

SERVOMECH linear actuators are electromechanical cylinders able to transform a rotary movement into a linear motion.

Developed and manufactured for industrial applications, Servomech linear actuators can offer higher linear speeds and loads at up to 100% duty cycle, even in the most extreme conditions and arduous applications.

Able to work under push or pull load.

According to their features they can be:

- Statically self-locking: able to sustain static load keeping the same position when the motor is switched off.
- Statically non self-locking: the load can be sustained with a brake motor.

They are capable of maintaining constant speed with a varying load, at a very low noise level.

Their motion can be simply a push-pull "ON-OFF" action, also they can become servomechanisms working as controlled axes, by means of accessories such as encoders or potentiometers for the positioning control, motors with tacho-generator and servo drives.

Their installation is simple and not expensive: it requires just a front and rear hinging as for standard hydraulic and pneumatic cylinders.

They can perfectly replace pneumatic or hydraulic cylinders being able to perform:

- Accuracy in push-pull motion
- Accuracy in stopping position
- Position holding under load (self-locking)
- Energy consumption only while moving
- High safety in lifting a load (internal safety devices available)
- Use in hard environment
- Use in low temperature environment without freezing problems
- Use in high temperature environment without fire risk

SERVOMECH linear actuators have a wide application field.

They are intended for industrial applications where it is necessary to perform in total safety or to control a linear motion while moving, turning over or lifting a load.

The wide range of sizes, stroke lengths, linear speeds, motors and accessories makes it easy to adapt these products for new applications or replace even complicated mechanical solutions and hydraulic or pneumatic cylinders, improving the applications final performances.

SERVOMECH's linear actuator range consists of 2 main product groups determined by their different input drives:

- Worm gear drive with electric motor at 90° with respect to the actuator axis
- Timing belt drive with electric motor in parallel with respect to the actuator axis

Both groups are available with either of the leadscrews below:

- 1 or 2 starts trapezoidal acme screw
- Ball screw

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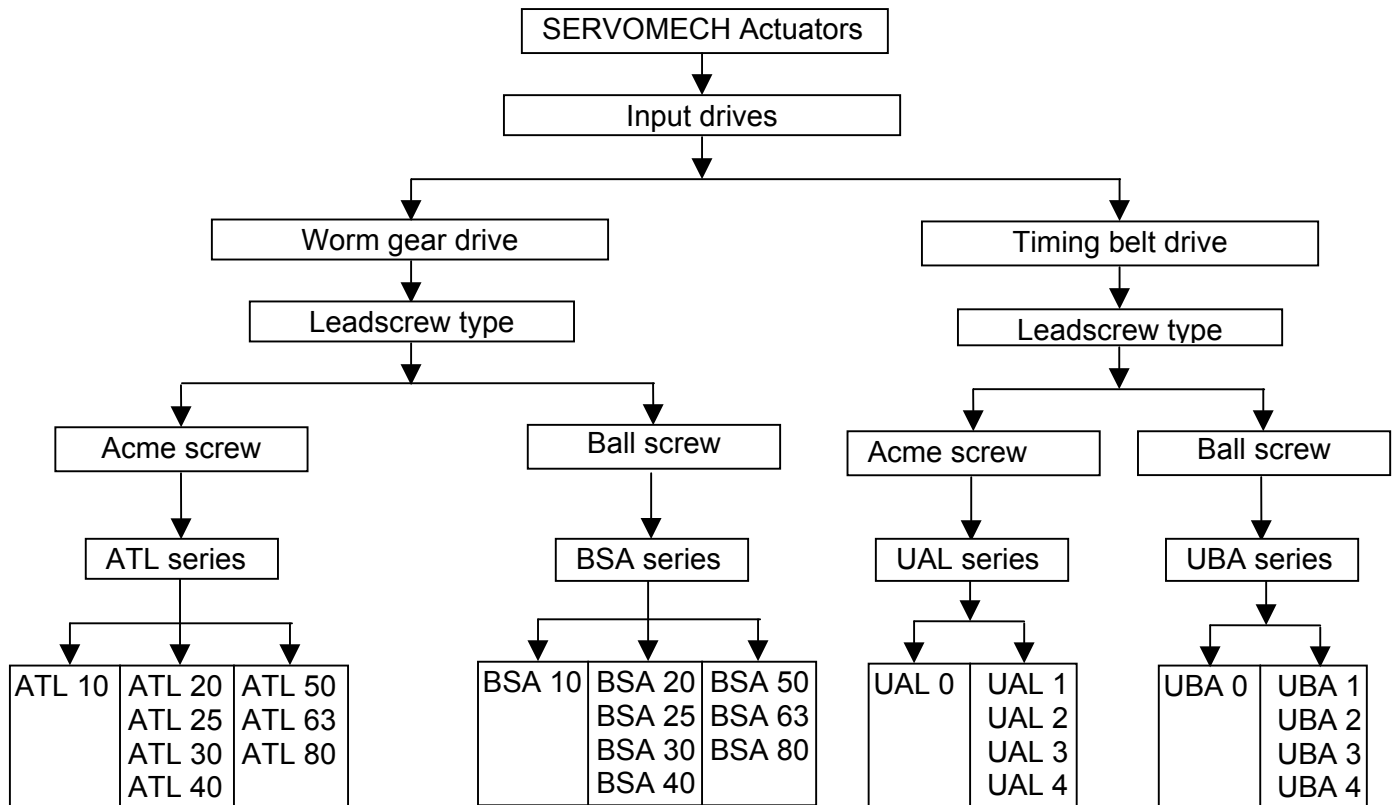
SERVOMECH LINEAR ACTUATORS RANGE

ATL series: Worm gear drive and acme leadscrew

BSA series: Worm gear drive and ball screw

UAL series: Timing belt and acme leadscrew

UBA series: Timing belt and ball screw



ATL and BSA Series

- ATL 10 and BSA 10:
Compact linear actuator with integral electric motor, available with AC 3-phases, AC 1-phase, DC 24 V or 12 V electric motors with or without brake.
- ATL 20 – 25 – 30 – 40 and BSA 20 – 25 – 30 – 40:
4 sizes with monoblock housing in hardened aluminium alloy.
Available in 4 different versions, see page 91.
 - Vers.1 single input shaft
 - Vers.2 double input shaft
 - Vers.3 input motor flange European standard IEC B14
 - Vers.4 input motor flange European standard IEC B14 and extended input shaft
 Electric motors available: AC 3-phases, AC 1-phase, DC 24 V or 12 V, with or without brake.
- ATL 50 – 63 – 80 and BSA 50 – 63 – 80:
3 sizes with monoblock housing in spheroidal graphite cast iron GS 500.
Available in 6 versions: 4 as the previous ones but with motor flange IEC B5 – 2 with motor flange adapter + coupling (see page 92). Electric motors available: AC 3-phases with or without brake.

UAL and UBA Series

- UAL 0 and UBA 0:
Compact linear actuator with integral electric motor.
Available only with DC motor 24 V or 12 V, with or without brake.
- UAL 1 – 2 – 3 – 4 and UBA 1 – 2 – 3 – 4:
Integral electric motors AC 3-phase, AC 1-phase or DC, available with or without brake.
Motors with European standard frame size IEC B14.

SERVOMECH linear actuators are manufactured completely inside with high tech CNC machinery.

Quality system currently in line with ISO 9001:2000.

Statistical control to monitor the components batch quality during the manufacturing process.

Final inspection and testing are carried out on every finished product to ensure the total reliability of the product.

Input drive:

- Worm gear, geometric design for high performances according to British Standard BS 721. ZI involute profile, low angular backlash. Wormwheel in bronze EN 1982 – CuSn12-C. Worm in casehardened steel 20MnCr5 UNI 7846 with thread and input shafts ground.
- Timing pulleys UNI 8530 in aluminium for low inertia or in steel. Timing belts UNI 8529, on request HTD series.

Housing:

Housings are designed and manufactured in monoblock form to achieve:

- high quality and accuracy of the mechanical work,
- strong and compact body able to sustain heavy push or pull loads.

High quality material are used:

- Hardened aluminium alloy EN 1706 AC-AISI10Mg T6
- Spheroidal graphite cast iron EN 1563 – GJS-500-7.

Bronze nut - profile UNI ISO 2901-2904

- 1 start nut: material bronze EN 1982 – CuAl9-C
- 2 starts nut: material bronze EN 1982 – CuSn12-C
- Max. axial backlash with unused nut (0.10 ÷ 0.12) mm

Trapezoidal acme screw profile UNI ISO 2901-2904

- Rolled or cut
- Material: steel C 43 UNI 7847
- Straightened to ensure the perfect alignment when working
- Max. lead error ± 0.05 mm on 300 mm length

Ball nut

- Carried out to SERVOMECH design
- Sized to guarantee high load capacity and performances
- Material: casehardened steel 18NiCrMo5 UNI 7846
- Ground profile
- Max. axial backlash (0.07 ÷ 0.08) mm

Ball screw

- Rolled and hardened
Material: 42CrMo4 UNI 7845
Max. lead error ± 0.05 mm on 300 mm length
- Hardened and ground
Material: 42CrMo4 UNI 7845
Max. lead error ± 0.025 mm on 300 mm length

Push rod

- Thick chrome plated steel tube
 - Material St 52 DIN 2391
 - Min. chrome plating thickness 0.05 mm
 - Tolerance on outer diameter ISO f7

On request push rods in stainless steel AISI 304 available.

Outer tubes in aluminium or steel

- Thick cold-drawn aluminium tube
 - Material: alloy 6060 UNI 90006/1
 - Anodizing 20 μ m
 - Inner tolerance ISO H9
- Cold-drawn steel tube
 - Material: St 52.2 DIN 2391
 - Outer galvanizing
 - Inner tolerance ISO H10 ÷ H11

Bearings

- Ball bearings on motor axis
- Preloaded angular contact ball bearings or taper roller bearings on actuator axis to avoid any axial backlash and to guarantee a high push-pull load capacity.

Front attachment

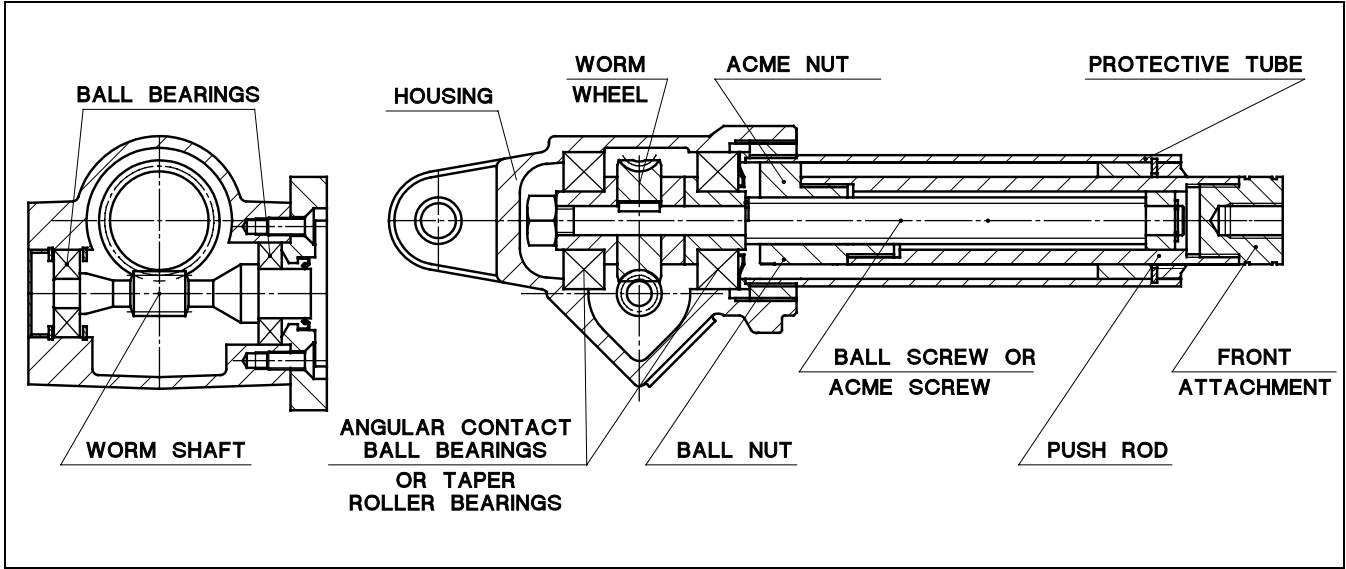
- Stainless steel AISI 303

Electrical stroke limit switches and rear bracket

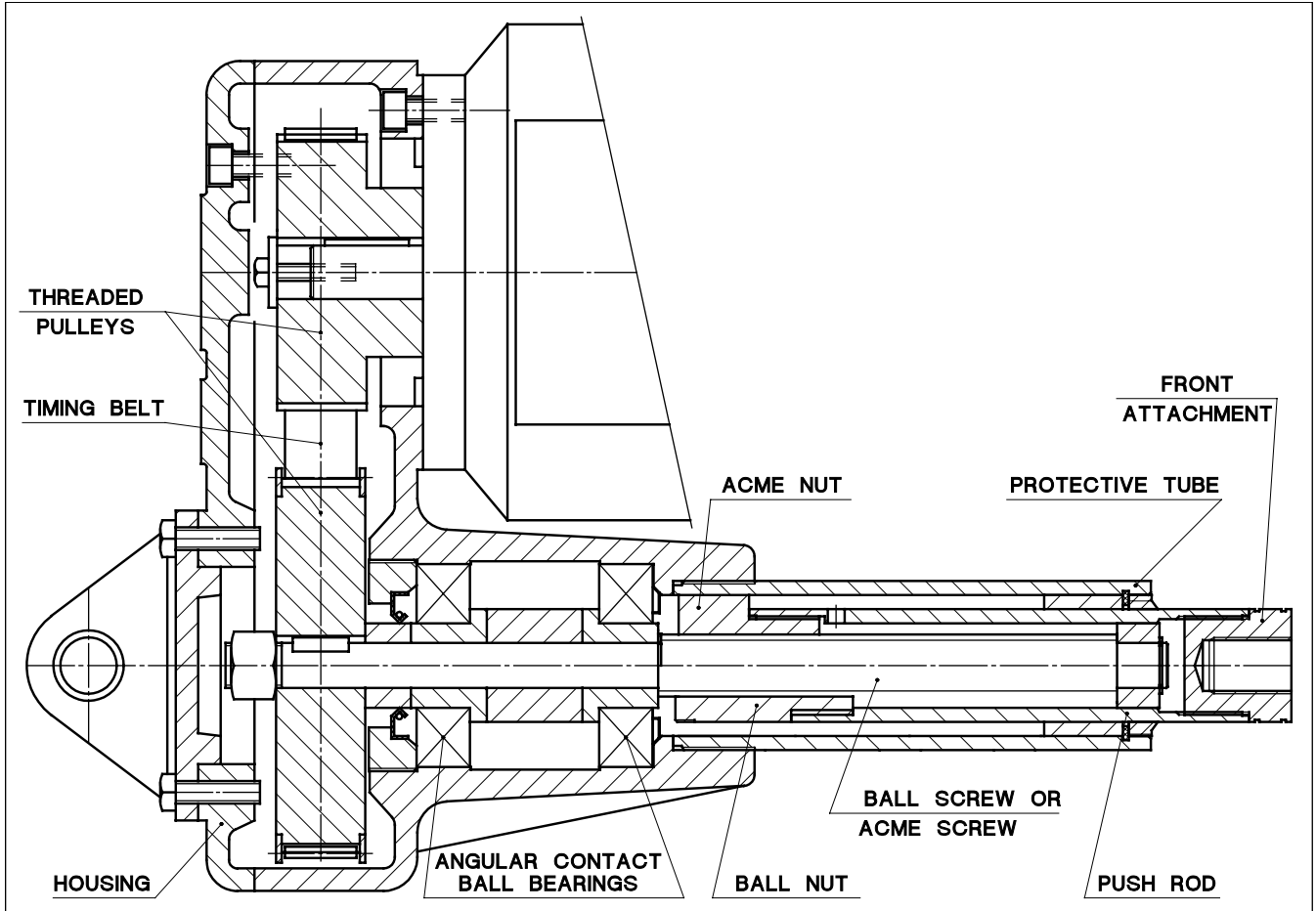
- Material: aluminium alloy (ATL-BSA 10, 20, 25, 30, 40 and Series UAL-UBA), spheroidal graphite iron (ATL-BSA 50, 63, 80)
- Pins in stainless steel AISI 303
- Adjustable rings in brass OT 58 UNI 5705/65

C O M P O N E N T S

LINEAR ACTUATORS Series ATL – Series BSA



LINEAR ACTUATORS Series UAL – Series UBA



The performance tables show the main technical features and performance characteristics for each type of actuator.

They are ideal for quick reference when requiring specific details for control applications in positioning and speed.

GENERAL FEATURES:

- Rod diameter = external diameter of the driving rod
- Protective tube diameter = external diameter of the outer protective tube
- Motor flange = European standard IEC B14 or B5 frame size
- Max. dynamic load = max. load that the specific actuator size can lift. The max. load is achieved with low speeds, which means slow ratio (RL). When increasing the speed the load is reduced, because the actuator has the same motor and therefore a constant power.
- Max. push or pull load = max. push or pull load admitted when the actuator is in still position. Generally the max. push load is higher than the max. pull load due to the bigger mechanical resistance of the fixing parts on housing side. The max. push load depends on the stroke length (refer to graphs on page 18).
- Ratio = Exact ratio of the driving gears between electric motor and linear leadscrew.
- Linear travel for 1 input shaft turn = linear travel in mm performed by the actuator for each input shaft turn. This information is useful when the actuator is equipped with encoder mounted on the input shaft to quantify the total number of pulses for the required linear travel.
Example: encoder 100 pulses per revolution
travel for 1 input shaft turn = 0,25 mm
result: 400 pulses for 1 mm travel
- Weight = mass in kg referred to actuators of 100 mm stroke length without motor. The total weight of an actuator can be obtained adding to the given weight for 100 mm stroke, the weight increment for each further increase of 100 mm stroke.
The weight of the motor is stated in tables on pages 100-104.

ACME SCREW LINEAR ACTUATORS FEATURES:

- 1-start acme screw = acme screw external diameter and lead of the trapezoidal thread in [mm]. The lead gives the actuator feed or travel in mm for each acme screw turn, i.e. for each turn of the wheel leaded by the driving gear.
- 2-starts acme screw = acme screw external diameter and effective lead of the trapezoidal thread in [mm]. The effective lead gives the actuator feed or travel in mm for each input turn of the acme screw. The value in brackets states the pitch between the two contiguous threads.

BALL SCREW LINEAR ACTUATORS FEATURES:

- Diameter × pitch = ball screw external diameter and thread lead in [mm].
- Dynamic load C = max. operating load admitted on the nut. The max. load values acceptable on the ball nut are also necessary for the nut lifetime calculation.
- Static load C₀ = max. static push or pull load admitted on the nut.

The max. load values admitted on the ball nut cannot be considered as performances values achievable by the actuator, because the real performances depend on the motor power and on the actuator components strength.

- Ball circuits quantity = is the total number of ball complete circuits under load.

1.4 ACME SCREW LINEAR ACTUATORS Series ATL

Technical features table

FEATURES		SIZE	ATL 10	ATL 20	ATL 25	ATL 30	ATL 40
Rod diameter	[mm]		25	25	30	35	40
Protective tube diameter	[mm]		36	36	45	55	60
Motor flange European standard IEC B14			–	56 B14	56 B14	63 B14	71 B14
Max. dynamic load	[N]		3000	4000	6000	10000	12000
Max. static load	Pull [N]		3000	4000	6000	10000	12000
	Push [N]		4000	6000	8000	12000	15000
1-start acme screw	[mm]		Tr 13.5×3	Tr 13.5×3	Tr 16×4	Tr 18×4	Tr 22×5
2-starts acme screw	[mm]		Tr 14×8 (P4)	Tr 14×8 (P4)	Tr 16×8 (P4)	Tr 18×8 (P4)	Tr 22×10 (P5)
Ratio	RH		1 : 4	1 : 4	1 : 4	–	–
	RV		1 : 6.25	1 : 6.25	1 : 6.25	1 : 4	1 : 5
	RN		1 : 12.5	1 : 12.5	1 : 12.5	1 : 16	1 : 20
	RL		1 : 25	1 : 25	1 : 25	1 : 24	1 : 25
	RXL		1 : 50	1 : 50	1 : 50	–	–
Linear travel [mm] for 1 input shaft turn (1-start acme screw)	RH1		0.75	0.75	1	–	–
	RV1		0.48	0.48	0.64	1	1
	RN1		0.24	0.24	0.32	0.25	0.25
	RL1		0.12	0.12	0.16	0.17	0.2
	RXL1		0.06	0.06	0.08	–	–
Linear travel [mm] for 1 input shaft turn (2-starts acme screw)	RH2		2	2	2	–	–
	RV2		1.28	1.28	1.28	2	2
	RN2		0.64	0.64	0.64	0.5	0.5
	RL2		0.32	0.32	0.32	0.33	0.4
	RXL2		0.16	0.16	0.16	–	–
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		1.7	2.2	2.5	3.8	6.5
Extra-weight for each additional 100 mm stroke length	[kg]		0.3	0.3	0.5	0.8	0.9

FEATURES		SIZE	ATL 50	ATL 63	ATL 80
Rod diameter	[mm]		50	60	90
Protective tube diameter	[mm]		70	90	115
Motor flange European standard IEC B5			63 B5 – 71 B5	80 B5	80 B5 – 90 B5
Motor flange adapter European standard IEC + coupling			80 B14 or 80 B5 90 B14 or 90 B5	90 B14 or 90 B5 100 B14 or 100 B5	100 B14 or 100 B5 112 B14 or 112 B5
Max. dynamic load	[kN]		25	50	80
Max. static load	pull [kN]		25	50	80
	push [kN]		25	50	100
1-start acme screw	[mm]		Tr 30 × 6	Tr 40 × 7	Tr 60 × 12
2-starts acme screw	[mm]		Tr 30 × 12 (P6)	Tr 40 × 14 (P7)	Tr 60 × 24 (P12)
Ratio	RV		1 : 6	1 : 7	1 : 8
	RN		1 : 18	1 : 14	1 : 24
	RL		1 : 24	1 : 28	1 : 32
Linear travel [mm] for 1 input shaft turn (1-start acme screw)	RV1		1	1	1.5
	RN1		0.33	0.50	0.50
	RL1		0.25	0.25	0.38
Linear travel [mm] for 1 input shaft turn (2-starts acme screw)	RV2		2	2	3
	RN2		0.67	1	1
	RL2		0.50	0.50	0.75
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		30	50	95
Extra-weight for each additional 100 mm stroke length	[kg]		2	3	5.5

FEATURES		SIZE	BSA 10	BSA 20	BSA 25	BSA 30	BSA 40
Rod diameter	[mm]		25	25	30	35	40
Protective tube diameter	[mm]		36	36	45	55	60
Motor flange European standard IEC B14			–	56 B14	56 B14	63 B14	71 B14
Max. dynamic load (1)	[N]		3000	4000	5000	6000	8000
Max. static load	pull [N]		3000	4000	6000	8000	10000
	push [N]		4000	6000	8000	10000	12000
Ball screw	Diameter × Pitch [mm]		14×5 (rolled)		16×5 (rolled)	20×5 (rolled)	25×6 (rolled)
	Dynamic load C [N]		8400		11260	12300	19380
	Static load C ₀ [N]		8570		11570	15040	29420
	Ball diameter [mm]		3.175 (1/8")		3.175 (1/8")	3.175 (1/8")	3.969 (5/32")
	Ball circuit quantity		2		3	3	3
Ratio	RH		1 : 4	1 : 4	1 : 4	–	–
	RV		1 : 6.25	1 : 6.25	1 : 6.25	1 : 4	1 : 5
	RN		1 : 12.5	1 : 12.5	1 : 12.5	1 : 16	1 : 20
	RL		1 : 25	1 : 25	1 : 25	1 : 24	1 : 25
	RXL		1 : 50	1 : 50	1 : 50	–	–
Linear travel [mm] for 1 input shaft turn	Ratio						
	RH1		1.25	1.25	1.25	–	–
	RV1		0.8	0.8	0.8	1.25	1.2
	RN1		0.4	0.4	0.4	0.31	0.3
	RL1		0.2	0.2	0.2	0.21	0.24
RXL1		0.1	0.1	0.1	–	–	
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		1.8	2.2	2.5	3.8	6.5
Extra-weight for each additional 100 mm stroke length	[kg]		0.3	0.3	0.5	0.8	0.9

FEATURES		SIZE	BSA 50	BSA 63	BSA 80
Rod diameter	[mm]		50	60	90
Protective tube diameter	[mm]		70	90	115
Motor flange European standard IEC B5			63 B5 - 71 B5	80 B5	80 B5 - 90 B5
Motor flange adapter European standard IEC + coupling			80 B14 or 80 B5 90 B14 or 90 B5	90 B14 or 90 B5 100 B14 or 100 B5	100 B14 or 100 B5 112 B14 or 112 B5
Max. dynamic load (1)	[kN]		25	37	45
Max. static load	pull [kN]		25	50	100
	push [kN]		25	50	100
Ball screw	Diameter × Pitch [mm]		32 × 10 (rolled)	40 × 10 (rolled)	63 × 20 (ground)
	Dynamic load C [kN]		52,2	65,8	105
	Static load C ₀ [kN]		65,3	87,7	225
	Ball diameter [mm]		6.35 (1/4")	6.35 (1/4")	9.525 (3/8")
	Ball circuit quantity		4	5	4
Ratio	RV		1 : 6	1 : 7	1 : 8
	RN		1 : 18	1 : 14	1 : 24
	RL		1 : 24	1 : 28	1 : 32
Linear travel [mm] for 1 input shaft turn	Ratio				
	RV1		1.67	1.43	2.5
	RN1		0.56	0.71	0.83
RL1		0.42	0.36	0.63	
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		30	50	100
Extra-weight for each additional 100 mm stroke length	[kg]		2	3	6

(1) Values based on estimated ball screw lifetime of at least 2000 hours under load, without shocks or vibrations.

1.4 ACME SCREW LINEAR ACTUATORS Series UAL

Technical features table

FEATURES		SIZE	UAL 0	UAL 1	UAL 2	UAL 3	UAL 4
Rod diameter	[mm]		25	25	30	35	40
Protective tube diameter	[mm]		36	36	45	55	60
Motor Flange European standard IEC B14			–	56 B14	63 B14	71 B14	80 B14 90 B14
Max. dynamic load	[N]		500	1600	2500	5100	8500
Max. static load	Pull [N]		3000	4000	6000	10000	12000
	Push [N]		3000	4000	6000	10000	12000
1-start acme screw	[mm]		Tr 13.5 × 3	Tr 13.5 × 3	Tr 16 × 4	Tr 18 × 4	Tr 22 × 5
2-starts acme screw	[mm]		Tr 14×8 (P4)	Tr 14×8 (P4)	Tr 16×8 (P4)	Tr 18×8 (P4)	Tr 22×10 (P5)
Ratio	RV		1 : 1	1 : 1.33	1 : 1.4	1 : 1.04	1 : 1.07
	RN		1 : 2	1 : 2.15	1 : 2.13	1 : 2	1 : 1.94
	RL		–	1 : 3	1 : 2.83	1 : 2.92	1 : 2.93
Linear travel [mm] for 1 input shaft turn (1-start acme screw)	Ratio	RV1	3	2.25	2.86	3.84	4.69
		RN1	1.5	1.39	1.88	2	2.57
		RL1	–	1	1.41	1.37	1.70
Linear travel [mm] for 1 input shaft turn (2 starts acme screw)	Ratio	RV2	8	6	5.71	7.68	9.38
		RN2	4	3.71	3.75	4	5.14
		RL2	–	2.67	2.82	2.74	3.41
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		2.2	3.3	5	8	11
Extra-weight for each additional 100 mm stroke length	[kg]		0.3	0.3	0.5	0.8	0.9

1.4 BALL SCREW LINEAR ACTUATORS Series UBA

Technical features table

FEATURES		SIZE	UBA 0	UBA 0	UBA 1	UBA 2	UBA 3	UBA 4
Rod diameter	[mm]		30	25	25	30	35	40
Protective tube diameter	[mm]		45	36	36	45	55	60
Motor Flange European standard IEC B14			–	–	56 B14	63 B14	71 B14	80 B14 90 B14
Max. dynamic load (1)	[N]		170	420	1750	2900	3200	5000
Max. static load	Pull [N]		3000	3000	4000	6000	10000	12000
	Push [N]		3000	3000	4000	6000	10000	12000
ROLLED ball screw	Diameter × Pitch [mm]		12.7×12.7	14 × 5	16 × 5	20 × 5	25 × 6	
	Dynamic load C [N]		5250	8400	11260	12300	19380	
	Static load C ₀ [N]		9000	8570	11570	15040	29420	
	Ball diameter [mm]		3.175	3.175	3.175	3.175	3.969	
	Ball circuit quantity		2 × 1.5	2	3	3	3	
Ratio	RV		1 : 1	1 : 1	1 : 1.33	1 : 1.4	1 : 1.04	1 : 1.07
	RN		1 : 2	1 : 2	1 : 2.15	1 : 2.13	1 : 2	1 : 1.94
	RL		–	–	1 : 3	1 : 2.83	1 : 2.92	1 : 2.93
Linear travel [mm] for 1 input shaft turn	Ratio	RV1	12.7 (RV2)	5	3.75	3.57	4.8	5.62
		RN1	6.35 (RN2)	2.5	2.32	2.34	2.5	3.09
		RL1	–	–	1.67	1.76	1.71	2.05
Weight (referred to actuator 100 mm stroke length, with lubricant, without motor)	[kg]		2.2	2.2	3.3	5	8	11
Extra-weight for each additional 100 mm stroke length	[kg]		0.3	0.3	0.3	0.5	0.8	0.9

(1) Values based on estimated ball screw lifetime of at least 2000 hours under load, without shocks or vibrations.