azbil

OM2-5240-1100

Pressure Detectors (Meter Bodies)

Model KKP/KFKB

User's Manual

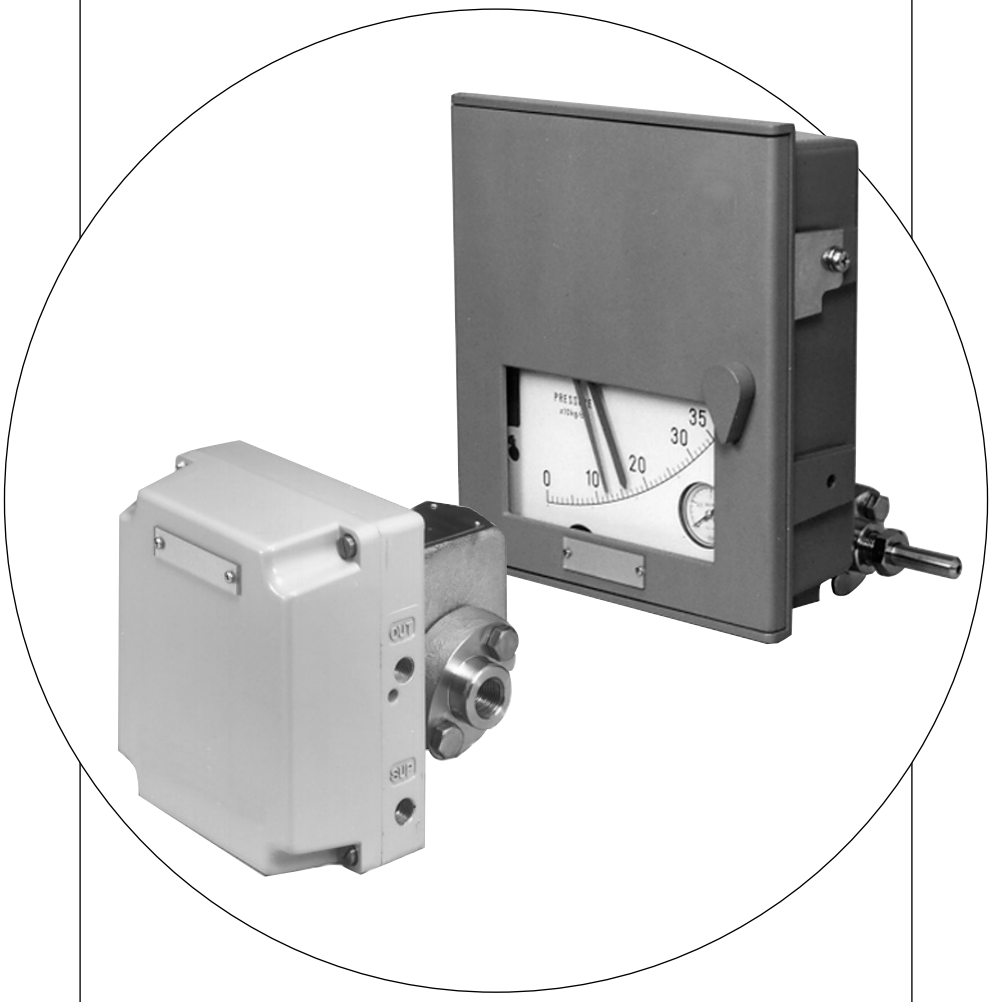

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Table of Contents

Chapter 1. Description 1

1-1. General 1
1-2. Models 1
1-3. Instructions for instruments (Transmitters and controllers) used in conjuncion. 1

Chapter 2. Structures of meter bodies. 2

2-1. External views 2
2-2. Structures and operating principles 3

Chapter 3. Installation 5

3-1. General 5
3-2. Bracket and bolts 5
3-3. Place of installation 5
3-4. Installation method 6
3-5. Pressure piping 8
3-6. Elevation and suppression 10

Chapter 4. Operation method 11

Chapter 5. Inspection and maintenance. 12

5-1. Check for leak from piping 12
5-2. Blow and cleaning of meter body and piping 12
5-3. Notes for use in freesing season 12

Appendix A. Specifications, Model No., External dimensions A-1

Chapter 1. Description

1-1. General

The pressure detector (meter body) accepts a process pressure with its pressure receiver element and converts the process pressure into a torque with its torque tube. The torque is applied to a pneumatic transmitter (Model KKP or KFKB) or a pneumatic controller (Model KFKB).
Some models of detectors have a flange incorporated with a diaphragm for connection to the process.

1-2. Models

Measured pressures or type of instrument	Model numbers of instruments used in conjunction	Operator's Manual used in conjunction
High gauge pressures	Models KKP11/12/13/14 Models KFKB11/12/13/14	OM2-5220-0000 (KKP) OM2-6220-0000 (KFKB)
Low gauge pressures	Models KKP15/16/17/18 Models KFKB15/16/17/18	
Absolute pressures	Models KKP25/26/27/28 Models KFKB25/26/27/28	
Remote sealed diaphragm type	Models KKP71/72/73/74/75/76 Models KFKB71/72/73/74/75/76	

1-3. Instructions for instruments (Transmitters and controllers) used in conjuncion

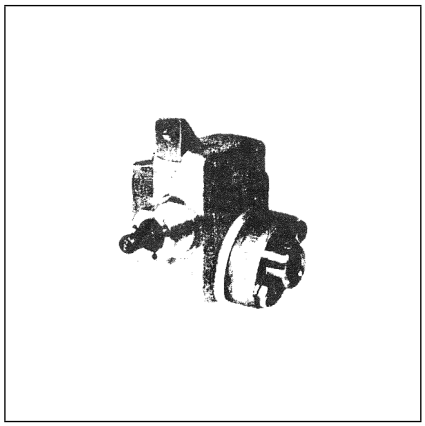
For the instructions for instruments used in conjunction, refer to respective Operator's Manuals which cover the operating principles, service and unit replacement procedures, and calibration and adjustment procedures of these instruments.

Chapter 2. Structures of meter bodies

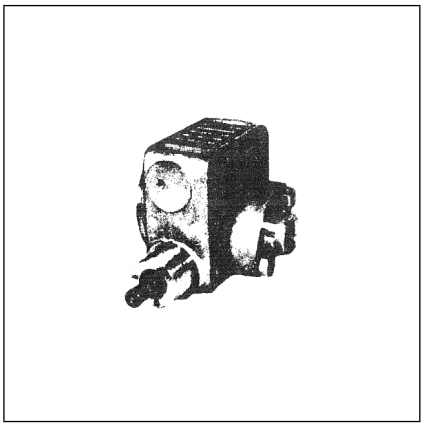
2-1. External views

Although external views of meter bodies differ by models as shown in Fig. 2-1, the bracket mounting section and instrument connection section are identical for all models.

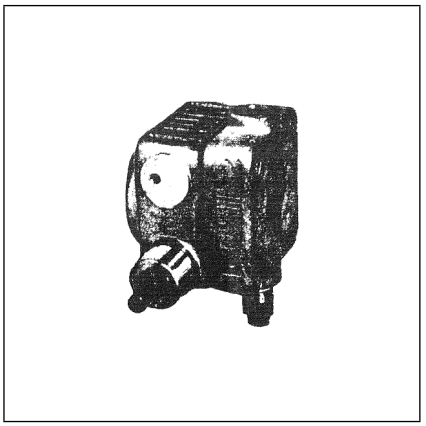
Models 11/12/13/14

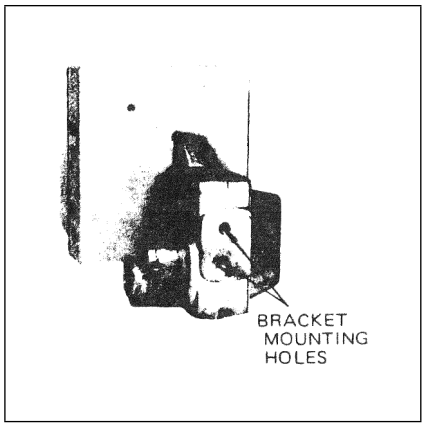


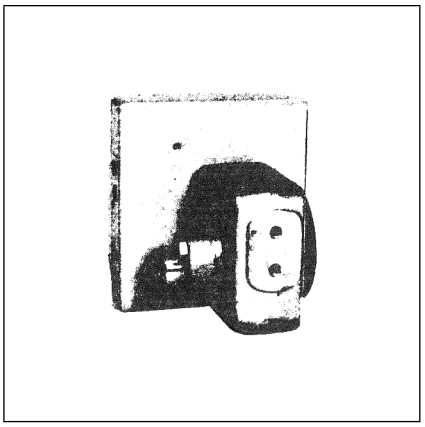
Models 15/16



Models 17/18
Models 25/26/27/28

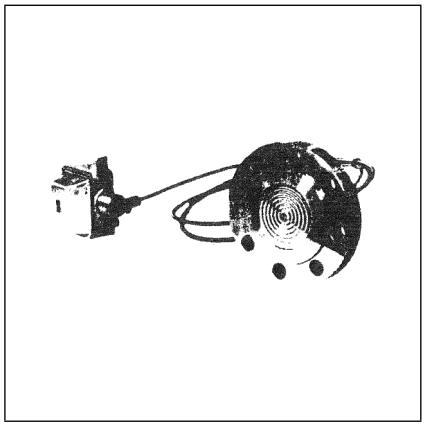


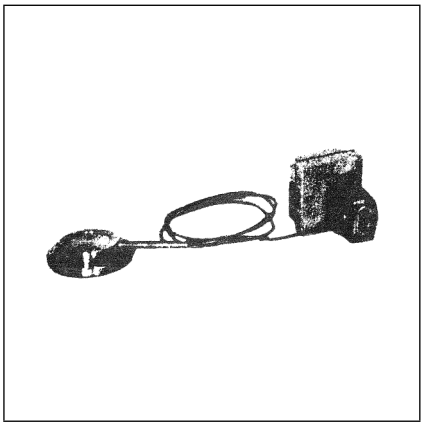




(Meter bodies as coupled to respective instruments)

Models 71/72/73/74/75/76





(Meter body as coupled to instrument)

Fig. 2-1.

2-2. Structures and operating principles

The operating principles of the pressure detectors (meter bodies) are illustrated in Fig. 2-2 through Fig. 2-7.

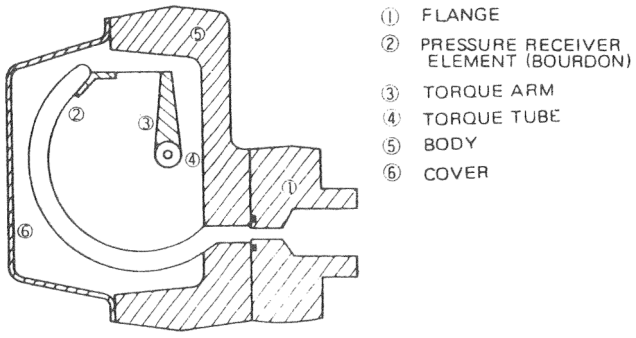


Fig. 2-2. Operating principle of Model 11/12/13/14 meter body (Bourdon element)

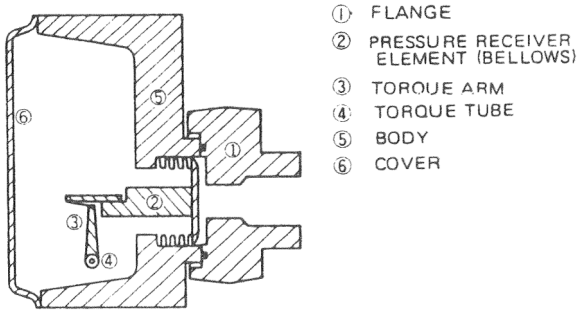


Fig. 2-3. Operating principle of Model 15/16 meter body (Bellows element)

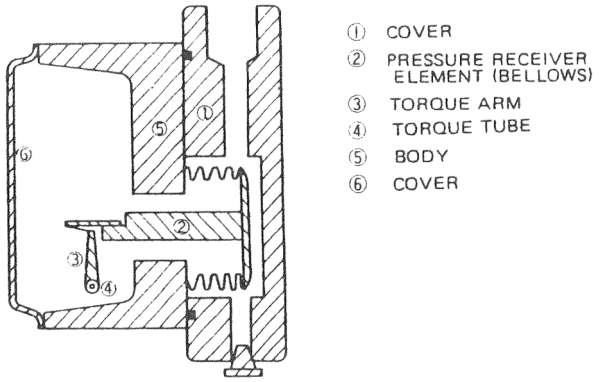


Fig. 2-4. Operating principle of Model 17/18 meter body (Bellows element)

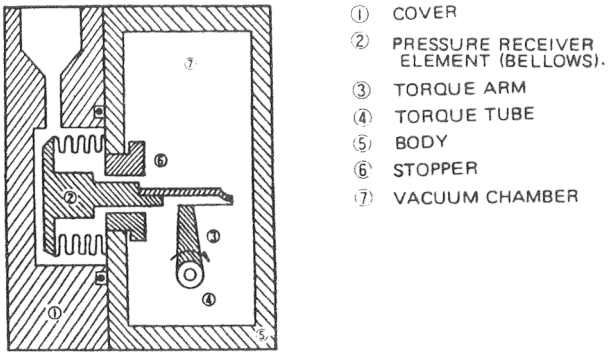


Fig. 2-5. Operating principle of Model 25/26/27/28 meter body

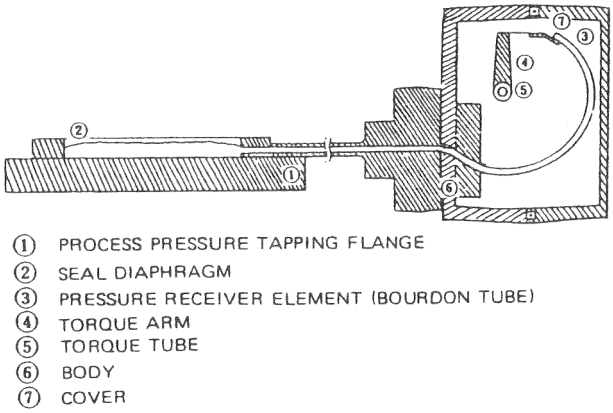


Fig. 2-6. Operating principle of Model 71/72/73/74 meter body (Bourdon element)

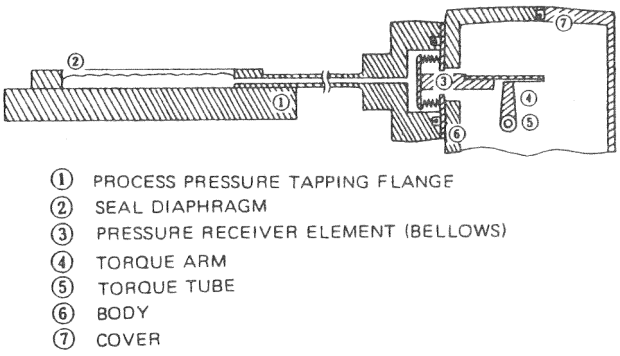


Fig. 2-7. Operating principle of Model 75/76 meter body (Bellows element)

The process pressure is fed through the flange or cover (and via the seal liquid in the case of a remote-sealed type) to the pressure receiver element which exercises a rotational force on the torque arm. The torque arm drives the torque tube through which a torque force representing the process pressure is applied to the beam of the instrument.
The reference-pressure chamber of the absolute-pressure detector (meter body) is kept vacuum.

Chapter 3. Installation

3-1. General

The meter body (detector), together with the instrument (transmitter) coupled to it, can be installed on a 50-mm pipe stanchion by using the accessory bracket and U-shape bolt.
Model 61/62 meter body can be installed simply by fixing its flange to the process.

3-2. Bracket and bolts

The bracket and bolts for installation are supplied accompanying the meter body.

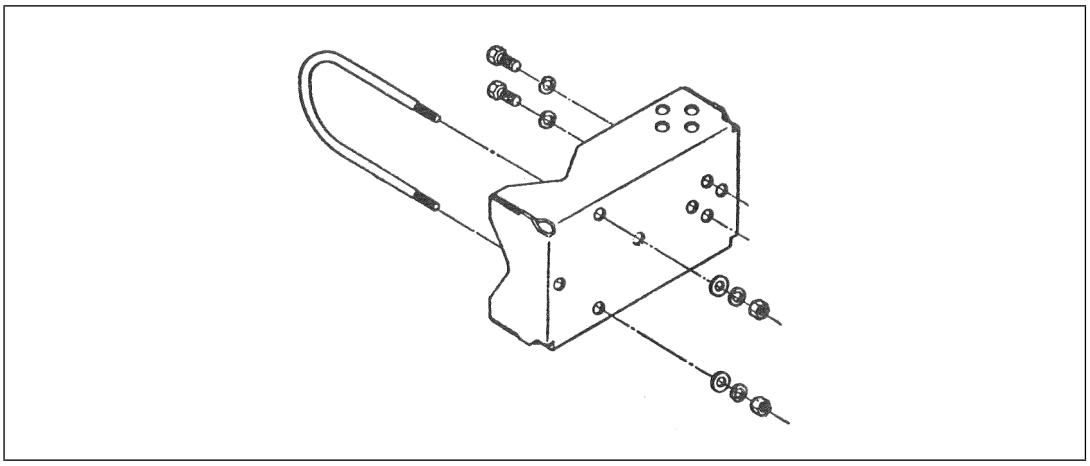


Fig. 3-1.

3-3. Place of installation

When selecting a place of installation for the instrument, take into consideration the matters related to instrument inspection, maintenance, longevity, and operation safety as follows:

(1) Select a place where temperature change is small (within the limits of –30 °C to +80 °C). Avoid a place where the instrument is exposed to high temperature by radiation from a source of heat.
When water is measured, pay attention to freezing which may cause damage to the meter body. Provide appropriate means to guard against freezing.

(2) Select a place where is reasonably free from humidity and vibration.

(3) Be sure to provide spaces for inserting a screwdriver for adjustment and span change.

3-4. Installation method

3-4-1. Installation of regular-type meter body

The meter body, together with the transmitter coupled to it, can be installed in either one of the following methods:

- Pipe stanchion mount
- Process pipe mount

In either case, fix the meter body to a 50-mm vertical or horizontal pipe using the mounting bracket and U-shape bolt. Fix the pipe securely to a foundation so that the pipe does not sway. (See Fig. 3-3.)

To install the meter body on a process pipe line, prepare brackets for mounting the 50-mm pipe to the process pipe. (See Fig. 3-2.)

When installing a remote-sealed type of meter body, exercise care not to sharply bend or twist the capillary tube and not to damage the diaphragm.

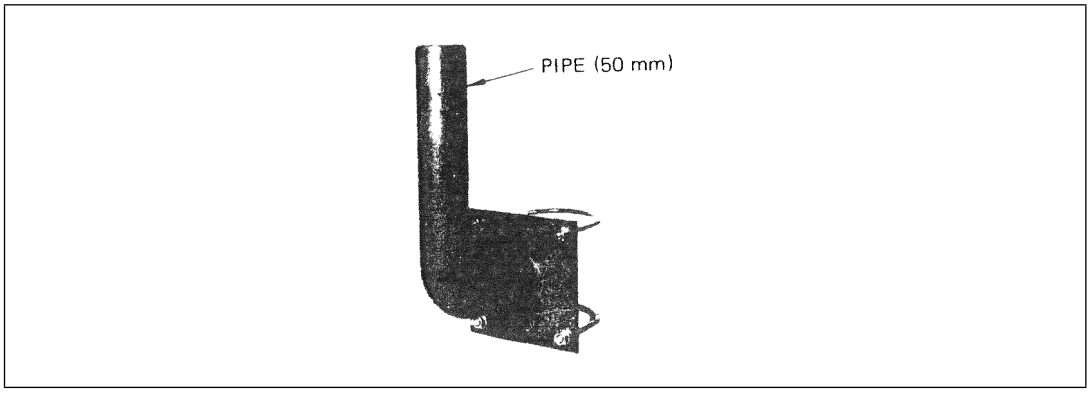


Fig. 3-2. Example of line mount bracket

Note: When installing the transmitter (meter body) on a 50-mm pipe, note that the order of mountings (transmitter, bracket, and 50-mm pipe) differs depending on the mounting direction.

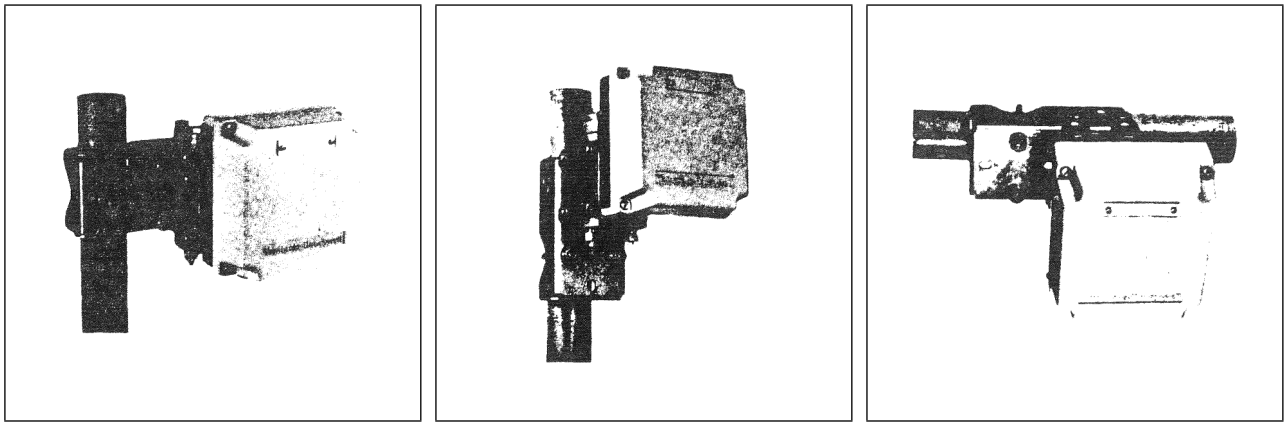


Fig. 3-3. Installation examples

3-4-2. Installation of remote-sealed diaphragm type meter body

This type of meter body can be fixed to a pipe stanchion in the same manner as in the case of the regular type of meter body. For connection to the process, proceed as follows:

(1) Connect the tapping flange to the process flange with the bolts and gasket. Evenly tighten the bolts to prevent leak. Lay the capillary tube so that it is less subjected to temperature change and fix it so that it does not move.
It is recommendable to install the transmitter at a location lower than the flange.

(2) If the zero point shift has been caused by the head pressure of the seal liquid due to the difference in height between the center of the flange and the center of the pressure receiver, adjust zero by means of the ZERO control (or ELEVATION or SUPPRESSION control). The specific-gravity of the seal liquid is 0. 935 at 20 °C (For temperature compensation, use a factor of 0.001/°C).

(3) For installation of the button diaphragm, refer to its dimension drawing.
When the installed button diaphragm is required to be pulled out, set the collar available as an option to the groove at the rear end of the element (capillary tube side) and retract the screw.

3-5. Pressure piping

3-5-1.

The pressure piping method (tapping pressure connection method) for the meter body (transmitted) differs by installation position of the meter body, by the type of the process pipe, and other conditions of measurement.

3-5-2.

Typical examples of pressure piping methods are shown in Fig. 3-4. For piping, observe the following instructions.

(1) Install a tee joint in the pressure tap line.

(2) Install a stop valve between the pressure tap point and the tee joint.

(3) For the pressure connection piping from the tap point of a horizontal process pipe to the meter body, provide a gradient so that drain is returned through the tap point to the process pipe.

Note: To measure a high pressure, pay attention to the types of joints, and pipe dimensions and materials.

(4) For pressure piping from the process pipe to the transmitter, use an appropriate type (appropriate schedule number and nominal thickness) of pipes depending on the process pressure and other measuring conditions. An example is a 1/2 inch Schedule 80 steel pipe. Copper pipes are used in general for measurement of water or steam pressures.

3-5-3. Auxiliary devices

(1) Oil seal and air purge
When it is undesirable to lead directly the measured pressure medium (fluid with suspension, highly viscous fluid, or corrosive fluid) to the pressure transmitter, use liquid seal or air purge.
Various liquid seal and air purge methods are possible. For details, please consult an Azbil Corp. representative.

(2) Pulsation damping
When the process pressure pulsates or otherwise varies abnormally rapidly, install a restriction valve in the pressure piping in order to smooth out such rapid pressure change.

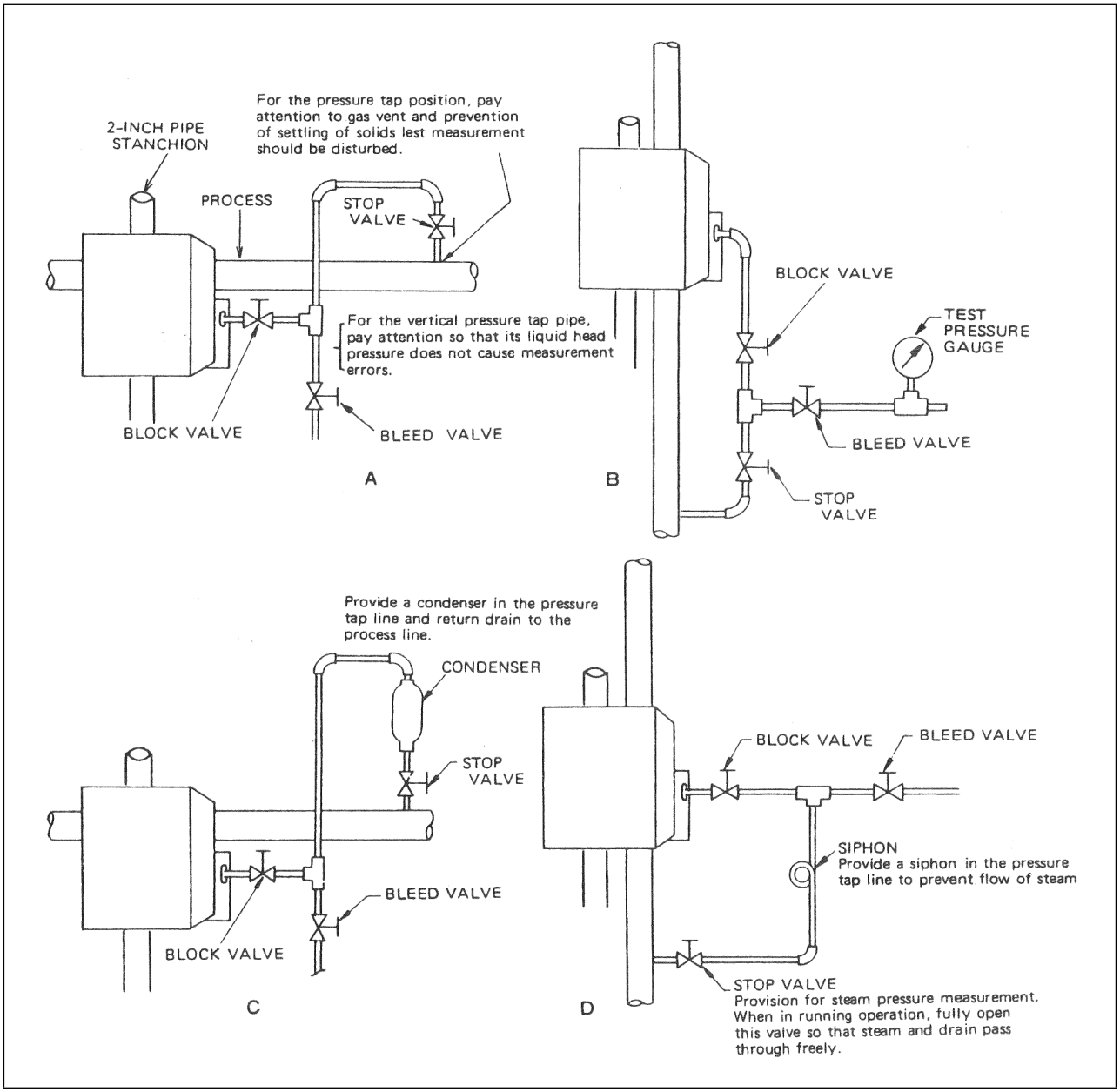


Fig. 3-4. Examples of pressure tap piping

3-6. Elevation and suppression

3-6-1. Definitions of elevation and suppression

The terms “elevation” and “suppression” as used in this publication are defined as follows:

Elevation: Synonymous with “suppressed zero range”
An input range whose low end value is higher than zero.
For example, a range of 20 to 100.

Suppression: Synonymous with “elevated zero range”
An input range whose low end value is lower than zero.
For example, a range of –20 to 0.

3-6-2. Setting of elevation/suppression

For setting of elevation/suppression, refer to Section “CALIBRATION AND ADJUSTMENT” of Operator’s Manual for Pneumatic Transmitter OM2-5220-0000.
When calculating the head pressure of the seal liquid of Model 71/72/73/74/75/76, multiply the level difference between the center of diaphragm and the center of detector by the specific-gravity of seal liquid (0.935*) and take the product value for the elevation.
* See 3-4-2 (2)

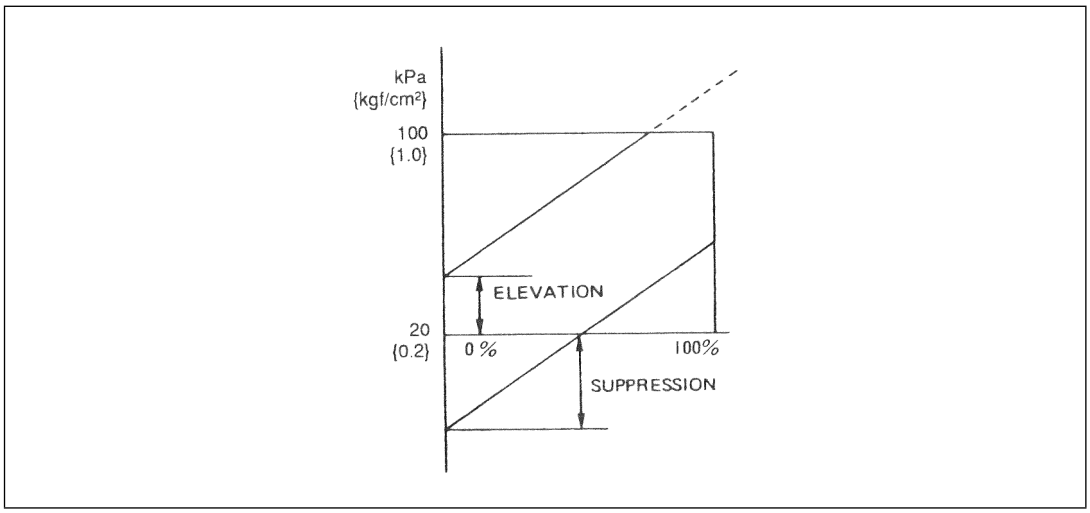


Fig. 3-5.

Note: Elevation alone is applicable to Model 25/26/27/28. To other models, suppression is applicable for vacuum pressures.

Chapter 4. Operation method

The meter body, together with the transmitter coupled to it, starts operating as the air supply and process input are fed to it. (It is recommendable to check the operation of the transmitter before starting the running operation.)

(1) Measurement of liquid or gas pressure (Except vacuum pressure process)
Close the block valve, open the bleed valve, and then open the stop valve in order to blow the pressure piping to eliminate foreign matter from inside the piping. Next, close the bleed valve, wait until the pressure piping is cooled off if process temperature is high, and then open the block valve to lead process liquid or gas to the meter body. (No bleed is required for vacuum pressure processes.)

(2) Measurement of steam pressure
The operating procedure is the same as that for liquid or gas pressure measurement of (1), except the following: After blowing the pressure piping to eliminate foreign matter and closing the bleed valve, condense steam so that the pressure piping and siphon are filled with water, and then open the block valve.

(3) Correction for Installation height of transmitter
When a liquid pressure is measured or when there is condensed steam in the pressure piping, correction should be made, as required, for the head pressure which depends on the height of installation of the transmitter. (This will be required especially when measuring low pressures.) For this correction, shift the zero point of the transmitter by an amount corresponding to the differential height between pressure tapping point and transmitter installation position multiplied by the specific gravity of the liquid. (Elevation)

(4) Zero point check
When the instrument has become the measuring state, check and adjust the zero point with the receiver connected to the transmitter.

Chapter 5. Inspection and maintenance

For routine inspection and maintenance, pay attention to the following:

5-1. Check for leak from piping

Check that there is no leak in the piping from the pressure tap points to the meter body. If any loose connections are found, tighten them securely.

5-2. Blow and cleaning of meter body and piping

To maintain constantly the instrument at its best performances meeting its specification accuracy, keep clean the meter body and its piping. If sediment or other foreign matters are entrapped in the pressure chambers of the meter body, measuring errors may be caused. To blow and clean the meter body and piping, proceed as mentioned in the following referring to 3-5. Pressure piping of Chapter 3. Installation.

1. Close the stop valve.
2. With the block valve kept open, rapidly open the bleed valve.
3. Close the bleed valve and open the stop valve.

For a vacuum pressure process, blow the piping only when the process is at a positive pressure. No blowing is necessary for the remote-sealed diaphragm type of meter bodies.

5-3. Notes for use in freesing season

When the transmitter used for measurement of water or other freezable liquid is paused in a freezing season or area, loosen the bleed valve and drain out liquid from the pressure chambers to prevent freezing.

No. SS2-KFK100-0100

azbil Specification

KF Series
Pressure Indicating Controller
Model KFK

OVERVIEW

The KF Series instruments are field installed type of pneumatic indicating controllers which are used to measure and control the various types of process variables such as temperatures, pressures, flows and liquid levels.

Model KFK Pressure Indicating Controllers (adjustable range type) indicate and control a process variable by converting its pressure into mechanical displacement of a bellows or a spiral pressure receiving element.

Indicating transmitters and indicating transmitting controllers also are available as well as indicating controllers. The controllers are available either in the local type to set the set-point value with the knob on the instrument or in the cascade type (remote type) to set the set-point value with a pneumatic signal.

FEATURES

- A wide variety of measuring elements and control mechanisms are available to meet various applications.
- A pneumatic circuit board and a heat-resistant weatherproof sturdy case are used, thereby greatly improving the durability and reliability.
- The pneumatic circuit board system allows to readily add or eliminate control mechanisms and units, thereby enhancing the system modifications and expansion flexibility
- Interchangeable parts are used to the maximum practicable extent, thereby reducing the number of parts to be kept in stock.
- The detecting section is identical with that of the pressure transmitter of PREX3000 Pneumatic Transmitter Series.

SPECIFICATIONS

Standard Specifications

Item				Specifications				
Detector								
Model No.	**Pressure element**	**Measuring range**		**Process connection**	**Pressure limit**	**Allowable overload**	**Suppression (max.)**	**Elevation (max.)**
11	**Bourdon tube**	0-5 to 0-70 MPa {0-50 to 0-700 kgf/cm^2}		Welding nipple connection (13.6 x 50)	-0.1 to +70 MPa {-1 to +700 kgf/cm^2}	-0.1, 75 MPa {-1, 750 kgf/cm^2}	-100 kPa {-1 kgf/cm^2}	65 MPa {650 kgf/cm^2}
12		0-1.25 to 0-25 MPa {0-12.5 to 0-250 kgf/cm^2}		Rc½ or Rc¼ internal Thread ½NPT or ¼NPT internal thread	-0.1 to +30 MPa {-1 to +300 kgf/cm^2}	-0.1, 32 MPa {-1, 320 kgf/cm^2}		28.75 MPa {287.5 kgf/cm^2}
13		0-0.35 to 0-7 MPa {0-3.5 to 0-70 kgf/cm^2}			-0.1 to +10.5 MPa {-1 to +105 kgf/cm^2}	-0.1, 14 MPa {-1, 140 kgf/cm^2}		10.15 MPa {101.5 kgf/cm^2}
14		0-0.175 to 0-3.5 MPa {0-1.75 to 0-35 kgf/cm^2}			-0.1 to +5.25 MPa {-1 to +52.5 kgf/cm^2}	-0.1, 7 MPa {-1, 70 kgf/cm^2}		5.075 MPa {50.75 kgf/cm^2}
15	**Bellows**	0-35 to 0-686 MPa {0-0.35 to 0-7 kgf/cm^2}			-0.1 to +1.05 MPa {-1 to +10.5 kgf/cm^2}	-0.1, 1.4 MPa {-1, 14 kgf/cm^2}		1.015 MPa {10.15 kgf/cm^2}
16		0-10 to 0-196 kPa {0-0.1 to 0-2 kgf/cm^2}			-100 to +300 kPa {-1 to +3 kgf/cm^2}	-100, 400 kPa {-1, 4 kgf/cm^2}		290 kPa {2.9 kgf/cm^2}
17		0-3.4 to 0-66.6 kPa {0-25 to 0-500 mmHg}			-66.6 to +66.6 kPa {-500 to +500 mmHg}	-66.6, 400 kPa {-500 mmHg, 4 kgf/cm^2}	-66.6 kPa {-500 mm Hg}	63.2 kPa {475 mmHg}
18		0-0.7 to 0-13.3 kPa {0-5 to 0-100 mmHg}			-13.3 to +13.3 kPa {-100 to +100 mmHg}	-13.3, 400 kPa {-100 mmHg, 4 kgf/cm^2}	-13.3 kPa {-100 mm Hg}	12.6 kPa {95mmHg}
25	**Bellows (absolute pressure)**	0-35 to 0-686 kPa abs. {0-0.35 to 0-7 kgf/cm^2} abs.			0 to 686 kPa abs. {0 to 7 kgf/cm^2} abs.	-1.4 MPa abs {14 kgf/cm^2} abs.	—	653 kPa abs. {6.65 kgf/cm^2} abs.
26		0-10 to 0-196 kPa abs. {0-0.1 to 0-2 kgf/cm^2} abs.			0 to 196 kPa abs. {0 to 2 kgf/cm^2} abs.	0.6 MPa abs. {6 kgf/cm^2} abs.	—	186 kPa abs. {1.9 kgf/cm2} abs.
27		0-3.4 to 0-66.6 kPa abs. {0-25 to 0-500 mmHg} abs.			0 to 66.6 kPa abs. {0 to 500 mmHg} abs.	0.4 MPa abs. {4 kgf/cm^2} abs.	—	63.2 kPa abs. {475 mmHg} abs.
28		0-0.7 to 0-13.3 kPa abs. {0-5 to 0-100 mmHg} abs.			0 to 13.3 kPa abs. {0 to 100 mmHg} abs.	0.4 MPa abs. {4 kgf/cm^2} abs.	—	12.6 kPa abs. {95 mmHg} abs.
71	**Remote seal diaphragm**	0-5 to 0-70 MPa {0-50 to 0-700 kgf/cm^2}		G1½ external thread (34 button diaphragm)	-0.05 to +70 MPa {-0.5 to +700 kgf/cm^2}	-0.05, 70 MPa {-0.5, 750 kgf/cm^2}	-0.05 MPa {-0.5 kgf/cm^2}	65 MPa {650 kgf/cm^2}
72		0-1.25 to 0-25 MPa {0-12.5 to 0-250 kgf/cm^2}		G1½ external thread (34 button diaphragm) or 2 in. ANSI wafer	-0.05 to +30 MPa {-0.5 to +300 kgf/cm^2}	-0.05, 32 MPa {-0.5, 320 kgf/cm^2}		28.75 MPa {287.5 kgf/cm^2}
73		0-0.35 to 0-7 MPa {0-3.5 to 0-70 kgf/cm^2}		2 in. -ANSI wafer	-0.05 to +10.5 MPa {-0.5 to +105 kgf/cm^2}	-0.05, 14 MPa {-0.5, 140 kgf/cm^2}		10.15 MPa {101.5 kgf/cm^2}
74		0-0.175 to 0-3.5 MPa {0-1.75 to 0-35 kgf/cm^2}		2 in. -ANSI wafer	-0.05 to +5.25 MPa {-0.5 to +52.2 kgf/cm^2}	-0.05, 7 MPa {-0.5, 70 kgf/cm^2}		5.075 MPa {50.75 kgf/cm^2}
				80 mm-JIS30K flush diaphragm 100 mm-JIS30K extended diaphragm	-0.05 to +5.1 MPa {-0.5 to +51 kgf/cm^2}	-0.05, 5.1 MPa {-0.5, 51 kgf/cm^2}		4.925 MPa {49.25 kgf/cm^2}
				3 in. -ANSI300 flush diaphragm 4 in. -ANSI300 extended diaphragm	-0.05 to +3.82 MPa {-0.5 to +37 kgf/cm^2}	-0.05, 3.82 MPa {-0.5, 37 kgf/cm^2}		3.525 MPa {35.25 kgf/cm^2}
75		0-35 to 0-686 kPa {0-0.35 to 0-7 kgf/cm^2}		80 mm-JIS10K flush diaphragm 100 mm-JIS10K extended diaphragm	-0.05 to +1.05 MPa {-0.5 to +10.5 kgf/cm^2}	-0.05, 1.4 MPa {-0.5, 14 kgf/cm^2]	-0.05 MPa {-0.5 kgf/cm^2}	1.015 MPa {10.15 kgf/cm^2}
				3 in. -ANSI150 flush diaphragm 4 in. -ANSI150 extended diaphragm				
76		0-10 to 0-196 kPa {0-01 to 0-2 kgf/cm^2}		80 mm-JIS10K flush diaphragm 100 mm-JIS10K extended diaphragm	-0.05 to +0.3 MPa {-0.5 to +3 kgf/cm^2}	-0.05, 0.4 MPa {-0.5, 4 kgf/cm^2}		0.29 MPa {2.9 kgf/cm^2}
				3 in. -ANSI150 flush diaphragm 4 in. -ANSI150 extended diaphragm				

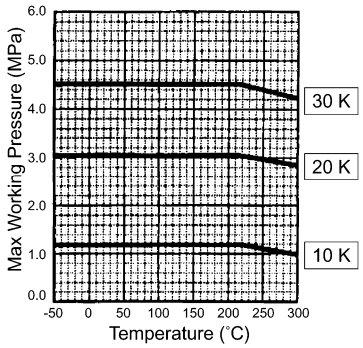
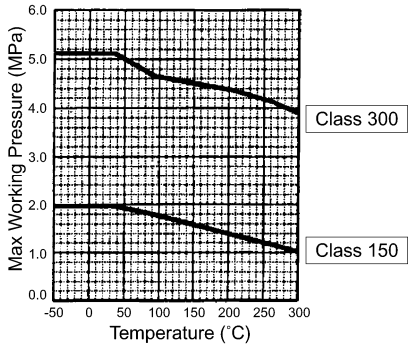
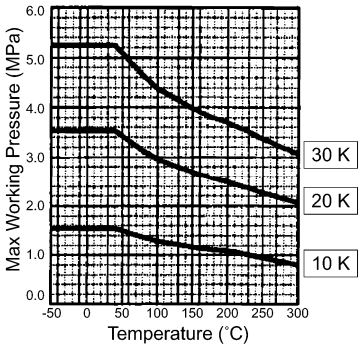
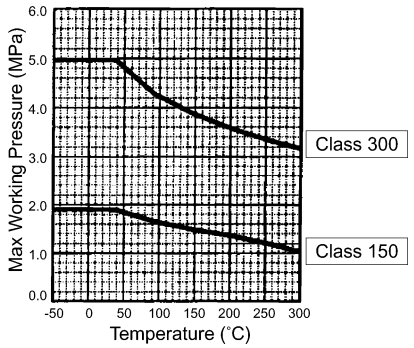
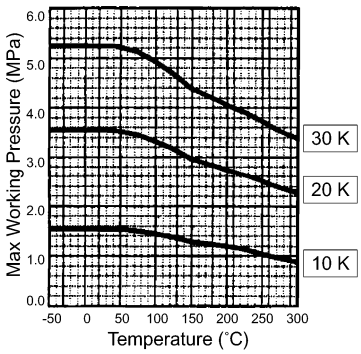
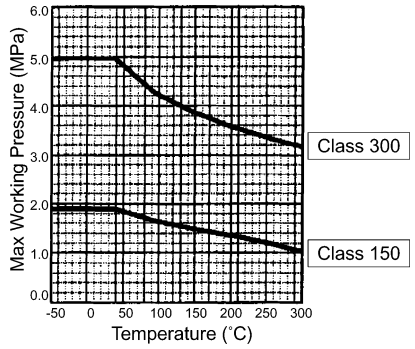
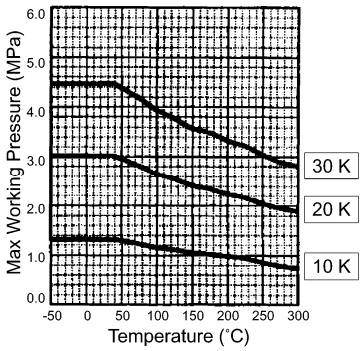
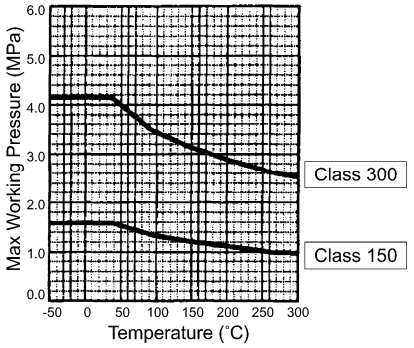
Note 1) Elevation + Span ≤ Max. span.

2) Refer to the annexed table about Max. working pressure on Remote seal diaphragm.

Max working pressure

Note 1 : Max working pressure depends on flange rating, flange materials and operating temperature. Please refer to the following data. Operating range of temperature depends on specification of transmitters.

Note 2 : In case of remote sealed type (KKP75, KFKB□□-75), Max working pressure depends on the smaller value of either 1.05 MPa or following data.

	JIS	JPI/ANSI
Carbon Steel		
SUS304		
SUS316		
SUS316L		

Item		Specifications	
Function			
Accuracy	Model No.	Measuring range	
	KFKB□□11/71	0-5 to 0- less than 10 MPa {0-50 to 0- less than 100 kgf/cm^2}	0-10 to 0-70 MPa {0-100 to 0-700 kgf/cm^2}
	〃 12/72	0-1.25 to 0- less than 2.5 MPa {0-12.5 to 0- less than 25 kgf/cm^2}	0-2.5 to 0-25 MPa {0-25 to 0-250 kgf/cm^2}
	〃 13/73	0-0.35 to 0- less than 0.7 MPa {0-3.5 to 0- less than 7 kgf/cm^2}	0-0.7 to 0-7 MPa {0-7 to 0-70 kgf/cm^2}
	〃 14/74	0-0.175 to 0- less than 0.35 MPa {0-1.75 to 0- less than 3.5 kgf/cm^2}	0-0.35 to 0-3.5 MPa {0-3.5 to 0-35 kgf/cm^2}
	〃 15/75	0-35 to 0- less than 68.6 kPa {0-0.35 to 0- less than 0.7 kgf/cm^2}	0-68.6 to 0-686 kPa {0-0.7 to 0-7 kgf/cm^2}
	〃 16/76	0-10 to 0- less than 19.6 kPa {0-0.1 to 0- less than 0.2 kgf/cm^2}	0-19.6 to 0-196 kPa 0-0.2 to 0-2 kgf/cm^2}
	〃 17	0-3.4 to 0- less than 6.66 kPa {0-25 to 0- less than 50mmHg}	0-6.66 to 0-66.6 kPa {0-50 to 0-500mmHg}
	〃 18	0-0.7 to 0- less than 1.33 kPa {0-5 to 0- less than 10mmHg}	0-1.33 to 0- less than 9.3 kPa (*1) {0-10 to 0- less than 70 nmHg}
	〃 25	0-35 to 0- less than 68.6 kPa abs. {0-0.35 to 0- less than 0.7 kgf/cm^2} abs.	0-68.6 to 0-686 kPa abs. {0-0.7 to 0-7 kgf/cm^2} [abs.]
	〃 26	0-10 to 0- less than 19.6 kPa abs. {0-0.1 to 0- less than 0.2 kgf/cm^2} abs.	0-19.6 to 0-196 kPa abs. {0-0.2 to 0-2 kgf/cm^2} [abs.]
	〃 27	0-3.4 to 0- less than 6.66 kPa abs. {0-25 to 0- less than 50mmHg} abs.	0-6.66 to 0-66.6 kPa {0-50 to 0-500mmHg} [abs.]
	〃 28	0-0.7 to 0- less than 1.33 kPa abs. {0-5 to 0- less than 10mmHg} abs.	0-1.33 to 0- less than 9.3 kPa abs. (*2) {0-10 to 0- less than 70 nmHg} [abs.]
	Transmission/Indication	±1.0%FS/±1.5%FS	±0.5%FS/±1.0%FS
Note: *1) Transmitting accuracy : ± 0.75%FS Indicating accuracy : ± 1.25%FS *2) Transmitting accuracy : ± 0.75%FS Indicating accuracy : ± 1.25%FS			
Repeatability		Within 0.3% FS	
Dead band		Within 0.1% FS	
Indication			
Angle		44 degrees	
Scale length		150 mm	
Pointe		Process variable ; Red Set-point value; Green	
Output indicator (40 mm)		Scale range; 0 to 200 kPa {0 to 2 kgf/cm^2}, Indicator accuracy; 3% FS	
Set-point Section			
Local setting		Internal or external setting by setting knob	
Remote setting		Pneumatic pressure setting of 20 to 100 kPa {0.2 to 1.0 kgf/cm^2}	
Setting range		0 to 100% FS	
Controller			
Control action		P + Manual reset, PI, PID, PD + Manual reset, PI + Batch, On-Off, Differential gap, P + External reset, PD + External reset	
Proportional band (P)		5-500% (direct or reverse action)	
Integral (I)		0.05 to 30 min.	
Derivative (D)		0.05 to 30 min.	
Differential gap		1 to 100% FS, adjustable	
Batch setting pressure		60 to 110 kPa {0.6 to 1.1 kgf/cm^2}, adjustable	
External reset pressure		20 to 100 kPa {0.2 to 1.0 kgf/cm^2}	
Manual reset		0 to 100% FS, adjustable (by pneumatic pressure setting.)	
General Specification			
Output		20 to 100 kPa {0.2 to 1.0 kgf/cm^2}, 0 or Corresponding to supply air pressure (when on-off or differential gap control action)	
Minimum load		I.D. 4 mm x 3 m + 20 cm^3	
Supply air pressure		140 ± 14 kPa {1.4 ± 0.14 kgf/cm^2}	
Air consumption (50% output balanced)		Indicating transmitter (A0) ; 5 L/min [N] Indicating controller (A1, A3) ; 9 Lmin [N] Indicating transmitting controller (A2, A4) ; 9 L/min [N] Manual controller (M) ; 3 L/min N]	
Saturated air supply capacity		Transmitter output : 40 L/min [N] Controller Output ; 40 L/min [N] Manual control output ; 30 L/min [N]	
Air connection		Rc ¼ or ¼ NPT internal thread	
Ambient temperature		At meter body (process fluid) ; -40 to +120 °C At transmitter (ambient) ; -30 to +80 °C	
Relative humidity		10-90% RH	
Case, Door		Enclosure ; Rain-tight and dust tight, meets JIS F 8001 class 3 splash-proof, NEMA 3, IEC IP 54 Materials ; Case .....Aluminum die-cast Door.....Polyester with fiberglass Door-glass .....Reinforced glass (3 mm thick) Case finish ; Acryl baking finish (for corrosion-resistant and silver finish, refer to the optional specification.) Color of finish ; Dark beige (Munsell 10YR 4.7 / 0.5)	
Mounting		Panel or 2 inch pipe mounting	
Weight		Approx. 9.3 kg (model KFKB12-1412A1T-X)	

Optional Specifications

Item		Specifications
(1)	External SP setting knob (for local setting)	A setting knob is mounted on the door. SP can be adjusted from outside.
(2)	Built-in manual controller (with auto/manual transfer switch)	Consists of manual control regulator , two position transfer switch and balance check button.
(3)	Elevation, Suppression	Elevation; The lower limit of input range is above zero. Suppression; The lower limit of input range is below zero.
(4)	Air set (not applicable to panel mounting type)	Pressure regulator with filter plus 40 mm pressure gauge. (supply pressure; 200 to 970 kPa {2 to 9.7 kgf/cm^2}, output; 140 kPa {1.4 kgf/cm^2}, pressure gauge; 0 to 200 kPa {0 to 2 kgf/cm^2})

Optional Semi-standard and Special Specifications

Item		Applicable Models	Specifications
(1)	Steam block (Y29)	Except remote seal diaphragm type	Max. operating pressure; 5 MPa {50 kgf/cm^2} Max. operating temperature ; 250 °C (below 120 °C at meter body) Steam piping connection ; PT¼ or ¼NPT internal thread Material ; Carbon steel (SF45A)
(2)	High temperature use (Y62)	Remote seal diaphragm type	Operating temperature; Fluid -10 to +200 ºC Ambient -10 to +80 ºC Sealing liquid ; Special silicon oil
(3)	Stainless steel bolts (Y66)	Model ; KFKB□□-11 to16	SUS304 stainless steel is used for meter body fixing bolts.
(4)	For oil-free (Y67)	Except remote seal diaphragm type	Liquid-contacting sections are degreased.
(5)	Corrosion-resistant and silver finish (Y138)	All the KFK models	Corrosion-resistant finish with baked acryl (Y138A): Resistant against corrosive gases. Corrosion-proof finish with baked epoxy resin (Y138B): Resistant against corrosive liquids. Regular silver finish with baked acryl (Y138C): To suppress temperature rise caused by direct sunlight or other cause. Corrosion-resistant silver finish with baked acryl (Y138D): To suppress temperature rise caused as above and to be resistance against corrosive gases. (note: silver finish is not resistant against alkaline gases.)
(6)	For oxygen measurement (Y182)	Remote seal diaphragm type (when measuring element material is SUS316 or SUS316L)	Liquid-fill ; Fluorine oil Operating temperature (both fluid and ambient) ; -10 to +60 ºC Wet-parts treatment ; Treated for degreasing
(7)	For chlorine gas measurement (Y183)	Model ; KFKB□□-74~76 (when measuring element material is tantalum.)	Liquid-fill ; Fluorine oil Operating temperature (both fluid and ambient) ; -10 to +80 ºC Wet-parts treatment ; Treated for degreasing.
(8)	Special order items (the items mentioned in the right are available as special order items.)	All the KFK models	1) Door lock 2) Stainless steel tag plate 3) AUTO/MAN switch viewing window 4) Pressure gauge (40 mm) for transmitting signal.

MODEL SELECTION

Ex.: KFKB12-7112050210A1T-M, K, 6, 7
KFKB12-1122A1T-M, K, 6, 7

Basic model no.				Selectable specifications								Options
Type	Func-tion	Control action	Type of detector	Cover, flange or mounting screw materials	Element materials	Flange or mounting screw rating	Capillary tube length	Length of extended parts of flange	Air connec-tion	Output pressure unit	Mounting method	
KFK	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

I

B0	Indicating transmitter
B1	Indicating controller (local type)
B2	Indicating transmitting controller (local type)
B3	Indicating controller (cascade type)
B4	Indicating transmitting controller (cascade type)

II

0	No selection	5	PI + Batch
1	P + Manual reset	6	On-Off
2	PI	7	Differential gap
3	PID	8	P + External reset
4	PD + Manual reset	9	PD + External reset

III

-11	Bourdon tube type	0-5	to 0-70 MPa
		{0-50	to 0-700 kgf/cm^2}
-12	Bourdon tube type	0-1.25	to 0-25 MPa
		{0-12.5	to 0-250 kgf/cm^2}
-13	Bourdon tube type	0-0.35	to 0-7 MPa
		{0-3.5	to 0-70 kgf/cm^2}
-14	Bourdon tube type	0-0.175	to 0-3.5 MPa
		{0-1.75	to 0-35 kgf/cm^2}
-15	Bellows type	0-35	to 0-686 MPa
		{0-0.35	to 0-7 kgf/cm^2}
-16	Bellows type	0-10	to 0-196 kPa
		{0-0.1	to 0-2 kgf/cm^2}
-17	Bellows type	0-3.4	to 0-66.6 kPa
		{0-25	to 0-500 mm Hg}
-18	Bellows type	0-0.7	to 0-13.3 kPa
		{0-5	to 0-100 mm Hg}
-25	Bellows type (abs. press.)	0-35	to 0-686 kPa abs.
		{0-0.35	to 0-7 kgf/cm^2}
-26	Bellows type (abs. press.)	0-10	to 0-196 kPa abs.
		{0-0.1	to 0-2 kgf/cm^2}
-27	Bellows type (abs. press.)	0-3.4	to 0-66.6 kPa abs.
		{0-25	to 0-500 mm Hg}
-28	Bellows type (abs. press.)	0-0.7	to 0-13.3 kPa abs.
		{0-5	to 0-100 mm Hg} abs.
-71	Remote seal diaphragm type	0-5	to 0-70 MPa
		{0-50	to 0-700 kgf/cm^2}
-72	Remote seal diaphragm type	0-1.25	to 0-25 MPa
		{0-12.5	to 0-250 kgf/cm^2}
-73	Remote seal diaphragm type	0-0.35	to 0-7 MPa
		{0-3.5	to 0-70 kgf/cm^2}
-74	Remote seal diaphragm type	0-0.175	to 0-3.5 MPa
		{0-1.75	to 0-35 kgf/cm^2}
-75	Remote seal diaphragm type	0-35	to 0-686 kPa
		{0-0.35	to 0-7 kgf/cm^2}
-76	Remote seal diaphragm type	0-10	to 0-196 kPa
		{0-0.1	to 0-2 kgf/cm^2}

IV

1	Carbon steel (SF45A) (applicable to type 17/18/2☐/7☐ detector excluding wafer type and diaphragm type)
2	SUS316 (except flange type and button diaphragm type)
7	SUS304 (applicable to type 7☐ detector except wafer)
8	SUS316L (applicable to type 7☐ detector except button diaphragm and flange)

V

2	SUS316 (seal diaphragm; SUS316L)	
3	Monel	(applicable to type 11-28 or 7☐ detector except extended flange, wafer and button diaphragm type)
4	Tantalum	
8	SUS316L (applicable to type 7☐ detector)	

VI

	Blank (applicable to type 1☐ or 2☐ detector)	
01	Flush diaphragm type 80mm-JIS 10K (RF) equiv. flange	(applicable to type 7☐ detector)
02	Flush diaphragm type 80mm-JIS 30K (RF) equiv. flange	
03	Flush diaphragm type 3 in.-ANSI 150 (RF) equiv. flange	
04	Flush diaphragm type 3 in.-ANSI 300 (RF) equiv. flange	
05	Extended diaphragm type 100 mm-JIS 10K (RF) equiv. flange	
06	Extended diaphragm type 100 mm-JIS 30K (RF) equiv. flange	
07	Extended diaphragm type 4 in.-ANSI 150 (RF) equiv. flange	
08	Extended diaphragm type 4 in.-ANSI 300 (RF) equiv. flange	
09	2 in.-ANSI 1500 (RF) equiv. wafer	
11	PF 1½ external thread (button diaphragm type)	

VII

	Blank (applicable to type 1☐ or 2☐ detector)
02	2m (applicable to type 7☐ detector)
03	3m (applicable to type 7☐ detector)
05	5m (applicable to type 7☐ detector)

VIII

	Blank (applicable to type 1☐ or 2☐ detector)
00	Applicable to flush diaphragm, wafer or button diaphragm type.
10	Length; 100 mm (applicable to extended diaphragm)
15	Length; 150 mm (applicable to extended diaphragm)

IX

A	Rc¼ internal thread (instruction plate: Japanese)
B	¼NPT internal thread (instruction plate: English)

X

1	0.2 to 1.0 kgf/cm^2
2	3 to 15 PSI
3	0.2 to 1.0 bar
4	20 to 100 kPa
8	19.6 to 98.1 kPa (equality to 0.2 to 1.0 kgf/cm^2)

XI

P	Panel mounting (Pressure regulator with filter cannot be installed)
T	2-inch pipe mounting

XII

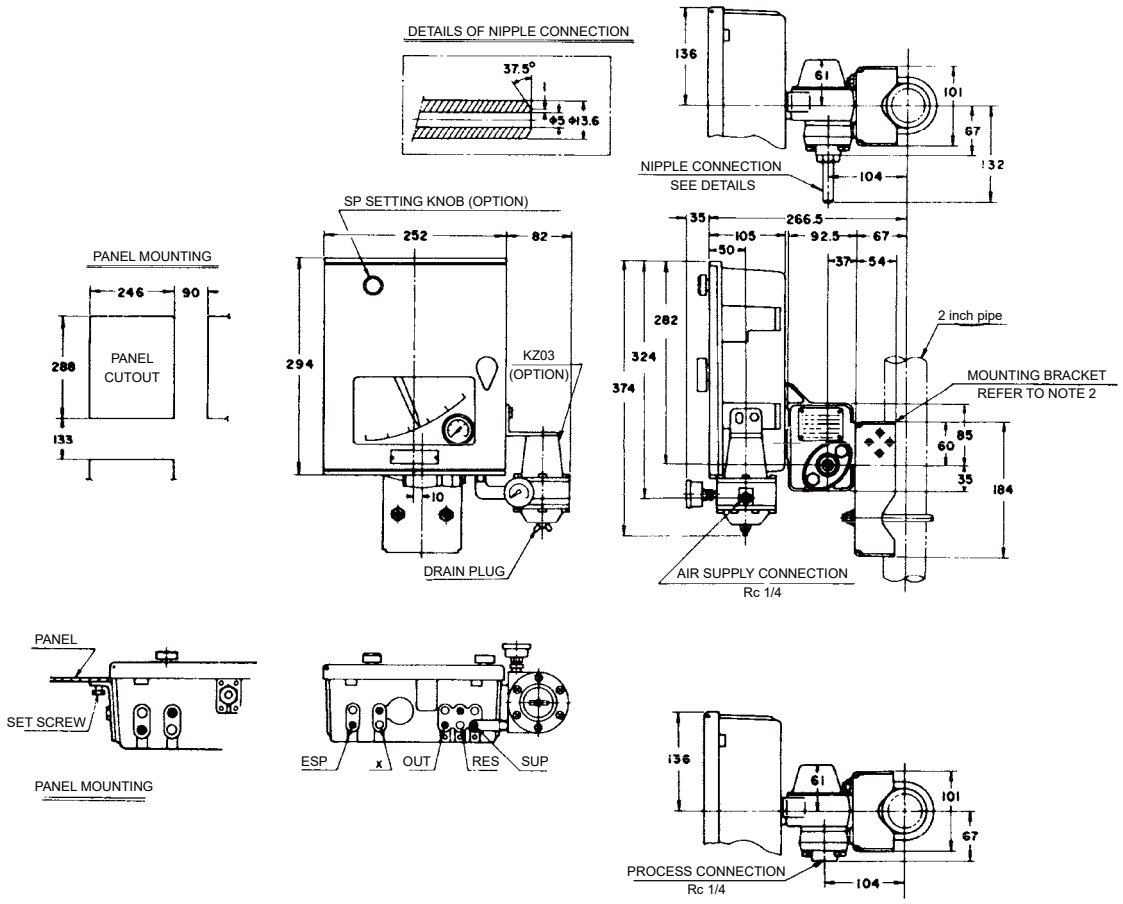
-X	No option
-M	Built-in manual controller (with auto/manual switch) (applicable to type B1, B2, B3 or B4 controller.)
-K	With external SP setting knob (applicable to type B1 or B2 controller)
-5	Elevation or high elevation
-6	Suppression
-7	With Pressure regulator with filter (KZ03)
-R	With Pressure regulator with filter (RA1B)

[Note] When specifying semi-standard option (Y☐) not listed in model no table, please write as: KFKB12-1122A1T-M,K,6,7 (Y67, Y 138) (Please consult with factory in case of a multiple of "Y" spec. are required.)

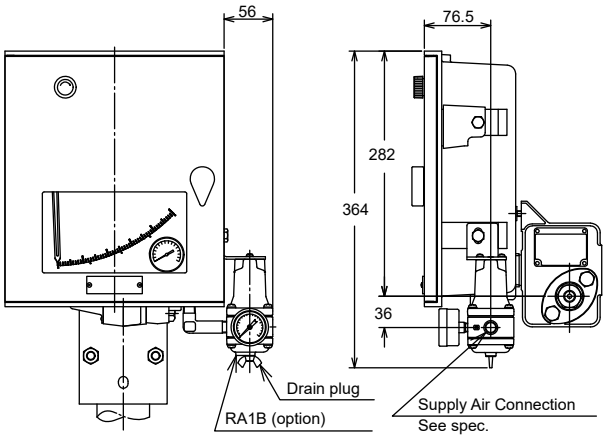
DIMENSIONS

(Unit:mm)

TYPE-11 DETECTOR



TYPE-12, 13, 14 DETECTORS



AIR CONNECTIONS (Refer to note 1, 3)

- o : Rc ¼ internal
- • : ¼ NPT internal

REGEND

ESP : EXTENAL SP SIGNAL
(FOR CASCADE TYPE ONLY)
× : TRANSMITTING SIGNAL
(FOR TRANSMITTER ONLY)
OUT : CONTROLLED SIGNAL
RES : EXTERNAL RESET SIGNAL
(FOR EXTERNAL RESET TYPE ONLY)
SUP : SUPPLY AIR PRESSURE

Notes:

1) The holes not to be used for connection are plugged.
2) These holes in the bracket enable the controller to be mounted in various position.
3) For manual reset provision, “SUP” and “RES” have been preconnected.
4) This dimensions are of bourdon type detector. (detector model nos 11 to 14).
Caution must be taken to dimensions which depend on the shape of elements.
(refer to the reference specification sheets at the rear of this sheet.)

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

   1.1 Warranty period

   Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

   1.2 Warranty scope

   In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

   (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
   (2) Failure caused for other reasons than Azbil Corporation's product;
   (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
   (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
   (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
   (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

   Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

   You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

   (1) Regulations and standards or laws that your Equipment is to comply with.
   (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
   (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
   Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

   *1. A design that is safe even if the user makes an error.
   *2. A design that is safe even if the device fails.
   *3. Avoidance of device failure by using highly reliable components, etc.
   *4. The use of redundancy.

3. Precautions and restrictions on application

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   Any Azbil Corporation's products shall not be used for/with medical equipment.

   The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

   3.2 Precautions on application

   you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

(1) Installation, adjustment, guidance, and attendance at a test run
(2) Maintenance, inspection, adjustment, and repair
(3) Technical guidance and technical education
(4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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