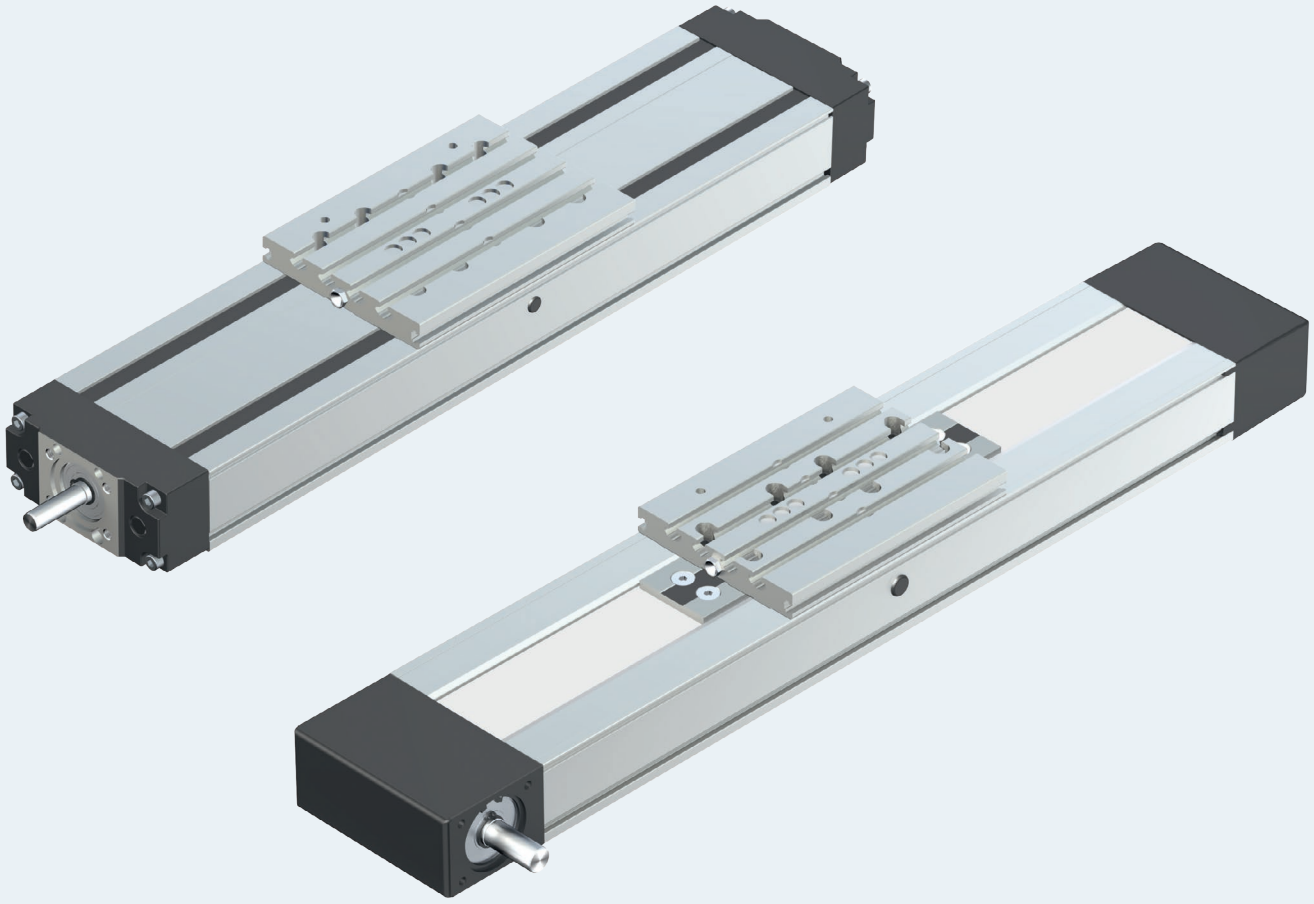
The Drive & Control Company

Rexroth
Bosch Group

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	-	N N	-	1
System	= Compact Module **(C)**									
Guideway	= Ball rail system **(K)**									
Drive unit	= Ball screw drive **(K)** Toothedbelt drive **(R)**									
Size	= 070 / 090 / **110** / 145 / 200									
Version	= Standard model **(N)**									
Generation	= Product generation **1**									

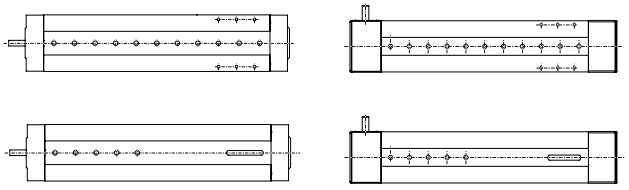
Changes/amendments at a glance

Catalog structure

- New catalog number
- Checking the motor catalogs:
  - "CKK/CKR Compact Modules (R310XX 2602 (2007.02))"
  - "CKK/CKR 9-70 Compact Modules (R310XX2624 (2008.10))"
- New product designation
- Revised dimensional drawing
- "Delivery form" additional chapter
- "Calculation" expanded chapter
- "Mounting kits for motors according to customer specification" additional chapter
- "Combination possibilities" of connecting shafts expanded chapter
- "EasyHandling" additional chapter
- Revised table structure of the technical data tables and drive data

Technical modifications

- Increase of the dynamic load capacities and moments
- Increase of the permissible drive torques for CKK
- Carriage with variable center-to-center
- "Switching system" chapter
- Connecting shafts extension
- Mounting element extension
- Extension: motor option with gears for: CKR-110, -145 and -200
- Integration of new motor types (MSM and MSK)
- "Without drive" option is not needed (for CKR)
- Order example
- Query sheet
- New guideway options:
  - Center holes
  - Center holes with long hole



Note to this catalog:
This updated edition 2017-01 is currently only available as a PDF file.
A print version of this edition is not planned at the moment.
In stock (printed), is the version 2016-04.

Contents

Product description

Characteristic features

- Five fine-tuned sizes based on a compact precision aluminum profile with two integrated pre-tensioned ball rail systems
- Identical external dimensions between Compact Module types CKK and CKR.
- Ready-to-install Compact Modules in any length up to L_{max}
- Aluminum carriages available in different lengths depending on load

Further highlights

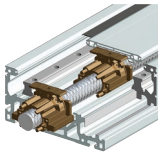
- Flexible thanks to options
- Ready for mounting with various attachment parts
- Center holes for simple combination with other linear systems and connection elements
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) from both sides or via the carriage or front side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

Compact Modules are available as complete solutions with motor, controller, and control system. For more information, see the “Motors” and “EasyHandling” chapters

CKK Compact Module
with ball rail system and ball screw drive

- Drive via precision ball screw drive
- Screw support for the realization of high speeds for long lengths of an assembly for CKK-200
- Protection of installation elements through a cover plate and two cover bands
- Repeatability of up to ± 0.005 mm

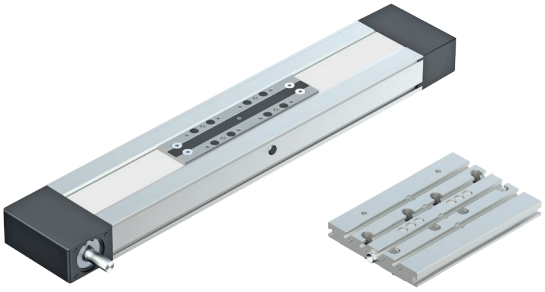
Connection plates



Screw support SPU

CKR Compact Module
with ball rail system and toothed belt drive

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



Connection plates

Delivery form

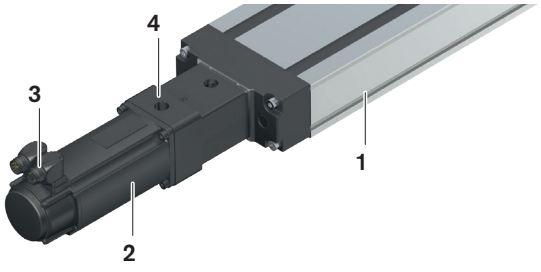
Compact Modules with ball rail system and ball screw drive or toothed belt drive are delivered completely assembled.

Motor attachment

If a combination of motor and motor attachment has been selected, then the attachment of the components is done as shown in the figure which also shows the location of the motor connector.
When ordering motor attachments without motor, not all parts can not be mounted.
The final assembly must be carried out by the customer.
All necessary instructions and parameters for professional assembly are included.

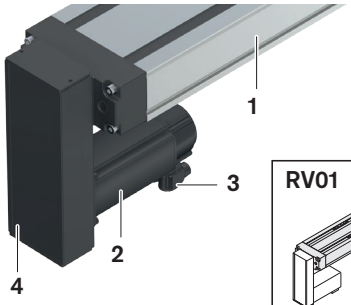
CKK

Flange and coupling (MF01)

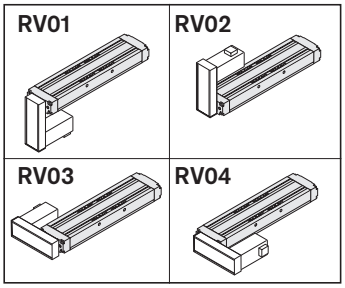


1 Linear system
2 Motor
3 Motor connector
4 Flange and coupling

Timing belt side drive (RV01–RV04)

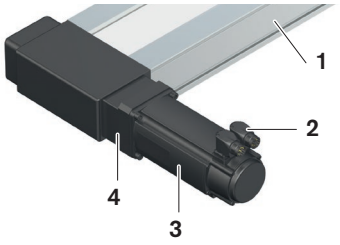


1 Linear system
2 Motor
3 Motor connector
4 Timing belt side drive



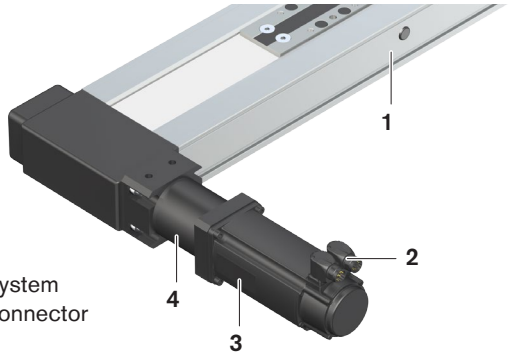
CKR

Direct attachment (MA10, MA11)



1 Linear system
2 Motor connector
3 Motor
4 Direct attachment (flange)

Planetary gearboxes (MG10, MG11, MG01-MG04)



1 Linear system
2 Motor connector
3 Motor
4 Gear reducer

Selectable options

Cable duct, mounting duct, switch, switching angles and socket with plugs are included as loose parts in the delivery.

Lubrication

Compact Modules are delivered with basic lubrication.
Information about lubricants are found in the chapter on “Lubrication”.

Documentation

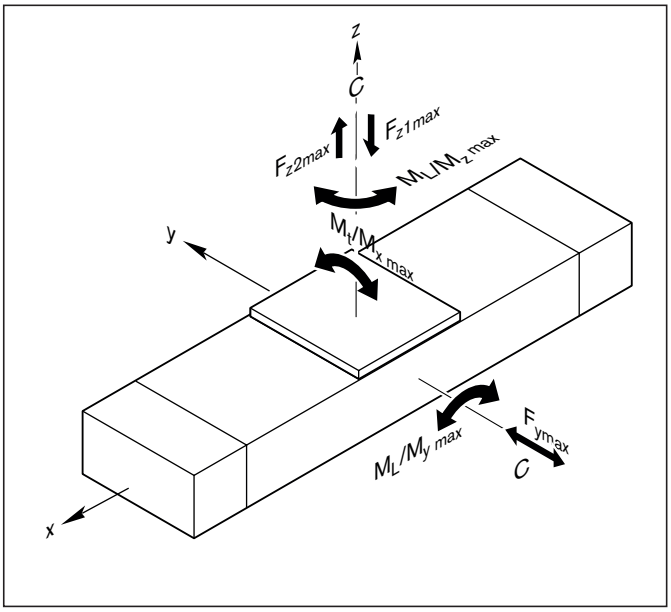
Each Compact Module will be delivered with the corresponding documentation.

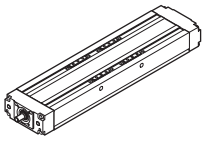
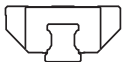
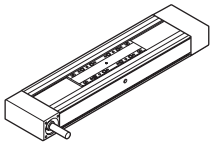
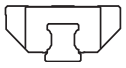
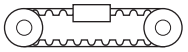
Overview of types with load capacities

Acceptable loads
(Recommended values based on experience)

In relation to the desired service life, loads for F_m, F_{comb} of up to about 20% of the dynamic load rating (C) have proven effective. See the chapter on calculation principles. Here the following must not be exceeded:
– The maximum permissible drive torque
– The maximum permissible load
– The permissible travel speed
– The maximum permissible acceleration

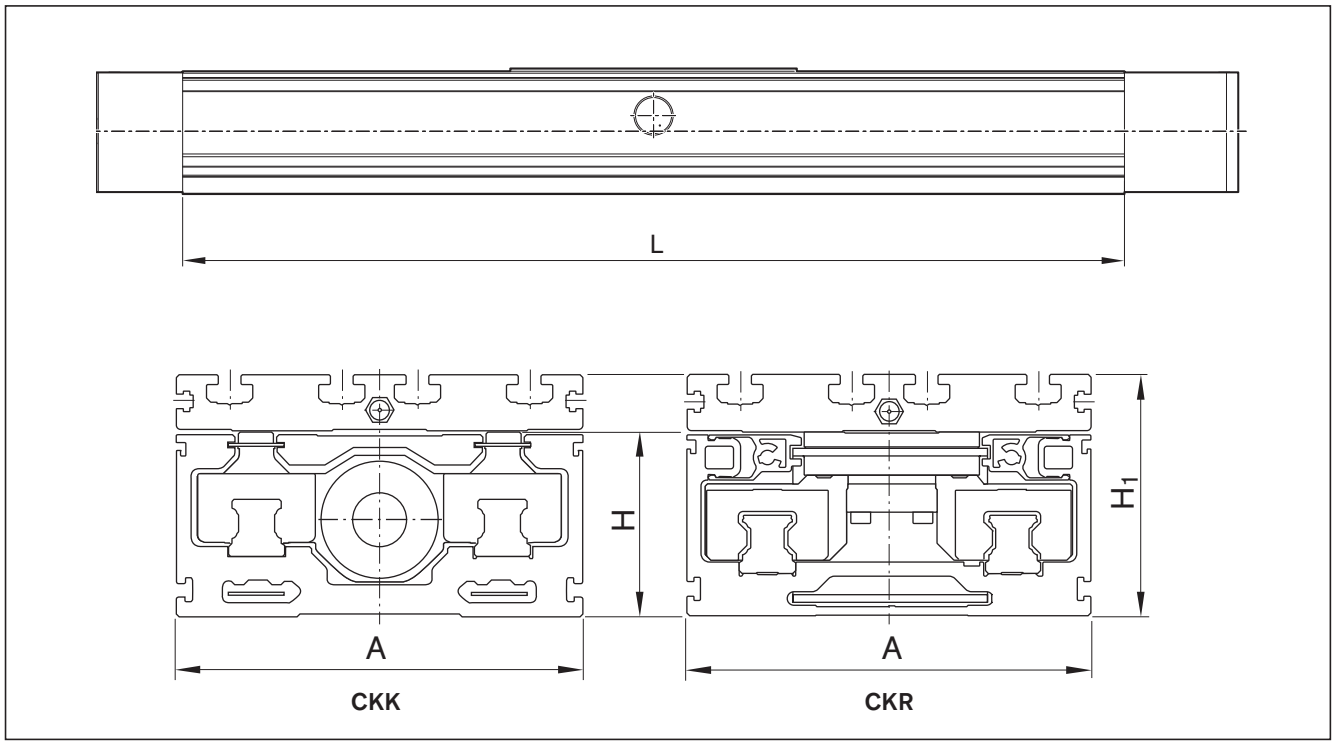
For further information, see the chapter on calculation.



Compact Modules	Type	Guideway	Drive unit	
	CKK	 Ball Rail System	 Ball screw drive	
	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	127
L_{max} (mm)	650			750			1 500			1 800			2 200[1]		
Dyn. load capacity C[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		
Dyn. load capacity C[2] (N)	3 830			7 505			32 035			76 025			121 185		

1) Up to 5500 mm are possible with screw support (SPU).
2) The maximum permitted dynamic values are specified here.
The vary depending on carriage length.

Product Overview

Properties

- Five fine-tuned sizes based on a compact precision aluminum profile with two integrated pre-tensioned ball rail systems
- Ready-to-install Compact Modules in any length up to L_{max}.
- Driven by precision ball screw drive in rolled design tolerance class T7 in accordance with DIN 69051 with backlash-free set single nut
- High travel speeds thanks to steep inclines with simultaneously high precision over large lengths
- Aluminum carriages available in different lengths
- Protection of installation elements through a cover plate and two cover bands
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) from both sides or via the carriage or front side via a connection plate
- Repeatability of up to ± 0.005 mm

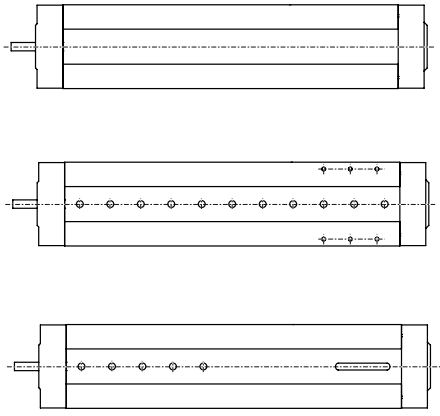
Further highlights

- Flexible thanks to selectable options
- Center holes for simple combination with other linear systems and connection elements
- Extensive accessories for connection and clamping elements
- Name plate with parameters for easy start-up

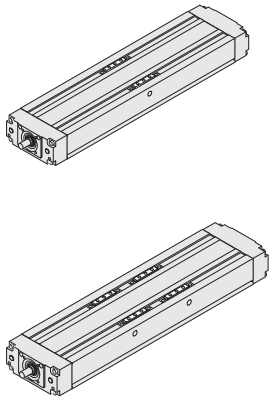
Attachment parts

- Removing the motor attachments with flange and coupling or via a timing belt side drive
- Mounting kits for motors according to customer specification
- Maintenance-free servo motors with selectable brake and attached feedback
- Switches (magnetic sensors), switch activation without additional switch flag
- Socket and plug
- Mounting duct made of aluminum for sensors

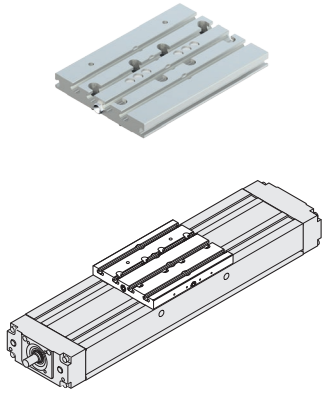
Design/options for guideway (frame), carriages, connection plates



Guideway (frame)



Carriages



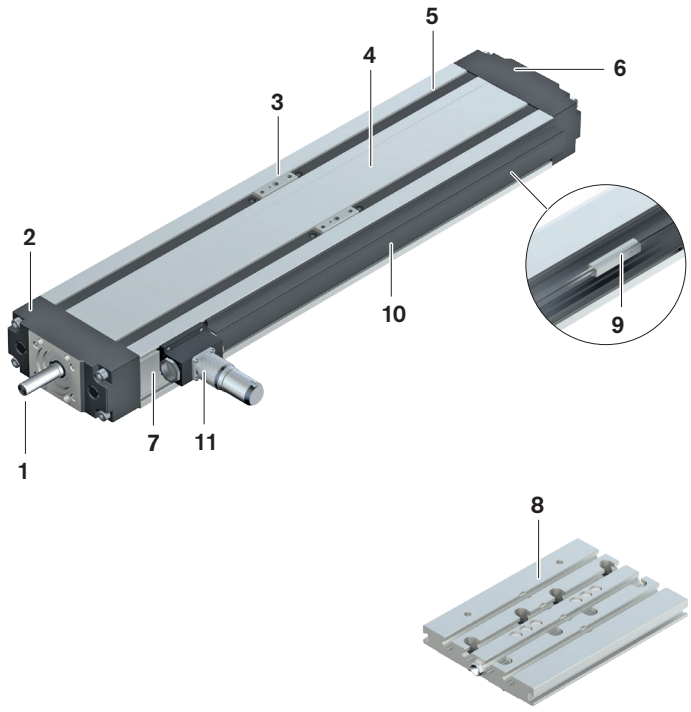
Connection plates

Structural design

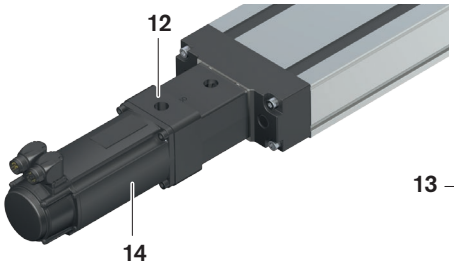
Structural design CKK

1 Ball screw drive with zero-backlash single nut
2 Cross tie, drive side
3 Carriage with integrated runner blocks
4 Cover plate
5 Cover strip made of reinforced PU belt
6 Cross tie
7 Frame

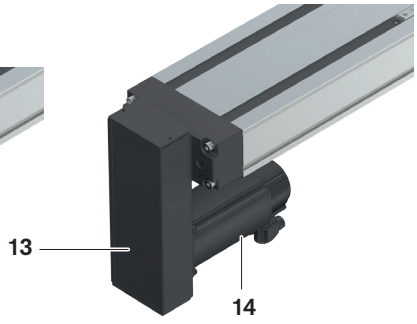
Attachments parts:
8 Connection plate
9 Magnetic sensor
10 Mounting duct
11 Socket/plug
12 Flange and coupling
13 Timing belt side drive
14 Motor



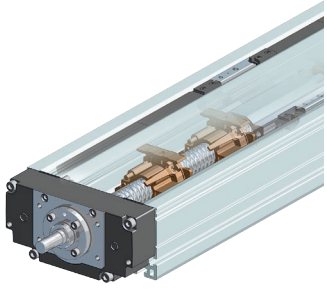
Motor attachment – flange and coupling

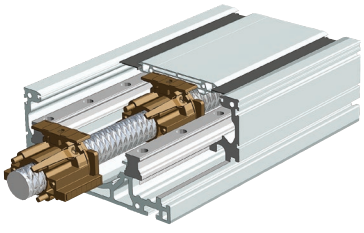


Motor attachment – timing belt side drive



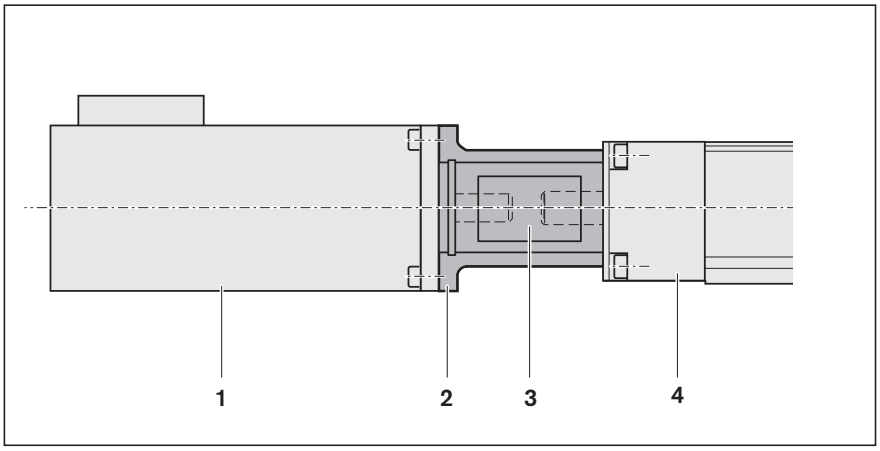
Screw support for CKK-200





Structural design of motor mount and coupling

A motor can be attached to all Compact Modules with ball screw drive by means of a motor mount and coupling.
The motor mount 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 shaft.
Our standard couplings compensate the system's thermal expansion.



1 Motor
2 Flange
3 Coupling
4 Compact Module

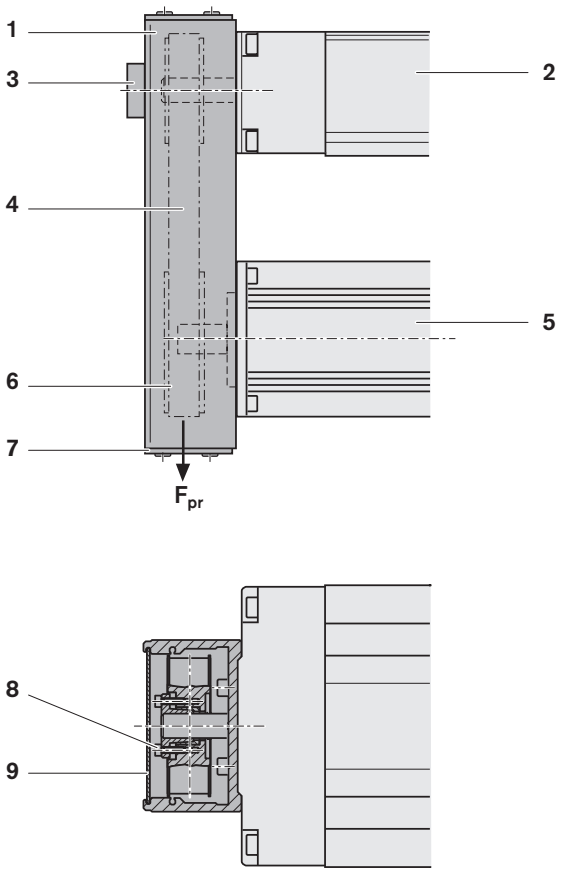
Structural design of timing belt side drive

All Compact Modules with ball screw drive offer the option of attaching the motor via a timing belt side drive.
This makes the overall length shorter than when attaching the motor with a flange and coupling.
The compact, closed housing serves as protection for the belt and as a motor bracket.
Besides this, various gear ratios are also available (depending on size):

- i = 1
- i = 1.5
- i = 2

The timing belt side drive can be installed in four directions:

- below, above (RV01 and RV02)
- left, right (RV03 and RV04)



1 Deflection housing made of anodized aluminum
2 Compact Module
3 Counter bearing at the screw journal in size CKK-070
4 Toothed belt
5 Motor
6 Pre-tensioning the toothed belt: Apply pretensioning force F_{pr} to motor (F_{pr} is provided upon delivery)
7 Cover
8 Fastening of belt pulleys with tensioning units
9 Cover plate

Technical data

General technical data

Pay attention to the “Calculation” chapter.

Size	Carriage			Ball screw drive	Dynamic characteristics				
	Connection plate				Dyn. load capacities			Dyn. load moments	
	without[1]	with[2]							
	L_{ca} (mm)	L_{ca} (mm)	L_W[3] (mm)	d_0 x P (mm)	C (N)	C_{bs} (N)	C_{fb} (N)	M_t (Nm)	M_L[4] (Nm)
CKK-070	32	60	–	8 x 2.5	2360	2370	1600	47	7
	73	95	–	8 x 2.5	3830	2370	1600	77	111
CKK-090	35	60	–	12 x 2	4620	2420	6900	125	16
				12 x 5		4100			
				12 x 10		2700			
	100	125	–	12 x 2	7505	2420	6900	203	244
				12 x 5		4100			
				12 x 10		2700			
	variable min = 101 max = 235	–	Variable min = 66 max = 200	12 x 2	7505	2420	6900	203	3.75 x L_W
				12 x 5		4100			
				12 x 10		2700			
CKK-110	39	60	–	16 x 5	19720	13320	13400	651	136
				16 x 10		10350			
				16 x 16		6800			
	124	155	85	16 x 5	32035	13320	13400	1057	1361
				16 x 10		10350			
				16 x 16		6800			
	variable min = 125 max = 289	–	Variable min = 86 max = 250	16 x 5	32035	13320	13400	1057	16.01 x L_W
				16 x 10		10350			
				16 x 16		6800			
CKK-145	49	80	–	20 x 5	46800	15480	17000	2059	400
				20 x 20		9810			
				20 x 40		12600			
				25 x 10		16920			
	149	190	100	20 x 5	76025	15480	17000	3345	3801
				20 x 20		9810			
				20 x 40		12600			
				25 x 10		16920			
	variable min = 150 max = 349	–	variable min = 101 max = 300	20 x 5	76025	15480	17000	3345	38.01 x L_W
				20 x 20		9810			
				20 x 40		12600			
				25 x 10		16920			
CKK-200	79.5	190	–	32 x 5	74600	23310	26000	4849	1053
				32 x 10		34200			
				32 x 20		21240			
				32 x 32		21060			
	254.5	305	175	32 x 5	121185	23310	26000	7877	10604
				32 x 10		34200			
				32 x 20		21240			
				32 x 32		21060			
	variable[6] min = 255.5 max = 429.5	–	variable[6] min = 176 max = 350	32 x 5	121185	23310	26000	7877	60.59 x L_W
				32 x 10		34200			
				32 x 20		21240			
				32 x 32		21060			

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 characteristics and maximum permissible loads are valid only for connection of the fastening bridges by customer application.
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.
4) For the variable L_W, M_L, $M_{y\,max}$ and $M_{z\,max}$ must be determined according to the selected center-to-center distance L_W.
5) Minimum required travel to ensure a reliable lubrication distribution ➠ “Maintenance: normal operating conditions”.
6) Screw support (SPU) is not available for the carriage version with variable center-to-center distance L_W.

Maximum permissible loads						Additional length		Min. travel range	Max. length
Maximum permissible moments			Maximum permissible forces			Connection plate			
						without	with		
$M_{x\,max}$ (Nm)	$M_{y\,max}$ [4] (Nm)	$M_{z\,max}$ [4] (Nm)	$F_{y\,max}$ (N)	$F_{z1\,max}$ (N)	$F_{z2\,max}$ (N)	L_{ad} (mm)	L_{ad} (mm)	s_{min} [5] (mm)	L_{max} (mm)
47	7	7	1270	2360	2360	30	2	40	650
77	111	60	2070	3830	3830	30	8	40	650
112	16	16	2490	4620	4140	50	25	40	750
203	244	132	4050	7505	7505	50	25	40	750
203	3.75 x L_W	2.03 x L_W	4050	7505	7505	50	–	40	750
198	32	32	3480	6000	6000	51	30	50	1500
396	510	240	5650	12000	12000	51	20	50	1500
396	6 x L_W	2.82 x L_W	5650	12000	12000	51	–	50	1500
634	100	100	8410	14400	14400	61	30	60	1800
1267	1440	683	13660	28800	28800	61	20	60	1800
1267	14.4 x L_W	6.83 x L_W	13660	28800	28800	61	–	60	1800
1375	299	299	12265	21150	21150	120.5	10	80	2200 (with SPU 5500)
2750	3701	1744	19925	42300	42300	120.5	70	80	2200 (with SPU 5500)
2750	21.14 x L_W	9.97 x L_W	19925	42300	42300	120.5	–	80	2200

C = dynamic load rating (guideway)
C_{bs} = dynamic load capacity, ball screw drive
C_{fb} = dynamic load capacity, fixed bearing
d_0 = nominal diameter
$F_{y\,max}$ = maximum dynamic load in y-direction
$F_{z\,max}$ = maximum dynamic load in z-direction
L_{ca} = carriage length
L_{ad} = additional length
L_{max} = maximum length
L_W = carriage center-to-center distance
M_L = dynamic longitudinal moment load
M_t = torsional moment load capacity
$M_{x\,max}$ = maximum permissible torsional moment around the x-axis
$M_{y\,max}$ = maximum permissible torsional moment around the y-axis
$M_{z\,max}$ = maximum permissible torsional moment around the z-axis
P = lead
s_{min} = minimum travel
SPU = screw support

Technical data

General technical data

Pay attention to the “Calculation” chapter.

Size	Carriage			Force application point		Ball screw drive	Moved mass of system		Constant mass calculation		Planar moment of inertia	
	Connection plate			Connection plate			Connection plate					
	without[1]	with[2]		without	with		without	with				
	L_{ca} (mm)	L_{ca} (mm)	L_W[3] (mm)	Z_1 (mm)	Z_1 (mm)	d_0 x P (mm)	m_{ca} (kg)	m_{ca} (kg)	$k_{g\,fix}$ (kg)	$k_{g\,var}$ (kg/mm)	I_y (cm^4)	I_z (cm^4)
CKK-070	32	60	–	19,2	31,7	8 x 2.5	0.15	0.26	0.29	0.0031	12.10	63.3
	73	95	–			8 x 2.5	0.25	0.42				
CKK-090	35	60	–	23,2	39,2	12 x 2	0.36	0.54	0.50	0.0054	14.32	124.4
						12 x 5						
						12 x 10						
	100	125	–			12 x 2	0.59	0.96				
						12 x 5						
						12 x 10						
	variable min = 101 max = 235	–	Variable min = 66 max = 200			12 x 2 12 x 5 12 x 10	0.59	–				
CKK-110	39	60	–	26,7	42,7	16 x 5	0.52	0.75	0.91	0.0094	37.74	318.7
						16 x 10						
						16 x 16						
	124	155	85			16 x 5	0.86	1.45				
						16 x 10						
						16 x 16						
	variable min = 125 max = 289	–	Variable min = 86 max = 250			16 x 5 16 x 10 16 x 16	0.86	–				
CKK-145	49	80	–	31,6	51,6	20 x 5	1.21	1.71	1.91	0.0179	114.10	986.4
						20 x 20						
						20 x 40						
						25 x 10						
	149	190	100			20 x 5	2.06	3.26				
						20 x 20						
						20 x 40						
						25 x 10						
	variable min = 150 max = 349	–	variable min = 101 max = 300			20 x 5 20 x 20 20 x 40 25 x 10	2.06	–				
CKK-200	79.5	190	–	36,0	63,0	32 x 5	3.20	5.50	4.06	0.0296	612.00	3008.0
						32 x 10						
						32 x 20						
						32 x 32						
	254.5	305	175			32 x 5	5.20	8.90				
						32 x 10						
						32 x 20						
						32 x 32						
	variable min = 256 max = 430	–	variable min = 176 max = 350			32 x 5 32 x 10 32 x 20 32 x 32	5.20	–				

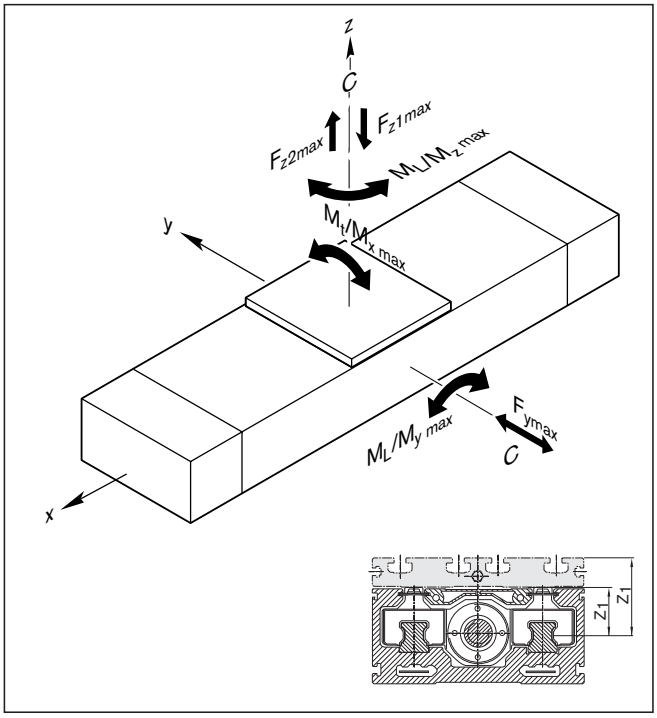
1) In the “without connection plate” version, carriage length L_{ca} corresponds to the dimension of the outer edge to outer edge of the fastening bridges.
2) The connection plate is mounted on the “without connection plate” carriage version.
   In the “with connection plate” version, carriage length 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.

d_0 = nominal diameter
$k_{g\,fix}$ = constant for fixed-length portion of the mass
$k_{g\,var}$ = constant for variable-length portion of the mass
L_{ad} = additional length
L_{ca} = carriage length
L_W = center-to-center distance of carriages
I_y = planar moment of inertia based on the y-axis
I_z = planar moment of inertia based on the z-axis
m_{ca} = moved mass of system (carriage)
m_s = mass of the linear system (without motor attachment, timing belt side drive and switch)
P = lead
s_e = excess travel
s_{eff} = effective travel
Z_1 = application point of the effective force

Acceptable loads
(Recommended values based on experience)

In relation to the desired service life, loads for F_m, F_{comb} of up to about 20% of the dynamic load rating (C) have proven effective. See the chapter on calculation principles.
Here the following must not be exceeded:
– The maximum permissible drive torque
– The maximum permissible load
– The permissible travel speed
– The maximum permissible acceleration

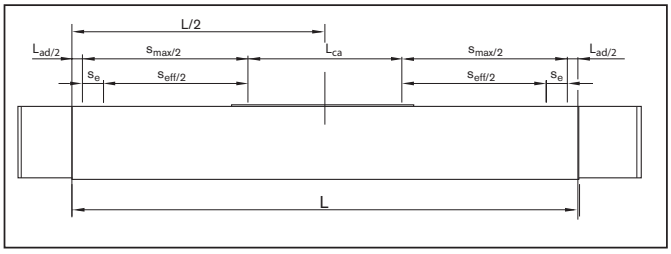
Note on dynamic load capacities and moments
Determination of the dynamic load capacities and moments is based on a total travel of 100,000 m. Often only 50,000 m are actually stipulated.
For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the table by 1.26.



Length calculation of the linear system

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

L_{ca} see dimension drawings for the respective sizes



Module of elasticity E of the linear system

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

Dimension drawing of the linear system
(without motor attachment, without motor)

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

Calculation of the mass moment of inertia of the linear system
➠ Chapter “Technical data, drive data”

Technical data

Drive data

Pay attention to the “Calculation” chapter.

Size	Ball screw drive	Carriage		Moved mass of system	
		Connection plate		Connection plate	
		without	with	without[1]	with
	d_0 x P	L_{ca}	L_{ca}	m_{ca}	m_{ca}
	(mm)	(mm)	(mm)	(kg)	(kg)
CKK-070	8 x 2.5	32	60	0.15	0.26
		73	95	0.25	0.42
CKK-090	12 x 2	35	60	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
CKK-110	16 x 5	39	60	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
CKK-145	20 x 5	49	80	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
CKK-200	32 x 5	79.5	190	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) Values also valid for the carriage version with variable center-to-center distance L_W.

a_{max} = maximum acceleration
d_0 = nominal diameter
J_s = mass moment of inertia of the linear motion system (kgm^2)
J_t = translational mass moment of inertia of the external load (kgm^2)
$k_{J\,fix}$ = constant for fixed-length portion of mass moment of inertia
$k_{J\,var}$ = constant for length-variable portion of mass moment of inertia
$k_{J\,m}$ = constant for mass-specific portion of mass moment of inertia
L = length (mm)
L_{ca} = carriage length
M_p = drive torque
M_{Rs} = frictional torque system
m_{ex} = moved external load
m_{ca} = moved mass of system (carriage)
P = lead
v_{max} = maximum speed

Constant mass moment of inertia				Frictional torque[1]	Max. acceleration	Max. drive torque	Max. speed
Connection plate without[1] $k_{J\,fix}$ (kgmm²)	with $k_{J\,fix}$ (kgmm²)	$k_{J\,var}$ (kgmm)	$k_{J\,m}$ (mm²)	M_{Rs} (Nm)	a_{max} (m/s²)	M_P (Nm)	v_{max} (m/s)
0.769	0.786	0.004	0.158	0.07	50.0	See diagrams	See diagrams
0.785	0.812						
1.279	1.298	0.013	0.101	0.13	48.4		
1.303	1.340			0.14			
1.454	1.568	0.011	0.633	0.15	50.0		
1.599	1.834			0.16			
2.138	2.594	0.011	2.533	0.18	50.0		
2.720	3.658			0.20			
5.088	5.234	0.031	0.633	0.37	50.0		
5.303	5.677			0.40			
6.076	6.658	0.031	2.533	0.40	50.0		
6.937	8.432			0.43			
8.161	9.652	0.034	6.485	0.42	50.0		
10.365	14.191			0.48			
22.564	22.880	0.084	0.633	0.48	39.8		
23.102	23.862			0.52			
34.029	39.950	0.081	10.132	0.60	50.0		
42.641	54.800			0.68			
70.856	91.120	0.086	40.528	0.70	50.0		
105.305	153.939			0.86			
26.335	27.601	0.239	2.533	0.60	50.0		
28.488	31.528			0.65			
71.348	72.867	0.605	0.633	1.10	17.9		
72.741	75.147			1.20			
76.612	82.691	0.640	2.533	1.10	30.7		
82.185	91.810			1.20			
93.299	117.676	0.639	10.132	1.15	50.0		
115.590	154.092			1.25			
127.391	189.642	0.617	25.938	1.25	50.0		
184.455	283.020			1.35			

Moment of inertia of the linear system

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

Determination of translational mass moment of inertia of the external load

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

Technical data

Pay attention to the “Calculation” chapter.

Drive data for motor attachment via timing belt side drive

Compact Module	Motor	Ball screw drive (mm)	up to L[2] (mm)	M_{sd}[1] (Nm)		J_{sd} (10^{-6} kgm²)		M_{Rsd} (Nm)	m_{sd} (kg)		B_t	
		d_0 x P		i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 1.5	i = 1	i = 1.5
CKK-070	MSM 019B	8 x 2.5	450	0.71	0.47	10.7	4.1	0.10	0.28	0.26	6 AT3	6 AT3
	MSK 030C, MSM 031B	8 x 2.5	450	0.71	0.47	45.6	17.7	0.15	0.63	0.61	10 AT3	10 AT3
CKK-090	MSK 030C, MSM 031C	12 x 2	750	0.79	0.53	38	14	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							
CKK-110	MSK 030C, MSM 031C	16 x 5	1250	3.17	2.11	41	16	0.15	0.53	0.48	10 AT3	10 AT3
		16 x 10	1500	3.17	2.11							
		16 x 16	1500	3.17	2.11							
	MSK 040C, MSM 041B	16 x 5	850	6.76	4.51	240	82	0.40	1.34	1.24	16 AT5	16 AT5
		16 x 10	1150	7.66	5.11							
		16 x 16	1450	7.66	5.11							
CKK-145	MSK 040C, MSM 041B	20 x 5	1350	8.22	5.48	250	85	0.40	1.42	1.31	16 AT5	16 AT5
		20 x 20	1800	8.22	5.48							
		20 x 40	1800	8.22	5.48							
		25 x 10	1800	8.22	5.48							

Compact Module	Motor	Ball screw drive (mm)	up to L[2] (mm)	M_{sd}[1] (Nm)		J_{sd} (10^{-6} kgm²)		M_{Rsd} (Nm)	m_{sd} (kg)		B_t	
		d_0 x P		i = 1	i = 2	i = 1	i = 2		i = 1	i = 2	i = 1	i = 2
CKK-145	MSK 050C	20 x 5	1150	11.00	5.50	1310	217	0.45	3.5	3.1	25 AT5	25 AT5
		20 x 20	1800	17.73	8.87							
		20 x 40	1800	17.73	8.87							
		25 x 10	1800	17.73	8.87							
CKK-200	MSK 060C	32 x 5	2200	19.00	9.50	1400	260	0.50	3.8	3.5	25 AT5	32 AT5
		32 x 10	2200	19.21	12.30							
		32 x 20	2200	19.21	12.30							
		32 x 32	2200	19.21	12.30							

1) Values for M_{sd} without consideration of the motor torque.

2) For greater lengths, the permissible drive torque is determined from the length-variable value M_p of the linear system in accordance with the diagram ➠ See the chapter on “Calculation principles”

B_t = belt type
d_0 = nominal diameter
i = timing belt side drive gear ratio
J_c = mass moment of inertia of the coupling
J_{sd} = reduced mass moment of inertia of timing belt side drive at motor journal
L = length
M_{cN} = rated torque of coupling
m_{fc} = mass of flange and coupling
M_{RRv} = Frictional torque of timing belt side drive at motor journal
M_{sd} = maximum permissible drive torque, timing belt side drive
m_{sd} = mass of timing belt side drive
P = lead

Drive data for motor attachment via flange and coupling

Compact Module	Motor type	Coupling		Flange and coupling
		M_{cN} (Nm)	J_c (10^{-6} kgm^2)	m_{fc} (kg)
CKK-070	MSK 030C	3.7	7.00	0.30
	MSM 019B	1.9	2.10	0.15
	MSM 031B	3.7	7.00	0.30
CKK-090	MSK 030C	13.0	12.20	0.30
	MSM 031C	13.0	12.20	0.35
CKK-110	MSK 030C	13.0	12.20	0.45
	MSK 040C	14.0	12.20	0.60
	MSM 031C	14.0	12.20	0.45
	MSM 041B	29.4	42.29	0.65
CKK-145	MSK 040C	26.1	42.29	0.80
	MSK 050C	26.1	42.29	1.00
	MSM 041B	26.1	42.29	0.80
CKK-200	MSK 060C	50.0	210.00	1.80
	MSK 076C	98.0	390.00	2.40

Technical data

Permissible drive torque

The values shown for M_p are applicable under the following conditions:
– Horizontal operation, 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 s_{min}!**

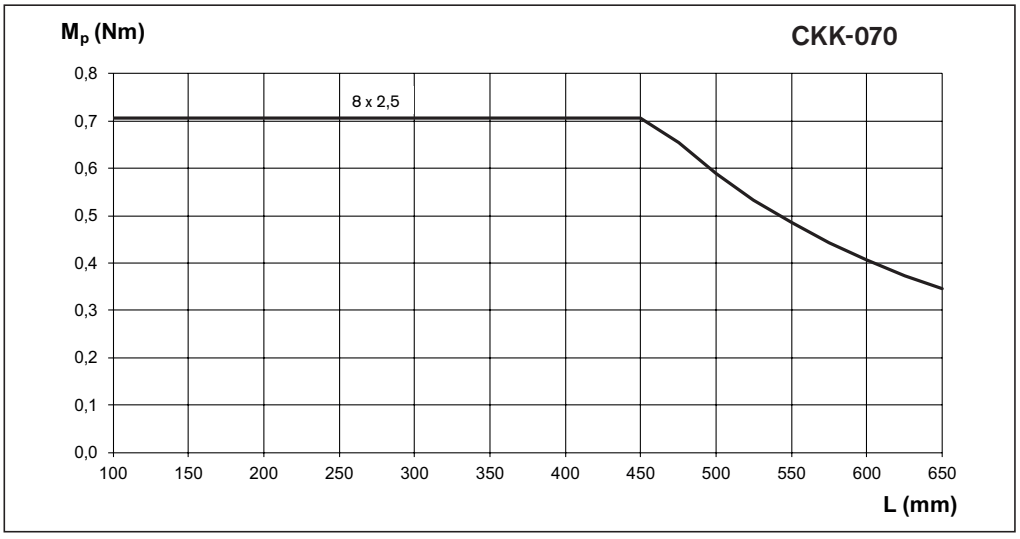
⚠ **Screw journal pin with keyway**
For reasons of stress concentration and a reduction of the effective diameter, observe the maximum values for drive torque!

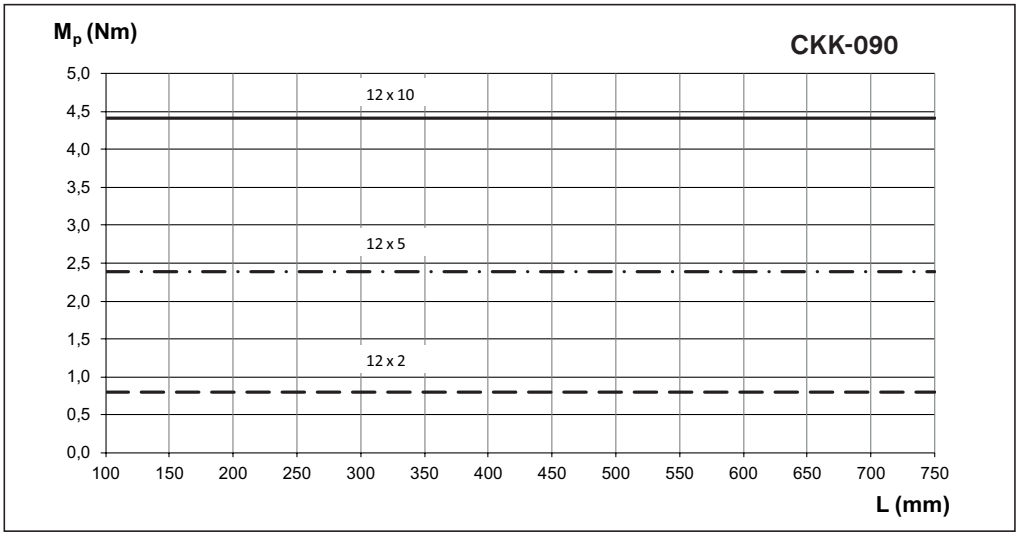
CKK	M_p (Nm)
CKK-070 / 090 / 110 / 145	–
CKK-200	48.6

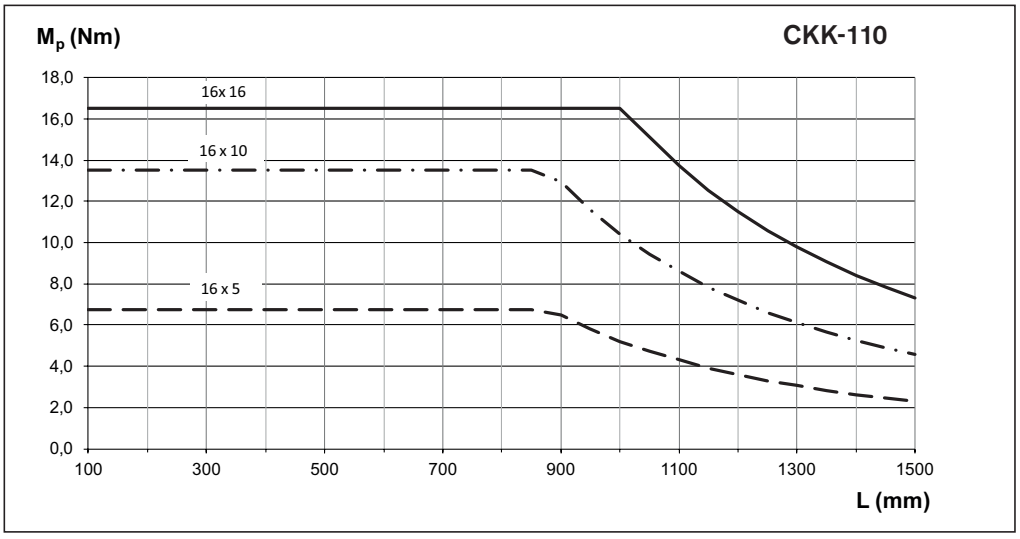
⚠ **For ball screw drive with keyway, the smallest value from the diagram and table is valid.**

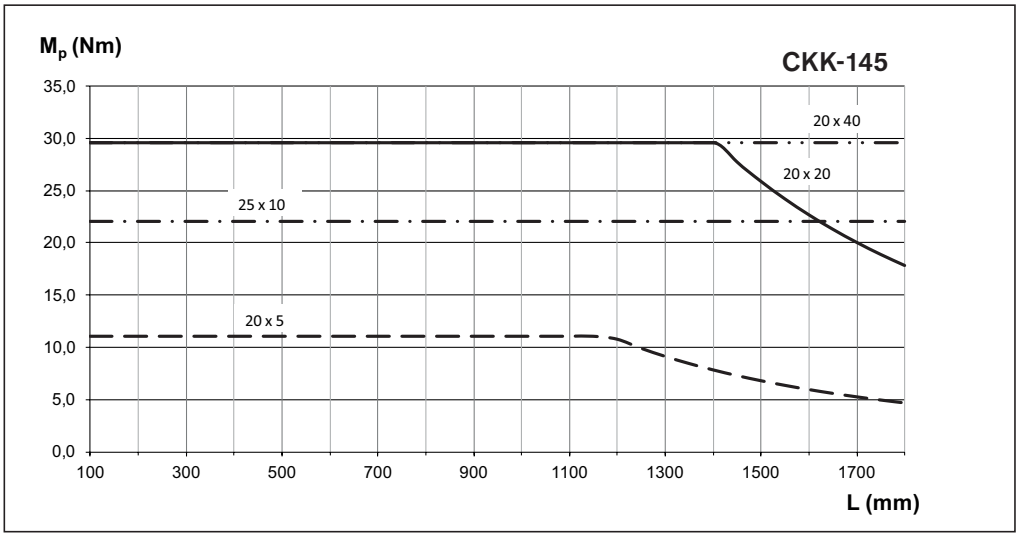
Example:

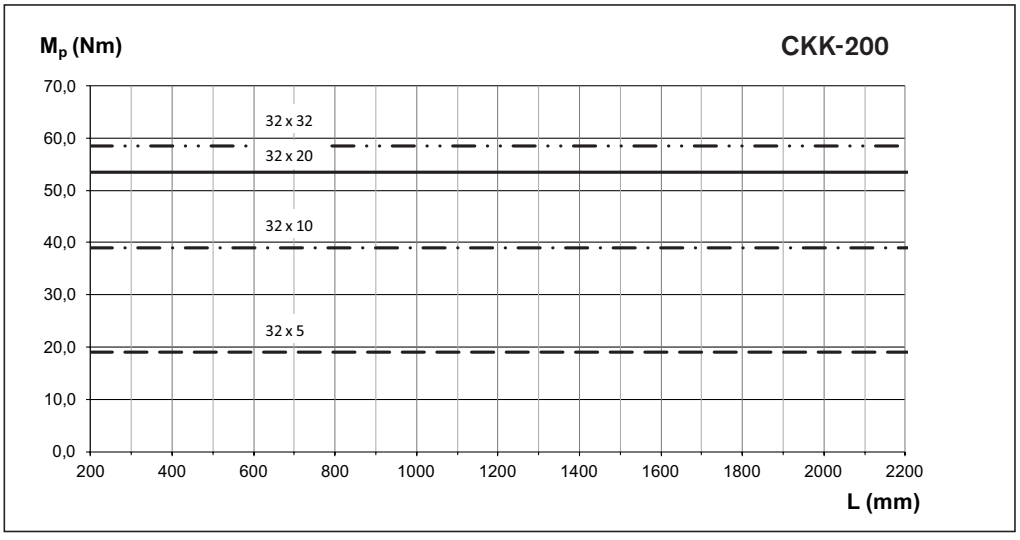
CKK-200	(d_0 x P) 32 x 32	(d_0 x P) 32 x 10
Length (mm)	1500	1500
M_p from diagram (Nm)	58.5	39.0
M_p maximal (Nm)	48.6	48.6
Value for design	48.6	39.0









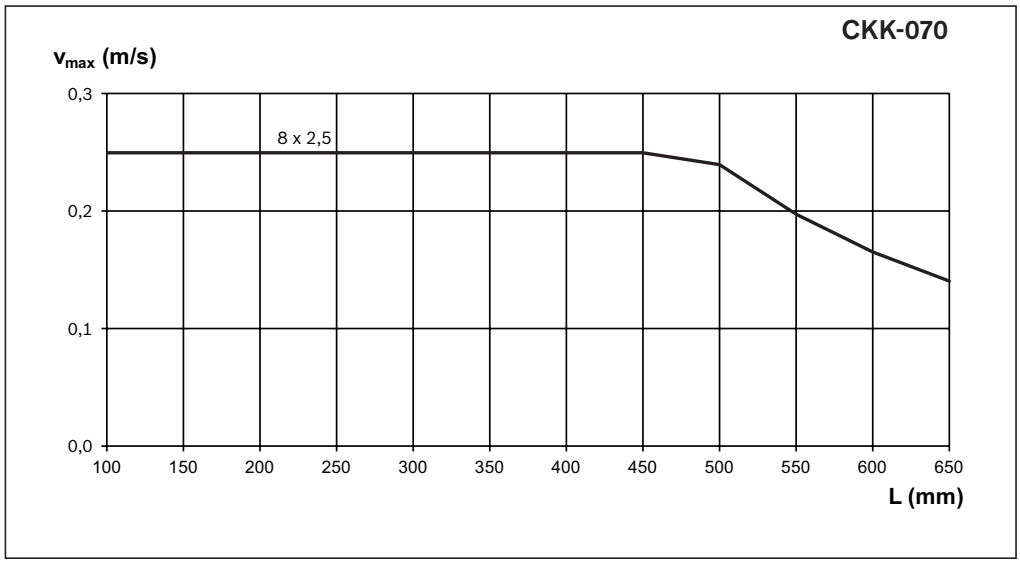


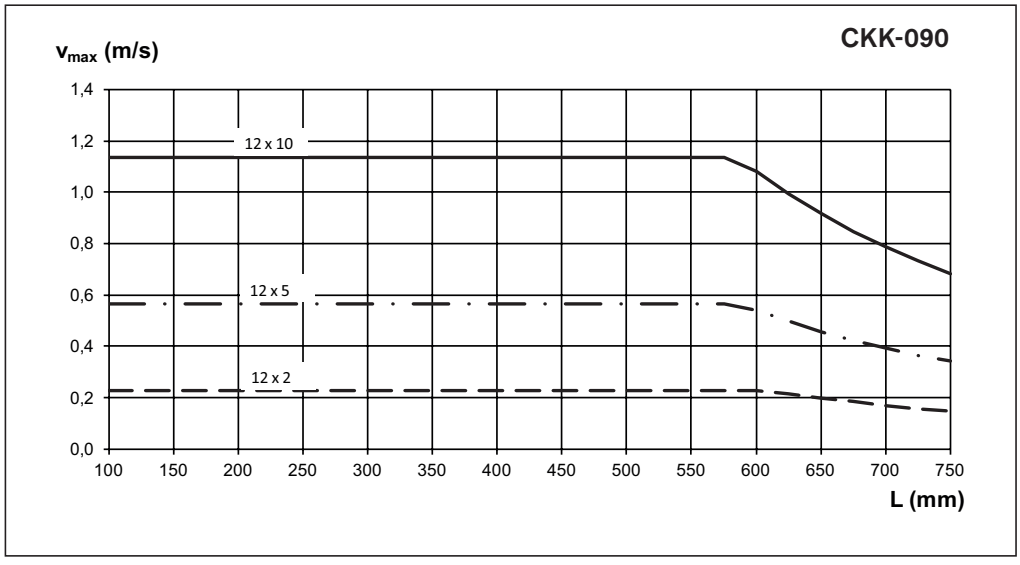
See the chapter “Screw support for CKK-200 Compact Module” for technical data of lengths 2,200 to 5,500 mm.

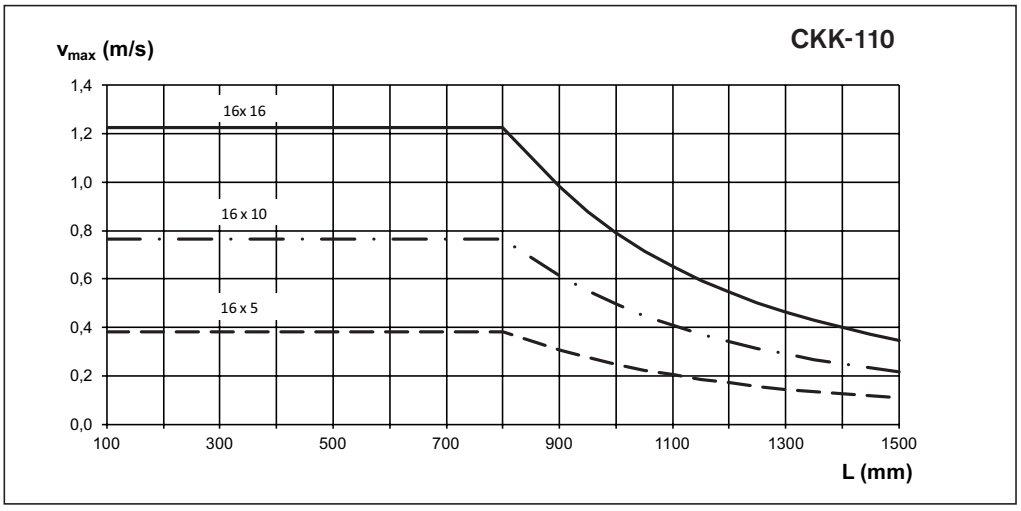
Technical data

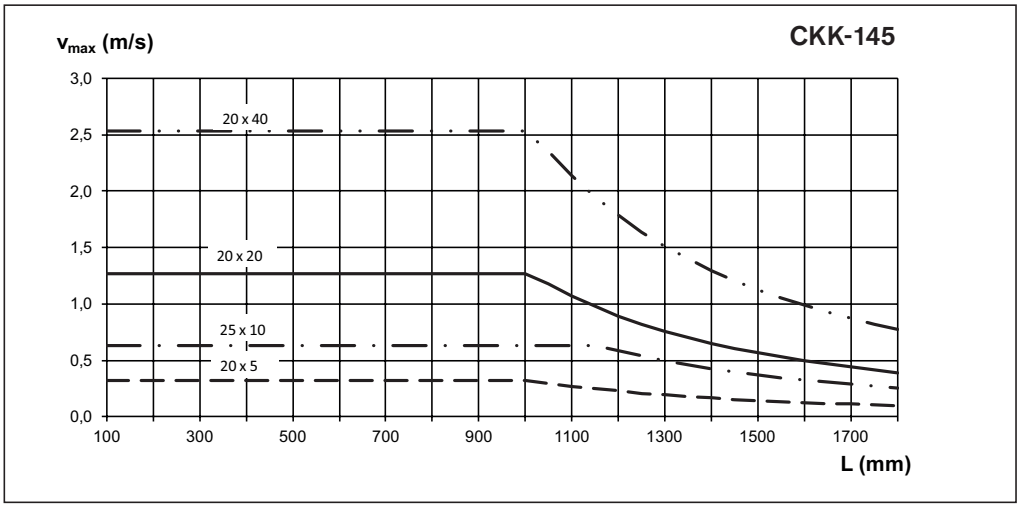
Permissible speed

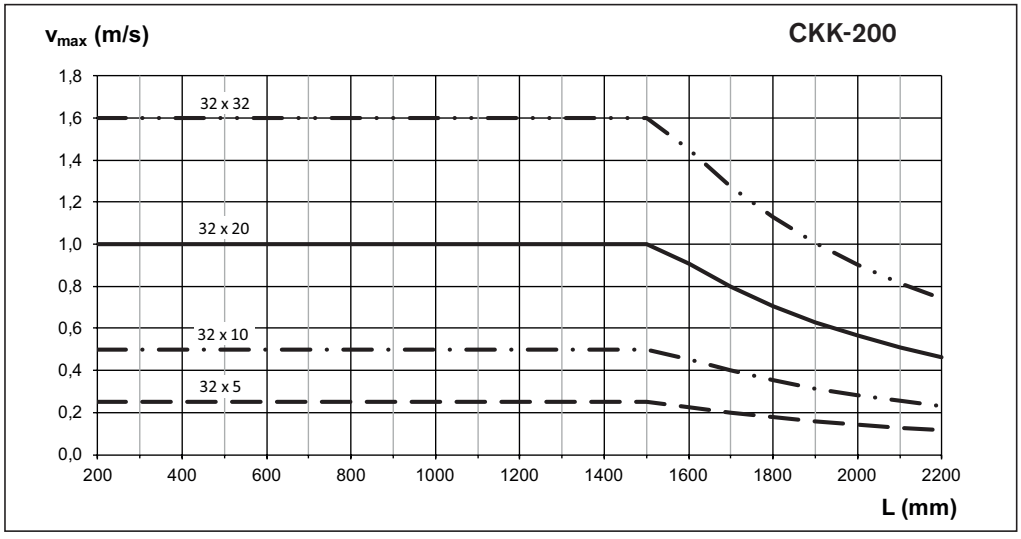
Consider motor speed!
Keep in mind the minimum travel s_{min}!







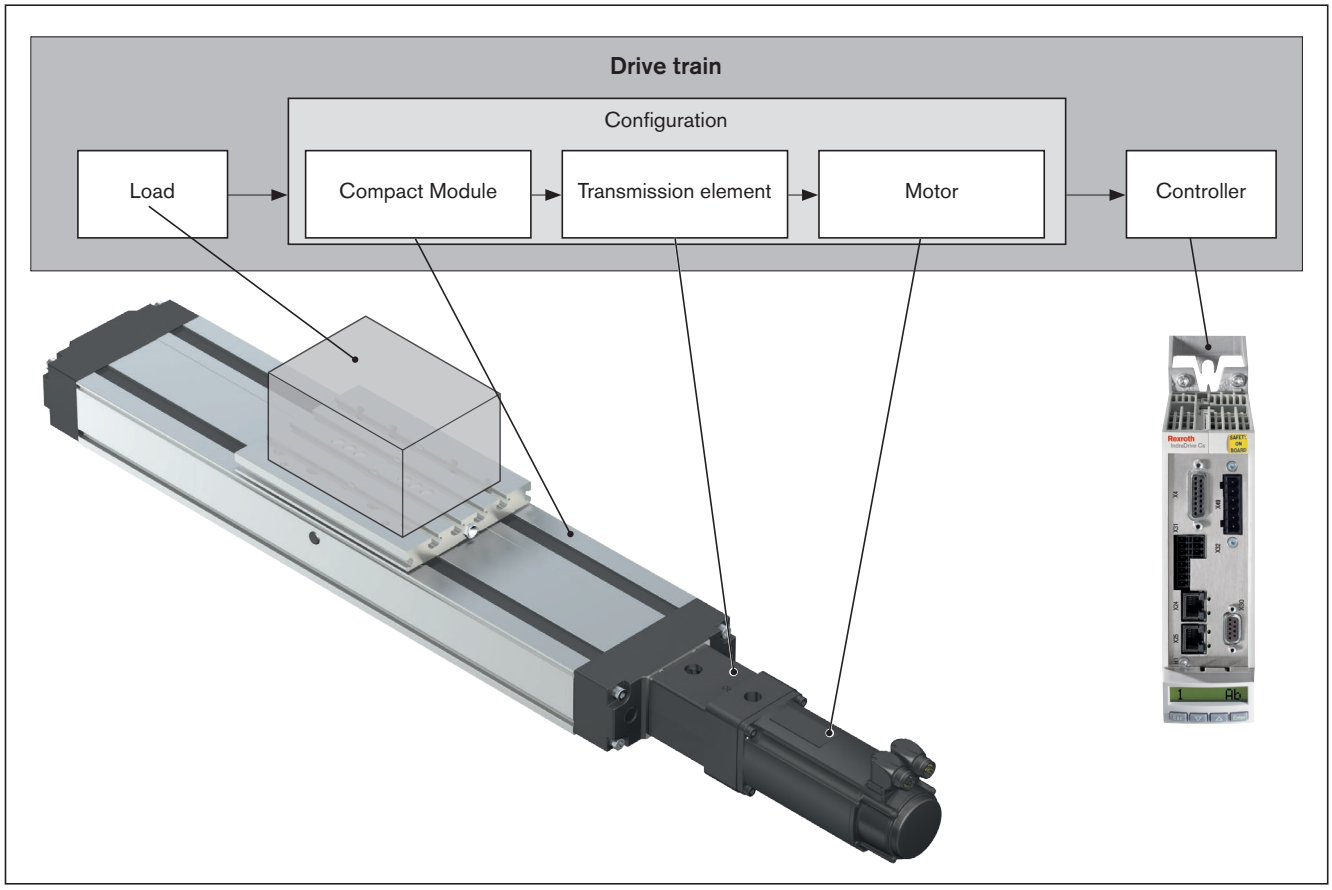




See the chapter “Screw support for CKK-200 Compact Module” for technical data of lengths 2,200 to 5,500 mm.

Calculations

Calculation principles



The correct dimensioning and assessment of an application requires structured consideration of the drive train as a whole. The basic element of the drive train is the configuration – made up of the linear system, the transmission element (coupling or timing belt side drive) and the motor – which can be ordered in that constellation in the catalog.

Maximum permissible loads

When selecting linear systems, it is essential to consider the upper limits for permissible loads and forces, as specified in the chapter on “Technical data”. The values given there are system-related. In other words, the upper limits are determined not only by the load ratings of the bearing points but also include structural design and material-related considerations.

Conditions for combined loads

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

Service life of the linear guide

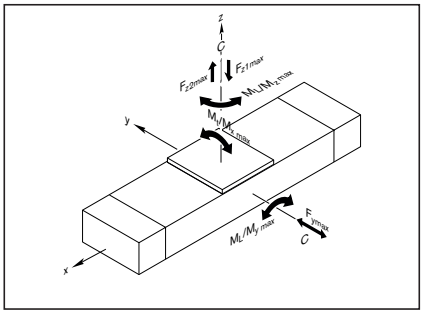
The service life of the rolling bearing points contained in a linear system can be calculated using the formulas given below. In a linear system with ball screw drive, the rolling bearing points that are relevant for the service life are the linear guide, the ball screw drive (nut), and the fixed bearing.

⚠ **The value to be indicated for the calculated service life of linear system is determined by the lowest of the separately calculated service life values for the linear guide, the ball screw drive or the fixed bearing.**

The linear guide of a linear system must bear the load and any processing forces.

Combined equivalent load on bearing of the guideway

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



Nominal service life

Nominal service life in meters

$$L = \left(\frac{C}{F_{comb}}\right)^3 \cdot 10^5$$

Nominal service life in hours

$$L_h = \frac{L}{3600 \cdot v_m}$$

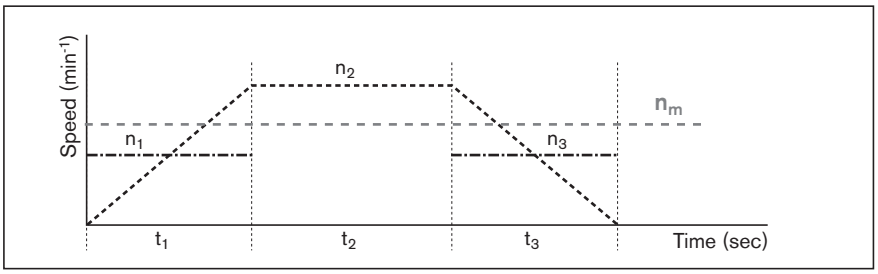
C	=	dynamic load capacity	(N)
F_{comb}	=	combined equivalent load on bearing	(N)
F_y	=	load due to a resulting force in the y-direction	(N)
F_z	=	load due to a resulting force in the z-direction	(N)
L	=	nominal service life	(m)
L_h	=	nominal service life	(h)
M_L	=	dynamic longitudinal moment load	(Nm)
M_t	=	dynamic torsional load moment	(Nm)
M_x	=	dynamic torsional moment about the x-axis	(Nm)
M_y	=	dynamic torsional moment about the y-axis	(Nm)
M_z	=	dynamic torsional moment about the z-axis	(Nm)
v_m	=	average travel speed	(m/s)

Calculation

Service life of ball screw drive or the fixed bearing

Where the operating conditions fluctuate (speed and load), the service life must be calculated using the averages $\mathbf{F_m}$ and $\mathbf{n_m}$.

Where the speed fluctuates, the average speed $\mathbf{n_m}$ is calculated as follows:



$$n_m = \frac{|n_1| \cdot t_1 + |n_2| \cdot t_2 + ... + |n_n| \cdot t_n}{t_{tot}}$$

$$t_{tot} = t_1 + t_2 + ... + t_n$$

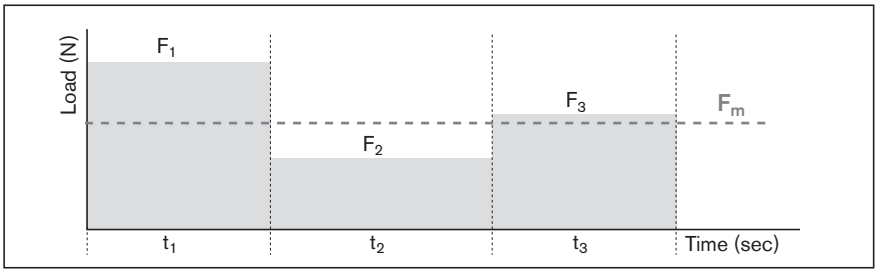
$n_{1, n_2, ... n_n}$ = speed in phases 1 … n (min-1)
n_m = average speed (min-1)
$t_{1, t_2, ... t_n}$ = discrete time step in phases 1 ... n (sec)
t_{tot} = sum of the discrete time steps (sec)

Speed in acceleration and braking phases $\mathbf{n_{1 \ldots n}}$:

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

n_1 = speed in acceleration and braking phases
$n_{A1 \ldots n}$ = speed at start in phase 1 ... n (min-1)
$n_{E1 \ldots n}$ = speed at finish in phase 1 ... n (min-1)

Where both the load and the speed fluctuate, the average load $\mathbf{F_m}$ is calculated as follows:



$$F_m = \sqrt[3]{\left|F_1\right|^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{t_1}{t_{tot}} + \left|F_2\right|^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{t_2}{t_{tot}} + ... + \left|F_n\right|^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{t_n}{t_{tot}}}$$

$F_{1, F_2, ... F_n}$ = axial load during phases 1 ... n (N)
F_m = equivalent dynamic axial load (N)
$n_{1, n_2, ... n_n}$ = speed in phases 1 … n (min-1)
n_m = average speed (min-1)
$t_{1, t_2, ... t_n}$ = discrete time step in phases 1 ... n (sec)
t_{tot} = sum of the discrete time steps (sec)

Nominal service life
Nominal service life in revolutions:

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

Nominal service life in hours:

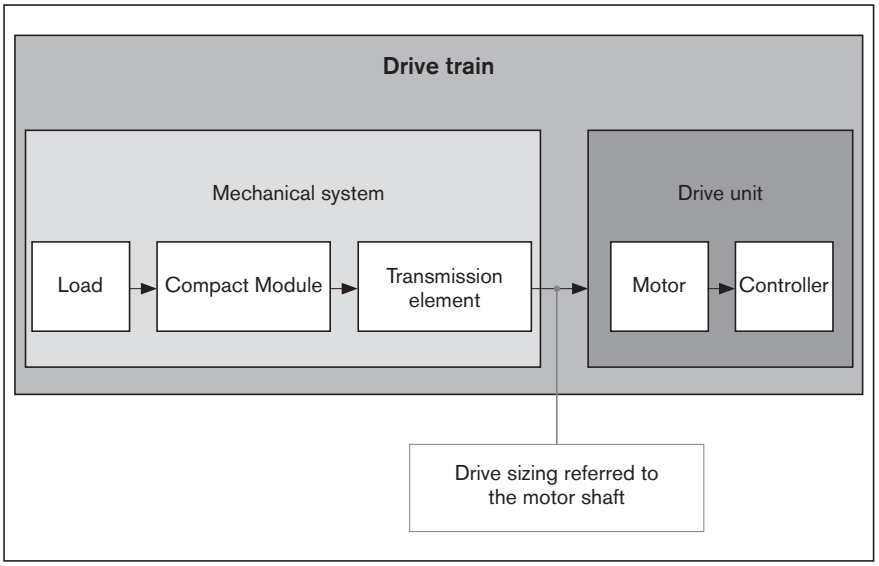
$$L_h = \frac{L}{n_m \cdot 60}$$

C = dynamic load capacity (N)
F_m = equivalent dynamic axial load (N)
L = nominal service life (–)
L_h = nominal service life (h)
n_m = average speed (min-1)

Sizing the drive

Basic principles

When calculating the required size of drive, the drive train can be subdivided into the mechanical system and the drive itself.
The **mechanical** system includes the physical components – linear system and the transmission elements (timing belt side drive, coupling) – and the load to be carried.
The electric **drive** is a motor-controller combination with the appropriate performance data.
The sizing or dimensioning of the electric drive is done taking the motor shaft as a reference point.
When sizing the drive, limit values must be taken into account as well as basic values. The limit values are to be observed in order to avoid damaging the mechanical components.



Technical data and formula symbols for the mechanical system

For each component (linear system, coupling, timing belt side drive), the relevant maximum permissible values must be identified for the drive torque and travel speed, as well as the basic values for frictional torque and mass moment of inertia.
The following technical data with the associated symbols are used when considering the basic **mechanical system** requirements in the design calculations for sizing the drive. The data listed in the table below can be found in the “Technical data” chapter or it is determined using the formulas described on the following pages.

		Mechanical system			
		Load	Linear system	Transmission element	
				Coupling	Timing belt side drive
Weight moment	**(Nm)**	M_g [6]	–	–	–
Frictional torque	**(Nm)**	–[5]	M_{Rs} [3]	–	M_{Rsd} [3]
Mass moment of inertia	**(kgm²)**	J_t [1]	J_s [2]	J_c [3]	J_{sd} [3]
Max. permissible speed	**(m/s)**	–	v_{max} [4]	–	–
Max. permissible drive torque	**(Nm)**	–	M_p [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) Value as per table
4) Length-dependent value, to be read off from the graph
5) Any additional process forces are to be taken into consideration as load moments
6) For vertical mounting orientation: Determine the value using the appropriate formula

Sizing the drive

Drive sizing referred to the motor shaft

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

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

Determination of the values for the individual mechanical components in the drive train, based on the motor shaft

Frictional torque M_R

For motor attachment via flange and coupling

$$M_R = M_{Rs}$$

For motor attachment via timing 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 timing belt side drive

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

Determination of mass moment of inertia of the linear system components

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

Determination of translational mass moment of inertia of the external load

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

i	=	gear ratio of timing belt side drive	(–)
J_c	=	mass moment of inertia of the coupling	(kgm^2)
J_{ex}	=	mass moment of inertia of mechanical system	(kgm^2)
J_s	=	mass moment of inertia of the linear motion system	(kgm^2)
J_{sd}	=	mass moment of inertia of timing belt side drive at motor journal	(kgm^2)
J_t	=	translational mass moment of inertia of external load based on the linear system screw journal	(kgm^2)
$k_{J\,fix}$	=	constant for fixed-length portion of mass moment of inertia	($kgmm^2$)
$k_{j\,m}$	=	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	(kgmm)
L	=	length of linear system	(mm)
m_{ex}	=	moved external load	(kg)
M_R	=	frictional torque at motor journal	(Nm)
M_{Rs}	=	frictional torque of system	(Nm)
M_{Rsd}	=	frictional torque of timing belt side drive at motor journal	(Nm)

Maximum permissible speed v_{mech}
The lowest of all the values for maximum permissible speed of all mechanical components contained in the drive train 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. Because it is a system in itself, a linear system with ball screw drive will always have a maximum permissible speed that is lower than the maximum values for the other components in the mechanical system, such as coupling or timing belt side drive, and therefore determines the maximum permissible speed of the overall mechanical system.

Maximum permissible speed

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

Maximum permissible speed
For motor attachment via motor mount and coupling

$$n_{mech} = \frac{v_{mech} \cdot 1000 \cdot 60}{P}$$

For motor attachment via timing belt side drive

$$n_{mech} = \frac{v_{mech} \cdot i \cdot 1000 \cdot 60}{P}$$

i	=	gear ratio of timing belt side drive	(–)
n_{mech}	=	maximum permissible speed of mechanical system	(min^{-1})
P	=	screw lead	(mm)
v_{max}	=	maximum permissible speed of linear system	(m/s)
v_{mech}	=	maximum permissible speed of mechanical system	(m/s)

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

For motor attachment via flange and coupling

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

For motor attachment via timing belt side drive

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

i	=	gear ratio of timing belt side drive	(–)
M_p	=	maximum permissible drive torque of the linear system	(Nm)
M_{cN}	=	rated torque of coupling	(Nm)
M_{sd}	=	maximum permissible drive torque of the timing belt side drive	(Nm)
M_{mech}	=	maximum permissible drive torque for mechanical system	(Nm)

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

Sizing the drive

Rough guide for motor selection

The following conditions can be used as a rough guide for preselecting the motor.

Condition 1:

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

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

n_{max} = maximum speed of motor (min^{-1})
n_{mech} = maximum permissible speed of the mechanical system (min^{-1})

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.

Relation of the moments of inertia

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

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

Application area	V
Handling	≤ 6.0
Processing	≤ 1.5

J_{br} = mass moment of inertia of motor brake (kgm^2)
J_{ex} = mass moment of inertia of mechanical system (kgm^2)
J_m = mass moment of inertia of motor (kgm^2)
V = ratio of mass moments of inertia of drive train and motor (—)

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

Torque ratio

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

Static load moment

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

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

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

g	=	gravitational acceleration (= 9.81)	(m/s^2)
i	=	gear ratio of timing belt side drive	(–)
m_{ca}	=	moved mass of carriage	(kg)
m_{ex}	=	moved external load	(kg)
M_g	=	weight moment at motor journal	(Nm)
M_0	=	continuous motor torque	(Nm)
M_R	=	frictional torque at motor journal	(Nm)
M_{stat}	=	static longitudinal moment load	(Nm)
P	=	screw lead	(mm)
π	=	pi	(–)

In the chapter ➠ “Configuration and ordering” users can put together standard configurations, including motor attachment and motor, for the various linear 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.

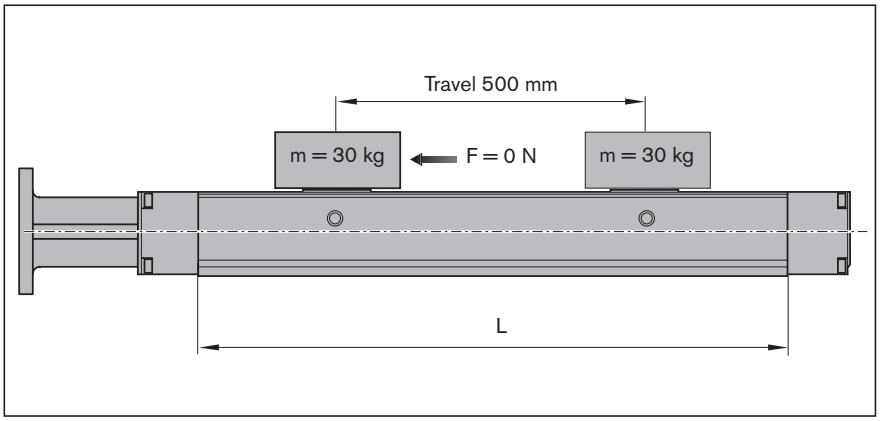
Precise sizing of the drive unit
Preselecting the motor according to this rough guide is no substitute for the required precise design calculations for the drive, taking all moments/torques and speed levels into account. For precise calculation of the electric drive, including consideration of the specific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

Calculation example

Starting 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:

CKK-110 Compact Module
- Carriage with connection plate $L_{ca} = 155$ mm
- With cover strip
- Motor attachment via timing belt side drive, $i = 1.5$
- with AC servo motor MSK 040C with brake



Estimation of length L

(For a first estimation, the largest possible lead and therefore length is assumed, since the permitted speed can decrease with increasing length.)

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

Selection of ball screw drive

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

Permissible ball screw drives according to “Permissible speed” chart for $v = 0.5$ m/min and $L = 739$ mm:

Ball screw drive 16 x 10 and ball screw drive 16 x 16

Ball screw drive selected (smaller lead):

Ball screw drive 16 x 10

Maximum permissible speed for ball screw drive 16 x 10 as read off from diagram:

$v_{max} = 0.77$ m/s

Estimation of length L

(for selected ball screw drive)

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

Frictional torque M_R

(motor attachment via timing belt side drive)

	M_R	$= M_{Rsd} + \frac{M_{Rs}}{i}$
Compact Module:	M_{Rs}	$= 0.43$ Nm
Timing belt side drive:	M_{Rsd}	$= 0.40$ Nm ($i = 1.5$)
Frictional torque:	M_R	$= 0.43 + \frac{0.40}{1.5} = 0.70$ Nm

Mass moment of inertia J_{ex}

(motor attachment via timing belt side drive)

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

Timing belt side drive: $J_{sd} = 82 \cdot 10^{-6}\ kgm^2$

Compact Module:
$J_s = (k_{J\,fix} + k_{J\,var} \cdot L) \cdot 10^{-6}$
$= (8.432 + 0.031 \cdot 715) \cdot 10^{-6}$
$= 30.597 \cdot 10^{-6}\ kgm^2$

External load:
$J_t = m_{ex} \cdot k_{J\,m} \cdot 10^{-6}$
$= 30 \cdot 2.533 \cdot 10^{-6}$
$= 75.99 \cdot 10^{-6}\ kgm^2$

Mass moment of inertia:
$J_{ex} = 82 \cdot 10^{-6} + \frac{(30.597 \cdot 10^{-6} + 75.99 \cdot 10^{-6})}{1.5^2}$
$= 129.372 \cdot 10^{-6}\ kgm^2$

Maximum permissible speed n_{mech}

(motor attachment via timing belt side drive)
Limit for mechanical system

$$n_{mech} = \frac{(v_{mech} \cdot i \cdot 1000 \cdot 60)}{P}$$

Max. permissible speed: $v_{mech} = v_{max} = 0.77\ m/s$

Max. permissible speed:
$n_{mech} = \frac{(0.77 \cdot 1.5 \cdot 1000 \cdot 60)}{10}$
$= 6930\ min^{-1}$

Maximum speed of application n_{mech}:

(Motor attachment via timing belt side drive) limit value application

Speed: $v_{mech} = 0.5\ m/s$

Speed:
$n_{mech} = \frac{0.5 \cdot 1.5 \cdot 1000 \cdot 60}{10}$
$= 4500\ min^{-1}$

Calculation example

Max. permissible drive torque M_{mech}

(Motor attachment via timing belt side drive) limit value mechanical system

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

Timing belt side drive: $M_{sd} = 5.11$ Nm (gear ratio $i = 1.5$ for MSK 040C)

Compact Module: $M_p = 13.51$ Nm

Drive torque:

$$M_{mech} = \text{minimum}\left(5.11;\ \frac{13.51}{1.5}\right)$$

$$= \text{minimum}\,(5.11;\ 9.0)$$

$$= 5.11 \text{ Nm}$$

Checking the motor preselection

Selected motor:
MSK 040C with brake

Condition 1:

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

$7500 \geq 4500$ condition fulfilled – motor selection OK

Condition 2:

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

Motor moment of inertia: $J_m = 140 \cdot 10^{-6}$ kgm²

Brake moment of inertia: $J_{br} = 23 \cdot 10^{-6}$ kgm²

Moment of inertia ratio:

$$V = \frac{129.372 \cdot 10^{-6}}{(140 \cdot 10^{-6} + 23 \cdot 10^{-6})}$$

$$= 0.79$$

Condition for handling: $V \leq 6$

$0.79 \leq 6$ condition fulfilled – motor selection OK

Condition 3:

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

Static load moment: $M_{stat} = M_R + M_g$ (horizontal mounting orientation $M_g = 0$)

$$= 0.67 \text{ Nm}$$

Torque of the motor: $M_0 = 2.7$ Nm

Torque ratio: $\frac{0.67}{2.7} = 0.25$

$0.25 \leq 0.6$ condition fulfilled – motor selection OK

All three conditions fulfilled ➠ selected motor is suitable for the application.

Result

CKK-110 Compact Module

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

With cover strip
Motor attachment via timing belt side drive, gear ratio i = 1.5
Preselected motor: MSK 040C 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.

Frictional torque:	M_R	= 0.70 Nm
Mass moment of inertia:	J_{ex}	= $129.372 \cdot 10^{-6}$ kgm^2
Speed:	v_{mech}	= 0.5 m/s (n_{mech} = 4500 min^{-1})
Limit value for drive torque:	M_{mech}	= 5.11 Nm

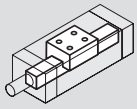
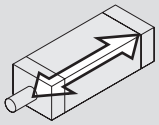
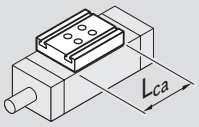
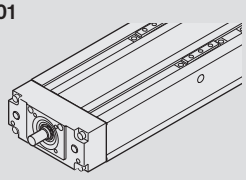
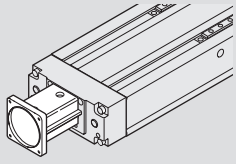
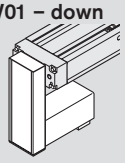
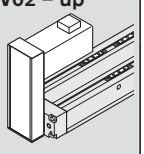
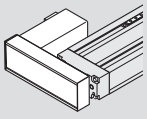
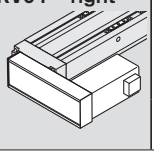
➠ The motor torque must be limited to 5.11 Nm on the drive side.

Limit value for acceleration:	a_{max}	= 50 m/s^2
Limit value for travel:	v_{max}	= 0.77 m/s (n_{mech} = 6930 min^{-1})

Besides the preferred type MSK 040C, other motors with identical connection dimensions can be adapted while taking care not to exceed the calculated limits.

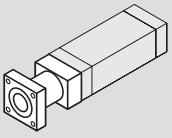
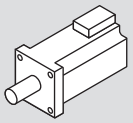
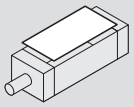
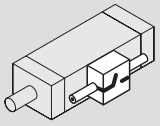
CKK-070

Configuration and ordering

Short designation, length[1] CKK-070-NN-1, ... mm		Guideway			Drive unit		Carriage				
											
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P	without connection plate L_{ca} =		with connection plate L_{ca} =		
Version						8 x 2.5	32 mm	73 mm	60 mm	95 mm	
Without attachment	OF01 	01	03	04	Ø6	01	01	02	40	41	
Flange/coupling	MF01 	01	03	04	Ø6	01	01	02	40	41	
Timing belt side drive	RV01 – down  RV02 – up  RV03 – left  RV04 – right 	01	03	04	Ø6	01	01	02	40	41	

d_0 = nominal diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
Option 03: with center holes and mounting threads in the ground area of the frame
Option 04: with center holes and long hole in the ground area of the frame
Selectable starting from length L ≥ 300 mm up to length L_{max}

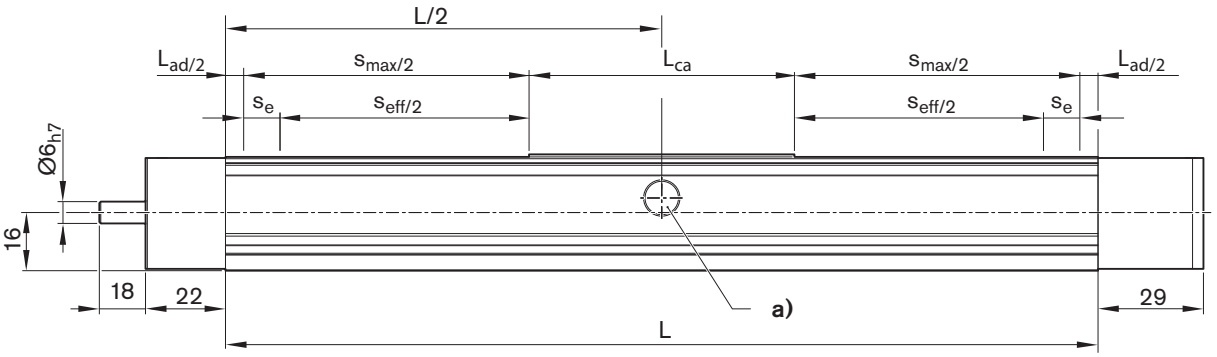
	Motor attachment[3]			**Motor**[5]		**Cover**		**Switching system**[6]		**Documentation**[8]
										
	i =	**Attachment kit**[4]	**for motor**	**without brake**	**with brake**	**Cover strip without**	**Cover strip with**			
	–	00	–	00		01	02	Without switch Without mounting duct Without socket plug	00	01
	–	01	MSK 030C	84	85			Magnetic sensor		
		03	MSM 031B	136	137			REED sensor	21	
		05	MSM 019B	134	135			Hall sensor PNP NC contact	22	
	1	11	MSK 030C	84	85			Hall sensor PNP NO contact	23	02
		13	MSM 031B	136	137			Mounting duct	25	
		15	MSM 019B	134	135			Socket plug	28	
	1.5	12	MSK 030C	84	85			Magnetic sensor with plug[7]		
		14	MSM 031B	136	137			REED sensor	58	03
		16	MSM 019B	134	135			Hall sensor PNP NC contact	59	

3) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
4) Mounting kit can also be deliver without motor. When ordering, enter the motor type “00”!
Mounting kits in according to customer specification ➠ chapter “Mounting kits for motors according to customer specification”
5) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Measurement report:
01 = standard report
02 = frictional torque measurement
03 = lead deviation
(also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKK-070 Dimensional drawings

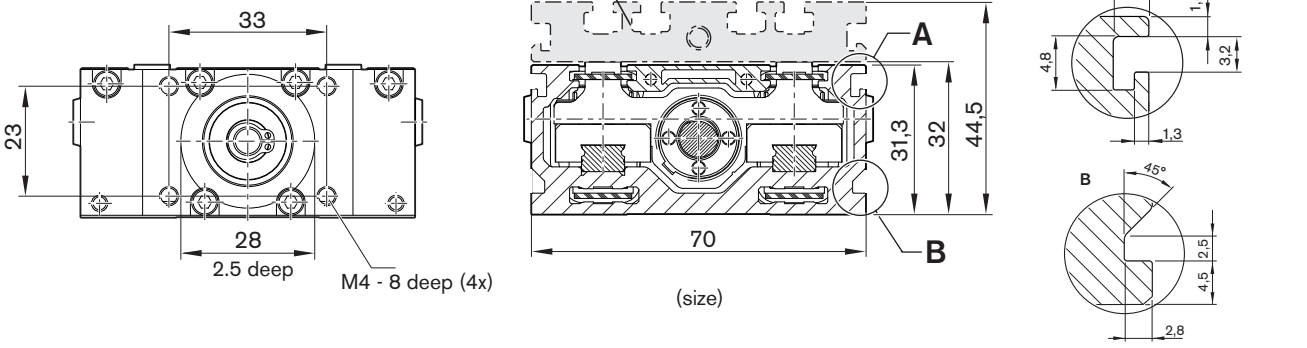
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-D 3
For further information, see the chapter on lubrication.

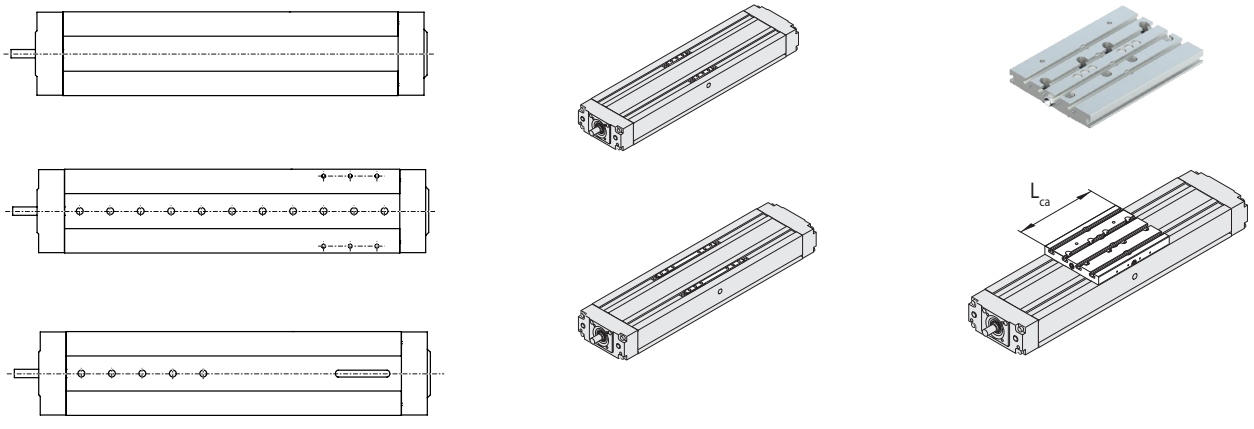
For connection plate, see chapter on "Mounting"

For mounting duct, socket plug



For mounting with clamping fixtures

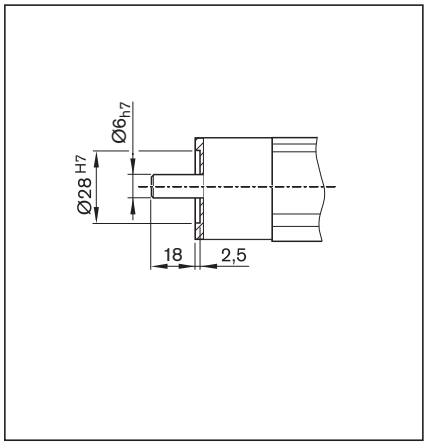
Design/options for guideway (frame), carriages, connection plates; see following pages



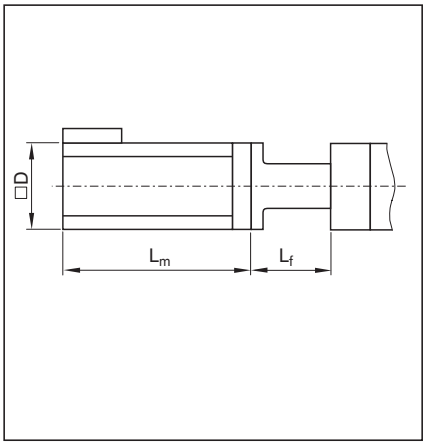
Guideway (frame) Carriages Connection plates

Version

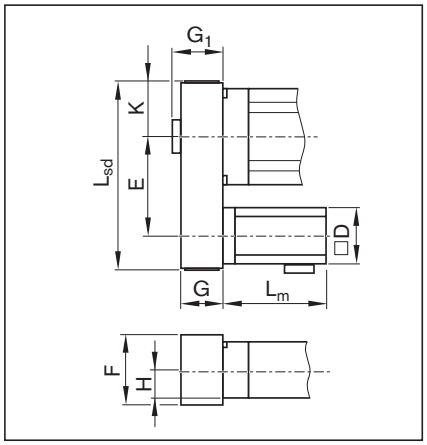
OF01



MF01



RV01, RV02, RV03, RV04



Version	Motor	Dimensions (mm) D	E i = 1	E i = 1.5	F	G	G_1	H	K	L_f	L_m without brake	L_m with brake	L_{sd}
RV01, RV02, RV03, RV04	MSM 031B	60	78.0	75.0	64.5	37.0	43.5	16	33.5	–	79.0	115.5	157
	MSK 030C	54								–	188.0	213.0	154
	MSM 019B	38	76.5	76.5	48.0	27.5	28.0	16	27.5	–	92.0	122.0	139
MF01	MSM 019B	38	–	–	–	–		–	–	45	92.0	122.0	–
	MSM 031B	60	–	–	–	–		–	–	50	79.0	115.5	–
	MSK 030C	54	–	–	–	–		–	–	50	188.0	213.0	–

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_W = center-to-center distance of carriages

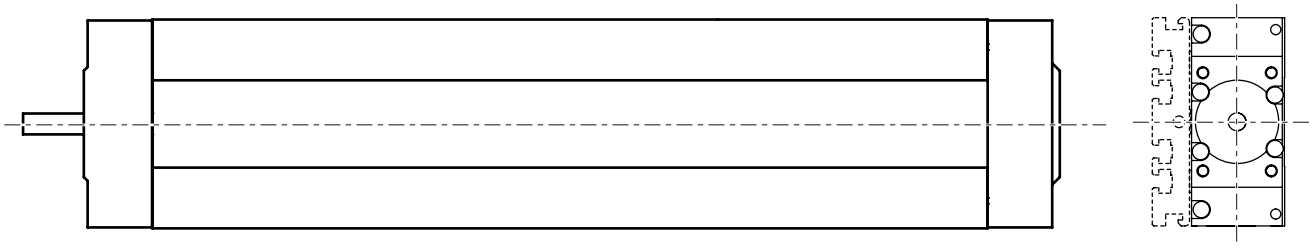
Carriage Connection plate without L_{ca} (mm)	Carriage Connection plate with L_{ca} (mm)	L_W (mm)	Additional length Connection plate without L_{ad} (mm)	Additional length Connection plate with L_{ad} (mm)
32	60	–	30	2
73	95	–	30	8

See order example for example of how to calculate length.

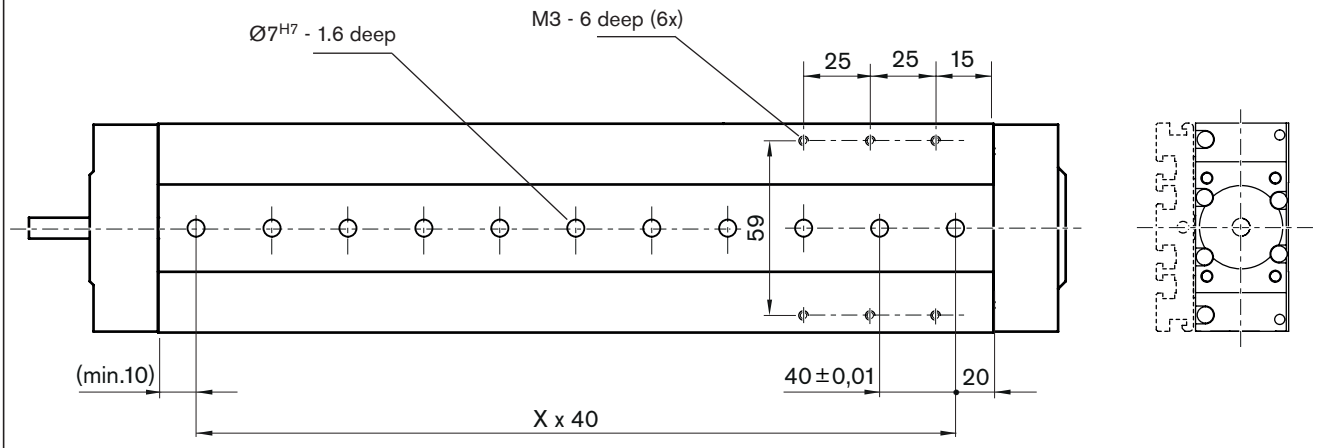
CKK-070 Guideway/carriage options Dimensional drawings

Guideway (frame)

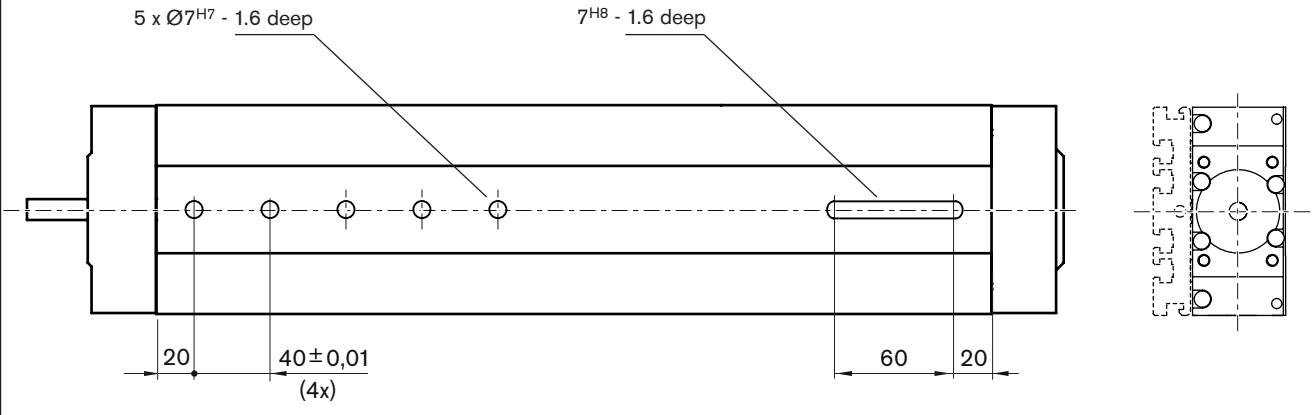
Option 01 / standard



Option 03 / with central holes

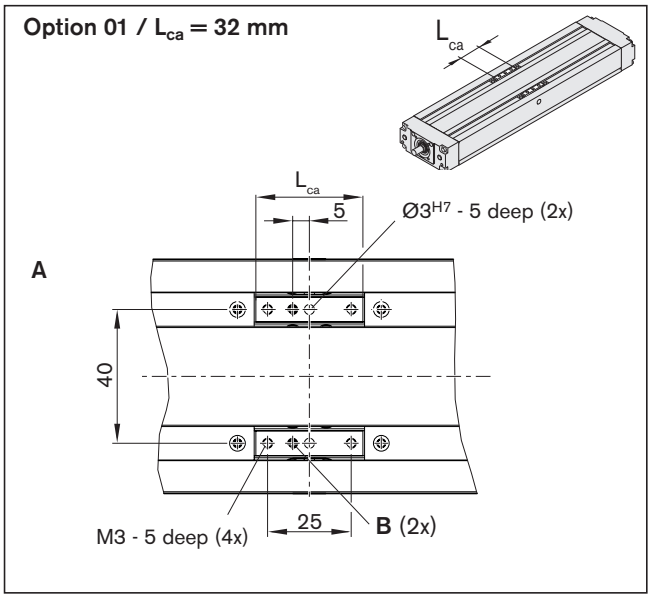


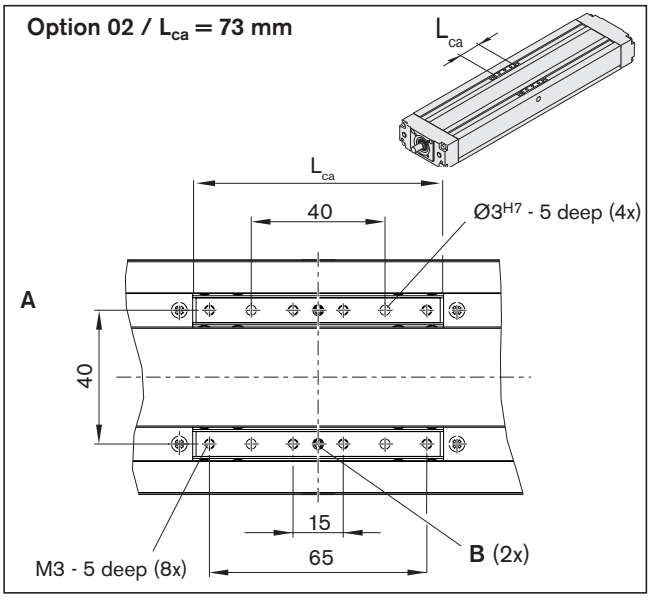
Option 04 / with central holes and long hole



View from below (ground area)

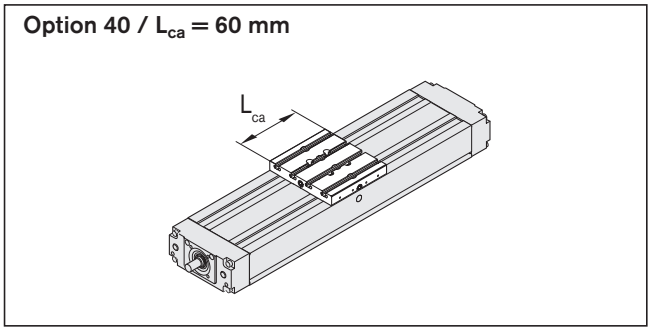
Carriage without connection plate

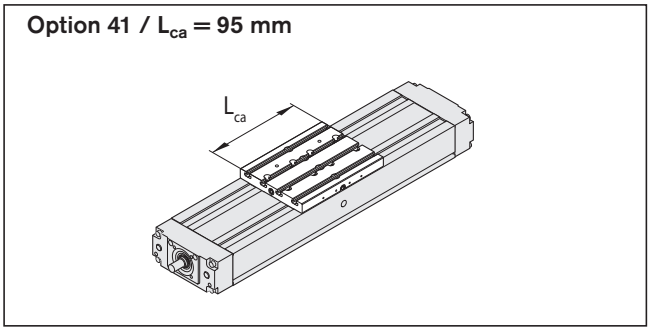




A Drive side
B Lube port for grease lubrication; closed with M3 set screw

Carriage with connection plate[1)]

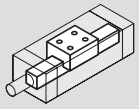
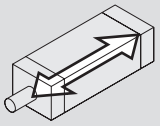
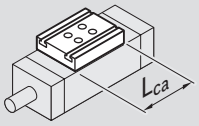
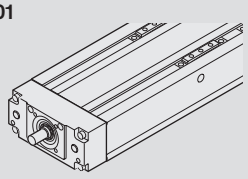
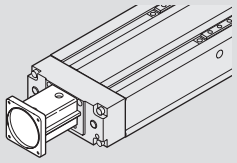
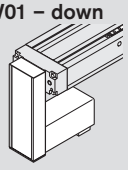
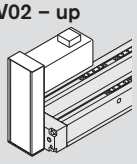
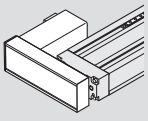
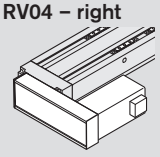




1) See the chapter on “Connection plates” for dimensional drawings

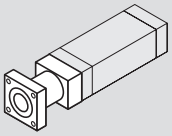
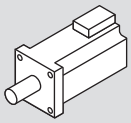
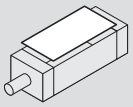
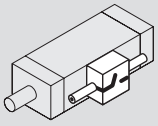
CKK-090

Configuration and ordering

Short designation, length[1] CKK-090-NN-1, ... mm		Guideway			Drive unit				Carriage					
														
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P 12 x 2	12 x 5	12 x 10	without connection plate L_{ca} = 35 mm	100 mm	variable[3]	with connection plate L_{ca} = 60 mm	125 mm	
Version														
Without attachment	OF01 	01	03	04	Ø8	03	01	02	01	02	05	40	41	
Flange/coupling	MF01 	01	03	04	Ø8	03	01	02	01	02	05	40	41	
Timing belt side drive	RV01 – down  RV02 – up  RV03 – left  RV04 – right 	01	03	04	Ø8	03	01	02	01	02	05	40	41	

d_0 = nominal diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   Option 04: with center holes and long hole in the ground area of the frame
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Length calculation of the carriage (see dimensional drawings)

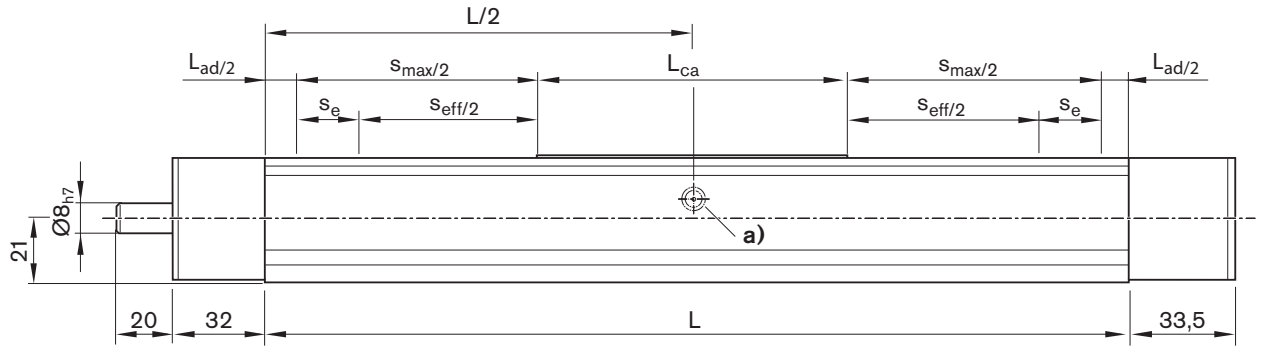
	Motor attachment[4]			Motor[6]		Cover		Switching system[7]		Documentation[9]
										
	i =	Attachment kit[5]	for motor	without brake	with brake	Cover strip without	with			
	–	00	–	00		01	02			01
	–	01	MSK 030C	84	85			Without switch Without mounting duct Without socket plug	00	
		05	MSM 031C	138	139			Magnetic sensor		
	1	11	MSK 030C	84	85			REED sensor	21	02
		13	MSM 031C	138	139			Hall sensor PNP NC contact	22	
	1.5	21	MSK 030C	84	85			Hall sensor PNP NO contact	23	
		23	MSM 031C	138	139			Mounting duct	25	
								Socket plug	17	
								Magnetic sensor with plug[8]		03
								REED sensor	58	
								Hall sensor PNP NC contact	59	

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Mounting kit can also be deliver without motor. When ordering, enter the motor type “00”!
Mounting kits in according to customer specification ➠ chapter “Mounting kits for motors according to customer specification”
6) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
7) For further information, see ➠ “Switching system” chapter.
8) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
9) Measurement report:
01 = standard report
02 = frictional torque measurement
03 = lead deviation
(also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

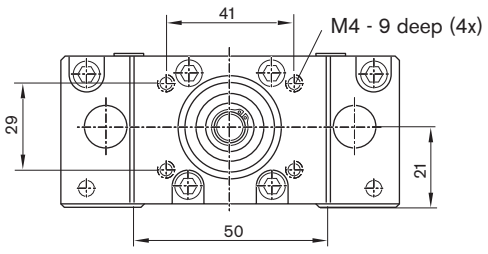
CKK-090 Dimensional drawings

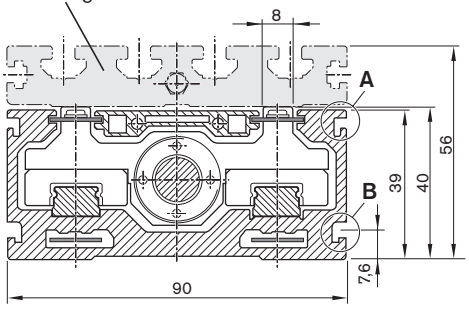
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-D 3.
For further information, see the chapter on lubrication.

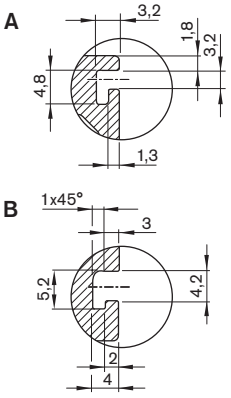
For connection plate, see chapter on “Mounting”





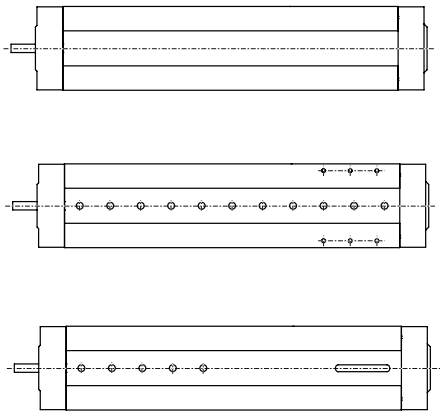
(size)

For mounting duct, socket plug

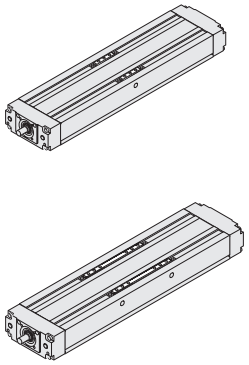


For mounting with clamping fixtures

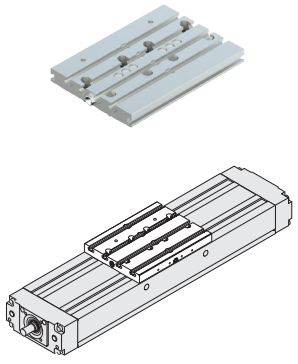
Design/options for guideway (frame), carriages, connection plates; see following pages



Guideway (frame)



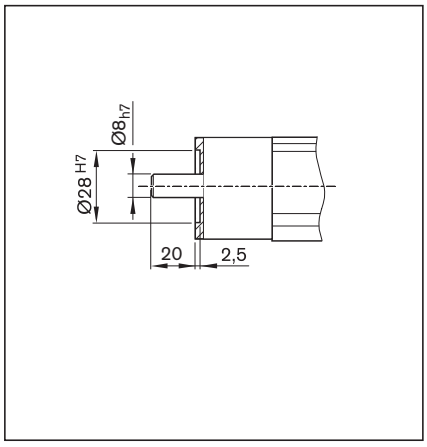
Carriages



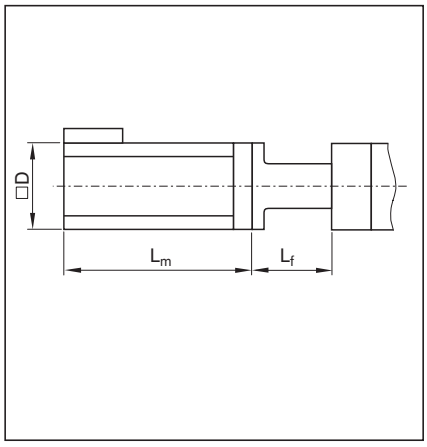
Connection plates

Version

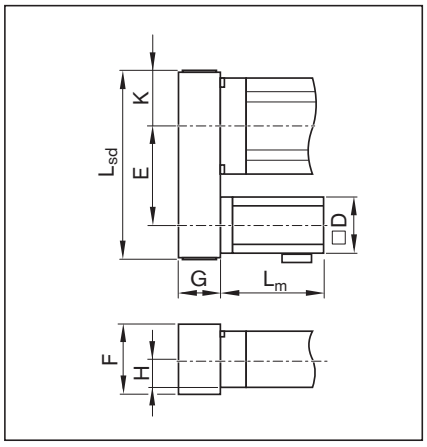
OF01



MF01



RV01, RV02, RV03, RV04



Version	Motor	Dimensions (mm) D	E i = 1	E i = 1.5	F	G	H	K	L_f	L_m without brake	L_m with brake	L_{sd} i = 1	L_{sd} i = 1.5
RV01, RV02, RV03, RV04	**MSM 031C**	60	103.5	89.5	64.5	37	21	33	–	98.5	135.0	179	165
	MSK 030C	54							–	188.0	213.0		
MF01	**MSM 031C**	60	–	–	–	–	–	–	71.5	98.5	135.0	–	–
	MSK 030C	54	–	–	–	–	–	–	70.0	188.0	213.0	–	–

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length (length that cannot be used)
L_W = center-to-center distance of carriages

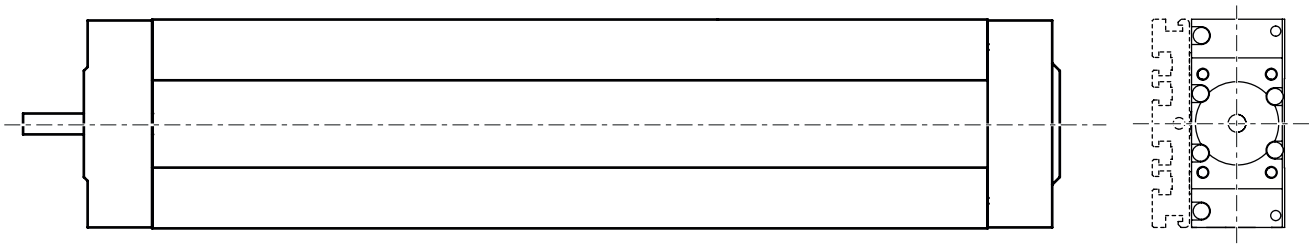
Carriage Connection plate without L_{ca} (mm)	Carriage Connection plate with L_{ca} (mm)	L_W (mm)	Additional length Connection plate without L_{ad} (mm)	Additional length Connection plate with L_{ad} (mm)
35	60	–	50	25
100	125	–	50	25
variable min = 101 max = 235	–	Variable min. = 66 max. = 200	50	–

See order example for example of how to calculate length.

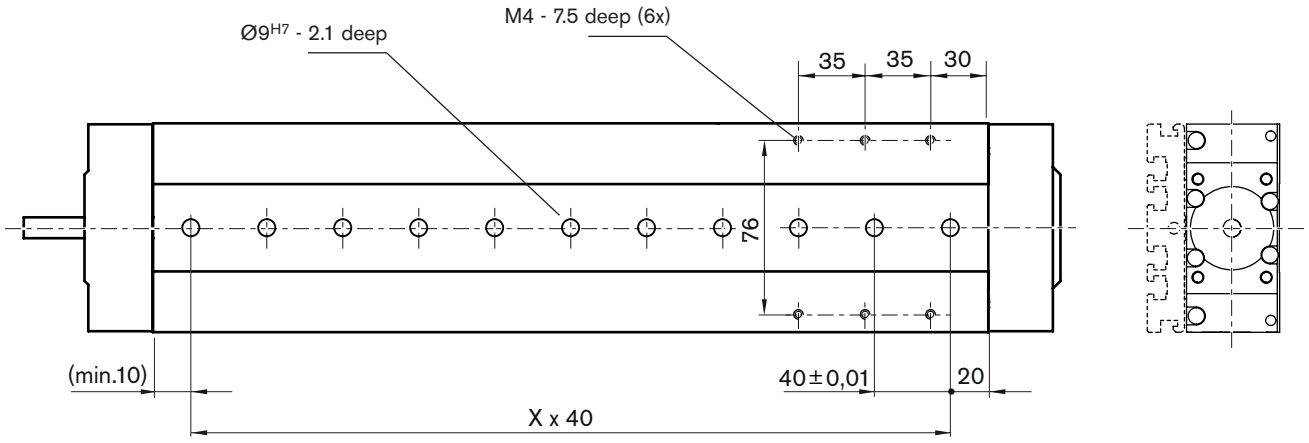
CKK-090 Guideway/carriage options Dimensional drawings

Guideway (frame)

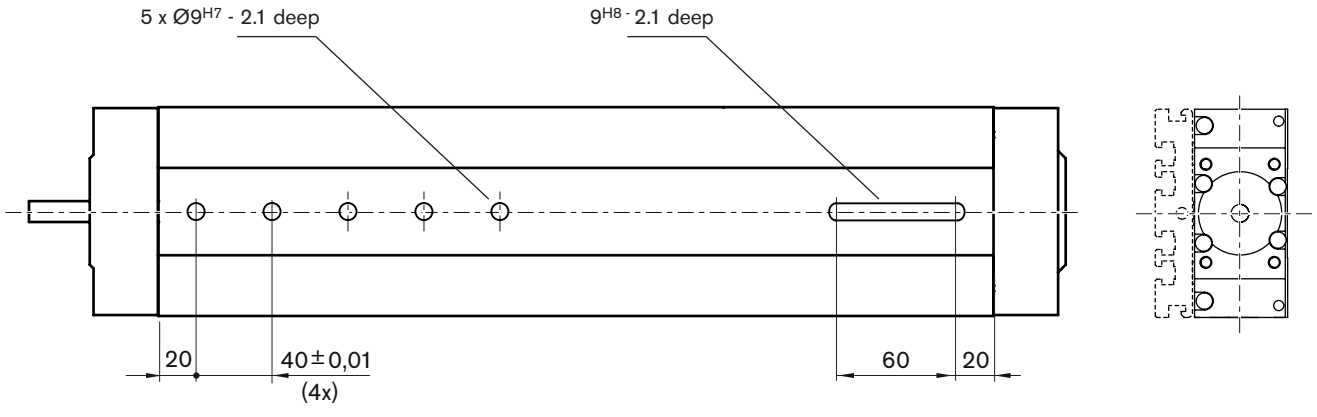
Option 01 / standard



Option 03 / with central holes



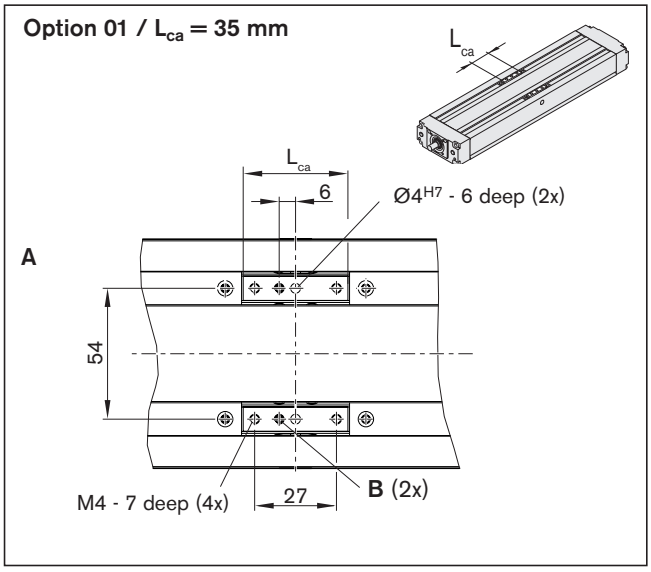
Option 04 / with central holes and long hole



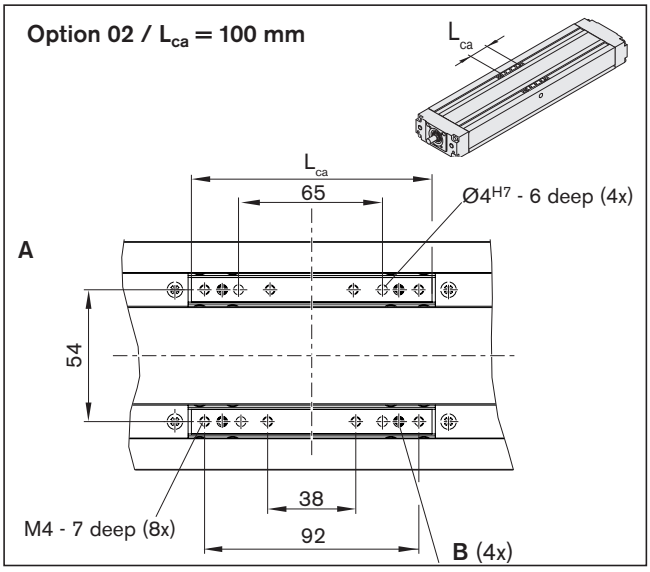
View from below (ground area)

Carriage without connection plate

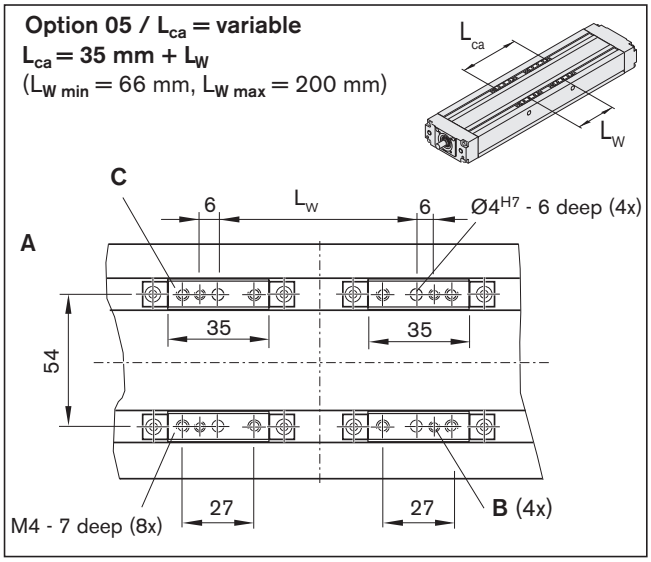
Option 01 / L_{ca} = 35 mm



Option 02 / L_{ca} = 100 mm



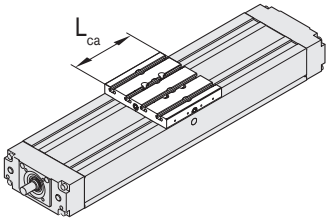
Option 05 / L_{ca} = variable
L_{ca} = 35 mm + L_W
($L_{W\ min}$ = 66 mm, $L_{W\ max}$ = 200 mm)



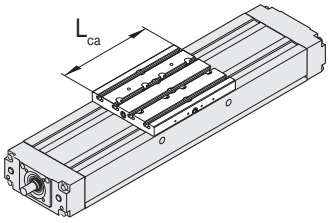
A Drive side
B Lube port for grease lubrication; closed with M3 set screw
C Driving runner block

Carriage with connection plate[1)]

Option 40 / L_{ca} = 60 mm

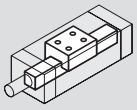
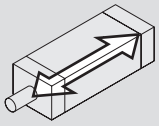
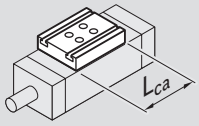
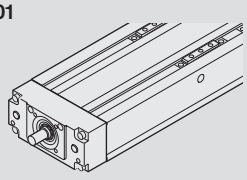
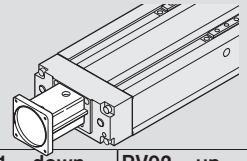
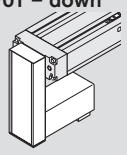
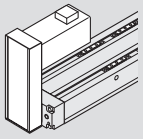
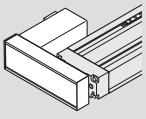
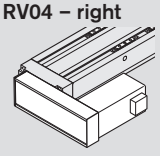


Option 41 / L_{ca} = 125 mm



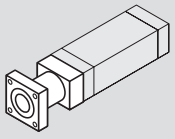
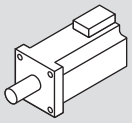
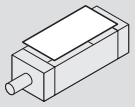
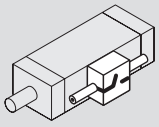
1) See the chapter on “Connection plates” for dimensional drawings

CKK-110 Configuration and ordering

Short designation, length[1] CKK-110-NN-1, ... mm		Guideway			Drive unit				Carriage					
														
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P 16 x 5	16 x 10	16 x 16	without connection plate L_{ca} = 39 mm	124 mm	variable[3]	with connection plate L_{ca} = 60 mm	155 mm	
Version														
Without attachment	OF01 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
					Ø11 with keyway	11	12	13						
Flange/coupling	MF01 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
Timing belt side drive	RV01 – down 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
	RV02 – up 													
	RV03 – left 													
	RV04 – right 													

d_0 = nominal diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
Option 03: with center holes and mounting threads in the ground area of the frame
Option 04: with center holes and long hole in the ground area of the frame
Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Length calculation of the carriage (see dimensional drawings)

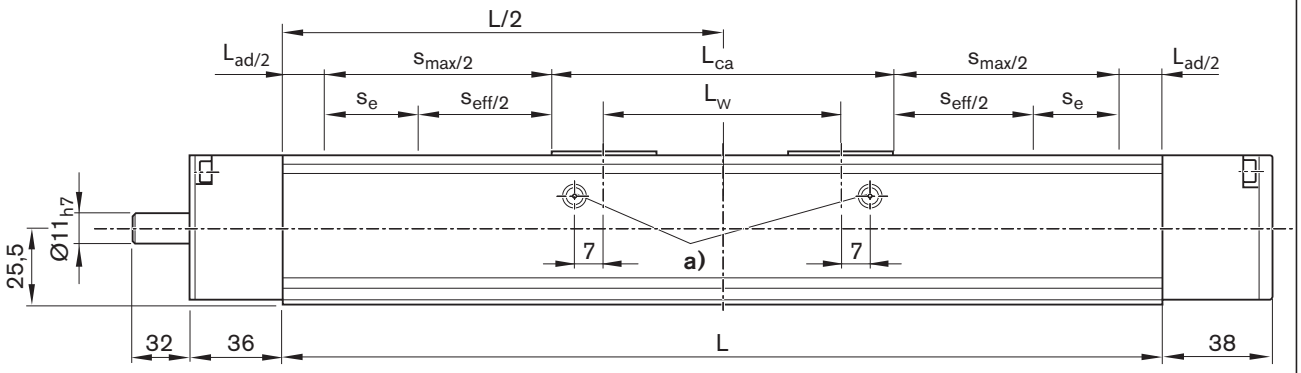
Motor attachment[4]			Motor[6]		Cover		Switching system[7]	Documentation[9]
								
i =	Attachment kit[5]	for motor	without brake	with brake	Cover strip without	Cover strip with		
–	00	–	00		01	02	Without switch Without mounting duct Without socket plug: 00	01
–	01	MSK 030C	84	85			**Magnetic sensor**	
	03	MSK 040C	86	87			REED sensor: 21	
	05	MSM 031C	138	139			Hall sensor PNP NC contact: 22	
	06	MSM 041B	140	141			Hall sensor PNP NO contact: 23	02
1	11	MSK 030C	84	85			Mounting duct: 25	
	13	MSK 040C	86	87			Socket plug: 17	
	15	MSM 031C	138	139			**Magnetic sensor with plug[8]**	
	17	MSM 041B	140	141			REED sensor: 58	03
1.5	21	MSK 030C	84	85			Hall sensor PNP NC contact: 59	
	23	MSK 040C	86	87				
	25	MSM 031C	138	139				
	27	MSM 041B	140	141				

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Mounting kit can also be deliver without motor. When ordering, enter the motor type “00”!
Mounting kits in according to customer specification ➠ chapter “Mounting kits for motors according to customer specification”
6) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
7) For further information, see ➠ “Switching system” chapter.
8) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
9) Measurement report:
01 = standard report
02 = frictional torque measurement
03 = lead deviation
(also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKK-110 Dimensional drawings

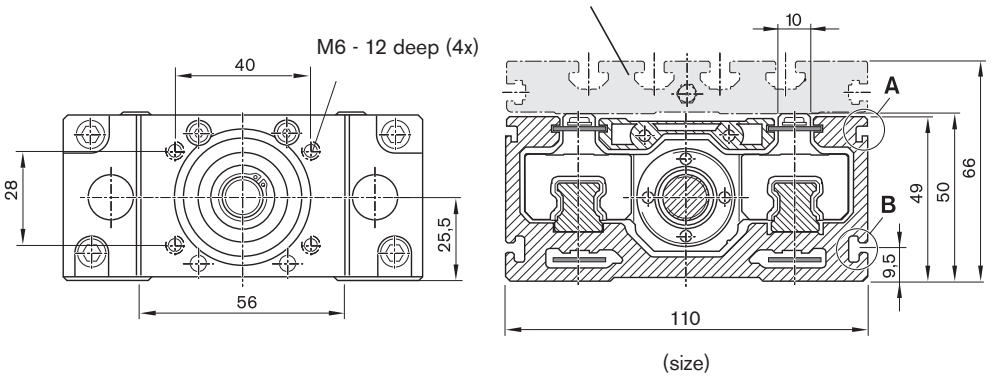
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



a) Lubrication bore (grease lubrication):
Funnel-type lube nipple DIN 3405-D 3.
For further information, see the chapter on lubrication.

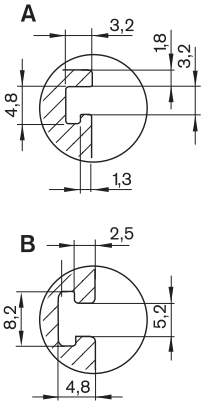
For connection plate, see chapter on "Mounting"

M6 - 12 deep (4x)



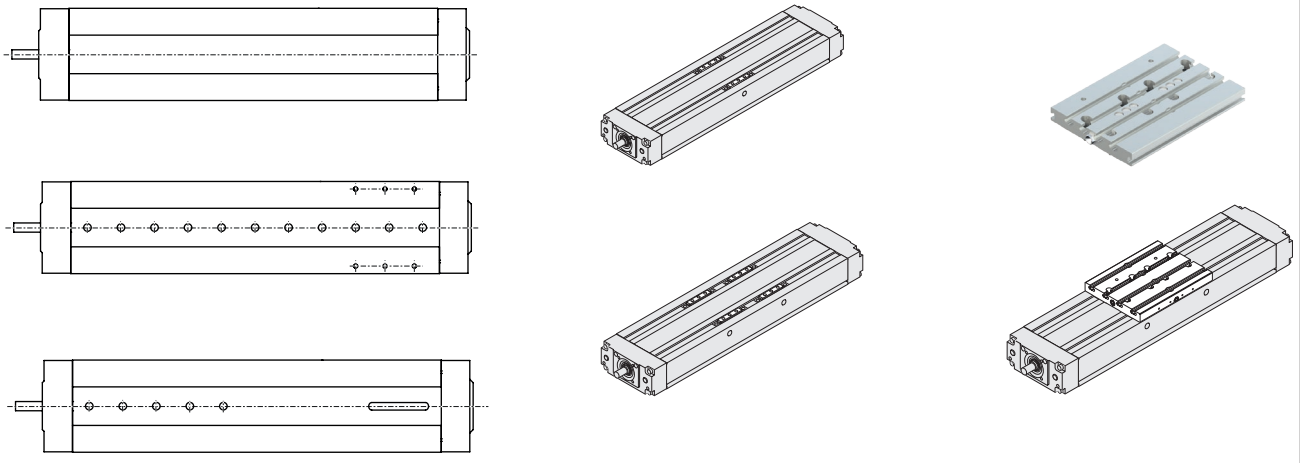
(size)

For mounting duct, socket plug



For mounting with clamping fixtures

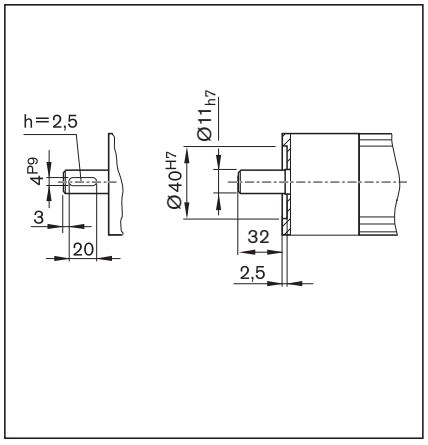
Design/options for guideway (frame), carriages, connection plates; see following pages



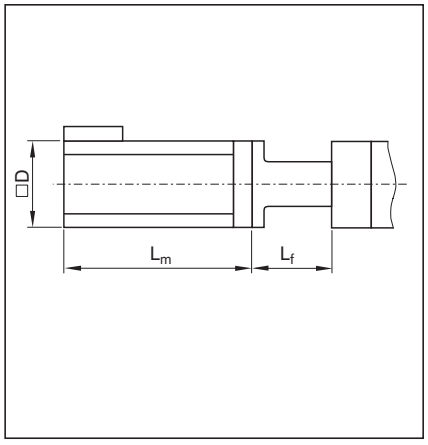
Guideway (frame) Carriages Connection plates

Version

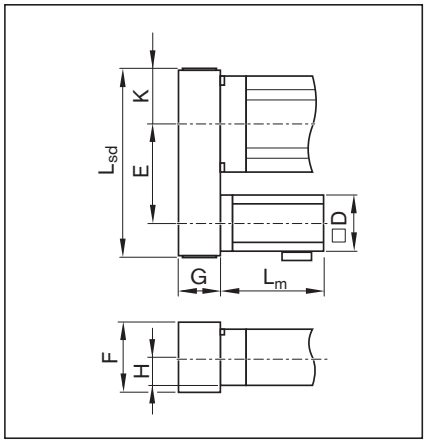
OF01



MF01



RV01, RV02, RV03, RV04



Version	Motor	Dimensions (mm) D	E		F	G	H	K	L_f	L_m		L_{sd}	
			i = 1	i = 1.5						without brake	with brake	i = 1	i = 1.5
RV01, RV02, RV03, RV04	**MSM 031C**	60	103.5	115	64.5	37	25.5	33	–	98.5	135.0	179	191
	MSM 041B	80	145	139.5	88	51	25.5	43.5	–	112.0	149.0	250	250
	MSK 030C	54	103.5	115	64.5	37	25.5	33	–	180.0	213.0	179	191
	MSK 040C	82	145	139.5	88	51	25.5	43.5	–	185.5	215.5	250	250
MF01	**MSM 031C**	60	–	–	–	–	–	–	72	98.5	135.0	–	–
	MSM 041B	80	–	–	–	–	–	–	83	112.0	149.0	–	–
	MSK 030C	54	–	–	–	–	–	–	75	180.0	213.0	–	–
	MSK 040C	82	–	–	–	–	–	–	77.5	185.5	215.5	–	–

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_W = center-to-center distance of carriages

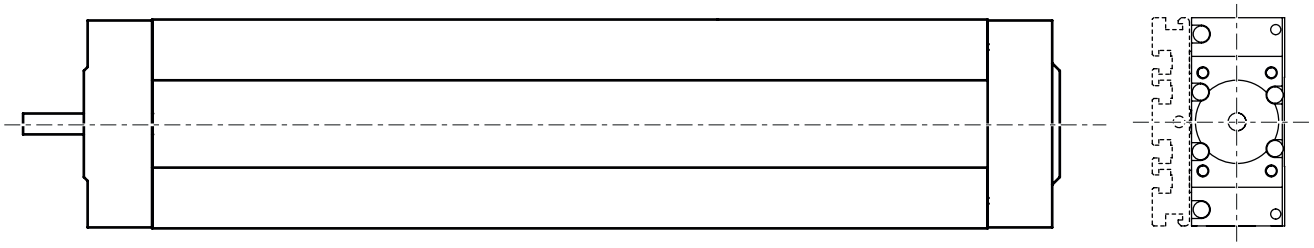
Carriage Connection plate without L_{ca} (mm)	with L_{ca} (mm)	L_W (mm)	Additional length Connection plate without L_{ad} (mm)	with L_{ad} (mm)
39	60	–	51	30
124	155	85	51	20
variable min = 125 max = 289	–	Variable min. = 86 max. = 250	51	–

See order example for example of how to calculate length.

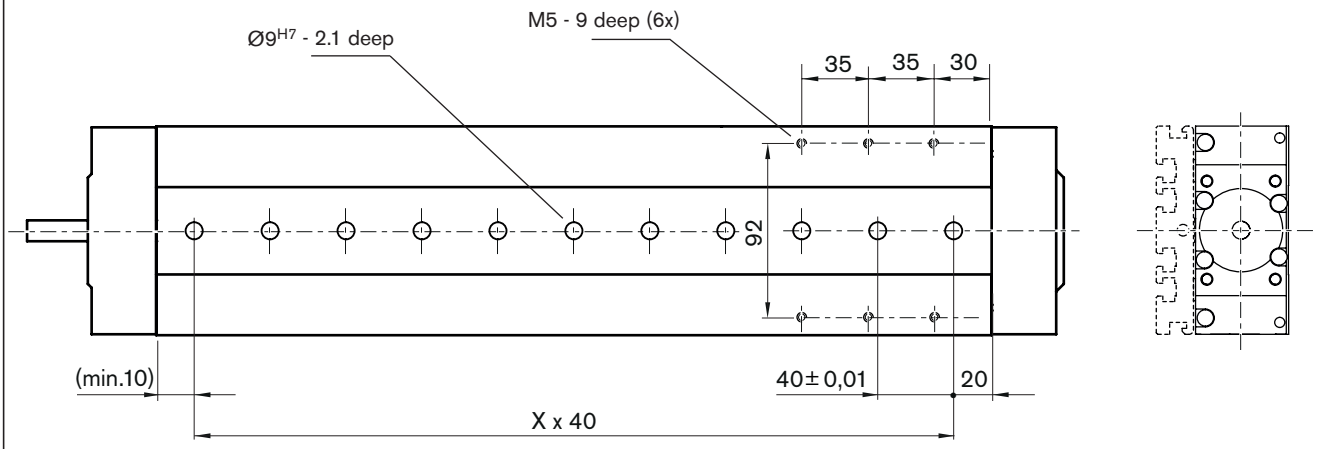
CKK-110 Guideway/carriage options

Guideway (frame)

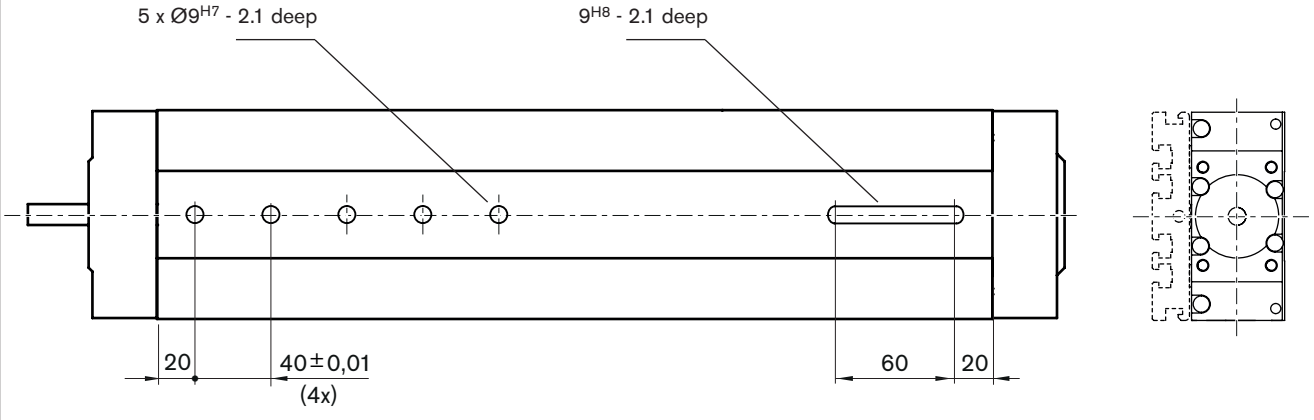
Option 01 / standard



Option 03 / with central holes



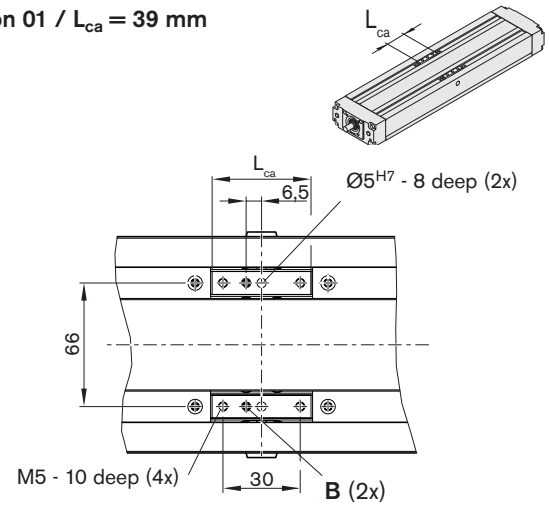
Option 04 / with central holes and long hole



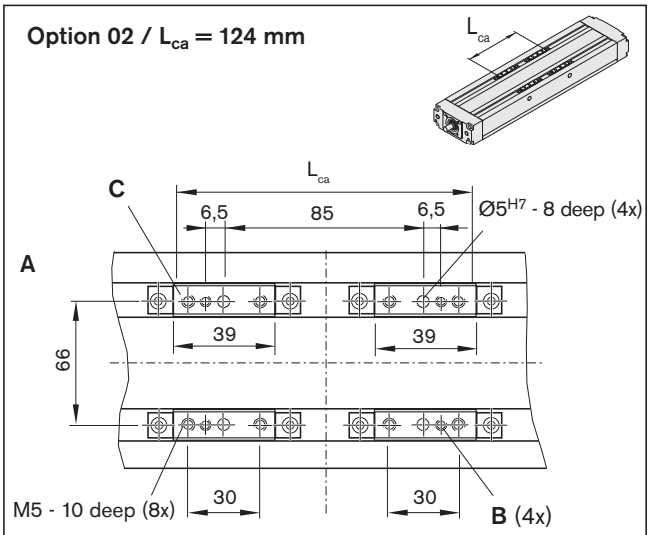
View from below (ground area)

Carriage without connection plate

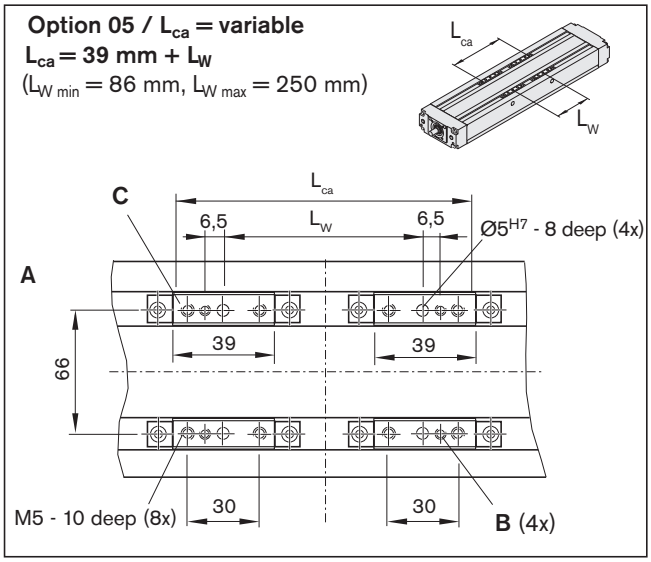
Option 01 / L_{ca} = 39 mm



Option 02 / L_{ca} = 124 mm



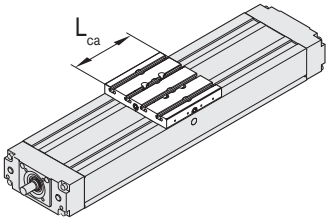
Option 05 / L_{ca} = variable
L_{ca} = 39 mm + L_W
($L_{W\,min}$ = 86 mm, $L_{W\,max}$ = 250 mm)



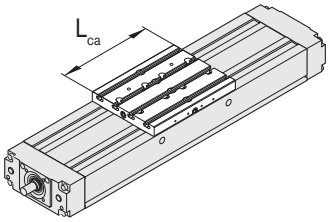
A Drive side
B Lube port for grease lubrication; closed with M3 set screw
C Driving runner block

Carriage with connection plate[1)]

Option 40 / L_{ca} = 60 mm

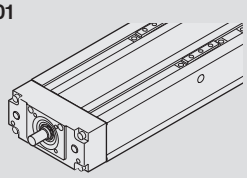
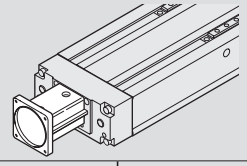
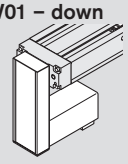
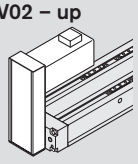
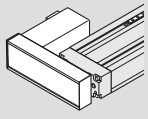


Option 41 / L_{ca} = 155 mm



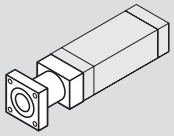
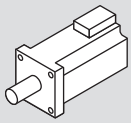
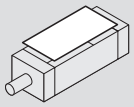
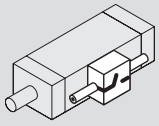
1) See the chapter on “Connection plates” for dimensional drawings

CKK-145 Configuration and ordering

Short designation, length[1] CKK-145-NN-1, ... mm		Guideway			Drive unit					Carriage				
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P				without connection plate L_{ca} =			with connection plate L_{ca} =	
Version						20 x 5	20 x 20	25 x 10	20 x 40	49 mm	149 mm	variable[3]	80 mm	190 mm
Without attachment	OF01 	01	03	04	Ø14	21	22	23	–	01	02	05	40	41
					Ø14 with keyway	14	15	16	–					
					Ø14	–	–	–	24	06	07	10	08	09
					Ø14 with keyway	–	–	–	17					
Flange/coupling	MF01 	01	03	04	Ø14	21	22	23		01	02	05	40	41
						–	–	–	24	06	07	10	08	09
Timing belt side drive	RV01 – down  RV02 – up 	01	03	04	Ø14	21	22	23	–	01	02	05	40	41
	RV03 – left  RV04 – right 					–	–	–	24	06	07	10	08	09

d_0 = nominal diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   Option 04: with center holes and long hole in the ground area of the frame
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Length calculation of the carriage (see dimensional drawings)

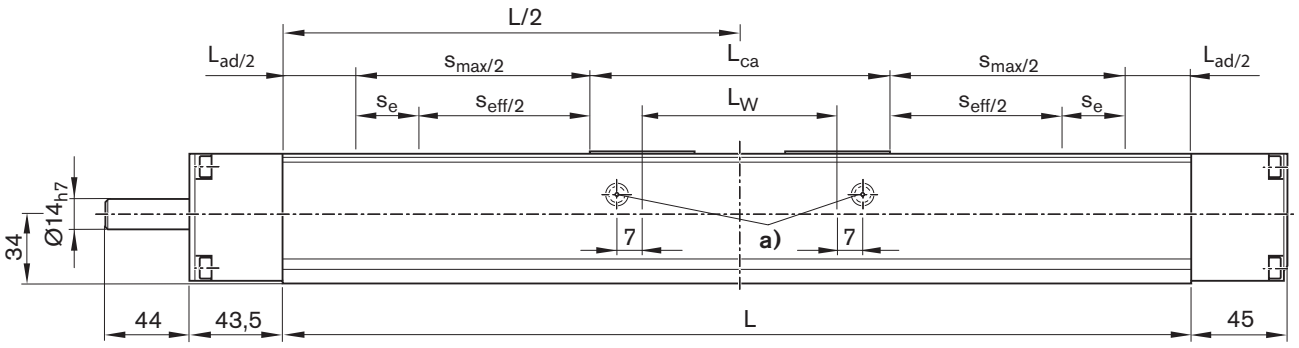
Motor attachment[4]			Motor[6]		Cover		Switching system[7]		Documentation[9]
									
i =	Attachment kit[5]	for motor	without brake	with brake	Cover strip without	Cover strip with			
–	00	–	00		01	02	Without switch Without mounting duct Without socket plug	00	01
							Magnetic sensor		
–	30	MSK 040C	86	87			REED sensor	21	02
	32	MSM 041B	140	141			Hall sensor PNP NC contact	22	
	33	MSK 050C	88	89			Hall sensor PNP NO contact	23	
1	11	MSK 040C	86	87			Mounting duct	25	
	35	MSK 050C	88	89			Socket plug	17	
	17	MSM 041B	140	141			Magnetic sensor with plug[8]		03
1.5	21	MSK 040C	86	87			REED sensor	58	
	27	MSM 041B	140	141			Hall sensor PNP NC contact	59	
2	36	MSK 050C	88	89					

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Mounting kit can also be deliver without motor. When ordering, enter the motor type “00”!
Mounting kits in according to customer specification ➠ chapter “Mounting kits for motors according to customer specification”
6) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
7) For further information, see ➠ “Switching system” chapter
8) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
9) Measurement report:
01 = standard report
02 = frictional torque measurement
03 = lead deviation
(also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

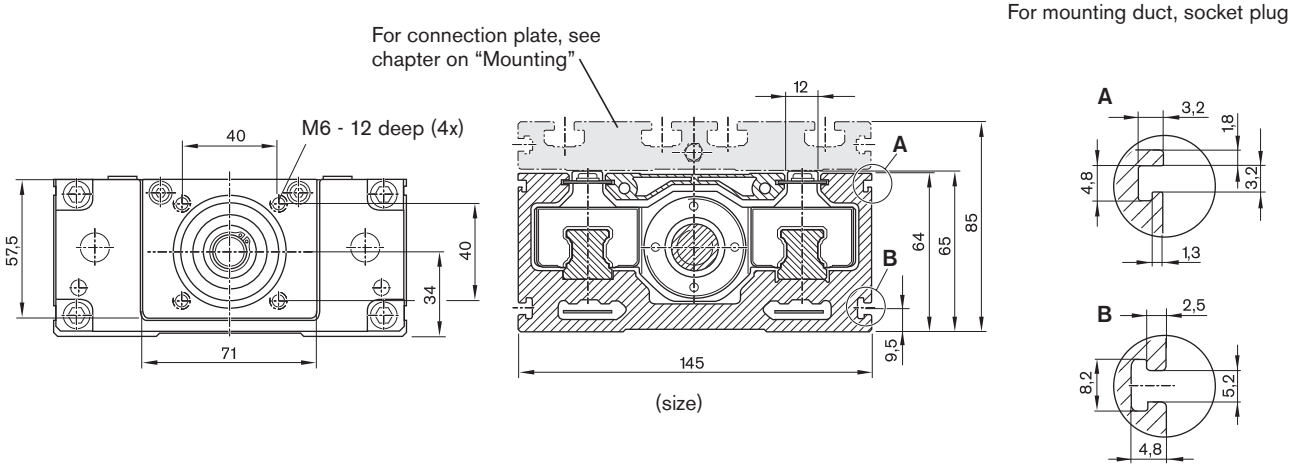
CKK-145 Dimensional drawings

All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



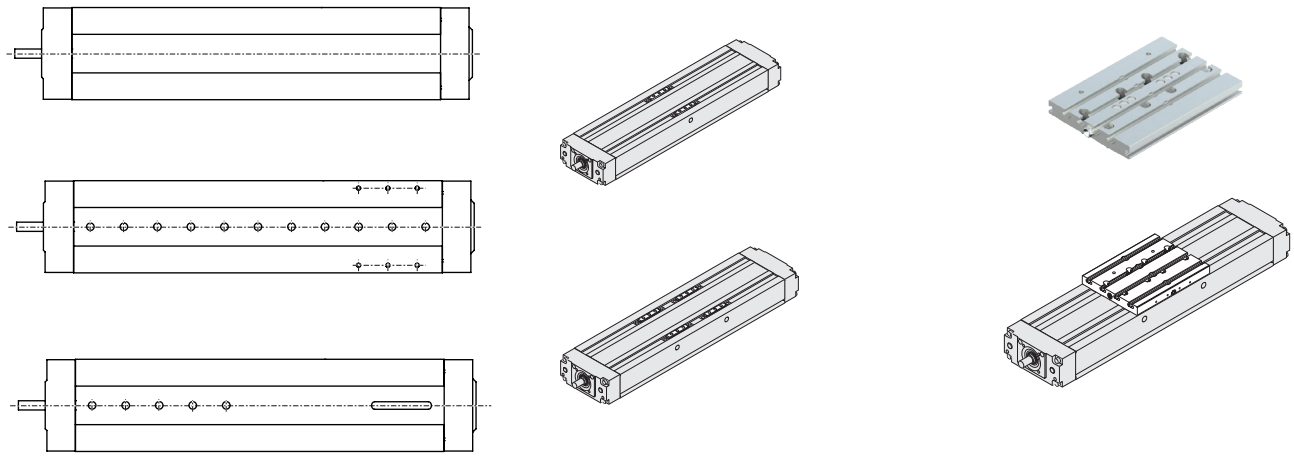
a) Lubrication bore (grease lubrication):
Funnel-type lube nipple DIN 3405-D 3.
For further information, see the chapter on lubrication.

For mounting duct, socket plug



For mounting with clamping fixtures

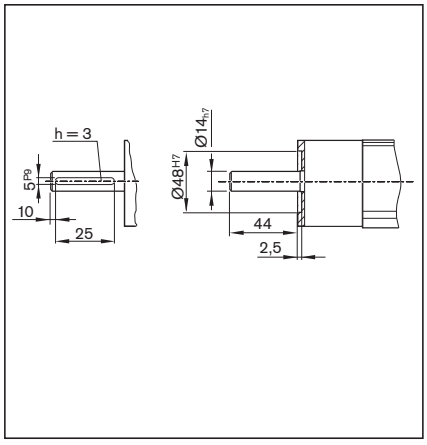
Design/options for guideway (frame), carriages, connection plates; see following pages



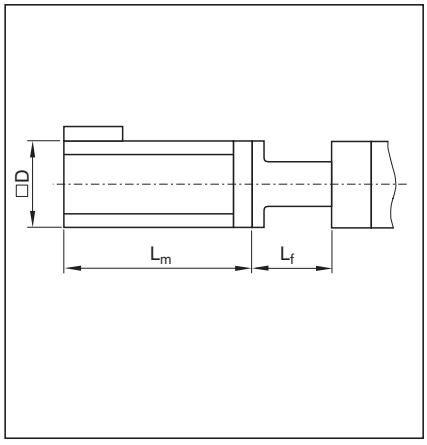
Guideway (frame) Carriages Connection plates

Version

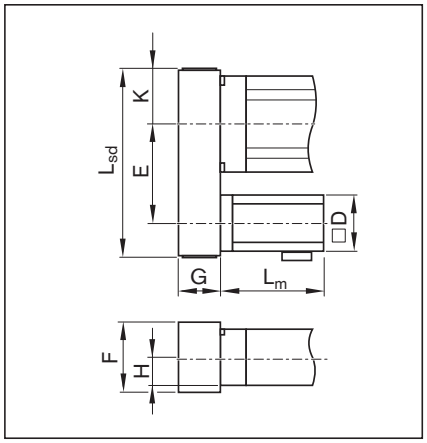
OF01



MF01



RV01, RV02, RV03, RV04



Version	Motor	Dimensions (mm) D	E i = 1	E i = 1.5	E i = 2	F	G	H	K	L_f	L_m without brake	L_m with brake	L_{sd} i = 1	L_{sd} i = 1.5	L_{sd} i = 2
RV01, RV02, RV03, RV04	**MSM 041B**	80	157.5	162	–	88	51	34	43.5	–	112.0	149.0	267	267	–
	MSK 040C	82	157.5	162	–	88	51	34	43.5	–	185.5	215.5	267	267	–
	MSK 050C	100	165		162	116	66	34	56	–	203.0	233.0	297	–	297
MF01	**MSM 041B**	80	–	–	–	–	–	–	–	90	112.0	149.0	–	–	–
	MSK 040C	82	–	–	–	–	–	–	–	85	185.5	215.5	–	–	–
	MSK 050C	98	–	–	–	–	–	–	–	95	203.0	233.0	–	–	–

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_W = center-to-center distance of carriages

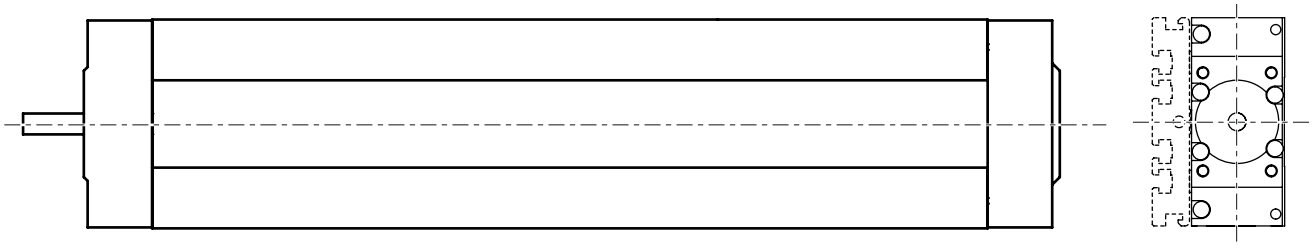
Carriage Connection plate without L_{ca} (mm)	Carriage Connection plate with L_{ca} (mm)	L_W (mm)	Additional length Connection plate without L_{ad} (mm)	Additional length Connection plate with L_{ad} (mm)
49	80	–	61	30
149	190	100	61	20
variable min = 150 max = 349	–	variable min = 101 max = 300	61	–

See order example for example of how to calculate length.

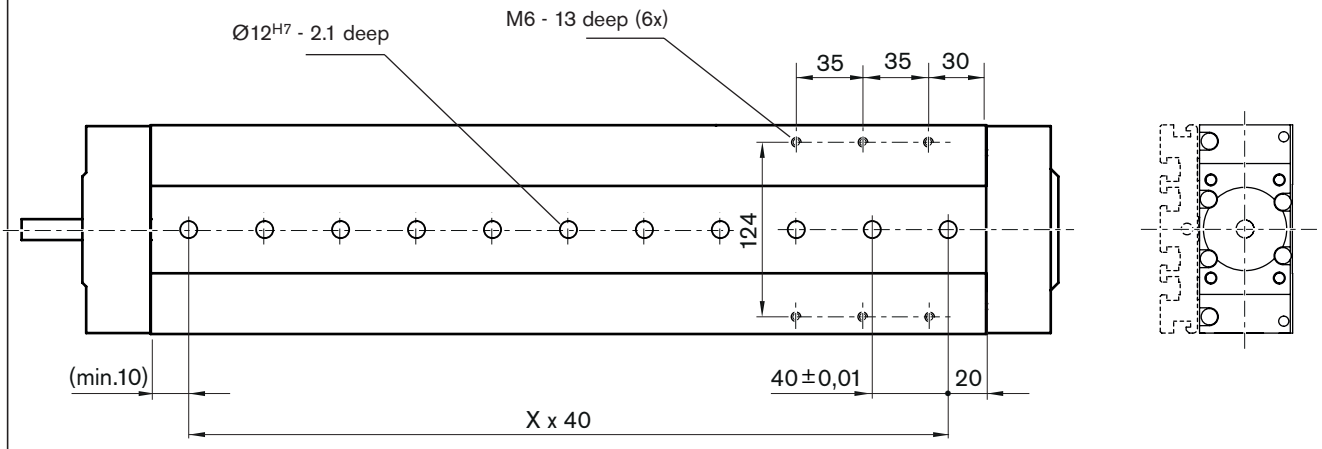
CKK-145 Guideway/carriage options

Guideway (frame)

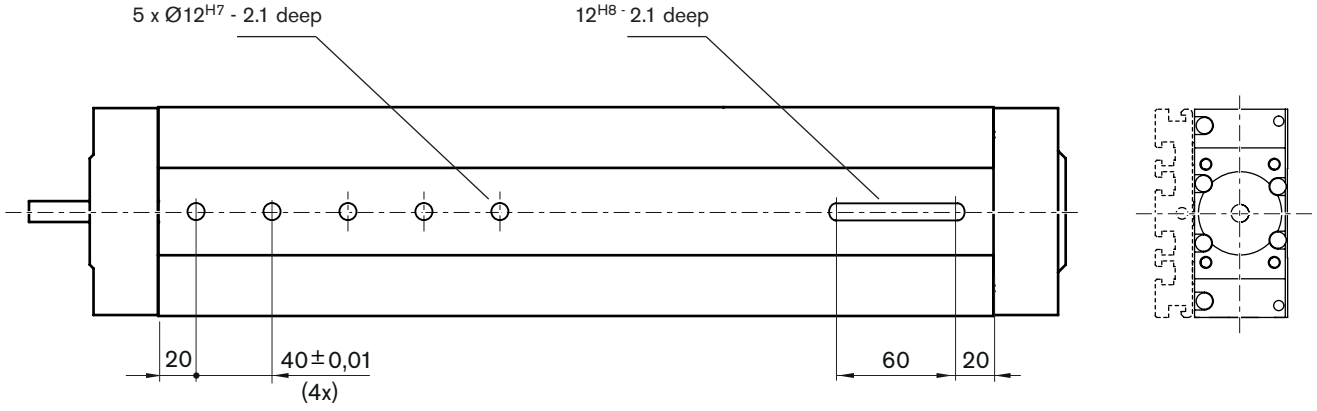
Option 01 / standard



Option 03 / with central holes



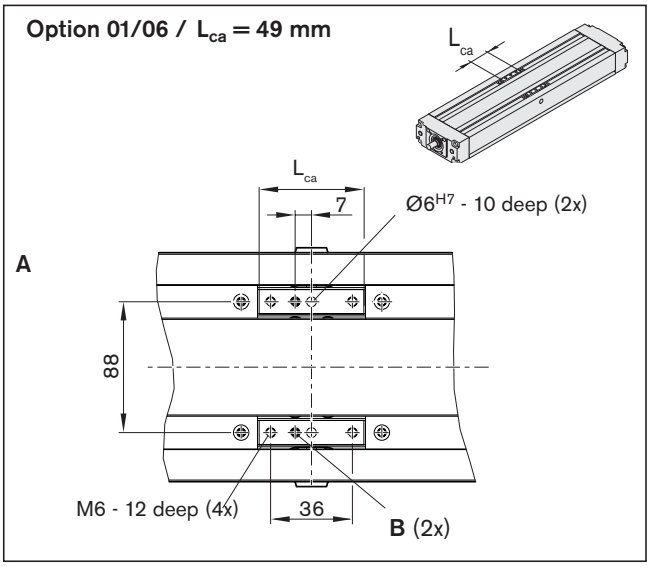
Option 04 / with central holes and long hole



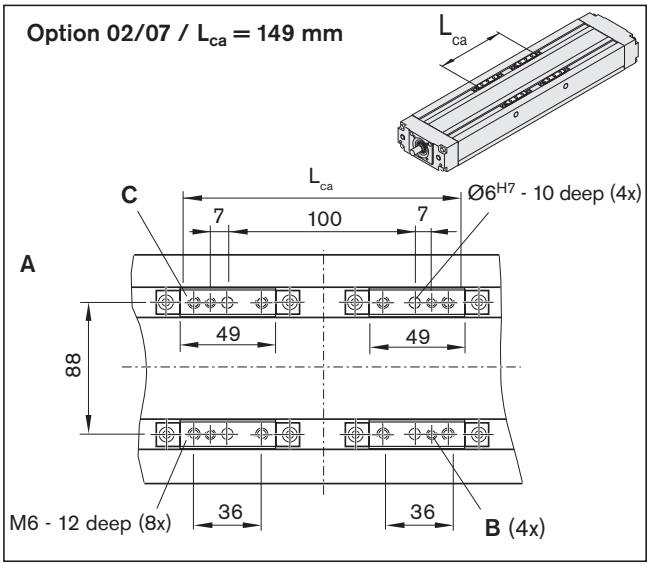
View from below (ground area)

Carriage without connection plate

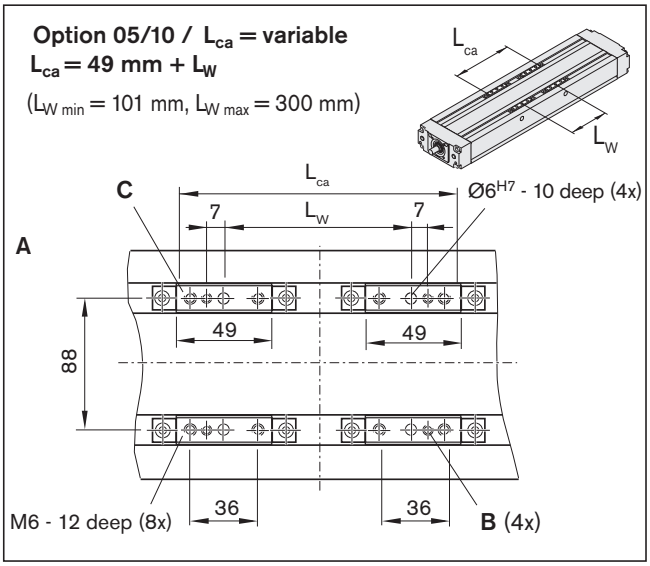
Option 01/06 / L_{ca} = 49 mm



Option 02/07 / L_{ca} = 149 mm



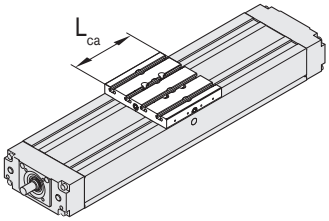
Option 05/10 / L_{ca} = variable
L_{ca} = 49 mm + L_W
($L_{W\,min}$ = 101 mm, $L_{W\,max}$ = 300 mm)



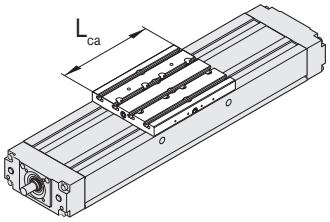
A Drive side
B Lube port for grease lubrication; closed with M3 set screw
C Driving runner block

Carriage with connection plate[1)]

Option 08/40 / L_{ca} = 80 mm

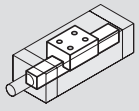
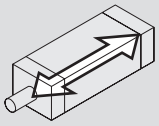
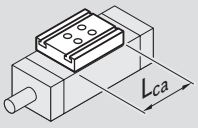
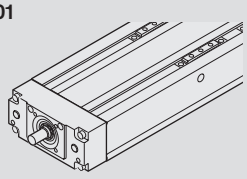
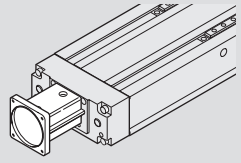
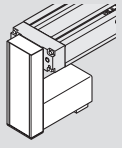
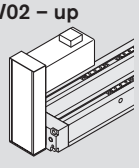
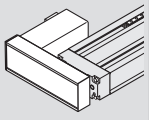
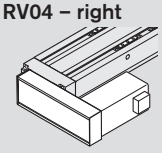


Option 09/41 / L_{ca} = 190 mm



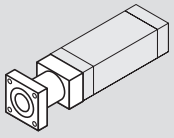
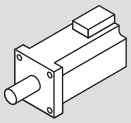
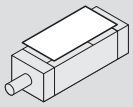
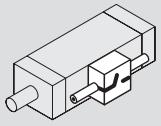
1) See the chapter on “Connection plates” for dimensional drawings

CKK-200 Configuration and ordering

Short designation, length[1] CKK-200-NN-1, ... mm		Guideway			Drive unit					Carriage					
															
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P				without connection plate L_{ca} =			with connection plate L_{ca} =		
						32 x 5	32 x 10	32 x 20	32 x 32	79.5 mm	254.5 mm	variable[3]	190 mm	305 mm	
Version															
Without attachment	OF01 	01	03	04	Ø16	01	02	03	04	01	11	18	40	41	
					Ø16 with keyway	11	12	13	14						
Flange/coupling	MF01 	01	03	04	Ø16	01	02	03	04	01	11	18	40	41	
Timing belt side drive	RV01 – down 	01	03	04	Ø16	01	02	03	04	01	11	18	40	41	
	RV02 – up 														
	RV03 – left 														
	RV04 – right 														

d_0 = nominal diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   selectable up to a length of L≤ 2000 mm
   Option 04: with center holes and long hole in the ground area of the frame
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Length calculation of the carriage (see dimensional drawings)

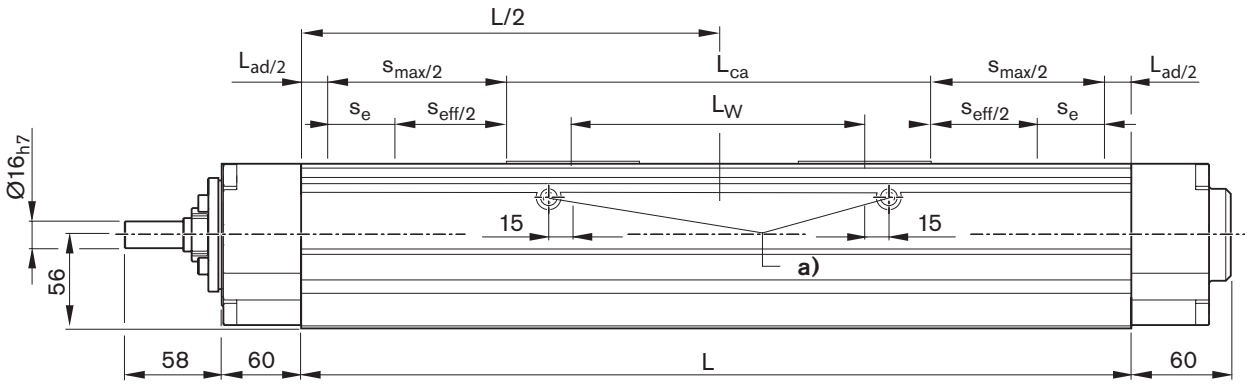
Motor attachment[4]			Motor[6]		Cover		Switching system[7]		Documentation[11]
									
i =	Attachment kit[5]	for motor	without brake	with brake	Cover strip without	with			
–	00	–	00		01	02	Without switch Without mounting duct Without socket plug	00	01
							Magnetic sensor		
							REED sensor	21	
							Hall sensor – PNP NC contact	22	
							Hall sensor – PNP NO contact	23	
–	02	MSK 076C	92	93			Mounting duct	25	
							Socket plug	27	
	03	MSK 060C	90	91			**Magnetic sensor with plug[8]**		02
							REED sensor	58	
							Hall sensor PNP NC contact	59	
1	27	MSK 060C	90	91					
							Proximity / mechanical switches[9]		03
							Mechanical	15	
							Proximity – PNP NC contact	11	
							Proximity – PNP NO contact	13	
							Cable duct	20	
2	28	MSK 060C	90	91			Switching angle[10] 1	16	
							Switching angle[10] 2	26	
							Socket plug	17	

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Mounting kit can also be deliver without motor. When ordering, enter the motor type “00”!
Mounting kits in according to customer specification ➠ chapter “Mounting kits for motors according to customer specification”
6) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
7) For further information, see ➠ “Switching system” chapter
8) Assembly contains 1 x sensor, 1 x switch 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 plate including mounting material
10) Switching angle can be attached only in conjunction with connection plate
11) Measurement report:
01 = standard report
02 = frictional torque measurement
03 = lead deviation
(also see the “Documentation” chapter)

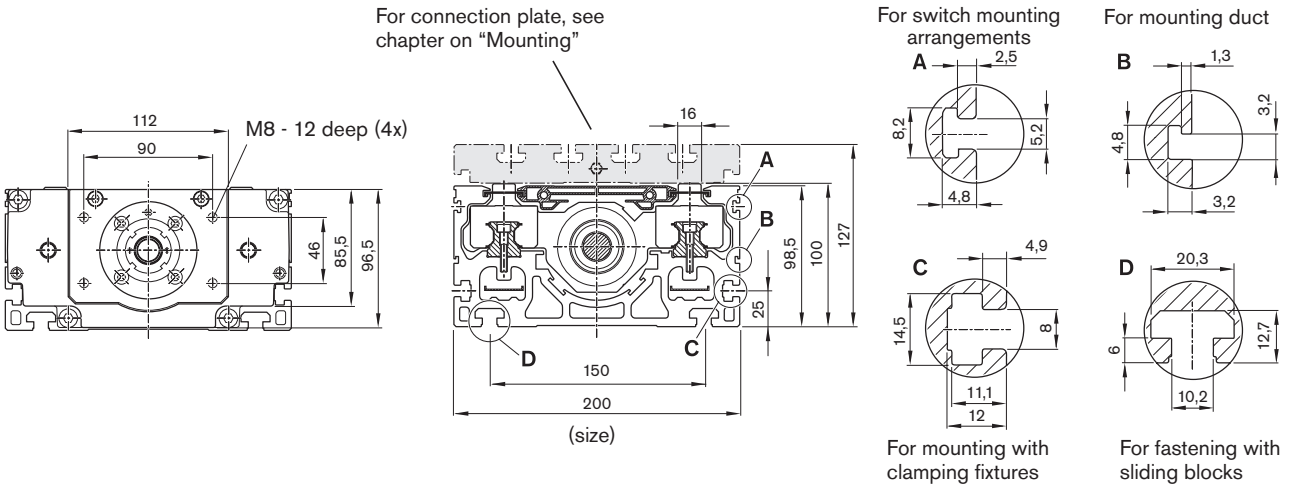
Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKK-200 Dimensional drawings

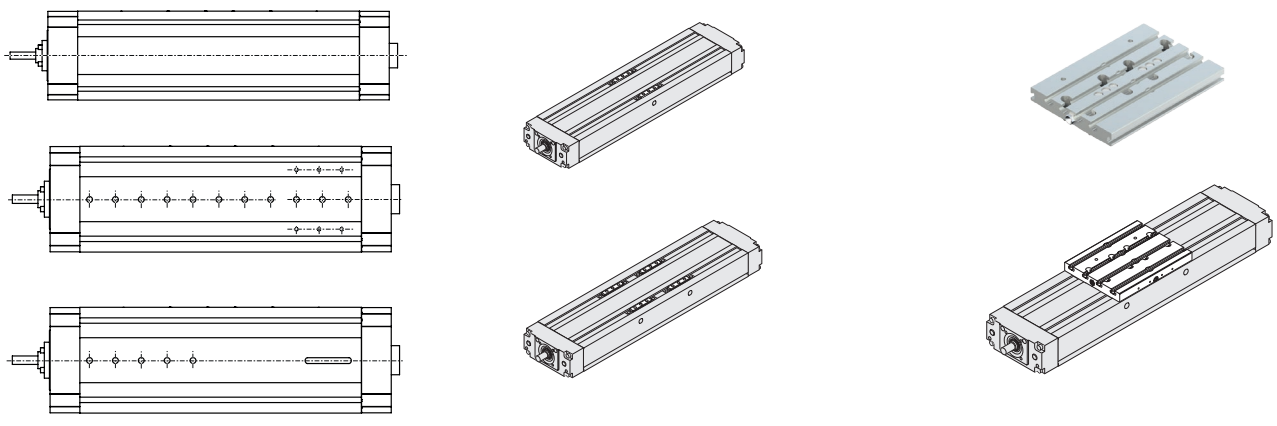
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



a) Lubrication bore (grease lubrication):
Funnel-type lube nipple DIN 3405-A M8x1.
For further information, see the chapter on lubrication.



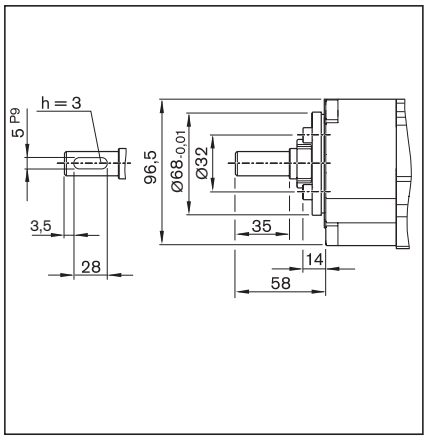
Design/options for guideway (frame), carriages, connection plates; see following pages



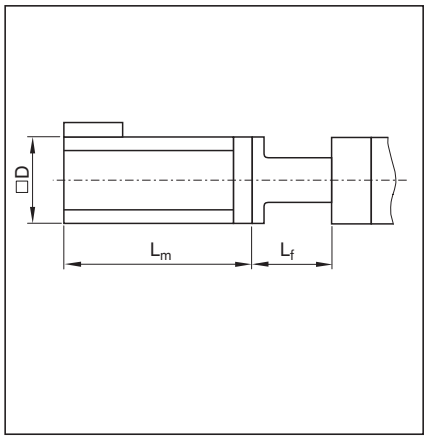
Guideway (frame) Carriages Connection plates

Version

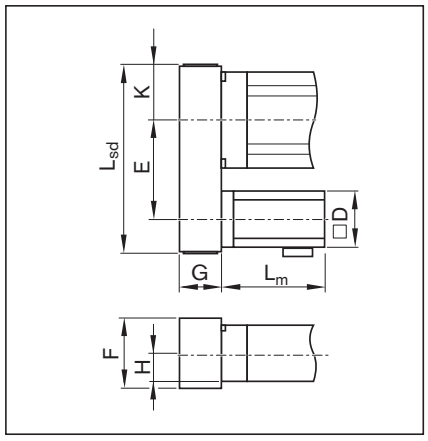
OF01



MF01



RV01, RV02, RV03, RV04



Version	Motor	Dimensions (mm)											
		D	E		F	G	H	K	L_f	L_m		L_{sd}	
			i = 1	i = 2						without brake	with brake	i = 1	i = 2
RV01, RV02, RV03, RV04	**MSK 060C**	116	267.5	265	116	66	56	59	–	226.0	259.0	403	403
MF01	**MSK 060C**	116	–	–	–	–	–	–	125	226.0	259.0	–	–
	MSK 076C	140	–	–	–	–	–	–	133	292.5	292.5	–	–

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_W = center-to-center distance of carriages

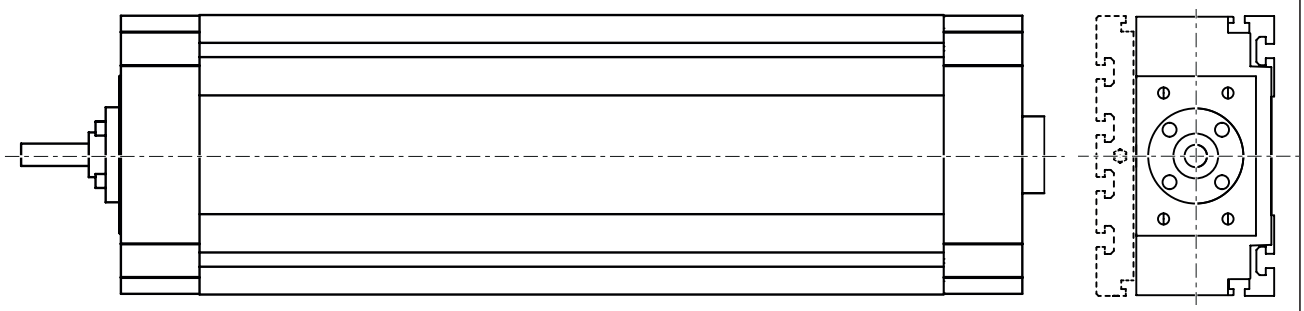
Carriage			Additional length	
Connection plate			Connection plate	
without	with		without	with
L_{ca} (mm)	L_{ca} (mm)	L_W (mm)	L_{ad} (mm)	L_{ad} (mm)
79.5	190	–	120.5	10
254.5	305	175	120.5	70
variable min = 255.5 max = 429.5	–	variable min = 176 max = 350	120.5	–

See order example for example of how to calculate length.

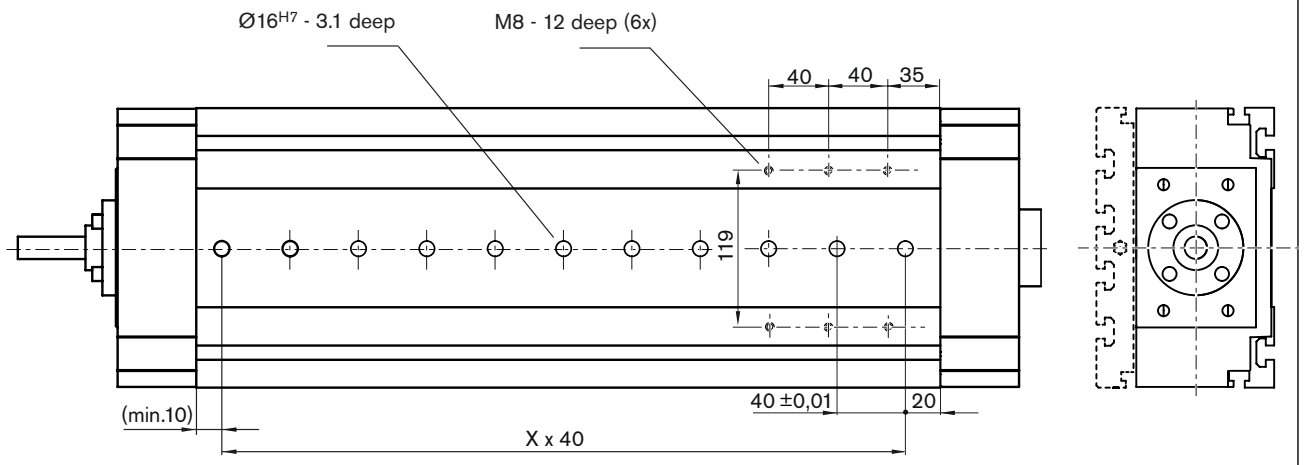
CKK-200 Guideway/carriage options

Guideway (frame)

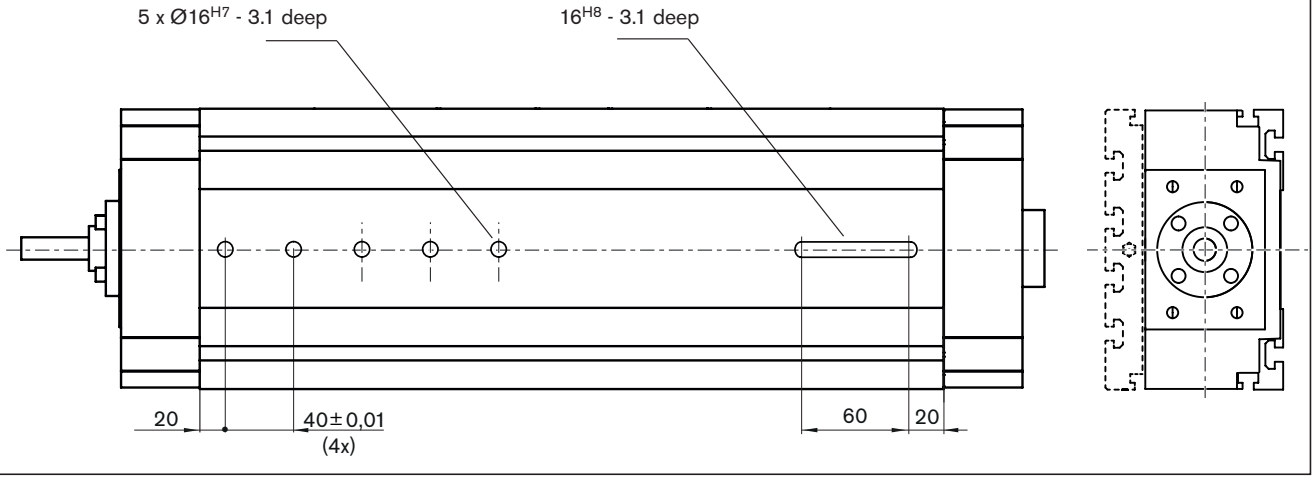
Option 01 / standard



Option 03 / with central holes



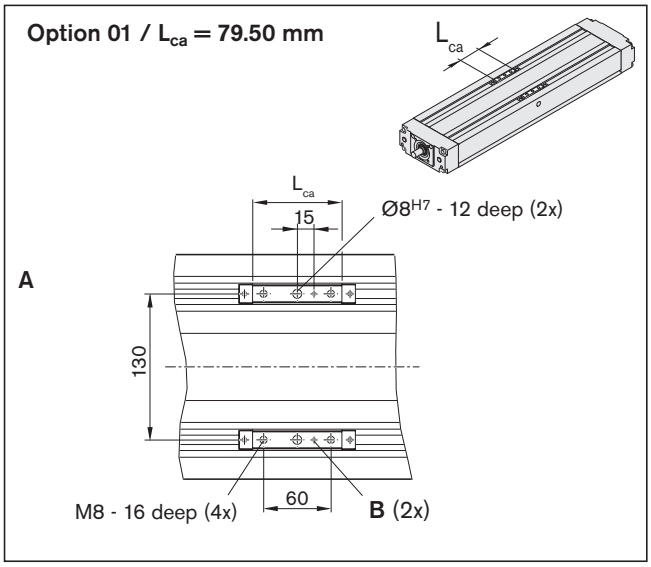
Option 04 / with central holes and long hole



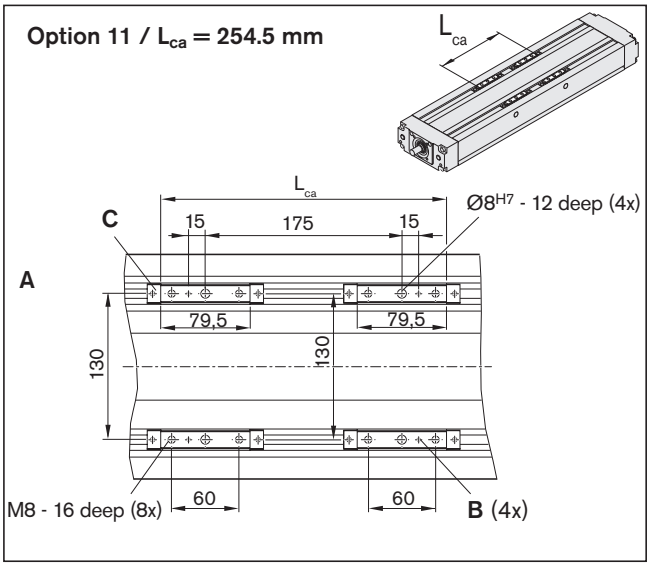
View from below (ground area)

Carriage without connection plate

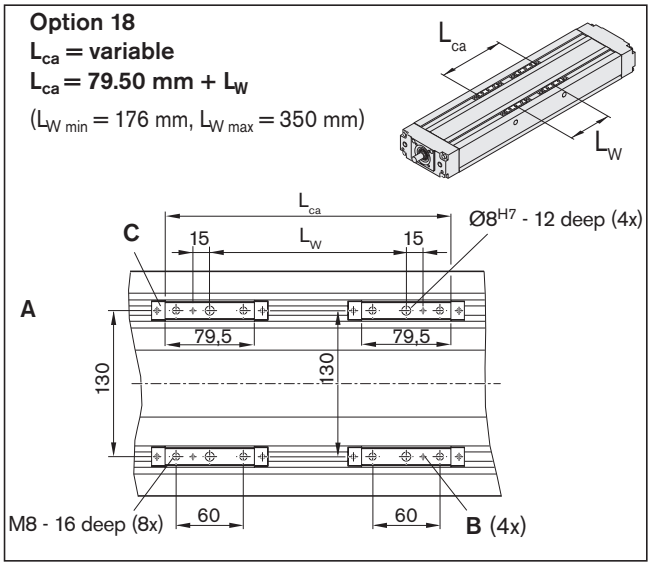
Option 01 / L_{ca} = 79.50 mm



Option 11 / L_{ca} = 254.5 mm



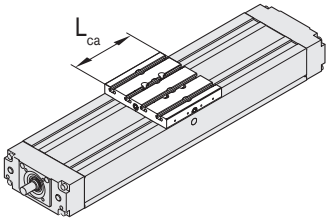
Option 18
L_{ca} = variable
L_{ca} = 79.50 mm + L_W
($L_{W\,min}$ = 176 mm, $L_{W\,max}$ = 350 mm)



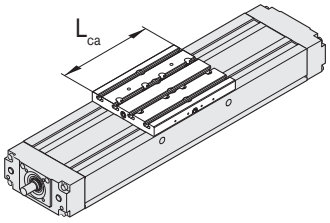
A Drive side
B Lube port for grease lubrication; closed with M4 set screw
C Driving runner block

Carriage with connection plate[1)]

Option 40 / L_{ca} = 190 mm



Option 41 / L_{ca} = 305 mm



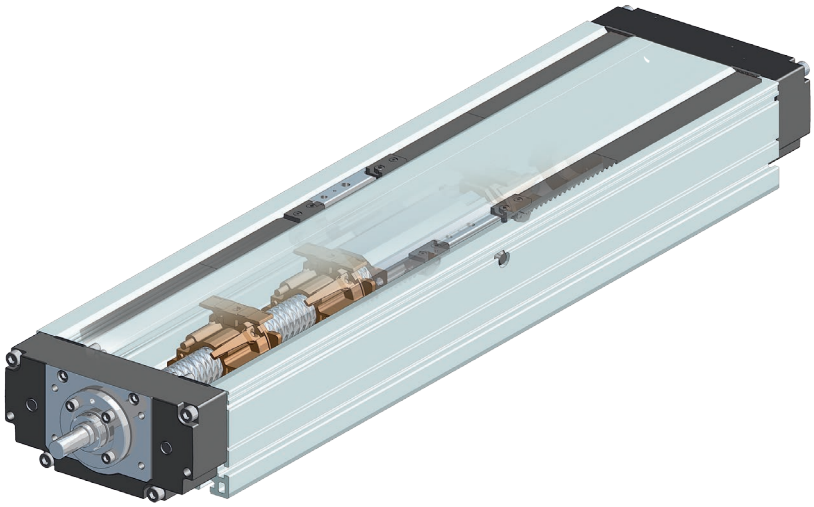
1) See the chapter on “Connection plates” for dimensional drawings

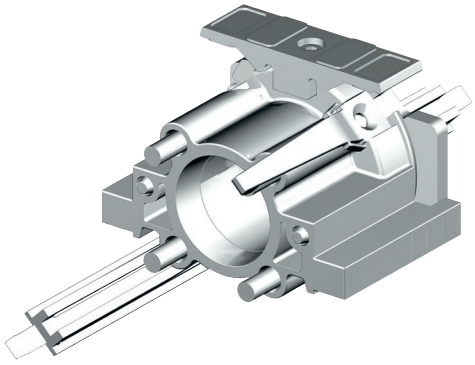
Screw support for Compact Module CKK-200

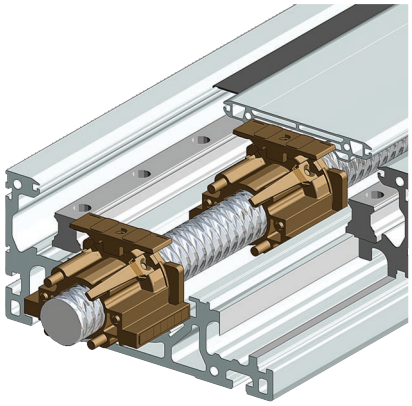
The screw support SPU provides the following benefits:

- Screw support can be selected as standard option through option number.
- High travel speed over great lengths up to 5,500 mm.
- Screw supports guided within frame.
- Elastomer buffer provides cushioning between carriage and screw supports.
- Screw supports are maintenance- free.
- Screw supports protected by cover plate and gap-type sealing.
- The screw supports prevent sagging of the aluminum cover in all directions.

⚠ **Screw support suitable for horizontal operation**

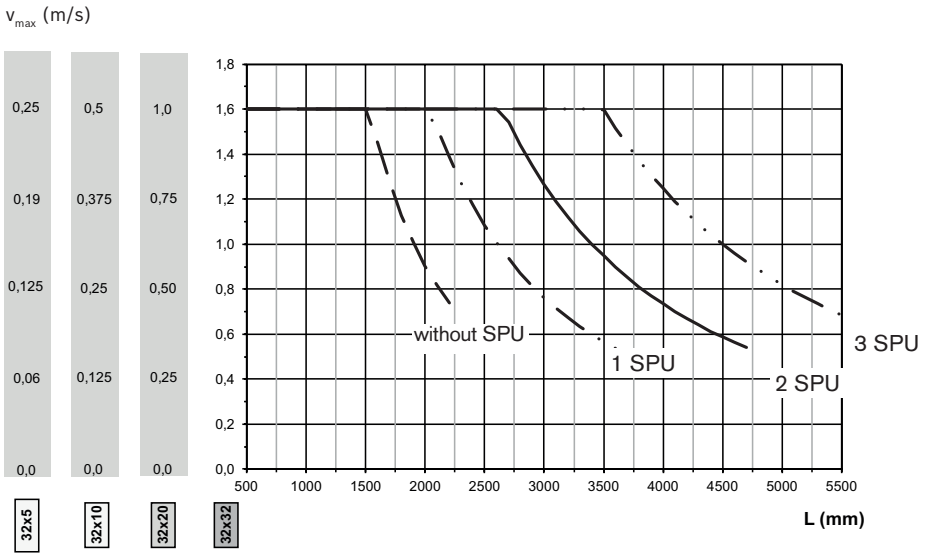






Technical data

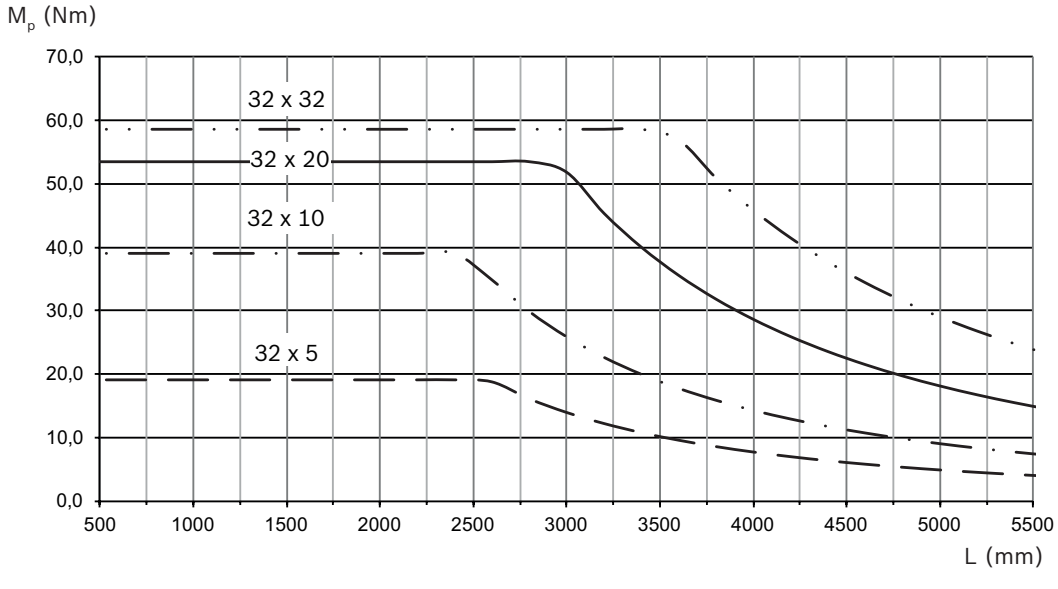
Permissible speed v_{max}
(Observe motor speed!)



Maximum permissible drive torque at the drive shaft M_p
The values shown for M_p are applicable under the following conditions:
- Horizontal operation
- Screw journal without keyway
- No radial loads on screw journal
- Keep in mind the rated torque of the coupling being used!

Screw journal pin with keyway
For reasons of stress concentration and a reduction of the effective diameter, observe the maximum value $M_p = 48.6$ Nm for drive torque! Whichever value is the **smaller one from the diagram and the maximum value of the drive torque** is valid.

CKK-200		**d_0 x P 32x32**	**d_0 x P 32x32**
Length	**(mm)**	3250	4500
M_p from diagram	**(Nm)**	58.5	36.0
M_p maximal	**(Nm)**	48.6	48.6
Value for design	**(Nm)**	48.6	36.0



Technical data

Pay attention to the “Calculation” chapter.

Size	Ball screw drive	Carriage		Number SPU	Carriage option number		Moved mass of system including SPU		Constant mass calculation	
		Connection plate			Connection plate		Connection plate			
		without[1]	with[2]		without	with	without	with		
	d_0 x P (mm)	L_{ca} (mm)	L_{ca} (mm)				m_{ca} (kg)	m_{ca} (kg)	$k_{g\ fix}$ (kg)	$k_{g\ var}$ (kg/mm)
CKK-200	32 x 5	79.5	190	without	01	40	3.20	5.50	4.06	0.0296
				1	02	–	3.40	–		
				2	03	–	3.60	–		
				3	04	–	3.80	–		
		254.5	305	without	11	41	5.20	8.90	4.06	0.0296
				1	12	26	5.40	9.10		
				2	13	27	5.60	9.30		
				3	14	28	5.80	9.50		
	32 x 10	79.5	190	without	01	40	3.20	5.50	4.06	0.0296
				1	02	–	3.40	–		
				2	03	–	3.60	–		
				3	04	–	3.80	–		
		254.5	305	without	11	41	5.20	8.90	4.06	0.0296
				1	12	26	5.40	9.10		
				2	13	27	5.60	9.30		
				3	14	28	5.80	9.50		
	32 x 20	79.5	190	without	01	40	3.20	5.50	4.06	0.0296
				1	02	–	3.40	–		
				2	03	–	3.60	–		
				3	04	–	3.80	–		
		254.5	305	without	11	41	5.20	8.90	4.06	0.0296
				1	12	26	5.40	9.10		
				2	13	27	5.60	9.30		
				3	14	28	5.80	9.50		
	32 x 32	79.5	190	without	01	40	3.20	5.50	4.06	0.0296
				1	02	–	3.40	–		
				2	03	–	3.60	–		
				3	04	–	3.80	–		
		254.5	305	without	11	41	5.20	8.90	4.06	0.0296
				1	12	26	5.40	9.10		
				2	13	27	5.60	9.30		
				3	14	28	5.80	9.50		

Pay attention to the “Calculation” chapter.

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.
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.

a_{max} = maximum acceleration
d_0 = nominal diameter
J_s = mass moment of inertia of the linear motion system (kgm²)
J_t = translational mass moment of inertia of the external load (kgm²)
$k_{g\ fix}$ = constant for fixed-length portion of the mass
$k_{g\ var}$ = constant for variable-length portion of the mass
$k_{J\ fix}$ = constant for fixed-length portion of mass moment of inertia
$k_{J\ var}$ = constant for length-variable portion of mass moment of inertia
$k_{J\ m}$ = constant for mass-specific portion of mass moment of inertia
L = length
L_{ad} = additional length
L_{ca} = carriage length
L_W = center-to-center distance of carriages
m = mass of Compact Module
m_{ca} = moved mass
m_s = mass of the linear system
M_{Rs} = frictional torque system
M_p = drive torque
P = lead
s_e = excess travel
s_{eff} = effective stroke
s_{max} = maximum travel
v_{max} = maximum speed

Additional length		Max. length	Constant mass moment of inertia				Frictional torque	Max. acceleration	Max. drive torque	Max. speed
Connection plate without	with		without	with						
L_{ad} (mm)	L_{ad} (mm)	L_{max} (mm)	$k_{J\,fix}$ (kgmm²)	$k_{J\,fix}$ (kgmm²)	$k_{J\,var}$ (kgmm)	$k_{J\,m}$ (mm²)	M_{Rs} (Nm)	a_{max} (m/s2)	M_p (Nm)	v_{max} (m/s)
120.5	10	2200	71.348	72.867	0.605	0.633	1.10	17.9	See diagrams	See diagrams
235.5	–	3500	71.474	–			1.20			
360.5	–	4600	71.601	–			1.20			
485.5	–	5500	71.728	–			1.40			
120.5	70	2200	72.741	75.147	0.605	0.633	1.20			
235.5	185	3600	72.867	75.274			1.30			
360.5	310	4700	72.994	75.400			1.30			
485.5	435	5500	73.121	75.527			1.50			
120.5	10	2200	76.612	82.691	0.640	2.533	1.10	30.7		
235.5	–	3500	77.119	–			1.20			
360.5	–	4600	77.625	–			1.40			
485.5	–	5500	78.132	–			1.50			
120.5	70	2200	82.185	91.810	0.640	2.533	1.20			
235.5	185	3600	82.691	92.317			1.30			
360.5	310	4700	83.198	92.823			1.50			
485.5	435	5500	83.705	93.330			1.60			
120.5	10	2200	93.299	117.616	0.639	10.132	1.15	50.0		
235.5	–	3500	95.326	–			1.30			
360.5	–	4600	97.352	–			1.50			
485.5	–	5500	99.378	–			1.70			
120.5	70	2200	115.590	154.092	0.639	10.132	1.25			
235.5	185	3600	117.616	156.118			1.40			
360.5	310	4700	119.643	158.145			1.60			
485.5	435	5500	121.669	160.171			1.80			
120.5	10	2200	127.391	189.642	0.617	25.938	1.25	50.0		
235.5	–	3500	132.578	–			1.40			
360.5	–	4600	137.766	–			1.70			
485.5	–	5500	142.953	–			1.90			
120.5	70	2200	184.455	283.020	0.617	25.938	1.35			
235.5	185	3600	189.642	288.207			1.50			
360.5	310	4700	194.830	293.395			1.80			
485.5	435	5500	200.018	298.583			2.00			

Length calculation of the linear system

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

Moment of inertia of the linear system

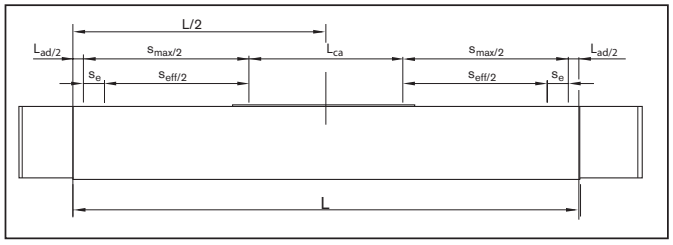
$$J_s = (k_{J\,fix} + k_{J\,var} \cdot L) \cdot 10^{-6}$$

Determination of translational mass moment of inertia of the external load

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

Dimension drawing of the linear system

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



Product overview

Properties

- Five fine-tuned sizes based on a compact precision aluminum profile with two integrated pre-tensioned ball rail systems
- Ready-to-install Compact Modules in any length up to Lmax.
- Realization of greater lengths of up to 10,000 mm
- Pre-tensioned toothed belt
- Aluminum carriages available in different lengths
- Intelligent toothed belt guide protects inner components
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) from both sides or via the carriage or front side via a connection plate
- Repeatability of up to ± 0.05 mm

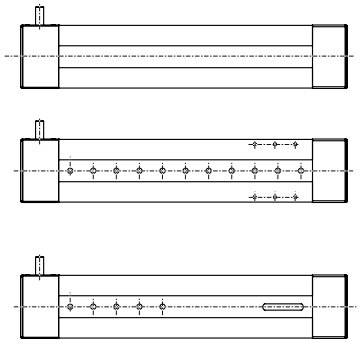
Further highlights

- Flexible thanks to selectable options
- Center holes for simple combination with other linear systems and connection elements
- Extensive accessories for connection and clamping elements
- Name plate with parameters for easy start-up

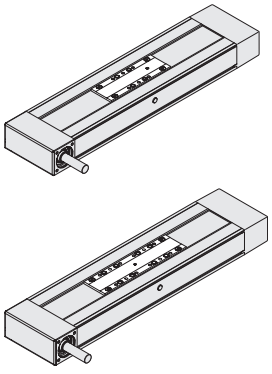
Attachments

- Planetary gearbox with various gear ratios
- Maintenance-free servo motors with selectable brake and attached feedback
- Switches (magnetic sensors), switch activation without additional switch flag
- Socket and plug
- Mounting duct made of aluminum for sensors

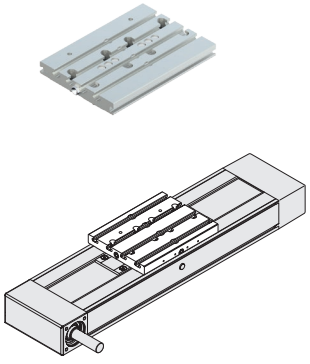
Design/options for guideway (frame), carriages, connection plates



Guideway (frame)



Carriages



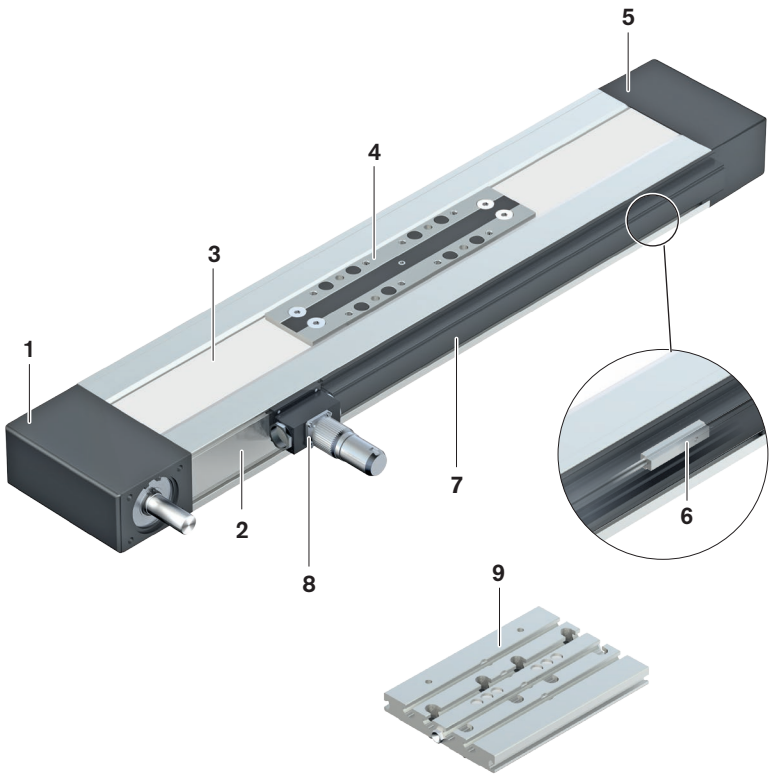
Connection plates

Structural design

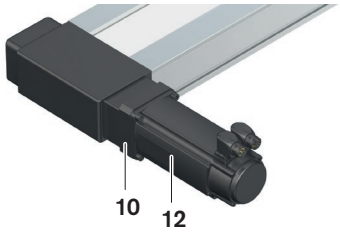
Structural design CKR

1 Drive end enclosure
2 Frame
3 Toothed belt
4 Carriage
5 Tension side end enclosure

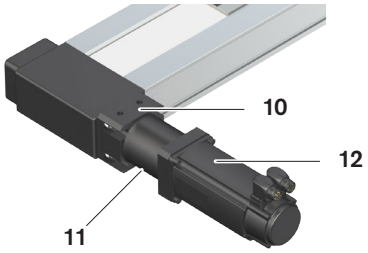
Attachments:
6 Magnetic sensor
7 Mounting duct
8 Socket/plug
9 Connection plate
10 Flange
11 Planetary gearbox
12 Motor



Motor attachment – direct attachment with i = 1
The motor is attached directly to the Compact Module's drive end enclosure via a motor mount.



Motor attachment – with gear
The planetary gearbox is attached by a flange.
The flange serves to mount the gearbox at 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 with minimal torsional deflection.
Available gear ratios: i = 3 (for CKR-145 and CKR-200),
i = 5, i = 10



Technical data

General technical data

Pay attention to the “Calculation” chapter.

Size	Carriage		Force application point		Dynamic characteristics			Maximum permissible loads					
	Connection plate		Connection plate		Dyn. Load capacity	Dyn. load moments		Max. perm. torques			Max. perm. forces		
	without[1] L_{ca} (mm)	with[2] L_{ca} (mm)	without Z_1 (mm)	with Z_1 (mm)	C guideway (N)	M_t (Nm)	M_L (Nm)	$M_{x\,max}$ (Nm)	$M_{y\,max}$ (Nm)	$M_{z\,max}$ (Nm)	$F_{y\,max}$ (N)	$F_{z1\,max}$ (N)	$F_{z2\,max}$ (N)
CKR-070	80	60	20.0	32.5	2360	47	7	47	7	7	1270	2360	2360
	108	95			3830	77	94	77	94	51	2070	3830	3830
CKR-090	102	60	24.0	40.0	4620	125	16	112	16	16	2490	4620	4620
	156	125			7505	203	244	203	244	132	4050	7505	7505
CKR-110	170	110	28.7	44.7	19720	651	136	198	32	32	3480	6000	6000
	215	155			32035	1057	1361	396	510	240	5650	12000	12000
CKR-145	180	125	37.5	57.5	46800	2059	400	634	100	100	8410	14400	14400
	240	190			76025	3345	3801	1267	1440	683	13660	28800	28800
CKR-200	265	190	45.5	72.5	74600	4849	1053	1375	299	299	12265	21150	21150
	405	305			121185	7877	10604	2750	3701	1744	19925	42300	42300

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 to ensure a reliable lubrication distribution ➠ “Maintenance: normal operating conditions”.
   If minimum values are not met, be sure to consult Bosch Rexroth.

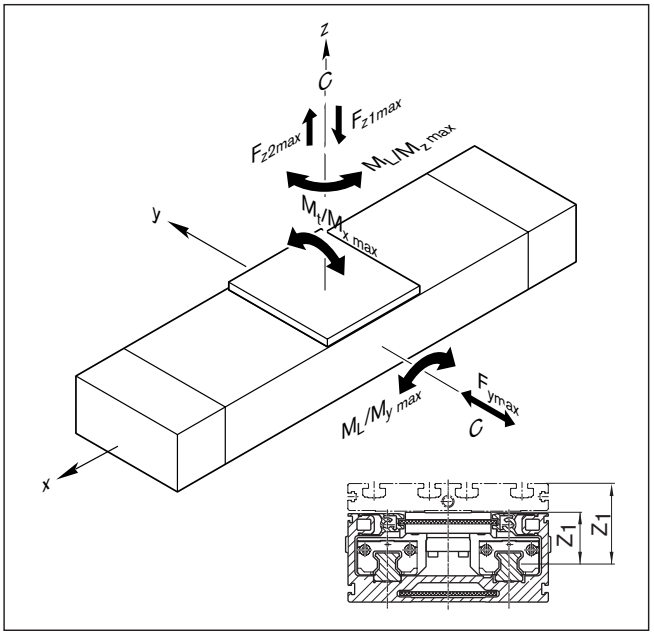
C = dynamic load rating
$F_{y\,max}$ = maximum dynamic load in y-direction
$F_{z\,max}$ = maximum dynamic load in z-direction
$k_{g\,fix}$ = constant for fixed-length portion of the mass
$k_{g\,var}$ = constant for variable-length portion of the mass
L = length
L_{ad} = additional length
L_{max} = maximum length
L_{ca} = carriage length
I_y = planar moment of inertia based on the y-axis
I_z = planar moment of inertia based on the z-axis
m_{ca} = moved mass of carriage
M_L = dynamic longitudinal moment load
m_s = mass of the linear system
M_t = dynamic torsional moment
$M_{x\,max}$ = maximum permitted torsional moment around the x-axis
$M_{y\,max}$ = maximum permitted torsional moment around the y-axis
$M_{z\,max}$ = maximum permitted torsional moment around the z-axis
s_{min} = minimum travel
s_e = excess travel
Z_1 = application point of the effective force

Additional length		Min. travel range	Max. length	Moved mass of system		Constant mass calculation		Planar moment of inertia	
Connection plate				Connection plate					
without	with			without	with				
L_{ad} (mm)	L_{ad} (mm)	s_{min} [3] (mm)	L_{max} (mm)	m_{ca} (kg)	m_{ca} (kg)	$k_{g\ fix}$ (kg)	$k_{g\ var}$ (kg/mm)	I_y (cm^4)	I_z (cm^4)
10	30	40	1500	0.12	0.23	0.50	0.00284	8.50	55.10
10	23			0.28	0.45				
25	67	40	5500	0.32	0.50	0.70	0.00440	12.80	115.30
25	56			0.55	0.92				
25	85	50	5500	0.52	0.90	1.27	0.00739	32.70	282.90
25	85			0.87	1.45				
25	80	60	5500	0.99	1.80	2.54	0.01222	87.50	903.90
25	75			1.67	2.82				
25	100	80	10000	2.40	4.60	7.83	0.02328	456.60	3316.60
25	125			4.30	7.90				

Acceptable loads
(Recommended values based on experience)

In relation to the desired service life, loads for F_m, F_{comb} of up to about 20% of the dynamic load rating (C) have proven effective. See the chapter on calculation principles.
Here the following must not be exceeded:
– The maximum permissible drive torque
– The maximum permissible load
– The permissible travel speed
– The maximum permissible acceleration

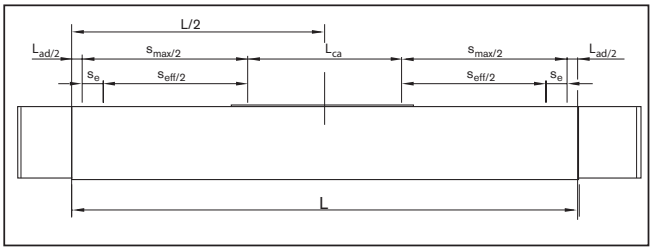
Note on dynamic load capacities and moments
Determination of the dynamic load capacities and moments is based on a total travel of 100,000 m. Often only 50000 m are actually stipulated.
For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the table by 1.26.



Length calculation of the linear system

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

L_{ca} see dimension drawings for the respective sizes



Module of elasticity E of the linear system

$$E = 70\ 000\ N/mm^2$$

Dimension drawing of the linear system
(without motor attachment, without motor)

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

Technical data

Drive data

Pay attention to the “Calculation” chapter.

Size	Gear	Gear ratio	Max. drive torque	Lead constant	Max. speed	Carriage		Moved mass of system	
						Connection plate		Connection plate	
						without[1]	with[2]	without	with
		i	M_P	u	v_{max}	L_{ca}	L_{ca}	m_{ca}	m_{ca}
		(–)	(Nm)	(mm/rev)	(m/s)	(mm)	(mm)	(kg)	(kg)
CKR-070	without	1[1]	3.0	72	3	80	60	0.12	0.23
						108	95	0.28	0.45
CKR-090	without	1[1]	8.0	90	3	102	60	0.32	0.50
						156	125	0.55	0.92
CKR-110	without	1[1]	13.5	120	5	170	60	0.52	0.90
						215	155	0.87	1.45
CKR-145	without	1[1]	32.5	165	5	180	125	0.99	1.80
						240	190	1.67	2.82
CKR-200	without	1[1]	112.7	250	5	265	190	2.40	4.60
		1 with keyway[2]	99.8			405	305	4.30	7.90

1) Valid for versions: 1 or 2 drive shafts, clamping hub or clamping hub with second pins
2) Version with keyway
3) Maximum power that can be transmitted through the engaging teeth that are in the belt pulley.
4) The permissible tensile load of the belt cross section (elasticity limit) is indicated for better comparability. This value represents the load limit with respect to the plastic deformation and may not be used to determine the maximum permitted drive torque.

a_{max} = maximum acceleration
d_3 = diameter of belt pulley
F_{bp} = maximum belt drive transmission force
F_{tzul} = elasticity limit, toothed belt
i = gear ratio
J_s = mass moment of inertia of the linear motion system (kgm^2)
J_t = translational mass moment of inertia of the external load (kgm^2)
$k_{J\,fix}$ = constant for fixed-length portion of mass moment of inertia
$k_{J\,var}$ = constant for length-variable portion of mass moment of inertia
$k_{J\,m}$ = constant for mass-specific portion of mass moment of inertia
L = length
L_{ca} = carriage length
m_{ca} = moved mass of carriage
m_{ex} = moved external load
m_s = mass of the linear system
M_p = maximum permissible drive torque of the linear system
M_{Rs} = frictional torque of system (Nm)
s_e = excess travel
u = lead constant
v_{max} = maximum speed

Constant mass moment of inertia				Frictional torque	Diameter, belt pulley	Belt type	Max. belt drive transmission force	Belt elasticity limit	Max. acceleration
Connection plate without	with								
$k_{J\,fix}$ (kgmm²)	$k_{J\,fix}$ (kgmm²)	$k_{J\,var}$ (kgmm)	$k_{J\,m}$ (mm²)	M_{Rs} (Nm)	d_3 (mm)		F_{max} [3] (N)	F_{max} [4] (N)	a_{max} (m/s²)
22.32	36.77	0.0142	131.11	0.23	22.92	25 AT3	260	1100	50
43.14	65.46			0.25					
92.45	129.38	0.0320	205.21	0.57	28.65	35 AT3	560	1600	50
139.64	215.57			0.58					
266.45	405.08	0.1364	364.81	1.04	38.20	50 AT5	705	4200	50
391.07	602.66			1.42					
1024.28	1582.85	0.3172	689.59	1.46	52.52	70 AT5	1235	4800	50
1621.61	2276.71			2.04					
6140.67	9623.81	1.8397	1583.24	4.55	79.58	100 AT10	2830	17000	50
9020.05	14719.73			5.69					

Moment of inertia of the linear system

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

Determination of translational mass moment of inertia of the external load

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

Technical data

Drive data

Pay attention to the “Calculation” chapter.

Size	Gear Type	Gear ratio	Max. acceleration torque[1] (at the gear output)	Base friction torque	Max. drive speed
		i (–)	M_{ge} (Nm)	M_{Rge} (Nm)	n_{ge} (min^{-1})
CKR-070	PG040	5	11.00	0.05	8000
		10	10.50	0.05	8000
CKR-090	PG050	5	14.00	0.05	8000
		10	13.00	0.05	8000
CKR-110	PG050	5	14.00	0.05	8000
		10	13.00	0.05	8000
CKR-145	PG070	3	55.00	0.30	6000
		5	40.00	0.20	6000
		10	37.00	0.15	6000
CKR-200	PG090	3	125.00	0.60	6000
		5	100.00	0.50	6000
		10	90.00	0.40	6000
	PG120	3	305.00	1.10	4800
		5	250.00	0.90	4800
		10	220.00	0.80	4800

1) The limit values of the linear system must not be exceeded ➠ “Calculation principles”.

2) The clamping hub diameter is reduced by a spacer on the motor shaft diameter.

M_{ge} = maximum permitted acceleration torque of the gear (at the output)
i = gear ratio of the gear
M_{Rge} = frictional torque of the gear at the motor journal
n_{ge} = maximum permissible speed of the gear
J_{ge} = mass moment of inertia of the gear at the motor journal
m_{ge} = mass of the gear
M_{mech} = maximum permissible drive torque for mechanical system
M_P = maximum permissible drive torque of the linear system
d_{ge} = clamping hub diameter
D = motor shaft diameter
PG = planetary gearbox

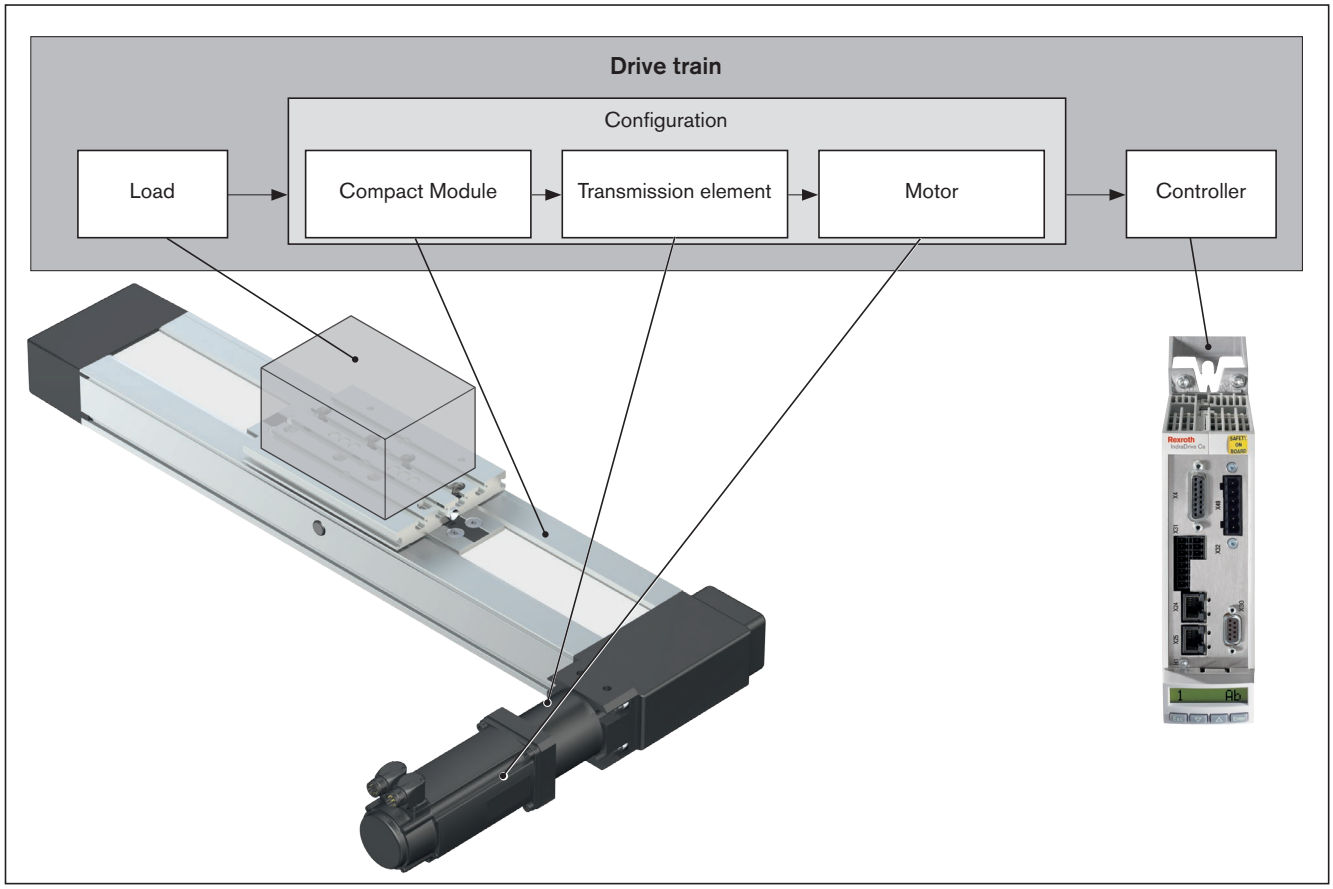
	Mass moment of inertia	Weight	Clamping hub diameter[2)]	Motor Shaft diameter	Type
	J_{ge} (kgm²)	m_{ge} (kg)	d_{ge} (mm)	D (mm)	
	0.0000041	0.31	9	9 k6	MSK030C-0900
		0.31	9	8 h6	MSM019B-0300
	0.0000041	0.31	9	9 k6	MSK030C-0900
		0.31	9	8 h6	MSM019B-0300
	0.0000055	0.77	11	9 k6	MSK030C-0900
	0.0000200	0.93	14	14 h6	MSM031C-0300
	0.0000055	0.77	11	9 k6	MSK030C-0900
	0.0000200	0.93	14	14 h6	MSM031C-0300
	0.0000055	0.77	11	9 k6	MSK030C-0900
	0.0000200	1.15	14	14 k6	MSK040C-0600
	0.0000200	0.93	14	14 h6	MSM031C-0300
	0.0000055	0.77	11	9 k6	MSK030C-0900
	0.0000200	1.15	14	14 k6	MSK040C-0600
	0.0000200	0.93	14	14 h6	MSM031C-0300
	0.0000300	2.20	16	14 k6	MSK040C-0600
	0.0000600	2.80	19	19 k6	MSK050C-0600
	0.0000600	2.20	19	19 h6	MSM041B-0300
	0.0000200	2.20	16	14 k6	MSK040C-0600
	0.0000600	2.80	19	19 k6	MSK050C-0600
	0.0000500	2.20	19	19 h6	MSM041B-0300
	0.0000200	2.20	16	14 k6	MSK040C-0600
	0.0000600	2.80	19	19 k6	MSK050C-0600
	0.0000500	2.20	19	19 h6	MSM041B-0300
	0.0001800	4.90	24	24 k6	MSK060C-0600
	0.0001600	5.42			MSK076C-0450
	0.0001600	4.90	24	24 k6	MSK060C-0600
	0.0001600	5.42			MSK076C-0450
	0.0001400	4.90	24	24 k6	MSK060C-0600
	0.0001600	5.42			MSK076C-0450
	0.0006900	9.50	32	24 k6	MSK076C-0450
	0.0005600				
	0.0005100				

Max. permissible drive torque M_{mech}
The lowest (minimum) of all the values for permissible drive torque of all mechanical components contained in the drive train determines the maximum permissible drive torque of the mechanical system

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

Calculations

Calculation principles



The correct dimensioning and assessment of an application requires structured consideration of the drive train as a whole.
The basic element of the drive train is the configuration – made up of the linear system, the transmission element (gears or directly without transmission element) and the motor – which can be ordered in that constellation in the catalog.

Maximum permissible loads

When selecting linear systems, it is essential to consider the upper limits for permissible loads and forces as specified in the chapter on “Technical data” on page 70. The values given there are system-related. In other words, the upper limits are determined not only by the load ratings of the bearing points but also include structural design and material-related considerations.

Conditions for combined loads

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

Service life of the linear guide

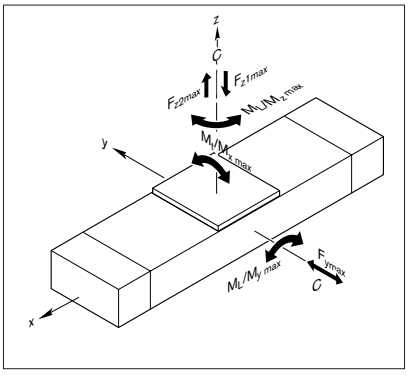
The service life of the rolling bearing points contained in a linear system can be calculated using the formulas given below. The rolling bearing point that is relevant to the service life in a linear system with geared belt drive is generally the linear guide.

⚠ **The calculated service life specification for the linear system is determined by the service life value of the linear guide.**

The linear guide of a linear system must bear the load and any processing forces.

Combined equivalent load on bearing of the guideway

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



C = dynamic load capacity (N)
F_{comb} = combined equivalent load on bearing (N)
F_y = load due to a resulting force in the y-direction (N)
F_z = load due to a resulting force in the z-direction (N)
L = nominal service life (m)
L_h = nominal service life (h)
M_L = dynamic longitudinal moment load (Nm)
M_t = dynamic torsional load moment (Nm)
M_x = dynamic torsional moment about the x-axis (Nm)
M_y = dynamic torsional moment about the y-axis (Nm)
M_z = dynamic torsional moment about the z-axis (Nm)
v_m = average travel speed (m/s)

Nominal service life

Nominal service life in meters

$$L = \left(\frac{C}{F_{comb}}\right)^3 \cdot 10^5$$

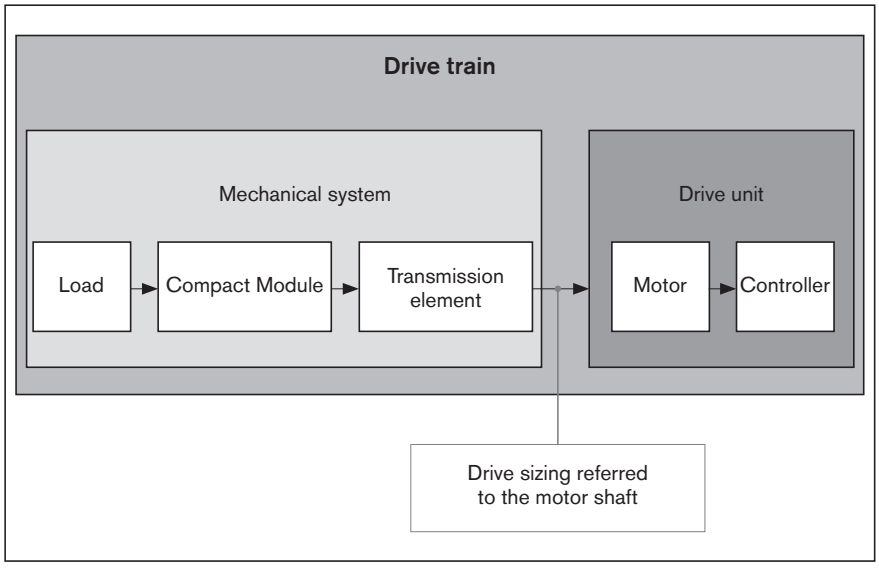
Nominal service life in hours

$$L_h = \frac{L}{3600 \cdot v_m}$$

Sizing the drive unit

Basic principles

When calculating the required size of drive, the drive train can be subdivided into the mechanical system and the drive itself.
The **mechanical** system includes the physical components – linear system and the transmission elements (gears or directly without transmission element) – and the load to be carried.
The electric **drive** is a motor-controller combination with the appropriate performance data.
The sizing or dimensioning of the electric drive is done taking the motor shaft as a reference point.
When sizing the drive, limit values must be taken into account as well as basic values. The limit values are to be observed in order to avoid damaging the mechanical components.



Technical data and formula symbols for the mechanical system

For each component (linear system, gears), the relevant maximum permissible values must be identified for the drive torque and travel speed, as well as the basic values for frictional torque and mass moment of inertia ➠ “Drive data” on page 70.
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 “Technical Data” section or they are determined using the formulas described on the following pages.

		Mechanical system		
		Load	**Linear system**	**Transmission element Gear**
Weight moment	**(Nm)**	M_g 5)	–	–
Frictional torque	**(Nm)**	–4)	M_{Rs} 3)	M_{Rge} 3)
Mass moment of inertia	**(kgm²)**	J_t 1)	J_s 2)	J_s 3)
Max. permissible speed	**(m/s)**	–	v_{max} 3)	–
Max. permissible speed	**(min^{-1})**	–	n_p 1)	n_{ge} 3)
Max. permissible drive torque	**(Nm)**	–	M_p 3)	M_{Rs} 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) Any additional process forces are to be taken into consideration as load moments
5) For vertical mounting orientation: Determine the value using the appropriate formula

Drive sizing referred to the motor shaft

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

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

Determination of the values for the mechanical system in the drive train, based on the motor shaft

Frictional torque M_R

For direct motor attachment (without gear)

$$M_R = M_{Rs}$$

For motor attachment via gear unit

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

Mass moment of inertia J_{ex}

For direct motor attachment (without gear)

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

For motor attachment via gear unit

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

Determination of mass moment of inertia of the linear system components

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

Determination of translational mass moment of inertia of the external load

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

i	=	gear ratio of gear	(–)
J_{ex}	=	mass moment of inertia of mechanical system	(kgm^2)
J_{ge}	=	mass moment of inertia of the gear at motor journal	(kgm^2)
J_s	=	mass moment of inertia of the linear motion system	(kgm^2)
J_t	=	translational mass moment of inertia of external load based on the linear system drive journal	(kgm^2)
$k_{J\,fix}$	=	constant for fixed-length portion of mass moment of inertia	($kgmm^2$)
$k_{j\,m}$	=	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	(kgmm)
L	=	length of linear system	(mm)
m_{ex}	=	moved external load	(kg)
M_R	=	frictional torque at motor journal	(Nm)
M_{Rs}	=	frictional torque of system	(Nm)
M_{Rge}	=	frictional torque of the gear at the motor journal	(Nm)

Sizing the drive unit

Maximum permissible speed v_{mech} (max. permissible speed n_{mech})
The lowest of all the values for maximum permissible speed or min^{-1} of all mechanical components contained in the drive train 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.

Maximum permissible speed
For direct motor attachment (without gear)

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

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

For motor attachment via gear unit

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

Maximum permissible speed
For direct motor attachment (without gear)

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

$$n_{mech} = n_p$$

For motor attachment via gear unit

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

$$n_p = \frac{v_{max} \cdot 1000 \cdot 60}{\pi \cdot d_3}$$

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

For direct motor attachment (without gear)

$$M_{mech} = M_p$$

For motor attachment via gear unit

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

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

d_3	=	diameter of belt pulley	(mm)
i	=	gear ratio of gear	(–)
n_{ge}	=	maximum permissible speed of mechanical system	(min^{-1})
n_{mech}	=	maximum permissible speed of mechanical system	(min^{-1})
n_{ge}	=	maximum permissible speed of linear system	(min^{-1})
M_{ge}	=	maximum permitted acceleration torque of the gear (at the output)	(Nm)
M_p	=	maximum permissible drive torque of the linear system	(Nm)
M_{mech}	=	maximum permissible drive torque for mechanical system	(Nm)
π	=	pi	(–)
v_{max}	=	maximum permissible speed of linear system	(m/s)
v_{mech}	=	maximum permissible speed of mechanical system	(m/s)

Rough guide for motor selection

The following conditions can be used as a rough guide for preselecting the motor.

Condition 1:
The speed of the motor must be the same as or higher than the speed required for the mechanical system (but not exceeding the maximum permissible value).

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

Condition 2:
Consideration of the ratio of mass moments of inertia of the mechanical system and the motor. The ratio of the 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.

Relation of the moments of inertia

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

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

Application area	V
Handling	≤ 6.0
Processing	≤ 1.5

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

Torque ratio

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

Static load moment

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

Weight moment
For vertical mounting orientation only!

$$M_g = \frac{d_3 \cdot (m_{ex} + m_{ca}) \cdot g}{2000 \cdot i}$$

In the chapter ➠"Configuration and ordering" users can put together standard configurations, including gears and motor, for the various linear 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 sizing of the drive unit
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 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 catalogs “IndraDrive Cs” and “IndraDrive C”.
When sizing the drive, the maximum permitted values for speed, drive torque and acceleration must not be exceeded, in order to avoid damaging the mechanical system.

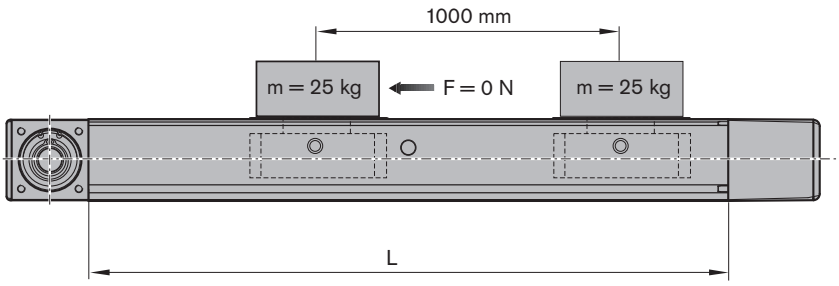
d_3	=	diameter of belt pulley	(mm)	M_0	=	continuous motor torque	(Nm)
g	=	gravitational acceleration (= 9.81)	(m/s^2)	M_R	=	Frictional torque at motor journal	(Nm)
i	=	gear ratio of the gear unit	(–)	M_{stat}	=	static longitudinal moment load	(Nm)
J_{br}	=	mass moment of inertia of motor brake	(kgm^2)	n_{max}	=	maximum speed of motor	(min^{-1})
J_{ex}	=	mass moment of inertia of mechanical system	(kgm^2)	n_{mech}	=	maximum permissible speed of mechanical system	(min^{-1})
J_m	=	mass moment of inertia of motor	(kgm^2)	V	=	ratio of mass moments of inertia of drive train and motor	(–)
m_{ca}	=	moved mass of carriage	(kg)				
m_{ex}	=	moved external load	(kg)				
M_g	=	weight moment at motor journal	(Nm)				

Calculation example

Starting 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:

CKR-145 Compact Module
- Carriage length = 190 mm
- with connection plate
- Motor attachment via planetary gearbox, i = 5
- with AC servo motor MSK 040C without brake



Estimation of length L

(In most cases, the recommended limit for excess travel is 2x lead constant. The excess travel must be greater than the emergency stop stopping distance, which is calculated for an exact design of the electrical drive.)

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

Lead constant: $u = \frac{u(i=1)}{i} = \frac{165}{5} = 33 \text{ mm}$

Excess travel: $s_e = 2 \cdot u = 2 \cdot 33 = 66 \text{ mm}$

Max. travel: $s_{max} = s_{eff} + 2 \cdot s_e = 1000 + 2 \cdot 66 = 1132 \text{ mm}$

Length: $L = 1132 + 190 + 75 = 1397 \text{ mm}$

Frictional torque M_R

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

Compact Module: $M_{Rs} = 2.04 \text{ Nm}$

Gear: $M_{Rge} = 0.2 \text{ Nm}$

Frictional torque: $M_R = 0{,}2 + \frac{2.04}{5} = 0.61 \text{ Nm}$

Mass moment of inertia J_{ex}

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

Compact Module: $J_s = (k_{J\,fix} + k_{J\,var} \cdot L) \cdot 10^{-6} = (2276{,}71 + 0{,}317 \cdot 1397) \cdot 10^{-6} = 2719.838 \cdot 10^{-6} \text{ kgm}^2$

External load: $J_t = m_{ex} \cdot k_{J\,m} \cdot 10^{-6} = 25 \cdot 689.59 \cdot 10^{-6} = 17239.75 \cdot 10^{-6} \text{ kgm}^2$

Mass moment of inertia: $J_{ex} = 20 \cdot 10^{-6} + \frac{(2719.838 \cdot 10^{-6} + 17239.75 \cdot 10^{-6})}{5^2} = 818.383 \cdot 10^{-6} \text{ kgm}^2$

Maximum permissible speed n_{mech}

(Motor attachment via gear unit, for without consideration of the motor)
Limit for mechanical system

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

Compact Module:

$$n_p = \frac{(v_{max} \cdot 1000 \cdot 60)}{\pi \cdot d_3} = \frac{(5 \cdot 1000 \cdot 60)}{\pi \cdot 52.52} = 1818\ \text{min}^{-1}$$

Gear: $n_{ge} = 6000\ \text{min}^{-1}$

Max. permitted speed:

$$n_{mech} = \text{minimum}\ (1818 \cdot 5\ ;\ 6000) = \text{minimum}\ (9090\ ;\ 6000) = 6000\ \text{min}^{-1}$$

Maximum permissible speed v_{mech}

(Motor attachment via gear unit, for without consideration of the motor)
Limit value, mechanical system

Max. permissible speed:

$$v_{mech} = \frac{(n_{mech} \cdot \pi \cdot d_3)}{i \cdot 1000 \cdot 60}$$

$$n_{mech} = \frac{(6000 \cdot \pi \cdot 52.52)}{5 \cdot 1000 \cdot 60} = 3.3\ \text{m/s}$$

Maximum permitted speed of the application n_{mech}

(Motor attachment via gear unit, for without consideration of the motor)
Limit value, application

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

Speed:

$$n_{mech} = \frac{(1.5 \cdot 5 \cdot 1000 \cdot 60)}{\pi \cdot 52.52} = 2727\ \text{min}^{-1}$$

Max. permissible drive torque M_{mech}

(Motor attachment via gear unit, for without consideration of the motor)
Limit value, mechanical system

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

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

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

Drive torque:

$$M_{mech} = \text{minimum}\ \left(\frac{40}{5};\frac{32.5}{5}\right) = \text{minimum}\ (8\ ;\ 6.5) = 6.5\ \text{Nm}$$

Calculation example

Checking the motor preselection

Selected motor:
MSK 040C without brake

Condition 1:

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

$6000 \geq 2727$ condition fulfilled – motor selection OK

Condition 2:

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

Motor moment of inertia: $J_m = 140 \cdot 10^{-6}$ kgm²

Brake moment of inertia: $J_{br} = 0$ kgm² (without brake)

Mass moment of inertia ratio: $V = \frac{818.383 \cdot 10^{-6}}{140 \cdot 10^{-6}}$

$= 5.85$

Condition for handling: $V \leq 6$

$5.85 \leq 6$ condition fulfilled – motor selection OK

Condition 3:

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

Static load moment: $M_{stat} = M_R + M_g$ (horizontal mounting orientation $M_g = 0$)

$= 0.61$ Nm

Continuous motor of the motor: $M_0 = 2.7$ Nm

Torque ratio: $\frac{0.61}{2.7} = 0.23$

$0.23 \leq 0.6$ condition fulfilled – motor selection OK

All three conditions fulfilled ➠ selected motor is suitable for the application.

Result

CKR-145 Compact Module

Length	L	= 1397 mm
Max. travel	s_{max}	= 1132 mm
Carriage length	L_{ca}	= 190 mm

Belt drive
without connection plate
Motor attachment via planetary gearbox, gear ratio i = 5
Preselected motor: MSK 040C 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.

Frictional torque	M_R	= 0.61 Nm
Mass moment of inertia	J_{ex}	= $818.383 \cdot 10^{-6}$ kgm^2
Speed:	v_{mech}	= 1.5 m/s (n_{mech} = 2727 min^{-1})
Limit for drive torque	M_{mech}	= 6.5 Nm

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

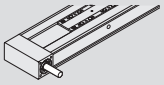
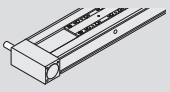
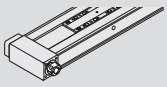
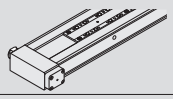
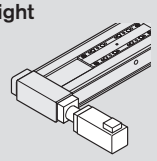
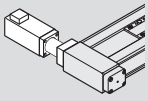
Limit for acceleration	a_{max}	= 50 m/s^2
Limit value for travel:	v_{max}	= 3.3 m/s (n_{mech} = 6000 min^{-1})

After the emergency stop stopping distance has been determined during the exact design, check whether the selected excess travel is sufficient or whether, if appropriate, an adjustment must be made.

Besides the preferred type MSK 040C, other motors with identical connection dimensions can be adapted while taking care not to exceed the calculated limits.

CKR-070

Configuration and ordering

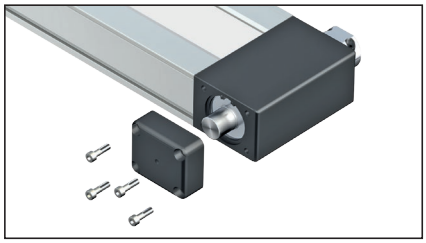
Short designation, length[1] CKR-070-NN-1, ... mm		Guideway			Drive unit		Carriage				
		Standard	Center holes[2]		Without keyway	For gear unit[3]	without connection plate L_{ca} =		with connection plate L_{ca} =		
Version					i = 1		80 mm	108 mm	60 mm	95 mm	
Drive shaft	MA01 – right 	01	03	04	01	–	01	02	40	41	
Drive shaft	MA02 – left 				02						
Clamping hub	MA05 – right 				06						
Clamping hub	MA06 – left 				07						
Gear attachment	MG10 – right 	01	03	04	–	08	01	02	40	41	
Gear attachment	MG11 – left 	01	03	04	–	09					

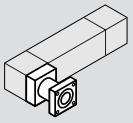
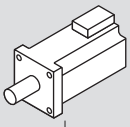
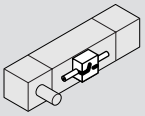
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   Option 04: with center holes and long hole in the ground area of the frame.
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Mounting kit for gear attachment

Drive end enclosure with additional drive shaft

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



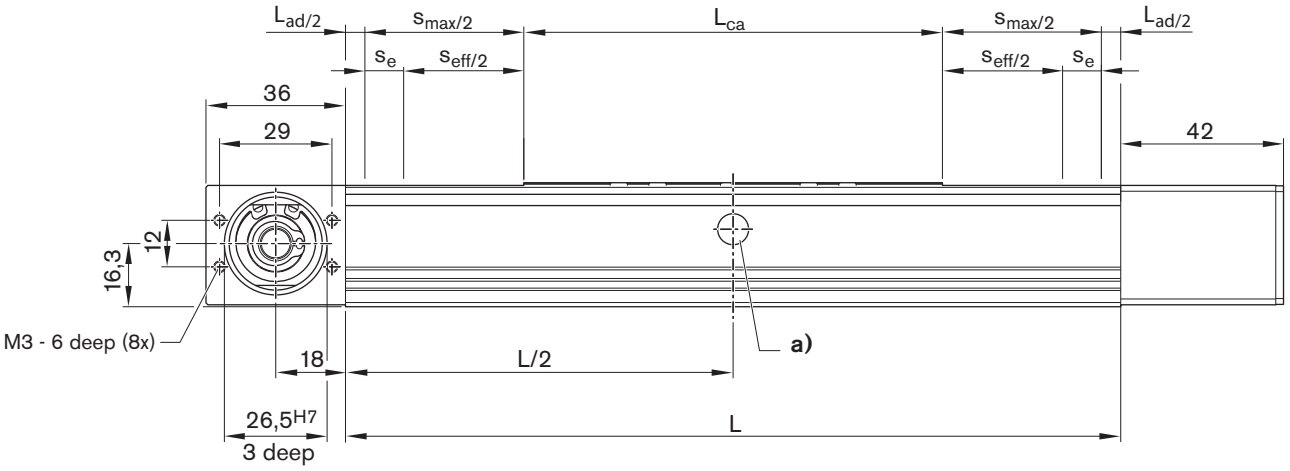
	Motor attachment[4]			Motor[5]		Switching system[6]		Documentation[8]
								
	Gear i = 5	i = 10	for motor	without brake	with brake			
	00			00		Without switch Without mounting duct Without socket plug	00	01
						Magnetic sensor		
						REED sensor	21	
						Hall sensor PNP NC contact	22	
						Hall sensor PNP NO contact	23	
						Mounting duct	25	
						Socket plug	28	
	11	12	MSK 030C	84	85	Magnetic sensor with plug[7]		02
						REED sensor	58	
						Hall sensor PNP NC contact	59	
	23	24	MSM 019B	134	135			

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Measurement report:
01 = standard report
02 = frictional torque measurement
(also see the “Documentation” chapter)

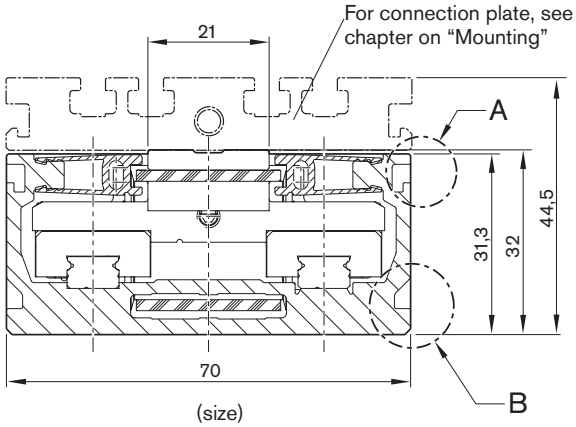
Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKR-070 Dimensional drawings

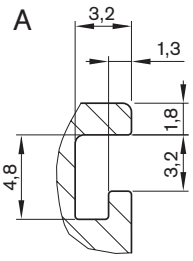
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



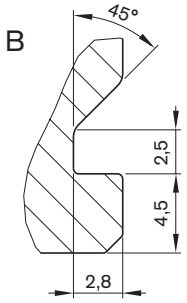
a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-D 4
For further information, see the chapter on lubrication.



(size)

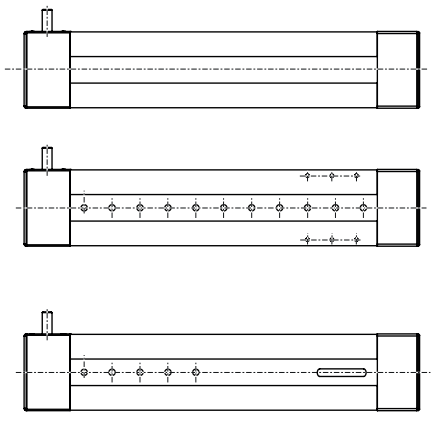


For mounting duct, socket

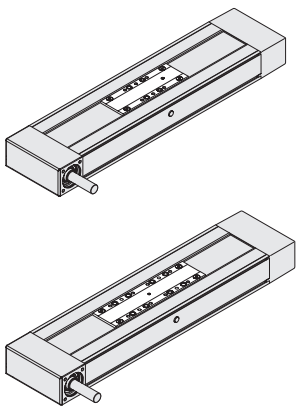


For mounting with clamping fixtures

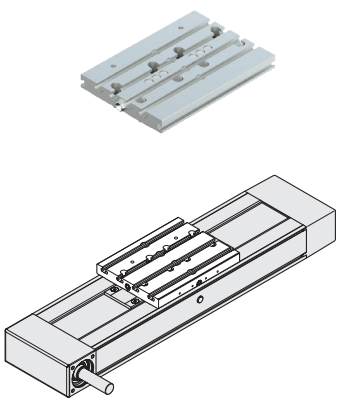
Design/options for guideway (frame), carriages, connection plates; see following pages



Guideway (frame)



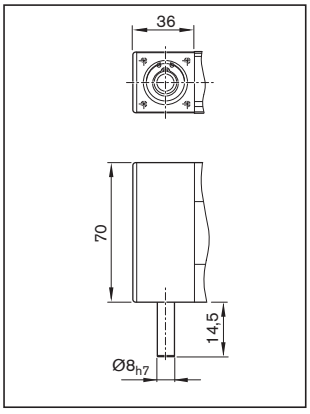
Carriages



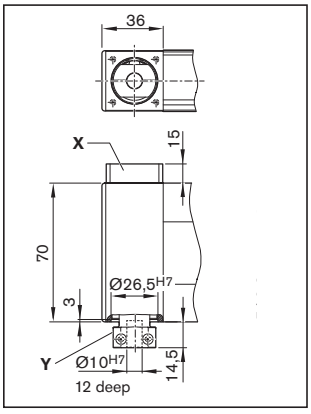
Connection plates

Version

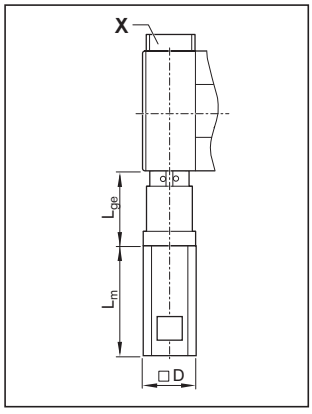
MA01 / MA02



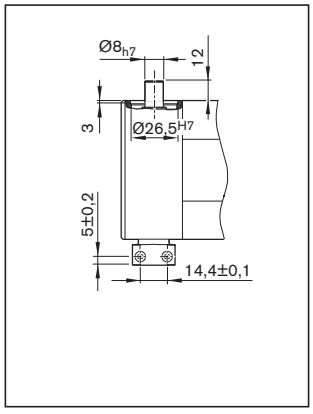
MA05 / MA06



MG10 / MG11



X / Y



Version	Motor	Dimensions (mm)			
		D	L_{ge}	L_m	
				without brake	with brake
MG10/MG11	**MSM 019B**	38	91.0	92.0	122.0
	MSK 030C	54	91.0	188.0	213.0

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_{ge} = gear length
L_m = motor length

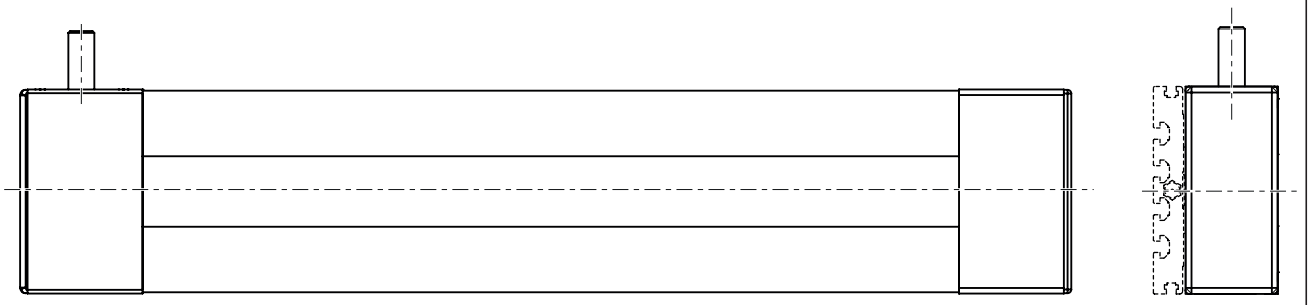
Carriage		Additional length	
Connection plate		Connection plate	
without	with	without	with
L_{ca} (mm)	L_{ca} (mm)	L_{ad} (mm)	L_{ad} (mm)
80	60	10	30
108	95	10	23

See order example for example of how to calculate length.

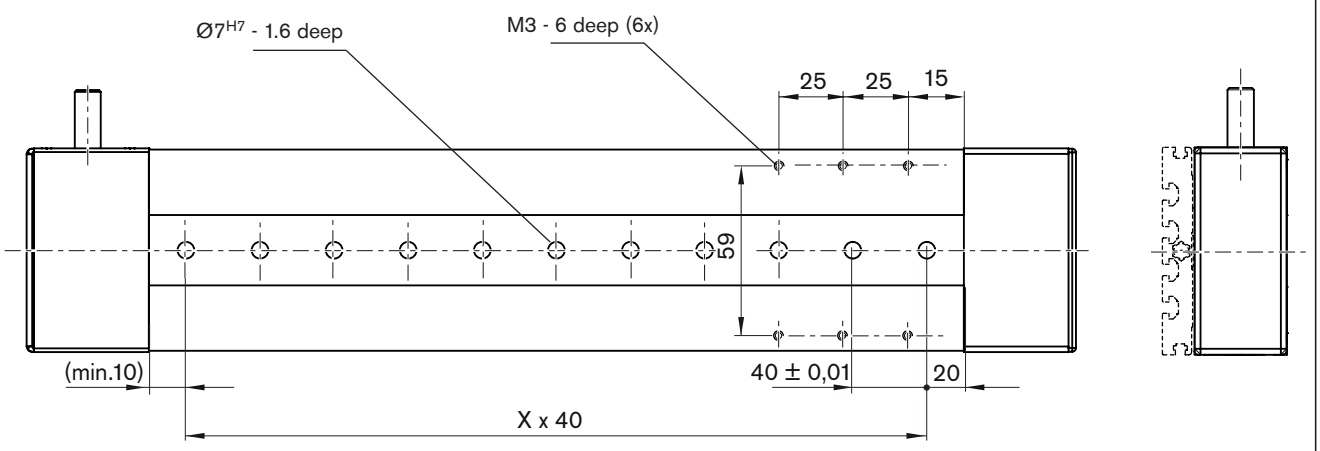
CKR-070 Guideway/carriage options Dimensional drawings

Guideway (frame)

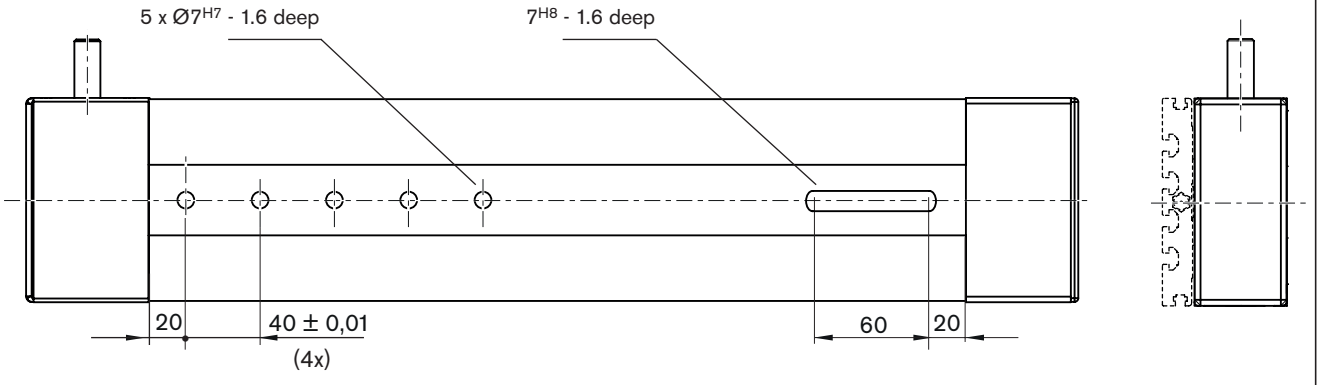
Option 01 / standard



Option 03 / with central holes



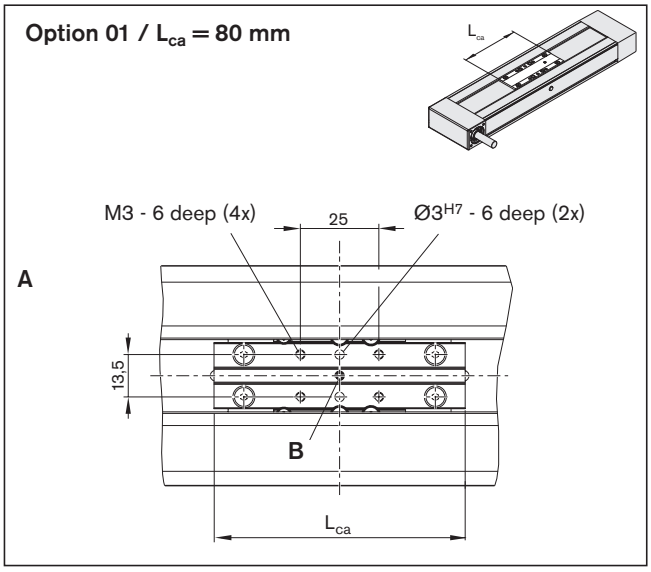
Option 04 / with central holes and long hole



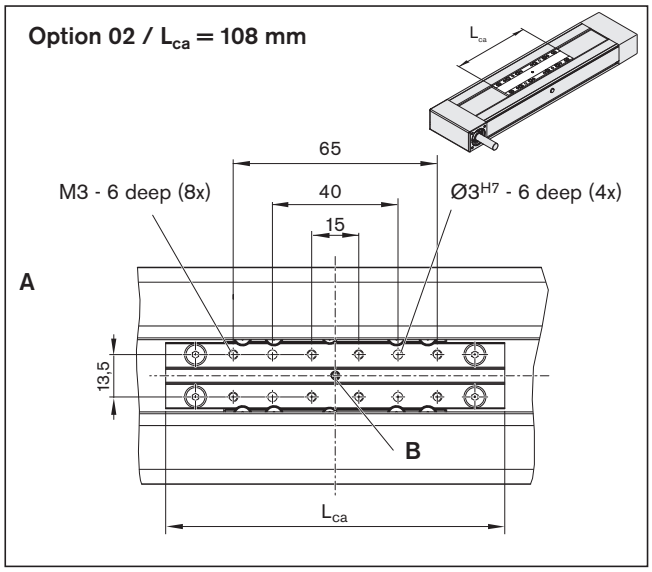
View from below (ground area)

Carriage without connection plate

Option 01 / L_{ca} = 80 mm



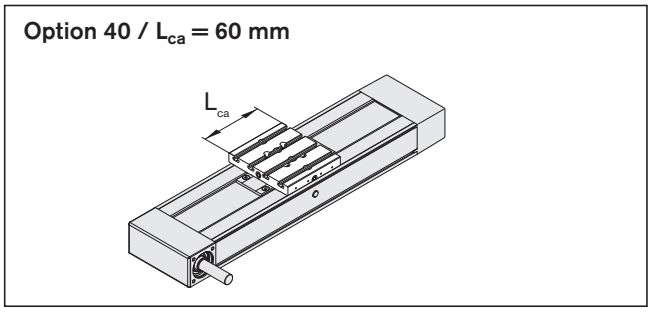
Option 02 / L_{ca} = 108 mm



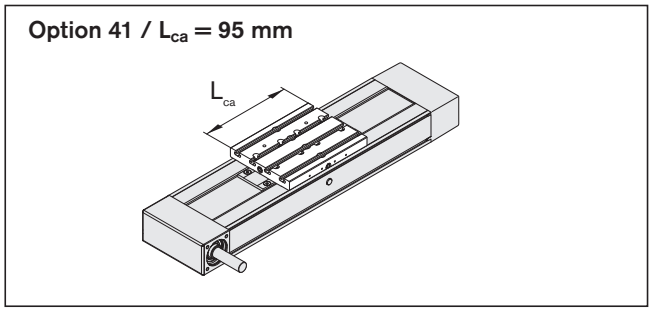
A Drive side
B Lube port for grease lubrication; closed with M4 set screw

Carriage with connection plate[1)]

Option 40 / L_{ca} = 60 mm



Option 41 / L_{ca} = 95 mm



1) For dimensional drawings of the connection plate, see the chapter on “Connection plates”

CKR-090

Configuration and ordering

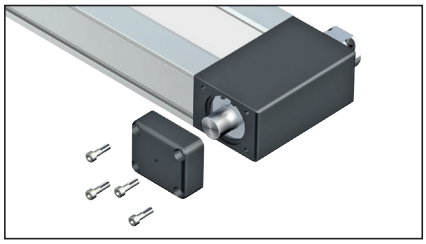
Short designation, length[1] CKR-090-NN-1, ... mm		Guideway			Drive unit			Carriage				
		Standard	Center holes [2]		Without keyway	with keyway	For gear unit [3]	without connection plate L_{ca} =		with connection plate L_{ca} =		
Version					i = 1	i = 1		102 mm	156 mm	60 mm	125 mm	
Drive shaft	MA01 – right	01	03	04	01	03	–	01	02	40	41	
Drive shaft	MA02 – left											
Clamping hub	MA05 – right				06	–						
Clamping hub	MA06 – left											
Direct attachment	MA10 – right / MA11 – left	01	03	04	06	–	–	01	02	40	41	
Gear attachment	MG10 – right / MG11 – left	01	03	04	–	–	08	01	02	40	41	

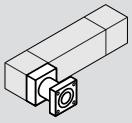
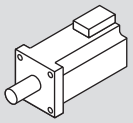
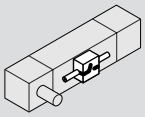
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   selectable up to a length of L ≤ 2000 mm
   Option 04: with center holes and long hole in the ground area of the frame.
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Mounting kit for gear attachment

Drive end enclosure with additional drive shaft

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



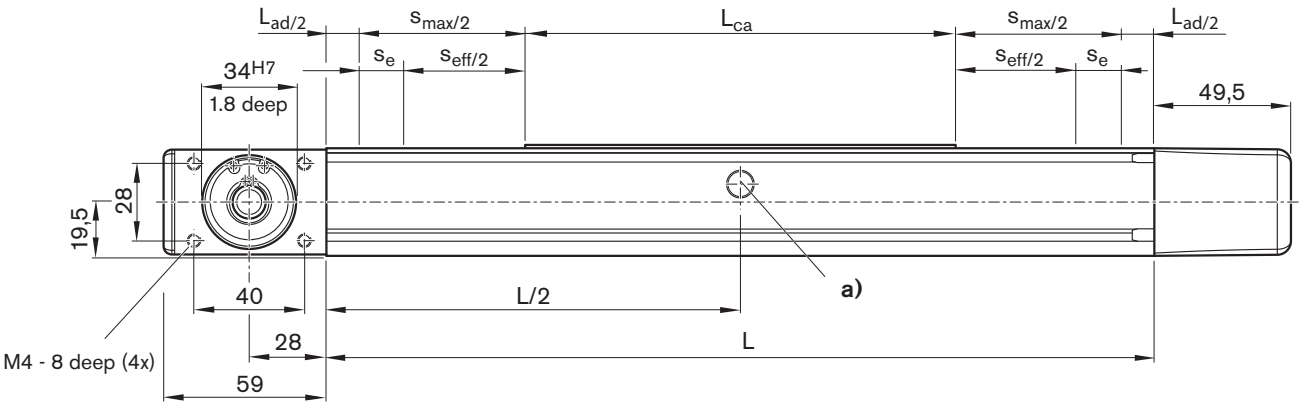
Motor attachment[4]				Motor[5]		Switching system[6]	Documentation[9]
							
Direct drive	Gear		for motor	without brake	with brake		
i = 1	i = 5	i = 10					
00			–	00		Without switch Without mounting duct Without socket plug: 00 **Magnetic sensor** REED sensor: 21 Hall sensor PNP NC contact: 22 Hall sensor PNP NO contact: 23 Mounting duct: 25 Socket plug: 17 **Magnetic sensor with plug[8]** REED sensor: 58 Hall sensor PNP NC contact: 59	01
01	–		MSK 040C	86	87		02
–	11	12	MSK 030C	84	85		
	31	32	MSM 031C	138	139		

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Measurement report:
01 = standard report
02 = frictional torque measurement
(also see the “Documentation” chapter)

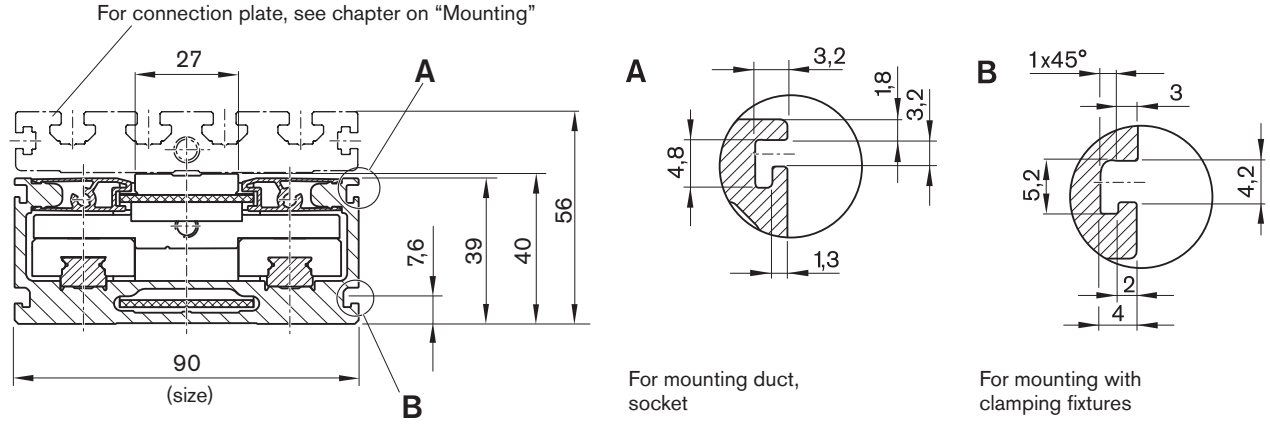
Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKR-090 Dimensional drawings

All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



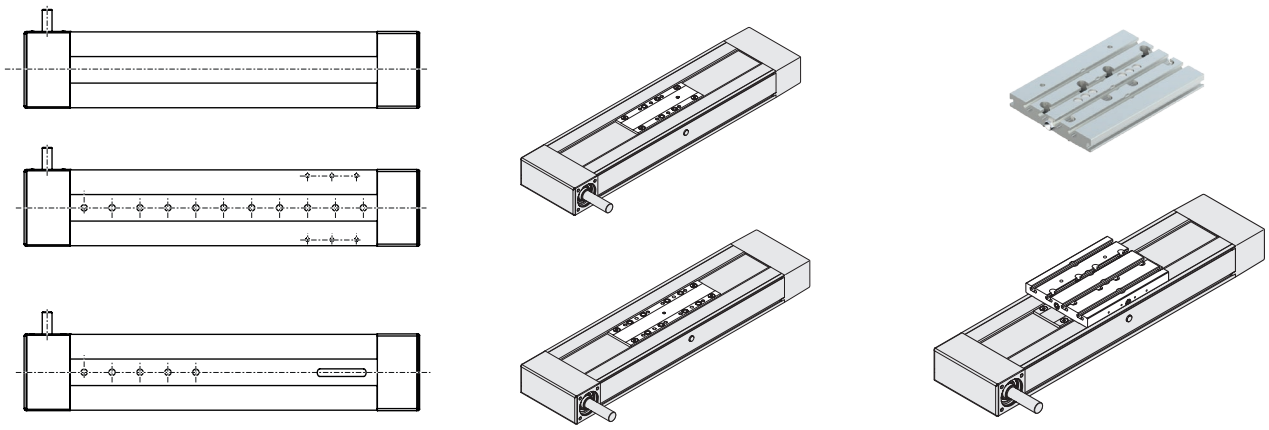
a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-D 4
For further information, see the chapter on lubrication.



For mounting duct, socket

For mounting with clamping fixtures

Design/options for guideway (frame), carriages, connection plates; see following pages



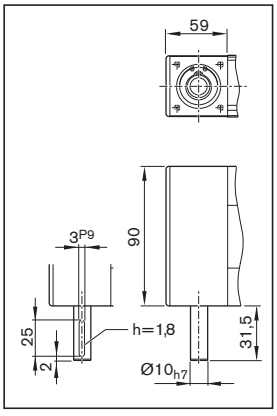
Guideway (frame)

Carriages

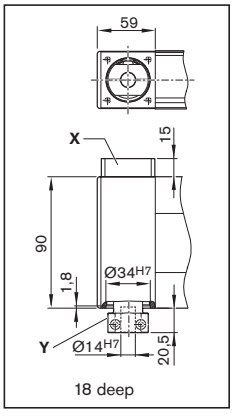
Connection plates

Version

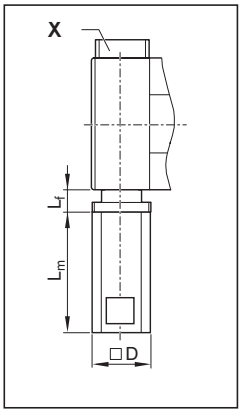
MA01 / MA02



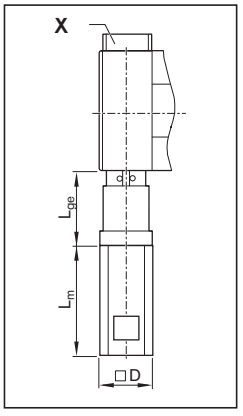
MA05 / MA06



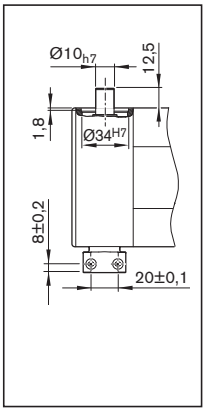
MA10 / MA11



MG10 / MG11



X / Y



Version	Motor	Dimensions (mm)				
		D	L_f	L_{ge}	L_m without brake	L_m with brake
MA10, MA11	MSK 040C	82	34.5	–	185.5	215.5
MG10, MG11	MSK 030C	54	–	91.0	188.0	213.0
	MSM 031C	60	–	111.0	98.5	135.0

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_{ge} = gear length
L_m = motor length

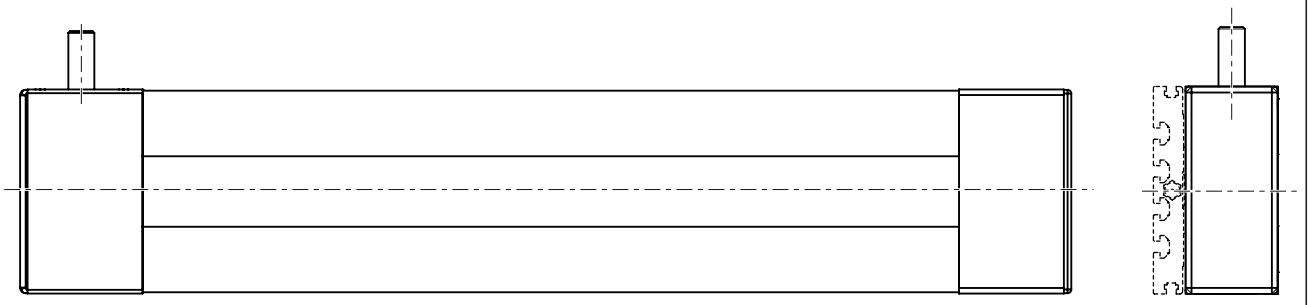
Carriage		Additional length	
Connection plate		Connection plate	
without	with	without	with
L_{ca} (mm)	L_{ca} (mm)	L_{ad} (mm)	L_{ad} (mm)
102	60	25	67
156	125	25	56

See order example for example of how to calculate length.

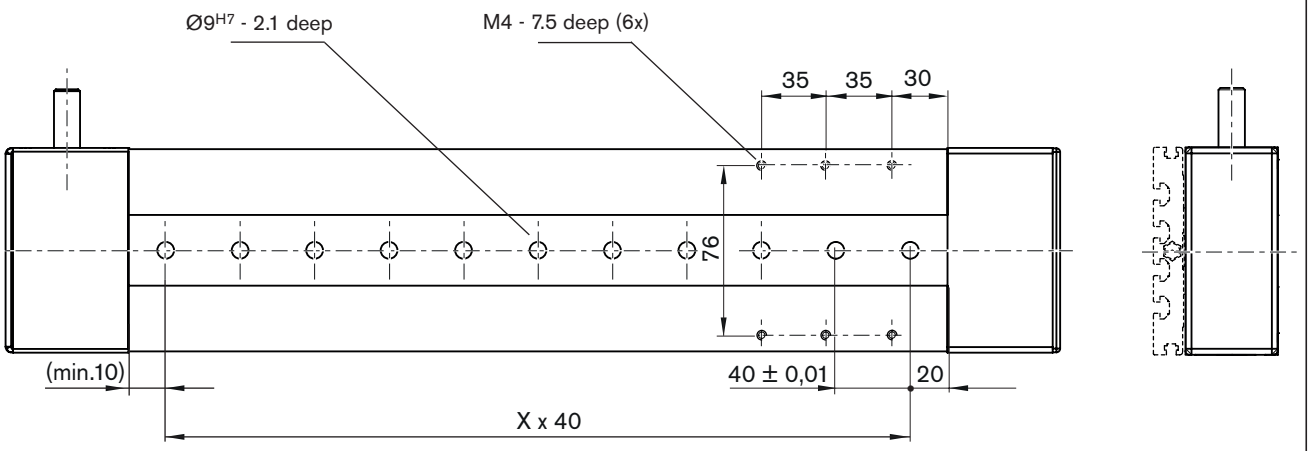
CKR-090 Guideway/carriage options Dimensional drawings

Guideway (frame)

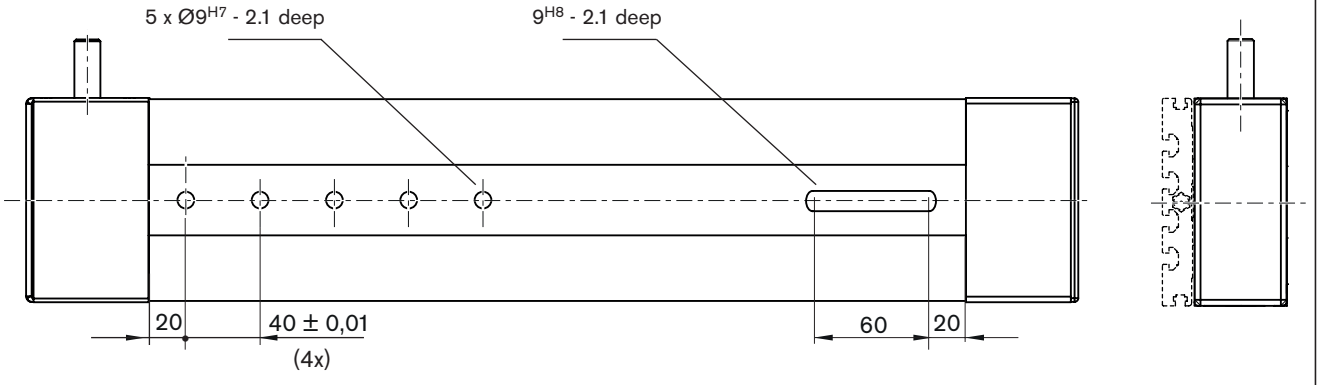
Option 01 / standard



Option 03 / with central holes



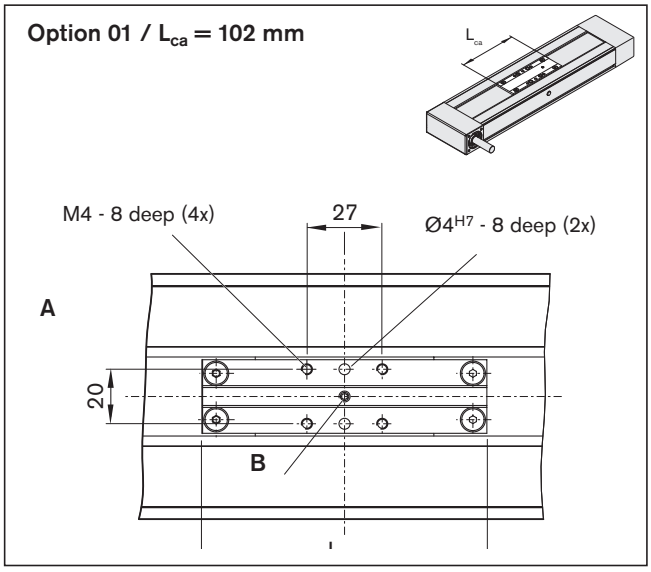
Option 04 / with central holes and long hole



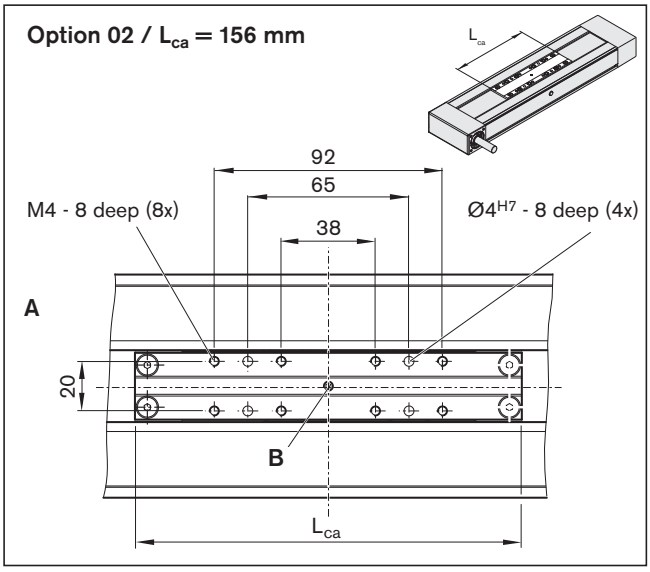
View from below (ground area)

Carriage without connection plate

Option 01 / L_{ca} = 102 mm



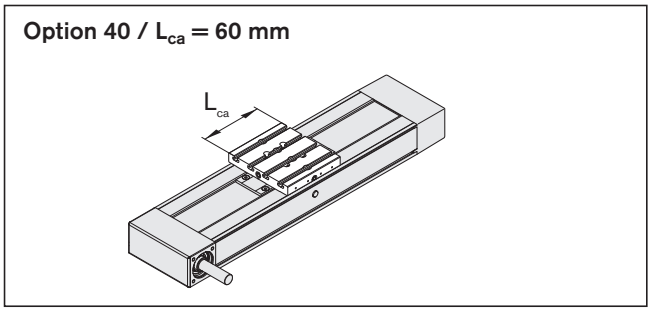
Option 02 / L_{ca} = 156 mm



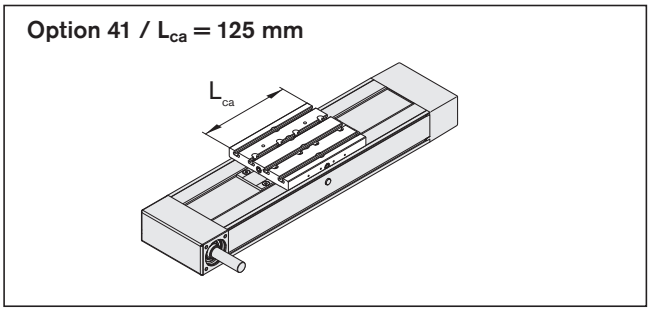
A Drive side
B Lube port for grease lubrication; closed with M4 set screw

Carriage with connection plate[1)]

Option 40 / L_{ca} = 60 mm



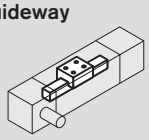
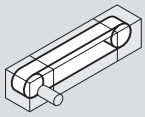
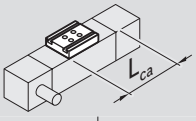
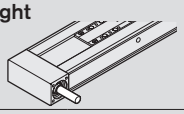
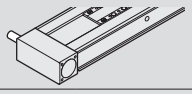
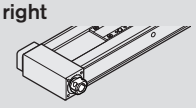
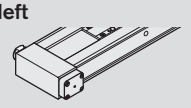
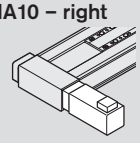
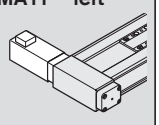
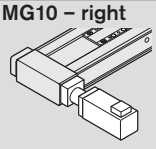
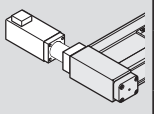
Option 41 / L_{ca} = 125 mm



1) For dimensional drawings of the connection plate, see the chapter on “Connection plates”

CKR-110

Configuration and ordering

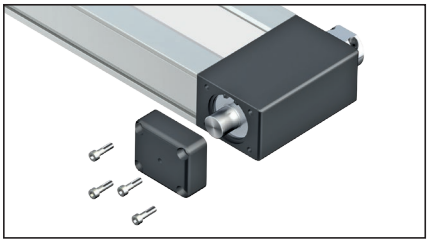
Short designation, length[1] CKR-110-NN-1, ... mm			Guideway			Drive unit			Carriage				
													
			Standard	Center holes [2]		Without keyway	with keyway	For gear unit [3]	without connection plate L_{ca} =		with connection plate L_{ca} =		
Version						i = 1	i = 1		170 mm	215 mm	110 mm	155 mm	
Drive shaft	MA01 – right		01	03	04	01	03	–	01	02	40	41	
Drive shaft	MA02 – left												
Clamping hub	MA05 – right					06	–						
Clamping hub	MA06 – left												
Direct attachment	MA10 – right		01	03	04	06	–	–	01	02	40	41	
Direct attachment	MA11 – left												
Gear attachment	MG10 – right		01	03	04	–	–	08	01	02	40	41	
Gear attachment	MG11 – left												

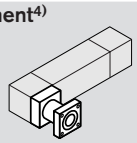
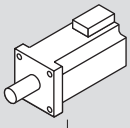
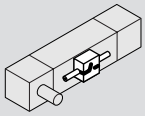
L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
Option 03: with center holes and mounting threads in the ground area of the frame
selectable up to a length of L ≤ 2000 mm
Option 04: with center holes and long hole in the ground area of the frame
Selectable starting from length L ≥ 300 mm up to length L_{max}

Drive end enclosure with additional drive shaft

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



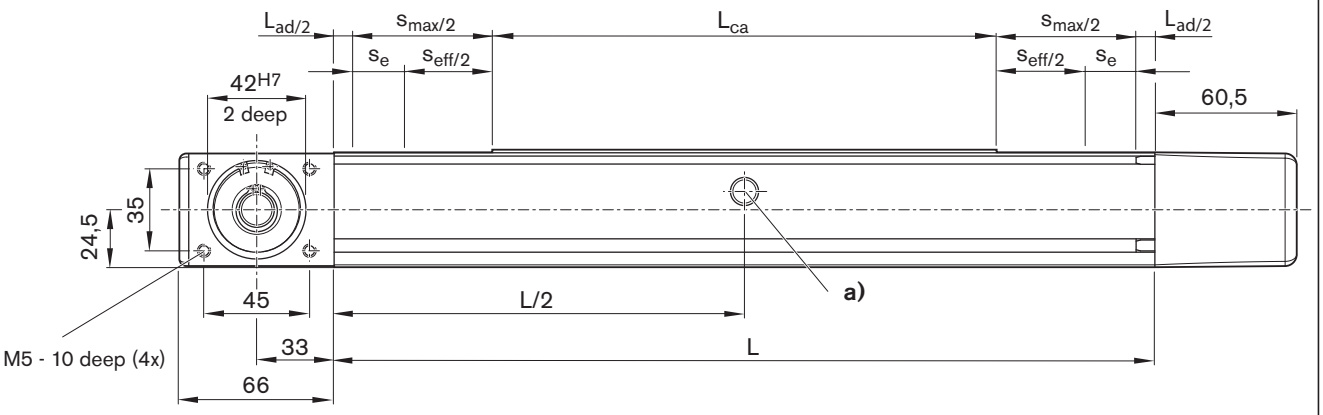
	Motor attachment[4]			**Motor**[5]		**Switching system**[6]	**Documentation**[8]
							
	Direct drive	**Gear**		**for motor**			
	i = 1	**i = 5**	**i = 10**		**without brake**	**with brake**	
	00					Without switch Without mounting duct Without socket plug: 00 **Magnetic sensor** REED sensor: 21 Hall sensor PNP NC contact: 22 Hall sensor PNP NO contact: 23 Mounting duct: 25 Socket plug: 17 **Magnetic sensor with plug**[7] REED sensor: 58 Hall sensor PNP NC contact: 59	01
	01	–		MSK 050C	88	89		02
	–	11	12	MSK 030C	84	85		
		21	22	MSK 040C	86	87		
		31	32	MSM 031C	138	139		

3) Mounting kit for gear attachment
4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Recommended motor, motor data and type designations
   ➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Measurement report:
   01 = standard report
   02 = frictional torque measurement
   (also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

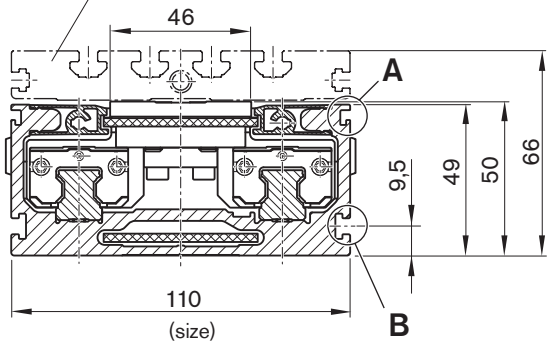
CKR-110 Dimensional drawings

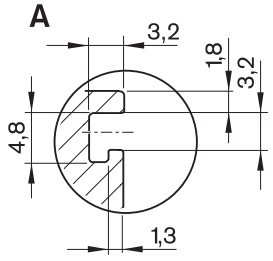
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



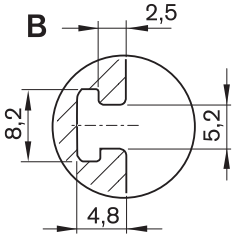
a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-A M6
For further information, see the chapter on lubrication.

For connection plate, see chapter on “Mounting”



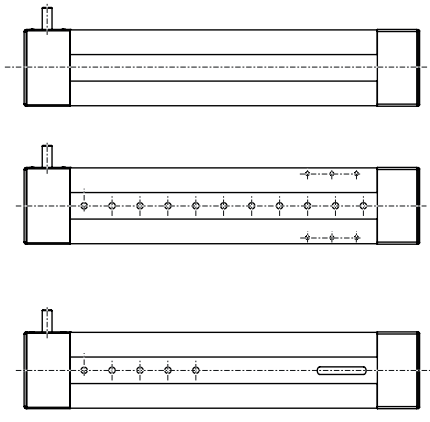


For mounting duct, socket

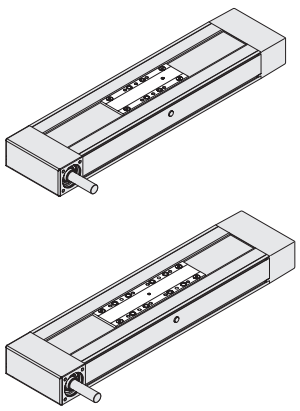


For mounting with clamping fixtures

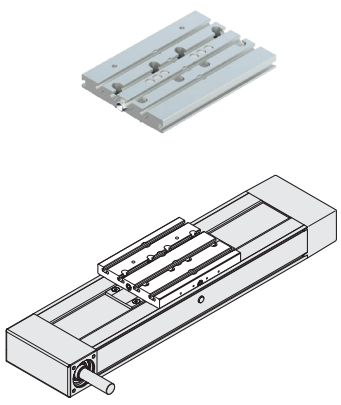
Design/options for guideway (frame), carriages, connection plates; see following pages



Guideway (frame)



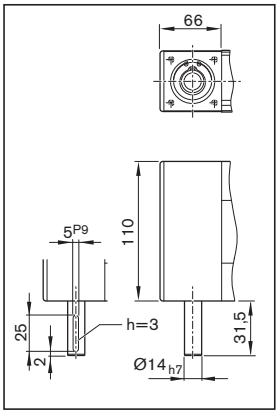
Carriages



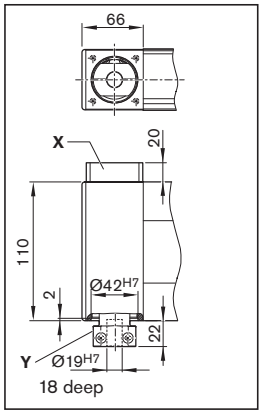
Connection plates

Version

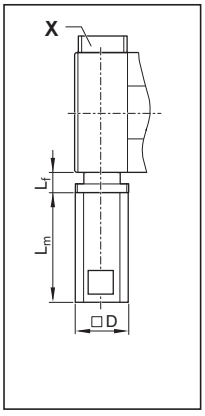
MA01, MA02



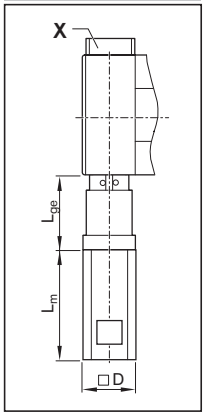
MA05, MA06



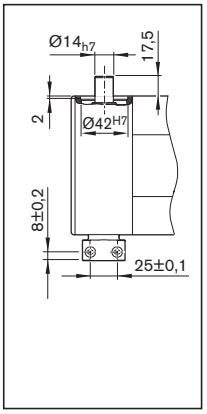
MA10, MA11



MG10, MG11



X / Y



Version	Motor	Dimensions (mm)				
		D	L_f	L_{ge}	L_m without brake	L_m with brake
MA10, MA11	MSK 040C	82	46.0	–	185.5	215.5
MG10, MG11	MSK 030C	54	–	93.5	188.0	213.0
	MSK 040C	82	46.0	–	185.5	215.5
	MSM 031C	60	–	93.5	98.5	135.0

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_{ge} = gear length
L_m = motor length

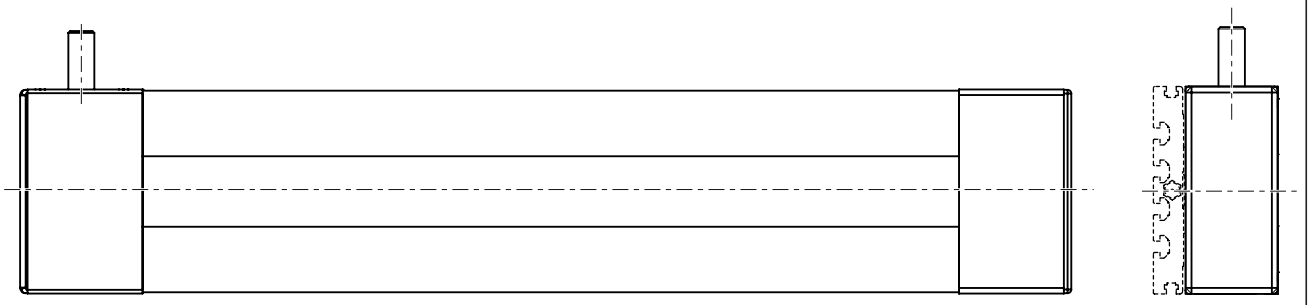
Carriage		Additional length	
Connection plate		Connection plate	
without	with	without	with
L_{ca} (mm)	L_{ca} (mm)	L_{ad} (mm)	L_{ad} (mm)
170	110	25	85
215	155	25	85

See order example for example of how to calculate length.

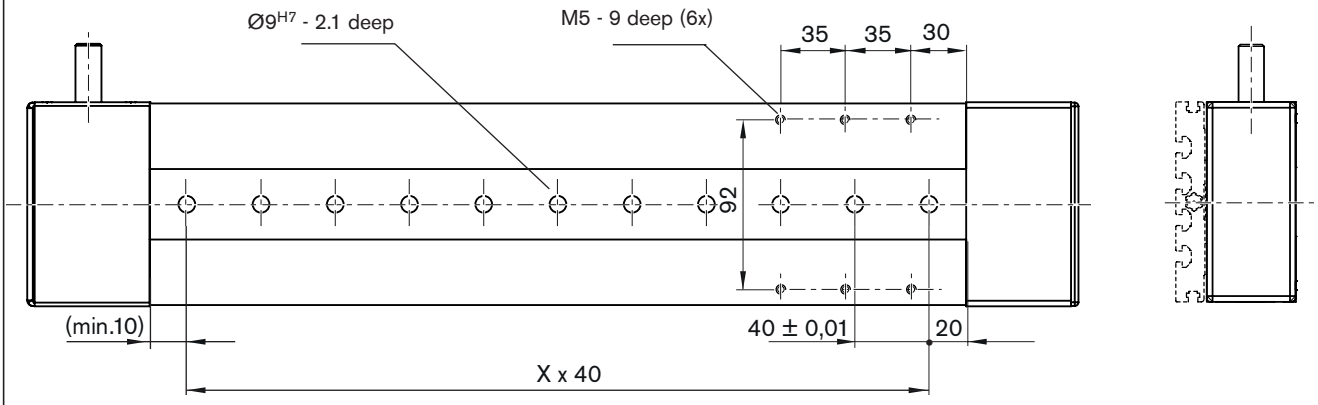
CKR-110 Guideway/carriage options Dimensional drawings

Guideway (frame)

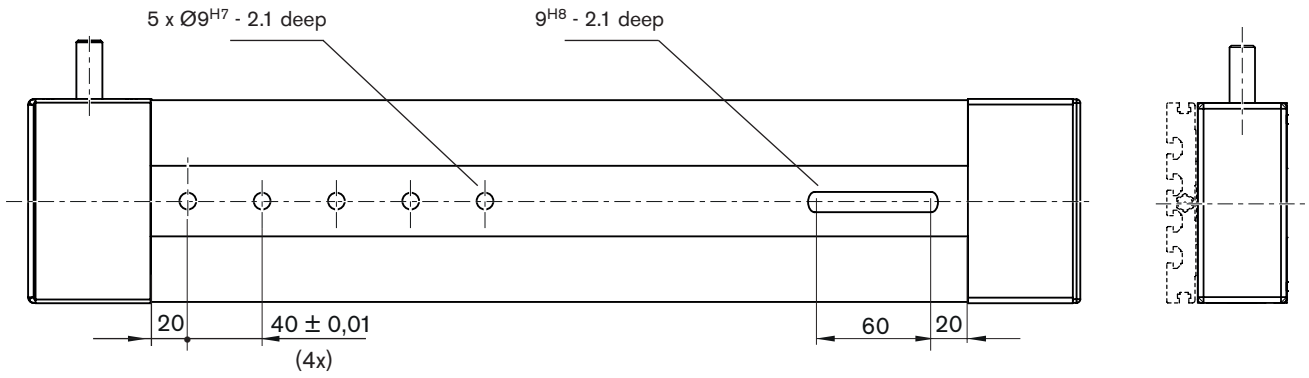
Option 01 / standard



Option 03 / with central holes

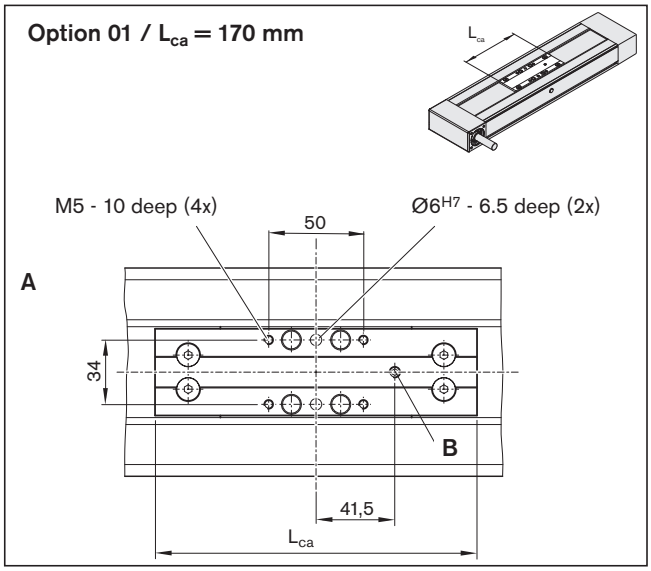


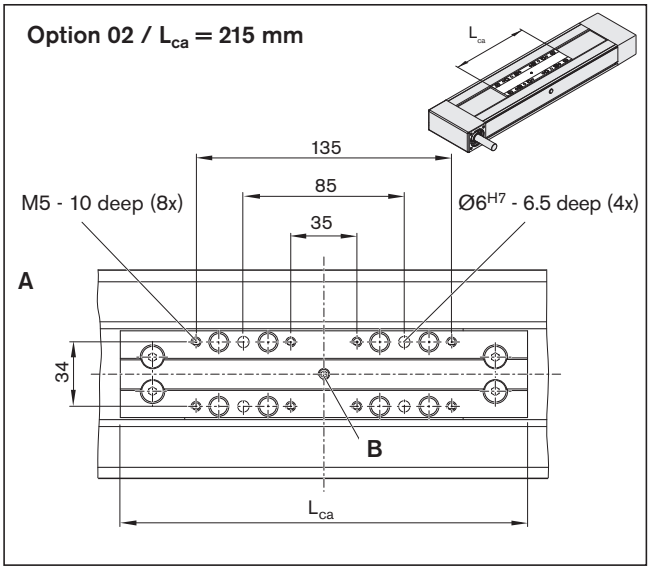
Option 04 / with central holes and long hole



View from below (ground area)

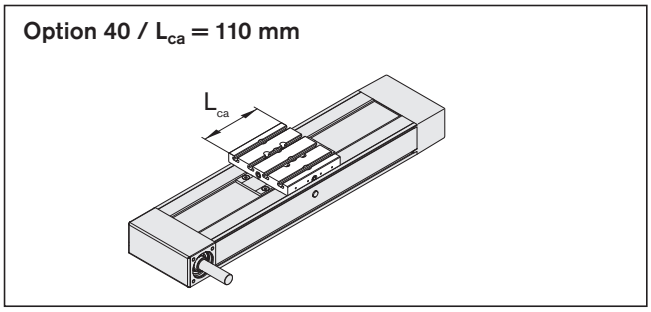
Carriage without connection plate

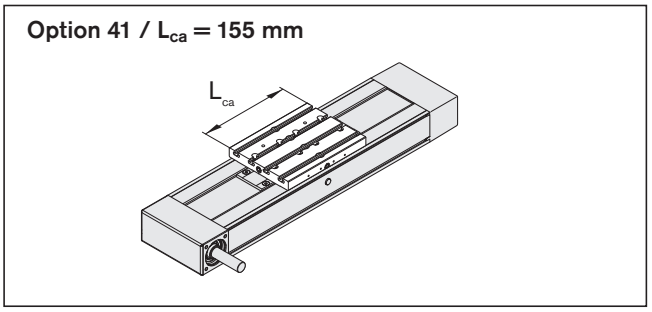




A Drive side
B Lubrication point for grease; sealed with M6 set screw

Carriage with connection plate[1)]

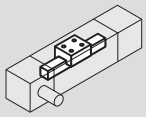
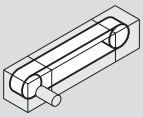
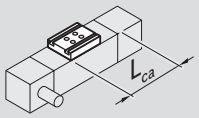
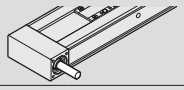
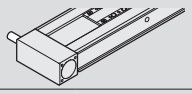
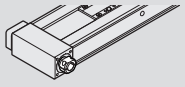
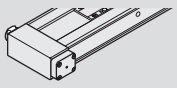
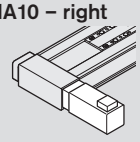
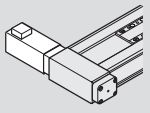
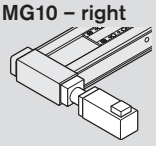
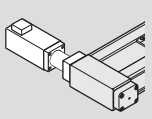




1) For dimensional drawings of the connection plate, see the chapter on “Connection plates”

CKR-145

Configuration and ordering

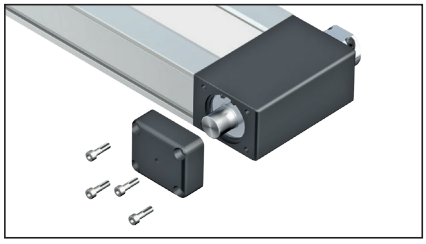
Short designation, length[1] CKR-145-NN-1, ... mm		Guideway			Drive unit			Carriage				
												
		Standard	Center holes [2]		Without keyway	with keyway	For gear unit [3]	without connection plate		with connection plate		
								L_{ca} =		L_{ca} =		
Version					i = 1	i = 1		180 mm	240 mm	125 mm	190 mm	
Drive shaft	MA01 – right 	01	03	04	01	03	–	01	02	40	41	
Drive shaft	MA02 – left 											
Clamping hub	MA05 – right 				06	–						
Clamping hub	MA06 – left 											
Direct attachment	MA10 – right  MA11 – left 	01	03	04	06	–	–	01	02	40	41	
Gear attachment	MG10 – right  MG11 – left 	01	03	04	–	–	08	01	02	40	41	

L_{ca} = carriage length
i = gear ratio

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   selectable up to a length of L ≤ 2000 mm
   Option 04: with center holes and long hole in the ground area of the frame
   Selectable starting from length L ≥ 300 mm up to length L_{max}
3) Mounting kit for gear attachment

Drive end enclosure with additional drive shaft

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



Motor attachment[4]					Motor[5]		Switching system[6]	Documentation[8]
Direct drive	Gear			for motor				
i = 1	i = 3	i = 5	i = 10		without brake	with brake		
00							Without switch Without mounting duct Without socket plug: 00 Magnetic sensor REED sensor: 21 Hall sensor PNP NC contact: 22 Hall sensor PNP NO contact: 23 Mounting duct: 25 Socket plug: 17 Magnetic sensor with plug[7] REED sensor: 58 Hall sensor PNP NC contact: 59	01
01	–			MSK 060C	90	91		02
–	10	11	12	MSK 040C	86	87		
	40	41	42	MSK 050C	88	89		
	30	31	32	MSM 041B	140	141		

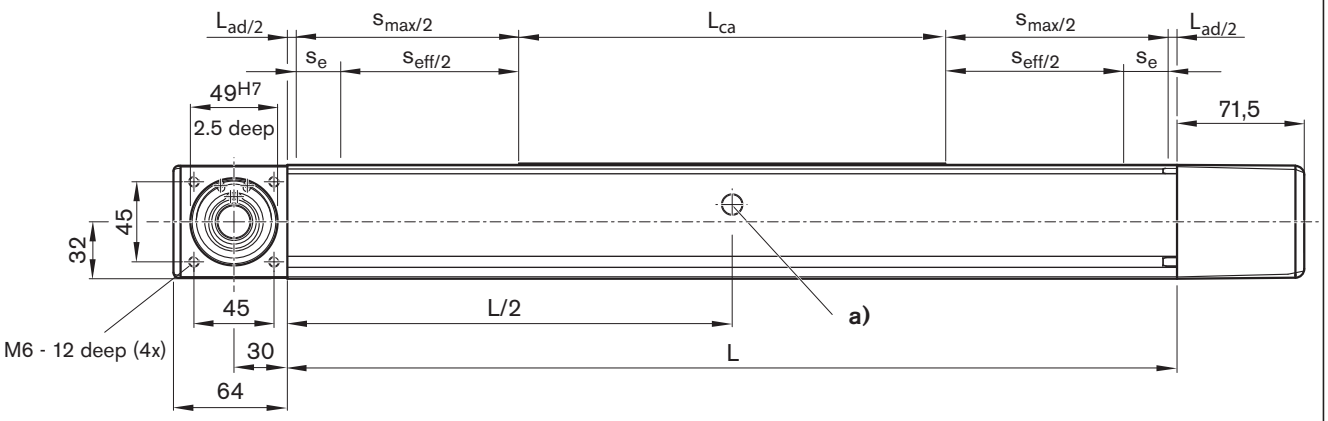
4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Measurement report:
01 = standard report
02 = frictional torque measurement
(also see the “Documentation” chapter)

Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKR-145

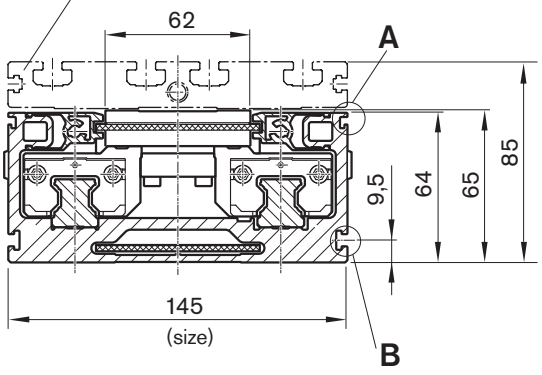
Dimensional drawings

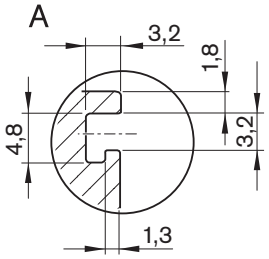
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



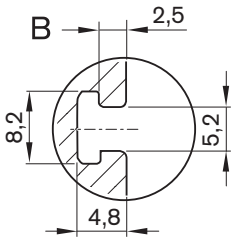
a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-A M6
For further information, see the chapter on lubrication.

For connection plate, see chapter on “Mounting”



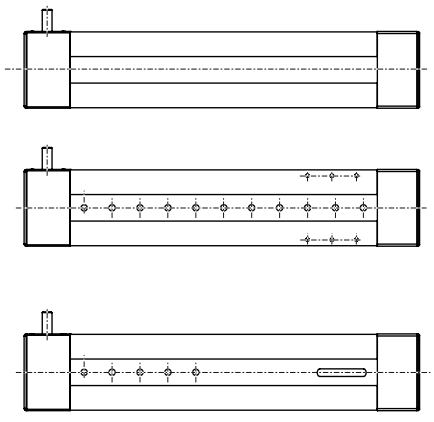


For mounting duct, socket

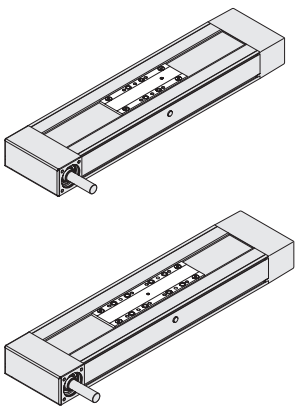


For mounting with clamping fixtures

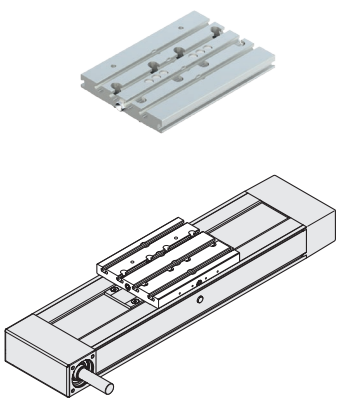
Design/options for guideway (frame), carriages, connection plates; see following pages



Guideway (frame)



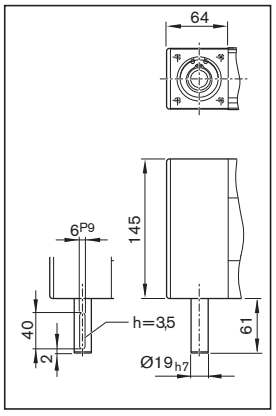
Carriages



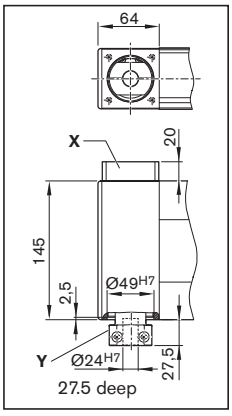
Connection plates

Version

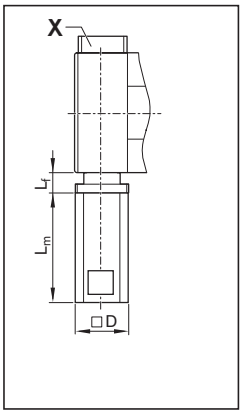
MA01 / MA02



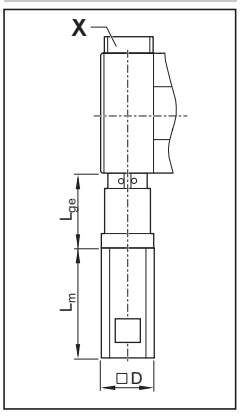
MA05, MA06



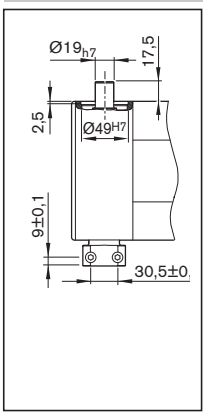
MA10, MA11



MG10, MG11



X / Y



Version	Motor	Dimensions (mm)				
		D	L_f	L_{ge}	L_m without brake	L_m with brake
MA10, MA11	**MSK 060C**	116	52	–	226.0	259.0
MG10, MG11	**MSK 040C**	82	–	127	185.5	215.5
	MSK 050C	98	–	137	203.0	233.0
	MSM 041B	80	–	132	112.0	149.0

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_{ge} = gear length
L_m = motor length

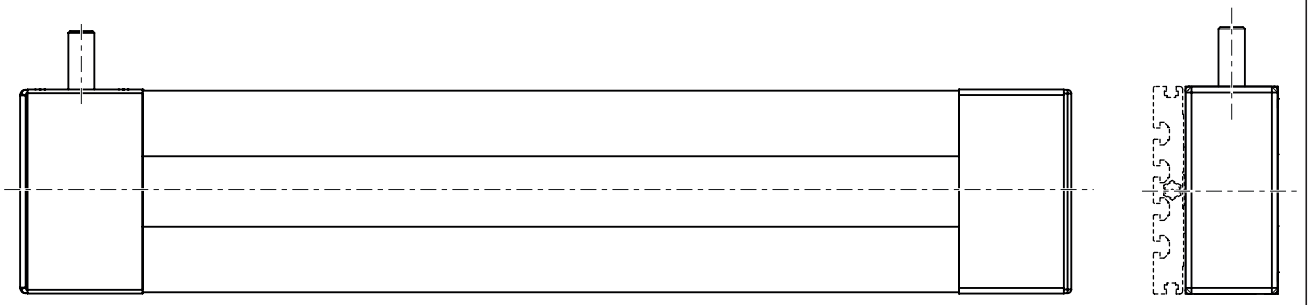
Carriage		Additional length	
Connection plate		Connection plate	
without	with	without	with
L_{ca} (mm)	L_{ca} (mm)	L_{ad} (mm)	L_{ad} (mm)
180	125	25	80
240	190	25	75

See order example for example of how to calculate length.

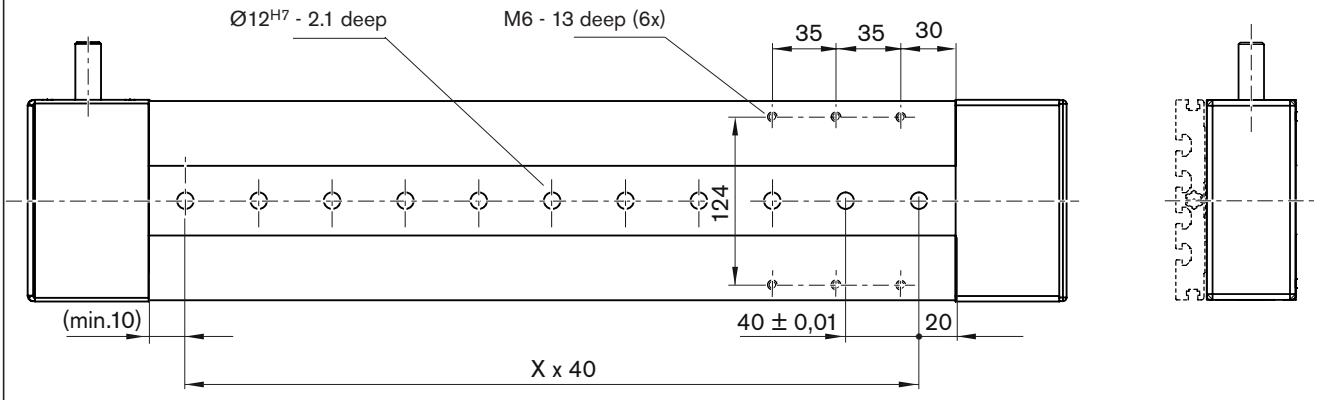
CKR-145 Guideway/carriage options Dimensional drawings

Guideway (frame)

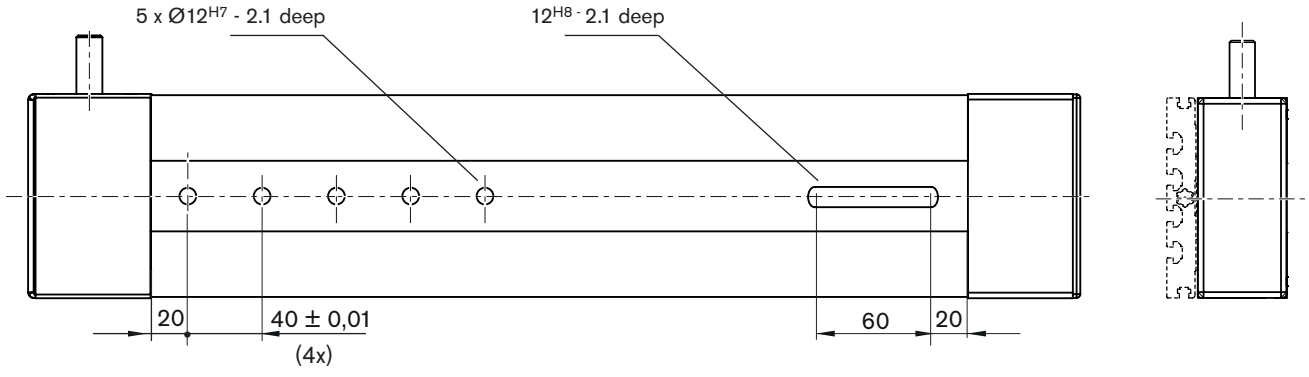
Option 01 / standard



Option 03 / with central holes

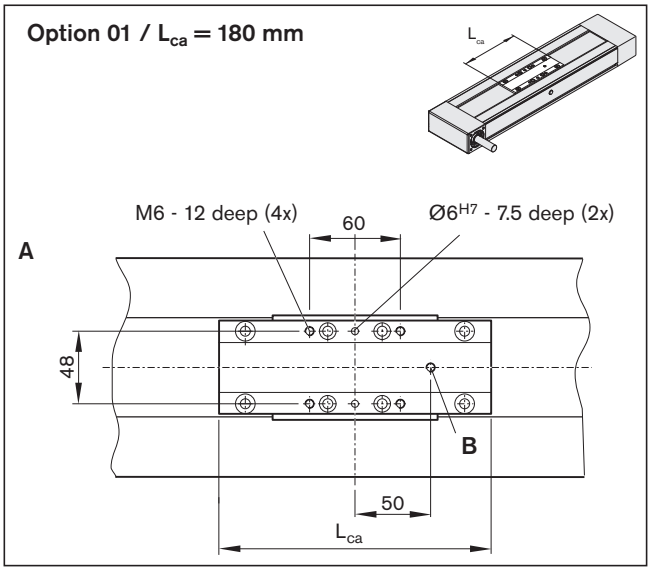


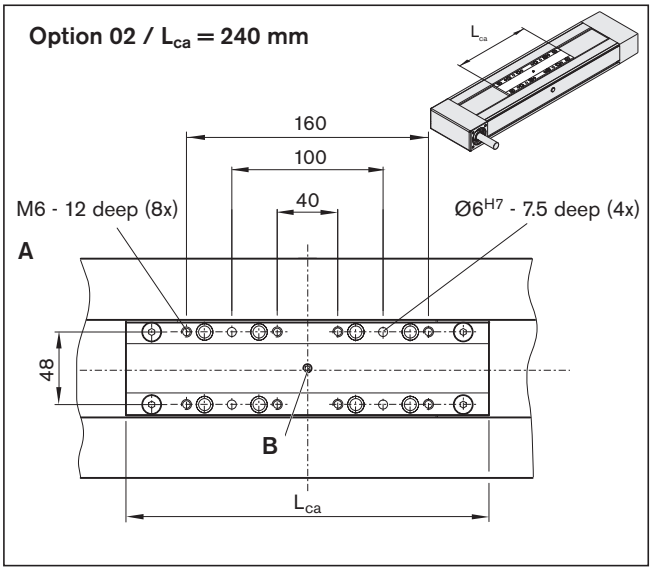
Option 04 / with central holes and long hole



View from below (ground area)

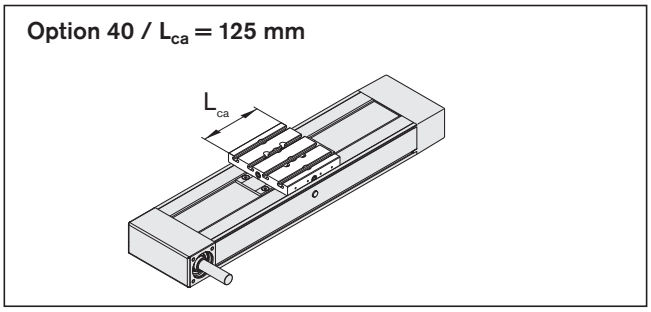
Carriage without connection plate

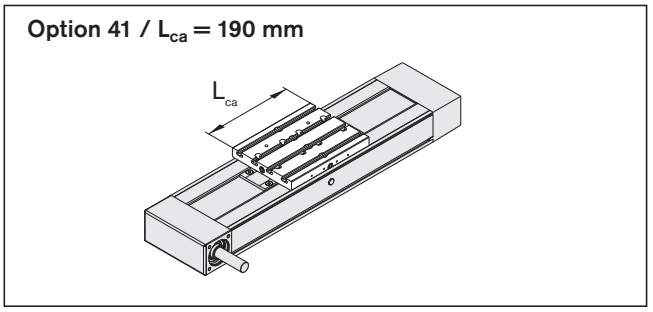




A Drive side
B Lubrication point for grease; sealed with M6 set screw

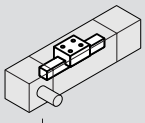
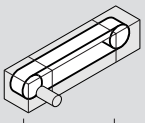
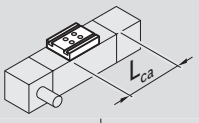
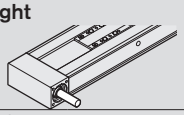
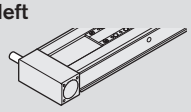
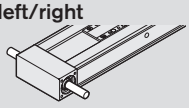
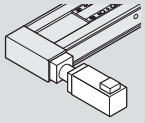
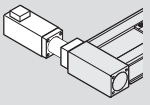
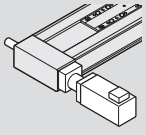
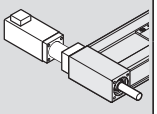
Carriage with connection plate[1)]





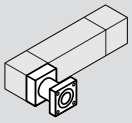
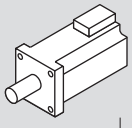
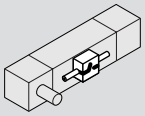
1) For dimensional drawings of the connection plate, see the chapter on “Connection plates”

CKR-200 Configuration and ordering

Short designation, length[1] CKR-200-NN-1, ... mm		Guideway			Drive unit			Carriage				
												
		Standard	Center holes [2]		Without keyway	with keyway	For gear unit [3]	without connection plate L_{ca} =		with connection plate L_{ca} =		
Version					i = 1	i = 1		265 mm	405 mm	190 mm	305 mm	
Drive shaft	MA01 – right 	01	03	04	01	03	–	01	02	40	41	
	MA02 – left 											
	MA03 – left/right 				02	04						
Gear attachment	MG01 – right 	01	03	04	–		PG090 10	01	02	40	41	
	MG02 – left 						PG120 12					
	MG03 – right with two drive shafts 				–		PG090 11					
	MG04 – left with two drive shafts 						PG120 13					

L_{ca} = carriage length
i = gear ratio
PG = planetary gearbox

1) Length calculation of the linear system (see dimensional drawings).
2) Center holes for simple combination with other linear systems and connection elements (see dimensional drawings).
   Option 03: with center holes and mounting threads in the ground area of the frame
   selectable up to a length of L ≤ 2000 mm
   Option 04: with center holes and long hole in the ground area of the frame
   selectable up to a length of L ≤ 5500 mm
3) Mounting kit for gear attachment

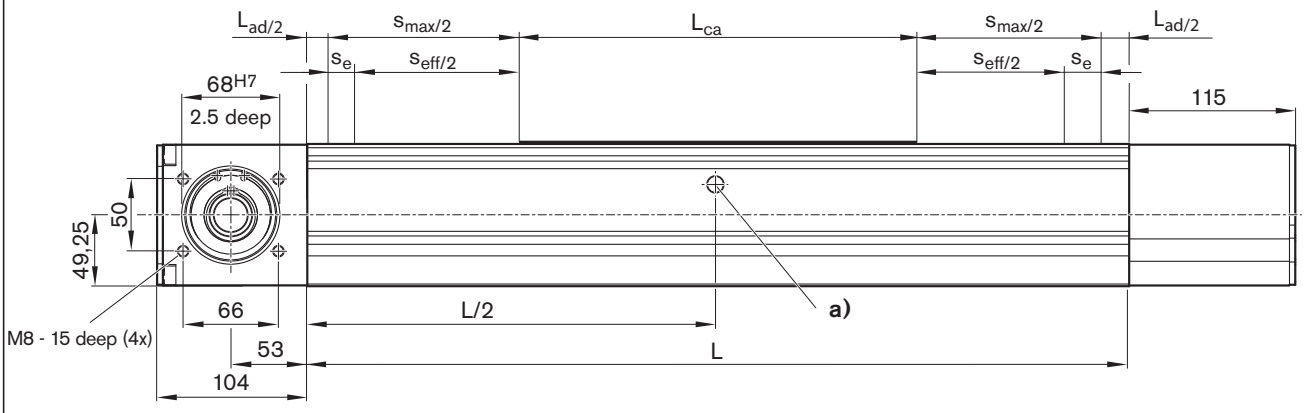
Motor attachment[4]				Motor[5]		Switching system[6]	Documentation[10]
							
Gear			for motor				
i = 3	i = 5	i = 10		without brake	with brake		
00						Without switch Without mounting duct Without socket plug: 00 **Magnetic sensor** REED sensor: 21 Hall sensor – PNP NC contact: 22 Hall sensor – PNP NO contact: 23 Mounting duct: 25 Socket plug: 27	01
40	41	42	MSK 060C	90	91	**Magnetic sensor with plug[7]** REED sensor: 58 Hall sensor PNP NC contact: 59	
20	21	22	MSK 076C	92	93		
30	31	32	MSK 076C	92	93	**Proximity / mechanical switches[8]** Mechanical: 15 Proximity – PNP NC contact: 11 Proximity – PNP NO contact: 13 Cable duct: 20 Switching angle[9] 1: 16 Switching angle[9] 2: 26 Socket plug: 17	02
40	41	42	MSK 060C	90	91		
20	21	22	MSK 076C	92	93		
30	31	32	MSK 076C	92	93		

4) When the servo motor is attached, the delivery is only made in accordance with the shown motor assembly in the “Delivery form” chapter (note the position of the motor plugs).
5) Recommended motor, motor data and type designations
➠ chapter “IndraDyn S servo motors MSK” and “IndraDyn S servo motors MSM”
6) For further information, see ➠ “Switching system” chapter.
7) Assembly contains 1 x sensor, 1 x switch plate including set screws and square nuts as well as 3 x cable holders including set screws
8) Switch configuration with magnetic sensor and mechanical/proximity switch together on one side is not possible.
Assembly contains 1 x sensor, 1 x switch plate including mounting material
9) Switching angle can be attached only in conjunction with connection plate
10) Measurement report:
01 = standard report
02 = frictional torque measurement
(also see the “Documentation” chapter)

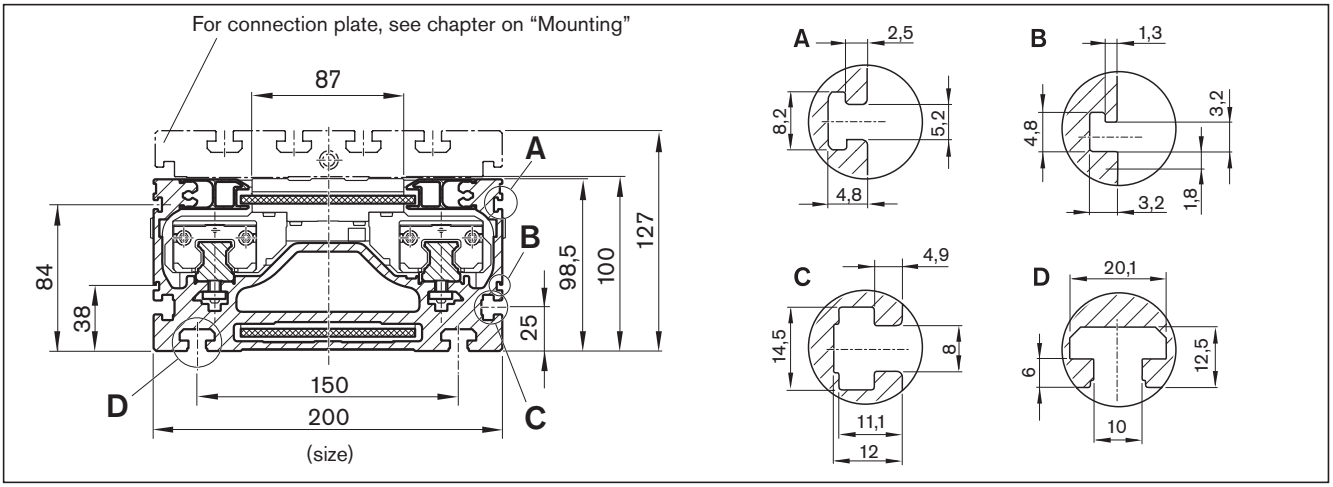
Explanation of the order parameters and order example: see “Inquiry/Order” chapter.

CKR-200 Dimensional drawings

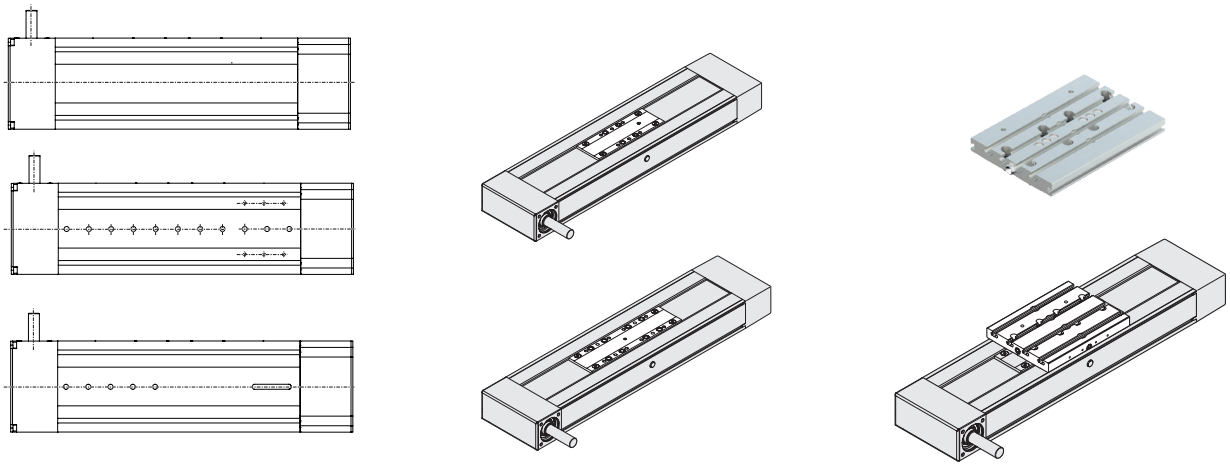
All dimensions in mm. Drawings not to scale.
Straightness and flatness tolerance according to DIN EN 12020-2



a) Lubrication bore on both sides (grease lubrication):
Funnel-type lube nipple DIN 3405-A M8 x 1
For further information, see the chapter on lubrication.



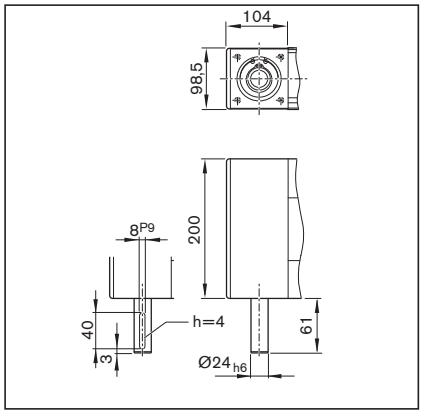
Design/options for guideway (frame), carriages, connection plates; see following pages



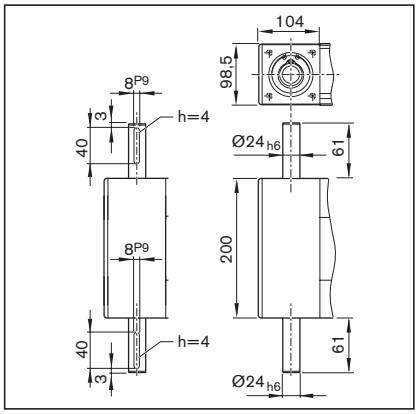
Guideway (frame) Carriages Connection plates

Version

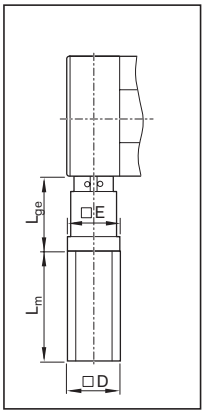
MA01, MA02



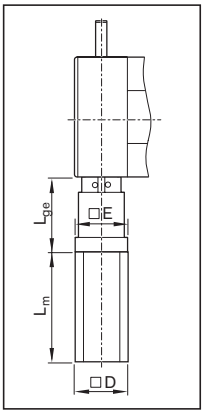
MA03



MG01, MG02



MG03, MG04



Version	Motor	Gear	Dimensions (mm)				
			D	E	L_{ge}	L_m without brake	L_m with brake
MG01/MG02 MG03/MG04	MSK 060C	PG090	116	120	157	226.0	259.0
	MSK 076C	PG120	140	140	215	292.5	292.5
		PG090	140	140	157	292.5	292.5

Refer to the chapter on “Motors” for more information and dimensions.

Length calculation of the linear system

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

Effective stroke

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

s_e = excess travel
s_{max} = maximum travel
s_{eff} = effective stroke
L = length
L_{ca} = carriage length
L_{ad} = additional length
L_{ge} = gear length
L_m = motor length

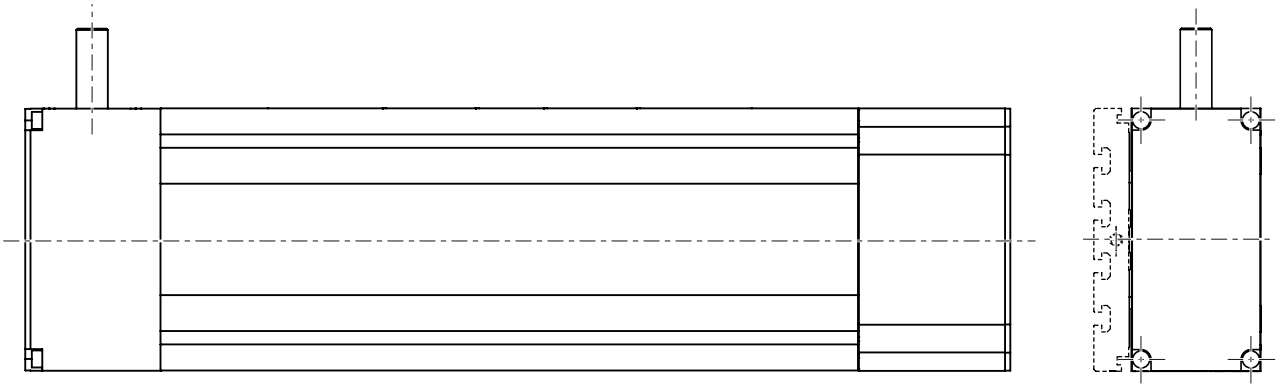
Carriage		Additional length	
Connection plate		Connection plate	
without	with	without	with
L_{ca} (mm)	L_{ca} (mm)	L_{ad} (mm)	L_{ad} (mm)
265	190	25	100
405	305	25	125

See order example for example of how to calculate length.

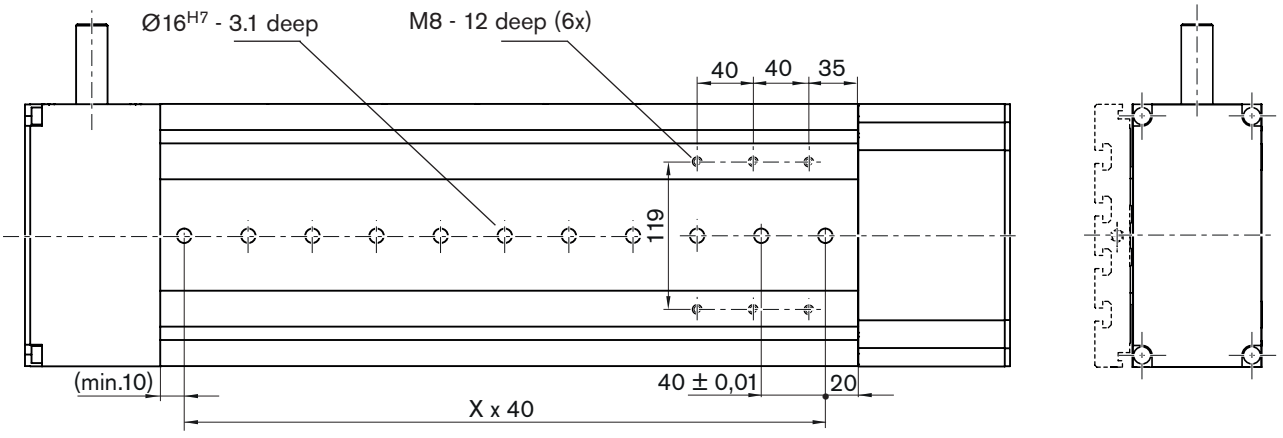
CKR-200 Guideway/carriage options Dimensional drawings

Guideway (frame)

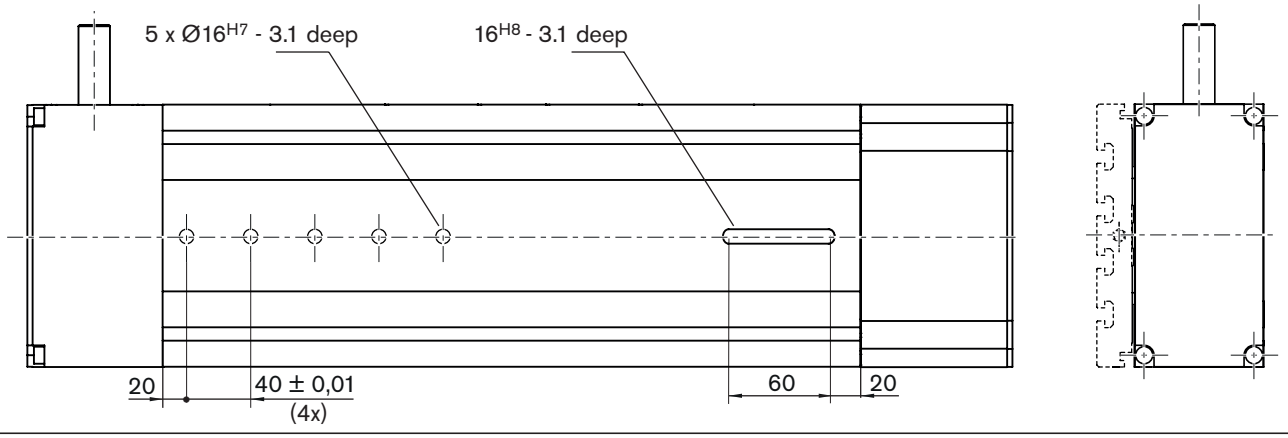
Option 01 / standard



Option 03 / with central holes



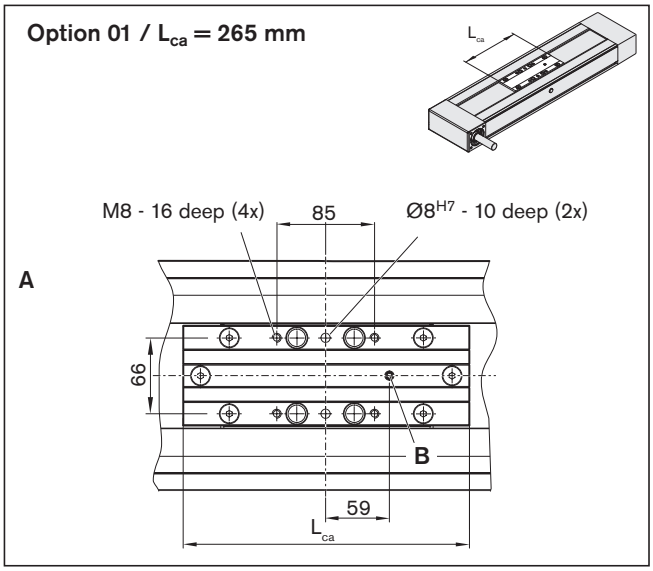
Option 04 / with central holes and long hole



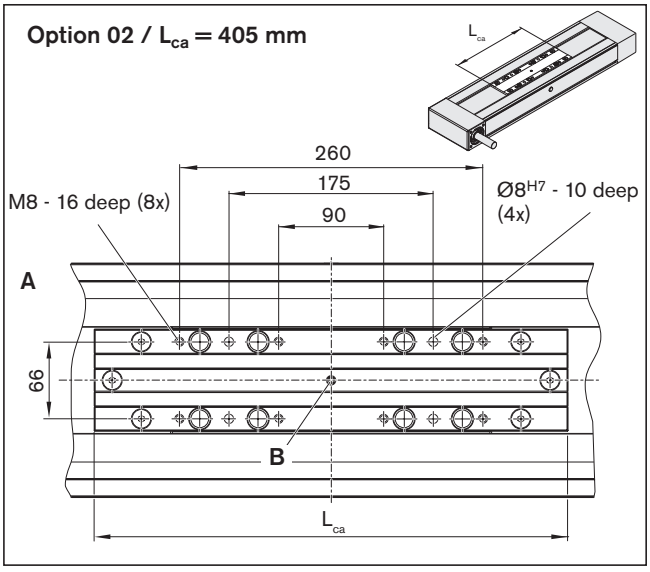
View from below (ground area)

Carriage without connection plate

Option 01 / L_{ca} = 265 mm



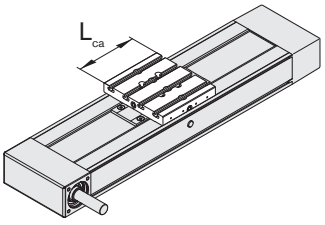
Option 02 / L_{ca} = 405 mm



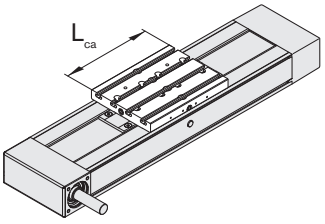
A Drive side
B Lubrication point for grease; sealed with M8 set screw

Carriage with connection plate[1)]

Option 40 / L_{ca} = 190 mm



Option 41 / L_{ca} = 305 mm



1) For dimensional drawings of the connection plate, see the chapter on “Connection plates”

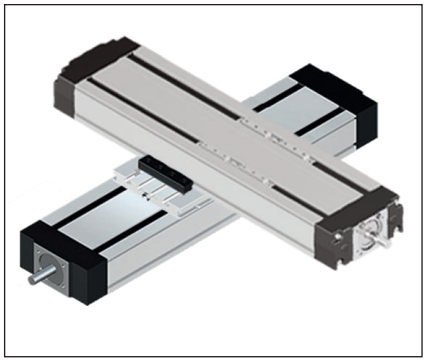
Fit Compact Modules together perfectly – fast and flexible

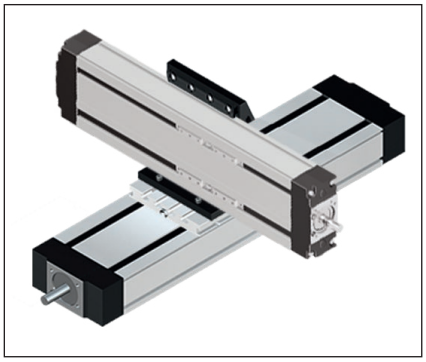
Minimal mounting times, maximum efficiency

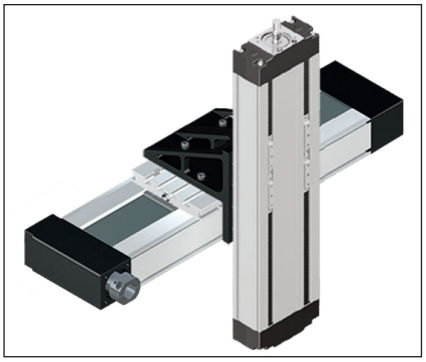
Standardized interfaces significantly reduce the effort during installation.
The mechanical systems have interlocking interfaces throughout.
Without complicated aligning, they are quickly and exactly fitted together.

The result:

The user can respond flexibly to the various tasks and applications of the handling.

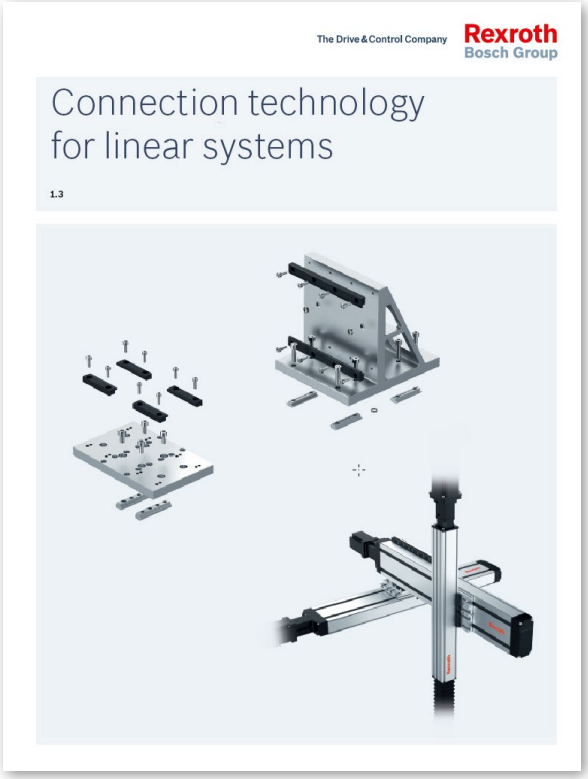






Supplementary information for connection technology

see the catalog “Connection technology for linear systems”



General notes

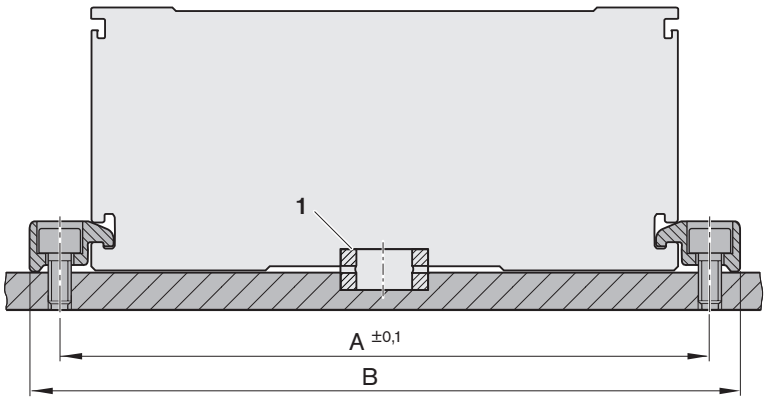
Compact Modules are mounted using clamping fixtures.

⚠ **Do not secure or support the Compact Module at the end enclosures! The frame is the load-bearing part! When mounting Compact Modules, please note the maximum tightening torques listed in the table.**

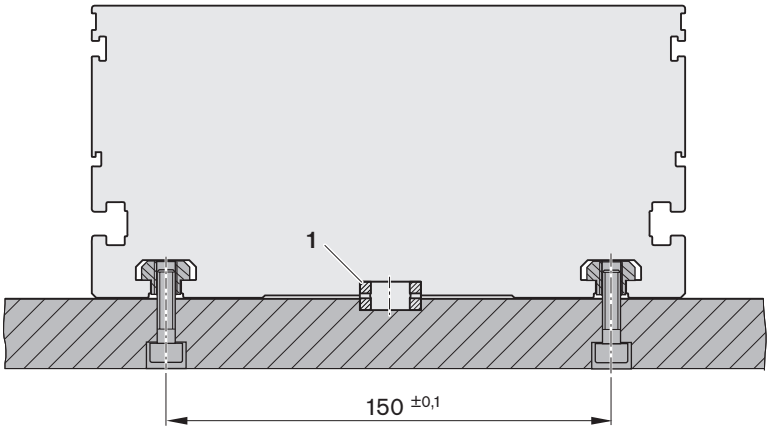
Size	A (mm)	B (mm)
070	82	95
090	102	112
110	126	140
145	161	175
200	222	240

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

Mounting with clamping fixtures



Alternative mounting with sliding blocks (size 200)



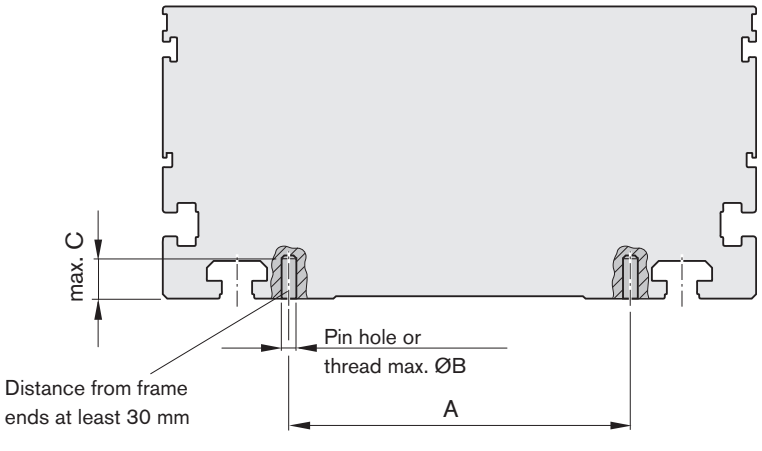
Mounting by means of special modification in the base surface of the frame is possible.

Size	A (mm)	B (mm)	C[1)] (mm)
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

1) Pin-hole and thread depth

⚠ **Guideway option 03 already includes tapped holes in the ground area of the frame (see dimensional drawings).**

Special modification in the base surface of the frame
(not available from factory)



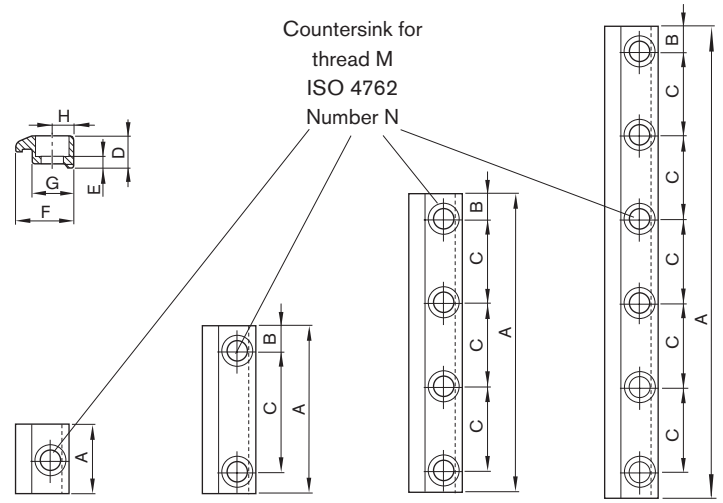
Mounting accessories

Clamping fixtures

Recommended number of clamping fixtures:
- Type 1: 6/3[1)] 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

Clamping fixtures



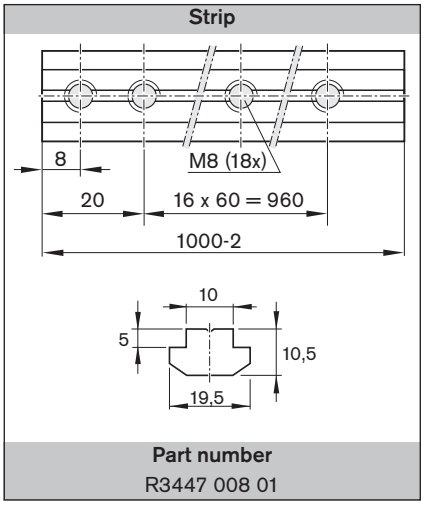
Size	For thread	Type	Number of holes N	Dimensions (mm)								Part number
				A	B	C	D	E	F	G	H	
070	M5	1	1	22	–	–	10.0	4.8	15.0	12.2	6.5	R1419 010 01
		2	2	57	8.5	40	10.0	4.8	15.1	12.2	6.5	R1419 010 43
090	M4	1	1	25	–	–	9.0	4.6	14.5	10.5	5.0	R0375 310 00
		3	4	87	6.0	25						R0375 310 02
		3	4	107	8.5	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 and 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

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

Sliding blocks and springs

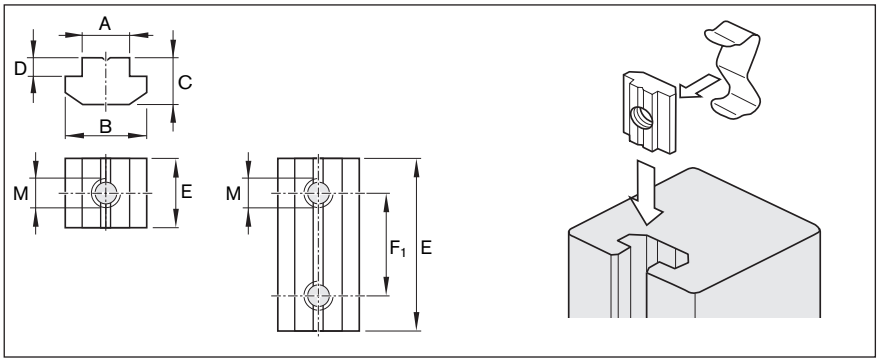
For fastening attachments on the connection plate.
The spring serves as a mounting and positioning aid.

Recommended number at the sliding blocks: with one thread, six pieces per meter and side



Tightening torques of fastening screws
with friction factor 0.125
strength class 8.8

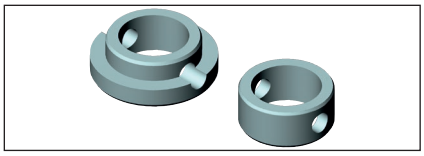
8.8	M4	M5	M6	M8
Nm	2.7	5.5	9.5	23

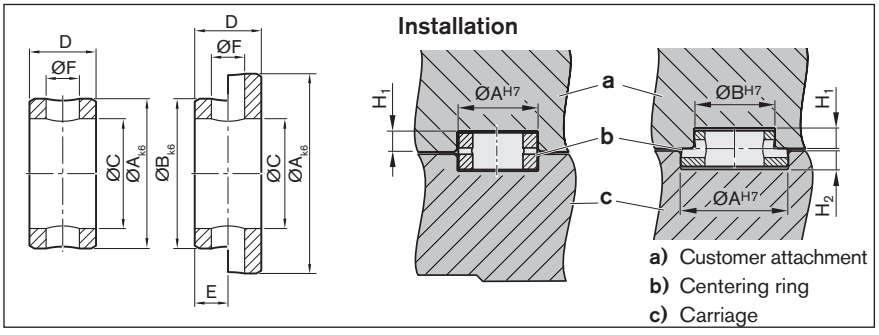


Size	For thread	Dimensions (mm) A	B	C	D	E	F_1	Part number of sliding block	Part number of spring
070	M4	4	7.8	3.9	0.4	10	–	R0375 210 20	–
	M4					19	10	R0375 210 21	–
090 and 110	M4	6	11.5	4	1	12	–	R3447 014 01	R3412 010 02
	M5					45	30	R0391 710 09	–
	M5					12	–	R3447 015 01	R3412 010 02
145	M4	8	16.0	6	2	16	–	R3447 017 01	R3412 011 02
	M5					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
200	M4	10	19.5	10.5	5	20	–	R3447 012 01	R3412 009 02
	M5					20	–	R3447 011 01	R3412 009 02
	M6					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 attachments to the frame.
It creates a positive-locking connection with good reproducibility.
Material: Steel





Ø Size (mm)	Dimensions (mm) A	B	C ±0.1	D −0.2	E +0.2	ØF	H_1 +0.2	H_2 +0.2	Part number
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

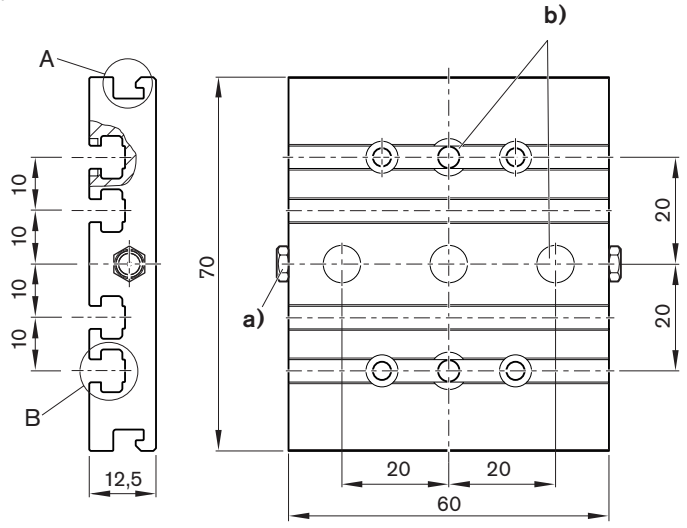
CKK-070

Function:
- Fastening of attachments (with sliding blocks)
- Lubrication possible from two sides (designed for one-point lubrication through only one of the two sides)

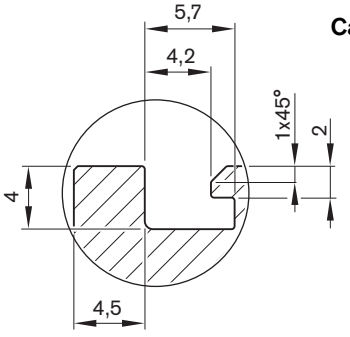
Assembly consists of:
- Connection plate
- Mounting accessories for fastening to the carriages.

Sliding blocks are not included with delivery.

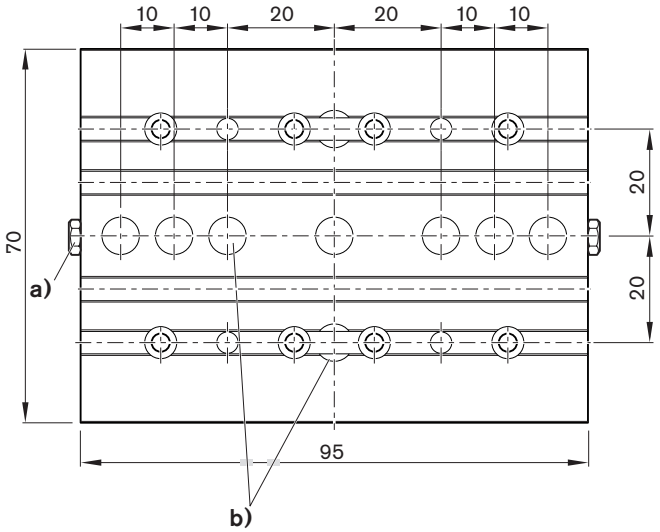
Carriage L_{ca} = 60 mm



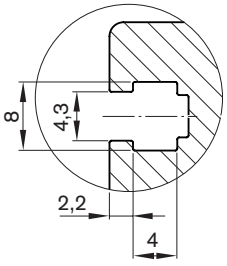
Detail A
Size 70



Carriage L_{ca} = 95 mm



Detail B



a) Funnel-type lube nipple DIN 3405-D4
b) Ø 7^{H7}, $1.6^{+0.2}$ deep

Size	Length of carriage L_{ca} (mm)	Part number Module	Weight (kg)
070	60	R0375 200 15	0.11
	95	R0375 200 10	0.17

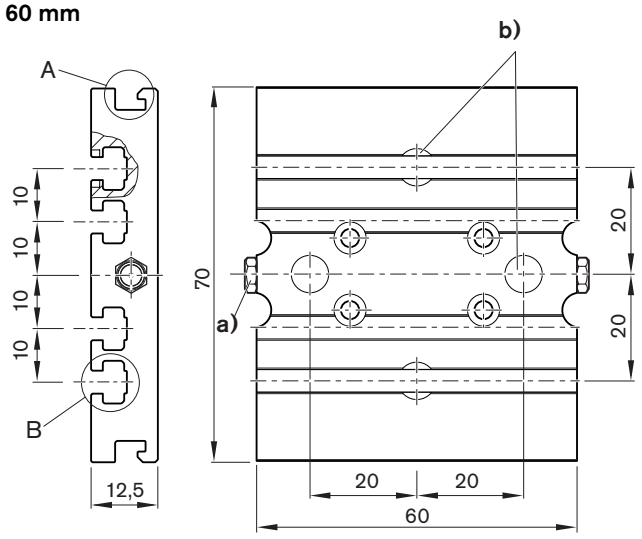
CKR-070

Function:
- Fastening of attachments (with sliding blocks)
- Lubrication possible from two sides (designed for one-point lubrication through only one of the two sides)

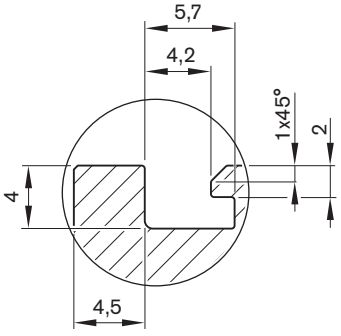
Assembly consists of:
- Connection plate
- Mounting accessories for fastening to the carriages.

Sliding blocks are not included with delivery.

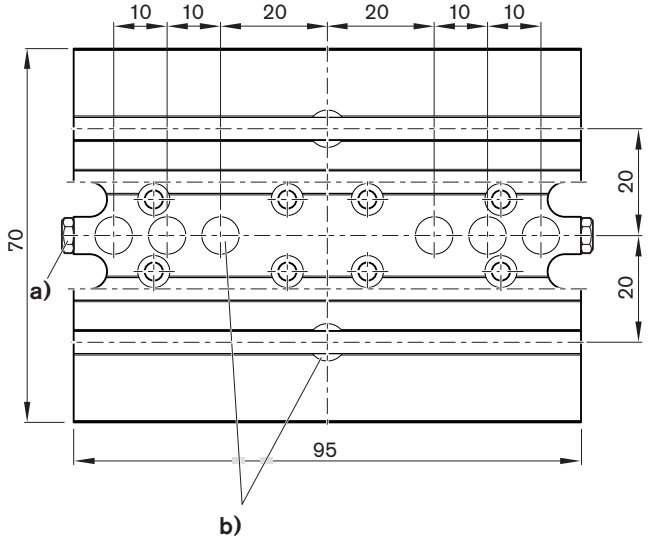
Carriage L_{ca} = 60 mm



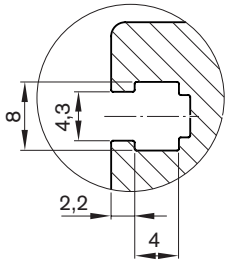
Detail A
Size 70



Carriage L_{ca} = 95 mm



Detail B



a) Funnel-type lube nipple DIN 3405-D4
b) Ø 7^{H7}, $1.6^{+0.2}$ deep

Size	Length of carriage L_{ca} (mm)	Part number Module	Weight (kg)
070	60	R0375 200 16	0.11
	95	R0375 200 11	0.17

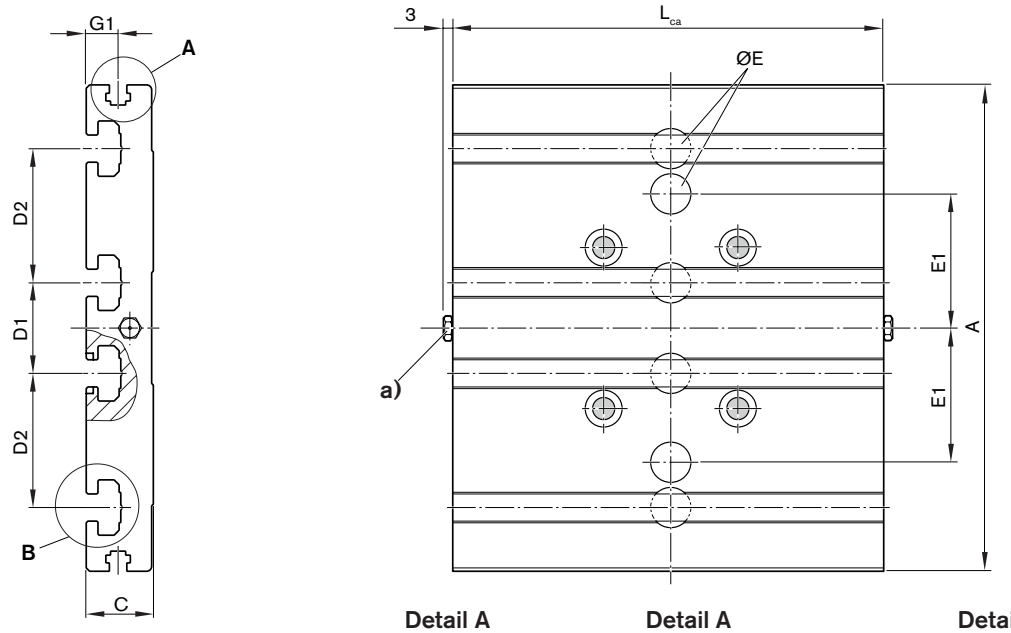
Connection plates

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

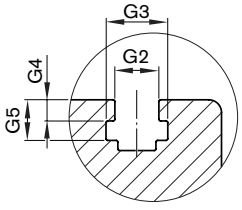
Function:
- Fastening of attachments (with sliding blocks)
- Lubrication possible from two sides (designed for one-point lubrication through only one of the two sides)

Assembly consists of:
- Connection plate
- Mounting accessories for fastening to the carriages.

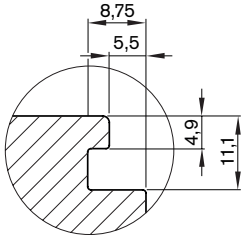
Sliding blocks are not included with delivery.



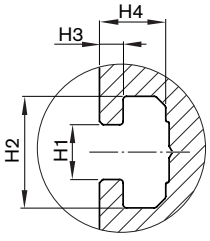
Detail A
Size 090, 110 and 145



Detail A
Size 200



Detail B



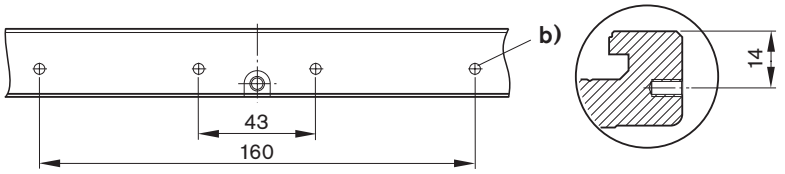
a) Funnel-type lube nipple AM8 x 1

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

Size	Dimensions (mm)																
	L_{ca}		A	C	D1	D2	ØE^{H7}	E1	G1	G2	G3	G4	G5	H1	H2	H3	H4
	CKK	CKR						±0.01									
090	60	60	90	16	20	20	9 - 2.1 deep	–	7.9	4.2	7.6	2.0	4.3	6	12.0	3.5	7.7
110	60	100	110	16	20	20	9 - 2.1 deep	–	6.0	5.2	9.5	2.5	4.8	6	12.0	3.5	7.7
145	80	125	145	20	27	40	12 - 2.1 deep	40	10.0	5.2	9.5	2.5	4.8	8	16.5	3.5	9.8
200	190	190	200	27	40	40	16 - 3.1 deep	–	–	–	–	–	–	10	20.1	6.0	12.5

Size		Part number for assembly	Weight (kg)
090	**CKK**	R0375 300 15	0.18
	CKR	R0375 300 16	
110	**CKK**	R0375 400 15	0.23
	CKR	R0375 400 16	0.38
145	**CKK**	R0375 500 15	0.50
	CKR	R0375 500 16	0.81
200	**CKK**	R0375 600 15	2.20
	CKR	R0375 600 16	

Connection dimensions for switching cam (size 200)



b) M4 - 6 deep

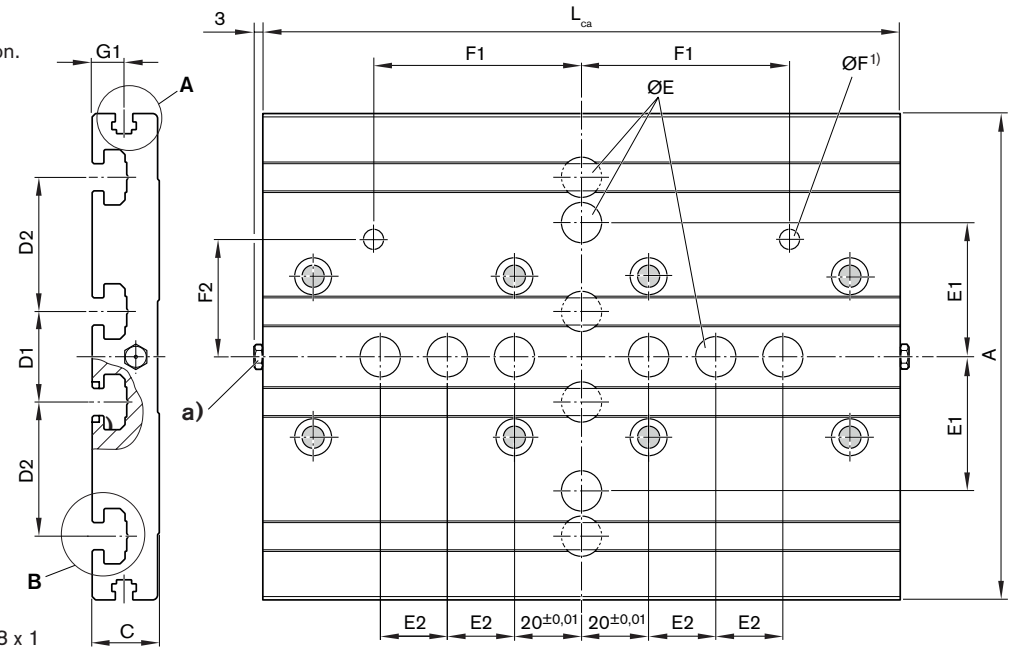
for CKK and CKR -090, -110, -145, -200

Function:
- Fastening of attachments (with sliding blocks)
- Lubrication possible from two sides (designed for one-point lubrication through only one of the two sides)

Assembly consists of:
- Connection plate
- Mounting accessories for fastening to the carriages.

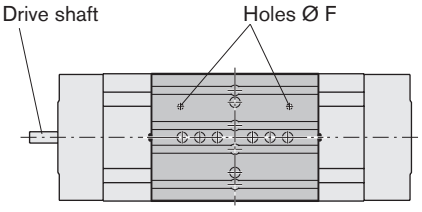
Sliding blocks are not included with delivery.

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

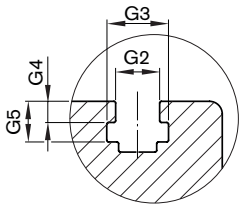


a) Funnel-type lube nipple AM8 x 1
1) for customer attachment

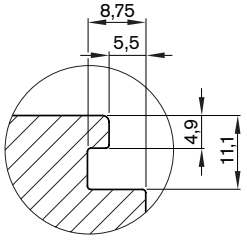
Mounting direction



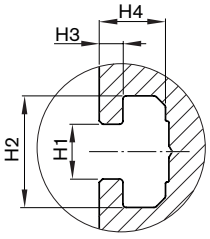
Detail A
Size 090, 110 and 145



Detail A
Size 200



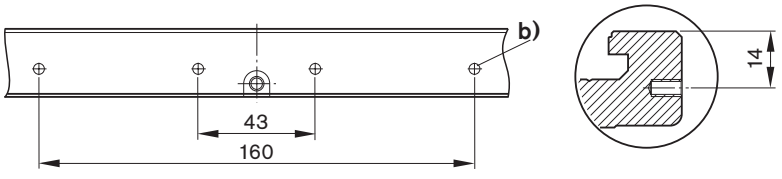
Detail B



Size	Dimensions (mm)																			
	L_{ca}	A	C	D1	D2	Ø E^{H7}	E1 ±0.01	E2 ±0.01	Ø F^{H7}	F1 ±0.01	F2 ±0.01	G1	G2	G3	G4	G5	H1	H2	H3	H4
090	125	90	16	20	20	9 - 2.1 deep	–	10	4 - 6 deep	38.0	20	7.6	4.2	7.3	2.0	4.3	6	12.0	3.5	7.7
110	155	110	16	20	20	9 - 2.1 deep	–	10	5 - 6.5 deep	46.0	42	9.5	5.2	7.3	2.5	4.8	6	12.0	3.5	7.7
145	190	145	20	27	40	12 - 2.1 deep	40	20	6 - 12 deep	62.0	35	9.5	5.2	7.3	2.5	4.8	8	16.5	3.5	9.8
200	305	200	27	40	40	16 - 3.1 deep	–	20	8 - 16 deep	59.5	41	–	–	–	–	–	10	20.1	6.0	12.5

Size		Part number for assembly	Weight (kg)
090	**CKK**	R0375 300 10	0.37
	CKR	R0375 300 11	
110	**CKK**	R0375 400 10	0.59
	CKR	R0375 400 11	0.58
145	**CKK**	R0375 500 10	1.20
	CKR	R0375 500 11	1.15
200	**CKK**	R0375 600 10	3.60
	CKR	R0375 600 11	

Connection dimensions for switching cam (size 200)



b) M4 - 6 deep

Connecting shafts

for CKR-070

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

Material
Coupling hub:
high-strength aluminum
Elastomer circle:
precision manufactured, extremely wear resistant, and thermally stable plastic
Connecting tube:
high-precision aluminum tube

Order
Please state the part number and length L_{cs} .
For example: R0391 510 22, L_{cs} = 550 mm

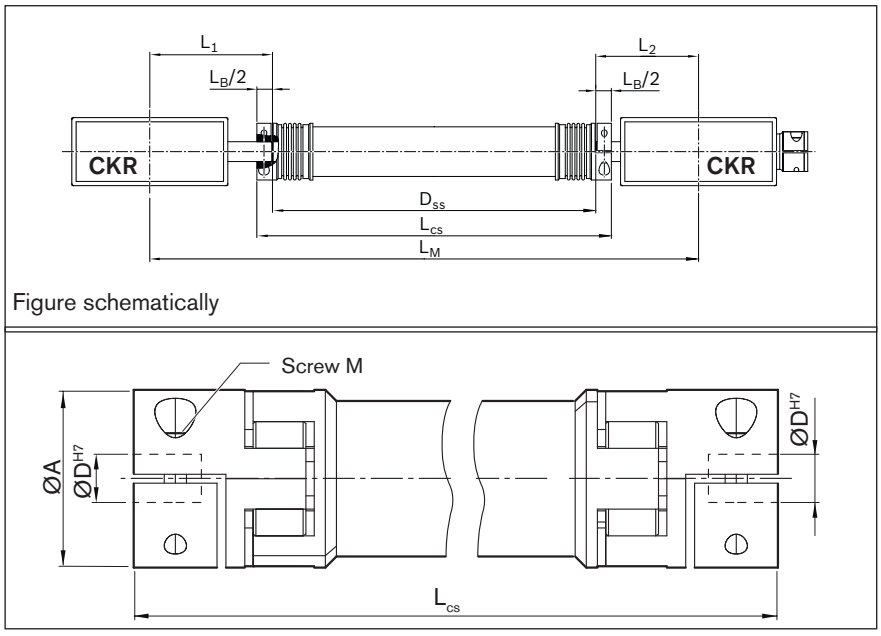


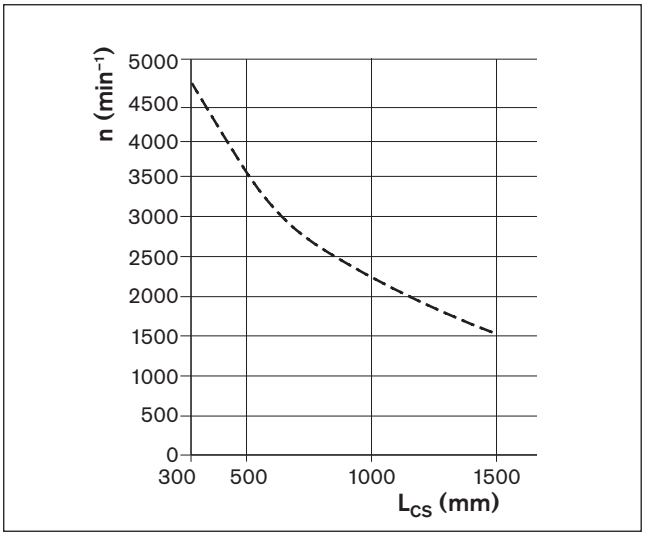
Figure schematically

Size	Part number	Dimensions (mm)						M_A (Nm)
		A	D	M	L_B	$L_{cs\ min}$	$L_{cs\ max}$	
070	R0391 510 22	30	8	M4	23	95	1500	4

Size	M_S (Nm)	M_{cs} (Nm)	Mass moment of inertia (10^{-6} kgm²)	Weight (kg)
070	25	12.5	$0.089 \cdot (L_{cs}\ (mm) - 72) + 29.8$	$0.00054 \cdot (L_{cs}\ (mm) - 72) + 0.12$

D_{SS} = Distance drive shafts
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

Bending-critical speed:



$L_{cs} = D_{SS} + L_B$
$D_{SS} = L_M - L_1 - L_2$
L_1/L_2: Calculation see dimension drawings;

n = speed (min^{-1})
L_{cs} = overall length of the connecting shaft (mm)

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

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

Material

Bellows: highly flexible stainless steel
Connecting tube and clamping hub: aluminum

Order

Please state the part number and length L_{cs}.
For example: R0391 510 20, L_{cs} = 550 mm

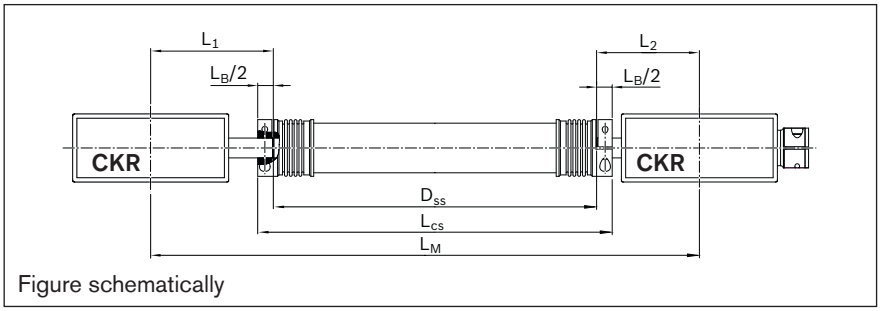
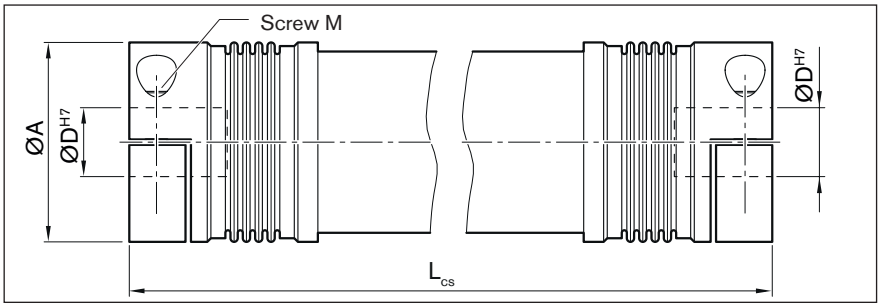


Figure schematically

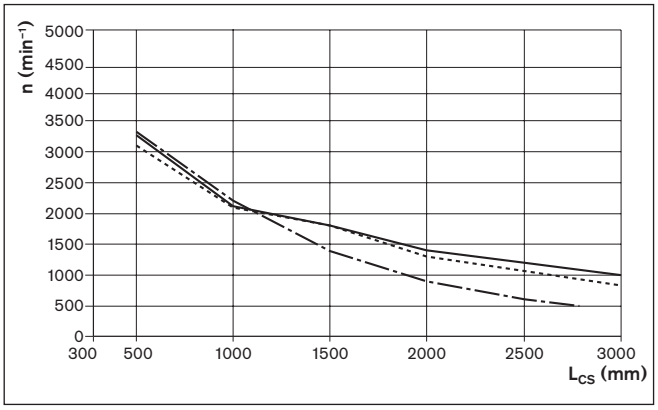


Size	Part number	Dimensions (mm)						M_A (Nm)
		A	D	M	L_B	$L_{cs\ min}$	$L_{cs\ max}$	
090	R0391 510 16	40	10	M4	24	105	3000	5
110	R0391 510 20	40	14	M4	24	105	3000	5
145	R0391 510 18	55	19	M6	32	150	3000	15
200	R0391 510 19	83	24	M10	48	200	3000	70

Size	M_S (Nm)	M_{cs} (Nm)	Mass moment of inertia (10^{-6} kgm²)	Weight (kg)
090	35	35	0.033 · (L_{cs} (mm) - 80) + 50	0.0054 · (L_{cs} (mm) - 80) + 0.22
110	35	35	0.033 · (L_{cs} (mm) - 80) + 50	0.0054 · (L_{cs} (mm) - 80) + 0.22
145	65	65	0.67 · (L_{cs} (mm) - 118) + 246	0.67 · (L_{cs} (mm) - 1180) + 0.62
200	170	170	4.4 · (L_{cs} (mm) - 160) + 1800	0.0032 · (L_{cs} (mm) – 160) + 1.9

D_{SS} = Distance drive shafts
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

Bending-critical speed:



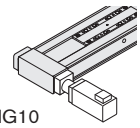
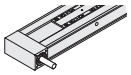
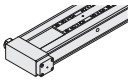
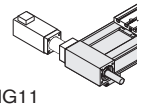
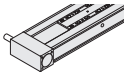
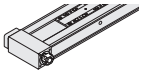
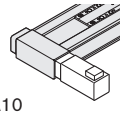
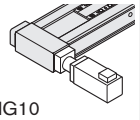
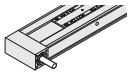
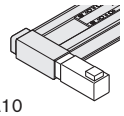
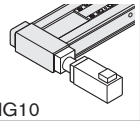
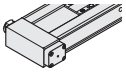
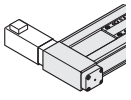
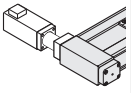
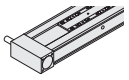
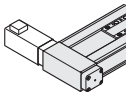
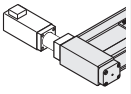
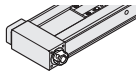
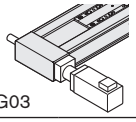
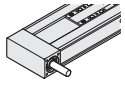
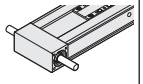
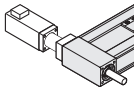
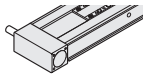
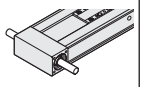
$L_{cs} = D_{SS} + L_B$
$D_{SS} = L_M - L_1 - L_2$
L_1/L_2: Calculation see dimension drawings;

CKR-090
CKR-110/145
CKR-200

n = speed (min-1)
L_{cs} = overall length of the connecting shaft (mm)

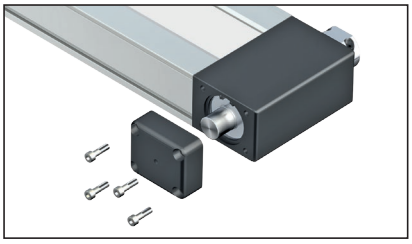
Connecting shafts

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	 MA03	
	 MG04	⟺	 MA02	 MA03	

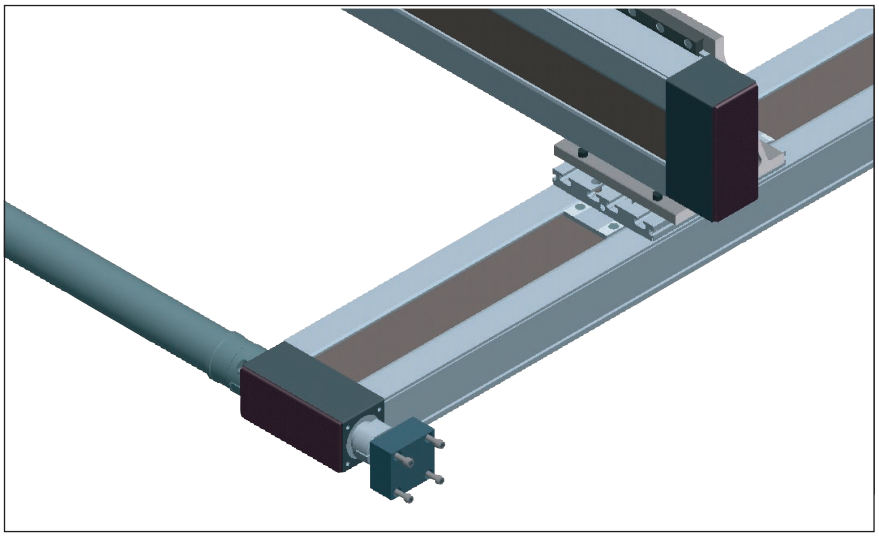
Drive end enclosure with additional drive shaft

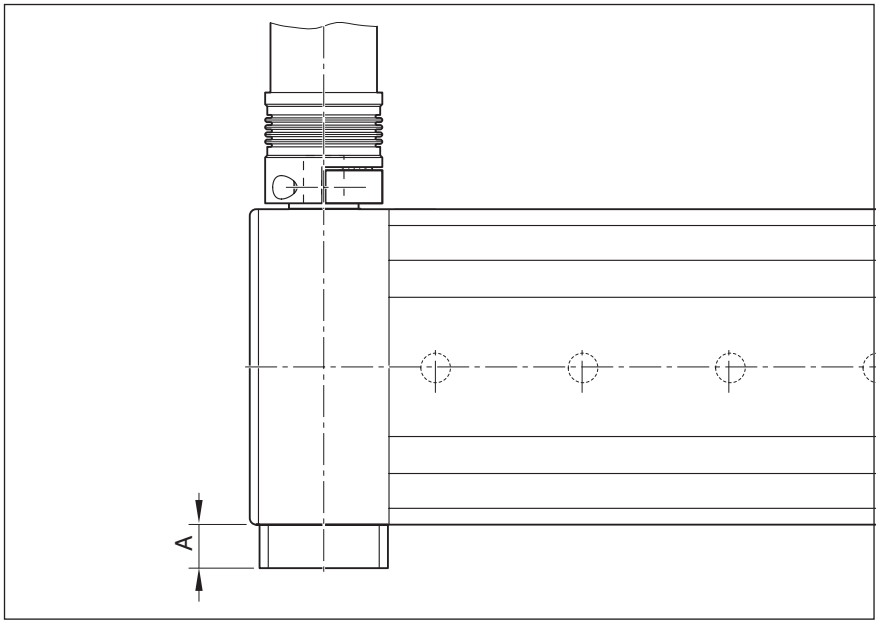
In types MA05, MA06, MA10, MA11, MG10, and MG11 a second drive shaft end can be made available by removing the screws and cover.



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.

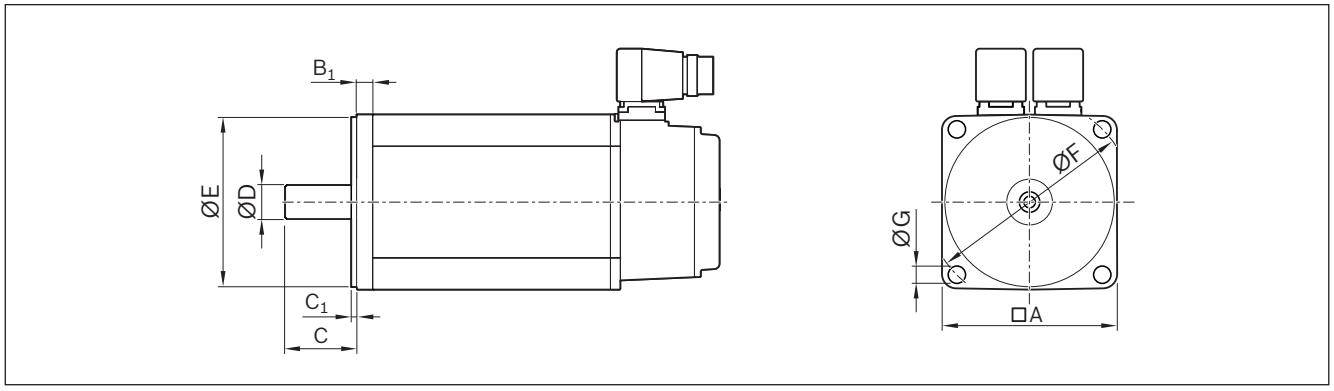




Size	Dimension (mm) A	Part number
070	20	R0375 200 09
090	24	R0375 300 09
110	26	R0375 400 09
145	31	R0375 500 09

Mounting kits for motors according to customer specification

The motor mounting for linear systems with ball screw drive consists of either a mounting kit with flange and coupling (MF) or a timing belt side drive (RV).
The available combinations are shown in the “Configuration and ordering” selection tables for the respective size.
In addition to motor options for Rexroth motors, kits for motors can also be ordered according to customer specifications. In order to determine the appropriate attachment kit, the connection geometry of the motor is crucial.
Characteristics required to uniquely determine the motor geometry are shown below.

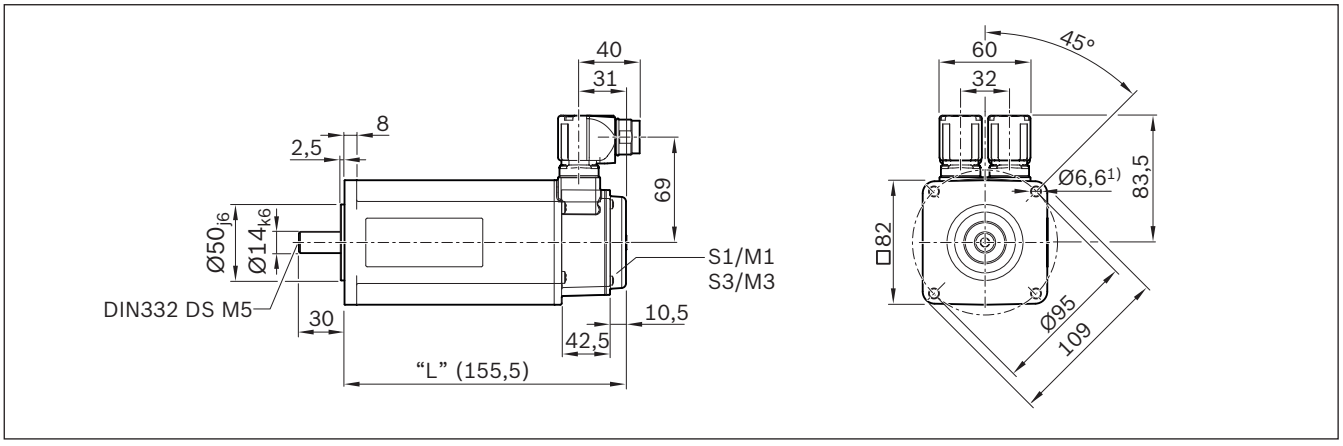


The dimensions queried result in a unique “motor geometry code”:

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

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

Example representation of servo motor IndraDyn S Type MSK040C

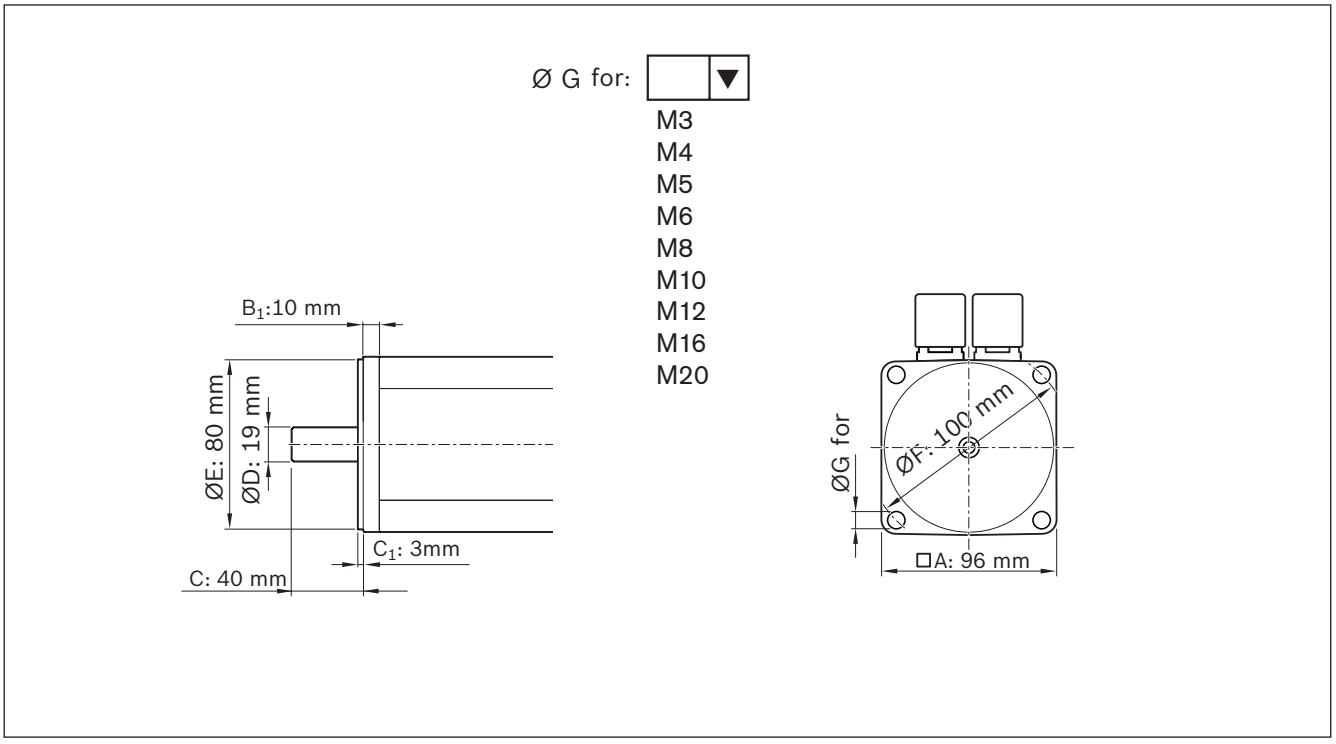


1 **4** – **3** **0** – **0** **5** **0** – **2** **.** **5** – **0** **9** **5** – **M** **0** **6** – **0** **0** **8** – **0** **8** **2**

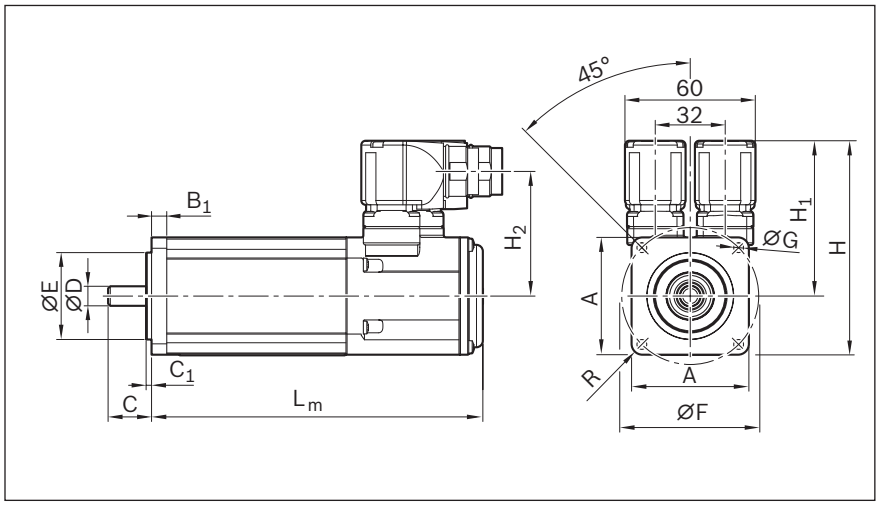
1) The through hole Ø 6.6 mm results in the type designation M06 for the geometry motor code (nominal thread diameter mounting screw M6).

Motor mounting kits for motors according to customer specification can be configured using the online configurator in the eShop. The option “Motor mounting kits according to customer specification” needs to be selected for this.

The motor geometry is entered via the input dialog box. The dimensions can be entered by being input directly or by a pull-down menu.



IndraDyn S - MSK servo motors



Schematic motor illustration

Motor	Dimensions (mm)													
	A	B_1	C	C_1	ØD k6	ØE j6	ØF	ØG	H	H_1	H_2	L_m Without holding brake	L_m With holding brake	R
MSK 030C-0900	54	7.0	20	2.5	9	40	63	4.5	98.5	71.5	57.4	188.0	213.0	R5
MSK 040C-0600	82	8.0	30	2.5	14	50	95	6.6	124.5	83.5	69.0	185.5	215.5	R8
MSK 050C-0600	98	9.0	40	3.0	19	95	115	9.0	134.5	85.5	71.0	203.0	233.0	R8
MSK 060C-0600	116	9.5	50	3.0	24	95	130	9.0	156.5	98.5	84.0	226.0	259.0	R9
MSK 076C-0450	140	14.0	50	4.0	24	110	165	11.0	180.0	110.0	95.6	292.5	292.5	R12

Motor data

Motor	n_{max} (min^{-1})	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kgm^2)	J_{br} (kgm^2)	m_m (kg)	m_{br} (kg)
MSK 030C-0900	9 000	0.8	4.0	1	0.000030	0.000007	1.9	0.2
MSK 040C-0600	7 500	2.7	8.1	4	0.000140	0.000023	3.6	0.3
MSK 050C-0600	6 000	5.0	15.0	5	0.000330	0.000107	5.4	0.7
MSK 060C-0600	6 000	8.0	24.0	10	0.000800	0.000059	8.4	0.8
MSK 076C-0450	5 000	12.0	43.5	11	0.004300	0.000360	13.8	1.1

Motor data independent of the Compact Module

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

Option number[1)]	Motor	Part number	Version		Type designation
			Holding brake		
			Without	With	
84	MSK030C-0900	R911308683	X		MSK030C-0900-NN-M1-UG0-NNNN
85		R911308684		X	MSK030C-0900-NN-M1-UG1-NNNN
86	MSK040C-0600	R911306060	X		MSK040C-0600-NN-M1-UG0-NNNN
87		R911306061		X	MSK040C-0600-NN-M1-UG1-NNNN
88	MSK050C-0600	R911298354	X		MSK050C-0600-NN-M1-UG0-NNNN
89		R911298355		X	MSK050C-0600-NN-M1-UG1-NNNN
90	MSK060C-0600	R911306052	X		MSK060C-0600-NN-M1-UG0-NNNN
91		R911306053		X	MSK060C-0600-NN-M1-UG1-NNNN
92	MSK076C-0450	R911318098	X		MSK076C-0450-NN-M1-UG0-NNNN
93		R911315713		X	MSK076C-0450-NN-M1-UG1-NNNN

[1)] From „Configuration and ordering“ table

Version

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

Notes

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

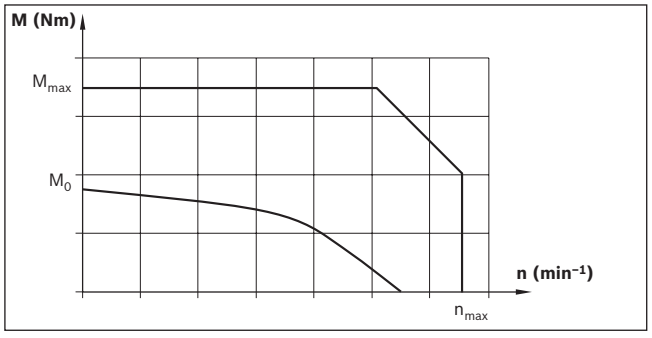
- Drive System Rexroth IndraDrive, R999000018
- Automation systems and control components, R999000026
- Rexroth IndraDyn S Synchronous Motors MSK, R911296288

Recommended motor/controller combination

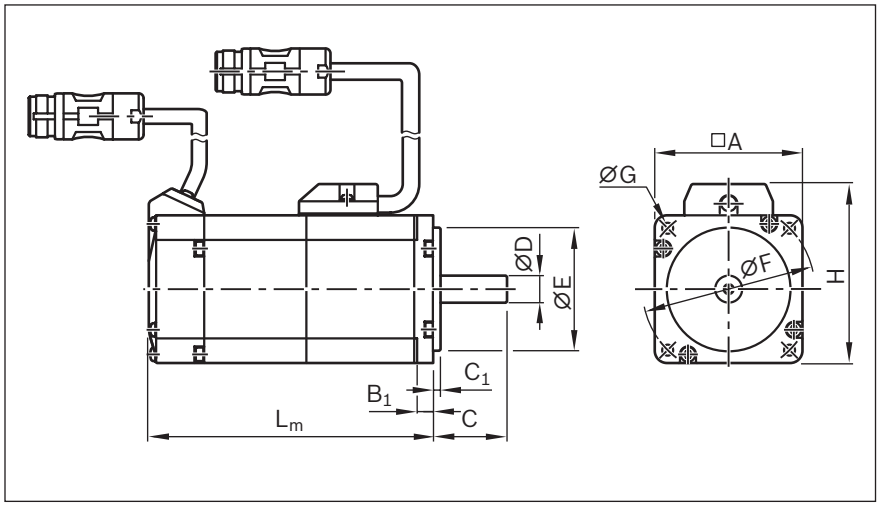
Motor	Controller
MSK 030C-0900	HCS 01.1E-W0005
MSK 030C-0900	HCS 01.1E-W0008
MSK 040C-0600	
MSK 040C-0600	HCS 01.1E-W0018
MSK 050C-0600	
MSK 050C-0600	HCS 01.1E-W0028
MSK 060C-0600	
MSK 060C-0600	HCS 01.1E-W0054
MSK 076C-0450	

Motor torque speed curve

(schematic)



IndraDyn S - MSM servo motors



Schematic motor illustration

Motor	Dimensions (mm)										
	A	B_1	C	C_1	ØD h6	ØE h7	ØF	ØG	H	L_m Without holding brake	L_m With holding brake
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

Motor data

Motor	n_{max} (min^{-1})	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kgm^2)	J_{br} (kgm^2)	m_m (kg)	m_{br} (kg)
MSM 019B-0300	5 000	0.32	0.95	0.29	0.0000051	0.0000002	0.47	0.21
MSM 031B-0300	5 000	0.64	1.91	1.27	0.0000140	0.0000018	0.82	0.48
MSM 031C-0300	5 000	1.30	3.80	1.27	0.0000260	0.0000018	1.20	0.50
MSM 041B-0300	4 500	2.40	7.10	2.45	0.0000870	0.0000075	2.30	0.80

Motor data independent of the Compact Module

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

Option number[1)]	Motor	Part number	Version Holding brake		Type designation
			Without	With	
134	MSM019B-0300	R911344211	X		MSM 019B-0300-NN-M5-MH0
135		R911344212		X	MSM 019B-0300-NN-M5-MH1
136	MSM 031B-0300	R911344213	X		MSM 031B-0300-NN-M5-MH0
137		R911344214		X	MSM 031B-0300-NN-M5-MH1
138	MSM 031C-0300	R911344215	X		MSM 031C-0300-NN-M5-MH0
139		R911344216		X	MSM 031C-0300-NN-M5-MH1
140	MSM 041B-0300	R911344217	X		MSM 041B-0300-NN-M5-MH0
141		R911344218		X	MSM 041B-0300-NN-M5-MH1

[1)] From „Configuration and ordering“ table

Versions:

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

Notes

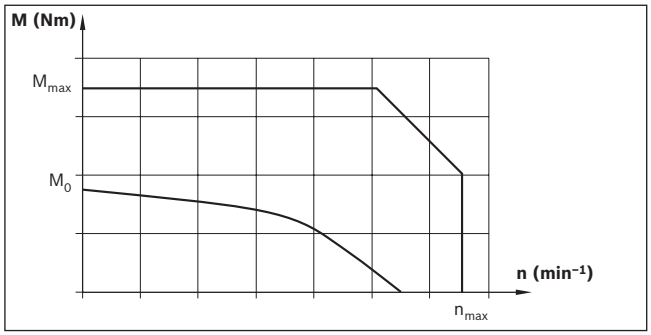
The motors can be supplied complete with controllers and control systems. For further motor types and more information on motors, controllers and control systems, please refer to the following Rexroth catalogs:

- Drive System Rexroth IndraDrive R999000018
- Automation systems and control components, R999000026
- Rexroth IndraDyn S Synchronous Motors MSM R911329337

Recommended motor/controller combination

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

Motor torque speed curve
(schematic)

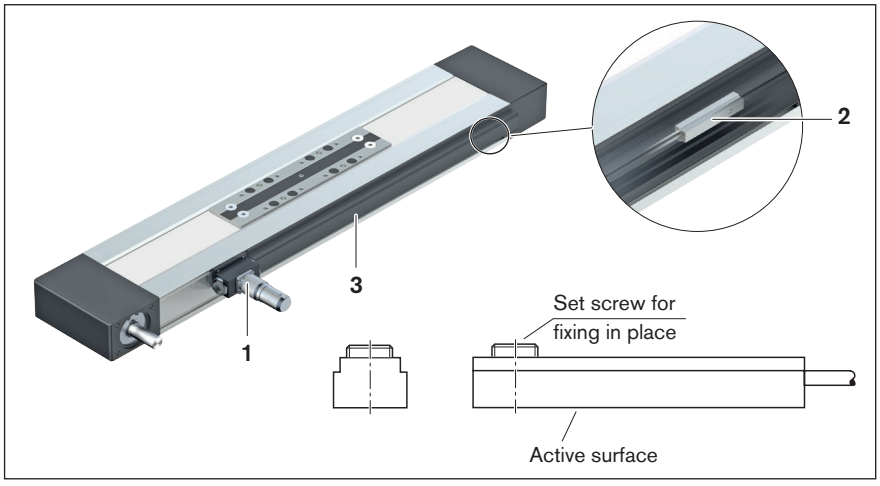


Overview of attachment variants

Magnetic sensor with free line end

1 Socket and plug
2 Sensor
3 Mounting duct

Alternatively, the sensor can also be attached by switch plate and cable holder.
See the magnetic sensor with plug.



Mounting/actuation

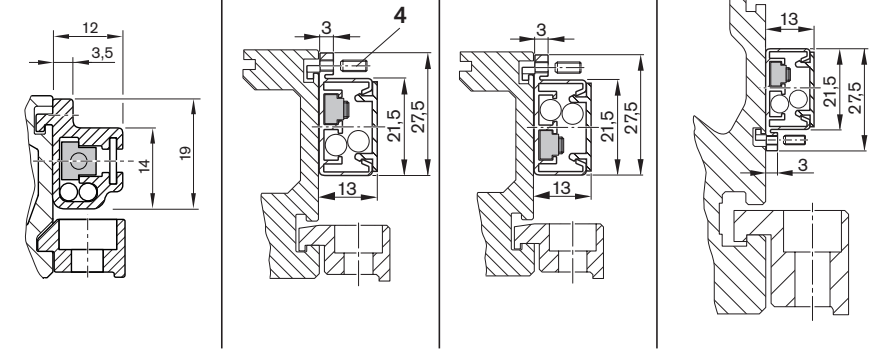
A mounting duct is needed to fasten the sensors and cable guides. This is suspended at the side in a slot at the Compact Module and secured with set screws (4).

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 mounting 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

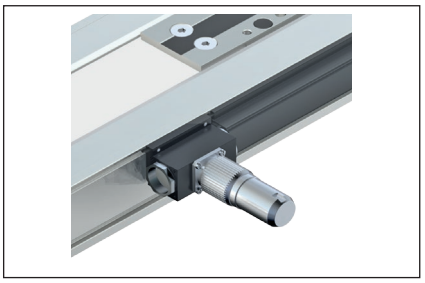


Mounting duct		
Compact Module	**Part number**	**Length calculation**
CKK / CKR: 070	R0396 620 26	$L_K = L - 5$
CKK: 090, 110, 145, 200	R0396 620 18	$L_K = L - 5$
CKR: 090, 110, 145, 200	R0396 620 18	$L_K = L - 10$

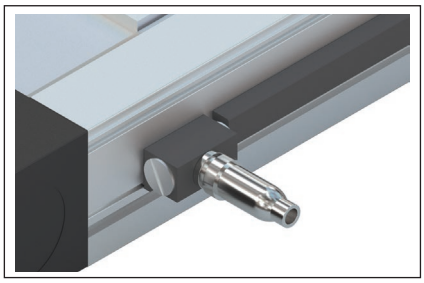
L_K = length of mounting duct (mm)
L = length of linear system (mm)

Socket - plug

Notes:
Socket and plug are not wired.
This allows optimal assignment of switching positions during start-up.
One plug is included.
The plug can be installed in three directions.
For further information, see the section “Socket - plug”.



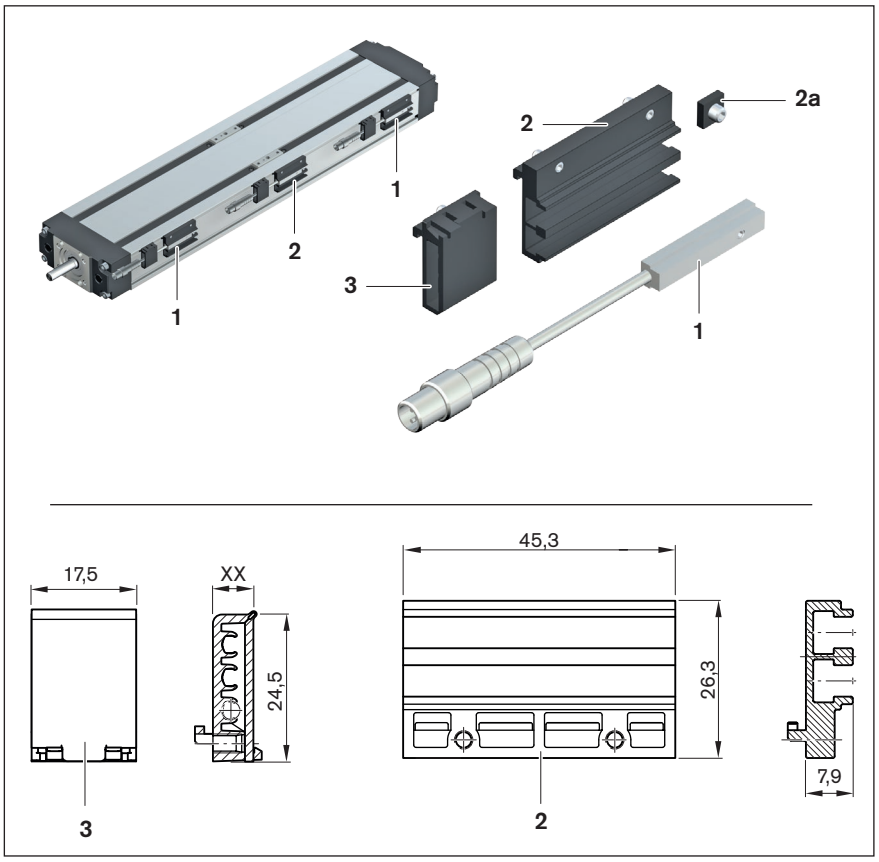
Socket plug	
Compact Module	**Part number**
CKK / CKR: 070	R1175 601 02
CKK / CKR: 090, 110, 145	R0375 400 00



Socket plug	
Compact Module	**Part number**
CKK / CKR: 200	R0375 400 00

Magnetic sensor with plug

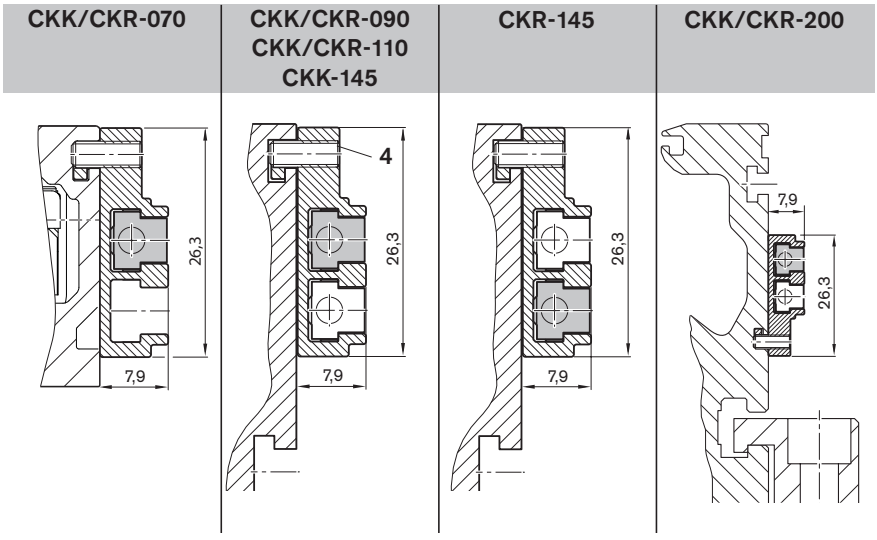
1 Sensor
2 Sensor mount including set screws (loose) and square nut **2a**
3 Cable holder including set screw (loose)



Attachment/actuation

A switch plate (2) is required to attach the sensors. This is suspended in the upper slot on the Compact Module and secured with set screws (4).
The sensors are pushed into the respective slot on the sensor mount and secured with one set screw.
The square nut with set screw (2a) serves as a positive stop for the sensor (switching position when changing sensors).
Parts are included with the sensor mounting assembly.

Switch activation is done by magnets in the carriage.



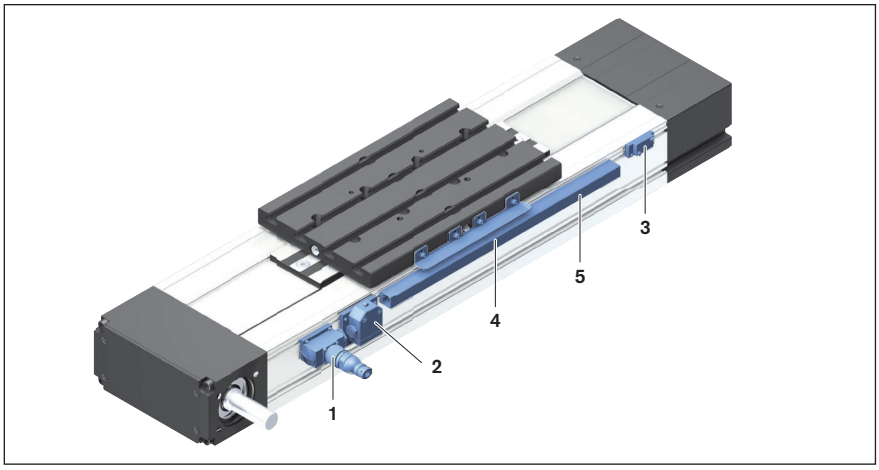
Switches and attachments

Item		Part number
1	**Magnetic sensor with plug**	See the chapter on sensors and accessories
2	**Switch plate**	R0375 300 21
3	**Cable holder**	R0375 300 22

Overview

Proximity sensors and mechanical switches for CKK/CKR-200

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

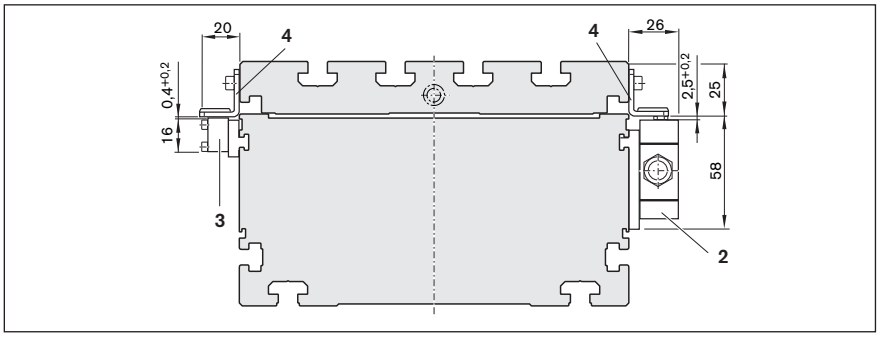


Alternatively, the connection line of the sensor can also be attached by cable holder.
See “Switching system”.

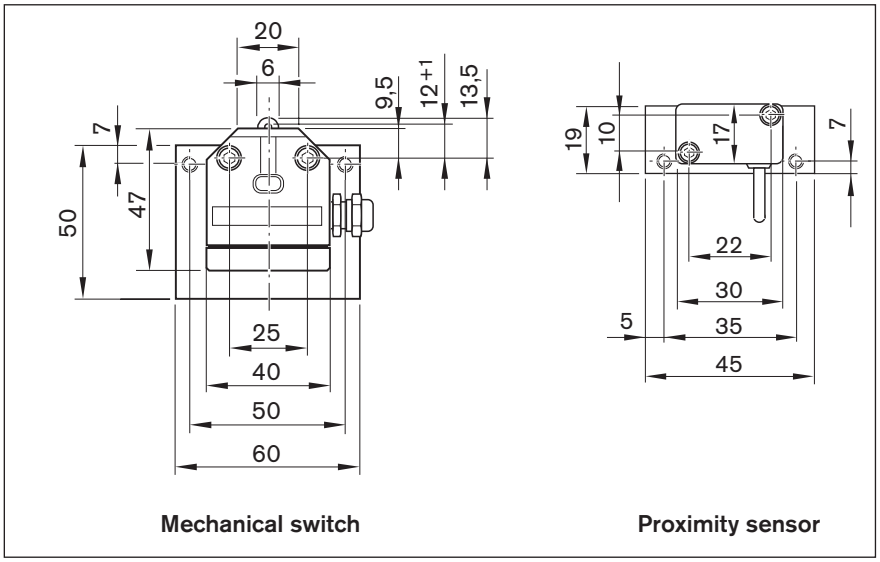
Attachment/actuation

The switches are suspended in the upper slot on the Compact Module and secured with set screws (4).

The actuation is done using switching cams (4). This is attached with screws at the connection plate. Fastening screws are included.



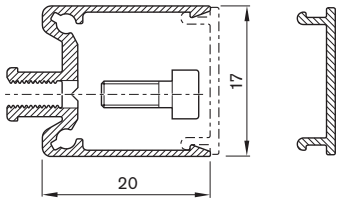
Switch with attachment part



Cable duct

- The attachment is done in the lateral slots of the frame. Fastening screws widen the profile and give the cable duct a secure hold.

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

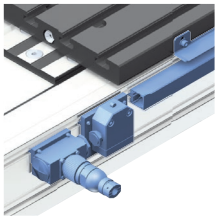


Cable duct	
Compact Module	**Length calculation**
CKK 200	$L_K = L - 5$
CKR 200	$L_K = L - 10$

L_K = length of fastening and mounting duct (mm)
L = length of linear system (mm)

Socket - plug

Notes:
Socket and plug are not wired.
This allows optimal assignment of switching positions during start-up.
One plug is included.
The plug can be installed in three directions.



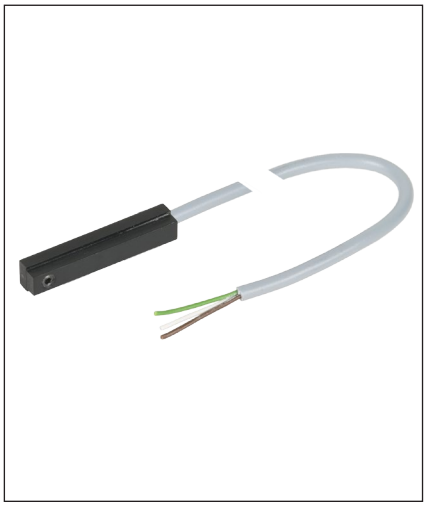
Switches and attachments

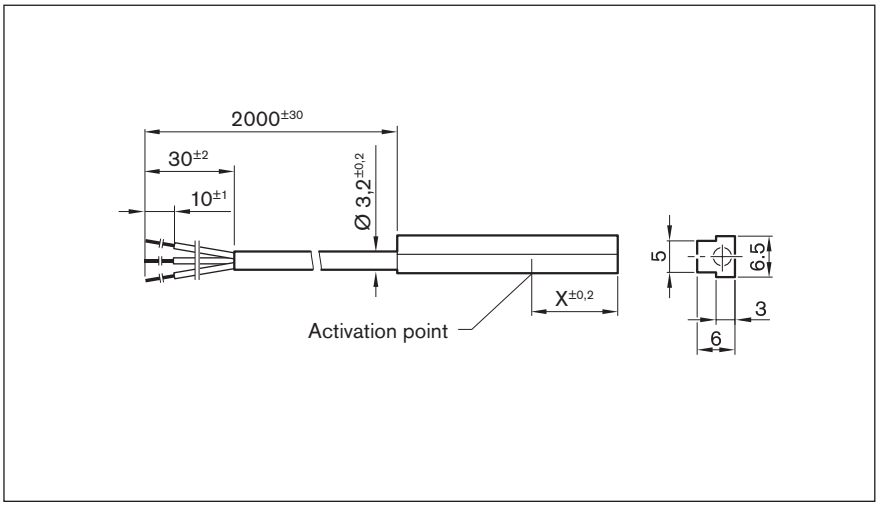
Item		Part numbers
1	**Socket plug**	R1175 001 53
2	**Mechanical switch**	See the chapter on sensors and accessories
	– Attachment parts without switches	R1175 001 65
3	**Proximity sensor**	See the chapter on sensors and accessories
	– Attachment parts without sensors	R1175 001 52
4	**Switching angle**[1)]	R1175 001 50
5	**Cable duct L_K = XX mm**	R0396 620 17

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

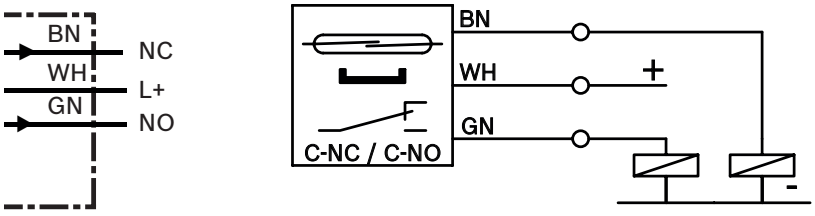
Sensors

Magnetic sensor with free line end

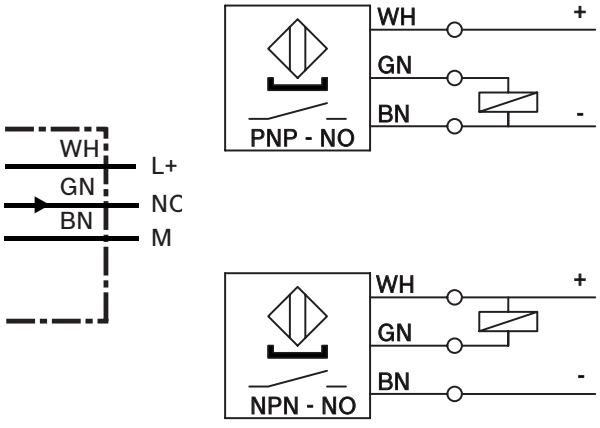




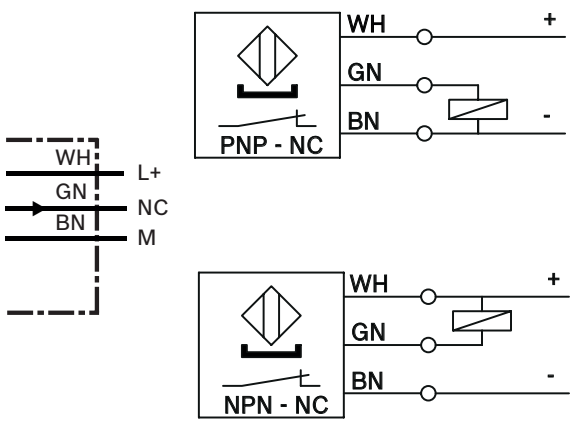
R347600903



R347601203
R347601403



R347601003
R347601303



Part number R347600903

Use	Reference, limit switches
Part number	R347600903
Description	R12212
Function principle	Magnetic
Operating voltage	max. 30 V DC
Load current	500 mA
Switching function	REED / changeover contact (NC: C+NC, NO: C+NO)
Operating point (dimension “X”)	9 mm

Material numbers R347601003 / R347601203 / R347601403 / R347601303

Use	Limit switch	Reference switch	Limit switch	Reference switch
Part number	R347601003	R347601203	R347601303	R347601403
Description	H14118	H15637	H15638	H15080
Function principle	Magnetic			
Operating voltage	3.8 - 30 V DC			
Load current	≤ 20 mA			
Switching function	Hall PNP/normally closed (NC)	Hall PNP/normally open (NO)	Hall NPN/normally closed (NC)	Hall NPN/normally open (NO)
Operating point, dimension “X”	13.65 mm			

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

Connection type	Line 2.0 m, 3-pin
Galvanized connection ends	
Function indication	–
Short-circuit protection	–
Reverse polarity protection	–
Switch-on suppression	–
Switching frequency	2.5 kHz
Pulse delay (Off delay)	–
Max. perm. approach speed	2 m/s
Suitable for drag chains*	–
Can withstand torsion*	–
Weld spark resistant*	–
Cable cross-section*	3x0.14 mm²
Cable diameter D	3.2 ±0.20 mm
Bending radius, stationary*	–
Bending radius, dynamic*	–
Bending cycles*	–
Max. perm. travel speed*	–
Max. perm. acceleration*	–
Ambient temperature	–40 °C to +85 °C
Protection class	IP66
MTTFd (acc. to EN ISO 13849-1)	–
Certifications and approvals**	–

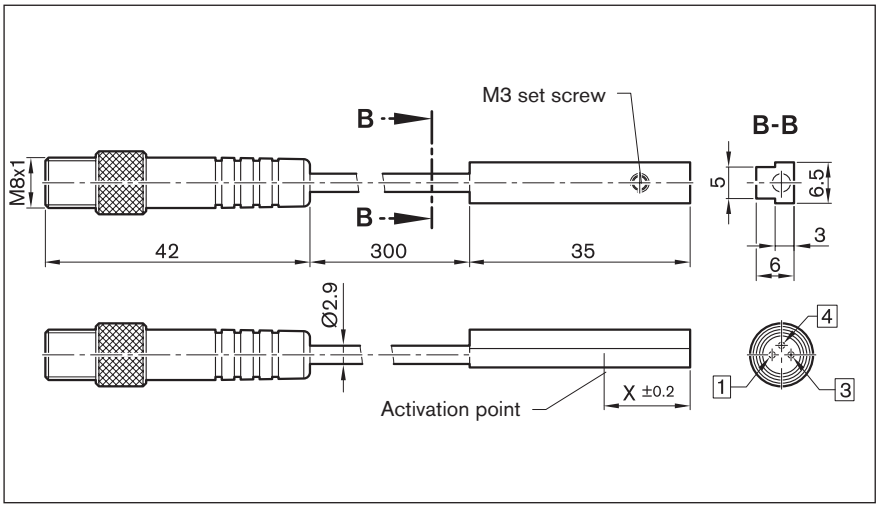
*) Technical data only for the cast-on connection line at the sensor.

Even more performance, e.g. extension cables are offered for use in a cable management chain (see the following pages).

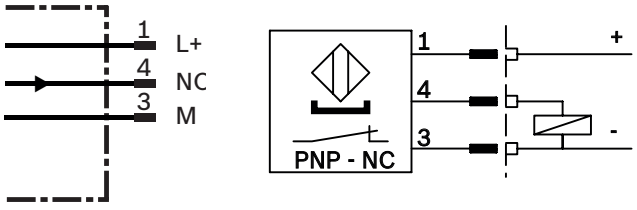
**) For these products no (CCC) certificate is necessary for introduction into the Chinese market.

Sensors

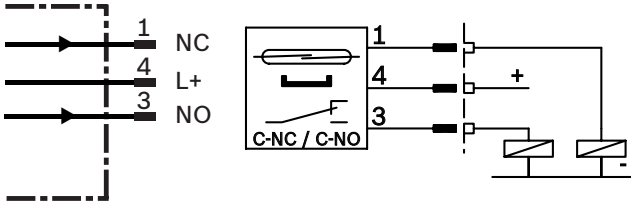
Magnetic sensor with M8x1 plug



R347602403



R347602303



Part numbers / technical data

Use	Reference / limit switches	Limit switch
Part number	R347602403	R347602303
Designation	H10706	R10705
Function principle	Magnetic	
Operating voltage	3.8 - 30 V DC	30 V DC
Load current	≤ 20 mA	500 mA
Switching function	Hall PNP/normally closed (NC)	REED / single-pole change-over (NC: C+NC, NO: C+NO)
Operating point, dimension "X"	13.65 mm	9 mm
Connection type	Cable 0.3 m and plug M8x1, 3-pin with knurled screws	
Function indication	–	
Short-circuit protection	–	
Reverse polarity protection	–	
Switch-on suppression	–	
Switching frequency	2.5 kHz	
Pulse delay (Off delay)	–	
Max. perm. approach speed	2 m/s	
Suitable for drag chains*	–	
Can withstand torsion*	–	
Weld spark resistant*	–	
Cable cross-section*	3x0.14 mm²	
Cable diameter D*	3.2 ±0.20 mm	
Bending radius, stationary*	–	
Bending radius, dynamic*	–	
Bending cycles*	–	
Max. perm. travel speed*	–	
Max. perm. acceleration*	–	
Ambient temperature	–40 °C to +85 °C	
Protection class	IP66	
MTTFd (acc. to EN ISO 13849-1)	–	
Certifications and approvals**	–	

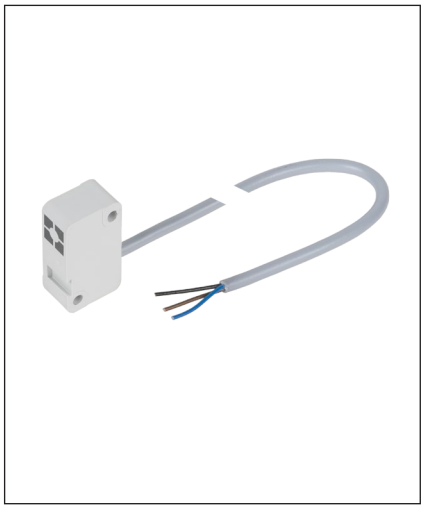
*) Technical data only for the cast-on connection line (0.3 m) at the magnetic sensor.

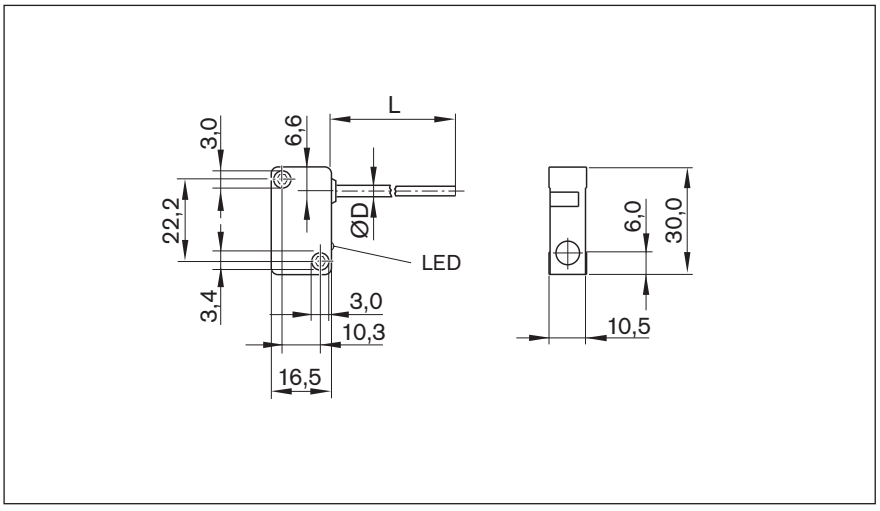
Even more performance, e.g. extension cables are offered for use in a cable management chain (see the following pages).

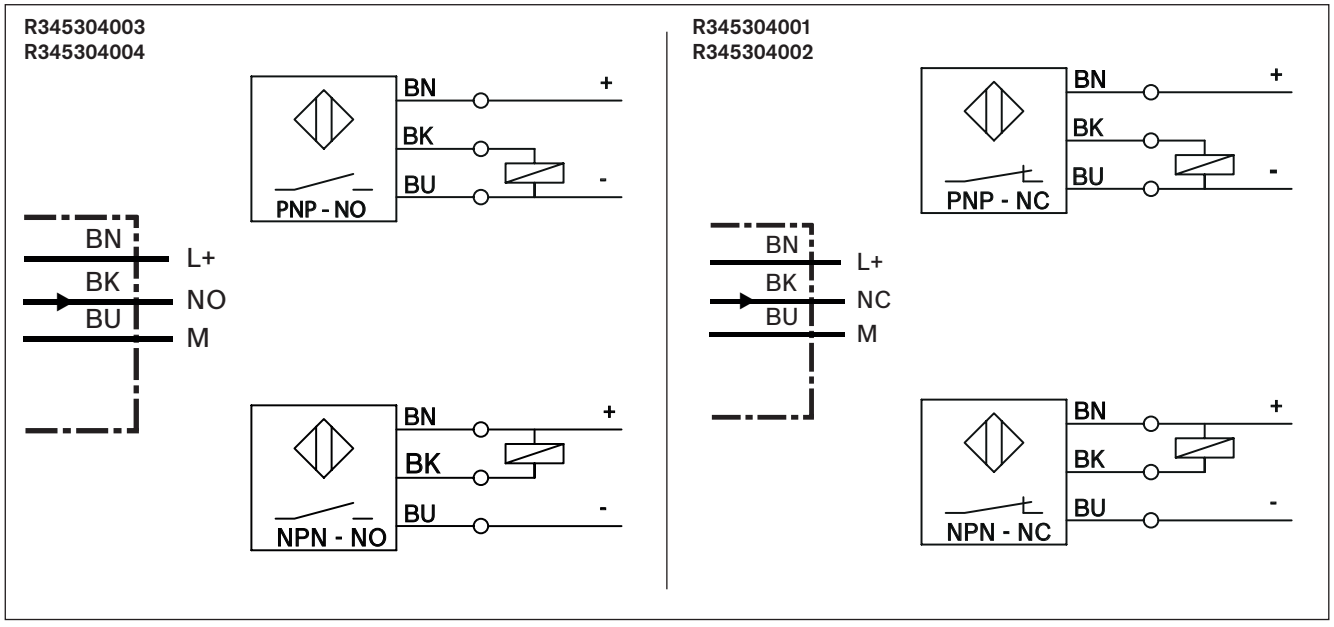
**) For these products no CCC certificate is necessary for introduction into the Chinese market.

Sensors

Proximity sensor with free line end







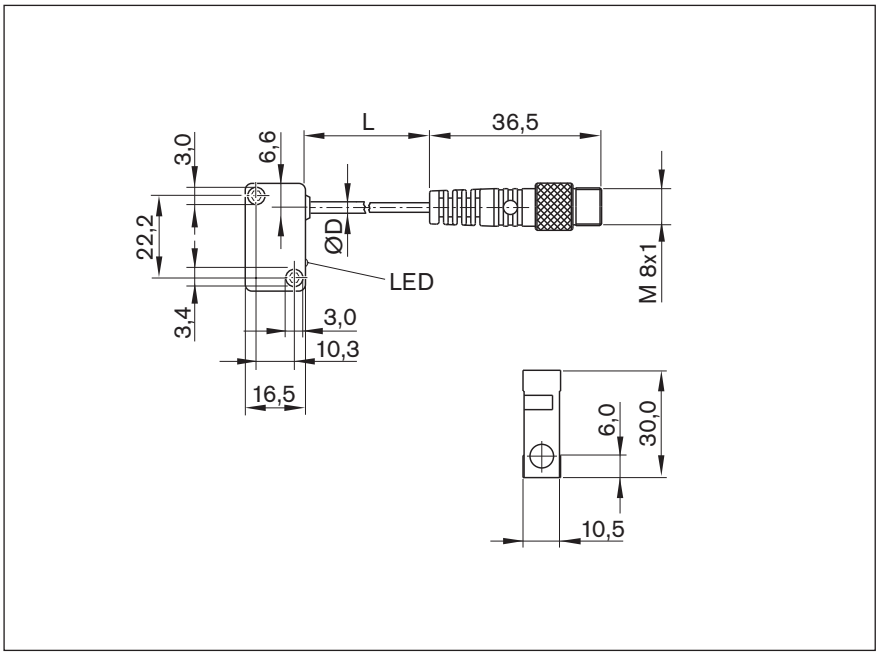
Part numbers / technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Part 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
Function principle	proximity			
Operating voltage	10 - 30 V DC			
Load current	≤ 200 mA			
Switching function	PNP/normally closed (NC)	PNP/normally open (NO)	NPN/normally closed (NC)	NPN/normally open (NO)
Connection type	Line 3 m, 3-pin, free line end			
Function indication	✓			
Short-circuit protection	✓			
Reverse polarity protection	✓			
Switching frequency	2.5 kHz			
Max. perm. approach speed	depending on the switch flag			
Suitable for drag chains*	–			
Can withstand torsion*	–			
Weld spark resistant*	–			
Cable cross-section*	3x0.14 mm²			
Cable diameter D*	3.5 ±0.15 mm			
Bending radius, stationary*	12 mm			
Bending radius, dynamic*	12 mm			
Bending cycles*	–			
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 approvals**	CE cULus LISTED RoHS			

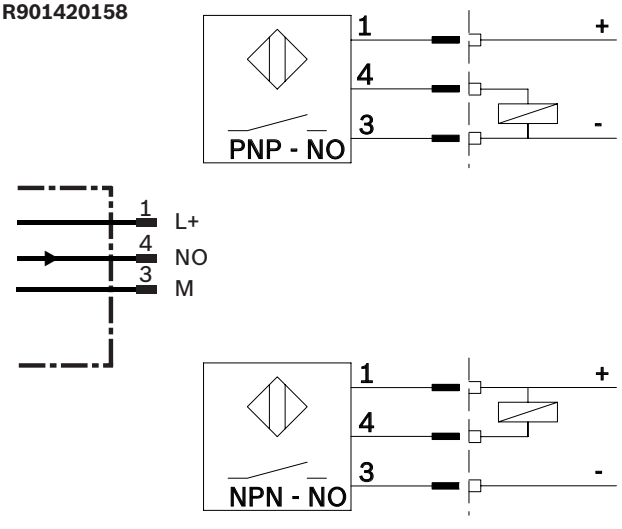
*) Technical data only for the cast-on connection line at the proximity sensor.
Even more performance, e.g. extension cables are offered for use in a cable management chain (see the following pages).
**) For these products no CCC certificate is necessary for introduction into the Chinese market.

Sensors

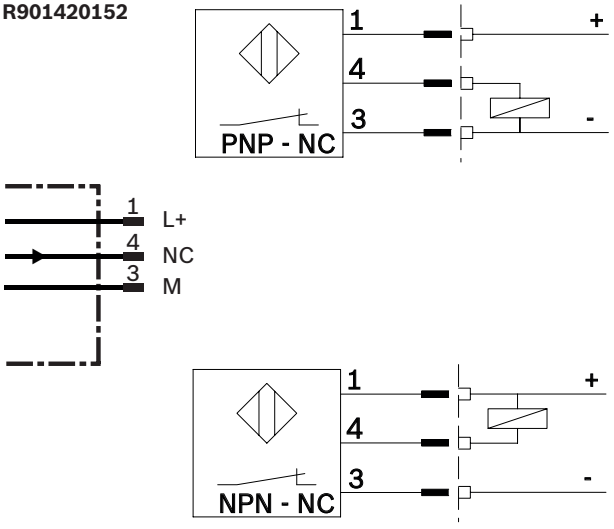
Proximity sensor with M8x1 plug



R901420156
R901420158



R901420149
R901420152



Part numbers / technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Part 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
Function principle	proximity			
Operating voltage	10 - 30 V DC			
Load current	≤ 200 mA			
Switching function	PNP/normally closed (NC)	PNP/normally open (NO)	NPN/normally closed (NC)	NPN/normally open (NO)
Connection type	Cable 0.2 m and plug M8 x 1, 3-pin with knurled screw			
Function indication	✓			
Short-circuit protection	✓			
Reverse polarity protection	✓			
Switching frequency	2.5 kHz			
Max. perm. approach speed	depending on the switch flag			
Suitable for drag chains*	–			
Can withstand torsion*	–			
Weld spark resistant*	–			
Cable cross-section*	3x0.14 mm²			
Cable diameter D*	3.5 ±0.15 mm			
Bending radius, stationary*	12 mm			
Bending radius, dynamic*	12 mm			
Bending cycles*	–			
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 approvals**	CE c UL us LISTED RoHS			

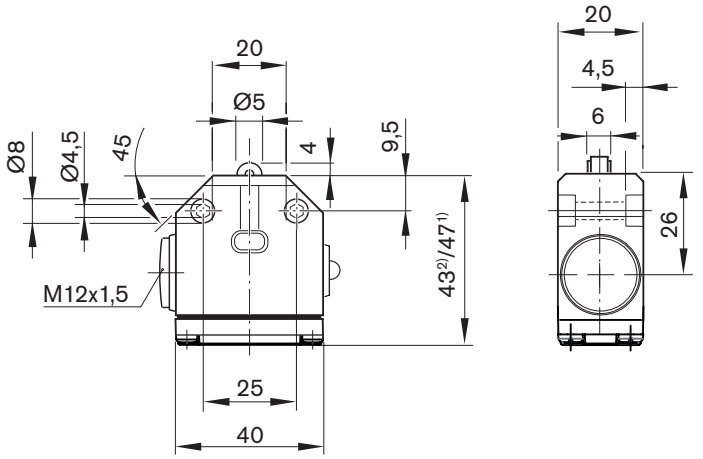
*) Technical data only for the cast-on connection line at the proximity sensor.

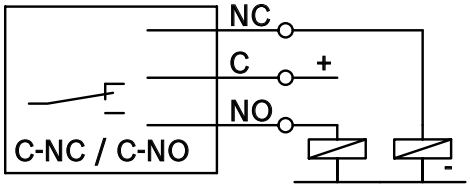
Even more performance, e.g. extension cables are offered for use in a cable management chain (see the following pages).

**) For these products no CCC certificate is necessary for introduction into the Chinese market.

Switch

Mechanical switch

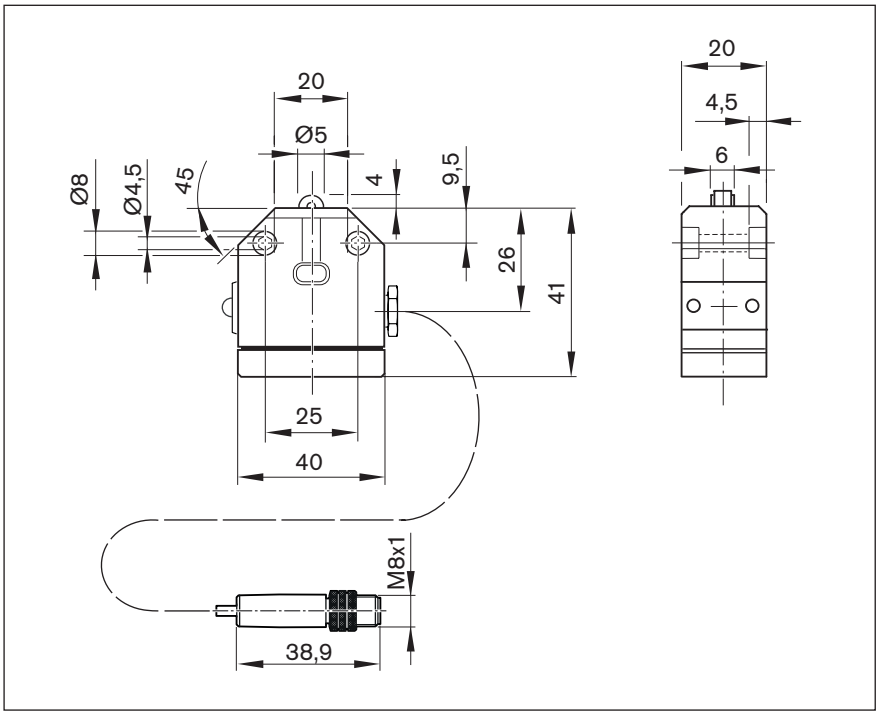


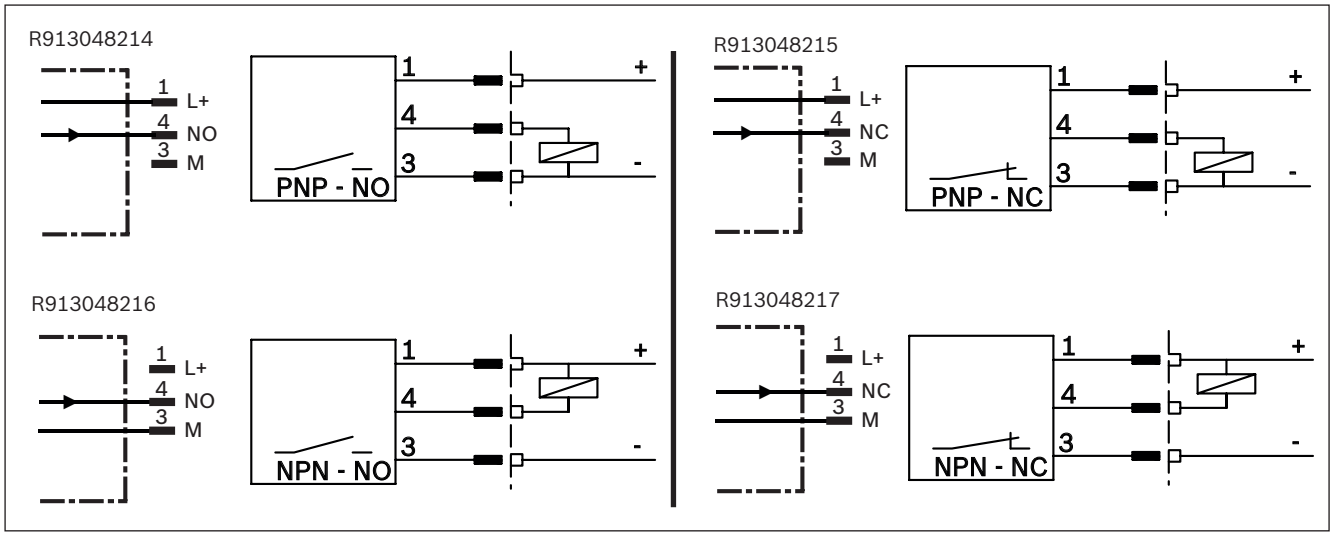


Part numbers / technical data		
Use	Limit switch	
Part number	R345304016[1)]	R347600305[2)]
Designation	BNS 819-X496-99-R-11	
Function principle	Mechanical	
Operating voltage	250 V AC	
Load current	≤ 5 A	
Switching function	Single-pole change-over/ (NC: C+NC, NO: C+NO)	
Connection type	Screw connection, without line	
Function indication	–	
Switching frequency	3.3 Hz	
Max. perm. approach 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	CE cULus RoHS	
Certifications and approvals, switching element	CE cULus CSA RoHS	

Switch

Mechanical sensor with M8x1 plug





Part numbers / technical data

Use	Limit switch	Reference switch	Limit switch	Reference switch
Part 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
Function principle	Mechanical			
Operating voltage	10 – 30 VDC			
Load current	≤ 200 mA			
Switching function	PNP/normally closed (NC)	PNP/normally open (NO)	NPN/normally closed (NC)	NPN/normally open (NO)
Connection type	Cable 0.2 m and plug M8 x 1, 3-pin with knurled screw			
Function indication	–			
Short-circuit protection	–			
Reverse polarity protection	–			
Switching frequency	3.3 Hz			
Max. perm. approach speed	1 m/s			
Suitable for drag chains*	–			
Can withstand torsion*	–			
Weld spark resistant*	–			
Cable cross-section*	3x0.14 mm^2			
Cable diameter D*	3.5 ±0.2 mm			
Bending radius, stationary*	12 mm			
Bending radius, dynamic*	12 mm			
Bending cycles*	–			
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 approvals**	CE cULus RoHS			

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

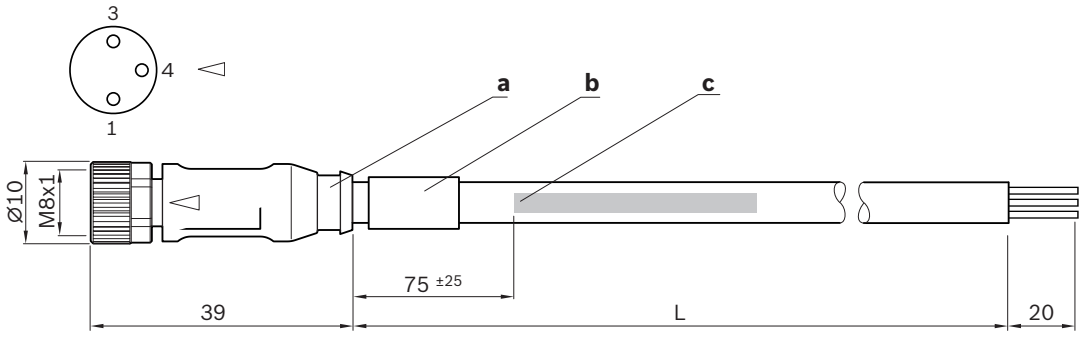
Even more performance, e.g. extension cables are offered for use in a cable management chain (see the following pages).

**) For these products, no CCC certificate is necessary for introduction into the Chinese market.

Extensions

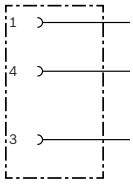
Assembled single-sided

Drawing



Connection scheme

1 brown (BN) (+)
3 blue (BU) (–)
4 black (BK) (signal)



Part numbers

Use	Extension cable		
Part 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
1st connection type	Straight socket, M8x1, 3-pin		
2nd connection type	Flying lead		

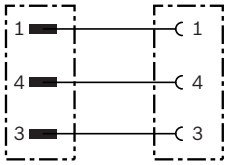
a) Contour for corrugated tube inner diameter 6.5 mm
b) Grommet
c) Cable label in accordance with labeling directive

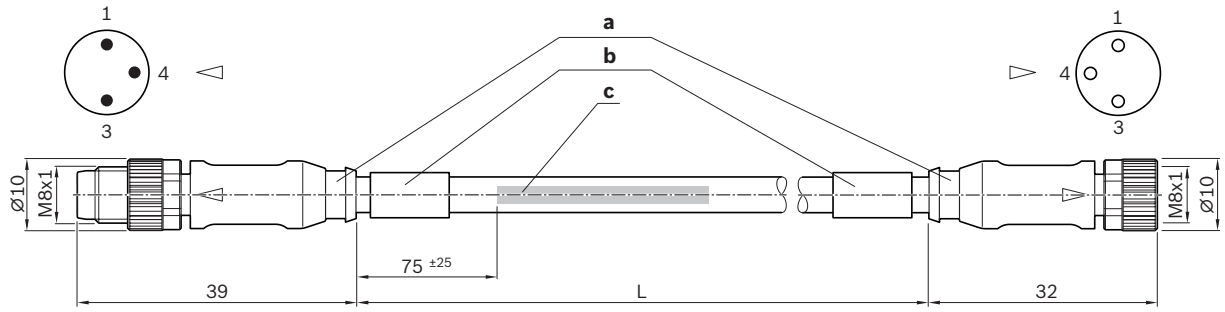
Assembled double-sided

Drawing

Connection scheme

1 brown (BN) (+)
3 blue (BU) (–)
4 black (BK) (signal)





Part numbers

Use	Extension cable				
Part 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
1st connection type	Straight socket, M8x1, 3-pin				
2nd connection type	Straight socket, M8x1, 3-pin				

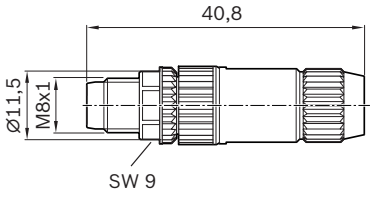
Technical data for single and double-sided pre-assembled extensions

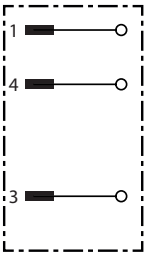
Function indication	–
Operating voltage indicator	–
Operating voltage	10 - 30 V DC
Type of cable	PUR black
Suitable for drag chains	✓
Can withstand torsion	✓
Weld spark resistant	✓
Cable cross-section	3x0.25 mm²
Cable diameter D	4.1 ±0.2 mm
Bending radius, stationary	≥ 5xD
Bending radius, dynamic	≥ 10xD
Bending cycles	> 10 million
Max. perm. travel speed	3.3 m/s - at 5 m travel range (typ.) to 5 m/s - at 0.9 m travel range
Max. perm. acceleration	≤ 30 m/s²
Ambient temperature, fixed lay	–40 °C to +85 °C
Ambient temperature, flexible lay	–25 °C to +85 °C
Protection class	IP68
Certifications and approvals	CE, cULus LISTED, CSA C US, PG, RoHS

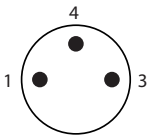
a) Contour for corrugated tube inner diameter 6.5 mm
b) Grommet
c) Cable label in accordance with labeling directive

Plug

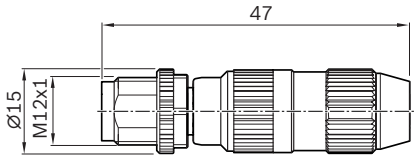
R901388333

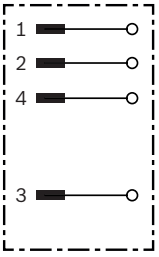


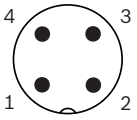




R901388352

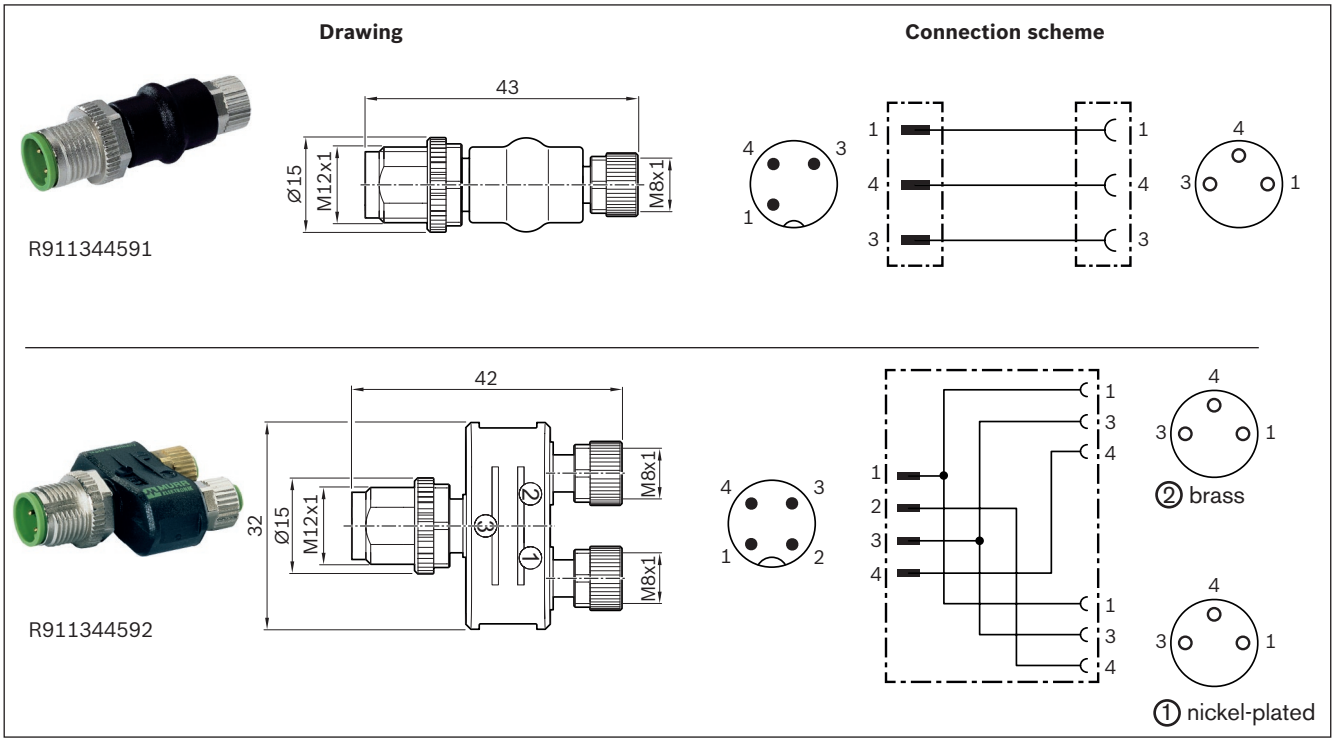






Part numbers / technical data		
Use	Plug, single	
Part number	R901388333	R901388352
Designation	7000-08331-0000000	7000-12491-0000000
Version	Straight	
Operating current per contact	max. 4 A	
Operating voltage	Max. 32 V AC/DC	
Connection type	Straight plug, M8x1, 3-pin, IDC, self-locking screw	Straight plug, M12x1, 4-pin, IDC, self-locking screw
Function indication	–	
Operating voltage indicator	–	
Connection cross-section	0.14 ... 0.34 mm²	
Ambient temperature	–25 °C to +85 °C	
Protection class	IP67 (plugged in & screwed down)	
Certifications and approvals	c UL us, CCC, RoHS	

Adapter



Part numbers / technical data

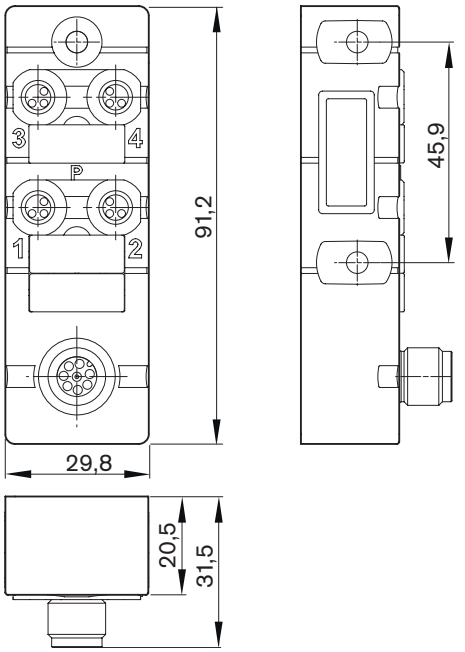
Use	Adapter	Adapter or distributor
Part number	R911344591	R911344592
Designation	7000-42201-0000000	7000-41211-0000000
Version	straight for 1 sensor	straight, for 1 – 2 sensors
Operating current per contact	max. 4 A	
Operating voltage	Max. 32 V AC/DC	
1st connection type	Straight socket, M8x1, 3-pin, IDC, self-locking screw thread	2 X straight sockets, M8x1, 3-pin, IDC, self-locking screw thread
2nd connection type	Straight plug, M12x1, 3-pin, IDC, self-locking screw thread	Straight plug, M12x1, 4-pin, IDC, self-locking screw thread
Function indication	–	
Operating voltage indicator	–	
Connection cross-section	–	
Ambient temperature	–25 °C to +85 °C	
Protection class	IP67 (plugged in & screwed down)	
Certifications and approvals	RoHS	c UL us LISTED, RoHS

Passive distributors

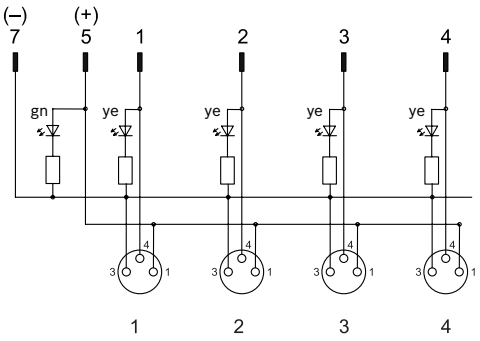
R901425737

R901429917

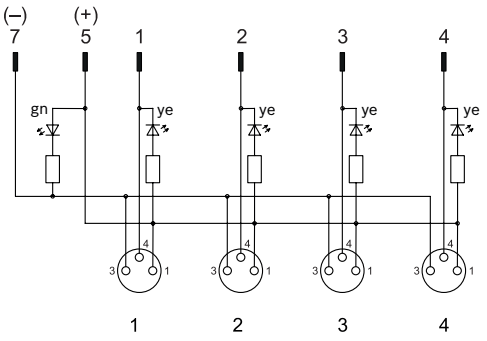
R911344592



R901425737



R901429917



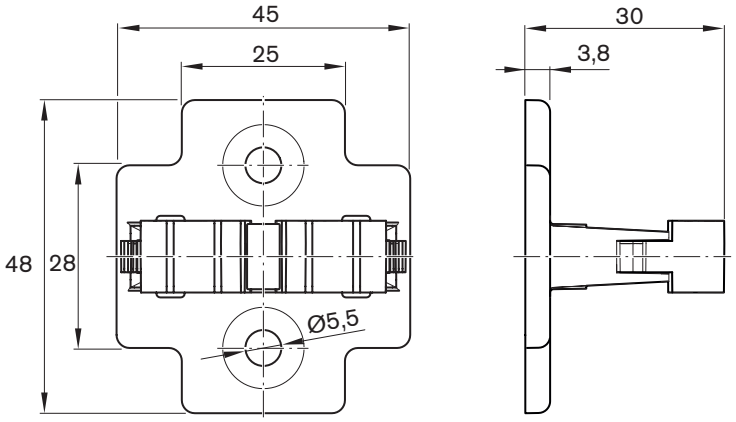
Part numbers / technical data

Use	Passive distributors		
Part number	R901425737	R901429917	R911344592
Designation	8000-84070-0000000	8000-84071-0000000	See the adapter for technical data and drawing
Version	straight, for 1 – 4 sensors		
Operating current per contact	max. 2 A		
Operating voltage	24 V DC		
Switching logic	PNP	NPN	
1st connection type	4x straight socket, M8x1, 3-pin, IDC, self-locking screw thread		
2nd connection type	Straight plug, M12x1, 8-pin, IDC, self-locking screw thread		
Function indication	✓		
Operating voltage indicator	✓		
Connection cross-section	–		
Ambient temperature	–20° to +70 °C		
Protection class	IP67 (plugged in & screwed down)		
Certifications and approvals			

Accessories for passive distributors

Holding plate

Screw plug



Part numbers / technical data

Use	For passive distributor R911344592	For passive distributors R901425737 / R901429917
Holding plate	R913047341	–
Designation	7000-99061-0000000	–
Quantity per pack	1 pc.	–
Screw plug	–	R913047322
Designation	–	3858627
Quantity per pack	–	10 pcs.

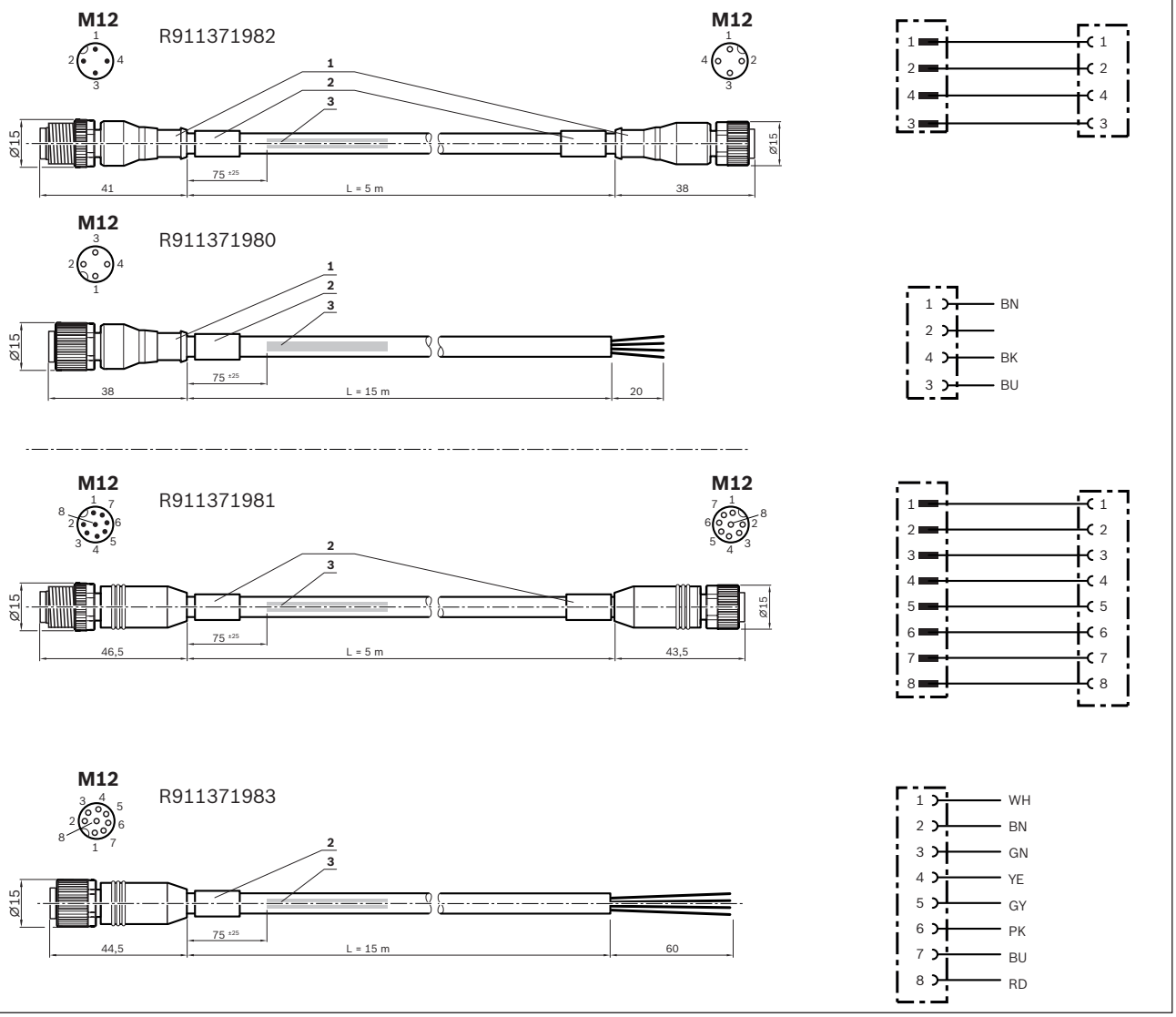
Extensions for passive distributors

R911371982

R911371981

R911371980

R911371983

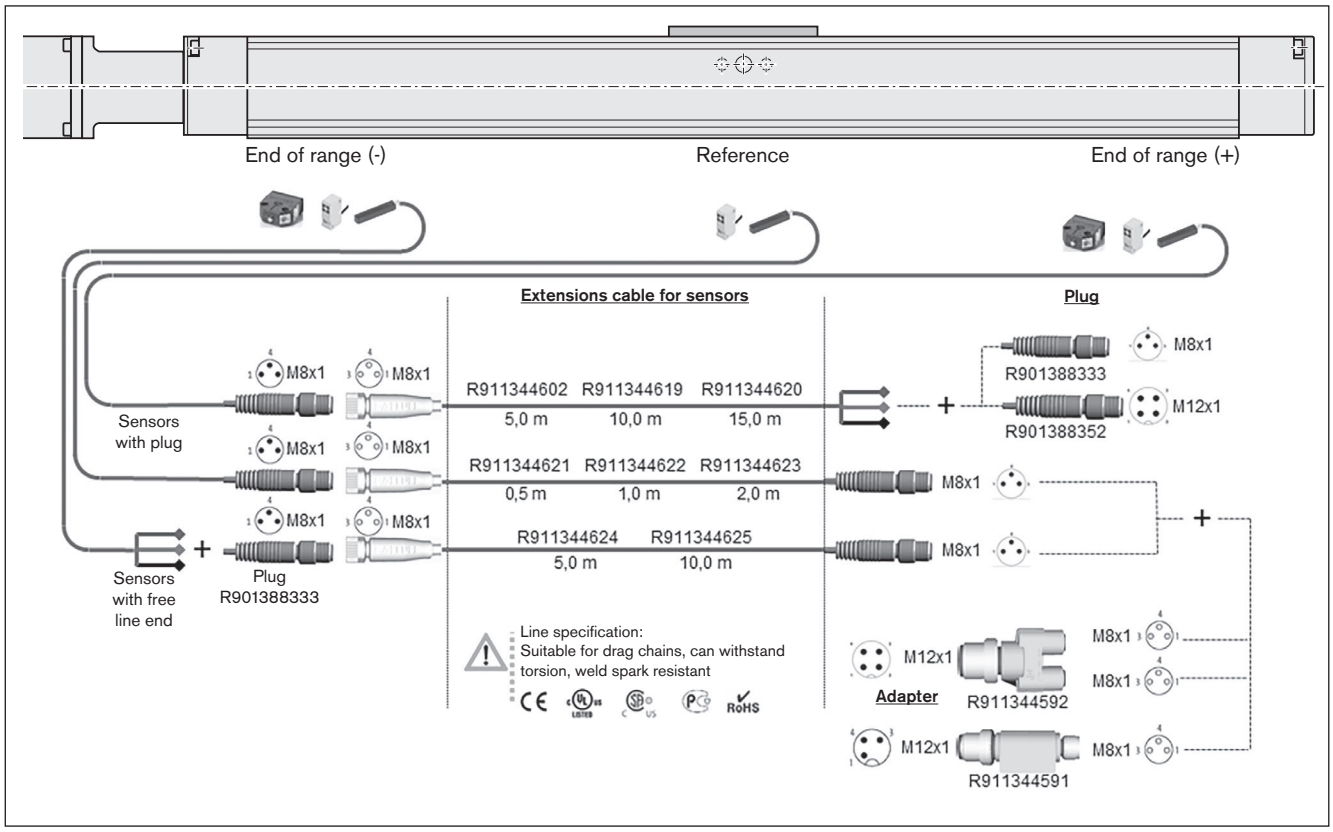


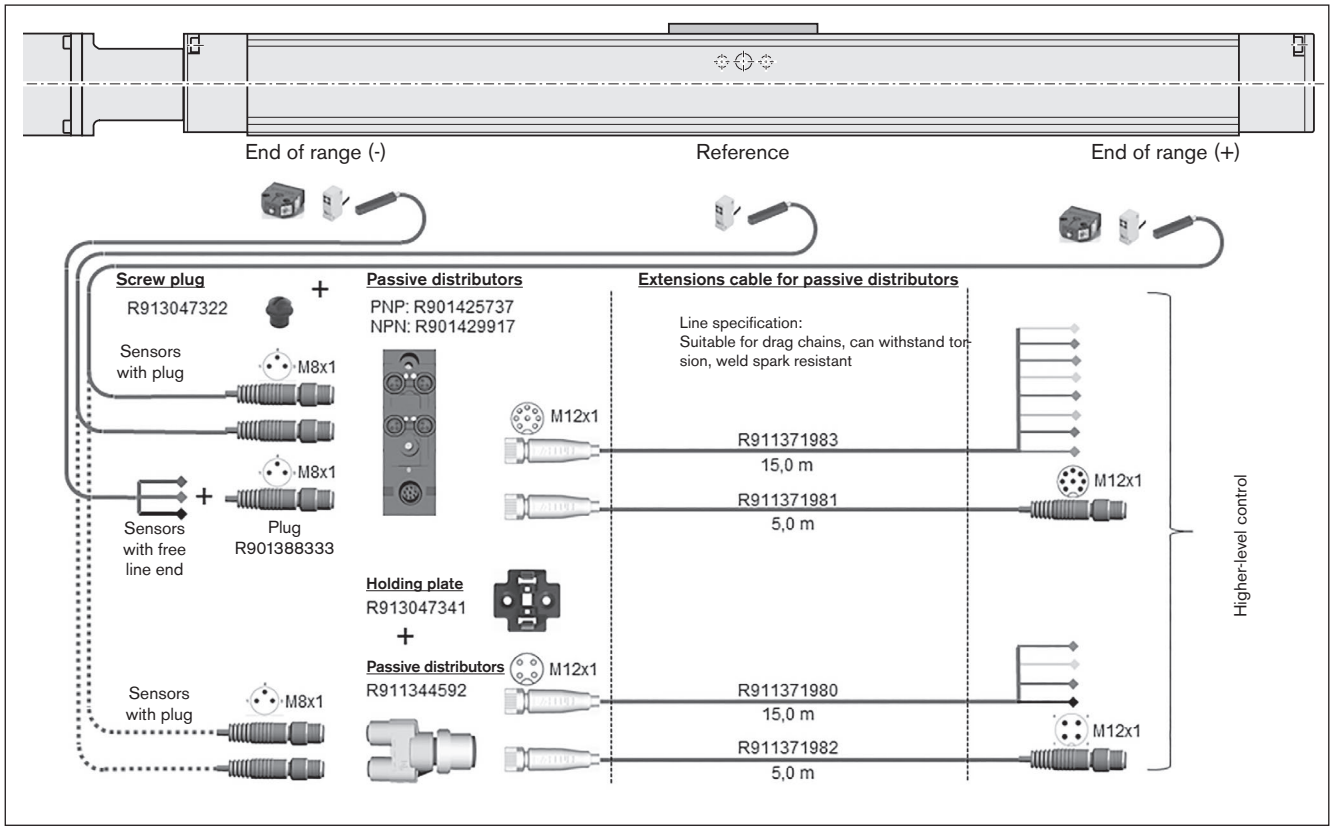
1) Contour for corrugated tube inner diameter 10
2) Grommet
3) Cable label acc. to ordering regulation 7000-08001

Part numbers / technical data

Use	Extension cable for passive distributor R911344592		Extension cable for passive distributors R901425737 / R901429917	
Part 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
1st connection type	Straight socket, M12x1, 4-pin		Straight socket, M12x1, 8-pin	
2nd connection type	Straight socket, M12x1, 4-pin	Flying lead	Straight socket, M12x1, 8-pin	Flying lead
Function indication	–			
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	✓			
Can withstand torsion	✓			
Weld spark resistant	✓			
Cable cross-section	4x0.34 mm²		8x0.34 mm²	
Cable diameter D	4.7 +/– 0.2 mm		6.2 +/– 0.3 mm	
Bending radius, stationary	≥ 5 x D			
Bending radius, dynamic	≥ 10 x D			
Bending cycles	> 10 million			
Max. perm. travel speed	3.3 m/s - at 5m travel range (typ.) to 5 m/s - at 0.9m travel range			
Max. perm. acceleration	≤ 30 m/s²			
Ambient temperature, fixed lay	–40 °C to +80 °C (90° max. 10,000 h)			
Ambient temperature, flexible lay	–25 °C to +80 °C (90° max. 10,000 h)			
Protection class	IP67 (plugged in & screwed down)			
Certifications and approvals	CE, cULus LISTED, CSA C US, PG, RoHS			

Combination example

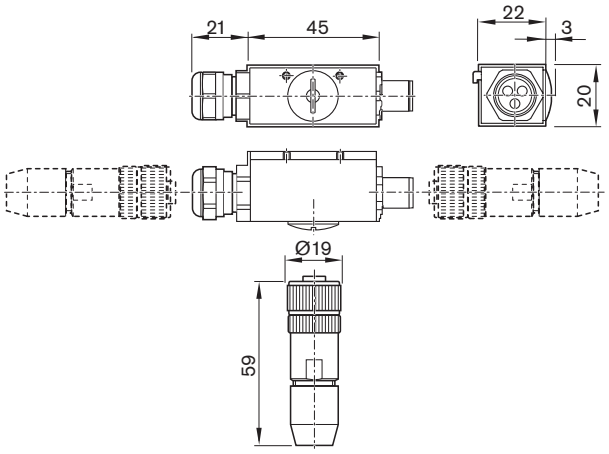


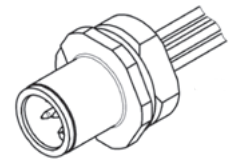


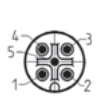
Socket and plug

Attach the socket on the side with the most switches. Socket and plug are not wired. The variable sliding attachment allows switching positions to be optimized during start-up. The plug can be installed in three directions.

R117560102

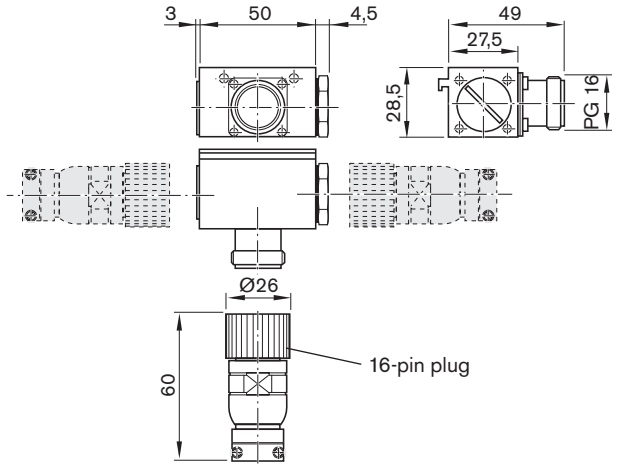


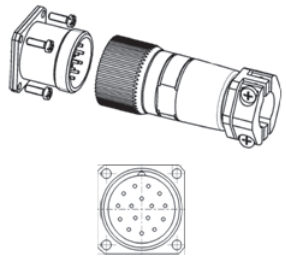




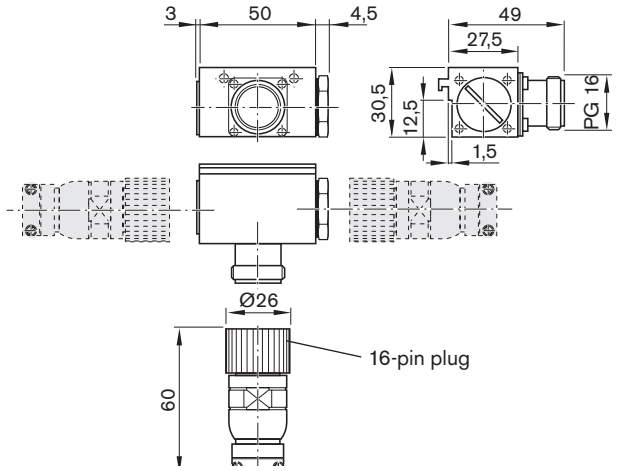
Pin		Color
1	BN	brown
2	WH	white
3	BU	blue
4	BK	black
5	GY	gray

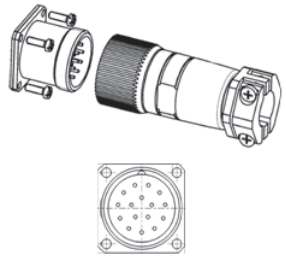
R037540000





R117500153



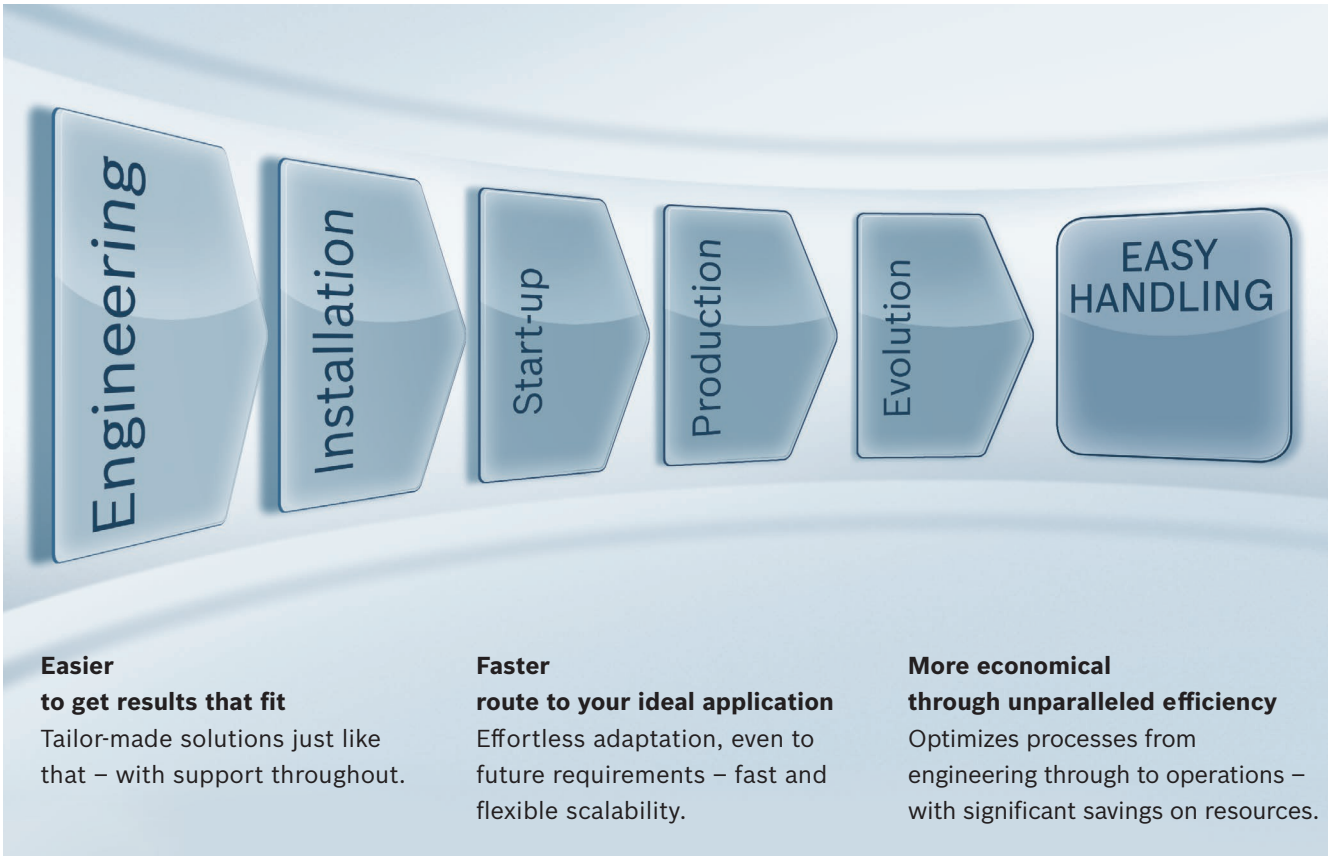


Use	Socket and plug	
Part number	R117560102	R037540000 / R117500153
Designation	for CKK / CKR-070	for CKK / CKR-090, -110, -145, -200
Version	angled, for suspension in the lateral slot of the linear system	
Operating current per contact	max. 4 A	max. 8 A
Operating voltage	10 - 30 V DC	150 V AC/DC
1st connection type	Straight socket, M12x1, 5-pin, spring-cage connection	Straight socket, 16-pin, soldered joint
2nd connection type	Coupling / flange socked M12x1, 5-pin, with 0.5 m cable	Coupling / flange socked, 16-pin, soldered joint
Cable bushing **Housing**	Cable gland M16x1.5 with seal (hole 3x3.5 mm) incl. cap and blind plug	1 seal with hole 2x5.5 mm, 1x3.5 mm seal 1 adaptable seal, max. 14 mm diameter incl. cap and blind plug
Cable bushing, plug	Gland 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		–

The perfect system solution for every application

Efficient production processes are the key to your success in the marketplace. Today's environment, defined by rapid change and short product cycles, demands flexible systems with an optimal design and configuration. EasyHandling gives you the tools you need to automate your handling applications with greater ease, speed, and efficiency. EasyHandling is more than just a modular collection of mechanical components; it takes an evolutionary step forward by providing an all-inclusive system solution – our best solution for your requirements.

EasyHandling –
Easier. Faster. More Economical.



Easier
to get results that fit
Tailor-made solutions just like that – with support throughout.

Faster
route to your ideal application
Effortless adaptation, even to future requirements – fast and flexible scalability.

More economical
through unparalleled efficiency
Optimizes processes from engineering through to operations – with significant savings on resources.

Engineering – up to 70% faster
EasyHandling tools help users right from the component selection stage, proposing solutions with all the necessary information on parts lists, technical data and CAD drawings.

Installation – saves up to 60% on time
Thanks to positive-locking interfaces, the mechanical components are perfectly aligned and accurately connected right away.

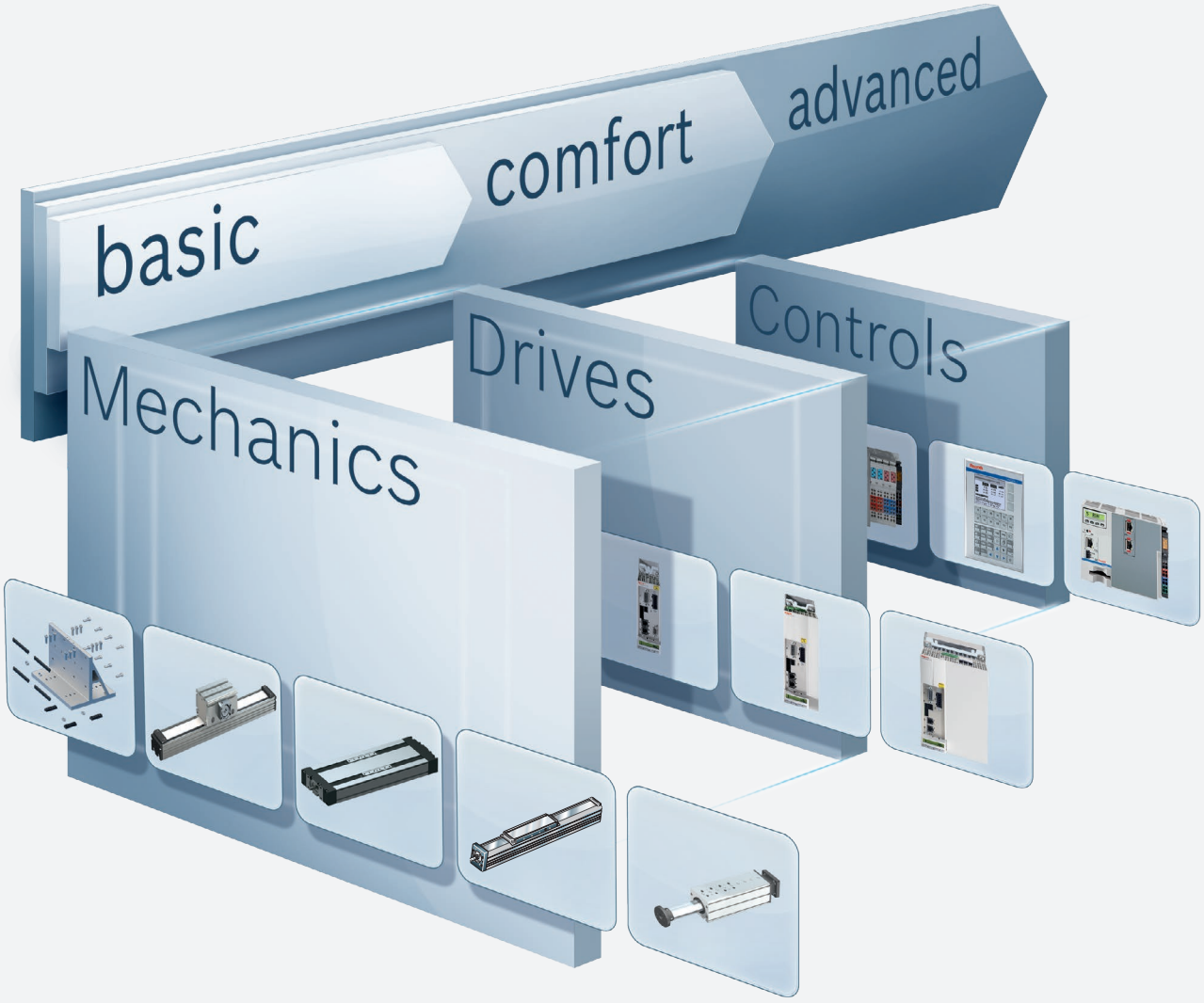
Start-up – reduces your effort by up to 90%
With the smart start-up assistant EasyWizard, parameterization and configuration become child's play. Your handling system will be ready to go in just a few clicks.

Production – more economical and more efficient
Rexroth enhances the system effectiveness still further with smart application tools: The drive controller software outputs maintenance-related messages to the user based on operating hours and travel to help schedule servicing at the right intervals. The result: longer life and reduced failure risk.

Future developments – continuous improvement
Prepare now for future market developments: One of the great features of EasyHandling systems is their systematic openness. The flexibility of the mechanical and electrical components allows you to adapt quickly and efficiently to new production requirements.

EasyHandling – more than just a kit of components

The modular system concept that ideally builds on itself



basic – Made-to-measure mechanics

EasyHandling basic contains all the mechatronic components you need to build complete, **single- or multiple-axis systems** to match your individual needs. All of the component interfaces are systematically standardized, making it possible to combine them at will. Practical tools and aids make selection and configuration even easier.

comfort – Getting started even faster

EasyHandling comfort expands the Basic component range by adding **powerful servo drives with multiple protocol capability**. The universal, smart control units are ideally suited for a variety of handling tasks. Unique: with the **EasyWizard start-up assistant**, linear systems are ready to use after entering just a few product-specific parameters.

advanced – Controls for demanding requirements

With the **freely scalable, high-performing motion logic control system**, EasyHandling advanced makes configuration and handling even easier. Predefined functions covering more than 90 percent of all handling applications eliminate the need for lengthy programming.

For more information about EasyHandling, see the brochure “EasyHandling – more than just a kit of components” R999000044.

Operating conditions

Normal operating conditions

Ambient temperature with Rexroth Servomotor	0 °C ... 40 °C, from 40 °C performance degradation
Ambient temperature mechanic (No passing below the dew point)	-10 °C ... 60 °C
Travel s_{min} 1)	see the CKK/CKR “technical data” table
Admission of dirt	not permissible

1) Minimum travel to ensure a reliable lubrication distribution.

Required and supplementary documentation

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

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

We would also be pleased to send you the documents.

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

Lubrication

Recommended lubricants

Lubrication instructions

Compact modules receive basic lubrication with Dynalub 510 or Dynalub 520 and are only designed for grease lubrication using a hand press.

One-point lubrication or lubrication via pulse lubricant dosing unit upon request.

Lubricant quantities

Lubricant amounts and lubricant intervals, see “Compact Module instructions”.

⚠ **Do not use lubricants with solid particles (e.g. graphite or MoS_2 additives).**

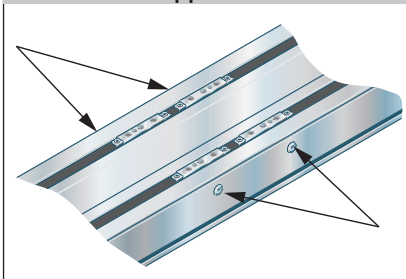
CKK/CKR	Grease (DIN)	Consistency class DIN 51818	Recommended grease	Part number (cartridge, 400 g)
070, 090	KP00K (DIN 51825)	NLGI 00	Dynalub 520	R3416 043 00
110, 145, 200	KP2K (DIN 51826)	NLGI 2	Dynalub 510	R3416 037 00

Short stroke for CKK/CKR

For short-stroke (travel stroke < s_{min}), please consult with us about lubrication:
See minimum travel s_{min} in the chapter on “Technical Data”.

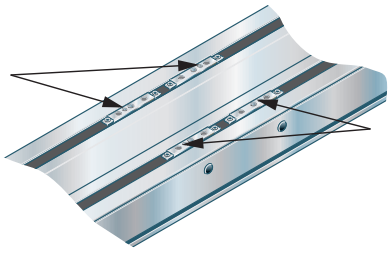
Lube fittings

Lube nipples in frame



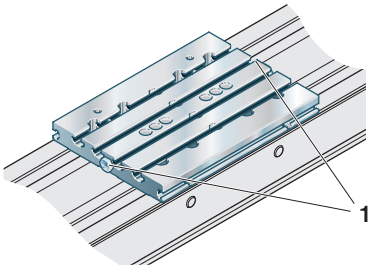
On each side of the frame of the Compact Modules, there are holes through which the lube nipples in the carriage can be accessed. Lubrication from one side only is sufficient.

Lube ports in carriage



There are other lube nipples in the carriage. These are sealed with a set screw before delivery.

Lube nipples in connection plate



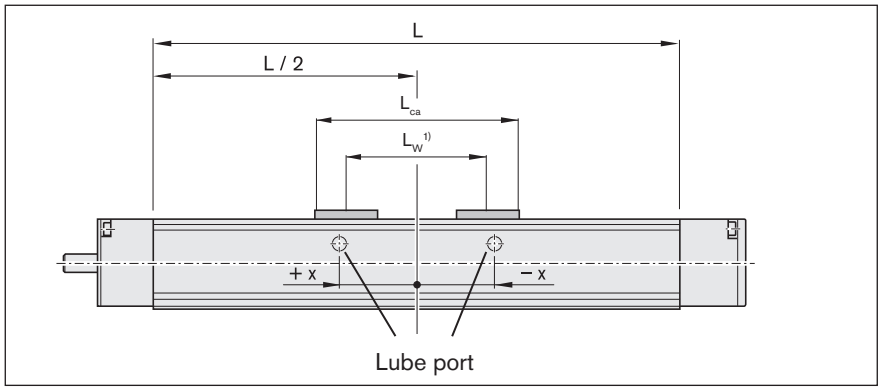
Each connection plate has two funnel type lube nipples (1) located on its end faces. See the chapter on “Connection plates”. Lubrication through only one of the two lube nipples is sufficient.

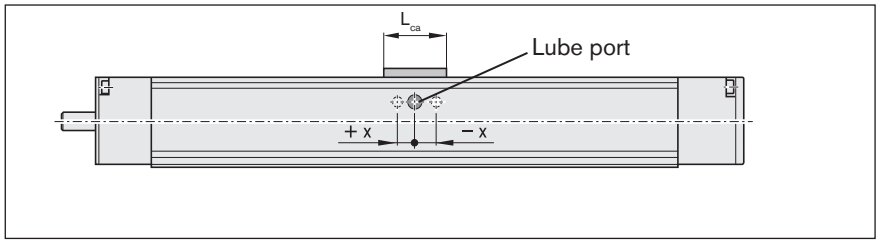
Lubrication

CKK Compact Module

Lube nipples in frame

On each side of the frame of the CKK Compact Modules there are holes through which the lube nipples in the carriage can be accessed. Lubrication from one side only is sufficient.



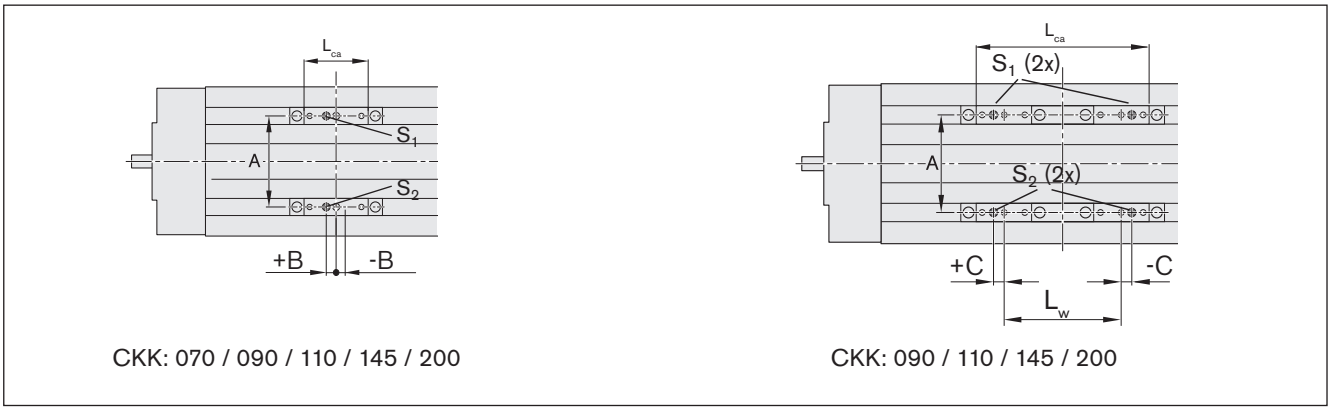


1) Lw = center-to-center distance of carriages (see dimensional drawings)

Size	Carriage option	Carriage length L_{ca} (mm)	Lube nipples in frame (Quantity)	Distance x (mm)	Lube nipples
070	01	32	1	12.5	DIN 3405-D 3
	02	73	1	0.0	
	40	60	1	12.5	
	41	95	1	0.0	
090	01	35	1	0.0	DIN 3405-D 3
	02	100	2	± 32.5	
	05	Variable	2	± Lw/2	
	40	60	1	0.0	
	41	125	2	± 32.5	
110	01	39	1	6.5	DIN 3405-D 3
	02	124	2	± 49.5	
	05	Variable	2	± (Lw/2 + 6.5)	
	40	60	1	6.5	
	41	155	2	± 49.5	
145	01, 06	49	1	7.0	DIN 3405-D 3
	02, 07	149	2	± 57.0	
	05, 10	Variable	2	± (Lw/2 + 7.0)	
	08, 40	80	1	7.0	
	09, 41	190	2	± 57.0	
200	01, 02, 03, 04	79.5	1	–15.0	DIN 3405-A M8x1
	11, 12, 13, 14	254.5	2	± 102.5	
	18	Variable	2	± (Lw/2 + 15.0)	
	40	190	1	–15.0	
	26, 27, 28, 41	305	2	± 102.5	

Lube ports for carriage attachments

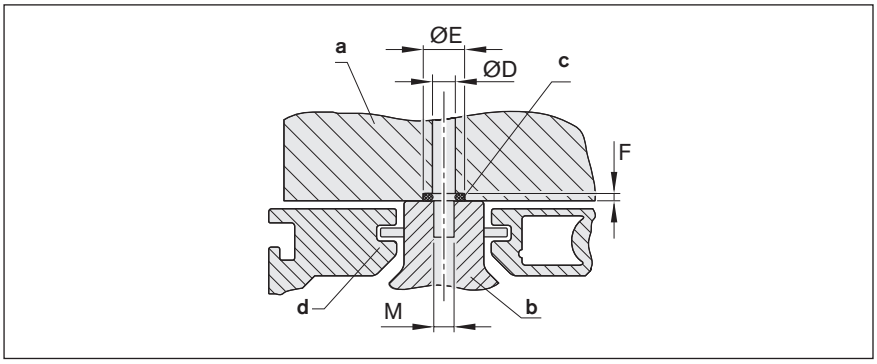
The lube ports S_1, S_2 are sealed with a set screw before delivery. Remove one set screw per carriage to use the lube ports. See the table for connection dimensions and O-rings.



CKK: 070 / 090 / 110 / 145 / 200

CKK: 090 / 110 / 145 / 200

S_1/S_2 = lube ports, for further information see dimensional drawings



a) Customer-built attachment
b) Carriage
c) O-ring
d) Frame

Size	Carriage option	Carriage length	Carriage center to center distance	Dimensions							O-Ring acc. to DIN3771	
		L_{ca} (mm)	L_W (mm)	A	B	C	Ø D ±0.2	Ø D ±0.2	F +0.2	M	Size	Part number
070	01	32	–	40	5.0	–	2.5	5.0	0.6	M3	3 x 1.0	R3411 118 01
	02	73	–		0.0	–						
090	01	35	–	54	6.0	–	3.0	6.2	1.0	M3	3 x 1.5	R3411 001 01
	02	100	–		0.0	–						
	05	Variable	Variable		–	6.0						
110	01	39	–	66	6.5	–	3.0	6.2	1.0	M3	3 x 1.5	R3411 001 01
	02	124	85		–	6.5						
	05	Variable	Variable		–	6.5						
145	01, 06	49	–	88	7.0	–	3.0	6.2	1.0	M3	3 x 1.5	R3411 001 01
	02, 07	149	100		–	7.0						
	05, 10	Variable	Variable		–	7.0						
200	01, 02, 03, 04	79.5	–	130	15.0	–	5.0	9.0	1.0	M4	5 x 1.5	R3411 108 01
	11, 12, 13, 14	254.5	175		–	15.0						
	18	Variable	Variable		–	15.0						

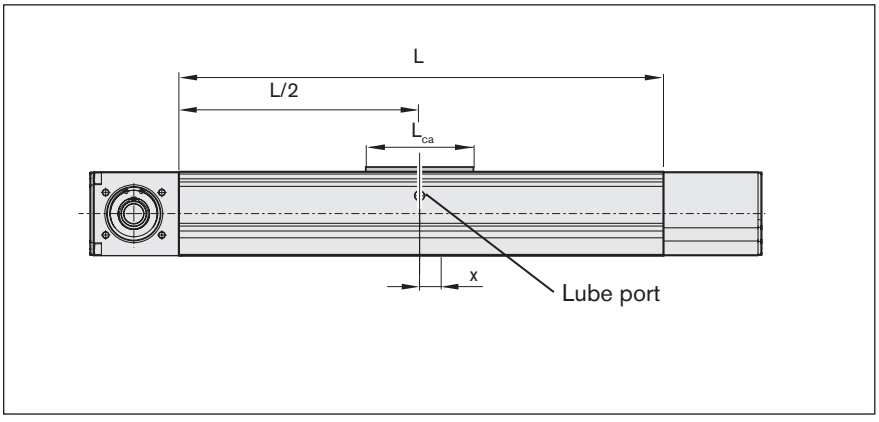
Lubrication

CKR Compact Modules

Lube nipples in frame

On each side of the frame of the CKR Compact Modules, there are holes through which the lube nipples in the carriage can be accessed. Lubrication from one side only is sufficient.

Depending on the carriage option, move to the lubrication position in accordance with the table.

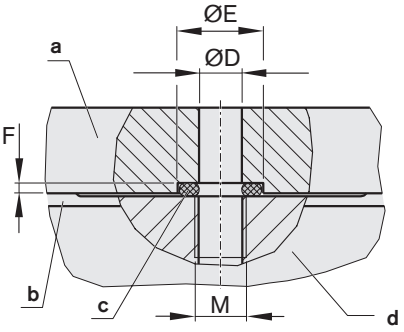


Size	Carriage option	Carriage length L_{ca} (mm)	Distance x (mm)	Lube nipples
070	01	80	0.0	DIN 3405-D 4
	02	108		
	40	60		
	41	95		
090	01	102	0.0	DIN 3405-D 4
	02	108		
	40	60		
	41	125		
110	01	170	41.5	DIN 3405-A M6
	02	215	0.0	
	40	110	41.5	
	41	155	0.0	
145	01	180	50.0	DIN 3405-A M6
	02	240	0.0	
	40	125	50.0	
	41	190	0.0	
200	01	265	59.0	DIN 3405-A M8x1
	02	465	0.0	
	40	190	59.0	
	41	305	0.0	

Lube ports for carriage attachments

The lube ports are sealed with a set screw in the factory before shipment. To use the lube port, the set screw has to be removed. See the table for connection dimensions and O-rings.

1 = lube ports, see dimensional drawings for more information

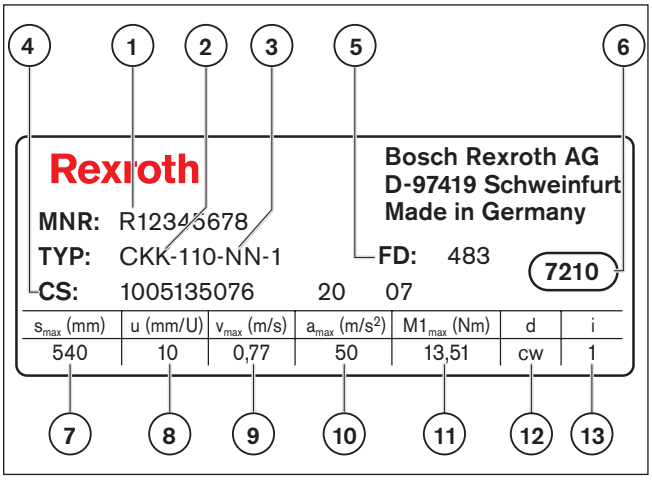


a) Customer-built attachment
b) Carriage
c) O-ring
d) Frame

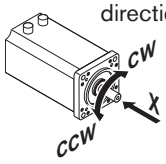
Size	Carriage option	Carriage length L_{ca} (mm)	Dimensions B	Ø D ±0.2	Ø D ±0.2	F +0.2	M	O-Ring acc. to DIN3771 Size	Part number
070	01	80	0.0	2.5	6.0	0.6	M3	3 x 1.5	R3411 001 01
	02	108							
090	01	102	0.0	3.0	10.0	1.7	M4	4 x 2.5	R3411 119 01
	02	156							
110	01	170	41.5	5.0	10.0	1.2	M6	5 x 2	R3411 109 01
	02	215	0.0						
145	01	180	50.0	5.0	10.0	1.2	M6	5 x 2	R3411 109 01
	02	240	0.0						
200	01	265	59.0	6.0	12.2	1.0	M8	8 x 2	R3411 008 01
	02	465	0.0						

Parameterization (commissioning)

Besides reference information for the production of the linear system, there are also technical parameters specified for commissioning on the name plate.



1 Part number
2 Type designation
3 Size
4 Customer information
5 Date of manufacture
6 Manufacturing location
7 s_{max} = max. travel range (mm)
8 u = lead constant without gears (mm/rev)
9 v_{max} = max. speed without gears (m/s)
10 a_{max} = max. acceleration without gear (m/s^2)
11 $M1_{max}$ = max. drive torque at motor journal (Nm)
12 d = Rotation of the motor in a positive direction to move



CW = ClockWise
CCW = Counter ClockWise

13 i = gear ratio

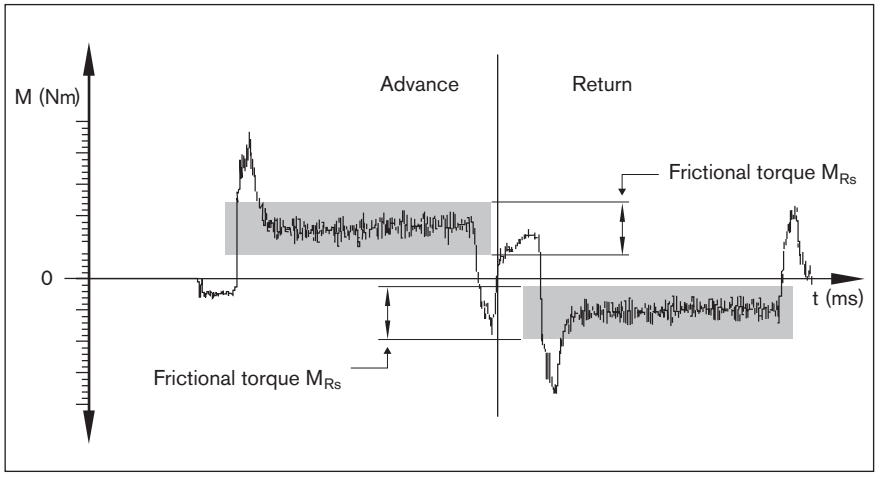
Documentation

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.

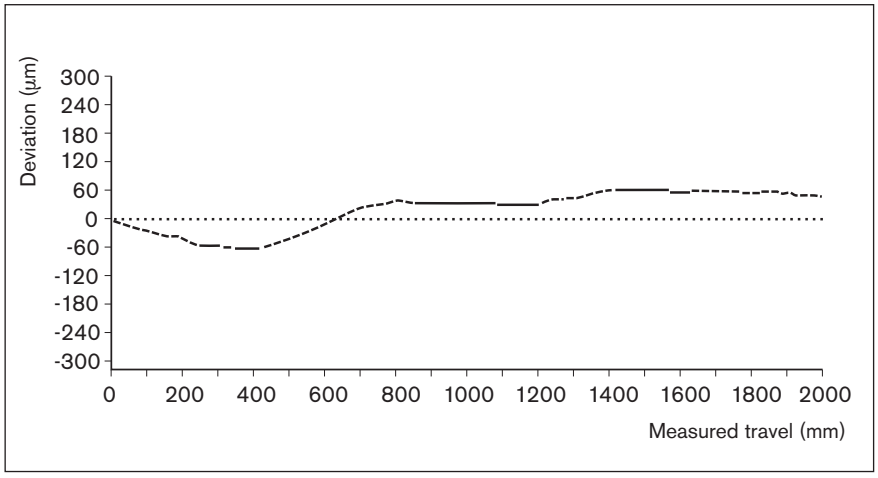
Frictional torque of complete system
Option 02 (contains option 01)

The moment of friction is measured over the entire travel range.



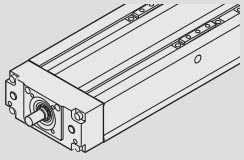
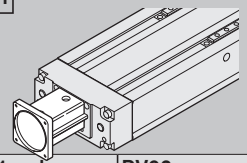
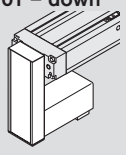
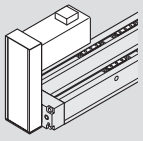
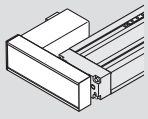
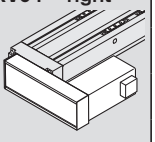
Lead deviation of ball screw drive for CKK Compact Module
Option 03 (contains option 01)

A measurement report in tabular form is provided in addition to the graph (see illustration).



Order example

Configuration and ordering

Short designation, length[1] CKK-110-NN-1, ... mm		Guideway			Drive unit				Carriage					
		Standard	Center holes[2]		Screw journal	Ball screw drive d_0 x P 16 x 5	16 x 10	16 x 16	without connection plate L_{ca} = 39 mm	124 mm	variable[3]	with connection plate L_{ca} = 60 mm	155 mm	
Version														
Without attachment	OF01 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
					Ø11 with keyway	11	12	13						
Flange/coupling	MF01 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
Timing belt side drive	RV01 – down 	01	03	04	Ø11	01	02	03	01	02	05	40	41	
	RV02 – up 													
	RV03 – left 													
	RV04 – right 													

= Mark of the selection area to the decision about design
= Selected option that is to be entered at “Inquiry/Order” in the the order form at the end of the catalog

d_0 = spindle diameter (mm)
P = lead (mm)
L_{ca} = carriage length
i = gear ratio

Length calculation of the linear system

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

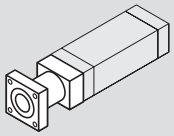
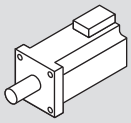
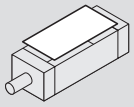
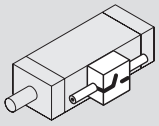
Stroke: s_{eff} = 500 mm
Drive unit: ball screw drive 16 x 10 (d_0 x P)
Excess travel: 2 x P = 20 mm (per side)
Carriage: L_{ca} = 155 mm
Additional length: L_{ad} = 20 mm

L = 500 + 2 x 20 + 155 + 20
L = 715 mm

Also see “Drive design calculation example”

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

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

Motor attachment[4]			Motor[6]		Cover		Switching system[7]	Documentation[9]
								
i =	Attachment kit[5]	for motor	without brake	with brake	Cover strip without	Cover strip with		
–	00	–	00		01	02	Without switch Without mounting duct Without socket plug: 00	01
							Magnetic sensor	
–	01	MSK 030C	84	85			REED sensor: 21	
	03	MSK 040C	86	87			Hall sensor PNP NC contact: 22	
	05	MSM 031C	138	139			Hall sensor PNP NO contact: 23	02
	06	MSM 041B	140	141			Mounting duct: 25	
1	11	MSK 030C	84	85			Socket plug: 17	
	13	MSK 040C	86	87			**Magnetic sensor with plug[8]**	
	15	MSM 031C	138	139			REED sensor: 58	03
	17	MSM 041B	140	141			Hall sensor PNP NC contact: 59	
1.5	21	MSK 030C	84	85				
	23	MSK 040C	86	87				
	25	MSM 031C	138	139				
	27	MSM 041B	140	141				

Type code: CKK-110-NN-1, 715 mm/MF01/01/02/41/01/85/02/21/22/21/25/17/01

Order data	Option	Explanation
Compact Module (short designation)	CKK-110-NN-1, 715 mm	CKK-110 Compact Module, length = 715 mm (1500 max.)
Version	MF01	Flange/coupling for motor attachment acc. to illustration MF01
Guideway	01	Standard frame
Drive unit	02	Planetary screw assembly 16 x 10
Carriage	41	Carriage with connection plate, L_{ca} = 155 mm
Motor attachment	01	Flange/coupling for motor MSK 030C
Motor	85	Motor MSK 030C with brake
Cover	02	With cover strip
1st switch	21	REED sensor (supplied as a loose part)
2nd switch	22	HALL sensor, PNP normally closed contact (supplied as a loose part)
3rd switch	21	REED sensor (supplied as a loose part)
Mounting duct / cable duct	25	Mounting duct (supplied as a loose part)
Socket plug	17	Socket-plug, loose (supplied as a loose part)
Documentation	01	Standard report

Request/order form

Find your local contact person here:
http://www.boschrexroth.com/en/xc/contact/index

Rexroth – Compact Module

Order example

Order data	Option	Explanation
Compact Module (short designation)	CKK-110-NN-1, 715 mm	CKK-110 Compact Module, length = 715 mm (1500 max.)
Version	MF01	Flange/coupling for motor attachment acc. to illustration MF01
Guideway	01	Standard frame
Drive unit	02	Planetary screw assembly 16 x 10
Carriage	41	Carriage with connection plate, L_{ca} = 155 mm
Motor attachment	01	Flange/coupling for motor MSK 030C
Motor	85	Motor MSK 030C with brake
Cover	02	With cover strip
1st switch	21	REED sensor (supplied as a loose part)
2nd switch	22	HALL sensor, PNP normally closed contact (supplied as a loose part)
3rd switch	21	REED sensor (supplied as a loose part)
Mounting duct / cable duct	25	Mounting duct (supplied as a loose part)
Socket plug	17	Socket-plug, loose (supplied as a loose part)
Documentation	01	Standard report

To be completed by customer: Inquiry ☐ **/ Order** ☐
Compact Module

(short designation): _____, length _____mm

Version = ☐☐☐☐
Guideway = ☐☐
Drive unit = ☐☐
Carriage = ☐☐
└ Carriage with center-to-center distance[1] └ ☐☐☐
Motor attachment = ☐☐
└ Geometry motor code[2] └ ☐☐-☐☐-☐☐☐-☐☐☐-☐☐☐-Ⓜ☐☐-☐☐☐-☐☐☐
Motor = ☐☐☐
Cover = ☐☐
1st switch = ☐☐
2nd switch = ☐☐
3rd switch = ☐☐
Mounting duct / cable duct = ☐☐
Socket plug = ☐☐
Documentation = ☐☐

1) Only required for carriage options with variable center-to-center distance.
2) Only required for “Mounting kits for motors according to customer specification”.

Quantity Order of: _____ pcs, _____ per month, _____ per year, per order, or _____
Comments:

Sender

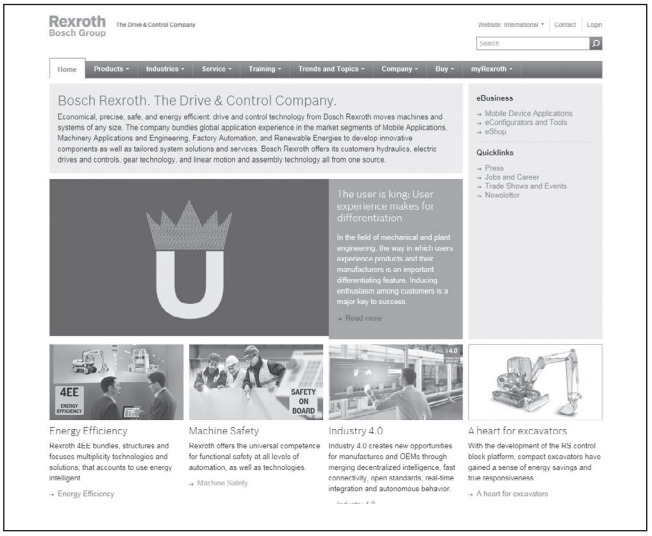
Company: _____
Address: _____
_____
_____

Responsible person: _____
Department: _____
Telephone: _____
Fax: _____

Further information

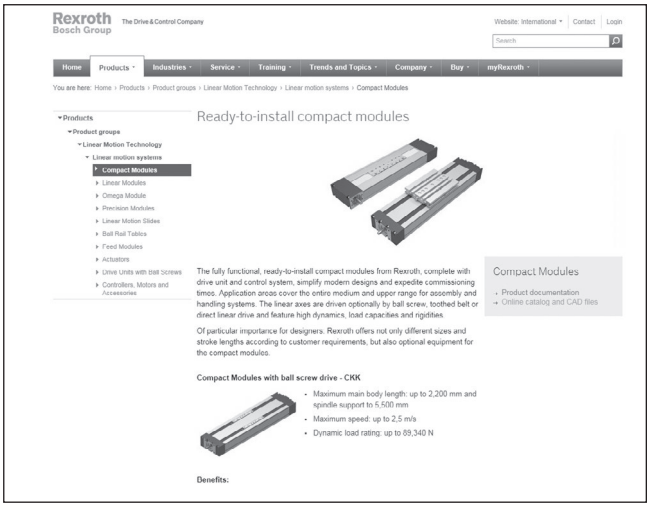
Bosch Rexroth homepage:

http://www.boschrexroth.com



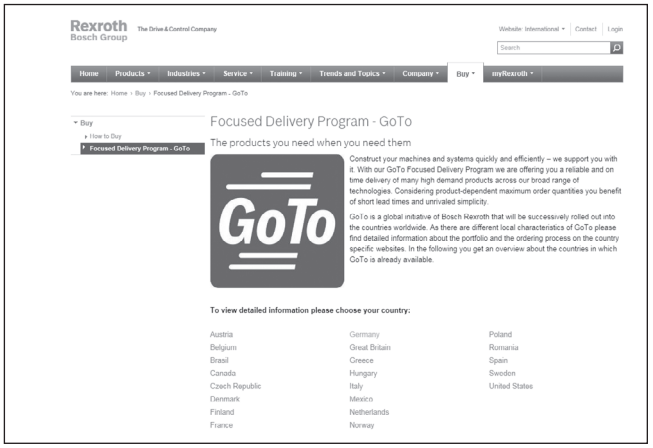
Compact Module product information:

http://www.boschrexroth.com/en/xc/products/product-groups/linear-motion-technology/linear-motion-systems/compact-modules/index



GoTo Europe:

http://www.boschrexroth.com/goto



The Drive & Control Company

Rexroth
Bosch Group

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

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

R999000499 (2017-04)