

QUADRA-POWR®X SPRING-DIAPHRAGM ROTARY ACTUATORS

Exclusively developed for quarter-turn valve service, *Quadra-PowrX* spring-diaphragm actuators provide safe and reliable operation even when minimal supply pressures are available. Yet they are capable of operating at pressures as high as 7 bar (100 psi). These units can be operated by air, gas, water, oil, or other supply media compatible with the ductile iron/carbon steel casing of the actuator and the Buna-N diaphragm reinforced with polyamide fabric. *Quadra-PowrX* torque outputs range from 15 to 796 Nm (11 to 587 ft lbs), depending on actuator selection and available supply pressure.

FEATURES

Adjustable travel stops

- Allow the actuator to be adjusted in both fully open as well as fully closed position.

High cycle-life design

- Rolling diaphragm design, along with new one-piece diaphragm retainer and UHMW Polyethylene bearing, assures extremely long cycle-life.
- Low-friction operation provides exceptionally smooth actuation.

Wide supply pressure range

- Unlike most spring-diaphragm actuators, the *Quadra-PowrX* can be operated up to 7 bar (100 psi).
- Actuators are available with four different spring ranges for 1.3, 2.8, 4.1 & 5.5 bar (20 psi, 40 psi, 60 psi, and 80 psi) supply pressures.

Low friction bearings

- Acetal-lined stainless steel backed bearings offer a low coefficient of friction that allows virtually all of the available torque to be delivered directly to the output shaft.
- Keeps the actuator size as small as possible while delivering hundreds of thousands of smooth cycles.
- UHMW Polyethylene bearing fully guides the diaphragm retainer through stroke of actuator, ensuring smooth operation and low friction.

Completely field reversible

- Fail-open or fail-close operation can be quickly changed in the field by simply inverting the actuator. Top and bottom mounting pads are identical.
- Springs are pre-loaded in a self-contained cartridge for safer handling and easier maintenance.



Corrosion resistant

- Zinc phosphate epoxy based primer coat and UV resistant polyurethane top coat provide durability and protection in corrosive atmospheres.
- All stainless steel external fasteners.
- A "Wet conditions kit" available for extreme environments.

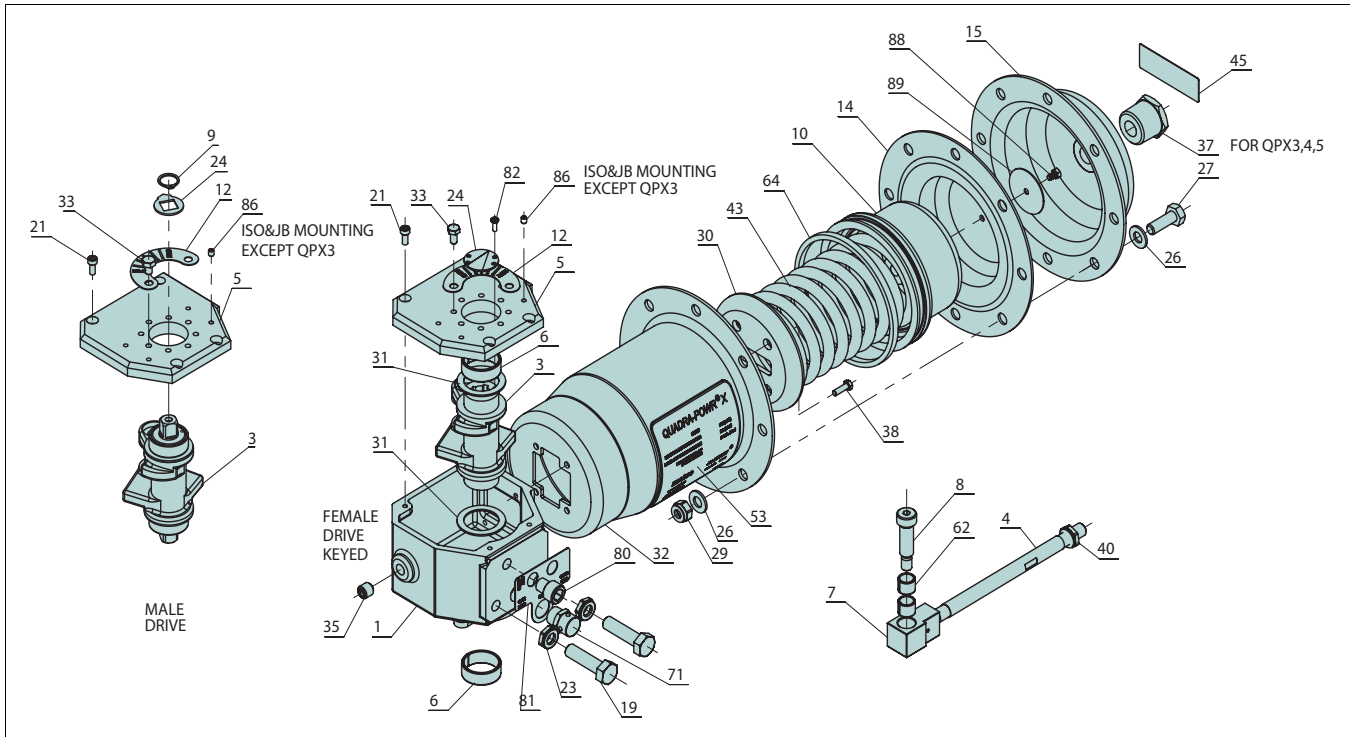
Low maintenance

- Lubricated at the factory. No further lubrication is required.

Easily fitted with a variety of accessories

- Wide range of optional accessories and control devices, which include direct-mount sandwich manual overrides, limit switches, position indicators, two-stage flow controllers, positioning and programmable cycling controllers, are available to satisfy virtually all automatic valve requirements.

EXPLODED VIEW



BILL OF MATERIALS AND PARTS LIST

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

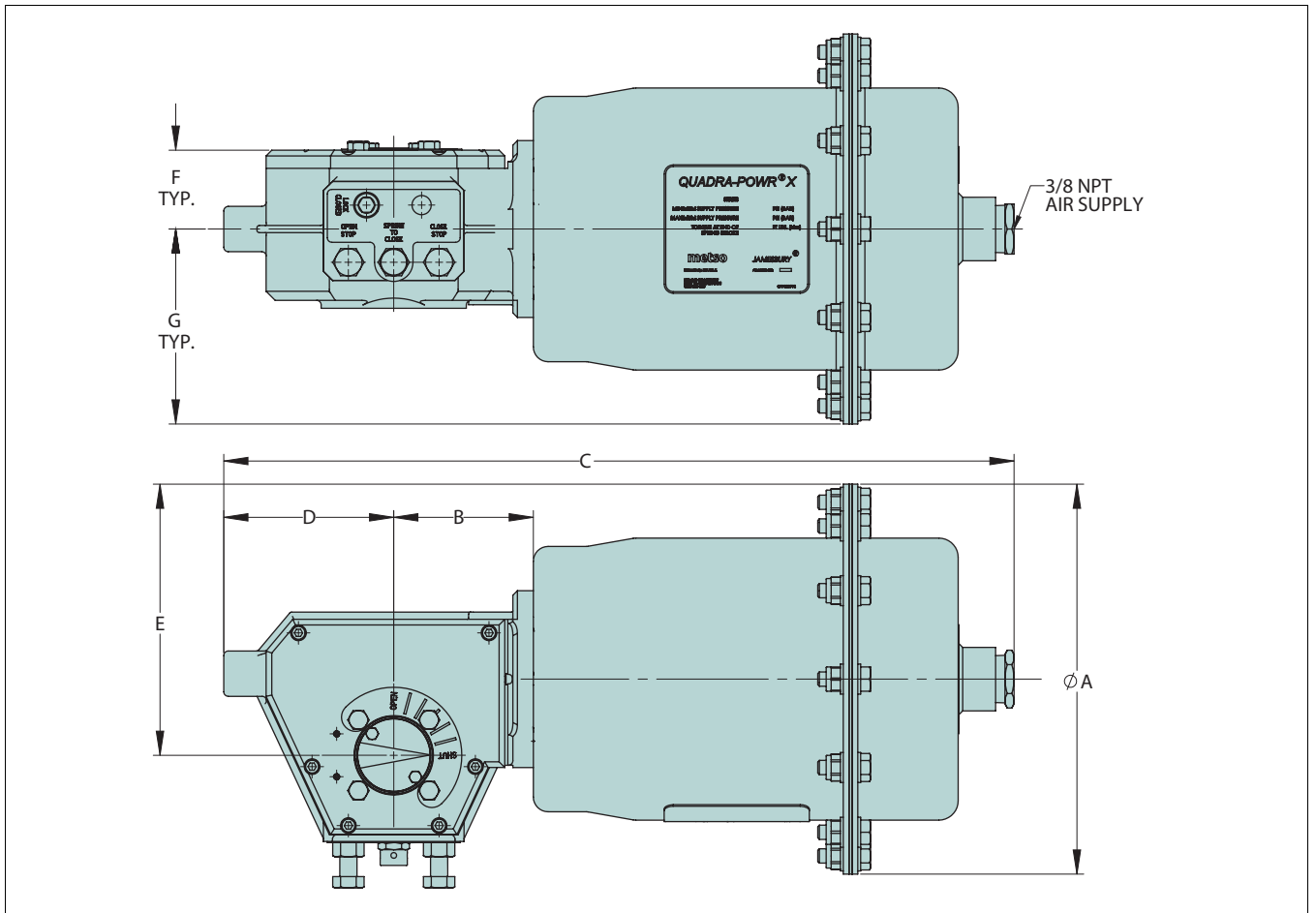
SPECIFICATIONS

Maximum operating pressure: 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.

Air volume requirements

Actuator series	Total volume liters	Swept volume liters	Approx. operating speed sec.		Effective diaphragm area - cm. ²
			Air stroke	Spring stroke	
QPX1	1.03	0.62	2	2	110
QPX2	1.57	1.08	3	3	155
QPX3	3.13	2.18	5	1-1/2	245
QPX4	6.03	4.34	10	4	387
QPX5	11.72	8.70	3	3	619

Actuator series	Total volume in. ³	Swept volume in. ³	Approx. operating speed sec.		Effective diaphragm area - in. ²
			Air stroke	Spring stroke	
QPX1	63	38	2	2	17
QPX2	96	66	3	3	24
QPX3	191	133	5	1-1/2	38
QPX4	368	265	10	4	60
QPX5	715	531	3	2	96



Actuator	Approximate dimensions - mm								Approx. weight kg
	A	B	C	D	E	F K drive	F M drive	G	
QPX1	197	67	360	70	135	49	49	99	12
QPX2	228	75	430	91	156	52	52	114	18
QPX3	274	98	553	119	190	56	56	137	30
QPX4	320	108	621	140	228	62	62	160	48
QPX5	382	130	754	160	276	77	77	191	94

Actuator	Approximate dimensions - inches								Approx. weight lb.
	A	B	C	D	E	F K drive	F M drive	G	
QPX1	7.75	2.64	14.17	2.76	5.31	1.93	1.93	3.88	26
QPX2	8.98	3.00	16.93	3.58	6.14	2.05	2.05	4.49	39
QPX3	10.79	3.85	21.77	4.69	7.48	2.20	2.20	5.39	65
QPX4	12.60	4.25	24.45	5.51	8.98	2.44	2.44	6.30	105
QPX5	15.04	5.13	29.69	6.30	10.87	3.03	3.03	7.52	205

ACTUATOR SELECTION

To select an actuator for a particular valve and service, first determine the maximum operating torque of the valve from the applicable bulletin. Then refer to the appropriate mode of operation of the actuator in the torque output tables below and on the next page and select an actuator that will, at the available supply pressure, provide a torque output equal or greater than the operating torque for the valve.

Output torques in Nm for QPX spring diaphragm actuators at specific supply pressures in bar																
Actuator	1.3 bar		2 bar		2.8 bar		3.4 bar		4.1 bar		4.8 bar		5.5 bar		6.2 bar	
	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring
QPX1C									34	34	52	34				
QPX2A	31*	15														
QPX2B			5	52	43	52	76	52								
QPX2C									68	77	98	77				
QPX2D											64	100	95	100	126	100
QPX3A	73*	35														
QPX3B			26	103	88	103	150	103								
QPX3C									136	155	194	155				
QPX3D											126	198	188	198	250	198
QPX4B			54	207	176	207	302	207								
QPX4C									271	311	391	311				
QPX4D											256	399	381	399	504	399
QPX5B			107	414	353	414	603	414								
QPX5C									542	621	781	621				
QPX5D											510	796	759	796	1008	796

* Can be used for direct control with a 0.8 – 1.3 bar signal on valves with 11 and 24 Nm maximum torque requirements, respectively.

Output torques in ft lbs for QPX spring diaphragm actuators at specific supply pressures in psi																
Actuator	20 psi		30 psi		40 psi		50 psi		60 psi		70 psi		80 psi		90 psi	
	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring	End of air	End of spring
QPX1C									25	25	38	25				
QPX2A	23*	11														
QPX2B			11	38	32	38	56	38								
QPX2C									50	57	72	57				
QPX2D											47	74	70	74	93	74
QPX3A	54*	26														
QPX3B			19	76	65	76	110	76								
QPX3C									100	114	143	114				
QPX3D											93	146	138	146	184	146
QPX4B			40	153	130	153	223	153								
QPX4C									200	229	288	229				
QPX4D											189	294	281	294	372	294
QPX5B			79	305	260	305	445	305								
QPX5C									400	458	576	458				
QPX5D											376	587	560	587	743	587

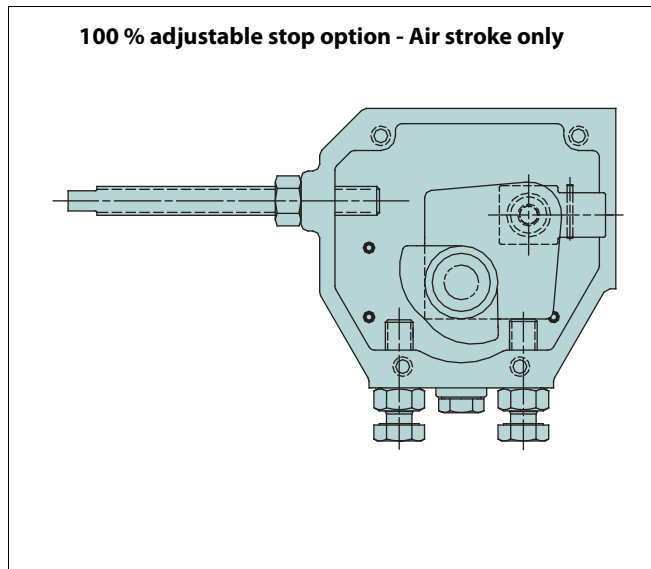
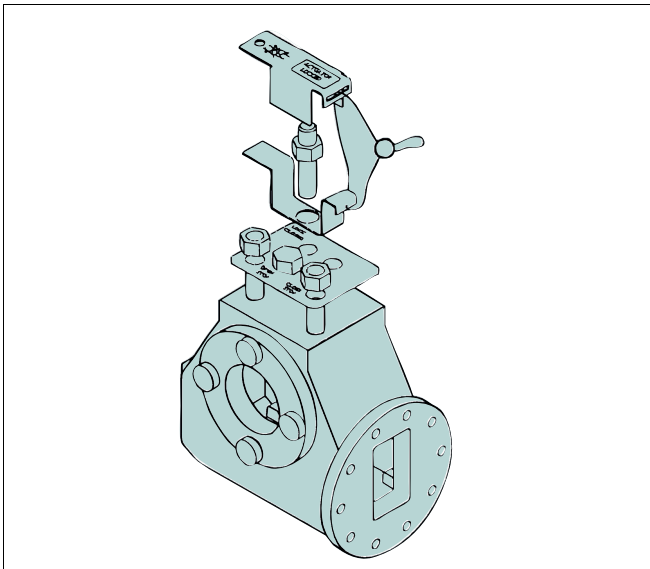
* Can be used for direct control with 12 – 20 psi signal on valves with 8 and 18 ft lbs maximum torque requirements, respectively.

Actuator orientation

Quadra-PowrX actuators may be mounted on valves in any of four 90° quadrants. To maximize cycle life, the diaphragm casing can be mounted in the vertical position (pointing up) with the valve stem and actuator driver in the horizontal position. Standard spring orientation is “spring to close” unless otherwise specified.

ACTUATOR ACCESSORIES AND CONTROLS

CONSTRUCTION OPTIONS



Mechanical lockout option

To comply with the intent of OSHA requirements for locking spring-driven actuators in the spring-driven position, every Quadra-Powr actuator can have the mechanical lockout option added to it. Design of the output shaft allows for locking the actuator in the spring-fail position. Actuators equipped with this option have a special lockout screw and a tamperproof cover attached to the housing of the actuator with a stainless steel wire. The lockout parts are readily available to permanently lock the actuator in place and padlock the locking device to prevent unwanted operation.

When limiting the rotation of the air stroke of a Quadra-Powr actuator, a 100 % adjustable stop option can be added. In the spring-to-close mode this option limits the opening stroke only; in the spring-to-open mode it limits the closing stroke only. The stop screw for this option is located in the housing end of the actuator.

Wet conditions (tropicalization) kit

All standard QPX actuators are shipped with all open mounting and accessory holes filled with fasteners. This reduces the possibility of “standing water” to enter into the driver housing. But in extremely moist environments, water can still potentially make its way inside the unit. In fact, all spring return actuators are subject to this. Every time a QPX strokes air inside the actuator (on the non-pressure side of the diaphragm) is pushed outside via the breather. This is due to the decreasing volume and differential pressures that are present. In contrast, when the actuator returns on the spring stroke the exact opposite happens- air must be pulled inside the actuator, and in a humid environment, taking along moisture with it. To block off all openings in the actuator

would stop the operation, as this “breathing” needs to happen for a spring-return diaphragm actuator to function.

The only realistic way to eliminate all moisture from getting inside the actuator is to regulate the air that is being transferred in and out of the actuator. This can be done with an accessory called the Tropicalization kit. This accessory kit takes exhaust air from the solenoid valve or positioner (clean dry air) and re-directs it into the housing in place of the breather fitting. This air is dumped inside the housing during the spring stroke, thus keeping a positive pressure in the housing, and keeping out atmospheric air (and moisture). This kit should be considered in any application where excessive moisture exists.

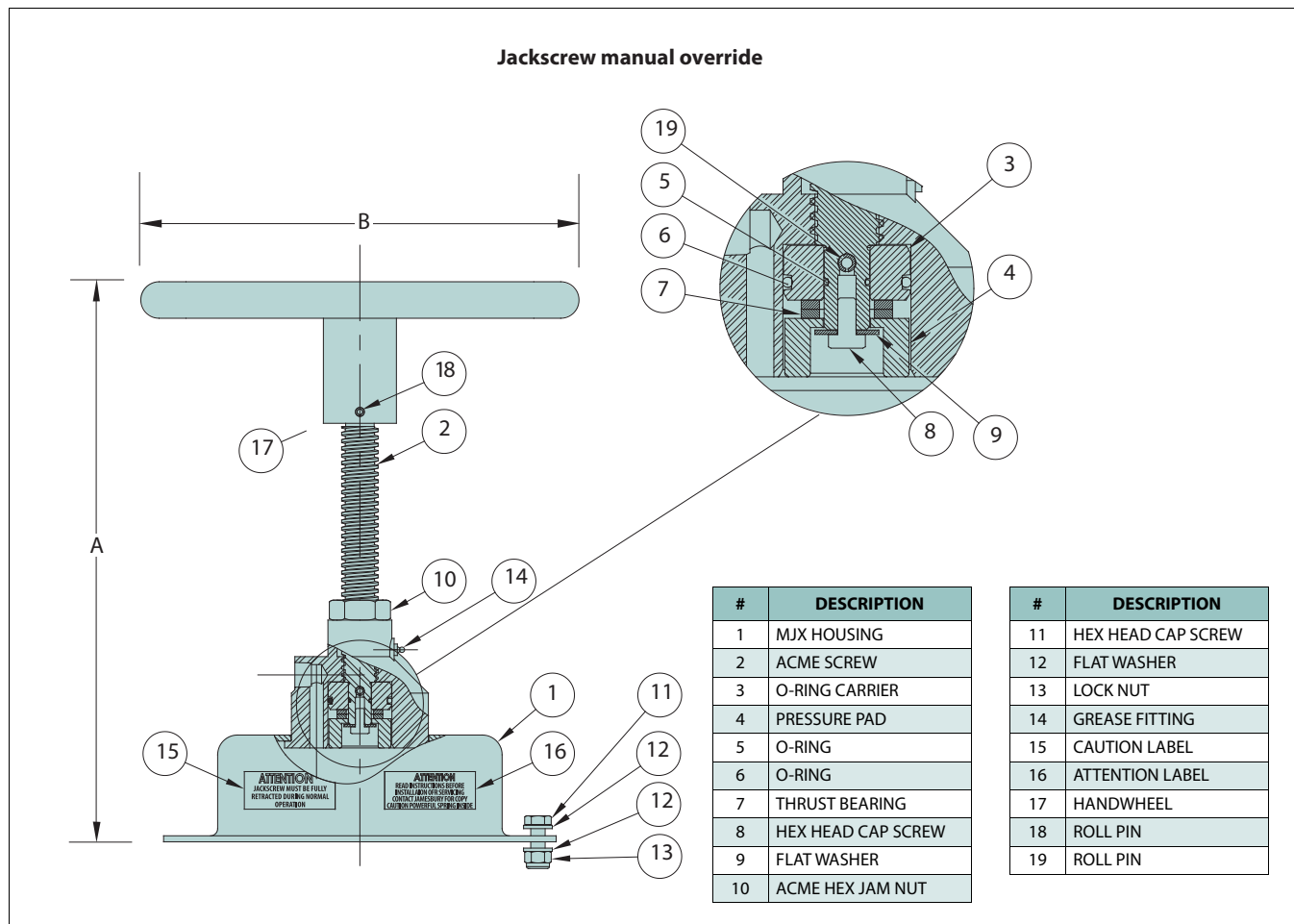
Fusible plug

A fusible plug option is available for all *Quadra-PowrX* actuators to allow for automatic closing or opening of the valve in the event of a fire or excessive environmental temperature. The standard plug is designed to melt when the temperature reaches

an approximate level of 165 °F (74 °C).

This releases the air from the diaphragm case and rotates the valve to its fail-closed or fail-open position. To order a fusible plug kit specify LK3116.

Jackscrew manual override: A jackscrew device is available on the QPX1, 2, 3, 4 and 5 actuators. When the handwheel of this device is turned, force is exerted on the diaphragm plate, compressing the actuator spring and operating the valve in the direction of the air stroke.

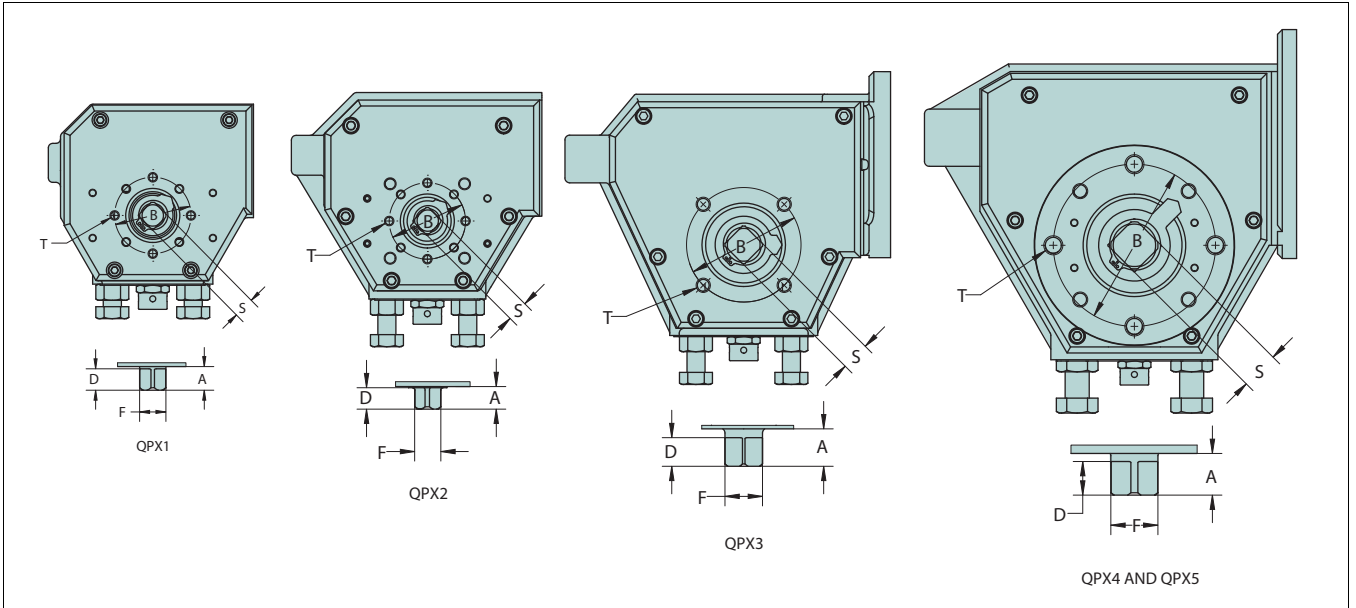


Jackscrew specification					
Model	For actuator series	Max. input torque* (N-m)	Number of turns to fully compress spring	Approximate dimensions (Millimeters)	
				A	B
MJX-1	QPX-1	11	17	358.9	200
MJX-2	QPX-2	22	18	409.4	300
MJX-3	QPX-3	49	21	457.5	400
MJX-4	QPX-4	56	25	532.4	500
MJX-5	QPX-5	89	35	603.8	600

Jackscrew specification					
Model	For actuator series	Max. input torque* (ftlbs)	Number of turns to fully compress spring	Approximate Dimensions (inches)	
				A	B
MJX-1	QPX-1	8	17	14.13	7.87
MJX-2	QPX-2	16	18	16.12	11.81
MJX-3	QPX-3	36	21	18.01	15.75
MJX-4	QPX-4	41	25	20.96	19.69
MJX-5	QPX-5	66	35	23.77	23.62

*Based on typical valve with 80-psi (5.5) bar actuator spring.

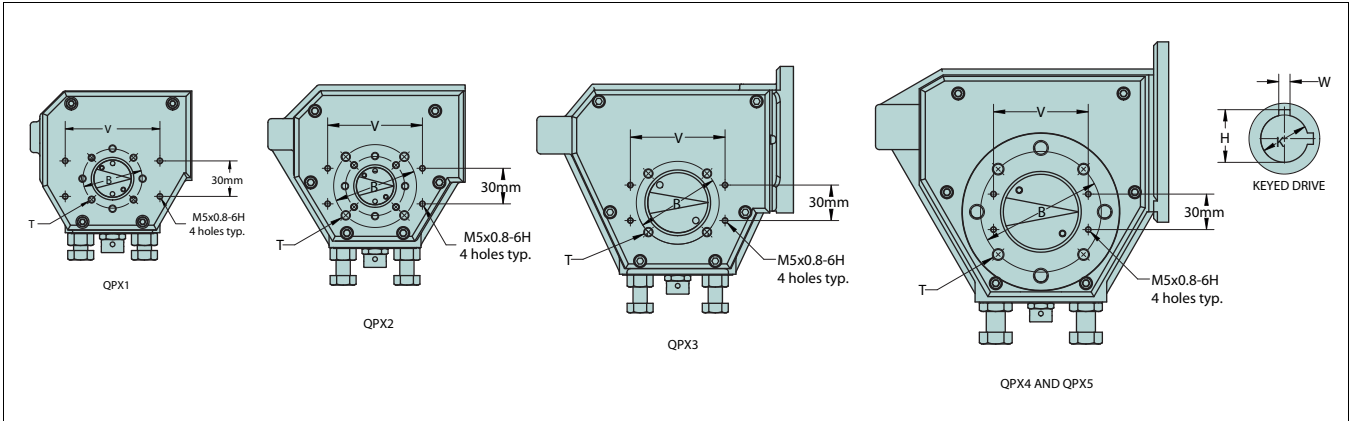
MOUNTING DIMENSIONS, MALE DRIVE VERSION



Approximate dimensions - mm						
Actuator	B Bolt circle	T Thread size	S Square	A	D	F
QPX1	51	1/4-20unc-2B	14	15-17	14	18
QPX2	51	1/4-20unc-2B	14	15-17	14	18
QPX3	76	3/8-16unc-2B	19	24-26	19	25
QPX4	108	1/2-13unc-2B	25	28-30	22	31
QPX5	108	1/2-13unc-2B	25	28-30	22	31

Approximate dimensions - inches						
Actuator	B Bolt circle	T Thread size	S Square	A	D	F
QPX1	2	1/4-20unc-2B	0.55	0.60-0.65	0.55	0.69
QPX2	2	1/4-20unc-2B	0.55	0.60-0.65	0.55	0.69
QPX3	3	3/8-16unc-2B	0.75	0.94-1.04	0.75	0.98
QPX4	4.25	1/2-13unc-2B	1.00	1.10-1.18	0.88	1.23
QPX5	4.25	1/2-13unc-2B	1.00	1.10-1.18	0.88	1.23

MOUNTING DIMENSIONS, KEY WAY VERSION



Approximate dimensions								
Actuator	Actuator/accessory mounting dimensions			Key dimensions				
	B	T	V	K	H		W	
	Bolt circle mm (inch)	Thread size	Namur/ VDI/VDE 3845 mm (inch)	Key diameter mm (inch)	mm	inches	mm	inches
QPX1, QPPX2A	50 (1.96)	M6	80 (3.14)	15 (0.59)	17	0.67	4.8	0.19
QPX2 (not QPX2A)	70 (2.76)	M8	80 (3.14)	20 (0.79)	23	0.89	4.8	0.19
QPX3	70 (2.76)	M8	80 (3.14)	35 (1.38)	40	1.56	9.6	0.38
QPX4	102 (4.01)	M10	80 (3.14)	40 (1.57)	45	1.75	9.6	0.38
QPX5	125 (4.92)	M12	80 (3.14)	40 (1.57)	45	1.75	9.6	0.38

PNEUMATIC, SPRING-DIAPHRAGM ACTUATOR, Series QPX

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

1. sign	Actuator series
QPX	Quadra-Powr X, spring-diaphragm actuator

2. sign	Size
1	QPX1
2	QPX2
3	QPX3
4	QPX4
5	QPX5

3. sign	Spring option
A	1,3 bar / 20 psi (QPX2 and QPX3 only)
B	2,8 bar / 40 psi
C	4,1 bar / 60 psi
D	5,5 bar / 80 psi

4. sign	Driver
Male square drive	
M	Male Square
Keyed female drive	
K15	15 mm when QPX1, QPX2A
K20	20 mm when QPX2 (not QPX2A)
K35	35 mm when QPX3
K40	40 mm when QPX4 or QPX5

5. sign	Options
--	No sign, Standard version, full reversible version
MJX	Handwheel override

6. sign	Model version indicator
-	No sign, model B
C	Model C

Metso Corporation

Töölönlahdenkatu 2, PO Box 1220, 00100 Helsinki, Finland
Tel. +358 20 484 100

Metso Flow Control Inc.

Vanha Porvoontie 229, P.O. Box 304, FI-01301 VANTAA, Finland.
Tel. +358 20 483 150. Fax +358 20 483 151

www.metso.com/valves

Subject to change without prior notice. Product names in this bulletin are all trademarks of Metso Flow Inc.

