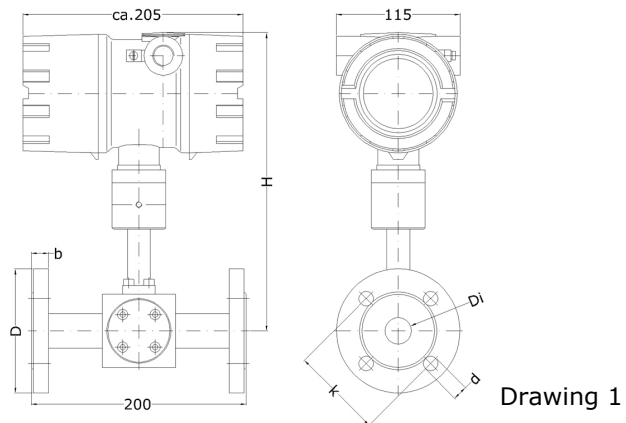




**Vortex Flow Sensor VA Di Ex-d for flow measurement in gases;
with integrated, configurable transducer UVA in Ex-d housing**



Measurable variables

- actual flow rate
- actual velocity
- standard volume flow (in combination with pressure and temperature sensors)

Design

- measuring tube with flanged connection



Kármán vortex street

Functional principle

- vortex meter for flow rate and volume measurement
- ultrasonic recording of the vortex shedding

Advantages

- compact measuring instrument with on-site display in Ex-application
- application in Category 1 (Zone 0 and 20), transducer housing approved for Category 2 (Zone 1 and 21)
- no external isolation/supply unit necessary
- records even the slightest flow rates, due to patented ultrasonic sensing
- high measuring dynamics (up to 1 : 100)
- no moving parts
- easy to clean
- high fatigue strength
- corrosion resistant
- operates to a large extent irrespective of gas composition
- low pressure drop
- easy configuration via HART® interface

Examples of application

- flow measurement in Ex-application, for example, of air, outgoing air, sludge activation air, engine intake air, natural gas, exhaust gas, process gas, biogas, motor car exhaust, torch gas, water vapour

Messmedium

- Primarily single-phase gas mixtures with air, nitrogen, oxygen, methane, natural gas, torch gas, ammonia, argon, carbon monoxide, water vapour ... as dominant components, combustion process of waste gases, biogas, sewer gas. Other gases on request.

Particles, humidity and condensation

- charges in the gas caused by particles such as dust and fibres do not affect measurement, as long as abrasion and agglomeration do not occur on the sensor
- relative gas humidity of less than 100 % and slight condensation on the sensor do not affect the measurement uncertainty



Model designation / order code (example)

VA Di 25	G	E	40 m/s	p10	ZG1	Ex-d
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Basic types

Type	Article No.
VA Di 25 GE 25 m/s / p10 ZG1 Ex-d	b015/055
VA Di 25 GT 25 m/s / p10 ZG1 Ex-d	b015/060
VA Di 25 GH 25 m/s / p10 ZG1 Ex-d	b015/065
VA Di 25 GL 25 m/s / p10 ZG1 Ex-d	b015/070
VA Di 40 GE 30 m/s / p10 ZG1 Ex-d	b015/056
VA Di 40 GT 30 m/s / p10 ZG1 Ex-d	b015/061
VA Di 40 GH 30 m/s / p10 ZG1 Ex-d	b015/066
VA Di 40 GL 30 m/s / p10 ZG1 Ex-d	b015/071
VA Di 50 GE 30 m/s / p10 ZG1 Ex-d	b015/057
VA Di 50 GT 30 m/s / p10 ZG1 Ex-d	b015/062
VA Di 50 GH 30 m/s / p10 ZG1 Ex-d	b015/067
VA Di 50 GL 30 m/s / p10 ZG1 Ex-d	b015/072
VA Di 80 GE 40 m/s / p10 ZG1 Ex-d	b015/058
VA Di 80 GT 40 m/s / p10 ZG1 Ex-d	b015/063
VA Di 80 GH 40 m/s / p10 ZG1 Ex-d	b015/068
VA Di 80 GL 40 m/s / p10 ZG1 Ex-d	b015/073
VA Di 100 GE 40 m/s / p10 ZG1 Ex-d	b015/059
VA Di 100 GT 40 m/s / p10 ZG1 Ex-d	b015/064
VA Di 100 GH 40 m/s / p10 ZG1 Ex-d	b015/069
VA Di 100 GL 40 m/s / p10 ZG1 Ex-d	b015/074

aA : on request

(1) Dimensions

tube inside Ø Di [mm]	flange outside Ø D [mm]	flange thickness b [mm]	hole circle Ø k [mm]	hole Ø d [mm]	number of holes	sensor length [mm]	sensor height H [mm]
25	115	16	85	14	4	200	276
40	150	16	110	18	4	200	290
50	165	18	125	18	4	200	290
80	200	20	160	18	8	200	302
100	220	20	180	18	8	200	318

Flange dimensions according to DIN 2527 PN16 Form C (other dimensions on request)

(2) Medium

Gases



(3) Materials in contact with the medium

Design	Material
... GE ...	stainless steel 1.4571, ceramics
... GT ...	titanium 3.7161, ceramics
... GH ...	Hastelloy 2.4610 (HC4), ceramics
... GL ...	tantalum, ceramics

(4) Measuring range

Di [mm]	flow rate V/t [m³/h]	average flow velocity v _m [m/s]	interrelationship v _m - V/t
25	0.7 ... 44	0.4 ... 25	1 m/s = 1.77 m³/h
40	1.8 ... 135	0.4 ... 30	1 m/s = 4.52 m³/h
50	2.8 ... 212	0.4 ... 30	1 m/s = 7.07 m³/h
80	7.2 ... 724	0.4 ... 40	1 m/s = 18.1 m³/h
100	11.0 ... 1131	0.4 ... 40	1 m/s = 28.3 m³/h

Measurement uncertainty	< 1 % of measured value + 0.3 % of terminal value (at +20 °C / 1000 hPa)
Repeatability	± (0.2 % of measured value + 0.025 % of terminal value)
Input/output sections	in order to achieve as great a measurement accuracy as possible, an input/output section of 20/10 x Di is recommended. The input section can be reduced considerably by using a flow rectifier (see Accessories). Further information on this subject can be found in the Operating Instructions U283_VADi_B_e.

(5) Max. working pressure

up to 10 bar / 1 MPa overpressure

(6) Design

as in Drawing 1

(7) Ex-protection

for gas : Ⓜ II 1/2 G Ex ia/d e [ia] IIC T6 Ga/Gb
 for dust : Ⓜ II 1/2 D Ex ia/tb IIIC TX Da/Db
 sensor for application in Category 1 (Ex-Zone 0 or 20),
 transducer housing for application in Category 2 (Ex-Zone 1 or 21)

Ex-d transducer housing

Dimensions	outside diameter/length/height: approx. 110/205/182 mm
Material	die-cast aluminium max. 0.5 % Mg, coated
Type of protection	IP68, IEC 529 and EN 60 529
Connection	bush for shielded cables with external diameter 5 ... 9 mm, contacting of the overall shielding on the earth terminal in the housing; connection via screw-type terminals Ex-e for wires with cross-section 0.14 - 1.5 mm²
Alignment to sensor	connection housing rotatable by approx. 350 ° and lockable
Setup	dual chamber system, consisting of 1) electronics in Ex-d protection (pressure-resistant casing) and 2) connections in Ex-e protection (increased safety) with terminal block and bush



Electromagnetic Compatibility (EMC)

according to EN 61 000-6-2 / IEC77

Mounting attitude

any	to ensure that the sensor remains operative in horizontal pipeline even with moderate condensation, sensors VA Di 25 should be installed with the connection housing pointing upwards, and sensors VA Di 40, VA Di 50, VA Di 80 and VA Di 100 with the connection housing pointing sideways. In the case of a vertical pipeline the attitude for all sensors VA Di ... - even with moderate condensation - can be chosen freely.
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Options (A) & (B)

Sealing material	Calibration pressure
(A)	(B)

Option (A) Sealing material

Material	permissible temperature of the medium	permissible ambient temperature	Art. No.
VITON [®] (standard)	-20 ... +180 °C	-20 ... +50 °C	b015/900
silicone	-40 ... +180 °C	-25 ... +50 °C	b015/901
KALREZ [®] (Compound 4079)	0 ... +180 °C	0 ... +50 °C	b015/902
EPDM [®]	-20 ... +160 °C	-20 ... +50 °C	b015/903

Option (B) Calibration pressure

Pressure	Comments	Art. No.
atmospheric pressure	with working pressures greater than 3 bar rel., calibration should be carried out at average working pressure to reduce the risk of measurement uncertainty	b015/910
___ bar rel.	calibration pressure selectable in range 1 ... 10 bar rel.; with working pressures greater than 3 bar rel., calibration at average working pressure is recommended to ensure the smallest possible measurement uncertainty	b015/911



Transducer UVA, integrated in the connection housing

Analog output flow	4 ... 20 mA resistance max. 500 Ohm
Output limit value or quantity pulse	potential-free relay contact (normally open contact), max. 300 mA / 27 VDC
Communication port	HART®, via modem adapter for PC connection and PC software UCOM (see under Accessories)
	output signals are electrically isolated from the power supply
Self-monitoring	parameter settings, sensor interface; in the case of error: analog output less than 3.6 mA
Power supply	24 V DC (20 ... 27 V DC)
Power consumption	less than 5 W
Setting parameter (selection depending on parameter set)	analog output, time constant, profile factor, limit value or quantity pulse (quality rating adjustable), switch-over actual/standard flow with setting parameters 'working pressure' and 'working temperature'



Ex-d transducer housing with optional LCD display

Accessories (optional)

	Description	Art. No.
LCD display	1 st line: 'instantaneous value': flow rate or flow velocity 2 nd line: 'counter' or 'error code'; 2 x 16-digit, character height 5.5 mm, working temperature range -20 ... +50 °C display rotatable in 90 °-stages on removing the Ex-d housing window cover	a010/520
Calibration certificate v/VA		klbneu
HART® modem adapter	for changing the setting parameter, for PC-USB connection	a010/101
HART® modem adapter	for changing the setting parameter, for PC-RS232 connection	a010/102
PC software UCOM	for configuring the UVA via RS232	a010/052



Accessories (cont.)

Process flange TP

for one pressure sensor (P) and one temperature sensor (T)

Identification	Article No.	Inside Di [mm]
TP Di/DN 25 PN16	b015/100	25
TP Di/DN 40 PN16	b015/101	40
TP Di/DN 50 PN16	b015/102	50
TP Di/DN 80 PN16	b015/103	80
TP Di/DN100 PN16	b015/104	100
Material	stainless steel 1.4571	
Connecting thread	2 x G 1/4 "	
Installation point	down stream, after the VA Di sensor	

Flow rectifier

for reducing the input section - incl. flow rectifier - to 11 x Di

Identification	Article No.	Inside Di [mm]
GL Di/DN25 PN16	b015/150	25
GL Di/DN40 PN16	b015/151	40
GL Di/DN50 PN16	b015/152	50
GL Di/DN80 PN16	b015/153	80
GL Di/DN100 PN16	b015/154	100
Material	stainless steel 1.4571	
Installation point	5 ... 8 x Di in front of the VA Di Sensor (see Operating Instructions U283_VADi_B_e)	

® Registered trademark:
Dupont: Viton, Kalrez, EPDM
HART: HART Communication Foundation

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Subject to alteration