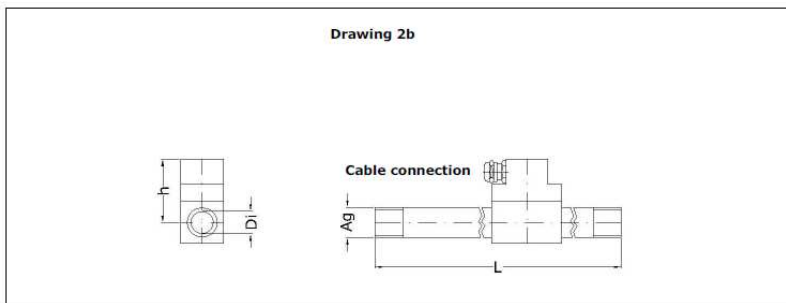
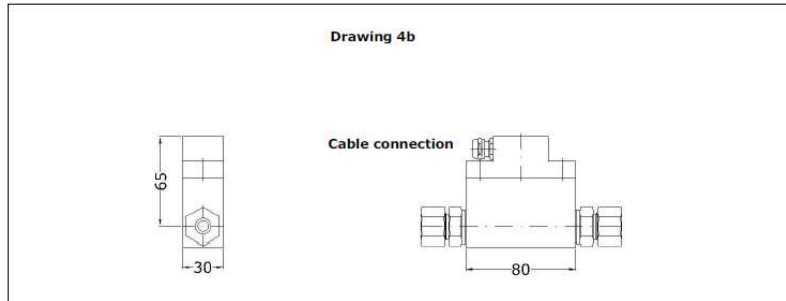


## Thermal Measuring Tube TA Di - for separate evaluation units

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



### 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<sup>3</sup>/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 [m<sup>3</sup>/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 flowtherm NT, 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, landfill gas ...
- calibration can be carried out with a multitude of gases or gas mixtures to achieve the lowest measuring uncertainty
- deviations in values as a result of variable air humidity in normal atmospheric conditions are covered by the measuring uncertainty specifications

### 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

### Model designation (example)

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

### Basic types

TA Di 8 GE 60 m/s / 140 / p16 ZG4b  
 TA Di 8 GE 120 m/s / 140 / p16 ZG4b  
 TA Di 8 GE 150 m/s / 140 / p16 ZG4b  
 TA Di 16 GE 60 m/s / 140 / p16 ZG2b  
 TA Di 16 GE 120 m/s / 140 / p16 ZG2b  
 TA Di 16 GE 150 m/s / 140 / p16 ZG2b  
 TA Di 21,6 GE 60 m/s / 140 / p16 ZG2b  
 TA Di 21,6 GE 120 m/s / 140 / p16 ZG2b  
 TA Di 21,6 GE 150 m/s / 140 / p16 ZG2b  
 TA Di 27,2 GE 60 m/s / 140 / p16 ZG2b  
 TA Di 27,2 GE 120 m/s / 140 / p16 ZG2b  
 TA Di 27,2 GE 150 m/s / 140 / p16 ZG2b  
 TA Di 35,9 GE 60 m/s / 140 / p16 ZG2b  
 TA Di 35,9 GE 120 m/s / 140 / p16 ZG2b  
 TA Di 35,9 GE 150 m/s / 140 / p16 ZG2b  
 TA Di 41,8 GE 60 m/s / 140 / p16 ZG2b  
 TA Di 41,8 GE 120 m/s / 140 / p16 ZG2b  
 TA Di 41,8 GE 150 m/s / 140 / p16 ZG2b

### (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	80 mm + SRV *	65	durch bauseitige Rohre 12 x 2 mm
16	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 m³/h	in kg/h	in Liter/min	in m/s	1 m³/h equivalent to [m/s]
<b>TA Di 8 ...</b>					
... 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
<b>TA Di 16 ...</b>					
... 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

<b>TA Di 21,6 ...</b>					
... 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 ... 190	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
<b>TA Di 27,2 ...</b>					
... 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 ... 300	7,0 ... 4184	0,2 ... 120	0,478
... 150 m/s ...	0,42 ... 314	0,50 ... 377	7,0 ... 5230	0,2 ... 150	0,478
<b>TA Di 35,9 ...</b>					
... 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
<b>TA Di 41,8 ...</b>					
... 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  $p_N = 1014$  hPa and a standard temperature  $t_P = +21$  °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

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) 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

**Type Article No.**

Ex ia IIC T4   Category 2G (Zone 1)  
required for hand-held unit HTA-Ex  
Ex ia IIC T4   Category 1/2G (Zone 0/1)  
required for transducer U15-Ex  
Ex nA IIC T4   Category 3G (Zone 2)  
Ex tD A22 IP6X T135°C                        Category 3D (Zone 22)  
in combination with U10a and flowtherm NT

**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, flowtherm NT :                   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, EN61000

**Requisite compatible, separate evaluation unit**

for non-Ex applications	<ul style="list-style-type: none"><li>• transducer U10a</li><li>• hand-held unit HTA</li><li>• hand-held unit flowtherm NT</li></ul>
for Ex-applications	<ul style="list-style-type: none"><li>• transducer U15-Ex Ex nA [ia] IIC T4 Category 3(1)G (Zone 2(0))</li><li>• hand-held unit HTA-Ex Ex ia IIC T4 Category 2G (Zone 1)</li></ul>

**Accessories**

Calibration certificate