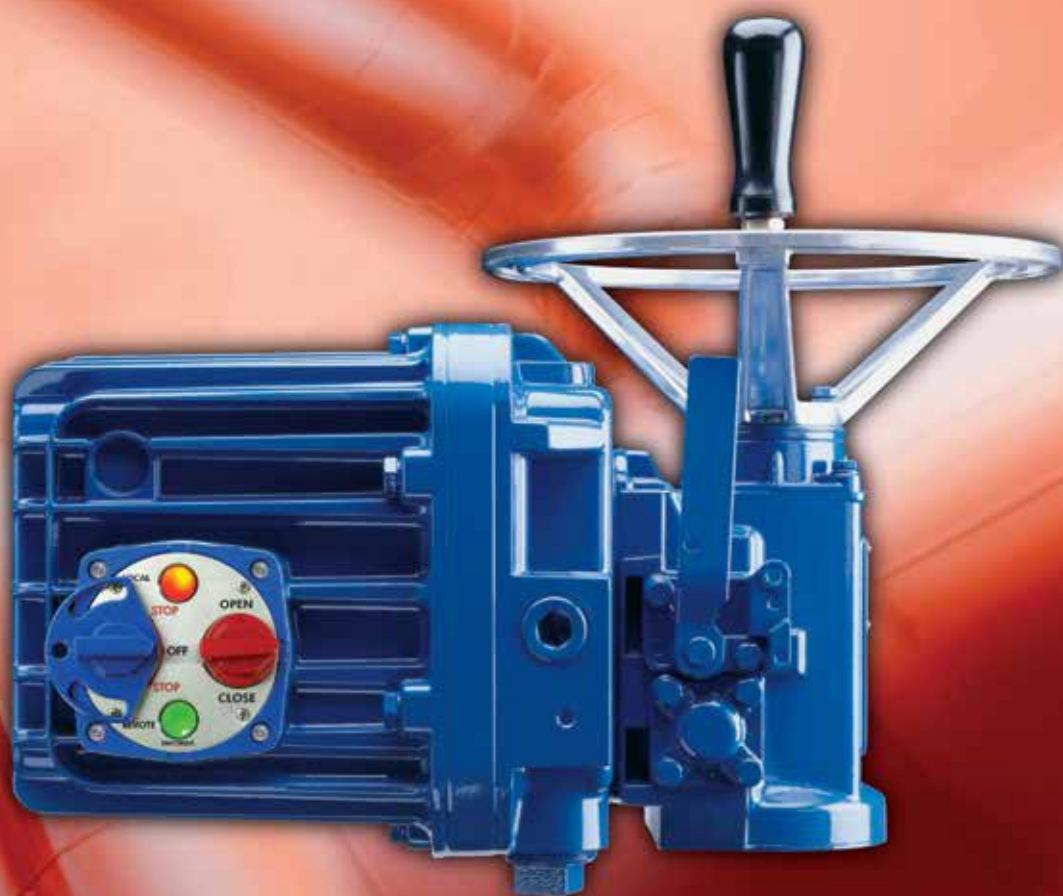




Limitorque® L120 Series Multi-Turn Electric Valve Actuators

For a wide range of process applications



Experience In Motion



Flowserve Limitorque L120 series: A solid record in demanding applications

Proven performers under the most challenging circumstances, Limitorque's L120 actuators are ideal for valves requiring rotary or linear movement.

With eight unit sizes, L120 electric actuators make it easy to meet or exceed your requirements for positive, dependable valve actuation.

Whether used with gate valves, globe valves, penstocks or sluice gates, versatile L120 Series actuators operate without modification in any rising or non-rising stem application for linear-action valves. When combined with a Limitorque WG or HBC series quarter-turn gear operator, L120 actuators can also be used to control butterfly, ball and plug valves, as well as damper drives, flop gates or any other device which requires rotary movement.

Rugged, reliable and versatile, L120 actuators are proven performers in challenging applications. Thousands of L120 actuators are at work in some of the world's most demanding conditions, where nothing less than day-after-day dependable operation is acceptable.

L120 actuators are specified for use in petrochemical, power generation, and water and waste treatment applications where failure of a single actuator can be extremely costly ... even catastrophic.

Solid design and durable construction qualify the L120 actuator for applications involving harsh environmental conditions. A successful record with challenging requirements and compatibility with advanced process control systems make L120 actuators the best combination of proven and leading-edge technologies. Backed by comprehensive technical support services, product documentation, and spare parts availability, the L120 series is an easy choice for flexible, dependable valve control.



Low-maintenance requirements make the L120 Series ideally suited for water and waste treatment applications.

L120 actuators meet rigid safety requirements and are available in weatherproof, explosion-proof and submersible configurations.



The L120 makes valve control easier for some of the world's most demanding customers.

Petrochemical Installations such as refineries, pipelines, terminals, tank farms, cokers and off-shore platforms rely on the L120's safety, endurance and operational efficiencies. The L120 has network compatibility, explosion-proof certification, and resistance to lightning, EMI and fire.

Power Generation plants value the L120's availability, controls versatility and reliable performance. The L120's rugged design and construction quality stands up to vibration, high-pressure steam and extreme temperatures.

Water and Waste Treatment Facilities benefit from the L120's low-maintenance requirements and modulating control capabilities. L120 actuators meet AWWA standards and easily fit the industry trend toward modern controls networks. The wide range of options in the L120 Series allows specification needs to be met cost-effectively.

Designed to provide positive, dependable actuation

The time-tested design and solid construction of the L120 Series allow these actuators to handle up to 60 000 ft-lb (81 600 Nm) of torque, and up to 500 000 ft-lb (225 000 kg) of thrust. Durable torque overload protection is provided in both directions of valve travel. Rugged enclosures are available in weatherproof, submersible and explosion-proof configurations.

L120 actuators can also be coupled to gearboxes such as Limitorque's V, B320, MT, WG or HBC operators for motorized operation of valves requiring quarter-turn operation or multi-turn applications for increased torque and/or thrust requirements.

All L120 actuators are factory-lubricated and weatherproofed for service in temperature ranges from -50°C to 65°C (-56°F to 150°F). Submersible, explosion-proof, and extremely cold temperature versions of all L120 models are available for appropriate applications. Refer to pages 8 and 9 for L120 specifications.

L120 series multi-turn electric valve actuators

L120-10 through -40 series

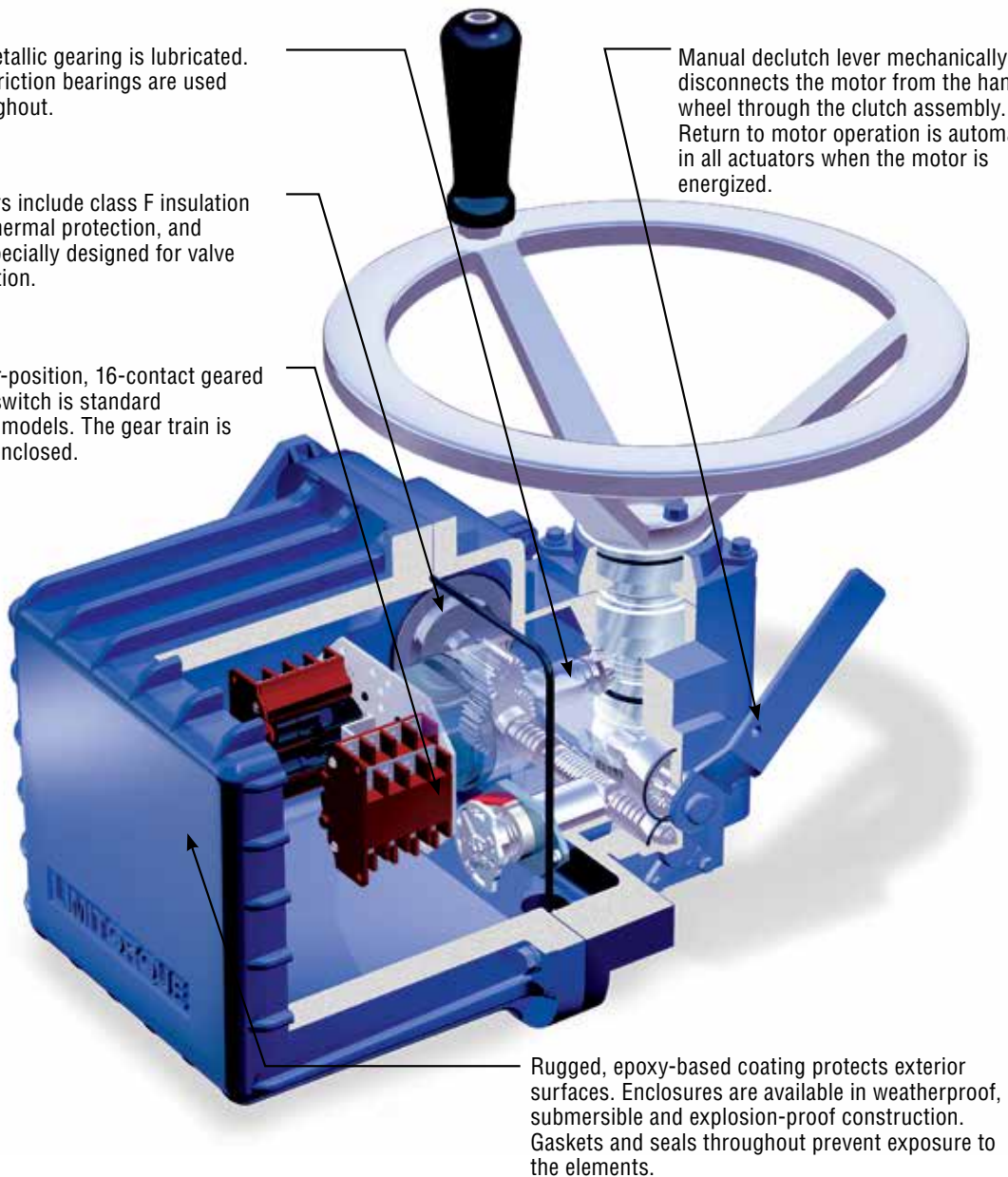
L120-10 through 40 actuators utilize models utilize die-cast aluminum housings and compartment covers with an option for ductile iron construction to withstand the most rigorous applications.

All metallic gearing is lubricated. Anti-friction bearings are used throughout.

Motors include class F insulation and thermal protection, and are specially designed for valve actuation.

A four-position, 16-contact geared limit switch is standard on all models. The gear train is fully enclosed.

Manual declutch lever mechanically disconnects the motor from the hand-wheel through the clutch assembly. Return to motor operation is automatic in all actuators when the motor is energized.



Rugged, epoxy-based coating protects exterior surfaces. Enclosures are available in weatherproof, submersible and explosion-proof construction. Gaskets and seals throughout prevent exposure to the elements.

L120-85 series

This model and larger actuators feature cast iron construction. Optional ductile iron construction is also available.



L120-190 series

This versatile midrange member of the L120 family delivers more than seven times the thrust of the smallest actuators in the line.



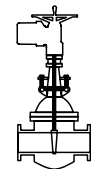
Actuation of valves, gates and dampers

Direct Mounting The L120 series can be directly coupled with valves for torque-only applications. For thrust applications, a separate thrust base is used for the L120-10 through -85.

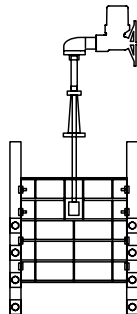
L120/V, L120/B320 and L120/MT Rising stem valves may be operated by an L120 coupled to a V, B320 or MT Series bevel gearbox. Thrusts to 921 000 lb (4100 kN) and torques to 19 000 ft-lb (26 000 N-m) are available.

L120/WG and L120/HBC The L120 series may be coupled to a WG or HBC worm gearbox for operation of quarter-turn valves or dampers, or multi-turn damper applications. Torque outputs to 449 000 lbs-ft (610 000 N-m) are available.

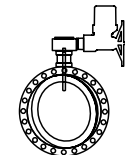
Valve mounting options



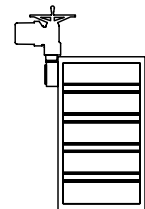
L120
mounted to
wedge gate



L120/B320
mounted to
sluice gate



L120/PT
mounted to
butterfly valve



L120/PT
mounted to
damper

Mounting bases

Thrust actuator drive bases

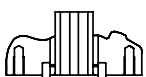
Type A1 (drive 2) — Alloy bronze (torque and thrust)

Torque-only actuator bases

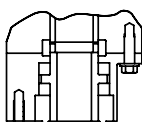
Type B4 (drive 1) — Standard steel bushing

Type BL (drive 3) — Splined steel bushing for rising or rotating stem valves

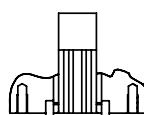
Mounting bases (L120-10 through -85)



Type B4
(drive 1)

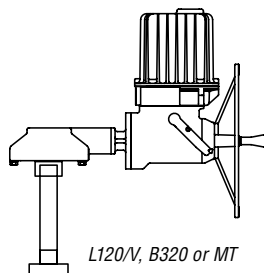


Type A1
(drive 2)

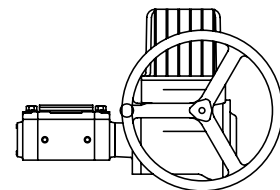


Type BL (drive 3)
L120-10 through -40

Combinations for torque reduction applications



L120/V, B320 or MT



L120/WG or HBC

From basic controls to digital networks

The L120, with 25+ years of proven performance, continues to deliver reliable operation in a wide range of process control environments. Standard control packages utilize circuit board technology to reduce the need for hard-wiring. Control stations are available with a variety of illuminated indicator and selector switch options. These control stations are available in a standard design for basic integral control packages and an electronic version for use with the UEX electronic controls in network control packages.

Human interfaces

Control stations are available with a variety of illuminated indicator and selector switch options. The control stations offer two lights and padlockable selector switches as standard for use with electronic controllers. Switch stations can be supplied in the compartment cover (standard) or for remote mounting.

Integral package options:

No Controls Unit (NCU) is offered for open/close applications. Actuator controls such as reversing contactors and control transformers are located in motor control centers.

Basic Integral Controls (BIC) include integrally mounted reversing contactors, control transformers, fuses and interlocks.

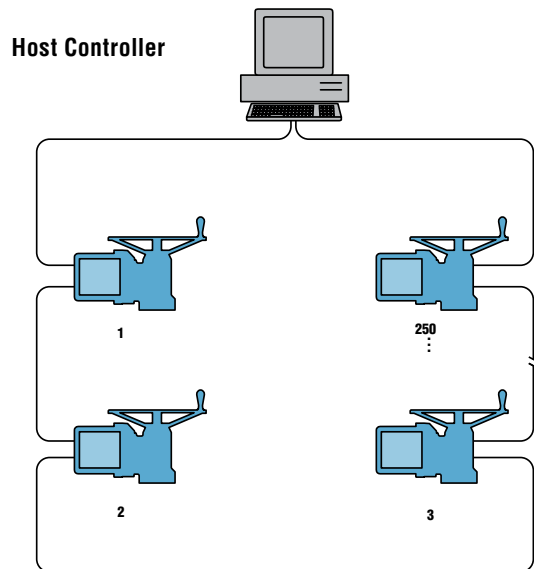
Integral Reversing Controls (IRC) include BIC functionality, plus a plug-in interconnect board and additional options.

Modutronic 20 Controls offer a choice of integral packages for positioning or process control functions in response to analog process signals.

Electronic Controls (UEX) offer state-of-the-art actuator control with advanced diagnostics and configurability. Built on MX technology, UEX features include all of the UEC-3 functionality plus position feedback via an absolute encoder, an on-board LCD display of status and position, and supports any of five network protocols. The UEX can be field-installed to replace UEC-3 control packages.

Network Protocols provided through the UEX Control package include Modbus, Foundation Fieldbus, Profibus DP, Profibus PA and DeviceNet.

L120/DDC direct-to-host networks support up to 250 field units



L120 specifications

Gear housing

- Cast aluminum, L120-10 through -40; cast iron, L120-85 through -2000
- Lubrication — Grade 0 or Grade 00
- Gear reduction — Double-reduction type
 - › Worm gear (alloy bronze) and spur gear (heat-treated steel), L120-10 through 85
 - › Worm gear (alloy bronze) and spur gear (heat-treated steel), and worm (alloy steel) and helical gearing (heat-treated steel), L120-190 through -2000

Electrical compartment covers

- Cast aluminum, O-ring sealed
 - › Hardware is nickel-plated carbon steel, L120-10 through -85, and L120-190 through -2000. Stainless steel optional for non-XP.

Motor

- Available as four-pole, 1800 rpm (60 Hz) or 1500 rpm (50 Hz); two-pole, 3600 rpm (60 Hz) or 3000 rpm (50 Hz); eight-pole, 900 rpm (60 Hz) or 750 rpm (50 Hz).
- Squirrel-cage induction for three-phase and capacitor start-induction run for single-phase.
- Power supply — three-phase motors, suitable for 3/60/230, 3/60/460, 3/60/575, 3/50/380 or 3/50/415.
- Nominal duty is 15 minutes.
- Dynamic torque is nominal 20% of start torque
- Class F insulation
- Two Class B thermal contacts embedded within motor windings provide thermal protection

Limit switch

- Gear driven, cam operated, snap acting
- Four rotor/16 SPST contact switches (four contacts per rotor — 2 N/O and 2 N/C). Rotors may be set to open or close at any valve position
- Contact rating is 600 volts per ICS-125.6. Current rated 6 amps resistive and 60 amps inrush at 120 VAC

Torque switch

- L120-10 through -85: Heavy-duty inlaid silver contacts, 600 volts, and one SPST contact each for open/closed direction dedicated to actuator torque protection
- L120-190 through -2000: 600 volts per ICS-125.6, 6 amps resistive and 60 amps inrush at 120 VAC. One SPST contact each for open/closed direction dedicated to actuator torque protection.

Reversing contactor

- Available at 12-, 25- or 50-amp ratings, selected according to motor ratings

Enclosure

- WP actuators suitable for NEMA 4
- XP actuators suitable for
 - › FM Class I, Groups B, C, D, Divisions 1 and 2; Class II, Groups E, F, G, Divisions 1 and 2
 - › CSA Class I, Groups C, D, Divisions 1 and 2; Class II, Groups E, F, G, Divisions 1 and 2

NOTE: XP actuators also carry NEMA 3 and 4 ratings.

Thrust and torque output drives

- Torque output only — a removable steel torque bushing is provided
- Thrust and torque output — a removable splined, bronze stem nut is provided, housed in a ductile iron thrust base and supported on thrust bearings.

Handwheel/declutch

- Fabricated steel or ductile iron for side-mounted; cast aluminum for L120-10 top-mounted only. Handwheels are connected directly to drive sleeve (L120-10, -20 and -40). L120-85 operates through the worm set. Declutch lever is padlockable in motor position.

Mounting base

- Supplied to MSS (English taps) standard. Optional ISO bases available.

Paint

- Valspar epoxy/polyurethane and powder-coating for L120-10 through -40; Valspar epoxy/polyurethane for L120-85 through -2000. Both coatings are suitable for 500-hour salt spray.

Temperature rating

- Standard operating temperature range is from -20°F to 150°F (-29°C to 66°C). Optional extended ranges available.
- For explosion-proof applications, the Factory Mutual XP temperature rating is shown on the FM nameplate.

Actuator nameplate

- Flowserve Limitorque name, point of manufacture, actuator type and size, order number, serial number, space for customer tag information

Controls options

- Available controls include BIC (Basic Integral Controls), Mod 20 modulating controls and UEX (electronic controls).

L120 specifications

XP enclosures

- L120-10 through -85:
 - › Nameplated as Class I, Groups B, C, D, Divisions 1 and 2; Class II, Groups E, F, G, Divisions 1 and 2 with FM label. Class I, Groups C, D, Divisions 1 and 2; Class II, Groups E, F, G, Divisions 1 and 2 with CSA label.
 - › FM and CSA labels available for NCU and standard controls packages
- L120-190 through -2000:
 - › Nameplated as Class I, Groups C and D, Divisions 1 and 2, and Class II, Groups E, F and G, Divisions 1 and 2, FM or CSA label.
- Nameplate material is stainless steel.

Options

- **Local Continuous Position Indication** Local position indicator shows continuous valve position in percentage open via dial, and is driven by dedicated gear set selected per application. Window in compartment cover shows indicator.
- **Local/Remote Indication** Includes local continuous position indicator with a 1000-ohm potentiometer. Potentiometers transmit valve position to remote location.
- **R/I Converter** Sends remote valve position indication signal via 4-20 mA signal. Internally powered.
- **Relay Boards** Provide isolated relays (2) or non-isolated relays (3) for interlocking with field equipment. Relay contacts rated at 250 VAC/6.5 A or 30 VDC/5 A.
- **Handwheel Gear Reduction** Bevel gear reductions are available for L120-10 through -40, and spur gear reductions are available for L120-190 through 2000.
- **Double-pole Torque Switch** Provides an additional SPDT contact in each direction that actuates when set torque is exceeded. Used as indication of over-torque condition.
- **Ductile Iron Housing (L120-10 through -40)** Ductile iron for load-carrying components.
- **Spring Compensation (L120S) (L120-190 through -2000)** SB-type spring-compensated stem nut used on high-speed or high-temperature, torque-seated applications.
- **Position Feedback for DDC** Communicates valve position to remote location via DDC network. Includes local position indication, 1000-ohm potentiometer and DDC analog channel. Used with DDC base actuator.
- **External Analog Feedback for DDC** Allows external analog signals to be connected to DDC field unit, converted to digital signals and transmitted over DDC network. Four signals may be accommodated. Includes DDC analog channel. Used with DDC base actuator.

- **Positioning Control for DDC** Permits positioning of valves over DDC network. Positioning commands valve to any point of travel, in 1% increments. Includes local position indication, 1000-ohm potentiometer and DDC analog channel. Used with DDC base actuator.
- **Two-speed Operation for DDC** Allows the actuator to be pulsed on and off, achieving slower operating speed for all or part of valve stroke. Default pulse rate is 2 seconds on, 10 seconds off, adjustable from 50 ms to 12.75 seconds in 50-ms increments. Configured via RS-232 link and dedicated software.
- **UEX Electronic Control Package** The UEX replaces the UEC-3 with MX technology-based control functionality. The absolute encoder provides position indication and control. Setup is achieved through the LCD display, providing status and fault indication in 11 languages. The UEX offers network control via Modbus, Foundation Fieldbus, Profibus DP, Profibus PA or DeviceNet.

Testing summary

Weatherproof enclosures meet NEMA 4, NEMA 4X and IP67. Submersible actuators are suitable for NEMA 6 and IP68. Explosion-proof enclosures fully conform to and are certified to be compliant to the following:

- Factory Mutual (FM) — Class I, Divisions 1 and 2, Groups B, C and D, and Class II, Divisions 1 and 2, Groups E, F, G; Temp Code T3C
- Canadian Standards Association (CSA) — Class I, Division 1, Groups C and D, and Class II, Division 1, Groups E, F and G; Temp Code T3C

Limitorque's factories are certified to ISO 9001 standards and maintain the highest quality of performance throughout the manufacturing processes.

L120 actuators meet the following seismic and vibration criteria: NTS Labs, Acton, MA, Test Report #31437-94M dated 3/28/94 to the following:

- Sine survey; 5 to 200 Hz @ 0.75 g
- Sine cycling; 5 to 200 Hz to 5 Hz @ 0.75 g
- Sine cycling; 2 to 35 to 2 Hz @ 1.0 g; 10 cycles
- Sine dwells; 2 to 35 to 2 Hz @ 1/3-octave intervals, 5.0 g @ 15-second dwells each frequency

NOTE: Standards are applicable to most actuators.

L120 series performance

(Three-phase-50 Hz/380, 400 and 415 V — 60 Hz/230, 460 and 575 V)

Actuator	Maximum Torque Capacity		Maximum Thrust Capacity		Output Speed Range (RPM)	
	ft-lb	N m	lb	kg	60 Hz	50 Hz
L120-10	100	136	10000	4500	12-250	10-210
L120-20	200	272	20000	9000	12-250	10-210
L120-40	400	544	30000	13500	24-250	20-210
L120-85	850	1156	45000	20250	24-192	20-160
L120-190	1900	2584	75000	33750	24-196	20-160
L120-420	4200	5712	140000	63000	19-196	16-165
L120-800	8000	10880	250000	112500	12-168	10-140
L120-2000	20000	27200	500000	225000	12-60	10-50

L120 weights (approx.)

Actuator	Actuator with STD Comp.		Add for Integral Comp.		Add for Max. Comp.		Add for Thrust Base		Add for Side-Mount Handwheel	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
L120-10	90	41	20	9	32	14	7	3	3	1
L120-20	115	52	20	9	32	14	13	6	8	4
L120-40	160	72	20	9	32	14	22	10	16	7
L120-85	285	129	20	9	32	14	67	30	(Note 2)	
L120-190	600	272	85	39	(Note 2)		(Note 2)		(Note 2)	
L120-420	1195	541	215	98	(Note 2)		(Note 2)		(Note 2)	
L120-800	1415	641	215	98	(Note 2)		430	195	(Note 2)	
L120-2000	2550	1155	215	98	(Note 2)		826	375	(Note 2)	

Note 1: Same as overall ratio.

Note 2: Consult factory for weight.

Note 3: Performance ratings and dimensions are also available for the L120-6000. Please consult factory.

Mounting Base and Drive Sleeves

	Previous Designation	Description
Type B4	Drive 1	Bore and key bushing for torque-only applications
Type A1	Drive 2	Threaded for thrust applications
Type BL	Drive 3	Splined steel bushing for rising rotating stem valves

L120 series performance

L120-10, -20 and -40

Drive options	L120-10		L120-20		L120-40	
	inch	mm	inch	mm	inch	mm
Type B4 bore and key	1.000- $\frac{1}{4} \times \frac{3}{16}$ (rect key)	25-8x6	1.875- $\frac{1}{2} \times \frac{3}{8}$ (rect key)	48-14x9	2.125- $\frac{1}{2} \times \frac{3}{8}$ (rect key)	53-16x10
	.938- $\frac{1}{4} \times \frac{1}{4}$ (sq key)		1.813- $\frac{1}{2} \times \frac{1}{2}$ (sq key)		2.063- $\frac{1}{2} \times \frac{1}{2}$ (sq key)	
Type B4 stem nut length	3.25	83	3.50	89	3.75	95
Type A1 threaded stem	1.25	32.8	2.25	57.2	2.63	66.8
Type A1 stem length	2.38	60	3.87	98	3.84	98
Type BL splined	1.25 - 6 and 38 splines	N/A	1.5 - 6 and 1.9 - 36 splines	N/A	2 - 6 and 1.5 - 8 splines	N/A
Type BL spline length	4.50	114	4.50	114	4.50	114
Mounting base	MSS FA-10	ISO F-10	MSS FA-14	ISO F-14	MSS FA-14	ISO F-14
Pilot diameter	2.312	70	3.750	100	3.750	100
Mounting holes (Note 1)	(4) $\frac{5}{16}$ -16x.88	(4) M10x1.5x22.4	(4) $\frac{5}{16}$ -11x1.25	(4) M16x2x32	(4) $\frac{5}{16}$ -11x1.25	(4) M16x2x32
Bolt circle	4.016	102	5.500	140	5.500	140
Mounting base diameter	4.92	125	7.000	178	7.000	178
Handwheel ratios						
Standard	1:1 Top Mount		1:1 Top Mount		1:1 Top Mount	
Optional gear reduction	4.2:1 Side Mount		5.7:1 Side Mount		12:1 Side Mount	

L120-85, -190 and -420

Drive options	L120-85		L120-190		L120-420	
	inch	mm	inch	mm	inch	mm
Type B4 bore and key	2.750- $\frac{5}{8} \times \frac{1}{16}$ (rect key)	70-20x12	2.875- $\frac{3}{4} \times \frac{1}{2}$ (rect key)	73-20x12	4.250-1x $\frac{3}{4}$ (rect key)	108-28x16
	2.625- $\frac{5}{8} \times \frac{5}{8}$ (sq key)		2.750- $\frac{3}{4} \times \frac{3}{4}$ (sq key)		4.125-1x1 (sq key)	
Type B4 stem nut length	6.00	152	8.25	210	9.38	238
Type A1 threaded stem	3.00	76	3.50	89	5.00	127
Type A1 stem length	4.88	124	8.25	210	9.38	238
Mounting base	MSS FA-16	ISO F-16	MSS FA-30	ISO F-30	MSS	ISO F-35
Pilot diameter	5.00	130	7	230	8.5	215.9
Mounting holes (Note 1)	(4) $\frac{3}{4}$ -10x1.0	(4) M20x2.5x24.5	(8) $\frac{3}{4}$ -10x1.13	(8) M20x2.5x32	(8) $\frac{7}{8}$ -9x1.75	(8) M30x3.5x1.75
Bolt circle	6.50	165	11.75	298	14.00	355.6
Mounting base diameter	8.25	222	13.50	343	16.00	406.4
Handwheel ratios						
Standard	18:1 - 71:1 (Same as overall ratio) Side Mount		9:1, 22.3:1		11.07:1, 28.37:1	
Optional gear reduction	N/A		4:1		6:1	

Note 1: Mounting holes straddle centerline.

Note 2: L120-85, -190, -420 and -800 are suitable for both torque and thrust applications. L120-2000 is suitable for torque as standard; thrust units are optional.

L120 series performance

L120-800 and -2000

Drive options	L120-800		L120-2000 drive 1 (torque only)		L120-2000 drive 2	
	inch	mm	inch	mm	inch	mm
Type B4 bore	4.50	108	6.25	159	N/A	N/A
	4.500-1x1 (sq key)		N/A		N/A	
Type B4 stem nut length	11.00	279.4	12.00	304.8	N/A	N/A
Type A1 threaded stem	5.00	127	N/A	N/A	6.25	159
Type A1 stem length	2.00	50.8	N/A	N/A	3.125	79.4
Type A1 base to drive sl.	15.50	393.7	N/A	N/A	18.60	472.4
Mounting base	MSS FA-40	ISO	MSS	ISO	MSS	ISO
Pilot diameter	9.00	300	18.00	457.2	13.00	330.2
Mounting holes (Note 1)	(8) 1.25-7x2.0	(8) M36x4x64	(16) 1-8x2.0	N/A	(12) 1.5-6x3.0	N/A
Bolt circle	16.00	406	23.50	596.9	18.00	457.2
Mounting base diameter	18.80	477.5	25.50	647.7	21.00	533.4
Handwheel ratios						
Standard	13.06:1, 33.69:1		163.5:1, 269.8:1		163.5:1, 269.8:1	
Optional gear reduction	6:1		2.86:1		2.86:1	

Note 1: Mounting holes straddle centerline.

Note 2: L120-85, -190, -420 and -800 are suitable for both torque and thrust applications. L120-2000 is suitable for torque as standard; thrust units are optional.