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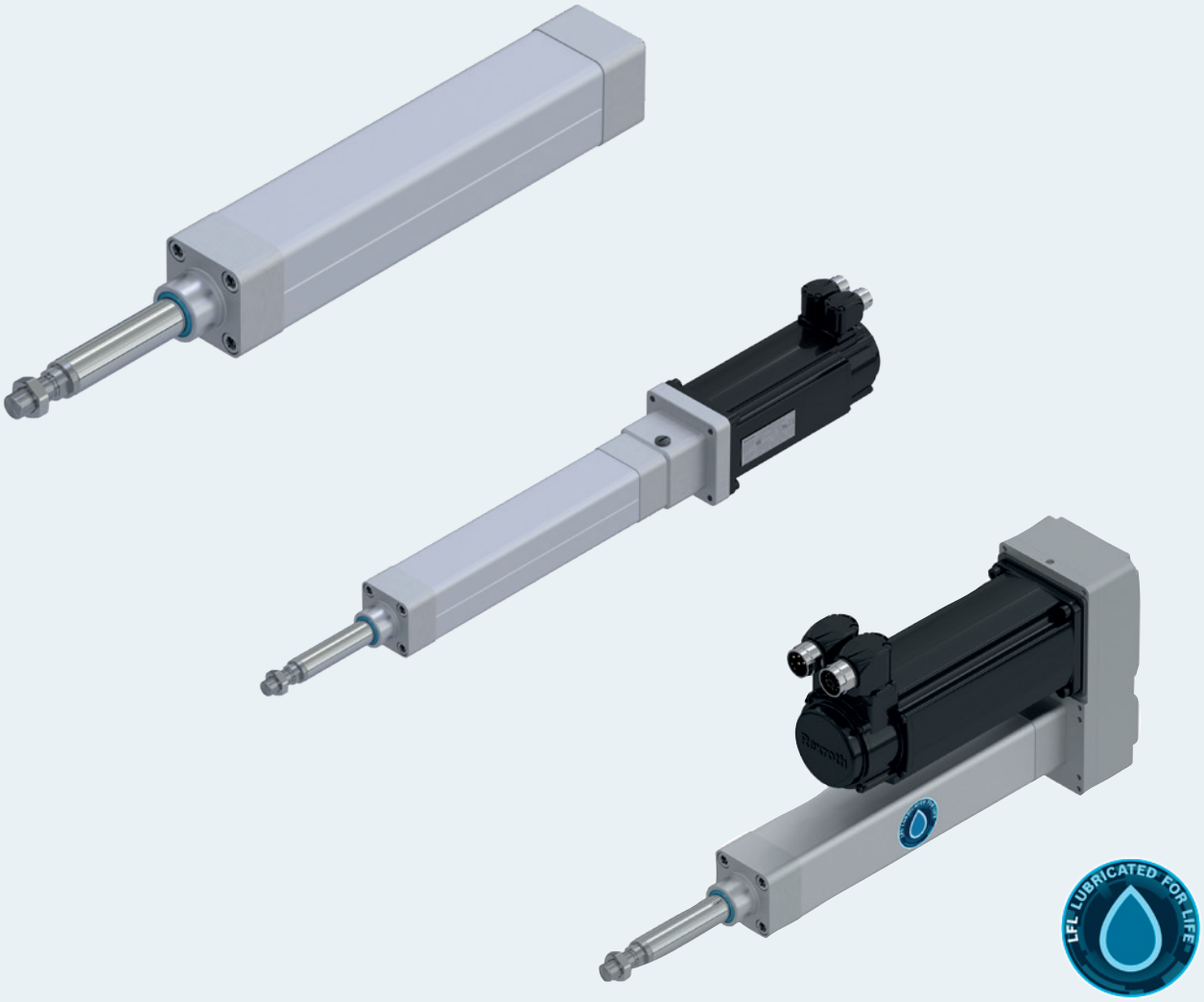
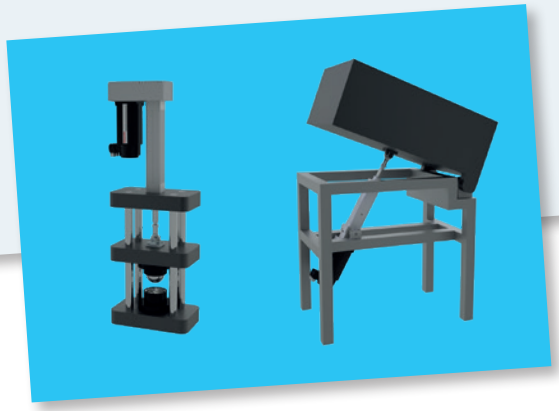
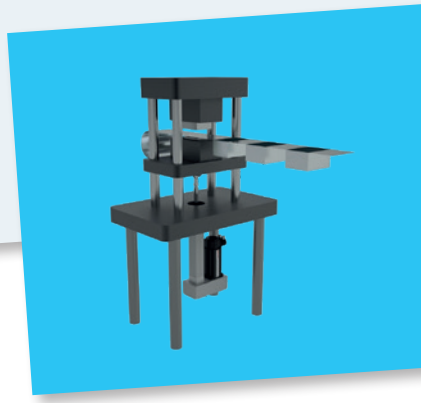
A Bosch Company

Electromechanical cylinders EMC







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Identification system for short product names

Short product name	Example: **EMC** – **063** – **NN** – **2**
System	**E**lectro**M**echanical **C**ylinder
Size	032 / 040 / 050 / **063** / 080 / 100
Version	**NN** Normal version
	XC Extra Capacity
Generation	Product generation **2**

Changes/additions at a glance:

- "Automation package" amended: in the product description, in the option tables, in the accessories
- Revision of "Technical data" section

Contents

Product description

A variable and complete system: hygienic, flexible, energy efficient
Its high variability makes the EMC so interesting for many industries and applications. By using the available configuration options, a cheaper, simpler base cylinder can be adjusted to virtually any customer requirement: chemical resistant, with perfect sealing and a high IP enclosure protection class. All these properties ensure a long service life – even under harsh industrial conditions. The powerful EMC always performs very efficiently. The resulting energy saving potential makes it an economical alternative to pneumatic systems.

Structural design
The mechanical system in the electromechanical cylinder is based on proven Rexroth ball screw assemblies in a variety of diameter and lead combinations. The Rexroth ball screw assembly converts the motor 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 screw drive nut and the piston rod are guided in the housing and cannot twist.
Optional limit switches prevent damage to the cylinder in operation. A reference point switch is available for the use of incremental encoder systems.
Thanks to grease lubrication, electromechanical cylinders EMC require only minimal maintenance at long intervals.

Advantages
- High-precision ball screw assemblies: for high performance with maximum cost-effectiveness
- Complete building system with great variability: can be adapted to a wide range of applications
- Complete turnkey system ready for installation for low design and assembly costs
- The 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)
- Optimized lubrication concept: optional connection to a central lubrication system reduces downtime
- Soundly sealed against dirt and water from the outside and lubrication leakage from the cylinder by selecting the IP65 enclosure protection class option
- Hygienic design: High resistance to chemicals and cleaning agents by selecting the option IP65 + R (resistant)

Notes on lubrication

- Liquid grease lubrication prepared for connection to central lubrication systems
- High operational reliability through automated relubrication
- Need-based maintenance reduces consumption of lubricant, while ensuring high availability
- More degrees of freedom as lubrication is not dependent on position and installation location
- Low-cost unmanned maintenance
- Observe the "Lubrication position" for relubrication. For further information on lubrication, see chapter "Lubrication and maintenance"

Lubrication versions

LSS:

- Initial lubrication (standard lubrication) carried out by Bosch Rexroth with Dynalub 510
- Relubrication using manual grease gun

LCF:

- Prepared for connection to central lubrication systems for liquid grease (grade NLGI 00 in accordance with DIN 51818) with Dynalub 520
- Lubrication with liquid grease only via single-line piston distributor system

LPG:

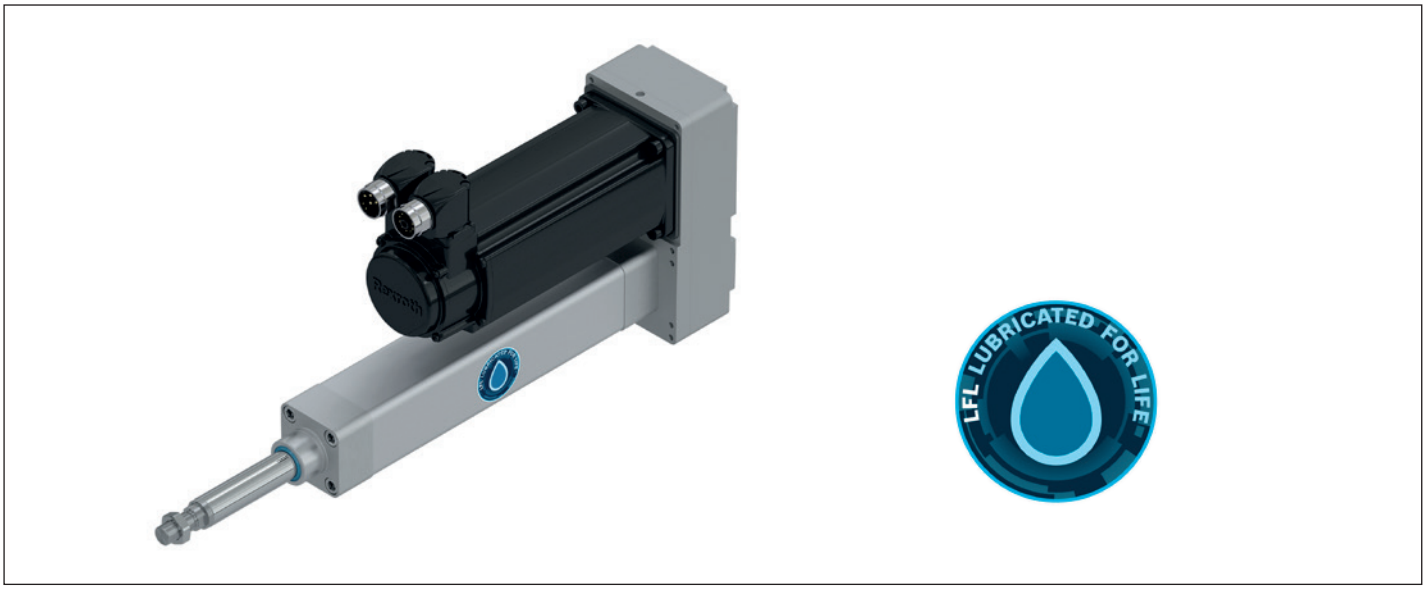
- With corrosion prevention; relubrication with manual grease gun; basic lubrication required

LHG:

- Initial lubrication with NSF-H1 grease

LFL:

- Lifelong lubrication with Mobilith SHC 460 (R913073149)
  Application conditions:
  - Service life ≤ 15,000 km
  - Average load (F_m /C) ≤ 0.05
  - Average linear speed (V_m) ≥ 0.05 m/s



Actuator + drive + software

SAVE TIME AND MONEY: EVERYTHING FROM A SINGLE SOURCE. WITH A SINGLE MATERIAL NUMBER.

To enable you to implement fully automated movements with actuators more quickly, all components are now available in one package.

With just a few clicks, you can design and configure the motor, drive controller, mains filter and cable online, as well as the software if you so choose.

Ordered with just one material number, your solution will be available to you in now time – and immediately ready for operation thanks to the axis parameters stored in the motor. If necessary, the proven Rexroth service is always available to assist you.

Everything from a single source. Just as you are used to with our plug & produce solution Smart Function Kit for Pressing. Could it be any easier?

The quicker way to automate:

Actuator + drive + software

in one package.

3 ORDERING OPTIONS, COMPLETE FREEDOM:

1. **Actuator**
2. **Actuator + drive**
   (incl. mains filter/cable)
3. **Actuator + drive + software**
   (incl. mains filter/cable) for individual configuration or as a plug & produce complete solution **Smart Function Kit for Pressing** – see here:

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Application areas

Electromechanical cylinders EMC 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 space-saving 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
- Assembly and handling technology
- Packaging machines and conveyor systems
- Food processing machines
- Testing equipment and laboratory applications
- Special machines

Application examples

Joining and pressing

Transport

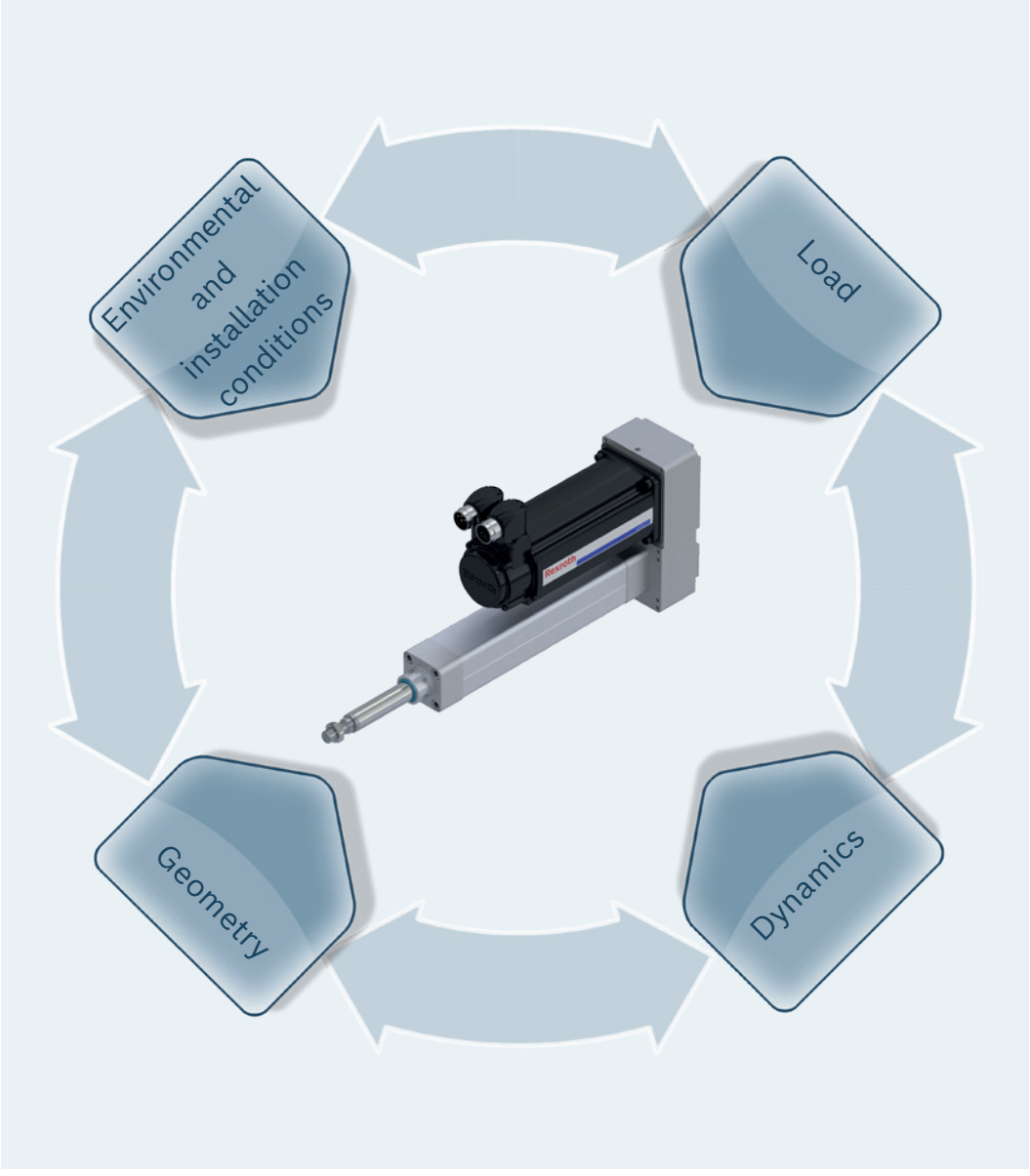
Forming / thermoforming

Lifting

Product selection guide

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

- Load
- Dynamics
- Geometry
- Environmental and installation conditions



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

Dynamics
- Acceleration
- Travel speed
- Cycle time
- etc.

Geometry
- Working area
- Installation space
- Stroke length
- Interference contours
- etc.

Environmental and installation conditions
- Installation position
- Fastening options
- Degrees of freedom
- Temperature
- Humidity
- Contamination
- Vibration and shocks
- etc.

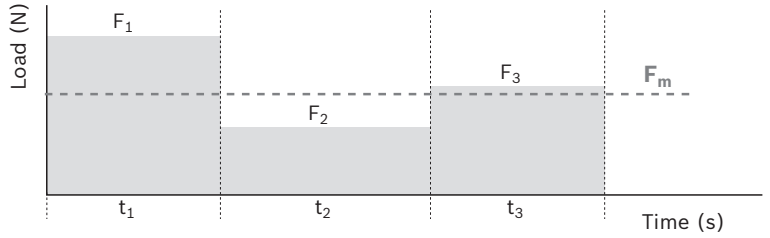
An electromechanical cylinder EMC that is optimized for your needs in just six steps

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

1. Loads

An EMC 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 service life 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 percentage ratio of operating time to total cycle time. 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.

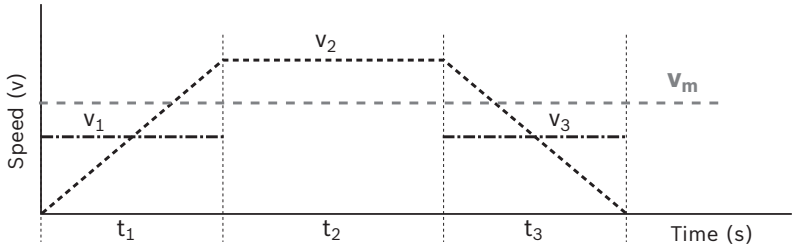
$$ED = \frac{t_B}{t_B + t_P} \cdot 100\%$$

ED	=	Duty cycle	(%)
t_B	=	Operating time	(s)
t_P	=	Pause time	(s)

Product selection guide

3. Total cycle

By stating the acceleration and linear speeds as accurately as possible or alternatively, the necessary cycle time and the travel range, it is possible to adapt the complete drive chain to maximize results for the application. The EMC and drive can be selected so that requirements are met precisely and efficiently.



4. Integration in the machine

Excessive transverse forces on the piston rod and alignment errors during assembly can shorten the service life of the electromechanical cylinder EMC.

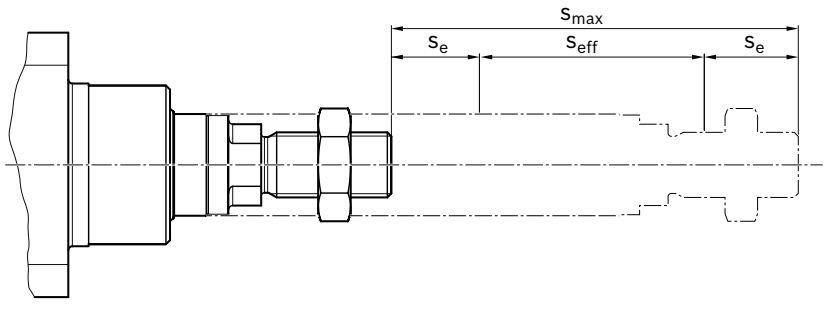
During fastening, it must be ensured that the cylinder is mounted free of distortive stresses and heavy transverse loads are absorbed by an external guideway.

In addition, the type of attachment and the EMC fastening element have an effect on the maximum permissible axial load. (see section "Axial load" in the chapter "Technical data", see also "Fastening elements").

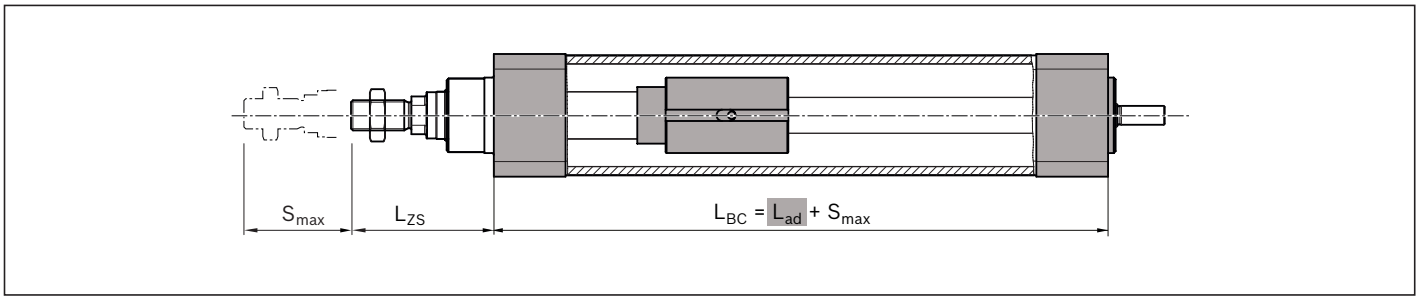
For an extensive and optimally balanced range of fastening elements, please refer to the chapter "Attachments and accessories".

5. Travel range and overall dimensions

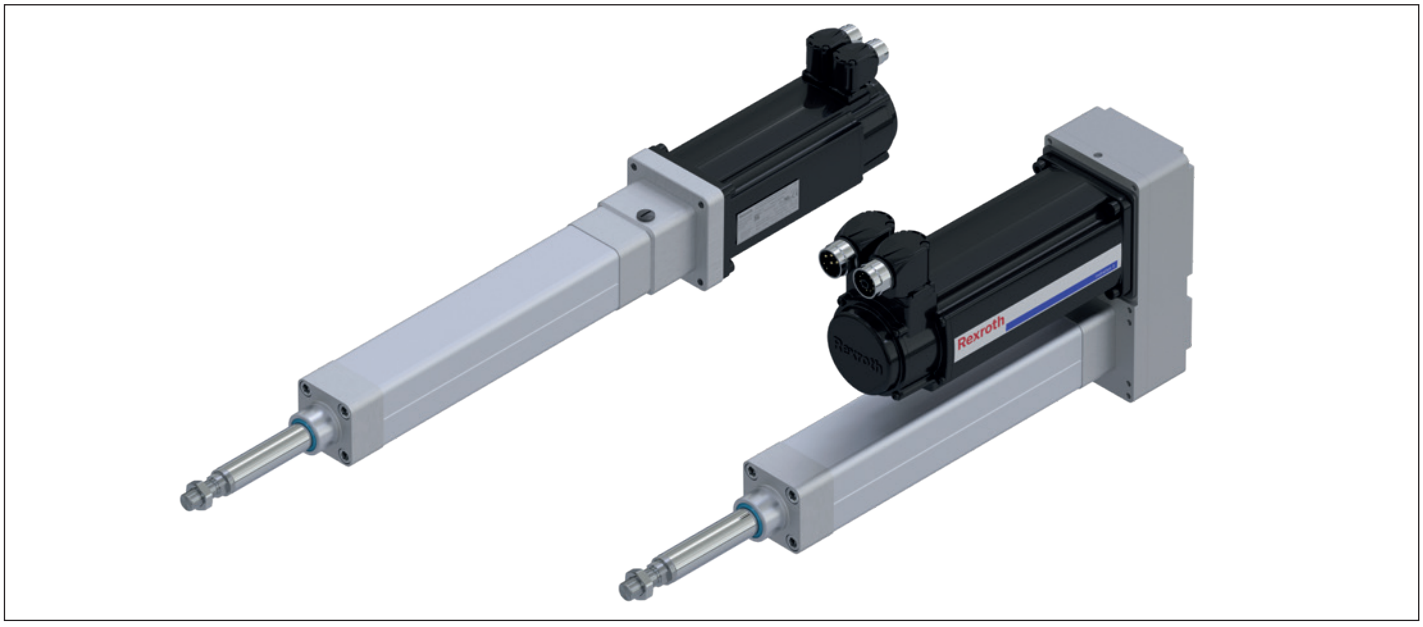
Determine the necessary operating stroke in your application. As electromechanical cylinders EMC must not be allowed to travel right up to the mechanical end stop, it is important to add excess travel (s_e) to both ends of the effective operating stroke (s_{eff}). This maximum travel range (s_{max})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



For structural design reasons, the overall length of the cylinder is greater than the maximum travel range (s_{max}), as it includes the length of components such as the screw drive nut and the bearings (represented by L_{ad}), in addition to the travel range. The dimension L_{ZS} describes the position of the piston rod in the retracted position.



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



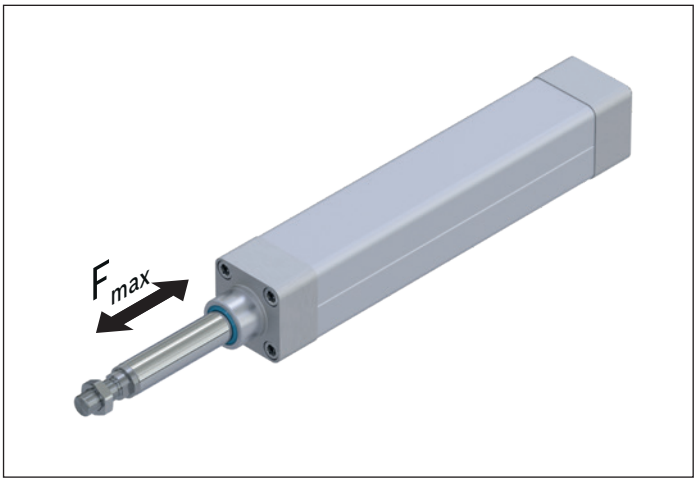
6. Ambient conditions

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 inquire if your application involves special environmental conditions.

Product overview

Note on dynamic load capacity
In relation to the desired service life, generally speaking an equivalent dynamic axial load of up to about 20% of the dynamic load rating (C) has proven effective.
(see also service life graphs in chapter "Technical data".)

Do not exceed the technical data.



The size designation 32 to 100 is selected according to the piston diameter of an ISO 15552 standard cylinder. The built-in ball screw assemblies have a diameter of 12 mm to 50 mm.

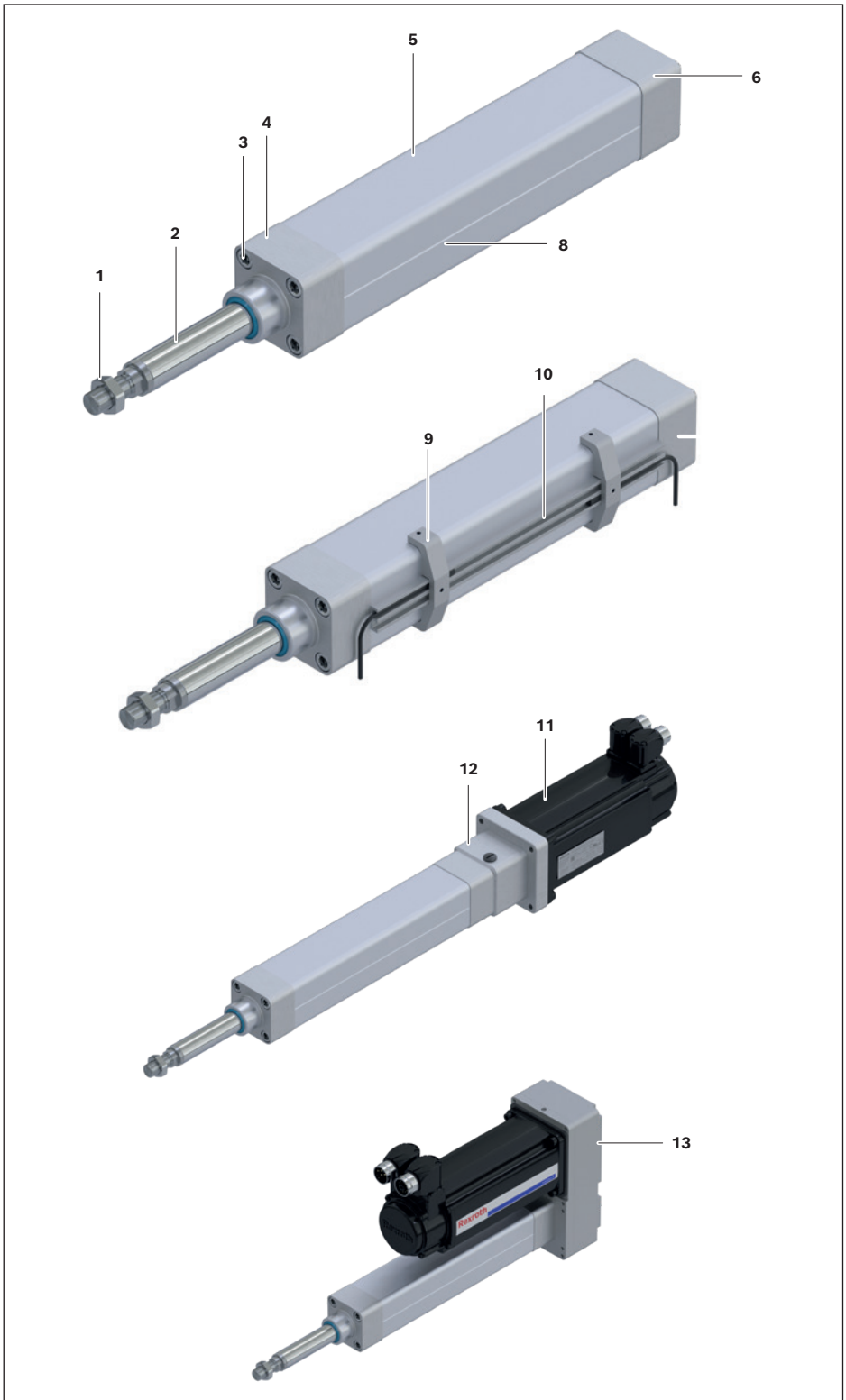
EMC	d_0 x P	C (N)	F_{max} (N)	$s_{max\ perm}$ (mm)	v_{max} (m/s)
32	12x5	4 100	1 200	750	0.57
	12x10	2 700	750		1.13
40	16x5	13 300	4 500	750	0.50
	16x10	10 400	3 000		1.00
	16x16	10 400	2 000		1.60
50	20x5	15 400	7 800	900	0.50
	20x10	15 200	5 500		1.00
	20x20	14 400	3 200		2.00
63	25x5	17 200	15 900	1 200	0.50
	25x10	17 000	14 800		1.00
	25x25	15 900	8 000		2.50
80	32x5	23 300	21 600	1 500	0.40
	32x10	26 000	22 000		0.80
	32x20	21 300	15 000		1.60
	32x32	21 100	10 400		2.50
100	40x5	31 400	29 000	1 500	0.30
	40x10	42 100	29 000		0.60
	40x20	40 900	29 000		1.25
	40x40	40 000	22 900		2.50
100XC	50x10	86 100	56 000	1 500	0.50
	50x20	104 900	50 000		1.00

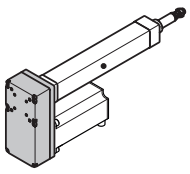
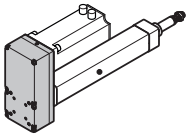
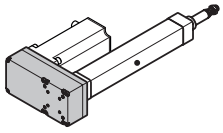
For short product names, see chapter "Abbreviations".

Structural design

1 Hexagon nut
2 Piston rod (stainless steel)
3 Hex socket head cap screw (for mounting fastening element and motor attachments)
4 Cover
5 Housing
6 Bottom
7 Screw journal
8 Slot for sensor profile (opposite the lube connection)

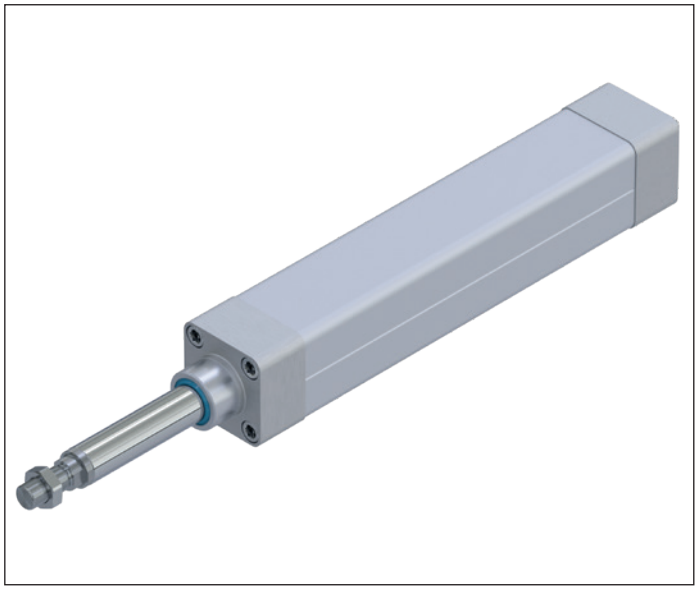
Attachments
9 Retaining bracket (for sensor profile)
10 Sensor profile
11 Motor
12 Flange and coupling
13 Belt side drive
14 Lube connection at lubrication versions LSS, LCF, LPG, LHG; for lubrication version LFL: Housing without lube connection
15 Connection for pressure compensation



RV01	RV02	RV03
		

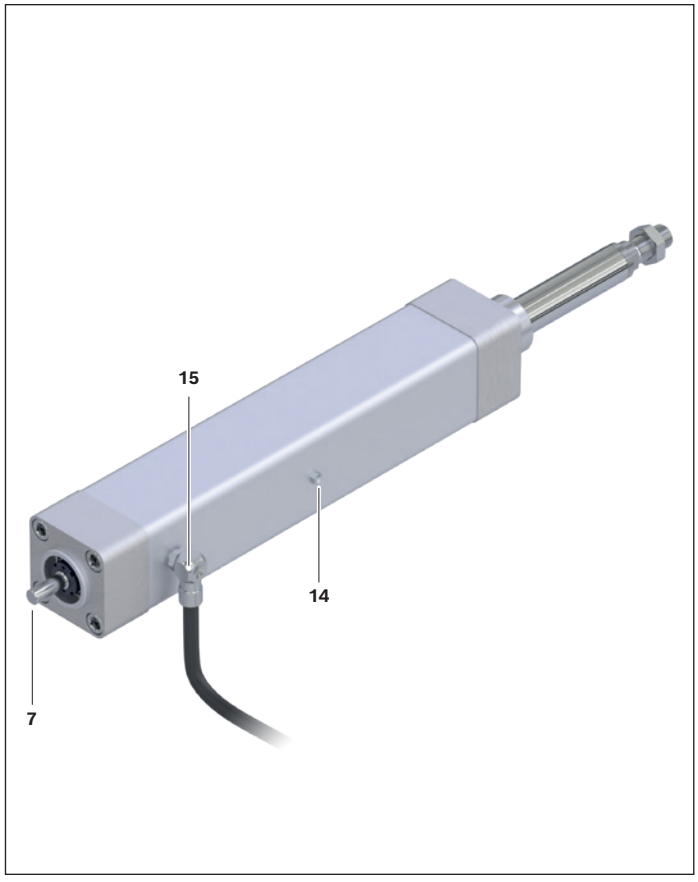
Motor flange and coupling
The motor flange is used to fasten the motor to the EMC and as a closed housing unit for the coupling. With the coupling, the drive torque of the motor is transmitted free of distortive stresses on the screw journal of the EMC.

Belt side drive
This configuration results in the shortest overall length of the EMC possible. The space-saving, closed housing serves as protection for the belt, motor bracket and to connect fastening elements.
Various gear ratios are available:
i = 1 : 1
i = 1 : 1.5
i = 1 : 2
The belt side drive can be mounted in three directions (RV01 to RV03).



Features at a glance

- The hygienic design of the EMC with smooth surfaces prevents the formation of dirt and allows for easy cleaning of the cylinder. A sensor profile can be mounted to the housing to allow the use of limit and/or reference switches outside of the aluminum profile.
  The EMC is pre-lubricated with standard grease or NSF-H1 grease and is therefore ready for immediate use. Alternatively, the built-in Rexroth ball screw assembly can also be ordered only conserved for initial lubrication by the customer. The EMC can be connected to a central lubrication system with liquid grease.
  A lube connection is included if the appropriate lubrication option has been selected.



IP65 enclosure protection class

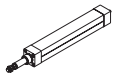
- Seals between the end caps and the housing and a reinforced seal on the piston rod ensure reliable protection against dust and water ingress. A connection for pressure compensation (15) in the housing prevents underpressure in the cylinder by allowing controlled air flow between interior and environment. The electric cylinder and motor mountings with IP65 fulfill the requirements according to IEC 60 529.

IP65 enclosure protection class +R (resistant)

- In addition to the benefits of the IP65 rating, this version provides chemical resistant seals between the end caps and the housing, as well as at the piston rod. The lube connection (14), the connection for pressure compensation (15) and the hexagon nut (1) are made from stainless steel.
  As additional accessories, corrosion-resistant plug screws for the hex socket head cap screws in the cover are available.

Technical data

Drive data without motor attachment

EMC 	d_0xP (mm)	C (N)	F_{max} (N)	M_p (Nm)	s_{min} (mm)	$s_{max\ adm}$ (mm)	v_{max} (m/s)	n_p (rpm)	a_{max} (m/s^2)	L_{ad} (mm)	M_{Rs} (Nm)
32	12x5	4 100	1 200	1.1	30	750	0.57	6 800	50.0	132.00	0.16
	12x10	2 700	750	1.3	40		1.13	6 800	50.0	136.00	0.20
40	16x5	13 300	4 500	4.0	35	750	0.50	4 600	50.0	134.00	0.28
	16x10	10 400	3 000	5.3	45		1.00	4 600	50.0	143.00	0.33
	16x16	10 400	2 000	5.7	65		1.60	4 600	50.0	159.00	0.40
50	20x5	15 400	7 800	6.9	40	900	0.50	3 800	39.8	142.00	0.50
	20x10	15 200	5 500	9.7	60		1.00	3 800	50.0	161.00	0.55
	20x20	14 400	3 200	11.3	80		2.00	3 800	50.0	180.00	0.65
63	25x5	17 200	15 900	14.1	45	1 200	0.50	3 300	28.9	148.00	0.75
	25x10	17 000	14 800	26.2	65		1.00	3 300	50.0	167.00	0.80
	25x25	15 900	8 000	35.4	95		2.50	3 300	50.0	199.00	1.00
80	32x5	23 300	21 600	19.1	50	1 500	0.40	3 000	17.9	163.00	1.20
	32x10	26 000	22 000	38.9	80		0.80	3 000	30.7	187.00	1.30
	32x20	21 300	15 000	53.1	85		1.60	3 000	50.0	195.00	1.40
	32x32	21 100	10 400	58.9	120		2.50	3 000	50.0	230.00	1.60
100	40x5	31 400	29 000	25.7	55	1 500	0.30	2 200	12.2	171.00	2.40
	40x10	42 100	29 000	51.3	70		0.60	2 200	16.8	185.00	2.50
	40x20	40 900	29 000	102.6	90		1.25	2 200	33.0	203.00	2.60
	40x40	40 000	22 900	162.0	145		2.50	2 200	50.0	258.00	2.80
100XC	50x10	86 100	56 000	99.0	90	1 500	0.50	3 000	12.1	316.00	4.00
	50x20	104 900	50 000	176.8	115		1.00	3 000	22.0	338.00	5.00

1) Total axial clearance of the EMC when new
2) Constants for calculating the mass moment of inertia. For formulas, see chapter "Drive dimensioning"

Note:
The travel range can be selected in mm steps between s_{min} and $s_{max\ perm.}$.

Mass of the EMC
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 belt side drive

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

Weight calculation without motor with flange and coupling

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

Moved mass of system

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

Length calculation

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

	Total axial clearance cylinder[1] (µm)	$k_{J\ fix}$[2]	$k_{J\ var}$[2]	$k_{J\ m}$[2]	m_s		m_{ca}	
					$k_{g\ fix}$ (kg)	$k_{g\ var}$ (kg/mm)	$m_{ca\ fix}$ (kg)	$m_{ca\ var}$ (kg/mm)
	10	1.945	0.012	0.633	0.885	0.004	0.311	0.001
	15	2.618	0.013	2.533	0.911	0.004	0.326	0.001
	10	6.616	0.032	0.633	1.255	0.005	0.432	0.001
	15	7.839	0.033	2.533	1.336	0.005	0.481	0.001
	20	11.114	0.040	6.485	1.487	0.005	0.567	0.001
	5	15.815	0.085	0.633	2.115	0.008	0.695	0.001
	10	19.092	0.088	2.533	2.382	0.008	0.838	0.001
	20	27.304	0.095	10.132	2.560	0.008	0.896	0.001
	5	39.693	0.223	0.633	3.018	0.010	1.059	0.002
	10	48.227	0.243	2.533	3.417	0.010	1.291	0.002
	20	76.002	0.242	15.831	4.047	0.010	1.679	0.002
	5	92.538	0.607	0.633	5.185	0.015	1.871	0.003
	10	119.067	0.647	2.533	6.182	0.015	2.495	0.003
	10	145.503	0.665	10.132	6.525	0.015	2.739	0.003
	20	225.036	0.684	25.938	7.610	0.015	3.404	0.003
	5	276.160	1.568	0.633	8.795	0.025	3.249	0.006
	5	291.780	1.369	2.533	9.684	0.025	3.829	0.006
	10	349.478	1.408	10.132	10.479	0.025	4.281	0.006
	20	628.583	1.567	40.528	13.410	0.025	6.166	0.006
	5	1 080.741	3.588	2.533	16.828	0.031	5.292	0.007
	10	1 184.852	3.519	10.132	18.020	0.031	5.994	0.007

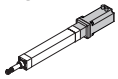
Mechanical efficiency η = 0.9 (for all sizes)

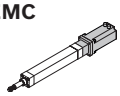
Note:

F_{max} and v_{max} depend on the selected travel range (s_{max}) of the EMC. See the following tables.

Technical data

Drive data for motor attachment via flange and coupling

EMC 	d_0 x P (mm)	for motor	Flange and coupling								
			F_{max} [2] (N)	M_p [2] (Nm)	v_{max} [2] (m/s)	M_{Rs} (Nm)	$k_{J\ fix}$ [1]	$k_{J\ var}$ [1]	$k_{J\ m}$ [1]	m_{fc} (kg)	a_{max} (m/s^2)
32	12 x 5	MSM019B MSM031B MS2N03B	1 200	1.1	0.57	0.16	8.945	0.012	0.633	0.37	50.0
	12 x 10	MSM019B MSM031B MS2N03B	750	1.3	1.13	0.20	9.618	0.013	2.533	0.37	
40	16 x 5	MSM031C MS2N03B MS2N03D	4 500	4.0	0.50	0.28	41.616	0.032	0.633	0.56	
		MS2N04								0.68	
	16 x 10	MSM031C MS2N03B MS2N03D	3 000	5.3	1.00	0.33	42.839	0.033	2.533	0.56	
		MS2N04								0.68	
	16 x 16	MSM031C MS2N03B MS2N03D	2 000	5.7	1.60	0.40	46.114	0.040	6.485	0.56	
		MS2N04								0.68	
50	20 x 5	MSM031C MSM041B MS2N04	7 800	6.9	0.50	0.50	78.815	0.085	0.633	1.10	39.8
		MS2N05								1.13	
	20 x 10	MSM031C MSM041B MS2N04	5 500	9.7	1.00	0.55	82.092	0.088	2.533	1.10	50.0
		MS2N05								1.13	
	20 x 20	MSM031C MSM041B MS2N04	3 200	11.3	2.00	0.65	90.304	0.095	10.132	1.10	
		MS2N05								1.13	
63	25 x 5	MSM041B MS2N05	15 900	14.1	0.50	0.75	249.693	0.223	0.633	1.77	28.9
		MS2N04					103.693			1.28	
		MS2N06					249.693			1.97	
	25 x 10	MSM041B MS2N05	14 800	26.2	1.00	0.80	258.227	0.243	2.533	1.77	50.0
		MS2N04	10 700	18.9			112.227			1.28	
		MS2N06	14 800	26.2			258.227			1.97	
	25 x 25	MSM041B MS2N05	8 000	35.4	2.50	1.00	286.002	0.242	15.831	1.77	
		MS2N04	4 300	19.0			140.002			1.28	
		MS2N06	8 000	35.4			286.002			1.97	

EMC 	d_0 x P (mm)	for motor	Flange and coupling								
			F_{max} [2] (N)	M_p [2] (Nm)	v_{max} [2] (m/s)	M_{Rs} (Nm)	$k_{J\ fix}$ [1]	$k_{J\ var}$ [1]	$k_{J\ m}$ [1]	m_{fc} (kg)	a_{max} (m/s^2)
80	32 x 5	MS2N05	21 600	19.1	0.40	1.20	302.538	0.607	0.633	2.29	17.9
		MS2N06								2.49	
		MS2N07								2.80	
	32 x 10	MS2N05	22 000	38.9	0.80	1.30	329.067	0.647	2.533	2.29	30.7
		MS2N06								2.49	
		MS2N07								2.80	
	32 x 20	MS2N05	15 000	53.1	1.60	1.40	355.503	0.665	10.132	2.29	50.0
		MS2N06								2.49	
		MS2N07								2.80	
	32 x 32	MS2N05	10 400	58.9	2.50	1.60	435.036	0.684	25.938	2.29	
		MS2N06								2.49	
		MS2N07								2.80	
100	40 x 5	MS2N06	29 000	25.7	0.30	2.40	686.160	1.568	0.633	3.77	12.2
		MS2N07								3.94	
	40 x 10	MS2N06	29 000	51.3	0.60	2.50	701.780	1.369	2.533	3.77	16.8
		MS2N07								3.94	
	40 x 20	MS2N06	29 000	102.6	1.25	2.60	759.478	1.408	10.132	3.77	33.0
		MS2N07								3.94	
	40 x 40	MS2N06	21 900	154.9	2.50	2.80	1 038.583	1.567	40.528	3.77	50.0
		MS2N07								3.94	
100XC	50 x 10	MS2N07	56 000	99.0	0.50	4.00	1 980.741	3.588	2.533	6.06	12.1
		MS2N10								7.45	
	50 x 20	MS2N07	50 000	176.8	1.00	5.00	2 084.852	3.519	10.132	6.06	22.0
		MS2N10								7.45	

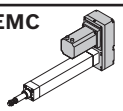
[1] Constants for calculating the mass moment of inertia. For formulas, see chapter "Drive dimensioning"
[2] Force or torque and speed can be limited by the motor

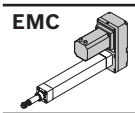
Mechanical efficiency η = 0.9 (for all sizes)

Note:
All data is given for the complete mechanical drive chain (EMC with coupling) at the reference point motor shaft.
F_{max} and v_{max} depend on the selected travel range (s_{max}) of the EMC. See the following tables.
Actual results depend on the selected motor-controller combination.
The motor torque might need to be limited.
For short product names, see chapter "Abbreviations".

Technical data

Drive data for motor attachment via belt side drive

EMC 	d_0 x P (mm)	$i^{1)}$	for motor	Belt side drive								
				$F_{max}^{3)}$ (N)	$M_p^{3)}$ (Nm)	$v_{max}^{3)}$ (m/s)	M_{Rs} (Nm)	$k_{J\ fix}^{2)}$	$k_{J\ var}^{2)}$	$k_{J\ m}^{2)}$	m_{sd} (kg)	a_{max} (m/s²)
32	12 x 5	1	MSM019	680	0.6	0.57	0.22	14.2	0.012	0.633	0.55	50.0
			MSM031B				0.31	45.6	0.012		0.95	
			MS2N03B					38.0			0.80	
	12 x 10	1	MSM019	450	0.8	1.13	0.26	14.9	0.013	2.533	0.55	
			MSM031B				0.35	46.3			0.95	
			MS2N03B					38.7			0.80	
40	16 x 5	1	MSM031C	3 100	2.8	0.50	0.43	47.6	0.032	0.633	0.80	50.0
			MS2N03B					43.5			0.75	
			MS2N04	3 400	3.0		0.68	247.7			1.70	
		1.5	MSM031C	3 100	1.9		0.34	15.4	0.014	0.281	0.75	
			MS2N03B					16.0			0.75	
			MS2N04	3 400	2.0		0.59	84.0		0.281	1.60	
	16 x 10	1	MSM031C	1 800	3.2	1.00	0.48	48.8	0.033	2.533	0.80	
			MS2N03B					44.7			0.75	
			MS2N04	2 200	4.0		0.73	248.9			1.70	
		1.5	MSM031C	1 800	2.1		0.37	16.0	0.015	1.126	0.75	
			MS2N03B					16.3			0.75	
			MS2N04	2 200	2.7		0.62	84.5			1.60	
	16 x 16	1	MSM031C	1 100	3.2	1.60	0.55	52.1	0.040	6.485	0.80	
			MS2N03B					48.0			0.75	
			MS2N04	1 400	4.0		0.80	252.2			1.70	
		1.5	MSM031C	1 100	2.1		0.42	17.4	0.018	2.882	0.75	
			MS2N03B					17.7			0.75	
			MS2N04	1 400	2.7		0.67	86.0			1.60	
50	20 x 5	1	MSM031C	6 200	5.5	0.50	0.90	256.4	0.085	0.633	1.70	39.8
			MSM041B					257.1			1.70	
			MS2N04					256.4			1.80	
			MS2N05	6 300	5.6		0.95	1 161.1	0.085	0.633	4.05	
		1.5	MSM031C	6 200	3.7	0.50	0.73	89.0	0.038	0.281	1.60	
			MSM041B					91.1			1.60	
			MS2N04					89.0			1.55	
	20 x 10	1	MSM031C	4 300	7.7	1.00	0.95	259.7	0.088	2.533	1.70	50.0
			MSM041B					260.3			1.70	
			MS2N04					259.7			1.80	
			MS2N05	4 400	7.9		1.00	1 164.4			4.05	
		1.5	MSM031C	4 300	5.1		0.77	90.4	0.039	1.126	1.60	
			MSM041B					92.6			1.60	
			MS2N04					90.4			1.55	
	20 x 20	1	MSM031C	2 300	8.2	2.00	1.05	267.9	0.095	10.132	1.70	
			MSM041B					268.5			1.70	
			MS2N04					267.9			1.80	
			MS2N05	2 400	8.5		1.10	1 172.5			4.05	
		1.5	MSM031C	2 300	5.5		0.83	94.1	0.042	4.503	1.60	
			MSM041B					96.2			1.60	
			MS2N04					94.1			1.55	

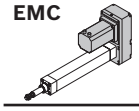
EMC 	d_0 x P (mm)	i[1]	for motor	Belt side drive								
				F_{max}[3] (N)	M_p[3] (Nm)	v_{max}[3] (m/s)	M_{Rs} (Nm)	$k_{J\ fix}$[2]	$k_{J\ var}$[2]	$k_{J\ m}$[2]	m_{sd} (kg)	a_{max} (m/s²)
63	25 x 5	1	MSM041B	15 900	14.1	0.50	1.20	1 081.2	0.223	0.633	4.2	28.9
			MS2N04					1 082.9			4.6	
			MS2N05				1.25	1 350.2			4.5	
			MS2N06					1 359.7			4.7	
		2	MSM041B	15 900	7.0		0.83	202.2	0.056	0.158	3.9	
			MS2N04					188.2			4.2	
			MS2N05				0.88	232.0			4.2	
	25 x 10	1	MSM041B	10 400	18.5	1.00	1.25	1 089.7	0.243	2.533	4.2	50.0
			MS2N04					1 091.5			4.6	
			MS2N05	11 400	20.2		1.30	1 358.7			4.5	
			MS2N06					1 368.2			4.7	
		2	MSM041B	10 400	9.3	1.00	0.85	204.3	0.061	0.633	3.9	
			MS2N04					190.4			4.2	
			MS2N05	11 400	10.1		0.90	234.1			4.2	
	25 x 25	1	MSM041B	4 200	18.6	2.50	1.45	1 117.5	0.242	15.831	4.2	
			MS2N04					1 119.2			4.6	
			MS2N05	5 200	23.1		1.50	1 386.5			4.5	
			MS2N06					1 396.0			4.7	
		2	MSM041B	4 200	9.3		0.95	211.3	0.060	3.958	3.9	
			MS2N04					197.3			4.2	
			MS2N05	5 200	11.6		1.00	241.0			4.2	
80	32 x 5	1	MS2N05	21 600	19.1	0.40	1.70	1 469.0	0.607	0.633	4.3	17.9
			MS2N06				1.75	5 161.9			10.1	
			MS2N07								10.4	
		2	MS2N05		9.5		1.10	261.7	0.152	0.158	4.4	
			MS2N06				1.15	861.3			9.2	
	32 x 10	1	MS2N05	13 900	24.6	0.80	1.80	1 495.5	0.647	2.533	4.3	30.7
			MS2N06	18 400	32.6		1.85	5 188.4			10.1	
			MS2N07								10.4	
		2	MS2N05	13 900	12.3		1.15	268.3	0.162	0.633	4.4	
			MS2N06	18 400	16.3		1.20	867.9			9.2	
	32 x 20	1	MS2N05	6 900	24.6	1.60	1.90	1 521.9	0.665	10.132	4.3	50.0
			MS2N06	11 500	40.8		1.95	5 214.8			10.1	
			MS2N07								10.4	
		2	MS2N05	6 900	12.3		1.20	274.9	0.166	2.533	4.4	
			MS2N06	11 500	20.4		1.25	874.5		2.533	9.2	
	32 x 32	1	MS2N05	4 300	24.6	2.50	2.10	1 601.5	0.684	25.938	4.3	
			MS2N06	7 600	43.3		2.15	5 294.4			10.1	
			MS2N07				2.15	5 294.4			10.4	
		2	MS2N05	4 300	12.3		1.30	294.8	0.171	6.485	4.4	
			MS2N06	7 600	21.7		1.35	894.4			9.2	

[1] Gear ratio of the belt side drive.
[2] Constants for calculating the mass moment of inertia. For formulas, see chapter "Drive dimensioning"
[3] Force or torque and speed can be limited by the motor

Please pay attention to the note at the end of the table

Drive data

Drive data for motor attachment via belt side drive

EMC 	d_0 x P (mm)	i[1]	for motor	Belt side drive								
				F_{max}[3] (N)	M_p[3] (Nm)	v_{max}[3] (m/s)	M_{Rs} (Nm)	$k_{J\ fix}$[2]	$k_{J\ var}$[2]	$k_{J\ m}$[2]	m_{sd} (kg)	a_{max} (m/s^2)
100	40 x 5	1	MS2N06	29 000	25.6	0.30	2.95	5 466.6	1.568	0.633	10.2	12.2
			MS2N07				3.00	7 933.1			11.7	
		2	MS2N06		12.8		1.75	937.5	0.392	0.158	9.3	
			MS2N07				1.80	1 331.6			10.4	
	40 x 10	1	MS2N06	29 000	51.3	0.60	3.05	5 482.2	1.369	2.533	10.2	16.8
			MS2N07				3.10	7 948.7			11.7	
		2	MS2N06		25.6		1.80	941.4	0.342	0.633	9.3	
			MS2N07				1.85	1 335.5			10.4	
	40 x 20	1	MS2N06	19 200	68.1	1.25	3.15	5 539.9	1.408	10.132	10.2	33.0
			MS2N07	29 000	102.6		3.20	8 006.4			11.7	
		2	MS2N06	19 200	34.1		1.85	955.8	0.352	2.533	9.3	
			MS2N07	29 000	51.3		1.90	1 349.9		2.533	10.4	
	40 x 40	1	MS2N06	9 600	68.1	2.50	3.05	5 819.0	1.567	40.528	10.2	50.0
			MS2N07	15 000	106.4		3.10	8 285.5			11.7	
		2	MS2N06	9 600	34.1		1.80	1 025.6	0.392	10.132	9.3	
			MS2N07	15 000	53.2		1.85	1 419.7			10.4	
100XC	50 x 10	1	MS2N07	56 000	99.0	0.50	4.60	11 127.9	3.588	2.533	16.9	12.1
			MS2N10					10 690.7			17.7	
		1.5	MS2N07		66.0		3.27	3 897.4	1.595	1.126	16.0	
			MS2N10					3 626.9			16.9	
	50 x 20	1	MS2N07	37 400	132.4	1.00	5.60	11 232.0	3.519	10.132	16.9	22.0
			MS2N10					10 794.8			17.7	
		1.5	MS2N07		88.3		3.93	3 943.7	1.564	4.503	16.0	
			MS2N10					3 673.1			16.9	

[1] Gear ratio of the belt side drive.
[2] Constants for calculating the mass moment of inertia. For formulas, see chapter "Drive dimensioning"
[3] Force or torque and speed can be limited by the motor

Mechanical efficiency η = 0.9 (for all sizes)

Note:
All data is given for the complete mechanical drive chain (EMC with belt side drive) at the motor shaft reference point.
F_{max} and v_{max} depend on the selected travel range (s_{max}) of the EMC. See the following tables.
Actual results depend on the selected motor-controller combination.
The motor torque might need to be limited.
For short product names, see chapter "Abbreviations".

Axial load on the cylinder mechanics

Note on special installation and usage example

Installation case III

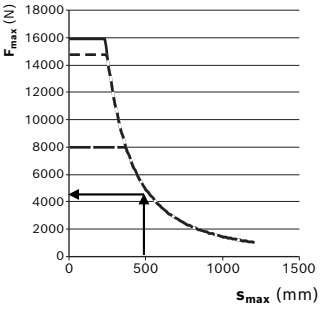
Application example:
Installation case III: Swivel clevis mount on the belt side drive, piston rod guided by means of rod end bearing or fork clevis.

Example for determining the permissible axial load on the cylinder mechanics

Pre-selection for the above installation case III as an application example:

- EMC-063 with Rexroth ball screw assembly 25 x 10
- selected travel range s_{max} 500 mm
- with belt side drive i=1 for MS2N05
- fastening with clevis mount and swivel mount

Max. permissible axial load according to installation case in the diagram: approx. 4 200 N.



F_{max} in table "Drive data for motor attachment via belt side drive":
F_{max} = 11 400 N

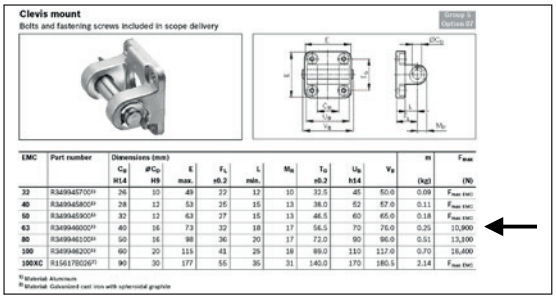
The actual achievable axial force of the system also depends on the selected motor / controller combination (see chapter "Drive dimensioning").

EMC	d_0 x P (mm)	i[1]	for motor	Belt side drive F_{max}[3] (N)	Belt side drive M_p[3] (Nm)
63	25 x 5	1	MSM041B	15 900	14.1
			MS2N04		
			MS2N05		
			MS2N06		
		2	MSM041B	15 900	7.0
			MS2N04		
			MS2N05		
	25 x 10	1	MSM041B	10 400	18.5
			MS2N04		
			MS2N05	11 400	20.2
			MS2N06		

Note: Limitations caused by additional orderable fastening elements are not taken into account in the consideration of the drive chain.

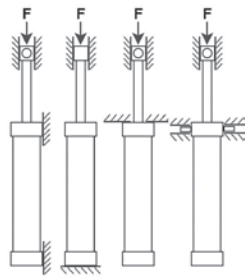
The F_{max} for the size 63 clevis mount, for example, is 10 900 N.

For F_{max} the smallest value is 4 200 N.



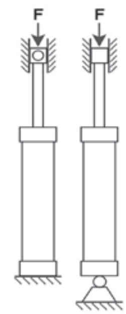
Axial load on the cylinder mechanics

Case I

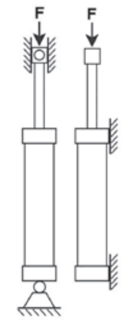


only permissible vertically

Case II

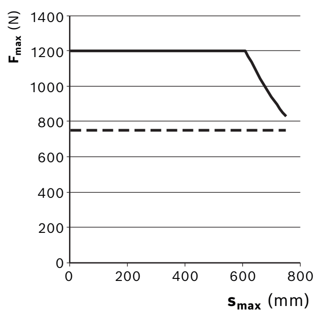


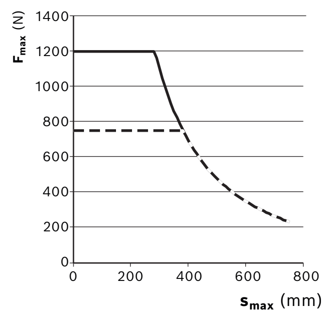
Case III

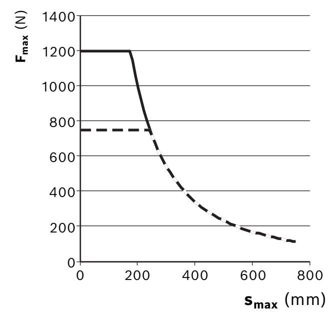


EMC-32

d_0 x P
- ——— 12 x 5
- - - - - 12 x 10

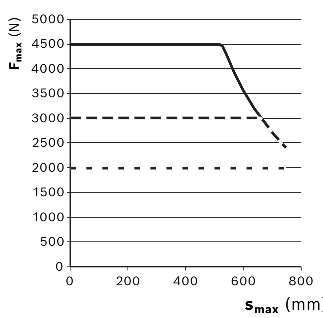


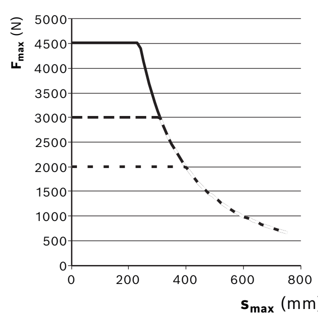


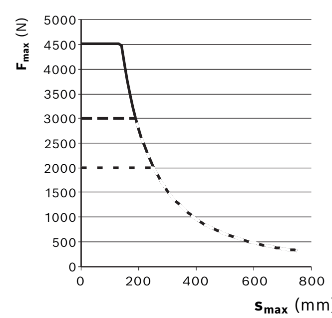


EMC-40

d_0 x P
- ——— 16 x 5
- - - - - 16 x 10
- · · · · · 16 x 16

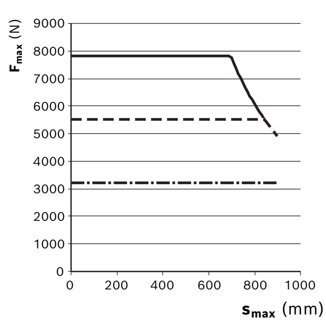


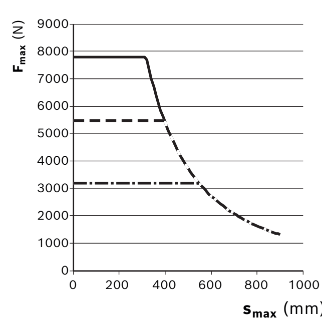


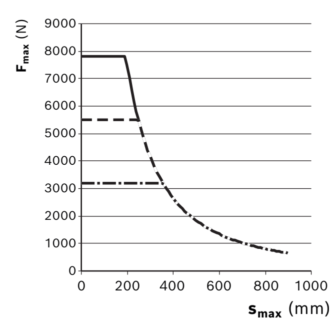


EMC-50

d_0 x P
- ——— 20 x 5
- - - - - 20 x 10
- -·-·-·- 20 x 20

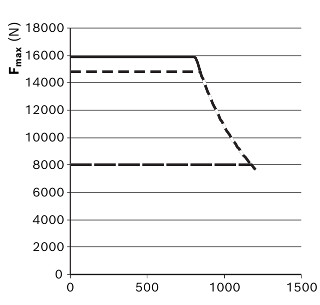


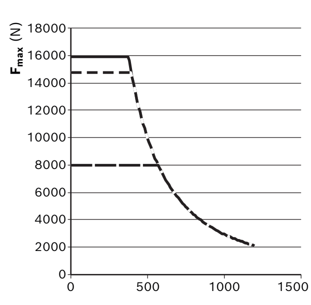


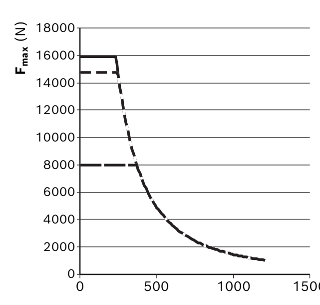


EMC-63

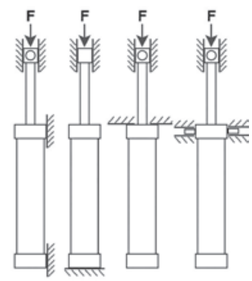
d_0 x P
- ——— 25 x 5
- - - - - 25 x 10
- — — — 25 x 25





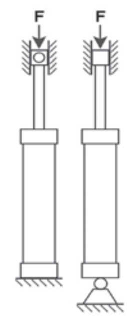


Case I

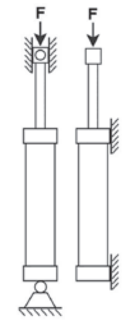


only permissible vertically

Case II



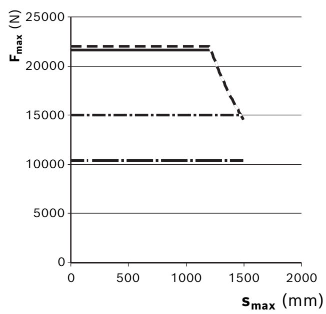
Case III



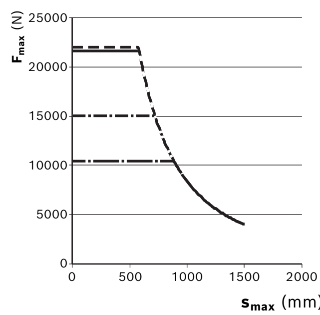
EMC-80

d_0 x P
- 32 x 5
- 32 x 10
- 32 x 20
- 32 x 32

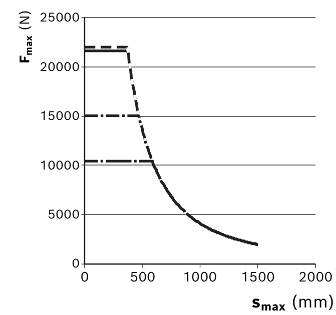
Case I



Case II



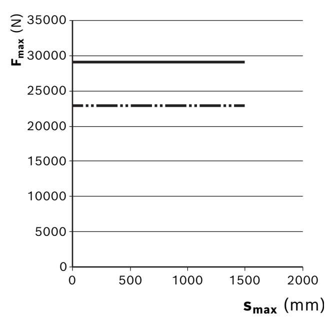
Case III



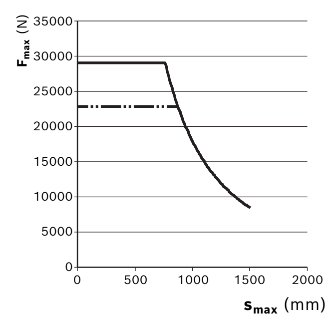
EMC-100

d_0 x P
- 40 x 5/40 x 10
- 40 x 20/40 x 40

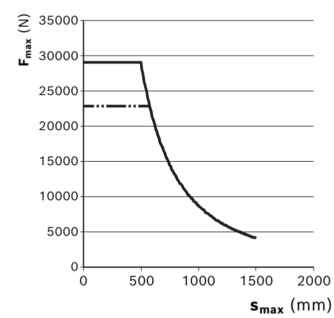
Case I



Case II



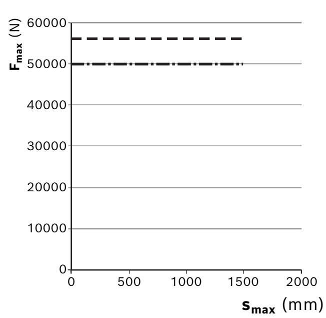
Case III



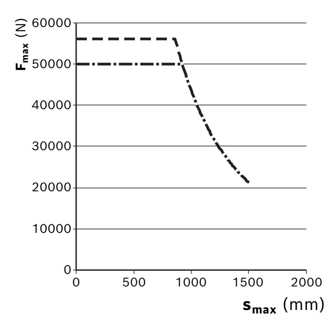
EMC-100XC

d_0 x P
- 50 x 10
- 50 x 20

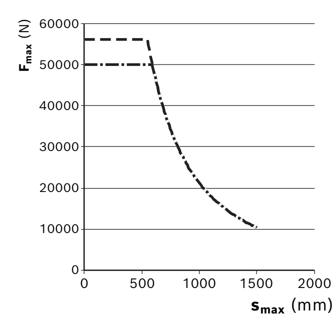
Case I



Case II



Case III



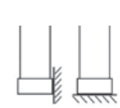
Piston rod in swivel bearings

Piston rod linear-guided

Piston rod free

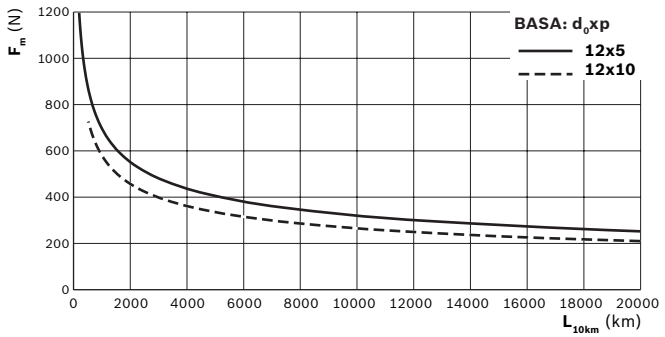
Fastening swiveling

Fastening fixed

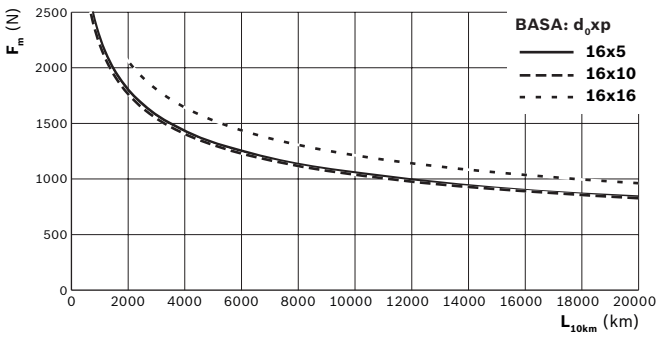


Service life

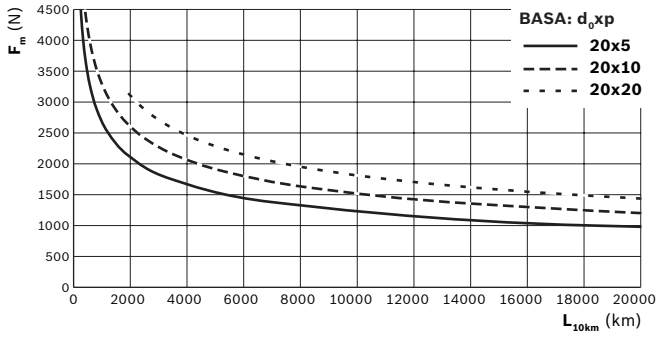
EMC-32



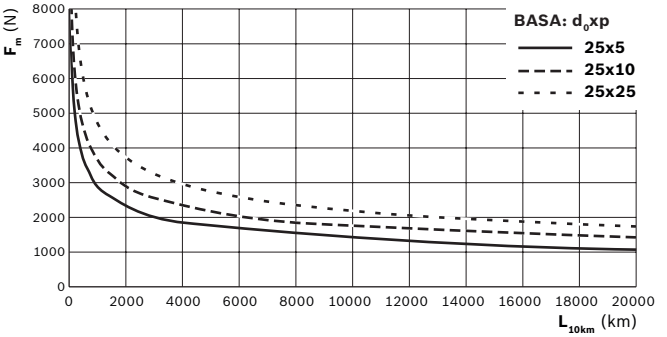
EMC-40



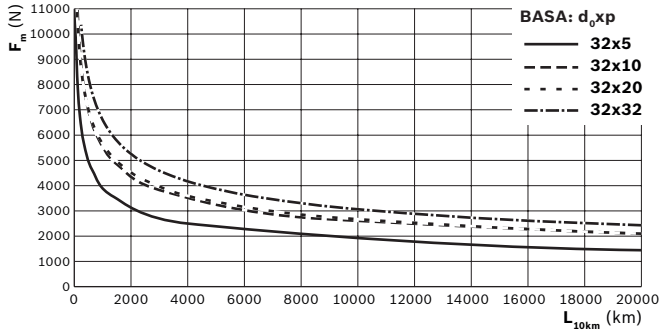
EMC-50



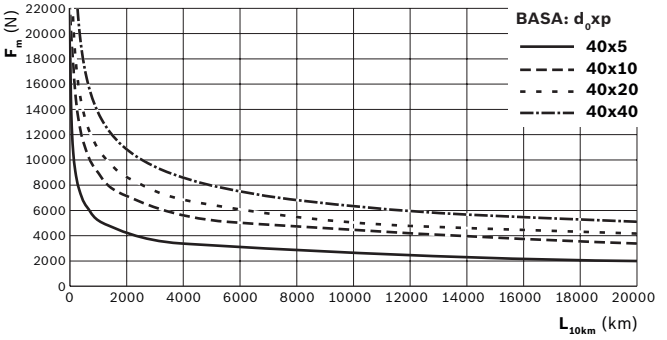
EMC-63



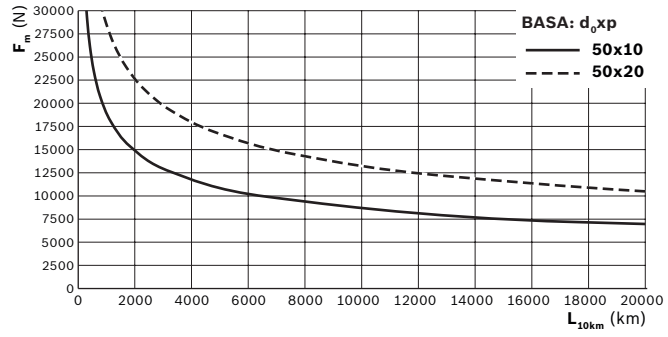
EMC-80



EMC-100



EMC-100XC

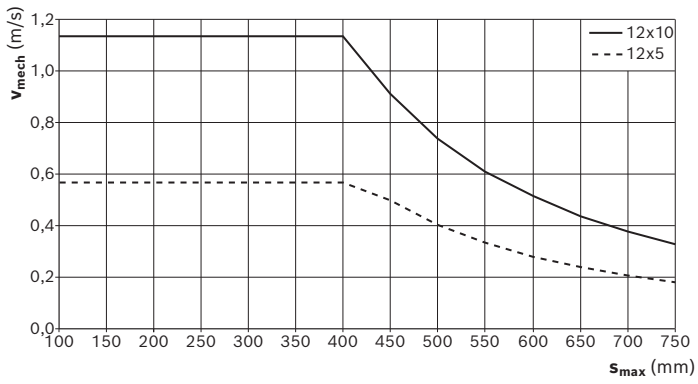


The stated values comply with the specified relubrication intervals (see chapter "Service and information").
For calculation of the equivalent dynamic axial load F_m see chapter "Calculation principles".

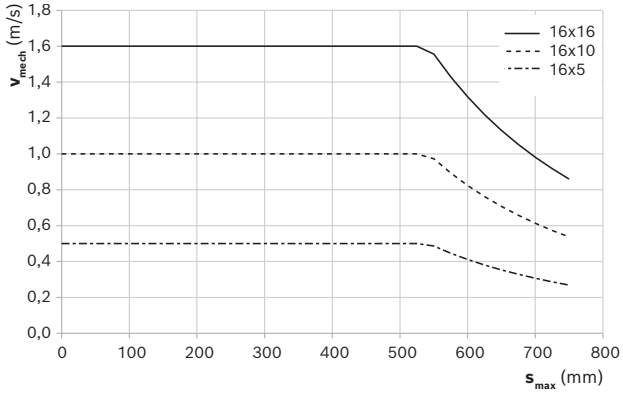
F_m = Equivalent dynamic axial load (N)
$L_{10\,km}$ = Nominal service life (km)

Permissible speeds

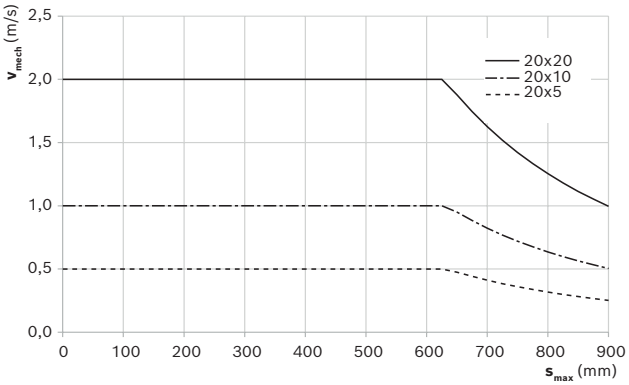
EMC-32



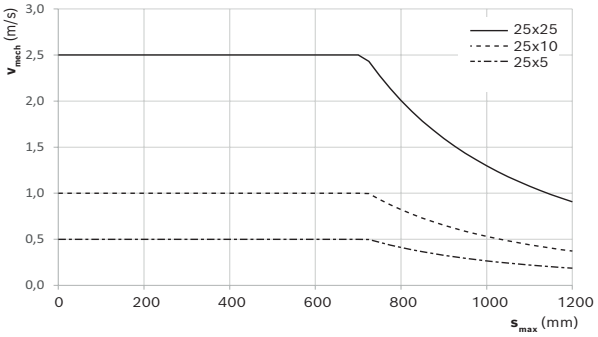
EMC-40



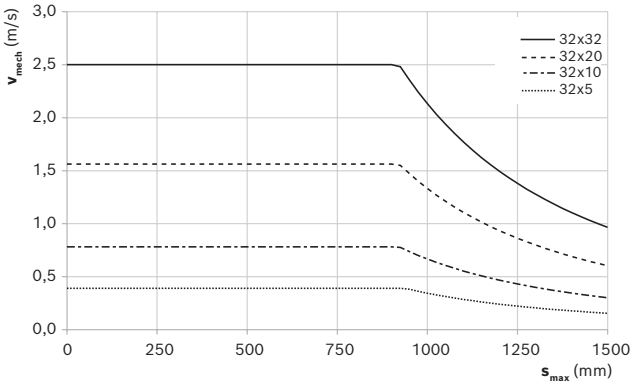
EMC-50



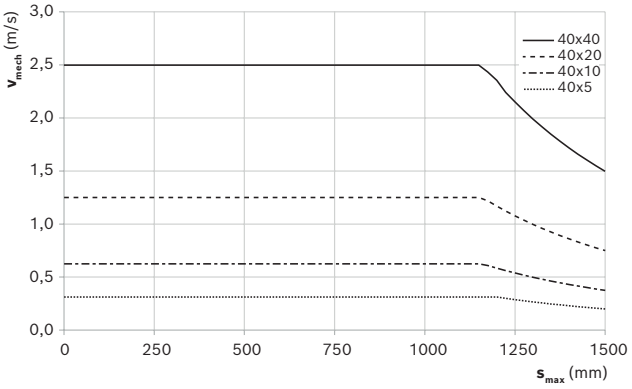
EMC-63



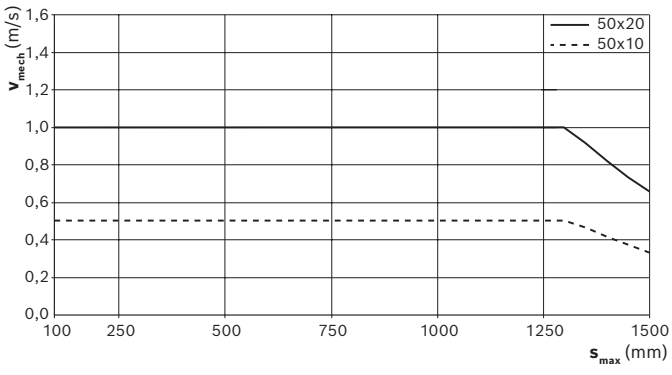
EMC-80



EMC-100

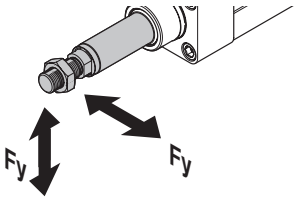


EMC-100XC

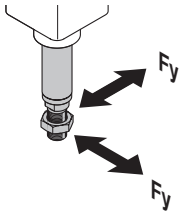


Load on the piston rod

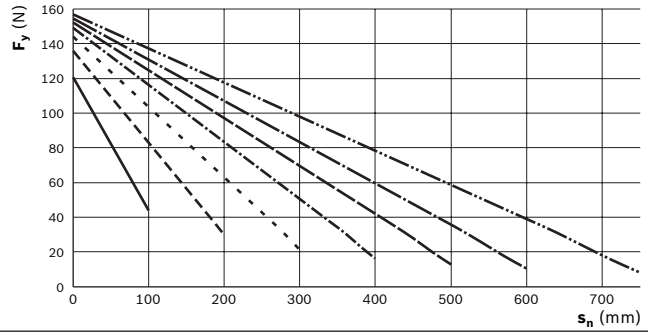
Horizontal mounting

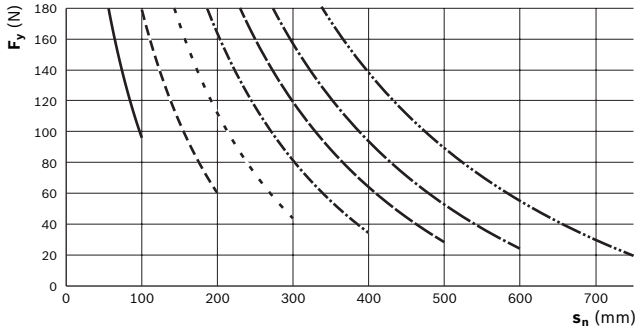


Vertical mounting

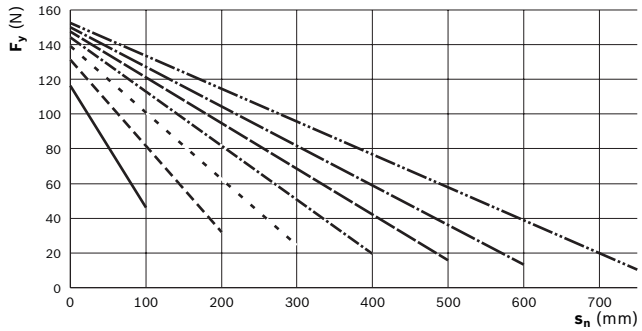


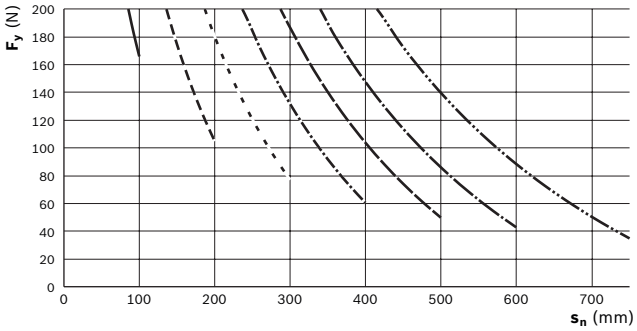
EMC-32



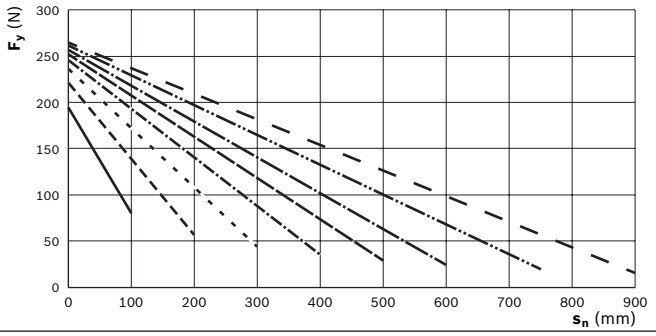


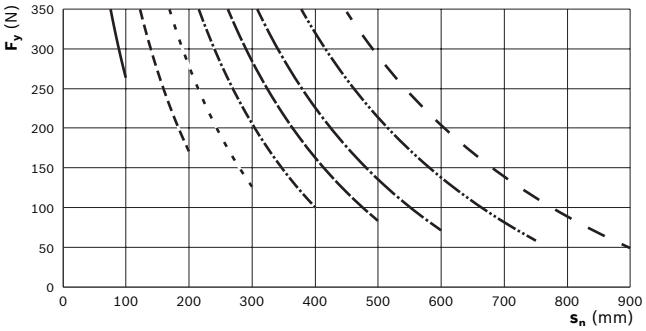
EMC-40



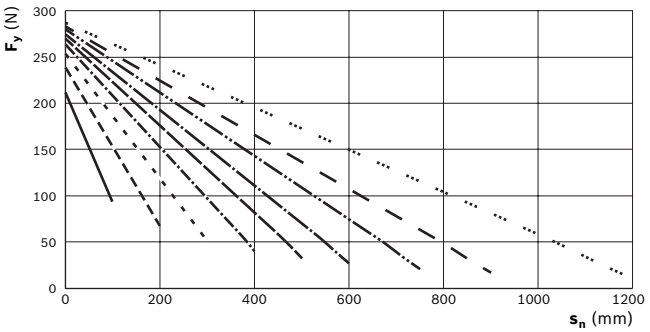


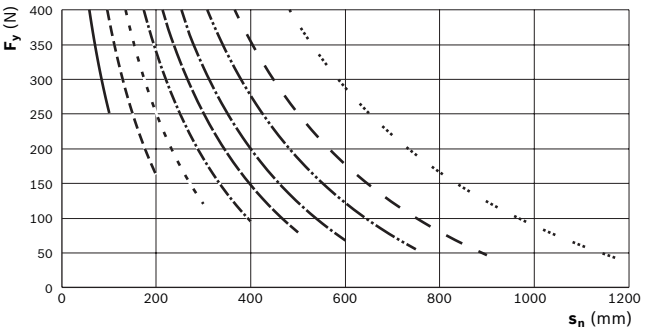
EMC-50



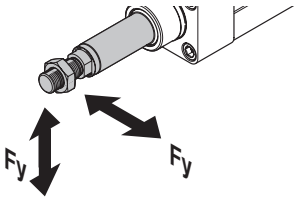


EMC-63

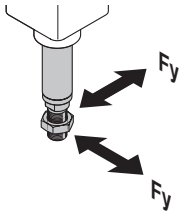




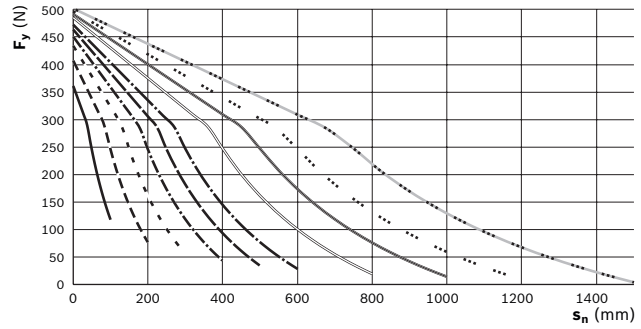
Horizontal mounting

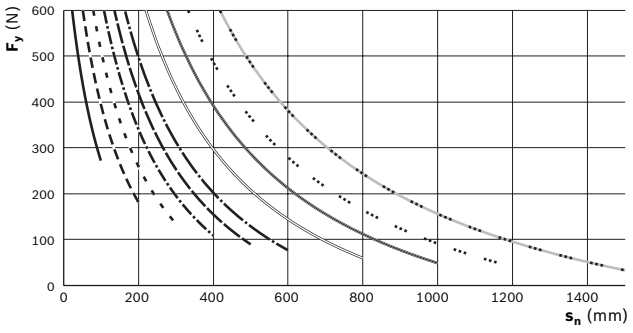


Vertical mounting

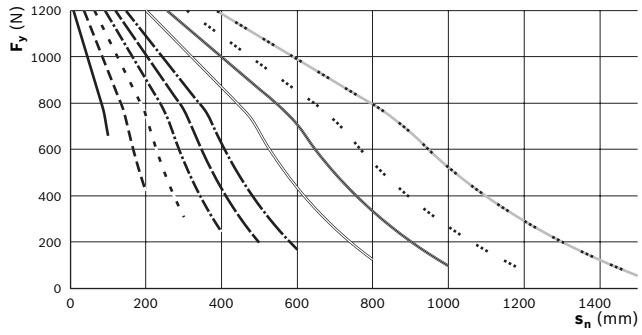


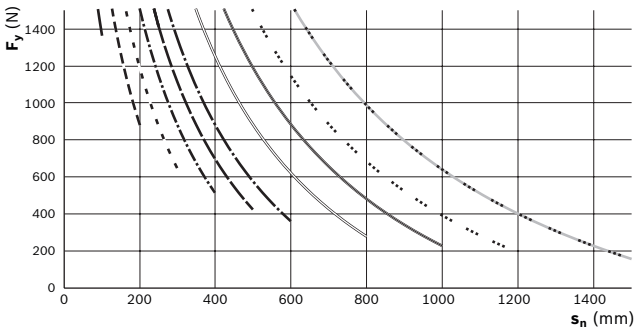
EMC-80



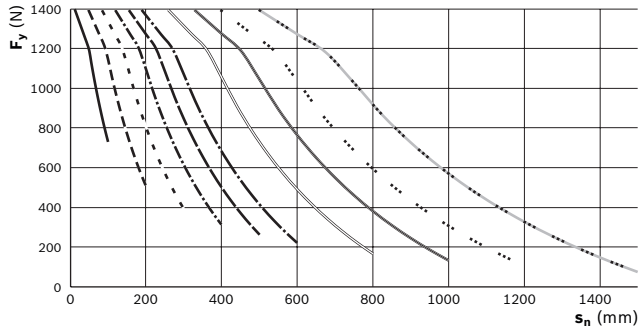


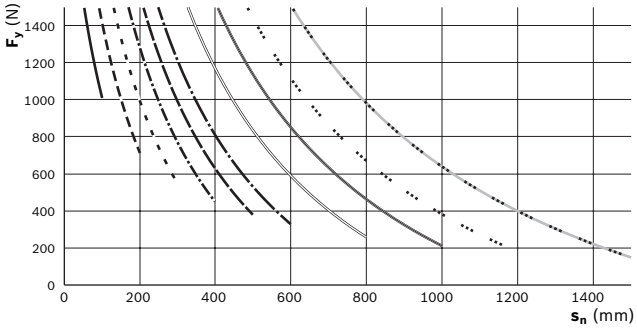
EMC-100





EMC-100XC





Characteristic curves for s_{max}

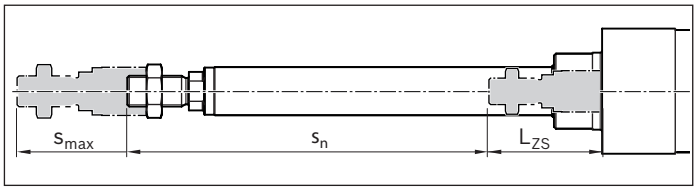
———	100 mm	-·-·-·-	750 mm
- - - - - -	200 mm	═══	800 mm
· · · · · ·	300 mm	— — —	900 mm
-·-·-·-	400 mm	———	1000 mm
— — — —	500 mm	··· ··· ···	1200 mm
-·-·-·-	600 mm	- - - - - -	1500 mm

F_y = Lateral force (N)
s_n = Position of the piston rod (mm)
s_{max} = Maximum travel range (mm)
L_{ZS} = Position of the piston rod retracted (mm)

Diagrams are valid for:

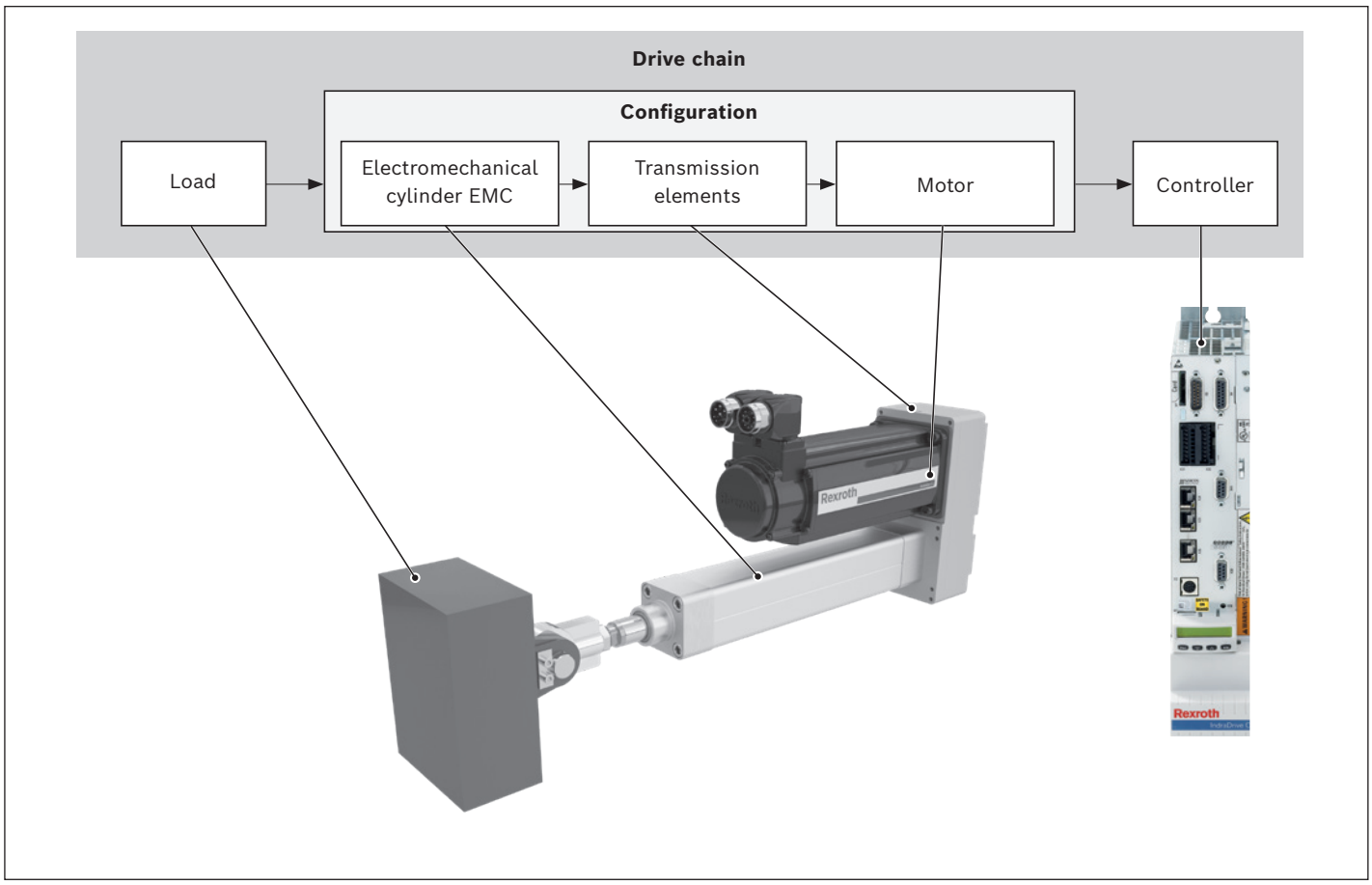
- 25% of F_{max}
- a speed of 0.5 m/s

Definition s_{max} /s_n



Calculation principles

Drive chain



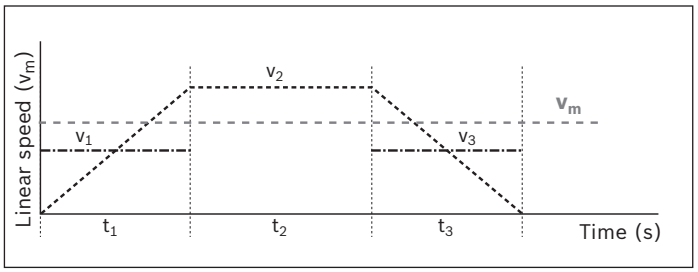
The correct dimensioning and assessment of an application requires structured consideration of the entire drive chain. The basic element of the drive chain is the configuration – comprising the electromechanical cylinder EMC, the transmission element (coupling or belt side drive) and the motor, which can be ordered in this constellation as per the catalog.

Maximum permissible loads

When selecting electromechanical cylinders EMC, maximum limits for permissible loads and forces must be taken into account. These limits can be found in chapter "Product description and technical data".
The values in this chapter are system-based, i.e. the limits are based not only on the load rating of the bearings, but also on design/material limits.

Mechanical calculation

Service life of electromechanical cylinder EMC
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.

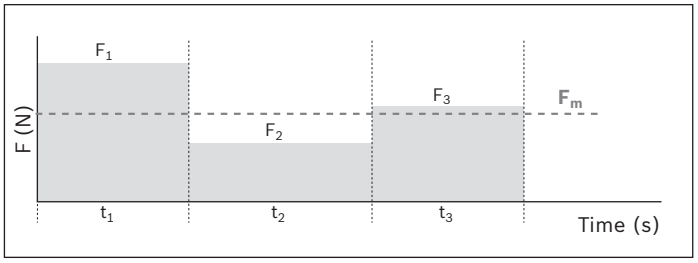


When the linear speed varies, the average speed v_m is calculated as follows:

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

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

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



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

Nominal service life
– in revolutions L

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

– in hours L_h

$$L_h = \frac{L}{n_m \cdot 60}$$

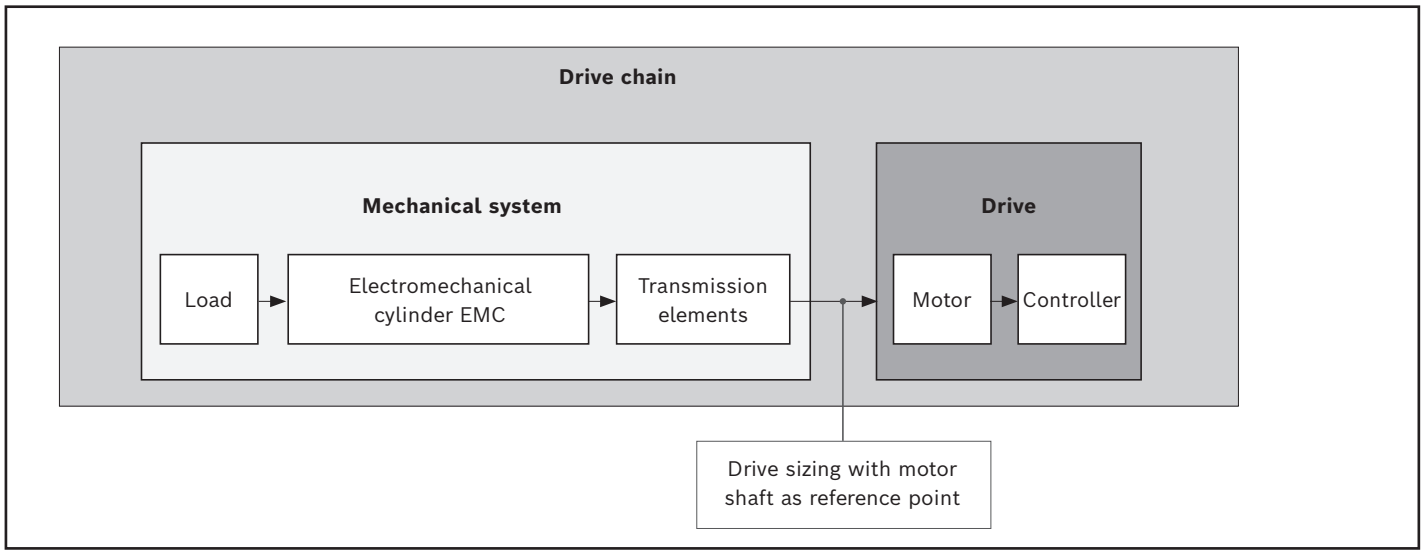
Drive torque M:

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

Drive sizing

Basic principles

For drive dimensioning, the drive chain can be divided into the **mechanical system** and **drive system**.
The **mechanical system** includes the physical components – electromechanical cylinder EMC (including gear unit transmission element) – and the load to be carried.
The electric **drive** is a motor-controller combination with corresponding performance data.
The sizing and/or dimensioning of the electric drive is done taking the motor shaft as a reference point.
For drive sizing, 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 relevant data for flange / coupling or belt side drive is already included in the specifications for the electromechanical cylinder EMC. In other words, the corresponding maximum permissible limits for drive torque and speed, as well as the underlying friction torque and mass moment of inertia with respect 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 chapter "Technical data" or is determined using formulas based on the descriptions on the following pages.

		Mechanical system	
		Load	EMC
Weight moment	(Nm)	M_g [4]	–
Equivalent dynamic torque	(Nm)	M_m [1]	–
Friction torque	(Nm)	–	M_{Rs} [3]
Mass moment of inertia	(kg/m^2)	J_t [1]	J_s [2]
Max. permissible speed	(m/s)	–	v_{max} [3]
Max. permissible rotary speed	(rpm)		n_P [3]
Max. permissible drive torque	(Nm)	–	M_p [3], M_{pl} [1]

[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] In vertical installation position: Determine value according to formula

Drive sizing with motor shaft as reference point

When dimensioning the drive, all relevant design calculation values for the mechanical components in the drive chain have to be determined and be expressed/reduced to the motor shaft. In other words, for a combination of mechanical components within the drive chain, this will result in one value for each of the following:

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

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

Friction torque M_R
With the value for friction torque of the EMC, friction is already reduced to the motor shaft.

$$M_R = M_{Rs}$$

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.

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

Determining the mass moment of inertia of the EMC component (including transmission elements, if used)

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

Determining the translative 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 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 chain (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 chain.

Drive sizing

Maximum permissible drive torque M_p, M_{mech}

The lower value of the permissible drive torque of all mechanical components contained in the drive chain (M_p) and allowable axial load from the user-defined installation case determines the maximum permissible drive torque of the mechanical system which needs to be taken into account as a limitation in the drive dimensioning.
The smaller value from the drive data table or that calculated from the F_{max} value from the permissible axial load on the cylinder mechanism diagram is valid.

$$M_{pl} = \frac{F_{max} \cdot P}{2\,000 \cdot \pi \cdot \eta}$$

$$M_{mech} = \text{minimum } (M_{p;}\, M_{pl})$$

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

Pre-selecting the motor

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
Machining	≤ 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 installation position only!
For motor attachment via flange 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:

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

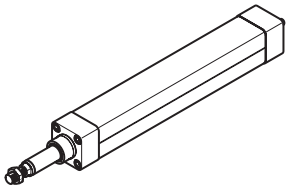
The equivalent dynamic torque can be calculated approximately via the average load F_m. The appropriate mechanical efficiency must be used depending on the drive element BASA.

In chapter "Configuration and ordering", users can put together standard configurations including gear reducer and motor, for the various EMC 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 sizing

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 catalog "Rexroth drive technology". When dimensioning the drive, the maximum permissible values for speed, drive torque and acceleration must not be exceeded, in order to avoid damaging the mechanical system!

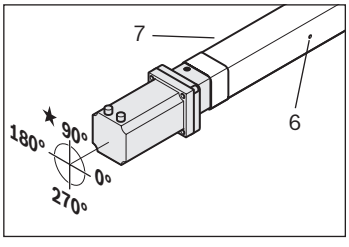
EMC 32 – EMC 50

Size short product name	Max. travel range (mm)	Housing			Drive		Lubrication[1]					Switch[3]				Version		
		Standard	Protection class IP65	Protection class IP65 + R	BASA d_0 x P (mm)		LSS	LCF	LPG	LHG	LFL[2]	without switch and sensor profile	Sensor profile	Switches 1, 2, 3, 4				
EMC-032-NN-2		01	02	03	12 x 5	01	01	02	03	04	05	00	80	PNP NC contact	120	OF01	without motor attachment	
																MF01	with flange	
					12 x 10	02										RV01 RV02 RV03	with belt side drive	
EMC-040-NN-2					16 x 5	01								NPN NC contact	121	OF01	without motor attachment	
																MF01	with flange	
					16 x 10	02										RV01 RV02 RV03	with belt side drive	
					16 x 16	03												
EMC-050-NN-2					20 x 5	01								PNP NO contact	122	OF01	without motor attachment	
																MF01	with flange	
					20 x 10	02									123	RV01 RV02 RV03	with belt side drive	
					20 x 20	04								NPN NO contact				

[1] LSS: Standard lubrication; LCF: prepared for central lubrication system for fluid grease; LPG: Preserved version; LHG: initial lubrication with NSF-H1 grease; LFL: Lifelong lubrication
[2] Application conditions must be observed, see page 5
[3] Sensor profile and switch not possible in combination with version RV03
[4] Attachment kit also available without motor (when ordering: enter "00" for motor); for motor attachment kit for customer motor see chapter "Motor attachment".
[5] For motor types see chapter "IndraDyn S - Servo motors"
[6] Lube connection for LSS, LCF, LPG, LHG; for LFL lubrication: Housing without lube connection
[7] Slot for sensor profile

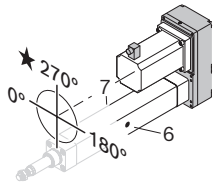
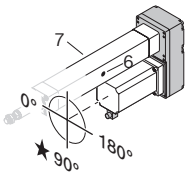
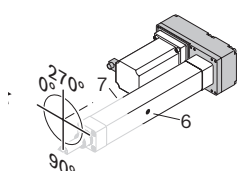
Flange	Motor connector position			
	0 °	90 °	180 °	270 °
MF01	000	090 ★	180	270

★ Standard delivery



Example:
Flange MF01
Motor connector position 90°

Motor attachment			Motor					Drive package		Documentation
				Cables						
				2 cable		1 cable				
				Brake		Brake				
Gear ratio	Attachment kit[4]	Motor code[5]	without	with	without	with	Motor connector position	Controller	Cables	
	00	without	00				000	➠Chapter "Drive package"		01 Standard report/ 02 Measurement of frictional torque 03 Lead deviation
	01	MSM019B-0300	134	135	–					
	02	MSM031B-0300	136	137	–					
	03	MS2N03-B0BYN	–	–	203	204				
i = 1	41	MSM019B-0300	134	135	–					
	42	MSM031B-0300	136	137	–					
	43	MS2N03-B0BYN	–	–	203	204				
	00	without	00				090			
	05	MSM031C-0300	138	139	–					
	06	MS2N03-B0BYN	–	–	203	204				
	200	MS2N03-D0BYN	–	–	207	208				
	07	MS2N04-B0BTN	–	–	211	212				
i = 1	45	MSM031C-0300	138	139	–					
	46	MS2N03-B0BYN	–	–	203	204				
	47	MS2N04-B0BTN	–	–	211	212				
		MS2N04-C0BTN	–	–	215	216				
i = 1.5	49	MSM031C-0300	138	139	–					
	50	MS2N03-B0BYN	–	–	203	204				
	51	MS2N04-B0BTN	–	–	211	212				
	00	without	00				180			
	09	MSM031C-0300	138	139	–					
	10	MSM041B-0300	140	141	–					
	11	MS2N04-B0BTN	–	–	211	212				
		MS2N04-C0BTN	–	–	215	216				
	12	MS2N05-B0BTN	–	–	223	224				
i = 1	53	MSM031C-0300	138	139	–					
	54	MSM041B-0300	140	141	–					
	55	MS2N04-C0BTN	–	–	215	216	270			
	56	MS2N05-C0BTN	–	–	227	228				
i = 1.5	58	MSM031C-0300	138	139	–					
	59	MSM041B-0300	140	141	–					
	60	MS2N04-B0BTN	–	–	211	212				

RV01	RV02	RV03
		

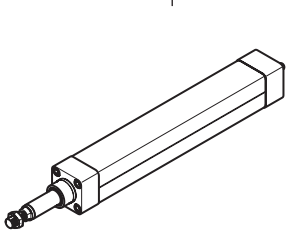
Belt side drive	Motor connector position			
	0 °	90 °	180 °	270 °
RV01	000	–	180	270 ★
RV02	000	090 ★	180	–
RV03	000 ★	090	–	270

★ Standard delivery

Example:
Belt side drive RV02
Motor connector position 90°

Explanation of the order parameters and ordering example ➠ Chapter "Ordering example".

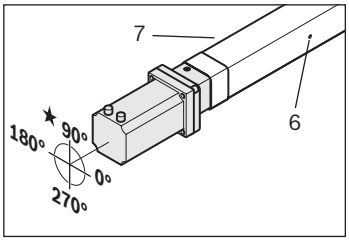
EMC 63 – EMC 80

Size short product name	Max. travel range (mm)	Housing			Drive		Lubrication[1]					Switch[3]				Version		
		Standard	Protection class IP65	Protection class IP65 + R	BASA d_0 x P (mm)		LSS	LCF	LPG	LHG	LFL[2]	without switch and sensor profile	Sensor profile	Switches 1, 2, 3, 4				
EMC-063-NN-2		01	02	03	25 x 5	01	01	02	03	04	05	00	80	PNP NC contact	120	OF01	without motor attachment	
																MF01	with flange	
					25 x 10	02								NPN NC contact	121	RV01 RV02 RV03	with belt side drive	
					25 x 25	05												
EMC-080-NN-2					32 x 5	01								PNP NO contact	122	OF01	without motor attachment	
																MF01	with flange	
					32 x 10	02												
					32 x 20	04								NPN NO contact	123	RV01 RV02 RV03	with belt side drive	
					32 x 32	06												

[1] LSS: Standard lubrication; LCF: prepared for central lubrication system for fluid grease; LPG: Preserved version; LHG: initial lubrication with NSF-H1 grease; LFL: Lifelong lubrication
[2] Application conditions must be observed, see page 5
[3] Sensor profile and switch not possible in combination with version RV03
[4] Attachment kit also available without motor (when ordering: enter "00" for motor); for motor attachment kit for customer motor see chapter "Motor attachment".
[5] For motor types see chapter "IndraDyn S - Servo motors"
[6] Lube connection for LSS, LCF, LPG, LHG; for LFL lubrication: Housing without lube connection
[7] Slot for sensor profile

Flange	Motor connector position			
	0 °	90 °	180 °	270 °
MF01	000	090 ★	180	270

★ Standard delivery

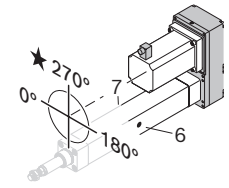
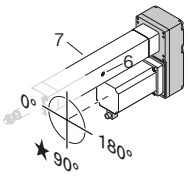
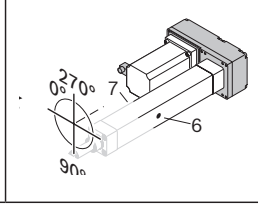


Example:
Flange MF01
Motor connector position 90°

Motor attachment			Motor					Drive package		Documentation
			Motor code[5]	Cables				Motor connector position		
				2 cables Brake		1 cable Brake				
Gear ratio	Attachment kit[4]			without	with	without	with		Controller	Cables
	00	without		00						
	14	MSM041B-0300		140	141	–				
	15	MS2N04-D0BQN		–	–	219	220			
	16	MS2N05-D0BRN		–	–	231	232			
	17	MS2N06-C0BTN		–	–	239	240	00		
		MS2N06-D0BRN		–	–	243	244			
	62	MSM041B-0300		140	141	–				
	63	MS2N04-D0BQN		–	–	219	220			
i = 1	64	MS2N05-D0BRN		–	–	231	232			
	206	MS2N06-C0BTN		–	–	239	240			
		MS2N06-D1BNN		–	–	247	248			
	67	MSM041B-0300		140	141	–		090		
i = 2	68	MS2N04-C0BTN		–	–	215	216			
	69	MS2N05-B0BTN		–	–	223	224			
	00	without		00						
	19	MS2N05-D0BRN		–	–	231	232			
	20	MS2N06-C0BTN		–	–	239	240			
		MS2N06-D0BRN		–	–	243	244			
		MS2N06-E0BRN		–	–	251	252	180		
	201	MS2N07-C0BQN		–	–	259	260			
		MS2N07-D0BRN		295	296	–				
	71	MS2N05-D0BRN		–	–	231	232			
i = 1	207	MS2N06-D1BNN		–	–	247	248			
	202	MS2N07-B1BNN		–	–	255	256			
		MS2N07-C1BRN		–	–	263	264	270		
	75	MS2N05-B0BTN		–	–	223	224			
i = 2		MS2N05-C0BTN		–	–	227	228			
	208	MS2N06-C0BTN		–	–	239	240			
		MS2N06-D0BRN		–	–	243	244			

➠Chapter "Drive package"

01 Standard report/ 02 Measurement of frictional torque
03 Lead deviation

RV01	RV02	RV03
		

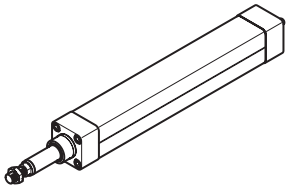
Example:
Belt side drive RV02
Motor connector position 90°

Belt side drive	Motor connector position			
	0 °	90 °	180 °	270 °
RV01	000	–	180	270 ★
RV02	000	090 ★	180	–
RV03	000 ★	090	–	270

★ Standard delivery

Explanation of the order parameters and ordering example ➠ Chapter "Ordering example".

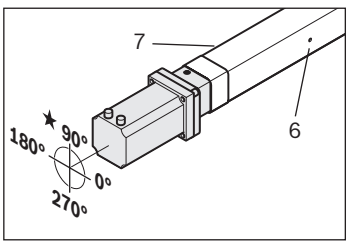
EMC 100 – EMC 100XC

Size short product name	Max. travel range (mm)	Housing			Drive		Lubrication[1]					Switch[3]				Version		
		Standard	Protection class IP65	Protection class IP65 + R	BASA d_0 x P (mm)		LSS	LCF	LPG	LHG	LFL[2]	without switch and sensor profile	Sensor profile	Switches 1, 2, 3, 4				
EMC-100-NN-2		01	02	03	40 x 5	01	01	02	03	04	05	00	80	PNP NC contact	120	OF01	without motor attachment	
					40 x 10	02										MF01	with flange	
					40 x 20	04								NPN NC contact	121	RV01 RV02 RV03	with belt side drive	
					40 x 40	07								PNP NO contact	122			
EMC-100-XC-2					50 x 10	02								NPN NO contact	123	OF01	without motor attachment	
																MF01	with flange	
					50 x 20	04										RV01 RV02 RV03	with belt side drive	

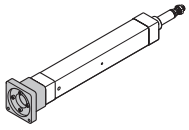
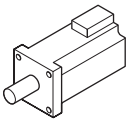
[1] LSS: Standard lubrication; LCF: prepared for central lubrication system for fluid grease; LPG: Preserved version; LHG: initial lubrication with NSF-H1 grease; LFL: Lifelong lubrication
[2] Application conditions must be observed, see page 5
[3] Sensor profile and switch not possible in combination with version RV03
[4] Attachment kit also available without motor (when ordering: enter "00" for motor); for motor attachment kit for customer motor see chapter "Motor attachment".
[5] For motor types see chapter "IndraDyn S - Servo motors"
[6] Lube connection for LSS, LCF, LPG, LHG; for LFL lubrication: Housing without lube connection
[7] Slot for sensor profile

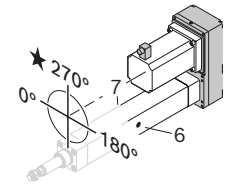
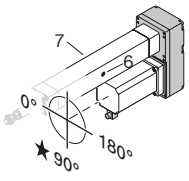
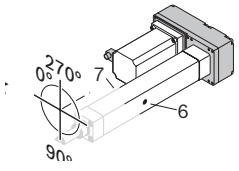
Flange	Motor connector position			
	0 °	90 °	180 °	270 °
MF01	000	090 ★	180	270

★ Standard delivery



Example:
Flange MF01
Motor connector position 90°

Motor attachment		Motor					Drive package		Documentation
									
Gear ratio	Attachment kit[4]	Motor code[5]	Cable 2 cables: without brake	Cable 2 cables: with brake	1 cable: without brake	1 cable: with brake	Motor connector position	Controller	Cables	Standard report
	00	without	00				00 / 090 / 180 / 270	➠Chapter "Drive package"		01 Standard report/ 02 Measurement of frictional torque 03 Lead deviation
	23	MS2N06-D0BRN	–	–	243	244				
		MS2N06-E0BRN	–	–	251	252				
	24	MS2N07-C0BQN	–	–	259	260				
		MS2N07-D0BRN	295	296	–					
		MS2N07-E0BQN	297	298						
i = 1	203	MS2N06-D1BNN	–	–	247	248				
	79	MS2N07-C1BRN	–	–	263	264				
		MS2N07-D0BRN	295	296	–					
		MS2N07-E0BQN	297	298						
i = 2	204	MS2N06-C0BTN	–	–	239	240				
		MS2N06-D0BRN	–	–	243	244				
		MS2N06-E0BRN	–	–	251	252				
	205	MS2N07-B1BNN	–	–	255	256				
		MS2N07-C0BQN	–	–	259	260				
		MS2N07-D0BRN	295	296	–					
	00	without	00							
	27	MS2N07-E0BQN	297	298	–					
	28	MS2N10-D0BHA	291	292						
		MS2N10-E0BHA	293	294						
i = 1	85	MS2N07-E1BNN	299	300						
	86	MS2N10-D0BHA	291	292						
i = 1.5	88	MS2N07-D1BNN	–	–	269	270				
		MS2N07-E1BNN	299	300	–					
	89	MS2N10-C0BNN	289	290	–					
		MS2N10-D0BHA	291	292						

RV01	RV02	RV03
		

Belt side drive	Motor connector position 0 °	90 °	180 °	270 °
RV01	000	–	180	270 ★
RV02	000	090 ★	180	–
RV03	000 ★	090	–	270

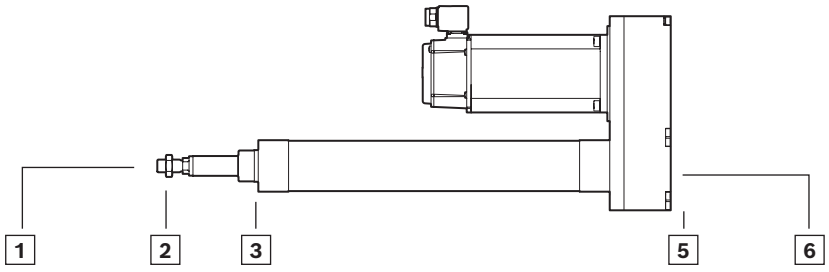
★ Standard delivery

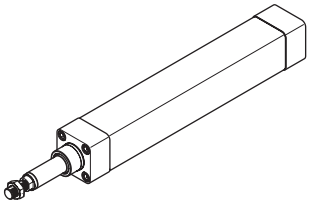
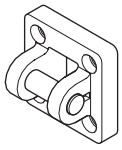
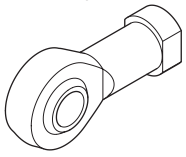
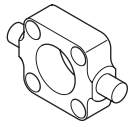
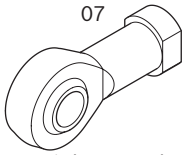
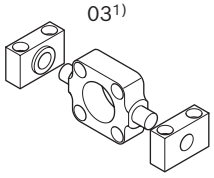
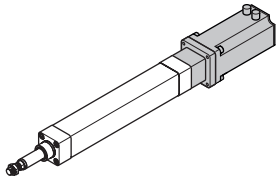
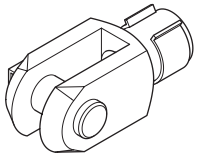
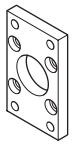
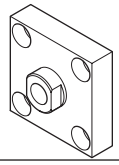
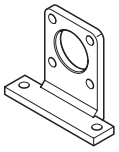
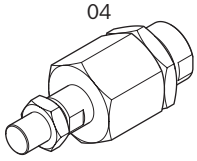
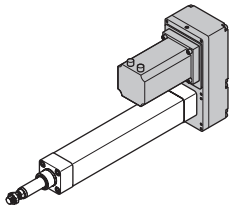
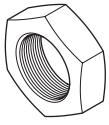
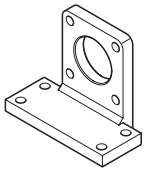
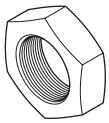
Example:
Belt side drive RV02
Motor connector position 90°

Explanation of the order parameters and ordering example ➠ Chapter "Ordering example".

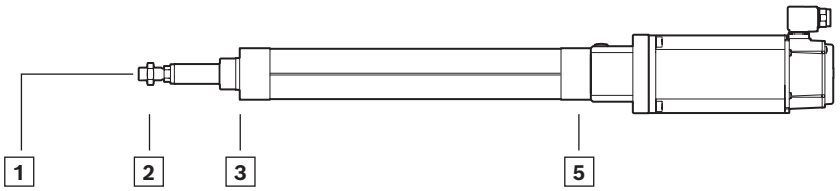
Fastening elements

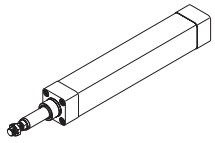
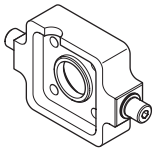
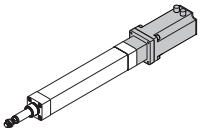
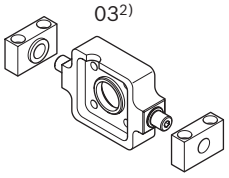
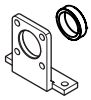
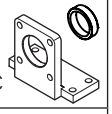
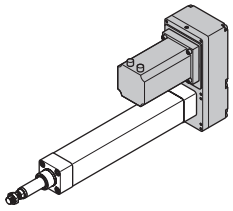
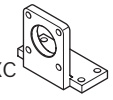
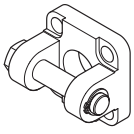
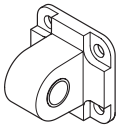
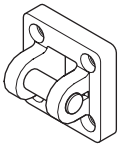
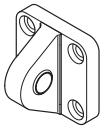
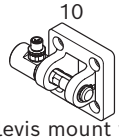
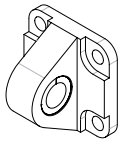
Fastening element



Version	**Group**			
	1	**2**	**3**	**4**
	00 without	00 without	00 without	00 without
without motor attachment OF01 	01 	01 	01[1] 	
	02  Clevis mount with force measuring bolt	07  Stainless steel	03[1] 	
with flange and coupling MF01 		02 	04 	
		03 	06 EMC-32 - EMC-50 	
		04 		
with belt side drive RV01 to RV03 		05 	EMC-63 - EMC-100XC 	
		06  Stainless steel		

[1] Only permissible vertically
[2] Fastening elements are supplied assembled when version with flange and coupling is selected

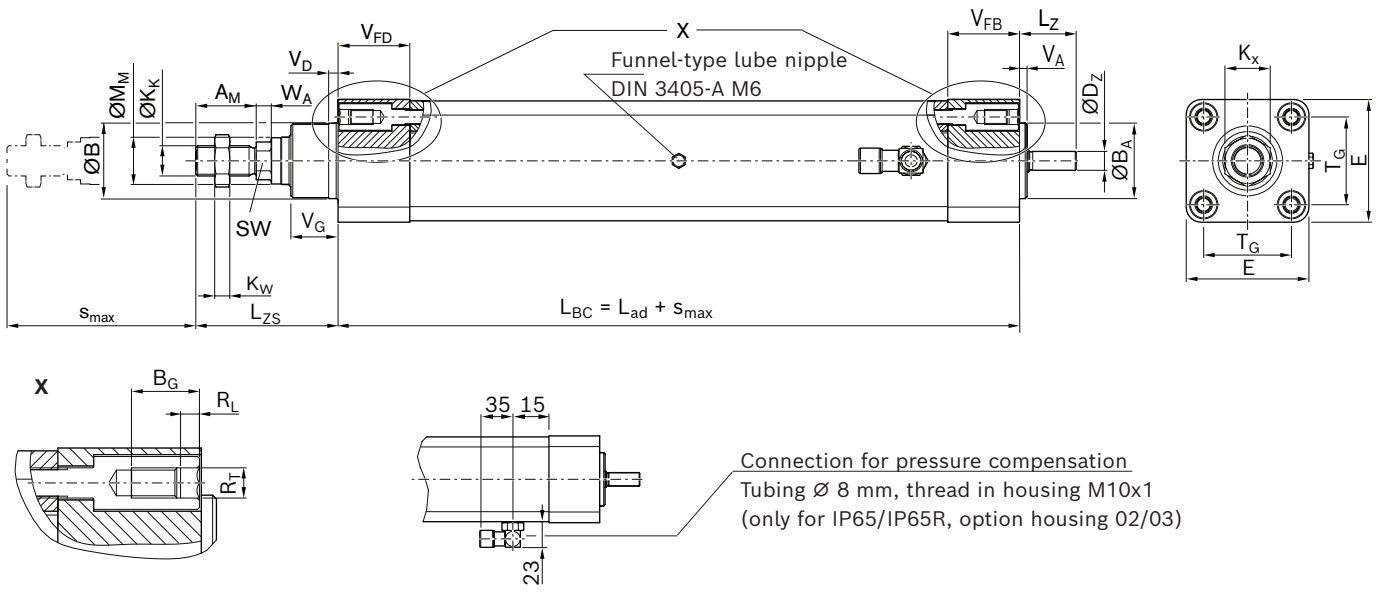


Version	Group			
	5		6	
	00	without	00	without
without motor attachment OF01 	01[2)] 			
with flange and coupling MF01 	03[2)] 			
	05[2)] EMC-32 - EMC-50  EMC-63 - EMC-100XC 			
with belt side drive RV01 to RV03 	06 EMC-32 - EMC-50  EMC-63 - EMC-100XC 			
	07 		01 EMC-32 - EMC-50  EMC-63 - EMC-100XC 	02 
	08 		03 EMC-32 - EMC-50  EMC-63 - EMC-100XC 	04 
	10  Clevis mount with force measuring bolt		05 	

Note: Fastening elements are included

Dimension drawing EMC

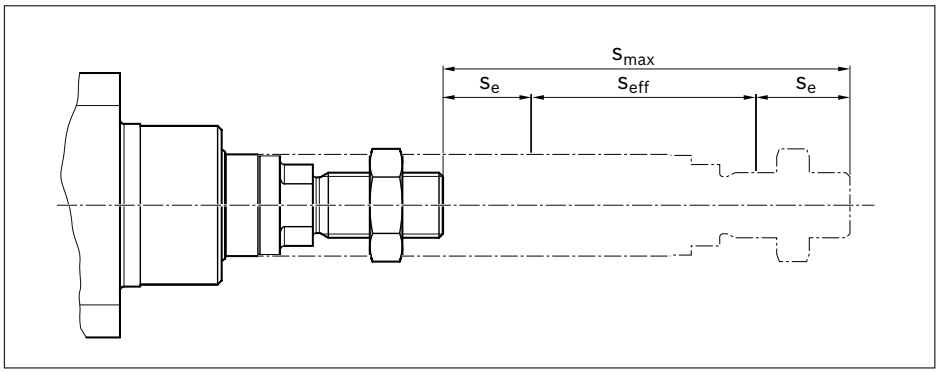
OF01



EMC	BASA	Dimensions (mm)							
		A_M	B_{d11} / $B_{A\ h7}$	$D^{Z\ h7}$	E	K_K	K_W	K_X	L_{ZS}
	d_0 x P	-0.1			±0.1				
32	12 x 5	22	30	5	47	M10x1.25	6	17	55.00
	12 x 10								
40	16 x 5	24	35	8	53	M12x1.25	7	19	61.50
	16 x 10								
	16 x 16								
50	20 x 5	32	40	10	65	M16x1.5	8	24	76.75
	20 x 10								
	20 x 20								
63	25 x 5	32	45	15	75	M16x1.5	8	24	76.50
	25 x 10								
	25 x 25								
80	32 x 5	40	55	18	95	M20x1.5	10	30	94.50
	32 x 10								
	32 x 20								
	32 x 32								
100	40 x 5	40	65	25	115	M20x1.5	10	30	99.25
	40 x 10								
	40 x 20								
	40 x 40								
100XC	50 x 10	72	75	32	115	M36x2	18	55	144.00
	50 x 20								

Effective stroke

Excess travel must be greater than braking distance. The acceleration travel can be adopted as the guideline value for the braking distance.



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

s_e	=	Excess travel	(mm)
s_{eff}	=	Effective stroke	(mm)
s_{max}	=	Maximum travel range	(mm)

Length calculation:

Overall length of EMC for motor attachment with flange and coupling = $L_{zs} + s_{max} + L_{ad} + L_f + L_m$

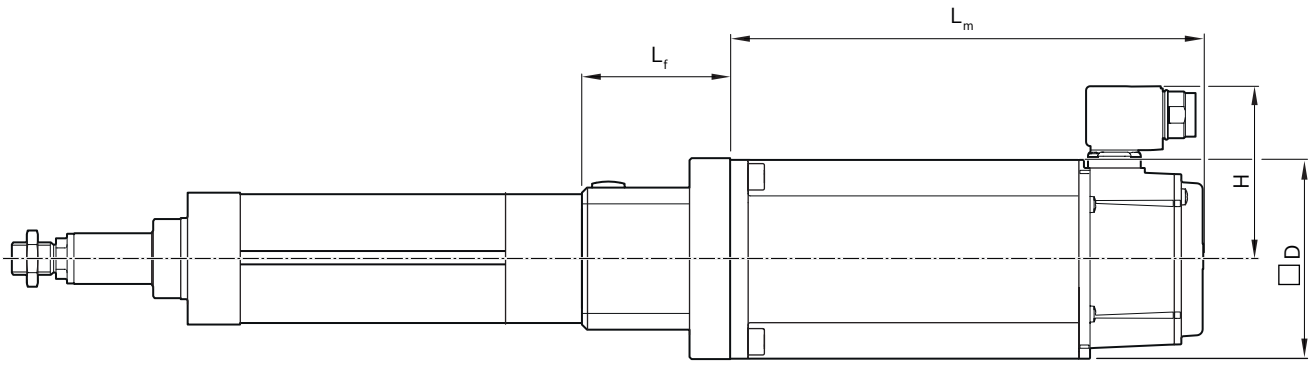
Overall length of EMC for motor attachment with belt side drive = $L_{zs} + s_{max} + L_{ad} + G$

(for L_f, L_m and G, see following page)

L_{ad}	L_Z	$M_{M\ f8}$	R_T	B_G	R_L	SW	T_G	V_A ±0.1	V_D	V_{FB}	V_{FD}	V_G ±0.1	W_A
132	18	18	M6	18	4	10	32.5	4	5	30	30	16	6
136													
134	25	20	M6		4	13	38.0			33		20	6
143													
159													
142	30	25	M8		5	17	46.5			38	38	25	8
161													
180													
148	35	30	M8		5	17	56.5			40			
167													
199													
163	46	38	M10	22	6	22	72.0			44	45	33	10
187													
195													
230													
171	57	50	M10		6	22	89.0			54		38	10
185													
203													
258													
316	62	60	M12	28	7	36	89.0			121	62	38	18
338													

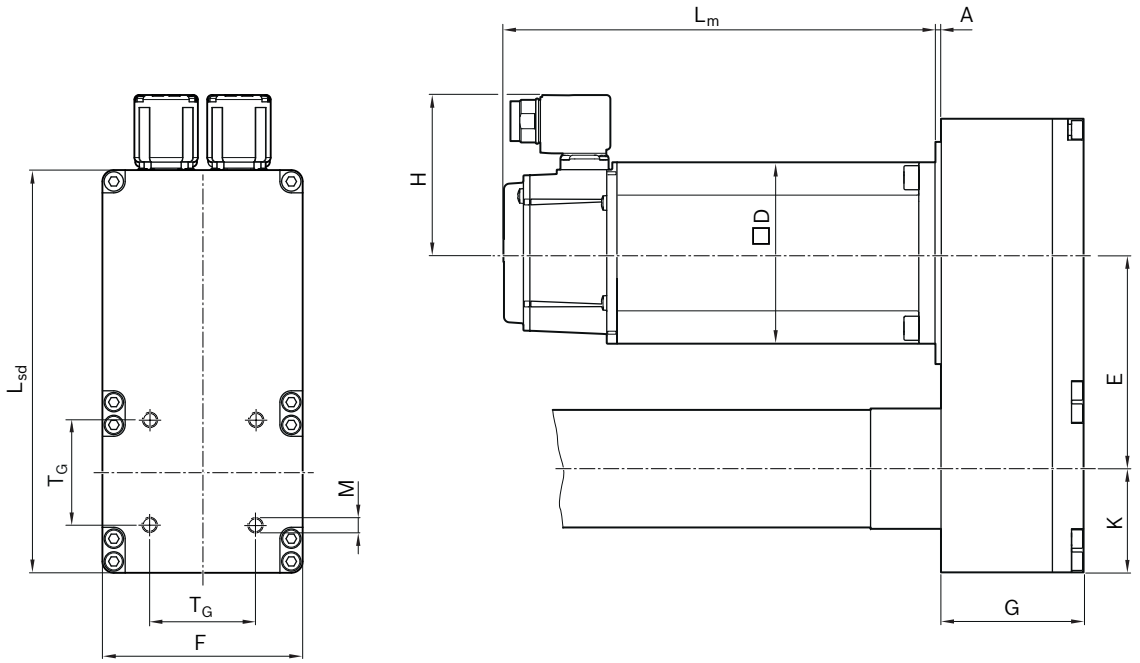
Dimension drawing for motor attachment with flange and coupling

MF01



Dimension drawing for motor attachment with belt side drive

RV01, RV02, RV03



EMC	for motor	i	Dimensions (mm)														
			A	E	K	G	□ D	H	L_m without brake	L_m with brake	L_{sd}	L_f	F	T_G	M	Max. permissible screw-in depth[1]
32	MSM019B	1	2.0	67.3	30.5	37.0	38	32.0	92.0	122.0	130	55	54.0	32.5	M6	10.5
	MSM031B	1	2.0	62.8	33.0	45.5	60	43.0	79.0	115.5	138		64.5			16.0
	MS2N03B	1	–				54	71.5	188.0	213.0						
40	MSM031C	1	2.0	62.8	33.0	45.5	60	42.0	98.5	135.0	138	61	64.5	38.0	M6	16.0
		1.5	2.0	65.3												
	MS2N03B	1	–	62.8			54	71.5	188.0	213.0						
		1.5	–	65.3												
	MS2N04	1	–	82.2	44.0	55.5	82	83.5	185.5	215.5	177		88.0			
		1.5	–	81.5												
50	MSM031C	1	0.5	82.2	44.0	55.5	60	43.0	99.0	135.0	177	73	88.0	46.5	M8	16.0
		1.5	0.5	81.5												
	MSM041B	1	3.0	82.2			80	53.0	112.0	149.0						
		1.5	3.0	81.5												
	MS2N04	1	–	82.2			82	83.5	185.5	215.5						
		1.5	–	81.5												
	MS2N05	1	3.0	117.2	56.0	77.0	96	85.5	203.0	233.0	245		116.0			
63	MSM041B	1	3.0	117.2	56.0	77.0	80	53.0	112.0	149.0	245	95	116.0	56.5	M8	16.0
		2	3.0	116.2												
	MS2N04	1	3.0	117.2			82	83.5	185.5	215.5		88				
		2	3.0	116.2												
	MS2N05	1	3.0	117.2			98	85.5	203.0	233.0		95				
		2	3.0	116.2												
	MS2N06	1	–	117.2			116	98.5	226.0	259.0						
80	MS2N05	1	3.0	116.2	56.0	77.0	98	85.5	203.0	233.0	245	100	116.0	72.0	M10	16.0
		2	3.0	117.2												
	MS2N06	1	2.5	149.7	77.0	102.0	116	98.5	226.0	259.0	324		160.0			
		2	2.5	151.4												
	MS2N07	1	6.0	149.7			140	110.0	292.5	292.5		110				
100	MS2N06	1	2.5	149.7	77.0	102.0	116	98.5	226.0	259.0	324	119	160.0	89.0	M10	16.0
		2	2.5	151.4												
	MS2N07	1	3.0	149.7			140	110.0	292.5	292.5						
		2	3.0	151.4												
100XC	MS2N07	1	3.0	174.7	89.0	113.5	140	132.0	352.0	387.0	375	143	197.0	89.0/ 140.0	M12/ M16	24.0
		1.5	3.0	175.6												
	MS2N10	1	4.0	174.7			192	166.0	410.0	410.0		145				
		1.5	4.0	175.6												

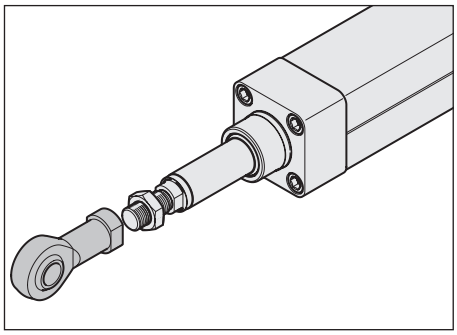
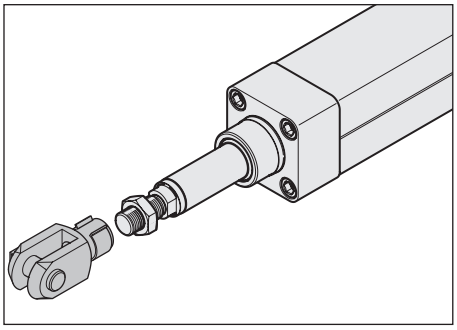
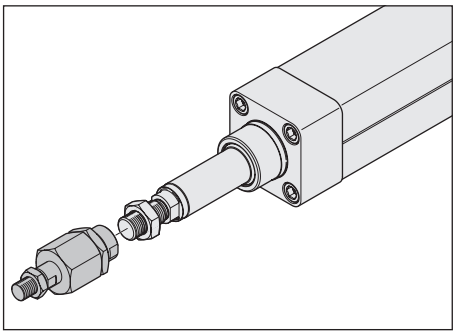
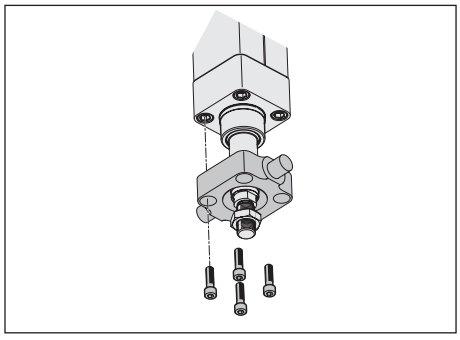
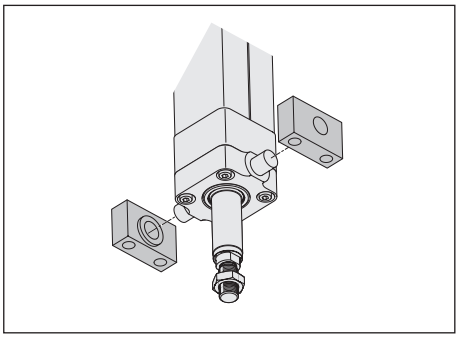
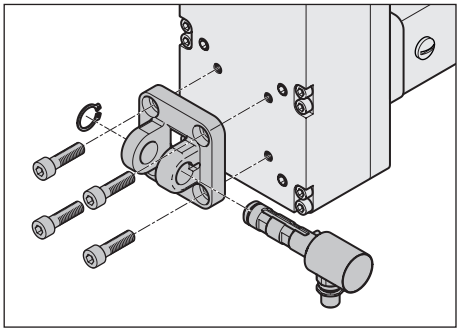
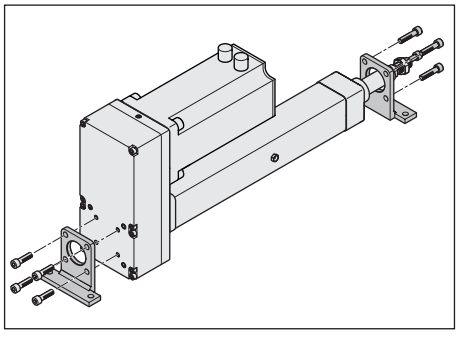
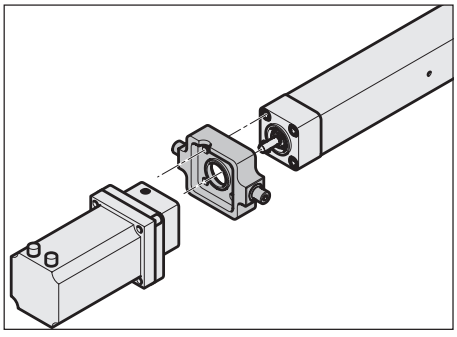
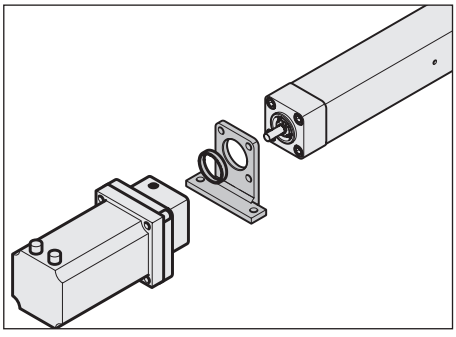
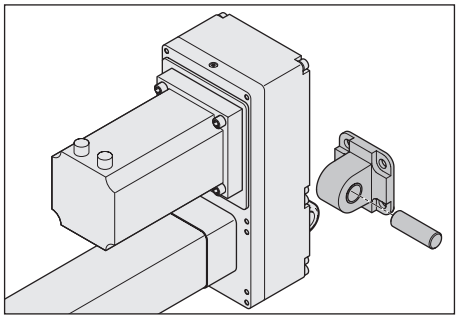
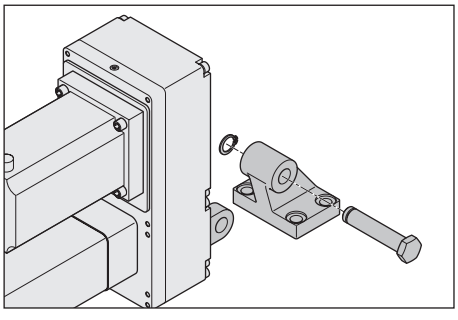
[1] Do not exceed max. permissible screw-in depth for "M" threads

Fastening

⚠When you order an EMC with flange, motor and foot mounting or trunnion on the bottom, the unit is delivered fully assembled. When assembling these fastening elements retrospectively to the cylinder base, the flange first needs to be disassembled.
The "Instructions EMC", R320103102 that are part of the product must be observed.

The fastening elements are mounted on the rear of the belt side drive. The screws are included with the fastening elements.
Before mounting the fastening elements, remove the set screws on the belt side drive.

Examples

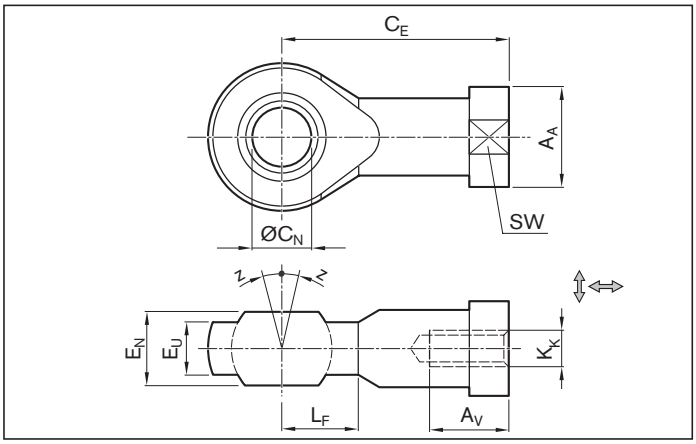












Fastening elements

Female spherical rod end bearing

Group 2 Option 01 Galvanized steel

Group 2 Option 07 Stainless steel



EMC	Material number		Dimensions (mm)										m
	Steel galvanized	Stainless steel	A_A	A_V min.	C_E	$ØC_N$ H7	E_N -0.1	E_U max.	K_K	L_F	SW	Z (°)	(kg)
32	R349938500	R349951600	19	15	43	10	14	11.5 (10.5)	M10x1.25	14	17	4 (7)	0.070 (0.10)
40	R349938600	R349951700	22	18 (16)	50	12	16	12.5 (12)	M12x1.25	16	19	4 (7)	0.105 (0.12)
50	R349938700	R349951800	29	24	64	16	21	15.5 (15)	M16x1.5	21	24	4 (8)	0.210 (0.23)
63													
80	R349938900	R349951900	34	30 (33)	77	20	25	18.5 (18)	M20x1.5	25	30 (32)	4 (8)	0.380 (0.42)
100													
100XC	R349951500	R349952000	60 (53)	56 (53)	125	35	43 (35)	32 (24)	M36x2	40 (37)	50 (–)	4 (6)	2.000 (1.40)

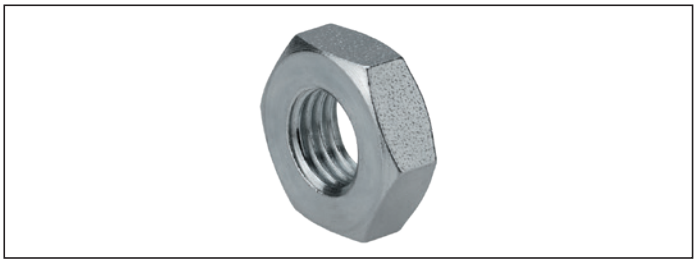
Bracketed values for "stainless steel" version

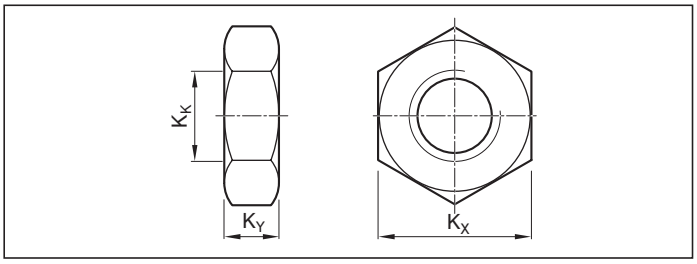
Fastening elements

Hexagon nut

One included with the EMC

Group 2 Option 05 Galvanized steel | **Group 2 Option 06 Stainless steel**





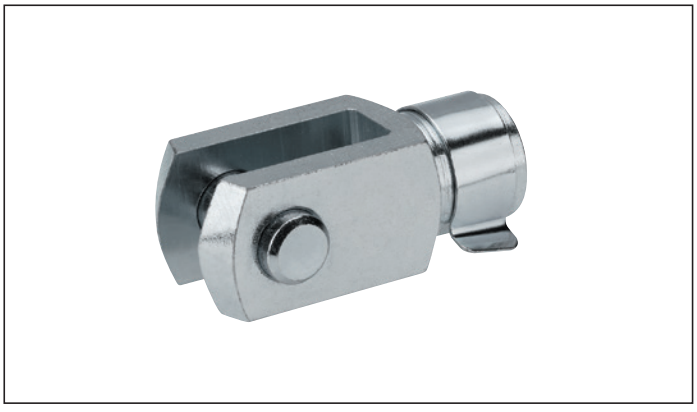
EMC	Material number		Dimensions (mm)			m
	Galvanized steel	Stainless steel	K_K	K_X	K_Y	(kg)
32	1823A00020	2990600303	M10x1.25	17	6 (5)	0.010
40	1823A00021	2990600304	M12x1.25	19	6	0.012
50	1823300030	2990600305	M16x1.5	24	8	0.017
63						
80	1823300031	2990600308	M20x1.5	30	10	0.030
100						
100XC	8103190414	2990600316	M36x2	55 (50)	18 (16)	0.175 (0.15)

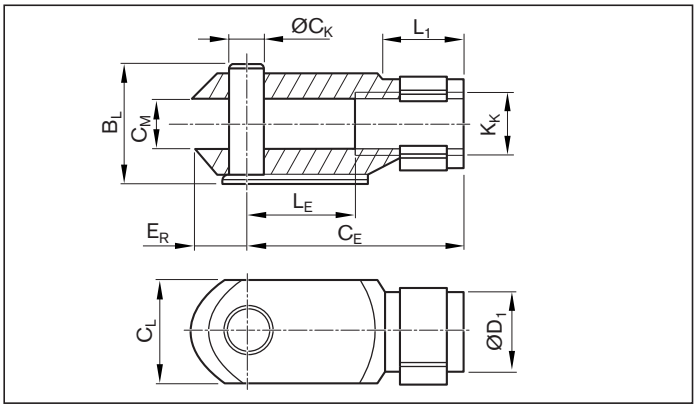
Bracketed values for "stainless steel" version

Fork clevis with internal thread

Material: Galvanized steel

Group 2 Option 02



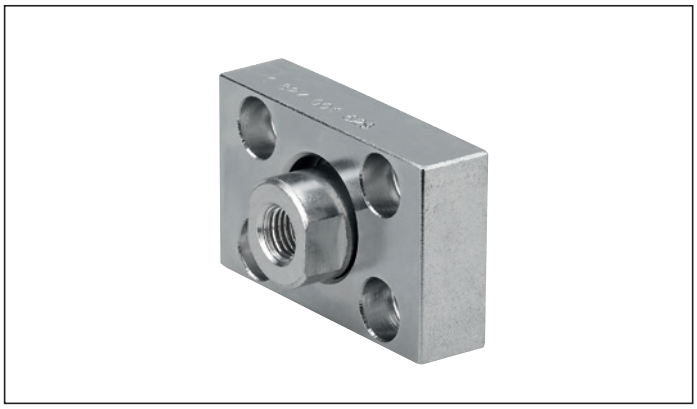


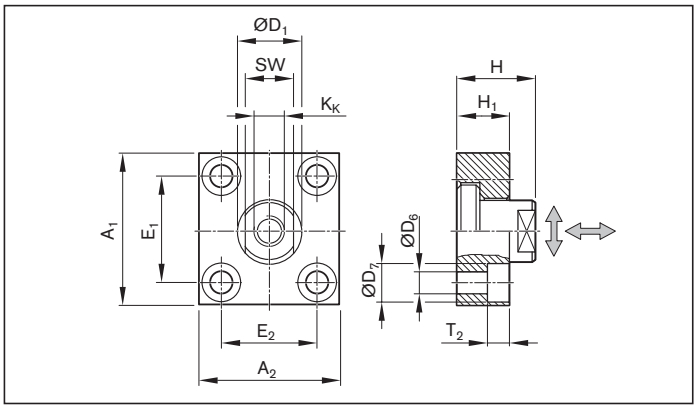
EMC	Material number	Dimensions (mm)										m
		B_L	C_E	$ØC_K$ e11	C_L	C_M	$ØD_1$	E_R	K_K	L_1	L_E	(kg)
32	R349939100	26	40	10	20	10	18	12	M10x1.25	15.0	20	0.10
40	R349939200	31	48	12	24	12	20	14	M12x1.25	18.0	24	0.15
50	R349939300	39	64	16	32	16	26	19	M16x1.5	24.0	32	0.35
63												
80	R349939500	50	80	20	40	20	34	20	M20x1.5	30.0	40	0.70
100												
100XC	R349951000	80	144	35	70	35	60	57	M36x2	54.5	72	1.40

Flexible coupling with fastening plate

Material: Galvanized steel

Group 2
Option 03



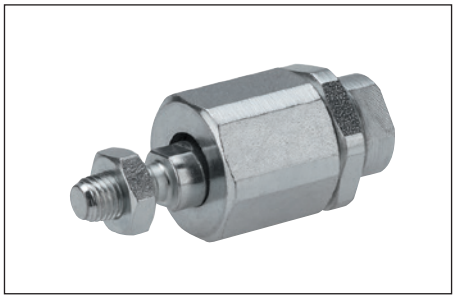


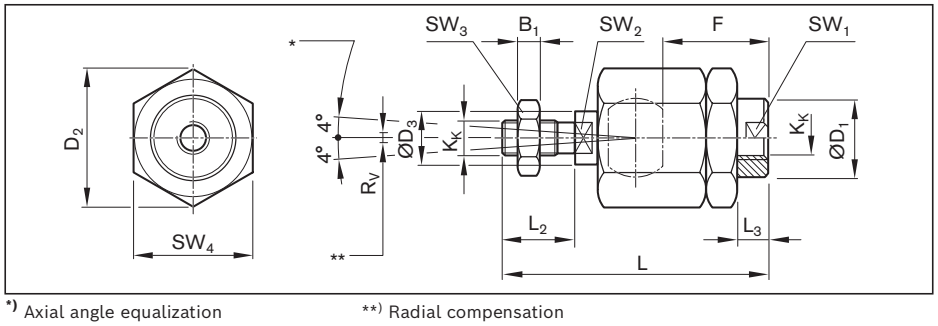
EMC	Material number	Dimensions (mm)													m	F_{max}
		A_1	A_2	ØD1 H11	ØD6 H13	ØD7 H13	E_1	E_2	H_1	H	K_K	SW	T_2	Clearance (min./max) ⇔ axial	Clearance (min./max) ⇕ radial	(kg)	(N)
32	R349939700	60	37	20	6.6	11	36±0.15	23±0.15	15	24	M10x1.25	17	7			0.30	$F_{max\ EMC}$
40	R349939800	60	56	25	9.0	15	42±0.20	38±0.20	20	30	M12x1.25	19	9			0.40	$F_{max\ EMC}$
50	R349939900	80	80	30	11.0	18	58±0.20	58±0.20	20	32	M16x1.5	24	11	0.4 – 0.8	1.9 – 2.3	0.90	$F_{max\ EMC}$
63																	$F_{max\ EMC}$
80	R349940100	90	90	40	14.0	20	65±0.30	65±0.30	20	35	M20x1.5	36	13			1.15	$F_{max\ EMC}$
100																	28 000
100XC	R349951100	125	125	60	18.0	26	90±0.30	90±0.30	30	55	M36x2	50	17	0.4 – 0.95	2.8 – 3.4	3.40	44 000

Flexible coupling

Material: Galvanized steel

Group 2
Option 04





*) Axial angle equalization

**) Radial compensation

EMC	Material number	Dimensions (mm)															m	F_{max}
		B_1	ØD1	D_2	ØD3	F	K_K	L ±2	L_2	L_3 ±1	SW_1	SW_2	SW_3	SW_4	R_V	Axial backlash	(kg)	(N)
32	R349937900	6	22	32	14	23	M10x1.25	74.5	23	7.5	19	12	17	30	0.7	0.05 – 0.5	0.21	$F_{max\ EMC}$
40	R349938000	7	22	32	14	22	M12x1.25	75.0	24	13.0	19	12	19	30	0.7	0.05 – 0.5	0.21	$F_{max\ EMC}$
50	R349938100	8	32	45	22	30	M16x1.5	103.0	30	9.0	30	20	24	41	1.0	0.05 – 0.5	0.65	$F_{max\ EMC}$
63																		10 300
80	R349938300	10	32	45	22	40	M20x1.5	119.0	40	19.0	30	20	30	41	1.0	0.05 – 0.5	0.68	10 300
100																		
100XC	R349950900	18	80	80	38	86	M36x2	241	72	18.2	50	36	55	75	1.5	0.05 – 0.2	5.40	15 000

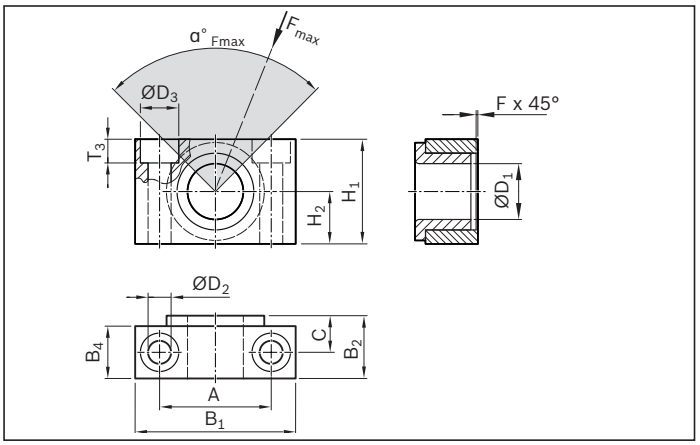
Radial clearance 0 – 2 mm

Fastening elements

Bearing for trunnion

Material: Galvanized steel, with female connectors made of sintered bronze. Delivered in pairs

Group 3 Option 03 | Group 5 Option 03



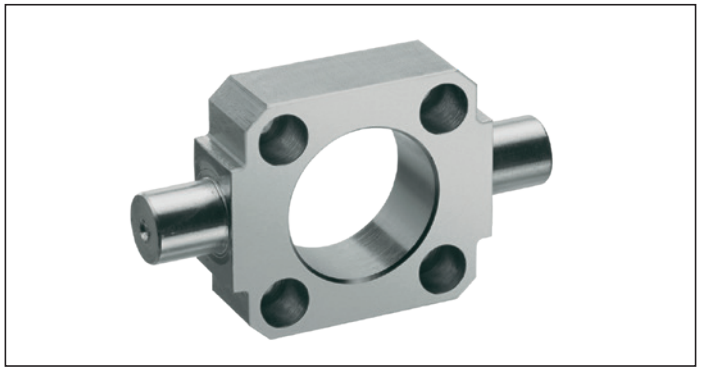
Note: Bearing for trunnion for vertical load; if α F_{max} is not complied with, a positive lock must be added

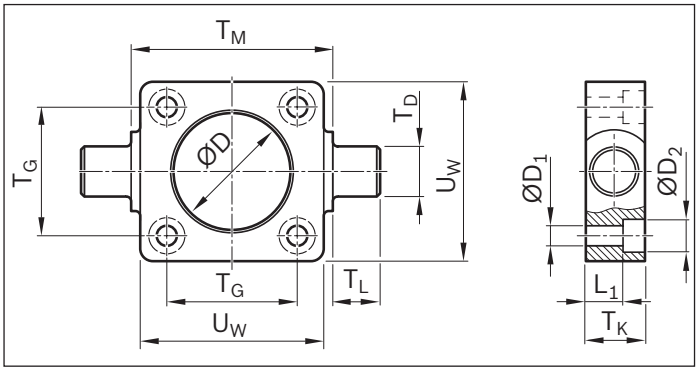
EMC	Material number	Dimensions (mm)												α°F_{max}
		A ±0.2	B_1 f8	B_2	B_4	C	ØD_1 H7	ØD_2 H12	ØD_3 H13	F x 45°	H_1	H_2 ±0.1	T_3 −0.4	
32	R349940900	32	46	18.0	15	10.5	12	6.6	11	1.0	30	15	6.8	180
40	R349941000	36	55	21.0	18	12.0	16	9.0	15	1.6	36	18	9.0	180
50														180
63	R349941200	42	65	23.0	20	13.0	20	11.0	18	1.6	40	20	11.0	110
80														70
100	R349941400	50	75	28.5	25	16.0	25	14.0	20	2.0	50	25	13.0	80
100XC														30

Trunnion for cover (only for vertical installation of EMC)

Material: Galvanized cast iron with spheroidal graphite. Fastening screws included in scope of delivery.

Group 3 Option 01 | Group 3 Option 03



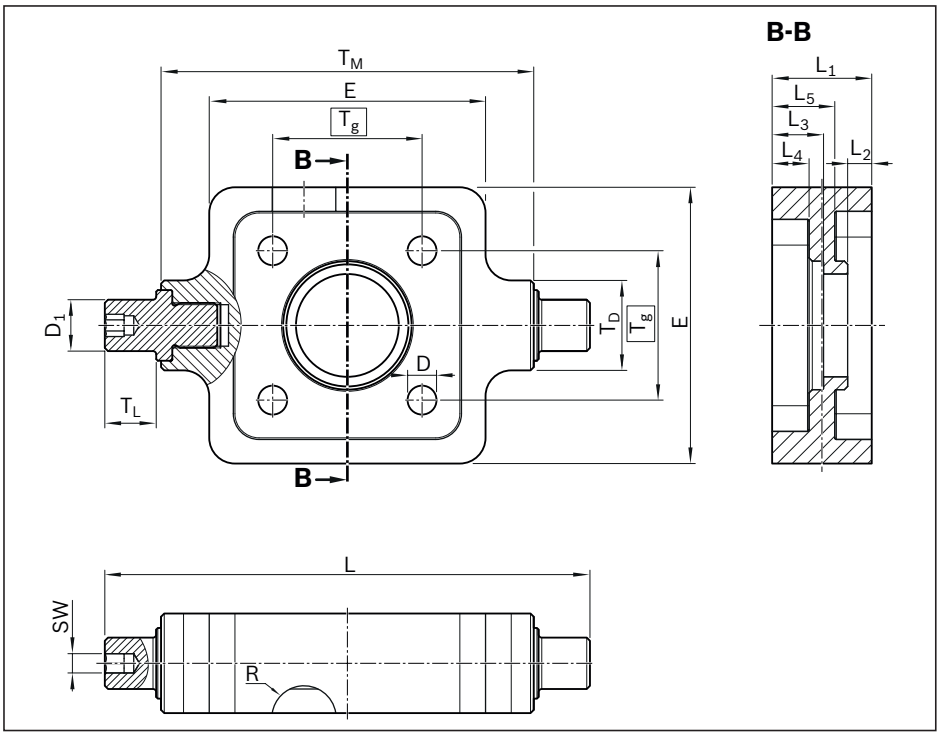


EMC	Material number	Dimensions (mm)										m
		ØD H11	ØD_1	ØD_2	L_1	T_D e9	T_G ±0.2	T_K	T_L h14	T_M h14	U_W	(kg)
32	R349940300	30	6.6	11	7.5	12	32.5	16	12	50	48	0.29
40	R349940400	35	6.6	11	7.5	16	38.0	20	16	63	56	0.50
50	R349940500	40	9.0	15	10.0	16	46.5	24	16	75	65	0.70
63	R349940600	45	9.0	15	10.0	20	56.5	24	20	90	75	1.10
80	R15615A001	55	11.0	18	16.0	20	72.0	28	20	110	100	1.50
100	R15616A001	65	11.0	18	25.5	25	89.0	38	25	132	120	2.70
100XC	R15617A001	75	13.5	20	25.5	25	89.0	38	25	132	120	3.88

Trunnion, for base

Material: Galvanized steel. Fastening screws included in scope of delivery.

Group 5 Option 01 | Group 5 Option 03



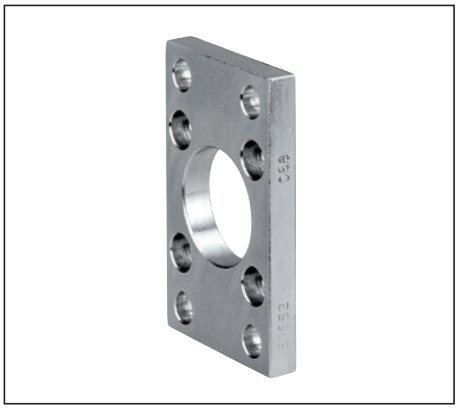
EMC	Material number	Dimensions (mm)															m
		ØD H13	$ØD_1$ h7	L	L_1 ±0.5	L_2 ±0.2	L_3 ±0.2	L_4 ±0.5	L_5 ±0.5	T_D ±0.5	T_g	T_M ±0.3	T_L ±0.2	E ±0.5	R	SW	(kg)
32	R15611B013	6.6	12	115	25	5.5	14.0	9.5	15.5	22	32.5	90	12	60	10	6	0.472
40	R15612B013	6.6	16	135	28	6.5	15.0	10.5	17.5	28	38.0	100	16	65	10	6	0.657
50	R15613B013	9.0		151	31	7.5	16.0	11.5	19.5	28	46.5	116		86	10		1.141
63	R15614B013	9.0	20	173	35	7.5	16.5	11.5	23.5	35	56.5	130	20	90	10	8	1.468
80	R15615B013	11.0		193	36	7.5	16.5	11.5	24.5	38	72.0	150		105	10		2.079
100	R15616B013	11.0	25	233	38	7.5	16.5	11.5	26.5	38	89.0	180	25	125	10	12	2.725
100XC	R15617B013	13.5	25	253	44	7.5	16.5	11.5	32.5	45	89.0	200	25	140	11	12	4.480

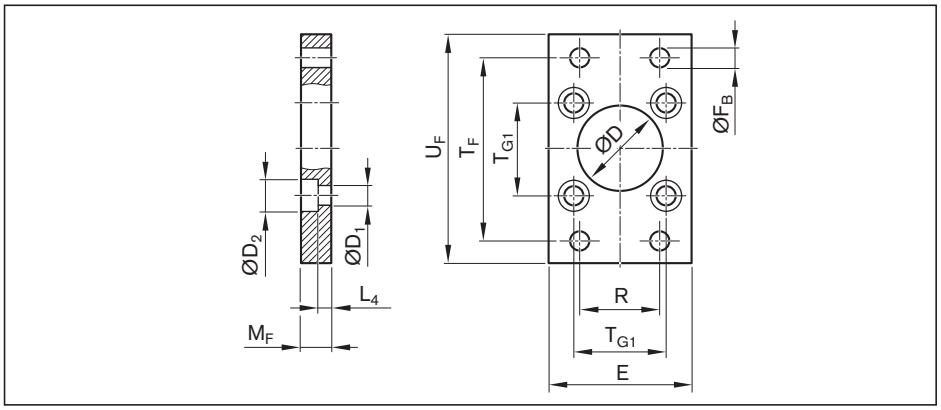
Fastening elements

Flange fastening

Material: Galvanized steel. Fastening screws included in scope of delivery.

Group 3
Option 04





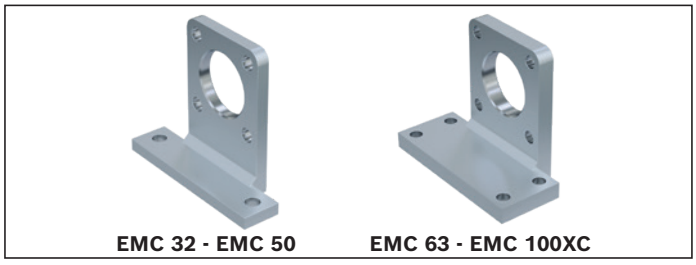
EMC	Material number	Dimensions (mm)											m
		ØD	$ØD_1$	$ØD_2$	E	$ØF_B$	L_4	M_F	R	T_F	T_{G1}	U_F	
		H11	H13	H13	max.			±0.1	±0.2	±0.2	±0.2	±0.2	(kg)
32	R349942100	30	6.6	11	50	7.0	4.5	10	32	64	32.5	80	0.3
40	R349942200	35	6.6	11	55	9.0	4.5	10	36	72	38.0	90	0.4
50	R349942300	40	9.0	15	65	9.0	6.0	12	45	90	46.5	110	0.8
63	R349942400	45	9.0	15	75	9.0	6.0	12	50	100	56.5	125	1.0
80	R15615A002	55	11.0	18	100	12.0	9.0	16	63	126	72.0	154	1.7
100	R15616A002	65	11.0	18	120	14.0	9.0	16	75	150	89.0	186	2.4
100XC	R15617A002	75	13.5	20	120	17.5	12.6	24	75	150	89.0	186	3.0

Foot mounting for assembly on the cover or belt side drive

Material: Galvanized steel

Fastening screws included in scope of delivery

Group 3 Option 06 | Group 5 Option 06



EMC 32 - EMC 50 EMC 63 - EMC 100XC

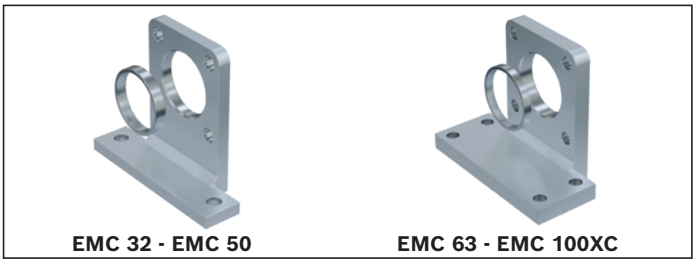
EMC	Material number	m (kg)
32	R15611B105	0.166
40	R15612B105	0.246
50	R15613B105	0.459
63	R15614B105	1.038
80	R15615B105	1.952
100	R15616B105	2.793
100XC	R15617B105	4.147

Foot mounting with centering ring for mounting on the base

Material: Galvanized steel

Fastening screws included in scope of delivery

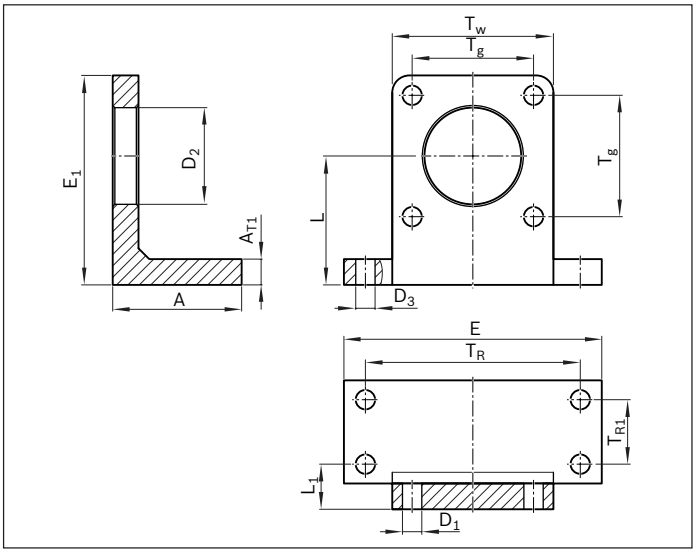
Group 5 Option 05

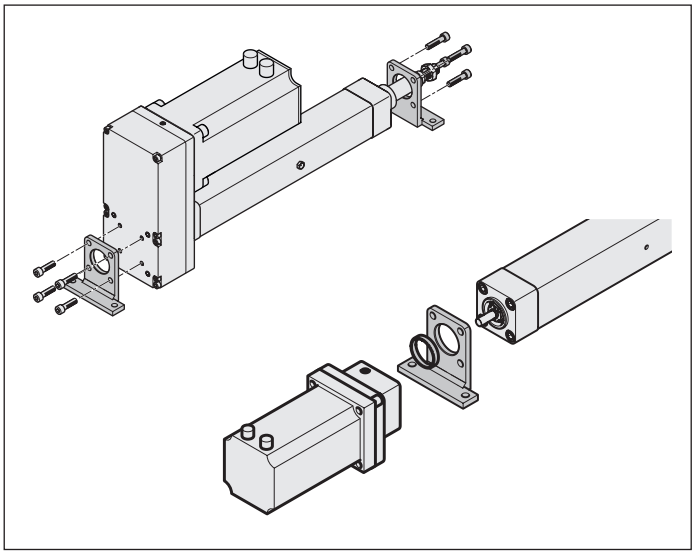


EMC 32 - EMC 50 EMC 63 - EMC 100XC

EMC	Material number	m[1] (kg)
32	R15611B104	0.172
40	R15612B104	0.252
50	R15613B104	0.465
63	R15614B104	1.047
80	R15615B104	1.962
100	R15616B104	2.805
100XC	R15617B104	4.165

[1] including the weight of the centering ring





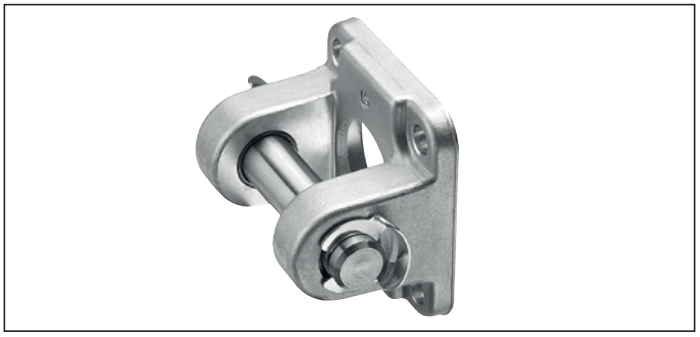
EMC	Dimensions (mm)												
	A ±0.5	A_{T1} ±0.5	ØD_1 H13	ØD_2 H7	ØD_3 H13	E ±0.5	E_1 ±0.5	L ±0.1	L_1	T_R	T_{R1}	T_g	TW ±0.5
32	30	6	6.6	30	6.6	79	57.5	34	18	65	–	32.5	47
40	30	7	6.6	35	9.0	90	71.5	45	18	75	–	38.0	53
50	35	8	9.0	40	9.0	110	93.5	60	21	90	–	46.5	65
63	50	12	9.0	45	9.0	120	98.5	60	21	100	20	56.5	75
80	62	13	11.0	55	11.0	153	129.5	82	27	128	25	72.0	95
100	72	15	11.0	65	14.0	178	140.5	82	27	148	30	89.0	115
100XC	90	21	13.5	75	17.5	188	156.5	99	33	158	45	89.0	115

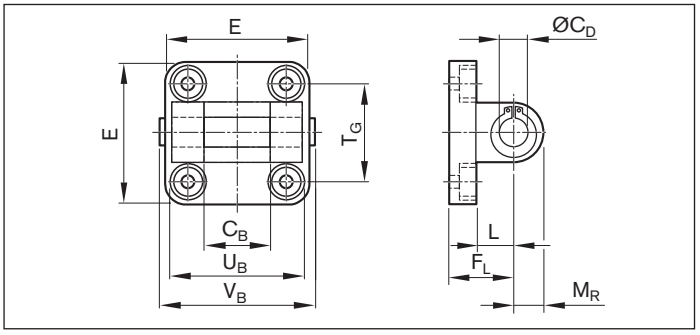
Fastening elements

Clevis mount

Group 5
Option 07

Bolts and fastening screws included in scope of delivery





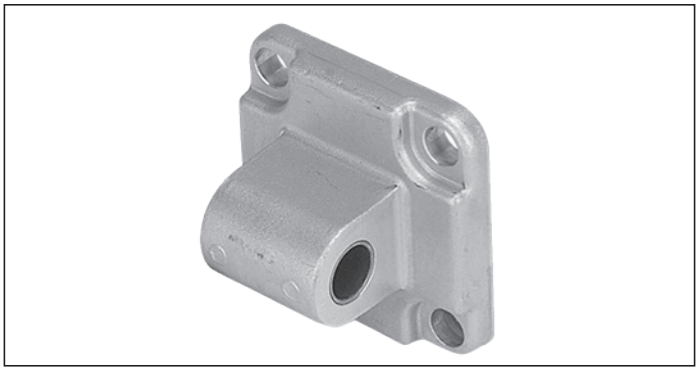
EMC	Material number	Dimensions (mm)									m	F_{max}
		C_B H14	ØC_D H9	E max.	F_L ±0.2	L min.	M_R	T_G ±0.2	U_B h14	V_B	(kg)	(N)
32	R349945700[1]	26	10	49	22	12	10	32.5	45	50.0	0.09	$F_{max\ EMC}$
40	R349945800[1]	28	12	53	25	15	13	38.0	52	57.0	0.11	$F_{max\ EMC}$
50	R349945900[1]	32	12	63	27	15	13	46.5	60	65.0	0.18	$F_{max\ EMC}$
63	R349946000[1]	40	16	73	32	18	17	56.5	70	76.0	0.25	10 900
80	R349946100[1]	50	16	98	36	20	17	72.0	90	96.0	0.51	13 100
100	R349946200[1]	60	20	115	41	25	18	89.0	110	117.0	0.70	16 400
100XC	R15617B026[2]	90	30	177	55	35	31	140.0	170	180.5	2.14	$F_{max\ EMC}$

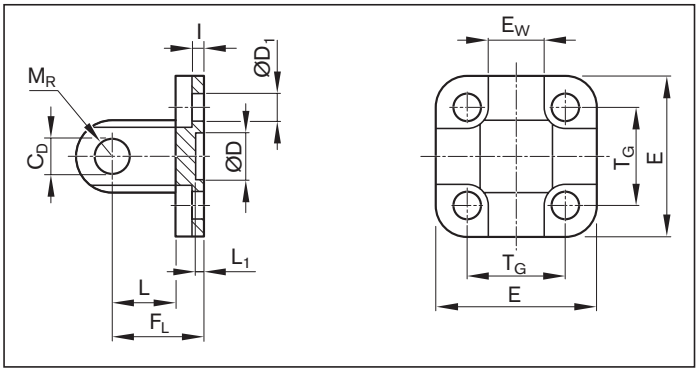
[1] Material: Aluminum
[2] Material: Galvanized cast iron with spheroidal graphite

Swivel mount

Group 6
Option 02

Fastening screws included in scope of delivery





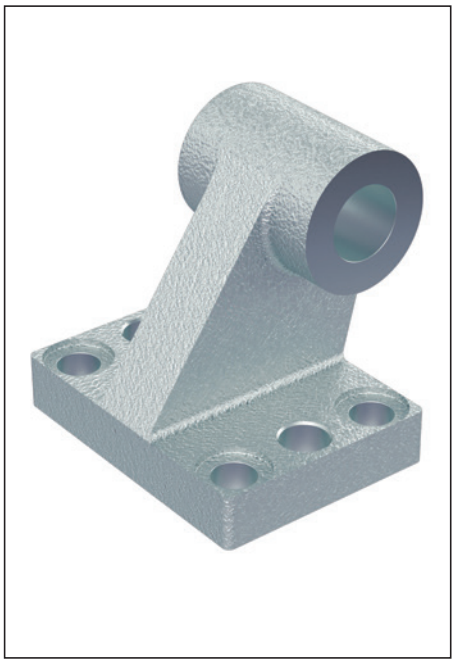
EMC	Material number	Dimensions (mm)												m	F_{max}
		C_D H9	ØD H11	D_1 H13	E	E_W −0.2/−0.6	F_L ±0.2	I ±0.5	L min.	L_1 min.	M_R max.	T_G ±0.2	DIN 912	(kg)	(N)
32	R349948100[1]	10	30	6.6	48	26	22	5.5	12	4.5	10	32.5	M6x18	0.08	$F_{max\ EMC}$
40	R349948200[1]	12	35	6.6	53	28	25	5.5	15	4.5	12	38.0	M6x18	0.11	$F_{max\ EMC}$
50	R349948300[1]	12	40	9.0	63	32	27	6.5	15	4.5	12	46.5	M8x20	0.17	$F_{max\ EMC}$
63	R349948400[1]	16	45	9.0	73	40	32	6.5	20	4.5	16	56.5	M8x20	0.27	10 900
80	R349948500[1]	16	45	11.0	98	50	36	10.0	20	4.5	16	72.0	M10x20	0.50	13 100
100	R349948600[1]	20	55	11.0	115	60	41	10.0	25	4.5	20	89.0	M10x20	0.77	16 400
100XC	1827004867[2]	30	65	13.5	180	90	55	10.0	35	7.0	31	140±0.3	M16x50	2.60	$F_{max\ EMC}$

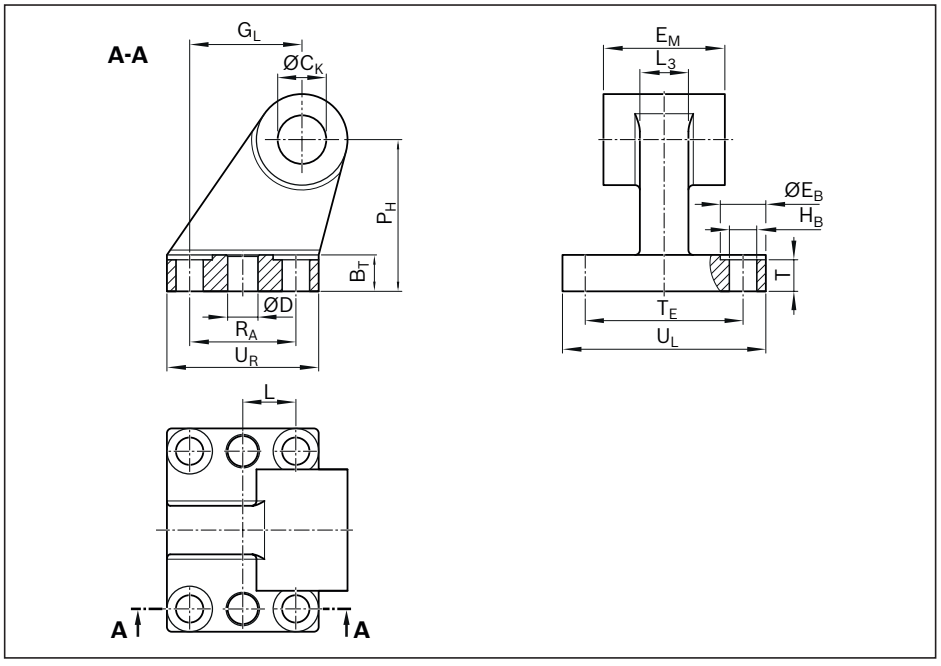
[1] Material: Aluminum
[2] Material: Galvanized cast iron with spheroidal graphite

Bearing block

Material: Galvanized cast iron with spheroidal graphite. Without fastening screws

Group 6
Option 01





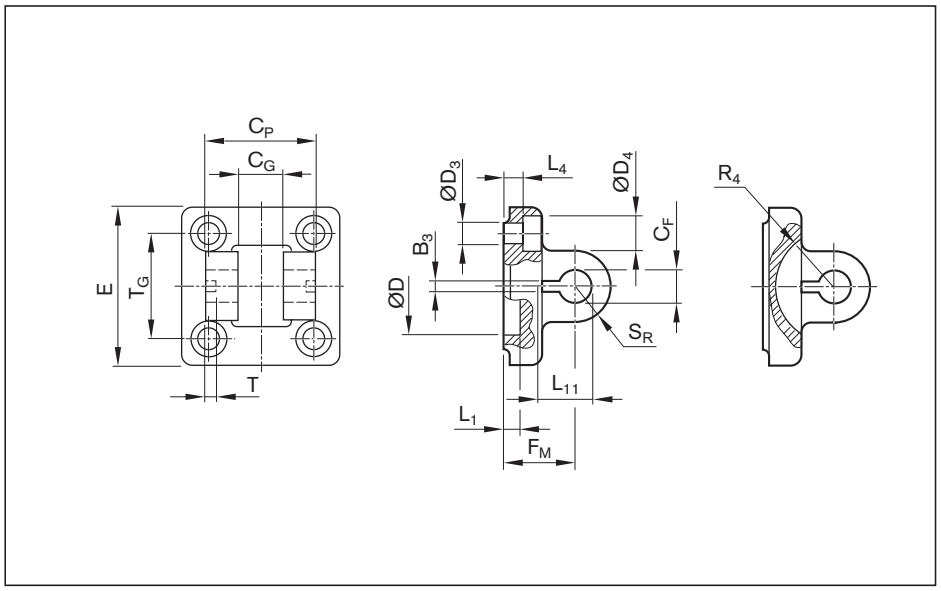
EMC	Material number	Dimensions (mm)																m
		B_R	B_T	$ØC_K$ H9	ØD H11	$ØE_B$ H13	E_M -0.2 -0.6	G_L	$ØH_B$ H13	L ±0.2	L_3	P_H JS15	R_A JS14	T	T_E JS14	U_L	U_R	(kg)
32	R349947500	10.0	8	10	–	10	26	21	6.6	–	10	32	18	4	38	51	31	0.20
40	R349947600	11.0	10	12	–	10	28	24	6.6	–	12	36	22	4	41	54	35	0.30
50	R349947700	13.0	12	12	–	11	32	33	9.0	–	16	45	30	6	50	65	45	0.50
63	R15614A017	15.0	12	16	10	11	40	37	9.0	17.5	16	50	35	6	52	67	50	0.85
80	R15615A017	15.0	14	16	10	15	50	47	9.0	20.0	20	63	40	6	66	86	60	1.40
100	R15616A017	19.0	15	20	10	15	60	55	11.0	25.0	20	71	50	6	76	96	70	1.90
100XC	R15617A017	31.5	25	30	12	26	90	97	14.0	44.0	36	115	88	17	118	156	126	1.90

Fastening elements

Clevis mount

Bolts and fastening screws included in scope of delivery

Group 1 Option 01 **Group 5 Option 08**



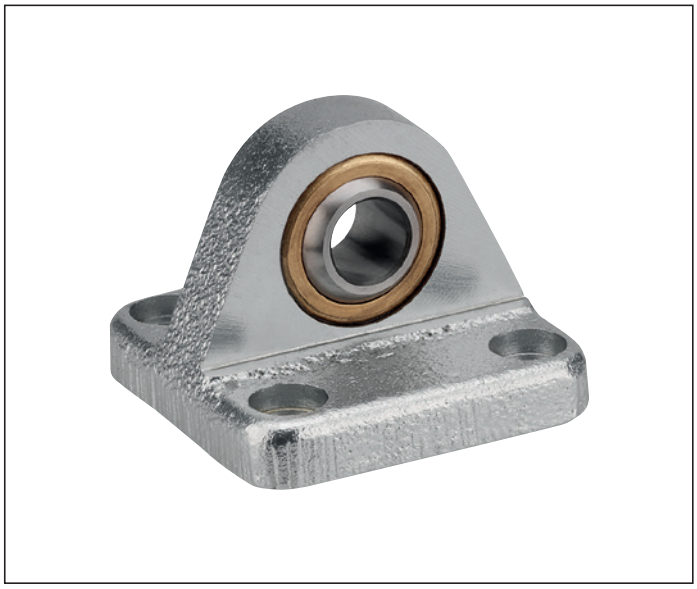
EMC	Material number	Dimensions (mm)																	m	F_{max}
		B_3 ±0.2	C_F F7	C_G D10	C_P d12	$ØD_3$	$ØD_4$	ØD	E	F_M ±0.2	L_1 ±0.5	L_4 ±0.5	L_{11} −0.5	R_4	S_R	T ±0.2	T_G ±0.2	DIN 912	(kg)	(N)
32	R349945100[1)]	3.3	10	14	34	6.6	11	30	49	22	4.5	5.5	16.5	17	11	3	32.5	M6x18	0.22	$F_{max\ EMC}$
40	R349945200[1)]	4.3	12	16	40	6.6	11	35	55	25	4.5	5.5	18.0	20	12	4	38.0	M6x18	0.29	$F_{max\ EMC}$
50	R349945300[1)]	4.3	16	21	45	9.0	15	40	67	27	4.5	6.5	23.0	22	15	4	46.5	M8x20	0.49	$F_{max\ EMC}$
63	R349945400[1)]	4.3	16	21	51	9.0	15	45	77	32	4.5	6.5	23.0	25	15	4	56.5	M8x20	0.68	14 500
80	R349945500[1)]	4.3	20	25	65	11.0	18	45	97	36	4.5	10.0	27.0	30	20	4	72.0	M10x20	1.39	17 800
100	R349945600[1)]	4.3	20	25	75	11.0	18	55	117	41	4.5	10.0	27.0	32	20	4	89.0	M10x20	2.04	22 900
100XC	1827001600[2)]	6.3	35	43	122	18.0	26	65	180	55	10.0	10.0	45.0	46	26	6	140.0	M16x50	2.13	$F_{max\ EMC}$

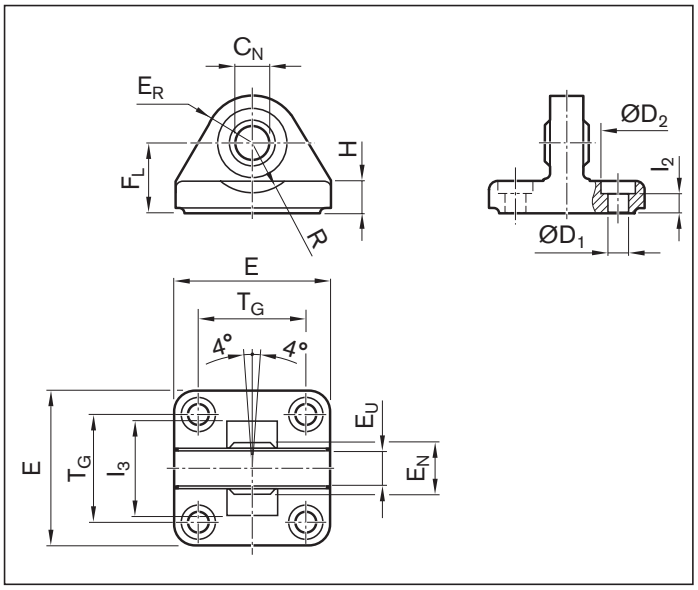
[1)] Material: Aluminum (forged)
[2)] Material: Galvanized spheroidal graphite iron

Swivel bearing

Fastening screws included in scope of delivery

Group 6
Option 04





EMC	Material number	Dimensions (mm)													DIN 912	m	F_{max}
		$ØC_N$ H7	$ØD_1$ H13	$ØD_2$ H13	E	E_N -0.1	E_R	E_U	F_L -0.2	H	l_2	l_3 min.	R	T_G ±0.2		(kg)	(N)
32	R349946900[1)]	10	6.6	11	47	14	15	10.5	22	9.0	5.5	36	12	32.5	M6x18	0.21	$F_{max\ EMC}$
40	R349947000[1)]	12	6.6	11	53	16	18	12.0	25	9.0	5.5	42	15	38.0	M6x18	0.28	$F_{max\ EMC}$
50	R349947100[1)]	16	9.0	15	65	21	20	15.0	27	10.5	6.5	48	19	46.5	M8x20	0.43	$F_{max\ EMC}$
63	R349947200[1)]	16	9.0	15	75	21	23	15.0	32	10.5	6.5	55	21	56.5	M8x20	0.68	14 500
80	R349947300[1)]	20	11.0	18	95	25	27	18.0	36	14.0	10.0	70	24	72.0	M10x20	1.21	17 800
100	R349947400[1)]	20	11.0	18	115	25	30	18.0	41	15.0	10.0	80	25	89.0	M10x20	2.03	22 900
100XC	1827001626[2)]	35	18.0	26	176	43	44	30.0	55	17.0	10.0	130	39	140.0	M16x30	6.10	$F_{max\ EMC}$

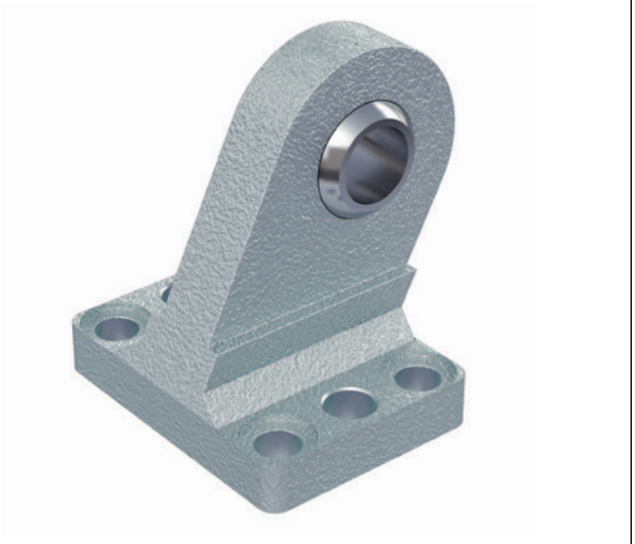
[1)] Material: Aluminum
[2)] Material: Galvanized cast iron with spheroidal graphite

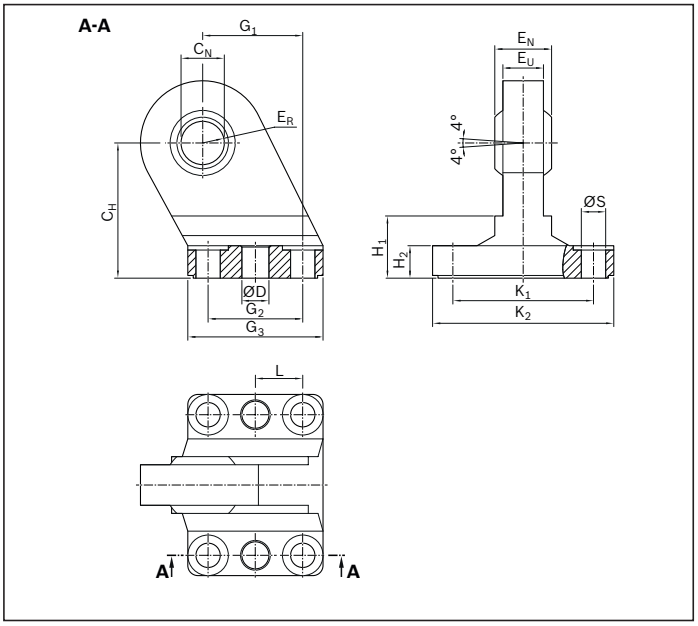
Fastening elements

Swivel bearing, high

Material: Galvanized cast iron with spheroidal graphite. Without fastening screws

Group 6
Option 03

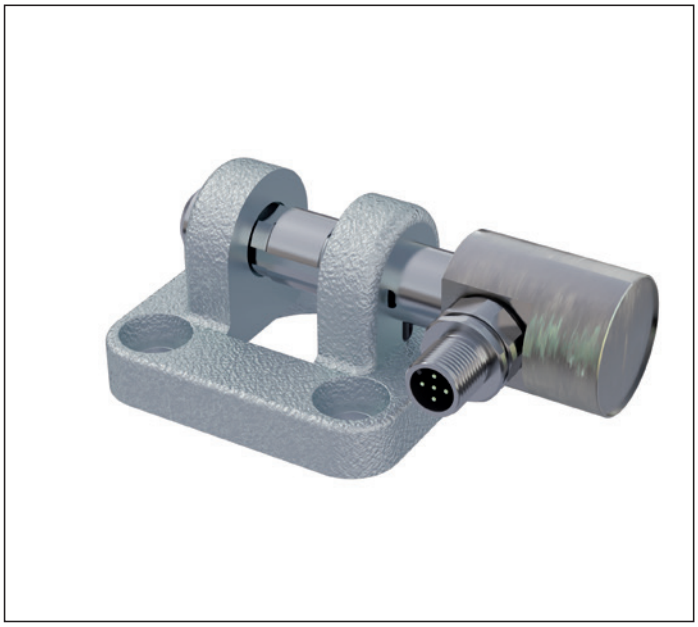


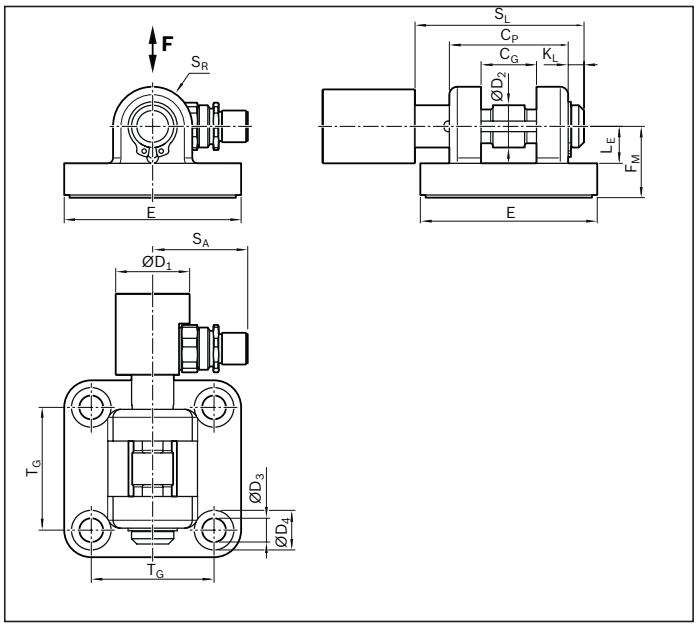


EMC	Material number	Dimensions (mm)															m
		C_H JS15	C_N H7	ØD H11	E_N -1.0	E_R max.	E_U	G_1 JS14	G_2 JS14	G_3 max.	H_1	H_2	K_1 JS14	K_2 max.	L ±0.2	ØS H13	(kg)
32	R349946300	32	10	–	14	16	10.5	21	18	31	16	$9^{\pm 1.0}$	38	51	–	6.6	0.21
40	R349946400	36	12	–	16	18	12.0	24	22	35	16	$9^{\pm 1.0}$	41	54	–	6.6	0.27
50	R349946500	45	16	–	21	21	15.0	33	30	45	23	$11^{\pm 1.0}$	50	65	–	9.0	0.50
63	R15614A018	50	16	10	21	23	15.0	37	35	50	23	$11^{\pm 1.0}$	52	67	17.5	9.0	0.61
80	R15615A018	63	20	10	25	28	18.0	47	40	60	32	$12^{\pm 1.5}$	66	86	20.0	11.0	1.14
100	R15616A018	71	20	10	25	30	18.0	55	50	70	33	$13^{\pm 1.5}$	76	96	25.0	11.0	1.56
100XC	R15617A018	115	35	12	43	44	28.0	97	88	126	70	$17^{\pm 1.5}$	118	156	44.0	14.0	6.64

Clevis mount with force measuring bolt

Group 1 Option 02 **Group 5 Option 10**





EMC	Material number	Dimensions (mm)																m	F_{max}
		C_G D10	C_P d12	$ØD_1$	$ØD_2$ f8	$ØD_3$	$ØD_4$	E	F_M ±0.2	K_L	L_E min.	S_A	S_L	S_R	T ±0.2	T_G ±0.2	DIN 912	(kg)	(N)
32	R15611B021[1)]	14	34	28	10	6.6	11	49	22	4.5	11.5	31.5	48	11	3	32.5	M6x18	0.372	$F_{max\ EMC}$
40	R15612B021[1)]	16	40	28	12	6.6	11	55	25	4.5	12.0	31.5	54	12	4	38.0	M6x18	0.485	$F_{max\ EMC}$
50	R15613B021[1)]	21	45	28	16	9.0	15	67	27	6.0	14.0	31.5	64	15	4	46.5	M8x20	0.721	$F_{max\ EMC}$
63	R15614B021[1)]	21	51	28	16	9.0	15	77	32	6.0	14.0	31.5	72	15	4	56.5	M8x20	1.025	14 500
80	R15615B021[1)]	25	65	28	20	11.0	18	97	36	6.5	16.0	31.5	74	20	4	72.0	M10x20	1.829	17 800
100	R15616B021[1)]	25	75	28	20	11.0	18	117	41	6.5	16.0	31.5	84	20	4	89.0	M10x20	2.866	22 900
100XC	R15617B021[2)]	43	122	35	35	18.0	26	180	55	10.5	35.0	35.5	135	26	6	140.0	M16x50	2.994	$F_{max\ EMC}$

[1)] Material: Aluminum (forged)
[2)] Material: Galvanized spheroidal graphite iron

Instruction for mounting

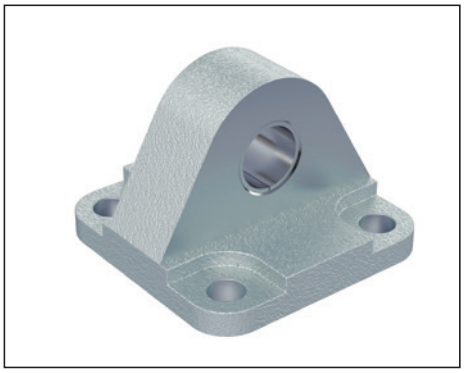
Pay attention to the direction of force, see also force sensor

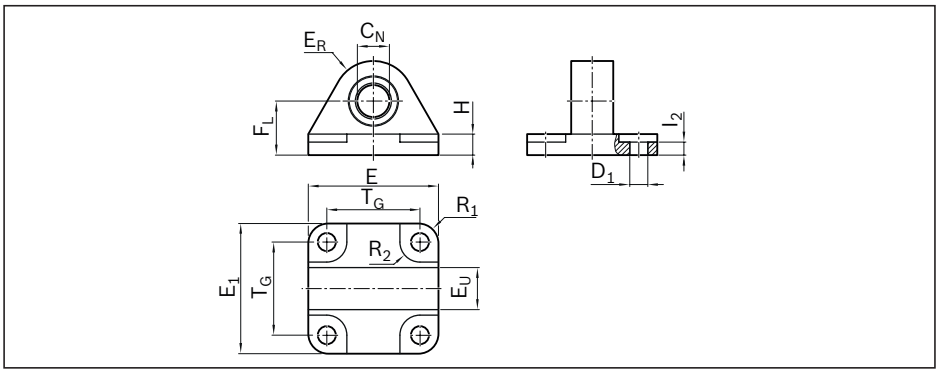
Fastening elements

Swivel mount for force measuring bolt

Material: Aluminum

Group 6
Option 05



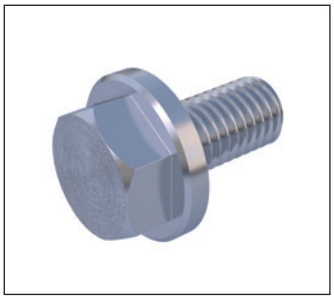


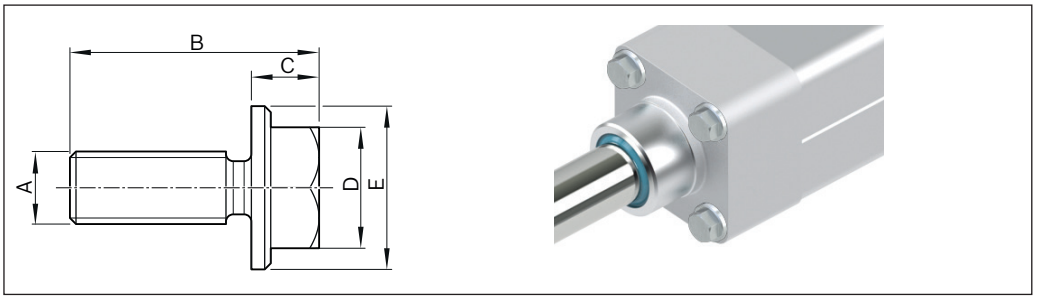
EMC	Material number	Dimensions (mm)											m
		$ØC_N$ H7	$ØD_1$ H13	F_L ±0.2	H ±0.5	E_R ±0.2	E_U ±0.2	I_2 ±0.5	E/E_1 ±0.5	T_G	R_1/R_2	DIN 912	(kg)
32	R15611B025	10	6.6	22	9.0	15	14	5.5	47	32.5	8	M6x18	0.074
40	R15612B025	12	6.6	25	9.0	18	16	5.5	53	38.0	8	M6x18	0.109
50	R15613B025	16	9.0	27	10.5	20	21	6.5	65	46.5	10	M8x20	0.181
63	R15614B025	16	9.0	32	10.5	23	21	6.5	80	56.5	10	M8x20	0.257
80	R15615B025	20	11.0	36	14.0	27	25	10.0	95	72.0	13	M10x20	0.493
100	R15616B025	20	11.0	41	15.0	30	25	10.0	115	89.0	13	M10x20	0.747
100XC	R15617B025	35	18.0	55	17.0	44	43	10.0	176	140.0	20	M16x40	2.238

Accessories

Screw plug for cover

Material: corrosion-resistant



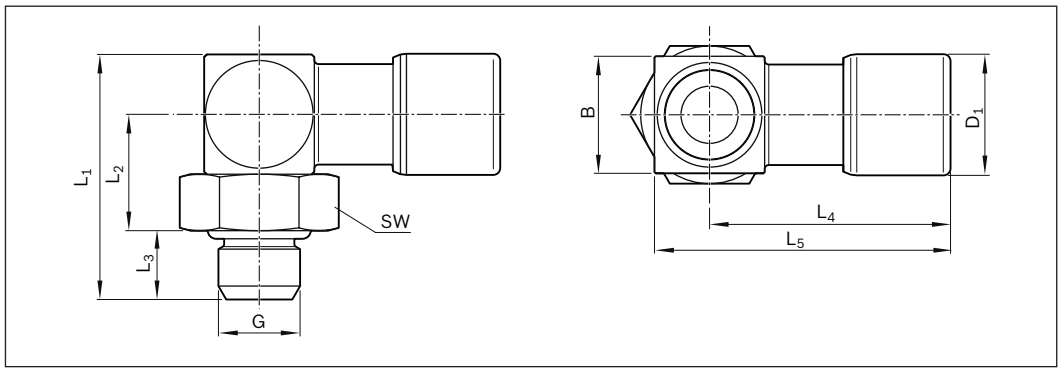


EMC	Material number	Dimensions (mm)				
		A	B	C	D	E
32/40	R15610A015	M6	20.6	5.6	SW 10	13.5
50/63	R15610A016	M8	24.0	8.0	SW 13	18.0
80/100	R15610A017	M10	29.0	8.5	SW 16	22.0
100XC	R15610A018	M12	36.0	10.0	SW 18	25.0

Accessories

Connection for central lubrication system

Is supplied once as part of the delivery if the lubrication option LCF has been chosen (prepared for central lubrication system for liquid grease).



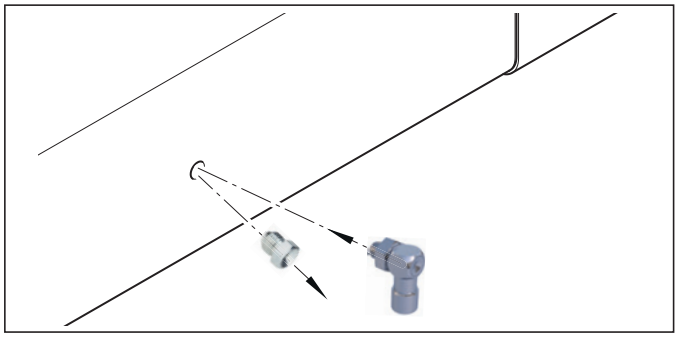
Material number	Material	G	for tubing	Dimensions (mm)								m
				SW	L_1	L_2	L_3	L_4	L_5	B	D_1	(g)
R913031697	Brass, chemically nickel-plated (for housing option standard and IP65)	M6	AD4(4/2)	10	17.8	8.5	5	17.5	21.5	8.5	8.8	10
R913031717	corrosion-resistant steel 1.430/1.4307 (for housing option IP65+R)											

Features

- Enclosed O-ring
- Seals FPM
- Temperature range -20 to +120 °C
- Operating pressure range -0.95 to 24 bar

Instruction for mounting

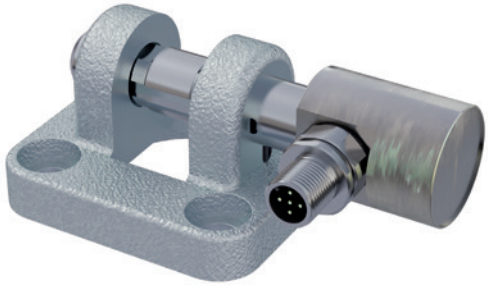
In order to connect the EMC to a central lubrication system, remove the standard lube nipple from the housing and replace it with the port for the central lubrication system.



Force sensor

Force measuring bolt

Clevis mount with force measuring bolt



If your application requires precise measurement of forces, there is a clevis bracket version available with a force measuring bolt. This option can be selected both at the piston rod end connected to the spherical rod end bearing, and at the belt side drive.
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 bolt is not permissible. It may only be inserted by hand.
The bolt is not suitable to handle torques. It is secured axially and against rotation, like the standard bolt, on one side of the clevis mount using the included retaining ring and clamping pin.
For force control at the controller level, a control component with an analog input is required.

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

Technical data, force measuring bolts

Metrological specifications

Material	stainless steel
Protection class	IP65
Hardness (load range)	38 HRC
Mechanical system	
Operating load	150% of MB
Breaking load	300% of MB
Accuracy	
Non-linearity	±0.5% of MB
Repeatability	±0.25% of MB
Hysteresis	±0.2% of MB
Temperature drift at zero point	±0.05% of MB/K.
Temperature drift over measurement range	±0.05% of MB/K.
Compensated temperature	+10 ... +40 °C
Operating temperature	-20 ... +60 °C

Electrical specifications

Output signal	0 kN	0±0.03 V
Output signal	MB	–10 ... 10 V ±0.2 V
Power supply voltage		24 V ±2 V
Tare (zero setting function)		7.2 ... 24 V
Current consumption		25 mA (24 V)
Bandwidth		2.5 ±0.2 KHz
Connection		Connector M12x1

Technical data, connection cable

Length	5 m
Rated voltage	250 V
Rated current	4 A
Connector outlet	angled
Connection type 1	Female connector, M12, 4-pin
Connection type 2	flying leads
Type of cable	PUR black, shielded
Suitable for drag chains	yes
Cable cross-section	4x0.34 mm^2
Cable diameter D	5.9 ±0.2 mm
Static bending radius	>10xD
Dynamic bending radius	>5xD
Bending cycles	> 2 million
Ambient temperature, stationary	-25 ... +80 °C
Ambient temperature, in motion	-40 ... +80 °C
Protection class	IP65

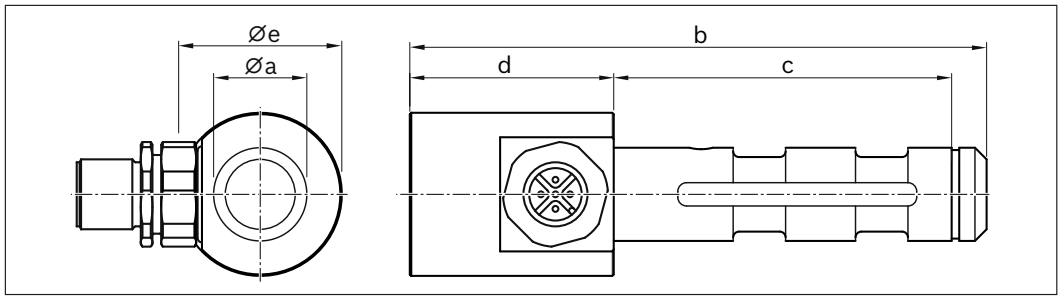
Connection cable in the scope of delivery

MB = Measurement range
MB/K. = Measurement range per Kelvin

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/material numbers



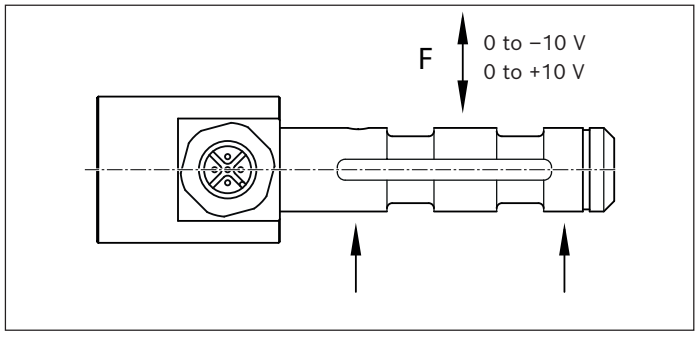
EMC	Material number (force measuring bolt)[1)]	Dimensions (mm)					Measurement range (kN)	Measurement inaccuracy (kN)
		Øa f8	b	c	d	Øe		
32	R15611A007	10	83	43.5	35	28	1.3	± 0.007
40	R15612A007	12	89	49.5	35	28	5.0	± 0.025
50	R15613A007	16	99	58.0	35	28	8.0	± 0.04
63	R15614A007	16	107	66.0	35	28	16.0	± 0.08
80	R15615A007	20	109	67.5	35	28	22.0	± 0.11
100	R15616A007	20	119	77.5	35	28	45.0	± 0.23
100XC	R15617A007	35	170	124.5	35	35	56.0	± 0.28

[1)] with connection cable

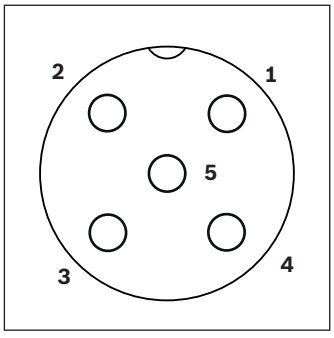
Connection diagram

Force measuring bolt
1 Supply (+)
2 Tare
3 GND
4 Output
5 internal assignment

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



Output signal depending on direction of loading

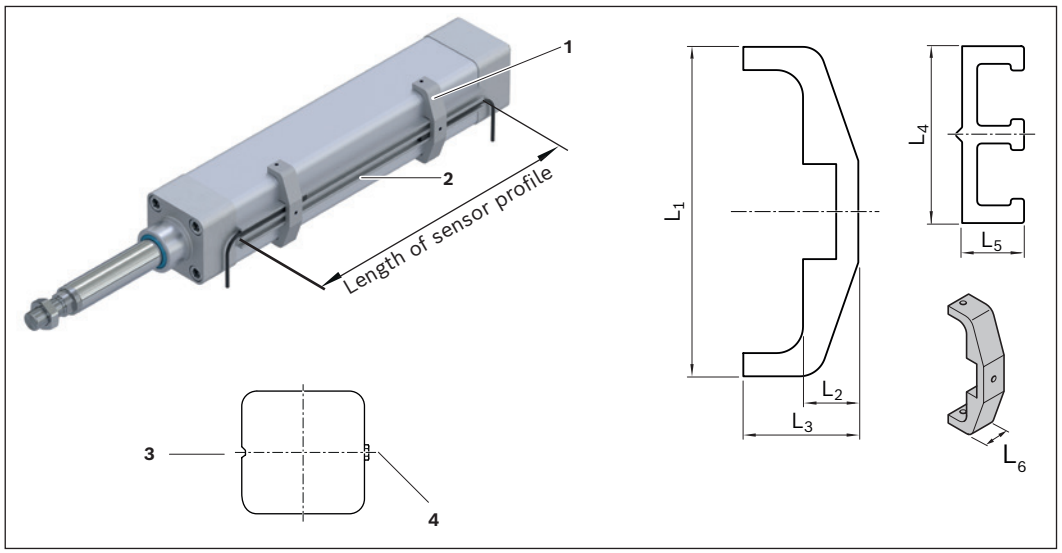


Connection diagram for measuring bolt

Switching system

Sensor profile

1 Retaining bracket
2 Sensor profile
3 Slot for sensor profile (opposite the lube nipple)
4 Lube nipple



EMC	Material number		BASA size d_0 x P (mm)	Dimensions (mm)						
	Retaining bracket	Sensor profile		L_{SL}	L_1	L_2	L_3	L_4	L_5	L_6
32	R15611B022	R15610A009	12 x 5	68	56.5	12.5	25	20	7	15
			12 x 10	72						
40	R15612B022		16 x 5	67	62.5	12.5	25			
			16 x 10	76						
			16 x 16	92						
50	R15613B022		20 x 5	62	74.5	12.5	26			
			20 x 10	81						
			20 x 20	100						
63	R15614B022		25 x 5	66	84.5	12.5	26			
			25 x 10	85						
			25 x 25	117						
80	R15615B022		32 x 5	70	104.5	12.5	26			
			32 x 10	94						
			32 x 20	102						
			32 x 32	137						
100	R15616B022		40 x 5	68	124.0	12.5	31			
			40 x 10	82						
			40 x 20	100						
			40 x 40	155						
100XC	R15616B022		50 x 10	129	124.0	12.5	31			
			50 x 20	151						

Number of retaining brackets

Length of sensor profile (mm)	Number of retaining brackets
≤500	2
≤900	3
≤1 200	4
≤1 500	5

Length calculation for sensor profile

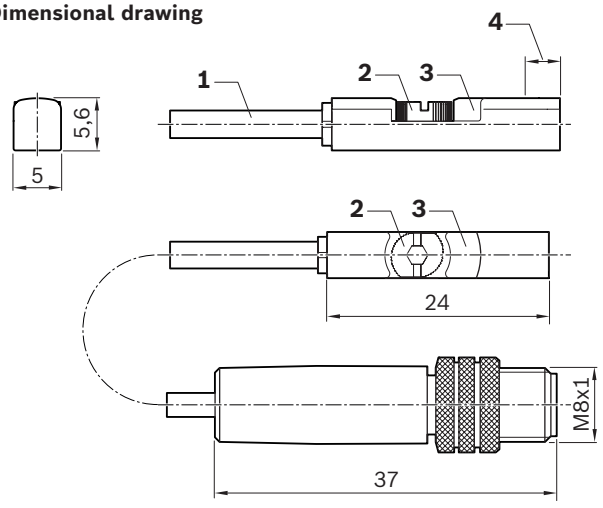
Length of sensor profile = s_{max} + L_{SL}

s_{max} = Maximum travel range (mm)

Switching system

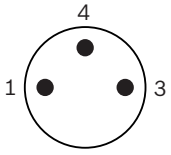
Magnetic switches with M8x1 connector

Dimensional drawing



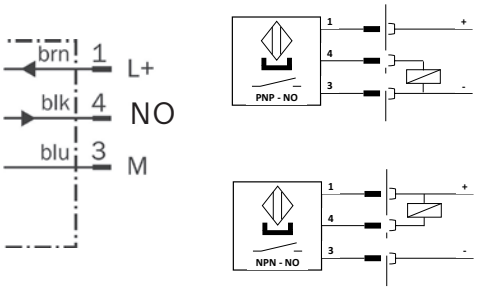
1) Connection
2) Fastening screw
3) LED display
4) Position of sensor element: 2 mm

1 brown (+)
3 blue (-)
4 black (signal)

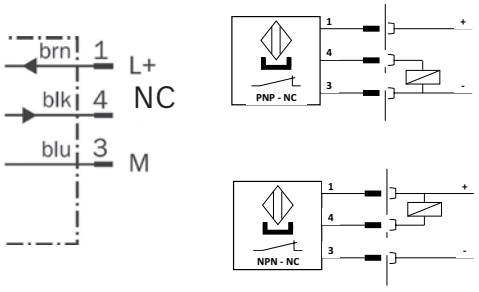


Connection diagram

R913037444
R913037446



R913037443
R913037445



Material numbers / technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Material number	R913037445	R913037444	R913037443	R913037446
Designation	MZT8-03VPO-KRDS14	MZT8-03VPS-KRDS13	MZT8-03VNO-KRDS16	MZT8-03VNS-KRDS15
Functional principle	magnetic			
Operating voltage	10 - 30 VDC			
Load current	≦ 200 mA			
Switching function	PNP/NC	PNP/NO	NPN/NC	NPN/NO
Connection type	0.5 m cable and M8x1 plug, 3-pin with knurled screw connection			
Function indicator	✓			
Short-circuit protection	✓			
Reverse polarity protection	✓			
Switch-on suppression	✓			
Switching frequency	3 kHz			
Pulse elongation (off delay)	20 ms			
Max. permissible starting speed	5 m/s			
Suitable for drag chains*	✓			
Torsion-resistant*	✓			
Welding spark-resistant*	–			
Cable cross-section*	3x0.14 mm^2			
Cable diameter D*	2.9 ±0.15 mm			
Static bending radius*	≧ 5xD			
Dynamic bending radius*	≧ 10xD			
Bending cycles*	> 2 Mio.			
Max. permissible travel speed*	5 m/s			
Max. permissible acceleration*	≦ 5 m/s^2			
Ambient temperature	-30 °C to +80 °C			
Protection class	IP 68			
MTTFd (per EN ISO 13849-1)	MTTFd = 2,339.0 years			
Certifications and approvals**	CE cULus LISTED RoHS			

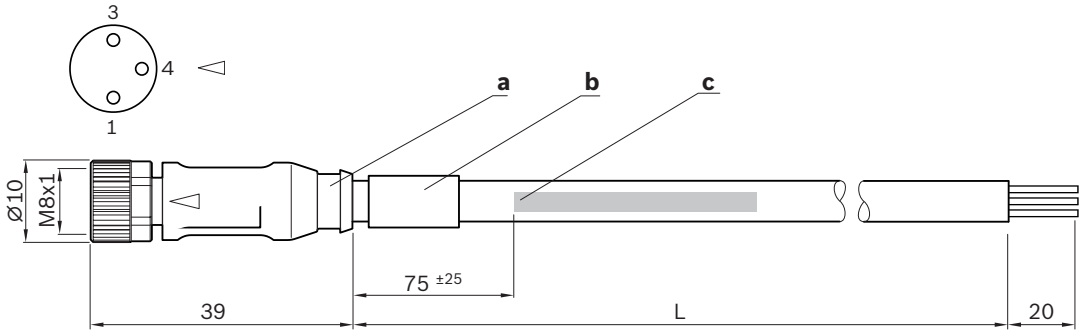
*) Technical data only for the cast-on connection line (0.5 m) on the magnetic sensor. Available extension cables offer even more performance, e.g. for use in a cable drag chain (see below).

**) No certificate for import to the CCC Chinese market required for these products. Document "Sales information CCC" available on request.

Switching system

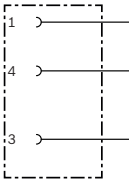
Extensions
Assembled on one end

Dimensional drawing



Connection diagram

1 brown (+)
3 blue (-)
4 black (signal)

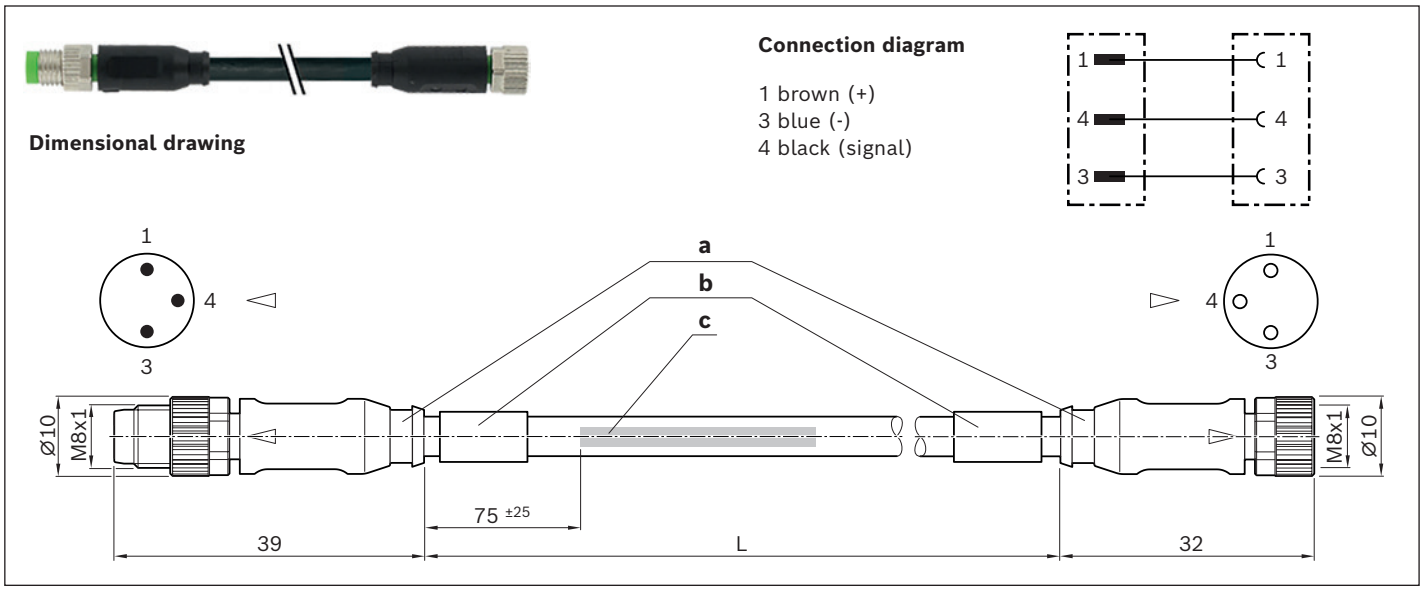


Material numbers

Use	Extension cable		
Material number	R911344602	R911344619	R911344620
Designation	7000-08041-6500500	7000-08041-6501000	7000-08041-6501500
Length (L)	5.0 m	10.0 m	15.0 m
Connection type 1	Female connector, straight, M8x1, 3-pin		
Connection type 2	Unassembled cable end		

a) Contour for 6.5 mm corrugated tube (inner diameter)
b) Cable grommet
c) Cable printing per printing specification

Assembled on two sides



Material numbers

Use	Extension cable				
Material number	R911344621	R911344622	R911344623	R911344624	R911344625
Designation	7000-88001-6500050	7000-88001-6500100	7000-88001-6500200	7000-88001-6500500	7000-88001-6501000
Length (L)	0.5 m	1.0 m	2.0 m	5.0	10.0
Connection type 1	Female connector, straight, M8x1, 3-pin				
Connection type 2	Connector, straight, M8x1, 3-pin				

Technical data for extensions pre-assembled on one or two sides

Function indicator	–
Operating voltage indicator	–
Operating voltage	10 - 30 VDC
Type of cable	PUR black
Suitable for drag chains	✓
Torsion-resistant	✓
Weld spark-resistant	✓
Cable cross-section	3x0.25 mm^2
Cable diameter D	4.1 ±0.2 mm
Static bending radius	≧ 5xD
Dynamic bending radius	≧ 10xD
Bending cycles	> 10 mil.
Max. permissible travel speed	3.3 m/s for 5 m travel range (typ.), up to 5 m/s for 0.9 m travel range
Max. permissible acceleration	≦ 30 m/s^2
Ambient temperature fixed ext.	-40 °C to +85 °C
Ambient temperature flexible ext.	-25 °C to +85 °C
Protection class	IP 68
Certifications and approvals	CE, cULus LISTED, CSA C US, PG, RoHS

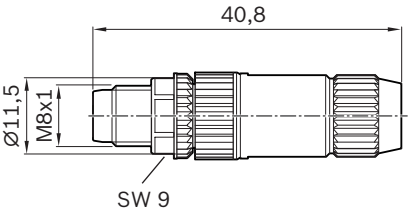
a) Contour for 6.5 mm corrugated tube (inner diameter)
b) Cable grommet
c) Cable printing per printing specification

Switching system

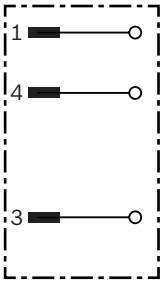
Connectors

R901388333

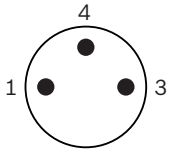
Dimensional drawing



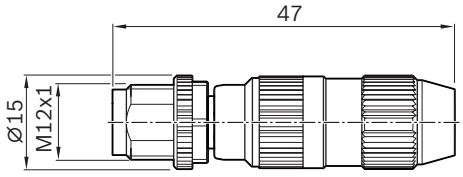
Connection diagram

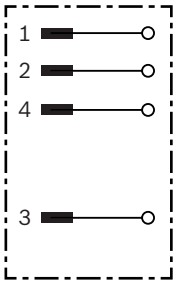


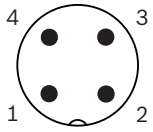
Connector side view



R901388352







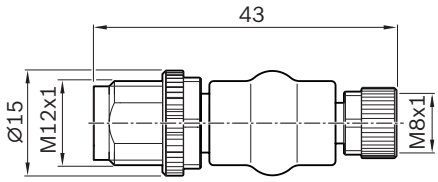
Material numbers / technical data

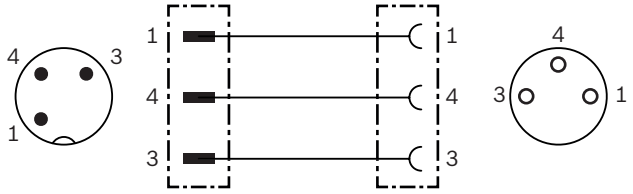
Use	Connector, single	
Material number	R901388333	R901388352
Designation	7000-08331-0000000	7000-12491-0000000
Version	straight	
Operating current per contact	max. 4 A	
Operating voltage	max. 32 V AC/DC	
Connection type	Connector, straight, M8x1, 3-pin, IDC, self-locking screw	Connector, straight, M12x1, 4-pin, IDC, self-locking screw
Function indicator	-	
Operating voltage indicator	-	
Connection cross-section	0.14...0.34 mm²	
Ambient temperature	-25 °C to +85 °C	
Protection class	IP67 (inserted and screwed down)	
Certifications and approvals		

Adapters

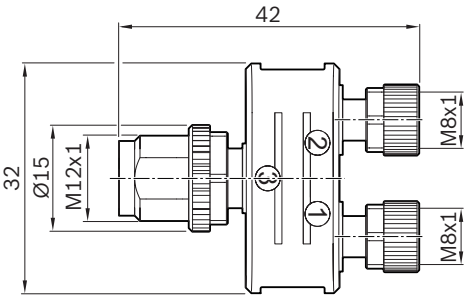
Dimensional drawing **Connection diagram**

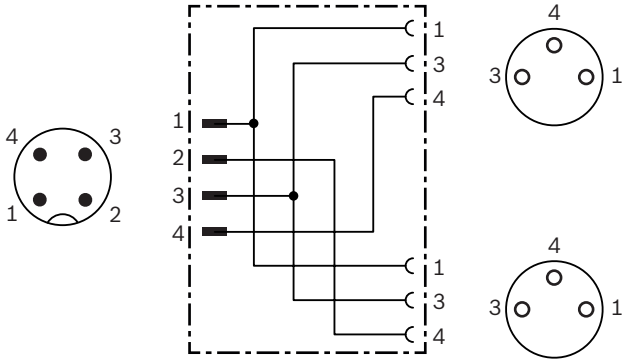
R911344591





R911344592

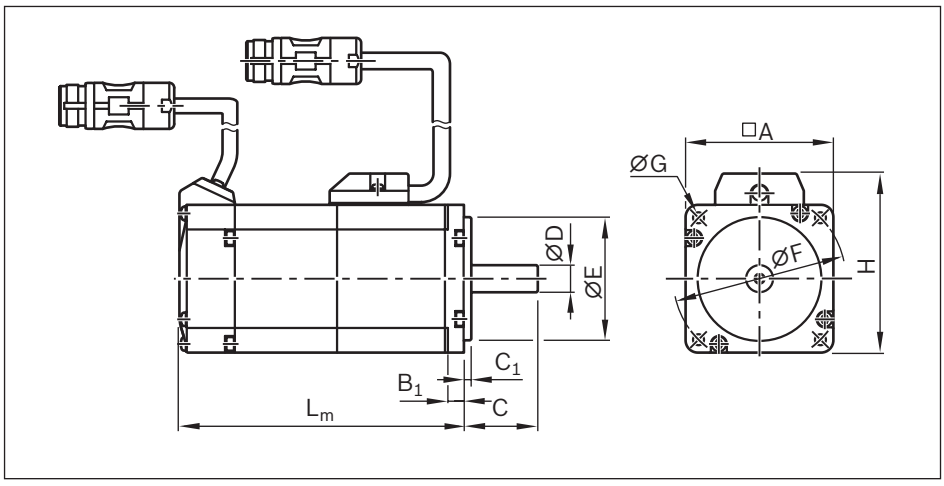




Material numbers / technical data

Use	Adapters	
Material number	R911344591	R911344592
Designation	7000-42201-0000000	7000-41211-0000000
Version	straight	
Operating current per contact	max. 4 A	
Operating voltage	max. 32 V AC/DC	
Connection type 1	Female connector, straight, M8x1, 3-pin, self-locking screw thread	2 X female connectors, straight, M8x1, 3-pin, self-locking screw thread
Connection type 2	Male connector, straight, M12x1, 3-pin, self-locking screw thread	Connector, straight, M12x1, 4-pin, self-locking screw thread
Function indicator	–	
Operating voltage indicator	–	
Connection cross-section	–	
Ambient temperature	-25 °C to +85 °C	
Protection class	IP67 (inserted and screwed down)	
Certifications and approvals	RoHS	c UL us LISTED, RoHS

IndraDyn S – Servo motors MSM



Motor schematic

Motor code	**Dimensions** (mm)									
	A	**B_1**	**C**	**C_1**	**ø D h6**	**ø E h7**	**ø F**	**ø G**	**L_m** Brake without	**L_m** with
MSM 019B-0300	38	6.0	25	3	8	30	45	3.4	92.0	122.0
MSM 031B-0300	60	6.5	30	3	11	50	70	4.5	79.0	115.5
MSM 031C-0300	60	6.5	30	3	14	50	70	4.5	98.5	135.0
MSM 041B-0300	80	6.0	35	3	19	70	90	6.0	112.0	149.0

Version:

- Plain shaft without shaft seal
- M5 multiturn absolute encoder (20-bit, absolute encoder function only available with backup battery)
- Cooling system: natural convection
- IP54 enclosure protection class (shaft: IP40)
- With and without brake
- M17 metal round connector

Note

Motors are available complete with control units and controllers. You can find more information on motors and controllers in the Rexroth drive technology catalogs at www.boschrexroth.com/mediadirectory.

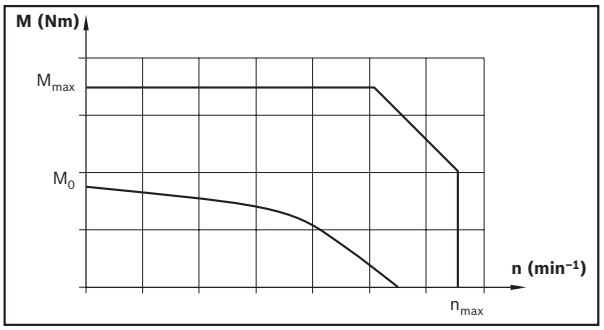
Motor data										Type code	Material number
n_{max} (rpm)	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kg/m²)	J_{br} (kg/m²)	m_m (kg)	m_{br} (kg)	Motor connection	Brake		
5 000	0.32	0.95	0.29	0.0000051	0.0000002	0.47	0.21	2	N	MSM 019B-0300-NN-M5-MH0	R911344211
									Y	MSM 019B-0300-NN-M5-MH1	R911344212
5 000	0.64	1.91	1.27	0.0000140	0.0000018	0.82	0.48	2	N	MSM 031B-0300-NN-M5-MH0	R911344213
									Y	MSM 031B-0300-NN-M5-MH1	R911344214
5 000	1.30	3.80	1.27	0.0000260	0.0000018	1.20	0.50	2	N	MSM 031C-0300-NN-M5-MH0	R911344215
									Y	MSM 031C-0300-NN-M5-MH1	R911344216
4 500	2.40	7.10	2.45	0.0000870	0.0000075	2.30	0.80	2	N	MSM 041B-0300-NN-M5-MH0	R911344217
									Y	MSM 041B-0300-NN-M5-MH1	R911344218

Recommended motor-controller combination

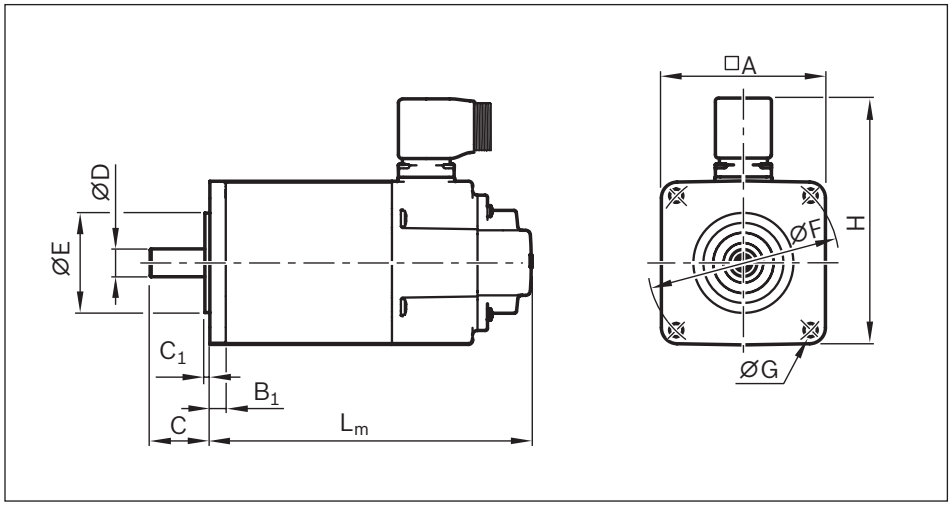
Motor	Controller
MSM 019B-0300	HCS 01.1E-W0003
MSM 031B-0300	HCS 01.1E-W0006
MSM 031C-0300	HCS 01.1E-W0009
MSM 041B-0300	HCS 01.1E-W0013

Motor characteristic

(Schematic)



IndraDyn S - Servo motors MS2N



Motor schematic

Dimensions / motor data

Motor code	Dimensions (mm)												
	□ A	B_1	C	C_1	⌀ D_{k6}	⌀ E_{j6}	⌀ F	⌀ G	H Cable 2	H Cable 1	L_m Brake without	L_m Brake with	
MS2N03-B0BYN	58	7.5	20	2.5	9	40	63	4.5	84	99	163	192	
MS2N03-D0BYN	58	7.5	23	2.5	11	40	63	4.5	84	99	203	232	
MS2N04-B0BTN	82	8	30	2.5	14	50	95	6.6	108	123	162	194.5	
MS2N04-C0BTN	82	8	30	2.5	14	50	95	6.6	108	123	194	226.5	
MS2N04-D0BQN	82	8	30	2.5	14	50	95	6.6	108	123	226	258.5	
MS2N05-B0BTN	98	9	40	3	19	95	115	9	124	139	188	218	
MS2N05-C0BTN	98	9	40	3	19	95	115	9	124	139	224	254	
MS2N05-D0BRN	98	9	40	3	19	95	115	9	124	139	260	290	
MS2N06-B1BNN	116	14	50	3	24	95	130	9	156	156	164	201	
MS2N06-C0BTN	116	14	50	3	24	95	130	9	156	156	184	202	
MS2N06-D0BRN	116	14	50	3	24	95	130	9	156	156	224	261	
MS2N06-D1BNN	116	14	50	3	24	95	130	9	156	156	224	261	
MS2N06-E0BRN	116	14	50	3	24	95	130	9	156	156	264	301	

MS2N07/ MS2N10 see next page
The table lists motors that might not be used with this product.

Version

- Plain shaft without shaft seal ring
- Multiturn encoder
- Advanced multiturn encoder (CM) with AcuroLink interface
- Protection class IP 64
- With or without holding brake
- Special ground connection terminal near motor flange (used as needed)

Notes:

Motors are available complete with control units and controllers. You can find more information on motors and controllers in the Rexroth drive technology catalogs at www.boschrexroth.com/mediadirectory.

Motor data										Type code	Material number
n_{max} (rpm)	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kg/m²)	J_{br} (kg/m²)	m_m (kg)	m_{br} (kg)	Motor connection 1/2 cable(s)	Holding brake		
9 000	0.73	3.46	1.8	0.000023	0.000007	1.4	0.4	1	N	MS2N03-B0BYN-CMSH0-NNNNE-NN	R911384767
								1	Y	MS2N03-B0BYN-CMSH1-NNNNE-NN	R911384769
9 000	1.15	6.8	1.8	0.000037	0.000007	2.0	0.4	1	N	MS2N03-D0BYN-CMSH0-NNNNE-NN	R911384772
								1	Y	MS2N03-D0BYN-CMSH1-NNNNE-NN	R911384773
6 000	1.75	5.9	5.0	0.000070	0.000040	2.7	0.7	1	N	MS2N04-B0BTN-CMSH0-NNNNE-NN	R911384527
								1	Y	MS2N04-B0BTN-CMSH1-NNNNE-NN	R911384528
6 000	2.80	12.0	5.0	0.000110	0.000050	3.7	0.7	1	N	MS2N04-C0BTN-CMSH0-NNNNE-NN	R911384531
								1	Y	MS2N04-C0BTN-CMSH1-NNNNE-NN	R911384532
6 000	3.85	18.1	5.0	0.000160	0.000040	4.7	0.7	1	N	MS2N04-D0BQN-CMSH0-NNNNE-NN	R911384535
								1	Y	MS2N04-D0BQN-CMSH1-NNNNE-NN	R911384536
6 000	3.75	10.6	10.0	0.000170	0.000110	4.0	1.1	1	N	MS2N05-B0BTN-CMSH0-NNNNE-NN	R911384542
								1	Y	MS2N05-B0BTN-CMSH1-NNNNE-NN	R911384543
6 000	6.10	20.8	10.0	0.000290	0.000110	5.9	1.1	1	N	MS2N05-C0BTN-CMSH0-NNNNE-NN	R911384546
								1	Y	MS2N05-C0BTN-CMSH1-NNNNE-NN	R911384547
6 000	7.90	31.3	10.0	0.000400	0.000110	7.3	1.1	1	N	MS2N05-D0BRN-CMSH0-NNNNE-NN	R911384550
								1	Y	MS2N05-D0BRN-CMSH1-NNNNE-NN	R911384551
6 000	3.25	9.5	10.0	0.000480	0.000110	5.1	1.1	1	N	MS2N06-B1BNN-CMSH0-NNNNE-NN	R911384929
								1	Y	MS2N06-B1BNN-CMSH1-NNNNE-NN	R911384930
6 000	6.00	16.0	10.0	0.000390	0.000110	6.4	1.0	1	N	MS2N06-C0BTN-CMSH0-NNNNE-NN	R911384933
								1	Y	MS2N06-C0BTN-CMSH1-NNNNE-NN	R911384934
6 000	9.70	32.0	15.0	0.000650	0.000140	9.0	1.5	1	N	MS2N06-D0BRN-CMSH0-NNNNE-NN	R911384937
								1	Y	MS2N06-D0BRN-CMSH2-NNNNE-NN	R911384938
6 000	9.00	38.4	15.0	0.001400	0.000140	9.0	1.5	1	N	MS2N06-D1BNN-CMSH0-NNNNE-NN	R911384941
								1	Y	MS2N06-D1BNN-CMSH2-NNNNE-NN	R911384942
6 000	13.0	49.0	15.0	0.000890	0.000140	11.5	1.5	1	N	MS2N06-E0BRN-CMSH0-NNNNE-NN	R911384945
								1	Y	MS2N06-E0BRN-CMSH2-NNNNE-NN	R911384946

IndraDyn S - Servo motors MS2N

Dimensions / motor data

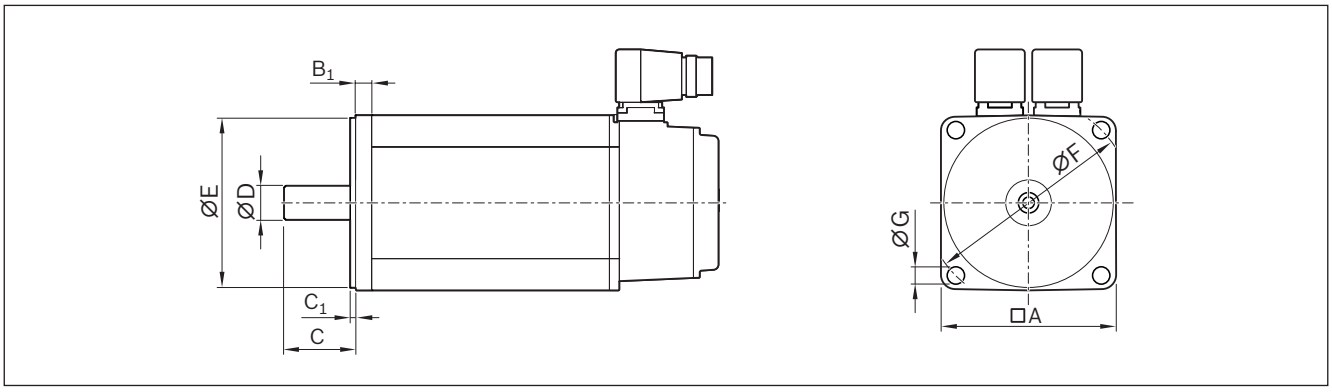
Motor code	**Dimensions** (mm)											
	□ **A**	B_1	**C**	C_1	⌀ D_{k6}	⌀ E_{j6}	⌀ **F**	⌀ **G**	**H**		L_m	
									Cable		**Brake**	
									2	1	without	with
MS2N07-B1BNN	140	18	58	4	32	130	165	11	180	180	176	230
MS2N07-C0BQN	140	18	58	4	32	130	165	11	180	180	205	259
MS2N07-C1BRN	140	18	58	4	32	130	165	11	180	180	205	259
MS2N07-D0BHA	140	18	58	4	32	130	165	11	203	-	384	438
MS2N07-D0BRN	140	18	58	4	32	130	165	11	180	-	263	317
MS2N07-D1BNN	140	18	58	4	32	130	165	11	180	180	263	317
MS2N07-E0BQN	140	18	58	4	32	130	165	11	203	-	321	375
MS2N07-E1BNN	140	18	58	4	32	130	165	11	203	-	321	375
MS2N10-C0BNN	196	20	80	4	38	180	215	14	270	-	238	298
MS2N10-D0BHA	196	20	80	4	38	180	215	14	274	-	394	454
MS2N10-E0BHA	196	20	80	4	38	180	215	14	274	-	452	512
MS2N10-E0BNA	196	20	80	4	38	180	215	14	270		452	512
MS2N10-F1BHA	196	20	80	4	38	180	215	14	276		510	570

The table lists motors that might not be used with this product.

Motor data								Motor connection 1/2 cable(s)	Holding brake	Type code	Material number
n_{max} (rpm)	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kg/m²)	J_{br} (kg/m²)	m_m (kg)	m_{br} (kg)				
6 000	7.4	21.0	20.0	0.001970	0.000260	9.5	2.0	1	N	MS2N07-B1BNN-CMSH0-NNNNE-NN	R911384951
								1	Y	MS2N07-B1BNN-CMSH1-NNNNE-NN	R911384952
6 000	12.8	35.7	20.0	0.001200	0.000260	12.0	2.0	1	N	MS2N07-C0BQN-CMSH0-NNNNE-NN	R911384955
								1	Y	MS2N07-C0BQN-CMSH1-NNNNE-NN	R911384956
6 000	11.5	42.2	20.0	0.003050	0.000260	12.0	2.0	1	N	MS2N07-C1BRN-CMSH0-NNNNE-NN	R911384959
								1	Y	MS2N07-C1BRN-CMSH1-NNNNE-NN	R911384960
4 000	35.5	73.2	36.0	0.002100	0.000410	20.0	2.5	2	N	MS2N07-D0BHA-CMVH0-NNNNE-NN	R914503253
								2	Y	MS2N07-D0BHA-CMVH2-NNNNE-NN	R914503254
6 000	22.0	73.2	36.0	0.002100	0.000410	17.5	2.5	2	N	MS2N07-D0BRN-CMVH0-NNNNE-NN	R914504164
								2	Y	MS2N07-D0BRN-CMVH2-NNNNE-NN	R911394492
6 000	18.9	84.8	36.0	0.005290	0.000410	17.5	2.5	1	N	MS2N07-D1BNN-CMSH0-NNNNE-NN	R911384965
								1	Y	MS2N07-D1BNN-CMSH2-NNNNE-NN	R911384966
6 000	29.2	109.5	36.0	0.003000	0.000410	23.0	3.0	2	N	MS2N07-E0BQN-CMVH0-NNNNE-NN	R914501679
								2	Y	MS2N07-E0BQN-CMVH2-NNNNE-NN	R914504165
6 000	25.8	128.5	36.0	0.007520	0.000410	23.0	3.0	2	N	MS2N07-E1BNN-CMVH0-NNNNE-NN	R914504166
								2	Y	MS2N07-E1BNN-CMVH2-NNNNE-NN	R914504167
6 000	30.2	70.5	53.0	0.004800	0.001470	23.5	5.0	2	N	MS2N10-C0BNN-CMVH0-NNNNE-NN	R914503255
								2	Y	MS2N10-C0BNN-CMVH2-NNNNE-NN	R914503256
4 000	82.4	142.0	53.0	0.008100	0.001470	35.0	5.0	2	N	MS2N10-D0BHA-CMVH0-NNNNE-NN	R914503257
								2	Y	MS2N10-D0BHA-CMVH2-NNNNE-NN	R914503258
6 000	119.0	214.0	90.0	0.011400	0.002700	46.0	7.0	2	N	MS2N10-E0BHA-CMAH0-NNNNE-NN	R914503270
								2	Y	MS2N10-E0BHA-CMAH3-NNNNE-NN	R914503271
6 000	119.0	214.0	90.0	0.011400	0.002700	46.0	7.0	2	N	MS2N10-E0BNA-CMAH0-NNNNE-NN	R914509918
									Y	MS2N10-E0BNA-CMAH3-NNNNE-NN	R914502696
4 000	145.0	333.0	90.0	0.032900	0.002700	60.0	7.0	2	N	MS2N10-F1BHA-CMAH0-NNNNE-NN	R914509919
									Y	MS2N10-F1BHA-CMAH3-NNNNE-NN	R914509920

Motor attachment kits according to customer specification

The motor attachment for linear motion systems with Rexroth ball screw assembly consists of either an attachment kit with flange and coupling (MF) or a belt side drive (SD).
The available combinations are shown in the "Configuration and ordering" selection tables for each size.
In addition to attachment kits for Rexroth motors, attachment kits for motors according to customer specification are also available. In order to determine the appropriate attachment kit, the connection geometry of the motor is crucial. Characteristics required to clearly determine motor geometry are shown below.

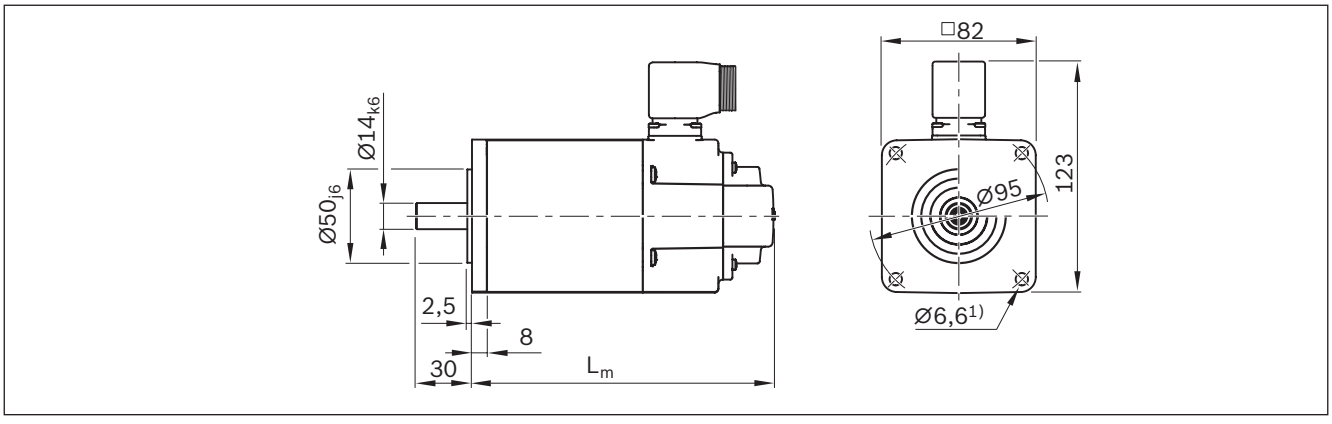


The dimensions queried result in a unique "motor geometry code":

□□ – □□ – □□□ – □□□ – □□□ – **M**□□ – □□□ – □□□

ØD	=	Shaft diameter
C	=	Shaft length
ØE	=	Centering diameter
C_1	=	Centering depth
ØF	=	Pitch diameter
ØG	=	Drill hole for fastening screw (specify thread diameter)
B_1	=	Flange thickness
A	=	Flange edge dimension

Example illustration of servo motor IndraDyn S type MS2N04



1 4 – 3 0 – 0 5 0 – 2 . 5 – 0 9 5 – M 0 6 – 0 0 8 – 0 8 2

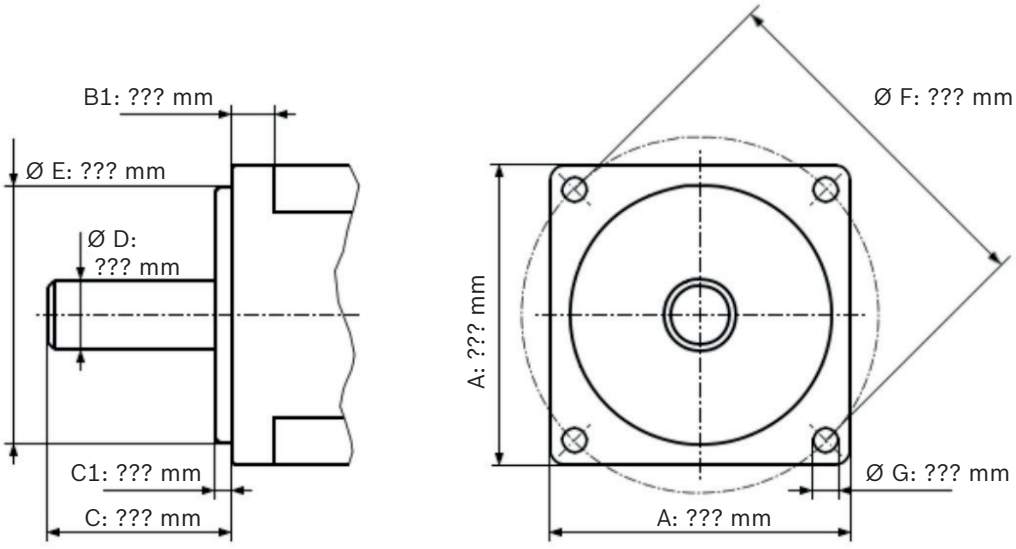
1) The drill hole Ø 6.6 mm results in the type designation M06 (nominal thread diameter of M6 fixing screw) for the geometry motor code.

Motor attachment kits for motors according to customer specification can be selected using the online configurator in the eShop. To do this, select the "mechanical interface" and "motors according to customer specification" option.

Dimension of customer motor

Motor manufacturer ▼

Motor type ▼

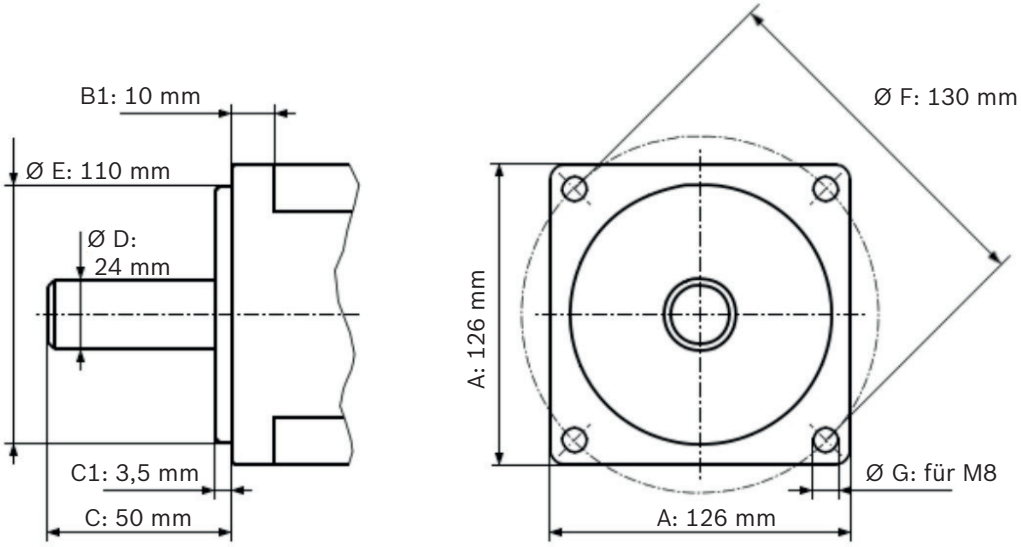


Example

Dimension of customer motor

Motor manufacturer Siemens ▼

Motor type 1FK706 ▼



Automation package

Automation package

2 ORDERING OPTIONS

- Single axis
- Single axis + drive (incl. mains filter/cable (optional))

Ordering options	System	Options				
		Motor MS2N	Drive controller		Cable	Mains filter
			Indra-Drive HCS	ctrlX Drive		
1	CKK / CKR MKK / MKR	—	—	—	—	—
		✔	—	—	—	—
2	EMC EMC-HP	✔	✔	—	Optional	Included
			—	✔	Optional	Included

Motor/controller combinations

Motor/controller combinations

Several motor-controller combinations are available in order to provide the most cost-effective solution for every customer application. When dimensioning the drive, always consider the motor-controller combination.
For more information on motors, controllers and control systems, please refer to the Rexroth automation solutions
➠ Chapter "Further information".

IndraDrive drive family
The converters of the IndraDrive C series generate a DC link direct voltage from the grid supply voltage and from it a controlled AC output voltage with variable amplitude and frequency for operation of a servo motor.
The compact format contains additional mains connection components, making it particularly suitable for single-axis applications.

Version
- Basic Universal or Basic Universal with Safe Motion
- Multi-Ethernet for communication with a superior controller
- More interfaces or integrated controls available
- For the converter HCS01, a smart function kit for pressing and joining applications is available
- Brake resistor included
- Adapters included
- Separate mains filter included

IndraDrive Cs
HCS01.1E-W0054

IndraDrive C
HCS03.1E-W0100

ctrlX drive family
With ctrlX DRIVE, Bosch Rexroth has developed the most compact, modular drive system worldwide for their customers. In addition to space-saving dimensions and maximum scalability, an almost unlimited number of combination options for the user, mature engineering tools and high energy efficiency are among the advantages of ctrlX DRIVE. The Bosch Rexroth servo motors are the perfect team players in the ctrlX DRIVE portfolio.
With compact dimensions, they combine highest dynamics with maximum accuracy for the position, rotary speed and torque values.

- EtherCAT SOE with Safe Torque Off or EtherCAT SOE with safe field bus
- Multi-Ethernet for communication with a superior controller
- More interfaces or integrated controls available
- Adapters included
- Separate mains filter included

ctrlX Drive (XCS)

Automation package

Motor/controller combinations

Motor				Drive controller				
	Brake			Without controller	HCS	Controller option		
	Without	With				BASIC		
						UNIVERSAL		
						MultiEthernet		
						(B-ET) + L3	(B-ET) + S4	
						Safe torque off	Safe motion	
Without motor	000			000	Without	000	000	
Motor not listed								
MS2N03-B0BYN-CMSHx	203	204	1 cable		HCS01-W0008	102	101	
MS2N03-D0BYN-CMSHx	207	208			HCS01-W0018	302	301	
MS2N04-B0BTN-CMSHx	211	212						
MS2N04-C0BTN-CMSHx	215	216						
MS2N04-D0BQN-CMSHx	219	220						
MS2N05-B0BTN-CMSHx	223	224						
MS2N05-C0BTN-CMSHx	227	228			HCS01-W0028	402	401	
MS2N05-D0BRN-CMSHx	231	232						
MS2N06-B1BNN-CMSHx	235	236			HCS01-W0008	102	101	
MS2N06-C0BTN-CMSHx	239	240			HCS01-W0028	402	401	
MS2N06-D0BRN-CMSHx	243	244						
MS2N06-D1BNN-CMSHx	247	248						
MS2N06-E0BRN-CMSHx	251	252			HCS01-W0054	502	501	
MS2N07-B1BNN-CMSHx	255	256			HCS01-W0018	302	301	
MS2N07-C0BQN-CMSHx	259	260			HCS01-W0028	402	401	
MS2N07-C1BRN-CMSHx	263	264			HCS01-W0054	502	501	
MS2N07-D1BNN-CMSHx	269	270						
MS2N07-D0BHA-CMVHx	287	288	2 cables					
MS2N07-D0BRN-CMVHx	295	296						
MS2N07-E1BNN-CMVHx	299	300						
MS2N07-E0BQN-CMVHx	297	298			HCS03-W0100	702	701	
MS2N10-C0BNN-CMVHx	289	290			HCS01-W0054	502	501	
MS2N10-D0BHA-CMVHx	291	292						
MS2N10-E0BHA-CMAHx	293	294			HCS03-W0100	702	701	
MS2N10-E0BNA-CMAHx	301	302			-	-	-	
MS2N10-F1BHA-CMAHx	303	304			-	-	-	

The table lists motors that might not be used with this product.

					Cable option					
	XCS2	**Controller option**		**Without**	**Controller HCS / XCS2**					
		MultiEthernet			**1 cable**			**2 cables**		
		**CAT SOE**								
		+ T0	**+FSoE + M5**		**5 m**	**10 m**	**15 m**	**5 m**	**10 m**	**15 m**
		Safe torque off	**Safe motion**							
	Without	000	000	000	000	000	000	000	000	000
	XCS2-W0023	2100	2130		105	110	115	-	-	-
	XCS2-W0054	3100	3130							
	XCS2-W0023	2100	2130							
	XCS2-W0054	3100	3130							
	XCS2-W0023	2100	2130							
	XCS2-W0054	3100	3130							
	XCS2-W0070	4100	4130		-	-	-	205	210	215
	XCS2-W0054	3100	3130							
	XCS2-W0070	4100	4130							
	XCS2-W0100	5100	5130							
	XCS2-W0100	5100	5130							
	XCS2-W0150	7100	7130							

Motor/controller/cable combinations

Motor/controller/cable combinations

Hybrid cable (power and encoder cable combined, 1 cable)

Motor	Drive controller	Technical data						
		Cable designation Part number	Cable weight (approxi-mately) kg/m	Cable outside diameter D (mm)	Bending radius minimum Fixed installation	 Flexible installation	Bending cycle	
MS2N03-B0BYN-CMSHx MS2N06-B1BNN-CMSHx	HCS01.1E-W0008	RH2-021DBB-NN-xxx,x 5m R911372050 10m R911372052 15m R911372053	0.26	13.0 +/- 0.3	5 x D	7.5 x D	> 5 mill.	
MS2N03-D0BYN-CMSHx MS2N04-B0BTN-CMSHx MS2N04-C0BTN-CMSHx MS2N04-D0BQN-CMSHx MS2N05-B0BTN-CMSHx MS2N07-B1BNN-CMSHx	HCS01.1E-W0018	RH2-023DBB-NN-xxx,x 5m R911372062 10m R911372064 15m R911372065						
MS2N05-C0BTN-CMSHx MS2N05-D0BRN-CMSHx MS2N06-C0BTN-CMSHx MS2N06-D0BRN-CMSHx MS2N06-D1BNN-CMSHx MS2N07-C0BQN-CMSHx	HCS01.1E-W0028							
MS2N06-E0BRN-CMSHx MS2N07-C1BRN-CMSHx MS2N07-D1BNN-CMSHx	HCS01.1E-W0054	RH2-024DBB-NN-xxx,x 5m R911374454 10m R911379794 15m R911379795						
MS2N03-B0BYN-CMSHx MS2N03-D0BYN-CMSHx MS2N04-B0BTN-CMSHx MS2N04-C0BTN-CMSHx MS2N04-D0BQN-CMSHx MS2N05-B0BTN-CMSHx MS2N05-C0BTN-CMSHx MS2N05-D0BRN-CMSHx MS2N06-B1BNN-CMSHx MS2N06-C0BTN-CMSHx MS2N06-D1BNN-CMSHx MS2N07-B1BNN-CMSHx MS2N07-C0BQN-CMSHx	XCS2-W0023	RHB2-021DCB-NN-xxx,x 5m R914507997 10m R914508010 15m R914508018	0.27	13.0 +/- 0.3	5 x D	7.5 x D	> 5 mill.	
MS2N06-D0BRN-CMSHx MS2N06-E0BRN-CMSHx MS2N07-C1BRN-CMSHx MS2N07-D1BNN-CMSHx	XCS2-W0054	RHB2-022DCB-NN-xxx,x 5m R914508036 10m R914508046 15m R914508052						

The table lists motors that might not be used with this product.

Motor/controller/cable combinations

Power and encoder cable separate, 2 cables

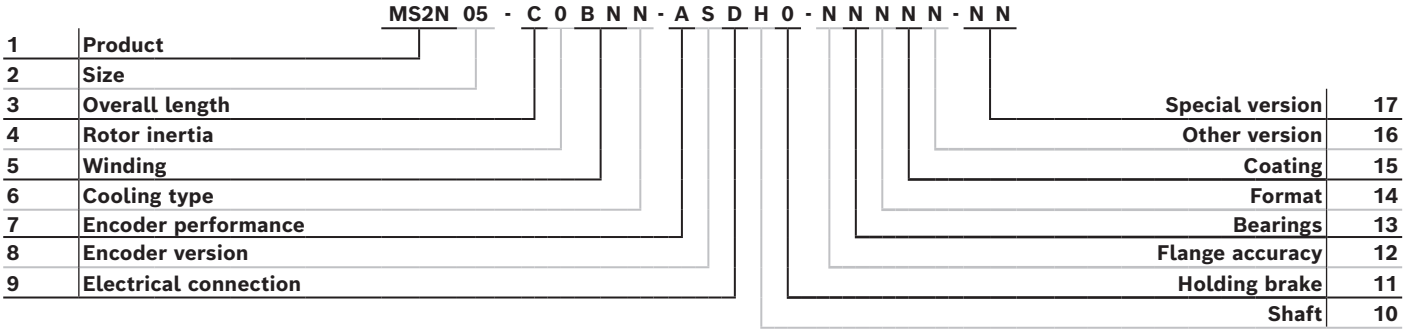
Motor	Drive controller	Technical data power cable						
		Cable designation Part number	Cable weight (approxi-mately) kg/m	Cable outside diameter D (mm)	Bending radius minimum Fixed installation	 Flexible installation	Bending cycle	
MS2N07-D0BHA-CMVHx MS2N07-E1BNN-CMVHx	HCS01.1E-W0054	RL2-044DBB-NN-xxx,x 5m R911374900 10m R911379527 15m R911379528	0.23	12.2 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
MS2N07-D0BRN-CMVHx MS2N10-C0BNN-CMVHx MS2N10-D0BHA-CMVHx	HCS01.1E-W0054	RL2-044EBB-NN-xxx,x 5m R911374902 10m R911384595 15m R911384596	0.33	14.8 +/- 0.5				
MS2N07-E0BQN-CMVHx	HCS03.1E-W0100	RL2-046EBB-NN-xxx,x 5 m R911376628 10m R911376666 15m R911376667						
MS2N10-E0BHA-CMAHx	HCS03.1E-W0100	RL2-066HBB-NN-xxx,x 5m R911373948 10m R911375037 15m R911375038	0.84	22.2 +/- 1.0				
MS2N07-D0BHA-CMVHx	XCS2-W0054	RLB2-042DBB-NN-xxx,x 5m R911397223 10m R911397225 15m R911397226	0.23	12.2 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
MS2N07-E1BNN-CMVHx	XCS2-W0070							
MS2N07-D0BRN-CMVHx MS2N10-C0BNN-CMVHx	XCS2-W0054	RLB2-042ECB-NN-xxx,x 5m R911396693 10m R911396695 15m R911396696	0.33	14.8 +/- 0.5				
MS2N07-E0BQN-CMVHx	XCS2-W0070							
MS2N10-D0BHA-CMVHx	XCS2-W0070	RLB2-042GDB-NN-xxx,x 5m R911397170 10m R911397173 15m R911397174"	0.58	18.2 +/- 0.6				
MS2N10-E0BHA-CMAHx	XCS2-W0100	RLB2-063HDB-NN-xxx,x 5m R911395186 10m R911395188 15m R911395189"	0.84	22.2 +/- 1.0				
MS2N10-E0BNA-CMAHx	XCS2-W0100	RLB2-063JEB-NN-xxx,x 5m R911395201 10m R911395203 15m R911395204	1,2	25,5+/-1,0				
MS2N10-F1BHA-CMAHx	XCS2-W0150	RLB2-064JEB-NN-xxx,x 5m R914503275 10m R914503276 15m R914510782						

The table lists motors that might not be used with this product.

		Technical data encoder cable						
		Cable designation **Part number**	**Cable weight (approxi-mately)**	**Cable outside diameter D**	**Bending radius minimum**		**Bending cycle**	
			kg/m	(mm)	Fixed installation	Flexible installation		
		RG2-002AAB-NN-XXX,X 5 m R911371232 10m R911371935 15m R911371936						
		RG2-007AAB-NN-XXX,X 5m R911382615 10m R911382617 15m R911382618	0.08	7.2 +/-0.2	4 x D	7.5 x D	> 5 mill.	
		RG2-007AAB-NN-XXX,X 5m R911382615 10m R911382617 15m R911382618						

Type designation

MS2N05 type designation / features (example)

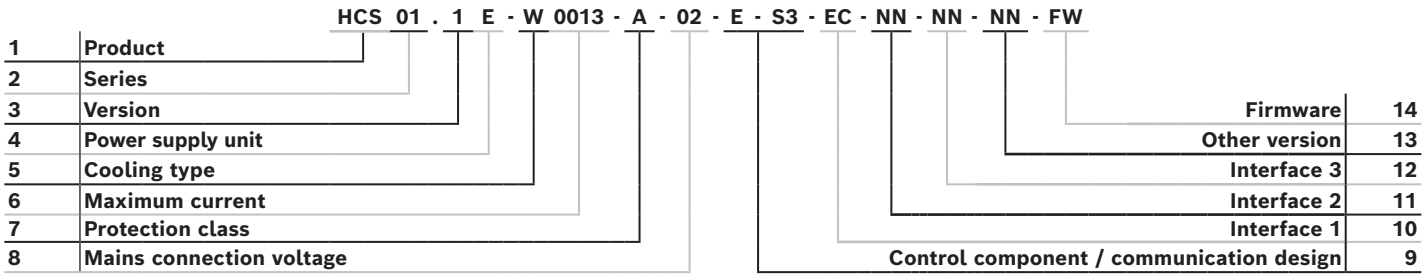


Description / options

1	**Product**	MS2N
2	**Size**	05
3	**Overall length**	B, C, D, E
4	**Rotor inertia**	0 = low inertia / 1 = mean inertia
5	**Winding**	BY = 9000 1/min / BT = 6000 1/min / BR = 4500 1/min / BQ = 4000 1/min BN = 3000 1/min / BH = 2000 1/min
6	**Cooling type**	N = self-cooling / A = external cooling axial 230 V/50 Hz
7	**Encoder performance**	Basic - 16 signal periods, Hiperface® = A Standard - 128 signal periods, Hiperface® (SIL2, PL d)= B Advanced - 20-bit, ACURO®Link (SIL2, PL d)= C Advanced - 20-bit, ACURO®Link (SIL2, PL e)= H
8	**Encoder version**	Single-turn - 1 revolution absolute = S Multi-turn - 4096 revolutions absolute = M
9	**Electrical connection**	Two-cable connection 2x M17, rotatable = D Single-cable connection M17, rotatable = H Single-cable connection M23, rotatable = S
10	**Shaft**	Smooth, without shaft seal ring = H / Smooth, with shaft seal ring = G Keyway, half-spine balancing without shaft seal ring = L Keyway, half-spine balancing with shaft seal ring = K
11	**Holding brake**	Without holding brake = 0 / size 1, electrically releasing = 1
12	**Flange accuracy**	Standard = N
13	**Bearings**	Standard bearing = N
14	**Format**	B5 / IM3001, PT1000 = N
15	**Coating**	Standard painting RAL 9005 black = N
16	**Other version**	None = N / Additional earthing connection = E / Sealing air connection = P
17	**Special version**	None = NN

▶ Further information on MS2N synchronous servo motors ➠ Chapter "Further information"

Type designation controller HCS01 (example)

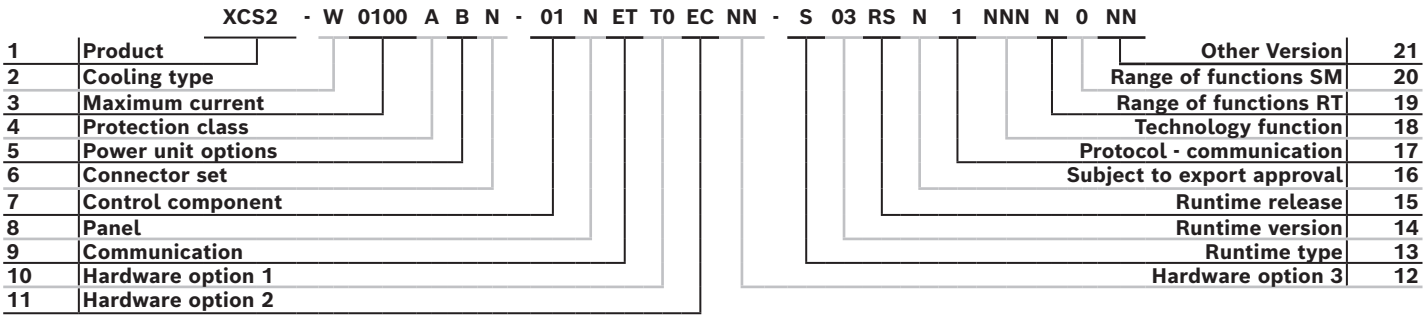


Description / options

1	**Product**	HCS
2	**Series**	01
3	**Version**	1
4	**Power supply unit**	E = infeed
5	**Cooling type**	W = air, internal
6	**Maximum current**	02:0003 = 3 A / 0006 = 6 A / 0009 = 9 A / 0013 = 13 A / 0018 = 18 A 03: 0005 = 5 A / 0008 = 8 A /0018 = 8 A /0028 = 28 A / 0054 = 54 A
7	**Protection class**	A = IP20
8	**Mains connection voltage**	02 = 3 x AC 110...230 V / 03 = 3 x AC 200...500 V
9	**Control component version | Communication**	A-CC = Advanced | Sercos III Master / B-ET = Basic | Multi-Ethernet/ E-S3 = Economy Sercos III
11	**Interface 1**	EC = Encoder IndraDyn / Hiperface / 1VSS / TTL / Endat 2.1/2.2
12	**Interface 2**	CN = CANopen / EC = Multi-encoder interface / EM = Encoder emulation / ET = Multi-Ethernet NN = Not equipped / PB = PROFIBUS
13	**Interface 3**	L3 = STO (Safe Torque Off) L4 = STO (Safe Torque Off) and SBC (Safe Brake Control) NN = Not equipped / S4 = Safe Motion
14	**Other version**	NN = None
15	**Firmware**	

▶ Further information on the controller ➠ Chapter "Further information"

Type designation controller XCS2 (example)



Description / options

1	**Product**	1: X =ctrlX DRIVE / 2: C = converter, feed-in / 3: S = single axis / 4: 2 = generation 2; 1 = generation 1
2	**Cooling type**	W = air, internal
3	**Maximum current**	0100 = 100 A (example) / 23, 54, 70. 100 ...
4	**Protection class**	A = IP20, 3 x AC 200...500 V
5	**Power unit options**	B = Brake transistor (XCS ≥ W0100) / R = Brake transistor/brake resistor integrated (XCS ≤ W0070)
6	**Connector set**	N = Without motor connector set
7	**Control component**	01 = ctrlX DRIVE / 02 = ctrlX DRIVEplus
8	**Panel**	N = Without panel / A = With panel
9	**Communication**	ET = Multi-Ethernet (RJ45) / X3 = ctrlX Core
10	**Hardware option 1**	T0 = Safe Torque Off (STO) / M5 = SafeMotion (M5)
11	**Hardware option 2**	EC = Multi-encoder interface / NN = Not equipped
12	**Hardware option 3**	ET = Multi-Ethernet / DA = I/O extension digital/analog / NN = Not equipped
13	**Runtime type**	S = Standard
14	**Runtime version**	02 = Version 02 (XCS1) / 03 = Version 03 (XCS2)
15	**Runtime release**	RS = Current release
16	**Subject to export approval**	N = No (maximum output frequency < 599 Hz)
17	**Protocol - communication**	0 = Defined via ctrlX CORE apps (XCS2) 1 = Sercos III / 2 = EtherCAT (SoE) / 4 = PROFINET IO
18	**Technology function**	NNN = None TF1 = Install technology apps (XCS2) TE1 = Install/program technology apps (XCS2) TX1 = Install/program technology apps incl. LIBs (Bosch Rexroth libraries) (XCS2)
19	**Range of functions RT**	N = DRIVE Runtime P = DRIVE Runtime Productivity
20	**Range of functions SafeMotion**	0 = Hardware option / 1 ≠ SafeMotion 3 = SafeMotion Speed / 5 = SafeMotion Position
21	**Other Version**	NN = No

▶ Further information on the controller ➠ Chapter "Further information"

Mains filter

Controller / mains filter option						
Controller			**Mains filter**			
	Option	**Weight (kg)**		**Option**	**Weight (kg)**	**Material number**
HCS01-W0008	101 / 102	1.3	NFD03.1-480-007	007	0.88	R911286917
HCS01-W0018	301 / 302	2.1	NFD03.1-480-007	007	0.88	R911286917
HCS01-W0028	401 / 402	2.1	NFD03.1-480-016	016	1.00	R911286918
HCS01-W0054	501 / 502	4.6	NFD03.1-480-030	030	1.67	R911286919
HCS03-W0100	701 / 702	8.0	NFD03.1-480-055	055	2.21	R911286920
CtrlX Drive XCS2-W0023A	2100 / 2130 2160 / 2161	3.0	NFD03.1-480-016	016	1.00	R911286918
CtrlX Drive XCS2-W0054A	3100 / 3130 3160 / 3161	6.3	NFD03.1-480-030	030	1.67	R911286919
CtrlX Drive XCS2-W0070A	4100 / 4130	6.3	NFD03.1-480-055	055	2.21	R911286920
CtrlX Drive XCS2-W0100A	5100 / 5130	18.1	NFD03.1-480-055	055	2.21	R911286920

Mains filter option	
Assembly	R039949992

Option	**Material number**	**Type**
000	Without mains filter	
001	Only CMS: with mains filter	
007	R911286917	NFD03.1-480-007 = 7 A
016	R911286918	NFD03.1-480-016 = 16A
030	R911286919	NFD03.1-480-030 = 30A
055	R911286920	NFD03.1-480-055 = 55A
100	R911383506	XNF1-1A-0100N = 100A

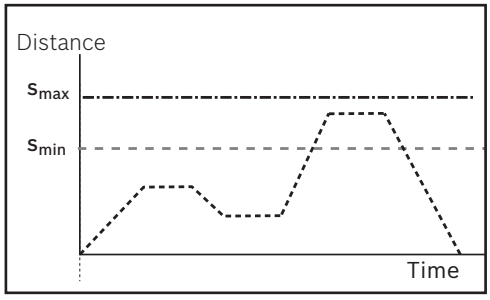
▶ Further information on the controller ➠ Chapter "Further information"

Operating conditions and usage

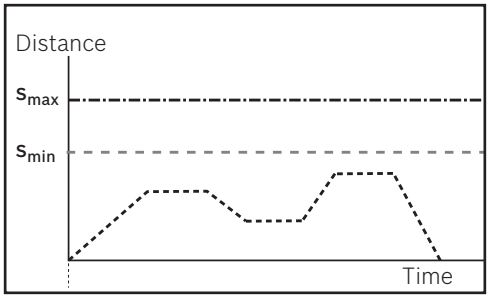
Normal operating conditions

Ambient temperature with Bosch Rexroth servo motor	0 °C ... 40 °C, loss of performance above 40 °C
Ambient temperature for mechanical system (no undershooting the dew point)	–10 °C ... 50 °C
Protection class	IP54, IP65 as an option
Duty cycle	100%
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).

Short stroke case 1:
Distance traveled in the cycle < s_{min} and > 2 x screw lead:
- Perform the service life calculation with 69% of the dynamic load rating
- Halve the maintenance interval (see "Instructions EMC R320103102")

Short stroke case 2:
Distance traveled in the cycle < s_{min} and ≤ 2 x screw lead:
- Only permissible with regular lubricating strokes
- Perform the service life calculation with reduction to the dynamic load capacity
- Adapt maintenance interval

Contact Bosch Rexroth for further details.

Notes

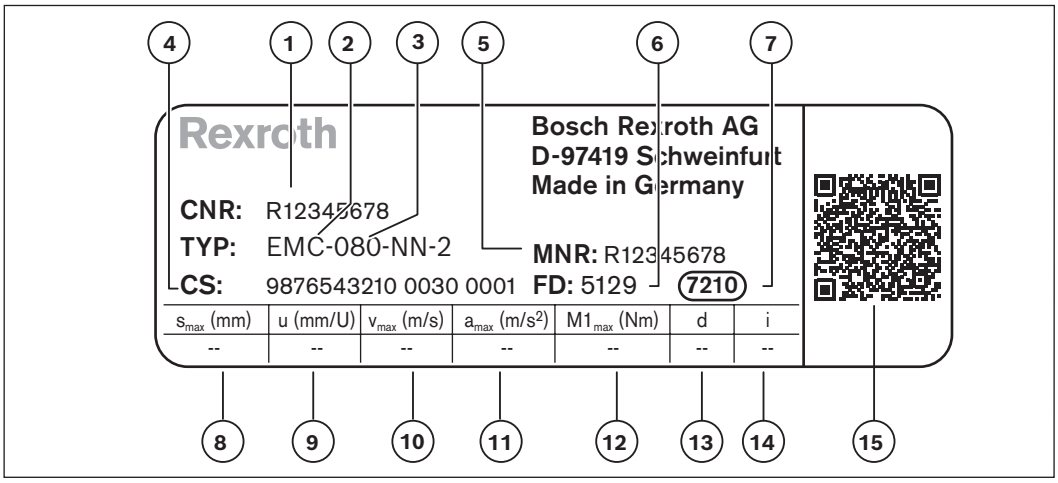
For more information about intended use and safety, see "Safety instructions for linear motion systems R320103152".

For more information on assembly/commissioning see "Instructions EMC R320103102".

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

Parameterization (commissioning)

The name plate contains reference information on the production of the linear motion system as well as technical commissioning parameters.



1	CNR	Customer's material number
2	TYP	Short product name
3	080	Size
4	CS	Customer information
5	MNR	Material number
6	FD	Date of manufacture
7	7210	Manufacturing location
8	s_{max}	Maximum travel range
9	u	Feed constant without motor attachment
10	v_{max}	Maximum speed
11	a_{max}	Maximum acceleration rate
12	$M1_{max}$	Maximum drive torque at motor journal
13	d	Direction of motor rotation to travel in positive (+) direction CW = clockwise CCW = counterclockwise
14	i	Gear ratio
15		QR-Code

Note

The values given describe the mechanical limit values of the axle.
Limit values for the included fastening elements and application-related installation cases are not taken into account here.

Lubrication and maintenance

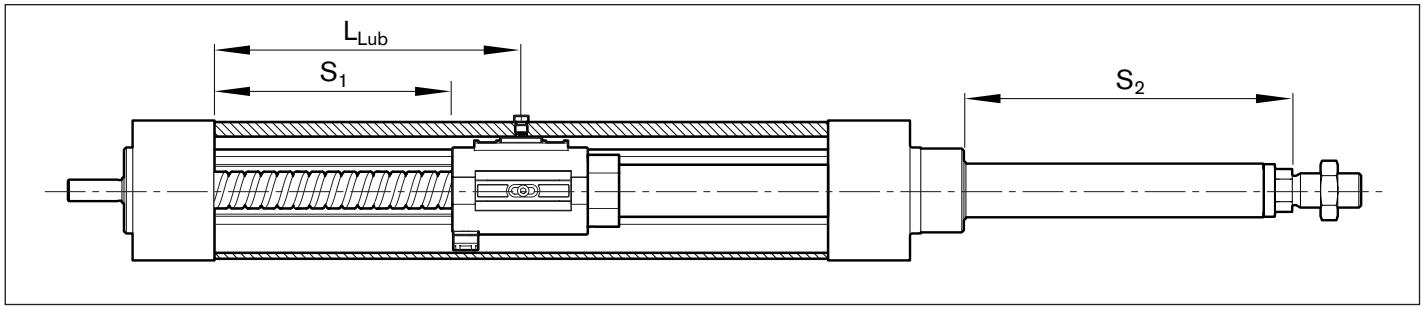
Grease lubrication

The advantage of grease lubrication is that ball screw assemblies can run for prolonged periods without needing relubrication. 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 grade NLGI 2 in accordance with DIN 51818 are recommended for the longest possible lubrication intervals. Tests have shown that grade NLGI 00 greases achieve only about 75% of the travel life of grade 2 at higher loads.

Lubrication position and notes on lubrication

Basic lubrication is applied in-factory before shipment. When selecting the LPG option (preserved version), initial lubrication by the customer is necessary prior to commissioning.

The electromechanical cylinders are designed for grease lubrication using a manual grease gun with a lubricating pin, or for connecting to a central lubrication system (with liquid grease). Maintenance is limited to relubrication of the ball screw assembly. In order to reach lubrication position L_{Lub}, move the piston rod to stroke position S_2. For this purpose, move S_1 from the rear end position according to the table. For more information, see "Instructions EMC, R320103102".



EMC	P[1)] (mm)	L_{Lub} (mm)	S_1 (mm)	S_2 (mm)
32	5	36.0 + $s_{max}/2$[2)]	21.5 + $s_{max}/2$[2)]	33.0 + $s_{max}/2$[2)]
	10	38.0 + $s_{max}/2$[2)]	18.5 + $s_{max}/2$[2)]	30.0 + $s_{max}/2$[2)]
40	5	35.5 + $s_{max}/2$[2)]	16.1 + $s_{max}/2$[2)]	28.1 + $s_{max}/2$[2)]
	10	40.0 + $s_{max}/2$[2)]	17.5 + $s_{max}/2$[2)]	29.5 + $s_{max}/2$[2)]
	16	48.0 + $s_{max}/2$[2)]	15.0 + $s_{max}/2$[2)]	27.0 + $s_{max}/2$[2)]
50	5	33.0 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
	10	42.5 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
	20	52.0 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
63	5	35.0 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
	10	44.5 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
	25	60.5 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	24.0 + $s_{max}/2$[2)]
80	5	37.0 + $s_{max}/2$[2)]	10.0 + $s_{max}/2$[2)]	26.0 + $s_{max}/2$[2)]
	10	49.0 + $s_{max}/2$[2)]	7.5 + $s_{max}/2$[2)]	24.5 + $s_{max}/2$[2)]
	20	53.0 + $s_{max}/2$[2)]	7.5 + $s_{max}/2$[2)]	24.5 + $s_{max}/2$[2)]
	32	70.5 + $s_{max}/2$[2)]	7.5 + $s_{max}/2$[2)]	24.5 + $s_{max}/2$[2)]
100	5	36.0 + $s_{max}/2$[2)]	7.9 + $s_{max}/2$[2)]	23.9 + $s_{max}/2$[2)]
	10	43.0 + $s_{max}/2$[2)]	10.5 + $s_{max}/2$[2)]	27.5 + $s_{max}/2$[2)]
	20	52.0 + $s_{max}/2$[2)]	4.5 + $s_{max}/2$[2)]	21.5 + $s_{max}/2$[2)]
	40	79.5 + $s_{max}/2$[2)]	4.5 + $s_{max}/2$[2)]	21.5 + $s_{max}/2$[2)]
100XC	10	66.5 + $s_{max}/2$[2)]	15.3 + $s_{max}/2$[2)]	43.4 + $s_{max}/2$[2)]
	20	77.5 + $s_{max}/2$[2)]	18.4 + $s_{max}/2$[2)]	46.5 + $s_{max}/2$[2)]

[1)] BASA lead

[2)] s_{max} maximum travel range of the EMC (see name plate)

Recommended lubricants

Note

Do not use lubricants with solid particles (e.g. graphite or MoS_2 additives). Dynalub 520 is recommended for central lubrication systems.

Grease	
Consistency class NLGI 2 in accordance with DIN 51818	**Consistency class NLGI 00 in accordance with DIN 51818**
- **Dynalub 510** (Bosch Rexroth) Cartridge (400 g) R341603700 Bucket (5 kg) R341603500 - **Berulub FG H2 SL** (Bechem) NSF-H1 grease Cartridge (400 g) R341604600	- **Dynalub 520** (Bosch Rexroth) Cartridge (400 g) R341604300 Bucket (5 kg) R341604200
Can also be used	**Can also 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)

Initial lubrication with NSF-H1 lubricant:

Ball screw assembly and other components are pre-lubricated with NSF-H1 lubricant.

Even when using an H1 lubricant, the EMC is only conditionally suitable for use in the foodstuff industry.

H1 lubricants or separating agents (preservative agents) only have H1 approval if they are available with grade purity in an unmixed state. A blend of two H1 approval lubricants or separating agents does not have H1 approval. Owing to the preservation used for the ball screw assembly, the H1 lubricant in the EMC does not have grade purity.

Information on the materials used is available upon request.
In case of any doubt, please consult Bosch Rexroth.

Connection for central lubrication system

For additional information, please refer to chapter "Attachments and accessories".

Documentation

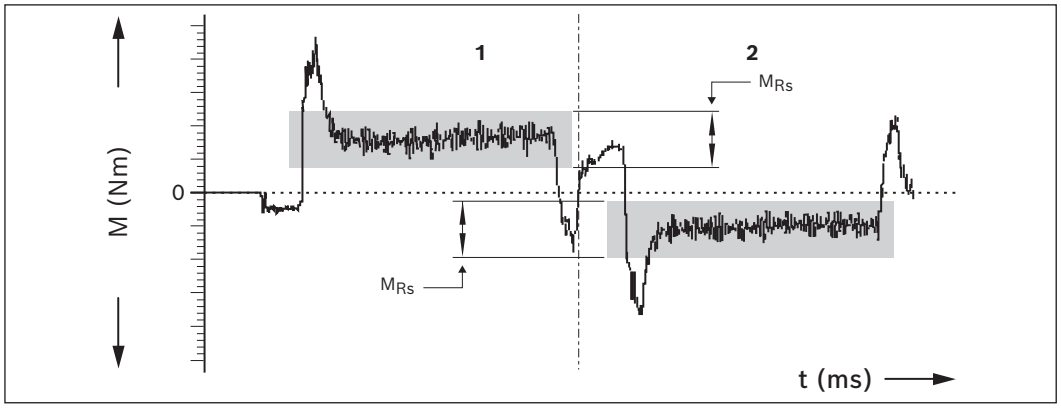
Standard report
Option 01

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 as per the standard report.
The friction torque M is measured over the entire travel range.

Example diagram

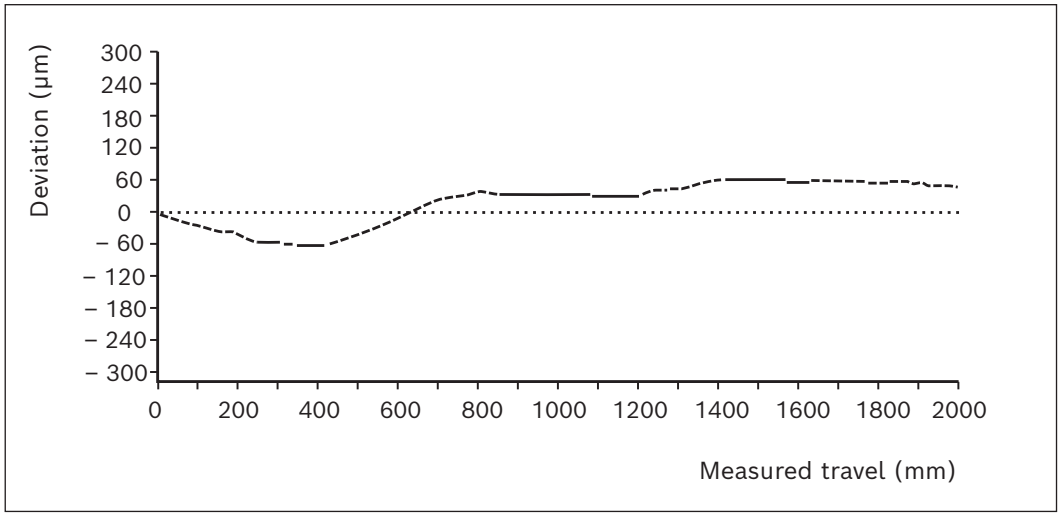


1 Advance
2 Return

M_{Rs} = Friction torque (N)
t = Travel time (ms)

Lead deviation of screw drive option 03
All items as per the standard report.
In addition to the graphical illustration (see figure), a measurement report is included in tabular form.

Example diagram



Abbreviations

Abbreviation/ index	Designation	Unit
a	Acceleration	(m/s^2)
a_{max}	Maximum acceleration rate	(m/s^2)
BASA	Ball screw assembly	(–)
C	Dynamic load capacity, guideway	(N)
d_0	Nominal diameter, ball screw assembly	(mm)
F_1, F_2, ... F_n	Axial load during phases 1 ... n	(N)
F_m	Equivalent dynamic axial load	(N)
i	Gear ratio	(–)
J_{br}	Mass moment of inertia of the motor brake	(kg/m^2)
J_{ex}	Mass moment of inertia of the mechanical system	(kg/m^2)
J_{ge}	Mass moment of inertia of the gear at the motor journal	(kg/m^2)
J_m	Mass moment of inertia of the motor	(kg/m^2)
J_s	Mass moment of inertia	(kg/m^2)
J_t	Translative mass moment of inertia of external load based on the linear motion system screw journal	(kg/m^2)
$k_{g\ fix}$	Constant for fixed portion of mass	(kg)
$k_{g\ var}$	Constant for variable-length portion of mass	(kg/mm)
$k_{J\ fix}$	Constant for fixed portion of mass moment of inertia	(kg/mm^2)
$k_{J\ m}$	Constant for mass-specific portion of mass moment of inertia	(mm^2)
$k_{J\ var}$	Constant for variable-length portion of mass moment of inertia	(kg/mm)
L	Nominal service life – in revolutions – in meters	 (rpm^{-1}) (m)
L_{ad}	Additional length	(mm)
L_h	Nominal service life	(h)
L_m	Length of the motor	(mm)
m_{br}	Mass of the brake	(kg)
m_{ex}	Moved external load	(kg)
m_{fc}	Mass of flange and coupling	(kg)
m_m	Mass of the motor	(kg)
m_s	Mass of the linear system (without attachments)	(kg)
m_{sd}	Mass of the timing belt side drive	(kg)
M_0	Continuous motor torque	(Nm)
M_m	Equivalent dynamic torque	(Nm)
M_{max}	Max. possible motor torque	(Nm)
M_{mech}	Maximum permissible drive torque for mechanical system	(Nm)
M_p	Maximum permissible drive torque (at drive journal)	(Nm)
M_R	Frictional torque at motor journal	(Nm)

Abbreviation/ index	Designation	Unit
M_{Rs}	Friction torque of system	(Nm)
M_{stat}	Static load moment	(Nm)
n_1, n_2, ... n_n	Rotary speed in acceleration and braking phases	(rpm)
n_{mech}	Maximum permissible rotary speed for mechanical system	(rpm)
n_{max}	Max. motor speed	(rpm)
n_p	Maximum permissible rotary speed	(rpm)
P	Screw lead	(mm)
s_e	Excess travel (excess travel s_e should be greater than braking distance. The acceleration travel can be used as a guideline value for braking distance.)	(mm)
s_{eff}	Effective stroke	(mm)
s_{min}	Minimum travel range	(mm)
s_{max}	Maximum travel range	(mm)
t_1, t_2, ... t_n	Time for phase 1 ... n	(s)
u	Feed constant	(mm/rev)
v_1, v_2, ... v_n	Speed in phase 1 ... n	(m/s)
v_{max}	Maximum permissible speed	(m/s)
v_{mech}	Maximum permissible speed of mechanical system	(m/s)
v_m	Average speed	(m/s)
V	Ratio of mass moments of inertia of drive chain and motor	(–)
π	Pi	(–)

Ordering example

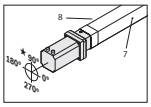
EMC 32 – EMC 50

Size short product name	Max. travel range mm	Housing: Standard	Housing: IP65 enclosure protection class	Housing: IP65 enclosure protection class +R	Drive: BASA d_0 x P (mm)		Lubrication[1]: LSS	LCF	LFG	LHG	LFL[1]	Switch[4]: without switch and sensor profile	Switch[4]: Sensor profile	Switch[4]: Switches 1, 2, 3, 4		Version			Motor attachment: Gear ratio	Motor attachment: Attachment kit[2]	Motor: Motor code[3]	Motor: Cables: 2 cables: Brake: without	Motor: Cables: 2 cables: Brake: with	Motor: Cables: 1 cable: Brake: without	Motor: Cables: 1 cable: Brake: with	Motor: Motor connector position	Documentation: Standard report	Documentation: Measurement reports	
EMC-032-NN-2		01	02	03	12 x 5	01	01	02	03	04	05	00	80	PNP NC contact	120	OF01	without motor attachment			00	without	00							
																MF01	with flange			01	MSM019B-0300	134	135	–					
																				02	MSM031B-0300	136	137	–					
																				03	MS2N03-B0BYN	–	–	203	204	000			
					12 x 10	02										RV01 RV02 RV03	with belt side drive		i = 1	41	MSM019B-0300	134	135	–					
																				42	MSM031B-0300	136	137	–					
																				43	MS2N03-B0BYN	–	–	203	204				
EMC-040-NN-2					16 x 5	01								NPN NC contact	121	OF01	without motor attachment			00	without	00							
																MF01	with flange			05	MSM031C-0300	138	139	–					
																				06	MS2N03-B0BYN	–	–	203	204				
																				200	MS2N03-D0BYN	–	–	207	208	090			
																				07	MS2N04-B0BTN	–	–	211	212				
					16 x 10	02										RV01 RV02 RV03	with belt side drive		i = 1	45	MSM031C-0300	138	139	–					
																				46	MS2N03-B0BYN	–	–	203	204				
																				47	MS2N04-B0BTN	–	–	211	212				
																					MS2N04-C0BTN	–	–	215	216				
					16 x 16	03													i = 1.5	49	MSM031C-0300	138	139	–					
																				50	MS2N03-B0BYN	–	–	203	204				
																				51	MS2N04-B0BTN	–	–	211	212				
EMC-050-NN-2					20 x 5	01								PNP NO contact	122	OF01	without motor attachment			00	without	00							
																MF01	with flange			09	MSM031C-0300	138	139	–					
																				10	MSM041B-0300	140	141	–					
																				11	MS2N04-B0BTN	–	–	211	212	180			
																					MS2N04-C0BTN	–	–	215	216				
																				12	MS2N05-B0BTN	–	–	223	224				
					20 x 10	02										RV01 RV02 RV03	with belt side drive		i = 1	53	MSM031C-0300	138	139	–					
																				54	MSM041B-0300	140	141	–					
																				55	MS2N04-C0BTN	–	–	215	216				
																				56	MS2N05-C0BTN	–	–	227	228	270			
					20 x 20	04													i = 1.5	58	MSM031C-0300	138	139	–					
																				59	MSM041B-0300	140	141	–					
																				60	MS2N04-B0BTN	–	–	211	212				

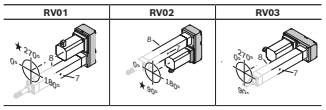
[1] LSS: Standard lubrication; LCF: prepared for central lubrication system for fluid grease; LPG: preserved version; LHG: initial lubrication with NSF-H1 grease; LFL: lifelong lubrication:
[2] Attachment kit also available without motor (when ordering: enter "00" for motor); for motor attachment kit for customer motor see chapter "Motor attachment".
[3] For motor types see chapter "IndraDyn S - servo motors"
[4] Measurement of frictional torque
[5] Lead deviation
[6] Sensor profile and switch not possible in combination with version RV03
[7] Lube connection for LSS, LCF, LPG, LHG; for LFL lubrication: Housing without lube connection
[8] Slot for sensor profile
[9] Application conditions, see page 5

Flange (F)	Motor connector position 0°	90°	180°	270°
MF01	000	090 ★	180	270

★ standard delivery



Example:
Flange MF01
Motor connector position 90°

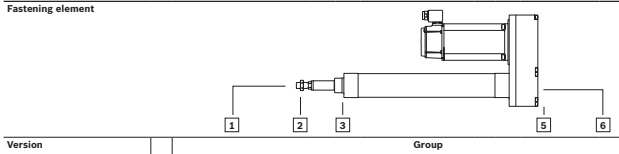


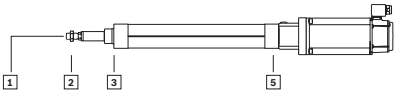
Belt side drive	Motor connector position 0°	90°	180°	270°
RV01	000	–	180	270 ★
RV02	000	090 ★	180	–
RV03	000 ★	090	–	270

★ standard delivery

Example:
Belt side drive RV02
Motor connector position 90°

Explanation of the order parameters and ordering example
➠ Chapter "Ordering example".





Version

Group 1

00	without
without motor attachment OF01	
with mount and coupling MF01	
with timing belt side drive RV01 to RV03	

Group 1

00	without
01	
02	Clevis mount with load measuring pin

Group 2

00	without
01	
02	
03	
04	
05	
06	Stainless steel
07	Stainless steel

Group 3

00	without
01[1]	
03[1]	
04	
06	EMC-32 - EMC-50
	EMC-63 - EMC-100XC

Group 4

00	without

Version

without motor attachment OF01
with mount and coupling MF01
with timing belt side drive RV01 to RV03

Group 5

00	without
01[2]	
03[2]	
05[2]	EMC-32 - EMC-50
	EMC-63 - EMC-100XC
06	EMC-32 - EMC-50
	EMC-63 - EMC-100XC
07	
08	
10	Clevis mount with load measuring pin

Group 6

00	without
01	EMC-32 - EMC-50
	EMC-63 - EMC-100XC
02	
03	EMC-32 - EMC-50
	EMC-63 - EMC-100XC
04	
05	

[1] Only allowed vertically
[2] Fastening elements are supplied assembled when ordering with mount and cushion is selected.

Note: Fastening elements are included

Electromechanical cylinder EMC-040-NN-2

Ordering data		Option	Explanation
Short product name		EMC-040-NN-2	
Max. travel range		580	580 mm
Housing		01	Standard
Drive		02	Rexroth ball screw assembly 16 x 10
Lubrication		02	LCF
Sensor profile		80	With sensor profile
Switch 1		122	PNP NO contact
Version		MF01	With flange
Motor attachment		06	Attachment kit (flange and coupling) for MS2N03
Motor		203	MS2N03, without brake, 1 cable
Documentation		01	Standard
Fastening elements	**Group 1**	00	None
	Group 2	01	Female spherical rod end bearing
	Group 3	06	Foot mounting
	Group 4	00	None
	Group 5	05	Foot mounting
	Group 6	00	None

Inquiry or ordering

Bosch Rexroth AG
97419 Schweinfurt
Germany

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

To be completed by customer	Option
Inquiry	
Order	

Ordering data		Option											
Short product name		E	M	C	-				-			-	2
Max. travel range (mm)	=												
Housing	=												
Drive	=												
Lubrication	=												
Sensor profile	=												
Switch 1	=												
Switch 2	=												
Switch 3	=												
Switch 4	=												
Version	=												

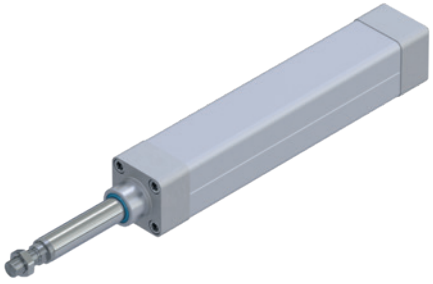
Motor attachment	=	**ØD**	–	**C**	–	**ØE**	–	**C_1**	–	**ØF**	–	**ØG**	–	**B_1**	–	**A**
Motor geometry code	=											**M**				

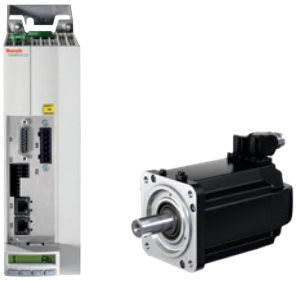
Motor	=		
Documentation	=		
Fastening elements	=		Group 1
	=		Group 2
	=		Group 3
	=		Group 4
	=		Group 5
	=		Group 6

Order quantity	Quantity		
one-off			
monthly			
annually			
per order			
Comments			

From	
Company	
Address	
Name	
Department	
Fax	
Email	

Further information





Bosch Rexroth AG
Ernst-Sachs-Straße 100
97424 Schweinfurt, Germany
Tel. +49 9721 937-0
Fax +49 9721 937-275
www.boschrexroth.com

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

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