



OPERATING MANUAL

Continuous Level Sensor

- **NSL-F-00**
- **NSL-F-01**
- **NSL-F-02**

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Application/intended use

- Continuous level monitoring in metallic vessels up to 3m in height
- Ideal for highly adhesive and pasty media
- Filling level measurement of foamy media
- Hygienic use for float sensors
- Generally for media with a conductivity of 5 $\mu\text{S}/\text{cm}$ or higher (media with a lower conductivity require individual clarification regarding the tank contour, temperature, assembly, etc.)
- Not suitable for explosive areas
- Not suitable for safety-related unit parts (SIL)

1 Conformity with standards

The basic safety and health requirements are met through fulfillment of

- 2014/30/EU Electromagnetic Compatibility
- 1935/2004/EU Consumer Goods Ordinance
- Directive (EU) 10/2011 (articles in contact with food)
- EN 61000-6-2:2005 (Interference Immunity)
- EN 61000-6-4:2007 + A1:2011 (Interference Emissions)

2 Safety instructions

These safety instructions must be followed to

- Avoid endangering persons and the environment
- Avoid damage to the sensors
- Prevent faulty batches during production

The electrical connections may only be performed by persons with the necessary technical skills (e.g. certified electricians or persons with technical training in electrics) and by persons with the necessary authorization from the operator.

The power supply and the control circuit inputs and outputs must be properly wired. The current state-of-the-art of electrical connections must be adhered to. See also section 8 "Wiring diagram".

The following details must be noted in particular:

- Safety instructions
 - Electrical connection data
1. All persons involved with the setup, commissioning, operation, service and maintenance of the sensor must be suitably qualified.
 2. This operating manual must be followed precisely. The operator must ensure that the personnel has read and fully understood the operating manual.
 3. All work must be performed with utmost care and may only be performed by authorized and trained personnel. The regulations effective in the country of use regarding the opening and repair of the devices must be adhered to.
 4. The operating manual must be stored in the vicinity of the measurement equipment in an easily accessible location.
 5. The sensor must be de-energized prior to alterations and maintenance.
 6. The working area of the operator must offer enough space to minimize the risk of injury.
 7. The technical data specified in the operating manual and on the type label must be adhered to.

Warranty coverage shall not be granted for any damage that can be attributed to improper execution of work.

3 Special features/advantages

- Installation in tanks and feed vessels from above, below and diagonally (types NSL-F-00 and NSL-F-02)
- Lateral installation in tanks by means of an angulated sensor and various clamping systems (type NSL-F-01)
- Four-conductor sensor with 4...20-mA output signal
- Due to the potentiometric measuring principle, calibration is not required after a change in medium
- Individual setting/programming via PC or Simple User Interface
- Current signal for measuring range, dry-run message and error message can be adjusted
- The M12 plug connection can be aligned by turning the sensor head
- 2 individual configurable LEDs on the display unit

4 Options/accessories

- Simple User Interface with small display (retrofittable)
- Programming adapter MPI-200 (PC-based)
- Tool for releasing the signal module
- Preassembled PVC cable

PVC cable with M12 coupling of stainless steel 1.4305, IP 69k, unshielded

- | | |
|------------------|----------------------------------|
| ○ M12-PVC/4-5 m | PVC cable, 4-pin, 5 m in length |
| ○ M12-PVC/4-10 m | PVC cable, 4-pin, 10 m in length |
| ○ M12-PVC/4-25 m | PVC cable, 4-pin, 25 m in length |

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

- | | |
|-------------------|----------------------------------|
| ○ M12-PVC/4G-5 m | PVC cable, 4-pin, 5 m in length |
| ○ M12-PVC/4G-10 m | PVC cable, 4-pin, 10 m in length |
| ○ M12-PVC/4G-25 m | PVC cable, 4-pin, 25 m in length |

- 2.2 Factory certificate as per EN 10204 (product-contacting equipment only)

5 Installation and connection

Information on mounting position



If the sensor is installed in the tank, the measurement signal will not be reliable in an area of 20 mm (35 mm) from the sealing edge (see dimensional drawing). This means that the 4 mA or 20 mA signal is located on the bottom weld seam of the measuring rod.

The continuous level sensor NSL-F is set to operate in aqueous media without requiring special settings. In case of highly critical media or special tank contours (with inside fittings such as a pipe), it may be necessary to adjust some parameters. The parameterization may be changed using the PC-based MPI-200 programming adapter or the Simple User Interface. The setting can either be set or changed directly on location or in the office in a dry simulation.

When setting the parameters, it must be ensured that the various authorization levels are enabled (see "Associated setup mode" column). The Monitor and Adjust levels are not required for setting the NSL-F sensor. These levels can be individually protected with a password and thus made available to specific users/service personnel. The software in both the PC/MPI-200 and Simple User Interface features a tree structure.

4...20-mA signal

- Filling level height for 4/20-mA signal
- "Dry run" warning signal
- "Failure" error signal
- "Underdriven/overdriven" signal limit
- "Underflow/overflow" error signal
- Signal simulation (3.95...20.05 mA)

Filling level measurement

- Filling level zero point/offset
- Filling level slope/gain
- Damping/filter
- Physical unit

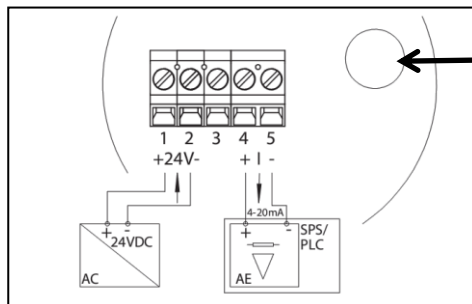
Mounting position

A list of the parameters settings in the continuous level sensor is included with the delivery. These default parameter values, and the parameter values changed by the user, can be printed out using the MPI-200 programming adapter software.

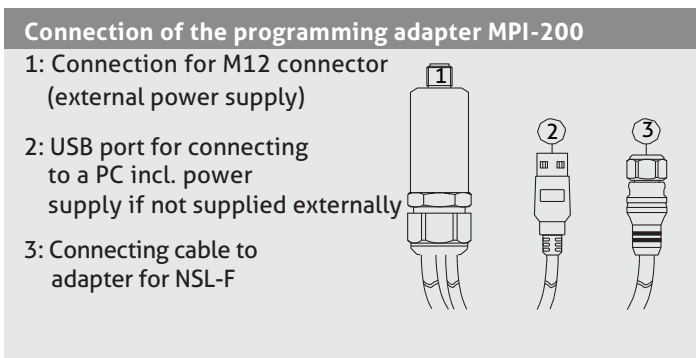
When making the settings, note the help texts in the MPI software. These contain additional useful information on changing the selected parameter.

6.1 Setup using the MPI-200 programming adapter

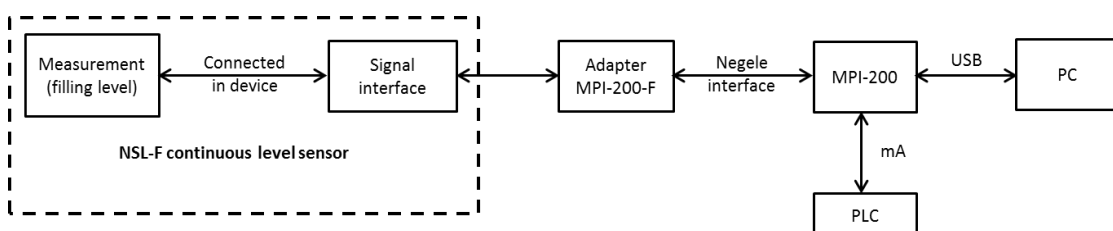
The MPI-200 programming adapter is connected to the NSL-F continuous level sensor via the external MPI-200-F adapter piece. It must be ensured that the NSL-F continuous level sensor is permanently connected to the supply voltage while the parameters are being set.



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).



Signal flow during programming



The correlation between the table below and the software is as follows:

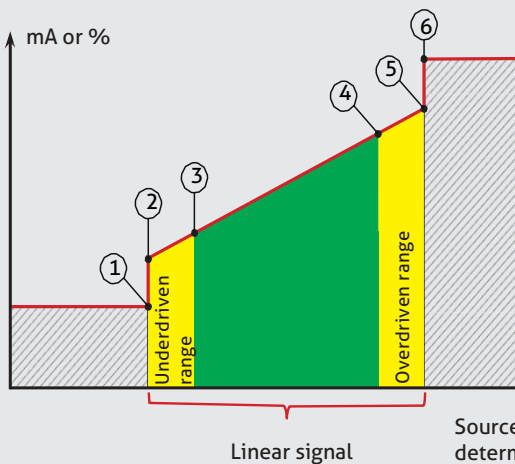
MPI-200 software: e.g. 4-mA set value display on PC

Node	Value name	Parameter name
Signal interface	X45a Current loop signal	4 mA setpoint

Note:

For further settings, please see also the description in the MPI-200 product information

Parameters/signal curve



- 1: Error signal: value underflow
- 2: Underdrive limit
- 3: 4 mA set value
- 4: 20 mA set value
- 5: Overdriven limit
- 6: Error signal: value overflow

Warning signal: no medium
Sensor is not submerged in the medium

Signal can be adjusted between 2.40...22.00 mA

Parameter	Node/module	Value name
4 mA Setpoint	Signal Int	x45a I-Out
20 mA set value	Signal Int	x45a I-Out
Underrange limit	Signal Int	x45a I-Out
Overrange limit	Signal Int	x45a I-Out
Warn-Sig: no Media	Signal Int	x45a I-Out
Warn-Sig: out of Spec.	Signal Int	x45a I-Out
Err-Sig: Overflow	Signal Int	x45a I-Out
Err-Sig: Underflow	Signal Int	x45a I-Out
Err-Sig: Global Failure	Signal Int	x45a I-Out
Mounting Orientation	Measure	(#)
Zero-Point (Offset)	Measure	Level
Slope (Gain)	Measure	Level
Damping	Measure	Level
Sensitivity Optimization	Measure	Dry Run D.
Threshold Fine Tuning	Measure	Dry Run D.

6.2 Setup using the MPI-200 programming adapter

The software structure of the Simple User Interface is similar to that of the PC version.

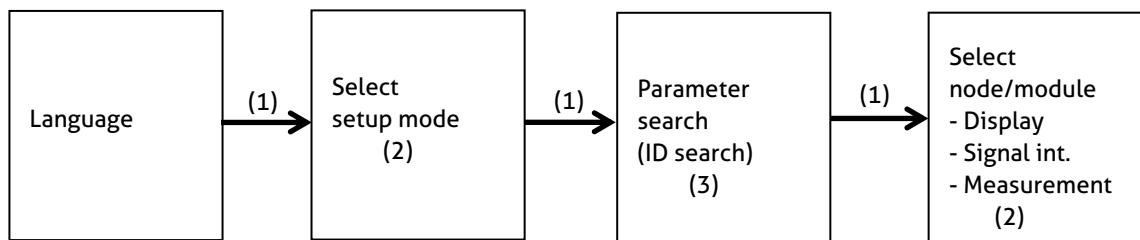
The system is operated using two control buttons to the left and right of the display. The button functions are as follows:

Right button, press briefly	R	Jump to next node, parameter
Right button, press and hold	RL	Edit a node, parameters
Left button, press briefly	L	Jump back to previous node, parameter ...
Left button, press and hold	LL	Leave the editing mode without saving, return to the next higher level
Right or left button briefly	R/L	scroll up or down
Press and hold both buttons		Press both buttons for 10 seconds, then jump back to the beginning of the menu (attention this is not a reset)

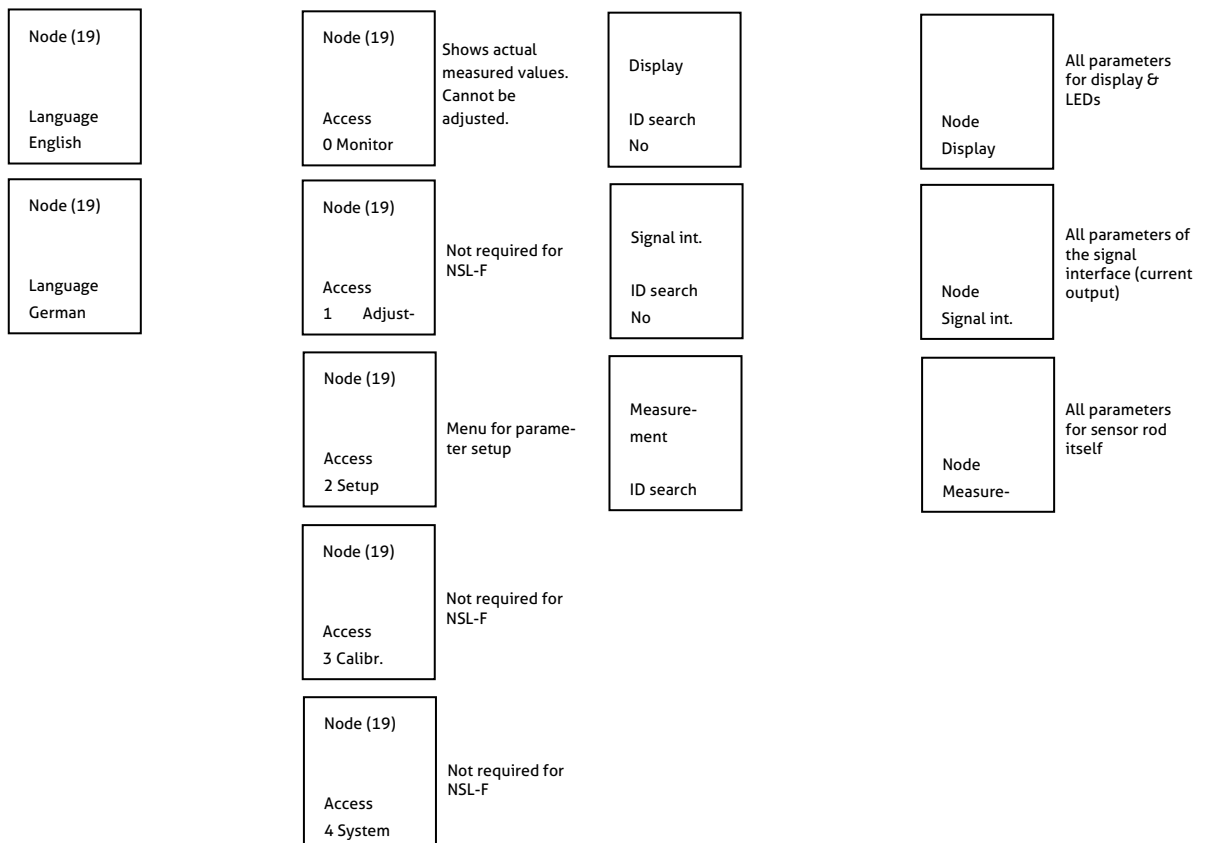
Note:

The abbreviations in column 2 refer to the following programming example.

Menu flowchart to change a parameter



Example of possible display on screen:



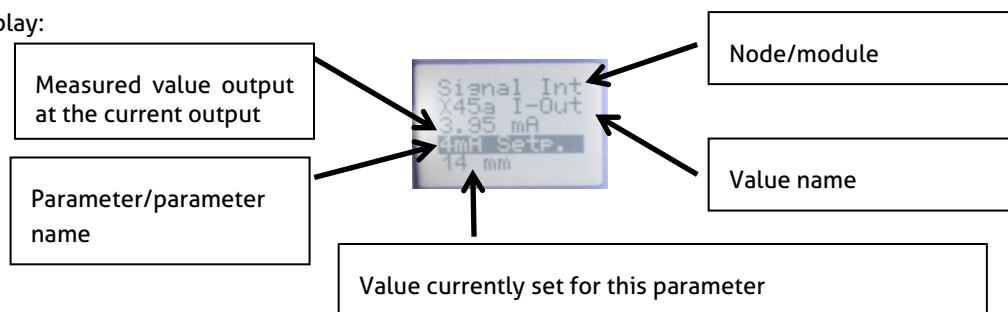
- (1) Briefly press the right button.
- (2) Press and hold the right button, and then select the desired mode (e.g. Setup) or node (e.g. Signal int), leaf through the menu with the right/left button and confirm the selection by pressing and holding the right button.
- (3) Press and hold the left button, and enter the ID number from right to left. Proceed as follows:
 - a.) Select the desired position (navigation with the right/left buttons, press the left button, change the position to the left, press the right button, change the position to the right).
 - b.) At the desired position, press and hold the right button until the field becomes gray. Then enter the numerical value with the right/left buttons and confirm by pressing and holding the right button until the gray area disappears. Then enter the next digit.
 - c.) When all digits have been entered, move all the way to the left with the left button until the field become gray.

Then press and hold the right button. The system jumps to the selected parameter and it can be entered or changed in the same manner. Start by pressing and holding the right button.

For some system-related parameters, you are asked to confirm that you really wish to make the change. Do this by pressing the left and right buttons.

- Press the right button to change the parameter or save the change.
- Press the left button to leave the setting without changing it.

Display:

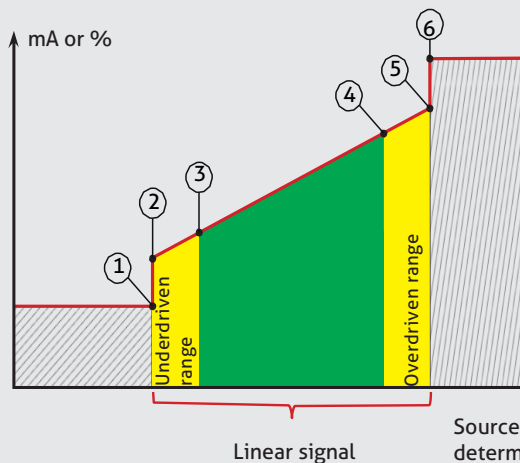


2 individual configurable LEDs on the display unit:

- **LED1** = left LED
Dry running: LED flashes every second if sensor says „no media“. In normal state this LED is turned off.
- **LED2** = right LED
Power ON Signal – device error: The right LED glows constantly in normal state as long as the sensor is supplied with power. If device error occurs, this LED flashes very fast (pulse approx. 0,4 sec.)

Parameter/ parameter name	Access/setup mode (must be set before the change is made)	Node/ module	Search num- ber (HTD number)	Value name
Contrast user interface	2 Setup	Display	451020	(#)
Backlight On/Off	2 Setup	Display	451030	(#)
4-mA Setpoint	2 Setup	Signal Int	330111	x45a I-Out
20-mA Setpoint	2 Setup	Signal Int	330191	x45a I-Out
Underrange Limit	2 Setup	Signal Int	330141	x45a I-Out
Overrange Limit	2 Setup	Signal Int	330211	x45a I-Out
Warn-Sig: no Media	2 Setup	Signal Int	330121	x45a I-Out
Warn-Sig: out of Spec.	2 Setup	Signal Int	330221	x45a I-Out
Err-Sig: Underflow	2 Setup	Signal Int	330151	x45a I-Out
Err-Sig: Overflow	2 Setup	Signal Int	330161	x45a I-Out
Err-Sig: Global Failure	2 Setup	Signal Int	330131	x45a I-Out
Mounting Orientation	2 Setup	Measure	012140	(#)
Zero-point (Offset)	2 Setup	Measure	012130	Level
Slope (Gain)	2 Setup	Measure	012135	Level
Damping	2 Setup	Measure	000020	Level
Sensitivity Optimization	2 Setup	Measure	012180	Dry Run D.
Threshold Fine Tuning	2 Setup	Measure	012121	Dry Run D.

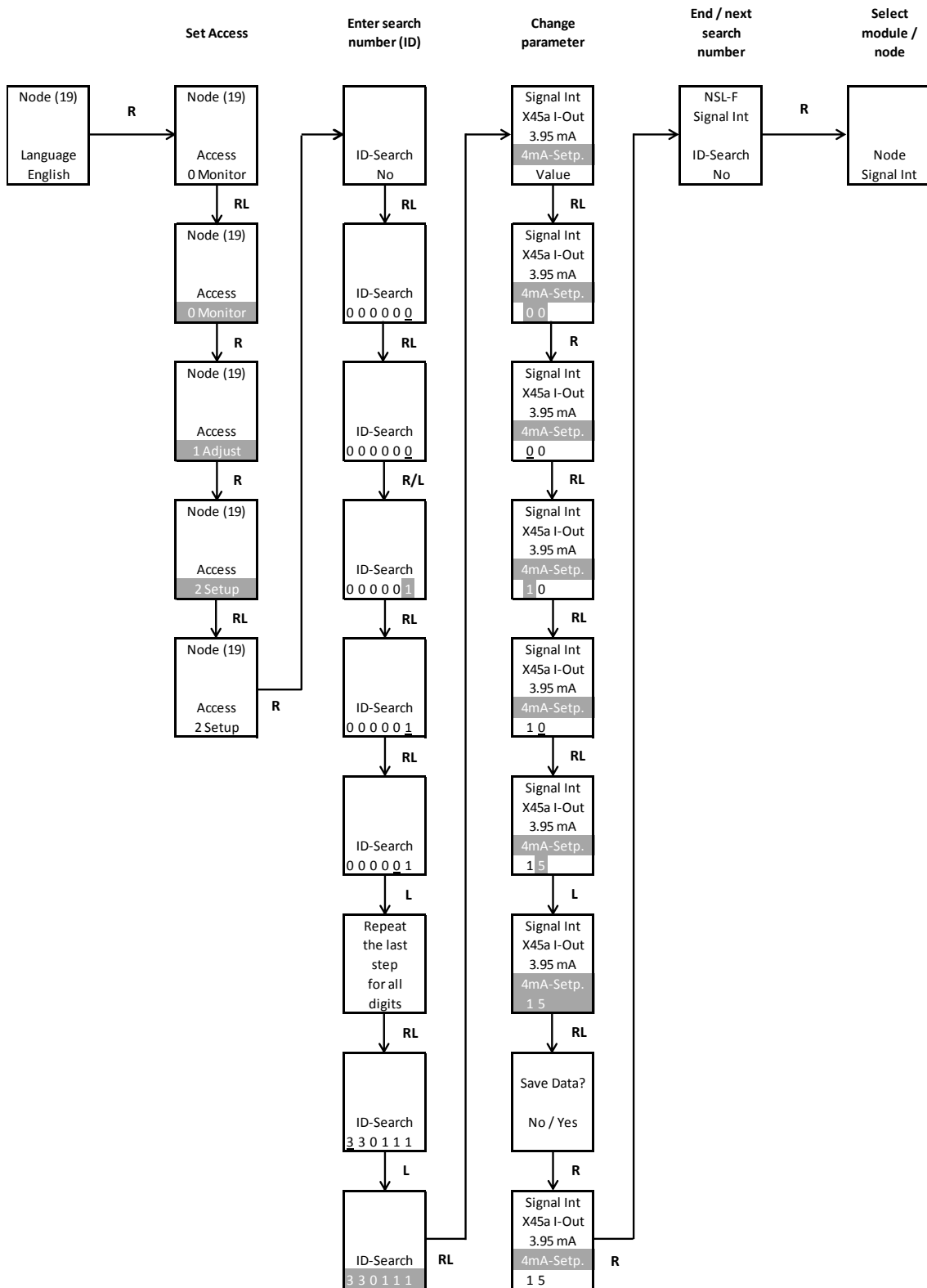
Parameter designation/signal curve



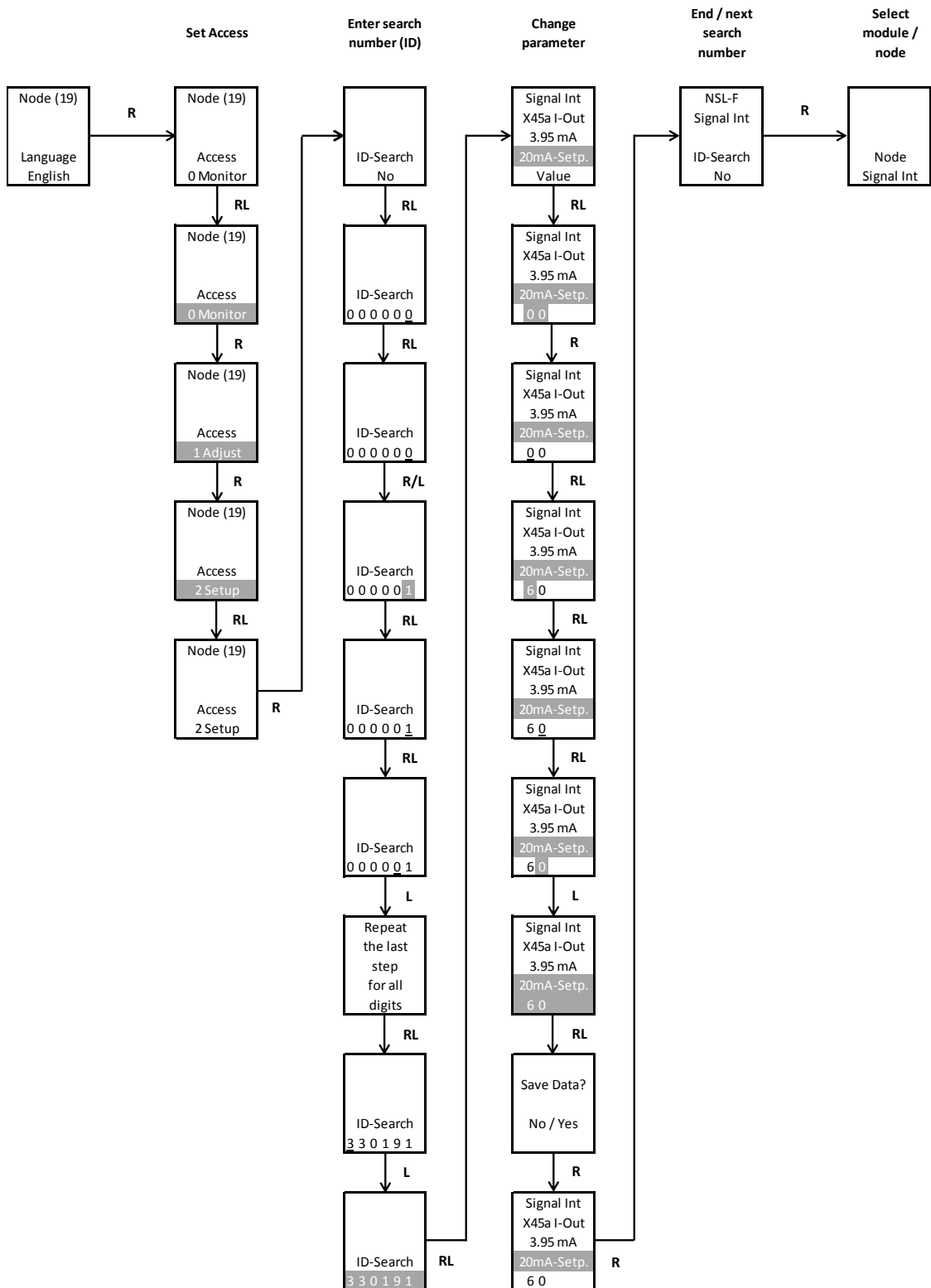
- 1: Error signal: Value underflow
- 2: Underdriven limit
- 3: 4-mA set value
- 4: 20-mA set value
- 5: Overdriven limit
- 6: Error signal: Value overflow

Warning signal: no medium
Sensor is not submerged in the medium
Signal can be set between 2.40 ... 22.00 mA

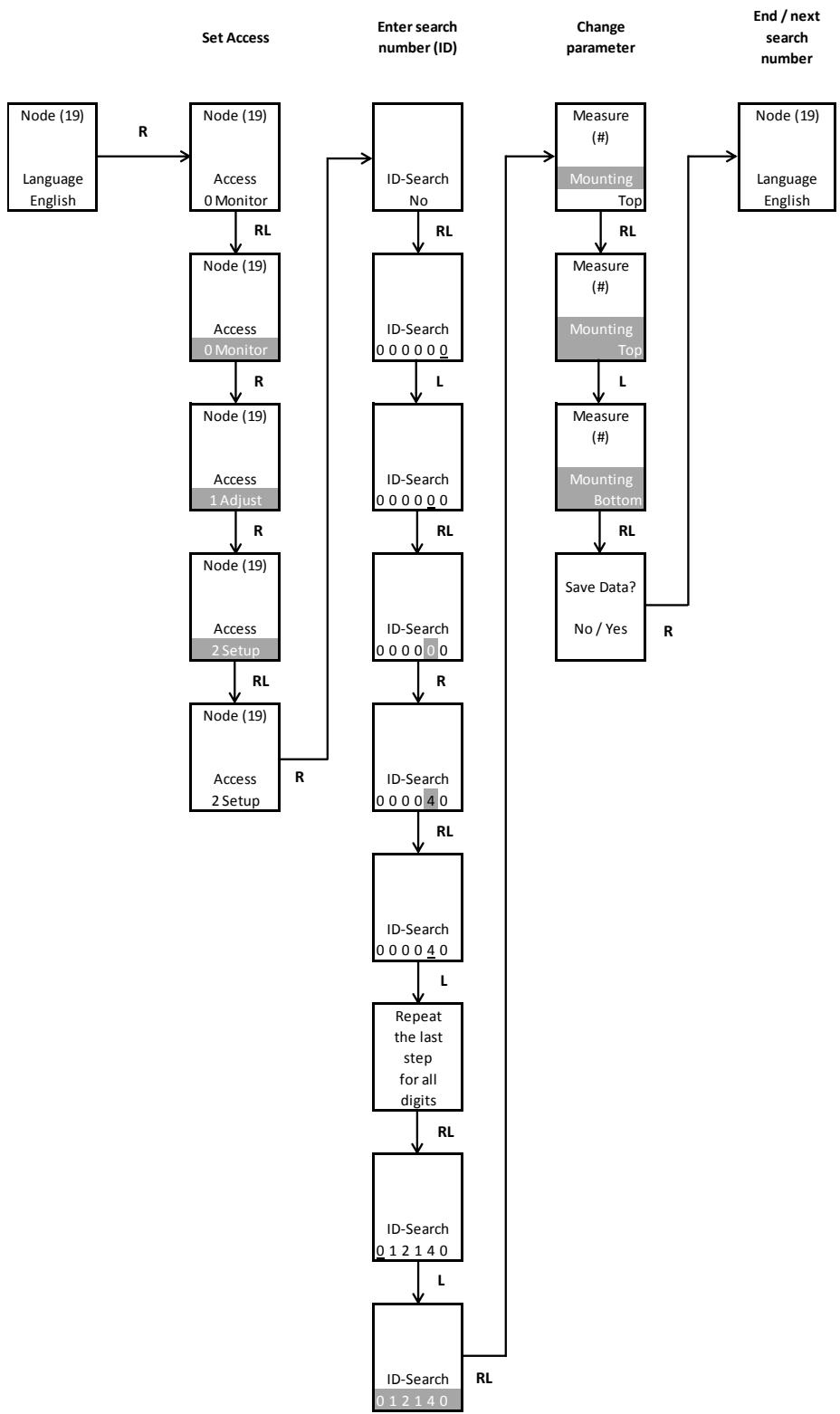
Example of setup of 4mA set value to 15mm above rod end:



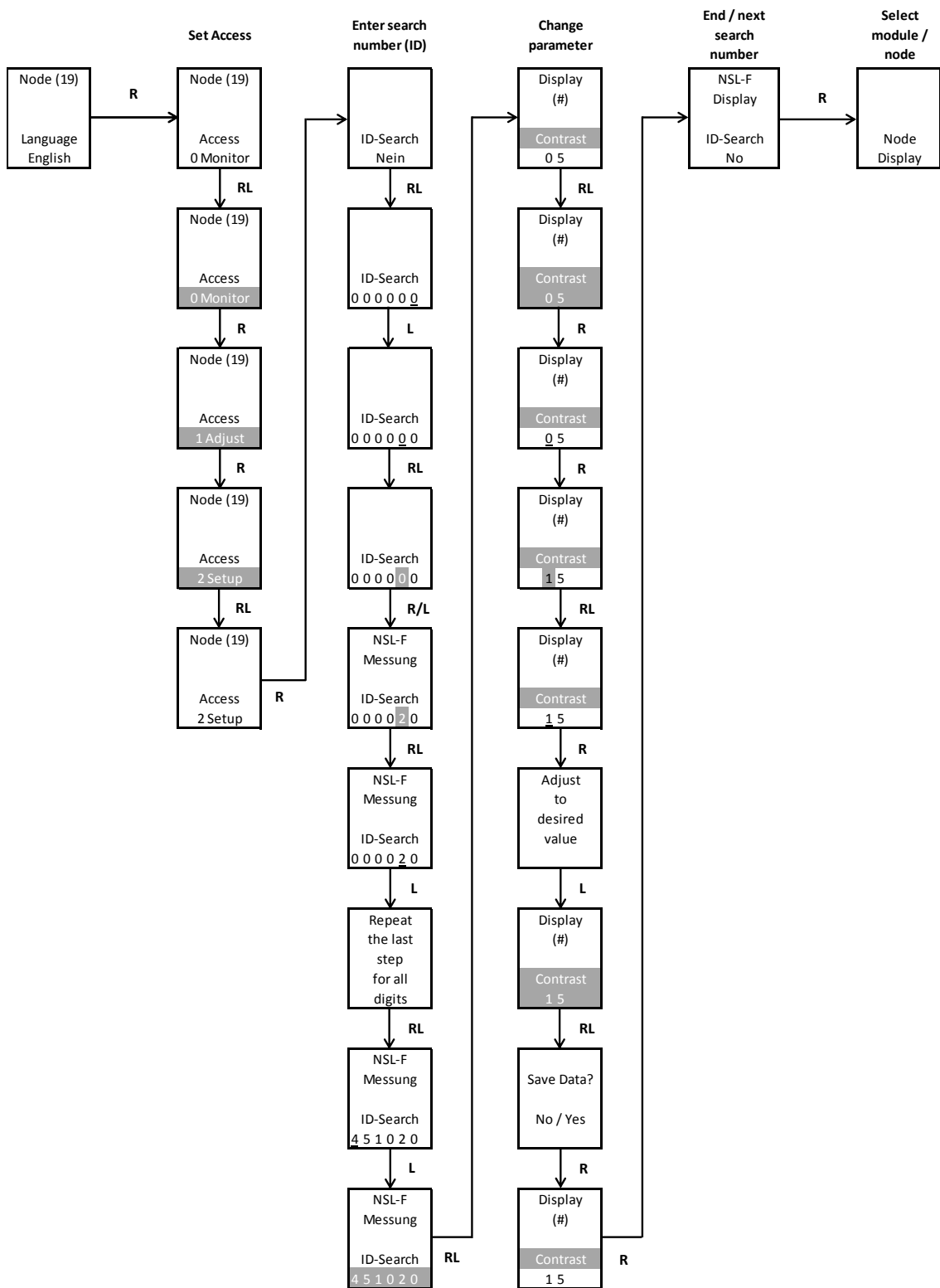
Example of setup of 20mA set value to 60mm:



Example of changing mounting orientation from top to bottom:



Example of changing contrast of the display:



6 Dimensions

Rod diameter

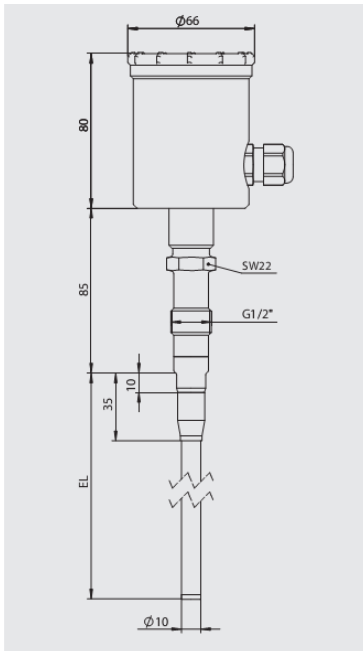


The rod diameter depends on the length (EL) of the rod (see table).

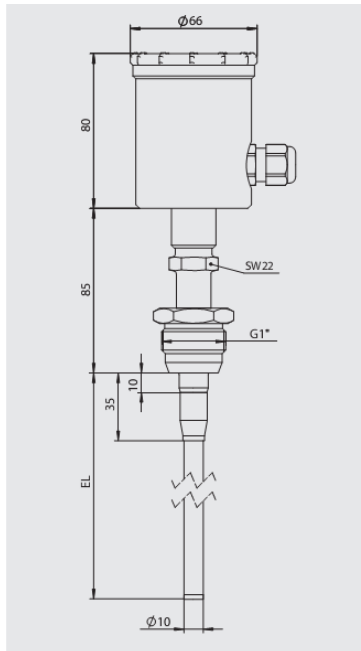
EL	øD
50...199 mm	6 mm
200....1500/3000 mm	10 mm

NSL-F-00 with vertical head

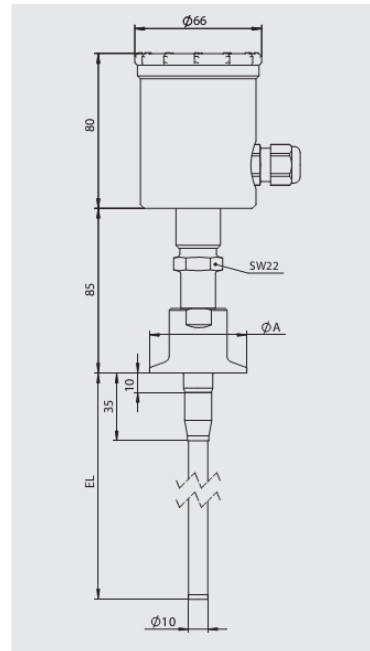
NSL-F-00/.../S00/... with EL > 200 mm



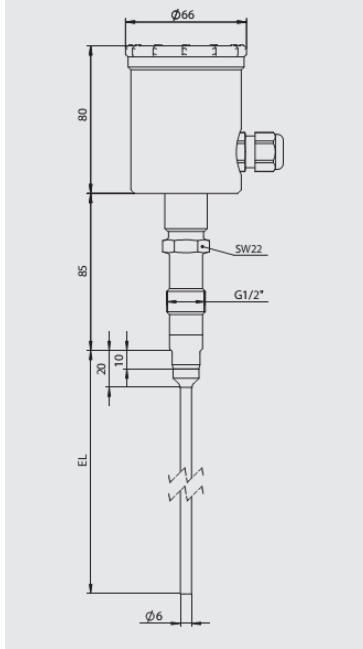
NSL-F-00/.../S01/... with EL > 200 mm



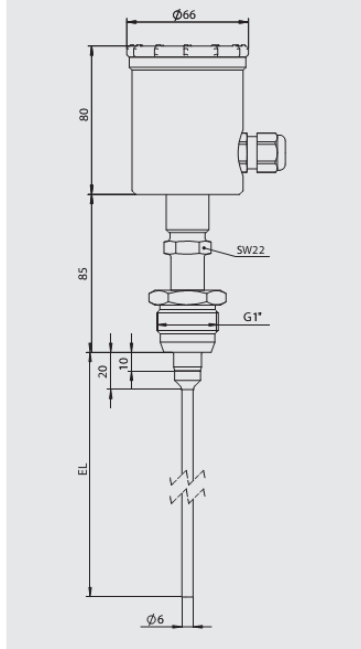
NSL-F-00/.../Txx/... with EL > 200 mm



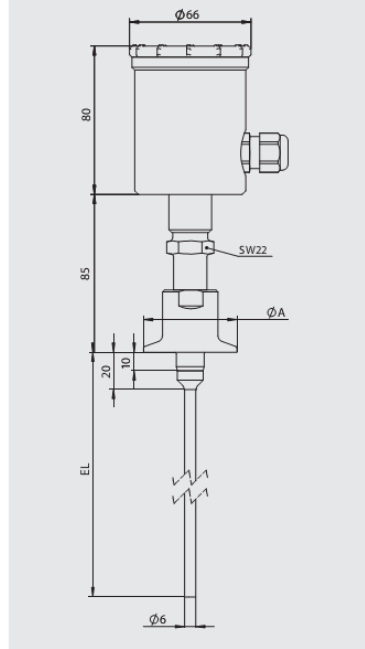
NSL-F-00/.../S00/... with EL>200 mm



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

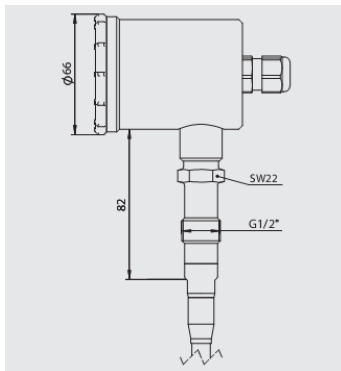


NSL-F-00/.../Txx/... with EL>200 mm



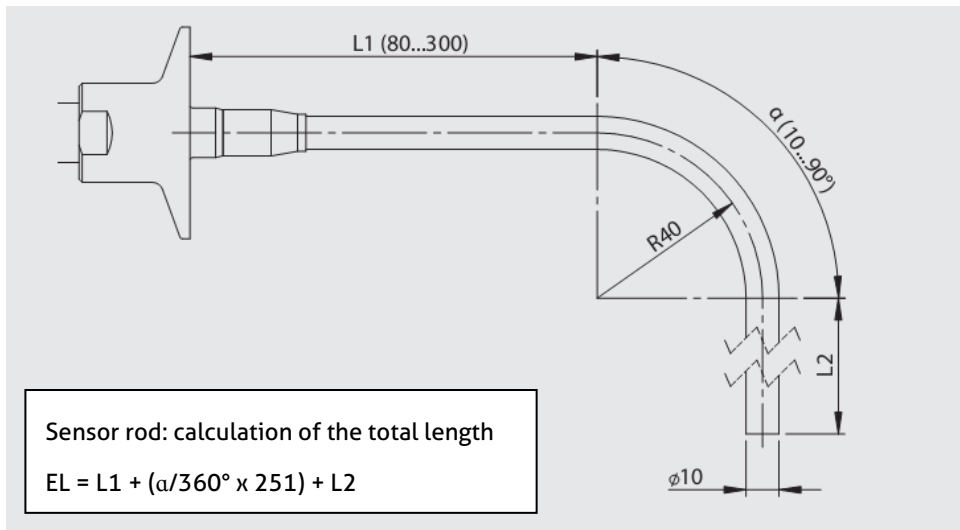
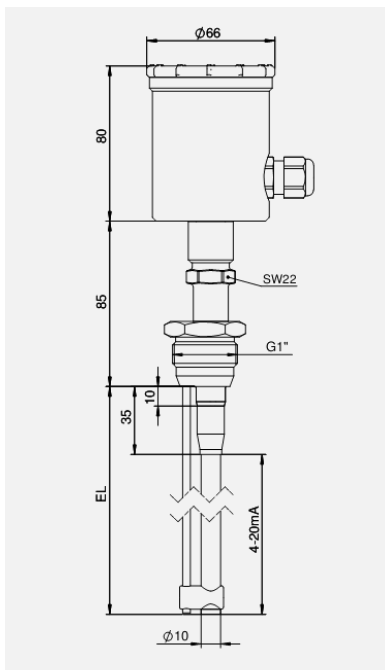
Type	ϕA
TC1	50.5 mm
TC2	64.0 mm
T25	77.5 mm
TC3	91.0 mm

NSL-F-00 with horizontal head



NSL-F-01

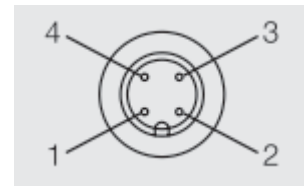
The following figure only contains information on the rod design. The sizes of the head and process connection can be gathered from the drawings for NSL-F-00.

**NSL-F-02**

7 Wiring diagram

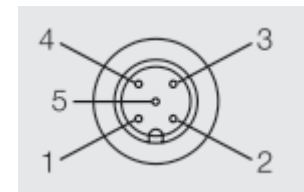
Electrical connection with 4-PIN M12 plug connection

4 PIN Cord Set	Description
1: Brown	+ Supply voltage
2: White	+ Output 4...20 mA
3: Blue	- Output
4: Black	- Supply voltage

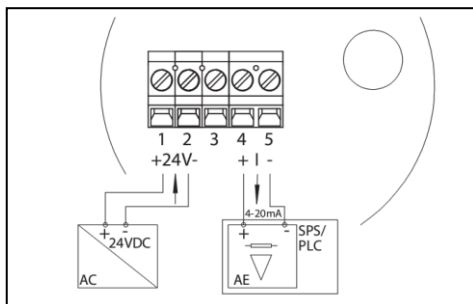


Electrical connection with 5-PIN M12 plug connection

Anderson-Negele 42117H, 42117K 5-PIN Cord Set	Other 5-PIN Cord Sets	Description
1: Red	1: Brown	+ Supply voltage
2: Black	2: White	- Supply voltage
3: Green	3: Blue	- Output
4: n.c.	4: n.c.	Not connected
5: White	5: Grey	+ Output 4...20 mA



Electrical connection with cable gland



8 Repair and maintenance

The level sensor described here is maintenance-free and contains components that could be repaired.

9 Technical data

Rod length EL	Product-contacting	Max. 3000 mm (NSL-F-00) Max. 1500 mm (NSL-F-01 + NSL-F-02)
Measurement range		50...199 mm (rod diameter 6 mm) 200...max. EL (rod diameter 10 mm)
Process connection	Thread Tri-Clamp Varivent	CLEANadapt G ½", G1" hygienic 1.5", 2", 2.5", 3" DN 25 (type F) DN 40/50 (type N)
Process pressure		Max. 16 bar
Tightening torque		10 Nm (CLEANadapt system)
Materials	Connecting head Threaded connector Insulating part Rod	Stainless steel 1.4308 Stainless steel 1.4305 PEEK (FDA approval: 21 CFR 177 2415) Stainless steel 1.4404; Ra ≤0.8 µm
Temperature ranges	Environment Storage temperature Process CIP/SIP	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 rod length <0.5 mm
Accuracy	Media with conductivity >50 µS/cm (beer, milk) Media with conductivity <50 µS/cm	<1% of rod length Depending on temperature, tank contour, medium, distance to tank wall
Linearity		<1.0% of rod length
Reproducibility	Rod length >500 mm Rod length <500 mm	<0.2% of rod length <1.0 mm
Temperature drift	At 25 °C	≤0.1%
Response time t90		<100 ms
Electrical connection	Supply voltage Protection class Output signal Ohmic resistance	18...36 V DC IP 69K 4...20 mA, galvanically isolated -> housing 0... 750 Ω
Weight		920 g at length of 1.5 m

SENSORS FOR FOOD AND BIOPHARMA,



HYGIENIC BY DESIGN

ANDERSON-NEGELE

NEGELE MESSTECHNIK GMBH, RAIFFEISENWEG 7, 87745 EGG AN DER GÜNZ

EG Konformitätserklärung EC Declaration of Conformity

Hiermit bestätigen wir die Übereinstimmung des aufgeführten Gerätes mit den Richtlinien des Rates der Europäischen Gemeinschaft zur CE-Kennzeichnung. Die Sicherheits- und Installationshinweise der Produktdokumentation sind zu beachten.

Herewith we confirm that the listed instrument is in compliance with the council directives of the European Community for CE marking. The safety and installation requirements of the product documentation must be observed.

Hersteller: Manufacturer:	Negele Messtechnik GmbH Raiffeisenweg 7 D-87743 Egg a. d. Günz Germany
Modelle : Types:	Kontinuierlicher Füllstandssensor <i>Continuous Level Sensor</i> NSL-F-00; NSL-F -01; NSL-F -02
Richtlinien: Directives:	<ul style="list-style-type: none"> • 2014/30/EU Elektromagnetische Verträglichkeit <i>2014/30/EU Electromagnetic Compatibility</i>, • 1935/2004/EU Bedarfsgegenständeverordnung (BedGgstV) <i>1935/2004/EU Consumer Goods Ordinance</i> • Verordnung (EU) 10/2011 (lebensmittelberührende Gegenstände) <i>Commission Regulation (EU) No 10/2011 (articles in contact with food)</i>
Normengrundlagen: Technical Standards:	<ul style="list-style-type: none"> • EN 61000-6-2:2005 (Störfestigkeit/<i>Immunity</i>) • EN 61000-6-4:2007, + A1:2011 (Störaussendung/<i>Emission</i>)

Egg a. d. Günz, 2015-02-13

.....
Bernhard Gierl (Geschäftsführer, *Managing Director*)

.....
i.A. Dr. Alex Kotschev (Leiter Forschung & Entwicklung, *Director R&D*)



HYGIENIC BY DESIGN

ANDERSON-NEGELE