

Jamesbury™ Quadra-Powr™ spring diaphragm quarter-turn actuator QPX series

Installation, maintenance and operating instructions

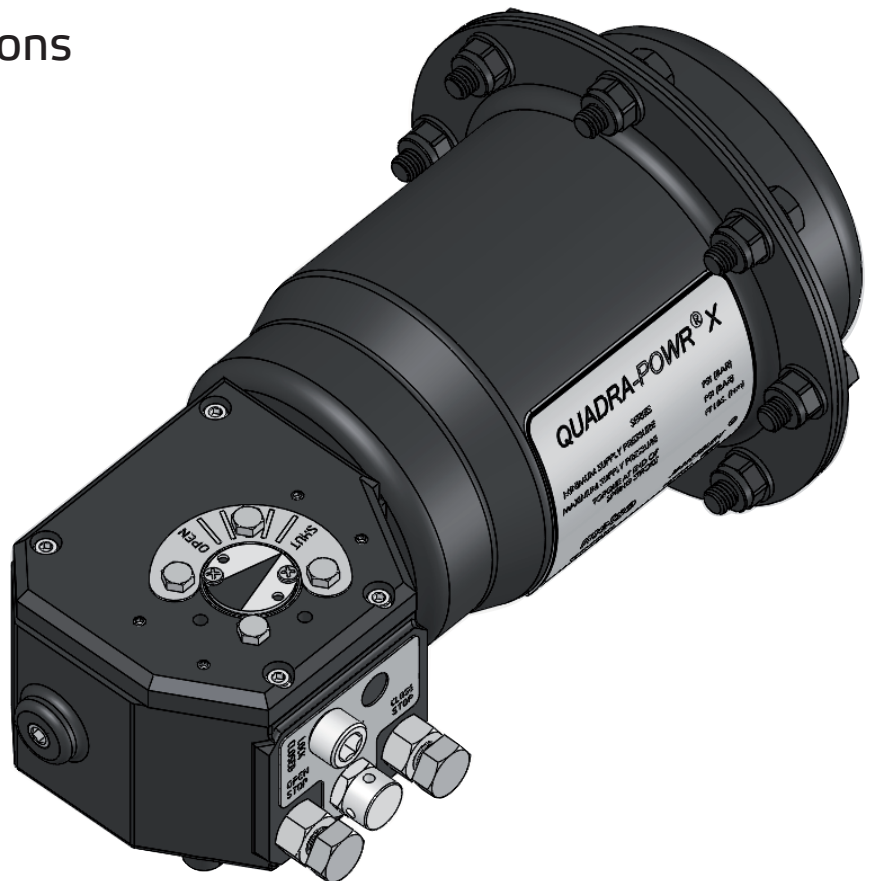


Table of contents

GENERAL	3	ACCESSORIES	12
Scope of the manual	3	100% Adjustable stop (AS)	12
Structure and operation	3	Safety mechanical lockout device (LD)	12
Actuator markings	3	1" NPT air inlet (F)	13
Specifications	3	Manual jackscrew override (MJX)	13
Recycling and disposal	4	Manual override gearbox (SRO)	15
Definitions	4	Fusible plug (LK-3116)	16
Safety precautions	4		
TRANSPORTATION AND STORAGE	5	EXPLODED VIEWS AND PARTS LISTS	17
MOUNTING AND DEMOUNTING	5	Actuators QPX 1-2	17
Actuator gas supply	5	Actuators QPX 3-5	17
Installation information	5	Parts list and bill of materials	18
Mounting the actuator on the valve	6	DIMENSIONS AND WEIGHTS	19
Demounting the actuator from the valve	6	Dimensions QPX	19
Operating directions	6	Weights QPX	19
MAINTENANCE	7	HOW TO ORDER	20
Maintenance general	7		
Actuator disassembly	7		
Actuator reassembly	10		
Malfunctions	11		
Tools	11		
Tightening torque table	11		
Ordering spare parts	11		

READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 Scope of the manual

This instruction manual contains important information regarding the installation, operation and maintenance of Jamesbury™ Quadra-Powr X Spring-Diaphragm (QPX) series actuators.

As the use of the Quadra-Powr X is application specific, many factors should be considered when selecting an actuator for a given application. Therefore, some of the situations in which the actuators are used are outside the scope of this manual. If you have any questions concerning the use, application or compatibility of the actuator with the intended service, contact Valmet for more information.

The manual can be changed or revised without any prior notice. Any changes in product's specification, structure, and/or any components may not result in an immediate revised version of the manual.

Please read these instructions carefully and save them for future reference. For more details about valves, positioners and accessories, refer to the separate installation, operating and maintenance instructions of the particular unit.

1.2 Structure and operation

Jamesbury™ QPX series actuators are unique spring-diaphragm actuators designed for rotary valves used in control and shut-off service. The QPX design provides safe, smooth, and reliable valve actuation at minimal pressures and up to 100 psi (6.9 BAR).

Pneumatic pressure is applied to the port marked "opening pressure" in Figure 1. Pressure builds up on the diaphragm (14) and diaphragm retainer (10), compressing the spring (43), and driving the actuator rod (4). The actuator rod turns the driver arm (3) and it's rotation is limited by the stop bolts (19). The spring (43) provides the required safety function; the valve either opens or closes if the air supply is interrupted. The standard QPX spring can rotate the valve clockwise and is typically used for a spring-to-close operation. For a counterclockwise operation, typically used for a spring-to-open operation, the actuator can be inverted or ordered with the "SO" option code.

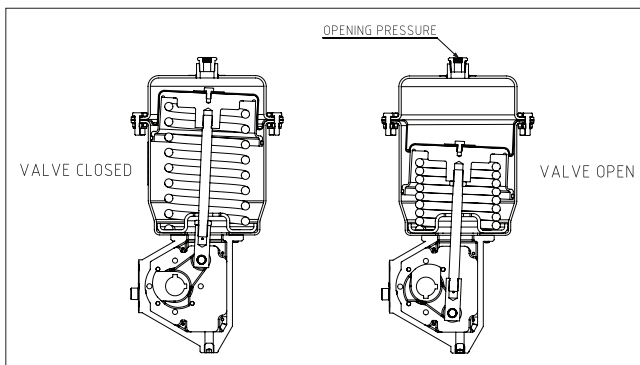


Figure 1. Operating principle

1.3 Actuator markings

The actuator is provided with an identification plate, see Fig. 2.

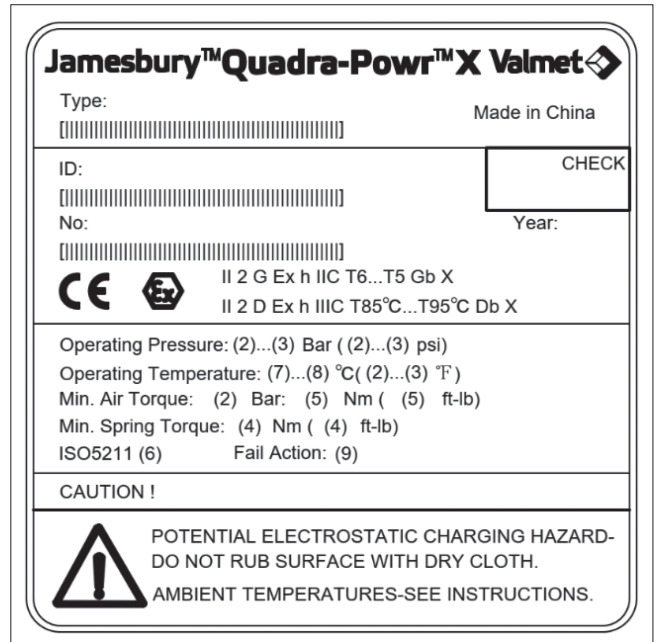


Figure 2. ID Plate

Identification plate markings are:

1. Typecode (Type)
2. ID Code (ID)
3. Serial number (No)
4. Atex category & protective level
5. Operating pressure
6. Operating temperature
7. Min air torque
8. Min spring torque
9. Mounting standard / Fail action
10. Caution

1.4 Specifications

Maximum operating pressure (MOP):	7 bar (100 psi)
Maximum design pressure:	11 bar (160 psi)
Temperature rating:	-29°C to +66°C / (-20° to 150°F)
Rotation adjustment:	-5° to +5° and 85° to 95°
Supply media:	Air, water, mineral-based hydraulic fluid, sweet natural gas, nitrogen

1.5 Recycling and disposal

Most of the actuator parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the actuator. In addition, separate recycling and disposal instructions are available from the manufacturer. An actuator can also be returned to the manufacturer for recycling and disposal against a fee.

1.6 Definitions

The following definitions given here are used in this document:

WARNING:

If not observed, user incurs a high risk of severe damage to the product and/or fatal injury to personnel.

CAUTION:

If not observed, user may incur damage to the product and/or injury to personnel.

NOTE:

Advisory and information comments provided to assist maintenance personnel to carry out maintenance procedures.

WARNING FOR ATEX:

If not observed, user incurs a high risk of severe damage to actuator and/or fatal injury to personnel.

WARNING:

Before installing the valve and actuator, be sure that the indicator pointer on top of the actuator (and the identification plate in female actuators) are correctly indicating the valve position. Failure to assemble these products to indicate correct valve position could result in damage or personal injury!

WARNING:

Do not try to manually operate a pressurized actuator.

CAUTION:

Loss of air pressure may cause spring-return actuators to move to their 'failure' position.

CAUTION:

Do not exceed the permitted values! Exceeding the permitted pressure value marked on the actuator may cause damage and lead to uncontrolled pressure release in the worst case. Damage to the equipment and personal injury may result.

NOTE:

Applying air pressure or control signal to valve/actuator assembly may cause the assembly to operate.

NOTE:

The actuator must be sized accurately for proper operation. Refer to information on the actuator end of stroke torques and the appropriate valve bulletin for operating torques.

NOTE:

When servicing a valve actuator assembly, the best practice is to remove the entire assembly from service. If the actuator is removed from the valve, it should be remounted on that same valve after servicing is completed. The actuator must be readjusted for proper "open" and "close" position each time it is remounted.

1.7 Safety precautions

User Safety

WARNING:

Beware of movement of the valve and any linkage between it and the actuator. Keep hand, body parts, tools and other objects out of the way of moving parts. Failure to do this may result in damage or personal injury!

WARNING:

Always keep hands and clothing away from the valve ports. A closing valve acts as a cutting device.

WARNING:

Disassembly of a spring-return actuator may be dangerous. Never attempt to disassemble the spring cartridge assembly of a spring-return actuator. Disassembly of the spring cartridge assembly may result in serious personal injury! If maintenance is required, the entire spring-return actuator should be directed to a Valmet service center.

WARNING:

Shut off and bleed all supply lines before installation or servicing the actuator.

ATEX/Ex Safety

CAUTION:

Potential electrostatic charging hazard do not rub surface with dry cloth.

CAUTION:

Ensure the general process and worker protection from static electricity in the facilities.

NOTE:

The actual surface temperature of actuator depends on the process and ambient conditions. The protection from high or low temperature must be considered by the end user before put into service.

WARNING FOR ATEX:

While lifting actuator housing should not impact on the other light or rusty metal.

WARNING FOR ATEX:

Inspect for paint damaged, to ensure continued corrosion protection.

WARNING:

Valve on which actuator is installed should be earthed properly to discharge static charge.

2. TRANSPORTATION AND STORAGE

Make sure that the actuator and associated equipment have not been damaged during transportation. Store the actuator carefully before installation, preferably indoors in a dry place. Do not take it to the installation site or remove the protective caps or ports for piping until just before installation.

Lift the actuator as shown in Figure 3: in a horizontal position from the spring housing, in a vertical position from an eye bolt screwed in place of the set screw (35). Refer to Section 7 for weights.

CAUTION:

Take the weight of the actuator or valve combination into account when handling it! Do not lift the valve combination from the actuator, positioner, limit switch or their piping. Lift the actuator as directed in Section 2, lifting ropes for a valve combination should be fastened around it. The weights are shown in Section 7. Dropping may result in personal injury or damage to the equipment.

CAUTION:

Do not use VDI/VDE mounting holes to lift an actuator.

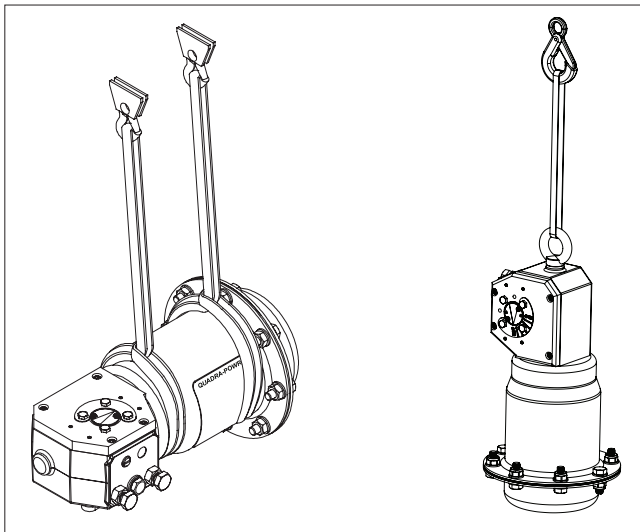


Figure 3. Lifting the actuator

WARNING:

Do not use the device if it is damaged during transportation!

If the device has suffered damage during transportation do not install and use it. In case of noticing damage to the device upon receiving it, please contact the supplier.

3. MOUNTING AND DEMOUNTING

3.1 Actuator gas supply

Dry compressed air, nitrogen, water, sweet natural gas, and mineral-based hydraulic fluid can be used as supply medium, no oil spraying is needed. The air supply connections are presented in the dimensional drawings in section 6. The maximum operating pressure (MOP) is 7 bar (100 psi).

3.2 Installation information

Before installation, take care of the safety precautions mentioned in section 1.7.

Ensure that the actuator will not be exposed to pressure in excess to the maximum rating as indicated on the actuator nameplate or technical documents.

Ensure throughout the installation that there are no leaks of the supply media.

Ensure that the maximum operating temperature, as indicated on the nameplate, is not exceeded during operation, transportation, or storage of the actuator.

The environment and surrounding should not affect or limit the operational safety of the product.

Ensure the product is protected against impact, vibration, or any kind of movement during operation, transportation, and storage.

Product should not be installed in hazardous area that is not compatible with the gas group and temperate class indicated on the nameplate.

Ensure proper tightening of fasteners and mounting accessories to avoid loosening during operation.

All the tubing, fitting and actuation media should be free from contamination and filtered to required level. Quality of media should be as per ISO 8573-1 [5:3:4]. For additional information consult Valmet.

Ensure proper adjustments of the stopper bolt to desired opening and closing of the valve.

Once proper installation is done, check for smooth continuous operation. If undesired operation occurs, check for correct pressure and volume flow.

NOTE:

Flow may be restricted by undersize tubing or fitting. These may throttle the flow resulting in reduced pressure or volume causing intermittent or undesired movement.

3.3 Mounting the actuator on the valve

CAUTION:

Be aware of the cutting movement of the valve!

1. Check to see that the position indicator on the actuator is assembled correctly for the desired failure mode, either spring-to-close or spring-to-open. In the spring-to-close mode, the actuator will cycle clockwise to close upon loss of pressure. In the spring-to-open mode, the actuator will cycle counterclockwise to open upon loss of pressure.
2. If the actuator is not set up in the configuration desired, remove the four hex head screws (33), indicator plate (12), indicator pointer (24), and remount them on the opposite mounting surface. In keyed drive (female) actuators, the fastener identification plate shows the failure mode of the actuator.
3. Mount the actuator to the valve following the directions in the AMI (Actuator Mounting Instructions) or valve IMO. General instructions are given below.
 - a. For the Male drive QPX, install the actuator so that the shaft of the valve, or any other device to be actuated, connects to the male square shaft using a two-piece "no-play" type coupling.
 - b. For keyed drive QPX, install the actuator so that the shaft of the valve, or any other device to be actuated, goes into the shaft bore of the actuator. If the bore is larger than the valve shaft diameter, use a keyed shaft adapter. There are two keyway slots in the shaft bore of the actuator at an angle of 90°. These allow the installation position of the actuator to be changed in relation to the valve.
 - c. The installation position can be selected freely, but Valmet recommends installation of the pneumatic cylinder pointing towards the ground. The actuator is thus best protected against damage due to supply air impurities or water. When the installation position of the actuator is altered, the arrow indicating the operating direction must be turned to correspond with the actual operation of the valve.
 - d. When necessary, lubricate the shaft bore and bushing with Cortec VCI 369 or an equivalent anti-corrosive agent to prevent it from jamming due to rust.
 - e. The actuator must not be allowed to come in contact with the pipework, because the vibrations may damage it or cause unsatisfactory operation.
 - f. In some cases, e.g. when using large actuators, the valve has an extended stem or with extensive pipework vibrations, the actuator should be supported. Consult Valmet for more instructions.
 - g. If the actuator is used with devices other than Valmet valves, any additional parts attached to the actuator must be properly protected.
4. Connect a regulated air supply to the 3/8" NPT (or 1" NPT) fitting in the diaphragm casing (15).

CAUTION:

The maximum operating pressure is 100 psi (6.9 BAR).

5. Adjust the stop screws (19) by releasing the jam nut (23) and turning. Stops can only be adjusted when driver arm (3) is off the stop screw being adjusted. (Maximum rotation adjustment +/- 5°.) Adjust stop screws based on the instructions provided in the appropriate valve IMO. Be sure to retighten jam nut (23).

3.4 Demounting the actuator from the valve

CAUTION:

Depressurize the actuator before starting demounting!

The actuator must be depressurized and the supply air disconnected. Unscrew the actuator-side bracket screws and pull the actuator off the valve shaft. This is best done by lifting the actuator as show in Figure 3. Note the mutual positioning of the valve and the actuator to ensure correct functioning after reassembly.

3.5 Operating directions

The operating pressure, output torque and drive type is determined by the actuator designation. Maximum operating pressure is 100 psi (6.9 BAR). (see Table 1)

Actuator designation example: QPX4C/K40 is a series QPX4 spring diaphragm actuator that has a 60 psi (4.1 BAR) spring, an end of air pressure stroke output torque of 200 ft-lbs (272 Nm) and uses a 40 mm female keyed drive to move the valve.

Before operating make sure all tapped holes in the body, which are not being used, are resealed with fasteners.

Table 1

Actuator Series	Spring Version	Operating Pressure in psi (BAR)	End of Spring Stroke Torque in FT•LBS (N•m)	Drive Type
QPX1	C	60 (4.1)	25 (34)	K15 - 15 mm Keyed M - 9/16" Square
	A**	20* (1.4)	11 (15)	
QPX2	B	40 (2.8)	38 (52)	K20 - 20 mm Keyed M - 9/16" Square
	C	60 (4.1)	57 (77)	
	D	80 (5.5)	74 (100)	
QPX3	A	20* (1.4)	26 (35)	K35 - 35 mm Keyed M - 3/4" Square
	B	40 (2.8)	76 (103)	
	C	60 (4.1)	114 (155)	
	D	80 (5.5)	146 (198)	
QPX4	B	40 (2.8)	153 (207)	K40 - 40 mm Keyed M - 1" Square
	C	60 (4.1)	229 (310)	
	D	80 (5.5)	294 (399)	
QPX5	B	40 (2.8)	305 (414)	K40 - 40 mm Keyed M - 1" Square
	C	60 (4.1)	458 (621)	
	D	80 (5.5)	587 (796)	

* For Direct Control Application

** QPX2A only available with QPX1 drive type options.

4. MAINTENANCE

4.1 Maintenance general

CAUTION:

Observe the safety precautions mentioned in section 1.7 before maintenance!"

Although Jamesbury actuators are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and, in real terms, reduce the total cost of ownership. Under normal operating conditions, the actuator requires only periodic observation to ensure proper adjustment. Valmet recommends inspecting actuators at least every five (5) years.

The inspection and maintenance frequency depends on the actual application and process condition and can be specified together with your local Valmet experts.

During this periodic inspection, the parts detailed in the spare part set should be replaced. Standard replacement of "soft" parts in Quadra-Powr X actuators consists of items numbered 6, 14, 31, 62 and 64. See section 4.7. Time in storage should be included in the inspection interval.

Maintenance can be performed as presented below. If maintenance assistance is required, please contact your local Valmet office. The part numbers in parentheses () in the text refer to the exploded view and to the parts list in Section 6, unless otherwise stated.

NOTE:

Before working on a Quadra-Powr X actuator, note that all fasteners except socket head shoulder screw (8) and hex head cap screw (88, on QPX4 & QPX5) are metric.

4.2 Actuator disassembly

WARNING:

It is possible, that the actuator may contain a dangerous gas and/or liquids. Ensure that all proper measures have been taken to prevent exposure or release of these types of contaminants before commencing any work.

NOTE:

In order to ensure safe and effective operation, always use original spare parts to make sure that the actuator functions as intended.

NOTE:

When sending goods to the manufacturer for repair, do not disassemble them.

When disassembly of the actuator is required for maintenance, remove the actuator to a clean well-lit area. Handling of the actuator is accomplished by using lifting straps. See Section 2.

Replacing the diaphragm

- A. Back off nuts (29) from the hex head screws (27), holding the diaphragm casing and spring housing together until the nuts are flush with the hex head screw ends. Do not remove the nuts completely from the hex head screws. If the spring package proves to be intact, remove the nuts (29) and remove the hex head screws (27).

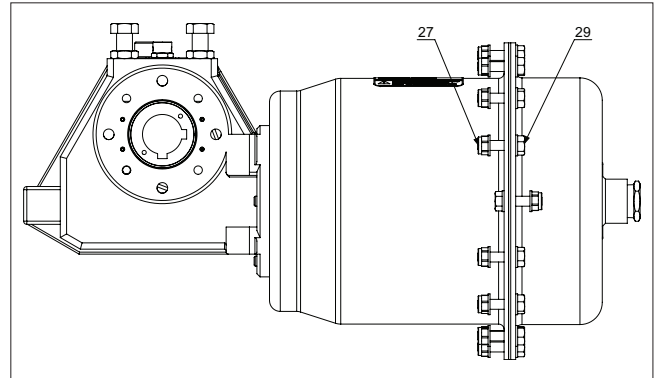


Figure 4.

WARNING:

If tension still exists on the hex head screws, then the spring package is not properly contained. Stop disassembly, retighten nuts, and return the actuator to Valmet for service.

- B. Lift off diaphragm casing (15). Remove hex head cap screw (88) and retaining washer (89). Remove diaphragm (14).

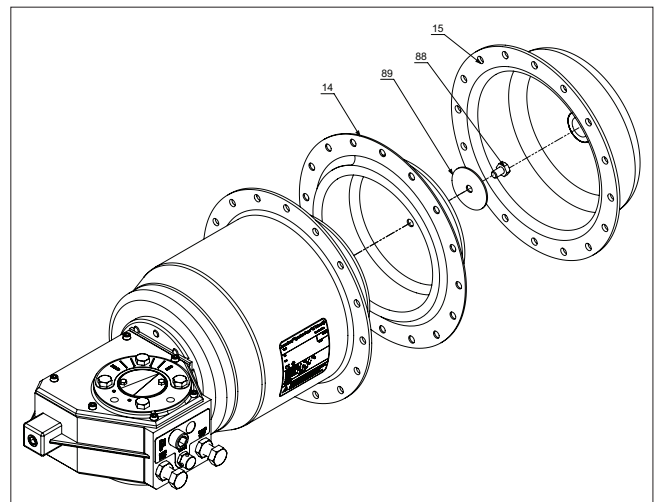


Figure 5.

- C. Inspect the inside of both the diaphragm casing (15) and the spring housing (32) for any rough spots or foreign matter which may cause abrasion to the diaphragm.

- D. Apply Loctite® 222 on center hole of diaphragm retainer (10). Place the new diaphragm (14) on the diaphragm retainer (10). Do not pinch or stretch the diaphragm. Attach with washer (89) and cap screw (88). Tighten to value in (Table 2) keeping spring housing (32) holes aligned with diaphragm (14) holes. Place the diaphragm casing (15) on the spring housing (32) and line up all the holes.

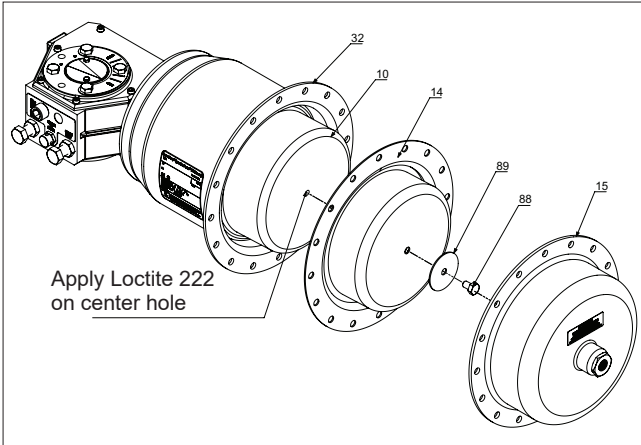


Figure 6.

- E. Lubricate screw (27) with anti-seize grease. Insert hex head screws (27) in all holes. Do not force the hex head screws through the diaphragm. Install nuts (29) on screws and tighten uniformly using the standard practice of tightening diametrically opposite bolts in sequence with the torque requirements from (Table 2).

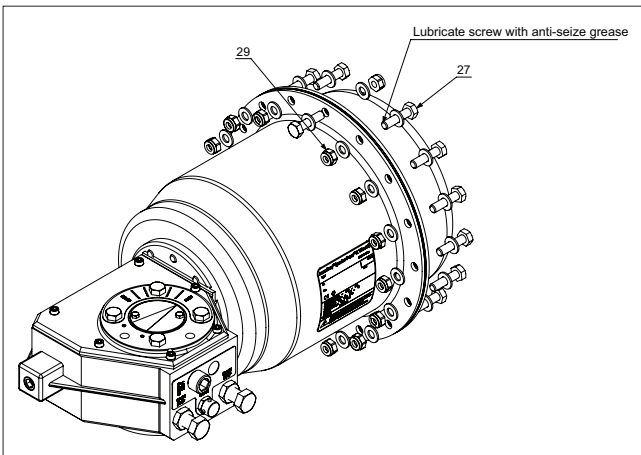


Figure 7.

Disassembling the actuator

- A. Use air pressure to remove spring preload by partially stroking the actuator until the driver arm moves slightly off the stop screw. If the diaphragm (14) is ruptured, replace as instructed in the previous section.

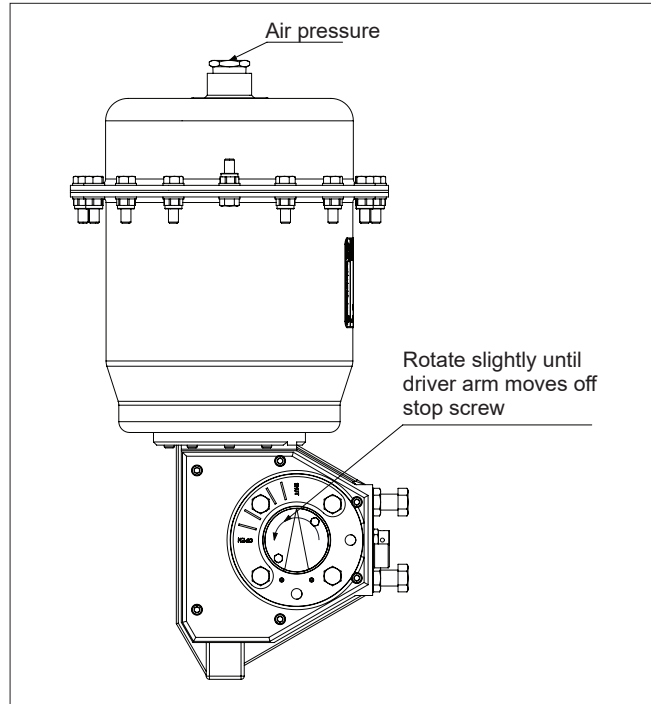


Figure 8.

- B. Remove the cover (5) by removing six (four on QPX1) socket cap screws (21). If the cover cannot be removed, tap it with a plastic hammer to break the adhesion of the paint between the body and cover joint.

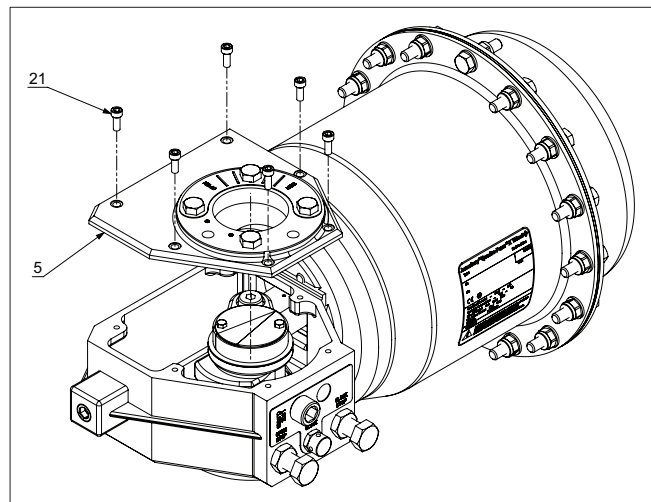


Figure 9.

- C. To remove the socket shoulder screw (8) (or socket cap screw in QPX1) that holds the clevis (7) to the driver arm (3), first apply some heat to the lower arm to loosen the Loctite on threads of the socket shoulder screw.

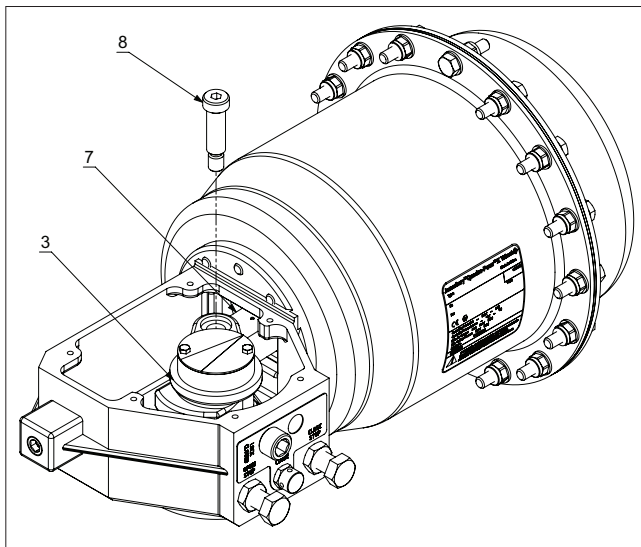


Figure 10.

CAUTION:

DO NOT place fingers or hands inside Driver Housing when disconnecting Clevis from Driver Arm. Part will be hot, allow to cool.

- D. Slowly relieve the air pressure in the actuator. The clevis (7) should be set against the spring retainer (30), and positioned symmetrically about the slot in the spring housing.

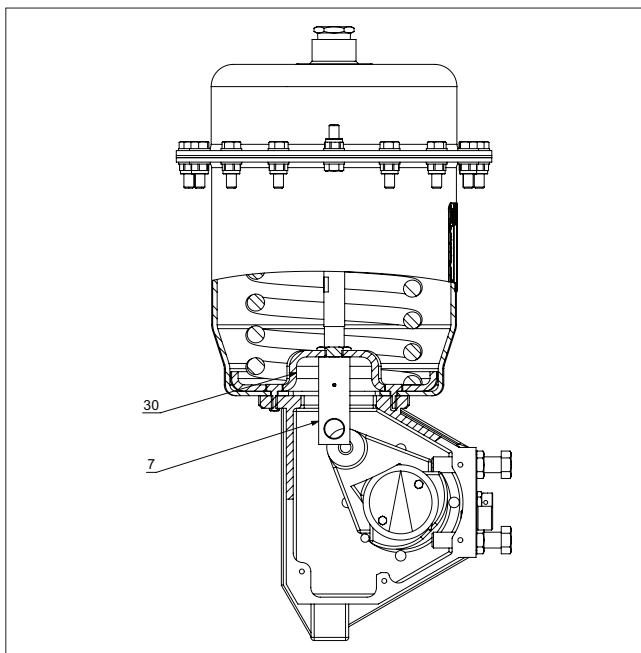


Figure 11.

- E. Shut off and bleed the air pressure to zero. Disconnect the air lines.
- F. Remove the hex head screws (27) and hex nuts (29) holding the diaphragm casing and spring housing together.

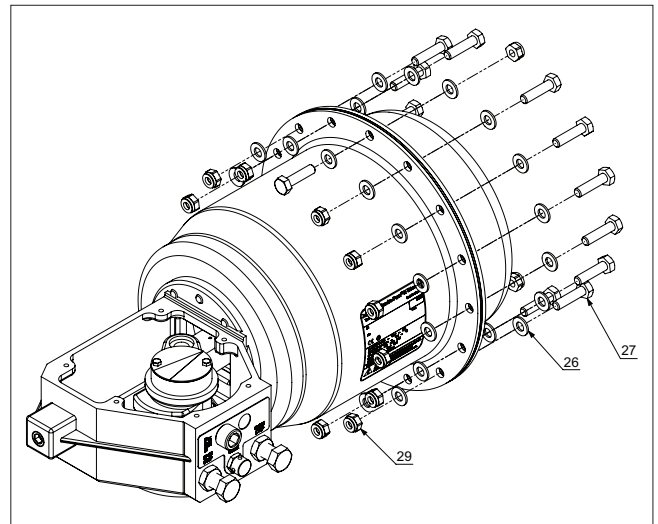


Figure 12.

CAUTION:

DO NOT remove diaphragm casing hex head cap screws (27) and nuts (29) or diaphragm casing while the actuator is pressurized.

- G. Lift off diaphragm casing (15), remove hex head cap screw (88), washer (89) and diaphragm (14). Inspect the diaphragm for signs of wear, rupture or mechanical damage.

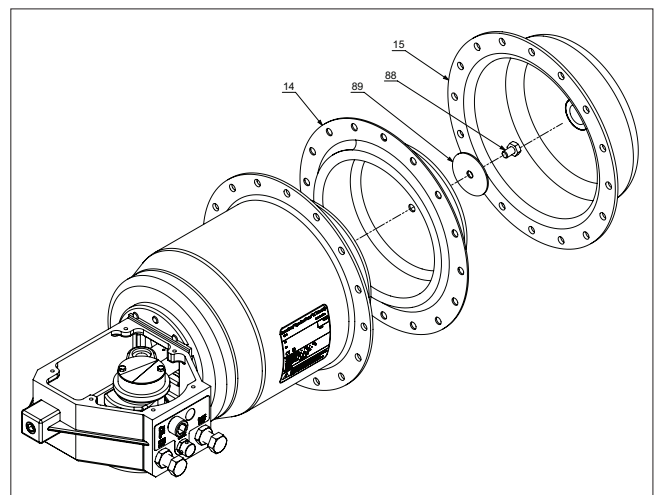


Figure 13.

- H. Inspect the inside of both the diaphragm casing and spring housing, as well as the outside of the diaphragm retainer for any rough spots or foreign matter which may cause abrasion of the diaphragm.
- I. Lift the entire spring cartridge out of the unit.

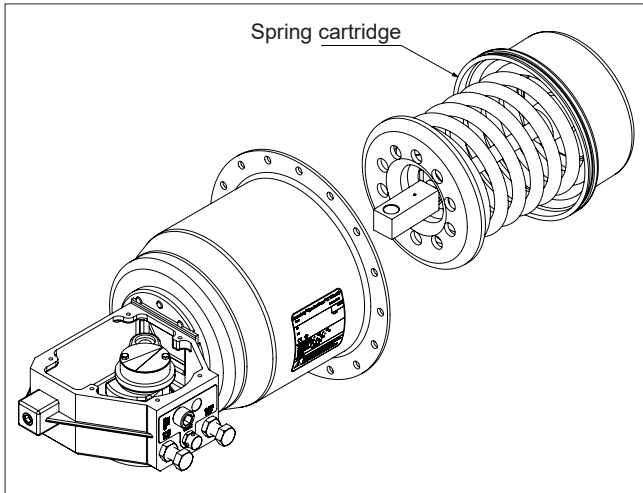


Figure 14.

WARNING:

Disassembly of the spring package should not be attempted. Special equipment is required. Disassembly of the spring package may result in serious personal injury. If maintenance is required ship the entire actuator to Valmet.

It is usually not necessary to remove the spring housing (32) from the body (1). However, if removal is required, heat must be used to loosen the Loctite®. When reassembling, the information in (Table 2), torque and Loctite® recommendations must be met. All fasteners should use Loctite® 271 on the threads. Inspect and clean all components.

Good practice dictates that all bearings should be removed and replaced. See section 4.7 for the proper actuator series repair kit number.

4.3 Actuator reassembly

To aid assembly, spread light oil or grease on the outside diameter of the new bearings.

1. Press driver arm bearings (6) into the body (1) and covers (5). This is best done in an arbor press, but a vise could be used if care is taken not to damage the bearing. Driver arm bearings are to be pressed in until they are flush or 0.015 in. (0.38 mm) below the body counterbore or the inside cover surface. Press clevis bearings (62) into the clevis (7).
2. Apply lubricant, MOLYKOTE® GN grease on the barrel of shoulder screw (8) prior to assembly. Also, apply MOLYKOTE®GN grease to driver arm bearings (6).
3. Place the thrust bearing (31) into the counterbore in the body of QPX1-QPX5 actuators. Slide the other thrust bearing onto the trunnion of the driver arm (3). Place the driver in the body.
4. Spring housing (32), diaphragm retainer (10) and springs shall be lubricated with Kendall L-427 Super Blu® or Mobilgrease™ XHP 222. Lower the spring cartridge into the spring housing (32). Make sure that the spring package is not resting on the hex head cap screws (38) which hold the spring housing and body together. If bearing (64) has separated from diaphragm retainer (10), hold in place while lowering spring cartridge into housing.
5. Place the new diaphragm (14) on the diaphragm plate. Attach diaphragm (14) to diaphragm retainer (10) using washer (89) and hex head cap screw (88). Torque to the value specified in (Table 2).
6. Insert the hex head bolt (27) in all holes. Do not force the bolts through the diaphragm. Install nuts (29) and tighten uniformly using the standard practice of tightening diametrically opposed bolts (criss cross pattern) in sequence. Follow (Table 2) for tightening torques.
7. Connect a regulated air supply to the pressure port and slowly increase the air pressure until the holes in the clevis and driver arm are aligned. Turn clevis a few degrees, if required, to align holes.
8. Apply Loctite® 271 on the threads of the shoulder screw. Insert it through the driver arm and clevis. Tighten per (Table 2).
9. Slowly release air pressure. Assemble cover by using the socket head screws (21). Apply tightening torque per (Table 2).
10. Install the indicator pointer (24) if this was previously disassembled. In female actuators make certain that the indicator points to the inscribed line in the driver arm. In male actuators, hold the indicator pointer in place with a retaining ring (9).

4.4 Malfunctions

Symptom	Possible cause	Action
Irregular or slow operation	Low supply pressure	Make sure that supply pressure complies with minimum torque required by valve. Check that supply air pipes are large enough.
	Positioner fault	Check positioner operation.
	Valve fault	Check that valve functions properly without actuator.
	Incorrect actuator rating	Contact manufacturer to check rating.
	Leak in diaphragm	Replace the diaphragm.
	Cylinder damaged by impurities	Note installation position recommendation. Replace actuator if damaged.
	Worn-out actuator bearings	Check bearings. Replace bearings when necessary.
	Moving parts corroded in harsh, humid conditions	Replace the corroded parts.
	Backlash in joint between actuator and valve	Replace parts as necessary.

4.5 Tools

For maintenance of the QPX series actuator, you will need a few common tools.

Tool (qty)	QPX1	QPX2	QPX3	QPX4	QPX5
Allen wrench (1)	3mm		5mm		6mm

Common tools for all sizes: (2) M10 combination wrenches, (1) screwdriver, (1) plastic faced mallet.

4.6 Tightening torque table

Table 2

Torque Requirements					
Required Tightening Torques In FT•LBS (N•m) For Various Fasteners					
	QPX1	QPX2	QPX3	QPX4	QPX5
Nuts for Hex Head Screws through Diaphragm Casing (29)	24 (32)	24 (32)	24 (32)	24 (32)	24 (32)
Socket Head Cover Screws (21)	4 (5)	6 (8)	6 (8)	6 (8)	15 (20)
Socket Head Shoulder Screw (8)	35 (48)	55 (75)	132 (179)	132 (179)	132 (179)
Nuts on Actuator Rod (74)	55 (74)	55 (75)	88 (119)	132 (176)	176 (239)
Hex Head Screws between Body and Spring Housing (38)	5 (7)	18 (24)	30 (40)	30 (40)	55 (75)
Hex Head Cap Screws for Attaching Diaphragm to Diaphragm Retainer (88)	19 IN•LBS (1)	19 IN•LBS (1)	27 IN•LBS (2)	10 FT•LBS (14)	17 FT•LBS (23)

4.7 Ordering spare parts

We recommend that actuators be directed to our service centers for maintenance. The service centers are equipped to provide rapid turn-around at a reasonable cost and offer new actuator warranty with all reconditioned actuators.

NOTE:

When sending goods to the service center for repair, do not disassemble them. Clean the actuator prior to shipping. For further information on spare parts and service or assistance visit our website at www.valmet.com/valves.

NOTE:

Use only original spare parts. This ensures proper functioning of the actuator.

When ordering spare parts, always include following information which can be found from the identification plate or documentation.

- Type code, sales order number, serial number
- Number of the parts list, part number, name of the part and required quantity.

Table 3

SERVICE KITS		
Model	Complete	Diaphragm
QPX1	RKQ-68	RKQ-75
QPX2	RKQ-70	RKQ-76
QPX3	RKQ-71	RKQ-77
QPX4	RKQ-72	RKQ-78
QPX5	RKQ-73	RKQ-79

5. ACCESSORIES

5.1 100% Adjustable stop (AS)

The standard Quadra-Powr can be configured in the field for a 100% adjustable stop to limit the stroke in the air direction.

- a. Remove the set screw plug (35) with an allen wrench.
- b. Adjust the standard limit stops to 0-90 deg, then thread in the adjustable stop screw enough to reach the desired stop position. Allow room for the lock nut.
- c. Screw on the lock nut for the adjustable stop and tighten to secure it in place.
- d. Apply air to the actuator cylinder to verify that the actuator position is limited as desired.

5.2 Safety mechanical lockout device (LD)

The standard Quadra-Powr can be configured in the field for a locking device to lock the actuator in its failsafe position. Installation of the locking device does not require adjustment of the standard open/close limit screws.

Installation (see Figure 15)

1. Before attempting to assemble lockout devices, make certain that the actuator is not pressurized and is in its failsafe position.
2. Remove the plug (80) using an allen wrench.
3. Remove the lower jam nut from the locking stud.
4. Insert the locking stud through the hole in the locking plate. Thread the locking stud into the lockout hole and tighten securely. Tighten the upper jam nut to secure the locking plate. Pivot the locking cover down until the hole in the cover lines up with the hole in the end of the locking plate.
5. After engaging the stud, functionally test the locked position of the actuator by applying full pressure to the unit to confirm that the stop is effective and the actuator remains in its failsafe position. Once confirmed, remove the supply pressure to vent the actuator.
6. Secure the locking device with a padlock. A padlock with 1/4" – 5/16" (6.35 – 7.9mm) diameter shackle is recommended.

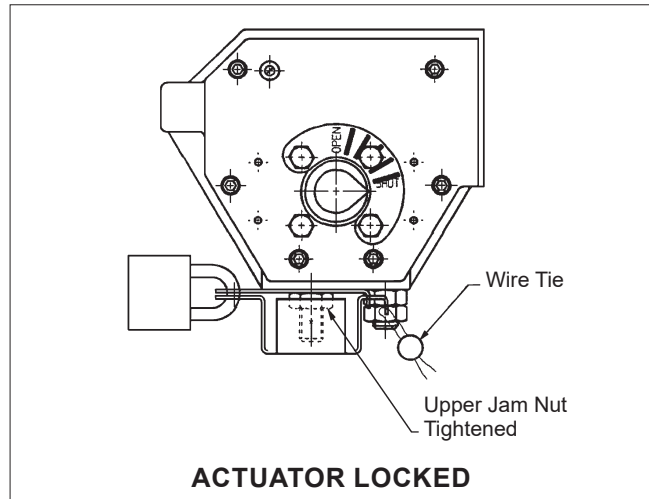


Figure 15.

Removal and storage (see Figure 16)

1. Remove the padlock and swing the cover out of the way.
2. Loosen (do not remove) the upper jam nut and then remove the locking stud.
3. With the locking stud still inserted through the large hole in the locking plate, thread the lower jam nut onto the bottom of the stud. This will secure the stud and nuts for storage.
4. Re-insert the plug (item 80) into the locking hole. The wire tie can be secured to the plug for storage of the locking device.

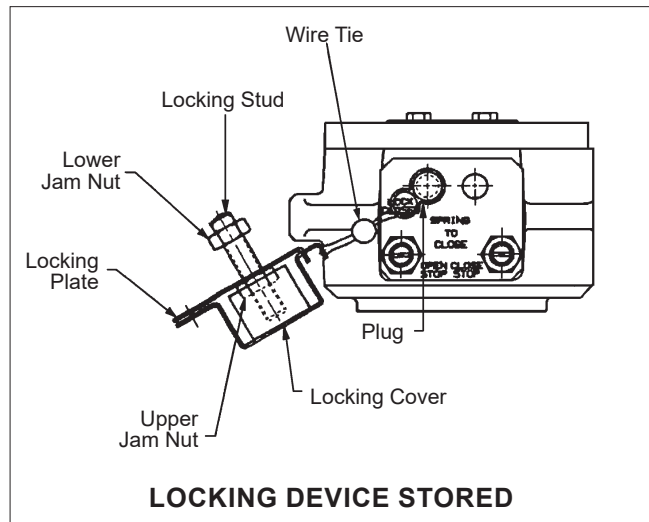


Figure 16.

5.3 1" NPT air inlet (F)

NOTE: Applicable only to QPX size 3 – 5.

Remove the 3/8" Reducing bushing (Item 37) to access the 1" NPT port.

5.4 Manual jackscrew override (MJX)



Figure 17.

The MJX is intended to move the valve upon failure of the actuator, supply air, or electrical system. When the handwheel of the manual jackscrew is turned clockwise, force is exerted on the diaphragm retainer, compressing the actuator spring and operating the valve in the direction of the air stroke.

Installation

WARNING:

Shutoff and bleed the air supply line before installation or servicing. If there is still spring pressure on the override shaft when it is backed out, all the way counterclockwise, do not disassemble the diaphragm casing screws.

1. Back off nuts (29) from the hex head screws (27), holding the diaphragm casing and spring housing together until the nuts are flush with the hex head screw ends.
2. Once the diaphragm casing is removed, inspect the diaphragm for signs of damage and replace as needed.
3. On the MJX, turn the acme screw (2) counterclockwise until the o-ring (6) and o-ring carrier (3) are seated inside the MJX housing (1).
4. Install the MJX housing sub-assembly (1) in place of the diaphragm casing using the lock nuts (13), flat washers (12) and hex head cap screws (11) that were supplied with the MJX housing sub-assembly (1). The lock nuts (13) and hex head cap screws (11) must be tightened to a torque of 22..25 ft-lbs (30..34 Nm).

Operation

NOTE:

The jackscrew is not to be used as an adjustable open stop. The jackscrew handwheel must be fully retracted during normal operation.

1. Vent the supply pressure from the actuator.
2. The jackscrew is operated by turning the handwheel clockwise. Depending on the jackscrew model, it can take between 17 and 35 turns to achieve full rotation. See the MJX Exploded View for details.
3. Stop turning the handle once the desired valve position is achieved.
4. When the cause of the malfunction is solved, turn the handwheel back to the actuator failsafe position. The actuator can now control the valve.

Maintenance

1. All units are shipped fully greased and require only periodic inspection and greasing. If needed, use grease fitting (14) to add Molykote type grease until the grease cavity is full.
2. The MJX housing sub-assembly should not be fully disassembled. Some parts can be replaced if damaged, such as thrust bearing (7), pressure pad (4), hex head cap screw (8) and o-ring (6).

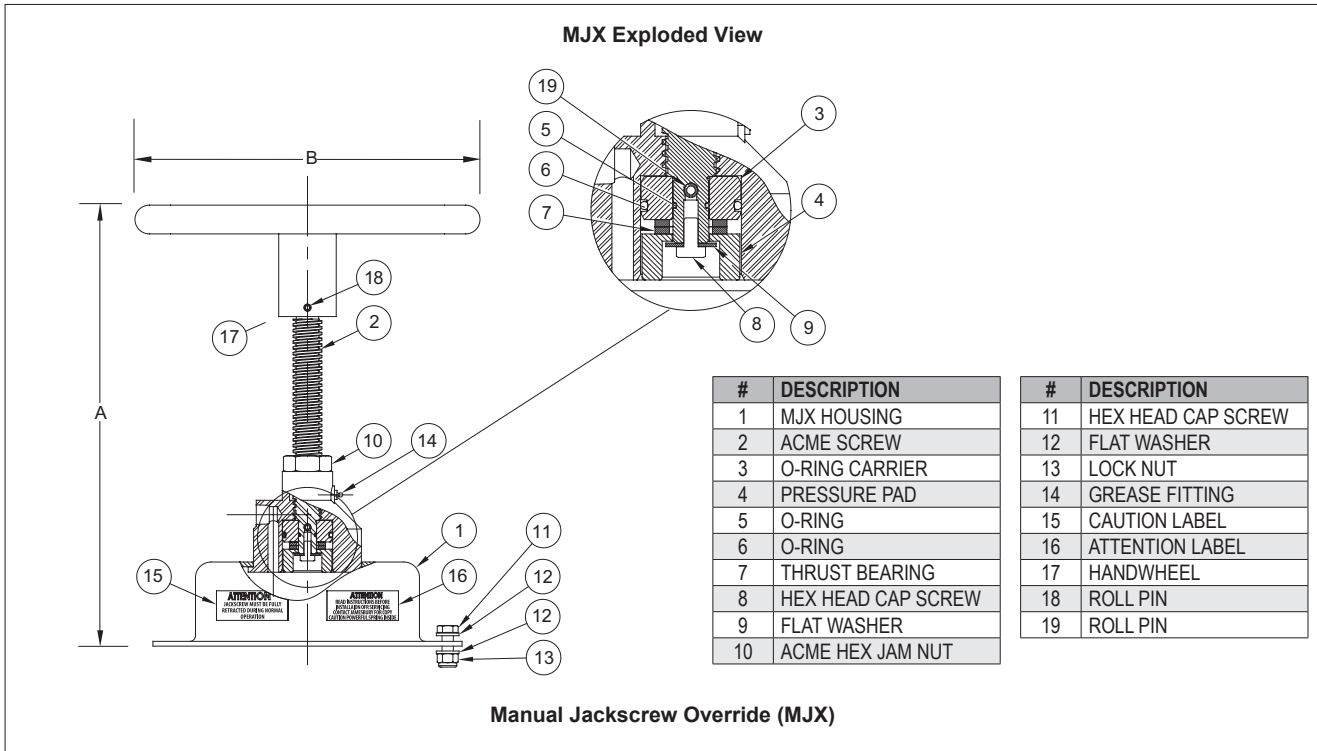


Figure 18.

Model	Actuator series	Jackscrew Specification								
		Rim Pull*		number of turns to fully compress the spring	Approx. Dimensions				Approx. Weight	
		N	lb.		A		B			
mm	in.	mm	in.	kg	lb.					
MJX-1	QPX1	109	24	17	359	14.13	200	7.87	13.2	6
MJX-2	QPX2	145	33	18	409	16.12	300	11.81	17.6	8
MJX-3	QPX3	244	55	21	457	18.01	400	15.75	22.1	10
MJX-4	QPX4	222	50	25	532	20.96	500	19.69	28.7	13
MJX-5	QPX5	298	67	35	604	23.77	600	23.62	37.5	17

*Based on a typical valve with the strongest QPX spring option.

5.5 Manual override gearbox (SRO)

The SRO is intended to move the valve upon failure of the actuator, supply air, or electrical system. The SRO can only be mounted to a QPX_M male drive.

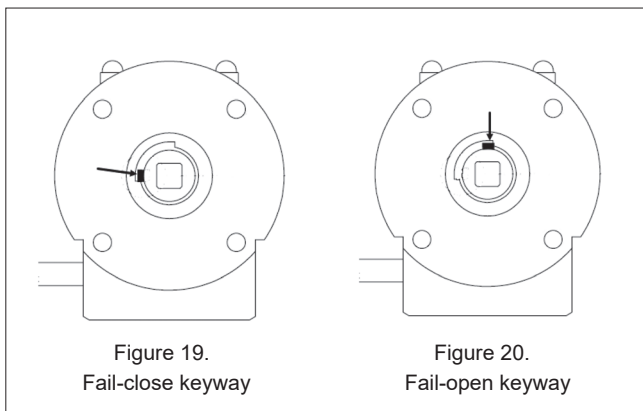
Installation

1. It is recommended to mount the handwheel on the input shaft prior to assembling the gearbox to the valve. Attach the stud bolts to the bottom of the gear if stud bolts are used for attaching the gear to the valve.
2. Verify that the flanges on the gearbox and valve align. Also verify that the valve stem and the bore of the gearbox driveshaft match.
3. Make sure the valve is in its failsafe position (fully closed or open).
4. Make sure that the gearbox position matches the valve position. This is achieved by turning the handwheel, clockwise for fail-close (factory default) or counterclockwise for fail-open, until it stops.

NOTE:

Use of a gasket/sealant on the flanges between the valve/gearbox and between the gearbox/actuator is recommended.

5. Insert the supplied drive shaft into the bottom side of the gearbox. Position the driveshaft so the key is touching the side of the quadrant as shown in figures 19/20 (viewed from the bottom side of the gear)



6. Mount the gearbox perpendicular to the valve and secure the fasteners.
7. Mount the actuator on top of the gearbox and secure the fasteners.

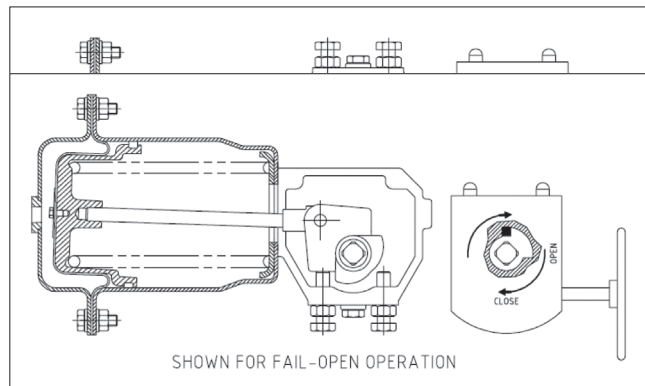


Figure 22.

Stop screw adjustment

- Remove the air from the actuator and ensure the valve/actuator/gear are in the fail-safe position.
- With the actuator and gear mounted, backout both stop screws on the gear by 3-4 turns.
- Using the actuator to cycle the valve, set the actuator stops for both open and close (see section 2 of this IMO for instructions).
- Fail-close actuator
 - Open Stop: Turn the gear handwheel counter clockwise until it stops. Turn-in the gear open stop screw (figure 23) until it stops and then tighten the lock nut.
 - Close Stop: Turn the gear handwheel clockwise until it stops. Turn-in the gear close stop screw (figure 23) until it stops and then tighten the lock nut.
- Fail-open actuator
 - Close Stop: Turn the gear handwheel clockwise until it stops. Turn-in the gear close stop screw (figure 23) until it stops and then tighten the lock nut.
 - Open Stop: Turn the gear handwheel counter clockwise until it stops. Turn-in the gear open stop screw (figure 23) until it stops and then tighten the lock nut.

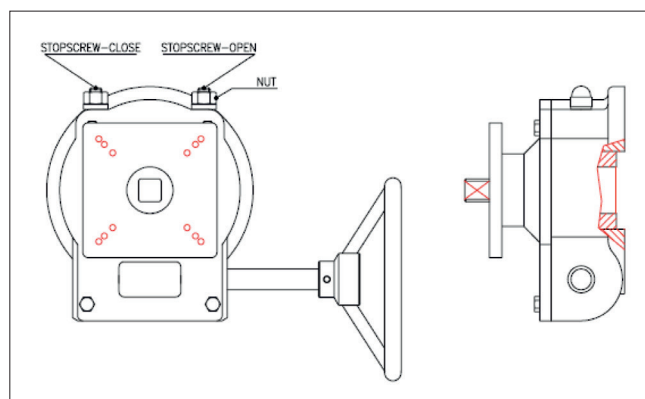


Figure 23.

Operation

- Vent the supply air from the pneumatic actuator.
- The gearbox is operated by turning the handwheel. Turn the handwheel counterclockwise to open a fail-close valve or clockwise to close a fail-open valve. Depending on the gearbox model, it can take between 8 and 13 turns to achieve full rotation.
- The gearbox is self-braking so simply stop turning the handle once the desired valve position is achieved.
- When the cause of the malfunction is solved, turn the handwheel in the reverse direction to move the actuator back to its failsafe position (clockwise for fail closed and counterclockwise for fail open). The actuator can now control the valve.

5.6 Fusible plug (LK-3116)

The fusible plug melts during a fire or excessive environmental temperature when the temperature reaches an approximate level of 165°F. This releases the air from the diaphragm case and rotates the valve to its fail-safe position.

NOTE:

If needed, LK-3192 has a higher melting point of 212°F.

Installation

1. Using thread sealant, attach the fusible plug (3) and pipe nipple (1) into the street tee as shown in Figure 24.
2. Insert this assembly into the plug guard (4) and secure using the screw (5), lock washer (6), and hex nut (7).
3. Using thread sealant, attach the completed fusible plug assembly to the 3/8" NPT port on the QPX diaphragm casing. The tubing from the solenoid or positioner will attach to the other end of the pipe nipple.

WARNING:

Ensure the plug guard "4" is installed. Otherwise, the fusible plug can become a projectile when released during a fire

Fusible plug Exploded View

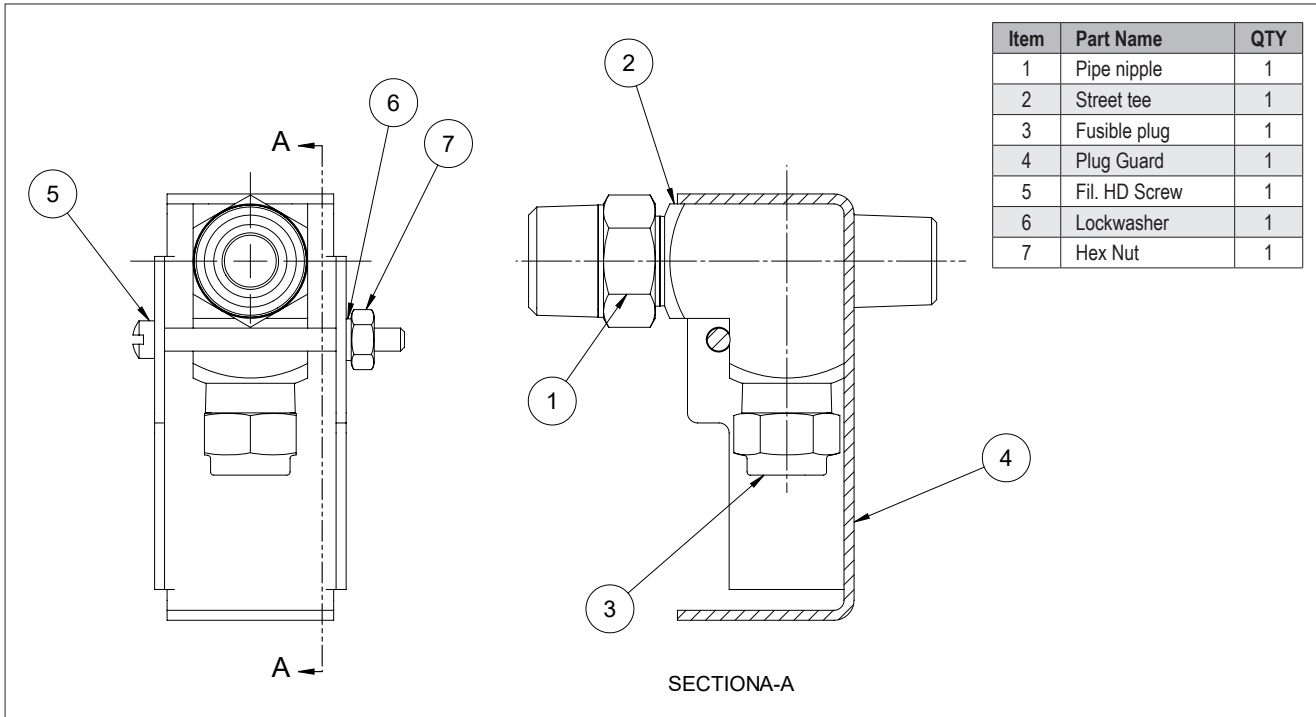
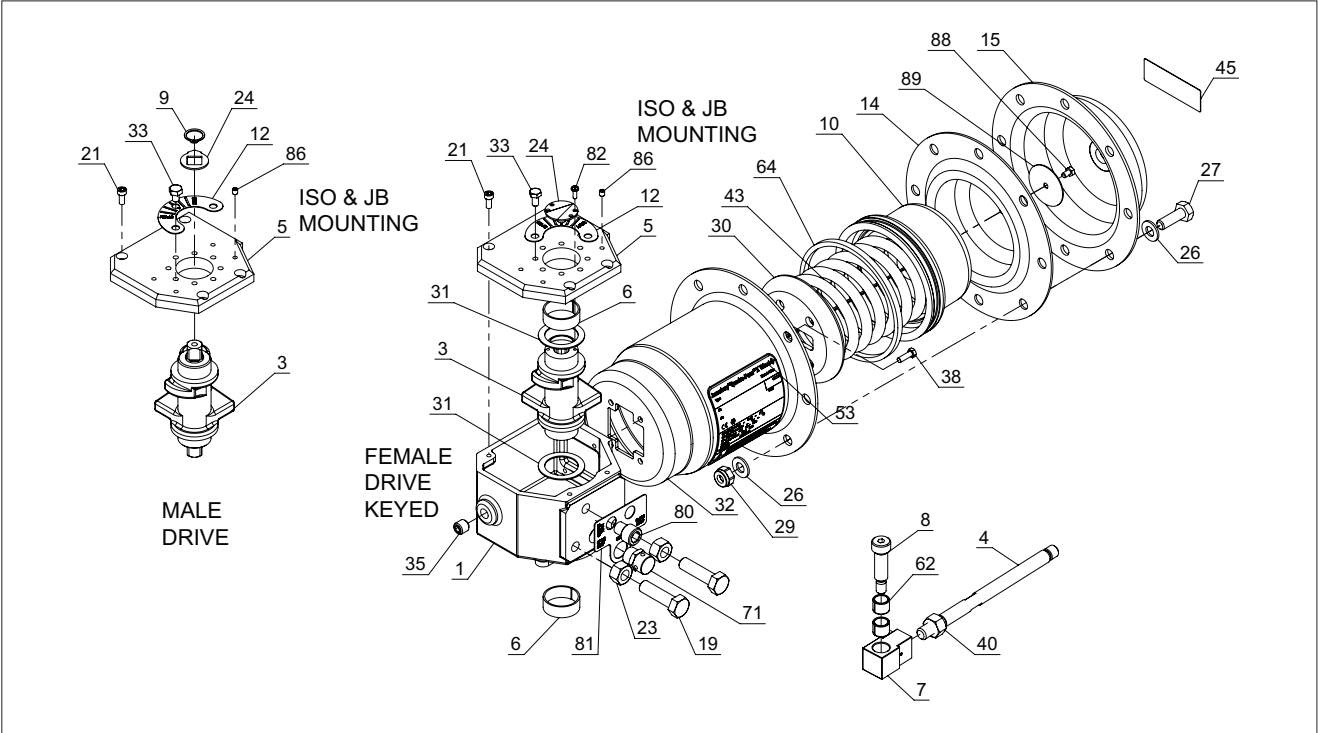


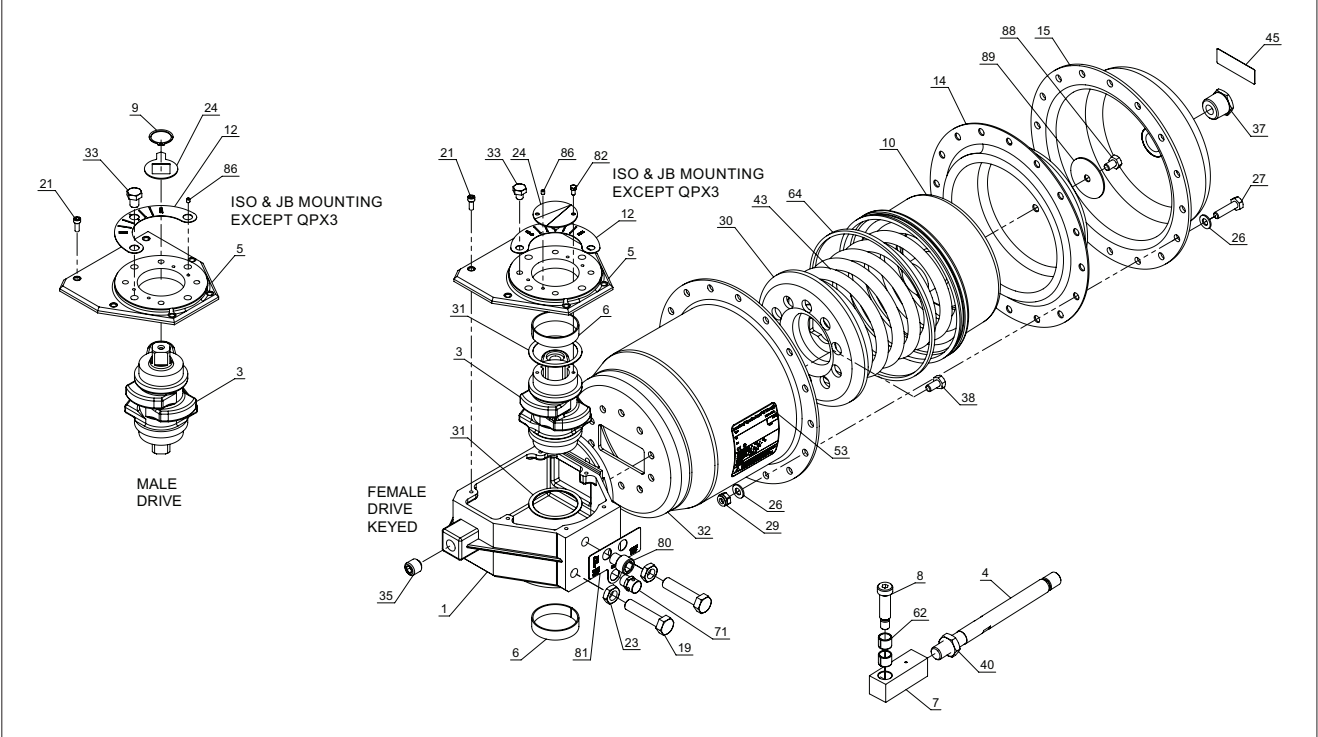
Figure 24.

6. EXPLODED VIEWS AND PARTS LISTS

6.1 Actuators QPX 1-2



6.2 Actuators QPX 3-5



6.3 Parts list and bill of materials

No.	Part description	Quantity by QPX size					Material
		1	2	3	4	5	
1	Driver housing	1					Gray or ductile iron
3	Driver arm	1					Ductile iron
4	Actuator rod	1					Carbon steel
5	Cover	1					Gray or ductile iron
6 y	Driver arm bearing	2					Stainless steel with acetyl lining
7	Clevis	1					Carbon steel
8	Shoulder screw	1					Carbon steel
9	Retaining ring (male drive actuators only)	1					Stainless steel
10	Diaphragm retainer	1					Ductile iron
12	Indicator plate	1					Stainless steel
14 x,y	Diaphragm with centering hole	1					Nitrile/Polymide fabric blend
15	Diaphragm casing	1					Carbon steel
19	Hex head cap screw	2					Stainless steel
21	Socket head cap screw	4	4 or 6	6	6	6	Stainless steel
23	Hex jam nut	2					Stainless steel
24	Indicator pointer	1					Carbon steel
26	Washer	16	24	24	32	48	Stainless steel
27	Hex head cap screw	8	12	12	16	24	Stainless steel
29	Nylon insert lock nut	8	12	12	16	24	Stainless steel
30	Spring retainer	1					Carbon steel
31 y	Thrust bearing	2					Nylon
32	Spring housing	1					Carbon steel
33	Hex head cap screw	4					Stainless steel
35	Set screw	1					Stainless steel
37	NPT adapter	-	-	1	1	1	Stainless steel
38	Hex head cap screw	4	4	6	10	10	Carbon steel
40	Hex jam nut	1					Stainless steel
43	Compression spring	1					Carbon steel
45	Attention plate	1					Mylar
53	Identification tag	1					Metalized polyester
62 y	Clevis bearing	2					Stainless steel with acetyl lining
64 x,y	Bearing, diaphragm retainer	1					UHMW PE
71	Breather	1					Stainless steel
80	Socket head cap screw	1					Stainless steel
81	Name plate	1					Stainless steel
82	Screw (keyed drive actuators only)	2					Stainless steel
86	Socket set screw	8					Stainless steel
88	Hex head cap scrw	1					Stainless steel
89	Diaphragm washer	1					Stainless steel

x = included in Diaphragm Service Kit

y = included in Complete Service Kit

7. DIMENSIONS AND WEIGHTS

7.1 Dimensions QPX

See technical bulletin A110-4EN for dimensions.

7.2 Weights QPX

Table 4

Handling Quadra-Powr X Actuators	
Actuator Series	Approx. Weight kg (Lb.)
QPX1	12 (26)
QPX2	18 (39)
QPX3	30 (65)
QPX4	48 (105)
QPX5	94 (205)

8. HOW TO ORDER

PNEUMATIC, SPRING-DIAPHRAGM ACTUATOR, Series QPX

1.	2.	3.	/	4.	5.	6.
QPX	1	C		M	AS	C

1. sign	2. sign	3. sign	4. sign		5. sign	6. sign
Actuator Series	Size	Spring Option	Keyed Female Drive	Male Square Drive	Options	Model version
QPX	1	C	K15 (15 mm)	M (Male Square)	- No sign, standard version AS 100% Adjustable stop (air direction) MJX Manual Jackscrew Override SO Fail Open F 1" NPT Air Inlet (2. sign "3-5" only)	C (Model C)
	2	A				
		B				
		C				
		D				
	3	A	K20 (20 mm)			
		B				
		C				
		D				
	4	B	K35 (35 mm)			
		C				
		D				
		D				
	5	B	K40 (40 mm)			
		C				
		C				
D						

3. sign	Spring Option Details
A	1.3 bar / 20 psi
B	2.8 bar / 40 psi
C	4.1 bar / 60 psi (standard)
D	5.5 bar / 80 psi

ACCESSORIES

Field Mountable Accessories		QPX Size				
		1	2	3	4	5
100% Adjustable Stop Kit	Code	AS-1		AS-3	AS-4	AS-5
	P/N	MA0234139		MA0234140	MA0234141	MA0234142
Mechanical Lockout Kit	Code	LD-60		LD-61	LD-62	LD-63
	P/N	MA0026407		MA0026408	MA0026409	MA0026410
Manual Jackscrew Override Kit	Code	MJX-1	MJX-2	MJX-3	MJX-4	MJX-5
	P/N	MA0026451	MA0026452	MA0026453	MA0026454	MA0026455
Manual Override Gearbox (QPX_M only)	Code	SRO-1	SRO-2	SRO-3	SRO-4	SRO-5
	P/N	MA0043214	MA0043215	MA0043216	MA0043217	MA0043218
Fusible Plug	Code	LK-3116				
	P/N	MA0044535				

Valmet Flow Control Oy

Vanha Porvoontie 229, 01380 Vantaa, Finland.

flowcontrol@valmet.com

Tel. +358 10 417 5000.

www.valmet.com/flowcontrol

Subject to change without prior notice.

Neles, Neles Easyflow, Jamesbury, Stonel, Valvcon and Flowrox, and certain other trademarks, are either registered trademarks or trademarks of Valmet Oyj or its subsidiaries in the United States and/or in other countries.

