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 maintenances costs.

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

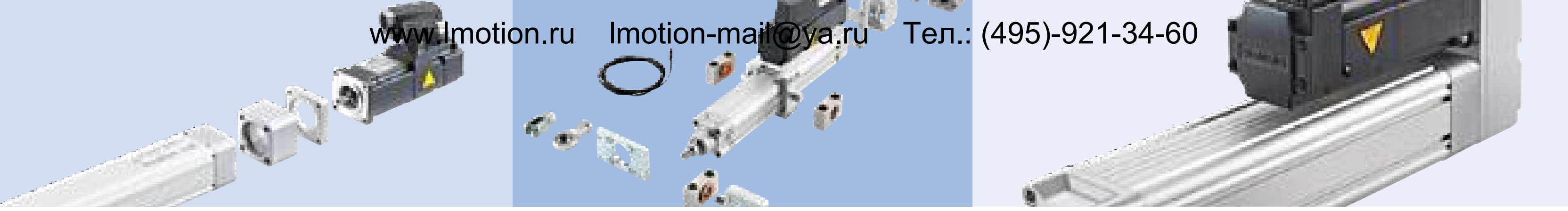
Thanks to high-grade materials, a sealing system with IP54S level protection, and high-quality manufacturing, CASM electric cylinders can also be used long-term even under adverse conditions. The low-backlash design provides positioning precision of up to ±0,01 mm. Together with various screws for different 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

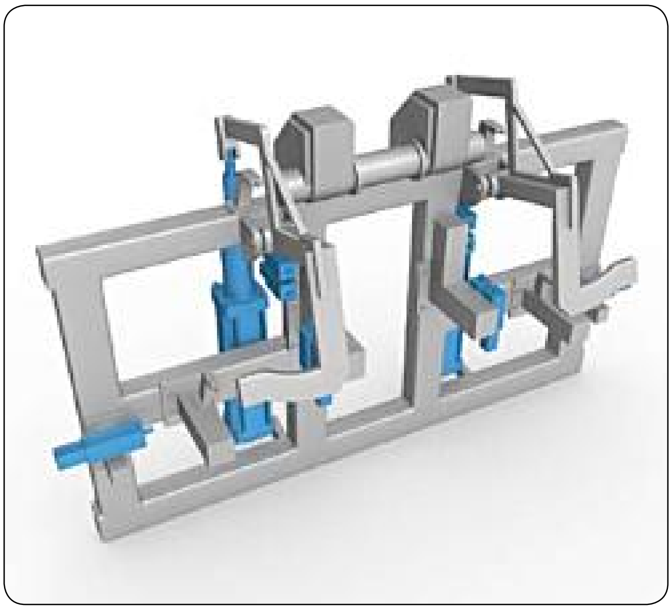
Benefits

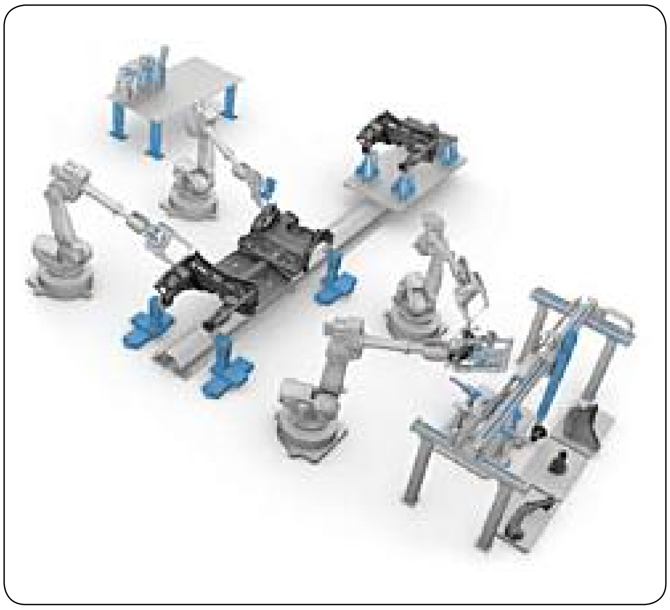
- Use your own controls and motors
- Easy integration and fast assembly
- Reduced stock
- Lower energy costs
- Worldwide service and support
- Very secure investment



SKF automation solutions

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



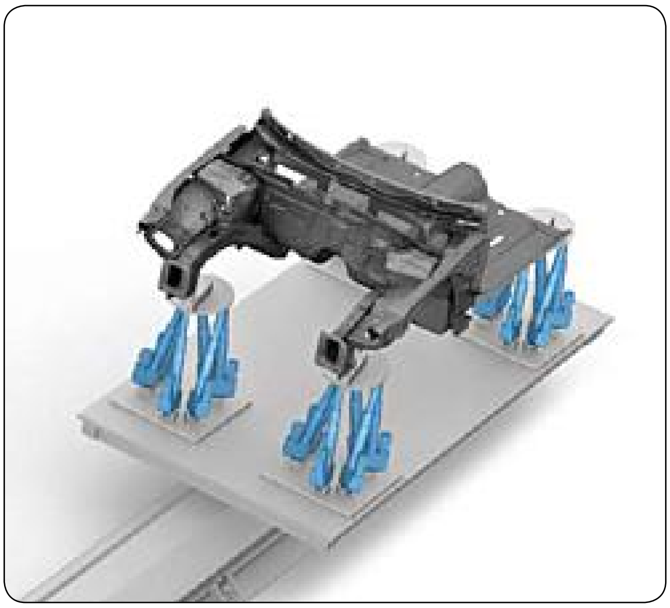


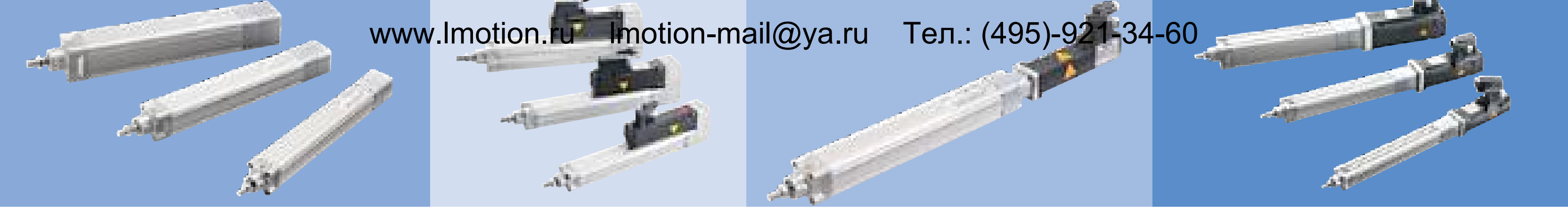
Tailor-made solutions with very flexible choices

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.).

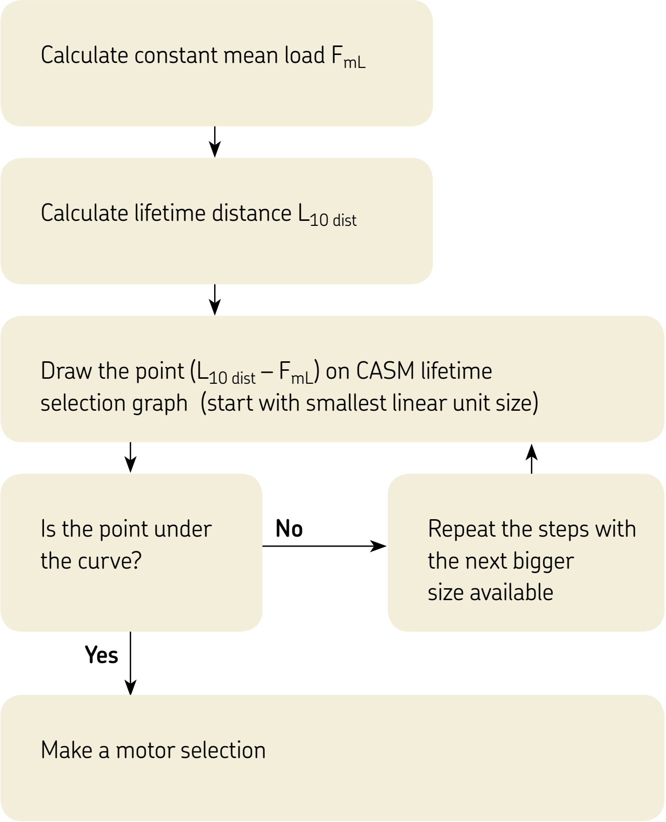
Replacement of pneumatics

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.





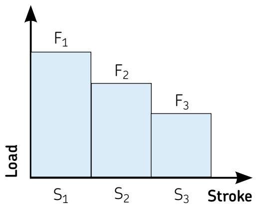
Selection of the linear unit



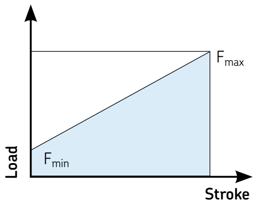
How to calculate the constant mean load F_{mL}

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:

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



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



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.

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

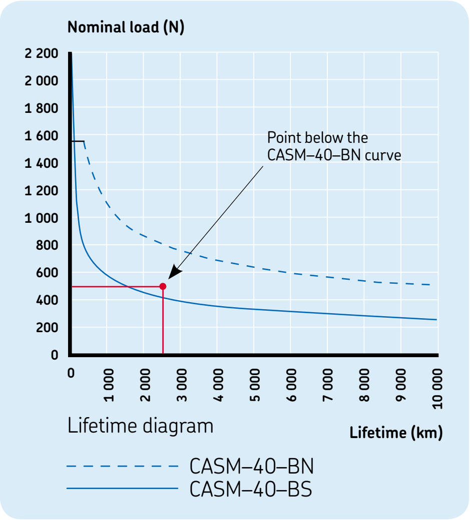
$L_{10\,dist}$ = lifetime distance in km
S_{total} = total distance travelled per cycle (both directions) in mm
t_L = lifetime in hours
t_{total} = total cycle time (from one cycle to the next) in s

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

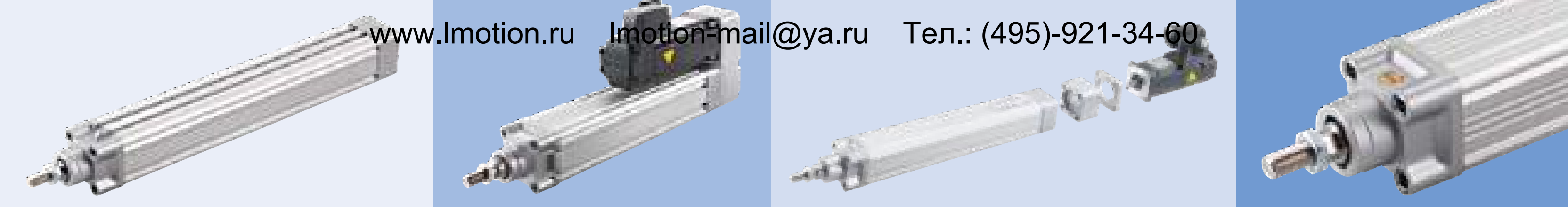
$$L_{10\,dist} = \frac{400 \times 27\,600 \times 0{,}0036}{15} = 2\,650 \text{ km}$$

Draw the operating point on CASM lifetime chart

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

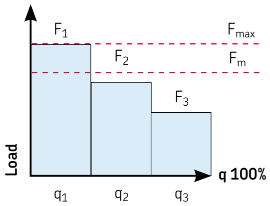


In this example, the CASM-40-BN is the smallest possible linear unit.



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

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

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

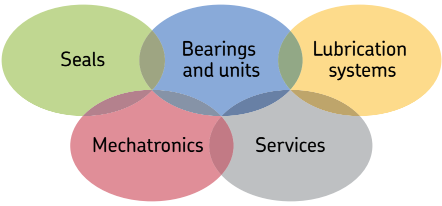
The rated torque of the motor should be at least 1,31 Nm at the needed speed, and the absolute maximum torque of the motor (or peak torque) must exceed 1,81 Nm.

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

See inserts for more details about CASM linear units, accessories and motors and adapters.

The Power of Knowledge Engineering



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

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