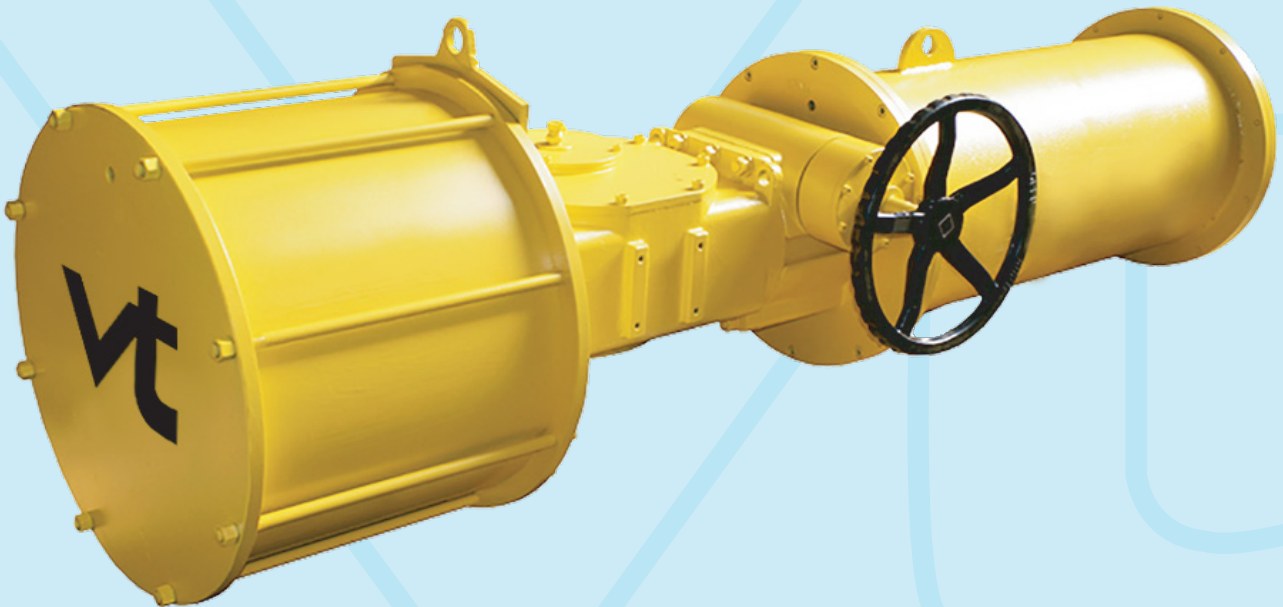




SCOTCH & YOKE PNEUMATIC ACTUATOR



INSTALLATION, OPERATION & MAINTENANCE GUIDELINES



INSTALLATION, OPERATION & MAINTENANCE GUIDELINES SCOTCH & YOKE PNEUMATIC ACTUATOR

1. Scope

These guidelines have been put together to help properly install and maintain the actuator to ensure long service life. This document is based on our experience and current knowledge. It should serve mainly as a installers guideline to supervisory and maintenance staff. All safety precautions must be taken by the operators and operating companies. Vahn-Tech does not take any responsibility or liability direct or indirect in relation with these guidelines.

Vahn-Tech (vt) reserves the right to update or refine technical data that may not be reflected in these guidelines. The content in these guidelines is for informational purposes and is subject to change without prior notice.


1.1 Structure

VAHN-TECH Scotch & Yoke Actuators offer modular configuration. In the common configuration, it is composed of driving module, cylinder module and spring cartridge module (for Fail Safe operation). Other possible configurations are shown in Figure 1.

It can also be equipped with solenoid valve, valve positioner, pneumatic accelerator, quick exhaust valve, valve position transmitter and other accessories for the related control and transmission of valve open/close position.

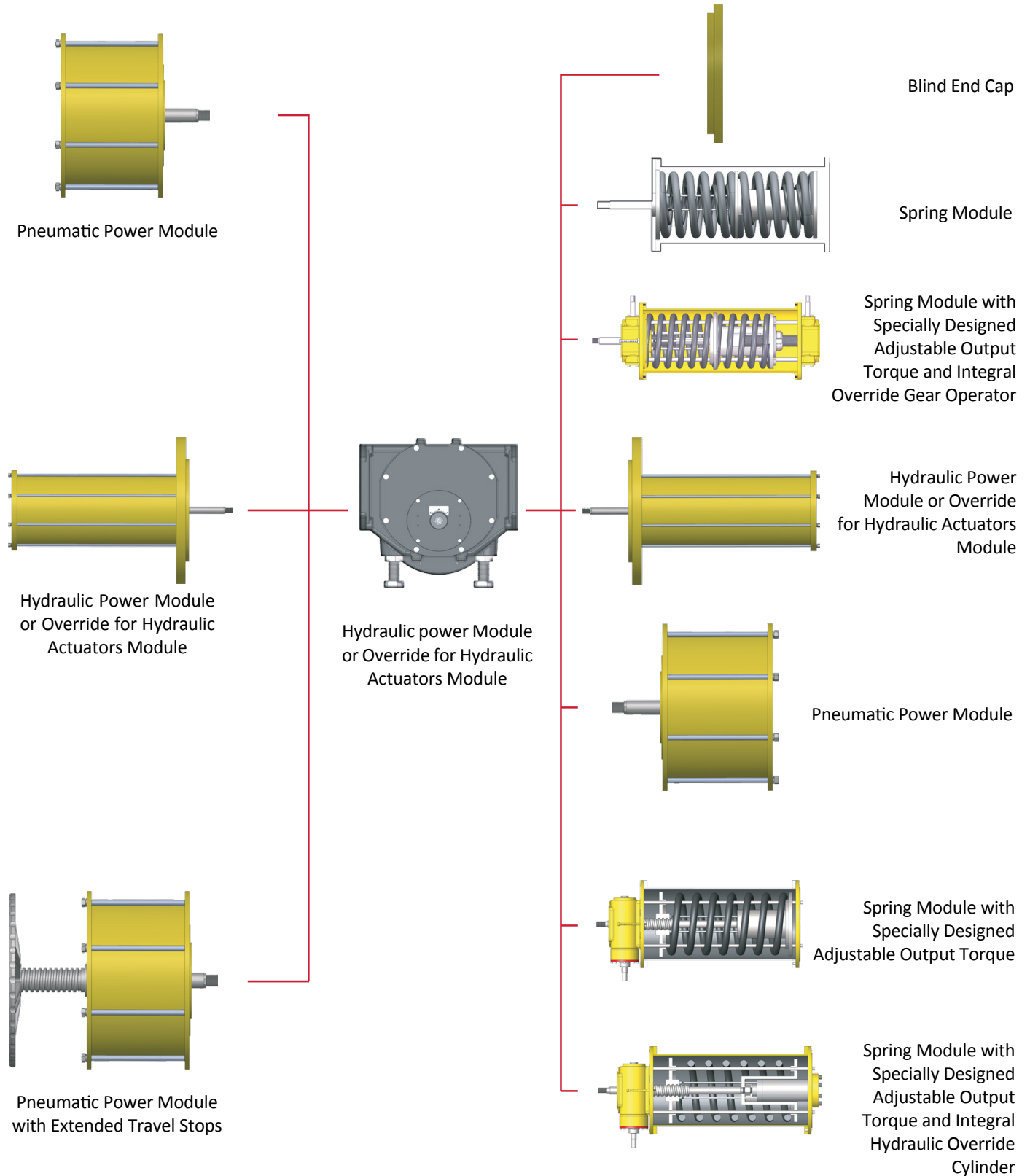
1.2 Markings

Each Scotch & Yoke Actuator is delivered with a nameplate fixed on the driving module of the actuator. The nameplate is marked with details of the Model, serial number, recommended air pressure and limiting temperature. Typical nameplate is shown below.

	Scotch & Yoke Pneumatic Actuator
	Model:
	Serial Number:
	Air Pressure:
	Temperature:

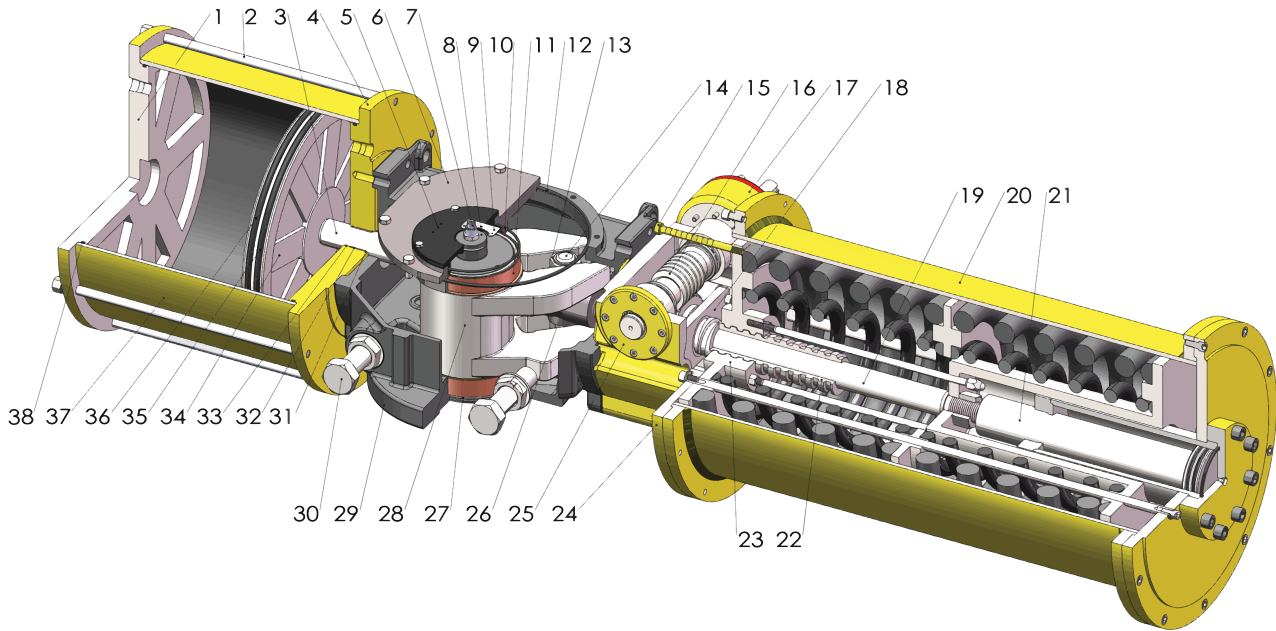
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Figure 1 (Modular Design)



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1.3 Parts List



No.	Description	Material
1	Cylinder End Cap	QT500-7
2	Stud	C45
3	Piston Rod	Alloy Steel
4	Cylinder End Cap	QT500-7
5	Up Cover	HT200
6	Cover	QT500-7
7	Indicator Cap	C45
8	Small Cover	HT200
9	Indicator Board	Al
10	O-Ring	NBR
11	Bearing	H62
12	O-Ring	NBR
13	Roller	GCr15
14	Pin	GCr15
15	Torque Indicator Pin	45
16	Worm	45
17	Energy Saving Unit	/
18	Supporting Seat	45
19	Tension Rod	45

No.	Description	Material
20	Spring Module	/
21	Hydraulic Module	/
22	Lead Screw	C45
23	Spring Seat	C45
24	End Cap	Carbon Steel
25	End Cap	C45
26	Guide Block	QT500-7
27	O-Ring	NBR
28	Yoke	Carbon Steel
29	Body	Carbon Steel
30	Adjust Bolt	C45+Ni
31	Circlip	65Mn
32	Bearing	H62
33	O-Ring	NBR
34	Piston	Carbon Steel
35	O-Ring	NBR
36	Guide Ring	PTFE
37	Cylinder	C20
38	O-Ring	NBR

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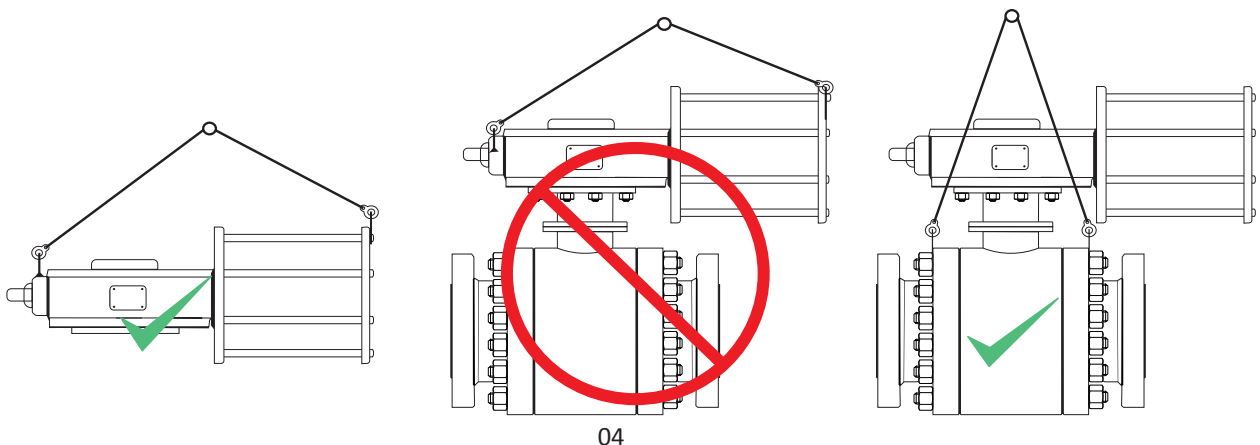
2. Recommended Safety Precautions

2.1 Safety Warnings and Caution

- 2.1.1 Prior to maintenance work on the scotch and yoke actuator, it is necessary to disconnect all air and electrical supplies from actuator.
- 2.1.2 The recommended air pressure is given according to the design pressure in principle. If local conditions require higher pressure, an assessment should be performed. However, it is recommended that the maximum air pressure should be not more than 0.6MPa.
- 2.1.3 Ensure the service environment conditions are compatible with scotch and yoke actuators before installation.
- 2.1.4 The air supply shall be clean, use of non-corrosive components, compressed air or other gas as suitable.
- 2.1.5 **ATTENTION:** The spring sleeve and end covers provide protection structure of the spring assembly. Spring is pre-compressed and is always under pressure, the nuts and bolts securing this assembly should not be tampered with to avoid any accidents.
- 2.1.6 **ATTENTION:** Before any assembly/dissassembly work of the actuator, the operator shall make sure the actuator spring is not energized and the actuator air supply is shut off. Failure to do so may result in injuries.
- 2.1.7 **ATTENTION:** During mounting of an actuator on a valve, never insert your hand in the valve bore.
- 2.1.8 Due to heavy weight of the actuator, it is advisable to provide support in the middle of the spring cartridge at the installation site.
- 2.1.9 Air supply shall be clean, use of non-corrosive components, compressed air or other gas as suitable.
- 2.1.10 The air pressure is given according to the design pressure in principle. If local conditions require higher pressure, an assessment should be performed.
- 2.1.11 However, it is recommended that the maximum air pressure should be not more than 0.6MPa.
- 2.1.12 The spring sleeve and end covers provide protection structure of the spring assembly. Spring is pre-compressed and is always under pressure, the nuts and bolts securing this assembly should not be tampered with to avoid any accidents.
- 2.1.13 During inspection maintenance, ensure that the air supply is cut off and pressure is fully discharged.

2.2 Handling of the Actuated Valve

The actuators are fitted with lifting bolts for handling of the actuators.
ATTENTION: The lifting bolts are designed to lift actuator only.



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3. Receiving and Storage

3.1 Unloading

Actuators should be unloaded carefully. The actuators should be carefully lowered from the truck to the ground, not dropped. Only hoists and slings with adequate load capacity to handle the weight of the actuators should be used. Do not hook hoists into or fasten chains around by motors, cylinders, or hand wheels. Failure to carefully follow these recommendations is likely to result in damage to the actuators.

3.2 Storage

Actuators should be stored in the fully closed position to prevent entry of foreign material that could cause damage to the seating surfaces. Whenever practical, actuators should be stored indoors. If outside storage is required, means should be provided to protect operating mechanisms, such as gears, motor and cylinders, from weather elements. During outside storage, actuators should be protected from the weather, sunlight, ozone, and foreign material. In colder climates, where actuators may be subject to freezing temperatures, it is absolutely essential to remove water from the actuators interior and close the tightly before storage. Failure to do so may result in a cracked castings.

Store actuators so that no heavy loads are applied to the actuators body.

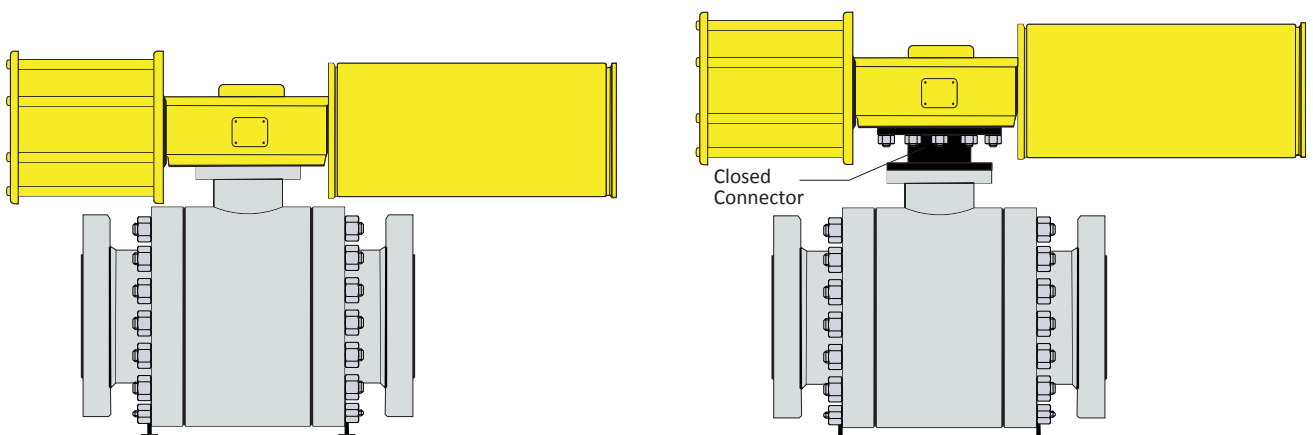
3.3 Inspection before installation

Actuators should be inspected at the time of receipt for damage in shipment. The initial inspection should verify compliance with specifications, directions of opening and size. Inspection personnel should look for broken hand wheels, cracked parts, loose bolts, missing parts and accessories, if applicable, and any other evidence of mishandling during shipment.

4. Installation & Adjustments

4.1 Mounting Type

The actuator can be mounted directly on the valve or with a closed connector.



4.2 Installation

Installation and connection of pneumatic actuators are as follows:

- 4.2.1 Cut off the air supply and fully exhaust, ensure the pneumatic actuator is in the closed position.
- 4.2.2 Valves to be in closed position.
- 4.2.3 Fix bracket on the valve installation platform or bottom connection flange of the pneumatic actuator transmission box.

Insert the valve shaft or transfer part (shaft) into the shaft hole of the bottom of the transmission box. Connect the pneumatic actuator and valve as a whole with bracket and key.

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4.3 Adjustment

The actuators come with the standard starting position (zero position) adjusted at the factory. However, to ensure full alignment with the valve or other mechanism, one needs to adjust this by cutting off the air supply and fully exhaust, to ensure that the pneumatic actuator is in the initial closed position.

If the valve or other adjustment mechanism are in a mis-match position

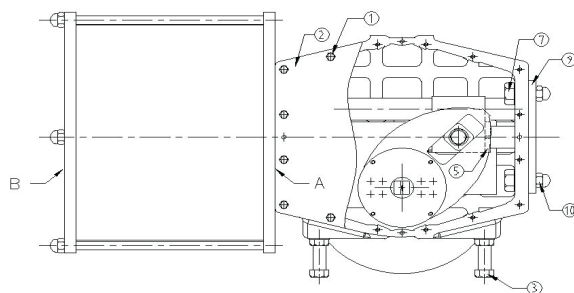
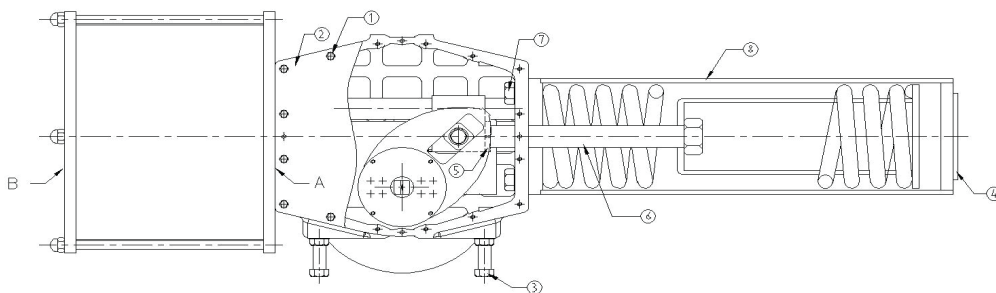
- a. Open the air supply and gradually increase the pressure, till the valve or other adjustment mechanism are aligned at specified closed position.
- b. Release the nut of the adjustment screw or adjustment bolt.
- c. Rotate the adjustment screw in clockwise direction until the adjust screw aligns up to the pneumatic actuator.
- d. Close the air supply pressure, make the valve or other adjustment mechanism to align at closed position with the force of spring.
- e. Lock the nut.
- f. If still not aligned at the position correctly, repeat the above steps.

4.4 Module Replacement

CAUTION:

Before any assembly/dissassembly work of the modules the operator shall make sure the actuator spring is not energized and the actuator air supply is shut off. Failure to do so may result in injuries.

1. Unscrew the fastening bolts ① of the housing cover and remove the housing cover ②
2. Cylinder A air intake, unscrew the air inlet after the adjustment bolt ③
3. The cylinder B slow intake, swing arm of the spring rod and expose the nut, loosen nut to a position that it can release air.
4. Remove the seal plate ④ of the rear spring module, loosen the spring rod flexible part and nut ⑤
5. Loosen the spring rod ⑥ and remove the nut ⑤, then remove the spring rod
6. Unscrew the fastening bolts between the shell and the spring module ⑦ (before, unscrewing the fastening bolts must use hook fixed spring module)
7. Remove the spring module ⑧, for double acting, seal plate ⑨ and screw nut ⑩





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5. Inspection and Maintenance

The scotch & yoke actuators are designed for long term maintenance-free service. Preventive maintenance shall be based on the actual operating conditions.

Actuators in stored for long period of time or with low operating cycles should be cycled at least once every 90 days.

Outside paints can be renewed if required based on environment conditions.

Internal seals should be every 3 to 6 years depending on the operating conditions.

6. Repairs

Leakage, broken parts, hard operation, and other major defects should be corrected by a repair crew as soon as possible after the defect has been reported. If repairs are to be performed in the field, the repair crews should take a full complement of spare parts to the jobsite. Provisions should be made to isolate the defective actuators from internal trapped pressure prior to performing any corrective maintenance. A record should be made to indicate that the actuator has been repaired and is in working condition. Any markings indicating that the actuator is not functioning should be removed.

7. Troubleshooting

Major operation failure of the actuator will require technical support by manufacturer. However, day to day trouble shooting guide is:

Symptom	Possibe Cause	Solution
No function	1) No air supply 2) No signal	1) Check the air supply 2) Check the signal
Fuction is too slow	1) The pressure is too low 2) The air path is blocked up 3) The cylinder has air leakage	1) Check the pressure 2) Check the air path 3) Check the cylinder, replace the seals
Vibrating Action	1) The pressure is too low 2) The air path is blocked (including the inlet air and outlet air) 3) Resonance	1) Check the pressure 2) Check the air path 3) Add support
Incomplete stroke	1) Stoppers set incorrectly 2) Foreign object inside valve bore	1) Check and adjust stoppers 2) Inspect valve



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