



Operating Instructions

for

Oval Wheel Flowmeter

High pressure

Model:

DON-H...



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2. Note

2.1 General

Before unpacking and commissioning the device, the operating instructions and the "General Safety Instructions" document must be read and followed carefully. The general safety instructions, the operating instructions, the data sheet as well as approvals and further information can be downloaded via the QR code on the device or under the respective product on www.kobold.com.

Due to technical changes, the device documentation available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form.

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the device should be used only when the entire machine fulfils the EU machinery directive.

2.2 Hazard warnings

The following instructions are intended to ensure your personal safety and to prevent damage to the product described or connected devices. Safety instructions and warnings to prevent danger to the life and health of users or maintenance personnel, or to prevent damage to property, are highlighted in this documentation using the symbols defined here. *The symbols and terms used have the following meaning in the documentation itself:*

Symbol	Explanation	Symbol	Explanation
 Note	Is important information about the product, the handling of the product or the respective part of the documentation to which particular attention should be drawn.	 Caution	Means that minor personal injury or minor property damage may occur if proper precautions are not taken.

Symbol	Explanation	Symbol	Explanation
	Indicates that serious personal injury or substantial property damage may occur if proper precautions are not taken.		Means that death can occur if proper precautions are not taken.
Warning		Danger	
	Attention: Hot surface!		Warning: Dangerous electrical voltage
Warning		Warning	

2.3 As per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Model DON-*	DN	P _{max} [bar]	Diagram 8 Group 1 dangerous fluids	Diagram 9 Group 2 no dangerous fluids
DON-05	1/8	400	Art. 4, § 3	Art. 4, § 3
DON-10	1/4	400		
DON-15	1/4	400		
DON-20	1/2	400		

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Oval Wheel Flowmeter, High pressure model: DON-H...

Each DON volume counter has been calibrated to function with mineral oil, which means the remainder of the calibration oil still remains in the device.

The oil used is:

for measurement ranges H05 for high viscosities: SHELL Morlina 10

for measurement ranges H10 to H20: EXXSOL D120

4. Regulation Use

The oval gear meter is a precise positive displacement flowmeter incorporating a pair of oval geared rotors. These meters are capable of measuring the flow of a broad range of clean liquids.

Stainless Steel flowmeters are suited to most water-based products and chemicals and aluminium meters are suitable for fuels, fuel oils, & lubricating liquids. It is important to ensure that the medium to be measured is compatible with the materials used in the instrument (see section 10 "Technical Data"). It is also imperative to comply with the maximum permissible operating parameters specified in the "Technical Data" section.

The operation of the offered electronics (Zx, 1A...5A, CT) is described in the separate ZOK- (Ex) or U-PACE operating instructions.

Any use of the oval gear flow meter model: DON, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Environment (only for DON-xxxxxxxxCTxx)

The DON device with U-PACE electronics is weatherproof and meets IP67 protection class. The meter is designed for industrial environments and complies with Directive 2014/30/EU (Electromagnetic Compatibility).

The device is intended for indoor use (relative humidity <100 %, use at up to 2000 m above sea level).

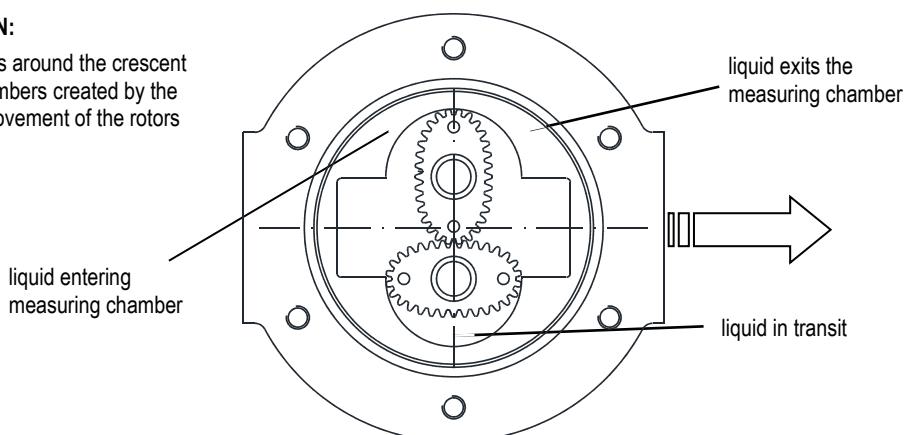
6. Operating Principle

Oval gear flowmeters are categorized as positive displacement flow technology. When liquid flows through this type of positive displacement flowmeter, two oval geared rotors measure a constant volume per rotation within a precisely machined measuring chamber. With each rotation, a constant volume of liquid is measured. The rotation of the oval gears is sensed via magnets embedded within the rotors. These magnets transmit a high-resolution pulse output. The output signal can be process externally via a remote display controller or PLC or via a variety of output/display options available as accessories attached to the flowmeters.

The positive displacement flow technology allows for precise flow measurement of most clean liquids regardless of the media conductivity. Other liquid properties also have a minimal effect on the performance of this type of meter. Flow profile conditioning is not required as with alternative flow technology options making oval gear installations simple to install in tight spaces and at an economical price.

OPERATION:

Liquid travels around the crescent shaped chambers created by the rotational movement of the rotors



7. Mechanical Connection

7.1 General

Points to verify before meter installation:

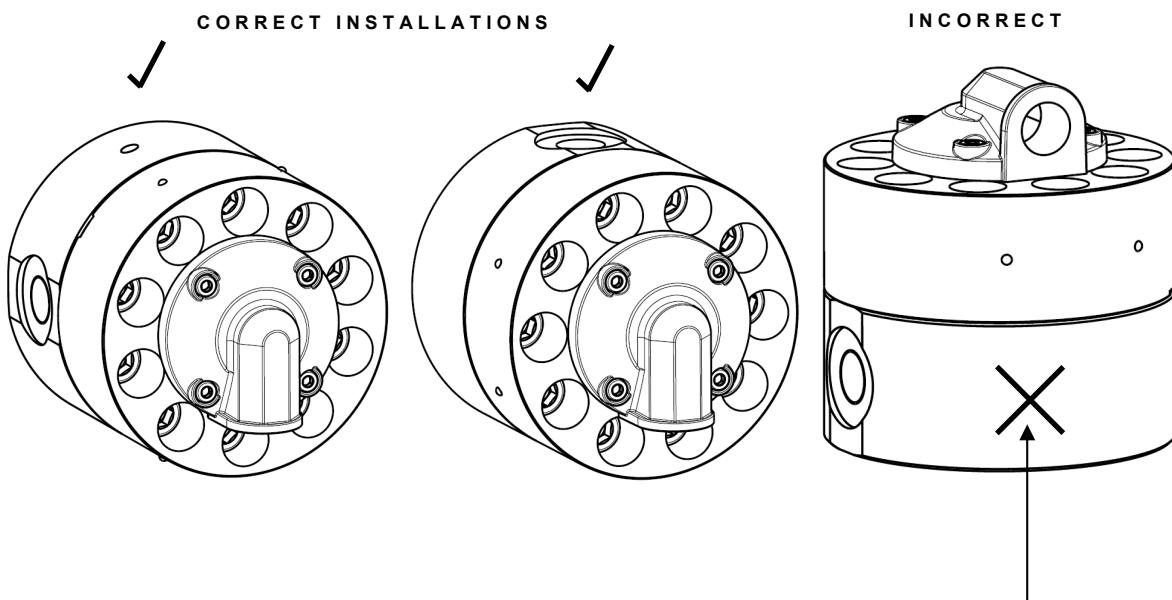
- Chemical compatibility of the liquid. Be sure that all wetted parts are identified and confirmed suitable for use with the media being measured. If unsure, please contact a KOBOLD engineer for guidance in obtaining the proper reference materials.
- Verify that the operational pressure and temperature limits are within capability of the fully specified meter. Verify that the operational flow rates are within the specified flow range. Viscous liquids may limit the maximum allowable flow based on the viscosity. The max allowable flow rate may need to be limited to ensure the differential pressure across the flowmeter does not exceed 1 bar, (100 kPa, 15 PSIG).
- Be sure that the flowmeter is not subject to any process temperatures and/or pressures that can cause the measured liquid to freeze or flash inside the meter.
- the measuring instrument is not subjected to process temperatures and pressures that convert the liquid medium into a gas inside the device.

 Note	Opening the screw ring of the CT electronics will void the guarantee.
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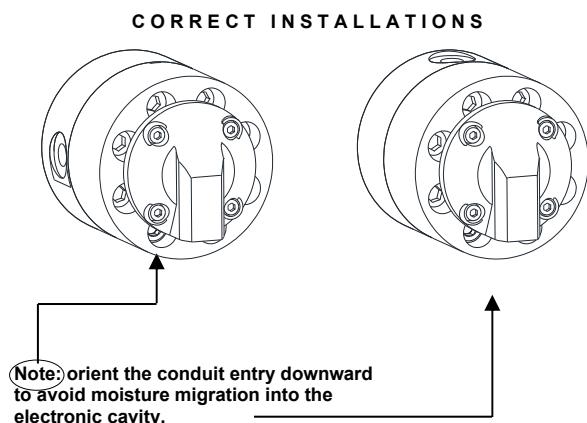
- The electronic display can be rotated in 90° steps via software. See chapter 5.3 of the C3T0/CT operating instructions.

7.2 Orientation

When installing the flowmeter, orientation must be considered. The rotor shafts must be in a horizontal plane. To verify that the rotor shafts are in a horizontal plane, electronic cover or optional digital display will be facing in a horizontal direction. For modification in the field, the electronic cover or digital display can be rotated in any 90 degree position. This accommodates access to the electrical entry and allows the electronic display orientation to best suit the installation.



Incorrect installations will cause the rotor weight to be felt on the bottom of the measuring cavity.



The DON flowmeter accommodates both horizontal and vertical flows. It is recommended that for vertical flow installations that the liquid flow up through the meter (*i.e. bottom to top*). This orientation assists in air or entrained gas removal. The flow meter is bidirectional. To identify the flow direction, in which the flowmeter was calibrated, the flowmeters are marked with arrows. These arrows are placed on the lower side for models DON-H05 .. DON-H20. The flowmeter calibration data refers to this arrow direction. This is also the preferred flow direction.

Flow Conditioning and installation location

Filter:

It is highly recommended to INSTALL a filter immediately before (prior to) the meter. Filters are available and sold separately.

Recommended Filter:

DON-H05...DON-H15: < 75 µm particle size (200 mesh)

DON-H20: < 150 µm particle size (100 mesh)

Flow conditioning: Flow conditions are not required since the DON flowmeter does not require any straight pipe runs before or after the flowmeter.

Location: The recommended installation would be before any flow control and/or shut off valves, this installation prevents complete emptying of the meter. This minimizes the risk of leakage and/or air entrapment which could result in damage to the flowmeter or inaccurate initial readings.

A by-pass installation is recommended for process or safety critical meters. Isolation valves enable the meter to be isolated from the system and serviced as needed. System purging is also possible with a by-pass arrangement. Accommodate all meter ratings and locate the meter on the discharge side of the process pump.

For outdoor applications, be sure all electrical entries are sealed properly via the proper glands, mounting, sealing or containment. For humid environments, mount the instrument appropriately as to avoid condensation build up. Generally, these installations have the conduit connection pointing downward as to drain any condensate away from the electronics.

Liquid State: Liquid within the flowmeter must not freeze. If heat tracing is necessary, please be sure to adhere to the temperature limits of the flow meter. Ensure the liquid does not flash, do not exceed the max DP of the flowmeter.

Hydraulic shock: Surge dampeners or pressure relief valves must be installed if hydraulic shock or pressure spikes are present. Highly pulsating flow can also damage the DON flowmeter. Diaphragm pumps and specific application profiles can cause high frequency pulsating flow. Proper pulsating dampers are highly recommended.

8. Electrical Connection

8.1 Connecting Cable

Proper shielded instrument cable is highly recommended. Low capacitance twisted pair 7 x 0.3 mm (0.5 mm²) for use with the DON and any remote receiving instrumentation. Typical cable would be Belden® 9363 or similar. Connect the cable shield to DC common or designated grounding terminal at the receiving instrument. Remember to only connect the end of the cable shielding at the receiving instrument (not the DON) to ensure proper interference protection.

Please be sure not to run the connecting cable within a common conduit or in close proximity to conduit with high inductive loads or power sources. This could result in noise or induced errors to the output signal or result in damage to the electronic components. Always run the instrument cables in a separate conduit or within a common conduit with other low power cables. Max cable length should be limited to 3280 ft (1000 m).

8.2 Electrical connection for integrated electronics options

The electrical connection of the integrated electronics options always requires the electronics cover to be dismantled. High pressure models incorporate the cable inlet into the electronics cover.

The connecting cable must be routed through the cable duct and connected in accordance with 7.3.1 to 7.3.4. The connecting terminals are of the plug-in type, and can be taken out of the terminal compartment to facilitate connection.

	EXPLOSION HAZARD
	When the ambient temperature exceeds +70 °C, the used cable and cable gland must be suitable for the corresponding temperature range.

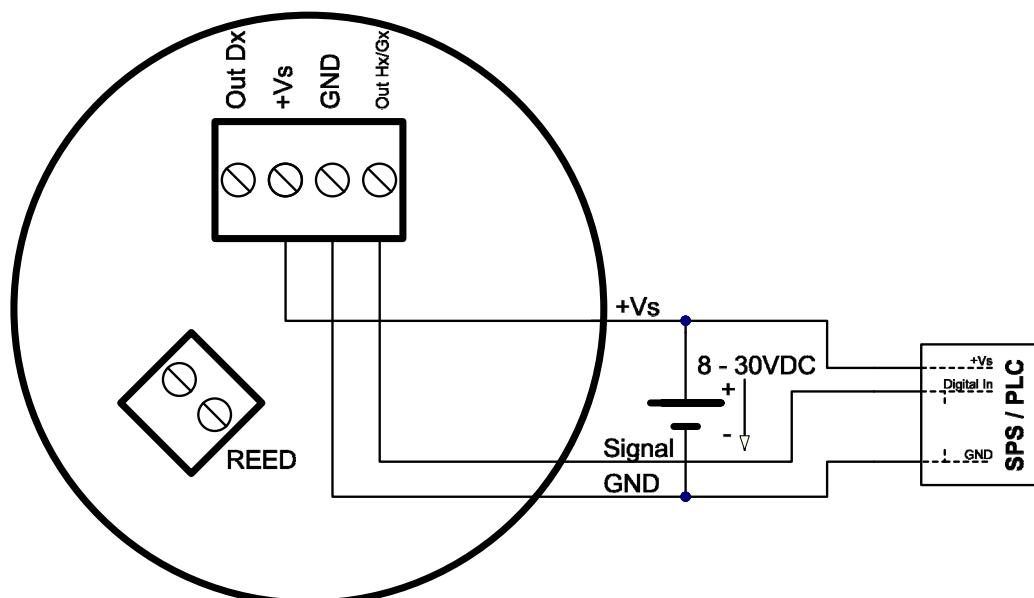
8.2.1 Hall-effect sensor with active pulse output (H0 option)

The H0 electronic option combines a hall-effect sensor with an active push-pull output stage. A three-phase electrical connection is used. The output is actively switched, either to the input terminal voltage +Vs or to GND. The external input terminal voltage is 8 to 30 V_{DC}. No additional external wiring is required (e.g. pull-up resistor). The high signal corresponds approximately to the +Vs input terminal voltage and the low signal approximately to 0 V.

The electrical load can be connected to either the input terminal voltage or GND

Max. output current (power source or sink): 100 mA (short-circuit protected).

 Note	The electronic option H0 is available with reed switch output.
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8.2.2 Reed Switch Pulse Output (option H0/HA)

The DON reed switch output is a SPST potential free N/O 2-wire output. This is a passive output so no power is required.

<div style="background-color: #f2e0aa; border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;"> NOTE </div> <p>Note</p>	<p>When using the reed switch output the liquid temperature must not change at a rate greater than 10 °C per minute (50 °F per minute).</p>
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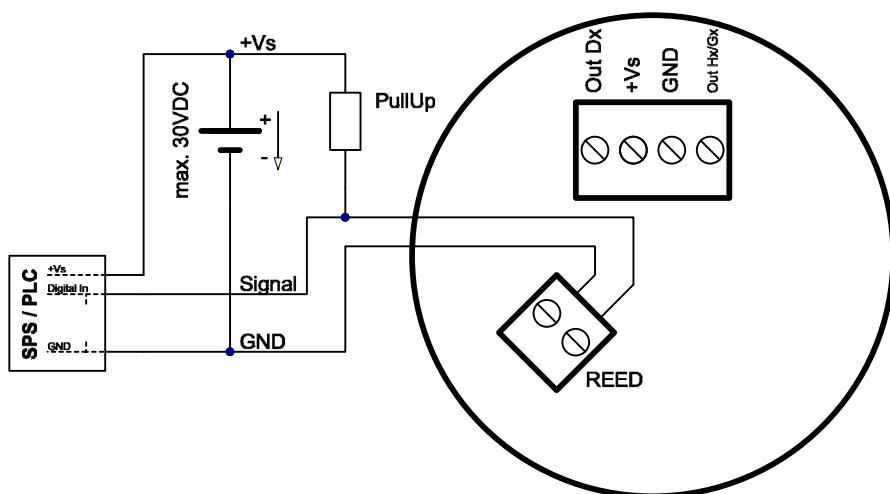
Average electrical endurance of switching contact (MTTF – Mean Time To First Failure):

Max. switching voltage (30 V/10 mA) 5×10^5 switching cycles

Max. current load (20 V/10 mA) 5×10^6 switching cycles

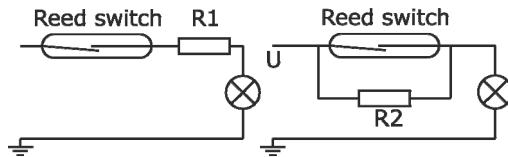
Min. load (<5 V/10 mA) 5×10^8 switching cycles

Switching capacity: Max. 30 V_{DC}, max. 20 mA

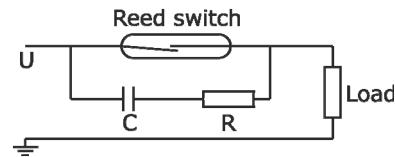


The individually specified maximum electrical values of the reed switch must never be exceeded, even for a moment. Higher switching values may reduce the service life or even destroy the contact.

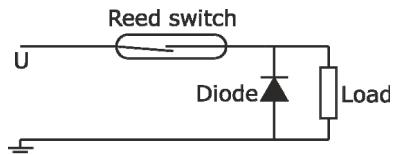
For capacitive and inductive loads (e.g. via long lines), we recommend the following protective circuits:



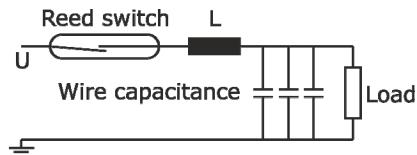
Lamp load with series or parallel resistance to the reed switch.



Protection with a RC suppressor
For a.c. current and inductive load.

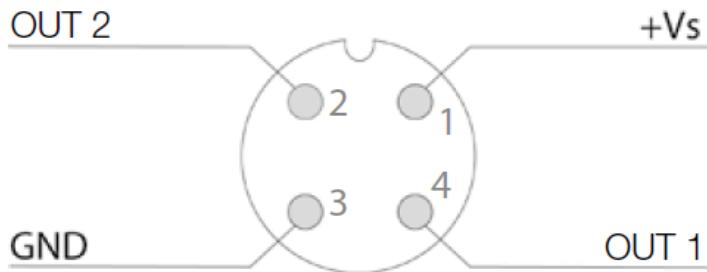


Protection with a diode
for d.c. current and inductive load.



Protection with an inductance or
Resistance for capacitive load.

8.2.3 U-PACE Electronics (Option CT)

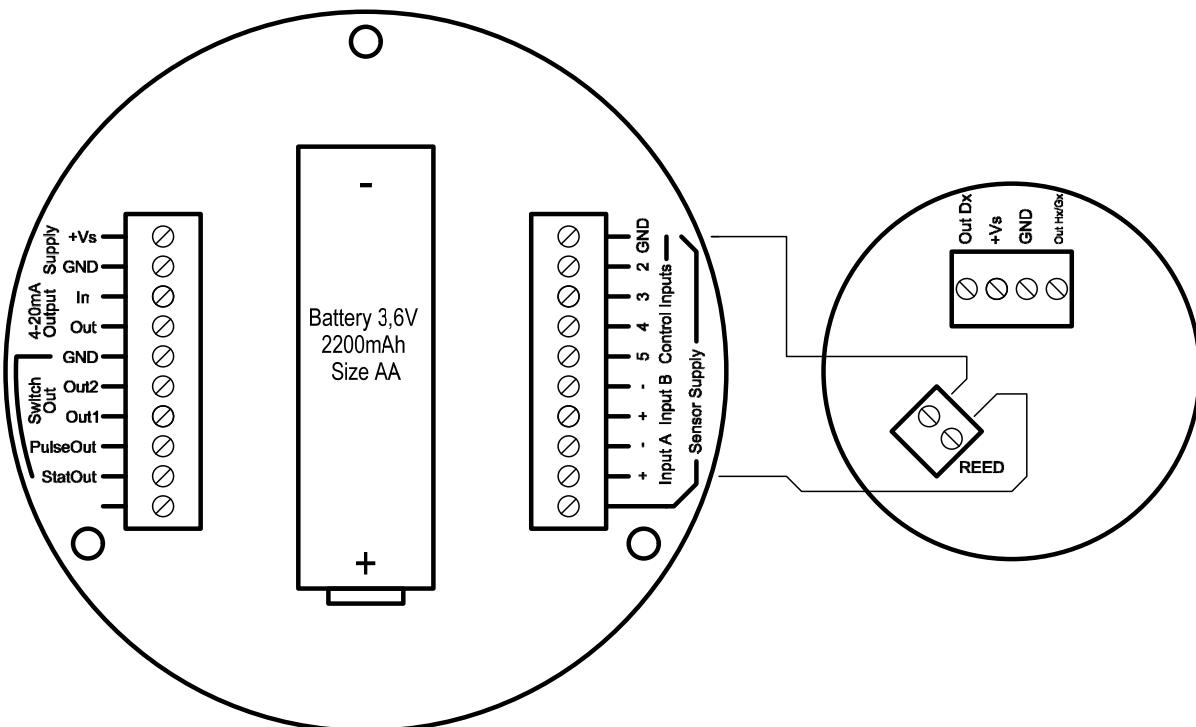


8.3 Internal wiring with electronic options -Zx

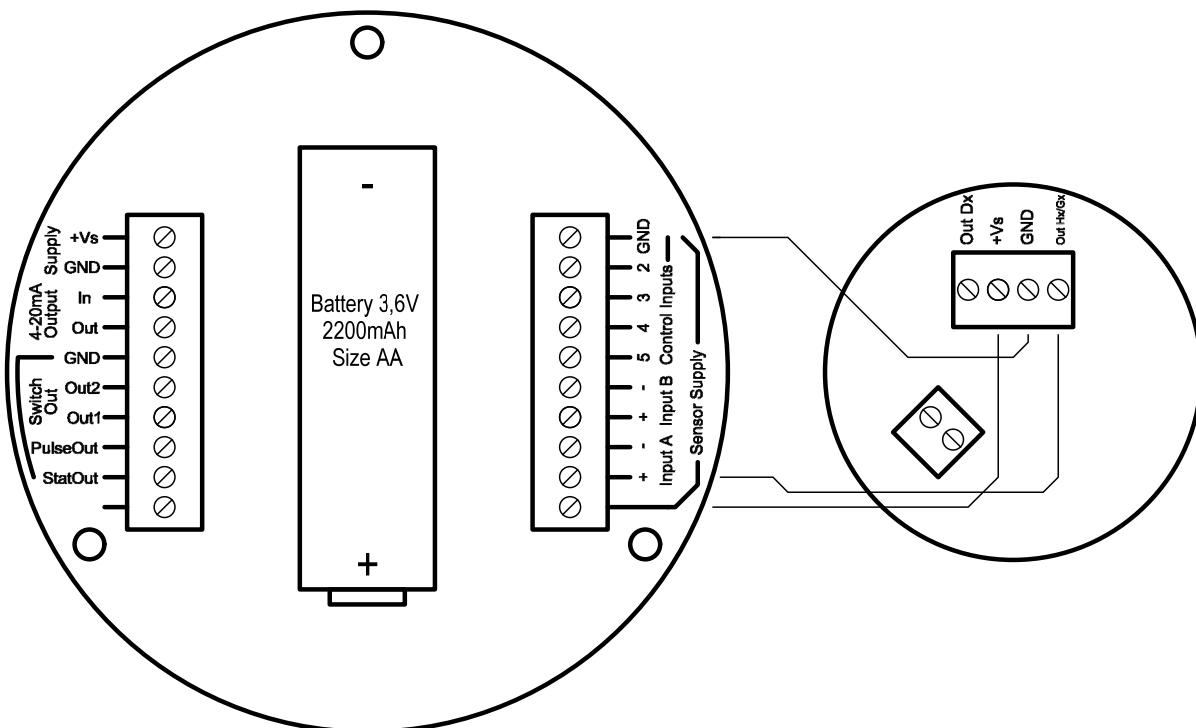
The -Zx electronic options are pre-configured ex works in connection with the sensor boards. Reconfiguration is available on request.

8.3.1 For Z1/Z2/Z3/Z5 electronic options (reed switch and Hall sensor)

- a) **Wiring diagram with reed switch (ex works standard, mandatory for supply with battery or in 2-wire 4-20 mA operation)**



b) Wiring diagram with Hall sensor (recommended in connection with external supply)



8.3.2 For 1A...5A electronics options

See supplement to operating instructions ZOK-Ex for electronics options 1A... 5A

8.3.3 Calibration Factor (scale or K Factor)

The DON flowmeter is delivered with a factory calibration certificate. Within this certificate, a calibration factor is provided. The calibration factor is a specific representation of pulses per unit volume. (i.e. pulses per liter) for that specific meter.

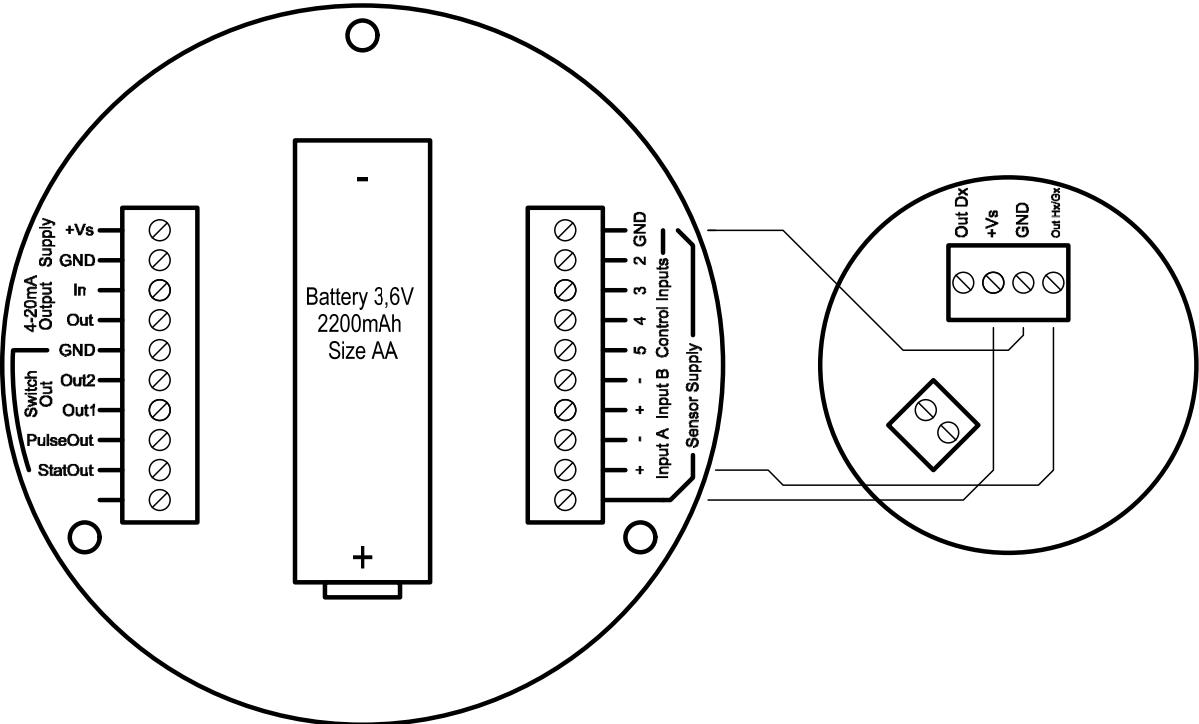
Measurement devices with attached electronics are factory pre-configured to the corresponding calibration factor. Depending on the model, the calibration protocol is based on either the flow rate display or the analog output.

For further details on the operation and parameterization of the electronic option Zx and 1A...5A see operating instructions ZOK- (Ex).

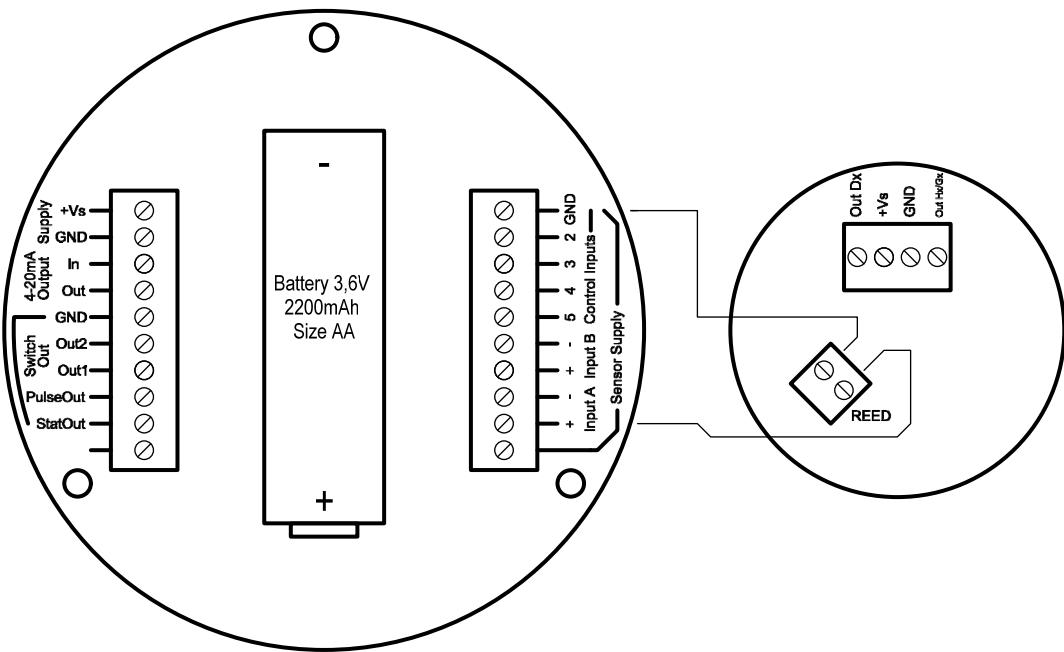
8.4 External wiring with electronic unit ZOK-Zx

8.4.1 Wiring with ZOK-ZxK

a) Circuit with Hall sensor (not for battery operation)

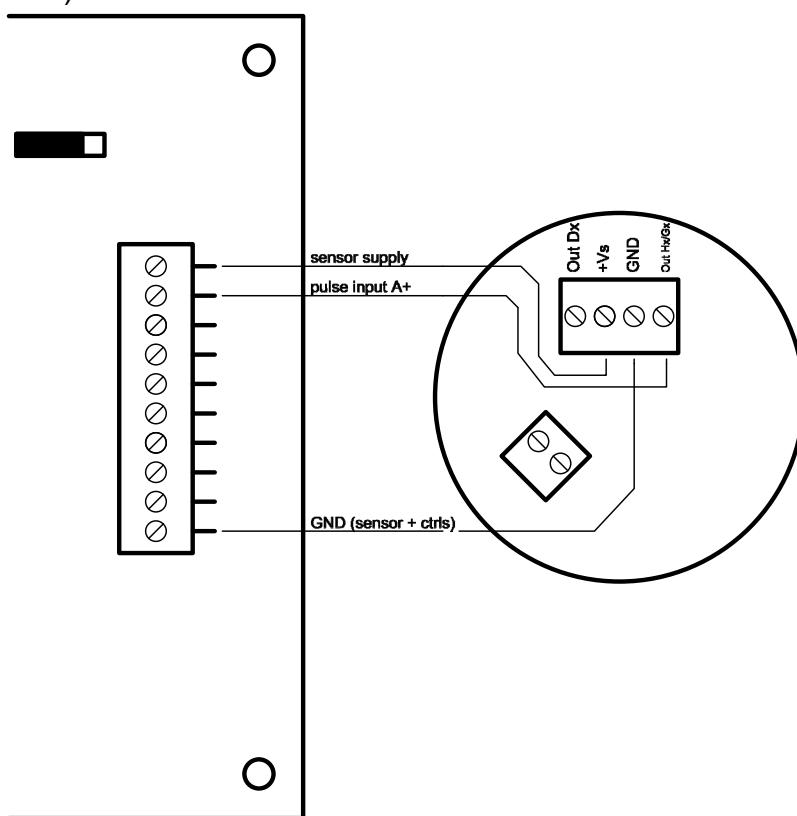


b) Circuit with Reed switch

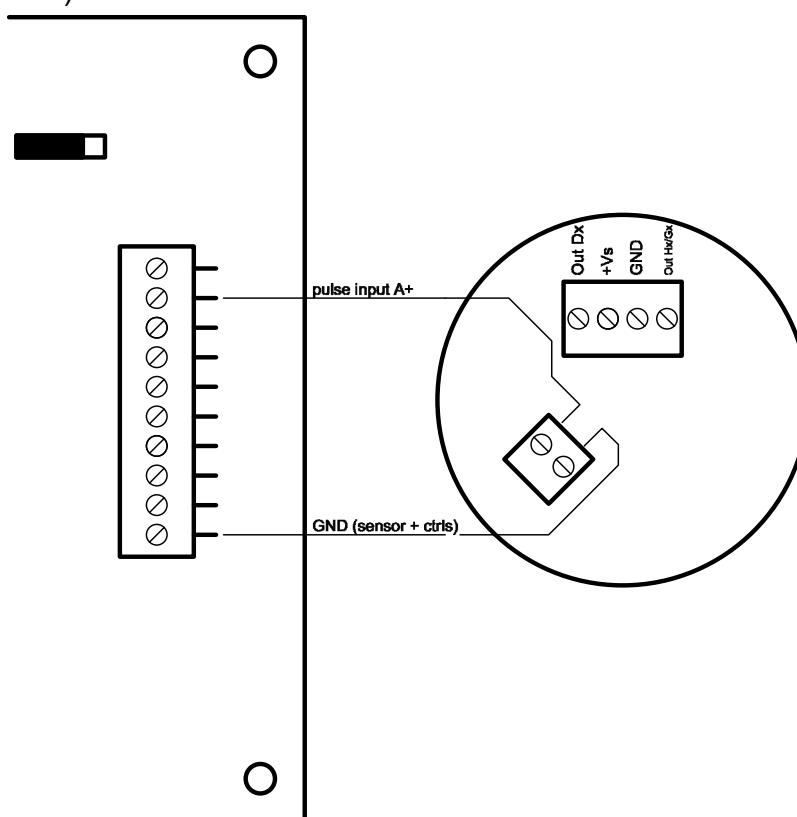


8.4.2 Wiring with ZOK-ZxP

a) Circuit with Hall sensor



b) Circuit with Reed switch

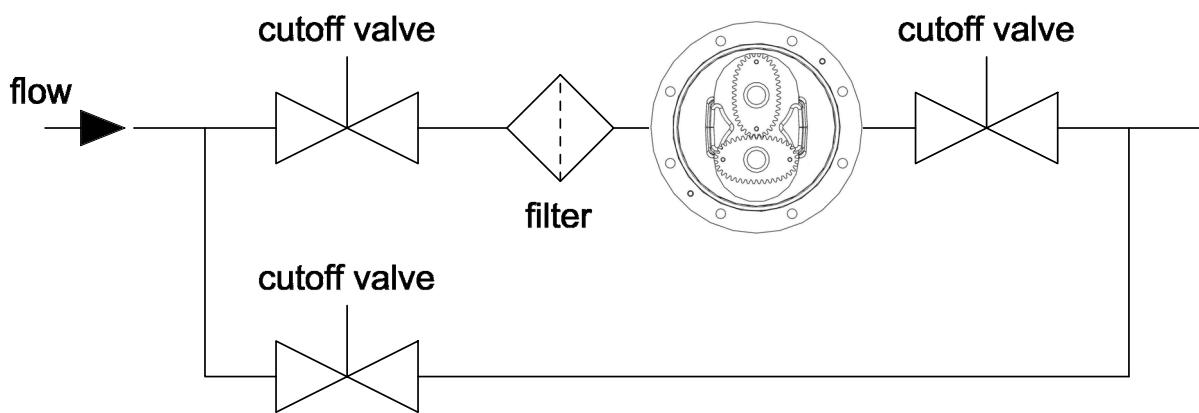


9. Commissioning

The piping MUST be flushed of debris before installation. Debris such as slag from welding, grinding dust, rust, pipe tape or sealing compound are common within new piping installations and will damage the flowmeter if not flushed or filtered from the process piping before installation and operation.

Before commissioning, the line should be filled slowly and carefully with the medium.

A by-pass system is common for frequent system flushing or frequent meter removal. If a by-pass system is not practical or possible, removal of the gears before flushing is necessary. (refer to section 9.1 "Disassembly of Pulse meter").



For proper operation the flowmeter must be purged of air. During long periods of inactivity or after a flushing, air may be in the piping. Elimination of the air may be achieved by operating the meter at a low flow rate until all the air is eliminated. Damage may occur to the flowmeter if it is run above the maximum rated flow rate or if the maximum differential pressure of 15 psi (1 bar, 100 kPa) is exceeded.

After mechanical and electrical installation according to the guidelines set forth within this user manual, the DON flowmeter is ready for operation.

	<p>CAUTION Risk of damage by blocking of measuring mechanism</p> <p>Risk of damage by blocking of measuring mechanism. A missing count signal may indicate a blocked measuring mechanism. The resulting increase in pressure at the inlet side of the device can lead to further damage to the unit and / or the plant. Remove the unit or shut down the plant immediately, if an unexpected absence of the counter signal takes place. Eliminate the cause of the malfunction.</p>
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10. Setting - compact electronics DON-xxxxxxCTxx

The operation and setting of the U-PACE electronics (order code: DON-xxxxxxCTxx) is described in the operating instructions supplement for U-PACE electronics.

11. Device status - U-PACE electronics DON-xxxxxxCTxx

Display text	Error type	Display color	Description	Troubleshooting
Meas Error	Functional limitation	orange	Measuring tube not or only partially filled or stationary air bubbles in front of the sound transducers	Fill the measuring tube completely with medium or Rinse out air bubbles
Temp overrun	Limitation of measurement accuracy	yellow	The measuring range of the temperature measurement has been exceeded	Reduce medium temperature if necessary
Temp underrun	Limitation of measurement accuracy	yellow	The measuring range of the temperature measurement has been exceeded	If necessary, increase the medium temperature
Temp sensor	Device error	red	Defect in the temperature sensor measuring circuit	Repair required by the manufacturer
Medium warning	Warning - qualitative limitation of flow measurement	orange	Large fluctuations in measured values caused by poor flow conditions in the inlet/outlet or air bubbles in the medium	Maintain inlet and outlet distances, avoid/remove air bubbles in the medium
MVMerror	Device error	Red	Internal data storage read error	If this occurs repeatedly, repairs will be necessary from the manufacturer
Signal warning	Warning - qualitative limitation of the flow measurement	orange	Strong signal attenuation due to the medium	Use a suitable medium or eliminate sound-absorbing components in the medium

12. Maintenance

Flowmeter maintenance precautions:

- Remove/disconnect power to the flowmeter.
- Ensure that flow supply to the meter is turned off and the system is not under pressure.
- Completely drain the flowmeter
- Confirm that any signal output(s) will not affect the system when de-energized or removed from the circuit.

Oval gear positive displacement flowmeters are mechanical by nature. A periodic maintenance/inspection schedule is suggested for an extended service life. Follow the guidelines within this user manual for the maximum flowmeter performance.

The maintenance/inspection schedule should be determined based off of application factors such as media type (abrasiveness, lubricity, and/or chemical compatibility), flow rate, and operating/maximum temperature and pressure.

12.1 Disassembly of DON-H with Pulse meter

Concerning option H0/HA

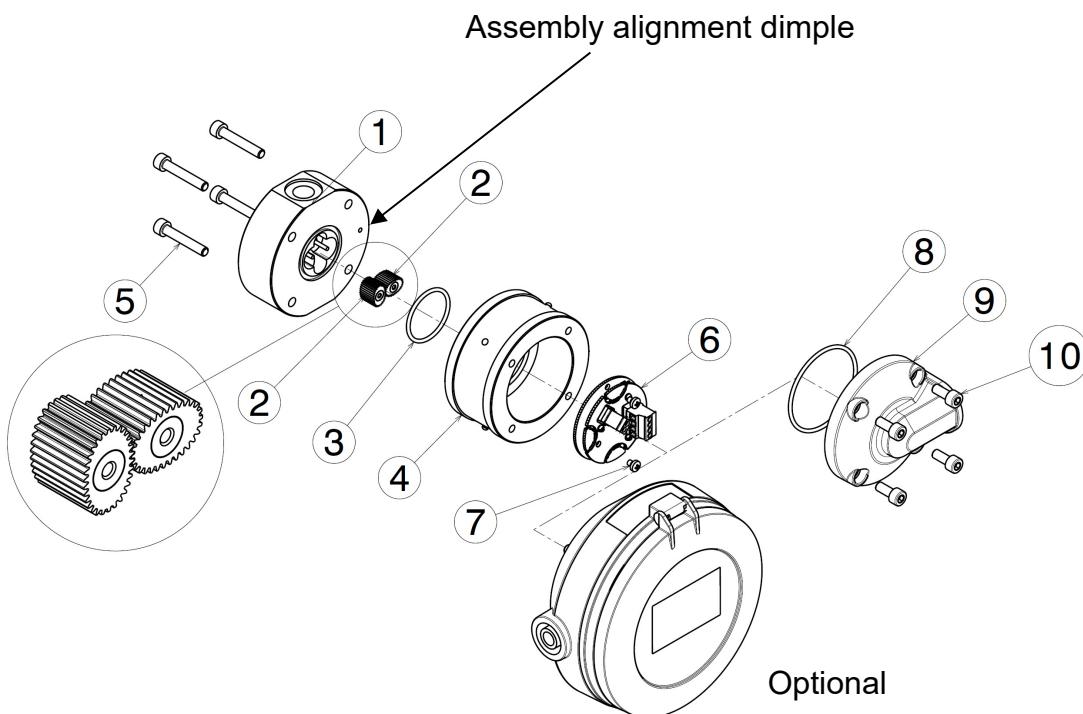
12.1.1 Pulse output board removal (refer exploded view diagram)

To remove the pulse output board, remove the 4 electronic cover screws (10), and remove the electronic cover (9). The pulse output board (6) can now be accessed and removed via the removal of the electronic board screws (7).

12.1.2 Oval gear removal for DON-H05...DON-H10 (refer exploded view diagram)

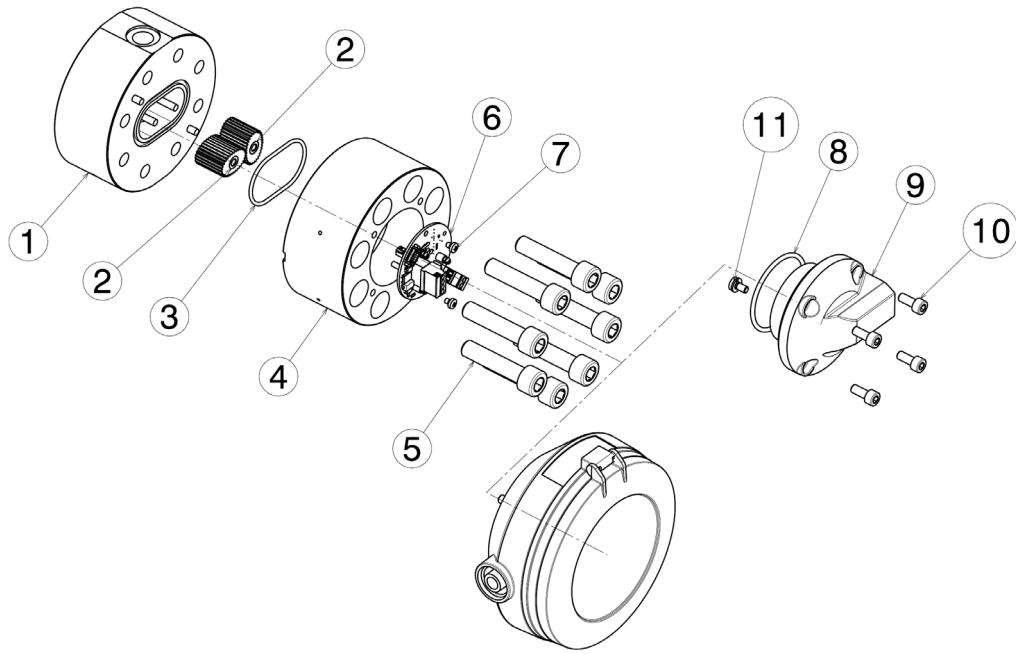
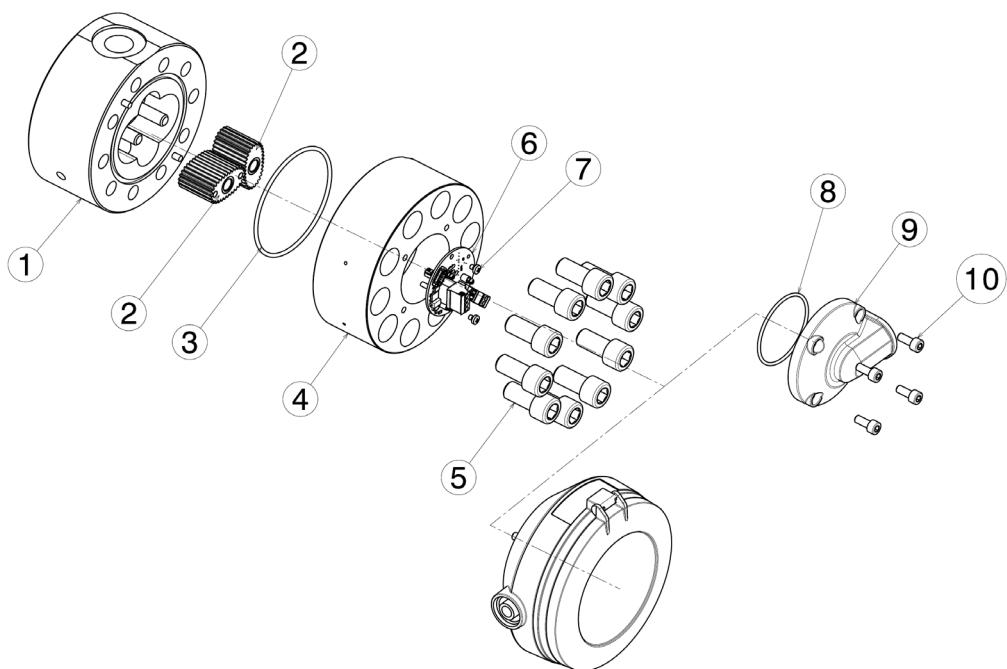
For access to the oval gears, remove the 4 lower meter body screws (5). With care, remove the upper meter body assembly (4) being careful not to damage or misplace the O-ring (3). You can then remove the oval gears (2).

For these small flowmeters (4 mm & 6 mm), when disassembling, please notice the dimples located on the meter bodies (1 & 4) face just outside the o-ring groove. The referencing dimples must be in alignment when reassembling. In addition, with these small flow meters, only one oval gear is equipped with magnets. The oval gear without magnet must be mounted on the axis that is closest to the dimple. With all other devices, both oval gears are equipped with magnets and can be mounted in arbitrary positions.



12.1.3 Removal of oval gears for DON-H15...H20 (refer exploded view)

For access to the oval gears, remove the 8 or 10 upper meter body screws (5). With care, remove the upper meter body assembly (4) being careful not to damage or misplace the O-ring (3). You can then remove the oval gears (2).

DON-H15...**DON-H20...**

Optional

12.2 Demounting of the electronics mounted on a DON with Zx and 1A...5A options

To access the device battery, terminal connections and pulse output board, the electronic cover with display must first be removed in case of flowmeters with built-in electronics. To do this, loosen the 4 screws of the display cover and carefully remove it without pulling out or damaging the connecting cable. During this procedure, be careful not to lose or damage the O ring. The terminal connection, device battery and pulse output board are now freely accessible. To remove the electronics, the screws used to connect the electronics housing to the oval gearbox housing should be loosened.

12.3 Spare Parts

Please consult your closest KOBOLD-Office
Internet: www.kobold.com or www.koboldusa.com

12.4 Inspection (refer Exploded View)

Inspection points will be the following:

O-rings – Inspect for physical or chemical damage or deformation.

Rotors – Inspect for physical damage due to unfiltered media or damage due to chemical attack. Also observe also the magnets, if exposed, for chemical attack.

Measuring Cavity – Inspect for physical damage (scoring) due to improperly filtered media or long-term wear and tear.

Axle Shafts – Inspect for physical damage and ensure that the shafts are not loose and do not rotate.

12.5 Re-assembly of DON-H

Before re-assembly, please be sure to thoroughly clean all parts.

Care must be taken when reinstalling the rotors such that the magnets should face the pulse output board. Their position can be found using another magnet or ferromagnetic objects.

12.5.1 Re-assembly of DON-H05...DON-H10

The small flowmeters DON-H05 to DON-H10 have dimples on both housing parts (1 and 4). The referencing dimples must be in alignment when reassembling. In addition, with these small flow meters, only one oval gear is equipped with magnets. The oval gear without magnet must be mounted on the axis that is closest to the dimple.

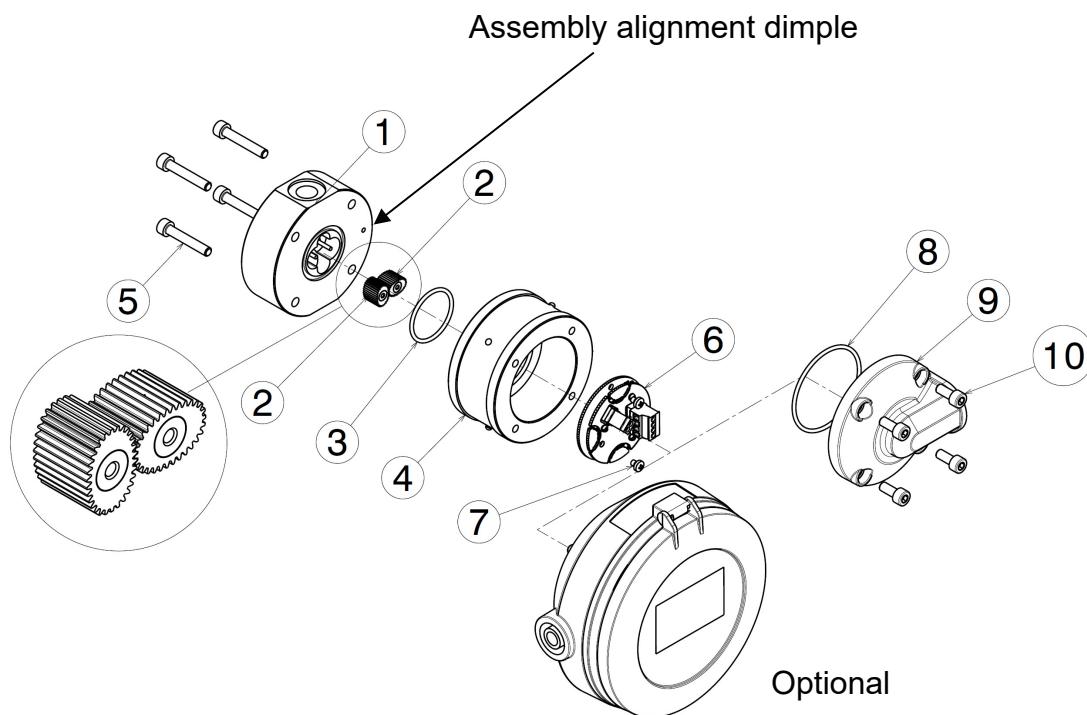
Both oval gears are correctly installed when they are at an angle of 90 ° to each other. The oval gears must be able to rotate freely. **Caution! With these sizes (DON-H05..DON-H10) the bores of the magnets are not visible in this installation situation.**

Check the correct fit and the friction between the axis and the bearings by slowly rotating the oval gears by hand.

Thereafter, the O-ring (3) is inserted into the groove of the measuring housing (1) and both parts (1 and 4) are reassembled. It must be ensured that the markings are in alignment with each other.

The screws (5) are inserted and tightened crosswise opposite one another. Tighten the screws with a torque of 3.5 Nm. The alternating tightening procedure is preferred for proper and even assembly.

If necessary, the pulse output board, the cover with the cable gland or the attached electronics are installed. Make sure that the O-ring (8) is seated correctly.



12.5.2 Re-assembly of DON-H15...DON-H20

Both oval gears are placed on the axle shafts with the magnets oriented towards the upper meter body (4). Verify that the axle shafts are not loose. Both oval gears are equipped with embedded magnets, allowing them to each be mounted on either axle.

Install the rotors exactly perpendicular from each other (90° in orientation). They will only work if installed precisely. Manually test full rotation after installation as the rotors will not completely rotate freely unless installed precisely 90° from each other.

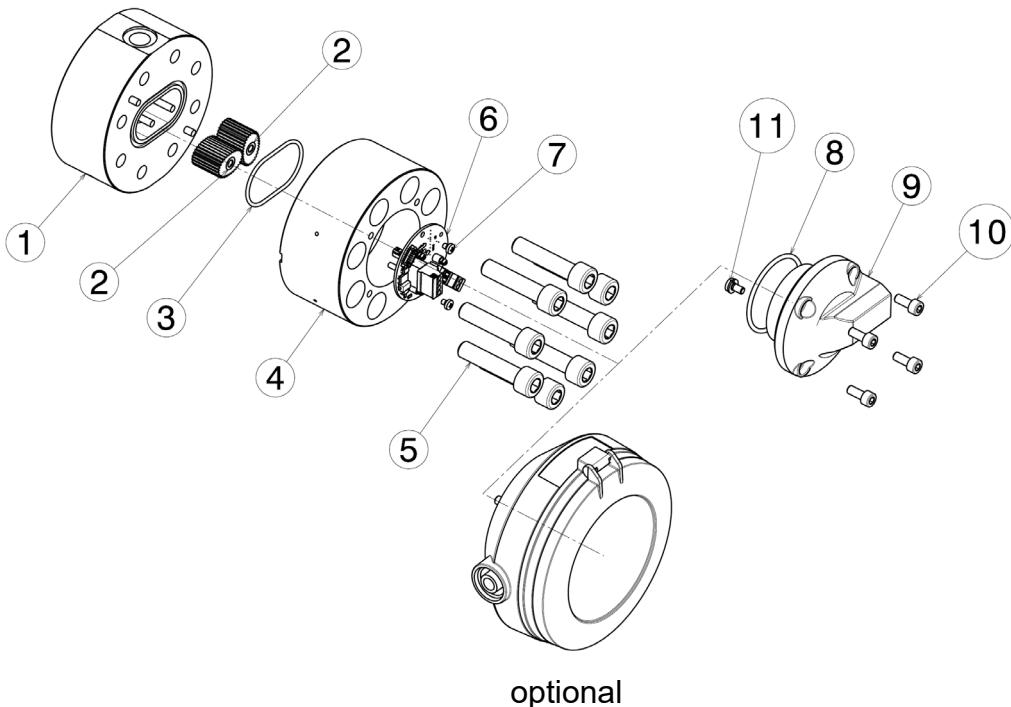
Proper placement of the O-ring within the groove is necessary for leak free operation. After placement, items (1 & 4) will then require assembly.

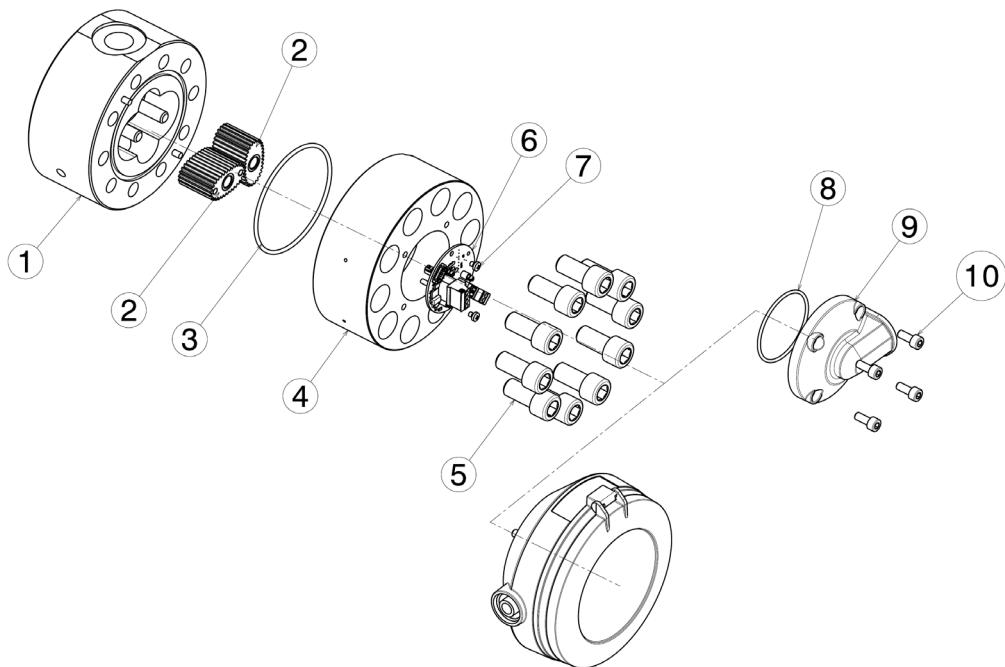
Tighten the upper meter body to the lower meter body (1 & 4) with the screws (5) in an alternating pattern (1, 3, 2, 4). Tighten to each to a torque of 3.5 Nm. The alternating tightening procedure is preferred for proper and even assembly.

Install the pulse detector board, the o-ring into the provided groove, and then install either the electronic cover (9) or optional electronic assembly.

Exploded view of DON-H15...DON-H20

DON-H15...



DON-H20...

Optional

Tightening torques of the screws used

Thread	Quality	Material	Tightening torques
M5	80	A4	6 Nm
M6	80	A4	10 Nm
M6	12.9	Steel	20 Nm
M10	70	A2	40 Nm

13. Technical Data

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

14. Pressure drop curves versus Viscosity

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

15. Order codes

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

16. Dimensions

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

17. Disposal

See "General Safety Instructions" - via the QR code on the device or via www.kobold.com

18. IO-Link function (only for DON-xxxxxxCTxx)

The specifications and parameters for the DON-xxxxxxCTxx devices with IO-Link function are available on the website

<https://ioddfinder.io-link.com>

available. The necessary information is available here

- Process data structure
- Diagnostic functions
- IO-Link commands
- ISDU parameters

The following table provides links to the different versions

Firmware identifier	Device-ID [hex]	Device-ID [dec]	Link
Ab V02.11_R240308	0x050000	327680	https://ioddfinder.io-link.com/productvariants/search/45892

Parameters that relate to the measured values of flow, temperature or volume must be entered in the basic units and, if necessary, converted beforehand. The basic units are:

Flow: **L/min**

Temperature: **°C**

Volume: **Liter**

Unit conversion table

Category: Flow		
Unit	Description	Conversion
L/m	Liter per minute (basic unit)	-
L/h	Liter per hour	1 L/h = 0,0167 L/m
mL/m	Milliliter per minute	1 mL/m = 0,001 L/m
m ³ /h	cubic meters per hour	1 m ³ /h = 16,667 L/m
gal/m	US gallons per minute	1 gal/m = 3.7854 L/m
gal/h	US gallons per hour	1 gal/h = 0,06309 L/m
galk/m	UK gallons per minute	1 galk/m = 4,54609 L/m
galk/h	UK gallons per hour	1 galk/h = 0,07577 L/m
L/s	Liter per second	1 L/s = 60 L/m
mL/s	Milliliter per second	1 mL/s = 0,0000167 L/m
USER	User unit	1 User unit = USER * L/m

Category: Temperature		
Unit	Description	Conversion
°C	degree Celsius (basic unit)	-
°F	degree Fahrenheit	$x \text{ } ^\circ\text{C} = (32 + x * 1,8) \text{ } ^\circ\text{F}$
USER	User unit	1 user unit = USER * °C

Category: Volume		
Unit	Description	Conversion
L	Liter (basic unit)	-
mL	Milliliter	1 mL = 0,001 L
m ³	cubic meter	1 m ³ = 1000 L
galUS	US Gallon	1 galUS = 3.7854 L
galUK	UK Gallon	1 galk = 4,54609 L
barrel	Barrel (US)	1 barrel = 158,99 L
USER	User unit	1 user unit = USER * L

 Note	If a measured value is invalid due to an error status (NAN), the corresponding process value is output with the value "0". In this case, the device status and the events must also be taken into account.
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19. Troubleshooting

Oval gear flowmeters have two clearly distinct portions: one of which is mechanical, wetted areas with the oval gears surrounded by a housing, and the other is the electrical area, which includes the pulse output board.

Details of some key troubleshooting steps will now be provided. Please also refer to the instructions on troubleshooting errors contained on the following page.

Step 1 - Check application, installation and set-up.

Carefully read the section on mechanical installation to ensure full knowledge of all relevant installation and application factors which may affect the operation of the counter. These include pulsation, trapped air or selecting the wrong counter, including incorrect flow rate, temperature or pressure, or material incompatibility. Refer to the section on electrical installation to ensure correct cabling.

Step 2 - Check for blockages.

For new and modified systems in particular, the most frequent cause of error or sub-optimal counter operation is internal system or counter blockages due to foreign particles, such as beads of condensate, sealing tape residues or mixtures of deposits, rust, etc.

Step 3 - Guarantee flow rate.

Flow stopping or a flow rate declining below the usual limit may be attributable to a blocked screen, flowmeter rotors which are stuck or damaged, a defective pump, closed valves or an insufficient liquid level in the storage tank.

Step 4 - The oval gears in the counter must revolve.

This rotation is audible: try holding a screwdriver blade against the counter housing and push the handle right against your earlobe. Test the counter as required with flow switched on and off, to ensure you are familiar with the audible sound of rotation.

Step 5 - Ensure that pulses are generated when liquids flow.

Here, a multimeter is often not fast enough to capture the pulse sequence of the reed switch or the Hall Effect sensor. However, an oscilloscope will allow you to observe the output pulse sequence. When testing the reed switch pulse, a pull-up resistor must be installed between the single connection of the reed switch and the supply voltage, while the other connection must be connected to the reference potential of the measurement device (oscilloscope) (see electrical installation).

Step 6 - Confirm device operation.

If a mounted electronic component is connected to the DON, check the functions by simulating a pulse input. A reed switch pulse input can be simulated by a swift and pulse-driven short-circuiting of the input terminals.

Problem	Possible cause	Solution
Counter values too high	1. Disruption of the output signal	1. Ground shielding of the signal cable 2. Re-lay the cable away from sources of high current
	2. Air or gas pockets	1. Eliminate the source of the air or gas pocket 2. Install an upstream air separator
	3. Pulsating flow from the piston pump	1. Increase back-pressure to the pump 2. Install a quick-response one-way check valve 3. Install a pulsation damper between the pump and the counter 4. Recalibrate the counter on site, to compensate for pulsations 5. Replace the pump type for a pump allowing smooth supply
Counter values are too low	1. Damaged or worn rotors	1. Check, repair, clear or replace rotors
	2. Damaged or worn measurement chamber	1. Check measurement chamber for damage - repair as required
		2. Check concentricity of the rotor shafts in the chamber
	3. Disruption of the output signal	1. Ground shielding of the signal cable 2. Re-lay the cable away from sources of high current
		3. Check all electrical connections and wires for the presence of current.
No output from counter	1. Soiled rotors	1. Check whether the rounded teeth at the base of the chamber are visible 2. Check for any obstructing foreign particles 3. Clear, repair or replace rotors
	2. Counter incorrectly mounted	1. See instructions for re-mounting the counter, focusing on the positioning of rotors and magnets above all
		1. Check screw terminal connections and soldering joints
No flow signals indicated on the analytical device	3. No output from the output board	2. Ensure the presence of DC voltage at +Vs and 0V/GND and that the analytical electronics connected include a pull-up resistor when using the reed switch
		3. Replace output plate
	1. Defective analytical electronics	1. Check settings and parameter data in the set-up menu
		2. Check screw terminal connections and the presence of electrical current
		3. Repair/replace analytical electronics

20. Use in Ex areas

20.1 General information

The flow meter is intended for commercial systems and may only be used in accordance with the information in the technical documentation from Kobold and the information on the nameplate. It is operated exclusively together with certified products via an intrinsically safe circuit. They correspond to the applicable standards and regulations. The installation regulations (e.g. EN 60079-14) for systems in potentially explosive areas must be considered.

20.1.1 General safety information

The flow meter corresponds to the state of the art and is operationally safe. The flow meter can bear a residual risk if it is used and operated improperly by untrained personnel. Every person who is entrusted with the installation, commissioning, maintenance or repair of the flow meter must have read and understood the assembly instructions and in particular the safety instructions.

- a) When selecting a product and using it as intended, follow the general rules of technology.
- b) All connected electrical and mechanical equipment must be suitable for the respective application.
- c) Observe the information in these operating instructions as well as the conditions of use and permissible data that appear on the imprints / nameplates of the respective products.
- d) It must be ensured that only the product types of protection that correspond to the zones are installed!
- e) The product is only approved for appropriate and intended use in a normal industrial atmosphere. Immersion in liquids is not permitted.
- f) It must be ensured that no falling objects can hit the product. If there is a risk of impact sparks, external housing parts made of light metal must be installed in a protected manner.
- g) The operator must ensure lightning protection for the entire system in accordance with local regulations.
- h) It is the responsibility of the installer to ensure that the flow meter functions properly in connection with the individual evaluation devices and that it is approved for the intended purpose.
- i) A safe to operate and non-critical medium is elementary for this type of protection and must be strictly adhered to!

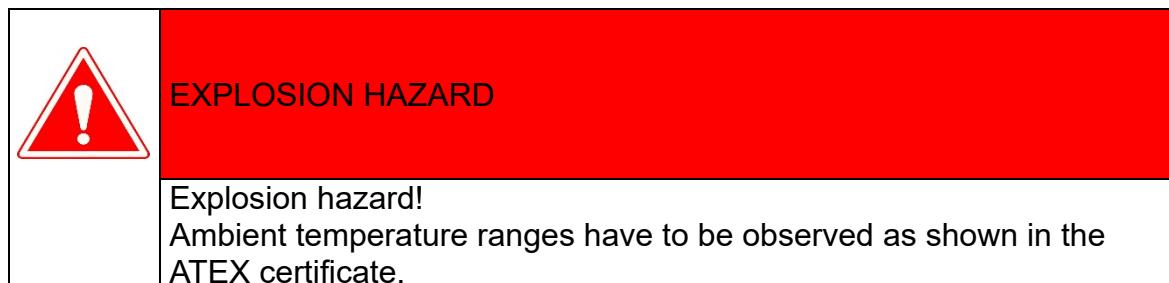
20.1.2 Intended use

- a) To ensure safe operation, the products may only be used in accordance with the information in the assembly instructions. When using the device, the legal and safety regulations required for the respective application must also be considered. This also applies analogously to the use of accessories.

- b) If the instructions given here are not followed or if the product is handled improperly, our liability is void. In addition, the warranty on products and spare parts does not apply.
- c) The products are not safety elements in the sense of their intended use.
- d) Only original parts from the manufacturer may be used.
- e) Flammable media within the flow meter must not be heated in Zone 1 above 80% of their ignition temperature without taking special measures
- f) Charging of the medium is not permitted; measures by the operator are necessary.

20.1.3 Equipment grouping, Temperature classes, ambient and medium temperature ranges

Equipment grouping	Medium temperature range (of passing through liquids)	Ambient temperature range (of equipment's installation)
IIC T6 Gb	-20°C up to +70°C	-20°C ≤ T _a ≤ +70°C
IIC T4 Gb	-20°C up to +120°C	-20°C ≤ T _a ≤ +80°C
I Mb	-20°C up to +140°C	-20°C ≤ T _a ≤ +80°C



20.1.4 Servicing, maintenance

Definition of terms according to IEC 60079-17:

Maintenance and repair: A combination of all activities carried out in order to keep an object in a condition or to bring it back into a condition that meets the requirements of the relevant specification and ensures the execution of the required functions.

Inspection: An activity that involves the careful examination of an object with the aim of making a reliable statement about the condition of this object, without dismantling or, if necessary, with partial dismantling, supplemented by measures e.g. measurements is carried out.

Visual inspection: A visual inspection is an inspection in which visible defects are found (e.g. missing screws) without the use of devices or tools.

Close-up inspection: An inspection that, in addition to the aspects of the visual inspection, identifies defects such as loose screws that can only be removed through the use of access devices (e.g. if necessary stairs) and tools. For close-up tests, a housing usually does not need to be opened or the equipment needs to be de-energized.

Detailed inspection: An inspection in which, in addition to the aspects of close-up inspection, defects such as loose connections, which can only be identified by opening housings and / or, if necessary, using tools and testing equipment, are treated.

- a) Maintenance measures may only be carried out by qualified persons.
- b) Only accessories that meet all the requirements of the European directives and national legislation may be used in potentially explosive areas.
- c) Maintenance measures including dismantling the flow meter may only be carried out in a non-explosive atmosphere.
- d) Components may only be replaced with original spare parts that are also approved for use in Ex areas. Repairs only by the manufacturer or specialist workshop.
- e) The products must be regularly serviced and cleaned in the Ex area. The intervals are determined by the operator in accordance with the environmental stresses on site.

	Activity	Visual inspection per month	Close-up inspection every 6 months	Detailed inspection every 12 months
1	Visual inspection of the flow meter for damage and remove dust deposits	•		
2	Check for integrity and function			•
3	Examination of the entire system	In the operator's area of responsibility		

20.1.5 Troubleshooting

No changes may be made to products that are operated in connection with potentially explosive areas. Repairs to the product may only be carried out by specially trained and authorized specialists.

20.1.6 Disposal

The packaging and used parts must be disposed of in accordance with the regulations of the country in which the product is installed.

20.2 ATEX version Exi (electronics options xA)

While evaluating the product, following Norms were considered:

- a) EN IEC 60079-0: 2018 Ed. 7 Hazardous areas - Part 0: Equipment - General requirements
- b) IEC 60079-11: 2011 Ed. 6 + Corr. 2012 / EN 60079-11: 2012 Hazardous areas - Part 11: Equipment protection by intrinsic safety "i"
- c) EN ISO 80079-36 2016 Explosive atmospheres - Part 36: Non-electrical devices for use in explosive atmospheres - Basics and requirements.

- d) EN ISO 80079-37 2016 Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"

20.2.1 General information on explosion protection

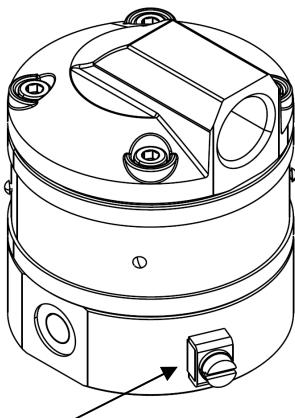
The electrical connection is made via a plug in a separate inductively coupled electronics compartment - exclusively in intrinsically safe systems. The electronics option HA is combined with the electronics models ZOK-E * M (compact version) or ZOK-E * K (remote electronics) in accordance with LOM 16 ATEX 2062 to form the electronics options 1A, 2A, 3A and 5A.

Permitted use

The intrinsically safe flow meter can be used as follows:

- In Zone 2 (Gas-Ex, Category 3G, EPL Gc) in explosion groups IIA, IIB and IIC.
- The requirements for simple electrical equipment in intrinsically safe circuits in Zone 1 according to EN 60079-11 are met for various versions.
- The qualification with regard to the surface temperature is T4 / T3; for all gases, vapours and fog with an ignition temperature $\geq 135^{\circ}\text{C}$ / $\geq 200^{\circ}\text{C}$, the products are not an ignition source.
- The permissible ambient temperature range is from $-20^{\circ}\text{C} \leq \text{Ta} \leq 80^{\circ}\text{C}$.

In accordance with the installation regulations, housing must be grounded using the earthing clamps. The maximum connection cross-section is 4 mm^2 .



External earthing clamp

20.2.2 Electrical parameters of the electronic option HA when used in Zone 1/2

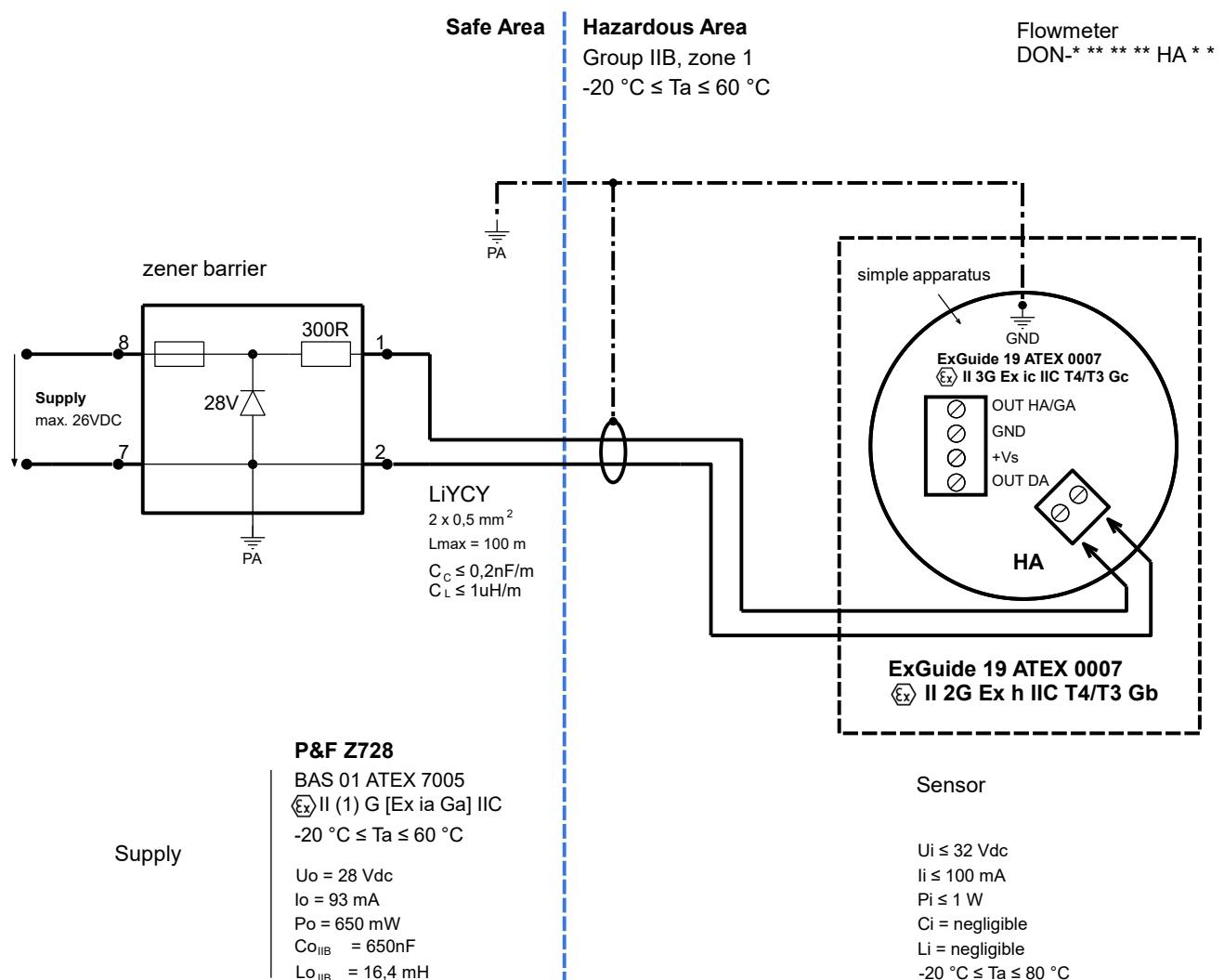
Electrical data:

- $P_i \leq 1 \text{ W}$ @ max. 80°C ambient temperature

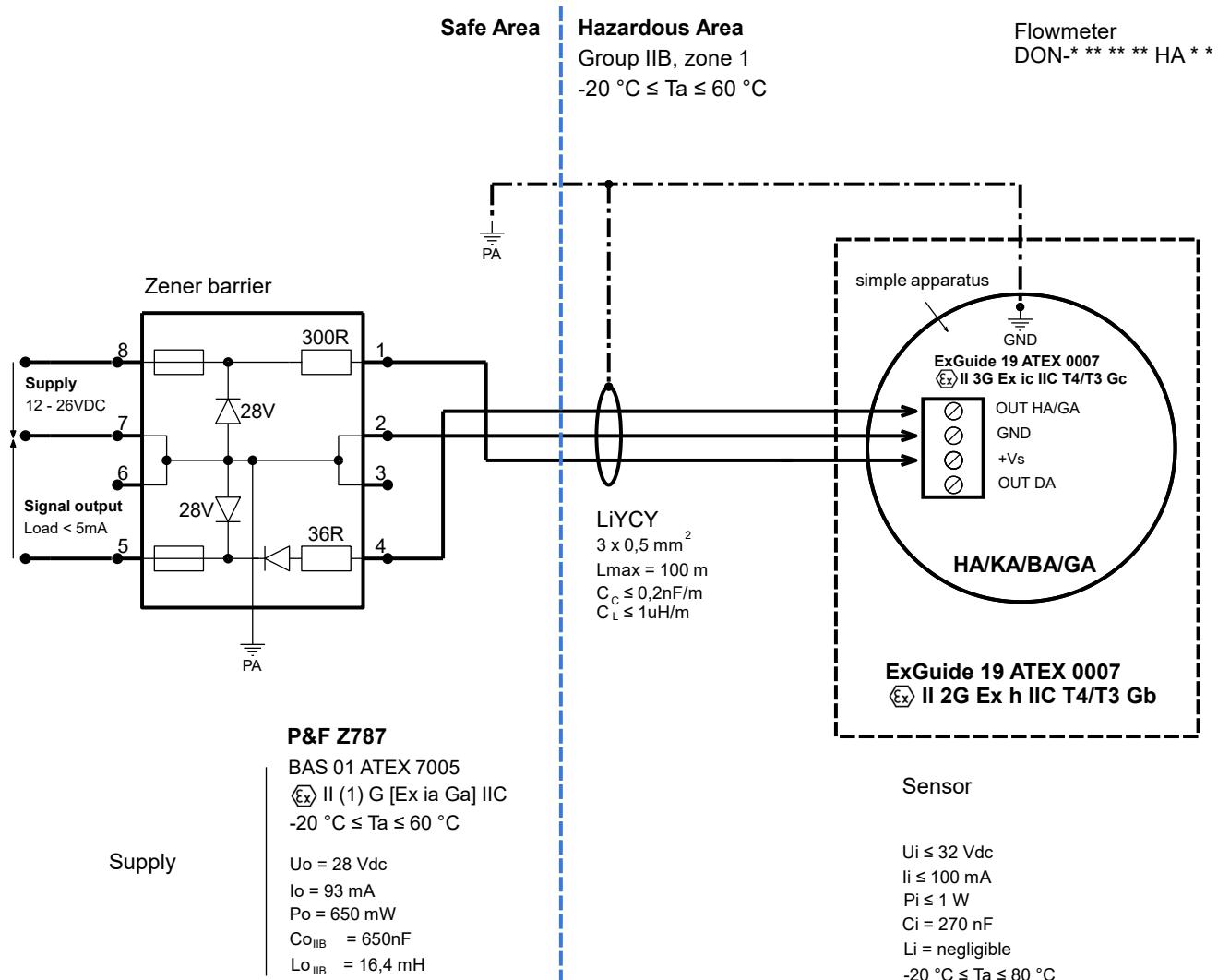
Electronics option	Use in zone	U_i	I_i	C_i
Hall sensor HA	1	$U_{IIB} \leq 32 \text{ VDC}$	$\leq 100 \text{ mA}$	270 nF
	2			
Reed switch HA	1	$U_{IIB} \leq 32 \text{ VDC}$	$\leq 100 \text{ mA}$	10 nF
	2			

20.2.3 Wiring examples for electronics option HA with Zener barriers

Control Drawing for DON-***HA - Oval Gear Flowmeter with pulse output (Reedswitch, usage with zener barrier) for Group IIB zone 1



Control Drawing for DON-*HA - Oval Gear Flowmeter with pulse output
(Hallsensor, usage with zener barrier) for group IIB zone 1**



20.2.4 Electronics options 1A to 5A when used in Zone 1/2

With the electronics option 1A to 5A, the electronics option HA in connection with a flow meter / doser / controller of the type ZOK-E * K * F3 or ZOK-E * M * F3 ** according to LOM 16 ATEX 2062 X is a simple electrical equipment used and supplied electrically by this equipment only.

Interconnection examples for options 1A to 5A can be found in the instruction manual supplement ZOK-Ex-supplement.

20.2.5 Commissioning, installation

Depending on the IP degree of protection, the time for cleaning the equipment (dust deposits) must be specified. Other important facts:

- a) The product may only be put into operation in Zone 2 (Cat. 3G, EPL Gc) or in Zone 1 (Cat. 2G, EPL Gb) in intrinsically safe circuits by specialists with a qualification similar to a qualified person in accordance with TRBS 1203.
- b) The requirements for simple electrical equipment, which apply to the potentially explosive area of zone 1 according to EN 60079-11, are met.
- c) The products may only be used in a normal industrial atmosphere. If aggressive substances are present in the air, the manufacturer should always be consulted. The products must be appropriately protected in adverse environmental conditions.
- d) The operation of the product is only permitted in the completely assembled and undamaged housing. In the event of possible damage, the operator may have to consider the spread of zones. In addition, operation is not permitted if the housing is damaged.
- e) The environmental conditions specified in the operating instructions must be strictly followed. Appropriate protection against adverse environmental conditions needs to be realised.
- f) The flow meter may only be operated when it is completely filled. Exceptions according to the operator's risk assessment are only permitted for start-up and shutdown.
- g) Thermal radiation from third-party products / components must be taken into account.
- h) The flow meter must be protected against inadmissible ingress of liquids and / or contamination.
- i) Stuck parts (e.g. due to frost or corrosion) must not be loosened with force in the presence of an explosive atmosphere. Icing must therefore be avoided.
- j) The flow meter may only be exposed to low vibrations, see also IEC 34-14.
- k) A direct electrostatic discharge of high energy onto the equipment is not permitted (usually cannot be generated by human contact). To ensure that electrostatic charges are discharged, the national requirements must be taken into account.
- l) In particular, isolated established capacities must be prevented.
- m) All construction parts must be connected to one another in metal, central connection for equipotential bonding.
- n) Equalizing currents must not be routed through the metallic structures.
- o) The intrinsically safe connection must be made using approved / tested evaluation devices that may have to be equipped with suitable Zener barriers or switching amplifiers.
- p) Only Zener barriers or switching amplifiers whose output circuits are approved / tested for use in an explosive atmosphere may be used. In Europe, use in Zone 1 requires an EC type-examination certificate for the equipment in question, which is issued by a body designated for explosion protection.
- q) The voltage of the supply devices must be less than or equal to the voltage U_i of the flow meter.
- r) The total current I_o of the supply devices must be less than or equal to the current I_i of the flow meter.

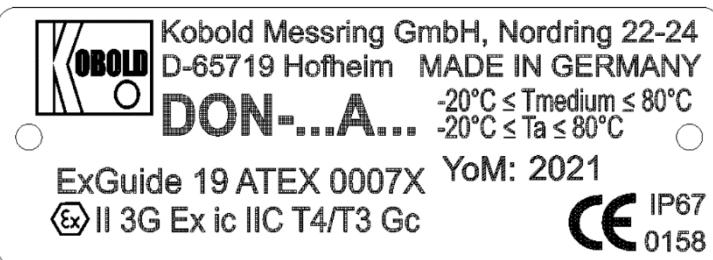
- s) The ignition limit curves from EN 60079-11 must be taken into account in Zone 2 without a safety factor and must be observed during installation. The safety factor 1.5 is to be used in zone 1. A control drawing (system description) to be created by the installer / operator is required for the installation of the intrinsically safe circuit.
- t) Equipotential bonding must be established along the intrinsically safe circuit. The certificates, including the special conditions specified therein, must be taken into account.
- u) Within the potentially explosive area, assembly may only be carried out in accordance with the locally applicable installation regulations. The following conditions must be observed (incomplete):
 - a) Installation and maintenance may only be carried out in an explosion-free atmosphere and in compliance with the regulations applicable in the operator's country.
 - b) Additional precautions must be taken if the presence of hydrogen sulfide, ethylene oxide and / or carbon monoxide is to be expected: These substances have a very low ignition energy!
 - c) If these substances are present and if a substance of explosion group IIC is present and an explosive atmosphere is likely to be present, only non-sparking tools may be used!
 - d) The flow meters must not be used in systems with cathodic corrosion protection; in borderline cases, consult the manufacturer.
 - e) Particular care must be taken to ensure that no stray currents (e.g. generated by motors that are operated on frequency converters, welding systems and / or cathodic corrosion protection systems) are fed through the flow meter.

20.2.6 Identification of the flow meter (nameplate)

Basic device label DON-H (example)



Device label for Ex version intrinsically safe, option HA (example)



20.3 ATEX Exd version (electronic options BE/HE/DE/GE/KE/LE)

20.3.1 General information

Products which were ordered with the optional encapsulated pressure-proof connector housing (Ex d) are marked with an ATEX label (see figure). The label includes details relating to explosion group and temperature class. Before installing and operating the device, the label should be checked to ensure it contains all the required details.

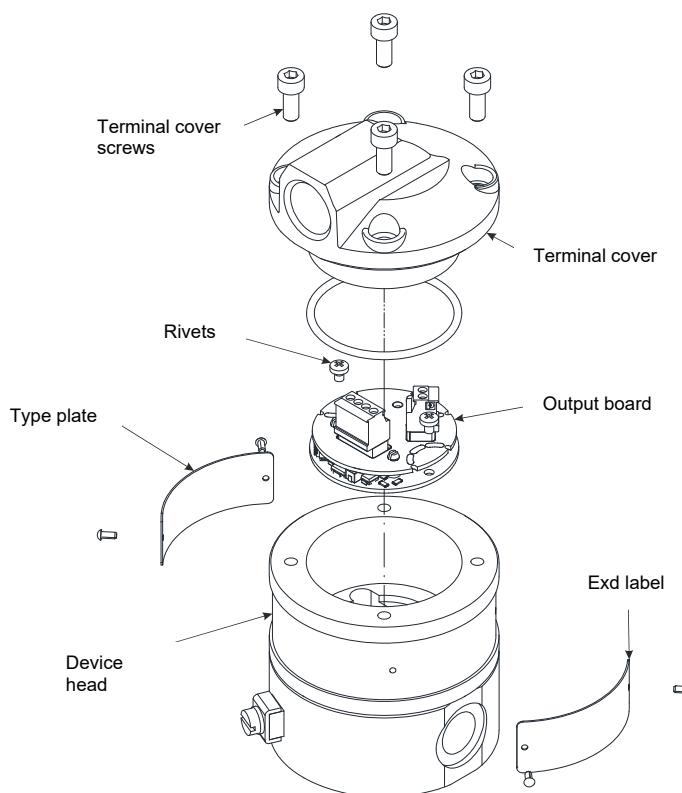
The relevant explosion groups and temperature classes are as follows:

Ex I: Devices for use in mining with mine gas accumulation. Mine gas refers to the methane gas naturally generated from coal and coal seams in the coal mining industry. **Only stainless-steel devices** are suitable for use in explosion group I (in accordance with IEC 60079-0, section 8.2). Aluminium devices are not permitted for explosion group I. If the flowmeter includes the label for group I, the surface temperature of the process fluid must not exceed +140 °C.

Ex IIC T6...T4: Devices for use in areas with potentially explosive atmospheres outside the mining field, but with mine gas accumulation. Either aluminium or stainless-steel devices may be used in explosion group IIC. For T4 temperature class applications, the surface temperature of the process fluid must not exceed 120 °C, and for T6 temperature class applications, the surface temperature of the process fluid must not exceed 70 °C.

Operating instructions:

The terminal cover of the Ex-d device may only be opened when the presence of an explosive atmosphere can be excluded.



The maximum permissible annular gap between the terminal cover and the measuring device must not exceed 0.15 mm. If the annular gap exceeds 0.15 mm due to corrosion or wear and tear, the worn-out parts must be replaced.

The product does not meet the requirements of the Ex d protection class unless the terminal cover is completely snapped into place and screwed down. No other screw sizes or lengths may be used than the ones of the original screws.

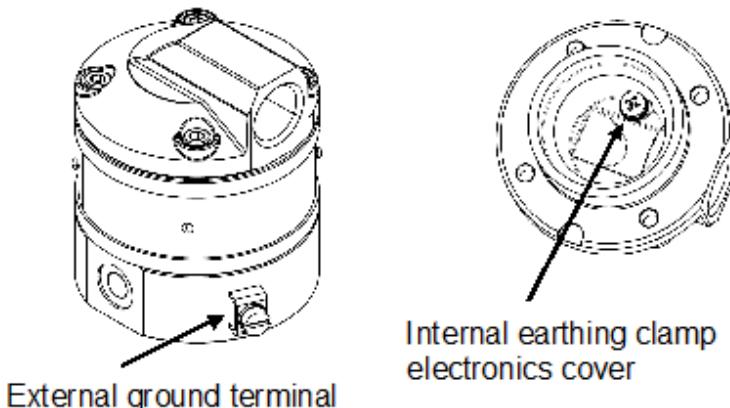


EXPLOSION HAZARD

Explosion hazard!
Contact the manufacturer for information on the dimensions of the flameproof joints. Repairs on flameproof joints may only be carried out by the manufacturer. The screws used to assemble the cover to the Ex d-housing shall be class A2-70 or better.

20.3.2 Electrical connection

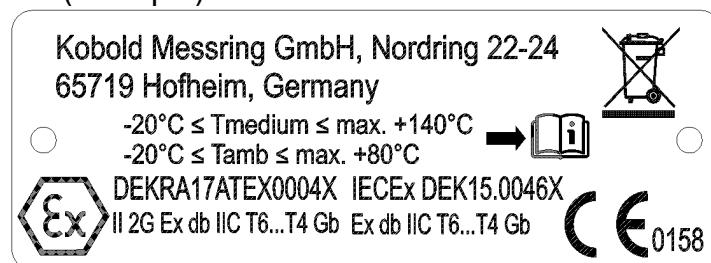
In accordance with the installation regulations, both the housing and the electronics cover must be grounded using the attached grounding clamps. The maximum connection cross-section is 4 mm².



The installer must ensure that the maximum supply voltage of 28 Vdc and the maximum current of 100 mA are not exceeded. This must be ensured by means of suitable external safety elements.

20.3.3 Identification of the flow meter (nameplate)

Device label for explosion-proof version, group 2 options HE / GE / DE / KE / BE / LE/ RE (example)



Device label for explosion-proof version, group 1/2 options HE / GE / DE / KE / BE / LE/ RE (example)



21. IO-Link manufacturer's declaration (only for DON-xxxxxxCTxx)

For IO-Link Device ID no. 327680:

<https://ioddfinder.io-link.com/productvariants/search/45892>

22. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, declare under our sole responsibility that the product:

Oval Gear Flow Meter Model: DON-H...

to which this declaration relates is in conformity with the following EU directives stated below:

2014/68/EU

PED

- Category II Diagram 8, pipes, group 1 dangerous fluids

2011/65/EU

RoHS

2015/863/EU

Delegated Directive (RoHS III)

Additionally, the options **Hx/Zx/Ex** are in accordance with:

2014/30/EU

EMC Directive

All oval gear flow meters type DON comply with the following standard:

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

AD 2000 Phamplets

Additionally, the options Hx/Zx/Ex are in accordance with:

EN IEC 61326-1:2021 Electrical equipment for measurement, control and laboratory use - EMC requirements – Part 1: General requirements

Hofheim, 27 March 2025



H. Volz
General Manager

J. Burke
Compliance Manager

23. EU declaration of conformity (ATEX)

We, Kobold Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, hereby declare under our sole responsibility and with the aim of traceability that the product

Product type: **Oval Gear Flow Meter** Model: DON-H....E..

EU type examination certificate: **DEKRA 17ATEX0004 X**

Statement of Conformity: **ExGuide 19 ATEX 0007X**

Complies with all relevant requirements of the following directive(s):

2014/34/EU Equipment and Protective systems intended for use in potentially Explosive Atmospheres

The following harmonized standards were applied for conformity assessment:

For EU-Type Examination: **DEKRA 17ATEX0004 X**

EN IEC 60079-0: 2018 Explosive atmospheres - Part 0:
Equipment – General requirements

EN 60079-1:2014 **Explosive atmospheres - Part 1:**
Equipment protection by flameproof enclosures 'd'

For Statement of Conformity: **ExGuide 19 ATEX 0007X**

EN IEC 60079-0: 2018 Explosive atmospheres - Part 0:
Equipment – General requirements

EN 60079-11: 2012 Explosive atmospheres - Part 11:
Equipment protection by intrinsic safety "i"

EN 80079-36:2016 Explosive atmospheres - Part 36:
Non-electrical equipment for explosive atmospheres - Basic method and requirements

EN 80079-37:2016 Explosive atmospheres - Part 37:

Non-electrical equipment for explosive atmospheres - non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"

It also complies with the following European and national standards and technical regulations:

- Technical rules for hazardous substances (TRGS) 727: 2016, avoidance of ignition hazards due to electrostatic charges

The above-mentioned product complies with Directive 2014/34/EU. New editions may have already replaced one or more of the standards mentioned in the EU type examination certificates. Kobold Messring declares that the product mentioned in this declaration of conformity either meets the requirements of the new editions or is not affected by the changes.

The notified body DEKRA Testing and Certification GmbH, identification number: 0158, was activated, in accordance with Article 17 of Directive 2014/34/EU, to monitor quality assurance related to the production process.

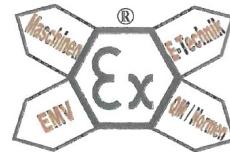
Certificate: BVS 24 ATEX ZQS/E110



Hofheim, 27 March 2025

H. Volz J. Burke
General Manager Compliance Manager

24. Statement of Conformity



(1)

Konformitätsaussage

(2)

- Richtlinie 2014/34/EU -
Geräte zur bestimmungsgemäßen Verwen-
dung in explosionsgefährdeten Bereichen

Statement of Conformity

- Directive 2014/34/EU -
*Equipment Intended for Use in
Potentially Explosive Atmospheres*

(3) Nummer:
Document-ID:

ExGuide 19 ATEX 0007X

(4) Geräte:
Equipment:

Ovalzahnrad-Durchflussmesser / Oval Gear Flow Meter
Type DON-*****

(5) Hersteller:
Manufacturer:

KOBOLD Messring GmbH

(6) Anschrift:
Address:

Nordring 22-24, DE 65719 Hofheim

(7) Die Bauart dieses Produktes, sowie die verschiede-
nen zulässigen Ausführungen, sind in der Anlage zu
dieser Konformitätsaussage festgelegt.

*This product and any acceptable variation thereto is
specified in the enclosure to this Statement of Con-
formity.*

(8) ExGuide Technology - Günter Kämper VDI beschei-
nigt, dass dieses Produkt die grundlegenden Sicher-
heits- und Gesundheitsanforderungen für die Kon-
zeption von Produkten der Kategorie 2 zur bestim-
mungsgemäßen Verwendung in explosionsgefährde-
ten Bereichen gemäß Anhang II der Richtlinie erfüllt.
Das ISO 9001 - System des Unternehmens ExGuide
Technology - Günter Kämper VDI wird von der GZQ
unter der Registrierung Q7180217 überwacht. Die
Ergebnisse der sicherheitlichen Betrachtung sind im
vertraulichen Dokument D068190802 hinterlegt.

*ExGuide Technology - Günter Kämper VDI certifies
that this product has been found to comply with the
Essential Safety and Health Requirements relating
to the design and construction of product of Cate-
gory 2 intended for use in potentially explosive at-
mospheres given in Annex II of the Directive.*

*The ISO 9001 system of ExGuide Technology –
Günter Kämper VDI is supervised by GZQ under the
registration number Q7180217.*

*The examination and test results are recorded in
the confidential report number D068190802.*

Seite / page 1 von / of 5 zu / to ExGuide19 ATEX 0007X

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- (9) Die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen wird durch Übereinstimmung mit den folgenden Normen bestätigt:

- EN IEC 60079-0:2018
- EN 60079-11:2012
- EN ISO 80079-36 2016
- EN ISO 80079-37 2016
- TRBS 727:2016

- (10) Falls das Zeichen "X" hinter der Nummer (3) steht, wird in der Anlage zur dieser Konformitätsaussage auf besondere Bedingungen für die sichere Anwendung des Produktes hingewiesen.

- (11) Diese Konformitätsaussage bezieht sich nur auf die Konzeption und den Bau des festgelegten Produktes. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen.

- (12) Die Kennzeichnung des Produktes soll die folgenden Angaben enthalten:

Compliance with the Essential Safety and Health Requirements has been assured by compliance with the following standards:

If the sign "X" is placed after the Document-ID (3), it indicates that the product is subject to special conditions for safe use specified in the enclosure of this Statement of Conformity.

This Statement of Conformity relates only to the design and construction of the specified product. If applicable, further requirements of this Directive apply to the manufacturing and supply of this product.

The marking of the product shall include the following:

Ex II 3G Ex ic IIC T4/T3 Gc
Ex II 2G Ex h IIC T4/T3 Gb

-20 °C ≤ Ta ≤ 80 °C

ExGuide Technology - Günter Kämper VDI
Ing.-Büro für Explosionsschutz
Birkenstraße 10
DE 44579 Castrop-Rauxel

Castrop-Rauxel, den 12. Februar 2020

Telefon: +49 2305 357130
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E-Mail: info@exguide.org
URL: www.exguide.org

KA68190802 DON 19 ATEX 0007X.odt



Anlagen / Enclosure

Diese Konformitätsaussage ist ohne Unterschrift ungültig! Im Original sind Teile in roter Schrift dargestellt (Zeile 1, 3, 14 und Logo).

This statement of conformity is not valid without signature! In the original, parts are printed in red (line 1, 3, 14 and logo).

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(13) Anlage zur

Enclosure to

(14)

Konformitätsaussage***Statement of Conformity*****ExGuide 19 ATEX 0007X**

(15) Beschreibung des Produktes

Description of product

(15a) Der Ovalzahnrad-Durchflussmesser ist ein Messgerät nach dem Verdrängerprinzip zur kontinuierlichen Durchflusssmessung und -zählung von reinen Partikel-freien Flüssigkeiten.

The oval gear flow meter is a measuring instrument based on the displacement principle and used for continuous flow measurement and counting of pure particle-free liquids.

Er besteht aus einem mechanischen Teil zur Wandlung des Durchflusses in eine Drehbewegung und einer elektronischen Einrichtung zur Erfassung der Drehzahlimpulse.

It consists of a mechanical part for converting the flow into a rotary motion and an electronic device for recording the speed pulses.

Die Drehbewegung wird induktiv in einen Elektronikraum übertragen, der elektrische Anschluss erfolgt über einen Stecker – nur für eigensichere Anlagen.

The rotary motion is inductively transmitted to an electronics compartment, the electrical connection is made via a plug – only to be used in intrinsically safe systems.

Die Geräte nach (15e) und (15f) können mit einem Durchflusszähler / -Dosierer / -Controller des Typs ZOK-E*K*F3 oder ZOK-E*M*F3** gem. LOM 16 ATEX 2062 X kombiniert werden.

*The devices according to (15e) and (15f) can be combined with a flow meter / controller type ZOK-E*K*F3 or ZOK-E*M*F3** according to LOM 16 ATEX 2062 X.*

(15b) Das Produkt kann folgendermaßen, je nach Kennzeichnung, eingesetzt werden:

The product can be used as follows – in accordance with the marking:

- a) In der Zone 2 (Gas-Ex, Kategorie 3G, EPL Gc) in den Explosionsgruppen IIA, IIB und IIC.
- b) In der Zone 1 (Gas-Ex, Kategorie 2G, EPL Gb) in den Explosionsgruppen IIA, IIB und IIC.

a) In Zone 2 (Gas, Category 3G, EPL Gc) in the explosion groups IIA, IIB and IIC.

b) In Zone 1 (Gas, Category 2G, EPL Gb) in the explosion groups IIA, IIB and IIC.

Die Qualifizierung hinsichtlich der Oberflächentemperatur ist T4/T3; für alle Gase, Dämpfe und Nebel mit einer Zündtemperatur > 135 °C / > 200 °C sind die Produkte keine Zündquelle.

The qualification with regard to the surface temperature is T4/T3; for all gases, vapours and mists with an ignition temperature > 135 °C / > 200 °C the product is not an ignition source.

Die Anforderungen an einfache elektrische Betriebsmittel in eigensicheren Stromkreisen in der Zone 1 nach EN 60079-11 werden erfüllt.

The requirements for simple apparatus according to IEC 60079-11, applicable to the hazardous area of Zone 1, are met.

(15c) Elektrische Daten für lineare Kennlinie:

Electrical data for linear characteristic:

Bernessungsspannung bis 32 VDC

Rated voltage up to

Bernessungsstrom bis 100 mA

Rated current up to

Li ≤ 100 mA, Pi ≤ 1 W@80 °C

Erwärmung am Außengehäuse < 10 K

Warning at the outer enclosure

(15d) Typ DON-a bb c dd e LA g h terminal block J1

U_{III,A} ≤ 19.5 VDC Li = 83 µH Ci = 3.4 µF

Diese Ausführung darf nicht als einfaches elektrisches Betriebsmittel in der Zone 1 eingesetzt werden! *This type is not for use as simple apparatus in Zone 1*

(15e) Typ DON-a bb c dd e ff g h ff = HA, BA, DA, GA terminal block J2 and J3

U_{III,C} ≤ 28 VDC U_{III,B} ≤ 32 VDC Li = negligible Ci = 270 nF

Zone 1: U_{III,C} ≤ 18.5 VDC U_{III,B} ≤ 32 VDC Li = negligible Ci = 270 nF

(15f) Typ DON-a bb c dd e RA g h terminal block J1

U_{III,C} ≤ 28 VDC U_{III,B} ≤ 32 VDC Li = negligible Ci = negligible

(15g) Die für das jeweilige Gerät relevante Temperaturklasse kann der Betriebsanleitung entnommen werden und ist auf dem Typenschild gekennzeichnet:

The relevant marking of the temperature classification of each piece of equipment is stated in the operator's manual and is marked on the label:

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- (15h) • Umgebungstemperaturbereich / *Ambient temperature range* $-20^{\circ}\text{C} \leq \text{Ta} \leq 80^{\circ}\text{C}$
 • Mediumstemperatur / *medium temperature* $-20^{\circ}\text{C} .. 100^{\circ}\text{C} \rightarrow$ Temperaturklasse / *temperature class T4*
 • Mediumstemperatur / *medium temperature* $-20^{\circ}\text{C} .. 130^{\circ}\text{C} \rightarrow$ Temperaturklasse / *temperature class T3*
- (15i) Typenschlüssel
 Der detaillierte Typenschlüssel ist der Betriebsanleitung zu entnehmen
 Type code
 The detailed type code can be found in the instructions operating manual (IOM)
- (15j) DON-* * * * * * * * *
 DON-a bb c dd e ff g h
 DON-
 a Material
 bb Messbereich
 c Anzeigeeinheit
 dd Anschluss ("x" \triangleq unterschiedliche Größen)
 e O-Ring Werkstoff
 ff Elektronik (Ex ic)
 g Kableinführung
 h Optionen (nicht ex-relevant)
 Mindestkennzeichnung
 Hersteller mit Anschrift
 Typ: DON-* * * * * * * * *
 (Seriennummer) €€ [Baujahr]
 TFR: 19 ATEX 0007X
 Ex II 3G Ex ic IIC T4/T3 Gc
 Ex II 2G Ex h IIC T4/T3 Gb
 $-20^{\circ}\text{C} \leq \text{Ta} \leq 80^{\circ}\text{C}$
 (Ergänzungen sind zulässig.)
- (15l) Die Prüfungsunterlagen sind im internen Dokument D068190802 hinterlegt. Gemeinsam mit dem Hersteller ist ein vertraulicher Prüfbericht PB68190802 erarbeitet worden. Die vertrauliche Nachweisdokumentation mit der TFR 19 ATEX 0007X lag zur Bewertung vor und ist bei der benannten Stelle 0158 BVS (DEKRA Testing and Certification, Bochum) hinterlegt.
- (16) Sicherheitstechnische Hinweise
 Die Hinweise in der vom Hersteller jedem Produkt beizufügenden Betriebsanleitung (Einbauvorschrift, Montageanweisung) sind unbedingt einzuhalten.
 a) Zur Sicherstellung des Explosionschutzes müssen elektrische Betriebsmittel und zusätzlich angebaute (mechanische) Produkte den Anforderungen der vor Ort geltenden Zonen entsprechen und sind vom Errichter der Maschine gesondert zu prüfen.
 b) An den Stromkreisen dürfen nur Produkte angeschlossen werden, die für den Betrieb in der infrage kommenden Zone geeignet sind und für die die entsprechenden Dokumente vorliegen.
 c) Der Durchflussmesser ist so zu montieren, dass mögliche elektrostatische Ladungen abfließen können.
 d) Eine direkte elektrostatische Entladung hoher Energie auf
- | | |
|--|---|
| <p><i>Material</i>
 <i>Measuring range</i>
 <i>Display unit</i>
 <i>Connection ("x" represents different sizes)</i>
 <i>Seal material</i>
 <i>Electronics / indication (Ex ic)</i>
 <i>Cable entry</i>
 <i>Options (not ex-relevant)</i>
 <i>Minimum identification of the electrical system:</i>
 <i>Name and address of manufacturer</i>
 <i>DON-* * * * * * * * *</i>
 <i>(serial number) €€ (year of construction)</i></p> | <p><i>(Additional hints are allowed.)</i>
 <i>Test reports are stored in the internal document D068190802. In cooperation with the manufacturer a confidential test report PB68190802 was compiled.</i>
 <i>The confidential proof documentation with TFR 19 ATEX 0007X has been submitted to inspection and is deposited at the notified body 0158 BVS (DEKRA Testing and Certification, Bochum).</i>
 <i>Safety relevant notes</i>
 <i>The notes in the operator's manual, enclosed to each order of the manufacturer (installation rules and instructions on assembly), have to be followed strictly.</i>
 <i>a) In order to ensure the explosion protection required, any electrical and additional mechanical product has to meet the requirements of the locally applicable zones and has to be checked separately by the company installing the unit.</i>
 <i>b) Only products suitable for operation in the relevant zone, and for which the relevant documents are available, may be connected to the circuits.</i>
 <i>c) The flow meter has to be mounted in such a manner that any possible electrostatic charges may be discharged.</i>
 <i>d) Any direct electrostatic discharge of high energy</i></p> |
|--|---|

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- das Betriebsmittel ist nicht zulässig (kann üblicherweise durch eine menschliche Berührung nicht erzeugt werden). *on the product is not permitted (and can usually not be caused by a human touch).*
- e) Ausgleichsströme dürfen nicht über die metallischen Konstruktionen geführt werden. *e) Equalizing currents must not be conducted using the metallic parts of the construction.*
- f) Der Durchflussmesser sollte gegen mechanische Schlagwirkung geschützt eingebaut werden. *f) The installation of the flow meter has to protect them against mechanical impact.*
- g) Im Verlauf des eigensicheren Stromkreises ist ein Potenzialausgleich zu errichten – wenn der Durchflussmesser über einen geerdeten Stromkreis versorgt wird. *g) Equipotential bonding must be installed along of the intrinsically safe circuit – if power to the flow meter is supplied via an earthed circuit.*
- h) Festsitzende Teile, z.B. durch Frost oder Korrosion, dürfen bei vorhandener explosionsfähiger Atmosphäre nicht mit Gewalt gelöst werden. *h) Parts being stuck (e.g. by frost or corrosion) may not be removed by force in the presence of explosive atmosphere.*
- i) Die Zündgrenzkurven aus der EN 60079-11 sind in der Zone 2 ohne Sicherheitsfaktor zu berücksichtigen und bei der Installation zu beachten. *i) In Zone 2 the ignition curves of EN 60079-11 have to be observed without a safety factor and to be taken into account for the installation.*
- j) In der Zone 1 ist der Sicherheitsfaktor 1,5 anzuwenden. *j) The safety factor 1.5 shall be applied in zone 1*
- k) In jedem Fall hat der Betreiber dazu eine Control Drawing (Nachweis der Eigensicherheit) anzufertigen. *k) In each case the operator has to create a control drawing (proof of intrinsic safety).*
- l) Eisbildung am Produkt sollte vermieden werden. *l) Ice formation on the device must be avoided.*
- (17) Besondere Bedingungen
- (17a) Die Geräte nach (15e) und (15f) werden in der Zusammenschaltung mit einem Durchflusszähler / -Dosierer / -Controller des Typs ZOK-E*K*F3 oder ZOK-E*M*F3** gem. LOM 16 ATEX 2062 X als einfache elektrische Betriebsmittel genutzt und einzlig durch dieses Betriebsmittel elektrisch versorgt. *The devices according to (15e) and (15f) are connected to a flow meter / dosing unit / controller of type ZOK-E*K*F3 or ZOK-E*M*F3** according to LOM 16 ATEX 2062 X as simple apparatus and are supplied electrically only by this equipment.*
- (17b) Kennzeichnung der Medientemperatur *Marking of media temperature*

Anhang / Annex

Temperaturklassen und Mediumstemperaturen / Temperature classes and medium temperature

Z	Material seal	Marking	Cat. 2 (Zone 1)	TC	Cat. 3 (Zone 2)	TC
1	FKM	e = 1	-20 °C .. 80 °C	T4	-20 °C .. 90 °C	T4
2			-20 °C .. 100 °C	T3	-20 °C .. 110 °C	T3
3	FEP / EPDM 92	e = 3	-20 °C .. 80 °C	T4	-20 °C .. 90 °C	T4
4			-20 °C .. 110 °C	T3	-20 °C .. 120 °C	T3
5	NBR	e = 4	-20 °C .. 80 °C	T4	-20 °C .. 90 °C	T4
6			-20 °C .. 100 °C	T3	-20 °C .. 110 °C	T3
7	Fluoroprene	e = 5	-20 °C .. 80 °C	T4	-20 °C .. 90 °C	T4
8			-20 °C .. 130 °C	T3	-20 °C .. 130 °C	T3

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25. Ex d Certificate



CERTIFICATE

(1) EU-Type Examination

- (2) **Equipment or protective systems intended for use in potentially explosive atmospheres - Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number: **DEKRA 17ATEX0004X** Issue Number: **3**

(4) Product: **Oval Gear Flowmeter Type DON-* *** *E* ***

(5) Manufacturer: **KOBOLD Messring GmbH**

(6) Address: **Nordring 22-24, 65719 Hofheim /Ts., Germany**

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

(8) DEKRA Certification B.V., Notified Body number 0344 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 confidential test report number NL/DEK/ExTR 17.0002/03.

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

EN IEC 60079-0 : 2018 **EN 60079-1 : 2014**

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:

Date of certification: 24 February 2025

DEKRA Certification B.V.

L.G. van Schie
Certification Manager

Page 1/3



Throughout this document, a point is used as the decimal separator.

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DEKRA Certification B.V. Meander 1051, 6825 MJ Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 88 96 83000 F +31 88 96 83100 www.dekra-product-safety.com Registered Arnhem 09085396

(13) **SCHEDULE**

(14) to EU-Type Examination Certificate DEKRA 17ATEX0004X Issue No. 3

(15) **Description**

The oval gear flowmeter type DON-* *** ** * E* * are positive displacement flowmeters where the passage of liquid causes two oval gears to rotate within a measuring chamber and with each rotation a fixed volume of liquid passes through the meter. Magnets embedded within the gears initiate a pulse train output. The pulse output can be wired directly to process control and monitoring equipment or can be used as an input to instruments supplied with or fitted directly onto the meter. The flowmeters can be made from aluminium or stainless steel for group II and are only stainless steel for group I.

Ambient and process temperature range:

Marking	Ambient temperature	Process temperature
Ex db IIC T6 Gb	-20 °C to +70 °C	-20 °C to +70 °C
Ex db IIC T4 Gb	-20 °C to +80 °C	-20 °C to +120 °C
Ex db I Mb	-20 °C to +80 °C	-20 °C to +140 °C

Electrical data: Umax : 28 Vdc, Imax : 100 mA

Type designation

Type: DON-* ** * * * E* *
 ID: I II III IV V VI VII VIII IX X

ID	Explanation	Value	Explanation	
I	General	DON	Generic reference	
II	Housing material (1 digit):	1 or 3 ¹⁾ 2 or 4 ¹⁾ 8 or 9 ¹⁾ H or S ¹⁾	Aluminium Stainless Steel Stainless Steel Stainless steel high pressure version only with measuring range 05, 10, 15 and 20	
III	Measuring range (2 digits)	04, 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60	Not relevant for Explosion Safety	
IV	Unit of measuring range (1 digit)	H G	Litre Gallon	Not relevant for Explosion Safety
V	Connection type/size (2 digits)	**	Not relevant for Explosion Safety	
VI	O-ring material (1 digit)	*	For use in the process side Not relevant for Explosion Safety	
VII	Electronic types (1 digit)	L R H B G D K	4-20mA "loop powered" analogue output Reed switch pulse output Hall sensor and reed switch pulse output Hall sensor (bipolar) pulse output Hall sensor (high resolution X4) pulse output Quad hall sensor pulse output Hall sensor (high resolution X2) pulse output	
VIII	General	E	Ex d	
IX	Cable entry options (1 digit)	M N	M20 1/2" NPT	
X	Options (1 digit)	*	Not relevant for Explosion Safety	

Note ¹⁾ Values 3, 4, 9 and S are used for high viscosity variants.



(13) **SCHEDULE**

(14) **to EU-Type Examination Certificate DEKRA 17ATEX0004X** Issue No. 3

Installation instructions

The instructions provided with the product shall be followed in detail to assure safe operation.

(16) **Report Number**

NL/DEK/ExTR17.0002/03.

(17) **Specific conditions of use**

- Contact the manufacturer for information on the dimensions of the flameproof joints.
- Ambient temperature ranges shown in the certificate applies.
- The screws used to assemble the cover to the Ex d housing shall be class A2-70 or better.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at item (9).

(19) **Test documentation**

As listed in Report No. NL/DEK/ExTR17.0002/03.

26. IECEx Certificate

	<h3>IECEx Certificate of Conformity</h3> <p>INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres</p> <p>for rules and details of the IECEx Scheme visit www.iecex.com</p>
<p>Certificate No.: IECEx DEK 15.0046X</p> <p>Status: Current</p> <p>Date of Issue: 2025-02-24</p> <p>Applicant: KOBOLD Messring GmbH Nordring 22-24 65719 Hofheim /Ts. Germany</p> <p>Equipment: Oval Gear Flowmeters, type DON-*****E**</p> <p>Optional accessory:</p> <p>Type of Protection: Ex db</p> <p>Marking: Ex db IIC T6...T4 Gb Enclosure of aluminium or stainless steel Ex db I Mb Enclosure of stainless steel</p>	
<p>Approved for issue on behalf of the IECEx Certification Body:</p> <p>Position: L.G. van Schie</p> <p>Signature: (for printed version)</p> <p>Date: 2025-02-24</p> <p>1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.</p>	
<p>Certificate issued by:</p> <p>DEKRA Certification B.V. Meander 1051 6825 MJ Arnhem Netherlands</p> <p style="text-align: right;"></p>	



IECEx Certificate of Conformity

Certificate No.: IECEx DEK 15.0046X

Page 2 of 5

Date of issue: 2025-02-24

Issue No: 3

Manufacturer: KOBOLD Messring GmbH
Nordring 22-24
65719 Hofheim /Ts.
Germany

Manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-1:2014 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

This Certificate does not indicate compliance with safety and performance requirements
other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

NL/DEK/ExTR17.0002/03

Quality Assessment Report:

DE/BVS/QAR09.0001/14



IECEx Certificate of Conformity

Certificate No.: IECEx DEK 15.0046X

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Date of issue: 2025-02-24

Issue No: 3

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The oval gear flowmeter Type DON-* *** ** *E* * are positive displacement flowmeters where the passage of liquid causes two oval gears to rotate within a measuring chamber and with each rotation a fixed volume of liquid passes through the meter. Magnets embedded within the gears initiate a pulse train output. The pulse output can be wired directly to process control and monitoring equipment or can be used as an input to instruments supplied with or fitted directly onto the meter.

The flowmeters can be made from aluminium or stainless steel for Group II and are only stainless steel for Group I.

Ambient and process temperature range:

Marking	Ambient temperature	Process temperature
Ex db IIC T6 Gb	-20 °C to +70 °C	-20 °C to +70 °C
Ex db IIC T4 Gb	-20 °C to +80 °C	-20 °C to +120 °C
Ex db I Mb	-20 °C to +80 °C	-20 °C to +140 °C

Electrical data: Umax = 28 Vdc, Imax = 100 mA.

SPECIFIC CONDITIONS OF USE: YES as shown below:

- Contact the manufacturer for information on the dimensions of the flameproof joints.
- Ambient temperature ranges shown in the certificate applies.
- The screws used to assemble the cover to the Ex d housing shall be class A2-70 or better.



IECEx Certificate of Conformity

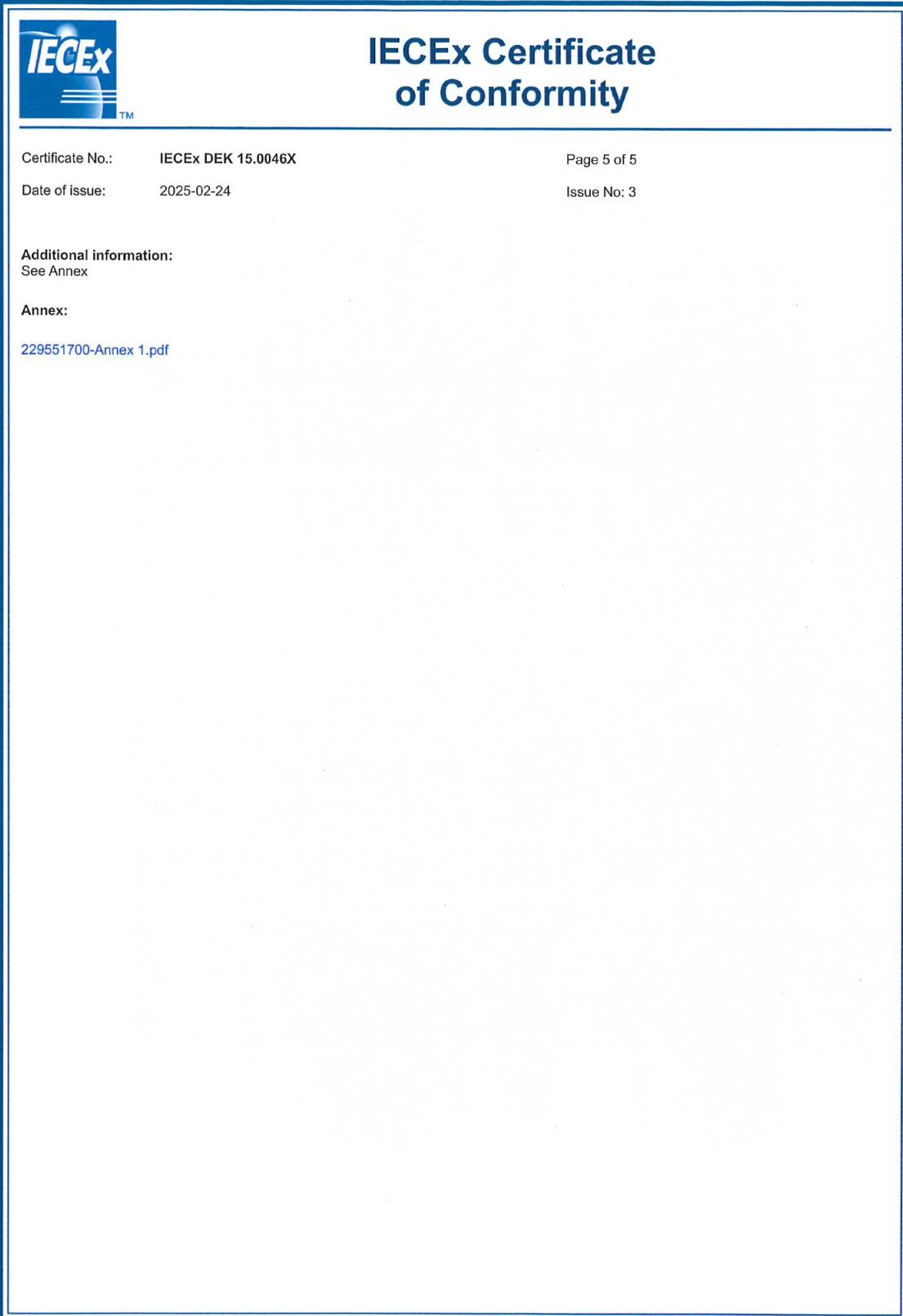
Certificate No.: IECEx DEK 15.0046X

Page 4 of 5

Date of issue: 2025-02-24

Issue No: 3

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Introduction of high viscosity variants.



27. State of safeness



State of safeness

KOBOLD Messring GmbH, D-65719 Hofheim

FO41903E
Rev. 02/15

Explanation for our customers:

In case of returning please take into account the following details and enclose this state of safeness

Address of the customer:

Contact person:

E-Mail-Address:

KOBOLD-Product:

KOBOLD- Order No.:

To be completed by customer

• Description of defect:

kind of medium:

trade name: _____ supplier: _____

• Operation conditions:

temperature: _____ °C

pressure: _____ bar

flow rate: _____

• Statement of safeness

We hereby certify that there are no noxious substances whatsoever (including detergents) in the instruments returned and that there is no hazard to employees handling the instruments.

Stamp, date, signature