

SERVICE INSTRUCTIONS	No.	01-50762E (TA2-0402) 01-50696E (TA2)
	Date	2016-09-01
	Notification number	SP-1004
NAME Pneumatic Actuator	Model number	TAD, TAO, TAC (φ40~160)

1. Safety Precautions
2. Outline
3. Specification
4. Operation Principle
5. Structure

 **NIPPON VALVE CONTROLS, INC.**



KONAN ELECTRIC CO.,LTD.

1. Safety Precautions

- Read this instruction manual carefully before use to prevent serious accidents or personal injury, and to use the actuator correctly.
- Warnings and cautions shown here do not cover all occasions. Read this instruction manual carefully and use it with safety first principle.

APPLICATION



WARNINGS

- Use compressed air only. Do not use other fluid. When you need to use other fluid than air, please contact us.
- Do not use this actuator with pressure over the maximum working pressure. It may result in breakage of the equipment or malfunction.



CAUTIONS

- Do not use this actuator with pressure less than the minimum working pressure.
- Do not use this actuator at the speed over the maximum rotational speed. It may result in breakage of the equipment.
- As for operational fluid, use clean air only filtered by an air filter (less than 40μ).
- Non-oiling is necessary for this actuator. If you need oiling, supply lubricants using a lubricator for compressed air. As for lubricants, use turbine oils Class 2 ISO VG32 or equivalent. Note that if oiling is once started, do not use it under non-oil state. It may result in short service life of the equipment.
- Do not apply a static load over the maximum output torque to the output shaft.
- Do not attempt to step onto the product or apply a heavy load or excessive shock from the outside.
- Install so that axial load and transverse load is not applied to stem.
Apply the stopper to the axis on the load side. (Do not use the spindle of the actuator as a stopper.)

ENVIROMENTS



WARNINGS

- Do not use this actuator with temperature over the maximum working temperature. It may result in breakage of the equipment or malfunction.



CAUTIONS

- Do not use this actuator with temperature less than the minimum working temperature.
- When this actuator is used under low temperature condition less than 5°C, use an air dryer and the like to prevent accumulation of drains and occurrence of freezing. It may result in breakage of the equipment or short service life of the equipment.
- When single acting type is used outdoors or at such a place where it is exposed to water splash, provide an elbow and the like to the breathing port to prevent entry of water or rainwater.
- When single acting type is used at such a place where much powder dust exist provide a filter (silencer) to the breathing port to prevent entry of powder dust.
- When using it in the environment of anti-oil (Ex. Clean room), please ask us. There is no gasket between Spring Unit and Body, therefore it has potential that the inside grease leaks to outside. Need to take preventive measures against it. Air exit port also needs the preventive measures.
- When this actuator is used under salt damage where seawater is splashed to it, use those processed by salt-proof treatment. Please contact us for products processed by salt-proof treatment.
- Do not use this actuator at such a place where it is exposed to chemicals, solvents or corrosive gas.

PIPING



CAUTIONS

- Do not remove a dust-proof cap provided to piping port before piping work starts.
- Carry out piping works taking care so that foreign matters such as dust or sealing materials may not enter into equipment interior. Before connecting pipes, be sure to clean inside by flushing using compressed air.
- When screwing in a joint to piping port, do not exert an excessive force.
- When steel pipes are used, be sure to use galvanized pipe and remove any burr generated by screw thread cutting.

OPERATIONS



WARNINGS

- At starting, be sure to apply a pressure to the cylinder chamber at exhaust side. If started while exhaust side cylinder chamber is in atmospheric state, the load will change suddenly and this is very dangerous.
- When the speed control valve makes speed regulation, open the valve slowly from closed condition. If speed regulation is attempted with valve open condition, the load will change suddenly and this is very dangerous.



CAUTIONS

- As for regulation of rotational angle, first loosen the lock nut and adjust the angle regulating screw. Upon completion of regulation, be sure to fasten the lock nut and secure the angle regulating screw. (φ50~160)

MAINTENANCE AND INSPECTION



WARNINGS

- Start maintenance and inspection after confirmed that the load is stopped and locked.
- When removing or dismounting the product, be sure to disconnect the power supply (electricity and compressed air) and release residual pressure thoroughly in the equipment and piping.
- When removing a spring unit of single acting type, first loosen the angle regulating screw completely before removal. (φ50~160)
- Never attempt to disassemble a spring unit of single acting type. If disassembled forcibly, internal parts may jump out and this is very dangerous. In the event any disassembly and inspection is necessary, please contact our local agent.



CAUTIONS

- Inspection interval depends on frequency of use and conditions. So, determine the interval according to results and provide periodical inspection (at least once a year).
- Before disassembly, check internal construction of the product carefully. You should be acquainted with its construction.
- At disassembly and inspection, be sure to replace consumable parts in the products (packings, gaskets), and replenish grease before assembly. As for consumable parts, use [Spare parts kit] sold separately. As for grease, use following brand. MOBILUX EP2 (Mobil Oil: Lithium family grease) or equivalent.

2. Outline

TA series is a pneumatic actuator capable of 90 degree rotation which is fitted with ball valves or butterfly valves, and is used for the purpose of automatic opening and closing of them.

φ40

The Rack & Pinion mechanism introduced into the construction enables it to produce a constant torque at the actuator stroke.

φ50~160

The scotch yoke mechanism introduced into the construction enables it to produce a maximum torque at the actuator stroke end has a suitable output characteristic for the valve opening and shutting. In mounting actuator to valves, the female fitting square hole of spindle makes direct mounting possible and does not require any particular space for mounting.

3. Specifications

3-1. Model code

T:A:① - ②:

①Actuator Type

Code	Operation	Working	
D	Double Acting Type	Air to port A: SHUT.	Air to port B: OPEN.
O	Single Acting Type	Air to intake port: OPEN.	Spring return: SHUT.
C	Single Acting Type	Air to intake port: SHUT.	Spring return: OPEN.

*3way: SHUT/Position-1, OPEN/Position-2

②Size

Code	040	050	063	080	100	125	160
Bore size (mm)	φ40	φ50	φ63	φ80	φ100	φ125	φ160

- 3-2. Operating fluid : Compressed air
 3-3. Operating pressure : 0.3~0.7MPa
 3-4. Proof pressure : 1.05MPa
 3-5. Operating temperature : -5~60°C

(In case of 5°C or less, ensure to be removed any water contained for prevention of freezing.)

3-6. Operating speed	φ40~100	φ125	φ160
	Max. 90°/1s	Max. 90°/2s	Max. 90°/3s

3-7. Rotating angle	φ40	90°
	φ50~160	90° (Angle adjustment range: ± 5° both end)

3-8. Air consumption To be calculated by following equations.

V = Air consumption per one reciprocating action (ℓ) (ANR)

TAD	TAO, TAC
$V = 2A \times \left(\frac{P+0.1013}{0.1013} \right)$	$V = A \times \left(\frac{P+0.1013}{0.1013} \right)$

P = Operating pressure (MPa)

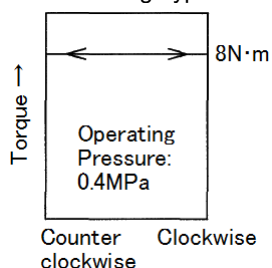
A = Actuator displacement (ℓ)

	A	
	TAD	TAO, TAC
φ40	0.055 ℓ	0.225 ℓ
φ50	0.09 ℓ	0.34 ℓ
φ63	0.17 ℓ	0.67 ℓ
φ80	0.33 ℓ	1.26 ℓ
φ100	0.68 ℓ	2.62 ℓ
φ125	1.36 ℓ	4.44 ℓ
φ160	2.78 ℓ	8.77 ℓ

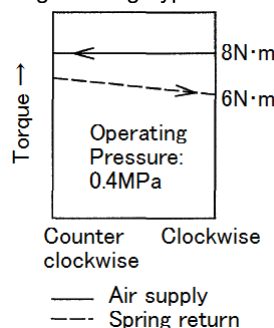
3-9. Output Torque

φ40

Double Acting Type



Single Acting Type



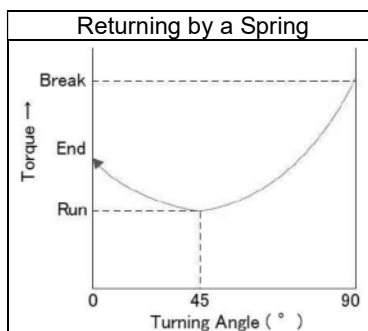
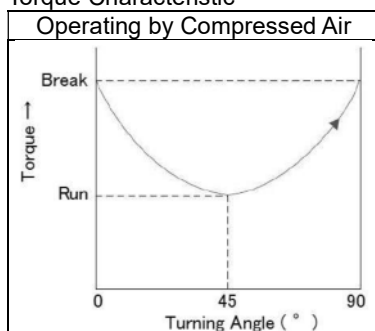
Output Torque (Double-Acting Type)

Operating pressure	0.3MPa	0.4MPa	0.5MPa	0.6MPa	0.7MPa
φ40	5.5N·m	8N·m	10N·m	12N·m	14N·m

Torque (Spring)

at 0.4MPa	Break	End
φ40	6.8N·m	6N·m

φ50~160 Torque Characteristic



Double-acting and Single-acting air torque (N·m)

	Operating pressure									
	0.3MPa		0.4MPa		0.5MPa		0.6MPa		0.7MPa	
	Break	Run	Break	Run	Break	Run	Break	Run	Break	Run
φ50	14.7	8.8	20.6	11.8	25.5	14.7	30.4	17.6	35.3	20.6
φ63	29.4	16.7	40.2	22.5	50	27.4	59.8	33.3	70.6	39.2
φ80	59.8	33.3	80.4	45.1	100	55.9	120.5	67.6	140.1	78.4
φ100	116.7	65.7	156.8	88.2	196	109.8	235.2	132.3	274.4	153.9
φ125	231.4	130.4	296	176.4	369.5	220.5	443.9	264.6	539.4	308.7
φ160	477.6	269.7	646.8	367.5	808.5	458.6	970.2	550.8	1127	642.9

Single-acting Type (spring return)

	spring torque (N·m)		
	Break	Run	End
φ50	26.8	12.4	17.1
φ63	56.6	25.2	32.6
φ80	109.3	49.3	65.4
φ100	226.8	100.5	129.3
φ125	366.5	175.9	257
φ160	795.9	375.1	533.3

4. Operation Principle

4-1. Outline of the construction

With single acting type (spring return), the spring is compressed by the exclusive piston while operational air is pressurized. So, air pressure output torque will be identical with that of double acting type.

φ40

Actuator is a Rack & Pinion mechanism introduced construction in order to convert linear motion to rotating motion through Rack & Pinion.

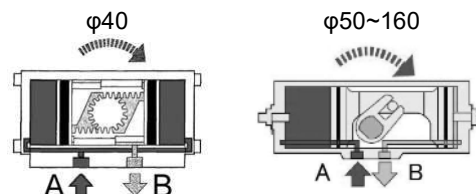
φ50~160

Actuator has Scotch yoke type construction. Piston liner motion is converted into rotational movement via pin and yoke.

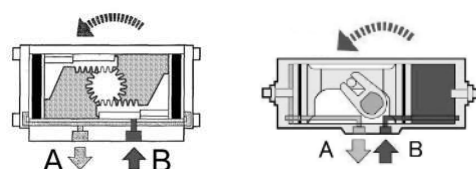
4-2. Operation explanation (View from the top of the actuator.)

T A D

- Air to port A: SHUT.
Exhaust from port B.
Actuator is rotates clockwise as viewed from above.

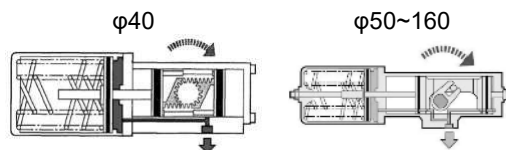


- Air to port B: OPEN.
Exhaust from port A.
Actuator is rotates counterclockwise as viewed from above.

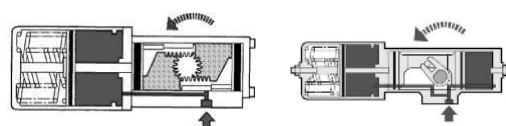


T A O

- Spring return: SHUT.
Actuator is rotates clockwise as viewed from above.

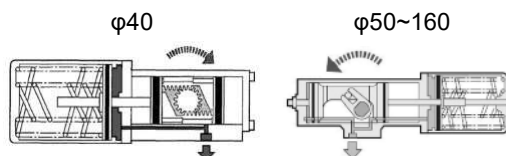


- Air to intake port: OPEN.
Actuator is rotates counterclockwise as viewed from above.

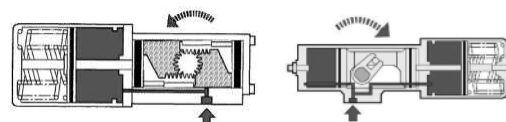


T A C

- Spring return: OPEN.
Actuator is rotates counterclockwise as viewed from above.



- Air to intake port: SHUT.
Actuator is rotates clockwise as viewed from above.



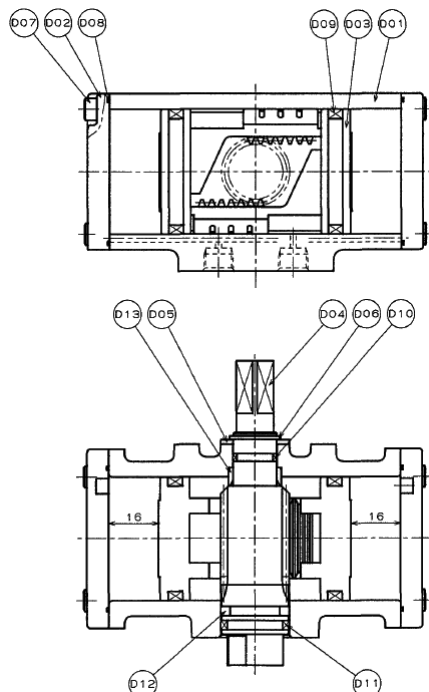
4-3. Adjustment of rotational angle (φ50~160)

- Adjustment of rotational angle is made by an adjustment screw provided to the flange or spring cover (single acting type).
- Position of termination of piston action is adjusted.
- When you need to widen the rotational angle, turn the screw counterclockwise to put it outside.
- When the rotational angle should be narrowed, turn the screw clockwise to put it inside.

5. Structure

5-1. $\phi 40$

Double Acting Type



D13	Bush	C3604	1
D12	Ring	Nylon	1
D11	Gasket	NBR	1
D10	Gasket	NBR	1
D09	Piston packing	NBR	2
D08	Flange gasket	NBR	2
D07	Hex. socket bolt	SCM435	8
D06	Stop ring	SUP	1
D05	Washer	Nylon	1
D04	Spindle	S45C	1
D03	Piston	Zn	2
D02	Flange	ADC12	2
D01	Body	ADC12	1
ITEM	PART NAME	MATERIAL	Q'TY

At the time of re-assembling, assemble the spindle (D04) and the piston (D03) at the sight position and the sight direction according to the drawing.

And be sure to assembling the spindle after pushing the two pistons in to the body (D01) to the depth from the both side.

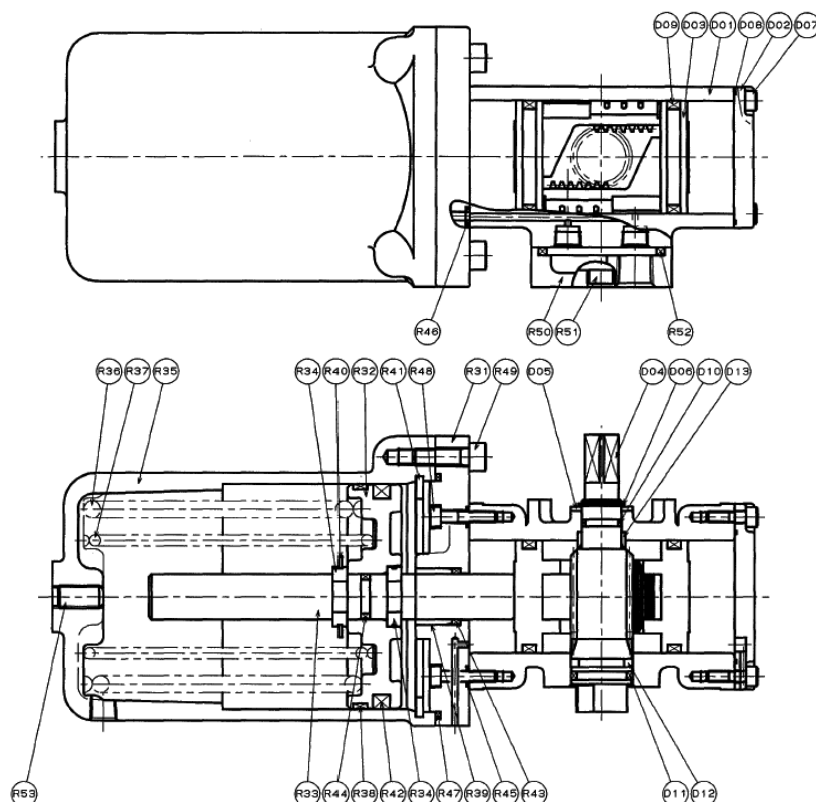
After assembling the spindle and the body, confirm the dimension from the end face of the body to the piston. Be careful about the direction of the gasket (D08) and the flange (D02).

Their directions are decided.

Single Acting Type

⚠ WARNINGS

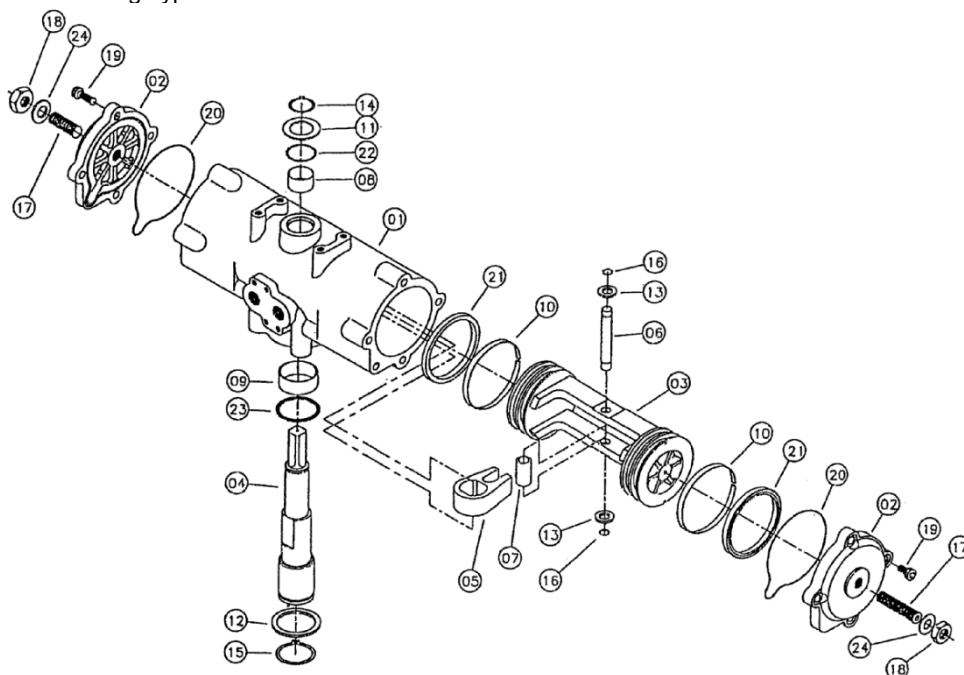
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D13	Bush (A)	C3604	1
D12	Ring	Nylon	1
D11	Gasket	NBR	1
D10	Gasket	NBR	1
D09	Piston packing (A)	NBR	2
D08	Flange gasket (A)	NBR	1
D07	Hex. socket bolt	SCM435	4
D06	Stop ring	SUP	1
D05	Washer	Nylon	1
D04	Spindle	S45C	1
D03	Piston (A)	Zn	2
D02	Flange (A)	ADC12	1
D01	Body	ADC12	1
ITEM	PART NAME	MATERIAL	Q'TY

R53	Hex. socket set screw	SCM435	1
R52	Gasket	NBR	1
R51	Hex. socket bolt	SCM435	2
R50	Plate	ADC12	1
R49	Hex. socket bolt	SCM435	4
R48	Hex. socket bolt	SCM435	4
R47	Flange gasket (B)	NBR	1
R46	Gasket	NBR	2
R45	Gasket	NBR	4
R44	Rod gasket	NBR	1
R43	Rod packing	NBR	1
R42	Piston packing (B)	NBR	1
R41	Stop ring	SUP	1
R40	Stop ring	SUP	1
R39	Bush (B)	SBK1218	1
R38	Guide band	Nylon	1
R37	Spring (B)	SWP	1
R36	Spring (A)	SWP	1
R35	Spring cover	ADC12	1
R34	Key	SS400	2
R33	Piston rod	S45C	1
R32	Piston (B)	ADC12	1
R31	Flange (B)	ADC12	1
ITEM	PART NAME	MATERIAL	Q'TY

5-2. $\phi 50 \sim 100$
Double Acting Type

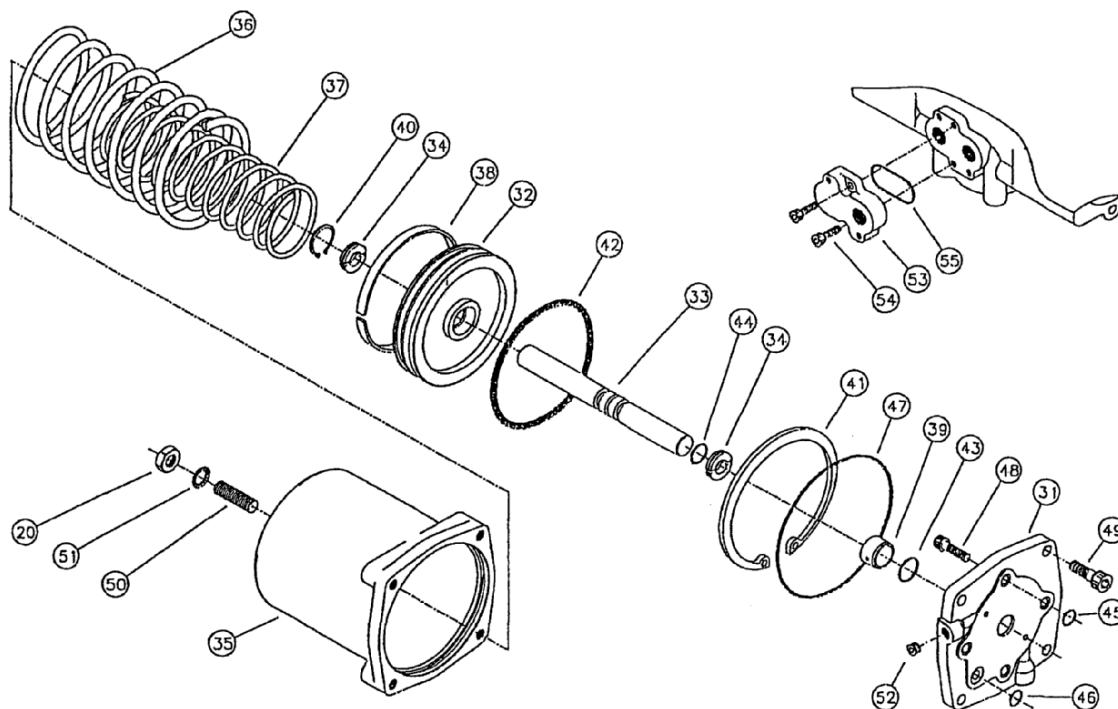


ITEM	PART NAME	Q'TY
01	BODY	1
02	FLANGE	2
03	PISTON	1
04	SPINDLE	1
05	ARM	1
06	PIN	1
07	RING	1
08	BUSH	1
09	BUSH	1
10	WEAR RING	2
11	WASHER	1
12	WASHER	1
13	WASHER	2
14	STOP RING	1
15	STOP RING	1
16	STOP RING	2
17	SET SCREWS	2
18	NUT	2
19	BOLT	8
20	FLANGE GASKET	2
21	PISTON PACKING	2
22	SPINDLE PACKING	1
23	SPINDLE PACKING	1
24	SEAL WASHER	2

Single Acting Type (Spring unit Structure)

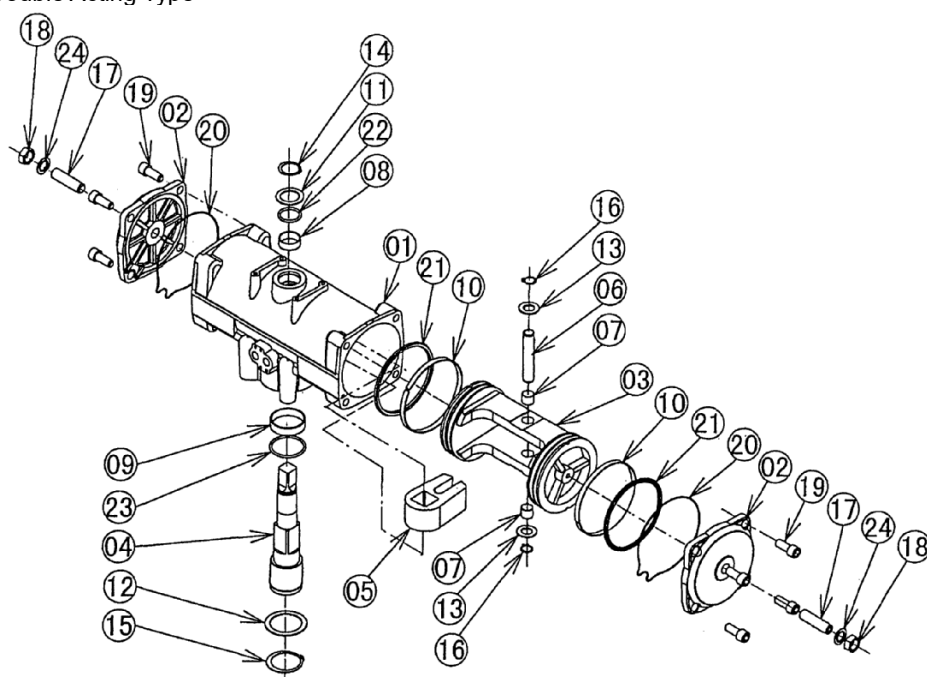
⚠ WARNINGS

This illustration is just for easy understanding of the construction. Never attempt to disassemble the spring unit. (Never remove Item No. [41] Stop ring.) Whenever you need any disassembly, please contact your local agent.



ITEM	PART NAME	Q'TY	ITEM	PART NAME	Q'TY	ITEM	PART NAME	Q'TY
31	FLANGE (B)	1	41	STOP RING	1	51	WASHER	1
32	PISTON (B)	1	42	PISTON PACKING	1	52	PLUG	1
33	PISTON ROD	1	43	ROD PACKING	1	53	PLATE	1
34	KEY	2	44	ROD GASKET	1	54	BOLT	2
35	SPRING COVER	1	45	GASKET	4	55	GASKET	1
36	SPRING (A)	1	46	GASKET	1			
37	SPRING (B)	1	47	FLANGE GASKET	1			
38		1	48	BOLT	4			
39	BUSH (C)	1	49	BOLT	4			
40	STOP RING	1	50	SET SCREW	1			

5-3. $\phi 125 \sim 160$
Double Acting Type

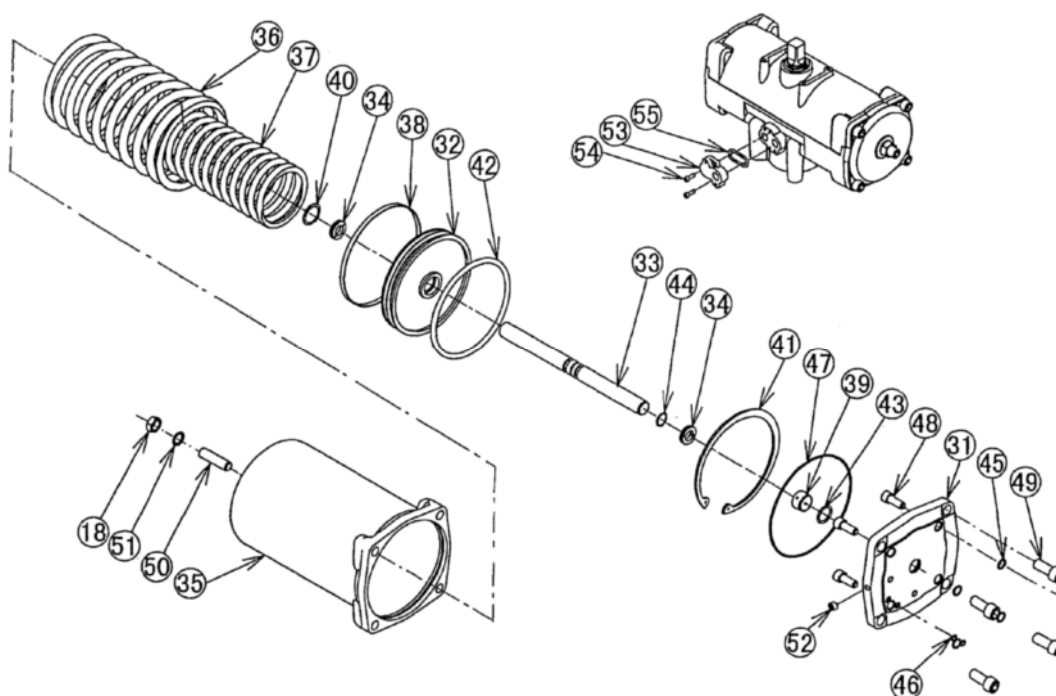


ITEM	PART NAME	Q'TY
01	BODY	1
02	FLANGE	2
03	PISTON	1
04	SPINDLE	1
05	ARM	1
06	PIN	1
07	RING	2
08	BUSH	1
09	BUSH	1
10		2
11	WASHER	1
12	WASHER	1
13	WASHER	2
14	STOP RING	1
15	STOP RING	1
16	STOP RING	2
17	SET SCREWS	2
18	NUT	2
19	BOLT	8
20	FLANGE GASKET	2
21	PISTON PACKING	2
22	SPINDLE PACKING	1
23	SPINDLE PACKING	1
24	SEAL WASHER	2

Single Acting Type (Spring unit Structure)

⚠ WARNINGS

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ITEM	PART NAME	Q'TY	ITEM	PART NAME	Q'TY	ITEM	PART NAME	Q'TY
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32	PISTON (B)	1	42	PISTON PACKING	1	52	PLUG	1
33	PISTON ROD	1	43	ROD PACKING	1	53	PLATE	1
34	KEY	2	44	ROD GASKET	1	54	BOLT	2
35	SPRING COVER	1	45	GASKET	4	55	GASKET	1
36	SPRING (A)	1	46	GASKET	2			
37	SPRING (B)	1	47	FLANGE GASKET	1			
38		1	48	BOLT	4			
39	BUSH (C)	1	49	BOLT	4			
40	STOP RING	1	50	SET SCREW	1			

The contents are subject to change without prior notice.