CRANE

brands you trust.

OPERATION MANUAL
CRANE® C-HPY SERIES
SCOTCH YOKE PNEUMATIC ACTUATOR

CRANE
Crane ChemPharma & Energy

www.cranecpe.com

CRANE

Table of Contents

1.0 Introduction

1.0 Introduction

C-HPY Series Pneumatic Actuators are designed for quarter turn rotary valves, major consisting of cylinder module, center body module, spring module and manual module, in configurations as:

C-HPY-XX-XX1-DA - Double Acting with a single cylinder
C-HPY-XX-XX2-DA - Double Acting with dual cylinders
C-HPY-XX-XXX-SRCX - Spring Return Fail Close (CW)
C-HPY-XX-XXX-SROX - Spring Return Fail Open (CCW)

Two output torque characteristic profiles are available in the forms of Symmetrical Yoke and Canted Yoke.

Standard actuators have a mounting base conformed to ISO 5211. Mounting of the shaft driven accessories is per NAMUR standard. The maximum operating pressure of the HPY Series Pneumatic Scotch Yoke Actuators range from 3 Bar to 8 Bar, depending upon the size and configuration. The maximum operating pressure refers to the name plate on the actuator.

Operating media shall be instrumentation air/inert gas, filtered to 40 microns or better, with dew point of -20°C (-4°F) or at least 10°C (18°F) below ambient temperature.

2.0 Installation

2.1 Notice

1. Use appropriate lifting slings to lift the actuator. The lifting eye bolt holes provided are for lifting the actuator only and not for lifting the complete valve-actuator-accessory assembly.
2. To prolong actuator seal life, use only recommended filtered media.
3. The actuator shall not be installed in hazardous areas incompatible with the defined gas groups and temperature class.
4. When using self-prepared manual override gearbox, must ensure the gearbox has over travel at least equal to that of the actuator.
5. The actuators can be mounted on valves in different positions according to valve position, but care shall be taken to reorient suitably, some accessories like filter regulation units, hydraulic override power pack reservoirs, etc. which are gravity dependent for functioning.
6. Spring tank and the end cover of spring module protects for the spring. Because of the pre-compression force, do not cut off the end cover or spring tank to avoid injury accident.

2.2 Installation instructions

1. Ensure the pressure module is depressurized completely by venting the gas to atmosphere and any power sources to accessories are disconnected.
2. Ensure the valve and actuator are aligned to the same position (i.e., valve closed - actuator closed or both open). For spring return actuators, align the valve to the safe position of the actuator. If a gearbox manual override is used, also ensure that it is aligned with the valve and actuator position.
3. Secure the valve, bolt the mounting bracket to the valve and then fit the coupler shaft on the valve stem (when using mounting kit). Confirm the position of actuator and valve, meanwhile align the valve stem (or coupler shaft) with the yoke bore and slide the actuator seats on the bracket mounting surface (or on the valve top flange, if without mounting bracket).
4. When using a manual override gearbox between the actuator and valve, first couple and fix the gearbox on the valve following the gearbox installation procedure. Back off the gearbox travel stop bolts. Mount the actuator on the gearbox with the coupler shaft and bolt up the actuator on the gearbox flange.
5. In order to align the bolt holes, it may be necessary to loosen the valve-bracket bolting slightly. The actuator mounting bolts should easily thread into the actuator base without side loading on the bracket (or the valve top flange). If needed, turn the actuator a bit and/or adjust the actuator travel stops blots. Bolt up the actuator to the bracket / gearbox flange / valve as the case may be.
6. Before operating the actuator, declutch the manual override (if present). The travel stops blot of the actuator shall limit the stroke and not those on the gearbox.
7. Adjust the travel stop bolts of the actuator for the proper open and closed valve positions, per valve manufacturer's recommendations.
8. Tighten the lock nuts of travel stop bolts after adjusting the stop bolts. Ensure the travel stops on gearbox (if provided) are now adjusted and locked to fractionally lag the actuator's stop position.
9. Ensure the manual overrides are declutched before putting the actuator to test in power operation mode.
10. Pneumatically stroke the actuator several times to check proper and smooth operation. If the actuator is equipped with a switch box or other accessories, adjust them at this time.

CRANE

3.0 Construction and Materials

See Figure 1

4.0 Maintenance

4.1 Disassembly and Maintenance of Modules

NOTICE: Prior to disassembly of the actuator, disconnect all air and electrical supplies from actuator, remove all accessories from actuator and dismount actuator from valve (or override gearbox, if present).

4.2 Spring Module

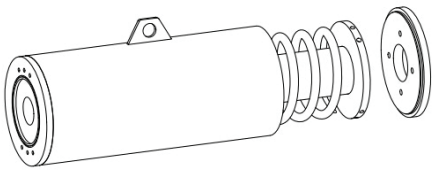


Figure 4.1, Spring Module

WARNING: To avoid personal injuries, please consult appropriate operating and maintenance manual. Before attempting to remove or disassemble the spring body, verify all pressure is released from the actuator, travel-limiting devices are disengaged and the stops blots are in the fully extended position. Do not tamper with factory weld components of spring tank.

NOTICE: If the actuator is provided with a manual override, first ensure to back off the override fully, to unload it from any spring force. Remove the override before disassembling Spring Module.

4.2.1 Disassembly of the Spring Module

1. Cut the air supply, ensure gas in the actuator vented to atmosphere completely;
2. Disassemble the spring Module from the Center Body Module;
3. Pull off the Spring Module from the Center Body Module carefully so as not to damage the threads on the Spring Rod and the Adaptor Plate Studs.
4. The Spring Module is welded into an integral component and the internal components cannot be disassembled.

4.2.2 Maintenance of the Spring Module

1. Clean and lubricate the Spring Rod and slide it back in.
2. Exchange the O-ring between the Spring Module and the Center Body Module.

4.3 Cylinder Module

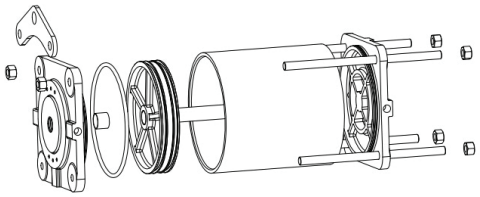


Figure 4.2, Cylinder Module

WARNING:

1. Ensure the gas is vented to atmosphere before disassembly of Cylinder Module. Failure to do so could cause severe injury;
2. To take the Cylinder Module off the Spring Return Actuator, first disassemble the Spring Module as described in section 4.2.1.

4.3.1 Disassembly of the Cylinder Module

1. Remove the Cylinder Module from the Actuator.
2. Unscrew the Tie Rod Nuts, remove the End Plate from cylinder module.
3. Tie Rods may be unscrewed from the Adaptor Plate.
4. Take off the cylinder.

4.3.2 Maintenance of the Cylinder Module

1. Clean the cylinder, grease the inside of cylinder
2. Exchange the piston and cap O-ring

4.4 Center Body Module

NOTICE: Either the Spring Module or the Cylinder Module must be removed from the Center Body Module before disassembling the Center Body Module..

4.4.1 Disassembly of the Center Body Module

1. Remove the position Indicator, if provided.
2. Loosen the screen of the top cover and take off it.
3. Loosen the bolts of the center body cap and open it.
4. Rotate the yoke to applicable location, loosen the screw on cover plate of the pin roll and take the cover and drive pin out.
5. Take out the yoke.

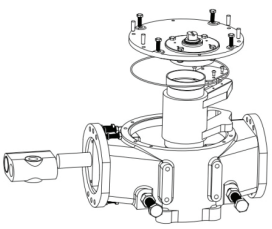


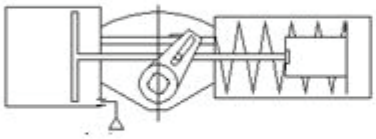
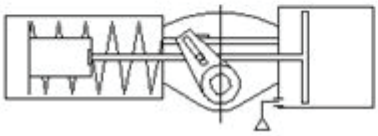
Figure 4.3, Center Body Module

5.0 Field Conversions

5.1 Fail Safe Condition (for Spring Return Actuators)
The fail safe position on spring return actuator can be reversed from fail CW to fail CCW and vice versa. This requires interchanging the position of Cylinder and Spring Modules and vice versa.

CAUTION: Never try to unscrew and remove the Spring Rod without completely relieving the spring load on it.

1. Follow the steps for removing the Spring and Cylinder Modules from the actuator, as described in Sections 4.2 and 4.3 respectively.
2. Switch the positions of the two modules, mount the Cylinder Module first. Take care to seat the module sealing O-ring properly in the groove.
3. Mount the Actuator back on the valve/gearbox and adjust the travel stop bolts, as required for proper valve operation. Tighten the sealing Lock Nuts on the travel Stop Bolts.
4. Check actuator for proper operation, using the rated working pressure.

Actuator Configuration	Fail Direction Configuration	
	CW	
	CCW	

5.2 Double Acting to Spring Return
1. To convert the DA actuator to Spring Return (fail CW mode), a Spring Module is needed to be mounted opposite the Centre Body Module. If convert to fail CCW mode, the Cylinder Module is needed to be disassembled first before mounted opposite the Centre Body Module, then assemble the Spring Module.
2. If the Cylinder Module needs to be shifted, for the required con-figuration of the Spring Return actuator, then first remove the Cylinder Module from the actuator. Follow the procedure in Section 4.3 to remove the Cylinder Module. Then mount the new Cylinder Module.
3. Connect the spring module and centre body module with stop bolts, install the module O-ring in adaptor groove of spring tank cap.
4. Re-assemble the actuator.
5. Adjust the stop bolts to ensure the correct mounting with valve.

5.3 Spring Return to Double Acting
1. Remove Spring Module from actuator (refer to Section 4.2).
2. Fit DA End Cover with O-ring to spring tank side of SR Actuator.
3. Adjust travel Stop Bolts, as required.

6.0 Hydraulic Module

Hydraulic module for both double acting and spring return actuator.

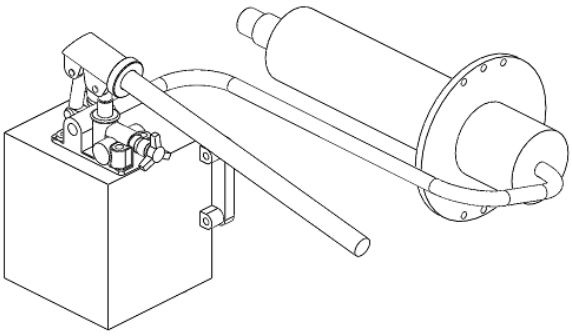


Figure 6.1, Hydraulic Module for Spring Return Actuator

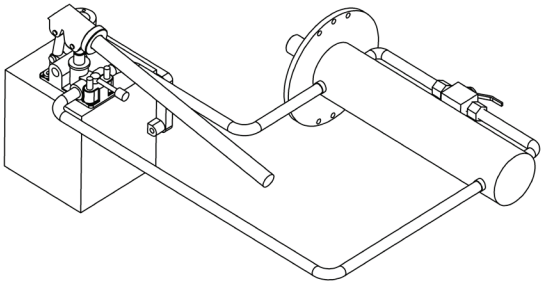


Figure 6.2 Hydraulic Module for Double Acting Actuator

6.1 Instructions

1. After the pipeline, it is required to carry out air exhaust operation before operating the manual pump for the first time;
2. For the single–acting pump, turn on unloading valve and move the operating lever quickly for several times;
3. For the single –acting pump, after stopping operating, the hydraulic cylinder will stay at the original position. When the unloading valve is turned off, the hydraulic cylinder will be reset slowly under the spring force. When the unloading is finished, please tighten it so as to facilitate the next operation;
4. For double-acting pump, need to loosen the threaded connector which connects with oil pipe, move the operating level up and down for several times till hydraulic oil seeps from the thread and then tighten the thread again;
5. Before operating the double-acting pump, it is required to shut off the balancing valve of the hydraulic cylinder. When the reversing lever is on the left side, the left port will output pressure oil while hydraulic oil on another side will flow back to the oil tank via the right port and vice versa.
6. For double-acting actuator, before canceling manual operation function and realizing pneumatic control, it is required to ensure the balancing valve to be opened and no pressure difference between left and right sides of the hydraulic cylinder.

WARNING: Please add the mineral hydraulic fluid or phosphate ester hydraulic fluid. Hydraulic fluid filter precision is not less than 20μm. The hydraulic fluid pollution degree not less than ISO 19/16(NAS10). Oil pollution will directly lead the damage for pump and valve function. The hydraulic fluid may be a polluting product. Do not spill hydraulic fluid using collection tanks and protect against accidental leaks and spills of the hydraulic fluid utilizing oil absorbing products.

7.0 Manual Module

Manual module include screw manual and gear manual, for both double acting and spring return actuator.

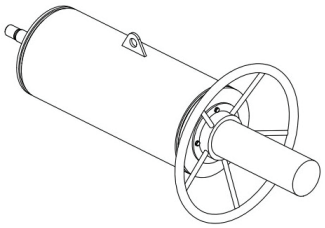


Figure 7.1 Manual Module for Spring Return Actuator

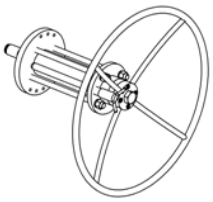


Figure 7.2 Manual Module for Double Acting Actuator

7.1 Instructions for Screw Manual and Gear Manual of Spring Return Actuator

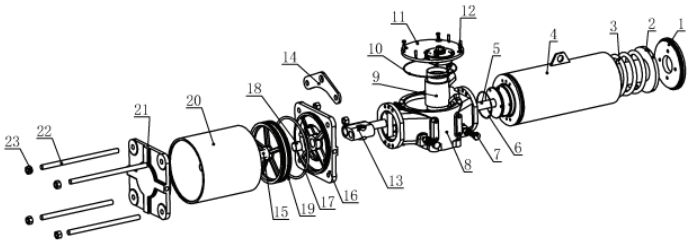
1. When the main air supply shut off for C-HPY-B/CX-XX1-SRC+AM/GM, turn the hand wheel counterclockwise on the manual mode t valve open position. The hand wheel must be turned clockwise to the initial position before actuator work in automatic mode..
2. When the main air supply shut off for C-HPY-B/CX-XX1-SRO+SM/GM, turn the hand wheel on the manual mode to valve close position. The hand wheel must be turned counterclockwise to the initial position before actuator work in automatic mode..
3. Turn the hand wheel on the manual module to move the screw forward (away from center body module), until it touches the extension's end.
4. Unscrew the sealing bolts from the middle of the hand wheel.
5. Push the slide key into the internal thread of the hand wheel.
6. Turn the hand wheel in the opposite direction to turn the actuator in required direction.
7. After completing the manual override stroke, disengage the coupler by pulling out the slide key, and hang on the bracket, screw the sealing bolts into the internal thread of the hand wheel. Back off the manual module completely before restoring automatic operation.

NOTICE: The manual module is not designed as an extended travel stop. It must be taken to fully backed-off position for the actuator to work normally in automatic mode. Turn the 3 position valves to connect the air supply to restore automatic operation.

7.2 Instructions for Screw Manual of Double Acting Actuator

7.3 Instructions for Gear Manual of Double Acting Actuator

When convert the automatic mode to manual mode, the Gear Module is referring to figure 7.3. Ensure stopped air supply before take off the snap ring from gear module, pull out cylindrical pin, rotate the hand wheel, forcing the flat joint moving towards the cylinder direction and approaching the Y joint, insert the cylindrical pin till the center hole of two joints aligned. Refer to figure 7.3 and vice versa.



								23	Nut	n	Carbon Steel
								22	Rod	n	Carbon Steel
								21	Cylinder Cap	1	Ductile Iron
				13	Drive Mechnism	1	High-quality Steel	20	Cylinder Body	1	Carbon Steel
6	O-Ring	1	Rubber	12	Screw	n	Carbon Steel	19	Piston	1	Ductile Iron
5	Spring Rod	1	Carbon Steel	11	Box Cap Mechnism	1	Ductile Iron	18	Guid Ring	1	Composite
4	Spring Body	1	Carbon Steel	10	Box sealing ring	1	Rubber	17	O-Ring	2	Rubber
3	Spring	1	Spring Steel	9	Yoke	1	Ductile Iron	16	Adaptor	1	Ductile Iron
2	Spring Seat	1	Carbon Steel	8	Box	1	Ductile Iron	15	Piston Rod	1	Carbon Steel
1	End Cap	1	Carbon Steel	7	Limit Screw	2	Carbon Steel	14	Lifting eye	1	Carbon Steel
Item Number	Part Name	Quantity	Material	Item Number	Part Name	Quantity	Material	Item Number	Part Name	Quantity	Material
Spring Module				Box Module				Cylinder Module			

CRANE

Crane ChemPharma Energy

Crane ChemPharma Energy
4526 Research Forest Drive, Suite 400
The Woodlands
Texas 77381, U.S.A.
Tel.: +1 936 271 6500
Fax: +1 936 271 6510

Friedrich Krombach GmbH
Armaturenwerke
Marburger Str. 364
57223 Kreuztal, Germany
Tel: +49 2732 520 00
Fax: +49 2732 520 100

www.cranecpe.com

FLOW OF FLUIDS
www.flowoffluids.com

brands you trust.

ALOYCO® CENTER LINE® COMPAC-NOZ® CRANE® DEPA®

ELRO® DUO-CHEK® FLOWSEAL® SINCE 1864 JENKINS® FK® KROMBACH ARMATUREN

NOZ-CHEK® PACIFIC VALVES RESISTOFLEX® revo® Saunders® the science inside

STOCKHAM® Triangle® UNI-CHEK® w.t.a.® XOMOX®

CPE-CRANE-SCOTCH_YOKE-IOM-EN-A4-2019_04_01