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READ THE INSTRUCTION MANUAL

INSTRUCTION MANUAL

MANOSTAR GAGE
WO70

TR-WO70-E08

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INTRODUCTION

Thank you very much for purchasing of "MANOSTAR GAGE WO70".

⚠ Caution	To ensure your safety in using this instrument : ・Be sure to read the instruction manual carefully before using the instrument so that you can use it properly. Wrong use may result in failure of the instrument and lead to its damage and accident. This manual should be kept in a proper place so that you can refer to it any time you need.

Ⅰ. PRECAUTIONS

⚠ Warning

・Do not use this instrument at the place where corrosive gas is present.
The instrument is not corrosion resistance construction. Measuring corrosive gas may corrode the receiving element and housing material of the instrument. It is expected that corrosive gas leaked out of the instrument will harm a person.

・Do not apply the pressure to the instrument more than it can withstand.
The diaphragm and the retainer are broken if the pressure exceeding withstanding pressure of the pressure receiving element is applied to the instrument. The case body and the transparent cover of the instrument are broken if the pressure exceeding withstanding pressure of the instrument body is applied to the instrument.

・The instrument is measurable for air and non-corrosive gas only.
The machine is exclusive use of dry air (90% RH or less). Using measuring the water or oil it may be damaged and causes the accident.

・Avoid using where the instrument is subject to many vibration and impact.
Using the instrument where intensified vibration and impact may be damaged the instrument. It is expected that gas leaks of the instrument which harms a parson.

・Do not exceed rated surrounding temperature, humidity and altitude in use.
Using the instrument by exceeding rated surrounding temperature and humidity and altitude it may be damaged and cause the accident.

・Do not disassemble or reconstruct the instrument.
It may void the warranty.

⚠ Caution

・As to where to install and how to install this instrument, be sure to follow the instruction manual provided so as to ensure a proper method.

・Use the instrument indoors.

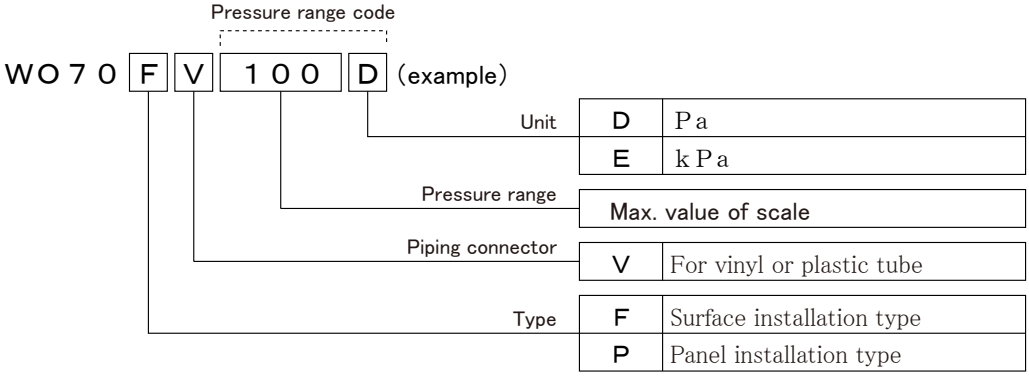
・In case of not being installed in dry and well-kept clean locations, the instrument must be enclosed in box of min. Protection degree IP54.

・Do not use organic solvent for cleaning.
Use a cloth soaked with water-diluted neutral detergent to wipe the surface of a product. Using of organic solvent causes damage on the surface.

・Dropping the product
If the product is dropped onto a desk or floor, not only its exterior but also interior mechanism is broken.

Ⅱ. SPECIFICATIONS OF MANOSTAR GAGE WO70

Types :



Pressure ranges and characteristics :

Pressure range codes	Pressure ranges		Standard installation position (refer to p.6)	Accuracy (at 20 ℃)
	Pa	kPa		
100 D	0 ～ 100	(0 ～ 0.1)	Installation position from upward horizontal to vertical is available.	± 2.5 % FS
200 D	0 ～ 200	(0 ～ 0.2)		
300 D	0 ～ 300	(0 ～ 0.3)		
500 D	0 ～ 500	(0 ～ 0.5)		
1000 D	0 ～ 1000			
1 E		0 ～ 1		
2 E		0 ～ 2		
3 E		0 ～ 3		
5 E		0 ～ 5		
+−100 D	−100 ～ +100	(−0.1 ～ +0.1)		
+−200 D	−200 ～ +200	(−0.2 ～ +0.2)		
+−300 D	−300 ～ +300	(−0.3 ～ +0.3)		
+−500 D	−500 ～ +500	(−0.5 ～ +0.5)		

( ) : Out of standard

Pressure measuring method : Measuring differential pressure

Flag pointer color : Red

Pressure receiving element : Diaphragm (silicone rubber)

Gas to be measured : Air or non−corrosive gas (not liquid)

Scale indicating angle : Approximately 90 °

Medium and ambient temperature : − 10 to + 50 ℃ (no freezing)

Ambient humidity : 90 % RH or less (no dewing)

Withstanding pressure of instrument body : 50 kPa

Withstanding pressure of receiving element : 20 kPa

Withstanding vibration : 5 to 10 Hz Amplitude : 10 ㎜,
10 to 50 Hz Accelerating : 39 m/s^2 (each two hours on triaxial directions)

Withstanding impact : 100 m/s^2 (each six times on triaxial directions)

Material of the outer case : Polycarbonate and polyamide

Applicable piping : 1. Vinyl, plastic tube or rubber tube (I.D. 6)
··· The resinous piping connectors (installed) for vinyl or plastic tube.

2. Metal tube (O.D. 6 ± 0.1)
··· Metal type piping connector (option) is needed.

3. Hard plastic tube (O.D. 6 × I.D. 4)
··· Metal type piping connector (option) and inner sleeve set (XIN6 × 4) are needed.

Polarity of piping connector :
- The piping connector indicated red color is high pressure side and blue color is low pressure side.
- Enabling to convert the polarity by changing piping connectors of high pressure side for low pressure side.

Mass : Approximately 200 g

Accessory :

WO70FV	Nil	WO70PV	One set of installation nuts

Conformed standards : RoHS Directive (2002/95/EC)
(Products in compliance with the RoHS carry G or [[G]] mark on the label of product itself and on each package.)

"The withstanding pressure of the pressure receiving element" means ;
The max. pressure under which the diaphragm withstands distortion or breakage (withstand single pressure) The single pressure acting on either H or L side.

"The withstanding pressure of the instrument body" means ;
The max. pressure under which the instrument body withstand safely without breakage (double side withstanding pressure) The pressure acing on both high and low sides.

Note : The withstanding pressure of the instrument body is not the pressure under which the airtightness of the instrument is guaranteed.

⚠ Caution

If the pressure exceeding the withstanding pressure of the pressure receiving element is applied to both L and H sides at the same time, the imbalance of the ultimate pressure arising from the difference in the capacity between the L side and H side chambers or tube. It may cause the pressure exceeding the withstanding pressure and the breakage or distortion of the diaphragm.
When applying the pressure exceeding the withstanding pressure of the diaphragm from both H and L sides at the same time, increase the pressure slowly and gradually. Likewise, in relieving the pressure, decrease the pressure slowly.

Ⅲ. INSTALLATION

Before using this instrument, make sure if it is the type that you requested and meets the demand of the environment, pressure and piping conditions where it is used, by specification.

1. Caution of service condition

a) Do not use the instrument in a place subjected to direct sunlight, vibration or shock, or excessive moisture. In particular, vibration and shock to the instrument should shorten its life.

b) Use under the medium and ambient temperature from − 10 to + 50 ℃ .

c) The instrument is not waterproof. Do not use it in a place subjected to rain, or other splashing water.

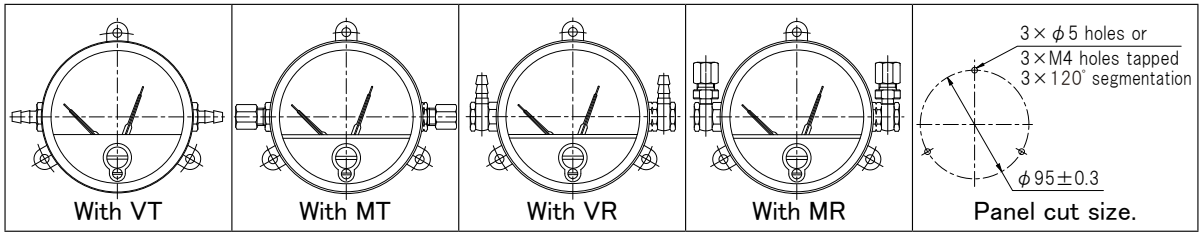
d) The instrument cannot be installed outdoors without an appropriate protection. If outdoor installing is required, the instrument should be housed in a box of drip-proof type for outdoor use.

e) In installing the instrument, select the place where the ground is smooth and flat.

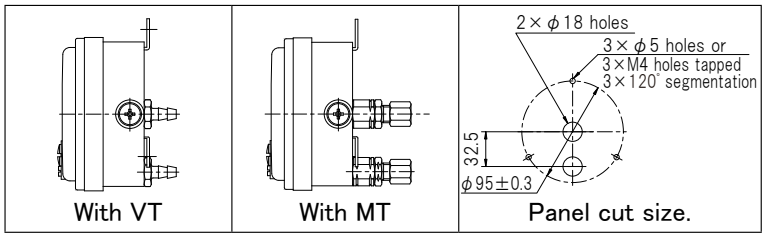
2. Installation of WO70FV

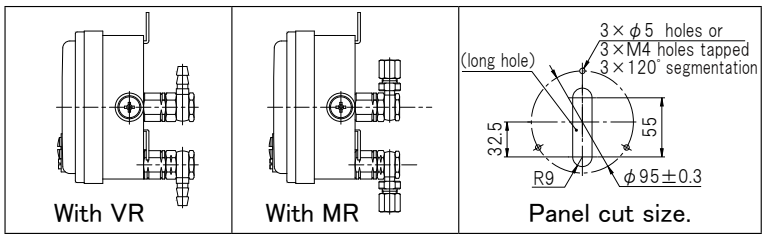
a) Panel cut size

In case of side piping



In case of rear piping



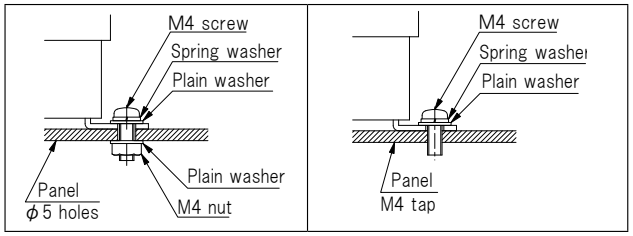


Note 1) When you install MT, VR and MR connector on back view piping connector port, use the piping adaptor on back view (KGA70FBA-L, KGA70FBA-H).
It is necessary to avoid interference with piping connectors and panel and to help put a locking spanner at this adaptor as a spacer.

2) MT, VR and MR connectors are sold separately as "connector for replacement" (refer to p. 7)

b) How to install

Mount installation feet for the instrument by screws as shown in the figure below.

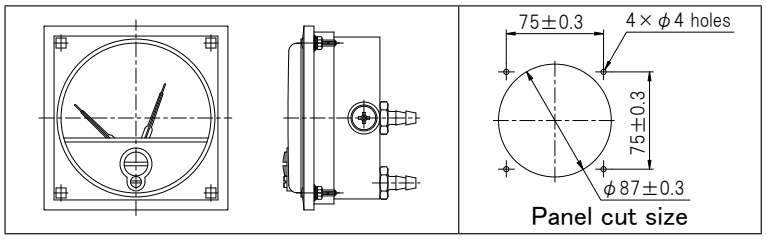


For nut tightening　　For machine screw tightening

⚠ Caution	Tighten the piping connectors with the torque of 1 N·m. Do not apply excessive torque more than necessary, otherwise it will damage the instrument body.

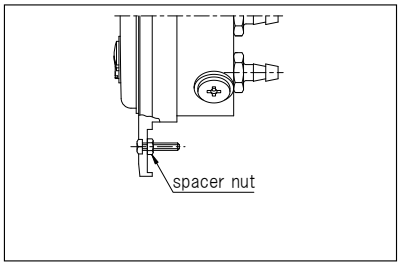
3. Installation of WO70PV

a) Panel cut size

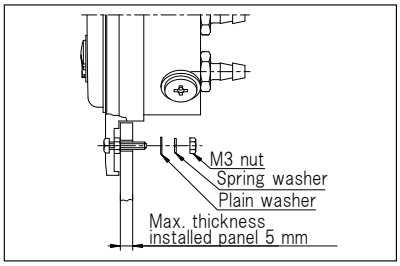


The same panel cut size can be used for gages with MT, VR and MR connectors available separately.

b) How to install



1. Remove four sets of a M3 nut, a spring washer and a plain washer from the packing bag. (Do not remove spacer nuts from set screws.)



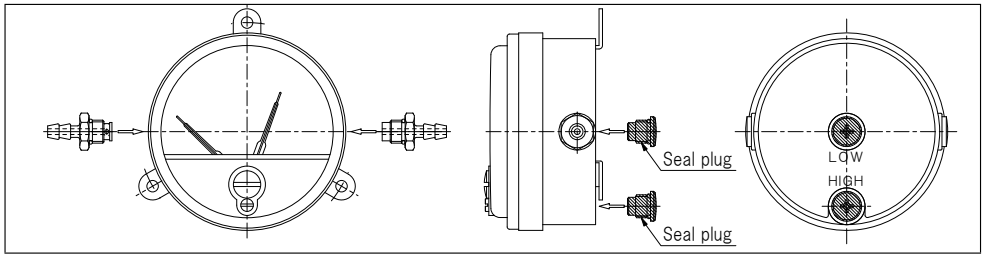
2. After installing the instrument body on the panel, set a plain washer and a spring washer. Then tighten a M3 nut from the back side of panel.

Caution

- If you install the instrument on the panel without spacer nuts, the instrument body will be broken.
- Tighten the installation M3 nut with the torque from 0.5 to 0.6 N・m. Do not apply excessive torque more than necessary, otherwise it will damage the instrument body.

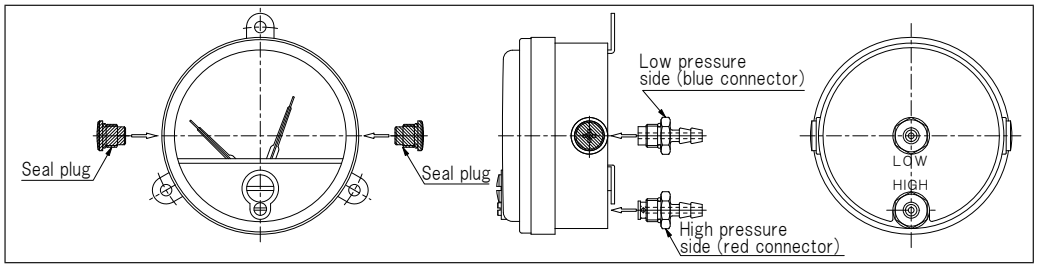
4. Position of connectors and polarity of high and low pressure side

a) The piping connector installed on side view

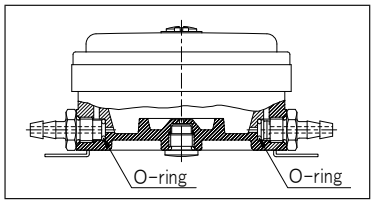


About side connector ports of the instrument body, there is no distinction between high pressure side and low pressure side. The polarity of the high and low pressure side is determined by the piping connector attached. In the model WO70, the polarity can be inverted by switching the piping connector each other. The high pressure side and the low pressure side are identified with red and blue color respectively.

b) The piping connector installed on back view



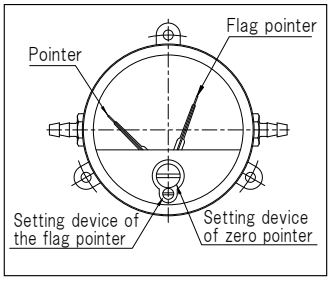
WO70 model polarity of back view connector is decided to high and low puressure side.
In case of installing the connectors to back view connector ports, install the connector of high pressure side in the port which the sign of “HIGH” is displayed and the connector of low pressure side in the port which the sign of “LOW” is displayed.



Caution

- When removing connector, do not allow to drop O-ring at the deep end of side connector ports. (at the end of back view connector port, O-ring is not attached).
- With seal plugs, be sure to close the two piping connector ports where connectors are not attached.

5. Zero point setting



Set the zero point of the gage or the pressure transmitter by turning the zero adjuster, after installing them in the position which they are used.
Before setting the zero point, be sure to open the high and low pressure piping connector to atmosphere, or stop the equipment to run low the residual pressure to zero.

6. Setting of flag pointer

The flag pointer is used for indicating a predicted values or a limit values.
Set it at the predicted or limit values.
If you turn the setting device of the flag pointer clockwise, the flag pointer moves counter-clockwise.

7. Pressure of measurement and connection of piping

a) Measurement of positive pressure

Connect the tube to the high pressure side piping connector (indicated by red color or letter H). The lower pressure port (blue or L) should opened to atmosphere, but do not remove the piping connector.

b) Measurement of negative pressure

Connect the tube to the low pressure side piping connector (blue or L). The high pressure port (red or H) should be opened to atmosphere, but do not remove the piping connector.

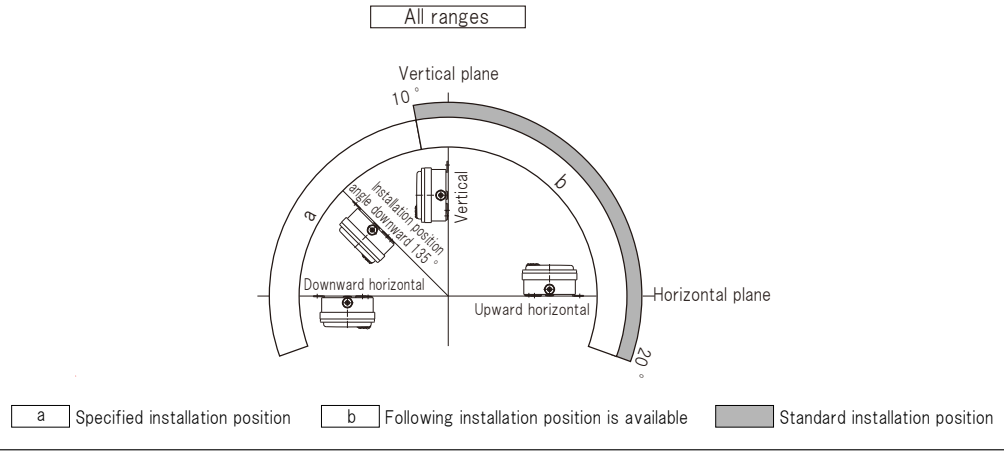
c) Measurement of differential pressure

Connect the tube from the high pressure piping connector to the high pressure port (red or H) and from the low pressure piping connector to the low pressure port (blue or L).

⚠ Caution	Measurement of single pressure using an instrument with zero point center range. Connect the tube to the high pressure side piping connector (red or H). In this case again, leave the piping connector attached to the low pressure side, which is opened to atmosphere. The single pressure is as displayed on a zero point center scale (+−).

8. Installation position

Pressure range specified Vertical or Upward horizontal that is standard installation position.



In ordering out of above mentioned installation position, please order us or our agency beforehand. It must be adjusted before the factory shipment.

9. Connectors and piping

a) VT connector for vinyl or plastic tube, resin-made [installed]

These are connectors for vinyl, plastic or rubber tubes. Be sure to use I.D. 6 and thickness of 1 mm or more. However, the vinyl or plastic tube (2 or more wall thickness) with enough withstanding pressure (including vacuum pressure) is required when the instrument range or the line pressure is higher more than 50 kPa.

b) MT connector for metal tube, brass-made [option]

This connector can be connected to the metal tube made from copper, aluminum and so on. (O.D. 6, the tolerance ± 0.1, ring joint type) In case of connecting with stainless tube, use MTW connector.

When this connector is connected to hard plastic tube (O.D. 6, I.D. 4), remove the brass-made sleeve and use the resinous inner sleeve set (XIN6 × 4) that is the optional accessory. (Fig. Ⅲ -2)

c) VR rotary connector for vinyl, plastic tube, brass-made [option]

These connectors are rotary elbow type and can be connected to vinyl, plastic and rubber tube of I.D. 6.

d) Piping adaptor on back view, brass-made [option]

When you install MT, VR and MR connector on back side port of WO70F type, this adaptor is necessary to avoid interference with connectors and panel.

It is also necessary as a spacer to use a locking spanner at this adaptor.

e) Inner sleeve set [option]

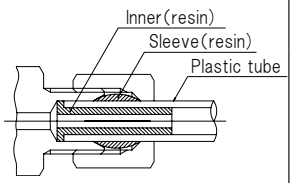
You need this to connect hard plastic tube (O.D. 6, O.D. 4) to the connectors for metal tube. (Fig. Ⅲ -2)

Low pressure side VT connector	High pressure side VT connector
	
Product code KGA70VT-L-P	Product code KGA70VT-H-P

Low pressure side MT connector	High pressure side MT connector
	
Product code KGA70MT-L	Product code KGA70MT-H

Low pressure side VR connector	High pressure side VR connector
	
Product code KGA70VR-L	Product code KGA70VR-H

Low pressure side back view piping adaptor	High pressure side back view piping adaptor
(for FV type)	(for FV type)
	
Product code KGA70FBA-L	Product code KGA70FBA-H

Inner sleeve set for plastic tube	
	
Product code XIN6X4	

(Fig. Ⅲ -1)

10. About tightening piping connector

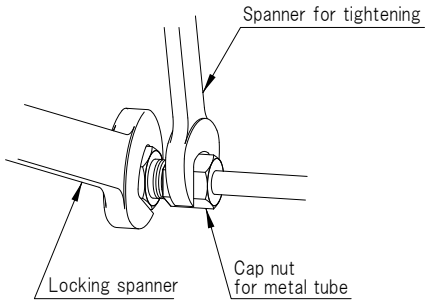
a) Tightening torque

The plug sealing between the piping connector port of the instrument, the piping connector, and the sealing plug is achieved by O-rings. Apply the tighting torque specified below when tightening the piping connector and sealing plug. The instrument body will be broken if excessive torque is applied.

- Piping connector for
  vinyl or plastic tube and metal tube ···· 1 N・m
- Seal plugs ····· 0.5 N・m

b) Tightening with locking spanner

Always use locking spanner to tighten the ring joints for MT connectors (for metal tube) or MR connectors (rotating type for metal tube) and be careful not to apply the tighting torque directly to the instrument body.
The locking spanner is also needed to ease the cap nuts. (Fig. Ⅲ -3)



(Fig. Ⅲ -2)

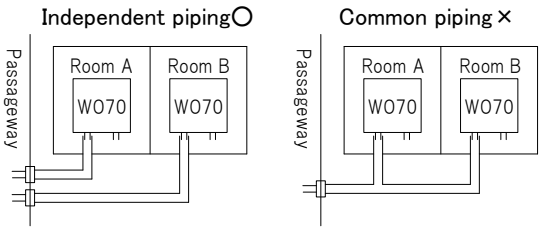
⚠ Caution	Do not directly tightening a cap nut without a locking spanner, or it will cause the damage to ports of connectors at the main body of the instrument.

11. Compatibility of connectors

The piping connector of Manostar gages WO81, WO70, and MS65 are not compatible with each other.Make sure to use the dedicated connectors of Manostar gage WO70.

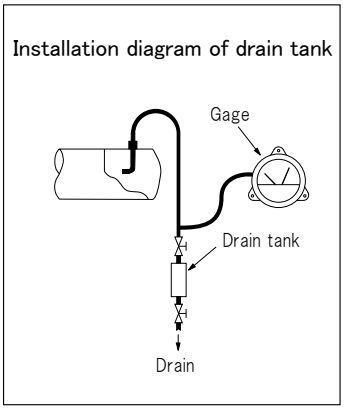
Ⅳ. GENERAL PRECAUTIONS

1. Prohibition of common piping



Piping each of pressure detectors and pressure receiving instruments tube exclusively dedicated for it, and do not connect the piping commonly with the adjacent system as shown in the right figure.
Common piping causes measurement error because the pressure of each system interferes.

2. Prevention of clogged piping due to drain

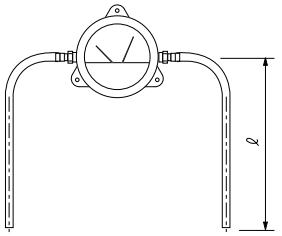


- If drain remains within the line, it causes measurement error. Be sure to install the pressure receiving instrument above the pressure outlet port of the pressure detector and arrange the line so that the drain water should not remain in the slack piping.
- If the arrangement mentioned above in not possible, install a drain tank within the line as shown in the right figure and clean it once in a while.
- After the cleaning of the tank, check that the air tightness is fully kept.

3. Measurement of high temperature gases

In the pressure measurement of high temperature gas, use the pressure detector (pitot tube) made of the heat-proof metal (such as stainless steel), and connect it with the pressure receiving instrument through a metal tube which is long enough to cool down the high temperature gas.

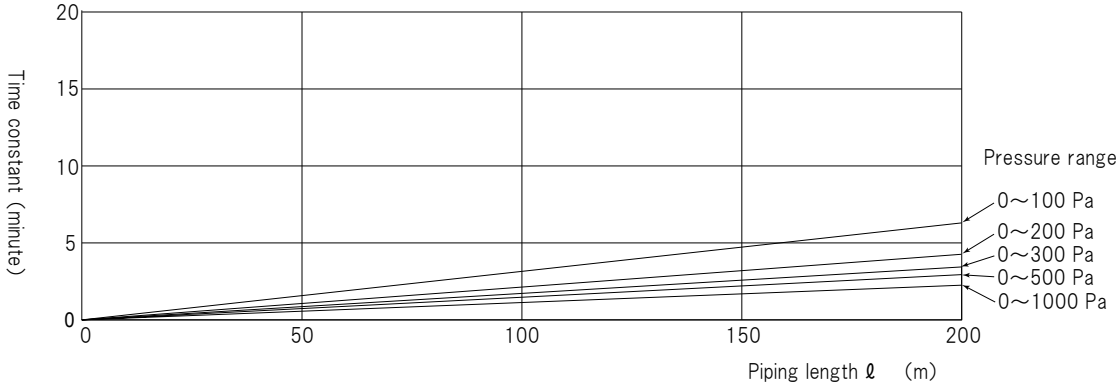
4. Errors caused by long distance piping



The speed of response is delayed when the product is used for remote monitoring.
In such application, the I.D. of the connection tube should be as large as possible.
The time constant is almost inversely proportional to the inner cross sectional area of the piping. (refer to the diagram below)
If the piping conditions of the high and low pressure side are significantly different, the difference in the piping resistance between high and low puressure side causes the difference in pressure transmission time, and the measurement becomes inaccurate.

Time constant: The time required that the indication of an instrument reaches about 63 % of the full scale.

WO70 : Relationship between piping length and time constant (tube I.D. 6)



Ⅴ. LINE PART ACCESSORIES

Pulsating protector

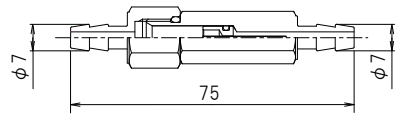
In case of strong turbulent flow of medium air that causes abnormal movement of pointer and output of transmitter, installing a pulsation protector applicable pressure range one each on H side and L side on the piping way between pressure sensor and the instrument.



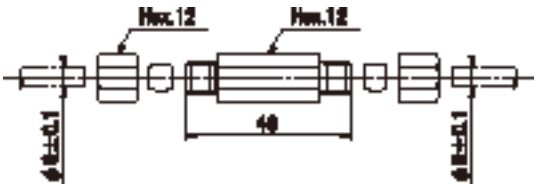
Product code		Applicable range (max. value)
For vinyl or plastic tube	For metal tube	Pa, kPa
RS-VT6-02	RS-MT6-02	200 Pa or less
RS-VT6-03	RS-MT6-03	300, 500, 1000 Pa
RS-VT6-04	RS-MT6-04	2, 3, 5, 10 kPa
RS-VT6-06	RS-MT6-06	20 kPa or more

Outline drawing for pulsating protector

For vinyl or plastic tube



For metal tube



Corrosive gas absorber

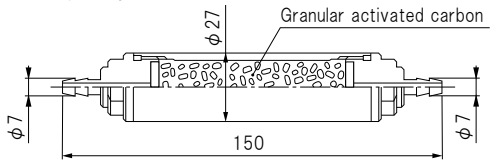
In case of measurement of gas which corrodes the material of the instrument, installing that corrosive gas absorber one each on H side and L side each on piping way between pressure detector prolong instrument life.
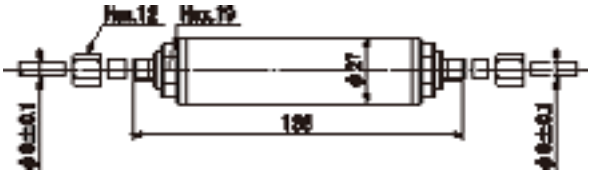


For vinyl or plastic tube	For metal tube
Product code FG-VT6-S	Product code FG-MT6-S

Outline drawing for corrosive gas absorber

For vinyl or plastic tube



For metal tube



Air filter for instrument

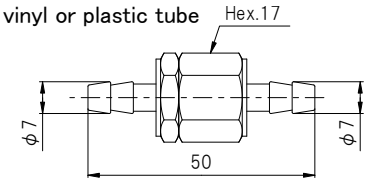
For measurement of dusty air, install air filter for instrument one each on H side and L side in the middle of piping between the pressure detector and the instrument. According to the condition of clogging inside filter, carry out periodically replacement of filter element as well as cleaning of the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



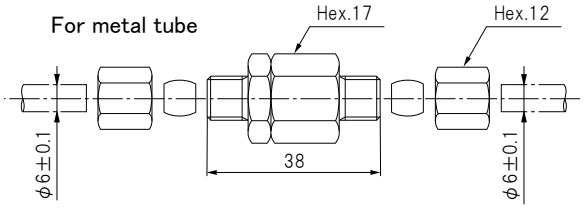
For vinyl or plastic tube	For metal tube
Product code AF-VT6	Product code AF-MT6

Outline drawing for instrument air filter

For vinyl or plastic tube



For metal tube



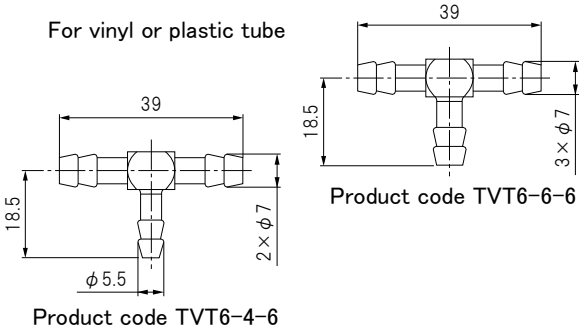
T joint



For vinyl or plastic tube	
Product code TVT6-4-6	For branching different I.D. 6 and 4
Product code TVT6-6-6	For branching the same I.D. 6 and 6

Outline drawing for T joint

For vinyl or plastic tube



Ⅵ. PERIODIC INSPECTION

Generally speaking, it is important not to exert external stress to keep life and reliability of the instrument for a long time.
Proper use of this instrument will ensure its faultless service over many years without any necessity of periodic lubrication.
However, it is recommended that it is subjected to periodic inspection (calibration) once a year.

Ⅶ. PRODUCT WARRANTY

Warranty Period

This product warranty is valid for one year from the date of delivery to a place specified by an ordering party who has transacted directly with Yamamoto Electric Works Co., Ltd.

Coverage

If a product breaks down due to a reason for which we are responsible during the warranty period and you return the product to us, we will either repair or replace the product free of charge.
This warranty does not cover:

(1) Usage of the product under any inappropriate conditions or environment contrary to what is described in our product catalog, specifications or manual.
Handling or usage of the product other than as described in our product catalog, specifications or manual.
(2) Breakdown due to a reason other than a fault within our product.
(3) Any product that has been modified or repaired by a party other than us.
(4) Any breakdown due to a reason that was not foreseeable based on scientific and technical standards applied at the time of shipment.
(5) Any breakdown due to a reason not attributable to us such as a natural calamity or other disaster.

These terms of warranty represent our entire liability with respect to the product, and we shall have no liability for any other loss arising in connection with a breakdown of the product.

*This product warranty is only valid within Japan.

This document is a translation from the original Japanese version, and the original Japanese version has priority over this translation.
Be sure to refer to the original Japanese for the details of this warranty.

<Prior notice>

The specifications and description of the product explained in this instruction manual may be subject to change without prior notice because of modification and the like.

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