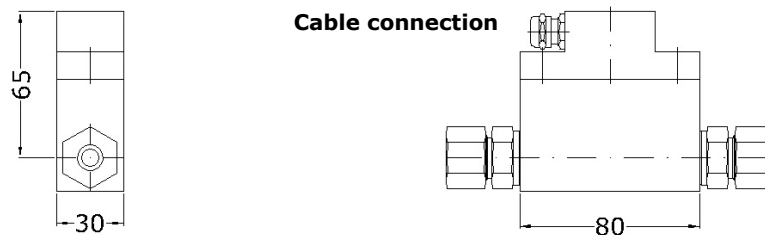


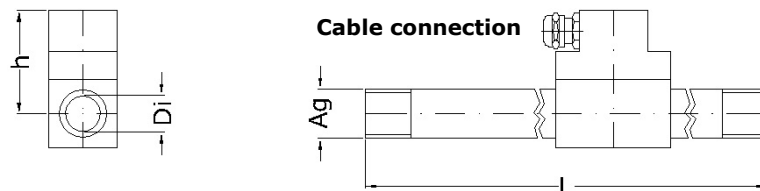
**Thermal flow sensor TA Di for separate evaluation units
for measuring mass flow, standard flow rate and air or gas consumption**

Drawing 3b



Sensor TA Di 8

Drawing 2b



Sensor TA Di 16 ... 41.8

Examples of application

- measuring
 - compressed air and gas consumption of oxygen, nitrogen, argon, for example in technical welding applications
 - leakage flows
 - in exhaust air, burner supply air
 - for inertisation of nuclear processes
 - in air in low vacuum range with pressures greater than 200 hPa abs.

Advantages

- high measuring dynamics N_v (0.2 ... 150 m/s)
- measuring range from 0.04 Nm^3/h (0.6 litre/min)
- 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
- negligible pressure drop thanks to virtually free passageway
- durable
- sterilisable (material-resistance of sensor allowing)
- optimal integration of associated transducer via PC software



Functional principle

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

Measurable variable

- standard flow rate [m³/h, l/min], mass flow [kg/h], standard velocity [m/s], norm:
temperature $t_n = +21\text{ °C}$,
pressure $p_n = 1014\text{ hPa}$

Design / Sensor

- measuring tube for separate transducers U10a, U15-Ex and hand-held units HTA and HTA-Ex
- thin film sensor element

Gases

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

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 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)

TA Di	8	G	E	60 m/s	140	p16	ZG4b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Basic types

			Article No.
TA Di 8 GE	60 m/s / 140 / p16	ZG4b	b016/555
TA Di 8 GE	120 m/s / 140 / p16	ZG4b	b016/555-120m/s
TA Di 8 GE	150 m/s / 140 / p16	ZG4b	b016/555-150m/s
TA Di 16 GE	60 m/s / 140 / p16	ZG2b	b016/550
TA Di 16 GE	120 m/s / 140 / p16	ZG2b	b016/550-120m/s
TA Di 16 GE	150 m/s / 140 / p16	ZG2b	b016/550-150m/s
TA Di 21.6 GE	60 m/s / 140 / p16	ZG2b	b016/551
TA Di 21.6 GE	120 m/s / 140 / p16	ZG2b	b016/551-120m/s
TA Di 21.6 GE	150 m/s / 140 / p16	ZG2b	b016/551-150m/s
TA Di 27.2 GE	60 m/s / 140 / p16	ZG2b	b016/552
TA Di 27.2 GE	120 m/s / 140 / p16	ZG2b	b016/552-120m/s
TA Di 27.2 GE	150 m/s / 140 / p16	ZG2b	b016/552-150m/s
TA Di 35.9 GE	60 m/s / 140 / p16	ZG2b	b016/553
TA Di 35.9 GE	120 m/s / 140 / p16	ZG2b	b016/553-120m/s
TA Di 35.9 GE	150 m/s / 140 / p16	ZG2b	b016/553-150m/s
TA Di 41.8 GE	60 m/s / 140 / p16	ZG2b	b016/554
TA Di 41.8 GE	120 m/s / 140 / p16	ZG2b	b016/554-120m/s
TA Di 41.8 GE	150 m/s / 140 / p16	ZG2b	b016/554-150m/s



(1) Sensor type / design

Thermal flow sensor TA Di designed as measuring tube

(2) Dimensions

measuring tube inside Ø Di [mm]	installation length L [mm]	installation height h [mm]	tube connection on both sides
8.0	80 mm + SRV *	65	with on-site tubes 12 x 2 mm
16.0	480	45	Ag R 1/2" **, Gg RP 1/2"
21.6	650	50	Ag R 3/4" **, Gg RP 3/4"
27.2	820	50	Ag R 1" **, Gg RP 1"
35.9	1080	40	Ag R 1 1/4" **, Gg RP 1 1/4"
41.8	1250	45	Ag R 1 1/2" **, Gg RP 1 1/2"

* **SRV** : cutting ring tube fitting on both sides
 ** **Ag** : Whitworth tapered pipe thread according to DIN 2999
Gg : counter thread

Input / output section

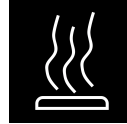
for TA Di 8 provided on site: tubes 12 x 2, 160 mm (input) / 80 mm (output) running straight;
 for all other measuring tubes no additional on site input/output section necessary; length of the
 input section 2/3 of the installation length L, length of the output section 1/3 of L

(3) Gases

air, pure gases, gas mixtures with constant mix ratio

(4) Materials in contact with the medium

stainless steel, glass, epoxy resin, Viton®



(5) Measuring ranges* air/nitrogen

Basic type / measuring range	in m ³ /h	in kg/h	in litre/min	in m/s	1 m ³ /h equivalent to [m/s]
TA Di 8 ...					
... 60 m/s ...	0.04 ... 11	0.05 ... 13	0.6 ... 181	0.2 ... 60	5.53
... 120 m/s ...	0.04 ... 22	0.05 ... 26	0.6 ... 362	0.2 ... 120	5.53
... 150 m/s ...	0.04 ... 27	0.05 ... 33	0.6 ... 452	0.2 ... 150	5.53
TA Di 16 ...					
... 60 m/s ...	0.15 ... 43	0.18 ... 52	2.4 ... 729	0.2 ... 60	1.38
... 120 m/s ...	0.15 ... 86	0.18 ... 104	2.4 ... 1448	0.2 ... 120	1.38
... 150 m/s ...	0.15 ... 109	0.18 ... 130	2.4 ... 1810	0.2 ... 150	1.38
TA Di 21.6 ...					
... 60 m/s ...	0.27 ... 79	0.32 ... 95	4.4 ... 1319	0.2 ... 60	0.758
... 120 m/s ...	0.27 ... 158	0.32 ... 158	4.4 ... 2638	0.2 ... 120	0.758
... 150 m/s ...	0.27 ... 198	0.32 ... 238	4.4 ... 3298	0.2 ... 150	0.758
TA Di 27.2 ...					
... 60 m/s ...	0.42 ... 125	0.50 ... 151	7.0 ... 2092	0.2 ... 60	0.478
... 120 m/s ...	0.42 ... 250	0.50 ... 251	7.0 ... 4184	0.2 ... 120	0.478
... 150 m/s ...	0.42 ... 314	0.50 ... 314	7.0 ... 5230	0.2 ... 150	0.478
TA Di 35.9 ...					
... 60 m/s ...	0.73 ... 219	0.88 ... 263	12.1 ... 3644	0.2 ... 60	0.274
... 120 m/s ...	0.73 ... 438	0.88 ... 526	12.1 ... 7288	0.2 ... 120	0.274
... 150 m/s ...	0.73 ... 547	0.88 ... 657	12.1 ... 9110	0.2 ... 150	0.274
TA Di 41.8 ...					
... 60 m/s ...	1.0 ... 296	1.2 ... 356	16.5 ... 4949	0.2 ... 60	0.202
... 120 m/s ...	1.0 ... 592	1.2 ... 712	16.5 ... 9880	0.2 ... 120	0.202
... 150 m/s ...	1.0 ... 741	1.2 ... 890	16.5 ... 12350	0.2 ... 150	0.202

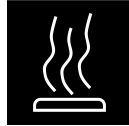
* all standard flow rate and standard flow velocity specifications relating to a standard atmospheric pressure $p_N = 1014 \text{ hPa}$ and a standard temperature $t_p = +21 \text{ °C}$ (294.15 K)

Measurement uncertainty / time constant

measurement uncertainty for flow rates NV/t 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 in the associated evaluation unit 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	



(6) Permissible temperature

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

(7) Max. working pressure

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

(8) Design

TA Di 8	measuring tube as in Drawing 4b
TA Di 16 ... 41.8	measuring tube as in Drawing 2b

Option Ex-protection

Type	Article No.
EEx ia IIC T4 Category 2G/Zone 1 required for hand-held unit HTA-Ex	ta10_1b_ex1
EEx ia IIC T4 Category 1G/Zone 0 required for transducer U15-Ex	ta10_1b_ex0
Ex nA IIC T4 Category 3G/Zone2 in combination with all evaluation units	taex2

Connector cable / connection

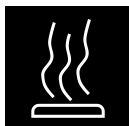
Standard sensor connector cable 3 m long, direct exit, resistant up to +140 °C, other lengths on request. With cable lengths other than standard, a minimal measurement uncertainty arises only in the case of fixed allocation of sensor and evaluation unit. connection (IP67) for transducer U10a, hand-held unit HTA : plug 423-5 with gold-plated pins transducer U15-Ex, hand-held unit HTA-Ex : plug 423-8 with gold-plated pins

Type of protection / mounting attitude

sensor IP68; at cable exit point IP65 any fitting position with atmospheric pressure, with pressures above atmospheric direction of flow not from above

Electromagnetic Compatibility (EMC)

IEC 1000-4, EN 50081, EN61000



Requisite compatible, separate evaluation unit

for non-Ex applications	<ul style="list-style-type: none"> transducer U10a hand-held unit HTA
for Ex-applications	<ul style="list-style-type: none"> transducer U15-Ex EEx ia IIC T4 Category 1 (Zone 0) hand-held unit HTA-Ex EEx ia IIC T4 Category 2 (Zone 1)

Accessories

	Article No.
Calibration certificate	klbneu

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Subject to alteration

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