No. OM-105E-R1

INSTRUCTION MANUAL

PNEUMATIC ACTUATOR

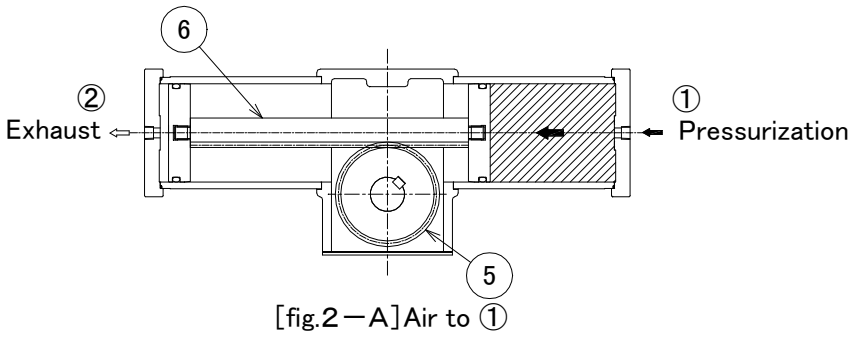
(MODEL:AR)

HISAKA WORKS,LTD.

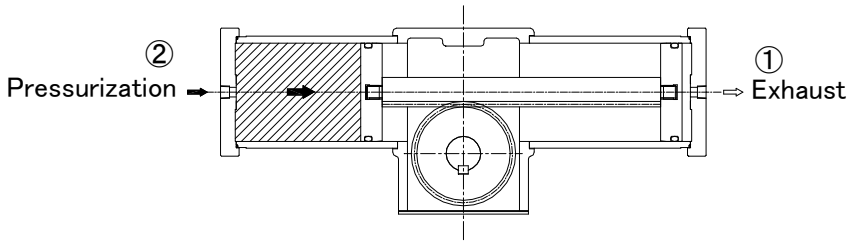
CONTENTS

1.Construction and Acting Principle　AR01～AR06[fig.1], AR07･AR08[fig.2]

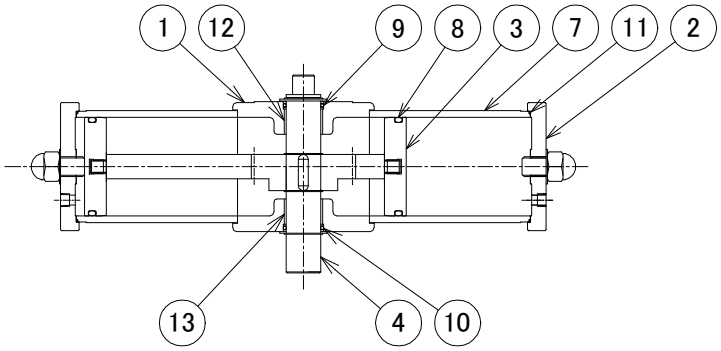
Operation air pressure pressurizes piston(No.3) inside cylinder pipe(No.7) and liner motion generated from moving storoke of the piston is converted to rotary motion of shaft(No.4) via rack(No.6) and spur gear(No.5).
When the operation air pressure is applied to air-supply①, the piston moves to the left, whereby the drive shaft is rotated counterclock. When the operation air pressure is pressure is applied to the air-supply②,the piston moves to the right, whereby the shaft is rotated clockwise.



[fig.2－A]Air to ①

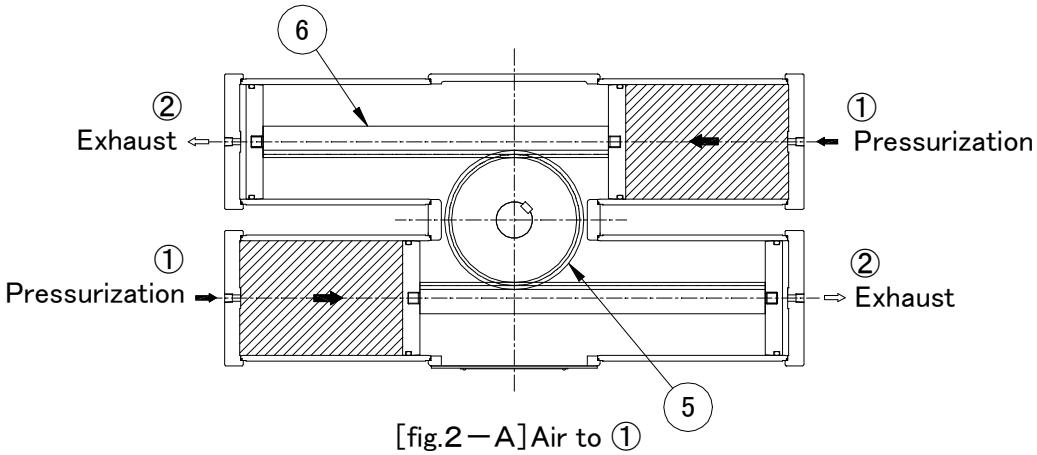


[fig.2－B]Air to ②

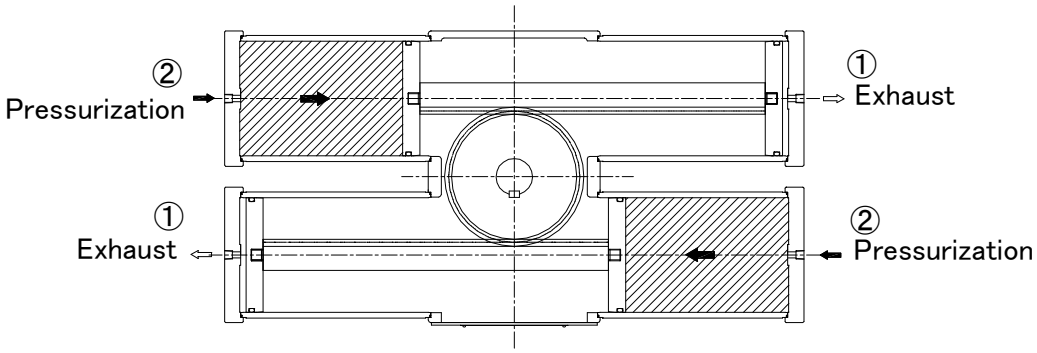


NO.	NAME
1	BODY
2	END CAP
3	PISTON
4	SHAFT
5	SPUR GEAR
6	RACK
7	CYLINDER PIPE
8	O-RING A
9	O-RING B
10	O-RING C
11	O-RING D
12	BEARING
13	BEARING

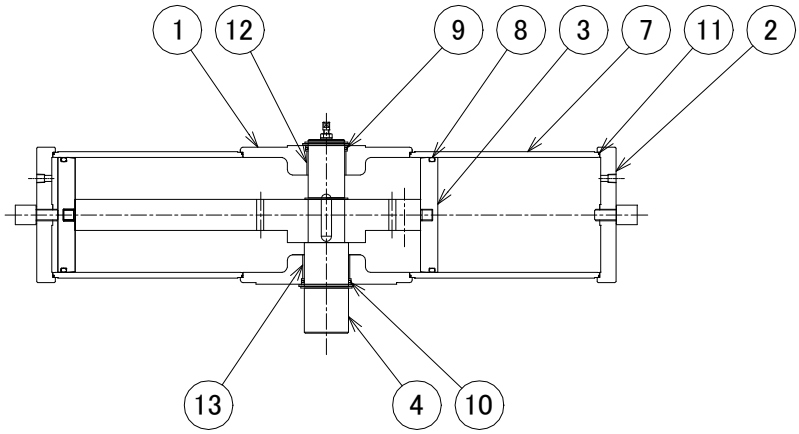
[fig.1]ＡＲ０１～ＡＲ０６



[fig.2－A]Air to ①



[fig.2－B]Air to ②



NO.	NAME
1	BODY
2	END CAP
3	PISTON
4	SHAFT
5	SPUR GEAR
6	RACK
7	CYLINDER PIPE
8	O-RING A
9	O-RING B
10	O-RING C
11	O-RING D
12	BEARING
13	BEARING

[fig.2]ＡＲ０７・ＡＲ０８

2. Operation Air Piping Procedure

2.1 Required air capacity

Calculate the require air capacity before air piping connection to the actuator. Less air capacity,if less, could cause the valve not to actuate. When an air tank is used, set the tank pressure in the range of 0.49 to 0.69MPa.

2.2 Air consumption in the cylinder

Air consumption in the cylindr is air discharge rate per minute of the actuator.

$$Q = V(P+1)n \times 1/60$$

Q : Air consumption per minute(N Lit./min)

V : Cylinder capacity(Lit.) [1 cycle] (Refer to[Annexed Tabe 1])

P : Supply pressure(MPa)

n : Piston reciprocals per hour (1reciprocal=1 cycle)

When calculating compressor capacity,air receiver capacity,etc.,include a margin of 30% or more in the usual air capacity,considering air leak and loss from the pipeline and accessories.

2.3 Precautions instruments piping

(1) Perfrom the instrument piping in reference to the Flow Sheet in[fig.3] .

(2) Supply the compressed air through a filter for complete removal of water content, oil content,and other foreig matter therefrom.

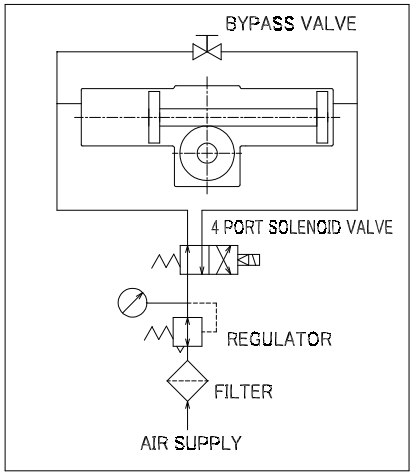
(3) Before mounting each device,don't fail to apply flushing to it for complete removal of dust,mist,chips, etc.(Further,keep the flushing pressure at less than maximum operating pressure of each device.

(4) The actuators can be mounted in any direction,but mount filter and oiler in vertical position.

(5) Regarding the operation air directional solenoid valves,use 4-port solenoid valve for the double acting type and 3-port solenoid valve for the single acting type (Use of 4-port solenoid valve is allowed. But in this case plug one of 4 ports with a blind plug.).

(6) After completion of the piping connection, increment the air pressure from 0 MPa up to required operating pressure (Standard 0.39MPa)using a pressure reducing valve.At the same time,check that no air leaks from each pipe joint.

(7) Use the actuators at an environment of -20℃ to +80℃ .



[fig.3] Flow Sheet

3. Check Points Prior to Operating

(1) Operate the actuator in manual mode to check the ball valve for smooth actuating.(In the case manual operation is unavailable,gradually raise the operating pressure up to 50 thru 80% of the specific operating pressure.)
(2) Check that the supply air pressure has reached the specific pressure (standard pressure 0.39MPa).

4. In-operating Cautions and Maintenance

(1) Periodically remove drains from the air filter.
(2) AR Type use special lubrication oil. Hence, these types in normal use require on oiler.
(3) Check that the operating pressure is kept at the specified valve (standard 0.39MPa).
(4) Check the specific check items periodically.

5. Overhaul and Reassembly Sequence

When overhauling the actuator for check and repair, follow the overhaul and reassmbly sequence given hereunder.

5.1 Overhaul

(1) Overhaul the actuator at a dust-free place.
(2) Apply “match mark”to each portion to be overhauled.
(3) Overhaul piston (No.3) and shaft (No.4) with good care not to damage the sliding surfaces,O-ring,etc., in reference to [fig.1][fig.2].

5.1 Reassembly

(1) Before reassembling,clean all the actuator components.
(2) Reassamble the actuator at a clean place to avoid inclusion of foreign matter.
(3) Apply coat of specific lubrication oil (Nippon Grease:NIGLUB A No.1 or other equivalent) to cylinder pipe(No.7) internal, piston (No.3), shaft (No.4), rack(No.6), spur gear(No.5) and O-ring.
(4) Assemble up the overhauled components so the stamped match marks match each other in reference to [fig.1][fig.2],with good care not to damage the sliding portions, O-ring, etc. Further,apply coat of liquid packing (THREE BOND 1104 or other equivalent) between body (No.1) and cylinder pipe(No.7).
(5) Check whether the actuator actuates smoothly at pressure of 0.05 MPa, throughout its full stroke.

6. Trouble Shooting

Phenomera	Check items or possible causes	Corrective action
①No specified pressure in actuator	①Compressor,air pipeline pressure reducing valve, solenoid valve,etc.normal？	Repair them as necessary.
②Specified pressure is fed into actuator, but it fails to start.	①Bypass valve not in open？	Close it,if opened.
	②No inclusion of foreing matter in ball seat？	Overhaul the valve to replace ball seat.
	③Separate actuator from valve.in case the actuator fails to actuate at 0.05MPa or specific pressure. (Single acting at 0.29MPa)	Overhaul actuator to replace necessary parts. (However,the single type is hazardous because of spring contained therein Follow the overhaul sequence on page 12.)
	④Separate actuator from valve (but the case the valve actuates st specific actuating torque and less.) (The valve actuating torque differs depending on model, size and fluid. Contact us for the detail.)	Re-adjust valve to actuator coupling yoke.
	⑤Separate actuator from valve (but the case the valve fails to actuate at specific operating torque and less)	Overhaul and repair the valve. Increase supply pressure to actuator or reselect actuator size.

[Annexed Table 1] Cylinder Capacity

Unit[cm^3]

AR01	AR02	AR03	AR04	AR05	AR06	AR07	AR08
740	1860	3200	7600	12000	24600	49000	94600

[Annexed Table 2] O-ring Size

parts No.	No. REQD	use point	AR01	AR02	AR03	AR04	AR05	AR06
8	2	PISTON	P60	P90	P110	P150	P165	P215
9	1	SHAFT(UPSIDE)	P22	P35	P40	P45	P50	P65
10	1	SHAFT(BOTTOM SIDE)	P22	P35	P40	P45	P50	P65
11	2	CYLINDER PIPE	S75	S105	S130	S165	S190	S240

parts No.	No. REQD	use point	AR07	AR08
8	4	PISTON	P215	P270
9	1	SHAFT(UPSIDE)	P70	P85
10	1	SHAFT(BOTTOM SIDE)	P85	P100
11	8	CYLINDER PIPE	S240	Gs290

[Annexed Table 3] Weight [kg]

AR01	AR02	AR03	AR04	AR05	AR06	AR07	AR08
7	19	29	57	95	165	300	510