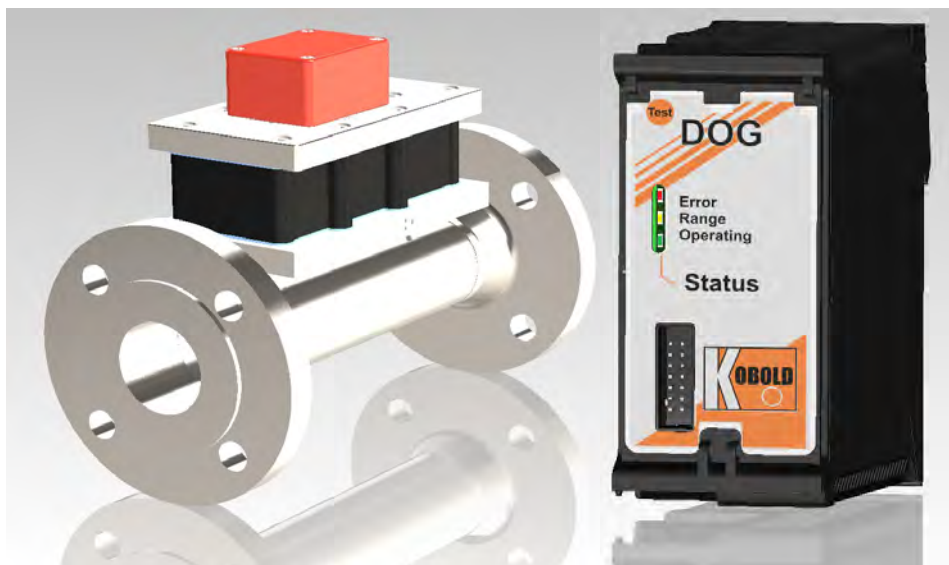


Operating Instructions for Oscillation Flowmeter

Model: DOG-4...

Transducer and Electronic Options A/B...O/P



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

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.

as per machine-guidelines 2006/42/EC

CE mark acc. ATEX-guideline 2014/34/EU

When used in machines, the DOG-4 should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

Model	Connection	PN	no dangerous gases (diagr. 7, 2)	dangerous gases (diagr. 6, 1)
DOG-4	DN 25	10	article 4, § 3	I
	DN 40 until DN 50	10	I	II
	DN 80 until DN 150	10	I	II
	DN 200	10	I	II

Funded by the Federal Ministry of Economics and Technology based on a decision of the German Bundestag.

3. Information on operating the device in potentially explosive environments (Ex, A0/D0/F0/H0/K0/N0/P0 option)

The devices can be used in the following way:

1. DOG-4S Flowmeter: In zones 0, 1 and 2 (gas Ex, category 1G, 2G, 3G) in explosion groups IIA, IIB and IIC
2. DOG-4A Reader/Transducer Reader: Outside the EX area
Here the following ambient temperatures must be adhered to
 $-20\text{ °C} \leq T_a \leq 60\text{ °C}$

The DOG-4 is suitable for use with gases of the explosion group IIC and temperature class $\geq T4$.

Further important details can be found in the EC Type Examination Certificate.

3.1 General requirements

In the event of failure to comply with this information or unauthorized tampering with the device, the manufacturer's liability will no longer apply. Moreover, the guarantee for the device and accessory parts will become void.

- Comply with the information in these operating instructions and adhere to the conditions of use and permissible data printed on each device / type plates.
- Follow the generally accepted rules of technology when selecting and operating a device.
- Take appropriate measures to prevent unintentional activation or inadmissible impairments.
- The devices may be used only in the correct way and for the intended purpose in a normal industrial environment. Use for unsuitable purposes, will render all guarantees and liability of the manufacturer void!
- Ensure that only devices with ignition protection suitable for the operating zones are installed.
- All electronic operating resources connected must be suitable for the respective use.
- The operator is obligated to provide lightning protection according to local regulations.

3.2 Startup, installation

The devices are intended for installation in a higher-level system. The intervals for cleaning the operating resources (dust deposits) are specified depending on the degree of IP protection. It is extremely important to ensure that only devices with suitable ignition protection for the zones/categories are installed! It is essential that the installation regulations applicable at the national level, e.g. EN 60079-14, are adhered to during installation. Other important factors:

- In the event of adverse environmental conditions, it is necessary to ensure that the devices are accordingly protected.
- Follow the operating instructions for the respective device and adhere to any special conditions described there.
- The device may only be used for the purpose for which it was intended.
- It is essential to avoid electrostatic charges.
- Any possible metal parts in the device/lines (e.g. shielding) must be incorporated in the potential equalization PA in compliance with the user's country regulations.
- Parts that have jammed (e.g. as the result of frost or corrosion) may not be loosened by force in hazardous atmospheres.
- Operate the device only in the completely assembled state and enclosed in undamaged housing. Operating with a damaged housing is prohibited.
- At ambient temperatures of less than -5°C the connecting lines must be securely laid.
- Do not allow the outside of the device to come into contact with strongly corrosive media.
- Do not subject the system to excessive vibrations, bending or torsion.
- The devices may not – or only with the manufacturer's permission, and then only using special measures – be used in systems with electric corrosion protection. Parasitic currents must not be fed in via the shielding.
- Installations in Ex areas may be carried out only in compliance with the local installation regulations.
- Installation and maintenance only in ex-free atmospheres in compliance with the user's national regulations.

Additional precautionary measures must be taken if there is a possibility that hydrogen sulfide, ethylene oxide and/or carbon monoxide could be present. These compounds have very low ignition power!

Only non-arcing tools may be used for these compounds as well as all compounds included in explosion group IIC – if explosive atmospheres are still to be expected!

3.3 Application

The devices may be used only in the correct way and for the intended purpose in a normal industrial environment. Use for unsuitable purposes, will render all guarantees and liability of the manufacturer void!

See Chapter 4, 5, 7 and 9.

3.4 Repair, maintenance (for applications in Ex areas)

Definition of terms as defined in IEC 60079-17:

Repair and maintenance: A combination of all activities carried out to maintain an item or restore the object to a state in which it is able to meet the requirements of the relevant specification and ensure the execution of its required functions.

Inspection: An activity comprising the careful examination of an item carried out either without demounting or, if necessary, with partial demounting through such steps as measurement in order to reliably determines the condition of the item.

Visual inspection: An inspection in which visible faults, e.g. missing bolts, are detected without the use of equipment or tools.

Close inspection An inspection which comprises the aspects of a visual inspection in addition to identifying defects, e.g. loose bolts, apparent only by access with the use of equipment, e.g. steps (when necessary) and tools. Close inspections do not normally require an open enclosure or the de-energizing of the equipment.

Detailed inspection An inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, e.g. loose connections which are only be apparent by opening the enclosure and/or using tools and test equipment where necessary.

- Maintenance work may be performed only by qualified personnel with the equivalent of or qualification according to TRBS 1203 (German Technical Rules for Industrial Safety).
- Only accessory parts which fulfill all European regulations and national laws may be used in hazardous areas.
- The replacement of components may only take place using original spare parts approved for use in Ex areas as well.
- The devices in Ex areas must be cleaned regularly. The intervals must be specified by the operator according to the environmental load.
- After maintenance and/or repair, replace all barriers and notices removed in the process in their original positions.
- Uninstall the device if any faults are detected. The customer may not repair internal parts. Send the device to the manufacturer for inspection.

Task	Visual inspection monthly	Check every 6 months	Detailed inspection every 12 months
Visual inspection of the device for integrity, remove dust residues	•		•
Inspection of the entire system	Responsibility of the operator		

3.1 Disposal

Disposal of the packaging and the used parts must be carried out according to the regulations of the country in which the device is installed.

4. Instrument Inspection

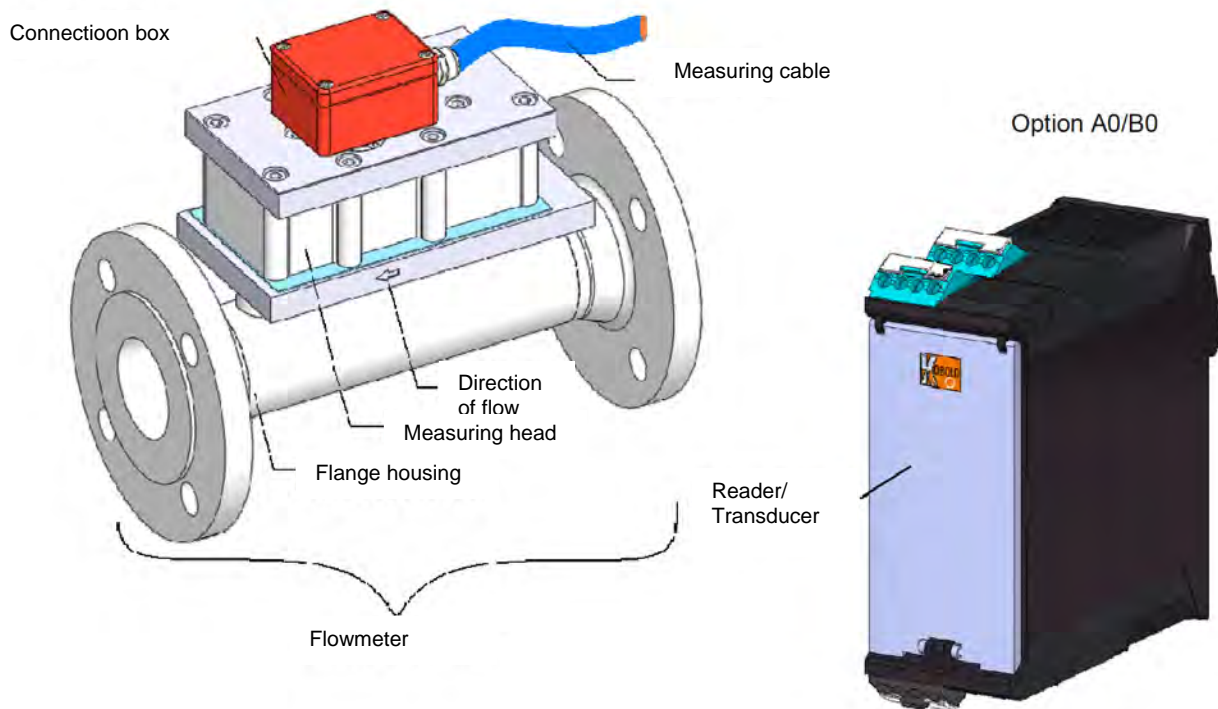
Instruments are inspected before shipping and sent out in perfect condition.

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:

- DOG-4S Flowmeter including flange housing, measuring head, thermal wire sensor and connection box.
- Measuring cable from the Flowmeter to the measuring converter (optional).
- DOG-4A/B...O/P reader/transducer.
- Operating instructions.

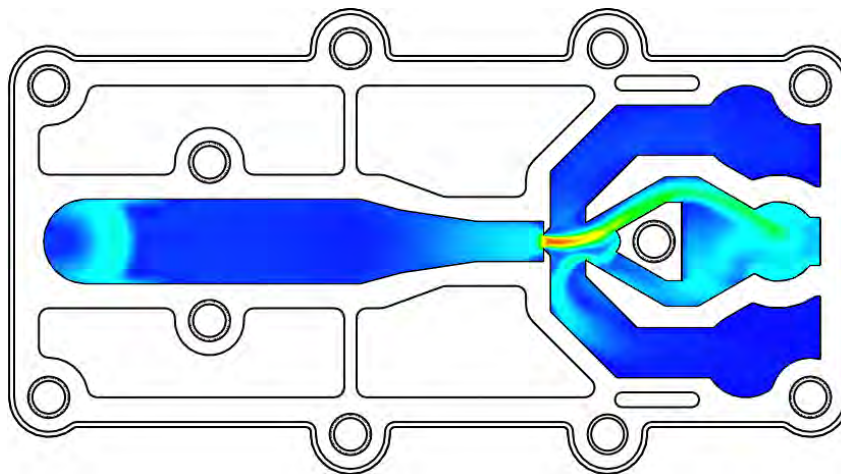


5. Regulation Use

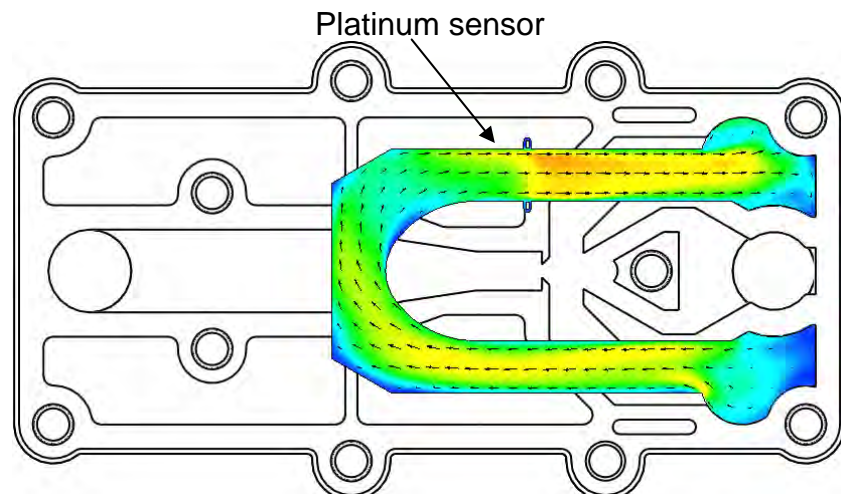
DOG-4 type devices are used for measuring and monitoring the rate of flow. Only clean media may be measured, against which the materials used are resistant. Dirt particles and other impurities can impair the measurement results, in spite of the fact that the continuous change in direction of the flow ensures a self-cleaning effect. The measuring sensor may be used only with the corresponding transducer.

6. Operating Principle

This device is an oscillating beam device and works without any movable parts. An orifice plate in the base creates flow resistance, which forces a partial flow to be directed into the measurement head. The gas in the measurement head begins to oscillate. The frequency of oscillation is proportional to the flow of volume. As the ratio between the flow through the measuring head and the flow through the measuring housing is constant, the frequency of oscillation is directly proportional to the entire flow of volume through the device. A platinum sensor determines the oscillation in the measuring head. The measuring converter normalises the measured oscillation to 0 Hz (without flow) and to 150 Hz for the end of the measuring range.



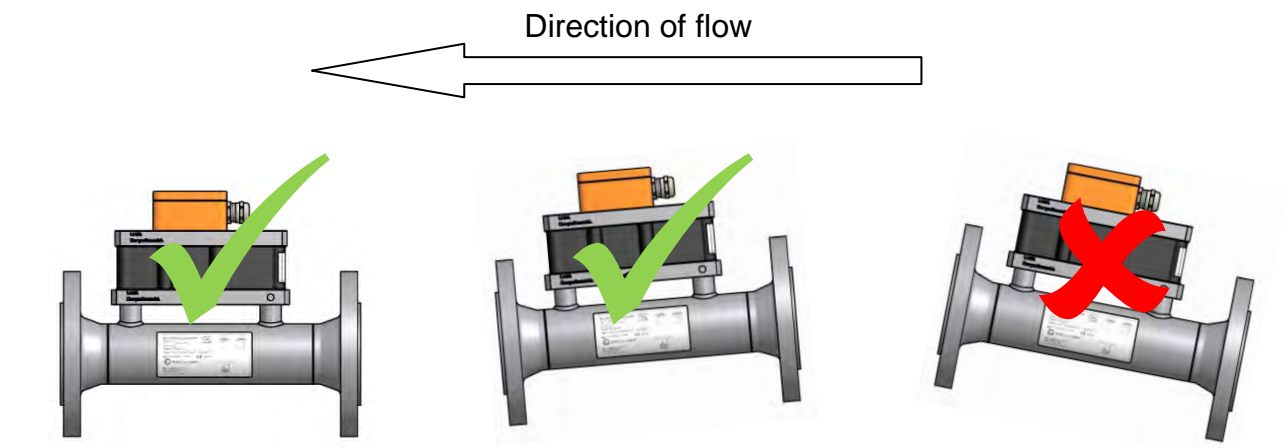
View from underneath



View from above

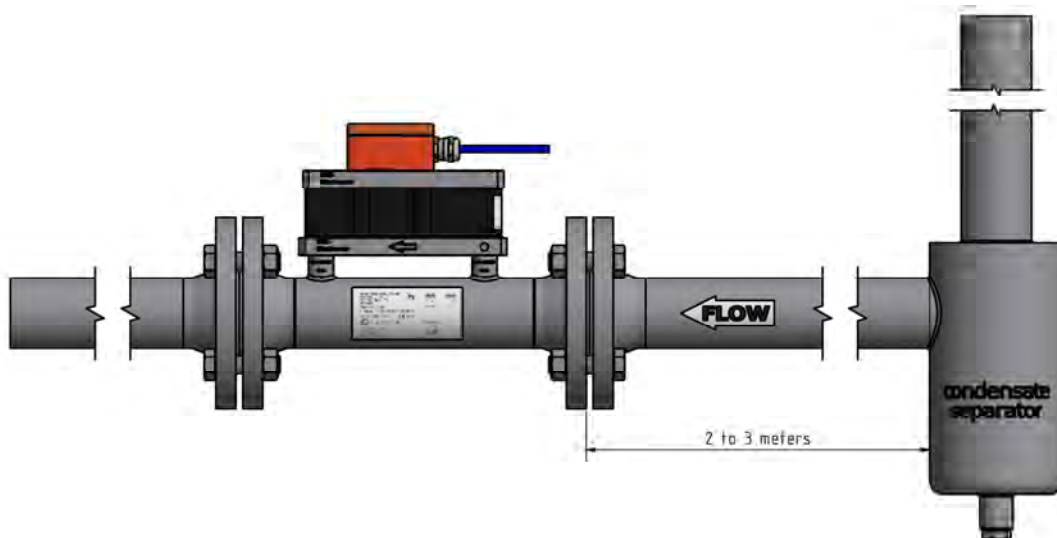
7. Mechanical Connection

The measuring sensor should be installed in a horizontal position with the measuring head facing upwards. A slight inclination in the direction of flow is permitted. The arrow on the flange housing must point in the direction of flow. The recommended minimum inlet path is 10 times the diameter of the pipe and the maximum outflow zone 5 times the diameter of the pipe. To prevent any possible rotational flow, it is recommended that a flow straightener be fitted upstream of the counter. For damp media, slightly inclined installation in the direction of flow is recommended in order to ensure the removal of condensate from the oscillator.



It is also recommended to install a condensate separator, preferably in a vertical pipe in front of the flow meter (see figure below). The condensate can thus be removed before entering the flow meter.

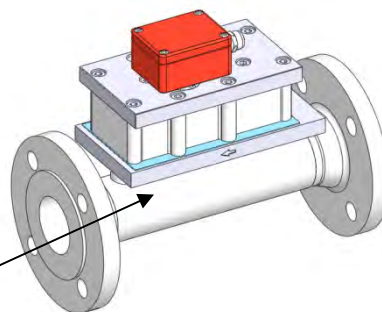
Should the temperature difference between ambient and medium be $+20\text{ }^{\circ}\text{C}$ or greater, the pipeline and the flow meter should be thermally insulated to prevent condensation.



8. Identification (Ex version)

Flowmeter (DOG-4S) type plate
(flange housing, measurement tube)

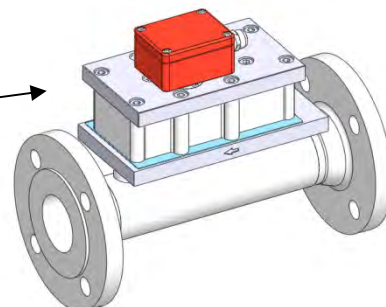
Kobold Messring GmbH Nordring 22-24 65719 Hofheim / Ts. Germany		
Type: DOG-4XXX X XX XXXX		
Serial no.: SE XXXXXX	YofC.: XX/20XX	
BVS 13 ATEX E 020 X  II 1G Ex ia IIC T4 Ga	CE 0158	
IECEx BVS 13.0035X Ex ia IIC T4 Ga -20 °C ≤ Ta ≤ +60 °C	Medium T = -20...+60 °C Pmax = xx bar	





There is a warning label on the plastic housing “WARNING – DANGER OF ELECTROSTATIC DISCHARGE – SEE OPERATING INSTRUCTIONS”



WARNUNG – GEFAHR DURCH ELEKTROSTATISCHE
 ENTLADUNGEN – SIEHE BETRIEBSANLEITUNG
 WARNING – POTENTIAL ELECTROSTATIC
 CHARGING HAZARD – SEE INSTRUCTIONS
 DANGER – POSSIBILITÉ DE CHARGE
 ÉLECTROSTATIQUE – VOIR LES INSTRUCTIONS



Transducer (DOG-4A) type plate
(see left)

Kobold Messring GmbH Nordring 22-24 65719 Hofheim / Ts. Germany		
Type: DOG-4XXX X XX XXXX		
Serial no.: TE XXXXXX	YofC.: XX/20XX	
BVS 13 ATEX E 020 X  II (1) G [Ex ia Ga] IIC	CE 0158	
IECEx BVS 13.0035X [Ex ia Ga] IIC -20 °C ≤ Ta ≤ +60 °C	Medium T = -20...+60 °C Pmax = xx bar	

(blue)	(orange)
Sensor	Output
1 2 3 4	1 2 3 4
+ -	E C

(black)
230VAC
1 2 3 4
L N



9. Electrical connections

9.1 General

- Install the measuring sensor near the transducer (max. 100 m cable length, depending on the electrical interference zone).
- The measuring cable must be laid well away from strong sources of electrical interference and not parallel to power cables.
- The measuring cable of several DOG-4s must not be laid over long distances next to one another or bundled together.
- The DOG-4A transducer must be installed outside of the Ex zone.
- Lay the electrical cabling according to the following wiring diagram.
- Each transducer is matched specifically to the respective measuring sensor and must not be swapped over.
- The pipelines and the flange housing must be grounded.

9.2 Measuring cable in Ex areas

An Ölflex EP (without shield) or Ölflex EBCY (with shield) may be used as measuring cable between the sensor and transmitter. Alternatively a cable with comparable properties may be used.

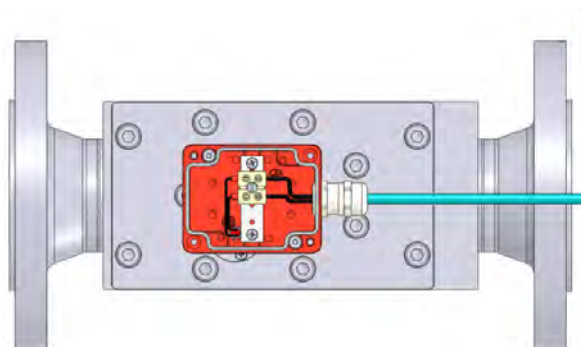
Ölflex EB $Li=0.65 \text{ mH/km}$ $Cisy=110 \text{ nF/km}$

Ölflex EBCY $Li=0.65 \text{ mH/km}$ $Cisy=135 \text{ nF/km}$ $Ciasy=185 \text{ NF/km}$

The length of the cable may not exceed 100 m. The maximum permitted cable inductance is $L_{imax}=65 \mu\text{H}$ and the maximum capacitance $C_{imax}=32 \text{ nF}$.

9.3 Connection to the measuring sensor

To connect the measuring cable, first unscrew the lid of the connection box and remove the lid. Feed the cable through the cable gland and connect it to the connecting terminal (independent of polarity). When using a shielded cable, the shield must be connected to the grounding screw.





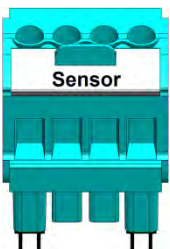
9.4 Terminal assignment of the DOG-4... reader/transducer



230 V_{AC}
 110 V_{AC}
 24 V_{AC}
 24 V_{DC}

Output

Sensor

for AC for DC				
	Supply	Output	Sensor	
	black			
	1	2	3	4
		L		N
	+		-	
		E	C	
		+	-	

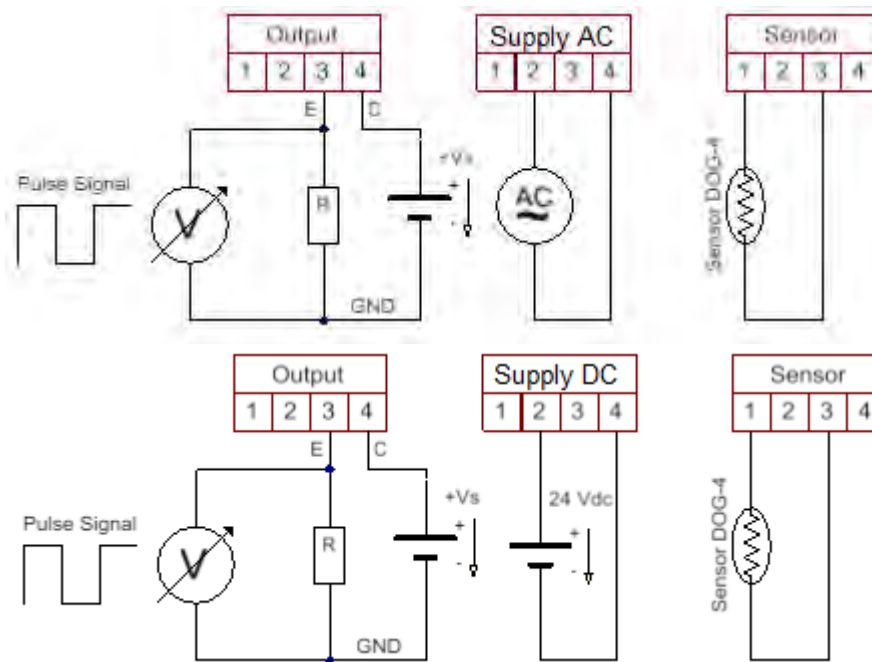
L = 230 V/110 V/24 V outer conductor
 N = 230 V/110 V/24 V neutral conductor

+ = supply DC+
 - = supply DC-

E = emitter optical coupler
 C = collector optical coupler

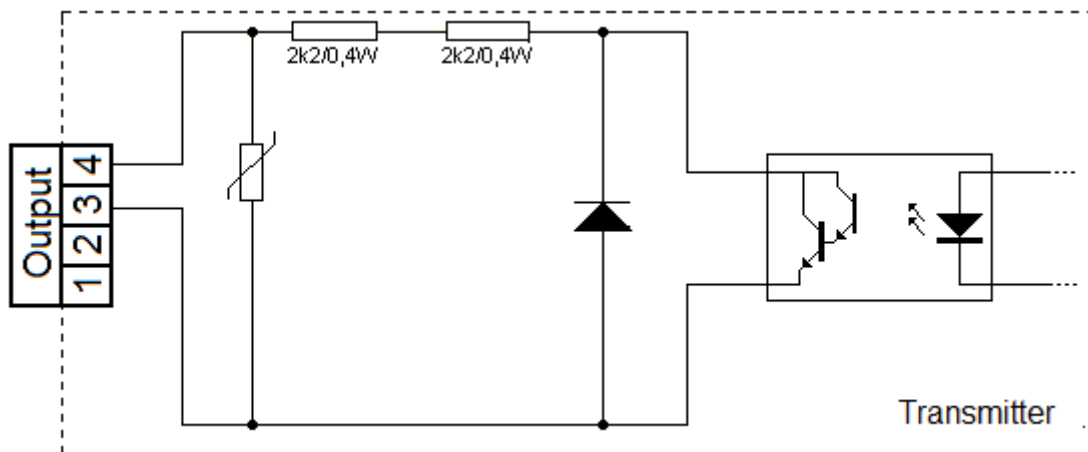
I- = sensor conductor
 I+ = sensor conductor

DOG-4



$$U_{\text{HIGH}} = \frac{R}{R+4.4 \text{ k}\Omega} ; U_{\text{LOW}} < 0.5 \text{ V}$$

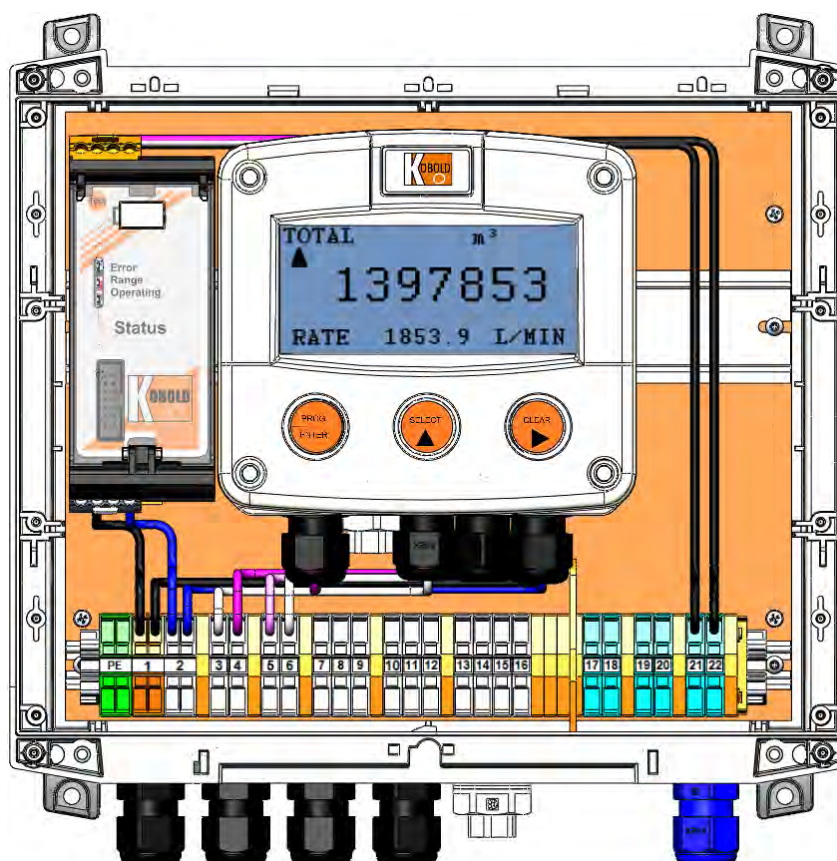
Example: $V_s = 24 \text{ V}_{\text{DC}}$: $U_{\text{HIGH}}=17 \text{ V}_{\text{DC}} @ R=10 \text{ k}\Omega$, $U_{\text{HIGH}}=23 \text{ V}_{\text{DC}} @ R=80 \text{ k}\Omega$,



Optical coupler output, external supply max. 30 V_{DC} , $I_{\text{max}} = 50 \text{ mA}$

9.5 Terminal assignment of the electronic option G0/H0/I0/K0/M0/N0/O0/P0

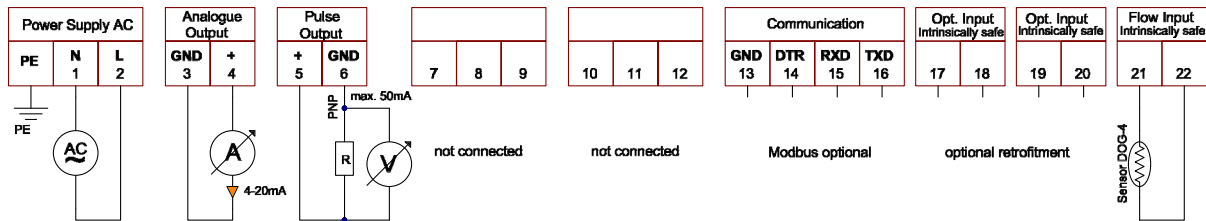
With the electronic option G0/H0/M0/N0, the reader/transducer is located together with the flow controller/flow computer prewired in the plastic wall housing. The connection terminal strip is located underneath the terminal cover. This must be removed for the electrical connection.

**Note:**

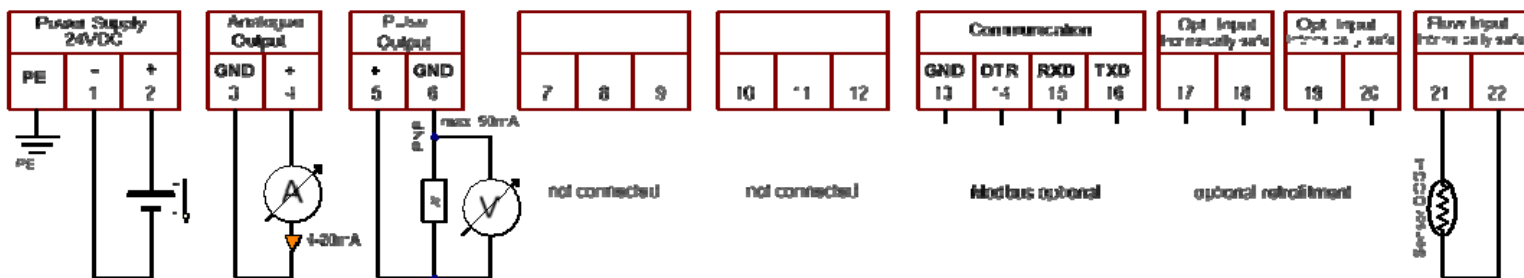
Additional pressure and temperature sensors are required for the electronic options M0/N0/O0/P0 (flow computer). These sensors are not included in the scope of delivery.

DOG-4

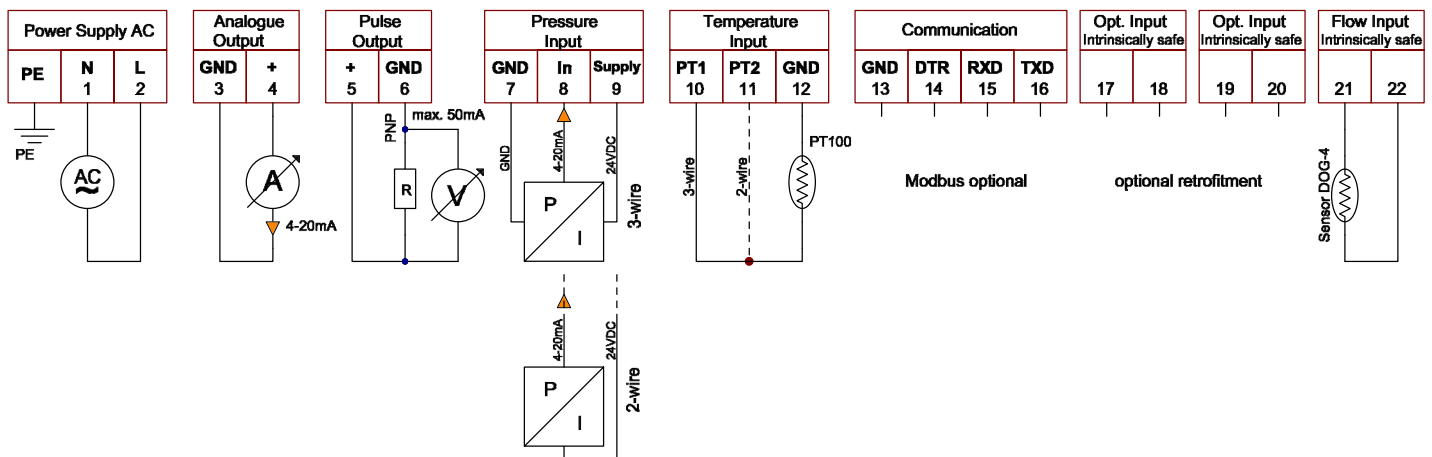
Wiring diagram electronic option DOG-4 G0/H0/I0/K0



Wiring diagram electronic option DOG-4 L0



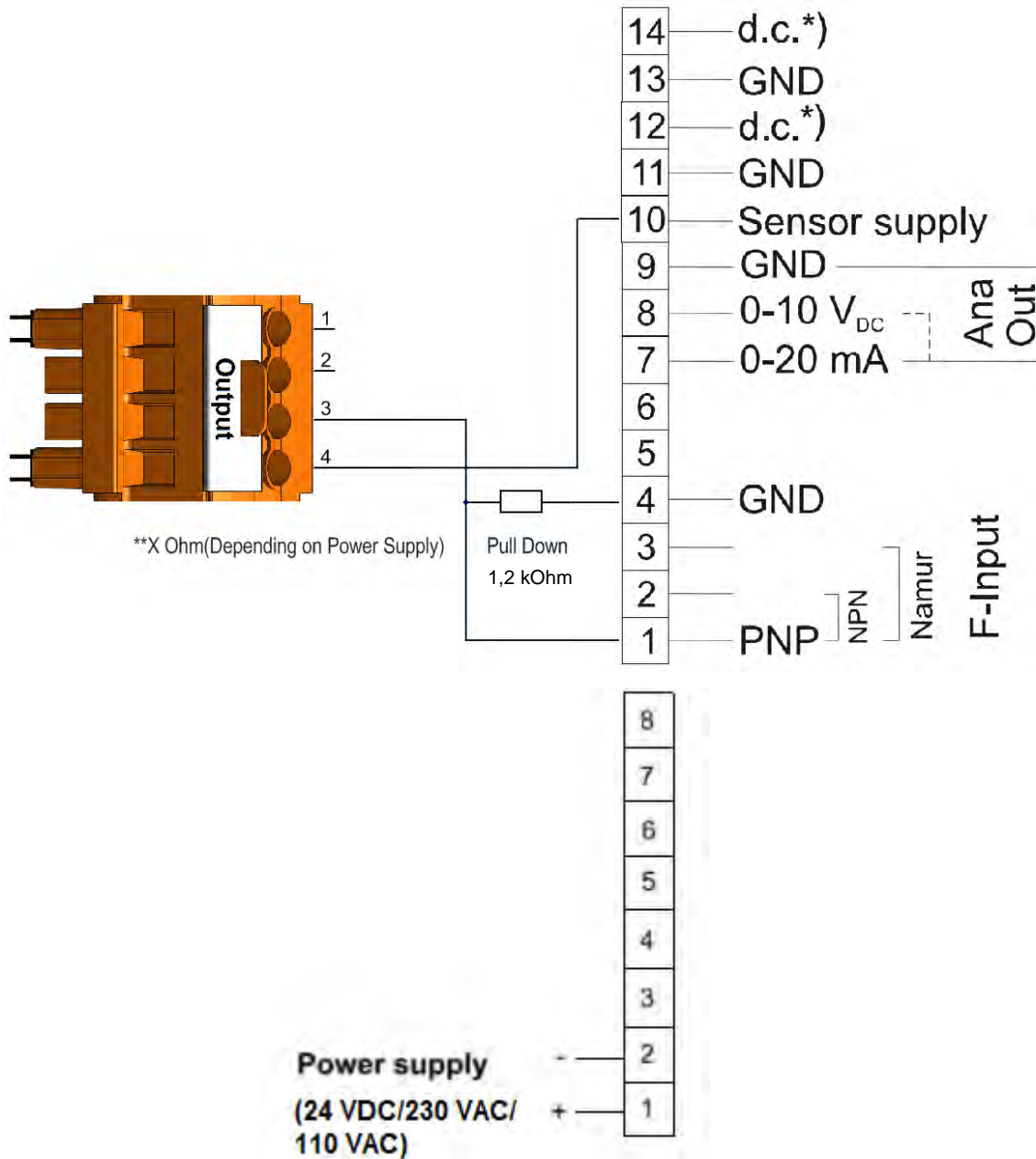
Wiring diagram electronic option DOG-4 M0/N0/O0/P0



Note:

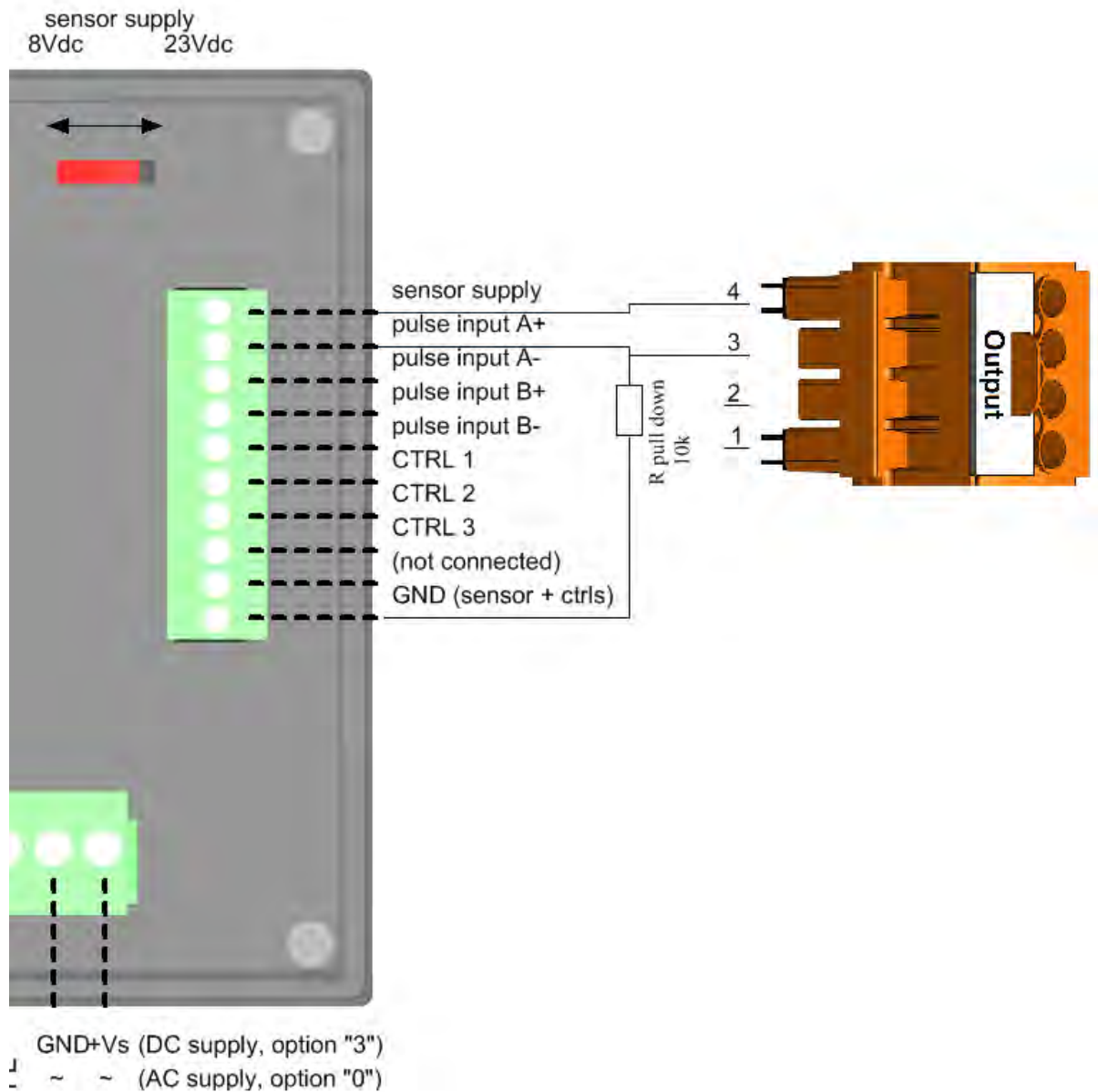
There is installation space for 2 additional Zener barriers in the housing if the pressure/temperature sensors do not have the required certification. Establishing contact in Ex areas can take place via terminals 17 to 20. The required cabling is the responsibility of the installer.

9.6 Connections of DOG-4 Transmitter with KOBOLD Evaluation Electronics ZED-X and ZOK-Zx



DOG-4 connection with ZED-Zx

DOG-4

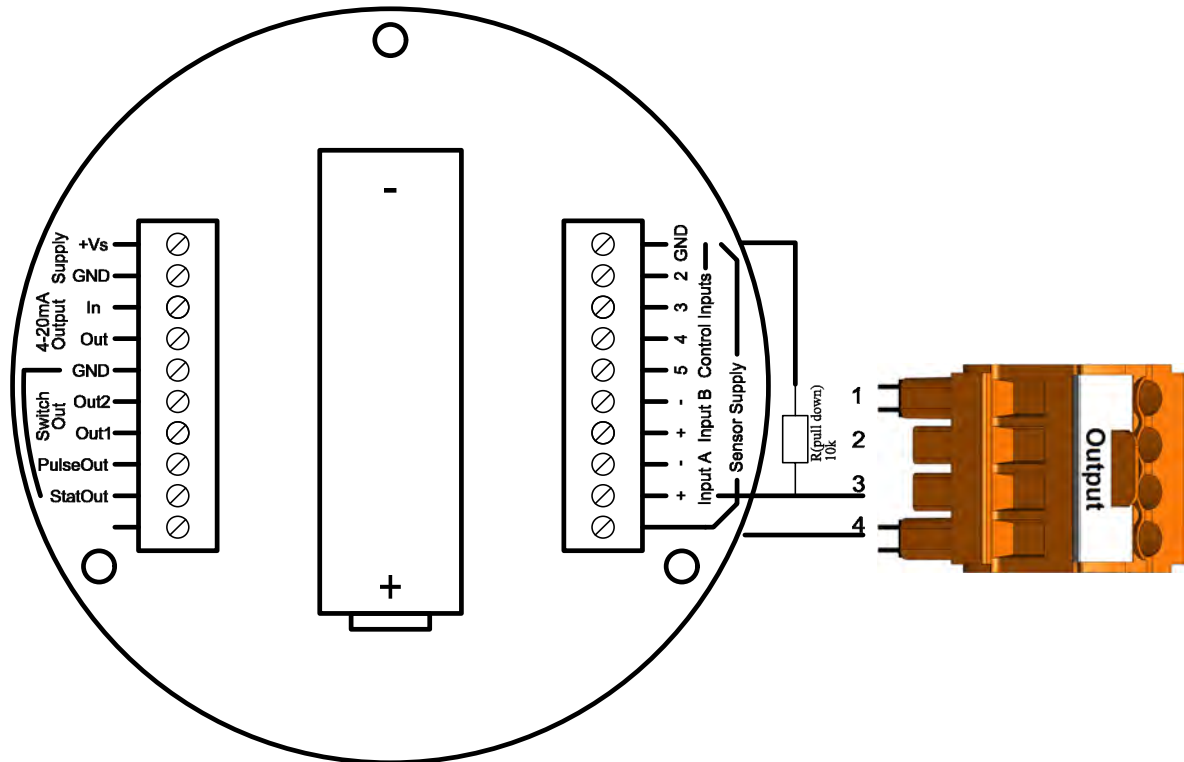


DOG-4 connection with ZOK-ZxP

Notes:

* The sensor supply from ZOK-ZxP must be set to 8 VDC.

From the software menu of ZOK-Zx, the 'Sensor type' must be set to 'PNP'
(For details please see the operating manual of ZOK-Zx electronics).



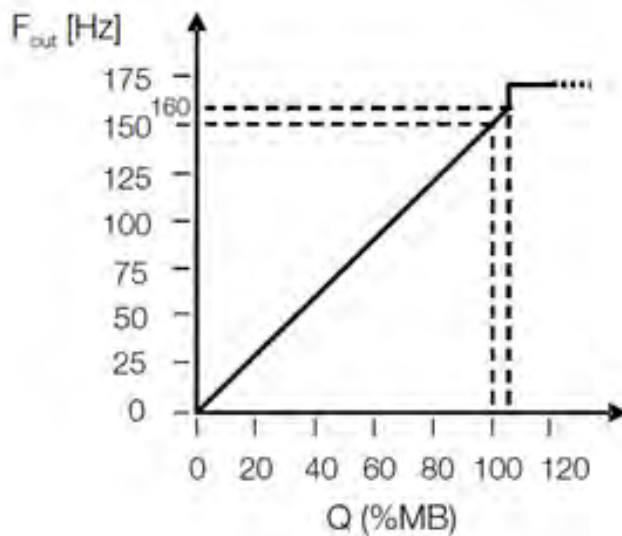
Connection example for DOG-4 with ZOK-ZxK

The sensor type must be set to "PNP" in the ZOK-ZX software menu (see operating manual ZOK-Zx electronics).

10. Startup

During startup, ensure that the shut-off valves upstream and downstream of the device are opened slowly. Avoid increasing the flow velocity to prevent the discharge rate from damaging the sensor.

The output frequency of the DOG-4 is proportional to the measuring range.



In the event of a sensor fault (breakdown or short circuit) the transistor output is permanently connected. During self-diagnosis, the transistor output is switched to the high-resistance state.

11. Setup and operation of the flow controller/flow computer (option G0/H0/I0/K0/M0/N0/L0/O0/P0)

The integrated flow controller/flow computer are preset and calibrated at the factory. See the separate operating instructions for the DOG-4G0/H0 and the DOG-4M0/N0 for details.

12. Transmitter error message

12.1 Status display not illuminated

- Check terminal “230 V_{AC}” of the terminal assignment.
- Check supply voltage

12.2 OPERATING illuminated green but no output signal

- Check terminal “Output” of the terminal assignment

12.3 RANGE illuminated yellow

- Measuring range overflows or underflows, decrease or increase flow

12.4 ERROR illuminated red

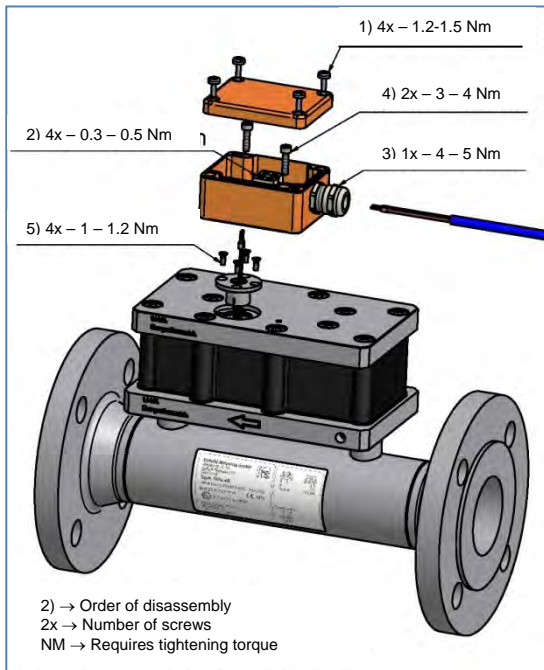
- Short circuit or interruption of the sensor circuit from the sensor to the transmitter.
- Check terminal “Sensor” of the terminal assignment
- Defective platinum sensor (target value: 40-60 Ohm)



13. Maintenance

13.1 Replacing the sensor

To replace the sensor, turn off the flow of medium and discharge the pressure in the lines. For versions with ball valves, it is sufficient to simply shut these.

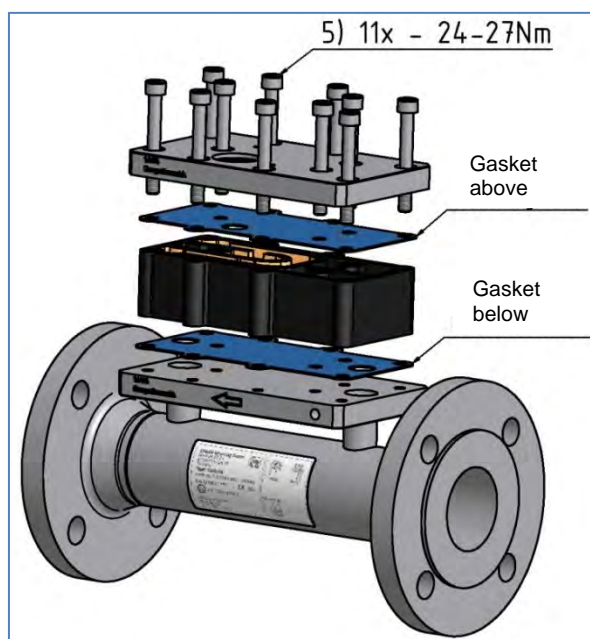


Demounting (see diagram) is carried out in the following order:

- 1) Open the connection box (4 x screws)
- 2) Unclamp the sensor from the strip terminal (2 screws)
- 3) If necessary (due to lack of space or tight cable arrangement), also unclamp from the strip terminal, loosen the cable gland and pull out the cable
- 4) Loosen the connection box from the plate (2 x screws)
- 5) **Slowly** release the sensor screws and **carefully** pull out the sensor. Take care that no sensor parts remain in the device and also that no foreign parts fall into the device (2 screws).

Reassembly is in the reverse order. Replac the O-rings with the new ones supplied with the sensor. Uniformly tighten the sensor screws crosswise.

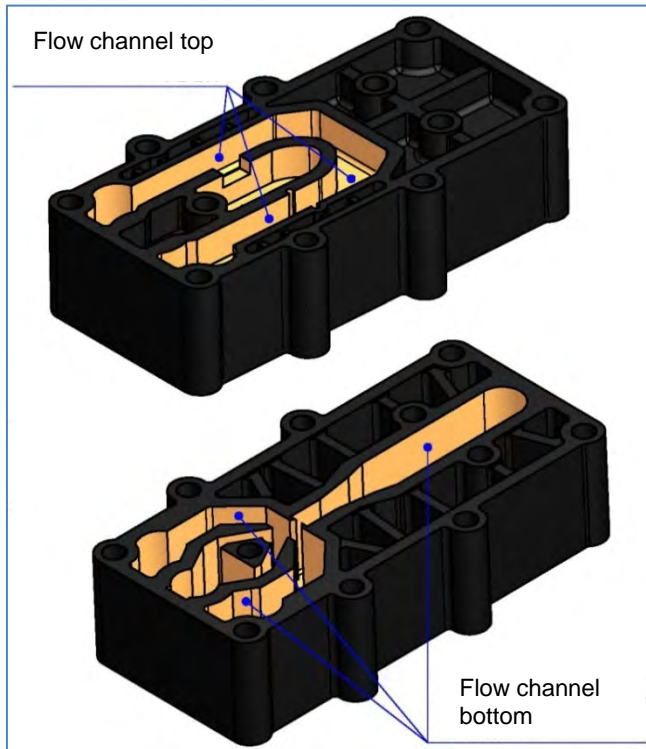
13.2 Disassembly and cleaning the Flowmeter



In the event that the internal section of the oscillator is dirtied by the medium or foreign particles fall into this during replacement of the sensor, the device must be demounted and cleaned (see figure at left).

Before the device can be demounted, the connection box and the sensor must be unscrewed. For this, see point 13.1.

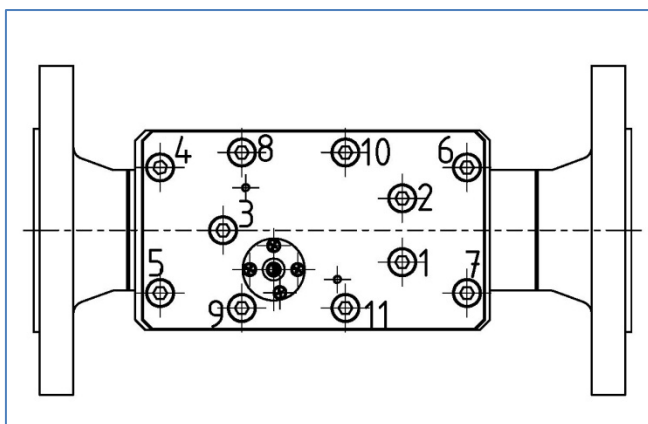
Then unscrew the screws in the upper plate, separate the parts and clean the flow channel of the oscillator on both sides.



Do not use any sharp objects or aggressive cleaning agents. These could damage the oscillator, causing measurement inaccuracies or breakdown of the device. Check the inflow and discharge channel and clean if necessary.

Reassembly takes place in the reverse order. The two gaskets must be replaced and are included in the repair set.

Tighten the screws uniformly with a torque of 24 to 27 Nm. The figure at the lower left shows the required order when tightening. Otherwise the device may leak or be damaged.



14. Technical Data



Measuring accuracy:	$\pm 1,5\%$ of meas. value (at Q_t -100%*) $\pm 5\%$ of measured value (at 1%- Q_t *) *The lower limit Q_t depends on the density. $Q_t = 8\%$ at density 1 kg/m ³ $Q_t = 4\%$ at density 2 kg/m ³ $Q_t = 2\%$ at density 4 kg/m ³ $Q_t = 1\%$ at density ≥ 8 kg/m ³
Repeatability:	0,1% of measured value
Media temperature:	-20 ...+120 °C (non ATEX version) -20 ...+60 °C (ATEX version)
Ambient temperature:	-25 ...+80 °C (non ATEX version) -25...+60 °C (ATEX version)
Operating pressure:	DOG-42xxx25...DOG-42xxx50...: PN 40 DOG-42xxx80...DOG-42xxx1F...: PN 16
Span:	1:100
Sensor:	platinum sensor
Protection:	IP 65

Materials (Transmitter)

Housing:	stainless steel 1.4404/316L
Orifice:	stainless steel 1.4404/316L
Measuring head:	polyphenylene sulfide (PPS)
Sensor:	platinum
Gaskets:	Klingersil® C-4265, NBR
Ball valves:	stainless steel

14.1 Electronic options

Electronics DOG-...A0/B0 (Transducer with/without ATEX certification)

Power supply A/B:	230 V _{AC} ± 10 %, 50...60 Hz
Power supply C/D:	110 V _{AC} ± 10 %, 50...60 Hz
Power supply E/F:	24 V _{AC} ± 20 %, 50...60 Hz
Power supply R:	24 V _{DC} ± 20 %
Input:	Platinum sensor (Allowed distance: max. 50 m to transmitter)
Output:	Opto coupler, frequency linear to flow V _{CE} : 12-24 V (recommended), max. 30 V I _C : max. 50 mA P _{tot} : 100 mW at 25 °C Derating: 0.91 mW/°C
Ambient temperature:	-25...+60 °C
Protection:	IP20
Ex-version(A):	
ATEX	
Transducer:	 II (1)G [Ex ia Ga] IIC
Sensor:	 II 1 G Ex ia IIC T4 Ga
IECEX	
Transducer:	[Ex ia Ga] IIC
Sensor:	Ex ia IIC T4 Ga
Mounting:	DIN Rail
Dimensions:	
Width:	45 mm
Height:	105.6 mm
Depth:	113.6 mm
Weight:	approx. 200 g

Electronics DOG-...G0/H0

(Transducer without/with ATEX certification and Flow rate/Unit counter, with current/pulse output)

Display:	alphanumeric LCD, UV-resistant, with displayed functions: Compensated flow rate (7 digits, 17 mm high) Compensated total (7 digits, 17 mm high) resettable Accumulated total (11 digits, 8 mm high) not resettable
Units:	Flow: m ³ , cf, scf, Nm ³ Time units: /sec, /min, /hr, /day Total: m ³ Accumulated total: m ³
Decimal places:	Flow: 0, 1, 2 or 3 Total: 0, 1, 2 or 3 Accumulated total: according to selection for total
Backlighting:	yes
Signal input:	Flow: DOG-4 sensor
Power supply:	
G/H:	230 V _{AC} ± 10 %, 50...60 Hz
I0/K0:	110 V _{AC} ± 10 %, 50...60 Hz
L0:	24 V _{DC} ± 20 %
Electrical connection:	4 x M16 x 1.5 cable gland
Housing material:	ABS with PC cover
Weight:	approx. 1800 g
Analogue output:	4...20 mA (active) 10-Bit resolution, 3-wire
Pulse output:	PNP, 24 V _{DC} active max. 50 mA, scaled according to linearised accumulated total (e.g. pulse every 12 liters) Pulse duration: user defined 0.008 s...2 s max. frequency: 64 HZ
Protection:	IP65
Mounting:	Wall mounting
Data protection:	EEPROM backup, backup of running totals every minute, Data retention at least 10 years
Communication:	Modbus RTU RS485 2-wire (optional, other Modbus versions on request)

Electronic Options DOG-...M0/N0/O0/P0

(Transducer without/with ATEX certification and Flow computer)

Display:	Alphanumeric LCD, UV-resistant with Displayed functions: Compensated Flow rate (7 digits, 17 mm high) Compensated total: (7 digits, 17 mm high) resettable Accumulated total (11 digits, 8 mm high) not resettable Actual line temperature (6 digits) Actual line pressure (6 digits)
Units:	Flow: m ³ , cf, scf, Nm ³ Time units: /sec, /min, /hr, /day Total: m ³ Accumulated total: m ³ Temperature: °C, °F, or K Pressure: mbar, bar PSI
Decimals:	Flow: 0, 1, 2 or 3 Total: 0, 1, 2 or 3 Accumulated total: according to selection for total Temperature/Pressure: 1
Backlighting:	yes
Signal input:	Flow: DOG-4 sensor Temperature: PT100, 2- or 3-wire Pressure: 0(4)...20 mA (passive), 14-Bit resolution, 2- or 3-wire
Power supply:	
M/N:	230 V _{AC} ± 10 %, 50...60 Hz
O/P:	110 V _{AC} ± 10 %, 50...60 Hz
Electrical Connection:	5 x M16 x 1.5 cable gland
Housing material:	ABS with PC cover
Weight:	approx. 1800 g
Analogue output:	4...20 mA (active), 10-Bit resolution, 3-wire
Pulse output:	PNP, 24 VDC active max. 50 mA, scaled according to linearised accumulated total (e.g. pulse every 12 liters) Pulse duration: user defined 0.001 s...10 s max. frequency 500 Hz
Protection:	IP65
Mounting:	Wall mounting
Data protection:	EEPROM backup, backup of running totals every minute, Data retention at least 10 years
Communication:	Modbus RTU RS485 2-wire (optional, other Modbus versions on request)

DOG-4

Display



Note: Temperature and pressure sensors are not included in scope of delivery.

15. Order Details

Order details for DOG-4 (Example: DOG-4200 S 50 0 A0 0)

Measuring range air [m ³ /h]	Model Material st. steel	Pressure rating [PN]	Connection flange [size/type]	Ball valve	Electronics	Options
0,12...12	DOG-42S0S25..	10...40 bar	DN25	0 = without ball valve 1 = with ball valve	B0 = Frequency output, 230 V _{AC} A0 = as 'B', with ATEX/IECEX G0 = Unit counter, pulse output, analogue output, 230 V _{AC} H0 = as 'G', with ATEX/IECEX M0 = Flow computer, pulse output, analogue output, 230 V _{AC} N0 = as 'M', with ATEX/IECEX C0 = as 'B0', 110 V _{AC} D0 = as 'A0', 110 V _{AC} E0 = as 'B0', 24 V _{AC} F0 = as 'A0', 24 V _{AC} R0 = as 'B0', 24 V _{DC} I0 = as 'G0', 110 V _{AC} K0 = as 'I0', 110 V _{AC} L0 = as 'G0', 24 V _{DC} O0 = as 'M0', 110 V _{AC} P0 = as 'N0', 110 V _{AC} Y0 = Special (specify in clear text)	0 = without Y = Special option (specify in clear text)
	DOG-42S0S40..		DN40			
	DOG-42S0S50..		DN50			
	DOG-42S0B25..	Klasse 300	ANSI 1"			
	DOG-42S0B40..		ANSI 1½"			
	DOG-42S0B50..		ANSI 2"			
0.2...20	DOG-4200S25..	10...40 bar	DN25			
	DOG-4200S40..		DN40			
	DOG-4200S50..		DN50			
	DOG-4200B25..	Class 300	ANSI 1"			
	DOG-4200B40..		ANSI 1½"			
	DOG-4200B50..		ANSI 2"			
0.35...35	DOG-4250S25..	10...40 bar	DN25			
	DOG-4250B25..	Class 300	ANSI 1"			
0.7...70	DOG-42A0S25..	10...40 bar	DN25			
	DOG-42A5B25..	Class 300	ANSI 1"			
0.9...90	DOG-42A5S40..	10...40 bar	DN40			
	DOG-42A5B40..	Class 300	ANSI 1½"			
1.1...110	DOG-42B0S50..	10...40 bar	DN50			
	DOG-42B0B50..	Class 300	ANSI 2"			
1.4...140	DOG-42B5F80..	16 bar	DN80			
	DOG-42B5S80..	40 bar	DN80			
	DOG-42B5A80..	Class 150	ANSI 3"			
	DOG-42BFB80..	Class 300	ANSI 3"			
2...200	DOG-42C0S40..	10...40 bar	DN40			
	DOG-42C0B40..	Class 300	ANSI 1½"			
2.5...250	DOG-42C5S50..	10...40 bar	DN50			
	DOG-42C5B50..	Class 300	ANSI 2"			
2.7...270	DOG-42D0F1H..	16 bar	DN100			
	DOG-42D0S1H..	40 bar	DN100			
	DOG-42D0A1H..	Class 150	ANSI 4"			
	DOG-42D0B1H..	Class 300	ANSI 4"			
4.5...450	DOG-42D5F80..	16 bar	DN80			
	DOG-42D5S80..	40 bar	DN80			
	DOG-42D5A80..	Class 150	ANSI 3"			
	DOG-42D5B80..	Class 300	ANSI 3"			
6.0...600	DOG-42E0F1F..	16 bar	DN150			
	DOG-42E0S1F..	40 bar	DN150			
	DOG-42E0A1F..	Class 150	ANSI 6"			
	DOG-42E0B1F..	Class 300	ANSI 6"			
6.5...650	DOG-42E5F1H..	16 bar	DN100			
	DOG-42E5S1H..	40 bar	DN100			
	DOG-42E5A1H..	Class 150	ANSI 4"			
	DOG-42E5B1H..	Class 300	ANSI 4"			

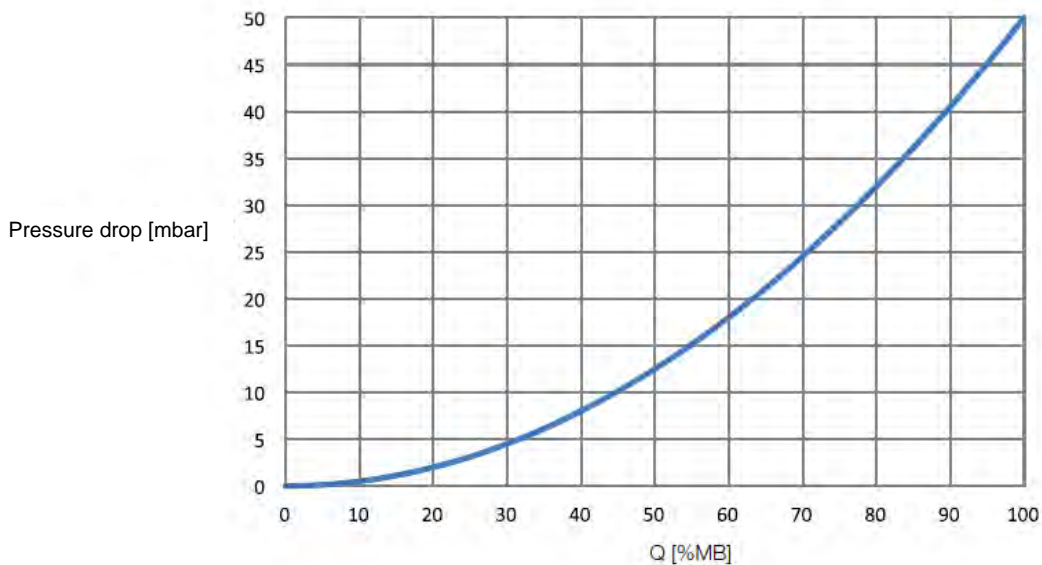
DOG-4

Order details for DOG-4 (Example: DOG-4200 S 50 0 A0 0) (continuation)

Measuring range air [m ³ /h]	Model Material st. steel	Pressure rating [PN]	Connection flange [size/type]	Ball valve	Electronics	Options
8.0...800	DOG-42F0F80..	16 bar	DN80	0 = without ball valve 1 = with ball valve	B0 = Frequency output, 230 V _{AC} A0 = as 'B', with ATEX/IECEx G0 = Unit counter, pulse output, analogue output, 230 V _{AC} H0 = as 'G', with ATEX/IECEx M0 = Flow computer, pulse output, analogue output, 230 V _{AC} N0 = as 'M', with ATEX/IECEx C0 = as 'B0', 110 V _{AC} D0 = as 'A0', 110 V _{AC} E0 = as 'B0', 24 V _{AC} F0 = as 'A0', 24 V _{AC} R0 = as 'B0', 24 V _{DC} I0 = as 'G0', 110 V _{AC} K0 = as 'I0', 110 V _{AC} L0 = as 'G0', 24 V _{DC} O0 = as 'M0', 110 V _{AC} P0 = as 'N0', 110 V _{AC} Y0 = Special (specify in clear text)	0 = without Y = Special option (specify in clear text)
	DOG-42F0S80..	40 bar	DN80			
	DOG-42F0A80..	Class 150	ANSI 3"			
	DOG-42F0B80..	Class 300	ANSI 3"			
10...1000	DOG-42F5F1H..	16 bar	DN 100			
	DOG-42F5S1H..	40 bar	DN 100			
	DOG-42F5A1H..	Class 150	ANSI 4"			
	DOG-42F5B1H..	Class 300	ANSI 4"			
12...1200	DOG-42G0F1F..	16 bar	DN 150			
	DOG-42G0S1F..	40 bar	DN 150			
	DOG-42G0A1F..	Class 150	ANSI 6"			
	DOG-42G0B1F..	Class 300	ANSI 6"			
	DOG-42G0E2H..	10 bar	DN 200			
	DOG-42G0F2H..	16 bar	DN 200			
	DOG-42G0S2H..	40 bar	DN 200			
	DOG-42G0A2H..	Class 150	ANSI 8"			
25...2500	DOG-42G0B2H..	Class 300	ANSI 8"			
	DOG-42G5E2H..	10 bar	DN 200			
	DOG-42G5F2H..	16 bar	DN 200			
	DOG-42G5S2H..	40 bar	DN 200			
	DOG-42G5A2H..	Class 150	ANSI 8"			
30...3000	DOG-42G5B2H..	Class 300	ANSI 8"			
	DOG-42H0F1F..	16 bar	DN 150			
	DOG-42H0S1F..	40 bar	DN 150			
	DOG-42H0A1F..	Class 150	ANSI 6"			
60...6000 ¹⁾	DOG-42H0B1F..	Class 300	ANSI 6"			
	DOG-42H5E2H..	10 bar	DN200			
	DOG-42H5F2H..	16 bar	DN 200			
	DOG-42H5S2H..	40 bar	DN 200			
	DOG-42H5A2H..	Class 150	ANSI 8"			
Special	DOG-42YYYYY..	Sonder	Sonder			

¹⁾ Calibrated up to 4000 m³/h. Higher flow rate calibration on request.

16. Pressure Loss/Flow



The diagram applies for gases with a density of air at NPT (0 °C and 1013.25 mbar). The pressure loss is always proportional to the density of the gas. For example, the pressure loss doubles at 100% higher operating pressure.

Calculating the Actual Density

The actual density can be calculated with the following formula:

$$D = \frac{D_0 \cdot P \cdot T_0}{T}$$

D0 = density at 1 bar abs. and 0 °C (= 273 K) T = temperature in K

(= °C + 273 for example 20 °C = 273 + 20 = 293 K) T0 = 273 K

P = operating pressure in bar (absolute pressure)

Calculating the Norm Flow

$$Q_N = Q \cdot \frac{P \cdot 273}{1.013 \cdot T}$$

QN = norm flow at 1.013 bar abs. and 0 °C

Q = operating flow

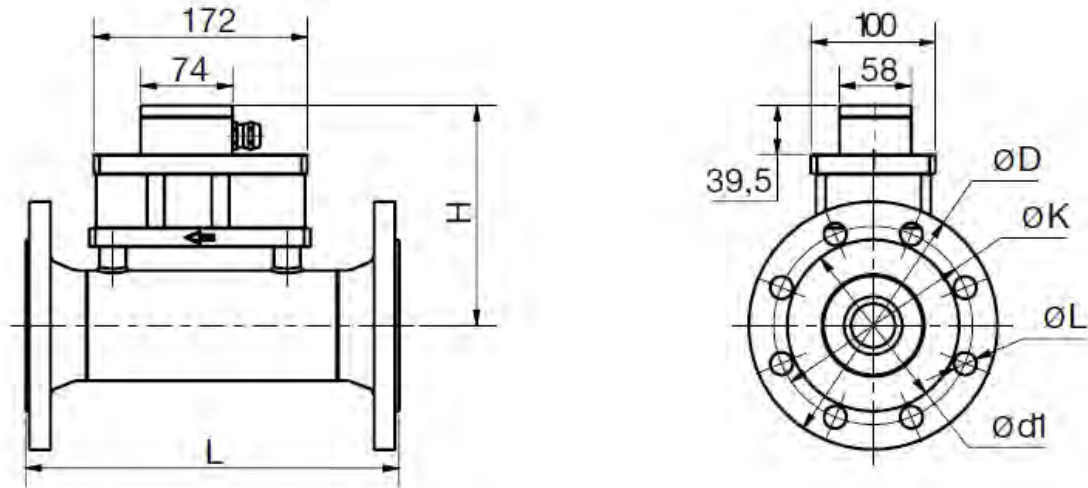
P = operating pressure in bar (absolute pressure)

T = operating temperature in K

DOG-4

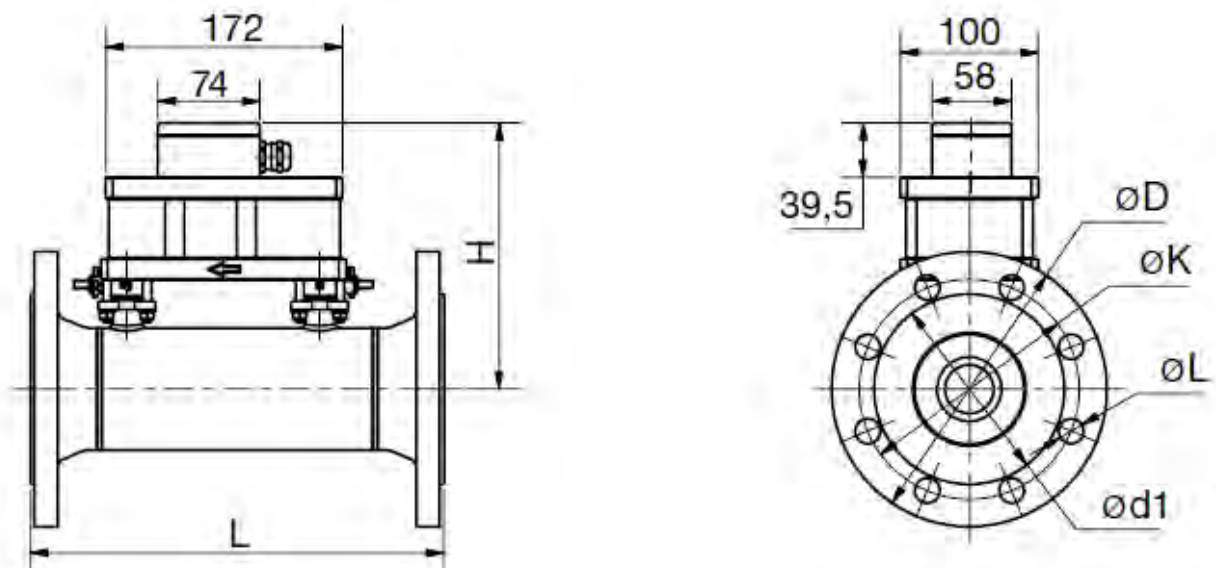
17. Dimensions

Dimensions and Weights DOG-4 (without ball valve)



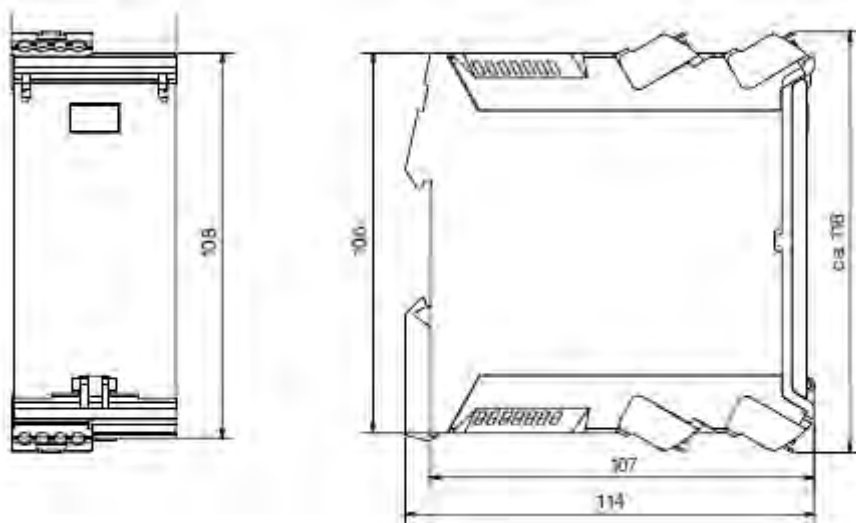
Dimensional details without ball valve									
DN [mm]	L (Length) [mm]	H (Height) [mm]	øD (outer ø) [mm]	øK (pitch circle) [mm]	øL (hole ø) [mm]	Ød1 (sealing surface) [mm]	No. of screws	Screw size	Weight [kg]
25	300	150	115	85	14	68	4	M12	8,1
40	300	158	150	110	18	88	4	M16	10
50	300	164	165	125	18	102	4	M16	11,6
80	300	178	200	160	18	138	8	M16	14,4
100	320	191	220	180	18	58	8	M16	16,6
150	320	218	285	240	22	212	8	M20	24,8
200	320	243	340	295	22	268	8	M20	35,8

Dimensions and Weights DOG-4 (with ball valve)

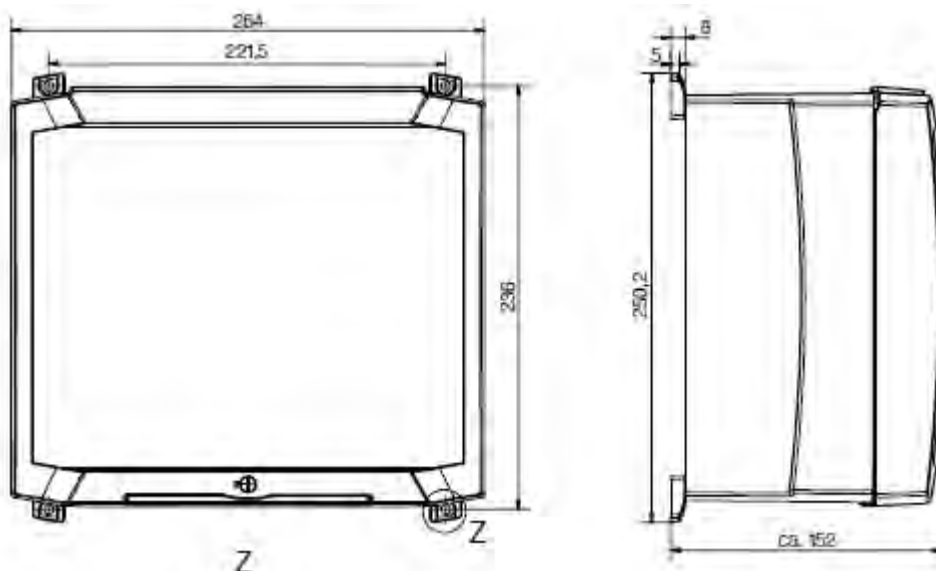


Dimensional details with ball valve									
DN [mm]	L (Length) [mm]	H (Height) [mm]	øD (outer ø) [mm]	øK (pitch circle) [mm]	øL (hole ø) [mm]	Ød1 (sealing surface) [mm]	No. of screws	Screw size	Weight [kg]
25	300	166	115	85	14	68	4	M12	8,5
40	300	174	150	110	18	88	4	M16	10,4
50	300	180	165	125	18	102	4	M16	12
80	300	194	200	160	18	138	8	M16	14,8
100	320	207	220	180	18	58	8	M16	16,9
150	320	234	285	240	22	212	8	M20	25,3
200	320	259	340	295	22	268	8	M20	36,3

Dimensions Electronics DOG-...A/B



Dimensions Electronics DOG-...G/H/M/N



Accessories (optional)

- Replacement sensor
- Sealing for oscillator
- Recalibration set for transmitter

18. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Oscillation Flowmeter Model: DOG-4

to which this declaration relates is in conformity with the standards noted below:

EN 61326:2013-07 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 13480-1:2013-11 Metallic industrial piping - Part 1: General

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

zusätzlich **DOG-4...A/H/N/D/F/P:**

EN 60079-0:2014-06 Explosive atmospheres - Part 0: Equipment – General requirements

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

EN 60079-26:2007 Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga

Also the following EU guidelines are fulfilled:

2014/30/EU EMC Directive

2014/35/EU Low Voltage Directive

2011/65/EU RoHS (category 9)

2014/68/EU PED

- Category III (IV) Diagram 1, vessel, group 1 dangerous fluids
- Module D, marking CE0575
- Notified body: DNV GL
- Certificate No. PEDD000000R

additional **DOG-4...A/H/N/D/F/P:**

2014/34/EU Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX 100a)
Production quality assurance
Certification no.: BVS 15 ATEX ZQS / E 110
Notified body: DEKRA EXAM
Identification no.: 0158



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 31. July 2018


19. ATEX-Certificate



Translation

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

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC
- (3) No. of EC-Type Examination Certificate: **BVS 13 ATEX E 020 X**
- (4) Equipment: **Flow measuring system type DOG-4**
- (5) Manufacturer: **KOBOLD Messring GmbH**
- (6) Address: **Nordring 22-24, 65719 Hofheim/Ts., Germany**
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this type examination certificate.
- (8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 13.2048 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:
 - EN 60079-0:2012 General requirements**
 - EN 60079-11:2012 Intrinsic safety 'i'**
 - EN 60079-26:2007 Equipment with equipment protection level (EPL) Ga**
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the appendix to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the equipment shall include the following:


II (1) G [Ex ia Ga] IIC for reader type DOG-4A
II 1 G Ex ia IIC T4 Ga for sensor type DOG-4S

DEKRA EXAM GmbH
 Bochum, dated 22nd February 2013

Signed: Simanski

Signed: Dr. Eickhoff

Certification body

Special services unit



(13) Appendix to

(14) **EC-Type Examination Certificate**
BVS 13 ATEX E 020 X

(15) 15.1 Subject and type

Flow measuring system type DOG-4,
consisting of a reader type DOG-4A and a sensor type DOG-4S

15.2 Description

The flow measuring system is intended for flow measuring of gaseous media.
The flow system consists of a reader which has to be mounted outside the hazardous area and a flow sensor; both apparatus can be connected via an up to 100 m long cable.

15.3 Parameters

15.3.1 Reader type DOG-4A

15.3.1.1 Mains circuit (terminals X100:2 and X100:4)

Nominal voltage		AC	230	V
max. voltage	Um	AC	253	V

15.3.1.2 Power supply (sensor) circuit (terminals X201:1 and X201:3), level of protection Ex ia IIC

Voltage	Uo	DC	8.6	V
Current	Io		925	mA
Power	Po		1.17	W

trapezoid output characteristic

15.3.1.3 Floating opto coupler output circuit (terminals X200:3 and X200:4),
level of protection Ex ia IIC

Voltage	Ui	DC	30	V
effective internal capacitance	Ci		negligible	
effective internal inductance	Li		negligible	

15.3.1.4 Ambient temperature range

Ta	-20 °C up to +60 °C
----	---------------------

15.3.2 Sensor type DOG-4S

Ambient temperature range	Ta	-20 °C up to +60 °C
---------------------------	----	---------------------

(16) Test and assessment report

BVS PP 13.2048 EG as of 22nd February 2013

(17) Special conditions for safe use

- 17.1 The sensor has to be mounted in areas where ignition hazard due to impact or friction will be excluded.
- 17.2 The sensor has to be mounted in areas where electrostatic charging/discharging hazard will be excluded.
- 17.3 The connecting cable has to be in a fixed installation if the ambient temperature is below -5 °C.



We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 22nd February 2013
BVS-Schu/Ma A 20120869

Certification body

Special services unit



Translation

EU-Type Examination Certificate Supplement 1

Change to Directive 2014/34/EU

- 2 **Equipment intended for use in potentially explosive atmospheres**
Directive 2014/34/EU
- 3 EU-Type Examination Certificate Number: **BVS 13 ATEX E 020 X**
- 4 Product: **Flow measuring system type DOG-4**
- 5 Manufacturer: **KOBOLD Messring GmbH**
- 6 Address: **Nordring 22-24, 65719 Hofheim/Ts., Germany**

7 This supplementary certificate extends EC-Type Examination Certificate No. BVS 13 ATEX E 020 X to apply to products designed and constructed in accordance with the specification set out in the appendix of the said certificate but having any acceptable variations specified in the appendix to this certificate and the documents referred to therein.

8 DEKRA EXAM GmbH, Notified Body number 0158, 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 Report No. BVS PP 13.2048 EU.

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0:2012 + A11:2013 General requirements
EN 60079-11:2012 Intrinsic Safety "i"
EN 60079-26:2015 Equipment with equipment protection level (EPL) Ga

10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Special Conditions for Use specified in the appendix 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 (1) G [Ex ia Ga] IIC** for type transmitter DOG-4
II 1 G Ex ia IIC T4 Ga for type sensor DOG-4

DEKRA EXAM GmbH
Bochum, 2016-10-31

Signed: Jörg Koch

Certifier

Signed: Dr. Michael Wittler

Approver



Page 1 of 3 of BVS 13 ATEX E 020 X / N1
This certificate may only be reproduced in its entirety and without any change.

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com



13 **Appendix**

14 **EU-Type Examination Certificate**

**BVS 13 ATEX E 020 X
Supplement 1**

15 **Product description**

15.1 **Subject and type**

Flow measuring system type DOG-4,
consisting of a type transmitter DOG-4 and a type sensor DOG-4

15.2 **Description**

The flow measuring system is intended for flow measuring of gaseous media.

The flow system consists of a transmitter which has to be mounted outside the hazardous area and a flow sensor; both apparatus can be connected via an up to 100 m long cable.

With this supplement the certificate is changed to Directive 2014/34/EU.

(Annotation: In accordance with Article 41 of Directive 2014/34/EU, EC-Type Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Supplementary Certificates to such EC-Type Examination Certificates, and new issues of such certificates, may continue to bear the original certificate number issued prior to 20 April 2016.)

Reason for the supplement:

Change to Directive 2014/34/EU

Two new variants with mains voltages 110 V and 24 V are possible

15.3 **Parameters**

15.3.1 **Type transmitter DOG-4**

15.3.1.1 **Mains circuit (terminals X100:2 and X100:4)**

Nominal voltage		AC	230	V
	or	AC	110	V
	or	AC	24	V
max. voltage	U_m	AC	253	V

15.3.1.2 **Power supply (sensor) circuit (terminals X201:1 and X201:3), level of protection Ex ia IIC**

Voltage	U_o	DC	8.6	V
Current	I_o		925	mA
Power	P_o		1.17	W

trapezoid output characteristic

15.3.1.3 **Floating opto coupler output circuit (terminals X200:3 and X200:4), level of protection Ex ia IIC**

Voltage	U_i	DC	30	V
Effective internal capacitance	C_i		negligible	
Effective internal inductance	L_i		negligible	

15.3.1.4 **Ambient temperature range**

T_a -20 °C up to +60 °C

15.3.2 **Type sensor DOG-4**

Ambient temperature range T_a -20 °C up to +60 °C



Page 2 of 3 of BVS 13 ATEX E 020 X / N1
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DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com



16 **Report Number**

BVS PP 13.2048 EU, as of 2016-10-31

17 **Special Conditions for Use**

The sensor has to be mounted in areas where ignition hazard due to impact or friction will be excluded.

The sensor has to be mounted in areas where electrostatic charging/discharging hazard will be excluded.

The connecting cable has to be in a fixed installation if the ambient temperature is below -5 °C.

18 **Essential Health and Safety Requirements**

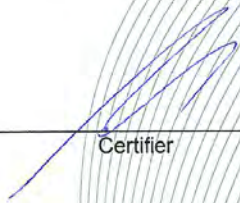
The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 **Drawings and Documents**


Drawings and documents are listed in the confidential report.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
Bochum, dated 2016-10-31
BVS-Schu/Nu A 20160043



Certifier



Approver


Page 3 of 3 of BVS 13 ATEX E 020 X / N1
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DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

20. IECEx-Certificate

		<h2 style="text-align: right;">IECEx Certificate of Conformity</h2>	
<p>INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres <small>for rules and details of the IECEx Scheme visit www.iecex.com</small></p>			
Certificate No.:	IECEx BVS 13.0035X	issue No.:1	Certificate history: Issue No. 1 (2016-11-4) Issue No. 0 (2013-3-1)
Status:	Current		
Date of Issue:	2016-11-04	Page 1 of 4	
Applicant:	KOBOLD Messring GmbH Nordring 22-24 65719 Hofheim/Ts. Germany		
Equipment: Optional accessory:	Flow measuring system type DOG-4		
Type of Protection:	Equipment protection by intrinsic safety "I", Equipment with Equipment Protection Level (EPL) Ga		
Marking:	[Ex ia Ga] IIC for type transmitter DOG-4 Ex ia IIC T4 Ga for type sensor DOG-4		
Approved for issue on behalf of the IECEx Certification Body:	J. Koch		
Position:	Head of Certification Body		
Signature: (for printed version)			
Date:			
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 the Official IECEx Website .			
Certificate issued by:			
DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany		On the safe side.	

		<h2 style="margin: 0;">IECEX Certificate of Conformity</h2>	
Certificate No.:	IECEX BVS 13.0035X	Issue No.:	1
Date of Issue:	2016-11-04	Page 2 of 4	
Manufacturer:	KOBOLD Messring GmbH Nordring 22-24 65719 Hofheim/Ts. Germany		
Additional Manufacturing location(s):			
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 electrical apparatus 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 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements		
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"		
IEC 60079-26 : 2014- Edition: 3.0	Explosive atmospheres – Part 26: Equipment with Equipment Protection Level (EPL) Ga 10		
<i>This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.</i>			
TEST & ASSESSMENT REPORTS: A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in			
<u>Test Report:</u> DE/BVS/ExTR13.0034/01			
<u>Quality Assessment Report:</u> DE/BVS/QAR09.0001/07			



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Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

General product information:

The flow measuring system is intended for flow measuring of gaseous media.
 The flow system consists of a transmitter which has to be mounted outside the hazardous area and a flow sensor; both apparatus can be connected via an up to 100 m long cable.

Parameters

See Annex

SPECIFIC CONDITIONS OF USE: YES as shown below:

- The sensor has to be mounted in areas where ignition hazard due to impact or friction will be excluded.
- The sensor has to be mounted in areas where electrostatic charging/discharging hazard will be excluded.
- The connecting cable has to be in a fixed installation if the ambient temperature is below -5 °C.

	IECEX Certificate of Conformity	
Certificate No.:	IECEX BVS 13.0035X	
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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):		
<p>Two variants have been added: variants with nominal mains voltage of AC 110 V and with nominal mains voltage of AC 24 V (marking of mains voltage on the label).</p>		

Annex: [BVS_13_0035X_Kobold_Annex_issue_1.pdf](#)