ELECTRIC AXIS
SERIES ELEKTRO SHAK

Belt-driven rodless electric cylinder with V-Lock type interface.
The cylinder structure features a sturdy anodized aluminium extruded profile to ensure optimal rigidity. The typical V-Lock dovetail (no grooves) is provided for easy installation using QS elements. The V-Lock interface with a dovetail and standard grooves is mounted on the moving plate to fix the other components using K or QS elements. The slide is moved by means of adjustable casters running along hardened and tempered guides inserted into the extruded profile, to obtain a rigid system with adjustable clearance. Guide lubrication nipples are also mounted on the slide plate. The slide is driven by a reinforced belt that is in turn operated by a pulley keyed onto the motor; a mechanical belt-tensioning system is mounted on the cylinder.
Different drives are available, both brushless and stepping. The versions with a brushless motor can be equipped with a 1:3 speed gearbox, when you want to make the most of the available torque.
In addition to the standard drives included in the catalogue, custom cylinder can also mount other types of motor. The homing position is identified by a inductive sensor included in the supply.
Two different size are available, SHAK 340 and SHAK 470, with pre-set standard strokes. For each size it is possible to choose side on which to mount the motor (4 positions). A version with a smooth tree-type output, mounted in a pre-set position, is also available. The SHAK cylinder can be mounted both horizontally and vertically. With vertical installation, it is advisable to use motors with a holding brake that only activates in the event of a power failure but not when there is a motor overload. For the correct operation of the brake, it is necessary to meet the limits required by the axial load curves according to the speed. Among the accessories available there is a cable guiding system with a handy cable channel and bracket.

SHAK 340

SHAK 470

TECHNICAL DATA		SHAK 340	SHAK 470
WITH STEPPING MOTORS			
Ambient temperature	°C	from -10 to +50	
Maximum relative humidity		90% at 40°C / 57% at 50°C (no condensate)	
Maximum value of duty cycle		50%	
Maximum value of axial force available (with Metal Work motors)			
without brake	N	150	250
with brake	N	180	250
Maximum speed without load			
without brake and without gearbox	m/s	2.5	2
with brake and without gearbox	m/s	2	2
Maximum acceleration without load	m/s^2	50	50
Maximum admissible mass	kg	5	7.5
WITH BRUSHLESS MOTORS			
Ambient temperature	°C	from 0 to +40	
Maximum relative humidity		90% (no condensate)	
Maximum value of duty cycle		100%	
Maximum value of axial force available (with Metal Work motors)			
without gearbox	N	70	80
with gearbox	N	600	700
Maximum speed without load			
without gearbox	m/s	5	5
with gearbox	m/s	2.4	2.7
Maximum acceleration without load	m/s^2	50	50
Maximum admissible mass			
without gearbox, vertical orientation	kg	3	3
with gearbox, vertical orientation	kg	15	25
without gearbox, horizontal orientation	kg	5	5
with gearbox, horizontal orientation	kg	15	25

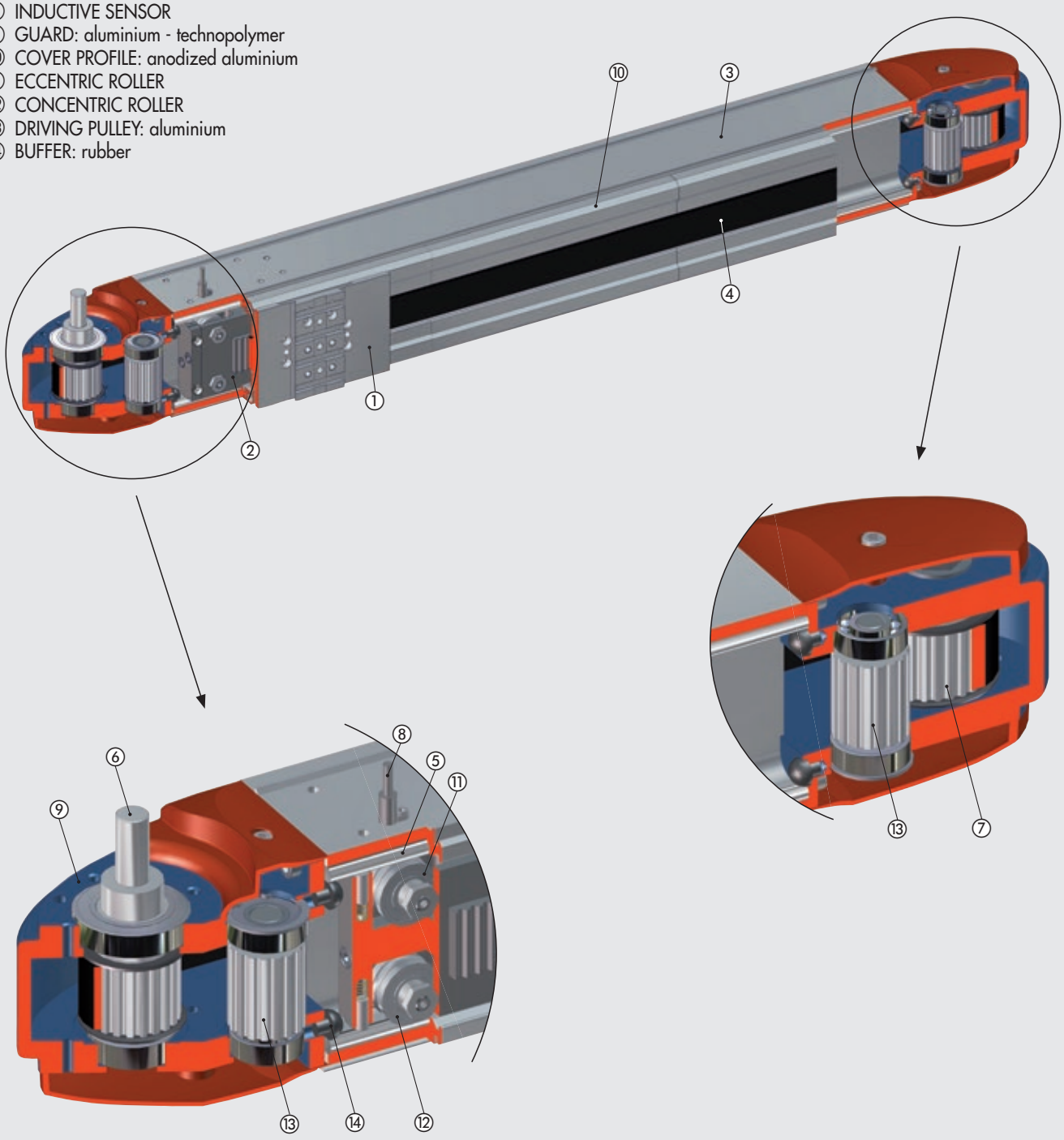
METAL WORK PNEUMATIC

MECHANICAL CHARACTERISTICS		SHAK 340	SHAK 470
Maximum movable mass	kg	15	25
Maximum speed (empty)	m/s	5	5
Maximum acceleration (empty)	m/s^2	50	50
Maximum axial force	N	800	1000
Maximum force applicable on the pulley	Nm	15	25
Standard strokes (special execution on request)	mm	400	800
		600	1200
		800	1600
		1000	2000
		1200	2400
Repetition accuracy	mm	±0.05	
Noise level	dBA	<66	
Mounting position		Any	
Protection level		IP30	
Toothed belt pitch	mm	5	
Type of belt		PowerGrip® LL GT 5MR 25 FV	PowerGrip® LL GT 5MR 30 ST
Belt elongation at maximum load		0.15%	0.25%
Pulley pitch diameter	mm	35.01	44.56
Stroke / Revolution	mm/rev	110	140
Homing position sensor		Inductive sensor switch	

MASS AND MOMENT OF INERTIA		SHAK 340	SHAK 470
Weight without motor	kg	7.7 (stroke 400)	15.9 (stroke 800)
		9 (stroke 600)	19.8 (stroke 1200)
		10.4 (stroke 800)	23.6 (stroke 1600)
		11.7 (stroke 1000)	27.5 (stroke 2000)
		13 (stroke 1200)	31.2 (stroke 2400)
Motor weight	kg		
Stepping motor without brake		2.5	4.2
Stepping motor with brake		3.7	4.5
Brushless motor without brake		1.3	2.6
Brushless motor with brake		1.7	2.2
Moving mass	kg	1.28 (stroke 400)	2.18 (stroke 800)
		1.32 (stroke 600)	2.28 (stroke 1200)
		1.36 (stroke 800)	2.38 (stroke 1600)
		1.40 (stroke 1000)	2.48 (stroke 2000)
		1.44 (stroke 1200)	2.58 (stroke 2400)
Gearbox weight	kg	0.8	4
Reduced inertia at motor (without load)	$kg\ mm^2$		
Versions without gearbox (without motor)		451 (stroke 400)	1414 (stroke 800)
		462 (stroke 600)	1467 (stroke 1200)
		474 (stroke 800)	1521 (stroke 1600)
		485 (stroke 1000)	1574 (stroke 2000)
		497 (stroke 1200)	1627 (stroke 2400)
Versions with gearbox (without motor)		58 (stroke 400)	216 (stroke 800)
		59 (stroke 600)	222 (stroke 1200)
		61 (stroke 800)	228 (stroke 1600)
		62 (stroke 1000)	234 (stroke 2000)
		63 (stroke 1200)	240 (stroke 2400)

COMPONENTS

① INTERFACE PLATE: anodized aluminium
② SLIDE: aluminium
③ BODY: anodized aluminium
④ TOOTHED TRANSMISSION BELT: loaded polychloroprene (CR)
⑤ HARDENED GUIDE: hardened ground chromed steel
⑥ DRIVE PULLEY: steel
⑦ IDLE PULLEY: aluminium
⑧ INDUCTIVE SENSOR
⑨ GUARD: aluminium - technopolymer
⑩ COVER PROFILE: anodized aluminium
⑪ ECCENTRIC ROLLER
⑫ CONCENTRIC ROLLER
⑬ DRIVING PULLEY: aluminium
⑭ BUFFER: rubber

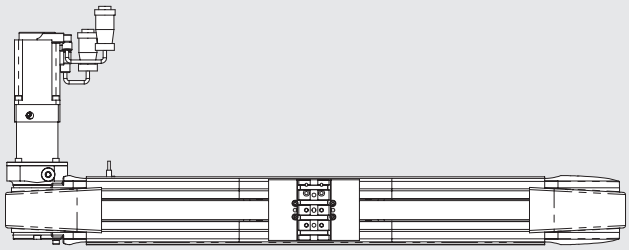


METAL WORK PNEUMATIC

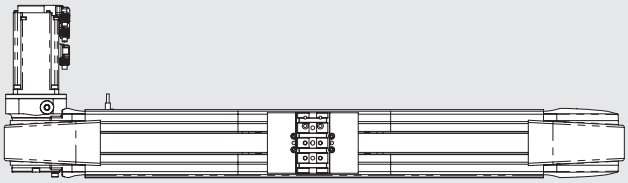
VERSIONS

VERSION WITHOUT MOTOR (attachment on the top left side only)

VERSION WITH MOTOR AND GEARBOX

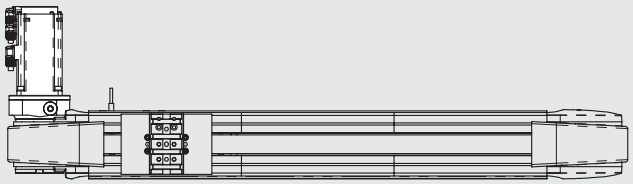


VERSION WITH MOTOR WITHOUT GEARBOX

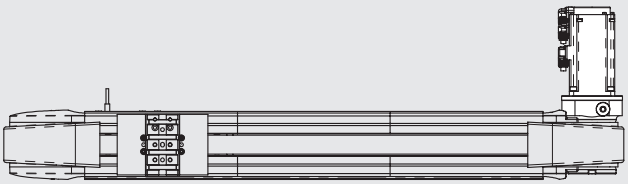


The versions supplied with **MOTOR** or with **MOTOR AND GEARBOX** are available in the following configurations:

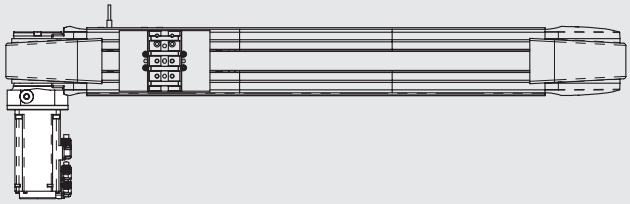
VERSION WITH MOTOR OR MOTOR AND GEARBOX TOP LEFT



VERSION WITH MOTOR OR MOTOR AND GEARBOX TOP RIGHT



VERSION WITH MOTOR OR MOTOR AND GEARBOX BOTTOM LEFT



VERSION WITH MOTOR OR MOTOR AND GEARBOX BOTTOM RIGHT

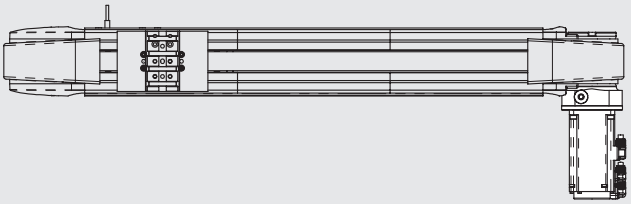
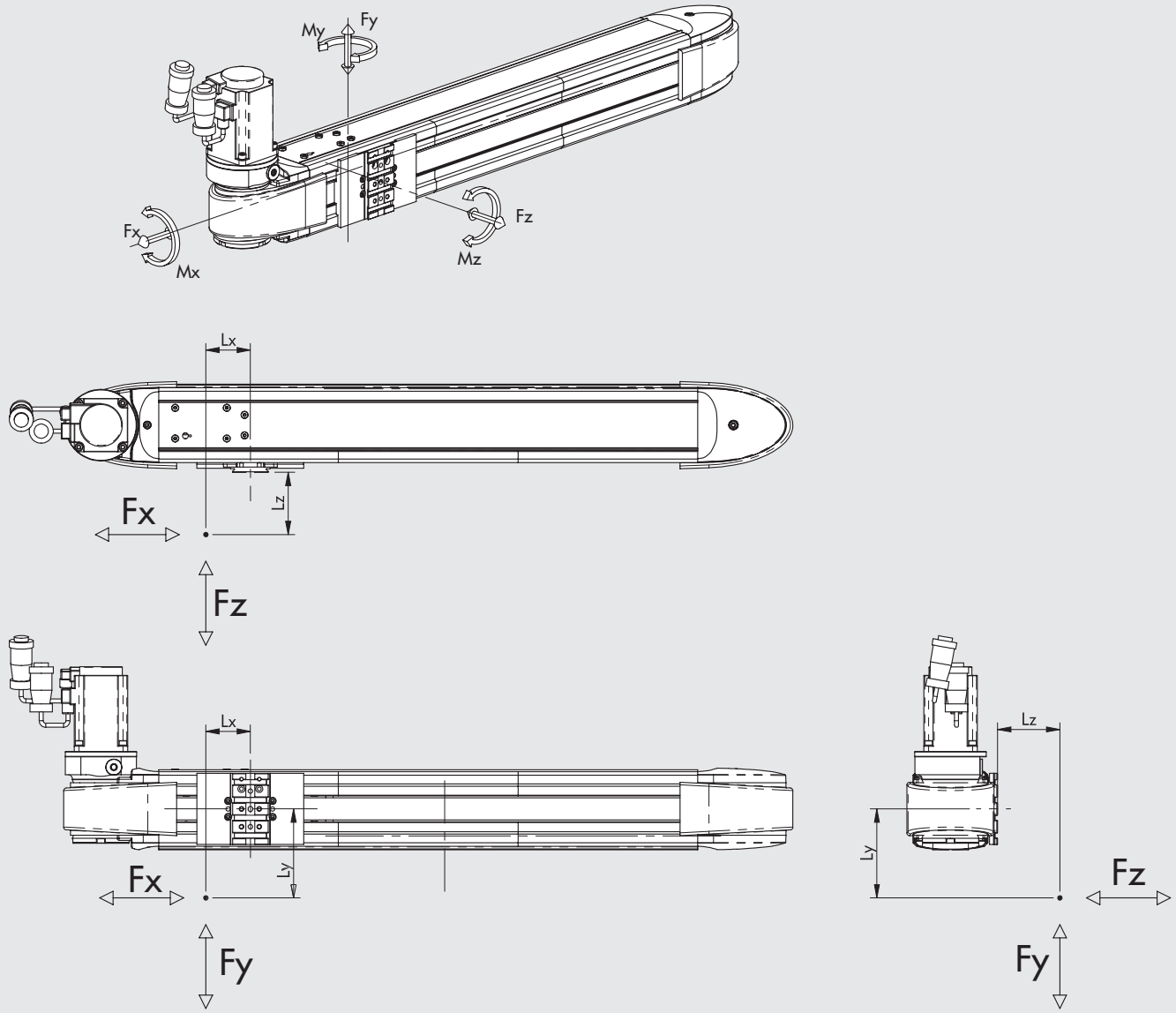


DIAGRAM OF FORCES AND MOMENTS



Size	Fy max [N]	Fz max [N]	Mx max [Nm]	My max [Nm]	Mz max [Nm]
SHAK 340	800	600	24	42	52
SHAK 470	1000	800	32	50	70

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

N.B.: For the maximum value of Fx see the general technical data and the axial load curves depending on the speed.

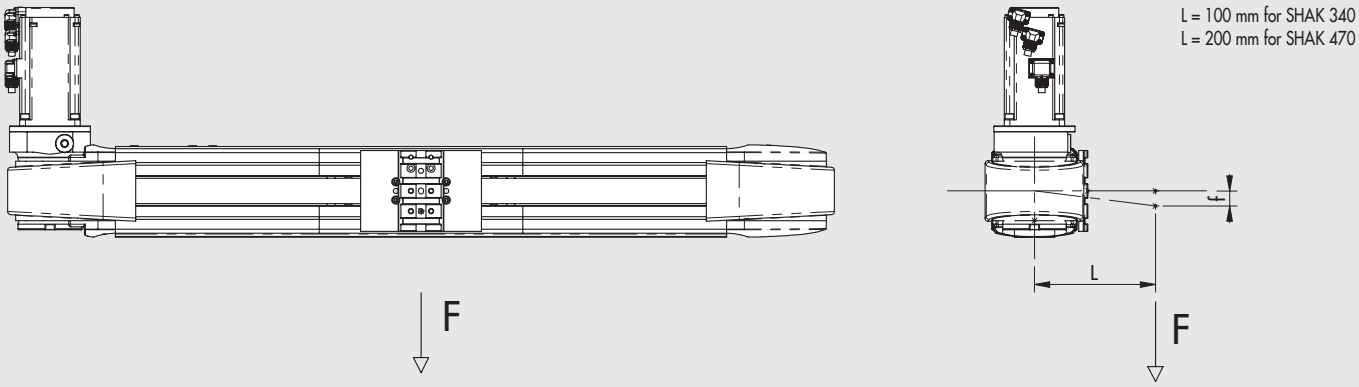
N.B.: When the cylinder is subjected simultaneously to torque and force, keep to the following equations, where Lx, Ly and Lz have to be given in metre.

$Mx = Fz \cdot Ly + Fy \cdot Lz \qquad My = Fz \cdot Lx + Fx \cdot Lz \qquad Mz = Fy \cdot Lx + Fx \cdot Ly$

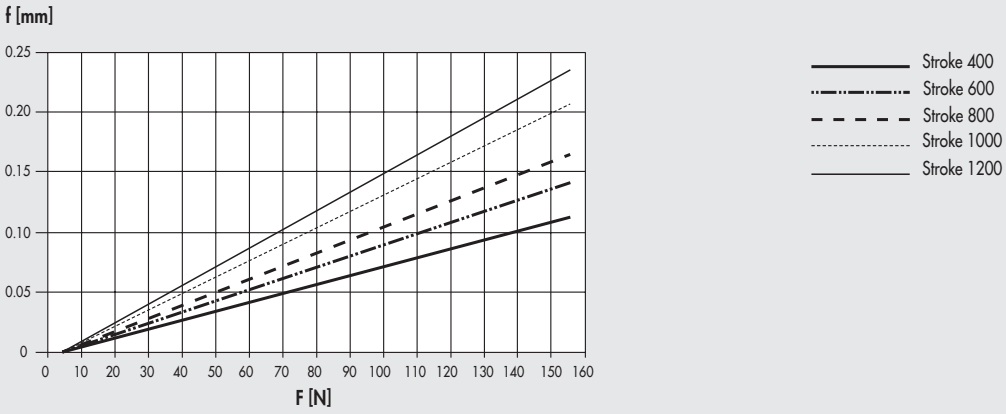
$$\frac{(Mx)}{Mx\ max} + \frac{(My)}{My\ max} + \frac{(Mz)}{Mz\ max} + \frac{(Fy)}{Fy\ max} + \frac{(Fz)}{Fz\ max} \leq 1$$

METAL WORK PNEUMATIC

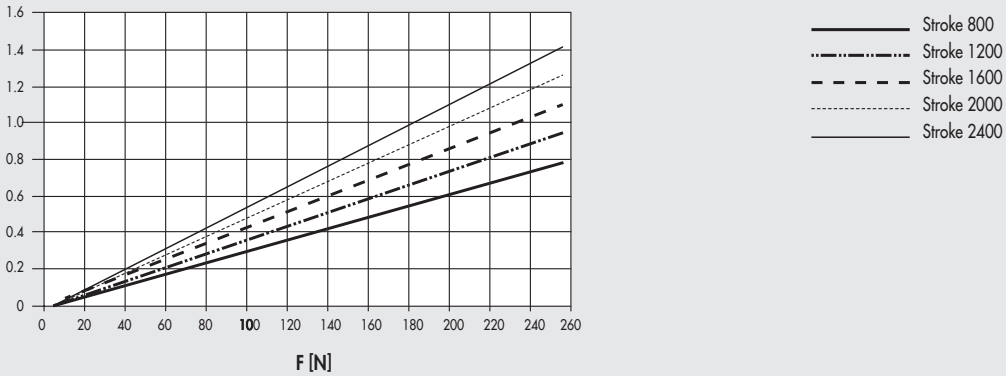
DEFORMATION ACCORDING TO LOAD



SHAK 340



SHAK 470

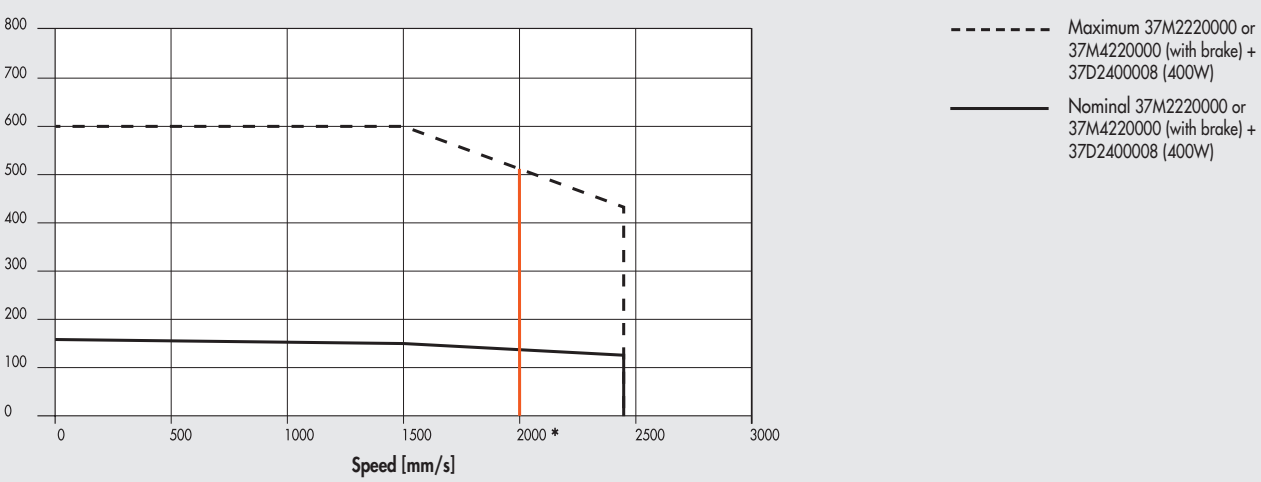


AXIAL LOAD-SPEED CURVES

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).

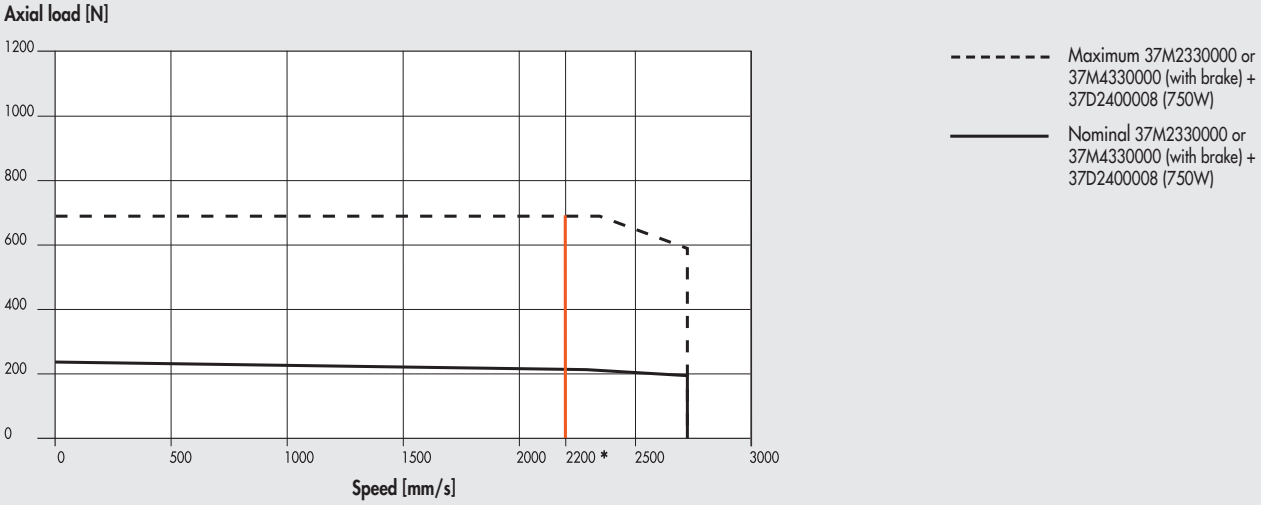
The following diagrams show the axial load with changing speed (mm/s). Each diagram shows two separate curves:
- **NOMINAL AXIAL LOAD** curve: the nominal axial load delivered by the motor with a duty cycle of 100%
- **MAXIMUM AXIAL LOAD** curve: the axial load delivered by the motor with a duty cycle of less than 100%.

SHAK 340
BRUSHLESS and BRUSHLESS with BRAKE drives (versions with 1:3 gearbox)



* = limit of gearbox continuous operation: higher speeds can be reached only for "duty cycle" ≤60% and for a maximum number of 1000 accelerations per hour.

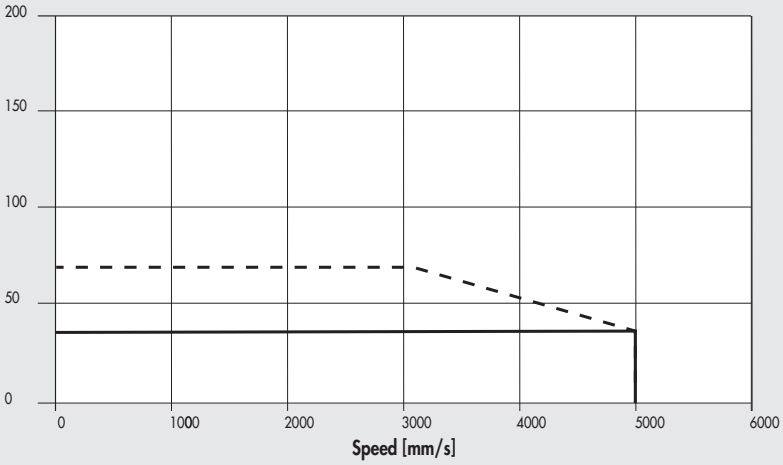
SHAK 470
BRUSHLESS and BRUSHLESS with BRAKE drives (versions with 1:3 gearbox)



* = limit of gearbox continuous operation: higher speeds can be reached only for "duty cycle" ≤60% and for a maximum number of 1000 accelerations per hour.

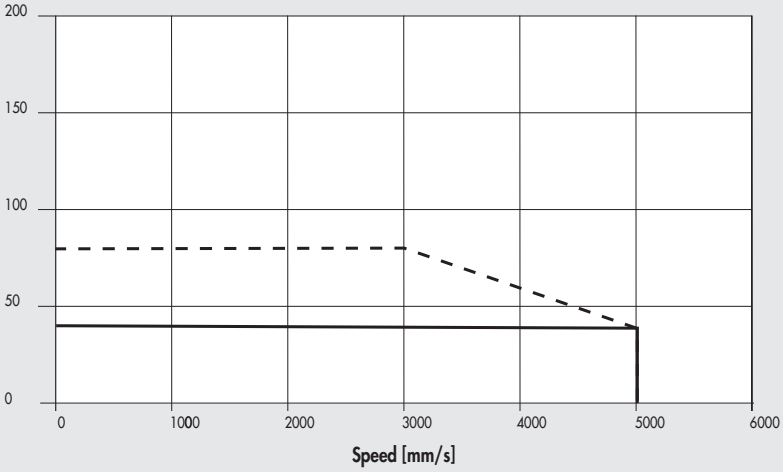
SHAK 340
BRUSHLESS and BRUSHLESS with BRAKE drives

Axial load [N]



SHAK 470
BRUSHLESS and BRUSHLESS with BRAKE drives

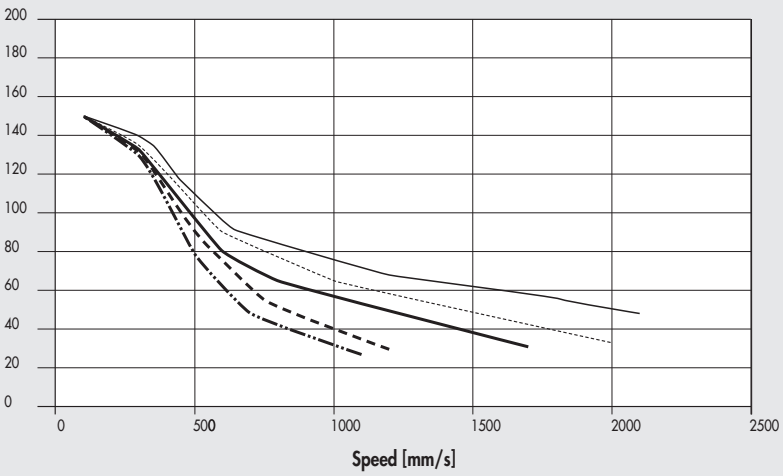
Axial load [N]



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%.

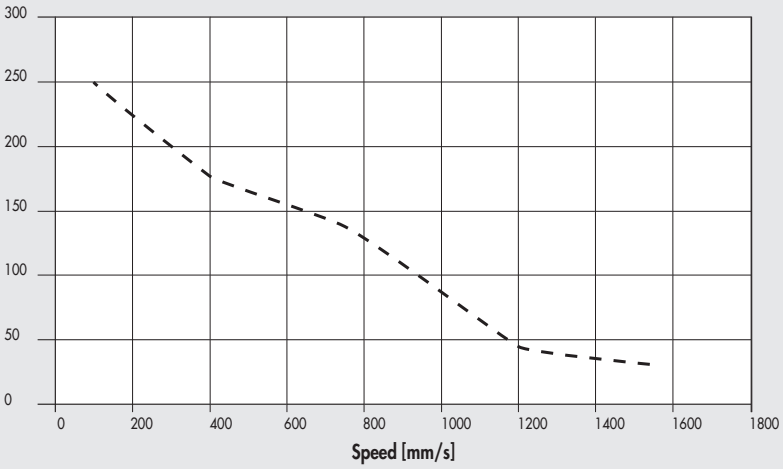
SHAK 340
STEPPING drives code 37M1440000

Axial load [N]



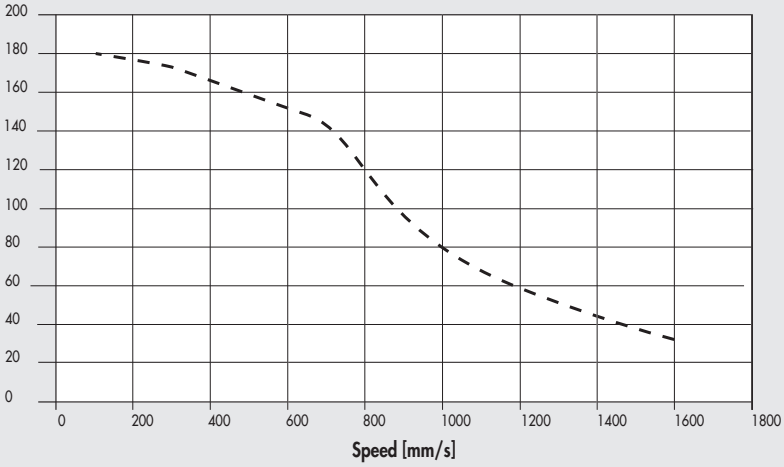
SHAK 470
STEPPING DRIVES code 37M1470000

Axial load [N]



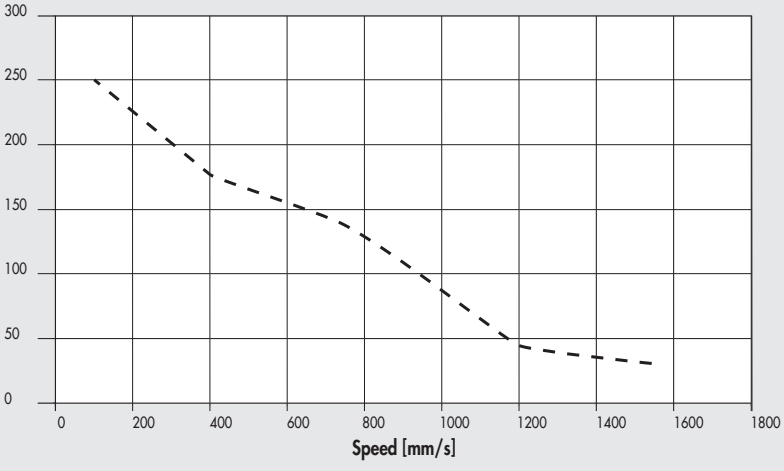
SHAK 340
STEPPING + BRAKE AND ENCODER DRIVES code 37M3450000

Axial load [N]



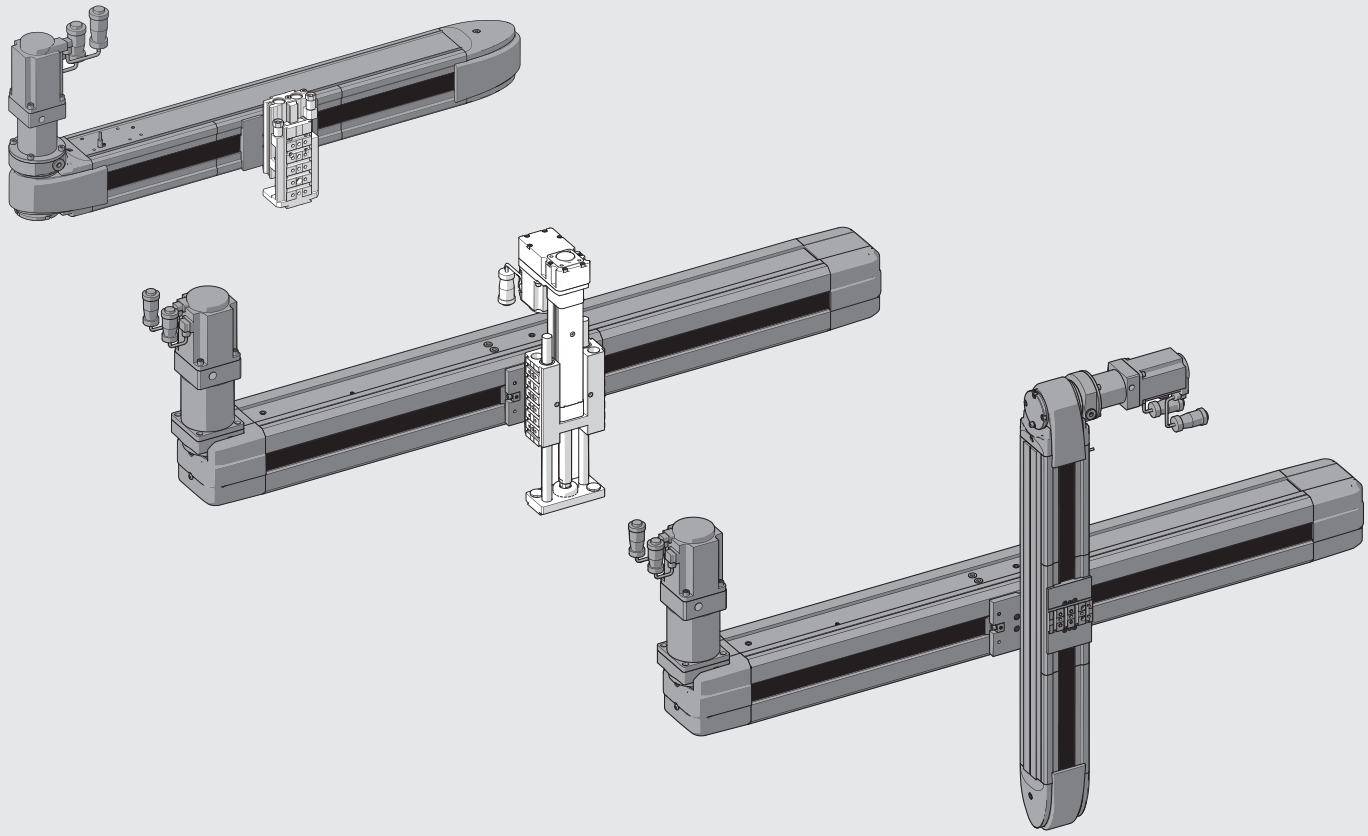
SHAK 470
STEPPING + BRAKE and ENCODER drives code 37M3470000

Axial load [N]



METAL WORK PNEUMATIC

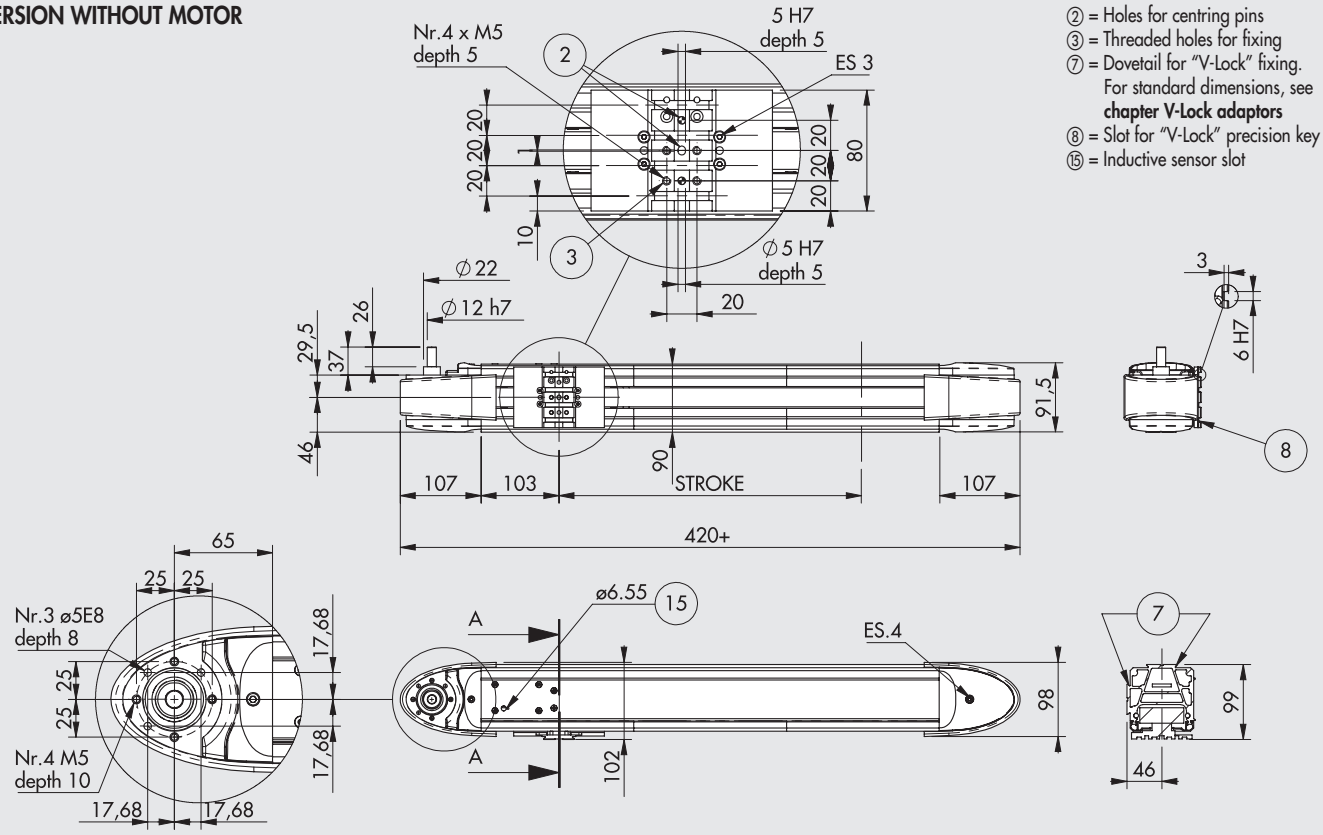
EXAMPLES OF APPLICATION



NOTES

DIMENSIONS SHAK 340

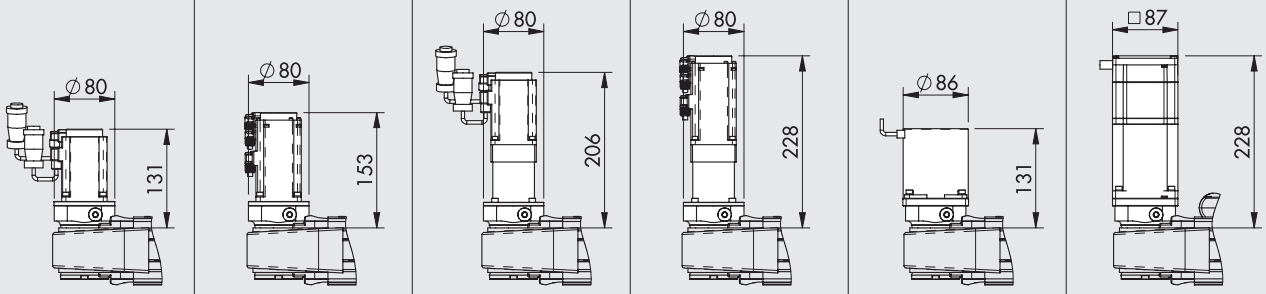
VERSION WITHOUT MOTOR



② = Holes for centring pins
③ = Threaded holes for fixing
⑦ = Dovetail for "V-Lock" fixing. For standard dimensions, see **chapter V-Lock adaptors**
⑧ = Slot for "V-Lock" precision key
⑮ = Inductive sensor slot

VERSION WITH MOTOR

Examples of overall dimensions referring to the version with motor on the top left; these values apply to the other versions as well.



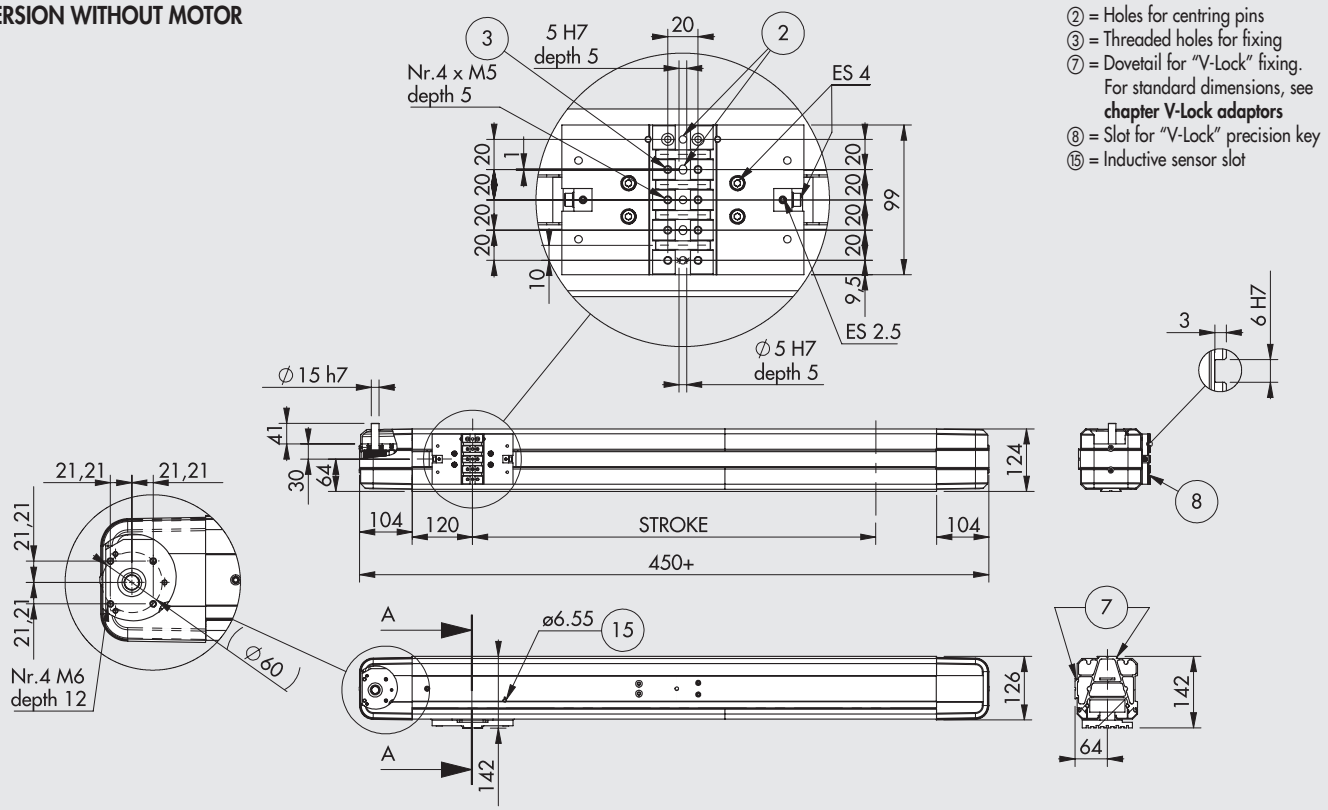
ORDERING CODES	BRUSHLESS MOTOR	BRUSHLESS MOTOR WITH BRAKE	BRUSHLESS MOTOR WITH GEARBOX	BRUSHLESS MOTOR WITH GEARBOX AND BRAKE	STEPPING MOTOR	STEPPING MOTOR WITH BRAKE
	375010_ _ _ _0002220	375010_ _ _ _0004220	375010_ _ _ _0102220	375010_ _ _ _0104220	375010_ _ _ _0001440	375010_ _ _ _0003450
	375010_ _ _ _0012220	375010_ _ _ _0014220	375010_ _ _ _0112220	375010_ _ _ _0114220	375010_ _ _ _0011440	375010_ _ _ _0013450
	375010_ _ _ _0022220	375010_ _ _ _0024220	375010_ _ _ _0122220	375010_ _ _ _0124220	375010_ _ _ _0021440	375010_ _ _ _0023450
	375010_ _ _ _0032220	375010_ _ _ _0034220	375010_ _ _ _0132220	375010_ _ _ _0134220	375010_ _ _ _0031440	375010_ _ _ _0033450

_ _ _ _ = Standard stroke (0400; 0600; 0800; 1000; 1200)

METAL WORK PNEUMATIC

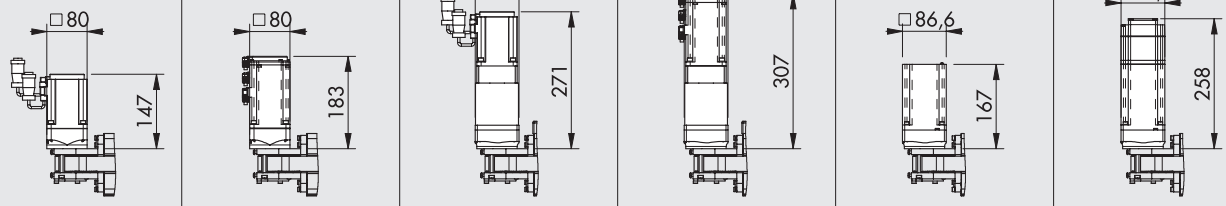
DIMENSIONS SHAK 470

VERSION WITHOUT MOTOR



VERSION WITH MOTOR

Examples of overall dimensions referring to the version with motor on the top left; these values apply to the other versions as well.



ORDERING CODES	BRUSHLESS MOTOR	BRUSHLESS MOTOR WITH BRAKE	BRUSHLESS MOTOR WITH GEARBOX	BRUSHLESS MOTOR WITH GEARBOX AND BRAKE	STEPPING MOTOR	STEPPING MOTOR WITH BRAKE
	375020_ _ _ _0002330	375020_ _ _ _0004330	375020_ _ _ _0102330	375020_ _ _ _0104330	375020_ _ _ _0001470	375020_ _ _ _0003470
	375020_ _ _ _0012330	375020_ _ _ _0014330	375020_ _ _ _0112330	375020_ _ _ _0114330	375020_ _ _ _0011470	375020_ _ _ _0013470
	375020_ _ _ _0022330	375020_ _ _ _0024330	375020_ _ _ _0122330	375020_ _ _ _0124330	375020_ _ _ _0021470	375020_ _ _ _0023470
	375020_ _ _ _0032330	375020_ _ _ _0034330	375020_ _ _ _0132330	375020_ _ _ _0134330	375020_ _ _ _0031470	375020_ _ _ _0033470

_ _ _ _ = Standard stroke (0800; 1200; 1600; 2000; 2400)

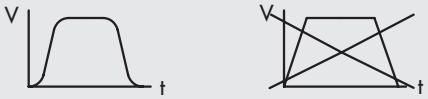
MOTOR-DRIVE COUPLINGS

MOTOR CODES		DRIVES CODES		
Metal Work		37D1332000 *	37D1442000	37D1552000
Manufacturer		RTA NDC 96	RTA PLUS A4	RTA PLUS B7
Metal Work	Manufacturer	(6A 24-75VDC)	(6A 77-140VDC)	(10A 28-62VAC) ●
STEPPING MOTORS				
37M1440000	SANYO DENKI 103-H8222-6340 (6A 140V max)	SHAK 340	SHAK 340	SHAK 340 ◆
37M1470000	B&R 80MPH6.101S000-01 (10A 80V max)	-	-	SHAK 470
STEPPING MOTORS WITH BRAKE + ENCODER				
37M3450000	B&R 80MPH4.101D114-01 (10A 80V max)	-	-	SHAK 340
37M3470000	B&R 80MPH6.101D114-01 (10A 80V max)	-	-	SHAK 470

✱ In all applications requiring motor powered up to 6A / 55VDC, the programmable drive **e**.drive, code 37D1332002, can be used.
◆ Important! Limit current
● Important! AC drive to continuous voltage VDC = VAC · $\sqrt{2}$

MOTOR CODES		DRIVES CODES
Metal Work		37D2400008
Manufacturer		SANYO DENKI RS3A03
Metal Work	Manufacturer	(30A 400-750 W)
BRUSHLESS MOTORS		
37M2220000	SANYO DENKI R2AA06040FXH11M (400W)	SHAK 340
37M2330000	SANYO DENKI R2AA08075FXH11M (750W)	SHAK 470
BRUSHLESS MOTORS WITH BRAKE		
37M4220000	SANYO DENKI R2AA06040FCH11M (400W)	SHAK 340
37M4330000	SANYO DENKI R2AA08075FCH11M (750W)	SHAK 470

The motor must be controlled in such a way as to avoid sudden changes in speed.



KEY TO CODES (WITHOUT MOTOR)

CYL	37	5	0	1	0	0800	0
	TYPE			SIZE		STROKE ◆	
	37 Electric actuators	**5** SHAK electric axes	**0** STD	**1** Size 340	**0** STD	400 600 800 1000 1200	**0** STD
				2 Size 470		800 1200 1600 2000 2400	

◆ Other strokes on request.

METAL WORK PNEUMATIC

KEY TO CODES AXIS ELECTRIC MOTOR

CYL	37 TYPE	5	0	1 SIZE	0	0800 STROKE ◆	0	0 REDUCTION ✱	0 MOTOR POSITION	2 MOTOR	DRIVE 2 FLANGE	2 TORQUE	0
	37 Electric actuators	**5** SHAK electric axes	**0** STD	**1** Size 340 **2** Size 470	**0** STD	400 600 800 1000 1200 800 1200 1600 2000 2400	**0** STD	**0** No reduction **1** 1:3 ratio	**0** Top left **1** Bottom left **2** Top right **3** Bottom right	**1** STEPPING **2** BRUSHLESS **3** STEPPING with BRAKE (+ Encoder) **4** BRUSHLESS with BRAKE	**2** 60 **3** 80 **4** NEMA 34	**2** 1.2-2.19 Nm **3** 2.2-3 Nm **4** 3.01-5 Nm **5** 6.21-7 Nm **7** > 7 Nm	**0** STD

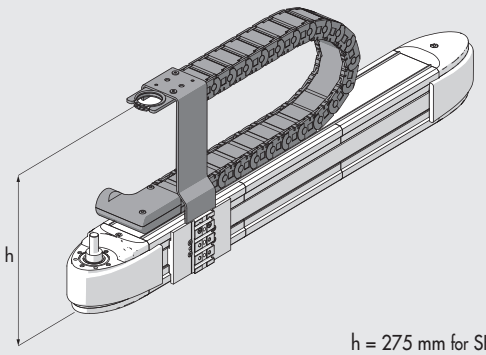
◆ Other strokes on request.
✱ On request, the versions with gearbox are available with reduction ratios other than those foreseen as standard.
N.B.: The Orderable configurations are shown on the previous pages.

ACCESSORIES

OIL

Code	Description	Volume [ml]
9910490	PARALIQ P 460	80

CABLE TRAY CHAIN



h = 275 mm for SHAK 340
h = 310 mm for SHAK 470

Code	Description
095340A0400	Cable tray chain accessory kit SHAK-340-400
095340A0600	Cable tray chain accessory kit SHAK-340-600
095340A0800	Cable tray chain accessory kit SHAK-340-800
095340A1000	Cable tray chain accessory kit SHAK-340-1000
095340A1200	Cable tray chain accessory kit SHAK-340-1200
095470A0800	Cable tray chain accessory kit SHAK-470-800
095470A1200	Cable tray chain accessory kit SHAK-470-1200
095470A1600	Cable tray chain accessory kit SHAK-470-1600
095470A2000	Cable tray chain accessory kit SHAK-470-2000
095470A2400	Cable tray chain accessory kit SHAK-470-2400

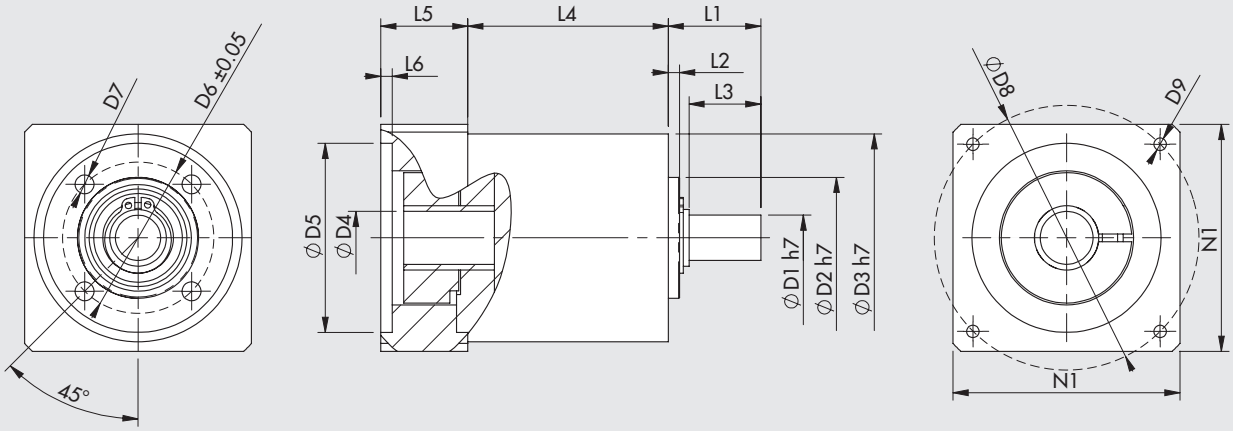
WARNING! You cannot mount the chain on versions with motor or gearmotor at the top right

DRIVES

For motor-drive couplings see table on page **A5**.90

SPARE PARTS

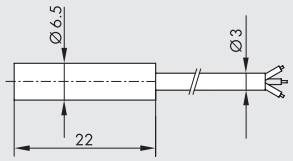
SHAK GEARBOXES



Code	Description	Application	C_{OUT} nominal [Nm]	N_{IN} nominal [1/min]	J reduced to motor shaft [kgmm²]	Mass [kg]	D1	D2	D3	D4	D5	D6	D7	D8	D9	L1	L2	L3	L4	L5	L6	N1
37R0341000	Gearbox MP053 1:3	SHAK 340	12	3300	8	0.8	12	32	55	14	50	40	M5	70	M4x10	24.5	3	19	53	23	3	60
37R0343000	Gearbox MP080 1:3	SHAK 470	40	2900	59	4	19	50	85	16	70	65	M6	90	M5x16	46	5	39	83.5	34	4	80

C_{OUT} = crated output torque N_{IN} = nominal input speed J = mass moment of inertia of the gearhead

SHAK INDUCTIVE SENSOR



Code	Description
095340A0000	SHAK inductive sensor accessory kit

ELECTRIC MOTORS

For motor-drive couplings see table on page **A5**.90

NOTES