XP100

Pneumatic Positioner　　Operating Manual

Concentric Rotary Motion/Back lever type

XP-B7

SSS Co., Ltd.

IM-XP1B7／00-R5

Safety precautions

Cautions and Warnings – read before operating

⚠ Warning! Indicates a situation where incorrect operation while failing to heed the warning could result in death or serious injury if not avoided.

⚠ Warning

When removing or disassembling component screws or pressure gauges etc. for inspection reduce the output pressure to 0 and then disconnect the supply pressure.

When operating the equipment during adjustment or inspection (see pages 1 and 2), do not touch moving parts such as cams, bearings, clamps or levers with your hands.

⚠ Caution! Indicates a situation where incorrect operation while failing to heed the caution could result in malfunction or physical damage.

During use ensure the supply pressure remains within the maximum POSI-POWER range of 0.7 MPa.

The normal value during single acting and double acting is 0.14 – 0.28 MPa and 0.4 MPa respectively.

Use the equipment with the POSI-POWER cover Assy installed.

If drainage or debris etc. accumulates in the pressure line on the supply side, the orifice will become plugged and cause a malfunction, so install an air filter (such as Mini-Set, manufactured by SSS Co., Ltd.) of 5 microns or less and supply air cleansed by a dryer etc.

When checking to see if debris or blockage is observed in the orifice or mesh filter, first shut off the supply pressure.

When carrying out pipe work, always flush the pipes sufficiently.

When screwing pipes and fittings, leave about one fifth of the screw and bind remainder with seal tape or apply liquid sealant.

Using lubricator will block the orifice or nozzle. Avoid using lubricator.

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1. Introduction Page 1

This manual is intended for use with the back lever type for concentric rotary motion single and double acting pneumatic positioner valve.

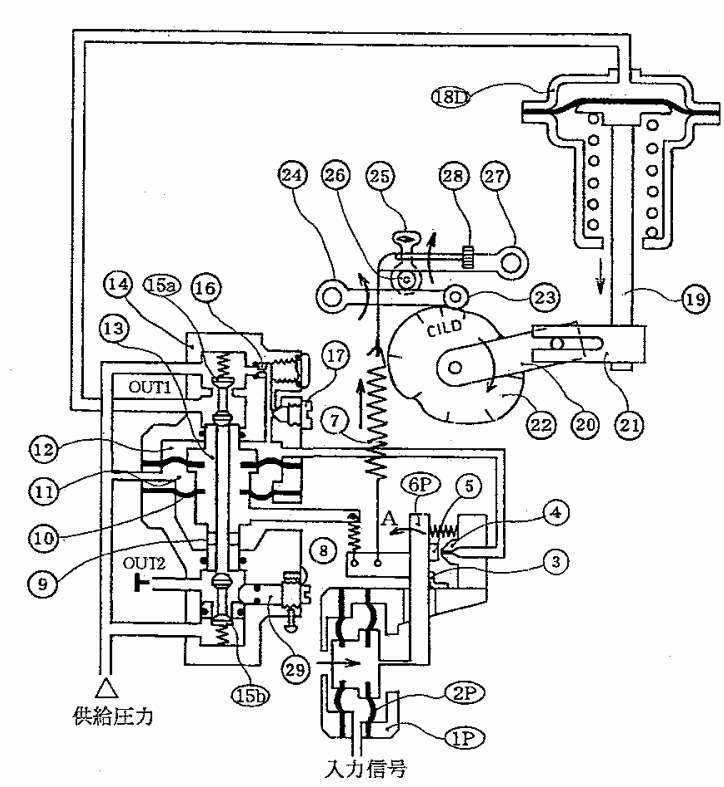
Please refer to the relevant manual for other types.

2. Operation

(1) Single acting

When an input current is applied to input chamber (1P), the flapper holder (6P) moves in the direction of arrow A by the flexure. This movement separates the flapper (5) from the nozzle (4) to reduce pressure in the nozzle back chamber (12), the balance between this pressure and that in the pressure chamber (11) is lost and eventually the relay spool (13) opens port (15a) to introduce the output of OUT1 to the pressure chamber (18D) of the diaphragm actuator, thereby lowering the stem (19).

This movement is transmitted to the feedback levers (20) and (21), cam (22), range (24) and zero arm (27) to expand the feedback spring (7) until the tension of this spring and the output of input chamber (1P) balance, obtaining a change in the stem (19) proportional to the input current.

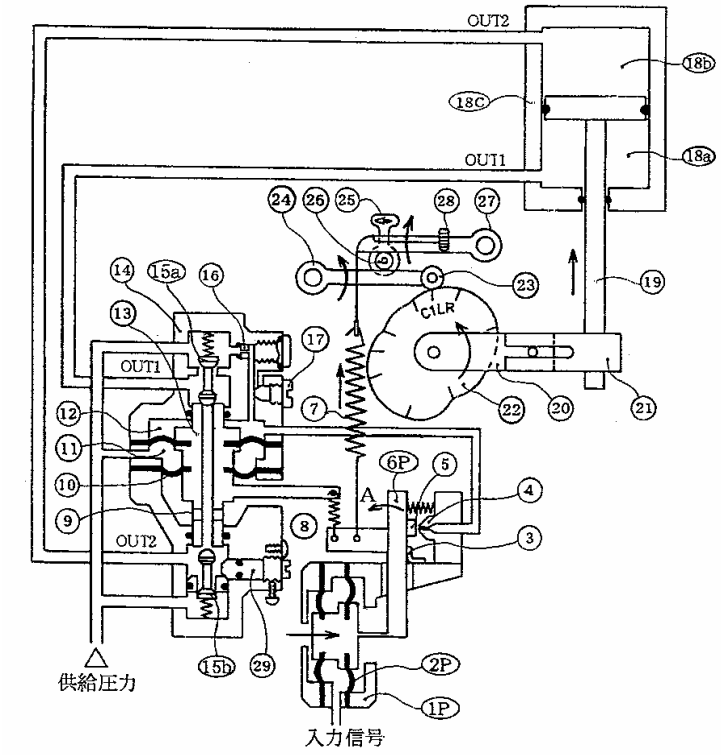


1P Input chamber
2P Armature
3 Flexure
4 Nozzle
5 Flapper
6P Flapper holder
7 Feedback Spring
8 Stabilizer Spring
9 Exhaust
10 Diaphragm
11 Pressure Chamber
12 Nozzle Back Pressure
13 Relay Spool
14 Pilot Relay Body
15a Port A
15b Port B
16 Orifice
17 A/M Selector
18D Diaphragm Actuator (Pressure Chamber)
19 Stem
20 Feedback Lever A
21 Feedback Lever B
22 Cam
23 Bearing
24 Range arm
25 Range Adjuster
26 Roller Shaft
27 Zero Arm
28 Zero Adjustment Knob
29 Seat Adjuster

(2) Double acting Page 2

When an input current is applied to input chamber (1P), the flapper holder (6P) moves in the direction of arrow A by the flexure. This movement separates the flapper (5) from the nozzle (4) to reduce pressure in the nozzle back pressure chamber (12). As a result, the balance between the above chamber and that in the pressure chamber (11) is lost, and eventually the relay spool (13) opens port (15a) and port (15b) simultaneously separates from the end of the relay spool. In response to this movement, the output of OUT 1 flows into the lower cylinder chamber (18a) and the upper cylinder chamber (18b) connects to the vent to raise steam.

This movement is transmitted to the feedback levers (20) and (21), cam (22), range (24) and zero arm (27) to expand the feedback spring (7) until the tension of this spring and the output of the input chamber (1P) balance. obtaining a change in the stem (19) proportional to the input current.



1P Input chamber
2P Diaphragm
3 Flexure
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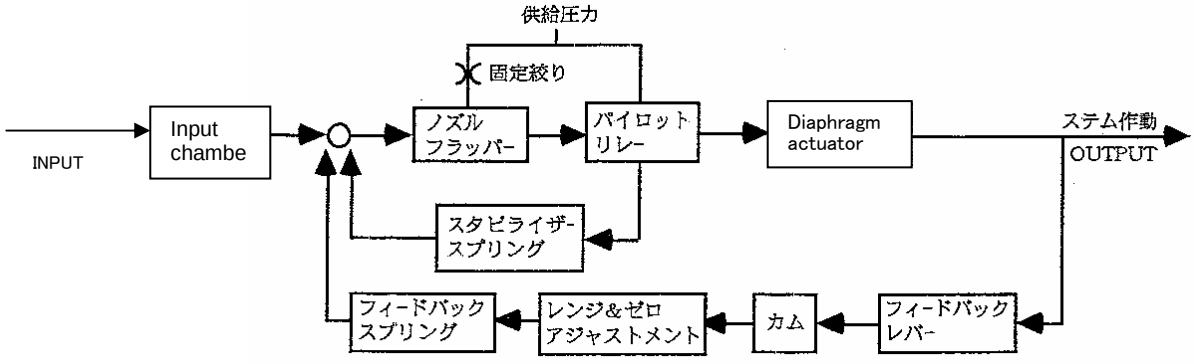
5 Flapper
6P Flapper holder
7 Feedback Spring
8 Stabilizer Spring
9 Exhaust
10 Diaphragm
11 Pressure Chamber
12 Nozzle Back Pressure
13 Relay Spool
14 Pilot Relay Body
15a Port A
15b Port B
16 Orifice
17 A/M Selector
18c Cylinder
18a lower cylinder chamber
18b upper cylinder chamber
19 Stem
20 Feedback Lever A
21 Feedback Lever B
22 Cam
23 Bearing
24 Range arm
25 Range Adjuster
26 Roller Shaft
27 Zero Arm
28 Zero Adjustment Knob
29 Seat Adjuster

(3) Operation flow-chart



3. Specifications Page 3

Specifications	Single acting	Double acting
Input current	20～100KPa	
Supply air pressure	0.14～0.7MPa／140～700kPa	
Stroke	90°, (60°)	
Air connector	Rc1/4(pressure measurement Rc 1/8) Option; NPT1/4(pressure measurement NPT1/8)	
Pressure gauge	0 - 0.2Mpa,	
	Standard; 0-0.4 Mpa, Option; kPa, psi, bar	
	0-1.0 Mpa	
Construction	Standard: anti-dust, anti-drip IP65 equivalent (IEC529-1989)	
Cam	Standard; Linear, Equal Option; non-linear characteristics	
Ambient temperature	Standard use (S); -20 to 83^{0}C Low temperature use (L); -50 to 60^{0}C High temperature use (L); 0 to 100^{0}C	
Weight	1.3kg	1.4kg
Material	Main body; Cast aluminium (special alumite treatment) Cover; PBT resin (containing glass fibre)/Cast aluminium…optional	

Characteristics	Single acting	Double acting
Linearity	±1％F・S	±1.5％F・S
Hysteresis	0.5％F・S	1.0％F・S
Repeatability	0.3％F・S	0.5％F・S
Sensitivity	0.2％F・S	0.5％F・S
Supply pressure change	0.2％/0.01MPa	0.3％/0.01MPa
Vibration resistance	1％/1G	
Posture error	0.2%／10°、4%／90°	
Air usage (Nl/min)	3 Nl/min /0.14 MPa	10 Nl/min /0.14 MPa
Max. Air treatment (Nl/min)	160 / 0.14 MPa Output side at max. open (orifice φ5)	370 / 0.4 MPa Output side at max. open (orifice φ5)

4. Installation Page 4

① Installation of Lever A and positioner

Install Lever A in advance to the previously prepared positioner, align the axes of Levers A and B and fix the positioner in position.

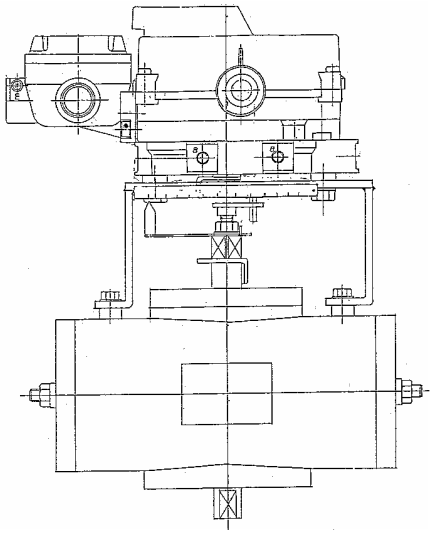
* When installing Lever A, rotate to R or D as displayed on the Cam shaft, depending on the required operation, (insert into each boss) and fix in place with a plugging screw.

* Non-alignment of the axes of A and B can lead to linearity errors.

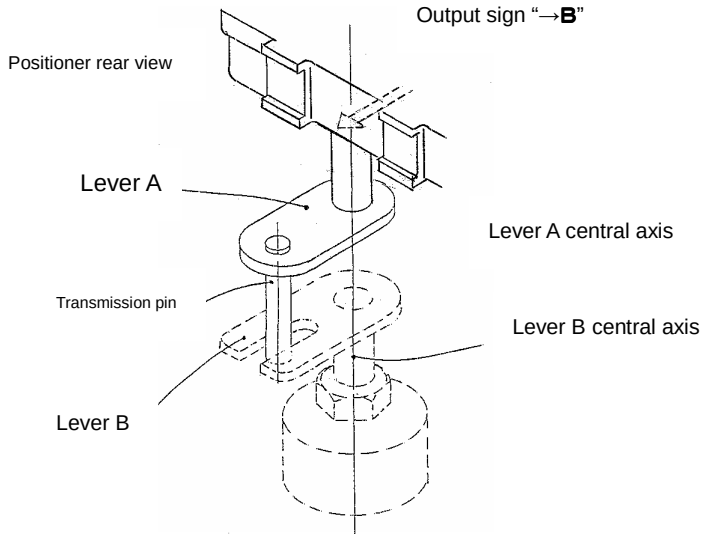
② Fixing Lever B in place

Next, at 50% valve open, turn A and B lever in the direction of B displayed on the rear of the positioner (adapter) and fix Lever B in the actuator stem.

(when specification is 90 degree valve open)

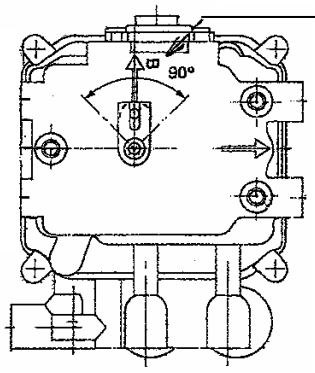


Actuator mounting



Lever mounting (50%)

Output sign "→B"



Positioner rear view

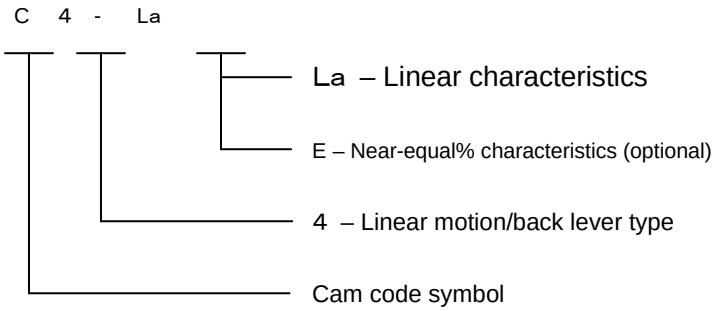
5. Cam Page 5

(1) Cam type and code

The valve operation (forward, reverse) can be changed without removing the single standard CAM installed.

The standard is linear characteristic, but with the option to choose near-equal% characteristic.

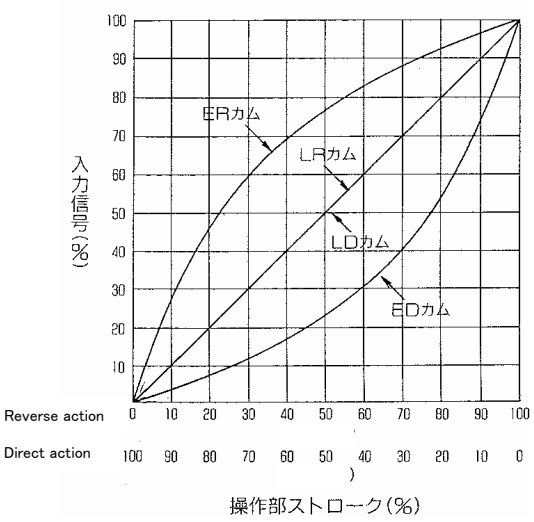
Unless otherwise specified, the default shipping setting is standard linear motion.



(2) Cam characteristics and specifications

The valve properties and CAM properties can be selected to suit the objectives of use.

The input signal and stroke are related as described in the diagrams below.



Cam specifications/applications

Cam code	Cam specifications/applications				
	Action	Char acter-istic	Cam angle/ actuator	Applicable actuator part (see ※1 below)	Cam shaft upper display (see ※2 below)
C7L-D	Rotary motion (concentric)	Linear	90°	Clockwise	
C7L-R		Linea	90°	Anti-clockwise	

※1 Clockwise or anticlockwise refers to rotating action as observed from above the rotary/actuator stem

※2 Fix lever in the direction of the relevant code

6. Pneumatic piping Page 6

(1) Pneumatic piping

1) The connection is selectable, either Rc1/4 or NPT1/4 as required. Please use the appropriate connector.

2) Ensure no foreign articles or cutting chips are contained in the piping by purging appropriately.

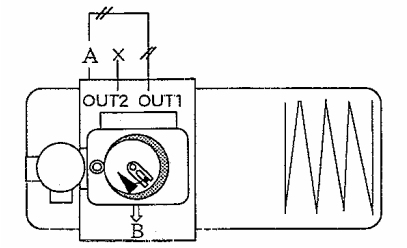
3) Use supply air that has been dried and filtered.

*** Use a filter around the supply air nozzle that has a filtration value of less than 5μ**

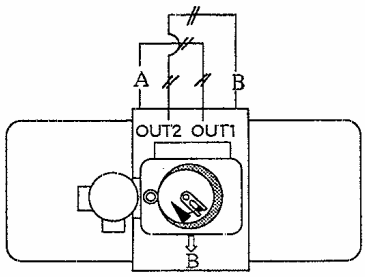
***Inappropriate supply air can cause malfunction and shorten the product's life.**

4) Regulate the supply pressure to the required pressure, using for example a Mini-set (pressure reduction valve with filter attached, provided by SSS).

5) When double acting type is used as a single acting type, blind OUT 2 connector nozzle (or OUT 1 when used as reverse action pilot), remove the pressure gauge and blind that port also.



Single action pneumatic piping



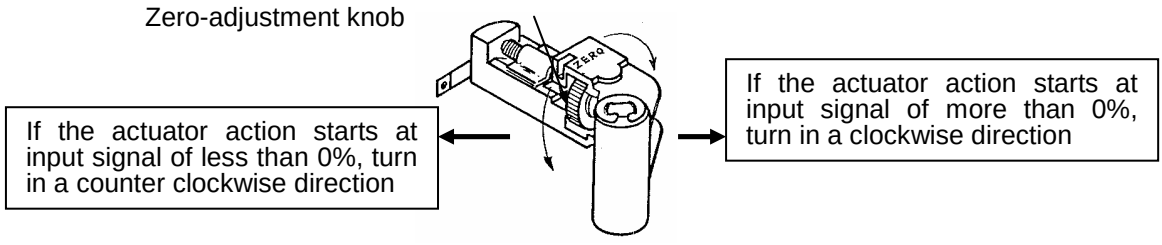
Double action pneumatic piping

＊ See page 8 for piping for anti-clockwise rotation of the actuator stem via increase in input current

7. Adjustment Page 7

(1) Zero point adjustment

1) Set input current to the stroke starting signal (20KPa) then turn the zero adjustment knob clockwise or counter clockwise. (Because the CAM has zero-falling, rising characteristics, adjust by the valve in closed position)



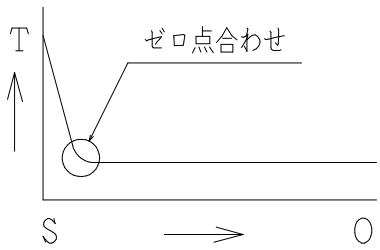
2) For Zero Point Adjustment, we recommend checking Output pressure adjustment as well as the stroke.

The table below shows output pressure when emphasizing tight-shut.

(Units: MPa)

Output pressure gauge	Double Acting		Single Acting	
	RA	DA	RA	DA
OUT1	0	MAX	0	MAX
OUT2	MAX	0	—	—

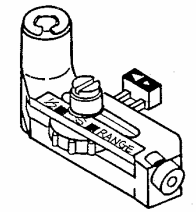
3) When torque is large when closed at the rotary valve, zero align at 5 to 10% (a level at which torque quickly becomes small) (see graph on right)



(2) Range adjustment

Adjust Range Adjustment so that an actuator stops at 0% position of the stroke by the 0% applied input signal and 100% position for 100% input signal respectively. (When Stopper or Valve Seat keeps staying at the 100% or 0% position of the actuator, the adjustment is made at the 10% - 90% position or, otherwise, 25% - 75% position)

Roller axle



Range adjuster

① First Zero Adjustment is carried out.

② Check the actuator stroke to be positioned at 100% position with the 100% applied input signal.

Checking for the input signal and stroke has to be done carefully because

over-ranged adjustment makes the actuator stroke over travelled, before the input signal is reaches 100%.

③ The range adjuster is ◁ ▷ accordingly. The large mark is to increase the range, the small mark is to decrease the range.

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④ The Range Adjuster can be free to move by loosening the Roller Shaft slightly using a screw driver.

Holding the Roller Shaft in place with the screw driver used to loosen the Shaft, move and adjust the Range Adjuster and lock it again. Do not loosen too much because the Roller Shaft will be slanted and its adjustment will become unreliable due to the zero-shifted stroke.

⑤ Range adjustment and zero adjustment is carried out alternately.

⑥ If Range adjustment cannot be achieved by full range movement of the Adjuster, check the position of the transmission pin on the feedback lever.

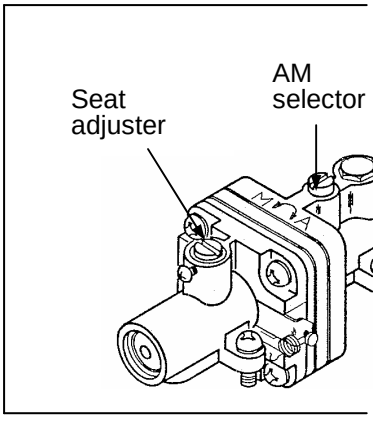
(3) Seat adjuster

1) The Seat Adjuster is designed to adjust the output pressure balance pressure, and is thus adjusted before the shipment for balanced output pressure (75% - 80% of supply air pressure). Thus, do not adjust unless you have accidentally turned the seat adjuster. Incorrect operation can result in malfunction.

2) Adjusting the balance pressure helps address the following issues. When adjusting follow the directions detailed on page 10. Contact SSS before carrying out any adjustments.

① Alleviates 'hunting' phenomenon (High Pressure Balance)

② Reduction in Hys. (shifting balance point)



(4) A/M Selector

A/M Selector is a valve for changing between Auto and Manual

1) When using in Auto mode, turn the Selector towards A (clockwise) until fast.

Use a torque equivalent to JIS or 6x100 screwdriver.

(Shipped products are set to Auto))

2) To use in manual mode turn the Selector to M (anti-clockwise).

(about one quarter to one and a half turns)

The actuator can be operated in manual mode using the supply pressure reducing valve. Not available for Single Acting-OUT2 and Double Acting.

(5) Linearity adjustment

Insufficient linearity can be caused by misalignment of CAM position (pointers position) when positioning the closed valve.

If this occurs, carry out micro adjustments on the bracket and/or clamp while checking the positioning of the pointers.

For adjustment range see page 4.

8. Change of operation Page 9

For anti-clockwise rotation of the actuator stem by increase in input current, follow the guidelines below.

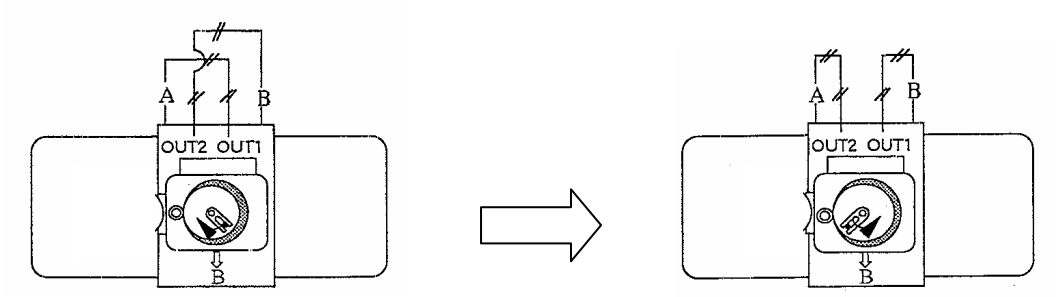
(clockwise and anti-clockwise refer to the direction of rotary actuator stem rotation as seen from above)）

(1) Double acting

① Flip OUT1, 2 wires.

② Switch the cam shaft lever installation from D to R, and at 50% valve open, turn A and B lever in the direction of →B displayed on the rear of the positioner (adapter) and fix Lever B in the actuator stem.

③ Adjust Zero and Span adjustments.

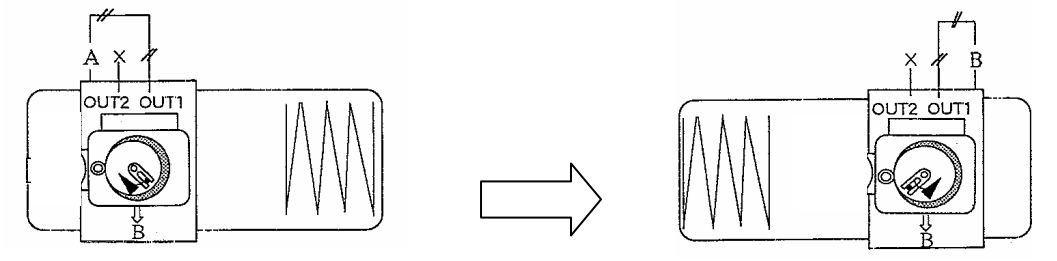


Clockwise rotation by increase in input signal

AntiClockwise rotation by increase in input signal

(2) Single acting

After carrying out the same procedure as ② above, carry out zero adjustment and range adjustment to complete the process.



Clockwise rotation by increase in input signal

AntiClockwise rotation by increase in input signal

※ For reverse direction pilot (lower output through increase in input current), flip output piping and output pressure gauge to OUT2. Move screw plug to OUT1 side.

9. Maintenance Page 10

9 – 1 Regular inspection

Carry out regular inspections for maintenance. Refer to the Regular Inspection Manual below.

Refer to pages 1, 2 and 15 for unit names and position of parts.

Regular Inspection Manual

○ Check (Replace defective parts) ◇ Checking and Cleaning ■ Replace △ Checking and Greasing

Unit	Check point	Checking period (Year)										Summary of checking contents
		0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	
Base & Cover	Supply pressure filter Pressure gauge Cover packing		◇ ○		○		◇ ○ ○		○		◇ ■ ■	Alien objects, dust etc. Indication error Defects
Zero & & Range Arm	Shaft holder Bearing Zero-adjustment plate		△				△ ○				△ ○ ○	Greasing Damage, wear Wear
Cam & Lever	Cam Plate Cam Shaft/Spring Transmission Pin Cam Shaft packing		△ ○				△ ○ ○				○ △ ○ ■	Wear Wear/Greasing Wear Defects
Input chamber unit ※1	Flexure spring Nozzle, flapper		◇				◇				◇ ◇	Loose screws Dirt/Wear&Tear
Pilot Relay ※3	Fixed Orifice Filter mesh (when cleaner attached)		○		○		○		○		■	Dirt, clogging

Note1. Dismantling the input chamber unit (※1) can harm the **performance of the explosion-proof characteristics and is prohibited**.

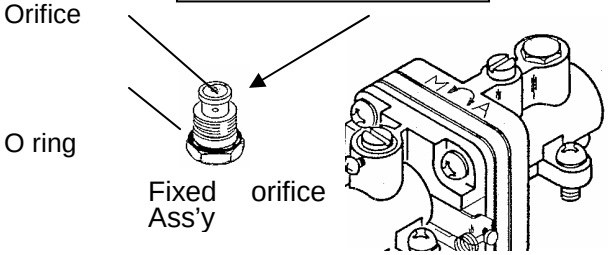
Note 2. Dismantling the Pilot Relay Unit (※3) can harm the **performance of the explosion-proof characteristics and is prohibited**.

Note 3. Change the Pilot Relay Unit every five years using the units provided.

＊Determine the exchange period based on the conditions of use (frequency, opening and closing speed) and ambient range of temperature.

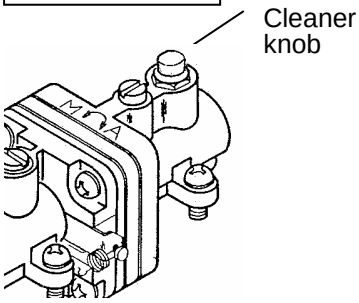
Note 4. Check that the supply air source is stopped and there is no residual pressure before cleaning the orifice (※4).)

No-cleaner type



Remove the orifice Ass'y from the pilot relay unit, and clean with 0.3 diameter piano wire and purified air.

Cleaner type



Push the cleaner knob (red), and dispose of rubbish

9 – 2 Replacing or changing unit parts Page 11

(1) Replacing pilot relay unit

Before replacing parts, always cut off the supply air pressure and check that no residual pressure remains.

Removing

① Remove the stabilizer spring from the hanger using a pin set.

* Be careful not to bend or stretch the stabilizer spring.

② Remove the four installation screws (M4 small cross hole screws: CN4-12WFWS), and remove the Pilot Relay Unit.

* When removing, check to make sure that O-ring on the Pilot Relay side is not still attached to the base side.

If it is still attached then remove.

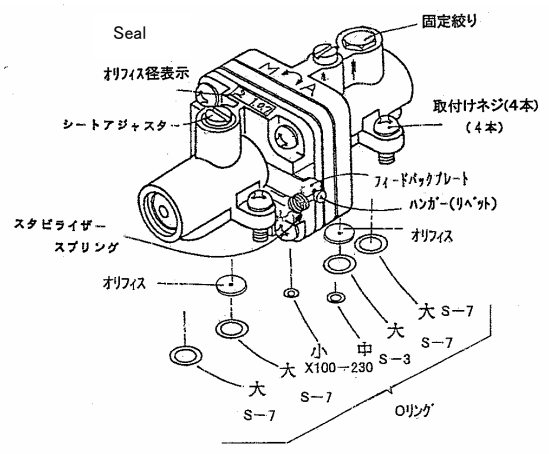
Installation, checking

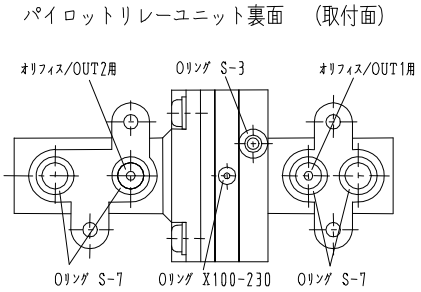
① Before installing the new Pilot Relay Unit, check that all the O-rings on the install seating are attached.

<u>Check particularly for S-3 and X100-230 O-rings, which are small and can get lost during removal of the unit.</u>

② Set the new Pilot Relay Unit on the base, fix in place with the four installation screws and then hang the stabilizer spring from the hanger.

③ Before finishing the operation, check the operation and hysteresis. Check that there is no air release sound to indicate air release from the base of the Pilot Relay Unit installation. A loud hissing sound could suggest major air release, in which case check that the O-rings are attached correctly.





Pilot relay unit

(2) Changing the orifice

When using small capacity actuator, hunting (or overshooting) may occur. If this happens, replace the actuator capacity on the orifice on the Positioner output side (Pilot Relay attachment) in accordance with the guidelines below.

Actuator capacity (litres)	Orifice diameter (φ)
0.5～0.7	0.7

1.0	1.0
2.0＜V	2.0, 5.0 (when increasing action speed

① After removing the Pilot Relay Unit following the replacement guidelines in (1) above, remove the 0-ring (S-7) for use in the unit rear seat pressure output OUT1 and OUT2, and the orifice to be replaced.

② After replacing with the specified orifice, attach the O-ring (S-7), and install the Pilot Relay Unit and Stabilizer Spring.

＊ Circle the appropriate figures for the diameter of the new orifice on the orifice diameter sticker.

③ After replacement, follow the guidelines above, and check activity and functionality.

(3) Changing to equal % Cam characteristics Page 12

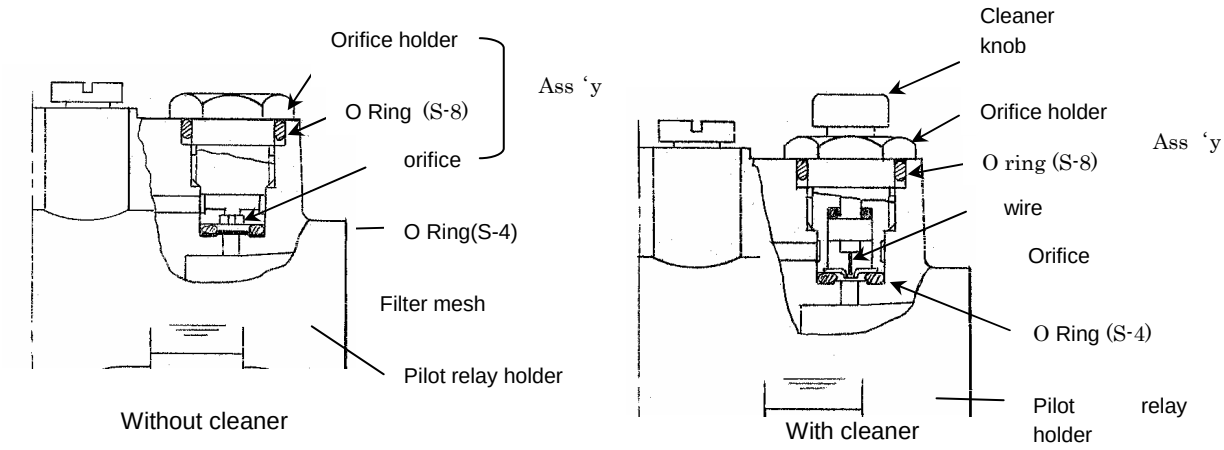
① After removing the Positioner side A Lever, remove the Adaptor mounted on the rear surface of the base.

② After converting for Equal % the CAM Ass'y (CAM and CAM shaft) installed in the Adaptor, reassemble as per the original assembly, carry out Zero and Span adjustment and check operation.

(4) Replacing orifice Ass'y

The orifice Ass'y comes in versions with cleaner attached and without cleaner. (Internal construction differs. See diagram below.)

Follow the guidelines below when converting from non-cleaner to cleaner-attached versions to avoid problems arising from quality of supply air. (<u>When converting make sure the supply air is turned off and that there is no residual pressure</u>).)



① Use an auxilary 10 spanner and remove the orifice Ass'y from the Pilot Relay Menu.

② Using a tool such as tweezers, remove the O-ring and filter mesh from the bottom of the hole left by the removal of the orifice Ass'y. (Use new O-ring's for the O-ring (S-4)

③ If the orifice Ass'y installation holes are dirty, clean by method such as applying air pressure to the area.

④ Re-attach the O-rings (S-4) to the holes. (Do not use the filter mesh)

⑤ Remove the orifice Ass'y and check operations.

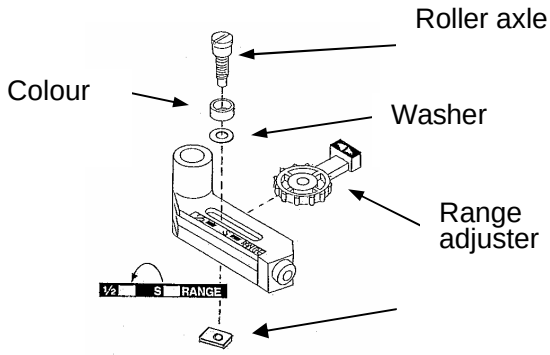
＊ At this point check that O-ring (S-8) is attached to the orifice Ass'y.

(5) Changing to split range

When converting to Split Range remove the roller shaft as shown below, then adjust as described above after repositioning the Range Adjuster gears to the 1/2 mark.

For 4-12mA range: Adjust to 4mA at 0% and 12mA at 100%.

For 12-20mA range: Adjust to 12mA at 0% and 20mA at 100%.



1) No operation despite application of input signal

Identification and assessment of problems can be done by gently moving the flapper holder (with flapper attached) by hand, attaching it to the nozzle and checking the output pressure.

Check at counterblock	Cause	Action
When counterblock is moved, output pressure is activated/switched normally	Incorrect wiring (+/-)	Tighten or correct wiring
	Torque motor is open or short circuited	Replace motor （※）
	Loose or incorrectly mounted feedback lever	Tighten or re-mount
When nozzle is closed at counterblock, OUT1 is raised and at a constant level	Orifice or cleaner orifice is jammed	Clean or replace/press cleane knob
	Incorrect replacement of A/M selector	Tighten towards arrow A
	Incorrect flapper contact, broken flapper	Replace motor （※）
When nozzle is open at counterblock, OUT1 is raised and at a constant level	Low or no supply pressure	Check DP Valve, or original pressure
	Jammed nozzle	Replace motor （※）
	Faulty pilot relay unit	Replace pilot relay unit

2) Malfunctioning operation

Issue	Cause	Action
Incorrect zero position	Loose feedback lever connection	Tighten and readjust
	Metal material near cover	Remove materials and readjust
Wrong stroke	Transmission pin wrongly positioned	Tighten and readjust
	Cam wrongly positioned	
	Loose range adjuster roller shaft	
Operation is not smooth	Loose set or lock screws	Tighten and readjust
	Cam shaft worn out	Replace if backlash is too big
Wrong linearity	Feedback lever setting is wrongly positioned	Correct setting
	Cam is worn out	Replace cam and readjust
Response time is slow (both wasy)	Supply port screen is clogged	Clean
	DP valve filter is clogged	Replace filter
Extremely slow response (one way, OUT1 pressure hard to raise	A/M selector not completely closed	Rotate to arrow
	Clogged orifice	Clean or replace
	Incorrect contact between nozzle and flapper	Replace motor （※）

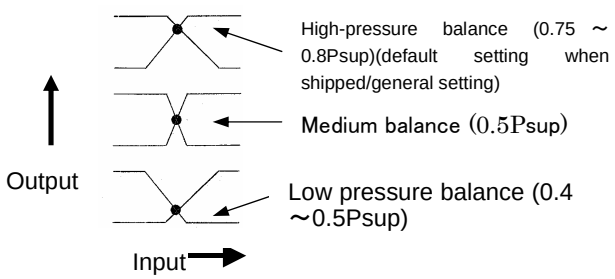
※Motors returned to SSS will be replaced

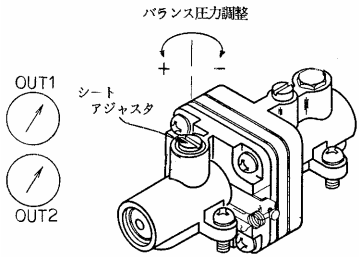
3) Poor Performance Page 14

Issue	Cause	Action
周期の速いハンチング	Fixed orifice becoming clogged	Clean or replace
周期の遅いハンチング	Grand packing worn out	Increase the actuator size
	Insufficient actuator strength	Replace grand packing or increase actuator size
	Pilot relay balance pressure too low	Adjust seat adjuster （※）
オーバーシュート	Pilot relay balance pressure too low	Adjust seat adjuster（※）
	Delayed transmission of feedback circuit	Check wearing and backlash
ジャンピング動作	Insufficient actuator torque	Increase the actuator size
ノッキング動作	Pilot relay balance pressure too low	Adjust seat adjuster （※）
	Actuator defect	Switch to manual mod, check and repair
	Lack of supply pressure capacity or clogged SUP filter	Increase DP valve size and clean or replace
ヒスが大きい	Feedback circuit is worn	Tighten loose screws/replace defective equipment
	Balance pressure not adjusted	Readjust seat adjuster （※）
感度が悪い	Problem with balance pressure	Readjust seat adjuster （※）
	Damaged, dirty or mispositioned nozzle/flapper	Replace torque motor (SSS will replace)

（※） Adjusting the Seat Adjuster

If the Seat Adjuster is turned in the wrong direction, and emergency recovery is required, follow the guidelines below.





① ・So that the actuator balances at arbitrary intermediate values (other than at full-open or tight-shut), change the input signal appropriately and check the internal air pressure of the balance point cylinder.

(Warning: When air escapes from between the positioner and actuator, the balance point becomes lower)

② When lowering the balance point, rotate the Seat Adjuster clockwise, and when raising

the balance point rotate in an anti-clockwise direction.

(After rotational adjustment (about 1/10 of a full rotation), change the input signal and check the output pressure balance point.

If the value falls outside the standard range for adjustment, rotate slightly in either direction as required.

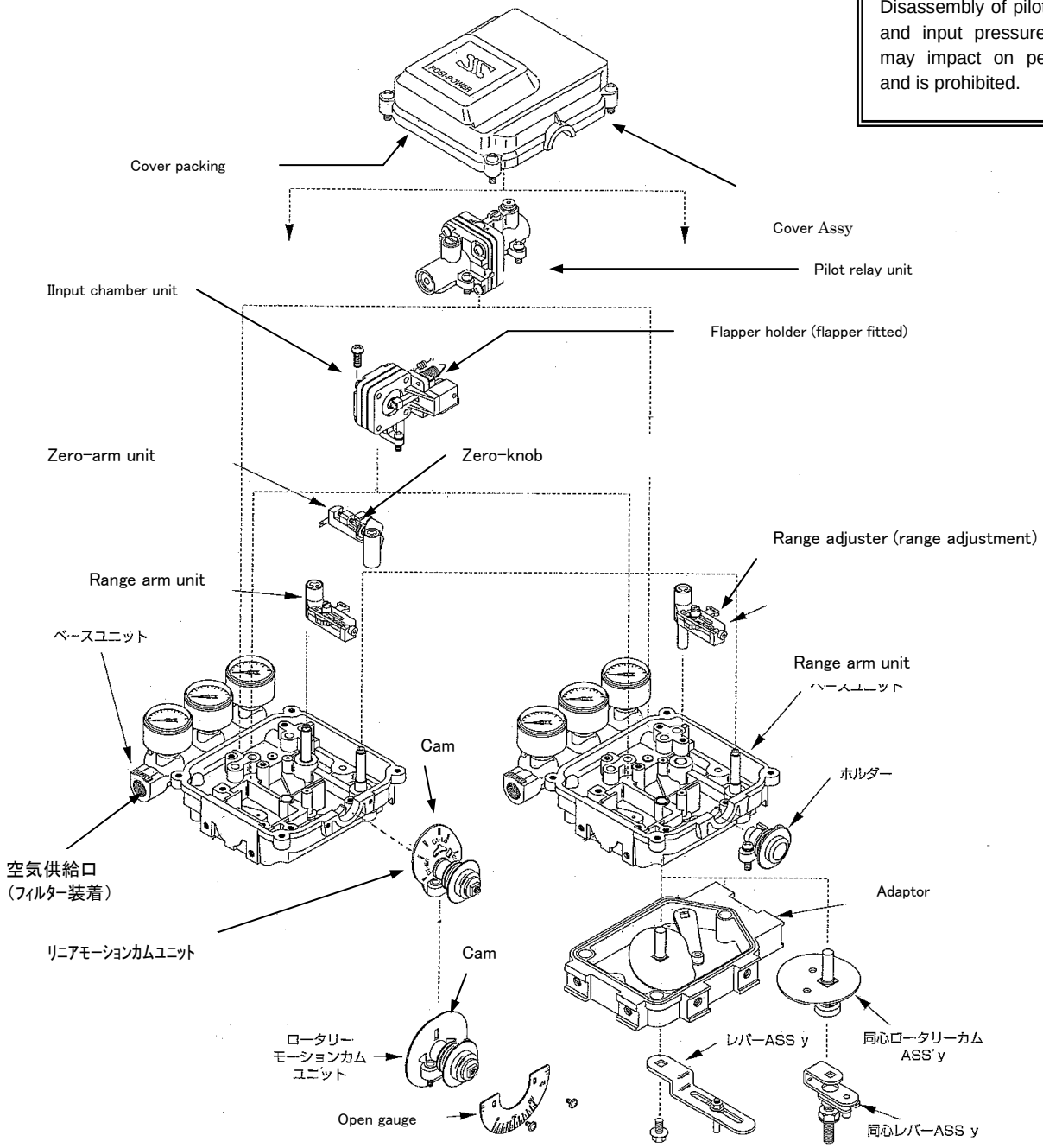
The maximum rotation range is 1/4 of a full rotation. Excessive rotation will damage the unit.

A difference in the effective surface area of pistons on either side, a spring inserted from one side, heavy loading can all cause pressure difference between OUT1 and OUT2. In such cases, set a high standard pressure.

11. Part names (common to XP models) Page 15

―Disassembly prohibited―

Disassembly of pilot relay unit and input pressure chamber may impact on performance and is prohibited.



S1	S3	B4	**B7**
Linear motion (Side lever type)	Rotary motion (Link lever type)	Linear motion (Back lever type)	Concentric motion (Back lever type)

12 Model notation Page 16

Basic model								Auxiliary Model			
1		2		3		4		5 a		5 b	
Unit		Series		Housing		Functions and connections		※ Ambient Temp. Range		Mounting method	
XP	Pneumatic	**1**	100 Series	**0**	Standard Type	**1**	Rc(PT)1/4 Single acting	**S**	Standard: -20 ～ 83℃	**S1**	Linear motion/ Side lever type
						2	Rc(PT)1/4 Double acting			**S3**	Link type Rotary motion
						3	NPT1/4Single acting			**B4**	Linear motion/ Back lever type
						4	NPT1/4Double acting	L	−50～60℃	**B7**	Concentric Rotary motion
						5	Rc(PT)1/4 Position transmitter	H	0～100℃		
						6	NPT1/4 Position transmitter				

Additional model											
6		7			8		9		10		
※2 Outlet Pressure gauge		Pilot Relay/Orifice			Input current		Cam		Lever & Clamp		
M2	0.2.0MPa	Standard Type			**B1**	20～100 KP a	**C1a**	Linear motion/45^0 4Phase linear/Eq%	L○○	Linear motion/side lever type Multi-stage lever combined with clamp	
		Cleaner		Orifice Dia							
M4	0.4MPa	No	Yes		**B2**	20～60 KPa	**C3L**	Linear/rotary/90^0 2Phase/linear	I○○	Multi-stage lever combined without clamp	
		F1	Q1	ϕ5							
M0	1.0MPa	**F2**	**Q2**	ϕ2(STD)	**B3**	60～100 KPa	C3E	Linear/rotary/90^0 2Phase/Eq%	D00	Direct lever combines/with clamp	
		F4	Q4	ϕ1.0							
K2	200kPa	F5	Q5	ϕ0.7			C3B	Linear/rotary/90^0 2Phase/square-law	D00	Direct lever combines/without clamp	
		F6	Q6	ϕ0.45							
K4	400kPa	Stability type					C3P	Linear/rotary/90^0 2Phase/reverse Eq%	K○○	Linkage lever type rotary motion Linkage lever combined/with clamp	
		G1	J1	ϕ5.0							
K0	1000Kpa	**G2**	**J2**	ϕ2(STD)			**C4La**	Linear motion/45^0 4Phase/linear	K○○	Linkage lever combined/without clamp	
		G4	J4	ϕ1.0							
P2	30psi	G5	J4	ϕ0.7			**C7L**	Rotary/concentric/ 90^0 2Phase/linear	H00	Linear motion/back lever type L type lever combined/with clamp	
		G6	J6	ϕ0.45							
P4	60psi	High Rangeability Type							h○○	L type lever combined/without clamp	
		R1	T1	ϕ5.0							

P0	150psi						V○○	Concentric rotary motion Concentric rotary combined/M8 screw combined
B2	2bar							
B4	4bar							
B0	10bar							

Note) Model notation in bold type is for standard and in normal type for optimal specifications

※ 1. The explosion proof type is only available for the standard product(s)

※ 2. Contact SSS for psi, bar displays

※<u>Motors returned to SSS will be replaced</u>