Installation & Operating Manual

HP Series Pneumatic Actuators Spring Return & Double Acting

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1. Introduction

This installation, operation and maintenance manual is for Albion Valves (UK) Limited's HP-series pneumatic actuators.

1.1. Safety Notices

- Safety notices in this manual outline precautions the user must take to reduce the risk of personal injury and damage to the equipment. The user(s) must read these instructions before the installation, operation or maintenance of HP-series pneumatic actuators.

- For the protection of personnel working on Albion Valves (UK) Ltd actuators, this guidance should be reviewed and implemented for safe disassembly and reassembly. Close attention should be paid to the instructions contained in this document.

- This guidance should not supersede or replace any customer's plant safety or work procedures.

- Do not attempt to remove the pistons from the actuator body by using air pressure when the end caps have been removed.

- Remove all piping and mounted accessories that may interfere with the module(s) that are to be worked on.

- This procedure should only be implemented by a technically competent person who takes care to observe good workmanship practices.

- Products supplied by Albion Valves (UK) Ltd, in its "as shipped" condition, are intrinsically safe if the instructions contained within this Service Instruction are strictly adhered to and executed by well-trained, equipped, prepared and competent personnel.

1.2. Product Identification

The actuator name plate is located on the upside of the body. The name plate contains the following:

- Logo (trade mark), Model, Type, Fail position, Manufactured year & month, Fluid, Design pressure & temperature, Operating air pressure, Hydrostatic test pressure, Manufacturer address & telephone number. If the markings are not applicable on the label, the marking can be substituted to indicate on the test report.

- CE/PED certified body code (TUV SUD CE0036)

- Applied directive and Standard.
  2014/68/EU Annex III, Module H (reference : 97/23/EC), DGR-0036-QS-1060-14,

- Certification range
  HP-180DA/SR~HP-212DA/SR (Up to HP-160 models were self-declared) Non-electric

explosion proof protective system by 94/9/EC, 09TH0074
Applicable ambient temperature
Standard product with NBR is applicable from -20°C to +80°C (-4°F ~ +176°F)
Optionally, FKM O-ring : from -20°C to +180°C, VMQ O-ring : from -40°C to +176°C
However the O-ring was used as optional materials, if users have to operate at extremely hot or cold condition such as under -20°C or over +80°C,
Design Pressure : 12 bar, Operation pressure : 8 bar max

1.3. Initial Inspection

Upon receipt of the actuator, the user should inspect the condition of the product and ensure that the product specification stated in the name plate matches with the order requirements.

- Remove the packing wrap or wooden box carefully. Inspect the product for any physical damage that may have occurred during shipment.

- Check the product specification with product ordered prior to installation.

1.4. Storage

- Actuators must be stored in a clean, cool and dry area. The unit should be stored with the air port openings sealed. Storage must be off the floor, covered with a sealed dust protector. When actuators are to be stored outdoor, they must be stored off the ground, high enough to prevent from being immersed in water or buried in snow.

1.5. Installation

- During the installation, be careful so that debris doesn't enter the actuator through the Inlet / Outlet port.

- When connecting the air pipe to NPT tap, be careful so that excessive power cannot be given to the PF tap in the starting point of the screws because the PF tap can be worn easily.

- Speed controllers must be used only for controlling speed in opening / closing.

- In case of air supply in the product, it is a general rule to use dry air without any dust.

- The temperature around the actuators must be below 80°C. If the temperature is over 80°C, smooth operation cannot be guaranteed. For use in low temperatures, consult Albion Valves (UK) Limited.

- Check all the bolts and correctly tightened.

- If air is let out inside/ outside for a long time, the o-ring sliding parts can be damaged. So, in case of air leakage, replace or repair immediately

1.6. Maintenance

- The normal recommended service interval for the HP-series actuators is one year.
- When service conditions are more severe, more frequent inspections are advised.
- Ensure that the actuator is properly aligned with the valve or other actuated device.
- Ensure that all screws are present and tight.
- Ensure that air supply connections are installed properly.
- Check that the supply pressure of the operating media is in the required range.
- Check the enclosure of O-ring seals and verify that the O-rings are not pinched between flanges.
- Visually inspect the open/close cycle.
- Inspect the identification labels for wear and replace if necessary.
- For the maintenance of the actuators, there should not be any air or electrical leaks. Periodical checking should be carried out regardless of perceived condition. For optimal working life of the actuators, it is necessary to use enough lubrication oil. The inner seal should be replaced periodically.

For further information regarding maintenance, please contact Albion Valves using the details below:

Tel.	01226 729900
Homepage	www.albionvalvesuk.com
Email	sales@albionvalvesuk.com
Address	9a Fallbank Industrial Estate, Dodworth, Barnsley, South Yorkshire S75 3LS

CAUTION:
Turn off all power services before attempting to perform any service on the actuator.

Before removing or disassembling your actuator, ensure that the valve or other actuated devices are isolated and not under pressure.

1.7. Lubrication Requirements

The HP-series are a totally enclosed unit with permanent lubrication in the actuator. Once installed, lubrication should not be required.

1.8. Supply air volume

Part / Model	HP050		HP063		HP066		HP075		HP088		HP100		HP115	
Inner size (mm)	50		63		66		75		88		100		115	
Air Volume	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Open (L)	0.1	.01	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.5	0.7	0.7	1.2	1.2
Close (L)	0.1		0.3		0.3		0.5		0.8		1.1		1.8	

Part / Model	HP125		HP145		HP160		HP180		HP200	
Inner size (mm)	125		145		160		180		200	
Air Volume	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Open (L)	1.5	1.5	2.4	2.4	3.1	3.1	4.3	4.3	5.9	5.9
Close (L)	2.3		3.8		4.2		6.9		9.5	

1.9. Operating time

Part / Model	HP050		HP063		HP066		HP075		HP088		HP100		HP115	
Operating time (sec)	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Open	0.2	0.25	0.25	0.3	0.3	0.35	0.3	0.35	0.4	0.5	0.5	0.6	0.7	0.8
Close	0.25	0.3	0.3	0.35	0.35	0.4	0.4	0.5	0.5	0.6	0.7	0.9	0.9	1.1

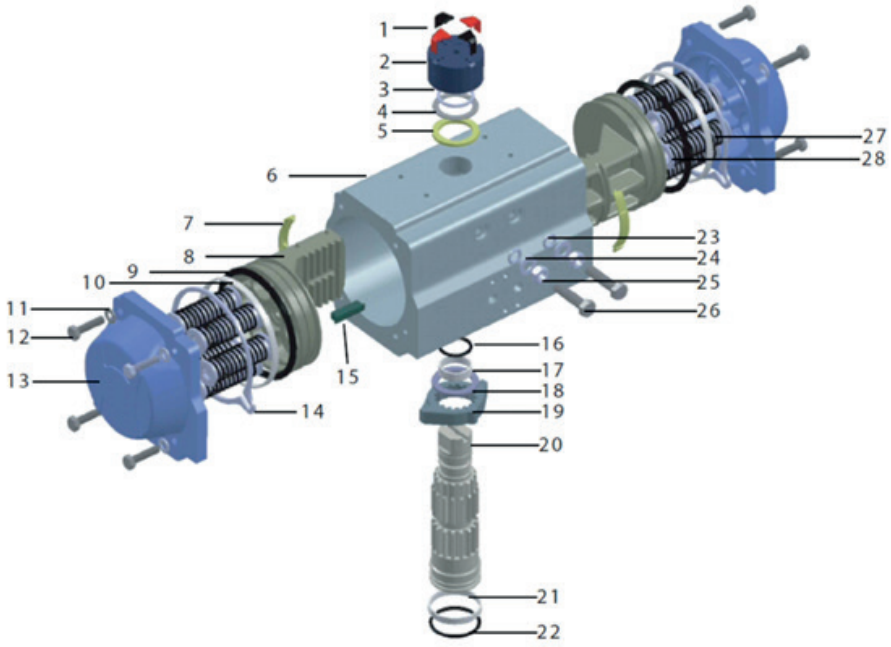
Part / Model	HP125		HP145		HP160		HP180		HP200	
Operating time (sec)	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Open	0.9	1.1	12	1.4	15	1.7	2	2.2	2.7	3.2
Close	1.2	1.4	1.5	1.8	1.8	2.1	2.4	2.8	3.5	4

1.10. Weight

Part / Model	HP050		HP063		HP066		HP075		HP088		HP100		HP115	
Type	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Kg	1.16	1.28	1.68	1.82	2.4	2.6	3	3.4	4.3	5	6	7	9	10.5

Part / Model	HP125		HP145		HP160		HP180		HP200	
Type	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
Kg	11.3	13.4	15.5	19	22	25.9	26.5	33	38.4	46

2. Bill of Materials



Part No	Unit Q'ty	Part Description	Standard Material	Corrosion Protection	Optional Material
1	4	Position Indicator	Polypropylene +GF		
2	1	Position Indicator Holder	Polypropylene +GF		
3	1	Spring Clip (Pinion)	Stainless Steel	HP160,200 Nickel plated	
4	1	Thrust Washer (Pinion)	Stainless Steel		
5	1	Thrust Bearing (Pinion)	Polyphthalamide		
6	1	Body	Extruded Aluminum alloy	Hard Anodized	
7	2	Bearing (Piston back)	Polyphthalamide		
8	2	Piston	Die Cast Aluminum	Hard Anodized	
9	2	O Ring (Piston)	Nitrile (NBR70)		NBR, FKM, VMQ
10	2	Bearing (Piston head)	Polyphthalamide		
11	8	Cap Bolt Washer	Stainless Steel		
12	2	Cap Bolt (End cap)	Stainless Steel		
13	2	Right and Left End Cap	Die Cast Aluminum	Chromate + Polyester coated	
14	2	O Ring (End cap)	Nitrile (NBR70)		NBR, FKM, VMQ
15	2	Piston Guide	Polypropylene +GF		
16	1	O Ring (Pinion top)	Nitrile (NBR70)		NBR, FKM, VMQ
17	1	Bearing (Pinion top)	Nylon 46		
18	1	Thrust Bearing (Pinion)	Polyphthalamide		

19	1	Open / Close Cam (Stop arrangement)	Stainless Steel	Nickel plated	
20	1	Drive Shaft	Steel alloy		
21	1	Bearing (Pinion bottom)	Nylon 46		
22	1	O Ring (Pinion bottom)	Nitrile (NBR70)		NBR, FKM, VMQ
23	1	O Ring (Stop screw)	Nitrile (NBR70)		NBR, FKM, VMQ
24	2	Stop Bolt Washer	Stainless Steel		
25	2	Stop Nut	Stainless Steel		
26	2	Stop Bolt	Stainless Steel		
27	5~12	Spring (Cartridge)	High alloy Spring Steel	Epoxy coated	
28	1	Spring Holder	Polypropylene +GF		

3. Mounting and Operating

- **Actuator Mounting**

- Mounting is most easily done with the valve shaft pointing vertically upward. But mounting is also possible in any other position; the actuator may be mounted in any position.

- The HP Series Pneumatic Actuators are supplied with a female drive output. The ISO5211 bolt patterns are provided for actuator mounting. The actuator drive bush is removable for ease of machining.

- It is mandatory for the actuator to be firmly secured to a sturdy mounting bracket or directly mounted to the valves' ISO mounting pad. High tensile bolts or studs with spring locking washers must be used.

- The valve output shaft must be in lined with the actuator output drive to avoid side-loading the shaft. To avoid any backlash, flexibility in the mounting bracket or mounting should not be allowed.

3.2. Operating Pressure and Method

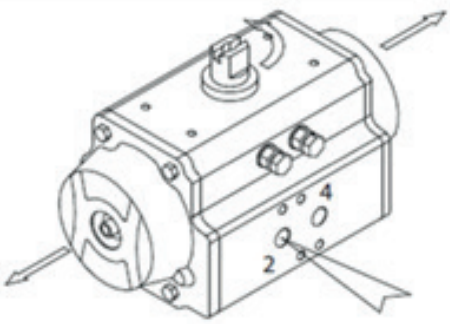
- The maximum operating air supply pressure should not exceed 8 bar (115psi). The air supply should be clean, dry and lubricated.

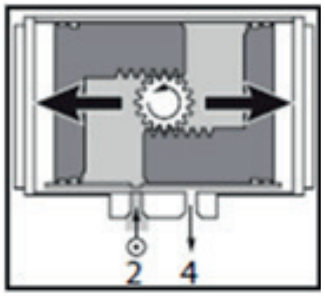
3.3. Principles of Operation

- Air connections double acting

OPEN

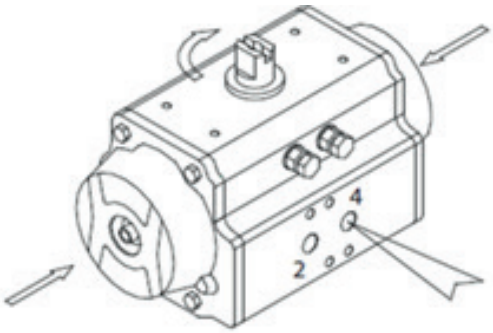
Air to port 2 : counter clockwise/open

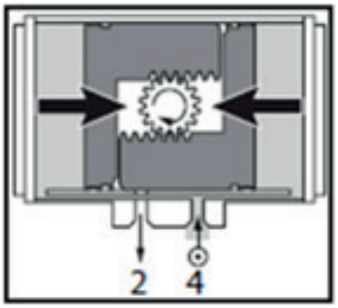




CLOSE

Air to port 4 : clockwise/close



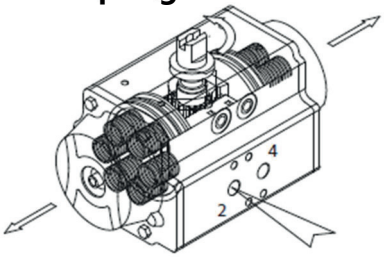


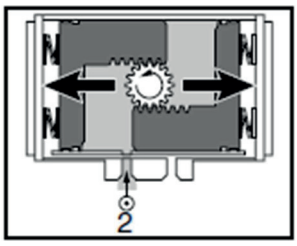
* Pistons must be inverted to reverse actuator rotation

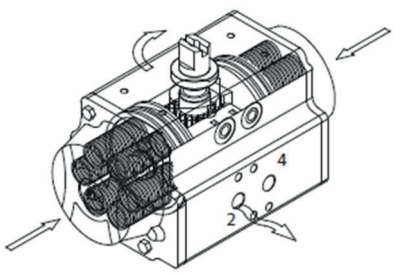
- Air connections of spring return

Spring to Close

Air to port 2: counter clockwise / open







Spring to Open

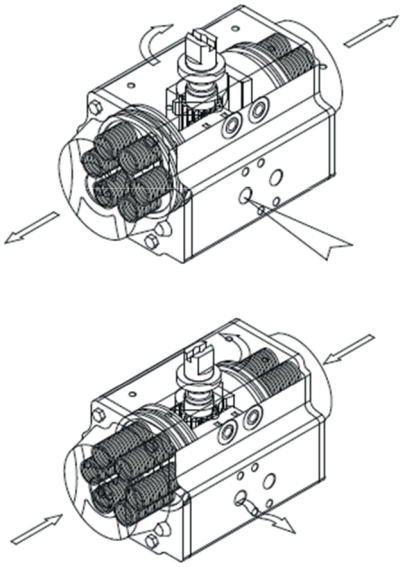


FIG 1 Make sure that both valve and actuator are close.

Air to port 2: clockwise / close

Spring return: counter clockwise / open

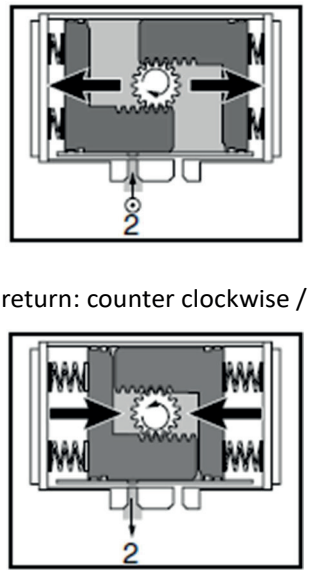
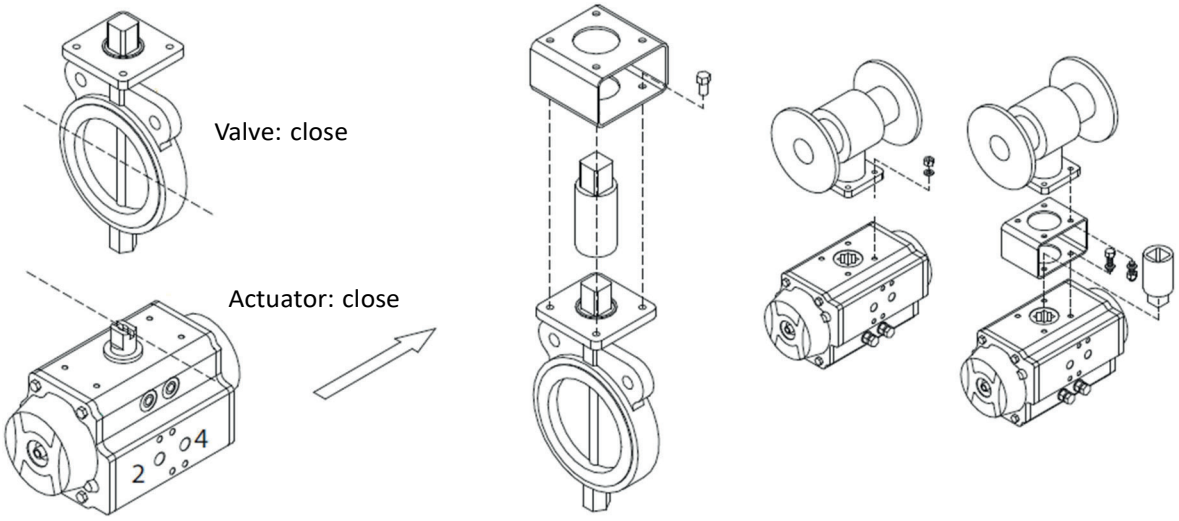


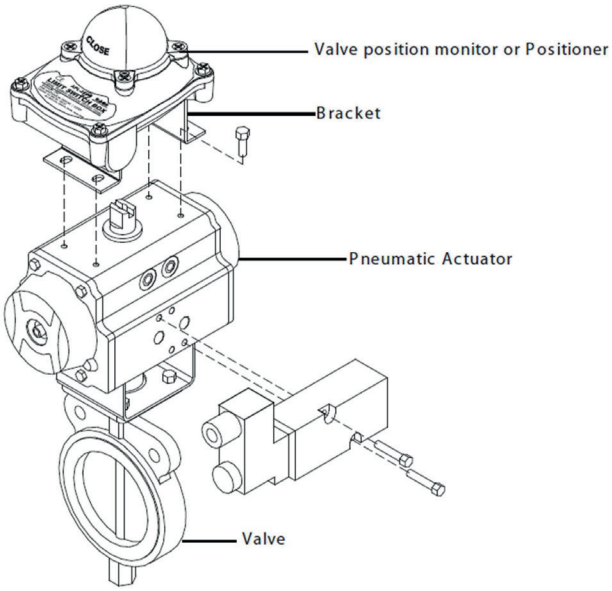
FIG 2 Insert actuator on top of adapter and assembly it through screws

Caution! Never disassemble a valve that is under pressure!

4. Assembly

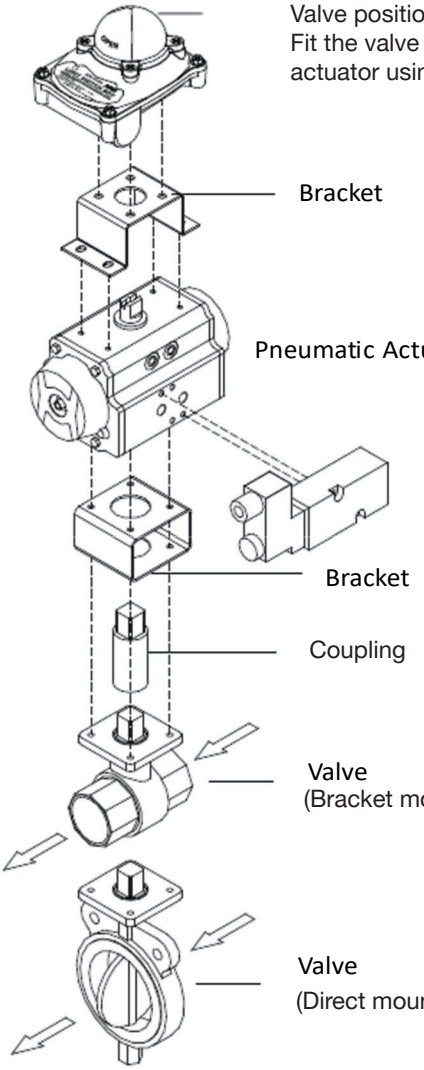
- Assembly of valve (Direct mounting)





Solenoid valve
Before mounting a s/o valve ensure that the actuator is in its normal position (close)

FIG 3 Connect eventual accessories, making sure of the real position of the valve. Connect pneumatic/electric feeding and verify correct operation.



Valve position monitor or Positioner
Fit the valve position monitor or positioner and bracket on the actuator using four screws provided.

Solenoid valve
Fit the solenoid valve on the actuator using the screws provided.

Tightening torque table	
Metric Screw	**Tightening torque table (Nm)**
M5	5~6
M6	10~11
M8	23~25
M10	48~52
M12	82~86
M14	132~138
M16	200~210
M20	390~410
M24	675~705
M30	1340~1400

- Before proceeding with the assembly of a valve onto an actuator be sure that the actuator operates in the desired direction of rotation and both actuator / valve are correctly orientated.

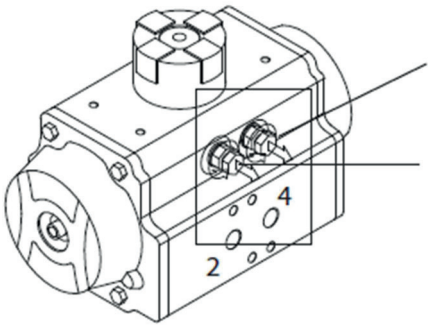
- Important : When using a spring return actuator for a fail safe operation, ensure that when air or electricity failure occurs the direction of rotation is correct for your application. There are two types of valve assembly onto the actuator:

- Bracket-mount : Mounting with a bracket and coupling the bracket is bolted to the actuator / valve to join them together and the coupling is used to connect the actuator output drive to the valve stem (max. tightening torque see table).

- Direct-mount : Fit the square of the valve directly into the square of the actuator and bolt together through the valve ISO pad (max. tightening torque see table above).

4.2. Open/close adjustment

OPEN/CLOSE Adjustment of HP 050~200 series



Open/close adjustment Max: ±4~5°

CLOSE
- Clockwise: CLOSE-
- Counterclockwise: CLOSE+

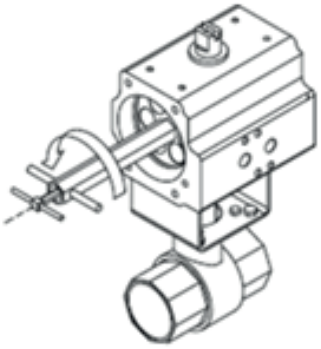
OPEN
- Clockwise: OPEN-
- Counterclockwise: OPEN+

OPEN/CLOSE Adjustment of END STOPPER TYPE (Option or HP-035)

4.2.1. Adjustment CLOSE

- After Valve and Actuator are assembled for Close condition, adjust stop bolt inside actuator for correct closed condition as shown on picture on the right-hand.

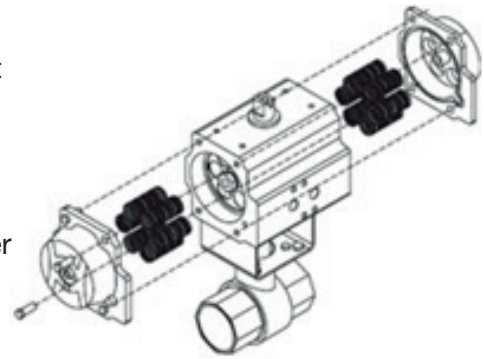
- Disassemble bolts both side like shown on the picture and, remove end-cap covers and springs (single acting actuator)

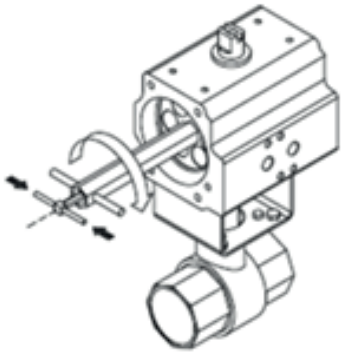


Loosen nut for adjustment of stop bolt like shown on the picture on the left-hand.

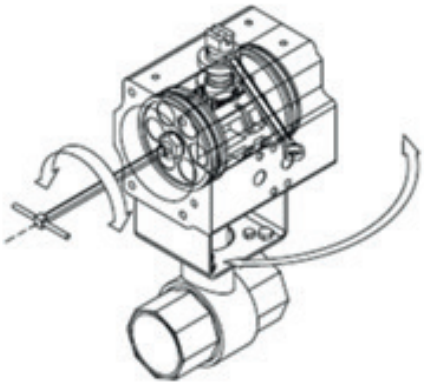
Adjust stop bolt using hex- wrench while actuator stem is fixed by spanner at closed position.

- Clockwise: CLOSE-
- Counterclockwise: CLOSE+



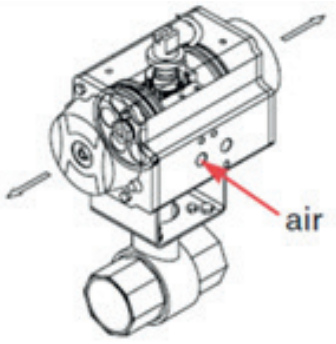


Tighten and fasten NUT while STOP BOLT is being fixed by hex- wrench like picture on the left- hand.
And assemble end - cap covers and springs in reversed order.



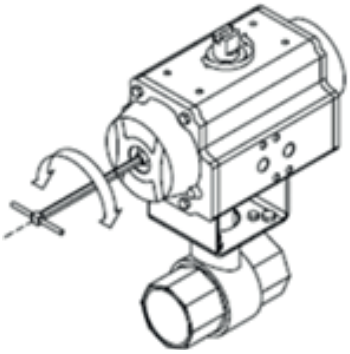
4.2.2. Adjustment for OPEN

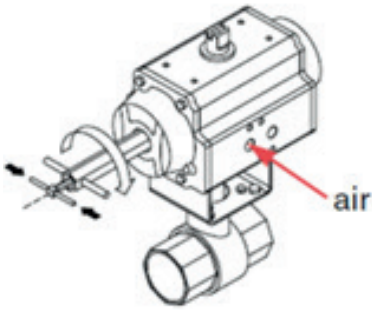
Loosen NUT a little to adjust OPEN STOP BOLT like picture on the right-hand.

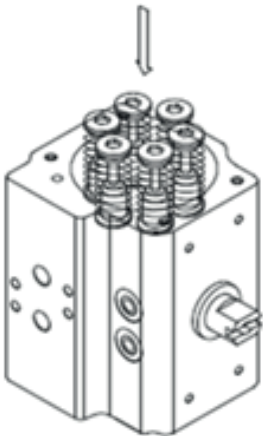


- Clockwise : OPEN-
- Counterclockwise : OPEN+

Tighten and fasten NUT while STOP BOLT is being fixed by hex-wrench.

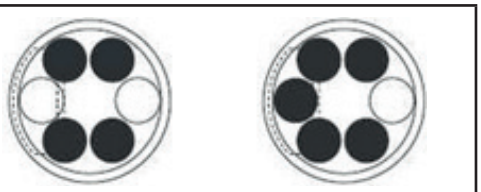




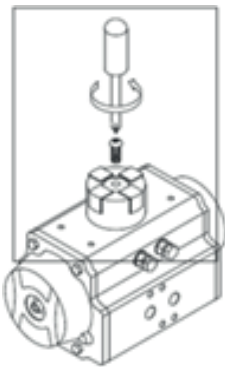


4.3. HP Series Spring Sets
ASSEMBLY

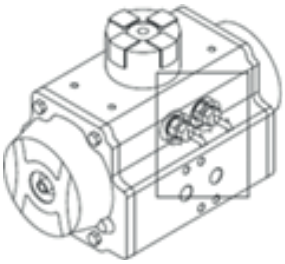
SET #5	
SET #6	
SET #7	
SET #8	

SET #9	
SET #10	
SET #11	
SET #12	

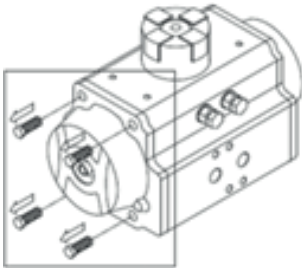
5. Disassembly



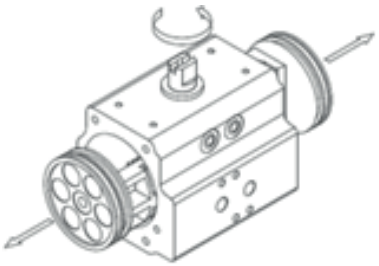
5-1. Remove cap screws



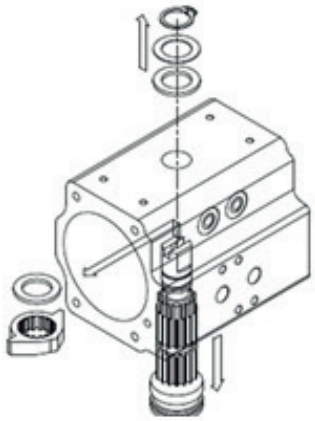
5-2. Remove both (open / close) stop cap screws together with nut and washer and o-ring



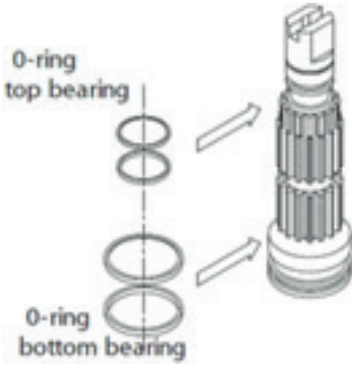
5-3. Remove end cap screws



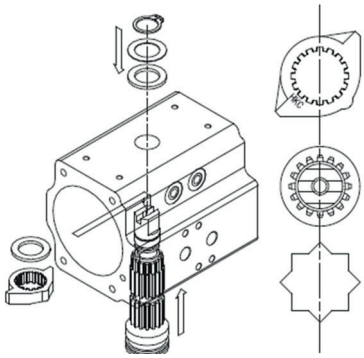
5-4. Pistons disassembly
Holding the body in vice, rotate the drive shaft until the piston.



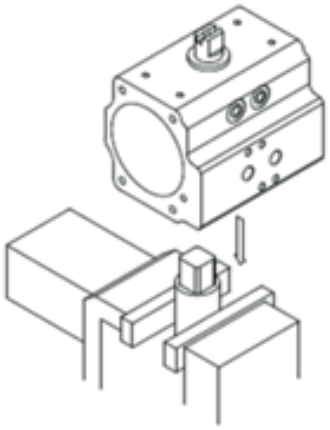
5-5. Pistons shaft disassembly



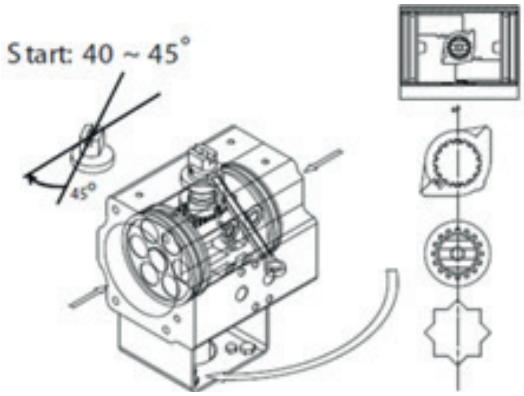
5-6. Drive shaft assembly



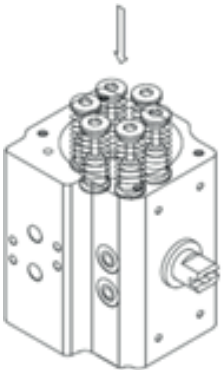
5-7. Pistons shaft assembly



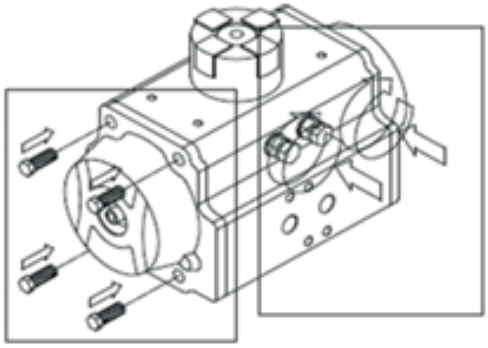
5-8. Pistons assembly



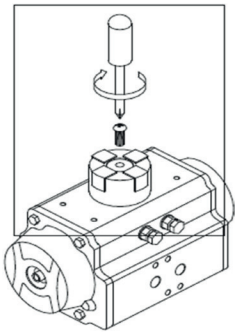
5-9. Pistons assembly



5-10. Spring assembly



5-11. End cap assembly



5-12. Indicator assembly

5.1. Actuator Testing

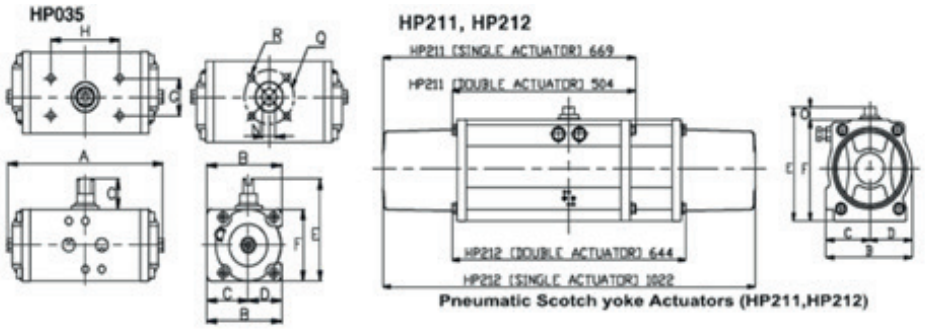
- Leakage Testing: All areas where leakage to the atmosphere may occur are to be checked using a commercial leak testing solution.
- Cycle the actuator 5 times at the nominal operating pressure (NOP) as listed on the actuator name tag or the user default actuator supply pressure. If excessive leakage across the pistons is noted, generally a bubble which breaks three seconds or less after starting to form, cycle the actuator five times as this will allow the seals to seek their proper service condition.
- Check the piston for leaks.
- The cover, drive shaft and air ports should be tested by pressurizing each port in turn and applying the test procedure.
- Remove pressure from the pressure inlet port
- If an actuator was disassembled and repaired, the above leakage test must be performed again.

6. Trouble Shooting Guide

Table 6-1 provides solutions for the most encountered issues during installation and start-up.

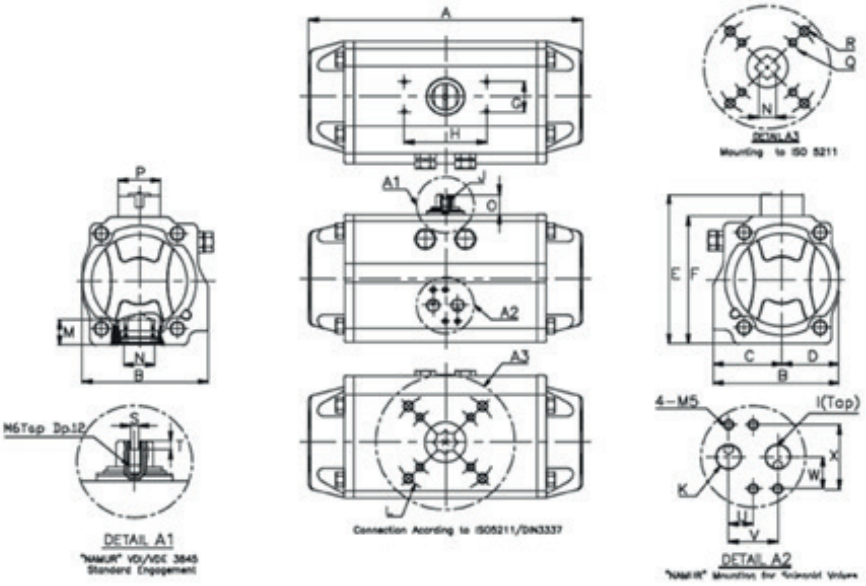
Issue	Reason	Solution
Valve open/close does not operate smoothly	Air pressure is low	Raise the air supply
	Pipe is obstructed by foreign substance	Remove the substance in pipe
	Locked speed controller	Open speed controller
	Air is escaping from cylinder / piston	Replace piston O-ring
	Working torque of valve is too high	a) Raise the air supply b) Replace valve
Valve does not open or close correctly	Stopper setting is incorrect	Perform stopper settings again
	Working torque of valve is too big	a) Raise the air supply b) Replace valve
The open/close valve operates too quickly or slowly	The setting of speed controller is not calibrated correctly	Reconfigure the speed controller
Air is escaping	O-ring of piston or cover bushing is worn out	Replace O-ring

MODEL	A	B	C	D	E	F	G	H	I	J	K	O	S	T	U	V	W	X
HP50	144	72	42	30	93	73	30	80	PF	M6	1/8”	20	4	4	12	24	16	32
HP63	163	85	47	38	107	87	30	80	PF	M6	1/8”	20	4	4	12	24	16	32
HP66	202	85	47	38	107	87	30	80	PF	M6	1/8”	20	4	4	12	24	16	32
HP75	210	96	53.5	42.5	124	104	30	80	PF	M6	1/8”	20	4	4	12	24	16	32
HP88	247	108	58.5	49.5	136	116	30	80	PF	M6	1/8”	20	4	4	12	24	16	32
HP100	268	123	67	56	148	128	30	80	PF	M6	1/4”	20	4	4	12	24	16	32
HP115	316	141	77	64	166	146	30	80	PF	M6	1/4”	20	4	4	12	24	16	32
HP125	347	151	82	69	179	159	30	80	PF	M6	1/4”	20	4	4	12	24	16	32
HP145	414	172	92	80	209	179	30	80	PF	M6	1/4”	30	4	4	12	24	16	32
HP160	467	190	101	89	226	196	30	130	PF	M6	1/4”	30	4	4	12	24	16	32
HP180	497	206	107	99	251	221	30	130	PF	M6	1/4”	30	4	4	12	24	16	32
HP200	555	227	116	111	277	247	30	130	PF	M6	1/4”	30	4	4	12	24	16	32



Pneumatic Scotch yoke Actuators (HP211,HP212)

HP050, HP063, HP066, HP075, HP088, HP100, HP115, HP125, HP145, HP160,HP200



7.1. Top Mounting Connection

Top mounting connection			
Model	**G**	**H**	**O**
HP050	30	80	20
HP063	30	80	20
HP066	30	80	20
HP075	30	80	20
HP088	30	80	20
HP100	30	80	20
HP115	30	80	20
HP125	30	80	20
HP145	30	80	30
HP160	30	130	30
HP180	30	130	30
HP200	30	130	30

7.2. Bottom Mounting Connection

Bottom mounting connection			
Model	**Flange L (ISO5211) Q**	**Base Tap DP (mm) R**	**Stem (mm) M(DP)/N(□)**
HP050	F03/F05	M5/M6	12/11
	Ø36/Ø50	9/10	
HP063	F05/F07	M6/M8	17/14
	Ø50/Ø70	11/14	
HP066	F05/F07	M6/M8	17/14
	Ø50/Ø70	11/14	
HP075	F05/F07	M6/M8	19/17
	Ø50/Ø70	12/14	
HP088	F05/F07/F10	M6/M8/M10	22/17
	Ø50/Ø70/Ø102	12/14/18	
HP100	F07/F10	M8/M10	22/17
	Ø70/Ø102	14/18	
HP115	F07/F10	M8/M10	25/22
	Ø70/Ø102	Ø70/Ø102 14/18	
HP125	F07/F10	M8/M10	25/22
	Ø70/Ø102	14/18	
HP145	F10/F12	M10/M12	30/27
	Ø102/Ø125	18/23	
HP160	F10/F12	M10/M12	30/27
	Ø102/Ø125	18/23	
HP180	F10/F12	M10/M12	38/36
	Ø102/Ø125	18/23	

HP200	F14	M16	38/36
	Ø140	26	

8. Warranty

- For further details of Albion Valves (UK) Ltd warranty period, please refer to Albion Valves (UK) Ltd 'Conditions of Sale' available on our website.

About Albion Valves (UK) Ltd

Albion has been supplying valves and fittings to the building services and industrial markets for the past 40 years.

Albion was created with the sole purpose of providing quality products at an affordable price. With a growing reputation for quality and reliability, Albion is now an established brand providing the industry with a trusted alternative to premium-priced products.

Our commitment to setting the highest standards in all areas of our business means, if you're looking for quality, service, delivery and choice — you'll find it's all at Albion.

Quality

Whatever you need, you can rest assured that if it comes from Albion it has been designed and manufactured to deliver optimum performance and is accredited with the necessary approvals. Our in-house quality department are always on hand too!

Service

We pride ourselves on our customer service – we have even won awards for it! Our cradle to grave approach means you will never be on your own!

Delivery

We know that time is money, and when a priority project depends on a part you can trust Albion to deliver – next day for all orders placed before 4:00PM.

Choice

We may have started out with a single brass ball valve, but our range has grown substantially since and we now consider ourselves to be a 'One Stop Shop' with our comprehensive range. It is becoming more and more apparent to the industry, that it really is all at Albion.