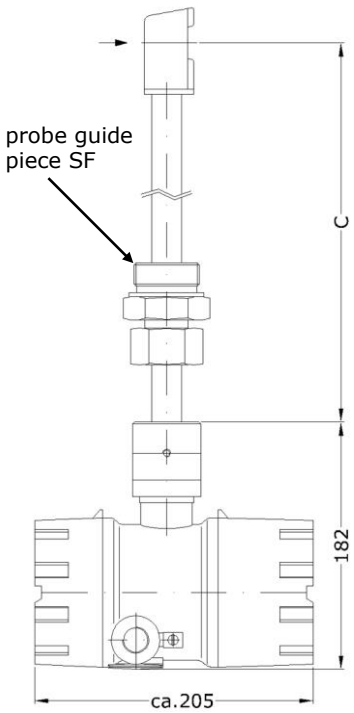
höntzsch
flow measuring technology

Vortex flow sensor VA40 ZG8 Ex-d with integrated, configurable transducer UVA in a flameproof enclosure for applications in explosive atmospheres

VA40 ZG8 Ex-d with flange guide piece SFB

Drawing 8



Probe with screw thread
probe guide piece SF

Measured variables
- actual flow velocity v [m/s]
- actual flow rate [m^3/h]
- conversion to standard velocity/standard volume flow with input parameters pressure and temperature

Measuring range
- 0.5 ... 40 m/s

Functional principle
- vortex meter for measuring flow velocity, flow rate and volume
- ultrasonic measuring of the vortex shedding

Kármán vortex street

Design
- insertion probe with probe guide piece and flameproof enclosure

Media
- primarily single-phase gas mixtures with air, nitrogen, oxygen, methane, natural gas, ammonia, argon, carbon monoxide, superheated steam, … as dominant components; biogas
  Other gases and gas mixtures on request.

Advantages
- compact unit for explosive atmospheres with optional local display
- applications in Category 1 (Zone 0 and 20); transducer housing approved for Category 2 (Zone 1 and 21)
- applications up to SIL2
- no external isolation/supply unit necessary
- low starting value (0.5 m/s)
- high turndown (1 : 80)
- long-term stability
- no moving parts
- easy to clean
- high durability
- corrosion-resistant
- largely unaffected by gas composition
- marginal pressure loss
- easy adjustment of parameters with HART® interface

Examples of application
- flow measurement in explosive atmospheres: air, outlet air, sludge activation air, engine intake air, natural gas, waste gas, process gas, biogas, car exhaust emissions, flare gas, water vapour, …

Particles, humidity and condensation
- dust or fibre particles in the gas do not affect the measurement, as long as these are not abrasive or accumulate on the sensor
- measurement uncertainty remains unaffected by a relative gas humidity of less than 100 % and a slight accumulation of condensate on the sensor

Model designation / order code (example)						
VA40	**G**	**E**	**40 m/s**	**p3**	**ZG8**	**Ex-d**
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Types

Type	Article No.
VA40 GE 40 m/s p3 ZG8 Ex-d	B009/000
VA40 GH 40 m/s p3 ZG8 Ex-d	B009/001
VA40 GT 40 m/s p3 ZG8 Ex-d	B009/002

(1) Sensor type / diameter

Vortex flow sensor VA40; width across corners of sensor head 40 mm and shaft Ø 21.3 mm for insertion in openings with a diameter greater than 40 mm

(2) Medium

... G ...	air/gases

(3) Materials in contact with the medium

Design	Material
... E ...	stainless steel, sensor housing 1.4581 connection tube 1.4404, ceramics VITON® seals silicone-free sensor
... H ...	Hastelloy 2.4610 / HC4, ceramics VITON® seals silicone-free sensor
... T ...	titanium 3.7161, ceramics VITON® seals silicone-free sensor

(4) Measuring range

Design	Range
... 40 m/s ...	0.5 ... 40 m/s

Measurement uncertainty	< 1.0 % of measured value + 0.03 m/s
Repeatability	± 0.2 % of measured value + 0.025 % FS

Examples of measurable flow rates			
measuring tube inside diameter Di [mm]	profile factor PF* [-]	smallest measurable value [m³/h]	terminal value [m³/h]
80	0.719	6.5	520
100	0.738	10.4	835
120	0.761	15.5	1240
150	0.796	26	2030
200	0.842	48	3810
300	0.845	108	8600
400	0.850	193	15400
500	0.850	300	24000
750	0.850	680	54100
1000	0.850	1200	96100
1250	0.850	1880	150000
1500	0.850	2700	216000

Flow rate measuring range specifications with centric positioning of sensor, non-rotational (vortex-free) inlet flow and amply dimensioned input/output sections (see Information for Use VA Probes U206).

* The profile factor PF describes the ratio of average flow velocity in the measurement cross section and the flow velocity measured from the sensor. The afore-mentioned operating conditions apply.

Working temperature range / seal material			
Design	**Material**	**Working temperature range of medium**	**Article No.**
't_{max} +100 °C'			
	VITON®	-20 ... +100 °C	B009/080
	silicone	-40 ... +100 °C	B009/081
	EPDM	-40 ... +100 °C	B009/082
	**KALREZ®	0 ... +100 °C	B009/083
't_{max} +180 °C'			
	VITON®	-20 ... +180 °C	B009/090
	silicone	-40 ... +180 °C	B009/091
	**KALREZ®	0 ... +180 °C	B009/092
Permissible ambient temperature		-20 ... +50 °C	

**Compound 4079

(5) Maximum working pressure

up to 3 bar / 300 kPa overpressure

(6) Design

as in Drawing 8 (Page 1)

(7) ATEX protection

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

Installation length (see Drawing 8, Page 1)

Measurement C	stainless steel ' ... E ...'	Hastelloy ' ... H ...'	titanium ' ... T ...'
	Article No.	Article No.	Article No.
250 mm	B009/050	B009/060	B009/070
500 mm	B009/051	B009/061	B009/071
750 mm	B009/052	B009/062	B009/072
1000 mm	B009/053	B009/063	B009/073
1250 mm	B009/054	B009/064	B009/074
1500 mm	B009/055	B009/065	B009/075
1750 mm	B009/056	B009/066	B009/076
2000 mm	B009/057	B009/067	B009/077

Select the installation length so that the surface temperature of the transducer housing does not exceed +50 °C!

Ex-d transducer housing

Dimensions	outside diameter/length/height: ca. 110/205/182 mm
Material	aluminium cast alloy max. 0.5 % Mg, coated
Protection	IP68, IEC 529 and EN 60 529
Connection	glands for shielded cables with outside diameter 5 ... 9 mm; contacting of overall screen on the ground terminal in the housing; via screw terminals Ex-e for wires with cross-section 0.14 – 1.5 mm²
Alignment	rotatable by approx. 350 ° and lockable
Setup	dual chamber system consisting of: 1) electronics in Ex-d protection (flameproof enclosure) 2) connections in Ex-e protection (increased safety) with terminal block and cable glands

Electromagnetic Compatibility (EMC)

according to EN 61 000-6-2 / IEC77

Functional Safety / Safety Integrity Level (SIL)

according to DIN EN 61508 part 1 to part 7 and DIN EN 61511 part 1 to part 3, SIL2;
please pay attention to our document U400!

Installation position

any	horizontal positioning is recommended if condensate on the sensor cannot be ruled out

Probe guide pieces* (see also Page 6) **Model designation (examples)**						
SFB	21.3		E	53	G1 1/2"	ZG5
SFK	21.3	/42	E	150	F-DN50PN16	ZG3
(S1)	**(S2)**	**(S3)**	**(S4)**	**(S5)**	**(S6)**	**(S7)**

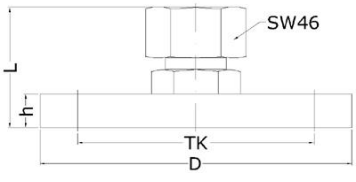
(S1) Type	
SFB	SF with clamping bush
SFK	SF with clamping yoke
SFZ	SF with collet
(S2) Diameter through hole [mm]	
... 21.3 ...	21.3 mm through hole
(S3) Diameter insertion opening for probe	
(S4) Material	
... E ...	stainless steel
... H ...	Hastelloy
(S5) Installation length L [mm]	
(S6) Process connection	
... G ...	thread
... F ...	flange
(S7) Design as in Drawing (ZG)	

Type	**Description**	**Article No.**
with screw thread connection		
SFB 21.3 E-53 / G 1½" ZG5, Drawing 5, Page 6	VITON® seal, TEFLON® clamping bush, working temperature range -20 ... +240 °C, max. working pressure 3 bar/300 kPa, thread length GL 22 mm	B004/504
SFB 21.3 E-53 / G 1½" ZG5 with metallic sealing edge, Drawing 5, Page 6	metallic sealing edge, TEFLON® clamping bush, working temperature range -40 ... +240 °C, max. working pressure 3 bar/300 kPa, thread length GL 22 mm	B004/511
SFB 21.3 E-53 / NPT 1½" ZG5, Drawing 5, Page 6	VITON® seal, PTFE clamping bush, working temperature range -20 ... +240 °C, max. working pressure 3 bar/300 kPa, according to ANSI/ASME B1.20.1-1983, thread length GL approx. 26 mm	B004/509
with flange connection		
SFB 21.3 E-70 / F-DN50 PN16 ZG1, Drawing 1, Page 6	seal TEFLON® clamping bush, working temperature range -20 ... +240 °C, max. working pressure 3 bar/300 kPa	B004/103
SFB 21.3 H-70 / F-DN50 PN16 ZG1, Drawing 1, Page 6	seal TEFLON® clamping bush, working temperature range -40 ... +240 °C, max. working pressure 3 bar/300 kPa	B004/105
SFB 21.3 E-70 / F-ANSI B16.5 2" 150 lbs ZG1 Drawing 1, Page 6	seal TEFLON® clamping bush, working temperature range -40 ... +240 °C, max. working pressure 3 bar/300 kPa, flange according to ANSI Standard B16.5	B004/512

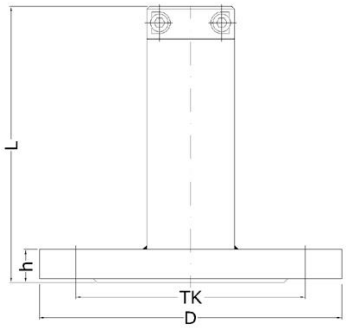
Probe guide pieces* (cont'd)		
Type	**Description**	**Article No.**
SFK 21.3 E-150 / F-DN50 PN16 ZG3, Drawing 3, Page 6	VITON® O-ring, working temperature range -20 ... +240 °C, max. working pressure 6 bar/600 kPa, incl. hexagon cranked wrench key SW5	B004/304
SFK 21.3 E-150 / F-DN40 PN16 ZG3, Drawing 3, Page 6	VITON® O-ring, working temperature range -20 ... +240 °C, max. working pressure 6 bar/600 kPa, incl. hexagon cranked wrench key SW5	B004/303
SFK 21.3 / 42 E-150 / F-DN50 PN16 ZG3 with ball valve, Drawing 3, Page 6	2 VITON® O-rings, working temperature range -20 ... +240 °C, max. working pressure 6 bar/600 kPa, with ball valve, installation length ball valve 150 mm, incl. hexagon cranked wrench key SW5. The probe guide piece can be retracted into the probe to close the ball valve.	B004/313

* Probe guide pieces are obligatory for process connection via screw socket or flange connector. They are adjustable, rotatable and permanently attached to the probe shaft.
It is to be ensured that sensor length, screw socket or flange connector height as well as probe insertion depth match up. Other probe guide pieces are available on request.

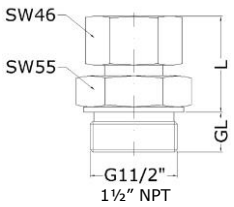
Drawing 1



Drawing 3



Drawing 5



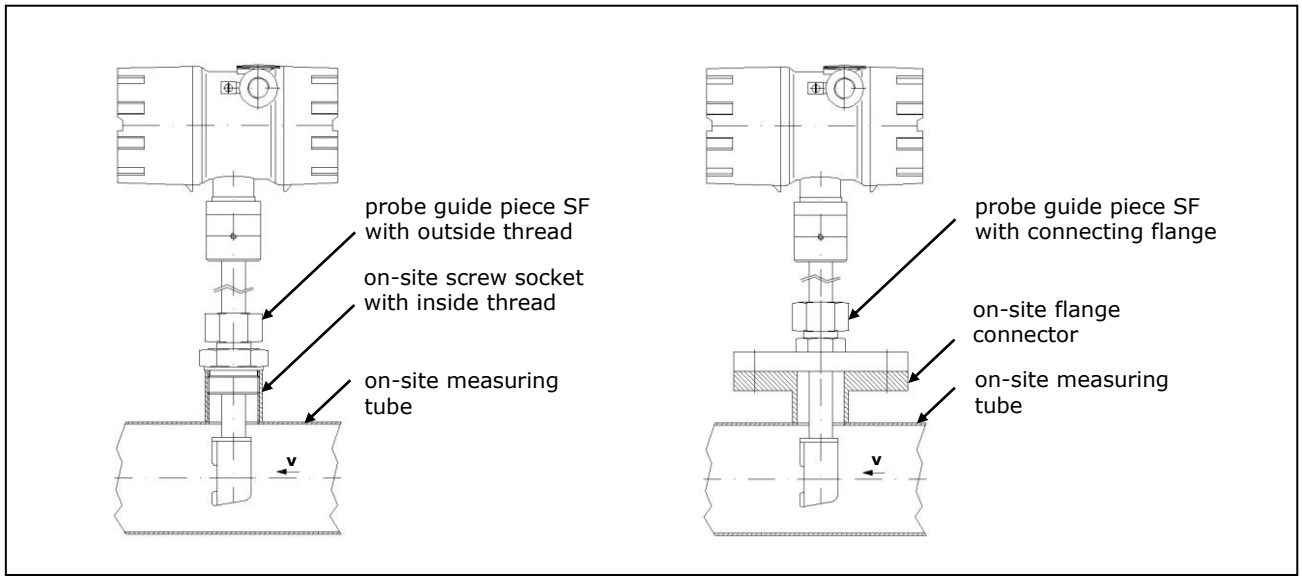
Probe guide pieces SF

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), max. 300 mA / 27 VDC
Communication port	HART® via modem adapter for PC connection and UCOM software (see Accessories)
	output signals are electrically isolated from the power supply
Self-monitoring	parameter settings, sensor interface; in the case of error: analog output < 3.6 mA
Power supply	24 V DC (20 ... 27 V DC)
Power consumption	less than 5 W
Setting parameters (selection depending on parameter set)	analog output, time constant, profile factor, tube inside diameter, limit value or quantity pulse (rating adjustable), switchover actual/standard flow with parameters 'working pressure' and 'working temperature'

Accessories (optional)		
	Description	**Article No.**
LCD display	1st row: 'instantaneous value': flow rate or flow velocity 2nd row: '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		KLB
HART® modem adapter	for changing setting parameters, for PC-USB connection	A010/101
PC software UCOM	for configuring the UVA via RS232	A010/052

Ex-d transducer housing with
optional LCD display

Probe installation



Probe installation with screw thread probe guide piece (left) and flange probe guide piece (right)

® Registered trademark:
Dupont: VITON, TEFLON, KALREZ
HART: HART Communication Foundation

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Subject to alteration