

ELECTRIC AXIS - RODLESS SERIES ELEKTRO SK



Electric axis without screw piston rod, with V-Lock interface.

The cylinder frame is made of anodized extruded solid aluminium, which gives the cylinder optimal torsional and flexural rigidity. The typical V-Lock dovetail is provided on three sides of the channel for easy fixing with QS elements.

The carriage features an interchangeable fixing interface plate, which is available with V-Lock axial or V-Lock orthogonal ports or in the blank type for custom solutions.

The carriage is driven by two sturdy pre-loaded ball recirculation bearings that ensure great accuracy of movement.

Threaded holes for the lubrication of the guides and ball recirculation screws are provided on both sides of the carriage.

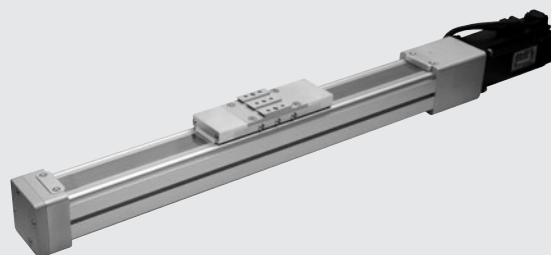
The carriage is driven by a system consisting of a hardened and tempered screw and a ball recirculation lead nut. The screw is pre-stressed with an elastic load device by means of cup springs in order to reduce vibration and hence noise level and the useful life of the system.

A series of slots for the fixing of magnetic sensors are provided on the two sides of the liner.

Various BRUSHLESS and STEPPING motor drives are available with optional motor brake and/or built-in encoder.

The cylinder can also be supplied without motor drive or, on request, with modules for interfacing with motors from the trade.

The motors can be installed in line with the liner or geared using toothed belt transmission gears.



TECHNICAL DATA		
Admissible ambient temperature for STEPPING motor	°C	from -10 to +50
BRUSHLESS motor	°C	from 0 to +40
Maximum relative humidity (IP40)		90% at 40°C; 57% at 50°C (no condensate)
Maximum duty cycle for STEPPING motor		50%
BRUSHLESS motor		100%
Minimum stroke	mm	100
Maximum stroke	mm	1200
Positioning repeatability	mm	± 0.02
Positioning accuracy	mm	± 0.2 **
Uncontrolled impact at the end of stroke		NOT ALLOWED (it provides an extra-stroke minimum 5 mm)
Sensor magnet		YES
Work position		Any
Interface for fixing on carriage		Axial V-Lock / Orthogonal V-Lock / Blank
Noise level	dBA	<66
** indicative average data that gets influenced by various factors such as the stroke, the type of motor, the cylinder version, etc ...		

MECHANICAL FEATURES			
Worm screw pitch	mm	4	10
Worm screw diameter	mm		12
Maximum static axial load* (F ₀)	N		2800
Dynamic axial load	N	5200	3600
Maximum number of revs	1/min	3000	4000
Maximum speed (V _{max})	mm/s	200	670
Maximum acceleration without load	m/s ²		5
Maximum drive torque applicable to the worm screw shank	Nm		5

* Maximum admissible static load without causing damage.

N.B.: For the verification of the linear guide system, please refer to page A5.125. For the verification of the screw, please refer to page A5.126

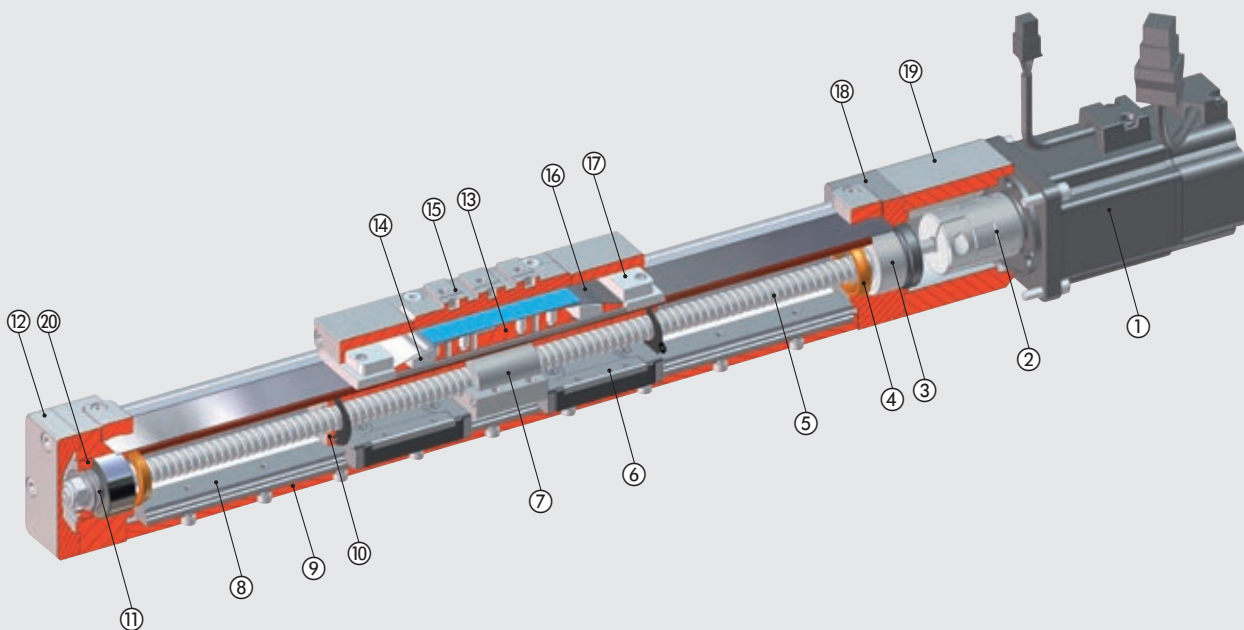
WEIGHTS			
Worm screw pitch (p)	mm	4	10
Weight at stroke 0 (excluding the carriage fixing interface)	g	2990	3000
Additional weight each mm of stroke	g		7
Weight of the in-line transmission (without motor)	g		400
Weight of the geared transmission (without motor)	g		600
Moving mass	g		1050
N.B.: You get the total weight of a complete cylinder by adding: weight stroke 0 + stroke [mm] x weight for each mm of stroke + weight of the transmission + weight of the motor			

MASS MOMENTS OF INERTIA

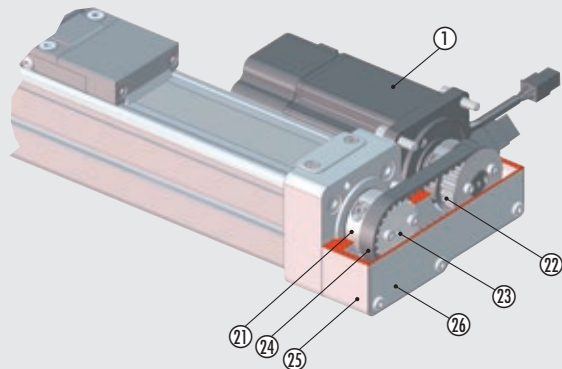
Worm screw pitch	mm	4	10
J0 at stroke 0	kg mm ²	2.7909	5.3633
J1 each metre of stroke	kg mm ² /m	12.0259	17.3353
J2 each kg of load	kg mm ² /kg	0.4056	2.5355
J3 in-line transmission	kg mm ²		5.2
J3 geared transmission	kg mm ²		19
Total mass moment o inertia Jtot = J0 + J1 · stroke [m] + J2 · load [kg] + J3			

COMPONENTS

ELECTRIC AXIS WITH IN-LINE MOTOR

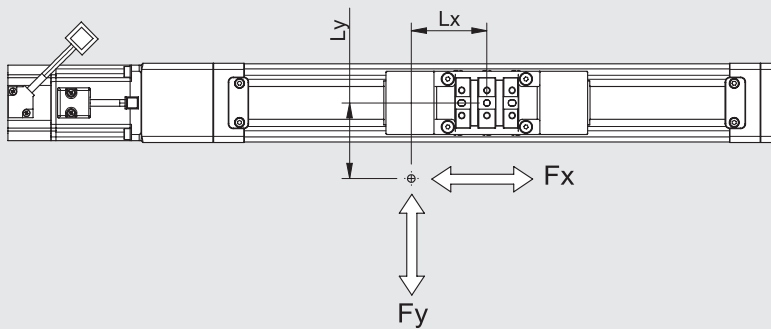
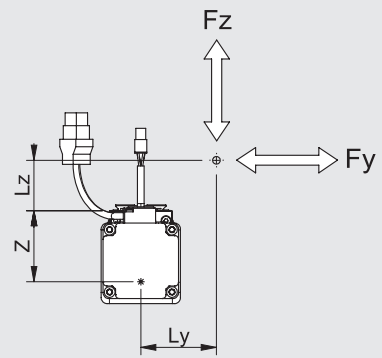
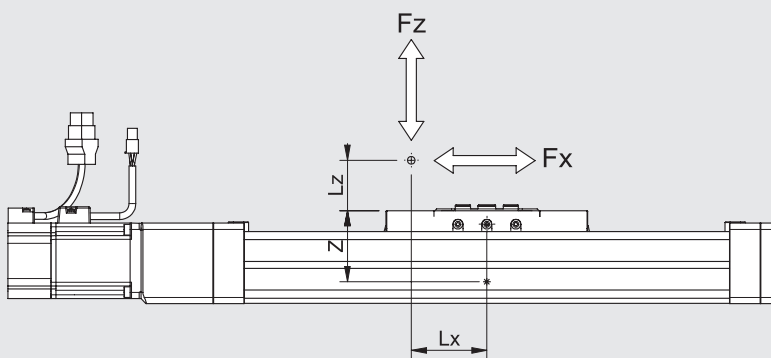
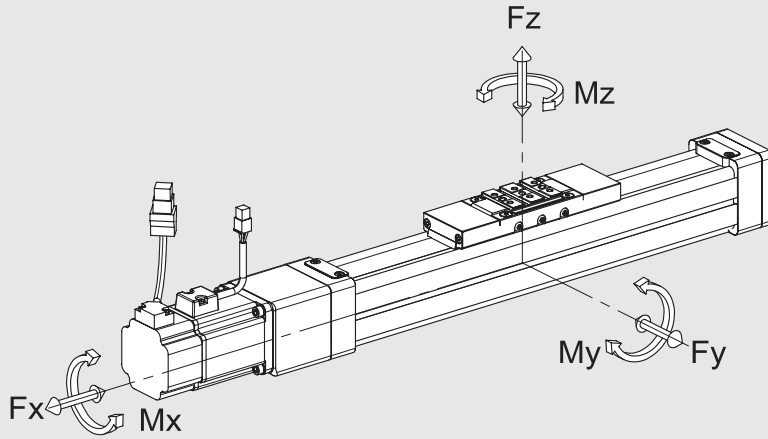


ELECTRIC AXIS WITH GEARED MOTOR



- ① MOTOR
- ② ELASTIC COUPLING: aluminium / polyurethane
- ③ DOUBLE-ROW ANGULAR BALL BEARING
- ④ BUFFER: polyurethane
- ⑤ RECIRCULATING BALL SCREW: hardened steel
- ⑥ BALL RECIRCULATION PAD: stainless steel / technopolymer
- ⑦ RECIRCULATING BALL SCROLL: hardened steel
- ⑧ RAIL: hardened steel
- ⑨ CYLINDER LINER: anodized aluminium
- ⑩ CARRIAGE LIMIT SWITCH: anodized aluminium
- ⑪ PRETENSIONING CUP SPRING: hardened steel
- ⑫ HEAD COVER: anodized aluminium
- ⑬ CARRIAGE BODY: anodized aluminium
- ⑭ LOWER STRAP PAD: technopolymer
- ⑮ INTERFACE FOR FIXING: anodized aluminium
- ⑯ PROTECTIVE STRAP: stainless steel
- ⑰ UPPER STRAP PAD: technopolymer
- ⑱ HEAD: anodized aluminium
- ⑲ MOTOR BEARING: anodized aluminium
- ⑳ BEARING LOCKING RING NUT: zinc-plated steel
- ㉑ ELASTIC COLLAR: aluminium
- ㉒ DRIVE GEAR PULLEY: aluminium
- ㉓ DRIVEN GEAR PULLEY: aluminium
- ㉔ TOOTHED TRANSMISSION BELT: reinforced rubber
- ㉕ GEARED MOTOR BEARING: aluminium
- ㉖ TRANSMISSION GUARD: aluminium

DIAGRAM OF FORCES AND MOMENTS



STATIC VERIFICATION

When the cylinder is subjected simultaneously to torque and force, keep to the following equations, where the lengths have to be given in metres.

Z [mm]	Fy0 max [N]	Fz0 max [N]	Mx0 max [Nm]	My0 max [Nm]	Mz0 max [Nm]
57	4500	4500	70	450	450

N.B.: The values in the table relates to the maximum admissible loads beyond which serious damage is likely to occur.

$$M_x = F_z \cdot l_y + F_y \cdot (L_z + z) \quad M_y = F_z \cdot L_x + F_x \cdot (L_z + z) \quad M_z = F_y \cdot L_x + F_x \cdot l_y$$

$$\frac{(M_x)}{M_{x0 \max}} + \frac{(M_y)}{M_{y0 \max}} + \frac{(M_z)}{M_{z0 \max}} + \frac{(F_y)}{F_{y0 \max}} + \frac{(F_z)}{F_{z0 \max}} \leq 1$$

DYNAMIC VERIFICATION

When the cylinder is subjected simultaneously to torque and force, keep to the following equations, where the lengths have to be given in metres.

Z [mm]	Fy max [N]	Fz max [N]	Mx max [Nm]	My max [Nm]	Mz max [Nm]
57	2500	2500	35	250	250

N.B.: The values are calculated on the basis of theoretical useful life of 10000 km.

$$M_x = F_z \cdot l_y + F_y \cdot (L_z + z) \quad M_y = F_z \cdot L_x + F_x \cdot (L_z + z) \quad M_z = F_y \cdot L_x + F_x \cdot l_y$$

$$\frac{(M_x)}{M_{x \max}} + \frac{(M_y)}{M_{y \max}} + \frac{(M_z)}{M_{z \max}} + \frac{(F_y)}{F_{y \max}} + \frac{(F_z)}{F_{z \max}} \leq 1$$

CALCULATION OF MEAN AXIAL LOAD F_m AND VERIFICATION

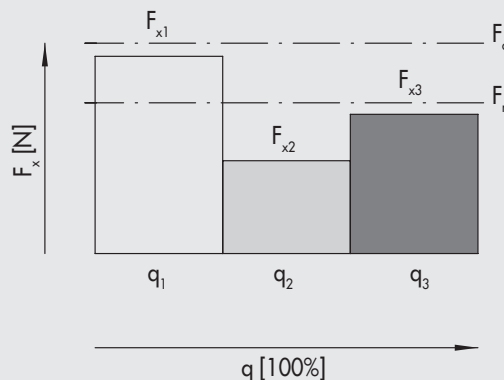
Peak axial load in a work cycle must not exceed the static axial load F_o . The peak value is usually achieved during upward acceleration in vertical installation. Exceeding this value leads to greater wear and hence shorter life of the recirculating ball screw.

Mean axial load F_m

$$F_m = \sqrt[3]{\sum F_x^3 \times \frac{V_x}{V_m} \times \frac{q}{100}} =$$

$$F_m = \sqrt[3]{F_{x1}^3 \times \frac{V_{x1}}{V_m} \times \frac{q_1}{100} + F_{x2}^3 \times \frac{V_{x2}}{V_m} \times \frac{q_2}{100} + F_{x3}^3 \times \frac{V_{x3}}{V_m} \times \frac{q_3}{100} + \dots}$$

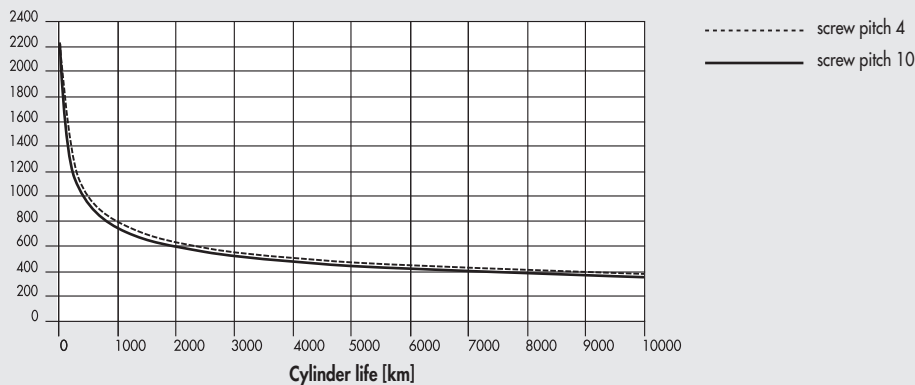
- F_x = Axial load at stage x
- F_m = Mean axial load during extension
- F_o = Static axial load
- q = Time segment
- V_x = Speed in the phase x
- V_m = Average speed



The mean axial load must not exceed the dynamic axial load: $F_m \leq F$
 The graph below shows the lifecycle of the screw as a function of F_m

LIFE CHARACTERISTICS AS A FUNCTION OF THE MEAN AXIAL LOAD

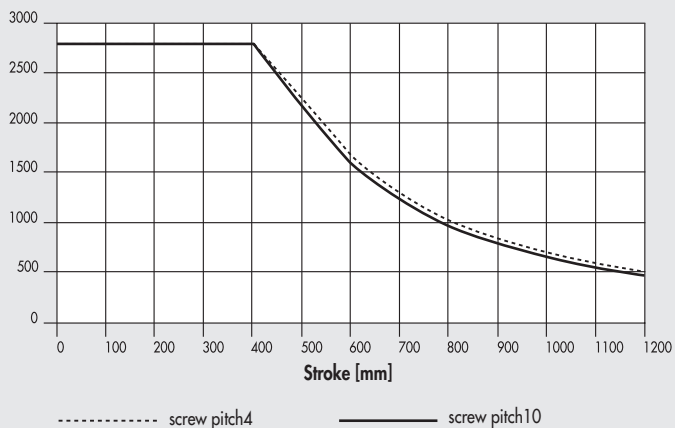
Mean axial load [N]



MAXIMUM AXIAL LOAD

The two variables (axial load and stroke) must comply with the conditions indicated in the graph, otherwise this could cause a serious damage.

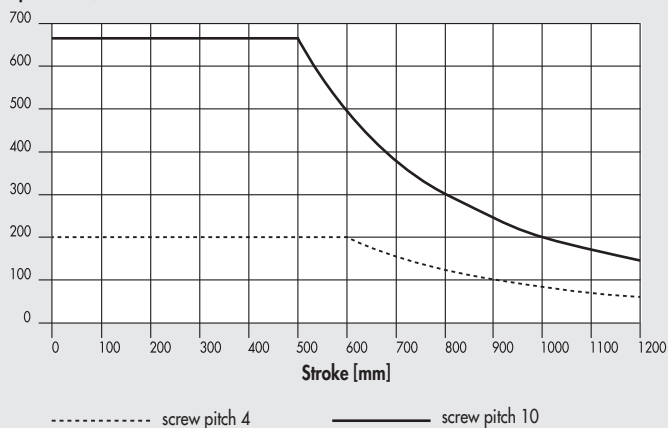
Axial load [N]



CRITICAL SPEED

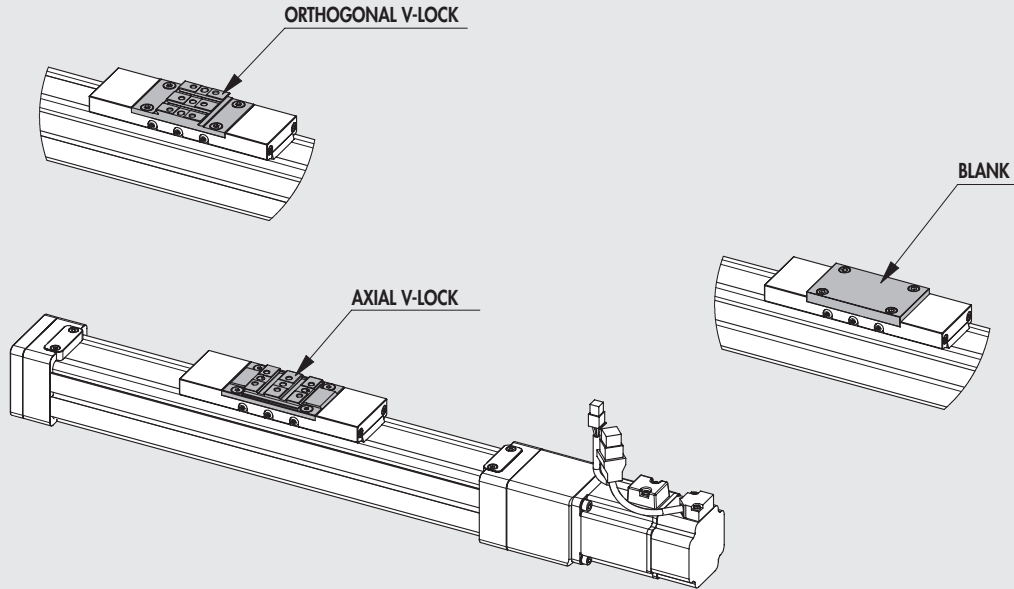
The two variables (axial load and stroke) must comply with the conditions indicated in the graph, otherwise this could trigger resonance phenomena that could impair the good functioning of the system.

Speed [mm/s]

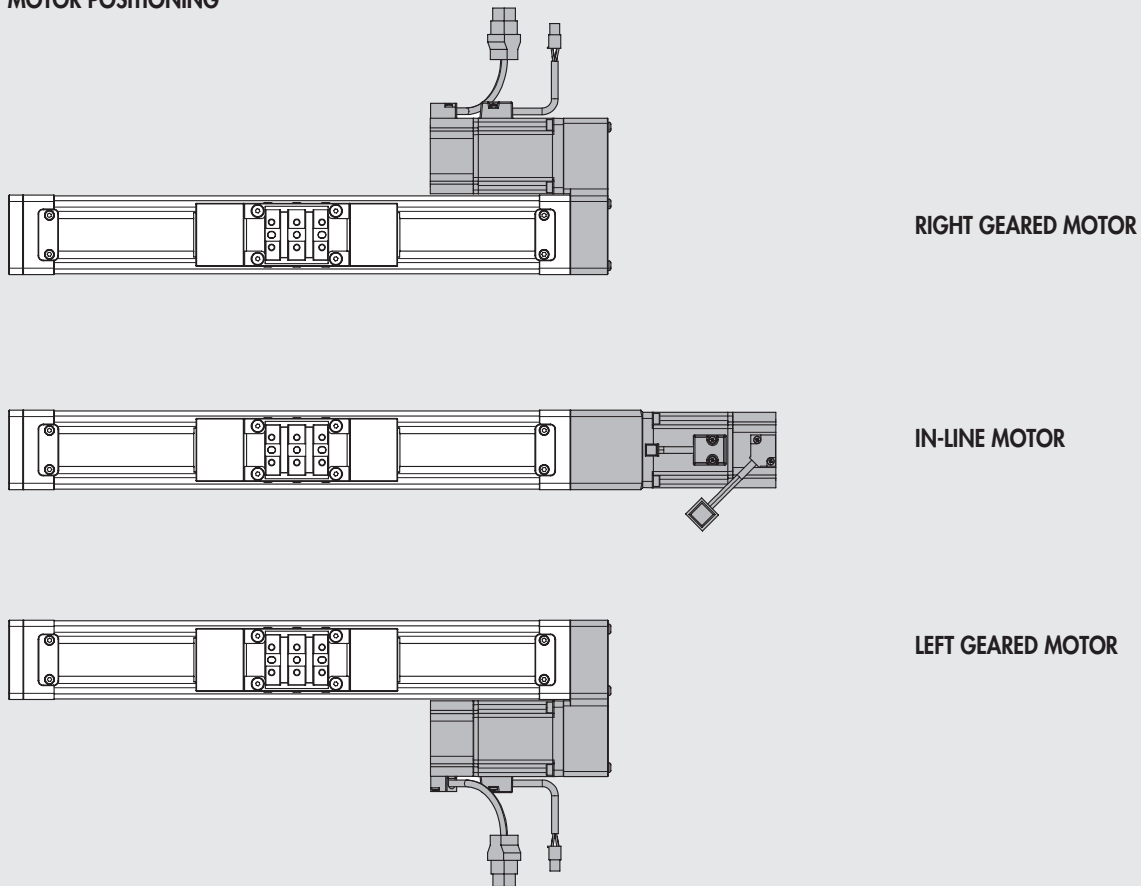


VERSIONS

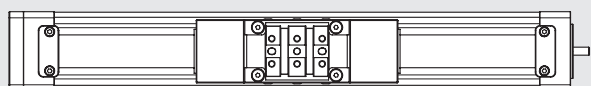
TYPE OF CARRIAGE INTERFACE



MOTOR POSITIONING



VERSION WITHOUT MOTOR



AXIAL LOAD CURVES AS A FUNCTION OF SPEED (CYLINDER COMPELTE WITH MOTOR AND DRIVE)

N.B.: Check that the following constraints are met for each cycle phase:

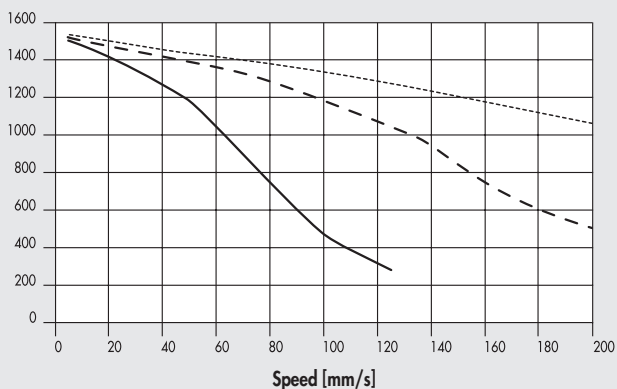
- the maximum movable masses and related acceleration values specified in the data sheets;
- the values specified in the force and moment calculation diagram (including moment of inertia);
- calculation of average axial load and peak axial load.

N.B.: The obtainable load values already take the efficiency of the system into account. For STEPPING motors, with the motor off, the drive current is automatically reduced by 50% to prevent overheating. Consequently, available axial load with the motor stopped is also reduced by 50%.

STEPPING motor code 37M1120001 (uprated revs)

Electric axis with a 4 mm-pitch screw

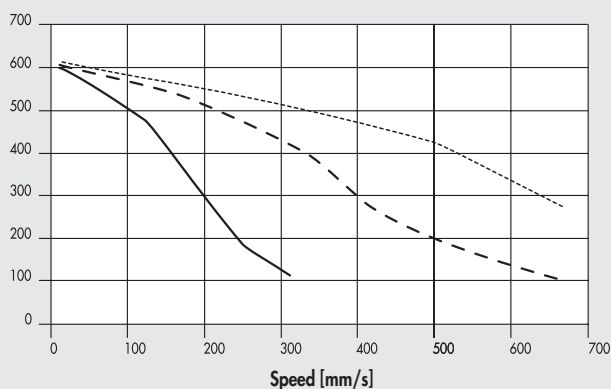
Axial load [N]



———— 24VDC - - - - 48VDC ······ 75VDC

Electric axis with a 10 mm-pitch screw

Axial load [N]

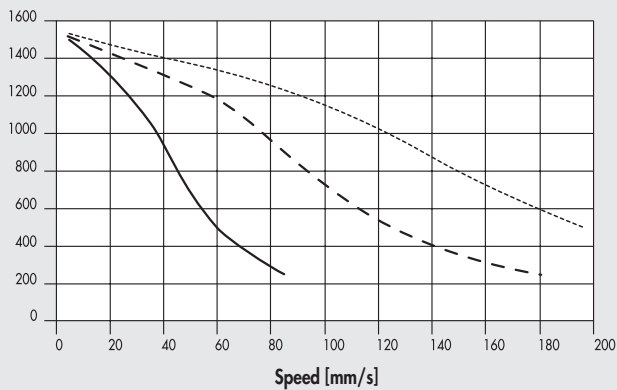


———— 24VDC - - - - 48VDC ······ 75VDC

STEPPING motor code 37M5120000 (with brake)

Electric axis with a 4 mm-pitch screw

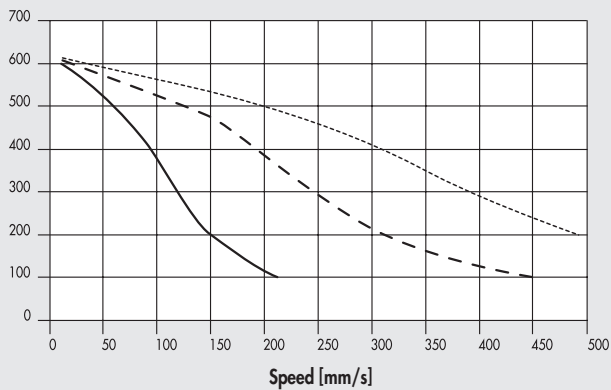
Axial load [N]



———— 24VDC - - - - 48VDC ······ 75VDC

Electric axis with a 10 mm-pitch screw

Axial load [N]

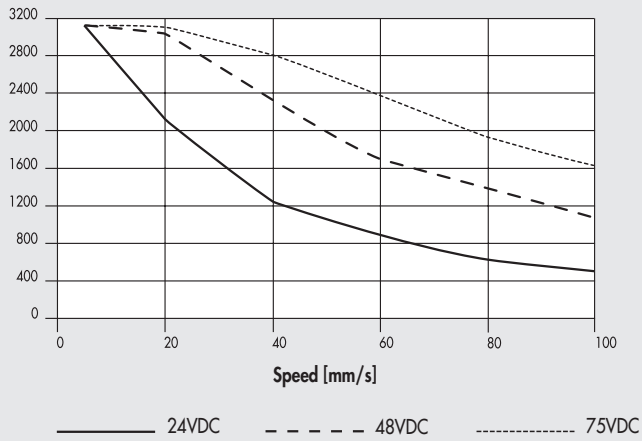


———— 24VDC - - - - 48VDC ······ 75VDC

STEPPING motor code 37M3230000 (with brake + encoder)

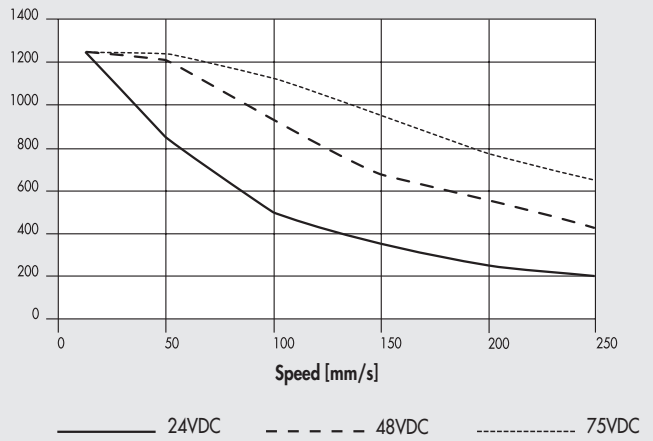
Electric axis with a 4 mm-pitch screw

Axial load [N]



Electric axis with a 10 mm-pitch screw

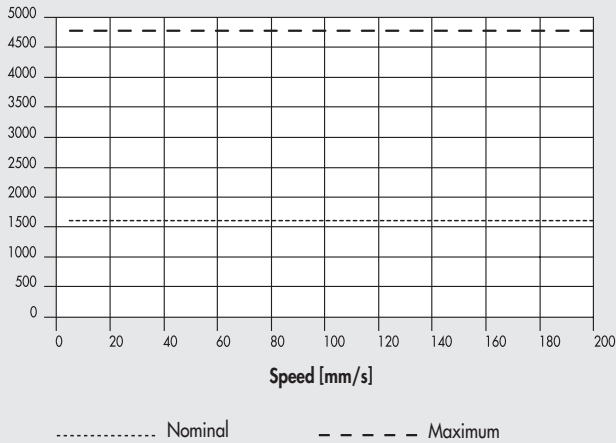
Axial load [N]



BRUSHLESS motors code 37M2220001 and code 37M4220001 (with brake)

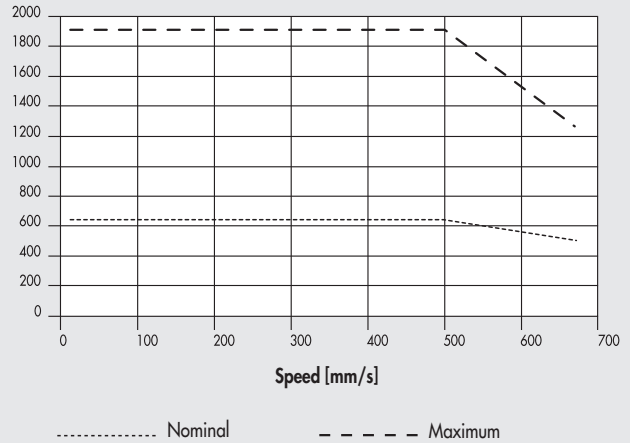
Electric axis with a 4 mm-pitch screw

Axial load [N]

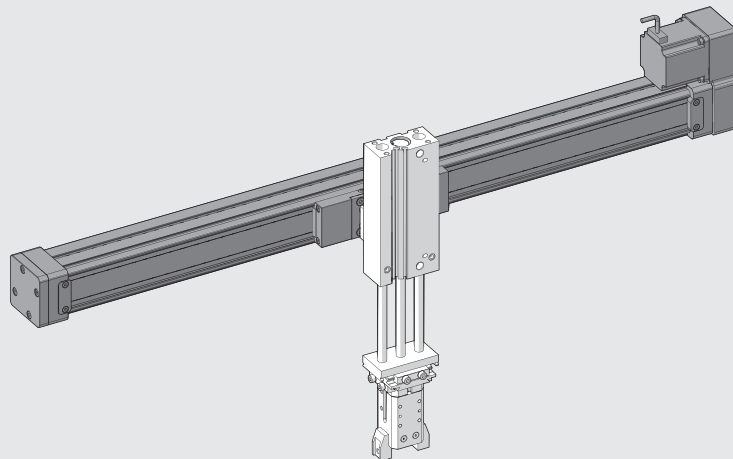


Electric axis with a 10 mm-pitch screw

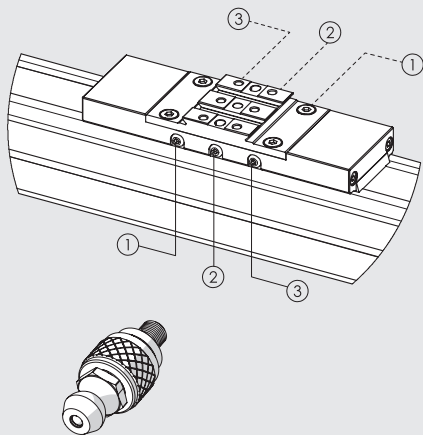
Axial load [N]



EXAMPLES OF APPLICATION



LUBRICATION DIAGRAM



The actuator is provided with a series of sealing passages - made in the carriage - which directly connect the lubrication points of the sliding blocks and of the ball bearing screw nut with the outside.

The lubrication points are 3, on both sides of the carriage, in order to ensure greater accessibility in case of maintenance, closed by M4 screws, so identified:

- ① Lubrication point for the left ball bearing sliding block.
- ② Lubrication point for the ball bearing screw nut.
- ③ Lubrication point for the right ball bearing sliding block.

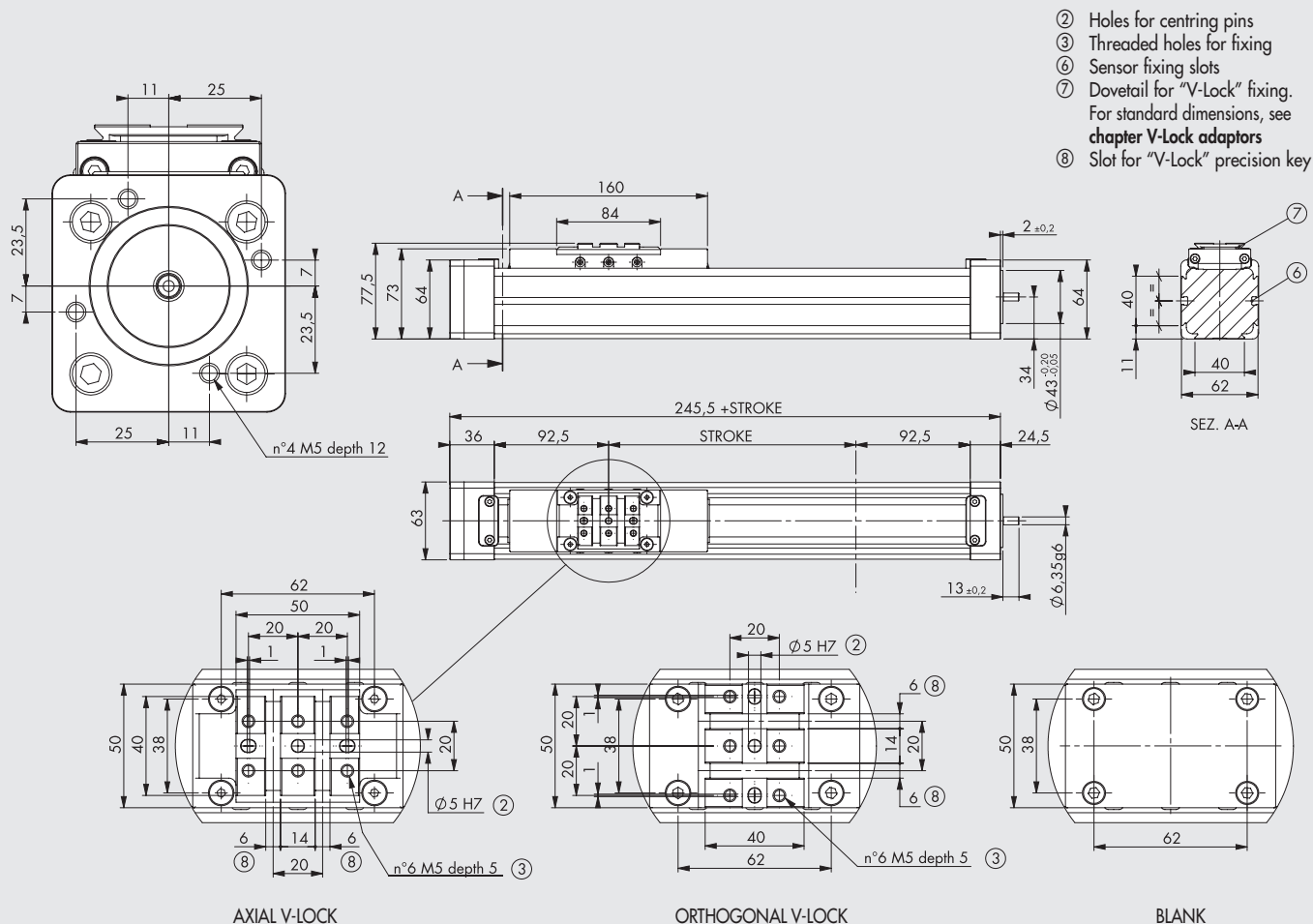
It is recommended to use the provided accessory (code 0950T2R108), which has spherical head according to UNI 7663 A and RHEOLUBE 363 AX1 grease (code 9910506).

Once you identify the most accessible side on the carriage:

- Unscrew the screw that closes the grease nipple.
- Screw, in the same thread, the provided accessory (0950T2R108).
- Pump grease (code 9910506) using the suitable lubricator according to the quantity in table.
- Let the actuator effect 4 complete strokes.
- Repeat the last two operations.
- Remove the grease nipple and stop the thread.
- Switch to the next lubrication point.
- The operation of re-greasing will have to be repeated at least once a year.

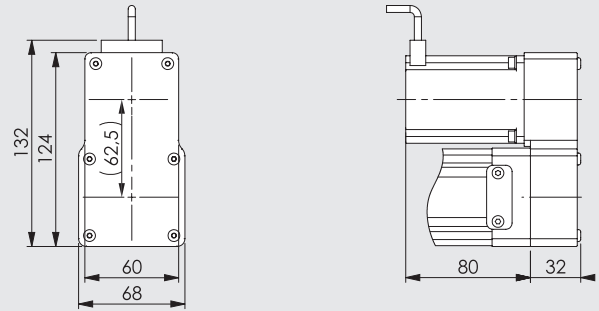
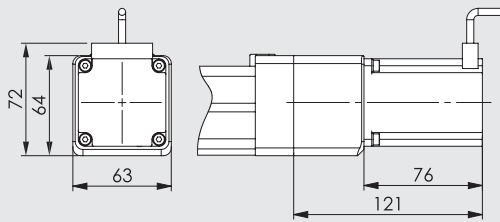
		① - ③	②	
Screw pitch (p)	mm	-	4	10
Relube grease quantity	g	0.7	0.3	0.5
	cc	0.61	0.26	0.43

DIMENSIONS ELECTRIC AXIS (WITHOUT MOTOR)



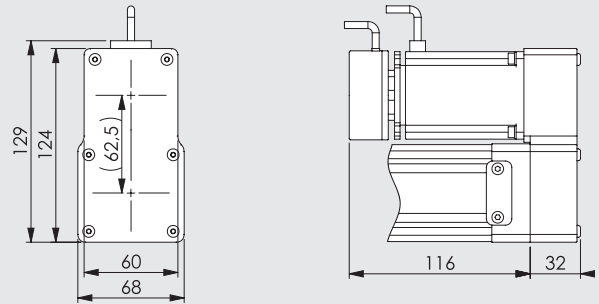
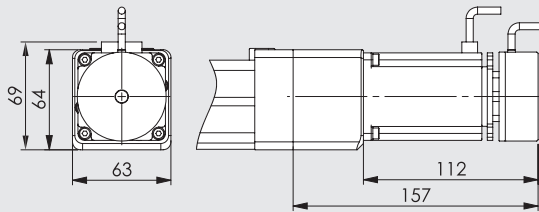
ELECTRIC AXIS DIMENSIONS WITH STEPPING MOTOR

Overall dimensions referring to versions with standard drive.
The geared motor versions represent right-hand positioning, the overall dimensions apply to left-hand positioning as well.



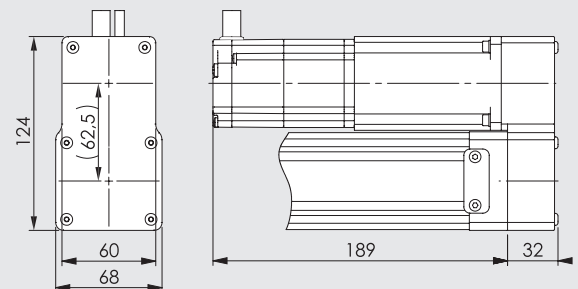
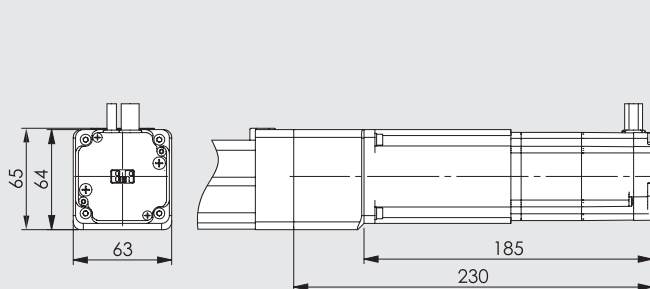
Code of electric axis complete with IN-LINE motor	Code of motor mounted on the electric axis
37302_ 21121	37M1120001

Code of electric axis complete with		Code of motor mounted on the electric axis
LEFT GEARED MOTOR	RIGHT GEARED MOTOR	
37302_ 91121	37302_ 61121	37M1120001



Code of electric axis complete with IN-LINE motor	Code of motor mounted on the electric axis
37302_ 25120	37M5120000

Code of electric axis complete with		Code of motor mounted on the electric axis
LEFT GEARED MOTOR	RIGHT GEARED MOTOR	
37302_ 95120	37302_ 65120	37M5120000



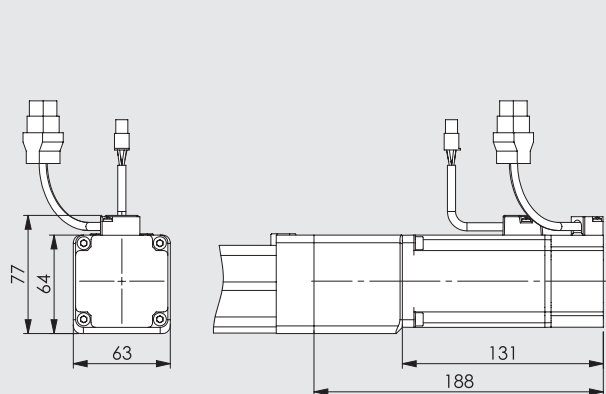
Code of electric axis complete with IN-LINE motor	Code of motor mounted on the electric axis
37302_ 23230	37M3230000

Code of electric axis complete with		Code of motor mounted on the electric axis
LEFT GEARED MOTOR	RIGHT GEARED MOTOR	
37302_ 93230	37302_ 63230	37M3230000

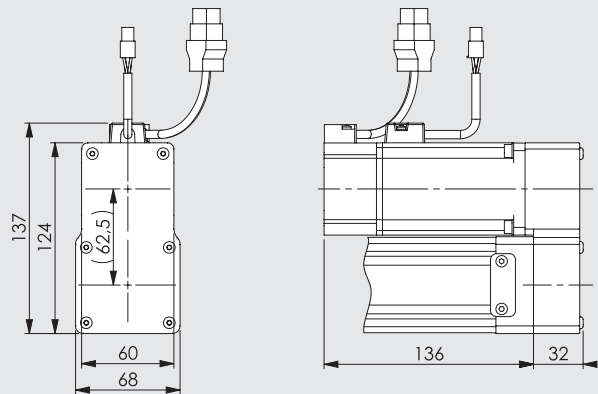
ELECTRIC AXIS DIMENSIONS WITH BRUSHLESS MOTOR

Overall dimensions referring to versions with standard drive.

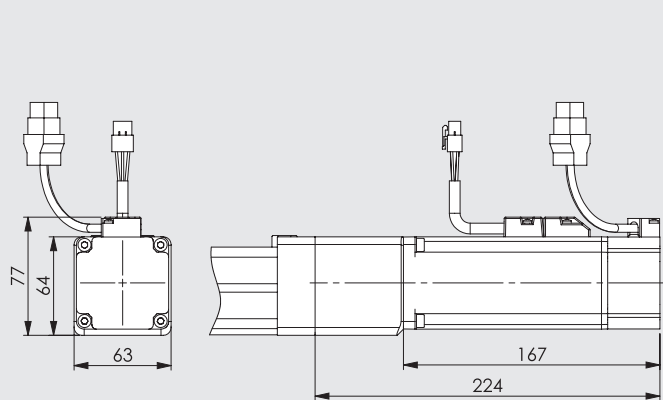
The geared motor versions represent right-hand positioning, the overall dimensions apply to left-hand positioning as well.



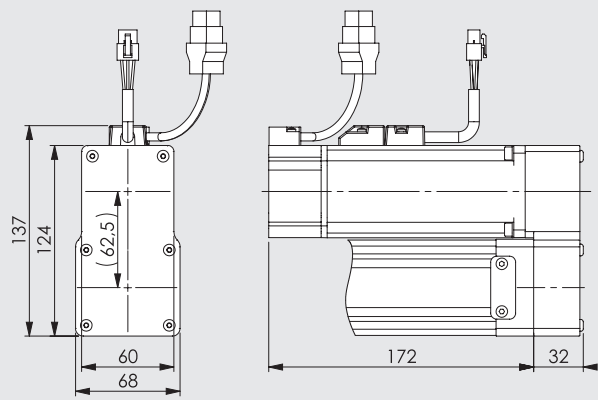
Code of electric axis complete with IN-LINE motor	Code of motor mounted on the electric axis
37302_22220	37M2220001



Code of electric axis complete with		Code of motor mounted on the electric axis
LEFT GEARED MOTOR	RIGHT GEARED MOTOR	
37302_92220	37302_62220	37M2220001



Code of electric axis complete with IN-LINE motor	Code of motor mounted on the electric axis
37302_24220	37M4220001



Code of electric axis complete with		Code of motor mounted on the electric axis
LEFT GEARED MOTOR	RIGHT GEARED MOTOR	
37302_94220	37302_64220	37M4220001

NOTES

MOTOR-DRIVE COUPLINGS



MOTOR CODES		DRIVES CODES				
Metal Work	Manufacturer	Metal Work Manufacturer	37D1222000 * RTA CSD 94 (4.4A 24-48VDC)	37D1332000 * RTA NDC 96 (6A 24-75VDC)	37D1442000 RTA PLUS A4 (6A 77-140VDC)	37D1552000 RTA PLUS B7 (10A 28-62VAC) ●
STEPPING MOTORS						
37M1120001	SANYO DENKI 103-H7126-6640 (5.6A 75V max)		-	√	-	√ ■
STEPPING MOTORS WITH BRAKE						
37M5120000	SANYO DENKI 103-H7126-1710.B (4A 75V max)		√	√ ◆	-	√ ■
STEPPING MOTORS WITH BRAKE + ENCODER						
37M3230000	B&R 80MPF5.500D114-01 (5A 80V max)		-	√ ◆	√ ■	√ ■

* In all applications requiring motor powered up to 6A / 55VDC, the programmable drive e.drive, code 37D1332002, can be used.

◆ Important! Limit current

■ Important! Limit current and voltage

● Important! AC drive to continuous voltage VDC VDC = VAC · √2

MOTOR CODES		DRIVES CODES	
Metal Work	Manufacturer	Metal Work	Manufacturer
		37D2300000	DELTA ASD-A2-0421-M (400W)
BRUSHLESS MOTORS			
37M2220001	DELTA ECMA-C20604RS (400W)		√
BRUSHLESS MOTORS WITH BRAKE			
37M4220001	DELTA ECMA-C20604SS (400W)		√

KEY TO CODES AXIS ELECTRIC (WITHOUT MOTOR)

CYL	37	3	0	2	1	0300	1
	TYPE			SIZE	CARRIAGE TYPE	STROKE	SCREW PITCH
	37 Electric actuators	3 Electric axis rodless elektro SK	0 STD	2 Size 2	1 Axial V-lock 2 Orthogonal V-lock 3 Blank	From 100 to 1200 mm	1 Screw pitch 4 4 Screw pitch 10

KEY TO CODES AXIS ELECTRIC MOTOR

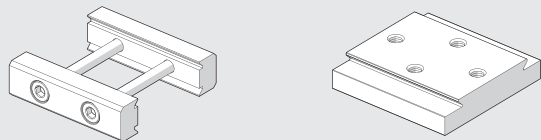
CYL	37	3	0	2	1	0300	1	2	DRIVE			
									1	1	2	0
	TYPE			SIZE	CARRIAGE TYPE	STROKE	SCREW PITCH	VERSION	MOTOR	FLANGE	TORQUE	
	37 Electric actuators	3 Electric axis rodless elektro SK	0 STD	2 Size 2	1 Axial V-lock 2 Orthogonal V-lock 3 Blank	From 100 to 1200 mm	1 Pitch 4 4 Pitch 10	● 2 In-line IP20/IP40 ● 6 Geared IP20/IP40 right ● 9 Geared IP20/IP40 left	1 STEPPING 2 BRUSHLESS 3 STEPPING with BRAKE + Encoder 4 BRUSHLESS with BRAKE 5 STEPPING with BRAKE without Encoder	1 NEMA 23 2 60	2 1.2 - 2.19 Nm 3 2.2 - 3 Nm	0 Base rpm 1 Greater rpm

● Version IP40 available for all STEPPING and BRUSHLESS motors, with the exception of motor code 37M5120000 which it is IP20.

N.B.: The Orderable configurations are shown on the previous pages.

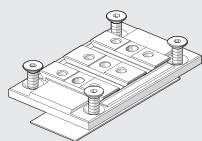
ACCESSORIES

FIXING ELEMENTS



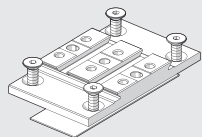
See V-Lock family.

CARRIAGE INTERFACE KIT



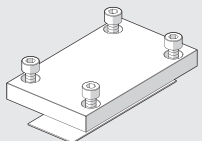
Code	Description	Weight [g]
0950T2R016K	V-Lock axial interface kit	95

Note: supplied complete with 4 screws, 1 adhesive pad



0950T2R017K	V-Lock orthogonal interface kit	91
-------------	---------------------------------	----

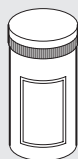
Note: supplied complete with 4 screws, 1 adhesive pad



0950T2R015	BLANK interface kit	127
------------	---------------------	-----

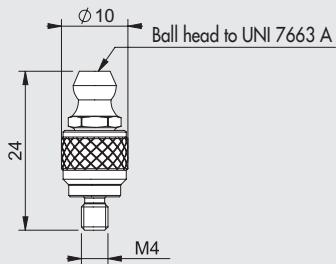
Note: supplied complete with 4 screws, 1 adhesive pad

GREASE



Code	Description	Weight [g]
9910506	Tube of RHEOLUBE 363 AX1 grease	400


GREASE NIPPLE




Code	Description
0950T2R108	Complete grease nipple for Elektro rodless SK cylinders

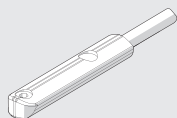
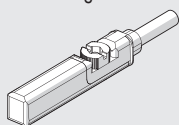
Note: Individually packed

RETRACTABLE SENSOR

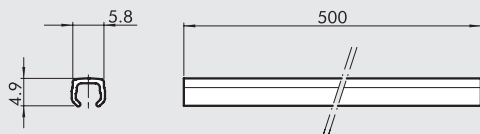
SENSOR, SQUARE TYPE 
Latest generation,
secure fixing

SENSOR, OVAL TYPE 
Traditional

For codes and technical data, see **chapter A6**.



BAR FOR GROOVING




Code	Description
W0950000160	Bar for grooving L = 500 mm

Note: The code corresponds to 1 piece.

Note: It is a plastic strap acting as dirt barrier and/or sensor wire protector to be fitted snugly into the section grooves.

DRIVES




For motor-drive couplings see table on page [A5.133](#) 

SPARE PARTS

ELECTRIC MOTORS



For motor-drive couplings see table on page [A5.133](#) 

NOTES