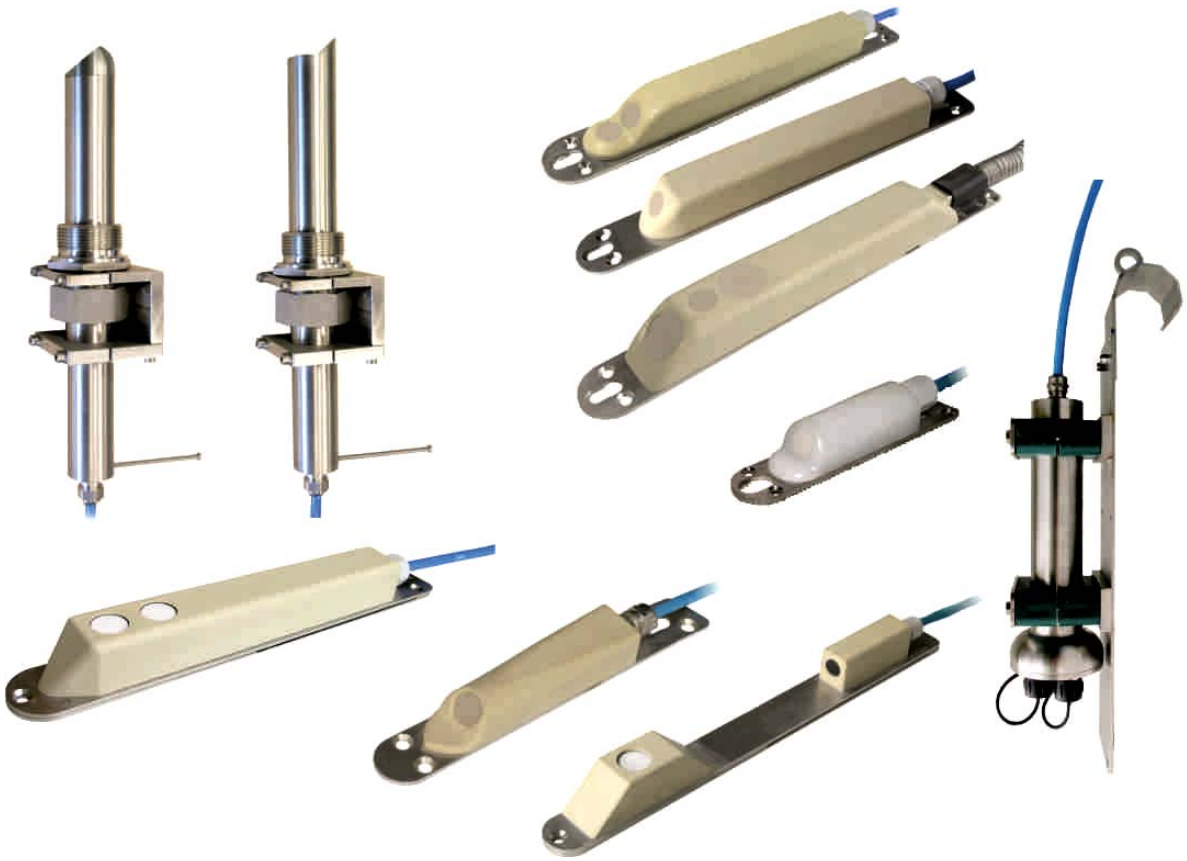
Technical Instructions for Correlation Sensors and external Electronic Box

(Original technical instructions – German)

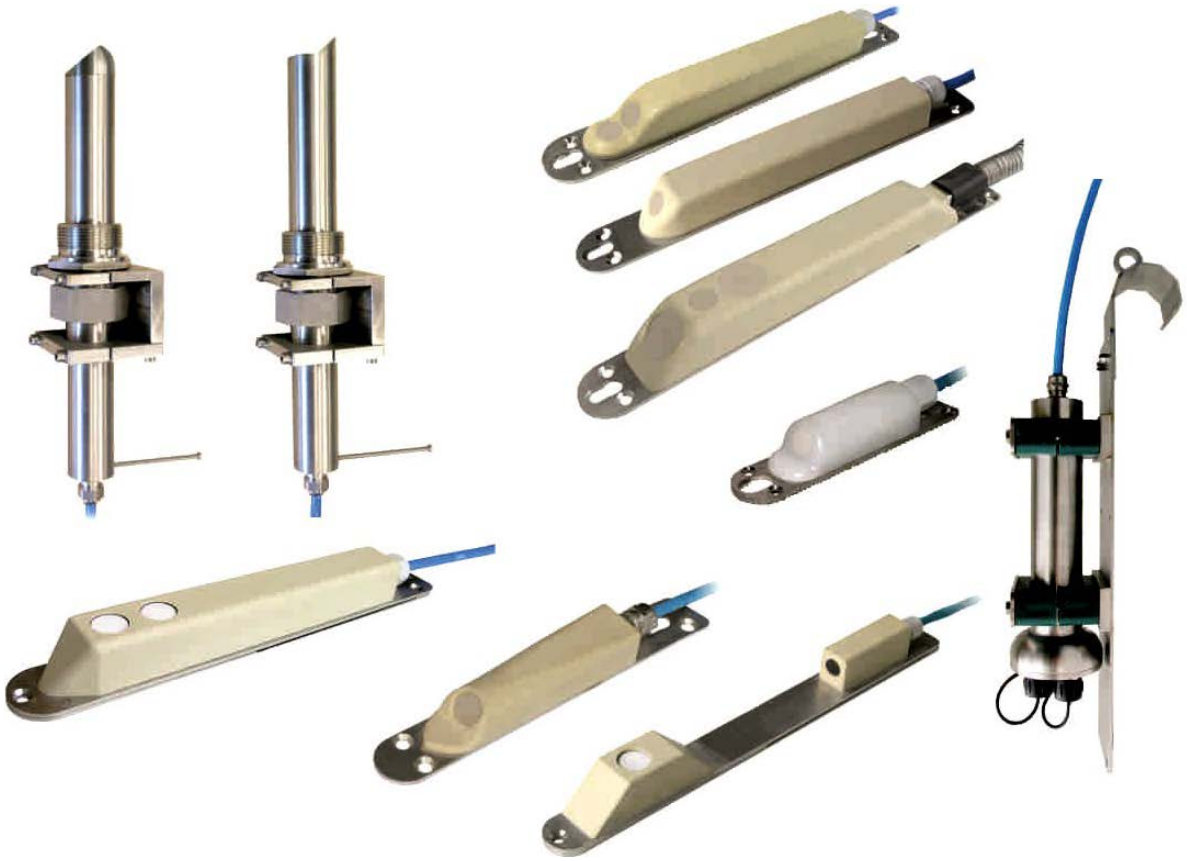


as of Firmware Version:	1.58 (POA-V2)
	1.59 (OCL-L1)
	1.58 (CS2)
	1.64 (EBM)

NIVUS GmbH
Im Taele 2
75031 Eppingen, Germany
Phone: +49 (0) 72 62 / 91 91 - 0
Fax: +49 (0) 72 62 / 91 91 - 999
E-mail: info@nivus.com
Internet: www.nivus.com

Technical Instructions for Correlation Sensors and external Electronic Box

(Original technical instructions – German)



as of Firmware Version:

1.58 (POA-V2)
1.59 (OCL-L1)
1.58 (CS2)
1.64 (EBM)

NIVUS GmbH
Im Taele 2
75031 Eppingen, Germany
Phone: +49 (0) 72 62 / 91 91 - 0
Fax: +49 (0) 72 62 / 91 91 - 999
E-mail: info@nivus.com
Internet: www.nivus.com

NIVUS AG
Hauptstrasse 49
8750 Glarus, Switzerland
Phone: +41 (0)55 6452066
Fax: +41 (0)55 6452014
E-mail: swiss@nivus.com
Internet: www.nivus.de

NIVUS Austria
Mühlbergstraße 33B
3382 Loosdorf, Austria
Phone: +43 (2754) 567 63 21
Fax: +43 (2754) 567 63 20
E-mail: austria@nivus.com
Internet: www.nivus.de

NIVUS France
14, rue de la Paix
67770 Sessenheim, France
Phone: +33 (0)3 88071696
Fax: +33 (0)3 88071697
E-mail: france@nivus.com
Internet: www.nivus.com

NIVUS U.K. Ltd
Wedgewood Rugby Road
Weston under Wetherley
Royal Leamington Spa
CV33 9BW, Warwickshire
Phone: +44 (0)1926 632470
E-mail: info@nivus.com
Internet: www.nivus.com

NIVUS U.K.
1 Arisaig Close
Eaglescliffe
Stockton on Tees
Cleveland, TS16 9EY
Phone: +44 (0)1642 659294
E-mail: info@nivus.com
Internet: www.nivus.com

NIVUS Sp. z o.o.
ul. Hutnicza 3 / B-18
81-212 Gdynia, Poland
Phone: +48 (0) 58 7602015
Fax: +48 (0) 58 7602014
E-mail: poland@nivus.com
Internet: www.nivus.pl

NIVUS Middle East (FZE)
Building Q 1-1 ap. 055
P.O. Box: 9217
Sharjah Airport International
Free Zone
Phone: +971 6 55 78 224
Fax: +971 6 55 78 225
E-mail: Middle-East@nivus.com
Internet: www.nivus.com

NIVUS Korea Co. Ltd.
#411 EZEN Techno Zone,
1L EB Yangchon Industrial Complex,
Gimpo-Si
Gyeonggi-Do 415-843,
Phone: +82 31 999 5920
Fax. +82 31 999 5923
E-mail: korea@nivus.com
Internet: www.nivus.com

Translation

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

Names

The use of general descriptive names, trade names, trademarks and the like in this handbook 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.

1 Contents

1.1 Table of Contents

2 General

Important

READ CAREFULLY BEFORE USE

KEEP IN A SAFE PLACE FOR LATER REFERENCE

This >Technical Instructions for Correlation Sensors and external Electronic Box< is intended for the initial start-up or the connection of the sensors depicted on the title page to NIVUS transmitters and is aimed exclusively to trained expert personnel.
Read the instructions carefully prior to use.

This technical description is part of the correlation sensors standard delivery and shall be available to users at any time. The safety instructions contained therein must be followed.
In case of selling the correlation sensors or the electronic box this technical description must be provided to the purchaser.

The sensor installation is described in the separate >Installation Instructions for Correlation and Doppler Sensors<. This document is part of the standard delivery and must be read necessarily prior to sensor installation.
Detailed information on how to operate the sensors in connection with NIVUS transmitters can be found in the accompanying transmitter instruction manual.

3 General Notes on Safety and Danger

3.1 General Danger Notes

Cautions
are framed and labelled with a warning triangle.

This indicates an immediate high risk threatening life and limb.

Danger by electric voltage
is framed and labelled with the symbol on the left.

Warnings
are framed and labeled with a "STOP"-sign.

This indicates a possible risk to persons as well as possible damage to facilities and material.

Notes
are framed and labelled with a "hand".

For connection, initial start-up and operation of the sensors or the Electronic Box the following information and higher legal regulations (e.g. in Germany VDE), such as Ex-regulations as well as safety requirements and regulations in order to avoid accidents, must be adhered to.
All operations, which go beyond steps regarding installation and connection the sensors, are allowed to be carried out by NIVUS staff only due to reasons of safety and guarantee.

3.2 Special Danger Notes

WARNING

Preventing electromagnetic discharge

It is indispensable to eliminate the risk of explosive atmospheres by using a gas warning unit prior to executing installation or maintenance works.

Please observe to avoid electrostatic charge during this procedure!

Avoid unnecessary movements to reduce the risk of building up electrostatic energy.

Make sure to discharge static electricity from your body before you begin to install the sensors.

WARNING

Germ contamination

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

3.3 Device Identification

The instructions in this manual apply only for the type of sensor or the units depicted on the title page.
The article number can be found where the cable enters the sensor body as well as on a nameplate on the end of the cable. This nameplate is protected against weathering and abrasion by using a transparent shrunk-on hose and contains the following:

- name and address of manufacturer
- CE label
- type and serial number
- year of manufacture
- Ex label (on Ex-version sensors only) as mentioned in chapter 4.2.

It is important for enquiries and replacement part orders to specify article number as well as serial number of the respective transmitter or sensor. This ensures correct and quick processing.

Fig. 3-1 Nameplate flow velocity sensor, type CSM

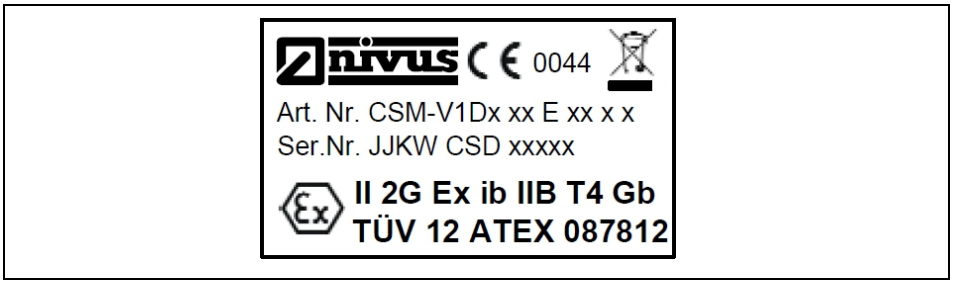


Fig. 3-2 Nameplate flow velocity sensor, type CSMD

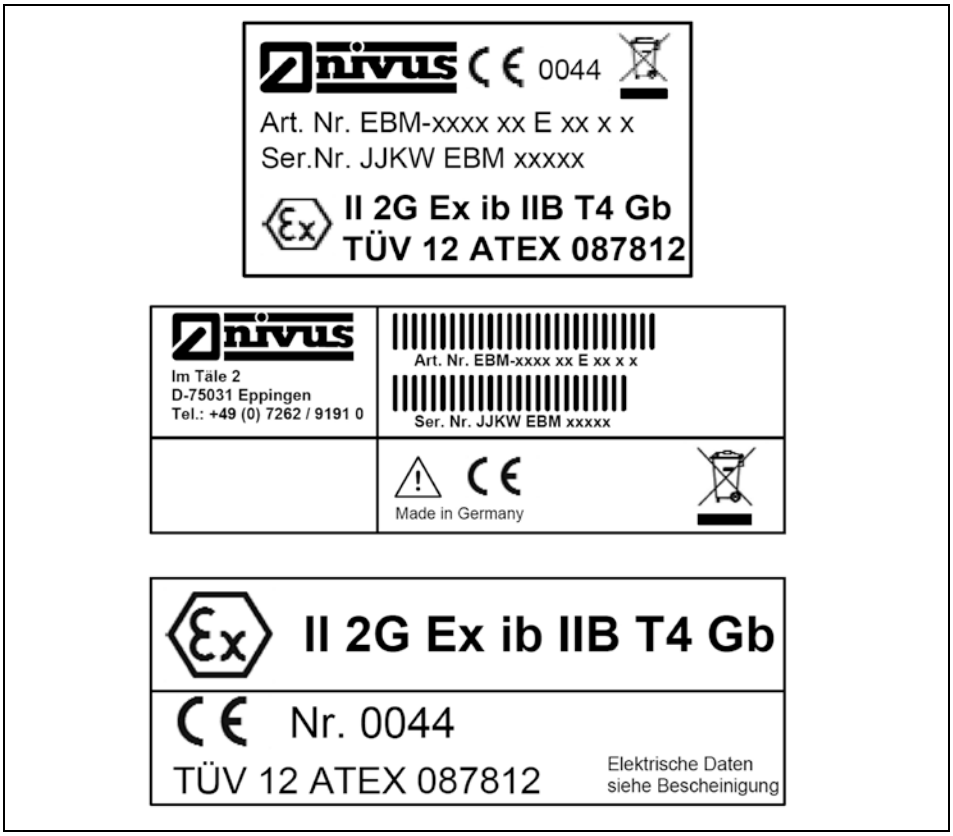


Fig. 3-3 Nameplate Electronic Box, type EBM

Fig. 3-4 Nameplate level sensor, type DSM

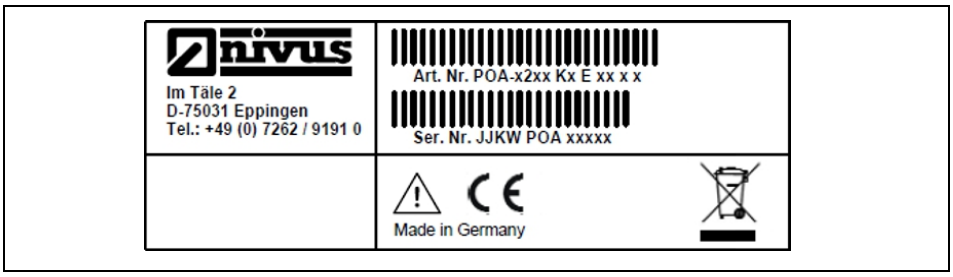


Fig. 3-5 Nameplate flow velocity sensor, type POA

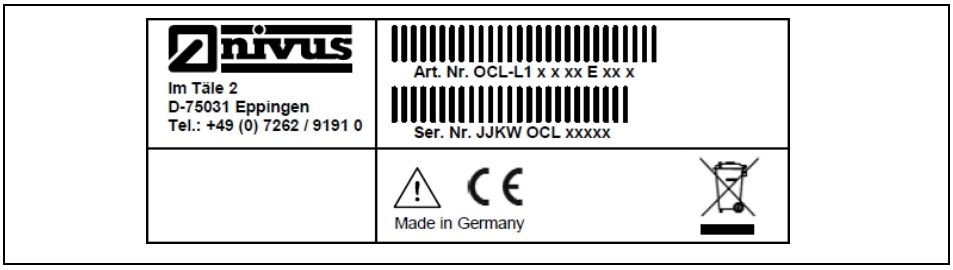


Fig. 3-6 Nameplate level sensor, type OCL-L1

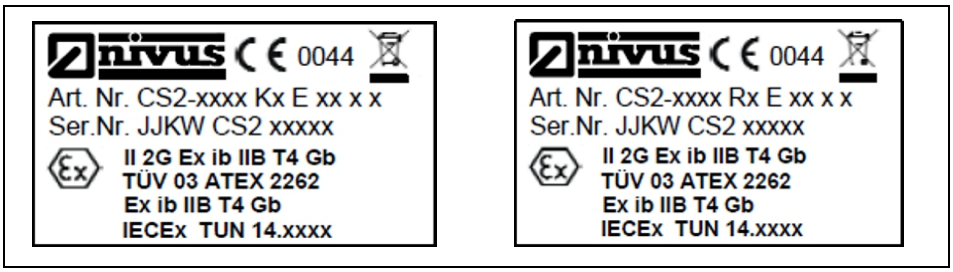


Fig. 3-7 Nameplates flow velocity sensor, type CS2

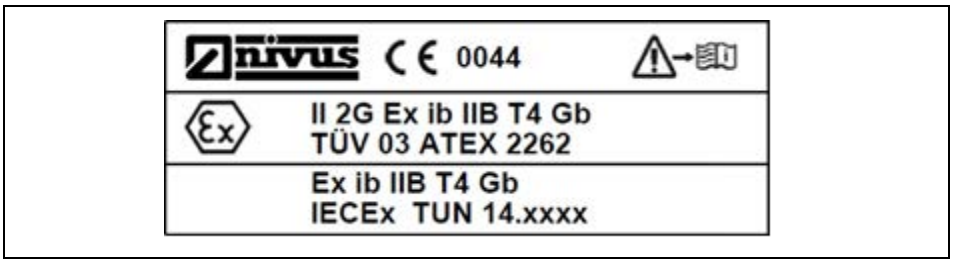


Fig. 3-8 Ex-label for each sensor; type POA, CS2, OCL-L1

3.4 Installation of Spare Parts and Parts subject to Wear and Tear

We herewith particularly emphasize that replacement parts or accessories, which are not supplied by us, are not certified by us, too. Hence, the installation and/or the use of such products may possibly be detrimental to the device's ability to work.

Damages caused by using non-original parts and non-original accessories are left at user's risk. Appropriate accessories and spare parts can be found in chapter 9.5.

3.5 User's Responsibilities

In the EEA (European Economic Area) national implementation of the framework directive 89/391/EEC and corresponding individual directives, in particular the directive 89/655/EEC 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 the Industrial Safety Ordinance must be observed.

The customer must (where necessary) obtain any local **operating permits** required and observe the provisions contained therein. In addition to this, he must observe local laws and regulations on

- 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)
- environmental protection.

This technical description is part of the standard delivery and must be available to the user at any time.

The safety instructions contained therein must be followed.

3.6 Sensor Versions

The sensors are available in various constructions (wedge and pipe sensors) and additionally vary in terms of Ex-Version, cable lengths, sensor connection (cable end for direct connection or configured plug / plug-on filter element) as well as various special versions and materials.
The article number can be found where the cable enters the sensor body as well as on a nameplate on the end of the cable. This nameplate is protected against weathering and abrasion by using a transparent shrunk-on hose.

CSM-	**Type**	Sensor with spatial allocation of flow velocities				
	V100	**Without Level Measurement**				
		KT	Wedge sensor made of PVDF; ground plate 1,4571			
		XX	Special construction			
	V1D0	**mit Druckmesszelle**				
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571			
		XX	Special construction			
			Approvals (ATEX)			
			0	none		
			E	Ex zone 1		
				Cable Length		
				07	7 m	
				15	15 m (only type V1D0)	
					Sensor Connection	
					C	Connection to electronic box, type RD
					D	Connection to electronic box, type RD incl. pressure compensation element
CSM-						

Fig. 3-9 Type key for water-ultrasonic sensors, type Typ CSM

EBM-V1L1 Electronic box for connection of 1x CSM and 1x DSM Sensor incl.suspension bracket and mounting plate, IP 68

Construction

- **RD** Wedge sensor
- **XX** Special construction

Approvals (ATEX)

- **0** none
- **E** Ex zone 1

Cable Lengths

- **03** 3 m
- **10** 10 m
- **15** 15 m
- **20** 20 m
- **30** 30 m
- **50** 50 m
- **99** 100 m
- **XX** Special length upon request

Sensor Connection

- **S** Connection to PCM Pro and PCM 4
- **K** Cable end pre-configured for connection to OCM Pro CF

EBM-V1L1					

Fig. 3-10 Type key for Electronic Box, type EBM

DSM-L0 Air-ultrasonic sensor for non-contact level measurement

Construction

- **K** Wedge sensor
- **X** Special construction

Sensor Version

- **S** Standard version made of PPO, ground plate 1.4571
- **X** Special construction

Transmitting Frequency

- **12** Standard frequency
- **XX** Special construction

Approvals (ATEX)

- **0** none
- **E** Ex zone 1

Cable Lengths

- **07** 7 m
- **15** 15 m

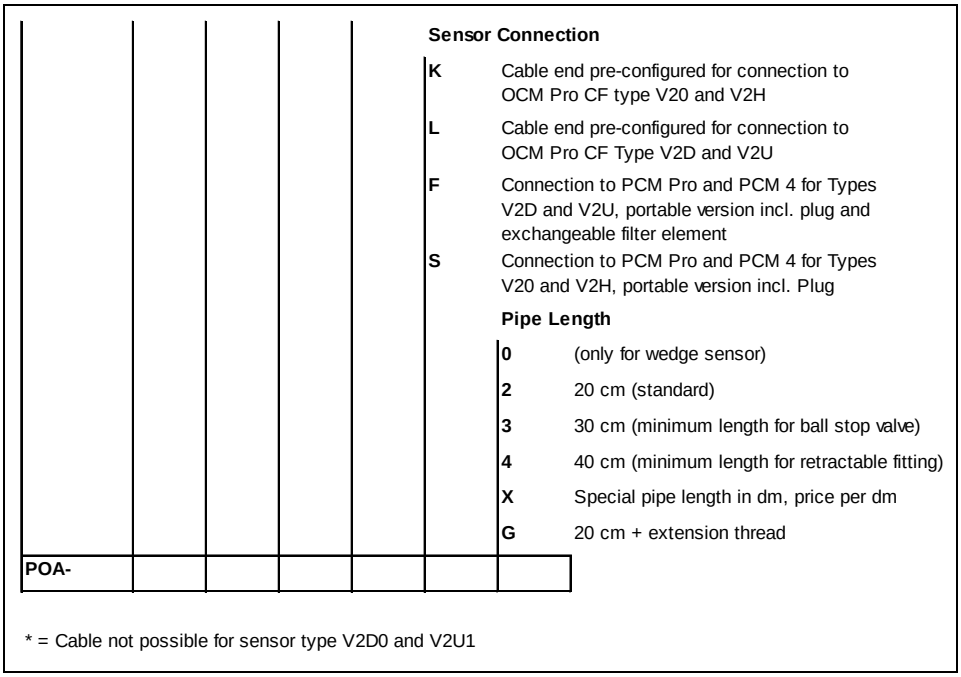
Sensor Connection

- **B** Connection to electronic box

DSM-L0						

Fig. 3-11 Type key for air-ultrasonic sensors, type DSM

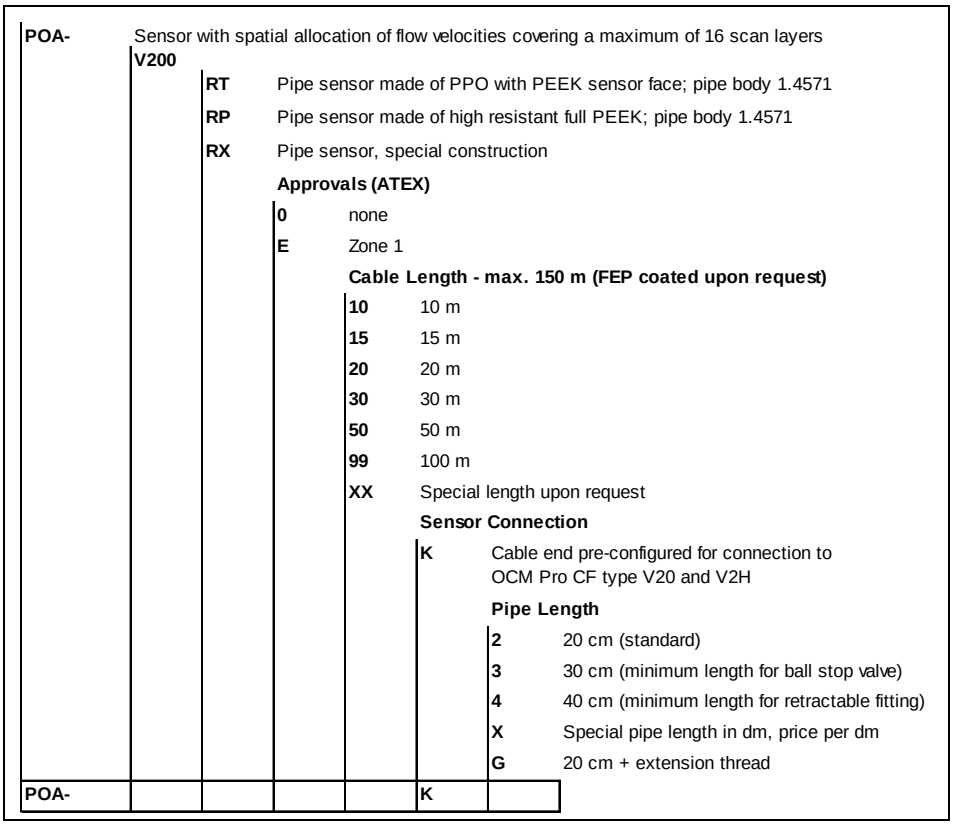
POA-	**Type**	Sensor with spatial allocation of flow velocities covering a maximum of 16 scan layers			
	V200	**without Level Measurement**			
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571		
		KP	Wedge sensor made of high resistant full PEEK, ground plate 1.4571		
		KX	Wedge sensor, special construction (e.g. made of high resistant full PEEK with ground plate made of Hastelloy or Titanium).		
		RT	Pipe sensor made of PPO with PEEK sensor face; pipe body 1.4571		
		RP	Pipe sensor made of high resistant full PEEK; pipe body 1.4571		
		RX	Pipe sensor, special construction		
	V2H1	**with ultrasound from bottom up for Level Measurement**			
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571		
		KP	Wedge senor made of high resistant full PEEK, ground plate 1.4571		
		KX	Wedge sensor, special construction (e.g. made of high resistant full PEEK with ground plate made of Hastelloy or Titanium).		
		RT	Pipe sensor made of PPO with PEEK sensor face; pipe body 1.4571		
		RP	Pipe sensor made of high resistant full PEEK; pipe body 1.4571		
		RX	Pipe sensor, special construction		
	V2D0	**with Pressure Measurement Cell for Level Measurement**			
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571		
		KX	Wedge sensor, special construction		
	V2U1	**with Pressure Measurement Cell and ultrasound from bottom up for Level Measurement**			
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571		
		KX	Wedge sensor, special construction		
			Approvals (ATEX)		
			0	none	
			E	Zone 1	
				Cable Length (max. 150 m / with pressure measurement cell up to 30 m)	
				10	10 m
				15	15 m
				20	20 m
				30	30 m
				50	50 m
				99	100 m
				XX	Special length upon request
				1B	10 m, FEP coated*
				2B	20 m, FEP coated*
				3B	30 m, FEP coated*
				5B	50 m, FEP coated*
				9B	100 m, FEP coated*
				XB	Special length / special construction*



							Sensor Connection
						K	Cable end pre-configured for connection to OCM Pro CF type V20 and V2H
						L	Cable end pre-configured for connection to OCM Pro CF Type V2D and V2U
						F	Connection to PCM Pro and PCM 4 for Types V2D and V2U, portable version incl. plug and exchangeable filter element
						S	Connection to PCM Pro and PCM 4 for Types V20 and V2H, portable version incl. Plug
							Pipe Length
							0 (only for wedge sensor)
							2 20 cm (standard)
							3 30 cm (minimum length for ball stop valve)
							4 40 cm (minimum length for retractable fitting)
							X Special pipe length in dm, price per dm
							G 20 cm + extension thread
POA-							

* = Cable not possible for sensor type V2D0 and V2U1

Fig. 3-12 Type key for water-ultrasonic sensors, type POA (V+H)



POA-	Sensor with spatial allocation of flow velocities covering a maximum of 16 scan layers						
	V200						
		RT	Pipe sensor made of PPO with PEEK sensor face; pipe body 1.4571				
		RP	Pipe sensor made of high resistant full PEEK; pipe body 1.4571				
		RX	Pipe sensor, special construction				
			Approvals (ATEX)				
			0 none				
			E Zone 1				
				Cable Length - max. 150 m (FEP coated upon request)			
				10 10 m			
				15 15 m			
				20 20 m			
				30 30 m			
				50 50 m			
				99 100 m			
				XX Special length upon request			
					Sensor Connection		
					K	Cable end pre-configured for connection to OCM Pro CF type V20 and V2H	
						Pipe Length	
						2	20 cm (standard)
						3	30 cm (minimum length for ball stop valve)
						4	40 cm (minimum length for retractable fitting)
						X	Special pipe length in dm, price per dm
						G	20 cm + extension thread
POA-					**K**		

Fig. 3-13 Type key for water-ultrasonic sensors, type for NFP (V)

OCL-L1	Active air-ultrasonic sensor						
	Construction						
	K	Wedge sensor					
	X	Special construction					
		Sensor Version					
		S	Standard version made of PPO, cable: PUR				
		X	Special construction				
			Transmitting Frequency				
			12	120 kHz			
			XX	Special construction			
				Approvals			
				0	none		
				E	Ex zone 1		
					Cable Length (max. 150 m)		
					10	10 m	
					15	15 m	
					20	20 m	
					30	30 m	
					50	50 m	
					99	100 m	
					XX	Special length upon request	
						Sensor Connection	
						K	Cable end pre-configured for connection to OCM Pro CF
						S	Connection plug for PCM Pro and PCM 4
OCL-L1						**K**	

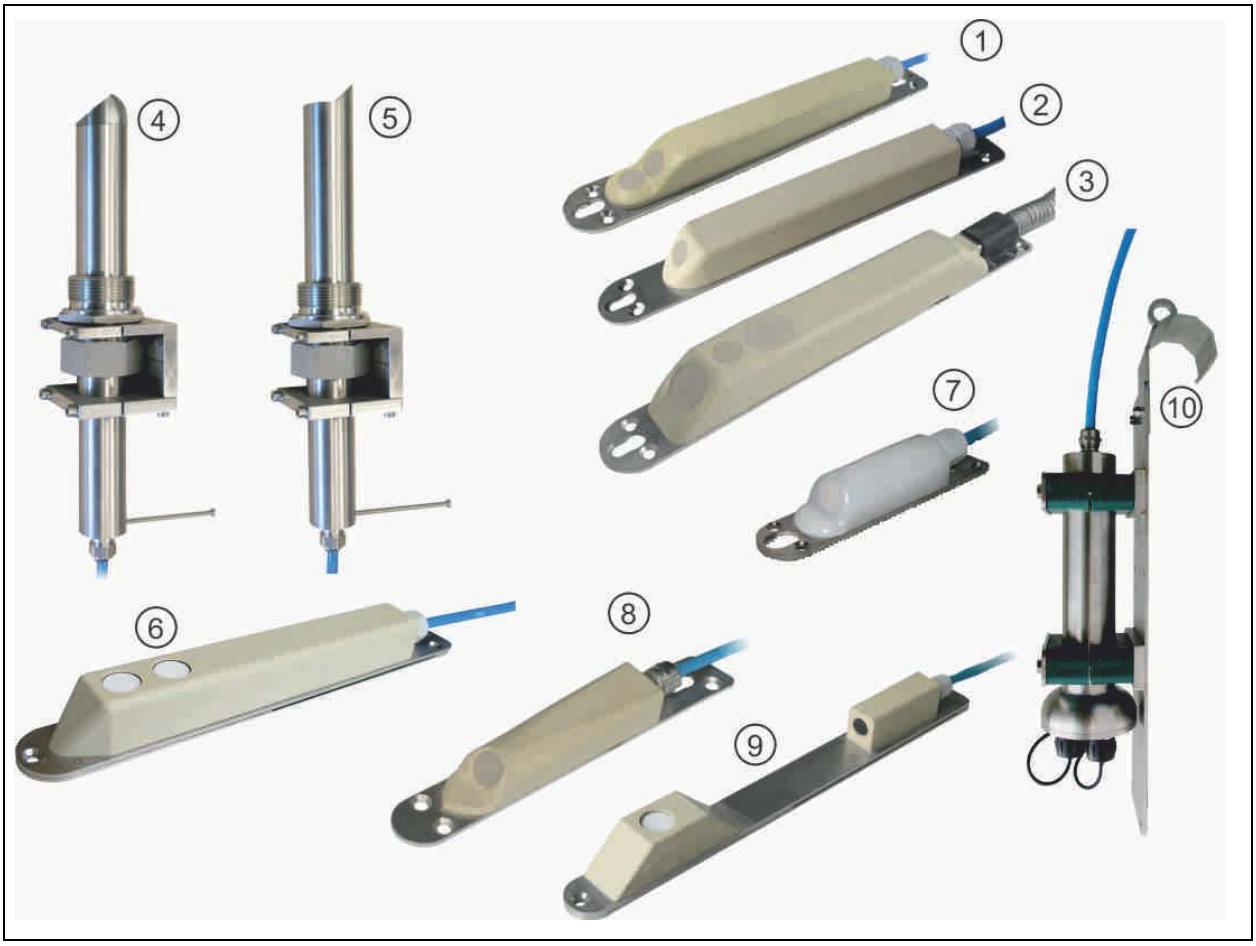
Fig. 3-14 Type key for air-ultrasonic sensors, type OCL-L1

CS2-	Type					
	V100	**without level measurement**				
		RP	Pipe sensor made of high resistant full PEEK; pipe body 1.4571			
		RX	Pipe sensor, special construction			
		SP	Rod sensor made of highly resistant full PEEK, pipe material 1.4571			
	V200	**without level measurement**				
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571			
	V2H1	**with ultrasound from bottom up for level measurement**				
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571			
	V2D0	**with pressure measurement cell for level measurement**				
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571			
	V2U1	**with pressure measurement cell and ultrasound from bottom up for level measurement**				
		KT	Wedge sensor made of PPO with PEEK sensor face; ground plate 1.4571			
			Approval (ATEX)			
			0	none		
			E	Zone 1		
				Cable Length (max. 150 m / with pressure measurement cell up to 30 m)		
				10	10 m	
				15	15 m	
				20	20 m	
				30	30 m	
				50	50 m	
				99	100 m	
				XX	Special length upon request	
					Sensor Connection	
					K	Connection to OCM Pro CF, Type V20 and V2H
					L	Connection to OCM Pro CF, Type V2D and V2U
					R	for pipe sensors for connection to OCM Pro CF, Type V10
					F	Connection to PCM Pro and PCM 4 for type V2D and V2U, incl. plug and replaceable filter element
					S	Connection to PCM Pro and PCM 4 for type V20 and V2H, incl. plug
						Pipe Length
						0 (only for wedge sensor)
						2 20 cm (standard)
						3 30 cm (minimum length for stop ball valve)
						4 40 cm (minimum length for retractable fitting)
						X Special pipe length in dm, price per dm
						G 20 cm + extension thread
CS2-						

Fig. 3-15 Type key for water-ultrasonic sensors, type CS2

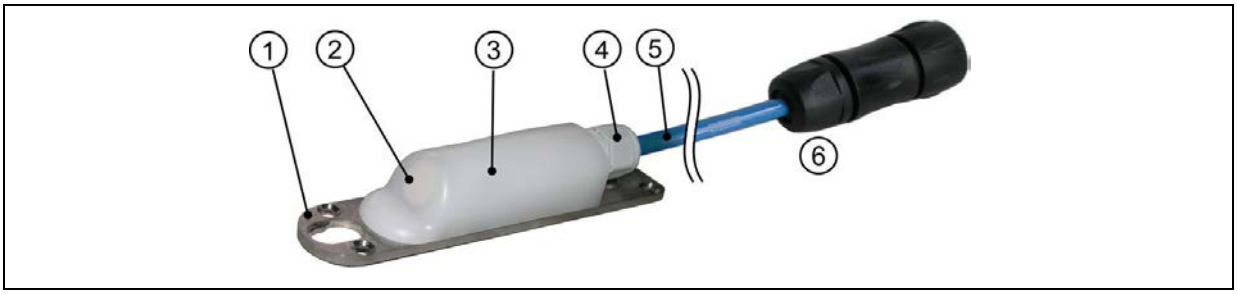
4 Overview and use in accordance with the requirements

4.1 Overview



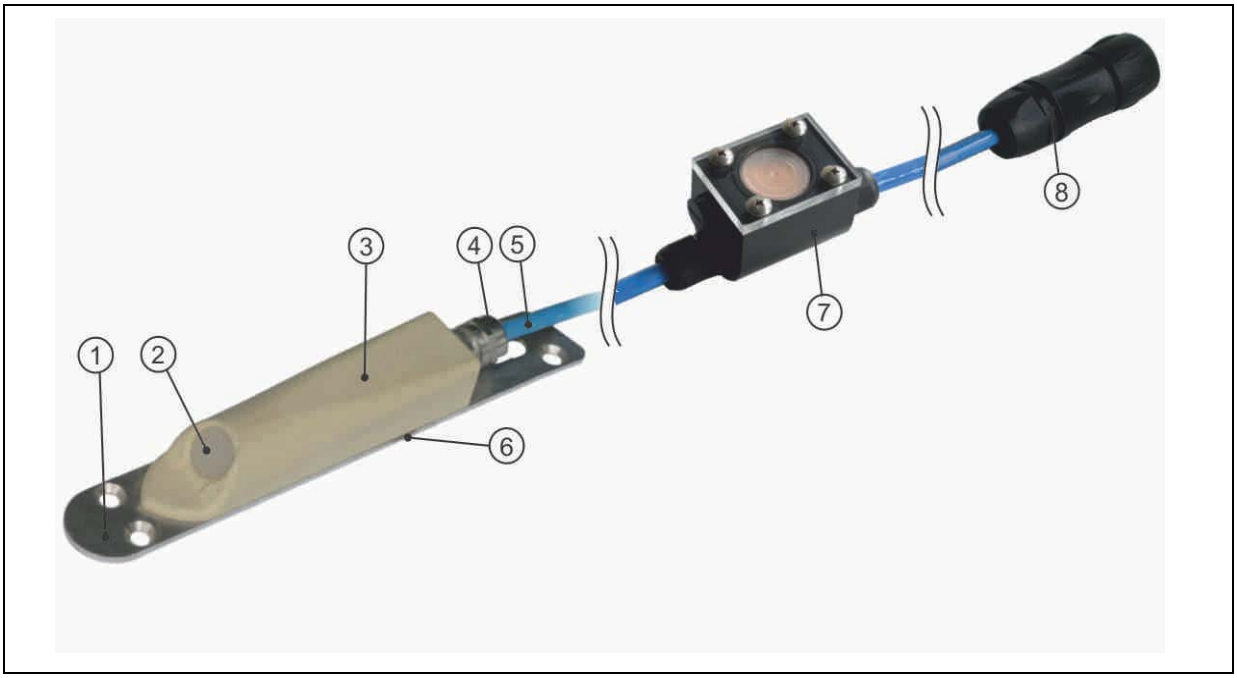
1	Flow velocity wedge sensor, type POA-V2H1/V2U1
2	Flow velocity wedge sensor, type POA-V200/V2D0
3	Flow velocity wedge sensor, type CS2
4	Pipe sensor, type CS2, with sensor screw connection and retaining element
5	Pipe sensor, type POA, with sensor screw connection and retaining element
6	Ultrasonic Level Sensor, type OCL-L1
7	Mini flow velocity wedge sensor, type CSM-V100
8	Mini flow velocity wedge sensor, type CSM-V1D0
9	Ultrasonic Level Sensor, type DSM
10	Electronic Box, type EBM

Fig. 4-1 Sensor overview and Electronic Box



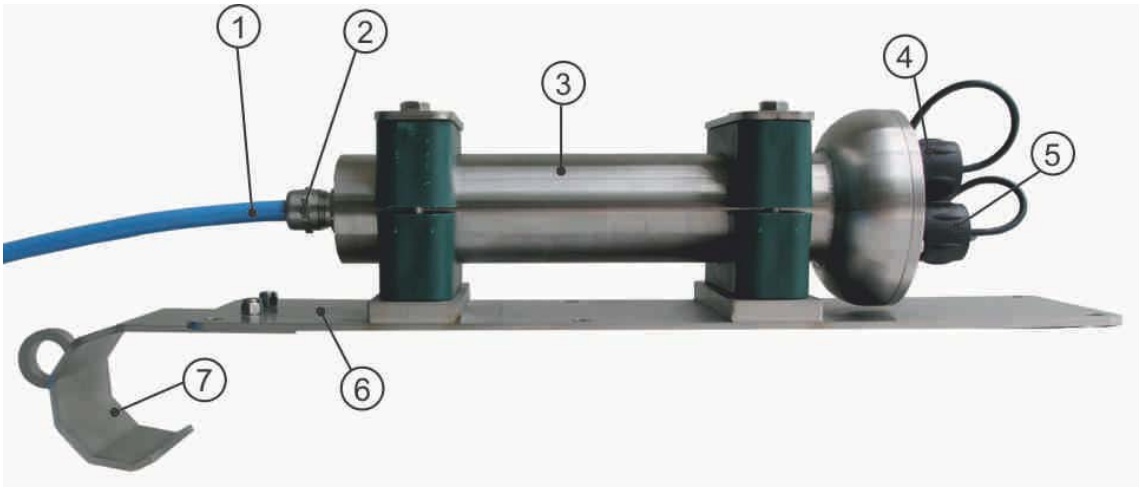
1. Ground plate
2. Sensor for flow velocity measurement
3. Sensor body
4. Cable gland
5. Sensor cable
6. Plug with spigot nut

Fig. 4-2 Overview wedge sensor, type CSM



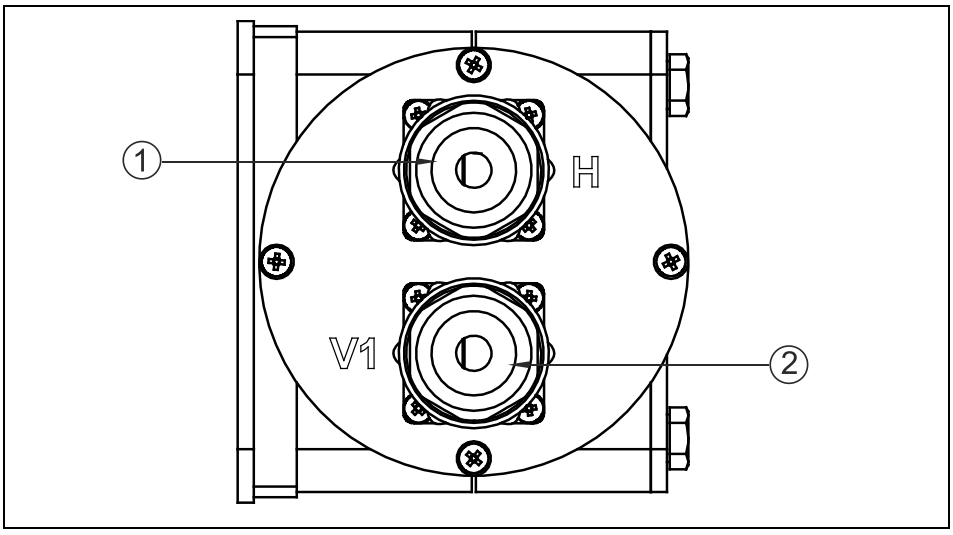
1. Ground plate
2. Sensor for flow velocity measurement
3. Sensor body
4. Cable gland
5. Sensor cable
6. Sensor for level measurement using pressure
7. Pressure compensation element
8. Plug with spigot nut

Fig. 4-3 Overview wedge sensor, type CSM-D



1. Cable connection to the measurement device OCM Pro CF or PCM Pro / PCM 4
2. Cable gland
3. Electronic Box body
4. Plug for water-ultrasonic sensor, type CSM
5. Plug for air-ultrasonic sensor, type DSM
6. Mounting plate
7. Suspension bracket

Fig. 4-4 Overview external Electronic Box, type EBM



1. Socket for air-ultrasonic sensor Type DSM
2. Socket for flow velocity sensor Type CSM

Fig. 4-5 Overview socket wiring Electronic Box, type EBM

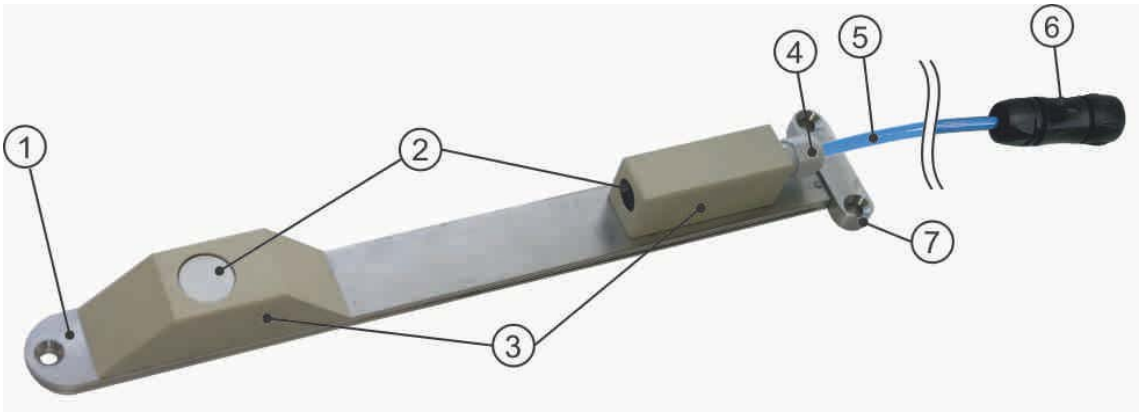
WARNING

Seal unused connection sockets

Unused connection sockets on the Type EBM Electronic Box shall be sealed watertight by using the screw cover fastened on each socket prior to installation. Otherwise the protection grade of the entire unit is no longer guaranteed. Damages resulting due to not using the covers are not covered by the manufacturer's liability.
Covers being damaged or lost due to the use of force can be ordered from NIVUS at extra costs.

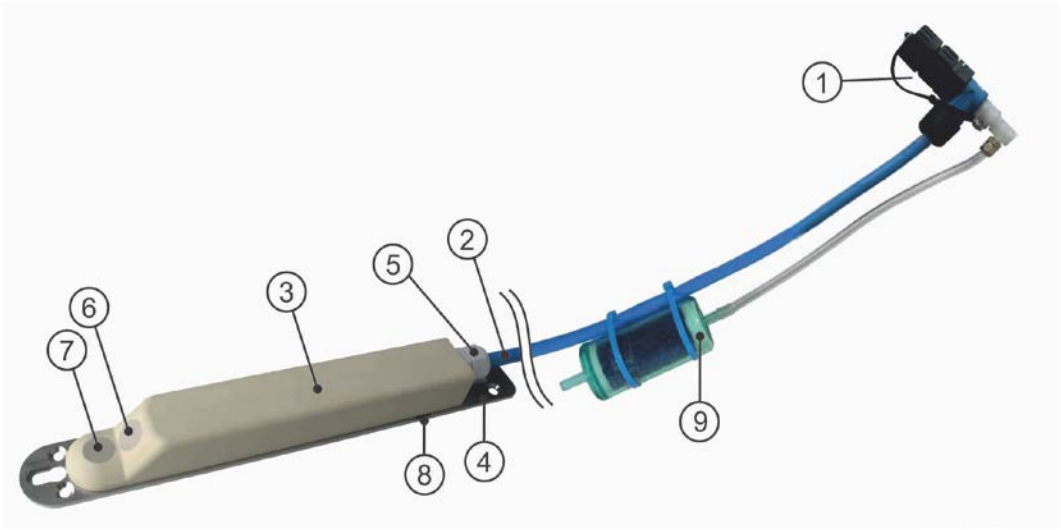
Keep threads of plugs and sockets carefully free of dirt, sand or similar and clean the threads with a soft and lint-free cloth prior to connection if required.

If placed in flood shafts or channels the transmitter must be secured in order to prevent it from being washed away unintentionally (use suspension gear, plastic or steel rope, chain or similar).



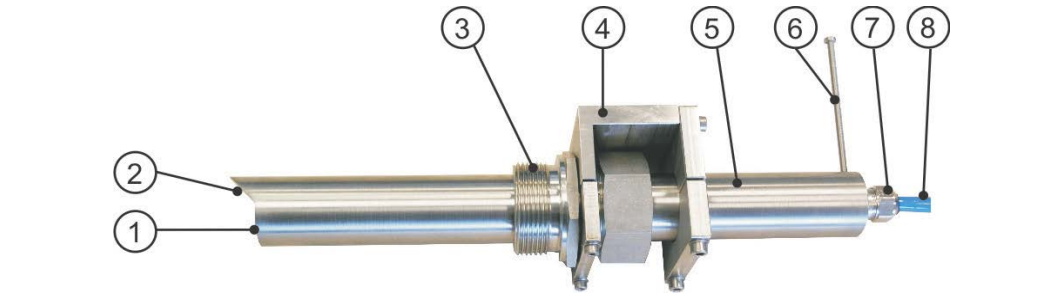
1. Ground plate
2. Sensors for level measurement using air-ultrasonic
3. Sensor body
4. Cable gland
5. Sensor cable
6. Plug with spigot nut
7. Fastening clamp for installation on ceiling

Fig. 4-6 Overview air-ultrasonic sensor, type DSM



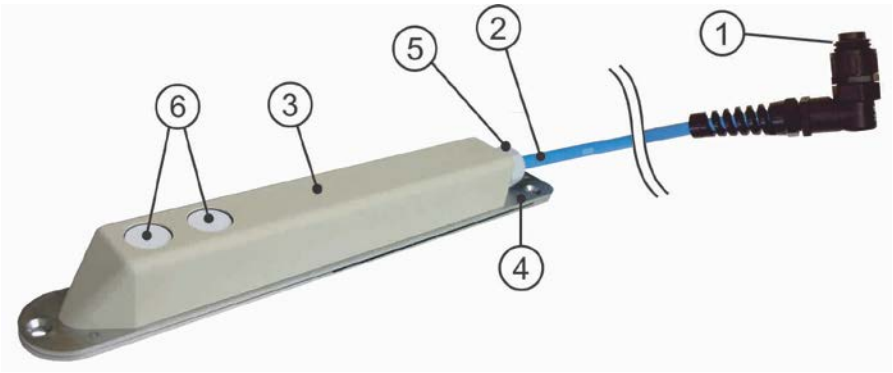
1. Plug with spigot nut (optional)
2. Sensor cable
3. Sensor body
4. Ground plate
5. Cable gland
6. Sensor for flow velocity measurement
7. Sensor for level measurement using water-ultrasonic (optional)
8. Sensor for level measurement using pressure (optional)
9. Air filter (optionally fixed with plug)

Fig. 4-7 Overview wedge sensor, type POA-V2H1/V2U1



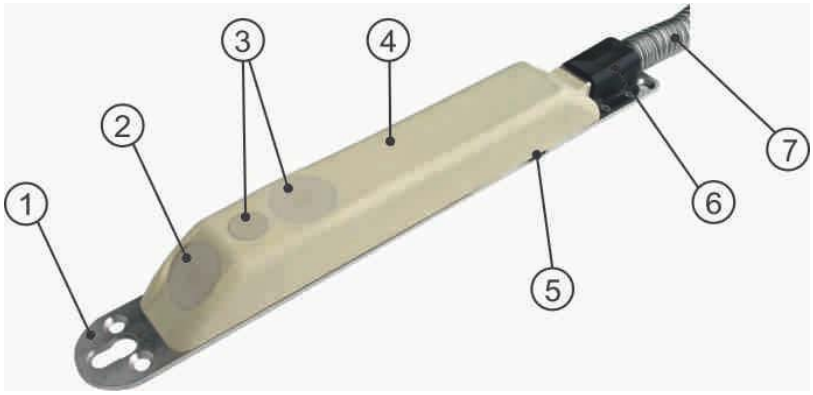
1. Sensor for level measurement using water-ultrasonic (optional)
2. Sensor for flow velocity measurement
3. Sensor screw joint (movable)
4. Retaining element
5. Sensor body
6. Installation help, screw M4
7. Cable gland
8. Sensor cable

Fig. 4-8 Overview pipe sensor, type POA



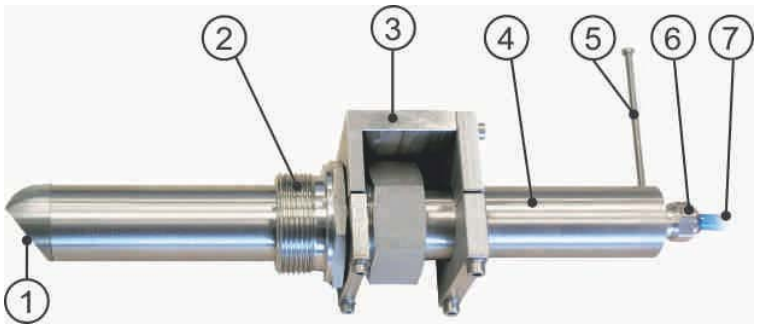
1. Plug with spigot nut
2. Sensor cable
3. Sensor body
4. Ground plate
5. Cable gland
6. Sensors for level measurement using air-ultrasonic

Fig. 4-9 Overview air-ultrasonic sensor, type OCL-L1



1. Ground plate
2. Sensor for flow velocity measurement
3. Sensor for level measurement using water-ultrasonic (optional)
4. Sensor body
5. Sensor for level measurement using pressure (optional)
6. Cable protection
7. Protection hose for sensor cable(optional)

Fig. 4-10 Overview wedge sensor, type CS2



1. Sensor for flow velocity measurement
2. Sensor screw joint (movable)
3. Retaining element
4. Sensor body
5. Installation help, screw M4
6. Cable gland
7. Sensor cable

Fig. 4-11 Overview pipe sensor, type CS2

4.2 Use in accordance with the requirements

CSM Sensor

The sensor type CSM is designed for flow velocity measurement of slight to heavily polluted media in part filled or full pipes and channels with low levels. The CSM sensor can be operated exclusively in connection with the accompanying Electronic Box EBM. For Type CSM-V100 an additional level measurement is required.

DSM Sensor

The sensor type DSM is designed to measure level of liquid media using ultrasound from top down in pipes featuring small dimensions. The sensor can be operated exclusively in connection with the accompanying Electronic Box EBM.

EBM Electronic Box

The Electronic Box Type EBM is conceived to connect the sensors Type CSM and DSM. It contains the detached electronic sensor components and is designed to be connected to Type PCM Pro / 4 or OCM Pro transmitters.

POA Sensor

The sensor type POA is designed to measure flow of slight to heavy polluted media in part filled and full sewers, pipes and other channels. Level measurement is additionally possible depending on the sensor type.

OCL-L1 Sensor

The sensor type OCL-L1 is designed to measure level of liquid media using ultrasound from top down.

CS2 Sensor

The sensor type CS2 is designed for flow velocity measurement of slight to heavily polluted media in part filled or full pipes and channels and featuring large dimensions and a minimum filling level of 10 cm. Level measurement is additionally possible depending on the sensor type.

Please necessarily observe the maximum permissible limit values as specified in chapter 5. Any cases varying from these conditions without written consent of NIVUS GmbH are entirely left at owner's risk.

WARNING

The sensors and the Electronic Box are exclusively intended to be used for purposes as described above. Modifying or using the sensors or Electronic Box for other purposes without the written consent of the manufacturer will not be considered as use in accordance with the requirements.
Damages resulting from this are left at user's risk.

The sensors are designed for a lifetime of approx. 10 years. After that period an inspection in addition with a general overhaul has to be made.

Ex-Approval

The Ex-version of the sensors is designed to be used in areas with explosive atmospheres (zone 1).

Approval ATEX / IECEx :  II 2 G Ex ib IIB T4 Gb / Ex ib IIB T4 Gb

WARNING

The approval is only valid in connection with the respective indication on the sensors nameplate.

The Ex-version sensors are matched to the NIVUS transmitters regarding the assessment of intrinsically safe electrical systems according to EN 60079-25.

In case of using other manufacturer's transmitters the operator is obliged to implement a system assessment according to EN 60079-25.

The required specifications for Ex-version sensors can be taken from the EC-type examination certificate TÜV 03 ATEX 2262 or TÜV 12 ATEX 087812

WARNING

When connecting the sensor to the transmitter the metal sensor ground plate must not exceed 1 GΩ grounding resistance!

In this case make sure to eliminate the risk of explosive atmospheres by using a gas warning unit prior to installation or maintenance works. Please observe to avoid building up electrostatic energy during the works!

5 Specifications

5.1 Water-ultrasonic sensor, type CSM-V100

Measurement principle	correlation with digital pattern detection
Minimum fill level	3 cm
Measurement frequency	1 MHz
Protection	IP 68
Ex-Approval (optional)	II 2 G Ex ib IIB T4 Gb
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (-4 °F to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Operating pressure	max. 4 bar
Cable length	7 m, for connection to Electronic Box
Type of cable	2x (2x28 AWG/7-(ST)12Y)+4x28 AWG/7
Medium contacting materials	Polyurethane, PVDF, stainless steel 1.4571, PA
Measurement range	-100 cm/s to +600 cm/s
Number of scan layers	Max. 16
Zero point drift	absolutely stable zero point
Error limits (per scan layer)	<1 % of measurement value (v > 1m/s) < 0.5 % of measurement value +5 mm/s (v <1 m/s)
Sonic beam angle	±5 degrees

5.2 Water-ultrasonic sensor, type CSM-V1D0

Measurement principle	correlation with digital pattern detection
Minimum fill level	5.5 cm
Measurement frequency	1 MHz
Protection	IP68
Ex-Approval (optional)	II 2 G Ex ib IIB T4 Gb
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (-4 °F to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Operating pressure	max. 1 bar
Cable length	7/15 m for connection to Electronic Box
Type of cable	1x (2xAWG24/7 CAT 7) + 1 PA hose 1.5/2.5mm + (4xAWG26/7)
Medium contacting materials	Polyurethane, stainless steel 1.4571, PPO GF30, PA, Pressure compensation element: POM-C, PMMA, PA, stainless steel 1.4571
Measurement range	-100 cm/s to +600 cm/s
Number of scan layers	Max. 16
Zero point drift	absolutely stable zero point
Error limits (per scan layer)	<1 % of measurement value (v > 1m/s) < 0.5 % of measurement value +5 mm/s (v <1 m/s)
Sonic beam angle	±5 degrees
Level measurement - Pressure	
Measurement range	0 to 500 cm
Zero point drift	max. 0.75 % of final value (0–50 °C)
Measurement uncertainty	≤0.5 % of final value

5.3 Electronic Box, type: EBM

Protection rating	IP 68 (with connection sockets locked)
Ex-Approval	II 2 G Ex ib IIB T4 Gb
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70° C (-22 °F to 158 °F)
Operating pressure	max. 1 bar
Cable length	3/10/20/30/50/100 m
Type of cable	LiYC11Y 2x1.5 + 1x2x0.34
Outside cable diameter	8.4 mm ±0.25 mm
Medium contacting materials	Polyurethane, stainless steel 1.4571, PP

5.4 Air Ultrasonic-Sensor Mini, type DSM

Measurement principle	Ultrasonic transit time
Measurement frequency	125 kHz / 200 kHz
Protection rating	IP 68
Ex-Approval	II 2 G Ex ib IIB T4 Gb
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (to 104 °F) for applications in Ex Zone 1
Type of cable	2x (2x28 AWG/7-(ST)12Y)+4x28 AWG/7
Storage temperature	-30 °C to +70° C (-22 °F to 158 °F)
Operating pressure	max. 1 bar
Cable length	7/15 m for connection to Electronic Box
Medium contacting materials	Polyurethane, stainless steel 1.4571, PPO GF30, PA
Measurement range	0 to 200 cm (0 to 6.56 ft)
Dead zone (as from ground plate)	4 cm (1.57 in)
Measurement uncertainty	< ±5 mm
Zero point drift	absolutely stable zero point
Temperature measurement	
Measurement range	-20 °C to +50 °C (-4 °F to 122 °F)
Measurement uncertainty	±0.5 K

5.5 Water-ultrasonic combi sensor, type POA

Measurement principle	- ultrasonic transit time (level) - piezo-resistive pressure measurement (level) - correlation with digital pattern detection (flow velocity)
Measurement frequency	1 MHz
Protection	IP 68
Ex-Approval (optional)	II 2 G Ex ib IIB T4 Gb (ATEX) Ex ib IIB T4 Gb (IECEX)
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (-4 °F to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Operating pressure	max. 4 bar (combi sensor with pressure element max. 1 bar)
Cable length	10/15/20/30/50/100 m, for sensors without plug (sensor connection type “K" and "L") extendable up to 250 m max. (820 ft); using sensors with integrated pressure measurement cell (Level measurement, type V2D0 und V2U1) requires to use a pressure compensation element after a cable length of 30 m (99 ft). Element may also be used to connect extension.
Type of cable	- Combi sensors with pressure measurement: LiYC11Y 2x1.5 + 1x2x0.34 + PA 1.5/2.5 - Sensors without pressure measurement: LiYC11Y 2x1.5 + 1x2x0.34
Outside cable diameter	- Combi sensors with pressure measurement: 9.75 mm ±0.25 mm - Sensors without pressure measurement: 8.4 mm ±0.25 mm
Sensor types	- Flow velocity sensor with v-measurement using cross correlation and temperature measurement to compensate the temperature effect on the velocity of sound. - Combi sensor with flow velocity sensor using cross correlation, level measurement via water ultrasonic and temperature measurement to compensate the temperature effect on the velocity of sound. - Combi sensor with flow velocity sensor using cross correlation, level measurement via pressure and temperature measurement to compensate the temperature effect on the velocity of sound (wedge sensor only). - Combi sensor with flow velocity sensor using cross correlation, level measurement via water ultrasonic as well as redundant pressure measurement and temperature measurement to compensate the temperature effect on the velocity of sound (wedge sensor only).
Types of construction	- Wedge sensor for installation on channel bottom - Pipe sensor for installation in pipes with sensor screw joint and retaining element
Medium contacting materials	Polyurethane, stainless steel 1.4571, PPO GF30, PA (wedge sensor only), PTFE (pipe sensors only) Option: sensor made of PEEK, resistant against chemical substances, Hastelloy C-276 mounting plate, Titanium mounting plate, FEP coated cable

5.6 Air Ultrasonic-Sensor, type OCL-L1

Measurement principle	Ultrasonic transit time
Measurement frequency	120 kHz
Protection rating	IP 68
Ex-Approval	II 2 G Ex ib IIB T4 Gb (ATEX) Ex ib IIB ic (IECEX)
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (-4 °F to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Operating pressure	max. 1 bar
Cable length	10/15/20/30/50/100 m
Type of cable	LiYC11Y 2x1.5 + 1x2x0.34
Outside cable diameter	8.4 mm ±0.25 mm
Type of construction	Wedge sensor for installation in channel vertex
Medium contacting materials	Polyurethane, stainless steel 1.4571, PPO GF30, PA
Level measurement	
Measurement range	0 to 200 cm (0 to 6.56 ft)
Dead zone (as from ground plate)	14 cm (5.51 in)
Measurement uncertainty	< ±0.5 % of final value
Temperature measurement	
Measurement range	-20 °C to +50 °C (-4 °F to 122 °F)
Measurement uncertainty	±0.5 K

5.7 Water-ultrasonic combi sensor, type CS2

Measurement principle	- ultrasonic transit time (level) - piezo-resistive pressure measurement (level) - correlation with digital pattern detection (flow velocity)
Measurement frequency	1 MHz
Protection	IP 68
Ex-Approval (optional)	II 2 G Ex ib IIB T4 Gb (ATEX) Ex ib IIB T4 Gb (IECEX)
Operating temperature	-20 °C to +50 °C (-4 °F to 122 °F) -20 °C to +40 °C (-4 °F to 104 °F) for applications in Ex Zone 1
Storage temperature	-30 °C to +70 °C (-22 °F to 158 °F)
Operating pressure	max. 4 bar (combi sensor with pressure element max. 1 bar)
Cable length	10/15/20/30/50/100 m, for sensors without plug (sensor connection type "K" and "L") extendable up to 250 m max. (820 ft); using sensors with integrated pressure measurement cell (level measurement, type V2D0 und V2U1) requires to use a pressure compensation element after a cable length of 30 m (99 ft). Element may also be used to connect extension
Type of cable	- Combi sensors with pressure measurement: LiYC11Y 2x1,5 + 1x2x0,34 + PA 1,5/2,5 - Sensors without pressure measurement: LiYC11Y 2x1,5 + 1x2x0,34
Outside cable diameter	- Combi sensors with pressure measurement: 9.75 mm ±0.25 mm - Sensors without pressure measurement: 8.4 mm ±0.25 mm
Sensor types	- Flow velocity sensor with v-measurement using cross correlation and temperature measurement to compensate the temperature effect on the velocity of sound. - Combi sensor with flow velocity sensor using cross correlation, level measurement via water ultrasonic and temperature measurement to compensate the temperature effect on the velocity of sound. - Combi sensor with flow velocity sensor using cross correlation, level measurement via pressure and temperature measurement to compensate the temperature effect on the velocity of sound. - Combi sensor with flow velocity sensor using cross correlation, level measurement via water ultrasonic as well as redundant pressure measurement and temperature measurement to compensate the temperature effect on the velocity of sound.
Types of construction	- Wedge sensor for installation on channel bottom or channel wall - Pipe sensor for installation in pipes with sensor screw joint and retaining element
Medium contacting materials	Polyurethane, stainless steel 1.4571, PPO GF30, PEEK, PA6 GF30

5.7.1 Water-ultrasonic level measurement type: POA and CS2

Measurement range	POA: 0 to 200 cm (0 to 6.56 ft), lowest absolutely measurable level 5 cm (0.16 ft) CS2: 0 to 500 cm (0 to 16.4 ft), lowest absolutely measurable level 8 cm (0.26 ft) (only wedge sensors)
Zero point drift	absolutely stable zero point
Measurement uncertainty	less than ±2 mm
Level measurement - pressure	
Measurement range	0 to 500 cm (0 to 16.4 ft)
Zero point drift	max. 0.75 % of final value (0 to 50 °C (32 °F to 122 °F)
Measurement uncertainty	≤0.5 % of final value
Flow velocity measurement	
Measurement range	-100 cm/s to +600 cm/s (-3.28 fps to 19.7 fps)
Number of scan layers	max. 16
Zero point drift	absolutely stable zero point
Error limits (per scan layer)	≤1 % of measurement value (v >1 m/s (3.28 fps)) ≤0.5 % of measurement value +5 mm/s (0.2 in/s) (v <1 m/s (3.28 fps))
Number of sensors	1 to 3 per transmitter
Sonic beam angle	±5 degrees
Temperature measurement	
Measurement range	-20 °C to +60 °C (-4 °F to 140 °F)
Measurement uncertainty	±0.5 K

6 Storing, Delivery and Transport

6.1 Receipt

Please check your delivery if it is complete and in working order according to the delivery note immediately after receipt. Any damage resulting from transport or transit shall be instantly reported to the carrier. An immediate, written report must be sent to NIVUS GmbH Eppingen as well.
Please report any shortcoming due to delivery to your representative or directly to NIVUS Eppingen within two weeks in writing.

Mistakes cannot be rectified later!

6.1.1 Delivery

The standard delivery of the correlation sensors contains:

- The instruction manual with the certificate of conformity. Here, all necessary steps to correctly install and to operate the sensors are listed.
- One correlation sensor as on the delivery note

Additional accessories depending on order. Please check by using the delivery note.

6.2 Storing

The following storing conditions shall be strictly adhered to:

max. temperature:	+70° C (158° F)
min. temperature:	- 30° C (-22° F)
max. humidity:	100 %

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

6.3 Transport

The Sensors are designed for harsh industrial conditions. However do not expose them to heavy shocks or vibrations.
Transportation must be carried out in the original packaging.

6.4 Return

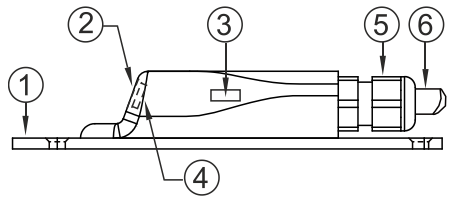
The units must be returned at customer costs to NIVUS Eppingen in the original packaging.
Otherwise the return cannot be accepted!

7 Installation

7.1 General

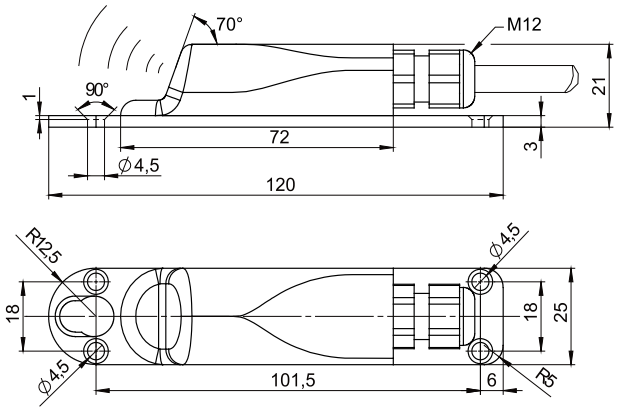
For electric installation the local regulations in the respective countries (e.g. VDE 0100 in Germany) must be referred to.

7.2 Sensor Design and Dimensions



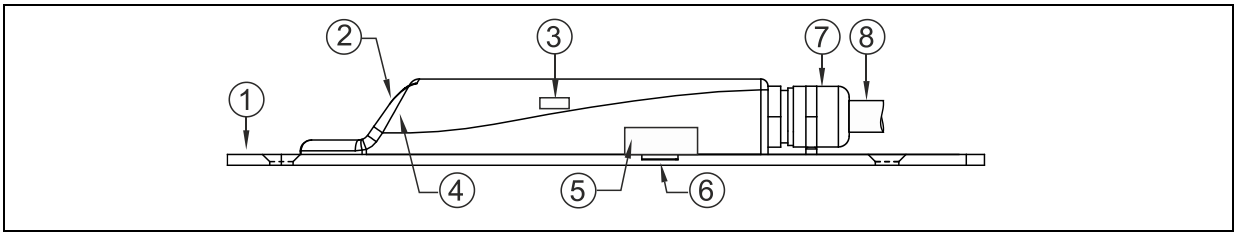
1 Ground plate
2 Acoustic coupling layer
3 Temperature sensor
4 Flow velocity sensor
5 Cable gland
6 Sensor cable

Fig. 7-1 Basic construction CSM wedge sensor



Dimensions in mm

Fig. 7-2 Dimensions CSM wedge sensor



1 Ground plate
2 Acoustic coupling layer
3 Temperature sensor
4 Flow velocity sensor
5 Pressure sensor
6 Duct to pressure measurement
7 Cable gland
8 Sensor cable

Fig. 7-3 Basic construction CSMD wedge sensor V1D0

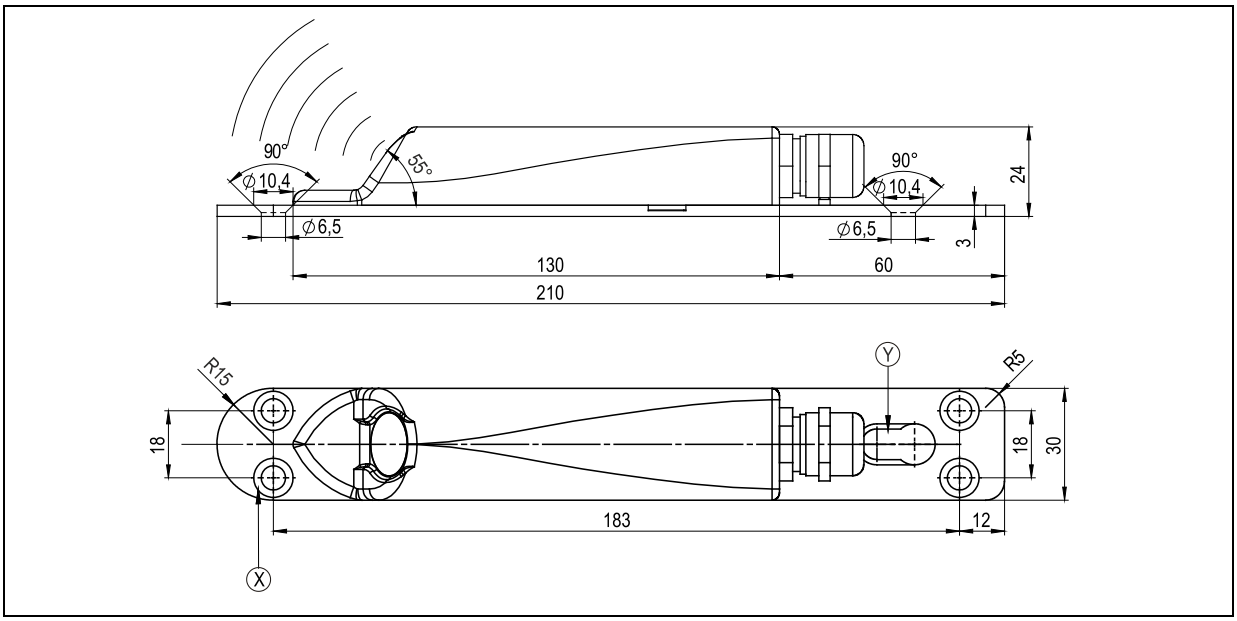
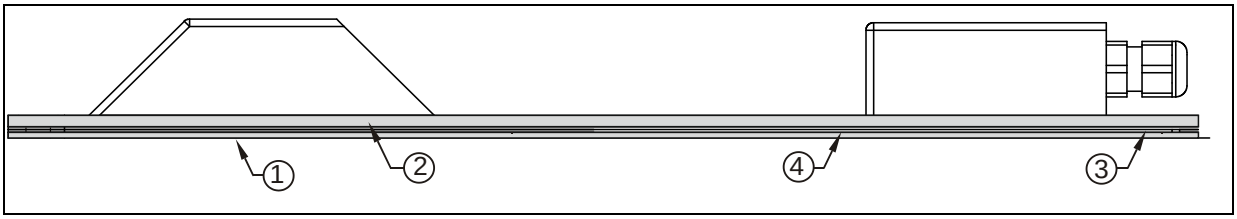
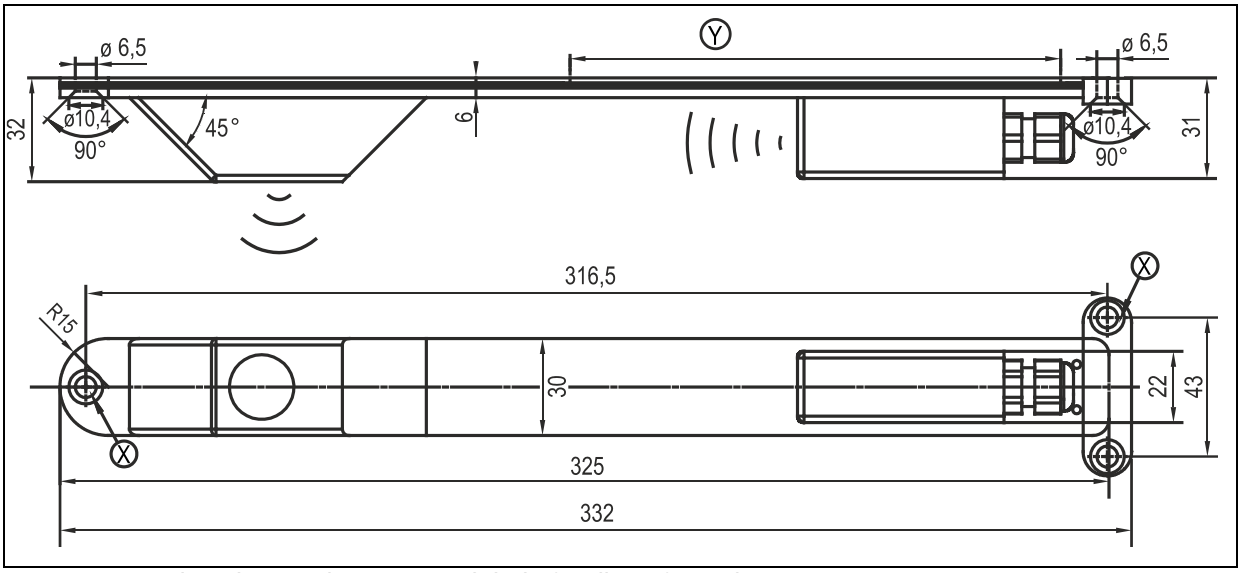


Fig. 7-4 Dimensions CSMD wedge sensor V1D0



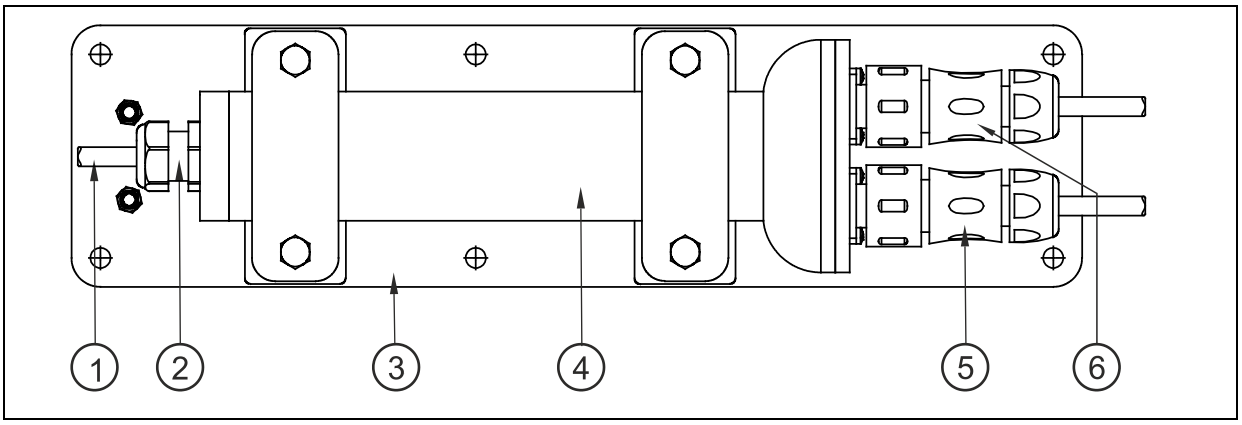
1 Ground plate 1
2 Mounting plate 2 (base plate)
3 Insertion section for pipe mounting plate
4 Mounting plate (spacer plate)

Fig. 7-5 Basic construction of air-ultrasonic sensor, type DSM



X = Fastening shoe and countersunk hole for direct fastening
Y = Insertion section for pipe mounting plate

Fig. 7-6 Dimensions air-ultrasonic sensor, type DSM



1 Cable
2 Cable gland
3 Ground plate
4 Electronic body
5 Plug for water-ultrasonic sensor, type CSM
6 Plug for air-ultrasonic sensor, type DSM

Fig. 7-7 Basic construction of Electronic Box, type EBM

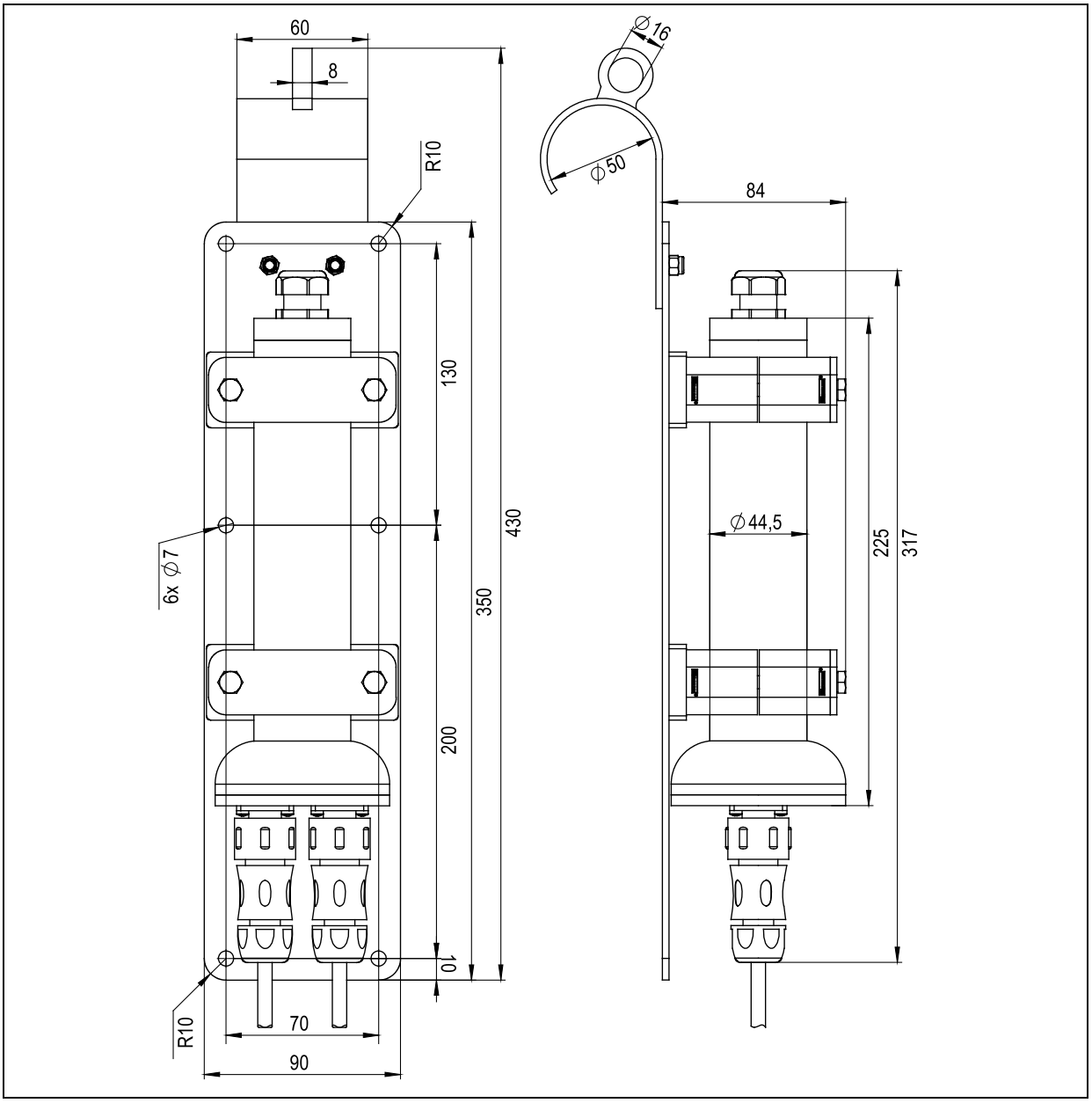
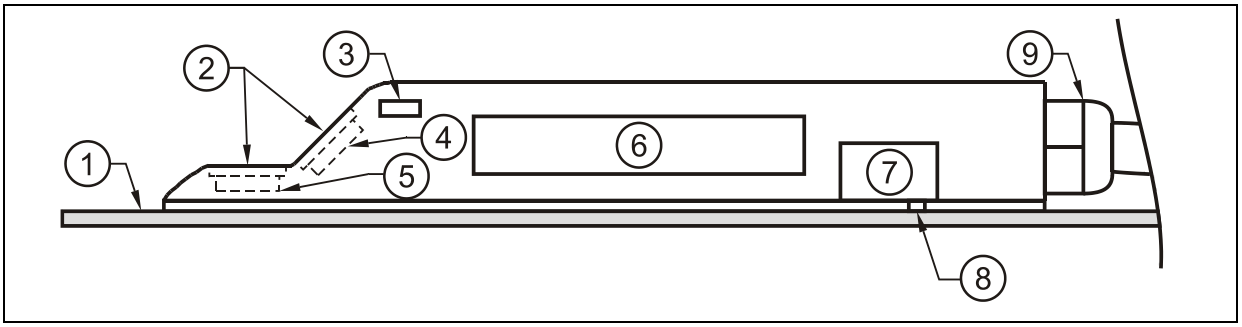
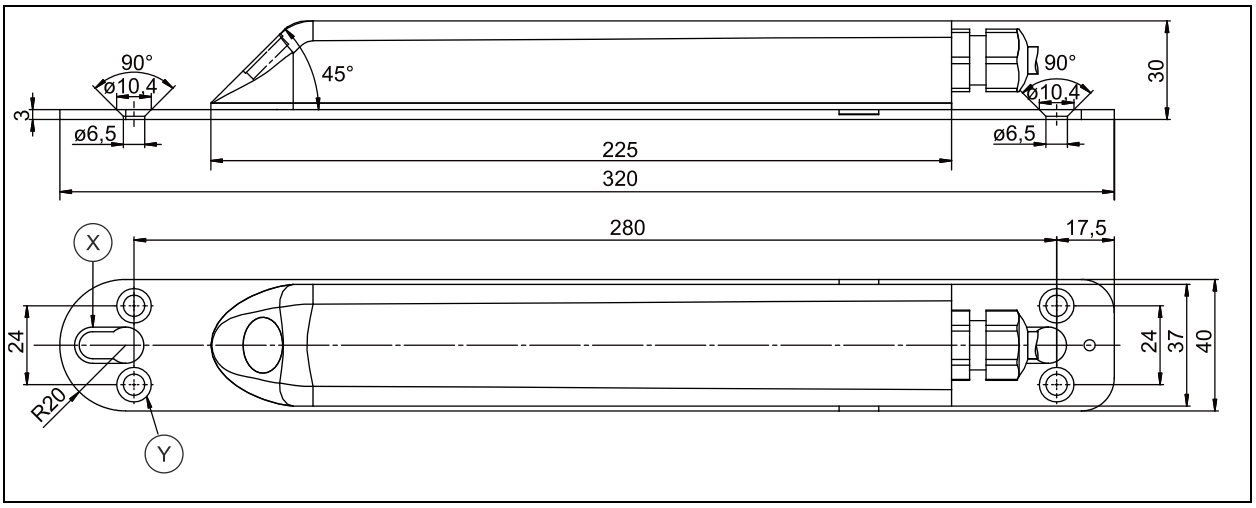


Fig. 7-8 Dimensions of Electronic Box, type EBM



1 Ground plate
2 Acoustic coupling layer
3 Temperatur sensore
4 Flow velocity sensor
5 Level / height sensor (optional)
6 Electronics
7 Pressure sensor (optional)
8 Duct to pressure measurement (optional)
9 Cable gland

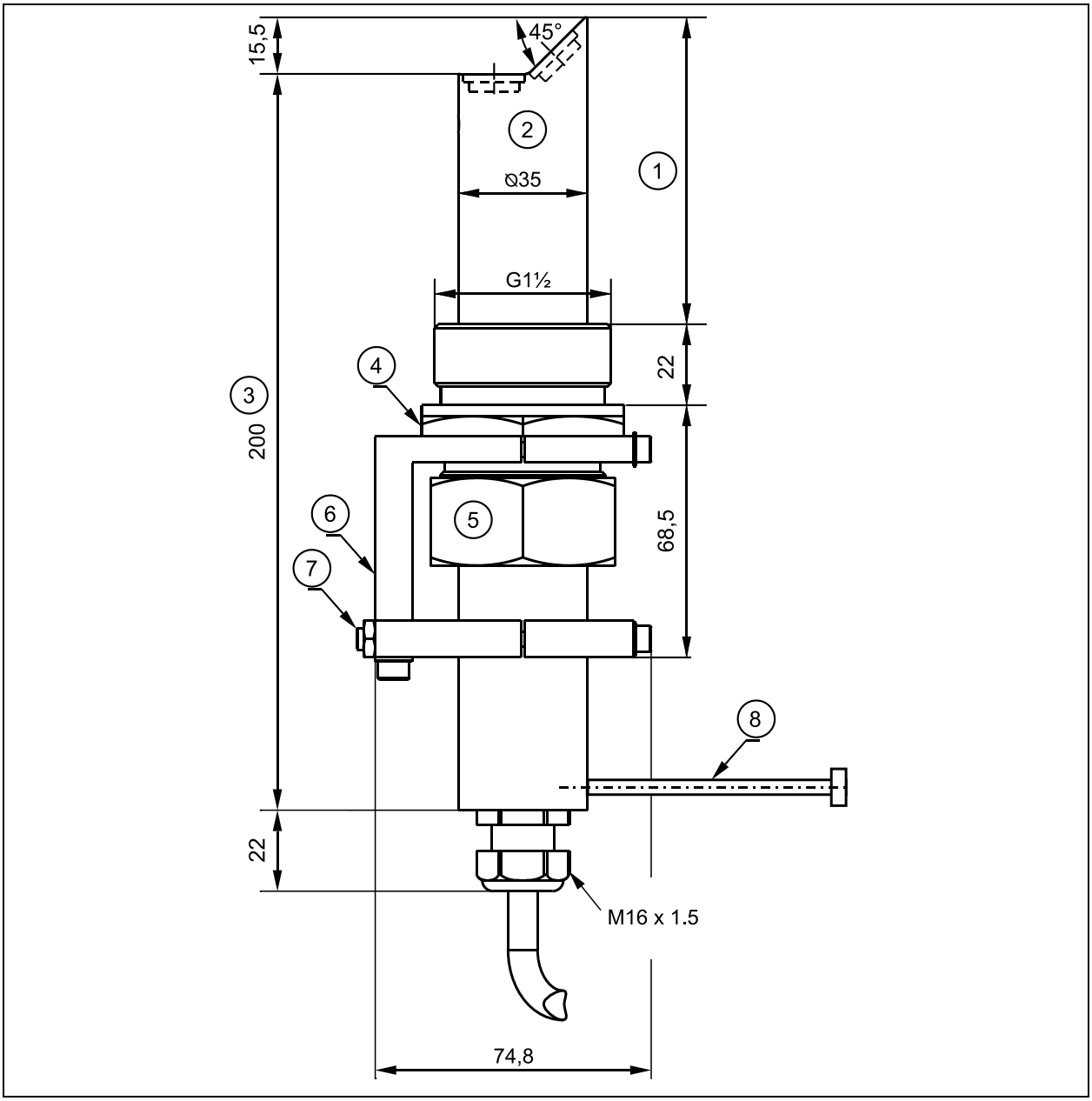
Fig. 7-9 Basic construction POA wedge sensor



X = Slotted holes for fastening on pipe mounting system

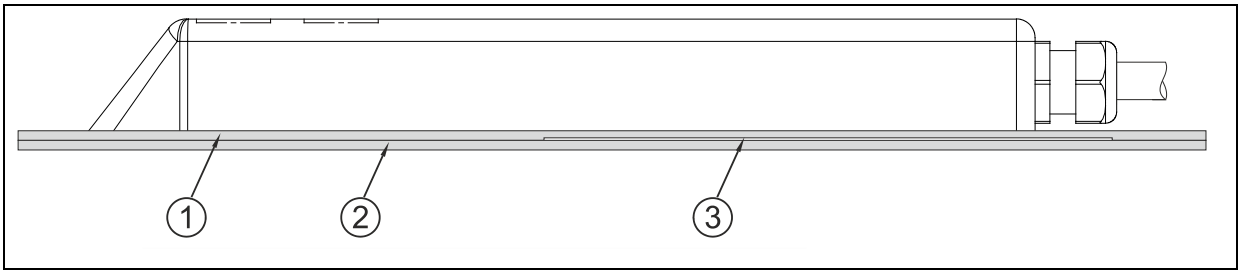
Y = 4 x countersunk holes DIN 66-5, however with d1 = 6.5 mm for direct fastening

Fig. 7-10 Dimensions POA wedge sensor V200/V2D0



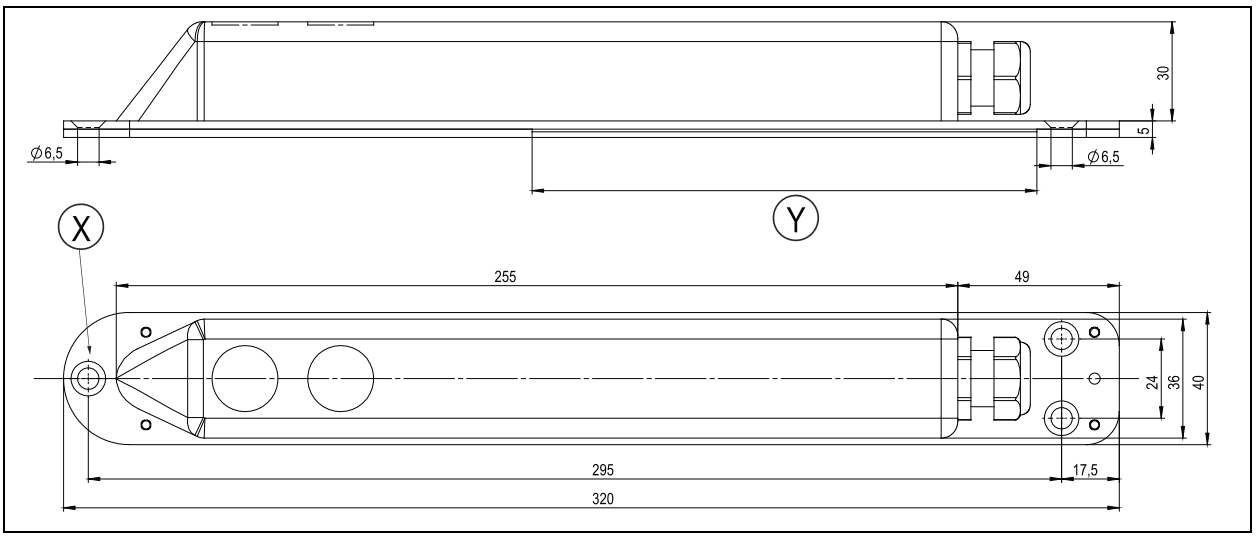
1 Movable
2 Pipe sensor
3 300 mm (use of a ball stop valve)
4 Wrench size 55
5 Wrench size 50
6 Retaining element
7 Set screw
8 Screw “installation help” - 180° to flow direction

Fig. 7-11 Dimensions POA pipe sensor



1 Ground plate 1
2 Ground plate 2 (base plate)
3 Insertion section for pipe mounting plate

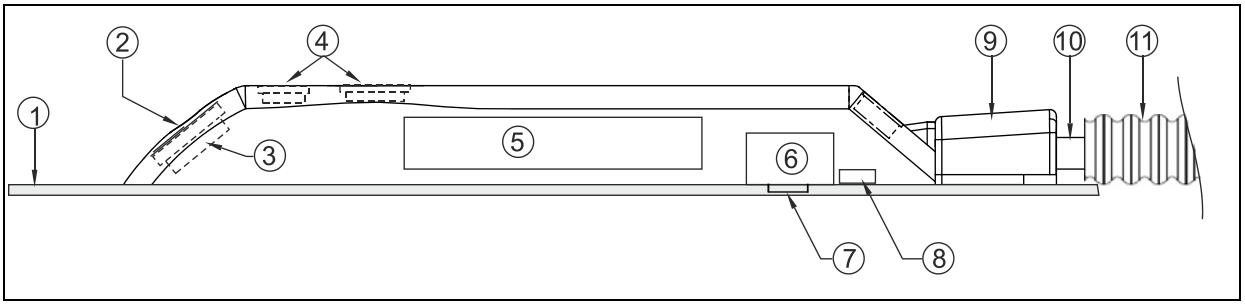
Fig. 7-12 Basic construction of air-ultrasonic sensor, type OCL



X = Fastening shoe and countersunk hole for direct fastening

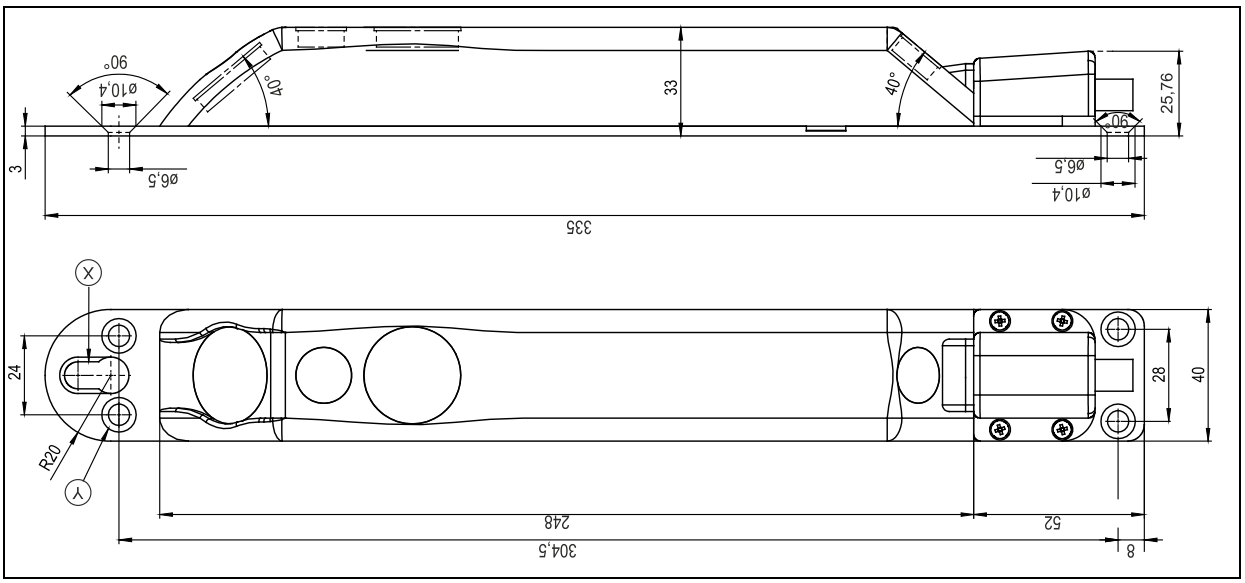
Y = Insertion section for pipe mounting plate

Fig. 7-13 Dimensions air-ultrasonic sensor, type OCL



1 Ground plate
2 Acoustic coupling layer
3 Flow velocity sensor positive flow direction
4 Level / height sensor water-ultrasound (optional)
5 Electronics
6 Pressure sensor (optional)
7 Duct to pressure measurement (optional)
8 Temperatur sensor (sensors without pressure cell only)
9 Protective cover for sensor cable and protection hose fastening
10 Sensor cable
11 Protection hose(optional)

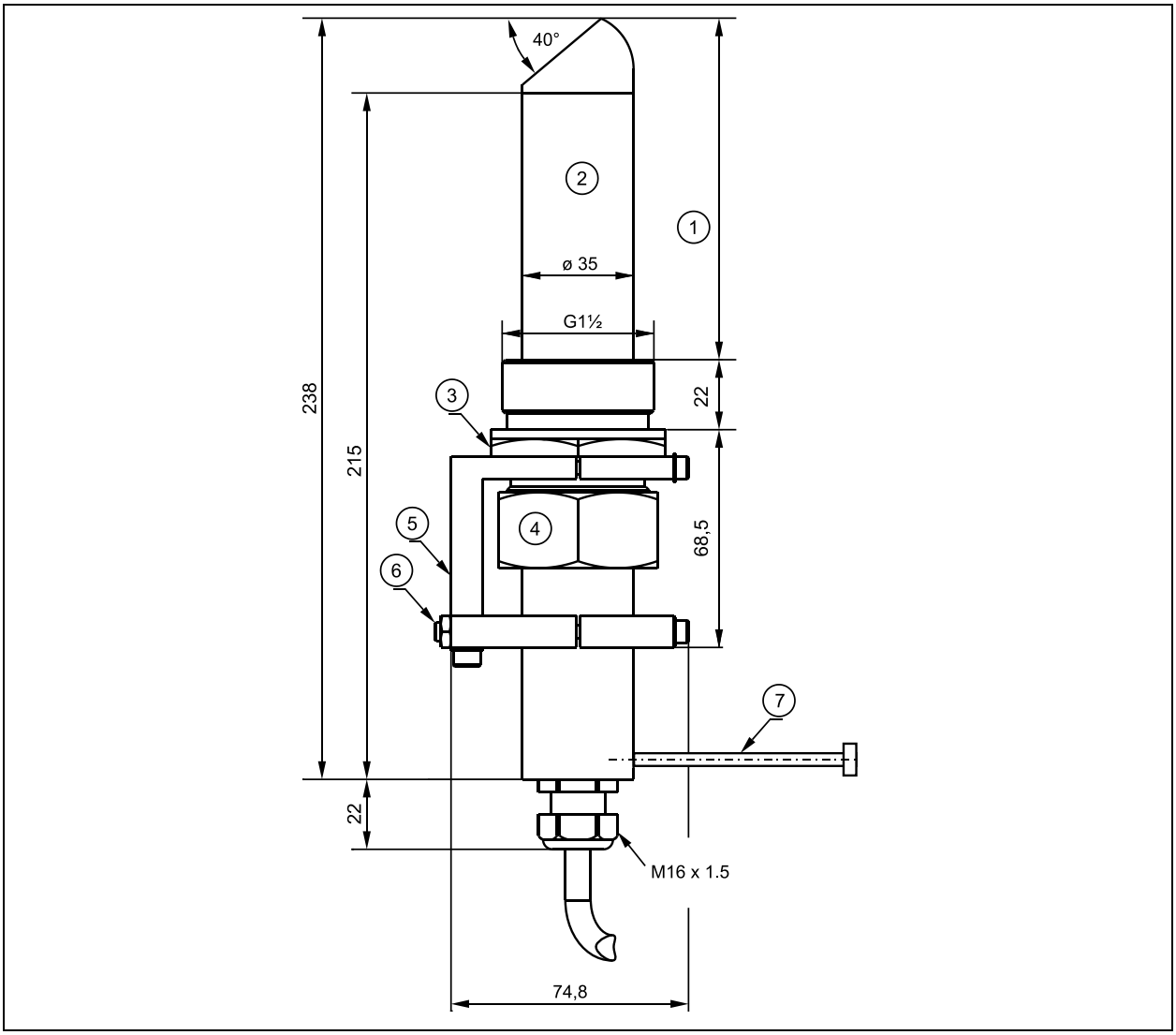
Fig. 7-14 Basic construction CS2 wedge sensor



X = Slotted holes for fastening on pipe mounting system

Y = 4 x countersunk holes DIN 66-5, however with d1 = 6.5 mm, for direct fastening

Fig. 7-15 Dimensions CS2 wedge sensor



1. Movable
2. Sensor
3. Wrench size 55
4. Wrench size 50
5. Retaining element
6. Grub screw
7. Screw “installation help” - 180° to flow direction

Fig. 7-16 Dimensions CS2 pipe sensor

7.3 Sensor Installation

WARNING

Leakage due to removing components

Removing or loosening from ground plate or cable gland result in leakage and therefore will cause measurement and sensor failure.

Do absolutely <u>not</u> remove any parts of the sensor!! Otherwise warranty as well as Ex protection will expire!

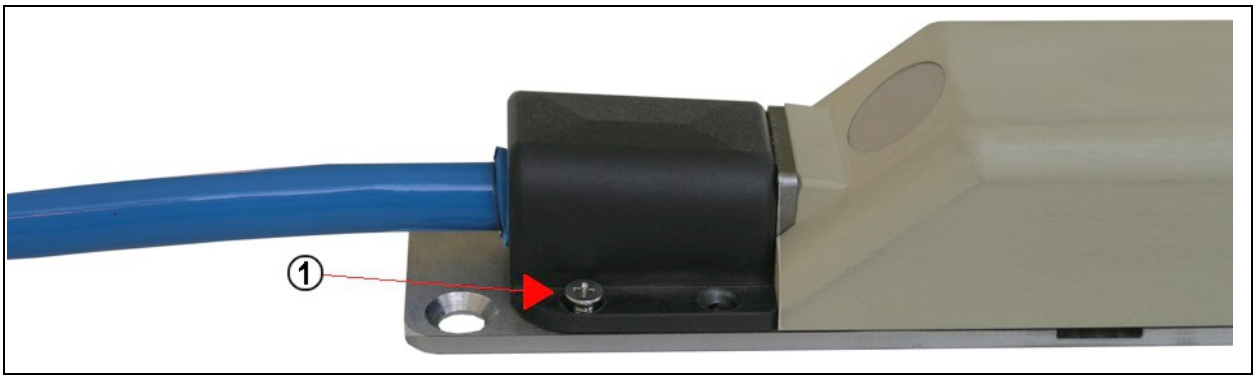
The installation of the sensors is described in the separately "Installation Manual for Sensors".
Please refer to:

- selecting sensor positions
- required calming sections
- sensor installation and fastening
- cable layout

Please anyway observe the hints on sensors with integrated pressure cell in this manual (chapters 7.6 and 7.7).

7.4 Mounting the protection hose for the sensor, type CS2

It is possible to optionally install a cable protection hose on the sensor.
To do this unscrew the 4 screws of the protective cover (see Fig. 7-17)



1 Protective cover screws

Fig. 7-17 Unscrewing the protective cover

Push the protection hose over the cable subsequently as depicted in Fig. 7-18.

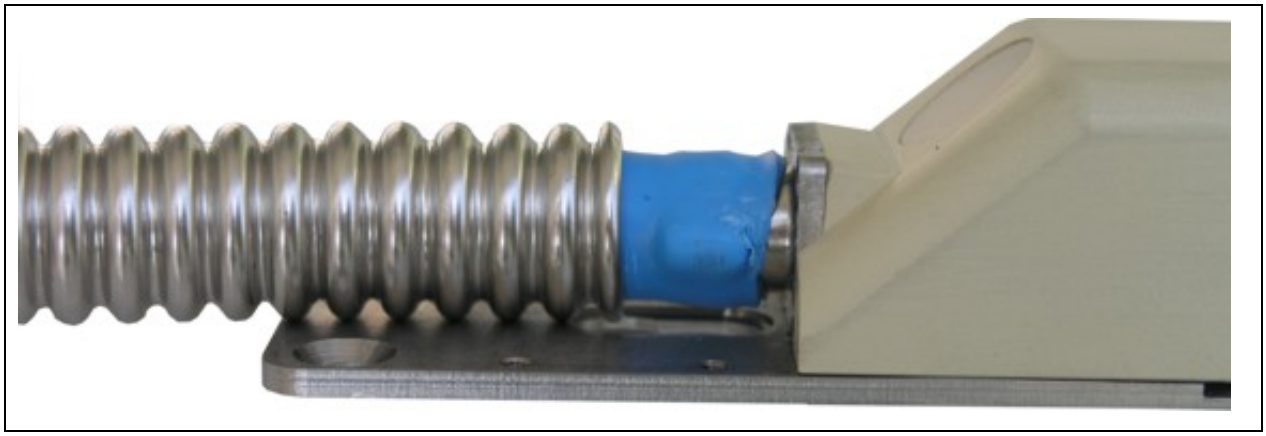


Fig. 7-18 Pushing the protection hose over the cable

Fasten the protective cover again by using the 4 screws subsequently.

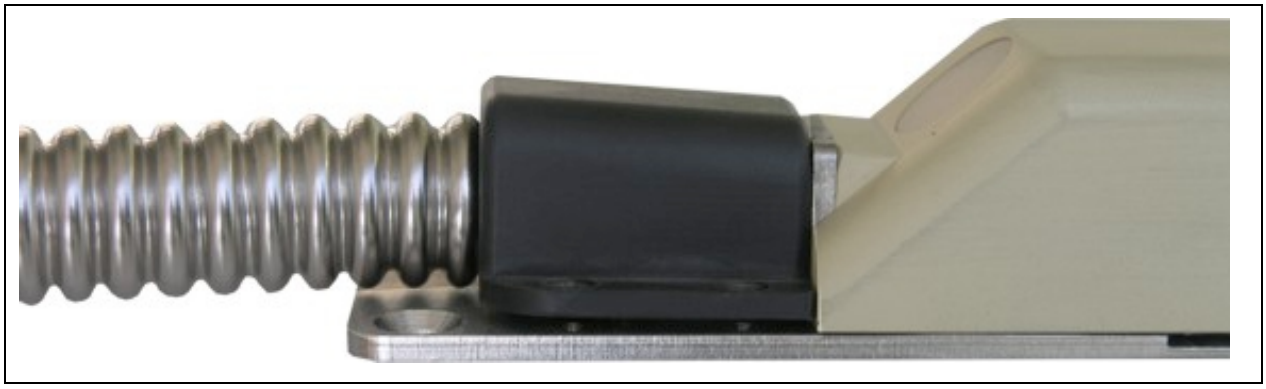
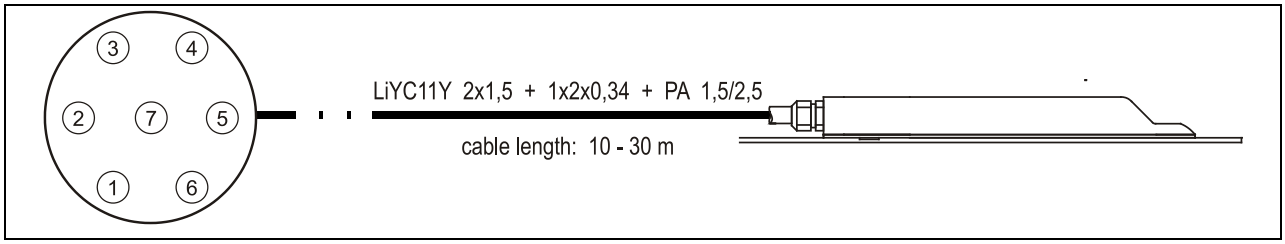


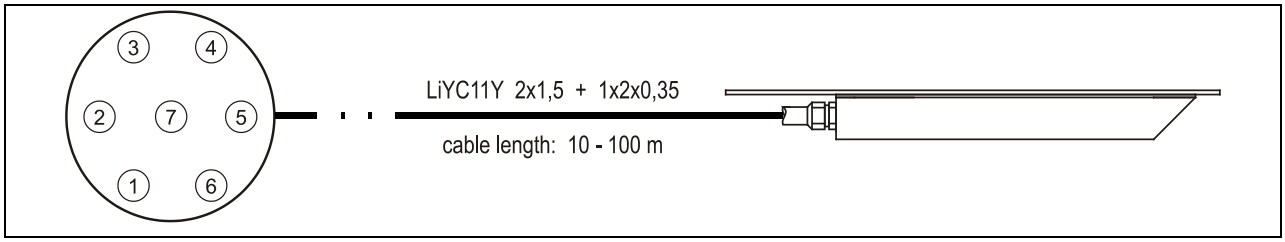
Fig. 7-19 Fastening the protective cover

7.5 Plug wiring and Sensor Cable



1	UE (voltage input, max. 9.9V)
2	RxTx + (RS485)
3	not connected
4	not connected
5	RxTx - (RS485)
6	UE-GND (power supply ground)
7	shield (cable shield)

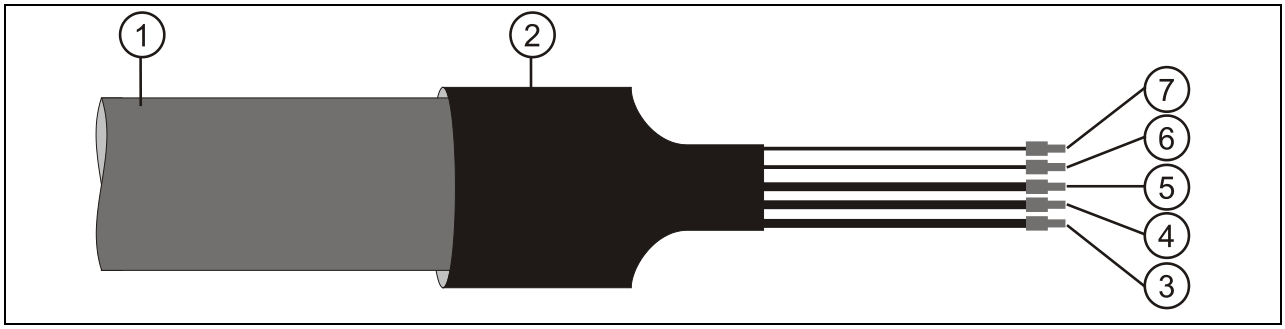
Fig. 7-20 Plug wiring water-ultrasonic sensors (POA, CS2)



1	UE (voltage input, max. 9.9V)
2	RxTx + (RS485)
3	+ mA (2-wire sensors)
4	- mA (2-wire sensors)
5	RxTx - (RS485)
6	UE-GND (power supply ground)
7	shield (cable shield)

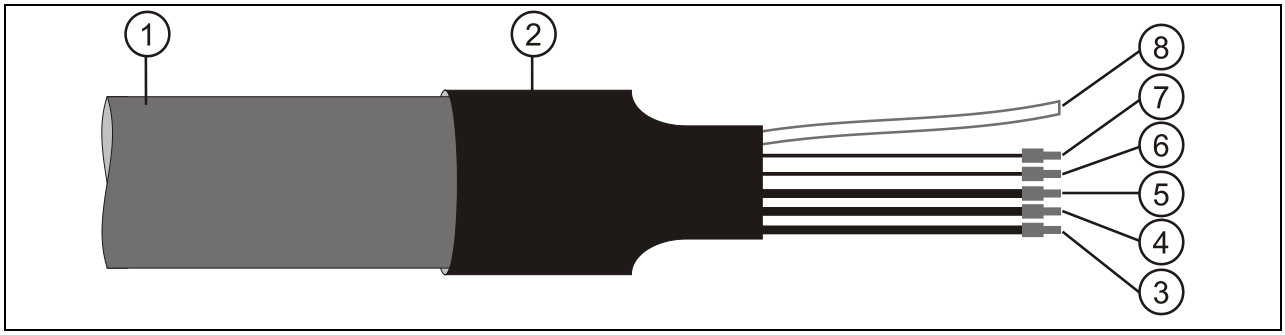
Fig. 7-21 Plug wiring air-ultrasonic sensors

For correct sensor positions, required calming sections, sensor installation and fastening as well as cable layout please refer to the separate "Installation Instructions for Correlation and Doppler Sensors".



1	cable jacket
2	shrunk-on hose
3	black; cable shield (no ground)
4	red; power supply +; max. 10,5V
5	blue; power supply -
6	white; RxTx +
7	green; RxTx -

Fig. 7-22 Cable end configuration; sensors without press. meas. cell



1	cable jacket
2	shrunk-on hose
3	black; cable shield (no ground)
4	red; power supply +; max. 10,5V
5	blue; power supply -
6	white; RxTx +
7	green; RxTx -
8	air compensation hose

Fig. 7-23 Cable end configuration; sensors with press. meas. cell

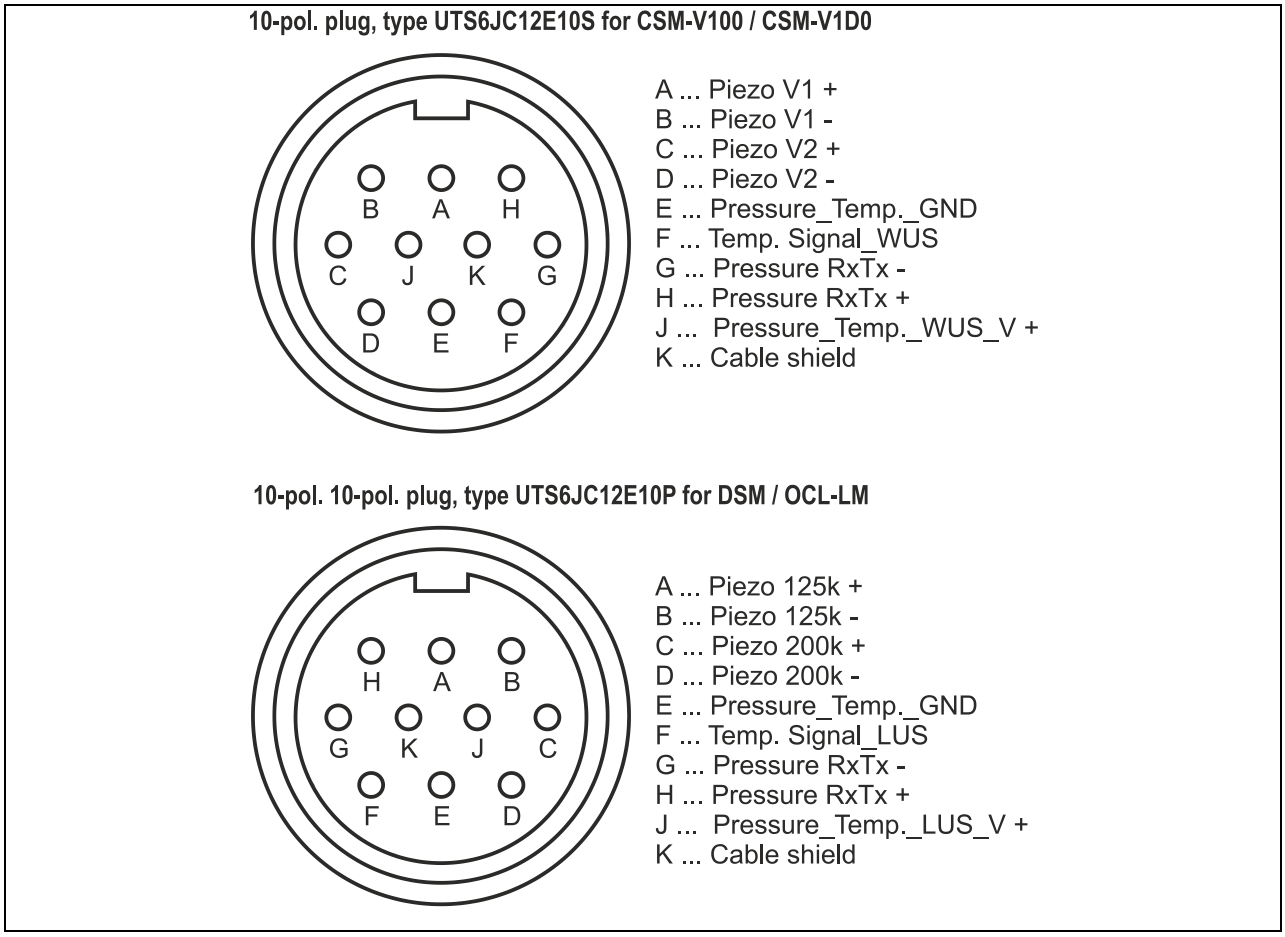
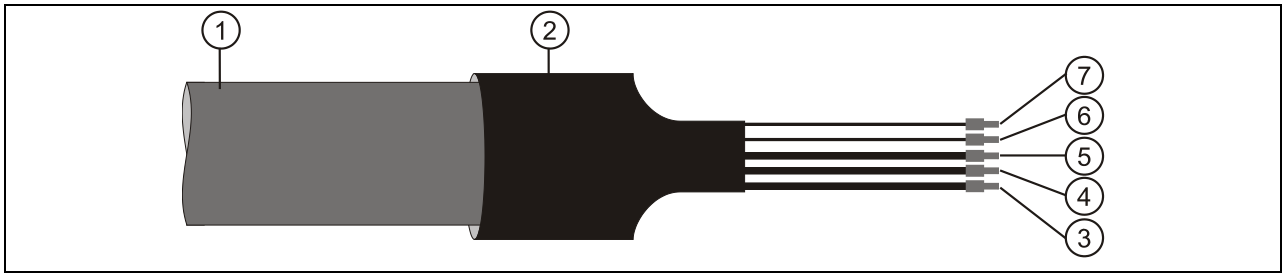


Fig. 7-24 Plug wiring CSM and DSM



1	cable jacket
2	shrunk-on hose
3	black; cable shield (no ground)
4	red; power supply +; max. 10,5V
5	blue; power supply -
6	white; RxTx +
7	green; RxTx -

Fig. 7-25 Cable end configuration; Electronic Box

7.6 Cable extension

WARNING

Electrical connection

Cable extension and sensor connection should be accomplished by authorised expert staff only.

WARNING

Possible electrical interference

If you wish to extend cables by using a terminal box use a box made of metal. The shields of outgoing as well as incoming cables must be wired to the ground connection of the terminal box.

Inappropriate connections leading to increased contact resistance or the use of unsuitable cables may result in interferences or even measurement failures.

Sensors with integrated pressure cell and sensor connection type „L“ (see Fig. 3-12) are equipped with a specially prepared cable type LIY11Y 2x1.5 mm² + 1x2x0.34 mm² + PA 1,5/2,5. Sensors without pressure measurement cell as well as the external Electronic Box with sensor connection type "K" are equipped with cables type LIY11Y 2x1.5 mm² + 1x2x0.34 mm². These cables can be extended without any problem by using single shielded signal cables.
Sensors with integrated pressure cell and sensor connection types "F" or "S" are equipped with the respectively wired plugs; type „F“ are equipped with an additional air filter with a dehydration agent on the connection plug (see Fig. 7-26). These sensors cannot be extended.

The signal cable fixed on the sensor is not designed to be laid in the ground permanently. If you wish to lay signal cables into soils, concrete or similar please use additional protective pipes or hoses with sufficient inner diameters. Please select inner diameter, bending radius and layout of protective pipes and hoses in a way which enables to remove old signal cables and to draw in new ones without any problems.

When extending the sensors please note that the allowed total resistance of the power supply lines must not exceed at

- *sensors with 10 m (30 ft) fixed cable: 2.100 Ohm*
- *sensors with 20 m (60 ft) fixed cable: 1.850 Ohm*
- *sensors with 30 m (90 ft) fixed cable: 1.600 Ohm*

(feed + return wires!).

(In special cases even higher cable lengths may be possible taking special cross-sectional cable areas into account. Please request more information on these particular cases from NIVUS).
If an application requires the use of 2 or 3 flow velocity sensors, it is possible to extend the sensor cables using one common signal cable.

It is not allowed to use common extensions in case of different applications or to use a common signal cable to extend separate level and flow velocity measurements.

The maximum cable length for air-ultrasonic sensors type OCL is 100 m (328 ft). This sensor cable shall not be extended.

NIVUS recommend cable type A2Y(L)Y 6x2x0.8 (or more wires) for extension purposes. Two wires are required for bus communication. Connect remaining wires in parallel in a way to obtain 2 lines for power supply (same number of wires for each line).

The maximum permissible length of the fixed cable between flow velocity sensor and transmitter is 150 m.
The maximum cable length may be extended to up to 250 m as follows: use sensors with 30 m (98.4 ft) fixed cable and extend the cable by using a connection box together with an extension cable with a larger cross-section than the fixed cable.
It is possible to use cables of other types with a minimum cable cross-section of 0.8 mm² and a common shield. Please contact NIVUS if in doubt regarding appropriate cable types.

In case of using type A2Y(L) 2Y as mentioned above, the extension of both signal lines (RxTx) is made with one wire each.
The power supply UE and earth UE-GND extension is carried out with one or more parallel connected wires per line depending on the distance.
The number listed below is the minimum per connection!

It is required twice! 1x for UE + and
1x for UE-GND

Parallel wires for UE + as well as GND have to be soldered together depending on supply line.

Extension to	**Min. number of wires for power supply and ground**	**Required total number of wires for extension (no reserves)**
30 m (98.4 ft)	per 1	4
50 m (164 ft)	per 1	4
70 m (229.7 ft)	per 2	6
100 m (328 ft)	per 2	6
150 m (492 ft)	per 3	8
200 m (656 ft)	per 4	10
250 m (820 ft)	per 5	12
300 m (984 ft)	per 6 (consult NIVUS before)	14
400 m (1312 ft)	per 8 (consult NIVUS before)	18
500 m (1640 ft)	per 10 (consult NIVUS before)	22

Extension by using equivalent cables with other cross-sectional areas on request.

7.7 Pressure compensation element for CSM Sensors

WARNING

Ingress of moisture

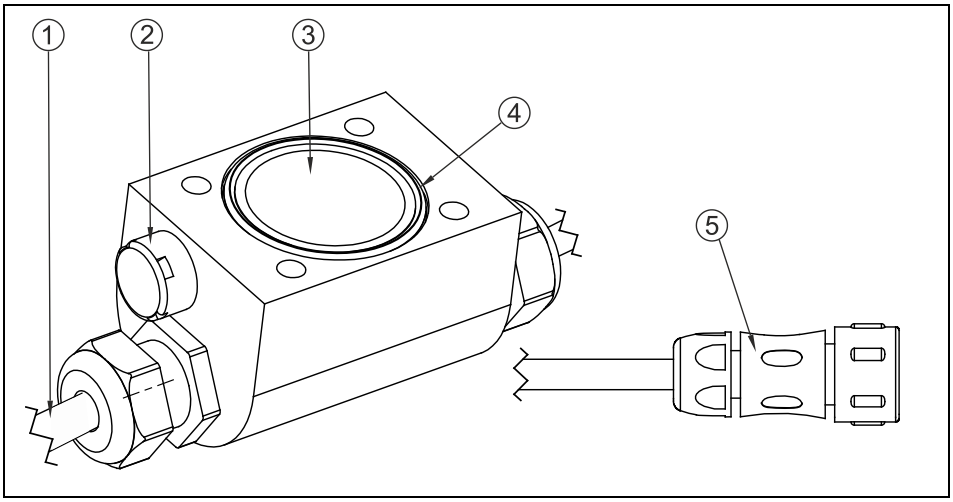
Never operate sensors with integrated pressure cell without or with used drying capsules.

Moisture leaking into the cell will irreversibly damage the built-in electronic components of the sensor!

The drying capsules avoid ingress of moisture!

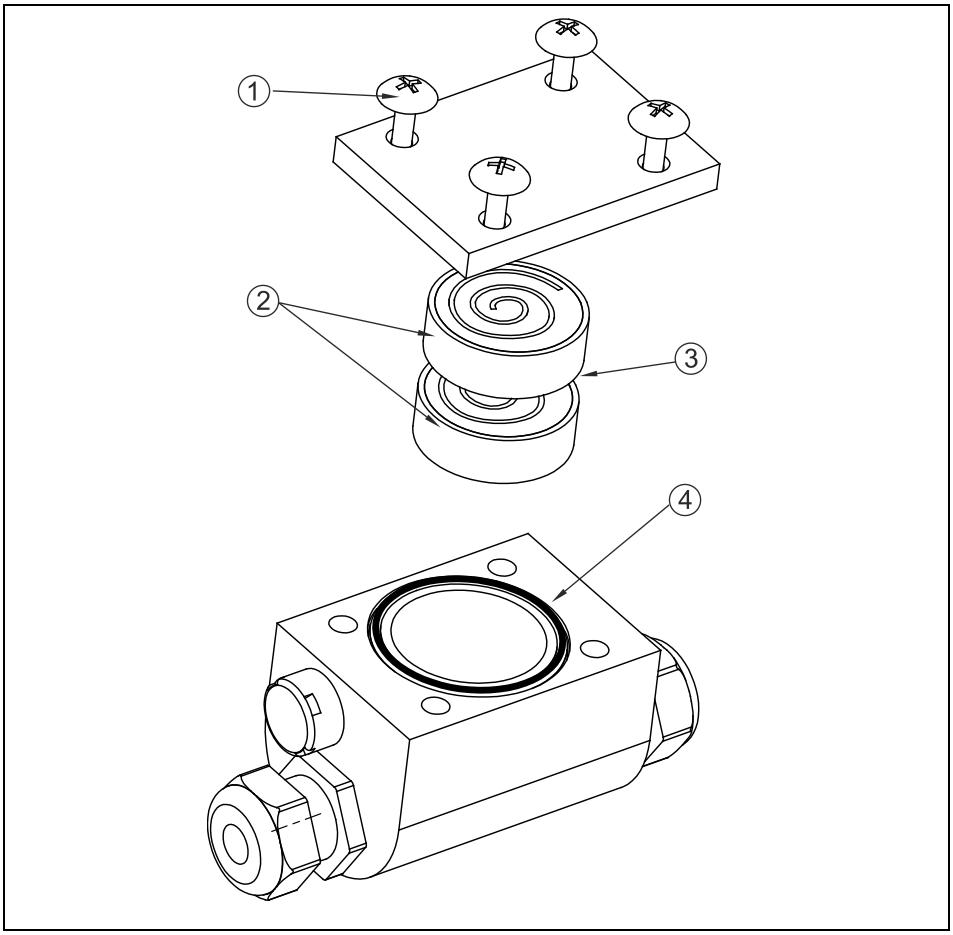
Please regularly check and replace the drying capsules if required.

The pressure compensation element for CSM sensors is equipped with 2 drying capsules. These capsules prevent moisture from leaking in and preserve electronic components. The drying capsules shall be checked and replaced if required regularly (depending on the ambient conditions).
Please observe the maintenance hints in chapter 9.3!



1 Cable to sensor
2 Pressure compensation diaphragm
3 2 drying capsules with acrylic glass cover
4 O-ring – please observe the ring is placed correctly!
5 Plug for connection to Electronic Box

Fig. 7-26 Pressure compensation element for connecting to EBM



1 Crosshead screws to open the cover (acrylic glass)
2 2 replaceable drying capsules
3 Insert with board surface down
4 O-ring – observe correct placement – keep free of dirt

Fig. 7-27 Exploded view drawing of pressure compensation element

7.8 Pressure compensation element for POA- and CS2- sensors

WARNING

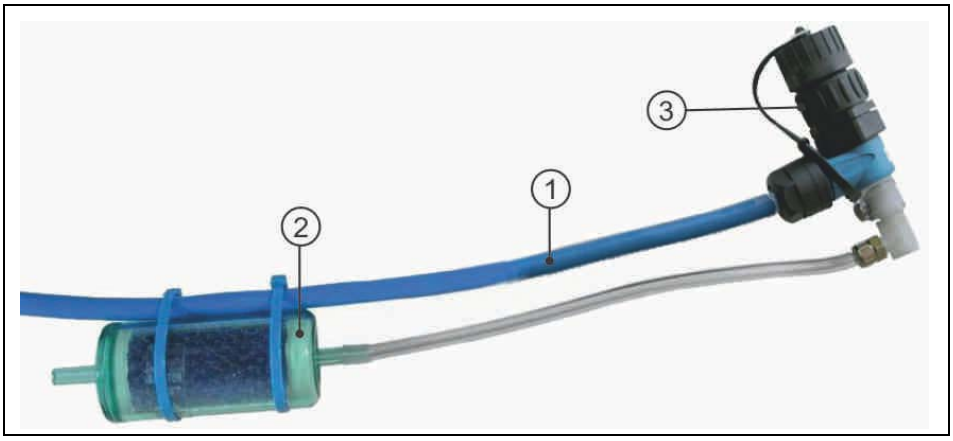
Penetration of moisture

Operating sensors with integrated pressure measurement cell without pressure compensation element for a longer period of time may lead to irreversible damage of sensor electronics.

Use NIVUS pressure compensation elements exclusively to operate sensors with integrated pressure cell.
Sensors with integrated pressure measurement cell and sensor connection types „F“ or „S“ have a configured plug, type „F“ additionally have a preconfigured filter element, which works as a pressure compensation element (see Fig. 7-26). This sensor cables shall not be extended.

For sensors with pressure measurement cell (types V1D, V2D, V1U, V2U see Fig. 3-12) the maximum uninterrupted cable length is 30 m (90 ft). For cable extension a connection box with pressure compensation (pressure compensation element) has to be installed.

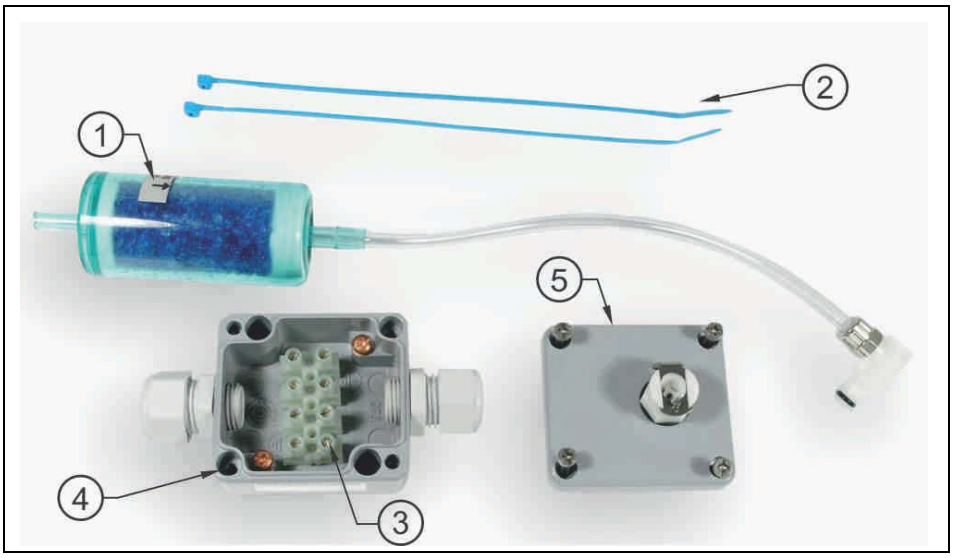
This pressure compensation element has to be installed even if the cable of a sensor with integrated pressure measurement cell is connected directly to the OCM Pro transmitter.
It is available directly from NIVUS under order article no. >ZUB0 ZDAE<.



1 Sensor cable
2 Filter element
3 Plug

Fig. 7-28 Connection plug with air filter for connection to PCM

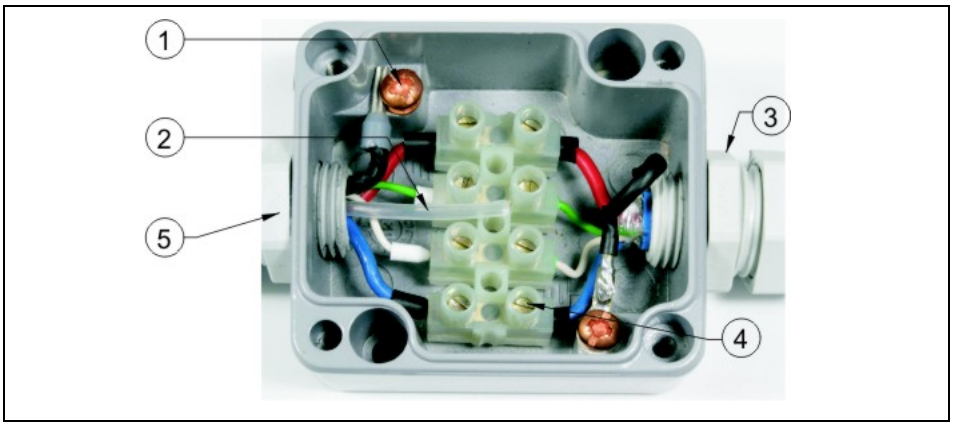
The pressure compensation element supplied by NIVUS consists of several components:



1 Filter element with air hose and air plug
2 Cable clips
3 Terminal clamps
4 Connection box
5 Box cover incl. self-locking socket for air hose plug

Fig. 7-29 Components of air compensation element

The 5-wire cable coming from the combi sensor must be connected 1:1 to the terminal clamp strip in the connection box. In this case please observe only to connect the power supply (red + blue) and the signal bus lines (white + green) to the terminal clamp strip. The cable shield (black) must NECESSARILY be connected to one of the both shield connection clamps within the box (Fig. 7-30).



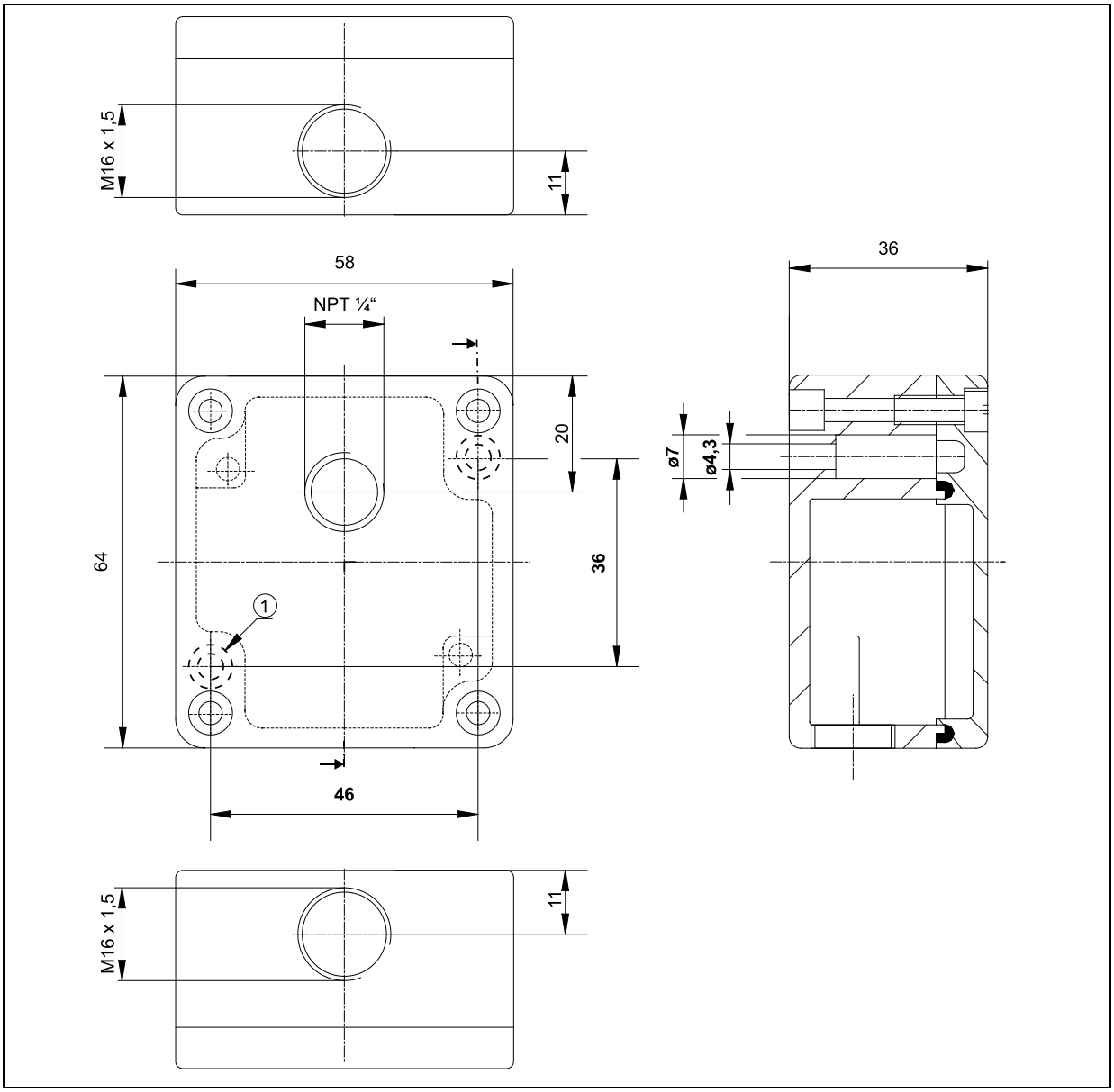
1 Shield
2 Air hose
3 Transmitter side
4 Terminal clamps
5 Flow velocity sensor side

Fig. 7-30 Open connection box

The connection box with air compensation has to be installed in an area without corrosive gases and which is durably protected from being flooded.

Never operate the measurement incl. pressure compensation element with unplugged air hose plug automatic self-locking mechanism of the integrated socket → will shift the zero point of the level measurement).

The opening of the filter element must look downwards always!



1 Holes for fastening

Fig. 7-31 Connection box dimensions

Important Note:

Please necessarily connect the shields of feed and return cable to the shield connections of the metal connection box.

Otherwise faulty results or even measurement failures may occur.

Extension from connection box to transmitter is carried out as described below by using A2Y or similar appropriate shielded signal cables.
After correct connecting the cables correctly fix the air filter with the cable clips on one of both cables in a way that the opening of the filter element looks downwards. Snap the air hose plug into the socket on the box lid and screw the lid onto the box subsequently.

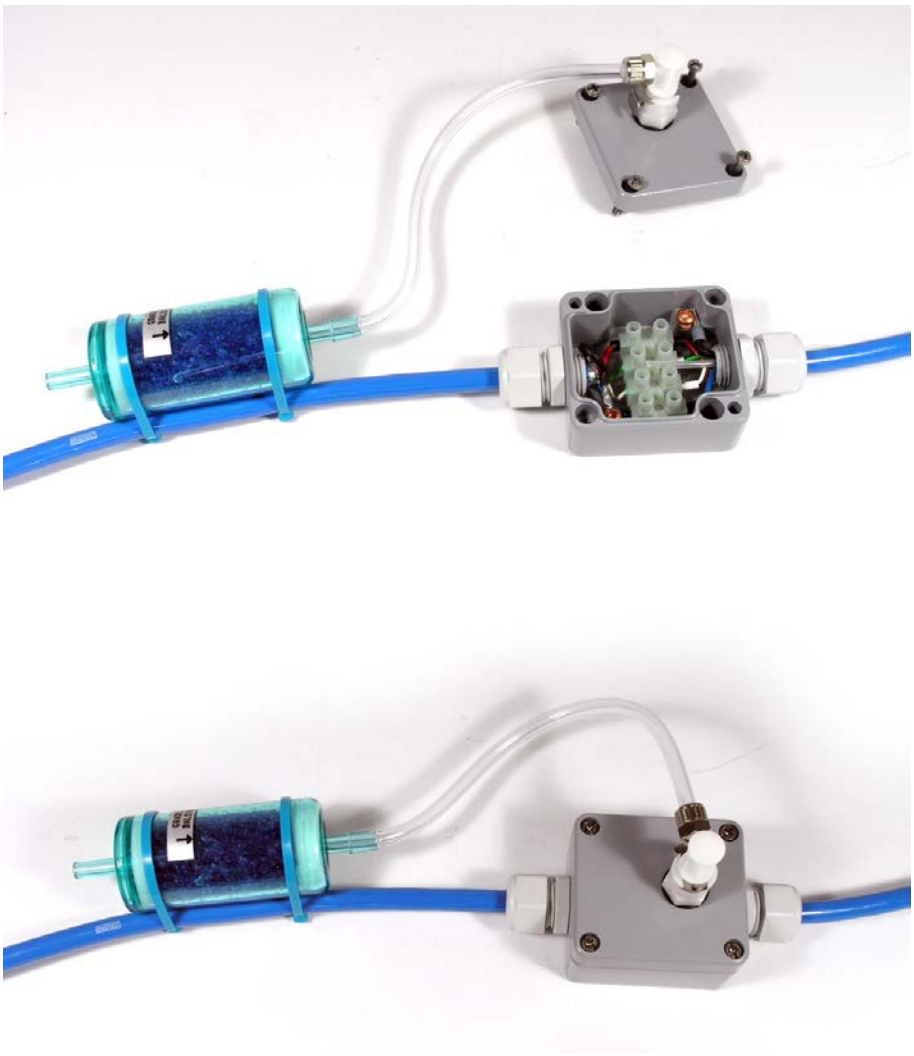


Fig. 7-32 Assembled pressure compensation element

8 Table of Resistiveness

WARNING

Damage due to aggressive media

As a basic principle, damage might occur in case of using chloride media (pitting corrosion in stainless steel ground plate or sensor jacket), hydrogen sulphide (H_2S – risk of diffusion through cable sheath or sensor body resulting in destruction of copper wires and conductor paths) as well as various organic solvents (may dissolve cable sheath or sensor body)!

Sensors and cables shall be installed exclusively in media according to the table of resistiveness below.

Sensor installation and cable layout shall be executed exclusively in media according to the table of resistiveness below! Otherwise the measurement system may be damaged irreversibly.

The medium contacting parts of the sensors consist of:

- V4A (ground plate or pipe sensor jacket)
- PPO GF30 (sensor body)
- PEEK (sensor crystal cover)
- Polyurethane (cable sheath and glands)
- PTFE (gasket of sensor screw joint)
- PA GF30 (protective cover for wedge sensor type CS2)

The following materials are used additionally for sensors with pressure measurement cell:

- Hastelloy® C-276
- Viton® (PA/PR)

The sensor technology is resistant to normal domestic sewages, dirt and rain water as well as mixed water from municipalities and communities. Also in many industrial plants (e.g. Huels, BASF etc.) the resistance does not present any problems. The sensor technology nevertheless is not resistant to all substances and substance mixtures.

Please observe that substance mixtures (several substances being present simultaneously) under certain circumstances may cause catalytic effects which might not occur if the individual substances are in use. Due to infinitely possible combinations these catalytic effects cannot be verified entirely.
If in doubt please contact your NIVUS representative and request a free material sample for long time testing purposes.

For use in special applications with high aggressive or solvent-containing media there are sensors made of full PEEK available with ground plates made of Hastelloy or Titanium as well as pipe sensors made of high resistant special steel. Sensor cables which have to be immersed into the medium are available with a special FEP coating (resistant to organic solvents or hydrogen sulphide).

MEDIUM	FORMULA	CONCEN-TRATION	HDPE	PPO GF30	PUR	PEEK	FEP	V4A	Hastelloy C 276	Viton (PA/PR)	PVDF
Acetaldehyde	C_2H_4O	40 %	3/3	4	4	1	(1)	(1)	0	4/4	4/4
Acetic acid	$C_2H_4O_2$	10 %	1/1	2	3	1	1/1	1/1	1	(3)	1/1
Acetic acid methyl ester	$C_3H_6O_2$	tech. clean	1/0	3	0	1	1/0	1/1	1	4/4	0/0
Acetone	C_3H_6O	40 %	1/1	4	4	1	(1)	1/1	1	4/4	3/3
Allyl alcohol	C_3H_6O	96 %	1/3	2	0	1	1/1	1/1	0	4/4	0/0
Aluminium chloride	$AlCl_3$	10 %	1/1	2	0	1	1/1	3/4	1	1/0	1/1
Aluminium chloride	$(NH_4)Cl$	aqueous	1/1	1	0	1	1/1	1/2L	1	1/1	1/1
Ammonium hydroxide	$NH_3 + H_2O$	5 %	1/1	2	4	1	1/1	1/1	1	(2)	1/1
Aniline	C_6H_7N	100 %	1/2	3	4	1	1/1	1/0	1	2/4	1/2
Benzene	C_6H_6	100 %	3/4	3/4	2	1	1/1	1/1	1	3/3	1/2
Benzyl alcohol	C_7H_8O	100 %	3/4	3	2	1	1/1	1/1	1	1/0	1/1
Boric acid	H_3BO_3	10 %	1/1	1	1	1	1/1	1/1	1	1/1	1/1
Bromic acid	$HBrO_3$	conc.	0/0	0	3	1	0/0	(4)	0	(2)	1/1
Butanol (butyl alcohol)	$C_4H_{10}O$	tech. clean	1/1	2	3	1	1/1	(1)	1	3/4	1/1
Calcium chloride	$CaCl_2$	spirituous	1/0	1	1	1	1/1	1/2L	1	1/1	1/1
Carbon disulphide	CS_2	100 %	4/4	2	0	1	1/1	1/1	1	1/0	1/0
Carbon tetrachloride (TETRA)	CCl_4	100 %	4/4	3	4	1	1/1	1/1L	1	1/1	1/1
Chloric gas	Cl_2		4/4	3	3	1	1/1	1/0	0	1/1	1/1
Chloric methane	CH_3Cl	tech. clean	3/0	4	4	1	1/0	1/1L	0	4/4	0/0
Chlorine water	$Cl_2 \times H_2O$		3/0	2	0	1	(1)	2/0L	1	1/0	0/0
Chlorobenzene	C_6H_5Cl	100 %	3/4	3	4	1	1/1	1/1	1	3/4	1/1
Chloroform	$CHCl_3$	100 %	3/4	4	4	1	1/1	1/1	1	4/4	1/1
Chromate	CrO_3	10 %	1/1	1	0	1	1/1	1/2	1	1/1	0/0
Citric acid	$C_6H_8O_7$	10 %	1/1	1	1	1	1/1	1/1	1	1/1	1/1
Diesel oil	—	100 %	1/3	2	0	1	(1)	(1)	0	1/1	1/1
Essential oils	—		0/0	1	1	1	(1)	1/1	0	1/0	0/0
Ethanol	C_2H_6O	96 %	1/0	1	1	1	1/1	1/1	1	3/0	0/0
Ethyl acetate	$C_4H_8O_2$	100 %	1/3	3	3	1	1/1	(1)	0	4/4	1/2
Ethyl alcohol	C_2H_6O	100 %	1/0	1	1	1	1/1	1/1	0	3/0	0/0
Ethylene chloride	$C_2H_4Cl_2$		3/3	4	3	1	1/1	1/1L	1	3/0	1/2
Ferric-(III)-chloride	$FeCl_3$	saturated	1/1	2	3	2	1/1	4/4	0	1/1	1/1
Formaldehyde solution	CH_2O	10 %	1/1	1	2	1	1/1	1/1	1	3/0	1/1
Gasoline, unleaded	C_5H_{12} - $C_{12}H_{26}$		2/3	3	2	1	1/1	1/1	1	(1-3)	1/1
Glycerol	$C_3H_8O_3$	0,9	1/1	1	2	1	1/1	1/1	1	1/1	1/1
Heptane, n-	C_7H_{16}	0,9	2/3	1	1	1	1/1	1/1	1	1/1	1/1
Hexane, n-	C_6H_{14}	100 %	2/3	1	2	1	1/1	1/1	1	1/1	1/1
Hydrochloric acid	HCl	1-5 %	1/1	1	3	1	1/1	4/4	1	1/1	1/1
Hydrofluoric acid	HF	50 %	1/1	2	3	1	1/1	4/4	2	1/3	1/1
Isopropanol	C_3H_8O	tech. clean	1/1	1	2	1	1/1	(1)	1	1/1	0/0
Lactic acid	$C_3H_6O_3$	3 %	1/1	1	0	1	1/1	1/1	1	1/1	1/2
Magnesium chloride	$MgCl_2$	aqueous	1/1	1	2	1	1/1	1/0L	1	1/1	1/1
Methanol	CH_4O		1/1	1	2	1	1/1	1/1	1	3/4	0/0
Methyl benzene (toluene)	C_7H_8	100 %	3/4	3	3	1	1/1	1/1	0	3/3	1/1
Mineral oil	—		1/1	1	1	1	1/1	1/1	1	1/1	1/1
Nitric acid	HNO_3	1-10 %	1/1	1	3	1	1/1	1/1	1	1/1	1/1
Nitrobenzene	$C_6H_5NO_2$		3/4	3	4	1	1/1	1/1	0	4/4	1/2
Oleic acid	$C_{18}H_{34}O_2$	tech. clean	1/3	1	1	1	(1)	1/1	0	2/2	1/1
Oxalic acid	$C_2H_2O_4 \times 2H_2O$	aqueous	1/1	2	0	1	1/1	1/3	2	1/1	1/1
Ozone	O_3		3/4	2	2	1	1/1	0/0	0	1/0	1/1
Petroleum	—	tech. clean	1/3	3	1	1	(1)	1/1	0	1/0	0/0
Phenol	C_6H_6O	100 %	2/3	3	2	1	1/1	1/1	1	2/3	1/1
Phosphoric acid	H_3PO_4	85 %	1/1	1	0	1	1/1	1/3	1	1/1	1/1
Potassium hydroxide	KHO	10 %	1/1	1	3	1	1/1	1/1	1	4/4	1/1
Potassium nitrate	KNO_3	aqueous	1/1	1	0	1	1/1	1/1	1	1/1	1/1
Quicksilver-(II)-chloride	$HgCl_2$	aqueous	1/1	1	0	1	1/1	(4)	1	1/1	1/1
Sodium bisulphite	$NaHSO_3$	aqueous	1/1	1	0	1	(1)	1/1	1	1/0	1/1
Sodium carbonate	Na_2CO_3	aqueous	1/1	1	3	1	1/1	1/1	1	1/1	1/1
Sodium chloride	NaCl	aqueous	1/1	1	2	1	1/1	1/2	1	1/1	1/1
Sodium hydroxide	NaHO	50 %	1/1	1	3	1	1/1	1/3	1	3/3	0/0
Sodium sulphate	Na_2SO_4	aqueous	1/1	1	0	1	1/1	1/1	1	1/1	1/1
Sulphuric acid	H_2SO_4	40 %	1/1	1	3	1	1/1	2/3	1	1/1	1/1
Trichloroethylene (TRI)	C_2HCl_3	100 %	3/4	4	4	1	1/1	1/1L	1	1/3	1/1

8.1 Resistiveness Legend

Resistiveness

There are two values per medium:
left number = value at +20 °C / right number = value at +50 °C.

- 0 no specifications available
- 1 very good resistance/suitable
- 2 good resistance/suitable
- 3 limited resistance
- 4 not resistant
- K no general specifications possible
- L risk of pitting corrosion or stress corrosion cracking
- ( ) estimated value

Material Names

- HDPE Polyethylene, high density
- FEP Tetrafluorethylene-Perfluorpropylene
- V4A Stainless steel 1.4401 (AISI 316)
- PPO GF30 Polyphenyloxylene with 30% glass fibres
- PU Polyurethane
- PEEK Polyetheretherketone
- PA GF30 Polyamide with 30 % glass fibre contents
- PVDF Polyvinylidenfluoride

9 Maintenance and Cleaning

WARNING

Germ contamination

Due to using the sensors mostly in the waste water field which may be contaminated with hazardous germs, please ensure to take respective precautions getting in contact with system, transmitter, cables and sensors.

In heavily polluted media tending to sedimentation it may be necessary to clean the flow velocity sensor regularly. To do so, please use a brush with plastic bristles, a broom or similar.

Polluted plugs (sensor connection F or S) and sockets must be cleaned and dried before reconnect a sensor. Remove touch dry dirt with compressed air or by using a brush with plastic bristles (no metal!). If required, maintain the contacts by using a contact spray.

WARNING

Damage by hard objects

No hard objects such as wire brushes, rods, scrapers or similar shall be used to clean the sensor. Cleaning by using a water jet is allowed up to a max. pressure of 4 bar (see Specifications) (e.g. using a water hose). Never clean flow velocity sensors with pressure measurement cell (types V2D and V2U) by using a water jet!

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

9.1 Water-US Combi Sensor with Pressure Measurement

WARNING

Do not remove parts

Removing or loosening of the ground plate or cable gland results in leakage and therefore will cause measurement and sensor failure.

Only the cover of the pressure measurement is allowed to be removed. Do absolutely <u>not</u> remove other parts of the sensor!!

WARNING

Damage of pressure measurement cell during cleaning

Never clean the pressure cell using a water jet, screw driver or similar! It is not permitted to touch the probe with the fingers or other objects (see Fig. 9-1)

This will irreversibly damage the pressure cell!

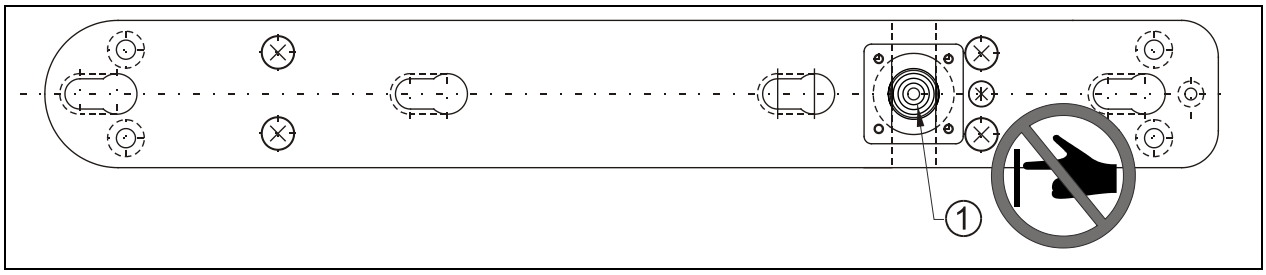
It is allowed to clean the pressure measurement by using slight flushing movements in a vessel filled with water.

Bei Verletzung dieses Verbotes erlischt die Gewährleistung seitens des Herstellers! If in doubt please let NIVUS do the cleaning

If the measurement medium contains substances (e.g. grease, lime) which may sediment on the pressure opening, they must be removed in order to prevent measurement faults.
The duct to the pressure measurement which is milled into the ground plate must be flushed with water immediately after each de-installation to avoid sedimentation. To do this, immerse the probe into water several times.
The cover on the pressure measurement can be removed for more extensive cleaning purposes.
The opened pressure cell must be cleaned very carefully. Slightly move the pressure probe in a container filled with water (e.g. bucket) to flush. Strictly avoid touching the probe with fingers, brushes, tools, water jets and similar! Disregarding invalidates the manufacturer warranty!

Important Note:

If sedimentation which cannot be removed prevents correct measurement the sensor must be maintained by NIVUS.



1 Pressure sensor

Fig. 9-1 Wedge sensor with pressure measurement cell, bottom view

Due to physical reasons, level measurements performed by sensors with pressure measurement cell are subject to long-term drift (see chap. 7.8). NIVUS therefore recommend to calibrate sensors with integrated pressure measurement cell twice a year regarding the respective zero point. The best results are going to be achieved if the water level is as low as possible or if the sensor has been removed from the measurement medium. The calibration procedure is described in according Instruction Manuals of OCM Pro or PCM transmitters.

The combination sensors with pressure measurement cell are equipped with an additional air filter with a dehydration agent on the connection plug. This dehydration agent is subject to normal wear which depends on measurement duration, measurement interval, air pressure fluctuation and environmental conditions. The filter wear is indicated by the dehydration agent turning from dark blue to pale violet.
The air filter has to be controlled each time before use, replacing the battery or reading out data. If the colour is beginning to change the air filter must be replaced by a new one of the same type.
Spare filters are available from NIVUS under Art. No. ZUB0 FILTER02 (also see chapter 9.5).

9.2 Air-Ultrasonic Sensor

These sensors are normally non-contacting. Hence, it is necessary to check if the transmitting pad is not covered and the sound beam is free to reach the water surface after immersion (flooding) into the measurement medium only.
In case of pollution clean the sensor with water and a cloth or a soft brush.

WARNING

Do not remove any parts

Except the ground plate2 (see Fig. 7-5 or Fig. 7-12) on the bottom absolutely no other parts are allowed to be removed from the air-ultrasonic sensor!

Removing or loosening of ground plate or cable gland result in leakage and therefore will cause measurement and sensor failure.

9.3 Pressure Compensation Element for CSM Sensors

When using CSM sensors with pressure measurement cell and pressure compensation element the built-in drying capsules (see Fig. 7-27) need to be regularly checked and replaced if required. Inspection intervals depend on the prevailing air humidity and may vary between 2 and 12 weeks depending on application.

As soon as the drying capsules are used up their colour will change from orange to white. The capsules then need to be replaced.

- ORANGE = new capsule / not yet used up
- WHITE = capsule used up – please replace both capsules

To replace the drying capsules unscrew the 4 crosshead screws on the acrylic cover. Before inserting new capsules remove the protective aluminium foil. Please observe to insert the capsules with the board side down.
The O-ring of the pressure compensation element (see Fig. 7-26, point 4) is for sealing and must always remain in the groove.
Keep the O-ring free of dirt. When closing the acrylic cover avoid dirt, sand or similar between the pressure compensation element and the cover. Otherwise the tightness of the pressure compensation element can be affected.

When replacing the drying capsules please observe the glued O-ring to remain in the groove. Necessarily keep the ring free of dirt since otherwise the pressure compensation element may leak.

Spare capsules are available from NIVUS (see chapter 9.5).

9.4 Pressure Compensation Element for POA and CS2 Sensor

Inspect the filter element regularly when mounting POA or CS2 sensors with pressure measurement cell and pressure compensation element (see Fig. 7-28). Inspection intervals depend on the prevailing air humidity and may vary between 2 and 12 weeks depending on application.
If the desiccant colour should change by more than 50 % (from dark blue to pale violet) replace the filter or the desiccant. Both can be purchased from NIVUS (see chapter 9.5).

9.5 Accessories (optional)

Pressure compensation element ZUB0 DAE	For connection of sensors with integrated pressure measurement cell Material: aluminium, plastics Protection rating: IP54
Replacement filter ZUB0 FILTER02	With plug and connection hose for connecting sensors with integrated pressure measurement cell to PCM series transmitters and to the pressure compensation element ZUB0 DAE.
Spare capsules ZUB0 TROCKENK	20 Spare capsules, individually packed, for pressure compensation element of the CSM sensor
Pipe mounting system ZUB0 RMS2… ZUB0 RMS3… ZUB0 RMS4…	For temporary, non-permanent clamping installation of wedge sensors POA-, CSM-, and DSM- in pipes DN 200 up to maximum DN 800
Sensor Adapters ZUB0 KLEMM…	Metal connection box incl. clamps for adaptation of PCM Sensors (incl. plug) to OCM Pro transmitters (in Ex and non-Ex areas) or for connection of pre-configured OCM Pro sensor cables to a PCM Pro (in Ex and non-Ex areas)
Manual extraction tool ZUB0 AA	For manual removal of 1 ½" pipe sensors under process conditions, pressure-tight up to 4 bar (not suitable for installation or fastening).
Ball stop valve ZUB0 HAHNR15	For removal of pipe sensors from pipes without pressure
Tapping saddle ZUB0 ABS01… ZUB0 ABS02… ZUB0 ABS03…	for installation of 1.5" pipe sensors in pipelines
Mounting plates ZUB0 ABP15….	For installation of pipe sensors in pipes made of GRP and concrete
Welding nozzles ZUB0 STU15…	For pipe sensors made of steel or stainless steel

You can find more accessories for sensor installation in our current price list.

10 Dismantling/Disposal

The device shall be disposed of according to local regulations for electronic products.

11 Table of Pictures

12 Certificates and approvals

The approvals are only valid in connection with the respective indication on the sensor nameplate.

The complete EC-type examination certificates (incl. supplements) can be downloaded from www.nivus.com.

Translation

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres **- Directive 94/9/EC**

(3) EC-Type Examination Certificate Number

TÜV 03 ATEX 2262

(4) Equipment: Sensor type POA/... resp. OCL/...

(5) Manufacturer: Nivus GmbH

(6) Address: D-75031 Eppingen, Im Täle 2

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH & Co. KG, TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential report N° 03 YEX 550797.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014: 1997 **EN 50 020: 2002**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

II 2 G EEx ib IIB T4

TÜV NORD CERT GmbH & Co. KG
TÜV CERT-Certification Body
Am TÜV 1
D-30519 Hannover
Tel.: 0511 986-1470
Fax: 0511 986-2555

Hanover, 2003-09-18

Head of the Certification Body

TÜV NORD CERT

(13) **SCHEDULE**

(14) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 03 ATEX 2262**

(15) Description of equipment

The sensor type POA/... resp. OCL/... is intended together with the associated measuring transformers for the measurement of the flow speed and the flow level in partly or fully filled pipes and channels via supersonic technology.

Electrical data

Signal and supply circuit (plug/prefabricated cable)	in type of protection Intrinsic Safety EEx ib IIB only for the connection to associated measuring transducer type OCP/... according to TÜV 00 ATEX 1572
	Maximum values: U_i = 10.5 V I_i = 500 mA
or	type PCP/... according to TÜV 03 ATEX 2268
	Maximum values: U_i = 9.9 V I_i = 640 mA

The effective internal inductance and capacitance are negligibly small.

(16) Test documents are listed in the test report No.: 03 YEX 550797.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

Translation

1. SUPPLEMENT to

EC TYPE-EXAMINATION CERTIFICATE No. TÜV 03 ATEX 2262

of the company: NIVUS GmbH
Im Täle 2
D-75031 Eppingen

In the future, the sensors type POA/... resp. OCL/... may also be manufactured and operated according to the test documents listed in the test report.

The amendments concern the electrical data.

Electrical data

Signal- and supply circuit (plug/prefabricated cable)	in type of protection Intrinsic Safety EEx ib IIB only for the connection to associated measuring transducer type OCP/... according to TÜV 00 ATEX 1572 Maximum values: U_i = 10,5 V I_i = 640 mA
or	type PCP/... according to TÜV 03 ATEX 2268 Maximum values: U_i = 9,9 V I_i = 629 mA The effective internal inductance and capacitance are negligibly small.

All other data apply unchanged for this amendment.

Test documents are listed in the test report N° 04 YEX 551201.

TÜV NORD CERT GmbH & Co. KG
TÜV CERT-Certification Body
Am TÜV 1
D-30519 Hannover
Tel.: 0511 986-1470
Fax: 0511 986-2555

Hannover, 2004-01-30

Head of the
Certification Body

BA 02.03.02

Translation

2. SUPPLEMENT

to Certificate No.	**TÜV 03 ATEX 2262**
Equipment:	Sensors types POA-x2xx xx E xx x x, OCL-L1 x x xx E xx K and CS2-xxxx xx E xx x x
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen, Germany
Order number:	8000555804
Date of issue:	2010-06-21

In the future, the sensors type POA/... resp. OCL/... may be produced and operated according to the documents listed in the test report.
The changes refer to

- the execution of the sensor electronics for the new sensor types
- a new dual sensor with type designation CS2-xxxx xx E xx x x in an new sensor housing with 4 ultrasonic transducers
- the changes of the origin type designations: POA-x2xx xx E xx x x and OCL-L1 x x xx E xx K
- a new RS485 interface with data for the protection level ib
- the marking.

The new marking reads: II 2 G Ex ib IIB T4

The permissible ambient temperature range of the sensors is -20 °C ... 40 °C.

Electrical data

Signal- and supply circuit	in type of protection Intrinsic Safety Ex ib IIB
(Plug in connector/cable tail	only for connection to
connection wires:	a certified intrinsically safe circuit
red: +	maximum values:
blue: GND)	U_i = 10.5 V
	I_i = 640 mA
	The connection to the following measuring transducers is permissible:
	type OCP/... according to TÜV 00 ATEX 1572 or
	type PCP/... according to TÜV 03 ATEX 2268
	The effective internal capacitance and inductance of the electronics are negligibly small.
RS485 interface	in type of protection Intrinsic Safety Ex ib IIB
(Plug in connector/cable tail	maximum values:
connection wires:	U_o = 6 V
white: RxTx+	I_o = 154 mA
green: RxTx-	P_o = 230 mW
blue: GND)	characteristic line: linear
	The effective internal capacitance and inductance of the electronics are negligibly small.

Ex ib	IIB	
max. permissible external inductance	9.5 mH	1 mH
max. permissible external capacitance	5.1 µF	13 µF

At connection of the RS485 interface to belonging measuring transducers with active intrinsically safe circuits, the rules for the interconnection of intrinsically safe circuits have to be observed.

maximum values:
U_i = 12.06 V
I_i = 176 mA

The equipment according to this supplement meets the requirements of these standards:

EN 60079-0:2006 EN 60079-11:2007

(16) The test documents are listed in the test report No. 10 203 555804.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Tel.: +49 (0) 511 986-1455, Fax: +49 (0) 511 986-1590

Translation

3. SUPPLEMENT

to Certificate No.	**TÜV 03 ATEX 2262**
Equipment:	Sensors types POA-xxxx xx E xx x x, OCL-L1 x x xx E xx K and Vector Profiler CS2-xxxx xx E xx x x
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen, Germany
Order number:	8000398817
Date of issue:	2012-03-27

In the future, the sensors type POA-... bzw. OCL-... bzw. CS2-... may be produced and operated according to the documents listed in the test report.
The changes refer to

- the execution of the sensor electronics,
- a new sensor of the generation „Vector Profiler" type CS2-xxxx **R**x E xx x x,
- a new sensor type POA-xxxx **R**x E xx x x
- new key sensor bodies for the sensors POA-... and
- the marking.

The new marking reads: II 2 G Ex ib IIB T4 Gb

The electrical data as well as all other details remain unchanged.

The equipment according to this supplement meets the requirements of these standards:

EN 60079-0:2009 EN 60079-11:2007

(16) The test documents are listed in the test report no. 12 203 087811.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Tel.: +49 (0) 511 986-1455, Fax: +49 (0) 511 986-1590

The system sensor family Mini consists of the following components:

- Electronic Box Mini type **EBM**
- Correlation Sensor Mini type **CSM** and
- Distance Sensor Mini type **DSM**

Translation

(1) **EC-Type-Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 94/9/EC**

(3)	**Certificate Number**	**TÜV 12 ATEX 087812**
(4)	for the equipment:	System sensor family Mini
(5)	of the manufacturer:	NIVUS GmbH
(6)	Address:	Im Täle 2 75031 Eppingen Germany
	Order number:	8000391048
	Date of issue:	2012-02-17

(7) The design of this equipment or protective system and any acceptable variation thereto are specified in the schedule to this EC-Type-Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 12 203 087812.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2009 EN 60079-11:2007

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

Ex **II 2 G Ex ib IIB T4 Gb**

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

(13) **SCHEDULE**

(14) **EC-Type-Examination Certificate No. TÜV 12 ATEX 087812**

(15) Description of equipment

In conjunction with the belonging measuring transducers, the system sensor familiy Mini is used for measurement of the flow speed and the flow level in partly or fully filled pipes and channels via supersonic technology.

The system sensor family Mini consists of the following components:
- Electronic box Mini type EBM,
- Correlation sensor Mini type CSM and
- Distance sensor Mini type DSM or filling level sensor type OCL-LM

The permissible ambient temperature range of the system is -20 °C ... 40 °C.

Electrical data

Signal and supply circuit .....
(Connection wires (pig tail):
red [+], blue [GND]

in type of protection Intrinsic Safety Ex ib IIB
only for connection to a certified intrinsically safe circuit
Maximum values:
U_i = 10.5 V
I_i = 640 mA
The connection to the following measuring transducers is permissible:
type OCP-... according to TÜV 00 ATEX 1572 or
type PCP-E... according to TÜV 03 ATEX 2268
The effective internal capacitance and inductance of the electronics are negligibly small.
The capacitances and inductances of the connected cable have to be taken into account.

Interface RS485 .....
(Connection wires (pig tail):
white [RxTx+]
green [RxTx-]
blue: GND)

in type of protection Intrinsic Safety Ex ib IIB

Maximum values:
U_o = 6 V
I_o = 154 mA
P_o = 230 mW
Characteristic line: linear
The effective internal capacitance and inductance of the electronics are negligibly small.

Ex ib	IIB	
max. permissible external inductance	9.5 mH	1 mH
max. permissible external capacitance	5.1 µF	13 µF

At connection of the interface RS485 to belonging measuring transducers with active intrinsically safe circuits, the rules for interconnection of intrinsically safe circuits have to be taken into account.

Maximum values:
U_i = 12.06 V
I_i = 176 mA

The interconnection of the electronic box Mini type EBM with the sensors

- Correlation sensor Mini type CSM and
- Distance sensor Mini type DSM (or filling level sensor type OCL-LM)

via a cable of the manufacturer with a length of 10 m is permissible.

(16) The test documents are listed in the test report No. 12 203 087812

(17) Special conditions for safe use

None

(18) Essential Health and Safety Requirements

no additional ones

Translation

1. SUPPLEMENT

to Certificate No.	**TÜV 12 ATEX 087812**
Equipment:	System sensor family Mini
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen
Order number:	8000426406
Date of issue:	2014-04-30

In the future, the "System sensor family Mini" may also be manufactured and operated according to the documents listed in the test report.
The changes refer to

- a new sensor type CSM-V1D0 with integrated pressure sensor and,
- the electrical data.

A standard update was performed.

Electrical data

Signal and supply circuit .....
(Connection wires (pig tail):
red [+], blue [GND]

in type of protection Intrinsic Safety Ex ib IIB
only for connection to a certified intrinsically safe circuit
Maximum values:
U_i = 10.5 V
I_i = 640 mA
P_i = 6.72 W
The connection to the following measuring transducers is permissible:
type OCP-... according to TÜV 00 ATEX 1572 or
type PCP-E... according to TÜV 03 ATEX 2268
The effective internal capacitance and inductance of the electronics are negligibly small.
The capacitances and inductances of the connected cable have to be taken into account.

Interface RS485 .....
(Connection wires (pig tail):
white [RxTx+]
green [RxTx-]
blue: GND)

in type of protection Intrinsic Safety Ex ib IIB

Maximum values:
U_o = 6 V
I_o = 81.9 mA
Angle current: 50 mA
Angle voltage: 4 V
P_o = 200 mW
Characteristic line: angular
The effective internal capacitance and inductance of the electronics are negligibly small.

Ex ib	IIB	
max. permissible external inductance	10 mH	1 mH
max. permissible external capacitance	3.8 µF	11.2 µF

At connection of the interface RS485 to belonging measuring transducers with active intrinsically safe circuits, the rules for interconnection of intrinsically safe circuits have to be taken into account.

Maximum values:

U_i = 12.06 V
I_i = 176 mA
P_i = 531 mW

The interconnection of the electronic box Mini type EBM with the sensors

- Correlation sensor Mini type CSM-V100 or CSM-V1D0 and
- Distance sensor Mini type DSM (or filling level sensor type OCL-LM)

via a cable of the manufacturer with a length of 15 m is permissible.

All other data apply unchanged for this supplement.

The equipment incl. of this supplement meets the requirements of these standards:

EN 60079-0:2012 EN 60079-11:2012

(16) The test documents are listed in the test report No. 14 203 129937.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Schwedt

Hanover office, Am TÜV 1, 30519 Hannover, Tel.: +49 (0) 511 986-1455, Fax: +49 (0) 511 986-1590

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

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**"Ex" - Ultraschallsensoren CSM / DSM**
Description / Désignation:	*"Ex" ultrasonic sensors / "Ex" capteurs ultrasoniques*
Typ */ Type / Type:*	**CSM-xxxxxxE... / DSM-xxxxxxE...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 94/9/EG
- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 60079-0:2012
- EN 60079-11:2012
- EN 61326-1:2013

Ex-Kennzeichnung */ Ex-designation / Marquage Ex* : Ⓔx II 2G Ex ib IIB T4 Gb

EG-Baumusterprüfbescheinigung */ EC-Type Examination Certificate / Attestation d'examen «CE» de type:*
TÜV12ATEX087812

Benannte Stelle (Kennnummer) */ Notified Body (Identif. No.) / Organisme notifié (№ d'identification):*
TÜV Nord CERT GmbH, Am TÜV 1, 30519 Hannover, Allemagne (0044)

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

NIVUS GmbH • Im Taele 2 • 75031 Eppingen, Allemagne

abgegeben durch */ represented by / faite par:*
Udo Steppe (Geschäftsführer */ Managing Director / Gérant)*

Eppingen, den 17.04.2014

Gez. *Udo Steppe*

H:\...\CE\CE CSM-_DSM-_Ex_Rev02.doc

NIVUS GmbH
Im Täle 2
75031 Eppingen

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

EG-Konformitätserklärung

EC Declaration of Conformity

Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**Ultraschallsensoren CSM / DSM**
Description / Désignation:	*Ultrasonic sensors / Capteurs ultrasoniques*
Typ */ Type / Type:*	**CSM-... / DSM-...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 61326-1:2013

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

NIVUS GmbH
Im Taele 2
75031 Eppingen, Germany

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

Eppingen, den 19.05.2014

Gez. *Marcus Fischer*

H:\...OE\CE CSM-_DSM-_Rev02.doc / Rev. 02

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

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**"Ex" externe Elektronikbox EBM**
Description / Désignation:	*"Ex" external electronic Box / "Ex" boîtier électronique externe*
Typ */ Type / Type:*	**EBM-xxxxxxE...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 94/09/EG
- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 60079-0:2009
- EN 60079-11:2007
- EN 61326-1:2013

Ex-Kennzeichnung */ Ex-designation / Marquage Ex* : Ⓔx II 2G Ex ib IIB T4 Gb

EG-Baumusterprüfbescheinigung / *EC-Type Examination Certificate / Attestation d'examen «CE» de type:*
TÜV12ATEX087812

Benannte Stelle (Kennnummer) */ Notified Body (Identif. No.) / Organisme notifié (№ d'identification):*
TÜV Nord CERT GmbH, Am TÜV 1, 30519 Hannover, Allemagne (0044)

Diese Erklärung wird verantwortlich für den Hersteller / Importeur:
This declaration is submitted on behalf of the manufacturer / importer:
Le fabricant / importateur 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 / Gérant)*

Eppingen, den 19.05.2014

Gez. *Marcus Fischer*

H:\...\EICE KOO-Ex_Rev02.doc

NIVUS GmbH
Im Täle 2
75031 Eppingen

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

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**externe Elektronikbox EBM**
Description / Désignation:	*external electronic Box / boîtier électronique externe*
Typ */ Type / Type:*	**EBM-...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 61326-1:2013

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

NIVUS GmbH
Im Taele 2
75031 Eppingen, Germany

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

Eppingen, den 19.05.2014

Gez. *Marcus Fischer*

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

EG-Konformitätserklärung

EC Declaration of Conformity
Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**"Ex" - Ultraschall-Aktivsensoren POA / OCL / CS2**
Description / Désignation:	*"Ex" - Ultrasonic active sensors / "Ex" - capteurs actifs ultrasoniques*
Typ */ Type / Type:*	**POA-xxxxxxE.. / OCL-xxxxxxE.. / CS2-xxxxxxE...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 94/9/EG
- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 60079-0:2009
- EN 60079-11:2007
- EN 61326-1:2006
- EN61326-2-3:2006

Ex-Kennzeichnung */ Ex-designation / Marquage Ex* : Ⓔx II 2G Ex ib IIB T4 Gb

EG-Baumusterprüfbescheinigung */ EC-Type Examination Certificate / Attestation d'examen «CE» de type:*
TÜV 03 ATEX2262 (3.Ergänzung)

Benannte Stelle (Kennnummer) */ Notified Body (Identif. No.) / Organisme notifié (№ d'identification):*
TÜV Nord CERT GmbH, Am TÜV 1, 30519 Hannover, Allemagne (0044)

Diese Erklärung wird verantwortlich für den Hersteller / Importeur:
This declaration is submitted on behalf of the manufacturer / importer:
Le fabricant / importateur 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 / Gérant)*

Eppingen, den 23.07.2013

Gez. *Marcus Fischer*

H:\...CE\ CE POA_OCL_CS2-Ex_Rev03.doc

NIVUS GmbH
Im Täle 2
75031 Eppingen

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

EG-Konformitätserklärung

EC Declaration of Conformity

Déclaration de conformité CE

Für das folgend bezeichnete Erzeugnis:
We hereby declare that the design of the:
Le produit désigné ci-dessous:

Bezeichnung:	**Ultraschall-Aktivsensoren POA / OCL / CS2**
Description / Désignation:	*Ultrasonic active sensors / Capteurs actifs ultrasoniques*
Typ */ Type / Type:*	**POA-... / OCL-... / CS2-...**

wird bestätigt, dass es mit den folgenden Richtlinien übereinstimmt:
as delivered complies with the following EC directives:
Est certifié, conforme aux directives CE suivantes:

- 2004/108/EG

Die Geräte stehen im Einklang mit den folgenden harmonisierten Normen oder Dokumenten:
The devices furthermore comply with the following harmonised standards or documents:
En outre, ces appareils satisfont aux normes et documents harmonisés désignés ci-après:

- EN 61326-1:2006
- EN 61326-2-3:2006

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

NIVUS GmbH
Im Taele 2
75031 Eppingen, Germany

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

Eppingen, den 23.07.2013

Gez. *Marcus Fischer*

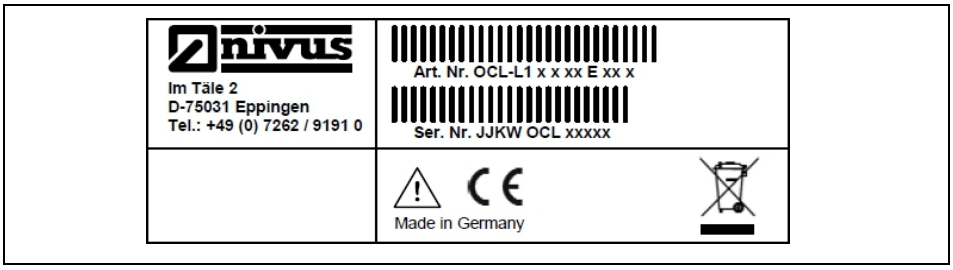


Fig. 3-6 Nameplate level sensor, type OCL-L1

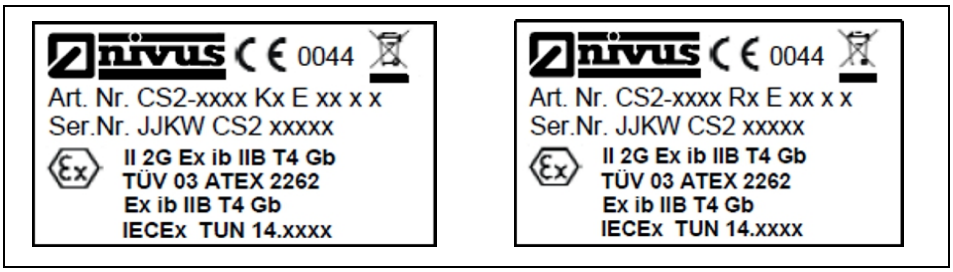


Fig. 3-7 Nameplates flow velocity sensor, type CS2

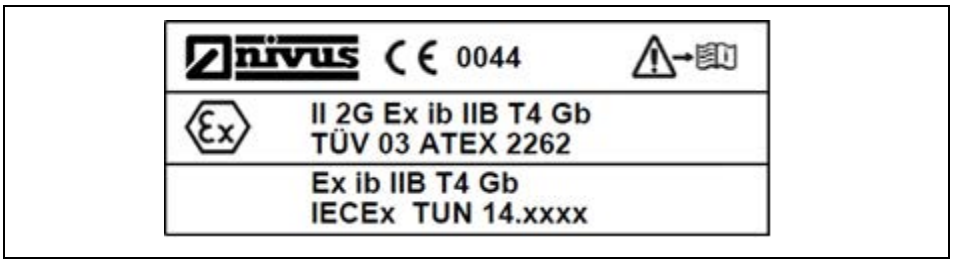


Fig. 3-8 Ex-label for each sensor; type POA, CS2, OCL-L1

3.4 Installation of Spare Parts and Parts subject to Wear and Tear

We herewith particularly emphasize that replacement parts or accessories, which are not supplied by us, are not certified by us, too. Hence, the installation and/or the use of such products may possibly be detrimental to the device's ability to work.

Damages caused by using non-original parts and non-original accessories are left at user's risk. Appropriate accessories and spare parts can be found in chapter 9.5.