SMC

Document No. : IP50-OM00003-A

Title OPERATION MANUAL

PNEUMATIC-PNEUMATIC POSITIONER

IP5000

IP5100

SMC CORPORATION

INDEX

Introduction

Pneumatic-Pneumatic positioner series IP5000 is to be mounted to pneumatic operated actuator.

Pneumatic pilot valve is operated by the signal pressure from adjustment device and accurately control the motion of actuator.

Safety Instructions

Be sure to read this operation manual before handling, and understand the contents to operate the product properly.

Keep this operation manual carefully to be able to refer to it whenever it is required, and ensure to give it to an end user.

These safety instructions are intended to prevent hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labeling "Caution", "Warning" or "Damage". To ensure safety, be sure to observe ISO4414 (Note 1), JIS B 8370 (Note 2) and other safety practices.

Caution : Operator error could result in injury or equipment damage.

Warning : Operator error could result in serious injury or loss of life.

Danger : In extreme conditions, there is a possibility of serious injury or loss of life.

(Note 1) ISO 4414 Pneumatic fluid power-Recommendations for the application of equipment to transmission and control system.

(Note 2) JIS B 8370 Pneumatic system axiom

Warning

1. **The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**
   Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications provided by a person in charge of design and specification after analyzing and/or testing to meet your specific requirements. A guarantee of the expected performance and safety is in charge of a person who decides the compatibility for the system. System should be constructed by reviewing all specifications and considering possible failure of machinery according to the latest catalog and material.

2. **Only trained personal should operate pneumatically operated machinery and equipment.**
   Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. **Do not service machinery / equipment or attempt to remove component until safety is confirmed.**
   A. Inspection and maintenance of machinery / equipment should only be performed after confirmation of safe locked-out control positions.

   B. When equipment is removed, confirm the safety process as mentioned above. Cut supply pressure for the equipment, turn off the power, and exhaust all residual compressed air in the system.

   C. Before machinery / equipment is restarted, take care safety of surroundings.

4. **Contact SMC if the product is to be used in any of the following conditions or environments.**
   A. Conditions and environments beyond the given specifications, or if product is used outdoors.

   B. Installation on equipment in conjunction with atomic energy, railway, aviation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.

   C. An application which has the possibility of having negative effects on people or properties, requiring special safety.

1. Specifications

Table 1 Specifications

Item \ Type	IP5000		IP5100	
	Lever type lever		Rotary type cam	
	Single action	Double action	Single action	Double action
Supply pressure	0.14～0.7MPa			
Input pressure	0.02～0.1MPa			
Standard stroke	10～85mm		60°～100°	
Sensitivity	Within 0.1%F.S.	Within 0.5%F.S.		
Linearity	Within ±1%F.S.	Within ±2%F.S.		
Hysteresis	Within 0.75%F.S.	Within 1%F.S.		
Repeatability	Within ±0.5%F.S.			
Output flow rate Note1	80ℓ/min (ANR) or more (SUP.=0.14MPa)			
	200ℓ/min(ANR) or more (SUP.=0.4MPa)			
Air consumption Note2	Within 5ℓ/min (ANR) (SUP.=0.14MPa)			
	Within 11ℓ/min (ANR) (SUP.=0.4MPa)			
Ambient and using fluid Temperature	-20℃～80℃ (Standard)			
Thermal coefficient	Within 0.1%F.S./℃			
Air connection port	Rc1/4 (Standard)			
Material	Aluminum diecast, Stainless steel, Brass, Nitrile rubber			
Mass	Approx. 1.4kg		Approx. 1.2kg	
Size	118×102×86(Body)		118×92×77.5(Body)	

Note1 : Refer to Fig. 1 for details of the output flow rate.

Note2 : Refer to Fig. 2 for details of the air consumption.

＊ Standard air temperature : 20° , Absolute pressure : 101.3KPa
Relative humidity : 65%

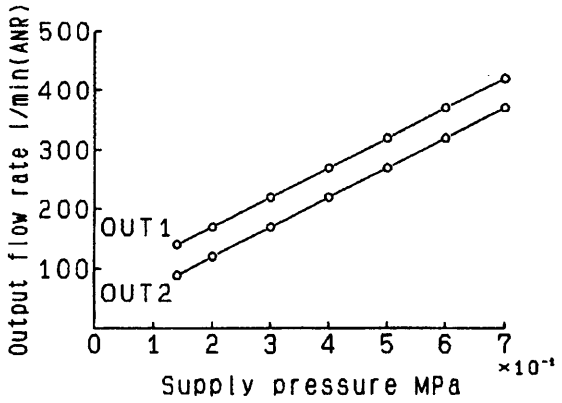


Fig.1 Output flow rate characteristic

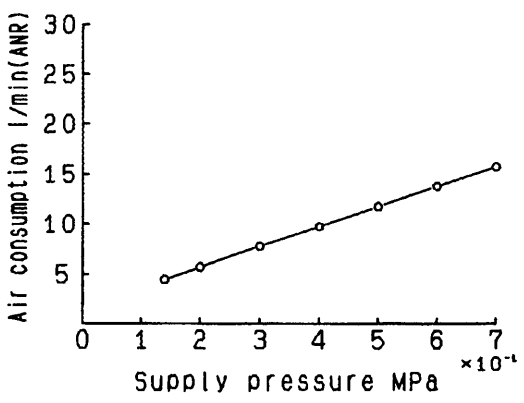


Fig.2 Air consumption characteristic

2. Operation Principle

2-1 Type IP5000

When the input pressure to SIG port of a positioner increase, bellows push balance-lever to the left. Since this movement moves flapper to tha left via joint spring, there appear a gap between nozzle and flapper and nozzle back pressure of pilot valve drops.Consequently, the pressure balance of constant pressure chamber is destroyed and exhaust valve push supply valve B to the right, and then the supply valve B is opened. As a result of this function, the output pressure of OUT1 increase and then diaphragm moves downwards.

The motion of diaphragm make feedback arm wave to the right via feedback lever, transmission lever and roller. Because of this wave, the tension of feedback spring increase and work on balance lever.

Since diaphragm keeps moving untill the tension of feedback spring and bellows become equal, it is constantly adjusted at the place where is proportioned to the input pressure.

When a signal air pressure decrease, the movement goes contrariwise.

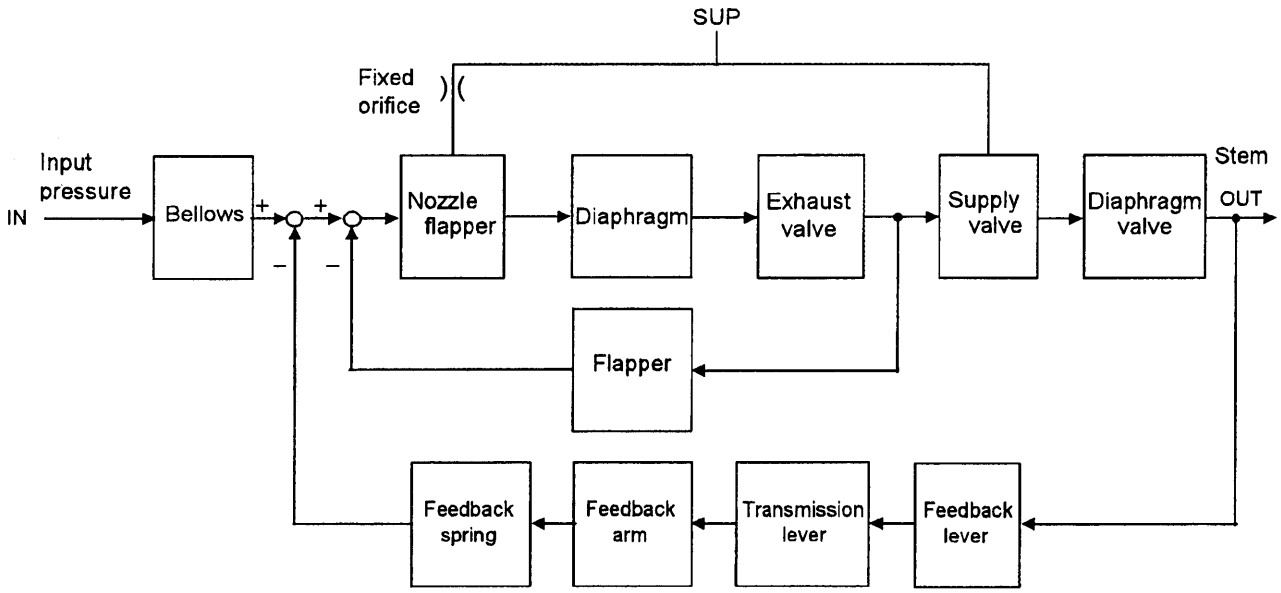
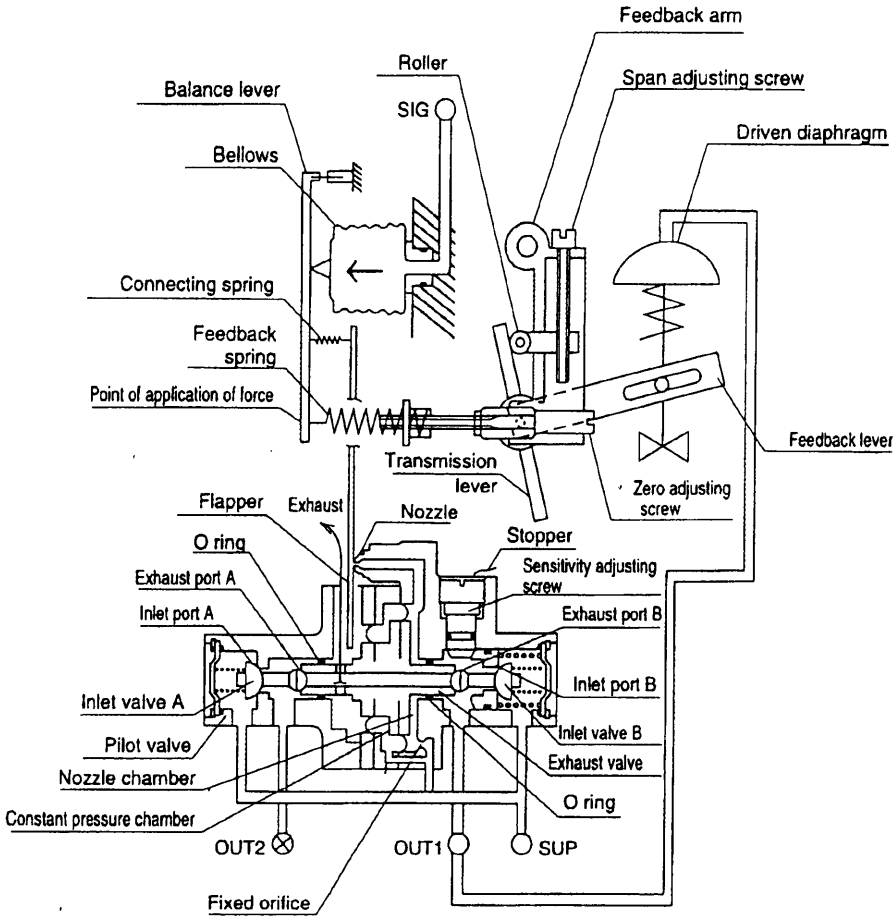


Fig. 3 Block diagram of Type IP5000



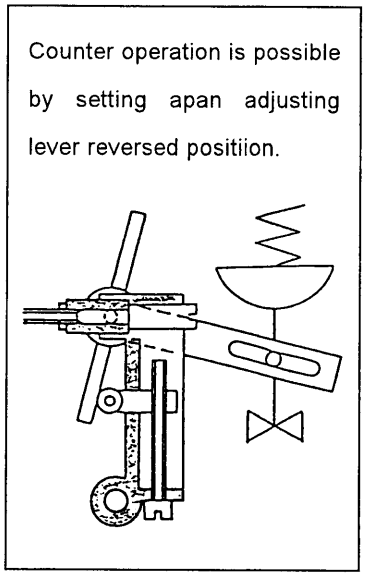


Fig.4 Drawing for IP5000 operation principle

2-2 Type IP5100

When the input pressure to SIG port of a positioner increases, bellows push balance-lever to the left. Since this movement makes flapper move to the left via joint spring, there appear a gap between nozzle and flapper and nozzle back pressure of pilot valve drops.

Consequently, the pressure balance of constant pressure chamber is destroyed and an exhaust valve push supply valve B to the right, and then the supply valve B is opened. As a result of this function, the output pressure of OUT1 increase while the output pressure of OUT2 decreases by the fact that rightward movement of exhaust valve opens exhaust port A. Therefore, there occurs a difference between the pressure of pressure chamber 1 and pressure chamber 2 of vibrating actuator. This movement makes the actuator go round to the direction of the arrow in the drawing.

The motion of the main axis of actuator makes feedback arm wave to the right via feedback shaft, cam and bearing. Because of this wave, the tension of feedback spring increase and work on a balance lever.

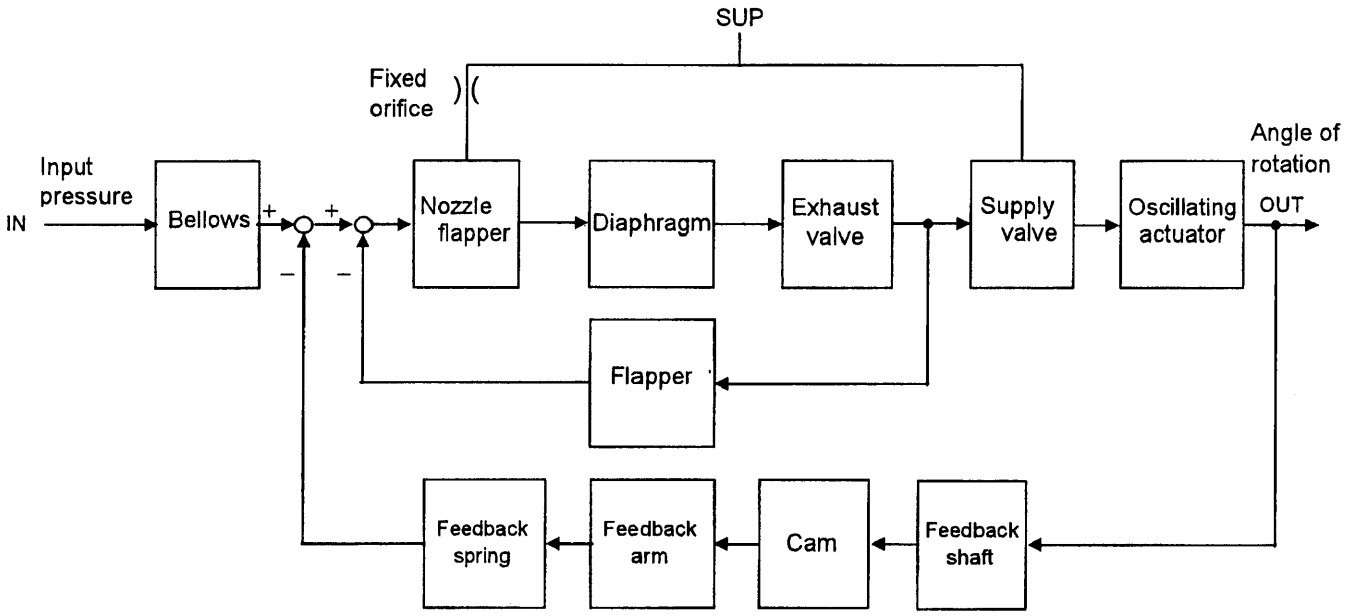
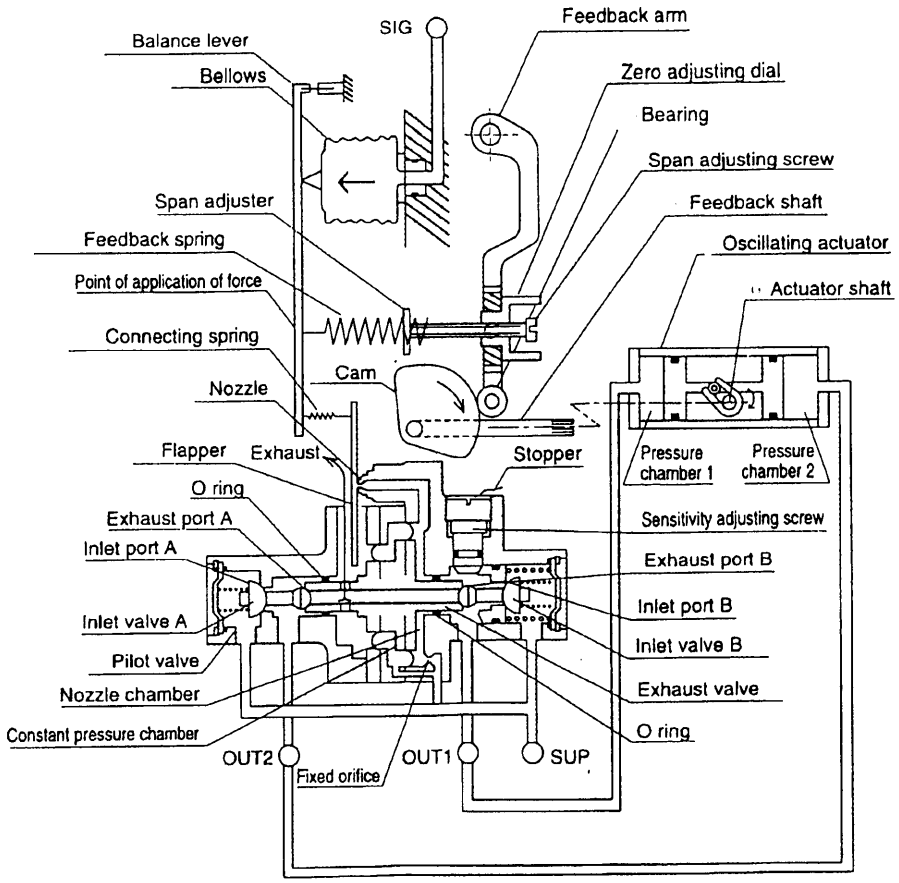


Fig. 5 Block diagram of Type IP5100



Counter operation is available by setting the cam back to front and connect pipings of OUT1 and OUT2 contrariwise.
(Use RA side for counter operation)

Fig.6 Drawing for IP5100 operation principle

3. Attaching

Warning

(1) Make a space needed for maintenance on the setting area.

(2) Care so that finger wouldn't be pinched during mounting and positioning cam. Cut supply pressure and release compressed air in positioner and actuator in advance.

Caution

(1) Confirm actuator and positioner are connected properly and tightly.

3-1 Type IP5000(Lever type lever feedback)

For positioner and diaphragm, brackets are to be manufactured according to the installation method. The unit should be attached using bolts firmly fixed through mounting holes on the side or back of the positioner.

For side installation, "P" mark attaching screw is interchangeable for IP300 and "E" mark mounting screw is interchangeable for IP600 and IP6000.

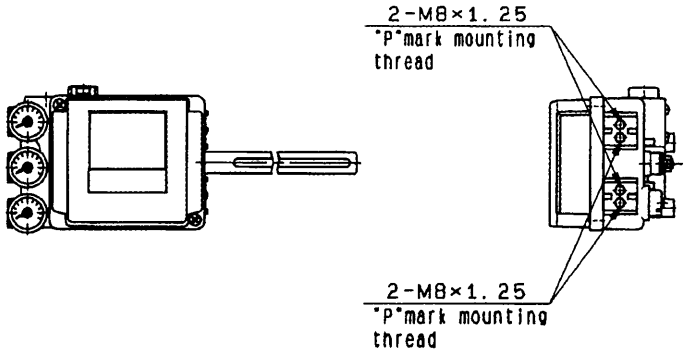
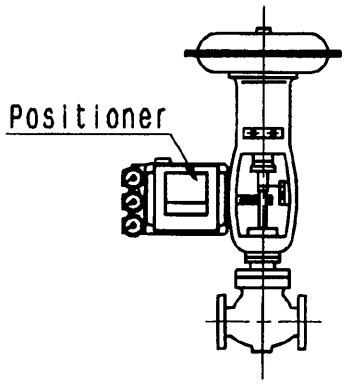


Fig. 7 Mounting position of "P" mark and "E" mark

3-1-1 Example of installation to actuator



8 Direct mount to diaphragm valve

Attach directly by using screw hole At a side of the positioner and that of yoke side of diaphragm.

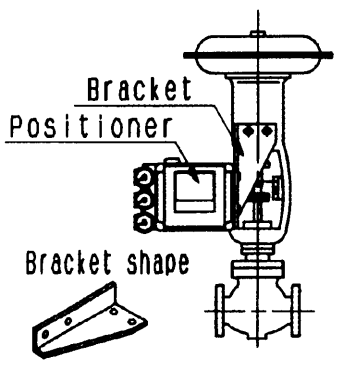


Fig.9 L-type bracket

Attach by using screw hole at the side of positioner and that of front mount of diaphragm.

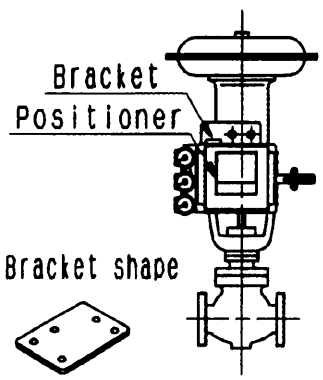
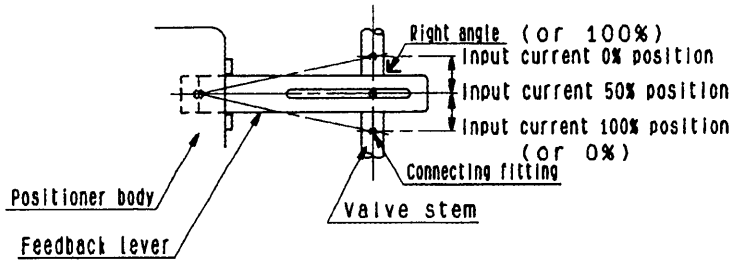


Fig.10 Front bracket

Attach by using screw hole of the back of positioner and that of front attach.

3-1-2 Connection with external feed back lever



(1) Install the valve stem and feedback lever so that they cross at right angle when input signal is 50%.

(2) Fullscalse should be at least 10% and at most 30%

3-2 Type IP5100

For positioner and rotary actuator, brackets should be manufactured according to the installation method. The unit should be attached using bolts firmly fixed through mouting holes on the side or back of the positioner.

For side installation, "E" mark mounting screw is interchangeable for IP610 and IP6100. Fork lever assembly M type is usable since it is interchangeable for serration fitting.

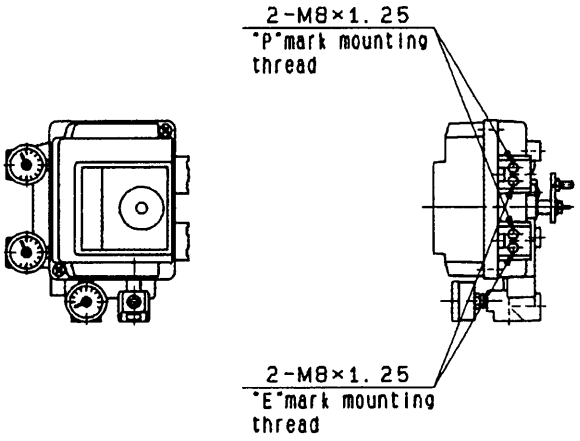


Fig.12 Mounting position of "P" mark & "E" mark

3-2-1 Installing actuator

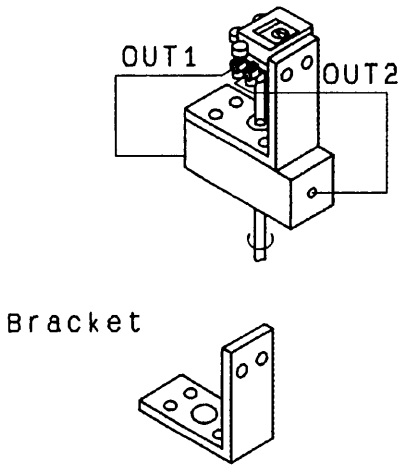


Fig.13 Mounting by positioner side screw

Install using screw hole of a side of positioner and the screw hole at actuator.

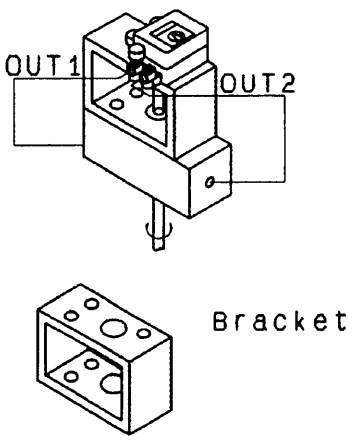


Fig.14 Mounting by positioner back screw

Install using screw hole at the positioner back and the screw hole at the actuator top.

3-2-2 Feedback shaft connecting

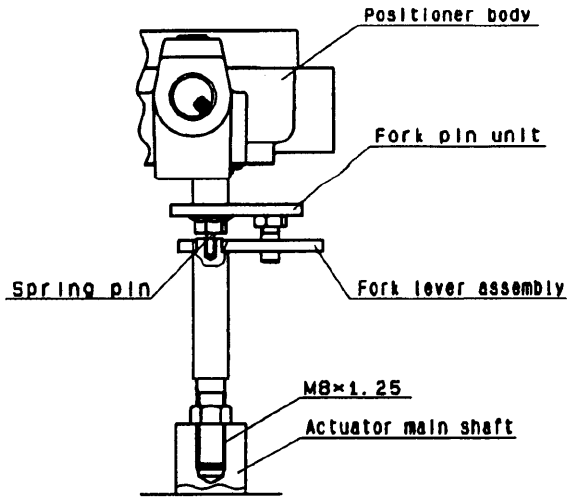


Fig.15 Example of attaching using fork lever type joint

(1) Install positioner feedback shaft and rotary actuator mian axis so that they are concentric.(so that spring pin of feedback shaft end can enter the end of fork lever assembly axis.)

(2) Product for IP310 serration type is able to be supplied as a special order.

3-2-3 Cam attaching procedure

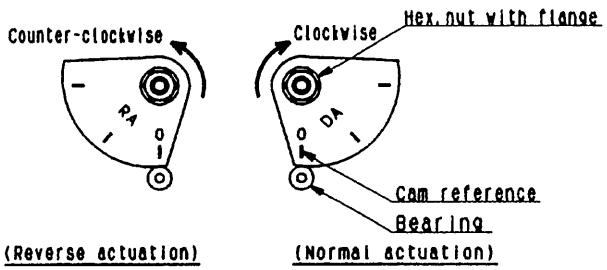


Fig.16 Mounting of cam

(1) See actuator from the side of positioner front cover when input pressure increases. When the actuator main axis rounds clockwise, use DA surface of cam. When it rounds counterclockwise, use RA surface. Mount the cam properly to feedback shaft centering location.

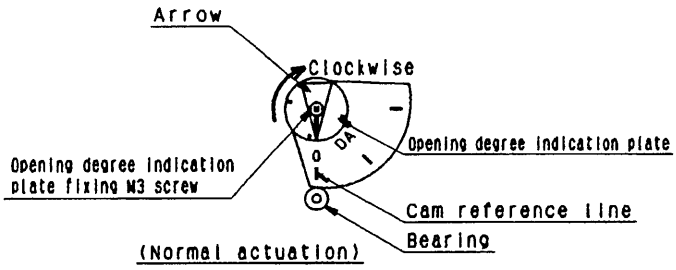
(2) After loosening hexagonal nut with flange, set the actuator in starting condition. Afterwards, mount the cam making sure that the connecting point of cam and the bearing of feedback arm unit meet the zero-point of cam properly.

(3) Since mounting of cam is dangerous, this must be performed without supplying pressure.

(4) Cam is tightened to the shaft temporarily when it is shipped from SMC. When it is operated, rock it firmly with lock nut.
(Tightening torque 2.0 to 2.5Nm)

3-2-4 Mounting procedure of opening degree indication plate

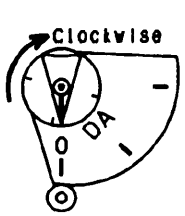
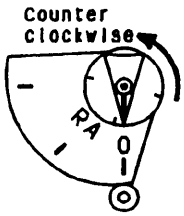
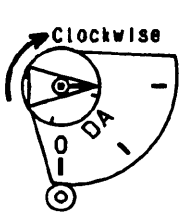
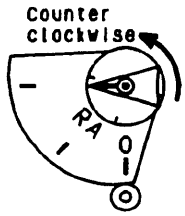
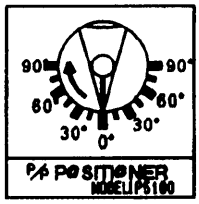
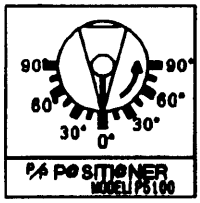
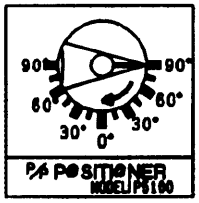
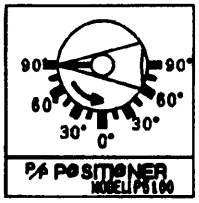
(1) Lock the cam and then adjust the zero-point and span (refer to Chapter 5).Then, fix the opening degree indication plate to the shaft using the M3 screw. At that moment, the end of the arrow of opening degree indication plate is to be pointing the center of the bearing as the figure 17. Please refer (I) and (II) in table 2. (for starting at the 0 position in the opening degree indication window)



(2) Mounting conditions of panel are shown in (III) and (IV) in table 2, when the panel is displayed in contrary way to (1).(for starting at the go degree position in the opening degree indication window) This panel should be used as a measure of valve lift.

Fig.17 Installing example of opening degree indication plate

Table 2 Attaching of opening degree indication plate

Indication method	0° →90°		90° →0°	
	Normal	Reverse	Normal	Reverse
Actuation form	A	A	B	C
Mounting cam and opening degree indication plate				
Opening degree indication window				
State	(I)	(II)	(III)	(IV)

4. Piping and Attaching of Internal Feed Back Unit

Caution

Prior to piping, flush enough and remove chip, cutting oil and dust in tube so that obstruction wouldn't intrude into positioner.

Table3 Piping (1)

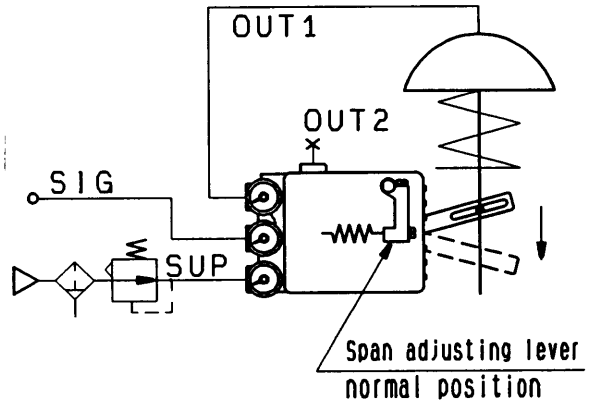
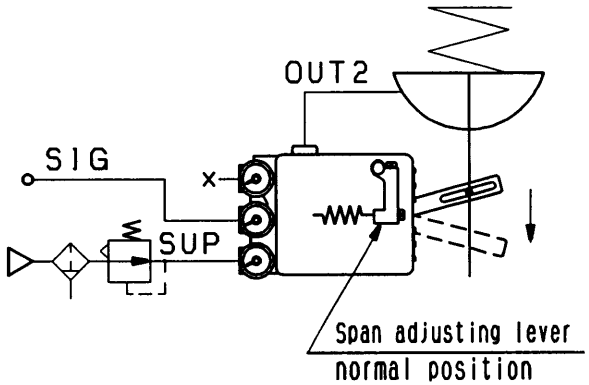
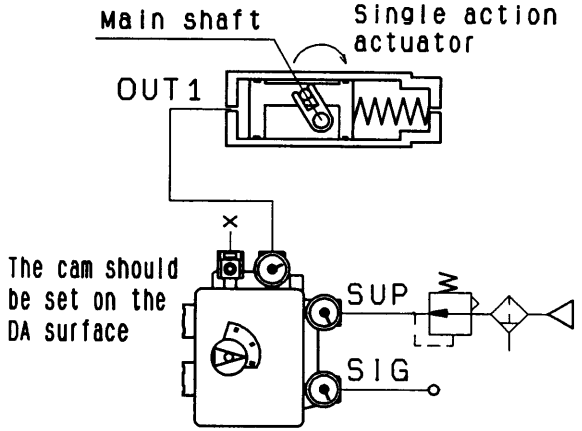
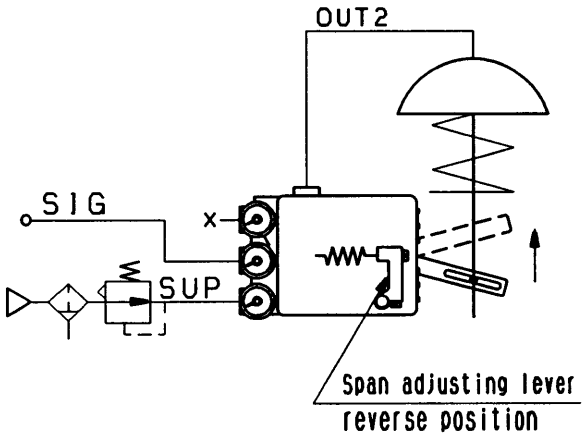
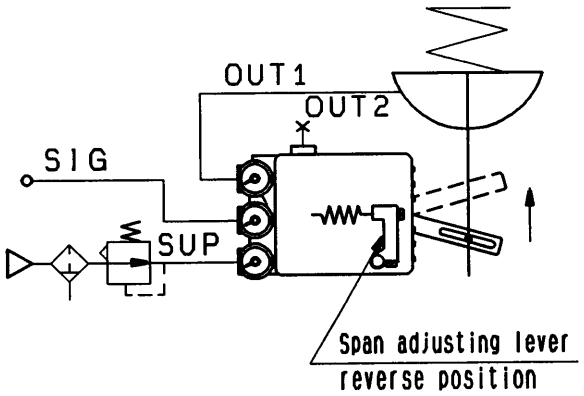
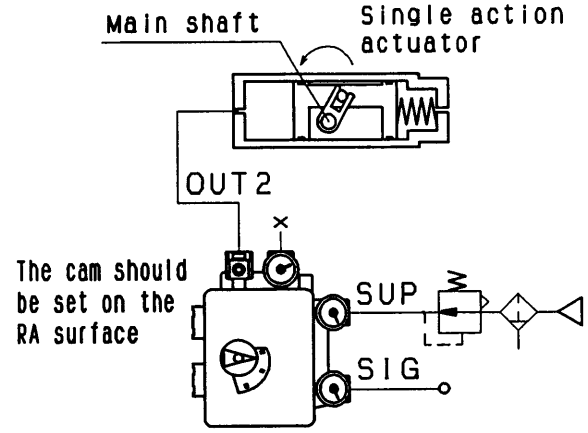
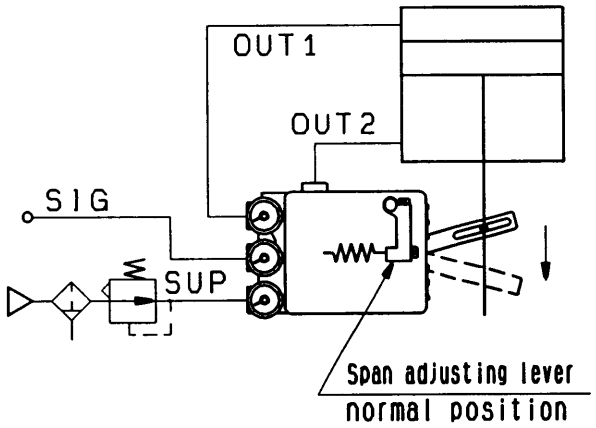
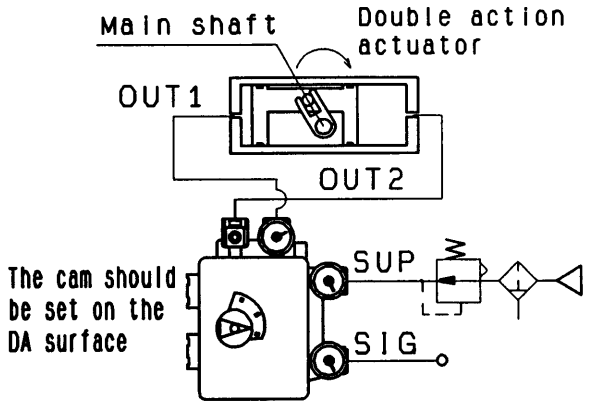
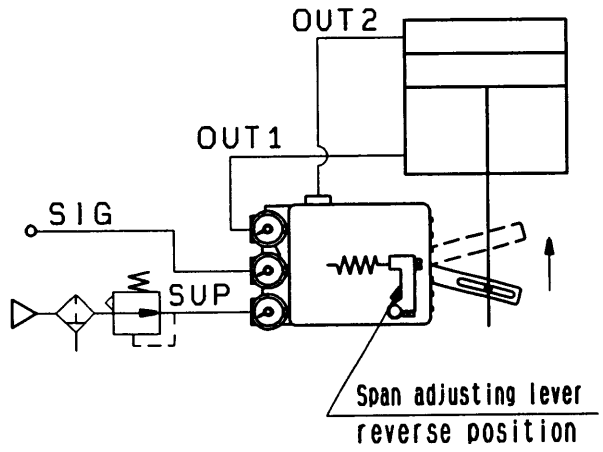
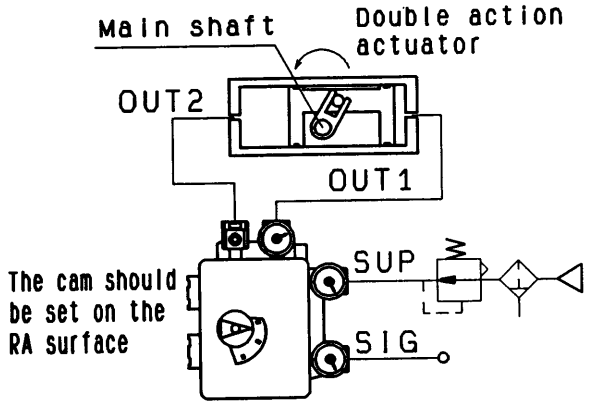
		IP5000(Lever type)		IP5100(Rotary type)
Single action	Normal actuation	Positioner : Type IP5000 Actuation : The stem moves in the arrow direction when the input current increases.  OUT2 : Plug	Positioner :Type IP5000 Action : The stem moves in the arrow direction when the input current increases. (Normal actuation using the reverse actuation drive unit)  OUT1 : Plug	Positioner : Type IP5100 The actuator main shaft turns clockwise when the input signal increases.  OUT2 : Plug
	Reverse actuation	Positioner : Type IP5000 Actuation : The stem moves in the arrow direction when the input current increases. (Reverse actuation using the normal actuation drive unit)  OUT1 : Plug	Positioner : Type IP5000 Actuation : The stem moves in the arrow direction when the inout current increases.  OUT2 : Plug	Positioner : Type IP5100 The actuator main shaf turns counter-clockwise when the input signal increases.  OUT1 : Plug

Table4 Piping (2)

		IP5000(Lever type)	IP5100(Rotary type)
Single action	Normal actuation	Positioner : Type IP5000 Actuation : The cylinder rod moves in the arrow direction when the input current increases. 	Positioner : Type IP5100 The actuator main shaft turns clockwise when the input signal increases. 
	Reverse actuation	Positioner : Type IP5000 Actuation : The cylinder rod moves in the arrow direction when the input current increases. 	Positioner : Type IP5100 The actuator main shaft turns counter-clockwise when the input signal increases. 

Cautionary remarks on piping

(1) Use denimified and dust-removed clear air as the supplying air source.
(2) Before laying the pipes, flush the pipe inside sufficiently so as to eliminate foreign matter in the piping completely.

5. Adjustment

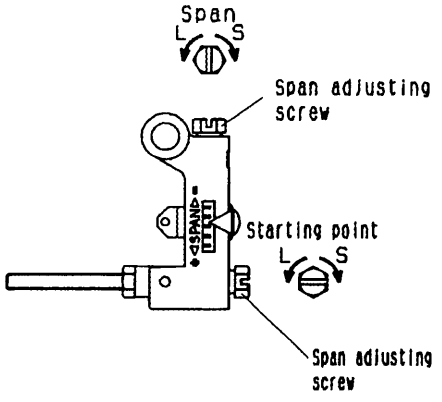
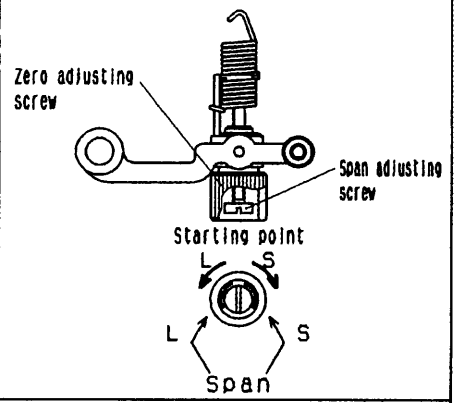
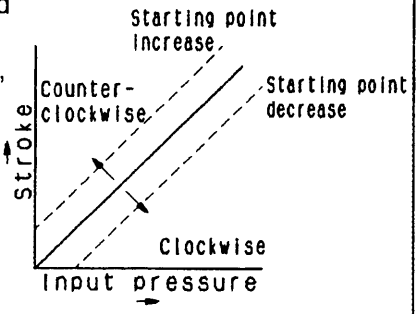
Caution

(1) For this positioner, span and zero point adjustment of each actuator is necessary. Adjustment shall be done based on each actuator size.
(2) Keep in mind that span and zero point adjustment interfere in each other.
(3) Lock the zero-span lock nut after adjustment.
(4) Characteristics changes due to change of mounting position, ambient temperature and supply pressure.
(5) This positioner is force balanced type. Characteristic depends on the mounting direction. If the direction of initial adjustment and the final adjustment differ, please re-adjust it.
(6) If it takes long time until operation after initial adjustment, check and adjust this product.

Check the following prior to start the adjustment.
(1) Check that the pipeline is correctly connected with the pressure supply port and OUT1 and OUT2 ports.
(2) Check that the actuator and positioner are sturdily connected.
(3) Check that the feed back arm of intenal feed back (Type IP5000) is attached to the correct (normal or reverse) position. (Refer to Tables 3 and 4.)
(4) Check for correct use of the cam face (normal or reverse) in Type IP5100 and that the flange nut is firmly locked.
(Refer to Table 2.)

5-1 Zero-point adjustment and span adjustment

Table 6 Adjustment procedure

<table>
<tr>
<td></td>
<td>IP5000
 
</td>
<td>IP5100
 
</td>
</tr>
<tr>
<td>Adjusting procedure</td>
<td colspan="2">(1) Set input pressure 0%, then set the actuator starting point by turning zero-adjustment screw.
(2) Secondly, vary the input pressure and see the stroke of actuator.
When span is not enough or too long, adjust it according to the drawing.
(3) Set inout pressure 0%, and again adjust at zero-point like (1).
(4) Repeat (1)～(3) until the stroke of actuator become proper stroke for input pressure.
 
</td>
</tr>
</table>

5-2 Sensitivity adjustment

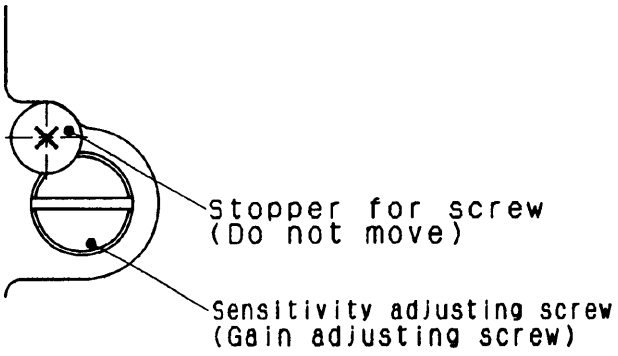


Fig.18 Pilot valve

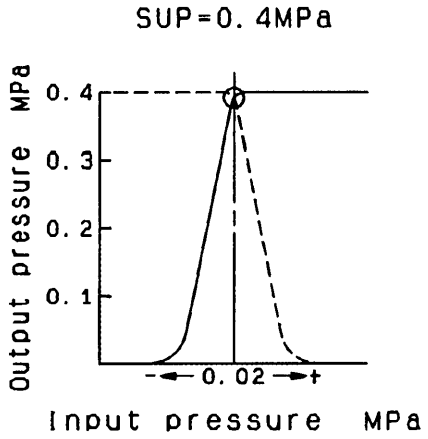


Fig19 Input/output pressure characteristic

Fig.19 shows the input current –output pressure characteristics of OUT1 and OUT2 of the pilot valve. When the positiioner is shipped out of our plant, the output pressure is set to the optimum state as shown in Fig.19 and this needs no adjustment ordinarily.

Caution

The sensitivity adjustment of pilot valve is effective to the actuator of double action type only. If the sensitivity is poor because of the actuator type of load condition, turn the sensitivity adjust screw clockwise. If hunting occurs, turn the sensitivity adjust screw counter-clockwise.
(The amount of turning varies by actuators. Turn it by 1/16 to one turn. Do not loosen the stopper screw at this time since it is set to avoid the screw coming off.)

※ If hunting occurs with an actuator of small capacity, refer to the description in 9-1 (for both single action and double action.)

6. Maintenance and Check

Warning

(1) After installation, repair and disassembling, connect compressed air and perform a proper function test and a leak test. If bleed noise is louder than the initial state or operation is abnormal, stop operation and check if installation is proper or not.

Caution

(1) Check if supply air is clean or not. Inspect compressed air cleaning system periodically and keep condition to be able to always get clean air so that dust, oil and humidity which cause malfunction and failure wouldn't include into the equipment.

(2) If handled improperly, compressed air can be dangerous. Maintenance and replacement of unit parts should be performed only by trained and experienced personnel for instrumentation equipment as well as following the product specifications.

(3) Check the positioner once a year. When you find excessively worn diaphragm. O-ring and other packing or any unit that has been damaged with new ones. Treatment at an early stage is especially important if the positioner is used in a place of severe environment like coastal area.

(4) Before removing the positioner for maintenance or replacing unit parts after installation, make sure the supply pressure is shut off and all residual air pressure is released from piping.

(5) When the fixed orifice is clogged with carbon particles or others, remove the pilot valve Auto/Manual changeover screw (built-in fixed aperture) and clean it by inserting a ϕ0.3 wire into the aperture.
(Refer to Fig.20 Fixed orifice position)

(6) When you disassemble the pilot valve, coat grease to the O-ring of the sliding section.
(Use the TORAY SILICONE SH45 grease.)

(7) Check air leak from piping which compressed air flows. Air leak from air piping could deteriorate characteristics.
Air is normally discharged from a bleed port, but this is a necessary air consumption based on the construction of the positioner, and is not an abnormality if the air consumption is within the specified range.

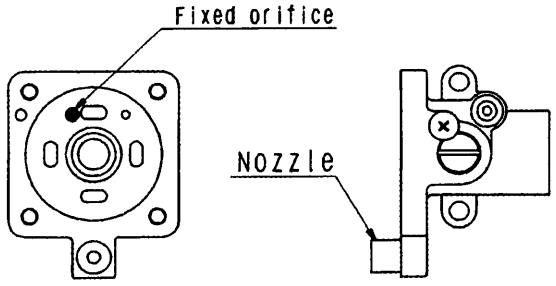


Fig.20 Fixed orifice position

7. Caution on Handling

⚠ Warning Operation

(1) Do not use this positioner out of the range of its specifications as this can cause failure. (Refer to 1. Specifications.)

(2) If the system is supposed to be in danger because of failure of the positioner, prepare the system with a safety circuit to avoid danger.

⚠ Warning Handling

(1) Excessive vibration to positioners during transporting or operating might cause failure.

(2) Since zero-point varies depend on mounting position, zero-point should be adjusted after installing.

(3) If you leave the positioner at the operation site for a long time without using it, put the cover on it so that the rain water does not enter the positioner. If the atmosphere is of high temperature or high humidity, take measures to avoid condensation inside. The condensation control measures must be taken throughly for export shipment.

⚠ Warning Air supply

(1) Positioner has Fixed Orifice and Nozzle who have fine paths in it. Therefore please use clean air which is dehydrated and filtered, and also avoid employing Lubricator which causes malfunction.

(2) Avoid using compressed air compressed air containing chemicals, synthetic fluid including organic solvent, salinity, and corrosive gas as it may cause malfunction.

(3) Use denimidified and dust-removed clean air as the supplying air source.

⚠ Warning Environment

(1) Do not use in an environment where the product is exposed to corrosive gas, chemicals, salt water, water or steam.

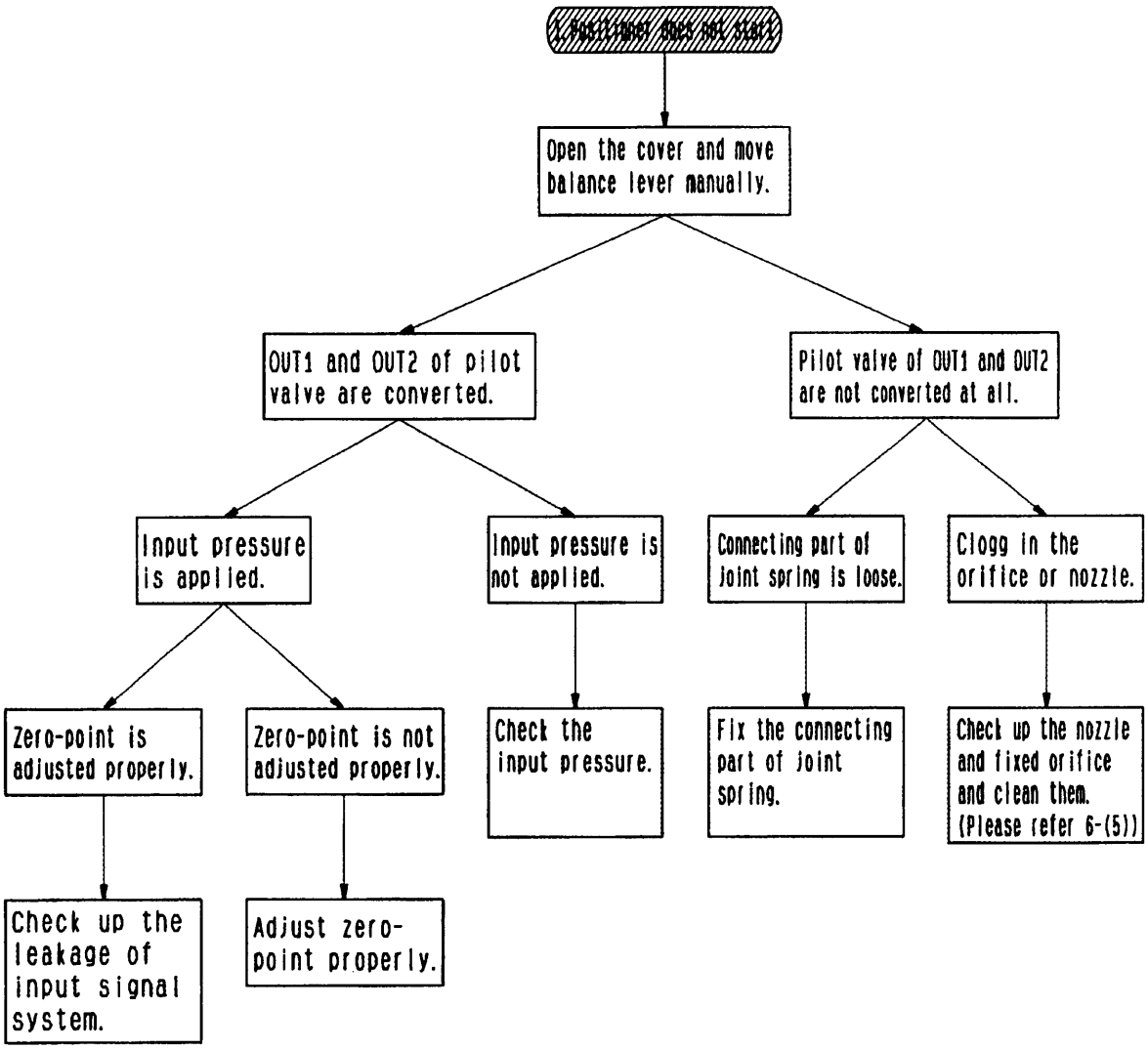
(2) Do not operate the product in a location where it is subject to strong vibration and/or shock.

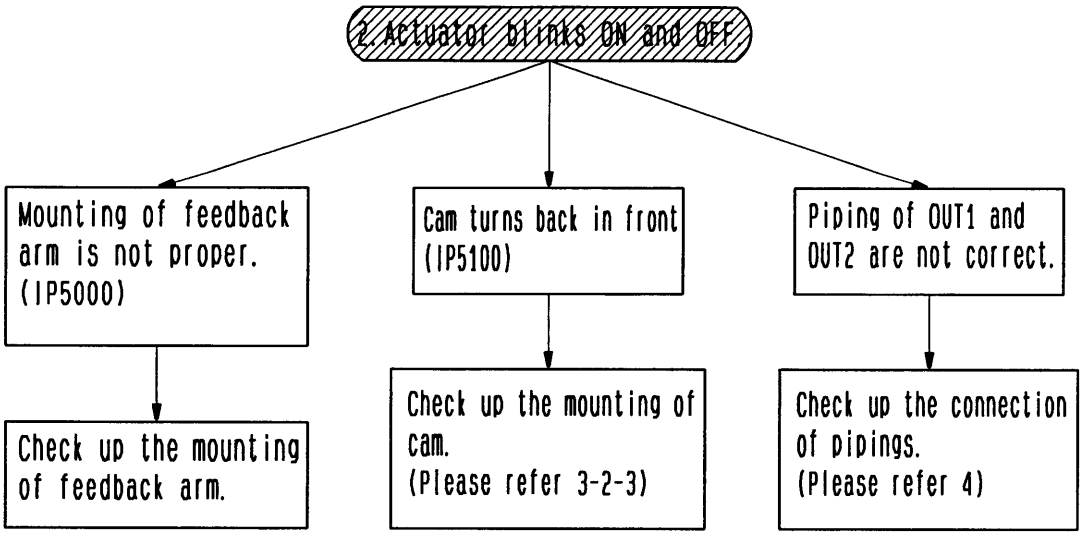
(3) If the positioner is used under temperature outside of the specification, the sealing materials deteriorate quicker and also the positioner may not operate normally.

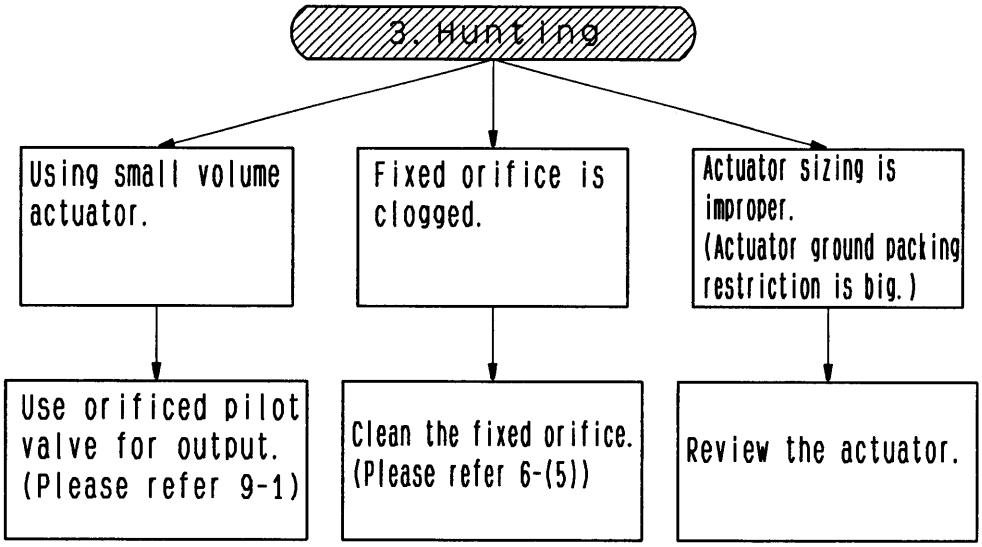
8. Troubleshooting

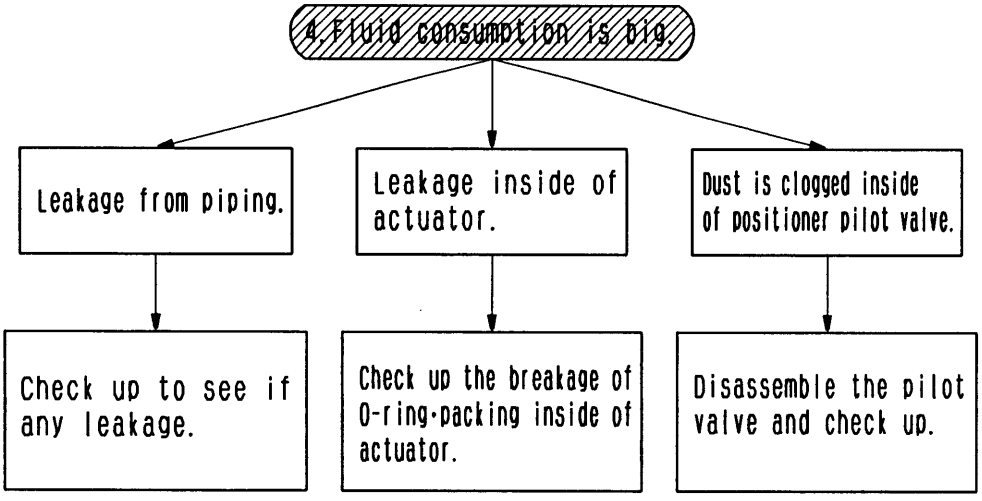
Warning

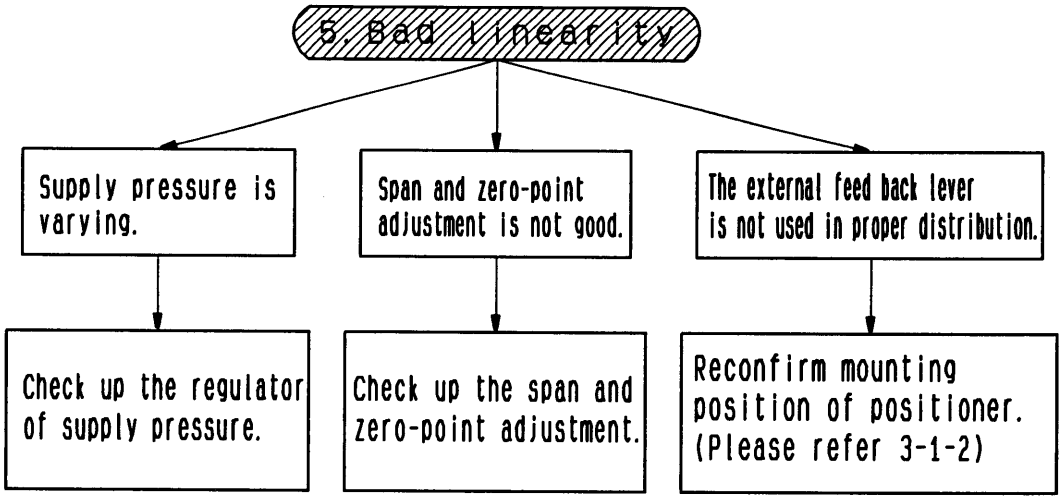
In case of not improving, stop use.

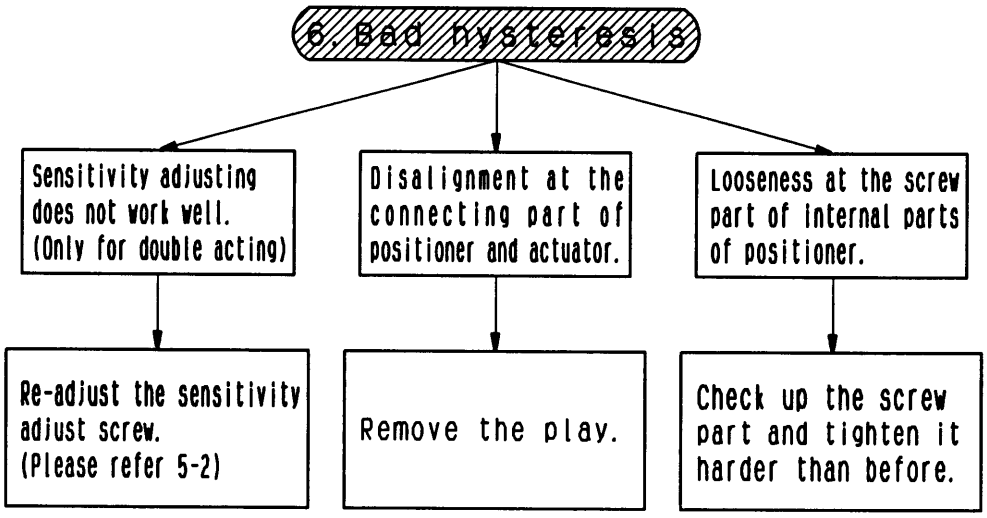



2. Actuator blinks ON and OFF
Mounting of feedback arm is not proper. (IP5000)
Cam turns back in front (IP5100)
Piping of OUT1 and OUT2 are not correct.
Check up the mounting of feedback arm.
Check up the mounting of cam. (Please refer 3-2-3)
Check up the connection of pipings. (Please refer 4)


3. Hunting
Using small volume actuator.
Fixed orifice is clogged.
Actuator sizing is improper. (Actuator ground packing restriction is big.)
Use orificed pilot valve for output. (Please refer 9-1)
Clean the fixed orifice. (Please refer 6-(5))
Review the actuator.


4. Fluid consumption is big.
Leakage from piping.
Leakage inside of actuator.
Dust is clogged inside of positioner pilot valve.
Check up to see if any leakage.
Check up the breakage of O-ring·packing inside of actuator.
Disassemble the pilot valve and check up.


5. Bad linearity
Supply pressure is varying.
Span and zero-point adjustment is not good.
The external feed back lever is not used in proper distribution.
Check up the regulator of supply pressure.
Check up the span and zero-point adjustment.
Reconfirm mounting position of positioner. (Please refer 3-1-2)


6. Bad hysteresis
Sensitivity adjusting does not work well. (Only for double acting)
Disalignment at the connecting part of positioner and actuator.
Looseness at the screw part of internal parts of positioner.
Re-adjust the sensitivity adjust screw. (Please refer 5-2)
Remove the play.
Check up the screw part and tighten it harder than before.

9. Accessory

9-1 Pilot valve with output throttle

Hunting may occur when the positioner is installed to a small capacity actuator. In such case, use a pilot valve having a throttle for OUT1 and OUT2. The throttle is removable. (Refer to Figs.21 and 22 for mounting and dismounting the throttle.)

Table 7 Throttle types

Throttling diameter	Part No.	Pilot valve unit No.having the throttle shown at left	
ϕ0.7	P36801080	P378010-51(IP5000)	P378020-61(IP5100)
ϕ1	P36801081	P378010-52(IP5000)	P378020-62(IP5100)

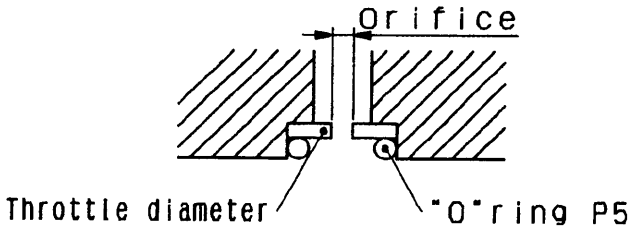


Fig. 21 Throttle mounting

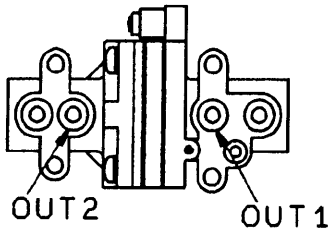


Fig. 22 Pilot valve bottom drawing

(Note 1) When mounting the throttle, pay attention not to let dust and others enter the port hole.
Be sure to mount an O-ring after mounting the throttle.

9-2 Fork lever type joint (Type IP5100)

For the main axis joint of actuator and positioner, fork lever type joint, which has flexibility for disalignment of center, is standardized.
The case of positioner side attaching, fork lever assembly M type is interchangeable for former serration joint.

Table 8 Type of fork lever type joint

Part name	Part No.
Fork lever assembly M	P368010-24
Fork lever assembly S	P368010-25

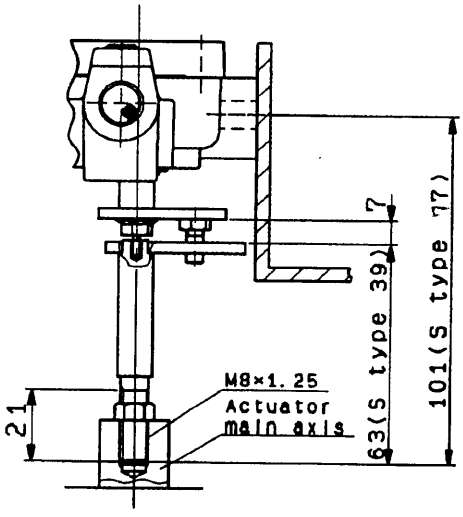


Fig.23 Example of side attaching using fork lever assembly M.

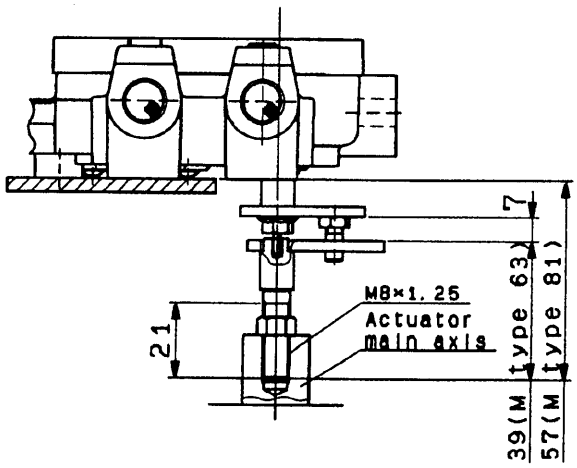


Fig.24 Example of backside attaching using fork lever assembly S.

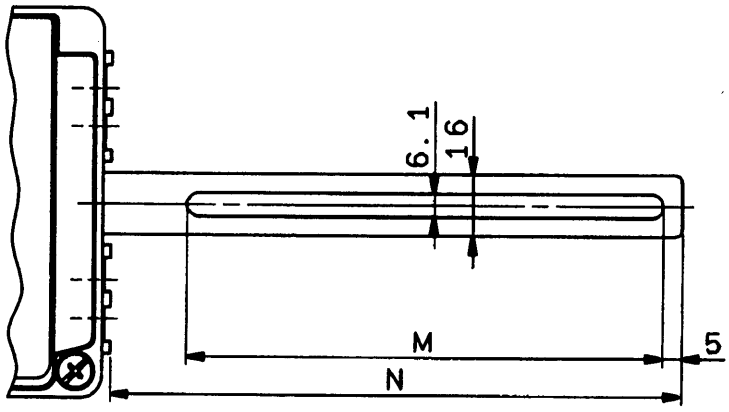
A

9-3 External feed back lever (Type IP5000)

Levers having different stroke sizes are available for the feed back lever of lever type IP5000. Please consult us to match your valve when stroke is less than 10mm.

Table 9 Feed back lever types

Stroke	Unit No.	M size	N size
10～85mm(Standard accessory)	P378010-11	125	150
35～100mm(E type accessory)	P378010-12	110	195
50～140mm(F type accessory)	P378010-13	110	275



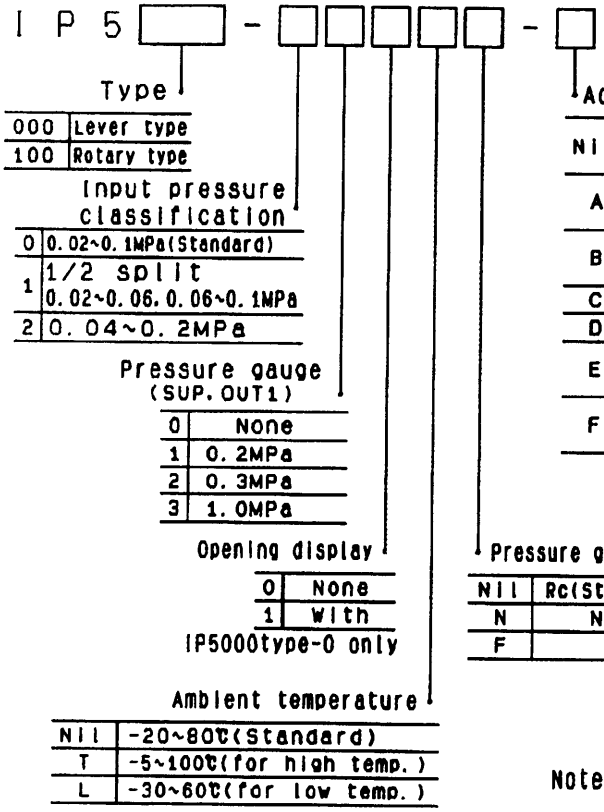
10. Options

10-1 Angle indicator equipped (IP5100 type)
Angle indicator enable valve angle to be seen on the case cover of positioner.
(Described in model No.)

10-2 Internal by-pass valve (IP5000 type)
Internal type by-pass valve <SIG-OUT1> enable diaphragm motor to be directly operated by signal output of automatic controller.

10-3 Internal equalizer valve (IP5100 type)
Internal equalizer valve <OUT1-OUT2> allows double acting actuator to be operated manually.
※ Please insult us about installation of by-pass valve and equalizer.

11. How to order



Type	
000	Lever type
100	Rotary type

Input pressure classification	
0	0.02~0.1MPa(Standard)
1	1/2 split 0.02~0.06, 0.06~0.1MPa
2	0.04~0.2MPa

Pressure gauge (SUP. OUT1)	
0	None
1	0.2MPa
2	0.3MPa
3	1.0MPa

Opening display	
0	None
1	With

IP5000type-0 only

Ambient temperature	
Nil	-20~80℃(Standard)
T	-5~100℃(for high temp.)
L	-30~60℃(for low temp.)

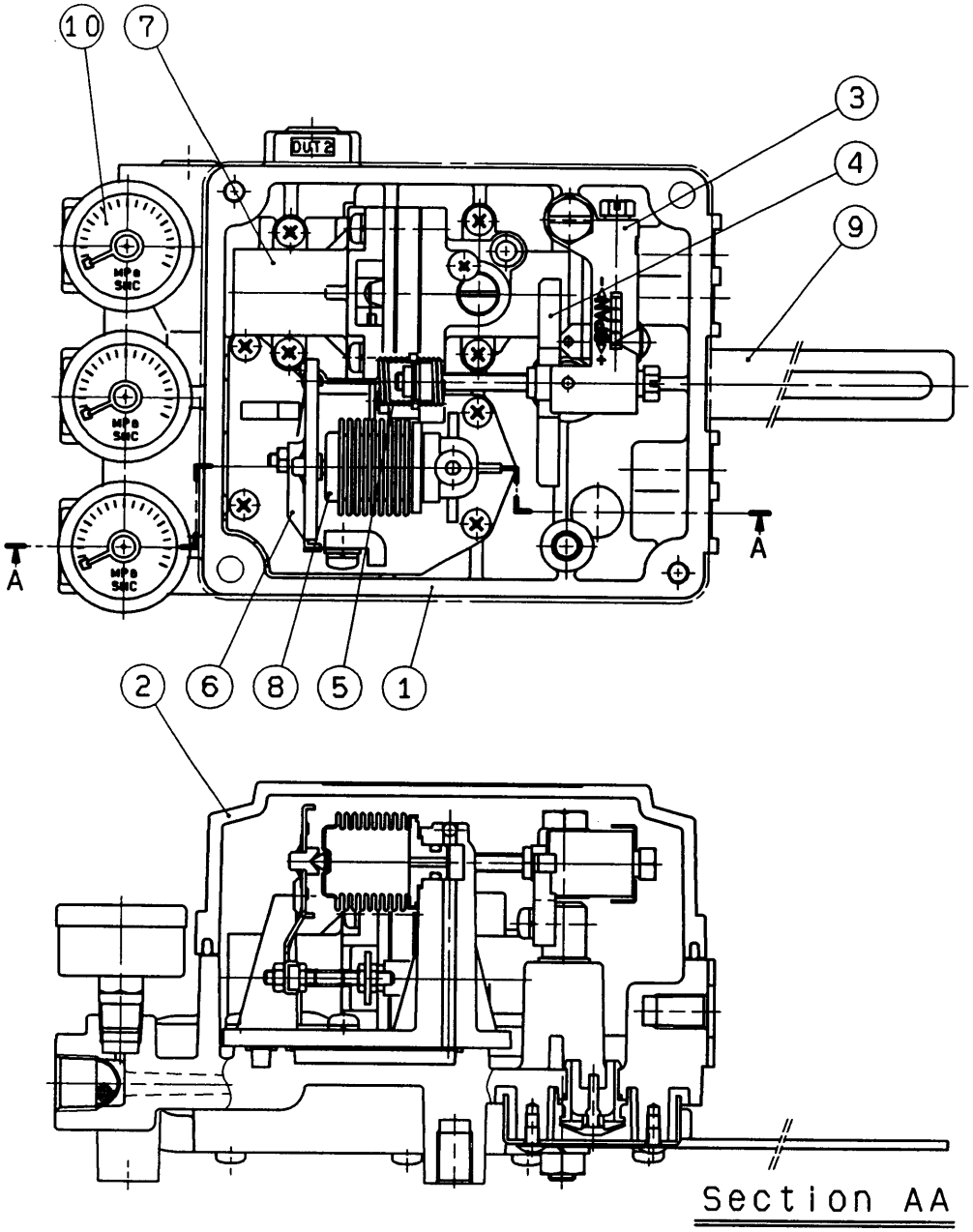
Pressure gauge. piping port	
Nil	Rc(Standard)
N	NPT
F	G

Accessories		
Nil	None(Standard)	IP5000 has standard lever for stroke(10~85mm)
A	ø0.7 Output restriction with pilot valve	Accessory for IP5000, IP5100 small capacity actuator
B	ø1.0 Output restriction with pilot valve	
C	Fork lever joint M	Accessory for IP5100
D	Fork lever joint S	
E	For stroke 35~100mm with lever unit	Accessory for IP5000
F	For stroke 50~140mm with lever unit	

Note 1) If two or more accessories are required, the part numbers should be made according to alphabetical order. (ex. IP5000-010-AD)

Note 2) The standard lever is not attached to accessories E and F.

Note 3) Angle display type for IP5000 is 0 only. (NO display)

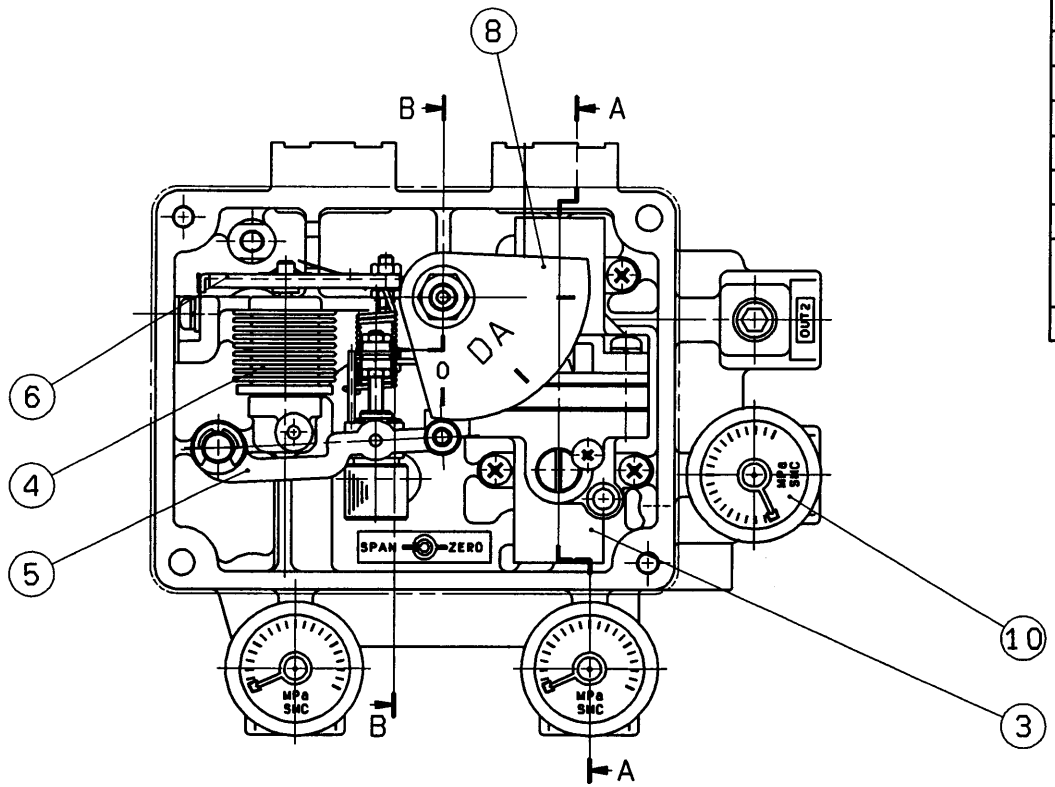


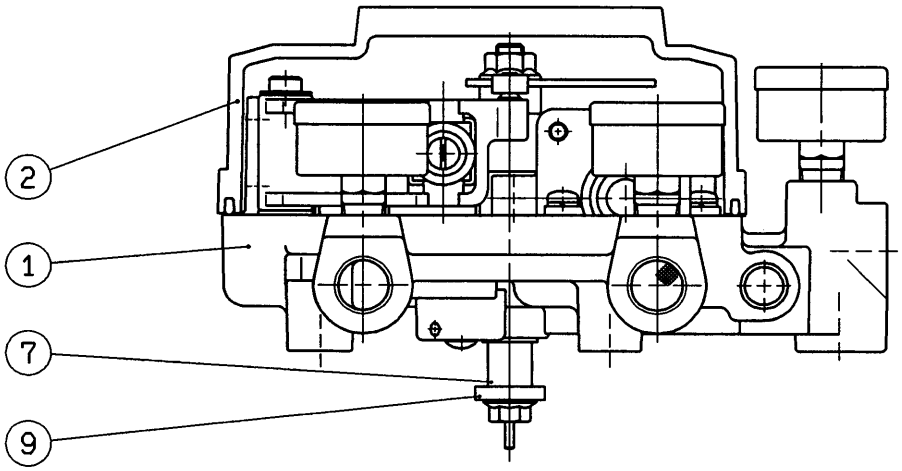
Section AA

10	G33-※-01	Pressure gauge		3	
9	P378010-11	Feedback lever unit	——	1	For standard stroke
8	P378010-8	Bellows assembly	——	1	
7	P378010-10	Pilot valve unit	——	1	
6	P378010-6	Balance lever unit	——	1	
5	P378010-5	Feedback spring unit	——	1	
4	P378010-4	Feedback shaft assembly	——	1	
3	P378010-3	Feedback arm unit	——	1	
2	P378010-2	Body cover unit	——	1	
1	P378010-1	Body unit	——	1	

Lever type·construction

IP5000-※※0

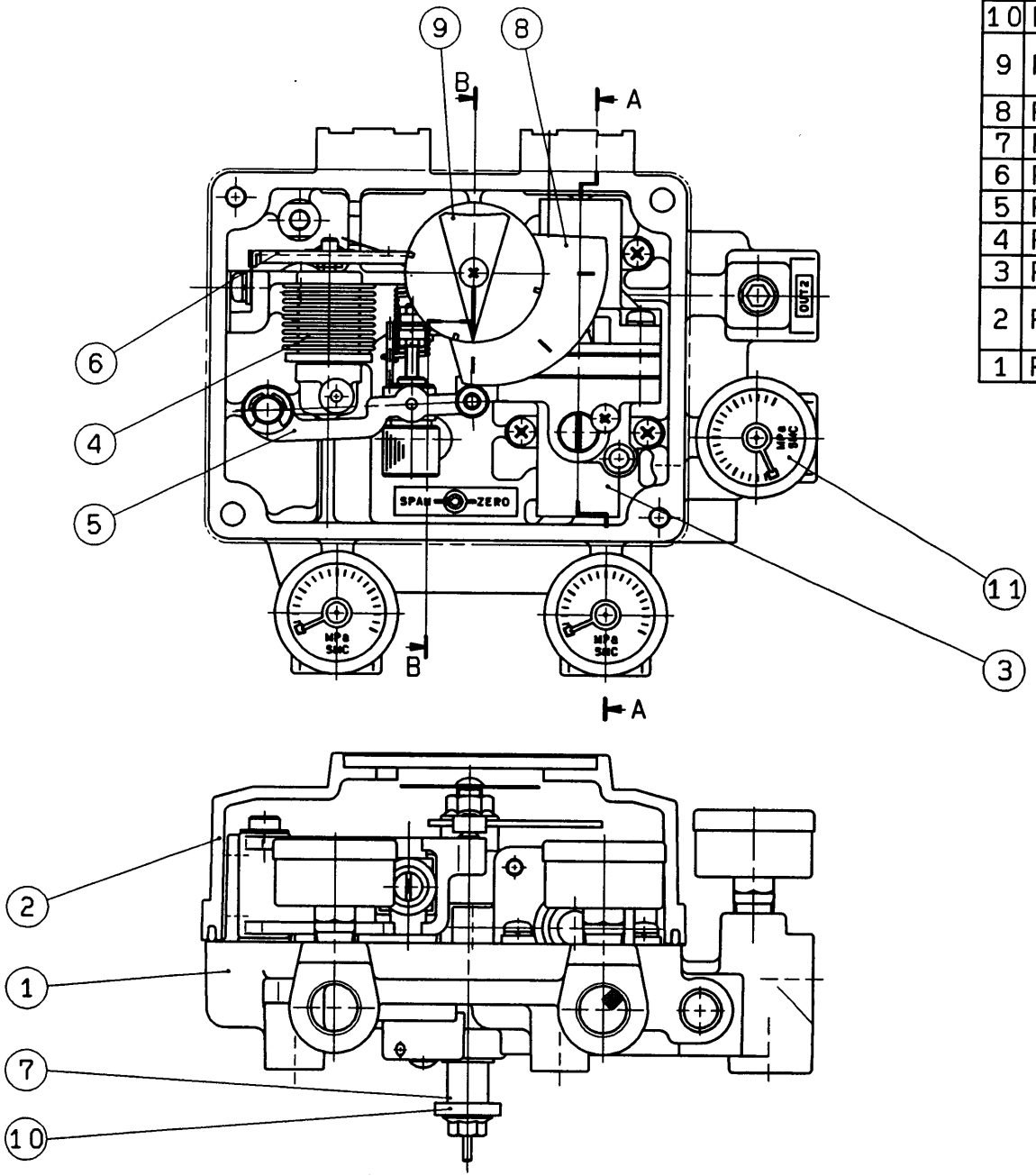




10	G33-※-01	Pressure gauge	——	3	
9	P368010-23	Fork pin unit	——	1	
8	P368010-18	Cam unit	——	1	
7	P378020-6	Feedback shaft assembly	——	1	
6	P378020-5	Balance lever unit	——	1	
5	P378020-4	Feedback arm unit	——	1	
4	P378010-8	Bellows assembly	——	1	
3	P378020-11	Pilot valve unit	——	1	
2	P378020-2	Body cover unit	——	1	(No opening degree indication panel)
1	P378020-1	Body unit	——	1	

Rotary type(No opening indication panel) construction

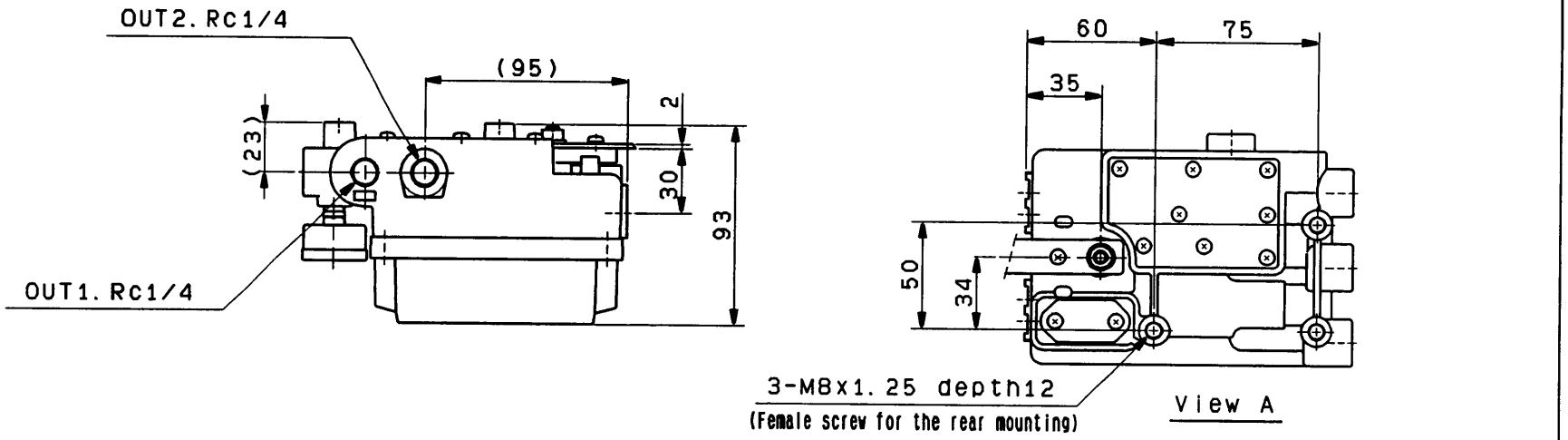
IP5100-※※0

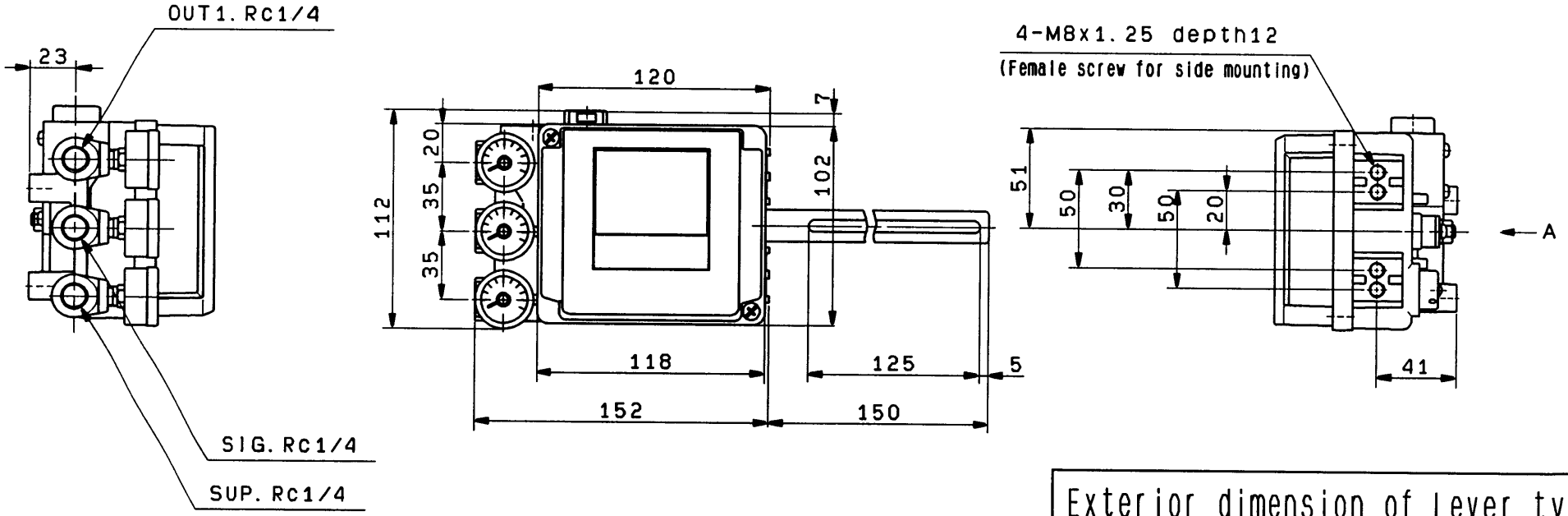


11	G33-※-01	Pressure gauge	——	3	
10	P368010-23	Fork pin unit	——	1	
9	P368010-19	Opening degree indication panel unit	——	1	
8	P368010-18	Cam unit	——	1	
7	P378020-6	Feedback shaft assembly	——	1	
6	P378020-5	Balance lever unit	——	1	
5	P378020-4	Feedback arm unit	——	1	
4	P378010-8	Bellows assembly	——	1	
3	P378020-11	Pilot valve unit	——	1	
2	P378020-3	Body cover unit	——	1	(With opening degree indication panel)
1	P378020-1	Body unit	——	1	

Rotary type(With open degree indication panel) construction

IP5100-※※1

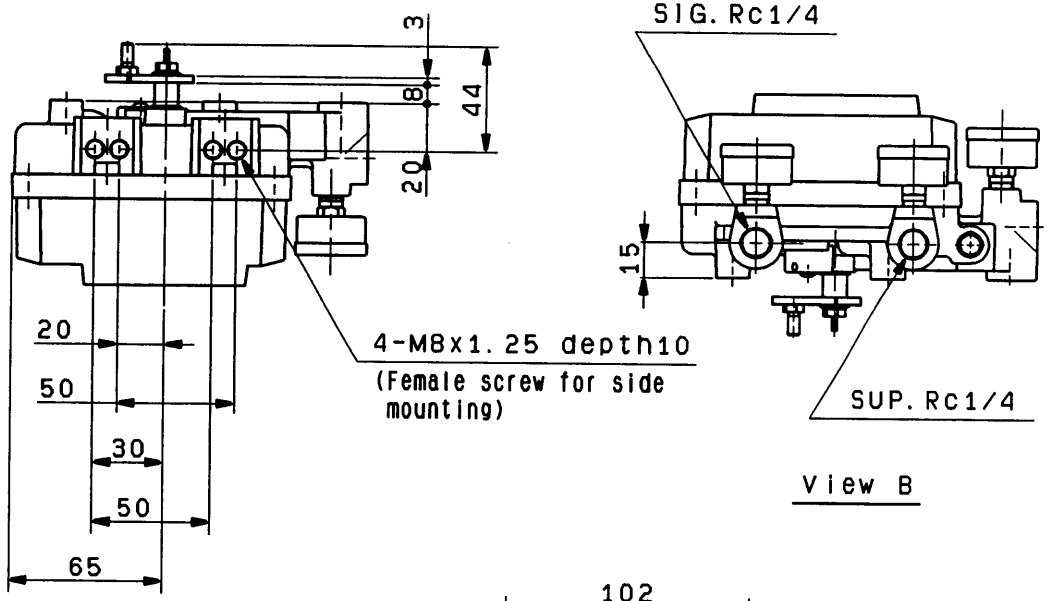




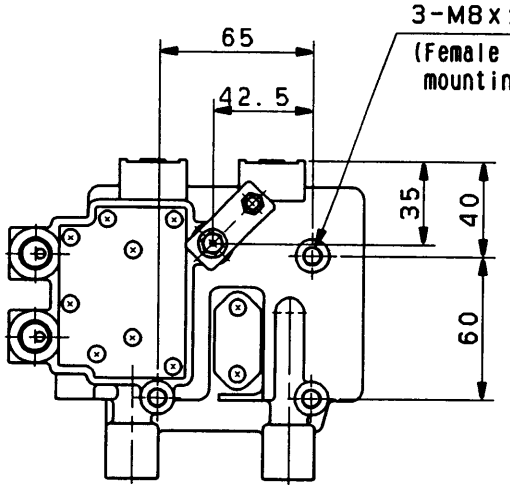
Exterior dimension of Lever type

IP5000-※※0

※ Regardless of the existance of opening display, the external from and mounting pitch are identical.



View B



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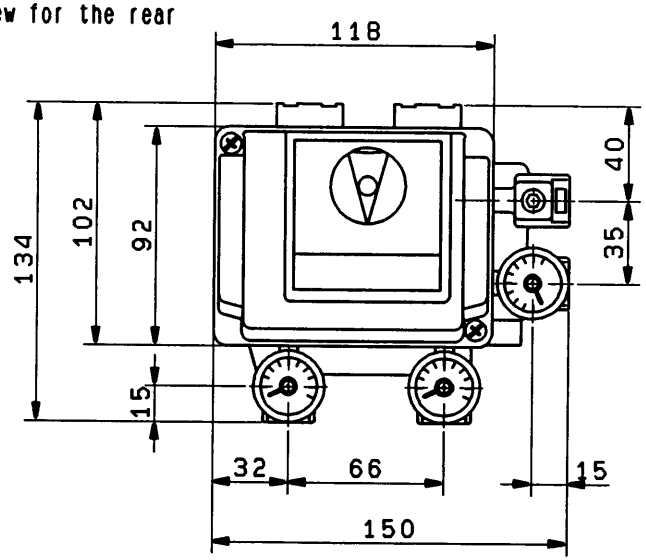
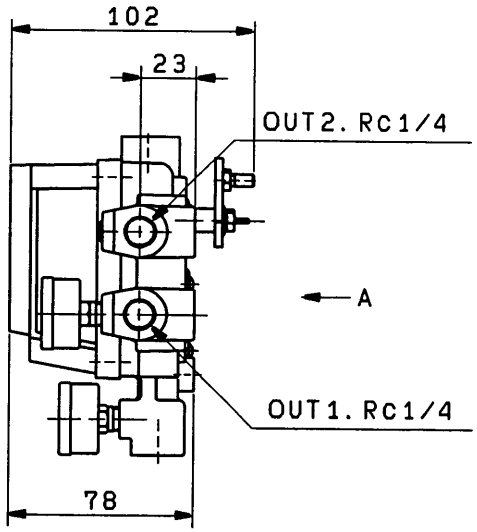


B



Exterior dimension of Rotary type

IP5100-※※1