

Technical and Installation Instructions for R-Series Sensors



Rev. 01 / 09.01.2019

Revised manual

Original Manual: German / rev. 01 as of 09.01.2019

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Important Note

This manual may exclusively - even in parts - be copied or translated in any other way with the express written consent of NIVUS GmbH.

Translation

If the device is sold to a country in the European Economic Area (EEA) this 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 manual (German) must be consulted or the manufacturer contacted for clarification.

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Names

The use of general descriptive names, trade names, trademarks and the like in this manual does not entitle the reader to assume they may be used freely by everyone. They are often protected registered trademarks even if not marked as such.

History of changes

Rev.	Changes	Editor in charge	Date
01	Branch addresses updated; History of changes added; chapters "1.3.1 Colour code for wires and single conductors", "15 Specifications", "19.6.1 Ex zone 1 version", "19.6.2 Ex zone 0 version" and "28 Accessories" modified	MoG	09.01.2019
00	First version based on the German document	MoG	17.08.2018

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General

1 About this manual

**Important Note**

READ CAREFULLY BEFORE USE.

KEEP IN A SAFE PLACE FOR LATER REFERENCE.

This instruction manual is intended for installation or the use in accordance with the requirements of R-Series sensors. This manual is oriented exclusively to qualified expert personnel.

Read this manual carefully and completely prior to installation and initial start-up since it contains relevant information on this product. Observe the notes and particularly follow the warning notes and safety instructions.

Keep this manual in a safe place and make sure it is available for the users of this product at any time.

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

In case of selling the R-series sensor this manual shall be provided to the purchaser since it is a part of the standard delivery.

The description on how to operate NivuMaster transmitters is a part of the according instruction manual.

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.

- Instruction Manual for Flow Measurement Transmitters NivuMaster Series
- Instruction Manual for Flow Measurement Transmitters NivuMaster L2

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


Image	Meaning	Remark
Ü	(Action) Step	Action to be performed by you. Note the numbering of action steps. Observe the order of the working steps!
C	Cross-reference	Refers to further or detailed information.
>Text<	Parameter or Menu	Indicates a parameter or a menu that is selected or described.
	Reference to document	Refers to an accompanying documentation.

Table 1 **Structural elements within the manual**

1.3 Abbreviations used

1.3.1 Colour code for wires and single conductors

The abbreviations of colours, wires and components follow the international colour code according IEC 60757.

BK	black	BN	brown	RD	red
OG	orange	YE	yellow	GN	green
BU	blue	VT	violet	GY	grey
WH	white	PK	pink	TQ	turquoise
GNYE	green/yellow	GD	gold	SR	silver

Safety Instructions

2 Used symbols and signal words

2.1 Valuation of the accident level



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

DANGER

Warnings in high degree of risk



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

WARNING

Warnings in medium degree of risk



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

CAUTION

Warnings in low-risk or property damages



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

WARNING

Danger by electric voltage



Indicates a hazard with a high risk of electric shock which may result in a life-threatening situation or (severe) bodily injury if it is not avoided.



Important Note

Contains information that should be highlighted. Indicates a potentially damaging situation which can result in a damage of the product or an object in its environment.



Note

Contains information and facts.

2.2 Warning notices on the product (option)



General warning label

This symbol is for operators to refer to this instruction manual. Observing the information contained therein is required in order to maintain protection measures provided by the instrument during installation procedures and operation.



Protective conductor

This symbol refers to the protective conductor of the unit. Depending on the mode of installation the instrument shall be operated solely connected to an appropriate protective conductor according to applicable laws and regulations.

3 Safeguards and Precautions

Working with NIVUS instruments requires to observe and to follow the safety measures and precautions below generally and at any time. These notes and warnings will not be repeated for each description within the document.

WARNING



Check danger through explosive gases

Prior to beginning mounting, installation and maintenance make sure to observe any regulations on safety at work as well as to check the potential risk due to explosive gases. Use a gas warner to check.

When working in the channel system make sure to avoid electrostatic charge:

- § *Avoid unnecessary movements to minimise the risk of static energy accumulating.*
- § *Discharge any possible static electricity from your body before you begin to install sensors.*

Disregarding may lead to personal injury or damage your equipment.

WARNING



Germ contamination

Please note that due to the operation in the waste water field the measurement system and cables may be loaded with dangerous disease germs. Respective precautionary measures must be taken to avoid damage to one's health.

Wear protective clothing.

WARNING



Observe occupational safety regulations

Before starting installation work, observing the work safety regulations need to be checked.

Disregarding may lead in personal injury.

WARNING



Do not disable safety devices

It is strictly prohibited to disable the safety devices or to change the way they work.

Disregarding may lead in personal injury.

WARNING**Disconnect the systems from mains**

Maintenance, cleaning and/or repairs (by qualified personnel only) may only be performed when de-energised.

Disregarding may lead to electric shocks.

**Putting into operation by trained experts only**

The entire measurement system shall be installed and put into operation by trained expert personnel only.

4 Liability disclaimer

The manufacturer reserves the right to change the contents of this document including this liability disclaimer without prior notice and cannot be held responsible in any way for possible consequences resulting from such changes.

For connection, initial start-up and operation as well as maintenance of the unit the following information and higher legal regulations of the respective country (in Germany e. g. VDE regulations) such as applicable Ex regulations as well as safety requirements and regulations in order to avoid accidents shall be observed.

All operations on the device which go beyond installation or connection measures in principle shall be carried out by NIVUS staff or personnel authorised by NIVUS due to reasons of safety and guarantee.

Operate the transmitter only in technically perfect working order.

Improper Use

Not being operated in accordance with the requirements may impair the safety. The manufacturer is not responsible for failures resulting from improper use.

5 Use in accordance with the requirements

**Note**

The instrument is intended solely for the purpose described below.

Modifying or using the instruments for any other purposes without the manufacturer's written consent will not be considered as use in accordance with the requirements.

The manufacturer cannot be held responsible for any damage resulting from improper use. The user alone bears any risk.

The R-Series sensors (radar sensors) are intended to measure level, volume and distance of liquid media and bulk solids.

R-Series sensors are connected to NivuMaster transmitters.

The R-series sensors are designed and manufactured in accordance with the current state of the art and with the recognised safety rules and regulations applicable at the time this document is issued. Danger to persons or material damage cannot be completely ruled out, however.


The maximum permissible limit values as specified in chapter "15 Specifications" shall be necessarily observed. Any case varying from these conditions which is not approved by NIVUS GmbH in written form is left at the owner's risk.


Ex protection

The Ex-versions of the R-series sensors are designed to be used in areas with explosive atmospheres (zone 1 and zone 0).

Please find the wiring diagrams in the instruction manual of the according transmitter.

Ex identification ATEX

Zone 0:  II 1G Ex ia IIC T4 Ga / II 1D Ex ia IIIC T135°C Da

Zone 1:  II 2G Ex mb IIC T4 Gb / II 2D Ex mb IIIC T135°C Db



Installation of the transmitter

Install the transmitter out of Ex zones!



System evaluation according to DIN 60079-25

For installation and commissioning the conformity certificates as well as the test certificates issued by the respective authorities shall be followed.

The required specifications of the Ex versions of the R-series sensors can be found in the according EC type examination certificates CML 18ATEX2193X Issue 0 / CML 18ATEX5194X Issue 0.

6 User's Responsibilities



Important Note

In the EEA (European Economic Area) national implementation of the framework directive 89/391/EEC and corresponding individual directives, 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, are to be observed and adhered to.

In Germany e. g. the Industrial Safety Ordinance must be observed.

Make sure to have a local operating permit available and observe the associated conditions. In addition to this you must observe environmental requirements and local laws on the following points:

- Personnel safety (accident prevention regulations)
- Safety of work materials and tools (safety equipment and maintenance)
- Disposal of products (laws on wastes)
- Disposal of materials (laws on wastes)
- Cleaning (cleansing agents and disposal)

Connections

Operators shall make sure prior to operating the instrument that during installation and initial start-up the local regulations (such as regulations for electrical connection) are observed.

7 Personnel requirements

Installation, commissioning and maintenance shall be executed only by personnel meeting the demands as follows:

- Expert personnel with relevant training and appropriate qualification
- Personnel authorised by the plant operator



Qualified personnel

within the context of this documentation or the safety notes on the product itself are persons who are sufficiently familiar with installation, mounting, starting up and operation of the product and who have the relevant qualifications for their work; for example:

- I. Training, instruction or authorisation to activate/deactivate, isolate, ground, and mark electric circuits and devices/systems according to the safety engineering standards.*
 - II. Education and instruction according to the standards of safety engineering regarding the maintenance and use of adequate safety equipment.*
 - III. First aid training*
-

Delivery, Storage and Transport

8 Delivery

The standard delivery of the R-series sensors contains:

- R-series sensor
- 2x PVC screw nut 1"
- Technical and Installation Instructions including the certificates of conformity and approvals. It contains any relevant information on how to install and operate the device.

Check additional accessories depending on your order and according to the delivery note.

9 Reception inspection

Check the packaging for visible damage immediately after receipt. Any possible damage in transit shall be instantly reported to the carrier. Furthermore a written report shall be sent to NIVUS GmbH in Eppingen.

Incomplete deliveries shall be reported in writing either to your local representative or directly to the NIVUS head office in Eppingen within two weeks.



The deadline of two weeks must be strictly complied with

Mistakes cannot be rectified later.

10 Storing

Observe the minimum and maximum values on environmental conditions such as temperature and humidity according to chapter "15 Specifications".

The sensors shall be protected from corrosive or organic solvent vapours, radioactive radiation as well as strong electromagnetic radiation.

Always store the instrument in its original packaging.

11 Transport

Do not expose the sensors to heavy shocks or vibrations.

Use the original packaging for transport.

12 Return

In case of a required reshipment return the unit at customer cost to NIVUS GmbH in Eppingen using the original packaging.

Insufficiently franked shipments will not be accepted.

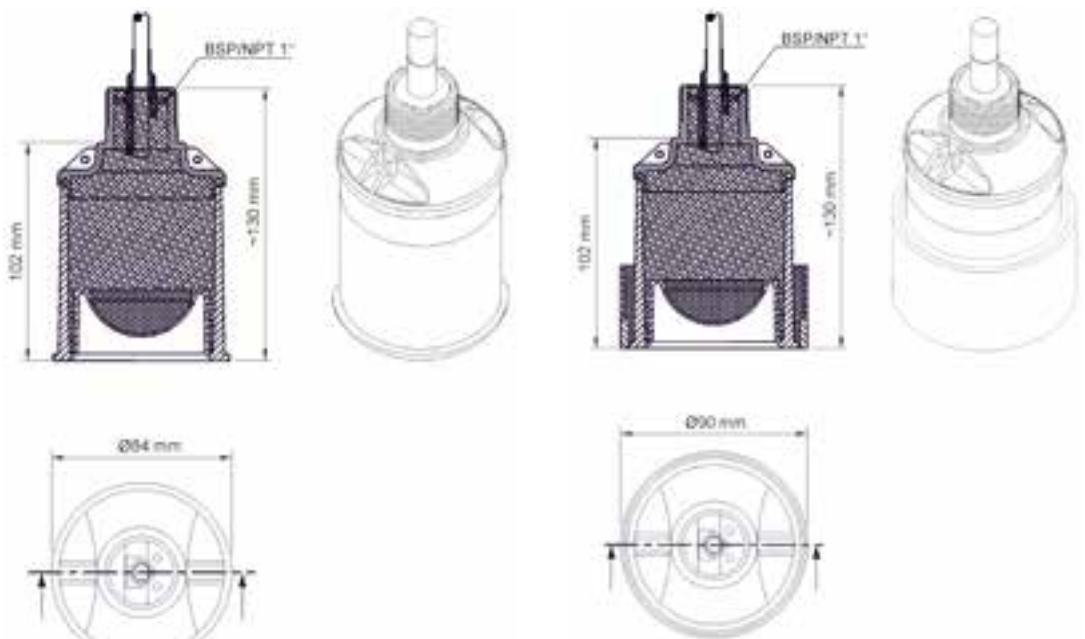
Product specification

13 Overview and dimensions



- 1 Connecting cable
- 2 Sensor body
- 3 Sensor face / antenna

Fig. 13-1 Overview



Zone 0 sensor R16z

Non Ex / Zone 1 sensor R16

Fig. 13-2 Dimensions

14 Device identification

The instructions contained within this manual are valid only for the type of device specified on the title page. The name plate is fixed on the sensor resp. on the package and contains the following:

- Name and address of the manufacturer
- CE label
- Information on type and series, serial no. if available

- Year of manufacture: the first four digits of the serial number represent the year and the week number of manufacture (1903NMR.....)

In case of enquiries and ordering replacement parts it is important to specify article number as well as the serial number of the respective transmitter or sensor. This ensures correct and quick processing.



Fig. 14-1 Nameplate R-series sensor



Fig. 14-2 Nameplate R-series Ex-sensor zone 1



Fig. 14-3 Nameplate R-series Ex-sensor zone 0



Check the nameplate

Check the delivered instrument for accordance with your order by identifying the nameplate.

Check the nameplate for correct specification of the power supply.

- C The EU-Type examination certificates (incl. appendix) and the declarations of conformity are located at the end of the manual.



Fig. 14-4 Banderole R-series Ex-sensor zone 1



Fig. 14-5 Banderole R-series Ex-sensor zone 0

15 Specifications

Measurement principle	FMCW radar
Measurement frequency	63 GHz / V-band
Measurement range	R8/R8z: 0.077...8 m R16/R16z: 0.077...16 m
Measurement uncertainty	±2 mm
Resolution	±1 mm
Protection	IP68 / NEMA 6P
Radio licence	EN302-729:2016 (Level Probing Radar)
Beam angle	8°
Operating temperature	-40...+80 °C
Storage temperature	-40...+80 °C
Cable length	5/10/20/30/50/100 m
Cable type	3x0.5 mm protected
Cable outer diameter	8.1 mm
Cable extension	3-core protected (e. g. 3x0.75 mm protected)
Current consumption	0.6 W typical
Power supply	28 V DC max.
Weight	1.1 kg
Dimensions	130x90 mm
Body material	Valox 357U
Connection thread	1" BSP/NPT
Transmitted HF power according to testing method ETSI EN 302 729	
Average spectral transmission power density	-24 dBm/MHz EIRP
Maximum spectral transmission power density	-21 dBm/MHz EIRP
Max. power density in a distance of 1 m	<0.1 µW/cm ²

Table 2 Specifications

Flow measurement transmitter

Construction and description of the related flow transmitter as well as the according specifications can be found in the accompanying instruction manuals.

16 Configuration

16.1 Device Types

The R-series sensors are available in different versions. The following table provides an overview on the different device versions.
 The devices vary in terms of Ex-versions and cable lengths.
 The actual device version can be identified from the article number which can be found on the sensor nameplate or on the original packaging.

NMR-	R-Series Sensor	Type	R8	Measurement range 0.077...8 m	R16	Measurement range 0.077...16 m
		Cable length	05	5 m	10	10 m
			20	20 m	30	30 m
			50	50 m	99	100 m
			XX	Special cable length upon request		
		Sensor body	0	Valox/PBT (Standard version without coating)		
		ATEX approval	0	None		
			E	Zone 1		
			Z	Zone 0 (only in conjunction with Zener barrier)		
		Extensions	0	None		
NMR-			0			0

Table 3 **Type key**

Functional Principle

17 Functional principle FMCW radar

The R-Series sensors emit a continuous signal featuring an alternating operation frequency. The transit time frequency difference Δf can be determined by comparing the emitted signal with the received reflection signal.

By using a particular mathematic formula this transit time frequency difference is converted into a distance which results in a concrete level.

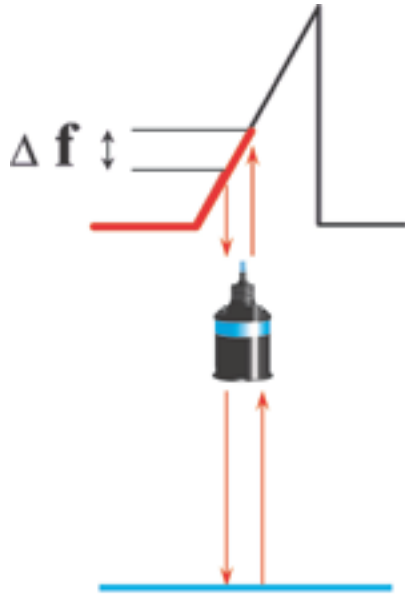


Fig. 17-1 Functional principle of the R-series sensor

Installation, Mounting and Connection

18 General Installation Instructions



Use only qualified personnel

In order to prevent the Radar sensor from being damaged the steps described within this section of the manual shall be executed by trained expert personnel exclusively. The executing company shall have extensive expertise and a sufficient background on installation and commissioning of ultrasonic and radar measurement systems in part filled applications. In other cases either contact the NIVUS commissioning service or an authorised specialist company.

WARNING



Danger prevention measures

Please ensure to observe all regulations on safety at work as well as danger due to explosive gases prior to the beginning of installation works. Respective measures to avert danger shall be taken if required.

Non-observance may result in injury to persons!



Norms and Standards

The knowledge of standards is an indispensable requirement for a safe and proper measurement site selection and sensor fastening in waters or rivers.

See DIN EN ISO 748 and DIN EN ISO 6416.



Permissions from public authorities

Prior to the sensors installation at bridge piers, embankments, groynes etc., and the laying of cables as well as the operation of the facilities in public waters, a written authorisation from the competent authority must be obtained.

For electric installation the local regulations in the respective countries (in Germany e. g. VDE 0100) must be referred to.

Before feeding the rated voltage the transmitter and sensor installation must be correctly completed. The installation should be carried out by qualified personnel only.

Further statutory standards, regulations and technical rulings have to be taken into account.

19 Mounting and Connection



Important hints on installation

- § *Ensure proper installation.*
 - § *Follow applicable legal or operational guidelines.*
 - § *Improper handling may lead to personal injuries and/or equipment damage.*
-

19.1 General

C Prior to beginning mounting works necessarily read chapters “18 General Installation Instructions” and “19.1.1 Hints on Fastening and Sensor Mounting Places”.

Disregarding the hints may lead to measurement errors. The manufacturer explicitly states that all required approvals and work regulations must be available and shall be observed.

During installation works keep in mind that electronic components may be irreversibly damaged due to electrostatic discharge. Therefore avoid intolerably high electrostatic charge during installation and mounting by implementing appropriate grounding measures (see chapter “19.2 Hints on how to avoid electrostatic discharge (ESD)”).

19.1.1 Hints on Fastening and Sensor Mounting Places

The sensor used shall be fastened permanently and reliably.

During sensor installation please observe the following:

- Use only **corrosion-free** fastening material.
- Use NIVUS mounting brackets (wall mount angles/ceiling mount angles).
- Fix the sensor during installation (e. g. with the aid of a mounting angle).
Do not suspend the sensor from its cable since otherwise the sensor may swing which leads to disturbed echo reception.
- Install the sensor in an angle of 90° directly above the measurement medium.
- Do not install near filling or emptying zones.
- Keep the measurement path between sensor and medium clear.
Always ensure direct visibility between sensor face and the medium to be measured. Keep off obstructions, weld seams, fills and similar whenever possible. It is possible to mask out disturbances, however it makes more sense to avoid disturbances at all.
- Select the mounting place in a way to comply with the near blanking distance if the maximum fill level has been reached. Measuring within the near blanking distance is not possible. False measurements will occur.
- The sensor can be fastened/screwed using the 1” BSP/NPT thread. Just tighten **manually** and do not use any tools (such as pliers or similar).

If the sensor is to be installed **outside of a closed container** observe the following hints additionally:

- Unless special permission has been granted by the appropriate national authority, the mounting location must be at least 4 km from any radio astronomy stations.
- The sensor must not be installed higher than 15 m from the ground when installed within 4...40 km of a radio astronomy station.

The following table depicts the geographical location of Europe's radio astronomy stations:

Country	Name/Place	Latitude	Longitude
Germany	Effelsberg	50°31'32" N	06°52'58" E
Finland	Metsähovin	60°13'04" N	24°23'37" E
	Tuaorlan	60°24'57" N	22°26'40" E
France	Floirac	44°50'07" N	00°31'33" W
	Plateau de Bure	44°38'02" N	05°54'26" E
Italy	Medicina	44°31'26" N	11°38'46" E
	Noto	36°52'36" N	14°59'20" E
	Sardinia	39°29'35" N	09°14'42" E
Poland	Krakow - Fort Skala	50°03'13" N	19°49'27" E
Russia	Kalyazin	57°13'22" N	37°54'01" E
	Pulkovskoe	59°46'20" N	30°19'34" N
	Puschchino	54°49'14" N	37°37'41" E
	Zelenchuksaya	43°49'33" N	41°35'13" E
Switzerland	Bleien	47°25'38" N	08°06'44" E
Spain	Pico Veleta	37°03'46" N	03°23'09" W
	Robledo	40°49'53" N	04°14'57" W
Hungary	Penc	47°47'23" N	19°16'53" E

Table 4 Radio astronomy stations in Europe

19.1.2 Support for selecting/assessing the measurement place

If in doubt regarding selection or assessment of the planned measurement place contact your NIVUS representative or the NIVUS Technical Sales and Support (sales@nivus.com) in Ep-pingen.

The following information/documents shall be at our disposal in order to assess the measurement place:

- sketches or drawings
- photos of the planned measurement place

19.2 Hints on how to avoid electrostatic discharge (ESD)

The sensitive electronic components inside of the instrument may be damaged by static electricity which may impair the instrument's performance or even lead to instrument failure. The manufacturer recommends the following steps to avoid equipment damage due to electrostatic discharge:

- Discharge static electricity from your body before touching the instrument's electronic components such as circuit boards and the components installed on the boards. To do so touch a grounded metal surface such as the unit's enclosure frame or a metal pipe.
- Avoid unnecessary movements to reduce the risk of building up static electricity.
- Transport statically sensitive components in antistatic containers or packing materials.
- To discharge your body and to stay free of static electricity wear an antistatic wristband grounded through a cable.
- Only touch components that are sensitive to electric charges in an antistatic working area. If possible, use antistatic mats and work pads.

19.3 Mounting of sensor

CAUTION



Deliberate handling of sensor cables

*Never run the cable slackly or uncovered. Risk of sensor or cable tear-off.
Do not sharply bend the cable due to the risk of cable break.*



Ensure stable installation and correct alignment

A highly accurate, vibration-free and firm installation as well as a correct sensor alignment are necessarily required for proper operation.

19.3.1 Fixation with ceiling mount

Parts/Tools required

- Ceiling mount (see chapter "28 Accessories")
- 2x PVC screw nut 1" (part of the delivery)
- Fixation material for the ceiling mount
- Spirit level

Ü Procedure:

1. Screw on the ceiling holder so that the sensor is pointing vertically downwards to the measurement medium.
2. Remove the ceiling holder to insert the sensor.
3. Screw the first 1" PVC nut manually onto the sensor.
4. Insert the sensor into the ceiling holder from the bottom and fasten it from the top using the second 1" PVC nut. Tighten the nut manually.
5. Fasten the ceiling holder together with the sensor on the ceiling again. Lay the sensor cable if required through the lateral recess of the ceiling holder. Do not bend the cable sharply.

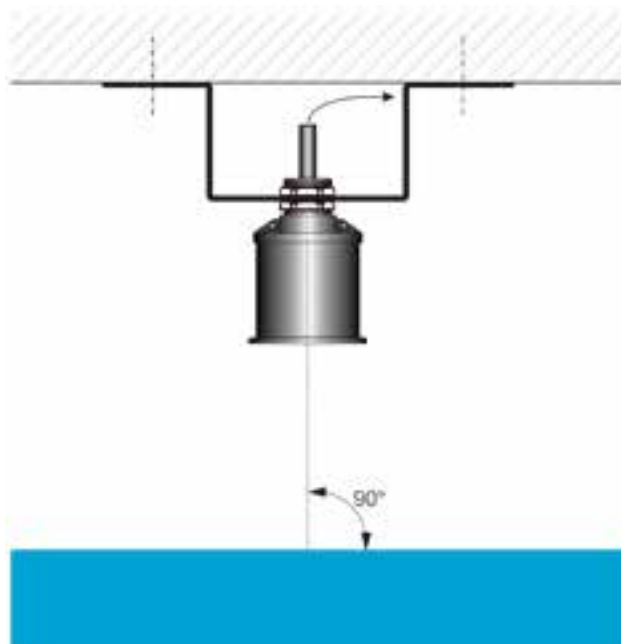


Fig. 19-1 Ceiling mount and sensor



Suspension from sensor cable

Do not suspend the sensor from its cable.

Necessarily use an appropriate strain relief (e. g. chain). The sensor shall not swing.

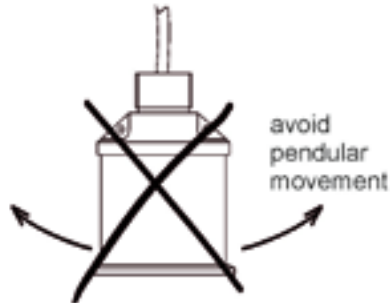


Fig. 19-2 Avoid pendular movement

19.3.2 Fixation with wall mounting angle

Parts/Tools required

- Wall mounting angle (see chapter "28 Accessories")
- 2x PVC screw nut 1" (part of the delivery)
- Fixation material for the wall mounting angle
- Spirit level

Ü Procedure:

1. Screw on the wall mounting angle so that the sensor is pointing vertically downwards to the measurement medium.
2. Screw the first 1" PVC nut manually onto the sensor.
3. Insert the sensor into the wall mounting angle from the bottom and fasten it from the top using the second 1" PVC nut. Tighten the nut manually.

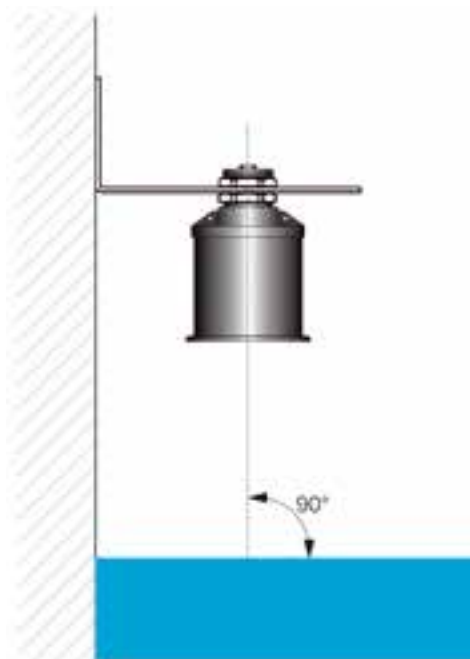


Fig. 19-3 Wall mounting angle and sensor



Suspension from sensor cable

Do not suspend the sensor from its cable.

Necessarily use an appropriate strain relief (e. g. chain). The sensor shall not swing.

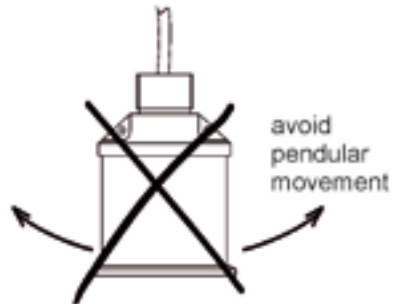


Fig. 19-4 Avoid pendular movement

19.3.3 Installation with align fixture

An align fixture shall be used for installation in bulk applications where formation of angles of repose and/or removal hoppers might occur. This enables the best possible sensor adjustment to the material.



Fig. 19-5 Sensor with align fixture

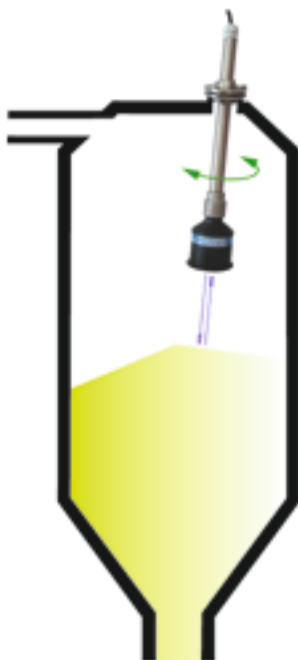


Fig. 19-6 Example for bulk application

19.4 Sensor connection



Use of junction boxes

If using a junction box please make sure to use cable glands which ensure the required minimum protection rating.
Lock unused cable inlets with appropriate dummy plugs before initial start-up.

Cable extension

Use a 3-wire shielded cable (without PE) as extension, e. g. LIYCY 3x0.75 mm². During transmitter as well as sensor installation please observe to comply with the specified enclosure protection ratings.

Electronic defects caused by dust or moisture due to improper installation void all warranty claims.

Correct connection

Before the first connection it is necessary to have a slight pressure on the screw of the clamping connection to ensure safe opening and a correct connection.

Use of improper cables

Improper connections or the use of improper cables may lead to disturbances or even measurement failure.

Connect the sensor at the respective transmitter terminal clamps according to the wiring diagram depicted below:

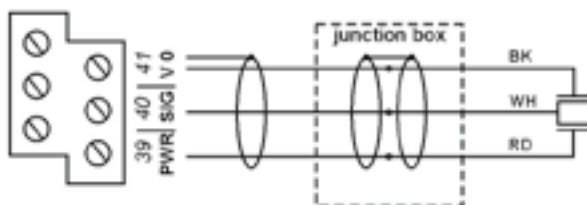


Fig. 19-7 Connecting R-series sensors

Detailed information to the connection of R-series sensors

- NIVUS recommends routing the sensor line directly to the NivuMaster without using additional clamps within the switching cabinet.
- Do not lay several sensor lines in a multi-core cable. Each sensor cable shall be laid separately.
- Lay sensor cables isolated from power lines and frequency-controlled motor lines.
- It is possible to extend the sensor cable up to 800 m (see also "Cable extension" on page 26). Always keep in mind that in case of voltage drops there is a minimum voltage of 18 V DC left for sensor supply.
The resistance of single wires shall not exceed 30 Ohm.
It is **not** allowed to use one common extension for different applications or one common extension for separate level measurements within one common signal cable.

19.5 Overvoltage Protection Precautions

For efficient sensor protection it is necessary to use overvoltage protection units on both sides if required. NIVUS recommends for sensor as well as for transmitter side overvoltage protection units Type SonicPro.



Fig. 19-8 Lines without overvoltage protection

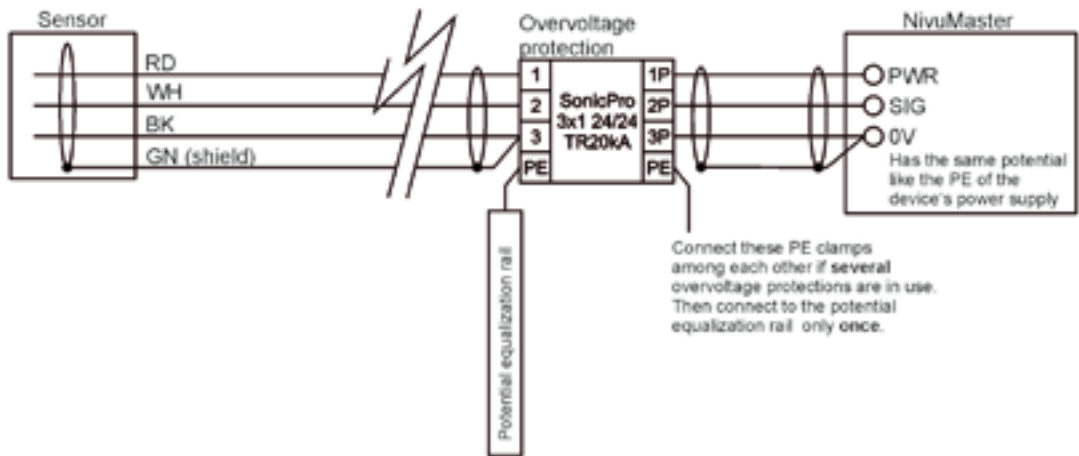


Fig. 19-9 Overvoltage protection on transmitter side

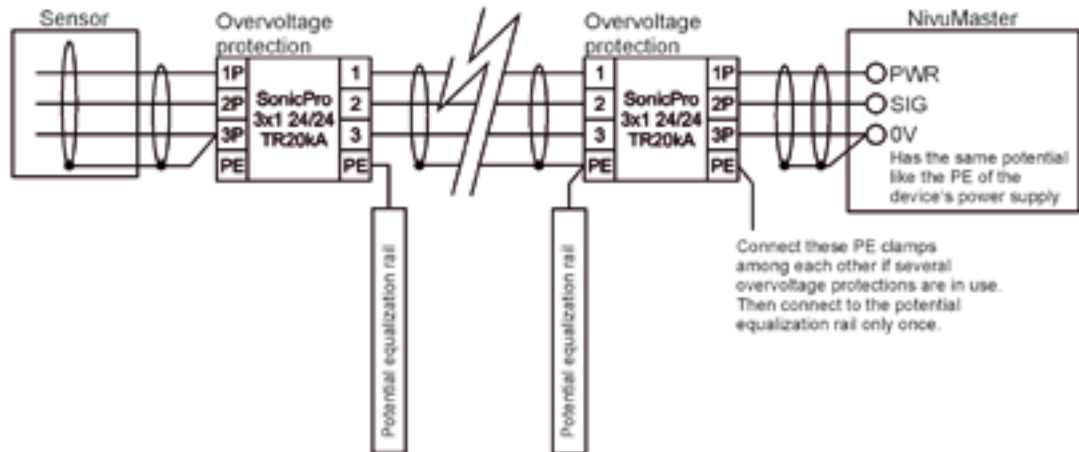


Fig. 19-10 Overvoltage protection on transmitter and sensor side

19.6 Installation in Ex zone

- C Prior to beginning and during installation works necessarily follow the hints in chapter “19.2 Hints on how to avoid electrostatic discharge (ESD)” to avoid damage to equipment and possible personal injuries in Ex areas.

19.6.1 Ex zone 1 version

The Ex zone 1 version of the R-Series sensors is supplied by the NivuMaster transmitter. This transmitter is fused against short circuits <math>< 1500 \text{ A}</math>. There are two extra 100 mA-fuses in the measurement transmitter (in the Non-Ex area).

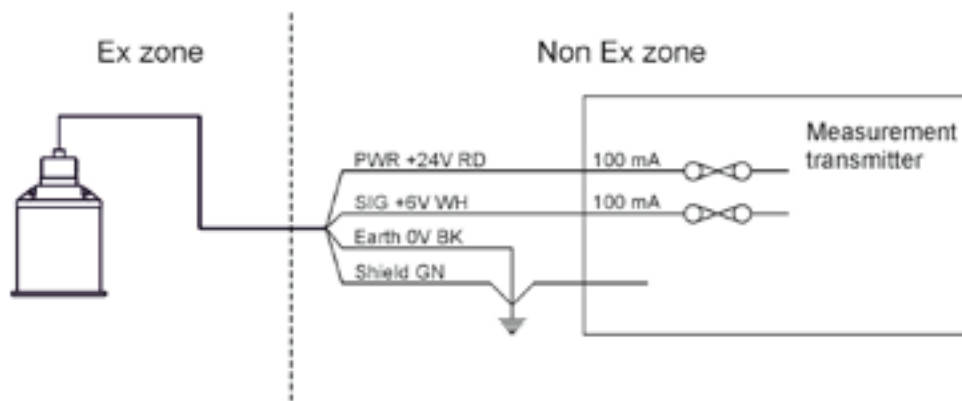


Fig. 19-11 Fuses in transmitter for Ex zone 1

The blue and orange jacketed wires are not used and remain within the cable sheath.

19.6.2 Ex zone 0 version

The NivuMaster transmitter for Ex zone 0 is the intrinsically safe sensor power supply (via a Zener barrier).

- Voltage:
 $U_i = 28 \text{ V}$, $I_i = 120 \text{ mA}$, $P_i = 0.83 \text{ W}$, $R_S \geq 234 \Omega$
- Signal:
 $U_i = 10 \text{ V}$, $I_i = 200 \text{ mA}$, $P_i = 0.5 \text{ W}$, $R_S \geq 50 \Omega$

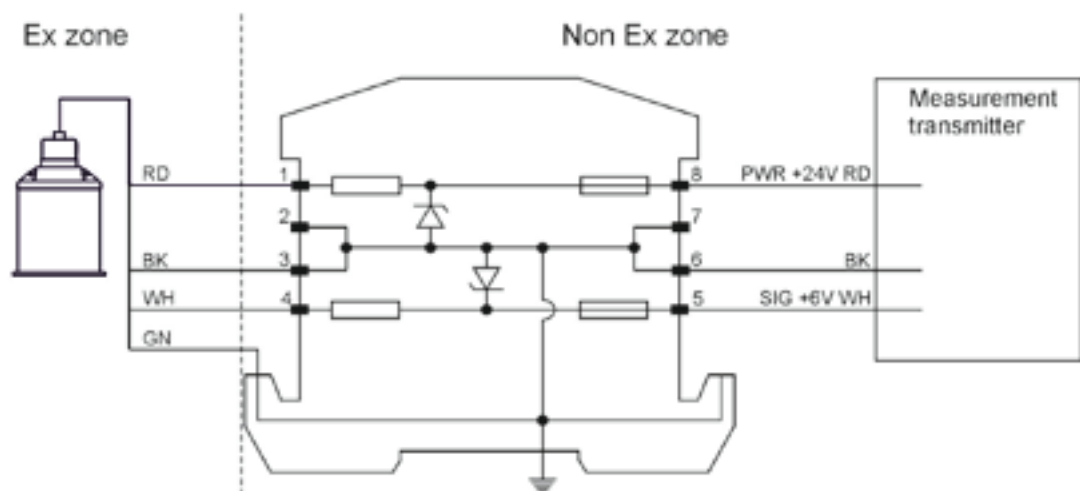


Fig. 19-12 Zener barriers (type ZUB0 NMR Z00) for Ex zone 0

WARNING



Special Conditions for Safe Use (Conditions of Certification)

The following conditions relate to safe installation and/or use of the equipment.

- I. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.
- II. The equipment must be routinely inspected to avoid the build-up of dust layers when installed in a Zones 20, 21, or 22.
- III. The equipment must only be connected to resistive intrinsically safe sources with minimum resistances as follows:
Power connection $R \geq 234 \Omega$
Signal connection $R \geq 50 \Omega$
TX connection $R \geq 50 \Omega$
RX connection $R \geq 50 \Omega$
- IV. When installing the equipment, the installer shall consider the length of integral cable attached to the equipment, in addition to any externally installed cable. The integral cable shall be considered to have parameters of 200 pF/m, and 1 μ H/m or 30 μ H/ Ω .

20 Electrical Installation

WARNING



Warning of electrical shock

Work on the electrical connections may only be performed with the supply voltage turned off.

Always observe the electrical data specified on the nameplate.

Disconnect the supplying transmitter NivuMaster from mains.

Disregarding may lead to electric shocks.

For electric installation the regulations in the respective countries must be referred to (in Germany e. g. VDE 0100).

For installation in wet environments or in areas featuring the risk of flooding it may be necessary to install extra protective measures such as a residual current device (RCD) if required. Check if the device's power supply needs to be integrated into the emergency shutdown concept of the facility.

Transmitters and sensors shall be installed completely before feeding the supply voltage. Check that the installation is correct.

The installation shall be carried out by qualified personnel only. Legal standards, provisions and technical regulations need to be observed.

20.1 Sensor cable laying



Avoid disturbances from electrical interferences

To avoid disturbances from electrical interferences, the sensor cable must not be laid close to engine (motor) lines or main power lines.

Risk of cable break

The minimum bending radius of the standard signal cable is 10 cm (3.94 in). Smaller radii may result in cable break.

21 Dielectric Constants for Materials

Dielectric constant (ϵ_0) is the ratio of the permittivity (the ability of a substance to store electrical energy in an electric field) of a medium to the permittivity of free space in a dimensionless property.

The value of dielectric constant of the product being measured is very important. In non-conductive products, some of the microwave energy will pass through the product (absorbed) and the rest will be reflected off the surface. This means that much lower reflected signal strength will be returned to the sensor.

R-series sensor is more sensitive to low dielectric constant materials, a common rule regarding dielectric constants is:

- Materials with $\epsilon_0 \geq 5$: There should be no issues.
- Materials with ϵ_0 between 1.9 and 5: Should be analysed and further information sought as to whether the signal strength returned to the sensor will offer what the customer requires (accuracy, measurement range etc.). Testing of application with a sensor prior to installation is advised.

Example Dielectric Constants ϵ_0			
Name	State	Degrees [Celsius / Fahrenheit]	Dielectric Constants ϵ_0
Acetone	Liquid	54.44 °C / 130 °F	17.7
Alcohol	Liquid		16...31
Ammonia	Liquid	23.89 °C / 75 °F	16.9
Ash	Powder	-17 °C / 1.7 °F	2
Butyl Acetate	Liquid	20 °C / 68 °F	5.01
Chlorine	Liquid	77 °C / 170.6 °F	1.7
Cement (Dry)	Granular		2.0
Clay	Powder		1.8...2.8
Diesel Fuel	Liquid		2.1
Ethyl Acetate	Liquid	20 °C / 68 °F	6.4
Flour	Powder		2.5...3.0
Gasoline	Liquid		2...2.2
Grain	Granular		3.0...8.0
Gravel			2.6
Lime			2.0
Methyl Ethyl Ketone (Mek)	Liquid	22.22 °C / 72 °F	18.4
Paint			5.0...8.0
Plastic Pellets	Solid		1.1...3.2
Rocksalt	Solid		6
Salt	Granular		3.0...15.0
Sand	Granular		9
Toluene	Liquid	20 °C / 68 °F	2.4
Water	Liquid	20 °C / 68 °F	80.4
Water, Salt	Liquid	21.11 °C / 70 °F	2.0
Wood Chips			2.3
Xylene	Liquid		2.2...2.6

Table 5 Dielectric Constants

Initial Start-up

22 Notes to the user



Required documentation

To put the entire system into operation it may be necessary to additionally consult the instruction manuals of the following accessories as well:

- § *Instruction Manual for Flow Measurement Transmitter NivuMaster Series*
- § *Instruction Manual for Flow Measurement Transmitter NivuMaster L2*

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

Before connecting and operating the R-series sensors the instructions below shall be followed.

This technical description / installation instruction contains any information required to properly connect and to operate R-Series sensors. The manual is intended for qualified personnel. Appropriate knowledge in the areas of measurement systems, automation technology, control engineering, information technology and wastewater hydraulics are preconditions for putting the R-series sensors into operation.

Read this manual carefully in order to guarantee proper function of the entire system.

In case of doubt regarding installation, connection or the setting of parameters contact our hotline:

- +49 (0) 7262 9191 955

To put the entire system into operation additionally consult the instruction manuals of the following accessories as well. These manuals are provided with the delivery of the accessories.

23 General

The entire measurement system shall not be put into operation before the installation has been finished and verified. It is required to thoroughly familiarise with the instruction manual prior to initial start-up.

After connecting transmitter and sensors, the parameters of the measurement place must be set according to the instruction manual by using the transmitter.

Maintenance and Cleaning

WARNING



Maintenance and Cleaning

Disconnect the instrument from mains power and safeguard the higher system against restart before you begin maintenance works (expert personnel only).

Disregarding may lead to electric shocks.

WARNING



Contamination by hazardous germs

Due to being frequently used in wastewater applications, some portions of the measurement system may be loaded with hazardous germs. This is why precautionary measures shall be taken while being in contact with the system, cables and sensors.

Wear protective clothing.

24 Maintenance

24.1 Maintenance interval

The R-series sensor is conceived to be virtually free of calibration, maintenance and wear. NIVUS recommends having the entire measurement system inspected by the NIVUS customer service **once per year**.

Depending on the area of use the maintenance intervals however may vary. Extent and intervals of maintenance depend on the following conditions:

- Measurement principle of the sensors
- Material wear
- Measurement medium and channel hydraulics
- General regulations for the operator of this measurement plant
- Ambient conditions

NIVUS recommends having the measurement system completely be inspected by the manufacturer after **latest ten years**.

Generally the verification of instruments and sensors is a basic measure in order to improve operational reliability and to increase the lifetime.

24.2 Customer Service Information

For the recommended annual inspection of the entire measurement system and/or the extensive inspection after latest ten years contact our customer service:

NIVUS GmbH – Customer Service

Phone +49 (0) 7262 9191 - 922

Customercenter@nivus.com

25 Cleaning

25.1 Sensor and Measurement place

WARNING



Disconnect instrument from mains

Disconnect the instrument from mains power before cleaning.

Disregarding may lead to electric shock.



Damage by hard objects

No hard objects such as wire brushes, rods, scrapers or similar shall be used to clean the sensor.

Using a high pressure cleaner may damage the sensor resulting in measurement failure and is therefore absolutely not allowed.

Risk of damage of the sensor.

The measurement place must be checked periodically.

Probably the measurement place has to be cleaned and must be kept free from vegetation. It may be necessary to clean the flow velocity sensor regularly in cause of pollution.

For cleaning the **measurement place** in general, use a brush with plastic bristles, a broom or similar. Clean the **sensor only** with a damp cloth!

Do **not** use sharp cleansing agents or solvents. Light household cleaners or soapy water can be used.

Do **not** remove built-in parts while cleaning the sensor.

The R-series sensor needs "clear view" to the surface of the measured media.

26 Dismantling/Disposal

Improper disposal may be harmful to the environment.

Ü Always dispose equipment components and packaging materials according to applicable local regulations on environmental standards for electronic products:

1. Disconnect the measurement system from mains power.
2. Use appropriate tools to remove the connected cables.
3. Remove the sensor from the holder.



EU WEEE-Directive

This symbol indicates that the Directive 2012/19/EU on waste electrical and electronic equipment requirements shall be observed on the disposal of the equipment.

27 Installation of spare parts and parts subject to wear and tear

We herewith particularly emphasise that replacement parts or accessories not supplied by NIVUS moreover are not certified and approved by NIVUS too. Installation and/or the use of such products hence may negatively influence predetermined constructional characteristics of the measurement system or even lead to instrument failures.

NIVUS cannot be held responsible for any damage resulting due to the use of non-original parts and non-original accessories.

28 Accessories

ZMS0 100	Ceiling mount
ZMS0 102	Wall mounting angle 300 mm, distance to wall infinitely adjustable
ZMS0 108	Wall mounting angle 600 mm, distance to wall infinitely adjustable
ZMS0 109	Wall mounting angle 1000 mm, distance to wall infinitely adjustable
USN0 AUSR-VA15	Alignment fixture for ultrasonic and radar sensors with 1½" thread made of stainless steel, 2" connection thread
ZUB0 NMR Z00	Zener barrier

Additional accessories and spare parts see valid NIVUS price list.

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Approvals and Certificates

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:



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

Bezeichnung:	Radarsensor R-Serie
<i>Description:</i>	<i>R-series sensor</i>
<i>Désignation:</i>	<i>Capteurs radar de la série R</i>
Typ / Type:	NMR-R...

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:

- 2014/30/EU
- 2014/35/EU
- 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 61326-1:2013
- EN 302 729: V2.1.1:2016
- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019

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:*

Ingrid Steppe (Geschäftsführerin / *Managing Director / Directeur général*)

Eppingen, den 25.10.2022

Gez. *Ingrid Steppe*

UK Declaration of Conformity

NIVUS GmbH
Im Tale 2
75031 Eppingen

Telefon: +49 07262 9191-0
Telefax: +49 07262 9191-999
E-Mail: info@nivus.com
Internet: www.nivus.de

For the following product:

Description:	R-series sensor
Type:	NMR-R...

we declare under our sole responsibility that the equipment made available on the UK market as of the date of signature of this document meets the standards of the following applicable UK harmonisation legislation:

- SI 2016 / 1091 The Electromagnetic Compatibility Regulations 2016
- SI 2016 / 1101 The Electrical Equipment (Safety) Regulations 2016
- SI 2017 / 1206 The Radio Equipment Regulations 2017
- SI 2012 / 3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:

- BS EN 61326-1:2013
- BS EN 302 729: V2.1.1:2016
- BS EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019

This declaration is submitted on behalf of the manufacturer:

NIVUS GmbH
Im Tale 2
75031 Eppingen
Germany

represented by:

Ingrid Steppe (Managing Director)

Eppingen, 25/10/2022

Signed by *Ingrid Steppe*

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

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

Für das folgend bezeichnete Erzeugnis:

For the following product:

Le produit désigné ci-dessous:

Bezeichnung:	"Ex" Radarsensor R-Serie
Description:	"Ex" R-Series sensor
Désignation:	"Ex" Capteurs radar de la série R
Typ / Type:	NMR-RxxxxxZ... ¹⁾ / NMR-RxxxxxE... ²⁾

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:

- 2014/30/EU
- 2014/34/EU
- 2014/35/EU
- 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 60079-0:2018
- EN 302 729 V2.1.1:2016
- EN 60079-11:2012 ¹⁾ only
- EN 61326-1:2013
- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN 60079-18:2015 + A1:2017 ²⁾ only

Ex-Kennzeichnung / Ex-designation / Marquage Ex :

 II 1G Ex ia IIC T4 Ga T_a=-20°C to +80°C ¹⁾

 II 1D Ex ia IIIC T135°C Da T_a=-20°C to +80°C ¹⁾

 II 2G Ex mb IIC T4 Gb T_a=-20°C to +80°C ²⁾

 II 2D Ex mb IIIC T135°C Db T_a=-20°C to +80°C ²⁾

EU-Baumusterprüfbescheinigung / EU-Type Examination Certificate / Attestation d'examen «UE» de type:

CML 18ATEX2193X Issue 0 ¹⁾

CML 18ATEX5194X Issue 0 ²⁾

Benannte Stelle (Kennnummer) / Notified Body (Identif. No.) / Organisme notifié (N° d'identification)

CML B.V., Koopvaardijweg 32, 4906CV Oosterhout, The Netherlands

(2776)

Qualitätssicherung ATEX / Quality assurance ATEX / Assurance qualité ATEX:

TÜV Nord CERT GmbH, Am TÜV 1, 45307 Essen, Germany

(0044)

Diese Erklärung wird verantwortlich für den Hersteller:

This declaration is submitted on behalf of the manufacturer:

Le fabricant assume la responsabilité de cette déclaration:

abgegeben durch / represented by / faite par:

Ingrid Steppe (Geschäftsführerin / Managing Director / Directeur général)

NIVUS GmbH
Im Täle 2
75031 Eppingen
Germany

Eppingen, den 25.10.2022

Gez. *Ingrid Steppe*

UK Declaration of Conformity

NIVUS GmbH
Im Tále 2
75031 Eppingen

Telefon: +49 07262 9191-0
Telefax: +49 07262 9191-999
E-Mail: info@nivos.com
Internet: www.nivos.de

For the following product:

Description:	"Ex" R-Series sensor
Type:	NMR-RxxxxxZ... ¹⁾ / NMR-RxxxxxE... ²⁾

we declare under our sole responsibility that the equipment made available on the UK market as of the date of signature of this document meets the standards of the following applicable UK harmonisation legislation:

- SI 2016 / 1091 The Electromagnetic Compatibility Regulations 2016
- SI 2016 / 1107 The Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016
- SI 2016 / 1101 The Electrical Equipment (Safety) Regulations 2016
- SI 2017 / 1206 The Radio Equipment Regulations 2017
- SI 2012 / 3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:

- BS EN 60079-0:2018
- BS EN 302 729 V2.1.1:2016
- BS EN 60079-11:2012 ¹⁾ only
- BS EN 61326-1:2013
- BS EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- BS EN 60079-18:2015 + A1:2017 ²⁾ only

Ex-designation:

⊕ II 1G Ex ia IIC T4 Ga Ta=-20°C to +80°C ¹⁾
⊕ II 1D Ex ia IIIC T135°C Da Ta=-20°C to +80°C ¹⁾
⊕ II 2G Ex mb IIC T4 Gb Ta=-20°C to +80°C ²⁾
⊕ II 2D Ex mb IIIC T135°C Db Ta=-20°C to +80°C ²⁾

EU-Type Examination Certificate:

CML 18ATEX2193X Issue 0 ¹⁾
CML 18ATEX5194X Issue 0 ²⁾

Notified Body (Identif. No.):

CML B.V., Koopvaardijweg 32, 4906CV Oosterhout, The Netherlands (2776)

Quality Assurance Ex:

TÜV Nord CERT GmbH, Am TÜV 1, 45307 Essen, Germany (0044)

This declaration is submitted on behalf of the manufacturer:

NIVUS GmbH
Im Tále 2
75031 Eppingen
Germany

represented by:

Ingrid Steppe (Managing Director)

Eppingen, 25/10/2022

Signed by *Ingrid Steppe*



CML 18ATEX5194X
Issue 0

11 Description

The NIVUS R-8 & NIVUS R-16 are DC powered level measurement sensor utilising radar technology. The sensor models are identical; differing in power outputs only. The sensor is housed in a non-metallic enclosure with integral five core cable which connects to control equipment located in the safe area providing power and data communication. The enclosure incorporates a threaded cap which allows the equipment to be mounted on a suitable bracket or flange.

The equipment is powered from a nominal 24Vdc power supply located in the safe area. The output of the sensor is sent via a signalling wire to external control equipment.

The equipment is fully encapsulated to allow use in areas requiring equipment protection levels Gb and Db and has the following ratings:

Um = 28Vdc (supply input)

Um = 6Vdc (signal connection)

12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	06/07/2018	R11818B/00	Issue of prime certificate

Note: Drawings that describe the equipment or component are listed in the Annex.

13 Conditions of manufacture

The following conditions are required of the manufacturing process for compliance with the certification.

- 13.1 Where the product incorporates certified parts or safety critical components the manufacturer shall ensure that any changes to those parts or components do not affect the compliance of the certified product that is the subject of this certificate.
- 13.2 Each piece of equipment shall be visually inspected. No damage shall be evident, such as cracks in the compound, exposure of encapsulated parts, flaking, inadmissible shrinkage, swelling, decomposition, failure of adhesion, or softening.

14 Special Conditions for Safe Use (Conditions of Certification)

The following conditions relate to safe installation and/or use of the equipment.

- 14.1 Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces (e.g. steam generation or windblown dust). In addition, the equipment shall only be cleaned with a damp cloth.
- 14.2 The equipment must be routinely inspected to avoid the build-up of dust layers when installed in Zones 21 or 22.
- 14.3 The equipment should not be used if there are any cracks or damage to the enclosure.

This certificate shall only be copied in its entirety and without change
www.CMLEx.com

2 of 3

Version: 7.0 Approval: Approved



CML 18ATEX5194X
Issue 0

- 14.4 The power supply and signal connections to the equipment shall each incorporate a 100mA fuse located in the safe area. The fuses shall have a minimum breaking capacity of 1500A.
- 14.5 The equipment shall only be installed in areas where there is a low risk of mechanical danger.

This certificate shall only be copied
in its entirety and without change
www.CMLEx.com

3 of 3

Version: 7.0 Approval: Approved

Certificate Annex



Certificate Number CML 18ATEX5194X
Equipment NIVUS R-8 & NIVUS R-16
Manufacturer NIVUS GmbH

The following documents describe the equipment or component defined in this certificate:

Issue 0

Drawing No	Sheets	Rev	Approved date	Title
D-804-1304-A	1 of 1	A	06/07/2018	NIVUS Ex mb R-8 & R-16 mmWave Radar wrap-around Labels

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Version: 7.0 Approval: Approved



EU Type Examination Certificate CML 18ATEX2193X Issue 0

- 1 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU
- 2 Equipment **NIVUS R-8z & NIVUS R-16z**
- 3 Manufacturer NIVUS GmbH
- 4 Address Im Tale 2,
D-75031 Eppingen,
Germany
- 5 The equipment is specified in the description of this certificate and the documents to which it refers.
- 6 Certification Management Limited, Unit 1 Newport Business Park, New Port Road, Ellesmere Port CH65 4LZ, UK, Notified Body Number 2503, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 12.

- 7 If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to conditions of safe use (affecting correct installation or safe use). These are specified in Section 14.
- 8 This EU Type Examination certificate relates only to the design and construction of the specified equipment or component. Further requirements of Directive 2014/34/EU Article 13 apply to the manufacture of the equipment or component and are separately certified.
- 9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN 60079-0:2012:A11:2013

EN 60079-11:2012

- 10 The equipment shall be marked with the following:



Ex Ia IIC T4 Ga

Ta= -20°C to +80°C



Ex Ia IIIC T135°C Da

Ta= -20°C to +80°C



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11 Description

The NIVUS R-8z and NIVUS R-16z are DC powered level measurement sensor utilising radar technology. The sensor models are identical; differing in power outputs only. The sensor is housed in a non-metallic enclosure with integral five core cable which connects to control equipment located in the safe area providing power and data communication. The enclosure incorporates a threaded cap which allows the equipment to be mounted on a suitable bracket or flange.

Intrinsic safety is achieved by connecting to the non-hazardous area via intrinsically safe interface devices, and by encapsulation of the electronics and sensor.

The equipment has the following safety description:

Power Port		Signal Port		RX port		TX port	
Ui	= 28V	Ui	= 10V	Ui	= 10V	Ui	= 10V
Ii	= 120mA	Ii	= 200mA	Ii	= 200mA	Ii	= 200mA
Pi	= 0.83W	Pi	= 0.5W	Pi	= 0.5W	Pi	= 0.5W
Ci	= 5nF	Ci	= 0	Ci	= 0	Ci	= 0
Li	= 0	Li	= 0	Li	= 0	Li	= 0
				Uo	= 6.51V	Uo	= 6.51V
				Io	= 208mA	Io	= 208mA

12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	06/07/2018	R11818A/00	Issue of prime certificate

Note: Drawings that describe the equipment or component are listed in the Annex.

13 Conditions of manufacture

The following conditions are required of the manufacturing process for compliance with the certification.

- 13.1 Where the product incorporates certified parts or safety critical components the manufacturer shall ensure that any changes to those parts or components do not affect the compliance of the certified product that is the subject of this certificate.

14 Special Conditions for Safe Use (Conditions of Certification)

The following conditions relate to safe installation and/or use of the equipment.

- 14.1 Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.
- 14.2 The equipment must be routinely inspected to avoid the build up of dust layers when installed in a Zones 20, 21, or 22.

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- 14.3 The equipment must only be connected to resistive intrinsically safe sources with minimum resistances as follows
- Power connection $R \geq 234\Omega$
 - Signal connection $R \geq 50\Omega$
 - TX connection $R \geq 50\Omega$
 - RX connection $R \geq 50\Omega$
- 14.4 When installing the equipment, the installer shall consider the length of integral cable attached to the equipment, in addition to any externally installed cable. The integral cable shall be considered to have parameters of 200pF/m, and 1μH/m or 30μH/Ω

Certificate Annex



Certificate Number CML 18ATEX2193X
Equipment NIVUS R-8z & NIVUS R-16z
Manufacturer NIVUS GmbH

The following documents describe the equipment or component defined in this certificate:

Issue 0

Drawing No	Sheets	Rev	Approved date	Title
D-804-1284-B	1 of 1	B	06/07/2018	NIVUS Ex ia R-8z & R-16z mmWave Radar wrap-around Labels

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Certificate and File Transfer

This document confirms the transfer of the following referenced certificates and files.

Receiving Notified Body:

CML B.V.,
Koopvaardijweg 32,
4906CV Oosterhout,
The Netherlands
(Notified Body number 2776)

(Original) Issuing Notified Body:

Certification Management Limited (Eurofins E&E CML Limited)
Newport Business Park,
New Port Road,
Ellesmere Port
CH65 4LZ
United Kingdom
(Notified Body number 2503)

Manufacturer:

NIVUS GmbH
Im Täle 2,
75031 Eppingen,
Germany

Certificates transferred

CML 18ATEX2193X
CML 18ATEX5194X

The manufacturer may use this document as evidence of continuity of certification.

Where the certification documentation or markings require updating to reflect the transfer, for example, change to Notified Body number, this is permitted without submission of updated documentation to CML.

The manufacturer shall apply to CML for any other changes to the product design.

Signed

On behalf of
CML B.V.

D R Stubbings MIET

Technical Director

Tuesday, 08 December 2020

On behalf of
CML UK

A C Smith

Technical Operations Director

Tuesday, 08 December 2020

On behalf of
NIVUS GmbH

Samuel Seiter

Ex Representative

Tuesday, 08 December 2020

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