FLOW

Technical Description

Doppler Sensors

Revised Instruction Manual

Document Revision 04 / 13.06.2024

Original Instruction Manual: German / Rev. 04 / 13.06.2024

Valid from serial number: JJKW KDA 05000

Always use the technical description as a whole with the installation instructions for correlation and Doppler sensors

measure analyse optimise

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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
04	NIVUS addresses updated; Chap. "Revision History" and "Index" added; various illustrations updated; Chap. "1 About this Manual", "17 Equipment/Sensor Versions" and "18 Specifications" updated; Chap. "Installation and Connection" and "Maintenance and Cleaning" updated; information on "FEP Coating" removed; document structure changed/updated; list of illustrations removed; Chap. "Approvals and Certificates" updated	MoG	13.06.2024
03	Skipped	-	-
02	Skipped	-	-
01	Dimensional drawing for Pressure Compensation Element supplemented	DMR	11.09.2012
00	New Creation	DMR	12.07.2010

Tab. 1 Change Overview

Table of Contents

General

1 About this Manual

Important

READ CAREFULLY BEFORE USE.

KEEP IN A SAFE PLACE FOR LATER REFERENCE.

This **Technical Description** is for the Doppler sensors and serves their intended use. This instruction manual is oriented exclusively to qualified expert personnel.

The technical description is a supplement to the **Installation Instructions for Cross-Correlation and Doppler Sensors**, which contain all the basic information and procedures for installing the sensors, installation accessories, tools and tips.

Both instructions for the Doppler sensors must be used as a unit.

Read these instruction manuals carefully and completely prior to installation or connection since they contain 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 technical description.

- Mounting Instruction Cross Correlation and Doppler Sensors
- Instruction manual for the respective flow measurement transmitter/data logger

These manuals are provided with the respective devices or sensors 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
	Documentation Reference	Refers to an accompanying documentation
>Text<	Parameter or menu	Indicates a parameter or a menu that is to be selected or is described

Tab. 2 Structural elements within the manual

1.3 Colour code for wires and single conductors

The abbreviations of colours for wire and single conductor labelling 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 and Danger Information

2 Used Symbols and Signal Words

2.1 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.

2.2 Warning Notices on the Device (optional)

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.

Protective earth connection

This symbol refers to the protective conductor terminal of the device.
Depending on the type of installation, the unit may only be operated with a suitable protective earth connection in accordance with applicable laws and regulations.

3 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 ***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 cables and sensors.

Wear protective clothing.

WARNING ***Observe Occupational Safety Regulations***

Installation, mounting, commissioning and maintenance shall only be carried out by appropriately trained personnel. Before beginning mounting works, compliance with all work safety regulations must always be checked.

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.

4 Warranty

The sensors were functionally tested prior to shipping. When used for the intended purpose (see Chap. "6 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 "5 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.

5 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 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-dependent 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 equipment 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.

6 Intended Use

Important Notice

The sensors are intended exclusively for the purpose mentioned below.
Any other use beyond this or modification of the sensors without written agreement with the companies of the NIVUS GmbH is considered improper use. The companies of the NIVUS GmbH are not liable for any damage resulting from this.

The operator alone bears the risk.

The KDA Doppler sensor is designed to measure the flow velocity in slightly to heavily polluted media in part filled and full canals, pipes, flumes or similar. Depending on the design/type, it is also possible to measure the fill level.

The sensors are 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 "18 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.

Note

For installation and commissioning observe the following points:

- *Declaration of Conformity*
- *Test certificates of the respective authorities*
- *Applicable national regulations*

7 Ex Protection

The KDA Doppler sensors partly are designed for use in areas with explosive atmospheres of zone 1 (ATEX approval). See also Chap. "17 Equipment/Sensor Versions".

As a general rule, maintenance and repair shall only be carried out **outside** the Ex area.

Sensor Approvals

Transducers		II 2G Ex ib IIB T4 Gb IBExU 07 ATEX 1082 Edition 1

DANGER

Danger by electrostatic Discharge

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.

Validity of the Ex Approval

The ATEX approval is only valid in conjunction with the corresponding marking on the nameplate of the sensors.

Declarations of Conformity and Test Certificates

For installation and commissioning, the EU declarations of conformity and test certificates of the approving body must be strictly observed.

The Ex-version of the sensors is matched to the corresponding NIVUS transmitters regarding the assessment of intrinsically safe electrical systems according to EN 60079-25.
When using transmitters from other manufacturers, the operator must carry out a system assessment in accordance with EN 60079-25.

The technical data required here for the Ex version of the sensors can be found in the EU type examination certificate.

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)

Connections

As the operator, before activating the measurement system, make sure that the local regulations (e.g. for the electrical connection) 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 sensors, 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 transit time sensors comprises:

- Doppler sensor KDA (quantity and type according to delivery documents)
- Technical description (with EU Declarations of Conformity and respective Ex Certificates) including all information required for operation of the sensors (printed copy or link to the NIVUS download centre)
- Installation instructions for correlation and Doppler sensors (printed copy or 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 "18 Specifications".

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

13 Transport

Protect the sensors from strong impacts, shocks, jolts or vibrations. Transport must be carried out 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 sensor to NIVUS GmbH in Eppingen carriage paid and in the original packaging.

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

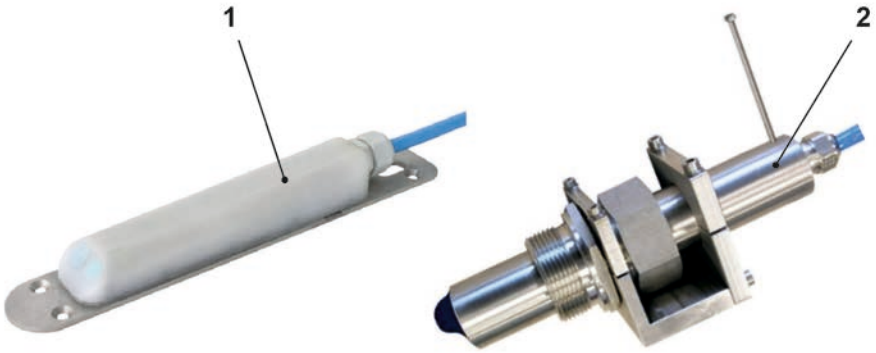
In general, a return note (incl. RMA return number) must be requested from the NIVUS customer service before returning the goods. Without this RMA number, the incoming goods cannot be assigned accordingly.

⇨ See Chap. "23.4 Customer Service Information".

Product Specification

15 Sensors in Overview

The sensors shown are designed for connection to NIVUS transmitters. They are always matched as pairs ex works and must be used/connected accordingly.

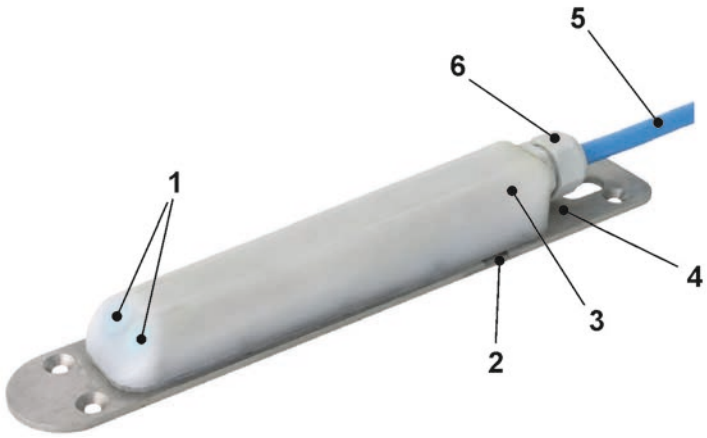


1 Compact Doppler Wedge Sensor

2 Compact Doppler Pipe Sensor with sensor fastening element

Fig. 15-1 Overview of sensors

15.1 Individual Sensor Overviews



1 Transducer/sensor for flow velocity measurement

2 Transducer/sensor for level measurement via pressure (optional)

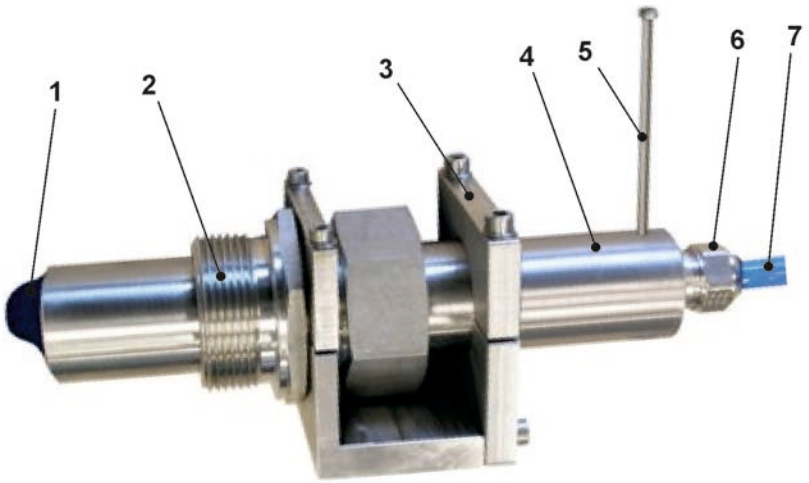
3 Sensor body

4 Mounting plate

5 Sensor cable

6 Cable gland

Fig. 15-2 Structure wedge sensor



1 Transducer/sensor for flow velocity measurement
2 Sensor screw connection (movable)
3 Fastening element
4 Sensor body
5 Alignment Aid (screw M4)
6 Cable gland
7 Sensor cable

Fig. 15-3 Structure pipe sensor

16 Device ID

The information in this technical description only applies to the sensor types indicated on the title page.

The nameplates are attached to the mounting/base plate or the sensor body or at the end of the cable (protected by means of a transparent protective tube) 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 (2303…..)
- Ex protection marking (for sensors in Ex version)
- Ambient conditions in operation (for sensors in Ex version)

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

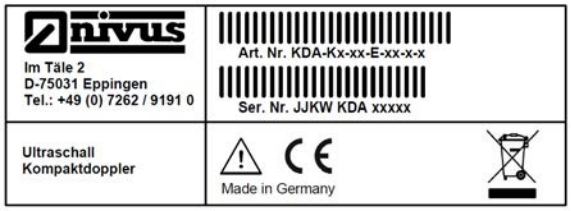


Fig. 16-1 Nameplate Sensor KDA (Example Wedge Sensor Ex Version)

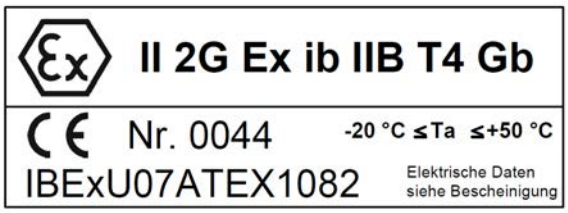


Fig. 16-2 Nameplate (additional) Sensor KDA (Example Wedge Sensor Ex Version)

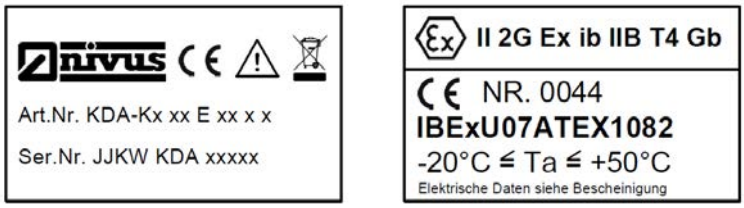


Fig. 16-3 Ex Nameplates Wedge Sensor KDA on cable tail

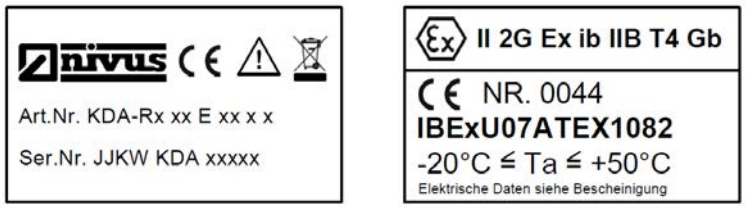


Fig. 16-4 Ex Nameplates Pipe Sensor KDA on cable tail

Check nameplates

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

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

17 Equipment/Sensor Versions

The sensors are manufactured in various designs and also differ in cable lengths, cable connections and various special designs and materials.

The article number is located at the entrance of the cable into the sensor body as well as at the end of the cable on a nameplate applied to the cable sheath. These are protected against weathering and abrasion by means of a transparent heat shrink tubing.

KDA-	Compact Doppler active sensor					
	Design/Type					
	K010	Wedge sensor for fastening on channel bottom or by using the RMS2 pipe mounting system				
	KP10	Combi wedge sensor with integrated pressure measurement cell, suitable for simultaneous flow velocity and level measurement; For fastening on channel bottom or by using the RMS2 pipe mounting system				
	R007	Pipe sensor for installation with G1$^1/_2$“ screw thread				
		ATEX Approval				
		0	None			
		E	Zone 1			
			Cable length (max. 150 m / max. possible 30 m with sensor type KP)			
			10	10 m		
			15	15 m		
			20	20 m		
			30	30 m		
			40	40 m		
			50	50 m		
			60	60 m		
			70	70 m		
			80	80 m		
			90	90 m		
			99	100 m		
			XX	Special length upon request		
				Sensor Connection		
				K	Cable end pre-assembled, for Types K0 and R0	
				L	Cable end pre-assembled, for Type KP	
					Pipe length (0 with wedge sensor)	
					0	Only for wedge sensor (due to system limitations)
					2	20 cm (standard)
					3	30 cm (minimum length for stop ball valve)
					X	Pipe length in dm
					G	20 cm + extension thread
KDA-						

Tab. 3 Product Structure

⇨ Accessories see Chap. "27 Accessories (Option)".

18 Specifications

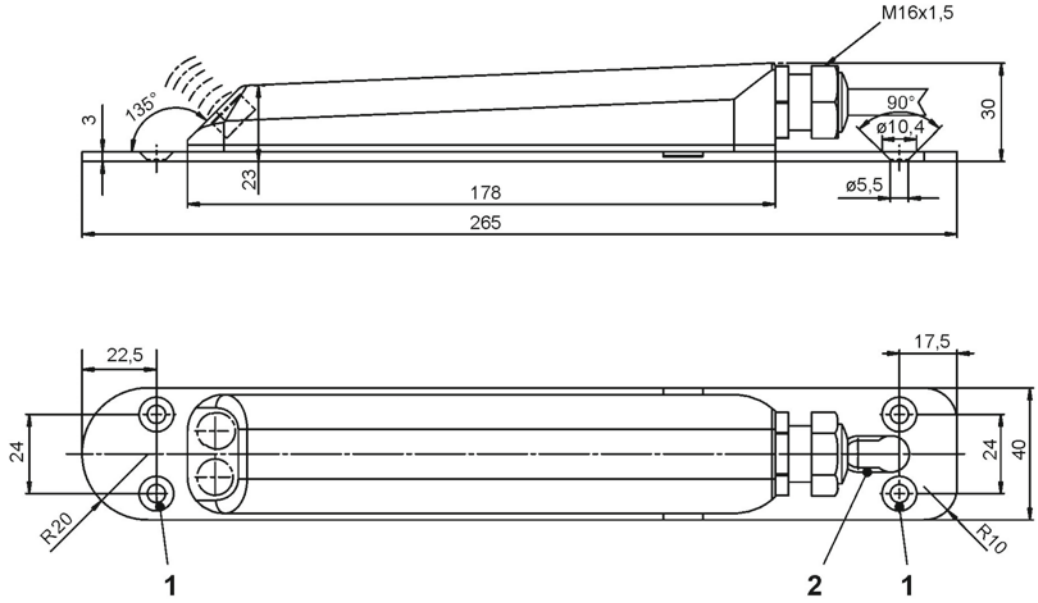
Measurement Principles	• Doppler (Flow Velocity) • Piezoresistive Pressure Measurement (Level Measurement)
Measurement Frequencies	• Wedge Sensors: 1 MHz • Pipe Sensors: 750 kHz
Protection	IP68
Ex Approvals (option) / other Approvals (option)	ATEX: IBExU 07 ATEX 1082 Edition 1 Ⓔx II 2G Ex ib IIB T4 Gb
Operation Temperature	-40 °C…+50 °C (also for use in Ex-Zone 1)
Storage Temperature	-40 °C…+70 °C
Operating pressure	Max. 4 bar (combi sensor with pressure element max. 1 bar)
Cable Lengths	10/15/20/30/40/50/60/70/80/90/100 m; pre-assembled; extendable upon request; for sensors with an integrated pressure measurement cell, a pressure compensation element is required for cable lengths over 30 m, which can also be used to connect an extension
Cable Types	• Sensors without pressure measurement: LiYC11Y 2x1.5 + 1x2x0.34 • Combi sensor with pressure measurement: LiYC11Y 2x1.5 + 1x2x0.34 + PA1.5/2.5
Outside Cable Diameter	• Sensors without pressure measurement: 8.4 mm ±0.25 mm • Combi sensor with pressure measurement: 9.75 mm ±0.25 mm
Sensor Connection	Connection "K" or "L": for connection to OCM F / OCM FR (OCM FR only in German-speaking countries)
Sensor Types	• (Pipe/wedge) flow velocity sensor with v-measurement using the Doppler measurement principle and temperature measurement (to compensate for the effect of temperature on the speed of sound) • Wedge combi sensor with v-measurement using the Doppler measurement principle; level measurement via pressure and temperature measurement (to compensate for the effect of temperature on the speed of sound)
Designs	• Wedge sensor for installation on the channel bottom • Pipe sensor for installation using nozzle, sensor screw connection and fastening element in pipes
Medium contacting Materials	• PVDF (wedge sensor body) • Stainless steel 1.4571/AISI 316 Ti; V4A (ground plate or pipe sensor jacket) • Polyurethane (cable sheath, cable gland and pipe sensor head) Additionally with sensors with pressure measurement cell: • Stainless steel 1.4404 (AISI 316L); V4A (pressure measurement cell) • Viton® Shore A (round sealing ring / gasket)

Flow Velocity Measurement	
Measurement Range	-600…+600 cm/s
Measurement Uncertainty	±1 % from full scale end value
Zero Point Drift	Absolutely stable zero point
Beam angle	±5 degrees of angle
Temperature Measurement / Sound Velocity Measurement	
Measurement Range	-20…+50 °C
Measurement Error	±0.5 K
Level Measurement - Pressure	
Measurement Range	0.005…5 m
Zero Point Drift	Max. 0.75 % of final value (0…50 °C)
Measurement Uncertainty (standing medium)	±0.5 % of final value (in range 0.005…3.5 m)

Tab. 4 Specifications KDA sensors

Installation and Connection

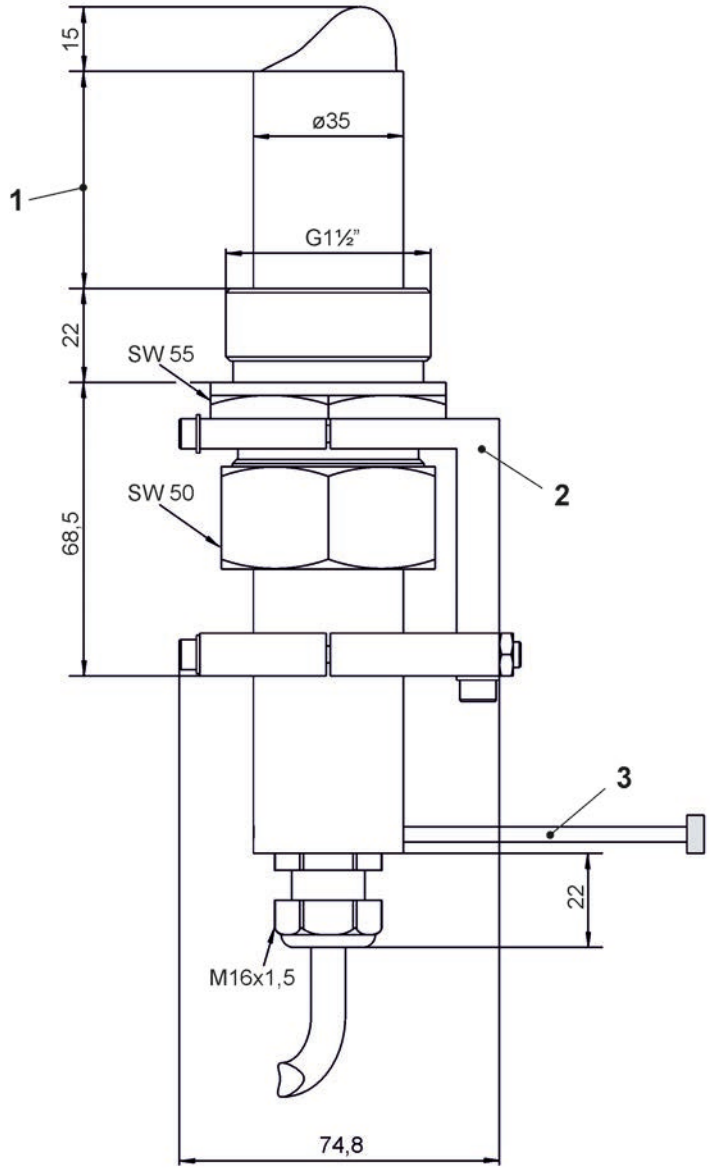
19 Sensor Dimensions



1 Countersink (in accordance with DIN EN ISO 15065:2005-05) for direct mounting

2 Slotted holes for fastening on pipe mounting system

Fig. 19-1 Dimensions wedge sensor



1 Movable; 200 mm or 300 mm (with stop valve)

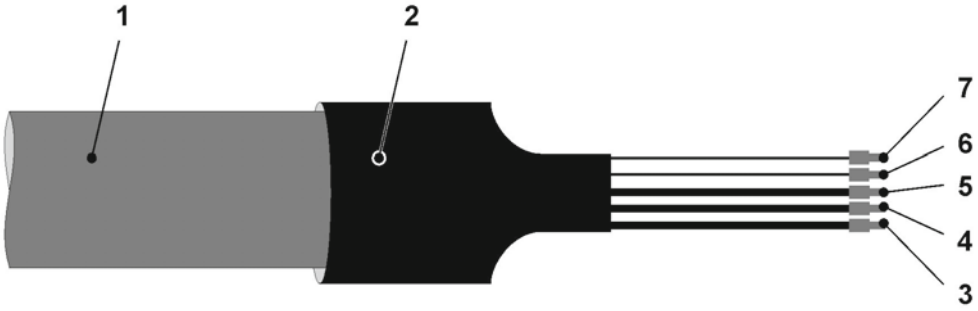
2 Fastening element

3 Alignment aid 180° to flow direction

Fig. 19-2 Dimensions pipe sensor

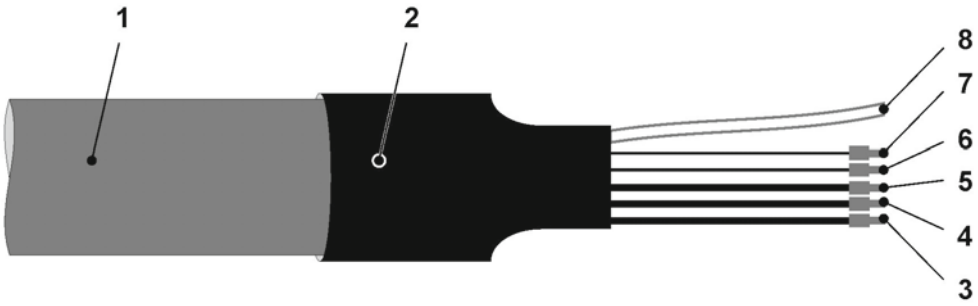
20 Sensor cable

20.1 Cable Layouts



1 Cable sheath
2 Heat shrink tubing
3 BK (black); cable shield (no earthing)
4 RD (red); power supply +;
max. 8.7 V with Ex version / max. 24 V with non-Ex version
5 BU (blue); power supply -
6 WH (white); RxTx +
7 GN (green); RxTx -

Fig. 20-1 Cable tail layout sensors without pressure measurement cell



1 Cable sheath
2 Heat shrink tubing
3 BK (black); cable shield (no earthing)
4 RD (red); power supply +;
max. 8.7 V with Ex version / max. 24 V with non-Ex version
5 BU (blue); power supply -
6 WH (white); RxTx +
7 GN (green); RxTx -
8 Air compensation hose

Fig. 20-2 Cable tail layout sensors with pressure measurement cell

20.2 Cable Extension

The sensor cable of the sensor can be extended, depending on the sensor connection (see Tab. 5) and taking into account the basic conditions described below.

DANGER

Risk of personal injury

Observe the maximum possible cable lengths in the Ex area.

See Type Examination Certificate(s) at the end of these instructions.

Only allow work to be carried out by qualified specialists

Cable extensions and sensor connections may only be carried out by qualified personnel. This is to prevent damage to the sensor.

Observe contact resistances and information on the junction box

Improper connections that create increased contact resistances or the use of incorrect cables may lead to disturbances or measurement failure.

If you extend the sensor cable via a junction box, use a metal junction box.
Be sure to connect the shield of the incoming and outgoing cable to the junction box ground.

Basic Conditions for Cable Extension

If the cables are to be extended, the preparation of an intrinsic safety certificate is required.

For this, the following **points/specifications** must be considered/included:

- The cable specifications of the cable extension used and the sensor cable.
- When using overvoltage protection elements, additionally their internal capacitance and inductance.
- The capacitances and inductances that can be connected for the supply circuit.
- The capacitances and inductances that can be connected for the RS485 circuit.

Moreover, the following two **conditions** must be met during project planning, selection and installation in accordance with EN 60079-14:

- $C_o \geq C_i + C_k$
- $L_o \geq L_i + L_k$

with

C_o = maximum permissible external capacitance of the corresponding transmitter circuit

C_i = effective internal capacitance of the KDA sensor and, if used, of the overvoltage protection element for the corresponding circuit

C_k = Total cable capacitances of the sensor cable and the cable extension used for the corresponding circuit

L_o = maximum permissible external inductance of the corresponding transmitter circuit

L_i = effective internal inductance of the KDA sensor and, if used, of the overvoltage protection element for the corresponding circuit

L_k = Total cable inductances of the sensor cable and the cable extension used for the corresponding circuit

NIVUS Cable Specifications for the KDA Doppler Sensor

- Cable capacitance (blue/red): 100 pF/m
- Cable inductance (blue/red): 0.76 µH/m

These values are of great importance in an Ex application if the operator has to provide an intrinsic safety certificate for his plant and has to consider the connectable external capacitance C_o or inductance L_o.

Laying cables in the Ground

The cable permanently connected to the sensor is not intended for permanent direct burial. If the cable is to be laid in the ground, sand, gravel or similar, then use additional protective tubes or protective hoses.

Select the inner diameter, bending radius and type of installation of these additional protective guides in such a way that the installed signal cable can be removed without problems afterwards and a new signal cable can be pulled in.

Possible Cable Extensions

Sensor Connection		Cable Extension
K	Sensor without pressure measurement cell, cable end pre-assembled for connection to OCM F / OCM FR (OCM FR only in German-speaking countries)	Cable extension with single shielded signal cable.
L	Sensor with pressure measurement cell, cable end pre-assembled for connection to OCM F / OCM FR (OCM FR only in German-speaking countries)	Cable extension is only possible if the pressure compensation element type *ZUB0 DAE* by NIVUS is used: Connect the sensor cable end to the terminals of the junction box of the pressure compensation element and extend it from there with a single shielded signal cable.

Tab. 5 Cable extensions depending on the connection

Max. Cable Length for Ex Sensors

Ex sensors can be extended to a max. cable length of 150 meter.

For extension NIVUS recommend cable type A2Y(L)Y 6x2x0.8 (or higher number of conductors).

➲ Procedure for cable extension with cable type A2Y(L) 2Y:

1. Extend the two twisted signal lines (RxTx) for bus communication with one wire each.
2. Combine the remaining cores in equal numbers to form two core strands for UE+ and for GND.
3. Depending on the distance between the sensor and the transmitter, extend these core strands with one or more parallel-connected core(s) per connection line.
   Solder or crimp parallel wires for UE+ and GND together for each supply line.

Tab. 6 shows the overview for the minimum number of conductors per connection for the **signal cable** type A2Y(L) 2Y.

The minimum number of cores per connection is specified as follows:

- x(y)

with

x = min. total number of conductors incl. data lines

y = Conductors for power supply + and -

The cable lengths given below refer to **non-Ex sensors**.

Extension to	Minimum number of cores per connection Sensor - Transmitter		Remarks
	10 m Cable on Sensor	30 m Cable on Sensor	
30 m	4 (2)	not applicable	-
50 m	4 (2)	4 (2)	-
70 m	4 (2)	4 (2)	-
100 m	4 (2)	4 (2)	-
150 m	6 (4)	6 (4)	-
200 m	6 (4)	6 (4)	-
250 m	8 (6)	8 (6)	Commissioning by NIVUS service required

Tab. 6 Minimum number of conductors per connection

Cable Extension with other Cable Types:

- Internationally, signal cables of other types with a minimum diameter of 0.8 mm and a common cable shield can be used. If you are uncertain about the suitability of the signal cable, contact NIVUS and enclose a detailed cable type data sheet.
- Extension by equivalent cables with other cross-sections on request.

Joint extensions not permitted

Joint extensions of different applications or joint extensions of separate level and flow velocity measurements in a common signal cable are not permitted.

21 Pressure Compensation Element

21.1 General

Sensors with integrated pressure measurement cell may only be operated with a NIVUS pressure compensation element.

The pressure equalisation element is provided with two drying capsules or with drying granulate. These prevent moisture from penetrating and protect the electronics.

- Check the drying capsules / granulate (depending on the environment) at regular intervals.
- Replace the drying capsules / drying granulate if necessary.
- Observe the maintenance information in Chap. "23.1.2 Pressure Compensation Element".

CAUTION

Sensor damage due to moisture ingress

Penetrating moisture can irreparably destroy the electronics inside the sensor.

- *Always operate sensors with integrated pressure measurement cell with pressure compensation element. The drying granulate / drying capsules prevent the ingress of moisture.*
- *Never operate sensors with integrated pressure measurement cell without or with used drying granulate / drying capsules.*
- *Check drying granulate / drying capsules regularly and replace if necessary.*

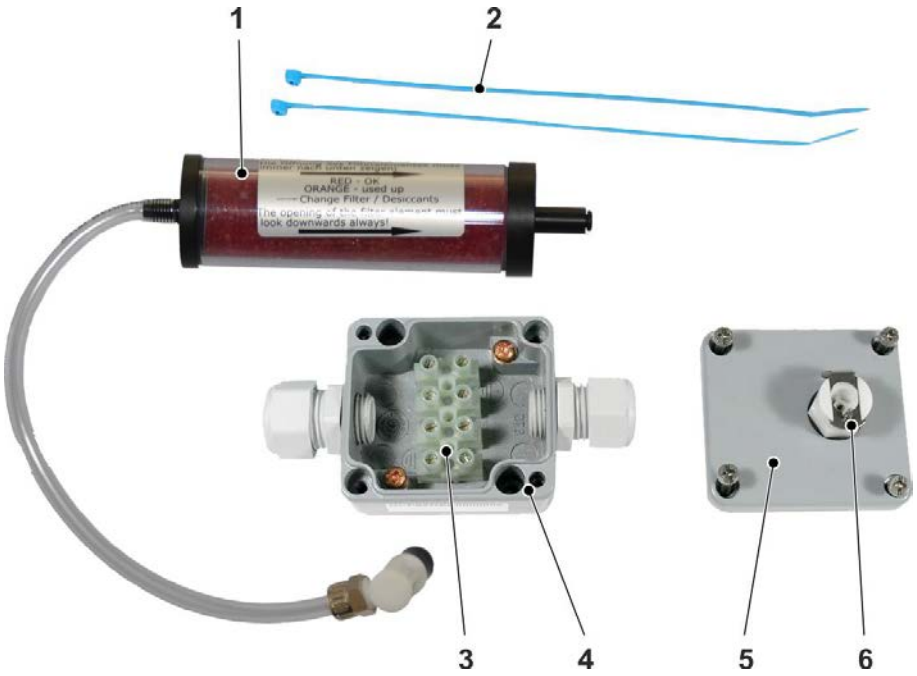
Accessories see Chap. "27 Accessories (Option)".

For sensors with pressure measurement cell, the cable of the sensor must not be extended. The maximum uninterrupted cable length is 30 m. A junction box with pressure compensation (pressure compensation element) must then be installed to extend the cable.

This pressure compensation element must also be installed if the cable of a sensor with integrated pressure measurement cell is to be connected directly to a transmitter of the types OCM F / OCM FR.

It is available at NIVUS under item number *ZUB0 DAE*.

The NIVUS pressure compensation element consists of several parts:

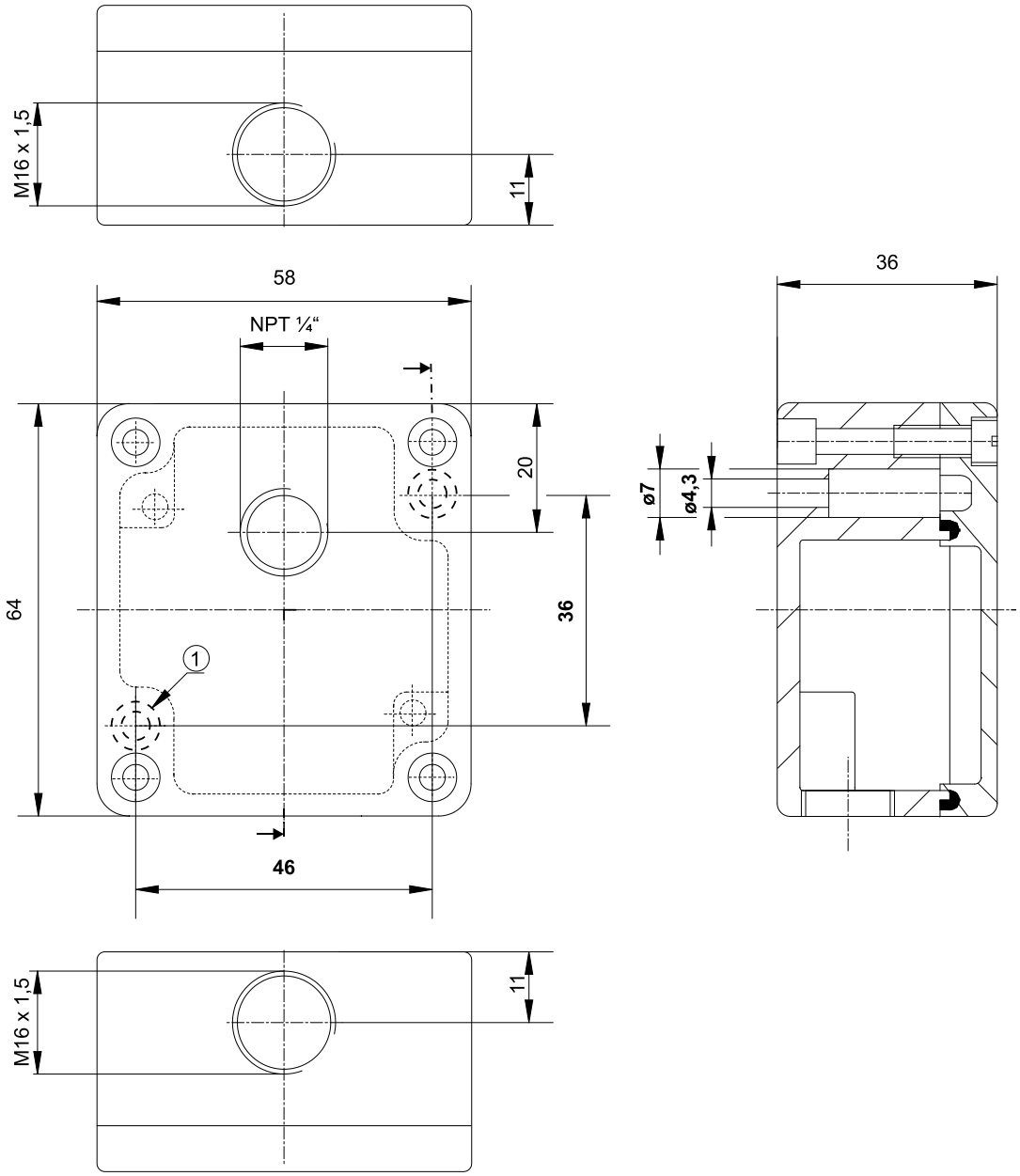


1 Filter element consisting of air filter, air hose and air hose connector
2 Cable tie
3 Terminal Clamps
4 Junction box
5 Junction box cover
6 Self-closing socket for the air hose connector

Fig. 21-1 Parts of the pressure compensation element

1 Shield connection
2 Air hose
3 Side to transmitter
4 Terminal Clamps
5 Side to flow velocity sensor

Fig. 21-2 Junction box, open



1 Holes for fastening

Fig. 21-3 Junction box, dimensions

21.2 Connecting Pressure Compensation Element and Air Filter

Important Notice

Install the junction box with air pressure compensation in an area where there are no corrosive gases and which is permanently protected from any flooding.

The shields of the incoming and outgoing cable must be connected to the shield connections of the metal junction box. Otherwise, measurements may be distorted or fail.

*The filter cover of the air filter must **always point downwards** to protect it from water drops.*

For the extension from the junction box to the transmitter use a signal cable type A2Y or another suitable signal cable with integrated common shield.

➲ Procedure:

1. Connect the 5-core cable coming from the sensor identically to the terminal strip in the junction box. Make sure that only the power supply (RD + BU) and the signal bus lines (WH + GN) are connected to the terminal strip (Fig. 21-2).
2. Connect the cable shield (BK) to one of the two shield connection terminals located in the box (Fig. 21-2 Pos.1).
3. Attach the air filter to one of the two cables with the two cable ties supplied so that the filter cover points downwards (Fig. 21-4).
4. Snap the air hose connector into the socket integrated in the cover (Fig. 21-1 Pos. 6).
5. Put on the junction box cover and screw it on.

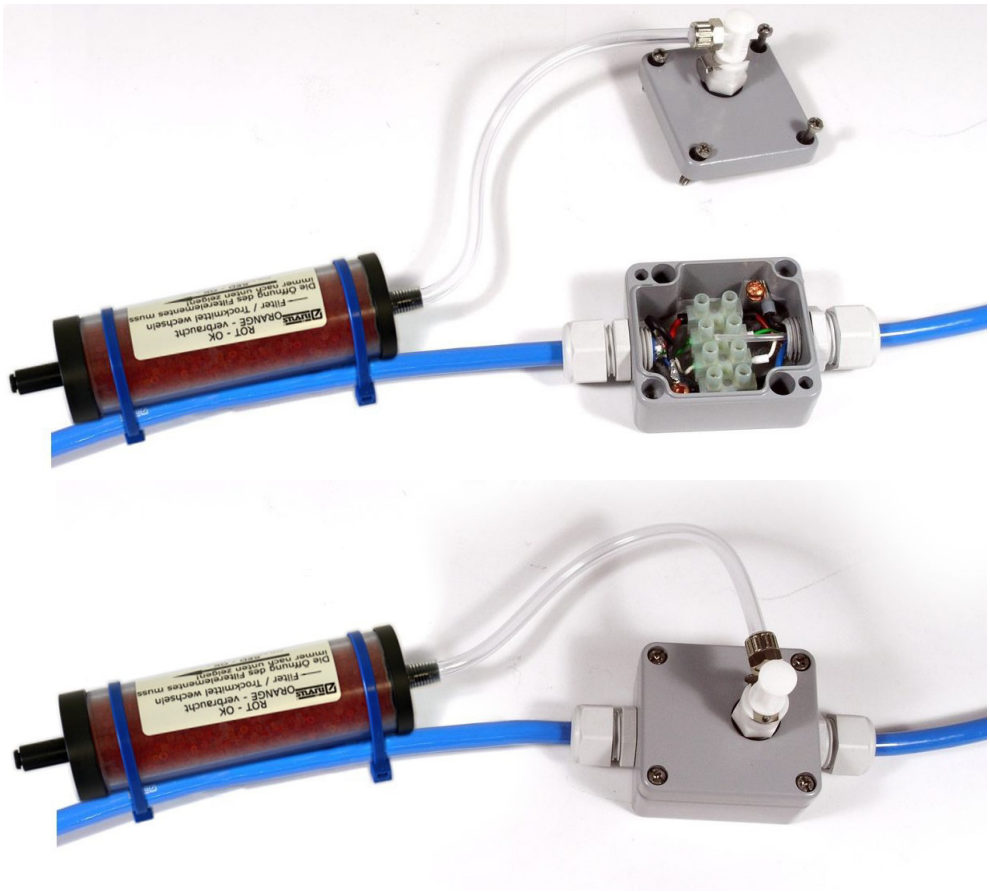


Fig. 21-4 Ready mounted pressure compensation element

Important Notice

The measurement incl. pressure compensation element must not be operated with the air hose connector disconnected, as an automatic self-sealing of the socket integrated in the cover leads to a shift of the zero point of the level measurement.

22 Resistance List

CAUTION

Damage due to aggressive media

In principle, there is a risk of pitting on the stainless steel mounting plate or on the pipe sensor jacket with media containing chloride.
Hydrogen sulphide (H_2S - danger of diffusion through cable sheath) and various organic solvents can corrode the sensor material.

***Only** install sensors or cables in suitable media, otherwise the sensor/cable material may be damaged/destroyed. It is essential to observe the following resistance list.*

The parts of the compact Doppler sensor that come into contact with the medium consist as standard of:

- Stainless steel 1.4571 (AISI 316 Ti); V4A (ground plate or pipe sensor jacket)
- Polyurethane (cable sheath and cable gland)
- PVDF (wedge sensor body)

When using sensors with a pressure measurement cell, the following materials are added:

- Stainless steel 1.4404 (AISI 316L); V4A (pressure measurement cell)
- Viton® Shore A (round sealing ring / gasket)

The sensor systems are resistant to all common types of water, wastewater and rainwater as well as combined water from municipalities and local authorities. Resistance is also not a problem in many industrial plants (e.g. Hüls, BASF, etc.). Nevertheless, sensor systems are not resistant to all substances and substance mixtures.

In the case of substance mixtures (simultaneous presence of several substances), catalytic effects may occur under certain circumstances, which do not appear in the presence of the individual substance. These catalytic effects cannot be completely tested due to the infinite possibilities of variations.

If in doubt, contact your local NIVUS representative and request a free material sample for long-term testing.

MEDIUM	FORMULA	CONCEN-TRATION	HDPE	PPO GF30	PUR	PEEK	FEP	V4A	Hastelloy C 276	Viton (PA/PR)	PA GF30	PVDF	PP-H
Acetaldehyde	C_2H_4O	40 %	3/3	4	4	1	(1)	(1)	0	4/4	2/4	4/4	3/4
Acetic acid	$C_2H_4O_2$	10 %	1/1	2	3	1	1/1	1/1	1	(3)	4/4	1/1	1/1
Acetone	C_3H_6O	40 %	1/1	4	4	1	(1)	1/1	1	4/4	1/0	3/4	1/3
Allyl alcohol	C_3H_6O	96 %	1/3	2	0	1	1/1	1/1	0	4/4	3/0	(2)	2/2
Aluminium chloride	$AlCl_3$	10 %	1/1	2	0	1	1/1	3/4	1	1/0	1/0	1/1	1/1
Ammonium chloride	$(NH_4)Cl$	watery	1/1	1	0	1	1/1	1/2L	1	1/1	3/4	1/1	0/0
Ammonium hydroxide	$NH_3 + H_2O$	5 %	1/1	2	4	1	1/1	1/1	1	(2)	(2)	(2)	1/1
Aniline	C_6H_7N	100 %	1/2	3	4	1	1/1	1/0	1	2/4	3/4	1/4	2/3
Benzene	C_6H_6	100 %	3/4	3/4	2	1	1/1	1/1	1	3/3	2/0	1/3	3/4
Benzyl alcohol	C_7H_8O	100 %	3/4	3	2	1	1/1	1/1	1	1/0	4/4	1/1	4/4
Boric acid	H_3BO_3	10 %	1/1	1	1	1	1/1	1/1	1	1/1	1/0	1/1	1/1
Bromic acid	$HBrO_3$	concentr.	0/0	0	3	1	0/0	(4)	0	(2)	(4)	(1)	3/0
Butanol	$C_4H_{10}O$	techn. pure	1/1	2	3	1	1/1	(1)	1	3/4	1/0	(2)	1/2
Calcium chloride	$CaCl_2$	spirituous	1/0	1	1	1	1/1	1/2L	1	1/1	4/4	1/1	1/1
Carbon disulphide	CS_2	100 %	4/4	2	0	1	1/1	1/1	1	1/0	3/0	1/0	4/4
Carbon tetrachloride	CCl_4	100 %	4/4	3	4	1	1/1	1/1L	1	1/1	4/4	1/1	4/4
Caustic soda	NaHO	50 %	1/1	1	3	1	1/1	1/3	1	3/3	1/0	1/1	1/1
Chlorine	Cl_2		4/4	3	3	1	1/1	1/0	0	1/1	4/4	1/0	4/4
Chlorine water	$Cl_2 \times H_2O$		3/0	2	0	1	(1)	2/0L	1	1/0	4/4	1/1	3/4
Chlorobenzene	C_6H_5Cl	100 %	3/4	3	4	1	1/1	1/1	1	3/4	4/4	1/1	3/4
Chloroform	$CHCl_3$	100 %	3/4	4	4	1	1/1	1/1	1	4/4	¾	1/1	3/4
Chloromethane	CH_3Cl	techn. pure	3/0	4	4	1	1/0	1/1L	0	4/4	(3)	1/0	4/4
Chromic acid	CrO_3	10 %	1/1	1	0	1	1/1	1/2	1	1/1	4/4	1/1	1/1
Citric acid	$C_6H_8O_7$	10 %	1/1	1	1	1	1/1	1/1	1	1/1	1/1	1/1	1/1
Diesel	—	100 %	1/3	2	0	1	(1)	(1)	0	1/1	1/1	1/1	1/3
Ethanedioic acid	$C_2H_2O_4 \times 2H_2O$	watery	1/1	2	0	1	1/1	1/3	2	1/1	4/4	1/1	1/1
Ethanol	C_2H_6O	96 %	1/0	1	1	1	1/1	1/1	1	3/0	1/0	1/1	1/1
Ethyl acetate	$C_4H_8O_2$	100 %	1/3	3	3	1	1/1	(1)	0	4/4	1/0	1/1	1/3
Ethyl alcohol	C_2H_6O	100 %	1/0	1	1	1	1/1	1/1	0	3/0	1/0	1/1	0/0
Ethylen chloride	$C_2H_4Cl_2$		3/3	4	3	1	1/1	1/1L	1	3/0	3/0	1/1	3/4
Ferric chloride	$FeCl_3$	saturated	1/1	2	3	2	1/1	4/4	0	1/1	3/0	1/1	1/1
Formaldehyd dilution	CH_2O	10 %	1/1	1	2	1	1/1	1/1	1	3/0	3/3	1/1	1/1
Glycerin	$C_3H_8O_3$	90%	1/1	1	2	1	1/1	1/1	1	1/1	1/0	1/1	1/1
Heptane	C_7H_{16}	90%	2/3	1	1	1	1/1	1/1	1	1/1	1/0	1/1	0/0
Hexane	C_6H_{14}	100 %	2/3	1	2	1	1/1	1/1	1	1/1	4/4	1/1	2/3
Hydrochloric acid	HCl	1-5 %	1/1	1	3	1	1/1	4/4	1	1/1	4/4	1/1	1/1
Hydrofluoric acid	HF	50 %	1/1	2	3	1	1/1	4/4	2	1/3	4/4	1/1	1/1
Hydroxypropionic acid	$C_3H_6O_3$	3 %	1/1	1	0	1	1/1	1/1	1	1/1	(3)	1/1	1/2
Isopropanol	C_3H_8O	techn. pure	1/1	1	2	1	1/1	(1)	1	1/1	1/0	0/0	1/1
Magnesium chloride	$MgCl_2$	watery	1/1	1	2	1	1/1	1/0L	1	1/1	1/0	1/1	1/1
Mercuric chloride	$HgCl_2$	watery	1/1	1	0	1	1/1	(4)	1	1/1	4/4	1/1	1/1
Methanol	CH_4O		1/1	1	2	1	1/1	1/1	1	3/4	2/0	1/1	1/1
Methyl acetate	$C_3H_6O_2$	techn. pure	1/0	3	0	1	1/0	1/1	1	4/4	1/0	1/1	1/3
Nitric acid	HNO_3	1-10 %	1/1	1	3	1	1/1	1/1	1	1/1	4/4	1/1	1/1
Nitrobenzene	$C_6H_5NO_2$		3/4	3	4	1	1/1	1/1	0	4/4	4/4	1/1	2/4
Oleic acid	$C_{18}H_{34}O_2$	techn. pure	1/3	1	1	1	(1)	1/1	0	2/2	1/0	1/1	1/3
Ozone	O_3		3/4	2	2	1	1/1	0/0	0	1/0	4/4	(1)	3/4
Petrol, unleaded	$C_5H_{12} - C_{12}H_{26}$		2/3	3	2	1	1/1	1/1	1	(1-3)	1/0	1/1	3/4
Petroleum	—		1/1	1	1	1	1/1	1/1	1	1/1	(1)	1/0	1/3
Petroleum	—	techn. pure	1/3	3	1	1	(1)	1/1	0	1/0	1/0	0/0	1/3
Phenol	C_6H_6O	100 %	2/3	3	2	1	1/1	1/1	1	2/3	4/4	1/1	1/2
Phenylmethane (Toluol)	C_7H_8	100 %	3/4	3	3	1	1/1	1/1	0	3/3	1/0	1/1	3/4
Phosphoric acid	H_3PO_4	85 %	1/1	1	0	1	1/1	1/3	1	1/1	4/4	1/1	1/2
Potassium hydroxide	KHO	10 %	1/1	1	3	1	1/1	1/1	1	4/4	1/0	1/1	1/1
Potassium nitrate	KNO_3	watery	1/1	1	0	1	1/1	1/1	1	1/1	1/0	1/1	1/1
Sodium bisulphite	$NaHSO_3$	watery	1/1	1	0	1	(1)	1/1	1	1/0	1/0	1/1	1/1
Sodium carbonate	Na_2CO_3	watery	1/1	1	3	1	1/1	1/1	1	1/1	1/0	1/1	1/1
Sodium chloride	NaCl	watery	1/1	1	2	1	1/1	1/2	1	1/1	1/1	1/1	1/1
Sodium sulphate	Na_2SO_4	watery	1/1	1	0	1	1/1	1/1	1	1/1	1/0	1/1	1/1
Sulphuric acid	H_2SO_4	40 %	1/1	1	3	1	1/1	2/3	1	1/1	4/4	1/1	1/1
Trichloroethylene	C_2HCl_3	100 %	3/4	4	4	1	1/1	1/1L	1	1/3	3/0	1/0	4/4
Vegetable oils	—		0/0	1	1	1	(1)	1/1	0	1/0	0/0	1/1	1/3

Tab. 7 Resistance List

Resistance List Legend

Two values are given per medium (e.g. 1/3).
left figure = value at +20 °C
right figure = value at +50 °C

0	no information available/no statement possible
1	very good resistance/suitability
2	good resistance/suitability
3	limited resistance

4	no resistance
K	no general information possible
L	risk of pitting or stress corrosion cracking
( )	estimated value

Material Name	
HDPE	high density Polyethylene
PPO GF30	Polyphenyloxylene with 30 % glass fibre content
PUR/PU	Polyurethane
PEEK	Polyetheretherketone
FEP	Tetrafluorethylene-Perfluorpropylene
V4A/Stainless steel	1.4571 (AISI 316Ti) or 1.4404 (AISI 316L)
Viton® Shore A	Fluoroelastomer (brand name)
PA GF30	Polyamide with 30 % glass fibre content
PVDF	Polyvinylidene Fluoride

Maintenance and Cleaning

WARNING ***Disconnect the System from Mains Power***

Disconnect the unit from the mains and secure the higher system against being switched on again before starting maintenance, cleaning and/or repair work (only by qualified personnel).

Disregarding may lead to electric shock.

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 ***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 cables and sensors.

Wear protective clothing.

23 Maintenance

23.1 Maintenance of the Wedge Sensors

23.1.1 Wedge Sensors with Pressure Measurement Cell

The level measurement of sensors with pressure measurement cell is subject to a long-term drift for physical reasons (see Chap. "21 Pressure Compensation Element").

Therefore, NIVUS recommend a 0-point calibration after every six months. Please contact the NIVUS customer service.

The best calibration results are achieved when the water level is as low as possible or when the sensor is dismantled and removed from the medium.

The wedge sensors with pressure measurement cell are additionally equipped with a filter element with drying granulate or with drying capsules at the connection plug or at the pressure compensation element.

The drying granulate and the drying capsules are subject to natural wear, which is dependent on:

- Measurement duration
- Measurement interval
- Fluctuations in atmospheric pressure
- Environmental conditions

Check the air filter or the drying capsules at regular intervals or before each use. Wear is indicated by the colour change of the drying granulate or the drying capsules (see sticker on the pressure compensation element).

If the colour of the drying granulate starts to change, then change the drying granulate or replace the filter element with a new filter element of the same design. When the colour of the drying capsules starts to change, change them.

For spare parts see Chap. "27 Accessories (Option)".

23.1.2 Pressure Compensation Element

Check the filter element at regular intervals when using KDA sensors with pressure measurement cell and pressure compensation element. The intervals depend on the prevailing humidity and can be between 2 and 12 weeks, depending on the application. Wear of the air filter is indicated by the colour change of the drying granulate (see sticker on the air filter). If the drying granulate has discoloured by more than 50 %, then you must change it or replace the filter element.

For spare parts see Chap. "27 Accessories (Option)".

1 Drying granulate

2 Filter platelets

3 Filter cover

Fig. 23-1 Air filter, open

23.2 Maintenance of Pipe Sensors

The pipe sensor can be easily removed from the pipe for cleaning or inspection. Its position is fixed by the fastening element.

For further information on the fastening element and the sensor screw connection, see "Mounting Instruction Cross Correlation and Doppler Sensors".

Required Tools/Aids

- Pipe wrench or similar
- Allen key for cylinder head screws M5
- Round gasket (*E-PMA-ORING 35*)
- White sealing ring (PTFE; *ZUB0 SCHNEID 15PT*)
- Grease paste *(E-VGM-ANTISEIZE)* for greasing

Removal/installation of the pipe sensor for maintenance/cleaning

➲ Pipe sensor removal:

1. Loosen the union nut (Fig. 23-2 Pos. 2) of the sensor screw connection.

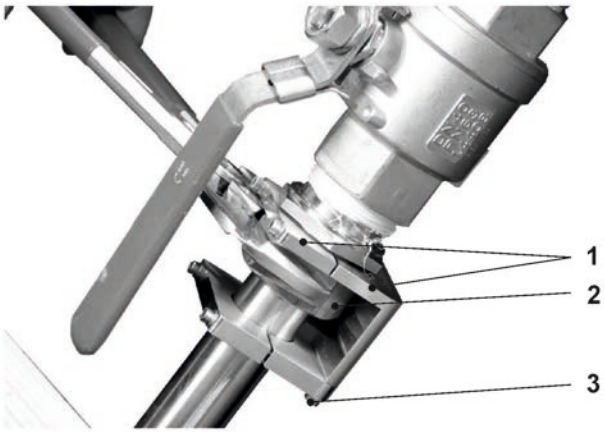


Fig. 23-2 Loosening/removing the sensor screw connection/fastening element

2. Remove the two cylinder head screws with hexagon socket M5 (Fig. 23-2 Pos. 3) on the rear, upper clamp element of the fastening element.
3. Remove the pipe sensor.
   The two screwed rear clamping elements (Fig. 23-2 Pos. 1) remain unchanged on the pipe sensor body. The clamping elements serve as a stop and positioning aid when refitting.

Fig. 23-3 Remove the pipe sensor

➲ Carry out maintenance/cleaning of the pipe sensor in accordance with Chap. "24.1 Principles of Cleaning".

➲ Reinstall the pipe sensor after maintenance/cleaning:

1. Replace the O-ring and white sealing ring (PTFE; *ZUB0 SCHNEID 15PT*) of the sensor screw connection and grease lightly (see Chap. "27 Accessories (Option)").
2. Insert the sensor into the sensor screw connection. Clamp elements must be together again.
3. Tighten the union nut (Fig. 23-2 Pos. 2) on the sensor.
4. Screw the fastening element back on with the two hexagon socket head screws M5 (Fig. 23-2 Pos. 3).

23.3 Maintenance Interval

The NIVUS sensors are virtually calibration-, maintenance- and wear-free by design.

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:

- Measurement principle of the sensors
- Material wear
- Measurement medium and channel hydraulics
- 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 verification of instruments and sensors is a basic measure in order to improve operational reliability and to increase the lifetime.

23.4 Customer Service Information

For 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 Centre

Phone +49 7262 9191-922

customercenter@nivus.com

24 Cleaning

24.1 Principles of Cleaning

In media with a tendency to be deposited by algae or flotsam and soiling due to moss on the sensor, it may be necessary to clean the flow velocity sensor at regular intervals. Use a brush with plastic bristles, a street broom or similar for this purpose.

CAUTION ***Damage caused by hard Objects***

Never use hard objects such as wire brushes, rods, scrapers or similar to clean the sensor.

The use of water jet cleaning is only permissible up to a permissible flushing pressure of max. 4 bar (see chapter "18 Specifications") (e.g. hosing down with a water hose).

As a matter of principle, do not clean flow velocity sensors with pressure measuring cell with a water jet.

The use of high-pressure cleaners may damage the sensor and lead to measurement failure and is therefore strictly prohibited.

24.2 Cleaning of the Wedge Sensors

CAUTION ***Material damage and measurement errors due to loose parts***

Removal or loosening of bottom plate or cable gland of the sensor will cause leakage and result in failure of measurement and sensor.

Do not remove any parts of the sensor.

CAUTION ***Damage to the pressure measurement cell during cleaning***

Never clean the pressure measurement cell with a water jet. To clean the pressure measurement cell, simply immerse the sensor in a bucket of water and gently swirl it to clean it.

The cover of the pressure measurement cell is sealed with a sticker on the bottom plate. This sticker must not be damaged or removed under any circumstances. Do not loosen the screws below the sticker.

Non-compliance may have negative consequences in terms of warranty and liability. See Chap. "4 Warranty" and "5 Disclaimer".

If in doubt, have the pressure probe cleaned by NIVUS customer service.

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

Do **not** use aggressive cleaning agents or solvents. Instead, it is better to use mild household cleaners or soap suds.

Rinse the connection duct milled into the mounting plate for pressure measurement with water **immediately after each removal** to prevent deposits from sticking. To do this, immerse the sensor in water several times.

24.3 Cleaning of Pipe Sensors

CAUTION ***Material damage and measurement errors due to loose parts***

Removal or loosening of the cable gland will cause leakage and result in failure of measurement and sensor.

Do not remove any parts of the sensor.

➲ To clean the pipe sensor, remove it according to the procedure in Chap. "23.2 Maintenance of Pipe Sensors" if required and reinstall it after cleaning.

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

Do **not** use aggressive cleaning agents or solvents. Instead, it is better to use mild household cleaners or soap suds.

25 Dismantling/Disposal

Improper disposal may be harmful to the environment.

Dispose of the sensors in accordance with the applicable local environmental regulations for electrical products.

➲ Procedure:

1. If possible, drain the measurement place.
2. Use a suitable tool to disconnect the connected cables from the transmitter.
3. Remove the sensors from the canal or the pipeline.

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.

26 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.

27 Accessories (Option)

Article No	Description
ZUB0 DAE	Pressure compensation element; For connecting sensors with integrated pressure measurement cell and open cable end (cable tail); Material: Aluminium / Plastic; Protection class: IP54 (except filter element)
ZUB0 FILTER	Replacement filter element; With connector and connection hose for connecting sensors with integrated pressure measurement cell to the pressure compensation element *ZUB0 DAE*.
ZUB0 FILTER MAT	Drying granulate; To refill used air filters of the filter element *ZUB0 FILTER*, 1 kg (for approx. 25 refills)
ZUB0 FILTER MAT5	Drying granulate; To refill used air filters of the filter element *ZUB0 FILTER*, 200 g (for approx. 5 refills)
ZUB0 RMS2 (xxx)	Pipe mounting system for the temporary installation of sensors in DN200...DN800 pipes
ZUB0 AA 02K	Manual extraction tool to remove and to insert 1½“ pipe sensors under process conditions; pressure level under process conditions 16 bar;.

	Material: 1.4571, 1.4305, EPDM, sintered bronze; extraction length approx. 150 mm
ZUB0 HAHN R15	Stop ball valve 1½“ to remove pipe sensors from pipes without pressure; Material: stainless steel 1.4408 (AISI 316)
ZUB0 ABS 0xxx	Tapping saddles for installation of pipe sensors 1½“ in pipelines; Material: stainless steel 1.4301 (AISI 304) and NBR
ZUB0 SCHNEID 15PT	Sensor gasket made of PTFE for screw-in pipe sensor connection
E-PMA-ORING35	Round gasket made of PTFE for screw-in pipe sensor connection
E-VGM-ANTISEIZE	Anti seize grease paste, 10 ml in syringe for screw-in pipe sensor connection

Tab. 8 Accessories

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

Index

Approvals and Certificates

DE / EN / FR

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:	**Kompaktdoppler-Aktivsensoren**
Description:	*Compact Doppler active sensors*
Désignation:	*Capteurs Doppler compact actif*
Typ / Type:	**KDA-K.../ KDA-R.../ KDS-K.../ KDS-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
- 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug 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

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 Taele 2
75031 Eppingen
Allemagne

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

Eppingen, den 20.04.2016

Gez. *Marcus Fischer*

DE / EN / FR

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" Kompaktdoppler-Aktivsensoren**
Description:	*"Ex" Compact Doppler active sensors*
Désignation:	*"Ex" Capteurs Doppler compact actif*
Typ / Type:	**KDA-KxxxE… / KDA-RxxxE…**

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
- 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug 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 IEC 60079-0:2018
- EN 60079-11:2012

Ex-Kennzeichnung / *Ex-designation / Marquage Ex* : ⟨Ex⟩ II 2G Ex ib IIB T4 Gb

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

IBExU 07 ATEX 1082 Ausgabe 1 / Issue 1

Notifizierte Stelle (Kennnummer) / *Notified Body (Identif. No.) / Organisme notifié (№ d'identification)*

IBExU Institut für Sicherheitstechnik GmbH, 09599 Freiberg, Allemagne (0637)

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:

NIVUS GmbH
Im Taele 2
75031 Eppingen
Allemagne

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

Eppingen, den 18.02.2022

Gez. *Marcus Fischer*

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **EU-TYPE EXAMINATION CERTIFICATE** - Translation

[2] Equipment or protective systems
intended for use in potentially explosive atmospheres, Directive 2014/34/EU

[3] EU-type examination certificate number **IBExU07ATEX1082** | Issue 1

[4] Product: **Monobloc doppler**
Type: KD*-K* ** E ** * * and KD*-R* ** E ** * *

[5] Manufacturer: NIVUS GmbH

[6] Address: Im Täle 2
75031 Eppingen
GERMANY

[7] This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 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 product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report IB-19-3-0179.

[9] Compliance with the essential health and safety requirements has been assured by compliance with:
EN IEC 60079-0:2018 EN 60079-11:2012
except in respect of those requirements listed at item [18] of the schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the specific conditions of use specified in the schedule to this certificate.

[11] This EU-type examination certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

II 2G Ex ib IIB T4 Gb
-20 °C ≤ Ta ≤ +50 °C

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

Tel: + 49 (0) 37 31 / 38 05 0
Fax: + 49 (0) 37 31 / 38 05 10

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

By order

Dipl.-Ing. Willamowski

- Seal -
(notified body number 0637)

Freiberg, 2020-10-05

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[13] **Schedule**

[14] **Certificate number IBExU07ATEX1082** | Issue 1

[15] **Description of product**
The monobloc doppler measures by ultrasound level and flow rate, especially inside gullies. The equipment consists of a plastic enclousure with a fitting panel. The electronic components are all side encapsulated embedded. The connection with the associated transmitter is carried out with a fixed cable.

Type designation

KDA-K* ** E ** * * (wedge shape)
KDA-R* ** E ** * * (tube shape)
KDO-K* ** E ** * * (wedge shape, OEM)
KDO-R* ** E ** * * (Tube shape, OEM)
KDS-K* ** E ** * * (wedge shape, solar)
KDS-R* ** E ** * * (tube shape, solar)
* variable manufacturer-specific data

Technical Data

Ambient temperature	from -20 °C to +50 °C

Electrical Data

Operating frequency	750 kHz resp. 1 MHz
Power supply circuit (wires: red: V+; blue GND black: shield)	in type of protection Intrinsic Safety Ex ib IIB Ui 10.5 V Ii 880 mA Li negl. Ci negl.
Signal circuit (RS485) (wires green RxDx-; white RxDx+)	galvanically connected to supply circuit Uss ± 4 V

Variations compared to previous certificates:

Variation 1
Circuit and layout modifications for the use of current pressure cans

Variation 2
Changes to the mechanical construction, without influence on intrinsic safety

Variation 3
Use of alternative components due to discontinuation

Variation 4
Extension of the type code

Variation 5
The devices also meet the requirements of current standards.

[16] **Test report**

The test results are recorded in the confidential test report IB-19-3-0179 of 2020-10-01.

The test documents are part of the test report and they are listed there.

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

Summary of the test results
The monobloc doppler type KD*-K* ** E ** * * and KD*-R* ** E ** * * fulfils the requirements of explosion protection of Equipment Group II and Category 2G in type of protection Intrinsic safety for explosive atmospheres of explosion group IIB.

[17] **Specific conditions of use**
None

[18] **Essential health and safety requirements**
In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item [9], the following are considered relevant to this product, and conformity is demonstrated in the test report: None

[19] **Drawings and Documents**
The documents are listed in the test report.

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing. Willamowski

Freiberg, 2020-10-05

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