

Instruction Manual

Vortex Sensors VA Di



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1 Safety Symbols



Warning! Non-observance of the instructions can result in serious injury to persons and damage to property!



Important notice! Non-observance can result in serious damage to the appliance or restriction in performance!

2 Operating Safety



All the following steps are to be carried out by qualified staff only!

Before unpacking the appliance please read the instruction manual carefully!

Safety can only be guaranteed if the appliance is operated in accordance with the requirements. Inappropriate handling can result in serious injury to persons and damage to the appliance!

3 Planning / Layout



3.1 Use in explosive atmospheres



Approved appliances only may be used in explosive atmospheres. Particular attention should be given to Ch. 5, 'Instruction Manual Measuring Tubes VA Di for explosive atmospheres.



3.2 Positioning

The positioning of the VA Di must be carefully selected to ensure optimum measurement accuracy. With this in mind, it is necessary to select the place of measurement so that a fully developed, turbulent flow profile prevails in the measurement cross section and in addition the flow is irrotational. The minimum length of the input/output sections necessary for this depends on the individual pipeline duct.

For notes on installation please refer to Figure 3.2-1.

If no sufficiently long input/output sections are available, then the existing section is to be divided into the equal input/output section ratio, see equivalents in Fig. 3.2-1. In addition, use of a flow straightener GL Di ... can considerably reduce the input section (see Data Sheet VA Di_D_e, Accessories).

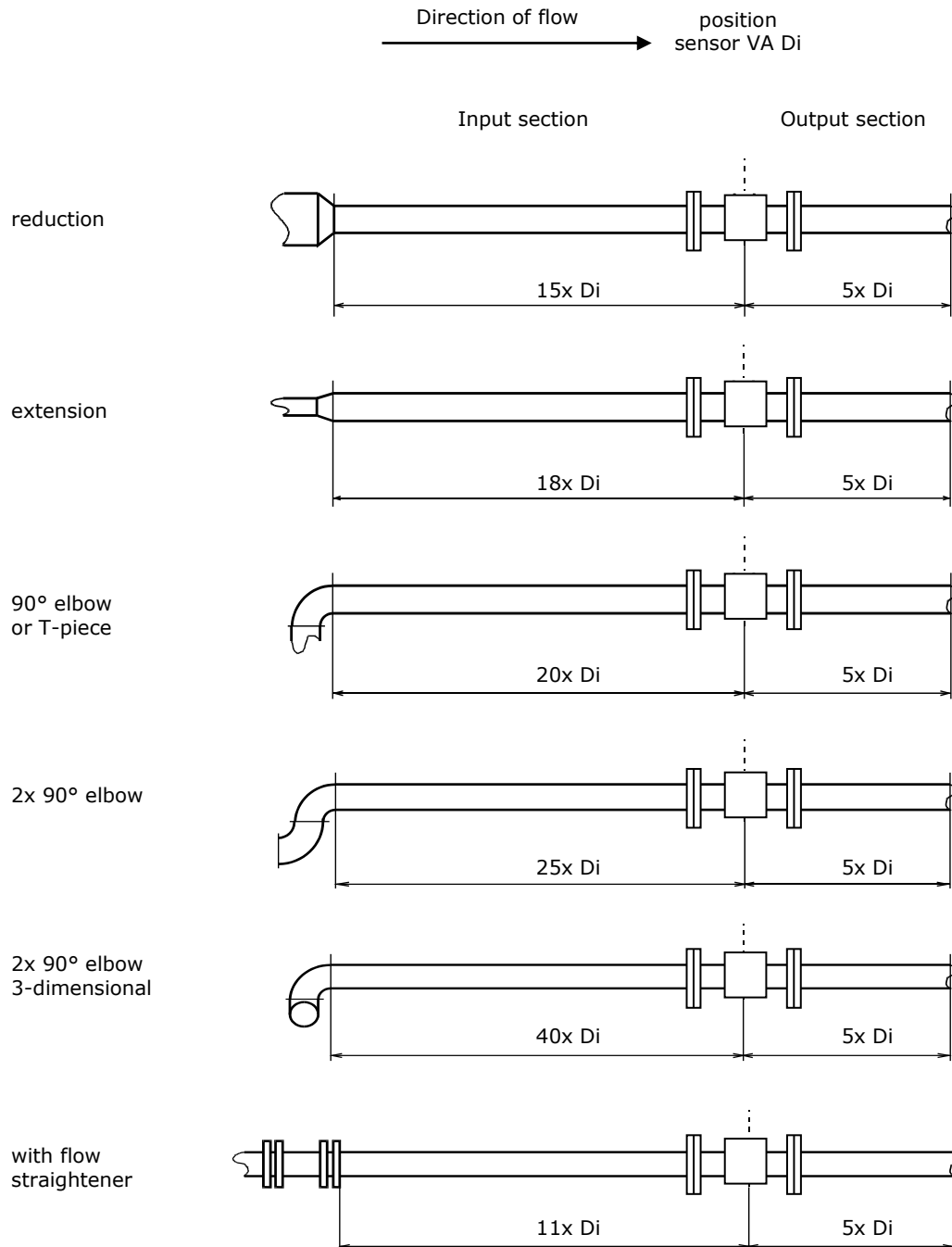


Fig. 3.2-1: necessary input/output sections dependent on the pipeline duct

4 Delivery

Please check that all goods received comply with the list in the Technical Data Sheet supplied with this consignment, paying special attention to any small parts (e.g. sets of screws, seals).

4.1 Essential accessories

An assembly kit is necessary for mechanical installation and this can be ordered from Höntzsch.

sensor type	screw size	number of screws
VA Di 40 ...	M16	4
VA Di 50 ...	M16	4
VA Di 80 ...	M16	8
VA Di 100 ...	M16	8

The choice of screw length depends on the positioning place. The thickness of the sensor flange is indicated in Data Sheet VA Di_D_e.

The assembly kit, consisting of screws, nuts, plain washers and standard flat gasket made of NBR reinforced with aramide fibres can be ordered from Höntzsch. Should this gasket prove unsuitable because of operating conditions, then a replacement with appropriate properties must be used.



5 Instruction Manual Measuring Tubes VA Di for explosive atmospheres (VA40 Z0 approval)

5.1 Apparatus Vortex flow sensors VA as measuring tube VA Di

These are intrinsically safe sensors for measuring the flow velocity of gases and designed for use in areas in which an explosive gas atmosphere is present continuously, or is present for long periods or frequently.



5.2 Safety precautions

Please read this Instruction Manual carefully before initial operation!
Non-compliance can cause an explosion.

The apparatus may be used only in category 1/2G and 2G areas, in which the ambient temperature for temperature classes T6 +40 °C, T5 +55 °C and T4 +90 °C, as marked on the type plate and in the corresponding technical documents, is not exceeded.

The temperature of the medium in category 1/2G areas must not exceed +60 °C under atmospheric pressure. The maximum admissible temperature of the medium in category 2G areas corresponds to the temperature class. In category 1/2D and 2D areas self-heating need not be considered. Always refer to the type plate and corresponding technical documents.

The gas container for the medium is to be insulated in such a way as to ensure that the electronics housing of the apparatus does not take on temperatures exceeding the above mentioned maximum ambient temperatures, taking radiant and convective heat into account.

VA Di measuring tubes for applications in explosive atmospheres may be used only in areas in which the gas temperature, ambient temperature and maximal permissible overpressure of 10 bar/1 MPa, as marked on the type plate, are not exceeded.

Sensors for applications in pressurized pipelines are to be inserted and retracted in depressurized conditions only. Non-observance can result in serious harm to personnel.

VA Di for explosive atmospheres may be connected to auxiliary electrical equipment with intrinsically safe isolation/supply unit only, so that the ratings in 5.3.1 are not exceeded.

5.3 Technical data

EC type examination certificate: **IBExU 03 ATEX 1065 X**

Marking

CE₀₆₃₇  **II 1/2 G**

Explosion protection: **Ex ia IIC T6 Ga/Gb**

Marking

CE₀₆₃₇  **II 1/2 D**

Explosion protection: **Ex ia IIIC TX Da/Db**

X: There are certain special factors to be observed for applications in explosive atmospheres (see under 5.2)

5.3.1 Electrical data

Operation range concerning safety specifications:

$U_i \leq 11 \text{ V}$, $I_i \leq 40 \text{ mA}$, $P_i \leq 224 \text{ mW}$



5.4 Installation

The current European Specifications for Assembly, the recognised standards of good practice and this Instruction Manual apply.

Cable glands M16 thread are used for cables with an exterior diameter of 5 ... 10 mm. The cable gland is to be tightened with a torque of 4 Nm.

The terminals are for wires with a cross-section of 0.5 ... 2.5 mm², AWG 20 to 16. Wire end sleeves must be used. Bare wires must not be visible after installation. The connection cables used must be usable for the temperature range of -25 ... +80 °C.

Refer to the currently valid regulations to ensure localized potential equalization. A protective ground terminal on the terminal box of the apparatus serves this purpose.

The earth terminal is designed for cross-sections of 1.5 ... 10 mm². Use a cable lug. The torque for fixture to the earth terminal must amount to 2 ... 3 Nm.



5.5 Cleaning / Maintenance

Sensors should be cleaned at regular intervals (see 14).

Any covering of dust on the electronic housing may not exceed 5 mm.

Any other maintenance or repair work is to be carried out solely by Höntzsch GmbH & Co. KG.



6 Installation

The current European Specifications for Assembly, the recognised standards of good practice and this Instruction Manual apply.

Before detaching the pipeline please ensure that it is in a depressurized state!

When installing the sensor the pipeline should be divided in such a way so that after fixing the mounting flange on the pipe side the notch width is 200 mm + 2 x sealing thickness.
The pipe-side flanges are to be fixed so that the borings are aligned to avoid discontinuous diameter variations in the pipe interior. Lap-joint flanges with welding stub are recommended.

Please ensure that the VA Di measuring tubes are secured safely in order to avoid injury to personnel.

A support may be necessary, depending on the dimensions of the sensor (see Data Sheet VADi_D_e) and thickness of the pipeline.

The sensor is to be installed so that the arrow on the connection housing points in the direction of flow.

The fitting position is exposed with vertical pipeline duct. To ensure that the sensor with horizontal pipeline duct remains operative even when affected by moderate condensation, the appliance should be installed with the connection housing pointing sideways.

When inserting the seal take care that the fit is concentric. If the seal is fitted off-centre it may cause faulty flow and impair the measurement accuracy.

The screws for securing the flange are to be tightened uniformly in two to three stages "crosswise". The starting torque is to be selected so that the permissible surface pressure of the flat gasket is not exceeded and maximum tightness is guaranteed.

The tightness of the flange connection is to be carefully checked before initial operation.

If the medium shows a temperature of over +80 °C, the pipeline is to be insulated on the outside so that the connection housing does not take on temperatures above +80 °C. In addition it can be useful if the sensor is installed with horizontal connection housing at pipeline height. This ensures that the housing is not additionally heated by convection of the rising hot ambient air.

7 Electrical Connection

7.1 Wiring diagrams

Before applying the supply voltage with VA Di with integrated transducer, check if this is within the specifications.

Data relating to the supply voltage is found on the type plate on the connection housing of the sensor.

In the case of measuring tubes VA Di with separate transducer, these are fed by the evaluation unit.



Power connection must be carried out according to the accompanying wiring diagram. **Faulty connection can lead to destruction of the electronics.**

Depending on the configuration of the appliance one of the following wiring diagrams must be followed. Wiring diagrams for measuring tubes VA Di in customized designs are supplied separately.

Integrated transducer:

see Operating Instructions U326_UVAintAS102_B_e

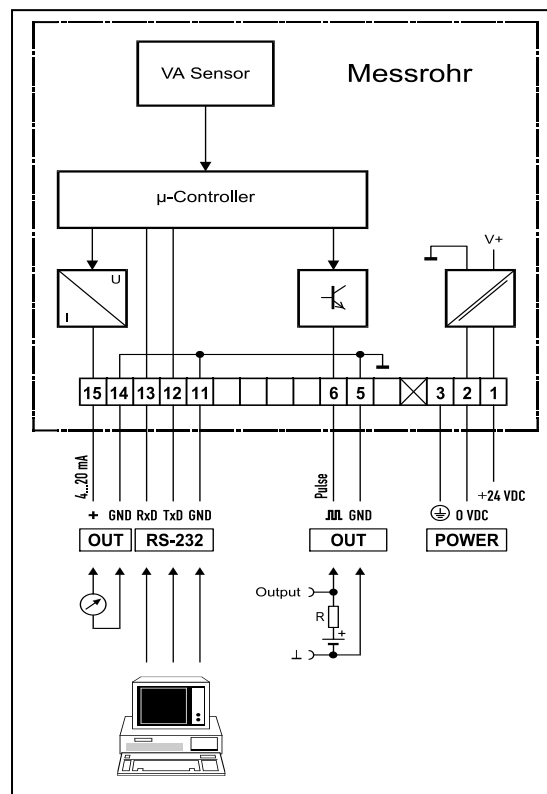


Fig. 7.1-1: VA Di with integrated transducer (without ATEX protection)

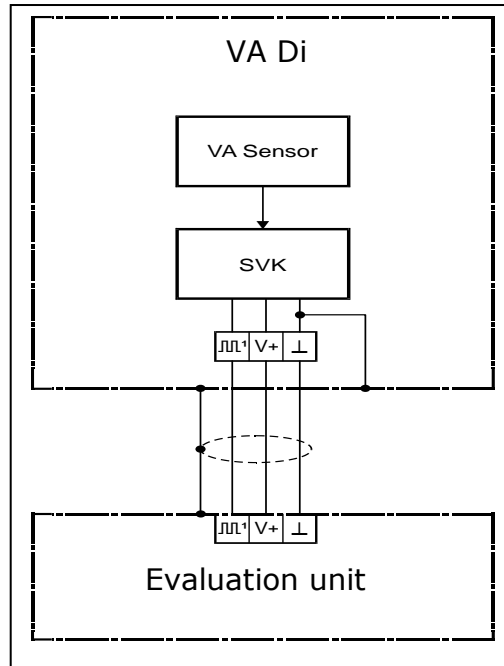


Fig. 7.1-2: VA Di with separate evaluation unit μ P-Vortex or VTP-VA (without ATEX protection)

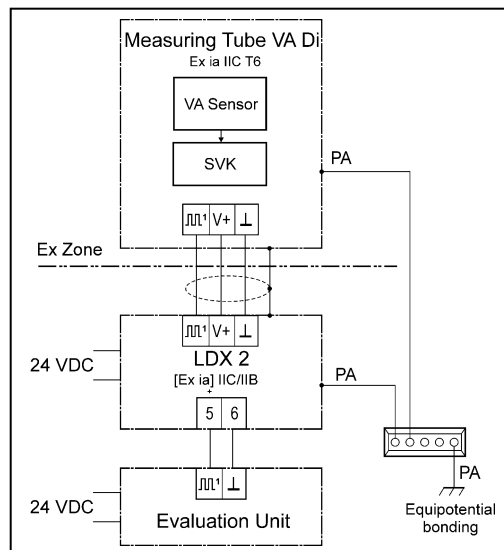


Fig. 7.1-3: VA Di with ATEX protection with isolation/supply unit LDX2 and separate evaluation unit μ P-Vortex or VTP-VA

After feeding the supply voltage the appliance is operative. With a flow below the smallest measurable value, 4 mA is on the analog output. In the case of evaluation units with display at zero flow – depending on the setting - '0 m/s', '0 m³/h' or '0 Nm³/h' is displayed. With flow values above the initial value the output signal must change proportionally to the adjacent flow. The equivalent applies to the display value for evaluation units with display.



7.2 Tips on Electromagnetic Compatibility (EMC)

- All transmission cables are to be kept as short as possible.
- In the case of electromagnetic disturbance in the cable path the use of shielded cable is recommended
- Do not lay any circuit loops!
- Lay both sides of non-used wires of a cable on protection potential.
- Lay cables as close to the reference potential as possible, for example side panels, mounting plates or steel girders.
- When using frequency converters there is a risk of HF disturbance emissions. Therefore, decouple the mains input of the frequency converter with a radio interference suppression filter against active disturbance emissions. This also increases the passive immunity of the system.
- Between motors and frequency converters only use shielded motor cables which are shielding-coated on both sides.
- Cables which transmit interference should be kept as far away as possible from measuring lines and evaluation units. If necessary, lay measuring lines in a metallic protective conduit.
- Metallic parts in service cabinets, such as sub-racks with control electronics or mounting plates – ensure HF-wise highly conductive connection over a large area.
- Wire relays, contactors, electro valves in the same wiring system using spark extinguisher combinations or excess-voltage limiting components.
- Place the shielding of the analog output signal lines one-sided only – preferably on the evaluation unit – and of low impedance. Twist non-shielded lines against balanced source terminal interference.
- Place the shielding of digital signal lines on both sides over a large area. In the case of potential differences between these points, the laying of a separate equipotential bonding conductor is recommended

7.3 Transmission cables

Integrated transducer

see Operating Instructions U326_UVAintAS102_B_e

External evaluation unit

For connection between sensor and evaluation unit LiYCY cable with simple copper braiding screen can be used when the cable path is short and electromagnetic disturbances are at a minimum. With longer cable paths or severe electromagnetic disturbances a double-screened cable of type LiYCY-CY should be used.

Sensor VA Di 3 x 0.25 mm²

The maximum conductor resistance per core is 15 Ohm.

Conductor resistance for fine-strand cables:

79 Ohm/km	with core cross section of 0.25 mm ²
39 Ohm/km	with core cross section of 0.50 mm ²
26 Ohm/km	with core cross section of 0.75 mm ²

8 Settings

Integrated transducer

see Operating Instructions U326_UVAintAS102_B_e

External evaluation unit

The required settings can be found in the corresponding Operating Instructions.

9 Performance check

Integrated transducer:
see Operating Instructions U326_UVAintAS102_B_e

External evaluation unit:

Current output

After feeding the supply voltage the analog output with zero flow should yield 4 mA. Values on evaluation units with display must amount to '0 m/s' or '0 m³/h'. When flow exceeds the smallest measurable value, linear detection of the output current must follow the flow modifications. If the output current is 20 mA or a few more, the output scaling should be checked and modified if necessary (for more details please refer to the Operating Instructions).

Voltage output

After feeding the supply voltage the analog output with zero flow should yield 0 V. Values on evaluation units with display must amount to '0 m/s' or '0 m³/h'. When flow exceeds the smallest measurable value, linear detection of the output voltage must follow the flow modifications. If the output current corresponds to maximum value, although the maximum flow has not been reached, the output scaling should be checked and modified if necessary (for more details please refer to the Operating Instructions).



10 Initial Operation

- Before initial operation be sure that the sensor materials are compatible with the medium (see Document VADi_D_e and Technical Data Sheet).
- Before initial operation also be sure that the operating conditions listed in Document VADi_D_e and in the Technical Data Sheet correspond to the measuring point parameters. In this connection pay particular attention to the application limits with regard to working pressure and temperature. The sensor must only be used in strict accordance with its specifications. When in doubt please do not hesitate to contact Höntzsch!



11 Operation

Risk of burning

The surface temperature of the sensor can be influenced by external heat to such an extent that unprotected contact can cause burns to the skin. In such cases it is recommended to wear suitable protective clothing.



12 Closing Down, Dismantling

Before dismantling the sensor please ensure that the inside of the pipeline is in a depressurized state.

Check carefully if harmful, toxic, corrosive, caustic, flammable or explosive hazardous materials

- have come into contact with the sensor
- adhere to the surface of the sensor
- have infiltrated any voids in the sensor
- have been released when dismantling the sensor

In such cases the individual safety measures must be strictly adhered to. If these measures are not complied with it can lead to serious injury to persons and damage to property!



13 Inspection

To guarantee performance of the sensor the vortex bluff body – which is found in the centre of the pipe – must be kept free from agglomeration. The same applies to the annular gap around the ceramic caps of the ultrasonic transmitter.

When being operated for the first time the sensor should be inspected at short intervals to ensure that no particles have collected. Afterwards inspection and cleaning intervals should be determined as necessary.



14 Maintenance

Only use a detergent that dries without residue and is compatible with the sensor material. Clean sensors with a slightly damp brush or cloth. Dried-on agglomerations can be removed with a metal brush. Should this affect the operability in any way, please contact Höntzsch.



15 Calibration

The VA Di measuring tube has excellent long-term stability. However, it is advisable to have the sensor calibrated at certain intervals. The time lapse between two calibrations depends on the individual operating conditions and the permissible drift. Therefore, shorter calibration cycles should be chosen at the start of use as a safety measure. As a general rule and under 'normal' operating conditions we estimate a calibration cycle of approx. 2 years.

The sensor must be returned to the manufacturer for calibration. Please refer to 17!

16 Troubleshooting

Problem	Cause	Troubleshooting
no measured value	sensor soiled	clean according to instructions
	profile factor set at 0.000	set profile factor at 0.000'
	sensor not connected (display: 'EEEE' or 'FFFF')	check sensor function and connection
	cable break or short circuit	check cable and replace if necessary
measured value too low	sensor soiled	clean according to instructions
	profile factor set too low	set profile factor at 1.000
	input/output section too short	change sensor position, improve flow conditions with a flow rectifier
	rotational flow	position sensor in direction of flow, provide flow rectifier
	reduced acoustic coupling in the sensor elements as a result of violent vibrating or impact	return the sensor to the manufacturer for performance check
	burden at the current output greater than specified in the Technical Data Sheet. This leads to correct output values in the lower range and to no longer increasing output values at the top end of the measuring range	reduce amount of burden resistance
	incorrect scaling of the analog output	check setting, change if necessary
measured value too high	profile factor set too high	set profile factor at '1.000'
	with volumetric display: oversized pipe inside diameter setting	deposit the correct inside diameter in the evaluation unit
	EMC problem	see 7.2
deviation between display and analog output	incorrect scaling or rating of the analog output	scaling the analog output e.g. check using the Technical Data Sheet (as supplied)

17 Returns

Should a return to the manufacturer be necessary, the appliance is to be cleaned thoroughly beforehand (see 14). A hazard warning or clearance document certifying no risk from materials that have come into contact with the sensor or have infiltrated any voids in the sensor must be submitted. If it cannot be ruled out that hazardous materials have settled on the surface, the safety measures to be taken when dealing with the appliance are to be listed in detail. Please use the Declaration of Hazard Potential form which is available on our website.

18 Disposal

Before disposing of the appliance please check that no hazardous materials are on the surface or have infiltrated the appliance. If it proves impossible to remove all traces of the material from the appliance, then proper disposal in accordance with the laws on protection against dangerous substances is to be carried out.

Mandatory for disposal by Höntzsch is the sending in of a no risk document from the customer. In case of doubt Höntzsch reserves the right to return certain appliances for disposal.

19 Spare Parts

The VA Di sensor does not have any spare parts or parts subject to wear.

20 Declaration of conformity, declaration of incorporation

We, Höntzsch GmbH & Co. KG
Gottlieb-Daimler-Straße 37
D-71334 Waiblingen

bearing sole responsibility, hereby declare that the product

flow measuring equipment
measuring tubes VA Di Z0

with EC type examination certificate **IBExU 03 ATEX 1065 X**

referred to in this declaration, is in conformity with the following standards or normative documents:

Provisions of the Directive	Reference and date of issue
2014/34/EU: Equipment and Protective Systems in Potentially Explosive Atmospheres	EN 60079-0: 2018 EN 60079-11: 2012 EN 60079-26: 2015
2014/30/EU: Electromagnetic Compatibility	EN 61000-6-4: 2007 + A1: 2011 EN 61000-6-2: 2006 + Corrigendum 1: 2011
2014/68/EU: Pressure Equipment Directive	

One or more of the standards referred to in the EC type examination certificate have been replaced by new versions. We declare that we are also in agreement with these new versions.



Waiblingen, 25.06.2021

Jürgen Lempp / Geschäftsführer

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