

Accessory

PTK·PTW·PTC Common panel cut size

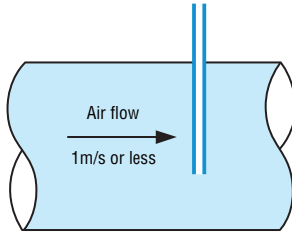
Piping connector type	Port size
-VT6, -MT6	φ 10.5
-VT4	φ 6.5

Pitot tube

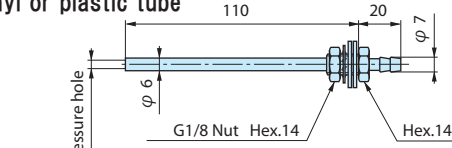
RoHS compliant

Simple model For measuring static pressure of air volume, velocity and dynamic pressure when air velocity is 1 m / s or less (for example measurement of indoor air pressure)

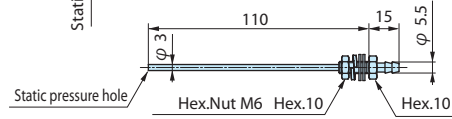
Simplified static pressure tube



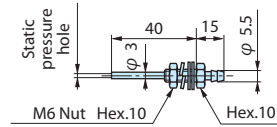
For vinyl or plastic tube



Product code PTK-VT6-110

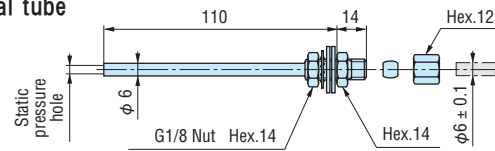


Product code PTK-VT4-110



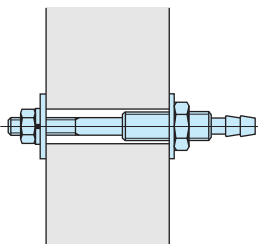
Product code PTK-VT4-40

For metal tube

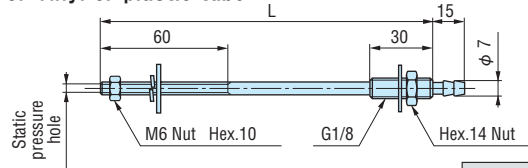


Product code PTK-MT6-110

Surface-installation static pressure tube

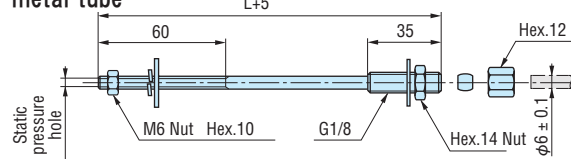


For vinyl or plastic tube



Product code	L (mm)	Applicable wall thickness
PTW-VT6-100	100	10~ 80
PTW-VT6-150	150	60~130
PTW-VT6-200	200	110~180
PTW-VT6-250	250	160~230
PTW-VT6-300	300	210~280

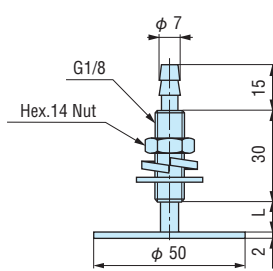
For metal tube



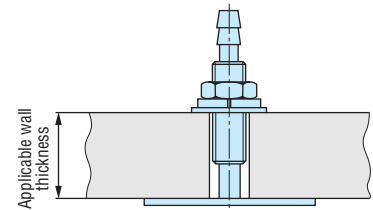
Product code	L (mm)	Applicable wall thickness
PTW-MT6-100	100	10~ 80
PTW-MT6-150	150	60~130
PTW-MT6-200	200	110~180
PTW-MT6-250	250	160~230
PTW-MT6-300	300	210~280

Static pressure tube

For ceiling and wall installing (for clean room)



Stainless steel-made



Product code	L (mm)	Applicable wall thickness
PTC-VT6-40-S	10	10~30
PTC-VT6-65-S	35	35~55

WO81

WO70

FR51A

MS30

MS61A

MS65

EB3C

EMD8

EMD7

EMT6

EMT1

EMTGPI

EMT1H

EMP5

EMA3

EMRT1

HWS15

Combination of Manosys

Accessories

Application Cautions for use Maintenance

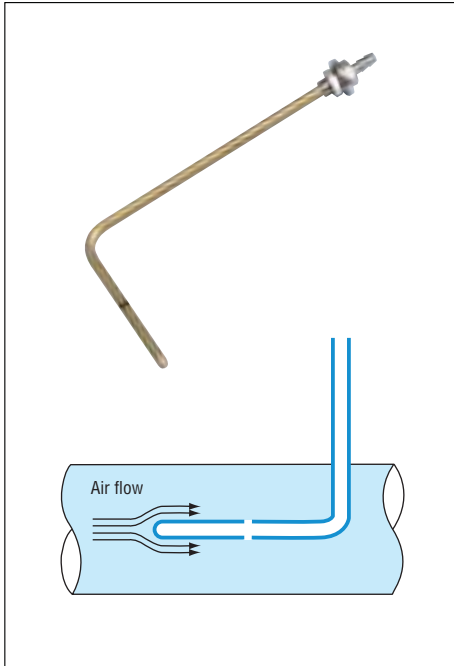
Accessory

Pitot tube RoHS compliant

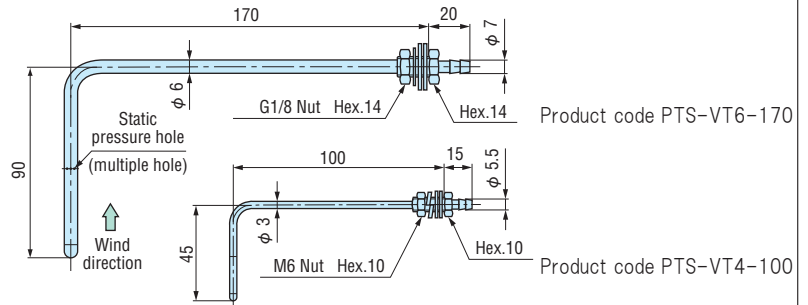
PTS·PTT Common panel cut size

Piping connector type	Port size
-VT6, -MT6	φ 10.5
-VT4	φ 6.5

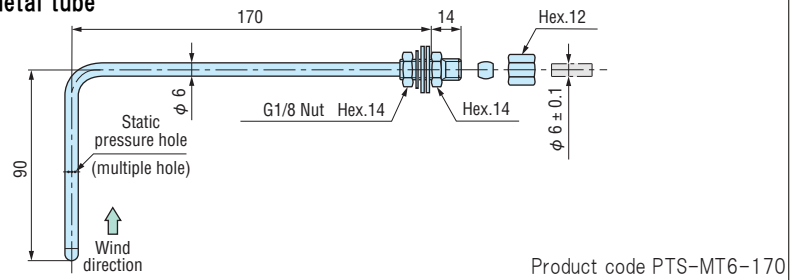
Static pressure tube For measuring static pressure of air volume, velocity and dynamic pressure when air velocity is 1 m / s or more (for example measurement of internal pressure of tube)



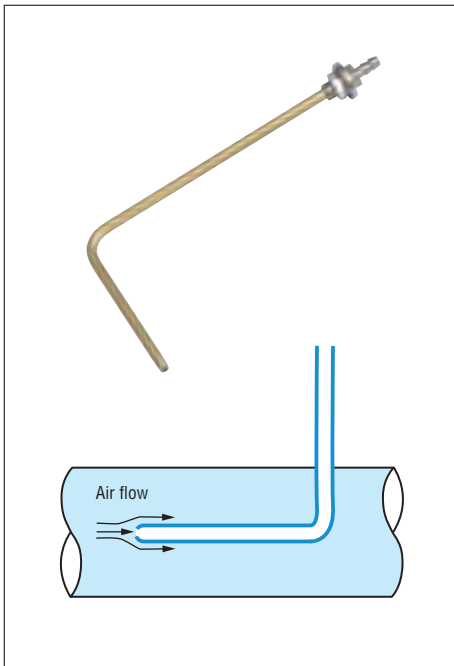
For vinyl or plastic tube



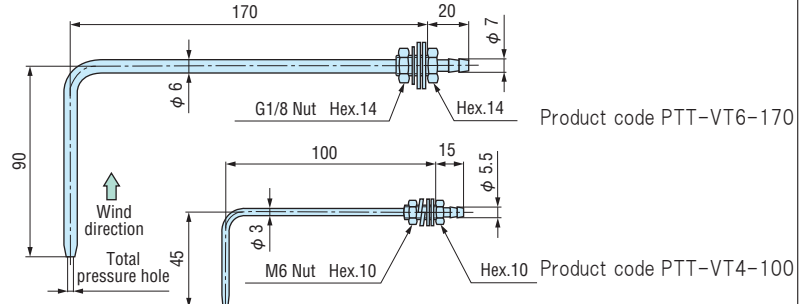
For metal tube



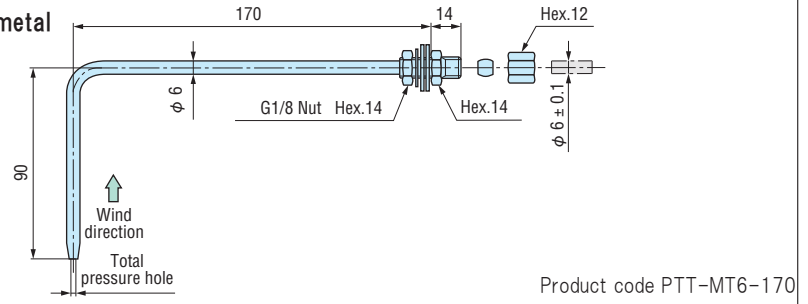
Total pressure tube For measuring total pressure combined with the static pressure tube as for measuring air volume, velocity and dynamic pressure



For vinyl or plastic tube



For metal tube



Flange set installing pitot tube

Plain washers attached with pitot tube

Toothed lock washer or spring washer with pitot tube

Packing for pitot tube

Four sets of tapping screw (not included in the flange set)

Flange

Flange packing

Four set of prepared hole for tapping screw

φ 34 ± 0.3

φ 24 (Hole)

Panel cut size

Content of flange set

Name	Material	Quantity
Flange	SPCC t1.6	1
Flange packing	NBR t1	1
Packing for pitot tube	NBR t1	1

Product code	Applicable pitot tube
PTF-6	PTK-VT6
	PTK-MT6
	PTS-VT6
	PTS-MT6
	PTT-VT6
PTF-4	PTK-VT4
	PTS-VT4
	PTT-VT4

* Because of quality improvement or any reason, some specifications are possibility of changing without notice.

- WO81
- WO70
- FR51A
- MS30
- MS61A
- MS65
- EB3C
- EMD8
- EMD7
- EMT6
- EMT1
- EMTGP1
- EMT1H
- EMP5
- EMA3
- EMRT1
- HWS15
- Combination of Manosys
- Accessories
- Application Cautions for use Maintenance

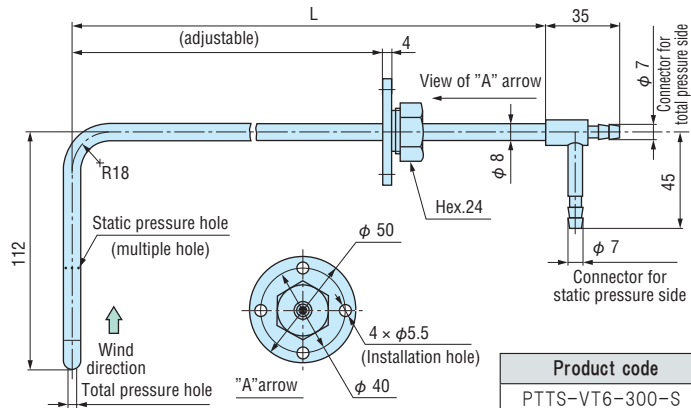
Accessory

Pitot tube RoHS compliant

Total static pressure tube For measuring static pressure of air volume, velocity and dynamic pressure when air velocity is 2 m / s or more (for example measurement of internal pressure of tube)

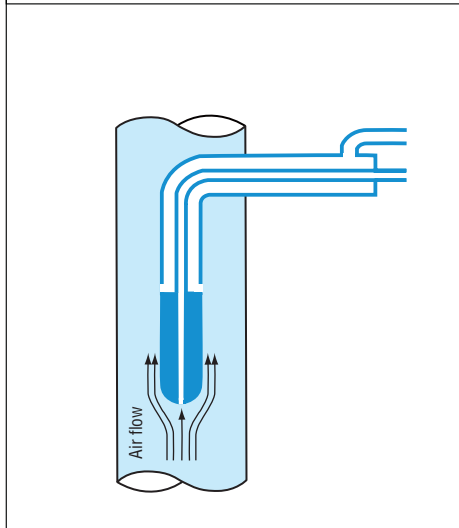


For vinyl or plastic tube

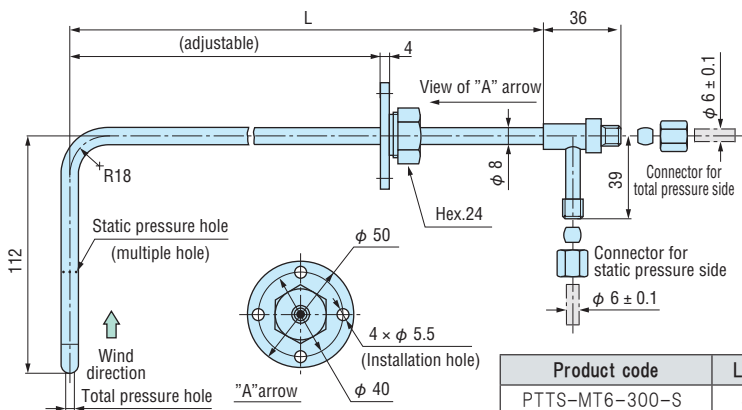


(The body is made from stainless steel)

Product code	L (mm)
PTTS-VT6-300-S	300
PTTS-VT6-500-S	500
PTTS-VT6-800-S	800



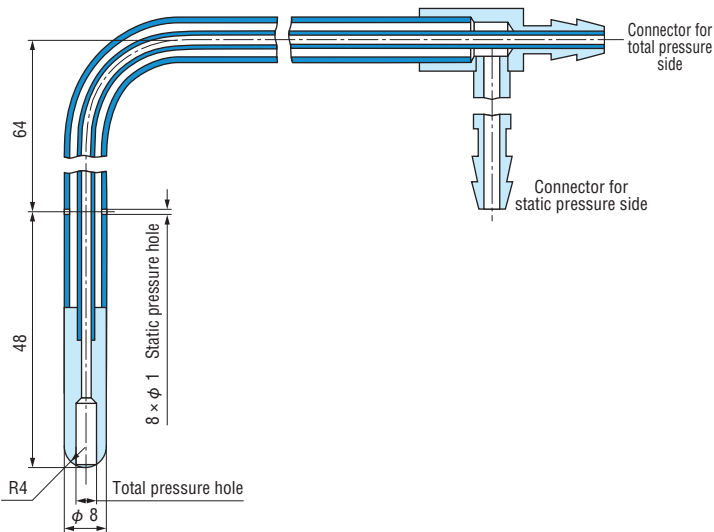
For metal tube



(The body is made from stainless steel)

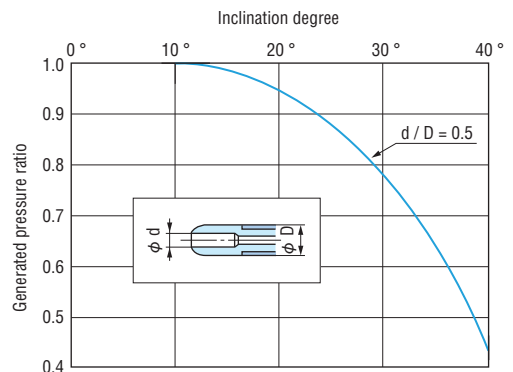
Product code	L (mm)
PTTS-MT6-300-S	300
PTTS-MT6-500-S	500
PTTS-MT6-800-S	800

Outline drawing



Characteristic by inclination of total static pressure tube

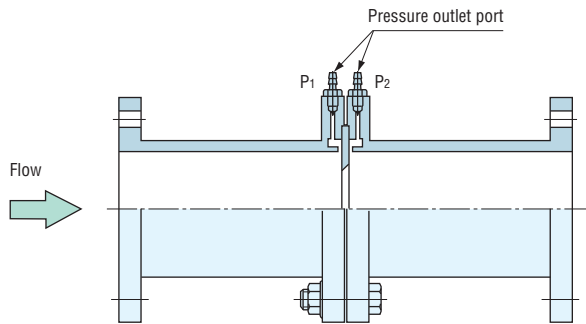
The below chart shows the ratio between the pressure to be measured when the tip division in the straight tube is positioned parallel to the air flow line and the pressure to be measured when the tip division in the straight tube is inclined against the air flow line. When the inclination is less than 10°, there is no problem on the measurement.



Pressure Detector

Orifice For measuring air volume

<Reference drawing>



Flow rate formula for orifice

$$Q = \epsilon \alpha F_0 \sqrt{\frac{2}{\gamma} (P_1 - P_2)}$$

Q : Volumetric flow rate (m³ / s)

ε : Correction coefficient of expansion

α : Flow coefficient

F₀ : Orifice area (m²)

P₁, P₂ : Fluid pressure expressed in absolute pressure (Pa)

γ : Density of fluid (kg / m³)

D : Inner diameter of tube

a : Width of slit

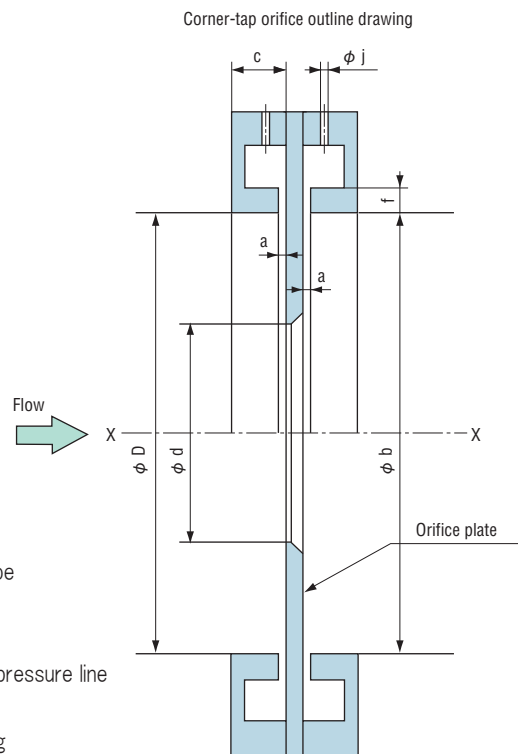
f : Thickness of slit

j : Diameter connected pressure line

d : Orifice diameter

b : Inner diameter of ring

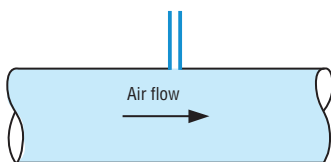
c : Thickness of upper stream ring



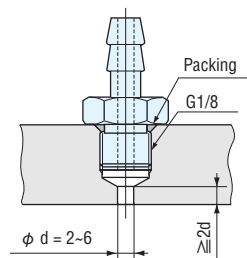
Discontinued product

Static pressure hole to be prepared by customer

<Reference drawing>



Detail of static pressure hole



- A static pressure hole is a hole drilled vertically on the tube wall
- A static pressure hole is larger than the pressure hole of the static tube so the use is advantageous when air contains a lot of installation of dust, or when the tube diameter is small.
- The structure is very simple, but is not applicable thin wall tubed. Refer to p.60 about connector
- KGAT1VT is applicable to divert the static pressure hole

Caution in using pressure detector

- Static pressure tube, total pressure (pitot tube) tube and total static pressure tube should be installed in such a way the tip division in straight tube will be parallel to the air flow direction (10° or less).
- Different types of gases corrode different materials. When the tube is used for the measurement of mixed corrosive gas (only rarefied gas), use the one made of corrosive-resistant material. The tube made of stainless steel is generally used. To install the pressure detector, take the straight piping section of the duct before and behind direction flowing air of the internal duct.
- For measurement of air velocity or volume, make sure to calculate and design the system so that the air velocity is higher than 2 m / s. Since the pressure generated at 2 m / s is roughly 2.5 Pa, it is difficult to measure accurately. If the air velocity becomes less than 2m/s, then reduce the cross sectional area of the duct until the air speed reaches the required value.
- All pressure detector is not available to air containing a large quantity of waste and oil mist. In case of using unavoidably, clean often.

WO81

WO70

FR51A

MS30

MS61A

MS65

EB3C

EMD8

EMD7

EMT6

EMT1

EMTGP1

EMT1H

EMP5

EMA3

EMRT1

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Combination of Manosys

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How to use a Pitot tube

How to measure static pressure and dynamic pressure

Measurement of static pressure

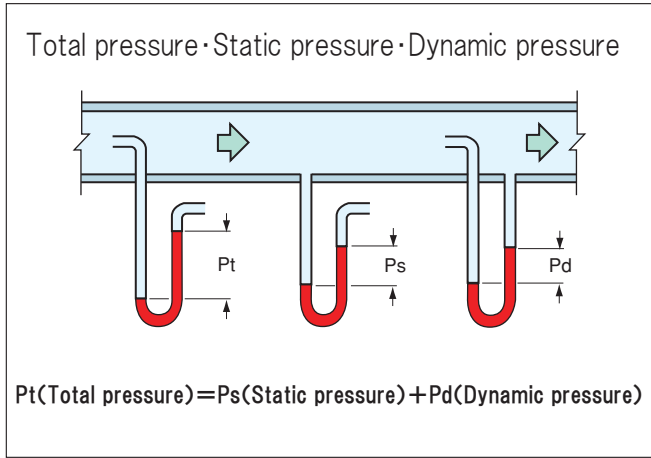
1. The method using static pressure tube
2. The method using static pressure hole that vertically drilled on the duct along internal wall
3. The method using simple static pressure tube. However, air velocity must be 1 m / s or less in this measurement, the error becomes too large due to the influence of dynamic pressure at a air velocity larger than 1 m / s

Measurement of dynamic pressure

The air velocity can be determined by the dynamic pressure. But the dynamic pressure cannot be measured directly. Therefore, the dynamic pressure determined as a differential pressure between total pressure and static pressure by using following equation.

$$\text{Total pressure} - \text{Static pressure} = \text{Dynamic pressure}$$

1. The method which the static pressure tube and total pressure tube are placed with the distance D between them (refer to p.86)
2. The method using static pressure tube



Calculation of air flow rate

The method measuring air velocity with using pitot tube is simple and provides reliable results. However, it cannot be used for measurement of a flow rate less than 2m/s.

Air velocity formula with pitot tube

$$V(\text{m/s}) = \sqrt{\frac{2}{\gamma} (P_t - P_s)}$$

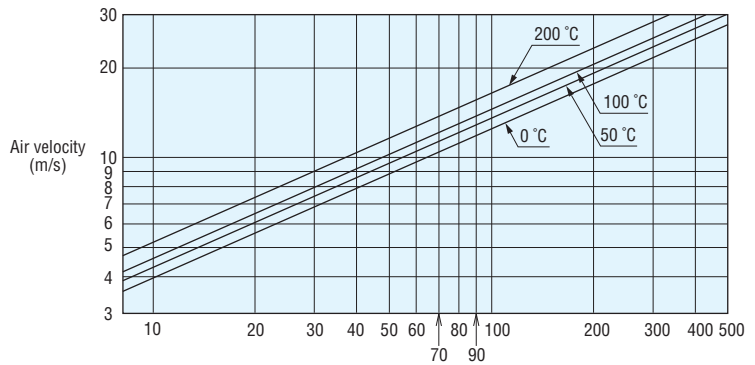
γ : Density of fluid

P_t : Total pressure

P_s : Static pressure

Density of dry air at 0 °C, 1 atm $\gamma = 1.293 \text{ kg/m}^3$

Correlation table between flow rate and dynamic pressure



Total pressure — Static pressure = Dynamic pressure (Pa)

Air volume measurement with using pitot tube

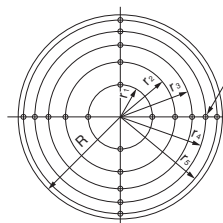
- Arrange the tip division in straight tube of pitot tube parallel to air flow. Measurement points should be located using the equation shown in the right on two diameter lines which cross at a right angle. The points should be 10 on each line and 20 in total. However, this measurement method is not applicable for commercial use because it takes considerable time and labor.

▪ It is practical to use multi-pitot tube.

▪ The rough estimate of air volume by measuring the max. air velocity at the center of duct with one pitot tube.

$$\text{Flow rate} = \text{Max. air velocity} \times \text{Cross sectional area of duct line} \times 0.9$$

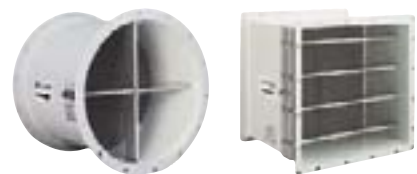
The measurement points with Pitot tube



- $r_1 = 0.316R$
- $r_2 = 0.548R$
- $r_3 = 0.707R$
- $r_4 = 0.837R$
- $r_5 = 0.949R$

Tip division in straight tube

Multi-pitot tube




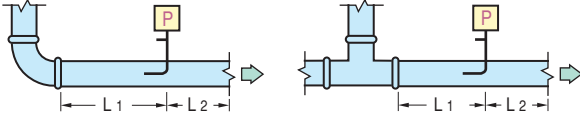
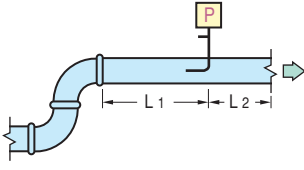
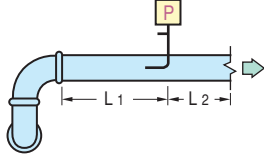
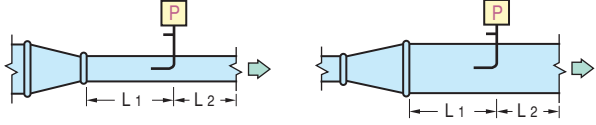
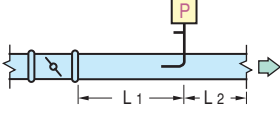
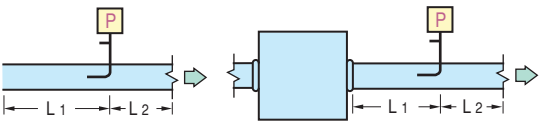
NEW AEROEYE

* "NEW AEROEYE" is produced by Wetmaster Co., Ltd.

How to use a Pitot tube

Guideline for Pitot tube installation points

Disturbance in flow, which may be caused in some duct layout, can affect the measurement stability. It is therefore recommended to secure enough straight segments longer than the values in the table below when installing a pitot tube.

 Pitot tube installation points D : Duct diameter Round duct D=Duct I.D. Square duct D= (duct inside width + height) / 2	Upper stream sizes (L ₁)		Lower stream size (L ₂)
	Without flow rectifier	With flow rectifier	
 <p>90 degree bend or one T joint</p>	7D	6D	3D
 <p>Two or more 90 degree bends on a plane</p>	8D	7D	3D
 <p>Two or more 90 degree bends on two or more planes</p>	17D	8D	3D
 <p>Contracting tube or expanding tube</p>	8D	8D	3D
 <p>Damper</p>	Damper full open	7D	3D
	Damper half open	8D	
 <p>Released to the atmosphere or a large capacity chamber</p>	15D	8D	3D

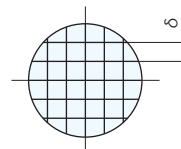
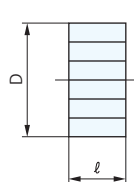
Strainer grid

The required straight length of the duct can be shortened by the installation of the strainer grid. But the installation increases the cost.

The axial length ℓ of the strainer grid must be three times or greater than the length δ of one side of each grid (square).

δ should be from 1 / 4 to 1 / 12 of I.D. of the line to be measured.

Dimensions of the strainer grid



$$\ell \geq 3\delta$$

$$\delta = \left(\frac{1}{4} \sim \frac{1}{12} \right) D$$

WO81

WO70

FR51A

MS30

MS61A

MS65

EB3C

EMD8

EMD7

EMT6

EMT1

EMTGPI

EMT1H

EMP5

EMA3

EMRT1

HWS15

Combination of Manosys

Accessories

Application Cautions for use Maintenance

Accessory

Line part

RoHS compliant

WO81

WO70

FR51A

MS30

MS61A

MS65

EB3C

EMD8

EMD7

EMT6

EMT1

EMTGP1

EMT1H

EMP5

EMA3

EMRT1

HWS15

Combination of Manosys

Accessories

Application Cautions for use Maintenance

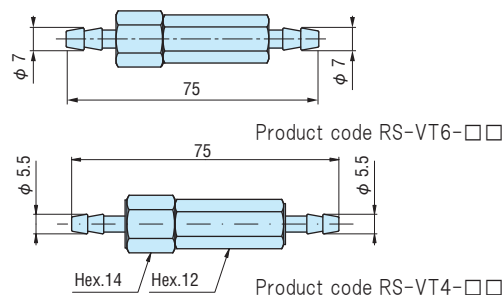
Pulsating protector

In case of strong turbulent flow of medium air that causes abnormal movement of pointer and output of transmitter, installing a pulsation protector applicable pressure range one each on H side and L side on the piping way between pressure sensor and the instrument.

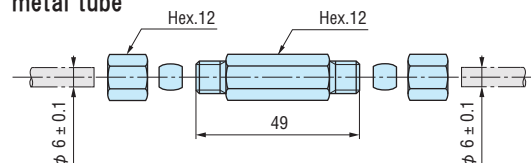


Product code		Applicable range (max. value)
For vinyl or plastic tube	For metal tube	
RS-VT6-02	RS-VT4-02	200 Pa or less
RS-VT6-03	RS-VT4-03	300, 500, 1000 Pa
RS-VT6-04	RS-VT4-04	2, 3, 5, 10 kPa
RS-VT6-06	RS-VT4-06	20 kPa or more

For vinyl or plastic tube



For metal tube

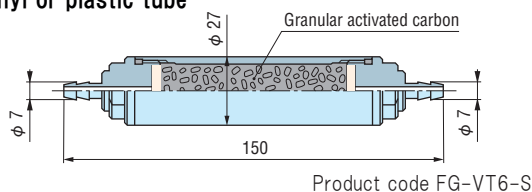


Corrosive gas absorber

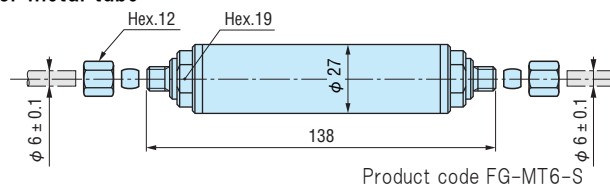
In case of measurement of gas which corrodes the material of the instrument, installing that corrosive gas absorber one each on H side and L side each on piping way between pressure detector prolong instrument life.



For vinyl or plastic tube



For metal tube

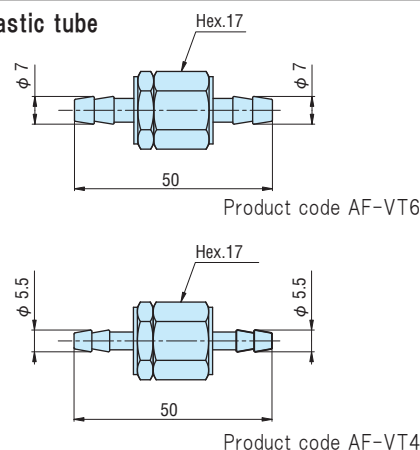


Air filter for instrument

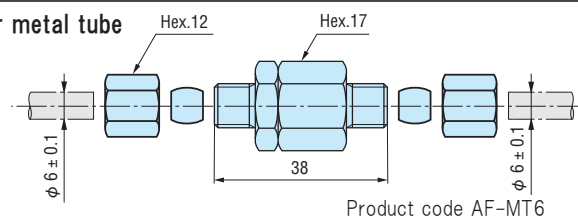
For measurement of dusty air, install air filter for instrument one each on H side and L side in the middle of piping between the pressure detector and the instrument. According to the condition of clogging inside filter, carry out periodically replacement of filter element as well as cleaning of the pressure detector and piping.



For vinyl or plastic tube



For metal tube




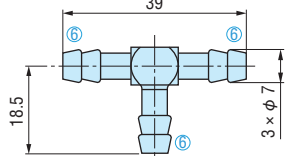
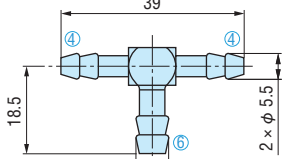
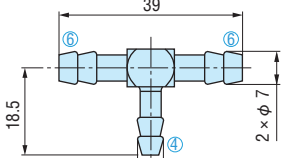
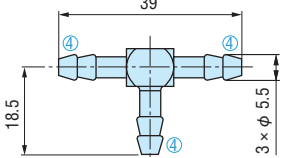
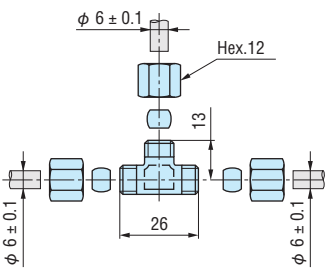

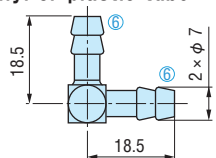
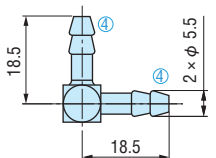
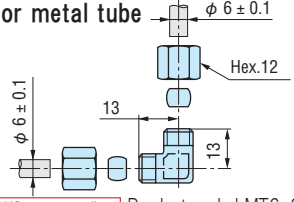

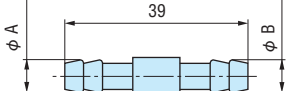
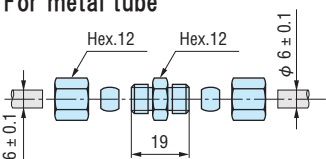

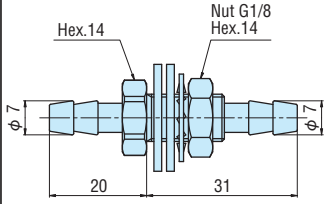
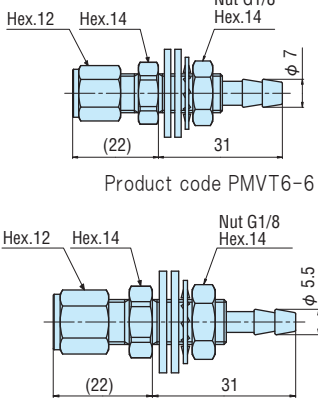
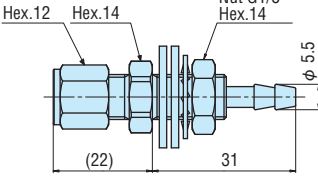
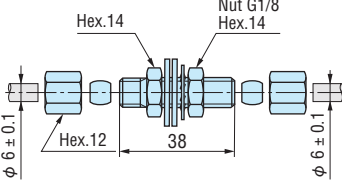
*Pulsating protector, corrosive gas absorber and air filter for instrument is not the direction of input and output.

Accessory

Line part

RoHS compliant

(Some of product is excluded)

 <p>T joint</p>	<p>For vinyl or plastic tube</p>  <p>Product code TVT6-6-6</p>  <p>Product code TVT4-6-4</p>  <p>Product code TVT6-4-6</p>  <p>Product code TVT4-4-4</p>	<p>For metal tube</p>  <p>RoHS non-compliant Product code TMT6-6-6</p>													
	<p>Elbow joint</p> 	<p>For vinyl or plastic tube</p>  <p>Product code LVT6-6</p>  <p>Product code LVT4-4</p>	<p>For metal tube</p>  <p>RoHS non-compliant Product code LMT6-6</p>												
 <p>Straight joint</p>	<p>For vinyl or plastic tube</p>  <table border="1"> <thead> <tr> <th>Product code</th> <th>A(mm)</th> <th>B(mm)</th> </tr> </thead> <tbody> <tr> <td>SVT6-6</td> <td>7</td> <td>7</td> </tr> <tr> <td>SVT4-4</td> <td>5.5</td> <td>5.5</td> </tr> <tr> <td>SVT6-4</td> <td>7</td> <td>5.5</td> </tr> </tbody> </table>	Product code	A(mm)	B(mm)	SVT6-6	7	7	SVT4-4	5.5	5.5	SVT6-4	7	5.5	<p>For metal tube</p>  <p>RoHS non-compliant Product code SMT6-6</p>	
	Product code	A(mm)	B(mm)												
SVT6-6	7	7													
SVT4-4	5.5	5.5													
SVT6-4	7	5.5													
 <p>Panel transixed joint</p>	<p>For vinyl or plastic tube</p>  <table border="1"> <thead> <tr> <th>Product code</th> <th>A(mm)</th> <th>B(mm)</th> </tr> </thead> <tbody> <tr> <td>PVT6-6</td> <td>7</td> <td>7</td> </tr> <tr> <td>PVT4-4</td> <td>5.5</td> <td>5.5</td> </tr> <tr> <td>PVT6-4</td> <td>7</td> <td>5.5</td> </tr> </tbody> </table>	Product code	A(mm)	B(mm)	PVT6-6	7	7	PVT4-4	5.5	5.5	PVT6-4	7	5.5	<p>For metal tube and plastic tube</p>  <p>Product code PMVT6-6</p>  <p>Product code PMVT6-4</p>	<p>For metal tube</p>  <p>Product code PMT6-6</p>
	Product code	A(mm)	B(mm)												
PVT6-6	7	7													
PVT4-4	5.5	5.5													
PVT6-4	7	5.5													

Others

 <p>Tube band</p>	Product code	Applicable diameter of tube O.D. mm	 <p>Product code XIN6 × 4</p>		Product code	I.D. mm	O.D. mm	
	XHB6	6			Vinyl or plastic	VT4-6	4	6
	XHB8	8				VT4-8	4	8
	XHB10	10			Urethane	VT6-8	6	8
	XHB12	12				VT6-12	6	12
	XHB13	13			UT4-6	4	6	
		UT6-8	6	8				
		Nylon	NT4-6	4	6			

* Because of quality improvement or any reason, some specifications are possibility of changing without notice.

WO81

WO70

FR51A

MS30

MS61A

MS65

EB3C

EMD8

EMD7

EMT6

EMT1

EMTGPI

EMT1H

EMP5

EMA3

EMRT1

HWS15

Combination of Manosys

Accessories

Application Cautions for use Maintenance