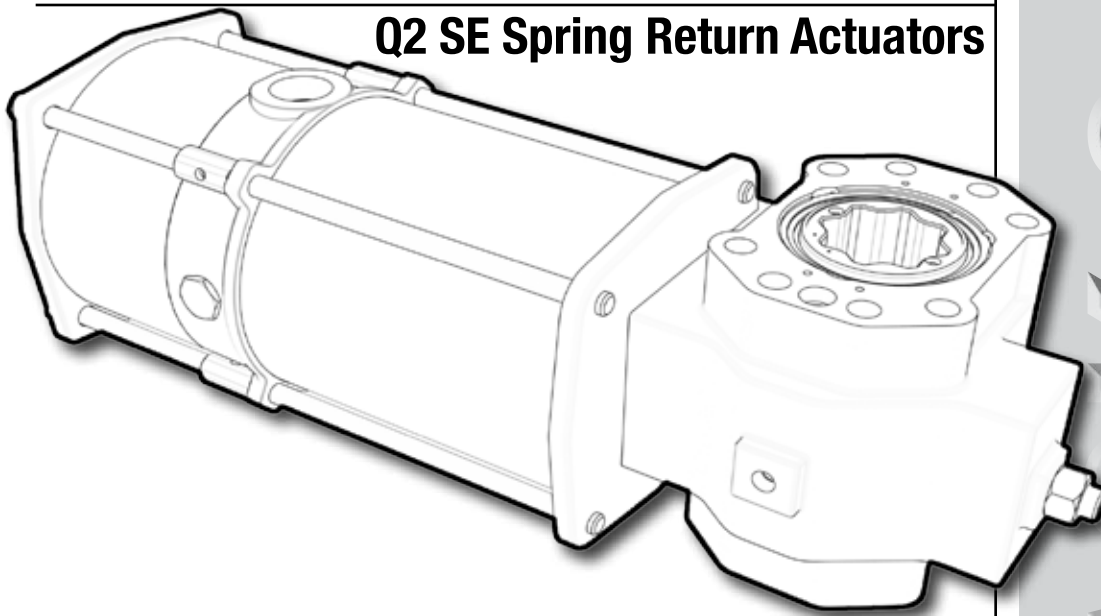


I O M

INSTALL-OPERATE-MAINTAIN

Q2 SE Spring Return Actuators



QTRCO Q2-series actuators are Rack & Gear® quarter-turn type actuators with lengths of travel of 90+/- 5°.

These actuators adhere to QTRCO design standards for long, maintenance free life.

This manual describes the proper methods for installation, operation, and repair maintenance.



The Leader in Actuator Technology

RACK & GEAR®
PNEUMATIC ACTUATORS

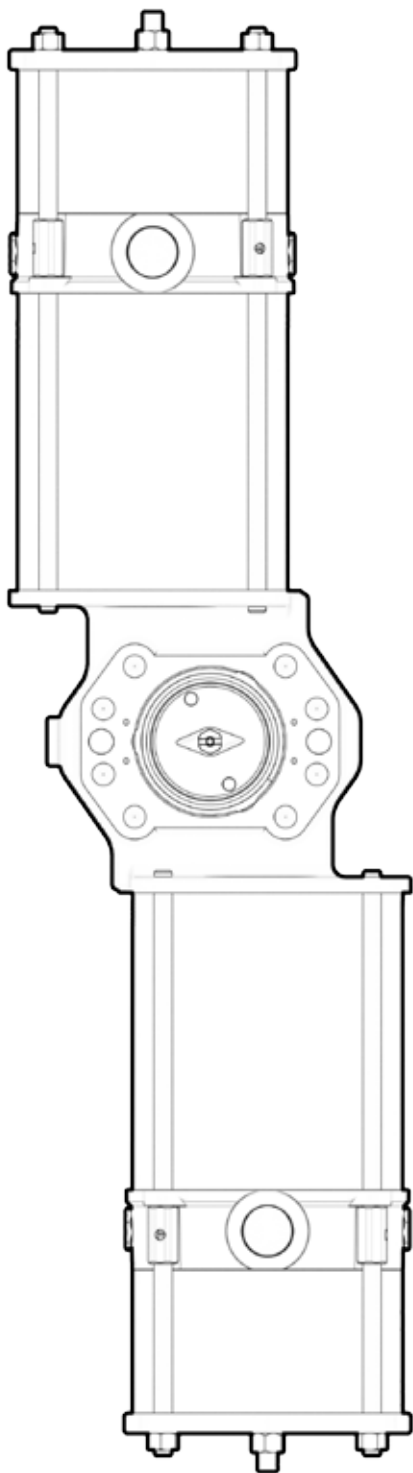
**NOTE:**

ALL ACTIVITIES MUST BE CARRIED OUT IN ORDER TO ENSURE PROPER ACTUATOR OPERATION.
ALWAYS READ ALL INSTRUCTIONS BEFORE BEGINNING MAINTENANCE.

QTRCO Q2-series actuators are composed of two or three basic sub-assemblies, one or two force modules and a torque module. The force module contains the piston and rack which provide linear motion. The torque module contains the gear which converts the force modules' linear motion into torque and operates the valve.

Every actuator assembled by QTRCO is tested prior to shipment to our customers.
Order specific documentation may be available upon request.

Contact QTRCO with any questions at info@qtrco.com or 281-516-0277.



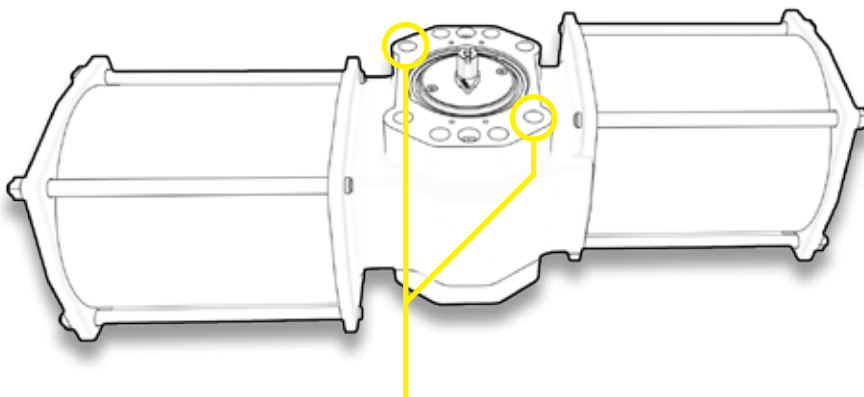
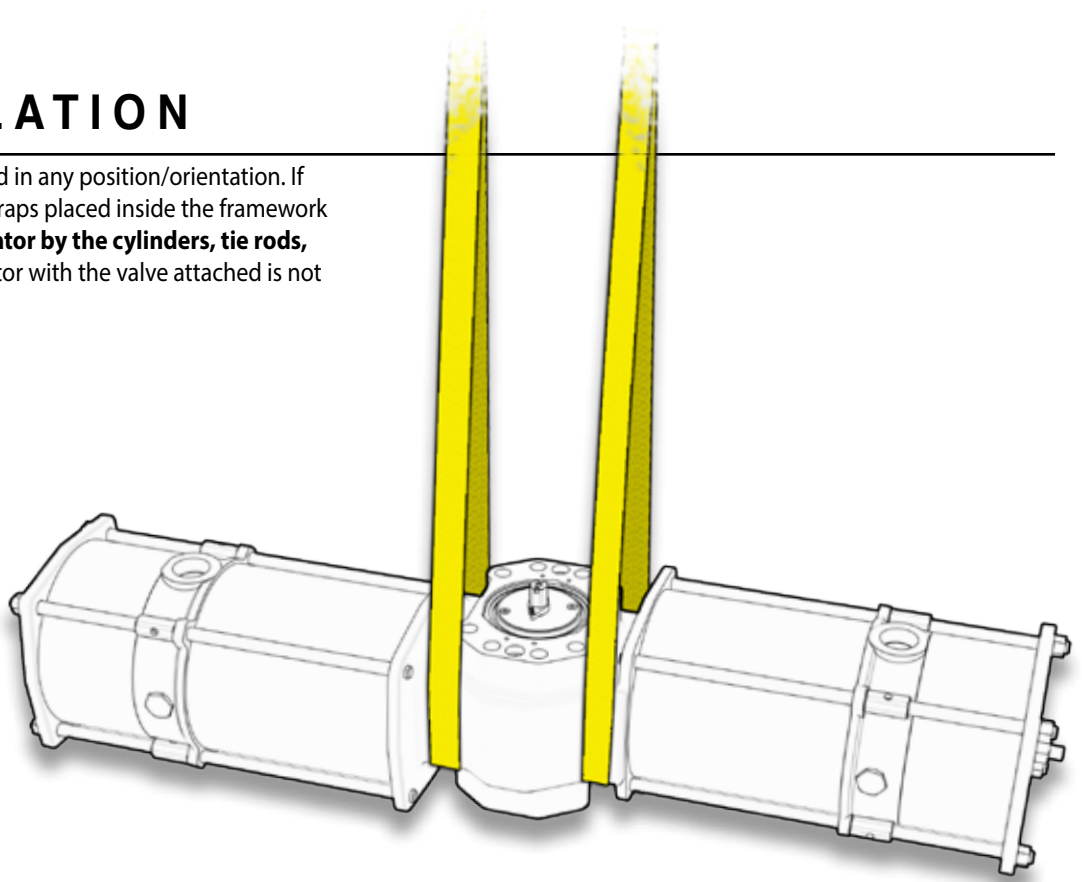
CONTENTS

1. INSTALLATION	4
1.1 VALVE ATTACHMENT	5
1.2 ACCESSORY MOUNTING	5
1.3 PIPING AND OPERATION	5
1.4 TRAVEL ADJUSTMENT	8
2. TROUBLESHOOTING	10
3. MAINTENANCE	11
3.1 PERIODIC MAINTENANCE SCHEDULE	11
3.2 LUBRICATION	11
3.3 MAINTENANCE KIT	12
3.4 PISTON SEAL REPLACEMENT	12
3. APPENDIX	14

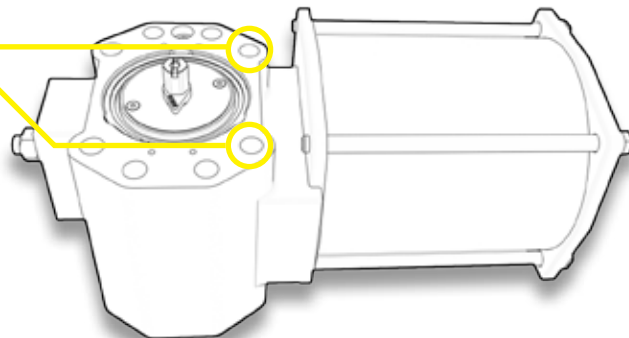
For additional information see: IOM Q2 Series Spring Return Actuators available at www.qtrco.com under the resources tab.

1. INSTALLATION

QTRCO actuators may be mounted in any position/orientation. If necessary, lift the actuator with straps placed inside the framework of the body. **NEVER lift the actuator by the cylinders, tie rods, or travel stops.** Lifting the actuator with the valve attached is not generally recommended.



Threaded Lifting Eyes
lifting eyes may be threaded into the body section and be used to lift the actuator.





1.1 VALVE ATTACHMENT

NOTE:

PRIOR TO MOUNTING THE ACTUATOR, VERIFY ALIGNMENT OF COUPLER AND SHAFT TO ENSURE THAT THE VALVE WILL MOVE TO THE CORRECT POSITION.

Ensure the actuator is in the same position as the valve. It may be necessary to stroke the actuator to determine the correct mounting orientation. Attach the actuator to the valve using the proper bracket and coupler, or with a QTRCO Universal Mounting Plate (UMP) if provided. Using all mounting holes indicated on QTRCO dimensional drawings, tighten all fasteners hand tight then torque the fasteners to the corresponding value on the table below.

	Thread Pattern	Ft-Lbs	Nm
Q203/204/205	M6	7	9
	M8	16	22
Q207/210	M10	32	43
Q212/214	M20	235	318

1.2 ACCESSORY MOUNTING

As a standard, Q2-Series actuators are provided NAMUR slotted accessory mounting geometry. When installing accessories, such as switchboxes or positioners, tighten accessory mounting bolts hand tight, stroke the actuator three times to ensure proper alignment then tighten the accessory mounting bolts to the proper torque. Check the dimensional drawing or associated product bulletin for exact dimensions.

1.3 PIPING AND OPERATION

The operation of an Q2 Spring Return (SR) actuator is comparable to any spring return, rack and pinion actuator.

Instrument air, water, and other power gases and fluids may be used to cycle the actuator so long as construction materials were chosen accordingly during assembly and max allowable pressure is not exceeded. Air driven stainless steel actuators with stainless steel or composite cylinders are not harmed by wet air (so long as freezing does not occur). Aluminum and chrome plated steel cylinders may be harmed over time by the presence of water.

WARNING

EXCEEDING THE STATED MAXIMUM PRESSURE MAY RESULT IN DAMAGE TO EQUIPMENT AND DANGER TO PERSONNEL INCLUDING SEVERE INJURY OR DEATH. CONSULT THE ACTUATOR LABEL FOR OPERATING LIMITS. IF AN ACTUATOR LABEL IS MISSING, CONTACT QTRCO TO REQUEST A REPLACEMENT.

WARNING

OPERATING OUTSIDE OF THE MINIMUM AND MAXIMUM TEMPERATURE RANGE MAY RESULT IN DAMAGE TO EQUIPMENT AND DANGER TO PERSONNEL INCLUDING SEVERE INJURY OR DEATH. CONSULT THE ACTUATOR LABEL FOR OPERATING LIMITS. IF AN ACTUATOR LABEL IS MISSING, CONTACT QTRCO TO REQUEST A REPLACEMENT. AN EXAMPLE OF AN ACTUATOR LABEL IS PROVIDED BELOW FOR YOUR REFERENCE.

MFG: QTRCO®, INC RACK AND GEAR® ACTUATOR
 13120 THEIS LN, TOMBALL, TX 77375, USA
 PH: 281-516-0277
 MODEL:
 P/N:
 S/N:
 MFG DATE:
 O-RING MATERIAL:
 BODY MATERIAL:
 MAX OPERATING PRESSURE: ___PSI/___BAR
 OPERATING TEMP: -___/+___C





 II 2 GD c

NB 0036

MAXIMUM SURFACE TEMPERATURE IS DEPENDENT ON FLUIDS TEMPERATURE

NOTE:

CE MARKING INDICATES PRODUCT CONFORMS TO THE REQUIREMENTS OF APPLICABLE DIRECTIVES AS LISTED ON THE ACTUATOR LABEL.

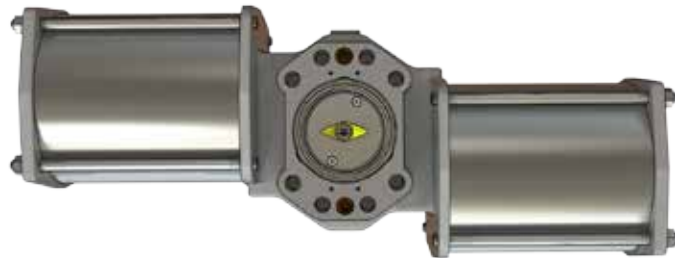
All Rack & Gear™ actuators are shipped in the fail clockwise (Left-Hand) orientation unless ordered as fail counter-clockwise (Right-Hand). The orientation may be reversed in the field by moving all accessories to the opposite side of the shaft and turning the actuator top-side down.

Spring Return (Left-Hand): pressure on the end cap ports pushes the pistons inward and causes counterclockwise rotation. Springs push the pistons outward resulting in a clockwise rotation.

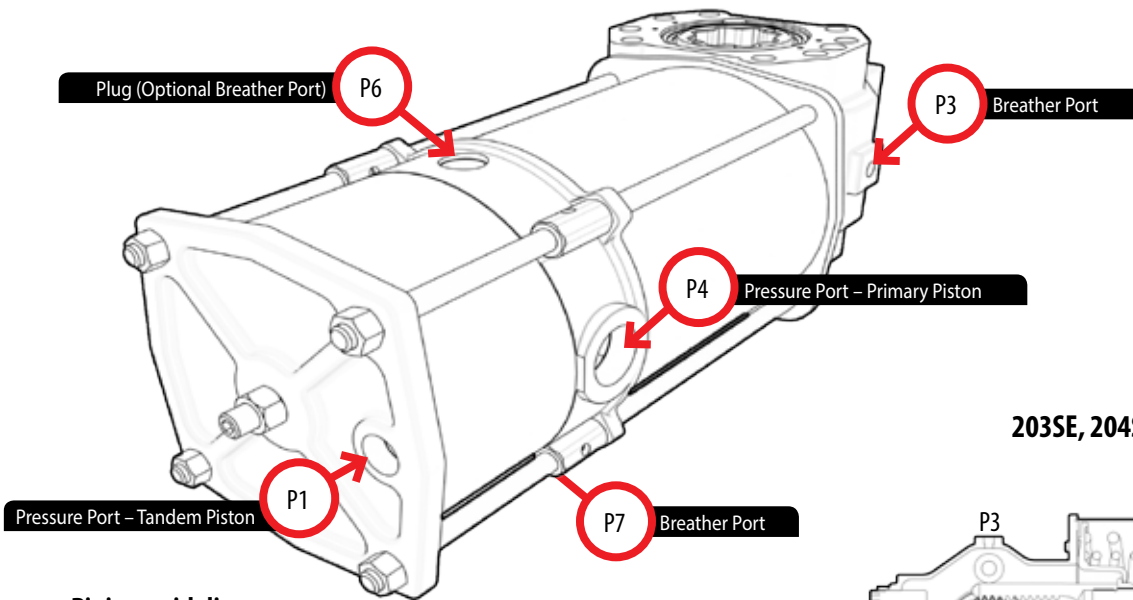
Spring Return (Right-Hand): pressure on the end cap ports pushes the pistons inward and causes clockwise rotation. Springs push the pistons outward resulting in a counterclockwise rotation.



Fail Clockwise



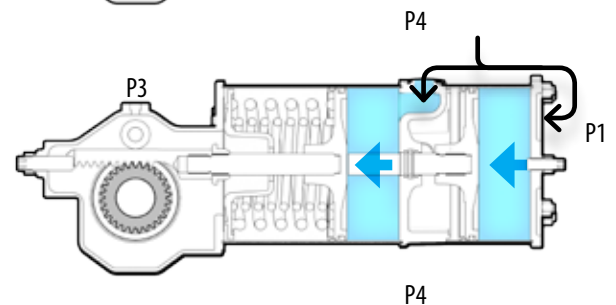
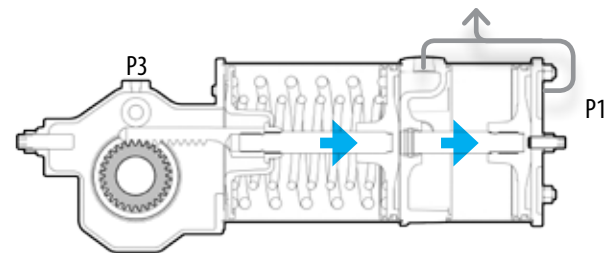
Fail Counter Clockwise



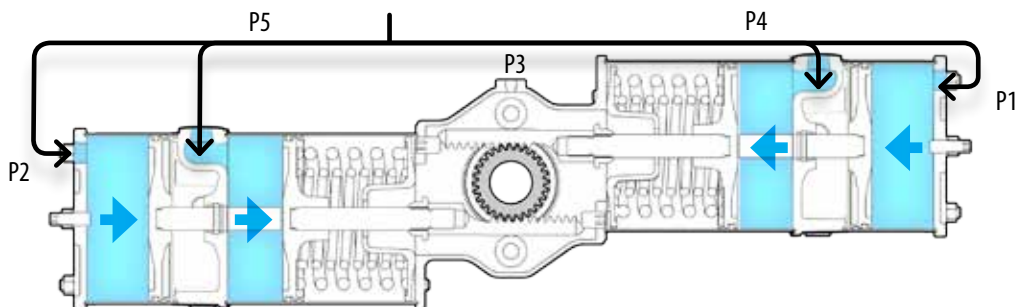
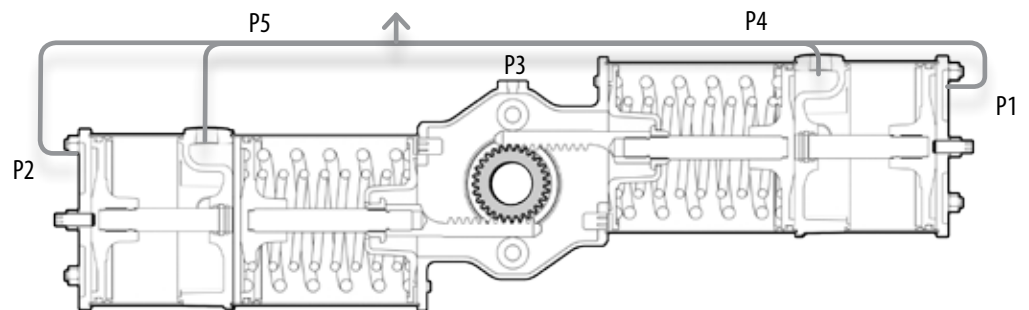
Piping guidelines:

- For dual cylinder models (205, 210, 214), pressure ports P1, P2, P4 and P5 must be utilized for proper operation.
- P1, P2, P4 and P5 are typically connected together and powered by a single air pathway.
- For single cylinder models (203, 204, 207, 212) pressure ports P1 and P4 must be utilized for proper operation.
- P3 is a breather port on the body and should be fitted with a strainer to prevent contaminants from entering the body.
- P7 is a breather port on the tandem piston and should be fitted with a strainer to prevent contaminants from entering the cylinder.

203SE, 204SE, 207SE, 212SE



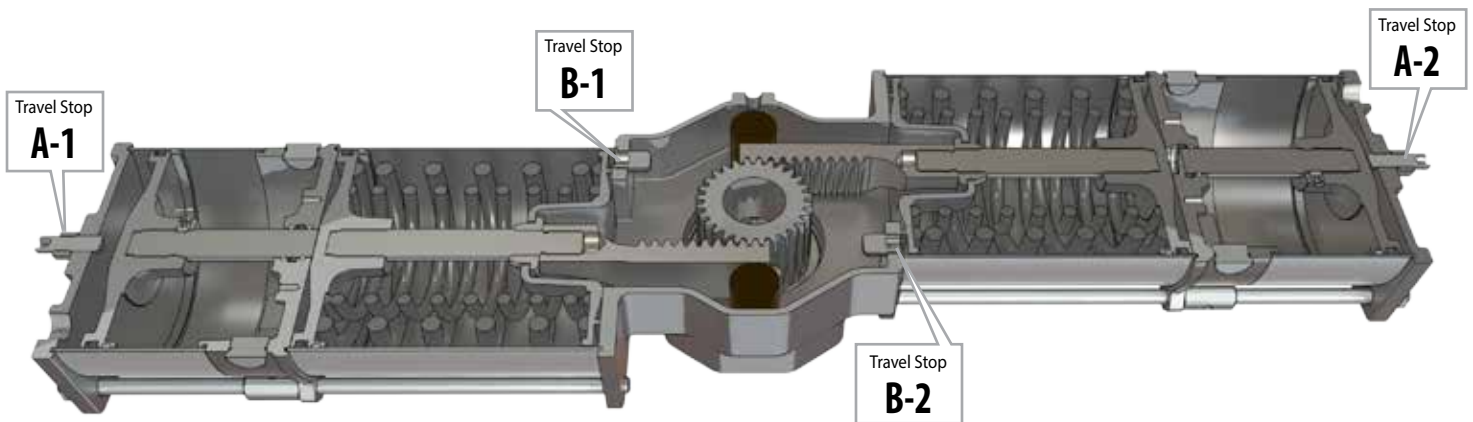
205SE, 210SE, 214SE



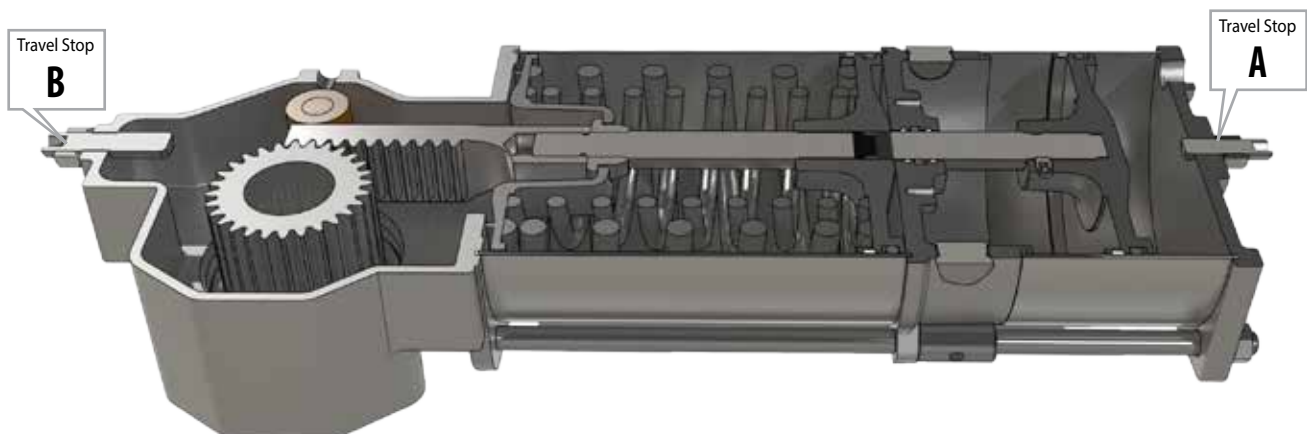
1.4 TRAVEL ADJUSTMENT

The following instructions are for fail clockwise (Left-Hand) orientated actuators. For non-standard models, clockwise and counterclockwise motion will be the inverse of what is described below. Check the actuator model and orientation before adjusting the Travel Stops.

205SE, 210SE, 214SE



203SE, 204SE, 207SE, 212SE





SET CLOCKWISE ROTATION (Travel Stop(s) A)

1. Relieve all pressure from the actuator.
2. Loosen Travel Stop Nut(s) on Travel Stop(s) A. Be careful not to misplace the travel stop o-ring(s).
3. Ensure actuator lockout (if provided) is disengaged.*

Single Cylinder Actuators:

- i. Apply sufficient pressure to P1 to relieve the pressure of the piston on Travel Stop A.
- ii. Adjust Travel Stop A until travel is set to the desired position. It will be necessary to exhaust pressure between each adjustment to determine the final travel position of the actuator.
- iii. With all pressure exhausted, tighten the travel stop nut until it comes in contact with the end cap then tighten and additional quarter turn.

Dual Cylinder Actuators:

- i. Apply sufficient pressure to P1 and P2 to relieve the pressure of the pistons on Travel Stops A.
- ii. Unthread Travel Stop A-2 four to five full turns.
- iii. Adjust Travel Stop A-1 until travel is set to the desired position. It will be necessary to exhaust all pressure between each adjustment to determine the final travel position of the actuator.
- iv. With pressure exhausted, thread Travel Stop A-2 in until it is in firm contact with the piston.
- v. With pressure still exhausted tighten both travel stop nuts until they are in contact with the end cap then tighten and additional quarter turn.

SET COUNTERCLOCKWISE ROTATION (Travel Stop(s) B)

1. Relieve all pressure from the actuator.
2. Ensure actuator lockout (if provided) is disengaged.*

Single Cylinder Actuators:

- i. Loosen the travel stop nut on Travel Stop B. Be careful not to misplace the travel stop o-ring.
- ii. Adjust Travel Stop B until travel is set to the desired position. It will be necessary to stroke the actuator in the counterclockwise direction between each adjustment to determine the final travel position of the actuator. This can be accomplished by applying pressure to P1.
- iii. With pressure applied to P1 tighten the travel stop nut until it comes in contact with the body.

Dual Cylinder Actuators:

If counterclockwise travel adjustment on a dual cylinder actuator is required in the field it is recommended the user accomplish this via bracket motion followed by resetting Travel Stops A via the directions listed above. If this cannot be accomplished follow the steps below.

WARNING

DO NOT REMOVE/LOOSEN TIE ROD NUTS UNLESS CYLINDER IS FULLY DEPRESSURIZED. COMPONENTS MAY EXIT THE ACTUATOR DANGEROUSLY IF DISASSEMBLY IS ATTEMPTED UNDER PRESSURE.

- i. Follow Section 3.4, Steps 1-3.
- ii. Adjust each Travel Stop B the appropriate amount. Use the table below as a guide as travel cannot be checked without fully assembling the actuator.†

MODEL	Degrees of Travel per ¼ Turn
Q205	1.4
Q210	1.1
Q214	0.8

- iii. Measure the height of both Travel Stops B protruding through the body and ensure that they are equal.
- iv. Follow Section 3.5, steps 16-20

*Clockwise rotation of the travel stop will shorten actuator stroke (stroke < 90°), counterclockwise rotation will lengthen actuator stroke (stroke > 90°).

† These travel stops were installed with threadlocker and may require an application of heat before they may be adjusted. It is recommended the user reapply threadlocker after their adjustment.



2. TROUBLESHOOTING

ISSUE	CAUSE	SOLUTION
Irregular or Stuttering Stroke	Supply pressure too low	Verify operating pressure is correct
	Worn internal components	See Section 3.4-3.5
	Damaged valve	Consult valve manufacturer
	Broken Springs	Replace Springpaq™
Leakage	Damaged cylinder seals	See Section 3.4
	Damaged shaft seals	See Section 3.5
	Travel stop nuts not tightened.	Tighten travel stop nut.
	Piston o-ring damaged	See Section 3.4
Improper Travel	Travel stops not set correctly	See Section 1.4
	Internal cylinder contaminants preventing normal stroke	See Section 3.4-3.5
	Damaged valve	Consult valve manufacturer
	Insufficient torque/Broken Springs	Upgrade to a larger actuator, increase supply pressure
	Broken Springs	Replace Springpaq™
Operating/Stroking too slowly	Supply medium pressure too low	Verify operating pressure will produce torque needed to operate valve correctly
	Internal cylinder contaminants preventing normal stroke	See Section 3.4-3.5
	Damaged sticky valve	Consult valve manufacturer
	Damaged seals or o-rings causing loss of pressure	See Section 3.4-3.5
	Damaged supply lines	Inspect supply lines replace as needed
	Exhaust port on body of actuator is blocked	Inspect port, clean as needed
	Limitation of accessories or port size	Upgrade accessories or port size

3. MAINTENANCE

3.1 PERIODIC MAINTENANCE SCHEDULE

General service actuators do not require periodic maintenance. Severe service actuators may require periodic maintenance based on operating conditions. Severe service may include but is not limited to high speed, high cycle, highly corrosive, explosive atmosphere, and others. Special applications may require individual maintenance schedules. Contact QTRCO for help developing a maintenance schedule for your application.

3.2 LUBRICATION

QTRCO actuators are lubricated for life. For special applications grease fittings may be provided. Use the grease fittings (if applicable) incorporated into the torque module of your actuator to apply additional lubricant. The frequency of this lubrication will depend on the application of the actuator. For any questions regarding the frequency of this operation or appropriate lubrication compounds contact your QTRCO distributor.

WARNING

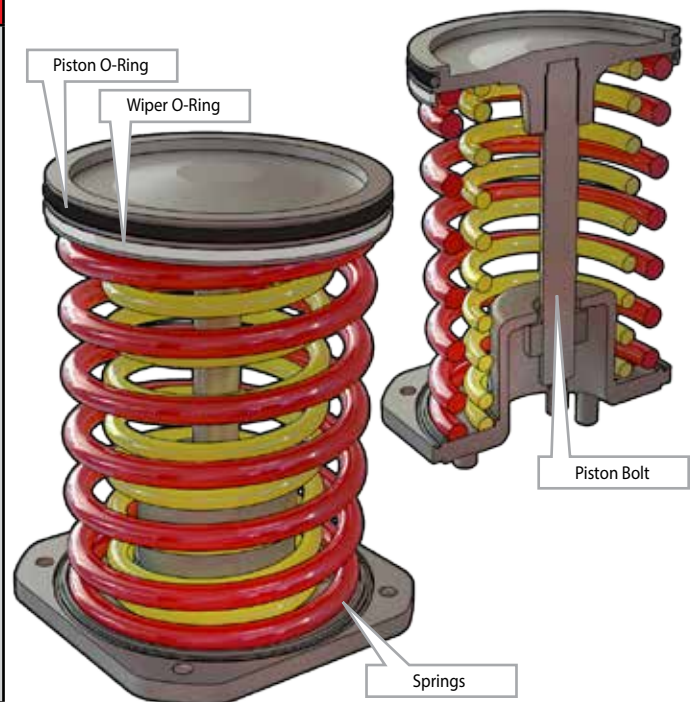
TAKE A MOMENT TO VIEW THE SPRINGPAQ™ IMAGE. NOTE HOW THE SPRINGPAQ™ CANNOT EXPAND WHEN THE END CAP AND CYLINDER ARE REMOVED FROM THE ACTUATOR. THE PISTON AND SPRING RETAINER CONTAIN THE SPRING IN ITS INITIAL COMPRESSED POSITION.

THE SPRING COMPRESSES FURTHER DURING ACTUATOR OPERATION. THE PISTON BOLT EXTENDS FROM THE PISTON TO THE SPRING RETAINER AND IS SECURED BY THE SAFETY COLLAR. THE SAFETY COLLAR IS RECESSED BELOW THE SURFACE OF THE SPRING RETAINER INTENTIONALLY TO PREVENT THE DISASSEMBLY OF THE SPRINGPAQ™.

DO NOT ATTEMPT TO DISASSEMBLE THE SPRINGPAQ™.

DISASSEMBLY OF THE SPRINGPAQ™ MAY EXPOSE YOU TO EXTREME DANGER, THE RESULT OF WHICH COULD BE SEVERE INJURY OR DEATH.

THERE IS NO REASON TO TAKE APART A SPRINGPAQ™. IF A SPRING IS BROKEN, REPLACE THE ENTIRE SPRINGPAQ™.



WARNING

DO NOT REMOVE/LOOSEN TIE ROD NUTS UNLESS CYLINDER IS FULLY DE-PRESSURIZED
COMPONENTS MAY EXIT THE ACTUATOR DANGEROUSLY IF DISASSEMBLY IS ATTEMPTED UNDER PRESSURE.
 ENSURE THAT ALL PROCESS LINES ARE SAFE / READ ALL MAINTENANCE INSTRUCTIONS BEFORE STARTING WORK.

WARNING

WHEN UNTHREADING TIE ROD NUTS, FIRST UNTHREAD ALL NUTS UNTIL THEY ARE FLUSH WITH THE ENDS OF THE TIE RODS. IF THERE IS STILL FORCE PUSHING OUTWARD ON THE ENDCAP AT THIS POINT, A DANGEROUS CONDITION MAY EXIST. A TRAVEL STOP OR OVERRIDE DEVICE MAY BE PUTTING PRESSURE ON THE SPRINGS, OR THERE MAY BE COMPONENT DAMAGE. FULLY REMOVING THE TIE ROD NUTS IN THIS CONDITION MAY ALLOW THE SPRINGS TO DANGEROUSLY DECOMPRESS. DO NOT CONTINUE FURTHER UNTIL IT IS ASSURED THAT THE UNIT IS SAFE TO DISASSEMBLE.

NOTE:

PERFORMING PISTON SEAL REPLACEMENT ON ONE CYLINDER AT A TIME WILL ALLOW MAINTENANCE WHILE RETAINING TRAVEL STOP ADJUSTMENT. IF BOTH CYLINDERS WILL BE REMOVED AT THE SAME TIME, THE TRAVEL STOPS MUST BE FULLY UNTHREADED PRIOR TO REMOVING THE END CAPS. LEAVING THE TRAVEL STOPS IN PLACE WILL PUT SPRING PRESSURE ON THE END CAP WHEN IT IS REMOVED, WHICH COULD CAUSE SERIOUS INJURY OR DEATH.

3.3 MAINTENANCE KIT

To purchase your actuator maintenance kit contact your QTRCO distributor. Please have the serial number of your actuator available. This number may be found on the actuator label or stamped into the body of the actuator.

3.4 PISTON SEAL REPLACEMENT

1. Exhaust all pressure and disconnect all supply lines.
2. Loosen all tie rod nuts until they are flush with the ends of the tie rods.
3. Check that there is no pressure against the end cap by verifying that the end cap is not being forced against the tie rod nuts.

WARNING

IF THERE IS FORCE AGAINST THE END CAP, STOP. DO NOT CONTINUE FURTHER UNTIL IT IS ASSURED THAT THE UNIT IS SAFE TO DISASSEMBLE.

4. Remove the end cap and tandem cylinder. Be careful not to lose the cylinder seal located on the internal side of the end cap.



5. Remove the separator plate and primary cylinder. Be careful not to damage the internal surface of the cylinder as this will compromise the piston's ability to seal.



6. Replace the primary piston o-ring and wiper ring as needed. Be sure to lubricate the new o-ring and wiper ring with the correct QTRCO approved lubricant if they are replaced.





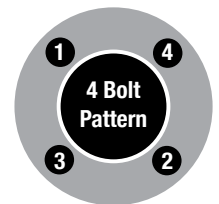
7. Inspect the pistons for any corrosion or wear (pitting, cracking). If excessive corrosion or wear is apparent a new actuator or actuator components may be necessary.
8. Lubricate the internal surface of the primary cylinder with a light coat of the correct QTRCO approved lubricant and slide the cylinder back over the piston and into the cylinder seal groove of the base plate, taking care not to pinch the piston o-ring.



9. Place the separator plate back over the primary piston cylinder and loosely attach this via the tie rod couplers. Thread the tandem tie rods into the tie rod couplers.
10. Lubricate the internal surface of the tandem cylinder with a light coat of the correct QTRCO approved lubricant and slide the tandem cylinder back over the piston and into the cylinder seal groove of the separator plate, taking care not to pinch the piston o-ring.
11. Place the end cap back over the tandem tie rods. Be sure that the tandem cylinder is seated in the cylinder seal groove of the end cap with the cylinder seal still in place between the two components.

12. Secure the end cap with the tie rod hex nuts you removed in step two. Hand tighten, and then torque the hex nuts to half and then full values according to the table below using the pattern designated.

MODEL	LB* FT	Nm
203	10	14
204/205	10	14
207/210	20	27
212/214	35	48

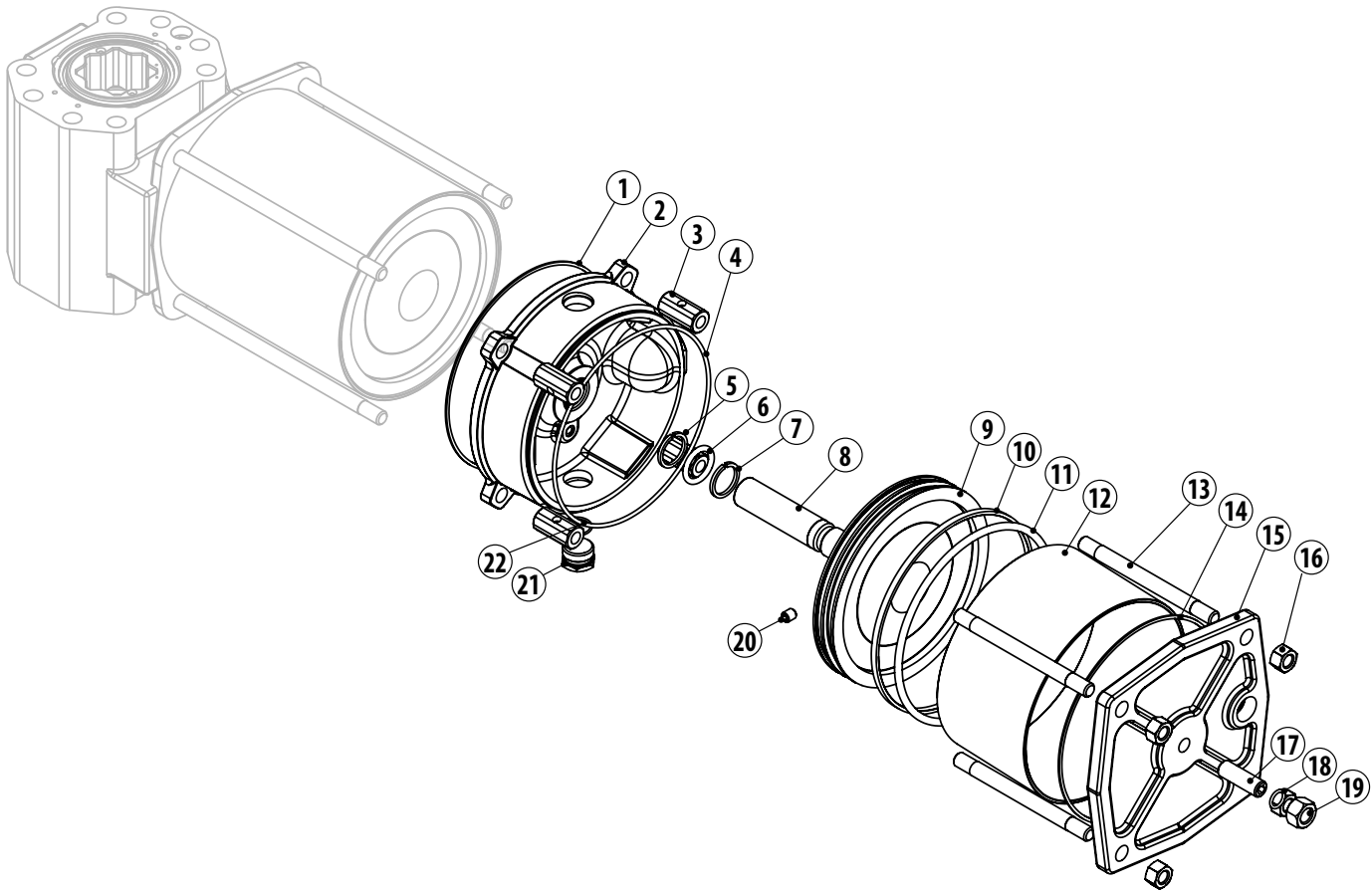


13. Complete steps 1-10 on the second force module of the actuator. (dual cylinder models)
14. Leak Test
15. Reinstall the actuator to service

4. APPENDIX

TANDEM PISTON MODULE

Torque Module and Force Module exploded views are included in the IOM "Q2 Series Spring Return Actuators" available at www.qtrco.com under the resources tab.



NUMBER	PART
1	Cylinder Seal
2	Separator Plate
3	Tie Rod Coupler
4	Separator O-Ring
5	Inner Shaft Bushing
6	Piston O-Ring
7	Inner Shaft Bushing
8	Piston Bolt
9	Piston
10	Wiper Ring
11	Piston O-Ring

NUMBER	PART
12	Cylinder
13	Tie Rod
14	Cylinder Seal
15	End Cap
16	Hex Nut
17	Travel Stop A
18	Travel Stop O-Ring A
19	Travel Stop Nut
20	Piston Bolt Set Screw
21	Breather
22	Breather O-Ring

*May not be present on all models





The Leader in Actuator Technology

QTRCO, Inc. | phone (281) 516-0277
13120 Theis Lane • Tomball, TX 77375 USA

QTRCO-SG C/O Severn Glocon FZE | phone +971 (0) 4 880 7330
Unit HC06, RA08 • North Zone, Jebel Ali Freezone UAE

 **888.ACTU.8.IT**
888.228.8848

 **www.qtrco.com**
Email: actu8it@qtrco.com