

Your Global Automation Partner

TURCK

NCLS... Limit Level Sensor

Instructions for Use



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1 About These Instructions

These instructions for use describe the structure, functions and the use of the product and will help you to operate the product as intended. Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device. Retain the instructions for future use during the service life of the product. If the product is passed on, pass on these instructions as well.

1.1 Target groups

These instructions are aimed at qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Explanation of symbols used

The following symbols are used in these instructions:



DANGER

DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.



WARNING

WARNING indicates a dangerous situation with medium risk of death or severe injury if not avoided.



CAUTION

CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.



NOTICE

NOTICE indicates a situation which may lead to property damage if not avoided.



NOTE

NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.



CALL TO ACTION

This symbol denotes actions that the user must carry out.



RESULTS OF ACTION

This symbol denotes relevant results of actions.

1.3 Other documents

Besides this document, the following material can be found on the Internet at www.turck.com:

- Data sheet
- Declarations of conformity (current versions)
- Commissioning manual IO-Link devices
- IO-Link parameters manual
- Approvals

1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to techdoc@turck.com.

2 Notes on the product

2.1 Product identification

These instructions apply to the following limit level sensors:

- NCLS-30-UP6X-H1141
- NCLS-30-UN6X-H1141

2.2 Scope of delivery

The scope of delivery includes:

- Capacitive Limit Level Sensor
- Quick Start Guide

2.3 Turck service

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database under www.turck.com contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats.

The contact details of Turck subsidiaries worldwide can be found on p. [▶ 22].

3 For your safety

The product is designed according to state-of-the-art technology. However, residual risks still exist. Observe the following warnings and safety notices to prevent damage to persons and property. Turck accepts no liability for damage caused by failure to observe these warning and safety notices.

3.1 Intended use

The capacitive limit level sensors from the NCLS product series monitor the filling level of different types of media (liquid, viscous, granular, powder form) in containers and pipes by creating contact with the media. The hygienic process connection, the PEEK sensor tip, the stainless steel housing and the M12 connector allow the limit level sensor to be used in various applications, including applications in the food and pharmaceutical industries. The device can be exposed to process temperatures of between 0... 100 °C (130 °C < 1 h) and a process pressure of up to 1 bar.

The devices may only be used as described in these instructions. Any other use is not in accordance with the intended use. Turck accepts no liability for any resulting damage.

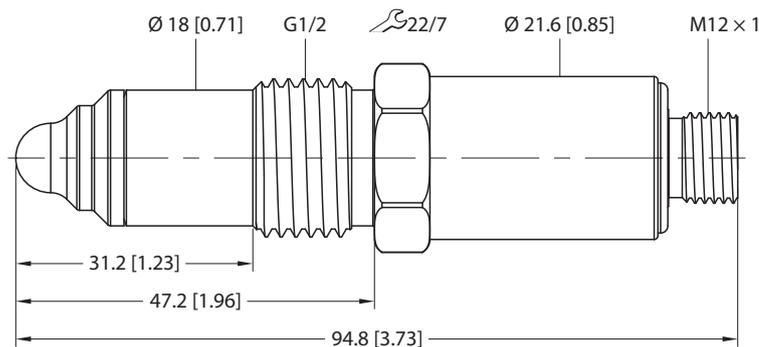
3.2 General safety instructions

- The device meets the EMC requirements for industrial areas. When used in residential areas, take measures to avoid radio interference.
- The device may only be assembled, installed, operated, parameterized and maintained by professionally-trained personnel.
- The device may only be used in accordance with applicable national and international regulations, standards and laws.
- The devices may only be used in metal containers. When used in non-metallic containers, measures must be taken to meet the requirements of the EMC Directive 2014/30/EU.
- The maximum permissible values for process pressure and process temperature must not be exceeded.

4 Product description

The capacitive limit level sensors of the NCLS series are contained in a stainless steel housing with a PEEK sensor tip. The devices are provided with a metal M12 male connector for connecting the sensor cable. An IO-Link interface is provided for setting and operating the devices. The devices are provided with two outputs that can be set independently of each other. Output 1 can be used as a switching output or in IO-Link mode as required.

4.1 Device overview



mm [Inch]

Fig. 1: Dimensions

4.2 Properties and features

- Media-contacting detection of limit levels in tanks and pipes
- Detection of different substances (liquid, viscous, granular, powder form)
- Hygienic PEEK sensor tip, CIP/SIP-compatible
- Certified by EHEDG
- Highly visible ring LED
- 12...32 VDC, < 1 W power consumption
- Two digital outputs, separately adjustable as NO contact or NC contact
- PNP, NPN or push-pull, switchable
- IO-Link for parameterization and process values
- Process connection G1/2" male thread, hygienic (in combination with Turck adapters)
- 4-pin connector device, M12 x 1

4.3 Operating principle

Capacitive sensors measure wear-free metallic (electrically conductive) and non-metallic (electrically non-conductive) objects. When in direct contact with the media, the NCLS limit level sensors are able to detect and differentiate different substances in liquid, viscous, granular or powder form. Typical application areas are the detection of limit levels (max./min.) and changes in media in tanks and pipes.

4.4 Functions and operating modes

The NCLS limit level sensor operates on the basis of the capacitive measurement principle. When immersed, the active surface of the switch detects whether the medium is present or not. The device is also able to differentiate between different media. The limit level sensor is equipped with two parametrizable switching outputs. One of the switching outputs can be used as an IO-Link interface, thus enabling direct access to the process values and parameters of the device during normal operation. The device can only be parameterized via IO-Link.

4.5 Technical accessories

4.5.1 Mounting accessories

Dimension drawing	Type	ID	Description
	NCLS-WA0	100004429	Process adapter, cylindrical welding sleeve without control bore for capacitive NCLS limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C
	NCLS-WA1	100004430	Process adapter, cylindrical welding sleeve with control bore for capacitive NCLS limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C
	NCLS-WA2	100004431	Process adapter, cylindrical welding sleeve without control bore for capacitive NCLS limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C
	NCLS-WA4	100004432	Process adapter, ball sleeve without control bore for NCLS capacitive limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C
	NCLS-WA7	100004433	Process adapter, welding sleeve with collar for capacitive NCLS limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C
	NCLS-VA	100004434	Process adapter, Varivent DN50 for NCLS capacitive limit level sensors, suitable for hygienic applications, material 316L, max. temperature 140 °C

5 Installing



NOTICE

Mounting without or with the wrong process adapter

Material damage caused by leaking connection

- ▶ Always mount the sensor with the process adapter.
- ▶ Only use a Turck process adapter for the process connection.

A Turck process adapter must be used for the process connection. The process adapter is available as a clamp adapter, welding adapter or screw-in adapter.

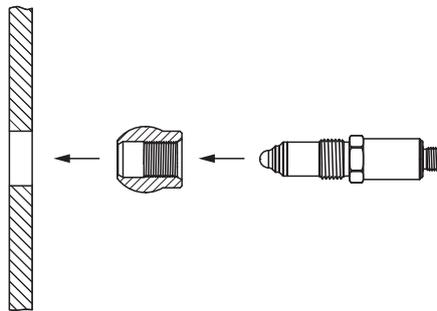


Fig. 2: Process connection with Turck process adapter

5.1 General mounting instructions

- In principle, the sensor can be installed in any position and in any location.
- Avoid mounting positions in which highly adhesive or viscous media may create deposits.
- Avoid mounting positions in which air pockets may be created.
- Ensure that the minimum distance of at least 15 mm is maintained between the sensor tip and any adjacent objects (e.g. the wall of a container or pipe).
- The relative permittivity (ϵ_r) of the medium must be >1.5 .

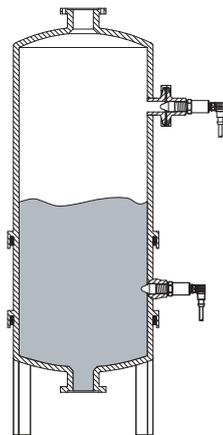


Fig. 3: Mounting location and position (schematic)

5.2 Mounting the sensor with the process adapter

The sensor is equipped with a G1/2" thread and is self-sealing when used in combination with the process adapter. An additional seal is not necessary.

- ▶ Before assembly, ensure that the system has been depressurized and that there is no media in the pipe or container.
- ▶ Mount the process adapter on the tank/pipe, ensuring that it is fully sealed.
- ▶ Screw the sensor into the Turck process adapter.
- ▶ Use a wrench to tighten the sensor (tightening torque: 20 Nm).

5.3 Mounting the sensor in hygienic applications according to EHEDG

The sensor is certified for use in hygienic applications in accordance with EHEDG.

- ▶ Integrate the sensor in the plate in accordance with EHEDG requirements.
- ▶ Only use an EHEDG-compliant process adapter for mounting.
- ▶ Install the sensor so that there is no dead space. Observe the following dimensions to avoid dead space: $L < (D-d)$

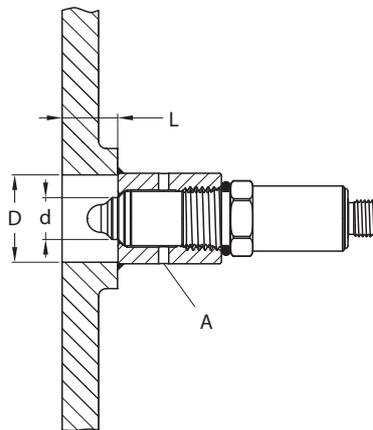


Fig. 4: Avoiding dead space and installing a leakage hole (A)

- ▶ Install a self-draining sensor.
- ▶ Choose an installation in the tank so that the sensor is fully accessible from the cleaning ports.
- ▶ Install the leakage hole (A) so that it is clearly visible. When using vertical cables, the leakage hole must face downward.

5.3.1 Installing the welding adapter

- ▶ Proceed as follows to attach the welding sleeve:

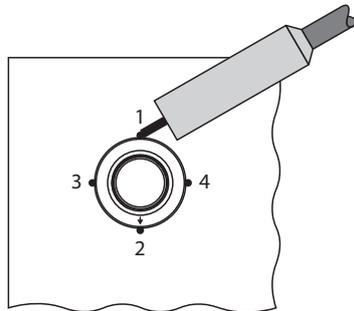


Fig. 5: Attach the welding sleeve

- ▶ If necessary, screw in an auxiliary tool to prevent damage from heat on the welding sleeve.
- ▶ Carry out the welding as shown in the following figure. Allow for a reasonable time between the welding seams in order to avoid heat damage.

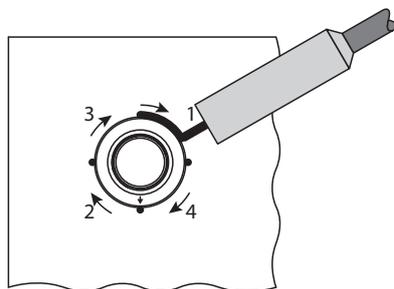


Fig. 6: Carrying out the welding

Welding according to EHEDG

The welding shall be done according to EHEDG Doc 9 with polishing to $R_a < 0,8 \mu\text{m}$ as post-treatment.

6 Connection

- ▶ Use a suitable connection cable (see "Technical accessories").
- ▶ Connect the device as shown in the wiring diagram.

6.1 Wiring diagrams

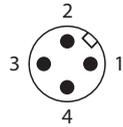


Fig. 7: Pin assignment

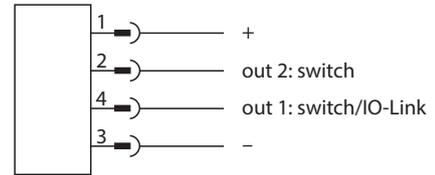


Fig. 8: Wiring diagram

7 Commissioning

After connecting and switching on the power supply, the device is automatically ready for operation.

8 Operation

8.1 LEDs

LED	Meaning
Green	Switching state of output 1, indication function adjustable: <ul style="list-style-type: none">■ Lit if output 1 (OUT1) is active■ Lit if output 1 (OUT1) is inactive <p>The LED ignores the set delay in both cases and switches immediately. The switching state of output 2 (OUT2) cannot be indicated via an LED.</p>
Green flashing	Process value within the set hysteresis

9 Setting

The device can only be parameterized via IO-Link. The following settings are possible for each output:

- Output type: PNP, NPN, push-pull
- Output function: NO contact (NO), NC contact (NC), pulse width modulation (PWM)
- Switching hysteresis (at least 2 %)
- Time delay for the switching signal

Parameter setting via IO-Link is explained in the IO-Link commissioning manual.

10 Troubleshooting

If the device does not function as expected, first check whether ambient interference is present. If there is no ambient interference present, check the connections of the device for faults.

If there are no faults, there is a device malfunction. In this case, decommission the device and replace it with a new device of the same type.

11 Maintenance

The device is maintenance-free. Clean with a damp cloth if required.

12 Repair

The device must not be repaired by the user. The device must be decommissioned if it is faulty. Observe our return acceptance conditions when returning the device to Turck.

12.1 Returning devices

Returns to Turck can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration can be downloaded from <https://www.turck.de/en/retoure-service-6079.php> and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

13 Disposal



The devices must be disposed of correctly and must not be included in general household garbage.

14 Technical data

	NCLS-30-UP6X-H1141	NCLS-30-UN6X-H1141
ID	100004248	100004249
Mounting position	Any	
Notes for mounting	Only use the NCLS limit level sensors with original Turck process adapters.	
Required permittivity (ϵ_r)	1.5	
Pressure resistance	10 bar	
Vacuum resistance	-1 bar	
Temperature drift	Typ. 20 %	
Ambient temperature	-10...+70 °C	
Temperature of medium	0...+100 °C	
Comment on Temperature of medium	0...+130 °C for <1 h at an ambient temperature of 40 °C	
Storage temperature	-20...+70 °C	
CIP/SIP-compatible	Yes	
Electrical data		
Operating voltage	12...32 VDC	
Power consumption	3 W	
Switch-on time	< 0.3 s	
Response time	< 0.2 s	
Switching frequency	≤ 5 Hz	
Insulation test voltage	≤ 0.5 kV	
Communication protocol	IO-Link	
SIO mode compatible	Yes	
Number of digital outputs	2	
Output function	4-wire, NO contact/NC contact, PNP	4-wire, NO contact/NC contact, NPN
Short-circuit protection	Yes	
Wire breakage / reverse polarity protection	Yes/yes	
Protection class	III	
Approvals	CE EHEDG	
IO-Link		
IO-Link specification	V1.1	
Parameterization	FDT/DTM	
Physical transmission layer	Complies with 3-wire technology (PHY2)	
Transmission rate	COM 2/38.4 kbps	
Process data width	16-bit	
Measured value information	14 bit	
Switching point information	2 bit	
Frame type	2.2	
Contained in SIDI GSDML	Yes	

	NCLS-30-UP6X-H1141	NCLS-30-UN6X-H1141
Mechanical data		
Design	Threaded barrel, G ½"	
Dimensions	94.8 × 22 × 22 mm	
Housing material	Stainless steel 1.4404 (AISI 316L)	
Material (in direct contact with media)	Plastic, PEEK	
Max. tightening torque of housing nuts	20 Nm	
Process connection	G ½" male thread, hygienic	
Electrical connection	Male connector, M12 × 1	
Vibration resistance	2 Hz (1 mm)	
Shock resistance	7 g (11 ms)	
Type of protection	IP67/IP69K	
MTTF	1080 years acc. to SN 29500 (Ed. 99) 40 °C	
Operating voltage indication	Ring LED, green	
Switching state indication	Ring LED, green (inverse of operating voltage indication)	

15 Turck subsidiaries — contact information

Germany	Hans Turck GmbH & Co. KG Witzlebenstraße 7, 45472 Mülheim an der Ruhr www.turck.de
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