

Instruction Manual

Radar Sensor for continuous Level Measurement NivuLink Radar



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Translation

If the device is sold to a country in the European Economic Area this instruction manual must be translated into the language of the country in which the device is to be used.

Should the translated text be unclear, the original instruction manual (German) must be consulted or a member company of the NIVUS-Group must be contacted for clarification.

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Names

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Revision History

Rev.	Modifications	Editor	Date
00	New creation on the basis of the German-language instruction manual	MoG	13.03.2024

Table of Contents

<u>Copyrights and Property Rights</u>	3
<u>Revision History</u>	4
<u>Table of Contents</u>	5
<u>General</u>	8
1 About this Manual.....	8
1.1 Applicable Documentation	8
1.2 Signs and Definitions used	8
2 Connections and Control Elements.....	9
2.1 Power Supply	9
2.1.1 Radar Sensor	9
2.1.2 Batteries	9
2.2 NivuLink Radar Control Elements.....	10
2.3 Interfaces/Status Display	10
<u>Safety Instructions</u>	11
3 Used Symbols and Signal Words.....	11
3.1 Information on the Valuation of Accident Levels.....	11
3.2 Warning Notices on the Device (optional).....	12
3.2.1 General	12
3.2.2 Special/type-related (Ex-relevant, battery, cleaning)	12
4 Special safety and Precautionary Measures.....	12
5 Warranty.....	13
6 Disclaimer.....	13
7 Intended Use	14
8 Duties of the Operator	14
9 Requirements for the Personnel	15
<u>Delivery, Storage and Transport</u>	16
10 Scope of Delivery	16
11 Inspection upon Receipt.....	16
12 Storage	16
13 Transport.....	16
14 Return.....	17
<u>Product Specification</u>	18
15 Product Construction and Overview.....	18
15.1 Battery-Operated Radar Sensor	18
15.2 Enclosure dimensions	19
16 Device ID.....	20
16.1 Nameplates NivuLink Radar	20
17 Specifications	20
17.1 NivuLink Radar.....	20
18 Equipment/Device Versions	22

18.1	Product Structure	22
Functional Description		23
19	Functional Principle of Data Acquisition/Transmission	23
20	Functional principle of level detection via PCR.....	24
Installation and Connection		25
21	General Installation Regulations	25
22	Selecting Measurement Places.....	26
22.1	General Conditions	26
22.2	Selecting the appropriate Sensor Type.....	26
22.3	Mounting Position to the Surface	27
23	Opening / closing the enclosure / battery compartment cover of the radar sensor	27
24	Mounting and Fastening of the Radar Sensor	28
24.1	Mounting Variants	29
24.2	Installing the Radar Sensor.....	30
25	Insert / change SIM card	33
25.1	Requirements for inserted SIM cards	33
25.2	Insert / change SIM card in the radar sensor.....	33
26	Antenna Installation.....	34
Commissioning		36
27	Notes to the User	36
28	Functionality of the (Status) LED on the NivuLink Radar.....	37
28.1	Status display/lighting system of the radar sensor	37
28.2	Functions with use of the ring magnet	38
Setting Parameters in NIVUS WebPortal		40
29	General Information on Parameterisation	40
30	Display in the NIVUS WebPortal.....	40
31	Parameterisation of the NivuLink Radar Sensor.....	41
32	Adding/removing process variables or changing the name of the measurement place.....	44
33	Performing a firmware update.....	45
Maintenance and Cleaning		48
34	Maintenance.....	48
34.1	Maintenance Interval.....	48
34.2	Maintenance Tasks.....	49
34.2.1	Clean, check and replace Seals	49
34.2.2	Replacing Batteries	49
34.3	Customer Service Information	49
35	Cleaning	50
35.1	Radar Sensor	50
36	Dismantling/Disposal.....	50
37	Installation of Spare Parts and Wearing Parts	50
37.1	Battery Replacement.....	51

38 Accessories	53
<u>Index</u>	54
<u>Open Source Software</u>	56
39 List of Sources of the Licences and Codes used	56
<u>Approvals and Certificates</u>	57

General

1 About this Manual



Important

READ CAREFULLY BEFORE USE.

KEEP IN A SAFE PLACE FOR LATER REFERENCE.

This instruction manual is for the NivuLink Radar radar sensor and serves its intended use. This instruction manual is oriented exclusively to qualified expert personnel.

Read this instruction manual carefully and completely prior to installation or connection since it contains relevant information on this product. Observe the notes and particularly follow the warning notes and safety instructions.

If you should have problems to understand information contained within this instruction manual either contact a member company of the NIVUS-Group or one of the distributors for further support. The member companies of the NIVUS-Group cannot be held responsible for damage to persons or material due to incorrectly understood information in this instruction.

1.1 Applicable Documentation

For the installation and operation of the complete system extra instruction manuals or technical descriptions may be required apart from this manual.

- Handbook for the NIVUS WebPortal

These manuals are provided with the auxiliary units or sensors and/or are available as download on the NIVUS homepage.

1.2 Signs and Definitions used

Representation	Meaning	Remarks
	(Action) Step	Execute action steps. Should action steps be numbered observe the specified order of the steps.
	Cross-reference	Refers to further or more detailed information.
	Refers to a documentation	Refers to an accompanying documentation.
>Text<	Parameter or menu	Indicates a parameter or a menu that is to be selected or is described.

Tab. 1 Structural elements within the manual

2 Connections and Control Elements

2.1 Power Supply

2.1.1 Radar Sensor

The NivuLink Radar is powered with batteries (Fig. 2-1 Pos. 1).

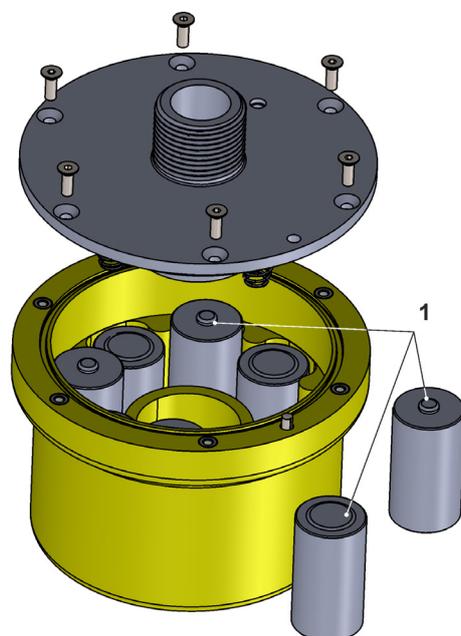


Fig. 2-1 Power supply by batteries

2.1.2 Batteries

The radar sensor is designed to operate with up to eight batteries (Fig. 2-1 Pos. 1).

The batteries can be purchased from specialised electrical retailers. However, only batteries approved by NIVUS are permitted (see Chap. "17 Specifications" and "37.1 Battery Replacement").

The battery life depends not only on the parameter settings and the battery capacity, but also on the ambient temperature, any battery batch tolerances, the reception quality at the installation site, etc.



Standard batteries are not rechargeable

*The batteries **cannot** be recharged.*



Storage tips for the batteries

By basically storing and using the batteries at non-critical temperatures (such as room temperature) and storing them dust-free, clean and dry, their capacity can be maintained for longer.

2.2 NivuLink Radar Control Elements

The NivuLink Radar is activated by holding the enclosed ring magnet *ZUBO NFM MAGNET* (Fig. 2-2) on the side of the enclosure in the area of the status LED.

Beyond that, the NivuLink Radar has no other control elements. The entire operation and parameterisation is carried out via the NIVUS WebPortal.



Observe the handbook for the NIVUS WebPortal.

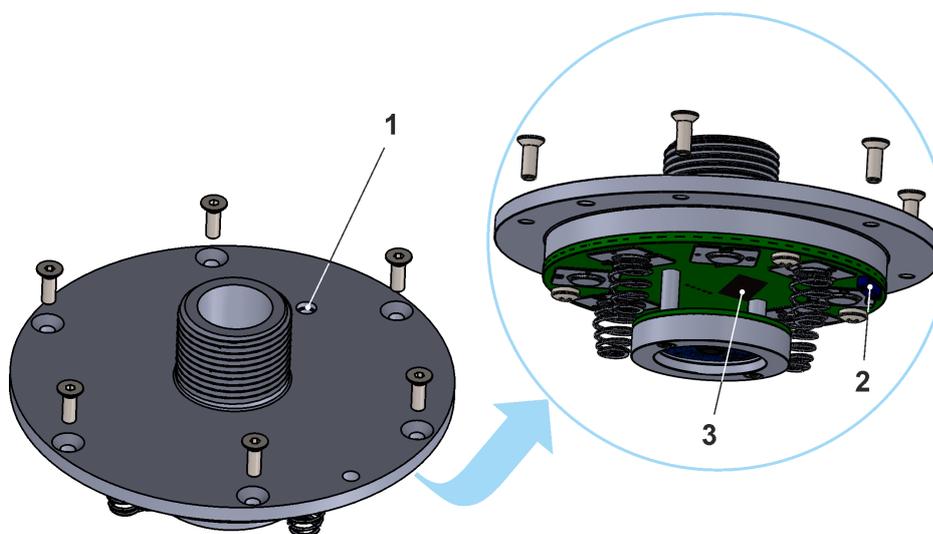
Download pdf under "Help" in the NIVUS WebPortal.



Fig. 2-2 Ring magnet

2.3 Interfaces/Status Display

The interfaces/status display of the radar sensor can be accessed from the outside or inside the radar sensor (the enclosure/battery compartment cover must be opened).



- 1 LED (status display)
- 2 Reed contact (wake-up via ring magnet, see Chap. "2.2 NivuLink Radar Control Elements")
- 3 SIM card slot; with the enclosure/battery cover open

Fig. 2-3 Available interfaces/status displays

Safety Instructions

3 Used Symbols and Signal Words

3.1 Information on the Valuation of Accident Levels



The general warning symbol indicates the risk of personal injuries or death. In the text section the general warning symbol is used in combination with the signal words described below.

DANGER

Warning in high degree of risk



Indicates a high-risk, **imminently** hazardous situation which will result in death or serious injury if not avoided.

WARNING

Warning in medium degree of risk and personal injury



Indicates a **possible** danger with medium risk which may result in a life-threatening situation or (severe) bodily injury if not avoided.

CAUTION

Warning in personal injury or property damage



Indicates a possible danger with moderate risk which may result in minor or moderate personal injury or property damage if not avoided.

WARNING

Danger by electric voltage



Indicates a medium-risk, **imminently** hazardous situation caused by electric shock which will result in death or (serious) injury if not avoided.



Important Notice

Contains information that needs to be highlighted.
Indicates a potentially harmful situation that may damage the product or something in its environment if not avoided.



Note

Contains tips or information.

3.2 Warning Notices on the Device (optional)

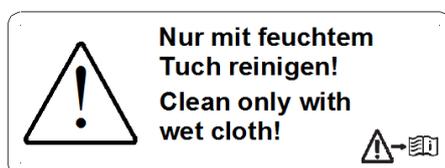
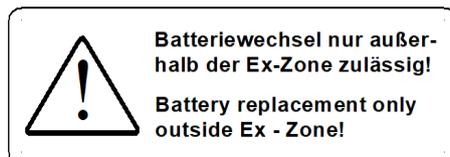
3.2.1 General



General Warning Notice

This symbol refers the operator or user to content in this manual. Consideration of the information contained herein is necessary to maintain the protection provided by the unit for installation and in operation.

3.2.2 Special/type-related (Ex-relevant, battery, cleaning)



4 Special safety and Precautionary Measures

When working with the NIVUS equipment, the following safety and precautionary measures must be observed and followed generally and at all times. These warnings and notes are not repeated for each description within the document.

WARNING



Check danger due to explosive gases

Before starting assembly, installation and maintenance work, be sure to check that all regulations on safety at work have been observed and that there is no possible risk of explosive gases. Use a gas warner for the check.

When working in the sewer system, make sure that no electrostatic charge can occur:

- *Avoid unnecessary movements to reduce the building-up of static charges.*
- *Discharge any static electricity present on your body before you start installing the sensor.*

Disregarding may result in personal injury or damage to the system.

WARNING



Open the device only out of Ex areas

Do not open, service or repair in an area where an explosive atmosphere is present.

WARNING



Germ Contamination

Due to the frequent use of the sensors in the waste water sector, parts can be contaminated with dangerous germs. Therefore, appropriate precautions must be taken when coming into contact with sensors.

Wear protective clothing.

WARNING**Observe Occupational Safety Regulations!**

Before and during mounting works, compliance with all work safety regulations must always be ensured.

Disregarding may lead to personal injury.

WARNING**Do not disable Safety Devices!**

It is strictly forbidden to disable the safety devices or to change their mode of operation.

Disregarding may result in personal injury or damage to the system.

**Commissioning only by qualified Personnel**

The entire measuring system may only be installed and commissioned by qualified personnel.

5 Warranty

The device was functionally tested prior to shipping. When used for the intended purpose (see Chap. "7 Intended Use") and in compliance with the instruction manual, the applicable (see Chap. "1.1 Applicable Documentation") and the safety information and instructions contained therein, no functional restrictions are to be expected and flawless operation should be possible.



Please also refer to the following chapter "6 Disclaimer".

**Limitation of Warranty**

In case of disregarding the safety notes and instructions in this document, the companies of the NIVUS-Group reserve the right to limit the warranty.

6 Disclaimer

The companies of the NIVUS-Group assume no liability

- for consequential damages resulting from a change in this document. The companies of the NIVUS-Group reserve the right to change the contents of the document including this disclaimer without prior notice.
- for personal injury or damage to property resulting from **failure to comply** with the applicable **regulations**. For connection, commissioning and operation of the devices/sensors, all information and higher-level legal regulations of the country (in Germany e.g. the VDE regulations), such as valid Ex regulations as well as the safety and accident prevention regulations applicable to the respective individual case shall be observed.
- for personal injury or damage to property resulting from **improper handling**. For safety and warranty reasons, all work on the equipment that goes beyond the installation and connection measures may only be carried out by NIVUS personnel or by persons or companies authorised by NIVUS.
- for personal injury or damage to property resulting from the operation of the devices/sensors in a **technically faulty** condition.
- for personal injury or damage to property resulting from **improper use**.

- for personal injury or damage to property resulting from **failure to observe** the **safety instructions** in this instruction manual.
- for missing or incorrect readings due to **improper installation or faulty parameterisation/programming** and for any consequential damage resulting therefrom.



No liability for transmission problems due to interference

If the device does not transmit correctly due to faults in the transmission path, the companies of the NIVUS-Group are not liable for data loss of any kind. The risk is the sole responsibility of the operator.

7 Intended Use



Strictly observe and comply with guidelines and requirements

The device is intended exclusively for the purpose mentioned below. Any other use beyond this, any conversion or modification of the instrument without written agreement with the companies of the NIVUS-Group is considered improper use.

The companies of the NIVUS-Group are not liable for any damage resulting from this.

The operator alone bears the risk.

The battery-operated, mains-independent NivuLink Radar radar sensor is designed for the continuous determination of fill level values and the remote transmission of these to a central server.

The NivuLink Radar is designed and produced according to the current state of the art and the recognised safety rules at the time of publication of this document. Nevertheless, risks of personal injury or damage to property cannot be completely ruled out.

The permissible maximum limit values in Chapter "17 Specifications" must be observed. All cases of use deviating from these limit values, which have not been approved by NIVUS GmbH in writing, are excluded from the liability of the NIVUS-Group.

8 Duties of the Operator



Important Notice

In the EEA (European Economic Area), the national transposition of the Framework Directive (89/391/EEC) as well as the associated individual directives and, in particular, the Directive (2009/104/EC) concerning the minimum safety and health requirements for the use of work equipment by workers at work, as amended, must be observed and complied with.

In Germany, the Ordinance on Industrial Safety and Health must be complied with.

Obtain the local operating licence and observe the associated conditions. In addition, you must comply with environmental protection requirements and local legal requirements for the following:

- Safety of personnel (accident prevention regulations)
- Safety of work equipment (protective equipment and maintenance)
- Product Disposal (Waste Management Act)
- Materials Disposal (Waste Management Act)
- Cleaning (Cleaning Agents and Disposal)

Connection/Activation

As the operator, before activating the device, make sure that the local regulations have been observed during installation and commissioning.

Keep the Instruction Manual for future Reference

Keep the instruction manual in a safe place and ensure that it is always available and can be consulted by the user of the product.

Hand over the Instruction Manual

When selling the radar sensor, this instruction manual must be handed over with it. The manual is part of the standard delivery.

9 Requirements for the Personnel

Installation, commissioning and maintenance may only be carried out by personnel who fulfil the following conditions:

- Qualified personnel with appropriate training
- Authorisation by plant operator



Qualified Personnel

in the sense of these instructions or the warnings on the product itself are persons who are familiar with the installation, assembly, commissioning and operation of the product and who have the qualifications appropriate to their job, such as

- I. Training and instruction or authorisation to switch circuits and devices/systems on and off, to earth and to label them in accordance with the standards of safety technology.*
 - II. Training or instruction in accordance with safety technology standards in maintenance and use of appropriate safety equipment.*
 - III. First Aid Training*
-

Delivery, Storage and Transport

10 Scope of Delivery

The standard delivery of the NivuLink Radar comprises:

- Radar sensor NivuLink Radar (variant/version according to the delivery documents) with antenna (internal or external magnetic base antenna) and batteries (if ordered)
- Ring magnet *ZUB0 NFM MAGNET* (Fig. 2-2) for activation
- NIVUS special spanner SW8 (only when ordering with external magnetic base antenna)
- Instruction manual (with declaration of conformity) including all the necessary information for operating the NivuLink Radar (printed or as a link to the NIVUS download centre)

Check additional accessories according to the order against the delivery note.

11 Inspection upon Receipt

Check the delivery for completeness and apparent intactness immediately after receipt. Report any transport damage immediately to the delivering carrier. Also send a written report to NIVUS GmbH in Eppingen.

Incomplete deliveries must be addressed in writing within two weeks to your responsible representative or directly to the head office in Eppingen.



Observe the two-week deadline

Complaints received later will not be recognised.

12 Storage

Observe the minimum and maximum values for external conditions such as temperature and humidity according to Chapter "17 Specifications".

Protect the instrument from corrosive or organic solvent vapours, radioactive radiation and strong electromagnetic radiation.

Store the device in the original packaging.

- ➡ Deactivate the NivuLink Radar before storage with the ring magnet.
See also Chap. "28.2 Functions with use of the ring magnet".

13 Transport

Protect the NivuLink Radar from strong impacts, blows, shocks or vibrations by using appropriate safety measures.

Transport the device in the original packaging.

Otherwise, the same conditions apply with regard to external influences as for storage (see Chap. "12 Storage").

14 Return

In the event of a return, send the unit to NIVUS GmbH in Eppingen carriage paid and in the original packaging.

Items that have not been sufficiently franked will not be accepted!

In general, a return note (incl. RMA return number) must be requested from the NIVUS customer service before returning the goods. Without this RMA number, the incoming goods cannot be assigned accordingly.



See Chap. "34.3 Customer Service Information".

CAUTION



Returning the radar sensor with inserted/defective LiSOCl₂ batteries is not permitted

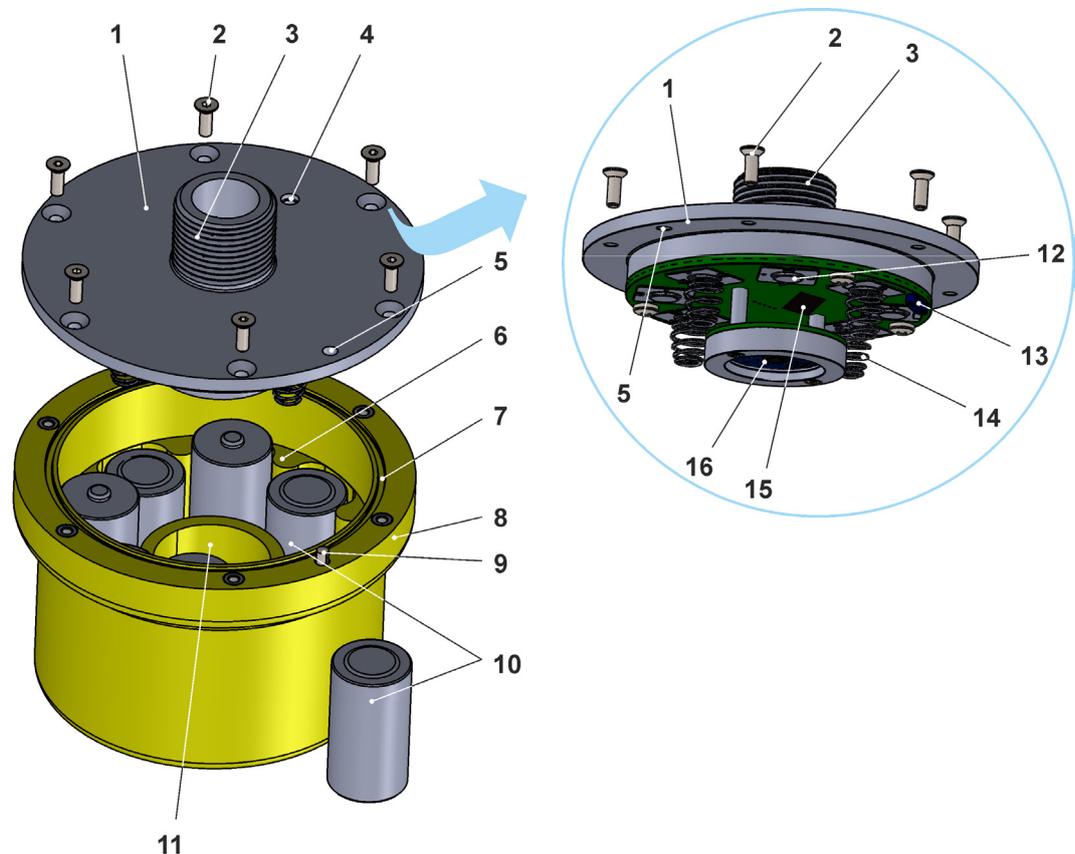
If the radar sensor is to be sent to NIVUS for inspection, then only without batteries. Remove the batteries from the device beforehand.

As a general rule, defective batteries must not be shipped individually or in a battery holder in accordance with the Dangerous Goods Regulations (DGR) 61st edition 2020 UN 3090 / 3091 Lithium Metal Batteries A154.

Product Specification

15 Product Construction and Overview

15.1 Battery-Operated Radar Sensor



- 1 Enclosure/battery compartment cover with electronics unit
- 2 Countersunk head screw M4 (6x)
- 3 Mounting thread G1"
- 4 LED (status display)
- 5 Hole for alignment
- 6 Guides (moulded) for the battery slots
- 7 (Cover) Gasket
- 8 Radar sensor enclosure
- 9 Alignment bolt
- 10 Batteries (up to 8x LiSOCl₂, 3.6 V, type C; plugged in alternately in pairs; for details see Chap. "34.2.2 Replacing Batteries")
- 11 Radar shaft
- 12 Battery contact for battery base (4x; plus 4x in the radar sensor enclosure (Pos. 8) when the installation direction is reversed)
- 13 Reed contact (for activating the radar sensor with magnet)
- 14 Battery contact with spring for battery head (4x; plus 4x in the radar sensor enclosure (Pos. 8) when the installation direction is reversed)
- 15 SIM card slot

Fig. 15-1 Device construction NivuLink Radar with batteries

15.2 Enclosure dimensions

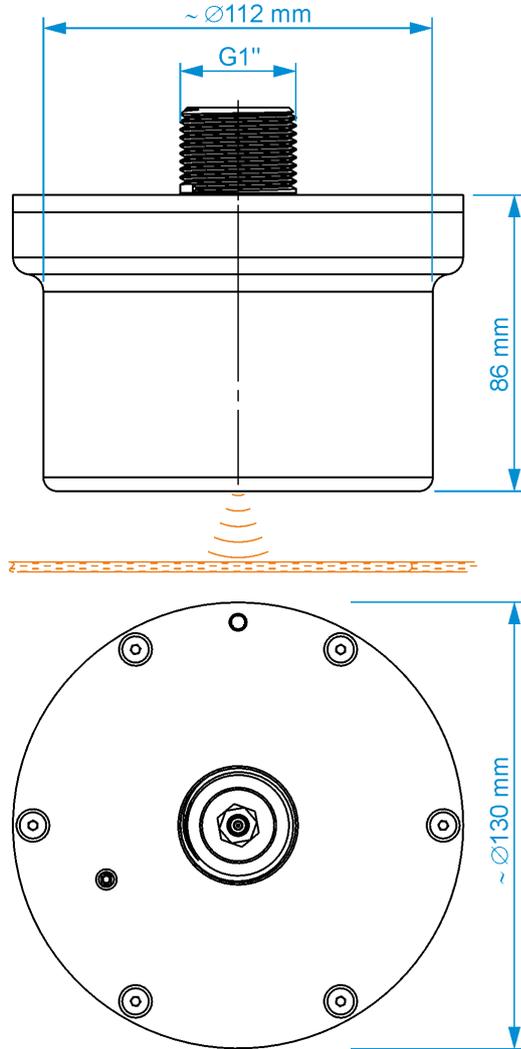


Fig. 15-2 Enclosure

16 Device ID

16.1 Nameplates NivuLink Radar

The information in this instruction manual only applies to the device indicated on the title page. The nameplates are attached to the side of the enclosure and contain the following information:

- Name and address NIVUS GmbH
- CE label
- Marking of the series and type with article number and serial number
- Year of manufacture: the first four digits of the serial number refer to the year of manufacture and the week number (2342.....)
- Ambient conditions in operation

It is important for all queries and spare parts orders that the article number and serial number of the respective device are specified correctly. This is the only way to ensure proper and fast processing.

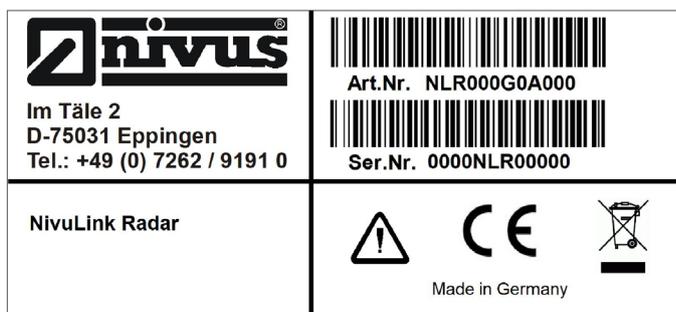


Fig. 16-1 Nameplate NivuLink Radar



Check nameplates

Check by means of the nameplates whether the supplied device corresponds with your order.



The EU Declaration(s) of Conformity can be found at the end of this instruction manual.

17 Specifications

17.1 NivuLink Radar

Measurement Principle/Frequency	Pulsed coherent radar (= PCR), 60 GHz (57...64 GHz)
Measurement range / measurement distance (perpendicular to the medium surface)	0.0...8.0 m No minimum distance/blocking distance required.
Measurement Uncertainty	±2 mm
Measurement frequency/interval	Depending on the current operating mode and parameterisation (see Chap. "31 Parameterisation of the NivuLink Radar Sensor")

Power supply	Up to 8x battery LiSOCl ₂ , 3.6 V, type C See also Chap. "37.1 Battery Replacement".
Battery life (type acc. to Chap. "37.1 Battery Replacement")	When using eight batteries: Min. 150,000 measurements/data transmissions until battery change (if fewer batteries are used -> shorter battery life). <i>Info:</i> <i>Each transmission process requires approx. 120...150 times more energy than a single measurement process.</i>
Enclosure	- Material: Polyethylene-High-Density (PE-HD), injection mould - Weight: approx. 410 g (without batteries); approx. 910 g (incl. 8 batteries) - Protection: IP68 closed - Dimensions see Chap. "15.2 Enclosure dimensions"
Operation Temperature	Non-Ex device: -20...+60 °C It is essential to observe the corresponding instructions/recommendations of the manufacturers of the batteries used.
Storage Temperature	-20...+60 °C (unit with batteries) NIVUS recommend -15...+40 °C to extend battery life. It is essential to observe the corresponding instructions/recommendations of the manufacturers of the batteries used.
Max. Humidity	90 %, non-condensing
Display of the operating status	Status LED (RGB) for indicating the operating status
Operation / Setting Parameters	- Magnet switch (Reed contact) - NIVUS WebPortal
Transmission cycle	1 minute to 24 hours Depending on the current operating mode and parameterisation (see Chap. "31 Parameterisation of the NivuLink Radar Sensor")
Data Memory	Internal; ring memory for max. 300 measurements
Data Transmission / Communication	- LTE-M / NB-IoT: Transmission interval depends on the parameterisation - LoRaWAN: Data transmission directly during measurement (in preparation)

Tab. 2 Specifications NivuLink Radar

18 Equipment/Device Versions

18.1 Product Structure

The radar sensor is manufactured in different versions. The table below provides an overview on the currently available different versions.

The version determines the article number. The article number can be found on the name-plate.

Conversely, the exact equipment/device version can be specified on the basis of the article number.

NLR-00	NivuLink Radar Sensor			
	Remote Data Transmission / Modem			
	G	With internal modem; modem card Global (LTE-M / NB-IoT) ^{*1}		
	L	With integrated LoRa modem (in preparation)		
	Number of Batteries			
	0	Without Batteries		
	6	6 Pcs.		
	8	8 Pcs.		
	Antenna Version			
	I	Antenna within sensor		
A	Magnetic base antenna, external (out of the sensor)			
ATEX Approval				
0	None			
E	Ex Zone 1 (in preparation)			
Options				
00	None			
NLR-00				00

^{*1} Areas of use: Global

Tab. 3 Product Structure



Accessories see Chapter "38 Accessories".

Functional Description

19 Functional Principle of Data Acquisition/Transmission

The NivuLink Radar is a compact radar sensor for determining and transmitting fill level data. The measurement data is transmitted wirelessly (LTE-M / NB-IoT or LoRaWAN) to the NIVUS WebPortal at a selectable interval.

This server can be accessed directly with a client on which a web browser is installed.

The integration of higher-level control systems, supplementary data sources such as geoinformation or analysis systems as well as operating software for billing purposes are realised via NIVUS DataKiosk.

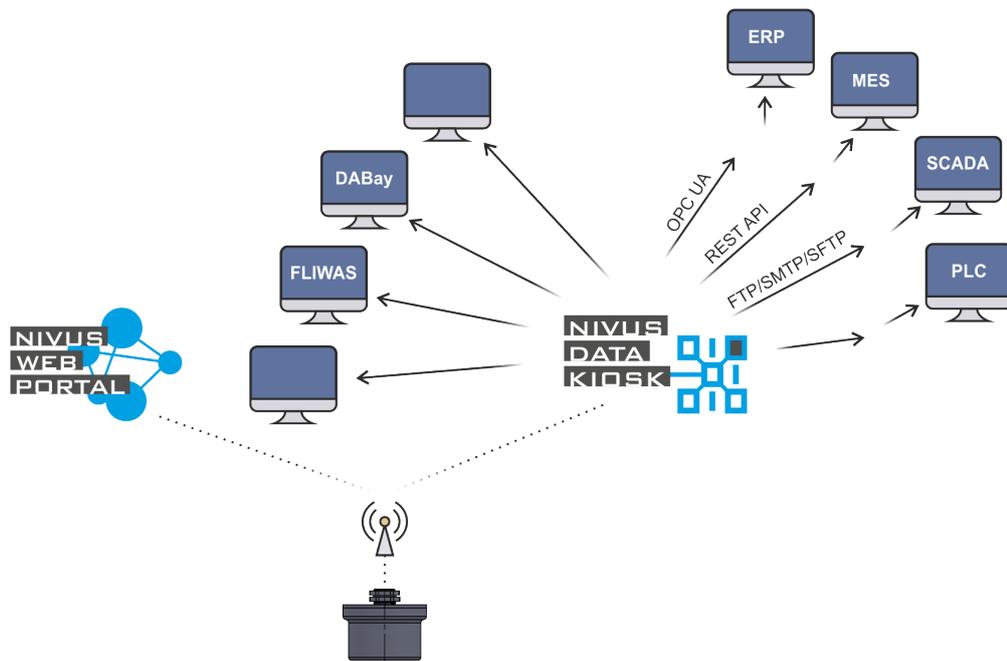


Fig. 19-1 Functional principle of the NivuLink Radar

20 Functional principle of level detection via PCR

The measurement method for determining the fill level is based on pulsed coherent radar (PCR) technology.

The radar sensor is mounted and aligned **perpendicular** (90°) to the medium surface.

The radar sensor emits an electromagnetic signal. This signal hits the surface of the medium and is reflected by it and detected by the sensor.

The distance to the medium surface is determined from the signal transit time between the transmitted and received signal and the level is calculated from this.

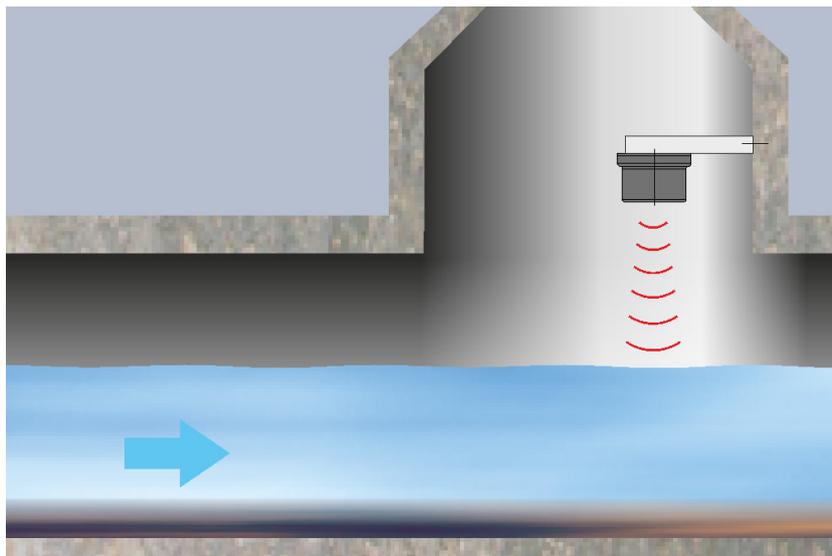


Fig. 20-1 Measurement via PCR (perpendicular, 90°)

Installation and Connection

21 General Installation Regulations



Expert knowledge required

To avoid damage to the radar sensor, the work described in this section of the instructions must only be carried out by competent personnel.

The executing company must have extensive expertise and sufficient experience in the installation and commissioning of ultrasonic measurement systems in part filled applications.

Otherwise, contact the NIVUS commissioning service or an authorised specialist company.

WARNING



Check danger due to explosive gases

Before starting assembly, installation and maintenance work, be sure to check that all regulations on safety at work have been observed and that there is no possible risk of explosive gases. Use a gas warner for the check.

When working in the sewer system, make sure that no electrostatic charge can occur:

- Avoid unnecessary movements to reduce the building-up of static charges.
- Discharge any static electricity present on your body before you start installing the sensor.

Disregarding may result in personal injury or damage to the system.

WARNING



Security Measures

Before beginning mounting works, compliance with all work safety regulations must always be checked. Likewise, any possible danger from explosive gases must be prevented at all costs. If necessary, take the necessary measures to avert danger.

Disregarding may cause personal injury.



Obtain Approvals

Prior to installing sensors on bridge piers, embankments, groynes, etc., permission must be obtained from the competent authority(ies) for the operation of the installations in public waters.

Before starting the installation work, it is essential to read the preceding General Installation Instructions and the instructions for fastening sensors.

Disregarding may result in interference with the measurements.

NIVUS GmbH expressly point out that all permits and work regulations must be obtained or observed.

The radar sensors used must be fixed permanently and reliably.

Use only non-corrosive fastening material. The optionally supplied fastening material is designed for normal flow conditions at the measurement place.

Observe the following conditions when mounting the sensors (e.g. use the brackets available from NIVUS GmbH):

- Make sensor mounting easily removable for maintenance or cleaning purposes so that no special equipment is required.
- If possible, design the installation in such a way that no new alignment is necessary after maintenance.

22 Selecting Measurement Places

22.1 General Conditions

When selecting the measurement section, observe the following conditions:

- There should be no herbaceous plumes, stones, piles, bed jumps, thresholds, etc. within the sensor's detection range. These can lead to incorrect measurements.
- The surface of the measurement place should not be influenced, even temporarily, by avoidable environmental influences such as changes in surface velocity caused by gusts of wind, foaming caused by sewage, shipping, driftwood, etc.
- Mount the sensor system protected from heat and direct sunlight.
- Avoid necessarily when selecting the mounting place:
 - Corrosive chemicals and gases
 - Radioactive radiation
 - Electro-magnetic radiation

For **assistance** in selecting or assessing the planned measurement place, contact your NIVUS representative or the product management department at NIVUS GmbH in Eppingen (see Chap. "34.3 Customer Service Information").

The following documents must be provided for the assessment of the measurement place:

- Sketches or drawings
- Photos/videos (smartphone quality is sufficient) of the planned measurement place

22.2 Selecting the appropriate Sensor Type

The NivuLink Radar sensor is available with two different antennas. Once the installation location has been determined, it is necessary to check which of the two antennas is best suited.

It must be ensured that the sensor can also transmit. If the transmission power of the internal antenna is not sufficient due to the external conditions of the installation site, the external magnetic base antenna must be used and installed in such a way that the antenna has a "clear view" and the transmission power is permanently sufficient.

 See Chap. "38 Accessories".

22.3 Mounting Position to the Surface

Mounting Instructions

- Ensure proper installation. Improper handling may result in injury and/or damage to the sensors.
- Follow applicable legal or company guidelines.

Mounting Details

- **Angle:**
it is mandatory that the radar sensors are mounted at an angle of 90° to the medium surface. Compliance with this angle is ensured when using the original NIVUS mounting accessories (see Chap. "24 Mounting and Fastening of the Radar Sensor"). If other brackets/mounting options are used, it is essential to **ensure** that this angle is set **unchangeably**.
- **Measurement distance:**
The maximum measurement distance from the bottom edge of the radar sensor to the water surface is 8 metres. The radar sensor cannot (reliably) detect greater distances.

23 Opening / closing the enclosure / battery compartment cover of the radar sensor

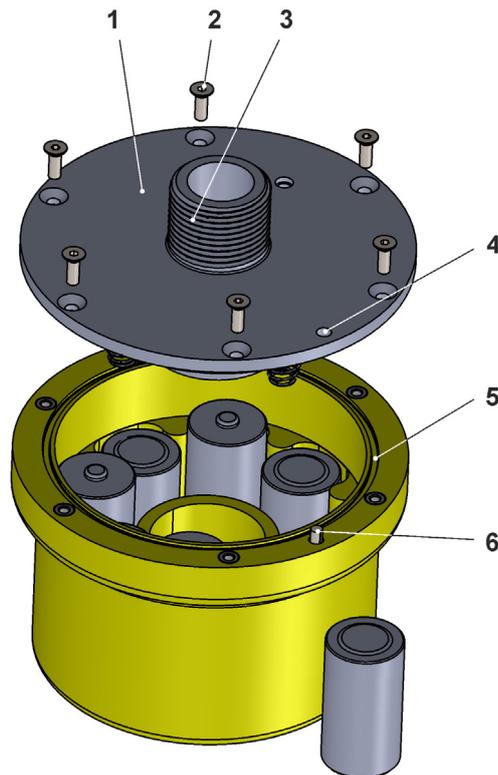


Fig. 23-1 Open / close enclosure

Requirements for opening/closing the radar sensor enclosure:

- The sensor is not fixed anywhere, so it can be placed completely on a work surface (see also Chap. "24 Mounting and Fastening of the Radar Sensor").
Info:
Any scratches on the underside of the sensor caused by very rough surfaces do not impair the function of the sensor.
- The following work takes place in the non-Ex area.
- The countersunk screws Torx TX20 (6x) (Fig. 23-1 Pos. 2) are freely accessible.

➡ Procedure to **open** the enclosure:

CAUTION



Equipment damage due to water

If you open the enclosure/battery compartment cover in the rain or in a location with potential water ingress from above, **be sure to protect the NivuLink Radar in a suitable manner against the ingress of moisture.**

1. Make sure that the requirements mentioned above are met.
2. Unscrew the countersunk Torx TX20 (6x) screws (Fig. 23-1 Pos. 2) **crosswise step by step** (high counter-pressure from the inside due to the batteries/springs, therefore **hold** with your hand **before** removing the last two countersunk screws!) on the housing/battery compartment cover (Fig. 23-1 Pos. 1).

CAUTION



Protect the radar sensor chip (Fig. 15-1 Pos. 16) from damage and soiling when the enclosure/battery compartment cover is open

Do not place the enclosure/battery compartment cover on stones, uneven surfaces or similar during the following work step.

3. Remove the enclosure/battery compartment cover and set aside.

➡ Procedure to **close** the enclosure:

1. Check the enclosure gaskets (Fig. 23-1 Pos. 5) and clean if necessary. Before closing the enclosure/battery compartment cover, always make absolutely sure that the gasket is clean and undamaged. Therefore:
 - Remove foreign bodies and dirt.
 - Replace defective gasket.
 - Treat the gasket with silicone grease if necessary.



Gaskets

Damage to equipment caused by defective gaskets shall be excluded from the liability of the companies of NIVUS GmbH.

➡ See also Chap. "34.2 Maintenance Tasks" and "34.3 Customer Service Information".

2. Fit the enclosure/battery compartment cover (Fig. 23-1 Pos. 1) (note the alignment bolt (Fig. 23-1 Pos. 6) and corresponding hole (Fig. 23-1 Pos. 4)) and screw it on **crosswise step by step** using the countersunk Torx TX20 (6x) screws (Fig. 23-1 Pos. 2) (high counter-pressure from the inside due to the batteries/springs).

24 Mounting and Fastening of the Radar Sensor

The following mounting variants are possible for fastening the NivuLink Radar:

- **Variante 0:** For NivuLink Radar sensors with **internal antenna**. Mounting on vertical walls (90° to the medium surface) with wall mounting angle (300/600/1000 mm or 600 mm hinged) (Fig. 24-1).
- **Variante 1:** For NivuLink Radar sensors with **external magnetic base antenna**. Mounting on vertical walls (90° to the medium surface) with wall mounting angle (300/600/1000 mm or 600 mm hinged) and fastening angle (Fig. 24-2).
- **Variante 2:** For **all** NivuLink Radar sensors. Mounting on vertical walls (90° to the medium surface) or ceilings (parallel to the medium surface) with fastening angle (Fig. 24-3).

- **Variante 3:** For all NivuLink Radar sensors. Attachment to inclined surfaces with adjustable ball mount (with integrated spirit level) (Fig. 24-4). If necessary, also in conjunction with the manhole holder.
- **Variante 4:** For all NivuLink Radar sensors. Fastening on ceilings, holders etc. (G1" thread). Without NIVUS mounting material.
Basic condition: the NivuLink Radar sensor is mounted perpendicular / 90° to the medium surface (not shown).

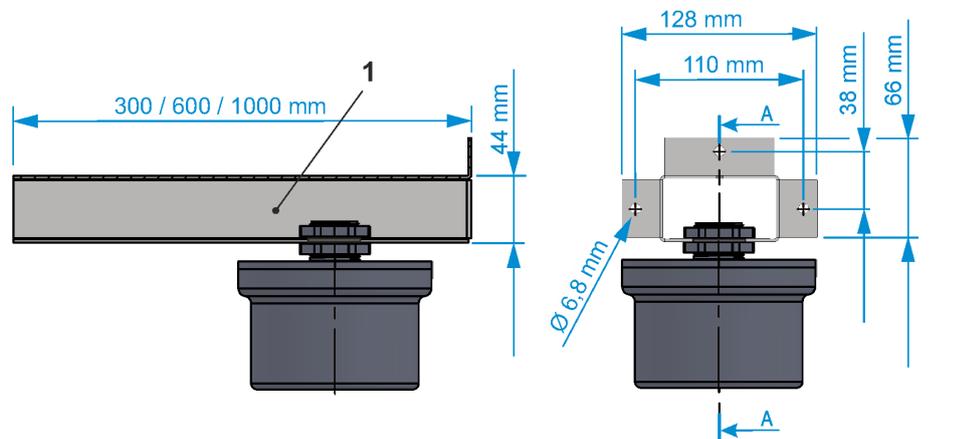
➡ See also Chap. "24.1 Mounting Variants" and "38 Accessories".

24.1 Mounting Variants



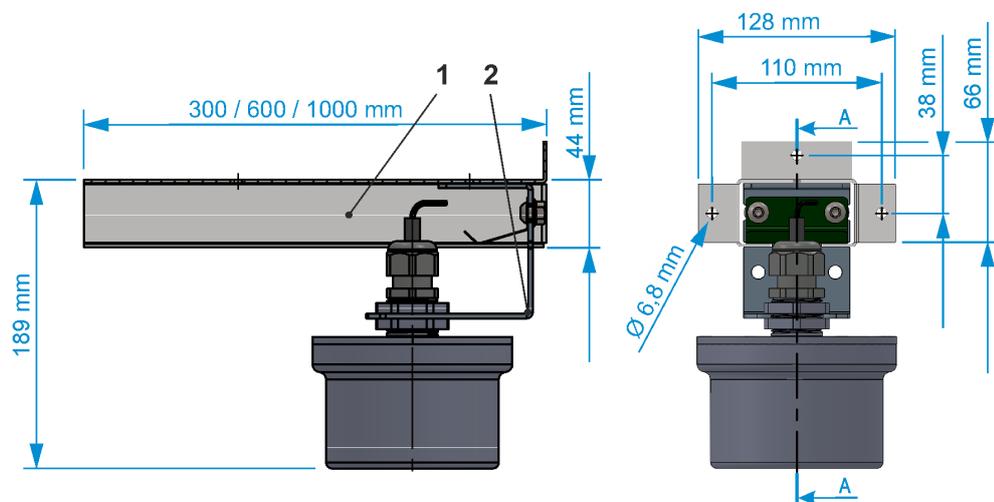
Note

Tools and screws for fixing to the wall/ceiling etc. are **not** included in the delivery.



1 Wall Mounting Angle

Fig. 24-1 Variant 0: On vertical wall with wall mounting angle (internal antenna)



1 Wall Mounting Angle

2 Fastening Angle

Fig. 24-2 Variant 1: On vertical wall with wall mounting and fastening angle

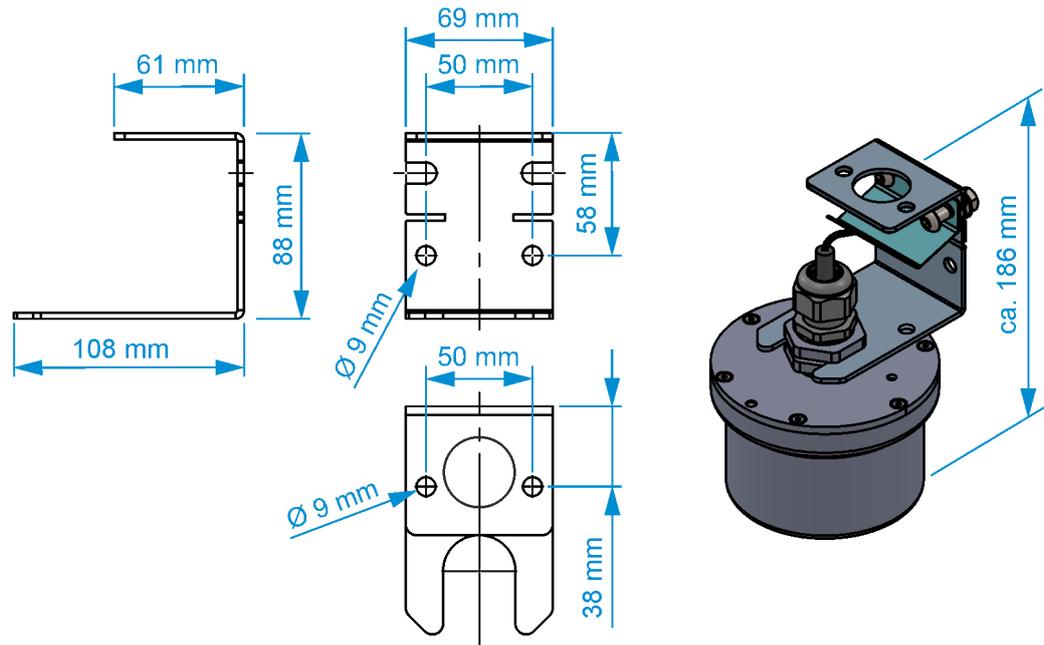
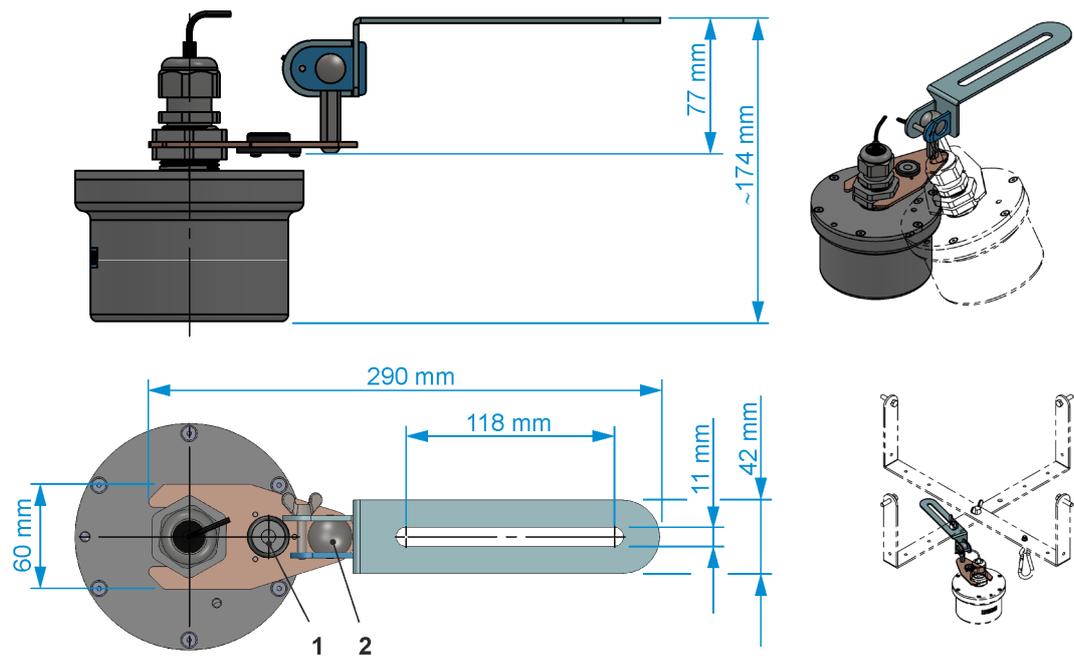


Fig. 24-3 Variant 2: On vertical wall / on ceiling with fastening angle



- 1 Integrated spirit level for alignment
- 2 Ball joint (with wing screw) for rotating the sensor as required

Fig. 24-4 Variant 3: Ball holder (swivelling) for alignment

24.2 Installing the Radar Sensor



Ensure that the LED status display is always visible when the radar sensor is installed

The current status of the radar sensor can be recognised by the flashing code on the status display.

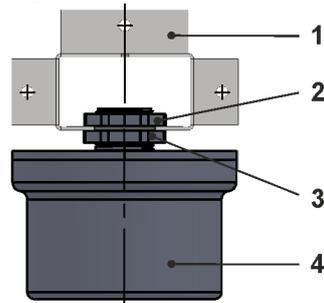


When using the external magnetic base antenna, allow sufficient space for its installation

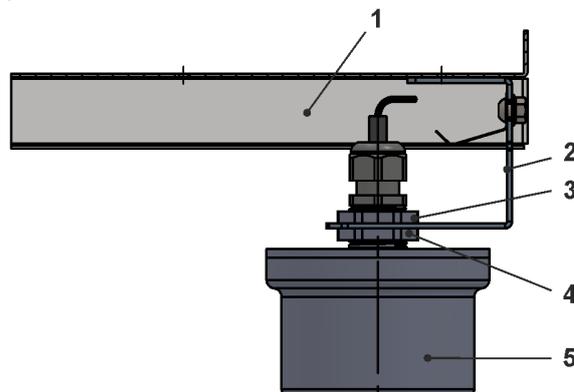
Before final fixing, be sure to allow sufficient space/clearance for the mounting of the antenna.

➤ Procedure:

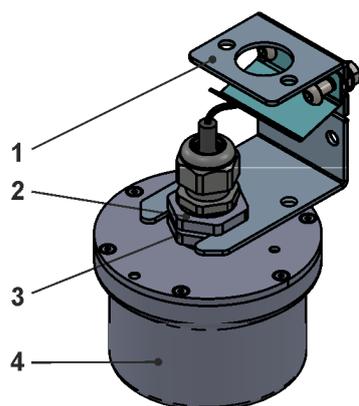
1. Provide installation material and required tools depending on the selected fastening variant (see Chap "24.1 Mounting Variants"). Calculate space requirements accordingly:
Ensure accessibility of the integrated spirit level for mounting variant 4.
2. Transfer the respective drilling pattern to the wall/ceiling and drill the holes. Insert dowels if necessary.
3. Depending on the fastening variant proceed with working step 4, 5, 6 or 7.
4. **Fastening variant 0 (see illustration below):**
Fasten wall mounting angle (Pos. 1) to the wall.
Open the gap between the upper (Pos. 2) and lower (Pos. 3) nut (G1") so that the sensor can be pushed into the wall mounting angle.
Tighten both nuts to clamp the sensor (Pos. 4).



5. **Fastening variant 1 (see illustration below):**
Fasten wall mounting angle (Pos. 1) to the wall.
Open the gap between the upper (Pos. 3) and lower (Pos. 4) nut (G1") so that the sensor can be pushed into the fastening angle (Pos. 2).
Tighten both nuts to clamp the sensor (Pos. 5).
Slide the fastening angle (Pos. 2) into the wall mounting angle (Pos. 1) to the desired position.



6. **Fastening variant 2 (see illustration below):**
If necessary, remove the spring plate, the two pan-head screws and the hexagon nuts from the fastening angle (Pos. 1).
Attach the fastening angle (Pos. 1) to the wall/ceiling.
Open the gap between the upper (Pos. 2) and lower (Pos. 3) nut (G1") so that the sensor can be pushed into the fastening angle (Pos. 1).
Tighten both nuts to clamp the sensor (Pos. 4).



7. Fastening variant 3 (see illustration below):

Attach the fastening rail (Pos. 3) (with ball joint and base) to the ceiling (slotted hole). Open the gap between the upper (Pos. 6) and lower (Pos. 7) nut (G1") so that the sensor can be pushed into the base (Pos. 4).

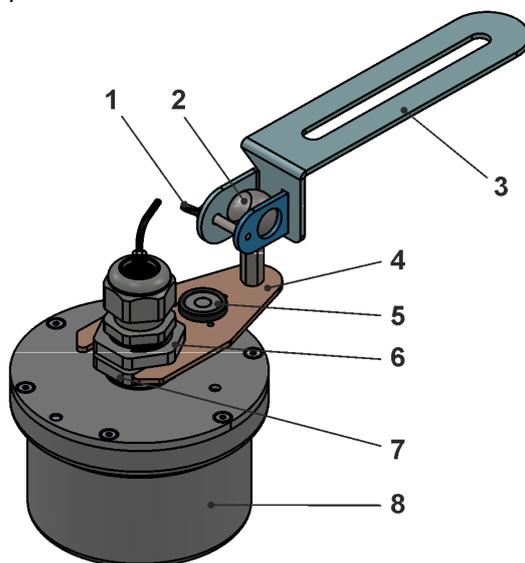
Tighten both nuts to clamp the sensor (Pos. 8).

Use the integrated spirit level (Pos. 5) to check whether the radar sensor is aligned vertically (90°) to the medium surface. If not, to align the radar sensor, loosen the wing screw (Pos. 1) to clamp the ball joint (Pos. 2), align the sensor or base and re-tighten the wing screw.

This mounting variant can also be used with the channel bracket (with cross holder) if necessary (see also Chap. "38 Accessories").

Info:

If the manhole is extremely deep, a special version with a long pipe can also be requested from NIVUS.



25 Insert / change SIM card

25.1 Requirements for inserted SIM cards

In principle, almost any SIM card can be used. However, the following **requirements** must be met:

- Format: Micro SIM (3FF)
- SIM card must be usable for IoT.
- The online connection must be possible without further parameterisation.



Secure Online Connection VPN

The NIVUS SIM card supplied automatically establishes a secure online connection (VPN). This is not the case with another card and the data is transmitted unencrypted via the Internet.

NIVUS therefore recommend to use the NIVUS SIM card.

25.2 Insert / change SIM card in the radar sensor

The SIM card must be inserted into the radar sensor outside the Ex area, as the enclosure must be opened for this and this is not permitted in the Ex area.

🔄 Procedure:

1. Open the NivuLink Radar enclosure according to Chap. "23 Opening / closing the enclosure / battery compartment cover of the radar sensor".
The SIM card slot (Fig. 25-1 Pos. 1) is accessible.

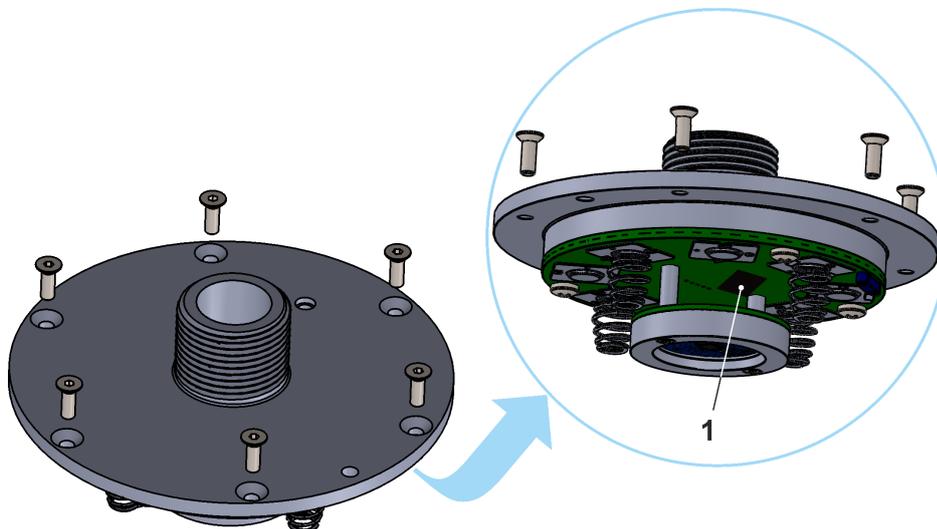


Fig. 25-1 SIM card slot

2. If present, remove the previous SIM card (do not pull it out, a light tap will unlock the card).
3. Insert the new SIM card into the card holder so that its contacts face the board. Lock by lightly tapping the card.
4. Close the enclosure according to Chap. "23 Opening / closing the enclosure / battery compartment cover of the radar sensor".

26 Antenna Installation



Only install antennas approved / recommended by NIVUS

The mobile phone antenna must be positioned to ensure that no person is permanently (longer than 6 minutes) at a distance of less than 25 cm from the antenna. When the device is operating normally, there is usually no health risk even at smaller distances, as the device only transmits for a short time on the mobile radio interface, but this distance should still be observed as a precautionary measure.

The antenna must not extend beyond the lightning-protected area of buildings and must be protected against lightning strikes.

Antenna Version "I":

Antenna already installed inside the sensor enclosure ex works.

No installation required.

Antenna Version "A":

External magnetic base antenna

When ordering this version, the magnetic base antenna is supplied connected to the sensor. Depending on the application and situation on site, the antenna may need to be unscrewed from the sensor and then screwed back on/connected after positioning (e.g. grille or similar). It must be ensured that the junction from the antenna cable to the cable gland is sealed again, otherwise the protection class of the sensor cannot be guaranteed.

➡ To do this, use the following tools and follow the procedure.

Tools required to unscrew/screw the antenna (antenna version "A"):

- 2x open-end spanner SW29 for loosening/tightening the cable gland
- Special NIVUS SW8 spanner for loosening/tightening the antenna socket (Fig. 26-1)



Fig. 26-1 Special NIVUS spanner SW8



Do not damage the antenna cable

The antenna cable (Fig. 26-2 Pos. 1) of the magnetic base antenna is sensitive. Therefore, observe the following points:

- *Do not lift the sensor by the antenna cable.*
- *Do not pull too hard on the antenna cable.*
- *Do not kink or damage the antenna cable.*



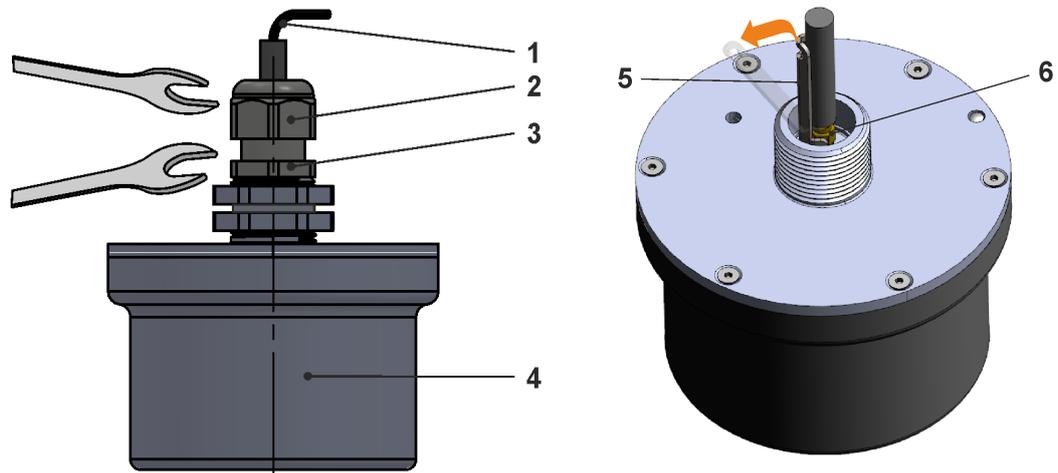
Antenna cable glands in the enclosure cover for external antenna

When using the magnetic base antenna mounted outside the sensor enclosure, the outlet opening for the cable in the cable gland must be necessarily sealed.

The protection class of the closed device is IP68.

➤ Procedure to unscrew/screw the antenna (antenna version "A"):

1. Secure/tighten the lower hexagon of the cable gland (Fig. 26-2 Pos. 3) with the first open-end spanner SW29 and loosen the upper hexagon of the cable gland (Fig. 26-2 Pos. 2) with the second open-end spanner SW29 (this prevents twisting and possible damage to the antenna cable).
2. Loosen the lower hexagon of the cable gland (Fig. 26-2 Pos. 3) using one of the open-end spanners SW29.
3. Slide the cable gland on the antenna cable (Fig. 26-2 Pos. 1) out of the way in the direction of the magnetic base antenna.
4. Position the special NIVUS spanner SW8 (Fig. 26-1 or Fig. 26-2 Pos. 4) on the thread of the SMA antenna connector (Fig. 26-2 Pos. 5), tilt it slightly backwards for better accessibility and unscrew the antenna connector.
5. If necessary, remove the cable gland from the antenna cable.
6. Taking the antenna cable length into account, attach the magnetic base antenna so that the antenna has a "clear view" and can transmit (test!).
7. Pull the cable gland back over the antenna cable (if previously removed).
8. Screw the SMA antenna connector to the sensor (Fig. 26-2 Pos. 3) using the special NIVUS spanner SW8.
9. Tighten the lower hexagon of the cable gland (Fig. 26-2 Pos. 3) on the sensor using an open-end spanner SW29 until the flat seal is slightly pressed.
10. Secure/tighten the lower hexagon of the cable gland (Fig. 26-2 Pos. 3) with the first open-end spanner SW29 and tighten the upper hexagon of the cable gland (Fig. 26-2 Pos. 2) with the second open-end spanner SW29. Tighten until the antenna cable is firmly and tightly seated in the cable gland in order to prevent the ingress of liquids and thus ensure the degree of protection.
11. Secure the antenna cable with cable ties or similar so that nothing can get caught/tangled in it and the cable is outside the measurement range of the radar sensor.



- 1 Antenna cable/shrink tubing (shown shorter)
- 2 Cable gland, upper hexagon SW29
- 3 Cable gland, lower hexagon SW29
- 4 Sensor
- 5 Special NIVUS spanner SW8
- 6 SMA Antenna connector

Fig. 26-2 Loosening/tightening the antenna socket for external magnetic base antenna

Commissioning

27 Notes to the User

Before connecting and operating the NivuLink Radar the instructions below shall be followed. This instruction manual contains all information required for parameterisation and use of the radar sensor. The instruction manual is intended for qualified expert personnel. The instruction manual is intended for qualified expert personnel. Appropriate knowledge in the areas of measurement systems, automation technology, control engineering, information technology and hydraulics are preconditions for putting the NivuLink Radar into operation.

Read this instruction manual carefully to ensure proper functioning of the NivuLink Radar.

If you have any questions regarding installation, connection or parameter setting, please contact our hotline at:

- +49 7262 9191-955

General Principles

Commissioning of the measurement system shall not be carried out before installation has been finished and verified.

WARNING



Danger of explosion when opening the unit

*The device may only be opened **only outside** the Ex area.
Never within Ex areas.*

Observe the information in this instruction manual to prevent incorrect or faulty or parameterisation. Familiarise yourself with the operation of the radar sensor before you start with the parameterisation.



Always activate the radar sensor on site at the measurement place

In the factory setting, the radar sensor measures every 1 hour, but only transmits once every 24 hours.

*To adapt this parameterisation to customer requirements or to test the transmission/reception strength of the modem, the radar sensor must first be activated once **on site** at the measurement place with simultaneous **access** to the **NIVUS WebPortal**.*

*The parameterisation of a **distance adjustment value** can also only be carried out on site.*

See Chap. "31 Parameterisation of the NivuLink Radar Sensor".

Activation and Standard Operation

After activating the radar sensor via the ring magnet (Fig. 2-2), the modem switches on for 5 minutes, the radar sensor immediately measures the distance to the medium surface and transmits this value online to the NIVUS WebPortal. In the NIVUS WebPortal (if parameterised correctly), the current fill level (>Level<) is calculated from the distance value (>Distance<). During these 5 minutes with an active modem, the radar sensor measures every 5 seconds.

The measurement cycle individually parameterised in the NIVUS WebPortal (with active measurement phases and passive switch-off mode) and the transmission mode start at the end of the 5 minutes after activation until optional deactivation (see Chap. "28.2 Functions with use of the ring magnet").

28 Functionality of the (Status) LED on the NivuLink Radar

28.1 Status display/lighting system of the radar sensor

The status LED (Fig. 28-1 Pos. 1) on the Top side of the NivuLink Radar lights up during operation according to a predefined system that allows conclusions to be drawn about the current status of the device.

#	LED light colour (in time intervals of approx. 0.1 sec.) (colour code according to Tab. 5)										
1.	off	off	off	off	off	off	off	off	off	off	Sensor sleeps (between measurements) or is deactivated
2.	TQ	off	Sensor is deactivated after a firmware update (Tab. 6 line 4) or opening the housing/battery compartment cover of the sensor								
3.	GN	off	Measurement runs (duration varies, but max. 2 sec.), then it goes into sleep mode								
4.	RD	off	Sensor detects a hardware error, then goes into sleep mode								
5.	BU	off	Modem initiates itself (due to a planned transmission or activation with the ring magnet)								
6.	BU	off	TQ	off	Modem is active, but has not yet established a connection to the NIVUS WebPortal						
7.	BU	off	GN	off	Modem is connected to the NIVUS WebPortal						
8.	BU	off	RD	off	Modem is in Error Mode						
9.	RD	off	RD	off	Modem is in error mode, no SIM card present, no measurement is performed; if the error is present, the message appears for approx. 1 minute after activation with the ring magnet, then the sensor goes permanently into sleep mode without a new connection attempt being made. A different SIM card must be inserted.						

10.	RD	off	PK	off						
<p>Modem is in error mode, SIM card is locked, no measurement is performed; if the error is present, the message appears for approx. 1 minute after activation with the ring magnet, then the sensor goes permanently into sleep mode without a new connection attempt being made. A different SIM card must be inserted.</p>										
11.	RD	off	TQ	off						
<p>Modem is in error mode, PIN of the SIM card is required, no measurement is performed; if the error is present, the message appears for approx. 1 minute after activation with the ring magnet, then the sensor goes permanently into sleep mode without a new connection attempt being made. A different SIM card must be inserted.</p>										

Tab. 4 Status display LED

Colour codes for LED colours	
GN	Green
RD	Red
BU	Blue
TQ	Cyan/Turquoise
PK	Magenta/Pink

Tab. 5 Colour abbreviations

28.2 Functions with use of the ring magnet

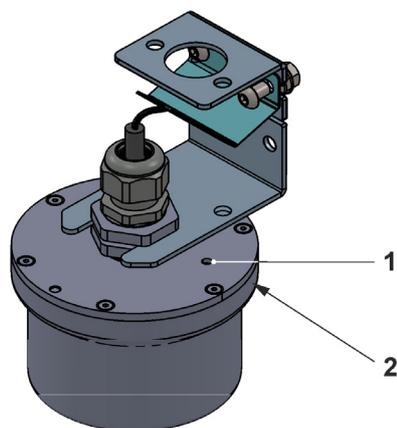


Fig. 28-1 LED on the top side of the NivuLink Radar

The radar sensor can be activated and deactivated using the ring magnet and observing the LED light sequence. A firmware update can also be installed.

Initial Start-Up/Activation

Before the NivuLink Radar sensor can measure and transmit for the first time, it must be **activated** once with the enclosed ring magnet (Fig. 2-2). To do this, hold the ring magnet near the status LED on the side of the upper flange of the sensor (Fig. 28-1 Pos. 2).



See also Chap. "27 Notes to the User": "Activation and Standard Operation".

Shutdown/Deactivation

If the NivuLink Radar sensor is not to be used for a longer period of time (transport, storage, etc.), it can also be **deactivated/switched off** using the magnet. This is done as described in Tab. 6 line 2.

LED light colour (in time intervals of ≥ 5 sec.) (when the ring magnet is held against the sensor) (colour code according to Tab. 5)			
1.	<table border="1"> <tr> <td>PK</td> <td>off</td> </tr> </table> <p>Ring magnet is held to the sensor and then removed again*1: off - no function</p>	PK	off
PK	off		
2.	<table border="1"> <tr> <td>PK</td> <td>RD</td> </tr> </table> <p>Ring magnet is held to the sensor and then removed again*1: RD - Sensor is deactivated/switched off (goes into permanent sleep and can be reactivated with the ring magnet; see also Chap. "27 Notes to the User": "Activation and Standard Operation")</p>	PK	RD
PK	RD		
3.	<table border="1"> <tr> <td>PK</td> <td>BU</td> </tr> </table> <p>Ring magnet is held to the sensor and then removed again*1: BU - Sensor is being prepared for a firmware update Attention: Firmware update only in consultation with NIVUS GmbH!</p>	PK	BU
PK	BU		
*1)	<i>The three intervals of the lines 1 to 3 run consecutively, the ring magnet must be removed at the desired time ("PK-off" or "PK-RD" or "PK-BU").</i>		
4.	<table border="1"> <tr> <td>BU</td> <td></td> </tr> </table> <p>LED does not flash, but lights up permanently; the update can take place; after the firmware update has been completed, the sensor goes into the status according to Tab. 4 line 2; if no update takes place within 2 minutes, the readiness of the sensor ends and it goes into sleep mode</p>	BU	
BU			

Tab. 6 Status display LED

Setting Parameters in NIVUS WebPortal

29 General Information on Parameterisation

The entire operation and parameterisation of the NivuLink Radar is carried out via the NIVUS WebPortal.

The **basic requirement** for working with the NivuLink radar sensor is access to the NIVUS WebPortal and basic knowledge of working with it.



Observe the handbook for the NIVUS WebPortal.

Download pdf under "Help" in the NIVUS WebPortal.

Only the special pages of the NivuLink Radar in the NIVUS WebPortal are described below.

30 Display in the NIVUS WebPortal

The basic display can be accessed via the corresponding NivuLink Radar sensor in "Available projects", "Devices" module and "Measurement Places". Select the sensor in the measurement place area (Fig. 30-1 Pos. 1) and click on the "Hydrographs" area/tab in the area selection (Fig. 30-1 Pos. 3).

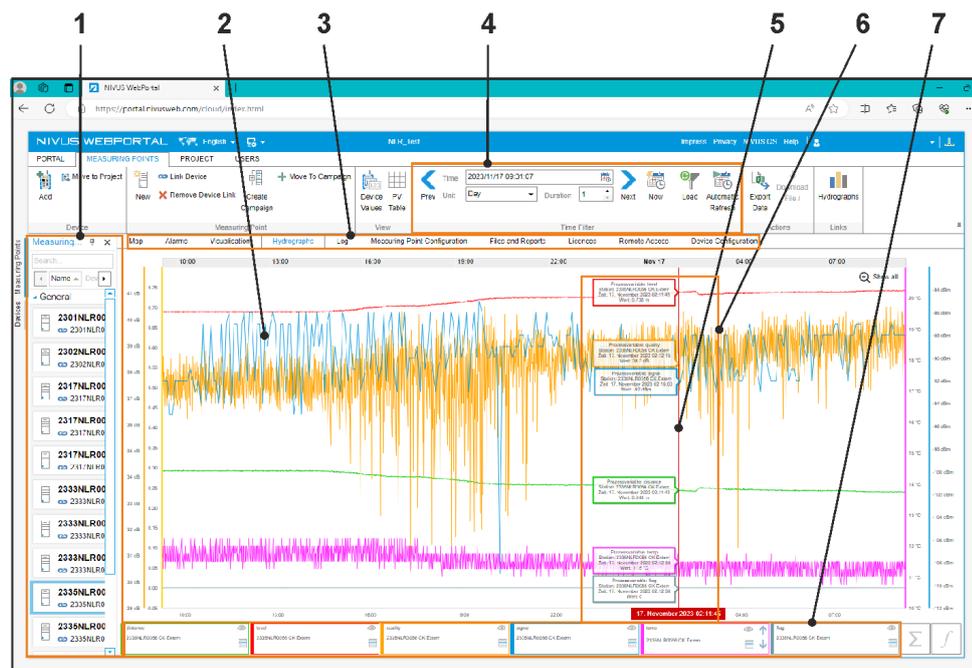
All current and previous sensor data and measured values can be read or called up in the basic display.



Delivery Status

On delivery, only the process variables >Distance<, >Temp.<, >Level< and >Quality< are available in the display. All other process variables can be added by the operator as required in accordance with the NIVUS WebPortal manual.

Download pdf under "Help" in the NIVUS WebPortal.



- 1 Measurement place area (sensor selection)
- 2 Display of the hydrographs of the (pre-)set or parameterised process variables

- 3 Area Selection / Tab
 - 4 Time filter, adjustable
 - 5 Selected time by "approaching" with the mouse
 - 6 (Measurement) values/process variables of the sensor available at the selected time
 - 7 Legend for the hydrographs; by clicking on them, the others are "greyed out" and thus the selected hydrograph is highlighted or hidden ("Eye" icon) or viewed in detail by jumping to the table of values ("Table" icon)
-

Fig. 30-1 (Basic) display in the NIVUS WebPortal

Meaning of the process variables

>v-Batt<

Battery voltage

>Distance<

Measured distance to the medium surface (vertical)

>Flag<

Any pending error messages / transmission errors (important for NIVUS customer service)

>Signal<

Receive field strength of the modem; value is only displayed during transmission to the NIVUS WebPortal

>Temp<

Temperature in the sensor

>Level<

Fill level height; is only displayed/calculated if the mounting height is parameterised/configured to be greater than "0"

>Reception Quality<

Reception quality of the modem

>Quality<

Signal-to-noise ratio (quality) of the measurement carried out; the higher the value, the better the sensor is adjusted

In addition, there are various **diagnostic process variables (Diag_xx)**, which are used exclusively for NIVUS customer service. In the event of problems, the customer service will refer back to it for troubleshooting/solving. These are displayed via the "Measurement Place Configuration" area/tab.

31 Parameterisation of the NivuLink Radar Sensor

Parameterisation is carried out in the NIVUS WebPortal via the "Device Configuration" area/tab.

To do this, select the sensor in the measurement place area (Fig. 30-1 Pos. 1) via the corresponding NivuLink Radar sensor in "Available Projects", "Devices" and "Measurement Places" module and click on the "Device Configuration" area/tab in the area selection (Fig. 30-1 Pos. 3).

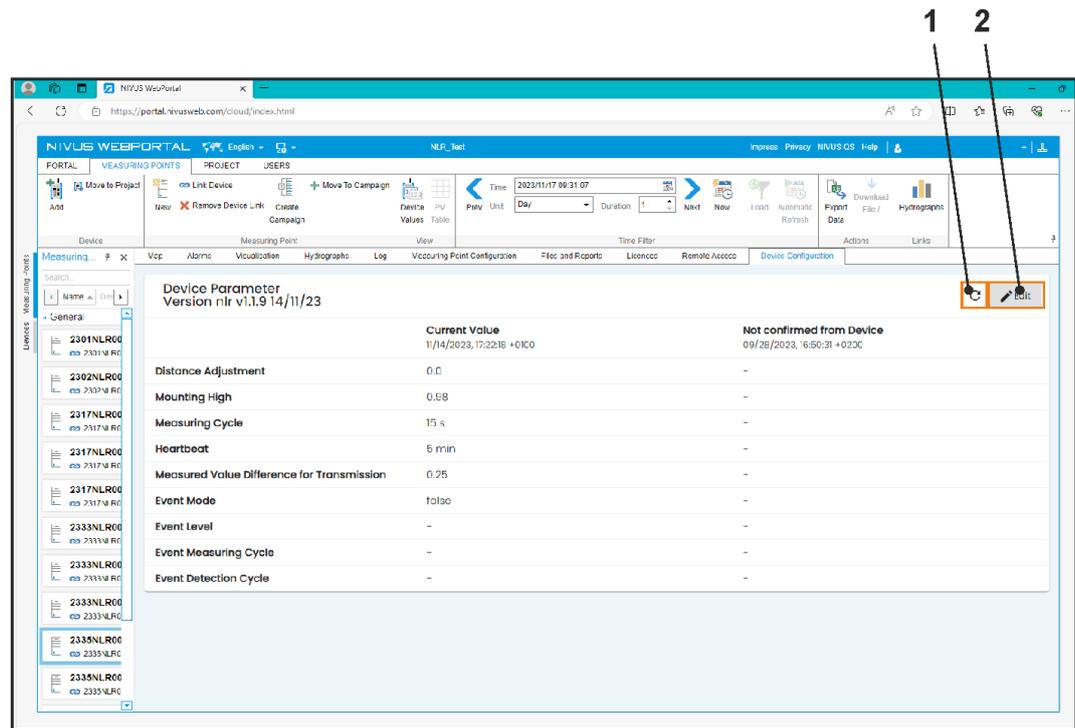


Fig. 31-1 Parameter display of the sensor in the NIVUS WebPortal

Meaning of Device Parameters

- >Distance Adjustment<**

If obstacles (such as step irons) in the "field of view" of the sensor could lead to interference signals/erroneous measurements, these can be determined **on site** during commissioning with a test measurement and this deviating measurement value can be "masked out" by a distance adjustment value.
Input via keyboard or in steps of 0.001 m using the small up/down arrows.
To make sure that the distance compensation value is entered directly by the sensor, it must first be **activated** with the ring magnet!
If necessary, the entered value can be deleted by entering 0.0 m.
- >Mounting Height<**

Mounting height of the sensor in metres, measured from the bottom of the channel or from the virtual zero level.
Input via keyboard or in steps of 0.001 m using the small up/down arrows.
- >Measurement Interval<**

Fixed interval of the measurements. These are stored in the ring memory until the next transmission.
Selection in pulldown menu: 15 s, 30 s, 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 10 min, 12 min, 15 min, 20 min, 30 min and 1 h
- >Heartbeat<**

Specified interval for transmitting the measured values to the NIVUS WebPortal or the changed parameters to the sensor.
Selection in pulldown menu: 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 10 min, 12 min, 15 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h, 8 h, 12 h and 24 h
- >Measurement Value Difference for Transmission<**

The sensor saves the last transmitted measurement values. If a new measurement value greater than or equal to the (measurement value) difference parameterised here deviates from the previous one, the sensor transmits this directly (regardless of the next transmission). Entering "0 m" disables this function.
Input via keyboard or in steps of 0.001 m using the small up/down arrows.

- **>Event Mode<**

In event mode, the measurements are taken according to the defined measurement interval and are transmitted immediately to the NIVUS WebPortal (regardless of the Heartbeat in normal mode).

If the sensor falls below the threshold for event mode after 10 measurements in a row, it switches from event mode back to normal mode.

Conversely, if the threshold is exceeded once, the sensor switches back from normal mode to event mode.

- **>Threshold for Event Mode<**

Defined threshold for the jump from event mode to normal mode or vice versa from normal mode to event mode;

Only active with event mode "On"

- **>Measurement Interval on Event<**

Setting the measurement interval in event mode.

Selection in pulldown menu: 15 s, 30 s, 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 10 min, 12 min, 15 min, 20 min, 30 min and 1 h

Only active with event mode "On"

- **>Check Interval for Event Mode<**

When activated, the system checks for events in normal mode with the parameterised >Measurement Interval for Event<.

Only active in event mode "As Event"

Editing the Parameters

1. Click the editing symbol (Fig. 31-1 Pos. 2).
An editing window (Fig. 31-2 Pos. 1) opens and the values can be changed there.
2. Press "OK" (Fig. 31-2 Pos. 2) to save the entered parameters and note "Not yet confirmed by device" in the right-hand column.
or
press "Cancel" (Fig. 31-2 Pos. 3) to cancel the editing process without accepting values. The sensor continues to work with the last saved parameters.
3. To transfer the noted parameters to the sensor:
Wait until the next transfer so that the parameters noted with OK are transferred. After the transfer, the sensor works with the changed parameters.



Refresh Icon

Clicking on the "Refresh" icon  (Fig. 31-1 Pos. 1) updates the display in the "Device Configuration" area/tab.

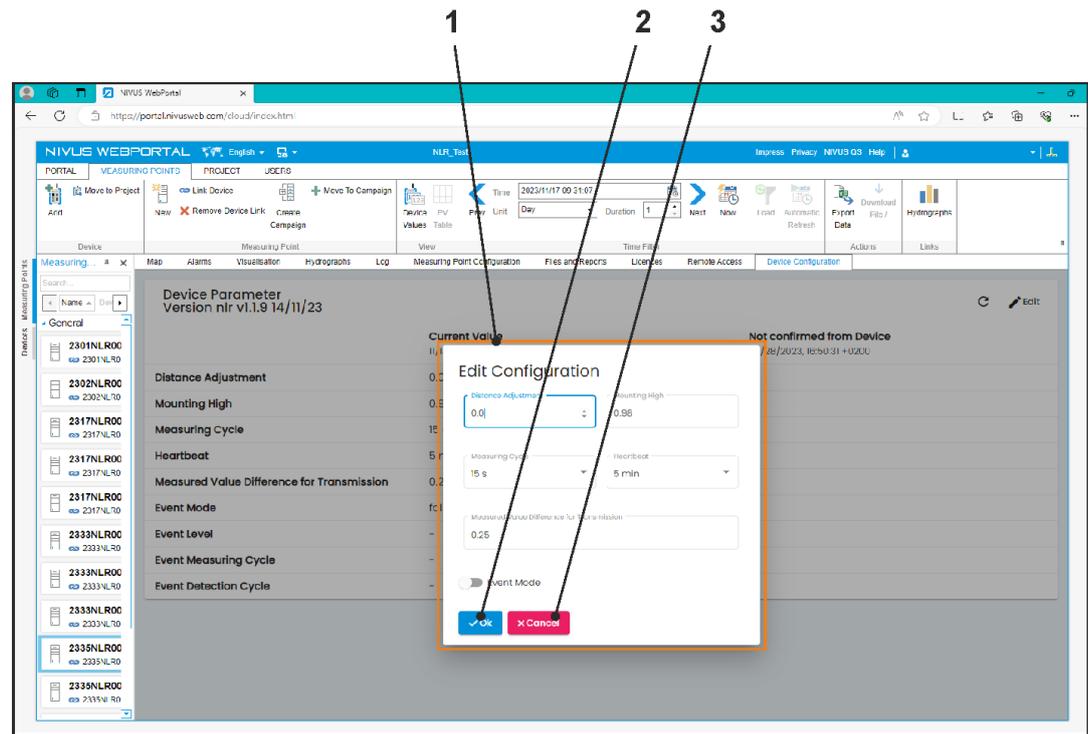


Fig. 31-2 Edit sensor parameters in the NIVUS WebPortal

32 Adding/removing process variables or changing the name of the measurement place



Adding/removing and changes in the NIVUS WebPortal

Changes in the NIVUS WebPortal are made in accordance with the NIVUS WebPortal manual.

Download pdf under "Help" in the NIVUS WebPortal.

33 Performing a firmware update



Only in consultation with the companies of the NIVUS-Group

If an update of the sensor firmware is required, this will be provided as a .zip file by NIVUS in individual cases.

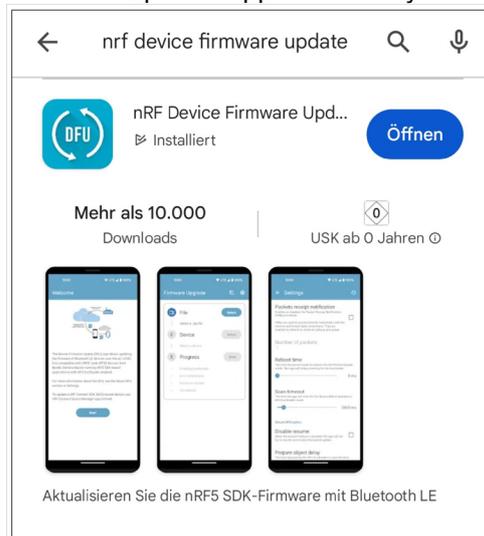
The (device) requirements and the procedure for installing the update are described below.

Prerequisite:

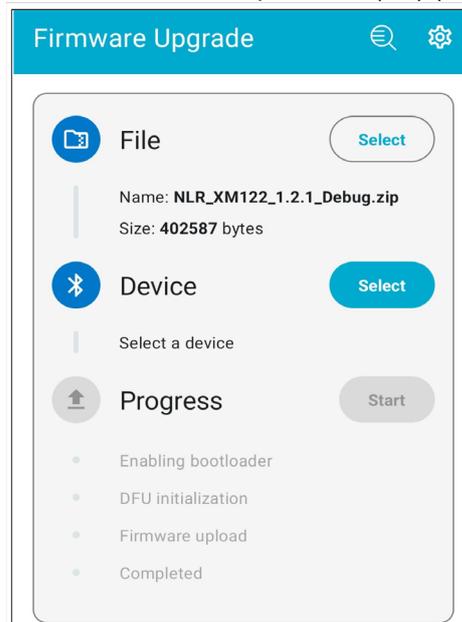
- A Bluetooth-enabled smartphone/tablet is available.

Procedure:

1. Save the .zip file received from NIVUS for the firmware update on the Bluetooth-enabled smartphone/tablet.
2. Depending on the Bluetooth-enabled device, download and open the "nRF Device Firmware Update" app via the Playstore (Android) or the App Store (Apple).

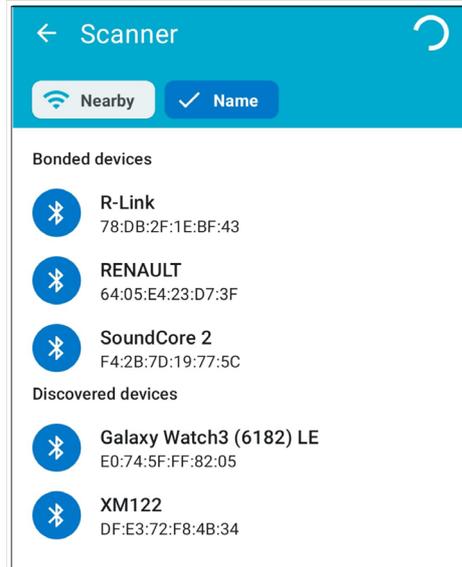


3. Select the firmware update file (file) (.zip file) via the app (Select).

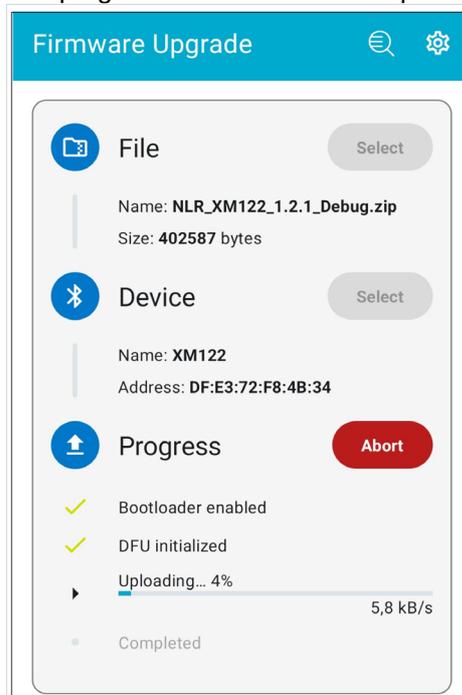


4. Prepare the NivuLink Radar sensor for the firmware update using the ring magnet:
 - Hold the ring magnet to the NivuLink Radar sensor (on the rim in the area of the

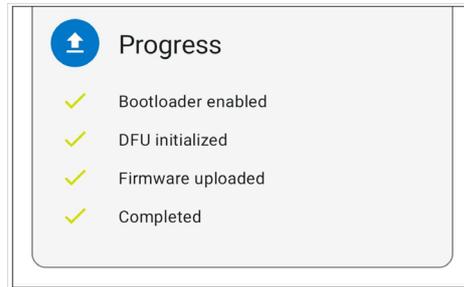
- status LED). The status LED starts to flash in magenta (pink).
- The flashing pattern changes from magenta (pink) / red to magenta (pink) / blue. When the status LED flashes in magenta (pink) / blue, remove the ring magnet. The status LED then lights up blue continuously (possibly with a slight time delay). If an update is not started within 2 minutes, the NivuLink Radar sensor returns to normal operating mode (see also Chap. "28.2 Functions with use of the ring magnet", Tab. 6 lines 1 to 3 on page 39).
 - In the app select (Select) the NivuLink Radar sensor (Device). The search starts.



5. As soon as the NivuLink Radar sensor **XM122** has been found, start the update (Progress - Start). The progress of the individual steps is displayed in the app.



6. If the firmware update is successful, all 4 steps are marked with a green tick. The NivuLink Radar sensor restarts automatically and the status LED flashes blue (see also Chap. "28.2 Functions with use of the ring magnet").



If the firmware update is cancelled (failed) by the app: repeat the process

A cancellation can occur due to a loss of signal.

Contact NIVUS in the event of a repeated error message.

Maintenance and Cleaning

WARNING



Check danger due to explosive gases

Before starting assembly, installation and maintenance work, be sure to check that all regulations on safety at work have been observed and that there is no possible risk of explosive gases. Use a gas warner for the check.

When working in the sewer system, make sure that no electrostatic charge can occur:

- *Avoid unnecessary movements to reduce the building-up of static charges.*
- *Discharge any static electricity present on your body before you start installing the sensor.*

Disregarding may result in personal injury or damage to the system.

WARNING



Open the device only out of Ex areas

Do not open, service or repair in an area where an explosive atmosphere is present.

WARNING



Germ Contamination

Due to the frequent use of the sensors in the waste water sector, parts can be contaminated with dangerous germs. Therefore, appropriate precautions must be taken when coming into contact with sensors.

Wear protective clothing.

34 Maintenance

34.1 Maintenance Interval

The radar sensor Type NivuLink Radar is conceived as a low-maintenance and low-wear instrument.

Nevertheless, NIVUS recommend an **annual check** of the entire measuring system by the NIVUS customer service.

Depending on the area of application of the measuring system, the maintenance interval may vary. The scope of maintenance and its intervals depend on the following factors:

- General regulations for the operator of the measurement system
- Environmental conditions

In addition to the annual maintenance, NIVUS recommend a complete maintenance of the measuring system by the NIVUS customer service after **ten years at the latest**.

Generally, the inspection of sensors is a basic measure that contributes to improve operational reliability and to increase the lifetime.

Contact the NIVUS customer service to make an appointment (see Chap. "34.3 Customer Service Information").

34.2 Maintenance Tasks

34.2.1 Clean, check and replace Seals

Basic Maintenance for all Types

The enclosure gasket of the radar sensor must be maintained/checked (at least) **every time** the enclosure/battery compartment cover is **closed**:

- Remove foreign bodies and dirt.
- Check elasticity.
- Check for damage.
- Ensure correct fit.
- Treat the gasket with silicone grease if necessary.
- Replace defective gasket.



Be sure to check the seals regularly

Non-compliance may have negative consequences in terms of warranty and liability. See Chap. "5 Warranty" and "6 Disclaimer".

34.2.2 Replacing Batteries

The service life of the batteries for the radar sensor can be very long, but it is essential to make sure that the maximum age specified by the battery manufacturer is not exceeded.

The approved batteries are marked by the battery manufacturer with an indication of the date of manufacture. It must be ensured that the batteries are removed in good time to avoid deep discharge.



Approved batteries and procedure to replace the batteries see Chap. "37.1 Battery Replacement".

34.3 Customer Service Information

For maintenance measures to be carried out by NIVUS, the recommended annual inspection of the entire measuring system or complete maintenance after ten years at the latest, contact our customer service:

NIVUS GmbH – Customer Service

Phone +49 7262 9191-922

customercenter@nivus.com



Observe Chap. "14 Return" prior to returning the radar sensor to NIVUS GmbH.

35 Cleaning

35.1 Radar Sensor

DANGER



Danger by electrostatic Discharge

Clean the device only with a damp cloth.

In case of disregard, the explosion protection of the device is no longer given due to possible static charge.

The device then poses a danger to the life of the user and can cause the ignition of an explosive atmosphere.

The NivuLink Radar enclosure complies with protection class IP68 when closed and is not very sensitive. Nevertheless, a high-pressure cleaner should **not** be used for cleaning.

Also, do **not** use harsh cleaning agents or solvents. Instead, it is better to use mild household cleaners or soap suds.

36 Dismantling/Disposal

Improper disposal may be harmful to the environment.

➡ Dispose of device components and packaging materials in accordance with the applicable local environmental regulations for electrical products:

1. Remove the radar sensor. If the radar sensor was installed in the Ex area, leave this area.
2. Open the enclosure/battery compartment cover according to Chap. "37.1 Battery Replacement".
3. Remove batteries and, if required, dispose of them properly.
4. Dispose of the radar sensor properly.



EU WEEE Directive

This symbol indicates that the requirements of Directive 2012/19/EU on waste electrical and electronic equipment must be observed when disposing of the device. NIVUS GmbH support and promote the recycling or environmentally sound, separate collection/disposal of waste electrical and electronic equipment to protect the environments and human health. Observe the local laws and regulations on disposal.

NIVUS GmbH is registered with the EAR, therefore public collection and return points in Germany can be used for disposal.

37 Installation of Spare Parts and Wearing Parts

We expressly draw your attention to the fact that spare parts and accessories which have not been supplied by us have also not been tested and approved by us. The installation and/or use of such products may therefore negatively alter or invalidate the design properties of your measurement system.

NIVUS are not liable for damage caused by the use of non-original parts and non-original accessories.

37.1 Battery Replacement

The batteries for the radar sensor are **not** rechargeable.

Approved Batteries

The following battery types are currently approved:

- For **non-Ex Sensor**:
SAFT LSH 14; LiSOCl₂; 3.6 V; Type C

The batteries can be purchased from specialised electrical retailers. If applicable, ensure that the traceability of the batteries can be guaranteed by this supplier (required for Ex use).

However, only battery types approved in writing by NIVUS are permitted.

In the future, other battery types may be approved.

- ➡ For more questions contact the NIVUS customer service (see Chap. "34.3 Customer Service Information").



Replacement only by qualified personnel

The batteries may only be inserted or replaced by trained personnel.



Replace all batteries at the same time

All batteries used must be replaced at the same time. The replacement of individual batteries is not permitted.



The following applies to the batteries used:

- *All batteries used in a device must be date stamped together by the manufacturer and must be new.*
 - *The replacement of individual batteries is not permitted.*
 - *Strict attention must be paid to the correct orientation of the batteries when inserting them.*
 - *All batteries must bear the  mark.*
-

Replacing the used Batteries

- ➡ Procedure:

1. Remove the radar sensor. If the radar sensor was installed in the Ex area, leave this area.
2. Open the enclosure/battery compartment cover according to Chap. "23 Opening / closing the enclosure / battery compartment cover of the radar sensor".
3. Remove the batteries (Fig. 37-1 Pos. 1).
4. Insert new batteries, observing the slot (Tab. 7) and installation direction (Fig. 37-2).
5. Close the enclosure/battery compartment cover according to Chap. "23 Opening / closing the enclosure / battery compartment cover of the radar sensor".

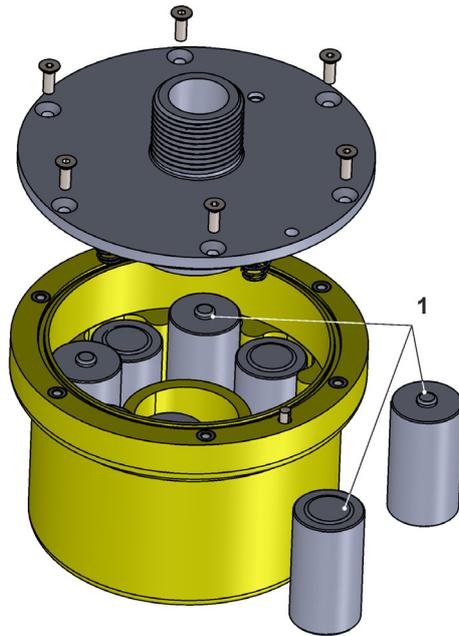


Fig. 37-1 Battery Replacement

Slot and Mounting Direction

Depending on the number of batteries used, these must be inserted in defined slots and in the correct mounting direction. The slots are each labelled with a number between the two corresponding slots on the circuit board in the enclosure (Fig. 37-2).

The installation direction can be recognised by the spiral springs (1x in the housing and 1x in the housing/battery compartment cover for each pair of slots).

Number of Batteries	Slot according to Fig. 37-2
6	1 and 2 and 3
8	1 and 2 and 3 and 4 (all)

Tab. 7 Correct positioning of the batteries

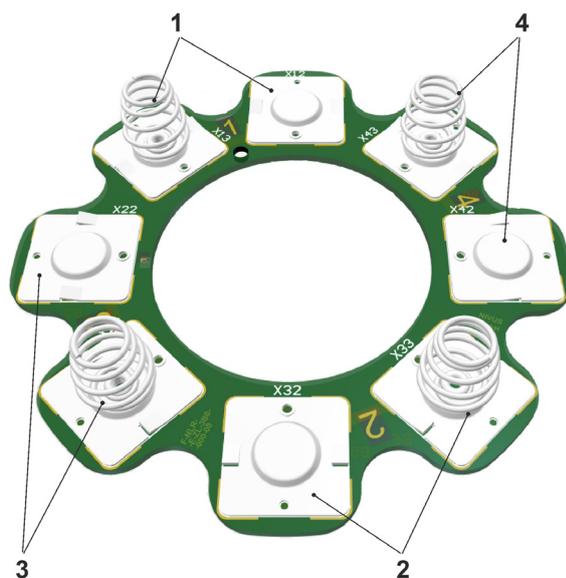


Fig. 37-2 Battery slots (circuit board in the enclosure)

38 Accessories

Article No	Description
ZMS0 102	Wall Mounting Angle 300 mm
ZMS0 108	Wall Mounting Angle 600 mm
ZMS0 109	Wall Mounting Angle 1000 mm
ZMS0 110	Wall Mounting Angle 600 mm, hinged
ZUB0 NLR BW	Fastening angle (with spring plate, pan-head screws and hexagon nuts), mounted
ZUB0 KUH	Ball holder for alignment
ZUB0 OFR MOSH 600	Manhole holder (cross holder ZUB0 HK required)
ZUB0 HK	Cross holder (required when using the ZUB0 OFR MOSH 600 manhole holder)
ZUB0 NFM MAGNET	Ring magnet, mounted
	<p>NIVUS DataKiosk / Data Kiosk Client:</p> <p>NIVUS DataKiosk is a web-based connectivity platform for the secure provision of measurement and process data to upstream or downstream systems such as a process control system. Due to its open architecture, NIVUS DataKiosk connects IoT solutions with a wide variety of IT systems and makes necessary data format adaptations.</p> <p>DataKiosk fulfils the function of a gateway. It enables application programmes to read data from a wide variety of devices and pass on control signals to devices on the basis of standardised internet technologies. Through comprehensive networking and automation, processes can be improved overall and their utility can be increased.</p> <p>The NIVUS DataKiosk Client is a graphical interface that retrieves the data from the DataKiosk and automatically stores the result in a configurable location.</p> <p>For details, please contact your sales representative.</p>

Tab. 8 Spare Parts and Accessories



More accessories and spare parts can be found in the current NIVUS price list.

Index

<p>A</p> <ul style="list-style-type: none"> Accessories53 Addresses <ul style="list-style-type: none"> Subsidiaries2 Approvals57 <p>B</p> <ul style="list-style-type: none"> Batteries, approved <ul style="list-style-type: none"> for Non-Ex Sensor51 <p>C</p> <ul style="list-style-type: none"> Certificates57 Cleaning50 Codes <ul style="list-style-type: none"> Open Source Software56 Colour Code <ul style="list-style-type: none"> LED Colour38 Copyright3 Copyrights3 Customer Centre49 <p>D</p> <ul style="list-style-type: none"> Delivery Status <ul style="list-style-type: none"> Parameterisation40 Device ID20 Device Parameters <ul style="list-style-type: none"> Parameterisation42 Device Versions22 Disclaimer13 <p>E</p> <ul style="list-style-type: none"> Editing Parameters43 Enclosure21 <p>G</p> <ul style="list-style-type: none"> Germ12, 48 <p>H</p> <ul style="list-style-type: none"> Humidity21 <p>I</p> <ul style="list-style-type: none"> Inspection upon Receipt16 Installation25 Intended Use14 <p>L</p> <ul style="list-style-type: none"> LED Colours <ul style="list-style-type: none"> Colour Code38 Licences <ul style="list-style-type: none"> Open Source Software56 Licensing Issues56 	<p>M</p> <ul style="list-style-type: none"> Maintenance Interval48 Measurement Distance20 Measurement Frequency20 Measurement Principles20 Measurement Range20 Measurement Uncertainty20 Modifications <ul style="list-style-type: none"> Document4 <p>N</p> <ul style="list-style-type: none"> Nameplates20 Names3 <p>O</p> <ul style="list-style-type: none"> Open Source Software56 Operation40 Operation Temperature21 Operator's Duties14 Original Instruction Manual3 Overview18 <p>P</p> <ul style="list-style-type: none"> Power Supply21 Precautions12 Process Variable <ul style="list-style-type: none"> Parameterisation41 Product Construction18 Property Rights3 Protection21 <p>Q</p> <ul style="list-style-type: none"> Qualified Personnel15 <p>R</p> <ul style="list-style-type: none"> Return17 <p>S</p> <ul style="list-style-type: none"> Safety Measures12 Scope of Delivery16 Setting Parameters40 Spare Parts50 Specifications20 Storage16 Storage Temperature21 Subsidiaries <ul style="list-style-type: none"> Addresses2 <p>T</p> <ul style="list-style-type: none"> Translation3 Transport16
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

W

Warranty 13
Wearing Parts 50

Open Source Software

39 List of Sources of the Licences and Codes used

The NivuLink Radar uses code from the following open source projects:

- Zephyr OS (<https://www.zephyrproject.org/>)
- Acconeer SDK (<https://www.acconeer.com/>)



Licensing Issues

For questions on licensing contact opensource@nivus.com

Approvals and Certificates



NIVUS GmbH
 Im Täle 2
 75031 Eppingen
 Telefon: +49 07262 9191-0
 Telefax: +49 07262 9191-999
 E-Mail: info@nivus.com
 Internet: www.nivus.de

DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity
Déclaration de conformité UE

Für das folgend bezeichnete Erzeugnis:
For the following product:
Le produit désigné ci-dessous:

Bezeichnung:	Autarker Radar-Füllstandssensor mit integrierter Datenübertragung per Funk
<i>Description:</i>	NivuLink Radar
<i>Désignation:</i>	<i>Self-sufficient radar level gauge with integrated data transmission by radio technology</i> <i>NivuLink Radar</i> <i>Capteur de niveau radar autonome avec transmission de données intégrée par radio</i> <i>NivuLink Radar</i>
Typ / Type:	NLRx00Gxx0xx

erklären wir in alleiniger Verantwortung, dass die auf dem Unionsmarkt ab dem Zeitpunkt der Unterzeichnung bereitgestellten Geräte die folgenden einschlägigen Harmonisierungsvorschriften der Union erfüllen:
we declare under our sole responsibility that the equipment made available on the Union market as of the date of signature of this document meets the standards of the following applicable Union harmonisation legislation:
nous déclarons, sous notre seule responsabilité, à la date de la présente signature, la conformité du produit pour le marché de l'Union, aux directives d'harmonisation de la législation au sein de l'Union:

- 2014/53/EU
- 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug auf die nachfolgend genannten anderen technischen Spezifikationen:

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:
L'évaluation est effectuée à partir des normes harmonisées applicable ou la conformité est déclarée en relation aux autres spécifications techniques désignées ci-dessous:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN 61326-1:2013
- EN 301 489-3 V2.1.1 (Radar)
- Draft ETSI EN 301 489-52 V1.1.2 (LTE/4G)
- EN 305 550-2 V1.2.1 (Radar)
- EN 301 908-13 V13.2.1 (LTE/4G)
- EN 303 413 V1.2.1 (GNSS)
- EN 62311:2008
- EN 301 489-1 V2.2.3 (Radar, Bluetooth, LTE/4G)
- Draft ETSI EN 301 489-17 V3.2.2 (Bluetooth)
- EN 300 328 V2.2.2 (Bluetooth)
- EN 301 908-1 V15.2.0 (LTE/4G)
- Draft ETSI EN 301 489-19 V2.2.0 (GNSS)

Diese Erklärung wird verantwortlich für den Hersteller:
This declaration is submitted on behalf of the manufacturer:
Le fabricant assume la responsabilité de cette déclaration:

NIVUS GmbH
Im Täle 2
75031 Eppingen
Germany

abgegeben durch / *represented by / faite par:*
Marcus Fischer (Geschäftsführer / *Managing Director / Directeur général*)

Eppingen, den 15.11.2023

Gez. *Marcus Fischer*