Technical Data and Dimensions EMC

Sizes 32 to 100 follow the standard cylinder series according to ISO 15552.

Built-in ball screw drives have a diameter of 12 mm to 40 mm.

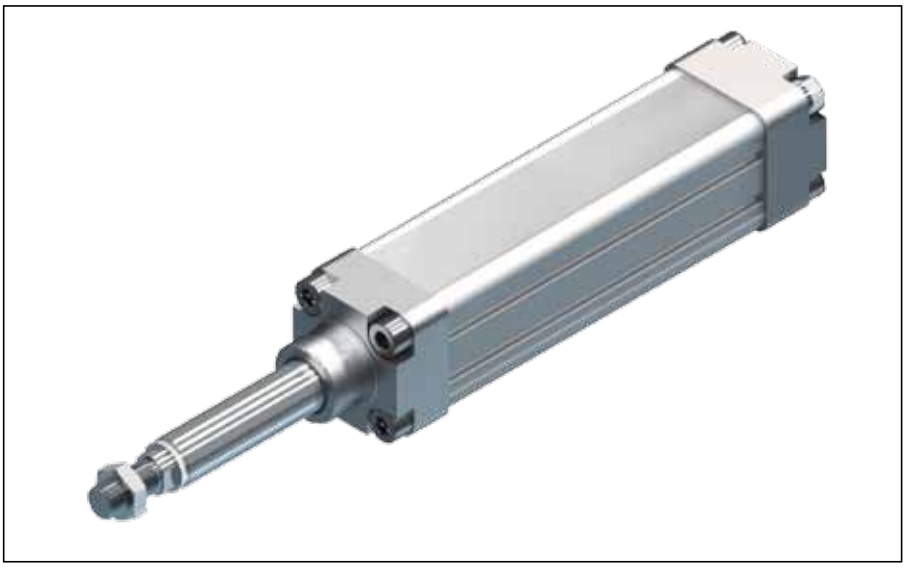
The EMC size is selected according to:

- Thrust
- Stroke
- Linear speed

The actual values must be smaller than the maximum permissible values.

C_{EMC} = dynamic load rating of the EMC
d_0 = nominal diameter of ball screw
$F_{max\ EMC}$ = maximum load
M_P = max. drive torque at drive journal
P = ball screw lead
$s_{max\ perm.}$ = maximum permissible travel distance
v_{max} = max. permissible linear peed

Maximum travel distance s_{max} per customer specifications (minimum 100 mm)



EMC size	Ball screw		C_{EMC} [1]	$F_{max\ EMC}$ [2]	M_p [2]	v_{max} [3]	$s_{max\ perm.}$
	d_0 (mm)	P (mm)	(N)	(N)	(Nm)	(m/s)	(mm)
32	12	5	3800	580	0.51	0.57	750
	12	10	2500	440	0.78	1.13	750
40	16	5	12300	2800	2.46	0.38	750
	16	10	9600	2200	3.95	0.77	750
	16	16	9600	1700	4.87	1.23	750
50	20	5	14300	5800	5.09	0.32	900
	20	10	14100	4700	8.30	0.63	900
	20	20	13300	3100	11.08	1.27	900
63	25	5	15900	15900	14.06	0.28	1200
	25	10	15700	15700	27.76	0.55	1200
	25	25	14700	11900	52.44	1.38	1200
80	32	5	21600	19100	16.89	0.25	1500
	32	10	26000	17400	30.75	0.50	1500
	32	20	19700	13500	47.68	1.00	1500
	32	32	19500	10000	56.86	1.60	1500
100	40	5	29000	29000	25.64	0.18	1500
	40	10	29000	29000	51.28	0.37	1500
	40	20	29000	29000	102.57	0.73	1500
	40	40	29000	22900	161.46	1.47	1500

1) Acceptable loads (recommended from experience):
With respect to the desired service life, loads up to about 20% of the load rating have proved acceptable.
2) The achievable values may vary depending on the version, mounting orientation and maximum travel range s_{max} **!** Charts page 24.
3) Depends on s_{max} **!** Charts page 22.

Operating conditions

Normal operating conditions	
Ambient temperature	0 °C ... 50 °C
Load	See Technical Data
Duty cycle	100%

Technical Data and Dimensions EMC

EMC size	Ball screw		Weight	Total axial backlash[1] for		Frictional torque	Constants[2]		
	d_0	P		Ball nut with reduced backlash	Ball nut with 2% preload	M_{RS}	$k_{j\,fix}$	$k_{j\,var}$	$k_{j\,m}$
	(mm)	(mm)	(kg)	(mm)	(mm)	(Nm)			
32	12	5	$0.869 + 0.003 \cdot s_{max}$	0.020	0.010	0.135	1.942	0.012	0.63300
	12	10	$0.887 + 0.003 \cdot s_{max}$	0.025	0.015	0.165	2.377	0.013	2.53303
40	16	5	$1.233 + 0.004 \cdot s_{max}$	0.030	0.010	0.260	9.437	0.032	0.63300
	16	10	$1.301 + 0.004 \cdot s_{max}$	0.035	0.015	0.300	10.257	0.033	2.53303
	16	16	$1.430 + 0.004 \cdot s_{max}$	0.040	0.020	0.350	12.335	0.040	6.48456
50	20	5	$2.062 + 0.006 \cdot s_{max}$	0.025	0.005	0.330	25.371	0.085	0.63300
	20	10	$1.919 + 0.006 \cdot s_{max}$	0.030	0.010	0.390	26.516	0.088	2.53303
	20	20	$2.468 + 0.006 \cdot s_{max}$	0.040	0.020	0.510	30.742	0.095	10.13210
63	25	5	$2.971 + 0.008 \cdot s_{max}$	0.025	0.005	0.450	60.788	0.223	0.63300
	25	10	$3.318 + 0.008 \cdot s_{max}$	0.030	0.010	0.545	76.223	0.256	10.13200
	25	25	$3.866 + 0.008 \cdot s_{max}$	0.040	0.020	0.770	80.765	0.249	15.83140
80	32	5	$5.207 + 0.013 \cdot s_{max}$	0.025	0.005	0.705	160.373	0.607	0.63300
	32	10	$6.170 + 0.013 \cdot s_{max}$	0.030	0.010	0.855	172.111	0.647	2.53303
	32	20	$6.430 + 0.013 \cdot s_{max}$	0.030	0.010	0.955	196.083	0.665	10.13210
	32	32	$7.548 + 0.013 \cdot s_{max}$	0.040	0.020	1.125	242.697	0.684	25.93820
100	40	5	$8.139 + 0.020 \cdot s_{max}$	0.025	0.005	1.040	486.375	1.568	0.63300
	40	10	$8.946 + 0.020 \cdot s_{max}$	0.040	0.005	1.320	455.882	1.369	2.53303
	40	20	$9.799 + 0.020 \cdot s_{max}$	0.045	0.010	1.420	499.344	1.408	10.13210
	40	40	$12.443 + 0.020 \cdot s_{max}$	0.055	0.020	1.840	673.570	1.567	40.52850

1) Total axial backlash of EMC when new

2) For calculation of the mass moment of inertia

M_{RS} = frictional torque of system

$k_{j\,fix}$ = constant for fixed-length portion of mass moment of inertia

$k_{j\,m}$ = constant for mass-specific portion of mass moment of inertia

$k_{j\,var}$ = constant for variable-length portion of mass moment of inertia

EMC with Rexroth mounting elements

For more information please refer to page 32-43.

⚠ **The permissible axial forces for the mechanical cylinder system are reduced when the Rexroth mounting elements are used. The actual load must not exceed the values in the table.**

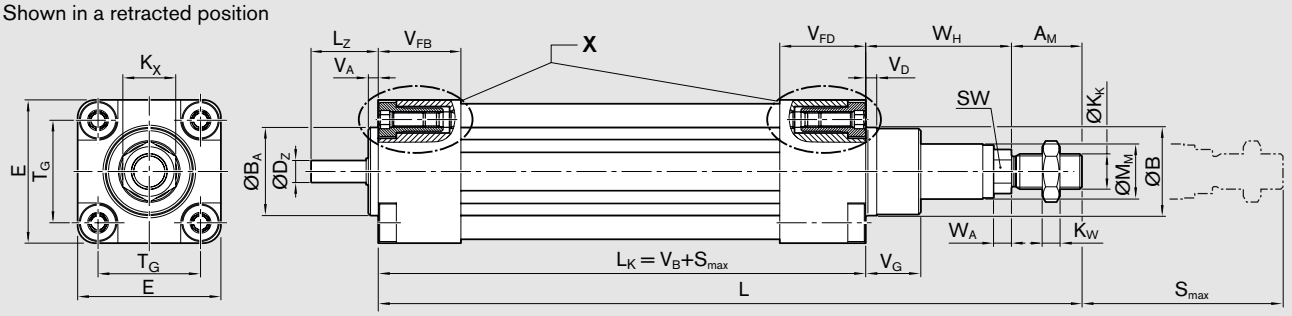
$F < F_{max\ EMC}$ with Rexroth mounting elements

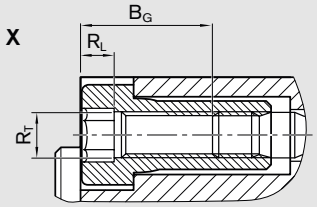
The maximum attainable forces of the EMC/motor combination can be determined by referring to the “Calculations” section.

EMC size	Ball screw d_0xP (mm)	Max. axial force (N) $F_{max\ EMC}$ [1]	$F_{max\ EMC}$ with Rexroth mounting elements
32	12x5	580	580
	12x10	440	440
40	16x5	2800	2100
	16x10	2200	2100
	16x16	1700	1700
50	20x5	5800	3400
	20x10	4700	3400
	20x20	3100	3100
63	25x5	15900	5000
	25x10	15700	5000
	25x25	11900	5000
80	32x5	19100	8000
	32x10	17400	8000
	32x20	13500	8000
	32x32	10000	8000
100	40x5	29000	12000
	40x10	29000	12000
	40x20	29000	12000
	40x40	22900	12000

1) $F_{max\ EMC}$ = maximum load

Shown in a retracted position





K_X = width across flats of the nut
s_{max} = maximum travel
SW = width across flats of the bolt

EMC size	Dimensions (mm)																			
	B d11	B_A d11	B_G	D_Z h7	E ± 0.1	K_K	K_W	K_X	L_Z	M_M f8	R_T	R_L	SW	T_G	V_A ± 0.1	V_D	V_{FB}	V_{FD}	V_G ± 0.1	W_A
32	30	30	16	5	47	M10x1.25	6	17	18	18	M6	4	10	32.5 ± 0.35	4	5	30	30	16	6
40	35	35	16	8	53	M12x1.25	7	19	25	20	M6	4	13	38.0 ± 0.35	4	5	33	30	20	6
50	40	40	16	10	65	M16x1.5	8	24	30	25	M8	4	17	46.5 ± 0.45	4	5	38	33	25	8
63	45	45	16	15	75	M16x1.5	8	24	35	30	M8	4	17	56.5 ± 0.55	4	5	40	33	25	8
80	55	55	16	18	95	M20x1.5	10	30	46	38	M10	0	22	72.0 ± 0.60	4	5	44	35	33	10
100	65	65	16	25	115	M20x1.5	10	30	57	50	M10	0	22	89.0 ± 0.60	4	5	48	35	38	10

EMC length

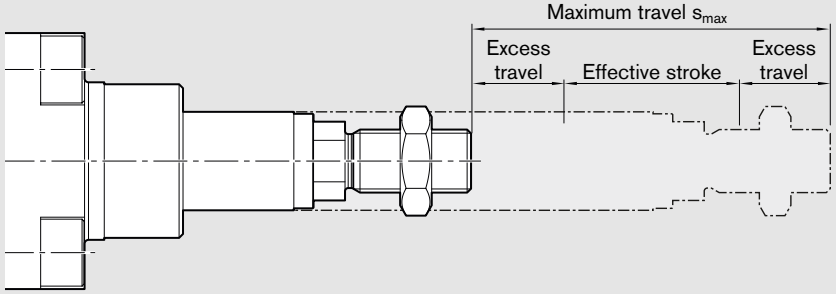
EMC size	Ball screw size	Dimensions (mm)		
		A_M −0.1	V_B	W_H
32	12x5Rx2-4	22	132	33
	12x10Rx2-2	22	136	33
40	16x5Rx3-4	24	134	37
	16x10Rx3-3	24	143	37
	16x16Rx3-3	24	159	37
50	20x5Rx3-4	32	142	44
	20x10Rx3-4	32	161	44
	20x20Rx3.5-3	32	180	44
63	25x5Rx3-4	32	148	44
	25x10Rx3-4	32	167	44
	25x25Rx3.5-3	32	199	44
80	32x5Rx3.5-4	40	163	54
	32x10Rx3.969-5	40	187	54
	32x20Rx3.969-3	40	195	54
	32x32Rx3.969-3	40	230	54
100	40x5Rx3.5-5	40	171	59
	40x10Rx6-4	40	185	59
	40x20Rx6-3	40	203	59
	40x40Rx6-3	40	258	59

$L_K = V_B + s_{max}$

$L = L_K + A_M + W_H$

s_{max} = maximum travel (mm)

Maximum travel = effective stroke + 2 · excess travel

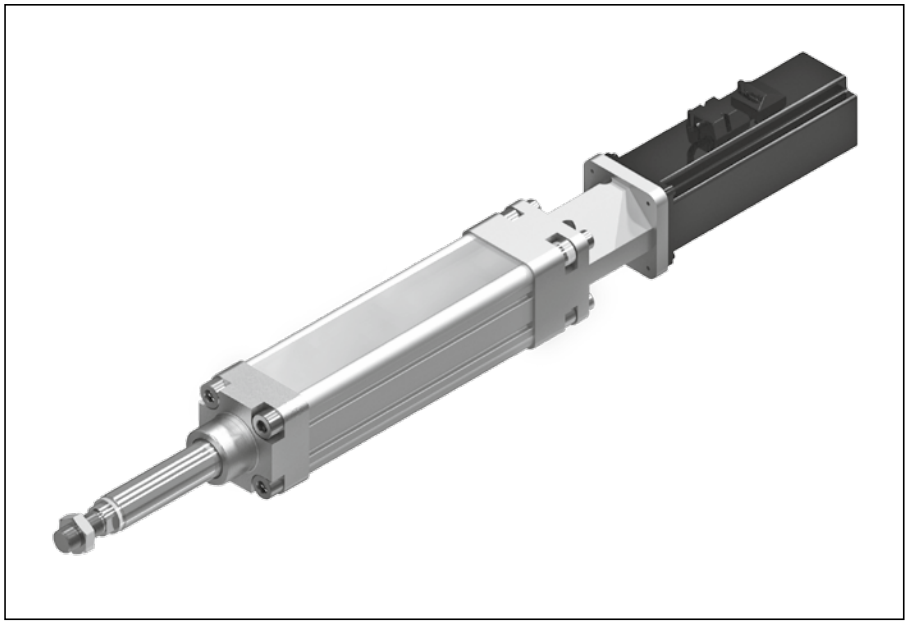


For safe operation, the excess travel must be longer than the braking distance.
The acceleration travel can be taken as a guideline value for the braking distance.
In most cases, this will be sufficient: Excess travel = 2 · screw lead (P)
Example: Ball screw (d_0 x P) 12x5: Excess travel = 2 · 5 mm = 10 mm

Maximum travel distance s_{max} per customer specifications (minimum 100 mm)

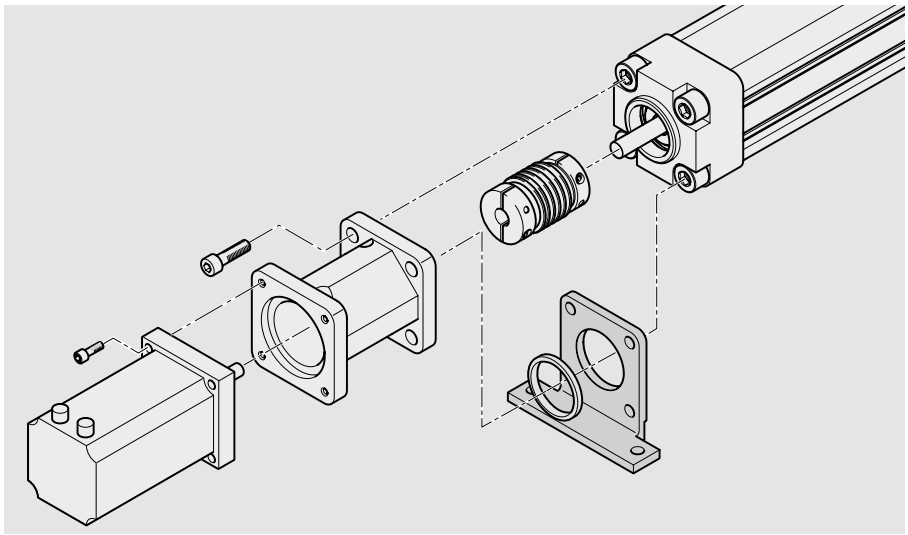
EMC with Motor Mount and Coupling

The motor mount serves to fasten the motor to the EMC and acts as a closed housing for the coupling. The coupling transmits the motor drive torque free of distortive stresses to the EMC's ball screw journal.



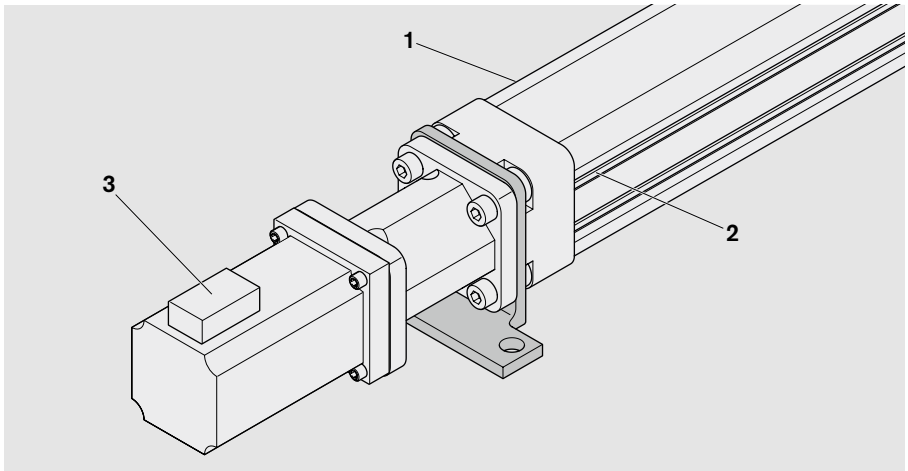
⚠ **When an EMC is ordered with motor mount, motor and foot mounting, this will be delivered pre-assembled. If the foot mounting is to be retrofitted to the cylinder end cap, the motor mount has to be removed first.**

For more information, see "Mounting Instructions for EMC," R320103103

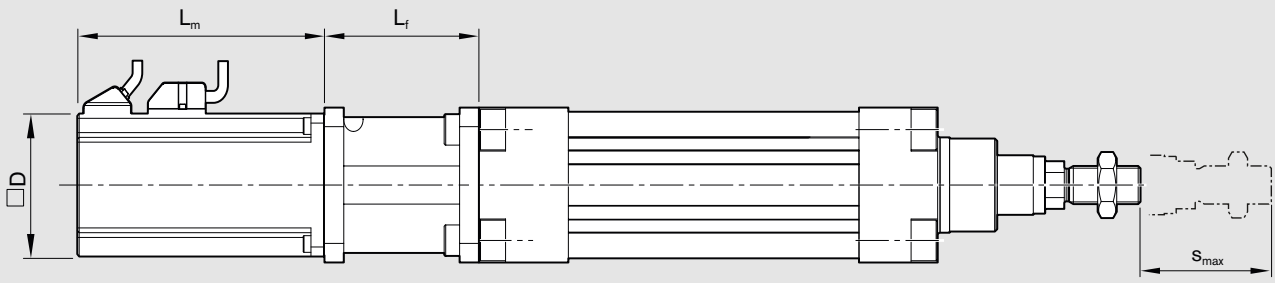


Mounting orientation of motor mount and coupling

1 Lube fitting on EMC
2 T-slots for switches on EMC
3 Motor connector



Shown in a retracted position



s_{max} = maximum travel

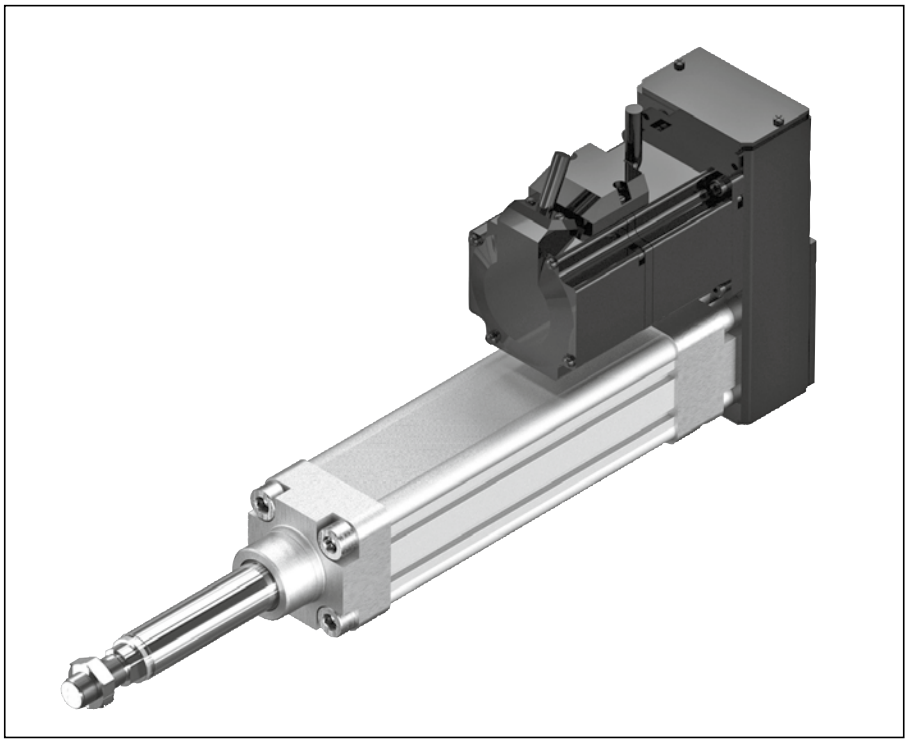
EMC size	Motor	Coupling			Dimensions (mm)			
		Mass moment of inertia	Rated torque	Mass of motor mount and coupling				
		J_c	M_{cN}	m	D	L_f	L_m	
							without brake	with brake
		($x10^{-6}$ kgm^2)	(Nm)	(kg)				
32	**MSM 019B**	2.1	1.9	0.15	38	45	92.0	122.0
	MSM 031B	7.0	3.7	0.22	60	55	79.0	115.5
	MSK 030C	7.0	3.7	0.22	54	55	188.0	213.0
40	**MSM 019B**	2.1	1.9	0.19	38	52	92.0	122.0
	MSM 031B	35.0	10.0	0.32	60	61	79.0	115.5
	MSK 030C	35.0	10.0	0.30	54	61	188.0	213.0
50	**MSM 031B**	63.0	14.5	0.53	60	73	98.5	135.0
	MSK 030C	63.0	14.5	0.48	54	73	188.0	213.0
	MSK 040C	63.0	14.5	0.67	82	73	185.0	215.5
63	**MSM 041B**	64.0	19.0	0.84	80	73	112.0	149.0
	MSK 040C	64.0	19.0	0.88	82	73	185.0	215.5
	MSK 050C	64.0	19.0	0.92	98	78	203.0	233.0
80	**MSK 040C**	63.0	14.5	1.21	82	78	185.0	215.5
	MSK 050C	210.0	74.0	1.80	98	95	203.0	233.0
	MSK 060C	210.0	74.0	2.00	116	100	226.0	259.0
	MSK 076C	210.0	74.0	2.30	140	100	292.5	292.5
100	**MSK 060C**	410.0	155.0	2.85	116	108	226.0	259.0
	MSK 076C	410.0	155.0	3.15	140	108	292.5	292.5

EMC with Belt Side Drive

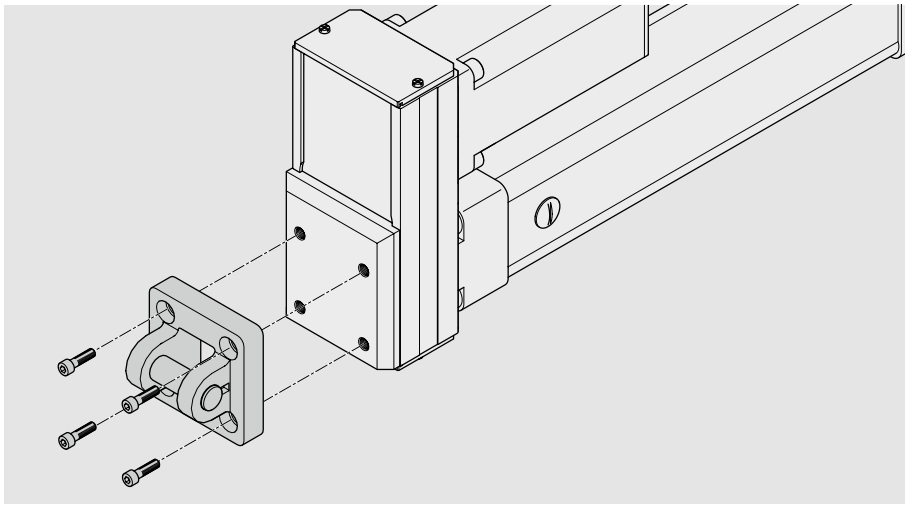
This configuration of the EMC results in the shortest possible installation length. The compact, closed housing protects the belt, secures the motor and serves as a base for fastening mounting elements.

The following gear ratios are available:
i = 1 : 1
i = 1 : 1.5
i = 1 : 2

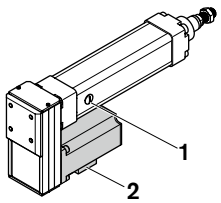
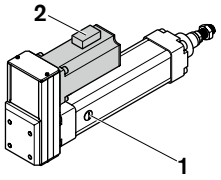
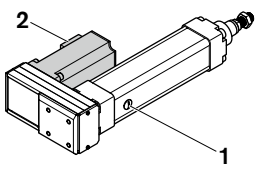
The timing belt side drive can be mounted in three different directions (RV01 to RV03).

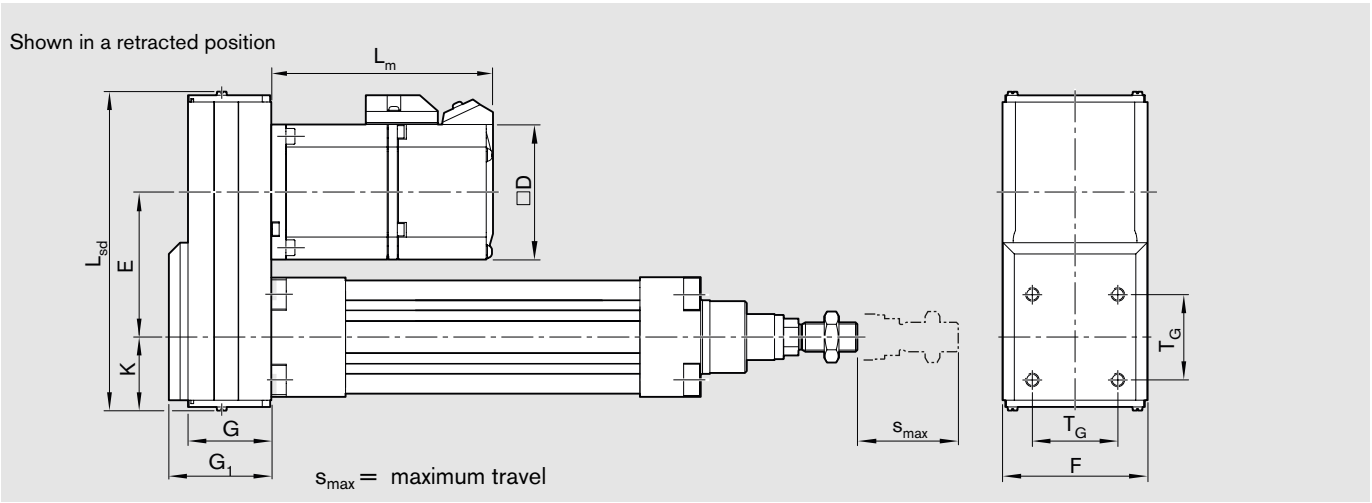


Mounting elements are attached at the rear end of the belt drive. The screws are included in the delivery of the mounting elements.
Before attaching the mounting elements, remove the set screws from the timing belt side drive.



Mounting orientations for the timing belt side drive
1 Lube fitting on EMC
2 Motor connector

RV01	RV02	RV03
		



EMC size	Motor	Reduction i	Timing belt side drive Type[1]	J_{sd} ($\cdot 10^{-6}$ kgm²)	$M_{R\,sd}$ (Nm)	m_{sd} (kg)	Dimensions (mm) E	L_{sd}	F	G	G_1	K	T_G	M	T_M	D	L_m Brake w/o	L_m Brake with
32	**MSM 019B**	**1**	A	12.0	0.08	0.37	67.5	133	48.0	27.5	37.0	30.5	32.5	M6	16	38	92.0	122.0
	MSM 031B	**1**	B	36.0	0.10	0.64	63.0	143	64.5	37.0	45.5	33.0				60	79.0	115.5
	MSK 030C	**1**	B	35.0	0.10	0.65										54	188.0	213.0
40	**MSM 031C**	**1**	A	36.0	0.15	0.70	63.0	143	64.5	37.0	45.5	33.0	38.0	M6	16	60	98.5	135.0
		1.5	A	13.0	0.15	0.62	65.5											
	MSK 030C	**1**	A	36.0	0.15	0.70	63.0									54	188.0	213.0
		1.5	A	13.0	0.15	0.65	65.5											
	MSK 040C	**1**	B	230.0	0.30	1.50	82.5	191	88.0	51.0	55.5	44.0				82	185.0	215.5
		1.5	B	82.0	0.30	1.40	81.5											
50	**MSM 031C**	**1**	A	230.0	0.35	1.35	82.5	174	88.0	51.0	55.5	44.0	46.5	M8	16	60	98.5	135.0
		1.5	A	82.0	0.35	1.25	81.5											
	MSM 041B	**1**	A	230.0	0.35	1.50	82.5	191								80	112.0	149.0
		1.5	A	78.0	0.35	1.40	81.5											
	MSK 040C	**1**	A	231.0	0.35	1.50	82.5									82	185.0	215.5
		1.5	A	82.0	0.35	1.40	81.5											
	MSK 050C	**1**	B	1090.0	0.40	3.30	95.0	234	116.0	66.0	77.0	56.0				98	203.0	233.0
63	**MSM 041B**	**1**	A	1040.0	0.45	2.80	95.0	219	116.0	66.0	77.0	56.0	56.5	M8	16	80	112.0	149.0
		2	A	170.0	0.45	2.50	98.5											
	MSK 040C	**1**	A	1040.0	0.45	2.80	95.0									82	185.0	215.5
		2	A	180.0	0.45	2.50	98.5											
	MSK 050C	**1**	B	1310.0	0.50	3.30	117.5	252								98	203.0	233.0
		2	B	220.0	0.50	2.90	116.5											
	MSK 060C	**1**	B	1330.0	0.50	3.40	117.5									116	226.0	259.0
80	**MSK 050C**	**1**	A	1380.0	0.55	3.50	117.5	257	116.0	66.0	77.0	56.0	72.0	M10	16	98	203.0	233.0
		2	A	240.0	0.55	3.10	116.5											
	MSK 060C	**1**	B	5040.0	0.70	6.80	130.0	290	160.0	90.0	102.0	77.0				116	226.0	259.0
		2	B	830.0	0.70	6.00	126.0											
	MSK 076C	**1**	B	5030.0	0.70	7.20	130.0	299								140	292.5	292.5
100	**MSK 060C**	**1**	A	5160.0	0.70	6.90	130.0	290	160.0	90.0	102.0	77.0	89.0	M10	16	116	226.0	259.0
		2	A	860.0	0.70	6.10	126.0											
	MSK 076C	**1**	B	7650.0	1.00	8.50	150.0	324								140	292.5	292.5
		2	B	1260.0	1.00	7.40	151.5											

J_{sd} Mass moment of inertia of timing belt side drive (at motor journal)

$M_{R\,sd}$ Frictional torque of timing belt side drive

m_{sd} Mass of the timing belt side drive

M_{sd} Maximum permissible drive torque of the timing belt side drive **!** Table page 25

1) See page 25, Table for drive torque according to lead and SD type