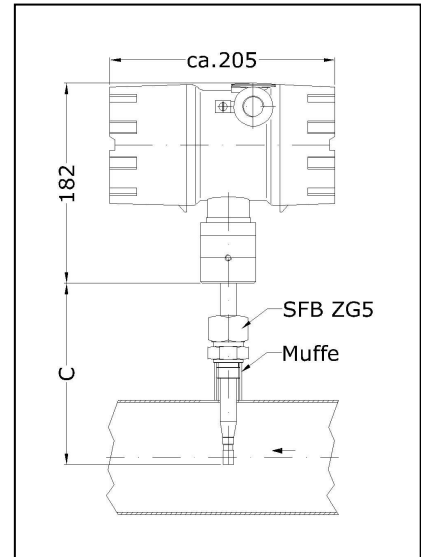


**Thermal flow sensor TA10/15 ... ZG1 Ex-d with integrated, configurable transducer UTA in pressure-proof Ex-d enclosure for application in potentially explosive atmospheres**



Sensor TA10/15 ... ZG1 Ex-d



Drawing 1: Connection on sleeve (Muffe) with inside thread provided on site

#### Measurable variables

- standard velocity  $N_v$ , standard flow rate  $NV/t$ , mass flow proportional
- norm: temperature  $t_n = +21\text{ °C}$ , pressure  $p_n = 1014\text{ hPa}$

#### Functional principle

- flow measurement according to the heat transfer method
- temperature-compensated measuring

#### Design / Sensor

- probe with integrated transducer in the Ex-d connection enclosure
- thin film sensor element

#### Gases

- pure gases, gas mixtures: air, nitrogen, methane, natural gas, hydrogen, argon, carbon dioxide, helium, sulphure hexafluoride, landfill gas ...
- calibration can be carried out with a multitude of gases or gas mixtures to achieve the lowest measuring uncertainty

#### Advantages

- application in potentially explosive atmospheres: Category 1/2 G (Zone 0/1) and Category 1/2 D (Zone 20/21)
- high measuring dynamics  $N_v$  (up to 1 : 1000)
- low measurement uncertainty, even at lowest flow velocities
- direct air/gas mass flow proportional measuring; additional measurement of pressure and temperature is not necessary

- sensor has no moving parts
- stainless steel sensor housing
- greater temperature and pressure resistance ranges

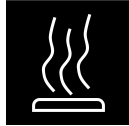
- low installation costs
- minor pressure drop thanks to small dimensions
- durable
- sterilisable (material-resistance of sensor allowing)
- easy configuration via HART® interface

#### Examples of application

- measuring
  - in Ex applications
  - of air velocity
  - of compressed air and gas consumption as well as leakage flows
  - of laminar flow in safety cabinets or machines
  - in exhaust air and burner supply air
  - in air-conditioning applications
  - in air in low vacuum range with pressures greater than 200 hPa abs.

#### Particles, humidity in the gas

- charges in the gas caused by particles such as dust and fibres do not affect the measurement, as long as there is no abrasion or 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)

<b>TA10/15</b>	<b>-165</b>	<b>G</b>	<b>E</b>	<b>140</b>	<b>p16</b>	<b>ZG1</b>	<b>Ex-d</b>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

### Basic types

Type	Article No.
TA10/15- <b>165</b> GE 140 / p16 / ZG1 / Ex-d	b013/001
TA10/15- <b>265</b> GE 140 / p16 / ZG1 / Ex-d	b013/002
TA10/15- <b>365</b> GE 140 / p16 / ZG1 / Ex-d	b013/003
TA10/15- <b>665</b> GE 140 / p16 / ZG1 / Ex-d	b013/004
TA10/15- <b>965</b> GE 140 / p16 / ZG1 / Ex-d	b013/005
TA10/15- <b>1465</b> GE 140 / p16 / ZG1 / Ex-d	b013/006

### (1) Sensor type / probe diameter

Thermal flow sensor  
10/15 mm

### (2) Probe length C

Standard length (see Basic types)  
Determining probe length

165, 265, 365, 665, 965, 1465 mm

on the basis:  
desired insertion depth in measurement cross-section,  
length of sleeve and ball valve, length of probe guide  
piece (see Accessories).  
In the case of greater flow velocities and insertion  
depths additional support may be necessary to avoid  
vibration of the probe.

#### Warning

Due to the weight of the connection housing, the probe  
should not protrude more than 150 mm out of the  
probe guide piece without additional support of the  
connection housing!

### (3) Gases

air, pure gases, gas mixtures with constant mix ratio

### (4) Materials in contact with the medium

stainless steel 1.4571, 1.4305, glass, epoxy resin

### Measuring ranges 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 with 1014 hPa and +21 °C  
less than/equal to 40 m/s : 2 % of measured value + 0.02 m/s  
greater than 40 m/s : 2.5 % of measured value  
time constant : in seconds



**Storing a characteristic for application in other gases (on request)**

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

**Examples – measurable flow rates**

measuring tube inside diameter Di [mm]	profile factor PF* [-]	smallest measurable value [Nm <sup>3</sup> /h]	terminal value [Nm <sup>3</sup> /h] with sensor measuring range				
			'60 m/s'	'120 m/s'	'150 m/s'	'180 m/s'	'200 m/s'
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	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 flow rate measuring range specifications with centric positioning of the sensor, irrotational afflux and amply dimensioned input / output sections (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	-20 ... +50 °C

**Permissible ambient and medium temperature ranges depending on the chosen temperature class. Ambient temperature (electronics) T<sub>U</sub>, medium temperature T<sub>M</sub>**

Instrument as Category 1/2G equipment		
Temperature class	T <sub>M</sub>	T <sub>U</sub>
T4	- 10 °C ... + 60 °C	- 20 °C ... + 50 °C
T3	- 10 °C ... + 60 °C	- 20 °C ... + 50 °C
Instrument as Category 2G equipment		
Temperature class	T <sub>M</sub>	T <sub>U</sub>
T4	- 10 °C ... + 130 °C	- 20 °C ... + 50 °C
T3	- 10 °C ... + 140 °C	- 20 °C ... + 50 °C
T2	- 10 °C ... + 140 °C	- 20 °C ... + 50 °C
T1	- 10 °C ... + 140 °C	- 20 °C ... + 50 °C
Instrument as Category 1/2D or 2D equipment		
max. surface temperature		T <sub>U</sub>
T 135 °C		- 20 °C ... + 50 °C



**(6) Working pressure**

max. 16 bar / 1.6 MPa above atmospheric  
working pressure greater than 16 bar / 1.6 MPa on request

**(7) Design**

probe with Ex-d connection enclosure as in drawing ZG1 (see Page 1)

**(8) Ex-protection**

for gas : Ⓢ II 1/2 G Ex ia/d e [ia] IIC T4 Ga/Gb  
for dust : Ⓢ II 1/2 D Ex ia/tb IIIC T135°C Da/Db  
Sensor for application in Category 1 (Ex-Zone 0 or 20),  
transducer enclosure for application in Category 2 (Ex-Zone 1 or 21)  
EC-Type Examination Certificate IExU06ATEX1103 X

**Type of protection / mounting attitude**

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

**Ex-d transducer housing**

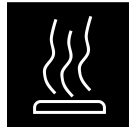
Dimensions	outside diameter/length/height: approx. 110/205/182 mm
Material	die-cast aluminium max. 0.5 % Mg, coated
Type of protection	IP68, IEC 529 and EN 60 529
Connection	bush for shielded cables with outside diameter 5 ... 9 mm, contacting of the overall shielding on the earth terminal in the housing
Alignment to the 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

**Transducer UTA, integrated in the sensor connection housing Ex-d**

Analog output flow	<b>4 ... 20 mA</b> 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 Accessories, Page 5)
	output signals are electrically isolated from the power supply



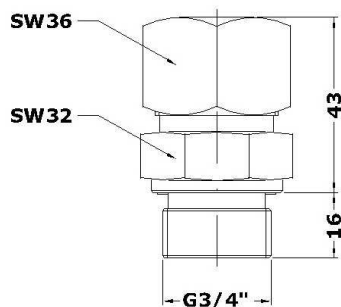
**Transducer UTA, integrated in the sensor connection housing Ex-d (contd.)**

Self-monitoring	parameter settings, sensor interface; in the case of error: analog output less than 3.6 mA
Connection	terminals Ex-e; for conductors 0.14 ... 1.5 mm <sup>2</sup>
Power supply	24 V DC (20 ... 27 V DC)
Power consumption	less than 5 W
Setting parameter	analog output, time constant, profile factor, tube inside diameter, limit value or quantity pulse (quality rating adjustable), 'working pressure' to zero correction (only relevant for $N_v$ less than 1 m/s)

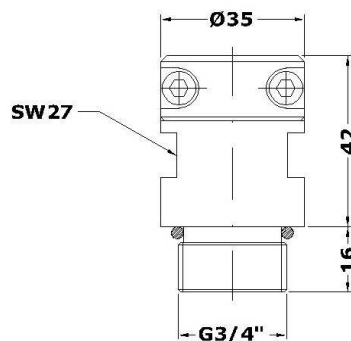
**Accessories (optional)**

	Description	Art. No.
LCD display	1 <sup>st</sup> line: 'instantaneous value': flow rate or flow velocity 2 <sup>nd</sup> 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 UTA via RS232	a010/052

**Drawing 5**  
Probe guide piece  
SFB 15 E-43 / G 3/4" ZG5



**Drawing 2**  
Probe guide piece  
SFK 15 E-42 / G 3/4" ZG2





**Accessories (optional, contd.)**

	<b>Description</b>	<b>Article No.</b>
Probe guide piece SFB 15 E-45 / G 3/4" ZG5 as in <b>Diagram 5</b>	for any repeated positioning with marginal overpressure (max. 0.5 bar) / low pressure, for connecting to screw socket or ball valve with inside thread G 3/4", working temperature range -20 ... +240 °C, installation length approx. 45 mm, materials: stainless steel, VITON®, PTFE bush	b004/515
Probe guide piece SFK 15 E-42 / G 3/4" ZG2 as in <b>Diagram 2</b>	for any repeated positioning with pressures up to 1.6 MPa/16 bar, for connection to pipe sleeves or ball valve with inside thread G 3/4", working temperature range -20 ... +240 °C, installation length approx. 42 mm, materials: stainless steel, VITON®, PTFE bush. Probe attachment by clamp strap.	b004/220

® Registered trademark:  
Dupont: VITON  
HART: HART Communication  
Foundation

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Subject to alteration