Max-Air TECHNOLOGY, INC.

751 Hoff Road – O'Fallon, MO 63366
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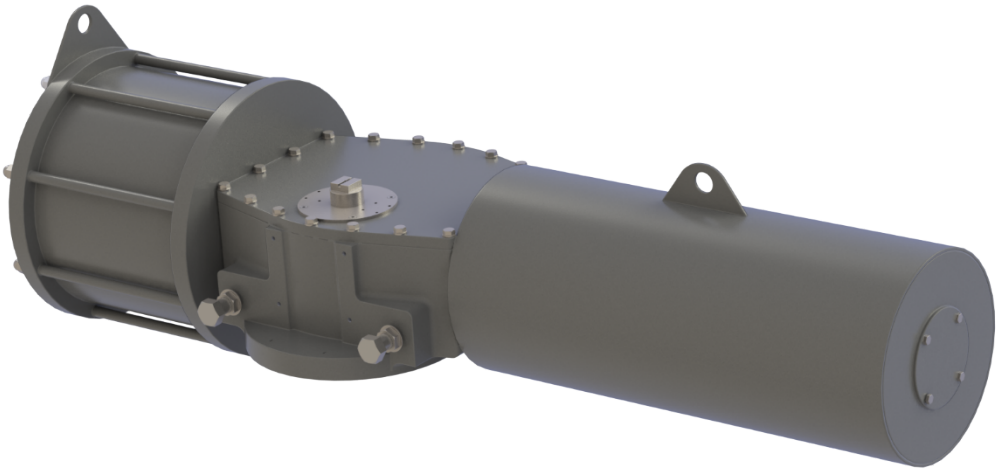
HD Series

Heavy-Duty Scotch-Yoke Pneumatic Actuator



Installation, Operation & Maintenance Manual

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1. Structure and Function

The HD Series heavy-duty scotch-yoke pneumatic actuator has a flexible, modular design composed of the center drive module, cylinder module and spring cartridge module. The center drive module is available with a symmetric or canted yoke to match the appropriate valve torque profile. The cylinder module contains the main air piston that drives the yoke, and the optional spring module provides an opposing spring force for failsafe operation if necessary. All HD series actuators are equipped with adjustable mechanical travel stops top provide some flexibility for the full open and full closed valve positions, and can be factory-equipped with an optional manual handwheel or hydraulic override to allow for manual or emergency operation. The HD Series actuator is commonly paired with complimentary components such as a solenoid valve, valve positioner, volume booster, quick exhaust valve, valve position transmitter and other accessories for a variety of desired operating profiles, position control options and monitoring feedback.

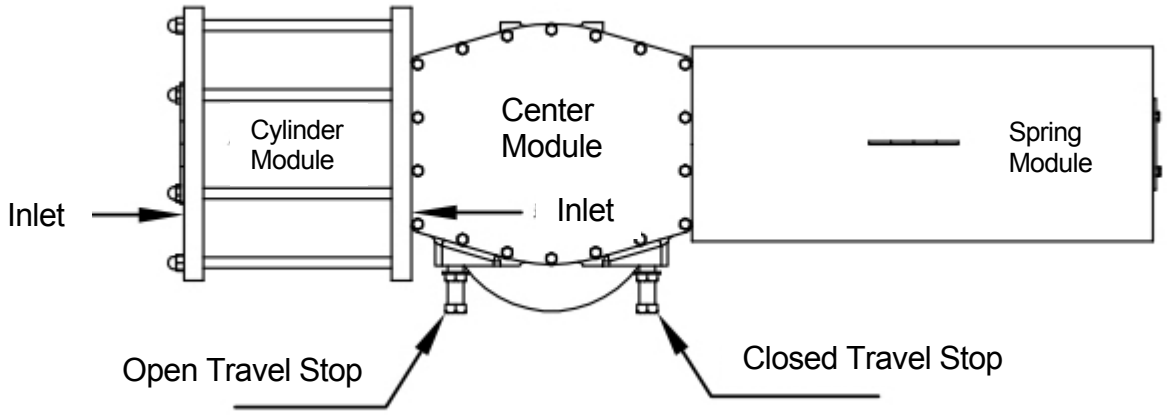

Figure 1. Basic Structure

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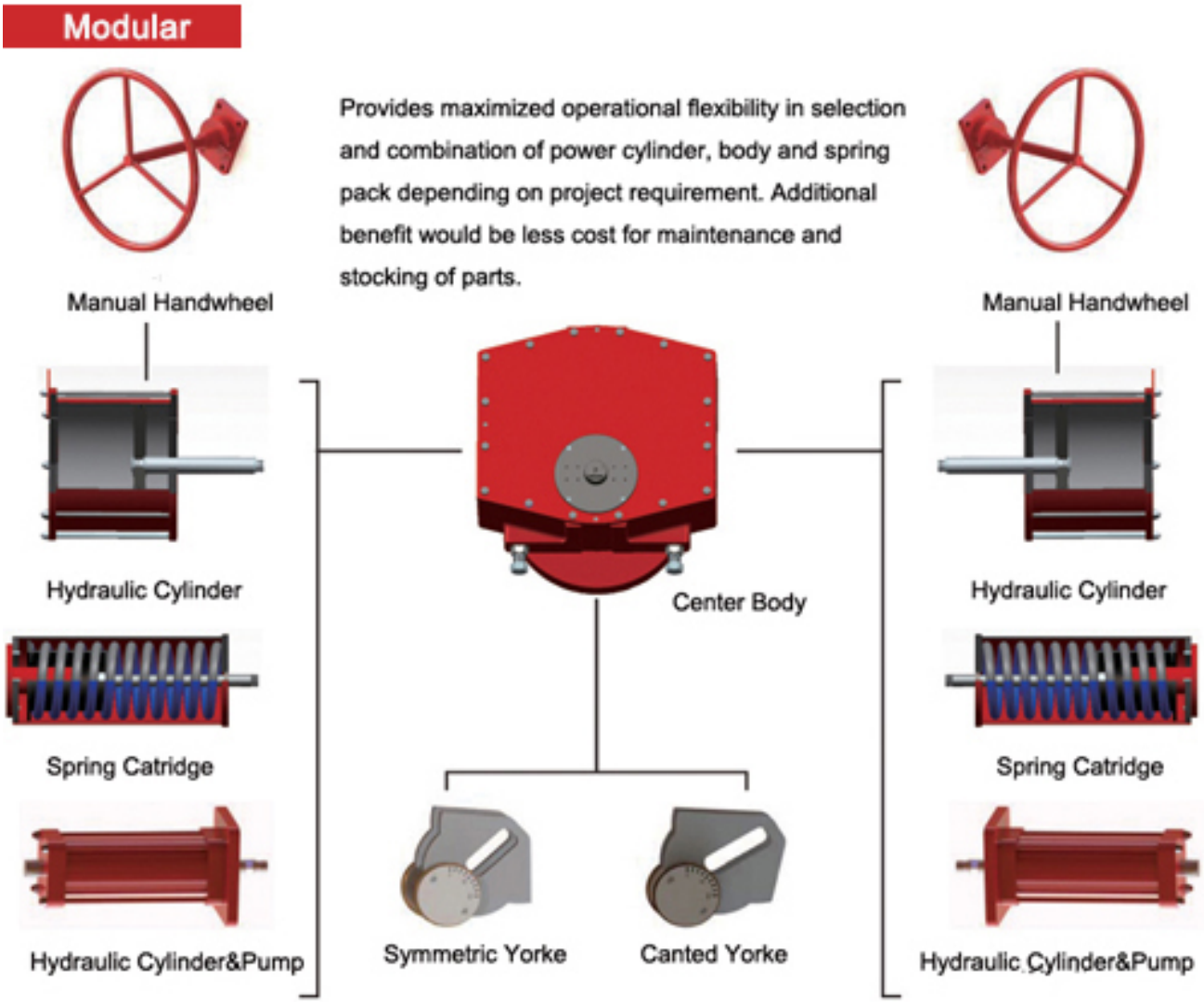

Figure 2. Modular Design

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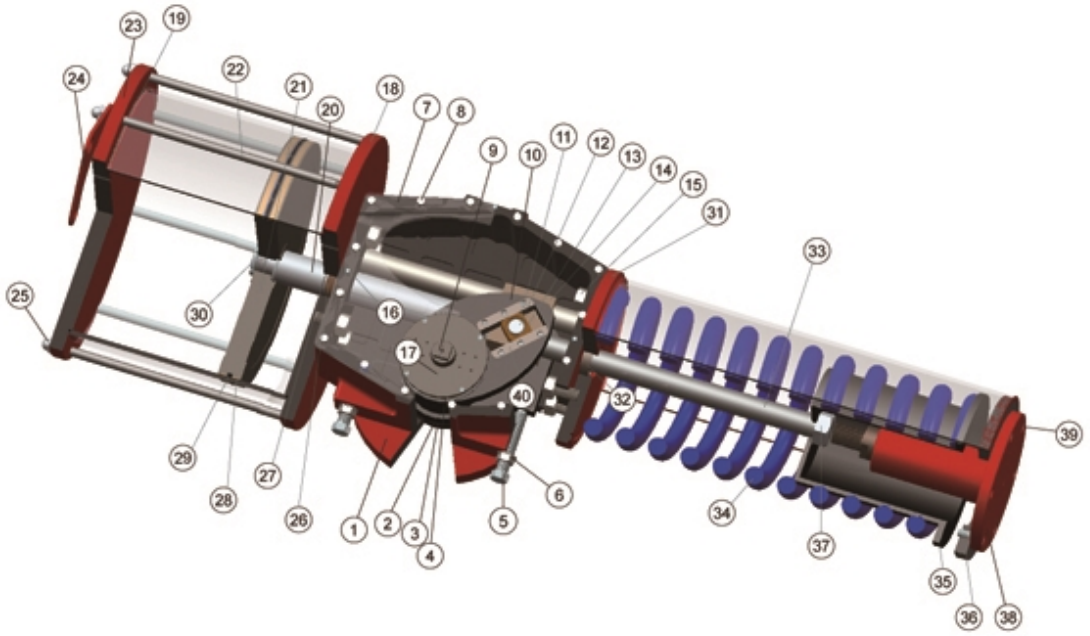
2. Materials of Construction



NO.	DESCRIPTION	MATERIAL
1	BODY	DUCTILE IRON
2	LOWER BUSHING	LOW CARBON STEEL
3	BUSHING O-RING	NBR
4	UPPER BUSHING	LOW CARBON STEEL
5	STOPPER BOLT	ALLOY STEEL
6	STOPPER UNT	ALLOY STEEL
7	BODY COVER	ALLOY STEEL
8	BODY COVER BOLT	ALLOY STEEL
9	POSITION INDICATOR	ALLOY STEEL
10	YOKE	ALLOY STEEL
11	SNAP RING	ALLOY STEEL
12	SLIDE PIN	ALLOY STEEL
13	SLIDING BLOCK	ALLOY BRASS
14	SLIDE BLOCK	ALLOY STEEL
15	FRONT COVER BOLT	ALLOY STEEL
16	COVER FIXED PIN	ALLOY STEEL
17	THE MOOUNTING PLATE	ALLOY STEEL
18	CYLINDER FRONT COVER	ALLOY STEEL
19	COVER O-RING-O	NBR
20	PISTON ROD	ALLOY STEEL

NO.	DESCRIPTION	MATERIAL
21	PISTON	ALLOY STEEL
22	TIE BOLT	ALLOY STEEL
23	CYLINDER END COVER	ALLOY STEEL
24	LIFE PLATE	ALLOY STEEL
25	TIE BOLT NUT	ALLOY STEEL
26	FRONT COVER BUSHING	ALLOY STEEL
27	O-RING	NBR
28	BACK-UP RING	PTFE
29	PISTON O-RING	NBR
30	PISTON LOCK BOLT	ALLOY STEEL
31	SPRING CASE FRONT COVER	ALLOY STEEL
32	SPRING ROD GUIDE BUSHING	ALLOY STEEL
33	SPRING ROD	ALLOY STEEL
34	SPRING	ALLOY STEEL
35	SPRING RETAINER	ALLOY STEEL
36	SPRING CASE END COVER	ALLOY STEEL
37	SPRING ROD LOCK NUT	ALLOY STEEL
38	HYDRAULIC CYLINDER	ALLOY STEEL
39	COVER BOL	ALLOY STEEL
40	ORBITAL MODULE	DUCTILE CAST IRON

3. Installation

Installation and connection of HD Series actuators should be performed according to the following steps:

1) Cut off the air supply and fully exhaust the actuator, ensure the actuator is in the closed position.
2) Make sure the valve is in the closed position before assembly.
3) Install any necessary mounting brackets onto the valve mounting pad or the actuator mounting pad.
4) Insert the valve shaft with shaft coupling if necessary into the drive hole on the bottom of the actuator as the actuator is placed onto the valve mounting surface.
5) Loosely insert all mounting bolts, making sure the actuator is as centered as possible before tightening down the mounting bolts.

4. Adjustment

The HD Series actuator full open and full closed positions come factory set, but may need to be adjusted depending on the valve and installation. If adjustment is needed, the open and closed travel stops can be adjusted as follows:

1) First, cut off the air supply and fully exhaust to ensure that the pneumatic actuator is in the initial closed position.
2) If the valve is too far past the desired closed or open position, proceed as follows:
    a. Apply air to the inlet port and gradually increase the pressure until the valve reaches the specified closed or open position.
    b. Loosen the closed or open travel stop nut and adjust the travel stop in the Clockwise direction until it just touches the internal hard stop. Re-tighten the closed travel stop nut.
    c. Apply air as necessary to test the actuator in the closed or open position. If still too far, repeat steps 2a & 2b.
3) If the valve is not far enough open or closed, proceed as follows:
    a. Ensure that the actuator is at the opposite end of the side that needs adjustment (apply air gradually as necessary). For closed adjustment, make sure valve is open; for open adjustment, make sure valve is closed.
    b. Loosen the closed or open travel stop nut and rotate the travel stop Counter-Clockwise a couple of turns.

c. Apply air as necessary to test the open or closed position. If not far enough, repeat steps 3a & 3b.
d. If valve travel becomes too far open or closed, use steps 2a through 2c.

5. Operation

Before operation, ensure that all piping connections and accessories are installed according to the system design requirement. Ensure all electrical connections are installed by a certified electrician according the electrical code for the operating location. Also ensure that the valve is properly installed and there are no obstructions in the valve path. After normal debugging, the user can operate the pneumatic actuator.

6. Maintenance

The pneumatic actuator is design for no regular maintenance; however, it is recommended to replace the seals every 3-5 years to prolong actuator life. Please call Max-Air Technology for details on seal repair kits.

7. Troubleshooting

If there is pneumatic actuator failure, please contact Max-Air technology for technical support. Some common troubleshooting methods are listed in the following table:

Failure phenomenon	Reason	Method
No actuation	No air supply No signal	Check the air supply Check the signal
Actuation time is too slow	The pressure is too low The air path is blocked up The cylinder is leaking	Check the air supply pressure Check the air path Check the cylinder, replace the seal
Excessive Vibration	The pressure is too low The air path is blocked (including the inlet air and outlet air) Resonance	Check the pressure Check the air path Add structural support

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8. Best Practices

1) Because the pneumatic actuator weight, it is advised to provide additional support around the middle of the spring cartridge at the installation site.
2) Air supply shall be clean, free from debris. Filter/regulators are recommended, lubrication is not necessary.
3) Actuators are designed to operate at specific air supply pressures; if the air supply pressure must be changed, re-evaluate to ensure the actuator will still meet torque requirements. Maximum air supply pressure should not exceed 0.6MPa (90psi).
4) The spring sleeve and end covers are the protection structure of the spring. Because the spring pre-compressed force is large, do not arbitrarily loosen fastening screws or bolts of the spring sleeve end covers to avoid serious injury.
5) Before maintenance or manual operation, ensure that the air supply is cut off and the actuator is exhausted. Contact Max-Air for technical support.