

CASM electric cylinders



The modular electric cylinder system

CASM electric cylinders are ideally suited to performing fast and powerful linear movements. Unlike pneumatic or hydraulic cylinders, CASM electric cylinders are flexible and thus can be positioned precisely. Furthermore, due to a reduced number of components, the whole system is more cost-effective, resulting in lower energy and maintenance costs.

The CASM modular concept enables easy connection to your preferred motor and control system. This can reduce design and programming costs considerably.

Thanks to high-grade materials, a sealing system with IP54S level protection, and high-quality manufacturing, CASM electric cylinders can also be used long-term even under adverse conditions. The low-backlash design provides positioning precision of up to ± 0.01 mm. Together with various screws for different speeds and forces, CASM electric cylinders are the optimum solution for a wide variety of applications.



Features

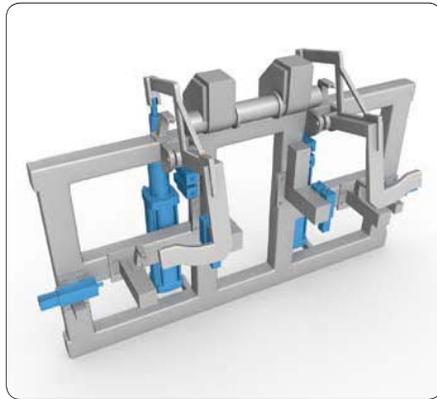
- ▶ Customised motor adapter
- ▶ Multi-option modular system
- ▶ Highly energy-efficient
- ▶ Highest levels of precision and repeatability

Benefits

- Use your own controls and motors
- Easy integration and fast assembly
- Reduced stock
- Lower energy costs
- Worldwide service and support
- Very secure investment

SKF automation solutions

The CASM range from SKF contributes to better performing and more reliable machine operations in a wide spectrum of automated applications.

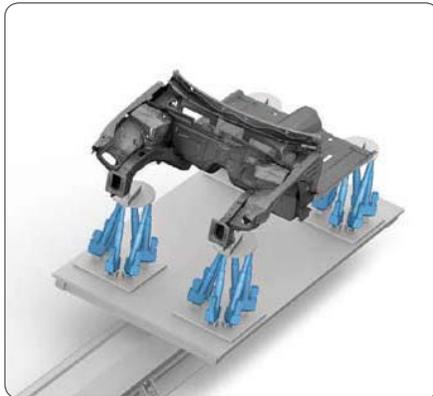
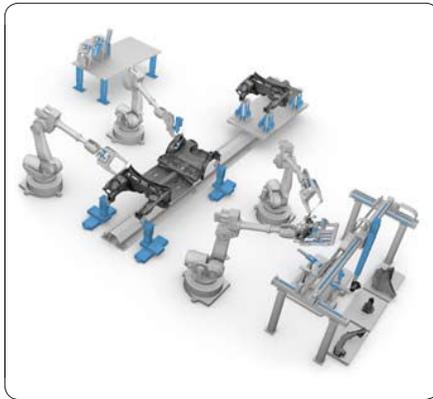


Tailor-made solutions with very flexible choices

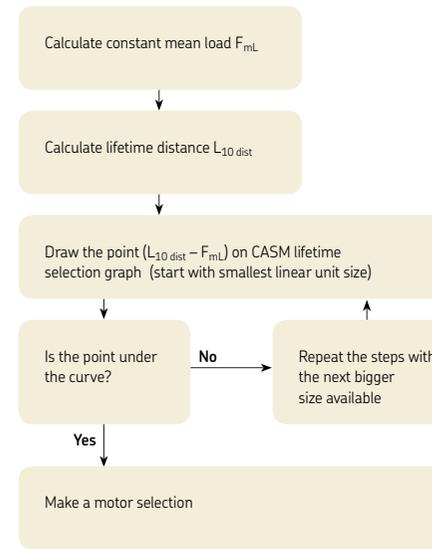
Thanks to its modularity, the CASM can easily be integrated into your own system. Depending on the needed mechanical performance (dynamic load, speed), a wide range of motors can be selected to match the performance for your application (nominal force, linear speed, peak force, etc.).

Replacement of pneumatics

CASM electromechanical solutions are a good alternative to pneumatic systems. With energy savings of up to 90%, electromechanical solutions result in tremendous savings. Besides, with less maintenance needed and less contamination risks, the operating costs of electromechanical solutions are much lower than for pneumatic systems. Like pneumatic cylinders, CASM linear units comply with ISO standards which makes replacement very easy. Thanks to software monitoring, CASM actuators can be synchronized and positioning is more accurate resulting in higher process stability.



Selection of the linear unit



F_{mL} = constant mean load for lifetime calculation in N
 F_n = force acting on push tube in N
 S_n = distance travelled in mm

How to calculate the lifetime distance $L_{10 dist}$

The lifetime distance $L_{10 dist}$ is defined as the life in km that 90% of a sufficiently large group of apparently identical actuators can be expected to attain or exceed.

$$L_{10 dist} = \frac{S_{total} \times t_L \times 0,0036}{t_{total}}$$

$L_{10 dist}$ = lifetime distance in km
 S_{total} = total distance travelled per cycle (both directions) in mm
 t_L = lifetime in hours
 t_{total} = total cycle time (from one cycle to the next) in s

Example:

Total distance travelled per cycle: 400 mm
 Required lifetime: 5 years, 230 days/year 24 h/day = 27 600 hours
 Total cycle time: 15 s

$$L_{10 dist} = \frac{400 \times 27\,600 \times 0,0036}{15} = 2\,650 \text{ km}$$

Draw the operating point on CASM lifetime chart

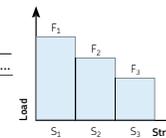
Example:

$F_{mL} = 500 \text{ N}$ and $L_{10 dist} = 2\,650 \text{ km}$

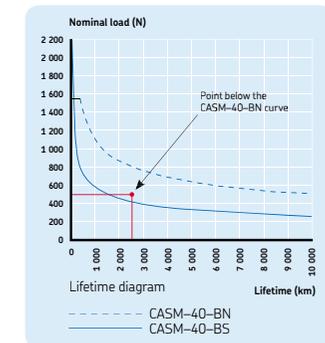
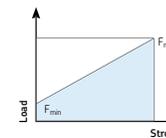
How to calculate the constant mean load F_{mL}

In many cases, the magnitude of the load fluctuates. In order to calculate the equivalent actuator load, it is necessary to first determine a constant mean load F_{mL} which has the same influence on the screw as the actual fluctuating load. A constant mean load can be obtained from the formula below:

$$F_{mL} = \sqrt[3]{\frac{F_1^3 S_1 + F_2^3 S_2 + F_3^3 S_3 + \dots}{S_1 + S_2 + S_3 + \dots}}$$



$$F_{mL} = \frac{F_{min} + 2F_{max}}{3}$$

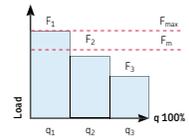


In this example, the CASM-40-BN is the smallest possible linear unit.



Selection of the motor

To calculate the mean motor torque, we first need to calculate the mean load F_m over the motor running time. Please note that the use of a motor brake can reduce the needed power of the motor.



$$F_m = \sqrt[3]{F_1^3 q_1 + F_2^3 q_2 + F_3^3 q_3}$$

F_m = mean force for motor selection in N
 F_n = force of the actuator, powered by the motor, in N
 q_n = time needed for one movement in percent of the full cycle

Example:
 $F_1 = 700 \text{ N}, t_1 = 2 \text{ s}, q_1 = 10\%$
 $F_2 = 500 \text{ N}, t_2 = 15 \text{ s}, q_2 = 75\%$
 $F_3 = 300 \text{ N}, t_3 = 3 \text{ s}, q_3 = 15\%$

If no brake is engaged:

$$F_m = \sqrt[3]{700^3 \times 0,1 + 500^3 \times 0,75 + 300^3 \times 0,15} = 509 \text{ N}$$

If the brake is engaged during the period q_2 :

$$F_m = \sqrt[3]{700^3 \times 0,1 + 0 \times 0,75 + 300^3 \times 0,15} = 337 \text{ N}$$

When using a SKF tested motor

When using a SKF tested motor, make sure that the F_m value mentioned in the system capabilities is equal to or higher than the calculated F_m value of your application.

System capabilities for CASM-40 with Siemens motor 1FK7034

	Unit	Peak force	F_m
CASM-40-LS	N	600	600
CASM-40-BS	N	2 375	1 219
CASM-40-BN	N	1 550	572

In our example, the F_m mentioned in the system capabilities for the CASM-40-BN is 572 N while the application has a F_m of 509 N. Therefore, the Siemens 1FK7034 is the right motor for this application.

When using a third-party motor

When using a third-party motor, we need to calculate the minimum required rated torque and maximum torque of the motor.

$$M_{M \min} = \frac{M_{L \max} F_m}{F_d}$$

$$M_{M \max} = \frac{M_{L \max} F_{\max}}{F_d}$$

$M_{M \min}$ = minimum rated torque required by the motor during the cycle in Nm
 $M_{M \max}$ = highest torque the motor has to reach during the cycle in Nm
 $M_{L \max}$ = maximum allowed input torque of the linear unit in Nm
 F_m = mean load of the application in N
 F_{\max} = maximum load of the application in N
 F_d = dynamic force of the linear unit in N

In our previous example:

$$M_{M \min} = \frac{4 \times 509}{1\,550} = 1,31 \text{ Nm}$$

$$M_{M \max} = \frac{4 \times 700}{1\,550} = 1,81 \text{ Nm}$$

The rated torque of the motor should be at least 1,31 Nm at the needed speed, and the absolute maximum torque of the motor (or peak torque) must exceed 1,81 Nm.

Attention:

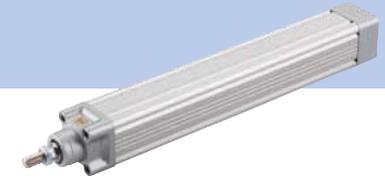
The dynamic torque of the motor may vary according to the speed. Please confirm that your motor is able to reach the needed speed, acceleration and max. torque for your application.

Configuration

For quick and easy selection, please use the Actuator Select application on www.skf.com/casm

CASM-32

Linear units

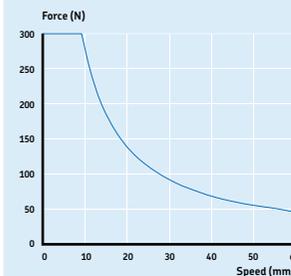


Technical data

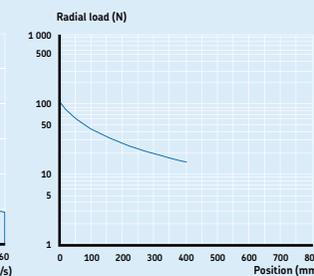
	Unit	CASM-32-LS	CASM-32-BS	CASM-32-BN
Screw type	–	Lead screw	Ball screw	Ball screw
Screw diameter	mm	9	10	10
Screw pitch	mm	1,5	3	10
Max. dynamic force	N	300	700	630
Max. static force	N	700	700	700
Max. speed	mm/s	60	150	500
Stroke	mm	50 to 400	50 to 400	50 to 400
Max. input torque*	Nm	0,5	0,8	1,4
Max. input RPM*	1/min	2 400	3 000	3 000
Max. acceleration	m/s ²	1	6	6
Duty cycle	%	60	100	100
Lifetime L_{10}	km	70	see chart	see chart
Repeatability (same direction and load)	mm	± 0,07	± 0,01	± 0,01
Operating temperature	°C	0 to +50	0 to +50	0 to +50
Humidity	%	95	95	95
Type of protection	IP	54S	54S	54S

* Speed and torque of the motor needs to be limited

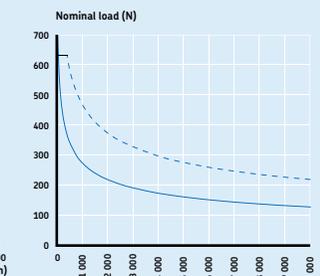
Performance diagrams CASM-32



Speed – force diagram CASM-32-LS
 No limitation for ball screw types (max. load at max. speed).



Radial load diagram
 The radial load acts perpendicular to the moving direction.

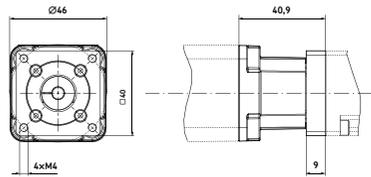


Lifetime diagram
 - - - - - CASM-32-BN
 ——— CASM-32-BS



Siemens motors and adapters

In-line adapter kit for CASM-32 and Siemens 1FK7015 motor*



* Screws included



Order N°
ZBE-375530

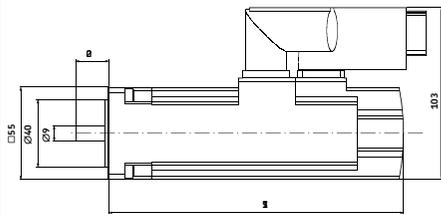
System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-32-LS	N	300	203
CASM-32-BS	N	700	293
CASM-32-BN	N	450	151

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

Solution with Siemens motor 1FK7022 and compatible adapter

Dimensional drawing Siemens motor 1FK7022

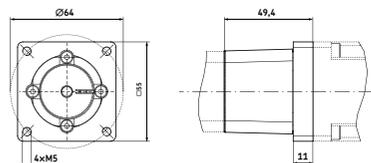


Order N°
1FK7022-5AK71-1UH3

Motor data

	Unit	1FK7022
Rated power (100 K)	kW	0,43
Rated speed	min ⁻¹	6 000
Rated current	A	1,4
Rated torque (100 K)	Nm	0,6
Static torque (100 K)	Nm	0,85
Peak torque	Nm	3,4
Inertia with brake	10 ⁻⁴ kgm ²	0,35
Shaft height	mm	28
Weight with brake	kg	2

In-line adapter kit for CASM-32 and Siemens 1FK7022 motor*



* Screws included



Order N°
ZBE-375531

System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-32-LS	N	300	300
CASM-32-BS	N	700	672
CASM-32-BN	N	630	357

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

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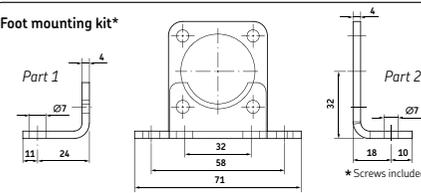
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CASM-32

Accessories

Foot mounting kit*



* Screws included

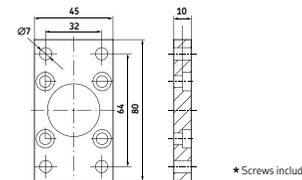


Note: The foot mounting between the linear unit and the adapter kit increases the length of the in-line version by 4 mm

Order N°
ZBE-375501-32
For parallel version
(2x part 1)

Order No
ZBE-375507-32
For in-line version
(part 1 + part 2)

Flange mounting kit*

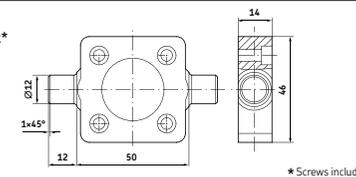


* Screws included



Order N°
ZBE-375502-32

Trunnion flange kit*

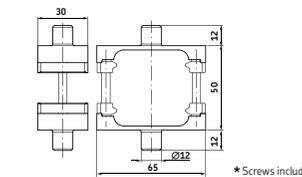


* Screws included



Order N°
ZBE-375503-32

Trunnion mounting kit*

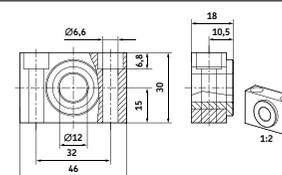


* Screws included



Order N°
ZBE-375508-32

Trunnion support pair



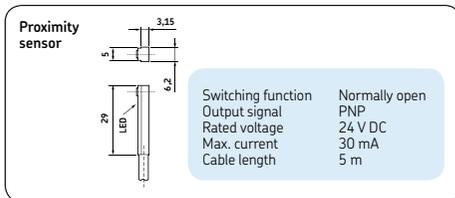
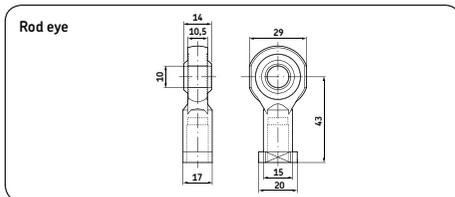
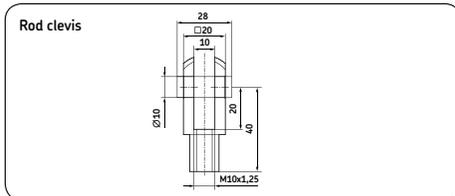
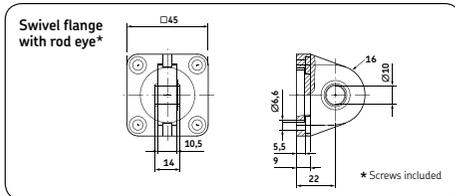
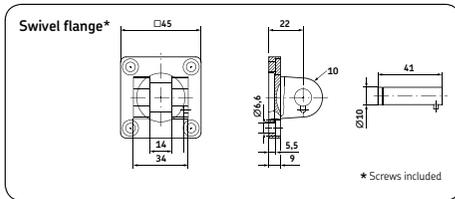
Note: to be used with trunnion flange kit or trunnion mounting kit



Order N°
ZBE-375509-32



Accessories



CASM-32

Order N°
ZBE-375504-32
For parallel version only

Order N°
ZBE-375506-32
For parallel version only

Order N°
ZBE-375510-32

Order N°
ZBE-375511-32

Order N°
ZSC-375525-N0

CASM-40

Linear units

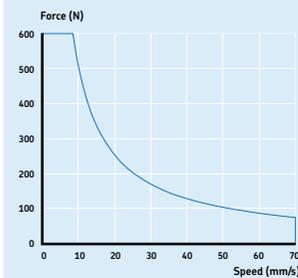


Technical data

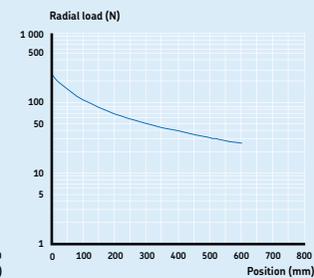
	Unit	CASM-40-LS	CASM-40-BS	CASM-40-BN
Screw type	-	Lead screw	Ball screw	Ball screw
Screw diameter	mm	12,5	12	12,7
Screw pitch	mm	2,5	5	12,7
Max. dynamic force	N	600	2 375	1 550
Max. static force	N	1 500	2 375	2 375
Max. speed	mm/s	70	300	825
Stroke	mm	100 to 600	100 to 600	100 to 600
Max. input torque*	Nm	1,2	2,9	4
Max. input RPM*	1/min	1 680	3 600	3 900
Max. acceleration	m/s ²	1	6	6
Duty cycle	%	60	100	100
Lifetime L ₁₀	km	100	see chart	see chart
Repeatability (same direction and load)	mm	± 0,07	± 0,01	± 0,01
Operating temperature	°C	0 to +50	0 to +50	0 to +50
Humidity	%	95	95	95
Type of protection	IP	54S	54S	54S

* Speed and torque of the motor needs to be limited

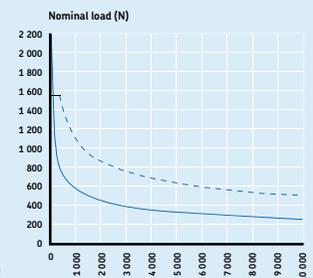
Performance diagrams CASM-40



Speed - force diagram CASM-40-LS
No limitation for ball screw types (max. load at max. speed).



Radial load diagram
The radial load acts perpendicular to the moving direction.



Lifetime diagram
--- CASM-40-BN
— CASM-40-BS

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Electro Mechanical Systems Limited

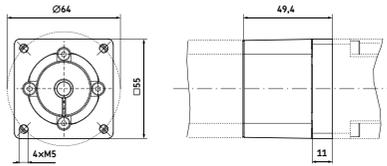
tel: 0118 981 7391

info@ems-ltd.com

www.ems-limited.co.uk

Siemens motors and adapters

In-line adapter kit for CASM-40 and Siemens 1FK7022 motor*



* Screws included



Order N°
ZBE-375532

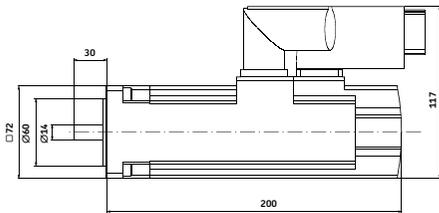
System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-40-LS	N	600	408
CASM-40-BS	N	2 375	640
CASM-40-BN	N	1 318	301

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

Solution with Siemens motor 1FK7034 and compatible adapter

Dimensional drawing Siemens motor 1FK7034

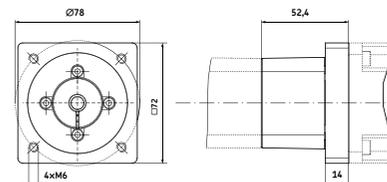


Order N°
1FK7034-5AK71-1UH3

Motor data

	Unit	1FK7034
Rated power (100 K)	kW	0,63
Rated speed	min ⁻¹	6 000
Rated current	A	1,3
Rated torque (100 K)	Nm	1
Static torque (100 K)	Nm	1,6
Peak torque	Nm	6,5
Inertia with brake	10 ⁻⁴ kgm ²	0,98
Shaft height	mm	36
Weight with brake	kg	4

In-line adapter kit for CASM-40 and Siemens 1FK7034 motor*



* Screws included



Order N°
ZBE-375533

System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-40-LS	N	600	600
CASM-40-BS	N	2 375	1 219
CASM-40-BN	N	1 550	572

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

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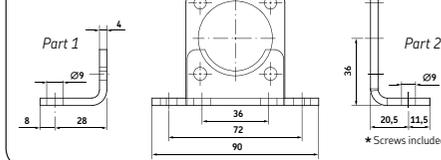
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CASM-40

Accessories

Foot mounting kit*



* Screws included

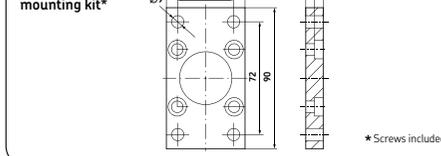


Note: The foot mounting between the linear unit and the adapter kit increases the length of the in-line version by 4 mm

Order N°
ZBE-375501-40
For parallel version
(2x part 1)

Order N°
ZBE-375507-40
For in-line version
(part 1 + part 2)

Flange mounting kit*

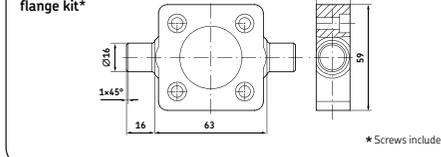


* Screws included



Order N°
ZBE-375502-40

Trunnion flange kit*

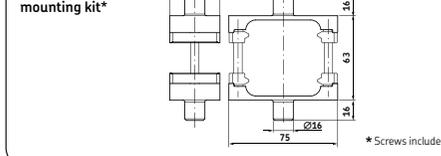


* Screws included



Order N°
ZBE-375503-40

Trunnion mounting kit*

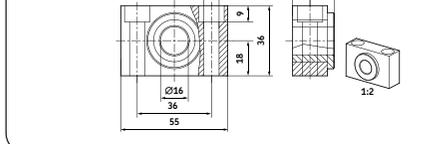


* Screws included



Order N°
ZBE-375508-40

Trunnion support pair



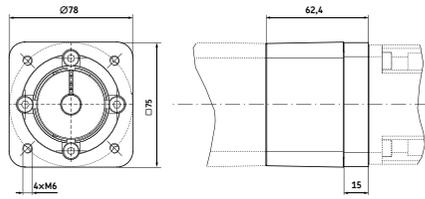
Note: to be used with trunnion flange kit or trunnion mounting kit

Order N°
ZBE-375509-40



Siemens motors and adapters

In-line adapter kit for CASM-63 and Siemens 1FK7034 motor*



* Screws included



Order N°
ZBE-375534

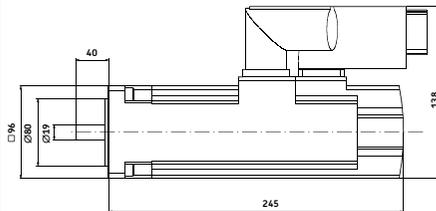
System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-63-LS	N	1 000	527
CASM-63-BN	N	3 052	708
CASM-63-BF	N	1 583	367

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

Solution with Siemens motor 1FK7044 and compatible adapter

Dimensional drawing Siemens motor 1FK7044

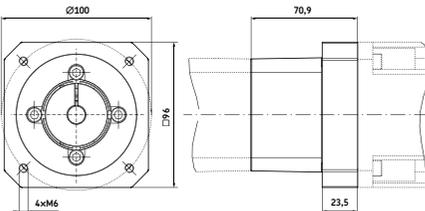


Order N°
1FK7044-7AH71-1UH3

Motor data

	Unit	1FK7044
Rated power (100 K)	kW	1,41
Rated speed	min ⁻¹	4 500
Rated current	A	4,9
Rated torque (100 K)	Nm	3
Static torque (100 K)	Nm	4
Peak torque	Nm	12
Inertia with brake	10 ⁻⁴ kgm ²	1,41
Shaft height	mm	48
Weight with brake	kg	8,3

In-line adapter kit for CASM-63 and Siemens 1FK7044 motor*



* Screws included



Order N°
ZBE-375535

System capabilities

	Unit	Peak force	Fm ¹⁾
CASM-63-LS	N	1 000	1 000
CASM-63-BN	N	5 400	1 745
CASM-63-BF	N	2 800	905

¹⁾ RMS force over full cycle. For more information, please visit www.skf.com/casm

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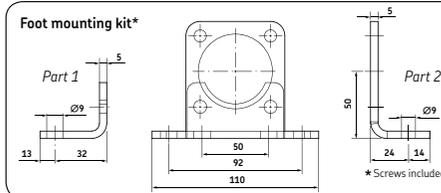
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CASM-63

Accessories

Foot mounting kit*



* Screws included

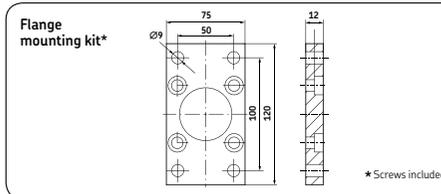


Note: The foot mounting between the linear unit and the adapter kit increases the length of the in-line version by 5 mm

Order N°
ZBE-375501-63
For parallel version
(2x part 1)

Order N°
ZBE-375507-63
For in-line version
(part 1 + part 2)

Flange mounting kit*

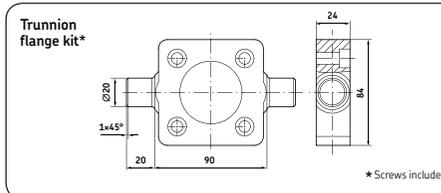


* Screws included



Order N°
ZBE-375502-63

Trunnion flange kit*

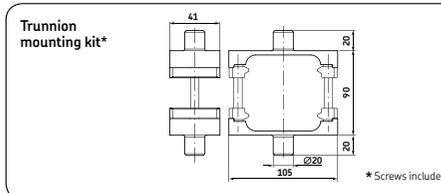


* Screws included



Order N°
ZBE-375503-63

Trunnion mounting kit*

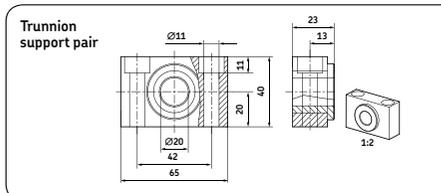


* Screws included



Order N°
ZBE-375508-63

Trunnion support pair



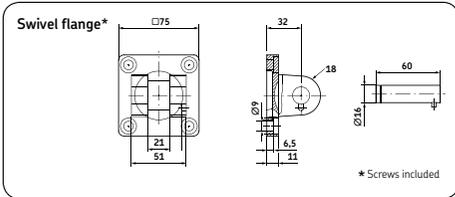
Note: to be used with trunnion flange kit or trunnion mounting kit



Order N°
ZBE-375509-63

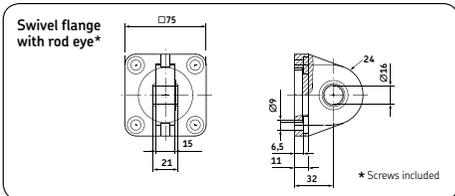


Accessories

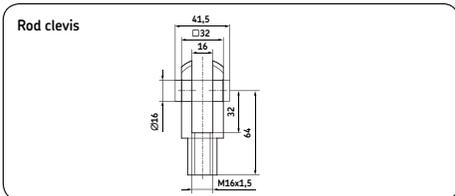


CASM-63

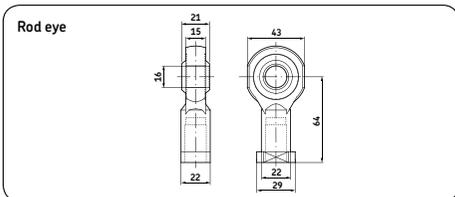
Order N°
ZBE-375504-63
For parallel version only



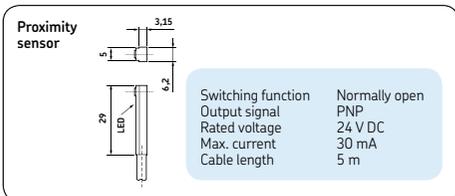
Order N°
ZBE-375506-63
For parallel version only



Order N°
ZBE-375510-63



Order N°
ZBE-375511-63



Order N°
ZSC-375525-N0

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