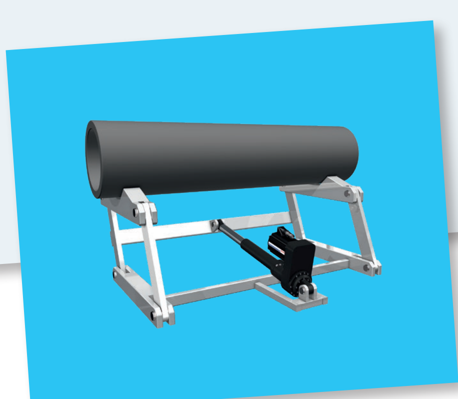
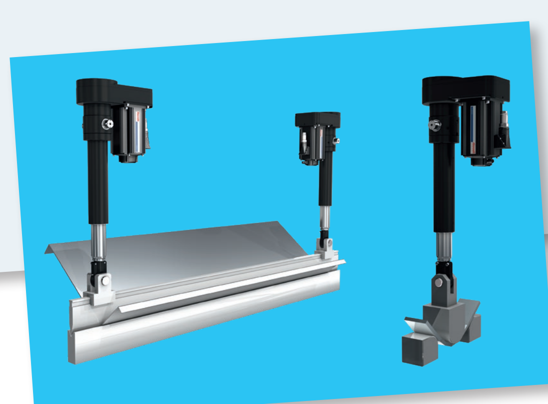
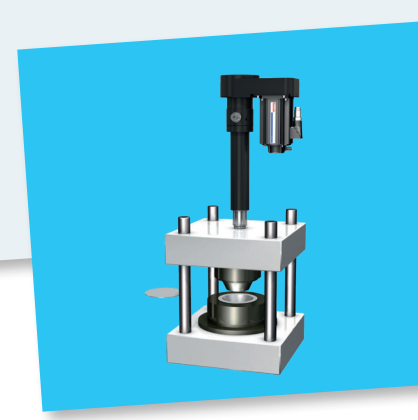
rexroth
A Bosch Company

Electromechanical Cylinder EMC-HD







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Identification system for short product names

Short product name		Example:	EMC	–	085	–	HD	–	1
System	=	**E**lectro**M**echanical **C**ylinder							
Size		**085** / 105 / 125 / 150 / 180							
Version	=	**H**eavy **D**uty							
Generation	=	Product generation **1**							

Changes / Supplements

- PLSA 60x10 and 60x20 supplemented in EMC-HD 150
- Revision of the option tables (configuration and ordering), "Lubrication" option

Note on the catalog:
This issue (2019-03) will no longer be printed.
The catalog is only available as PDF document.

Contents

Product description

For positioning loads weighing tons with absolute precision on micrometers, powerful pressing, joining or closing and unrestricted motion sequence variation: 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 dynamics and force requirements. 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 entire cylinder fulfills the requirements for protection class IP 65.
The EMC-HD is available with or without a piston rod anti rotation feature. The integrated anti rotation 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. A load measuring pin is available for the exact measurement of forces.
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 low negative environmental impact (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 great variability for high flexibility in 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 allows 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 tightly confined spaces.

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

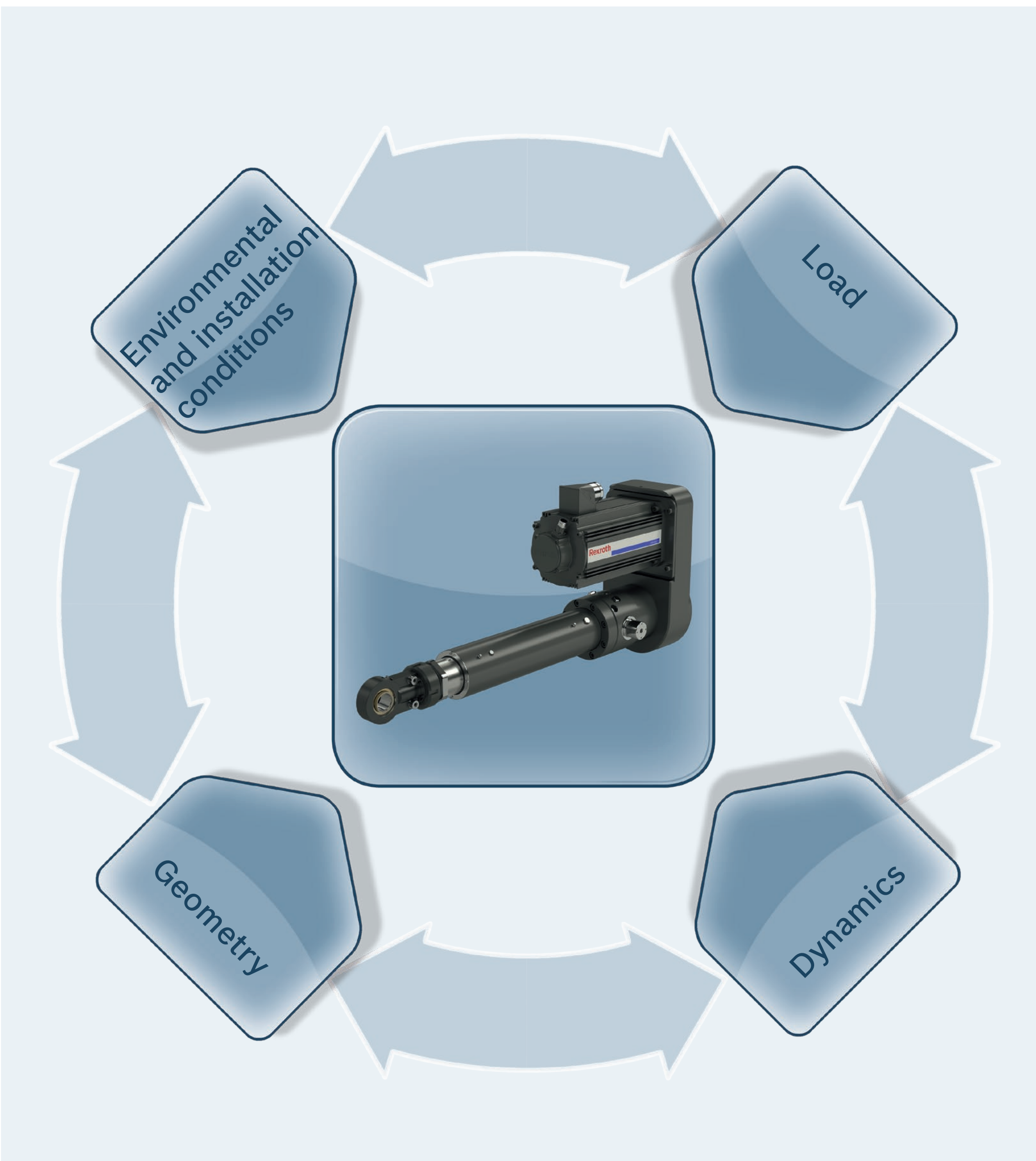
Presses

Transporting

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
- Travel speed
- Cycle time
- etc.

Geometry

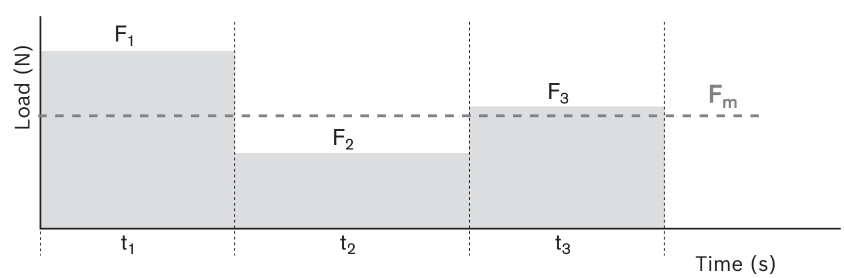
- Work space
- Installation space
- Stroke length
- Interference contours
- etc.

Environmental and installation conditions

- Installation position
- Mounting 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. 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 life expectancy calculation.
Large safety factors for the force required, as are common in some fluid-power applications, should be avoided so that the axis is not over-sized. A differentiation also needs to be made between static load (cylinder at standstill) and dynamic load (during 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 be stated in the calculation as well.

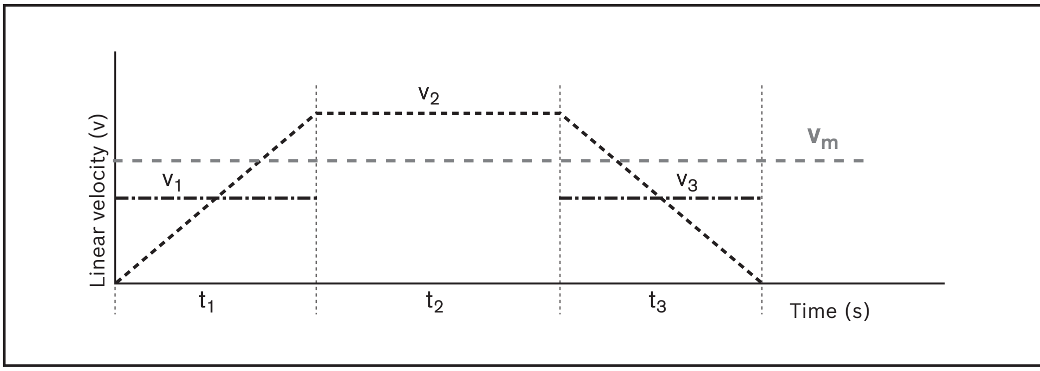
$$DC = \frac{t_B}{t_B + t_P} \cdot 100\%$$

DC	=	duty cycle	(%)
t_B	=	operating time	(s)
t_P	=	pause time	(s)

Selection guide

3. Total cycle

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



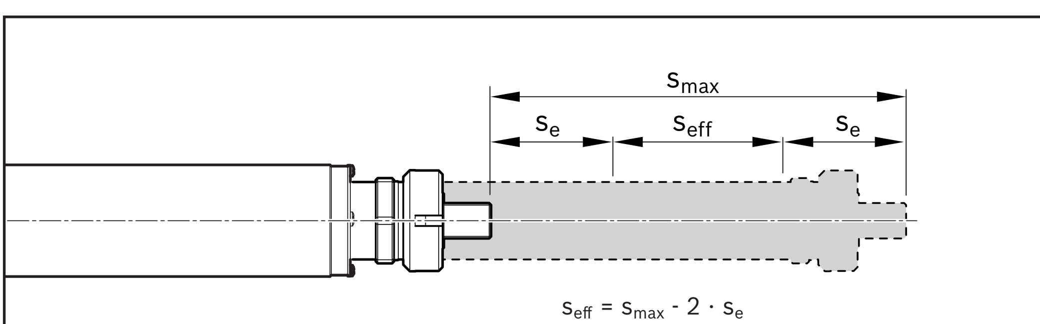
4. Integration in the machine

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.
Especially long cylinder housings in horizontal position at the front end should be supported through the foot mounting element (the load on the thrust rod is reduced by the dead weight of the cylinder). 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 rotation feature. (For further information on the anti rotation feature see the “Structural design” section).

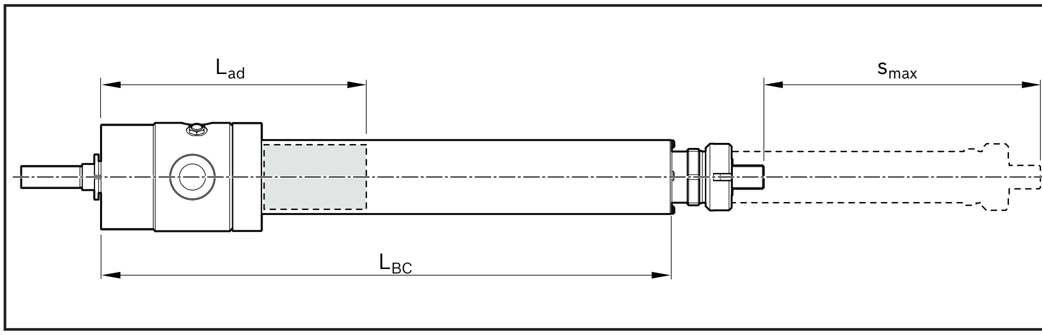
5. Travel range and overall dimensions

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 range (s_{max}) is the parameter to be stated when ordering the cylinder.

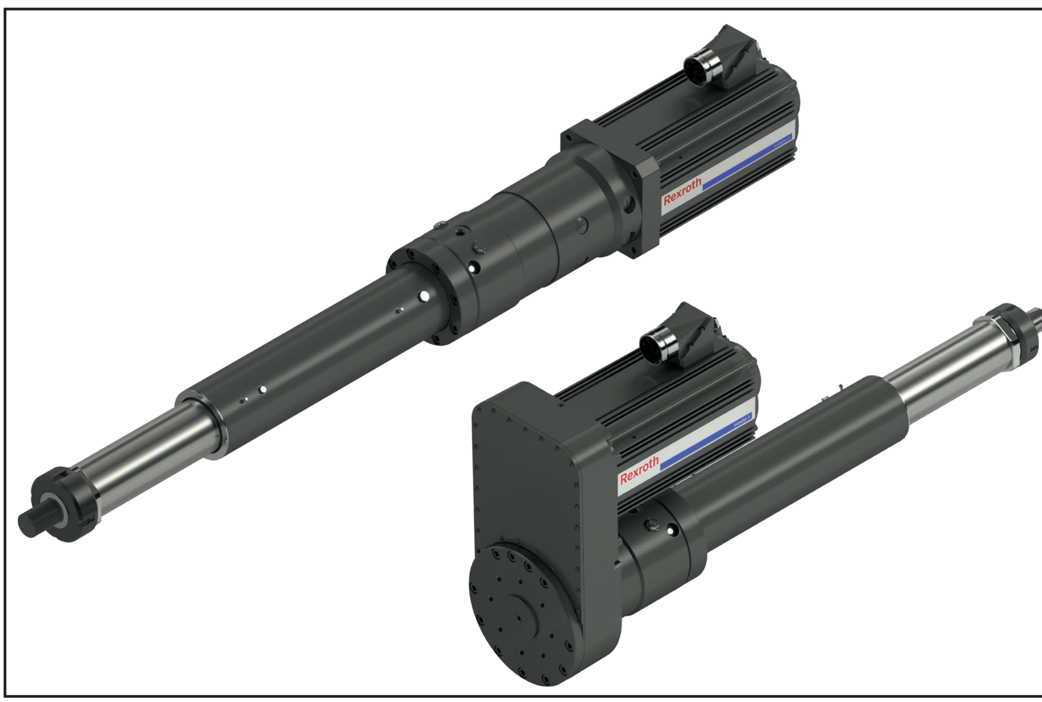
Please note information on the short stroke in the “Operating conditions and application” section



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 (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 your application involves special environmental conditions.

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.

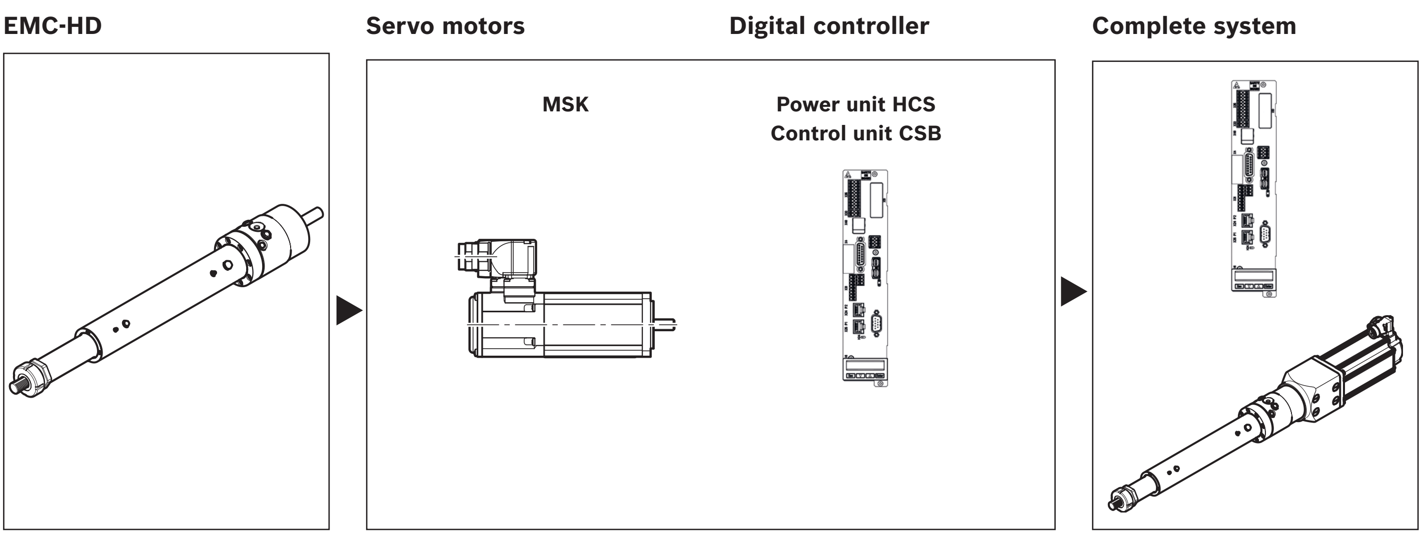
Notes on motors and controllers

- The motors are available complete with controllers and control systems
- For recommended motor-controller combinations, see the “Motors” section

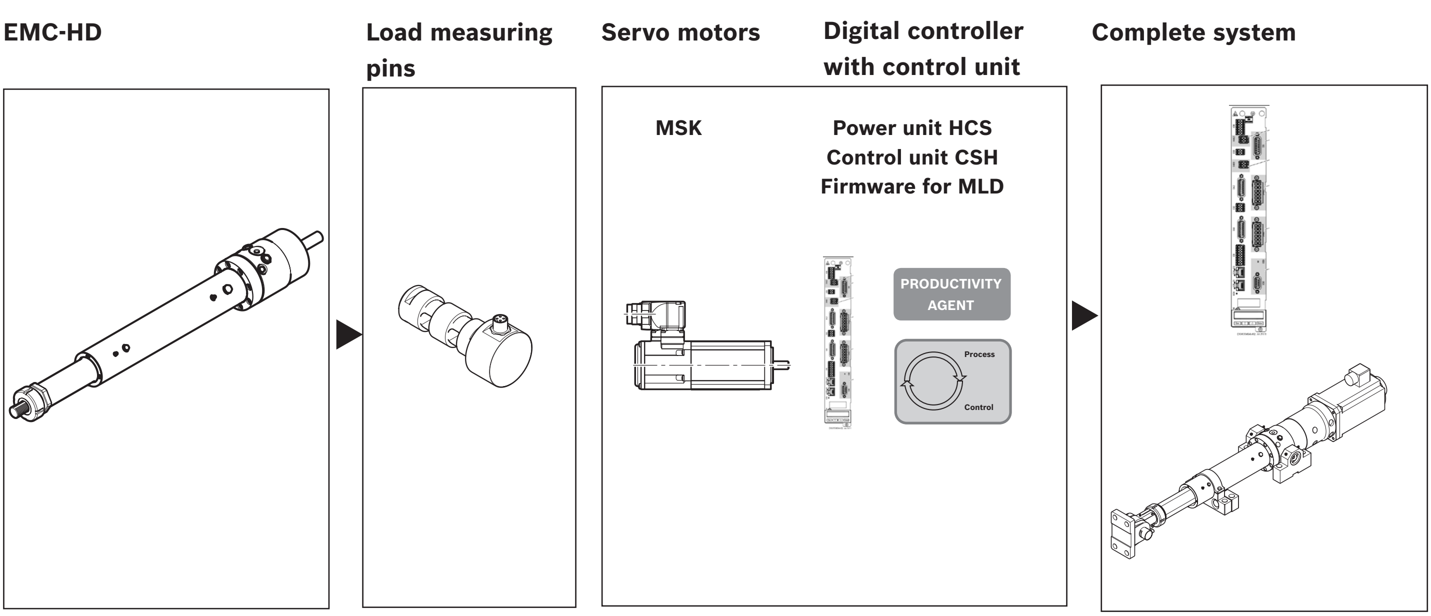
Catalogs and information

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

Drive-based positioning



Force control

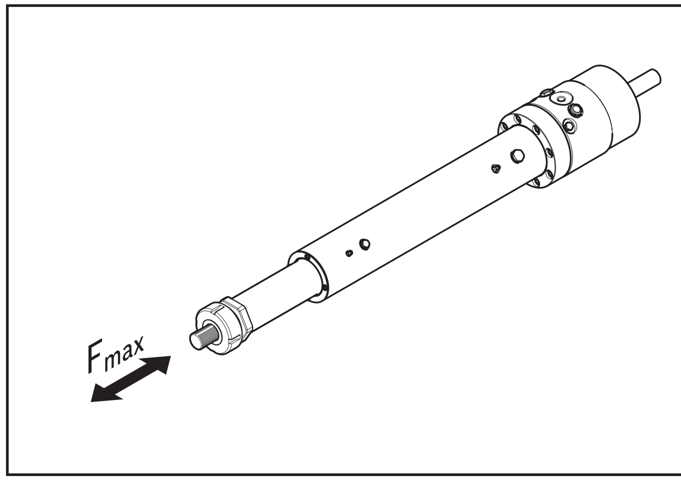


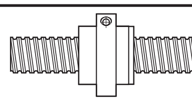
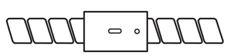
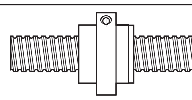
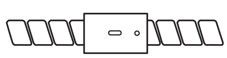
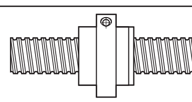
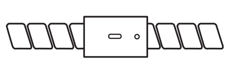
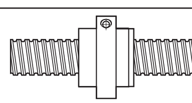
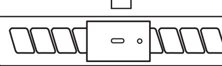
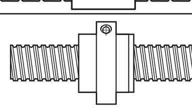
Load ratings and sizes

Note on dynamic load capacities
In relation to the desired service life, generally speaking an equivalent dynamic axial load of up to about 20% of the dynamic load capacity (C) has proven effective.

See the section titled “Calculation Basics” and service life graphs in the section titled “Technical data.”

Do not exceed the technical data for the EMC.



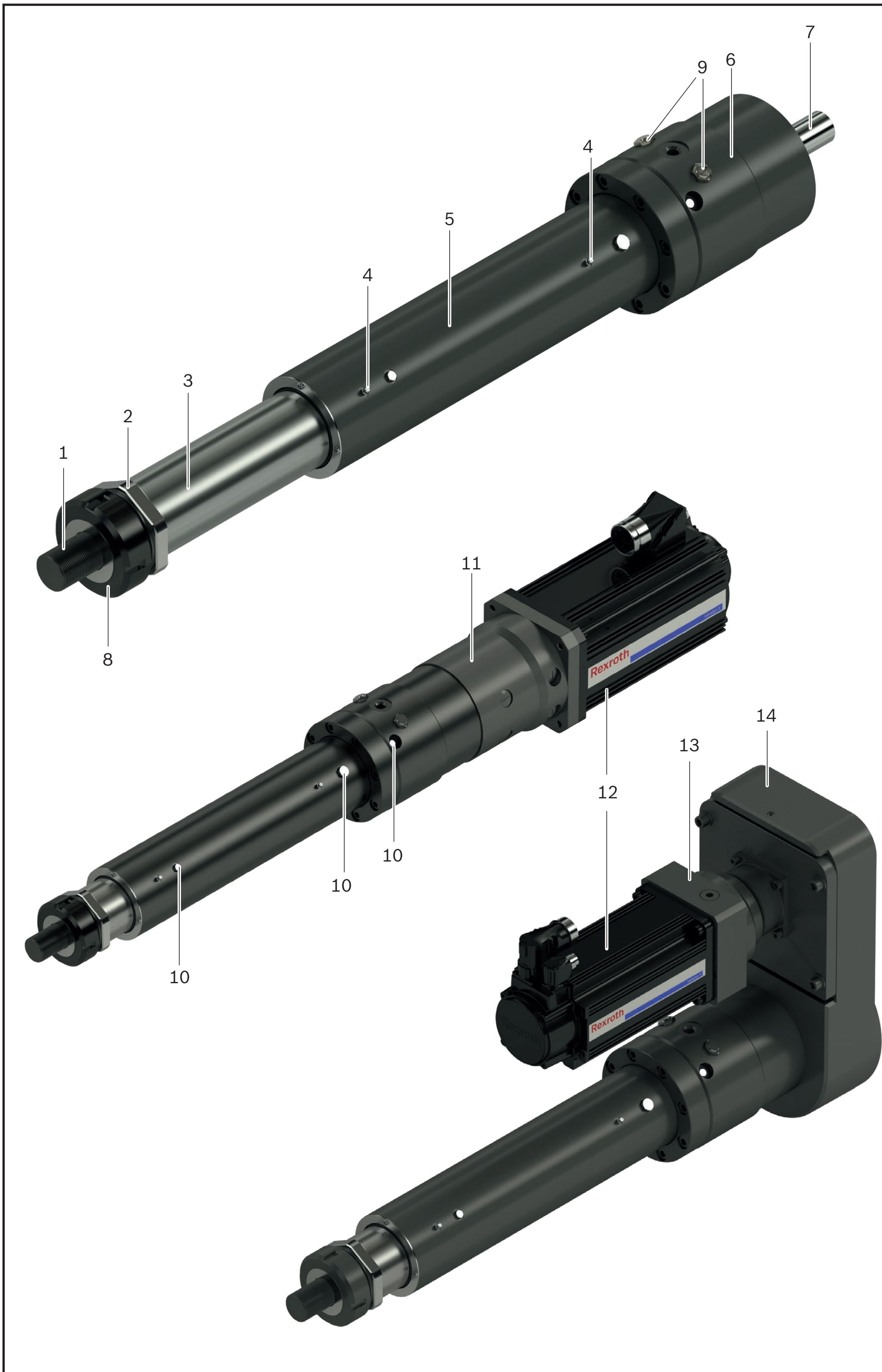
EMC-HD	Drive		d_0xP (mm)	C (N)	F_{max} (N)	$s_{max\ perm}$ (mm)	v_{max} (m/s)
085	**PLSA**		30x5	87 000	44 000	700	0.42
			30x10	98 000	44 000		0.83
	BASA		40x10	86 500	44 000		0.63
			40x20	95 500	38 000		1.00
105	**PLSA**		39x5	122 000	65 000	1 000	0.32
			39x10	140 000	76 000		0.64
	BASA		50x10	95 600	65 000		0.50
			50x20	116 500	56 000		1.00
125	**PLSA**		48x5	188 000	95 000	1 200	0.26
			48x10	211 000	110 000		0.52
	BASA		63x10	106 500	88 000		0.40
			63x20	130 800	85 000		0.80
150	**PLSA**		60x10	307 000	170 000	1 500	0.42
			60x20	307 000	184 000		0.85
	BASA		80x20	307 000	115 000		0.50
180	**PLSA**		75x10	470 000	250 000	1 700	0.33
			75x20	470 000	290 000		0.67

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

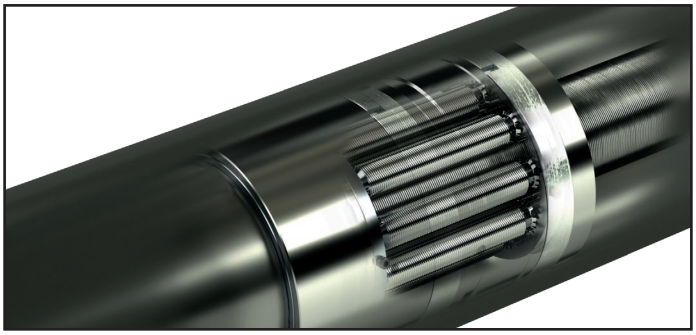
Structural design

1 Threaded bolts (steel, black finished)
2 Wrench flats, only for version “round piston rod”” (steel, galvanized)
3 Piston rod (steel, chrome-plated)
4 Lube nipple (steel, galvanized)
5 Housing (steel, black painted)
6 Bearing housing (steel, black painted or galvanized)
7 Drive journal (steel)
8 Lock nut (steel, black galvanized)
9 Air compensation (bronze)
10 Mounting thread for switch (with locking screw steel, galvanized)

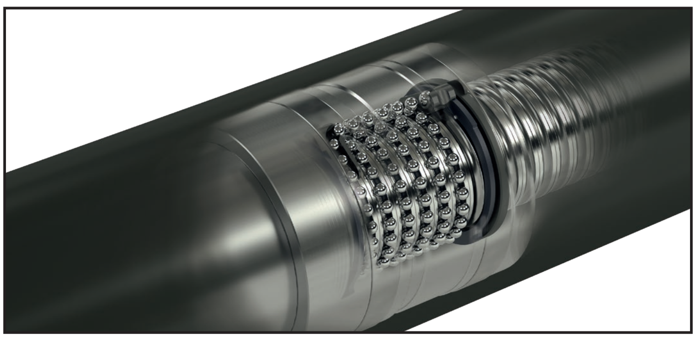
Attachments
11 Mount and coupling
12 Motor
13 Gear unit
14 Timing belt side drive



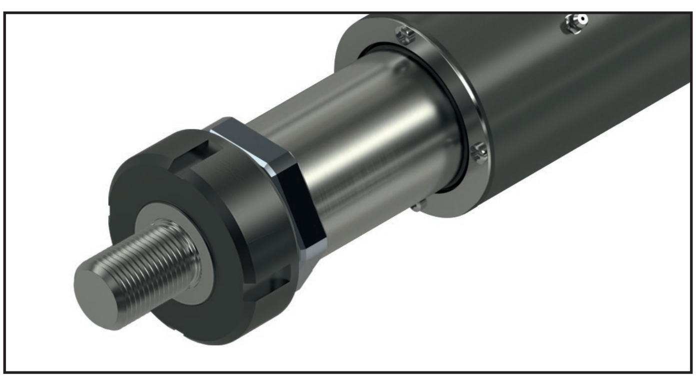
Version with Planetary Screw Assembly PLSA



Version with Ball Screw Assembly BASA



Guideway with round piston rod



Guideway with integrated anti rotation 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 the 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 nut of the ball screw results in high load ratings and therefore a long service life.

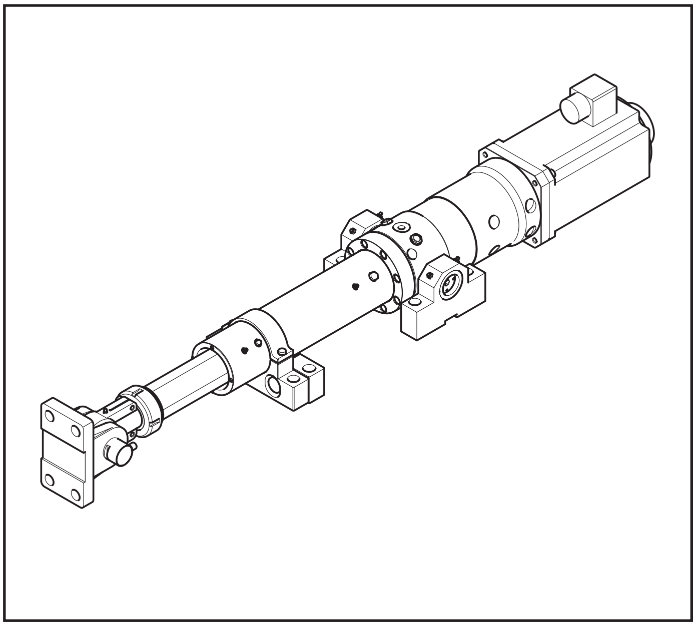
Anti rotation feature

The EMC-HD is available with either a round piston rod or a piston rod with added flats (integrated anti-rotation feature).

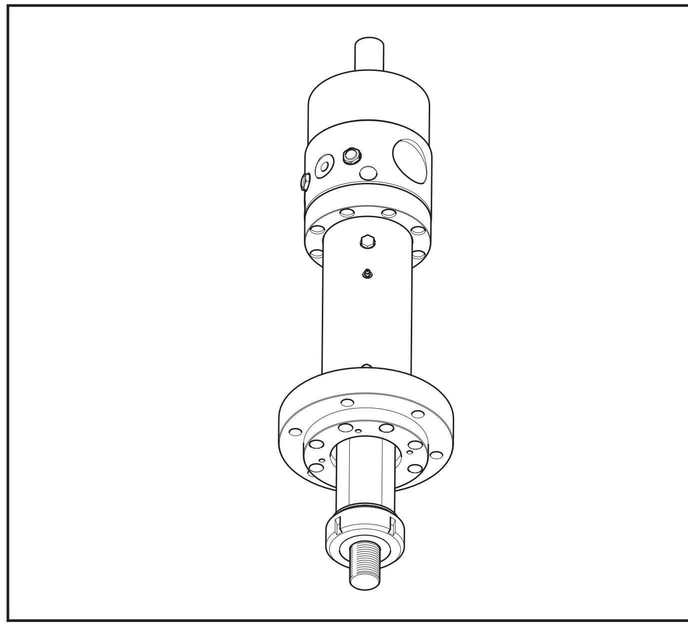
- The cost-optimized basic version includes a round piston rod. The full round shape allows for free rotation of the rod. This may help during installation since the piston rod can be positioned manually, even with an active motor brake. To properly ensure the translation of rotation into linear motion, the piston rod must be locked against rotation externally.(e.g. connected to a linear guide or a solid object). This external anti-rotation design must be strong enough to absorb the active drive torque at the EMC-HD drive shaft for the given application. (see the calculations section).
- The integrated anti-rotation option is used if an external anti-rotation feature (see above) is not possible (e.g. when space is limited or if the piston rod extends freely into the working zone). Rotation lock is realized with flats on the piston rod and an internal sliding surface – hidden inside the cylinder housing. This anti-rotation feature is designed to absorb the maximum permissible drive torque of the EMC-HD.

Application examples

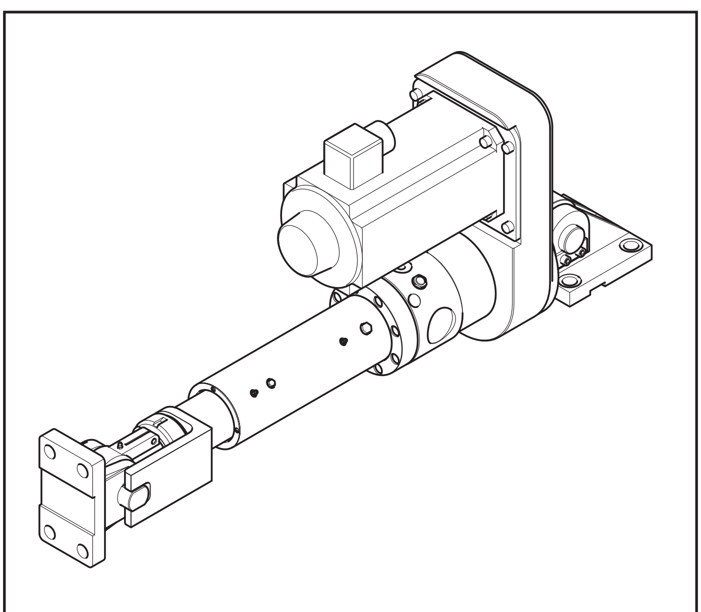
Installation with pillow blocks and foot mounting, non-swiveling



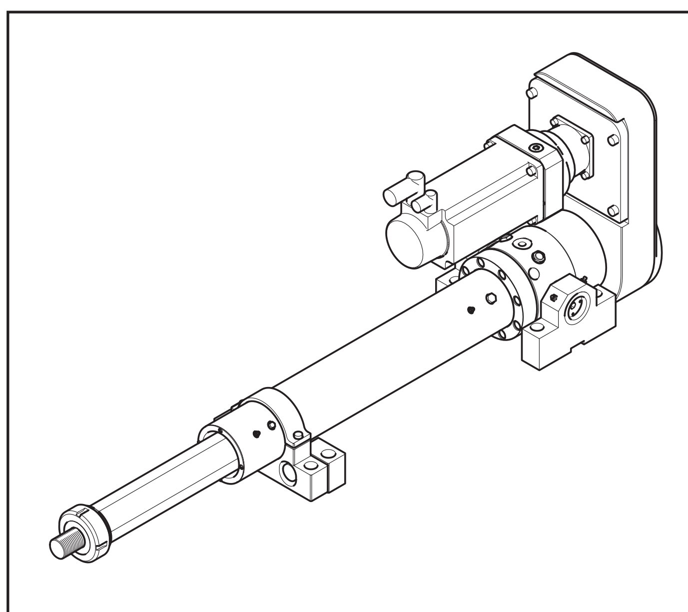
Installation with round flange only possible vertical, non-swiveling



Installation with bearing block form A and B = swiveling



Installation with pillow blocks, thrust rod not guided Foot mounting required, non-swiveling



Technical data

Dimensions, load capacities, maximum forces and masses

EMC-HD	PLSA d_0xP (mm)	BASA d_0xP (mm)	C (N)	F_{max} (N)	s_{min} 1) (mm)	$s_{max\ perm}$ 1) (mm)	L_{ad} (mm)	m_s $k_{g\ fix}$ (kg)	m_s $k_{g\ var}$ (kg/mm)	m_{ca} $m_{ca\ fix}$ (kg)	m_{ca} $m_{ca\ var}$ (kg/mm)
085	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	86 500	44 000	110	700	352	30	0.033	6.2	0.011
	–	40x20	95 500	38 000	110	700	370	30	0.033	6.2	0.011
105	39x5	–	123 000	65 000	110	1 000	404	44	0.030	11.0	0.015
	39x10	–	140 000	76 000	110	1 000	404	44	0.030	11.0	0.015
	–	50x10	95 600	65 000	110	1 000	394	44	0.047	11.0	0.015
	–	50x20	116 500	56 000	115	1 000	416	44	0.047	11.0	0.015
125	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	106 500	88 000	110	1 200	405	70	0.068	16.5	0.025
	–	63x20	130 800	85 000	115	1 200	427	70	0.068	16.5	0.025
150	60x10	–	307 000	170 000	155	1 500	569	112	0.093	32.0	0.036
	60x20	–	307 000	184 000	155	1 500	569	112	0.093	32.0	0.036
	–	80x20	307 000	115 000	170	1 500	586	115	0.103	32.0	0.036
180	75x10	–	470 000	250 000	190	1 700	677	206	0.135	53.0	0.058
	75x20	–	470 000	290 000	190	1 700	677	206	0.135	53.0	0.058

1) For non-standard movement paths, please contact Bosch Rexroth.

Mass of the EMC-HD

Weight calculation without the 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 mount and coupling including gear unit (optional)*)

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

Moved system mass*)

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

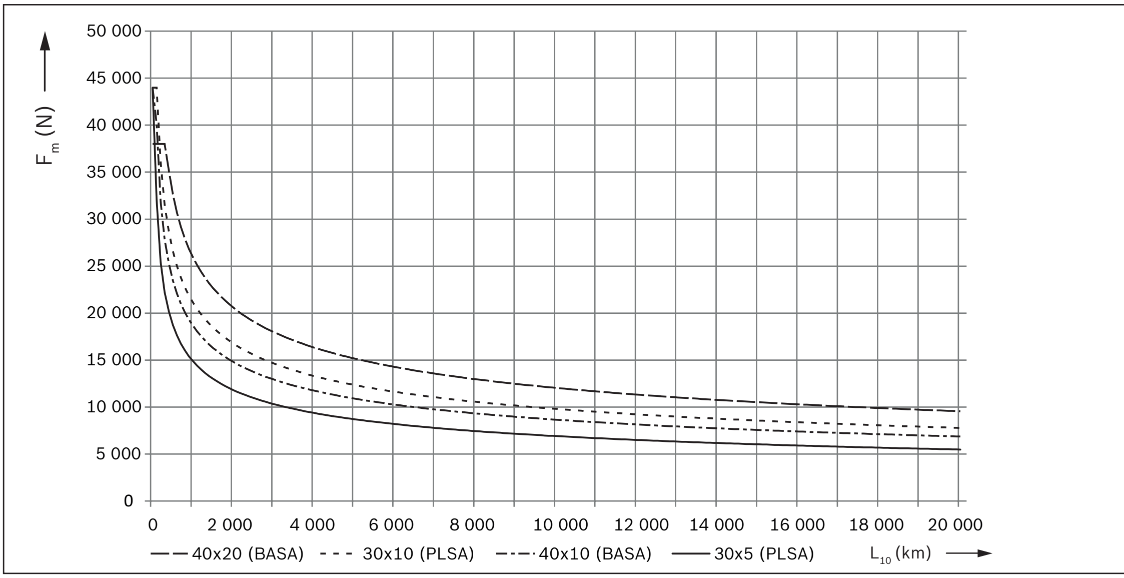
*) When calculating the mass of the entire system, additionally the masses of the attachments/mounting elements must also be taken into account.

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

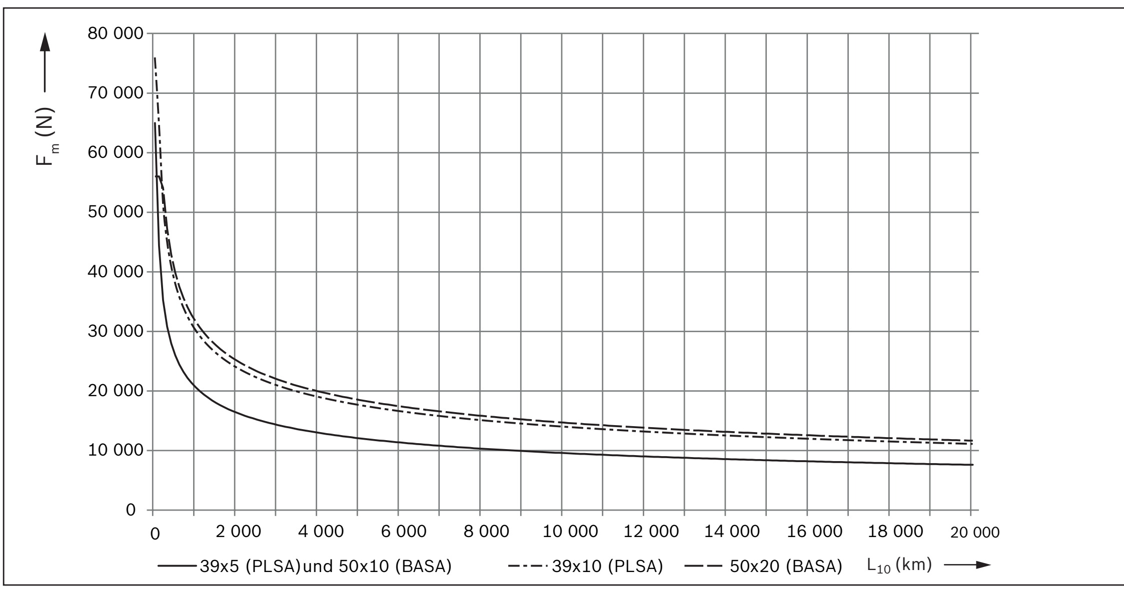
Technical data

Life

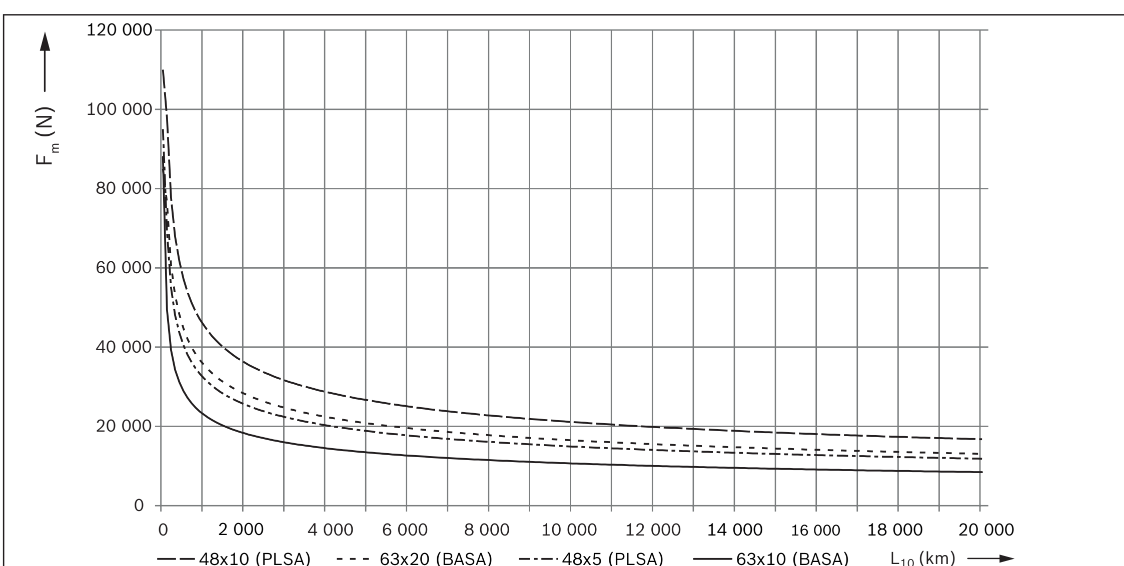
EMC-085-HD



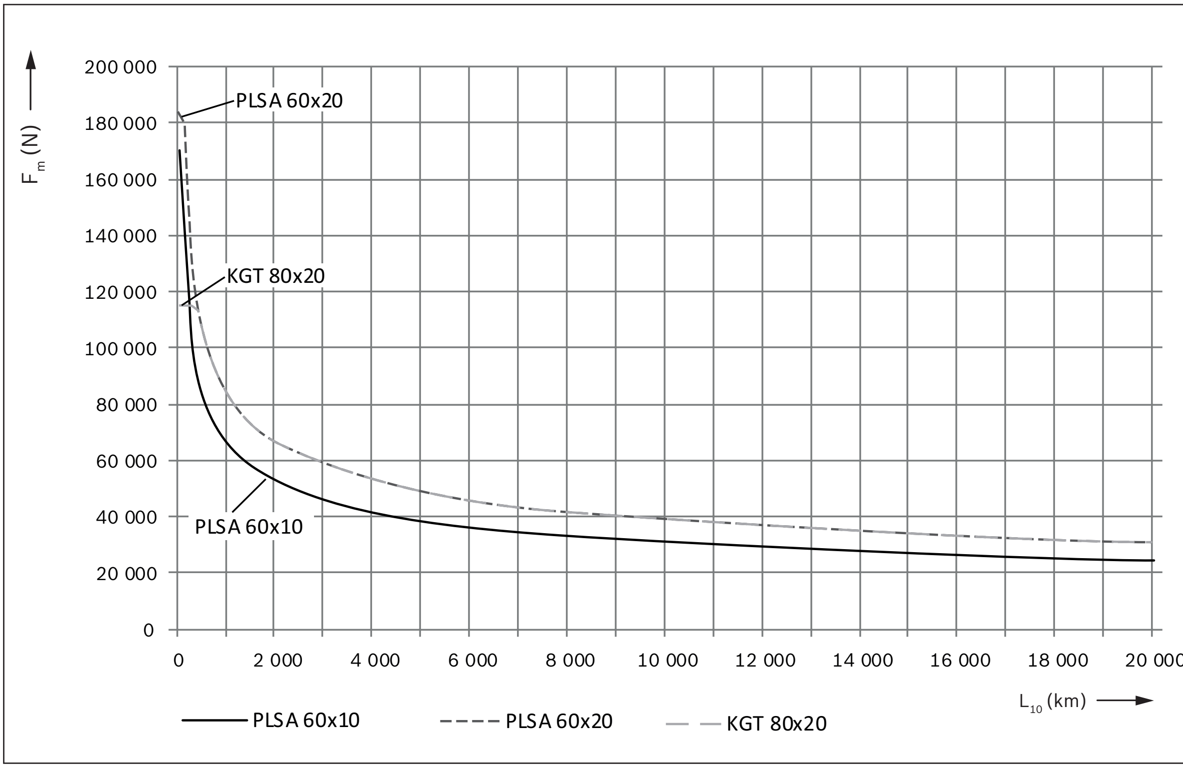
EMC-105-HD



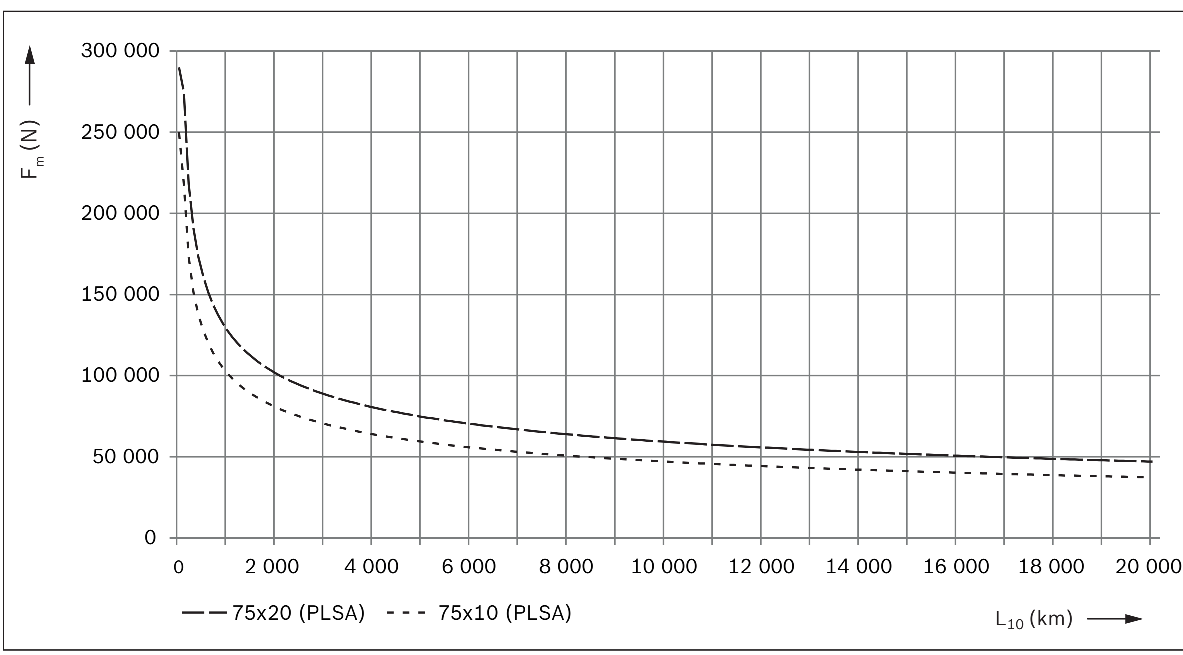
EMC-125-HD



EMC-150-HD



EMC-180-HD



L_{10} = nominal life (km)
F_m = equivalent dynamic axial load (N)

The indicated values apply on compliance with the specified relubrication intervals and for standard operation.
For short stroke (stroke < s_{min}), reduction factors must be taken into consideration.
(see the “Operating conditions and application” section).
For calculation of the equivalent dynamic axial load F_m see the “Calculation principles” section.

Technical data

Drive data without motor attachment

EMC-HD	PLSA d_0xP (mm)	BASA d_0xP (mm)	F_{max} (N)	M_p [4] (Nm)	v_{max} (m/s)	n_P (rpm)	a_{max} (m/s^2)	M_{Rs} (Nm)
085	30x5	–	44,000	44	0.42	5,040	30	3.5
	30x10	–	44,000	88	0.83	4,980	30	4.0
	–	40x10	44,000	78	0.63	3,780	16	4.0
	–	40x20	38,000	134	1.00	3,000	24	4.5
105	39x5	-	65,000	65	0.32	3,850	30	7.0
	39x10	-	76,000	146	0.64	3,850	30	7.0
	–	50x10	65,000	112	0.50	3,000	12	7.5
	–	50x20	56,000	198	1.00	3,000	17	7.5
125	48x5	–	95,000	94	0.26	3,120	30	8.0
	48x10	–	110,000	219	0.52	3,120	30	8.0
	–	63x10	88,000	156	0.40	2,400	8	8.0
	–	63x20	85,000[1]	301	0.80	2,400	12	9.0
150	60x10	–	170,000	338	0.42	2500	30	18.0
	60x20	–	184,000	732	0.83	2,500	30	18.0
	–	80x20	115,000	407	0.50	1,875	7	19.0
180	75x10	–	250,000	497	0.33	2,000	30	19.0
	75x20	–	290,000	1,154	0.67	2,000	30	22.0

1) When using timing belt side drives only possible up to 62,000 N
2) For version with anti rotation feature
3) Calculated for 25 °C ambient temperature
4) No radial loads on screw journal

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_{fc} = 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 speed
η = mechanical efficiency

	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	Backlash of screw drive (µm)	Max. perm. piston rod twist angle[2] (°)	Perm. average transmitted power[3] (W)	η
	206	0.628	0.633	30	±1.5	430	0.8
	216	0.643	2.533	30	±1.5	430	0.8
	456	1.383	2.533	0	±1.5	1,100	0.9
	527	1.463	10.132	0	±1.5	2,000	0.9
	712	1.775	0.633	30	±1.5	440	0.8
	733	1.810	2.533	30	±1.5	480	0.8
	1,456	3.616	2.533	0	±1.5	1,100	0.9
	1,491	3.632	10.132	0	±1.5	2,000	0.9
	2,046	4.104	0.633	30	±1.5	460	0.8
	2,065	4.125	2.533	30	±1.5	540	0.8
	4,459	9.645	2.533	0	±1.5	1,100	0.9
	4,704	9.645	10.132	0	±1.5	2,000	0.9
	6,001	10.019	2.533	30	±1.5	750	0.8
	6,115	10.262	10.132	30	±1.5	900	0.8
	12,843	21.475	10.132	0	±1.5	2,000	0.9
	16,529	24.436	2.533	30	±1.5	970	0.8
	16,550	24.527	10.132	30	±1.5	1,240	0.8

Technical data

Drive data for motor attachment via flange and coupling - reference point at motor shaft

EMC-HD	d_0xP	Attachment for motor (optionally with gear unit)	Motor attachment option	i	Motor mount and coupling incl. gear unit F_{max}	M_p 1)	v_{max}	n_p 2)	η	M_{Rs}	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	m_{fc}	a_{max}
	(mm)				(N)	(Nm)	(m/s)	(rpm)		(Nm)				(kg)	(m/s²)
085	30x5	MSK071	01	1	44.000	44.0	0.42	5.000	0.80	3.50	1.106.0	0.628	0.633	5.0	30
		MSK100/101	02/03	1	44.000	44.0	0.42	5.000	0.80	3.50	1.106.0	0.628	0.633	6.6	
		MSK071/101	06/07	3	44.000	15.4	0.13	4.500	0.76	4.70	1.232.9	0.070	0.070	14.3	
		MSK071	16	5	44.000	9.3	0.08	4.500	0.76	3.10	1.012.2	0.025	0.025	12.7	
	30x10	MSK071	01	1	44.000	88.0	0.83	5.000	0.80	4.00	1.116.0	0.643	2.533	5.0	
		MSK100/101	02/03	1	44.000	88.0	0.83	5.000	0.80	4.00	1.116.0	0.643	2.533	6.6	
		MSK071/101	06/07	3	44.000	30.9	0.25	4.500	0.76	4.80	1.234.0	0.071	0.281	14.3	
		MSK071	16	5	44.000	18.5	0.15	4.500	0.76	3.20	1.012.6	0.026	0.101	12.7	
	40x10	MSK071	01	1	44.000	78.0	0.63	3.750	0.90	4.00	1.356.0	1.383	2.533	5.0	16
		MSK100/101	02/03	1	44.000	78.0	0.63	3.750	0.90	4.00	1.356.0	1.383	2.533	6.6	
		MSK071/101	06/07	3	44.000	27.4	0.25	4.500	0.86	4.80	1.260.7	0.154	0.281	14.3	
		MSK071	16	5	44.000	16.4	0.15	4.500	0.86	3.20	1.022.2	0.055	0.101	12.7	
	40x20	MSK071	01	1	38.000	134.0	1.00	3.000	0.90	4.50	1.427.0	1.463	10.132	5.0	33
		MSK100/101	02/03	1	38.000	134.0	1.00	3.000	0.90	4.50	1.427.0	1.463	10.132	6.6	
		MSK071/101	06/07	3	38.000	47.0	0.50	4.500	0.86	5.00	1.268.6	0.163	1.126	14.3	
		MSK 071	16	5	38.000	28.2	0.30	4.500	0.86	3.30	1.025.1	0.059	0.405	12.7	
105	39x5	MSK071	01	1	65.000	64.7	0.32	3.846	0.80	7.00	2.632.6	1.7754	0.633	6.1	30
		MSK100/101	02/03	1	65.000	64.7	0.32	3.846	0.80	7.00	2.632.6	1.7754	0.633	7.9	
		MSK071	06	3	65.000	22.7	0.13	4.500	0.76	5.80	1.402.5	0.1973	0.070	13.8	
		MSK101	12	4	65.000	17.0	0.09	4.500	0.76	4.50	1.174.5	0.1110	0.040	15.6	
		MSK071	16	5	65.000	13.6	0.08	4.500	0.76	3.80	1.073.3	0.0710	0.025	13.8	
		MSK071	26	7	65.000	9.7	0.05	4.500	0.76	2.60	989.7	0.0362	0.013	13.8	
	39x10	MSK071	01	1	76.000	151.2	0.64	3.846	0.80	7.00	2.653.5	1.8096	2.533	6.1	
		MSK100/101	02/03	1	76.000	151.2	0.64	3.846	0.80	7.00	2.653.5	1.8096	2.533	7.9	
		MSK071	06	3	76.000	53.1	0.25	4.500	0.76	5.80	1.404.8	0.2011	0.281	13.8	
		MSK101	12	4	76.000	39.8	0.19	4.500	0.76	4.50	1.175.8	0.1131	0.158	15.6	
		MSK071	16	5	76.000	31.8	0.15	4.500	0.76	3.80	1.074.1	0.0724	0.101	13.8	
		MSK071	26	7	76.000	22.7	0.11	4.500	0.76	2.60	990.2	0.0369	0.052	13.8	
	50x10	MSK071	01	1	65.000	114.9	0.50	3.000	0.90	7.50	3.376.3	3.6166	2.533	6.1	12
		MSK100/101	02/03	1	65.000	114.9	0.50	3.000	0.90	7.50	3.376.3	3.6166	2.533	7.9	
		MSK071	06	3	65.000	40.3	0.25	4.500	0.86	6.00	1.485.1	0.4018	0.281	13.8	
		MSK101	12	4	65.000	30.2	0.19	4.500	0.86	4.58	1.221.0	0.2260	0.158	15.6	
		MSK071	16	5	65.000	24.2	0.15	4.500	0.86	3.90	1.103.1	0.1447	0.101	13.8	
		MSK071	26	7	65.000	17.3	0.11	4.500	0.86	2.67	1.004.9	0.0738	0.052	13.8	
	50x20	MSK071	01	1	56.000	198.1	1.00	3.000	0.90	7.50	3.411.5	3.6324	10.132	6.1	22
		MSK100/101	02/03	1	56.000	198.1	1.00	3.000	0.90	7.50	3.411.5	3.6324	10.132	7.9	
		MSK071	06	3	56.000	69.5	0.50	4.500	0.86	6.00	1.489.1	0.4036	1.126	13.8	
		MSK101	12	4	56.000	52.1	0.38	4.500	0.86	4.58	1.223.2	0.2270	0.633	15.6	
		MSK071	16	5	56.000	41.7	0.30	4.500	0.86	3.90	1.104.5	0.1453	0.405	13.8	
		MSK071	26	7	56.000	29.8	0.21	4.500	0.86	2.67	1.005.6	0.0741	0.207	13.8	

Note:
All data is given for the complete mechanical drive train (EMC-HD with mount and coupling) at the reference point motor shaft.
Actual results depend on the selected motor-controller combination.
The motor torque might need to be limited.

EMC-HD	d_0xP (mm)	Attachment for motor (optionally with gear unit)	Motor attachment option	i	Motor mount and coupling incl. gear unit F_{max} (N)	M_p 1) (Nm)	v_{max} (m/s)	n_p 2) (rpm)	η	M_{Rs} (Nm)	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	m_{fc} (kg)	a_{max} (m/s²)
125	48x5	MSK100	02	1	95.000	94.5	0.26	3.120	0.80	7.50	3.966.0	4.104	0.633	6.8	30
		MSK101	03	1	95.000	94.5	0.26	3.120	0.80	7.50	4.136.0	4.104	0.633	6.9	
		MSK100	06	3	95.000	33.2	0.13	4.500	0.76	6.00	1.569.6	0.456	0.070	14.5	
		MSK101	07	3	95.000	33.2	0.11	4.000	0.76	10.10	1.949.6	0.456	0.070	24.1	
		MSK071	16	5	95.000	19.9	0.08	4.500	0.76	3.90	1.126.6	0.164	0.025	14.2	
	48x10	MSK100	02	1	110.000	218.8	0.52	3.120	0.80	8.00	3.985.0	4.125	2.533	6.8	
		MSK101	03	1	110.000	218.8	0.52	3.120	0.80	8.00	4.155.0	4.125	2.533	6.9	
		MSK100	06	3	110.000	76.8	0.25	4.500	0.76	6.17	1.571.7	0.458	0.281	14.5	
		MSK101	07	3	110.000	76.8	0.22	4.000	0.76	10.27	1.951.7	0.458	0.281	24.1	
		MSK071	16	5	110.000	46.1	0.15	4.500	0.76	4.00	1.127.4	0.165	0.101	14.2	
	63x10	MSK100	02	1	88.000	155.6	0.40	2.400	0.90	8.00	6.379.0	9.645	2.533	6.8	8.5
		MSK101	03	1	88.000	155.6	0.40	2.400	0.90	8.00	6.549.0	9.645	2.533	6.9	
		MSK100	06	3	88.000	54.6	0.25	4.500	0.86	6.17	1.837.7	1.072	0.281	14.5	
		MSK101	07	3	88.000	54.6	0.22	4.000	0.86	10.27	2.217.7	1.072	0.281	24.1	
		MSK071	16	5	88.000	32.8	0.15	4.500	0.86	4.00	1.223.2	0.386	0.101	14.2	
	63x20	MSK100	02	1	62.200	220.0	0.80	2.400	0.90	9.00	6.624.0	9.645	10.132	6.8	15
		MSK101	03	1	85.000	300.6	0.80	2.400	0.90	9.00	6.794.0	9.645	10.132	6.9	
		MSK100	06	3	62.200	77.2	0.50	4.500	0.86	6.50	1.864.9	1.072	1.126	14.5	
		MSK101	07	3	85.000	105.5	0.44	4.000	0.86	10.60	2.244.9	1.072	1.126	24.1	
		MSK071	16	5	62.200	46.3	0.30	4.500	0.86	4.20	1.233.0	0.386	0.405	14.2	
150	60x10	MSK101	03	1	170.000	338.2	0.42	2.500	0.80	18.00	10.530.8	10.0191	2.533	17.5	30
		MSK133	04	1	170.000	338.2	0.42	2.500	0.80	18.00	11.140.8	10.0191	2.533	18.7	
		MSK101	12	4	170.000	89.0	0.17	4.000	0.76	10.30	1.881.3	0.6262	0.158	35.4	
		MSK101	17	5	170.000	71.2	0.13	4.000	0.76	8.30	1.529.6	0.4008	0.101	35.4	
		MSK101	13	4	170.000	89.0	0.15	3.500	0.76	15.50	6.452.5	0.6262	0.158	60.4	
		MSK101	18	5	170.000	71.2	0.12	3.500	0.76	12.60	4.750.0	0.4008	0.101	60.4	
		MSK101	27	7	170.000	50.9	0.08	3.500	0.76	9.40	3.220.0	0.2045	0.052	60.4	
	60x20	MSK101	03	1	85.451	340.0	0.83	2.500	0.80	18.00	10.817.0	10.3028	10.132	17.5	30
		MSK101	04	1	150.796	600.0	0.83	2.500	0.80	18.00	11.427.0	10.3028	10.132	18.7	
		MSK101	12	4	130.690	136.8	0.33	4.000	0.76	10.30	1.899.2	0.6439	0.633	35.4	
		MSK101	17	5	130.690	109.5	0.27	4.000	0.76	8.30	1.541.1	0.4121	0.405	35.4	
		MSK101	13	4	184.000	192.6	0.29	3.500	0.76	15.50	6.470.4	0.6439	0.633	60.4	
		MSK101	18	5	184.000	154.1	0.23	3.500	0.76	12.60	4.761.5	0.4121	0.405	60.4	
		MSK101	27	7	184.000	110.1	0.17	3.500	0.76	9.40	3.225.9	0.2103	0.207	60.4	
	80x20	MSK101	03	1	96.133	340.0	0.50	1.500	0.90	19.00	17.372.6	21.4752	10.132	17.5	6.9
		MSK133	04	1	115.000	406.7	0.50	1.500	0.90	19.00	17.982.6	21.4752	10.132	18.7	
		MSK101	12	4	115.000	107.0	0.33	4.000	0.86	10.60	2.308.9	1.3422	0.633	35.4	
		MSK101	17	5	115.000	85.6	0.27	4.000	0.86	8.50	1.803.3	0.8590	0.405	35.4	
		MSK101	13	4	115.000	107.0	0.29	3.500	0.86	15.80	6.880.2	1.3422	0.633	60.4	
		MSK101	18	5	115.000	85.6	0.23	3.500	0.86	12.80	5.023.7	0.8590	0.405	60.4	
		MSK101	27	7	115.000	61.2	0.17	3.500	0.86	9.50	3.359.6	0.4383	0.207	60.4	

1) Torque may be limited by the maximum torque of the motor. No radial loads on screw journal.
2) Rotary speed may be limited by the maximum speed of the motor.

Technical Data

Drive data for motor attachment via flange and coupling - reference point at motor shaft

EMC-HD	d_0xP (mm)	Attachment for motor (optionally with gear unit)	Motor attachment option	i	Motor mount and coupling incl. gear unit F_{max} (N)	M_p[1] (Nm)	v_{max} (m/s)	n_p[2] (rpm)	η	M_{Rs} (Nm)	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	m_{fc} (kg)	a_{max} (m/s²)
180	75x10	MSK101	03	1	250,000	497.4	0.33	2,000	0.80	19.0	59 610.4	24.4358	2.533	27.1	30
		MSK133	04	1	250,000	497.4	0.33	2,000	0.80	19.0	59 610.4	24.4358	2.533	28.3	
		MSK101	07	3	250,000	174.5	0.19	3,500	0.76	20.3	11 703.4	2.7151	0.281	61.1	
		MSK101	17	5	250,000	104.7	0.12	3,500	0.76	12.8	5 174.4	0.9774	0.101	61.1	
		MSK101	27	7	250,000	74.8	0.08	3,500	0.76	9.5	3 436.5	0.4987	0.052	61.1	
		MSK133	08	3	250,000	170.9	0.19	3,500	0.78	24.3	16 445.8	2.7151	0.281	69.1	
		MSK133	18	5	250,000	102.5	0.12	3,500	0.78	13.3	7 346.9	0.9774	0.101	69.1	
	75x20	MSK101	03	1	133,204	530.0	0.67	2,000	0.80	22.0	59 874.4	24.5272	10.132	27.1	
		MSK133	04	1	163,363	650.0	0.67	2,000	0.80	22.0	59 874.4	24.5272	10.132	28.3	
		MSK101	07	3	178,442	249.1	0.39	3,500	0.76	21.3	11 732.7	2.7252	1.126	61.1	
		MSK101	17	5	178,442	149.5	0.23	3,500	0.76	13.4	5 185.0	0.9811	0.405	61.1	
		MSK101	27	7	178,442	106.8	0.17	3,500	0.76	9.9	3 441.9	0.5006	0.207	61.1	
		MSK133	08	3	290,000	396.5	0.39	3,500	0.78	25.3	16 475.1	2.7252	1.126	69.1	
		MSK133	18	5	290,000	237.9	0.23	3,500	0.78	13.9	7 357.5	0.9811	0.405	69.1	

[1] Torque may be limited by the maximum torque of the motor. No radial loads on screw journal.
[2] Rotary speed may be limited by the maximum speed of the motor.

Note:
All data is given for the complete mechanical drive train (EMC-HD with mount and coupling) at the reference point motor shaft.
Actual results depend on the selected motor-controller combination.
The motor torque might need to be limited.

Technical Data

Drive data for motor attachment via timing belt side drive - reference point at motor shaft

EMC-HD	d_0xP (mm)	Attachment for motor (optionally with gear unit)	Motor attachment option	i [1)]	Timing belt side drive incl. gear unit F_{max} (N)	M_p [2)] (Nm)	v_{max} (m/s)	n_p [3)] (rpm)	η	M_{Rs} (Nm)	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	m_{sd} (kg)	a_{max} (m/s^2)
085	30x5	MSK071/100/101	40/41/42	1.5	44,000	30.1	0.42	7,560	0.78	5.33	3,621.6	0.2791	0.281	16.0	30
		MSK071	50	4.5	44,000	10.6	0.08	4,500	0.74	5.28	1,512.4	0.0310	0.031	23.7	
		MSK071	70	7.5	44,000	6.3	0.05	4,500	0.74	3.47	1,112.9	0.0112	0.011	23.7	
	30x10	MSK071/100/101	40/41/42	1.5	44,000	60.2	0.83	7,470	0.78	5.67	3,626.0	0.2858	1.126	16.0	
		MSK071	50	4.5	44,000	21.1	0.17	4,500	0.74	5.39	1,512.9	0.0318	0.125	23.7	
		MSK071	70	7.5	44,000	12.7	0.10	4,500	0.74	3.53	1,113.0	0.0114	0.045	23.7	
	40x10	MSK071/100/101	40/41/42	1.5	44,000	53.5	0.63	5,670	0.87	5.67	3,732.7	0.6147	1.126	16.0	16
		MSK071	50	4.5	44,000	18.8	0.17	4,500	0.83	5.39	1,524.7	0.0683	0.125	23.7	
		MSK071	70	7.5	44,000	11.3	0.10	4,500	0.83	3.53	1,117.3	0.0246	0.045	23.7	
	40x20	MSK071/100/101	40/41/42	1.5	38,000	92.1	1.00	4,500	0.87	6.00	3,764.2	0.6502	4.503	16.0	33
		MSK071	50	4.5	38,000	32.3	0.33	4,500	0.83	5.50	1,528.2	0.0722	0.500	23.7	
		MSK071	70	7.5	38,000	19.4	0.20	4,500	0.83	3.60	1,118.6	0.0260	0.180	23.7	
105	39x5	MSK071/100/101	40/41/42	1.5	65,000	44.4	0.32	5,769	0.78	7.70	3,846.7	0.7891	0.281	16.0	30
		MSK071	50	4.5	65,000	15.6	0.08	4,500	0.74	6.10	1,537.4	0.0877	0.031	23.7	
		MSK071	70	7.5	65,000	9.4	0.05	4,500	0.74	3.90	1,121.9	0.0316	0.011	23.7	
	39x10	MSK071/100/101	40/41/42	1.5	76,000	103.9	0.64	5,769	0.78	7.70	3,856.0	0.8043	1.126	16.0	30
		MSK071	50	4.5	76,000	36.5	0.17	4,500	0.74	6.10	1,538.4	0.0894	0.125	23.7	
		MSK071	70	7.5	76,000	21.9	0.10	4,500	0.74	3.90	1,122.2	0.0322	0.045	23.7	
	50x10	MSK071/100/101	40/41/42	1.5	65,000	79.0	0.50	4,500	0.87	8.00	4,177.2	1.6074	1.126	16.0	12
		MSK071	50	4.5	65,000	27.7	0.17	4,500	0.83	6.17	1,574.1	0.1786	0.125	23.7	
		MSK071	70	7.5	65,000	16.6	0.10	4,500	0.83	4.00	1,135.1	0.0643	0.045	23.7	
	50x20	MSK071/100/101	40/41/42	1.5	55,983	136.1	1.00	4,500	0.87	8.00	4,192.9	1.6144	4.503	16.0	22
		MSK071	50	4.5	55,983	47.7	0.33	4,500	0.83	6.17	1,575.9	0.1794	0.500	23.7	
		MSK071	70	7.5	55,983	28.6	0.20	4,500	0.83	4.00	1,135.7	0.0646	0.180	23.7	
125	48x5	MSK100/101	41/42	1.5	95,000	64.9	0.26	4,680	0.78	9.60	11,329.3	1.8240	0.281	27.1	30
		MSK100/101	51/52	4.5	95,000	22.8	0.08	4,500	0.74	6.70	2,368.8	0.2027	0.031	36.8	
		MSK071	70	7.5	95,000	13.7	0.05	4,500	0.74	4.32	1,421.2	0.0730	0.011	36.8	
	48x10	MSK100/101	41/42	1.5	110,000	150.4	0.52	4,680	0.78	9.93	11,337.8	1.8333	1.126	27.1	
		MSK100/101	51/52	4.5	110,000	52.8	0.17	4,500	0.74	6.81	2,369.8	0.2037	0.125	34.8	
		MSK071	70	7.5	110,000	31.7	0.10	4,500	0.74	4.39	1,421.5	0.0733	0.045	34.8	
	63x10	MSK100/101	41/42	1.5	88,000	107.0	0.40	7,560	0.87	9.93	12,401.8	4.2867	1.126	27.1	8.5
		MSK100/101	51/52	4.5	88,000	37.5	0.17	4,500	0.83	6.81	2,488.0	0.4763	0.125	34.8	
		MSK071	70	7.5	88,000	22.5	0.10	4,500	0.83	4.39	1,464.1	0.1715	0.045	34.8	
	63x20	MSK100/101	41/42	1.5	62,000	164.9	0.80	3,600	0.87	10.60	12,510.7	4.2867	4.503	27.1	15
		MSK100/101	51/52	4.5	62,000	72.5	0.33	4,500	0.83	7.03	2,500.1	0.4763	0.500	34.8	
		MSK071	70	7.5	62,000	43.5	0.20	4,500	0.83	4.52	1,468.4	0.1715	0.180	34.8	

Drive data for motor attachment via timing belt side drive - reference point at motor shaft

EMC-HD	d_0xP (mm)	Attachment for motor (optionally with gear unit)	Motor attachment option	i[1]	Timing belt side drive incl. gear unit										
					F_{max} (N)	M_p[2] (Nm)	v_{max} (m/s)	n_p[3] (rpm)	η	M_{Rs} (Nm)	$k_{J\ fix}$	$k_{J\ var}$	$k_{J\ m}$	m_{sd} (kg)	a_{max} (m/s²)
150	60x10	MSK101	42	1.5	120,637	164.9	0.42	3,750	0.78	20.0	22,837.0	4.4529	1.126	38.0	30
		MSK101	51	4.5	170,000	81.6	0.15	4,000	0.74	14.3	4,027.4	0.4948	0.125	55.7	
		MSK101	71	7.5	170,000	48.9	0.09	4,000	0.74	8.7	2,013.5	0.1781	0.045	55.7	
		MSK101	52	4.5	170,000	81.6	0.13	3,500	0.74	20.7	7,617.4	0.4948	0.125	72.0	
		MSK101	72	7.5	170,000	48.9	0.08	3,500	0.74	13.0	3,703.5	0.1781	0.045	72.0	
	60x20	MSK101	42	1.5	60,320	164.9	0.83	3,750	0.78	20.0	22,964.2	4.5790	4.503	38.0	30
		MSK101	51	4.5	135,500	130.0	0.30	4,000	0.74	14.3	4,041.6	0.5088	0.500	55.7	
		MSK101	71	7.5	184,000	105.9	0.18	4,000	0.74	8.7	2,018.6	0.1832	0.180	55.7	
		MSK101	52	4.5	173,400	166.4	0.26	3,500	0.74	20.7	7,631.6	0.5088	0.500	72.0	
		MSK101	72	7.5	184,000	105.9	0.16	3,500	0.74	13.0	3,708.6	0.1832	0.180	72.0	
	80x20	MSK101	42	1.5	67,858	164.9	0.50	2,250	0.87	20.7	25,877.8	9.5445	4.503	38.0	6.9
		MSK101	51	4.5	115,000	98.1	0.30	4,000	0.83	14.5	4,365.3	1.0605	0.500	55.7	
		MSK101	71	7.5	115,000	58.9	0.18	4,000	0.83	8.8	2,135.1	0.3818	0.180	55.7	
		MSK101	52	4.5	115,000	98.1	0.26	3,500	0.83	20.9	7,955.3	1.0605	0.500	72.0	
		MSK101	72	7.5	115,000	58.9	0.16	3,500	0.83	13.1	3,825.1	0.3818	0.180	72.0	
180	75x10	MSK101/133	42/43	1.5	201,052	274.9	0.33	3,000	0.78	27.7	65,566.4	10.8604	1.126	68.4	30
		MSK101	51	4.5	250,000	119.9	0.15	4,000	0.74	16.8	8,775.2	1.2067	0.125	86.3	
		MSK101	71	7.5	250,000	72.0	0.09	4,000	0.74	10.2	3,722.7	0.4344	0.045	86.3	
		MSK101	52	4.5	250,000	119.9	0.13	3,500	0.74	23.2	12,365.2	1.2067	0.125	103.0	
		MSK133	53	4.5	250,000	119.9	0.13	3,500	0.74	23.2	13,105.2	1.2067	0.125	103.0	
		MSK101	72	7.5	250,000	72.0	0.08	3,500	0.74	14.5	5,412.7	0.4344	0.045	103.0	
	75x20	MSK101/133	42/43	1.5	100,526	274.9	0.67	3,000	0.78	29.7	65,575.6	10.9010	4.503	68.4	
		MSK101	51	4.5	135,485	130.0	0.30	4,000	0.74	17.5	8,776.2	1.2112	0.500	86.3	
		MSK101	71	7.5	229,282	132.0	0.18	4,000	0.74	10.6	3,723.0	0.4360	0.180	86.3	
		MSK101	52	4.5	290,000	278.3	0.26	3,500	0.74	23.9	12,366.2	1.2112	0.500	103.0	
		MSK133	53	4.5	290,000	278.3	0.26	3,500	0.74	23.9	13,106.2	1.2112	0.500	103.0	
		MSK101	72	7.5	290,000	167.0	0.16	3,500	0.74	14.9	5,413.0	0.4360	0.180	103.0	

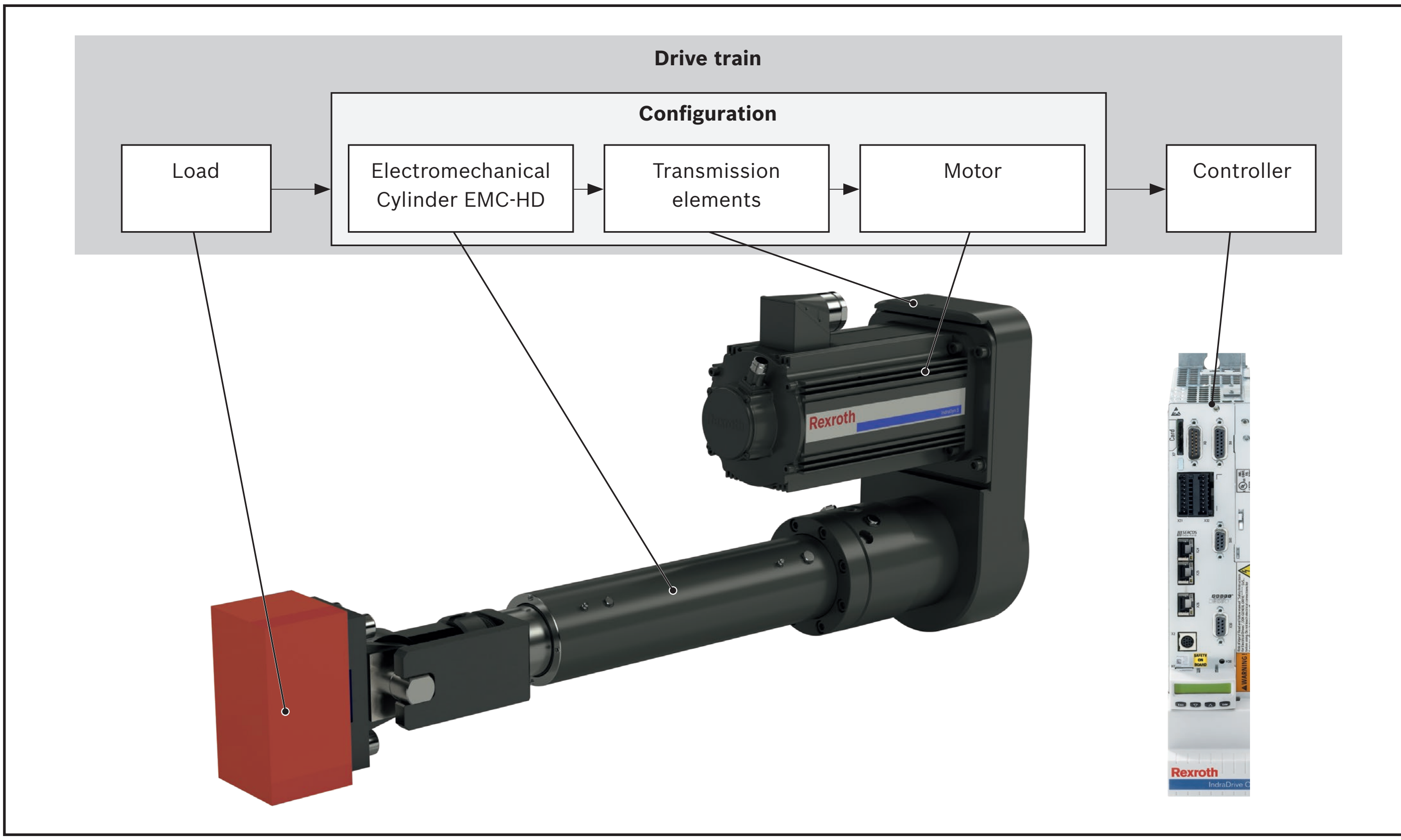
[1] Gear ratio of timing belt side drive and gear unit.
[2] Torque may be limited by the maximum torque of the motor.
[3] Rotary speed may be limited by the maximum speed of the motor.

Note:
All data is given for the complete mechanical drive train (EMC-HD with timing belt side drive) at the motor shaft reference point.
Actual results depend on the selected motor-controller combination.
The motor torque might need to be limited.

- 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 speed
- η = mechanical efficiency

Calculation Basics

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 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 in this section are system-based, i.e. the limits are based not only on the load capacity of the bearings, but also on design/material limits.

Mechanical calculation

Useful power

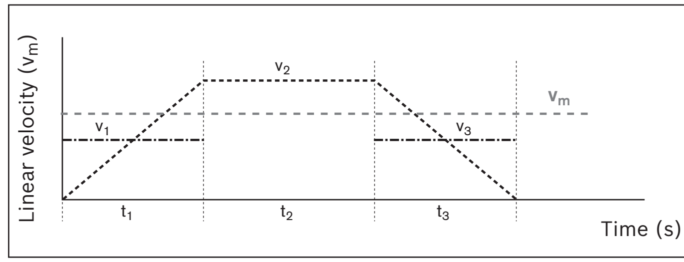
To take into account the power loss in the EMC-HD, a permissible useful power is stated for each cylinder-screw drive combination, see “Technical Data”. This value applies at an ambient temperature of 25 °C and even distribution of the load over the stroke length. For applications in which the cylinder 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.

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

P_{app} < perm. transmitted power

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 average values for F_m and v_m.

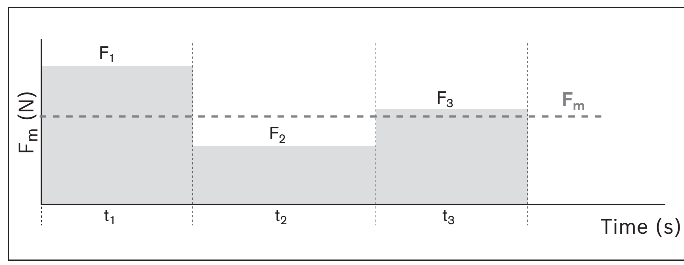


When the linear speed varies, the average speed v_m is calculated as follows:

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

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

Where both the load and the speed fluctuate, 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

The formula applies on compliance with the specified relubrication intervals and for standard operation.

For short stroke (stroke < s_{min}) a reduction must be taken into consideration.

– in revolutions L_{10}

– in hours L_{10h}

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

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

$$n_m = \frac{v_m \cdot 60{,}000}{P}$$

Driving torque M:

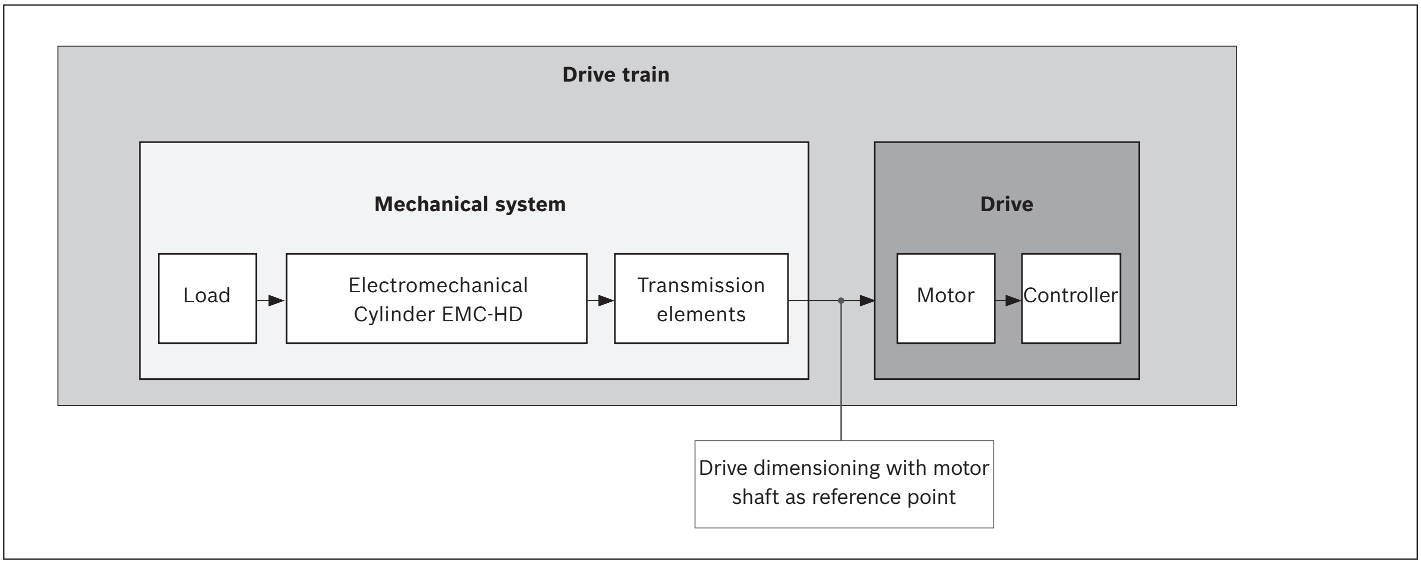
$$M = \frac{F \cdot P}{2{,}000 \cdot \pi \cdot \eta \cdot i}$$

C	=	dynamic load capacity	(N)
F	=	load	(N)
$F_1, F_2, \ldots F_n$	=	axial load in phase 1 … n	(N)
F_m	=	equivalent dynamic axial load	(N)
i	=	gear ratio of timing belt side drive/gear unit	(–)
L_{10}	=	nominal life in revolutions	(–)
L_{10h}	=	nominal life in hours	(h)
M	=	drive torque	(Nm)
n_m	=	average speed	(min^{-1})
P	=	screw drive lead	(mm)
P_{app}	=	useful power in the application	(W)
$t_1, t_2, \ldots t_n$	=	discrete time step for phases 1 … n	(s)
t_{tot}	=	sum of discrete time steps $t_1, t_2, \ldots t_n$	(s)
$v_1, v_2, \ldots v_n$	=	linear speed in phase 1 … n	(m/s)
v_m	=	average travel speed	(m/s)
η	=	mechanical efficiency	

Drive dimensioning

Principles

For drive dimensioning, the drive train can be divided into the **mechanical system** and the **drive system**.
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 dimensioning of the electric drive is done taking the motor shaft as a reference point.
For drive dimensioning, limits must be taken into account as well as base values. The limits must not be exceeded in order to avoid damaging the mechanical components.



Technical data and formula 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 drive dimensioning. 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	(kgm^2)	J_t [1]	J_s [2]
Max. permissible linear speed	(m/s)	–	v_{max} [3]
Max. permissible rotary speed	(rpm)		n_P [3]
Max. permissible drive torque	(Nm)	–	M_p

1) Determine the value using the appropriate formula
2) Length-dependent value, determined using the appropriate formula
3) Use the value from the table
4) For vertical mounting position: Determine the value using the appropriate formula

Drive dimensioning with motor shaft as reference point

When dimensioning the drive, all relevant design calculation values for the mechanical components in the drive train have to be determined and be expressed/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}
- Maximum permissible speed v_{mech} (max. permissible speed n_{mech})
- Max. permissible drive torque M_{mech}

Determination of the values for each mechanical component in the drive train based on the motor shaft as a reference point

Frictional torque M_R

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

For motor attachment via gear

$$M_R = M_{Rs}$$

Mass moment of inertia J_{ex}

The constants $k_{J\,fix}$, $k_{J\,var}$ and $k_{J\,m}$ used in the formulas already contain the mass moment of inertia and gear ratios for any incorporated transmission elements, 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)

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

Maximum permissible speed and maximum permissible rotary speed

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

Maximum permissible 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 linear system	(kgm^2)
J_t	=	translational mass moment of inertia of external load based based on 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 proportion of mass moment of inertia	(–)
s_{max}	=	maximum travel range	(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	(rpm)
n_p	=	maximum permissible rotary speed of EMC-HD	(rpm)
v_{max}	=	maximum permissible speed of EMC-HD	(m/s)
v_{mech}	=	max. permissible speed of the mechanical system	(m/s)

Drive dimensioning

Max. 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.

General motor preselection

The motor can be generally preselected using the following conditions.

Condition 1:

The rotary speed of the motor must be greater than or equal to the rotary speed required for the mechanical system (but not exceeding the maximum permissible limit 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 mass moments of inertia serves as an indicator for the control performance of a motor/controller combination.

The mass moment of inertia of the motor is directly related to the motor size.

Mass moment of inertia ratio

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

For preselection, 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 an empirical value of 0.6. This condition roughly factors in the missing dynamic characteristics of an exact motion profile with the required motor torques.

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 position only!
For motor attachment via mount and coupling: i = 1

$$M_g = \frac{P \cdot (m_{ex} + m_{ca}) \cdot g}{2{,}000 \cdot \pi \cdot i \cdot \eta}$$

Equivalent dynamic torque:

$$M_m = \frac{F_m \cdot P}{2{,}000 \cdot \pi \cdot i \cdot \eta}$$

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, BASA or PLSA.

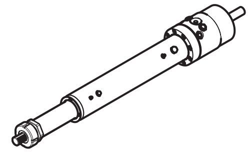
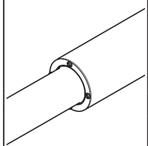
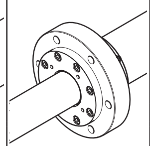
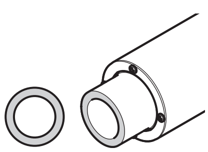
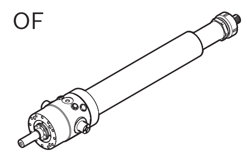
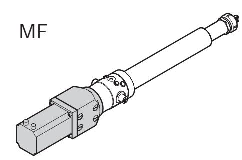
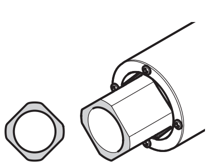
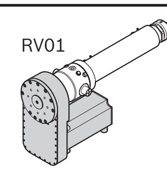
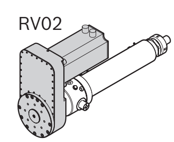
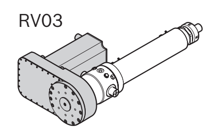
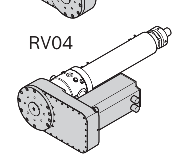
In the “Configuration and Ordering” section, users can put together standard configurations including gear unit and motor, for the various EMC-HD sizes by selecting the appropriate options. By checking the three conditions stated above, it is possible to see whether a standard motor selected in a particular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

Precise drive dimensioning

Preselecting the motor according to this rough guide is no substitute for the required precise design calculations for the drive, taking all moments/torques and rotary 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 dimensioning 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 unit	(–)
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 the 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 longitudinal moment load	(Nm)
n_{mech}	=	maximum permissible rotary speed of mechanical system	(rpm)
n_{max}	=	maximum speed of motor (rpm)	
P	=	screw lead	(mm)
V	=	ratio of mass moments of inertia of drive train and motor	(–)
η	=	mechanical efficiency	(–)

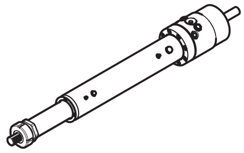
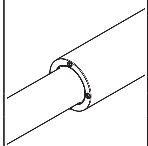
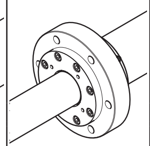
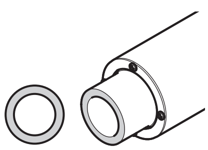
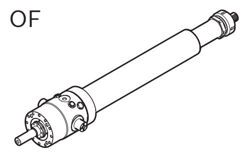
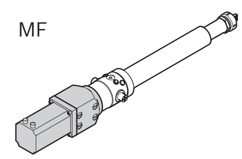
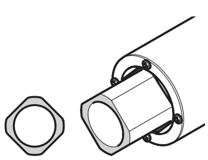
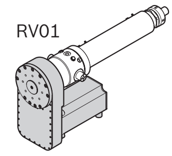
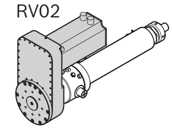
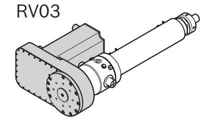
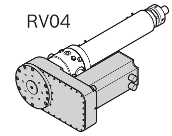
EMC-085-HD – Configuration and ordering

Short product name, s_{max} **EMC-085-HD-1, ... mm** 	**Guideway** 		**Drives** PLSA d_0xP		BASA d_0 x P		**Lubrication**[2]			**Version**	
	Without round flange	With round flange[1]	30 x 5	30 x 10	40 x 10	40 x 20	LSS	LLG		Description	
Round piston rod 	01	02	01	02	12	13	01	02		Without mount	OF 
										With mount	MF 
With anti rotation feature 	11	12								with timing belt side drive	RV01  RV02  RV03  RV04 

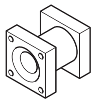
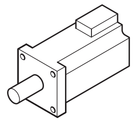
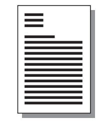
[1] For vertical installation only
[2] LSS: Standard lubrication
LLG: Initial lubrication with low-temperature grease (only with PLSA drive)
[3] Measurement of frictional torque without motor attachment

Motor attachment			**Motor**			**Switch**				**Surface**		**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 of frictional torque[3]	Lead deviation
	Without	00	Without	00	00	00	01	02	03	01	13	01	02	03
i = 1	With mount	01	MSK071D	114	115									
		02	MSK100B	116	117									
		03	MSK101D	118	119									
			MSK101E	120	121									
i = 3	With mount and gear unit SP100	06	MSK071D	114	115									
		07	MSK101D	118	119									
i = 5	With mount and gear unit SP100	16	MSK071D	114	115									
i = 1.5	Timing belt side drive	40	MSK071D	114	115									
		41	MSK100B	116	117									
		42	MSK101D	118	119									
			MSK101E	120	121									
i = 4.5	RV (i = 1.5) and gear unit SP100 (i = 3)	50	MSK071D	114	115									
i = 7.5	RV (i = 1.5) and gear unit SP100 (i = 5)	70	MSK071D	114	115									

EMC-105-HD – Configuration and ordering

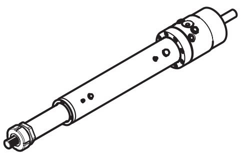
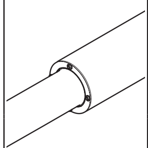
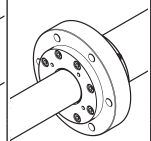
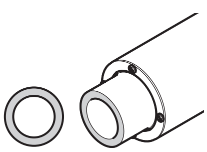
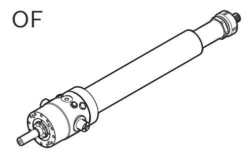
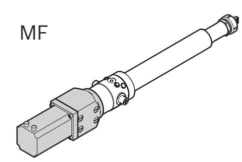
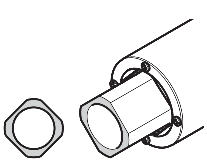
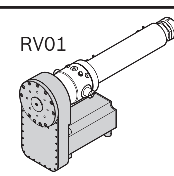
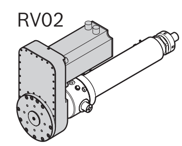
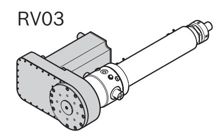
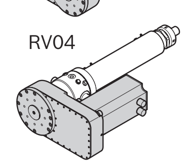
Short product name, s_{max}	**Guideway**		**Drives**				**Lubrication**[2]			**Version**	
EMC-105-HD-1, ... mm 			PLSA d_0xP		BASA d_0xP						
	Without round flange	With round flange[1]	39 x 5	39 x 10	50 x 10	50 x 20	LSS	LLG		Description	
Round piston rod 	01	02	01	02	12	13	01	02		without mount OF 	
										with mount MF 	
With anti rotation feature 	11	12								with timing belt side drive RV01  RV02  RV03  RV04 	

1) For vertical installation only
2) LSS: Standard lubrication
LLG: Initial lubrication with low-temperature grease (only with PLSA drive)
3) Measurement of frictional torque without motor attachment

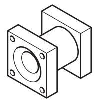
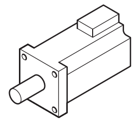
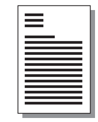




Motor attachment			Motor			Switch				Surface		Documentation		
Gear ratio	Description			Without brake	With brake	without switch	1 reference switch	2 limit switches	2 limit switches and 1 reference switch	Standard	Black painted	Standard report	Measurement of frictional torque[3]	Lead deviation
	Without	00	Without	00	00	00	01	02	03	01	13	01	02	03
i = 1	With mount	01	MSK071D	114	115									
		02	MSK100B	116	117									
		03	MSK101D	118	119									
			MSK101E	120	121									
i = 3	With mount and gear unit SP100	06	MSK071D	114	115									
i = 4	With mount and gear unit SP100	12	MSK101D	118	119									
i = 5	With mount and gear unit SP100	16	MSK071D	114	115									
i = 7	With mount and gear unit SP100	26	MSK071D	114	115									
i = 1.5	Timing belt side drive	40	MSK071D	114	115									
		41	MSK100B	116	117									
		42	MSK101D	118	119									
			MSK101E	120	121									
i = 4.5	RV (i = 1.5) and gear unit SP100 (i = 3)	50	MSK071D	114	115									
i = 7.5	RV (i = 1.5) and gear unit SP100 (i = 5)	70	MSK071D	114	115									

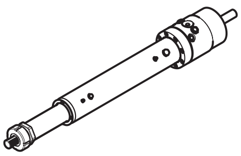
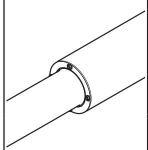
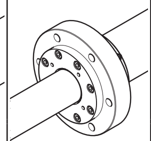
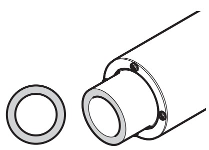
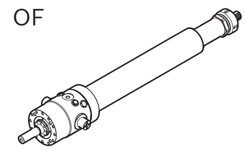
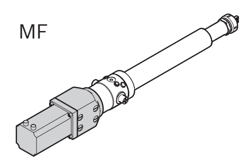
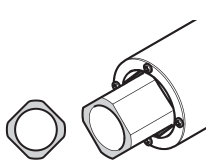
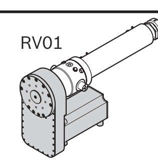
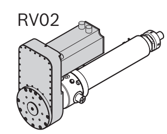
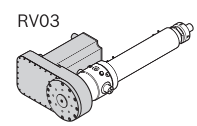
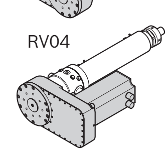
EMC-125-HD – Configuration and ordering

Short product name, s_{max} EMC-125-HD-1, ... mm	Guideway		Drives				Lubrication[2]			Version	
			PLSA d_0 x P		BASA d_0 x P						
	Without round flange	With round flange[1]	48 x 5	48 x 10	63 x 10	63 x 20	LSS	LLG		Description	
Round piston rod 	01	02	01	02	12	13	01	02		without mount: OF 	
										With mount (MF): MF 	
With anti rotation feature 	11	12								With timing belt side drive (RV): RV01  RV02  RV03  RV04 	

1) For vertical installation only
2) LSS: Standard lubrication
LLG: Initial lubrication with low-temperature grease (only with PLSA drive)
3) Measurement of frictional torque without motor attachment

Motor attachment			Motor			Switch				Surface		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 of frictional torque[3)]	Lead deviation
	Without	00	Without	000	000									
i = 1	With mount	02	MSK100B	116	117									
		03	MSK101D	118	119									
			MSK101E	120	121									
i = 3	With mount and gear unit SP100	06	MSK100B	116	117									
	With mount and gear unit SP140	07	MSK101D	118	119									
i = 5	With mount and gear unit SP100	16	MSK071D	114	115	00	01	02	03	01	13	01	02	03
i = 1.5	Timing belt side drive	41	MSK100B	116	117									
		42	MSK101D	118	119									
			MSK101E	120	121									
i = 4.5	RV (i = 1.5) and gear unit SP100 (i = 3)	51	MSK100B	116	117									
		52	MSK101D	118	119									
i = 7.5	RV (i = 1.5) and gear unit SP100 (i = 5)	70	MSK071D	114	115									

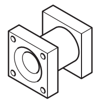
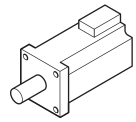
EMC-150-HD – Configuration and ordering

Short product name, s_{max} **EMC-150-HD-1, ... mm** 	**Guideway**		**Drives**			**Lubrication**[2]		**Version**
			PLSA d_0 x P		BASA d_0 x P			
	Without round flange	With round flange[1]	60 x 10	60 x 20	80 x 20	LSS	LLG	Description
Round piston rod 	01	02	02	04	13	01	02	without mount: OF 
								With mount (MF): MF 
With anti rotation feature 	11	12						With timing belt side drive (RV): RV01  RV02  RV03  RV04 

[1] For vertical installation only

[2] LSS: Standard lubrication

LLG: Initial lubrication with low-temperature grease (only with PLSA drive)

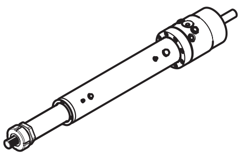
Motor attachment 			**Motor** 			**Switch**				**Surface**		**Documentation**		
Gear ratio	Description			Without brake	With brake	without switch	1 reference switch	2 limit switches	2 limit switches and 1 reference switch	Standard	Black painted	Standard report	Measurement of frictional torque[4]	Lead deviation
	Without	00	Without	000	000	00	01	02	03	01	13	01	02	03
i = 1	With mount	03	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
		04	MSK133B[3]	126	127									
i = 4	With mount and gear unit SP140	12	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	With mount and gear unit SP180	13	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 5	With mount and gear unit SP140	17	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	With mount and gear unit SP180	18	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 7	With mount and gear unit SP180	27	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 1.5	Timing belt side drive	42	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 4.5	RV (i = 1.5) and gear unit SP140 (i = 3)	51	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	RV (i = 1.5) and gear unit SP180 (i = 3)	52	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 7.5	RV (i = 1.5) and gear unit SP140 (i = 5)	71	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	RV (i = 1.5) and gear unit SP180 (i = 5)	72	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									

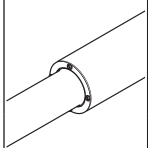
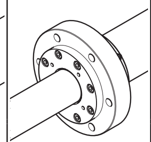
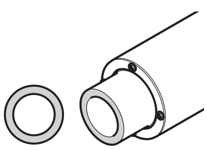
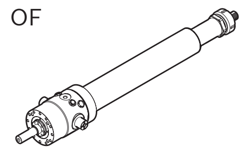
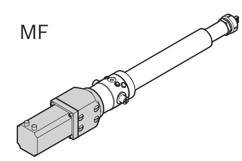
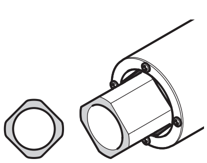
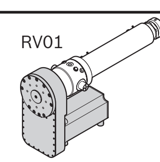
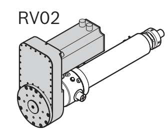
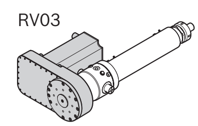
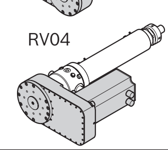
[3] With fan
[4] Measurement of frictional torque without motor attachment

EMC-180-HD – Configuration and ordering

Short product name, s_{max}

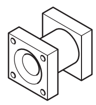
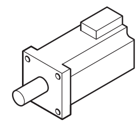
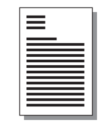
EMC-180-HD-1, ... mm



Short product name	Guideway: Without round flange	Guideway: With round flange[1]	Drives PLSA d_0 x P: 75 x 10	Drives PLSA d_0 x P: 75 x 20	Lubrication[2]: LSS	Lubrication[2]: LLG		Version: Description	
									
Round piston rod 	01	02	02	04	01	02		without mount	OF 
								With mount (MF)	MF 
With anti rotation feature 	11	12						With timing belt side drive (RV)	RV01  RV02  RV03  RV04 

[1] For vertical installation only

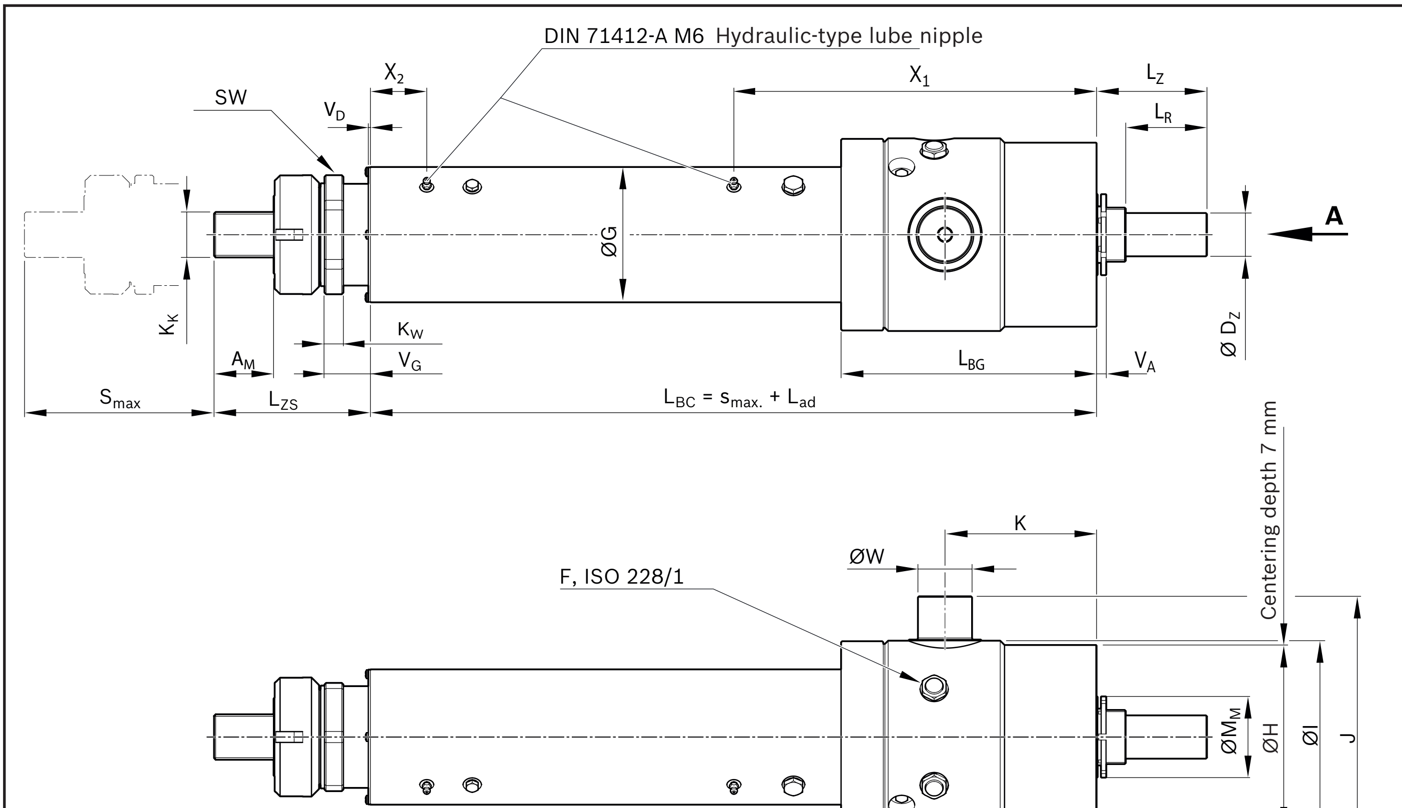
[2] LSS: Standard lubrication
LLG: Initial lubrication with low-temperature grease (only with PLSA drive)

Motor attachment			Motor			Switch				Surface		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 of frictional torque[4]	Lead deviation
	Without	00	Without	000	000	00	01	02	03	01	13	01	02	03
i = 1	With mount	03	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
		04	MSK133B[3]	126	127									
			MSK133D[3]	128	129									
i = 3	With mount and gear unit SP180	07	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	With mount and gear unit XP050S	08	MSK133B[3]	126	127									
			MSK133D[3]	128	129									
i = 5	With mount and gear unit SP180	17	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	With mount and gear unit XP050S	18	MSK133B[3]	126	127									
			MSK133D[3]	128	129									
i = 7	With mount and gear unit SP180	27	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
i = 1.5	Timing belt side drive	42	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
		43	MSK133B[3]	126	127									
			MSK133D[3]	128	129									
i = 4.5	RV (i = 1.5) and gear unit SP140 (i = 3)	51	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	RV (i = 1.5) and gear unit SP180 (i = 3)	52	MSK101E	120	121									
			MSK101E[3]	124	125									
		53	MSK133B[3]	126	127									
i = 7.5	RV (i = 1.5) and gear unit SP140 (i = 5)	71	MSK101D	118	119									
			MSK101E	120	121									
			MSK101E[3]	124	125									
	RV (i = 1.5) and gear unit SP180 (i = 5)	72	MSK101E	120	121									
			MSK101E[3]	124	125									

3) With fan
4) Measurement of frictional torque without motor attachment

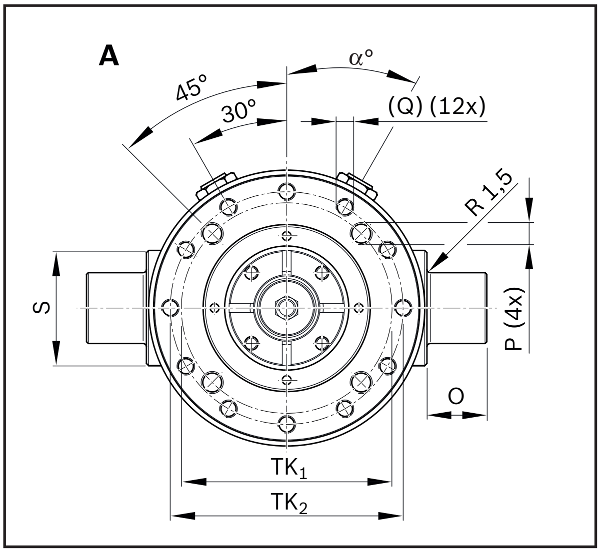
Dimension drawings for electromechanical cylinder



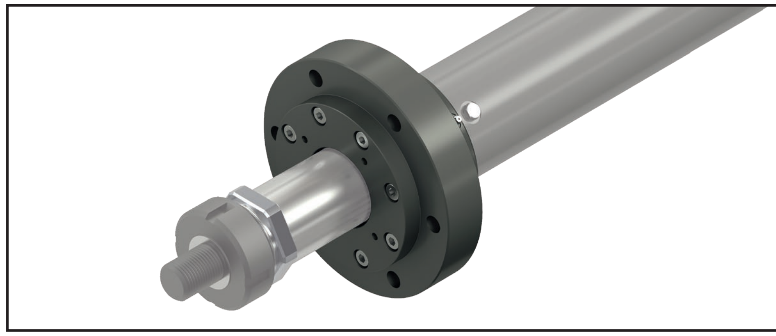
EMC-HD	F
085 / 105	G 1/4"
125 / 150 / 180	G 3/8"

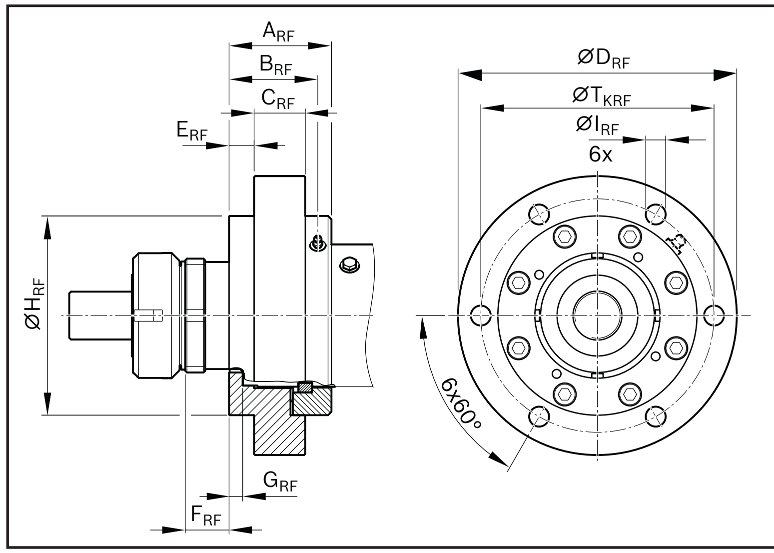
EMC-HD	Drive	d_0 x P (mm)	Dimensions (mm) EMC-HD (base cylinder) A_M -0.1	α (°)	$ØD_Z$ h7	ØG	ØH -0.05	ØI	J	K	K_K	K_W	L_{ad}	L_{BG}	L_R	L_Z	L_{ZS}	$ØM_M$	SW	V_G 1)	V_D
085	PLSA	30 x 5	36	30	25	85	120	124.5	180.5	105	M27x2	14.0	352	185	70	91.8	116.5	52	65	42.5	2
		30 x 10											352								
	BASA	40 x 10											352								
		40 x 20											370								
105	PLSA	39 x 5	45	15	35	105	145	148	214.0	120	M33x2	18.0	404	221	70	92.0	132.5	65	90	48.5	2
		39 x 10											404								
	BASA	50 x 10											394								
		50 x 20											416								
125	PLSA	48 x 5	55	30	40	125	170	178	260.0	140	M42x2	17.5	442	236	75	102.0	152.5	75	100	50.5	2
		48 x 10											442								
	BASA	63 x 10											405								
		63 x 20											427								
150	PLSA	60 x 10	64	15	60	150	200	202	304.0	180	M48x2	28.0	569	301	98	130.0	180	100	130	66.0	2
		60 x 20											569								
	BASA	80 x 20											586								
180	PLSA	75 x 10	84	30	85	180	260	263	391.0	220	M64x3	30.0	677	366	105	142.0	208	130	150	66.5	2
		75 x 20											677								

1) at position 0 mm

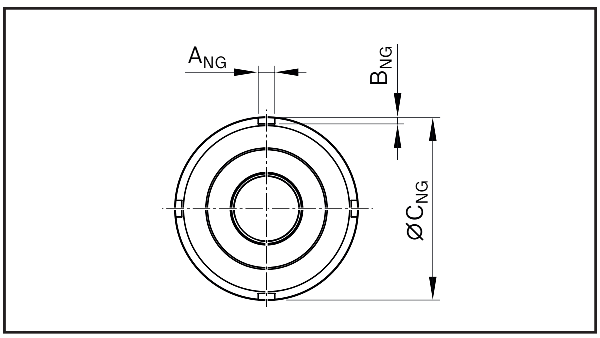


Round flange, for vertical installation only





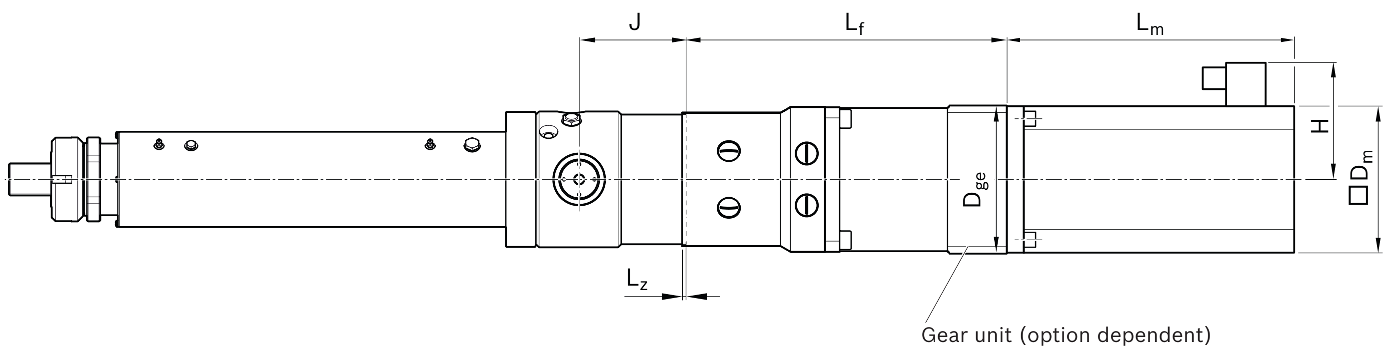
Lock nut on threaded mounting interface



										Lock nut			**Round flange**										
X_2	X_1	V_A	ØW h7	$ØTK_1$	$ØTK_2$	O	P	Q	S	A_{NG}	B_{NG}	$ØC_{NG}$	$ØT_{KRF}$	$ØD_{RF}$	A_{RF}	B_{RF}	C_{RF}	E_{RF}	F_{RF}	G_{RF}	$ØH_{RF}$ ±0.1	$ØI_{RF}$	m_{RF} (kg)
52	256	7.8	32	95	105	27	M10 22 deep	M8 18 deep	52	8	4.0	77	155	185	76	66	35	15	32.5	10	130	13.5	8.2
52	320	10.0	40	120	125	32	M10 23 deep	M10 23 deep	62	10	4.0	95	170	200	88	76	40	20	38.5	10	150	13.5	10.2
52	335	9.0	50	130	147	40	M12 26 deep	M12 26 deep	68	10	4.0	110	205	245	90	78	45	22	38.5	12	175	17.5	15.8
67	419	14.0	63	166	178	50	M14 32 deep	M14 32 deep	90	11	4.5	130	245	295	109	97	50	22	47.0	17	210	22.0	26.2
67	499	14.0	80	215	230	63	M16 33 deep	M16 33 deep	110	12	5.0	155	290	335	116	95	55	20	50.0	15	245	26.0	35.8

Dimension drawing for motor attachment with flange and coupling

MF01
MF01 with gear unit



Note: The drawing for motor attachment flange and coupling is schematic. Detailed contours can be found in the CAD model.

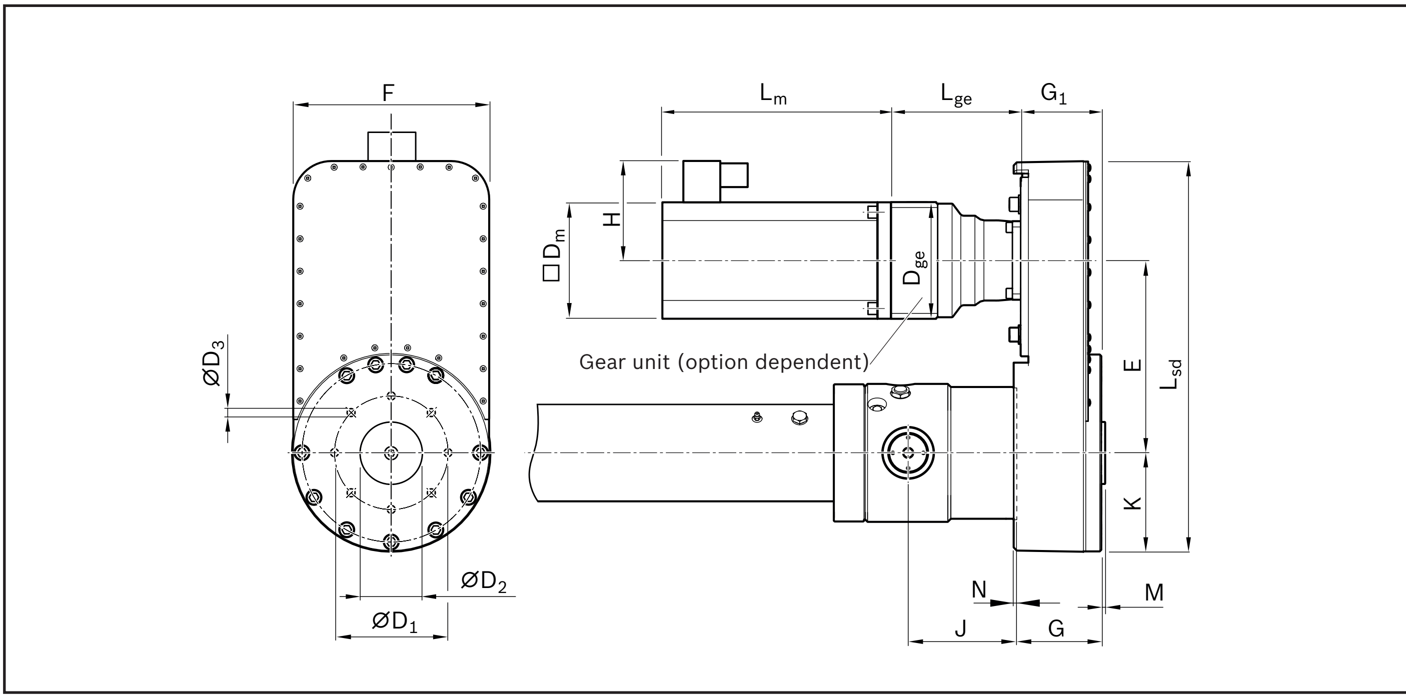
EMC-HD	Motor	Option Motor attachment	i	Dimensions (mm) L_m With brake	L_m Without brake	D_m	D_{ge}	L_f	J	H	L_z
EMC-085-HD	MSK071D	01	1	347	312	140	–	153.5	105	132	3
		06	3				150	339.5			
		16	5				150	339.5			
	MSK100B	02	1	368	368	192	–	178.5		166	
	MSK101D	03	1	410	410	192	–	178.5			
		07	3	410	410	192	190	339.5			
	MSK101E	03	1	501	501	192	–	178.5			
EMC-105-HD	MSK071D	01	1	347	312	140	–	165.0	120	132	4
	MSK100B	02	1	368	368	192	–	190.0		166	
	MSK101D	03	1	410	410	192	–	190.0		166	
	MSK101E	03	1	501	501	192	–	190.0		166	
	MSK071D	06	3	347	312	140	150	351.0		132	
	MSK101D	12	4	410	410	192	190	351.0		166	
	MSK071D	16	5	347	312	140	150	351.0		132	
	MSK071D	26	7	347	312	140	150	351.0		132	
EMC-125-HD	MSK071D	16	5	347	312	140	150	368.0	140	132	5
	MSK100B	02	1	368	368	192	–	207.0		166	
		06	3	368	368	192	190	368.0		166	
	MSK101D	03	1	410	410	192	–	207.0		166	
		07	3	410	410	192	190	388.3		166	
	MSK101E	03	1	501	501	192	–	207.0		166	

EMC-HD	Motor	Option Motor attachment	i	Dimensions (mm) L_m With brake	L_m Without brake	D_m	D_{ge}	L_f	J	H	L_z
EMC-150-HD	MSK101D	03	1	410	410	192	–	249	180	166	5
	MSK101E	03	1	501	501	192	–	249		166	
	MSK101E[1]	03	1	672	672	208	–	249		166	
	MSK133B[1]	04	1	807	622	260	–	245		214	
	MSK101D	12	4	410	410	192	190	420		166	
	MSK101E	12	4	501	501	192	190	420		166	
	MSK101E[1]	12	4	672	672	208	190	420		166	
	MSK101D	17	5	410	410	192	190	420		166	
	MSK101E	17	5	501	501	192	190	420		166	
	MSK101E[1]	17	5	672	672	208	190	420		166	
	MSK101D	13	4	410	410	192	210	452		166	
	MSK101E	13	4	501	501	192	210	452		166	
	MSK101E[1]	13	4	672	672	208	210	452		166	
	MSK101D	18	5	410	410	192	210	452		166	
	MSK101E	18	5	501	501	192	210	452		166	
	MSK101E[1]	18	5	672	672	208	210	452		166	
	MSK101D	27	7	410	410	192	210	452		166	
	MSK101E	27	7	501	501	192	210	452		166	
	MSK101E[1]	27	7	672	672	208	210	452		166	
EMC-180-HD	MSK101D	03	1	410	410	192	–	259	220	166	5
	MSK101E	03	1	501	501	192	–	259		166	
	MSK101E[1]	04	1	672	672	208	–	259		166	
	MSK133B[1]	04	1	807	622	260	–	255		214	
	MSK133D[1]	04	1	907	722	260	–	255		238	
	MSK101D	07	3	410	410	192	210	462		166	
	MSK101E	07	3	501	501	192	210	462		166	
	MSK101E[1]	07	3	672	672	208	210	462		166	
	MSK133B[1]	08	3	807	622	260	260	490		214	
	MSK133D[1]	08	3	907	722	260	260	490		238	
	MSK101D	17	5	410	410	192	210	462		166	
	MSK101E	17	5	501	501	192	210	462		166	
	MSK101E[1]	17	5	672	672	208	210	462		166	
	MSK133B[1]	18	5	807	622	260	260	490		214	
	MSK133D[1]	18	5	907	722	260	260	490		238	
	MSK101D	27	7	410	410	192	210	462		166	
	MSK101E	27	7	501	501	192	210	462		166	
	MSK101E[1]	27	7	672	672	208	210	462		166	

1) With fan (illustration differs)

Dimension drawing for motor attachment with timing belt side drive

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



Note: The drawing for motor attachment with timing belt side drive is schematic. Detailed contours can be found in the CAD model.

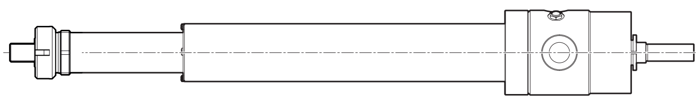
EMC-HD	Motor	Motor attachment option	i	Dimensions (mm) L_{sd}	E	K	G	G_1	J	M	N	L_m With brake	L_m Without brake	L_{ge}	D_m	D_{ge}	H	F	$ØD_1$	$ØD_2$ -0.15	$ØD_3$
EMC-085-HD	MSK071D	40	1.5	460	211	100	99	99	105	5	4	347	312	–	140	–	132	200	100	60	M8 (8x) 16 deep
		50	4.5					109						156		150					
		70	7.5					109						156		150					
	MSK100B	41	1.5					99				368	368	–	192	–	166				
	MSK101D	42	1.5					99				410	410								
	MSK101E	42	1.5					99				501	501								
EMC-105-HD	MSK071D	40	1.5	460	211	100	99	99	120	5	4	347	312	–	140	–	132	200	104	60	M8 (12x) 21 deep
	MSK071D	50	4.5					109						156		150					
	MSK071D	70	7.5					109						156		150					
	MSK100B	41	1.5	504	248	128	102	102			9	368	368	–	192	–	166	255	104	60	M8 (12x) 21 deep
	MSK101D	42	1.5									410	410								
	MSK101E	42	1.5									501	501								
EMC-125-HD	MSK100B	41	1.5	504	248	128	109	104	140	5	4	368	368	–	192	–	166	255	145	80	M12 (8x) 22 deep
	MSK101D	42	1.5									410	410								
	MSK101E	42	1.5									501	501								
	MSK100B	51	4.5					114				368	368	156	192	190	166				
	MSK101D	52	4.5									410	410		192		166				
	MSK071D	70	7.5									347	312		140		132				

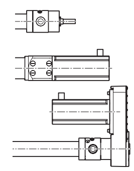
EMC-HD	Motor	Motor attachment option	i	Dimensions (mm) L_{sd}	E	K	G	G_1	J	M	N	L_m With brake	L_m Without brake	L_{ge}	D_m	D_{ge}	H	F	$ØD_1$	$ØD_2$ -0.15	$ØD_3$
EMC-150-HD	MSK101D	42	1.5	574	290.3	135	140	141	180	5	4	410	410	–	192	–	166	270	145	80	M12 (12x) 24 deep
	MSK101E	42	1.5									501	501	–	192	–					
	MSK101E1)	42	1.5									672	672	–	208	–					
	MSK101D	51	4.5									410	410	171	192	190					
	MSK101E	51	4.5									501	501	171	192	190					
	MSK101E1)	51	4.5									672	672	171	208	190					
	MSK101D	52	4.5									410	410	203	192	190					
	MSK101E	52	4.5									501	501	203	192	190					
	MSK101E1)	52	4.5									672	672	203	208	190					
	MSK101D	71	7.5									410	410	171	192	210					
	MSK101E	71	7.5									501	501	171	192	210					
	MSK101E1)	71	7.5									672	672	171	208	210					
	MSK101D	72	7.5									410	410	203	192	210					
	MSK101E	72	7.5									501	501	203	192	210					
	MSK101E1)	72	7.5									672	672	203	208	210					
EMC-180-HD	MSK101D	42	1.5	752	397.1	182.5	149	145	220	8	4	410	410	–	192	–	166	365	194	80	M16 (10x) 28 deep
	MSK101E	42	1.5									501	501	–	192	–	166				
	MSK101E1)	42	1.5									672	672	–	208	–	166				
	MSK133B1)	43	1.5									807	622	–	260	–	214				
	MSK133D1)	43	1.5									907	722	–	260	–	238				
	MSK101D	51	4.5									410	410	171	192	190	166				
	MSK101E	51	4.5									501	501	171	192	190	166				
	MSK101E1)	51	4.5									672	672	171	208	190	166				
	MSK101E	52	4.5									501	501	203	192	210	166				
	MSK101E1)	52	4.5									672	672	203	208	210	166				
	MSK133B1)	53	4.5									807	622	239	260	260	214				
	MSK101D	71	7.5									410	410	171	192	190	166				
	MSK101E	71	7.5									501	501	171	192	190	166				
	MSK101E1)	71	7.5									672	672	171	208	190	166				
	MSK101E	72	7.5									501	501	203	192	210	166				
	MSK101E1)	72	7.5									672	672	203	208	210	166				

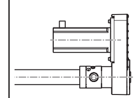
1) With fan (illustration differs)

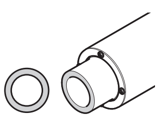
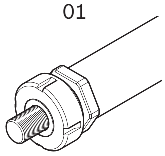
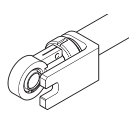
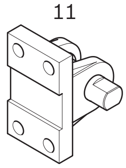
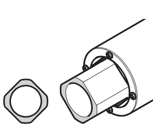
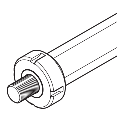
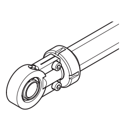
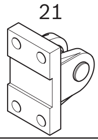
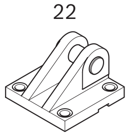
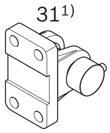
Mounting elements – configuration and ordering

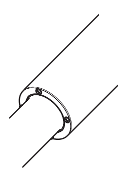
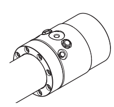
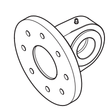
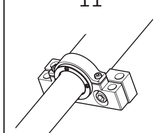
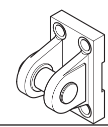
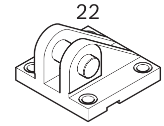
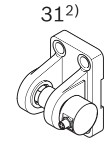
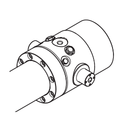
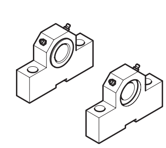
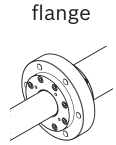
Mounting elements





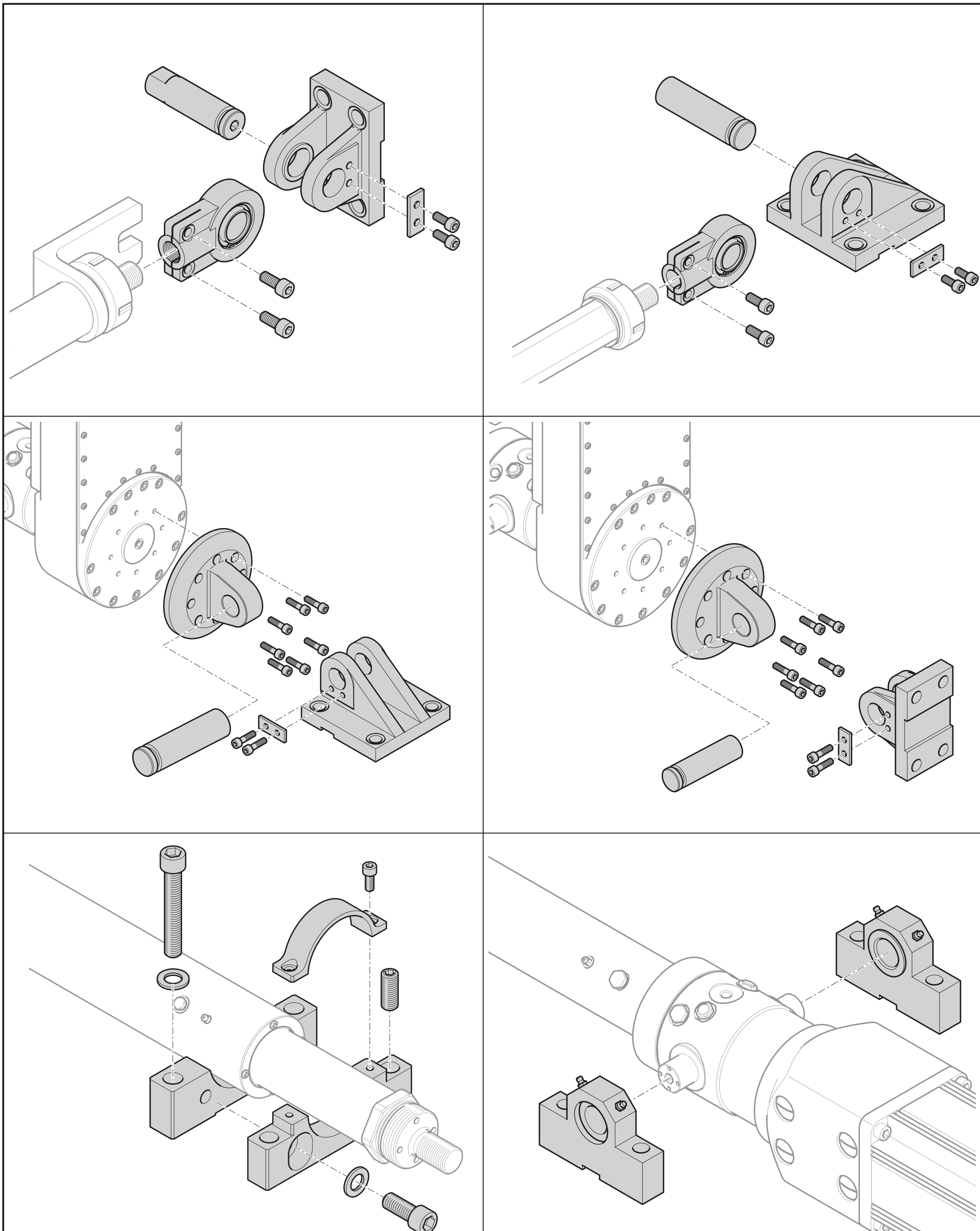


Version	Group 1	Group 2[3]
Guideway with round piston rod 	00	01 
	00	02 
	11 	02
Guideway with anti rotation feature 	00	11 
	00	12 
	21 	12
	22 	12
	31[1] 	12

Version[3]	Group 3	Group 4[3]	Group 5[3]	Group 6
Without round flange 	00	01 	00	00
	00	01	11 	00
	11 	01	11	21 
	11	01	11	22 
	11	01	11	31[2] 
	11	02 	00	00
	11	02	00	01 
With round flange 	00	01	00	00

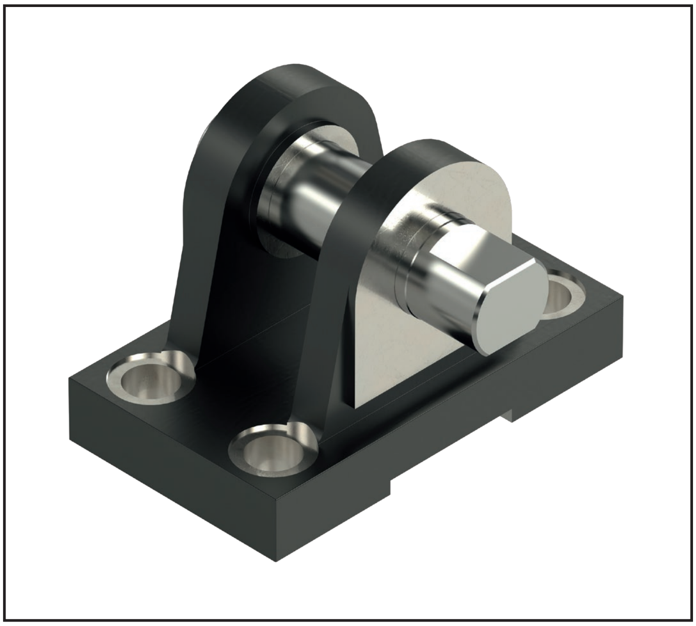
1) With load measuring only on "With anti rotation feature" option (see "Attachments and Accessories" section)
2) With load measuring only on "With anti rotation feature" option (see "Attachments and Accessories" section) NOT to be used in combination with round flange or foot mounting!
3) Pre-assembled on delivery

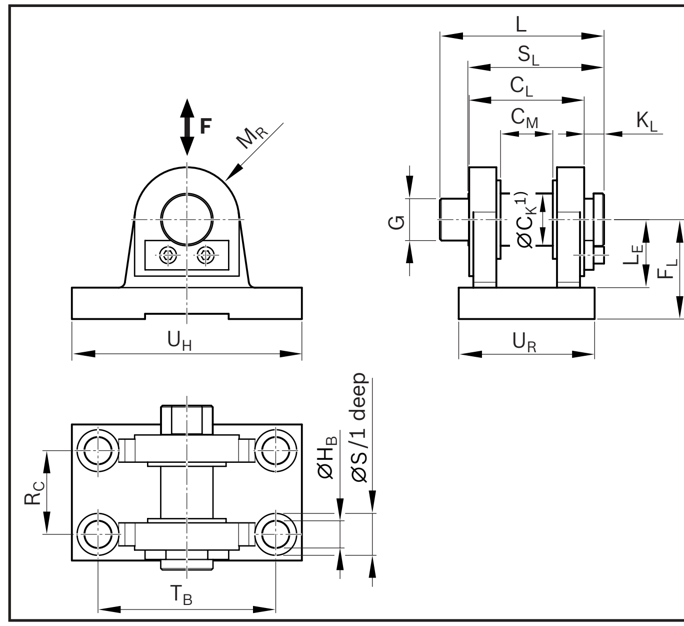
Examples



Mounting elements

Clevis bracket CLCD (comparable with ISO 8132) for spherical rod end bearing with clevis, form A
Group 1, option 11



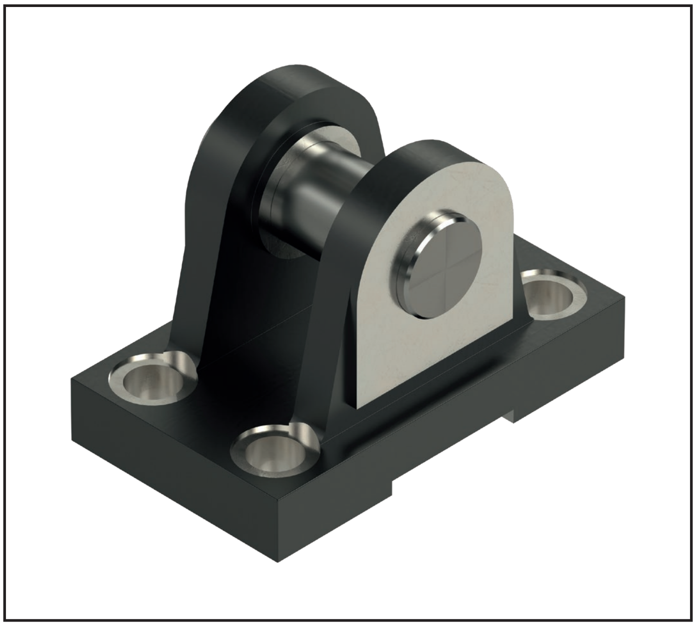


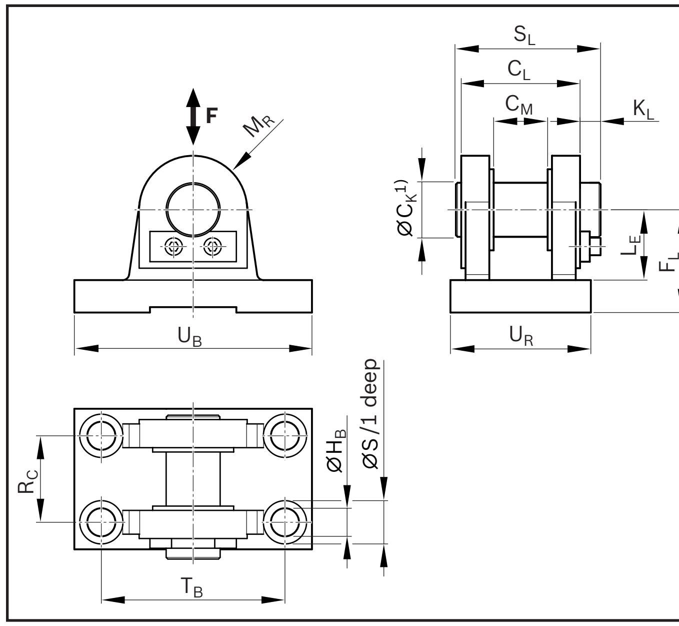
EMC-HD	Part number	Dimensions (mm)																m
		$ØC_K$ [1]	C_L	C_M	F_L	$ØH_B$	K_L	L_E	M_R	R_C	ØS	S_L [2]	L [2]	G [2]	T_B	U_R	U_H	
		H9	h16	A12	js12	H13		min.	max.	js14				f7	js14	max.	max.	(kg)
085	R156330100	32	70	32	65	17.5	13	43	32	50	26	90.5	114.5	25	110	85	143	3.15
105	R156340100	40	90	40	76	22.0	16	52	40	65	33	112.0	135.0	30	130	108	170	5.75
125	R156350100	50	110	50	95	26.0	19	65	50	80	40	130.0	157.0	40	170	130	220	10.95
150	R156360100	63	140	63	112	33.0	20	75	63	100	48	165.0	198.0	53	210	160	270	17.70
180	R156370100	80	170	80	140	39.0	26	95	80	125	57	192.0	230.0	70	250	210	320	33.40

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

Note: Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Clevis bracket CLCD ISO 8132, form A
Group 1 / 6, option 21





EMC-HD	Part number	Dimensions (mm)														m
		$ØC_K$[1)] H9	C_L h16	C_M A12	F_L js12	$ØH_B$ H13	K_L	L_E min.	M_R max.	R_C js14	ØS	S_L	T_B js14	U_R max.	U_H max.	(kg)
085	R156330101	32	70	32	65	17.5	13	43	32	50	26	87	110	85	143	3.0
105	R156340101	40	90	40	76	22.0	16	52	40	65	33	110	130	108	170	5.5
125	R156350101	50	110	50	95	26.0	19	65	50	80	40	133	170	130	220	10.6
150	R156360101	63	140	63	112	33.0	20	75	63	100	48	164	210	160	270	17.0
180	R156370101	80	170	80	140	39.0	26	95	80	125	57	202	250	210	320	32.0

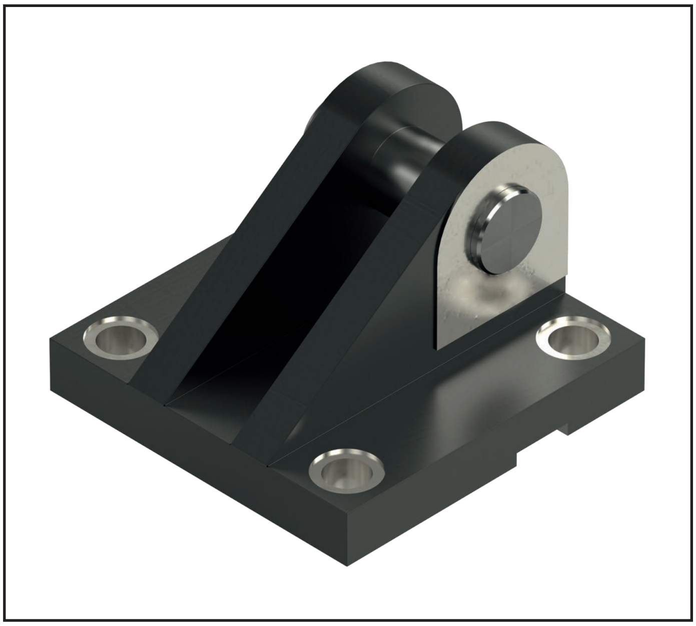
1) Matching pivot pin Ø m6 (pin and pin locking feature are included in the scope of supply and are not ready-mounted on delivery)

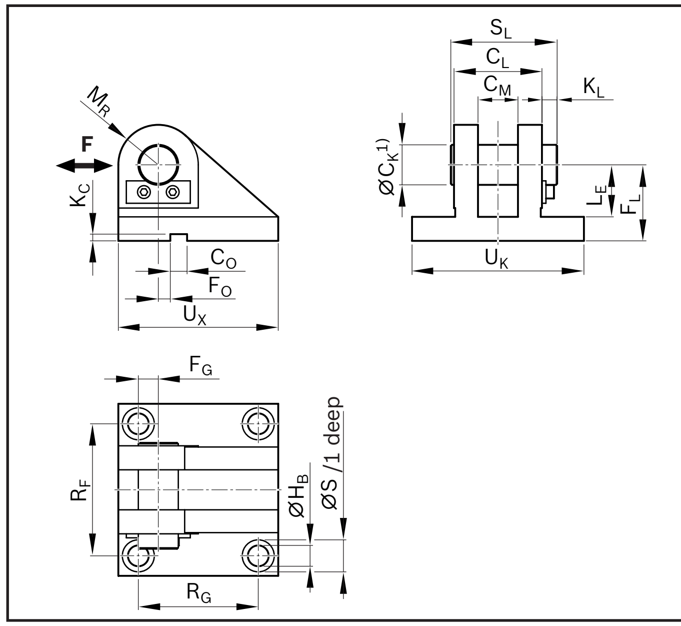
Note: Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Mounting elements

Clevis bracket CLCA ISO 8132, form B

Group 1 / 6, option 22





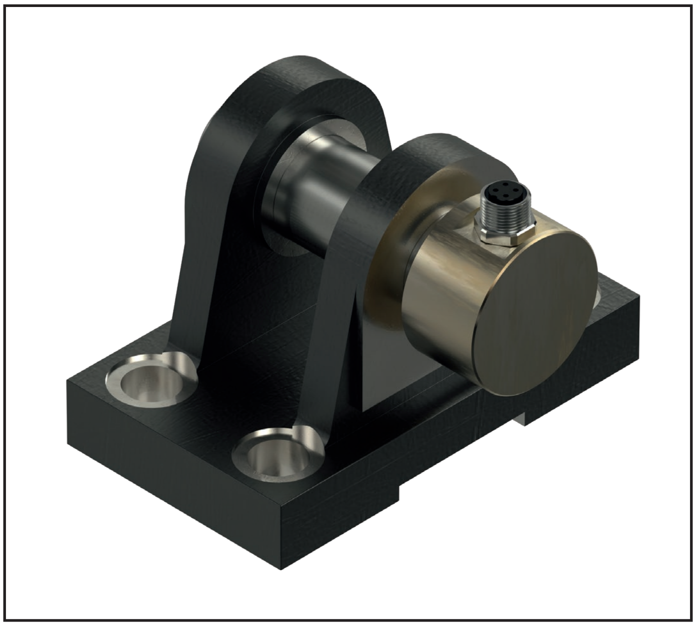
EMC-HD	Part number	Dimensions (mm)																		m
		$ØC_K$[1] H9	C_L h16	C_M A12	C_O N9	F_G js14	F_L js12	F_O js14	$ØH_B$ H13	K_C +0.3	K_L	L_E min.	M_R max.	R_F js14	R_G js14	ØS	S_L	U_K max.	U_X max.	(kg)
085	R156330102	32	70	32	25	14.5	65	6	17.5	5.4	13	43	32	110	110	26	87	145	145	4.5
105	R156340102	40	90	40	36	17.5	76	6	22.0	8.4	16	52	40	140	125	33	110	185	170	8.5
125	R156350102	50	110	50	36	25.0	95	0	26.0	8.4	19	65	50	165	150	40	133	215	200	13.5
150	R156360102	63	140	63	50	33.0	112	0	33.0	11.4	20	75	63	210	170	48	164	270	230	23.4
180	R156370102	80	170	80	50	45.0	140	0	39.0	11.4	26	95	80	250	210	57	202	320	280	38.5

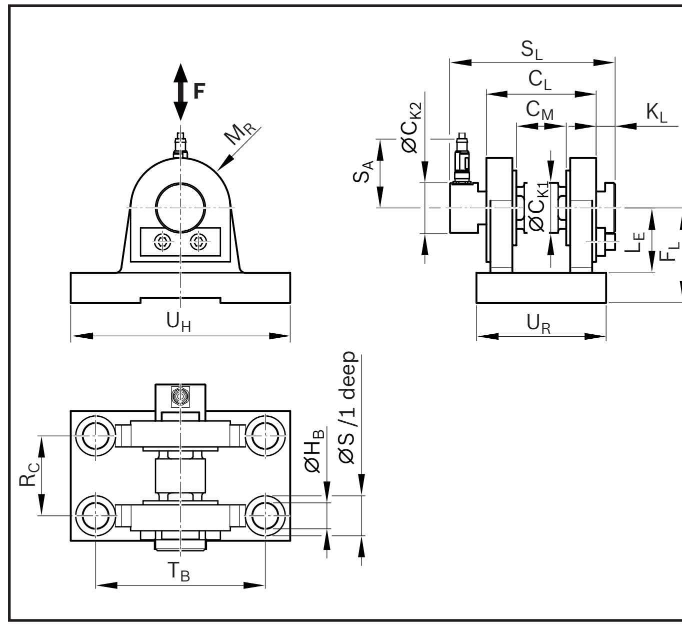
[1] Matching pivot pin Ø m6 (pin and pin locking feature are included in the scope of supply and are not ready-mounted on delivery)

Note: Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

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

Group 1 / 6, option 31





EMC-HD	**Part number**	**Dimensions** (mm)																**m**
		$ØC_{K1}$ 1)	**$ØC_{K2}$**	**C_L**	**C_M**	**F_L**	**$ØH_B$**	**K_L 2)**	**L_E**	**M_R**	**R_C**	**ØS**	**S_L 2)**	**T_B**	**U_R**	**U_H**	**S_A 2)**	
		H9		**h16**	**A12**	**js12**	**H13**		**min.**	**max.**	**js14**			**js14**	**max.**	**max.**		(kg)
085	R156330103	32	50	70	32	65	17.5	12	43	32	50	26	117.0	110	85	143	69.5	3.5
105	R156340103	40	40	90	40	76	22.0	13	52	40	65	33	135.0	130	108	170	61.0	6.8
125	R156350103	50	50	110	50	95	26.0	20	65	50	80	40	166.5	170	130	220	69.5	11.0
150	R156360103	63	63	140	63	112	33.0	17	75	63	100	48	189.0	210	160	270	73	22.0
180	R156370103	80	80	170	80	140	39.0	21	95	80	125	57	225.0	250	210	320	93.0	34.5

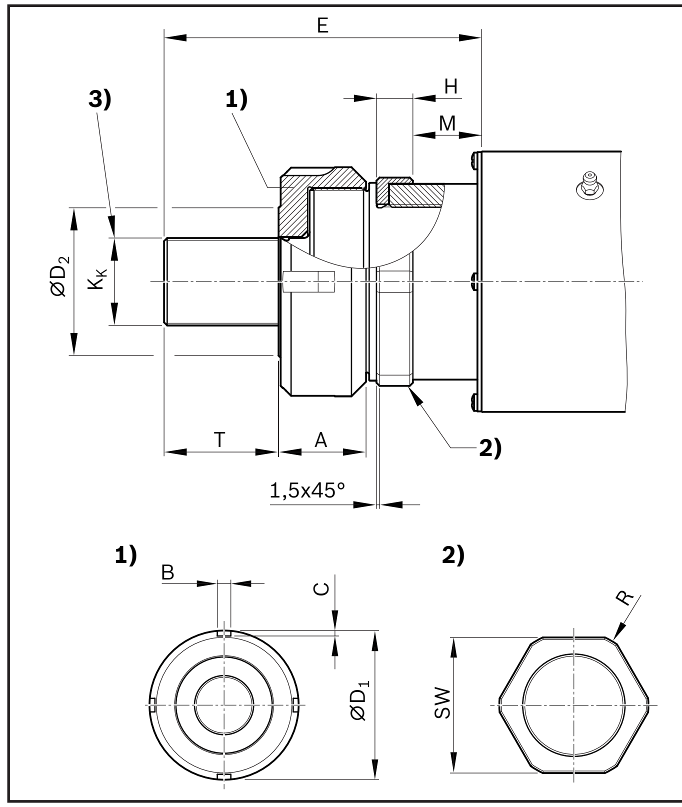
1) Matching pivot pin Ø f8. For detailed information on the load measuring pin see “Load Sensor” section.
2) Values deviate from ISO 8132 standard

Note: Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Mounting elements

Threaded mounting interface for version without integrated anti rotation feature

Group 2, option 01



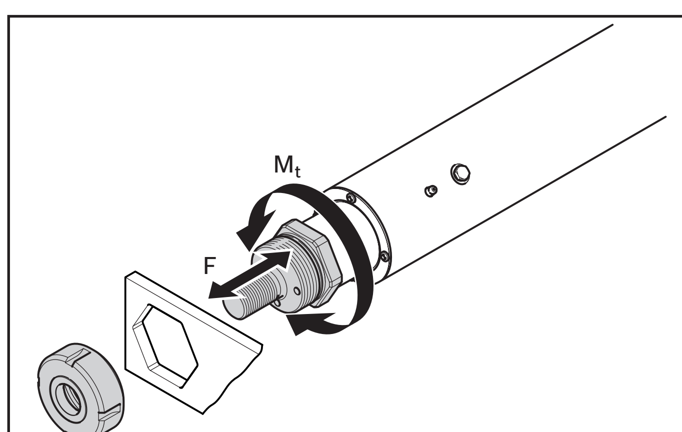
1) Lock nut on threaded mounting interface
2) Wrench flats for supporting the drive torque
3) Fastening thread for absorbing tensile/compressive forces

EMC-HD	Dimensions (mm)												
	A	B	C	$ØD_1$	$ØD_2$	E4)	H5)	Lock nut	K_K	M4)	R	T max.	SW
085	31	8	4.0	77	41	116.5	14.0	M60x1.5	M27x2	28.5	R36	37	65
105	37	10	4.0	95	72	132.5	18.0	M74x2	M33x2	30.5	R50	44	90
125	42	10	4	110	71	152.5	17.5	M90x2	M42x2	33.0	R55	56	100
150	47	11	4.5	130	80	180.0	28.0	M105x2	M48x2	38.0	R73	63	130
180	53	12	5.0	155	100	225.0	28.5	M130x2	M64x3	36.5	R82.5	85	150

4) Dimensions E and M are shown in retracted state (stroke = 0 mm)!
5) Maximum dimension of customer-built attachment
The mass is included in the basis cylinder weight

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 mounting, 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 for retention of the customer's attachment axially against the wrench flats.

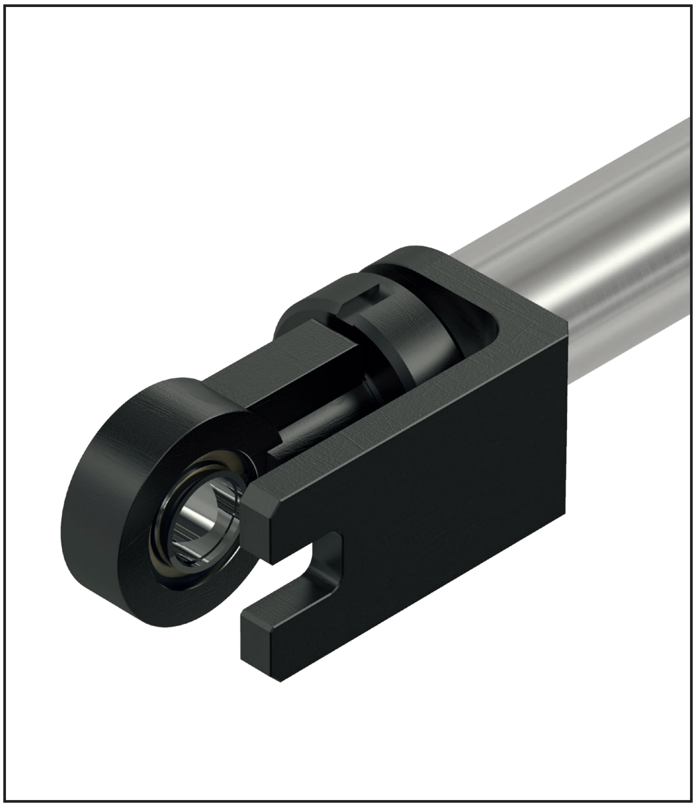


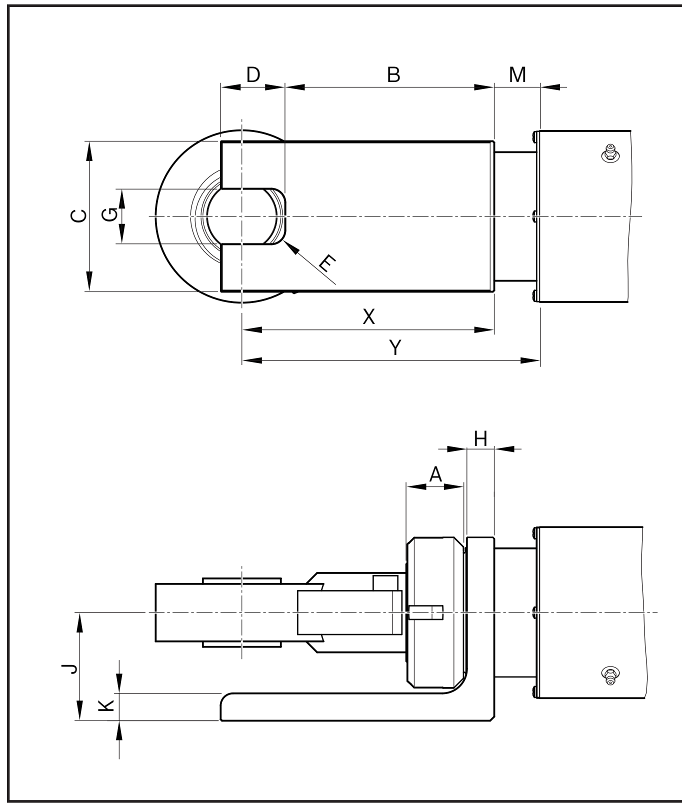
Note

The threaded mounting interface is non-removable.

Spherical rod end bearing CGKD (clampable) with clevis

Group 2, option 02





EMC-HD	Dimensions (mm)												m[2)]
	A	B	C	D	E	G H7	H	J	K	M[1)]	X	Y[1)]	(kg)
085	31	114	75	34	R6	25	15.0	62	15	28.5	131.0-134.0	159.5-162.5	2.6
105	37	131	95	47	R5	30	18.0	73	18	30.5	154.0-157.0	184.5-187.5	4.6
125	42	153	110	47	R10	40	20.0	79	15	33.0	183.5-186.5	216.5-219.5	7.8
150	47	175	135	75	R15	53	28.0	105	28	38.0	218.0-221.0	256.0-259.0	14.6
180	53	215	160	80	R15	70	28.5	120	25	36.5	266.5-271.0	303.0-307.5	24.5

1) Dimensions M and Y are shown in retracted state (stroke = 0 mm)!
2) Add mass for basis cylinder weight

Notes

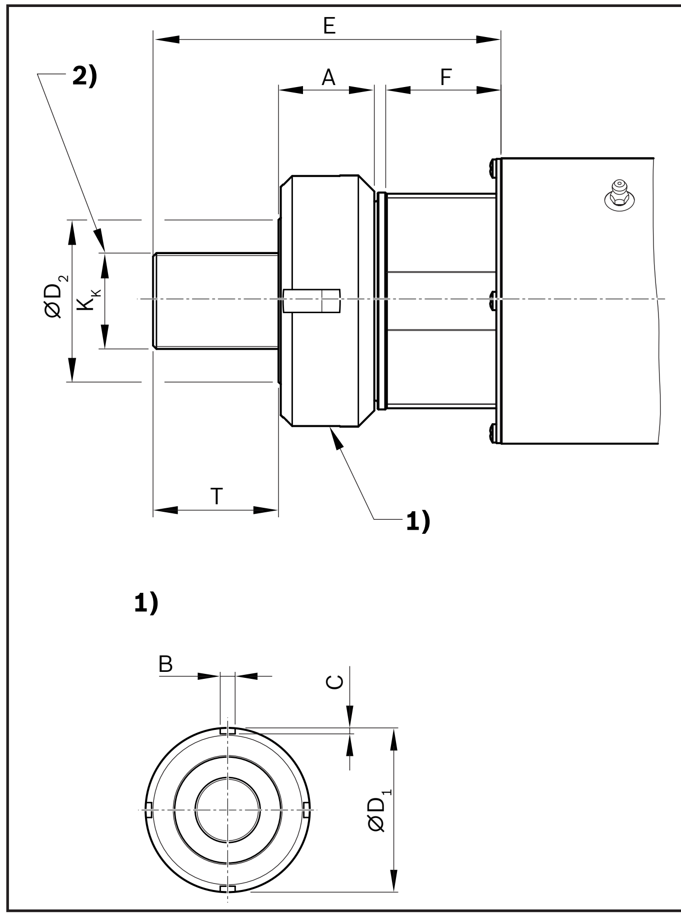
The matching pivot pin is included with the clevis bracket for spherical rod end bearing with clevis (group 1, option 11).
Customer-built connection elements dimensions analog to clevis brackets (group 1, option 11).
The clevis is non-removable.
Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Mounting elements

Threaded mounting interface for version with integrated anti rotation feature

Group 2, option 11

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



EMC-HD	Dimensions (mm)									
	A	B	C	ØD1	ØD2	E[3]	F[3]	Lock nut	K_K	T max.
085	31	8	4.0	77	41	116.5	42.5	M60x1.5	M27x2	37
105	37	10	4.0	95	72	132.5	48.5	M74x2	M33x2	44
125	42	10	4.0	110	71	152.5	50.5	M90x2	M42x2	56
150	47	11	4.5	130	80	180.0	66.0	M105x2	M48x2	63
180	53	12	5.0	155	99	208.0	65.0	M130x2	M64x3	84

[3] Dimensions E and F are shown in retracted state (stroke = 0 mm)!
The mass is included in the basis cylinder weight

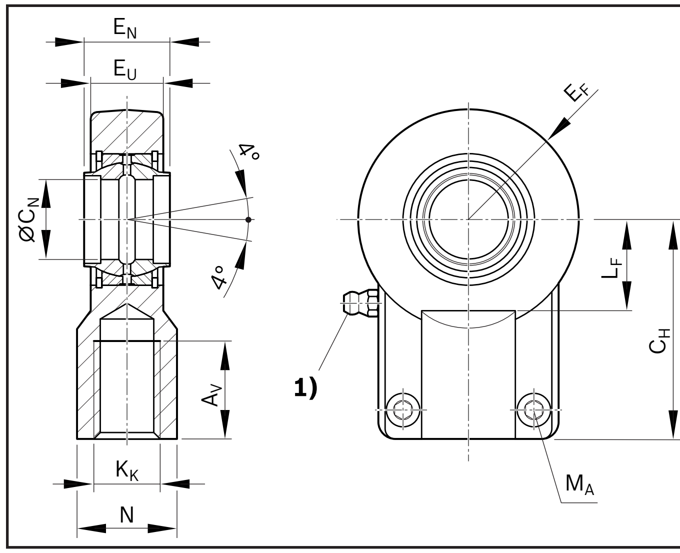
Notes for mounting

The drive torque is absorbed via the integrated anti rotation feature.
Use with spherical rod end bearing only.
Tensile and compressive axial forces are absorbed via the fastening thread.
During mounting, 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).

Note

The threaded mounting interface is non-removable.

Spherical rod end bearing CGKD (clampable)
Group 2, option 12



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

EMC-HD	Part number	Dimensions (mm)									Clamping screw		m[3)]
		A_V	N	C_H	E_F	$ØC_N$[2)]	E_N	E_U	K_K	L_F	ISO 4762-10.9	M_A	
		min.	max.	js13	max.	H7	h12	max.		min.		(Nm)	(kg)
085	R900322049	37	38	80	40.0	32	32	28.0	M27x2	30	M10x25	59	1.15
105	R900322029	46	47	97	50.0	40	40	34.0	M33x2	39	M10x30	59	2.10
125	R900322719	57	58	120	63.0	50	50	42.0	M42x2	47	M12x35	100	4.00
150	R349952200	64	70	140	72.5	63	63	53.5	M48x2	58	M16x40	250	7.20
180	R349952300	86	91	180	92.0	80	80	68.0	M64x3	74	M20x50	490	15.0

2) Matching pivot pin Ø m6
3) Add mass for basis cylinder weight

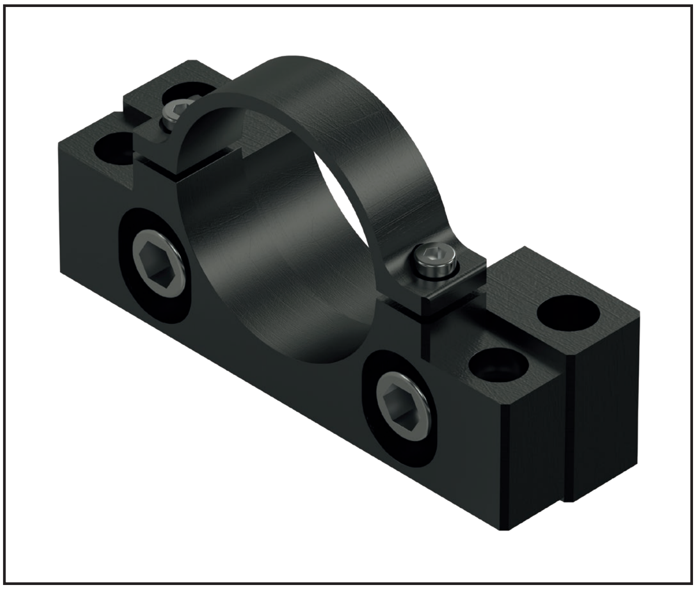
Notes for mounting
During mounting, screw the lock nut all the way onto the threaded mounting interface.
After screwing on and radially aligning the connection element, screw back the lock nut against the connection element (maximum 1.5 turns).
Then tighten clamping screws to the stated tightening torque (M_A).

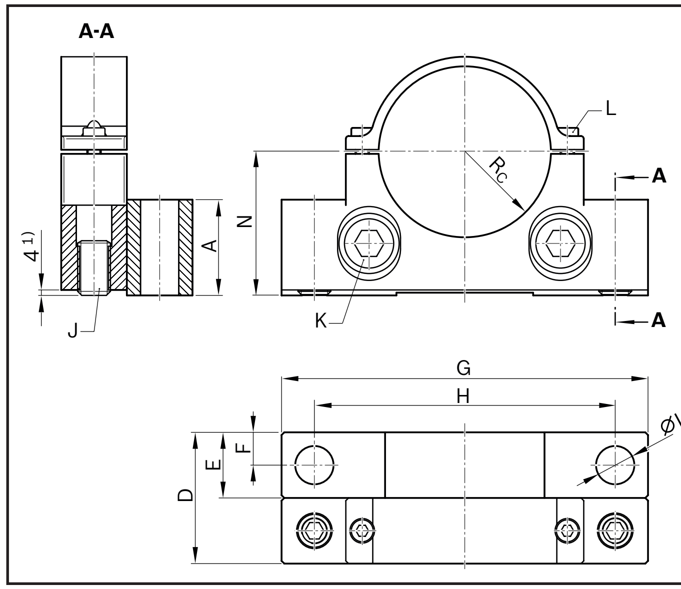
Note: Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Mounting elements

Foot mount

Group 3, option 11





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

EMC-HD	Part number	Dimensions (mm)								J	K	L	N	m2)
		A	R_C	D	E	F	G	H	ØI	Set screw ISO 4026	Screw ISO 4762	Screw ISO 4762		(kg)
085	R156330130	55	43	60	32	16	195	162	19	M16X40	M16x40	M8x20	65	1.4
105	R156340130	50	53	70	40	20	232	182	22	M16x40	M16x40	M8x20	76	2.0
125	R156350131	65	63	96	48	24	268	220	28	M24x40	M16x55	M10x25	95	4.0
150	R156360130	77	76	106	58	29	310	254	33	M24x40	M24x70	M12x30	112	6.4
180	R156370130	106	91	118	70	35	400	327	39	M24X40	M24x70	M16x45	140	11.5

2) Add mass for basis cylinder weight

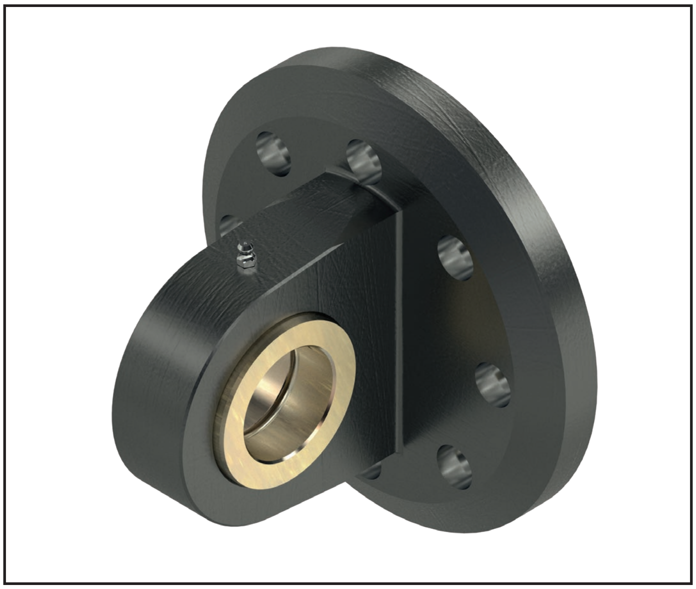
Notes

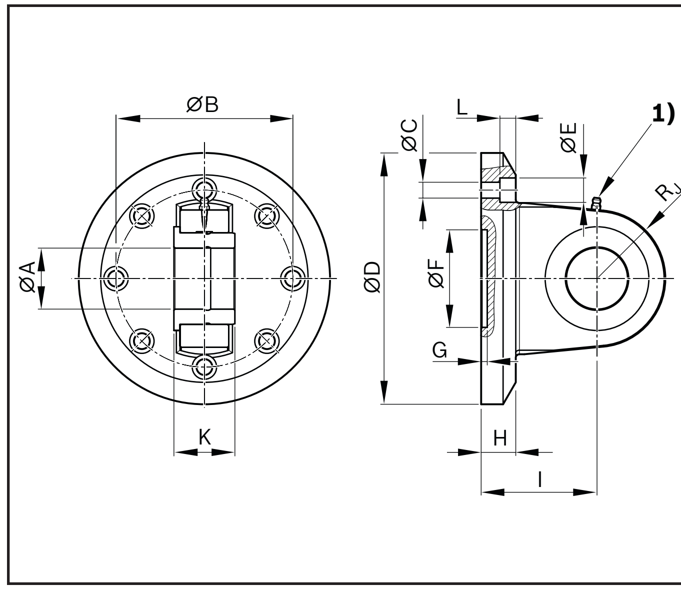
This mounting element is suitable to support the housing pipe, and can be mounted in any position on the housing pipe. It is not designed to absorb axial forces!

Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Swivel bearing

Group 5, option 11





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

EMC-HD	Part number	Dimensions (mm)												m[2)]
		ØA H9	ØB	ØC	ØD	ØE	ØF H7	G	H max.	I	R_J	K h12	L	(kg)
085	R156330151	32	100	9 (8x)	162	15	60	5	22.7	65	39	32	9	4.1
105	R156340151	40	104	9 (12x)	158	15	60	5	21.0	73	44	40	9	4.4
125	R156350151	50	145	13 (8x)	206	20	80	5	28.4	95	56	50	13	10.8
150	R156360151	63	145	13(12x)	206	20	80	5	27.0	102	62	63	13	11.8
180	R156370151	80	197	18 (10x)	250	26	80	9	27.0	122	82	80	16	20.0

2) Add mass for basis cylinder weight

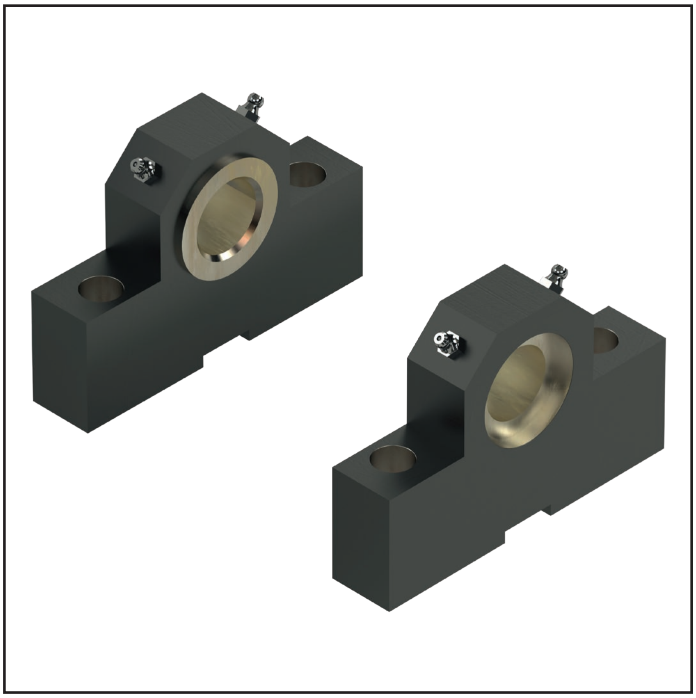
Notes

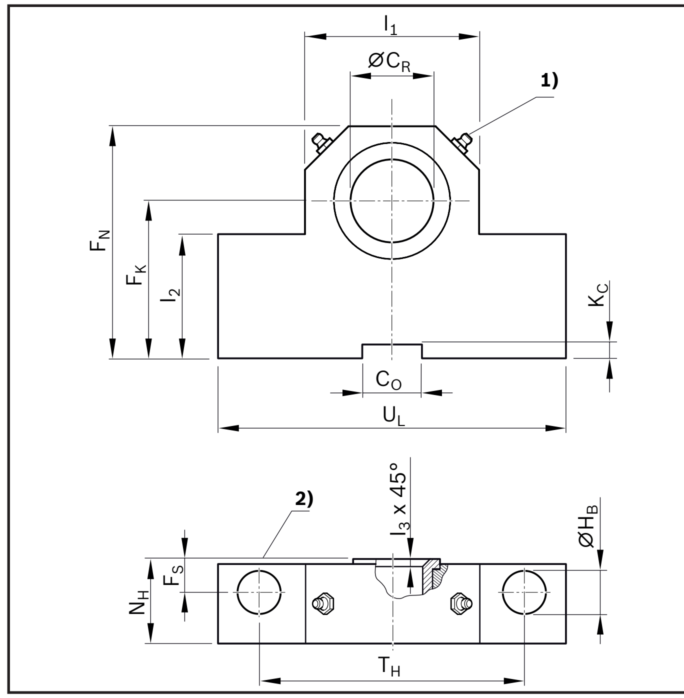
If the swivel bearing installation position is horizontal, load the female connector collar.
The number of drill holes for mounting on the housing varies depending on the size!
Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

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)

EMC-HD	Part number	**Dimensions** (mm)													m[3)]
		$\varnothing C_R$ H7	C_O N9	F_K js12	F_N max.	F_S js14	$\varnothing H_B$ H13	K_C +0.3	l_1	l_2	l_3	N_H max.	T_H js14	U_L max.	(kg)
085	R156330160	32	25	65	100	15	17.5	5.4	70	52	2.5	33	110	150	4.55
105	R156340160	40	36	76	120	16	22.0	8.4	88	60	2.5	41	125	170	7.30
125	R156350160	50	36	95	140	20	26.5	8.4	100	75	2.5	51	160	210	14.50
150	R156360160	63	50	112	180	25	33.0	11.4	130	85	3.0	61	200	265	23.10
180	R156370160	80	50	140	220	31	39.0	11.4	160	112	3.5	81	250	325	52.30

3) Add mass for basis cylinder weight, figure per pair

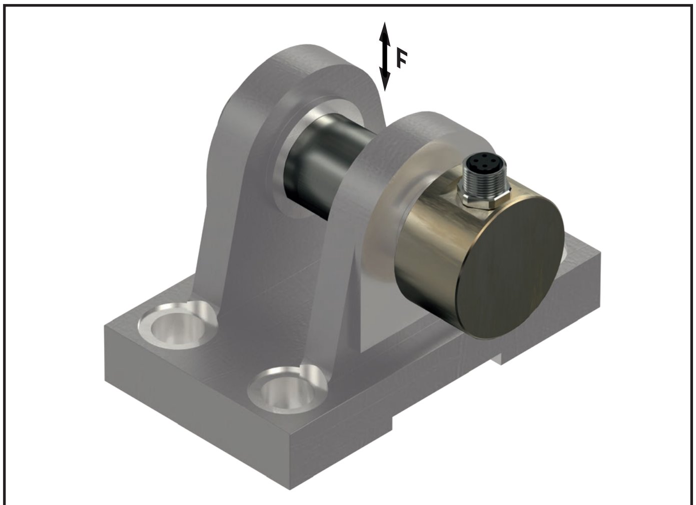
Notes

Trunnion bearing blocks are always supplied in pairs.

Non-dimensioned contours may deviate from the illustration and/or from the CAD file.

Load sensor

Clevis bracket with load measuring pin



If your application requires precise load sensing, there is a clevis bearing block version with force measuring bolt 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 pivot pin is not permitted. It may only be inserted by hand.
The load measuring pin is not suitable for measuring torques and may therefore only be used with the cylinder option “Guideway with anti rotation feature”.
It is secured axially and against rotation, like the standard pin, on one side of the bearing block using the pin locking feature included.
For force control at the controller level, a control component with an analog input is required.
Connection cable is included.

Output signal 4 - 20 mA, reduced measurement range and test certificate on request.

Technical Data

Metrological specifications

Material	Stainless steel
Protection type	IP 65
Hardness (load range)	38 HRC
Mechanical system	
Operating load	150% of MR
Breaking load	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

		EMC-HD
Output signal	0 kN	0 ± 0.03 V
Output signal	MR	−10 ... 10 V ± 0.2 V
Power supply		24 ± 2 V
Tare (zero setting function)		7.2 ... 24 V
Current consumption		max. 50 mA
Bandwidth		2.5 ± 0.2 KHz
Connection		Plug M12x1

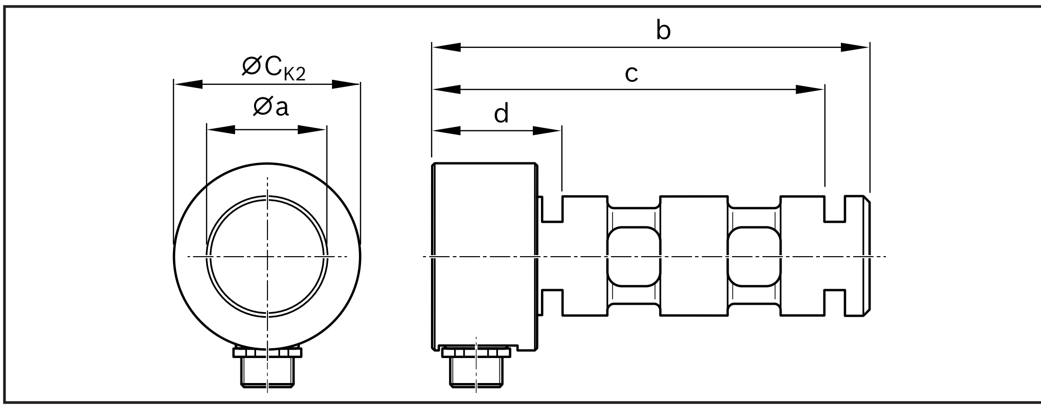
Technical data, connection cable

Length	5 m
Rated voltage	250 V
Rated current	4 A
Plug outlet	Angled
1. Connection type	Socket M12x1, 4-pin
2. Connection type	Flying leads
Type of cable	PUR black, shielded
Suitable for drag chains	yes
Cable cross-section	4x0.34 mm²
Cable diameter D	5.9 ± 0.2 mm
Static bending radius	> 10 x D
Dynamic bending radius	> 5 x D
Bending cycles	> 2 mill.
Ambient temperature, stationary	−25 ... +80 °C
Ambient temperature, in motion	−40 ... +80 °C
Protection type	IP 65

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

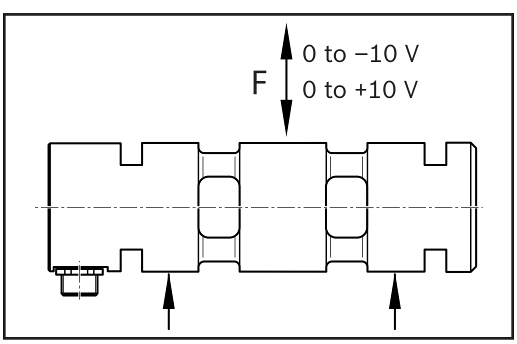


EMC-HD	Part number	Dimensions (mm)					Measuring range	Weight
		Øa f8	$ØC_{K2}$	b	c	d	(kN)	(kg)
085	R1563 370 80	32	32	131.0	119.0	49.0	50	0.9
105	R1563 470 80	40	40	135.0	122.0	32.0	80	1.3
125	R1563 570 80	50	50	166.5	146.5	36.5	110	2.2
150	R1563 670 80	63	63	189.0	172.0	32.0	190	4.6
180	R1563 770 80	80	80	225.0	204.0	34.0	300	8.8

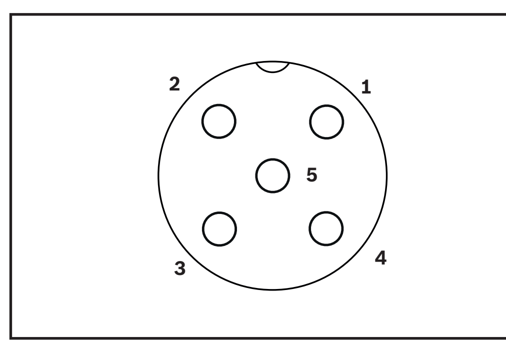
Connection diagram

Force measuring bolt
1 Supply (V+)
2 Tare
3 GND (0 V)
4 Output
5 Internal allocation

Connection cable
1 brn = brown, supply (V+)
2 wht = white, Tara
3 blu = blue, GND (0V)
4 blk = black, output



Output signal depending on load direction

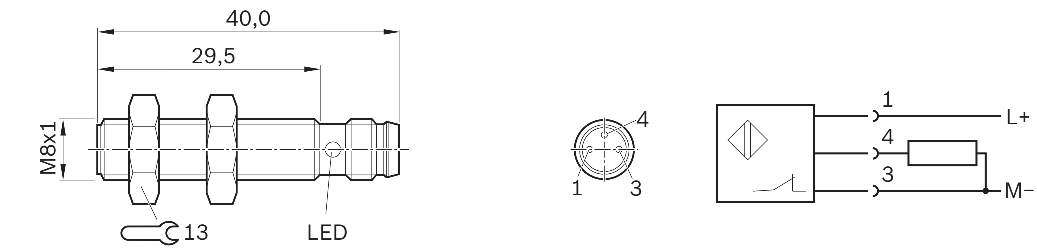


Connection diagram for force measuring bolt

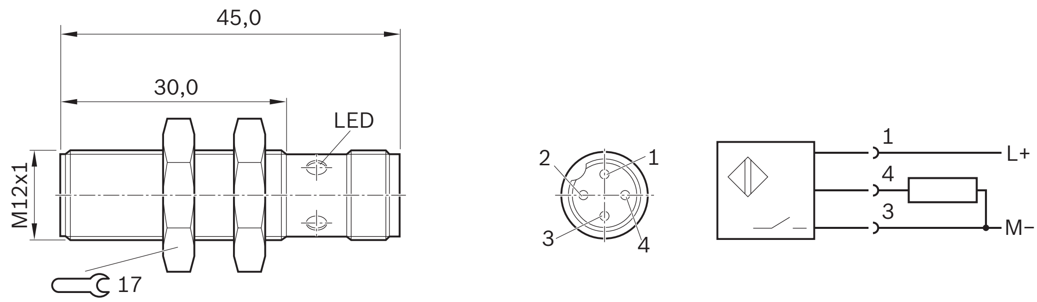
Switch mounting arrangements

Proximity switches

Limit switch



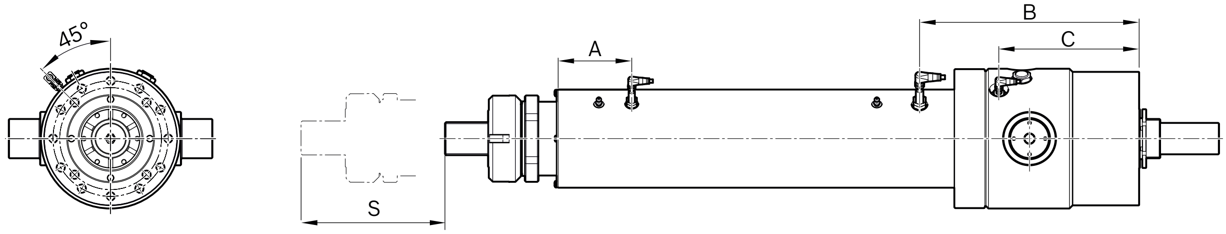
Reference switch



Technical data, proximity switches

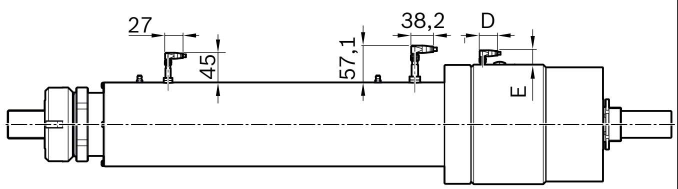
	Limit switch	Reference switch
Part number	R9130 307 57	R9130 307 58
		
Functional principle	inductive	inductive
Operating voltage	10 ... 30 V DC	10 ... 30 V DC
Load current	< 200 mA	< 200 mA
Switching function	PNP/NC	PNP/NO
Connection type	Plug-and-socket connection, M8x1, 3-pin	Plug-and-socket connection, M12x1, 4-pin
Function indicator	✓	✓
Short-circuit protection	✓	✓
Reverse polarity protection	✓	✓
Switching frequency	3 kHz	2 kHz
Reproducibility	< 0.05 mm	< 0.05 mm
Max. permissible starting speed	1 m/s	1 m/s
Ambient temperature	−25 ℃ to +70 ℃	−25 ℃ to +70 ℃
Protection type	IP 68	IP 68
MTTFd (as per EN 13849)	835 years at 40 ℃	835 years at 40 ℃
Certification and approval	CE, cULus LISTED	CE, cULus LISTED

Switch position

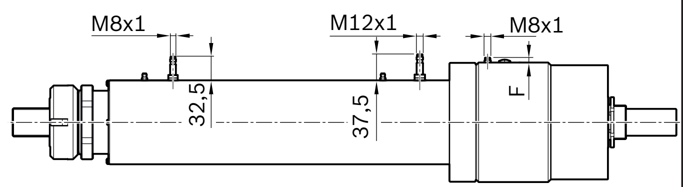


The switching point of the limit switch is up to 5 mm outside of the maximum travel path.

With connection cable



Without connection cable

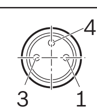
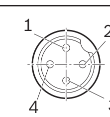


EMC-HD	Dimensions (mm)						
	A	B	C	D	E	F	S
085	91	210	135	27	18.5	6	75
105	94	265	165	27	24.0	11	100
125	94	280	180	27	18.5	6	100
150	114	339	239	0	27.0	0	100
180	114	399	299	0	17.0	−10 [1]	100

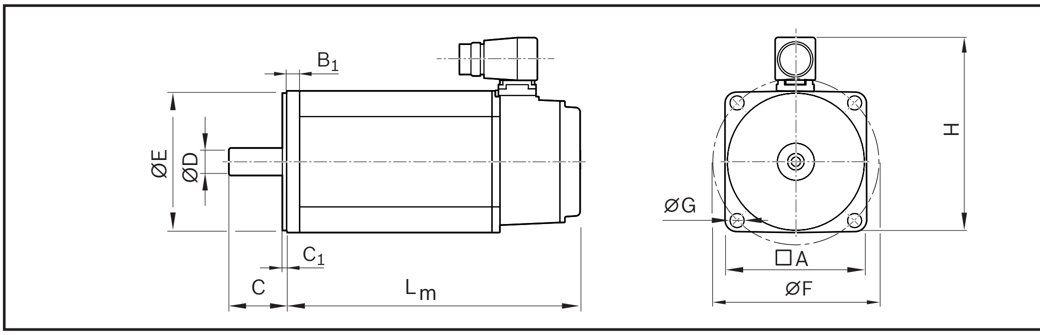
[1] Countersunk to a depth of 10 mm in the bearing housing, therefore straight plugs are also used on the connection cable

S = reference position

Technical data, cables

	Limit switch cable		Reference switch cable
Part number	R9873 914 96	R9013 912 55	R9130 233 89
Pin assignment	 1 brown 3 blue 4 black		 1 brown 2 white 3 blue 4 black
Type of cable	PUR black	PUR black	PUR black
Length	5.0 m	5.0 m	5.0 m
Operating voltage	10 ... 30 V DC	10 ... 30 V DC	10 ... 30 V DC
1. Connection type	Angled female connector, M8x1, 3-pin	Socket, straight, M8x1, 3-pin	Angled female connector, M12x1, 5-pin
2. Connection type	Unassembled cable end	Unassembled cable end	Unassembled cable end
Function indicator	–	–	✓
Operating voltage indicator	✓	✓	✓
Suitable for drag chains	✓	✓	✓
Cable cross-section	3 x 0.34 mm²	3 x 0.34 mm²	4 x 0.34 mm²
Cable diameter D	4.3 ± 0.2 mm	4.3 ± 0.2 mm	5.9 ± 0.2 mm
Static bending radius	> 5 x D	> 5 x D	> 5 x D
Dynamic bending radius	> 10 x D	> 10 x D	> 10 x D
Bending cycles	> 2 mil.	> 2 mil.	> 2 mil.
Max. permissible travel velocity	3.3 m/s	3.3 m/s	3.3 m/s
Max. permissible acceleration	5 m/s²	5 m/s²	5 m/s²
Ambient temperature fixed & moving	−25 °C to +80 °C	−25 °C to +80 °C	−25 °C to +80 °C
Ambient temperature, flexing installation	−25 °C to +60 °C	−25 °C to +60 °C	−25 °C to +60 °C
Protection type	IP 68	IP 68	IP 68
Certification and approval	c UL us LISTED	c UL us LISTED	c UL us LISTED

IndraDyn S – Servo Motors MSK



Motor schematic

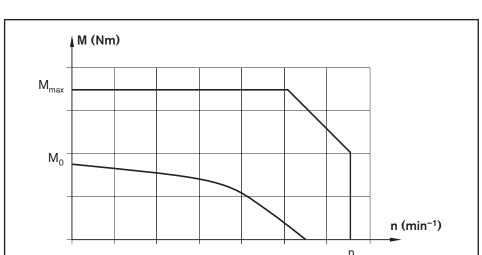
Motor	Dimensions (mm)									
	A	B_1	C	C_1	ØD k6	ØE j6	ØF	ØG	H	L_m Without holding brake	L_m With holding brake
MSK071D-0300	140	16.5	58	4	32	130	165	11	202	312	347
MSK100B-0300	192	17.5	60	4	32	130	215	14	262	368	368
MSK101D-0300	192	17.5	80	4	38	180	215	14	262	410	410
MSK101E-0300	192	17.5	80	4	38	180	215	14	262	501	501
MSK101E-0300[1)]	208	17.5	80	4	38	180	215	14	262	672	672
MSK133B-0202[1)]	260	15.0	110	5	48	250	300	18	368	622	807
MSK133D-0202[1)]	260	15.0	110	5	48	250	300	18	368	722	907

Motor data

Motor	n_{max} (rpm)	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kgm²)	J_{Br} (kgm²)	m_m (kg)	m_{br} (kg)
MSK071D-0300	3,800	17.5	66	Without	0.00230	–	18.0	–
MSK071D-0300		17.5	66	23	0.00230	0.00030	18.0	1.6
MSK100B-0300	4,500	28.0	102	Without	0.01920	–	34.0	–
MSK100B-0300		28.0	102	32	0.01920	0.00124	34.0	2.5
MSK101D-0300	4,600	50.0	160	Without	0.00932	–	40.0	–
MSK101D-0300		50.0	160	70	0.00932	0.00300	40.0	3.8
MSK101E-0300	4,600	70.0	231	Without	0.0138	–	53.5	–
MSK101E-0300		70.0	231	70	0.0138	0.00300	53.5	3.8
MSK101E-0300[1)]	4,600	105	231	Without	0.0138	–	57.8	–
MSK101E-0300[1)]		105	231	70	0.0138	0.00300	57.8	3.8
MSK133B-0202[1)]	3,300	152	320	Without	0.0476	–	91.6	–
MSK133B-0202[1)]	3,000	152	320	$200^{+40\%}_{-20\%}$	0.0476	0.02500	91.6	60.0
MSK133D-0202[1)]	3,300	250	520	Without	0.0780	–	127.0	–
MSK133D-0202[1)]	3,000	250	520	$224^{+40\%}_{-20\%}$	0.0780	0.02500	127.0	60.0

1) With fan (illustration differs)

Torque/speed characteristic (schematic)



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} = max. motor torque
m_m = mass of motor
m_{br} = mass of holding brake
n_{max} = maximum speed

Motor option	Motor	Motor material number	External holding brake part number	Fan part number	Version Holding brake Without	With	Type designation
114	MSK071D-0300	**R911310539**	–		X		MSK071D-0300-NN-M1-UG0-NNNN
115		**R911310168**	–			X	MSK071D-0300-NN-M1-UG1-NNNN
116	MSK100B-0300	**R911315705**	–		X		MSK100B-0300-NN-M1-AG0-NNNN
117		**R911310478**	–			X	MSK100B-0300-NN-M1-AG1-NNNN
118	MSK101D-0300	**R911315888**	–		X		MSK101D-0300-NN-M1-AG0-NNNN
119		**R911310895**	–			X	MSK101D-0300-NN-M1-AG2-NNNN
120	MSK101E-0300	**R911317226**	–		X		MSK101E-0300-NN-M1-AG0-NNNN
121		**R911310891**	–			X	MSK101E-0300-NN-M1-AG2-NNNN
124	MSK101E-0300[1)]	**R911317226**	–	**R911325863**	X		MSK101E-0300-NN-M1-AG0-NNNN
125		**R911310891**	–	**R911325863**		X	MSK101E-0300-NN-M1-AG2-NNNN
126	MSK133B-0202[1)]	**R911344559**	–	– [3)]	X		MSK133B-0202-SA-M1-EG0-NPNN
127		**R911344559**	**R039612359**[2)]	– [3)]		X	MSK133B-0202-SA-M1-EG0-NPNN
128	MSK133D-0202[1)]	**R911344560**	–	– [3)]	X		MSK133D-0202-SA-M1-EG0-NPNN
129		**R911344560**	**R039612359**[2)]	– [3)]		X	MSK133D-0202-SA-M1-EG0-NPNN

1) With fan
2) Motors MSK133B/ MSK133D do not have their own holding brakes
3) The fan is integrated in the motor part number

Versions:
- Plain shaft with shaft seal
- Multi-turn absolute encoder M1 (Hiperface)
- Cooling system: natural convection
- Protection class IP65 (housing)
- With or without holding brake

Notes

Motors are available with control units and controllers. 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
- Automation systems and control components, R999000026
- Rexroth IndraDyn S Synchronous Motors MSK, R911296288

Recommended motor/ controller combinations

Motor	Controller [1)]	Controller [2)]
MSK 071D	HCS01.1E-W0054	HCS01.1E-W0028
MSK 100B	HCS03.1E-W0100	HCS02.1E-W0054
MSK 101D	HCS03.1E-W0150	HCS03.1E-W0100
MSK 101E	HCS03.1E-W0210	HCS03.1E-W0100
MSK 133B	HCS03.1E-W0210	HCS03.1E-W0100
MSK 133D	HCS03.1E-W0210	HCS03.1E-W0150

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!

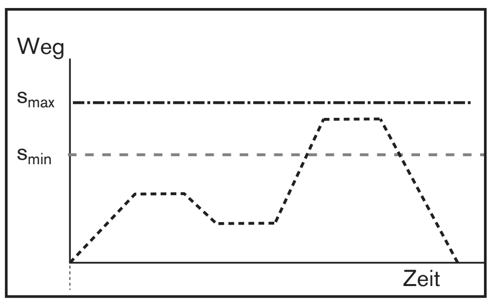
Due to the need to take into account the drive controller's power and the effect of accessories (mains choke), detail design is essential in any case.

Operating conditions and usage

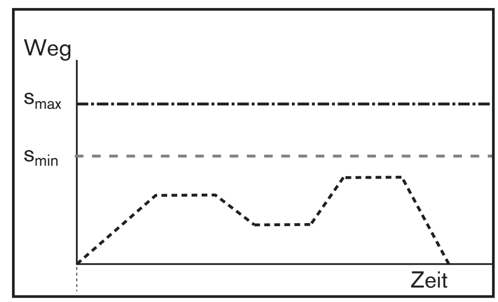
Normal operating conditions

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 (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 (up to +60 °C with low duty cycle and power)
Protection type	IP 65
Duty cycle	100% (depending on power required, the permissible duty cycle may be limited due to heat generation)
Normal stroke	The distance traveled per cycle is ≥ s_{min} (see diagram)

Stroke definition



Normal stroke



Short stroke

Short stroke: The distance traveled per cycle is < s_{min} (see diagram).

Attention:
- Short stroke operation only permitted with regular lubrication strokes (larger s_{min})
- Perform service life expectancy calculation with reduction to the load rating
- Adapt maintenance interval

Contact Bosch Rexroth for further details.

Notes

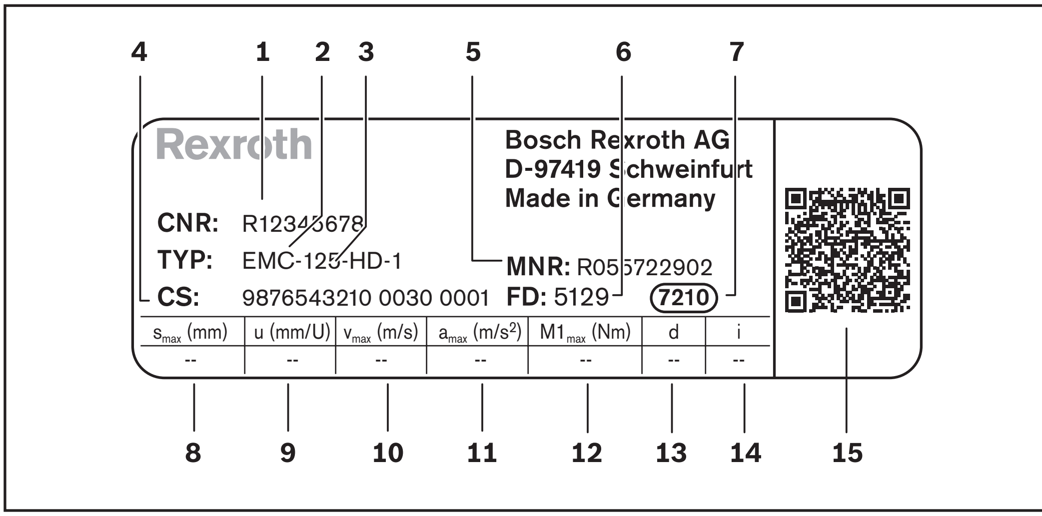
For more information about Intended use and safety, see “Safety for linear systems R320103152” and “Instructions EMC-HD R320103139”.

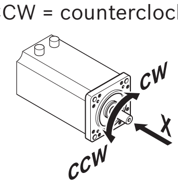
For more information on installation/start-up see “Instructions EMC-HD R320103139”.

PDF files of these documents can be found on the Internet at: www.boschrexroth.com/mediadirectory

Parameterization (start-up)

In addition to references for Linear Motion System production, the name plate contains technical parameters for start-up.



1	CNR	Customer's part number
2	TYP	Short product name
3	125	Size
4	CS	Customer information
5	MNR	Part number
6	FD	Manufacturing date
7	7210	Manufacturing location
8	s_{max}	Max. travel range
9	u	Lead constant without motor attachment
10	v_{max}	Maximum speed
11	a_{max}	Max. acceleration
12	$M1_{max}$	Maximum drive torque at motor journal
13	d	Direction of motor rotation to move in positive (+) direction CW = clockwise CCW = counterclockwise 
14	i	Gear ratio
15		QR code (for start-up)

Note

The values given describe the mechanical limit values of the axle.

Limits for the supplied mounting elements and application-related installation cases are not taken into account here.

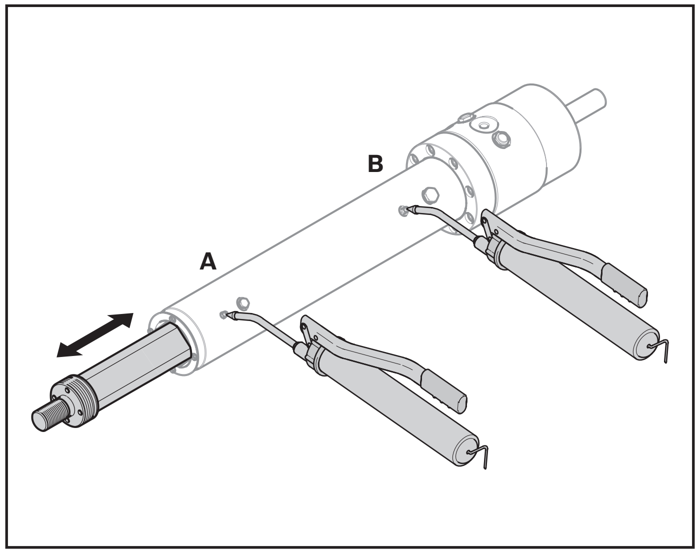
Lubrication and maintenance

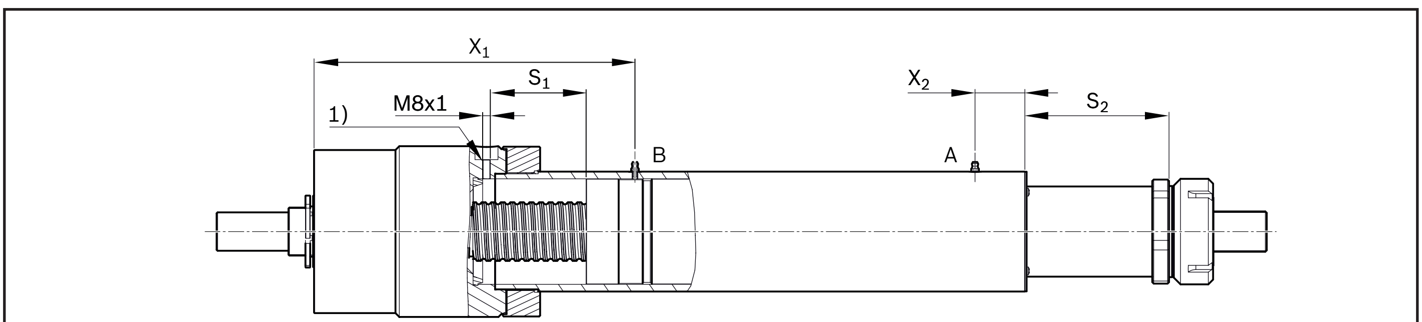
Grease lubrication

The advantage of grease lubrication is that Rexroth Ball Screw Assemblies can run for prolonged periods without needing relubrication. As a result, a lubricating system is not required in many cases.
All high-quality ball bearing lubricating greases can be used. Follow the lubricant manufacturer's instructions!
Greases in accordance with DIN 51825 K2K and, for higher loads, KP2K of NLGI grade 2 in accordance with DIN 51818 are recommended for the longest possible lubrication intervals. Tests have shown that greases of NLGI grade 00 achieve only about 50% of the running performance of Class 2 at higher loads.

Lubrication position and notes on lubrication

Basic lubrication is applied in-factory before shipment.
The electromechanical cylinders are designed for grease lubrication. Screw drives (**B**) and guideway (**A**) must be relubricated. During this process lubricant must be applied to all lubrication points. There are 3 options for reaching the lubrication position:
a) move the piston rod to stroke position S_2 (reference position) see figure
b) with limit switch fitted, extend by S_1 from the limit switch position.
c) without limit switch, extend from the rear end position by S_1 + 8 mm.
The lubrication of the guideway (A) can be carried out regardless of the position of the screw drive nut. For more information, see "Instructions for EMC-HD, R320103139".





1) Limit switch bore

EMC-HD	X_1 (mm)	X_2 [2] (mm)	S_1 (mm)	S_2 [2] (mm)
085	256	52	75	117
105	320	52	100	148
125	335	52	100	150
150	419	67	100	166
180	499	67	100	167

2) Deviates with the round flange option. Please take note of the appropriate dimension drawings.

Recommended lubricants

Note

Do not use greases with solid lubricant components (e.g. graphite or MoS_2 additives). Dynalub 520 is recommended for central lubrication systems.
For lubrication quantity and lubrication intervals see "Instructions EMC-HD R320103139".

Grease		**Low-temperature grease** (−30 ... +60 °C)
Consistency class NLGI 2 as per DIN 51818 We recommend Dynalub 510 (Bosch Rexroth) Cartridge (400 g) R341603700 Bucket (5 kg) R341603500	**Consistency class NLGI 00 as per DIN 51818** We recommend Dynalub 520 (Bosch Rexroth) Cartridge (400 g) R341604300 Bucket (5 kg) R341604200	Klüber BEM 34-132 R341603600
Can still be used	**Can still be used**	
Elkalub GLS 135 / N2 (Chemie-Technik) Tribol GR 100-2 PD (Castrol)	Elkalub GLS 135 / N00 (Chemie-Technik) Tribol GR 100-00 PD (Castrol)	

Documentation

Standard report
Option 01

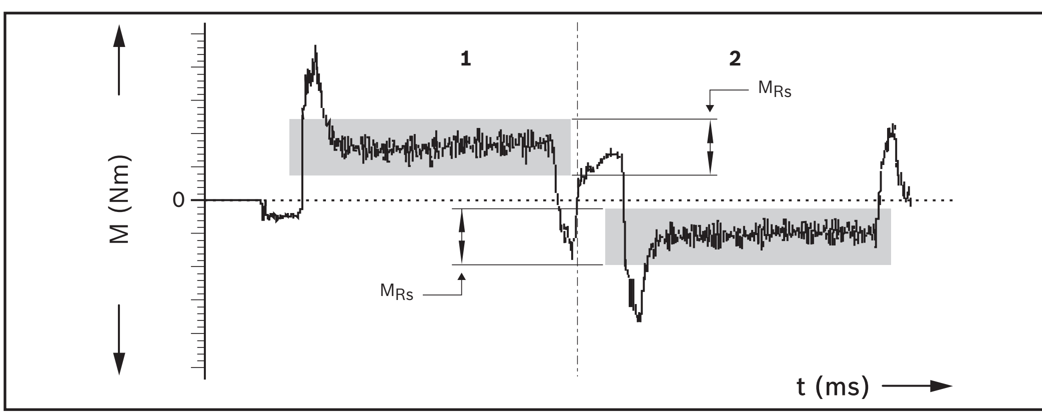
The standard report serves to confirm that the checks listed in the report have been carried out and that the measured values lie within the permissible tolerances. Checks listed in the standard report:

- Functional checks of mechanical components
- Functional checks of electrical components
- Design as per order confirmation

Measurement of frictional torque of complete system
Option 02

All items contained in the standard report.
The moment of friction M is measured over the entire travel range.

Example

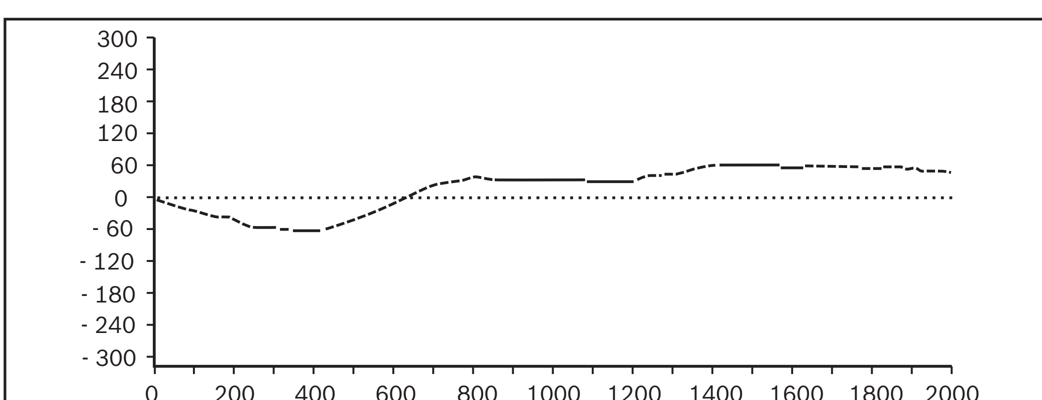


1) Advance
2) Return

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 illustration (see illustration), a measurement report is supplied in tabular form.



Ordering example EMC-125-HD

EMC-125-HD – Configuration and ordering

Short product name, s_{max} EMC-125-HD-1, ... mm	Guideway: Without round flange	Guideway: With round flange[1]
Round piston rod	01	02
With anti rotation feature	11	12

Drives: PLSA d_0 x P 48 x 5	PLSA d_0 x P 48 x 10	BASA d_0 x P 63 x 10	BASA d_0 x P 63 x 20	Lubrication[2]: LSS	Lubrication[2]: LLG
01	02	12	13	01	02

Version	Description	Gear ratio	Motor attachment: Description		Motor	Without brake	With brake
Without mount	OF		Without	00	Without	000	000
With mount	MF	i = 1	With mount	02	MSK100B	116	117
				03	MSK101D	118	119
				03	MSK101E	120	121
		i = 3	With mount and gear unit SP100	06	MSK100B	116	117
			With mount and gear unit SP140	07	MSK101D	118	119
		i = 5	With mount and gear unit SP100	16	MSK071D	114	115
with timing belt side drive	RV01, RV02, RV03, RV04	i = 1,5	Timing belt side drive	41	MSK100B	116	117
				42	MSK101D	118	119
				42	MSK101E	120	121
		i = 4,5	RV (i = 1.5) and gear unit SP100 (i = 3)	51	MSK100B	116	117
				52	MSK101D	118	119
		i = 7,5	RV (i = 1.5) and gear unit SP100 (i = 5)	70	MSK071D	114	115

Switch: without switch	1 reference switch	2 limit switches	2 limit switches and 1 reference switch	Surface: Standard	Black painted	Documentation: Standard report	Measurement of frictional torque	Lead deviation
00	01	02	03	01	13	01	02	03

1) For vertical installation only
2) LSS: Standard lubrication
LLG: Initial lubrication with low-temperature grease (only with PLSA drive)

Mounting elements – configuration and ordering

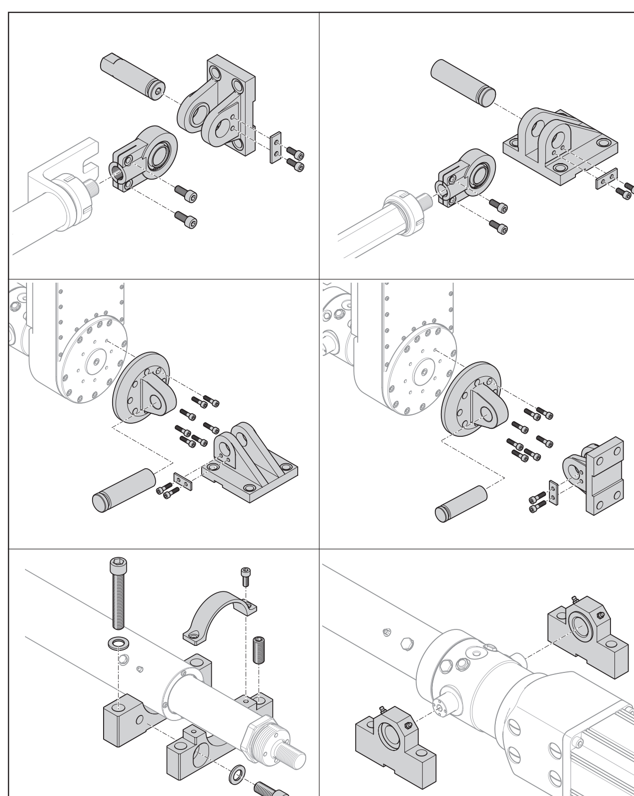
Mounting elements

Version	Group 1	Group 2[3]
Guideway with round piston rod	00	01
	00	02
	11	02
Guideway with anti rotation feature	00	11
	00	12
	21	12
	22	12
	31[1]	12

Version[3]	Group 3	Group 4[3]	Group 5[3]	Group 6
Without round flange	00 / 11	01	00	00
			11	00
				21
				22
				31[2]
		02	00	00
				01
With round flange	00	01	00	00

1) With load measuring only on "With anti rotation feature" option (see "Attachments and Accessories" section)
2) With load measuring only on "With anti rotation feature" option (see "Attachments and Accessories" section) NOT to be used in combination with round flange or foot mounting!
3) Pre-assembled on delivery

Examples



Electromechanical Cylinder EMC-125-HD-1

Ordering data	Option	Description
Short product name	EMC-125-HD-1	
Max. travel range	580	580 mm
Guideway	11	Without round flange, with anti rotation feature
Drive	02	Planetary Screw Assembly 48 x 10
Lubrication	01	Initial greasing
Version	MF	With mount
Motor attachment	03	Motor mount and coupling for MSK 101D
Motor	118	MSK 101D, without brake
Switch	02	Two limit switches
Surface	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 ordering

To be completed by customer	Option
Inquiry	
Order	

Bosch Rexroth AG
97419 Schweinfurt
Deutschland

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

Ordering data	Option											
Short product name	E	M	C	-				-	H	D	-	1
Max. travel range (mm) =												
Guideway =												
Drive =												
Lubrication =												
Version =												
Motor attachment =												
Motor =												
Switch =												
Surface =												
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	

From	
Company	
Address	
Name	
Department	
Fax	
Email	

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.

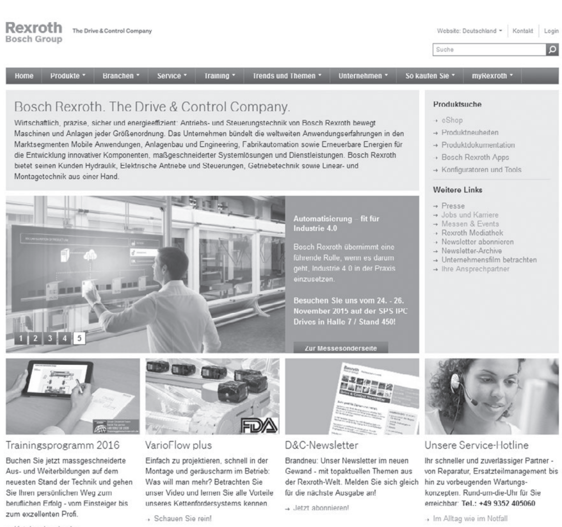
Reference switch:
Reference switches are used to detect the position of a moved component, e.g. screw drive nut in the cylinder. The switch emits a signal when the component reaches a defined position (reference mark). Reference switches are required for incremental measuring systems or motors with incremental 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.

Further information



Bosch Rexroth homepage:
http://www.boschrexroth.com/de/de/

Product information EMC-HD:
http://www.boschrexroth.com/de/de/produkte/produktgruppen/lineartechnik/linearsysteme/aktuatoren/emc-hd/em-zylinder-emc-hd

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