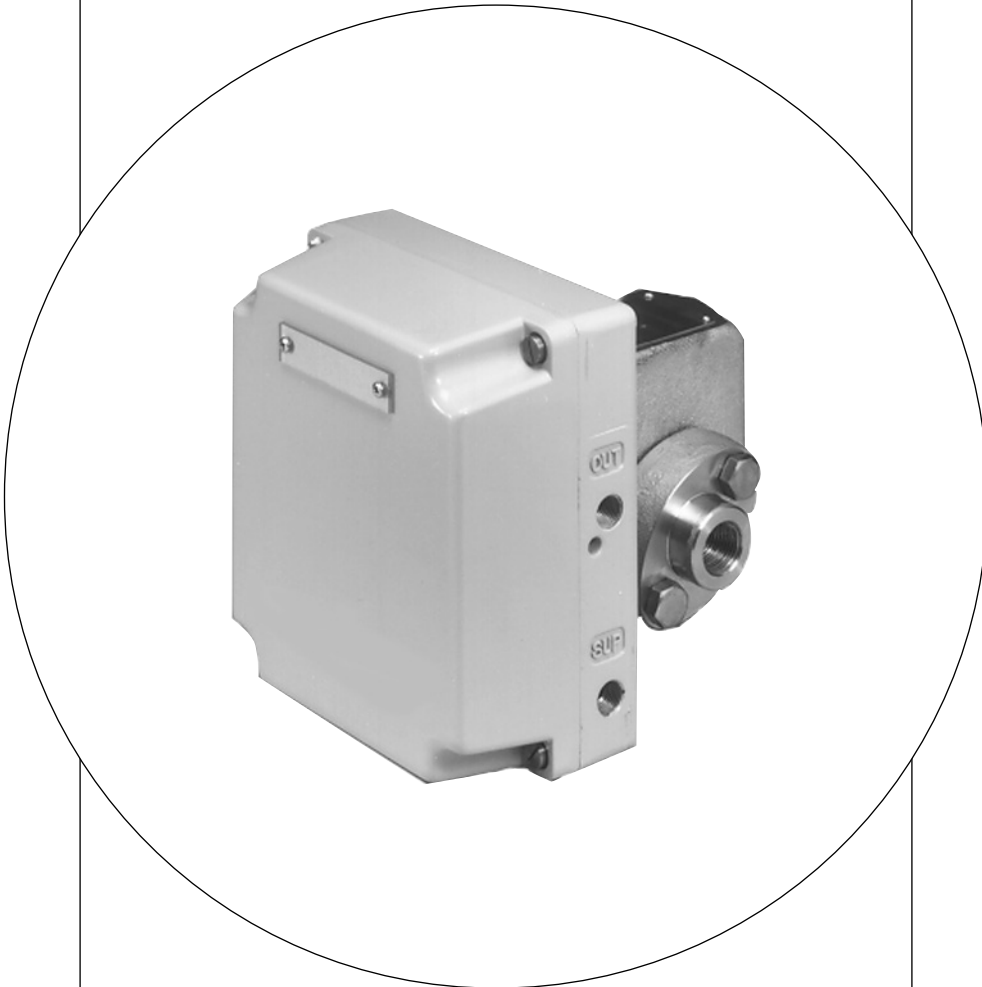


Pneumatic Pressure Transmitter

Model KKP

User's Manual



Azbil Corporation

NOTICE

While the information in this manual is presented in good faith and believed to be accurate, Azbil Corporation disclaims any implied warranty of merchantability or fitness for a particular purpose and makes no express warranty except as may be stated in its written agreement with and for its customer.

In no event shall Azbil Corporation be liable to anyone for any indirect, special or consequential damages. This information and specifications in this document are subject to change without notice.

Unpacking & Verification

Unpacking the RREX 3000 Transmitter package

This device is a precision instrument and should be handled with care to prevent damage and breakage.

After unpacking the device, verify that the following items are contained:

- Transmitter itself
- Standard accessories
- Manual

Verifying the specifications:

The specifications of this device are written on its attached identification plate. Compare the specifications with Chapter 2. Specifications and Chapter 3. Model Numbers, and verify that all items of the specifications on the plate are correct.

Inquiries

If you have any questions regarding the specifications of the device, contact your nearest Azbil Corporation office or representative. When making inquiry, be sure to provide the model number, product number and serial number of this device.

The purpose of this manual is to provide the installation, operational and maintenance notes. The equipment undergoes a performance test and inspection before shipping. However, in order to insure maximum operating efficiency, you should learn how to handle the transmitter correctly under your specific environmental conditions. This manual contains instructions for use during and following installation, operation and maintenance

Practical Notes

Handling:

Carry the transmitter to the installation location in the packed condition and safe from accidental damage.

Storing:

When storing this device before use, observe the following precautions:

- Store indoors at room temperature (-40 to +85 °C) and humidity (25 °C and 65 %RH recommended) in a place safe from vibration or other mechanical effects.
- Store it in the same condition as it was shipped.
- When storing this device after use, rinse the inside of the sensing head with water to eliminate residual fluid, then allow to dry.

Installation place.

To ensure reliable performance of the transmitter over a long time, check the following items on installation:

- A heat insulation or accelerated air flow should be provided if the transmitter is exposed to significant radiant heat.
- Avoid corrosive environments, shock and excessive vibration.


Application


- a) Do not apply pressure over the specified level.
(Refer to Chapter 2. Specifications)
- b) Do not tighten or loosen the tightening screws or bolts when pressure is being applied.
- c) Be careful when handling even after pressure has been released, following the measurement of any processer.

Safety Precautions


Safety precautions in this manual are flagged as either --- Warning or Caution. The meaning of these flags is as follows:

Failure to observe the handling or operational instruction may produce dangerous conditions that could result in injury to the operator or in damage to property.


 **WARNING** Potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION** Failure to observe the handling or operational instruction may produce dangerous conditions that could result in injury to the operator or in damage to property.

Precautions during installation


 **WARNING**

- a) Avoid any projection of the gasket on the connection into the process. Use the adapter to leading tube with a flange, otherwise, liquid leakage or output error may be produced.
- b) Every unit or instrument shall be used within the specified pressure, temperature and connection ratings. Damage or leakage may lead to serious accident. The device is manufactured and shipped under internationally-certified quality assurance systems. Any modifications to the device may lead to damage of the device and/or property.

 **CAUTION**

- a) Do not step on this device. Applying such mechanical stress will cause damage to the instrument, and/or lead to injury.
- b) Avoid contact of tools or other hard objects on the indi-cat or glass.
- c) Grounding shall be done to get reduce grounding resistance and conform to local regulations. Inadequate grounding may cause output error.
- d) While carrying, please wear safety shoes and watch your step.

Precautions during maintenance

 **WARNING**

- a) Be careful to avoid gas or liquid spurting from process tubes, since residual fluid may exist in pipes. On disconnection of the lead tube from the process, such matter may be forced out by residual pressure.
- b) Check the removal direction of the vent/drain when removing. Be careful not to bring the vent/drain into contact with the human body, as this may result in physical damage.


 **CAUTION** The device is manufactured and shipped under internationally-certified quality assurance systems. Any modifications to the device may lead to damage of the device and/or property.

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Chapter 1. Overview

The pneumatic transmitter PREX 3000 comprises a sensing head, meter body and transmitting section, and is used to convert process pressure into a pneumatic signal, 20 to 100 kPa. {0.2 to 1.0 kgf/cm²}

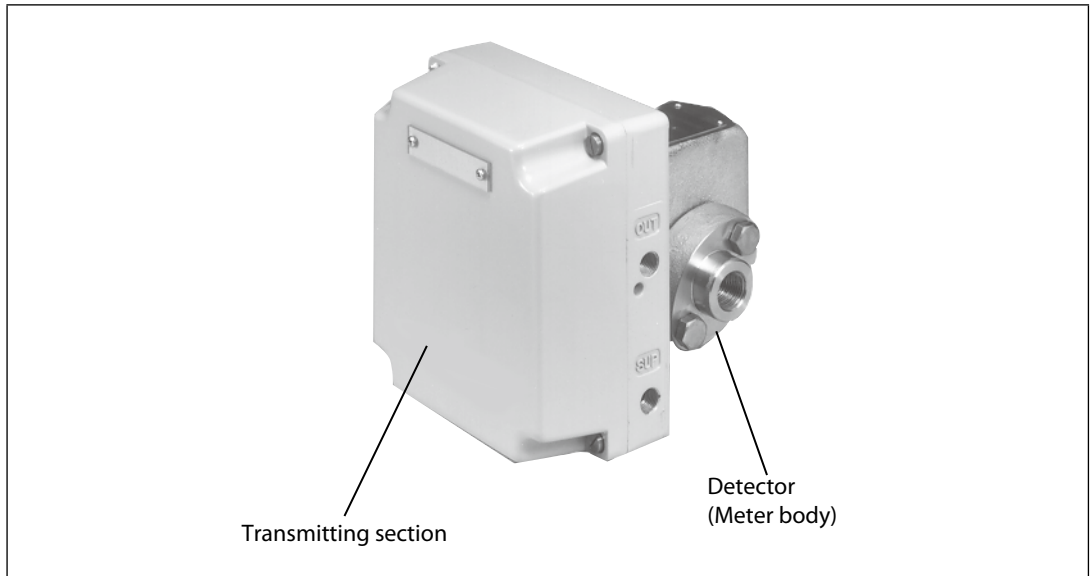


Fig. 1-1.

Chapter 2. Specifications

2-1. Model KKP 11/12/13/14/15/16/17/18

Standard Specifications

Item		Specifications	
	Basic model No.		
Measuring range (continuously variable)	KKP11	0–5 to 0–70 MPa	
	KKP12	0–1.25 to 0–25 MPa	
	KKP13	0–0.35 to 0–7 MPa	
	KKP14	0–0.175 to 0–3.5 MPa	
	KKP15	0–35 to 0–686 kPa	
	KKP16	0–10 to 0–196 kPa	
	KKP17	0–3.4 to 0–66.6 kPa	
	KKP18	0–0.7 to 0–13.3 kPa	
Operating pressure		Operating pressure	Overload resistance
	KKP11	–0.1 MPa to +70 MPa	75 MPa
	KKP12	–0.1 MPa to +30 MPa	32 MPa
	KKP13	–0.1 MPa to +10.5 MPa	14 MPa
	KKP14	–0.1 MPa to +5.25 MPa	7 MPa
	KKP15	–0.1 MPa to +1.05 MPa	1.4 MPa
	KKP16	–100 to +300 kPa	400 kPa
	KKP17	–66.6 to +66.6 kPa	400 kPa
KKP18	–13.3 to +13.3 kPa	400 kPa	
Process connection	KKP11	Welded nipple ($\phi 13.6 \times 50$)	
	KKP12/13 /14/15/16 /17/18	Rc 1/2 or 1/4 and 1/2 or 1/4 NPT female thread	
Air supply connection	Rc 1/4 or 1/4 NPT female thread		
Supply air pressure	140 \pm 14 kPa		
Output	20 to 100 kPa (see the model number selection for other outputs)		
External load	I.D. 4 mm \times Length 3 m + 20 cm ³ or more		
Air supply capacity	20 L/min (normal) or more at 6.7 kPa		
Air consumption	5 L/min (normal) or less (when balanced at 100 % output)		
Accuracy	KKP11	± 1 % FS (span 5 to less than 10 MPa), ± 0.5 % FS (span 10 MPa or more)	
	KKP12	± 1 % FS (span 1.25 to less than 2.5 MPa), ± 0.5 % FS (span 2.5 MPa or more)	
	KKP13	± 1 % FS (span 0.35 to less than 0.7 MPa), ± 0.5 % FS (span 0.7 MPa or more)	
	KKP14	± 1 % FS (span 0.175 to less than 0.35 MPa), ± 0.5 % FS (span 0.35 MPa or more)	
	KKP15	± 1 % FS (span 35 to less than 70 kPa), ± 0.5 % FS (span 70 kPa or more)	
	KKP16	± 1 % FS (span 10 to less than 20 kPa), ± 0.5 % FS (span 20 kPa or more)	
	KKP17	± 1 % FS (span 3.4 to less than 6.8 kPa), ± 0.5 % FS (span 6.8 kPa or more)	
	KKP18	± 1 % FS (span 0.7 to less than 1.4 kPa), ± 0.5 % FS (span 1.4 to less than 9.8 kPa), ± 0.75 % FS (span 9.8 kPa or more)	
Deadband	0.1 % FS		
Damping time constant	Always 0.5 seconds or less		
Operating temperature	Meter body (process fluid): –40 to +120 °C Transmitter (ambient): –30 to +80 °C		
Operating humidity	10 to 90 % RH		
Structure	Dust-proof and waterproof	Satisfies IEC IP54, NEMA TYPE 3R, JIS C0920 rainproof	

Item			Specifications
		Basic model No.	
Material	Bourdon tube	KKP11/12 /13/14	SUS316
	Bellows	KKP15/16 /17/18	SUS316L
	Wetted parts gasket		PTFE
	Wetted parts	KKP11/12 /13/14/15/16	SUS316
		KKP/17/18	Carbon steel (SF45A) or SUS316
	Transmitter case		Aluminum alloy
Sealed liquid		Silicone oil	
Finish			Baked acrylic finish. Color: light beige (Munsell 4Y7.2/1.3)
Mounting			On vertical or horizontal 2-inch pipe
Mass		KKP11/12 /13/14/15 /16	Approx. 5.5 kg (+ 0.8 kg for model with an air-set)
		KKP/17/18	Approx. 8 kg (+ 0.8 kg for model with an air-set)

Additional specifications

Item		Specifications					
	Basic model No.	Span	Suppression (max.)	Elevation, spring A (max.)	High elevation, spring B	Maximum operating pressure	Unit
Suppression and elevation*	KKP11	5 to 70	-100 kPa	65	-	70	MPa
	KKP12	1.25 to 25		22.5	22.5 to 28.75	30	
	KKP13	0.35 to 7		6	6 to 10.15	10.5	
	KKP14	0.175 to 3.5		3	3 to 5.075	5.25	
	KKP15	35 to 686	-100	600	600 to 1015	1050	kPa
	KKP16	10 to 196		180	180 to 290	300	
	KKP17	3.4 to 66.6	-66.6	63.2	-	66.6	
	KKP18	0.7 to 13.3	-13.3	12.6	-	13.3	
Air-set	Primary pressure		200 to 990 kPa				
	Secondary pressure		140 kPa				
	Filter mesh diameter		5 µm				
	Connection		Rc 1/4 or 1/4 NPT female thread				

* Elevation + Span ≤ Maximum operating pressure

Optional Specifications

Item		Specifications	
SUS304 bolt for meter body cover*	Y66	Operating pressure	See standard specifications.
Degreasing	Y67	Wetted parts	
Corrosion-resistant and silver finish	Y138	Corrosion-resistant (baked acrylic) finish (Y138A)	Resistance against corrosive gases
		Heavy corrosion-resistant (baked epoxy) finish (Y138B)	Resistance against corrosive liquids
		Silver-normal (baked acrylic) finish (Y138C)	Prevention of device temperature rise due to direct sunlight, radiant heat, etc.
		Silver-corrosion-resistant (baked acrylic) finish (Y138D)	Prevention of temperature rise as described above and resistance to corrosive gases
		<i>Note: Silver finish should not be used in alkaline gases.</i>	
Output indicator	Y185	With φ100 gauge	
High vibration resistance	Y188	High vibration-resistance model with a dashpot	

* Selectable for model KKP11/12/13/14/15/16

2-2. Model KKP 25/26/27/28

Standard Specifications

Item		Specifications	
	Basic model No.		
Measuring range (continuously variable)	KKP25	0–35 to 0–686 kPa	
	KKP26	0–10 to 0–196 kPa	
	KKP27	0–3.4 to 0–66.6 kPa	
	KKP28	0–0.7 to 0–13.3 kPa	
Operating pressure		Operating pressure	Overload resistance
	KKP25	0–686 kPa abs	1.4 MPa abs
	KKP26	0–196 kPa abs	0.6 MPa abs
	KKP27	0–66.6 kPa abs	0.4 MPa abs
	KKP28	0–13.3 kPa abs	0.4 MPa abs
Process connection		Rc 1/2 or 1/4 and 1/2 or 1/4 NPT female thread	
Air supply connection		Rc 1/4 or 1/4 NPT female thread	
Supply air pressure		140 ±14 kPa	
Output		20 to 100 kPa (see the model number selection for other outputs)	
External load		I.D. 4 mm × Length 3 m + 20 cm ³ or more	
Air supply capacity		20 L/min (normal) or more at 6.7 kPa	
Air consumption		5 L/min (normal) or less (when balanced at 100 % output)	
Accuracy	KKP25	±1 % FS (span 35 to less than 70 kPa abs), ±0.5 % FS (span 70 kPa abs or more)	
	KKP26	±1 % FS (span 10 to less than 20 kPa abs), ±0.5 % FS (span 20 kPa abs or more)	
	KKP27	±1 % FS (span 3.4 to less than 6.8 kPa abs), ±0.5 % FS (span 6.8 kPa abs or more)	
	KKP28	±1 % FS (span 0.7 to less than 1.4 kPa abs), ±0.5 % FS (span 1.4 to less than 9.8 kPa abs), ±0.75 % FS (span 9.8 kPa abs or more)	
Deadband		0.1 % FS	
Operating temperature		Meter body (process fluid): –40 to +120 °C Transmitter (ambient): –30 to +80 °C	
Operating humidity		10 to 90 % RH	
Structure	Dust-proof and water-proof	Satisfies IEC IP54, NEMA TYPE 3R, JIS C0920 rainproof	
Material	Bellows	SUS316L	
	Wetted parts gasket	PTFE	
	Wetted parts	Carbon steel (SF45A) or SUS316	
Finish		Baked acrylic finish. Color: light beige (Munsell 4Y7.2/1.3)	
Material	Bellows	SUS316L	
	Wetted parts gasket	PTFE	
	Wetted parts	Carbon steel (SF440A) or SUS316	
	Transmitter case	Aluminum alloy	
Finish		Baked acrylic finish. Color: light beige (Munsell 4Y7.2/1.3)	
Mounting		On vertical or horizontal 2-inch pipe	
Mass		Approx. 8 kg (+ 0.8 kg for model with an air-set)	

Additional specifications

Item		Specifications	
	Basic model No.	Span	Elevation (max.)
Elevation*	KKP25	35 to 686 kPa	653 kPa abs
	KKP26	10 to 196 kPa	186 kPa abs
	KKP27	3.4 to 66.6 kPa	63.2 kPa abs
	KKP28	0.7 to 13.3 kPa	12.6 kPa abs

Item		Specifications	
		Span	Elevation (max.)
	Basic model No.		
Air-set	Primary pressure	200 to 990 kPa	
	Secondary pressure	140 kPa	
	Filter mesh diameter	5 μm	
	Connection	Rc 1/4 or 1/4 NPT female thread	

* $Elevation + Span \leq Maximum\ operating\ pressure$

Optional Specifications

Item		Specifications	
Degreasing	Y67	Wetted parts	
Corrosion-resistant and silver finish	Y138	Corrosion-resistant (baked acrylic) finish (Y138A)	Resistance against corrosive gases
		Heavy corrosion-resistant (baked epoxy) finish (Y138B)	Resistance against corrosive liquids
		Silver-normal (baked acrylic) finish (Y138C)	Prevention of device temperature rise due to direct sunlight, radiant heat, etc.
		Silver-corrosion-resistant (baked acrylic) finish (Y138D)	Prevention of temperature rise as described above and resistance to corrosive gases
		<i>Note: Silver finish should not be used in alkaline gases.</i>	
Output indicator	Y185	With φ100 gauge	
High vibration resistance	Y188	High vibration-resistance model with a dashpot	

2-3. Model KKP 71/72/73/74/75/76

Standard specifications

Item		Specifications									
	Basic model No.										
Measuring range (continuously variable)	KKP71	0–5 to 0–70 MPa									
	KKP72	0–1.25 to 0–25 MPa									
	KKP73	0–0.35 to 0–7 MPa									
	KKP74	0–0.175 to 0–3.5 MPa									
	KKP75	0–0.035 to 0–0.686 MPa									
	KKP76	0–0.01 to 0–0.196 MPa									
Operating pressure (refer to Figure 1 to 11)	Operating pressure (up to 120 °C)		Overload resistance								
			Up to 120 °C				Normal temperature				
	KKP71	–0.05 MPa to +70 MPa		–0.05 MPa, 70 MPa							
	KKP72	–0.05 MPa to +30 MPa		–0.05 MPa, 32 MPa							
	KKP73	–0.05 MPa to +10.5 MPa		–0.05 MPa, 14 MPa							
	KKP74	–0.05 MPa to +5.25 MPa		–0.05 MPa, 7 MPa							
		–0.05 MPa to +5.1 MPa		–0.05 MPa, 5.1 MPa							
		–0.05 MPa to +3.82 MPa		–0.05 MPa, 3.82 MPa				–0.05 MPa, 4.96 MPa			
KKP75	–0.05 MPa to +1.05 MPa		–0.05 MPa, 1.4 MPa								
KKP76	–0.05 MPa to +0.3 MPa		–0.05 MPa, 0.4 MPa								
Process connection	Screw		Flange connection								
	G 1-1/2 (φ 34 button diaphragm)	2in. (RF) Wafer	Flush diaphragm type (RF)				Extended diaphragm type (RF)				
			80A-JIS10K	80A-JIS30K	3in.-ANSI150	3in.-ANSI300	100A-JIS10K	100A-JIS30K	4in.-ANSI150	4in.-ANSI300	
			KKP71	✓							
			KKP72	✓	✓						
			KKP73		✓						
			KKP74		✓		✓		✓		✓
	KKP75			✓		✓		✓			
KKP76			✓		✓		✓				
Capillary tube length	2, 3, or 5 m										
Sealed liquid	Silicone oil for general use (specific gravity: 0.935 at 25 °C)										
Air supply connection	Rc 1/4 or 1/4NPT female thread										
Supply air pressure	140 ±14 kPa										
Output	20 to 100 kPa (see the model number selection for other outputs)										
External load	I.D. 4 mm × Length 3 m + 20 cm ³ or more										
Air supply capacity	20 L/min (normal) or more at 6.7 kPa										
Air consumption	5 L/min (normal) or less (when balanced at 100 % output)										
Item		Specifications									
	Basic model No.										
Accuracy	KKP71	±1 % FS (span 5 to less than 10 MPa), ±0.5 % FS (span 10 MPa or more)									
	KKP72	±1 % FS (span 1.25 to less than 2.5 MPa), ±0.5 % FS (span 2.5 MPa or more)									
	KKP73	±1 % FS (span 0.35 to less than 0.7 MPa), ±0.5 % FS (span 0.7 MPa or more)									
	KKP74	±1 % FS (span 0.175 to less than 0.35 MPa), ±0.5 % FS (span 0.35 MPa or more)									
	KKP75	±0.1 % FS (span 0.035 to less than 0.07 MPa), ±0.5 % FS (span 0.07 MPa or more)									
	KKP76	±0.1 % FS (span 0.01 to less than 0.02 MPa), ±0.5 % FS (span 0.02 MPa or more)									
Deadband	0.1 % FS										
Operating temperature	Meter body (process fluid): –40 to +120 °C Transmitter (ambient): –30 to +80 °C (see figure 1)										
Operating humidity	10 to 90 % RH										
Structure	Dust-proof and waterproof	Satisfies IEC IP54, NEMA TYPE 3R, JIS F8001 Class 3 splash-proof, JIS C0920 rainproof									

Material	Process connecting flange	SUS304
	Wetted parts	SUS316 ¹ , SUS316L, nickel copper alloy, tantalum
	Transmitter case	Aluminum alloy
Finish	Baked acrylic finish. Color: light beige (Munsell 4Y7.2/1.3)	
Mounting	Direct mounting on the process-side flange* ²	
Flange standard (and year)	JIS: JIS B 2220 (1984) ANSI: ANSI B16.5-88 JPI: JPI-7S-15-93	
Mass	Approx.12.5 kg (for 80A-JIS10K flange model. Add 0.6 kg for model with air set)	

*1. Diaphragm: SUS316L

*2. Mount the main unit of the transmitter on a vertical or horizontal 2-inch pipe using the mounting bracket.

Additional specifications

	Item		Specifications					
	Basic model No.		Span	Suppression (max.)	Elevation, spring A (max.)	High elevation, spring B	Maximum operating pressure	
Suppression and elevation* (Unit: MPa)	KKP71		5 to 70	-0.05	65	-	70	
	KKP72		1.25 to 25		22.5	22.5 to 28.75	30	
	KKP73		0.35 to 7		6	6 to 10.15	10.5	
	2in.-ANSI wafer 80A-JIS30K /100A-JIS30K 3in.-AN-SI300/4in.-AN-SI300	KKP74			0.175 to 3.5	3	3 to 5.075	5.25
							3 to 4.925	4.51 (carbon steel) / 4.12 (SUS304)
							3 to 3.525	3.82
	KKP75		0.035 to 0.686		0.6	0.6 to 1.015	1.05	
KKP76		0.01 to 0.196	0.18	0.18 to 0.29	0.3			
Air set	Primary pressure		200 kPa to 990 MPa					
	Secondary pressure		140 kPa					
	Filter mesh diameter		5 μm					
	Connection		Rc 1/4 or 1/4NPT female thread					

* Elevation + Span ≤ Maximum operating pressure

Optional specifications

Item		Specifications	
For vacuum	Y23	Cannot be combined with Y182 or Y183 (see fig. 3 or figs. 6-11)	
For high temperature	Y62	Operating temperature	Fluid: -10 to +280 °C (up to 180 °C for nickel copper alloy or tantalum) Ambient: -10 to +80 °C
		Sealed liquid	Special silicone oil (specific gravity: 1.07 at 25 °C)
		(See fig. 4 or figs. 6-11)	
For high temperature and vacuum	Y62 + Y23	Cannot be combined with Y182 or Y183 (see fig. 5 or figs. 6-11)	
Corrosion-resistant and silver finish	Y138	Corrosion-resistant (baked acrylic) finish (Y138A)	Resistance against corrosive gases
		Heavy corrosion-resistant (baked epoxy) finish (Y138B)	Resistance against corrosive liquids
		Silver-normal (baked acrylic) finish (Y138C)	Prevention of device temperature rise due to direct sunlight, radiant heat, etc.
		Silver-corrosion-resistant (baked acrylic) finish (Y138D)	Prevention of temperature rise as described above and resistance to corrosive gases
		<i>Note: Silver finish should not be used in alkaline gases.</i>	
For oxygen	Y182	Wetted parts material	SUS316 or SUS316L
		Sealed liquid	Fluorine oil (specific gravity: 1.92 at 25 °C)
		Operating temperature range (fluid and ambient)	-10 to +60 °C
		Wetted parts degreased (see fig. 2 or figs. 6-11)	

Item		Specifications	
For chlorine (applicable for Model KKP74/75/76)	Y183	Wetted parts material	Tantalum
		Sealed liquid	Fluorine oil (specific gravity: 1.92 at 25 °C)
		Operating temperature range (fluid and ambient)	-10 to +80 °C
		Wetted parts degreased (see Fig. 2 or Figs. 6 to 10)	
Output indicator	Y185	With ϕ 100 gauge	
High vibration resistance	Y188	High vibration-resistance model with a dashpot	

Chapter 3. Model Numbers

3-1. Model KKP 11/12/13/14/15/16/17/18

Model Selection Table

		Basic model No.	Optional spec.				Add'l spec.				
Measuring span (MPa)	0-5 to 0-70	KKP11									
	0-1.25 to 0-25	KKP12									
	0-0.35 to 0-7	KKP13									
	0-0.175 to 0-3.5	KKP14									
Measuring span (kPa)	0-35 to 0-686	KKP15									
	0-10 to 0-196	KKP16									
	0-3.4 to 0-66.6	KKP17									
	0-0.7 to 0-13.3	KKP18									
Cover material/element material	SF45A/SUS316L* ¹							1	8		
	SUS316/SUS316* ²							2	2		
	SUS316/SUS316L							2	8		
Air supply connection	Rc 1/4 female thread									A	
	1/4 NPT female thread									B	
Signal air pressure	kgf/cm ² : 0.2 to 1.0 kgf/cm ² * ³										1
	psi: 3 to 15 psi* ³										2
	bar: 0.2 to 1.0 bar* ³										3
	Pa: 20 to 100 kPa										4
	Pa: 19.6 to 98.1 kPa (0.2 to 1.0 kgf/cm ² or equivalent)										8
Additional specifications	None					X					
	Elevation					5					
	Suppression					6					
	Degreasing and moisture removal					A					
	Air-set (KZ03)					7					
	High-grade degreasing and moisture removal					W					
	Air-set (RA1B)					R					

*1. Selectable for model KKP17/18 only

*2. Selectable for model KKP11/12/13/14 only

*3. Non-SI units can only be used overseas.

3-2. Model KKP 25/26/27/28

Model Selection Table

		Basic model No.	Optional spec.				Add'l spec.
Measuring span (kPa)	0-35 to 0-686	KKP25					
	0-10 to 0-196	KKP26					
	0-3.4 to 0-66.6	KKP27					
	0-0.7 to 0-13.3	KKP28					
Cover material/ element material	SF45A/SUS316L		1	8			
	SUS316/SUS316L		2	8			
Air supply con- nection	Rc 1/4 female thread				A		
	1/4 NPT female thread				B		
Signal air pres- sure	kgf/cm ² : 0.2 to 1.0 kgf/cm ² * ¹					1	
	psi: 3 to 15 psi* ¹					2	
	bar: 0.2 to 1.0 bar* ¹					3	
	Pa: 20 to 100 kPa					4	
	Pa: 19.6 to 98.1 kPa (0.2 to 1.0 kgf /cm ² or equivalent)					8	
Additional speci- fications	None						X
	Elevation						5
	Degreasing and moisture removal						A
	Air-set (KZ03)						7
	High-grade degreasing and moisture removal						W
	Air-set (RA1B)						R

*1. Non-SI units can only be used overseas.

3-3. Model KKP 71/72/73/74/75/76

Model selection table

		Basic model No.	Optional spec.										Add'l spec.		
Measurement range (MPa)	0-5 to 0-70	KKP71													
	0-1.25 to 0-25	KKP72													
	0-0.35 to 0-7	KKP73													
	0-0.175 to 0-3.5	KKP74													
	0-0.035 to 0-0.686	KKP75													
	0-0.01 to 0-0.196	KKP76													
Cover material/element material	SUS316/SUS316 ^{*2}		2	2											
	SUS304/SUS316 ^{*1 *3 *4}		7	2											
	SUS304/Nickel copper alloy		7	3											
	SUS304/tantalum ^{*3}		7	4											
	SUS304/SUS316L ^{*1 *3 *4}		7	8											
	SUS316L/SUS316L ^{*2}		8	8											
Process connection	Flush diaphragm type, 80A JIS10K (RF)		0	1											
	Flush diaphragm type, 80A JIS30K (RF)		0	2											
	Flush diaphragm type, 3in. ANSI150 (RF)		0	3											
	Flush diaphragm type, 3in. ANSI300 (RF)		0	4											
	Extended diaphragm type, 100A JIS10K (RF)		0	5											
	Extended diaphragm type, 100A JIS30K (RF)		0	6											
	Extended diaphragm type, 4in. ANSI150 (RF)		0	7											
	Extended diaphragm type, 4in. ANSI300 (RF)		0	8											
	Wafer type, 2in. ANSI (RF)		0	9											
	G 11/2 button diaphragm screw		1	1											
Capillary length	2 m		0	2											
	3 m		0	3											
	5 m		0	5											
Flange extension length	None (flush diaphragm type flange)		0	0											
	100 mm		1	0											
	150 mm		1	5											
Air supply connection	Rc 1/4												A		
	1/4NPT female thread												B		
Signal air pressure	kgf/cm ² : 0.2 to 1.0 kgf/cm ² ^{*5}													1	
	psi: 3 to 15 psi ^{*5}													2	
	bar: 0.2 to 1.0 bar ^{*5}													3	
	Pa: 20 to 100 kPa													4	
	Pa: 19.6 to 98.1 kPa (0.2 to 1.0 kgf/cm ² or equivalent)													8	
Additional specifications	None													X	
	Elevation													5	
	Suppression													6	
	With an air set (KZ03)													7	
	Air-set (RA1B)													R	

*1. Selectable for button diaphragm screw connection.

*2. Selectable for wafer flange connection.

*3. Selectable for flush diaphragm flange connection.

*4. Selectable for extended diaphragm flange connection.

*5 Non-SI units can only be used outside of Japan.

Chapter 4. Structure & Mechanism

4-1. Transmitting Section

In the transmitting section, the housing itself, the base plate and each component mounted on the base plate form the air circuit. No pipes or tubes are used.

(1) Nozzle and flapper

The nozzle is attached in the side of the base plate and the flapper is attached on the tip of the beam.

(2) Pilot relay

The pilot relay, which amplifies the nozzle's back-pressure, is assembled in the manifold that is integrated with the enclosure.

(3) Feedback mechanism

The feedback mechanism comprises a feedback bellows--that generates force by responding to the output of the pilot relay--a floating fulcrum and a span arm clamp. The flapper-attached beam is also included in this category.

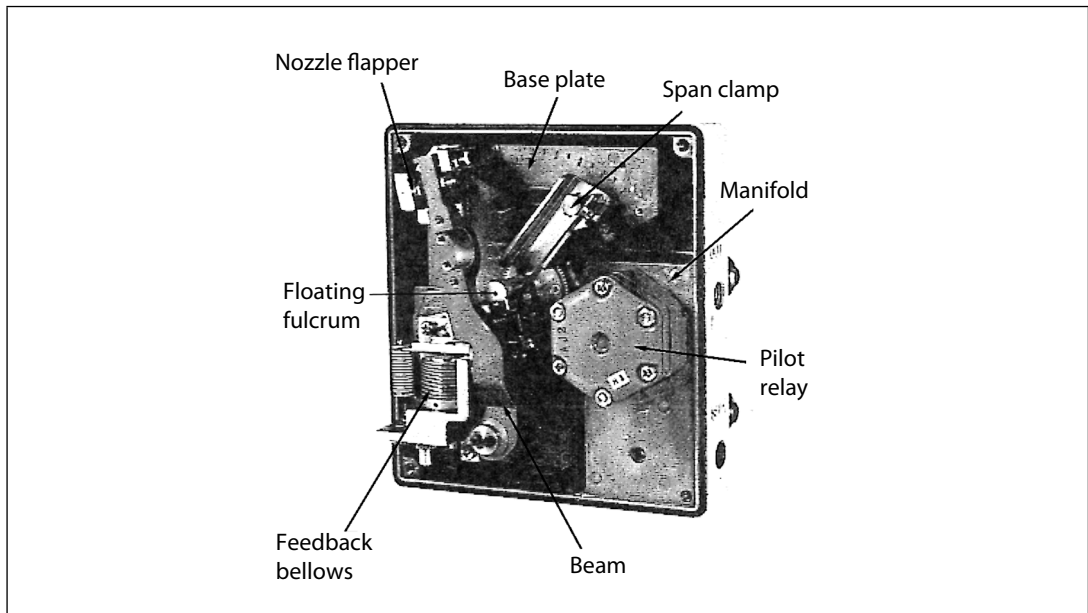
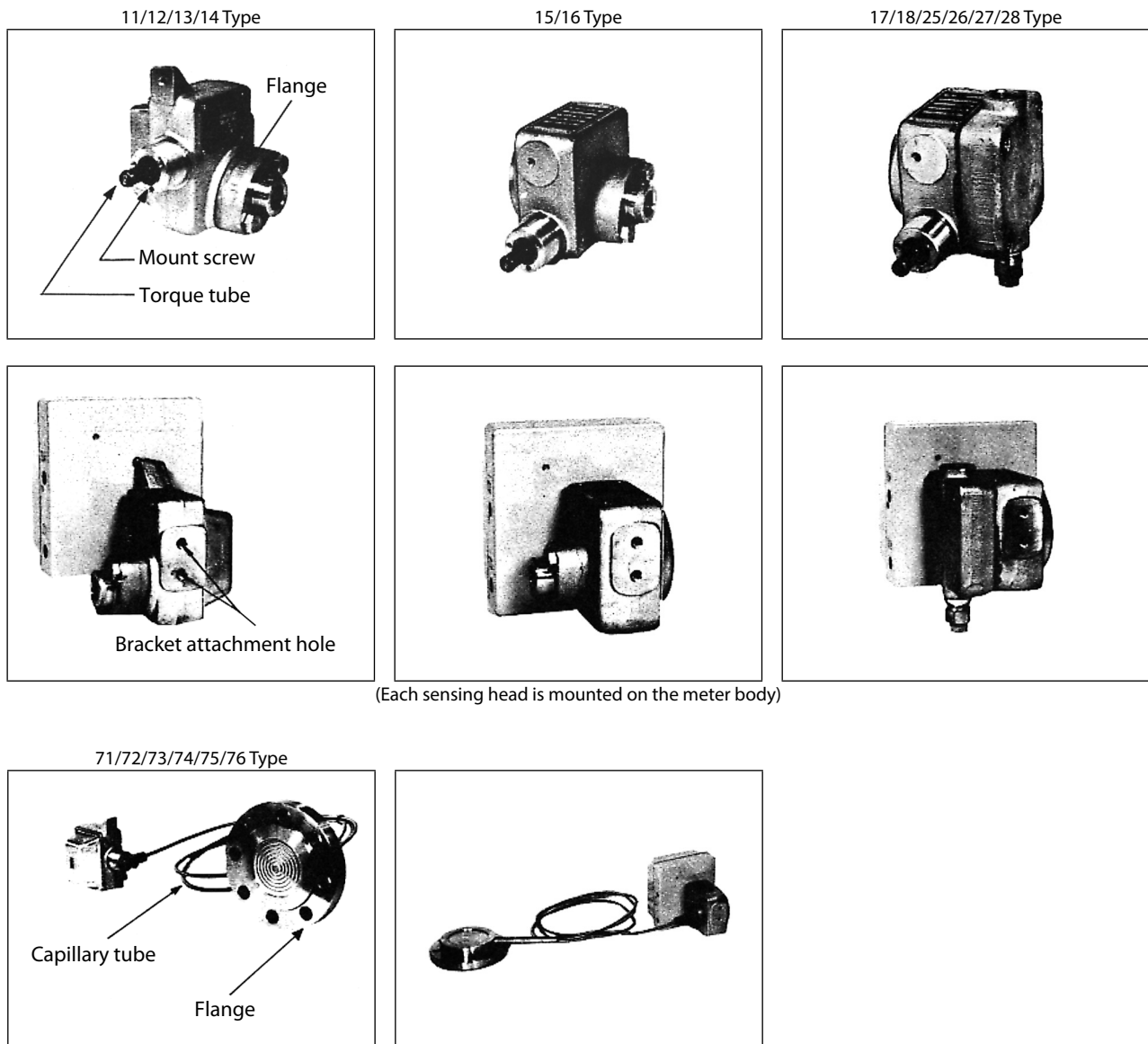


Fig. 4-1.

4-2. Sensing Head (Meter Body)

The following photograph shows various types of sensing head and meter body. The bracket and meter attachment shown are the most common types of design.



(Each sensing head is mounted on the meter body)

(Sensing heads are connected to the meter body)

Fig. 4-2. Various Sensing Heads

The pressure sensing element is SUS316 Bourdon tube (Fig. 4) for high- and mid-pressure use, and SUS316 bellows (Fig. 5 and Fig. 6) for low pressure use. The process pressure is induced through the flange, which is applied to the sensing element. A deformation proportional to the pressure is transferred to torque tube via the strap.

Then, the torque proportional to the pressure is transferred from the torque tube to the input beam in the transmitting section.

All sections that come in contact with the process are welded.

The absolute pressure gauge is built in the same structure as the low pressure gauge except that the atmospheric pressure section is changed in a vacuum chamber.

Flange type & Remote seal diaphragm type

The center body structure of the meter body is basically identical to that of the standard induced pressure connection type, to which a flange and capillary are attached.

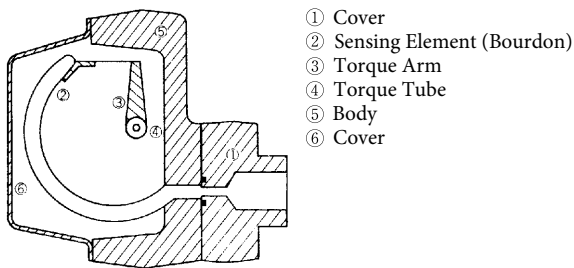


Fig. 4-2-1 11/12/13/14 type meter body functional diaphragm (Bourdon tube element)

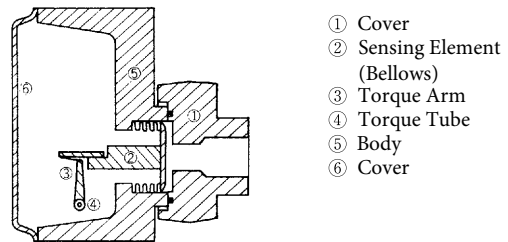


Fig. 4-2-2 15/16 type meter body functional diaphragm (Bellows element)

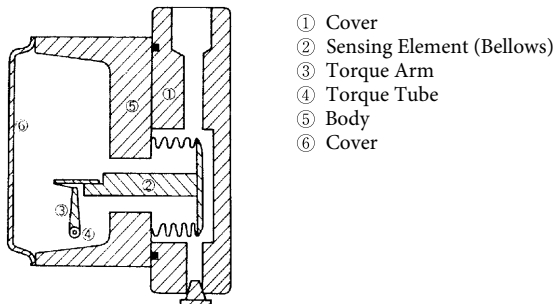


Fig. 4-2-3 17/18 type meter body functional diaphragm (Bellows element)

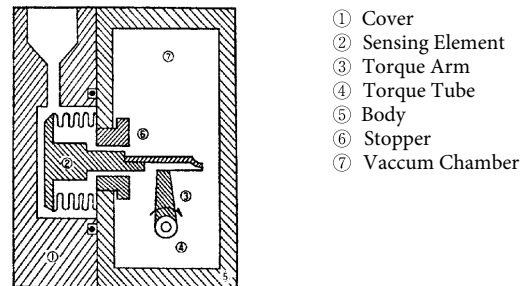


Fig. 4-2-4 25/26/27/28 type meter body functional diaphragm

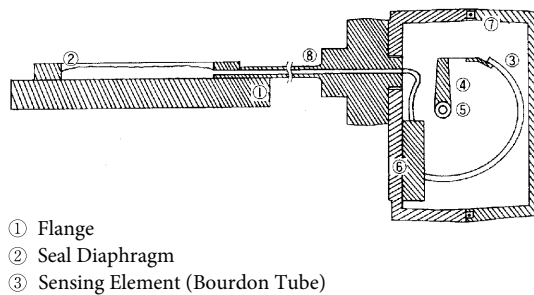


Fig. 4-2-5 71/72/73/74 type meter body functional diaphragm (Bourdon tube element)

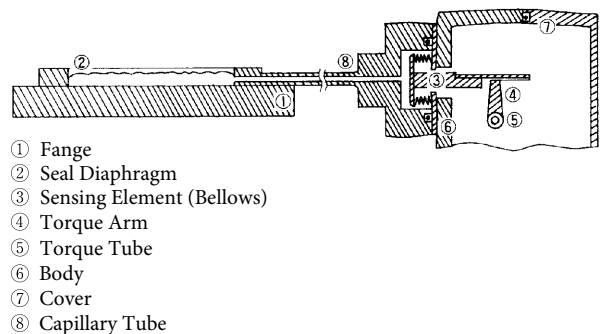


Fig. 4-2-6 75/76 type meter body functional diaphragm (Bellows element)

Chapter 5. Principle

The input to the transmitter is transferred to the beam as torque via the torque tube, which varies the clearance between the nozzle and flapper.

The back pressure of the nozzle varies in proportion to the movement of the flapper. Then, the pilot relay boosts the pneumatic pressure/air volume, which is developed as the output pneumatic pressure.

The output pneumatic pressure is converted to a force by the feedback bellows. The vector component (F1) of the force as shown in Fig. 5-1. is transferred to the beam via the strap, which forms as a feedback loop. Therefore, the output is settled in a value proportional to the input. The exertion of the spring force to the beam produces the elevation/suppression.

Also, the directional variation of the vector F3 can vary the component of the vector F1 to vary the feedback gain, and adjust the span.

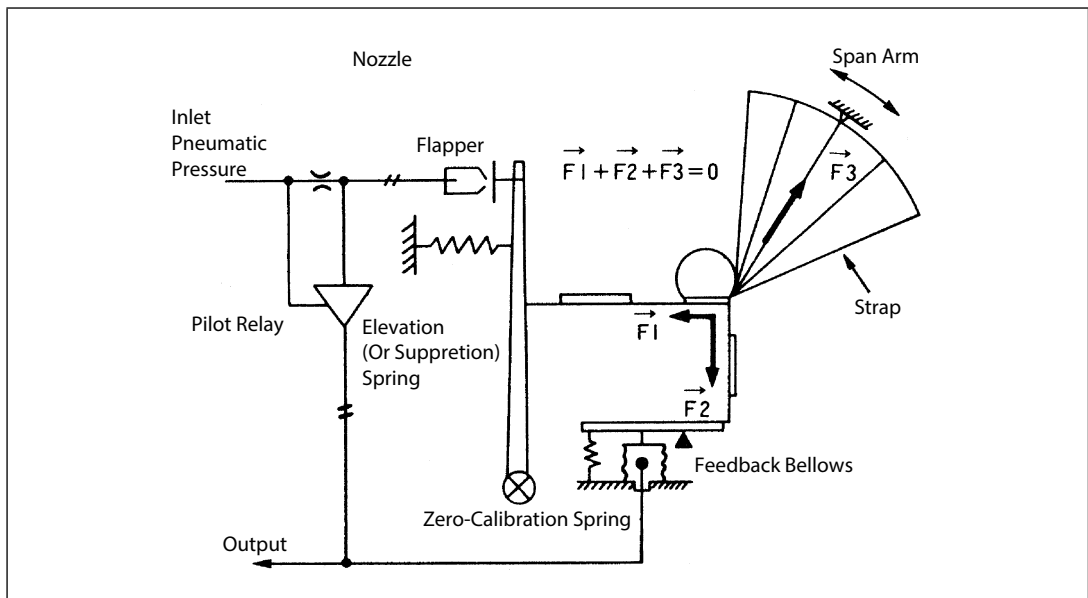


Fig. 5-1.

Chapter 6. Installation

6-1. Installation location

The installation location should be selected in consideration of the following items pertaining to maintenance, parts replacement, servicing and safety:

- a) The ambient temperature is -30 to +80 deg C and temperature variation is low as possible. Especially, avoid locations subject to high levels of radiant heat, as this may cause the instrument to overheat.
For the measurement of water, apply some heat insulation to prevent freezing and breakage.
- b) Minimal damp and vibration
- c) Provide a space for adjustment and changing the measurement range.

6-2. How to install the transmitter

Mounting the transmitter

With a bracket, mount the transmitter on a 50 A vertical or horizontal pipe and fix it with U-bolts. Tightly fix the pipe to the base avoiding any slackness or loose fitting.

When installing a remote seal diaphragm type transmitter, ensure that the capillary tube is not folded or twisted and the diaphragm surface cannot be scratched.

6-3. Fixtures Bracket

The bracket (Fig. 6-1.) is attached to the transmitter as standard.

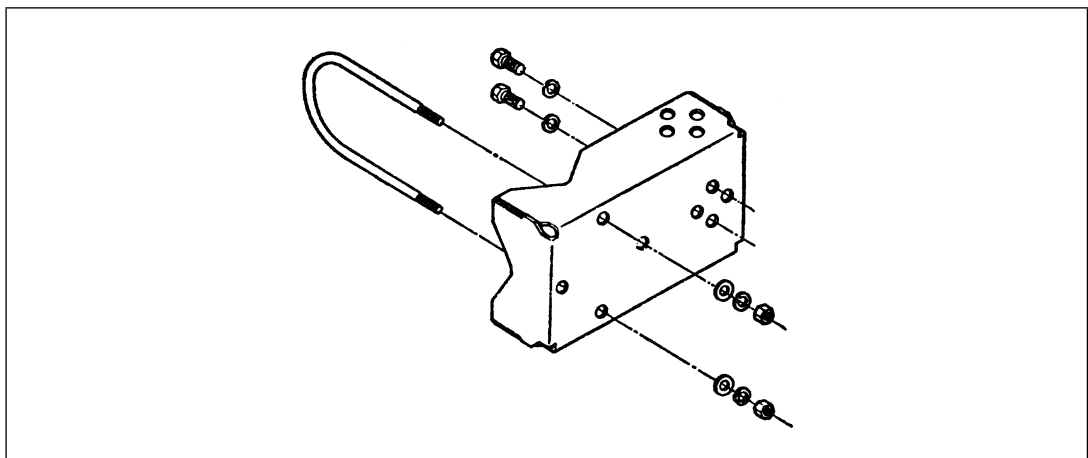


Fig. 6-1. Bracket

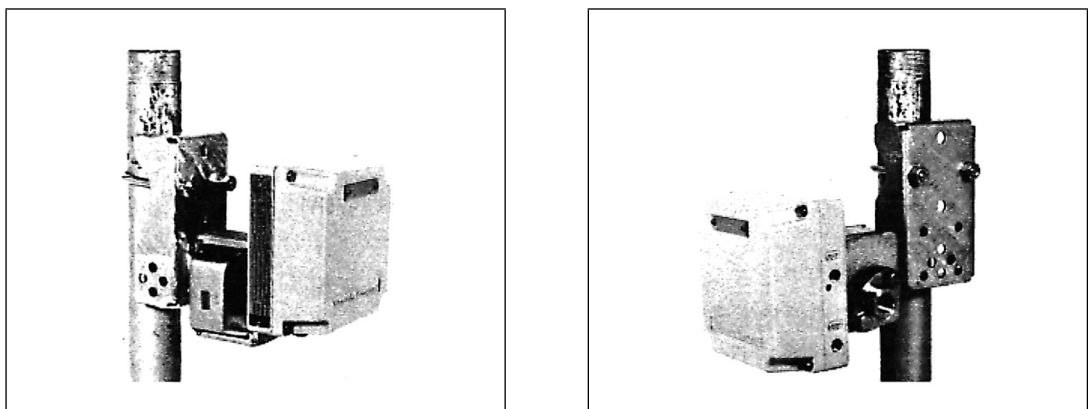


Fig. 6-2. Mounting examples

6-4. Remote seal diaphragm type transmitter

Mount the transmitter on the pipe as described in para.

6-2.

The mounting procedure for the transmitter on the process flange is as follows:

- 1) Mount the transmitter flange on the process flange, inserting a gasket and fixing bolt.
To prevent leakage, tighten all bolts equally. Fix the caterpillar tube with a proper rigid support having a low temperature coefficient. The installation height of the transmitter should be lower than that of the flange.
- 2) After installation, the zero-calibration point may be deviated by the enclosed pressure due to the height differential between the center of the flange and transmitter center. Calibrate the zero by elevation and suppression.
- 3) When installing the button diaphragm, refer to the drawing for the external dimensions.
To remove a diaphragm that has been set, fit the special (optional) collar into the groove at the back of the element (on the capillary tube side), loosen the screw, and retighten it to remove the diaphragm.

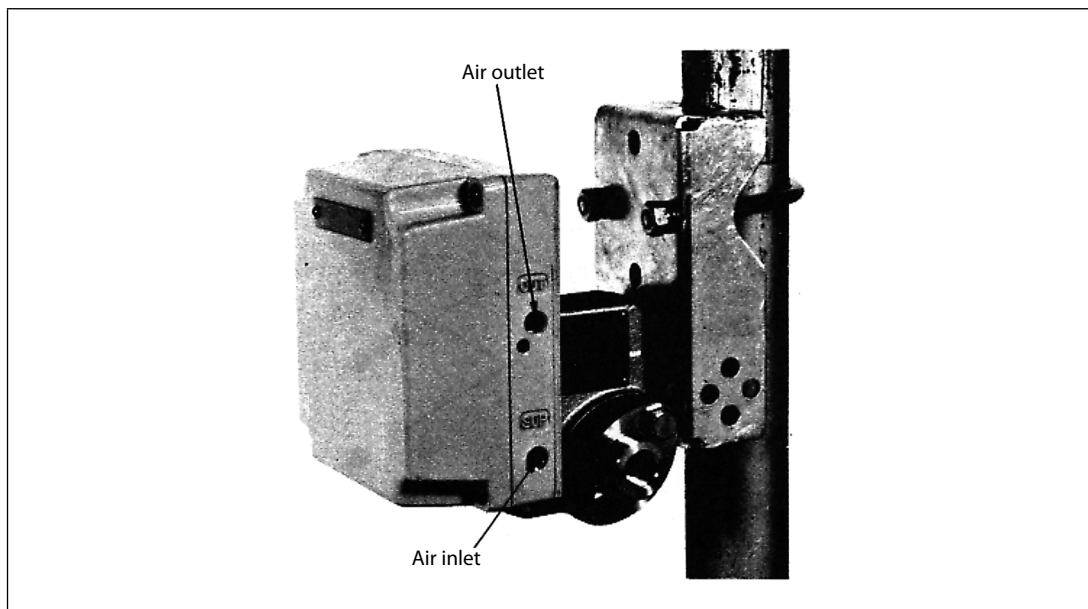


Fig. 6-3.

6-5. Pneumatic piping

If your model has no airset (an assembly of regulator and filter) assembled, connect the air supply to the inlet port marked "SUP" (female-thread) on the right side of the meter. "OUT" port is the outlet.

If your model has an airset (an assembly of regulator and filter) assembled, connect the air supply to the air inlet port on the side of the airset. Remove the red vinyl protection cap from each port.

6-6. Piping and installation for the process

- a) Piping to the measurement object depends on the installation position and the status of the piping line.
- b) A typical piping example is shown in Fig. 6-4. The procedure is as follows:
 - 1) Apply the T-type joint to the pressurized pipe line.
 - 2) Provide a stop valve between the inlet of the pressurized pipe line and the T-type joint.
 - 3) Provide a slope so that the drainage flows into the pressurized line if the process piping is horizontal.

Note: For high pressure, consider the type of joints, pipe size and material.

- 4) Determine the schedule number and nominal thickness of the lead tube from the process line based on the pressure and other process conditions. For instance, a 1/2B schedule 80 copper tube is generally used for the object measurement fluid, water or steam.

6-7. Auxiliary units

- a) Oil-seal and air-purge

Apply an oil-seal or air-purge if the direct introduction of the pressure medium (suspension, highly-viscous or corrosive fluid) may damage the pressure sensing element.

- b) Preventing pulsation

Install a throttle valve in the lead tube to suppress pulsation if excessive pulsation or pressure variation may occur in the process.

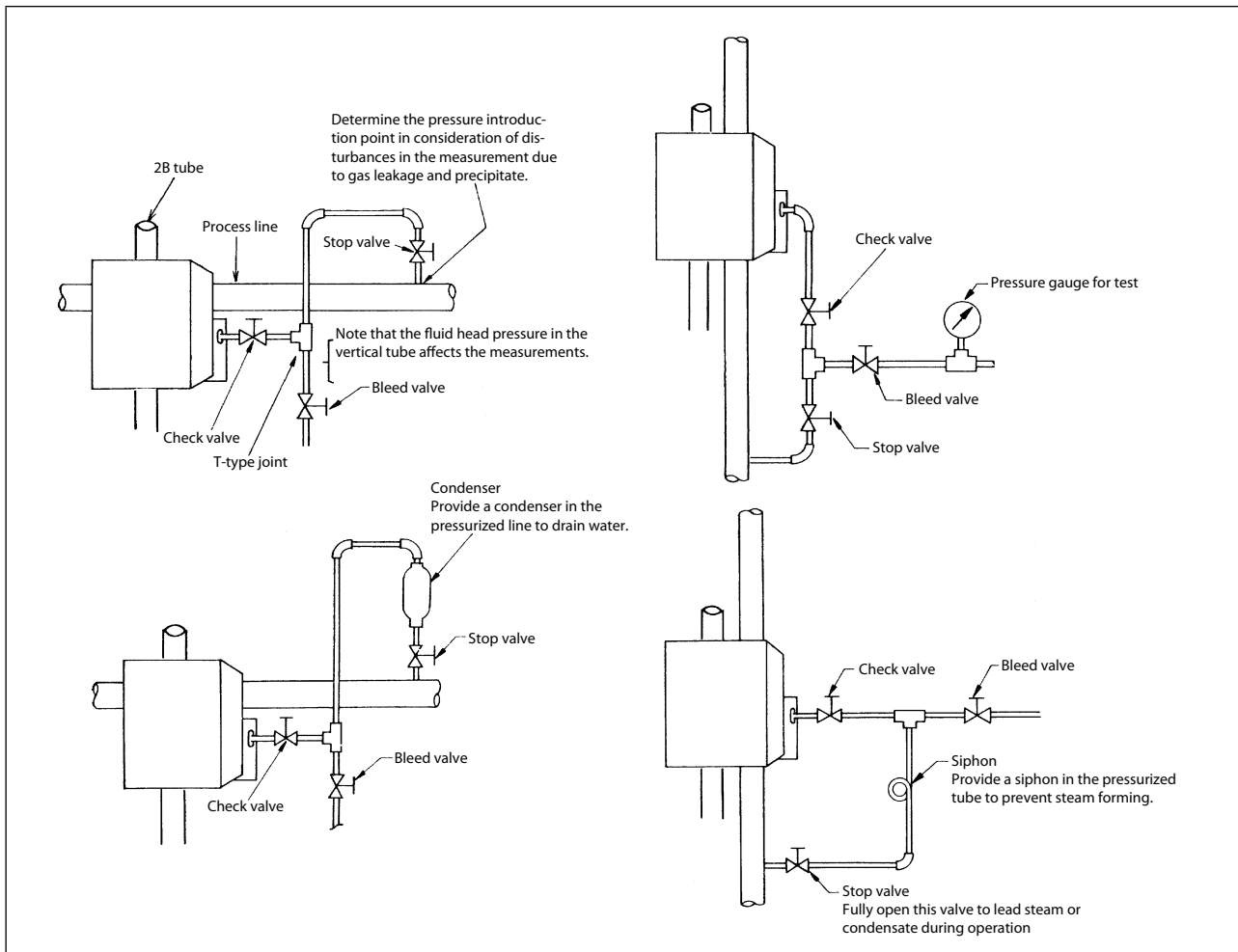


Fig. 6-4. Typical piping systems

6-8. Elevation & Suppression

The elevation and suppression are defined as follows

a) Elevation

The elevation is short for Elevated Zero Range; the lower limit of the input range larger than zero, for instance, 20 to 100 {0.2 to 1.0}.

The suppression is short for Suppressed Zero Range; the lower limit of the input range less than zero, for instance, -20 to 0.

b) How to adjust the suppression or elevation For details about the adjustment of the suppression and elevation, refer to Chapter 9. Calibration and Adjustment.

Generally, the elevation should be obtained by multiplying the positional difference between the center of the diaphragm and center of the transmitter by the input fluid density (specific gravity) when the head pressure of the enclosed fluid is calculated.

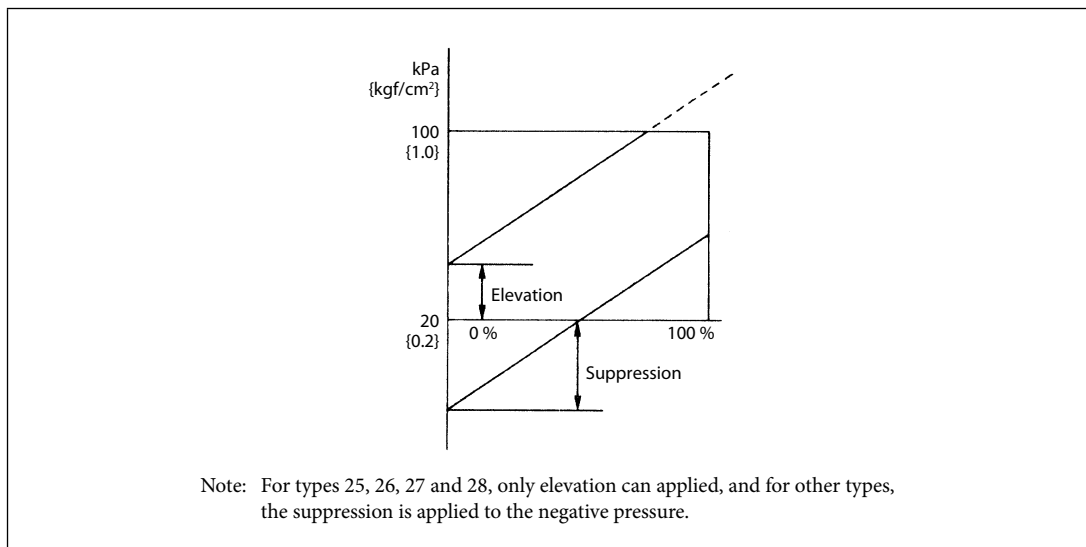


Fig. 6-5.

Chapter 7. Operation

The transmitter comes into operation when the sensing head is assembled with the transmitter.

The transmitter starts to operate when the pneumatic pressure is supplied and process input signal is entered. It is recommended that the zero calibration and operation check are performed before the run.

1) Liquid and gas (excluding negative pressure process)

Close the check valve, open the bleed valve and stop valve to remove foreign matter in the pressurized piping. Then, close the bleed valve, allow the leading tube to cool (if the process temperature is high) and open the check valve to lead the fluid into the sensing head (meter body). Do not operate the bleeding under negative process pressure.

2) Steam

This procedure is basically identical to that of item

1) However, remove foreign matter and close the bleed valve before condensing the steam to fill the lead tube and siphon and open the check valve.

3) Compensation against the installation height of the meter

Compensation must be performed against the head pressure for the installation height of the transmitter when the measurement object is liquid, or when condensate steam is left in the leading tube (low pressure measurement range). The above compensation is also required for the remote seal diaphragm type transmitter.

In this case, compensate the zero point of the transmitter by the product of the height difference between the pressure outlet and the process inlet port, and the specific gravity of the liquid. --- elevation

4) Checking the zero point

Check the zero point under the measurement condition in which the instrument has been set up. Calibrate the zero if deviated.

Chapter 8. Maintenance

8-1. Daily check

- a) Check leaks along the piping.
Tighten the joint if loose.
- b) Blowing and cleaning the transmitter and piping
Piping and sensing head must always be kept clean.
If precipitate or foreign matter deposits on the sensing head, measurement errors may occur. Blow out using the following procedure and referring to the piping example in para. 6-6. Piping and installation for the process:
 - 1) Open the stop valve.
 - 2) Quickly open the bleed valve when the check valve is open.
 - 3) Close the bleed valve and open the stop valve.
For the negative pressure process, blow out only under positive pressure in the process.
For the remote seal diaphragm type transmitter, no blowing is required.
- c) Note on the cooling condition
Drain the measurement liquid from the sensing head of the transmitter with the bleed valve when the measurement of water or other liquid having cooled and when the measurement is stopped.

8-2. Servicing and replacing units

Only the pilot relay requires servicing. Operate the following service if the pilot fails, and replace the pilot relay if necessary.

If the sensing head must be replaced due to specification or application changes, or due to failure, please place an order on Azbil Corporation for a replacement.

- a) Replacing the pilot relay
Loosen 3 assembling screws to remove the pilot relay shown in Fig. 8-2. If the gasket has deteriorated or is damaged, also replace the gasket. To assemble, fit the gasket in place and fit the guide pin into the guide hole at the bottom of the pilot relay.
Then, put the assembly on the manifold and tighten it with even torque.
- b) Servicing the pilot relay
Remove the pilot relay with the procedure in the Item a) and assemble again after servicing.
 - 1) Remove 3 assembling screws and nuts.
 - 2) Remove parts in this order. The part need not be removed unless it requires replacement.
 - 3) Clean the metallic part with an appropriate solvent such as petroleum, naphtha or chlorocene. When cleaning, push the valve stem in the direction to depress the conical spring, so that the solvent can soak through the surface on which the port of the valve stem contacts.
 - 4) Check the exhaust ring and valve stem for dirt.
Clean the ring and valve stem with a cloth soaked in solvent.
 - 5) Completely dry all of the part in clean compressed air.
 - 6) Check the diaphragm and. Replace if worn or damaged.
 - 7) When assembling the pilot relay, collect up all the parts in order of assembly and evenly tighten the screws and nuts.

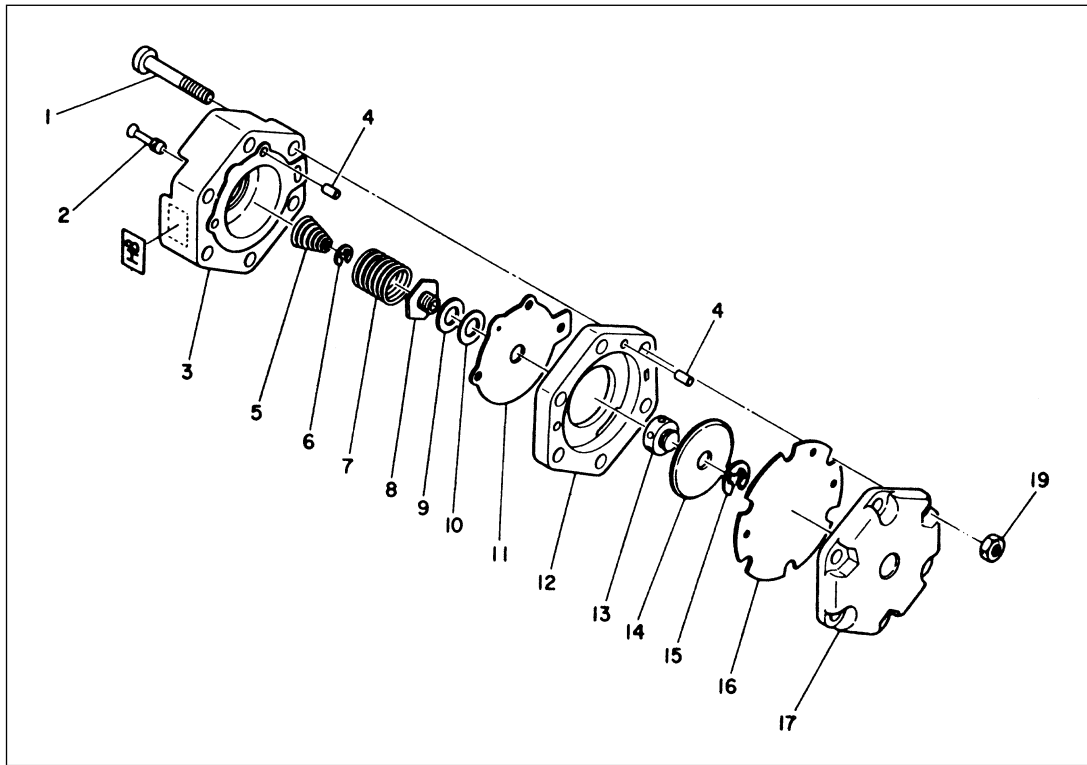


Fig. 8-1. Disassembling the pilot relay

No.	Part Name	Quantity
1	Assembling screw	3
2	Valve stem	1
3	Housing	1
4	Guide pi	6
5	Conical spring	1
6	Pin washer	1
7	Spring	1
8	Nozzle	1
9	Washer	1
10	Seal	1
11	Diaphragm(lower)	1
12	Exhaust ring(outer)	1
13	Exhaust ring(inner)	1
14	Disk	1
15	Pin washer	1
16	Diaphragm(upper)	1
17	Cover	1
18	Nut	1

Chapter 9. Calibration and Adjustment

9-1. Overview

The sensing head (meter body) transfers the torque tube torque proportional to the detection signal to the transmitting mechanism in the transmitter. Accordingly, adjust the transmitter so that it can linearly develop a signal of 20 to 100 kPa {0.2 to 1.0 kgf/cm²} in the measurement range 0 % to 100 % regardless of the sensing head installed.

For the elevation and suppression incorporated transmitter, remove the spring assembly and set the measurement range without the elevation and suppression, that is, no zero point shift.

Calibrate the zero point before checking the operation of the transmitter. When the sensing head is replaced or the measurement range is changed, adjust the transmitter by connecting a 0 to 150 kPa {0 to 1.5 kgf/cm²} range precision pressure meter to the outlet port.

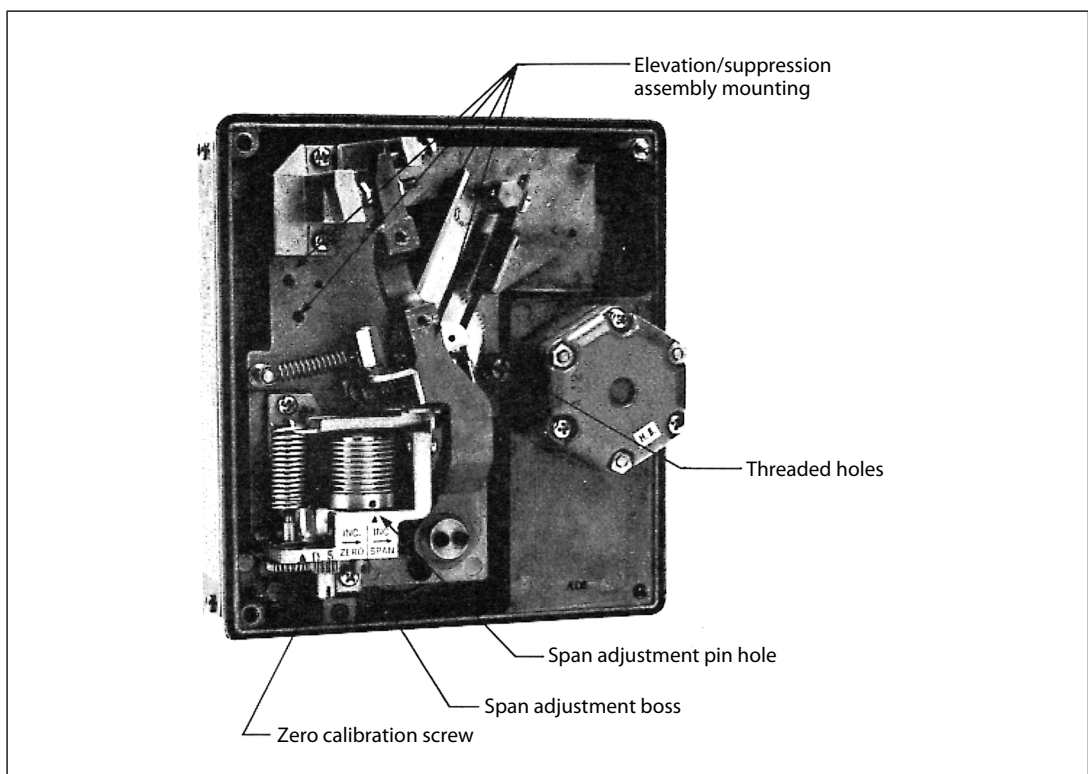


Fig. 9-1.

9-2. Measuring the gauge pressure

- 1) Connect a variable pressure generator (a pneumatic pressure source with regulator) to the input port of the sensing head, and also connect a precision pressure reading unit (a piping adapter is required for the flange type unit).
- 2) Operate the pressure generator to apply a pressure equivalent to 100% of the specified pressure to the high-pressure side of the sensing head.
- 3) If the output largely deviates from the above specified pressure (100 kPa {1.0 kgf/cm²}), adjust the output to the full specified pressure by turning the adjusting boss with a screwdriver.
(Adjusting the span)
Clockwise turn --> narrow the span --> increase pressure
Counterclockwise turn --> extend the span --> decrease pressure
- 4) Open the inlet port to atmosphere.
- 5) If the output is deviated from 0 % (20 kPa {0.2 kgf/cm²}) adjust the output to 0 % by turning the zero adjust screw.
Clockwise --> increase pressure
Counterclockwise --> decrease pressure
- 6) Apply a pressure equivalent to 100 % pressure input to the input port.
- 7) If the pressure deviates from 100 % pressure, turn the adjusting boss under the feedback bellows to set the pressure as follows:
If the output is over 100 %, set the pressure lower than 100 % by 1/4 of the deviation (e.g., when the output level is 104 %, the objective adjustment level is $100 - 1/4 \times 4 = 99$ %.)
If the output is less than 100 %, set the pressure higher than 100 % by 1/4 of the deviation (e.g., when the output level is 98 %, the objective adjustment level is $100 + 1/4 \times 2 = 100.5$ %.)
Instead of the span adjusting boss, the output pressure can be adjusted by turning the feedback bellows with the pin.
Turn rightward --> extend span --> increase pressure
Turn leftward --> narrow span --> decrease pressure
- 8) Repeat the operation from the item 4) to 7) until the accuracy is satisfied.

9-3. Measuring absolute pressure

For the full negative pressure measurement range only or a negative pressure range significantly occupied on a compound pressure meter, apply an oil-sealed rotary vacuum pump and/or precision needle valve to the variable pressure generator in item 1) of para. 9-2 and adjust the pressure with the procedure in item 2) and following.

A negative pressure digital manometer or negative pressure mercury bulb can be used as the pressure measurement.

For the positive pressure range significantly occupied on a compound pressure meter, the atmospheric pressure is processed as an input component converted to a percentage and the compound meter can be calibrated and adjusted.

9-4. Setting the elevation and suppression

Provide the zero shift that is first removed as described in para. 9-1 according to the actually required value.

Then, apply the 100 % input according to the procedure of the calibration and adjustment. If a deviation is found, finely adjust the span again.

In this case, the set level of zero point and 100 % point shall include a consideration of the shift.

a) How to provide the elevation

After completing the adjustment without elevation, mount the elevation spring assembly on the input beam.

Provide the input equivalent to the necessary zero-shifting deviation and set the output in 20 kPa {0.2 kgf/cm²} by turning the spring screw with a wrench.

Counterclockwise turn of screw --> increase the elevation

b) How to provide suppression

Provide suppression according to the procedure identical to that for the elevation.

Clockwise turn screw --> increase the suppression

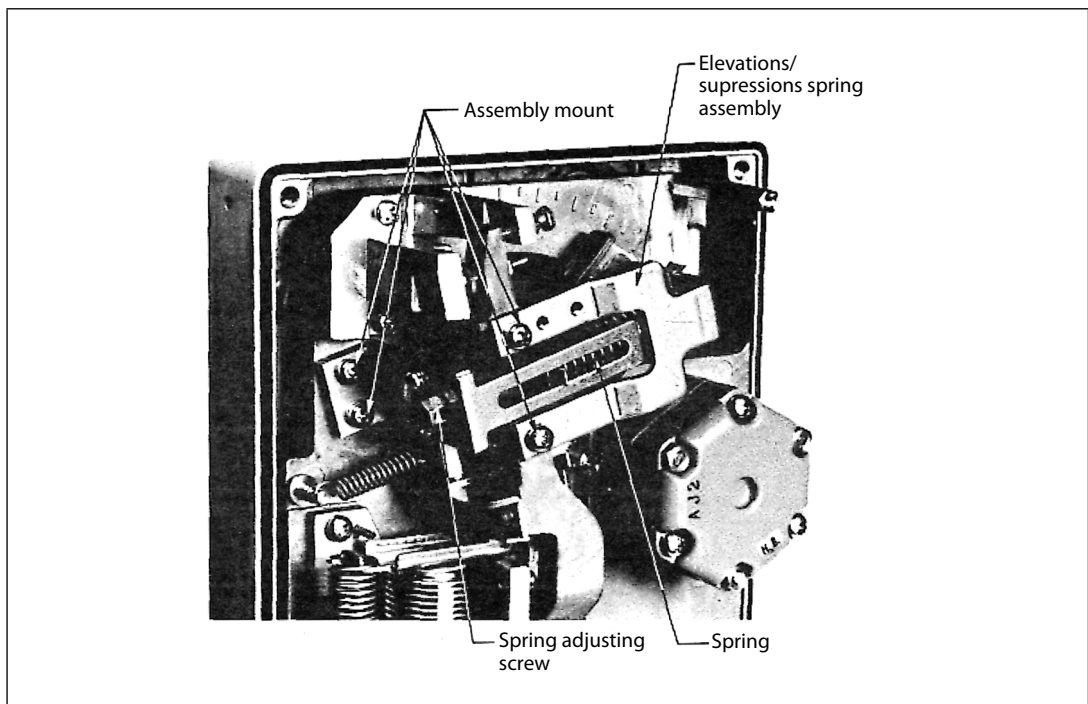


Fig. 9-2.

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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