

Sensor TADi ZG2d with integrated transducer U10b

Functional principle

Measurement of flow according to the heat transfer method

Design

Probe with integrated transducer

Measured variables

- standard velocity, standard volume flow, mass flow and temperature
- standard conditions adjustable; default:
temperature $t_n = +21\text{ °C}$
pressure $p_n = 1014\text{ hPa}$

Gases

- pure gases, gas mixtures: air, nitrogen, methane, natural gas, propane, butane, argon, carbon dioxide, sulphur hexafluoride, helium, hydrogen, landfill gas, ...
- switching between the calibration characteristics of various measurement gases is possible in running operation

Output variables

- 2 analog outputs 4 ... 20 mA (flow and temperature)
- quantity pulse / limit value
- performance data via WiFi

Advantages

- high turndown ratio (up to 1 : 1000)
- measuring range from 0.2 m/s
- low measuring uncertainty, even at lowest flow velocities
- direct mass flow measurement; additional pressure and temperature measuring is not necessary
- sensor has no moving parts
- stainless steel sensor housing
- higher working temperature and pressure ranges
- low installation costs
- negligible pressure drop thanks to its size
- high durability and long-term stability
- sterilisable (sensor material-resistance allowing)
- optional: LCD with keypad, WiFi
- values can be displayed and parameters set simply via the display and keypad or web interface

Range and examples of application

- measuring
 - air velocity
 - compressed air and gas consumption, leakages
 - laminar flows in clean rooms or machines
 - outgoing air, burner supply air and draught
 - in climatic applications
 - measuring in low vacuum range at pressures greater than 200 hPa abs.

Particles, condensation, humidity in the gas

- charges in the gas caused by particles, dust and fibres do not affect the measurement as long as there is no abrasion and no deposits on the sensor
- deviations in values as a result of variable air humidity in normal atmospheric conditions are covered by the measuring uncertainty specifications

Model designation (example)						
TA10	-165	G	E	140	p16	ZG2d
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Basic types		
Type		Article no.
TA10 -165	GE 140 / p16 ZG2d	B013/070
TA10 -265	GE 140 / p16 ZG2d	B013/071
TA10 -365	GE 140 / p16 ZG2d	B013/072
TA10 -665	GE 140 / p16 ZG2d	B013/073
TA10 -965	GE 140 / p16 ZG2d	B013/074

(1) Sensor type / probe diameter	
thermal flow sensor	
probe diameter 10 mm	

(2) Probe measurement A	
standard lengths (see basis types)	165, 265, 365, 665, 965 mm
fix probe length based on	insertion depth in measurement cross section, screw socket length, length of ball valve and probe guide piece (see accessories)

(3) Measurement gases	
air, gases, gas mixtures with constant ratio of mixture	

(4) Materials in contact with the medium	
stainless steel 1.4571, 1.4305, 1.4404, glass, epoxy resin, silicone (silicone-free on request)	

(5) Permissible temperature	
medium	-10 ... +140 °C
ambient	-25 ... +50 °C
	-20 ... +50 °C with option 'LCD'

(6) Pressure resistance	
max. 16 bar / 1.6 MPa above atmospheric	
greater than 16 bar / 1.6 MPa on request	

(7) Design	
probe with connection housing, as drawing ZG2d	

Measuring ranges air/nitrogen	
	Article no.
0.2 ... 60 m/s	V_TA10_2B_60
0.2 ... 120 m/s	V_TA10_2B_120
0.2 ... 150 m/s	V_TA10_2B_150
0.2 ... 200 m/s	V_TA10_2B_200

Measuring uncertainty / damping	
Measurement uncertainty for flow velocities N_v with 1014 hPa and +21 °C in air and gases, as far as calibration performed in real gas	
less than / equal to 40 m/s	: 2 % v. M. + 0.02 m/s
greater than 40 m/s	: 2.5 % v. M.
damping	: adjustable to 0.5 s and multiples

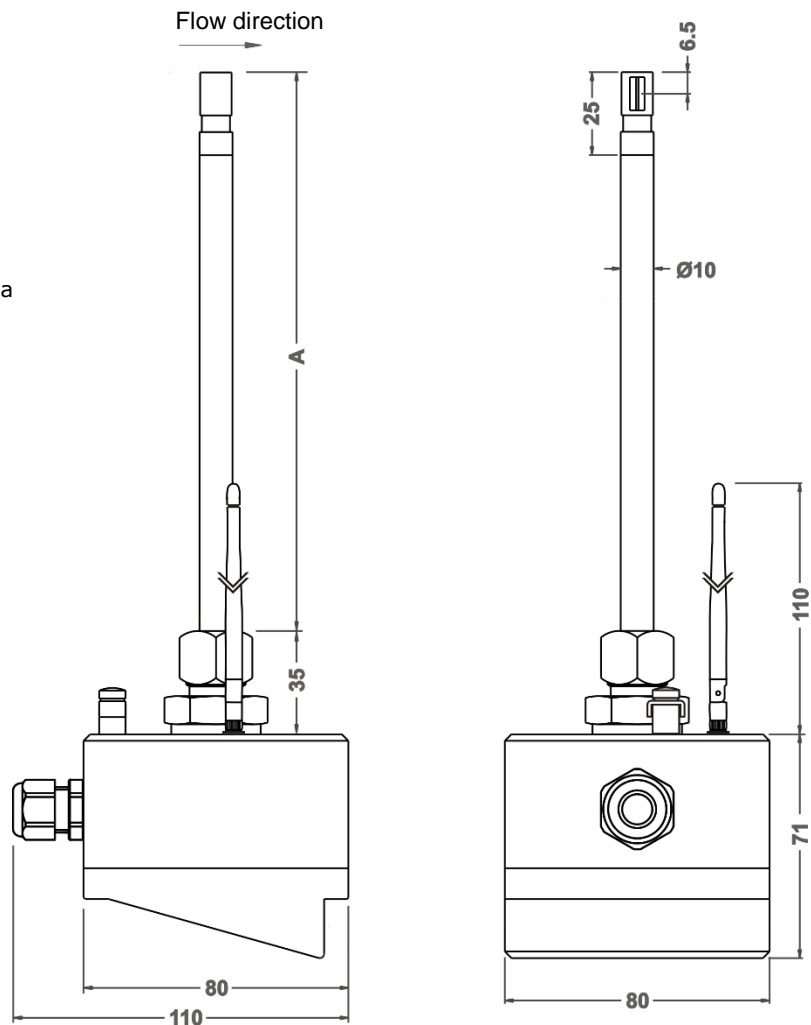
Measurable gases			
Medium	Calibration	Medium	Calibration
air	calibration in the medium	carbon dioxide (CO ₂)	transformed characteristics
nitrogen (N ₂)	transformed characteristics	landfill gas (40 % CH ₄)	transformed characteristics
argon (Ar)	transformed characteristics	helium (He)	transformed characteristics
methane (CH ₄)	transformed characteristics	hydrogen (H ₂)	transformed characteristics
propane (C ₃ H ₈)	transformed characteristics	custom 1	customised calibration
butane (C ₄ H ₁₀)	transformed characteristics	custom 2	customised calibration

Calibration always performed in air, in addition, characteristics transformation for the described media.

The media stored for the realisation of the smallest measurement uncertainties are generally also calibrated in real gas.

On request, additional calibration data for up to 2 further calibrations can be stored in other media or as special calibrations.

Drawing 2d
Angled cover with display and antenna optional



Ingress protection / Fitting position

sensor IP68, IEC 529 and EN 60 529
any installation position with atmospheric pressure,
with pressures above atmospheric direction of flow not from above

Connection housing AS80

dimensions	80 / 80 / 71 (60) mm (L / W / H)
connection	Cable gland for cables with an outside diameter 5 ... 9 mm, terminal clamps for strands with cross section 0.2 ... 1.5 mm ² . Comply with the standards and regulations applicable to the cable routing.
degree of protection	IP65, IEC 529 and EN 60 529
material	powder-coated aluminium

Transducer U10b, integrated in sensor connection housing

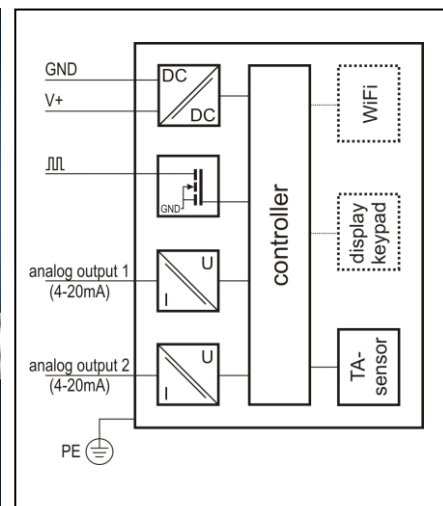
analog output 1 flow or temperature	4 ... 20 mA (linear), update every 500 ms burden max. 500 Ohm
analog output 2 flow or temperature	4 ... 20 mA (linear), update every 500 ms burden max. 500 Ohm
measured variable flow	Sm/s, Sft/min, Scfm, Sl/s, Sl/min, Sl/h, Sm ³ /s, Sm ³ /min, Sm ³ /h and kg/h counter in Sm ³
measured variable temperature	°C, °F
pulse output	for quantity measurement or as a limit value, open drain, max. 32 V, 20 mA, pulse duration 0.5 s, max. pulse frequency 1 Hz per volume unit SV, internal current limiting, thermal circuit breaker
power supply	24 V DC ±10 %
power consumption	less than 3 W
housing	AS80
EMC	EN 61 000-6-2 and EN 61 000-6-4
setting parameter	physical variables, initial and final value of the analog outputs, time constants, profile factor, pipe inside diameter, quantity pulse, limit value, working pressure, default, standard density, WiFi settings and more parameter can be changed via display and keypad or web interface.



Display and keypad (optional)



WiFi (optional)



Wiring diagram U10b

Examples for measurable volume flows in air

measuring pipe inside diameter Di [mm]	profile factor PF* [-]	measuring range starting value [Sm ³ /h]	measuring range terminal value [Sm ³ /h] sensor measuring range				
			'60 m/s'	'120 m/s'	'150 m/s'	'180 m/s'	'200 m/s'
25	0.725	0.26	77	154	192	231	256
40	0.810	0.73	220	440	550	660	730
50	0.840	1.2	356	713	890	1070	1180
60	0.840	1.7	513	1030	1280	1540	1710
80	0.840	3.0	912	1820	2280	2740	3040
100	0.840	4.8	1425	2850	3560	4280	4750
120	0.840	6.8	2050	4100	5130	6160	6840
150	0.840	11	3210	6410	8020	9620	10600
200	0.840	19	5700	11400	14250	17100	19000
300	0.840	43	12820	25650	32060	38480	42750
400	0.840	76	22800	45600	57000	68400	76000
500	0.840	120	35600	71200	89100	106900	118800
1000	0.840	480	142500	285000	356300	427600	475000

* Standard volume flow measuring range specifications with centric positioning of the sensor, irrotational afflux and amply-dimensioned input and output section (see Instruction Manual). 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.

Options

	Description	Article no.
local LCD with keypad and quantity counter	illuminated, in housing cover, multi-row, graphic-capable, temperature range -20 ... +50 °C, display options: - instantaneous value (volume flow and temperature) - volume - graphical overview of the instantaneous values of the last 10 seconds - status information	A010/530
WiFi module	compatible with the WLAN standards IEEE 802.11b/g/n (2.4 GHz), rotatable and pivotable round antenna. Permits parameter setting and display of the measured value course via web interface. Use as local hotspot or integration in the existing WLAN possible.	WIFI
ATEX type of protection category 3G and 3D (zone 2 and 22)	Ex ec IIC T4 Gc X * Ex tc IIIC T135 °C Dc X * * option display and keypad not possible	TAEX2E

Accessories

	Description	Article no.
ball valve	installation length 75 mm, through hole 15 mm, stainless steel 1.4408, seal PTFE, working temperature range max. +200 °C, working pressure 64 bar/6.4 MPa rel., connection thread G 1/2" inside (DIN/ISO 228)	B004/900
calibration certificate Sv	minimum 6 standard calibration values	KLB

Accessories (cont)		
	Description	Article no.
Drawing 5 * Probe guide piece SFB 10 E-35 / G 1/2" ZG5	for any repeated positioning with lower overpressure (max. 3 bar) / underpressure for connecting to screw socket or ball valve with inside thread G 1/2", threaded height 22 mm, working temperature range -20 ... +240 °C, installation length 35 mm, materials: stainless steel, VITON®, PTFE clamping bush	B004/503
Drawing 6 * probe guide piece SFB 10 E-60 / G 1/2" ZG7 with clamp clip and anti-twist device	for any repeated positioning with higher overpressure / underpressure, clamping device for safeguarding the probe attachment, for connecting to screw socket or ball valve with inside thread G 1/2", working temperature range -20 ... +240 °C, installation length 55mm, materials: stainless steel, VITON®, PTFE clamping bush	B004/600
Drawing 7 * probe guide piece SFB 10 E-60 / G 1/2" ZG7 with chain guard, clamp clip and anti-twist device	for any repeated positioning with higher overpressure / underpressure, clamping device for safeguarding the probe attachment and chain guard, for connecting to screw socket or ball valve with inside thread G 1/2", working temperature range -20 ... +240 °C, installation length 55mm, materials: stain-less steel, VITON®, PTFE clamping bush	B004/601
* installation information: the connection thread of the probe guide piece is not greased. When fitting, use temperature and media-compatible lubricant.		

