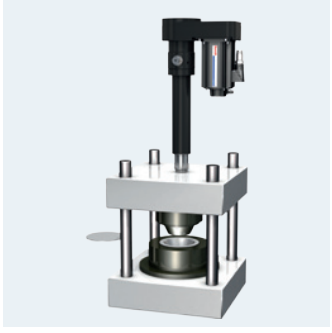
The Drive & Control Company

Rexroth
Bosch Group

# Electromechanical Cylinder EMC-HD

# Identification system for short product names

| **Short product name** | | Example: **EMC – 085 – HD – 1** |
|---|---|---|
| **System** | = | **E**lectro**M**echanical **C**ylinder |
| **Size** | | **085** / 125 |
| **Version** | = | **H**eavy **D**uty |
| **Generation** | = | Product generation **1** |

# Contents

# Product Description

Positioning loads weighing tons to the micrometer, pressing, joining or closing powerfully while varying the motion sequence as required: the new Electromechanical Cylinders EMC Heavy Duty (EMC-HD) from Rexroth exploit the advantages of modern control technology even at high forces.
The high rigidity of the units allows precise positioning in addition to high performance and dynamics. Users can seamlessly integrate the cylinders into intelligent energy management and in this way reduce power consumption and carbon emissions.
Parameters for force, position and travel speed can be set as required and flexibly adapted to new tasks at any time via the drive system. The Electromechanical Cylinders EMC-HD for heavy loads transmit the motor movement via ball or planetary screw assemblies depending on the requirements on dynamics and force. Available in various sizes and leads the highly precise Rexroth screw drives cover a wide range of needs cost-effectively. Rexroth offers the EMC-HD as ready-to-install, purely mechanical axes and as a complete system with a choice of precisely matched gear units, servo motors and drive controllers from the IndraDrive series.

**Structural design**

The mechanical system in the Electromechanical Cylinders EMC-HD Heavy Duty is based on proven planetary or ball screw assemblies in a wide range of diameter and lead combinations. A screw drive converts torque into linear motion with high mechanical efficiency. During this process the piston rod fastened to the screw drive nut is extended and retracted. Both the nut and the piston rod are guided in the housing.
The piston rod-to-housing interface is optimally sealed to prevent dirt from working its way in. The complete cylinder is compliant with protection class IP 65.
The EMC-HD is available with or without a piston rod anti-twist feature. The integrated anti-twist feature is realized by means of four guide surfaces on the piston rod and a sliding guide in the housing.
Integrated end position buffers protect the mechanical system during start-up. Switches are available as an option. Limit switches prevent damage to the cylinder in operation. A reference point switch is available for the use of incremental encoder systems.
Electromechanical Cylinders EMC-HD require only minimal maintenance effort. The advantage of grease lubrication is that the screw drive can run long distances on one supply of grease.

**Advantages**

- High energy efficiency and little pollution (no risk of leaks)
- Straightforward, compact and robust structural design for space-saving integration in machine concepts and usage even in harsh environmental conditions
- Complete building system with multiple combination options for high flexibility to serve a broad range of applications
- Precise positioning, high dynamics, powerful drive and long service life due to the use of highly precise Rexroth planetary and ball screw assemblies
- Smart, freely programmable drive system allowing the realization of complex travel profiles (parameters for force, position and travel speed can be set as required over the complete working travel range)

**Application areas**

Electromechanical Cylinders EMC-HD can be used in many application areas. Due to their specific characteristics, they offer advantages in terms of accuracy, dynamics and controllability, and can therefore not only help to shorten cycle times but also to increase flexibility and quality in the manufacturing process. Their compact design makes them ideal for use in restricted space envelopes.

Possible application areas are:

- Servo presses and forming technology
- Joining technology
- Thermoforming
- Injection molding and blow molding machines
- Woodworking machines
- Machine tools
- Assembly and handling technology
- Packaging machines and conveyor systems
- Testing equipment and laboratory applications
- Simulators
- Special-purpose machines

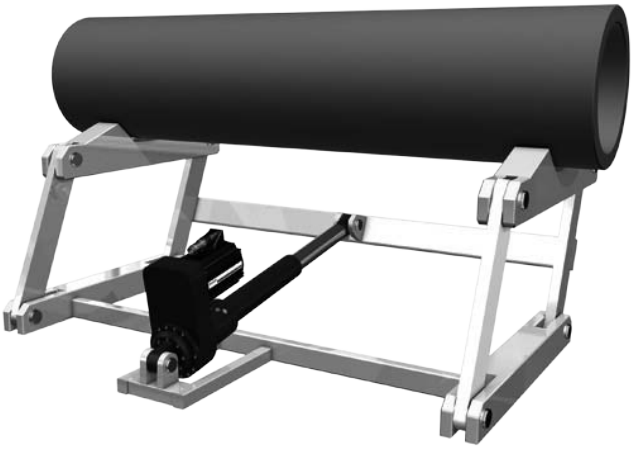
**Application examples**

**Bending**

**Lifting**

**Pressing**

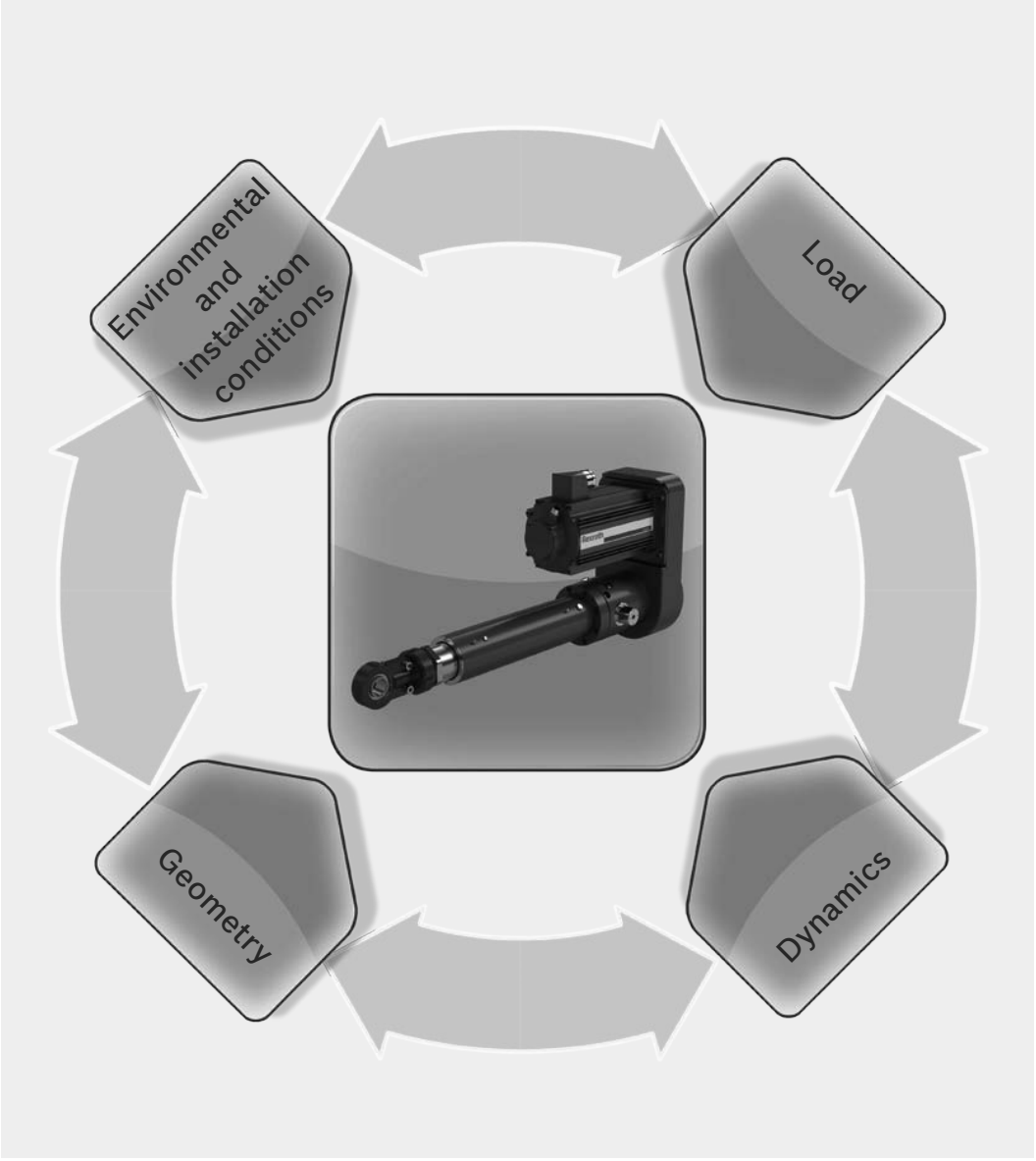
**Transporting**



# Product Selection Guide

To make sure your electromechanical solution delivers optimal performance, both technically and economically, the right decisions have to be made as early as the planning phase. The following key parameters have a decisive influence on the choice of system and its structural design:

- Load
- Dynamics
- Geometry
- Environmental and installation conditions




**Load**
- Process force
- Masses
- Duty cycle
- Service life requirement
- etc.

**Dynamics**
- Acceleration
- Linear speed
- Cycle time
- etc.

**Geometry**
- Work space
- Installation space
- Stroke length
- Interference contours
- etc.

**Environmental and installation conditions**
- Mounting orientation
- Fastening options
- Degrees of freedom
- Temperature
- Humidity
- Contamination
- Vibration and shocks
- etc.

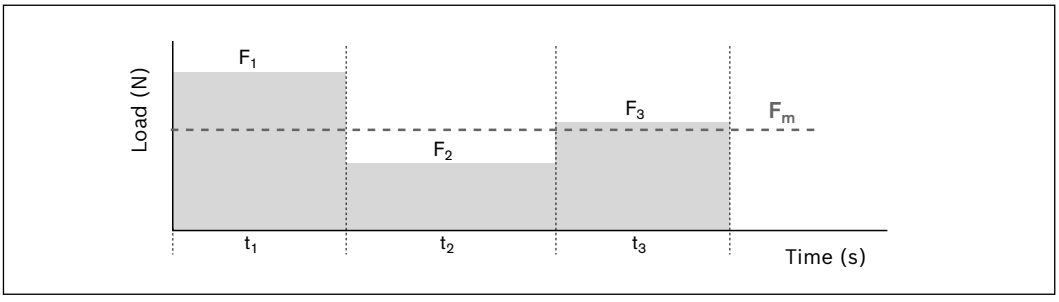
**An Electromechanical Cylinder EMC-HD that matches your needs in just six steps**

Electromechanical Cylinders EMC-HD offer higher dynamics and precision, better controllability and greater mechanical efficiency than the majority of fluid-power drives (e.g. hydraulic cylinders). Because of to their special characteristics in comparison with fluid-driven technology, it is particularly important to completely define the requirements of the application in advance. To find the most cost-efficient solution for your application, the following input parameters should be known:

**1. Loads**

An EMC-HD solution that is both economical and reliable can be found when the loads (process forces and masses) are known as accurately as possible. Along with the maximum force in the application, it is important to also state changing forces over the stroke so that the average load over the entire cycle can be determined. This average load forms the basis for the nominal life calculation.

Large safety factors on the force required, as are common in some fluid-power applications, should be avoided so that the axis is not over-sized. A differentiation is also to be made between static load (cylinder at standstill) and dynamic load (during the feed motion).




**2. Duty cycle**

The duty cycle is the ratio of the operating time to the total cycle time expressed in percent. The duty cycle is an important input parameter for both the estimation of the total service life of the cylinder and for the thermal assessment of cylinder and motor. Pause times should always also be stated for the calculation.

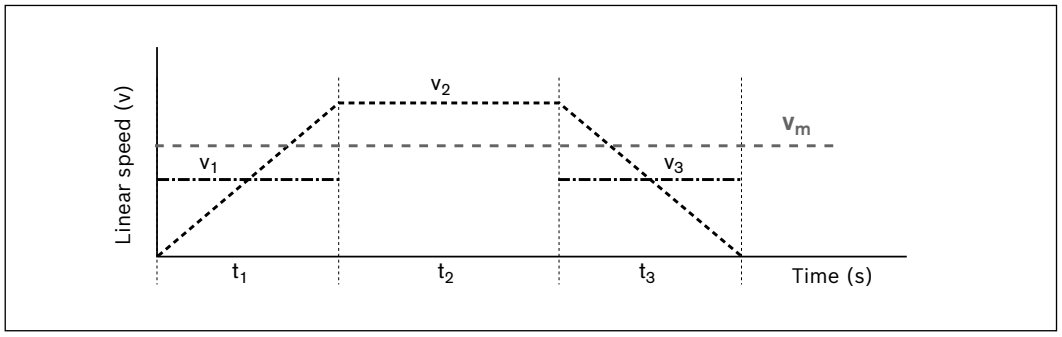
$$DC = \frac{t_O}{t_O + t_P} \cdot 100\%$$

| | | | |
|---|---|---|---|
| DC | = | duty cycle | (%) |
| $t_O$ | = | operating time | (s) |
| $t_P$ | = | pause time | (s) |

# Product Selection Guide

**3. Total cycle**

By stating as accurately as possible the accelerations and linear speeds or, alternatively, the necessary cycle time and the travel, it is possible to adapt the complete drive train to maximize results for the application. The type of screw drive, lead, gear reductions and drive can be selected such that the requirements are met precisely and efficiently.



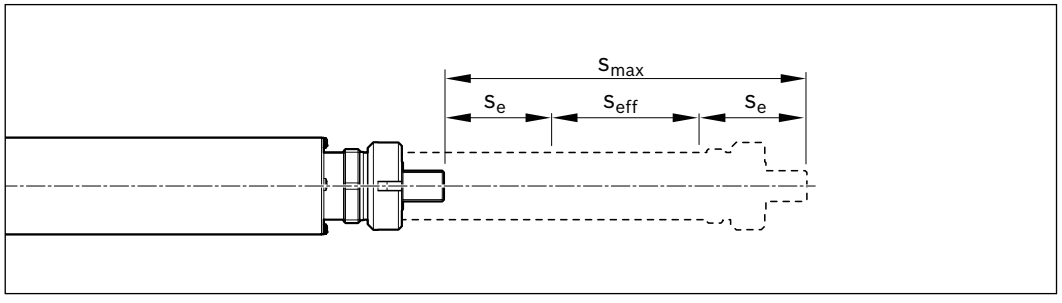

**4. Integration in the machine**

Transverse forces on the piston rod and alignment errors during installation can shorten the service life of the Electromechanical Cylinder EMC-HD.

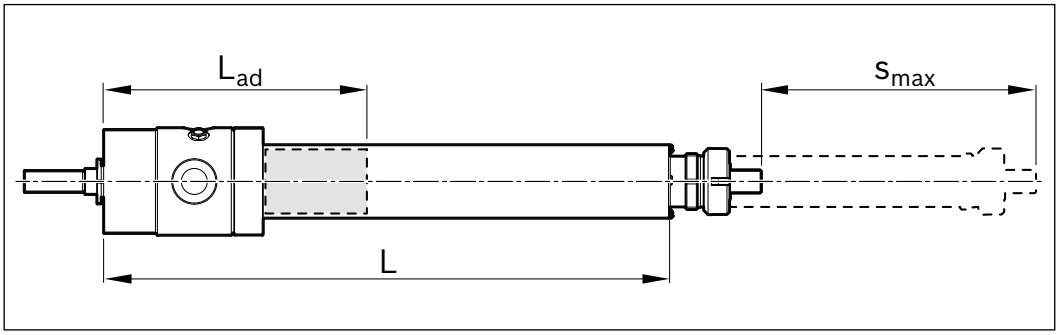
During mounting it must be ensured the cylinder is installed free of distortive stresses and any transverse loads are absorbed by an external guideway. Depending on whether the drive torque is to be absorbed in the cylinder or via an external guideway, the cylinder can be ordered with or without an integrated anti-twist feature. (For further information on the anti-twist feature see the “Structural design” section).

**5. Travel and overall dimensions**

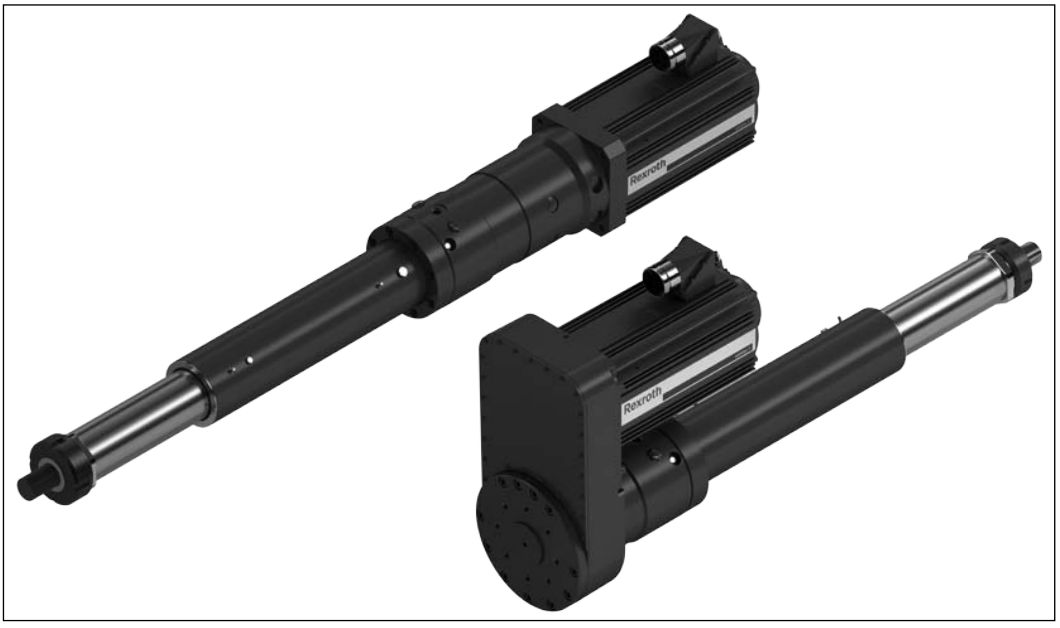
Determine the necessary operating stroke in your application. As Electromechanical Cylinders EMC-HD must not be allowed to travel right up to the mechanical end stop, it is important to add excess travel ($s_e$) to both ends of the effective operating stroke ($s_{eff}$). This maximum travel ($s_{max}$) is the parameter to be stated when ordering the cylinder.



For structural design reasons the overall length of the cylinder is greater than the maximum travel ($s_{max}$), as it includes the length of components such as the screw drive nut or the bearings, in addition to the travel.




The cylinder can be adapted to the available installation space by mounting the motor as an extension to the axis (motor mount and coupling) or parallel to the axis (timing belt side drive). The type of motor attachment chosen also has an effect on the technical performance data and the selectable mounting methods.




**6. Environmental conditions**

The environment in which a cylinder is operated can have a significant effect on its service life. Both very high and very low temperatures can affect seals, lubrication and the performance of the motor. Abrasive dirt and chemicals can damage the seals and ultimately cause the screw drive to fail over the long term.

Please ask if there are special environmental conditions in your application.

# Motor-Controller Combination

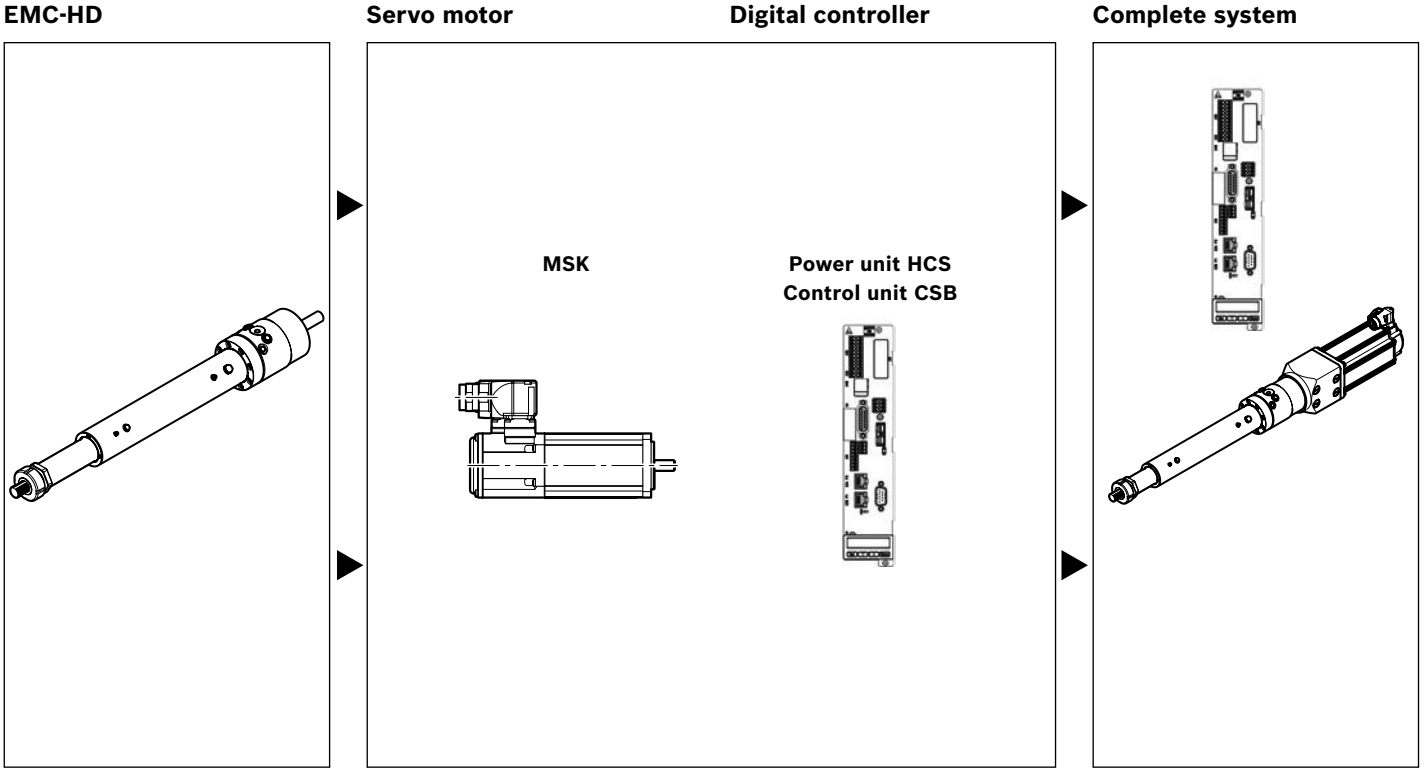
Several motor-controller combinations are available in order to provide the most cost-effective solution for every customer application. When sizing the drive, always consider the motor-controller combination.

**Notes on motors and controllers**

- The motors can be supplied complete with controllers and control systems
- For recommended motor-controller combinations, see the “Servo Motors” section

**Catalogs and information**

- Drive System Rexroth IndraDrive, R999000018
- Rexroth IndraDyn S Synchronous Motors MSK, R911296288
- Rexroth IndraDrive C Drive Controllers with HCS02 and HCS03, R911314904

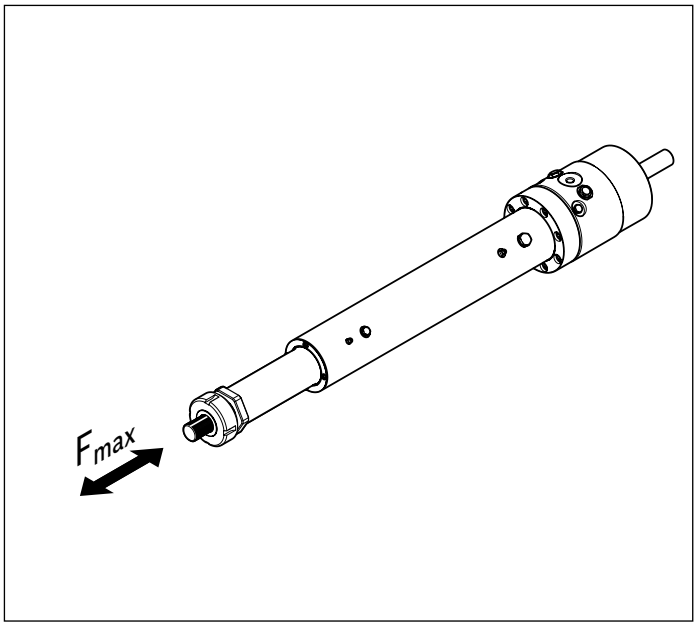


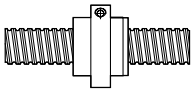
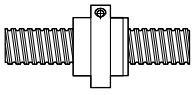
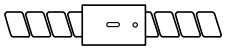
# Load Ratings and Sizes

**Note on dynamic load ratings**

In relation to the desired service life, in general an equivalent dynamic axial load of up to about 20% of the dynamic load rating (C) has proved appropriate.
(See also service life graphs in the “Technical Data” section.)

- Here the following must not be exceeded:
  - The maximum permissible drive torque
  - The maximum permissible load
  - The maximum permissible linear speed
  - The maximum permissible acceleration




| Electromechanical Cylinder | Drive | $d_0$xP | C (N) | $F_{max}$ (N) | $s_{max\ perm}$ (mm) | $v_{max}$ (m/s) |
|---|---|---|---|---|---|---|
| **EMC-085-HD** | **PLSA**  | 30x5 | 87 000 | 44 000 | 700 | 0.42 |
| | | 30x10 | 98 000 | 44 000 | | 0.83 |
| | **BS**  | 40x10 | 72 000 | 44 000 | | 0.63 |
| | | 40x20 | 95 000 | 38 000 | | 1.00 |
| **EMC-125-HD** | **PLSA**  | 48x5 | 188 000 | 95 000 | 1 200 | 0.26 |
| | | 48x10 | 211 000 | 110 000 | | 0.52 |
| | **BS**  | 63x10 | 88 000 | 88 000 | | 0.40 |
| | | 63x20 | 130 000 | 85 000 | | 0.80 |

C = dynamic load rating
$d_0$ = diameter of screw drive
$F_{max}$ = maximum permissible axial force
BS = Ball Screw Assembly
PLSA = Planetary Screw Assembly
P = screw drive lead
$s_{max\ perm}$ = maximum permissible linear travel
$v_{max}$ = maximum linear speed

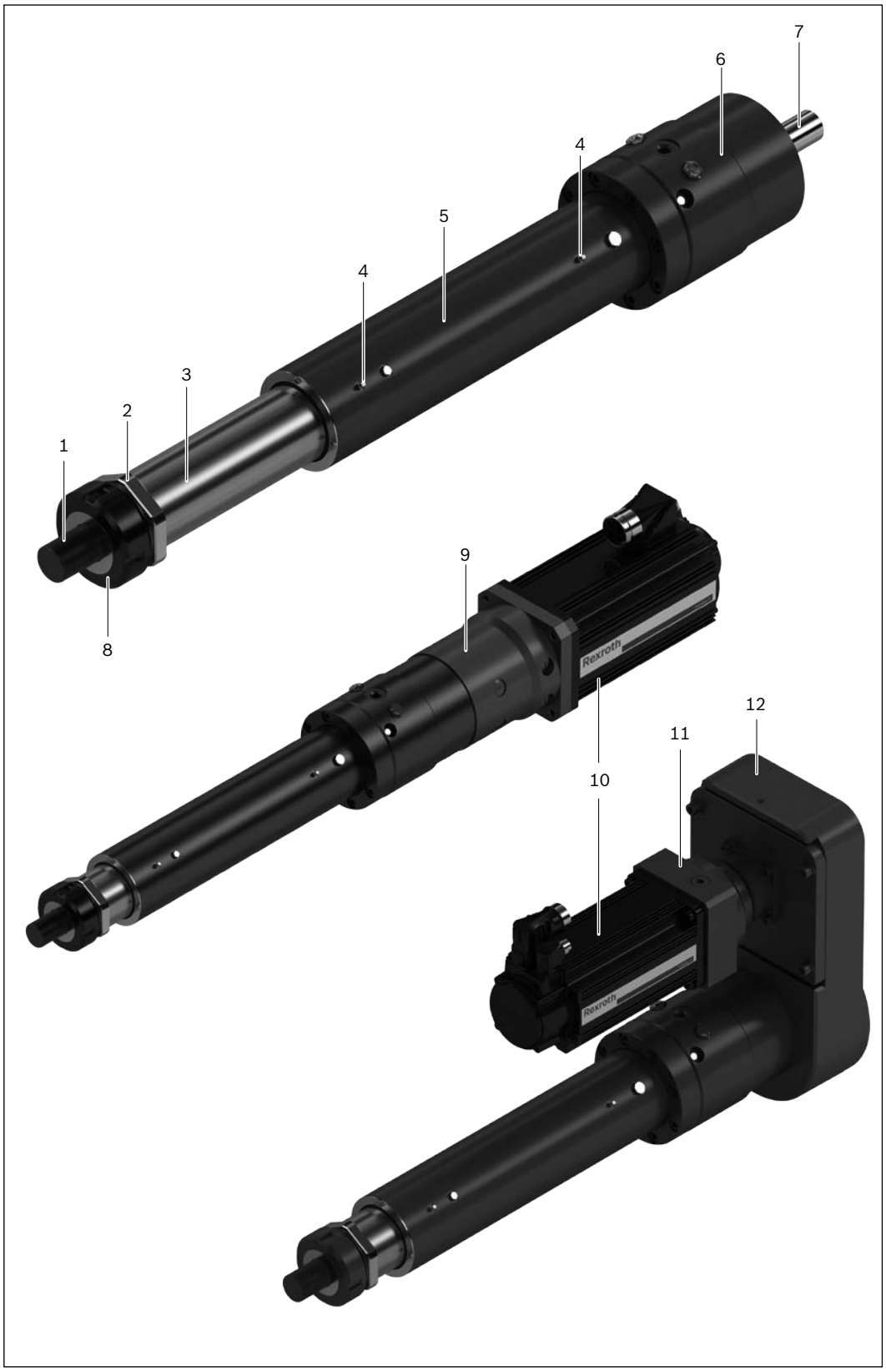
# Structural Design

**1** Threaded mounting interface [1)]
**2** Wrench flats [3)]
**3** Piston rod [2)]
**4** Lube nipple
**5** Housing [1)]
**6** Bearing housing [1)]
**7** Drive journal [4)]
**8** Lock nut

**Attachments**

**9** Motor mount and coupling
**10** Motor
**11** Gear reducer
**12** Timing belt side drive

**1)** Steel, black galvanized, black painted as an option
**2)** Steel, chromium plated
**3)** Only on version “without anti-twist feature”
**4)** Steel

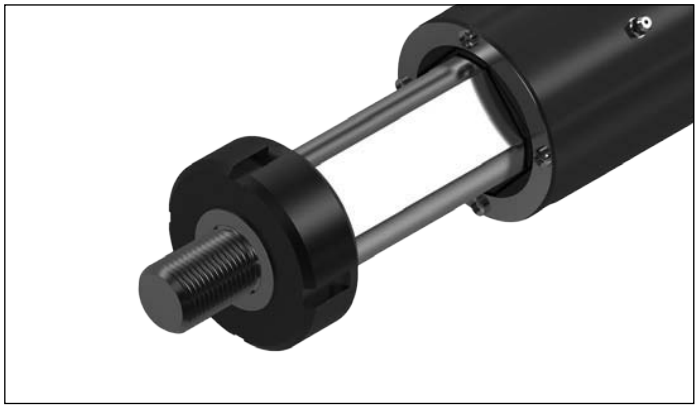


**Version with Planetary Screw Assembly PLSA**

**Version with Ball Screw Assembly BS**

**Guide without integrated anti-twist feature**

**Guide with integrated anti-twist feature**



**Screw drive**

The EMC-HD is available with a planetary or ball screw assembly.

- In the case of planetary screw assemblies, several planets are positioned in a rotationally symmetrically manner inside a nut. They rotate parallel to the axis of a screw and generate linear motion. The numerous contact areas inherent in this system design result in high axial rigidity and load-bearing capacity and thus provide for a long service life. Planetary screw assemblies achieve very high positioning accuracy and repeatability even in case of minimal traversing movements.
- In ball screw assemblies, balls provide the rolling contact. The high leads allow for highly dynamic applications while assuring high mechanical efficiency so that little heat is generated. The low lubricant consumption ensures service intervals are long. The use of multi-start screws and a large number of ball track turns in the ball nut results in high load ratings and therefore a long service life.

**Anti-twist feature**

The EMC-HD is available with or without a piston rod anti-twist feature.

- On the cost-optimized basic version without anti-twist feature, the piston rod can still be twisted during installation and as a result easily extended and retracted manually. To ensure correct linear motion in operation, the piston rod must be secured externally against twisting (e.g. by fastening it to a linear guide). The torque to be absorbed corresponds to the drive torque at the drive journal of the screw drive (see the “Design calculations” section).
- The integrated anti-twist feature is used if external absorption of the torque is not possible (e.g. when space is limited or if the piston rod extends freely into the working zone). The anti-twist feature is realized by means of four guide surfaces on the piston rod and a sliding guide at the head end of the housing.

# Technical Data

**Dimensions, load capacities, maximum forces and masses**

| Size | PLSA | BS | | | | | | $m_s$ | | $m_{ca}$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $d_0$xP | $d_0$xP | C | $F_{max}$ | $s_{min}$ | $s_{max\ perm}$ [1)] | $L_{ad}$ | $k_{g\ fix}$ | $k_{g\ var}$ | $m_{ca\ fix}$ | $m_{ca\ var}$ |
| | (mm) | (mm) | (N) | (N) | (mm) | (mm) | (mm) | (kg) | (kg/mm) | (kg) | (kg/mm) |
| **EMC-085-HD** | 30x5 | – | 87 000 | 44 000 | 85 | 700 | 352 | 30 | 0.030 | 6.2 | 0.011 |
| | 30x10 | – | 98 000 | 44 000 | 85 | 700 | 352 | 30 | 0.030 | 6.2 | 0.011 |
| | – | 40x10 | 72 000 | 44 000 | 110 | 700 | 352 | 30 | 0.033 | 6.2 | 0.011 |
| | – | 40x20 | 95 000 | 38 000 | 230 | 700 | 370 | 30 | 0.033 | 6.2 | 0.011 |
| **EMC-125-HD** | 48x5 | – | 188 000 | 95 000 | 130 | 1 200 | 442 | 70 | 0.060 | 16.5 | 0.025 |
| | 48x10 | – | 211 000 | 110 000 | 130 | 1 200 | 442 | 70 | 0.060 | 16.5 | 0.025 |
| | – | 63x10 | 88 000 | 88 000 | 170 | 1 200 | 405 | 70 | 0.068 | 16.5 | 0.025 |
| | – | 63x20 | 130 000 | 85 000 | 230 | 1 200 | 427 | 70 | 0.068 | 16.5 | 0.025 |

**1** For non-standard distances please contact Bosch Rexroth.

**Mass of the EMC-HD**

Weight calculation without motor and without motor attachment

$$m_s = k_{g\ fix} + k_{g\ var} \cdot s_{max}$$

Weight calculation without motor with timing belt side drive including gear unit (optional)

$$m_s = k_{g\ fix} + k_{g\ var} \cdot s_{max} + m_{sd}$$

Weight calculation without motor with motor mount and coupling including gear unit (optional)

$$m_s = k_{g\ fix} + k_{g\ var} \cdot s_{max} + m_c$$

**Moved mass of system**

$$m_{ca} = m_{ca\ fix} + m_{ca\ var} \cdot s_{max}$$

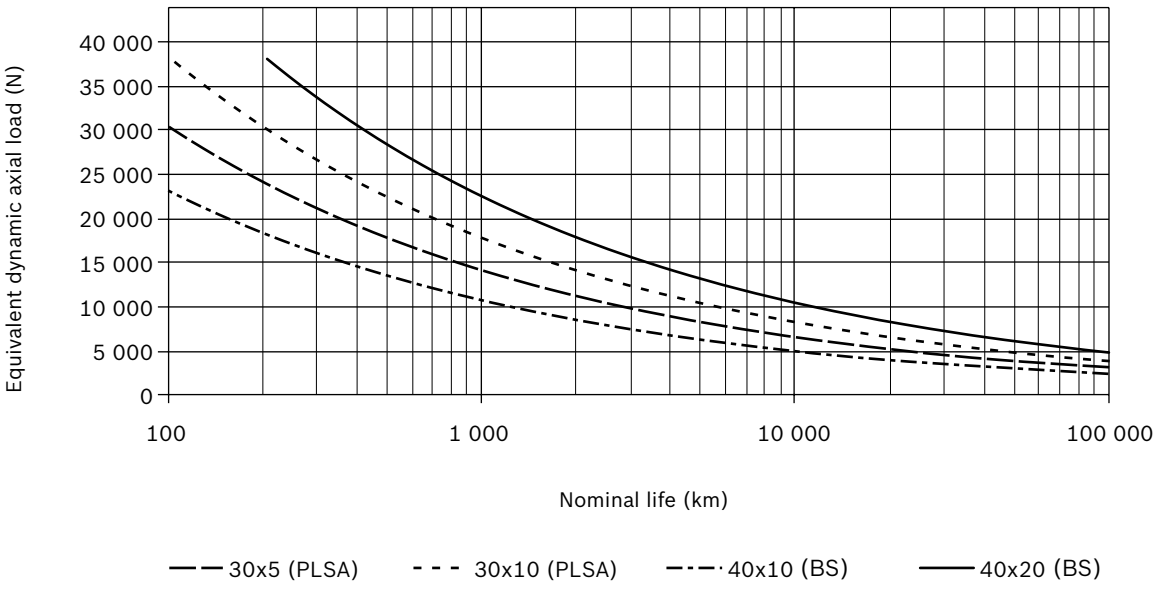
**Length calculation**

$$L = s_{max} + L_{ad}$$

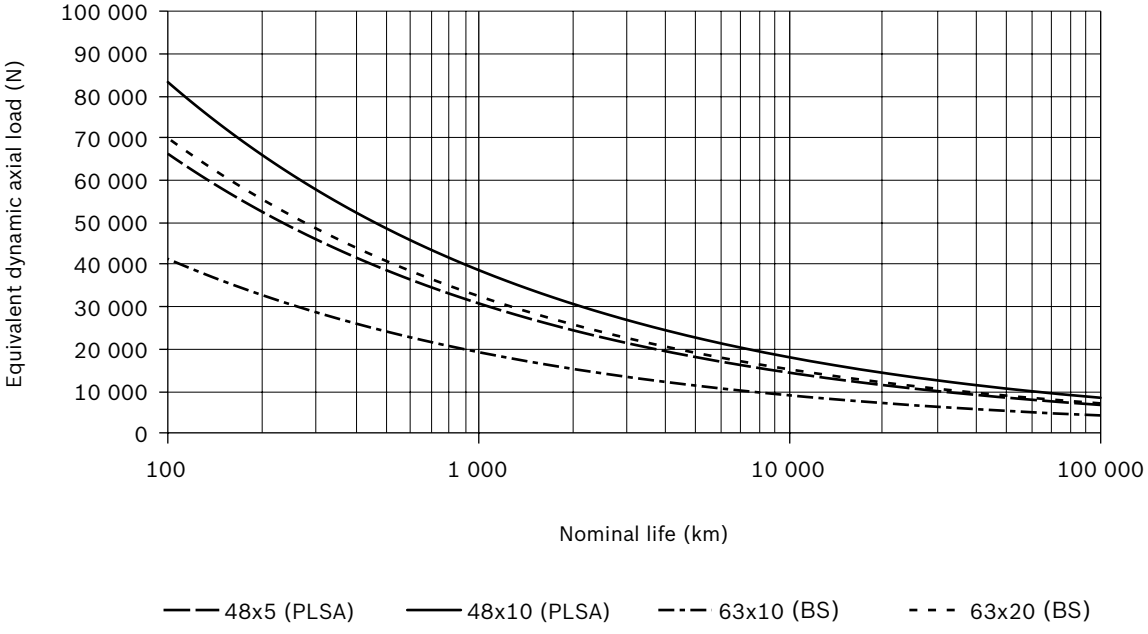
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | = | dynamic load capacity | (N) | $m_{ca\ fix}$ | = | constant for the fixed-length portion of the moved mass of system | (kg) |
| $d_0$ | = | diameter of screw drive | (mm) | $m_{ca\ var}$ | = | constant of the variable-length portion of the moved mass of system | (kg/mm) |
| $F_{max}$ | = | maximum permissible axial force | (N) | $m_s$ | = | mass of EMC-HD | (kg) |
| BS | = | Ball Screw Assembly | | $m_{sd}$ | = | mass of timing belt side drive | (kg) |
| $k_{g\ fix}$ | = | constant for the fixed-length portion of the mass | (kg) | P | = | screw drive lead | |
| $k_{g\ var}$ | = | constant for the variable-length portion of the mass | (kg/mm) | PLSA | = | Planetary Screw Assembly | |
| L | = | overall length (without piston rod) | (mm) | $s_{min}$ | = | minimum travel | (mm) |
| $L_{ad}$ | = | additional length | (mm) | $s_{max}$ | = | maximum travel | (mm) |
| $m_c$ | = | mass of motor mount and coupling | (kg) | $s_{max\ perm}$ | = | maximum permissible travel | (mm) |
| $m_{ca}$ | = | moved mass of system | (kg) | | | | |

**Service life**

**EMC-085-HD**




**EMC-125-HD**




The stated values apply on compliance with the specified relubrication intervals(see the “Service and Information” section).

For calculation of the equivalent dynamic axial load $F_m$ see the “Calculation Principles” section.

# Technical Data

## Drive data

| Size | PLSA $d_0$xP (mm) | BS $d_0$xP (mm) | $F_{max}$ (N) | $M_p$ (Nm) | $v_{max}$ (m/s) | $n_P$ ($min^{-1}$) | $a_{max}$ ($m/s^2$) | $M_{Rs}$ (Nm) |
|---|---|---|---|---|---|---|---|---|
| **EMC-085-HD** | 30x5 | – | 44 000 | 44 | 0.42 | 5040 | 30 | 6 |
| | 30x10 | – | 44 000 | 88 | 0.83 | 4980 | 30 | 6 |
| | – | 40x10 | 44 000 | 78 | 0.63 | 3780 | 8 | 5 |
| | – | 40x20 | 38 000 | 134 | 1.00 | 3000 | 22 | 5 |
| **EMC-125-HD** | 48x5 | – | 95 000 | 94 | 0.26 | 3120 | 30 | 12 |
| | 48x10 | – | 110 000 | 219 | 0.52 | 3120 | 30 | 12 |
| | – | 63x10 | 88 000 | 156 | 0.40 | 2400 | 8 | 10 |
| | – | 63x20 | 85 000[1)] | 301 | 0.80 | 2400 | 13 | 10 |

**1** When using timing belt side drives only possible up to 62 000 N

| Size | PLSA $d_0$xP (mm) | BS $d_0$xP (mm) | $k_{J\ fix}$ | $k_{J\ var}$ | $k_{J\ m}$ | Backlash of screw drive (µm) | Max. perm. piston rod twist angle[1)] (°) | Perm. transmitted power[2)] (W) | η |
|---|---|---|---|---|---|---|---|---|---|
| **EMC-085-HD** | 30x5 | – | 206 | 0.628 | 0.633 | 30 | ±1.5 | 430 | 0.8 |
| | 30x10 | – | 216 | 0.643 | 2.533 | 30 | ±1.5 | 430 | 0.8 |
| | – | 40x10 | 456 | 1.383 | 2.533 | 0 | ±1.5 | 1 100 | 0.9 |
| | – | 40x20 | 527 | 1.463 | 10.132 | 0 | ±1.5 | 2 000 | 0.9 |
| **EMC-125-HD** | 48x5 | – | 2046 | 4.104 | 0.633 | 30 | ±1.5 | 460 | 0.8 |
| | 48x10 | – | 2065 | 4.125 | 2.533 | 30 | ±1.5 | 540 | 0.8 |
| | – | 63x10 | 4459 | 9.645 | 2.533 | 0 | ±1.5 | 1 100 | 0.9 |
| | – | 63x20 | 4704 | 9.645 | 10.132 | 0 | ±1.5 | 2 000 | 0.9 |

**1** For version with anti-twist feature
**2** Calculated for 25 ℃ ambient temperature

$a_{max}$ = maximum permissible acceleration
$d_0$ = diameter of screw drive
$F_{max}$ = maximum permissible axial force
$k_{J\ fix}$ = constant for fixed-length portion of mass moment of inertia
$k_{J\ var}$ = constant for length-variable portion of mass moment of inertia
$k_{J\ m}$ = constant for mass-specific portion of mass moment of inertia
i = gear ratio
$m_c$ = mass of motor mount and coupling including gear unit
$M_p$ = maximum permissible drive torque
$M_{Rs}$ = frictional torque of EMC-HD
$n_P$ = maximum permissible rotary speed of EMC-HD
P = screw drive lead
$v_{max}$ = maximum permissible linear speed
η = mechanical efficiency

**Drive data for motor attachment via motor mount and coupling**

| EMC-HD | $d_0$xP (mm) | Attachment for motor (optionally with gear unit) | i | Motor mount and coupling incl. gear unit | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $F_{max}$ (N) | $M_p$ [1] (Nm) | $v_{max}$ (m/s) | $n_p$ [2] ($min^{-1}$) | η | $M_{Rs}$ (Nm) | $k_{J\ fix}$ | $k_{J\ var}$ | $k_{J\ m}$ | $m_c$ (kg) | $a_{max}$ ($m/s^2$) |
| **085** | 30x5 | MSK 071 | 1 | 44 000 | 44.0 | 0.42 | 5 040 | 0.80 | 6.00 | 1 106.0 | 0.628 | 0.633 | 5.0 | 30 |
| | | MSK 100/101 | 1 | 44 000 | 44.0 | 0.42 | 5 040 | 0.80 | 6.00 | 1 106.0 | 0.628 | 0.633 | 6.6 | 30 |
| | | MSK 071/101 with gear unit | 3 | 44 000 | 15.4 | 0.13 | 4 500 | 0.76 | 5.50 | 1 232.9 | 0.070 | 0.070 | 14.0 | 30 |
| | | MSK 071 with gear unit | 5 | 44 000 | 9.3 | 0.08 | 4 500 | 0.76 | 3.60 | 236.3 | 0.025 | 0.025 | 14.0 | 30 |
| | 30x10 | MSK 071 | 1 | 44 000 | 88.0 | 0.83 | 4 980 | 0.80 | 6.00 | 1 116.0 | 0.643 | 2.533 | 5.0 | 30 |
| | | MSK 100/101 | 1 | 44 000 | 88.0 | 0.83 | 4 980 | 0.80 | 6.00 | 1 116.0 | 0.643 | 2.533 | 6.6 | 30 |
| | | MSK 071/101 with gear unit | 3 | 44 000 | 30.9 | 0.25 | 4 500 | 0.76 | 5.50 | 1234.0 | 0.071 | 0.281 | 14.0 | 30 |
| | | MSK 071 with gear unit | 5 | 44 000 | 18.5 | 0.15 | 4 500 | 0.76 | 3.60 | 236.7 | 0.026 | 0.101 | 14.0 | 30 |
| | 40x10 | MSK 071 | 1 | 44 000 | 78.0 | 0.63 | 3 780 | 0.90 | 5.00 | 1 356.0 | 1.383 | 2.533 | 5.0 | 8 |
| | | MSK 100/101 | 1 | 44 000 | 78.0 | 0.63 | 3 780 | 0.90 | 5.00 | 1 356.0 | 1.383 | 2.533 | 6.6 | 8 |
| | | MSK 071/101 with gear unit | 3 | 44 000 | 27.4 | 0.25 | 4 500 | 0.86 | 5.17 | 1 260.7 | 0.154 | 0.281 | 14.0 | 8 |
| | | MSK 071 with gear unit | 5 | 44 000 | 16.4 | 0.15 | 4 500 | 0.86 | 3.40 | 246.3 | 0.055 | 0.101 | 14.0 | 8 |
| | 40x20 | MSK 071 | 1 | 38 000 | 134.0 | 1.00 | 3 000 | 0.90 | 5.00 | 1427.0 | 1.463 | 10.132 | 5.0 | 22 |
| | | MSK 100/101 | 1 | 38 000 | 134.0 | 1.00 | 3 000 | 0.90 | 5.00 | 1427.0 | 1.463 | 10.132 | 6.6 | 22 |
| | | MSK 071/101 with gear unit | 3 | 38 000 | 47.0 | 0.50 | 4 500 | 0.86 | 5.17 | 1 268.6 | 0.163 | 1.126 | 14.0 | 22 |
| | | MSK 071 with gear unit | 5 | 38 000 | 28.2 | 0.30 | 4 500 | 0.86 | 3.40 | 249.1 | 0.059 | 0.405 | 14.0 | 22 |
| **125** | 48x5 | MSK 100 | 1 | 95 000 | 94.0 | 0.26 | 3 120 | 0.80 | 12.00 | 4 136.0 | 4.104 | 0.633 | 6.8 | 30 |
| | | MSK 101 | 1 | 95 000 | 94.0 | 0.26 | 3 120 | 0.80 | 12.00 | 4 136.0 | 4.104 | 0.633 | 6.9 | 30 |
| | | MSK 100 with gear unit | 3 | 95 000 | 33.0 | 0.13 | 4 500 | 0.76 | 7.50 | 1 569.6 | 0.456 | 0.070 | 14.2 | 30 |
| | | MSK 101 with gear unit | 3 | 95 000 | 33.0 | 0.11 | 4 000 | 0.76 | 11.60 | 1 949.6 | 0.456 | 0.070 | 23.3 | 30 |
| | | MSK 071 with gear unit | 5 | 95 000 | 19.8 | 0.08 | 4 500 | 0.76 | 4.80 | 357.5 | 0.164 | 0.025 | 14.2 | 30 |
| | 48x10 | MSK 100 | 1 | 110 000 | 219.0 | 0.52 | 3 120 | 0.80 | 12.00 | 4 155.0 | 4.125 | 2.533 | 6.8 | 30 |
| | | MSK 101 | 1 | 110 000 | 219.0 | 0.52 | 3 120 | 0.80 | 12.00 | 4 155.0 | 4.125 | 2.533 | 6.9 | 30 |
| | | MSK 100 with gear unit | 3 | 110 000 | 76.8 | 0.25 | 4 500 | 0.76 | 7.50 | 1 571.7 | 0.458 | 0.281 | 14.2 | 30 |
| | | MSK 101 with gear unit | 3 | 110 000 | 76.8 | 0.22 | 4 000 | 0.76 | 11.60 | 1 951.7 | 0.458 | 0.281 | 23.3 | 30 |
| | | MSK 071 with gear unit | 5 | 110 000 | 46.1 | 0.15 | 4 500 | 0.76 | 4.80 | 358.2 | 0.165 | 0.101 | 14.2 | 30 |
| | 63x10 | MSK 100 | 1 | 88 000 | 156.0 | 0.40 | 2 400 | 0.90 | 10.00 | 6 549.0 | 9.645 | 2.533 | 6.8 | 8 |
| | | MSK 101 | 1 | 88 000 | 156.0 | 0.40 | 2 400 | 0.90 | 10.00 | 6 549.0 | 9.645 | 2.533 | 6.9 | 8 |
| | | MSK 100 with gear unit | 3 | 88 000 | 54.7 | 0.25 | 4 500 | 0.86 | 6.83 | 1 837.7 | 1.072 | 0.281 | 14.2 | 8 |
| | | MSK 101 with gear unit | 3 | 88 000 | 54.7 | 0.22 | 4 000 | 0.86 | 10.93 | 2 217.7 | 1.072 | 0.281 | 23.3 | 8 |
| | | MSK 071 with gear unit | 5 | 88 000 | 32.8 | 0.15 | 4 500 | 0.86 | 4.40 | 453.9 | 0.386 | 0.101 | 14.2 | 8 |
| | 63x20 | MSK 100 | 1 | 85 000 | 301.0 | 0.80 | 2 400 | 0.90 | 10.00 | 6 794.0 | 9.645 | 10.132 | 6.8 | 13 |
| | | MSK 101 | 1 | 85 000 | 301.0 | 0.80 | 2 400 | 0.90 | 10.00 | 6 794.0 | 9.645 | 10.132 | 6.9 | 13 |
| | | MSK 100 with gear unit | 3 | 66 000 | 82.5 | 0.50 | 4 500 | 0.86 | 6.83 | 1 864.9 | 1.072 | 1.126 | 14.2 | 13 |
| | | MSK 101 with gear unit | 3 | 85 000 | 105.6 | 0.44 | 4 000 | 0.86 | 10.93 | 2 244.9 | 1.072 | 1.126 | 23.3 | 13 |
| | | MSK 071 with gear unit | 5 | 85 000 | 63.4 | 0.30 | 4 500 | 0.86 | 4.40 | 463.8 | 0.386 | 0.405 | 14.2 | 13 |

**1** Torque may be limited by the maximum torque of the motor.
**2** Rotary speed may be limited by the maximum speed of the motor.

### Drive data for motor attachment via timing belt side drive

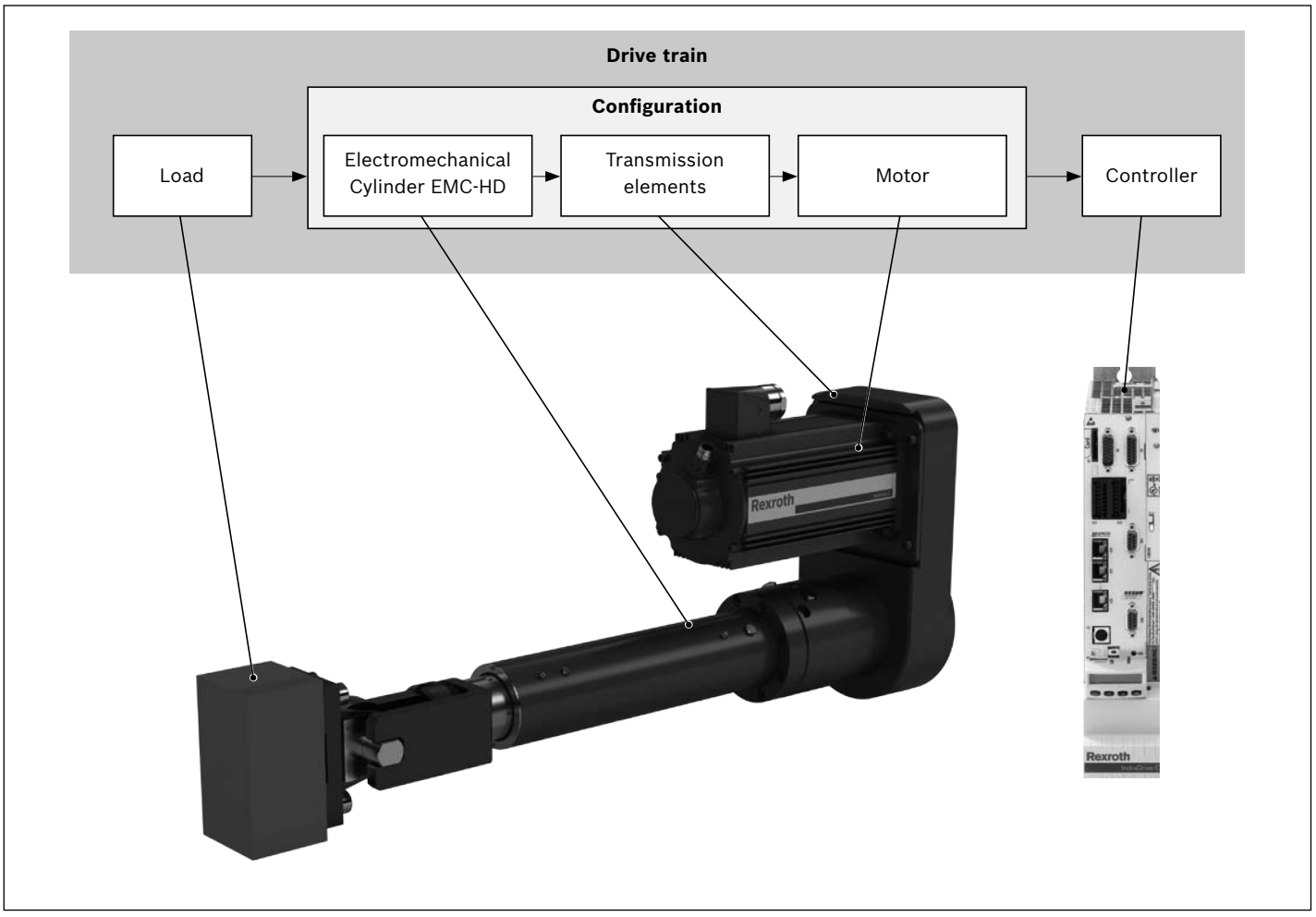
| EMC-HD | $d_0$xP (mm) | Attachment for motor (optionally with gear unit) | i[1] | Timing belt side drive incl. gear unit | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $F_{max}$ (N) | $M_p$[2] (Nm) | $v_{max}$ (m/s) | $n_p$[3] ($min^{-1}$) | η | $M_{Rs}$ (Nm) | $k_{J\ fix}$ | $k_{J\ var}$ | $k_{J\ m}$ | $m_{sd}$ (kg) | $a_{max}$ ($m/s^2$) |
| **085** | 30x5 | MSK 071/100/101 | 1.5 | 44 000 | 30.2 | 0.42 | 7 560 | 0.78 | 8.30 | 3621.6 | 0.2791 | 0.281 | 16.0 | 30 |
| | | MSK 071 with gear unit | 4.5 | 44 000 | 10.6 | 0.08 | 4 500 | 0.74 | 6.27 | 731.4 | 0.0310 | 0.031 | 25.0 | 30 |
| | | MSK 071 with gear unit | 7.5 | 44 000 | 6.4 | 0.05 | 4 500 | 0.74 | 4.06 | 336.9 | 0.0112 | 0.011 | 25.0 | 30 |
| | 30x10 | MSK 071/100/101 | 1.5 | 44 000 | 60.5 | 0.83 | 7 470 | 0.78 | 8.30 | 3 626.0 | 0.2858 | 1.126 | 16.0 | 30 |
| | | MSK 071 with gear unit | 4.5 | 44 000 | 21.2 | 0.17 | 4 500 | 0.74 | 6.27 | 731.9 | 0.0318 | 0.125 | 25.0 | 30 |
| | | MSK 071 with gear unit | 7.5 | 44 000 | 12.7 | 0.10 | 4 500 | 0.74 | 4.06 | 337.1 | 0.0114 | 0.045 | 25.0 | 30 |
| | 40x10 | MSK 071/100/101 | 1.5 | 44 000 | 53.6 | 0.63 | 5 670 | 0.87 | 7.63 | 3 732.1 | 0.6147 | 1.126 | 16.0 | 8 |
| | | MSK 071 with gear unit | 4.5 | 44 000 | 18.8 | 0.17 | 4 500 | 0.83 | 6.04 | 743.8 | 0.0683 | 0.125 | 25.0 | 8 |
| | | MSK 071 with gear unit | 7.5 | 44 000 | 11.3 | 0.10 | 4 500 | 0.83 | 3.93 | 341.3 | 0.0246 | 0.045 | 25.0 | 8 |
| | 40x20 | MSK 071/100/101 | 1.5 | 38 000 | 92.1 | 1.00 | 4 500 | 0.87 | 7.63 | 3764.2 | 0.6502 | 4.503 | 16.0 | 22 |
| | | MSK 071 with gear unit | 4.5 | 38 000 | 32.3 | 0.33 | 4 500 | 0.83 | 6.04 | 747.3 | 0.0722 | 0.500 | 25.0 | 22 |
| | | MSK 071 with gear unit | 7.5 | 38 000 | 19.4 | 0.20 | 4 500 | 0.83 | 3.93 | 342.6 | 0.0260 | 0.180 | 25.0 | 22 |
| **125** | 48x5 | MSK 100/101 | 1.5 | 95 000 | 64.6 | 0.26 | 4 680 | 0.78 | 14.60 | 11 329.3 | 1.8240 | 0.281 | 27.1 | 30 |
| | | MSK 100/101 with gear unit | 4.5 | 95 000 | 22.7 | 0.08 | 4 500 | 0.74 | 8.94 | 1 587.8 | 0.2027 | 0.031 | 36.3 | 30 |
| | | MSK 071 with gear unit | 7.5 | 95 000 | 13.6 | 0.05 | 4 500 | 0.74 | 5.32 | 645.2 | 0.0730 | 0.011 | 36.3 | 30 |
| | 48x10 | MSK 100/101 | 1.5 | 110 000 | 150.5 | 0.52 | 4 680 | 0.78 | 14.60 | 11 337.8 | 1.8333 | 1.126 | 27.1 | 30 |
| | | MSK 100/101 with gear unit | 4.5 | 110 000 | 52.8 | 0.17 | 4 500 | 0.74 | 8.37 | 1 588.8 | 0.2037 | 0.125 | 36.3 | 30 |
| | | MSK 071 with gear unit | 7.5 | 110 000 | 31.7 | 0.10 | 4 500 | 0.74 | 5.32 | 645.5 | 0.0733 | 0.045 | 36.3 | 30 |
| | 63x10 | MSK 100/101 | 1.5 | 88 000 | 107.2 | 0.84 | 7 560 | 0.87 | 13.27 | 12 401.8 | 4.2867 | 1.126 | 27.1 | 8 |
| | | MSK 100/101 with gear unit | 4.5 | 88 000 | 37.6 | 0.17 | 4 500 | 0.83 | 7.92 | 1 707.0 | 0.4763 | 0.125 | 36.3 | 8 |
| | | MSK 071 with gear unit | 7.5 | 88 000 | 22.6 | 0.10 | 4 500 | 0.83 | 5.05 | 688.1 | 0.1715 | 0.045 | 36.3 | 8 |
| | 63x20 | MSK 100/101 | 1.5 | 62 000 | 151.2 | 0.80 | 3 600 | 0.87 | 13.27 | 12 510.7 | 4.2867 | 4.503 | 27.1 | 13 |
| | | MSK 100/101 with gear unit | 4.5 | 62 000 | 53.1 | 0.33 | 4 500 | 0.83 | 7.92 | 1 719.1 | 0.4763 | 0.500 | 36.3 | 13 |
| | | MSK 071 with gear unit | 7.5 | 62 000 | 31.8 | 0.20 | 4 500 | 0.83 | 5.05 | 692.5 | 0.1715 | 0.180 | 36.3 | 13 |

**1** Gear ratio of timing belt side drive and gear unit.
**2** Torque may be limited by the maximum torque of the motor.
**3** Rotary speed may be limited by the maximum speed of the motor.

$a_{max}$ = maximum permissible acceleration
$d_0$ = diameter of screw drive
$F_{max}$ = maximum permissible axial force
$k_{J\ fix}$ = constant for fixed-length portion of mass moment of inertia
$k_{J\ var}$ = constant for length-variable portion of mass moment of inertia
$k_{J\ m}$ = constant for mass-specific portion of mass moment of inertia
i = gear ratio
$M_p$ = maximum permissible drive torque
$M_{Rs}$ = frictional torque of EMC-HD
$m_{sd}$ = mass of timing belt side drive including gear unit
$n_P$ = maximum permissible rotary speed of EMC-HD
P = screw drive lead
$v_{max}$ = maximum permissible linear speed
η = mechanical efficiency

# Calculation Principles

## Drive train




The correct dimensioning and assessment of an application requires structured consideration of the drive train as a whole. The basic element of the drive train is the configuration – comprising the Electromechanical Cylinder EMC-HD, the transmission element (coupling or timing belt side drive) and the motor which can be ordered in that constellation as per the catalog.

**Maximum permissible loads**

When selecting of Electromechanical Cylinders EMC-HD, maximum limits for permissible loads and forces must be taken into account. These limits can be found in the “Product Description and Technical Data” section.
The values given there are system-related. In other words, the upper limits are determined not only by the load ratings of the bearing points but also include structural design and material-related considerations.

## Mechanical calculation

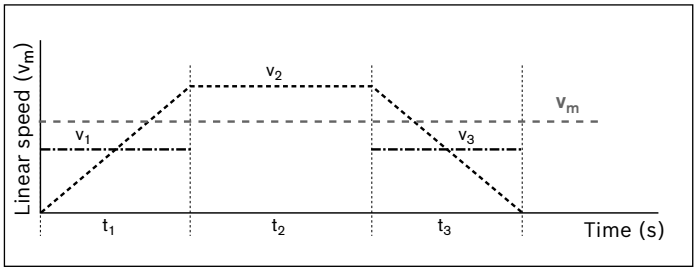
### Useful power

To take into account the power loss in the EMC-HD, a permissible useful power is stated for each cylinder-screw drive combination, see “Technical Data”. This value applies at an ambient temperature of 25 °C and even distribution of the load over the stroke length. For applications in which the cylinder is permanently loaded over a small section of the total stroke length, please contact Bosch Rexroth.
Phases without load must be taken into account when calculating of the sum of the discrete time steps.

$$P_{app} = \frac{1}{t_{tot}} \cdot (|F_1| \cdot |v_1| \cdot t_1 + |F_2| \cdot |v_2| \cdot t_2 \ldots |F_n| \cdot |v_n| \cdot t_n)$$

### Service life of Electromechanical Cylinder EMC-HD

Where the operating conditions vary (fluctuating linear speed and load), the service life must be calculated using the averages values for $F_m$ and $v_m$.

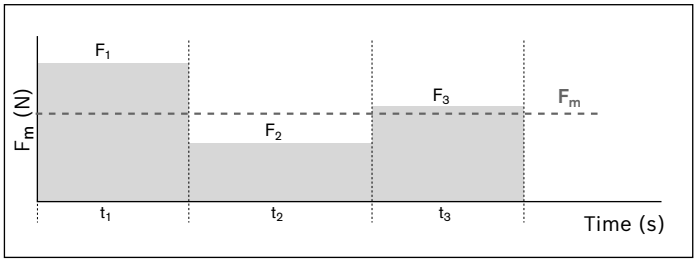



**When the linear speed varies, the average speed $v_m$ is calculated as follows:**

$$v_m = \frac{1}{t_{tot}} \cdot (|v_1| \cdot t_1 + |v_2| \cdot t_2 + \ldots + |v_n| \cdot t_n)$$

$$t_{tot} = t_1 + t_2 + \ldots + t_n$$

**When the load and rotary speed vary, the average load $F_m$ is calculated as follows:**




$$F_m = \sqrt[3]{|F_1|^3 \cdot \frac{|v_1|}{v_m} \cdot \frac{t_1}{t_{tot}} + |F_2|^3 \cdot \frac{|v_2|}{v_m} \cdot \frac{t_2}{t_{tot}} + \ldots + |F_n|^3 \cdot \frac{|v_n|}{v_m} \cdot \frac{t_n}{t_{tot}}}$$

### Nominal life

**– in revolutions $L_{10}$**

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^6$$

**– in hours $L_{10h}$**

$$L_{10h} = \frac{L_{10}}{n_m \cdot 60}$$

**Drive torque $M_p$:**

$$M_p = \frac{F \cdot P}{2000 \cdot \pi \cdot \eta}$$

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | = | dynamic load capacity | (N) | P | = | screw drive lead | |
| F | = | load | (N) | $P_{app}$ | = | useful power in the application | (W) |
| $F_1, F_2, \ldots F_n$ | = | axial load in phase 1 ... n | (N) | $t_1, t_2, \ldots t_n$ | = | discrete time step for phases 1 ... n | (s) |
| $F_m$ | = | equivalent dynamic axial load | (N) | $t_{tot}$ | = | sum of discrete time step $t_1, t_2, \ldots t_n$ | (s) |
| $L_{10}$ | = | nominal life in revolutions | (—) | $v_1, v_2, \ldots v_n$ | = | linear speed in phase 1 ... n | (m/s) |
| $L_{10h}$ | = | nominal life in hours | (h) | $v_m$ | = | average linear speed | (m/s) |
| $M_P$ | = | drive torque | (Nm) | $\eta$ | = | mechanical efficiency | |

# Sizing the Drive

## Principles

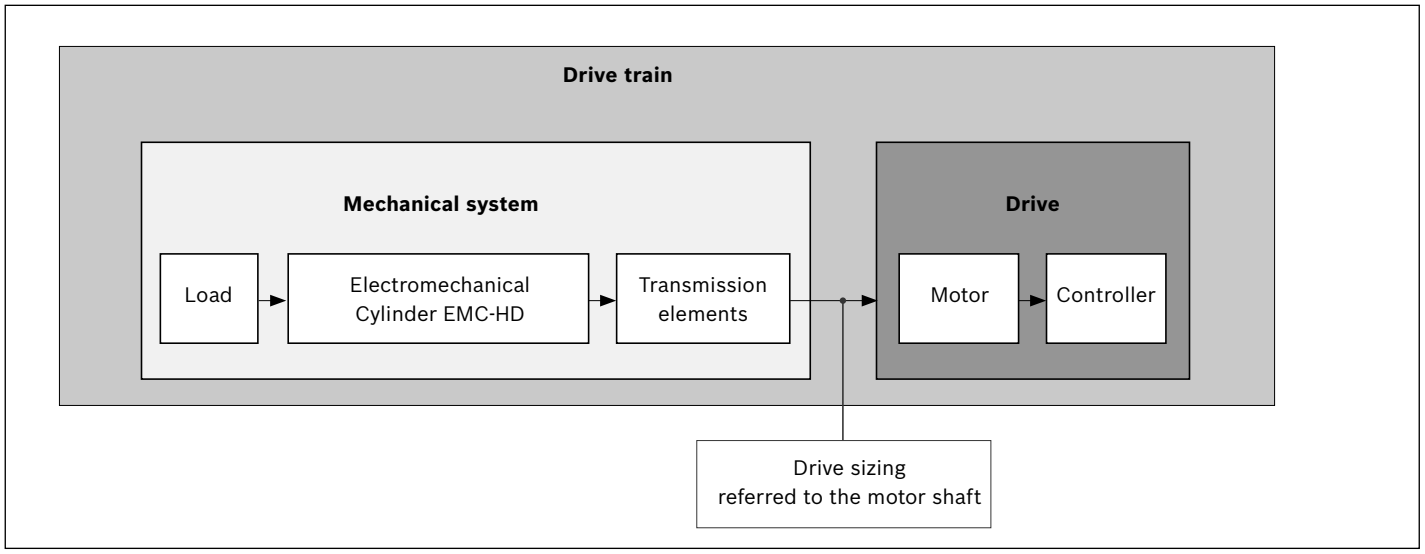
When calculating the required size of drive, the drive train can be subdivided into the **mechanical system** and the **drive** itself.

The **mechanical system** includes the physical components – Electromechanical Cylinder EMC-HD (including gear unit transmission element) – and the load to be carried.

The electric **drive** is a motor/controller combination with the appropriate performance data.

The electric drive is sized or dimensioned using the motor shaft as the reference point.

When sizing the drive, limit values must be taken into account as well as basic values. The limit (i.e. maximum) values must not be exceeded, in order to avoid damaging the mechanical components.




### Technical data and symbols for the mechanical system

The technical data for the Electromechanical Cylinder EMC-HD already include the relevant gear unit data and the gear ratio. This means that the relevant maximum permissible values for drive torque and linear speed as well as the basic values for frictional torque and mass moment of inertia referred to the motor shaft are reduced and can be taken directly from the tables (see “Drive data”).

The following technical data with the associated symbols are used when considering the basic mechanical system requirements in the design calculations for sizing the drive. The data listed in the table below can be found in the “Technical Data” section or they are determined using the formulas described on the following pages.

| | | **Mechanical system** | |
|---|---|---|---|
| | | **Load** | **EMC-HD (incl. gear unit as transmission element)** |
| Weight moment | (Nm) | $M_g$ 4) | – |
| Equivalent dynamic torque | (Nm) | $M_m$ 1) | – |
| Frictional torque | (Nm) | – | $M_{Rs}$ 3) |
| Mass moment of inertia | (kgm²) | $J_t$ 1) | $J_s$ 2) |
| Max. permissible linear speed | (m/s) | – | $v_{max}$ 3) |
| Max. permissible rotary speed | ($min^{-1}$) | | $n_P$ 3) |
| Max. permissible drive torque | (Nm) | – | $M_p$ 4) |

**1)** Determine the value using the appropriate formula
**2)** Length-dependent value, determined using the appropriate formula
**3)** Value as per table
**4)** For vertical mounting orientation: determine the value using the appropriate formula

## Drive sizing referred to the motor shaft

For drive sizing, all the relevant design calculation values for the mechanical components contained in the drive train must be determined as they relate to – and be expressed in terms of or reduced to – the motor shaft. In other words, for a combination of mechanical components within the drive train, this will result in one value for each of the following:

- Frictional torque $M_R$
- Mass moment of inertia $J_{ex}$
- Max. permissible linear speed $v_{mech}$ (max. permissible rotary speed $n_{mech}$)
- Max. permissible drive torque $M_{mech}$

**Determination of the values for individual mechanical components in the drive train referred to the motor shaft**

**Frictional torque $M_R$**

The value for the frictional torque of the EMC-HD already includes the friction for an appropriately configured gear reducer and has been reduced referred to the motor shaft.

For motor attachment via gear reducer

$$M_R = M_{Rs}$$

**Mass moment of inertia $J_{ex}$**

The constants used in the formulas $k_{J\,fix}$, $k_{J\,var}$ and $k_{J\,m}$ already include the mass moment of inertia and gear ratios of the related transmission elements used and can therefore be taken from the “Drive data” table.

$$J_{ex} = J_s + J_t$$

Determination of the mass moment of inertia of the EMC-HD components (including transmission elements, if used)

$$J_s = (k_{J\,fix} + k_{J\,var} \cdot s_{max}) \cdot 10^{-6}$$

Determination of the translatory mass moment of inertia of the external load (reduced to motor shaft)

$$J_t = m_{ex} \cdot k_{J\,m} \cdot s_{max} \cdot 10^{-6}$$

**Maximum permissible linear speed and maximum permissible rotary speed**

The value for the maximum permissible linear speed of the EMC-HD already includes the permissible rotary speed for any incorporated transmission elements.

**Maximum permissible linear speed $v_{mech}$**

$$v_{mech} = v_{max}$$

**Maximum permissible rotary speed $n_{mech}$**

$$n_{mech} = n_p$$

When considering the complete drive train (mechanical system + motor/controller) the rotary speed of the motor can lie below the maximum value for the mechanical system ($M_{mech}$) and thus limit the maximum permissible rotary speed of the overall drive train.

| | | | |
|---|---|---|---|
| $J_{ex}$ | = | mass moment of inertia of mechanical system | ($kgm^2$) |
| $J_s$ | = | mass moment of inertia of the linear motion system | ($kgm^2$) |
| $J_t$ | = | translatory mass moment of inertia of external load referred to the linear system drive journal | ($kgm^2$) |
| $k_{J\,fix}$ | = | constant for fixed-length portion of mass moment of inertia | (–) |
| $k_{J\,m}$ | = | constant for mass-specific portion of mass moment of inertia | (–) |
| $k_{J\,var}$ | = | constant for variable-length portion of mass moment of inertia | (–) |
| $s_{max}$ | = | maximum travel | (mm) |
| $m_{ex}$ | = | moved external load | (kg) |
| $M_R$ | = | frictional torque at motor journal | (Nm) |
| $M_{Rs}$ | = | frictional torque of system | (Nm) |
| $n_{mech}$ | = | maximum permissible rotary speed of mechanical system | ($min^{-1}$) |
| $n_p$ | = | maximum permissible rotary speed of EMC-HD | ($min^{-1}$) |
| $v_{max}$ | = | maximum permissible linear speed of EMC-HD | (m/s) |
| $v_{mech}$ | = | maximum permissible linear speed of mechanical system | (m/s) |

**Maximum permissible drive torque $M_{mech}$**

The lowest (minimum) of all the values for permissible drive torque of all mechanical components contained in the drive train determines the maximum permissible drive torque of the mechanical system which has to be taken into consideration as the upper limit for the drive when sizing the motor. The value for the maximum permissible drive torque of the EMC-HD already includes the maximum permissible drive torque of any incorporated transmission elements.

$$M_{mech} = M_p$$

When considering the complete drive train (mechanical system + motor/controller) the maximum torque of the motor can lie below the maximum value for the mechanical system ($M_{mech}$) and thus limit the maximum permissible drive torque of the overall drive train.
If the maximum torque of the motor lies above the upper limit for the mechanical system ($M_{mech}$), the maximum motor torque must be limited to the permitted value for the mechanical system.

## Rough guide for pre-selection of the motor

The following conditions can be used as a rough guide for pre-selecting the motor.

**Condition 1:**

The speed of the motor must be the same as or higher than the speed required for the mechanical system (but not exceeding the maximum permissible value).

$$n_{max} \geq n_{mech}$$

**Condition 2:**

Consideration of the ratio of mass moments of inertia of the mechanical system and the motor. The ratio of the moments of inertia is used as an indicator for the quality of the control of a motor/controller combination. The ratio of the mass moments of inertia serves as an indicator for the control performance of a motor-controller combination.

**Mass moment of inertia ratio**

$$v = \frac{J_{ex}}{J_m + J_{br}}$$

For pre-selection, experience has shown that the following ratios will result in high control performance.
These are not rigid limits, but values exceeding them will require closer consideration of the specific application.

| Application area | V |
|---|---|
| Handling | ≤ 6.0 |
| Processing | ≤ 1.5 |

**Condition 3:**
Estimation of the ratio of the static load moment to the continuous torque of the motor. The torque ratio must be less than or equal to the empirical value of 0.6. By looking at the required motor torque levels, this estimation roughly covers the dynamic characteristics which still have be determined by plotting an exact motion profile.

**Torque ratio:**

$$\frac{M_{stat}}{M_0} \leq 0.6$$

**Static load moment:**

$$M_{stat} = M_R + M_g + M_m$$

**Weight moment:**
For vertical mounting orientation only!
For motor attachment via motor mount and coupling: i = 1

$$M_g = \frac{P \cdot (m_{ex} + m_{ca}) \cdot g}{2000 \cdot \pi \cdot i \cdot \eta}$$

**Equivalent dynamic torque:**

$$M_m = \frac{F_m \cdot P}{2000 \cdot \pi \cdot i \cdot \eta}$$

When considering the torque ratio, the torque demand from the axial loads in the cycle must be included in the static load moment. The equivalent dynamic torque can be calculated approximately via the average load $F_m$. The value to be used for mechanical efficiency will depend on the drive element, ball screw or PLSA.

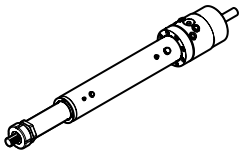
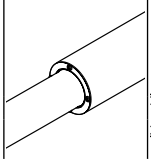
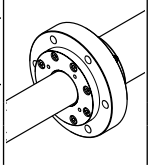
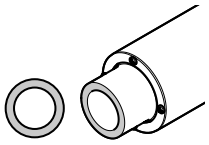
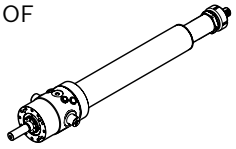
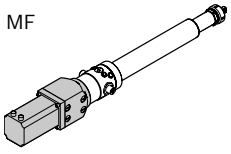
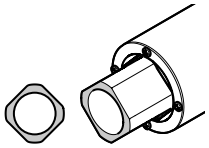
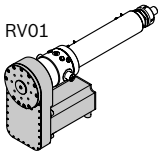
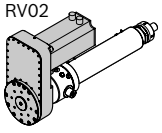
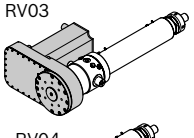
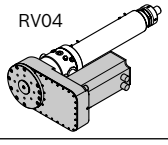
In the “Configuration and Ordering” section, users can put together standard configurations including gear reducer and motor, for the various EMC-HD sizes by selecting the appropriate options. By checking the three conditions stated above, it is possible to see whether a standard motor selected in a particular configuration will generally be of a suitable size for the specific application.

## Precise sizing of the drive

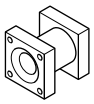
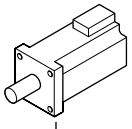
Pre-selecting the motor according to this rough guide is no substitute for the required precise design calculations for the drive, taking all moments/torques and speed levels into account. For precise calculation of the electric drive, including consideration of the specific motion profile, please refer to the performance data in the IndraDrive C catalog. When sizing the drive, the maximum permitted values for linear speed, drive torque and acceleration must not be exceeded, in order to avoid damaging the mechanical system!

| | | | |
|---|---|---|---|
| $F_m$ | = | equivalent dynamic axial load | (N) |
| g | = | gravitational acceleration (= 9.81) | ($m/s^2$) |
| i | = | gear ratio of timing belt side drive/gear reducer | (–) |
| $J_{br}$ | = | mass moment of inertia of motor brake | ($kgm^2$) |
| $J_{ex}$ | = | mass moment of inertia of mechanical system | ($kgm^2$) |
| $J_m$ | = | mass moment of inertia of motor | ($kgm^2$) |
| $m_{ca}$ | = | moved mass of carriage | (kg) |
| $m_{ex}$ | = | moved external load | (kg) |
| $M_g$ | = | weight moment at motor journal | (Nm) |
| $M_{mech}$ | = | maximum permissible drive torque of mechanical system | (Nm) |
| $M_m$ | = | equivalent dynamic torque | (Nm) |
| $M_p$ | = | maximum permissible drive torque of EMC-HD | (Nm) |
| $M_0$ | = | continuous motor torque | (Nm) |
| $M_R$ | = | frictional torque at motor journal | (Nm) |
| $M_{stat}$ | = | static load moment | (Nm) |
| $n_{mech}$ | = | maximum permissible rotary speed of mechanical system | ($min^{-1}$) |
| $n_{max}$ | = | maximum speed of motor | ($min^{-1}$) |
| P | = | screw drive lead | (mm) |
| V | = | ratio of mass moments of inertia of drive train and motor | (–) |
| $\eta$ | = | mechanical efficiency | (–) |

# EMC-085-HD – Configuration and Ordering

| **Short product name, $s_{max}$**<br>**EMC-085-HD-1, ... mm** | **Guideway** | | **Drive units** | | | | **Lubrication** | | | **Version** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  Without round flange |  With round flange | PLSA $d_0$xP<br>30 x 5 | PLSA $d_0$xP<br>30 x 10 | Ball screw $d_0$xP<br>40 x 10 | Ball screw $d_0$xP<br>40 x 20 | With initial greasing | Prelubricated with low-temperature grease | | Description | |
| Without anti-twist feature<br>  | 01 | 02 | 01 | 02 | 12 | 13 | 01 | 02[1] | | Without motor mount<br>OF<br>  | |
| | | | | | | | | | | With motor mount<br>MF<br>  | |
| With anti-twist feature<br>  | 11 | 12 | | | | | | | | With timing belt side drive (SD)<br>RV01<br>  <br>RV02<br>  <br>RV03<br>  <br>RV04<br>  | |

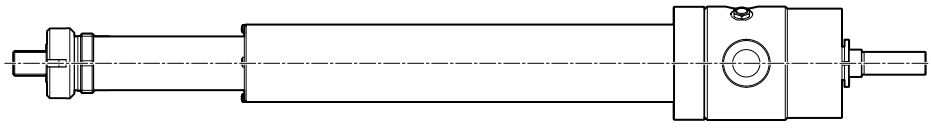
**1)** Only with PLSA drive

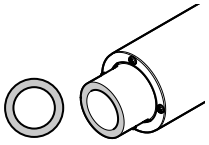
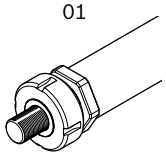
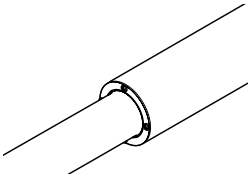
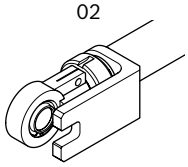
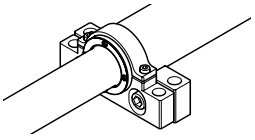
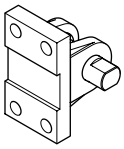
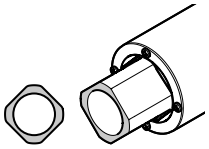
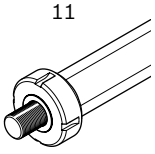
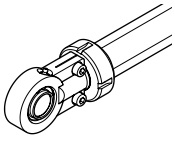
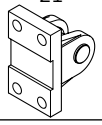
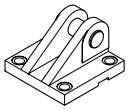
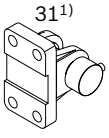
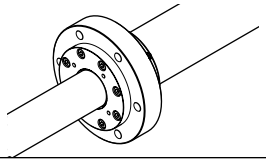
| | **Motor attachment** | | | **Motor** | | | **Switches** | | | | **Surface finish** | | **Documentation** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| |  | | |  | | | | | | | | |  | | |
| | Gear ratio | Description | | | Without brake | With brake | Without switch | 1 reference switch | 2 limit switches | 2 limit switches and 1 reference switch | Standard | Black painted | Standard report | Measurement report | |
| | | Without | 00 | Without | 00 | 00 | 00 | 01 | 02 | 03 | 01 | 13 | 01 | 02[2)] | 03[3)] |
| | i = 1 | With motor mount | 01 | MSK 071D | 114 | 115 | | | | | | | | | |
| | | | 02 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | | 03 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | | MSK 101E | 120 | 121 | | | | | | | | | |
| | i = 3 | With motor mount and gear unit | 06 | MSK 071D | 114 | 115 | | | | | | | | | |
| | | | 07 | MSK 101D | 118 | 119 | | | | | | | | | |
| | i = 5 | With motor mount and gear unit | 16 | MSK 071D | 114 | 115 | | | | | | | | | |
| | i = 1.5 | Timing belt side drive | 40 | MSK 071D | 114 | 115 | | | | | | | | | |
| | | | 41 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | | 42 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | | MSK 101E | 120 | 121 | | | | | | | | | |
| | i = 4.5 | SD (i = 1.5) and gear unit (i = 3) | 50 | MSK 071D | 114 | 115 | | | | | | | | | |
| | i = 7.5 | SD (i = 1.5) and gear unit (i = 5) | 70 | MSK 071D | 114 | 115 | | | | | | | | | |

**2)** Frictional torque measurement **3)** Lead deviation

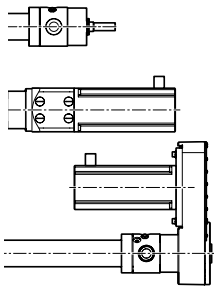
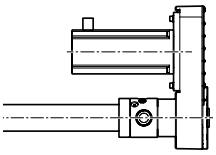
# EMC-085-HD – Configuration and Ordering

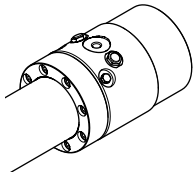
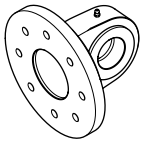
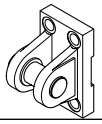
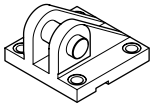
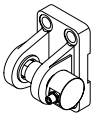
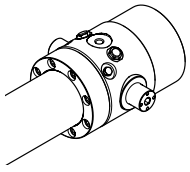
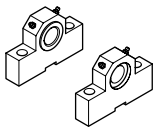
**Mounting elements**



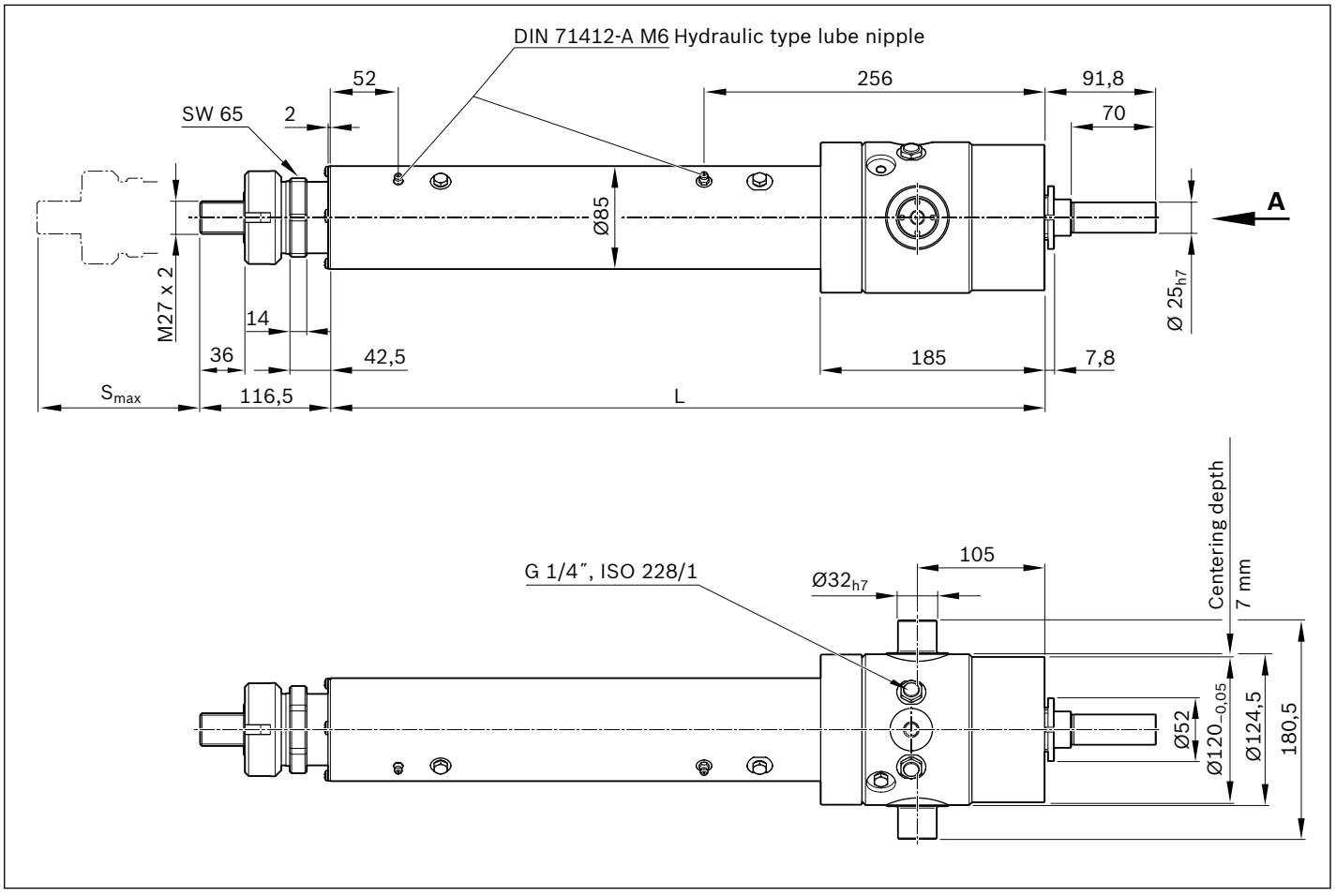
<table>
<tr><th>Version</th><th>Group 1</th><th>Group 2</th><th>Version</th><th>Group 3</th></tr>
<tr><td rowspan="3">Without anti-twist feature<br>  </td><td>00</td><td>01<br>  </td><td rowspan="5">Without round flange<br>  </td><td>00</td></tr>
<tr><td>00</td><td rowspan="2">02<br>  </td><td rowspan="3">11<br>  </td></tr>
<tr><td>11<br>  </td></tr>
<tr><td rowspan="5">With anti-twist feature<br>  </td><td>00</td><td>11<br>  </td></tr>
<tr><td>00</td><td rowspan="4">12<br>  </td></tr>
<tr><td>21<br>  </td></tr>
<tr><td>22<br>  </td></tr>
<tr><td>31[1)]<br>  </td><td rowspan="2">With round flange<br>  </td><td rowspan="2">00</td></tr>
</table>

**1)** With load measuring pin (see “Attachments and Accessories” section)

| | | Group 4 | Group 5 | Group 6 | |
|---|---|---|---|---|---|
| | | 01  | 00 | 00 | |
| | | | 11  | | 00 |
| | | | | | 21  |
| | | | | | 22  |
| | | | | | 31[1]  |
| | | 02  | 00 | 00 | |
| | | | | 01  | |
| | | 01 | 00 | 00 | |

# EMC-085-HD – Dimension Drawings

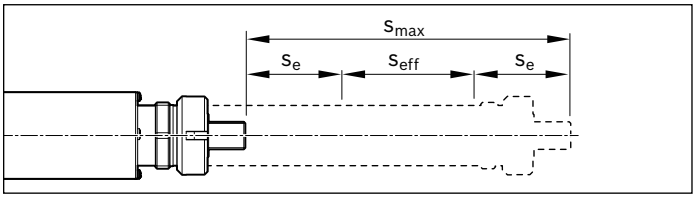



**Effective stroke**

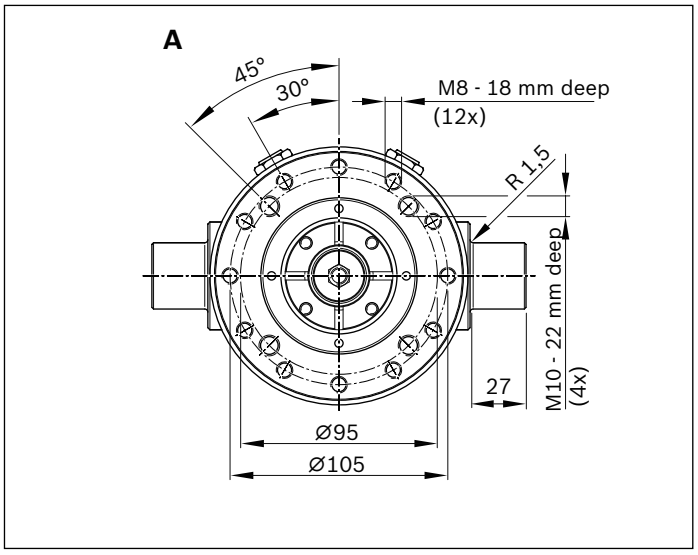
For safe operation, the excess travel must be longer than the braking distance. The acceleration travel can be taken as a guideline value for the braking distance.
In most cases, this will be sufficient:
Excess travel = 2 · screw lead (P)
Example: Ball screw ($d_0$ x P) 63x10:
Excess travel = 2 · 10 mm = 20 mm

Maximum travel $s_{max}$ as per customer specification.

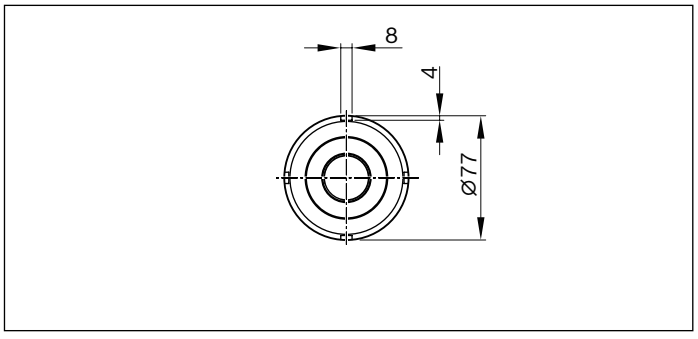
$$s_{eff} = s_{max} - 2 \cdot s_e$$




| | | | |
|---|---|---|---|
| $s_e$ | = | excess travel | (mm) |
| $s_{eff}$ | = | effective stroke | (mm) |
| $s_{max}$ | = | maximum travel | (mm) |



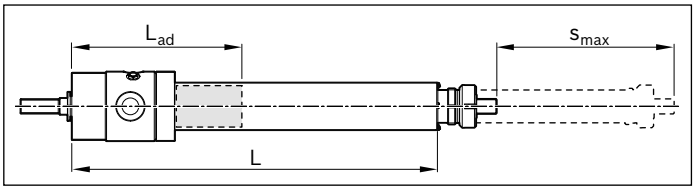

**Lock nut on threaded mounting interface**




## Length calculation L

| | $d_0$xP | $L_{ad}$ (mm) |
|---|---|---|
| **PLSA** | 30x5 | 352 |
| | 30x10 | 352 |
| **BS** | 40x10 | 352 |
| | 40x20 | 370 |

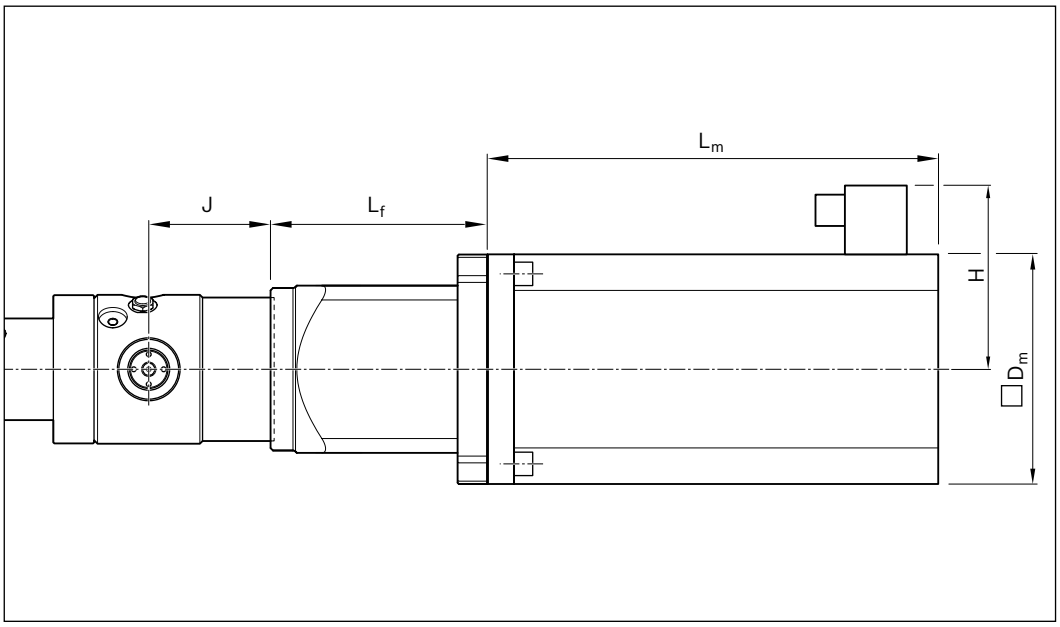
$$L = s_{max} + L_{ad}$$



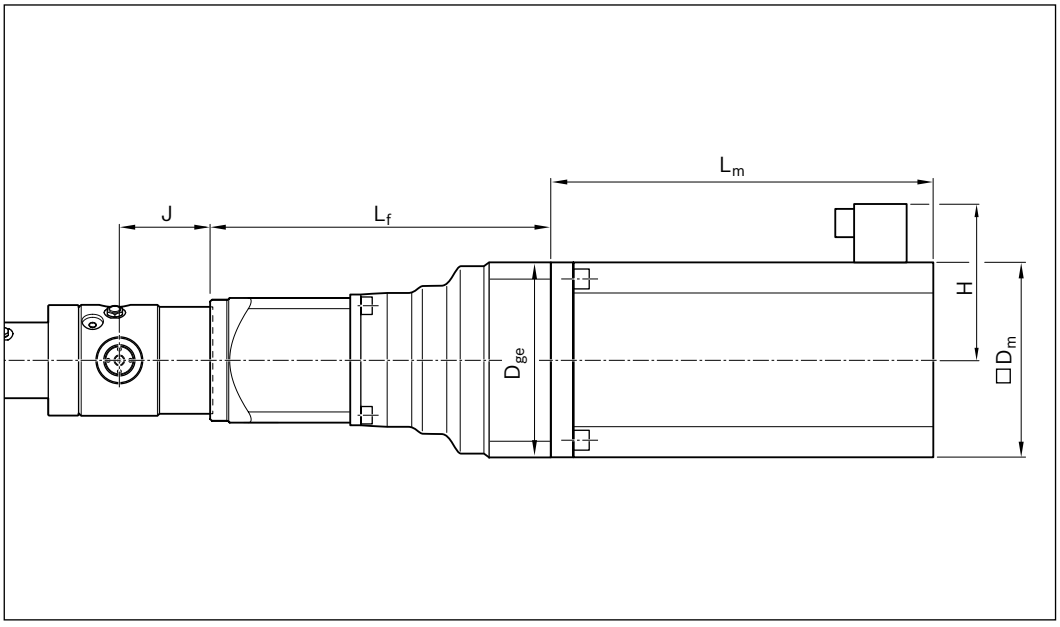

| | | | |
|---|---|---|---|
| L | = | overall length (without piston rod) | (mm) |
| $L_{ad}$ | = | additional length | (mm) |
| $s_{max}$ | = | maximum travel | (mm) |

# EMC-085-HD – Motor Attachments

**MF01**

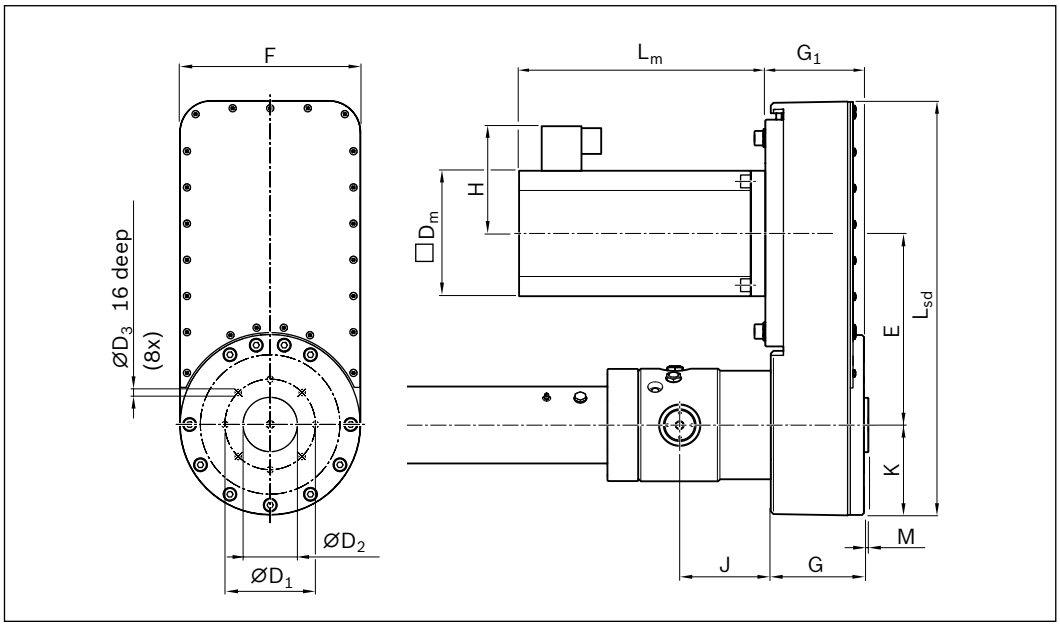



**MF01 with gear unit**

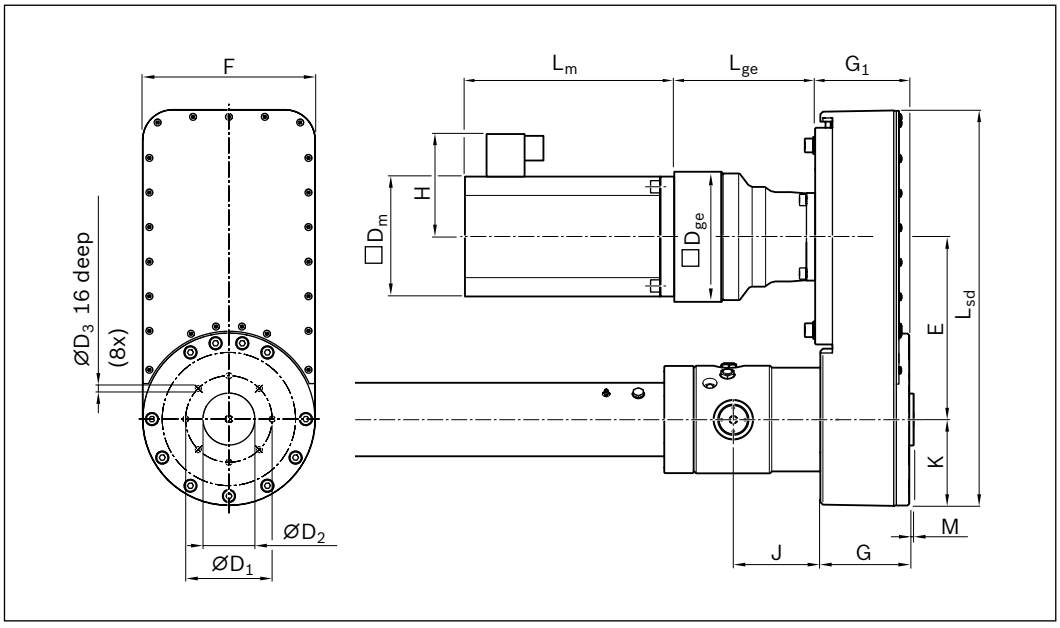



| Motor | Option | i | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | $L_m$ | | $D_m$ | $D_{ge}$ | $L_f$ | J | H |
| | | | With brake | Without brake | | | | | |
| MSK071D | 01 | – | 347 | 312 | 140 | – | 153.5 | 105 | 132 |
| | 06 | 3 | 347 | 312 | 140 | 150 | 339.5 | 105 | 132 |
| | 16 | 5 | 347 | 312 | 140 | 150 | 339.5 | 105 | 132 |
| MSK100B | 02 | – | 368 | 368 | 192 | – | 178.5 | 105 | 166 |
| MSK101D | 03 | – | 410 | 410 | 192 | – | 178.5 | 105 | 166 |
| | 07 | 3 | 410 | 410 | 192 | 190 | 339.5 | 105 | 166 |
| MSK101E | 03 | – | 501 | 501 | 192 | – | 178.5 | 105 | 166 |

**RV01, RV02, RV03, RV04**




**RV01, RV02, RV03, RV04 with gear unit**




| Motor | Option | | Dimensions (mm) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | i | $L_{sd}$ | E | K | G | $G_1$ | J | M | $L_m$ With brake | $L_m$ Without brake | $L_{ge}$ | $D_m$ | $D_{ge}$ | H | F | $\varnothing D_1$ | $\varnothing D_2$ g7 | $\varnothing D_3$ |
| MSK071D | 40 | 1.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 347 | 312 | – | 140 | – | 132 | 200 | 100 | 60 | M8 |
| | 50 | 4.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 347 | 312 | 156 | 140 | 150 | 132 | | | | |
| | 70 | 7.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 347 | 312 | 156 | 140 | 150 | 132 | | | | |
| MSK100B | 41 | 1.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 368 | 368 | – | 192 | – | 166 | | | | |
| MSK101D | 42 | 1.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 410 | 410 | – | 192 | – | 166 | | | | |
| MSK101E | 42 | 1.5 | 458 | 211 | 100 | 99 | 99 | 105 | 5 | 501 | 501 | – | 192 | – | 166 | | | | |

# EMC-125-HD – Configuration and Ordering

| **Short product name, $s_{max}$**<br>**EMC-125-HD-1, ... mm** | **Guideway** | | **Drive units** | | | | **Lubrication** | | | **Version** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLSA $d_0$ x P | | Ball screw $d_0$ x P | | | | | | |
| | Without round flange | With round flange | 48 x 5 | 48 x 10 | 63 x 10 | 63 x 20 | With initial greasing | Prelubricated with low-temperature grease | | Description | |
| Without anti-twist feature | 01 | 02 | 01 | 02 | 12 | 13 | 01 | 02[1] | | Without motor mount: OF | |
| | | | | | | | | | | With motor mount: MF | |
| With anti-twist feature | 11 | 12 | | | | | | | | With timing belt side drive (SD): RV01, RV02, RV03, RV04 | |

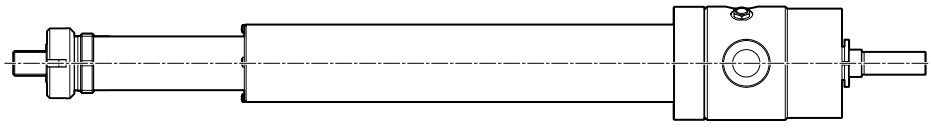
**1)** Only with PLSA drive

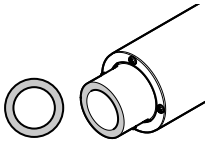
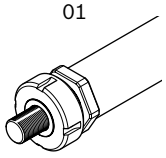
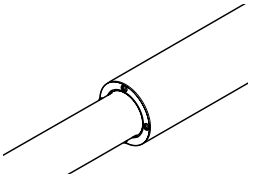
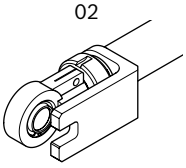
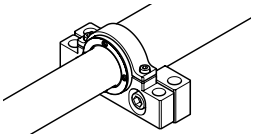
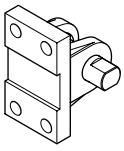
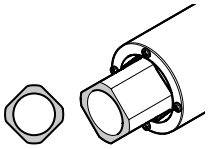
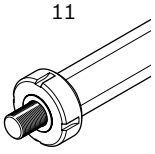
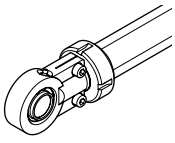
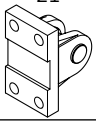
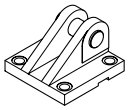
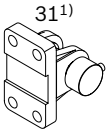
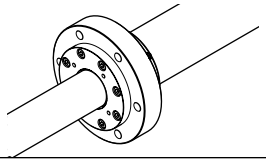
| **Motor attachment** | | | **Motor** | | | **Switches** | | | | **Surface finish** | | **Documentation** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear ratio | Description | | | Without brake | With brake | Without switch | 1 reference switch | 2 limit switches | 2 limit switches and 1 reference switch | Standard | Black painted | Standard report | Measurement report | |
| | Without | 00 | Without | 000 | 000 | 00 | 01 | 02 | 03 | 01 | 13 | 01 | 02[2)] | 03[3)] |
| i = 1 | With motor mount | 02 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 03 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | MSK 101E | 120 | 121 | | | | | | | | | |
| i = 3 | With motor mount and gear unit | 06 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 07 | MSK 101D | 118 | 119 | | | | | | | | | |
| i = 5 | With motor mount and gear unit | 16 | MSK 071D | 114 | 115 | | | | | | | | | |
| i = 1.5 | Timing belt side drive | 41 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 42 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | MSK 101E | 120 | 121 | | | | | | | | | |
| i = 4.5 | SD (i = 1.5) and gear unit (i = 3) | 51 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 52 | MSK 101D | 118 | 119 | | | | | | | | | |
| i = 7.5 | SD (i = 1.5) and gear unit (i = 5) | 70 | MSK 071D | 114 | 115 | | | | | | | | | |

**2)** Frictional torque measurement **3)** Lead deviation

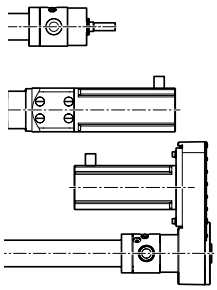
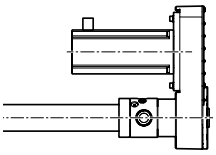
# EMC-125-HD – Configuration and Ordering

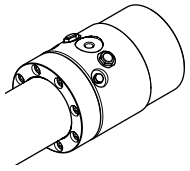
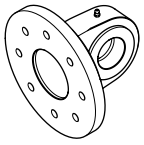
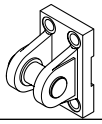
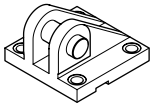
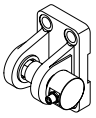
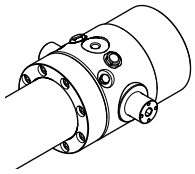
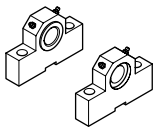
**Mounting elements**



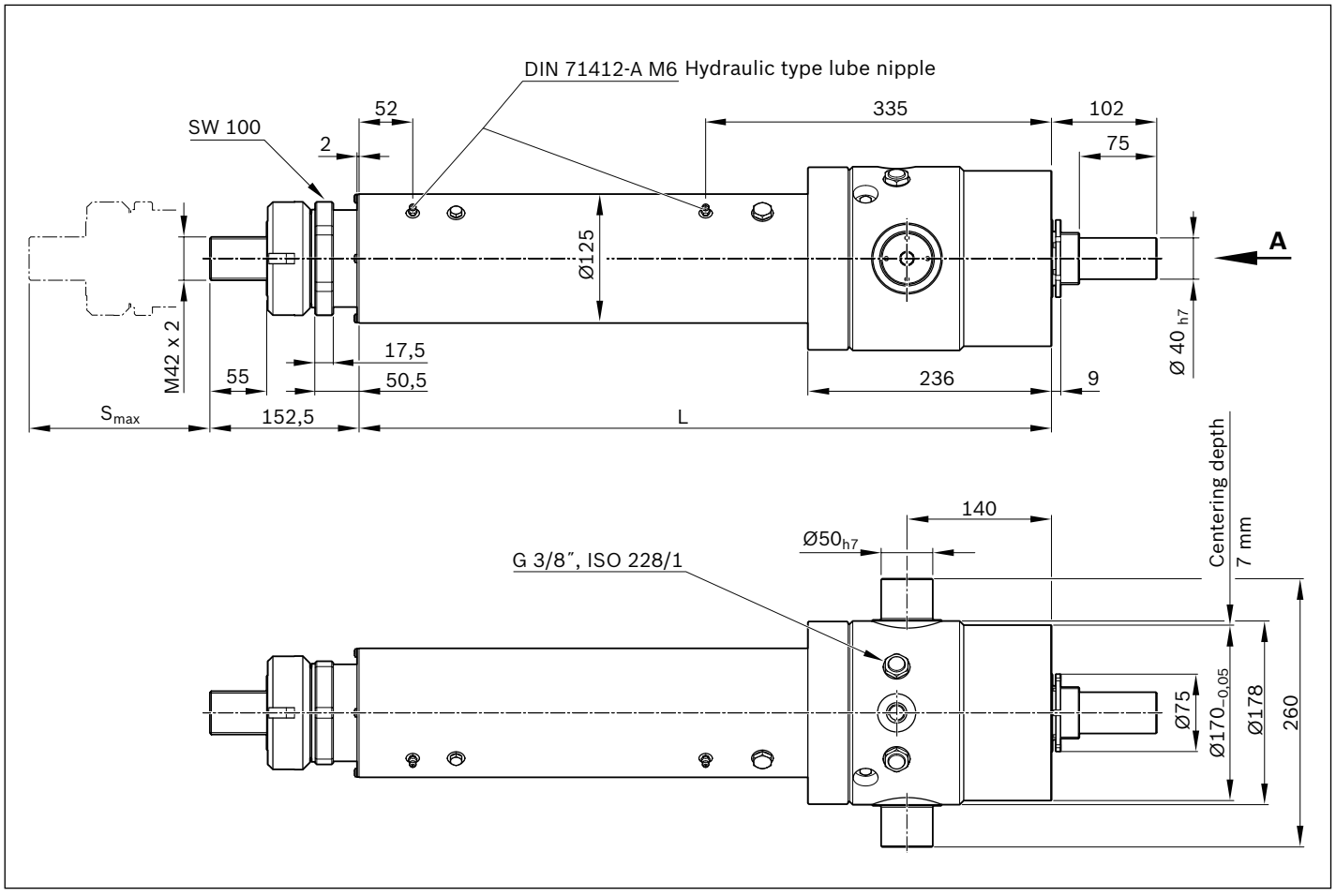
| Version | Group 1 | Group 2 | Version | Group 3 |
|---|---|---|---|---|
| Without anti-twist feature  | 00 | 01  | Without round flange  | 00 |
| | 00 | 02  | | 11  |
| | 11  | | | |
| With anti-twist feature  | 00 | 11  | | |
| | 00 | 12  | | |
| | 21  | | | |
| | 22  | | | |
| | 31[1]  | | With round flange  | 00 |

**1)** With load measuring pin (see “Attachments and Accessories” section)

| | | Group 4 | Group 5 | Group 6 | |
|---|---|---|---|---|---|
| | | 01  | 00 | 00 | |
| | | | 11  | 00 | |
| | | | | 21  | |
| | | | | 22  | |
| | | | | 31[1]  | |
| | | 02  | 00 | 00 | |
| | | | | 01  | |
| | | 01 | 00 | 00 | |

# EMC-125-HD – Dimension Drawings

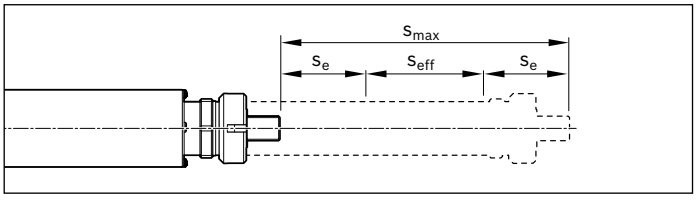



**Effective stroke**

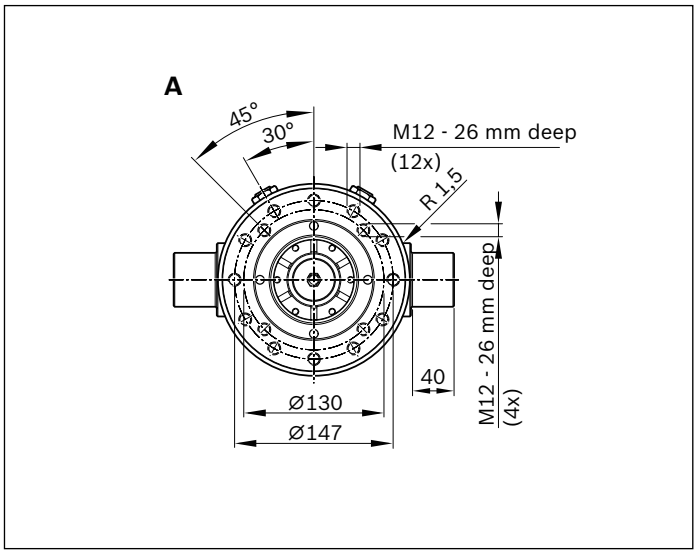
For safe operation, the excess travel must be longer than the braking distance. The acceleration travel can be taken as a guideline value for the braking distance.
In most cases, this will be sufficient:
Excess travel = 2 · screw lead (P)
Example: Ball screw ($d_0$ x P) 63x10:
Excess travel = 2 · 10 mm = 20 mm

Maximum travel $s_{max}$ as per customer specification.

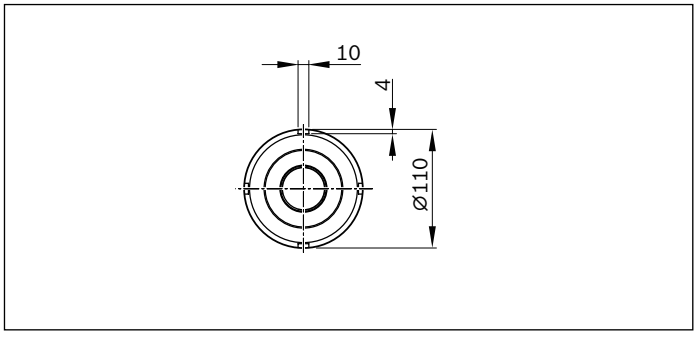
$$s_{eff} = s_{max} - 2 \cdot s_e$$




| | | | |
|---|---|---|---|
| $s_e$ | = | excess travel | (mm) |
| $s_{eff}$ | = | effective stroke | (mm) |
| $s_{max}$ | = | maximum travel | (mm) |



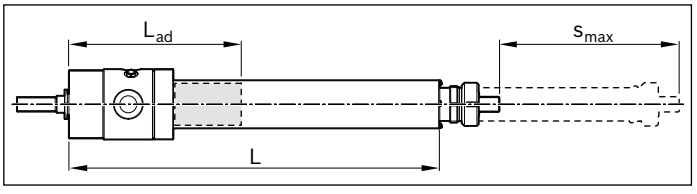

**Slotted nut on threaded mounting interface**




## Length calculation L

| | $d_0$xP | $L_{ad}$ (mm) |
|---|---|---|
| **PLSA** | 48x5 | 442 |
| | 48x10 | 442 |
| **BS** | 63x10 | 405 |
| | 63x20 | 427 |

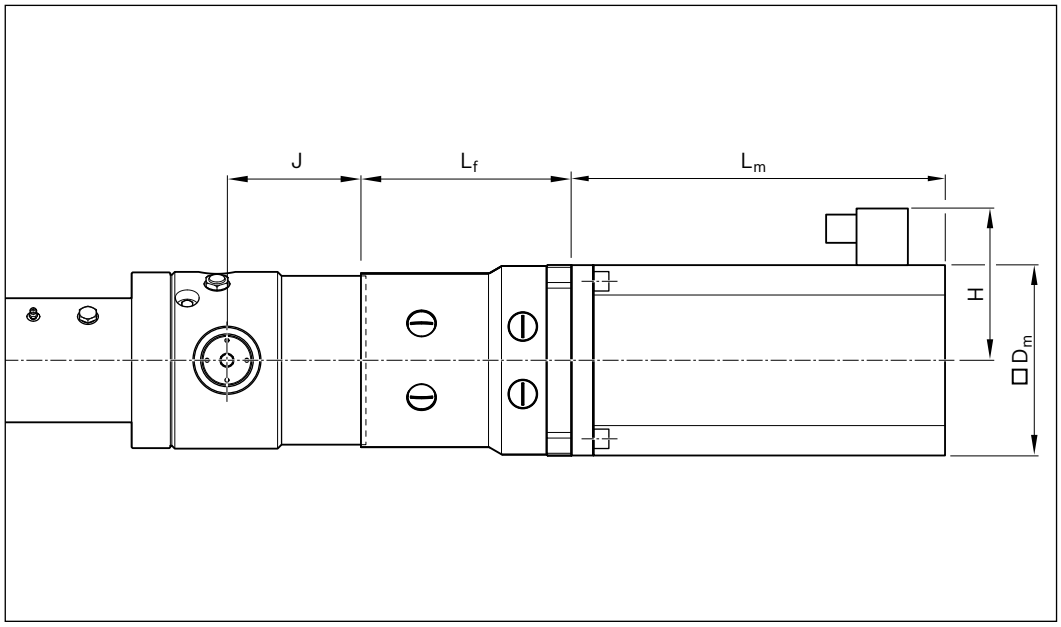
$$L = s_{max} + L_{ad}$$



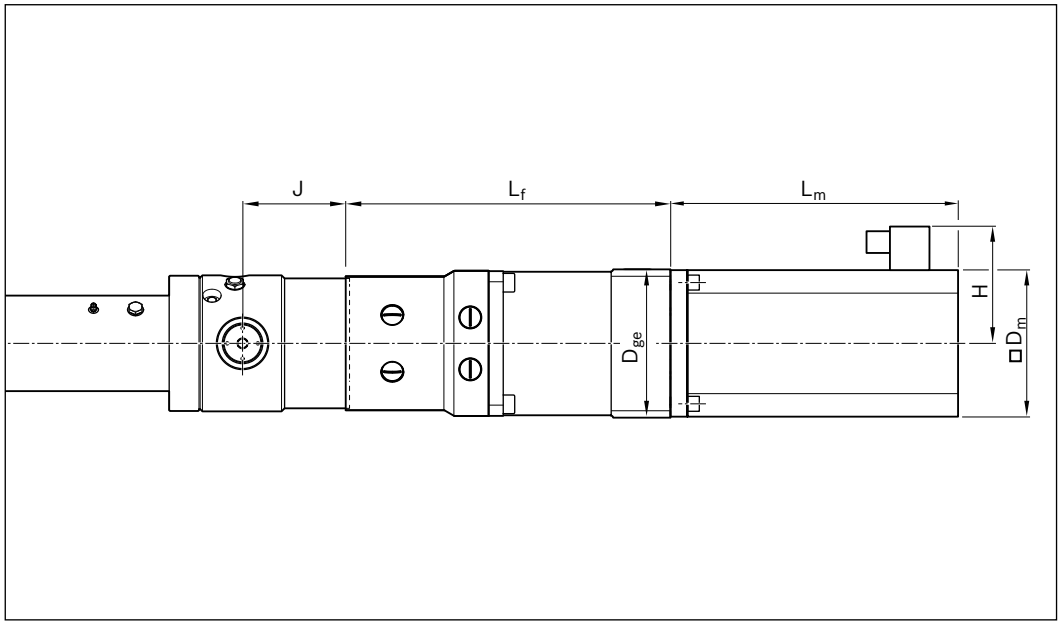

| | | | |
|---|---|---|---|
| L | = | overall length (without piston rod) | (mm) |
| $L_{ad}$ | = | additional length | (mm) |
| $s_{max}$ | = | maximum travel | (mm) |

# EMC-125-HD – Motor Attachments

**MF01**

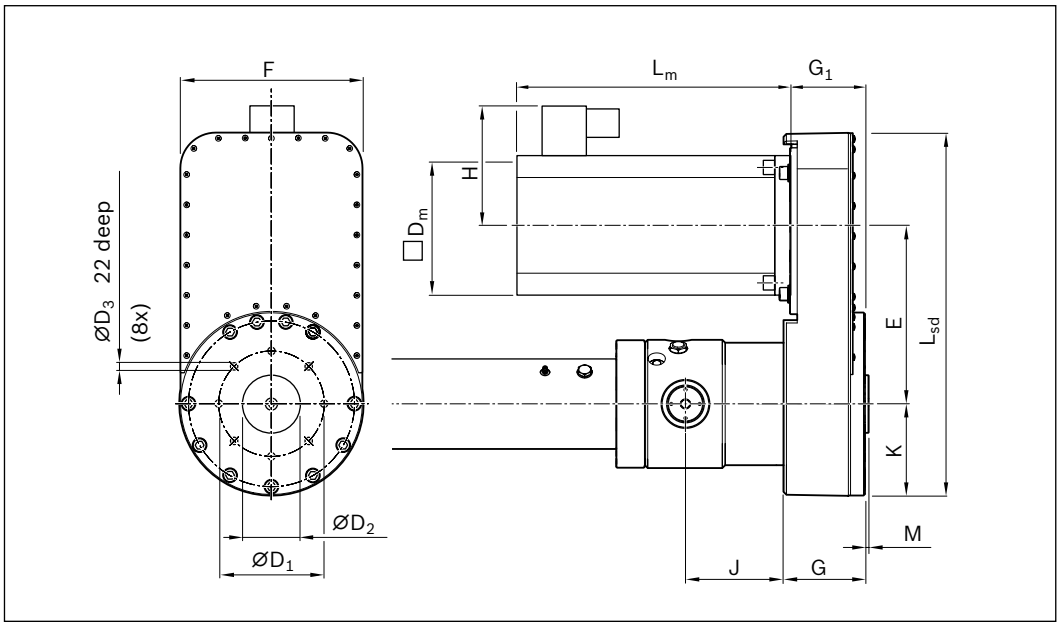



**MF01 with gear unit**

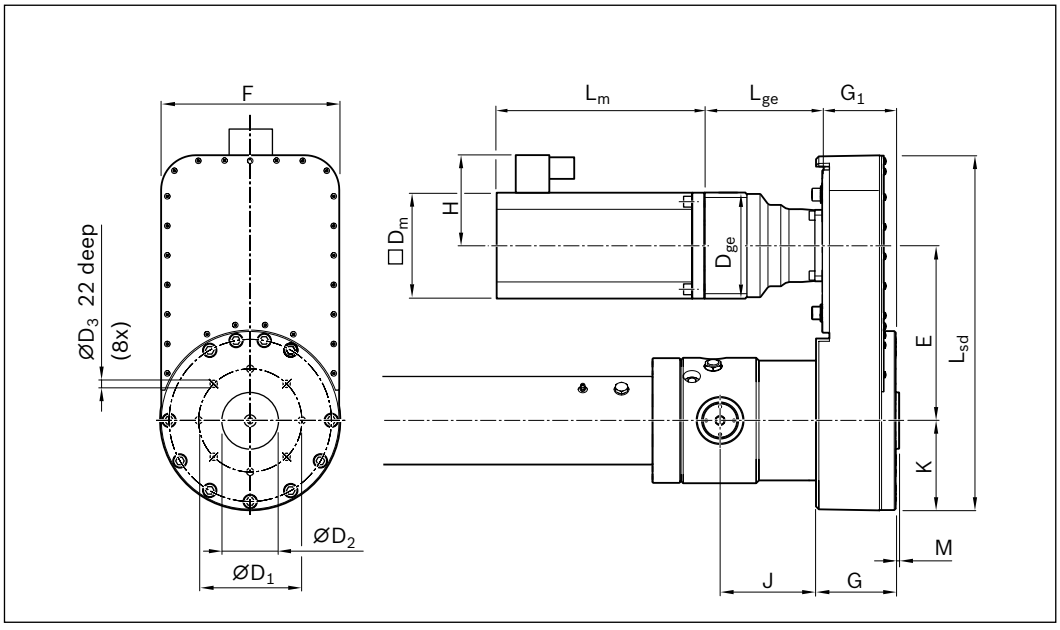



| Motor | Option | i | Dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | $L_m$ | | $D_m$ | $D_{ge}$ | $L_f$ | J | H |
| | | | With brake | Without brake | | | | | |
| MSK071D | 16 | 5 | 347 | 312 | 140 | 150 | 388.3 | 140 | 132 |
| MSK100B | 02 | – | 368 | 368 | 192 | – | 207.0 | 140 | 166 |
| | 06 | 3 | 368 | 368 | 192 | 190 | 368.0 | 140 | 166 |
| MSK101D | 03 | – | 410 | 410 | 192 | – | 207.0 | 140 | 166 |
| | 07 | 3 | 410 | 410 | 192 | 190 | 388.3 | 140 | 166 |
| MSK101E | 03 | – | 410 | 410 | 192 | – | 207.0 | 140 | 166 |

**RV01, RV02, RV03, RV04**




**RV01, RV02, RV03, RV04 with gear unit**

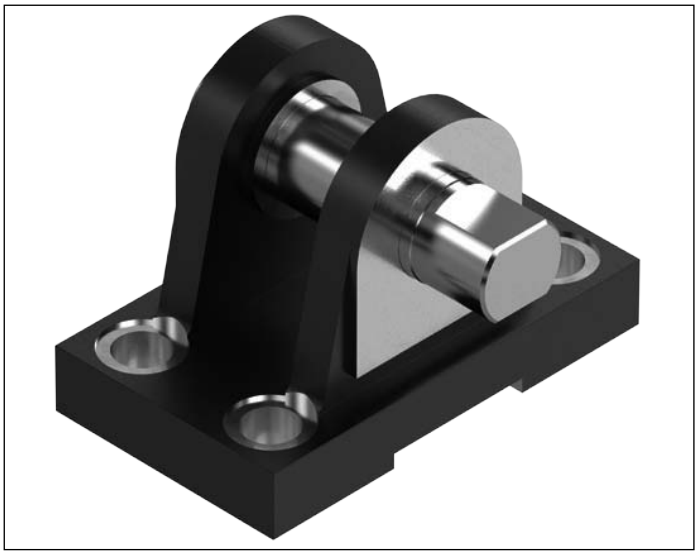


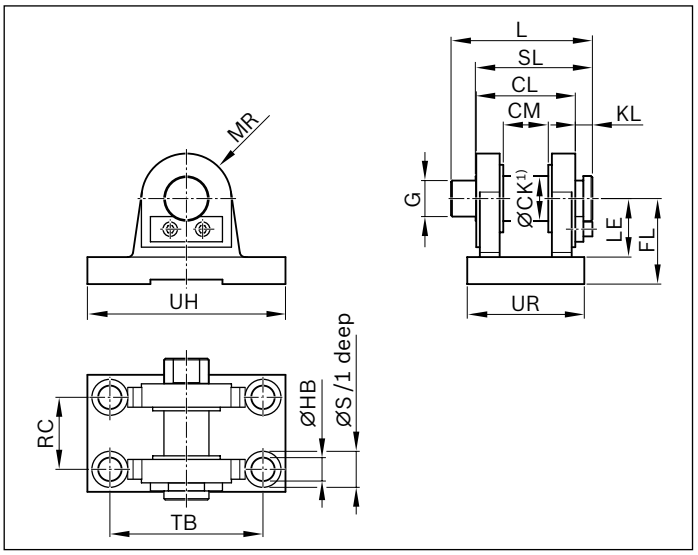

| Motor | Option | i | Dimensions (mm) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $L_{sd}$ | E | K | G | $G_1$ | J | M | $L_m$ With brake | $L_m$ Without brake | $L_{ge}$ | $D_m$ | $D_{ge}$ | H | F | $ØD_1$ | $ØD_2$ g7 | $ØD_3$ |
| MSK100B | 41 | 1.5 | 504 | 248 | 128 | 109 | 104 | 140 | 5 | 368 | 368 | – | 192 | – | 166 | 255 | 145 | 80 | M12 |
| MSK101D | 42 | 1.5 | 504 | 248 | 128 | 109 | 104 | 140 | 5 | 410 | 410 | – | 192 | – | 166 | | | | |
| MSK101E | 42 | 1.5 | 504 | 248 | 128 | 109 | 104 | 140 | 5 | 501 | 501 | – | 192 | – | 166 | | | | |
| MSK100B | 51 | 4.5 | 504 | 248 | 128 | 109 | 114 | 140 | 5 | 368 | 368 | 156 | 192 | 190 | 166 | | | | |
| MSK101D | 52 | 4.5 | 504 | 248 | 128 | 109 | 114 | 140 | 5 | 410 | 410 | 156 | 192 | 190 | 166 | | | | |
| MSK071D | 70 | 7.5 | 504 | 248 | 128 | 109 | 114 | 140 | 5 | 347 | 312 | 156 | 140 | 150 | 132 | | | | |

# Mounting Elements

## Clevis bracket CLCD (comparable with ISO 8132) for spherical rod end bearing with clevis, form A

**Group 1, option 11**



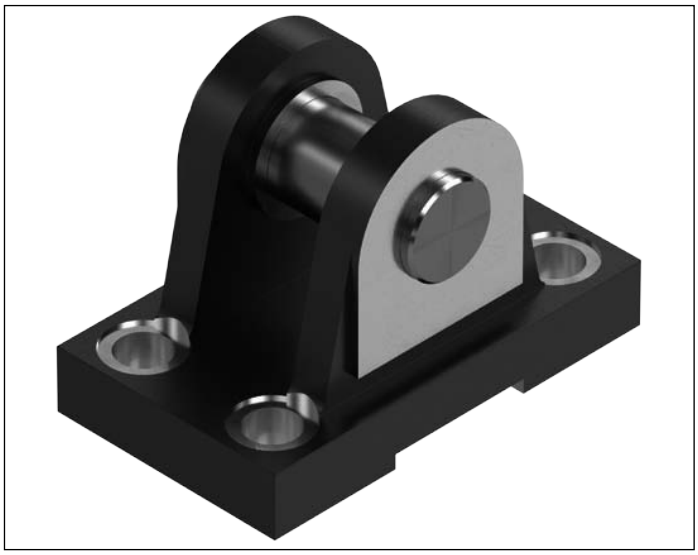


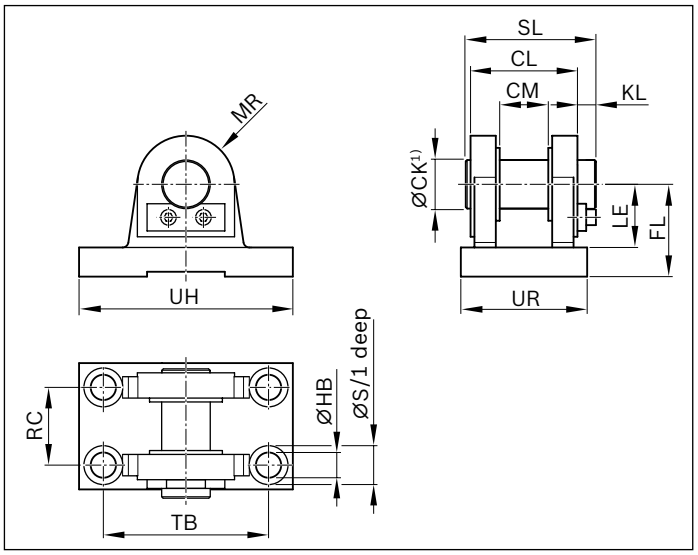

| Size | Part number | Dimensions (mm) | | | | | | | | | | | | | | | | m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØCK[1] | CL | CM | FL | ØHB | KL | LE | MR | RC | ØS | SL[2] | L[2] | G[2] | TB | UR | UH | (kg) |
| | | H9 | h16 | A12 | js12 | H13 | | min. | max. | js14 | | | | f7 | js14 | max. | max. | |
| EMC-085-HD | R156330100 | 32 | 70 | 32 | 65 | 17.5 | 13 | 43 | 32 | 50 | 26 | 90.5 | 114.5 | 25 | 110 | 85 | 143 | 3.15 |
| EMC-125-HD | R156350100 | 50 | 110 | 50 | 95 | 26.0 | 19 | 65 | 50 | 80 | 40 | 130.0 | 157.0 | 40 | 170 | 130 | 220 | 10.95 |

**1** Matching pivot pin Ø f7 (pin and pin locking feature are included in the scope of supply and are not ready-mounted on delivery)
**2** Values deviate from ISO 8132 standard

## Clevis bracket CLCD ISO 8132, form A

**Group 1 / 6, option 21**





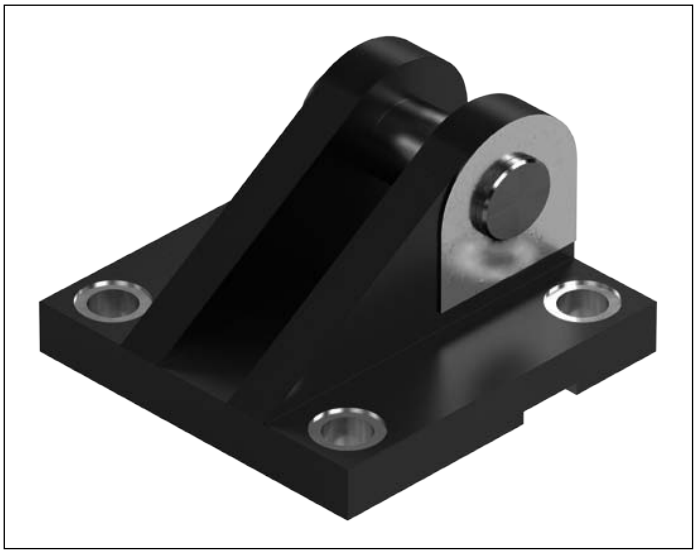

| Size | Part number | Dimensions (mm) | | | | | | | | | | | | | | | m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØCK[1)] H9 | CL h16 | CM A12 | FL js12 | ØHB H13 | KL | LE min. | MR max. | RC js14 | ØS | SL | TB js14 | UR max. | UH max. | | (kg) |
| EMC-085-HD | R156330101 | 32 | 70 | 32 | 65 | 17.5 | 13 | 43 | 32 | 50 | 26 | 87 | 110 | 85 | 143 | | 3.0 |
| EMC-125-HD | R156350101 | 50 | 110 | 50 | 95 | 26.0 | 19 | 65 | 50 | 80 | 40 | 133 | 170 | 130 | 220 | | 10.6 |

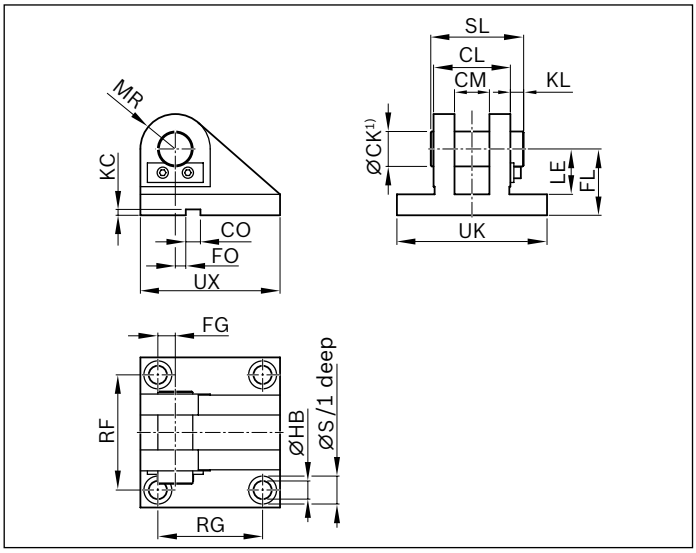
**1** Matching pivot pin Ø m6 (pin and pin locking feature are included in the scope of supply and are not ready-mounted on delivery)

# Mounting Elements

## Clevis bracket CLCA ISO 8132, form B

**Group 1 / 6, option 22**



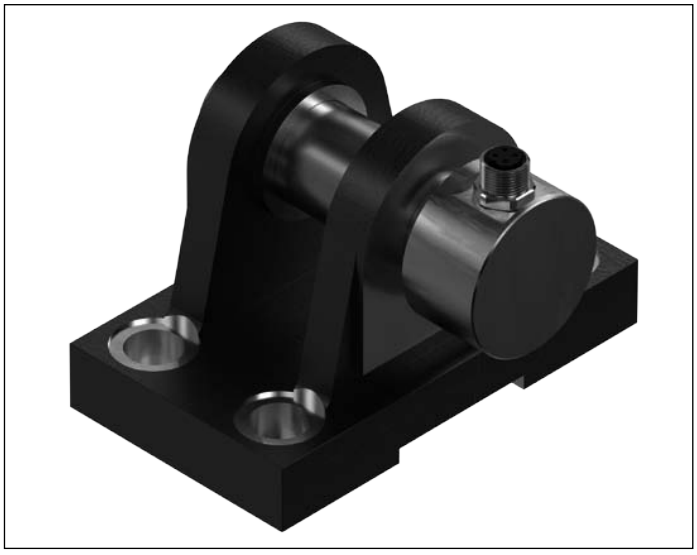


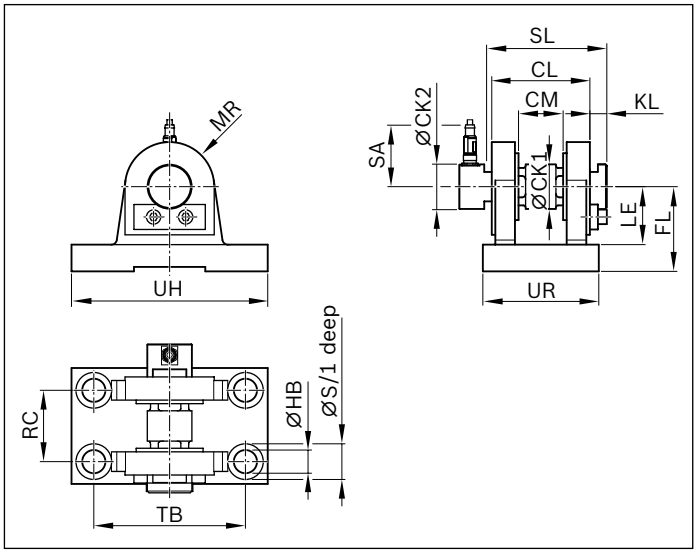

| Size | Part number | Dimensions (mm) | | | | | | | | | | | | | | | | | | | m (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØCK[1] H9 | CL h16 | CM A12 | CO N9 | FG js14 | FL js12 | FO js14 | ØHB H13 | KC +0.3 | KL | LE min. | MR max. | RF js14 | RG js14 | ØS | SL | UK max. | UX max. | | |
| EMC-085-HD | R156330102 | 32 | 70 | 32 | 25 | 14.5 | 65 | 6 | 17.5 | 5.4 | 13 | 43 | 32 | 110 | 110 | 26 | 87 | 145 | 145 | | 4.5 |
| EMC-125-HD | R156350102 | 50 | 110 | 50 | 36 | 25.0 | 95 | – | 26.0 | 8.4 | 19 | 65 | 50 | 165 | 150 | 40 | 133 | 215 | 200 | | 13.5 |

**1** Matching pivot pin Ø m6 (pin and pin locking feature are included in the scope of supply and are not ready-mounted on delivery)

## Clevis bracket CLCD (comparable with ISO 8132), form A, with load measuring pin

**Group 1 / 6, option 31**






| Size | Part number | Dimensions (mm) | | | | | | | | | | | | | | | | m (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØCK1[1] H9 | ØCK2 | CL h16 | CM A12 | FL js12 | ØHB H13 | KL[2] | LE min. | MR max. | RC js14 | ØS | SL[2] | TB js14 | UR max. | UH max. | SA | |
| EMC-085-HD | R156330103 | 32 | 50 | 70 | 32 | 65 | 17.5 | 12 | 43 | 32 | 50 | 26 | 117.0 | 110 | 85 | 143 | 69.5 | 3.35 |
| EMC-125-HD | R156350103 | 50 | 50 | 110 | 50 | 95 | 26.0 | 20 | 65 | 50 | 80 | 40 | 166.5 | 170 | 130 | 220 | 69.5 | 11.05 |

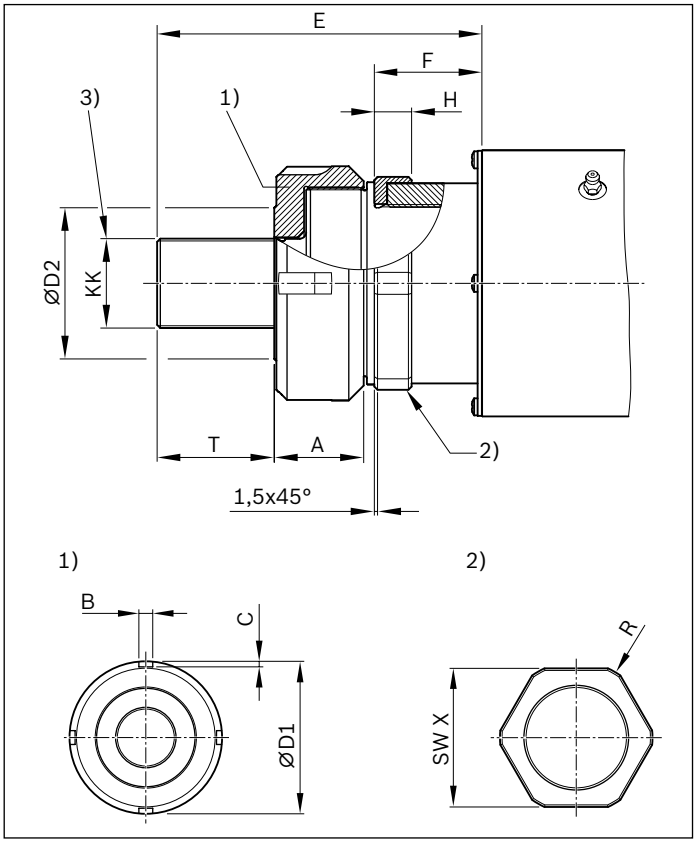
**1** Matching pivot pin Ø f8. For detailed information on the load measuring pin see “Load Sensor” section.

**2** Values deviate from ISO 8132 standard

# Mounting Elements

## Threaded mounting interface for version without integrated anti-twist feature

**Group 2, option 01**



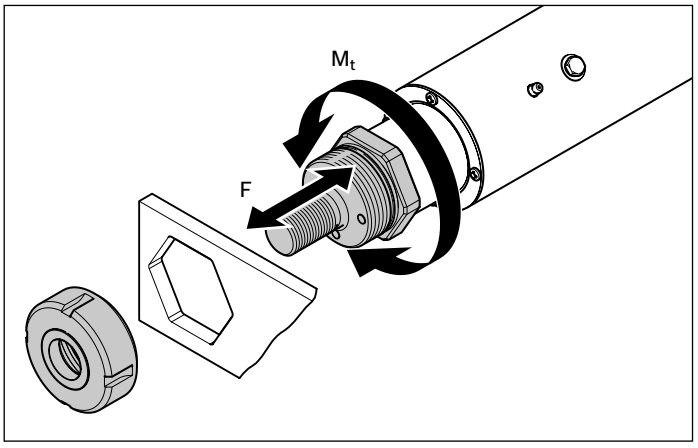

**1)** Lock nut on threaded mounting interface
**2)** Wrench flats for supporting the drive torque
**3)** Fastening thread for absorbing tensile/compressive forces

| Size | Dimensions (mm) | | | | | | | | | | | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | ØD1 | ØD2 | E[2)] | F[2)] | Lock nut | KK | H[1)] | R | T max. | SW X | (kg) |
| EMC-085-HD | 31 | 8 | 4 | 77 | 41 | 116.5 | 42.5 | M60x1.5 | M27x2 | 14.0 | R36 | 37 | 65 | 3.0 |
| EMC-125-HD | 42 | 10 | 4 | 110 | 71 | 152.5 | 50.5 | M90x2 | M42x2 | 17.5 | R55 | 56 | 100 | 10.6 |

**1** Maximum dimension of customer-built attachment
**2** Dimensions E and F are shown in retracted state (stroke = 0 mm)!

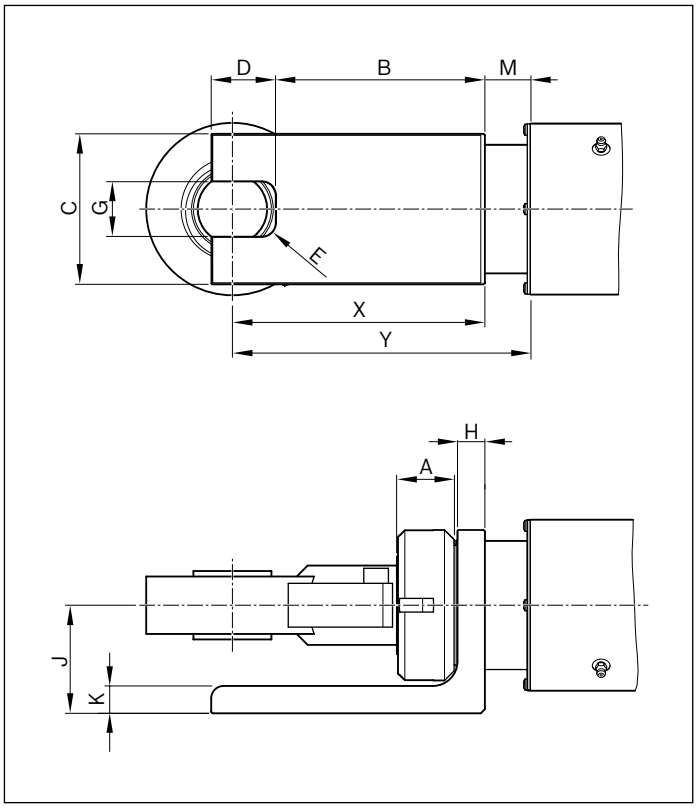
### Notes for mounting

The wrench flats provide positive-locking support for the drive torque.
Tensile and compressive axial forces are absorbed via the fastening thread.
During installation, screw the lock nut all the way onto the threaded mounting interface.
After screwing on and radially aligning the connection element, screw back the lock nut against the connection element (maximum 1.5 turns).
The lock nut is not intended to fix the customer's attachment axially against at the wrench flats.



## Spherical rod end bearing CGKD (clampable) with clevis

**Group 2, option 02**




| Size | Dimensions (mm) | | | | | | | | | | | | m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | G H7 | H | J | K | M[1)] | X | Y[1)] | (kg) |
| EMC-085-HD | 31 | 114 | 75 | 34 | R6 | 25 | 15 | 62 | 15 | 28.5 | 131-134 | 159.5-162.5 | 1.6 |
| EMC-125-HD | 42 | 153 | 110 | 47 | R10 | 40 | 20 | 79 | 15 | 33.0 | 183.5-186.5 | 216.5-219.5 | 4.1 |

**1** Dimensions M and Y are shown in retracted state (stroke = 0 mm)!

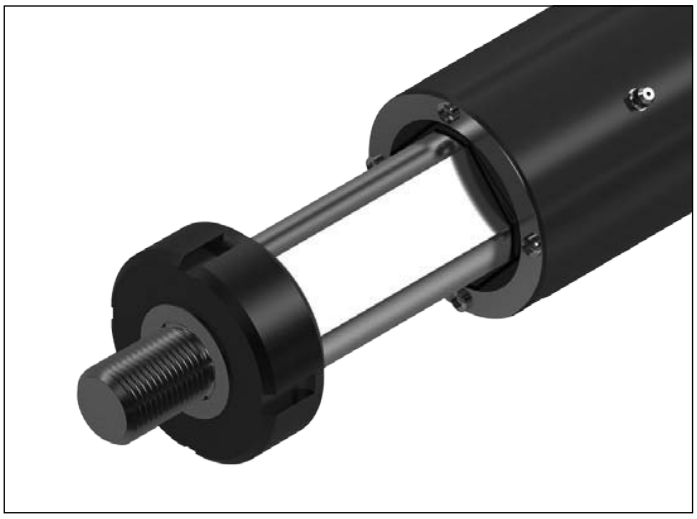
### Note

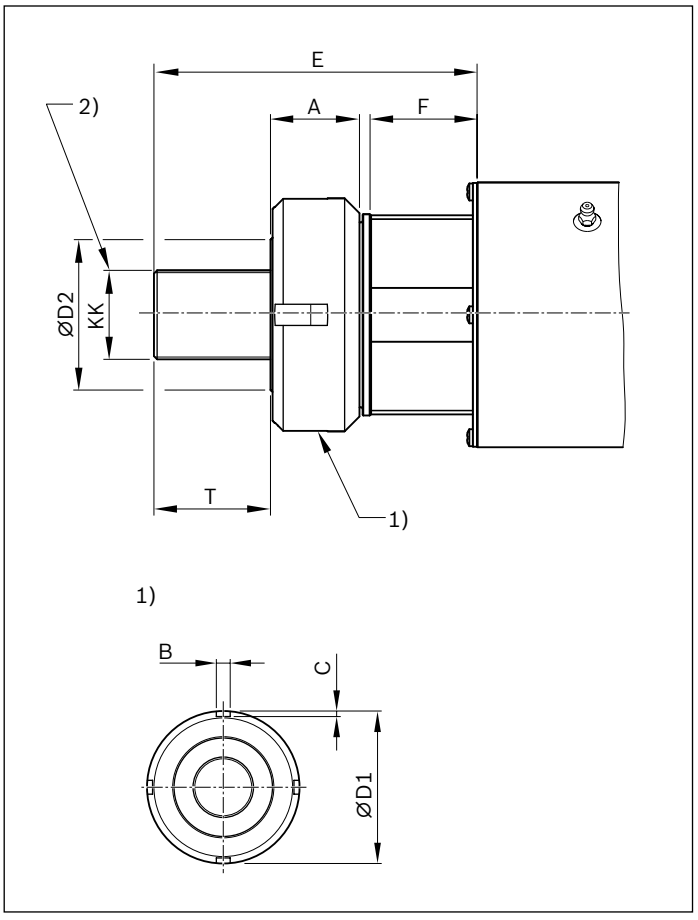
The matching pivot pin is included with the clevis bracket for spherical rod end bearing with clevis (group 1, option 11).
Customer-built connection elements dimensions analog to clevis brackets (group 1, option 11).

# Mounting Elements

## Threaded mounting interface for version with integrated anti-twist feature

**Group 2, option 11**






**1)** Lock nut on threaded mounting interface
**2)** Fastening thread for absorbing tensile/compressive forces

| Size | Dimensions (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | ØD1 | ØD2 | E[1)] | F[1)] | Lock nut | KK | T max. |
| EMC-085-HD | 31 | 8 | 4 | 77 | 41 | 116.5 | 42.5 | M60x1.5 | M27x2 | 37 |
| EMC-125-HD | 42 | 10 | 4 | 110 | 71 | 152.5 | 50.5 | M90x2 | M42x2 | 56 |

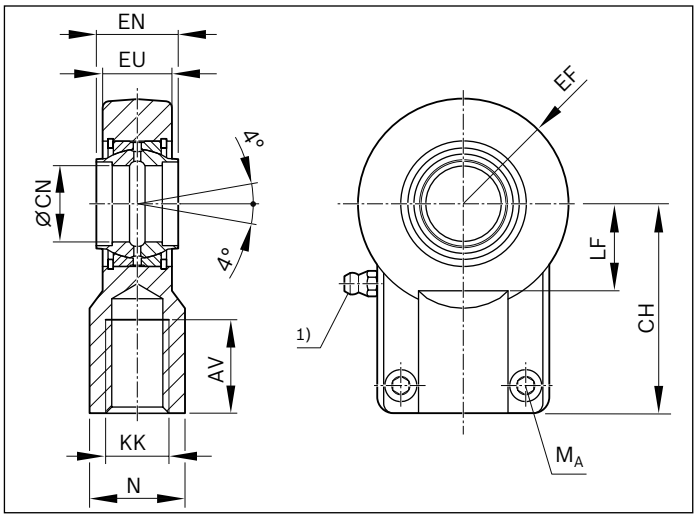
**1** Dimensions E and F are shown in retracted state (stroke = 0 mm)!

### Notes for mounting

The drive torque is absorbed via the integrated anti-twist feature.
Tensile and compressive axial forces are absorbed via the fastening thread.
During installation, screw the lock nut all the way onto the threaded mounting interface.
After screwing on and radially aligning the connection element, screw back the lock nut against the connection element (maximum 1.5 turns).

## Spherical rod end bearing CGKD (clampable)

**Group 2, option 12**




**1)** Lube nipple, hydraulic type A as per DIN 71412

| Size | Part number | Dimensions (mm) | | | | | | | | | Clamping screw | $M_A$ | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AV | N | CH | EF | ØCN[1)] | EN | EU | KK | LF | ISO 4762-10.9 | (Nm) | (kg) |
| | | min. | max. | js13 | max. | H7 | h12 | max. | | min. | | | |
| EMC-085-HD | R900322049 | 37 | 38 | 80 | 40 | 32 | 32 | 28 | M27x2 | 30 | M10x25 | 59 | 1.15 |
| EMC-125-HD | R900322719 | 57 | 58 | 120 | 63 | 50 | 50 | 42 | M42x2 | 47 | M12x35 | 100 | 4.00 |

**1** Matching pivot pin Ø m6

### Notes for mounting

During installation, screw the lock nut all the way onto the threaded mounting interface.

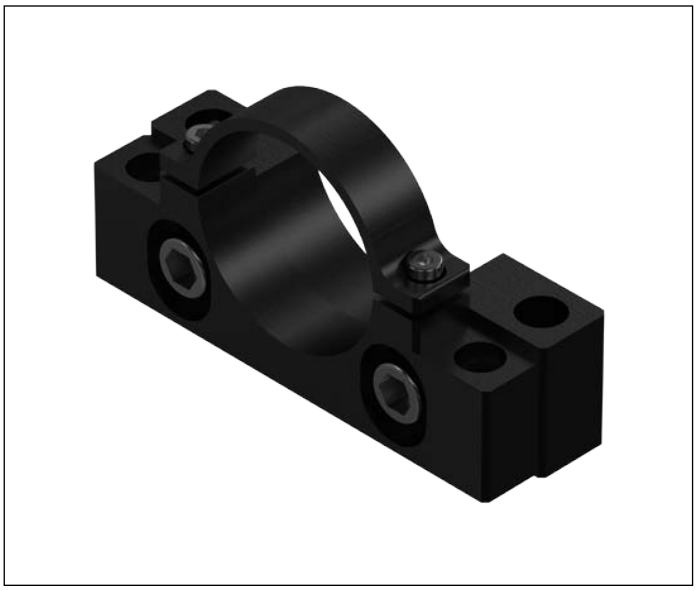
After screwing on and radially aligning the connection element, screw back the lock nut against the connection element (maximum 1.5 turns).

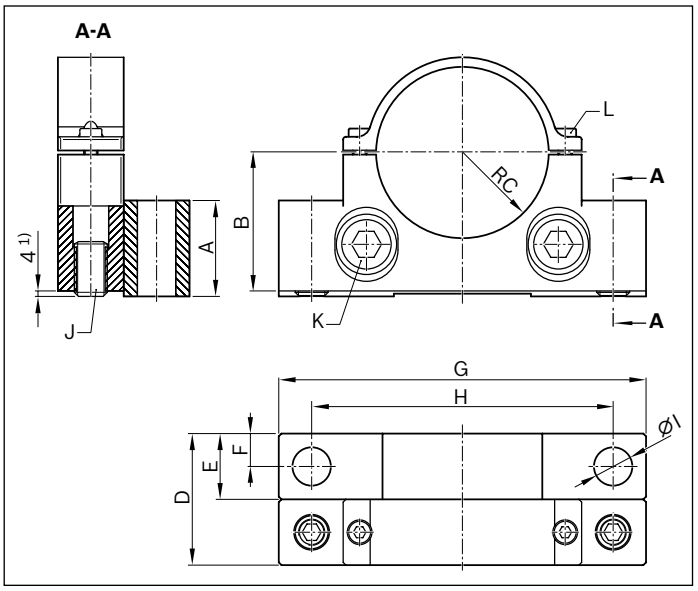
Then tighten clamping screws to the stated tightening torque.

# Mounting Elements

## Foot mount

**Group 3, option 11**






| Size | Part number | Dimensions (mm) | | | | | | | | | J | K | L | m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | RC | D | E | F | G | H | ØI | Set screw ISO 4026 | Screw ISO 4762 | Screw ISO 4762 | (kg) |
| EMC-085-HD | R156330130 | 55 | 61.5 | 43 | 60 | 32 | 16 | 195 | 162 | 19 | M16X40 | M16x40 | M8x20 | 1.4 |
| EMC-125-HD | R156350130 | 70 | 101.5 | 63 | 96 | 48 | 24 | 268 | 220 | 28 | M24X40 | M24x70 | M10x25 | 4.7 |

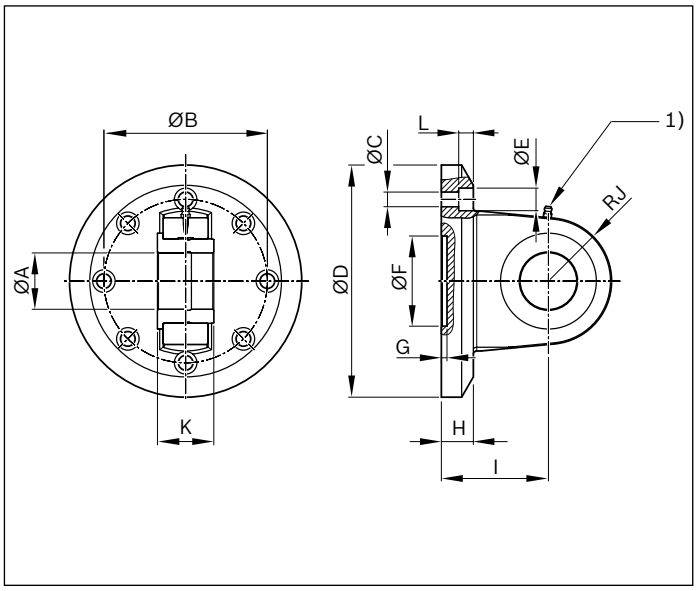
**1** The foot mount can be adjusted for height in a range of +/- 4 mm

### Note

This fastening element is only suitable for supporting the housing tube when the cylinder is installed horizontally.
It is not designed to absorb axial forces!

## Swivel bearing

**Group 5, option 11**



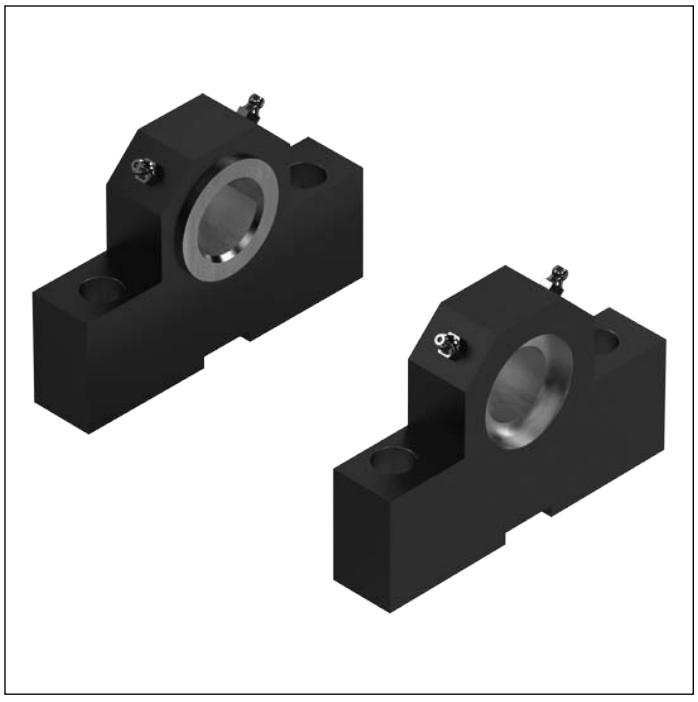

**1)** Lube nipple, hydraulic type A as per DIN 71412

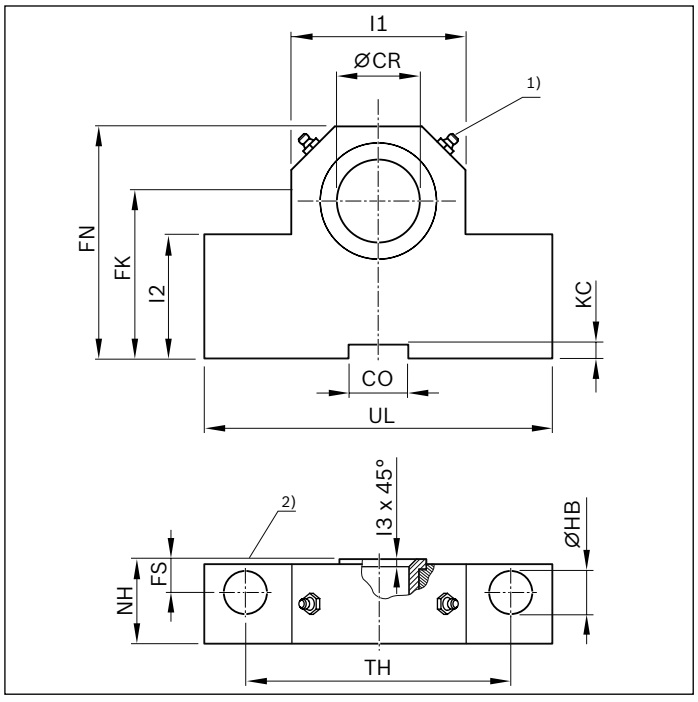
| Size | Part number | Dimensions (mm) | | | | | | | | | | | | m (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØA H9 | ØB | ØC | ØD | ØE | ØF H7 | G | H max. | I | RJ | K h12 | L | |
| EMC-085-HD | R156330150 | 32 | 100 | 9 | 162 | 15 | 60 | 5 | 22.7 | 65 | 39 | 32 | 9 | 4.1 |
| EMC-125-HD | R156350150 | 50 | 145 | 13 | 206 | 20 | 80 | 5 | 28.4 | 95 | 56 | 50 | 13 | 10.8 |

# Mounting Elements

## Trunnion bearing block CLTB

**Group 6, option 01**






**1)** Lube nipple, hydraulic type A as per DIN 71412
**2)** Trunnion location face (inside)

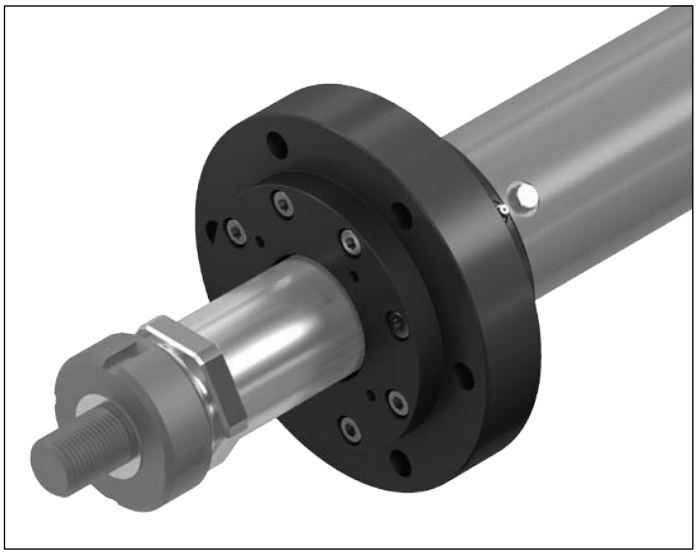
| Size | Part number | Dimensions (mm) | | | | | | | | | | | | | m [1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ØCR H7 | CO N9 | FK js12 | FN max. | FS js14 | ØHB H13 | KC +0.3 | l1 | l2 | l3 | NH max. | TH js14 | UL max. | (kg) |
| EMC-085-HD | R156330160 | 32 | 25 | 65 | 100 | 15 | 17.5 | 5.4 | 70 | 52 | 2.5 | 33 | 110 | 150 | 4.55 |
| EMC-125-HD | R156350160 | 50 | 36 | 95 | 140 | 20 | 26.5 | 8.4 | 100 | 75 | 2.5 | 51 | 160 | 210 | 14.50 |

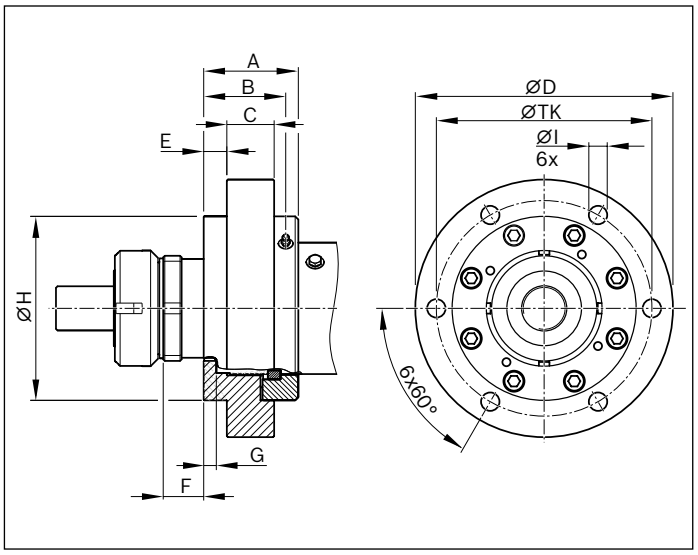
**1** Figure per pair

### Note

Trunnion bearing blocks are always supplied in pairs.

## Round flange





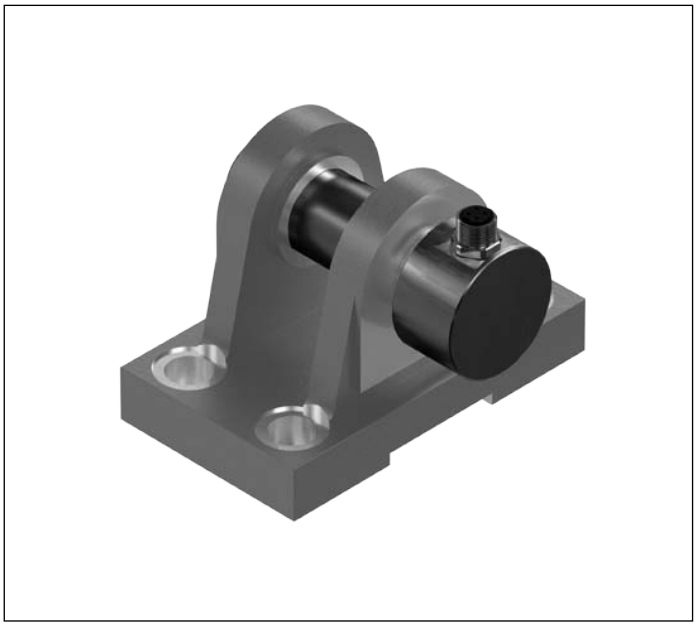

| Size | Dimensions (mm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØTK | ØD | A | B | C | E | F | G | ØH | ØI | m (kg) |
| EMC-085-HD | 155 | 185 | 76 | 66 | 35 | 15 | 32.5 | 10 | 130 | 13.5 | 8.2 |
| EMC-125-HD | 205 | 245 | 90 | 78 | 45 | 22 | 38.5 | 12 | 175 | 17.5 | 15.8 |

**Note**

This type of mounting is only suitable for vertical installation.

# Load Sensor

**Clevis bracket with load measuring pin**



If your application requires precise load sensing, there is a clevis bracket version with load measuring pin available for this purpose. This option can be selected both at the piston rod end connected to the spherical rod end bearing, and at the timing belt side drive connected to the swivel bearing. Thanks to the thin-film technology used, the load cells are very robust and stable over the long term. The load cells are compliant with the EN 61326 standard for electromagnetic compatibility (EMC) and are designed to sense both tensile and compressive forces.

**Note**

The use of a hammer or press to fit the pin is not permitted. It may only be inserted by hand.
The pin is not suitable for measuring torques and may therefore only be used with the cylinder option “Guideway with anti-twist feature”.
It is secured axially and against twisting, like the standard pin, on one side of the bracket using the pin locking feature supplied.
For force control at the controller level, a control unit with an analog input is required.

**Load measuring pin for**

| Size | Part number | Measuring range |
|---|---|---|
| **EMC-085-HD** | R156337080 | 50 kN |
| **EMC-125-HD** | R156357080 | 110 kN |

**Technical data**

**Metrological specifications**

| | |
|---|---|
| **Material** | Stainless steel |
| **Protection class** | IP 65 |
| **Hardness (load sensing range)** | 38 HRC |
| **Mechanical system** | |
| **Operating load** | 150% of MR |
| **Load at fracture** | 300% of MR |
| **Accuracy** | |
| **Non-linearity** | ±0.5% of MR |
| **Repeatability** | ±0.25% of MR |
| **Hysteresis** | ±0.2% of MR |
| **Temperature drift at zero point** | ±0.05% of MR/K |
| **Temperature drift over measuring range** | ±0.05% of MR/K |
| **Compensated temperature** | +10 ... +40 °C |
| **Operating temperature** | –20 ... +60 °C |

MR = measuring range
MR/K = measuring range per Kelvin

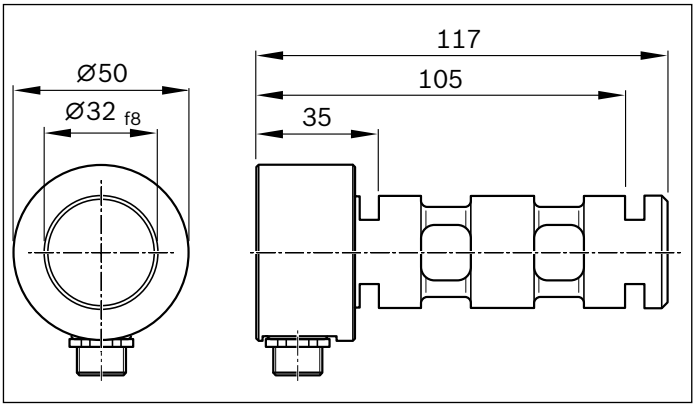
**Electrical specifications**

| | | |
|---|---|---|
| **Output signal** | 0 kN | 0±0.03 V |
| **Output signal** | MR | –10 ... 10 V ±0.2 V |
| **Power supply** | | 19 ... 28 V |
| **Current consumption** | | 50 mA (24 V) |
| **Bandwidth** | | 2.5±0.2 KHz |

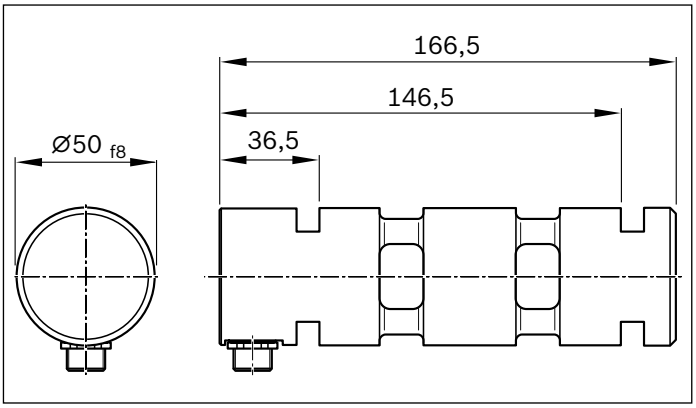
**Features**

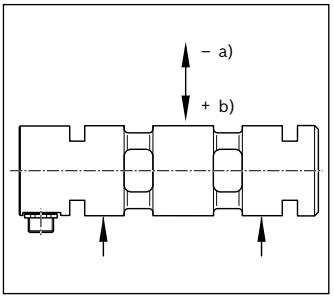
- For tensile and compressive forces
- Corrosion-resistant stainless steel version
- Integrated amplifier
- Low temperature coefficient
- High long term stability
- High shock and vibration resistance
- For dynamic or static measurements
- Good reproducibility
- Easy mounting

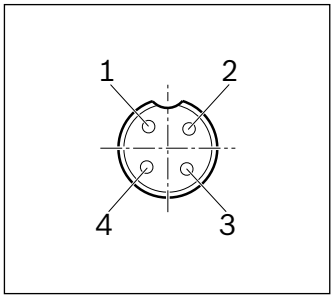
**Dimensions**
**for EMC-085-HD**




**for EMC-125-HD**



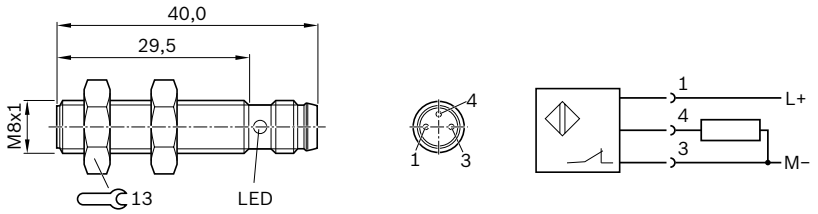




**1** brn = brown, power supply (+)
**2** wht = white, output
**3** blu = blue, GND
**4** blk = black, tare

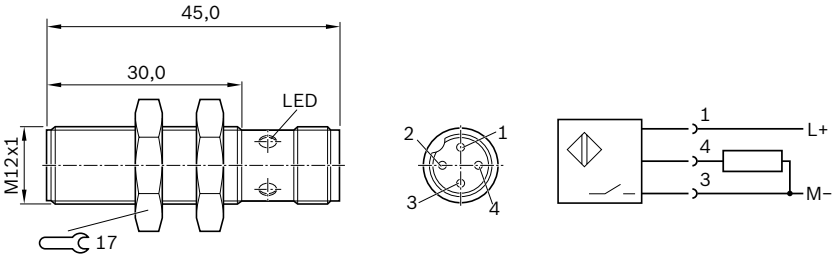
# Switch Mounting Arrangements

## Proximity switches

**Limit switch**



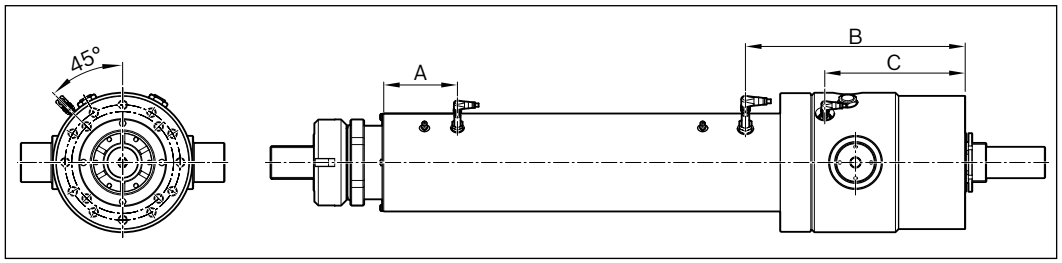

**Reference switch**




## Technical data, proximity switches

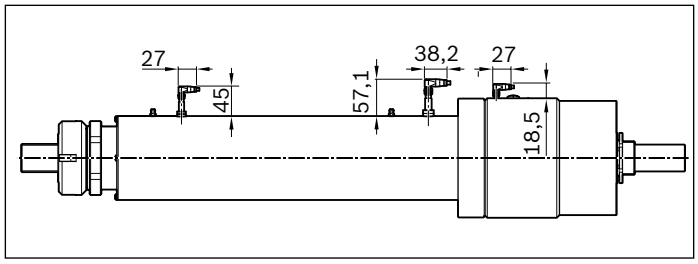
| | Limit switch | Reference switch |
|---|---|---|
| **Part number** | R9130 307 57 | R9130 307 58 |
| |  |  |
| **Function principle** | Proximity | Proximity |
| **Operating voltage** | 10 ... 30 V DC | 10 ... 30 V DC |
| **Load current** | < 200 mA | < 200 mA |
| **Switching function** | PNP/normally closed (NC) | PNP/normally open (NO) |
| **Connection type** | Plug connector, M8x1, 3-pin | Plug connector, M12x1, 4-pin |
| **Function indication** | ✓ | ✓ |
| **Short-circuit protection** | ✓ | ✓ |
| **Polarity safe** | ✓ | ✓ |
| **Switching frequency** | 3 kHz | 2 kHz |
| **Reproducibility** | < 0.05 mm | < 0.05 mm |
| **Max. perm. approach speed** | 1 m/s | 1 m/s |
| **Ambient temperature** | –25 ℃ to +70 ℃ | –25 ℃ to +70 ℃ |
| **Protection class** | IP 68 | IP 68 |
| **MTTFd (as per EN 13849)** | 835 years at 40 ℃ | 835 years at 40 ℃ |
| **Certification and approval** | CE c UL us LISTED | CE c UL us LISTED |

### Switch position

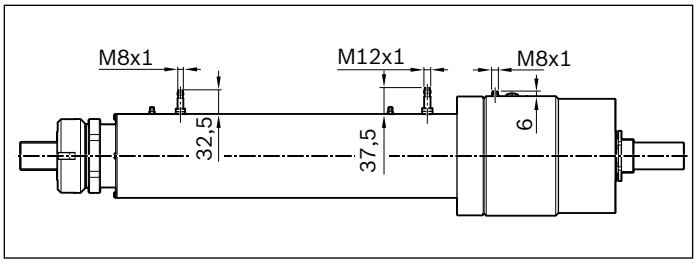



| Size | Dimensions (mm) | | |
|---|---|---|---|
| | A | B | C |
| EMC-085-HD | 91 | 210 | 135 |
| EMC-125-HD | 94 | 280 | 180 |

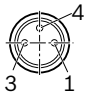
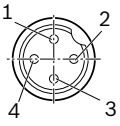
**With connection cable**



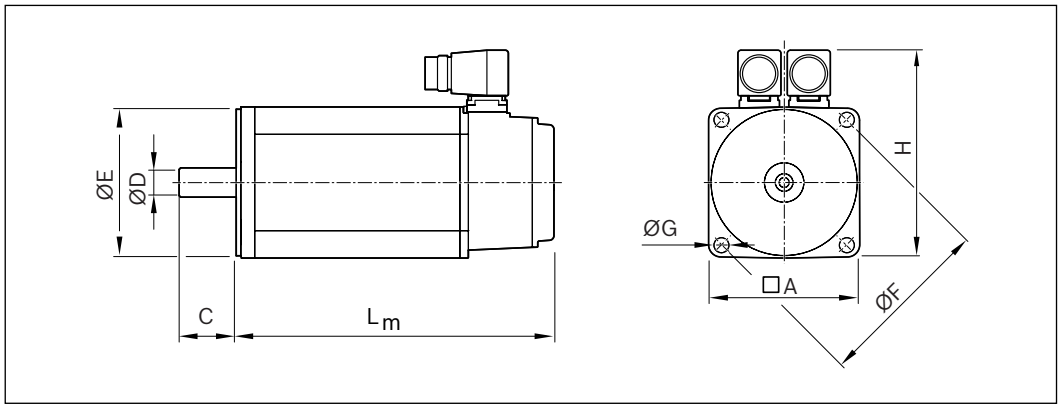

**Without connection cable**




### Technical data, cables

| | Limit switch cable | Reference switch cable |
|---|---|---|
| **Part number** | R9873 914 96 | R9130 233 89 |
| **Pin assignment** |  1 brown, 3 blue, 4 black |  1 brown, 3 blue, 4 black |
| **Type of cable** | PUR black | PUR black |
| **Length** | 5.0 m | 5.0 m |
| **Operating voltage** | 10 ... 30 V DC | 10 ... 30 V DC |
| **1. Connection type** | Angled female connector, M8x1, 3-pin | Angled female connector, M12x1, 5-pin |
| **2. Connection type** | Flying lead | Flying lead |
| **Function indication** | – | ✓ |
| **Operating voltage indicator** | ✓ | ✓ |
| **Suitable for flexing installation** | ✓ | ✓ |
| **Cable cross-section** | 3 x 0.34 mm² | 3 x 0.34 mm² |
| **Cable diameter D** | 4.3 ± 0.2 mm | 4.3 ± 0.2 mm |
| **Bending radius, stationary** | > 5 x D | > 5 x D |
| **Bending radius, flexing** | > 10 x D | > 10 x D |
| **Flexing cycles** | > 2 million | > 2 million |
| **Max. perm. travel speed** | 3.3 m/s | 3.3 m/s |
| **Max. perm. acceleration** | 5 m/s² | 5 m/s² |
| **Ambient temperature fixed & moving** | –25 °C to +80 °C | –25 °C to +80 °C |
| **Ambient temperature, flexing installation** | –25 °C to +60 °C | –25 °C to +60 °C |
| **Protection class** | IP 68 | IP 68 |
| **Certification and approval** | c UL us LISTED | c UL us LISTED |

# IndraDyn S – Servo Motors MSK


Motor connector is orientated in direction of motor shaft

| Motor | Dimensions (mm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | C | ØD | ØE | ØF | ØG | H | $L_m$ | |
| | | | | | | | | Without holding brake | With holding brake |
| **MSK 071D-0300** | 140 | 58 | 32 | 130 | 165 | 11 | 202 | 312 | 347 |
| **MSK 100B-0300** | 192 | 60 | 32 | 130 | 215 | 14 | 262 | 368 | 368 |
| **MSK 101D-0300** | 192 | 80 | 38 | 180 | 215 | 14 | 262 | 410 | 410 |
| **MSK 101E-0300** | 192 | 80 | 38 | 180 | 215 | 14 | 262 | 501 | 501 |

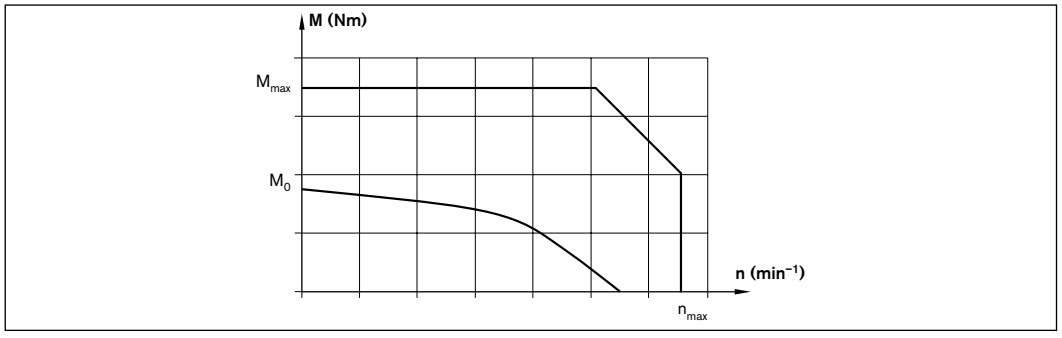
## Motor data

| Motor | $n_{max}$ (min$^{-1}$) | $M_0$ (Nm) | $M_{max}$ (Nm) | $M_{br}$ (Nm) | $J_m$ (kgm$^2$) | $J_{Br}$ (kgm$^2$) | $m_m$ (kg) | $m_{br}$ (kg) |
|---|---|---|---|---|---|---|---|---|
| **MSK 071D-0300** | 3 800 | 17.5 | 66.0 | Without | 0.00230 | – | 18.0 | – |
| **MSK 071D-0300** | | 17.5 | 66.0 | 23 | 0.00230 | 0.00030 | 18.0 | 1.6 |
| **MSK 100B-0300** | 4 500 | 28.0 | 102.0 | Without | 0.01920 | – | 34.0 | – |
| **MSK 100B-0300** | | 28.0 | 102.0 | 32 | 0.01920 | 0.00124 | 34.0 | 2.5 |
| **MSK 101D-0300** | 4 600 | 50.0 | 160.0 | Without | 0.00932 | – | 40.0 | – |
| **MSK 101D-0300** | | 50.0 | 160.0 | 70 | 0.00932 | 0.00300 | 40.0 | 3.8 |
| **MSK 101E-0300** | | 70.0 | 231.0 | Without | 0.01380 | – | 53.5 | – |
| **MSK 101E-0300** | | 70.0 | 231.0 | 70 | 0.01680 | 0.00300 | 53.5 | 3.8 |

$J_{br}$ = mass moment of inertia of holding brake
$J_m$ = mass moment of inertia of motor
$L_m$ = length of motor
$M_0$ = standstill torque
$M_{br}$ = holding torque of holding brake when switched off
$M_{max}$ = maximum possible motor torque
$m_m$ = mass of motor
$m_{br}$ = mass of holding brake
$n_{max}$ = maximum rotary speed

## Motor torque speed curve

(schematic)



| Option number[1)] | Motor | Part number | Version | | Type designation |
|---|---|---|---|---|---|
| | | | Holding brake | | |
| | | | Without | With | |
| **114** | MSK 071D-0300 | **R911310539** | X | | MSK071D-0300-NN-M1-UG0-NNNN |
| **115** | | **R911310168** | | X | MSK071D-0300-NN-M1-UG1-NNNN |
| **116** | MSK 100B-0300 | **R911315705** | X | | MSK100B-0300-NN-M1-AG0-NNNN |
| **117** | | **R911310478** | | X | MSK100B-0300-NN-M1-AG1-NNNN |
| **118** | MSK 101D-0300 | **R911315888** | X | | MSK101D-0300-NN-M1-AG0-NNNN |
| **119** | | **R911310895** | | X | MSK101D-0300-NN-M1-AG2-NNNN |
| **120** | MSK 101E-0300 | **R911317226** | X | | MSK101E-0300-NN-M1-AG0-NNNN |
| **121** | | **R911310891** | | X | MSK101E-0300-NN-M1-AG2-NNNN |

**1** From “Configuration and Ordering” table

**Version:**

- Plain shaft with shaft seal
- Multi-turn absolute encoder M1 (Hiperface)
- Cooling system: natural convection
- Protection class IP 65 (casing)
- With or without holding brake

**Note**

The motors can be supplied complete with controllers and control systems. For further motor types and more information on motors, controllers and control systems, please refer to the following Rexroth catalogs on drive technology:

- Drive System Rexroth IndraDrive, R999000018
- Rexroth IndraDyn S Synchronous Motors MSK, R911296288
- Rexroth IndraDrive C Drive Controllers with HCS02 and HCS03, R911314904
- HCS03 (see “General product description; motor-controller combination”)

**Recommended motor/ controller combinations**

| Motor | Controller [1)] | Controller [2)] |
|---|---|---|
| MSK 071D-0300 | HCS02.1E-W0070 | HCS02.1E-W0028 |
| MSK 100B-0300 | HCS03.1E-W0100 | HCS02.1E-W0054 |
| MSK 101D-0300 | HCS03.1E-W0150 | HCS03.1E-W0100 |
| MSK 101E-0300 | HCS03.1E-W0210 | HCS03.1E-W0100 |

**1)** Design for maximum current / maximum torque of the motor
If the acceleration torque is not required, a drive controller 1-2 power ratings lower may also be adequate.

**2)** Design for continuous current at standstill / continuous torque at standstill of the motor
The relevant DC bus continuous power and increased current demand on acceleration are to be taken into account!

Due to the need to take into account the drive controller’s power and the effect of accessories (mains choke), detail design is essential in any case.

# Operating Conditions and Usage

**Normal operating conditions**

| | |
|---|---|
| **Ambient temperature, cylinder with Rexroth servo motor** | 0 °C ... 40 °C, above 40 °C loss of performance |
| **Ambient temperature cylinder mechanical system** | –10 °C ... +50 °C<br>(up to +60 °C with low duty cycle and power) |
| **Ambient temperature cylinder mechanical system with PLSA and low-temperature grease** | –30 °C ... +50 °C<br>(up to +60 °C with low duty cycle and power) |
| **Protection class** | IP 65 |
| **Duty cycle** | 100% (depending on power required, the permissible duty cycle may be limited due to heat generation) |

**Design notes**

- Moved parts: safety devices and guards necessary
- For vertical installations: arresting devices necessary to protect against falling loads

**Intended use**

The product is an assembly.
The product may be used in accordance with the technical documentation (product catalog) for the following purposes:

- for precise positioning in space.

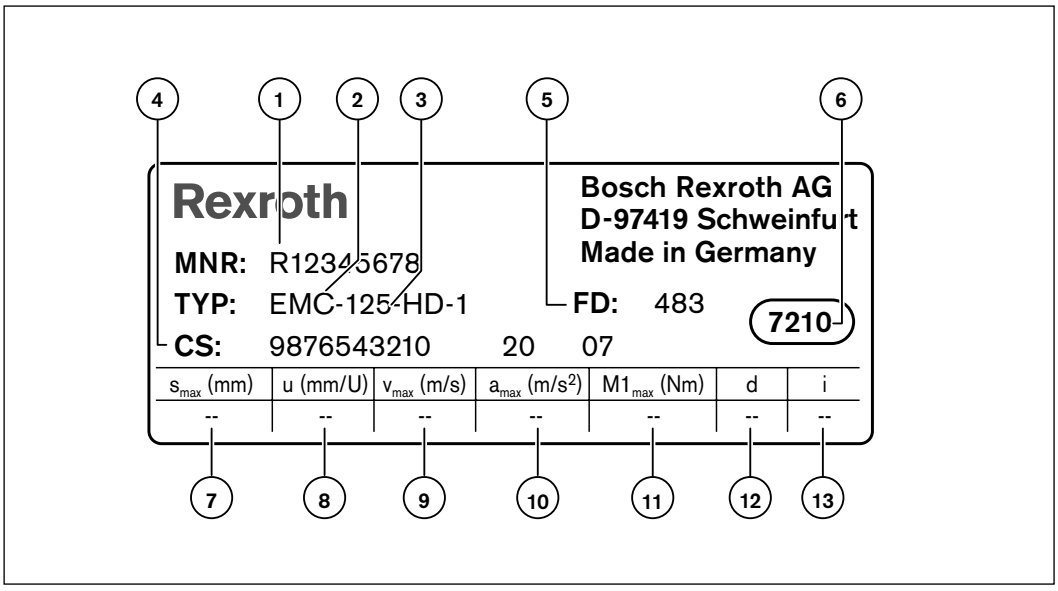
The product is intended exclusively for professional use and not for private use. Use for the intended purpose also includes the requirement that you must have read and understood the product documentation completely, in particular the “Safety Instructions for Linear Motion Systems”.
The product is exclusively intended for incorporation into a final machine or a system or for assembly to other components for the purpose of building a final machine or a system.

**Misuse**

Use of the product in any other way than as described under “Intended use” is considered to be misuse and is therefore not permitted. If unsuitable products are installed or used in safety-relevant applications, this may lead to uncontrolled operating statuses in the application which can cause personal injury and/or damage to property.
The product may only be used in safety-relevant applications if this use has been expressly specified in the product documentation and is permitted, e.g. in zones with potentially explosive atmospheres or in safety-critical parts of a control system (functional safety).
Bosch Rexroth AG will not accept any liability for injury or damage caused by misuse of the product. The risks associated with any misuse of the product shall be borne by the user alone.
Misuse of the product includes:

- the transport of persons

# Nameplate




| | | |
|---|---|---|
| **1** | MNR | Part number |
| **2** | TYPE | Short product name |
| **3** | 125 | Size |
| **4** | CS | Customer information |
| **5** | FD | Date of manufacture |
| **6** | 7210 | Manufacturing location |
| **7** | $s_{max}$ | Maximum travel range |
| **8** | u | Lead constant without motor attachment |
| **9** | $v_{max}$ | Maximum linear speed |
| **10** | $a_{max}$ | Maximum acceleration |
| **11** | $M1_{max}$ | Maximum drive torque at motor journal |
| **12** | d | Direction of rotation of the motor for travel in positive (+) direction |
| **13** | i | Gear ratio |

**Note**

The stated values describe the mechanical limits of the axis.

# Lubrication and Maintenance

**Grease lubrication**

The advantage of grease lubrication is that the ball or planetary screw assemblies can run long distances on one supply of grease. As a result, a lubricating system is not required in many cases.

All commercially available high-quality ball bearing lubricating greases may be used. Read the lubricant manufacturer's specifications carefully! Greases in accordance with DIN 51825 K2K and, for higher loads, KP2K of NLGI Class 2 in accordance with DIN 51818 are recommended for the longest possible lubrication intervals. Tests have shown that greases of NLGI Class 00 achieve only about 50% of the running performance of Class 2 at higher loads.

The relubrication interval depends on many factors such as the degree of contamination, operating temperature, load, etc. The following values can thus serve only as a guide.

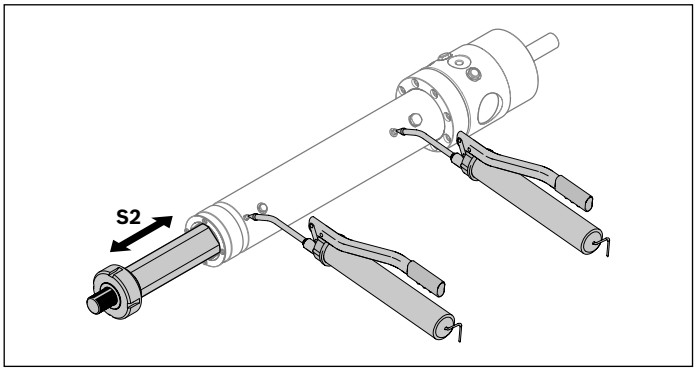
**Lubrication position and notes on lubrication**

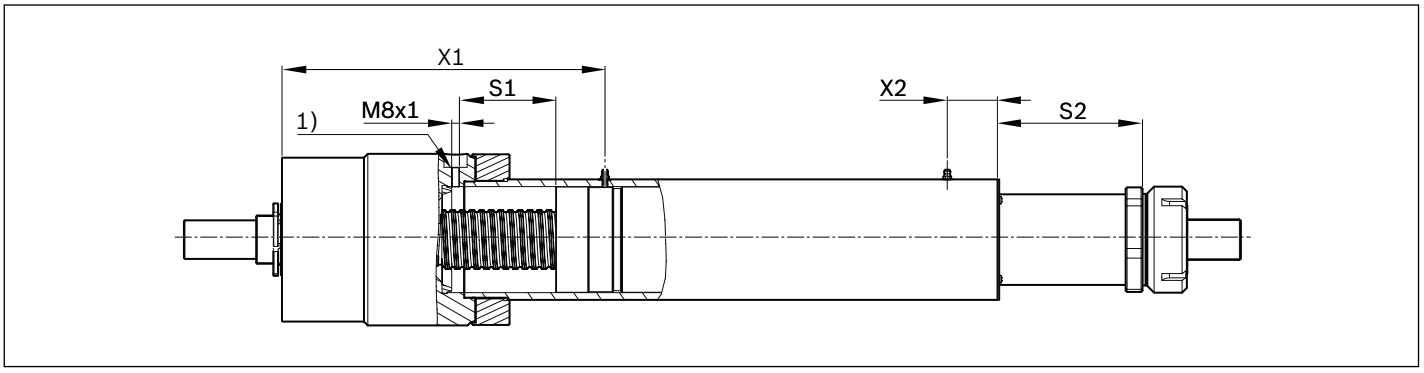
Basic lubrication is applied in-factory before shipment.

The electromechanical cylinders are designed for grease lubrication. Screw drives and guideway must be relubricated. During this process lubricant must be applied to all lubrication points. To reach the lubrication positions X1 and X2, move the piston rod to stroke position S2 (reference position), see figure:

- With limit switch fitted, move by S1
- Without limit switch, move by S1 + 8 mm from the rear end position.

For more information, see "Instructions for EMC-HD, R320103139".




**1)** Limit switch bore

| Size | X1 (mm) | X2 (mm) | S1 (mm) | S2 (mm) |
|---|---|---|---|---|
| **EMC-085-HD** | 256 | 52 | 75 | 117 |
| **EMC-125-HD** | 335 | 52 | 100 | 150 |

**Recommended lubricants**

**Note**

Do not use greases with solid lubricant components (e. g. graphite or $MoS_2$ additives).

Dynalub 520 is recommended for centralized lubrication systems.

| **Grease** | | **Low-temperature grease** (–30 ... +60 °C) |
|---|---|---|
| **Consistency class NLGI 2 as per DIN 51818**<br>We recommend<br>Dynalub 510 (Bosch Rexroth)<br>Cartridge (400 g) R341603700<br>Bucket (5 kg) R341603500 | **Consistency class NLGI 00 as per DIN 51818**<br>We recommend<br>Dynalub 520 (Bosch Rexroth)<br>Cartridge (400 g) R341604300<br>Bucket (5 kg) R341604200 | Klüber BEM 34-132<br>R341603600 |
| **May also be used** | **May also be used** | |
| Elkalub GLS 135 / N2 (Chemie-Technik)<br>Castrol Longtime PD2 (Castrol) | Elkalub GLS 135 / N00 (Chemie-Technik)<br>Castrol Longtime PD 00 (Castrol) | |

# Documentation

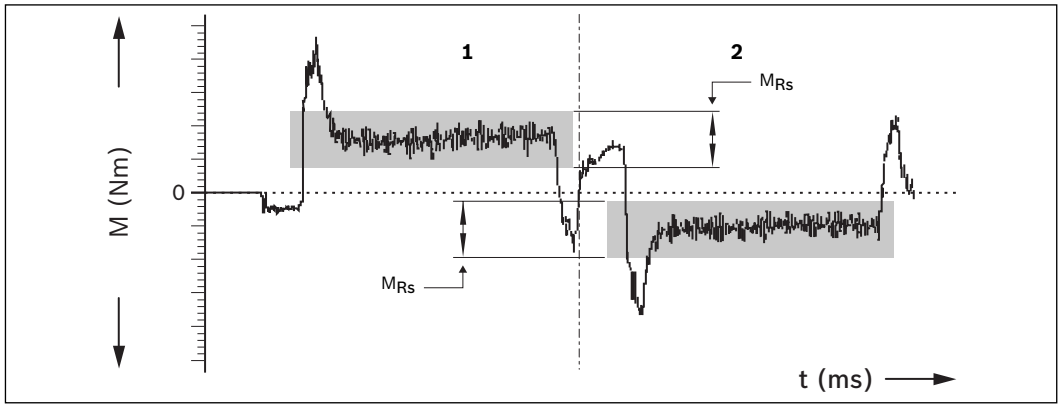
**Standard report**
**Option 01**

The standard report serves to confirm that the checks listed in the report have been carried out and that the measured values lie within the permissible tolerances.
Checks listed in the standard report:

- Functional checks on mechanical components
- Functional checks on electrical components
- Design in accordance with order confirmation

**Frictional torque of the complete system**
**Option 02**
All items contained in the standard report.
The moment of friction M is measured over the entire travel range.

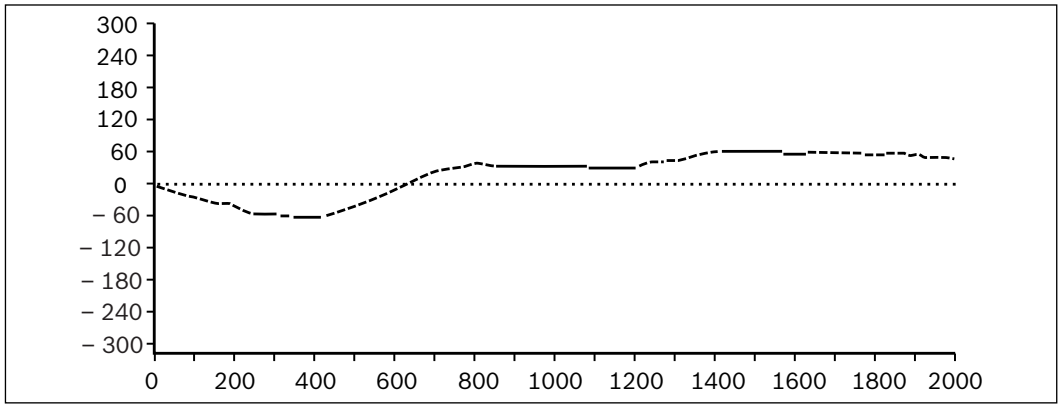
**Example**




**1)** Advance
**2)** Return

$M_{Rs}$ = frictional torque (N)
t = travel time (ms)

**Lead deviation of screw drive**
**Option 03**
All items contained in the standard report.
In addition to graphical representation (see illustration), a measurement report is supplied in table form.



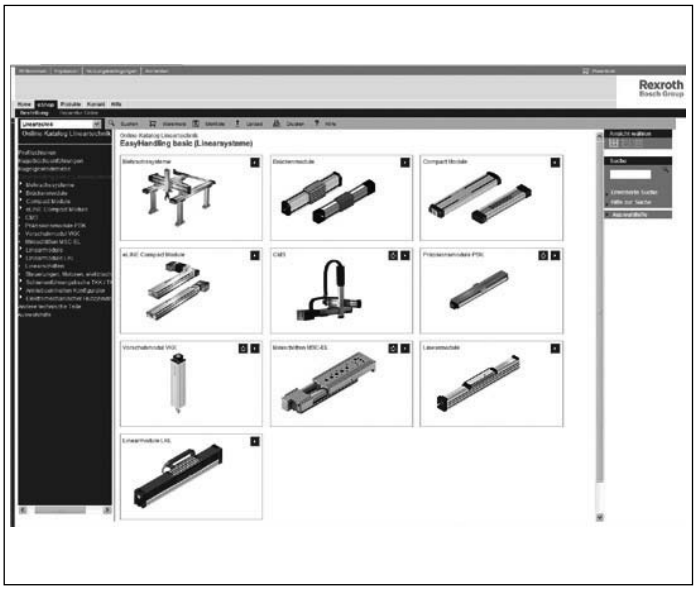
# Further Information

Here you will find extensive information on products, eShop, safety engineering, and training and services offered.

**Product information:**
http://www.boschrexroth.com/dcl

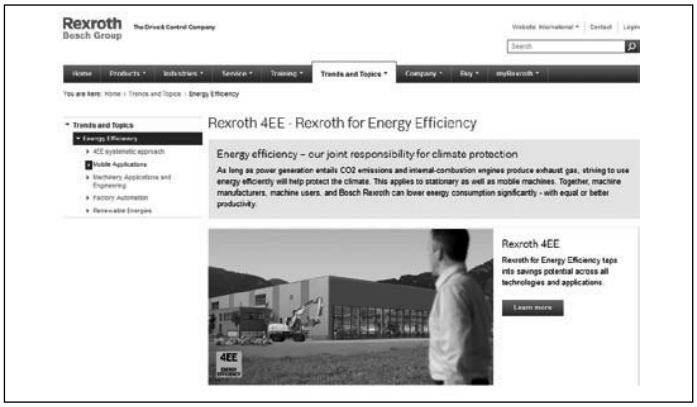

**1** Instructions and catalogs in PDF format and 3D CAD generator
**2** Printed catalogs and other publications
**3** Configurator

**eShop:**
http://www.boschrexroth.com/eshop



**Rexroth 4EE - Rexroth for Energy Efficiency:**

http://www.boschrexroth.com/4EE




**Safety engineering:**

http://www.boschrexroth.com/Maschinensicherheit


**Training:**

http://www.boschrexroth.com/training


**Service:**

http://www.boschrexroth.com/service

# Ordering Example EMC-125-HD

| **Short product name, $s_{max}$**<br>**EMC-125-HD-1, ... mm** | **Guideway** | | **Drive units** | | | | **Lubrication** | | | **Version** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLSA $d_0$ x P | | Ball screw $d_0$ x P | | | | | | |
| | Without round flange | With round flange | 48 x 5 | 48 x 10 | 63 x 10 | 63 x 20 | With initial greasing | Prelubricated with low-temperature grease | | Description | |
| Without anti-twist feature | 01 | 02 | 01 | 02 | 12 | 13 | 01 | 02[1)] | | Without motor mount: OF | |
| | | | | | | | | | | With motor mount: MF | |
| With anti-twist feature | 11 | 12 | | | | | | | | With timing belt side drive (SD): RV01, RV02, RV03, RV04 | |

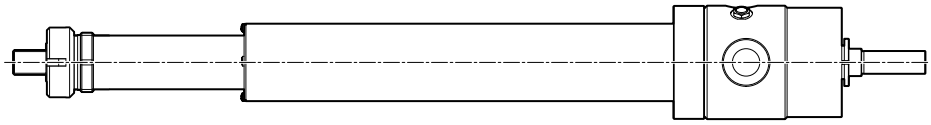
**1)** Only with PLSA drive

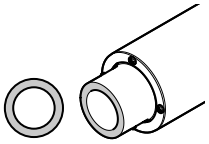
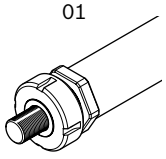
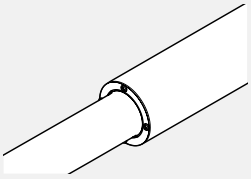
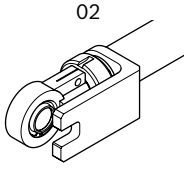
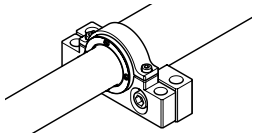
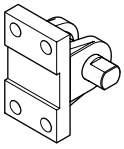
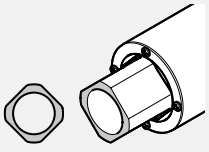
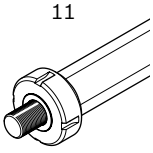
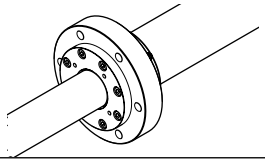
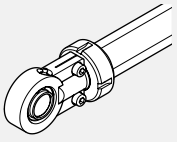
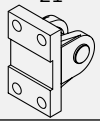
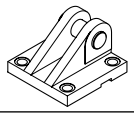
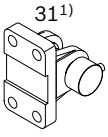
| **Motor attachment** | | | **Motor** | | | **Switches** | | | | **Surface finish** | | **Documentation** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear ratio | Description | | | Without brake | With brake | Without switch | 1 reference switch | 2 limit switches | 2 limit switches and 1 reference switch | Standard | Black painted | Standard report | Measurement report | |
| | Without | 00 | Without | 000 | 000 | 00 | 01 | 02 | 03 | 01 | 13 | 01 | 02[2)] | 03[3)] |
| i = 1 | With motor mount | 02 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 03 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | MSK 101E | 120 | 121 | | | | | | | | | |
| i = 3 | With motor mount and gear unit | 06 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 07 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | MSK 101E | 120 | 121 | | | | | | | | | |
| i = 5 | With motor mount and gear unit | 16 | MSK 071D | 114 | 115 | | | | | | | | | |
| i = 1.5 | Timing belt side drive | 41 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 42 | MSK 101D | 118 | 119 | | | | | | | | | |
| | | | MSK 101E | 120 | 121 | | | | | | | | | |
| i = 4.5 | SD (i = 1.5) and gear unit (i = 3) | 51 | MSK 100B | 116 | 117 | | | | | | | | | |
| | | 52 | MSK 101D | 118 | 119 | | | | | | | | | |
| i = 7.5 | SD (i = 1.5) and gear unit (i = 5) | 70 | MSK 071D | 114 | 115 | | | | | | | | | |

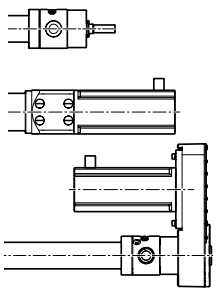
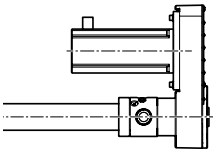
**2)** Frictional torque measurement **3)** Lead deviation

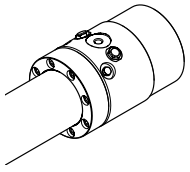
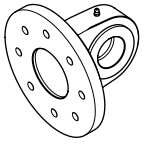
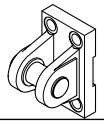
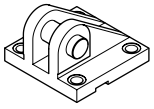
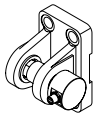
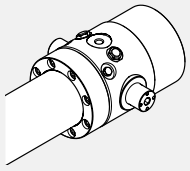
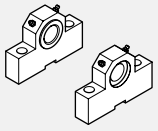
# Ordering Example EMC-125-HD

**Mounting elements**



| Version | Group 1 | Group 2 | | Version | Group 3 |
|---|---|---|---|---|---|
| Without anti-twist feature  | 00 | 01  | | Without round flange  | 00 |
| | 00 | 02  | | | 11  |
| | 11  | | | | |
| With anti-twist feature  | 00 | 11  | | With round flange  | 00 |
| | 00 | 12  | | | |
| | 21  | | | | |
| | 22  | | | | |
| | 31[1)]  | | | | |

| | | Group 4 | Group 5 | Group 6 | |
|---|---|---|---|---|---|
| | | 01  | 00 | 00 | |
| | | | 11  | 00 | |
| | | | | 21  | |
| | | | | 22  | |
| | | | | 31[1)]  | |
| | | 02  | 00 | 00 | |
| | | | | 01  | |
| | | 01 | 00 | 00 | |

# Ordering example

**Electromechanical Cylinder EMC-125-HD-1**

| Ordering data | Option | Description |
|---|---|---|
| **Short product name** | EMC-125-HD-1 | |
| **Max. travel** | 580 | 580 mm |
| **Guideway** | 11 | Without round flange |
| **Drive unit** | 02 | Planetary screw assembly 48 x 10 |
| **Lubrication** | 01 | With initial greasing |
| **Version** | MF | With motor mount |
| **Motor attachment** | 03 | Motor mount and coupling for MSK 101D |
| **Motor** | 118 | MSK 101D, without brake |
| **Switches** | 02 | Two limit switches |
| **Surface finish** | 01 | Standard |
| **Documentation** | 01 | Frictional torque |
| **Mounting elements** | 21 | Clevis bracket |
| | 12 | Spherical rod end bearing CGKD |
| | 00 | Without |
| | 02 | Trunnion mount |
| | 00 | Without |
| | 01 | Trunnion bearing block CLTB |

# Inquiry or Order

| To be completed by customer | Option |
|---|---|
| **Inquiry** | |
| **Order** | |

**Bosch Rexroth AG**
97419 Schweinfurt
Germany

**Find your local contact person here:**
www.boschrexroth.com/contact

| Ordering data | | Option | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Short product name** | | E | M | C | - | | | | - | H | D | - | 1 | |
| **Max. travel (mm)** | = | | | | | | | | | | | | | |
| **Guideway** | = | | | | | | | | | | | | | |
| **Drive unit** | = | | | | | | | | | | | | | |
| **Lubrication** | = | | | | | | | | | | | | | |
| **Version** | = | | | | | | | | | | | | | |
| **Motor attachment** | = | | | | | | | | | | | | | |
| **Motor** | = | | | | | | | | | | | | | |
| **Switches** | = | | | | | | | | | | | | | |
| **Surface finish** | = | | | | | | | | | | | | | |
| **Documentation** | = | | | | | | | | | | | | | |
| **Mounting elements** | = | | | Group 1 | | | | | | | | | | |
| | = | | | Group 2 | | | | | | | | | | |
| | = | | | Group 3 | | | | | | | | | | |
| | = | | | Group 4 | | | | | | | | | | |
| | = | | | Group 5 | | | | | | | | | | |
| | = | | | Group 6 | | | | | | | | | | |

| Order quantity | Quantity |
|---|---|
| **One-off** | |
| **Monthly** | |
| **Annually** | |
| **Per order** | |
| **Comments** | |

| Sender | |
|---|---|
| **Company** | |
| **Address** | |
| **Name** | |
| **Department** | |
| **Fax** | |
| **E-mail** | |

# Glossary (definitions)

**Dynamic load rating C:**
Constant that is used to calculate the service life of a screw drive. The value for the dynamic load rating C represents the load under which 90% of a sufficiently large number of identical screw drives can achieve a service life of one million revolutions.

**Limit switch:**
Limit switches are used to monitor the end position of moving parts. They emit a signal when the component reaches a certain position, usually the beginning or end of a stroke. The signal can be electrical, pneumatic or mechanical. Typical forms of limit switches with electrical signals are roller lever switches or non-contacting switches such as photoelectric sensors and proximity switches.

**Service life:**
The nominal life is expressed by the number of revolutions (or number of operating hours at constant rotary speed) that will be attained or exceeded by 90% of a sufficiently large number of identical screw drives before the first signs of material fatigue become evident.

**Maximum force $F_{max}$:**
Maximum permissible mechanical load in axial direction.

**Positioning accuracy:**
The positioning accuracy is the maximum deviation between the actual position and the target position, as defined in VDI/DGQ 3441.

**Reference switch:**
Reference switches are used to detect the position of a moved component, e.g. screw drive nut in the cylinder. The switch emits a signal when the component reaches a defined position (reference mark). Reference switches are required for incremental measuring systems or motors with incremental encoders during start-up and after any interruption to the power supply.

**Lead:**
Relating to screws or threaded shafts, the lead is the linear distance traveled per revolution of the screw or shaft. In the case of a single thread (single-start screws), this is the distance between two thread crests or two grooves (running tracks).

**Gear ratio:**
This relates to the transmission and conversion of movements, linear and rotary speeds, forces and torques in a geared mechanism. The gear ratio (also known as reduction ratio) is the ratio between the drive variable and the output variable, e.g. the ratio of input speed to output speed.

**Repeatability:**
The repeatability indicates how precisely a linear system positions itself when approaching a position repeatedly from the same direction (unidirectional motion). It is stated as the deviation between the actual position and the target position.

The Drive & Control Company

Rexroth
Bosch Group

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