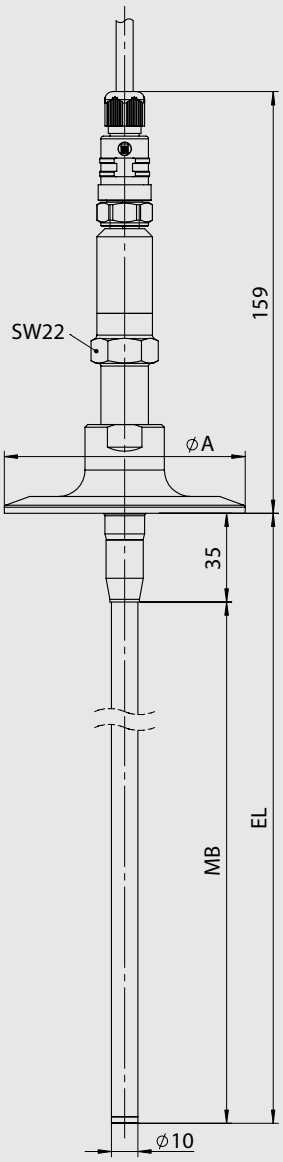
NSL-FS / G1/2" CLEANadapt



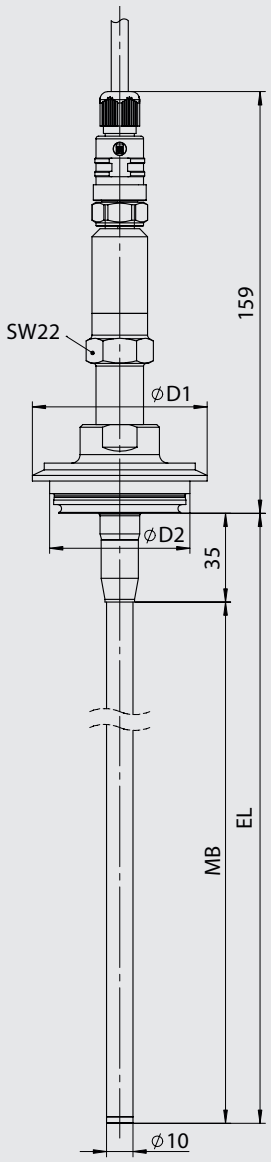
NSL-FS / G1" CLEANadapt



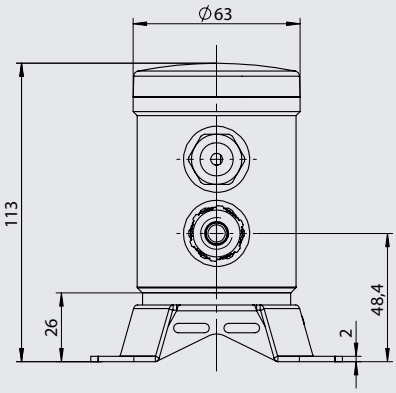
NSL-FS / Tri-Clamp

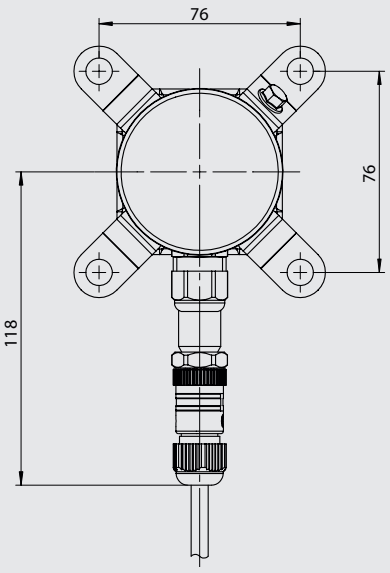


NSL-FS / Varivent



HUR | Head unit remote version



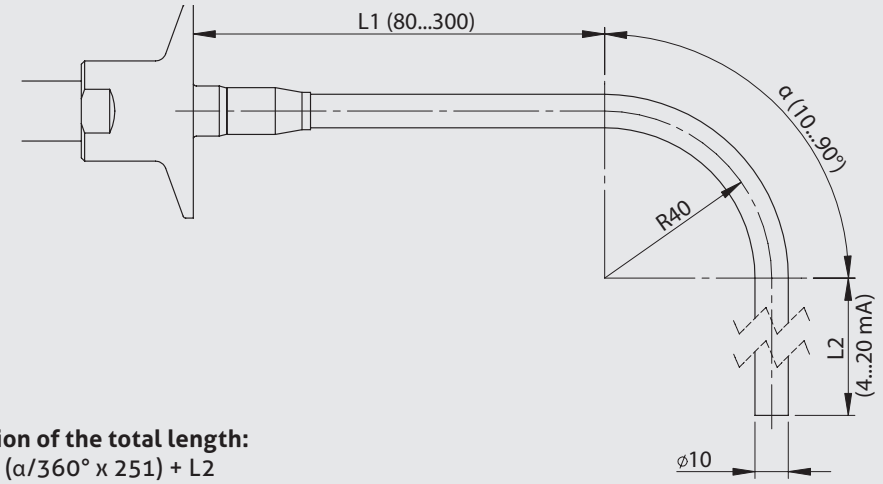


Dimensions table Varivent

Type	Varivent Type	D1 [mm]	D2 [mm]
V10	B	52.7	31.0
V25	F	66.0	50.0
V40	N	84.0	68.0

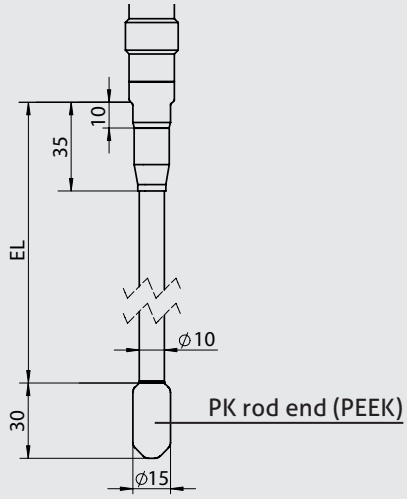
Version NSL-F-01, NSL-FR-01

The NSL-F sensor is optionally available as version NSL-F-01 and NSL-FR-01 with a curved rod.



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

Drawing option PK



Insulation at rod end (option PK)

Insulation at top

Conventional usage

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

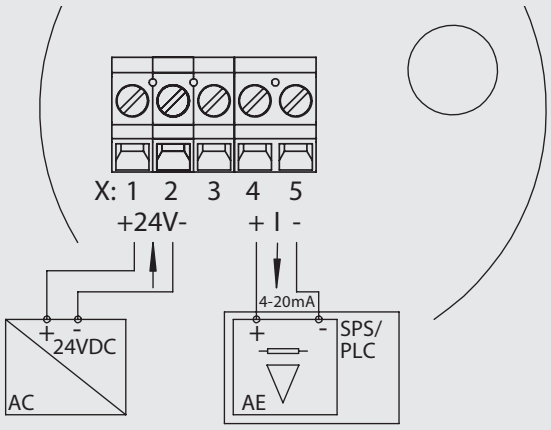
Mounting position

If the sensor is mounted into a vessel from below, there is a range of 20 mm or 35 mm from the sealing edge (see dimensional drawing) where the level cannot be reliably measured. The 4 mA/20 mA signal starts with the bottom weld seam of the rod.

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

- The sensors NSL-F conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 143 °C / 120 minutes (289 °F for 120 minutes).
- Only permitted with the **CLEANadapt** build-in system (EMZ-xx1, EMK-xx1, adapter AMC-xx1 and AMV-xx1).
- 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.

Electrical connection (signal module A42)

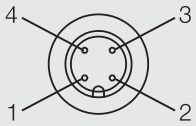


1: Power supply +24 V DC
2: Power supply -
3: Not assigned
4: Analog output X45 +
5: Analog output X45 -

Electrical connection "M" (Signal module A42)

M12 connector (4 pin)

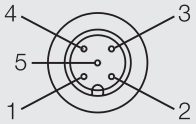
1: Power supply +24 V DC
2: Analog output X45 +
3: Analog output X45 -
4: Power supply -



Electrical connection "L" (Signal module A42)

M12 connector (5 pin)

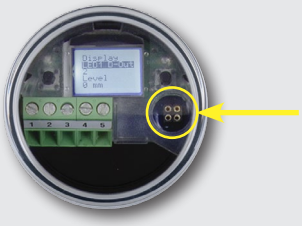
1: Power supply +24 V DC
2: Power supply -
3: Analog output X45 -
4: Not assigned
5: Analog output X45 +



Settings using the MPI-200 programming adapter

The MPI-200 programming adapter is connected to the NSL-F level sensor via the external MPI-200-F adapter piece. It must be ensured that the NSL-F level sensor is permanently connected to the supply voltage while the parameters are being set.

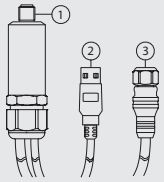
Programming adapter MPI-200-F connection



Connection plug for MPI-200-F adapter as an intermediate plug between the NSL-F electronics and the MPI-200 connection 3 (see next figure).

Connection of programming adapter MPI-200

1: Connection for M12 connector
2: USB port for connecting to a PC
3: Connection cable to adapter for NSL-F

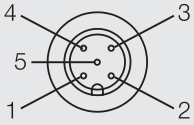


Electrical connection "C" (Signal module I42)

M12 connector (5 pin)

IO-Link

1: Power supply +24 V DC
2: Analog output X45 -
3: Power supply -
4: IO-Link
5: Analog output X45 +



Creating settings with the User Interface (SUI or LUI)

The software structure of the User Interface is similar to that of the PC version. The system is operated using two control buttons to the left and right of the display. These buttons can be used to navigate to the required parameter. The button functions are as follows:

Button	Press briefly	Press and hold
R (right)	Jump to next node, parameter	Edit a node, parameter
L (left)	Jump back to previous node, parameter	Leave editing mode without saving, return to next higher level
R/L	Scroll up and down	
R and L simultaneously		Press both buttons for 10 seconds: the menu jumps back to the beginning (attention: this is not a reset)

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

Cleaning/maintenance

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

Standards and guidelines

- Compliance with the applicable regulations and directives is mandatory.

Note on CE

- Applicable directives:
  Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

Disposal

- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

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

Programming adapter/PC interface MPI-200	Including PC software
CERT / 2.2 / NSL	Factory certificate 2.2 acc. to EN10204 (only product contacting surface)

PVC cable with M12 connection

Programming adapter MPI-200

Remote cable for remote version

PVC-cable, 8 pin, twisted pair unshielded, IP69K
Length selectable in steps of 1 meter, 30 m max.

M12-PVC / 8-PBT	M12 plug/coupling made of PBT plastic
M12-PVC / 8-SS	M12 plug/coupling made of stainless steel

Remote cable

Order code

NSL-F-00 (Potentiometric level sensor, straight design)

Rod lenght EL

0050...3000 (In steps of 10 mm, intermediate sizes at extra charge)

Process connection

S00	(CLEANadapt G1/2" hygienic)
S01	(CLEANadapt G1" hygienic)
TC1	(Tri-Clamp 1½")
TC2	(Tri-Clamp 2")
T25	(Tri-Clamp 2½")
TC3	(Tri-Clamp 3")
V10	(Varivent type B, DN 10/15)
V25	(Varivent type F, DN 25)
V40	(Varivent type N, DN 40/50)

Material certificate

O	(No certificate)
Z	(With 3.1 material certificate)

Mounting position

1	(Installation from top, head orientation horizontal)
2	(Installation from top, head orientation vertical)
3	(Installation from bottom, head orientation horizontal)
4	(Installation from bottom, head orientation vertical)
5	(Installation from top, head orientation horizontal, 40 mm insulation) only for EL ≥ 200 mm
6	(Installation from top, head orientation vertical, 40 mm insulation) only for EL ≥ 200 mm

Signal module

A42	(1x 4...20 mA level)
I42	(IO-Link and 1x 4...20 mA level)

Electrical connection

P	(Cable gland M16x1.5)
M	(1x M12 plug)
L	(1x M12 plug, 5 pin, wiring according to LN sensor)
C	(1x M12 plug, 5 pin analog output and IO-Link)

Display

X	(Without display)
S	(Simple User Interface with small display)
L	(Large User Interface with display)

Cap

X	(Opaque plastic)
P	(Clear plastic)
M	(Stainless steel without control window)
W	(Stainless steel with control window)

Insulation at rod end

XX	(Without insulation)
PK	(With PEEK insulation >> EL + 30 mm)

Configuration

X	(Factory setting)
S	(Special customer setting)

NSL-F-00 /	**1500 /**	**S00 /**	**O /**	**1 /**	**A42 /**	**P /**	**X /**	**X /**	**XX /**	**X**

Order code

NSL-F-01 (Potentiometric level sensor, curved design)

Rod length EL
0400...
1500 (In steps of 10 mm, intermediate sizes at extra charge)

Process connection
TC1 (Tri-Clamp 1½")
TC2 (Tri-Clamp 2")
T25 (Tri-Clamp 2½")
TC3 (Tri-Clamp 3")
V10 (Varivent type B, DN 10/15)
V25 (Varivent type F, DN 25)
V40 (Varivent type N, DN 40/50)

Material certificate
O (No certificate)
Z (With 3.1 material certificate)

Installation
1 (Installation from top, head orientation horizontal)
2 (Installation from top, head orientation vertical)
3 (Installation from bottom, head orientation horizontal)
4 (Installation from bottom, head orientation vertical)
5 (Installation from top, head orientation horizontal, 40 mm insulation) only for EL ≥ 200 mm
6 (Installation from top, head orientation vertical, 40 mm insulation) only for EL ≥ 200 mm

Signal module
A42 (1x 4...20 mA level)
I42 (IO-Link and 1x 4...20 mA level)

Electrical connection
P (Cable gland M16x1.5)
M (1x M12 plug)
L (1x M12 plug, 5 pin, wiring according to LN sensor)
C (1x M12 plug, 5 pin analog output and IO-Link)

Display
X (Without display)
S (Simple User Interface with small display)
L (Large User Interface with display)

Cap
X (Opaque plastic)
P (Clear plastic)
M (Stainless steel without control window)
W (Stainless steel with control window)

Insulation at rod end
XX (Without insulation)
PK (PEEK insulation >> EL + 30 mm)

Configuration
X (Factory setting)
S (Special customer setting)

Details on curved version
80...300 (Length L1 in mm)
10...90 (Angle α in °)

NSL-F-01 /	1500 /	S00 /	O /	1 /	A42 /	P /	X /	X /	XX /	X /	150-90

Order code

NSL-FR-00 (Potentiometric level sensor, straight design - remote version, remote cable must be ordered separately)

Rod lenght EL

0050...3000 (In steps of 10 mm, intermediate sizes at extra charge)

Process connection

S00	(CLEANadapt G1/2" hygienic)
S01	(CLEANadapt G1" hygienic)
TC1	(Tri-Clamp 1½")
TC2	(Tri-Clamp 2")
T25	(Tri-Clamp 2½")
TC3	(Tri-Clamp 3")
V10	(Varivent type B, DN 10/15)
V25	(Varivent type F, DN 25)
V40	(Varivent type N, DN 40/50)

Material certificate

O	(No certificate)
Z	(With 3.1 material certificate)

Mounting position

2	(Installation from top)
4	(Installation from bottom)
6	(Installation from top, 40 mm insulation) only for EL ≥ 200 mm

Signal module

A42	(1x 4...20 mA level)
I42	(IO-Link and 1x 4...20 mA level)

Electrical connection

P	(Cable gland M16x1.5)
M	(1x M12 plug)
L	(1x M12 plug, 5 pin, wiring according to LN sensor)
C	(1x M12 plug, 5 pin analog output and IO-Link)

Display

X	(Without display)
L	(Large User Interface with display)

Cap

X	(Opaque plastic)
P	(Clear plastic)
M	(Stainless steel without control window)
W	(Stainless steel with control window)

Insulation at rod end

XX	(Without insulation)
PK	(With PEEK insulation >> EL + 30 mm)

Configuration

X	(Factory setting)
S	(Special customer setting)

NSL-FR-00 /	**1500 /**	**S00 /**	**O /**	**2 /**	**A42 /**	**P /**	**X /**	**X /**	**XX /**	**X**

Information

The components NSL-FS / sensor and HUR / Head Unit Remote can be purchased as spare parts separately.
The valid configuration can be seen on the product labels.

Order code

NSL-FR-01 (Potentiometric level sensor, curved design - remote version, remote cable must be ordered separately)

Rod length EL
0400...
1500 (In steps of 10 mm, intermediate sizes at extra charge)

Process connection
TC1 (Tri-Clamp 1½")
TC2 (Tri-Clamp 2")
T25 (Tri-Clamp 2½")
TC3 (Tri-Clamp 3")
V10 (Varivent type B, DN 10/15)
V25 (Varivent type F, DN 25)
V40 (Varivent type N, DN 40/50)

Material certificate
O (No certificate)
Z (With 3.1 material certificate)

Installation
2 (Installation from top)
4 (Installation from bottom)
6 (Installation from top, 40 mm insulation) only for EL ≥ 200 mm

Signal module
A42 (1x 4...20 mA level)
I42 (IO-Link and 1x 4...20 mA level)

Electrical connection
P (Cable gland M16x1.5)
M (1x M12 plug)
L (1x M12 plug, 5 pin, wiring according to LN sensor)
C (1x M12 plug, 5 pin analog output and IO-Link)

Display
X (Without display)
L (Large User Interface with display)

Cap
X (Opaque plastic)
P (Clear plastic)
M (Stainless steel without control window)
W (Stainless steel with control window)

Insulation at rod end
XX (Without insulation)
PK (PEEK insulation >> EL + 30 mm)

Configuration
X (Factory setting)
S (Special customer setting)

Details on curved version
80...300 (Length L1 in mm)
10...90 (Angle α in °)

NSL-FR-01 / 1500 / TC1 / O / 2 / A42 / P / X / X / XX / X / 150-90

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