

Mounting- and operating instructions

DSM2420

Combined sensor for velocity and level measurement



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1. Scope of delivery

- Sensor DSM2420
- Cable connected to the sensor in standard length (other lengths on request) with clamp
- Floor Mounting base plate
- Optional: Canal clamping ring

2. General notes

- Read the safety instructions and keep the manual
- Installation, commissioning, electrical connection and repairs may only be carried out by qualified personnel.
- The specified degree of protection is only guaranteed if the device is installed in the correct position and the cables are inserted and screwed in properly.
- Operate the device only at the specified voltage
- Modification and conversion of the device is not permitted and releases E.L.B. Füllstandsgerate Bundschuh GmbH & Co. KG from any warranty and liability



Read these assembly instructions carefully before using the device. Follow the instructions. Keep these mounting instructions in a safe place for future reference..

2.1. Safety instructions

Safe operation is only ensured if the notes and warnings will be noted in this manual.

Seal, seals and labels:

Opening or removing seals or labels, eg etc. with serial numbers, will result in immediate loss of warranty claims result.



CAUTION

- Assembly and electrical connection may only be carried out by qualified personnel.
- Read these operating instructions carefully before commissioning.

- Only operate the device with the voltage and frequency specified on the nameplate.
- Do not make any modifications to the device.
- never operate the device without the electronics cover.

2.2. Determination and proper use

The manufacturer is not liable for damages resulting from improper use.

Before commissioning, please compare the conformity of the supply voltage with the specifications on the type plate.

If it becomes apparent that safe operation is no longer possible (e.g. in the case of visible damage), please shut down the device immediately and secure it against unintentional operation.

The device may be dangerous if it is used improperly or not as intended. For this reason, we recommend that the safety instructions are strictly observed.

2.3. Commissioning & operating personnel

Assembly, electrical installation, commissioning and maintenance of the device may only be carried out by trained specialist personnel who have been authorized to do so by the system operator.

The qualified personnel must have read and understood these operating instructions and must comply with their statements.

The device may only be operated by persons who have been authorized and instructed by the system operator. The instructions in this operating manual must be followed.

Make sure that the device is correctly connected according to the electrical connections.

2.4. Repairs

Repairs can only be carried out by trained customer service personnel.

In this case, please contact E.L.B. Füllstandsgeräte Bundschuh GmbH & Co. KG.

2.5. Technological progress

The manufacturer reserves the right to adapt technical data to technical development progress without special announcements. For information on the activities and possible extensions of these operating instructions, please contact E.L.B. Füllstandsgeräte Bundschuh GmbH & Co. KG.

3. Product description

The DSM2420 sensor is a combined sensor for measuring flow velocity and level in open or accessible closed channels of all types and shapes.

The sensor is made of special plastic and is therefore resistant to virtually all aggressive media found in water and wastewater.

The sensor can be mounted on any type in the channel by means of appropriate adaptable stainless steel mounting shoes. When also used to measure the filling level, floor mounting is required.

Explosionsgefährliche Atmosphäre:

The sensor is supplied by the associated meter FDL400 with matching integrated Zener barrier normally for use in explosive atmosphere. The supply is here exclusively with voltages that are listed in the Examination Certificate



CAUTION

For applications in non-hazardous atmospheres, the sensor can be supplied by any other device. Here the supply range extends from 12.6V to 24V DC.

The sensor supplies standardized currents of 4-20mA at its two outputs. Therefore a standardization of the sensor cable length is not necessary. With an appropriate cross-section, the length of the connection cable can be extended to a multiple.

Avoid Damage:

Never kink the sensor cable, otherwise the internal air tube for atmospheric pressure compensation of the altitude sensor may be damaged.



Avoid Damage:

The internal air tube for atmospheric pressure compensation of the height sensor has a small air filter on the connection side which prevents water from penetrating and thus also condensation from forming in the air tube. This filter must never be removed. Shortening the sensor cable without reattaching this filter is not permitted.



The device conforms to the following standards:

- EN IEC 60079-0
- EN 60079-11
- EN 61000-6-2
- EN 61000-6-4

3.1. Technical data

- Housing: Polyoxymethylene plastic (POM)
- Protection class: IP 68
- Dimensions in mm (LxWxH): 180x48x36,5
- Weight: 1,5kg (incl. 10m cable)
- Cable length: 15m standard, others possible
- Bending radius: $> 10 \times D$ (cable diameter 7,2mm) = $> 72\text{mm}$
- Supply voltage: 12,7 - to 24V DC
- Current consumption: approx. 30 mA + (flow rate 4-20mA) + (fill level 4-20mA)
- Fuse: reverse polarity and short circuit protected
- mounting shoe: material V2A 1,5mm
- Temperature range: 0...50°C

Velocity

- Measuring principle: Ultrasonic - Doppler
- Measuring range 0,01 - 4 m/s
- Measuring accuracy: +/-5% of the instantaneous value in the channel
- Temperature drift 0,1 % / °C (measuring span)
- Temperature drift 0,05 % / °C (zero point)
- Output signal 4 - 20 mA
- Zero point norm 4 mA (+/- 3 %)
- Signal integration: approx. 1s

Level

- Measuring principle: Differential pressure
- Measuring ranges: 0 -1 m ; 0 - 2 m ; 0 - 4 m
- Measuring accuracy: $< 0,2\%$ f.s. sum of non-linearity, hysteresis and repeatability
- Temperature drift: 0.005% / °C f.s. Measuring span
- Temperature drift: 0.005% / °C f.s. zero point
- Material: Al2O3 (96%) active area
- Output signal: 4 - 20 mA
- Zero point norm: 4 mA (+/- 3 %)

Note:

The sensor has been subjected to the prescribed tests in the EMC laboratory in accordance with CE confirmation regulations. In general, all data are only relevant for the operating condition.



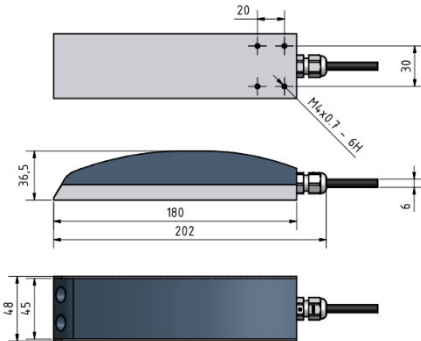
3.2. Mounting instructions

The measuring method used in this sensor is based on the ultrasonic Doppler principle.

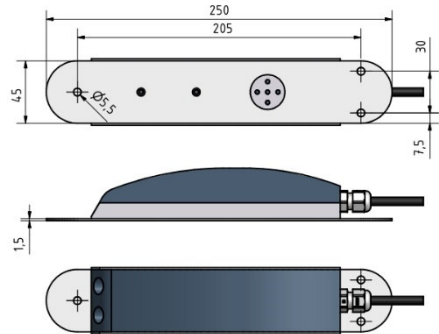
For proper functioning, it requires a certain minimum proportion of entrained particles in the measuring medium, on which the emitted ultrasound can be reflected. In most applications, these conditions are met.

Only in the cleanest liquids, such as drinking water, must particles be artificially added in the form of air bubbles.

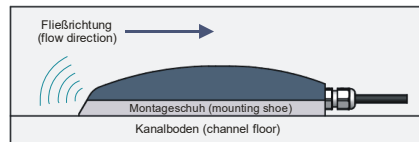
Mounting for ring mounting



Mounting for floor mounting

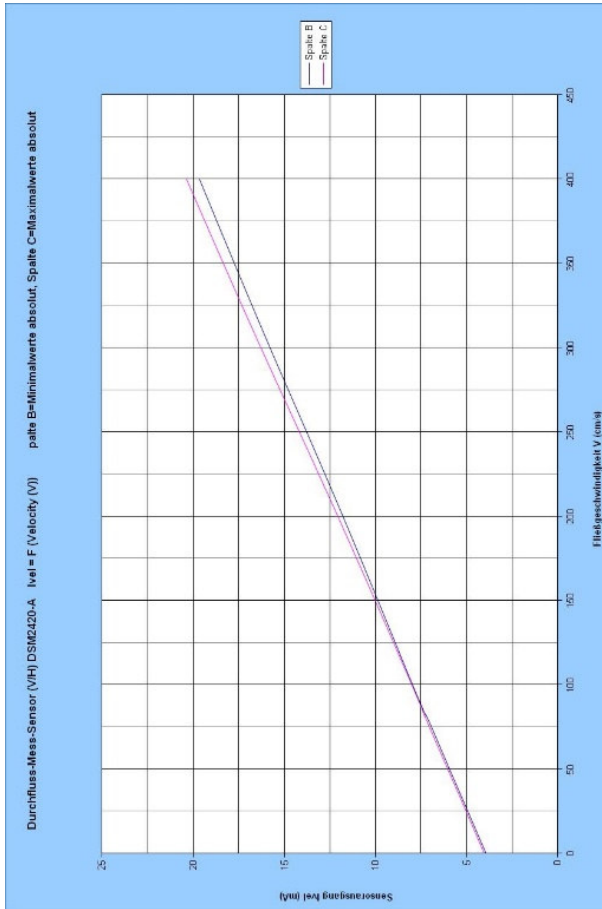


Installation arrangement of the measuring sensor for flow velocity and level:

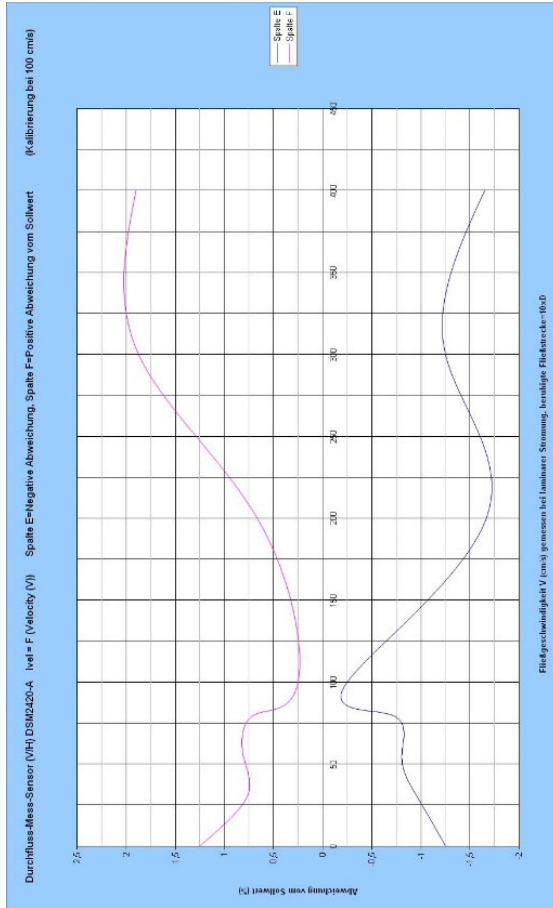


3.4. Tolerance curves (typical)

Flow velocity curve (min. and max. values) - Sensor calibrated at 1m/s



Deviation from set point - sensor calibrated at 1m/s

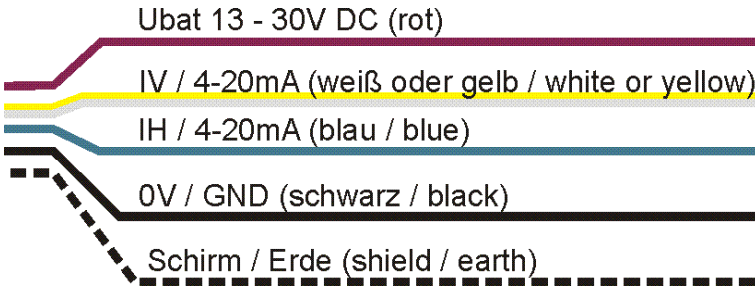
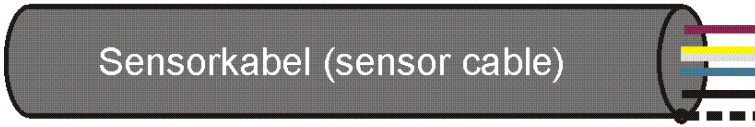


Note:

The tolerance curves and the supplied sensor-specific linearity curve are only valid for flow heights > 50mm.



4. Pin assignment



5. Declaration of Conformity



Konformitätserklärung

Declaration of conformity
Déclaration de conformité



E.L.B. Füllstandsgeräte
Bundschuh GmbH & Co. KG
An der Hartbrücke 6
D-64625 Bensheim

- erklärt in alleiniger Verantwortung, dass das Produkt : Sensor
- declare under our sole responsibility that our product : Sensor
- déclare sous sa seule responsabilité que le produit : Capteur

DSM 2420.; DSM 2525..

- auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt
- to which this declaration relates is in conformity with the following standards
- auquel se réfère cette déclaration est conforme aux normes

EN IEC 60079-0:2018
EN 60079-11:2012
EN 61000-6-2:2019
EN 61000-6-4:2019

- gemäß den Bestimmungen der Richtlinien
- following the provision of Directives
- conformément aux dispositions des Directives

2014/34/EU
2014/30/EU
2011/65/EU

**EU-Baumusterprüfung gemäß Anhang III der Richtlinie durch
IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
D-09599 Freiberg**

EU-Baumusterprüfbescheinigungs-Nr.: **IBExU 04 ATEX 1256**

Bensheim, 05.04.2022

Frank Wiedmann
Geschäftsführer

Sensor_DSM_Ex_IBExU

6. Type Examination Certificate (ATEX)

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

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



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

[3] EU-type examination certificate number **IBExU04ATEX1256** | Issue 1

[4] Product: **Sensor**
Types: DSM 2420 / DSM 2525

[5] Manufacturer: E.L.B. Füllstandsgeräte Bundschuh GmbH & Co. KG

[6] Address: An der Hartbrücke 6
64625 Bensheim
GERMANY

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

[8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report IB-22-3-0040/2.

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

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

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

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

II 2G Ex ib IIB T4 Gb
-20 °C ≤ T_a ≤ +60 °C

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order


Dipl.-Ing. (FH) A. Henker



(notified body number 0637)

Tel: +49 (0) 37 31 / 38 05 0
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Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Freiberg, 2022-05-11

IBExU Institut für Sicherheitstechnik GmbH

An-Institut der TU Bergakademie Freiberg

[13] **Schedule**[14] **Certificate number IBExU04ATEX1256 | Issue 1**[15] **Description of product**

The Sensor type DSM 2420 / DSM 2525 serves to measure filling levels and flow velocities by the ultrasonic flow measuring method. It is used mainly in sewer tunnels. The equipment consists of a compact plastic housing with mounting plate. The internal electronic components are completely potted. Power supply unit and evaluation device are connected via a firmly installed cable.

Technical data:

Ambient temperature range -20 °C up to + 60 °C
 Cable length up to 500 m

Electrical data

Supply circuit In type of protection intrinsically safe Ex ib IIB
(Wires: red [+US], black [GND])

Maximum input voltage $U_i \leq 16 \text{ V}$
 Maximum input current $I_i \leq 350 \text{ mA}$
 Maximum input power $P_i \leq 1.6 \text{ W}$
 Effective internal capacitance C_i negligible
 Effective internal inductance L_i negligible

Data circuit per channel In type of protection intrinsically safe Ex ib IIB
(Wires: blue [H-I], white [V-I])

Maximum in-/ output voltage $U_{i/o} \leq 16 \text{ V}$
 Maximum in-/ output current $I_{i/o} \leq 66 \text{ mA}$
 Maximum in-/ output power $P_{i/o} \leq 260 \text{ mW}$

The supply and data circuits are equipotential bonded with each other.

Safety instructions

For circuits including inductances and capacitances the following has to be observed:
 The values for L_o and C_o , mentioned in the EU-Type Examination Certificate are allowed for:

- distributed inductance and capacitance e.g. as in a cable or
- if the total L_i of the external circuit (excluding the cable) is $< 1\%$ of the L_o value or
- if the total C_i of the external circuit (excluding the cable) is $< 1\%$ of the C_o value.

Ex ib IIB	
C_o	2.75 μF
L_o	25 mH

The values of L_o and C_o determined in the EU-Type Examination Certificate shall be reduced to 50 % or taken from the following table if both of the following conditions are met:

- the total L_i of the external circuit (excluding the cable) $\geq 1\%$ of the L_o value and
- the total C_i of the external circuit (excluding the cable) $\geq 1\%$ of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μF for Groups I, IIA, and IIB and 600 nF for Group IIC.

Ex ib IIB		
C_o	2.5 μF	1.6 μF
L_o	500 μH	5 mH

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

Variations compared to issue 0 of this certificate and her additions:

Variation 1

The EU Type Examination Certificate is transferred to a new manufacturer.

Variation 2

The device meet the requirements of the current standard EN IEC 60079-0:2018.

[16] Test report

The test results are recorded in the confidential test report IB-22-3-0040/2 of 2022-04-27.

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

Summary of the test results

The sensor still fulfils the requirements of the type of protection intrinsic safety on an explosion-protected electrical apparatus for group II and category 2G.

[17] Specific conditions of use

None

[18] Essential health and safety requirements

In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item [9], the following are considered relevant to this product, and conformity is demonstrated in the test report:

None

[19] Drawings and Documents

The documents are listed in the test report.

IBExU Institut für Sicherheitstechnik GmbH
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09599 Freiberg, GERMANY

By order



Dipl.-Ing.(FH) A. Henker

Freiberg, 2022-05-11