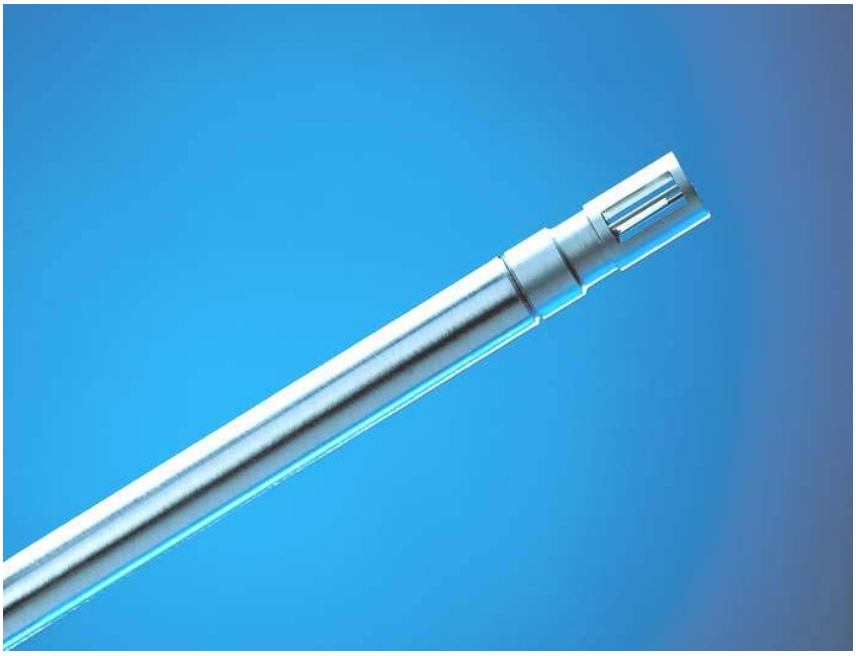
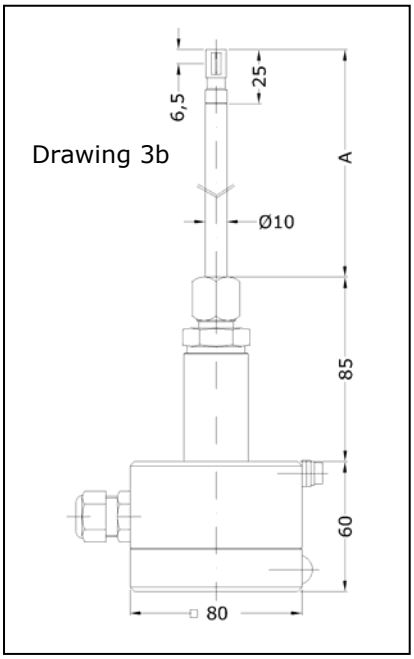
Thermal Flow Sensors
TA10 ... Ex ZG3b

höntzsch
flow measuring technology

Thermal Flow Sensors TA10 ... Ex ZG3b for applications in potentially explosive areas Category 2 G (Zone 1)



Sensor TA10 ... Ex ZG3b



TA10 ... Ex ZG3b (Dim. A Page 2)

Measurable variable

- standard velocity Nv, standard flo rate NV/t, mass flow proportional
- norm: temperature t_n = +21 °C pressure p_n = 1014 hPa

Functional principle

- measurement of flow according t heat transfer method
- temperature dependence of measurement compensated by complete temperature operating range

Advantages

- application in potentially explosive areas Category 2 G (Zone 1)
- high measuring dynamics Nv (up to 1 : 1000)
- measuring range from 0.2 m/s
- low measuring uncertainty, even at lowest velocities
- direct air/gas mass flow proportional measurement. Additional measuring of pressure and temperature not necessary.

Range and examples of application

- measuring
  - in hazardous areas
  - of air velocity
  - compressed air and gas consumption, leakage
  - laminar flow in safety cabinets or machinery
  - in outgoing air, burner supply air and draughts
  - in climatic applications
  - in air in rough vacuum range with pressures greater than 200 hPa abs.

Design / Sensor

- probe with integrated transducer
- thin film sensor element
- sensor has no moving parts
- stainless steel sensor housing
- greater working temperature and pressure ranges

Gases

- pure gases, gas mixtures: air, nitrogen, methane, natural gas, argon, carbon dioxide, helium, sulphur hexafluoride, biogas, hydrogen ...
- calibration with a multitude of gases or gas mixtures can be carried out to achieve the slightest measuring uncertainty
- easy and cost-efficient installation
- low pressure drop due to small size
- fatigue strength
- sterilisable (sensor material-resistance allowing)
- configurable and optimal integration with PC software

Particles, condensation, humidity in the gas

- charges in the gas caused by particles such as dust and fibres do not affect the measurement, as long as abrasion and agglomeration do not occur 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	p10	Ex	ZG3b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Basic types

Type	Article No.
TA10- **165** GE 140 / p10 / Ex ZG3b	b013/025
TA10- **265** GE 140 / p10 / Ex ZG3b	b013/026
TA10- **365** GE 140 / p10 / Ex ZG3b	b013/027
TA10- **665** GE 140 / p10 / Ex ZG3b	b013/028
TA10- **965** GE 140 / p10 / Ex ZG3b	b013/029

(1) Sensor type / probe diameter

Thermal flow sensor

Probe diameter 10 mm

(2) Probe lenth - Dimension A

Standard length (see Basic types)	165, 265, 365, 665, 965 mm
Fix probe length based on	designated insertion depth in measurement cross section, length of sleeve, ball valve and probe guide piece (see Accessories). To prevent vibration of the probe at higher flow velocities and greater insertion depths, an additional support is necessary. **Warning** On account of the weight of the connection housing the probe should not protrude more than 150 mm out of the probe guide piece without extra support for the connection housing!

(3) Gases

Air, clean gases, gas mixtures with consistent mixture ratio

(4) Materials in contact with the medium

Stainless steel 1.4571, 1.4305, glass, epoxy resin

Measuring range air/nitrogen

	Article No.
0.2 ... 60 m/s	v_ta10_3b_60
0.2 ... 120 m/s	v_ta10_3b_120
0.2 ... 150 m/s	v_ta10_3b_150
0.2 ... 180 m/s	v_ta10_3b_180
0.2 ... 200 m/s	v_ta10_3b_200

Measurement uncertainty / time constant

measurement uncertainty for flow velocities Nv at 1014 hPa and +21 °C
less than/equal to 40 m/s : 2 % of measured value + 0.02 m/s
greater 40 m/s : 2.5 % of measured value

time constant : in seconds

Implementation of a characteristic for application in other gases (on request)

based on	Article No.
calibration in air and conversion of the air characteristic for an other gas, up to 60 m/s, additional measurement uncertainty 3.5 % of measured value (on request)	ta_transfo
real gas calibration for achieving slightest measurement uncertainties	

Examples for measurable flow rates

measuring tube inside diameter Di [mm]	profile factor PF* [-]	smallest measurable value [Nm³/h]	measurement range terminal values [Nm3/h] with 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	0.95	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	10700	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	28500	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 Operating Instructions).

* 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.

(5) Permissible temperature

medium	-10 ... +140 °C
ambient	-25 ... +50 °C

Permissible ambient and medium temperature ranges against the selected temperature class. Ambient temperature T_U, medium temperature T_M

Temperature class	T_U	T_M	$T_U = T_M$
T5 (95 °C)	- 20 °C ... + 50 °C	- 20 °C ... + 45 °C	- 20 °C ... + 45 °C
T4 (130 °C)	- 20 °C ... + 50 °C	- 20 °C ... + 130 °C	- 20 °C ... + 50 °C
T3 (195 °C)	- 20 °C ... + 50 °C	- 20 °C ... + 140 °C	- 20 °C ... + 50 °C
T2 (295 °C)	- 20 °C ... + 50 °C	- 20 °C ... + 140 °C	- 20 °C ... + 50 °C
T1 (445 °C)	- 20 °C ... + 50 °C	- 20 °C ... + 140 °C	- 20 °C ... + 50 °C

(6) Working pressure

max. 10 bar / 1.0 MPa overpressure

greater 10 bar / 1.0 MPa on request

(7) Type of protection

EEx e q [ia] IIC T5 for applications in Category 2 G (Zone 1)

EC Type Examination Certificate ZELM 01 ATEX 0065

(8) Design

Probe with connection housing; see Drawing ZG3b (Page 1)

Sensor protection class / mounting attitude

IP68, IEC 529 and EN 60 529	
any	

Connection housing

Dimensions	80 / 80 / 60 mm (L / W / H)
Connection cable	direct exit in connection housing, cable length approx. 2 m
Connection	in Ex-areas at hand-over point in type of protection 'increased safety Exe' only
Terminal assignment	see Page 6
Protection class	IP65, IEC 529 and EN 60 529

Transducer U12-Ex, integrated in the sensor connection housing

Analog output flow	4 ... 20 mA (linear), output every second working resistance max. 400 Ohm
Pulse output	quantity measurement, Open Collector / max. 24 V, 20 mA / pulse duration 0.5 s, max. pulse frequency 1 Hz per unit of volume NV
PC interface	RS232, for transducer configuration via PC
Power supply	24 V DC +/- 5 %, an intrinsically safe mains adapter is not necessary for operating the sensor. Wiring installation must simply be carried out in Ex 'e'.
	the signal lines are electrically isolated from the power supply
Power consumption	less than 5 W
EMC	EN 61 000-6-2 / IEC 77
Setting parameter (with PC software UTACOM and programming adapter (see below) alterable)	analog output, time constant, profile factor, tube inside diameter, quantity pulse (quality rating adjustable), 'working pressure' for zero correction (only relevant when Nv less than 1 m/s)

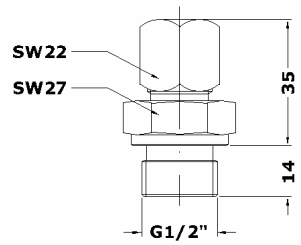
Accessories

	Description	Article No.
PC software UTACOM	for configuration of transducer U12-Ex via RS232 interface	a010/012
PC programming adapter U12acom	for configuration of transducer U12-Ex together with UTACOM software (see above), connection PC sub-D 9-pin, adapter plug 230VAC/24 VDC	a012/002
Interface converter USB / RS232	for connecting PC with USB port and Höntzsch programming adapter with RS232 interface, PC connection: USB plug type A prog. adapter connection: sub-D 9-pin	a010/100

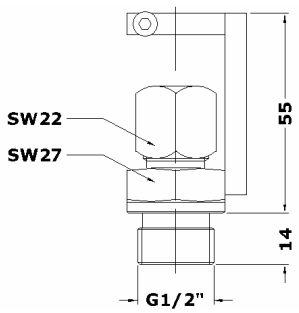
Accessories (cont.)

	Description	Article No.
Calibration certificate Nv	min. 6 standard calibration values	klbneu
Probe guide piece SFB 10 E-35 / G ½" ZG5 as in **Drawing 5**	unlimited and repeated positioning with slight overpressure (max. 3 bar) / low pressure, for connecting to screw socket or ball valve with inside thread G 1/2", working temperature range -20 ... +240 °C, installation length 35 mm, materials: stainless steel, VITON®, PTFE clamping bush	b004/503
Probe guide piece SFB 10 E-55 / G ½" ZG6 with clamp clip for locking and anti-twist device as in **Drawing 6**	unlimited and repeated positioning even at higher overpressure / low pressure, clamping device for safeguarding fixing of probe, for connecting to screw socket or ball valve with inside thread G 1/2", working temperature range -20 ... +240 °C, installation length 55 mm, materials: stainless steel, VITON®, PTFE clamping bush	b004/600
probe guide piece SFB 10 E-55 / G ½" ZG7 with chain safety device and clamp clip for locking and anti-twist device as in **Drawing 7**	unlimited and repeated positioning even at higher overpressure / low pressure, clamping device for safeguarding fixing of probe and chain safety device, for connecting to screw socket or ball valve with inside thread G 1/2", working temperature range -20 ... +240 °C, installation length 55 mm, materials: stainless steel, VITON®, PTFE clamping bush	b004/601

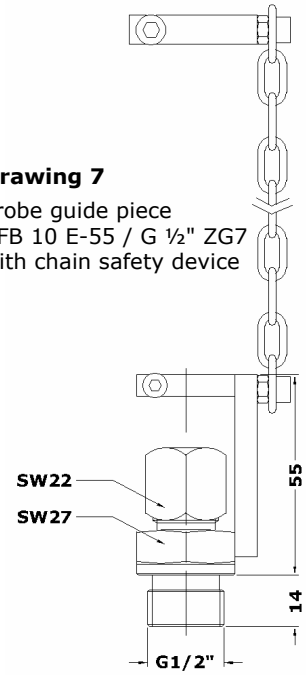
Drawing 5
Probe guide piece
SFB 10 E-35 / G ½" ZG5



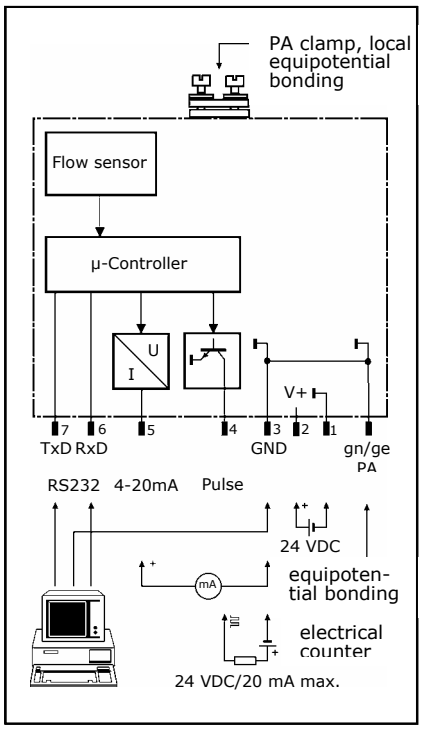
Drawing 6
Probe guide piece
SFB 10 E-55 / G ½" ZG6



Drawing 7
Probe guide piece
SFB 10 E-55 / G ½" ZG7
with chain safety device



Accessories (cont.)		
	Description	**Article No.**
Ball valve	installation length 60 mm, through hole 15 mm, stainless steel 1.4408, PTFE seal, 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



Terminal connection diagram transducer U12-Ex

1	**Power V -**
2	**Power V +**
3	**GND**
4	**Pulse output**
5	**4-20 mA output**
6	**RxD RS232**
7	**TxD RS232**
gn/ge	**PA equipotential bonding**

Conductor marking for U12-Ex connecting cable

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