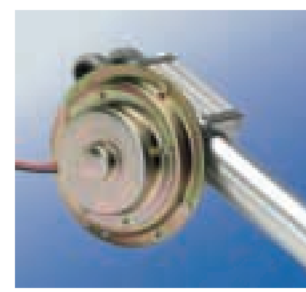
CAR Linear Actuators



The CAR Linear Actuators

The CAR range of industrial actuators offers a unique standard of performance, durability and reliability. The compact design incorporates well-proven parts, such as the SKF high efficiency ball screw, a sturdy gearbox assembly and high quality DC and AC-motors. All to give the best possible performance with unsurpassed service life. Individual application requirements can easily be matched thanks to the modular design concept. A vast number of motors, gear ratios and other options can be combined to give the actuator the required characteristics. The CAR range is available in three sizes, CAR22, CAR32 and CAR40, with loads of up to 6000N. Three special version of the CAR 32 actuator are available:

- CAP 32, with integrated positional feedback potentiometer.
- CARN 32, with gearbox input shaft for external drive source.
- CCBR 32, without motor and gearbox (direct drive on the ball screw).

Contents

The specifications and data in this publication are believed to be accurate and reliable.
However, it is the responsibility of the product user to determine the suitability of all products selected for a specific application.
Consult SKF for application support. The right is reserved to make changes without prior notice.

Ordering keys

CAR 22

Dynamic load (N)/ Speed (mm/sec.)		Motor options	
1500/xx	1000/xx	No motor	0000
1500/15-10	1000/30-20	12Vd.c., flat motor, IP44	D12B
1500/15-10	1000/30-20	24Vd.c., flat motor, IP44	D24B
1	2		

C A R □ 22 X □□□ X □ □□□□

Motor assembly

Right	R
Left	L

Stroke

50 mm	050
100mm	100
200mm	200
300mm	300
50>S<300	xxx

CAR 32
CAP 32

Dynamic load (N)/ Speed (mm/sec.)			Motor options	
3500/XX	2500/XX	1500/XX	No motor	0000
2500/15-10	2000/30-20	1000/60-40	12Vd.c., flat motor, IP44	D12C
3500/15-10	2500/30-20	1500/60-40	24Vd.c., flat motor, IP44	D24C
3500/9-5	2500/18-10	1500/34-24	24Vd.c., flat motor, low speed, IP44	D24CW
3500/15-10	2500/30-20	1500/60-40	24Vd.c., flat motor, extended shaft, IP 44	D24CS
3500/15-10	2500/30-20	1500/60-40	24Vd.c., flat motor, brake IP20	D24CB
3500/8	2500/16	1500/32	110Va.c./60Hz, single phase, IP54	E110C
3500/8	2500/16	1500/32	110Va.c./60Hz, single phase, brake IP20	E110CB
3500/6	2500/13	1500/26	220Va.c./50Hz, single phase, IP54	E220C
3500/6	2500/13	1500/26	220Va.c./50Hz, single phase, brake IP20	E220CB
1	2	4		

C A R / C A P □ 32 X □□□ X □ □ □□□□□□

Motor assembly

Right	R
Left	L

Stroke

50 mm	050
100mm	100
200mm	200
300mm	300
500mm	500
700mm	700
50>S<300	xxx

Options

Friction clutch	F
Back-up nut	S

CAR 40

Dynamic load (N)/ Speed (mm/sec.)			Motor options	
6000/xx	4000/xx	2000/xx	No motor	0000
6000/15-10	4000/30-20	2000/60-40	24Vd.c., flat motor, IP44	D24D
6000/15-10	4000/30-20	2000/60-40	24Vd.c., flat motor, extended shaft, IP44	D24DS
6000/15-10	4000/30-20	2000/60-40	24Vd.c., flat motor, brake IP20	D24DB
6000/10	4000/20	2000/40	110Va.c.,/60Hz, single phase, IP54	E110D
6000/10	4000/20	2000/40	110Va.c.,/60Hz, single phase, brake, IP20	E110DB
6000/9	4000/17	2000/34	220Va.c.,/50Hz, single phase, IP54	E220D
6000/9	4000/17	2000/34	220Va.c.,/50Hz single phase, brake, IP20	E220DB
1	2	4		

C A R □ 40 X □□□ X □ □ □□□□□□

Motor assembly

Right	R
Left	L

Stroke

100mm	100
300mm	300
500mm	500
700mm	700
50>S<300	xxx

Options

Friction clutch	F
Back-up nut	S

Performance

V DC-motors

Actuator	Max dynamic load	Max static load	Linear speed	Current consump-tion
D24B	N	N	mm/sec.	A
CAR 22xSx1	1500	2200	15-10	5
CAR 22xSx2	1000	2200	30-20	5
D24C/D24CS/D24CB				
CAR/CAP 32xSx1	3500	5400	15-10	8
CAR/CAP 32xSx2	2500	5400	30-20	8
CAR/CAP 32xSx4	1500	5400	60-40	8
D24CW				
CAR 32xSx1	3500	5400	9-5	5
CAR 32xSx2	2500	5400	18-10	5
CAR 32xSx4	1500	5400	34-24	5
D24D/D24DS/D24DB				
CAR 40xSx1	6000	8700	15-10	16
CAR 40xSx2	4000	8700	30-20	16
CAR 40xSx4	2000	8700	60-40	16
D12B				
CAR 22xSx1	1500	2200	15-10	9
CAR 22xSx2	1000	2200	30-20	9
D12C				
CAR/CAP 32xSx1	2500	5400	15-10	13
CAR/CAP 32xSx2	2000	5400	30-20	13
CAR/CAP 32xSx4	1000	5400	60-40	13

The CAR actuator range is self-locking within the dynamic load range with gear (1).
Gear (2) and (4) are self-locking within the dynamic load range if a DC-motor with brake is used.

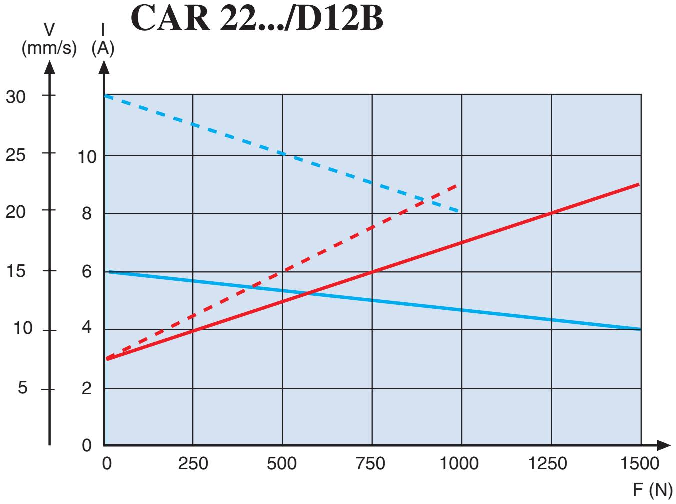
V AC-motors

Actuator	Max dynamic load			Max static l oad	Linear speed
E220C	N			N	mm/sec.
	6µF	4µF	3µF		
CAR/CAP32xSx1	3500	2500	1500	5400	6
CAR/CAP 32xSx2	2500	1500	900	5400	13
CAR/CAP 32xSx4	1500	900	500	5400	26
E110C					
	25µF	16µF	12µF		
CAR/CAP 32xSx1	3500	2500	1500	5400	8
CAR/CAP 32xSx2	2500	1500	900	5400	16
CAR/CAP 32xSx4	1500	900	500	5400	32
E220D					
	12µF	8µF			
CAR 40xSx1	6000	4000		8700	9
CAR 40xSx2	4000	2700		8700	17
CAR 40xSx4	2000	1200		8700	34
E110D					
	37.5µF	25µF			
CAR 40xSx1	6000	4000		8700	10
CAR 40xSx2	4000	2700		8700	20
CAR 40xSx4	2000	1200		8700	40

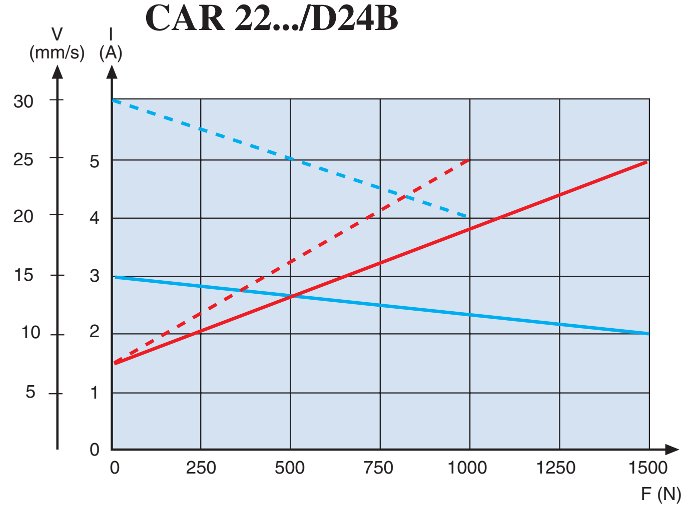
CAR actuators equipped with AC-motors are self-locking within the dynamic load range if a brake is used.

Performance diagram

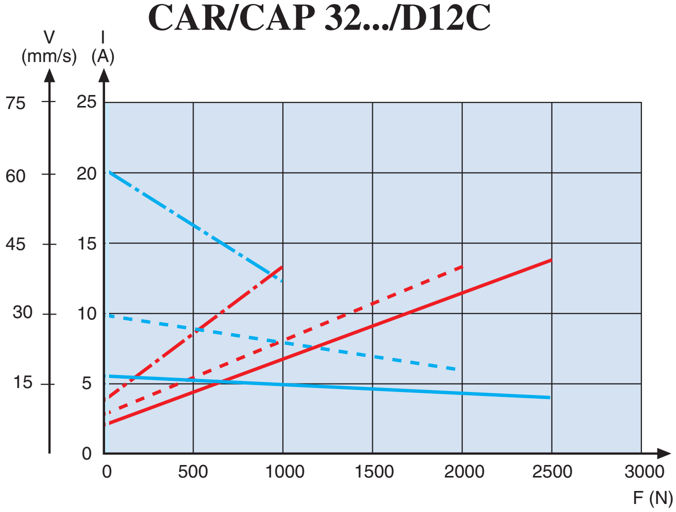
CAR 22.../D12B



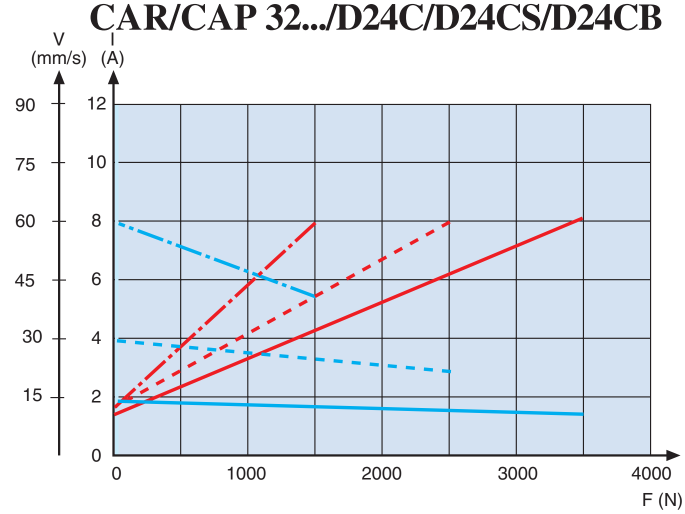
CAR 22.../D24B



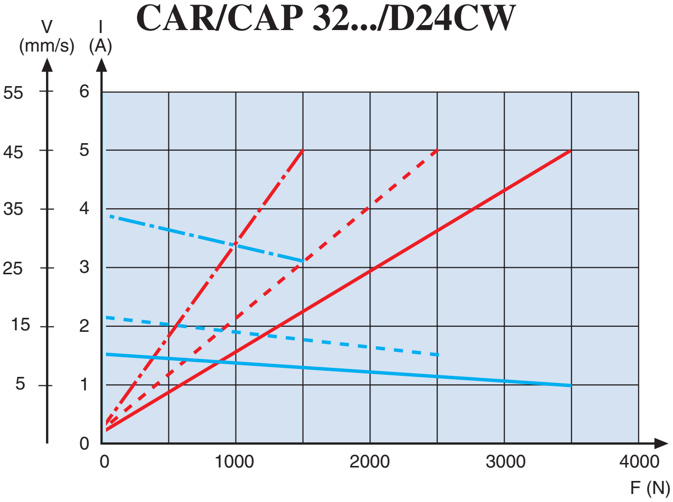
CAR/CAP 32.../D12C



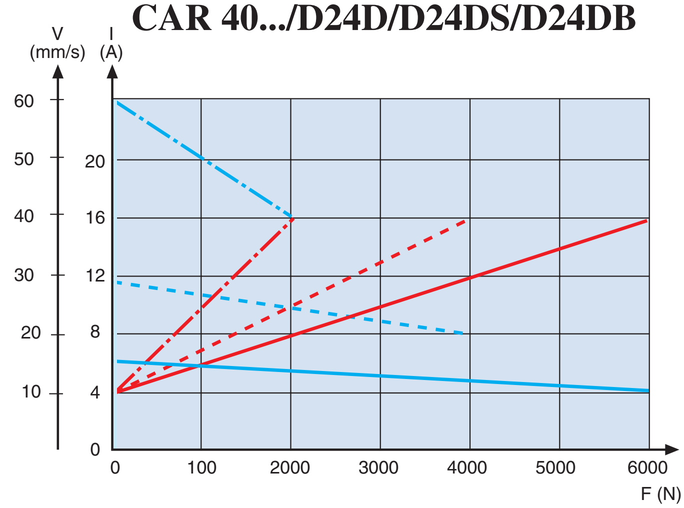
CAR/CAP 32.../D24C/D24CS/D24CB

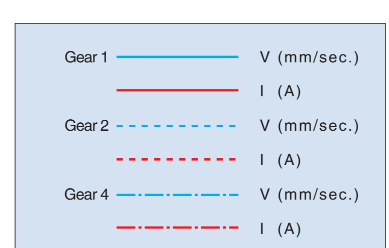


CAR/CAP 32.../D24CW

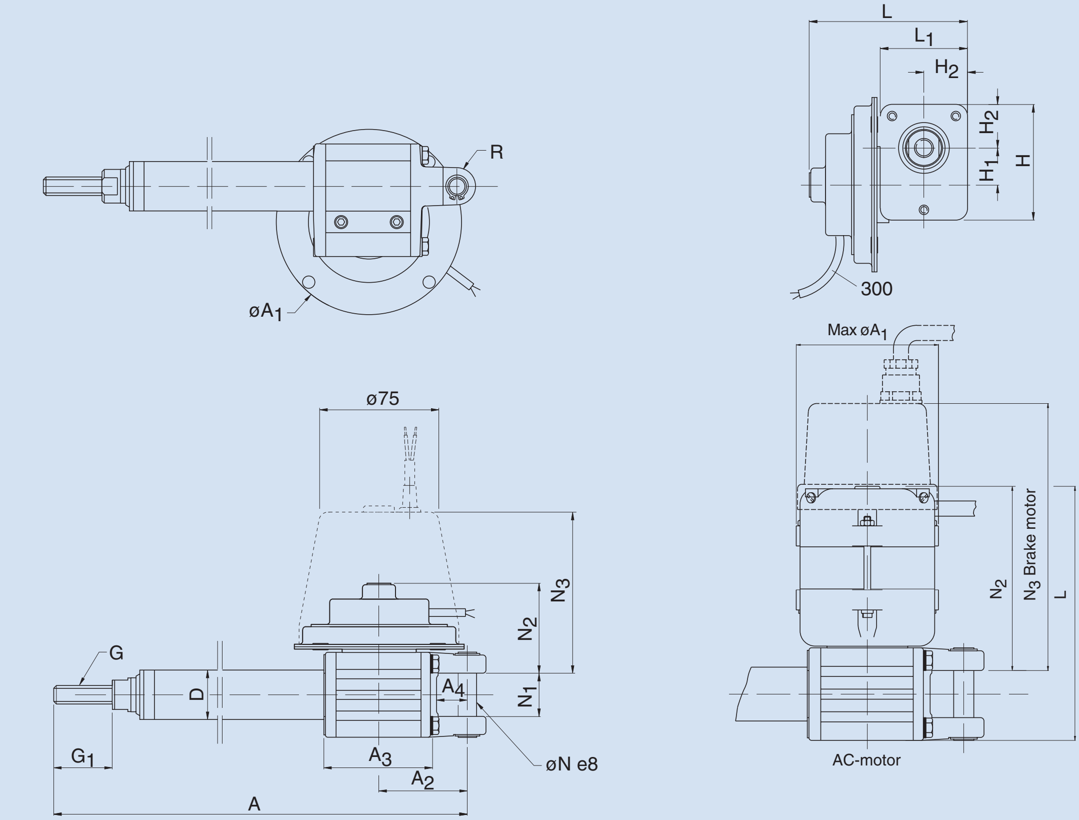


CAR 40.../D24D/D24DS/D24DB





CAR 22, 32, 40



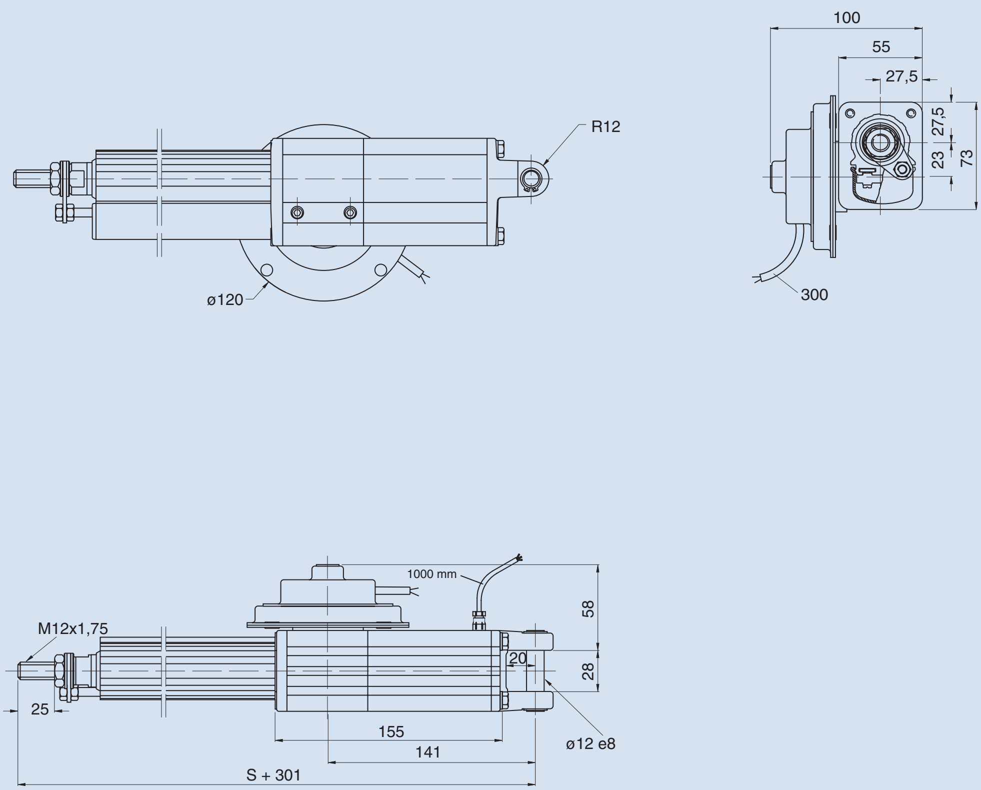
Actuator S=Stroke in mm	A	A2	A3	A4	D	G	G1	H	H1	H2	L1	N	N1	R
	mm													
CAR 22	S+205	49	66	16	22	M10 x1.5	35	60	16.5	23	46	10	26	9
CAR 32	S+218	57	71	20	32	M12 x1.75	38	73	23	27.5	55	12	28	12
CAR 40	S+263	75	100	25	40	M16 x2	53	97	29	40	80	16	40	19

Motor	A1	L	N2	N3
	mm			
D12B	104	86	53	-
D12C	120	104	58	-
D24B	104	86	53	-
D24C	120	104	58	-
D24CW	120	104	58	-
D24CS	120	104	58	-
D24CB	120	-	-	100
D24D	150	127	75	-
D24DS	150	127	87	-
D24DB	150	-	-	121
E110C	97	150	108	-
E110CB	97	198	-	156
E110D	119	200	141	-
E110DB	119	248	-	189
E220C	97	150	108	-
E220CB	97	198	-	156
E220D	119	200	141	-
E220DB	119	248	-	189

	Stroke S	Weight
	mm	kg
CAR22	50	1.2
	100	1.3
	150	1.4
	200	1.5
	300	1.6
CAR32	50	2.1
	100	2.2
	200	2.4
	300	2.7
	500	3.2
	700	3.7
CAR40	100	5.8
	300	6.7
	500	7.6
	700	8.4

The CAR actuator is manufactured in three versions with capacities up to 6000 N. The CAR 32 and 40 versions can be supplied with three gear ratios (1, 2, 4) while the CAR 22 is available with two ratios (1, 2). With gear 1, the CAR actuator is self-locking within the dynamic load range, when used together with DC-motors. Actuators fitted with gear 2 & 4 are self-locking within the dynamic load range provided that a motor with brake is fitted. CAR actuators equipped with AC-motors are self-locking within the dynamic load range providing motors with brakes are fitted. The safety friction device protects the actuator and the mechanism to which it is fitted from damage caused by dynamic overload.

CAP 32



The CAP 32 actuator is fitted with a potentiometer which indicates the position of the actuator.
This unit is, therefore, suitable for use in situations where it is necessary to know the current position of the actuator, either for manual or automatic control.
The CAP 32 has a built in 10kΩ potentiometer which is linked to the ball screw. This provides an analogue signal representing the present position of the adjustment tube.
The CAP 32 is fitted, as standard, with CAXB limit switch.
Other performance values are identical with CAR 32.

Positioning accurancy

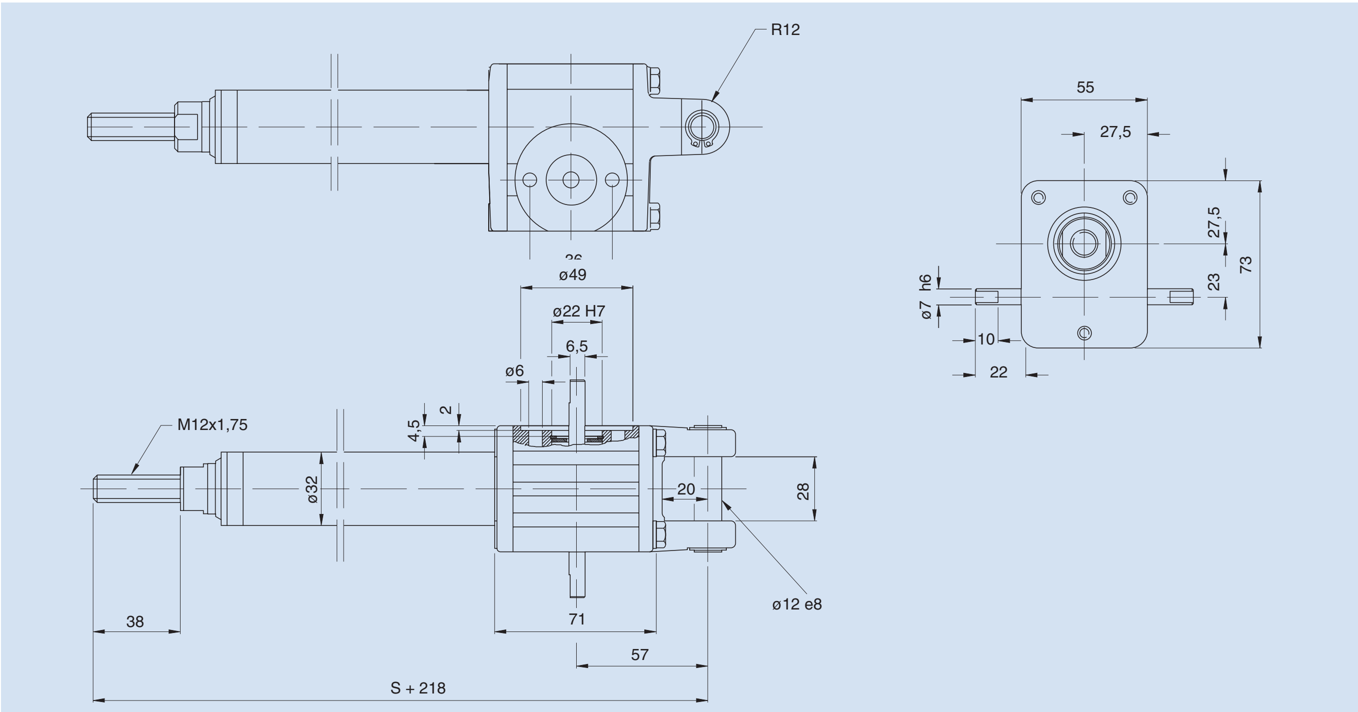
Gear	Accurancy
mm	
1	±1
2	±2
4	±4

At constant load and direction of load a significantly higher accuracy can be achieved. Please consult SKF for further information.

	Stroke S	Weight
	mm	kg
CAP32	50	2.9
	100	3.3
	200	3.7
	300	4.1
	500	4.5
	700	5.0

Ordering key - see page 3.

CARN 32 actuator without motor

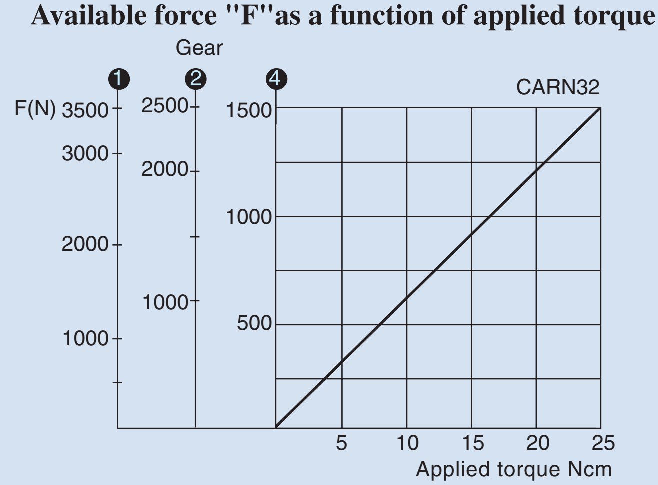


An external drive can be connected to CARN 32. This could be a pneumatic motor, a manual drive unit or an electric motor, linked to the gearbox input shaft.
The CARN 32 actuator can also be operated in parallel with two, or more, actuators.
The linear speed is determined by the input rotary speed, as shown in the diagram below. A diagram also shows the torque required for any given load.

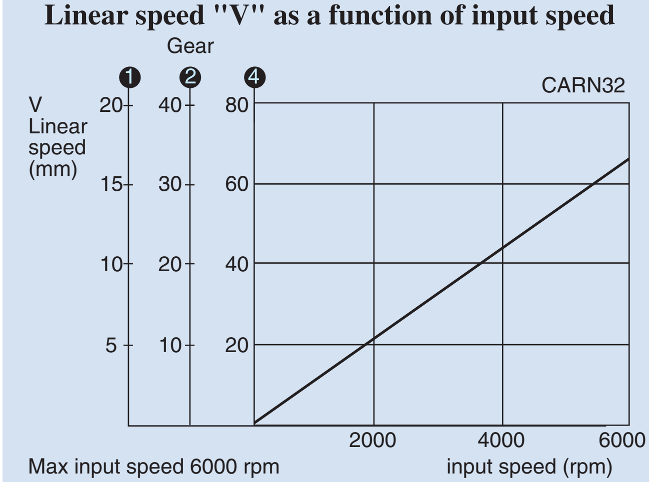
	Stroke S	Weight
	mm	kg
CARN32	50	0.8
	100	1.0
	200	1.5
	300	2.2
	500	2.7
	700	3.3

Designation Ordering key	Gear ratio	Ballscrew lead
		mm
CARN 32xSx1	25.0:1	4
CARN 32xSx2	12.5:1	4
CARN 32xSx4	6.25:1	4

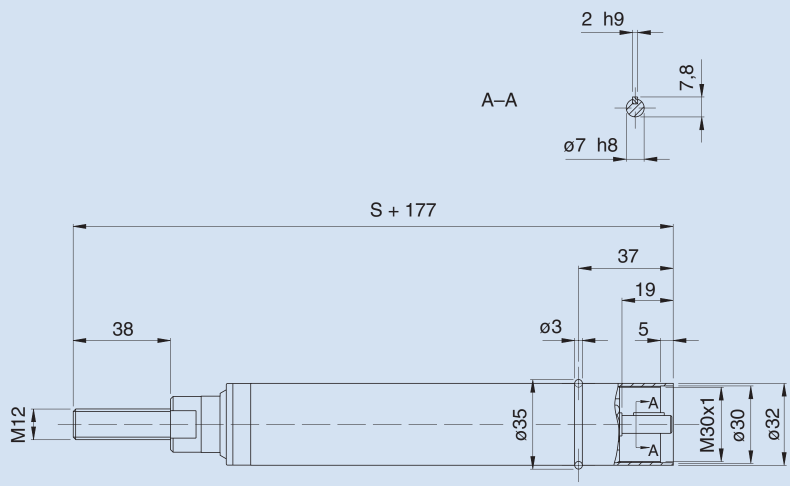
Available force "F"as a function of applied torque



Linear speed "V" as a function of input speed



CCBR 32 actuator without motor

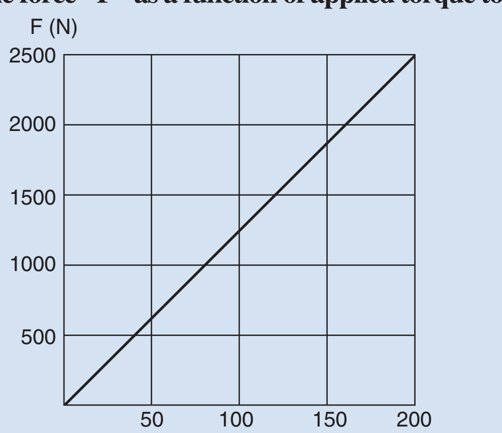


The CCBR 32 is an actuator with no motor or gearbox. It is driven directly by the ball screw and is therefore of small external dimensions.
Direct drive offers very accurate positioning. The SKF ball screw provides a high level of efficiency.
The linear speed is determined by the input rotary speed, as shown in the diagram below. A diagram also shows the torque required for any given load.
If required, the CAXB 32 limit switch can be mounted on the ball screw cylinder.
The front mounting attachment described in this folder is also suitable for CCBR 32.
A steel ring to be mounted at the end of the cylinder is supplied with CCBR 32. The drawing shows the ring fitted to the cylinder.

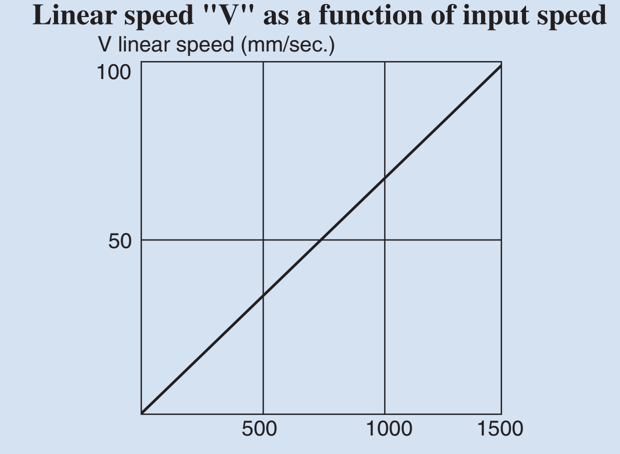
	Stroke S	Weight
	mm	kg
CCBR32	50	1.1
	100	1.2
	200	1.25
	300	1.3
	500	1.4
	700	1.5

Designation Ordering key	Max dyn. load	Max stat. load	Ballscrew lead
	N	N	mm
CCBR 32xS	2500	5400	4

Avaiable force "F" as a function of applied torque torque



Linear speed "V" as a function of input speed



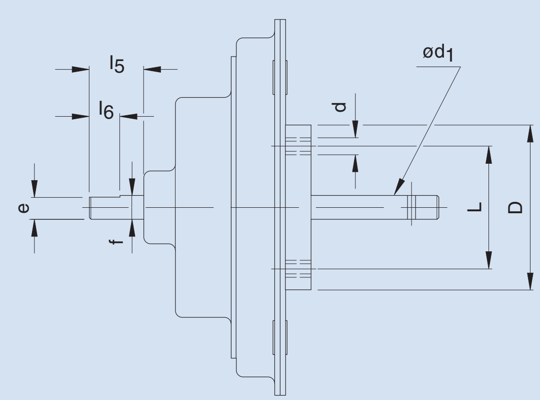
Motors

SKF actuators are fitted with either AC or DC-motors.

DC-motors
12 and 24 Volt motors are available. CAR and CAP 32 are fitted with compact flat motors. DC-motors are simple to control but have a limited service life, due to the wear of the brushes and commutator. The 'General motor data' table on page 11 shows the approximate service life when operated at rated power. The flat motors are protected against dust and moisture, to protection class IP44. The connecting cables on all flat motors are 300 mm in length.

AC-motors
110 and 220 Volt motors are available. The 220V motors are fitted with thermal protection. AC-motors are protected against dust and moisture, to protection class IP54 (with brake IP20). The motors for CAR 32 and 40 are fitted with connecting cables 1000 mm in length. A start capacitor is required for the operation of AC-motors. For selection of capacitor see page 18 (calculation section).

Motors with extended shaft
These motors is suitable for situations where it is necessary to synchronize the actuator. The shaft can then be linked to the extended shaft or another motor or to the shaft of a CARN 32 actuator. The extended shaft can also be used to adjust the actuator manually with a hand wheel, for example, in case of power failure.
Motors with extended shaft are available in the 24 V DC range for use on the CAR 32, 40 and CAP 32.



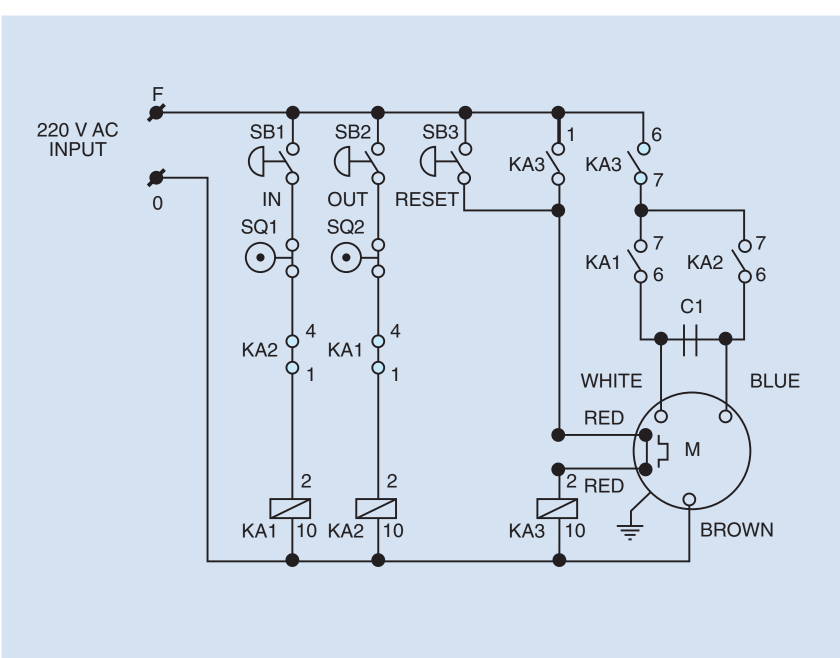
Motor with extended shaft (D24CS/D24DS)

Actuator size	Motor type	Dimensions D	d	d1	e	f	I5	I6	L
CAR 32	D24CS	48mm	M5	7hg	6.5	7h7	16	9	36
CAR 40	D24DS	70mm	M8	9h6	6.5	7h7	16	9	55

General motor data

Designation	Rated voltage	Rated speed	Brush life
DC-motors	Volt	rpm	hours
D12B	12	7600	300
D12C	12	5300	1500
D24B	24	7500	500
D24C	24	5500	1500
D24CB	24	5500	1500
D24CW	24	2500	1500
D24CS	24	5500	1500
D24D	24	4700	900
D24DB	24	4700	900
D24DS	24	4700	900
AC-motors	Volt	rpm	
E220C	240/50Hz	2600	-
E220CB	240/50Hz	2600	-
E220D	240/50Hz	2790	-
E220DB	240/50Hz	2790	-
E110C	110/60Hz	3250	-
E110CB	110/60Hz	3250	-
E110D	110/60Hz	3350	-
E110DB	110/60Hz	3350	-

Recommended wiring diagram for general connection of CAR with 230/110 V AC-motors



A low voltage limit switch (CAXB) can be used in connection with SKF special electronic control systems. As standard, motors are fitted with thermo-contacts which activates at +140°C.

SB = operating switch
SQ = limit switch
KA = relay
C1 = capacitator
M = motor

Accessories

Mounting attachments

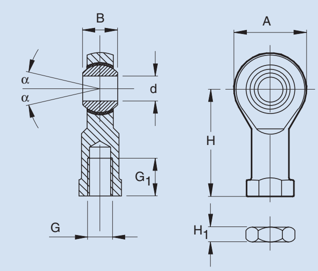
SKF mounting attachments provide simple and secure mounting of the actuators. There are various types for attachment both to front and rear of the actuator. The mounting attachments are supplied complete with nuts and bolts.

Front mounting attachments

Rod-end, Type 575

The rod-end allows some alignment of the actuator. The rod-end requires no maintenance and consists of a head with an inner pivot bearing and a bearing surface located between the hole in the head and the inner ring. The rod-end is made of galvanized steel. The unit is supplied complete with lock nut. Mounting attachment Type 575 must not be combined with Type 581.

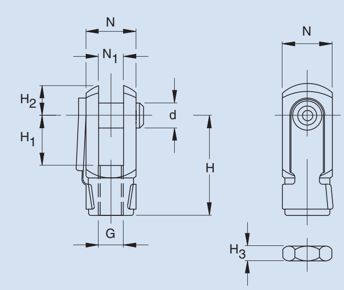
Rod-end Designation	Appropriate for linear actuator No.	Dimensions A	B	d	G	G1	H	H1	Degrees α
		mm							°
575-22	22	30	14	10	M10	15	43	5	13
575-32	32	34	16	12	M12	18	50	6	13
575-40	40	42	21	16	M16	24	64	8	15



Clevis attachment, Type 576

This consists of a galvanized clevis head and a journal fitted with a quick coupling. It allows simple and rapid attachment of the actuator. This mounting attachment is supplied complete with locking nut.

Clevis Designation	Appropriate for linear actuator No.	Dimensions d	G	H	H1	H2	H3	N	N1
		mm							
576-22	22	10h11	M10	40	20	12	5	20	10
576-32	32	12h11	M12	48	24	14	6	24	12
576-40	40	16h11	M16	64	32	19	8	32	16

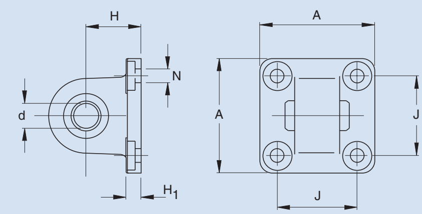


Rear mounting attachments

Rear mounting bracket, Type 580

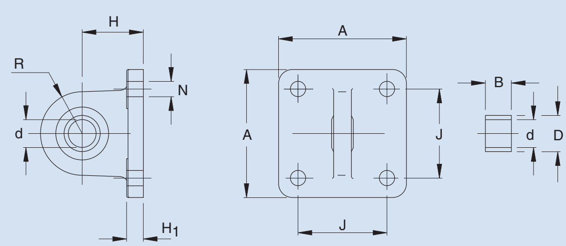
The bracket consists of an eye on a base plate, made of light alloy, with a bronze bush vulcanized into the ring of the eye. This gives some degree of flexibility to the attachment and the rubber also has a vibration damping effect. The unit is supplied complete with attachment bolts.

Bracket Designation	Appropriate for linear actuator No.	Dimensions A	d	H	H1	J	N
		mm					
580-22	22	46	10	22	6	32	5.5
580-32	32	55	12	28	12	40	6.6
580-40	40	80	16	36	15	59	9



Ball-joint bracket, Type 581

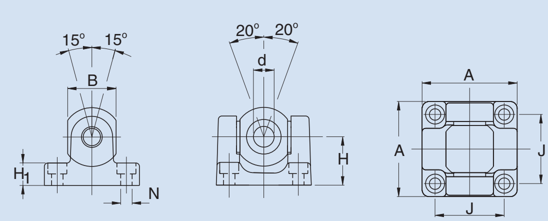
This bracket is intended for mounting at the rear of the actuator. It consists of an eye on a base plate, made of light alloy, with a pivoted bearing in the eye ring. This allows some degree of self-alignment. This bracket should not be used if the actuator is fitted with a safety clutch. The bracket is supplied complete with two spacer rings and attachments bolts. Mounting attachment Type 581 must no be combined with Type 575.



Bracket Designation	Appropriate for linear actuator No.	Dimensions A	d	H	H1	J	N	R	B	d	D
		mm									
581-22	22	46	10	22	6	32	5.5	15	8	10	13
581-40	40	80	16	36	11	59	9	25	11.5	16	20

Universal bracket, Type 582

This bracket is moulded in aluminum, and consists of a plate with an integrated ball, which has an attachment hole. The ball is guided, so it can be misaligned (±15°) horizontally and (±20°) vertically. This feature will allow some degree of misalignment, and make it possible to mount the actuator on an uneven surface.



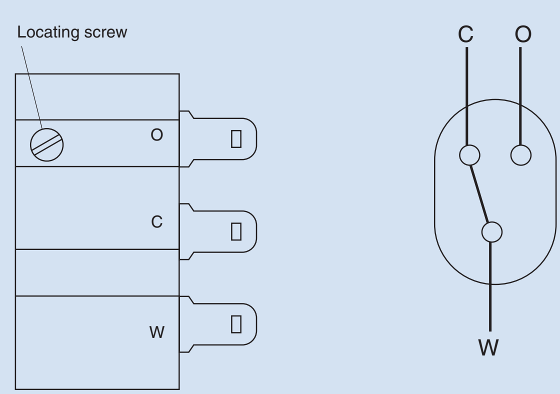
Bracket Designation	Appropriate for linear actuator No.	Dimensions A	d	H	H1	J	N	B
		mm						
582-32	32	55	12	28	13	40	6.6	27.5

Accessories

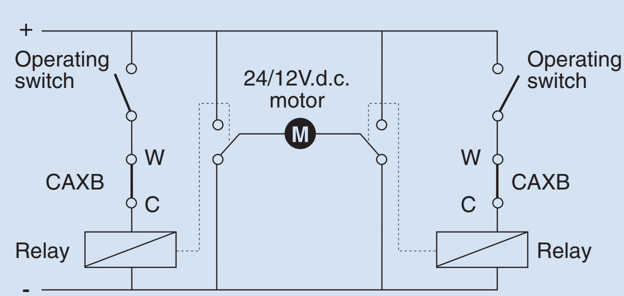
Limit switch CAXB

Limit switches, in combination with an SKF control unit make it possible to set the actuator for any desired stroke length.
They also protect the actuator from running against the mechanical end stops, thereby avoiding damage.
The CAXB limit switch can be used on the following ball screw actuator: CAR, CAP, CARN and CCBR. It is robust and durable and can be used in most environments.
CAXB limit switches are available in a number of standards lengths, but can be manufactured in special lengths on request.
The CAXB limit switch consists of a profiled tube, two switch units, a rod carrying a permanent magnet and a protective cover.
The profiled tube, which is made of anodized aluminum, is mounted directly on the protection tube of the actuator.
The two switch units (proximity switches) are attached to the profiled tube and can be adjusted to any position. The magnet rod, made of stainless steel, is attached to the end of the adjustment tube and runs in a groove in the profiled tube.

When the magnet, which is attached to the free end of the rod, approaches the switch unit, the latter is activated. The switches are connected to the control unit, from which relays disconnect the power supply to the motor. The motor is then short-circuited, thereby braking the actuator.
The switches and connections are effectively protected by an anodized aluminum cover. There are three connections to the switch units, allowing them to be connected in ”normally open”, ”normally closed” or ”alternating” modes (see illustration below).
In order to minimize the stopping distance of the actuator and to ensure correct circuit-breaking, the actuator should be connected as shown in the wiring diagram below.



W = Common
C = Normally closed
O = Normally open

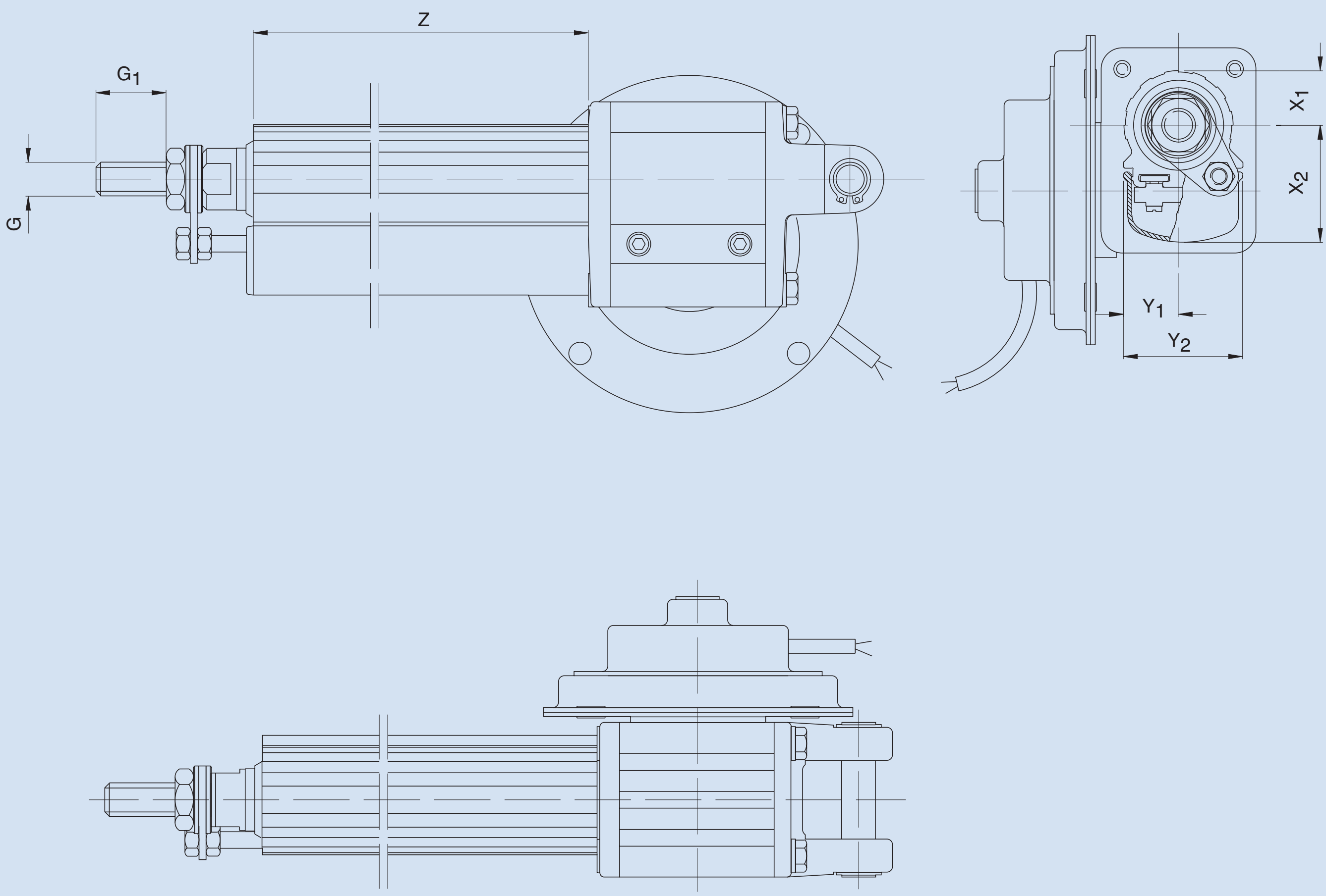


Permissible brake power 3 W
Max brake voltage 200 V DC
Max brake current 200 mA DC
The switches must not be connected to an AC supply

SKF

Accessories

Limit switch CAXB



Designation	Dimensions X1	X2	Y1	Y2	Z	G	G1
	mm	mm	mm	mm	mm	thread	mm
CAXB 22x50	14	37	22	42.5	120	M10x1.5	25
CAXB 22x100					170		
CAXB 22x150					220		
CAXB 22x200					270		
CAXB 22x300					370		
CAXB 32x50	20	42	20	42.5	120	M12x1.75	25
CAXB 32x100					170		
CAXB 32x200					270		
CAXB 32x300					370		
CAXB 32x500					570		
CAXB 32x700					770		
CAXB 40x100	23	46	19	42.5	170	M16x2	35
CAXB 40x300					370		
CAXB 40x500					570		
CAXB 40x700					770		

Options

Friction clutch
All CAR actuators, except size 22, can be equipped with a friction clutch. The friction clutch is not intended for use as a load limiter, but only for protection of the actuator and the mechanism to which the actuator is fitted, in the event of dynamic overload.

Back-up nut
CAR 32 and CAR 40 can be fitted with a back-up nut in cases where added safety is required. The ball nut is then equipped with a device which prevents the ball nut moving axially, in case of failure.

SKF Control units

	CAEL 10-24R	CAEN 10R	CAEP 10P-SL	CAED 5-24R	CAED 9-24R	CAEV 110/220
DC-Motor						
D24B				X		
D24C	X	X	X		X	
D24CS	X	X	X		X	
D24CB	X	X	X		X	
D24CW				X		
AC-Motor						
E110C						X
E110CB						X
E220C						X
E220CB						X
Limit switch						
CAXB	X	X		X	X	X
Hand switch						
CAES 31B	X	X	X			
CAES 31C				X	X	X

Calculations
Life calculation

The service life of a CAR actuator is normally determined by the L_{10} life of the ball screw. In most cases there is less wear on the worm gear and bearings than on the ball screw. Under certain circumstances the life of the motor is shorter than that of the ball screw, however, the motor can be easily replaced. The table, page 11, shows the life of various DC-motors at rated output power. Generally, the life of DC-motors is reduced when load and number of starts/stops is increased. To calculate the basic rating life L_{10} of ball screw it is sufficient if the dynamic load and actual stroke is known. L_{10} is defined as the life that 90 % of a sufficiently large group of apparently identical ball screws can be expected to attain or exceed.

$$L_{10\,d\,s} = \frac{500\,000 \text{ x} p}{S} \text{ x } \left(\frac{C}{F_M}\right)^3$$

$L_{10\,d\,s}$ = basic rating life in double strokes i.e. a stroke from one end position to the other and back again.

p = lead of the ball screw mm (CAR 22, 2.5 mm, CAR 32, 4 mm, CAR 40, 5 mm).

S = actual stroke (mm).

C = ball screw basic dynamic load rating (N) (CAR 22, 1500N, CAR 32, 3400N, CAR 40, 5200N).

F_M = cubic mean load (N).

In many cases, the magnitude of the load fluctuates. In order to calculate the equivalent screw load, it is first necessary to determine a constant mean load F_M which would have the same influence on the ball screw as the actual fluctuating load. A constant mean load can be obtained from the formula below.

$$F_M = \sqrt[3]{\frac{F_1^3 xS_1 + F_2^3 xS_2 + F_3^3 xS_3 + ...}{S_1 + S_2 + S_3 + ...}}$$

F_1, F_2, F_3...= cubic load (N) during S_1, S_2 and S_3 .... partial stroke.

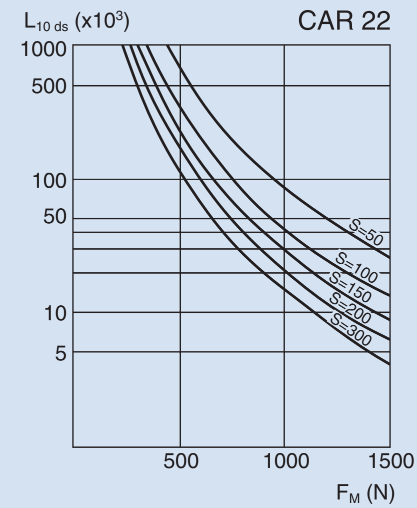
The diagrams show life in double strokes, $L_{10\,d\,s}$ at various load and stroke.

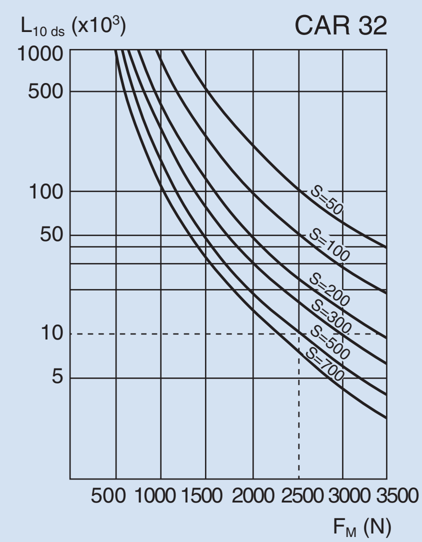
Example:
CAR 32x500x1/D24C having a load of 2800N in one direction of movement and 2100N in the other. The entire stroke of the actuator is utilized.

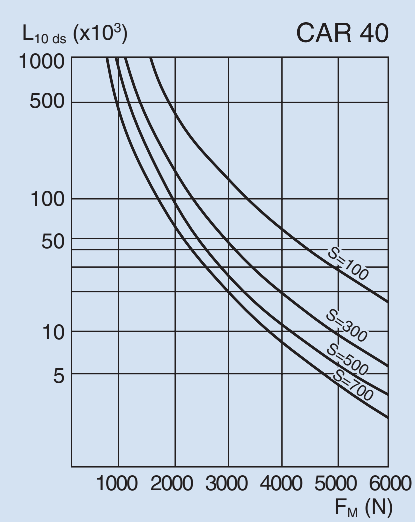
$$F_M = \sqrt[3]{\frac{2800^3 \text{ x } 500 + 210^3 \text{ x } 500}{500 + 500}} = 2500 \text{ N}$$

Diagram for CAR 32 shows $L_{10\,d\,s}$ = 10000 double strokes

Basic rating life $L_{10\,d.s.}$







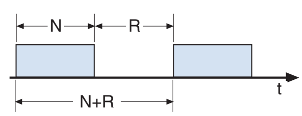
Calculations

Duty factor

SKF Linear Actuators are designed for intermittent operation. Permitted load is related to the duty factor i.e. load must be reduced when the duty factor is increased. In the diagrams maximum load is shown as a function of duty cycle. A capacitor must be selected for AC-actuators. The diagrams show required capacitor size at various load and duty factor. If the recommended duty factor is exceeded the actuator may be overheated and damaged. Duty factor is defined as amount of time running under load versus total cycle time.

$$\text{Duty factor \%} = \frac{N}{N+R} \times 100$$

N = running under load
R = rest period
N+R = total cycle time



Permitted load for DC-actuators at a specific duty factor is expressed in percentage of maximum dynamic load capacity, see diagram.

Example:
A CAR 40x700x2/D24D is running with the following cycle. 5 seconds running, 5 seconds rest, 5 seconds running, 15 seconds rest, and so on.

Calculate duty factor and maximum load for this working cycle.

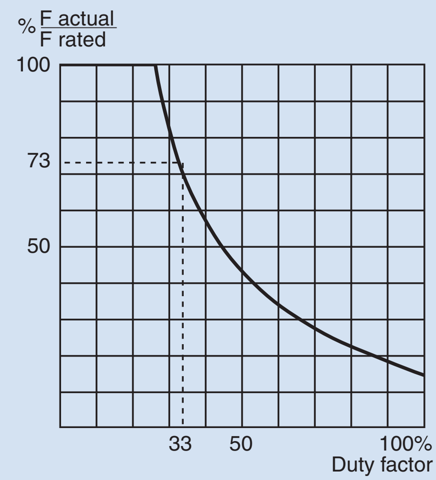
$$\text{Duty factor} = \frac{5+5}{(5+5)+(5+15)} \times 100 = 33\ \%$$

Diagram shows that permitted load (F_{act}/F_{rated}) is 73% of maximum dynamic load at 33 % duty factor.

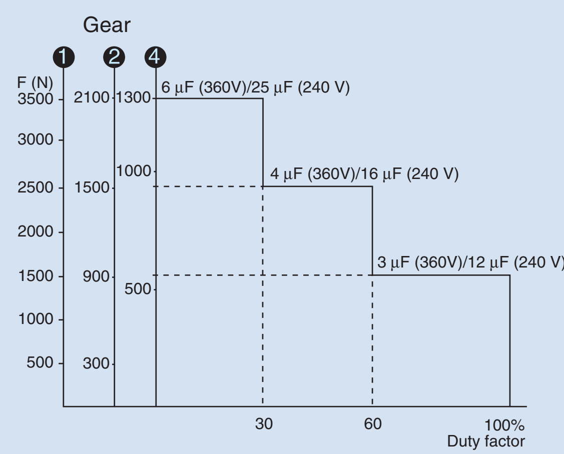
Max dynamic load = 5000 N
Permitted load = 0.73x5000=3650 N.

Note:
All diagrams are valid for a maximum ambient temperature of +20°C. At higher temperatures or in critical applications, please contact SKF.

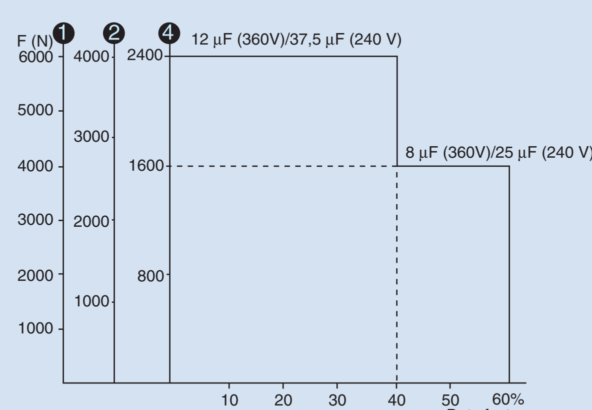
CAR 22, 32, 40 ... 24/12 VDC
CAP 32... 24/12VDC



CAR 32...220/110VAC



CAR 40... 220/110VAC



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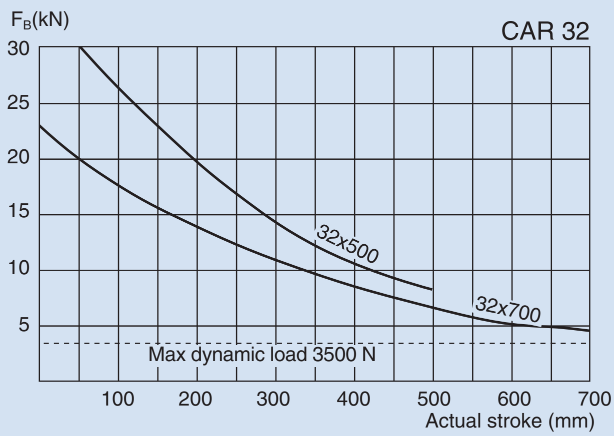
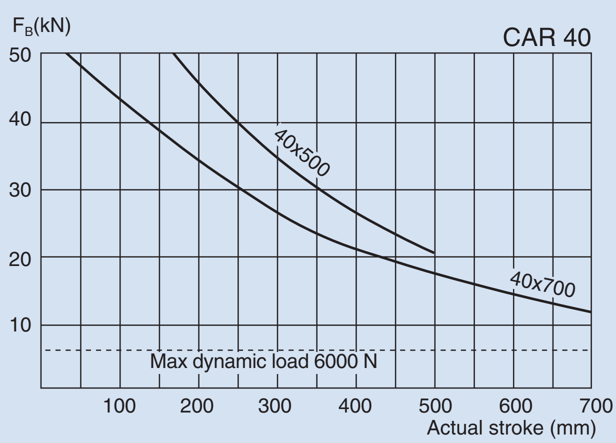
Calculations

Buckling safety factor

At max. dynamic load the buckling safety factor exceeds 2 for all actuators with standard stroke, except CAR 32 with a stroke of 700 mm. The diagrams below, show the buckling load for CAR 32 and 40 with 500 and 700 mm strokes. As shown, the buckling load varies with the actual stroke. If the required stroke exceeds the maximum standard stroke, please contact SKF.

Buckling load





Selection

Long lead wires between the power source and the actuator will result in a voltage drop for DC-units. The wires should be selected so that the voltage drop does not exceed 5 % of rated voltage. Required wire dimension can be calculated using the following formula:

$$a = 0.4 \ \mathrm{x} \ L \ \mathrm{x} \ \frac{I}{U}$$

a = cross section area of the wire (mm^2)
L = total wire length in the both directions (m)
I = current consumption (A)
U = supply voltage (DC)

Example:
L= 5 m
I= 14A
U =12 Vd.c.

$$a = 0.4 \ \mathrm{x} \ 5 \ \frac{14}{12} = 2.3 \ mm^2$$

i.e. select nearest standard wire: a=2.5 mm^2

Temperatures
The CAR actuator can normally be used within a temperature range -20°C to +70°C. All performance data stated in the catalogue are only valid at +20°C.

SKF Actuation Systems - Product groups

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Linear actuators

Telescopic pillars

Rotary actuators

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