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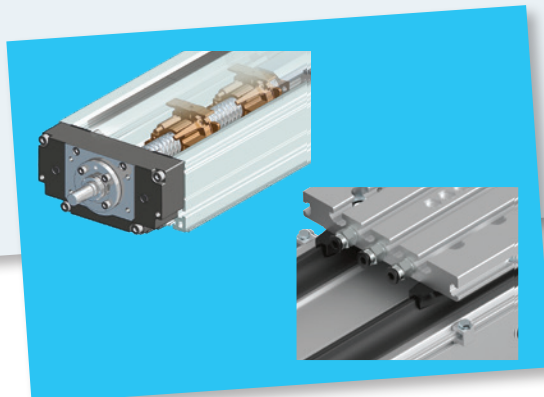
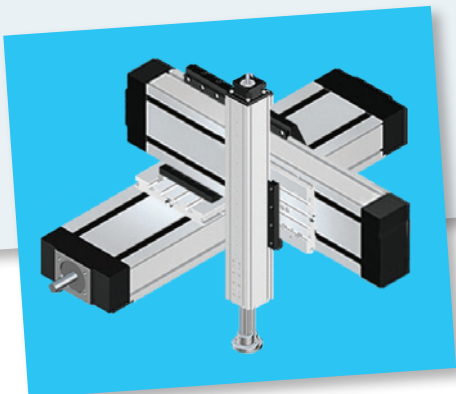
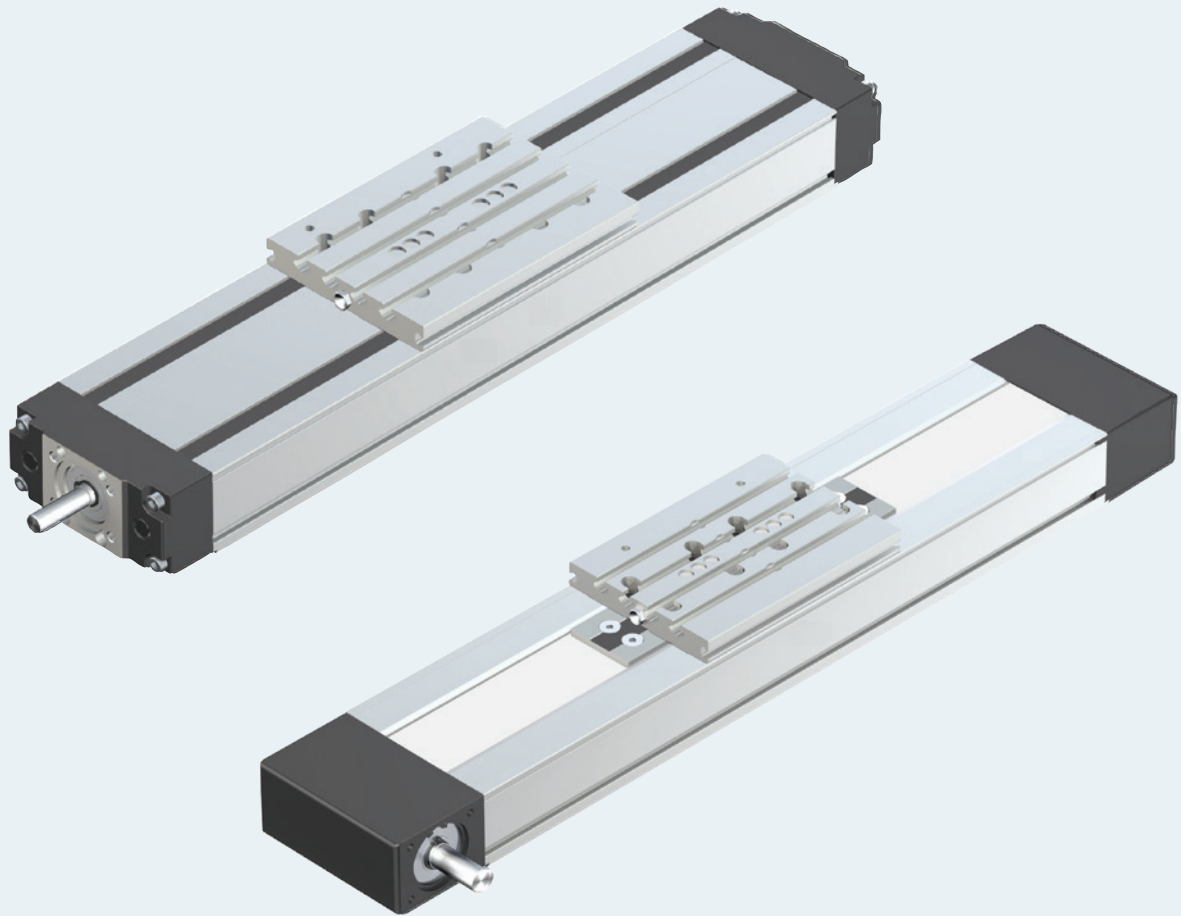


SERVICE & SUPPORT

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rexroth
A Bosch Company

Compact modules CKK/CKR



Identification system for short product names

Compact modules are identified by the type designation and size.

Example		C	K	K	- 110 -	NN	- 1
System	=	Compact module (C)					
Guideway	=	Ball rail system (K)					
Drive	=	Ball screw assembly (K) Toothed belt drive (R)					
Size	=	070 / 090 / 110 / 145 / 200					
Version	=	Standard version (N)					
Generation	=	Product generation 1					

Changes/additions at a glance

- ▶ MS2N motors revised: chapter "Configuration and ordering" and chapter "Motors"
- ▶ "Automation package" amended: in the product description, in the option tables, for accessories

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Product description

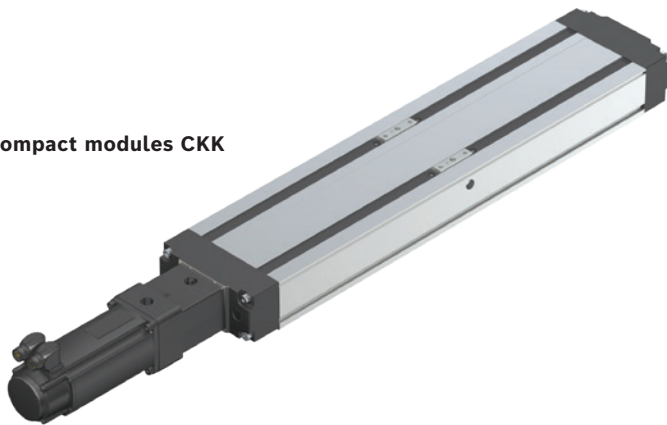
Characteristic features

- ▶ Five fine-tuned sizes based on a compact precision aluminum profile with two integrated preloaded ball rail systems
- ▶ Identical external dimensions between compact module types CKK and CKR.
- ▶ Four different lube versions (see the following pages and the chapter "Lubrication")
- ▶ Ready-to-install compact modules in any length up to L_{max}
- ▶ Aluminum carriages available in different versions depending on load

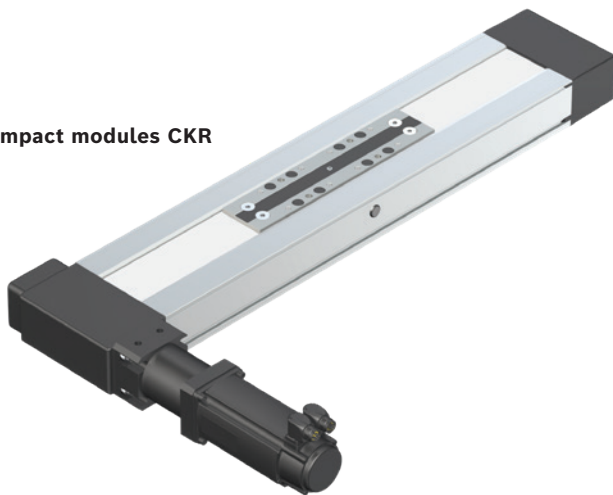
Further highlights

- ▶ Flexible thanks to options
- ▶ Ready-to-install with various attachment parts
- ▶ Centering holes for simple combination with other linear motion systems and connection elements
- ▶ Economical maintenance thanks to one-point lubrication feature (grease lubrication) from both sides or via the carriage or via a connection plate

Compact modules CKK



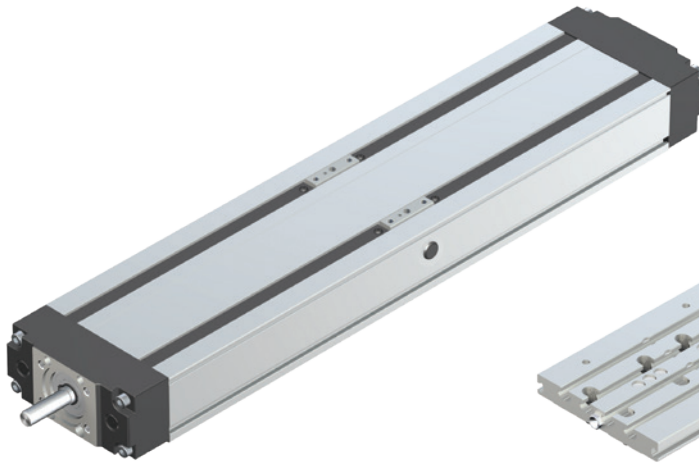
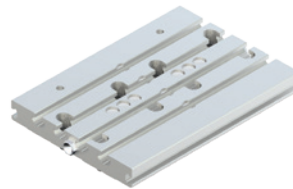
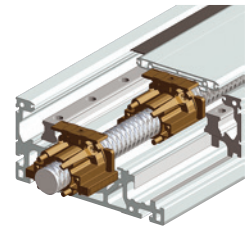
Compact modules CKR



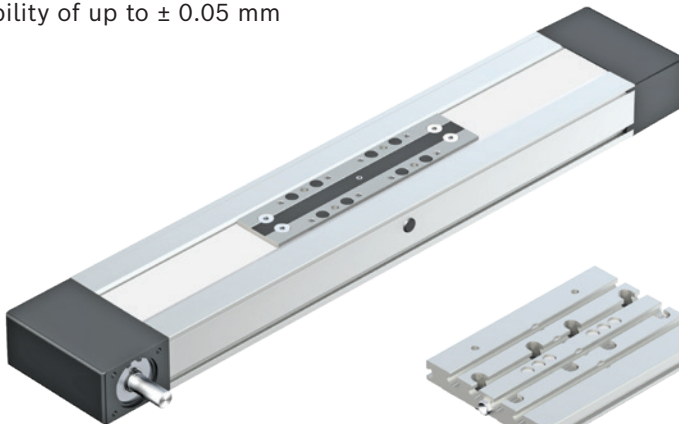
Compact modules are available as complete solutions with motor, controller, and control system. For more information, see the "Axis / drive / software" chapter.

Compact modules CKK**with ball rail system and ball screw assembly**

- ▶ Drive via precision ball screw assembly
- ▶ Screw support for the realization of high speeds on long assembly lengths for CKK-200
- ▶ Protection of installation elements through a cover plate and two cover strips; Optionally increased protection thanks to "Resist" cover
- ▶ Repeatability of up to ± 0.005 mm

**"Resist" cover****Connection plates****Screw support SPU
for CKK-200****Compact modules CKR****with ball rail system and toothed belt drive**

- ▶ Realization of greater lengths of up to 10,000 mm
- ▶ Preloaded toothed belt
- ▶ Intelligent toothed belt guide protects inner components
- ▶ Repeatability of up to ± 0.05 mm

**Connection plates**

Axis / drive / software

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

So that you can realize fully automated movements with single axes faster, all components are now available in one package.

With just a few clicks, you can design and configure motor, drive controller, mains filter and cable online, and optionally also the software.

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.

Really everything from a single source.
Can it be easier?



Faster automation:

single axis + drive + software in one package.



3 ORDERING OPTIONS, ALL FREEDOMS:

1. **Single axis**
2. **Single axis + drive**
(incl. mains filter/cable)
3. **Single axis + drive + software**
(incl. mains filter/cable) as plug & play complete solution

► For further information see chapter "Configuration and ordering" and chapter "Automation package".

Lubrication versions

Two drive versions:

- ▶ Compact modules CKK with ball rail system and ball screw assembly
- ▶ Compact modules CKR with ball rail system and toothed belt drive

Four different lube versions

- ▶ Standard lubrication (LSS)
- ▶ Preserved (LPG)
- ▶ Carriage with connection plate prepared for connection to central lubrication systems for liquid grease (LCF)
- ▶ Carriage with connection plate prepared for connection to central lubrication systems for oil (LCO)

Versions for oil and 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

Notes:

LSS:

- ▶ Initial lubrication by Bosch Rexroth
- ▶ Relubrication using manual grease gun

LPG:

- ▶ Ball rail system and ball screw assembly only with corrosion prevention
- ▶ Relubrication using manual grease gun
- ▶ Basic lubrication required

LCF:

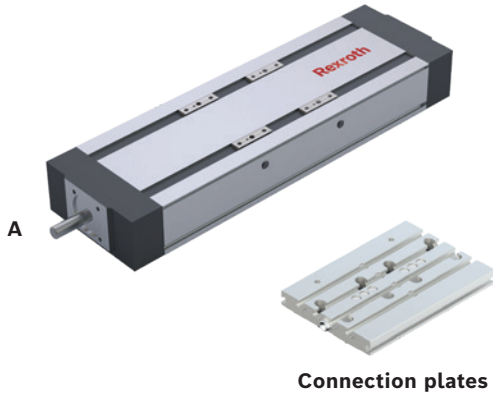
- ▶ Prepared for connection to central lubrication systems for liquid grease (grade NLGI 00 in accordance with DIN 51818)
- ▶ Lubrication with liquid grease only via single-line piston distributor system
- ▶ Basic lubrication required

LCO:

- ▶ Prepared for connection to central lubrication systems for oil
- ▶ Oil lubrication only via single-line piston distributor system
- ▶ Runner block and ball screw assembly nut with integrated non-return valves
- ▶ Basic lubrication required

Compact modules CKK
Lubrication version LSS, LPG

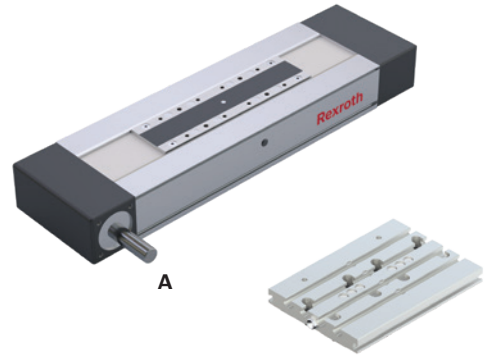
- ▶ Grease lubrication with manual grease gun via frame, carriage or via connection plate



Connection plates

Compact modules CKR
Lubrication version LSS, LPG

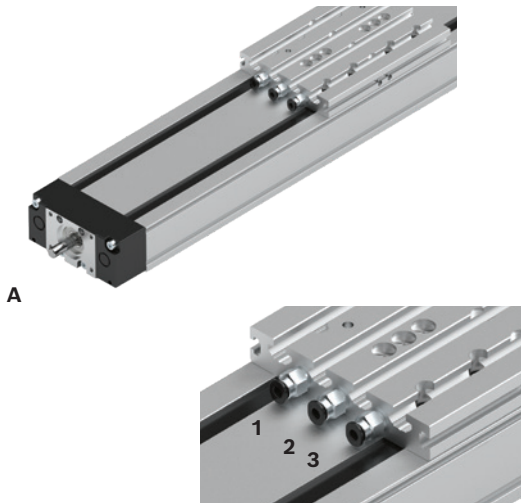
- ▶ Grease lubrication with manual grease gun via frame, carriage or via connection plate



Connection plates

Lubrication version LCF, LCO

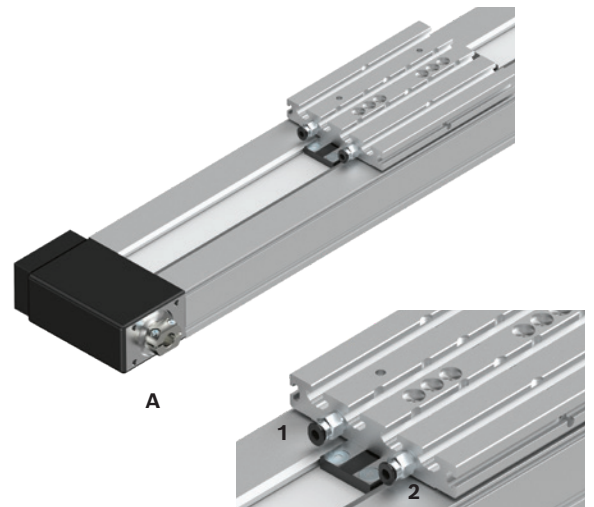
- ▶ 3 lube fittings
- ▶ Prepared for connection to central lubrication systems



- A** Drive side
- 1** Lube connection, runner block left
- 2** Lube connection, runner block right
- 3** Lube connection, ball screw assembly

Lubrication version LCF, LCO

- ▶ 2 lube fittings
- ▶ Prepared for connection to central lubrication systems



- A** Drive side
- 1** Lube connection, runner block left
- 2** Lube connection, runner block right

Form of delivery

Compact modules with ball rail system and ball screw or toothed belt drive are delivered completely assembled.

Motor attachment

If a combination of motor and motor attachment has been selected, then the components are attached as shown in the figure, which also shows the location of the motor connector.

When ordering motor attachments without motor, not all parts can be mounted.

Final assembly must then be carried out by the customer.

All necessary instructions and parameters for professional assembly are included.

Available options

Cable duct, mounting duct, switch, switching cam and socket with connector are included as loose parts.

Lubrication

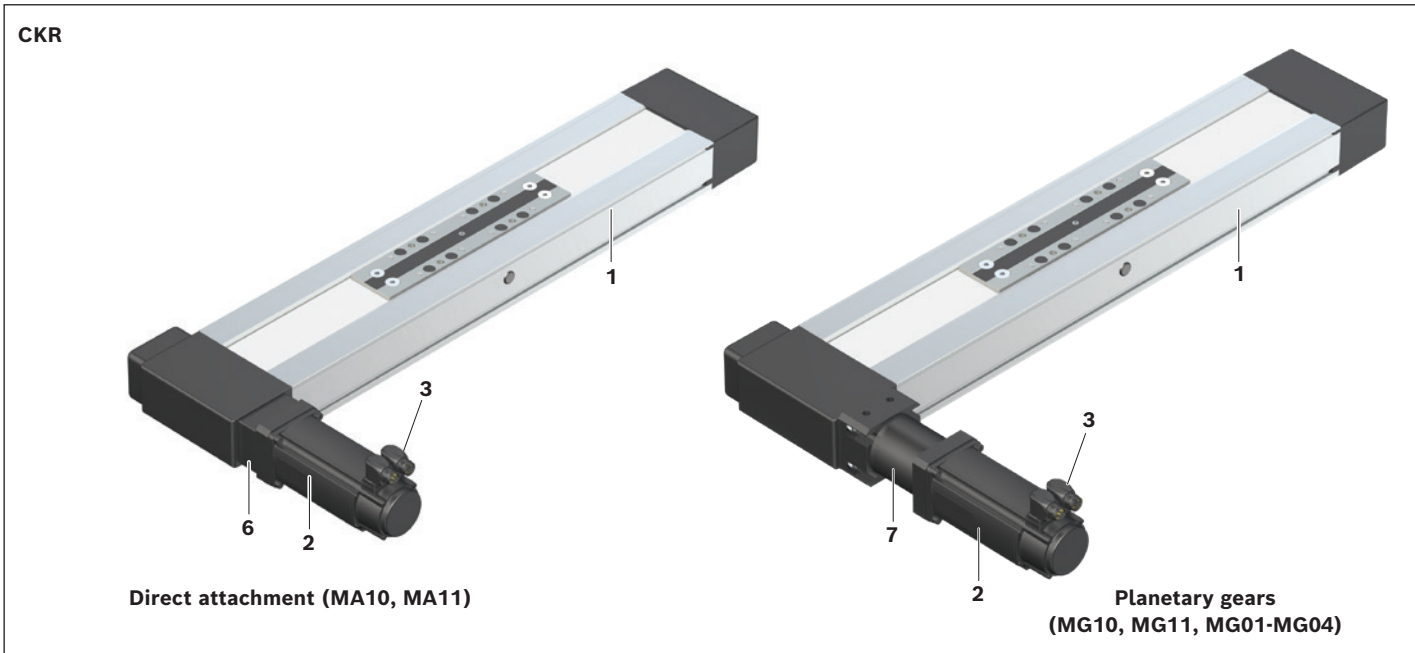
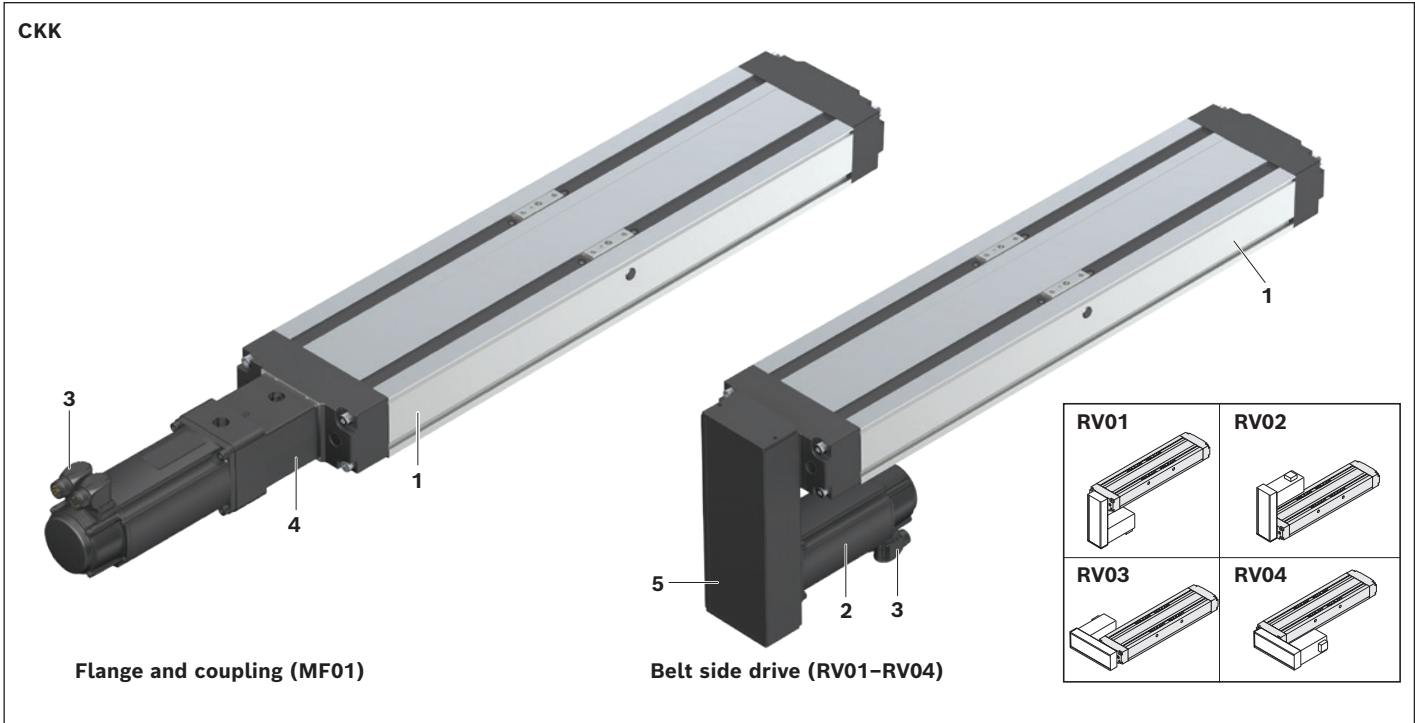
Compact modules are delivered with initial greasing, depending on the lubricant used.

For more information on lubricants, see Chapter "Lubrication".

Documentation

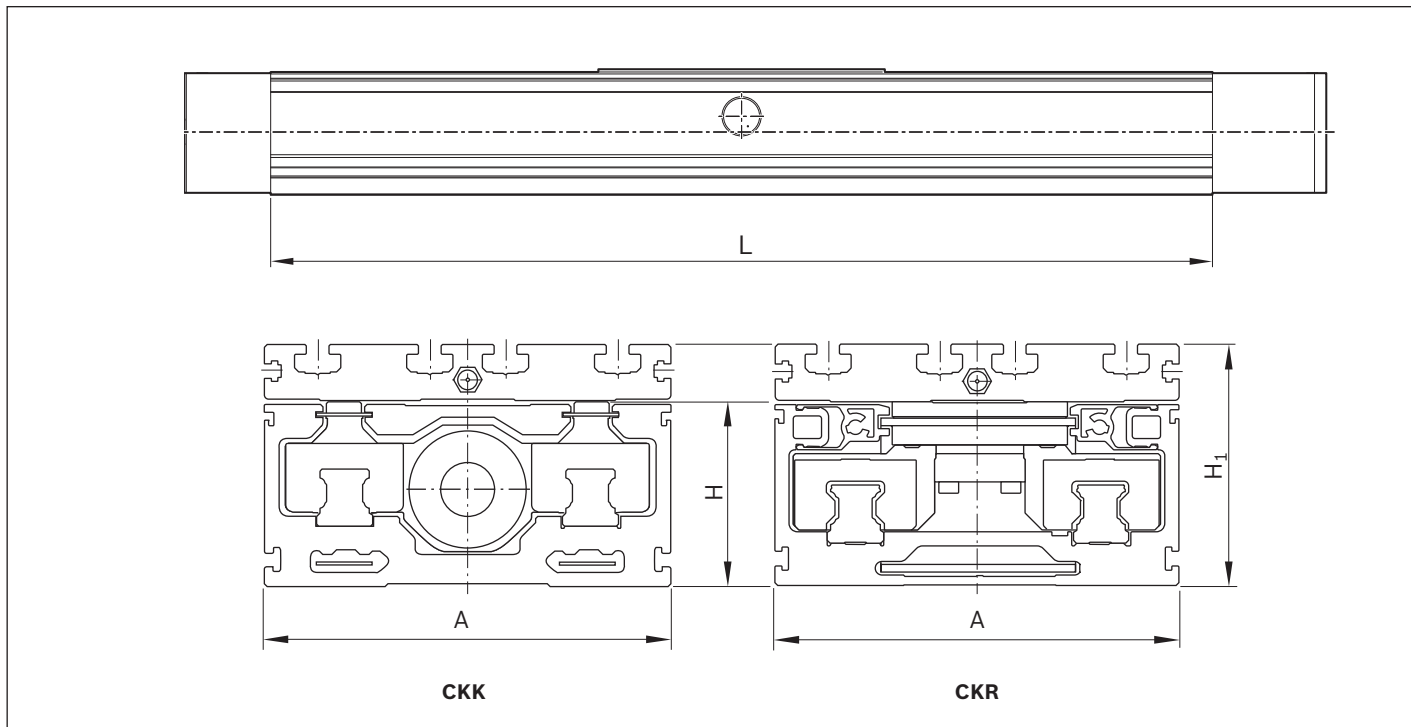
Each compact module is supplied with the accompanying documentation.

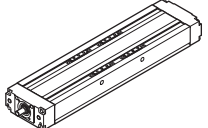
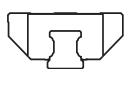

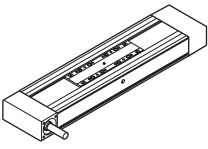
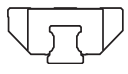
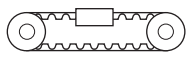
All CKK and CKR versions that have been configured with "Carriage with connection plate" are supplied without the lube ports in the frame. All configured compact modules with carriages without connection plate are still supplied with lube ports in the frame.



- 1 Linear motion system
- 2 Motor
- 3 Motor connector
- 4 Flange and coupling
- 5 Belt side drive
- 6 Direct attachment (flange)
- 7 Gearing

Overview of types with load capacities



Compact modules	Type	Guideway	Drive
	CKK	 Ball rail system	 Ball screw assembly
	CKR	 Ball rail system	 Toothed belt drive

Note on dynamic load capacities and moments

Determination of the dynamic load capacities and moments is based on a total travel of 100,000 m. Often only 50,000 m of total travel are actually stipulated. For comparison: Multiply values C, M_t and M_L by a factor of 1.26.

Size	070			090			110			145			200		
Dimensions (mm)	A	H	H ₁	A	H	H ₁	A	H	H ₁	A	H	H ₁	A	H	H ₁
		70	32	44.5	90	40	56	110	50	66	145	65	85	200	100
L _{max} (mm)	650			750			1,500			1,800			2,200 ¹⁾		
Dynamic load capacity C _{gw} ²⁾ (N)	3,830			7,505			32,035			76,025			121,185		
L _{max} (mm)	1,500			5,500			5,500			5,500			10,000		
Dynamic load capacity C _{gw} ²⁾ (N)	3,830			7,505			32,035			76,025			121,185		

¹⁾ Up to 5,500 mm are possible with screw support (SPU).

²⁾ The maximum permitted dynamic values are specified here. They vary depending on the carriage length.

Compact modules with ball screw assembly (CKK)

Product overview

Features

- ▶ Five fine-tuned sizes based on a compact precision aluminum profile with two integrated preloaded ball rail systems
- ▶ Four different lube versions
- ▶ Ready-to-install compact modules in any length up to L_{max}
- ▶ Driven by precision ball screw assembly in rolled design tolerance grade T7 in accordance with DIN 69051 with single nut set to zero-clearance
- ▶ High travel speeds thanks to large leads with high precision over long lengths
- ▶ Aluminum carriages available in different lengths
- ▶ Protection of installation elements through a cover plate and two cover strips; optionally increased protection thanks to "Resist" cover
- ▶ Low-cost maintenance
- ▶ Repeatability of up to ± 0.005 mm

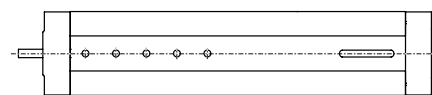
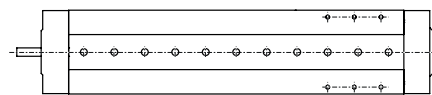
Further highlights

- ▶ Flexible thanks to selectable options
- ▶ Centering holes for simple combination with other linear motion systems and connection elements
- ▶ Extensive accessories for connection and clamping units
- ▶ Nameplate with parameters for easy commissioning

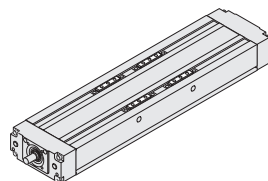
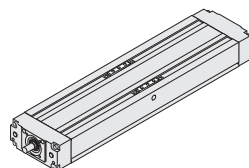
Attachments

- ▶ Motor attachments with flange and coupling or via a belt side drive
- ▶ Motor attachment kits according to customer specification
- ▶ Maintenance-free servo motors with selectable brake and attached feedback
- ▶ Magnetic sensors, switch activation without additional switching cam
- ▶ Socket and connector
- ▶ Cable duct made of aluminum for sensors

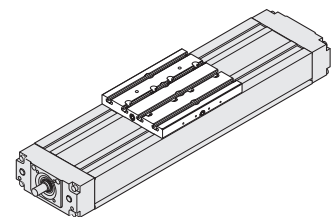
Design/options for guideway (frame), carriages, connection plates



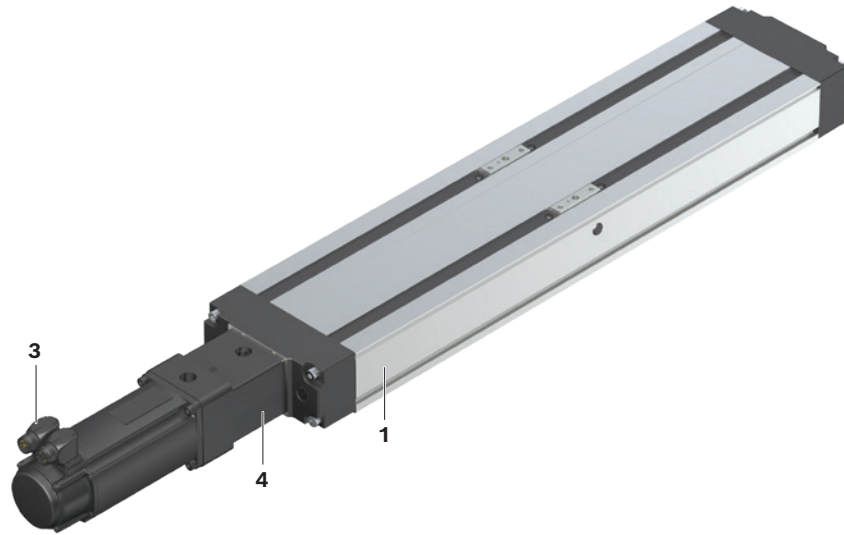
Guideway (frame)



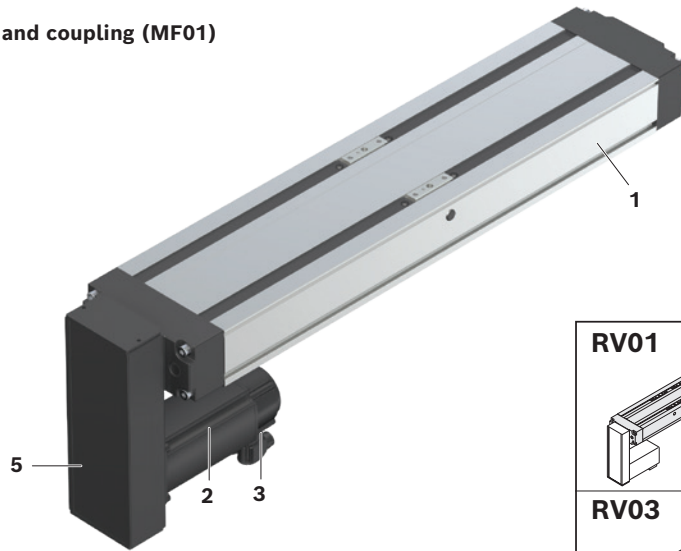
Carriages



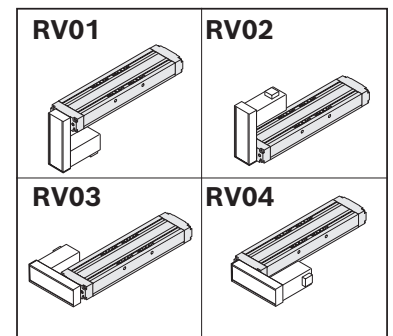
Connection plates



Flange and coupling (MF01)



Belt side drive (RV01-RV04)



- 1 Linear motion system
- 2 Motor
- 3 Motor connector
- 4 Flange and coupling
- 5 Belt side drive

Screw support for compact module CKK-200

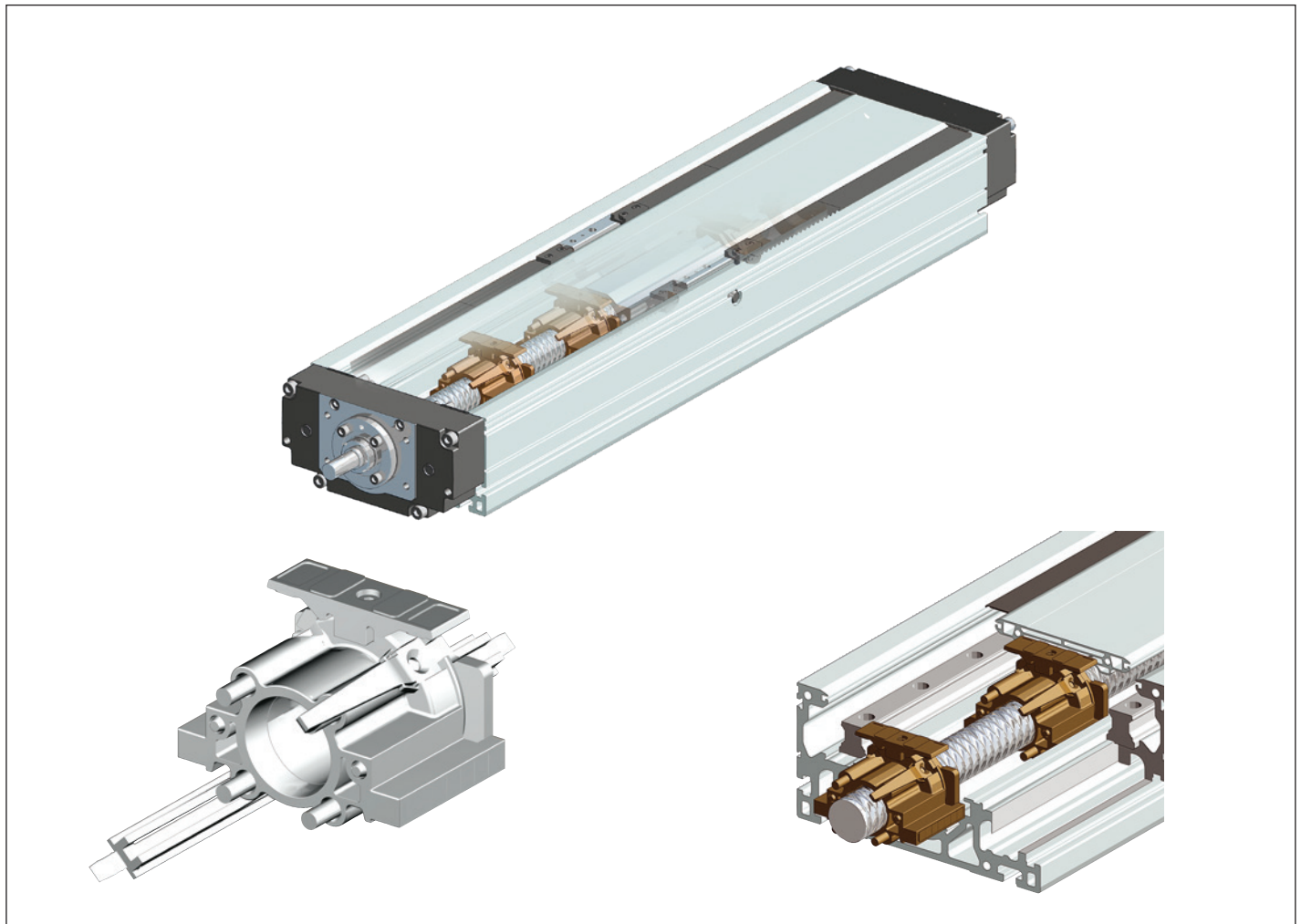
Structural design:

- ▶ Guidance of the screw supports in the frame.

Features:

- ▶ High speed over longer lengths of up to 5,500 mm.
- ▶ Elastomer buffer provides cushioning between carriage and screw supports.
- ▶ Screw supports are maintenance-free.
- ▶ Screw supports are protected by the cover plate and two cover strips.
- ▶ The screw supports prevent the cover plate from sagging in all directions.

 **Screw support suitable for horizontal operation only**



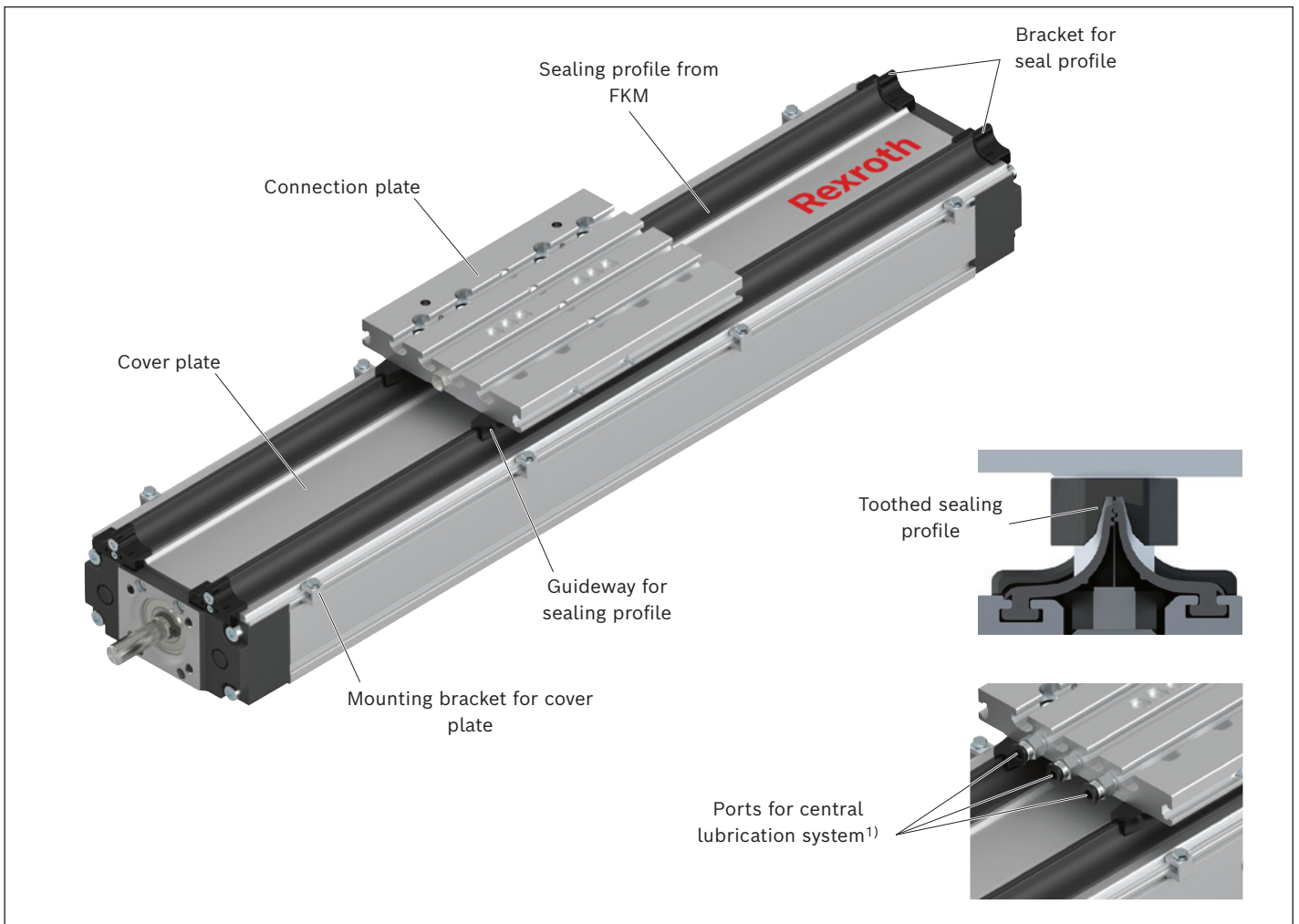
"Resist" cover

Structural design:

- ▶ Sizes: CKK -110, -145, -200
- ▶ Possible for version with connection plate

Features:

- ▶ Increased protection thanks to the toothed sealing profile
- ▶ The integrated guideway on the carriage ensures the sealing profile interlocks perfectly
- ▶ Sealing profile made of flexible FKM – material
- ▶ Free of LABS (substances harmful to paint structure)
- ▶ Replaceable sealing profile
- ▶ The sealing profile has a short-term temperature resistance of up to 300°C
- ▶ Suitable for exposure to dry chips with broken chips of aluminum and component handling during welding application
- ▶ Selectable with all lube versions



¹⁾ See chapter "Lubrication"

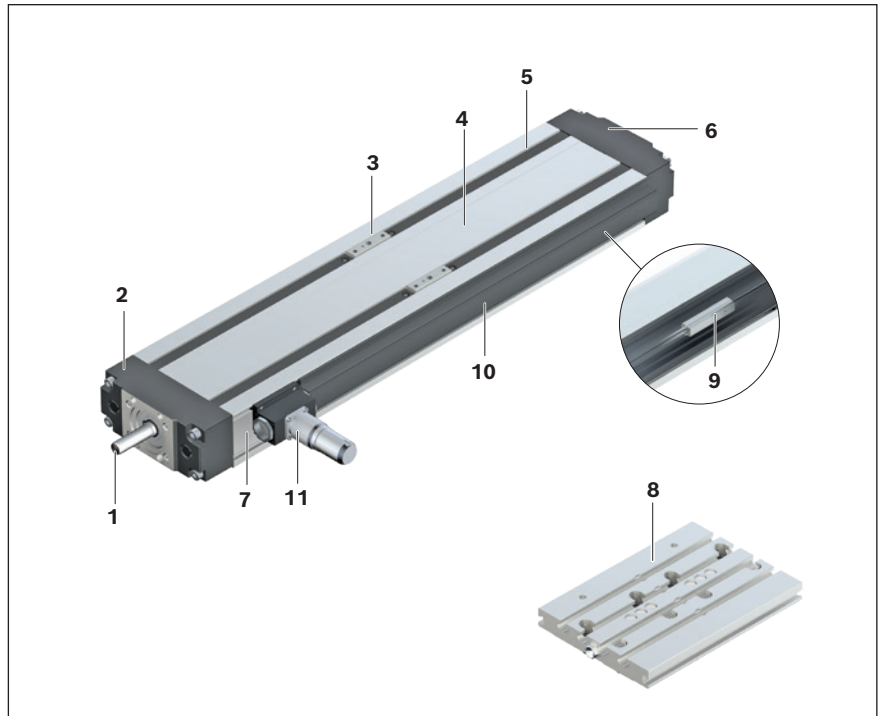
Structural design

Structural design CKK

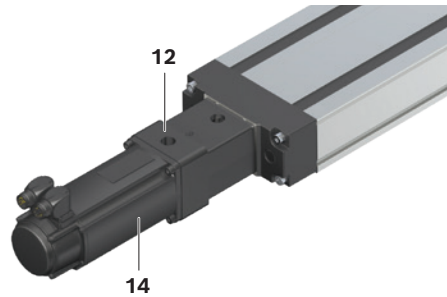
- 1 Ball screw assembly with zero-backlash single nut
- 2 Drive side cross tie
- 3 Carriage with integrated runner block
- 4 Cover plate
- 5 Cover strip made of reinforced strip PU
- 6 End block
- 7 Frame

Attachments:

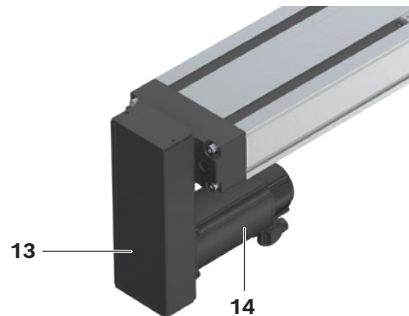
- 8 Connection plate
- 9 Magnetic sensor
- 10 Cable duct
- 11 Socket/connector
- 12 Flange and coupling
- 13 Belt side drive
- 14 Motor



Motor attachment – flange and coupling



Motor attachment – belt side drive



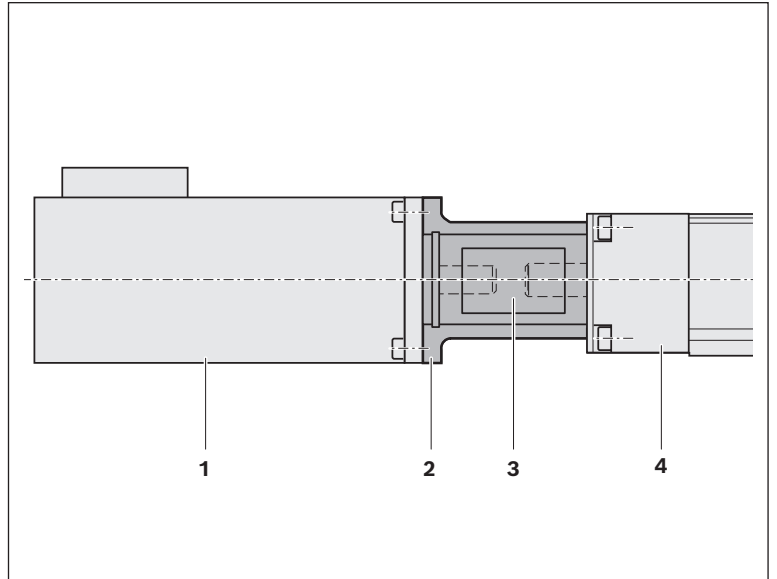
Structure of flange and coupling

A motor can be attached to all compact modules with ball screw assembly by means of a flange and coupling.

The flange serves to fasten the motor to the compact module and acts as a closed housing for the coupling. The motor's drive torque is transmitted stress-free through the coupling to the compact module's drive journal.

Our standard couplings compensate for the system's thermal expansion.

- 1 Motor
- 2 Flange
- 3 Coupling
- 4 Compact module



Structure of belt side drive

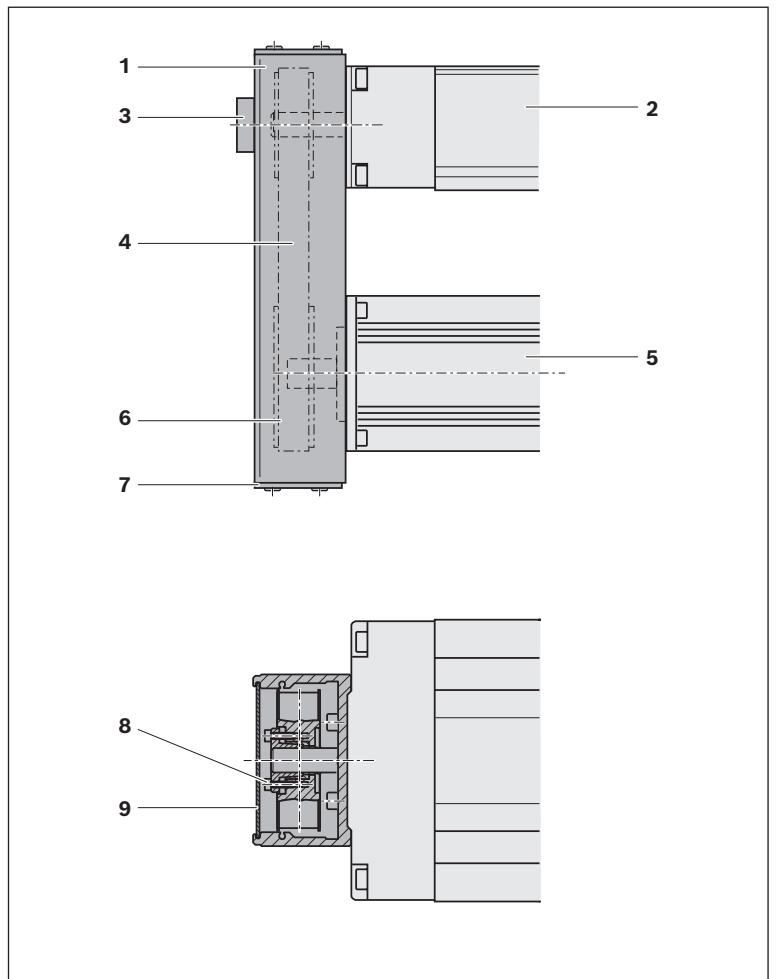
All compact modules with ball screw assembly offer the option of attaching the motor via a belt side drive. This makes the overall length shorter than when attaching the motor with flange and coupling. The space-saving, closed pulley housing serves as protection for the belt and as a motor bracket. In addition, various gear ratios are also available (depending on size):

- ▶ $i = 1$
- ▶ $i = 1.5$
- ▶ $i = 2$

The belt side drive can be mounted in four different directions:

- ▶ Below, above (RV01 and RV02)
- ▶ Left, right (RV03 and RV04)

- 1 Pulley housing made of anodized aluminum frame
- 2 Compact module
- 3 Support bearing at the screw journal in size CKK-070
- 4 Toothed belt drive
- 5 Motor
- 6 Toothed belt drive
- 7 Cover
- 8 Belt pulleys with tensioning units
- 9 Cover plate



Technical data

General technical data

Observe the "Project planning/calculation" chapter.

CKK	Carriage			Additional length		Min. travel range $s_{min}^{4)}$ (mm)	Max. length L_{max} (mm)	BASA $d_0 \times P$ (mm)	Dynamic characteristic values																	
	Connection plate without ¹⁾		$L_W^{3)}$ (mm)	Connection plate with					Load capacities			Load moments														
	L_{ca} (mm)	L_{ca} (mm)		L_{ad} (mm)	L_{ad} (mm)				C_{gw} (N)	C_{bs} (N)	C_{fb} (N)	M_t (Nm)	$M_L^{5)}$ (Nm)													
-070	32	60	-	30	2	40	650	8 x 2.5	2,360	2 250	1 600	47	7													
					8			8 x 5		2500																
	73	95												8 x 2.5	2 250		77	111								
														8 x 5	2500											
-090	35	60	-	50	25	40	750	12 x 2	4,620	2,420	6,900	125	16													
														12 x 5	4,100											
														12 x 10	2,700											
	100	125			-			50	25	40				750	12 x 2	7,505	2,420	6,900	203	244						
																					12 x 5	4,100				
																					12 x 10	2,700				
	variable min. 101 max. 235	-			variable min. 66 max. 200			50	-						40	750	12 x 2				7,505	2,420	6,900	203	3.75 x L_W	
																						12 x 5				4,100
				12 x 10	2,700																					
-110	39	60	-	51	30	50	1,500	16 x 5	19,720		13,320	13,400	651				136									
																					16 x 10	10,350				
											16 x 16			6,800												
	124	155			85			51	20	50	1,500			16 x 5				32,035	13,320	13,400	1,057	1,361				
																										16 x 10
																16 x 16			6,800							
	variable min. 125 max. 289	-			variable min. 86 max. 250				51					-	50	1,500		16 x 5	32,035				13,320	13,400	1,057	16.01 x L_W
																							16 x 10			
				16 x 16	6,800																					
-145	49	80	-	61	30	60	1,800		20 x 5			46,800	15,480	17,000			2,059	400								
																			20 x 20				9,810			
										20 x 40	12,600															
										25 x 10	16,920															
	149	190		100	61		20	60	1,800	20 x 5	76,025	15,480	17,000						3,345	3,801						
															20 x 20	9,810										
															20 x 40	12,600										
															25 x 10	16,920										
	variable min. 150 max. 349	-		variable min. 101 max. 300			61		-	60	1,800	20 x 5			76,025	15,480					17,000	3,345	38.01 x L_W			
																20 x 20								9,810		
																20 x 40								12,600		
																25 x 10								16,920		
-200	79.5	190	-	120.5		10	80		2,200		32 x 5	74,600		23,310	26,000	4,849	1,053									
																		32 x 10						34,200		
																		32 x 20						21,240		
																		32 x 32						21,060		
	254.5	305		175	120.5	70		80	2,200		32 x 5	121,185	23,310	26,000				7,877	10,604							
																				32 x 10				34,200		
																				32 x 20				21,240		
																				32 x 32				21,060		
	variable min. 255.5 max. 429.5	-		variable min. 176 max. 350		120.5			-	80	2,200	32 x 5	121,185							23,310	26,000	7,877	60.59 x L_W			
																				32 x 10				34,200		
																				32 x 20				21,240		
																				32 x 32				21,060		

1) In the "without connection plate" version, carriage length L_{ca} corresponds to the dimension of the outer edge to outer edge of the fastening bridges. Dynamic characteristic values and maximum permissible loads are valid only when connecting the fastening bridges via customer-built attachment.

2) The connection plate is mounted on the "without connection plate" carriage version. In the "with connection plate" version, carriage length L_{ca} corresponds to the length of the connection plate.

3) A variable center-to-center distance L_W is only possible for the "without connection plate" carriage design. The variable center-to-center distance is freely selectable between minimum and maximum distance in millimeters steps.

Maximum permissible loads							Planar moments of inertia		Point of force application	
Moments			Forces				L_y (cm ⁴)	L_z (cm ⁴)	Connection plate	
$M_{x \max}$ (Nm)	$M_{y \max}^{5)}$ (Nm)	$M_{z \max}^{5)}$ (Nm)	$F_{y \max}$ (N)	$F_{z1 \max}$ (N)	$F_{z2 \max}$ (N)	without Z_1 (mm)			with Z_1 (mm)	
47	7	7	1,270	2,360	2,360	5,72	50,0	19.2	31.7	
77	111	60	2070	3830	3830					
112	16	16	2,490	4,620	4,140	14,80	140,2	23.2	39.2	
203	244	132	4,050	7,505	7,505					
203	3.75 x L _W	2.03 x L _W	4,050	7,505	7,505					
198	32	32	3,480	6,000	6,000	38,90	361,7	26.7	42.7 (60.7) ⁶⁾	
396	510	240	5,650	12,000	12,000					
396	6 x L _W	2.82 x L _W	5,650	12,000	12,000					
634	100	100	8,410	14,400	14,400	125,50	1,148.0	31.6	51.6 (71.6) ⁶⁾	
1,267	1,440	683	13,660	28,800	28,800					
1,267	14.4 x L _W	6.83 x L _W	13,660	28,800	28,800					
1,375	299	299	12,265	21,150	21,150	551,00	3,895.0	36.0	63.0 (86.4) ⁶⁾	
2,750	3,701	1,744	19,925	42,300	42,300					
2,750	21.14 x L _W	9.97 x L _W	19,925	42,300	42,300					

4) Minimum required travel range to ensure a reliable lubrication distribution.

5) For the variable L_W, M_L, M_{y max} and M_{z max} must be determined according to the selected centerline-to-centerline distance L_W.

6) "Resist" cover → "Resist" chapter.

Drive data

Observe the "Project planning/calculation" chapter.

CKK	BASA	Carriage		Constant weight calculation		Moved mass of system	
		Connection plate without	with	$k_{g\text{ fix}}$ (kg)	$k_{g\text{ var}}$ (kg/mm)	Connection plate without ¹⁾	with
	$d_0 \times P$ (mm)	L_{ca} (mm)	L_{ca} (mm)			m_{ca} (kg)	m_{ca} (kg)
-070	8 x 2.5	32	60	0.29	0.0038	0.15	0.26
		73	95			0.25	0.42
	8 x 5	32	60			0.15	0.26
		73	95			0.25	0.42
-090	12 x 2	35	60	0.50	0.0054	0.36	0.54
		100	125			0.59	0.96
	12 x 5	35	60			0.36	0.54
		100	125			0.59	0.96
	12 x 10	35	60			0.36	0.54
		100	125			0.59	0.96
-110	16 x 5	39	60	0.91	0.0094	0.52	0.75
		124	155			0.86	1.45
	16 x 10	39	60			0.52	0.75
		124	155			0.86	1.45
	16 x 16	39	60			0.52	0.75
		124	155			0.86	1.45
-145	20 x 5	49	80	1.91	0.0179	1.21	1.71
		149	190			2.06	3.26
	20 x 20	49	80			1.21	1.71
		149	190			2.06	3.26
	20 x 40	49	80			1.21	1.71
		149	190			2.06	3.26
	25 x 10	49	80			1.21	1.71
		149	190			2.06	3.26
-200	32 x 5	79.5	190	4.06	0.0296	3.20	5.50
		254.5	305			5.20	8.90
	32 x 10	79.5	190			3.20	5.50
		254.5	305			5.20	8.90
	32 x 20	79.5	190			3.20	5.50
		254.5	305			5.20	8.90
	32 x 32	79.5	190			3.20	5.50
		254.5	305			5.20	8.90

¹⁾ To the carriage version with variable center-to-center distance L_w , the larger value applies

	Constant mass moment of inertia				Friction torque ¹⁾	Max. acceleration	Max. speed	Max. drive torque
	Connection plate		$k_{J \text{ var}}$ (kg/mm)	$k_{J \text{ m}}$ (mm ²)				
without ¹⁾	with	$k_{J \text{ fix}}$ (kg/mm ²)			$k_{J \text{ fix}}$ (kg/mm ²)			
	0.769	0.786	0.004	0.158	0.07	50.0	See "Diagrams" chapter	See "Diagrams" chapter
	0.785	0.812						
	0.840	0.910						
	0.903	1.011						
	1.279	1.298	0.013	0.101	0.13	48.4	See "Diagrams" chapter	See "Diagrams" chapter
	1.303	1.340						
	1.454	1.568	0.011	0.633	0.15	50.0		
	1.599	1.834						
	2.138	2.594	0.011	2.533	0.18	50.0		
	2.720	3.658						
	5.088	5.234	0.031	0.633	0.37	50.0		
	5.303	5.677						
	6.076	6.658	0.031	2.533	0.40	50.0		
	6.937	8.432						
	8.161	9.652	0.034	6.485	0.42	50.0		
	10.365	14.191						
	22.564	22.880	0.084	0.633	0.48	39.8		
	23.102	23.862						
	34.029	39.950	0.081	10.132	0.60	50.0		
	42.641	54.800						
	70.856	91.120	0.086	40.528	0.70	50.0		
	105.305	153.939						
	26.335	27.601	0.239	2.533	0.60	50.0		
	28.488	31.528						
	71.348	72.867	0.605	0.633	1.10	17.9		
	72.741	75.147						
	76.612	82.691	0.640	2.533	1.10	30.7		
	82.185	91.810						
	93.299	117.676	0.639	10.132	1.15	50.0		
	115.590	154.092						
	127.391	189.642	0.617	25.938	1.25	50.0		
	184.455	283.020						

Technical data for CKK-200 with screw support

General technical data

Observe the "Project planning/calculation" chapter.

CKK	Carriage		BASA	SPU	Additional length			Max. length	Min. travel range	Dynamic characteristic values					
	Connection plate without ¹⁾	Connection plate with ²⁾			d ₀ x P (mm)	L _{ad} (mm)	L _{ad} (mm)			L _{max} (mm)	Load capacities			Load moments	
											L _{ca} (mm)	L _{ca} (mm)	S _{min} ³⁾ (mm)	C _{gw} (N)	C _{bs} (N)
-200	79.5	190	32 x 5	0	120.5	10	2,200	80	74,600	26,000	4,849	1,053	23,310		
				1	235.5	-	3,500								
				2	360.5	-	4,600								
				3	485.5	-	5,500								
			32 x 10	0	120.5	10	2,200						34,200		
				1	235.5	-	3,500								
				2	360.5	-	4,600								
				3	485.5	-	5,500								
			32 x 20	0	120.5	10	2,200						21,240		
				1	235.5	-	3,500								
				2	360.5	-	4,600								
				3	485.5	-	5,500								
			32 x 32	0	120.5	10	2,200						21,060		
				1	235.5	-	3,500								
				2	360.5	-	4,600								
				3	485.5	-	5,500								
	254.5	305	32 x 5	0	120.5	70	2,200	80	121,185	26,000	7,877	10,604	23,310		
				1	235.5	185	3,600								
				2	360.5	310	4,700								
				3	485.5	435	5,500								
			32 x 10	0	120.5	70	2,200						34,200		
				1	235.5	185	3,600								
				2	360.5	310	4,700								
				3	485.5	435	5,500								
			32 x 20	0	120.5	70	2,200						21,240		
				1	235.5	185	3,600								
				2	360.5	310	4,700								
				3	485.5	435	5,500								
32 x 32			0	120.5	70	2,200	21,060								
			1	235.5	185	3,600									
			2	360.5	310	4,700									
			3	485.5	435	5,500									

¹⁾ In the "without connection plate" version, carriage length L_{ca} corresponds to the dimension of the outer edge to outer edge of the fastening bridges. Dynamic characteristic values and maximum permissible loads are valid only when connecting the fastening bridges via customer-built attachment.

²⁾ The connection plate is mounted on the "without connection plate" carriage version. In the "with connection plate" version, carriage length L_{ca} corresponds to the length of the connection plate.

³⁾ Minimum required travel range to ensure a reliable lubrication distribution.

Maximum permissible loads							Constants		Planar moments of inertia		Point of force application	
Moments			Forces				Mass calculation		I_y (cm ⁴)	I_z (cm ⁴)	Connection plate	
$M_{x \max}$ (Nm)	$M_{y \max}$ (Nm)	$M_{z \max}$ (Nm)	$F_{y \max}$ (N)	$F_{z1 \max}$ (N)	$F_{z2 \max}$ (N)	$k_g \text{ fix}$ (kg)	$k_g \text{ var}$ (kg/mm)	Z_1 (mm)			Z_1 (mm)	
1,375	299	299	12,265	21,150	21,150	4.06	0.0296	551	3,895	36.0	63.0	
2,750	3,701	1,744	19,925	42,300	42,300	4.06	0.0296	551	3,895	36.0	63.0	

Drive data

Observe the "Project planning/calculation" chapter.

CKK	BASA	SPU	Carriage Connection plate		Constant mass calculation		Moved mass of system Connection plate	
			without L _{ca} (mm)	with L _{ca} (mm)	k _g fix (kg)	k _g var (kg/mm)	without ¹⁾ m _{ca} (kg)	with m _{ca} (kg)
-200	32 x 5	0	79.5	190	4.06	0.0296	3.20	5.50
		1					3.40	-
		2					3.60	-
		3					3.80	-
		0	254.5	305			5.20	8.90
		1					5.40	9.10
		2					5.60	9.30
		3					5.80	9.50
	32 x 10	0	79.5	190			3.20	5.50
		1					3.40	-
		2					3.60	-
		3					3.80	-
		0	254.5	305			5.20	8.90
		1					5.40	9.10
		2					5.60	9.30
		3					5.80	9.50
	32 x 20	0	79.5	190			3.20	5.50
		1					3.40	-
		2					3.60	-
		3					3.80	-
		0	254.5	305			5.20	8.90
		1					5.40	9.10
		2					5.60	9.30
		3					5.80	9.50
	32 x 32	0	79.5	190			3.20	5.50
		1					3.40	-
		2					3.60	-
		3					3.80	-
0		254.5	305	5.20	8.90			
1				5.40	9.10			
2				5.60	9.30			
3				5.80	9.50			

¹⁾ To the carriage version with variable center-to-center distance L_w, the larger value applies

	Constant mass moment of inertia				Friction torque ¹⁾	Max. acceleration	Max. speed	Max. drive torque
	Connection plate		$k_{J \text{ var}}$ (kg/mm)	$k_{J \text{ m}}$ (mm ²)				
without ¹⁾	with	$k_{J \text{ fix}}$ (kg/mm ²)			$k_{J \text{ fix}}$ (kg/mm ²)			
	71.348	72.867	0.605	0.633	1.10	17.9	See "Diagrams" chapter	See "Diagrams" chapter
	71.474	-			1.20			
	71.601	-			1.20			
	71.728	-			1.40			
	72.741	75.147	0.605	0.633	1.20			
	72.867	75.274			1.30			
	72.994	75.400			1.30			
	73.121	75.527			1.50			
	76.612	82.691	0.640	2.533	1.10	30.7	See "Diagrams" chapter	
	77.119	-			1.20			
	77.625	-			1.40			
	78.132	-			1.50			
	82.185	91.810	0.640	2.533	1.20			
	82.691	92.317			1.30			
	83.198	92.823			1.50			
	83.705	93.330			1.60			
	93.299	117.616	0.639	10.132	1.15	50.0	See "Diagrams" chapter	
	95.326	-			1.30			
	97.352	-			1.50			
	99.378	-			1.70			
	115.590	154.092	0.639	10.132	1.25			
	117.676	156.118			1.40			
	119.643	158.145			1.60			
	121.669	160.171			1.80			
	127.391	189.642	0.617	25.938	1.25	50.0	See "Diagrams" chapter	
	132.578	-			1.40			
	137.766	-			1.70			
	142.953	-			1.90			
	184.455	283.020	0.617	25.938	1.35			
	189.642	288.207			1.50			
	194.830	293.395			1.80			
	200.018	298.583			2.00			

Technical data

Drive data for motor attachment via belt side drive

Observe the "Project planning/calculation" chapter.

CKK	Motor	BASA (mm) d ₀ x P	up to L ¹⁾ (mm)	M _{sd} ²⁾ (Nm)		J _{sd} (10 ⁻⁶ kgm ²)		M _{Rsd} (Nm)	m _{sd} (kg)		B _t	
				i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 1.5	i = 1	i = 1.5
-070	MSM019B	8 x 2.5	450	0.71	0.47	10.7	4.1	0.06	0.28	0.26	6 AT3	6 AT3
	MS2N03-B MSM031B	8 x 2.5	450	0.71	0.47	34.77	13.05	0.15	0.66	0.63	10 AT3	10 AT3
	MSM019B	8 x 5	450	1.31	0.87	10.7	4.1	0.06	0.28	0.26	6 AT3	6 AT3
	MS2N03-B MSM031B	8 x 5	450	1.41	0.94	34.77	13.05	0.15	0.66	0.63	10 AT3	10 AT3
-090	MS2N03-B MSM031C	12 x 2	750	0.79	0.53	38.0	14.0	0.15	0.53	0.48	10 AT3	10 AT3
		12 x 5	750	2.39	1.59							
		12 x 10	750	2.73	1.82							
-110	MS2N03-B MSM031C	16 x 5	1,250	3.17	2.11	41.0	16.0	0.15	0.53	0.48	10 AT3	10 AT3
		16 x 10	1,500	3.17	2.11							
		16 x 16	1,500	3.17	2.11							
	MS2N04 MSM041B	16 x 5	850	6.76	4.51	240.0	82.0	0.40	1.34	1.24	16 AT5	16 AT5
		16 x 10	1,150	7.66	5.11							
-145	MS2N04 MSM041B	20 x 5	1,350	8.22	5.48	250.0	85.0	0.40	1.42	1.31	16 AT5	16 AT5
		20 x 20	1,800	8.22	5.48							
		20 x 40	1,800	8.22	5.48							
		25 x 10	1,800	8.22	5.48							

CKK	Motor	BASA (mm) d ₀ x P	up to L ¹⁾ (mm)	M _{sd} ²⁾ (Nm)		J _{sd} (10 ⁻⁶ kgm ²)		M _{Rsd} (Nm)	m _{sd} (kg)		B _t	
				i = 1	i = 2	i = 1	i = 2		i = 1	i = 2	i = 1	i = 2
-145	MS2N05	20 x 5	1,150	11.00	5.50	1,310	217	0.45	3.5	3.1	25 AT5	25 AT5
		20 x 20	1,800	17.73	8.87							
		20 x 40	1,800	17.73	8.87							
		25 x 10	1,800	17.73	8.87							
-200	MS2N06	32 x 5	2,200	19.00	9.50	1,400	260	0.50	3.8	3.5	25 AT5	32 AT5
		32 x 10	2,200	19.21	12.30							
		32 x 20	2,200	19.21	12.30							
		32 x 32	2,200	19.21	12.30							

¹⁾ For greater lengths, the permissible drive torque is determined from the length-variable value M_p of the linear motion system in accordance with the graph → Chapter "Project planning/calculation"

²⁾ Values for M_{sd} do not factor in motor torque.

Drive data for motor attachment via flange and coupling

CKK	Motor	Coupling		Flange and coupling
		M_{cN} (Nm)	J_c (10^{-6} kgm ²)	
-070	MS2N03-B	3.7	7.00	0.30
	MSM019B	1.9	2.10	0.15
	MSM031B	3.7	7.00	0.30
-090	MS2N03-B	13.0	12.20	0.30
	MSM031C	13.0	12.20	0.35
-110	MS2N03-B	13.0	12.20	0.45
	MS2N03-D	14.0	12.20	0.45
	MS2N04	14.0	12.20	0.60
	MSM031C	14.0	12.20	0.45
	MSM041B	29.4	42.29	0.65
-145	MS2N04	26.1	42.29	0.80
	MS2N05	26.1	42.29	1.00
	MSM041B	26.1	42.29	0.80
-200	MS2N06	50.0	210.00	1.80
	MS2N07	98.0	390.00	2.25

Diagrams

Permissible drive torque

The values shown for M_p apply under the following conditions:

- ▶ Screw journal without keyway
- ▶ No radial loads on screw journal

⚠ Keep in mind the rated torque of the coupling being used! Keep in mind the minimum travel range s_{min} !

⚠ Screw journal with keyway

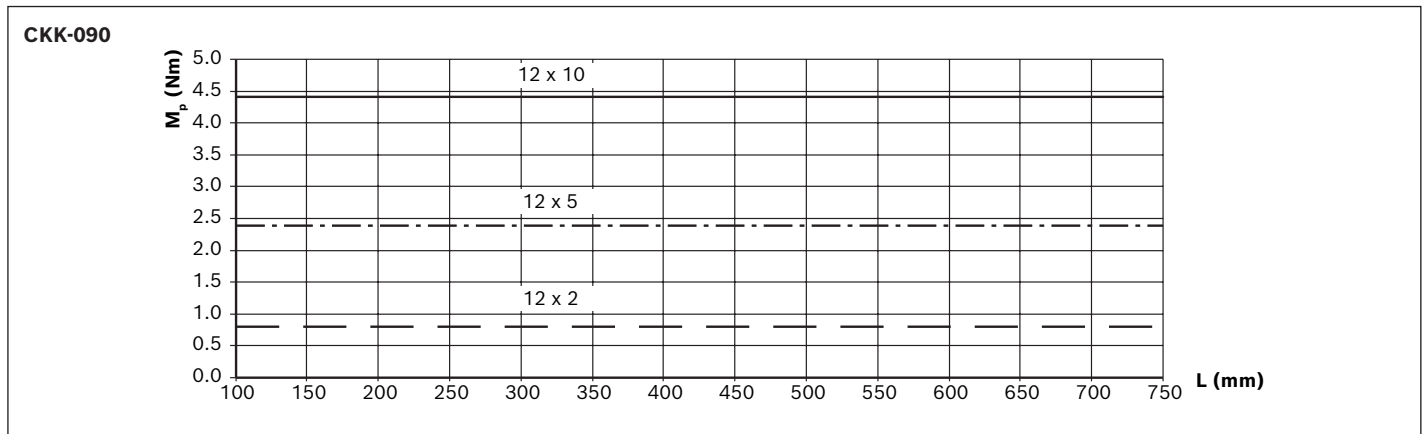
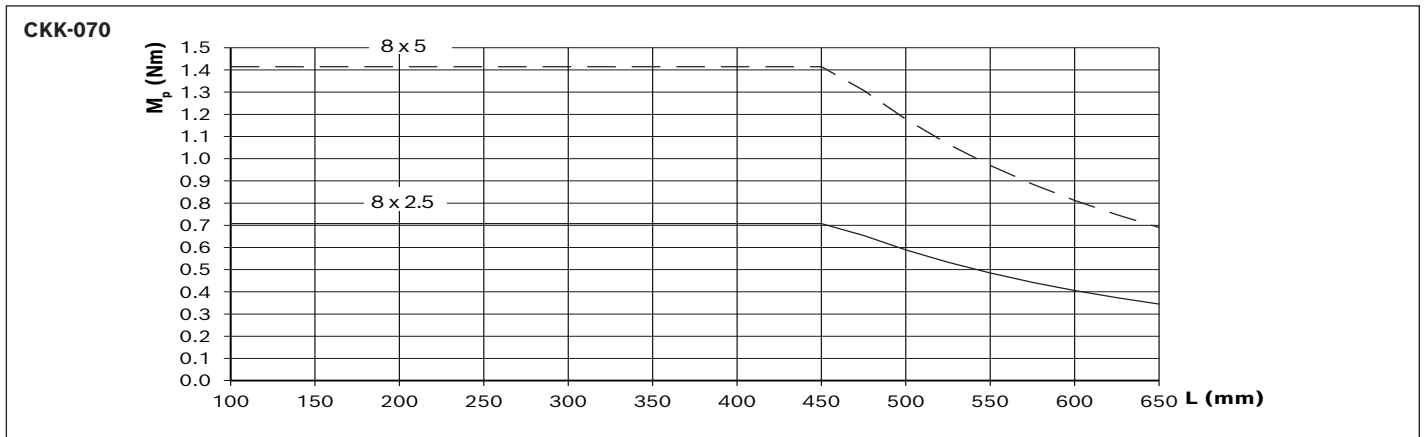
For reasons of stress concentration and a reduction of the effective diameter, observe the maximum values for drive torque!

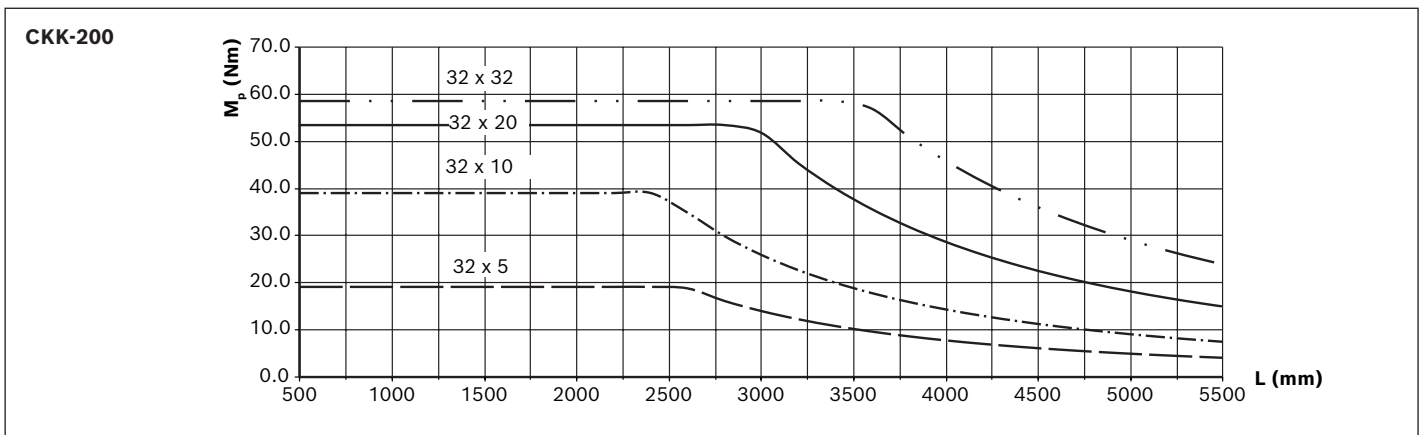
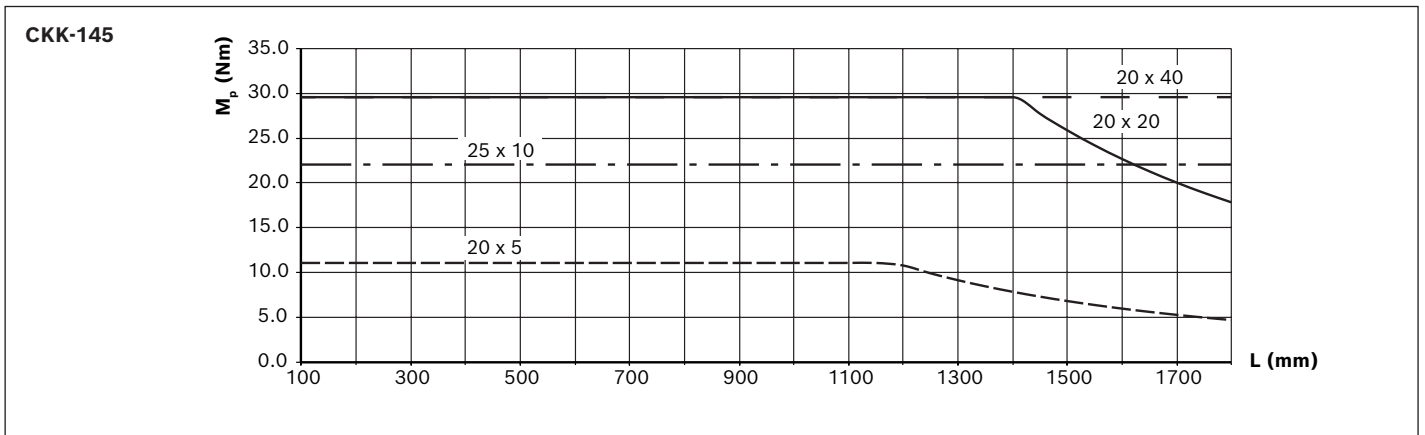
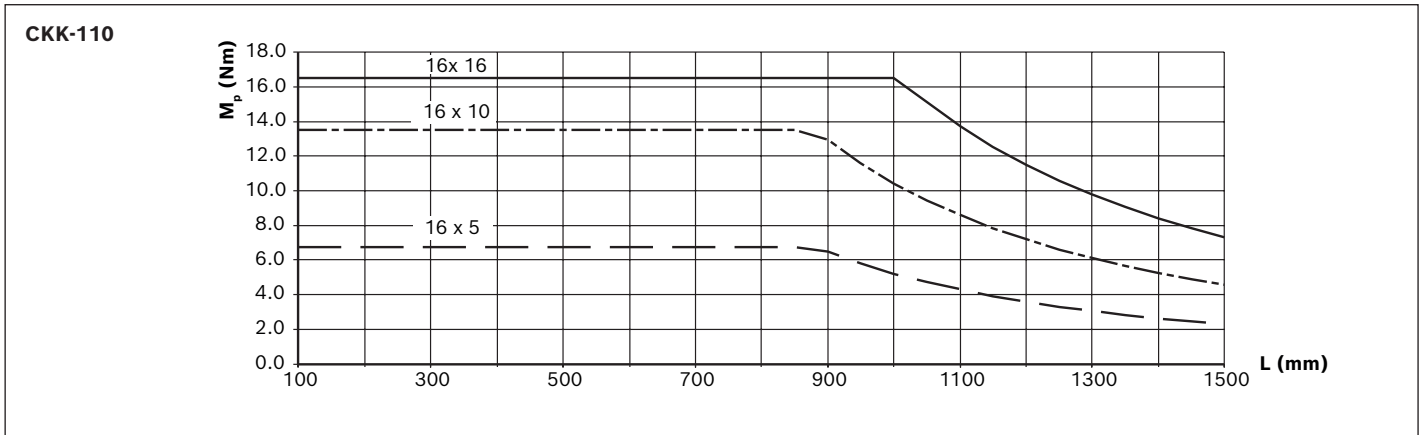
CKK	M_p (Nm)
-110 / -145	No reduction
-200	48.6

⚠ For ball screw assemblies with keyway, the smallest value from the diagrams and the table is valid.

Example:

CKK-200	$(d_o \times P)$	
	32 x 32	32 x 10
Length (mm)	1,500	1,500
M_p from diagram (Nm)	58.5	39.0
M_p maximum (Nm)	48.6	48.6
Value for sizing	48.6	39.0

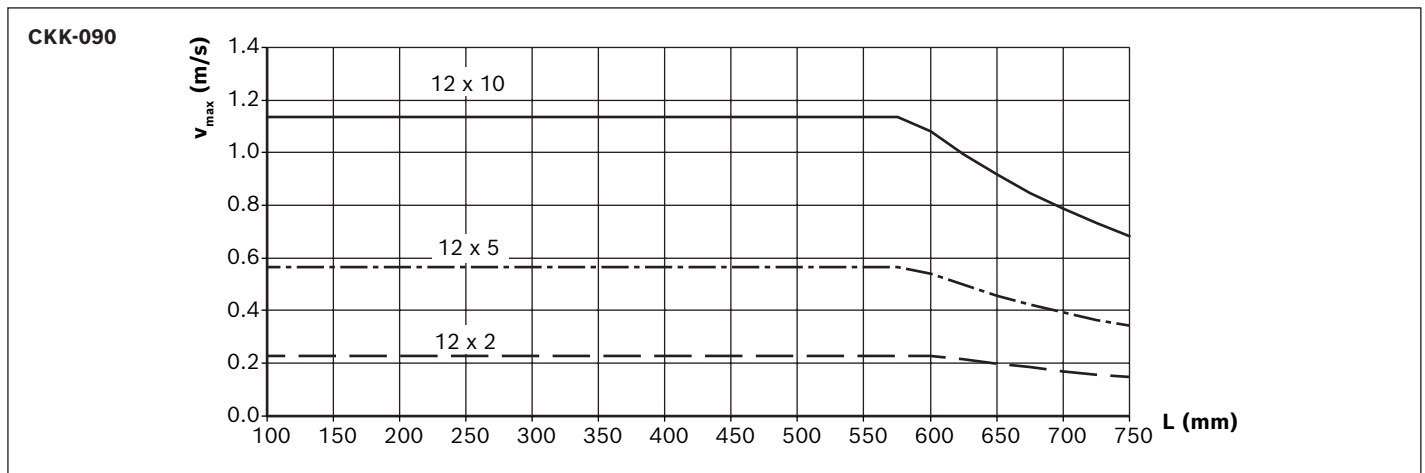
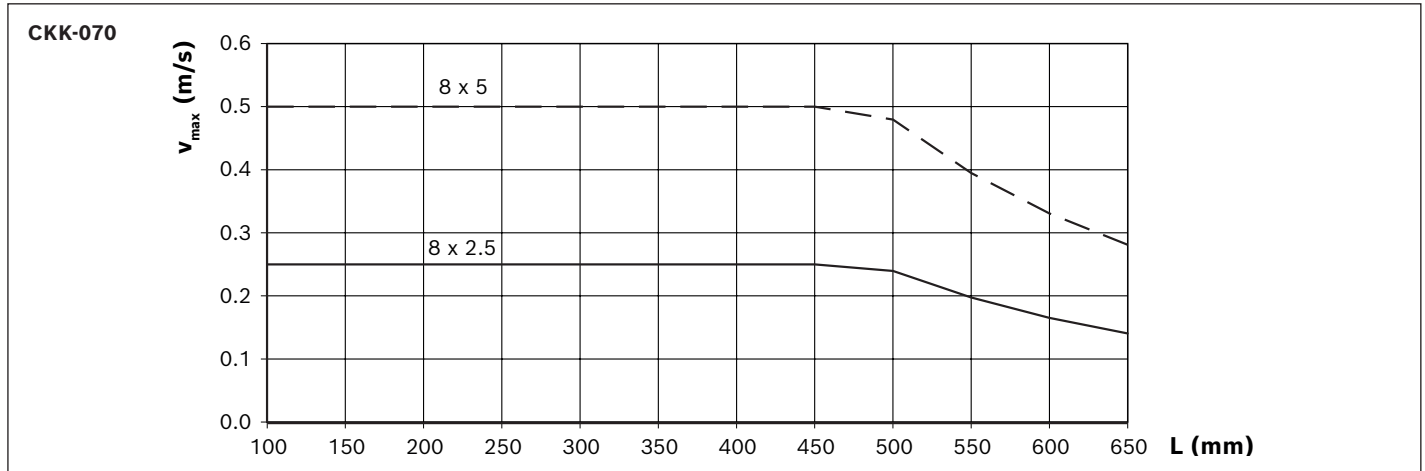


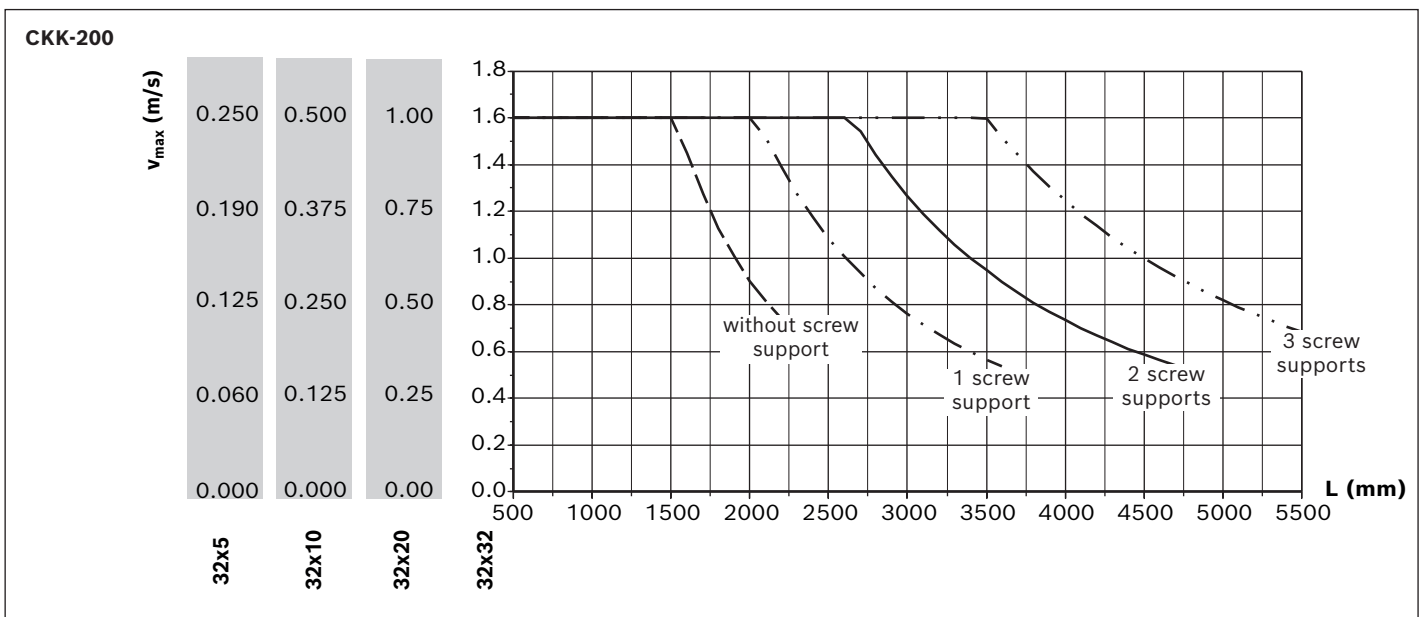
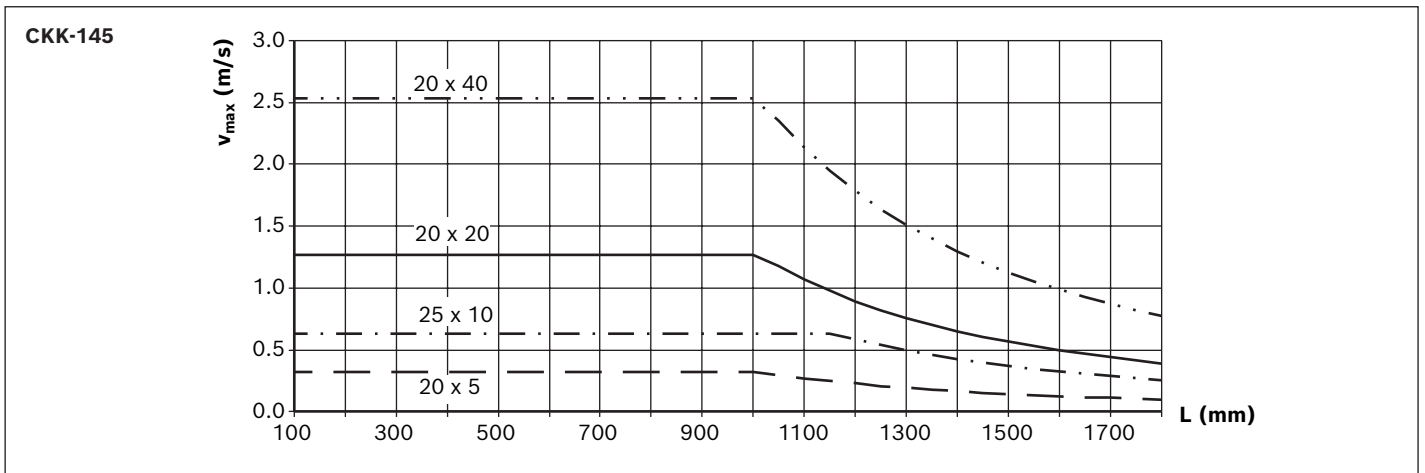
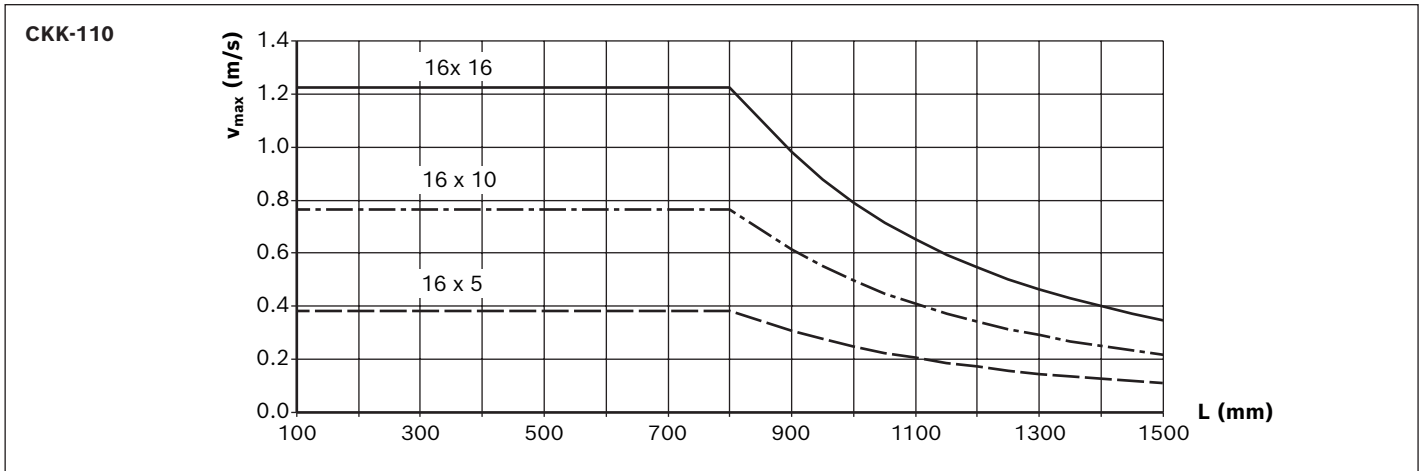


Permissible speed

Observe motor speed!

Keep in mind the minimum travel range s_{min} !



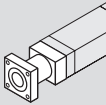
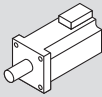

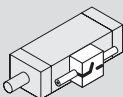



Configuration, order

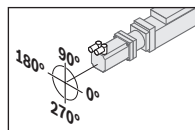
CKK-070

Short product name, length ¹⁾ CKK-070-NN-1, ... mm		Guideway		Lubrication ³⁾	Drive			Carriage				
		Standard	Centering holes ²⁾		Screw journal (mm)	BASA d ₀ x P (mm)		Connection plate without L _{ca} (mm)		with L _{ca} = (mm)		
Version						8 x 2.5	8 x 5	32	73	60	95	
Without drive	OA01	01	03	04	LSS	-	050	050	01	02	40	41
	LPG				-				302	-	341	
Without attachment	OF01				LSS	∅6	01	02	01	02	40	41
Flange/ coupling	MF01				LPG	∅6	31	32	-	302	-	341
	RV01				RV02							
Belt side drive	RV03				RV04							

- 1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (see dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame
Option 04: with centering holes and long hole in the ground area of the frame; selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication ⇒ Chapter "Lubrication".
- 4) Attachment kit also available without motor. When ordering, enter the motor type "00"! Attachment kits according to customer specifications ⇒ Chapter "Attachment Kits for Motors according to Customer Specifications"
- 5) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
- 6) More information ⇒ Chapter "Switching system"
- 7) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 8) Measurement report: 01 = standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (see also "Documentation" chapter)

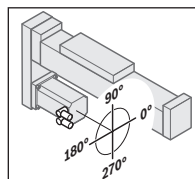
Motor attachment		Motor ⁵⁾						Cover	Switching system ⁶⁾		Automation package			Documentation ⁸⁾									
																							
i =	Attachment kit ⁴⁾	Motor code		2 cables		1 cable		Motor connector position		Cover strip		Controller	Cable	Software									
				without brake	with brake	without brake	with brake	without	with														
OA01	-	00	-	00				-	01	Without		"Automation package" chapter		01									
	OF01										- Switch - Cable duct - Socket-connector				00								
MF01	-	01	MS2N03-B0BYN	-	-	203	204	000	02	Magnetic sensor					"Automation package" chapter		02						
		03	MSM031B-0300	136	137	-	-			REED, changeover (NC: C+NC, NO: C+NO)	21												
		05	MSM019B-0300	134	135	-	-			Hall, PNP normally closed (NC)	22												
RV01 - RV04	1	17	MS2N03-B0BYN	-	-	203	204	090		Magnetic sensor								"Automation package" chapter		03			
		19	MSM031B-0300	136	137	-	-			Hall, PNP normally open (NO)	23												
		15	MSM019B-0300	134	135	-	-			Cable duct	25												
	1.5	18	MS2N03-B0BYN	-	-	203	204	270		Magnetic sensor with connector ⁷⁾											"Automation package" chapter		03
		20	MSM031B-0300	136	137	-	-			REED, changeover (NC: C+NC, NO: C+NO)	58												
		16	MSM019B-0300	134	135	-	-			Hall, PNP normally closed (NC)	59												

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



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
RV04	-	090	180 ★	270

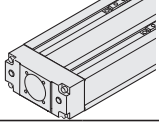
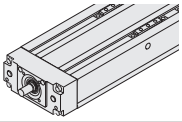
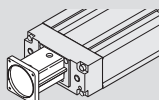
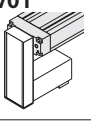
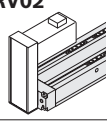
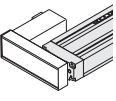
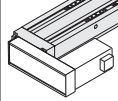


Example:
Belt side drive RV01
Motor connector position 180°

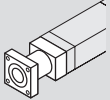
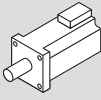

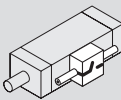

★ Standard delivery

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

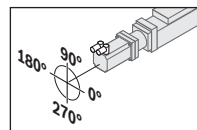
CKK-090

Short product name, length ¹⁾ CKK-090-NN-1, ... mm		Guideway		Lubrication ³⁾	Drive				Carriage					
		Standard	Centering holes ²⁾		Screw journal (mm)	BASA d ₀ x P (mm)			Connection plate without L _{ca} = (mm)			with L _{ca} = (mm)		
Version							12 x 2	12 x 5	12 x 10	35	100	variable ³⁾	60	125
Without drive	OA01 			LSS	-	050			01	02	05	40	41	
				LPG	-	050			-	302	305	-	341	
Without attachment	OF01 	01	03	04	LSS	Ø8	03	01	02	01	02	05	40	41
Flange/coupling	MF01 				LPG	Ø8	31	32	33	-	302	305	-	341
Belt side drive	RV01 	RV02 			LCO	Ø8	21	22	23	-			141	
	RV03 	RV04 			LCO	Ø8	21	22	23	-			241	

1) Length calculation of the linear motion system → "Project planning/calculation" chapter.
 2) Centering holes for simple combination with other linear motion systems and connection elements (see dimension drawings).
 Option 03: with centering holes and fastening threads in the ground area of the frame
 Option 04: with centering holes and long hole in the ground area of the frame; selectable starting from length L ≥ 300 mm up to length L_{max}
 3) Lubrication → Chapter "Lubrication".
 4) Attachment kit also available without motor. When ordering, enter the motor type "00"! Attachment kits according to customer specifications → Chapter "Attachment Kits for Motors according to Customer Specifications"
 5) Recommended motor, motor data and type designations → Chapter "Motors"
 6) More information → Chapter "Switching system"
 7) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
 8) Measurement report: 01 = standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (see also "Documentation" chapter)

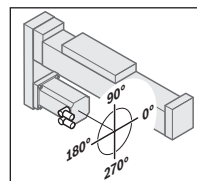
Motor attachment		Motor ⁵⁾						Cover		Switching system ⁶⁾		Automation package			Docu- menta- tion ⁸⁾
															
i =	Attachment kit ⁴⁾	Motor code	2 cables		1 cable		Motor connector position	Cover strip				Controller	Cable	Software	
			without brake	with brake	without brake	with brake		without	with						
OA01	-	00	-	00				-	01	02	Without		"Automation package" chapter		
											- Switch	00			
- Cable duct															
- Socket-connector															
OF01	-	01	MS2N03-B0BYN	-	-	203	204	000	01	02	Magnetic sensor				
											REED, changeover (NC: C+NC, NO: C+NO)	21			
MF01	-	05	MSM031C-0300	138	139	-	-	090	01	02	Hall, PNP normally closed (NC)	22			
											Hall, PNP normally open (NO)	23			
RV01 - RV04	1	11	MS2N03-B0BYN	-	-	203	204	180	01	02	Cable duct	25			
		13	MSM031C-0300	138	139	-	-				Socket-connector	17			
	1.5	21	MS2N03-B0BYN	-	-	203	204	270	01	02	Magnetic sensor with connector ⁷⁾				
		23	MSM031C-0300	138	139	-	-				REED, changeover (NC: C+NC, NO: C+NO)	58			
											Hall, PNP normally closed (NC)	59			

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



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
RV04	-	090	180 ★	270

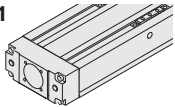
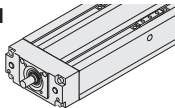
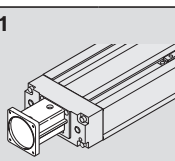
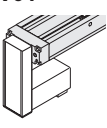
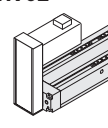
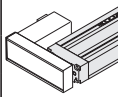
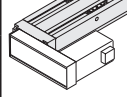


Example:
Belt side drive RV01
Motor connector position 180°

★ Standard delivery

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

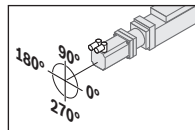
CKK-110

Short product name, length ¹⁾ CKK-110-NN-1, ... mm		Guideway		Lubrication ³⁾	Drive			Carriage						
		Standard	Centering holes ²⁾		Screw journal (mm)	BASA d ₀ x P (mm)			Connection plate without L _{ca} = (mm)			with L _{ca} = (mm)		
Version							16 x 5	16 x 10	16 x 16	39	124	variable ³⁾	60	155
Without drive	OA01 	01	03	04	LSS	-	050			01	02	05	40	41
					LPG					-	302	305	-	341
Without attachment	OF01 	01	03	04	LSS	Ø11 with keyway (OF01)	11	12	13	01	02	05	40	41
Flange/ coupling	MF01 				LSS	Ø11	01	02	03	01	02	05	40	41
					LPG	Ø11	31	32	33	-	302	305	-	341
Belt side drive	RV01 				LCO	Ø11	01	02	03	-			141	
	RV02 				LCO	Ø11	01	02	03	-			241	
	RV03 													
	RV04 													

1) Length calculation of the linear motion system → "Project planning/calculation" chapter.
 2) Centering holes for simple combination with other linear motion systems and connection elements (→ Dimension drawings).
 Option 03: with centering holes and fastening threads in the ground area of the frame
 Option 04: with centering holes and long hole in the ground area of the frame; selectable starting from length L ≥ 300 mm up to length L_{max}
 3) Lubrication → Chapter "Lubrication".
 4) Attachment kit also available without motor. When ordering, enter the motor type "00"! Attachment kits according to customer specifications → Chapter "Attachment Kits for Motors according to Customer Specifications"
 5) Recommended motor, motor data and type designations → Chapter "Motors"
 6) Only possible with version Carriage with connection plate L_{ca} = 155 mm; Switch mounting only possible with magnetic sensor with connector. (It may be necessary to move the mounting brackets for Resist cover)
 7) More information → Chapter "Switching system"
 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (→ Chapter "Documentation")

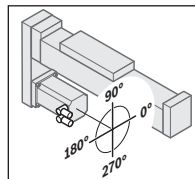
Motor attachment		Motor ⁵⁾						Cover		Switching system ⁷⁾		Automation package			Docu- menta- tion ⁹⁾	
i =	Attachment kit ⁴⁾	Motor code	2 cables		1 cable		Motor connector position	Cover strip	Resist ⁶⁾	Controller	Cable	Software	Documentation ⁹⁾			
			without brake	with brake	without brake	with brake								without	with	
OA01	-	00	-	-	00	-	-	-	Without		"Automation package" chapter			01		
OF01	-	00	-	-	00	-	-	- Switch - Cable duct - Socket-connector		00						
MF01	-	01	MS2N03-B0BYN	-	-	203	204	000	01	02					12	Magnetic sensor
		07	MS2N03-D0BYN	-	-	207	208							REED, changeover (NC: C+NC, NO: C+NO)		21
		03	MS2N04-C0BTN	-	-	215	216							Hall, PNP normally closed (NC)		22
			MS2N04-D0BQN	-	-	219	220							Hall, PNP normally open (NO)		23
		05	MSM031C-0300	138	139	-	-							Cable duct		25
06	MSM041B-0300	140	141	-	-	Socket-connector	17									
RV01 - RV04	1	11	MS2N03-B0BYN	-	-	203	204	090	01	02				12	Magnetic sensor with connector ⁸⁾	
		13	MS2N04-C0BTN	-	-	215	216								REED, changeover (NC: C+NC, NO: C+NO)	58
		15	MSM031C-0300	138	139	-	-				Hall, PNP normally closed (NC)	59				
		17	MSM041B-0300	140	141	-	-									
	1.5	21	MS2N03-B0BYN	-	-	203	204	270	01	02	12					
		23	MS2N04-B0BTN	-	-	211	212									
		25	MSM031C-0300	138	139	-	-									
	27	MSM041B-0300	140	141	-	-										

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



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
RV04	-	090	180 ★	270

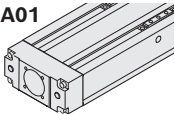
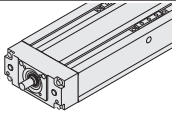
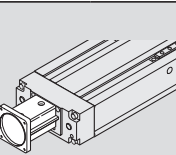
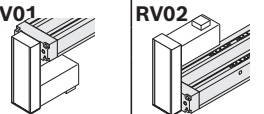


Example:
Belt side drive RV01
Motor connector
position 180°


★ Standard delivery

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

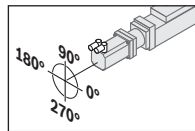
CKK-145

Short product name, length ¹⁾ CKK-145-NN-1, ... mm		Guideway		Lubrication ³⁾	Drive				Carriage						
		Standard	Centering holes ²⁾		Screw journal (mm)	BASA d ₀ x P (mm)				Connection plate without L _{ca} = (mm)			with L _{ca} = (mm)		
Version						20 x 5	20 x 20	25 x 10	20 x 40	49	149	variable ¹⁾	80	190	
Without drive		01	03	04	LSS	-				01	02	05	40	41	
					LPG	050				-	302	305	-	341	
Without attachment		01	03	04	LSS	Ø14 with keyway (OF01)	14	15	16	-	01	02	05	40	41
							-	17	06	07	10	08	09		
Flange/coupling		01	03	04	LSS	Ø14	21	22	23	-	01	02	05	40	41
							-	24	06	07	10	08	09		
Belt side drive		01	03	04	LPG	Ø14	31	32	33	-	-	302	305	-	341
							-	34	-	307	310	-	309		
	LCF				Ø14	21	22	23	-	-			141		
						-	24	-			109				
	LCO				Ø14	21	22	23	-	-			241		
						-	24	-			209				

- 1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame
Option 04: with centering holes and long hole in the ground area of the frame; selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication ⇒ Chapter "Lubrication".
- 4) Attachment kit also available without motor. When ordering, enter the motor type "00"! Attachment kits according to customer specifications ⇒ Chapter "Attachment Kits for Motors according to Customer Specifications"
- 5) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
- 6) Only possible with version Carriage with connection plate L_{ca} = 190 mm;
Switch mounting only possible with magnetic sensor with connector. (It may be necessary to move the mounting brackets for Resist cover)
- 7) More information ⇒ Chapter "Switching system"
- 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (⇒ Chapter "Documentation")

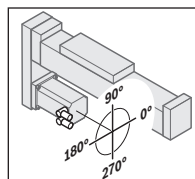
Motor attachment		Motor ⁵⁾						Cover		Switching system ⁷⁾		Automation package			Docu- menta- tion ⁹⁾			
i =	Attachment kit ⁴⁾	Motor code				Motor connector position	Cover strip	without	with	Resist ⁶⁾	Switching system ⁷⁾		Controller	Cable	Software			
		2 cables		1 cable							without	with						
		without brake	with brake	without brake	with brake													
OA01	-	00	-				-	-	-	Without		00	"Automation package" chapter			01		
										- Switch	- Cable duct						- Socket-connector	
OF01	-	00	00				-	-	-	Magnetic sensor		21	"Automation package" chapter			02		
										REED, changeover (NC: C+NC, NO: C+NO)	Hall, PNP normally closed (NC)						Hall, PNP normally open (NO)	
MF01	-	30	MS2N04-C0BTN	-	-	215	216	000	01	02	12	Cable duct	25	"Automation package" chapter			03	
			MS2N04-D0BQN	-	-	219	220					Socket-connector	17					
			MS2N05-B0BTN	-	-	223	224					Magnetic sensor with connector ⁸⁾						
			MS2N05-C0BTN	-	-	227	228					REED, changeover (NC: C+NC, NO: C+NO)	58					
			MS2N05-D0BRN	-	-	231	232					Hall, PNP normally closed (NC)	59					
RV01 - RV04	1	11	MS2N04-C0BTN	-	-	215	216	090	01	02	12			"Automation package" chapter			01	
			MS2N04-D0BQN	-	-	219	220											
			MS2N05-D0BRN	-	-	231	232											
	1.5	21	21	MS2N04-B0BTN	-	-	211	212	180	01	02	12			"Automation package" chapter			02
				MS2N04-C0BTN	-	-	215	216										
				MS2N04-D0BQN	-	-	219	220										
				MSM041B-0300	140	141	-	-										
				MS2N05-B0BTN	-	-	223	224										
2	36	36	MS2N05-B0BTN	-	-	223	224	270	01	02	12			"Automation package" chapter			03	
			MSM041B-0300	140	141	-	-											

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



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
RV04	-	090	180 ★	270

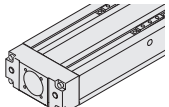
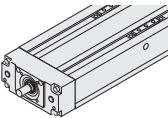
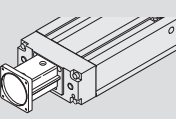
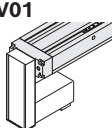
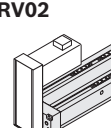
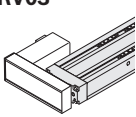
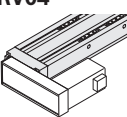
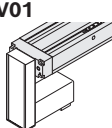
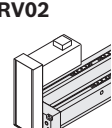
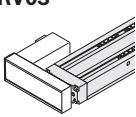
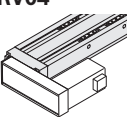


Example:
Belt side drive RV01
Motor connector position 180°

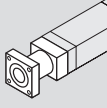
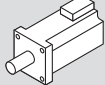

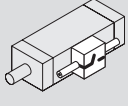

★ Standard delivery

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

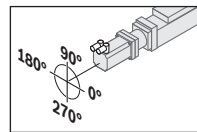
CKK-200

Short product name, length ¹⁾ CKK-200-NN-1, ... mm		Guideway		Lubrication ³⁾	Drive				Carriage													
		Standard	Centering holes ²⁾		Screw journal (mm)	BASA d ₀ x P (mm)				SPU Number	Connection plate without			with								
32 x 5	32 x 10			32 x 20		32 x 32	L _{ca} = (mm)				L _{ca} = (mm)											
Version									79.5	254.5	variable ¹⁾	190	305									
Without drive	OA01 	01	03	04	LSS	-				-	01	11	18	40	41							
					LPG	050				-	-	311	318	-	341							
Without attachment	OF01 	01	03	04	LSS	Ø16 with keyway	11	12	13	14	0	01	11	18	40	41						
											1	02	12	-	-	26						
											2	03	13	-	-	27						
Flange/coupling	MF01 	01	03	04	LSS	Ø16	01	02	03	04	3	04	14	-	-	28						
Belt side drive	RV01  RV02 	01	03	04	LPG	Ø16	31	32	33	34	0	-	311	318	-	341						
											1	-	312	-	-	326						
											2	-	313	-	-	327						
	RV03  RV04 	01	03	04	LPG	Ø16	31	32	33	34	3	-	314	-	-	328						
	RV01  RV02 	01	03	04	LCF	Ø16	01	02	03	04	0	-	-	-	-	141						
											1	-	-	-	-	126						
											2	-	-	-	-	127						
											3	-	-	-	-	128						
							RV03  RV04 	01	03	04	LCO	Ø16	01	02	03	04	0	-	-	-	-	241
																	1	-	-	-	-	226
				2	-	-							-	-	227							
				3	-	-							-	-	228							

- 1) Length calculation of the linear motion system → "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (→ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame; selectable up to length L ≤ 2000 mm
Option 04: with centering holes and long hole in the ground area of the frame; selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication → Chapter "Lubrication".
- 4) Attachment kit also available without motor. When ordering, enter the motor type "00"!
Attachment kits according to customer specifications → Chapter "Attachment Kits for Motors according to Customer Specifications"
- 5) Recommended motor, motor data and type designations → Chapter "Motors"
- 6) Only possible with version Carriage with connection plate L_{ca} = 305 mm;
Switch mounting only possible with magnetic sensor with connector. (It may be necessary to move the mounting brackets for Resist cover)
- 7) More information → Chapter "Switching system"
- 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 9) Switch configuration with magnetic sensor and mechanical/proximity switch together on one side is not possible.
Assembly contains 1 x sensor, 1 x switch mounting plate including mounting material
- 10) Switching cam can be attached only in conjunction with connection plate
- 11) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (→ Chapter "Documentation")

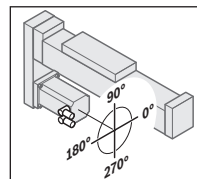
Motor attachment		Motor ⁵⁾				Cover		Switching system ⁷⁾		Automation package			Docu- ment- ation ¹¹⁾		
															
i =	Attachment kit ⁴⁾	Motor code		2 cables		1 cable		Motor connector position	Cover strip	Resist ⁶⁾	Controller	Cable	Software		
		without brake	with brake	without brake	with brake	without brake	with brake								
OA01	-	00	-	00				-	01	02	12	Without		01	
				- Switch	00	- Cable duct						- Socket-connector			
OF01	-	03	-	00				-	01	02	12	Magnetic sensor		02	
				REED, changeover (NC: C+NC, NO: C+NO)	21	Hall, PNP normally closed (NC)	22					Hall, PNP normally open (NO)	23		Cable duct
MF01	-	04	-	MS2N06-D0BRN	-	-	243	244	000	01	02	12	Magnetic sensor with connector ⁸⁾		03
				MS2N06-E0BRN	-	-	251	252					REED, changeover (NC: C+NC, NO: C+NO)	58	
RV01 - RV04	1	27	-	MS2N06-B1BNN	-	-	235	236	090	01	02	12	Mechanical		03
				MS2N06-D1BNN	-	-	247	248					Proximity - PNP NC contact	11	
RV01 - RV04	2	28	-	MS2N06-C0BTN	-	-	239	240	270	01	02	12	Switching cam ¹⁰⁾		03
				MS2N06-C0BTN	-	-	239	240					1	16	

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



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
RV04	-	090	180 ★	270

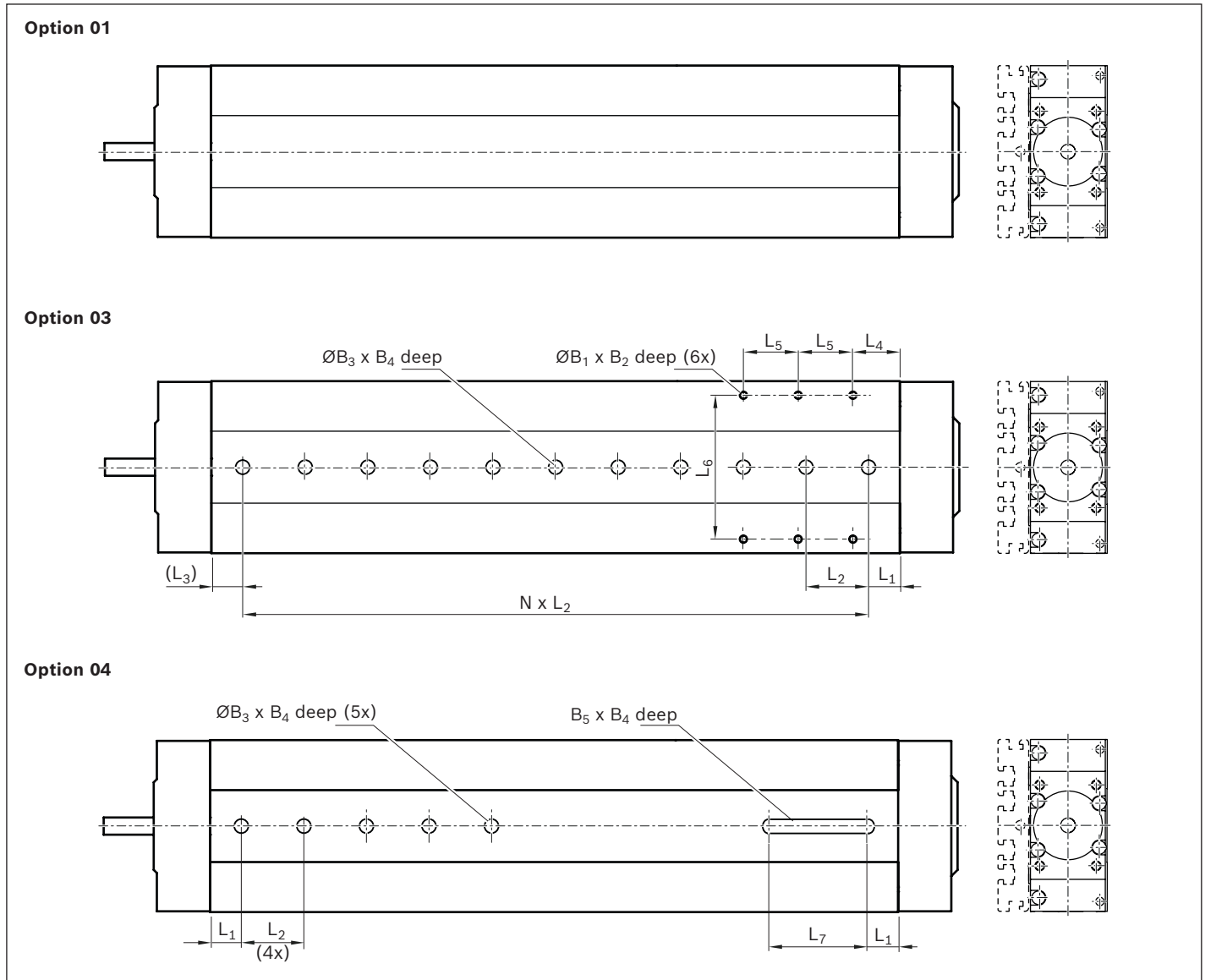


Example:
Belt side drive RV01
Motor connector position 180°

★ Standard delivery

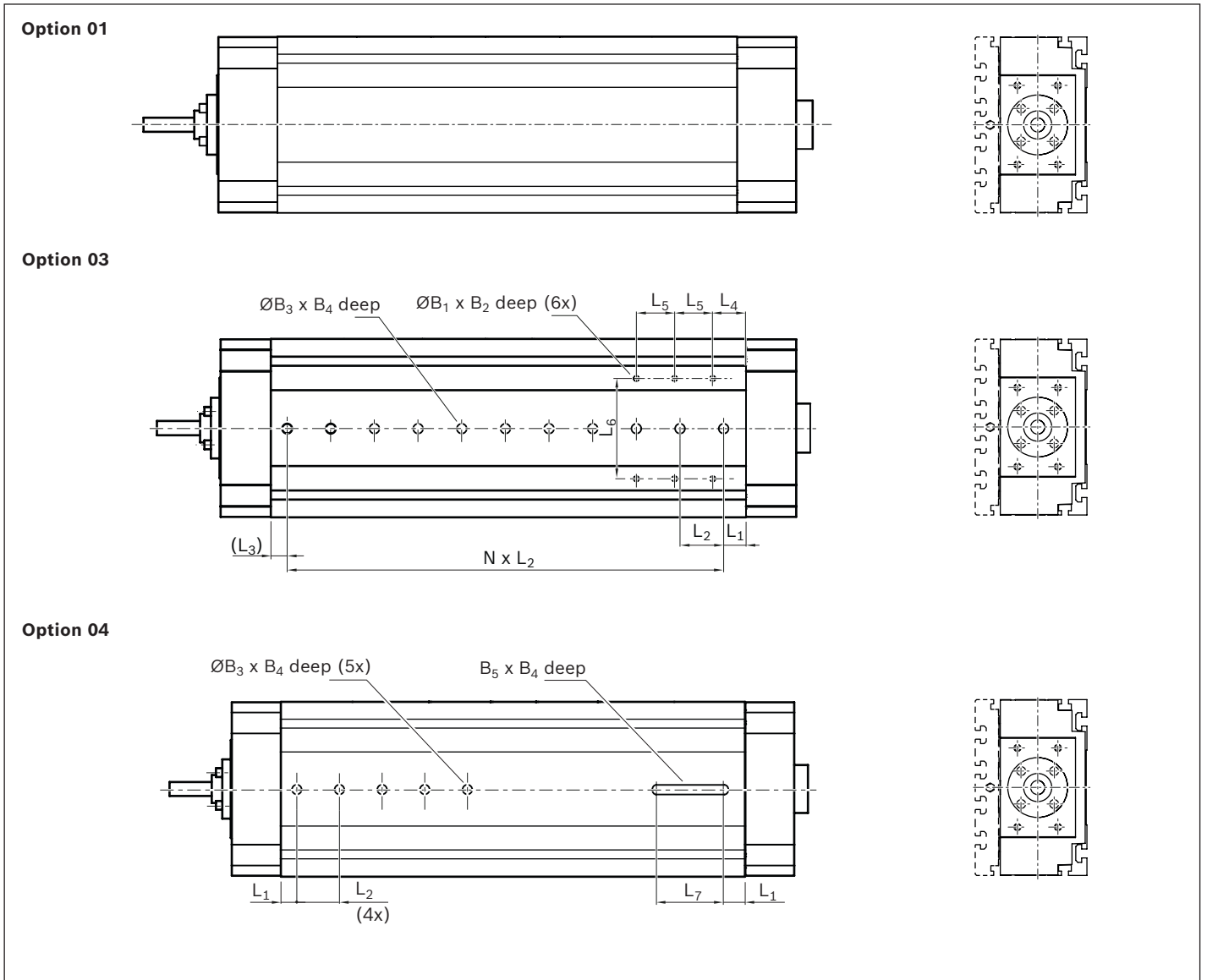
Explanation of the order parameters and ordering example ➡ Chapter "Ordering example".

Frame CKK-070/-090/-110/-145



CKK	Option	Dimensions (mm)					L ₁	L ₂ ^{±0.01}	L ₃ (min)	L ₄	L ₅	L ₆	L ₇
		B ₁	B ₂	ØB ₃ ^{H7}	B ₄	B ₅ ^{H8}							
-070	03	M3	6	7	1.6	-	20	40	10	15	25	59	-
	04	-	-	-	-	7			-	-	-	-	-
-090	03	M4	7.5	9	2.1	-	20	40	10	30	35	76	-
	04	-	-	-	-	9			-	-	-	-	-
-110	03	M5	9	9	2.1	-	20	40	10	30	35	92	-
	04	-	-	-	-	9			-	-	-	-	-
-145	03	M6	13	12	2.1	-	20	40	10	30	35	124	-
	04	-	-	-	-	12			-	-	-	-	-
-200	03	M8	12	16	3.1	-	20	40	10	35	40	119	-
	04	-	-	-	-	16			-	-	-	-	-

Frame CKK-200



Views from below (ground area)

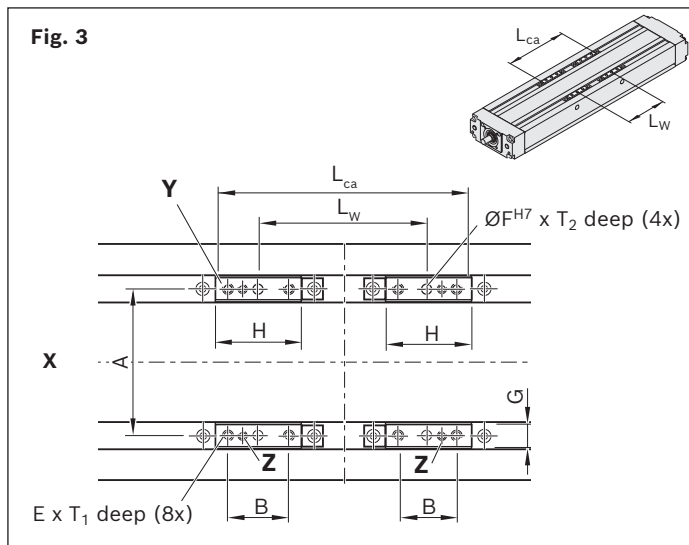
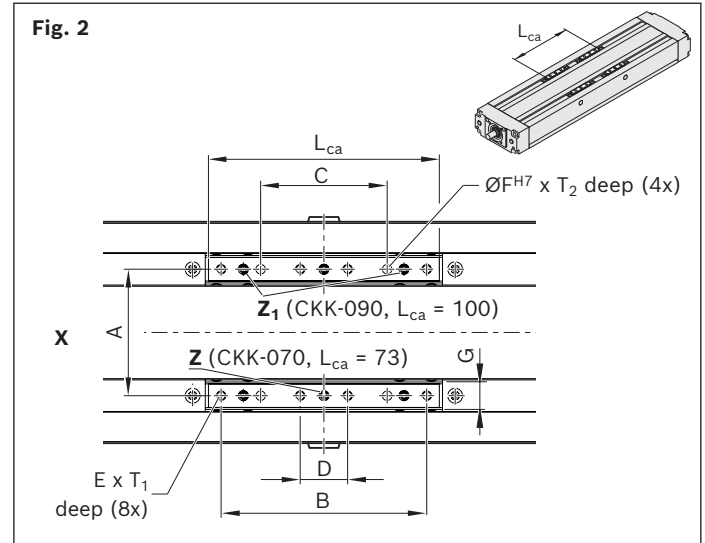
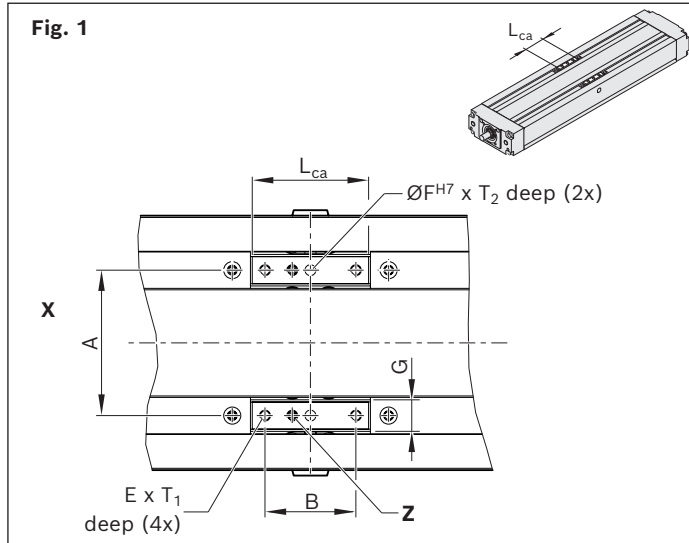
Option 01 / standard

Option 03 / with centring holes

Option 04 / with centring holes and long hole

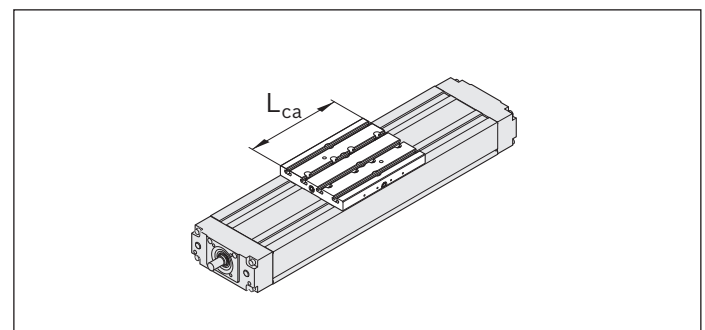
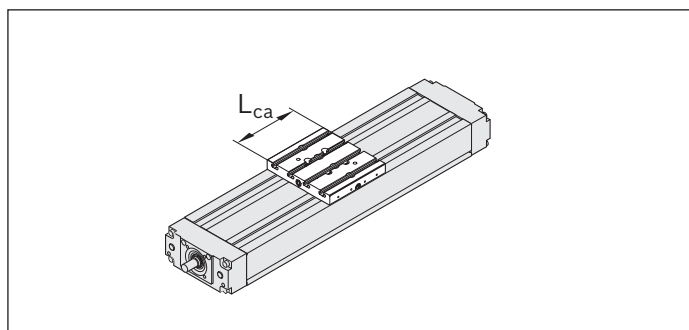
Carriages CKK-070/-090/-110/-145/-200

Carriage without connection plate



X Drive side
Y Drive carriage
Z/Z1 Lubrication point for grease; sealed with set screw.
 Supplementary information for lubrication → Chapter "Lubrication".

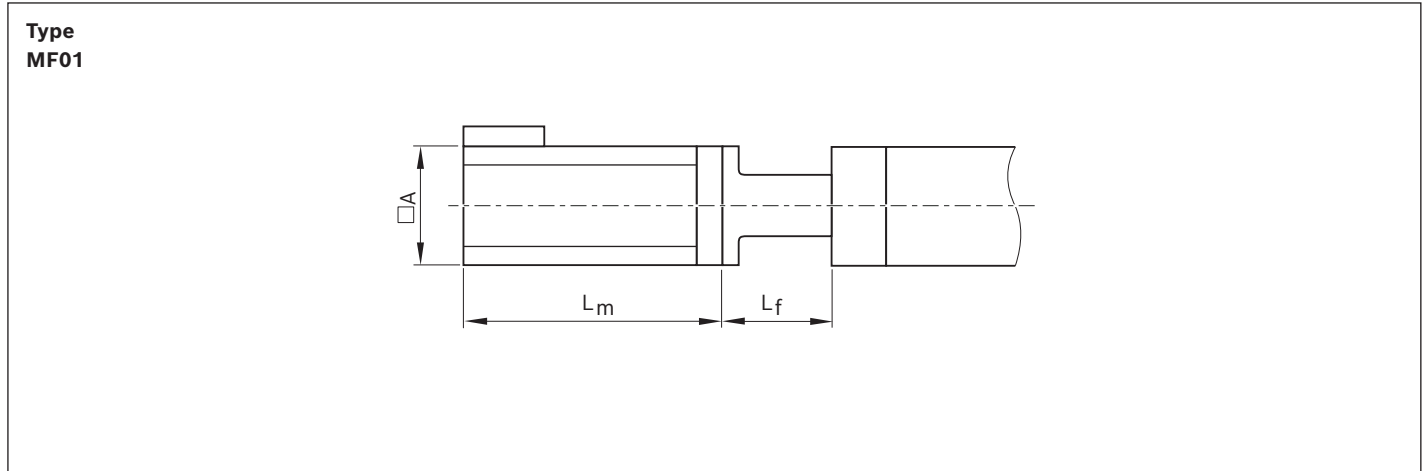
Carriage with connection plate¹⁾



¹⁾ Dimension drawings → Chapter "Connection plates"

CKK	Figure	Dimensions (mm)		A	B	C	D	E	ØF ^{H7}	G	H	T ₁	T ₂	
		L _{ca}	L _w											
-070	1	32	-	40	25	-	-	M3	3	7.5	-	5	5	
	2	73			65	40	15							
-090	1	35	-	54	27	-	-	M4	4	8.0	35	7	6	
	2	100			92	65	38							
	3	variable min. 101 max. 235			min. 66 max. 200	27	-							-
-110	1	39	-	66	30	-	-	M5	5	10.0	39	10	8	
	3	124												85
	3	variable min. 125 max. 289												min. 86 max. 250
-145	1	49	-	88	36	-	-	M6	6	12.0	49	12	10	
	3	149												100
	3	variable min. 150 max. 349												min. 101 max. 300
-200	1	79.5	-	130	60	-	-	M8	8	16.0	79.5	16	12	
	3	254.5												175
	3	variable min. 255.5 max. 429.5												min. 176 max. 350

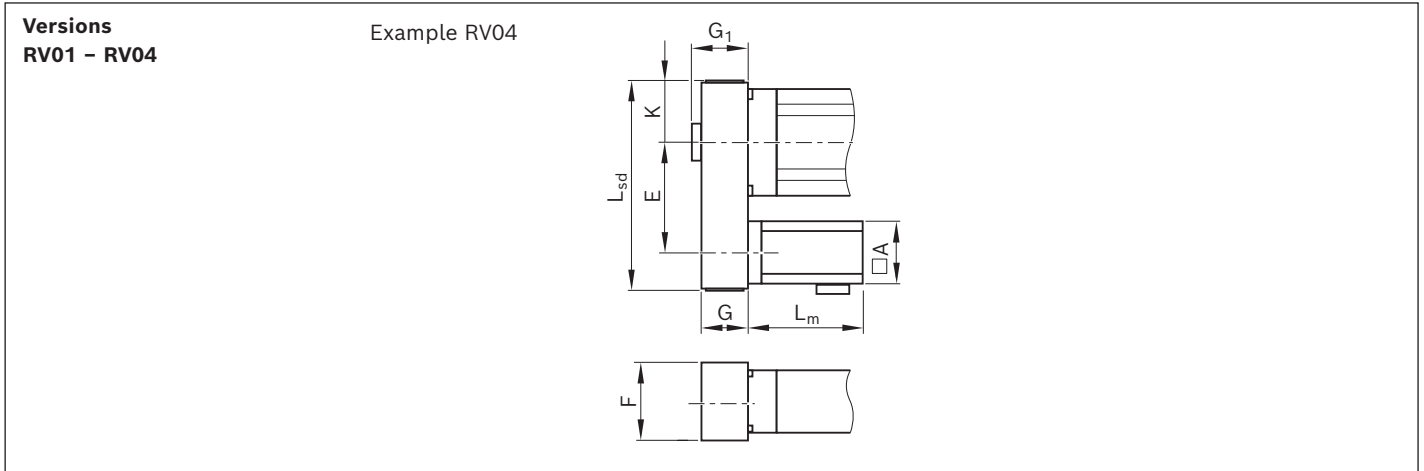
Motor attachment with flange and coupling



CKK	Motor code	Dimensions (mm)		
		L_f	L_m	$\square A$
-070	MS2N03-B0BYN	50.0		
	MSM031B-0300			
	MSM019B-0300			
-090	MS2N03-B0BYN	70.0		
	MSM031C-0300	71.5		
-110	MS2N03-B0BYN	75.0		
	MS2N03-D0BYN			
	MS2N04-C0BTN	77.5		
	MS2N04-D0BQN			
	MSM031C-0300	72.0		
	MSM041B-0300	83.0		
-145	MS2N04-C0BTN	85.0		
	MS2N04-D0BQN	90.0		
	MSM041B-0300			
	MS2N05-B0BTN	95.0		
	MS2N05-C0BTN			
MS2N05-D0BRN				
-200	MS2N06-D0BRN	125.0		
	MS2N06-E0BRN	133.0		
	MS2N07-C0BQN			
	MS2N07-D0BRN			

⇒ Chapter "Motors"

Motor attachment with belt side drive



CKK	Motor code	Dimensions (mm)										L _{sd}	L _m	□A
		i=1	i=1.5	E i=2	F	G	G ₁	K	i=1	i=1.5	i=2			
-070	MS2N03-B0BYN	103.5	89.5	-	64.5	37.0	44.0	33.5	179	165	-			
	MSM031B-0300								182	168				
	MSM019B-0300	76.5	76.5	-	48.0	27.5	28.0	27.5	139					
-090	MS2N03-B0BYN	103.5	89.5	-	64.5	37.0	-	33.0	179	165	-			
	MSM031C-0300													
-110	MS2N03-B0BYN	103.5	115.0	-	64.5	37.0	-	33.0	179	191	-			
	MS2N04-B0BTN	-	139.5		88.0	51.0		43.5	-	250				
	MS2N04-C0BTN	145.0	-		88.0	51.0		43.5	250	-				
	MSM031C-0300	103.5	115.0		64.5	37.0		33.0	179	191				
	MSM041B-0300	145.0	139.5		88.0	51.0		43.5	250	250				
-145	MS2N04-B0BTN	-	162.0	-	88.0	51.0	-	43.5	-	267	-		Chapter "Motors"	
	MS2N04-C0BTN	157.5	162.0	-	88.0	51.0	-	43.5	267	267	-			
	MS2N04-D0BQN													
	MS2N05-B0BTN	165.0	-	162	116.0	66.0	-	56.0	297	-	297			
	MS2N05-D0BRN													
	MSM041B-0300	157.5	162.0	-	88.0	51.0	-	43.5	267	267	-			
-200	MS2N06-B1BNN	267.5	-	-	116.0	66.0	-	59.0	403	-	-			
	MS2N06-D1BNN													
	MS2N06-C0BTN	-	-	265	116.0	66.0	-	59.0	-	-	403			

Compact modules with toothed belt drive (CKR)

Product overview

Features

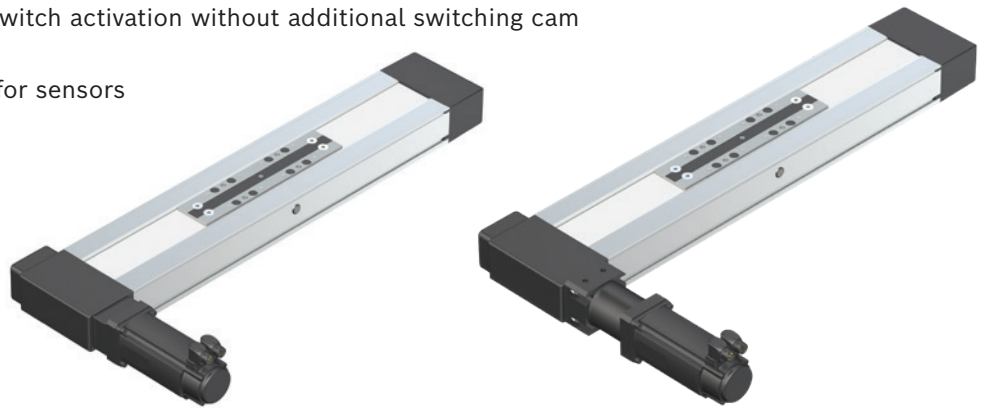
- ▶ Five fine-tuned sizes based on a compact precision aluminum profile with two integrated preloaded ball rail systems
- ▶ Four different lube versions
- ▶ Ready-to-install compact modules in any length up to L_{max} .
- ▶ Realization of greater lengths of up to 10,000 mm
- ▶ Preloaded toothed belt
- ▶ Aluminum carriages available in different lengths
- ▶ Intelligent toothed belt guide protects inner components
- ▶ Low-cost maintenance
- ▶ Repeatability of up to ± 0.05 mm

Further highlights

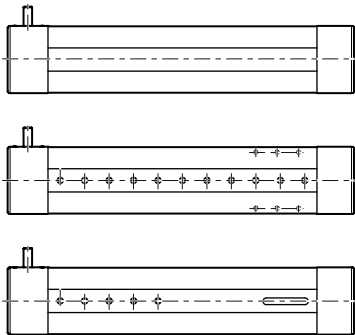
- ▶ Flexible thanks to selectable options
- ▶ Centering holes for simple combination with other linear motion systems and connection elements
- ▶ Extensive accessories for connection and clamping units
- ▶ Nameplate with parameters for easy commissioning

Attachments

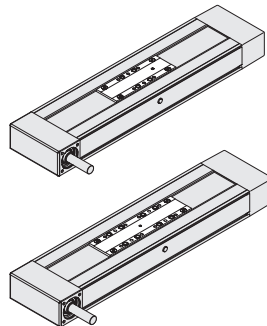
- ▶ Planetary gear with various gear ratios
- ▶ Maintenance-free servo motors with selectable brake and attached feedback
- ▶ Switches (magnetic sensors), switch activation without additional switching cam
- ▶ Socket and connector
- ▶ Cable duct made of aluminum for sensors



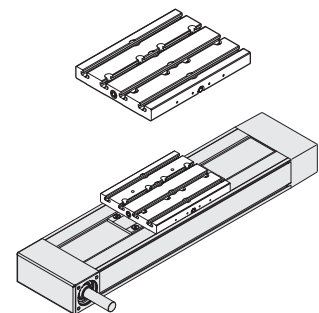
Design/options for guideway (frame), carriages, connection plates



Guideway (frame)



Carriages



Connection plates

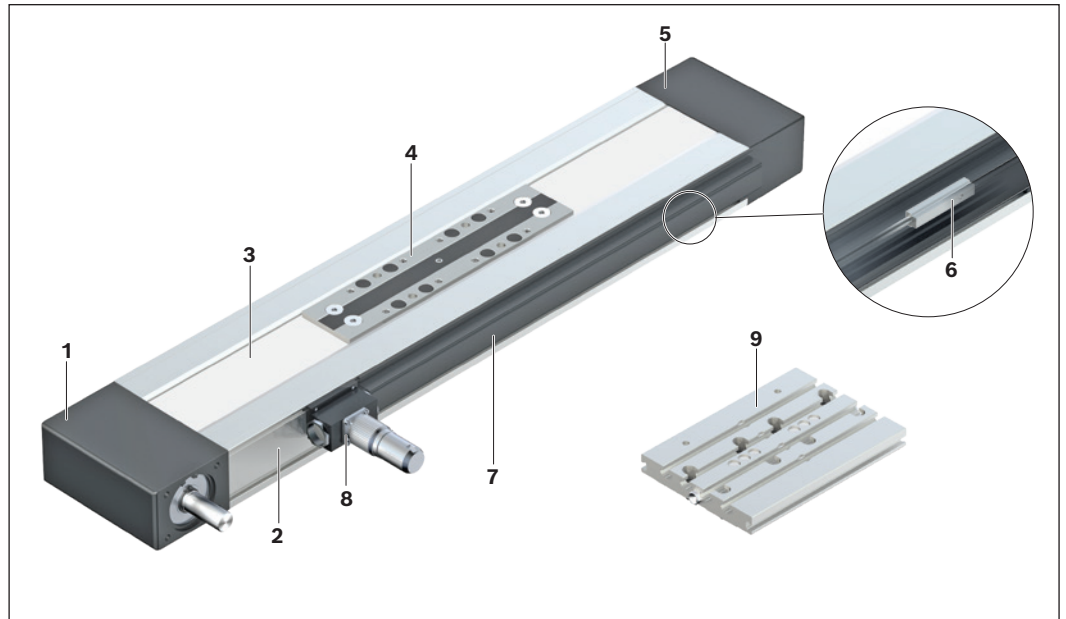
Structural design

Structural design CKR

- 1 Drive end enclosure
- 2 Frame
- 3 Toothed belt drive
- 4 Carriage
- 5 Idler end enclosure

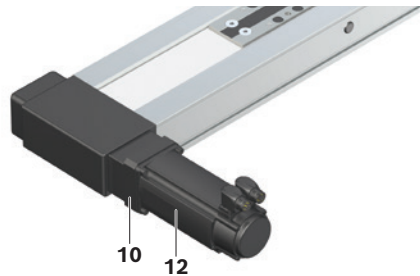
Attachments:

- 6 Magnetic sensor
- 7 Cable duct
- 8 Socket/connector
- 9 Connection plate
- 10 Flange
- 11 Planetary gear
- 12 Motor



Motor attachment – direct attachment with $i = 1$

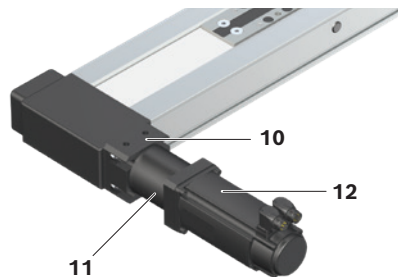
The motor is attached directly to the compact module's drive end enclosure via a flange.



Motor attachment – with gear

The planetary gear is attached by means of a flange. The flange serves to fasten the gearbox to the CRK and as a closed housing. Due to the connection without coupling, the drive torque is transferred to the drive shaft of the compact module in a torsionally stiff manner.

Available gear ratios: $i = 3$ (for CKR-145 and CKR-200)
 $i = 5, i = 10$



Technical data

General technical data

Observe the "Project planning/calculation" chapter.

CKR	Carriage Connection plate		Additional length		Min. travel range	Max. length	Dynamic characteristic values		
	without ¹⁾	with ²⁾	without	with			Load capacities	Load moments	
	L _{ca} (mm)	L _{ca} (mm)	L _{ad} (mm)	L _{ad} (mm)	S _{min} ³⁾ (mm)	L _{max} (mm)	C _{gw} (N)	M _t (Nm)	M _L (Nm)
-070	80	60	10	30	40	1,500	2,360	47	7
	108	95	10	23			3,830	77	94
-090	102	60	25	67	40	5,500	4,620	125	16
	156	125	25	56			7,505	203	244
-110	170	110	25	85	50	5,500	19,720	651	136
	215	155	25	85			32,035	1,057	1,361
-145	180	125	25	80	60	5,500	46,800	2,059	400
	240	190	25	75			76,025	3,345	3,801
-200	265	190	25	100	80	10,000	74,600	4,849	1,053
	405	305	25	125			121,185	7,877	10,604

Drive data

Observe the "Project planning/calculation" chapter.

CKR	Gearing	Gear ratio	Max. drive torque	Feed constant	Max. speed	Carriage Connection plate		Moved mass of system	
						without	with	without	with
		i (-)	M _p (Nm)	u (mm/rev)	v _{max} (m/s)	L _{ca} (mm)	L _{ca} (mm)	m _{ca} (kg)	m _{ca} (kg)
-070	-	1	3.00	72.00	3.00	80	60	0.12	0.23
		5	0.62	14.40	1.92	108	95	0.28	0.45
		10	0.31	7.20	0.96				
-090	-	1	8.00	90.00	3.00	102	60	0.32	0.50
		5	1.65	18.00	3.00	156	125	0.55	0.92
		10	0.82	9.00	1.50				
-110	-	1	13.50	120.00	5.00	170	60	0.52	0.90
		5	2.72	24.00	4.40	215	155	0.87	1.45
		10	1.26	12.00	2.20				
-145	-	1	32.50	165.00	5.00	180	125	0.99	1.80
		3	11.00	55.00	5.00	240	190	1.67	2.82
		5	6.70	33.00	5.00				
		10	3.35	16.50	2.92				
-200	-	1	112.70 99.80 ⁶⁾	250.00	5.00	265	190	2.40	4.60
		3	38.73	83.33	5.00	405	305	4.30	7.90
		5	20.62	50.00	5.00				
		10	9.28	25.00	2.92				
		3	38.73	83.33	5.00	405	305	4.30	7.90
		5	23.24	50.00	5.00				
		10	11.62	25.00	2.50				

- 1) In the "without connection plate" carriage version, carriage length L_{ca} corresponds to the length of the clamping surface.
- 2) The connection plate is mounted on the "without connection plate" carriage version.
 In the "with connection plate" carriage version, the carriage length corresponds to the length of the connection plate.
- 3) Minimum required travel range to ensure a reliable lubrication distribution.
- 4) Maximum force that can be transmitted via the teeth meshing with the belt pulley.
- 5) The maximum permissible tensile load on the belt cross section (belt elasticity limit) is given here for easier comparability.
 This value represents the load limit in terms of plastic deformation and may not be used to calculate the maximum permissible drive torque.
- 6) Version with keyway

Maximum permissible loads							Planar moments of inertia		Point of force application	
Moments			Forces				I_y (cm ⁴)	I_z (cm ⁴)	Connection plate	
M_x max (Nm)	M_y max (Nm)	M_z max (Nm)	F_y max (N)	F_{z1} max (N)	F_{z2} max (N)	Z_1 (mm)			Z_1 (mm)	
47	7	7	1,270	2,360	2,360	5.62	51.6	20.0	32.5	
77	94	51	2,070	3,830	3,830					
112	16	16	2,490	4,620	4,620	13.49	139.6	24.0	40.0	
203	244	132	4,050	7,505	7,505					
198	32	32	3,480	6,000	6,000	36.31	361.2	28.7	44.7	
396	510	240	5,650	12,000	12,000					
634	100	100	8,410	14,400	14,400	91.30	1047.0	37.5	57.5	
1,267	1,440	683	13,660	28,800	28,800					
1,375	299	299	12,265	21,150	21,150	498.00	3,836.0	45.5	72.5	
2,750	3,701	1,744	19,925	42,300	42,300					

Constant mass calculation		Constant mass moment of inertia				Friction torque M_{Rs} (Nm)	Belt pulley diameter d_3 (mm)	Belt type B_t	Max. belt drive transmission force $F_{bp}^{4)}$ (N)	Belt elasticity limit $F_{t perm}^{5)}$ (N)	Max. acceleration a_{max} (m/s ²)
k_g fix (kg)	k_g var (kg/mm)	Connection plate		$k_{J var}$ (kg/mm)	$k_{J m}$ (mm ²)						
		without $k_{J fix}$ (kg/mm ²)	with $k_{J fix}$ (kg/mm ²)								
0.50	0.00284	22.32	36.77	0.0142	131.11	0.23	22.92	25 AT3	260	1,100	
		43.14	65.46			0.25					
0.70	0.00440	92.45	129.38	0.0320	205.21	0.57	28.65	35 AT3	560	1 600	
		139.64	215.57			0.58					
1.27	0.00739	266.45	405.08	0.1364	364.81	1.04	38.20	50 AT5	705	4 200	
		391.07	602.66			1.42					
2.54	0.01222	1,024.28	1,582.85	0.3172	689.59	1.46	52.52	70 AT5	1,235	4 800	
		1,621.61	2,276.71			2.04					
7.83	0.02328	6,140.67	9,623.81	1.8397	1,583.24	4.55	79.58	100 AT10	2,830	17,000	
		9,020.05	14,719.73			5.69					

50

Gear data

Observe the "Project planning/calculation" chapter.

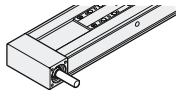
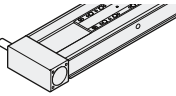
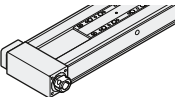
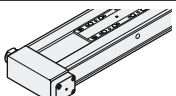
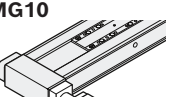
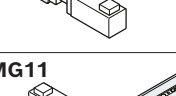
CKR	Gearing Type	Gear ratio <i>i</i> (-)	Max. acceleration torque ¹⁾ (at the gear output)	Base frictional torque	Max. drive speed
			<i>M_{ge}</i> (Nm)	<i>M_{Rge}</i> (Nm)	<i>n_{ge}</i> (min ⁻¹)
-070	PG040	5	14.0	0.06	9,000
		10	13.0	0.05	9,000
-090	PG050	5	14.0	0.09	10,000
		10	13.0	0.08	10,000
-110	PG050	5	14.0	0.09	10,000
		10	13.0	0.08	10,000
-145	PG070	3	32.0	0.24	8,000
		5	40.0	0.17	8,000
		10	35.0	0.12	8,000
-200	PG090	3	125.0	0.38	7,000
		5	100.0	0.26	
		10	90.0	0.17	
	PG120	3	200.0	1.00	6,000
		5	250.0	0.76	
		10	220.0	0.58	

¹⁾ The limits of the linear motion system must not be exceeded → "Drive data / project planning/calculation".

Motor	Mass moment of inertia	Weight	
		J_{ge} (kgm ²)	m_{ge} (kg)
MS2N03-B	0.000004		0.50
MSM019-B			
MS2N03-B	0.000003		
MSM019-B			
MS2N03-B	0.0000030		0.80
MS2N03-D	0.0000050		0.80
MSM031-C	0.0000130		1.30
MS2N03-B	0.0000020		0.80
MS2N03-D	0.0000040		0.80
MSM031-C	0.0000130		1.30
MS2N03-B	0.0000030		0.90
MS2N03-D	0.0000050		0.90
MS2N04	0.0000130		1.40
MSM031-C	0.0000130		1.40
MS2N03-B	0.0000020		0.90
MS2N03-D	0.0000040		0.90
MS2N04	0.0000130		1.40
MSM031-C	0.0000130		1.40
MS2N04	0.0000320		2.10
MS2N05	0.0000530		3.20
MSM041-B	0.0000530		3.20
MS2N04	0.0000270		2.10
MS2N05	0.0000460		3.20
MSM041-B	0.0000460		3.20
MS2N04	0.0000220		2.10
MS2N05	0.0000430		3.20
MSM041-B	0.0000430		3.20
MS2N06	0.0001800		4.4
	0.0001600		
	0.0001500		
MS2N07	0.0007200		17.30
	0.0005900		
	0.0005400		

Configuration, order

CKR-070

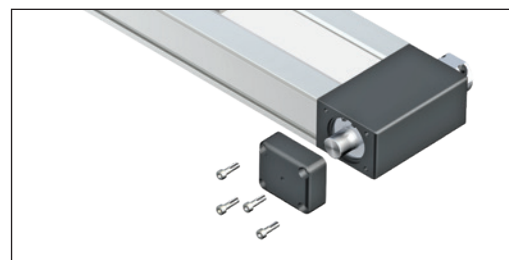
Short product name, length ¹⁾ CKR-070-NN-1, ... mm		Guideway		Drive		Lubrication ³⁾	Carriage										
		Standard	Centering holes ²⁾	without keyway	for gear unit ⁴⁾		Connection plate without		with								
Version				i = 1			L _{ca} = (mm)		L _{ca} = (mm)								
							80	108	60	95							
Drive journal	MA01 	01	03	04	01	LSS	01	02	40	41							
	MA02 				02												
Clamping hub	MA05 				07						06	-	LPG	-	302	-	341
	MA06 										07						
Gear attachment	MG10 				08						-	09	LPG	-	302	-	341
	MG11 										-						

- 1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame.
Option 04: with centering holes and long hole in the ground area of the frame. Selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication ⇒ Chapter "Lubrication".
- 4) Attachment kit for gear attachment
- 5) If a module has been ordered with an attached servo motor, it will only be delivered with the motor mounting shown in the chapter "Form of delivery" (note position of motor connector).
- 6) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
- 7) More information ⇒ Chapter "Switching system".
- 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; (⇒ Chapter "Documentation")
- 10) Motor attachment consisting of: Adapter flange for gear unit, however "without gear unit". No motor connector position selectable.

Motor attachment ⁵⁾			Motor ⁶⁾					Switching system ⁷⁾		Automation package			Documentation ⁹⁾	
Direct drive	Gearing		Motor code	2 cables		1 cable		Motor connector position			Controller	Cable	Software	
	i = 1	i = 5		i = 10	without brake	with brake	without brake							
MA01								Without		"Automation package" chapter			01	
MA02	00		00					- Switch - Cable duct - Socket-connector						00
MA05								Magnetic sensor						
MA06								REED, changeover (NC: C+NC, NO: C+NO)						21
								Hall, PNP normally closed (NC)						22
								Hall, PNP normally open (NO)						23
MG10 / MG11	00 ¹⁰⁾		00					Cable duct		25	"Automation package" chapter	02		
	11	12	MS2N03-B0BYN	-	-	203	204	Socket-connector		17				
								Magnetic sensor with connector ⁸⁾						
								REED, changeover (NC: C+NC, NO: C+NO)		58				
	23	24	MSM019B-0300	134	135	-	-	Hall, PNP normally closed (NC)		59				

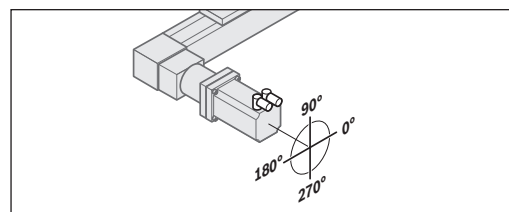
Drive end enclosure with additional drive journal

In the versions MA05, MA06, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



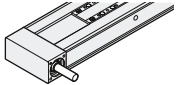

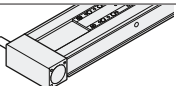
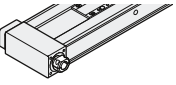
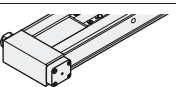
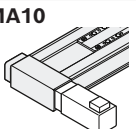
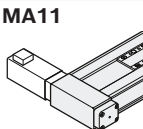
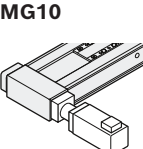
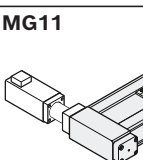
Version	Motor connector position			
	0°	90°	180°	270°
MG10 / MG11	000	090 ★	180	270

★ Standard delivery


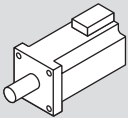
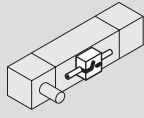



Explanation of the order parameters and ordering example ➔ Chapter "Ordering example".

CKR-090

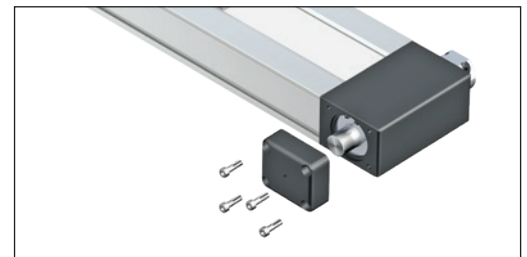
Short product name, length ¹⁾ CKR-090-NN-1, ... mm		Guideway		Drive			Lubrication ³⁾	Carriage												
		Standard	Centering holes ²⁾	without keyway	with keyway	for gear unit ⁴⁾		Connection plate without		with										
Version				i = 1	i = 1			L _{ca} = (mm)		L _{ca} = (mm)										
								102	156	60	125									
Drive journal	MA01 	01	03	04				LSS	01	02	40	41								
	MA02 				01	03														
Clamping hub	MA05 															LPG	-	302	-	341
	MA06 				06	-														
Direct attachment	MA10 															LCF		-		141
	MA11 				06	-							-							
Gear attachment	MG10 															LCO		-		241
	MG11 				-	-							08							

- 1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame. Selectable up to a length of L ≤ 2000 mm
Option 04: with centering holes and long hole in the ground area of the frame. Selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication ⇒ Chapter "Lubrication".
- 4) Attachment kit for gear attachment
- 5) If a module has been ordered with an attached servo motor, it will only be delivered with the motor mounting shown in the chapter "Form of delivery" (note position of motor connector).
- 6) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
- 7) More information ⇒ Chapter "Switching system".
- 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; (⇒ Chapter "Documentation")
- 10) Motor attachment consisting of: Adapter flange for gear unit, however "without gear unit". No motor connector position selectable.

Motor attachment ⁵⁾			Motor ⁶⁾					Switching system ⁷⁾		Automation package			Documentation ⁹⁾	
 Direct drive i = 1 Gearing i = 5 i = 10			 Motor code 2 cables without brake with brake 1 cable without brake with brake Motor connector position							Controller Cable Software				
MA01	00		00					Without		"Automation package" chapter			01	
MA02								- Switch						00
MA05								- Cable duct						
MA06								- Socket-connector						
								Magnetic sensor						
								REED, changeover (NC: C+NC, NO: C+NO)					21	
								Hall, PNP normally closed (NC)					22	
								Hall, PNP normally open (NO)					23	
								Cable duct					25	
								Socket-connector					17	
MA10 / MA11	01	-	MS2N04-D0BQN	-	-	219	220	000	"Automation package" chapter			02		
	00 ¹⁰⁾		00					090						
	15 16		MS2N03-B0BYN	-	-	203	204	180						
	13 14		MS2N03-D0BYN	-	-	207	208	270						
	33 34		MSM031C-0300	138	139	-	-	270						
								Magnetic sensor with connector ⁸⁾						
								REED, changeover (NC: C+NC, NO: C+NO)				58		
								Hall, PNP normally closed (NC)				59		

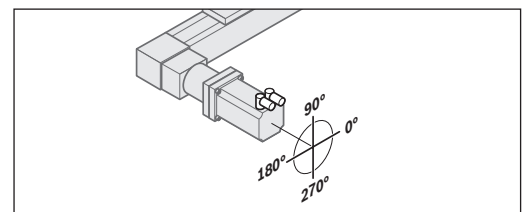
Drive end enclosure with additional drive journal

In the versions MA05, MA06, MA10, MA11, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



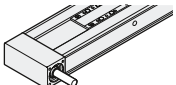
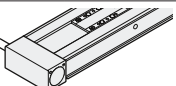
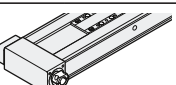
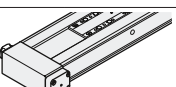
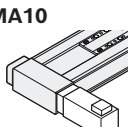
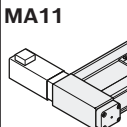
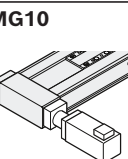
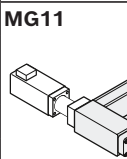
Version	Motor connector position			
	0°	90°	180°	270°
MA10 / MA11 MG10 / MG11	000	090 ★	180	270

★ Standard delivery

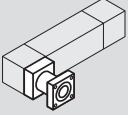
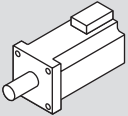
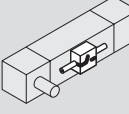



Explanation of the order parameters and ordering example ⇒ Chapter "Ordering example".

CKR-110

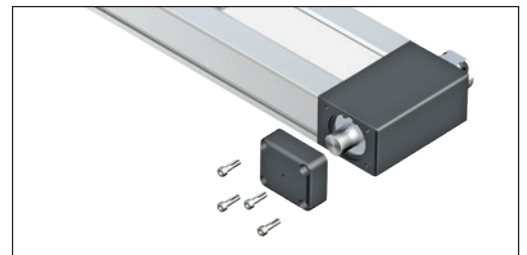
Short product name, length ¹⁾ CKR-110-NN-1, ... mm		Guideway		Drive			Lubrication ³⁾	Carriage							
		Standard	Centering holes ²⁾	without keyway	with keyway	for gear unit ⁴⁾		Connection plate without L _{ca} = (mm)	with L _{ca} = (mm)						
Version				i = 1	i = 1			170	215	110	155				
Drive journal	MA01 	01	03	04			LSS								
	MA02 				01	03				01	02	40	41		
Clamping hub	MA05 										LPG				
	MA06 				06	-		-		-		-	302	-	341
Direct attachment	MA10 										LCF				
	MA11 				06	-		-		-		-			141
Gear attachment	MG10 										LCO				
	MG11 				-	-		08		-		-			241

- 1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
- 2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame. Selectable up to a length of L ≤ 2000 mm
Option 04: with centering holes and long hole in the ground area of the frame. Selectable starting from length L ≥ 300 mm up to length L_{max}
- 3) Lubrication ⇒ Chapter "Lubrication".
- 4) Attachment kit for gear attachment
- 5) If a module has been ordered with an attached servo motor, it will only be delivered with the motor mounting shown in the chapter "Form of delivery" (note position of motor connector).
- 6) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
- 7) More information ⇒ Chapter "Switching system".
- 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
- 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; (⇒ Chapter "Documentation")
- 10) Motor attachment consisting of: Adapter flange for gear unit, however "without gear unit". No motor connector position selectable.

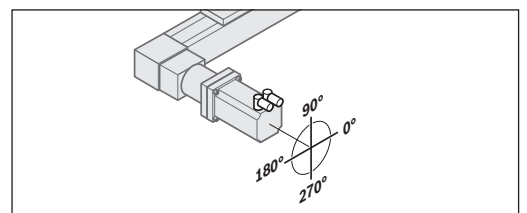
Motor attachment ⁵⁾			Motor ⁶⁾					Switching system ⁷⁾		Automation package			Documentation ⁹⁾
													
Direct drive	Gearing		Motor code		2 cables		1 cable		Motor connector position	Controller	Cable	Software	
i = 1	i = 5	i = 10	without brake	with brake	without brake	with brake							
MA01									000	Without			
MA02									000	- Switch	00		
MA05	00								000	- Cable duct			
MA06									000	- Socket-connector			
MA10 / MA11	01	-	MS2N05-D0BRN	-	-	231	232	000	Magnetic sensor				01
MG10 / MG11	-	00 ¹⁰⁾		00				090	REED, changeover (NC: C+NC, NO: C+NO)	21	"Automation package" chapter		02
	15	16	MS2N03-B0BYN	-	-	203	204	180	Hall, PNP normally closed (NC)	22			
	13	14	MS2N03-D0BYN	-	-	207	208	180	Hall, PNP normally open (NO)	23			
	23	24	MS2N04-B0BTN	-	-	211	212	270	Cable duct	25			
	33	34	MS2N04-C0BTN	-	-	215	216	270	Socket-connector	17			
			MSM031C-0300	138	139	-	-		Magnetic sensor with connector ⁸⁾				
									REED, changeover (NC: C+NC, NO: C+NO)	58			
									Hall, PNP normally closed (NC)	59			

Drive end enclosure with additional drive journal

In the versions MA05, MA06, MA10, MA11, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



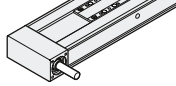
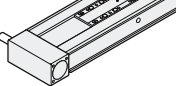
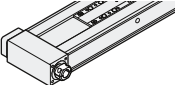
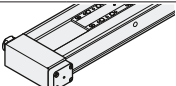
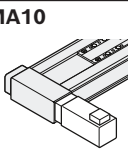
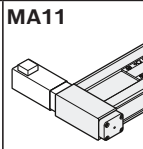
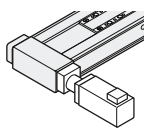
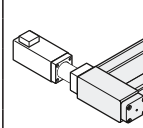
Version	Motor connector position			
	0°	90°	180°	270°
MA10 / MA11 MG10 / MG11	000	090 ★	180	270



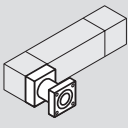
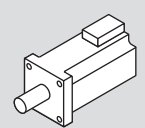
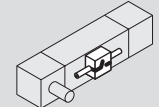

★ Standard delivery

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

CKR-145

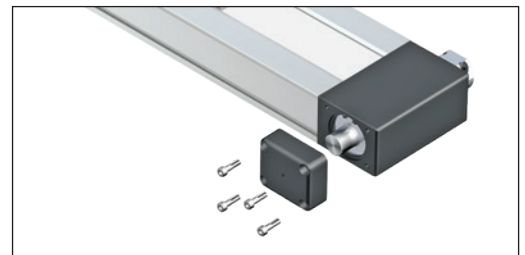
Short product name, length ¹⁾ CKR-145-NN-1, ... mm		Guideway		Drive			Lubrication ³⁾	Carriage								
Version		Standard	Centering holes ²⁾	without keyway i = 1	with keyway i = 1	for gear unit ⁴⁾		Connection plate								
								without L _{ca} = (mm)		with L _{ca} = (mm)						
								180	240	125	190					
Drive journal	MA01 	01	03	04			LSS									
	MA02 				01	03		-	01	02	40	41				
Clamping hub	MA05 										LPG					
	MA06 				06	-		-	-	302		-	341			
Direct attachment	MA10 										LCF					
	MA11 				06	-		-	-	-		141				
Gear attachment	MG10 										LCO					
	MG11 				-	-		08	-	-		241				

1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.
 2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
 Option 03: with centering holes and fastening threads in the ground area of the frame. Selectable up to a length of L ≤ 2000 mm
 Option 04: with centering holes and long hole in the ground area of the frame. Selectable starting from length L ≥ 300 mm up to length L_{max}
 3) Lubrication ⇒ Chapter "Lubrication".
 4) Attachment kit for gear attachment
 5) If a module has been ordered with an attached servo motor, it will only be delivered with the motor mounting shown in the chapter "Form of delivery" (note position of motor connector).
 6) Recommended motor, motor data and type designations ⇒ Chapter "Motors"
 7) More information ⇒ Chapter "Switching system".
 8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws
 9) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; (⇒ Chapter "Documentation")
 10) Motor attachment consisting of: Adapter flange for gear unit, however "without gear unit". No motor connector position selectable.

Motor attachment ⁵⁾				Motor ⁶⁾					Switching system ⁷⁾		Automation package			Docu- menta- tion ⁹⁾				
 Direct drive i = 1 Gearing i = 3 i = 5 i = 10				 Motor code 2 cables without brake with brake 1 cable without brake with brake Motor connector position							Controller Cable Software							
MA01	00			00					Without		"Automation package" chapter			01				
MA02	00			00					- Switch - Cable duct - Socket-connector						00			
MA05	00			00					Magnetic sensor									
MA06	00			00					REED, changeover (NC: C+NC, NO: C+NO)						21			
MA10 / MA11	01	-	-	-	MS2N06-D1BNN	-	-	247	248	000				Hall, PNP normally closed (NC)		22		
														Hall, PNP normally open (NO)		23		
MG10 / MG11	-	00 ¹⁰⁾	13	14	15	MS2N04-C0BTN	-	-	215	216				180	Cable duct		25	
															Socket-connector		17	
															Magnetic sensor with connector ⁸⁾			
															REED, changeover (NC: C+NC, NO: C+NO)		58	
MG10 / MG11	-	00 ¹⁰⁾	43	44	45	MS2N05-C0BTN	-	-	223	224	270	Hall, PNP normally closed (NC)		59				
												MS2N05-D0BRN		231 232				
MG10 / MG11	-	00 ¹⁰⁾	33	34	35	MSM041B-0300	140	141	-	-	090							

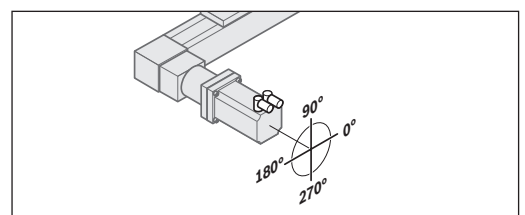
Drive end enclosure with additional drive journal

In the versions MA05, MA06, MA10, MA11, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



Version	Motor connector position			
	0°	90°	180°	270°
MA10 / MA11 MG10 / MG11	000	090 ★	180	270

★ Standard delivery



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

CKR-200

Short product name, length ¹⁾ CKR-200-NN-1, ... mm		Guideway		Drive			Lubrication ³⁾	Carriage				
Version		Standard	Centering holes ²⁾	without keyway	with keyway	for gear unit ⁴⁾		Connection plate without		with		
				i = 1	i = 1			L _{ca} = (mm)		L _{ca} = (mm)		
								265	405	190	305	
Drive journal	MA01	01	03	04			-	LSS	01	02	40	41
	MA02				01	03						
	MA03				02	04						
Gear attachment	MG01	01	03	04			-	LCF		-		141
	MG02											
	MG03											
	MG04											
							LCO				241	

1) Length calculation of the linear motion system ⇒ "Project planning/calculation" chapter.

2) Centering holes for simple combination with other linear motion systems and connection elements (⇒ Dimension drawings).
Option 03: with centering holes and fastening threads in the ground area of the frame. Selectable up to a length of L ≤ 2000 mm
Option 04: with centering holes and long hole in the ground area of the frame. Selectable up to a length of L ≤ 5500 mm

3) Lubrication ⇒ Chapter "Lubrication".

4) Attachment kit for gear attachment

5) If a module has been ordered with an attached servo motor, it will only be delivered with the motor mounting shown in the chapter "Form of delivery" (note position of motor connector).

6) Recommended motor, motor data and type designations ⇒ Chapter "Motors"

7) More information ⇒ Chapter "Switching system".

8) Assembly contains 1 x sensor, 1 x switch mounting plate including set screws and square nuts as well as 3 x cable holders including set screws

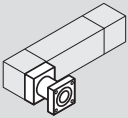
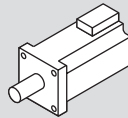
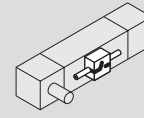

9) Switch configuration with magnetic sensor and mechanical/proximity switch together on one side is not possible.

Assembly contains 1 x sensor, 1 x switch mounting plate including mounting material

10) Switching cam can be attached only in conjunction with connection plate

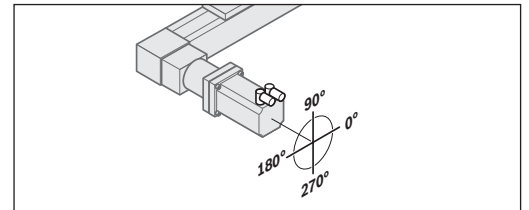
11) Measurement report: 01 = Standard report; 02 = Measurement of frictional torque; 03 = Lead deviation (⇒ Chapter "Documentation")

12) Motor attachment consisting of: Adapter flange for gear unit, however "without gear unit". No motor connector position selectable.

Motor attachment ⁵⁾					Motor ⁶⁾					Switching system ⁷⁾		Automation package			Docu- menta- tion ¹¹⁾				
 Gearing i = 3 i = 5 i = 10					 Motor code					2 cables		1 cable				Controller	Cable	Software	
										without brake	with brake	without brake	with brake						
MA01	MA02	MA03	00			00					Without		"Automation package" chapter	01					
			- Switch		00		Magnetic sensor		REED, changeover (NC: C+NC, NO: C+NO)		21								
			Hall, PNP normally closed (NC)		22		Hall, PNP normally open (NO)		23		Cable duct				25				
Socket-connector		17		Magnetic sensor with connector ⁸⁾		REED, changeover (NC: C+NC, NO: C+NO)		58		Hall, PNP normally closed (NC)		59							
Proximity/mechanical switches ⁹⁾		15		Mechanical		11		Proximity – PNP NC contact		13		Cable duct			20				
Switching		16		cam ¹⁰⁾		26		Socket-connector		17									
MG01 / MG02 / MG03 / MG04	PG090	00 ¹²⁾			00					000	Magnetic sensor with connector ⁸⁾		"Automation package" chapter	02					
		43	44	45	MS2N06-D1BNN	-	-	247	248		REED, changeover (NC: C+NC, NO: C+NO)	58							
	PG120	33	34	35	MS2N07-B1BNN	-	-	255	256		Hall, PNP normally closed (NC)	59							
					MS2N07-C1BRN	-	-	263	264		Proximity/mechanical switches ⁹⁾				15				
MS2N07-D1BNN					-	-	269	270	Mechanical		11								
Proximity – PNP NC contact		13		Proximity – PNP NO contact		20		Cable duct		20		Switching			16				
cam ¹⁰⁾		26		Socket-connector		17													

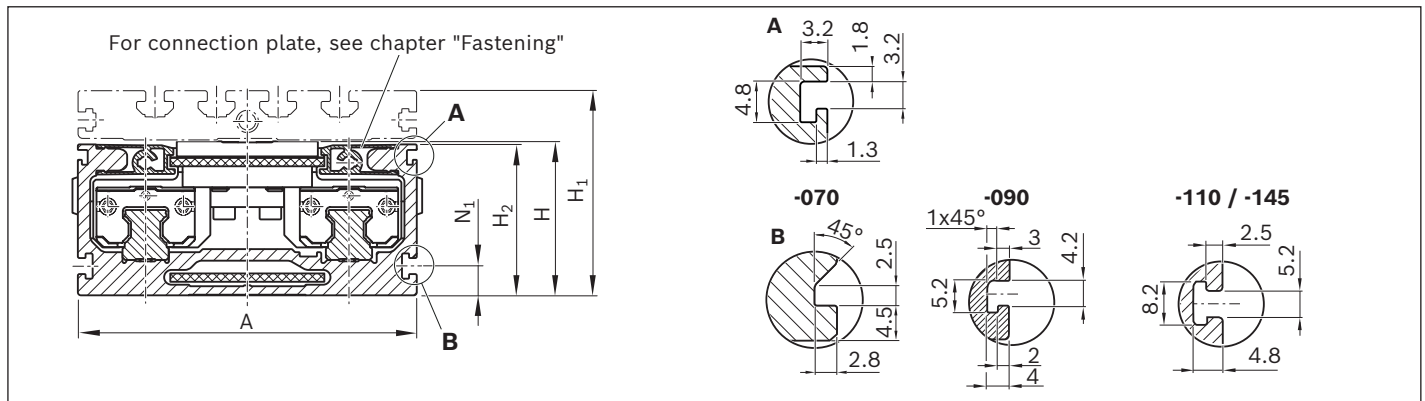
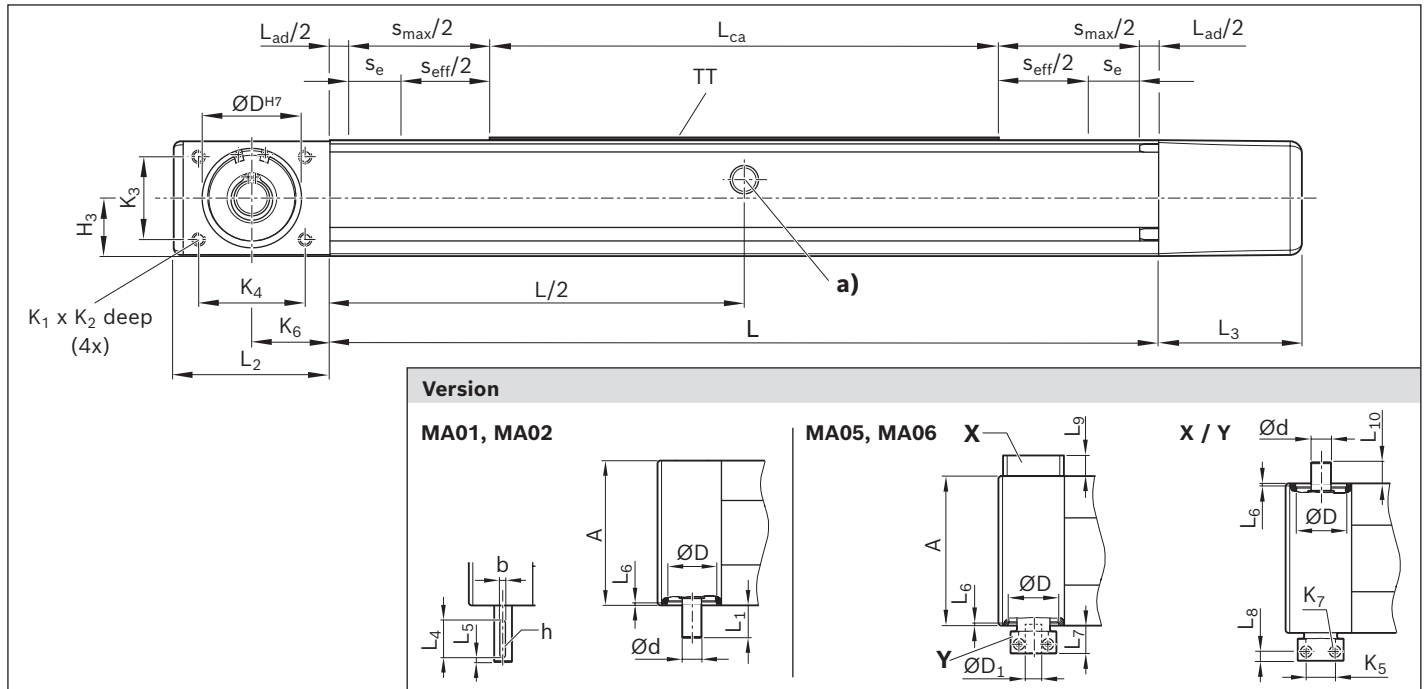
Version	Motor connector position			
	0°	90°	180°	270°
MG01-MG04	000	090 ★	180	270

★ Standard delivery



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

Frame CKR-070/-090/-110/-145



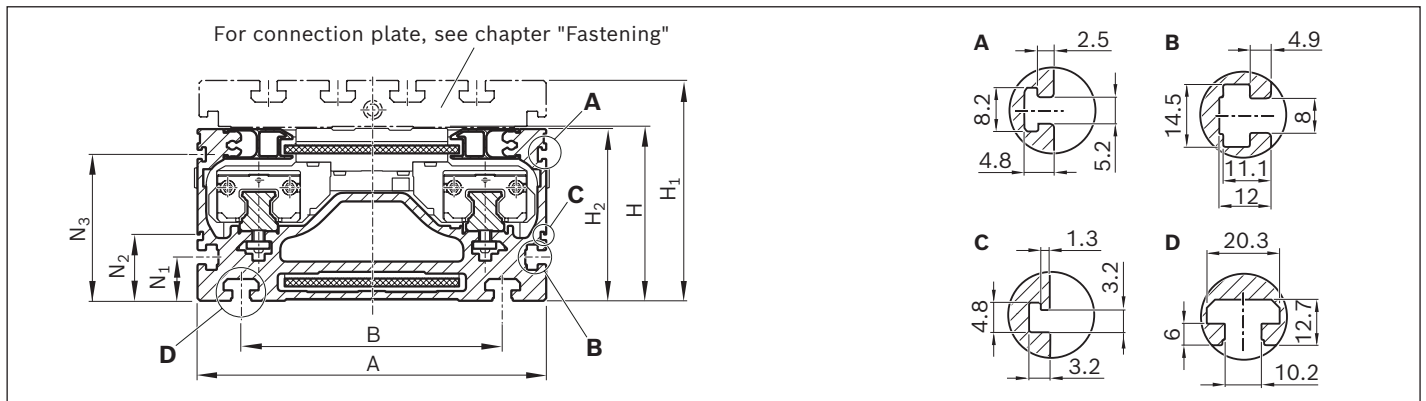
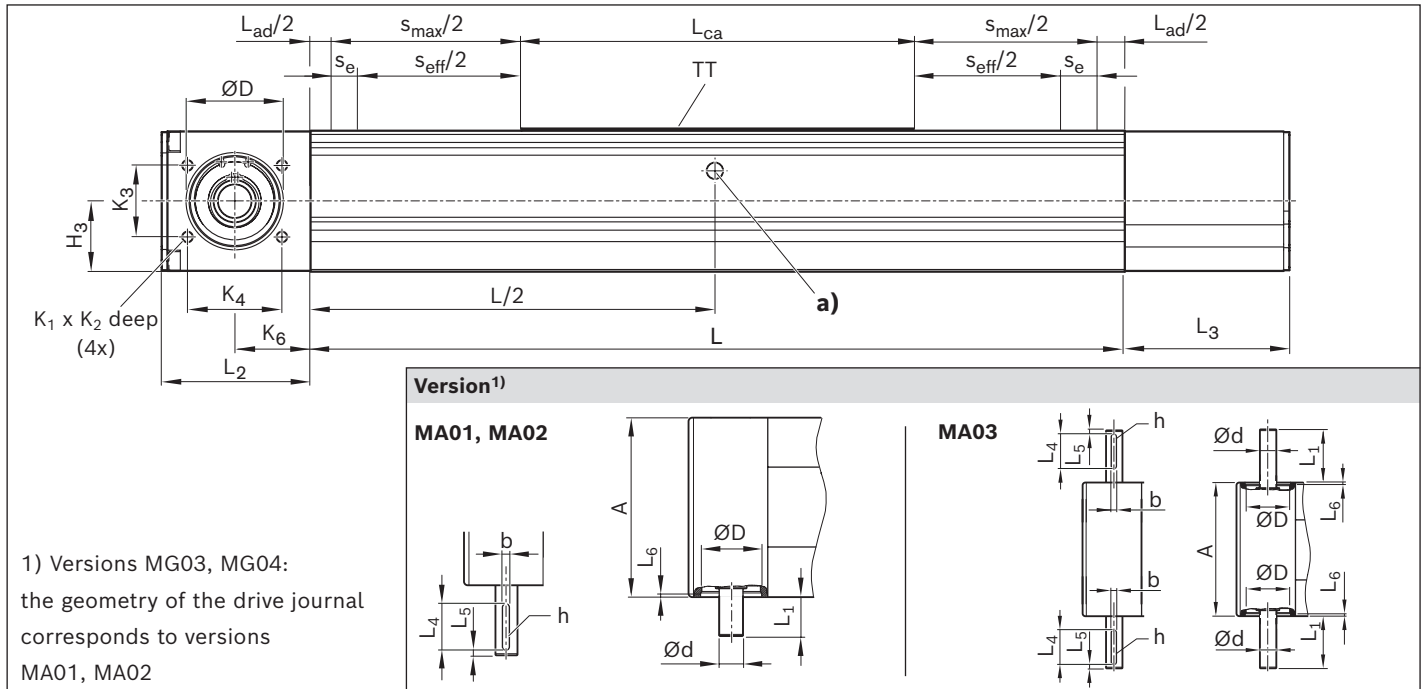
CKR	Dimensions (mm)														
	A	B	b ^{P9}	H	H ₁	H ₂	H ₃	h	ØD H7	ØD ₁ H7	h7	Ød h6	K ₁	K ₂	
-070	70	-	-	32	44.5	31.3	16.30	-	26.5	10	8	-	M3	6	
-090	90	-	3	40	56.0	39.0	19.50	1.8	34.0	14	10	-	M4	8	
-110	110	-	5	50	66.0	49.0	24.50	3.0	42.0	19	14	-	M5	10	
-145	145	-	6	65	85.0	64.0	32.00	3.5	49.0	24	19	-	M6	12	
-200	200	150	8	100	127.0	98.5	49.25	4.0	68.0	-	-	24	M8	15	

a) Lube port on both sides (grease lubrication). ➔ Chapter "Lubrication".

Straightness and flatness tolerance in accordance with DIN EN 12020-2.

Note: all dimensions in mm. Drawings not schematically to scale. Exact contours and dimensions can be found in the CAD model. CAD configurator available on the Internet at www.boschrexroth.com "Product configurators".

Frame CKR-200



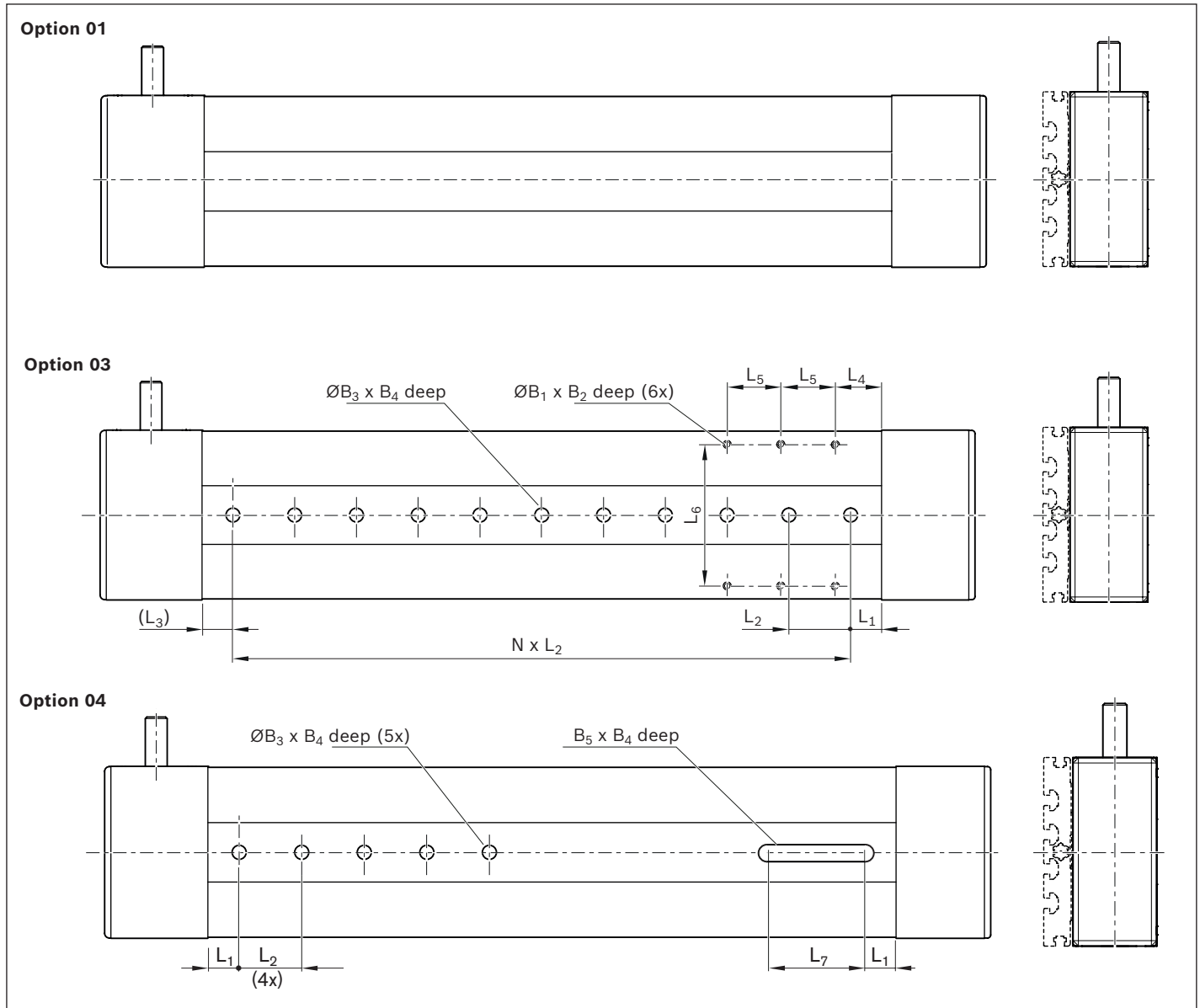
K_3	K_4	K_5 ± 0.1	K_6	K_7	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	N_1	N_2	N_3
12	29	14.4	18	M2.5 (ISO 4762)	14.5	36	42.0	-	-	3.0	14.5	5 ± 0.2	15	12.0	-	-	-
28	40	20.0	28	M4 (DIN 6912)	31.5	59	49.5	25	2	1.8	20.5	8 ± 0.2	15	12.5	7.6	-	-
35	45	25.0	33	M4 (ISO 4762)	31.5	66	60.5	25	2	2.0	22.0	8 ± 0.2	20	17.5	9.5	-	-
45	45	30.5	30	M5 (ISO 4762)	61.0	64	71.5	40	2	2.5	27.5	9 ± 0.1	20	17.5	9.5	-	-
50	66	-	53	-	61.0	104	115.0	40	3	2.5	-	-	-	-	25.0	38	84

See following pages for dimension drawings for frames, carriages and motor attachment.

Length calculation of the linear motion system ➔ Chapters "Technical data" and "Project planning/calculation".

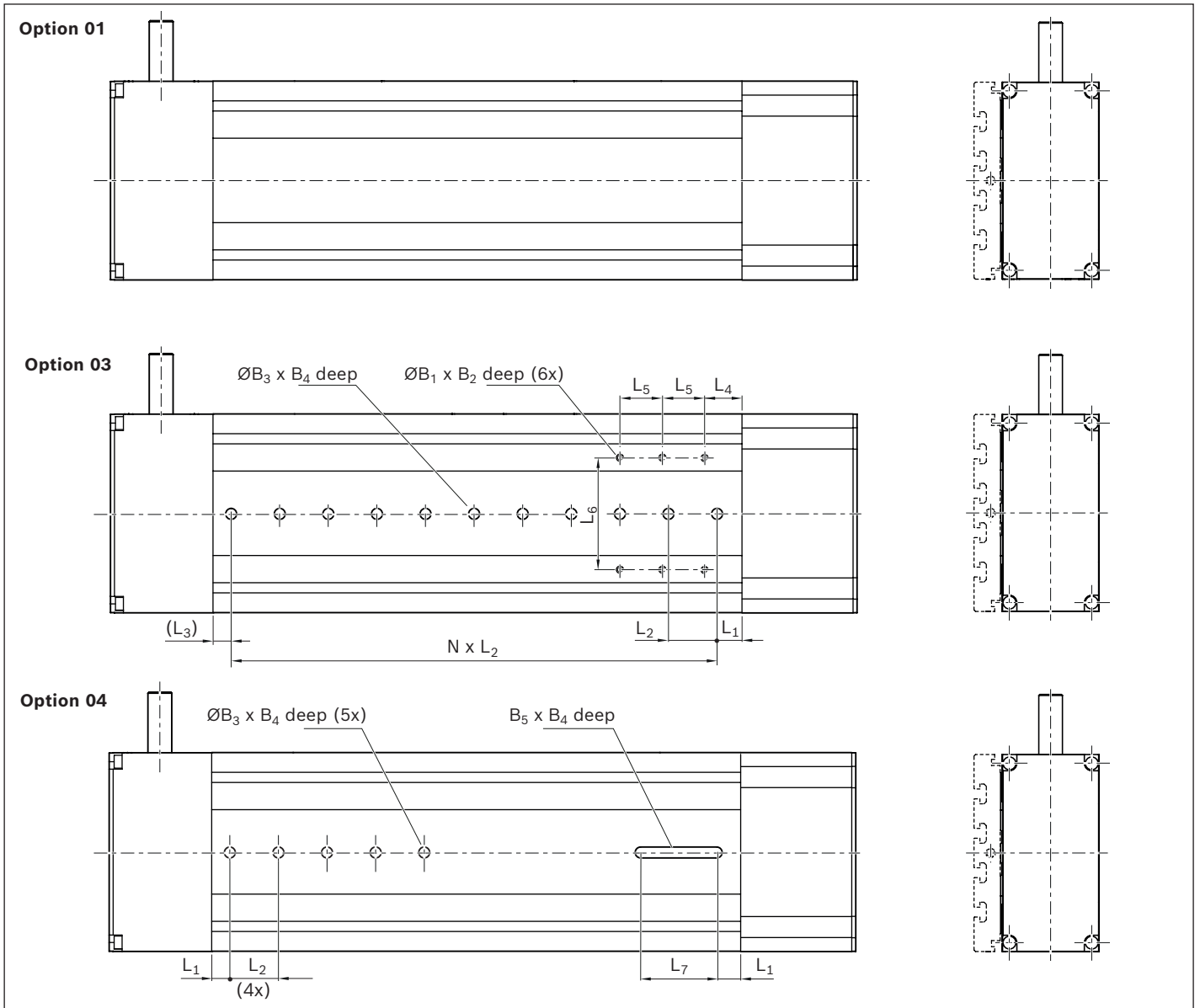
- A** For switch mounting arrangements
- B** For mounting with clamping fixtures
- C** For cable duct
- D** For fastening with sliding blocks
- TT = Carriage

Frame CKR-070/-090/-110/-145



CKR	Option	Dimensions (mm)					L ₁	L ₂ ± 0.01	L ₃ (min)	L ₄	L ₅	L ₆	L ₇
		B ₁	B ₂	∅B ₃ ^{H7}	B ₄	B ₅ ^{H8}							
-070	03	M3	6.0	7	1.6	-	20	40	10	15	25	59	-
	04	-	-						7	-	-	-	-
-090	03	M4	7.5	9	2.1	-	20	40	10	30	35	76	-
	04	-	-						9	-	-	-	-
-110	03	M5	9.0	9	2.1	-	20	40	10	30	35	92	-
	04	-	-						9	-	-	-	-
-145	03	M6	13.0	12	2.1	-	20	40	10	30	35	124	-
	04	-	-						12	-	-	-	-
-200	03	M8	12.0	16	3.1	-	20	40	10	35	40	119	-
	04	-	-						16	-	-	-	-

Frame CKR-200



Views from below (ground area)

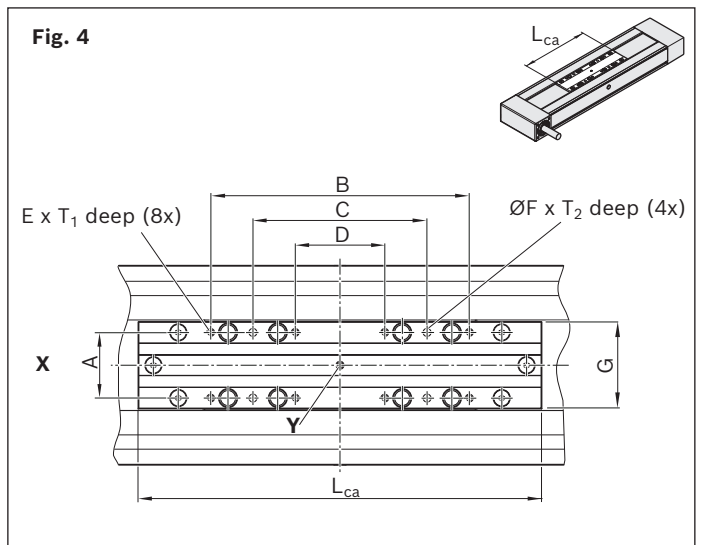
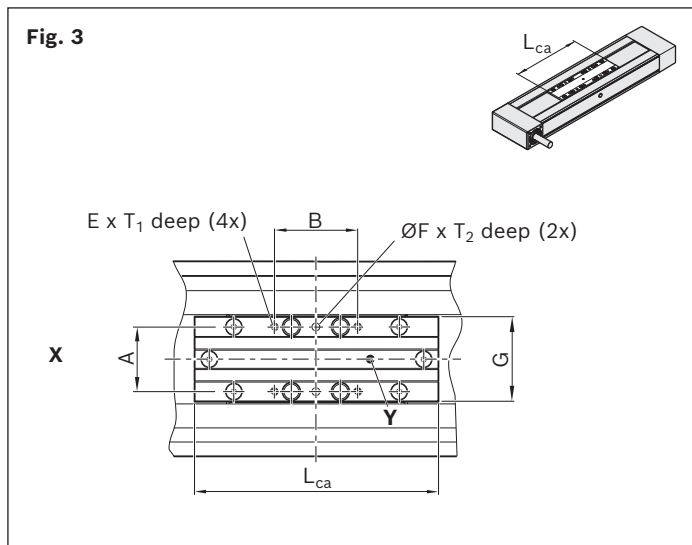
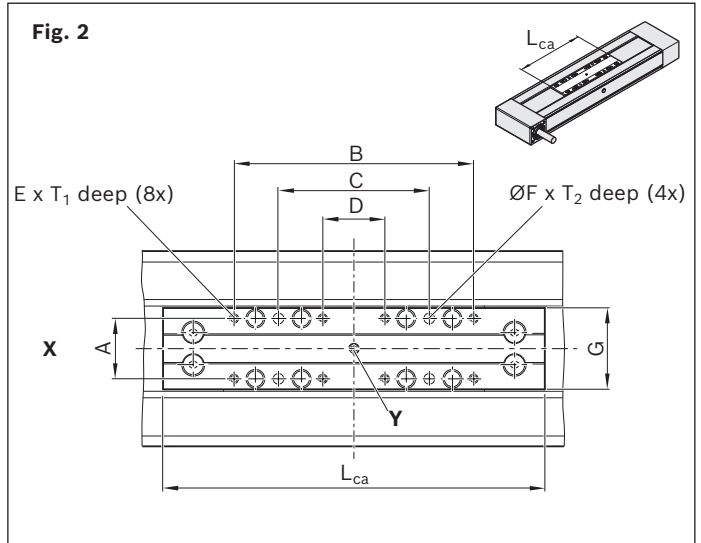
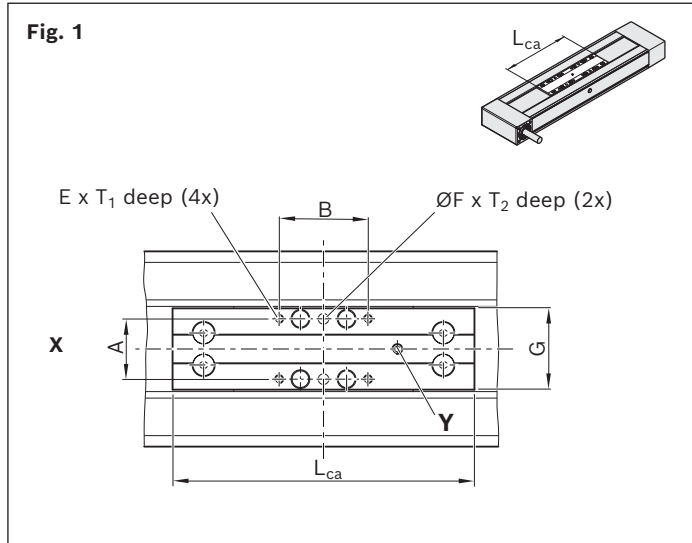
Option 01 / standard

Option 03 / with centering holes

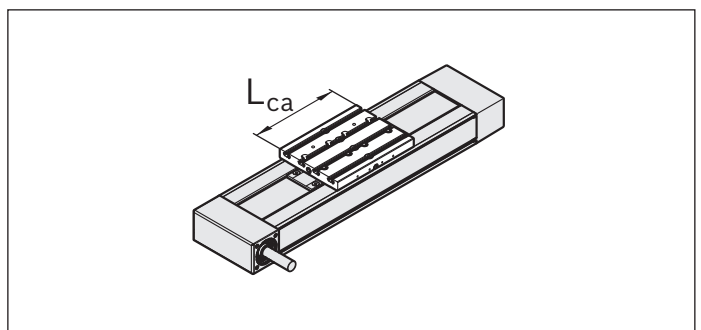
Option 04 / with centering holes and long hole

Carriages CKR-070/-090/-110/-145/-200

Carriages without connection plate



Carriages with connection plate¹⁾

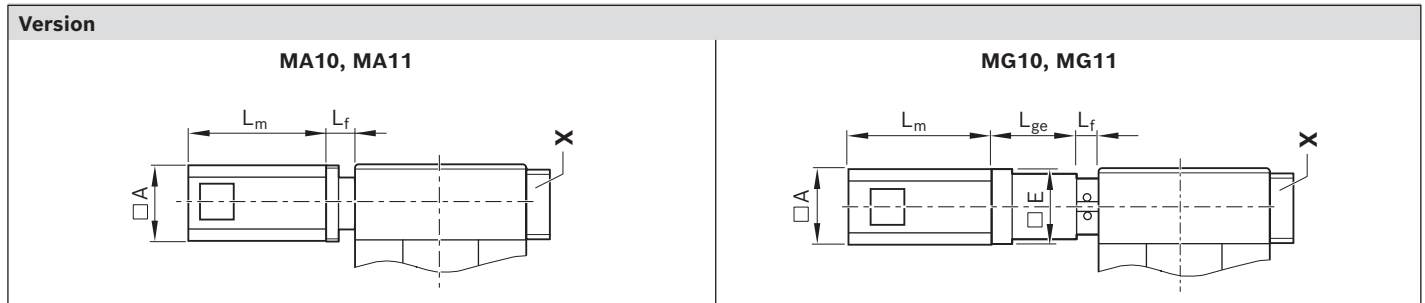


¹⁾ Dimension drawings → Chapter "Connection plates"

CKR	Figure	Dimensions (mm)									
		L _{ca}	A	B	C	D	E	ØF ^{H7}	G	T ₁	T ₂
-070	1	80	13.5	25	-	-	M3	3	21	6	6
	2	108		65	40	15					
-090	1	102	20	27	-	-	M4	4	27	8	6.5
	2	156		92	65	38					
-110	1	170	34	50	-	-	M5	6	46	10	6.5
	2	215		135	85	35					
-145	1	180	48	60	-	-	M6	6	62	12	7.5
	2	240		160	100	40					
-200	3	265	66	85	-	-	M8	8	87	16	10
	4	405		260	175	90					

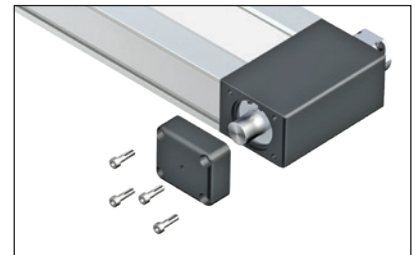
- X** Drive side
- Y** Lubrication point for grease; sealed with set screw.
Supplementary information for lubrication ➡ Chapter "Lubrication".

Motor attachment CKR-070/-090/-110/-145

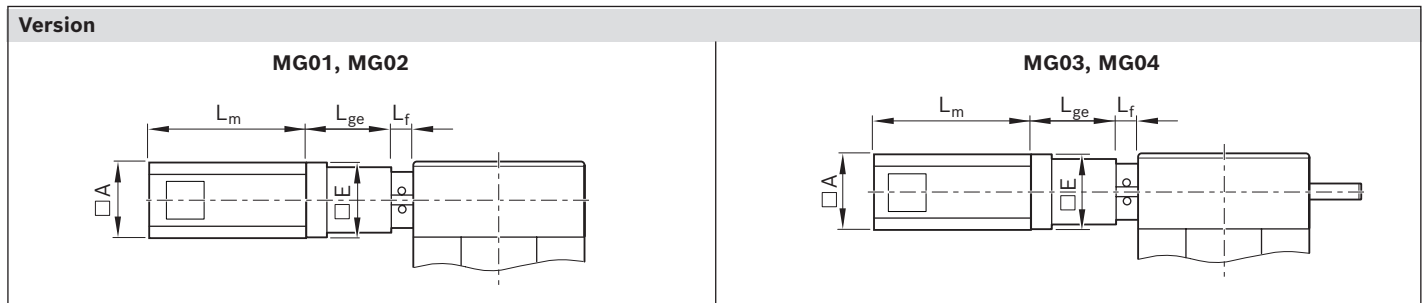


X: Drive end enclosure with additional drive journal

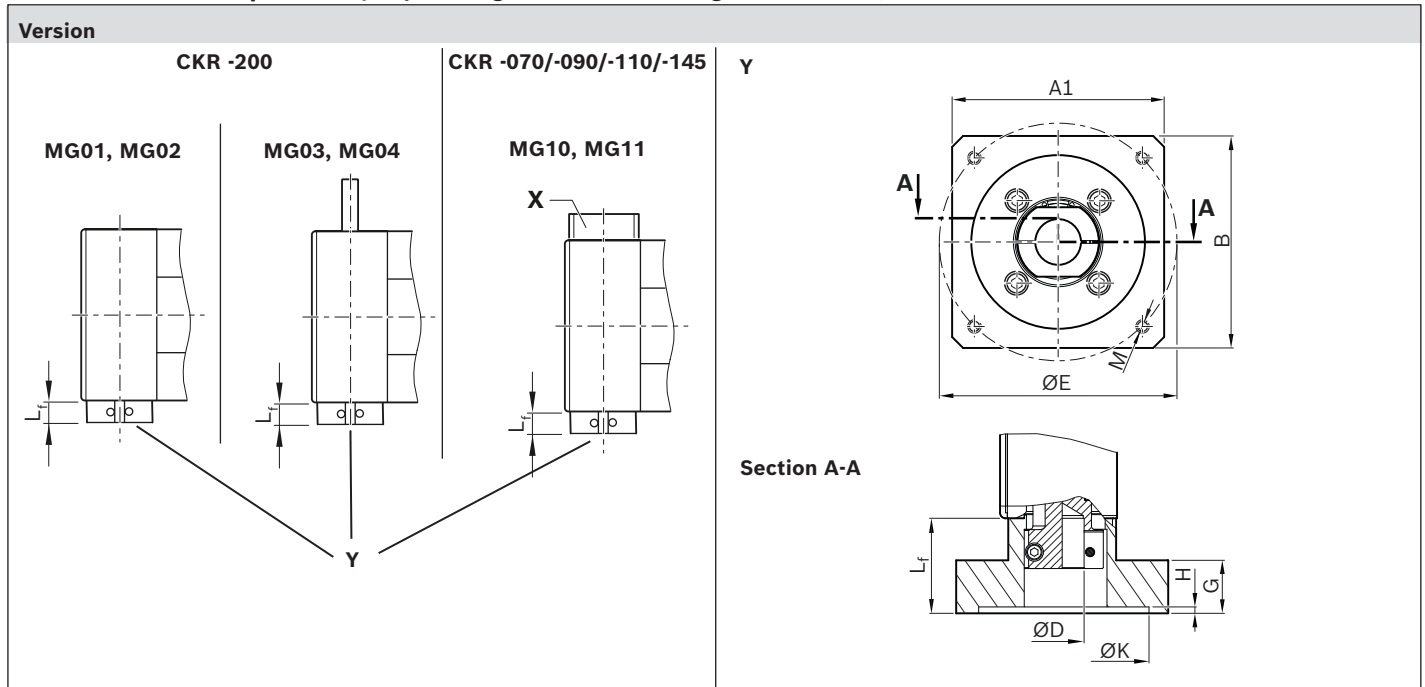
In the versions MA10, MA11, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



Motor attachment CKR-200

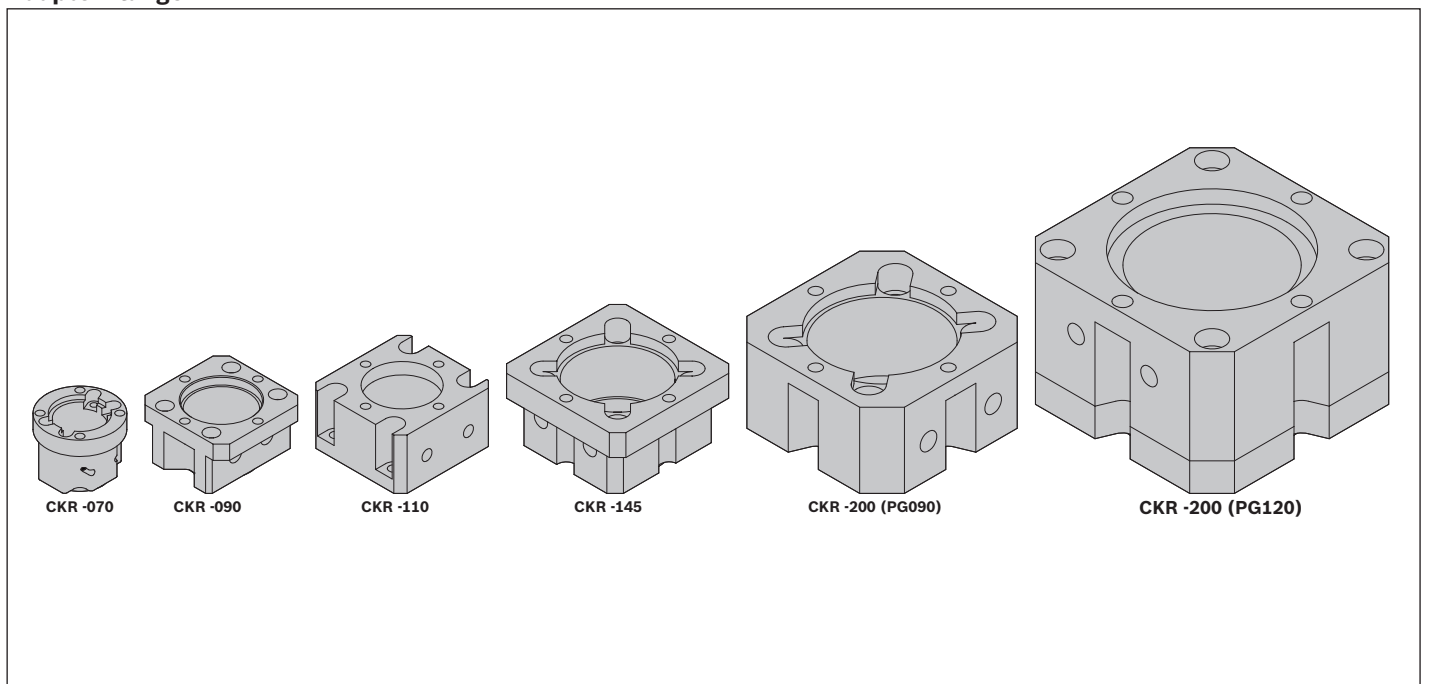


Motor attachment Option 00 (adapter flange for customer-side gear attachment)



CKR	Version	Motor code	Dimensions (mm)				L _m	□ A	A1	B	Ø E	G	H	Ø D	Ø K	Ø M									
			□ E	L _f	L _{ge}	□ A																			
-070	MG10, MG11	MS2N03-B0BYN	55	29.5	60.7	See chapter "Motors"	-	-	Ø 40		34	8.5	2.5	10 ^{H7}	27 ^{+0.2}	4.3									
		MSM019B-0300	40	-	-																				
-090	MA10, MA11	MS2N04-D0BQN	-	34.5	-		-	-	51	51	44	8.5	4.5	14 ^{H7}	35.1 ^{+0.3}	4.5									
	MG10, MG11	MS2N03-B0BYN	55	28.0	68.0																				
		MSM031C-0300	70	-	75.0																				
-110	MA10, MA11	MS2N05-D0BRN	55	46.0	-		-	-	57	55	44	-	7 ^{+0.4}	19 ^{H7}	35 ^{H7}	4.5									
	MG10, MG11	MS2N03-B0BYN	55	30.5	68.0																				
		MS2N03-D0BYN	-	-	-																				
		MS2N04-B0BTN	80	-	75.0																				
		MS2N04-C0BTN	70	-	75.0																				
-145	MA10, MA11	MS2N06-D1BNN	55	52.0	-		-	-	72	72	62	13	5.5 ^{+0.3}	24 ^{H7}	53 ^{+0.4}	5.5									
	MG10, MG11	MS2N04-C0BTN	80	37.0	92.0																				
		MS2N04-D0BQN	-	-	-																				
		MS2N05-B0BTN	100	-	101.0																				
		MS2N05-C0BTN	90	-	97.0																				
		MSM041B-0300	70	-	75.0																				
-200	MG01, MG02, MG03, MG04	MS2N06-D1BNN	120	45.0	124.5	-	-	95	95	80	-	6	22 ^{F7}	68.3 ^{+0.2}	6.6										
		MS2N07-B1BNN	150	75.0	154.0			120	120	108	-	8	32 ^{F7}	90.3 ^{+0.2}	9.0										
		MS2N07-C1BRN	-	-	-																				
		MS2N07-D1BNN	-	-	-																				
		MS2N07-E1BNN	-	-	-																				

Adapter flange



Attachments and accessories

Mounting/mounting accessories

Compact modules fit together perfectly – fast and flexible

Minimal mounting times, maximum efficiency

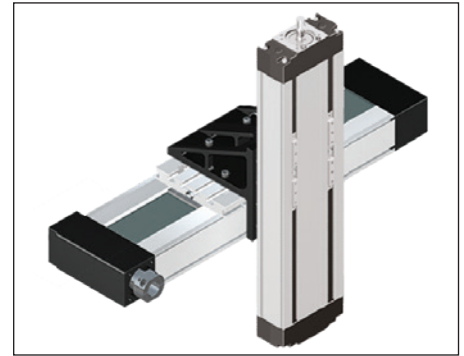
Standardized interfaces significantly reduce the effort during mounting.

The mechanical systems have positive-locking interfaces throughout.

They can be quickly and accurately connected together without time-consuming alignment.

The result:

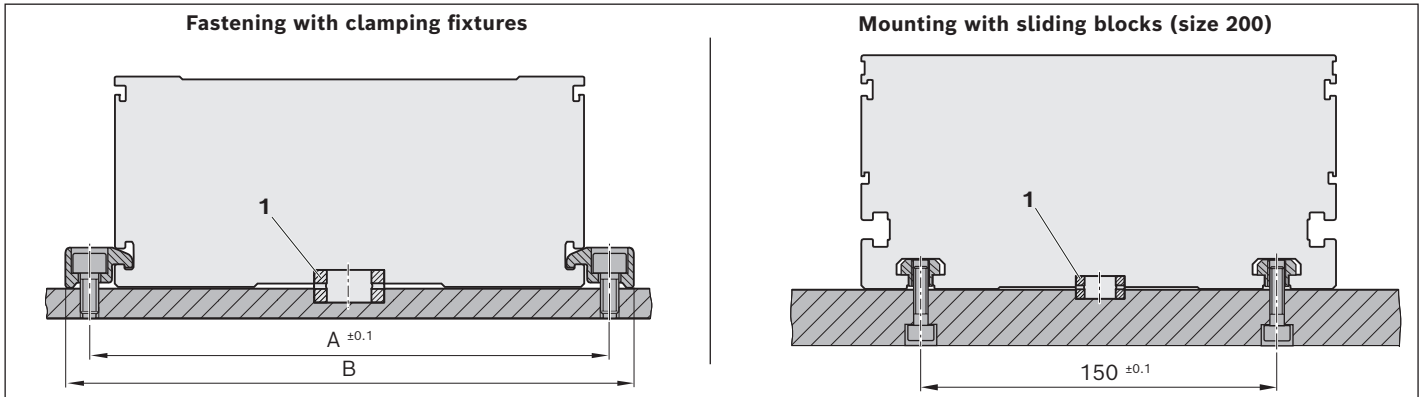
Users can respond flexibly to handling the different applications and tasks.



Supplementary information for connection technology

See the catalog "Linear motion systems connection technology"





1 For compact modules with centering holes in the ground area (selection via the guideway option):
 Use centering rings to better align to other linear motion systems and connection elements.

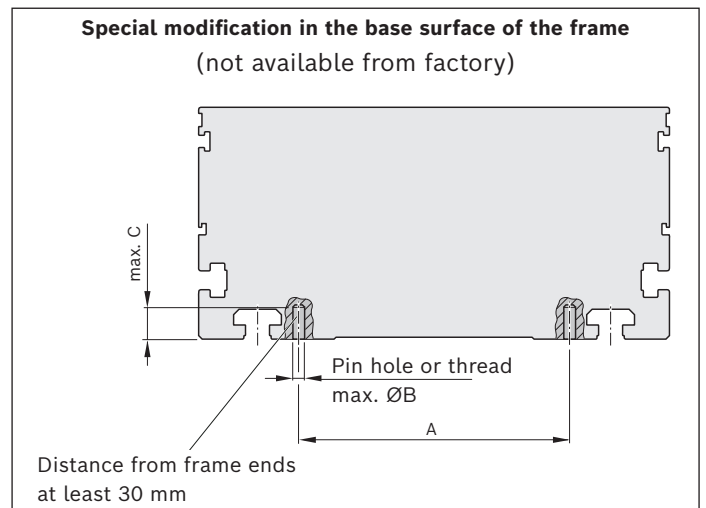
⚠ Do not fasten or support the compact module at the end enclosures! The frame is the load-bearing part!

Size	Dimensions (mm)	
	A	B
-070	82	95
-090	102	112
-110	126	140
-145	161	175
-200	222	240

Mounting by means of special modification in the base surface of the frame is possible

⚠ Option guideway 03 already includes threaded holes in the ground area of the frame (see dimension drawings).

Size	Dimensions (mm)		
	A	B	C
-070	59	3	7.5
-090	76	4	7.5
-110	92	5	9.0
-145	124	6	13.0
-200	119	8	12.0

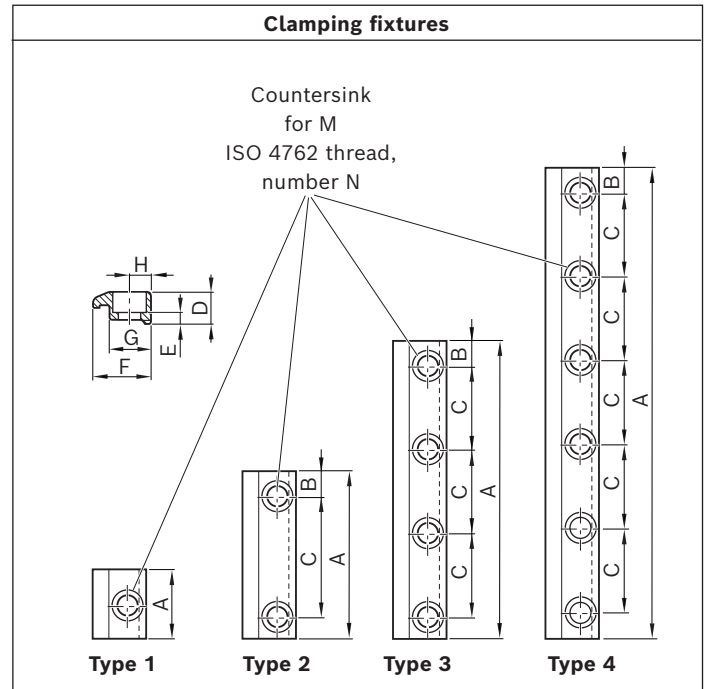


Mounting accessories

Recommended number of clamping fixtures:

- ▶ Type 1: 6/3¹⁾ pieces per meter and side
- ▶ Type 2: 4 pieces per meter and side
- ▶ Type 3: 3 pieces per meter and side
- ▶ Type 4: 3 pieces per meter and side

¹⁾ For size 070

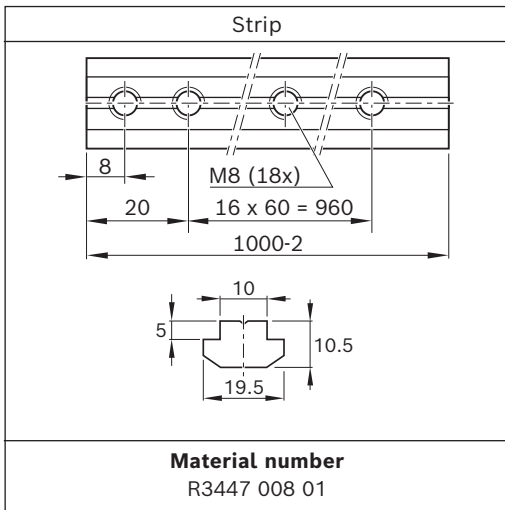


Size	For thread	Type	Number of bores N	Dimensions (mm)								Material number
				A	B	C	D	E	F	G	H	
-070	M5	1	1	22	-	-	10.0	4.8	15.0	12.2	6.5	R1419 010 01
		2	2	57	8.5	40	10.0	4.8	15.1	12.2	6.5	R1419 010 43
-090	M4	1	1	25	-	-	9.0	4.6	14.5	10.5	5.0	R0375 310 00
		3	4	87	6.0	25						R0375 310 02
		3	4	107	8.5	30						R0375 310 03
		2	2	72	11.0	50						R0375 310 32
		2	2	62	11.0	40						R0375 310 33
		3	4	87	13.5	20						R0375 310 38
		4	6	107	8.5	18						R0375 310 41
-110 / -145	M5	3	4	107	8.5	30	11.5	4.8	19.3	14.0	7.0	R0375 410 02
		3	4	77	8.5	20						R0375 410 26
		4	6	107	8.5	18						R0375 410 41
	M6	1	1	25	-	-	11.5	5.3	19.3	14.0	7.0	R0375 510 00
		3	4	142	11.0	40						R0375 510 02
		2	2	72	11.0	50						R0375 510 33
		2	2	62	11.0	40						R0375 510 34
		2	2	47	8.5	30						R0375 510 23
4	6	142	8.5	25	R0375 510 41							
-200	M8	2	2	108	19.0	70	27.5	16.3	29	19.0	9.0	R1175 290 26
		2	2	88	19.0	50		14.8				R1175 290 96
		2	2	78	19.0	40		14.8				R1175 290 97

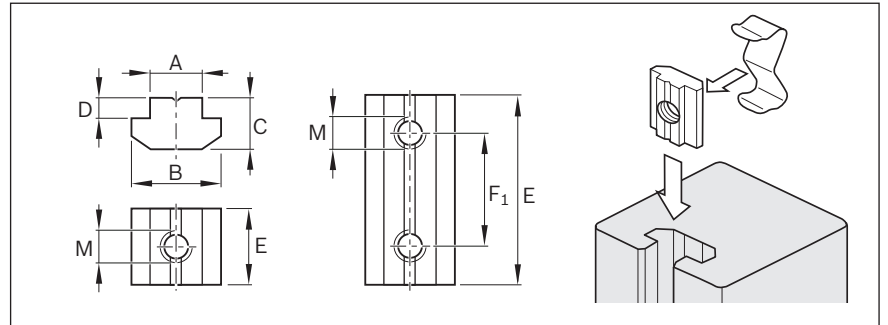
Compact modules CKR: When mounting the clamping fixtures, observe a minimum distance of 10 mm to the end face of the frame.

Sliding blocks, springs and strips

Recommended number of sliding blocks:
with 1 thread, 6 pieces per meter and side



For fastening attachments on the connection plate.
The spring serves as assembly and positioning aid.



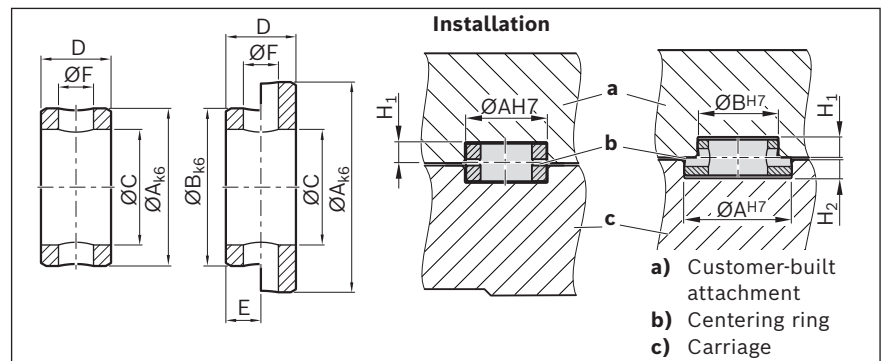
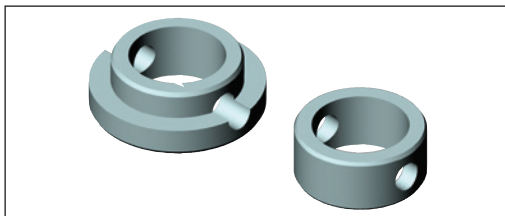
Size	For thread	Dimensions (mm)						Material number	
		A	B	C	D	E	F ₁	Sliding block	Spring
-070	M4	4	7.8	3.9	0.4	10	-	R0375 210 20	-
	M4					19	10	R0375 210 21	-
-090 / -110	M4	6	11.5	4.0	1.0	12	-	R3447 014 01	R3412 010 02
	M5					45	30	R0391 710 09	-
	M5					12	-	R3447 015 01	R3412 010 02
	M4					16	-	R3447 017 01	R3412 011 02
-145	M5	8	16.0	6.0	2.0	16	-	R3447 018 01	R3412 011 02
	M6					16	-	R3447 019 01	R3412 011 02
	M6					50	36	R0391 710 08	-
	M8					16	-	R3447 020 01	R3412 011 02
	M4					20	-	R3447 012 01	R3412 009 02
	M5					20	-	R3447 011 01	R3412 009 02
-200	M6	10	19,5	10,5	5,0	20	-	R3447 010 01	R3412 009 02
	M8					20	-	R3447 009 01	R3412 009 02
	M8					90	70	R0391 710 07	-

Centering rings

The centering ring serves as a positioning aid and for positive locking when mounting customer-built attachments to the carriage and the frame.

It creates a positive-locking connection with good reproducibility.

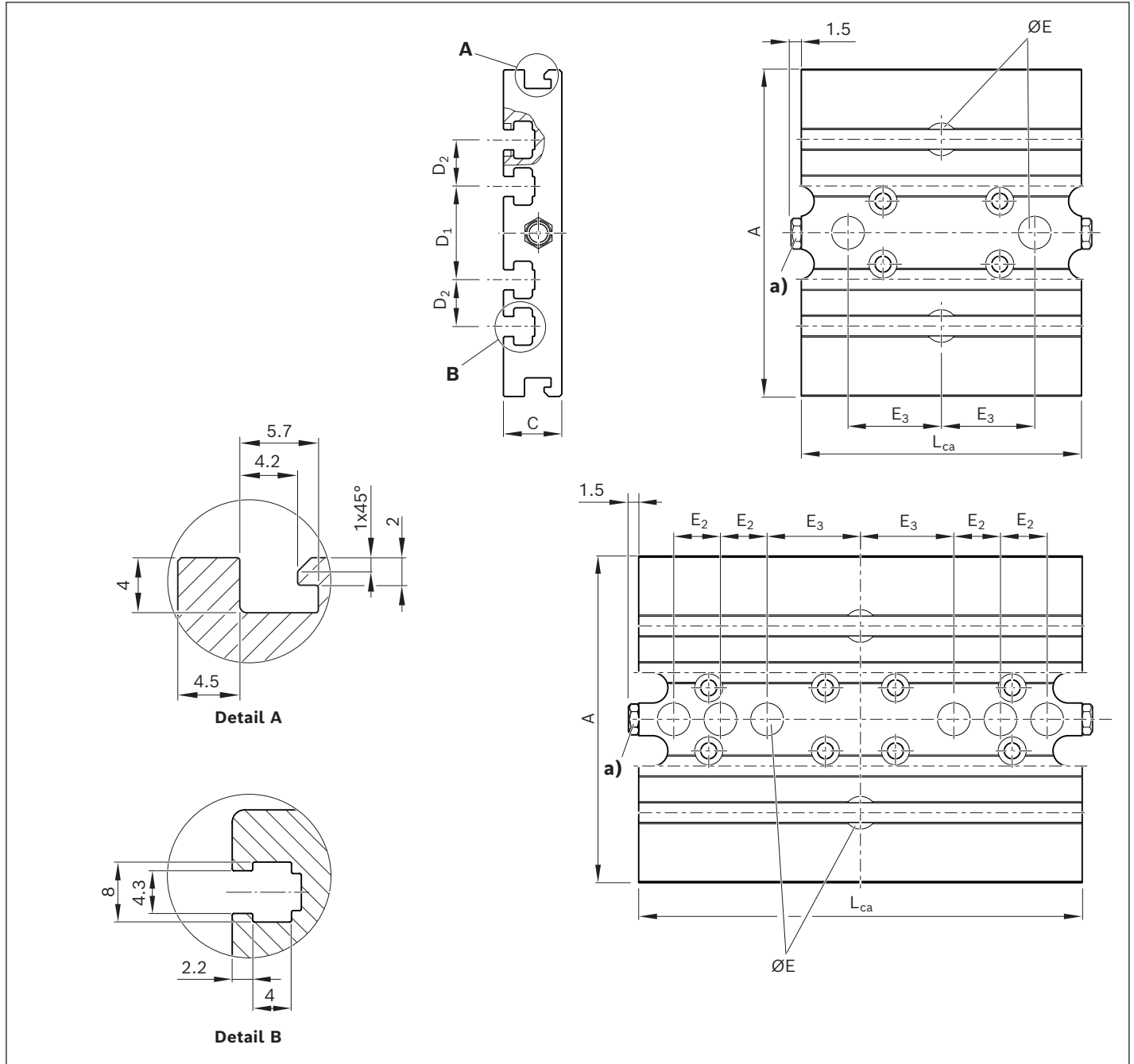
Material: Steel



Ø Size (mm)	Dimensions (mm)						Material number		
	A	B	C ±0.1	D -0.2	E +0.2	ØF	H ₁ +0.2	H ₂ +0.2	
5	5	-	3.4	3.0	-	1.6	1.6	-	R0396 605 42
7	7	-	5.5	3.0	-	1.6	1.6	-	R0396 605 43
9	9	-	6.6	4.0	-	2.0	2.1	-	R0396 605 44
12	12	-	9.0	4.0	-	2.0	2.1	-	R0396 605 45
16	16	-	11.0	6.0	-	3.0	3.1	-	R0396 605 46
7 - 5	7	5	3.4	3.0	1.5	1.6	1.6	1.6	R0396 605 47
9 - 5	9	5	3.4	3.5	1.5	1.6	2.1	1.6	R0396 605 48
9 - 7	9	7	5.5	3.5	1.5	1.6	2.1	1.6	R0396 605 49
12 - 9	12	9	6.6	4.0	2.0	2.0	2.1	2.1	R0396 605 50
16 - 12	16	12	9.0	5.0	2.0	2.0	2.1	3.1	R0396 605 51

Connection plates

CKK/CKR -070



a) Funnel-type lube nipple DIN 3405-D4; lubrication points from two sides (central lubrication only necessary with grease gun on one of the two sides).

The connection plates differ in appearance in the representation. Shown here is the connection plate for CKR-070.

Function:

- ▶ Fastening of attachments (with sliding blocks)
- ▶ Lubrication of the ball rail system and the ball screw assembly possible via the connection plate
- ▶ For lube version LSS, LPG

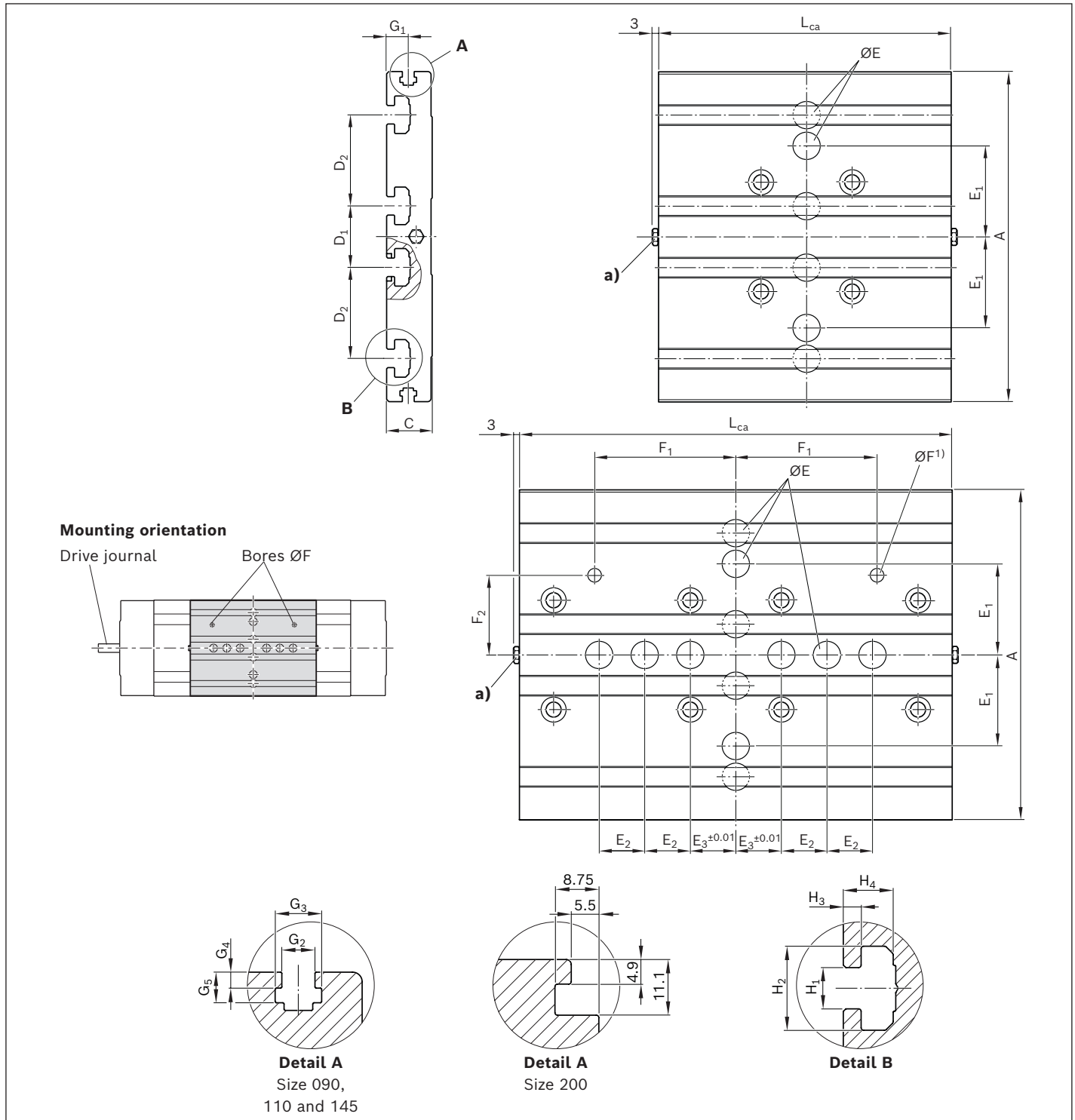
The assembly consists of:

- ▶ Connection plate
- ▶ Mounting accessories for fastening to the carriages
- ▶ Sliding blocks are not included with delivery

CKK/CKR	Dimensions (mm)									
	CKK	L _{ca} CKR	A	C	D ₁	D ₂	ØE ^{H7}	E ₂ ±0.01	E ₃ ±0.01	
-070	60	60	70	12.5	20	10	7 - 1.6 ^{+0.2} deep	10	20	
	95	95								

CKK/CKR	L _{ca} (mm)	Material number		Mass (kg)
		CKK	CKR	
-070	60	R0375 200 15	R0375 200 16	0.11
	95	R0375 200 10	R0375 200 11	0.17

CKK and CKR -090, -110, -145, -200



¹⁾ For customer-built attachment

- a)** Funnel-type lube nipple AM8 x 1 for lube version LSS/LPG; lubrication points from two sides (central lubrication only necessary with grease gun on one of the two sides).

Lube fittings for lube versions LCF/LCO see next page.

The connection plates differ in appearance in the representation. Shown here is the connection plate for CKK-145.

Function:

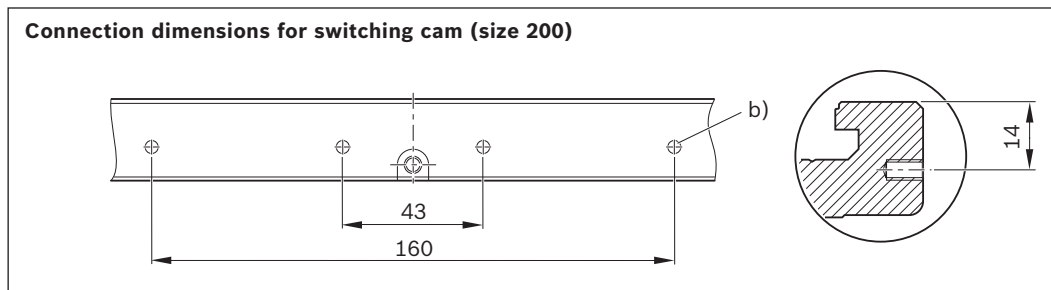
- ▶ Fastening of attachments (with sliding blocks)
- ▶ Lubrication of the ball rail system and the ball screw assembly possible via the connection plate
- ▶ For lube version LSS, LPG

The assembly consists of:

- ▶ Connection plate
- ▶ Mounting accessories for fastening to the carriages
- ▶ Sliding blocks are not included with delivery

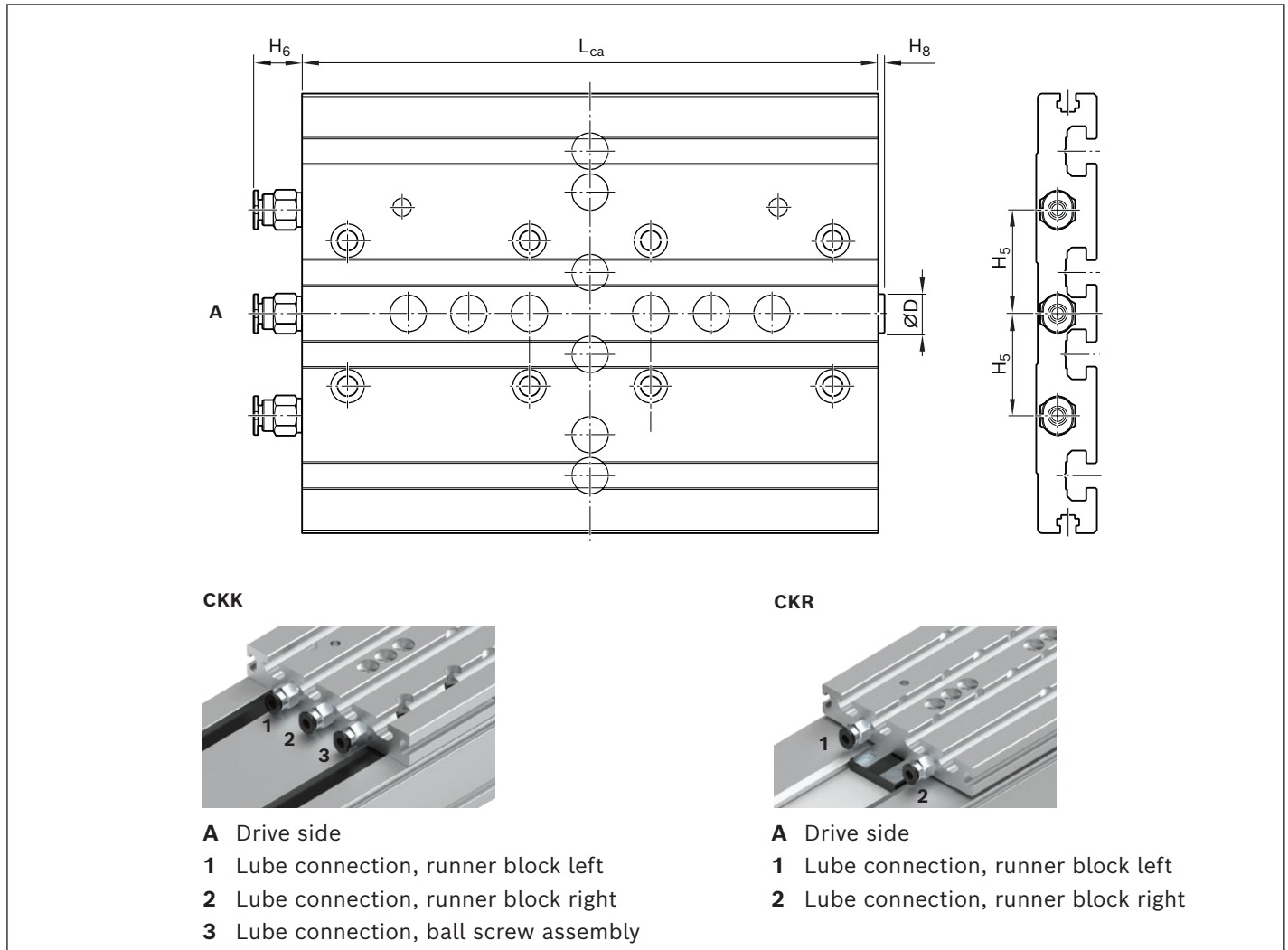
CKK/ CKR	Dimensions (mm)																							
	CKK	CKR	L _{ca}	A	C	D ₁	D ₂	ØE ^{H7}	E ₁	E ₂	E ₃	ØF ^{H7}	F ₁	F ₂	G ₁	G ₂	G ₃	G ₄	G ₅	H ₁	H ₂	H ₃	H ₄	
								±0.01	±0.01	±0.01		±0.01	±0.01											
-090		60		90	16	20	20	9 - 2.1 deep	-	-		-	-	-	7.6	4.2	7.3	2.0	4.3	6	12.0	3.5	7.7	
		125								10		4 - 6 deep	38.0	20										
-110	60	110		110	16	20	20	9 - 2.1 deep	-	-		-	-	-	9.5	5.2	7.3	2.5	4.8	6	12.0	3.5	7.7	
		155								10		5 - 6.5 deep	46.0	42										
-145	80	125		145	20	27	40	12 - 2.1 deep	40	-		-	-	-	9.5	5.2	7.3	2.5	4.8	8	16.5	3.5	9.8	
		190								20		6 - 12 deep	62.0	35										
-200		190		200	27	40	40	16 - 3.1 deep	-	-		-	-	-	-	-	-	-	-	10	20.1	6.0	12.5	
		305								20		8 - 16 deep	59.5	41										

CKK/CKR	L _{ca} (mm)		Material number		Mass (kg)	
	CKK	CKR	CKK	CKR	CKK	CKR
-090		60	R0375 300 15	R0375 300 16		0.18
		125	R0375 300 10	R0375 300 11		0.37
-110	60	110	R0375 400 15	R0375 400 16	0.23	0.38
		155	R0375 400 10	R0375 400 11	0.59	0.58
-145	80	125	R0375 500 15	R0375 500 16	0.50	0.81
		190	R0375 500 10	R0375 500 11	1.20	1.15
-200		190	R0375 600 15	R0375 600 16	2.20	2.20
		305	R0375 600 10	R0375 600 11	3.60	3.60



b) M4 - 6 deep

For lube version LCF/LCO



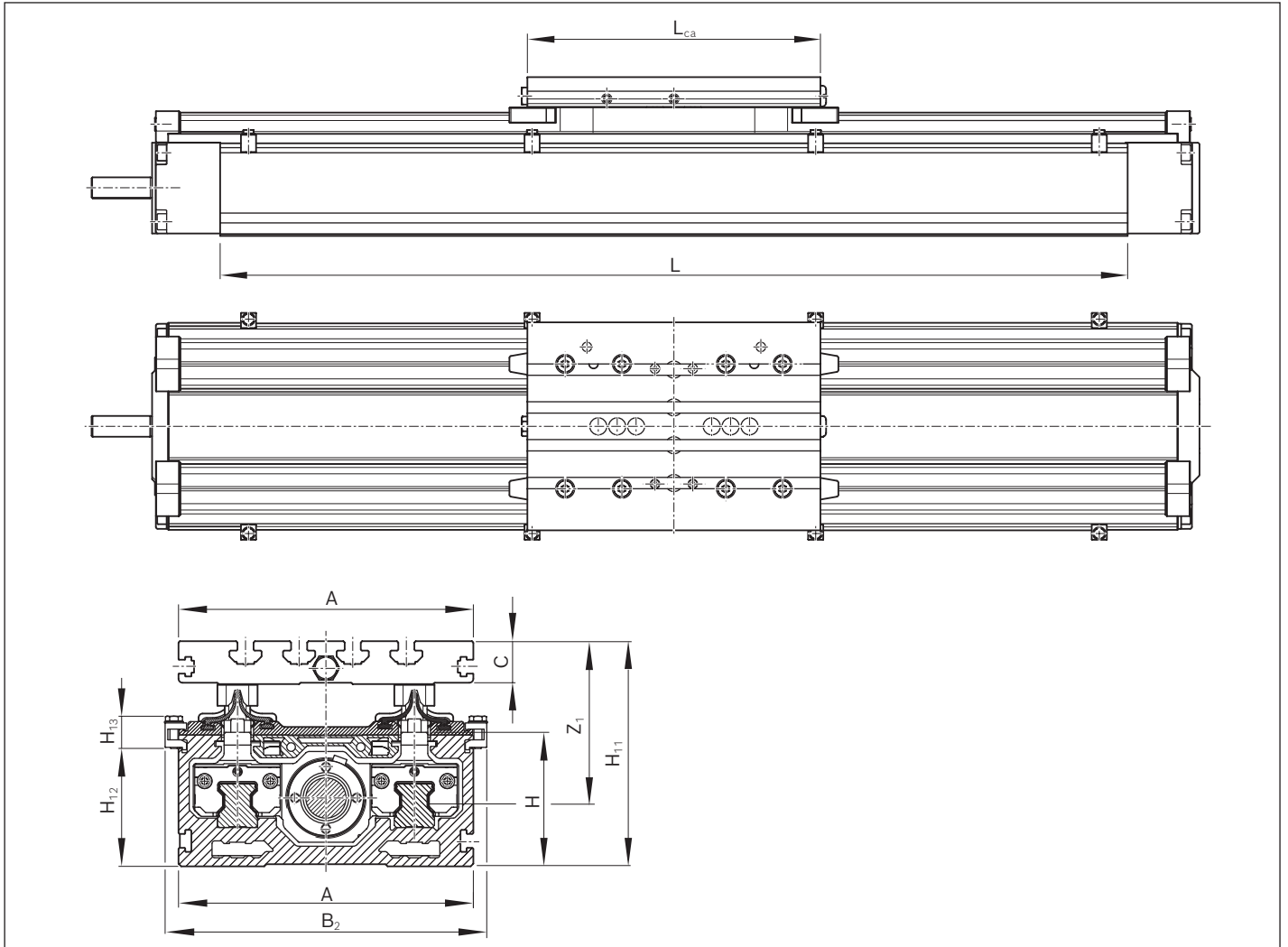
CKK/CKR	Dimensions (mm)					
	ØD	CKK	H ₅ CKR	H ₆	H ₈	L _{ca}
-070	-	-	-	-	-	-
-090	8.5	19	19	12.5	3	125
-110	8.5	20	40		3	155
-145	-	26	42		-	190
-200	-	31	55		-	305

More dimensions ➔ Chapter "Connection plates".

Lube fittings: Straight connector (SW 9), for Ø 4 mm plastic tubes and metal pipes

Cover

Resist



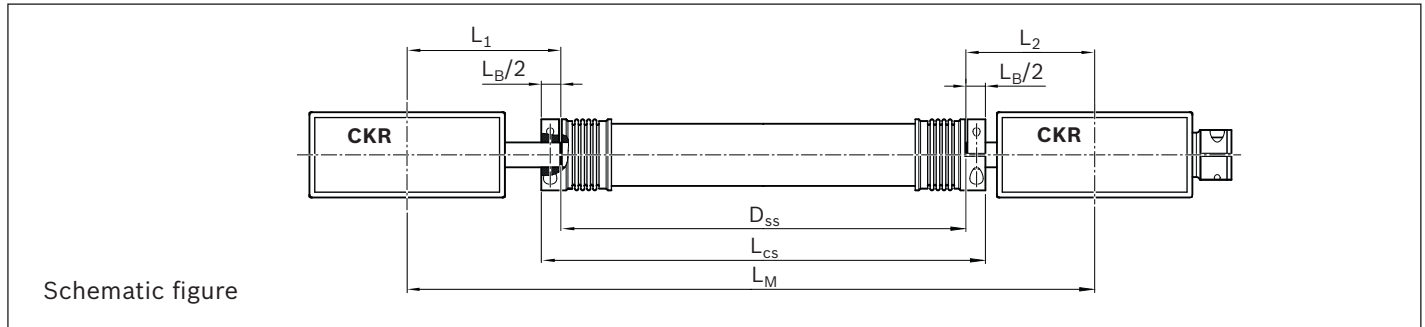
CKK	Dimensions (mm)									
	A	B ₂	C	H	H ₁₁	H ₁₂	H ₁₃	L _{ca}	Z ₁	
-110	100	120	16	50	84	44	12	155	60.7	
-145	145	155	20	65	105	59	12	190	71.6	
-200	200	212	27	100	150	82	24	305	86.4	

Z₁ = Application point of the effective force

Connecting shafts

Features

- ▶ Bridge large distances between axes
- ▶ Can be mounted radially by split clamping hub
- ▶ Mounting and dismounting without shifting the aligned axes
- ▶ Backlash-free and torsionally stiff



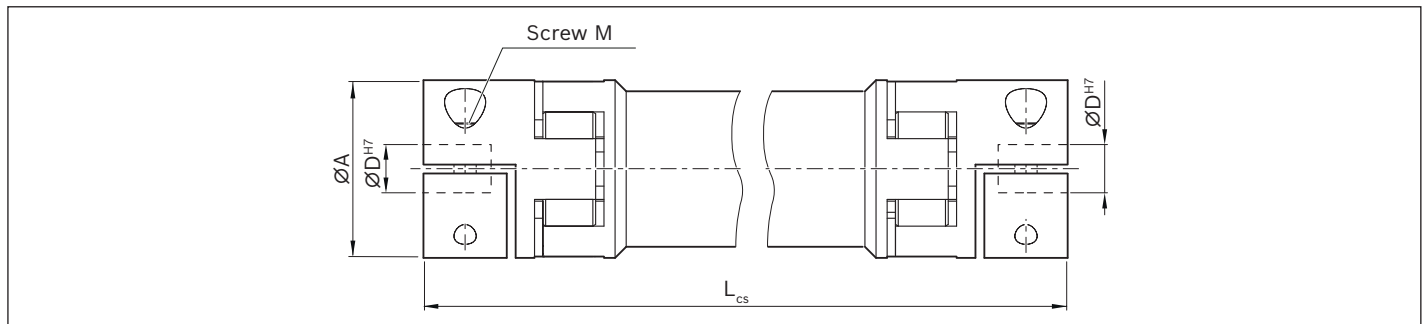
CKR-070

Material

Coupling hub: high-strength aluminum

Elastomer circle: precision manufactured, extremely wear resistant, and thermally stable plastic

Connecting tube: high-precision aluminum tube

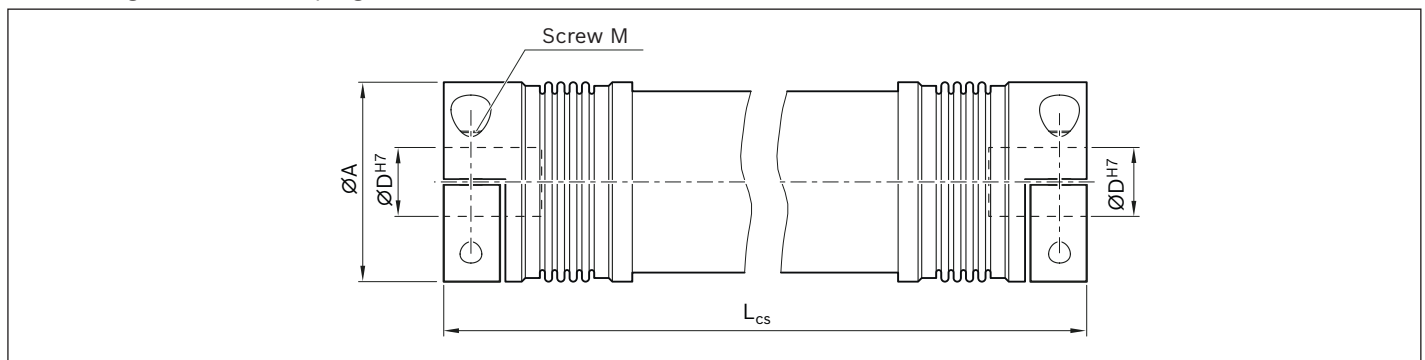


CKR-090, -110, -145, -200

Material

Bellows: highly flexible stainless steel

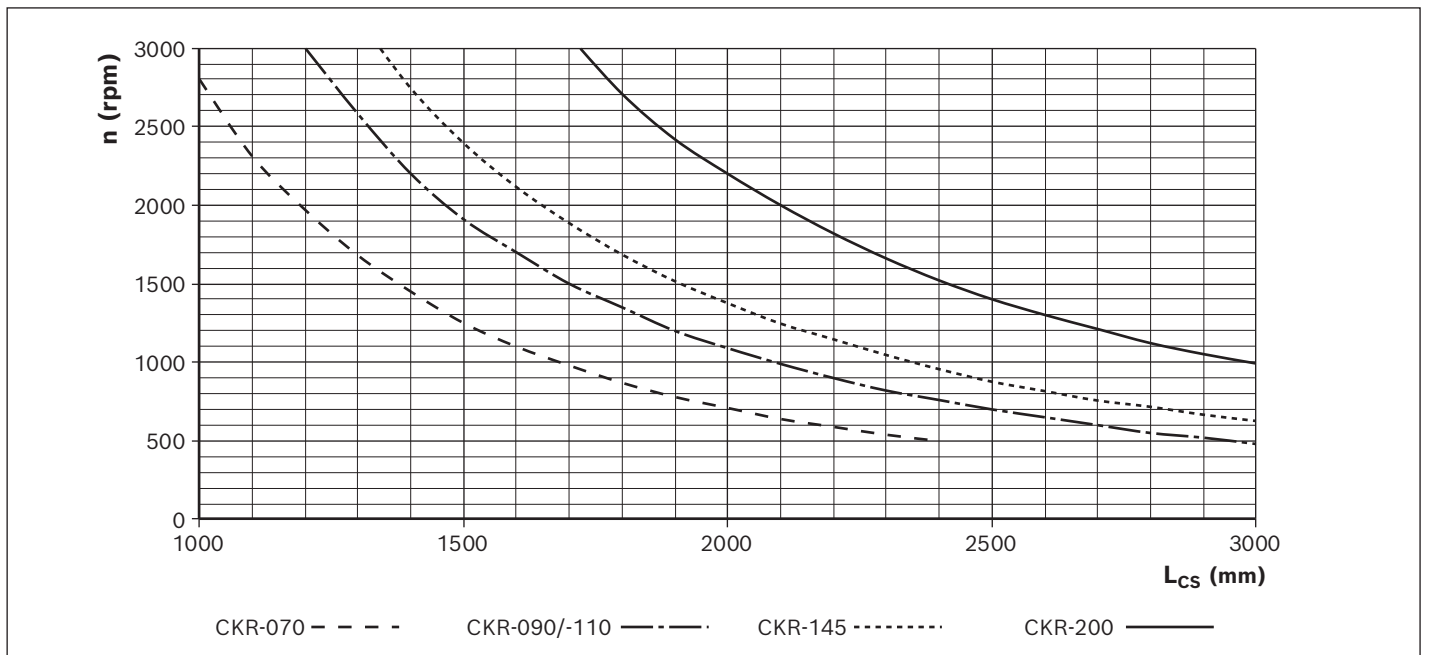
Connecting tube and clamping hub: Aluminum



Size	Material number	Dimensions (mm)						M _A (Nm)
		A	D	M	L _B	L _{CS min}	L _{CS max}	
-070	R0391 510 22	30	8	M4	21	95	2,400	4
-090	R0391 510 16	40	10	M4	22	105	3,000	5
-110	R0391 510 20	40	14	M4	22	105	3,000	5
-145	R0391 510 18	55	19	M6	32	150	3,000	15
-200	R0391 510 19	83	24	M10	50	200	3,000	70

Size	M _S (Nm)	M _{CS} (Nm)	Mass moment of inertia (10 ⁻⁶ kgm ²)	Weight (kg)
-070	25	12.5	0.090 · (L _{CS} (mm) - 80) + 30	0.00054 · (L _{CS} (mm) - 80) + 0.12
-090	17	10.0	0.032 · (L _{CS} (mm) - 80) + 68.2	0.00090 · (L _{CS} (mm) - 80) + 0.21
-110	17	10.0	0.032 · (L _{CS} (mm) - 80) + 68.2	0.00090 · (L _{CS} (mm) - 80) + 0.21
-145	45	30.0	0.670 · (L _{CS} (mm) - 118) + 246	0.00120 · (L _{CS} (mm) - 118) + 0.62
-200	170	170.0	4.500 · (L _{CS} (mm) - 160) + 2,000	0.00320 · (L _{CS} (mm) - 160) + 2.00

Bending-critical speed



Order

Please state the material number and length L_{CS} .
e.g.: R0391 510 20, $L_{CS} = 550$ mm

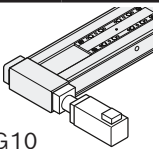
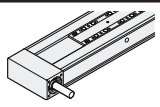
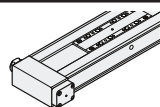
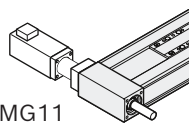
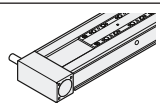
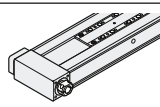
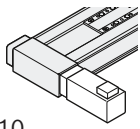
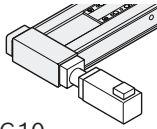
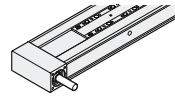
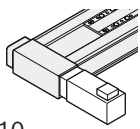
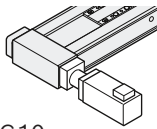
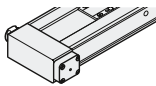
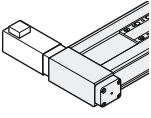
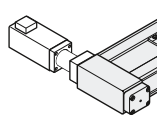
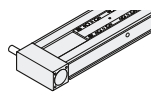
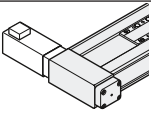
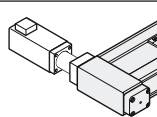
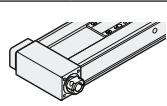
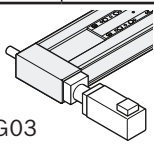
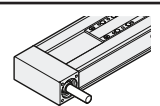
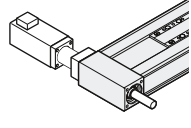
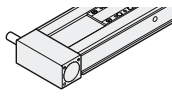
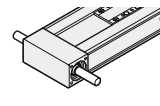
$$L_{CS} = D_{SS} + L_B$$

$$D_{SS} = L_M - L_1 - L_2$$

L_1/L_2 : For the calculation, refer to the dimension drawings

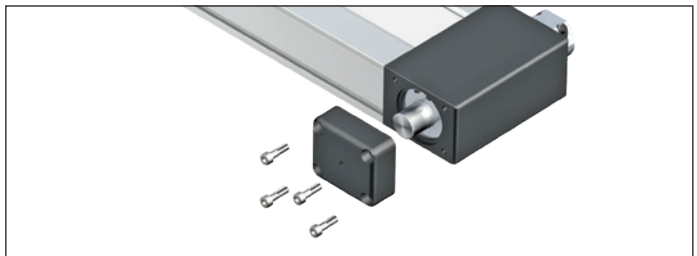
- D_{SS} = Distance drive journals
- L_{CS} = Overall length of the connecting shaft
- L_M = Centerline-to-centerline distance between compact modules
- M_A = Tightening torque of screws
- M_{CS} = Rated torque of connecting shaft
- M_S = Peak torque of connecting shaft
- n = Rotary speed (rpm)
- L_{CS} = Overall length of the connecting shaft (mm)

Combination possibilities for multi-axis systems with connecting shaft

Size	Version				
-070	 MG10		↔	 MA01	 MA06
	 MG11			 MA02	 MA05
-090 -110 -145	 MA10	 MG10	↔	 MA01	
	 MA10	 MG10		↔	 MA06
	 MA11	 MG11	↔		 MA02
	 MA11	 MG11		↔	 MA05
-200	 MG03		↔		 MA01
	 MG04			 MA02	 MA03

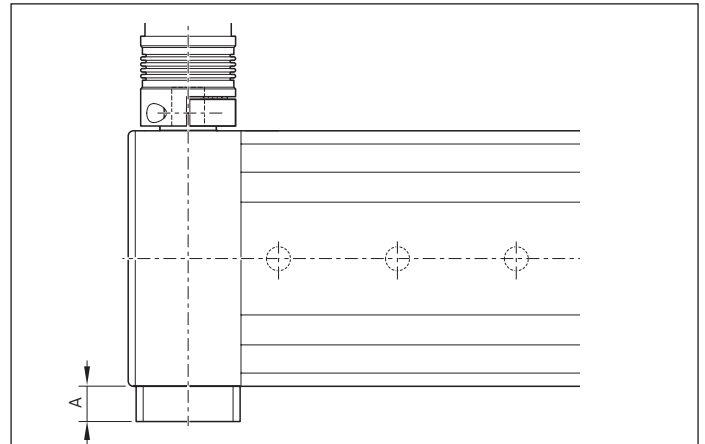
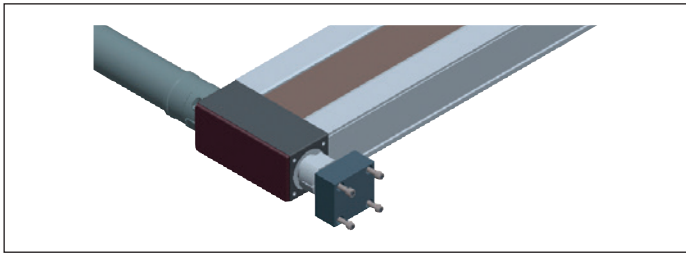
Drive end enclosure with additional drive journal

In the versions MA05, MA06, MA10, MA11, MG10 and MG11, a second drive journal can be made available by removing the screws and cover.



Cover

By attaching the cover, the open end of the drive (clamping hub) is closed.
This means there is no longer any risk of injury from the rotating motor holder.



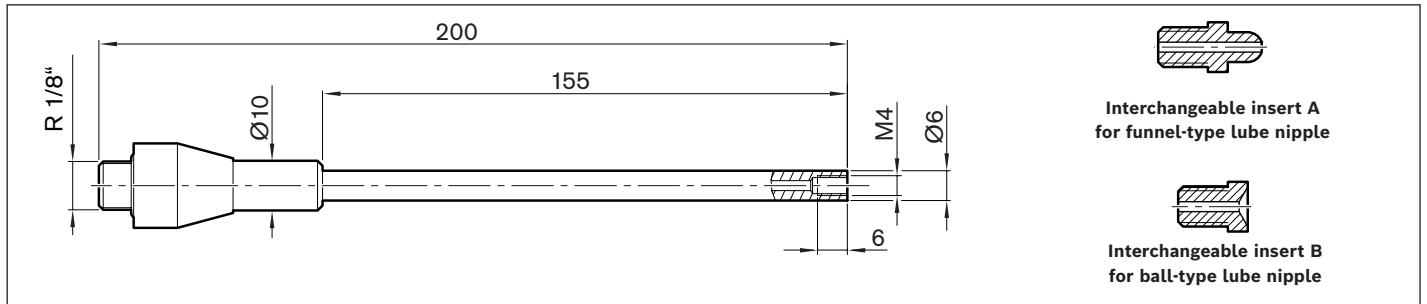
Size	Dimension (mm)	Material number
	A	
-070	20	R0375 200 09
-090	24	R0375 300 09
-110	26	R0375 400 09
-145	31	R0375 500 09

Nozzle pipe

For manual grease guns. For the lubrication of funnel-type and ball-type lube nipples.

Scope of delivery:

Nozzle pipe, interchangeable insert A for funnel-type lube nipple, interchangeable insert B for ball-type lube nipple.



Material number	Mass (g)
R345503106	158

Frequency meter

For checking the toothed belt pretension on linear axes with a toothed belt drive, as well as for setting the toothed belt pretension with a drive over the belt side drive.

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

Enter motor geometry in the input dialog box. The dimensions can be entered directly or by using a drop-down menu.

Size of customer motor

Motor manufacturer ▼

Motor type ▼

The diagram shows a side view of a motor on the left and a top view on the right. The side view labels include B1: ??? mm (width of the top flange), Ø E: ??? mm (total diameter), Ø D: ??? mm (shaft diameter), C1: ??? mm (width of the bottom flange), and C: ??? mm (total width). The top view labels include A: ??? mm (square width), Ø F: ??? mm (circumscribed circle diameter), and Ø G: ??? mm (inner circle diameter).

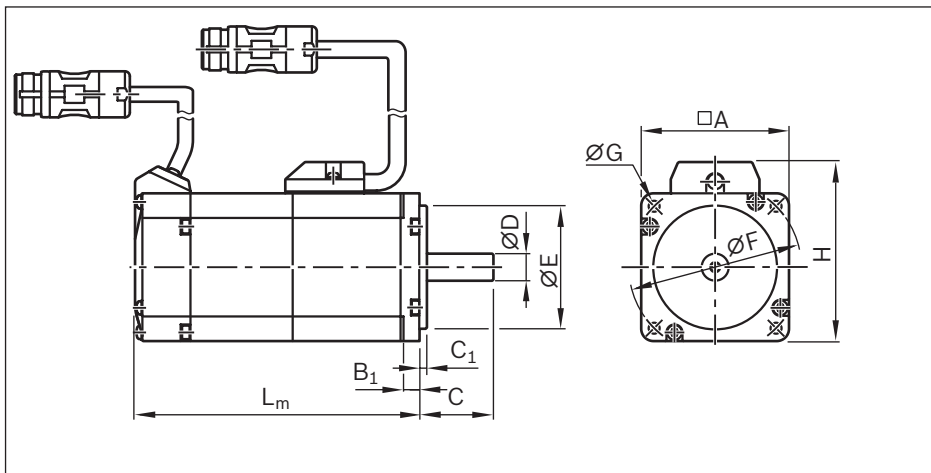
Example

Size of customer motor

Motor manufacturer ▼

Motor type ▼

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	H	L _m	
										Brake without	with
MSM 019A-0300	38	6.0	25	3	8	30	45	3.4	51	72.0	102.0
MSM 019B-0300	38	6.0	25	3	8	30	45	3.4	51	92.0	122.0
MSM 031B-0300	60	6.5	30	3	11	50	70	4.5	73	79.0	115.5
MSM 031C-0300	60	6.5	30	3	14	50	70	4.5	73	98.5	135.0
MSM 041B-0300	80	8.0	35	3	19	70	90	6.0	93	112.0	149.0

Version:

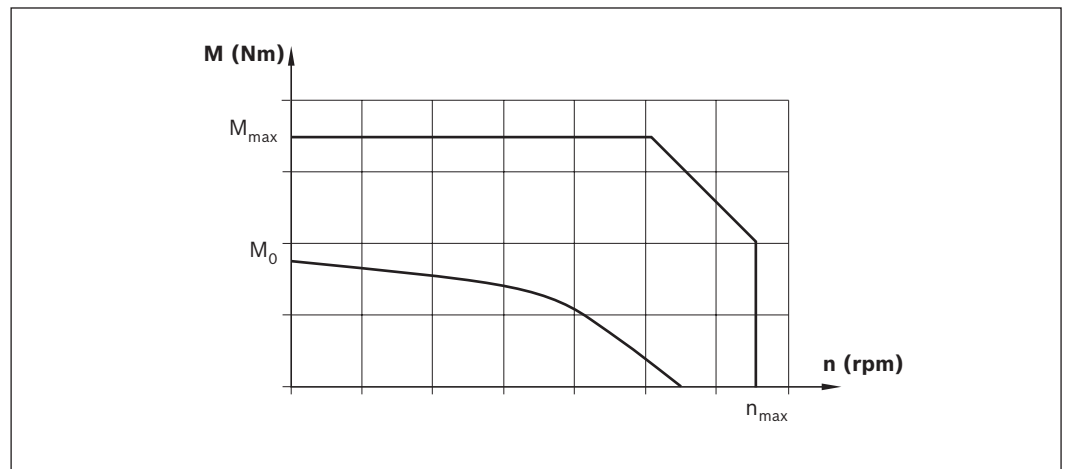
- ▶ Plain shaft without shaft seal
- ▶ M5 multi-turn absolute encoder (20-bit, absolute encoder function only available with backup battery)
- ▶ Cooling system: natural convection
- ▶ IP54 protection class (shaft IP40)
- ▶ With or without holding brake
- ▶ M17 metal round connector

Note

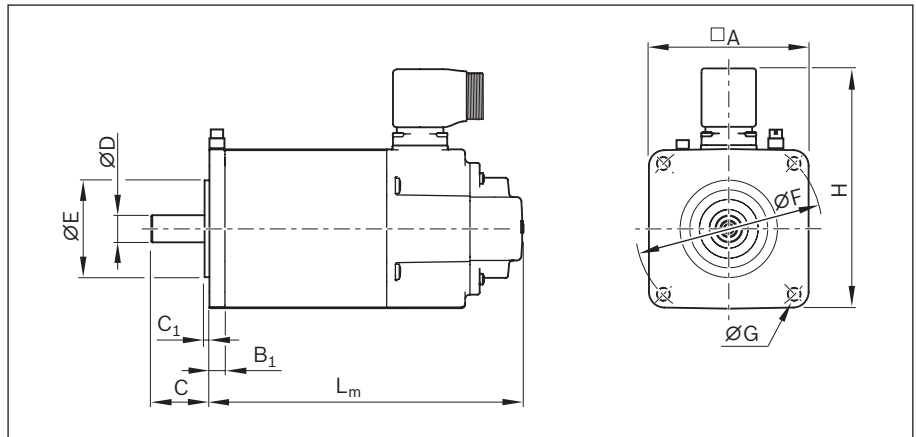
Motors are available with controllers and control systems. For more information on motors, controllers and control systems, please refer to the Rexroth automation solutions ➡ Chapter "Further information"

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 (kgm ²)	J_{br} (kgm ²)	m_m (kg)	m_{br} (kg)					
5,000	0.16	0.48	0.29	0.0000025	0.0000002	0.32	0.21	2	N	MSM 019A-0300-NN-M5-MH0	R911344209	
									Y	MSM 019A-0300-NN-M5-MH1	R911344210	
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	

Motor characteristic
(Schematic)



IndraDyn S - Servo motors MS2N



Motor schematic

Dimensions / motor data

Motor code	Dimensions (mm)											
	□ A	B ₁	C	C ₁	Ø D _{k6}	Ø E _{J7}	Ø F	Ø G	H		L _m	
									Cable	Brake	2	1
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-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-D1BNN	140	18	58	4	32	130	165	11	180	180	263	317

Version

- ▶ Plain shaft without shaft seal ring
- ▶ Multi-turn encoder
- ▶ Advanced encoder (B) in conjunction with 1-cable connector (AcuroLink interface)
- ▶ IP64 protection class
- ▶ With or without holding brake
- ▶ Special ground connection terminal near motor flange (used as needed)

Note

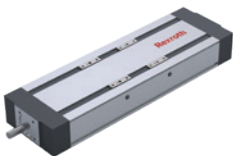
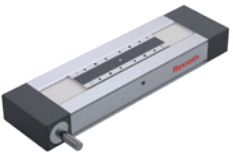
Motors are available with controllers and control systems. For more information on motors, controllers and control systems, please refer to the Rexroth automation solutions ➡ Chapter "Further information". For further information on the type code, see chapter "Type code".

Motor data									Motor connection	Brake	Type code	Material number
n_{max} (rpm)	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kgm ²)	J_{br} (kgm ²)	m_m (kg)	m_{br} (kg)					
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	0.0001100	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	0.0001100	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	0.0001400	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	0.0001400	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	0.0001400	11.5	1.5	1	N	MS2N06-E0BRN-CMSH0-NNNNE-NN	R911384945	
								1	Y	MS2N06-E0BRN-CMSH2-NNNNE-NN	R911384946	
6,000	7.40	21.0	20.0	0.001970	0.0002600	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	0.0002600	12.0	2.0	1	N	MS2N07-C0BQN-CMSH0-NNNNE-NN	R911384955	
								1	Y	MS2N07-C0BQN-CMSH1-NNNNE-NN	R911384956	
6,000	11.50	42.2	20.0	0.003050	0.0002600	12.0	2.0	1	N	MS2N07-C1BRN-CMSH0-NNNNE-NN	R911384959	
								1	Y	MS2N07-C1BRN-CMSH1-NNNNE-NN	R911384960	
6,000	18.90	84.8	36.0	0.005290	0.0004100	17.5	2.5	1	N	MS2N07-D1BNN-CMSH0-NNNNE-NN	R911384965	
								1	Y	MS2N07-D1BNN-CMSH2-NNNNE-NN	R911384966	

Automation package

3 ORDERING OPTIONS

- ▶ Single axis
- ▶ Single axis + drive (incl. mains filter/cable (optional))
- ▶ Single axis + drive + software (incl. mains filter/cable (optional)) as plug & play complete solution

Ordering options	CKK / CKR	Options					Further information	
		Motor MS2N	Drive controller		Cable	Mains filter		Software
			Indra-Drive HCS	ctrlX Drive				
1		—	—	—	—	—	—	
		✓	—	—	—	—	—	
2		✓	✓	—	optional	included	—	
		✓	—	✓	optional	included	—	
3		✓	—	✓	optional	included	optional	SFK-H ¹⁾

¹⁾ Further information on this ➔ Smart Function Kit Handling (SFK-H)

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)

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				without	000	000	
motor not listed								
MS2N03-B0BYN-CMSHx	203	204	1 cable	000	HCS01-W0008	102	101	
MS2N03-D0BYN-CMSHx	207	208			HCS01-W0018	302	301	
MS2N04-B0BTN-CMSHx	211	212				HCS01-W0028	402	401
MS2N04-C0BTN-CMSHx	215	216					HCS01-W0008	102
MS2N04-D0BQN-CMSHx	219	220				HCS01-W0028	402	401
MS2N05-B0BTN-CMSHx	223	224			HCS01-W0028	502	501	
MS2N05-C0BTN-CMSHx	227	228				HCS01-W0018	302	301
MS2N05-D0BRN-CMSHx	231	232				HCS01-W0028	402	401
MS2N06-B1BNN-CMSHx	235	236				HCS01-W0018	302	301
MS2N06-C0BTN-CMSHx	239	240			HCS01-W0054	502	501	
MS2N06-D0BRN-CMSHx	243	244				HCS01-W0018	302	301
MS2N06-D1BNN-CMSHx	247	248				HCS01-W0028	402	401
MS2N06-E0BRN-CMSHx	251	252				HCS03-W0100	702	701
MS2N07-B1BNN-CMSHx	255	256			HCS01-W0054		502	501
MS2N07-C0BQN-CMSHx	259	260			HCS01-W0028		402	401
MS2N07-D1BNN-CMSHx	269	270			HCS03-W0100		702	701
MS2N07-D0BHA-CMVHx	287	288				HCS01-W0054	502	501
MS2N07-D0BRN-CMVHx	295	296				HCS01-W0028	402	401
MS2N07-E1BNN-CMVHx	299	300				HCS03-W0100	702	701
MS2N07-E0BQN-CMVHx	297	298			HCS01-W0054		502	501
MS2N10-C0BNN-CMVHx	289	290	HCS01-W0028	402	401			
MS2N10-D0BHA-CMVHx	291	292	HCS03-W0100	702	701			
MS2N10-E0BHA-CMAHx	293	294						



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

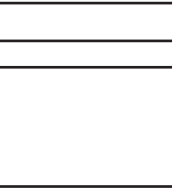
¹⁾ Further information on this ➔ Smart Function Kit Handling (SFK-H)

	XCS2	Controller option				without	Cable option					
		MultiEthernet					Controller HCS / XCS2					
		CAT SOE		SOE ¹⁾			1 cable			2 cables		
		+ T0	+FSoE + M5	+core +Software_SFK T0	+FSoE +core +Software_SFK M5		5 m	10 m	15 m	5 m	10 m	15 m
	Safe torque off	Safe motion	Safe torque off	Safe motion								
	without	000	000	000	000	000	000	000	000	000	000	000
	XCS2-W0023	2100	in preparation	2160	2161	105	110	115	-	-	-	
	XCS2-W0054	3100		3160	3161							
	XCS2-W0023	2100		2160	2161							
	XCS2-W0054	3100		3160	3161							
	XCS2-W0023	2100		2160	2161							
	XCS2-W0054	3100		3160	3161							
	XCS2-W0070	4100		-	-							
	XCS2-W0054	3100		3160	3161							
	XCS2-W0070	4100		-	-							
	XCS2-W0100	5100		-	-							
									205	210	215	

Motor/controller/cable combinations





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





Motor	Drive controller	Technical data								
		Cable designation part number	Cable weight (approximately) kg/m	Cable outside diameter D (mm)	Bending radius minimum		Bending cycle			
					fixed installation	flexible installation				
MS2N03-B0BYN-CMSHx	HCS01.1E-W0008	RH2-021DBB-NN-xxx,x	0.26	13.0 +/- 0.3	5 x D	7.5 x D	> 5 mill.			
MS2N06-B1BNN-CMSHx		5m R911372050 10m R911372052 15m R911372053								
MS2N03-DOBYN-CMSHx		HCS01.1E-W0018							RH2-023DBB-NN-xxx,x	
MS2N04-B0BTN-CMSHx										
MS2N04-C0BTN-CMSHx										
MS2N04-D0BQN-CMSHx										
MS2N05-B0BTN-CMSHx										
MS2N07-B1BNN-CMSHx										
MS2N05-C0BTN-CMSHx	HCS01.1E-W0028									5m R911372062 10m R911372064 15m R911372065
MS2N05-D0BRN-CMSHx										
MS2N06-C0BTN-CMSHx										
MS2N06-DOBRN-CMSHx	HCS01.1E-W0054	RH2-024DBB-NN-xxx,x								
MS2N06-E0BRN-CMSHx										
MS2N07-C1BRN-CMSHx									5m R911374454 10m R911379794 15m R911379795	
MS2N07-D1BNN-CMSHx										
MS2N03-B0BYN-CMSHx	XCS2-W0023	RHB2-021DDB-NN-xxx,x	0.27	13.0 +/- 0.3	5 x D	7.5 x D	> 5 mill.			
MS2N03-DOBYN-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-W0054	RHB2-022DDB-NN-xxx,x
MS2N06-DOBRN-CMSHx										
MS2N06-E0BRN-CMSHx	5m R911400352 10m R911400353 15m R911400354									
MS2N07-C1BRN-CMSHx										
MS2N07-D1BNN-CMSHx										



Motor/controller/cable combinations

Power and encoder cable separate, 2 cables

Motor	Drive controller	Technical data power cable						
		Cable designation part number	Cable weight (approximately) kg/m	Cable outside diameter D (mm)	Bending radius minimum		Bending cycle	
					fixed installation	flexible installation		
MS2N07-E1BNN-CMVHx	HCS01.1E-W0054	RL2-044DBB-NN-xxx,x	0.23	12.2 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
		5m R911374900						
		10m R911379527						
MS2N07-D0BRN-CMVHx	HCS01.1E-W0054	RL2-044EBB-NN-xxx,x	0.33	14.8 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
		5m R911374902						
		10m R911384595						
MS2N07-E1BNN-CMVHx	XCS2-W0070	RLB2-042DBB-NN-xxx,x	0.23	12.2 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
		5m R911397223						
		10m R911397225						
MS2N07-D0BRN-CMVHx	XCS2-W0054	RLB2-042ECB-NN-xxx,x	0.33	14.8 +/- 0.5	5 x D	7.5 x D	> 5 mill.	
		5m R911396693						
		10m R911396695						
		15m R911396696						

Technical data encoder cable							
	Cable designation part number	Cable weight (approximately) kg/m	Cable outside diameter D (mm)	Bending radius minimum		Bending cycle	
				fixed installation	flexible installation		
	RG2-002AAB-NN-XXX,X 5m R911371232 10m R911371935 15m R911371936	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 controller XCS2 (example)

		XCS2	-	W	0100	A	B	N	-	01	N	ET	T0	EC	NN	-	S	03	RS	N	1	NNN	N	0	NN			
1	Product																										Other version	21
2	Cooling type																										Range of functions SM	20
3	Maximum current																										Range of functions RT	19
4	Protection class																										Technology function	18
5	Power unit options																										Protocol - communication	17
6	Connector set																										Subject to export approval	16
7	Control component																										Runtime release	15
8	Panel																										Runtime version	14
9	Communication																										Runtime type	13
10	Hardware option 1																										Hardware option 3	12
11	Hardware option 2																											

Description / options

1	Product	1: X = ctrlX DRIVE / 2: C = converter infeed / 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	Material number
	Option	Option		
HCS01-W0008	100 / 101 / 102	NFD03.1-480-007	007	R911286917
HCS01-W0018	300 / 301 / 302	NFD03.1-480-007	007	R911286917
HCS01-W0028	400 / 401 / 402	NFD03.1-480-016	016	R911286918
HCS01-W0054	500 / 501 / 502	NFD03.1-480-030	030	R911286919
HCS03-W0100	700 / 701 / 702	NFD03.1-480-055	055	R911286920
CtrlX Drive XCS2-W0023A	2100 / 2130	NFD03.1-480-016	016	R911286918
	2160 / 2161			
CtrlX Drive XCS2-W0054A	3100 / 3130	NFD03.1-480-030	030	R911286919
	3160 / 3161			
CtrlX Drive XCS2-W0070A	4100 / 4130	NFD03.1-480-055	055	R911286920
CtrlX Drive XCS2-W0100A	5100 / 5130	NFD03.1-480-055	055	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 = 16 A
030		R911286919		NFD03.1-480-030 = 30 A
055		R911286920		NFD03.1-480-055 = 55 A

► Further information on the controller ►► Chapter "Further information"

Switching system

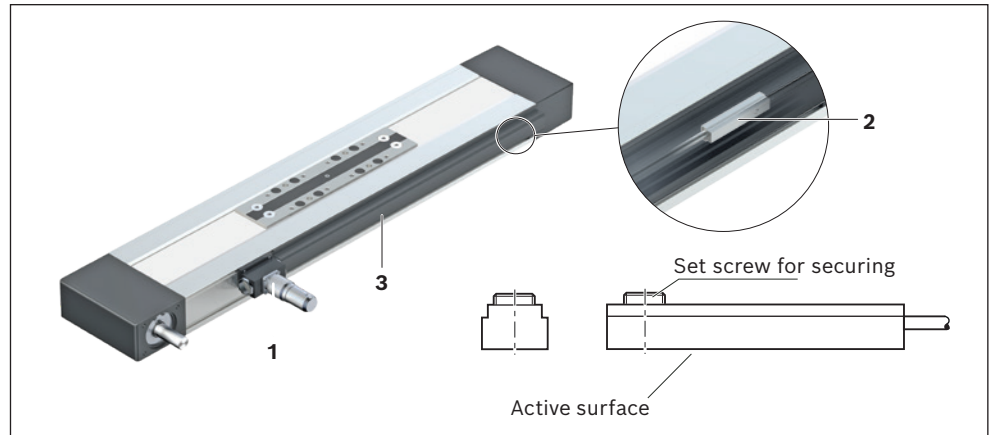
Overview of attachment variants

Magnetic sensor with free cable end

- 1 Socket and connector
- 2 Sensor
- 3 Cable duct

Alternatively, the sensor can also be fastened by switch mounting plate and cable holder.

See the magnetic sensor with connector.



Attachment/actuation

A cable duct is needed to fasten the sensors and for cable routing. This is suspended at the side in a slot at the compact module and fastened with set screws (4).

The set screws are included.

The sensors are pushed into the upper T-slot (CKK/CKR-090,-110 and CKK-145) or into the lower T-slot (CKR-145, CKK/CKR-200) of the cable duct and secured with set screws.

Switch activation is done by magnets in the carriage.

CKK/CKR-070	CKK/CKR-090 CKK/CKR-110 CKK-145	CKR-145	CKK/CKR-200

Cable duct

Compact module	Material number	Length calculation
CKK/CKR: 070	R039662026	$L_K = L - 5$
CKK: 090, 110, 145, 200	R039662018	$L_K = L - 5$
CKR: 090, 110, 145, 200	R039662018	$L_K = L - 10$

L_K = Length of the cable duct (mm)
 L = Length of the linear motion system (mm)

Socket-connector

Notes:

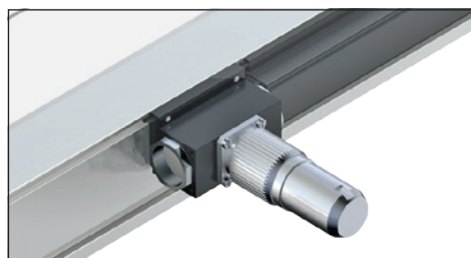
The socket and connector are not pre-wired.

This allows optimal assignment of switch activation points during commissioning.

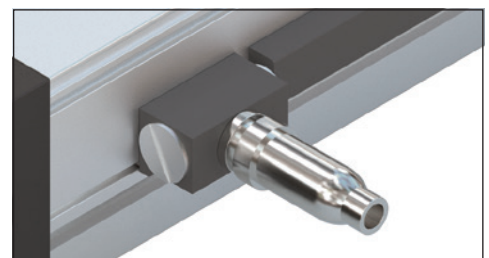
One connector is included.

The connector can be mounted in three directions.

For further information, see the section "Socket-connector".



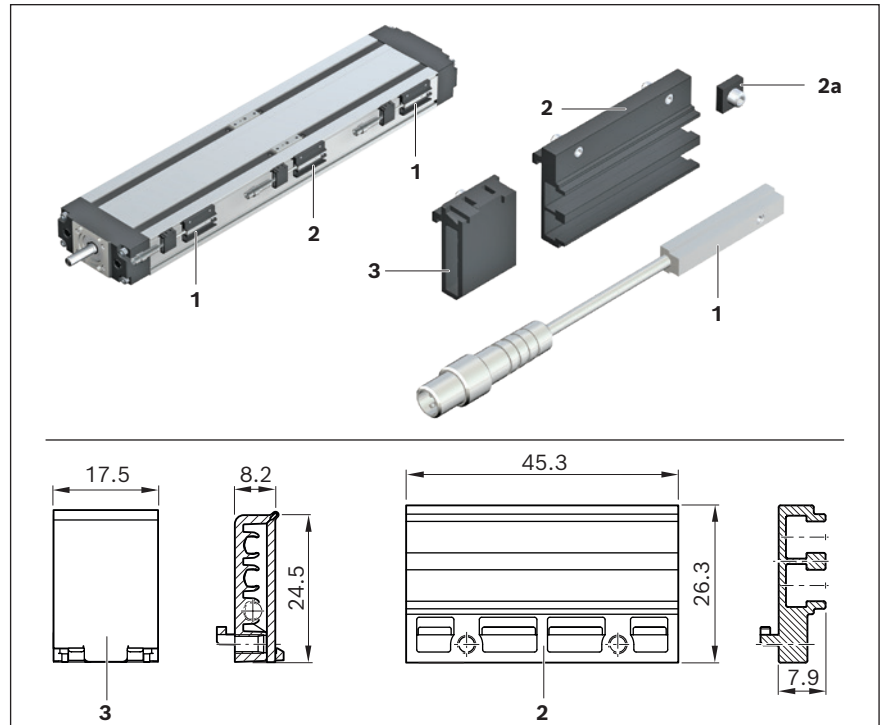
Socket-connector	
Compact module	Material number
CKK/CKR: 070	R117560102
CKK/CKR: 090, 110, 145	R037540000



Socket-connector	
Compact module	Material number
CKK/CKR: 200	R037540000

**Magnetic sensor
with connector**

- 1 Sensor
- 2 Switch mounting plate including set screws (loose) and square nut (2a)
- 3 Cable holder including set screw (loose)



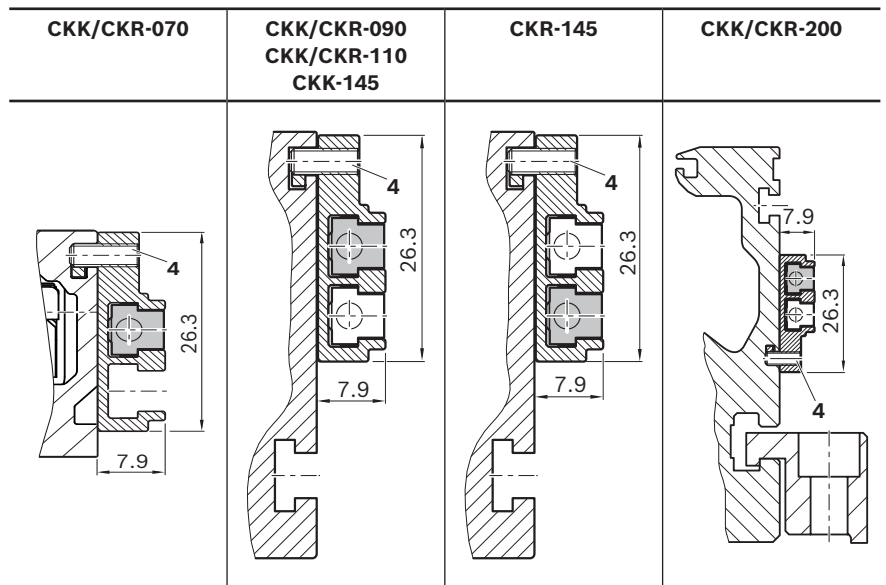
Attachment/actuation

A switch mounting plate (2) is required to fasten the sensors. This is suspended in the slot on the compact module and fastened with set screws (4).

The sensors are pushed into the respective slot on the switch mounting plate and secured with one set screw.

The square nut with set screw (2a) serves as a positive stop for the sensor (switch activation point when changing sensors). Parts are included in the scope of delivery of the sensor mounting kit.

Switch activation is done by magnets in the carriage.



Switches and attachments

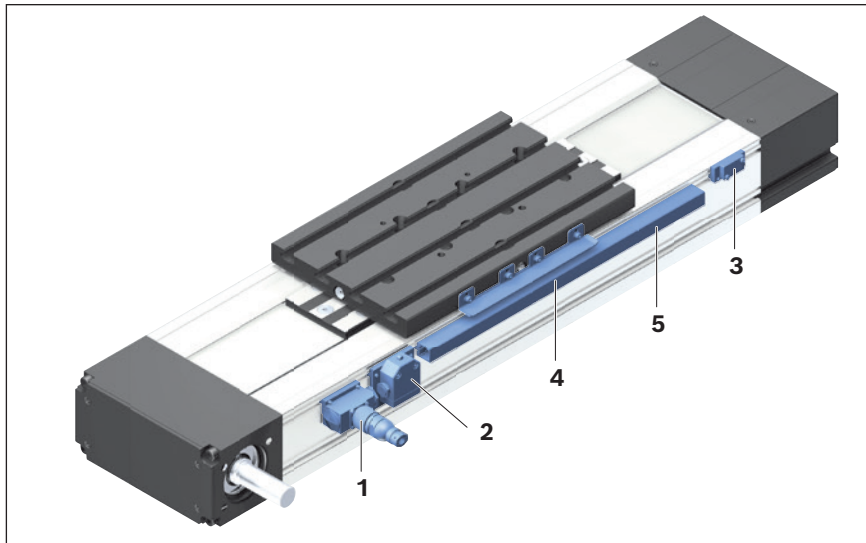
Item	Material number
1 Magnetic sensor with connector	See the chapter on sensors and accessories
2 Switch mounting plate	R037530021
3 Cable holder	R037530022

Inductive sensors and mechanical switches for CKK/CKR-200

- 1 Socket and connector
- 2 Mechanical switch (with attachments)
- 3 Inductive sensor (with attachments)
- 4 Switching cam (attachment only at the connection plate)
- 5 Cable duct

Alternatively, the connection line of the switches can also be fastened by cable holder.

See "Switching system".

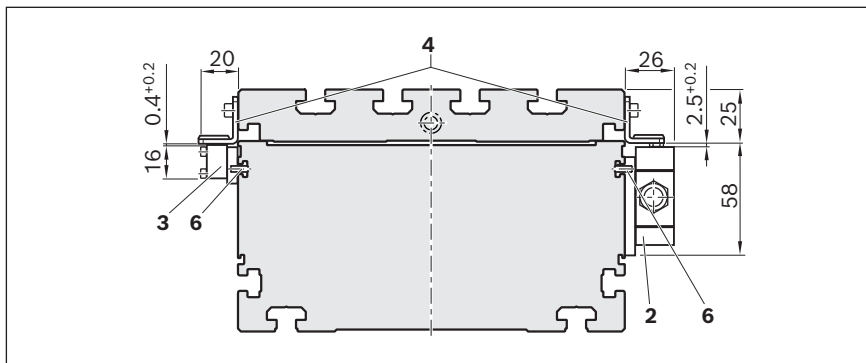


Attachment/actuation

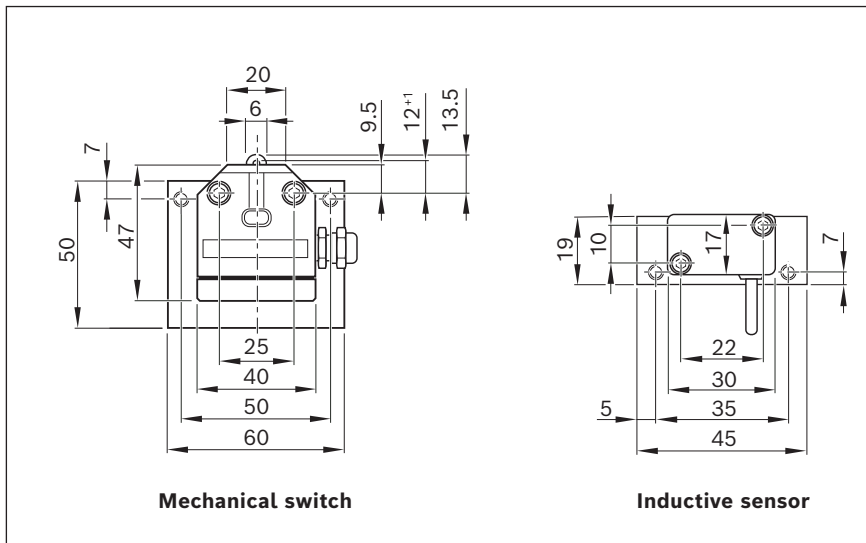
The switches are suspended in the upper slot on the compact module and fastened with set screws (6).

The actuation is done using switching cams (4). This is fastened with the screws to the connection plate.

Fastening screws are included.



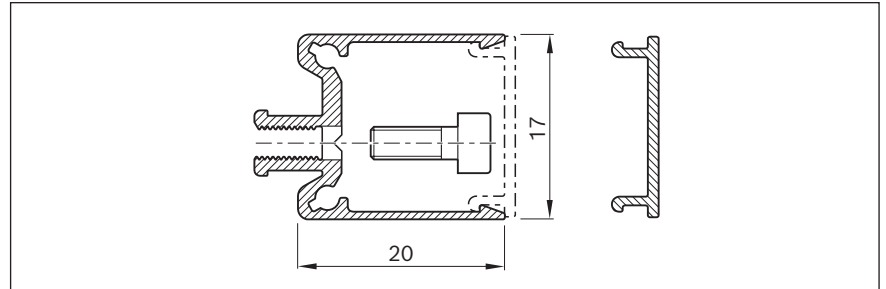
Switch with attachment



Cable duct

The cable duct is fastened in the lateral slots of the frame. Fastening screws widen the profile and ensure that the cable duct is securely mounted.

The cable duct will accommodate up to two cables for mechanical switches and three cables for proximity switches. Fastening screws are included.



Cable duct

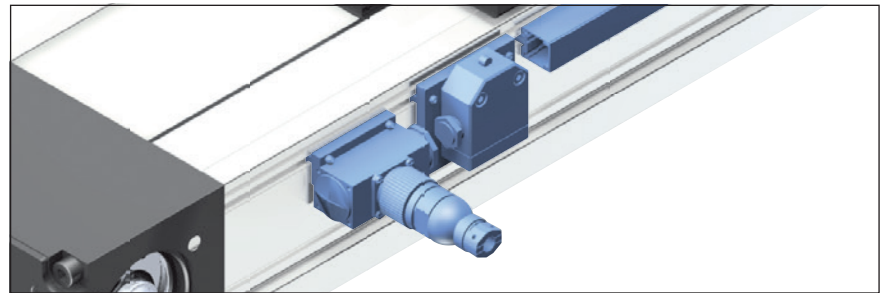
Compact module	Length calculation
CKK 200	$L_K = L - 5$
CKR 200	$L_K = L - 10$

L_K = Length of the fastening and the cable duct (mm)
 L = Length of the linear motion system (mm)

Socket-connector

Notes:

The socket and connector are not pre-wired. This allows optimal assignment of switch activation points during commissioning. One connector is included. The connector can be mounted in three directions.



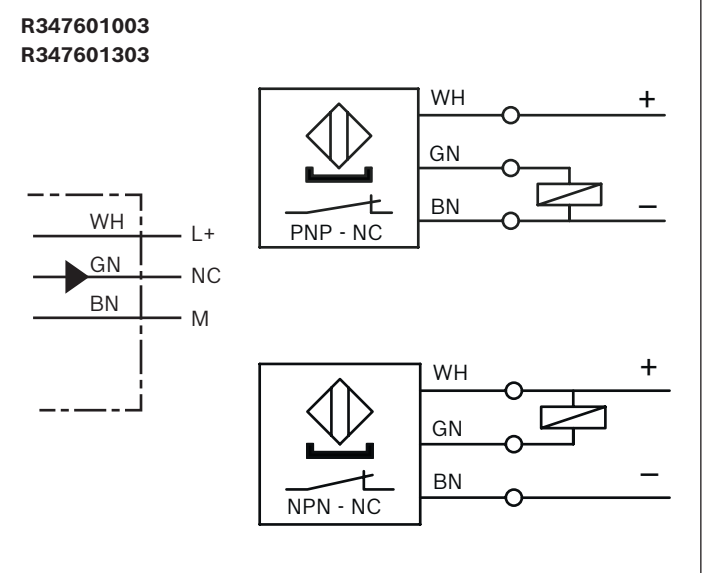
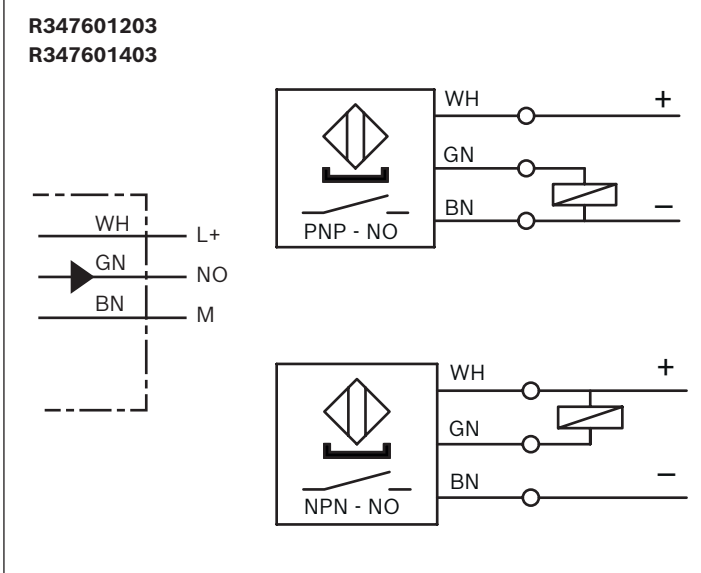
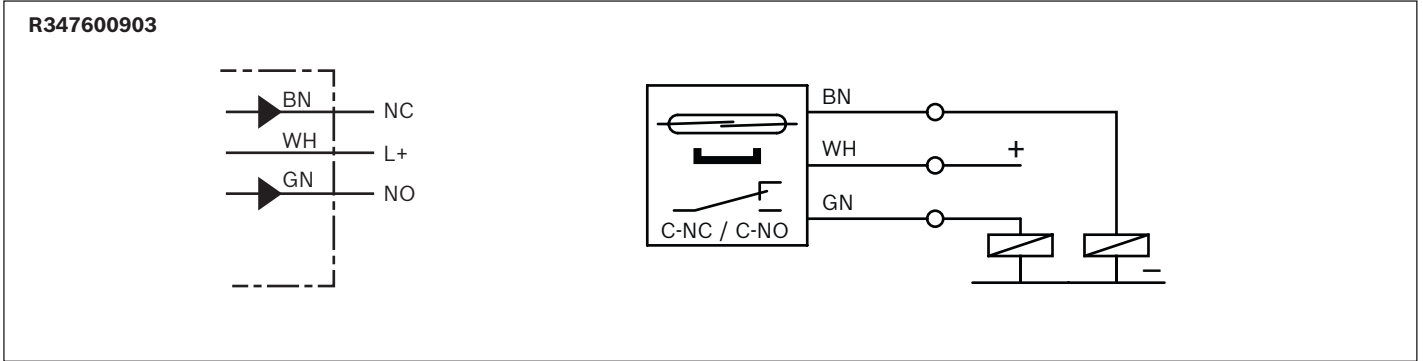
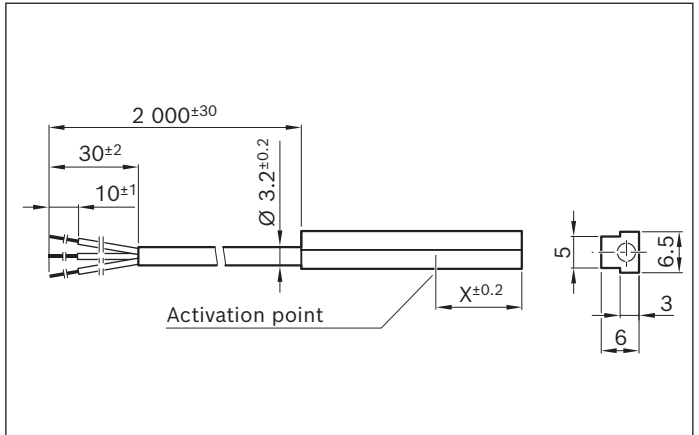
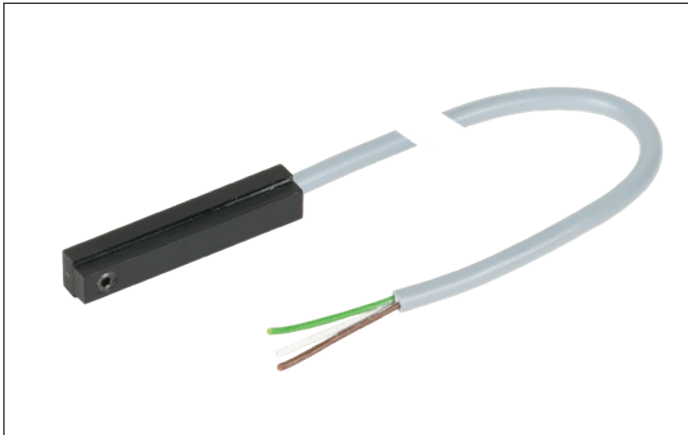
Switches and attachments

Item		Material numbers
1	Socket-connector	R117500153
2	Mechanical switch	See the chapter on sensors and accessories
	- Attachments without switch	R117500165
3	Inductive sensor	See the chapter on sensors and accessories
	- Attachments without sensor	R117500152
4	Switching cam¹⁾	R117500150
5	Cable duct $L_K = XX$ mm	R039662017

¹⁾ Size 200 switching cam attachment is only possible on connection plate – otherwise customer-designed solution.

Sensors

Magnetic sensor with free cable end



Material number R347600903

Use	Reference, limit switch
Material number	R347600903
Designation	R12212
Functional principle	magnetic
Operating voltage	max. 30 V DC
Load current	500 mA
Switching function	REED/changeover contact: (NC: C+NC, NO: C+NO)
Activation point (dimension "X")	9 mm

Material numbers R347601003 / R347601203 / R347601403 / R347601303

Use	Limit switch	Reference switch	Limit switch	Reference switch
Material number	R347601003	R347601203	R347601303	R347601403
Designation	H14118	H15637	H15638	H15080
Functional principle	magnetic			
Operating voltage	3.8 - 30 V DC			
Load current	≤ 20 mA			
Switching function	Hall PNP/NC	Hall PNP/NO	Hall NPN/NC	Hall NPN/NO
Activation point dimension "X"	13.65 mm			

Technical data for R347600903 / R347601003 / R347601203 / R347601403 / R347601303

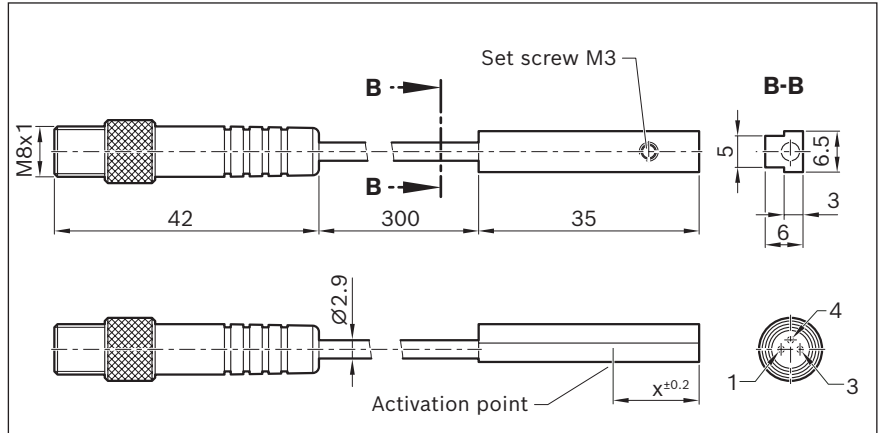
Connection type	Cable 2.0 m, 3-pin
Galvanized connection ends	✓
Function indicator	—
Short-circuit protection	—
Reverse polarity protection	—
Switch-on suppression	—
Switching frequency	2.5 kHz
Pulse elongation (off delay)	—
Max. permissible starting speed	2 m/s
Suitable for drag chains¹⁾	—
Torsion-resistant¹⁾	—
Welding spark-resistant*	—
Cable cross-section*	3 x 0.14 mm ²
Cable diameter D	3.2 ±0.20 mm
Static bending radius¹⁾	—
Dynamic bending radius¹⁾	—
Bending cycles¹⁾	—
Maximum permissible travel speed¹⁾	—
Max. permissible acceleration¹⁾	—
Ambient temperature	-40 °C to +85 °C
Protection class	IP66
MTTFd (per EN ISO 13849-1)	—
Certifications and approvals²⁾	—

¹⁾ Technical data only for the cast-on connection line at the sensor.

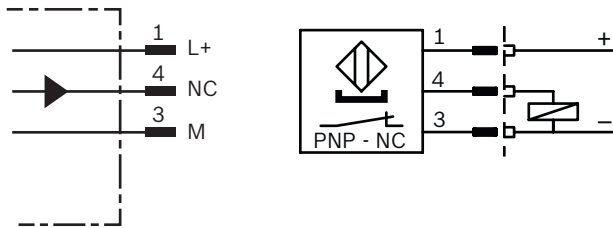
The available extension cables offer even better performance, e.g., when using a cable drag chain (see following pages).

²⁾ No (CCC) certificate is required to introduce these products to the Chinese market.

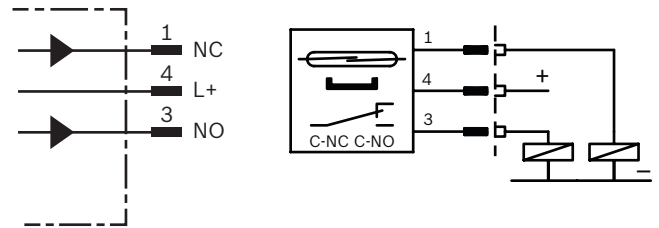
Magnetic sensor with M8x1 connector



R347602403



R347602303



Material numbers/technical data

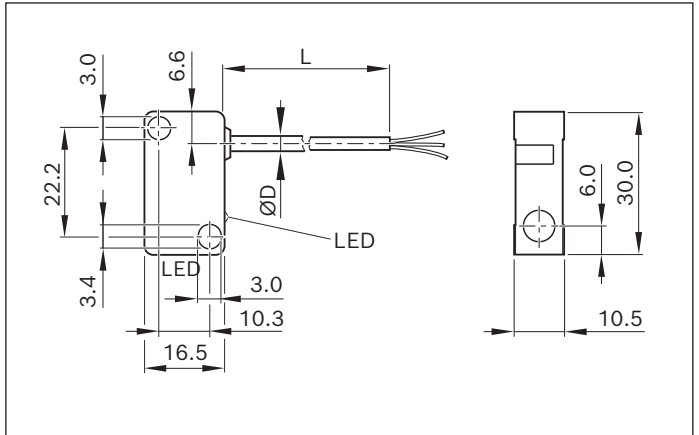
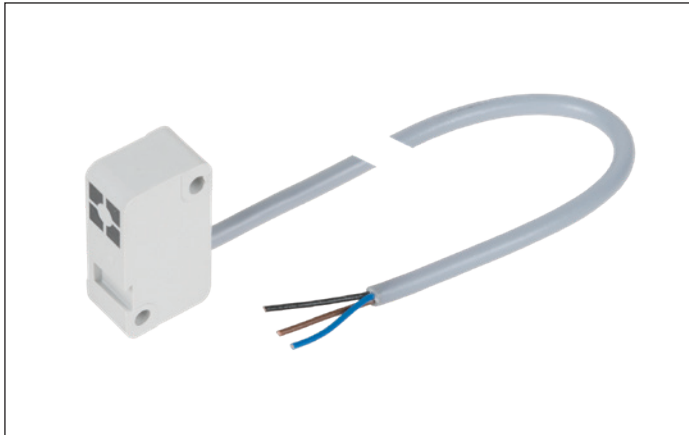
Use	Reference / limit switch	Limit switch
Material number	R347602403	R347602303
Designation	H10706	R10705
Functional principle	magnetic	
Operating voltage	3.8 - 30 V DC	30 V DC
Load current	≤ 20 mA	500 mA
Switching function	Hall PNP/NC	REED/single-pole changeover (NC: C+NC, NO: C+NO)
Activation point dimension "X"	13.65 mm	9 mm
Connection type	0.3 m cable and M8x1 connector, 3-pin with knurled screw connection	
Function indicator	—	
Short-circuit protection	—	
Reverse polarity protection	—	
Switch-on suppression	—	
Switching frequency	2.5 kHz	
Pulse elongation (off delay)	—	
Max. permissible starting speed	2 m/s	
Suitable for drag chains¹⁾	—	
Torsion-resistant¹⁾	—	
Weld spark-resistant¹⁾	—	
Cable cross-section¹⁾	3 x 0.14 mm ²	
Cable diameter D¹⁾	3.2 ±0.20 mm	
Static bending radius¹⁾	—	
Dynamic bending radius¹⁾	—	
Bending cycles¹⁾	—	
Maximum permissible travel speed¹⁾	—	
Max. permissible acceleration¹⁾	—	
Ambient temperature	-40 °C to +85 °C	
Protection class	IP66	
MTTFd (per EN ISO 13849-1)	—	
Certifications and approvals²⁾	—	

¹⁾ Technical data only for the cast-on connection line at the sensor.

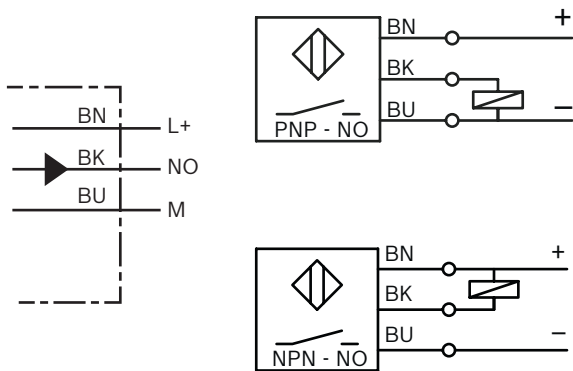
The available extension cables offer even better performance, e.g., when using a cable drag chain (see following pages).

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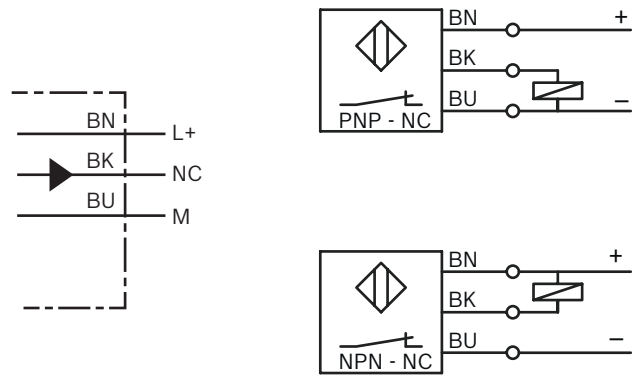
Inductive sensor with free line end






R345304003
R345304004



R345304001
R345304002



Material numbers/technical data

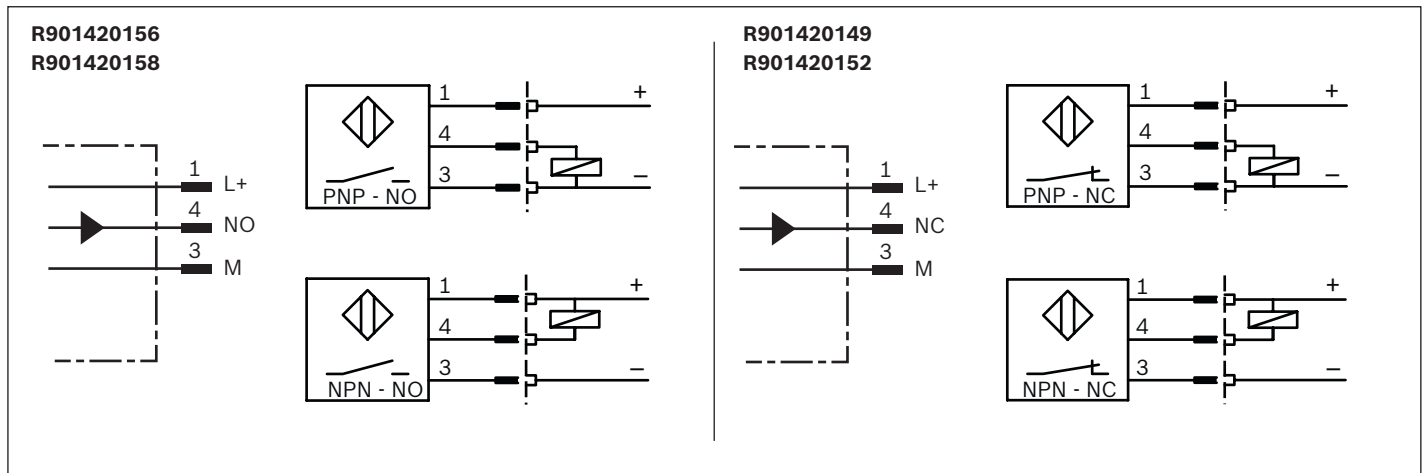
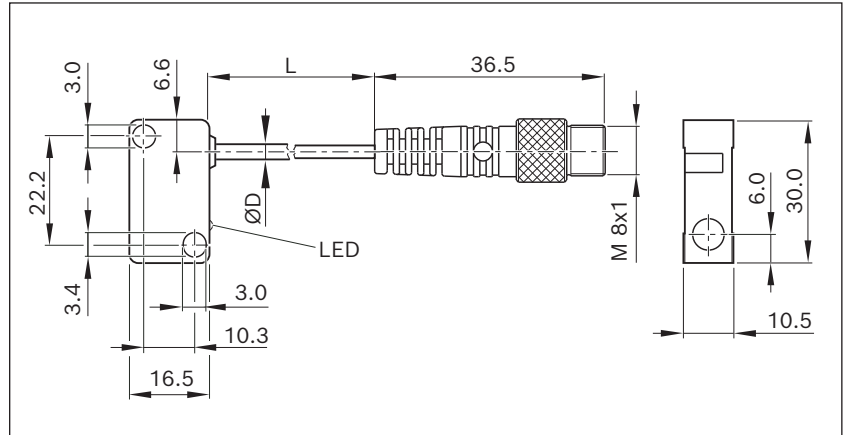
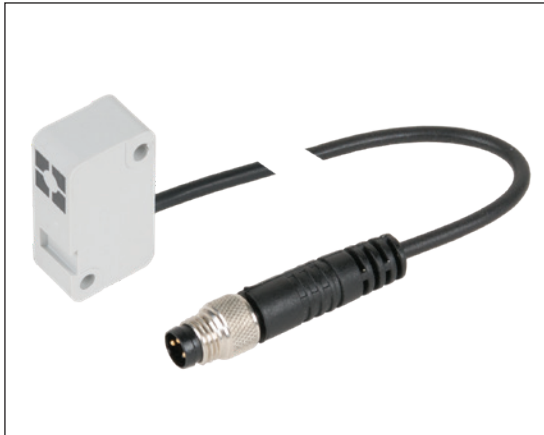
Use	Limit switch	Reference switch	Limit switch	Reference switch
Material number	R345304001	R345304003	R345304002	R345304004
Designation	BES 517-351-NO-C-03	BES 517-398-NO-C-03	BES 517-352-NO-C-03	BES 517-399-NO-C-03
Functional principle	inductive			
Operating voltage	10–30 V DC			
Load current	≤ 200 mA			
Switching function	PNP/NC	PNP/NO	NPN/NC	NPN/NO
Connection type	Line 3 m, 3-pin, free line end			
Function indicator	✓			
Short-circuit protection	✓			
Reverse polarity protection	✓			
Switching frequency	2.5 kHz			
Max. perm. starting speed	depending on the length of the switching cam			
Suitable for drag chains¹⁾	–			
Torsion-resistant¹⁾	–			
Weld spark-resistant¹⁾	–			
Cable cross-section¹⁾	3 x 0.14 mm ²			
Cable diameter D¹⁾	3.5 ±0.15 mm			
Static bending radius¹⁾	12 mm			
Dynamic bending radius¹⁾	12 mm			
Bending cycles¹⁾	–			
Ambient temperature	-40 °C to +70 °C			
Protection class	IP65			
MTTFd (acc. to EN ISO 13849-1)	MTTFd = 830 years		MTTFd = 585 years	
Certifications and approvals²⁾	  			

¹⁾ Technical data only for the cast-on connection line at the sensor.




The available extension cables offer even better performance, e.g., when using a cable drag chain (see following pages).

²⁾ No (CCC) certificate is required to introduce these products to the Chinese market.

Inductive sensor with M8x1 connector



Material numbers/technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Material number	R901420149	R901420156	R901420152	R901420158
Designation	BES 517-351-NO-C-S49-00.2	BES 517-398-NO-C-S49-00.2	BES 517-352-NO-C-S49-00.2	BES 517-399-NO-C-S49-00.2
Functional principle	inductive			
Operating voltage	10–30 V DC			
Load current	≤ 200 mA			
Switching function	PNP/NC	PNP/NO	NPN/NC	NPN/NO
Connection type	Cable 0.2 m and connector M8 x 1, 3-pin with knurled screw			
Function indicator	✓			
Short-circuit protection	✓			
Reverse polarity protection	✓			
Switching frequency	2.5 kHz			
Max. permissible starting speed	depending on the length of the switching cam			
Suitable for drag chains¹⁾	–			
Torsion-resistant¹⁾	–			
Weld spark-resistant¹⁾	–			
Cable cross-section¹⁾	3x0.14 mm ²			
Cable diameter D¹⁾	3.5 ±0.15 mm			
Static bending radius¹⁾	12 mm			
Dynamic bending radius¹⁾	12 mm			
Bending cycles¹⁾	–			
Ambient temperature	-40 °C to +70 °C			
Protection class	IP65			
MTTFd (per EN ISO 13849-1)	MTTFd = 830 years		MTTFd = 585 years	
Certifications and approvals²⁾	  			

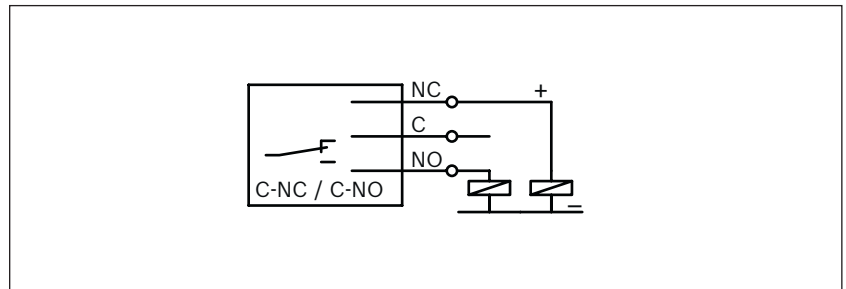
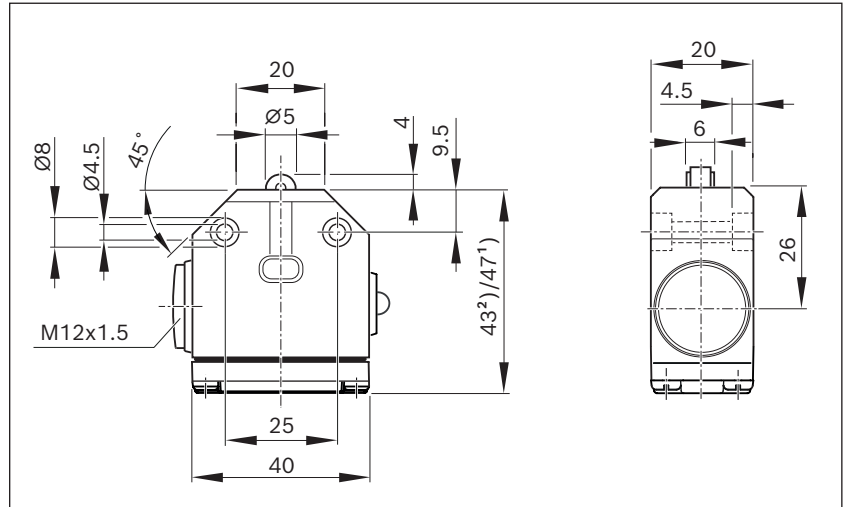
¹⁾ Technical data only for the cast-on connection line at the sensor.








The available extension cables offer even better performance, e.g., when using a cable drag chain (see following pages).

²⁾ No (CCC) certificate is required to introduce these products to the Chinese market.


Switches

Mechanical switch




Material numbers/technical data		
Use	Limit switch	
Material number	R345304016 ¹⁾	R347600305 ²⁾
Designation	BNS 819-X496-99-R-11	BNS 819-X510-99-R-10
Functional principle	mechanical, roller	
Operating voltage	250 V AC	
Load current	≤ 5 A	
Switching function	single-pole changeover/ (NC: C+NC, NO: C+NO)	
Connection type	Screw connection, without line	
Function indicator	-	
Switching frequency	3.3 Hz	
Max. permissible starting speed	1 m/s	
Ambient temperature	-5°C to +85°C	
Protection class	IP67	
B10d value	5x10 ⁶ (wet area); 10x10 ⁶ (dependent on current load (dry area))	
Certifications and approvals, housing	  	
Certifications and approvals, switching element	   	

Material numbers/technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Material number	R913048215	R913048214	R913048217	R913048216
Designation	BNS 819-X1002-99-R-10	BNS 819-X1001-99-R-10	BNS 819-X1004-99-R-10	BNS 819-X1003-99-R-10
Functional principle	mechanical, roller			
Operating voltage	10 - 30 VDC			
Load current	≤ 200 mA			
Switching function	PNP/NC	PNP/NO	NPN/NC	NPN/NO
Connection type	Cable 0.2 m and connector M8 x 1, 3-pin with knurled screw			
Function indicator	—			
Short-circuit protection	—			
Reverse polarity protection	—			
Switching frequency	3.3 Hz			
Max. perm. starting speed	1 m/s			
Suitable for drag chains¹⁾	—			
Torsion-resistant¹⁾	—			
Weld spark-resistant¹⁾	—			
Cable cross-section¹⁾	3x0.14 mm ²			
Cable diameter D¹⁾	4.3 ±0.2 mm			
Static bending radius¹⁾	12 mm			
Dynamic bending radius¹⁾	12 mm			
Bending cycles¹⁾	—			
Ambient temperature	-5 °C to +70 °C			
Protection class	IP65			
B10d value	5x10 ⁶ (wet area); 10x10 ⁶ (dependent on current load (dry area))			
Certifications and approvals²⁾				

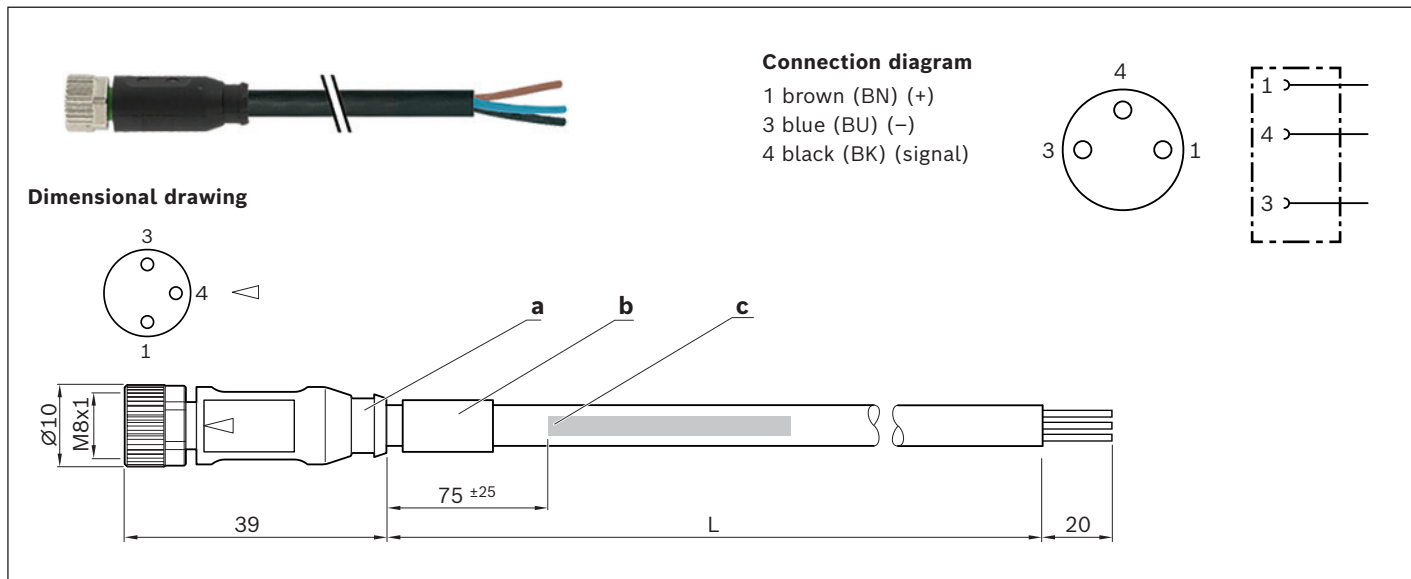
¹⁾ Technical data only for the cast-on connection line at the mechanical switch.

The available extension cables offer even better performance, e.g., when using a cable drag chain (see following pages).

²⁾ No  certificate is required to introduce these products to the Chinese market.

Extensions

Assembled on one end

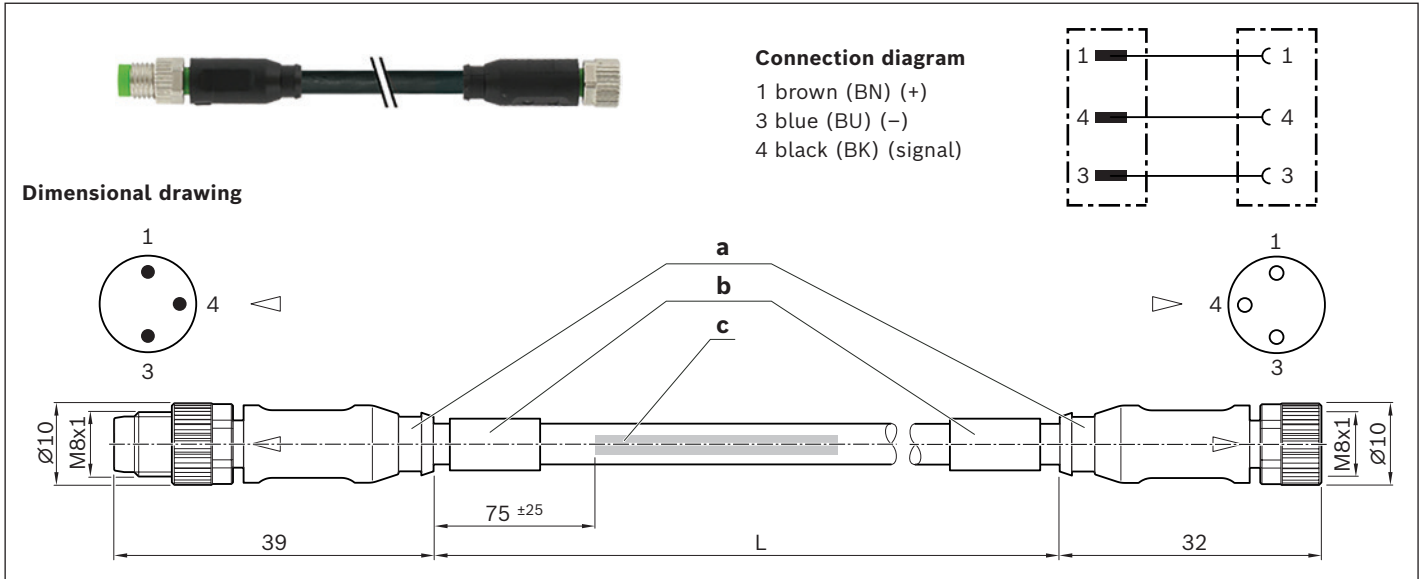


Material numbers

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 m	10.0 m
Connection type 1	Female connector, straight, M8x1, 3-pin				
Connection type 2	Connector, straight, M8x1, 3-pin				


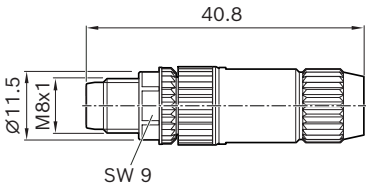
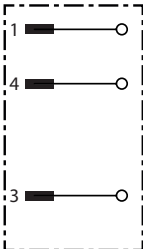
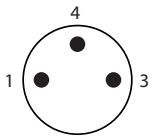

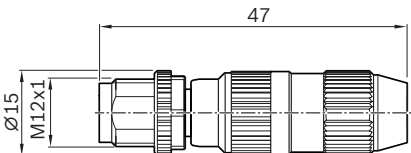
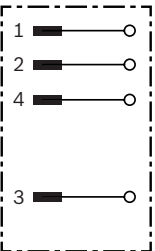
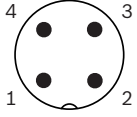
Technical data for extensions pre-assembled on one or two sides

Function indicator	-
Operating voltage indicator	-
Operating voltage	10–30 V DC
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	IP68
Certifications and approvals	    




a) Contour for 6.5 mm corrugated tube (inner diameter)
b) Cable grommet

c) Cable printing per printing specification


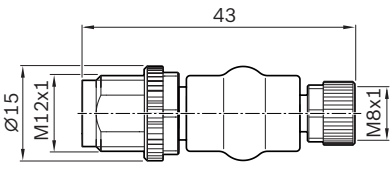
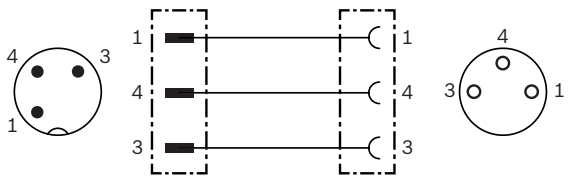

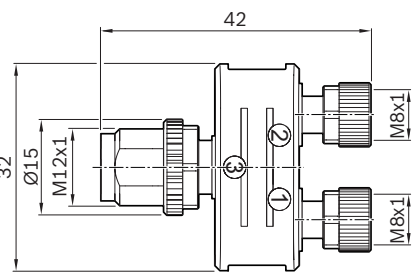
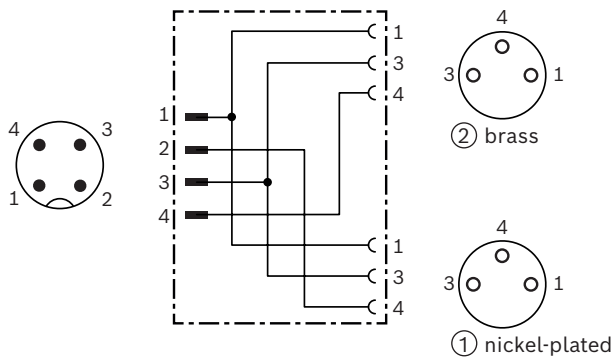
Connectors

	Dimensional drawing	Connection diagram	View Connector side
 R901388333			
 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	Straight connector, M8x1, 3-pin, IDC, self-locking screw	Straight connector, M12x1, 4-pin, IDC, self-locking screw
Function indicator	-	
Operating voltage indicator	-	
Connection cross-section	0.14 ... 0.34 mm ²	
Ambient temperature	-25°C to +85°C	
Protection class	IP67 (inserted and bolted)	
Certifications and approvals	  	

Adapters

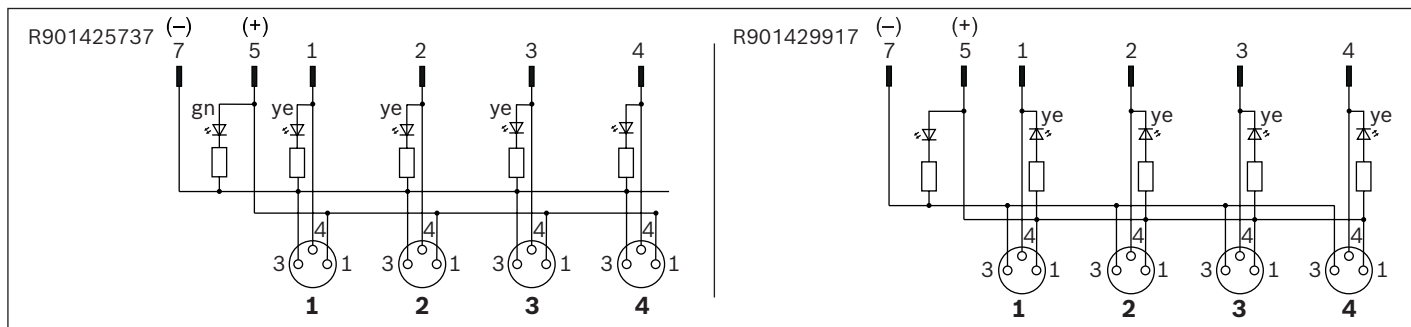
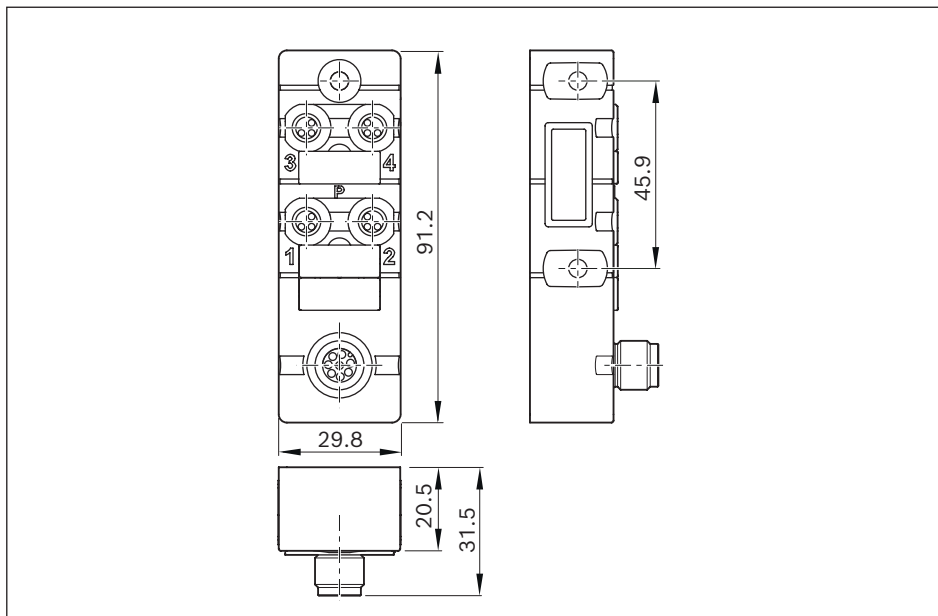
 R911344591	<p>Dimensional drawing</p> 	<p>Connection diagram</p> 
 R911344592	<p>Dimensional drawing</p> 	<p>Connection diagram</p> 

Material numbers/technical data




Use	Adapters	Adapter or distributor
Material number	R911344591	R911344592
Designation	7000-42201-0000000	7000-41211-0000000
Version	straight for 1 sensor	straight, for 1 - 2 sensors
Operating current per contact	max. 4 A	
Operating voltage	max. 32 V AC/DC	
Connection type 1	Straight female connector, 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	Straight connector, M12x1, 4-pin, IDC, self-locking screw thread
Function indicator	-	
Operating voltage indicator	-	
Connection cross-section	-	
Ambient temperature	-25°C to +85°C	
Protection class	IP67 (inserted and bolted)	
Certifications and approvals		  

Distributors

Passive distributor

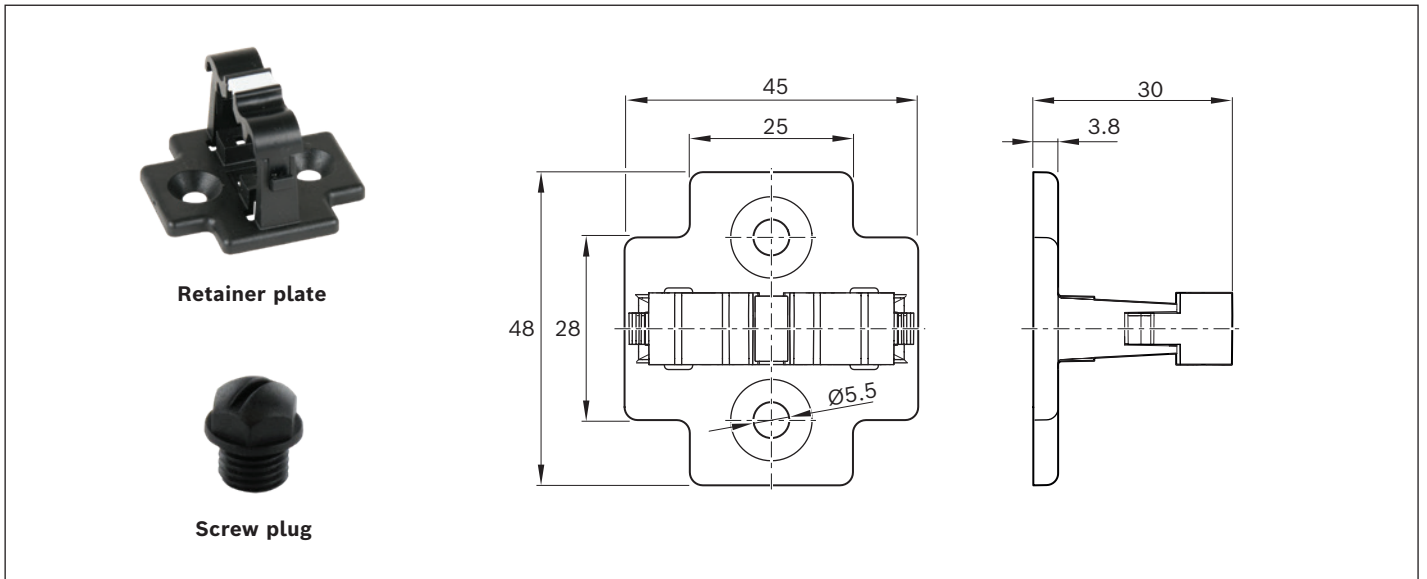


Material numbers/technical data

Use	Passive distributor		
Material number	R901425737	R901429917	R911344592
Designation	8000-84070-0000000	8000-84071-0000000	
Version	straight, for 1 - 4 sensors		
Operating current per contact	max. 2 A		
Operating voltage	24 VDC		
Switching logic	PNP	NPN	
Connection type 1	4x female connectors, straight, M8x1, 3-pin, self-locking screw thread		
Connection type 2	Male connector, straight, M12x1, 8-pin, IDC, self-locking screw thread		
Function indicator	✓		
Operating voltage indicator	✓		
Connection cross-section	-		
Ambient temperature	-20 °C to +70 °C		
Protection class	IP67 (inserted and bolted)		
Certifications and approvals	  		

For technical data and dimensional drawings, see adapter

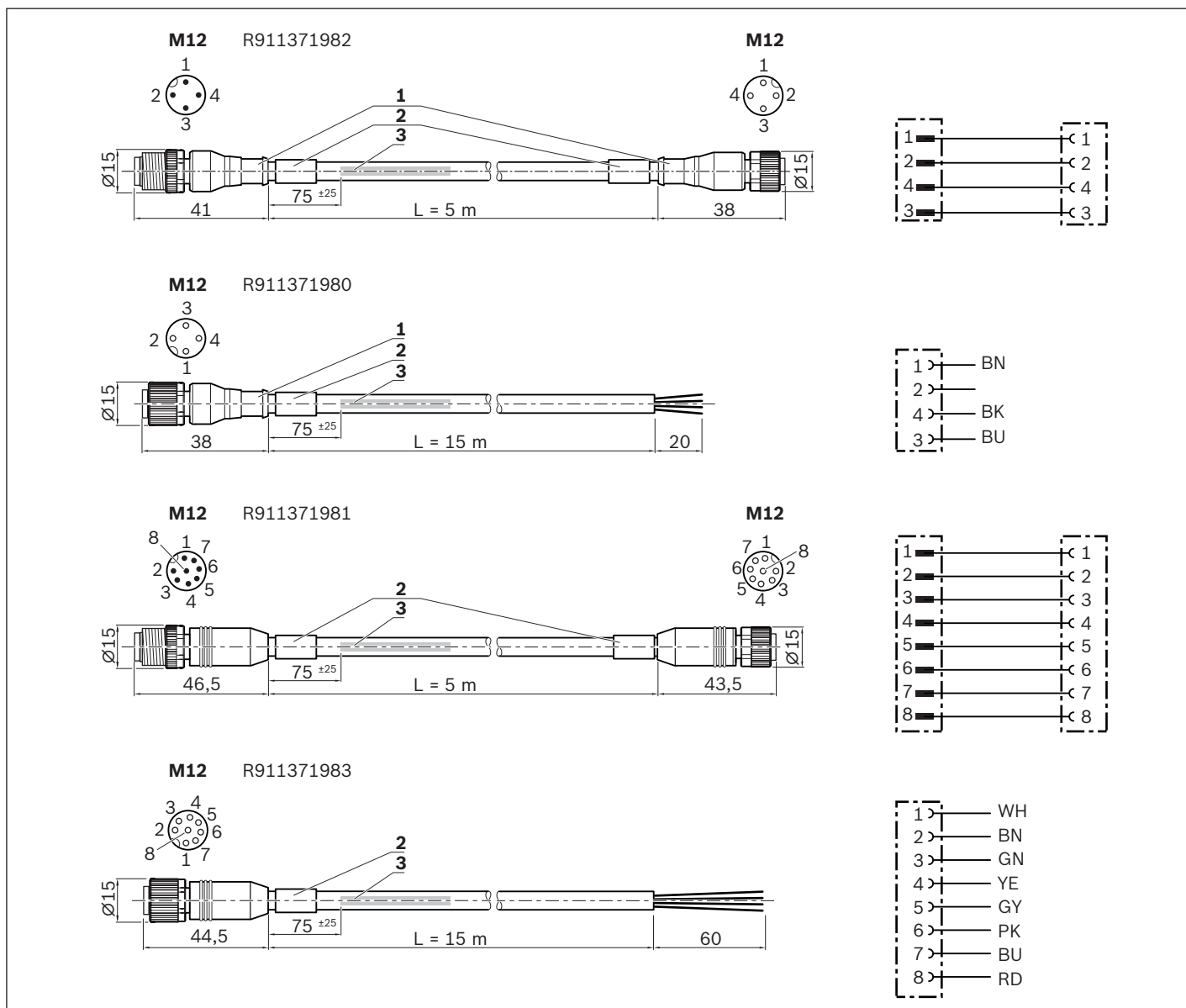
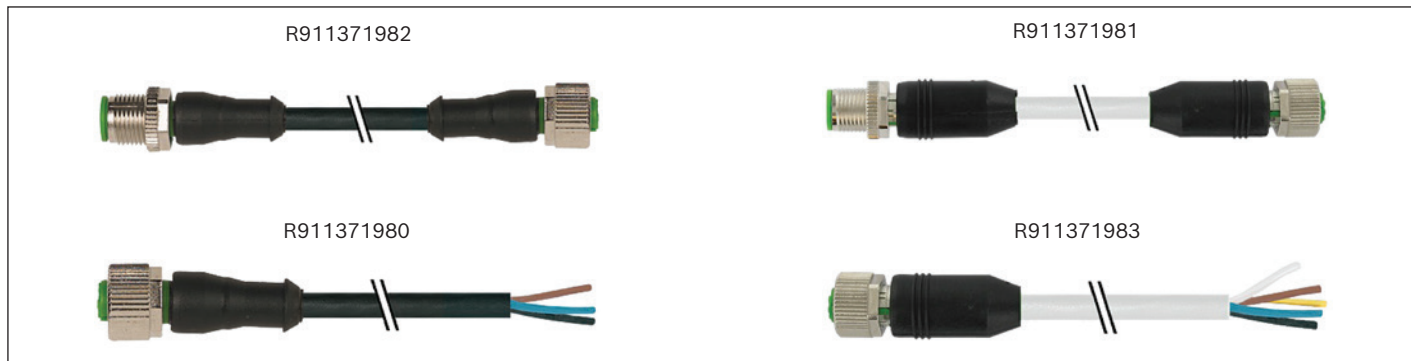
Accessories for passive distributors



Material numbers/technical data






Use	For passive distributor R911344592	For passive distributors R901425737 / R901429917
Retainer plate	R913047341	-
Designation	7000-99061-0000000	-
Set	1 unit	-
Screw plug	-	R913047322
Designation	-	3858627
Set	-	10 units

Extensions for passive distributors

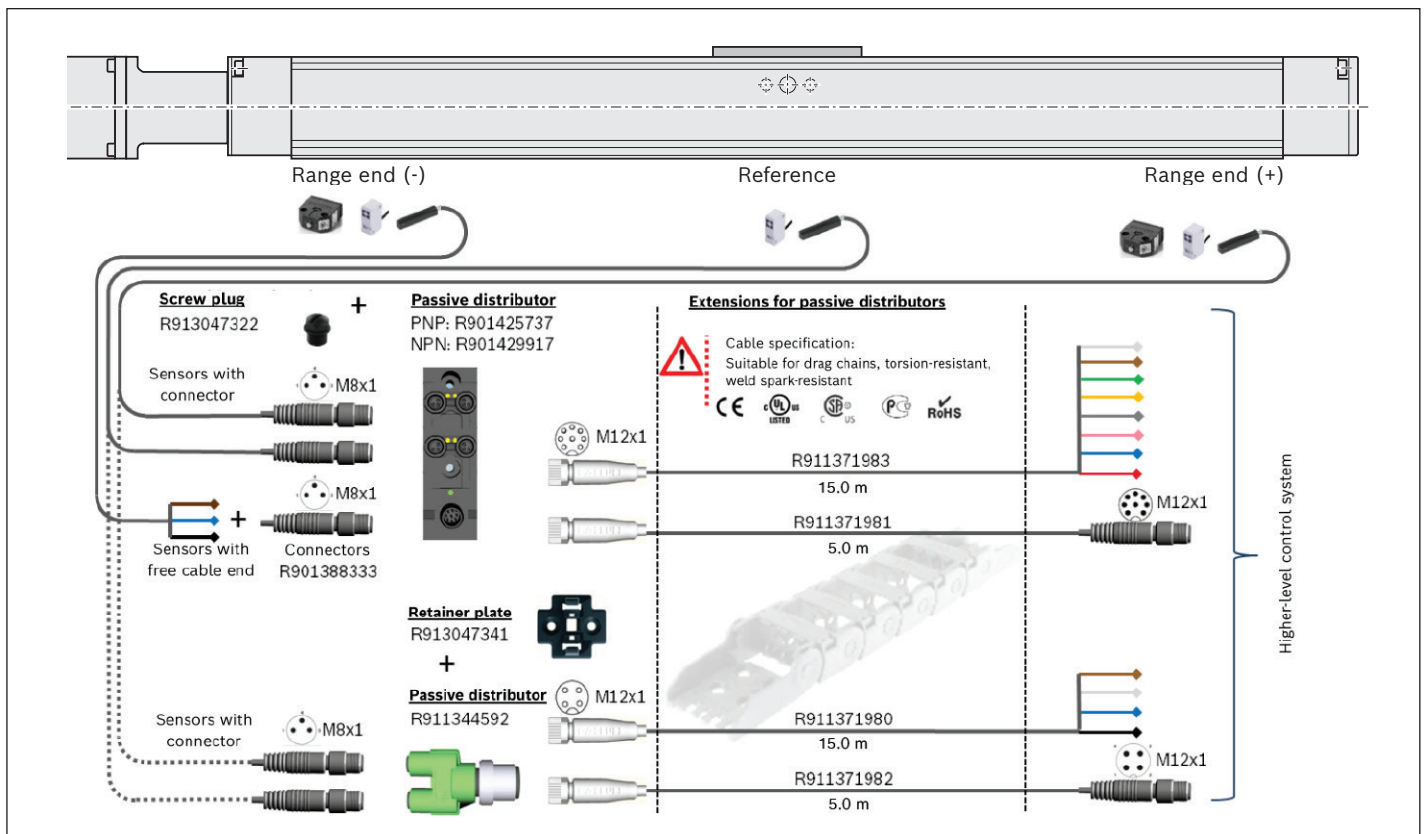
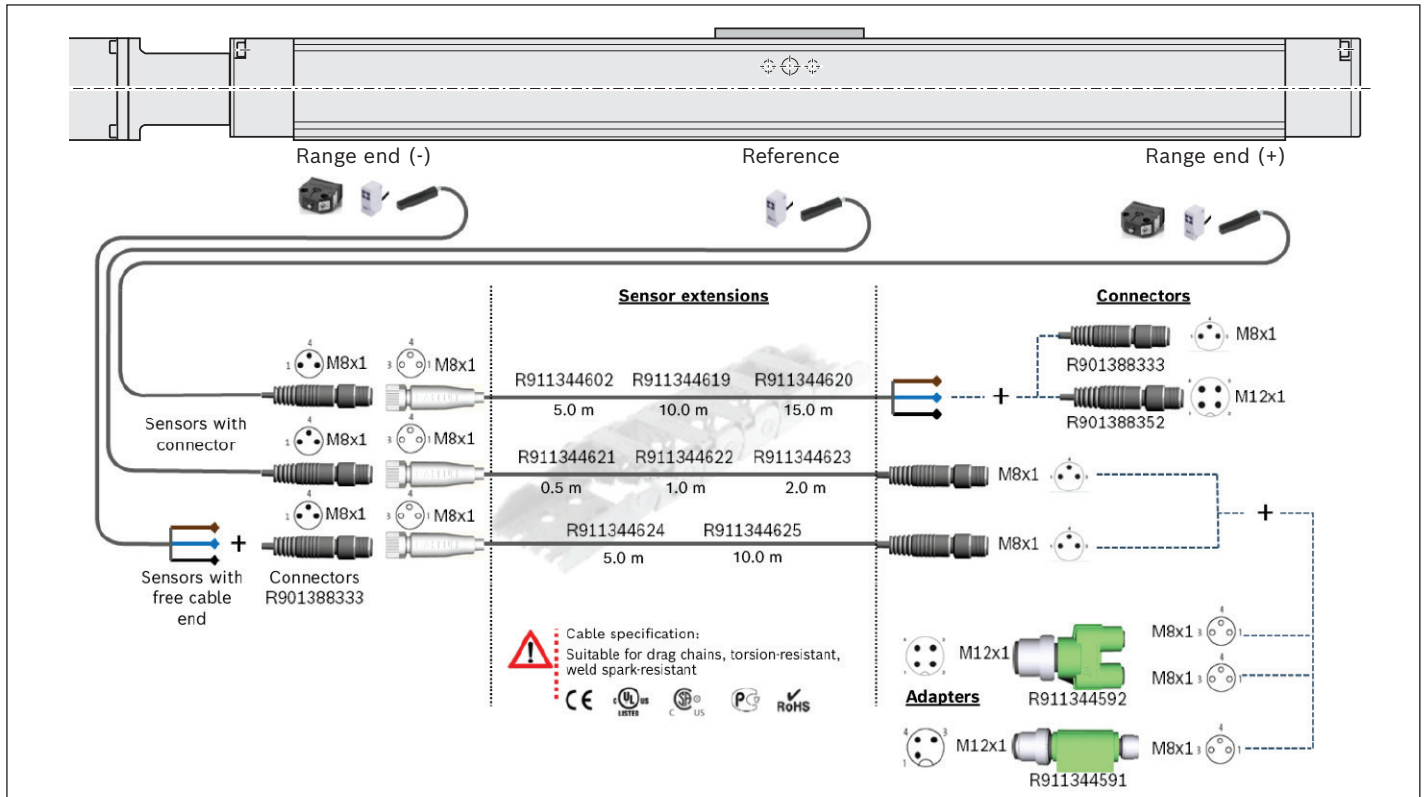


1) Contour for conduit pipe with inner diameter of 10
2) Cable grommet
3) Cable print per ordering specification 7000-08001

Material numbers/technical data

Use	Extension cable for passive distributor R911344592		Extension cable for passive distributors R901425737 / R901429917	
Material number	R911371982	R911371980	R911371981	R911371983
Designation	7000-40021-6540500	7000-12221-6541500	7000-48001-3770500	7000-17041-3771500
Length	5.0 m	15.0 m	5.0 m	15.0 m
Connection type 1	Female connector, straight, M12x1, 4-pin		Female connector, straight, M12x1, 8-pin	
Connection type 2	Male connector, straight, M12x1, 4-pin	Unassembled cable end	Male connector, straight, M12x1, 8-pin	Unassembled cable end
Function indicator	-			
Operating voltage indicator	-			
Type of cable	PUR black		PUR gray	
Operating voltage	30 V AC/DC			
Operating current per contact	max. 4 A per contact		max. 2 A per contact	
Suitable for drag chains	✓			
Torsion-resistant	✓			
Weld spark-resistant	✓			
Cable cross-section	4x0.34 mm ²		8x0.34 mm ²	
Cable diameter D	4.7 +/- 0.2 mm		6.2 +/- 0.3 mm	
Static bending radius	≥ 5 x D			
Dynamic bending radius	≥ 10 x D			
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 distance			
Max. permissible acceleration	≤ 30 m/s ²			
Ambient temperature fixed ext.	-40°C to +80°C (90° max. 10,000h)			
Ambient temperature flexible ext.	-25°C to +80°C (90° max. 10,000h)			
Protection class	IP67 (inserted and bolted)			
Certifications and approvals	    			


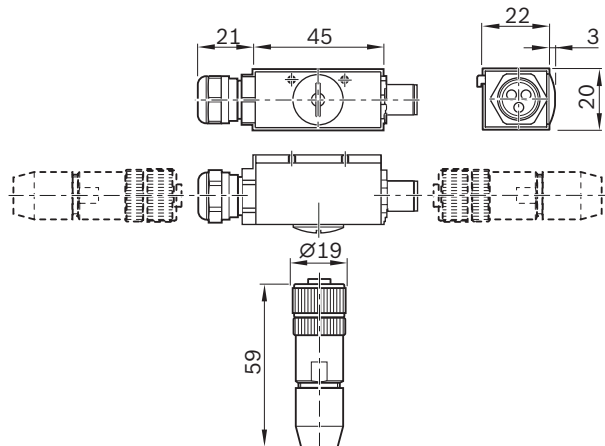
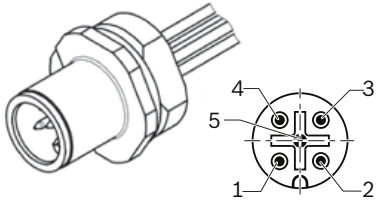
Combination examples



Socket and connector


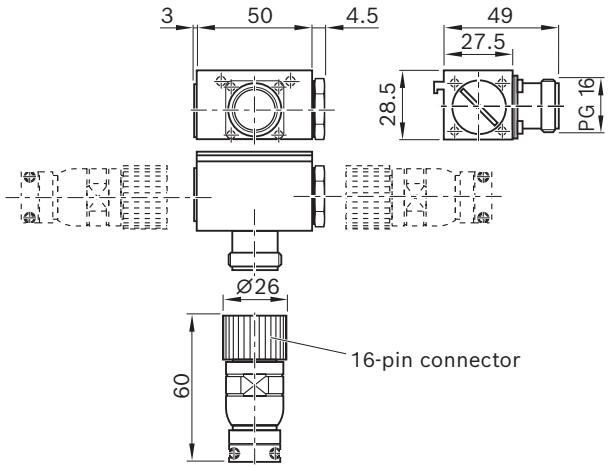
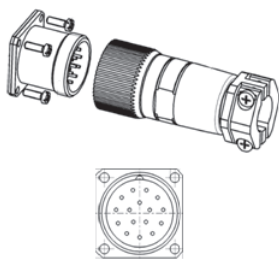
Attach the socket on the side with the magnetic sensors. The socket and connector are not pre-wired. The variable sliding attachment allows switch activation points to be optimized during commissioning. The connector can be mounted in three directions.

R117560102


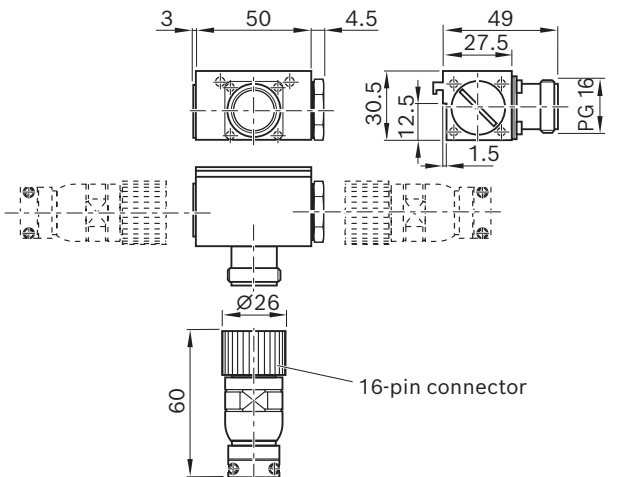
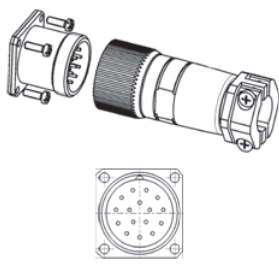




Pin		Color
1	BN	brown
2	WH	white
3	BU	blue
4	BK	black
5	GY	gray

R037540000

R117500153

Use	Socket and connector	
Material number	R117560102	R037540000 / R117500153
Designation	for CKK / CKR-070	for CKK / CKR-090, -110, -145, -200
Version	angled, for suspension in the lateral slot of the linear motion system	
Operating current per contact	max. 4 A	max. 8 A
Operating voltage	10–30 V DC	150V AC/DC
Connection type 1	Male connector, straight, M12x1, 5-pin, spring-cage connection	Male connector, straight, 16-pin, soldered connection
Connection type 2	Coupling / flange socket M12x1, 5-pin, with 0.5 m cable	Coupling / flange socket, 16-pin, soldered connection
Cable bushing Housing	Cable gland M16x1.5 with seal (bore 3x3.5 mm) incl. cap and blind plug	1 seal with bore 2x5.5 mm, 1x3.5 mm 1 adaptable seal, max. 14 mm diameter incl. cap and blind plug
Cable bushing, connector	Bolting with pull relief	
Connection cross-section	0.14 ... 0.5 mm	0.14 ... 1 mm
Cable diameter	4 ... 8 mm	10 ... 14 mm
Ambient temperature	-25°C to +85°C	-20°C to +125°C
Protection class	—	
Certifications and approvals	—	

Service and information

Operating conditions

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 ... 60 °C
Travel range s_{\min} ¹⁾	See the CKK/CKR "technical data" table
Soiling	Not permissible

¹⁾ Minimum travel range to ensure a reliable lubrication distribution.

Required and supplementary documentation

For further instructions and information, please refer to the documentation for this product.

You can find PDF files of these documents on the Internet at www.boschrexroth.com/mediadirectory.

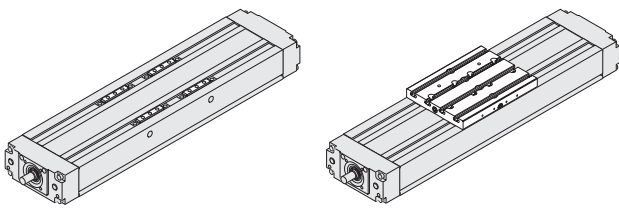
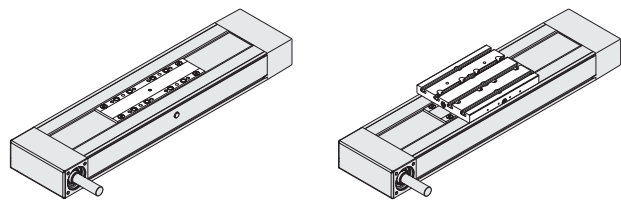
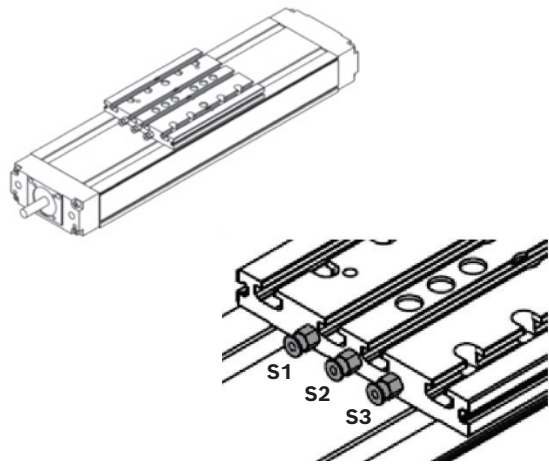
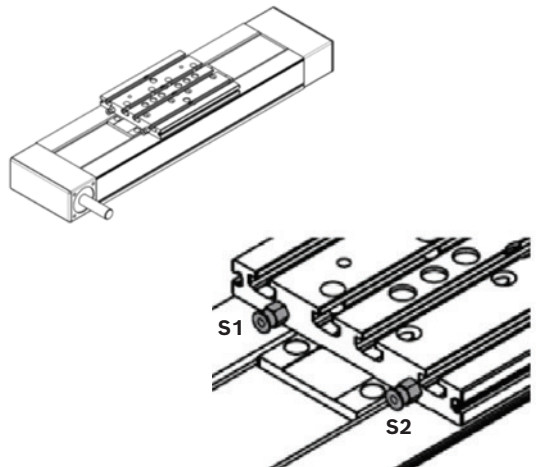
We would also be happy to send you the documents that you want.

If you are unsure about using this product, please contact Bosch Rexroth.

Lubrication

The profiled rail system and the ball screw assembly must be lubricated (compact modules CKK). The basic lubrication of all other components, e.g. deep-groove ball bearings, cover strips, gear units, etc. is done by the manufacturer.

Overview of lubrication versions

<p style="text-align: center;">Compact modules CKK Lubrication version LSS, LPG</p> <ul style="list-style-type: none"> ▶ Grease lubrication using manual grease gun via <ul style="list-style-type: none"> - Frame - Carriage - Connection plate  <p style="text-align: center;">with connection plate</p>	<p style="text-align: center;">Compact modules CKR Lubrication version LSS, LPG</p> <ul style="list-style-type: none"> ▶ Grease lubrication using manual grease gun via <ul style="list-style-type: none"> - Frame - Carriage - Connection plate  <p style="text-align: center;">with connection plate</p>
<p style="text-align: center;">Lubrication version LCF, LCO</p> <ul style="list-style-type: none"> ▶ 3 lube fittings ▶ Prepared for connection to central lubrication systems 	<p style="text-align: center;">Lubrication version LCF, LCO</p> <ul style="list-style-type: none"> ▶ 2 lube fittings ▶ Prepared for connection to central lubrication systems 

- ▶ Further information on the lubrication versions ➡ Page 9
- ▶ Further information on lubrication points, lubrication intervals and lubrication quantities, etc. ➡ Instruction compact modules R320103178 ➡ Chapter "Further information"

Lubricants

Lubrication version	LSS		LPG	
Size	CKx-110, -145, -200	CKx-070, -090	CKx-110, -145, -200	CKx-070, -090
Basic lubrication	Dynalub 510	Dynalub 520	Preserved, basic lubrication required (see instructions)	
Consistency class	NLGI 2 (DIN 51818)	NLGI 00 (DIN 51818)	-	
Identification	KP2K-20 (DIN 51825)	GP00K-20 (DIN 51826)	-	
Lubrication with grease gun	yes	yes	yes	
Prepared for connection to central lubrication systems	-	-	-	
Recommended lubricants	Dynalub 510 (grease lubricant) (NLGI2 DIN 51818)	Dynalub 520 (liquid grease) (NLGI00 DIN 51818)	Dynalub 510 (grease lubricant) (NLGI2 DIN 51818)	Dynalub 520 (liquid grease) (NLGI00 DIN 51818)
Features	<ul style="list-style-type: none"> • Good water resistance • Corrosion protection • Temperature range: -20 to +80 °C 		<ul style="list-style-type: none"> • Good water resistance • Corrosion protection • Temperature range: -20 to +80 °C 	
Material numbers	R3416 037 00 (400 g cartridge)	R3416 043 00 (400 g cartridge)	R3416 037 00 (400 g cartridge)	R3416 043 00 (400 g cartridge)
	R3416 035 00 (25 kg container)	R3416 042 00 (5 kg bucket)	R3416 035 00 (25 kg container)	R3416 042 00 (5 kg bucket)
Alternative lubricants	<ul style="list-style-type: none"> • Tribol GR 100-2 PD • Elkalub GLS 135/N2 	<ul style="list-style-type: none"> • Tribol GR 100-00 PD • Elkalub GLS 135/N00 	<ul style="list-style-type: none"> • Tribol GR 100-2 PD • Elkalub GLS 135/N2 • Tribol GR 100-00 PD • Elkalub GLS 135/N00 • Dynalub 520 	<ul style="list-style-type: none"> • Tribol GR 100-00 PD • Elkalub GLS 135/N00
Alternative lubricants with H1 approval	-	-	<ul style="list-style-type: none"> • Berulub FG H2 SL • Cassida Grease EPS2 • VP 874 	<ul style="list-style-type: none"> • Berulub FB 34-00 • Elkalub GLS 367/N00

Notes on lubrication

- ▶ Follow the product instructions.
- ▶ Do not use lubricants with solid particles (e.g. graphite or MoS₂).
- ▶ If you use different lubricants than the ones specified, relubrication intervals may be shorter and performance may decrease with short stroke and load ratio; in addition, chemical interactions can take place between the plastics, lubricants and preservative agents. Single-line central lubrication systems also need to be able to pump these lubricants.
- ▶ If using a central lubrication system, make sure all lines and elements are filled with lubricant all the way to the connection to the consumer (carriage) and that there are no air bubbles.
- ▶ Lubricant reservoirs should contain an agitator to ensure the lubricant can flow (avoids hardening in the reservoir).
- ▶ For relubrication, it is not possible to switch from grease to oil lubrication and vice-versa.
- ▶ If environmental factors such as contamination, vibrations, impact loads, etc. are present, we recommend shorter relubrication intervals. Even under normal operating conditions, relubrication is required every two years due to grease aging.
- ▶ Rexroth recommends piston distributors by SKF. These should be installed as close to the carriage lube fittings as possible. Avoid long lines (no longer than 1 m) and narrow line diameters. Install the lines at a gradient.
- ▶ If other consumers are connected to the single-line lubrication system, the weakest link in this chain determines the lubrication cycle.
- ▶ Excess lubricant can accumulate inside of the compact module or flow out and may lead to contamination of the environment
- ▶ Never put a compact module into operation without basic lubrication.

	LCF	LCO
	CKx-090, -110, -145, -200	CKx-090, -110, -145, -200
	required, see instructions	required, see instructions
	NLGI 00 (DIN 51818)	–
	GP00K-20 (DIN 51826)	–
	–	–
	<ul style="list-style-type: none"> • only via single-line piston distributor system • smallest permissible piston distributor size: CKx-090, -110, -145, -200: 0.2 cm³ 	<ul style="list-style-type: none"> • only via single-line piston distributor system • smallest permissible piston distributor size: CKx-090, -110: 0.2 cm³; CKx-145: 0.4 cm³; CKx-200: 0.6 cm³
	Dynalub 520 (liquid grease) (NLGI00 DIN 51818)	Shell Tonna S3 M220 (lubricant oil)
	<ul style="list-style-type: none"> • Good water resistance • Corrosion protection • Temperature range: –20 to +80 °C 	<ul style="list-style-type: none"> • Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides • A blend of highly refined mineral base oils and additives • Can be used even when mixed with significant quantities of metalworking fluids
	R3416 043 00 (400 g cartridge)	–
	R3416 042 00 (5 kg bucket)	–
	<ul style="list-style-type: none"> • Tribol GR 100-00 PD • Elkalub GLS 135/N00 	<ul style="list-style-type: none"> • Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
	–	–

⚠ Use of lubricants with H1 approval:

Loss of H1 approval

H1 lubricants or release agents (preservative agents) only have H1 approval if they are separated and unmixed (including at the lubrication point). A blend of two H1 approval lubricants or separating agents does not have H1 approval.

No approval or authorization for use in the food industry

Because of the use of H1 lubricants, the compact modules do not have authorization or approval for the food industry.

Components lubricated at the factory

Components lubricated by the manufacturer at the factory such as deep-groove ball bearings, cover strips, gears, etc. do not use H1 lubricants.

⚠ Compact modules with Dynalub 520 (NLGI 00 consistency class) initial greasing must not be pre-lubricated with lubricants of NLGI 2 consistency class!

For relubrication quantity and relubrication position ⇒ see Compact modules CKK / Compact modules CKR instructions.

Relubrication interval

When using the standard lubrication from the manufacturer:

Relubrication interval ⇒ see Compact modules CKK / Compact modules CKR instructions.

Use of Dynalub 520 (NLGI 00) instead of Dynalub 510 (NLGI 2):

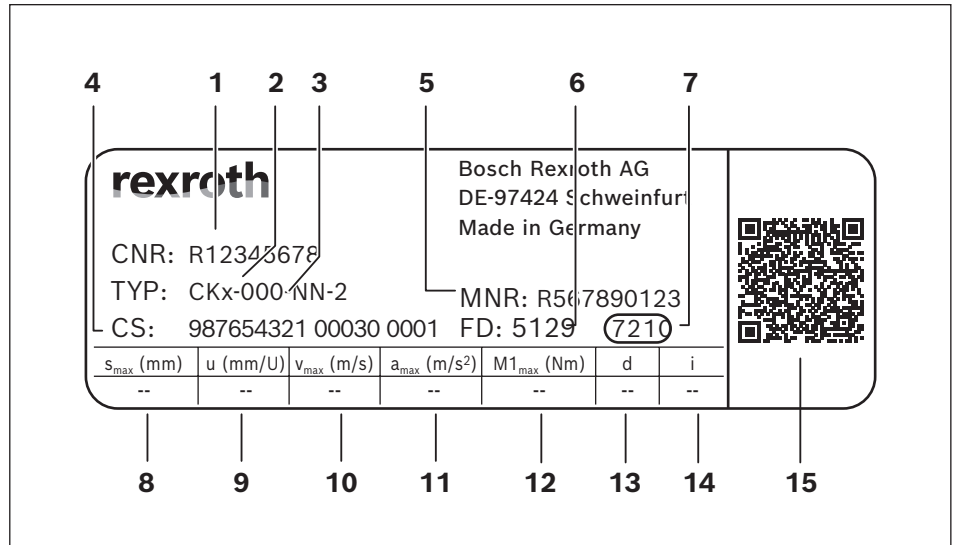
The relubrication interval is 75% of the standard relubrication interval ⇒ CKK/CKR instructions.

Use of lubricants with H1 approval:

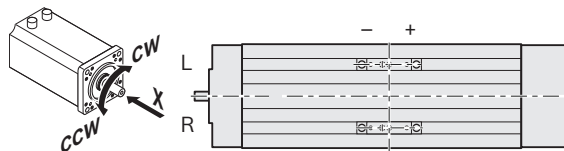
First relubrication takes place after 20 km. As a guideline value for relubrication intervals, 50% of the standard relubrication intervals must be applied ⇒ See Compact modules CKK / Compact modules CKR instructions.

Parameterization (commissioning)

The nameplate 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	110	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

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.

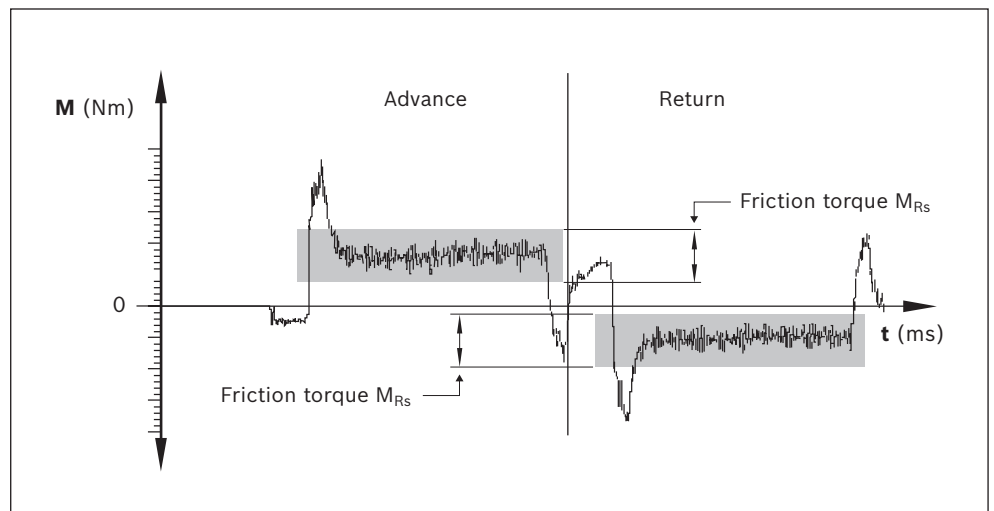
Checks listed in the standard report:

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

Measurement of frictional torque of complete system

Option 02 (includes option 01)

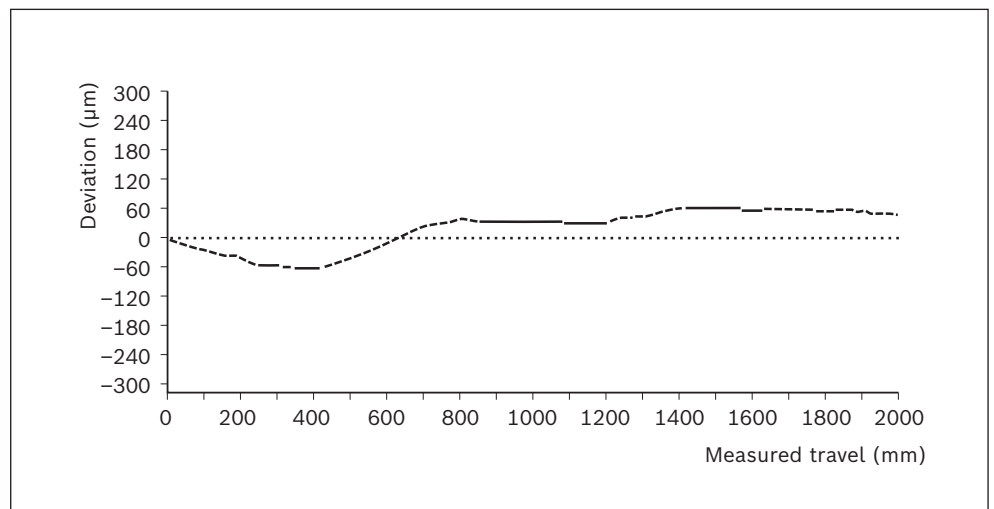
The friction torque is measured over the entire travel range.



Lead deviation of the ball screw assembly with compact modules
CKK

Option 03 (includes option 01)

In addition to graphical representation (see illustration), a measurement report is supplied in table form.

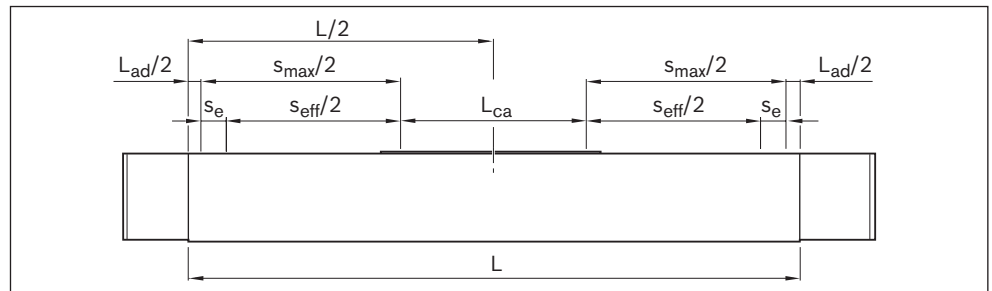


Project planning/calculation

Calculation principles

Calculation principles	142
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Length calculation of the linear motion system



For length calculation values, see chapter "Technical Data" of the relevant compact module (CKK/CKR)

$$L = s_{eff} + 2 \cdot s_e + L_{ca} + L_{ad}$$

Effective stroke

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

Stroke: maximum distance from carriage center to the outer-most switch activation points.

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

Mass of the linear motion system

Weight calculation:

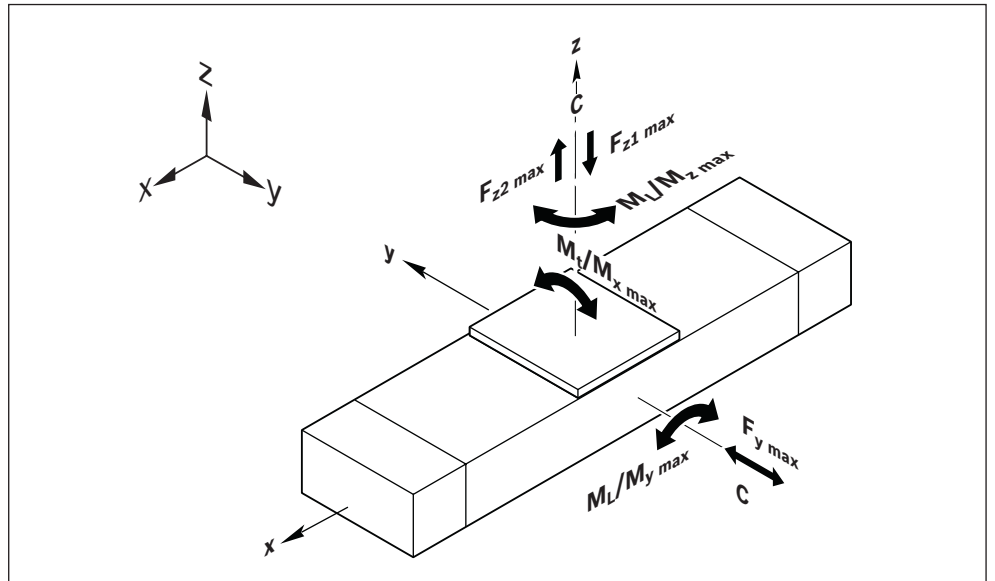
- ▶ without motor
- ▶ without switch mounting
- ▶ without motor attachment

$$m_s = k_{g \text{ fix}} + k_{g \text{ var}} \cdot L + m_{ca}$$

Note on dynamic load capacities and moments

Determination of the dynamic load capacities and moments is based on a total travel of 100,000 m. Often only 50,000 m of total travel are actually stipulated. For comparison: Multiply values C , M_t and M_L by a factor of 1.26.

Suitable loads

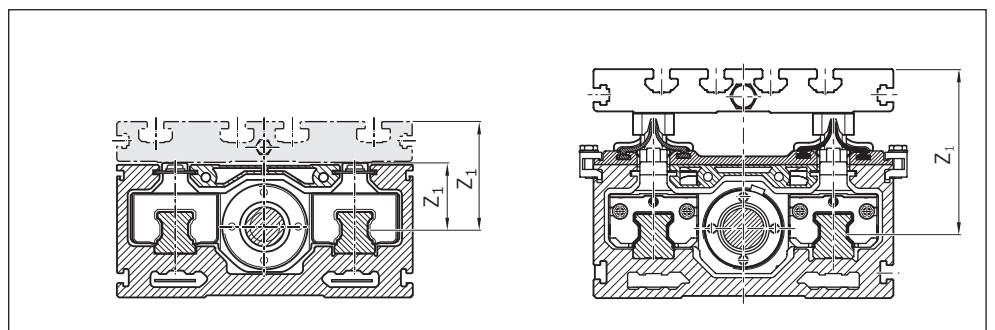


Regarding the desired service life, general loads for F_{mgw} , F_{mbs} should not exceed around 20% of the dynamic characteristic values (C_{gw} , C_{bs}).

See "Project planning" chapter.

Do not exceed the technical data for the linear motion system.

Application point of the effective force (Z_1)



Modulus of elasticity E

$E = 70,000 \text{ N/mm}^2$

Maximum permissible load

When selecting linear motion systems, it is essential to consider the maximum permissible load and force tolerances according to the table. The values depend on the system. In other words, the tolerances are determined not only by the load capacities of the bearing points but are also based on design and material.

Conditions for combined loads:

$$\frac{|F_y|}{F_{y \max}} + \frac{|F_z|}{F_{z \max}} + \frac{|M_x|}{M_{x \max}} + \frac{|M_y|}{M_{y \max}} + \frac{|M_z|}{M_{z \max}} \leq 1$$

Life expectancy calculation of the linear guide

The service life of the rolling bearing points contained in a linear motion system can be calculated using the formulas given below. The roller bearing points that determine the life of a linear motion system with ball screw assembly are the linear guide, the ball screw assembly (nut) and the fixed bearing. The linear guide in the linear motion system must withstand the load as well as any process forces that occur.

⚠ The calculated service life specification for the linear motion system is determined by the shortest of the separately determined service life values for linear guide, ball screw assembly or fixed bearing.

Where the operating conditions vary (speed and load), the service life must be calculated using the average values v_{mgw} and F_{mgw} .

Nominal service life in meters:

$$L_{gw} = \left(\frac{C_{gw}}{F_{mgw}} \right)^3 \cdot 10^5$$

Nominal service life in hours:

$$L_{hgw} = \frac{L_{gw}}{3600 \cdot v_{mgw}}$$

Dynamically equivalent load on bearing of the guideway:

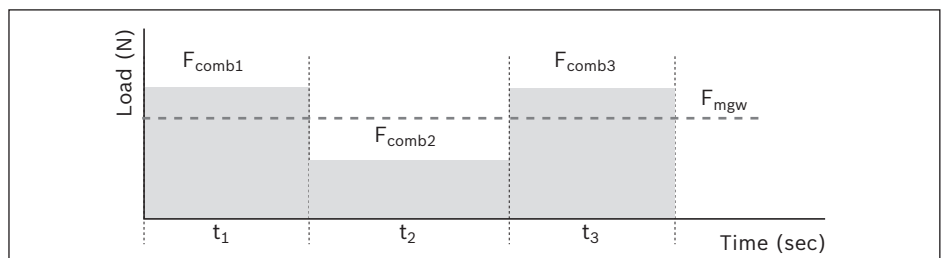
$$F_{mgw} = \sqrt[3]{|F_{eff1}|^3 \cdot \frac{q_{t1}}{100\%} + |F_{eff2}|^3 \cdot \frac{q_{t2}}{100\%} + |F_{eff3}|^3 \cdot \frac{q_{t3}}{100\%} + |F_{effn}|^3 \cdot \frac{q_{tn}}{100\%}}$$

The following applies to linear motion systems:

$$F_{eff} = F_{comb}$$

Combined equivalent bearing load:

$$F_{comb} = |F_y| + |F_z| + C_{gw} \cdot \frac{|M_x|}{M_t} + C_{gw} \cdot \frac{|M_y|}{M_L} + C_{gw} \cdot \frac{|M_z|}{M_L}$$



Average linear speed of the guideway:

$$v_{mgw} = \frac{|v_1| \cdot q_{t1} + |v_2| \cdot q_{t2} + \dots + |v_n| \cdot q_{tn}}{100\%}$$

Service life of ball screw assembly or fixed bearing

Where the operating conditions vary (rotary speed and load), the service life must be calculated using the average values F_{mbs} and n_m .

Nominal service life in revolutions:

$$L_{bs} = \left(\frac{C_{bs}}{F_{mbs}} \right)^3 \cdot 10^6$$

Nominal service life in hours:

$$L_{hbs} = \frac{L_{bs}}{60 \cdot n_m}$$

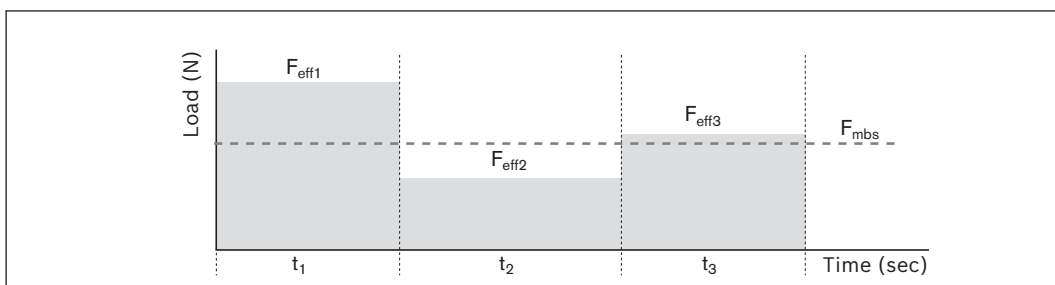
Dynamically equivalent load on bearing of the ball screw assembly:

$$F_{mbs} = \sqrt[3]{|F_{eff1}|^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100\%} + |F_{eff2}|^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100\%} + |F_{eff3}|^3 \cdot \frac{|n_3|}{n_m} \cdot \frac{q_{t3}}{100\%} + \dots + |F_{effn}|^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100\%}}$$

The following applies to the axial load F_n for linear motion systems:

$$F_{eff} = |F_n|$$

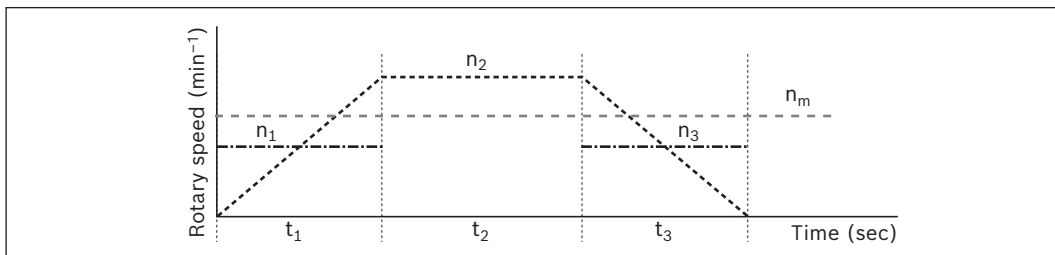
When both the load and the rotary speed vary, the average load F_{mbs} is calculated as follows:



Average rotary speed of the screw:

$$n_m = \frac{|n_1| \cdot q_{t1} + |n_2| \cdot q_{t2} + \dots + |n_n| \cdot q_{tn}}{100\%} = \frac{v_{mgw} \cdot 60\,000}{P}$$

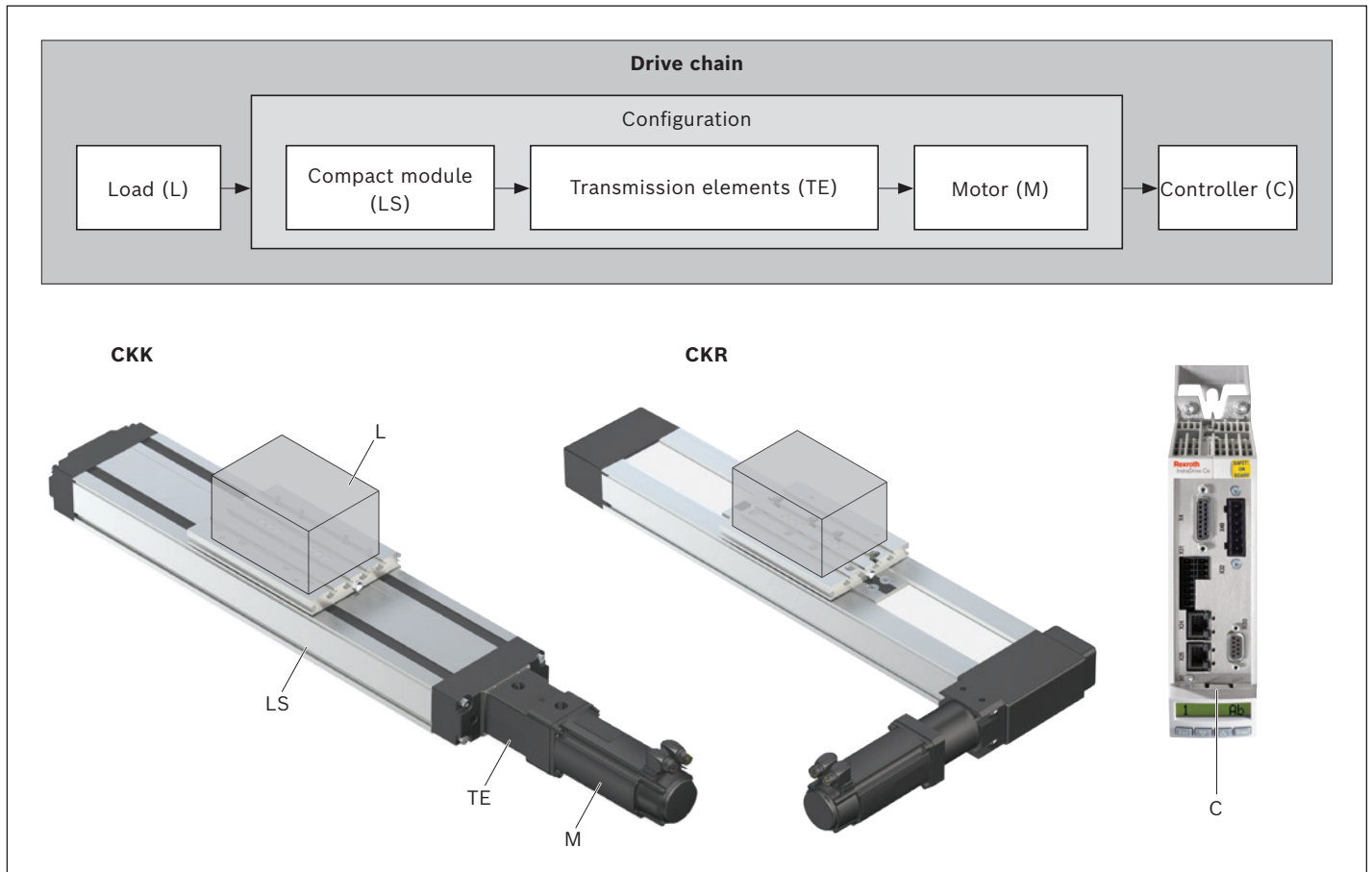
If rotary speed varies, average rotary speed n_m is calculated as follows:



Rotary speed in acceleration and braking phases $n_{1 \dots n}$:

$$n_{1 \dots n} = \frac{n_{A1 \dots n} + n_{E1 \dots n}}{2}$$

Drive sizing



The correct dimensioning and assessment of an application requires structured consideration of the drive chain as a whole.

The basic element of the drive chain is the configuration – made up of the linear motion system, the transmission element (coupling, belt side drive or gear unit) and the motor – which can be ordered in that constellation in the catalog.

Basic principles

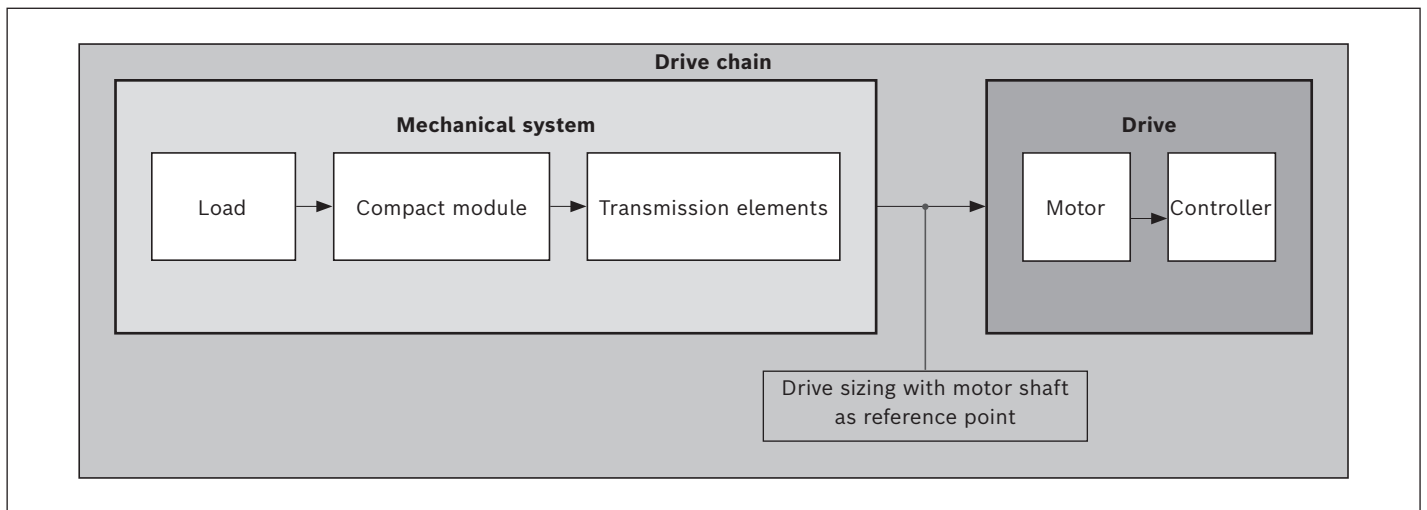
For drive sizing, the drive chain can be divided into mechanical system and drive system.

The **mechanical** system includes the physical components – linear motion system and the transmission elements (belt side drive, coupling) – 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

For every component (linear motion system, coupling, belt side drive, gear unit), the corresponding maximum permissible limits for drive torque and speed, and the base values for friction torque and mass moment of inertia have to be used.

The following technical data with the associated formula symbols are used when considering the basic **mechanical** system requirements in the design calculations for sizing the drive. The data listed in the table below can be found in the chapter "Technical Data" or is determined using formulas based on the descriptions on the following pages.

	Mechanical system				
	Load	Linear motion system	Transmission element		
			Coupling	Belt side drive	Gearing
Weight moment	(Nm)	$M_g^{5)}$	—	—	—
Friction torque	(Nm)	$—^{4)}$	$M_{Rs}^{3)}$	—	$M_{Rge}^{3)}$
Mass moment of inertia	(kgm ²)	$J_t^{1)}$	$J_s^{2)}$	$J_c^{3)}$	$J_{sd}^{3)}$
Max. permissible speed	(m/s)	—	$v_{max}^{3)4)}$	—	—
Max. permissible rotary speed	(rpm)	—	$n_p^{1)}$	—	$n_{ge}^{3)}$
Max. permissible drive torque	(Nm)	—	$M_p^{3)4)}$	$M_{cN}^{3)}$	$M_{sd}^{3)}$

- 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) CKK: Length-dependent value, to be read off the graph
- 5) Any additional process forces are to be taken into consideration as load moments
- 6) For vertical installation position: Determine the value using the appropriate formula

Drive sizing with motor shaft as reference point

When sizing 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. 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} (maximum 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

Compact modules CKK

Friction torque M_R

For motor attachment via flange and coupling

$$M_R = M_{Rs}$$

For motor attachment via belt side drive

$$M_R = M_{Rsd} + \frac{M_{Rs}}{i}$$

Mass moment of inertia J_{ex}

For motor attachment via flange and coupling

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

For motor attachment via belt side drive

$$J_{ex} = J_{sd} + \frac{(J_s + J_t)}{i^2}$$

Compact modules CKR

Friction torque M_R

For motor attachment via gear

$$M_R = M_{Rge} + \frac{M_{Rs}}{i}$$

Mass moment of inertia J_{ex}

For direct motor attachment (without gear)

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

For motor attachment via gear

$$J_{ex} = J_{ge} + \frac{(J_s + J_t)}{i^2}$$

Mass moment of inertia of linear motion system

$$J_s = (k_{J \text{ fix}} + k_{J \text{ var}} \cdot L) \cdot 10^{-6}$$

Determination of translative mass moment of inertia of the external load

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

Maximum permissible speed v_{mech} or maximum permissible rotary speed n_{mech}

The lowest of all the values for permissible speed or rotary speed of all mechanical components contained in the drive chain determines the maximum permissible speed of the mechanical system which has to be taken into consideration as the upper limit for the drive when sizing the motor.

Depending on the system, the maximum permissible speed/rotary speed of the linear motion system with ball screw assembly is always below the limits for the coupling or belt side drive components, meaning it determines the maximum permissible speed of the mechanical system.

Compact modules CKK

Maximum permissible speed

$$v_{\text{mech}} = v_{\text{max}}$$

Maximum permissible rotary speed

For motor attachment via flange and coupling

$$n_{\text{mech}} = \frac{v_{\text{mech}} \cdot 1\,000 \cdot 60}{p}$$

For motor attachment via belt side drive

$$n_{\text{mech}} = \frac{v_{\text{mech}} \cdot i \cdot 1\,000 \cdot 60}{p}$$

Compact modules CKR

Maximum permissible speed

For direct motor attachment (without gear)

$$v_{\text{mech}} = v_{\text{max}}$$

$$v_{\text{mech}} = \frac{n_{\text{mech}} \cdot \pi \cdot d_3}{1000 \cdot 60}$$

For motor attachment via gear

$$v_{\text{mech}} = \frac{n_{\text{mech}} \cdot \pi \cdot d_3}{i \cdot 1\,000 \cdot 60}$$

Maximum permissible rotary speed

For direct motor attachment (without gear)

$$n_{\text{mech}} = \frac{v_{\text{mech}} \cdot 1\,000 \cdot 60}{\pi \cdot d_3}$$

$$n_{\text{mech}} = n_p$$

For motor attachment via gear

$$n_p = \frac{v_{\text{max}} \cdot 1\,000 \cdot 60}{\pi \cdot d_3}$$

$$n_{\text{mech}} = \text{minimum}(n_p \cdot i; n_{\text{ge}})$$

Maximum permissible drive torque M_{mech}

The lowest (minimum) of all the values for permissible drive torque of all mechanical components contained in the drive chain determines the maximum permissible drive torque of the mechanical system which has to be taken into consideration as the upper limit for the drive when sizing the motor.

Compact modules CKK

For motor attachment via flange and coupling

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

For motor attachment via belt side drive

$$M_{\text{mech}} = \text{minimum} (M_{\text{sd}}; \frac{M_{\text{p}}}{i})$$

Compact modules CKR

For direct motor attachment
(without gear)

$$M_{\text{mech}} = M_{\text{p}}$$

For motor attachment via gear

$$M_{\text{mech}} = \text{minimum} (\frac{M_{\text{ge}}}{i}; \frac{M_{\text{p}}}{i})$$

⚠ When considering the complete drive chain (mechanical system + motor/controller), the maximum torque of the motor can lie below the upper 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.

General motor preselection

The motor can be generally preselected using the following conditions.

Condition 1:

The rotary speed of the motor must be greater than or equal to the rotary speed required for the mechanical system (but not exceeding the maximum permissible limit value).

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

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.

Ratio of mass moments of inertia

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

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

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

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

Compact modules CKK

Weight moment

For vertical installation position only!

For motor attachment via flange and coupling: $i = 1$

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

Compact modules CKR

Weight moment For vertical installation position only!

$$M_g = \frac{d_3 \cdot (m_{ex} + m_{ca}) \cdot g}{2\,000 \cdot i}$$

In the chapter titled ➡ "Configuration and ordering", users can put together standard configurations, including motor attachment, gears and motor, for the various linear motion system sizes by selecting the appropriate options. By checking the above conditions, 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 sizing the drive, the maximum permitted values for linear speed, drive torque and acceleration must not be exceeded, in order to avoid damaging the mechanical system.

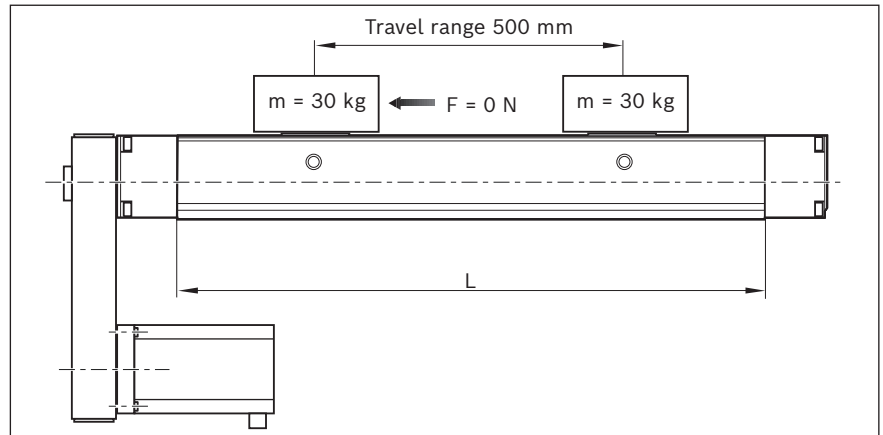
Calculation example CKK

Given data

In a handling task, a mass of 30 kg is to be moved horizontally by 500 mm at a travel speed of 0.5 m/s. The following was selected based on the technical data and the installation space:

Compact module CKK-110

- ▶ Carriage with connection plate
 $L_{ca} = 155 \text{ mm}$
- ▶ With cover strip
- ▶ Motor attachment via belt side drive,
 $i = 1.5$
- ▶ With motor MS2N04-B0BTN with brake



Estimation of length L

(For an initial estimate, the greatest possible lead and length are used for the calculation since the permissible speed can decrease as length increases.)

	$L = s_{eff} + 2 \cdot s_e + L_{ca} + L_{ad}$
Excess travel:	$s_e = 2 \cdot P = 2 \cdot 16 = 32 \text{ mm}$
Max. travel range:	$s_{max} = s_{eff} + 2 \cdot s_e$
	$= 500 + 2 \cdot 32 = 564 \text{ mm}$
Length:	$L = 564 + 155 + 20 = 739 \text{ mm}$

Selection of the ball screw assembly

(Better to choose the lowest lead as this is favorable in terms of resolution, braking distance, length.)

Permissible ball screw assemblies according to "Permissible speed" graph with given $v = 0.5 \text{ m/s}$ and $L = 739 \text{ mm}$:

BASA 16 x 10 and BASA 16 x 16

Selected ball screw assembly (lower lead):

BASA 16 x 10

Maximum permissible speed for BASA 16 x 10 from graph:

$$v_{max} = 0.77 \text{ m/s}$$

Calculation of length L

(for selected ball screw assembly)

Excess travel:	$s_e = 2 \cdot P = 2 \cdot 10 = 20 \text{ mm}$
Max. travel range:	$s_{max} = s_{eff} + 2 \cdot s_e$
	$= 500 + 2 \cdot 20 = 540 \text{ mm}$
Length:	$L = 540 + 155 + 20 = 715 \text{ mm}$

Friction moment M_R

(motor attachment via belt side drive)

	$M_R = M_{Rsd} + \frac{M_{Rs}}{i}$
Compact module:	$M_{Rs} = 0.43 \text{ Nm}$
Belt side drive:	$M_{Rsd} = 0.40 \text{ Nm} (i = 1.5)$
Friction torque:	$M_R = 0.40 + \frac{0.43}{1.5} = 0.69 \text{ Nm}$

Mass moment of inertia J_{ex}

(motor attachment via belt side drive)

$$\begin{aligned}
 J_{ex} &= J_{sd} + \frac{(J_s + J_t)}{i^2} \\
 \text{Belt side drive: } J_{sd} &= 82 \cdot 10^{-6} \text{ kgm}^2 \\
 \text{Compact module: } J_s &= (k_{J \text{ fix}} + k_{J \text{ var}} \cdot L) \cdot 10^{-6} \\
 &= (8.432 + 0.031 \cdot 715) \cdot 10^{-6} \\
 &= 30.597 \cdot 10^{-6} \text{ kgm}^2 \\
 \text{External load: } J_t &= m_{ex} \cdot k_{J m} \cdot 10^{-6} \\
 &= 30 \cdot 2.533 \cdot 10^{-6} \\
 &= 75.99 \cdot 10^{-6} \text{ kgm}^2 \\
 \text{Mass moment of inertia: } J_{ex} &= 82 \cdot 10^{-6} + \frac{(30.597 \cdot 10^{-6} + 75.99 \cdot 10^{-6})}{1.5^2} \\
 &= 129.372 \cdot 10^{-6} \text{ kgm}^2
 \end{aligned}$$

Maximum permissible rotary speed n_{mech}

(motor attachment via belt side drive)
 mechanical system limit

$$\begin{aligned}
 n_{mech} &= \frac{(0.77 \cdot 1.5 \cdot 1\,000 \cdot 60)}{10} \\
 \text{Max. permissible speed: } v_{mech} &= v_{max} = 0.77 \text{ m/s} \\
 \text{Max. permissible rotary speed: } n_{mech} &= \frac{(v_{mech} \cdot i \cdot 1,000 \cdot 60)}{P} \\
 &= 6\,930 \text{ min}^{-1}
 \end{aligned}$$

Maximum rotary speed of the application n_{mech}

(motor attachment via belt side drive)
 application limit

$$\begin{aligned}
 \text{Speed: } v_{mech} &= 0.5 \text{ m/s} \\
 \text{Rotary speed: } n_{mech} &= \frac{0.5 \cdot 1.5 \cdot 1\,000 \cdot 60}{10} \\
 &= 4\,500 \text{ min}^{-1}
 \end{aligned}$$

Calculation example CKK

Maximum permissible

drive torque M_{mech}

(motor attachment via belt side drive)
mechanical system limit

$$M_{\text{mech}} = \text{Minimum} \left(M_{\text{sd}}; \frac{M_{\text{p}}}{i} \right)$$

Belt side drive: $M_{\text{sd}} = 5.11 \text{ Nm}$ (gear ratio $i = 1.5$ for MS2N04-B0BTN)

Compact module: $M_{\text{p}} = 13.51 \text{ Nm}$

Drive torque: $M_{\text{mech}} = \text{Minimum} \left(5.11; \frac{13.51}{1.5} \right)$
 $= \text{Minimum} (5.11; 9.0)$
 $= 5.11 \text{ Nm}$

Motor preselection check

Selected motor:

MS2N04-B0BTN with brake

Condition 1:

Rotary speed: $n_{\text{max}} \geq n_{\text{mech}}$
 $6,000 \geq 4500$ condition met – motor selection OK

Condition 2:

Mass moment of inertia ratio: $V = \frac{J_{\text{ex}}}{J_{\text{m}} + J_{\text{br}}}$

Motor inertia: $J_{\text{m}} = 70 \cdot 10^{-6} \text{ kgm}^2$

Brake moment of inertia: $J_{\text{br}} = 40 \cdot 10^{-6} \text{ kgm}^2$

Moment of inertia ratio: $V = \frac{129.372 \cdot 10^{-6}}{(70 \cdot 10^{-6} + 40 \cdot 10^{-6})} = 1.18$

Handling condition: $V \leq 6$
 $1.18 \leq 6$ condition met
 – motor selection OK

Condition 3:

Torque ratio: $\frac{M_{\text{stat}}}{M_0} \leq 0.6$

Static load moment: $M_{\text{stat}} = M_{\text{R}} + M_{\text{g}}$ (installed horizontally $M_{\text{g}} = 0$)
 $= 0.69 \text{ Nm}$

Continuous motor torque: $M_0 = 1.75 \text{ Nm}$

Torque ratio: $\frac{0.69}{1.75} = 0.39$
 $0.39 \leq 0.6$ condition met
 – motor selection OK

All three conditions met ⇒ Selected motor is suitable for the application.

Result

Compact module CKK-110

Length: $L = 715 \text{ mm}$
 Max. travel range: $s_{\max} = 540 \text{ mm}$
 Carriage length: $L_{ca} = 155 \text{ mm}$
 Ball screw assembly: Nominal diameter: $d_0 = 16 \text{ mm}$
 Lead: $P = 10 \text{ mm}$

With cover strip
 Motor attachment via belt side drive, gear ratio $i = 1.5$
 Motor preselection: MS2N04-B0BTN with brake

For precise sizing of the electric drive, the motor-controller combination must always be considered, as the performance data (e.g. maximum useful speed and maximum torque) will depend on the controller used.

When doing this, the following data must be considered:

Friction torque: $M_R = 0.69 \text{ Nm}$
 Mass moment of inertia: $J_{ex} = 129.372 \cdot 10^{-6} \text{ kgm}^2$
 Speed: $v_{\text{mech}} = 0.5 \text{ m/s}$ ($n_{\text{mech}} = 4\,500 \text{ rpm}$)
 Drive torque limit: $M_{\text{mech}} = 5.11 \text{ Nm}$

⇒ The motor torque must be limited to 5.11 Nm on the drive side!

Acceleration limit: $a_{\max} = 50 \text{ m/s}^2$
 Limit for speed: $v_{\max} = 0.77 \text{ m/s}$ ($n_{\text{mech}} = 6\,930 \text{ rpm}$)

Besides the preferred type MS2N04-B0BTN, other motors with identical connection dimensions can be adapted while taking care not to exceed the calculated limit values.

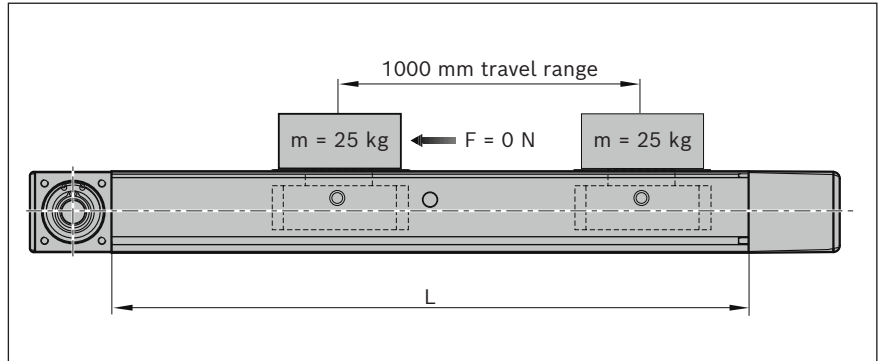
Calculation example CKR

Given data

In a handling task, a mass of 25 kg is to be moved horizontally by 1000 mm at a travel speed of 1.5 m/s. The following was selected based on the technical data and the installation space:

compact module CKR-145

- ▶ Carriage length = 190 mm
- ▶ With connection plate
- ▶ Motor attachment via planetary gear, $i = 5$
- ▶ With motor MS2N04-D0BQN without brake



Calculation of length L

(In most cases, 2x feed constant is sufficient as general guideline value for excess travel. The excess travel must be greater than the emergency stop stopping distance, which is calculated for exact sizing of the electrical drive.)

$$\begin{aligned}
 L &= s_{\max} + L_{ca} + L_{ad} \\
 \text{Feed constant: } u &= \frac{u(i=1)}{i} \\
 &= \frac{165}{5} = 33 \text{ mm} \\
 \text{Excess travel: } s_e &= 2 \cdot u = 2 \cdot 33 = 66 \text{ mm} \\
 \text{Max. travel range: } s_{\max} &= s_{\text{eff}} + 2 \cdot s_e \\
 &= 1\,000 + 2 \cdot 66 = 1\,132 \text{ mm} \\
 \text{Length: } L &= 1\,132 + 190 + 75 = 1\,397 \text{ mm}
 \end{aligned}$$

Friction torque M_R

$$\begin{aligned}
 M_R &= M_{Rge} + \frac{M_{Rs}}{i} \\
 \text{Compact module: } M_{Rs} &= 2.04 \text{ Nm} \\
 \text{Gear: } M_{Rge} &= 0.17 \text{ Nm} \\
 \text{Friction torque: } M_R &= 0.17 + \frac{2.04}{5} = 0.58 \text{ Nm}
 \end{aligned}$$

Mass moment of inertia J_{ex}

$$\begin{aligned}
 J_{ex} &= J_{ge} + \frac{(J_s + J_t)}{i^2} \\
 \text{Gear: } J_{ge} &= 27 \cdot 10^{-6} \\
 \text{Compact module: } J_s &= (k_{J \text{ fix}} + k_{J \text{ var}} \cdot L) \cdot 10^{-6} \\
 &= (2\,276.71 + 0.3172 \cdot 1\,397) \cdot 10^{-6} \\
 &= 2\,719.838 \cdot 10^{-6} \text{ kgm}^2 \\
 \text{External load: } J_t &= m_{ex} \cdot k_{Jm} \cdot 10^{-6} \\
 &= 25 \cdot 689.59 \cdot 10^{-6} \\
 &= 17\,239.75 \cdot 10^{-6} \text{ kgm}^2 \\
 \text{Mass moment of inertia: } J_{ex} &= 27 \cdot 10^{-6} + \frac{(2\,719.838 \cdot 10^{-6} + 17\,239.75 \cdot 10^{-6})}{5^2} \\
 &= 825.384 \cdot 10^{-6} \text{ kgm}^2
 \end{aligned}$$

Maximum permissible rotary speed n_{mech}

(Motor attachment via gear reducer,
 without considering the motor)

Limit for mechanical system

$$n_{\text{mech}} = \text{Minimum} (n_p \cdot i ; n_{\text{ge}})$$

Compact module: $n_p = \frac{(v_{\text{max}} \cdot 1\,000 \cdot 60)}{\pi \cdot d_3}$

$$= \frac{(5 \cdot 1\,000 \cdot 60)}{\pi \cdot 52.52}$$

$$= 1\,818 \text{ rpm}$$

Gear: $n_{\text{ge}} = 8\,000 \text{ rpm}$

Max. permissible rotary speed: $n_{\text{mech}} = \text{Minimum} (1\,818 \cdot 5 ; 8\,000)$

$$= \text{Minimum} (9\,090 ; 8\,000)$$

$$= 8\,000 \text{ rpm}$$

Maximum permissible speed v_{mech}

(Motor attachment via gear reducer,
 without considering the motor)

Limit for mechanical system

$$v_{\text{mech}} = \frac{(n_{\text{mech}} \cdot \pi \cdot d_3)}{i \cdot 1\,000 \cdot 60}$$

Max. permissible speed: $v_{\text{mech}} = \frac{(8\,000 \cdot \pi \cdot 52.52)}{5 \cdot 1\,000 \cdot 60}$

$$= 4.4 \text{ m/s}$$

Maximum permitted rotary speed of the application n_{mech}

(Motor attachment via gear reducer,
 without considering the motor)

Application tolerance

Speed: $v_{\text{mech}} = 1.5 \text{ m/s}$

Rotary speed: $n_{\text{mech}} = \frac{(1.5 \cdot 5 \cdot 1\,000 \cdot 60)}{\pi \cdot 52.52}$

$$= 2\,727 \text{ rpm}$$

Maximum permissible drive torque M_{mech}

(Motor attachment via gear reducer,
 without considering the motor)

Limit for mechanical system

$$M_{\text{mech}} = \text{Minimum} \left(\frac{M_{\text{ge}}}{i} ; \frac{M_p}{i} \right)$$

Compact module: $M_p = 32.5 \text{ Nm}$

Gear: $M_{\text{ge}} = 40 \text{ Nm}$

Drive torque: $M_{\text{mech}} = \text{Minimum} \left(\frac{40}{5} ; \frac{32.5}{5} \right)$

$$= \text{Minimum} (8.0 ; 6.5)$$

$$= 6.5 \text{ Nm}$$

Calculation example CKR

Motor preselection check

Selected motor:
 MS2N04-D0BQN without brake

Condition 1:
 Rotary speed: $n_{\max} \geq n_{\text{mech}}$
 $6,000 \geq 2727$ condition met – motor selection OK

Condition 2:
 Mass moment of inertia ratio: $V = \frac{J_{\text{ex}}}{J_m + J_{\text{br}}}$
 Motor inertia: $J_m = 160 \cdot 10^{-6} \text{ kgm}^2$
 Brake moment of inertia: $J_{\text{br}} = 0 \text{ kgm}^2$ (without brake)
 Moment of inertia ratio: $V = \frac{825.384 \cdot 10^{-6}}{160 \cdot 10^{-6}}$
 $= 5.16$
 Handling condition: $V \leq 6$
 $5.16 \leq 6$ condition met
 – motor selection OK

Condition 3:
 Torque ratio: $\frac{M_{\text{stat}}}{M_0} \leq 0.6$
 Static load moment: $M_{\text{stat}} = M_R + M_g$ (installed horizontally $M_g = 0$)
 $\frac{0.58}{3.85} = 0.58 \text{ Nm}$
 Continuous torque
 of the motor: $M_0 = 3.85 \text{ Nm}$
 Torque ratio: $= 0.15$
 $0.15 \leq 0.6$ condition met
 – motor selection OK

All three conditions met \Rightarrow selected motor is suitable for the application.

Result

compact module CKR-145

Length $L = 1\,397\text{ mm}$

Max. travel range $s_{\max} = 1\,132\text{ mm}$

Carriage length $L_{\text{ca}} = 190\text{ mm}$

Toothed belt drive

With connection plate

Motor attachment via planetary gear, gear ratio $i = 5$

Motor preselection: MS2N04-D0BQN without brake

For precise sizing of the electric drive, the motor-controller combination must always be considered, as the performance data (for example, maximum useful speed and maximum torque) will depend on the controller used.

When doing this, the following data must be considered.

Friction torque $M_R = 0.58\text{ Nm}$

Mass moment of inertia $J_{\text{ex}} = 825.384 \cdot 10^{-6}\text{ kgm}^2$

Travel speed $v_{\text{mech}} = 1.5\text{ m/s}$ ($n_{\text{mech}} = 2\,727\text{ min}^{-1}$)

Drive torque limit $M_{\text{mech}} = 6.5\text{ Nm}$

➡ The motor torque must be limited to 6.5 Nm on the drive side!

Acceleration limit $a_{\max} = 50\text{ m/s}^2$

Limit for travel speed $v_{\max} = 3.3\text{ m/s}$ ($n_{\max} = 6\,000\text{ min}^{-1}$)

After determining the emergency-stop stopping distance during precise sizing, the selected excess travel must be checked to see whether it is sufficient and adjusted if necessary.

Besides the preferred type MS2N04-D0BQ, other motors with identical connection dimension can be adapted while taking care not to exceed the calculated limits.

Abbreviations

Abbreviation/ index	Designation	Unit
a	Acceleration	(m/s ²)
a_{max}	Maximum acceleration rate	(m/s ²)
BASA	Ball screw assembly	(–)
B_t	Belt type	(–)
c_{spe}	Specific spring rate	(N)
C_{gw}	Dynamic load capacity, guideway	(N)
C_{bs}	Dynamic load capacity, ball screw assembly	(N)
C_{fb}	Dynamic load capacity, fixed bearing	(N)
d₀	Nominal diameter, ball screw assembly	(mm)
d₃	Belt pulley diameter	(mm)
f_w	Load factor	(–)
F_n	Axial load of the ball screw assembly	(N)
F_{eff}	Effective equivalent axial load	(N)
F_{bp}	Max. belt drive transmission force	(N)
F_{comb}	Combined equivalent bearing load	(N)
F_{mbs}	Dynamically equivalent load on bearing of the ball screw assembly	(N)
F_{mgw}	Dynamically equivalent load on bearing of the guideway	(N)
F_n	Axial load of the ball screw assembly	(N)
F_{t zul}	Belt elasticity limit	(N)
F_y	Load due to a resulting force in the y-direction	(N)
F_{y max}	Maximum dynamic load in y-direction	(N)
F_z	Load due to a resulting force in the z-direction	(N)
F_{z max}	Maximum dynamic load in z-direction	(N)
g	Gravitational acceleration (= 9.81)	(m/s ²)
i	Gear ratio	(–)
I_y	Planar moment of inertia about the y-axis	(cm ⁴)
I_z	Planar moment of inertia about the z-axis	(cm ⁴)
J_{br}	Mass moment of inertia of the motor brake	(kgm ²)
J_c	Mass moment of inertia of the coupling	(kgm ²)
J_{dc}	Mass moment of inertia of the drive train	(kgm ²)
J_{ex}	Mass moment of inertia of the mechanical system	(kgm ²)
J_{ge}	Mass moment of inertia of the gear about the motor journal	(kgm ²)
J_m	Mass moment of inertia of the motor	(kgm ²)
J_s	Mass moment of inertia of the linear motion system	(kgm ²)
J_{sd}	Mass moment of inertia of the belt side drive about the motor journal	(kgm ²)
J_t	Translative mass moment of inertia of external load based on the linear motion system screw journal	(kgm ²)
k_{g fix}	Constant for fixed portion of mass	(kg)
k_{g var}	Constant for variable-length portion of mass	(kg/mm)

Abbreviation/ index	Designation	Unit
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	Length of the linear motion system	(mm)
L_{ad}	Additional length	(mm)
L_{ca}	Carriage length	(mm)
L_{bs}	Nominal service life (ball screw assembly, fixed bearing)	(rpm)
L_{hbs}	Nominal service life (ball screw assembly, fixed bearing)	(h)
L_{gw}	Nominal service life of the guideway	(m)
L_{hgw}	Nominal service life of the guideway	(h)
L_m	Length of the motor	(mm)
L_{max}	Max. length	(mm)
L_w	Centerline-to-centerline distance between carriages	(mm)
m_{br}	Holding brake mass	(kg)
m_{ca}	Moved mass of system of carriage	(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)
M₀	Continuous motor torque	(Nm)
M_{cN}	Rated torque of coupling	(Nm)
M_g	Weight moment at motor journal	(Nm)
M_{ge}	Maximum permissible acceleration torque of the gear (at the output drive)	(Nm)
M_L	Dynamic longitudinal moment load capacity	(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)
M_{Rge}	Friction torque of gear at motor journal	(Nm)
M_{Rs}	Friction torque of system	(Nm)
M_{Rsd}	Friction torque of belt side drive at motor journal	(Nm)
M_{sd}	Maximum permissible drive torque of the belt side drive	(Nm)
M_{stat}	Static load moment	(Nm)
M_t	Dynamic torsional moment load capacity	(Nm)
M_x	Dynamic torsional moment around the x-axis	(Nm)
M_{x max}	Maximum permissible torsional moment around the x-axis	(Nm)

Abbreviation/ index	Designation	Unit
M_y	Dynamic torsional moment around the y-axis	(Nm)
$M_{y \max}$	Maximum permissible torsional moment around the y-axis	(Nm)
M_z	Dynamic torsional moment around the z-axis	(Nm)
$M_{z \max}$	Maximum permissible torsional moment around the z-axis	(Nm)
n	Rotary speed of the ball screw assembly	(rpm)
n_1, n_2, \dots, n_n	Rotary speed in acceleration and braking phases	(rpm)
$n_{A1 \dots n}$	Starting speed in phase 1 ... n	(rpm)
$n_{E1 \dots n}$	Ending speed in phase 1 ... n	(rpm)
n_{ge}	Maximum permissible rotary speed of the gear	(rpm)
n_m	Average rotary speed of the ball screw assembly	(rpm)
n_{mech}	Maximum permissible rotary speed for mechanical system	(rpm)
n_{max}	Max. motor speed	(rpm)
n_p	Maximum permissible rotary speed of the linear motion system	(rpm)
P	Screw lead	(mm)
P_{app}	Effective power in application	(W)
Keyway	Keyway	(–)
$qt_{1..n}$	Time step of the phases	(%)
s_a	Acceleration travel	(mm)
s_e	Excess travel (excess travel s_e should be greater than braking distance. The acceleration travel can be assumed as the guideline value for the braking distance.)	(mm)
s_{eff}	Effective stroke	(mm)
s_{min}	Minimum travel range	(mm)
s_{max}	Maximum travel	(mm)
SPU	Screw support	
t_a	Acceleration/braking time	(s)
t_1, t_2, \dots, t_n	Time for phase 1 ... n	(s)
u	Feed constant	(mm/rev)
v_1, v_2, \dots, 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_{mgw}	Average linear speed of the guideway	(m/s)
V	Ratio of mass moments of inertia of drive chain and motor	(–)
z_1	Application point of the effective force	(mm)

Ordering example CKK

Ordering data		Explanation
Compact module	CKK-110-NN-1	Compact module with ball screw assembly CKK-110-NN-1
Length L	715	Length = 715 mm
Version	RV01	Belt side drive
Guideway	01	Standard main body
Lubrication ¹⁾	LSS	Standard lubrication
Drive		
BASA (ball screw assembly d ₀ x P)	02	Nominal diameter = 16 mm, lead = 10 mm
Carriage		
Carriage ²⁾	41	Carriage with connection plate, L _{ca} = 155 mm
Carriage centerline-to-centerline distance L _w	–	Only necessary with carriages with variable center-to-center distance
Motor attachment		
Gear ratio	–	Without gear ratio
Attachment kit ³⁾	23	Motor attachment for MS2N04-C0BTN servo motor
Motor		
Motor code	212	MS2N04-B0BTN, 1 cable, with brake
Motor connector position	270	Motor connector position = 270°
Cover		
Cover	02	With cover strip
Switching system (max. 6 switches/sensors selectable)		
Sensor 1	21	REED, changeover contact (NC: C+NC, NO: C+NO)
Sensor 2	22	Hall, PNP normally closed (NC)
Sensor 3	21	REED, changeover contact (NC: C+NC, NO: C+NO)
Cable duct / cable channel	25	Cable duct
Socket-connector	17	Socket-connector
Documentation	01	Standard report

¹⁾ Not part of the option key

²⁾ For the permissible values see "General technical data"

³⁾ The motor geometry code is required for motors according to customer specifications

Inquiry/order form for CKK

Ordering data		Explanation
Compact module		
Length L		
Version		
Guideway		
Lubrication ¹⁾		
Drive		
BASA (ball screw assembly d ₀ x P)		
Carriage		
Carriage ²⁾		
Carriage centerline-to-centerline distance L _w		
Motor attachment		
Gear ratio		
Attachment kit ³⁾		
Motor		
Motor code		
Motor connector position		
Cover		
Cover		
Switching system		
Sensor 1		
Sensor 2		
Sensor 3		
Cable duct / cable channel		
Socket-connector		
Documentation		

- ¹⁾ Not part of the option key
- ²⁾ For the permissible values see "General technical data"
- ³⁾ The motor geometry code is required for motors according to customer specifications

Motor attachment kits according to customer specification (motor geometry code)

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

□□ - □□ - □□□ - □□□ - □□□ - **M**□□ - □□□ - □□□

- ∅D** = Shaft diameter
- C** = Shaft length
- ∅E** = Centering diameter
- C₁** = Centering depth
- ∅F** = Pitch diameter
- ∅G** = Drill hole for fastening screw (specify thread diameter)
- B₁** = Flange thickness
- A** = Flange edge dimension

Quantity Acceptance of: ____ pcs, ____ per month, ____ per year, per order, or

Comments: _____

From
 Company: _____ Name: _____
 Address: _____ Department: _____
 _____ Phone: _____
 _____ Fax: _____

Ordering example CKR

Ordering data		Explanation
Compact module	CKR-110-NN-1	Compact module with toothed belt drive CKR-110-NN-1
Length L	1500	Length = 1500 mm
Version	MG10	Gear attachment right
Guideway	01	Standard main body
Drive		
Toothed belt drive	08	Toothed belt drive, with attachment kit for gearbox and second journal
Lubrication ¹⁾	LSS	Standard lubrication
Carriage		
Carriage ²⁾	41	Carriage with connection plate, $L_{ca} = 155$ mm
Motor attachment		
Gearing	23	Gearing PG050, $i=5$ for motor MS2N04
Motor		
Motor code	212	MS2N04-B0BTN, 1 cable connection, with brake
Motor connector position	090	Motor connector position = 90°
Switching system (max. 6 switches/sensors selectable)		
Sensor 1	21	REED, changeover contact (NC: C+NC, NO: C+NO)
Sensor 2	22	Hall, PNP normally closed (NC)
Sensor 3	21	REED, changeover contact (NC: C+NC, NO: C+NO)
Cable duct / cable channel	25	Cable duct
Socket-connector	17	Socket-connector
Documentation	01	Standard report

¹⁾ Not part of the option key

²⁾ For the permissible values see "General technical data"

Inquiry/order form for CKR

Ordering data		Explanation
Compact module		
Length L		
Version		
Guideway		
Drive		
Toothed belt drive		
Lubrication ¹⁾		
Carriage		
Carriage ²⁾		
Motor attachment		
Gearing		
Motor		
Motor code		
Motor connector position		
Switching system (max. 6 switches/sensors selectable)		
Sensor 1		
Sensor 2		
Sensor 3		
Cable duct / cable channel		
Socket-connector		
Documentation		

¹⁾ Not part of the option key





²⁾ For the permissible values see "General technical data"

Quantity Acceptance of: ____ pcs, ____ per month, ____ per year, per order, or

Comments: _____

From
 Company: _____ Name: _____
 Address: _____ Department: _____
 _____ Phone: _____
 _____ Fax: _____

Further information

<p><u>Bosch Rexroth Linear Motion Technology homepage</u></p>	
<p><u>Compact module product information (instruction, configurator, store, etc.)</u></p>	
<p><u>Smart Function Kit Handling (SFK-H)</u></p>	
<p><u>Product overview, automation solutions (motors, drives, control systems, etc.)</u></p>	

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