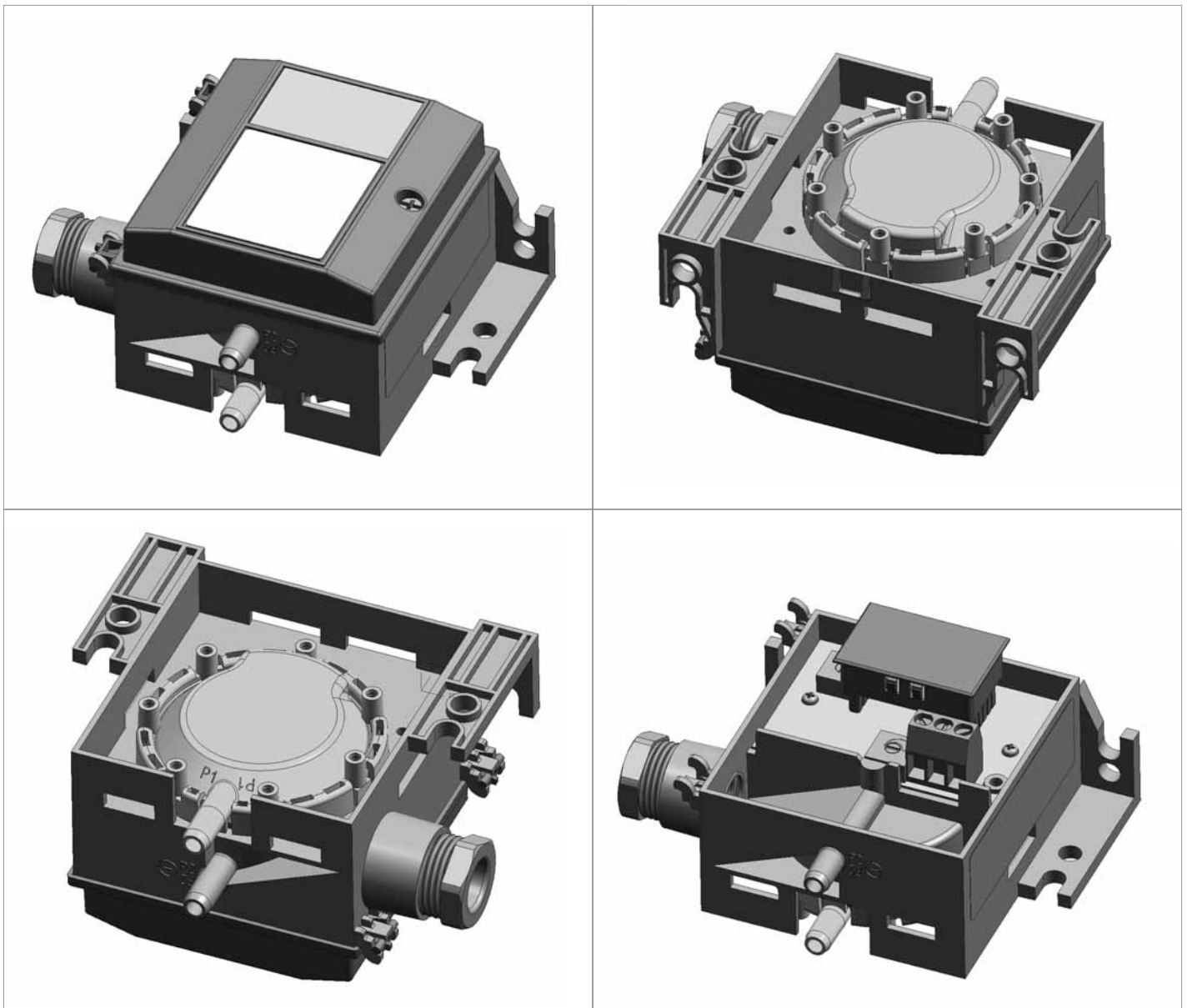


## Relative and differential pressure transmitter

-0.5 ... +0.5 mbar / 0 ... 1 – 50 mbar



**Huba Control**

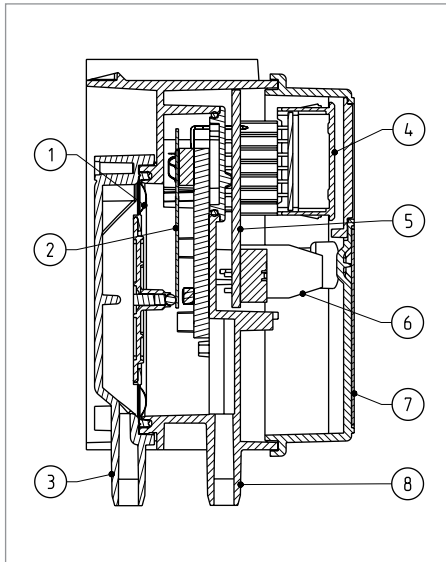
FEINE MESSIDEEN FÜR DRUCK UND STRÖMUNG  
FOR FINE PRESSURE AND FLOW MEASUREMENT  
LA FINESSE DES MESURES DE PRESSION ET DE DEBIT

## Technical overview

The differential pressure transmitters of the Type 694 series incorporate a proven ceramic fulcrum lever technology.

They deliver adjusted and temperature-compensated sensor signals, available as standard voltage or current outputs.

They are ideal for registering low air flow in air conditioning systems and for the measurement of fine pressures in laboratory, environmental and clean-room applications.



## Legend to cross-section drawing

- 1 Diaphragm
- 2 Sensor element
- 3 P1 Pressure connection (higher pressure)
- 4 Display (option)
- 5 Amplified electronics
- 6 Connection terminals
- 7 Cover
- 8 P2 Pressure connection (lower pressure)

## The distinct advantages

- Compact construction
- Fast, easy mounting.  
Housing incorporates integral bracket for wall or ceiling mounting. Snap-on cover with a single screw
- Available with or without LCD display
- Available with or without root-extracted output
- Available zero point and full scale adjustable
- Attractive price/performance ratio

## Medium

Air and neutral gases

## Pressure range

–0.5 ... +0.5 mbar / 0 ... 1 – 50 mbar  
 –50 ... +50 Pa / 0 ... 100 – 5000 Pa  
 –0.2 ... +0.2 inH<sub>2</sub>O / 0 ... 0.4 – 20 inH<sub>2</sub>O  
 –5 ... +5 mmWC / 0 ... 10 – 500 mmWC

## Tolerable overload on one side

100 mbar  
 10'000 Pa  
 40 inH<sub>2</sub>O  
 1000 mmWC

For ± type max.:

100 mbar on P1, 4 mbar on P2  
 10'000 Pa on P1, 400 Pa on P2  
 40 inH<sub>2</sub>O on P1, 1.6 inH<sub>2</sub>O on P2  
 1000 mmWC on P1, 40 mmWC on P2

## Rupture pressure

2 x overload at ambient temperature  
 1.5 x overload at 70 °C

## Setting range

Zero point ±10% fs  
 Full scale 40 ... 100% fs

## Materials in contact with medium

Housing: Polycarbonate PC  
 Diaphragm: Silicone  
 Sensor: Al<sub>2</sub>O<sub>3</sub> (96%) / glass

## Temperature

Medium and ambient 0 ... +70 °C  
 Storage –10 ... +70 °C  
 No condensation

## Output Power supply

3-wire  
 0 ... 10 V 13.5 ... 33 VDC / 24 VAC ±15%  
 0 ... 20 mA 13.5 ... 33 VDC / 24 VAC ±15%  
 4 ... 20 mA 13.5 ... 33 VDC / 24 VAC ±15%

2-wire  
 4 ... 20 mA 11.0 ... 33 VDC

## Load

3-wire  
 0 ... 10 V > 10 kOhm  
 0 ... 20 mA < 400 Ohm  
 4 ... 20 mA < 400 Ohm  
 2-wire  
 4 ... 20 mA  $< \frac{\text{supply voltage} - 11 \text{ V}}{0.02 \text{ A}}$  [Ohm]

## Current consumption

At nominal pressure  
 3-wire  
 0 ... 10 V < 10 mA  
 0 ... 20 mA < 30 mA  
 4 ... 20 mA < 30 mA  
 2-wire  
 4 ... 20 mA 20 mA

## Dynamic response

Suitable for dynamic measurements  
 Response time < 10 ms  
 Load cycle < 10 Hz

## Electrical connection

Screw terminals for wire and stranded conductors up to 1.5 mm<sup>2</sup>, cable gland with built-in strain relief PG11

## Polarity reversal protection

Short circuit proof and protected against polarity reversal. Each connection is protected against crossover up to max. supply voltage.

## Protection standard

Without cover IP 00  
 With cover IP 54 or IP 65

## Pressure connections

Connection pipe Ø 6.2 mm

## Installation arrangement

Recommended and factory adjustment:  
 Vertical, with pressure connections downwards (± types forcible)

Horizontal with cover downwards.

Signal approximately 13 Pa higher than actual pressure

Horizontal with cover upwards.

Signal approximately 13 Pa lower than actual pressure

## Mounting

Mounting bracket (integrated in case)

## Display

Liquid-crystal, 3 digit

## Tests / Admissions

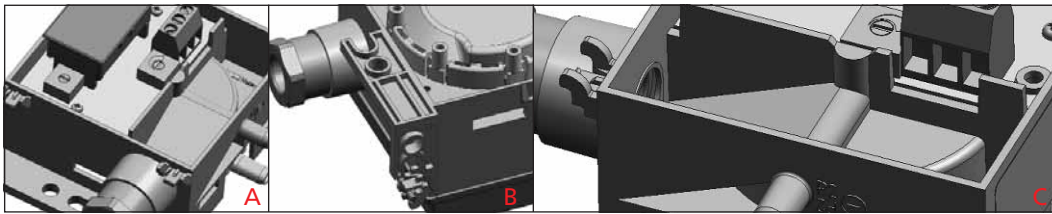
ETL  
 CE conform

## Weight

With display approx. 100 g  
 Without display approx. 90 g

## Packaging

Single packaging in cardboard



## Versions

- A – 2 potentiometers for full scale and zero point adjustment
- B – Housing with built-in fixing brackets
- C – Self-retaining screw in cover and angled surface for easy cable entry

## Accuracy

Transmitter Type Parameter	Unit	± 0.5 mbar	0 ... 1 mbar	0 ... 3 mbar	0 ... 5 mbar	0 ... 10–50 mbar
Tolerance zero point <sup>1)</sup>	max. % fs	± 1.0	± 1.0	± 0.7	± 0.7	± 0.7
Tolerance full scale <sup>1)</sup>	max. % fs	± 1.0	± 1.0	± 0.7	± 0.7	± 0.7
Resolution	% fs	0.2	0.2	0.1	0.1	0.1
Total of linearity, hysteresis and repeatability	max. % fs	± 3.0	± 2.0	± 1.0	± 1.0	± 0.6
Long term stability acc. to DIN IEC 60770	% fs	± 1.0	± 1.0	± 1.0	± 1.0	± 1.0
TC zero point <sup>2)</sup>	typ. % fs/10 K	± 0.2	± 0.2	± 0.2	± 0.1	± 0.1
TC zero point <sup>2)</sup>	max. % fs/10 K	± 1.0	± 1.0	± 0.5	± 0.4	± 0.4
TC sensitivity <sup>2)</sup>	typ. % fs/10 K	+ 0.3	+ 0.3	+ 0.2	+ 0.1	± 0.1
TC sensitivity <sup>2)</sup>	max. % fs/10 K	+ 0.6	+ 0.6	+ 0.5	+ 0.5	± 0.2

## With root-extracted output (2 ... 100% pressure)

Absolute error: (% of full scale)

TC zero point: (% fs) <sup>2)</sup>

–0.5 ... +0.5 mbar / 0 ... 1 mbar

$$\text{max. } \pm 0.6 \sqrt{\frac{P_{fs}}{P}} + 1.5$$

0 ... 3 – 50 mbar

$$\text{max. } \pm 0.3 \sqrt{\frac{P_{fs}}{P}} + 1.5$$

$$\text{max. } \pm 0.6 \sqrt{\frac{P_{fs}}{P}} + 1.5$$

Test conditions: 25 °C, 45% RH, Power supply 24 VDC  
TC z. p. / TC s. 0 ... 70 °C

## Order code selection table

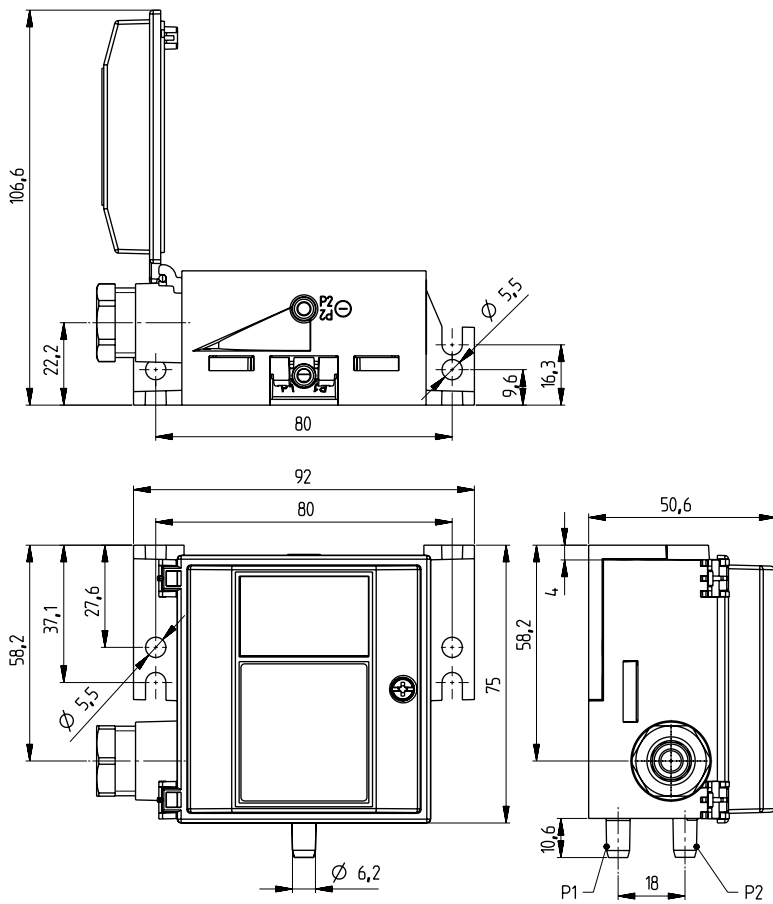
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Pressure range <sup>3)</sup>	mbar (hPa)	Pa	mmWC (mmH <sub>2</sub> O)	inH <sub>2</sub> O																
–0.5 ... +0.5	–50 ... +50	–5 ... +5	–0.2 ... +0.2		3	1														
0 ... 1	0 ... 100	0 ... 10	0 ... 0.4		1	1														
0 ... 3	0 ... 300	0 ... 30	0 ... 1.2		1	2														
0 ... 5	0 ... 500	0 ... 50	0 ... 2		1	3														
0 ... 10	0 ... 1000	0 ... 100	0 ... 4		1	4														
0 ... 16	0 ... 1600	0 ... 160	0 ... 6.4		1	5														
0 ... 25	0 ... 2500	0 ... 250	0 ... 10		1	6														
0 ... 50	0 ... 5000	0 ... 500	0 ... 20		1	7														
Unit of pressure	mbar (hPa)									0										
	Pa									2										
	mmWC (mmH <sub>2</sub> O)									3										
	inH <sub>2</sub> O									1										
Output signal / Adjustment	Linear																			
	Linear	Full scale and zero point adjustable by customer																		
	Square root extracted																			
	Square root extracted	Full scale and zero point adjustable by customer								1										
Output <sup>4)</sup> and power supply	0 ... 10 V	13.5 ... 33 VDC / 24 VAC ±15%	3-wire																	
	0 ... 20 mA	13.5 ... 33 VDC / 24 VAC ±15%	3-wire																	
	4 ... 20 mA	13.5 ... 33 VDC / 24 VAC ±15%	3-wire																	
	4 ... 20 mA	11.0 ... 33 VDC	2-wire																	
Display 3 digit	Without																			0
	In pressure unit chosen above																			1
	In % fs																			2
Pressure connections / Pressure orifices	Connection pipe Ø 6.2 mm	without pressure orifice																		1
	Connection pipe Ø 6.2 mm	pressure orifice on P1																		2
	Connection pipe Ø 6.2 mm	pressure orifice on P2																		3
	Connection pipe Ø 6.2 mm	pressure orifices on P1 and P2																		4
Version	IP 54: Without connection kit																			0
	IP 54: With connection kit (metal), 90° angled including tube 2 m long (Fig. 1) <sup>5)</sup>																			1
	IP 54: With connection kit (plastic), straight including tube 2 m long (Fig. 2) <sup>5)</sup>																			2
	IP 65: Without connection kit																			3
	IP 65: With connection kit (metal), 90° angled including tube 2 m long (Fig. 1) <sup>5)</sup>																			4
	IP 65: With connection kit (plastic), straight including tube 2 m long (Fig. 2) <sup>5)</sup>																			5
Variation (optional)	Of pressure range or output signal																			
	Indicate W and state on order (e.g. 0 ... 9 mbar / Out 0 ... 10 V)																			

## Accessories

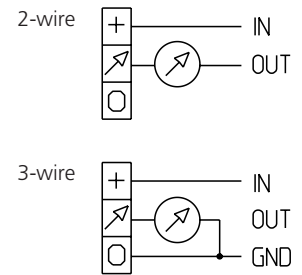
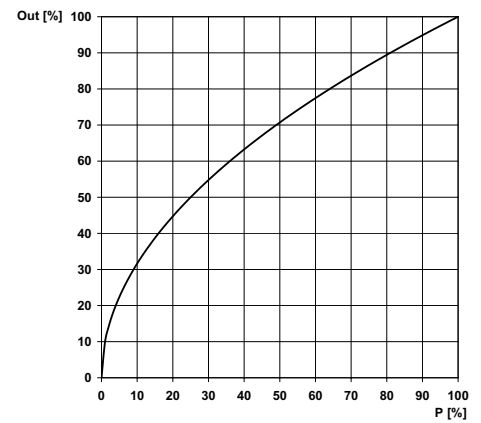
	Order number
Connection kit for vent duct (metal), 90° angled including tube 2 m long (Fig. 1) <sup>5)</sup>	104312
Connection kit for vent duct (plastic), straight including tube 2 m long (Fig. 2) <sup>5)</sup>	100064
Calibration certificate	104551

<sup>1)</sup> For changing diaphragm position see installation arrangement page 6  
<sup>2)</sup> TC = Temperature coefficient  
<sup>3)</sup> Other pressure ranges on request  
<sup>4)</sup> Other output signals on request  
<sup>5)</sup> See page 8

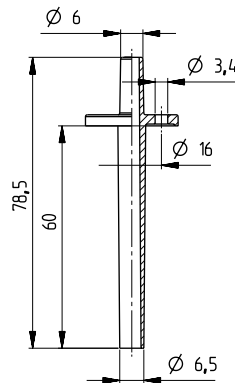
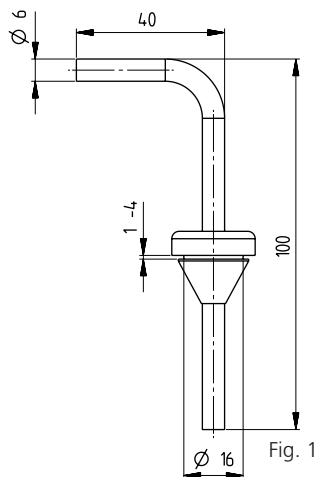


Root-extracted signal

$$[\%] = 100 \cdot \sqrt{\frac{p[\%]}{100}}$$



## Accessories



## Electromagnetic compatibility

CE conformity (EMC) by application of harmonised standards: EN 61000-6-2, EN 61000-6-3 and EN 61326

Interference stability	Test standard	Effect
Electrostatic discharge (ESD)	EN 61000-4-2	8 kV air / 4 kV contact
High-frequency electromagnetic radiation (HF)	EN 61000-4-3	10 V/m, 80 ... 1000 MHz
Fast transients (burst)	EN 61000-4-4	± 4 kV
Surge	EN 61000-4-5	Line-Line: ± 1 kV Line-Ground: ± 2 kV
Conducted HF interference	EN 61000-4-6	10 V, 0.15 ... 80 MHz
Magnetic fields	EN 61000-4-8	30 A/m, 50 Hz
Short time interruption and voltage fluctuation	EN 61000-4-11	60%
Interference emit	Test standard	Effect
Conducted interference	EN 55022 (CISPR 22)	0.15 ... 30 MHz
Radiation from housing		30 ... 1000 MHz, 10 m



# Averaging Flow Measuring Tube

## 平均流速測管



### 技術概觀

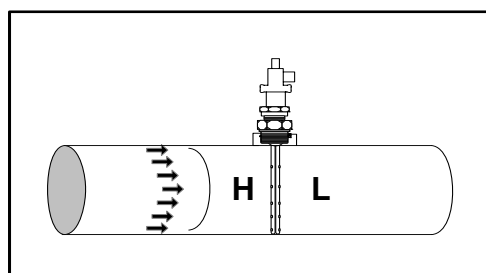
- 動壓(差壓)的量測經常被運用於流量的計算中,AFMT(平均流速測管)則是安裝於系統管路中,測量流量動壓的擷取管。多個位置的壓力偵測孔平均了流體在管路內流動曲線的特性,由於流量系統中,空間問題常導致無法給予足夠的直管部,造成嚴重的擾流問題,使用平均流速測管亦可有效改善量測上的困難。

### 測量原理

- 平均流速測管,由其結構示意圖所知,它是一個沿直徑插入管道中的測棒,在迎向流體流動方向有多點的測壓孔測量總壓,與全壓管相連通,引出平均全壓 P1,背流面與靜壓管相通,引出靜壓 P2。平均流速管是利用測量流體的全壓與靜壓之差(動壓)來測量流速的。平均流速測速管的輸出動壓 ( $\Delta P$ ) 和流體平均速度 (V),可根據伯努利定理得出。

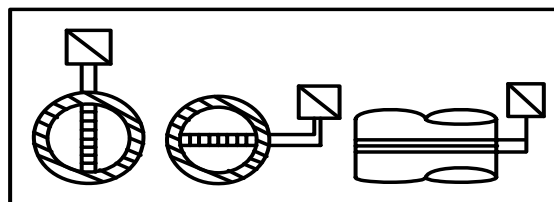
### 技術資料

- 測量介質: 空氣
- 操作壓力: 最大 10 bar
- 操作溫度: 最大 250 °C
- 安裝連接: 12" 以下為 3/4" PT活動牙  
24" 以上為 1" PT活動牙
- 測管材質: 不鏽鋼 (Stainless steel) SUS316
- 安裝: 依流量管路直徑選擇平均流速測管規格後,垂直且完全插入預留的接口



(H) 高壓側須面對流體流動方向  
(L) 低壓側為背對流體流動方向

### 按裝方式



- 氣體: 安裝時,將探頭的管外部分朝上,

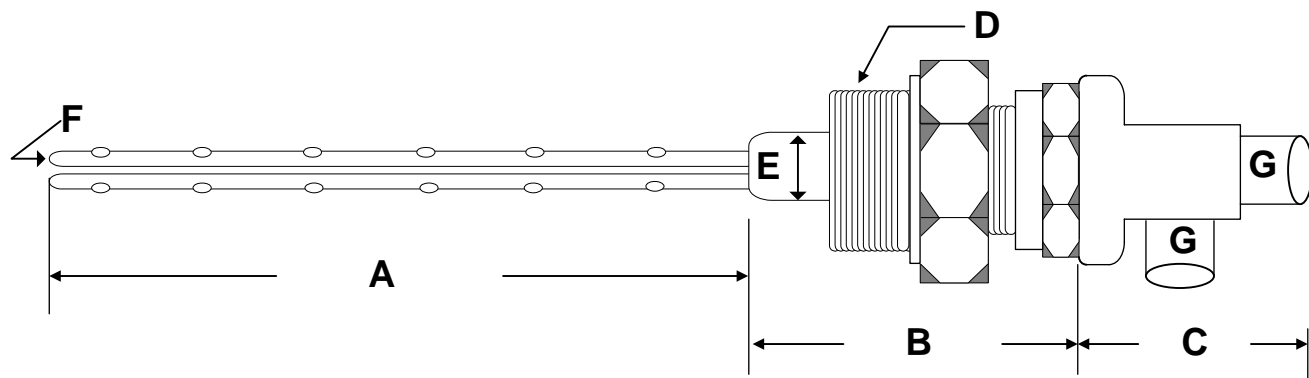
而且管內部份向下傾斜,使氣體的水份(潮濕氣體)自動排出。



# Averaging Flow Measuring Tube

## 平均流速測管

### 尺寸圖



### 訂貨編號

單位：mm

AFMT- 系列	A	B	C	D	E	F	G
AFMT-042-150	150	85	75	3/4"PT 活動牙	16	5	1/8"PT內牙
AFMT-042-200	200	85	75	3/4"PT 活動牙	16	5	1/8"PT內牙
AFMT-042-300	300	85	75	3/4"PT 活動牙	16	5	1/8"PT內牙
AFMT-042-600	600	150	80	1"PT 活動牙	25	8	1/4"PT內牙
AFMT-042-800	800	150	80	1"PT 活動牙	25	8	1/4"PT內牙

### 測量公式

#### ■ 流速計算基本公式

$$V = K \sqrt{\frac{2}{\rho} \Delta P}$$

- V：流體的流速，m/s
- $\Delta P$ ：全壓與靜壓之差(動壓)，Pa
- $\rho$ ：流體密度，kg/m<sup>3</sup>
- K：流量係數

#### ■ 流量計算基本公式

$$q_v = K \varepsilon A \sqrt{\frac{2}{\rho} \Delta P}$$

$$q_m = q_v \rho$$

- $q_v$ ：流體的體積流量，m<sup>3</sup>/s
- $q_m$ ：流體的質量流量，kg/s
- K：工作狀態下均速管的流量係數
- $\varepsilon$ ：工作狀態下流體流過檢測管時的膨脹係數
- A：工作狀態下管道內截面面積，m<sup>2</sup>