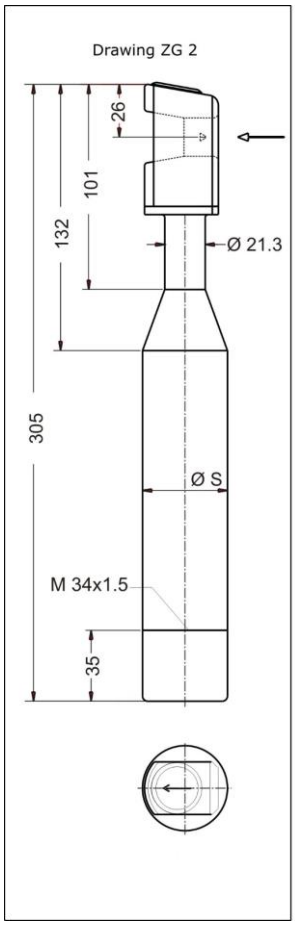
**Vortex flow sensor, extendable,
optional with integrated PT100 sensor,
for connection to a fixed or portable evaluation unit**

probe VA(T)40/42 ZG2



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

Kármán vortex street

Measuring range
- 0.5 ... 60 m/s

Design
- insertion probe with fixed cable, extendable

Medium
- primarily single-phase gas mixtures, e.g. air, nitrogen, oxygen, methane, natural gas, ammonia, argon, carbon monoxide, superheated steam, biogas, exhaust gas, etc.
- other gases or gas mixtures on request

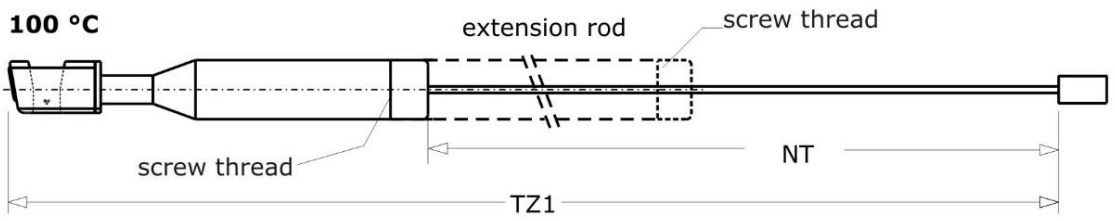
Measured variables
- actual flow velocity v [m/s]
- actual flow rate [m³/h]
- optional temperature [°C]
- conversion to standard velocity/standard volume flow with input parameters pressure and temperature

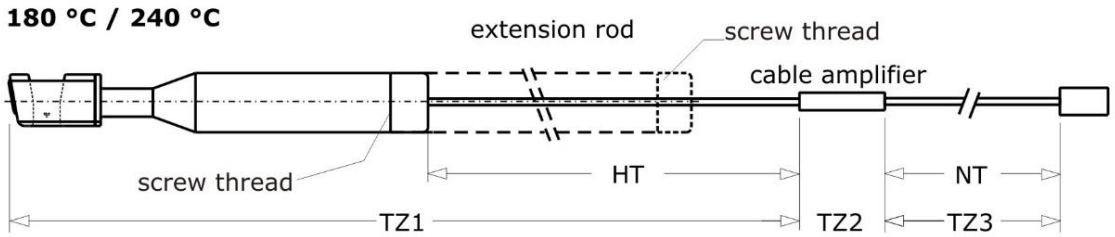
Connection possibilities
- portable and fixed evaluation units with sensor input

Range and examples of application
- permanent and portable
- flow measurement e.g. of air, exhaust air or gas, process gas
- in heavily contaminated gases
- in processes with changing and/or unknown gas composition
- in moist gases or gases that are partly liable to condensate
- waste incineration plants
- large combustion plants
- monitoring of inerting processes
- use up to 240 °C
- recommended according DIN EN ISO 16911, normative for checking of automatic measuring equipment

Advantages
- no moving parts
- long-term stability
- high durability
- corrosion-resistant
- easy to clean
- marginal pressure loss
- exact measuring values even at changing and/or unknown gas composition
- high turn down ratio (1:80)
- no distortion of the measurement values by thermal radiation
- optional for use in category 2G (zone 1)
- extendable
- universal range of use
- optional with integriated PT100 sensor
- suitable for big stacks, pipes and ducts

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





HT: high temperature cable *
NT: low temperature cable (1.5 ... 2 m length) *

TZ: temperature zone *

* explanation HT, NT, TZ1, TZ2 and TZ3 see page 5

Model designation (example)									
VA	**40**	**/42**	**G E**	**40 m/s**	**240**	**-2**	**p3**	**ZG2**	
VAT	**40**	**/42**	**G E**	**60 m/s**	**180**	**-3**	**p3**	**ZG2**	
VA	**40**	**/42,4**	**G H**	**40 m/s**	**100**		**p3**	**ZG2**	**KALREZ**
VA	**40**	**/42**	**G T**	**40 m/s**	**100**		**p3**	**ZG2**	
(1)	**(2)**	**(3)**	**(4) (5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**

Types	
type	**article no.**
VA 40/42 GE 40 m/s 100 / p3 ZG2	B009/200
VA 40/42,4 GH 40 m/s 100 / p3 ZG2	B009/208
VA 40/42 GT 40 m/s 100 / p3 ZG2	B009/212
VA 40/42 GE 40 m/s 180-2 / p3 ZG2	B009/216
VA 40/42,4 GH 40 m/s 180-2 / p3 ZG2	B009/222
VA 40/42 GT 40 m/s 180-2 / p3 ZG2	B009/226
VA 40/42 GE 40 m/s 240-2 / p3 ZG2	B009/230
VA 40/42,4 GH 40 m/s 240-2 / p3 ZG2	B009/231
VA 40/42 GT 40 m/s 240-2 / p3 ZG2	B009/232
VAT 40/42 GE 40 m/s 100 p3 ZG2	B009/250
VAT 40/42,4 GH 40 m/s 100 p3 ZG2	B009/258
VAT 40/42 GT 40 m/s 100 p3 ZG2	B009/262

Types (cont`d)	
type	**article no.**
VAT 40/42 GE 40 m/s 180-2 / p3 ZG2	B009/266
VAT 40/42,4 GH 40 m/s 180-2 / p3 ZG2	B009/272
VAT 40/42 GT 40 m/s 180-2 / p3 ZG2	B009/276
VAT 40/42 GE 40 m/s 240-2 / p3 ZG2	B009/280
VAT 40/42,4 GH 40 m/s 240-2 / p3 ZG2	B009/281
VAT 40/42 GT 40 m/s 240-2 / p3 ZG2	B009/282
design with KALREZ® sealings	
VA 40/42 GE 40 m/s 100 / p3 ZG2 KALREZ	B009/205
VA 40/42,4 GH 40 m/s 100 / p3 ZG2 KALREZ	B009/210
VA 40/42 GT 40 m/s 100 / p3 ZG2 KALREZ	B009/214
VA 40/42 GE 40 m/s 180-2 / p3 ZG2 KALREZ	B009/220
VA 40/42,4 GH 40 m/s 180-2 / p3 ZG2 KALREZ	B009/224
VA 40/42 GT 40 m/s 180-2 / p3 ZG2 KALREZ	B009/228
VAT 40/42 GE 40 m/s 100 p3 ZG2 KALREZ	B009/255
VAT 40/42,4 GH 40 m/s 100 p3 ZG2 KALREZ	B009/260
VAT 40/42 GT 40 m/s 100 p3 ZG2 KALREZ	B009/264
VAT 40/42 GE 40 m/s 180-2 / p3 ZG2 KALREZ	B009/270
VAT 40/42,4 GH 40 m/s 180-2 / p3 ZG2 KALREZ	B009/274
VAT 40/42 GT 40 m/s 180-2 / p3 ZG2 KALREZ	B009/278

(1) Sensor type	
Description	**Design**
VA	vortex flow sensor
VAT	vortex flow sensor with integrated PT100 sensor

(2) Sensor diameter	
vortex width across corners	
40	vortex flow sensor VA40 with sensor head width across corners 40 mm for insertion in openings with a diameter greater than 44 mm

(3) Shaft diameter	
shaft diameter of the sensors Ø S (s. page 1, drawing ZG2)	
/42	shaft diameter 42 mm
/42,4	shaft diameter 42.4 mm

(4) Medium	
... G ...	air/gases

Ingress protection cable outlet	
sensor design … G …	IP50

(5) Materials in contact with the medium	
design	material
... E ...	stainless steel, sensor housing 1.4581 shaft 1.4404, ceramics, FKM or KALREZ® seals, silicone-free sensor
... H ...	Hastelloy 2.4610 / HC4, ceramics, FKM or KALREZ® seals, silicone-free sensor
... T ...	titanium 3.7035 (grade 2), ceramics, FKM or KALREZ® seals, silicone-free sensor
other sealing materials on request	

(6) Measuring range	
design	measuring range
... 40 m/s ...	0.5 ... 40 m/s
... 60 m/s ...	0.7 ... 60 m/s (on request)

Measurement accuracy *	< 1.0 % of measured value + 0.03 m/s **
Repeatability *	± 0.2 % of measured value + 0.025 % of terminal value

The lowest measurement uncertainties in the field are attained with calibrations as close as possible to the operating conditions. For this, the measurement results obtained can be implemented as characteristic in the evaluation unit. Information and details on the measurement uncertainties according to the calibrated measurement standards can be found in the calibration documents 'U325 and U183'.

* only for versions with pairs of values with linearization of characteristics and for sensor design up to 40 m/s; by use of KKZ-function other specification are possibly valid
** related to calibration conditions on the Höntzsch wind tunnel WK320

Profile factors depending on pipe inside diameter

measuring tube inside diameter Di [mm]	profile factor PF* [-]	measuring tube inside diameter Di [mm]	profile factor PF* [-]
80	0.719	300	0.845
100	0.738	400	0.850
120	0.761	500	0.860
150	0.796	...	0.860
200	0.842	peculiarity°	1.000

* These profile factors are only accurate with centric sensor positioning, turbulent, non-rotational inlet flow and sufficiently dimensioned input and output sections (see Operating Instructions). The profile factor describes the ratio of average flow velocity in the measurement cross section area and the flow velocity measured from the sensor. The above mentioned operating conditions apply.
° With profile factor 1.000, the local flow velocity at the sesnor head will be passed on without further calculation.

(7, 11) Permissible temperatur of the medium * / ambient temperature * / sealing

design	temperature of the medium	ambient temperature (see drawings, page 2)		
FKM		**TZ1**	**TZ2**	**TZ3**
... 100 ...	-20 ... +100 °C	-20 ... +100 °C	-	-
... 180 ...	-20 ... +180 °C	-20 ... +180 °C	-40 ... +105 °C	-40 ... +105 °C
... 240 ...	-20 ... +240 °C	-20 ... +240 °C	-40 ... +105 °C	-40 ... +105 °C
KALREZ®		**TZ1**	**TZ2**	**TZ3**
... 100 ...	0 ... +100 °C	0 ... +100 °C	-	-
... 180 ...	0 ... +180 °C	0 ... +180 °C	-40 ... +105 °C	-40 ... +105 °C

The temperature ranges may differ when using other sealing materials.

* When used in hazardous areas, the media and ambient temperature are restricted in accordance with the valid operating instructions.

(8) Cable lengths of high temperature cable (HT-cable) in front of cable amplifier

design	description
for sensor design up to 180 °C and 240 °C*	
... -2 ...	2 m fixed high temperature cable in front of cable amplifier * + 1.5 m silicone cable (NT-cable, max. +105 °C) behind cable amplifier *

* special cable lengths for HT-cable in front of the cable amplifier and standard cable (NT-cable) behind cable amplifier on request

(9) Maximum working pressure

... p3 ...	up to 3 bar / 0.3 MPa overpressure

(10) Design

as in drawing 2 (page 1)

Electromagnetic Compatibility (EMC)

according to EN 61 000-6-2 and EN 61 000-6-4

Installation position

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

Option ATEX-protection

type of protection	art. no.	comment
CE <Ex> II 3 G Ex ec IIC T6 Gc X for gas: Category 3G (zone 2)	VAEX2E *	in conjunction with evaluation unit
CE <Ex> II 3 D Ex tc IIIC TX Dc X for dust: Category 3D (zone 22)	VAEX2E *	in conjunction with evaluation unit
CE <Ex> II 2 G Ex ia IIC T6 Gb for gas: Category 2G (zone 1)	VAEX1 *	only in conjunction with: - isolation-/supply unit LDX2 and 'non-Ex evaluation unit' or - ATEX-conform, separate evaluation unit with Ex input - not valid for VAT-sensors

* Note: media and ambient temperatures according to the valid operating instructions.

Compatible separate evaluation units	
for non-Ex applications	UVA, µP-Vortex, VT-VA, VP-VA, VTP-VA, flowtherm NT
for Ex applications	flowtherm Ex or isolation-/supply unit LDX2 in LDG16 housing in combination with evaluation units UVA, µP-Vortex, VT-VA, VP-VA, VTP-VA in LDG housings (additional requirement: Ex input t, p)

Evaluation unit connection

for unit with 8-pin screw-type connector

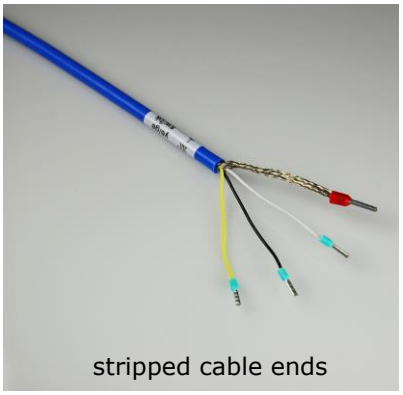
		article no.
plug 423-8	type of protection IP67	A099/056
plug 680-8	type of protection IP40	A099/055

for unit with connecting terminals

stripped cable end	marked strands with end sleeves	A099/110


plug 423-8


plug 680-8


stripped cable ends

Extension rods

description	**material**	**length**	**outside-diameter**	**article no.**
SR42E-350	stainless steel, FKM-O-Ring	350 mm	42 mm	B099/510
SR42E-500	stainless steel, FKM-O-Ring	500 mm	42 mm	B099/511
SR42E-1000	stainless steel, FKM-O-Ring	1000 mm	42 mm	B099/512
SR42,4H-500	Hastelloy, FKM-O-Ring	500 mm	42.4 mm	B099/513
SR42,4H-1000	Hastelloy, FKM-O-Ring	1000 mm	42.4 mm	B099/514
SR42T-500	titanium, FKM-O-Ring	500 mm	42 mm	B099/515

Direction indicator / Calibration certificate

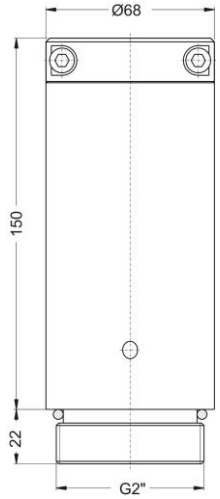
description	**article no.**
direction indicator RZ42	B099/957
direction indicator RZ42.4	B099/958
calibration certificate	KLB
DAkkS / ISO 17025 calibration certificate	on request

Proibe guide pieces *		
type	**description**	**article no.**
SFK 42 E-100 / F-DN50 PN16 **drawing 3,** page 8	connection: flange DN50PN16 EN1092-1 max. pressure: 6 bar / 600 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 100 mm	B004/317
SFK 42 E-260 / F-DN50 PN16 **drawing 3,** page 8	connection: flange DN50PN16 EN1092-1 max. pressure: 6 bar / 600 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 260 mm	B004/307
SFK 42 E-260 / F-DN80 PN16 **drawing 3,** page 8	connection: flange DN80PN16 EN1092-1 max. pressure: 6 bar / 600 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 260 mm	B004/308
SFK 42 E-150 / G 2" **drawing 2,** page 8	connection: outside thread G 2" max. pressure: 3 bar / 300 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 150 mm (probe guide piece)	B004/231
SFK 42 E-150 / G 2" **with ball valve** **drawing 2,** page 8	connection: outside thread G 2" (SFK) inside thread G 2" (ball valve) max. pressure: 3 bar / 300 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 150 mm (probe guide piece) 134 mm (ball valve)	B004/230
SFK 42,4 E-260 / F-DN50 PN16 **drawing 3,** page 8	connection: flange DN50PN16 EN1092-1 max. pressure: 6 bar / 600 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 260 mm	B004/310
SFK 42,4 E-260 / F-DN80 PN16 **drawing 3,** page 8	connection: flange DN80PN16 EN1092-1 max. pressure: 6 bar / 600 kPa temperature: -20 … +240 °C materials: stainless steel, FKM fixation: clamp yoke length: 260 mm	B004/311

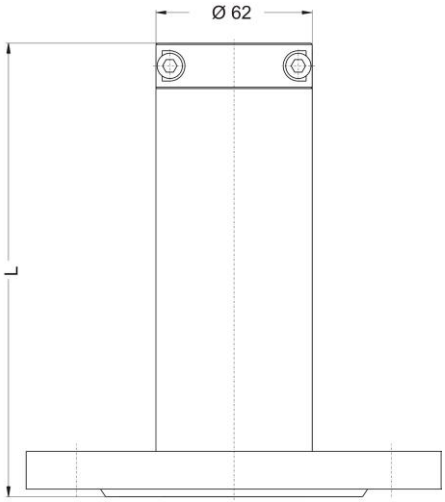
***** Probe guide pieces enable a process connection via threaded sleeve or flange connection. They are moveable and rotable on the probe shaft.

Probe guide pieces / drawings

Probe guide piece drawing 2 (w/o ball valve)

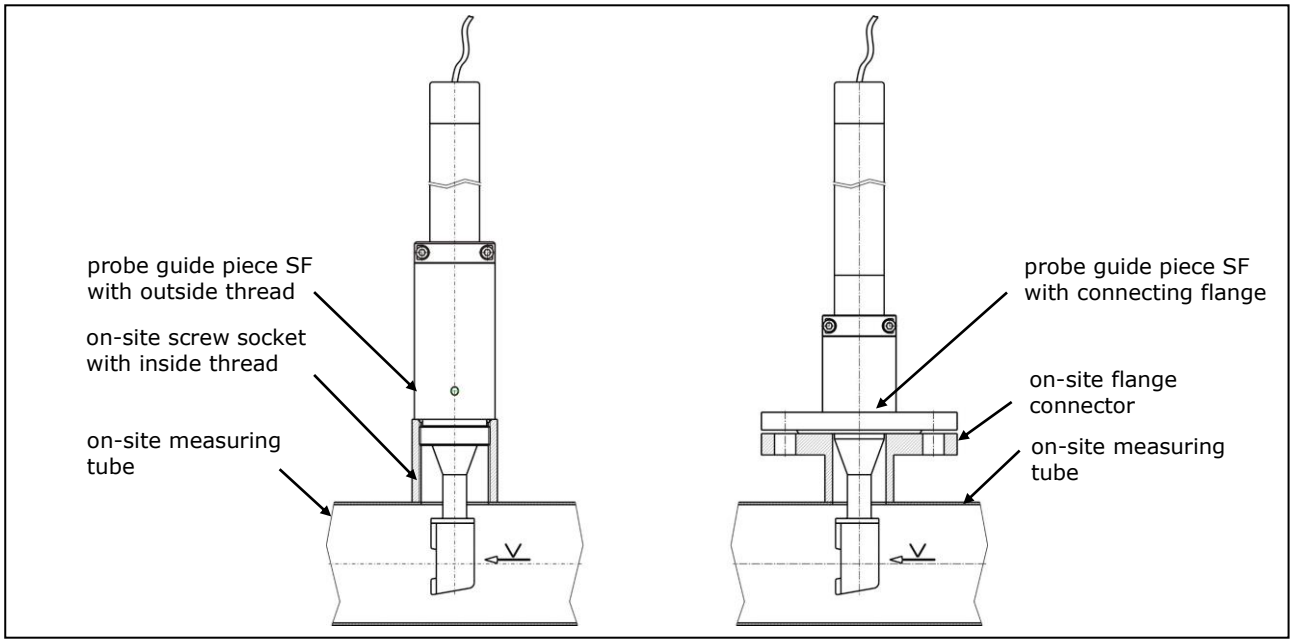


Probe guide piece drawing 3 - stainless steel



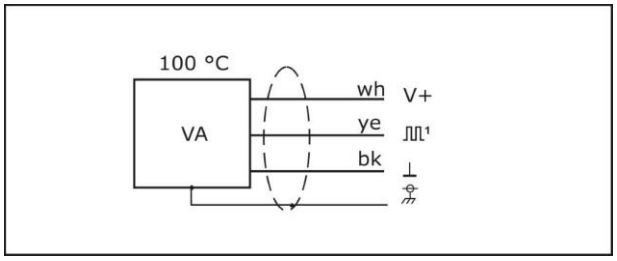
DN50 PN16 DIN EN 1092-1 Form B1
DN80 PN16 DIN EN 1092-1 Form B1

Sensor installation

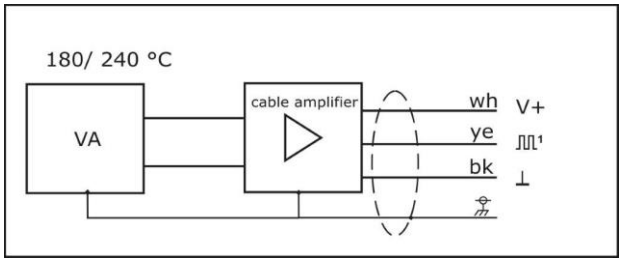


Wiring diagrams

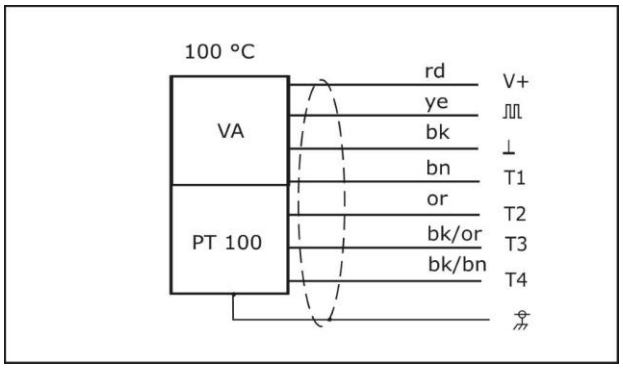
VA40/42_100 °C sensors



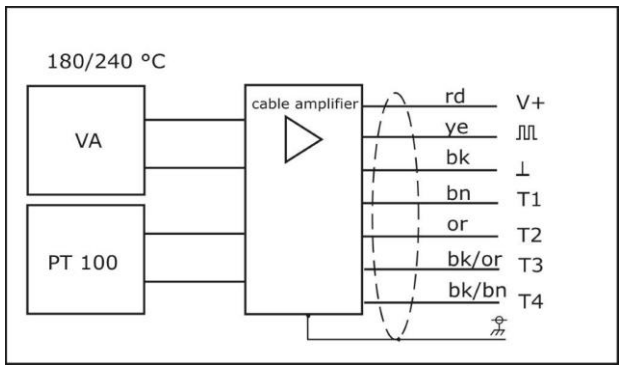
VA40/42_180 °C_240 °C sensors



VAT40/42_100 °C sensors



VAT40/42_180 °C_240 °C sensors



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