Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

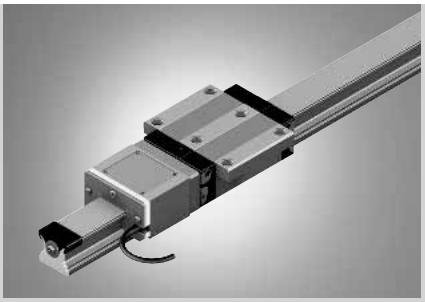
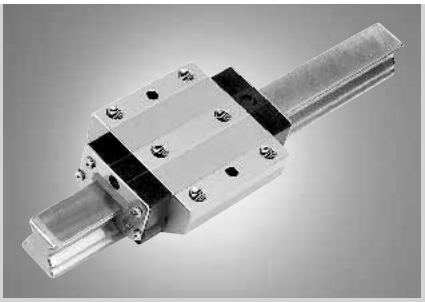
Compact Modules

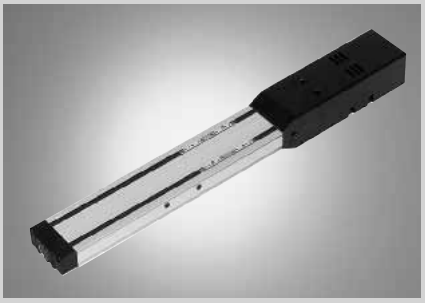
with ball screw drive and toothed belt drive

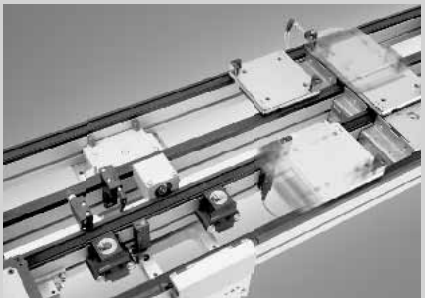
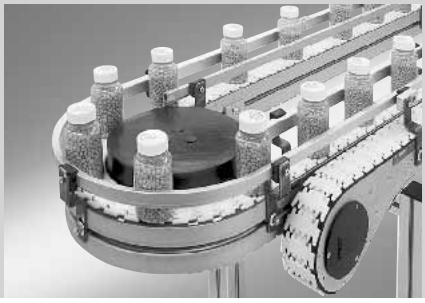
The Drive & Control Company

Linear Motion and Assembly Technologies

Ball Rail Systems
Roller Rail Systems
Linear Bushings and Shafts
Ball Screw Drives
Linear Motion Systems
Basic Mechanical Elements
Manual Production Systems
Transfer Systems

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Compact Modules

Product overview of Compact Modules

Compact Modules are precision, ready-to-install linear motion systems characterized by their high performance, compact design, and good price/performance ratio. Compact Modules are available at short notice and in any desired length.

The benefits

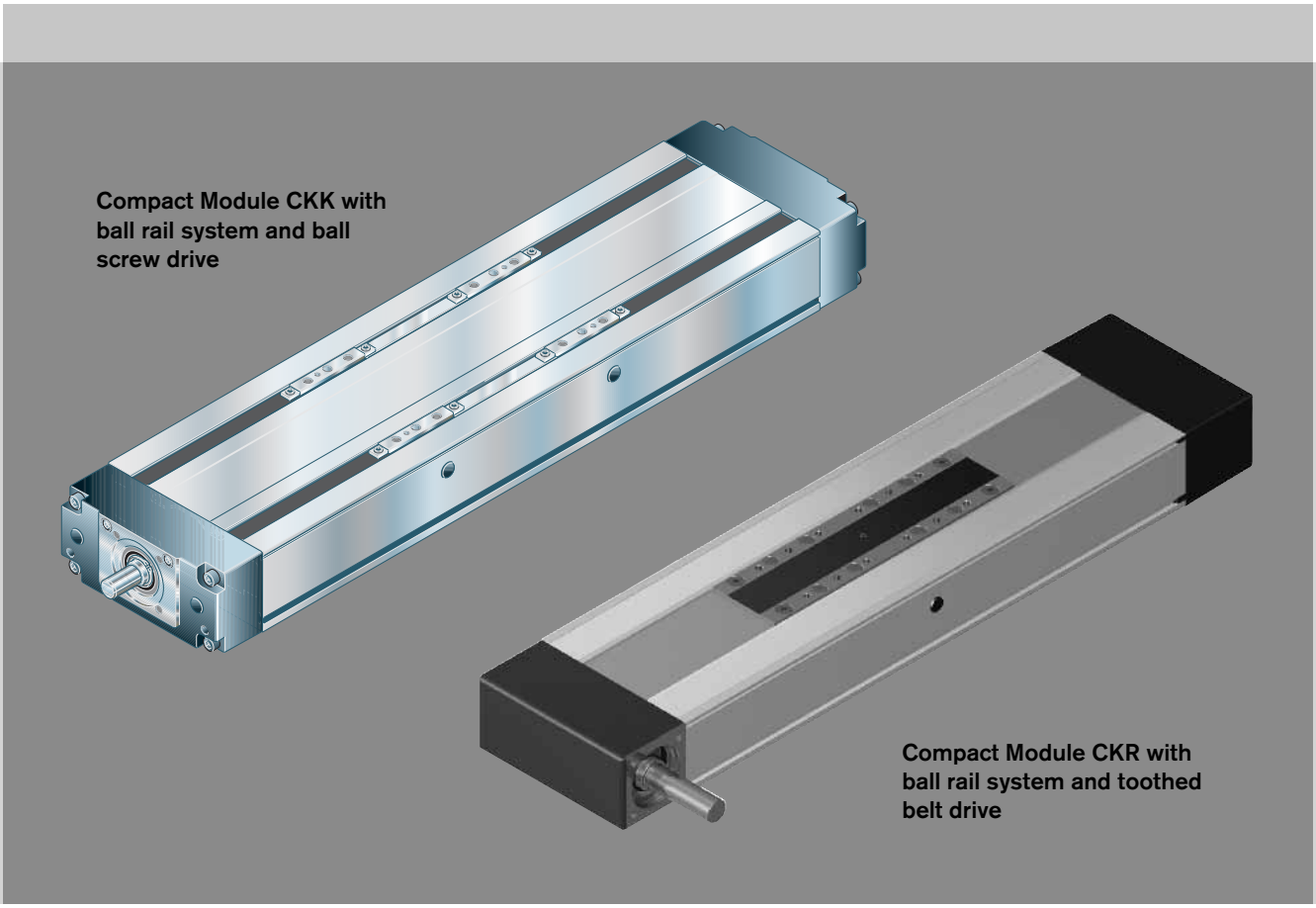
- Two integrated zero-clearance ball rail systems provide optimized travel performance, high load capacities, and high rigidity
- High travel speed with high precision and smooth operation over long lengths
- Easy motor attachment by means of locating feature and fastening threads on drive head
- Adjustable switches over the entire travel range, switch activation without switching cam
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) from both sides or via the carriage
- Precise alignment and secure fastening of attachments with threads and pin holes in carriage
- Identical external dimensions, similar accessories and attachments for Compact Module types CKK and CKR

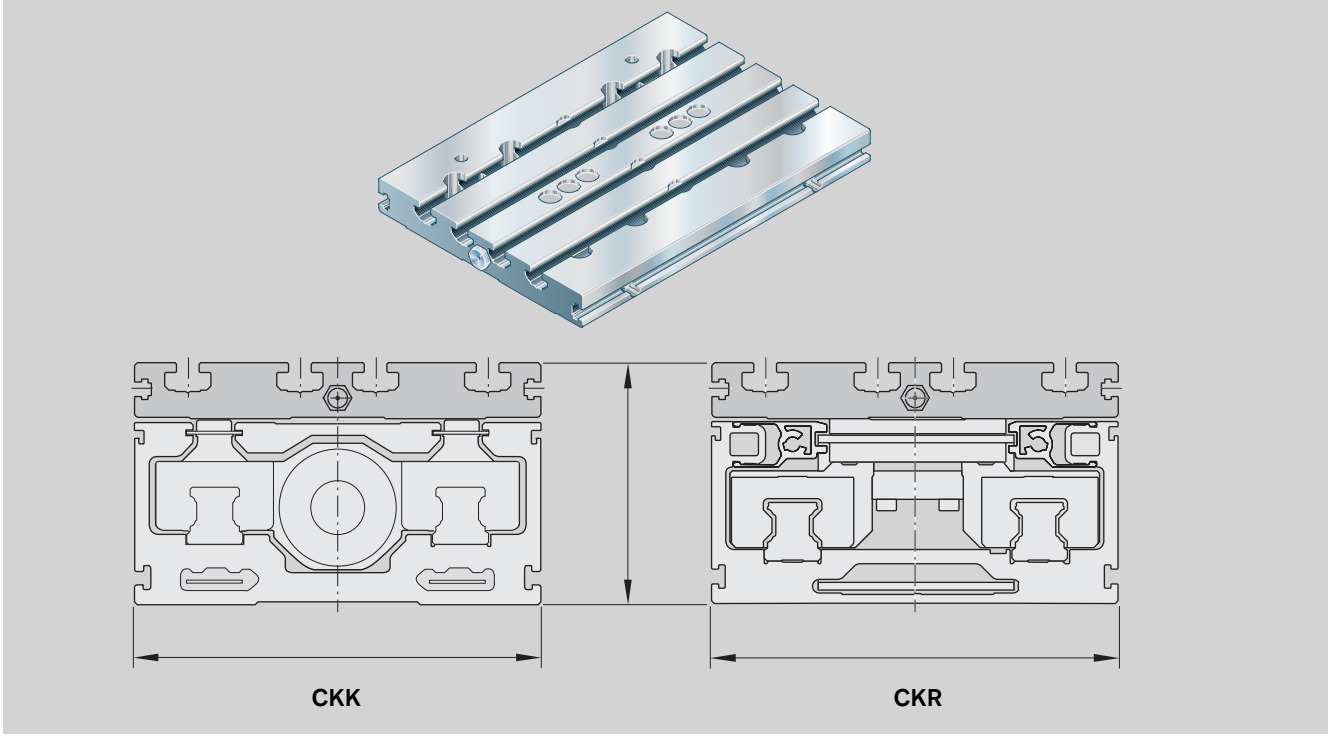
Structural design

- Extremely compact precision aluminum profile with two integrated ball rail systems for optimized travel performance and movement of large masses at high travel speed
- Ready-to-install Compact Modules in any length up to L_{max}
- Carriage made of aluminum with integrated runner blocks

Attachments

- Maintenance-free digital servo drives with integrated brake and attached feedback
- Three-phase stepping motors
- Reed or Hall sensors
- Socket with mating plug for the switches
- Mounting duct made of profiled aluminum



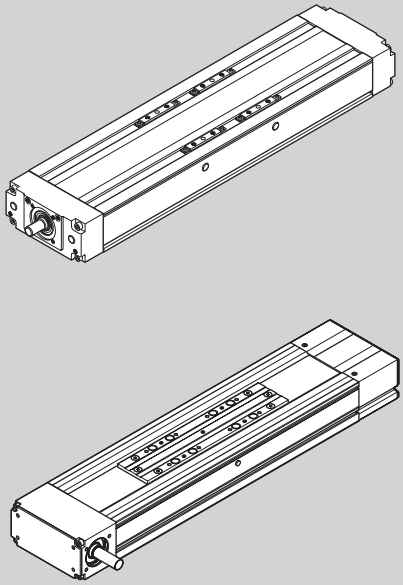


Due to the connection plates, CKK and CKR have the same connection dimensions.

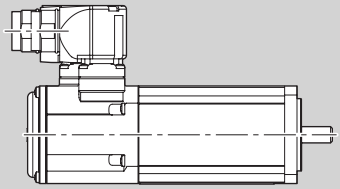
Product overview of motors and controllers

Motor selection based on drive controllers and control system

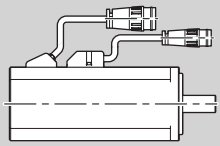
Several motor-controller combinations are available in order to provide the most cost-effective solution for every customer application.
When dimensioning the drive unit, always consider the motor-controller combination.
Refer to the “Control systems, Electrical accessories” catalogs for more information about motors and control systems.



Digital AC servo motor

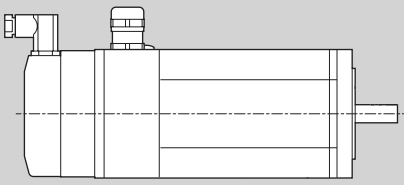


MSK



MSM

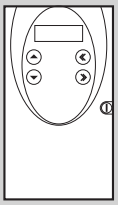
Three-phase stepping motor



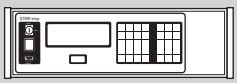
VRDM

Indradrive

Ecodrive Cs

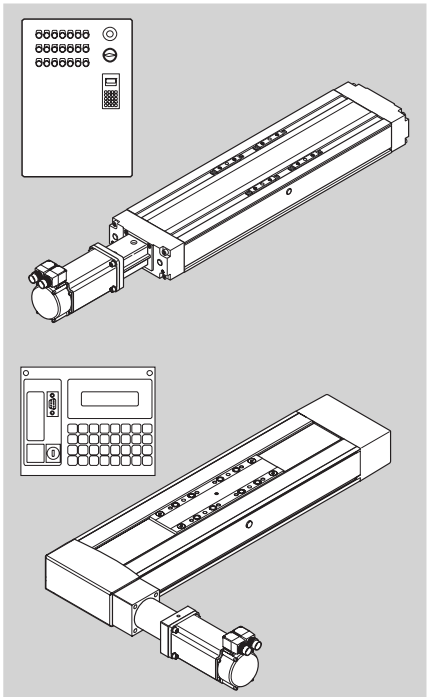


SD326
SD328



Single and multi-axis positioning control system with power pack

A complete solution



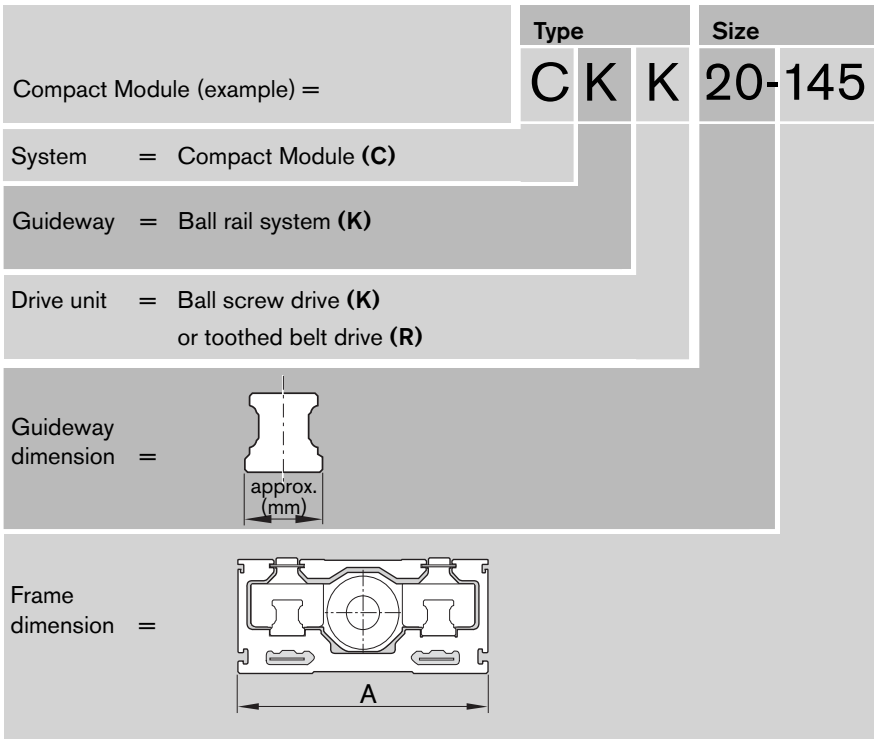
Compact Modules are available as complete solutions with motor, controller unit, and control system.

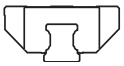
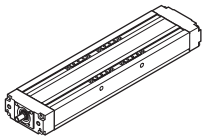
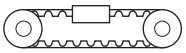
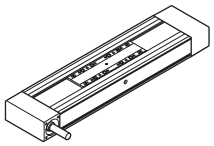
Overview of types with load capacities

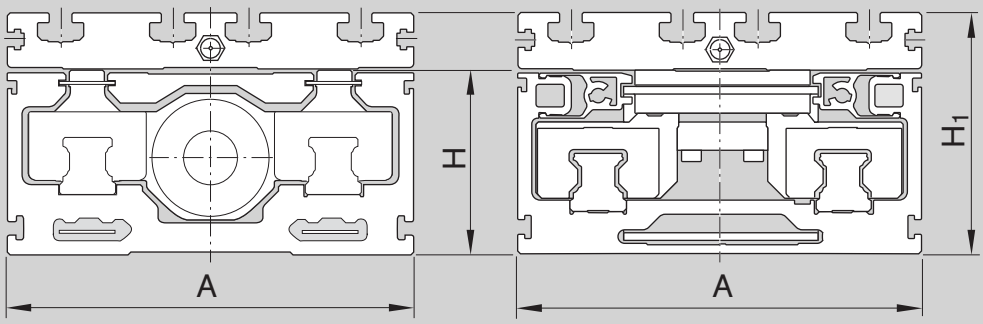
Type designation (size)

Compact Modules are identified by the type designation and size.

The type designations are also assigned to the design styles with the same external features but without drive unit.



	Type	Guideway	Drive unit	Compact Module	
Compact Modules	CKK	 Ball rail system	 Ball screw drive		
	CKR	 Ball rail system	 Toothed belt drive		



CKK **CKR**

Compact Module	Dimensions A x H (mm)	H_1	Dynamic load capacity C (N)	
			one carriage with CKK short carriage with CKR	two carriages with CKK long carriage with CKR
CKK 12-90	90 x 40	56	4 620	7 500
CKK 15-110	110 x 50	66	15 600	25 340
CKK 20-145	145 x 65	85	37 600	61 080
CKK 25-200	200 x 100	127	55 000	89 340
CKR 12-90	90 x 40	56	4 620	7 500
CKR 15-110	110 x 50	66	14 560	23 650
CKR 20-145	145 x 65	85	34 800	56 530
CKR 25-200	200 x 100	127	55 000	89 340

Note: All Compact Modules are also available without a drive unit.

Compact Modules CKK Compact Modules with ball screw drive (CKK)

Product overview

Compact Modules are precision, ready-to-install linear motion systems characterized by their high performance and compact design.
Favorable price/performance ratio and fast delivery times.

Structural design

- Extremely compact precision aluminum profile with two integrated ball rail systems
- Precision ball screw drive according to tolerance grade 7 with backlash-free nut system
- Fixed bearing end block made of aluminum with two-row, preloaded angular-contact thrust ball bearing
- Floating bearing end block with double ball bearings
- One or two carriages made of aluminum with integrated runner blocks

Attachments

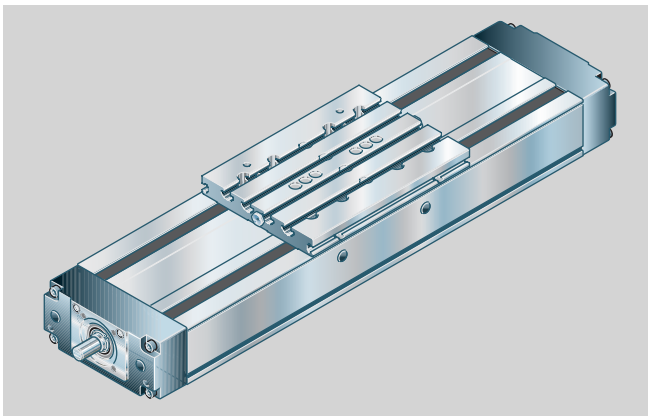
- Maintenance-free digital AC servo drives with integrated brake and attached feedback or stepping motors
- Motor mount and coupling or timing belt side drive for motor attachment
- Switches
- Socket with mating plug for the switches
- Mounting duct made of profiled aluminum

Other distinguishing features

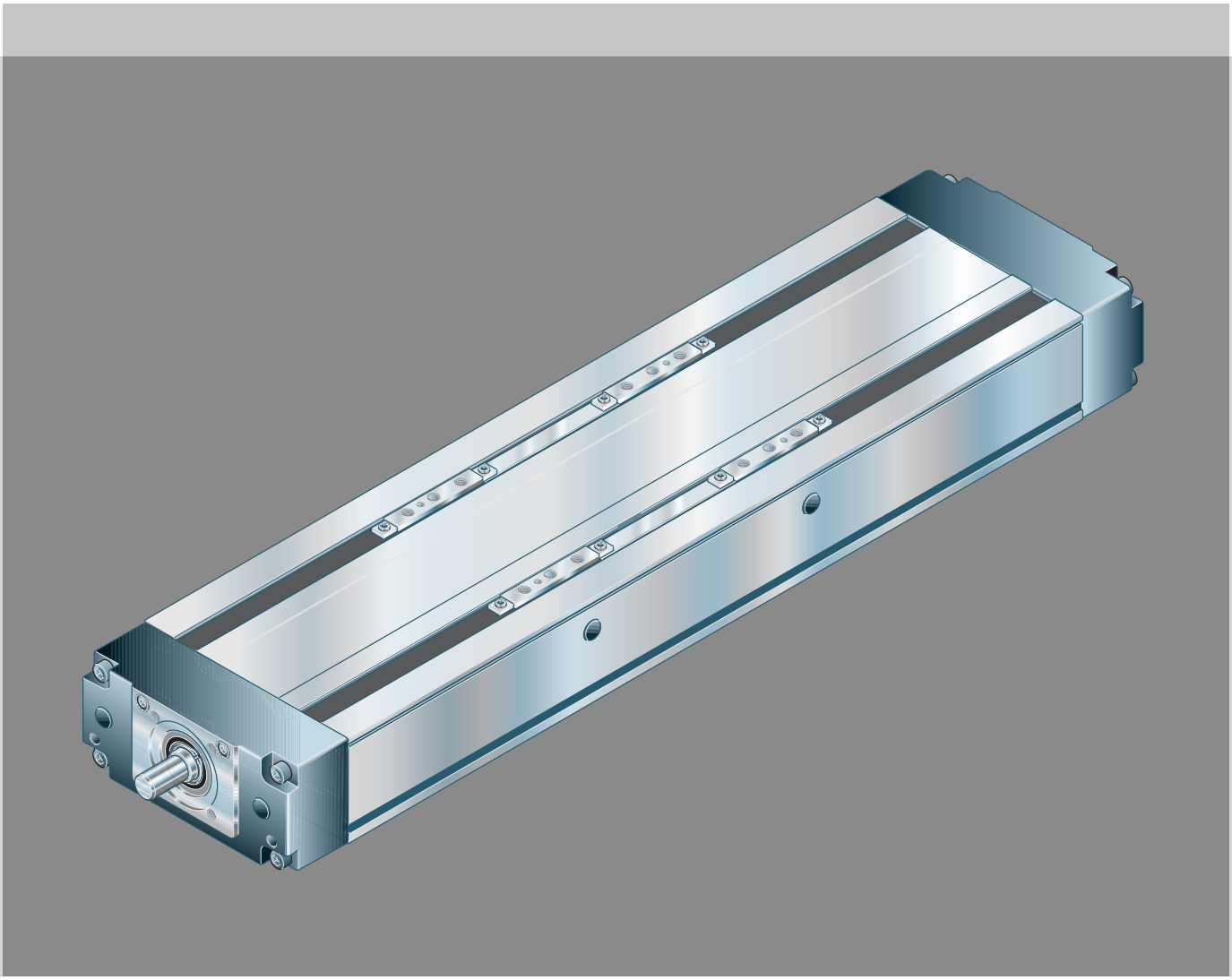
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) of ball rail systems and ball screw drive at both sides
- Easy motor attachment by means of locating feature and fastening threads
- Precise alignment and secure fastening of attachments with threads and pin holes and through one or two carriages
- Internal components protected by rigid aluminum cover and two gap-type seals made of polyurethane strip reinforced with integrated steel cords
- Adjustable switches over the entire travel range, switch activation without switching cam
- Two integrated zero-clearance ball rail systems provide optimized travel performance, high load capacities, and high rigidity
- Exceptionally low profile due to centrally located ball screw
- High positioning accuracy and repeatability provided by ball screw drive with zero-backlash nut system
- High travel speeds and high precision over long lengths with ball rail systems, large screw diameters and screw leads, and double floating bearings

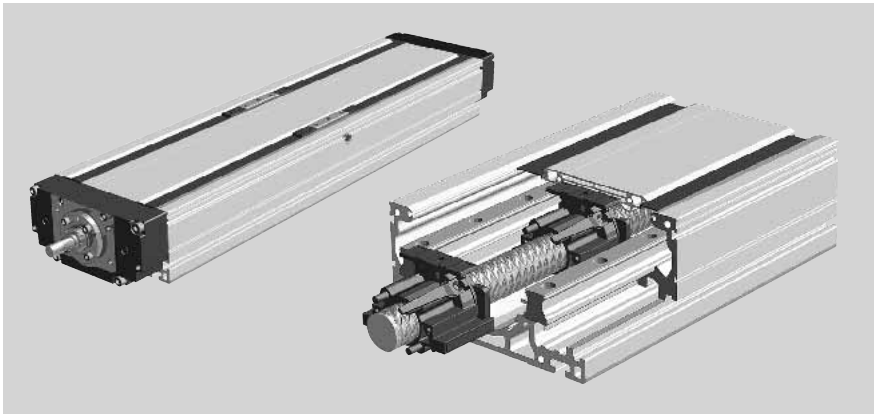
Drive controllers and control systems

For mounting and maintenance, see “Instructions for Compact Modules CKK” RE 82 671

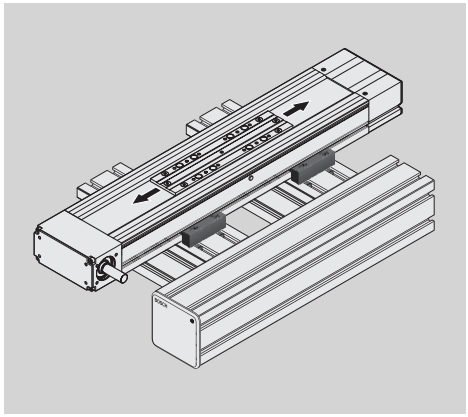


Connection plate for easy installation





Screw support for CKK 25-200



Connection elements for fastening Compact Modules

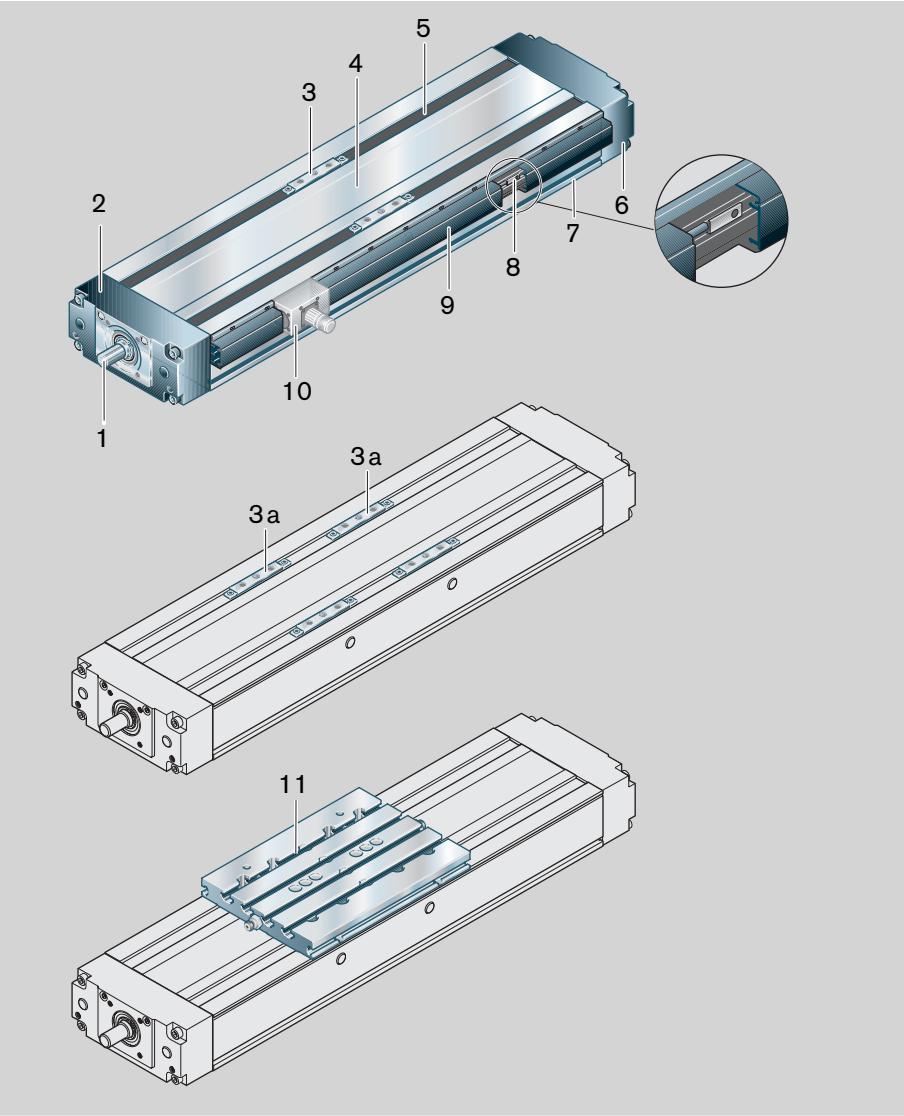
Compact Modules CKK

Structural design

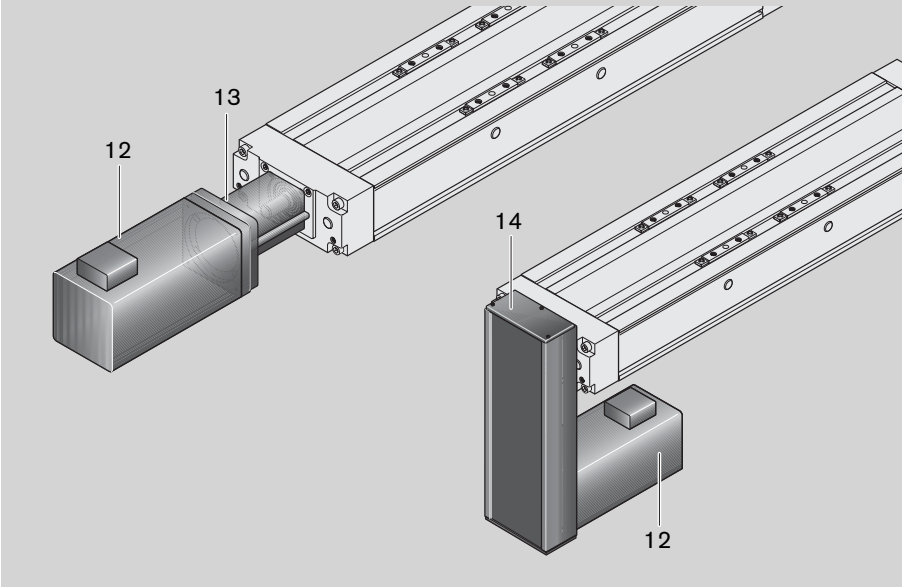
Structural design CKK

1 Ball screw drive with zero-backlash, cylindrical single nut
2 Floating bearing end block
3 Carriage with integrated runner blocks
3a Two carriages with two integrated runner blocks each
4 Aluminum cover
5 Gap-type seal made of PU strip (recirculating)
6 Fixed bearing end block
7 Frame

Attachments:
8 Magnetic field sensor
9 Mounting duct
10 Socket/plug
11 Connection plate

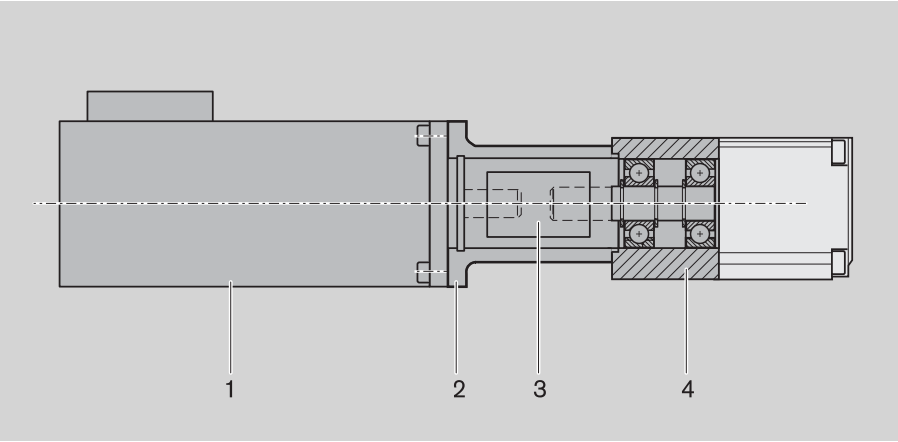


12 Motor
13 Motor mount and coupling
14 Timing belt side drive



Structural design of motor mount and coupling

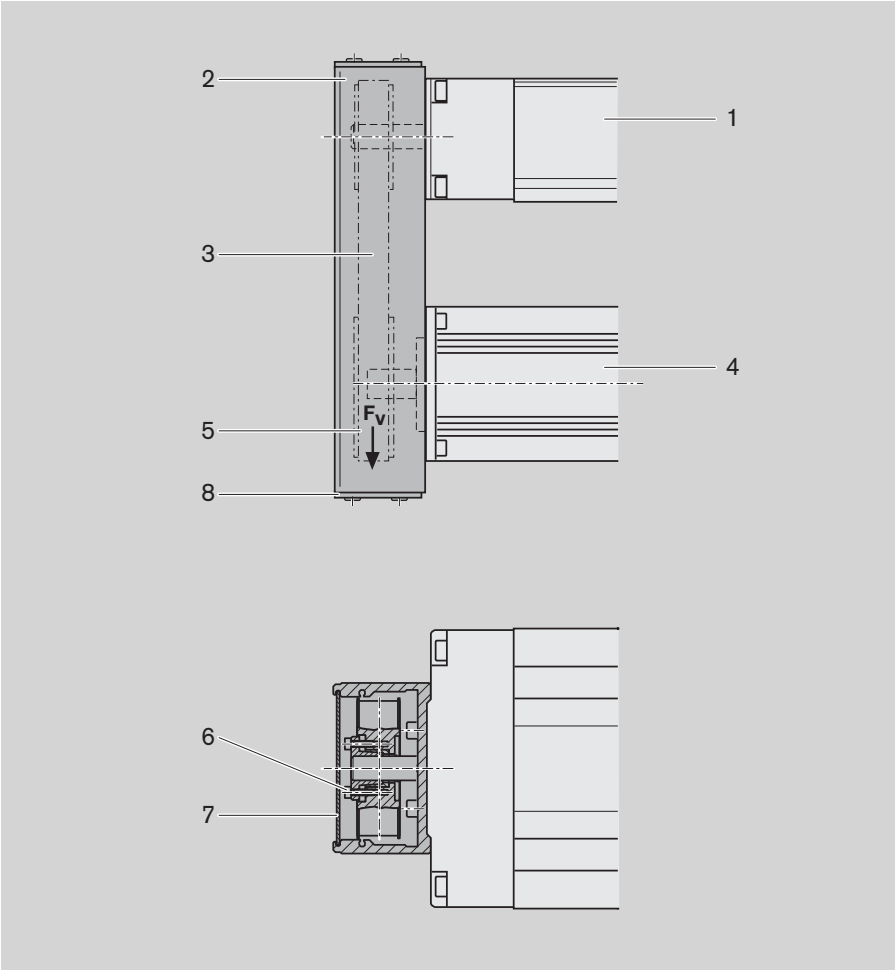
A motor can be attached to all Compact Modules with ball screw drive by means of a motor mount and coupling.
The motor mount serves to fasten the motor to the Compact Module and acts as a closed housing for the coupling.
The motor's drive torque is transmitted stress-free through the coupling to the Compact Module's drive shaft.
Our standard couplings compensate the system's thermal expansion.
If installing third-party couplings, thermal expansion must be considered.



1 Motor
2 Motor mount
3 Coupling
4 Compact Module

Structural design of timing belt side drive

All Compact Modules 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 motor mount and coupling.
The compact, closed housing serves as protection for the belt and as a motor bracket.
Various gear ratios are also available:
– i = 1 : 1
– i = 1 : 1.5
– i = 1 : 2
The timing belt side drive can be installed in four directions:
– below, above (RV01 and RV02)
– left, right (RV03 and RV04)



1 Compact Module
2 Extruded anodized aluminum profile
3 Toothed belt
4 AC servo motor
5 Pre-tensioning the toothed belt: Apply pretensioning force F_v to motor (F_v is provided upon delivery)
6 Fastening of belt pulleys with tensioning units
7 Cover plate
8 Cover

Compact Modules CKK

Technical data

General technical data

Load capacities and moments

Size	Number of carriages	Ball screw	Dynamic load capacity C (N)			Dynamic moments		Planar moment of inertia		Maximum length	Moved mass
			Guideway	Ball screw	Fixed bearing						
		d_0 x P				M_t (Nm)	M_L (Nm)	I_y (cm^4)	I_z (cm^4)	L_{max} (mm)	m_b (kg)
CKK 12-90	1	12 x 2	4620	2240	6900	125	16	14.32	124.4	750	0.36
		12 x 5		3800							
		12 x 10		2500							
	2 (l_m = 65 mm)	12 x 2	7500	2240	6900	200	240	14.32	124.4	750	0.59
		12 x 5		3800							
		12 x 10		2500							
CKK 15-110	1	16 x 5	15600	12300	13400	515	80	37.74	318.7	1500	0.52
		16 x 10		9600							
		16 x 16		6300							
	2 (l_m = 85 mm)	16 x 5	25340	12300	13400	835	1075	37.74	318.7	1500	0.86
		16 x 10		9600							
		16 x 16		6300							
CKK 20-145	1	20 x 5	37600	14300	17000	1650	255	114.10	986.4	1800	1.21
		20 x 20		9100							
		20 x 40		14000							
		25 x 10		15700							
	2 (l_m = 100 mm)	20 x 5	61080	14300	17000	2685	3050	114.10	986.4	1800	2.06
		20 x 20		9100							
		20 x 40		14000							
		25 x 10		15700							
CKK 25-200	1	32 x 5	55000	21500	26000	3570	540	612.00	3008.0	2200 (with SPU 5500)*	3.18
		32 x 10		31700							
		32 x 20		19700							
		32 x 32		19500							
	2 (l_m = 175 mm)	32 x 5	89340	21500	26000	5800	7810	612.00	3008.0	2200 (with SPU 5500)*	5.20
		32 x 10		31700							
		32 x 20		19700							
		32 x 32		19500							

l_m = Center-to-center distance of carriages * = See section “Screw support for CKK 25-200” for lengths of 2,200 to 5,500

Maximum permissible loads

Size	Number of carriages	Maximum permissible forces (N)			Maximum permissible moments (Nm)	
		F_{z1max}	F_{z2max}	F_{ymax}	M_{tmax}	M_{Lmax}
CKK 12-90	1	4 620	4 620	2 490	125	16
	2	7 500	7 500	4 050	200	240
CKK 15-110	1	12 000	6 000	3 480	198	31
	2	19 490	9 740	5 650	322	414
CKK 20-145	1	29 000	14 500	8 410	638	100
	2	47 110	23 550	13 660	1 030	1 180
CKK 25-200	1	42 200	21 100	12 230	1 372	209
	2	68 550	34 270	19 880	2 228	2 999

Acceptable loads
(recommended from experience)

With respect to the desired service life, loads up to about 20% of the characteristic dynamic values (C, M_t, M_L) have proven to be acceptable.

At the same time, the following may not be exceeded:
- maximum permissible loads,
- permissible drive torque,
- permissible travel speed.

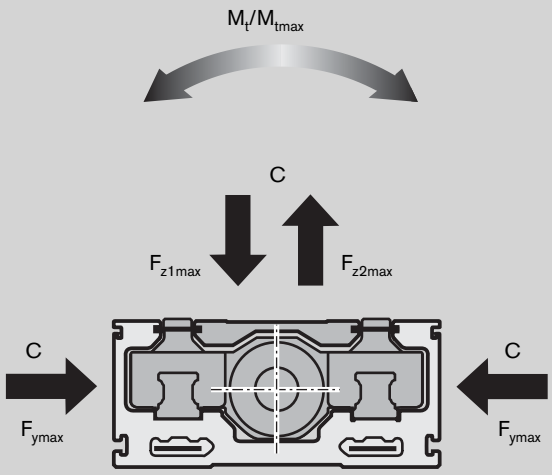
Modulus of elasticity E

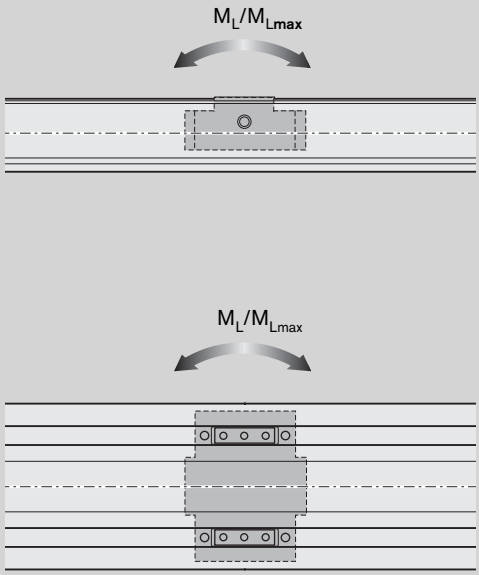
$E = 70{,}000\ N/mm^2$

Weight
Weight calculation without motor and switch.

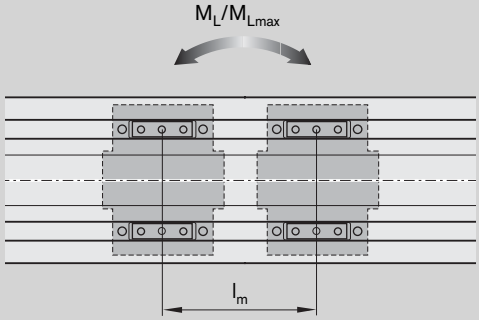
Weight formula:
Weight (kg/mm) · length L (mm) + weight of all parts independent of length (carriage, end blocks, etc.) (kg)

Size	Ball screw	Number of carriages	Weight (kg)
CKK 12-90	with	1	0.0055 · L + 0.9
		2	0.0055 · L + 1.2
CKK 15-110	with	1	0.0092 · L + 1.6
		2	0.0092 · L + 2.0
CKK 20-145	with	1	0.0178 · L + 3.0
		2	0.0178 · L + 3.9
CKK 25-200	with	1	0.0299 · L + 6.7
		2	0.0299 · L + 8.7





Compact Module with one carriage



Compact Module with two carriages
l_m = Center-to-center distance of carriages

Note on dynamic load capacities and moments
Determination of the dynamic load capacities and moments is based on a travel life 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.

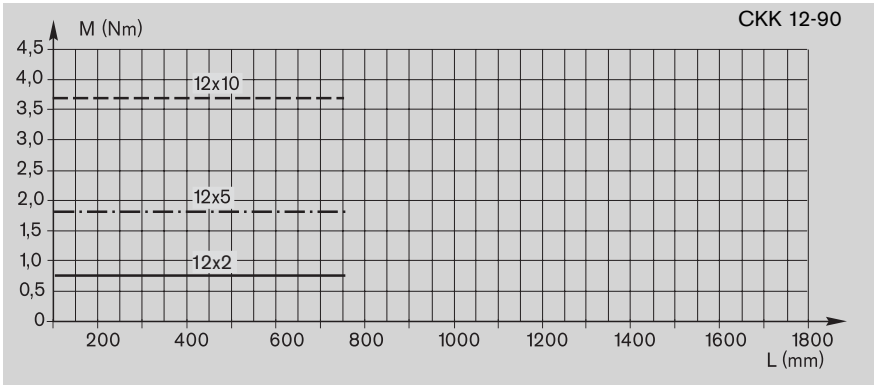
Compact Modules CKK

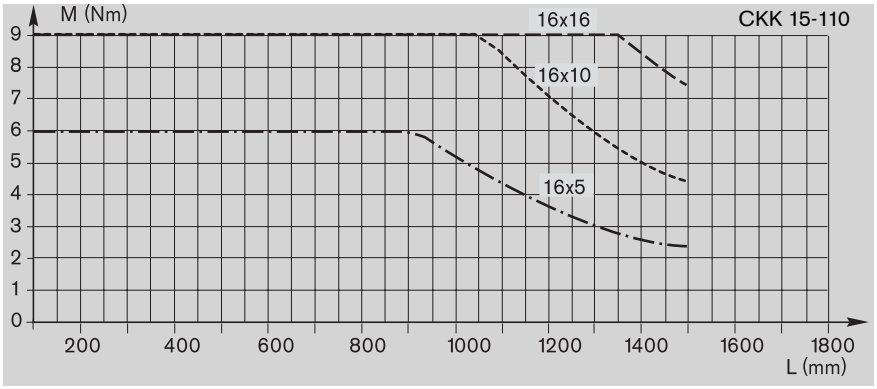
Technical data

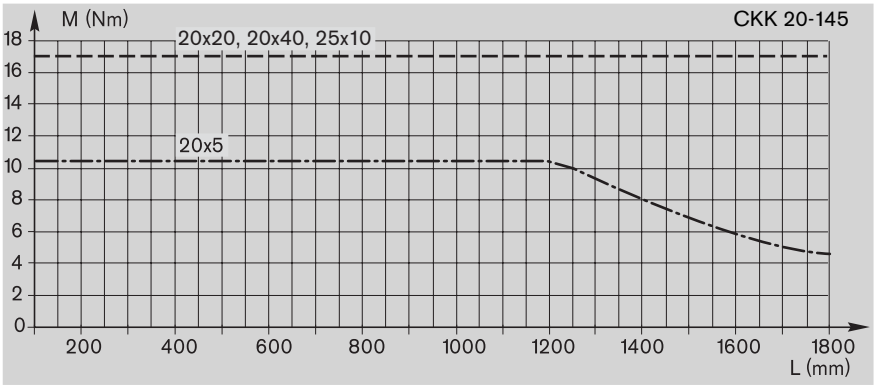
Permissible drive torque M_{perm}

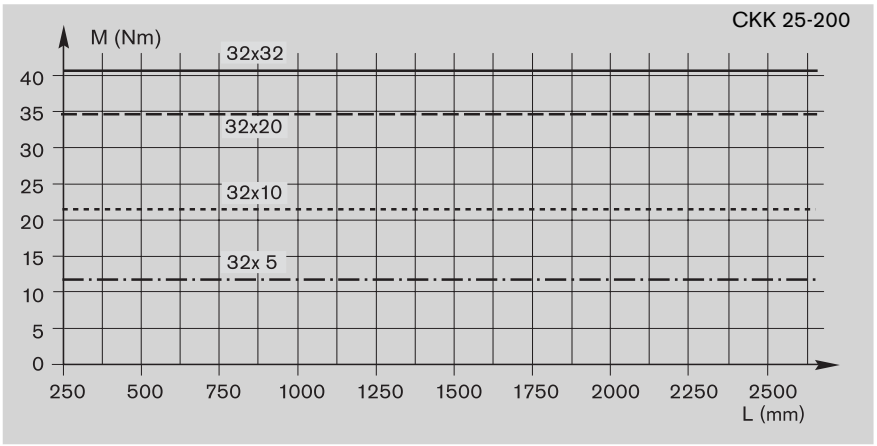
The values shown for M_{perm} are applicable under the following conditions:
- Horizontal operation
- Ball screw journal without keyway
- No radial loads on ball screw journal

Consider the coupling's rated torque!









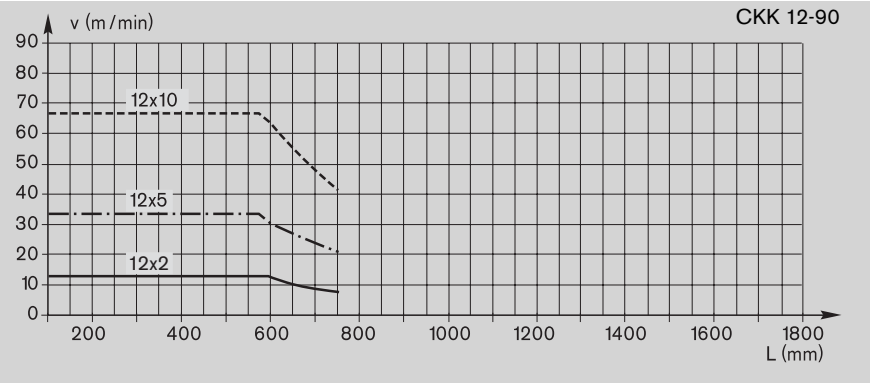
See section "Screw support for Compact Module CKK 25-200" for technical data of lengths 2,200 to 5,500.

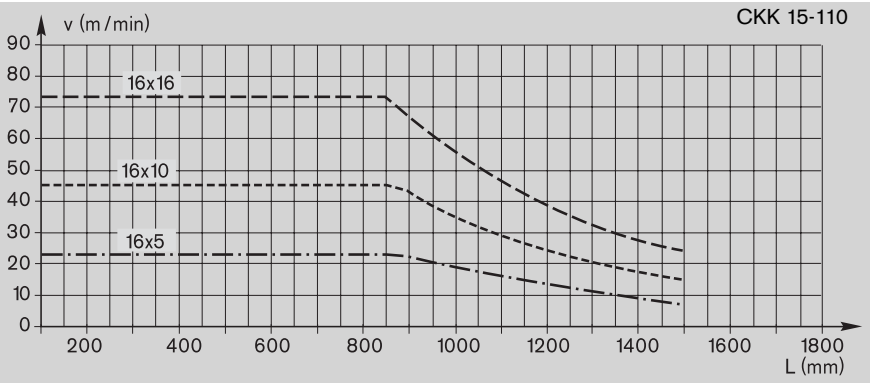
Ball screw journal with keyway
For reasons of stress concentration and a reduction of the effective diameter, observe the following maximum values for drive torque!

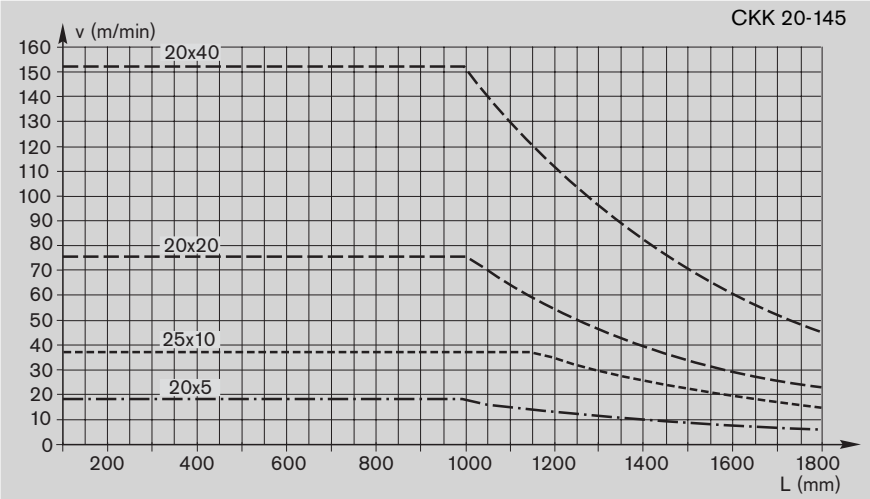
Size	M_{perm} (Nm)
CKK 12-90	–
CKK 15-110	5.0
CKK 20-145	11.5
CKK 25-200	18.0

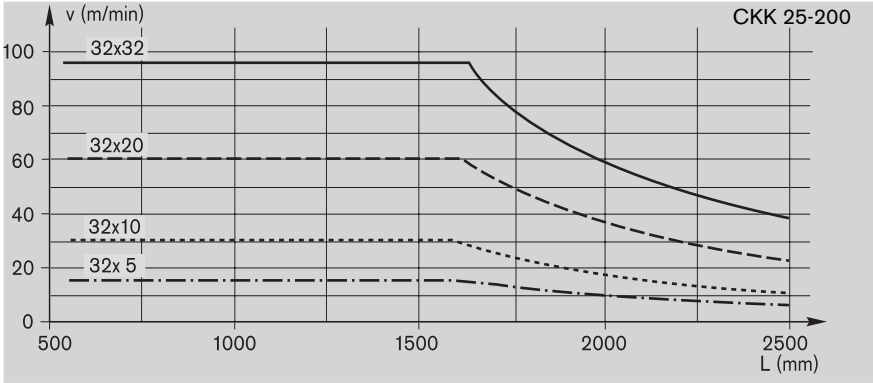
Permissible speed v

Observe motor speed!









See section “Screw support for Compact Module CKK 25-200” for technical data of lengths 2,200 to 5,500.

Compact Modules CKK

Technical data

Specifications of timing belt side drive, floating bearing end for motor attachment via timing belt side drive

Motor		MSM 030C / MSK 030C					MSM 040B / MSK 040C					
Frictional torque M_{RRv} (Nm)		0.35					0.4					
		Permissible torque up to length L[1] = … at			Reduced mass moment of inertia at		Permissible torque up to length L[1] = … at			Reduced mass moment of inertia at		
Gear ratio i = …			i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 1.5	i = 1	i = 1.5	
Size	Ball screw d_0 x P	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)	
CKK 12-90	12 x 2	750	0.7	0.5	38	14						
	12 x 5	750	1.8	1.2								
	12 x 10	750	2.5	1.7								
CKK 15-110	16 x 5	1400	2.5	1.7	41	16	900	6.0	4.0	240	82	
	16 x 10	1500	2.5	1.7			1200	6.9	4.6			
	16 x 16	1500	2.5	1.7			1500	6.9	4.6			
CKK 20-145	20 x 5						1400	7.5	5.0	250	85	
	20 x 20						1800	7.5	5.0			
	20 x 40						1800	7.5	5.0			
	25 x 10						1800	7.5	5.0			
CKK 25-200	32 x 5											
	32 x 10											
	32 x 20											
	32 x 32											

M_{Rv} = Permissible torque for system with timing belt side drive at motor journal (observe max. motor torque M_{max})
M_{RRv} = Frictional torque of timing belt side drive at motor journal
J_{Rv} = Reduced mass moment of inertia of timing belt side drive
i = Timing belt side drive reduction
1) Permissible torque for greater lengths available upon request

	MSK 050C					MSK 060C				
	0.45					0.5				
	Permissible torque up to length L[1] = … at			Reduced mass moment of inertia at		Permissible torque up to length L[1] = … at			Reduced mass moment of inertia at	
		i = 1	i = 2	i = 1	i = 2		i = 1	i = 2	i = 1	i = 2
	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)
	1200	10.5	5.2	1310	217					
	1800	16	8.0							
	1800	16	8.0							
	1800	16	8.0							
						2200	12.0	6.0	1400	260
						2200	19.0	11.0		
						2200	19.0	13.0		
						2200	19.0	13.0		

Compact Modules CKK

Calculations

Formulas

Nominal life

Nominal life in meters:

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

Nominal life in hours:

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

L_{10} = Nominal life in meters (m)
L_{10h} = Nominal life in hours (h)
C = Dynamic load capacity (N)
F_m = Mean equivalent dynamic load (N)
v = Speed (from “Permissible speed” chart) (m/min)

Frictional torque

for motor attachment via motor mount and coupling:

$$M_R = M_{RS}$$

M_R = Frictional torque at motor journal (Nm)
M_{RS} = Frictional torque of system (Nm)

for motor attachment via timing belt side drive:

$$M_R = \frac{M_{RS}}{i} + M_{RRv}$$

M_{RRv} = Frictional torque of timing belt side drive at motor journal (Nm)
i = Gear ratio

Constants k_1, k_2, k_3 Frictional torque M_R

Size	Ball screw	Constants				Frictional torque
		k_1		k_2	k_3	M_{RS}
	d_0 x P	1 carriage	2 carriages			(Nm)
CKK 12-90	12 x 2	1.279	1.303	0.013	0.101	0.11
	12 x 5	1.454	1.600	0.011	0.633	0.15
	12 x 10	2.138	2.750	0.011	2.533	0.18
CKK 15-110	16 x 5	5.088	5.303	0.029	0.633	0.44
	16 x 10	6.076	6.937	0.029	2.533	0.47
	16 x 16	8.161	10.365	0.033	6.485	0.50
CKK 20-145	20 x 5	22.516	23.054	0.079	0.633	0.60
	20 x 20	33.962	42.575	0.0741	10.132	0.77
	20 x 40	70.856	105.305	0.086	40.528	0.70
	25 x 10	26.278	28.431	0.233	2.533	0.78
CKK 25-200	32 x 5	71.968	73.247	0.605	0.633	0.9
	32 x 10	79.094	84.211	0.640	2.533	1.0
	32 x 20	103.229	123.695	0.639	10.132	1.1
	32 x 32	152.810	205.205	0.617	25.938	1.2

Mass moment of inertia

For handling:

$$6 \cdot J_M \geq J_{fr}$$

For processing:

$$1.5 \cdot J_M \geq J_{fr}$$

J_{fr} = Mass moment of inertia of external load (kgm²)
J_M = Mass moment of inertia of motor (kgm²)

for motor attachment via motor mount and coupling

$$J_{fr} = J_S + J_K + J_{Br}$$

$$J_S = (k_1 + k_2 \cdot L + k_3 \cdot m_{fr}) \cdot 10^{-6}$$

$$J_{tot} = J_{fr} + J_M = J_S + J_K + J_{Br} + J_M$$

for motor attachment via timing belt side drive

$$J_{fr} = \frac{J_S}{i^2} + J_{Rv} + J_{Br}$$

$$J_S = (k_1 + k_2 \cdot L + k_3 \cdot m_{fr}) \cdot 10^{-6}$$

$$J_{tot} = J_{fr} + J_M = \frac{J_S}{i^2} + J_{Rv} + J_M + J_{Br}$$

J_{tot} = Total mass moment of inertia (kgm²)
J_{fr} = Mass moment of inertia of external load (kgm²)
J_S = Mass moment of inertia of system with external load (kgm²)
J_K = Mass moment of inertia of coupling (kgm²)
J_{Br} = Mass moment of inertia of motor brake (kgm²)
J_M = Mass moment of inertia of motor (kgm²)
J_{RV} = Reduced mass moment of inertia of timing belt side drive at motor journal (kgm²)
m_{fr} = External load (kg)
L = Length of Compact Module (mm)
i = Gear ratio
k_1, k_2, k_3 = Constants, see "Constants" table

Rotary speed
When attaching a gear motor, also include the gear mass moment of inertia and gear reduction in the calculation.

$$n_1 = \frac{i \cdot v \cdot 1000}{P}$$

$$n_1 < n_{max}$$

$v <$ Permissible speed from chart

v = Permissible speed (m/min)
n_1 = Speed (1/min)
n_{max} = Maximum usable motor speed (1/min)
P = Screw lead (mm)
i = Gear ratio

Coupling data
Couplings with data according to the table are used with standard servo motors for Compact Modules CKK...

Size	Rated torque of coupling M_K (Nm)	Mass moment of inertia J_K (10^{-6} kgm²)	Coupling mass (kg)
CKK 12-90	14	12.13	0.092
CKK 15-110	14	12.13	0.092
CKK 20-145	26	42.30	0.140
CKK 25-200	50	200	0.7

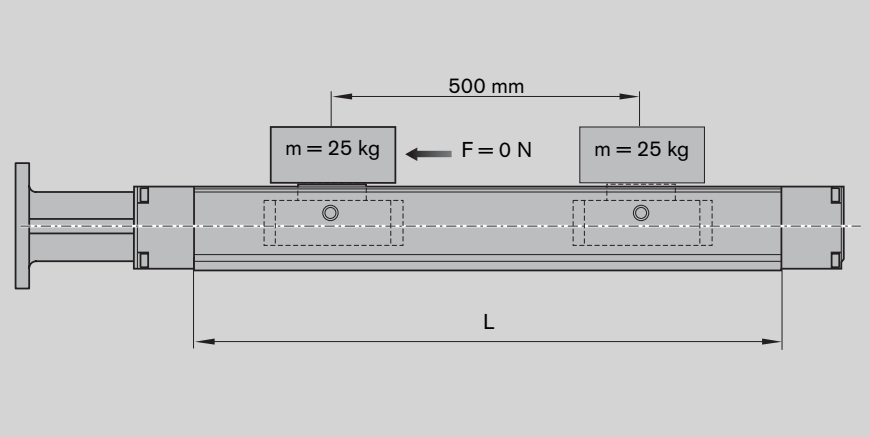
Compact Modules CKK

Calculation example

When sizing the drive unit, always consider the motor-controller combination because the motor type and performance data (such as maximum usable speed and maximum torque) are dependent on the controller or control system used.

Starting data
A mass of 25 kg is to be moved 500 mm at a maximum travel speed of 40 m/min. Based on the technical data and connection dimensions, the following module is selected:

Compact Module CKK 15-110
- one carriage
- 2% preload
- with gap-type seal made of PU strip
- with a size 41 AC servo motor attached via motor mount and coupling



Estimation of Compact Module length L

Excess travel	=	$2 \cdot P = 2 \cdot 16$ mm = 32 mm
Max. travel distance	=	$stroke_{eff}$ + 2 · excess travel
	=	500 mm + 2 · 32
	=	564 mm
Compact Module length L	=	(stroke + 2 · excess travel) + 90 (according to formula given under “Components and ordering” for CKK 15-110)
	=	564 + 90
	=	654 mm

Selecting the ball screw drive
See section “Technical data” for charts.
In general:
It is preferable to choose the smallest possible lead (resolution, braking distance, length).

Permissible ball screw drives according to “Permissible speed” chart for v = 40 m/min and L = 654 mm:
Ball screw 16 x 10 and ball screw 16 x 16
Selected ball screw drive (smaller lead):
Ball screw 16 x 10
with a maximum permissible drive torque of 9 Nm
according to “Permissible drive torque” chart

Calculation of Compact Module length L

Excess travel	=	$2 \cdot P = 2 \cdot 10$ mm = 20 mm
Max. travel distance	=	$stroke_{eff}$ + 2 · excess travel
	=	500 mm + 2 · 20 mm
	=	540 mm
Compact Module length L	=	(stroke + 2 · excess travel) + 90 mm
	=	540 mm + 90 mm
	=	630 mm

Frictional torque M_R

M_R	= M_{RS} (see “Technical data”)
M_R	= 0.47 Nm

Mass moment of inertia J

$J_S = (k_1 + k_2 \cdot L + k_3 \cdot m_{fr}) \cdot 10^{-6}\ kgm^2$
$= (6.076 + 0.029 \cdot 630\ mm + 2.533 \cdot 25\ kg) \cdot 10^{-6}\ kgm^2$
$= 87.67 \cdot 10^{-6}\ kgm^2$ (k_1. k_2. k_3 see "Constants" table)

$J_K = 12.13 \cdot 10^{-6}\ kgm^2$ (see "Technical data")

$J_{Br} = 16 \cdot 10^{-6}\ kgm^2$

$J_{fr} = J_S + J_K + J_{Br}$
$= 115.8 \cdot 10^{-6}\ kgm^2$

For handling:

$$J_M > \frac{J_{fr}}{6} = \frac{115.8 \cdot 10^{-6}}{6}$$

$J_M > 19.3 \cdot 10^{-6}\ kgm^2$

Rotary speed n
at v = 40 m/min

$$n_1 = \frac{i \cdot v \cdot 1000}{P} = \frac{1 \cdot 40\ m/min \cdot 1000}{10\ mm} = 4000\ min^{-1} < n_{Mmax}$$

$v = 40\ m/min$

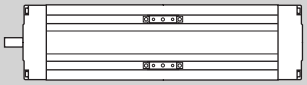
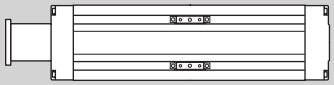
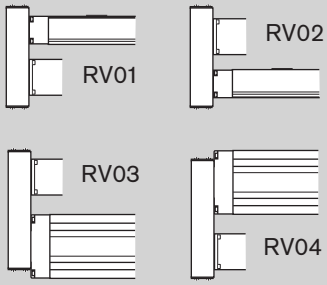
Result

Compact Module CKK 15-110
Length: L = 630 mm
Ball screw drive:
Diameter: 16 mm
Lead: 10 mm
Number of carriages: 1
Preload: 2%
Motor attachment via motor mount and coupling
Motor with: – a maximum usable speed $n_{max} > 4{,}000\ min^{-1}$
– mass moment of inertia $J_M > 19.3 \cdot 10^{-6}\ kgm^2$
– maximum permissible drive torque $M_{perm} < 9$ Nm
Consider rated torque of coupling M_K and frictional torque M_R
($M_K = 14$ Nm; $R_R = 0.47$ Nm)

These requirements are fulfilled by all AC servo motors approved for CKK 15-110 in the table "Components and ordering".
The specific motor is selected:
– according to criteria from the table "AC servo motor data"
– by recalculating the drive unit with performance data from the "Control systems, Electrical accessories" catalog.

Compact Modules CKK

CKK 12-90 components and ordering

Part number, length R0360 300 00, ... mm	Type	Guideway	Drive unit				Carriage				
			Screw journal	Ball screw size d_0 x P			One carriage		Two carriages l_m=65		
				12 x 2	12 x 5	12 x 10	Connection plate without	Connection plate with	Connection plate without	Connection plate with	
without motor mount 	OF01	01	Ø8	03	01	02	01	40	02	41	
with motor mount 	MF01	01	Ø8	03	01	02	01	40	02	41	
with timing belt side drive 	RV01 RV02 RV03 RV04	01	Ø8	03	01	02	01	40	02	41	

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories

Order example: see “Inquiry / Order form” section.

Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

Switch mounting arrangements

A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).
Refer to “Switch mounting arrangements” for more information on switch types and switch mounting.

	Motor attachment			Motor		Cover		Switch Socket, plug Mounting duct	Documentation	
	Gear ratio i =	Attachment kit[1]	for motor	Motor type without brake	Motor type with brake	Gap-type seals made of PU strip without	Gap-type seals made of PU strip with		Standard report	Measurement report
		00		00		01	02	without switch, without mounting duct: 00 Magnetic field sensor: Reed sensor 21, Hall sensor PNP - NC contact 22, Mounting duct 25 Length = L, Socket Plug 17 Magnetic field sensor with plug[2]: Reed sensor 58, Hall sensor PNP - NC contact 59	01	02 Frictional torque 03 Lead deviation 05 Positioning accuracy
		01	MSK 030C	84	85					
		05	MSM 030C	72	73					
		06	VRDM 397	37	38					
			VRDM 3910	39	40					
	1	11	MSK 030C	84	85					
		13	MSM 030C	72	73					
	1.5	21	MSK 030C	84	85					
		23	MSM 030C	72	73					

Calculating the length of the Compact Module

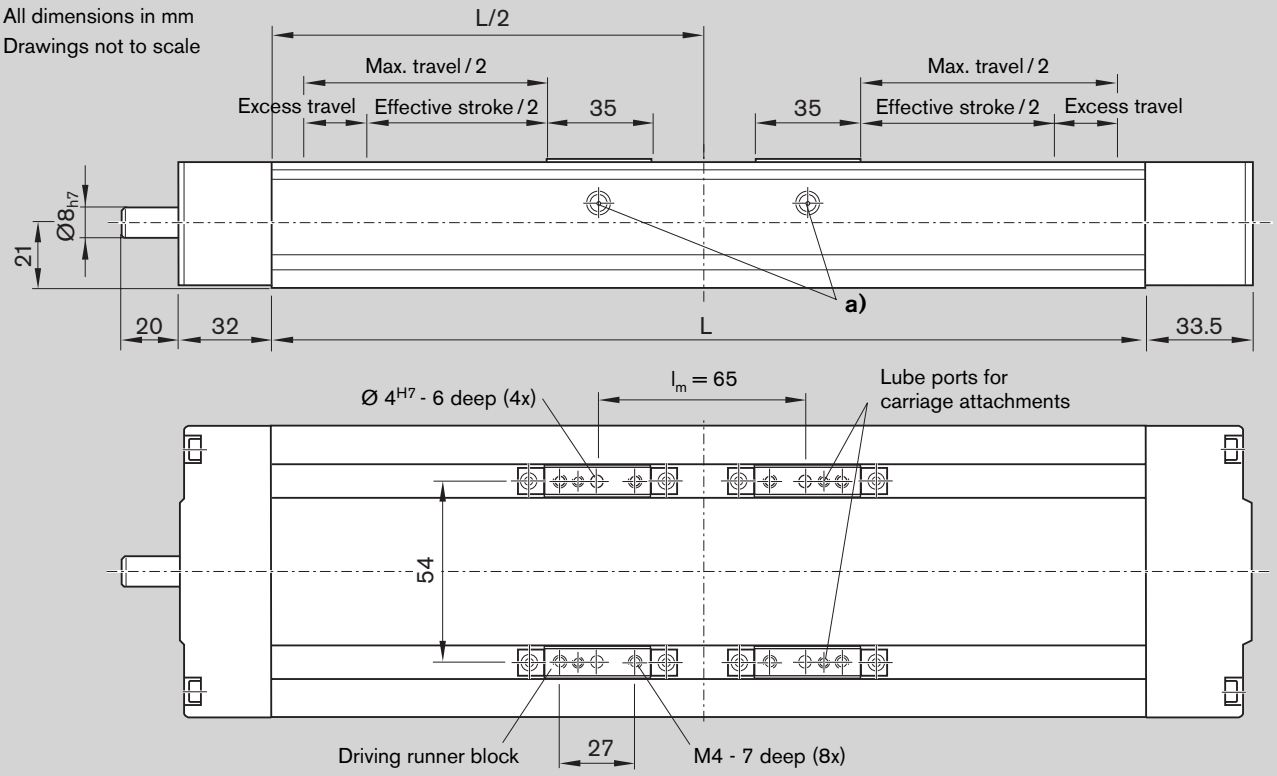
With one carriage:
L = (stroke + 2 · excess travel) + 85 mm
With two carriages (l_m = 65 mm):
L = (stroke + 2 · excess travel) + 150 mm
Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P
Example:
Ball screw 12 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

Compact Modules CKK

CKK 12-90 dimensions

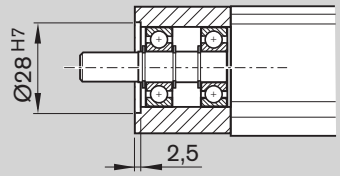
All dimensions in mm
Drawings not to scale



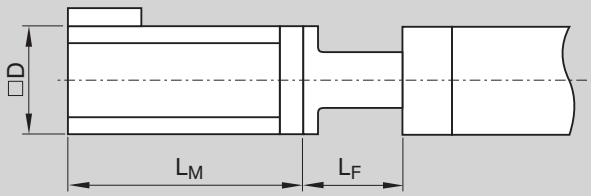
a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at L/2)
Module with one carriage: 1 lube port per side at L/2

Refer to “Motors” for more information and dimensions.

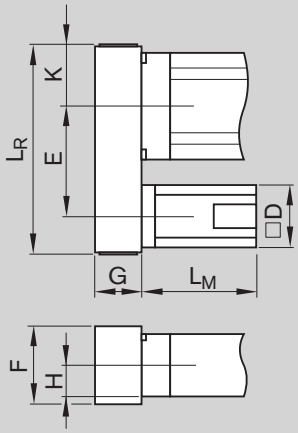
Type OF01

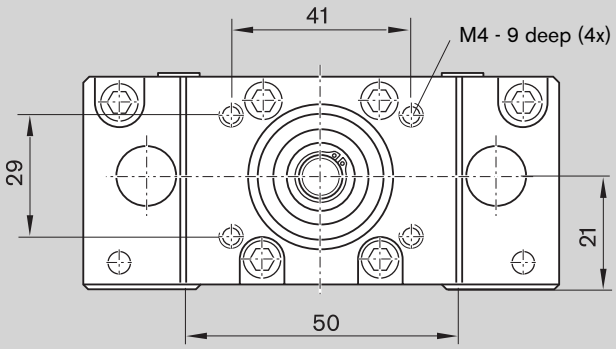


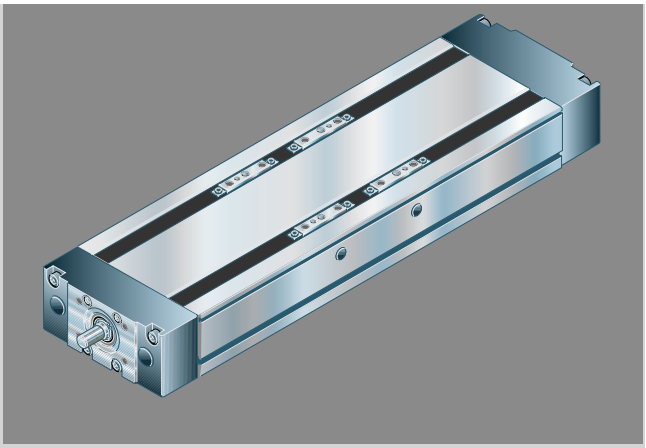
Type MF01

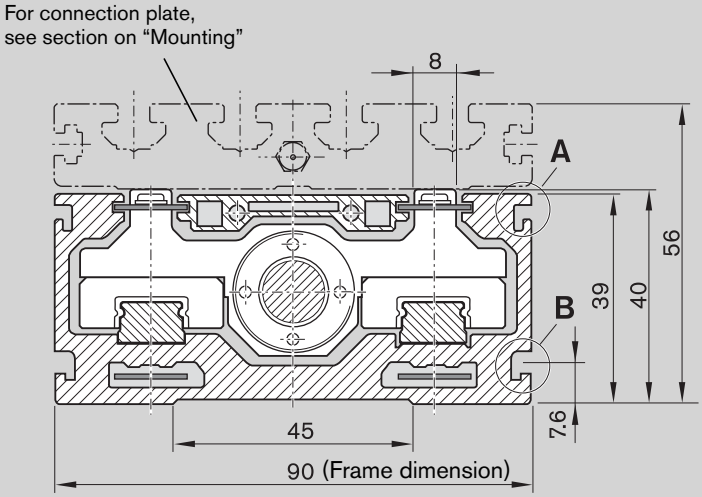


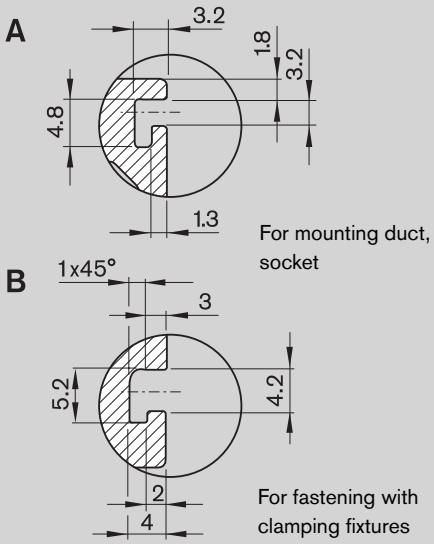
Type RV01, RV02, RV03, RV04







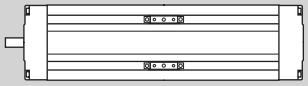
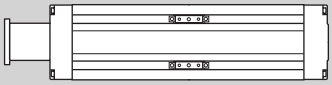
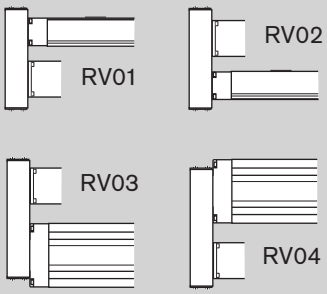




Type	Motor	Dimensions (mm)												
		D	E		F	G	H	K	L_F	L_M		L_R	
			i=1	i=1.5						without brake	with brake	i=1	i=1.5
RV01/RV02	**MSM 030C**	60	103.5	89.5	64.5	37	21	33	–	–		179	165
RV03/RV04	**MSK 030C**	54							–	–			
MF01	**MSM 030C**	60	–	–	–	–	–	–	71.5	138.5	171.5	–	–
	MSK 030C	54	–	–	–	–	–	–	70.0	188	213	–	–
	VRDM 397	85	–	–	–	–	–	–	71.5	110	156.5	–	–
	VRDM 3910	85	–	–	–	–	–	–	71.5	140	186.5	–	–

Compact Modules CKK

CKK 15-110 components and ordering

Part number, length R0360 400 00, ... mm	Type	Guideway	Drive unit				Carriage			
			Screw journal	Ball screw size d_0 x P			One carriage		Two carriages l_m=85	
				16 x 5	16 x 10	16 x 16	Connection plate without	with	without	with
without motor mount 	OF01	01	Ø11	01	02	03	01	40	02	41
			Ø11 with keyway	11	12	13				
with motor mount 	MF01	01	Ø11	01	02	03	01	40	02	41
with timing belt side drive 	RV01 RV02 RV03 RV04	01	Ø11	01	02	03	01	40	02	41

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories

Order example: see “Inquiry / Order form” section.

Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

Switch mounting arrangements

A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).
Refer to “Switch mounting arrangements” for more information on switch types and switch mounting.

	Motor attachment			Motor		Cover		Switch Socket, plug Mounting duct	Documentation	
	Gear ratio i =	Attachment kit [1]	for motor	Motor type without brake	Motor type with brake	Gap-type seals made of PU strip without	Gap-type seals made of PU strip with		Standard report	Measurement report
		00		00						
		01	MSK 030C	84	85					02 Frictional torque
		03	MSK 040C	86	87					
		04	VRDM 397	37	38					
			VRDM 3910	39	40					
		05	MSM 030C	72	73					03 Lead deviation
		06	MSM 040B	74	75	01	02		01	
	1	11	MSK 030C	84	85					
		13	MSK 040C	86	87					
		15	MSM 030C	72	73					05 Positioning accuracy
		17	MSM 040B	74	75					
	1.5	21	MSK 030C	84	85					
		23	MSK 040C	86	87					
		25	MSM 030C	72	73					
		27	MSM 040B	74	75					

without switch without mounting duct — **00**

Magnetic field sensor

Reed sensor	21	**Mounting duct** 25 Length = L	**Socket Plug** 17
Hall sensor PNP - NC contact	22		

Magnetic field sensor with plug [2]

Reed sensor	58
Hall sensor PNP - NC contact	59

Calculating the length of the Compact Module

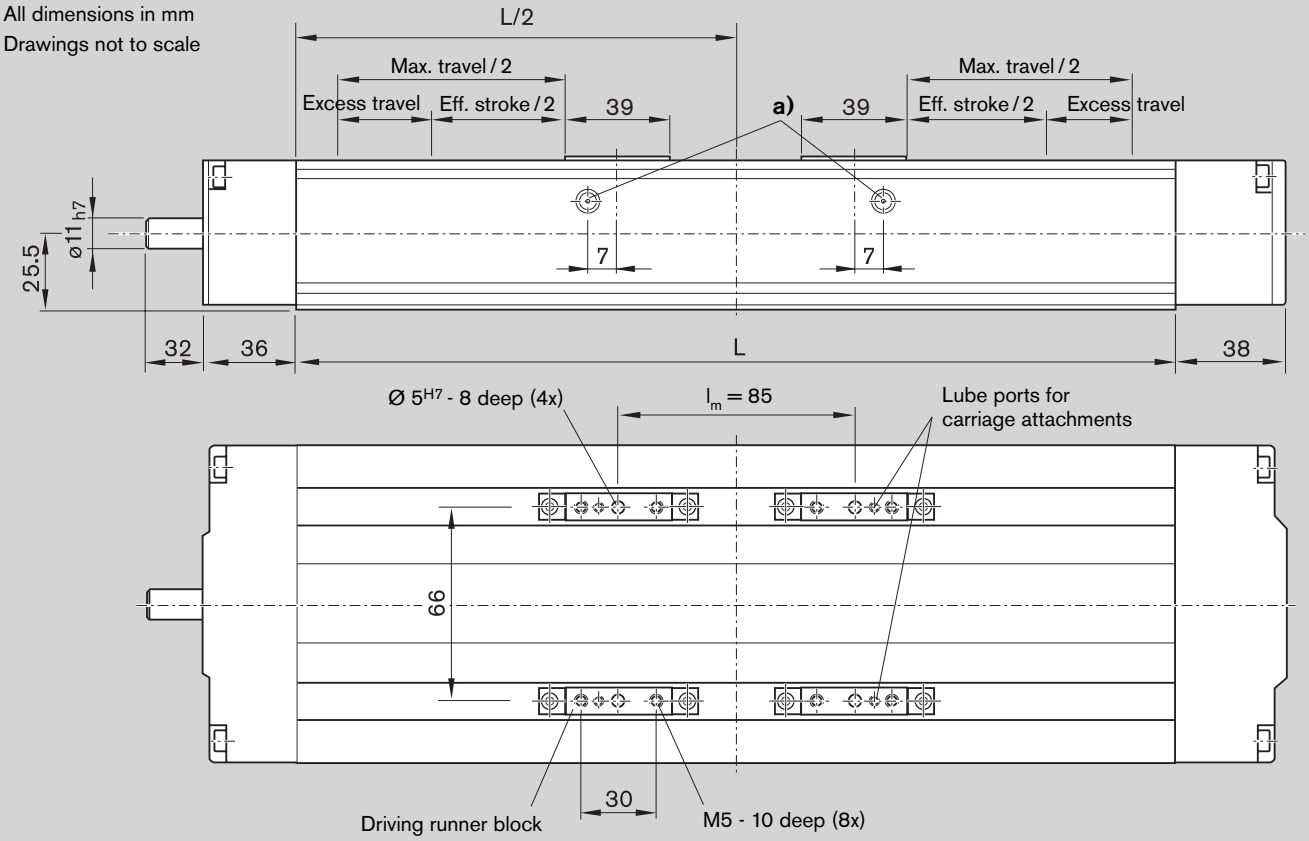
With one carriage:
L = (stroke + 2 · excess travel) + 90 mm
With two carriages (l_m = 85 mm):
L = (stroke + 2 · excess travel) + 175 mm
Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P
Example:
Ball screw 16 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

Compact Modules CKK

CKK 15-110 dimensions

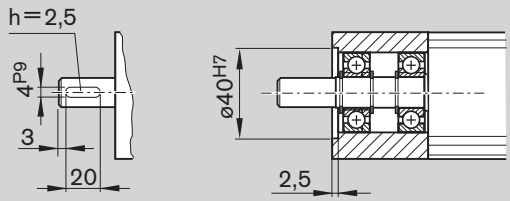
All dimensions in mm
Drawings not to scale



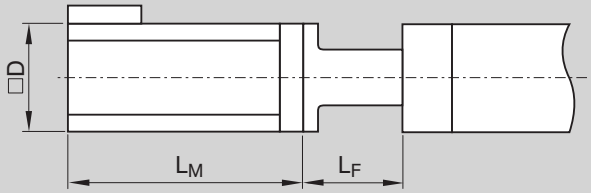
a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at L/2)
Module with one carriage: 1 lube port per side at L/2

Refer to “Motors” for more information and dimensions.

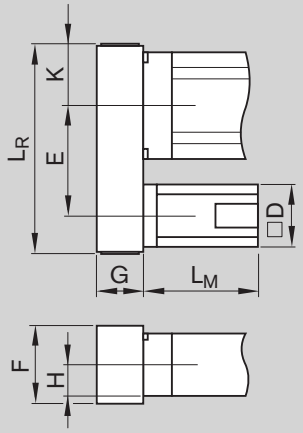
Type OF01

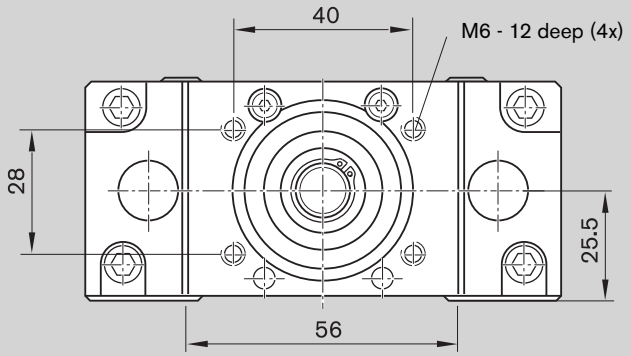


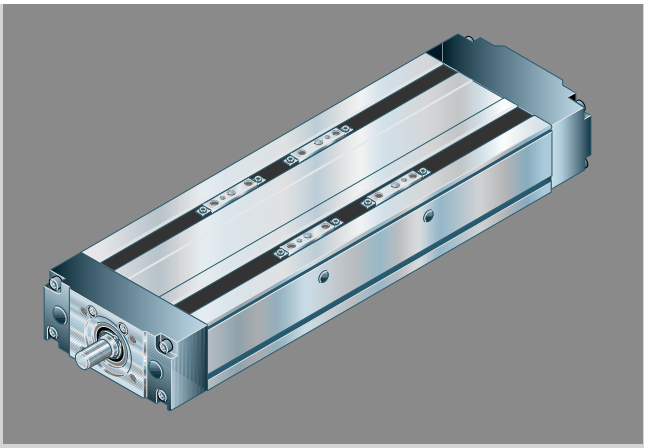
Type MF01

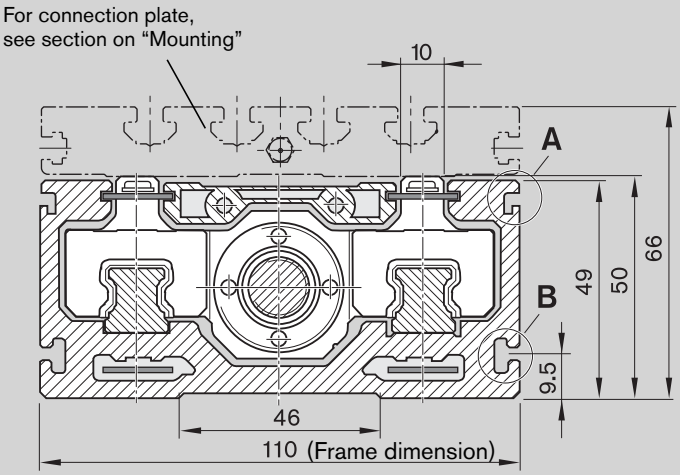


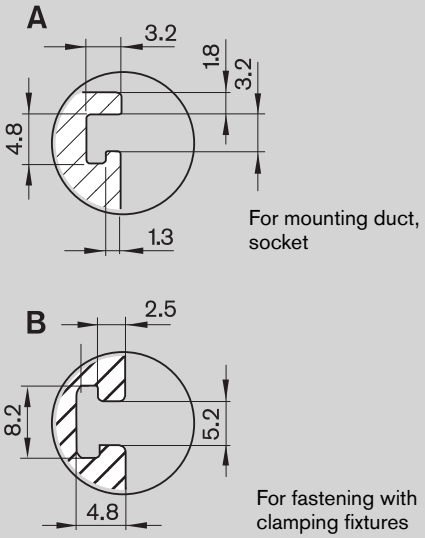
Type RV01, RV02, RV03, RV04







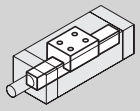
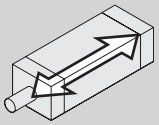
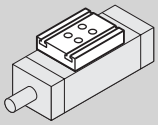
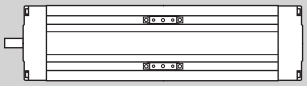
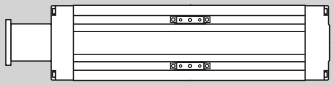
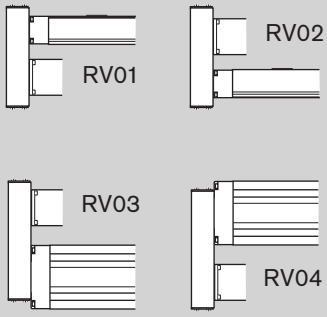




Type	Motor	Dimensions (mm)											
		D	E		F	G	H	K	L_F	L_M		L_R	
			i=1	i=1.5						without brake	with brake	i=1	i=1.5
RV01/RV02	MSM 030C	60	103.5	115	64.5	37	25.5	33	–		–	179	191
RV03/RV04	MSM 040B	80	145	139.5	88	51	25.5	43.5	–		–	250	250
	MSK 030C	54	103.5	115	64.5	37	25.5	33	–		–	179	191
	MSK 040C	82	145	139.5	88	51	25.5	43.5	–		–	250	250
MF01	MSM 030C	60	–	–	–	–	–	–	72	138.5	171.5	–	–
	MSM 040B	80	–	–	–	–	–	–	83	157.5	191.5	–	–
	MSK 030C	54	–	–	–	–	–	–	75	188	213	–	–
	MSK 040C	82	–	–	–	–	–	–	77.5	185.5	215.5	–	–
	VRDM 397	85	–	–	–	–	–	–	77.5	110	156.5	–	–
	VRDM 3910	85	–	–	–	–	–	–	77.5	140	186.5	–	–

Compact Modules CKK

CKK 20-145 components and ordering

Part number, length R0360 500 00, ... mm	Type	Guideway 	Drive unit  Screw journal	Ball screw size d_0 x P 20 x 5	20 x 20	25 x 10	20 x 40	Carriage  One carriage Connection plate without	with	Two carriages l_m= 100 mm Connection plate without	with
without motor mount 	OF01	01	Ø14	21	22	23		01	40	02	41
			Ø14 with keyway	14	15	16					
			Ø14				24	06	08	07	09
			Ø14 with keyway				17				
with motor mount 	MF01	01	Ø14	21	22	23		01	40	02	41
							24	06	08	07	09
with timing belt side drive 	RV01 RV02 RV03 RV04	01	Ø14	21	22	23		01	40	02	41
							24	06	08	07	09

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories

Order example: see “Inquiry / Order form” section.

Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

Switch mounting arrangements

A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).
Refer to “Switch mounting arrangements” for more information on switch types and switch mounting.

Motor attachment			Motor		Cover		Switch Socket, plug Mounting duct	Documentation	
Gear ratio i =	Attachment kit[1]	for motor	Motor type without brake	 with brake	Gap-type seals made of PU strip without	 with		Standard report	Measurement report
	00		00						02 Frictional torque
	30	MSK 040C	86	87			without switch, without mounting duct: 00		
	31	VRDM 3913	41	42			Magnetic field sensor: Reed sensor 21; Hall sensor PNP - NC contact 22; Mounting duct 25, Length = L; Socket Plug 17		03 Lead deviation
	32	MSM 040B	74	75					
	33	MSK 050C	88	89	01	02		01	
	11	MSK 040C	86	87					
1	35	MSK 050C	88	89					
	17	MSM 040B	74	75					
	21	MSK 040C	86	87					
1.5	27	MSM 040B	74	75					
2	36	MSK 050C	88	89					05 Positioning accuracy

Magnetic field sensor with plug[2]: Reed sensor 58; Hall sensor PNP - NC contact 59

Calculating the length of the Compact Module

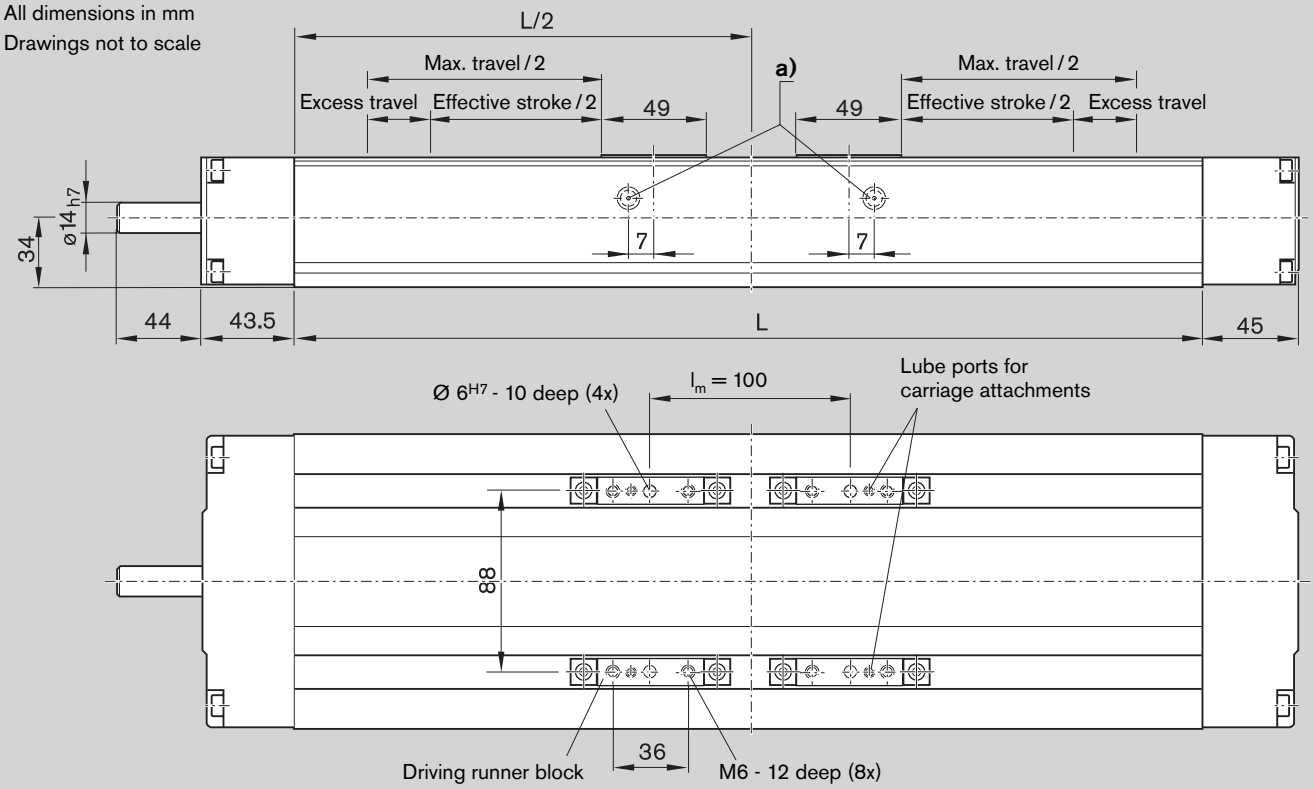
With one carriage:
L = (stroke + 2 · excess travel) + 110 mm
With two carriages (l_m = 100 mm):
L = (stroke + 2 · excess travel) + 210 mm
Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P
Example:
Ball screw 25 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

Compact Modules CKK

CKK 20-145 dimensions

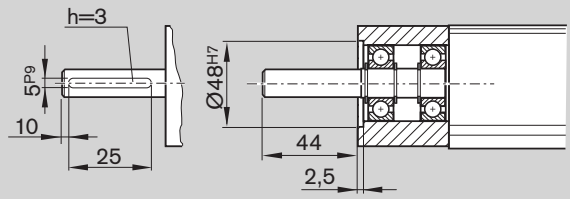
All dimensions in mm
Drawings not to scale



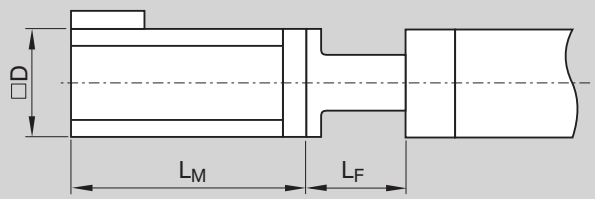
a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at L/2)
Module with one carriage: 1 lube port per side at L/2

Refer to “Motors” for more information and dimensions.

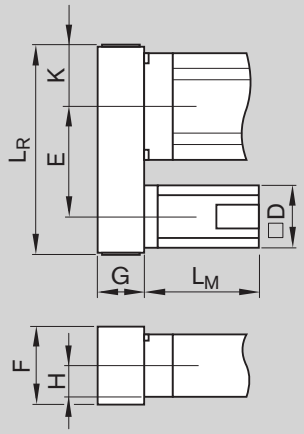
Type OF01

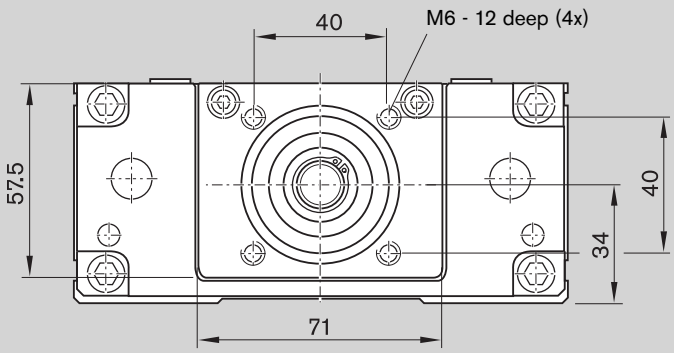


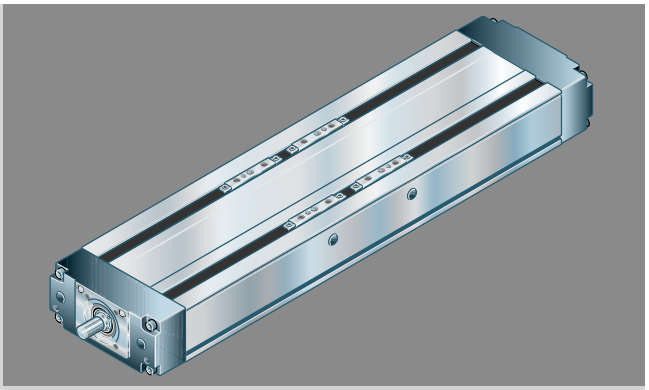
Type MF01

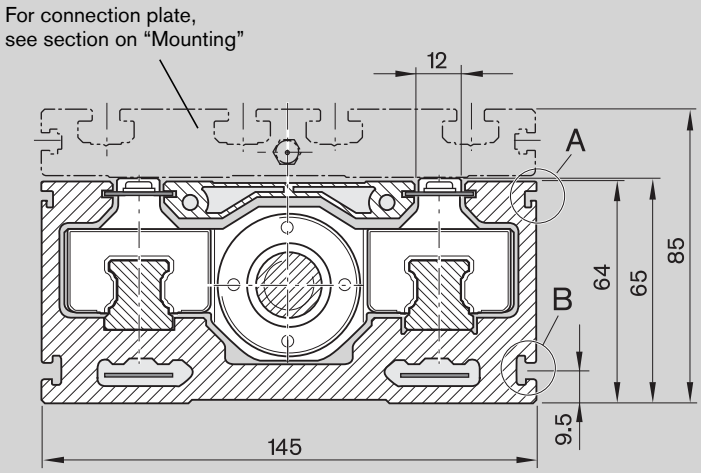


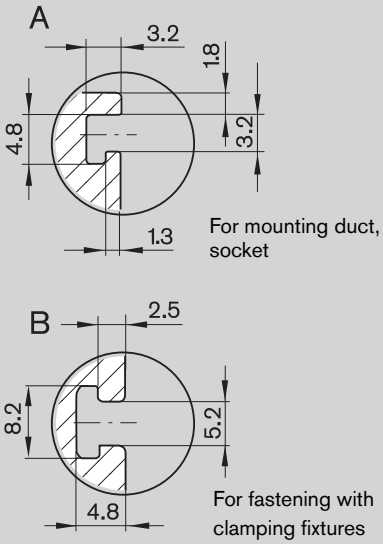
Type RV01, RV02, RV03, RV04







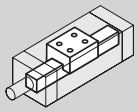
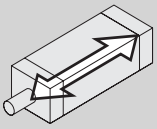
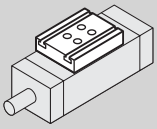
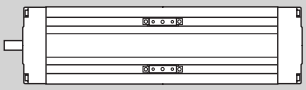
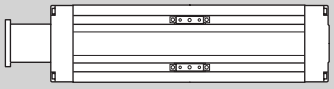
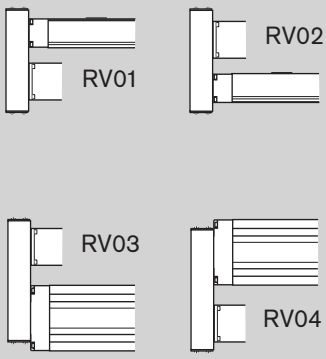




Type	Motor	Dimensions (mm)													
		D	E			F	G	H	K	L_F	L_M		L_R		
			i=1	i=1.5	i=2						without brake	with brake	i=1	i=1.5	i=2
RV01/RV02	MSM 040B	80	157.5	162	–	88	51	34	43.5	–	–	–	267	267	–
RV03/RV04	MSK 040C	82	157.5	162	–	88	51	34	43.5	–	–	–	267	267	–
	MSK 050C	100	165		162	116	66	34	56	–	–	–	297	–	297
MF01	MSM 040B	80	–	–	–	–	–	–	–	81	157.5	191.5	–	–	–
	MSK 040C	82	–	–	–	–	–	–	–	85	185.5	215.5	–	–	–
	MSK 050C	98	–	–	–	–	–	–	–	95	203	233	–	–	–
	VRDM 3913	85	–	–	–	–	–	–	–	81	170	216.5	–	–	–

Compact Modules CKK

CKK 25-200 components and ordering

Part number, length R0360 600 00, ... mm	Type	Guideway 	Drive unit 					Carriage[5] 				
			Screw journal	Ball screw size d_0 x P				One carriage		Two carriages l_m= 175 mm		
				32 x 5	32 x 10	32 x 20	32 x 32	Connection plate without	with	without	with	
without motor mount 	OF01	01	Ø16	01	02	03	04	01	40	11	41	
			Ø16 with keyway	11	12	13	14					
with motor mount 	MF01	01	Ø16	01	02	03	04					
with timing belt side drive 	RV01 RV02 RV03 RV04	01	Ø16	01	02	03	04					

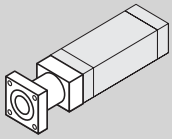
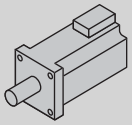
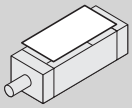
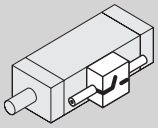
1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories
3) Switch configuration with magnetic field sensor and mechanical/proximity switch together on one side is not possible.
4) Switching cam can be attached only in conjunction with connection plate.
5) When using screw supports, be sure to specify the correct option numbers: see “Screw support” section.

Order example: see “Inquiry / Order form” section.

Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

Switch mounting arrangements

A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).
Refer to “Switch mounting arrangements” for more information on switch types and switch mounting.

	Motor attachment			Motor		Cover		Switch Socket, plug Mounting duct	Documentation	
										
	Gear ratio i =	Attachment kit [1]	for motor	Motor type without brake	with brake	Gap-type seals made of PU strip without	with		Standard report	Measurement report
		00		00		01	02	without switch without mounting duct: 00	01	02 Frictional torque 03 Lead deviation 05 Positioning accuracy
		02	MSK 076C	92	93			Magnetic field sensor Reed sensor 21 Hall sensor PNP - NC contact 22 Mounting duct 25 Length = L Socket Plug 27		
		03	MSK 060C	90	91			Magnetic field sensor with plug [2] Reed sensor 58 Hall sensor PNP - NC contact 59		
	1	27	MSK 060C	90	91			Proximity / mechanical switches [3] Mechanical 15 Proximity PNP - NC contact 11 Proximity PNP - NO contact 13 1 switching cam [4] 16 2 switching cams [4] 26 Socket Plug 17		
	2	28	MSK 060C	90	91					
								Cable duct length = L: 20		

Calculating the length of the Compact Module

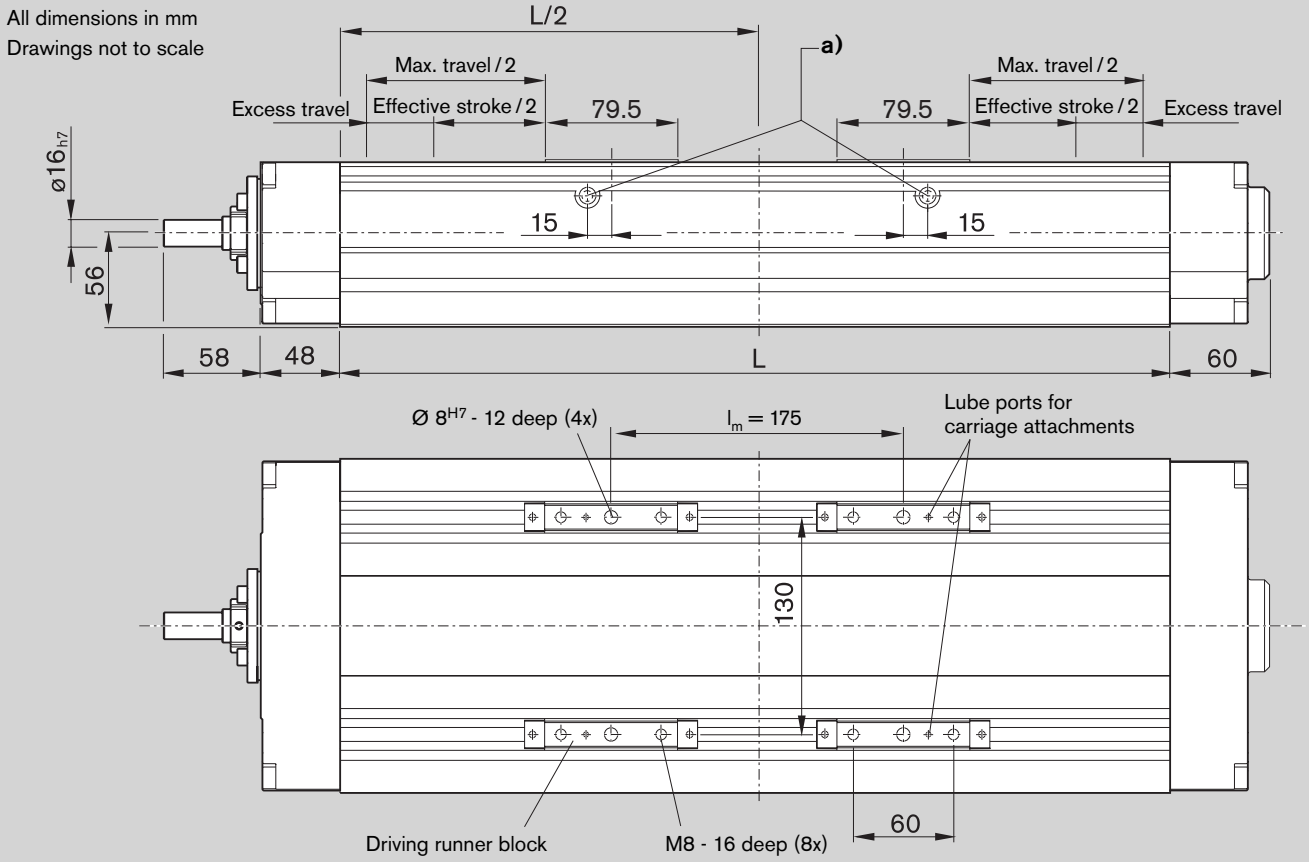
With one carriage:
L = (stroke + 2 · excess travel) + 200 mm
With two carriages (l_m = 175 mm):
L = (stroke + 2 · excess travel) + 375 mm
Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P
Example:
Ball screw 32 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

Compact Modules CKK

CKK 25-200 dimensions

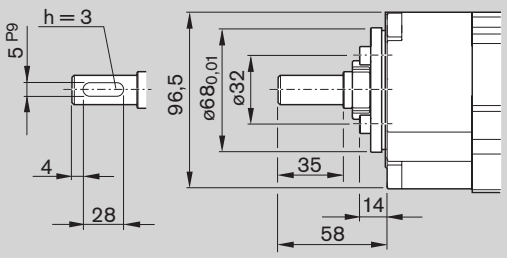
All dimensions in mm
Drawings not to scale



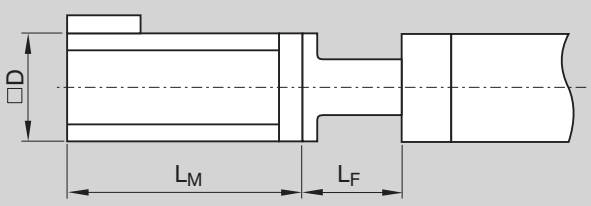
a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-AM6 (lubricating position at L/2)
Module with one carriage: 1 lube port per side at L/2

Refer to “Motors” for more information and dimensions.

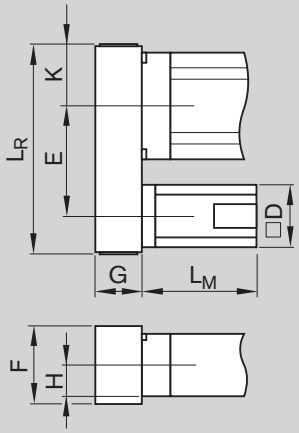
Type OF01

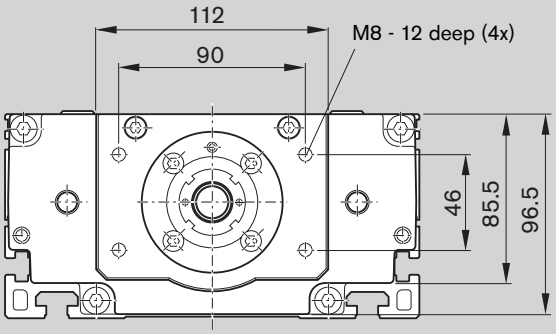


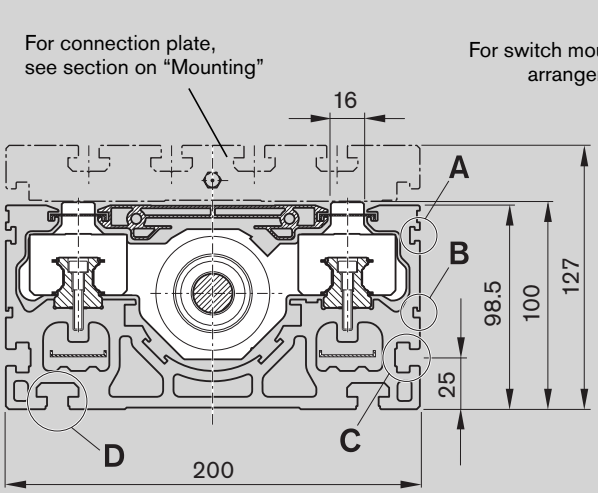
Type MF01

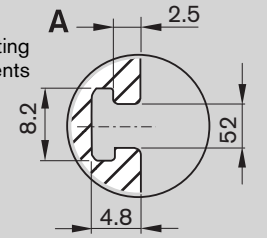


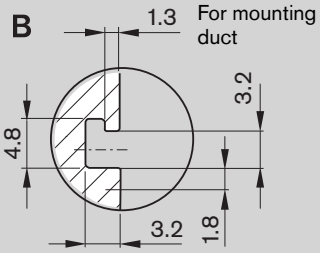
Type RV01, RV02, RV03, RV04

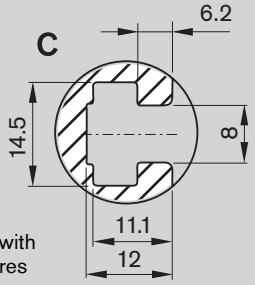


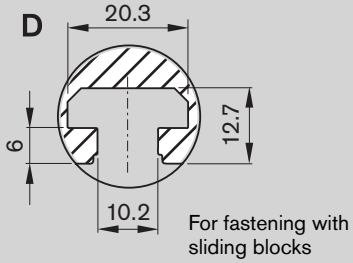












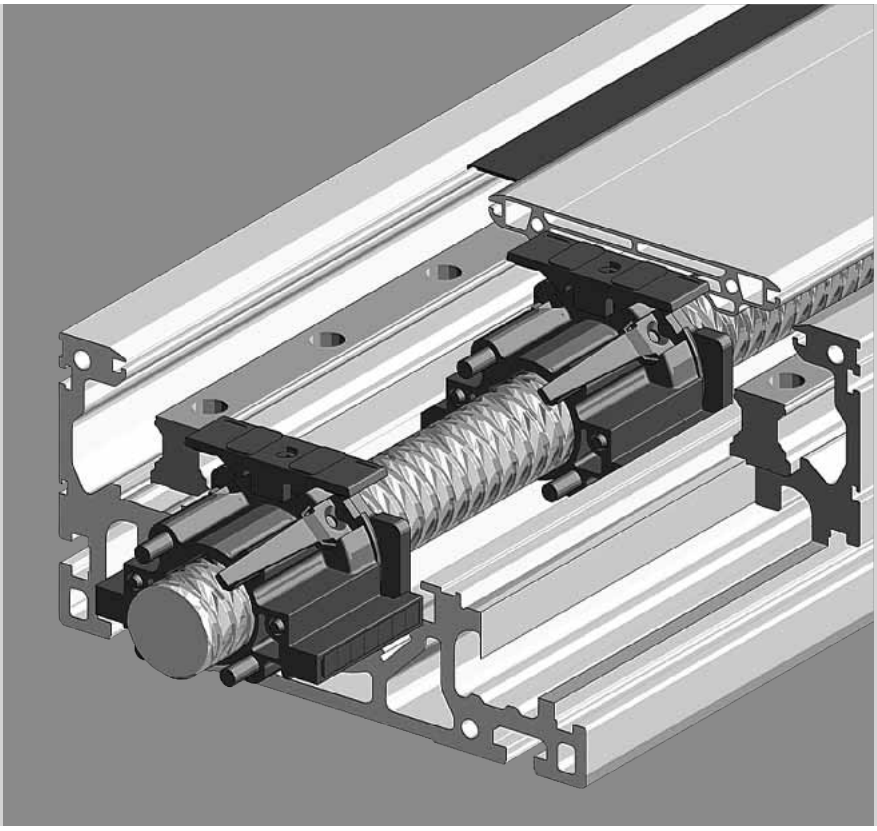
Type	Motor	Dimensions (mm)											
		D	E		F	G	H	K	L_F	L_M		L_R	
			i=1	i=2						without brake	with brake	i=1	i=2
RV01/RV02 RV03/RV04	MSK 060C	116	267.5	265	116	66	56	59	–	–	–	403	403
MF01	MSK 060C	116	–	–	–	–	–	–	125	226	259	–	–
	MSK 076C	140	–	–	–	–	–	–	133	–	292.5	–	–

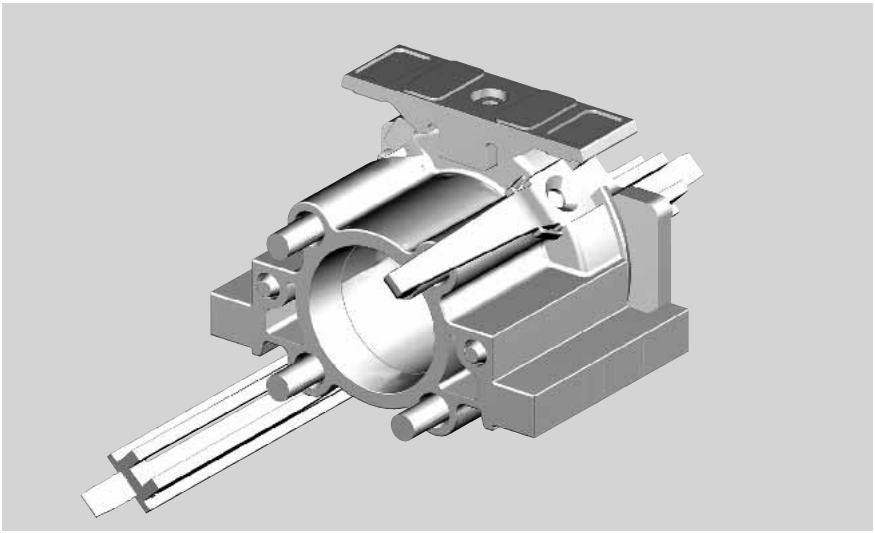
Compact Modules CKK

Screw support for Compact Module CKK 25-200

The new 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.
- Maximum drive torque for all lengths.
- Screw supports guided within frame.
- Elastomer buffer provides cushioning between carriage and screw supports.
- Integration of up to 5 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.





Technical data

☞ When using Compact Modules with screw supports (SPU), the following values apply for horizontal operation only. Vertical installation available upon request.

Number of carriages	Type	Carriage option number	Weight (kg)	$Length_{max}$ (mm)	Length calculation
1 carriage	without SPU	01	0.0299 x L + 6.7	2200	L = stroke + 2 · excess travel +200
	1 SPU	02	0.0299 x L + 6.7 plus 0.2 kg/SPU	3500	L = stroke + 2 · excess travel +315
	2 SPU	03		4600	L = stroke + 2 · excess travel +440
	3 SPU	04		5500	L = stroke + 2 · excess travel +565
	4 SPU	05		5500	L = stroke + 2 · excess travel +690
	5 SPU	06		5500	L = stroke + 2 · excess travel +815
2 carriages	without SPU	11	0.0299 x L + 8.7	2200	L = stroke + 2 · excess travel +375
	1 SPU	12	0.0299 x L + 8.7 plus 0.2 kg/SPU	3600	L = stroke + 2 · excess travel +490
	2 SPU	13		4700	L = stroke + 2 · excess travel +615
	3 SPU	14		5500	L = stroke + 2 · excess travel +740
	4 SPU	15		5500	L = stroke + 2 · excess travel +865
	5 SPU	16		5500	L = stroke + 2 · excess travel +990

Frictional torque M_R with one carriage[1)]

Ball screw size	M_R (Nm)					
	without SPU	with 1 SPU	with 2 SPU	with 3 SPU	with 4 SPU	with 5 SPU
32 x 5	0.9	1.1	1.2	1.4	1.6	1.7
32 x 10	1.0	1.2	1.4	1.5	1.7	1.9
32 x 20	1.1	1.3	1.5	1.7	1.9	2.1
32 x 32	1.2	1.4	1.7	1.9	2.1	2.3

1) If two carriages, increase frictional torque values by 0.1 Nm.

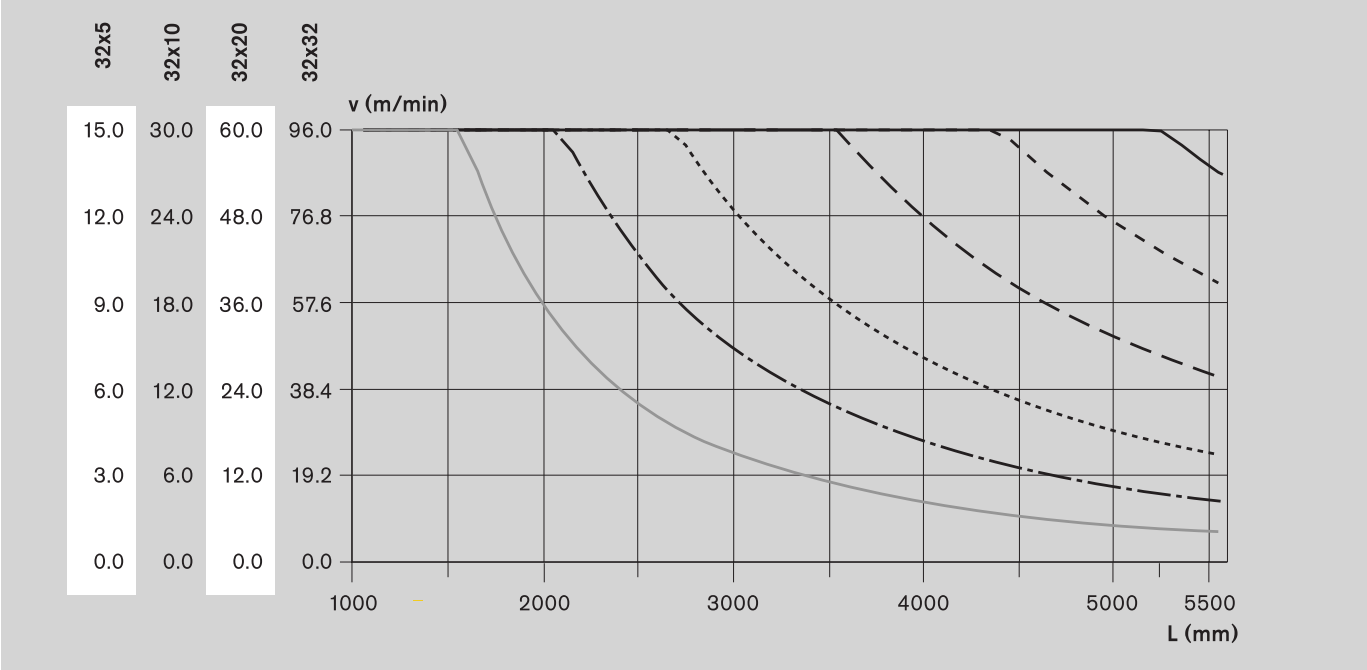
Compact Modules CKK

Screw support for Compact Module CKK 25-200

Technical data

Permissible speed v

(Observe motor speed!)



without SPU
with 1 SPU
with 2 SPU
with 3 SPU
with 4 SPU
with 5 SPU

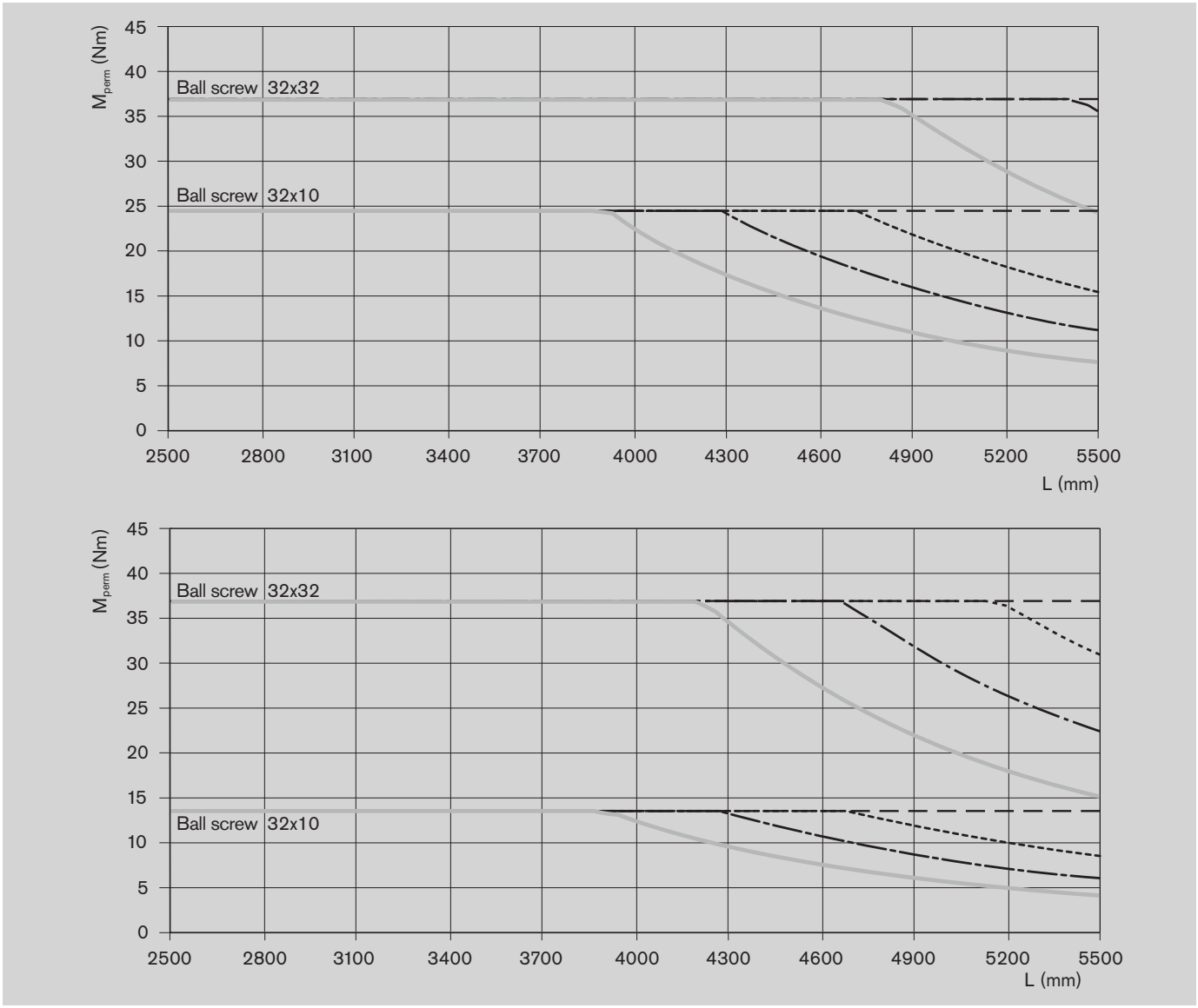
Permissible drive torque M_{perm}

The values shown for M_{perm} are applicable under the following conditions:
– Horizontal operation
– Ball screw journal without keyway
– No radial loads on ball screw journal
Consider the coupling's rated torque!

Ball screw journal with keyway

For reasons of stress concentration and a reduction of the effective diameter, observe the maximum value 18 Nm for drive torque!

When checking the values in the curves against the maximum drive-torque value (M_{perm} = 18 Nm) the smaller value will always apply.



——— without SPU

Compact Modules CKR Compact Modules with toothed belt drive (CKR)

Product overview

Compact Modules are precision, ready-to-install linear motion systems offering high performance, compact design, and good price/performance ratio.
Compact Modules are available in any desired length and with fast delivery time.

Structural design

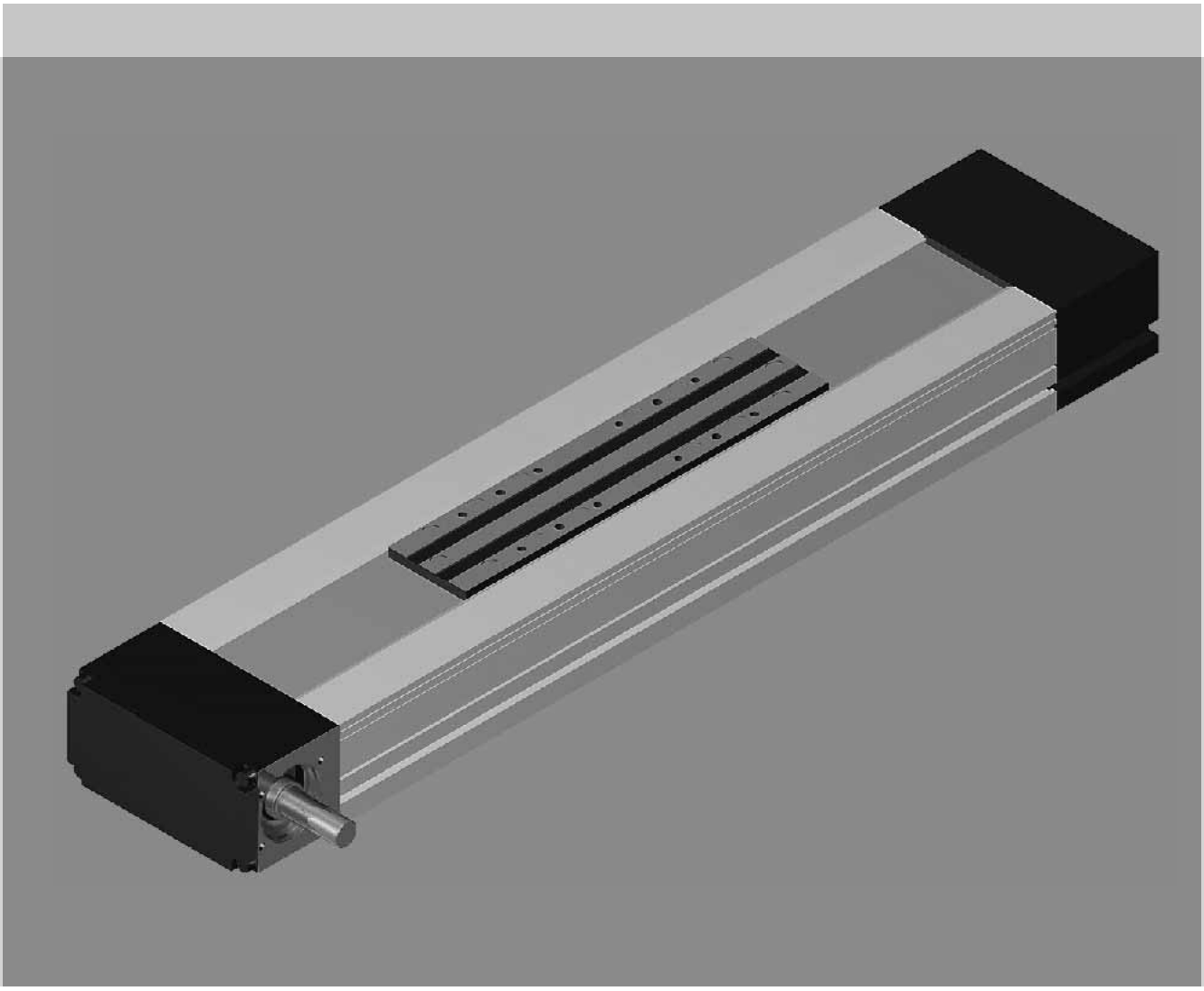
- Extremely compact precision aluminum profile with two integrated ball rail systems
- Ready-to-install Compact Modules in selectable lengths up to L_{max}
- Aluminum carriage available in two lengths, depending on applied load
- Driven by a pre-tensioned toothed belt

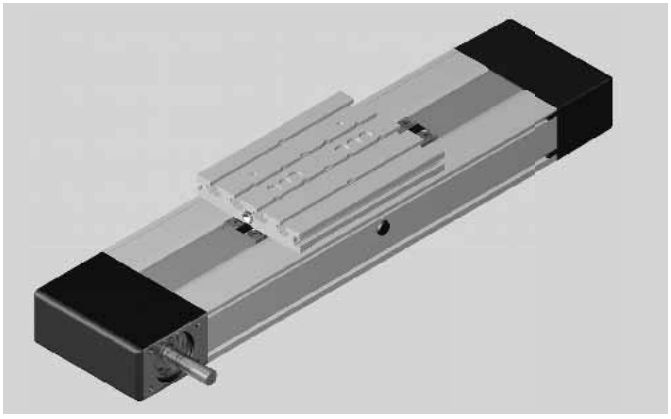
Attachments

- Maintenance-free digital servo drives with integrated brake and attached feedback
- Gear reducer type LP
- Reed or Hall sensors
- Socket with mating plug for the switches
- Aluminum profile mounting duct

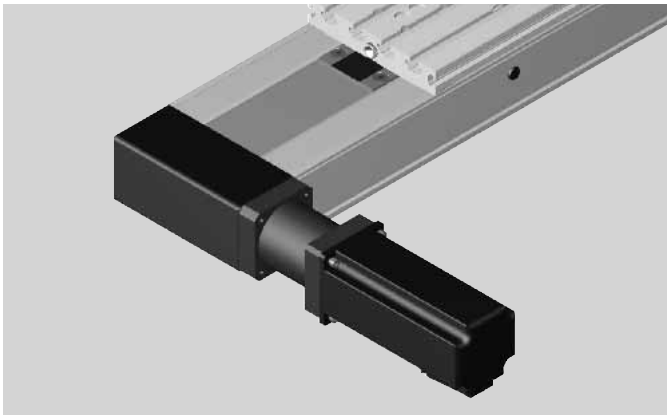
Other distinguishing features

- Precise alignment and secure fastening of attachments with threads and pin holes in carriage
- Idler (non-drive) end enclosure with integrated belt-tensioning system. Pulley ball bearings are lubricated for life
- Economical maintenance thanks to one-point lubrication feature (grease lubrication) for ball rail systems at sides or through the carriage
- Easy motor attachment by means of locating feature and fastening threads on drive end enclosure
- Two integrated zero-clearance ball rail systems provide optimized travel performance, high load capacities, and high rigidity
- High travel speed with high precision and smooth operation over lengths up to 10,000 mm
- Gap-type sealing and side-mounted aluminum profiles for guiding the toothed belt
- Adjustable switches over the entire travel range, switch activation without switching cam (with switching cam in CKR 25-200)





Connection plate for easy installation



Gear reducer:
A variety of gear ratios allow an optimal match between the load and the motor inertia.

Compact Modules CKR

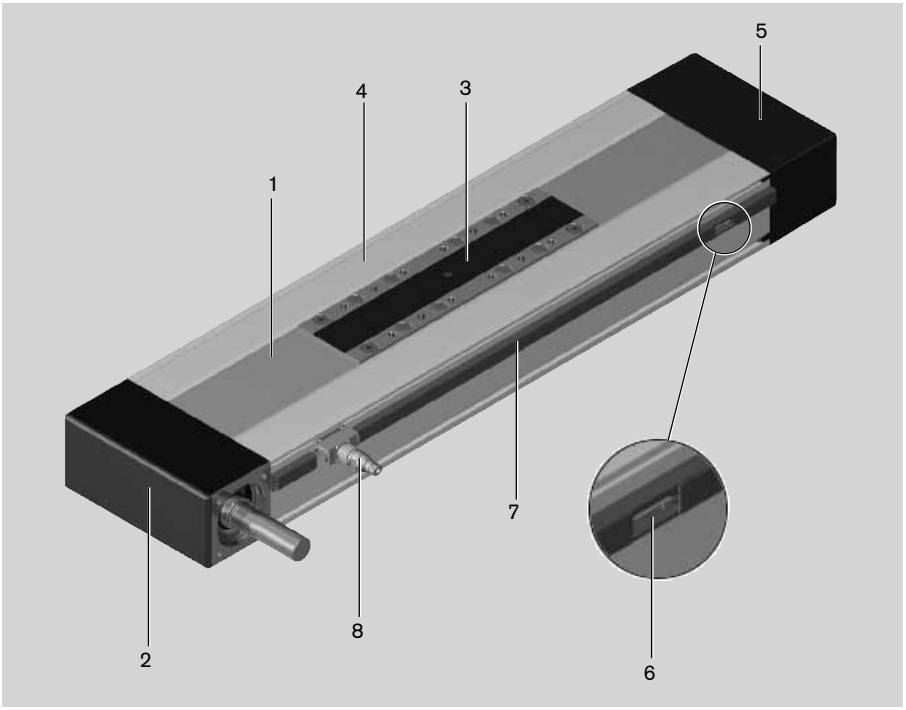
Structural design

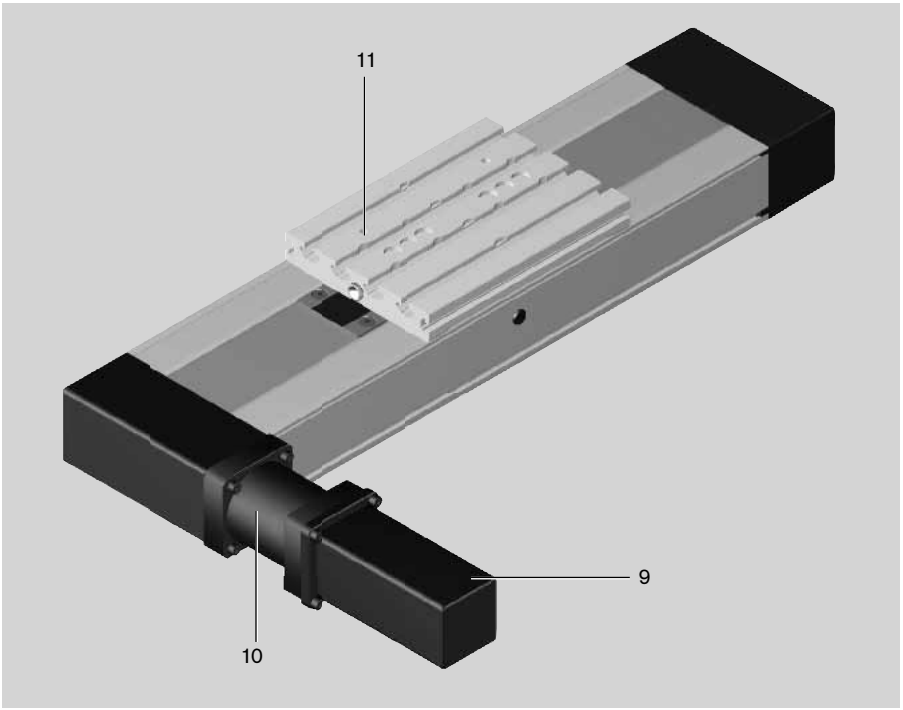
Structural design CKR

1 Toothed belt
2 Drive end enclosure
3 Carriage versions
– “Short carriage” with two runner blocks
– “Long carriage” with four runner blocks
4 Frame
5 Idler (non-drive) end enclosure

Attachments:

6 Magnetic field sensor
7 Mounting duct
8 Socket/plug
9 Motor
10 Gear reducer LP
11 Connection plate

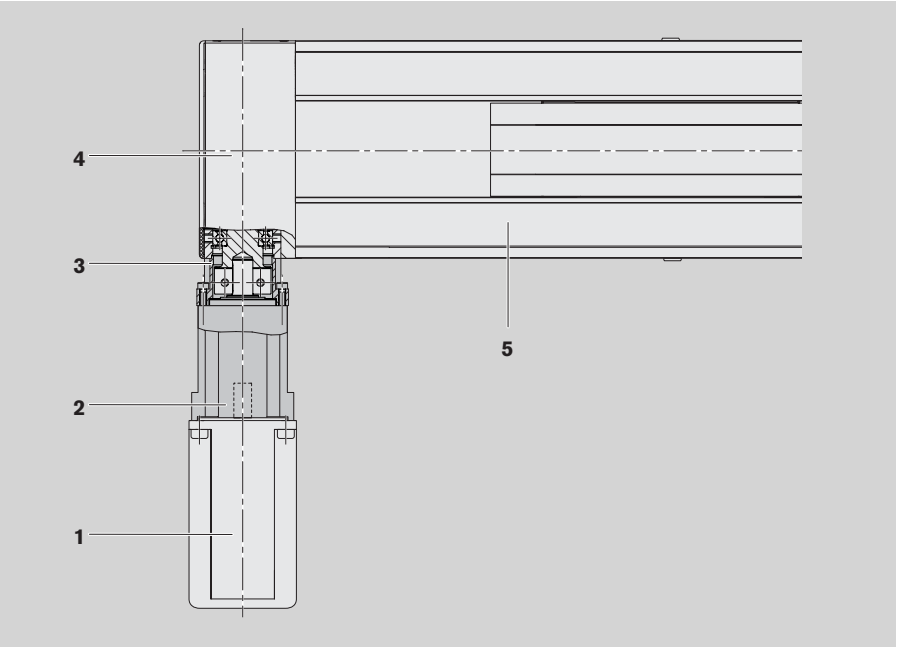




Structural design of gear reducer

For all Compact Modules CKR, a planetary gearbox can be installed via a flange. The flange serves as a mounting point for the gearbox to the Compact Module. This direct connection eliminates the need for a coupling, thereby minimizing torsional deflection.

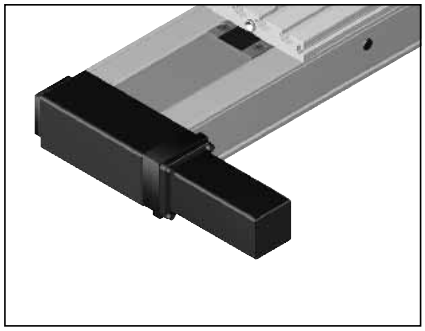
Several different gear ratios are available:
i = 3 (only for CKR 20-145 and 25-200)
i = 5
i = 10



1 Motor
2 Gear reducer
3 Flange
4 Drive end enclosure
5 Compact Module

Direct motor attachment with i = 1

The motor is attached directly to the Compact Module's drive end enclosure via a motor mount.



Compact Modules CKR

Technical data

Load capacities and moments

Size	Carriage length	Belt type	Dynamic load capacity of guideway	Dynamic moments		Planar moment of inertia		Moved mass	Maximum length	Specific spring rate
			C (N)	M_t (Nm)	M_L (Nm)	I_y (cm^4)	I_z (cm^4)	m_B (kg)	L_{max} (mm)	c_{spec} (N/mm · m)
CKR 12-90	102	AT 3	4620	110	16	12.8	115.3	0.32	5500	350
	156	AT 3	7500	360	240	12.8	115.3	0.55		
CKR 15-110	170	AT 5	14560	480	80	32.7	282.9	0.52		1050
	215	AT 5	23650	780	1000	32.7	282.9	0.87		
CKR 20-145	180	AT 5	34800	1530	260	87.5	903.9	0.99		1225
	240	AT 5	56530	2480	2820	87.5	903.9	1.67		
CKR 25-200	265	AT 10	55000	3570	360	465.6	3316.6	2.40	10000	4000
	405	AT 10	89340	5800	7810	465.6	3316.6	4.24		

Toothed belt stretch $\Delta L = (F \cdot L)/c_{spec}$

Maximum permissible loads

Size	Carriage length	Maximum permissible forces (N)			Maximum permissible moments (Nm)	
		F_{z1max}	F_{z2max}	F_{ymax}	M_{tmax}	M_{Lmax}
CKR 12-90	102	4620	4120	1195	110	16
	156	7500	6700	2170	180	210
CKR 15-110	170	11200	5600	3240	180	40
	215	18190	9090	5270	300	380
CKR 20-145	180	26760	13380	7760	580	130
	240	43470	21730	12600	950	1080
CKR 25-200	265	42300	21150	12260	1370	180
	405	68710	34350	19920	2230	3000

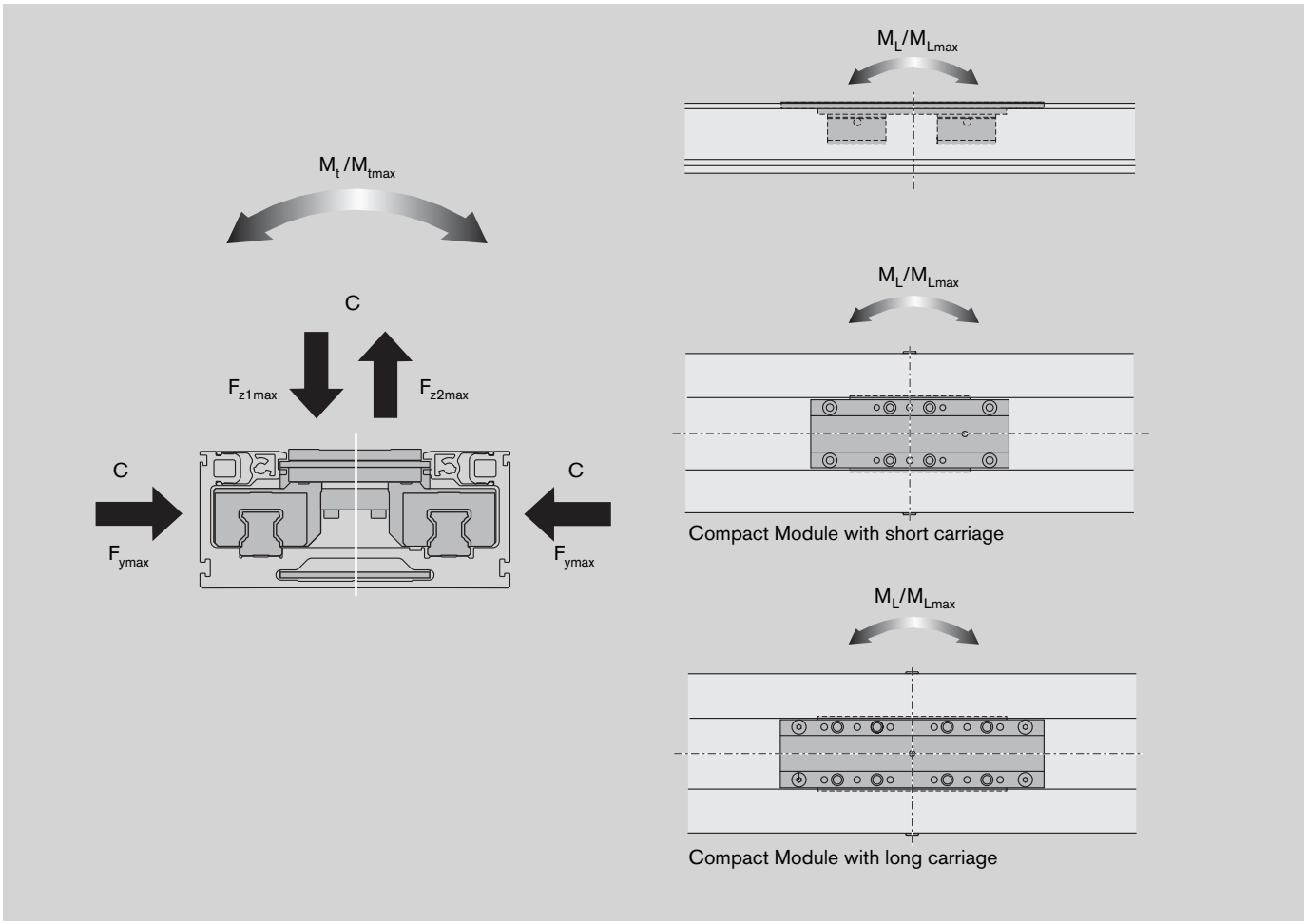
Modulus of elasticity E

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

Weight

Mass calculation without motor and sensors.
Mass formula: Mass (kg/mm) · length L (mm) + mass of all parts of fixed lengths (carriage, drive end, idler end, etc.) (kg)
(+ additional mass (kg))

Compact Module	Carriage length (mm)	Drive type	Mass (kg)	Additional mass of gear reducer (kg)
CKR 12-90	102	without drive	0.0044 · L + 0.77	–
		Drive i = 1	0.0044 · L + 0.96	1.00 (LP050)
	156	without drive	0.0043 · L + 0.96	–
		Drive i = 1	0.0043 · L + 1.15	1.00 (LP050)
CKR 15-110	170	without drive	0.0074 · L + 1.55	–
		Drive i = 1	0.0074 · L + 1.79	1.02 (LP050)
	215	without drive	0.0073 · L + 1.84	–
		Drive i = 1	0.0073 · L + 2.08	1.02 (LP050)
CKR 20-145	180	without drive	0.0122 · L + 2.84	–
		Drive i = 1	0.0122 · L + 3.53	2.29 (LP070)
	240	without drive	0.0122 · L + 3.47	–
		Drive i = 1	0.0122 · L + 4.16	2.29 (LP070)
CKR 25-200	265	without drive	0.0233 · L + 8.99	–
		Drive i = 1	0.0233 · L + 10.23	4.37 (LP090) / 11.36 (LP120)
	405	without drive	0.0231 · L + 10.83	–
		Drive i = 1	0.0231 · L + 12.07	4.37 (LP090) / 11.36 (LP120)



Note on dynamic load capacities and moments
Determination of the dynamic load capacities and moments is based on a travel life 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.

Compact Modules CKR

Technical data

Drive data

Size	Drive type	Gear reducer ratio i	Max. drive torque[1] M_a (Nm)	Lead constant u (mm/rev)	Belt type	Width b (mm)	Tooth pitch T (mm)	Max. belt drive transmission force F (N)	Belt elasticity limit F_{perm} (N)
CKR 12-90	i = 1	1	8.0	90.0	AT 3	35	3	560	1600
	Gear reducer LP050	5	1.6	18.0					
		10	0.8	9.0					
CKR 15-110	i = 1	1	13.5	120.0	AT 5	50	5	705	4200
	Gear reducer LP050	5	2.4	24.0					
		10	1.1	12.0					
CKR 20-145	i = 1	1	32.5	165.0	AT 5	70	5	1235	4800
	Gear reducer LP070	3	10.6	55.0					
		5	6.4	33.0					
		10	3.2	16.5					
CKR 25-200	i = 1	1	112.7	250.0	AT10	100	10	2830	17000
		1 with keyway	99.8	250.0					
	Gear reducer LP090	3	24.0	83.3					
		5	18.0	50.0					
		10	8.0	25.0					
	Gear reducer LP120	3	37.6	83.3					
		5	22.5	50.0					
		10	11.2	25.0					

1) Maximum 1,000 cycles/hour

Drive data without motor (i = 1)

Size	Drive unit diameter (mm)	Lead constant (mm)	Travel speed (m/s)	Belt type	Reduced mass moment of inertia for short carriage (kgm^2)	Reduced mass moment of inertia for long carriage (kgm^2)
CKR 12-90	28.65	90	up to 3	AT 3 Width 35 mm	$(0.71 + 0.00032 \cdot L) \cdot 10^{-4}$	$(1.08 + 0.00032 \cdot L) \cdot 10^{-4}$
CKR 15-110	38.20	120	up to 5	AT 5 Width 50 mm	$(2.91 + 0.00136 \cdot L) \cdot 10^{-4}$	$(3.80 + 0.00136 \cdot L) \cdot 10^{-4}$
CKR 20-145	52.52	165	up to 5	AT 5 Width 70 mm	$(10.57 + 0.00317 \cdot L) \cdot 10^{-4}$	$(14.49 + 0.00317 \cdot L) \cdot 10^{-4}$
CKR 25-200	79.58	250	up to 5	AT10 Width 100 mm	$(76.18 + 0.01840 \cdot L) \cdot 10^{-4}$	$(88.87 + 0.01840 \cdot L) \cdot 10^{-4}$

Calculations

Formulas

Nominal life

Nominal life in meters:

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

L_{10} = Nominal life in meters (m)
L_{10h} = Nominal life in hours (h)
C = Dynamic load capacity (N)
F_m = Mean equivalent dynamic load (N)
v_m = Average speed (m/s)

Nominal life in hours:

$$L_{10h} = \frac{L_{10}}{3600 \cdot v_m}$$

Frictional torque

with motor attached via motor mount and coupling:

$$M_R = M_{RS}$$

M_R = Frictional torque at motor journal (Nm)
M_{RS} = Frictional torque of system (Nm)

with motor attached via gear reducer:

$$M_R = \frac{M_{RS}}{i} + M_{RLP}$$

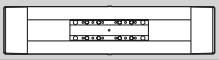
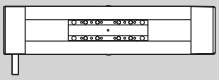
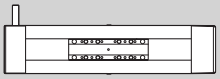
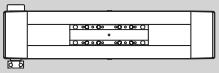
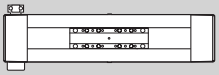
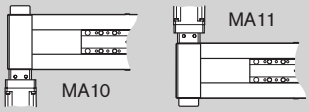
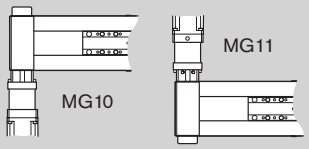
M_{RLP} = Frictional torque of gear reducer (Nm)
i = Gear ratio

Frictional torque data

Size	Motor	Gear unit type	i	M_{RS} (Nm)	M_{RLP} (Nm)
12-90	MSK030C	Gear reducer LP050	5, 10	0.58	0.05
	MSM030C				
15-110	MSK030C	Gear reducer LP050	5, 10	1.42	0.05
	MSM030C				
20-145	MSK040C	Gear reducer LP070	3, 5, 10	2.04	0.14
	MSM040B				
25-200	MSK060C	Gear reducer LP090	3, 5, 10	3.60	0.38
	MSK076C	Gear reducer LP120	3, 5, 10	3.60	0.80

Compact Modules CKR

CKR 12-90 components

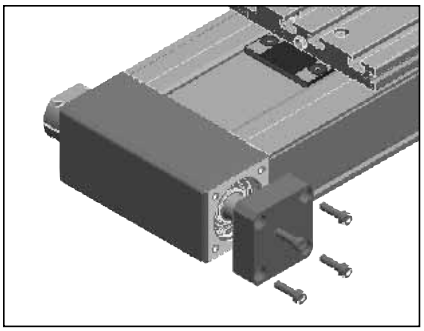
Part number, length R0364 300 00, ... mm	Type	Guideway	Drive unit Shaft for motor	without keyway i = 1	with keyway i = 1	Gear reducer i = 5, 10	Carriage Length 102 mm Connection plate without	Length 102 mm Connection plate with	Length 156 mm Connection plate without	Length 156 mm Connection plate with
without drive 	OA01	01	without	50			01	40	02	41
with drive 	MA01		right	01	03					
	MA02		left							
	MA05		right	06						
	MA06		left	06						
with direct drive, i=1 	MA10 MA11	01	right	06			01	40	02	41
			left	06						
with gear reducer 	MG10 MG11	01	with gear reducer			08	01	40	02	41

1) Attachment kit also available without motor (when ordering: enter “00” for motor)

Note: For gear unit performance data, see “Performance data” section.

CKR with second shaft end

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[1]			Motor			Switch Socket, plug Mounting duct	Documentation	
	Direct drive	i = 5	i = 10		without brake	with brake		Standard report	Measure-ment report
	00	00	00		00		without switch without mounting duct: 00 Magnetic field sensor Reed sensor: 21 Hall sensor PNP - NC contact: 22 Mounting duct 25 Length = L Socket Plug 17	01	02 Frictional torque 05 Positioning accuracy
	01			MSK 040C	86	87	Magnetic field sensor with plug[2] Reed sensor: 58 Hall sensor PNP - NC contact: 59		
		11	12	MSK 030C	84	85			
		31	32	MSM 030C	72	73			

Including mounting accessories

Length of the Compact Module

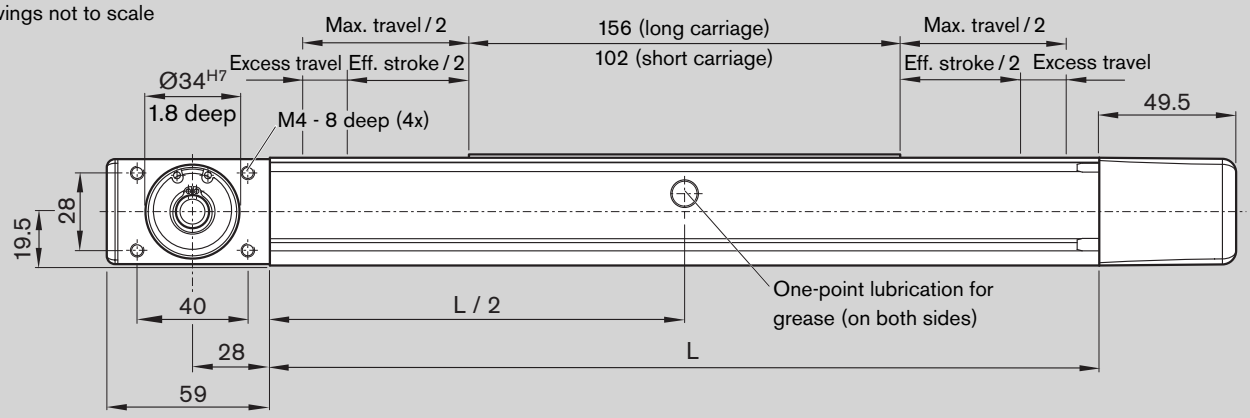
$L = (\text{stroke} + 2 \cdot \text{excess travel}) + L_T + 25$ mm

See order example on p. 102 for example of how to calculate length.

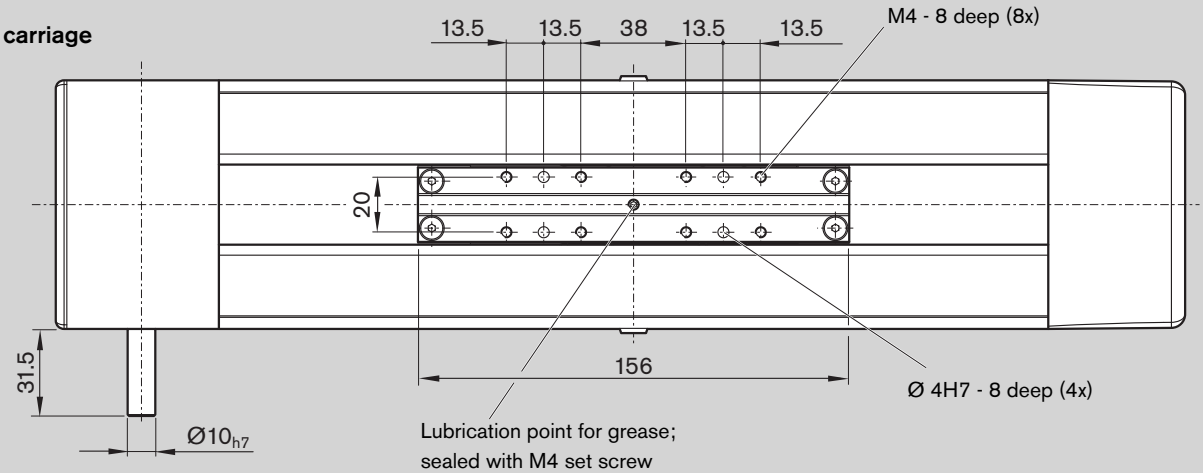
Compact Modules CKR

CKR 12-90 dimensions

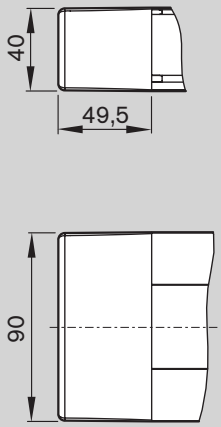
All dimensions in mm
Drawings not to scale



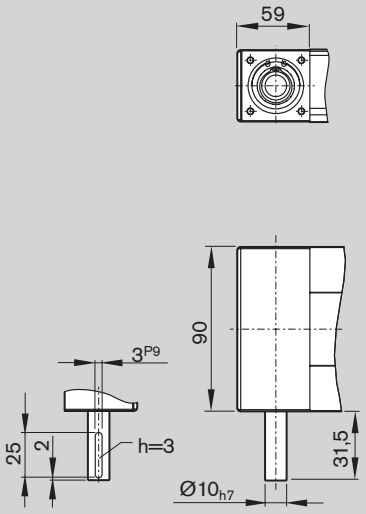
Long carriage



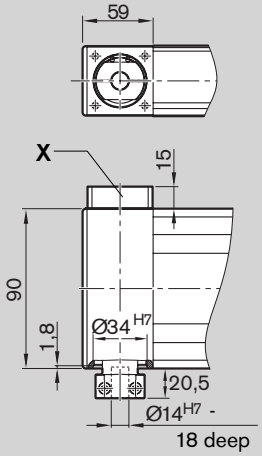
Type OA01



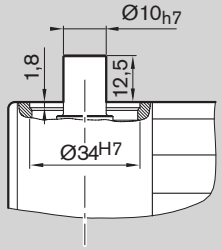
Types MA01 and MA02

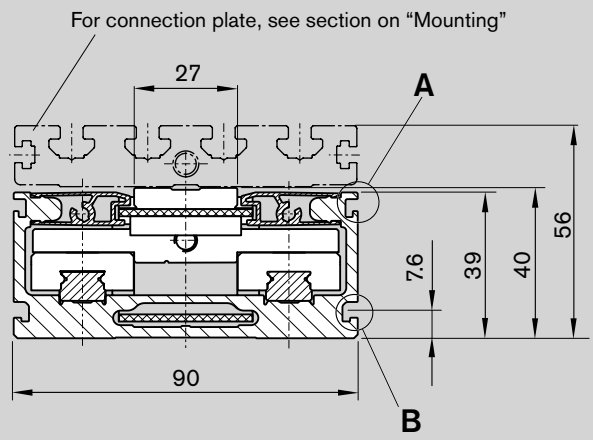


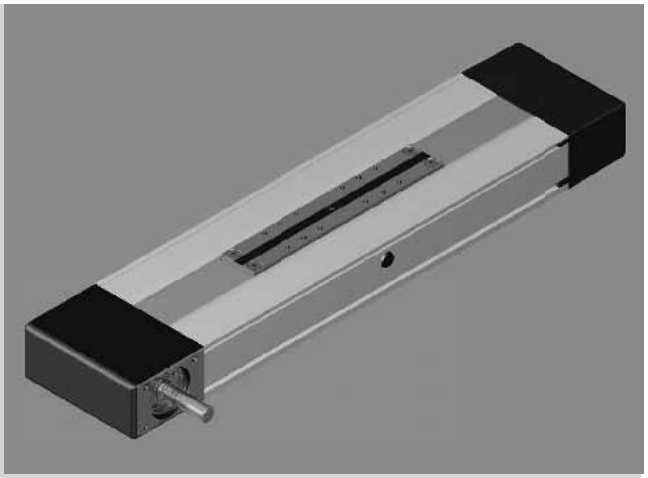
Types MA05 and MA06



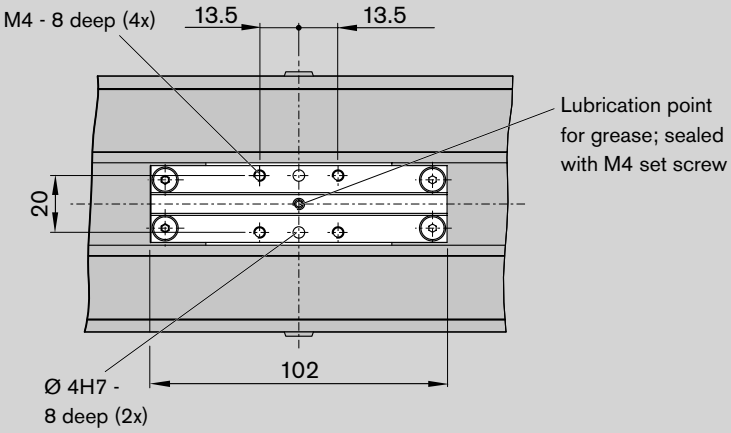
X

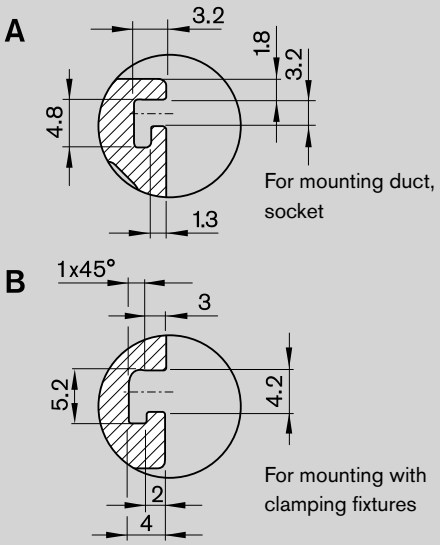




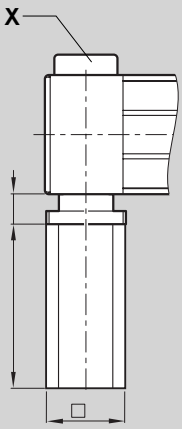


Short carriage

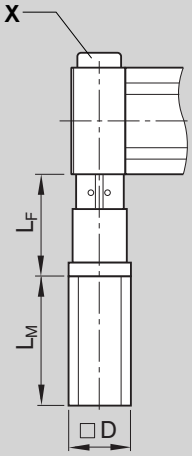




Types MA10 and MA11



Types MG10 and MG11



Type	Motor	Dimensions (mm)			
		D	L_F	L_M without brake	L_M with brake
MA10 **MA11**	**MSK 040C**	82	34.5	185.5	215.5
MG10	**MSK 030C**	54	91.0	188.0	213.0
MG11	**MSM 030C**	54	111.0	138.5	171.5

Compact Modules CKR

CKR 15-110 components

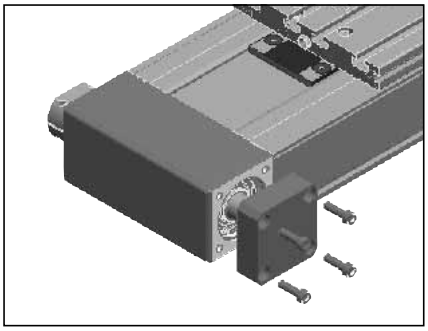
Part number, length R0364 400 00, ... mm	Type	Guideway	Drive unit Shaft for motor	without keyway i = 1	with keyway i = 1	Gear reducer i = 5, 10	Carriage Length 170 mm Connection plate without	with	Length 215 mm Connection plate without	with
without drive	OA01	01	without	50			01	40	02	41
with drive	MA01		right	01	03					
	MA02		left							
	MA05		right	06						
	MA06		left	06						
with direct drive, i=1	MA10 MA11	01	right	06			01	40	02	41
			left	06						
with gear reducer	MG10 MG11	01	with gear reducer			08	01	40	02	41

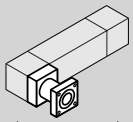
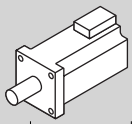
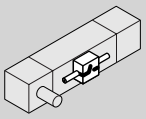
1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories

Note: For gear unit performance data, see “Performance data” section.

CKR with second shaft end

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 [1]			Motor			Switch Socket, plug Mounting duct	Documentation	
									
	Direct drive	i = 5	i = 10		without brake	with brake		Standard report	Measure-ment report
	00	00	00		00		without switch without mounting duct: 00 Magnetic field sensor Reed sensor: 21 Hall sensor PNP - NC contact: 22 Mounting duct 25 Length = L Socket Plug 17	01	02 Frictional torque
	01			MSK 050C	88	89	Magnetic field sensor with plug [2] Reed sensor: 58 Hall sensor PNP - NC contact: 59		05 Positioning accuracy
		11	12	MSK 030C	84	85			
		31	32	MSM 030C	72	73			

Length of the Compact Module

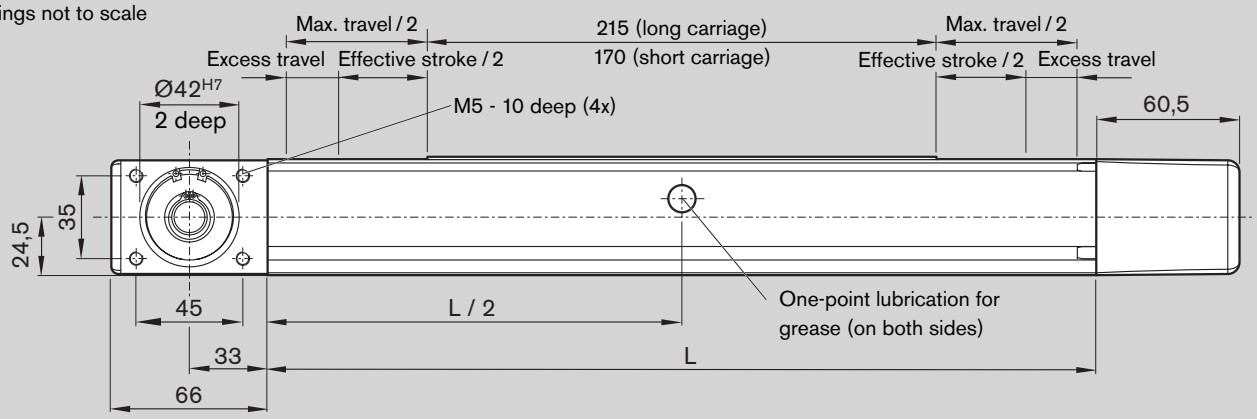
$L = (\text{stroke} + 2 \cdot \text{excess travel}) + L_T + 25$ mm

See order example on p. 102 for example of how to calculate length.

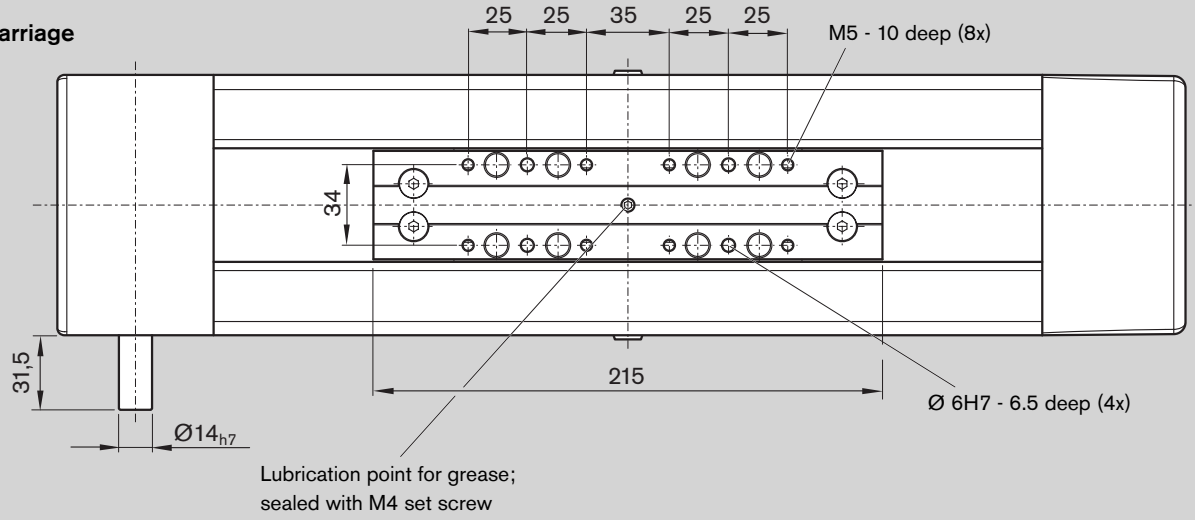
Compact Modules CKR

CKR 15-110 dimensions

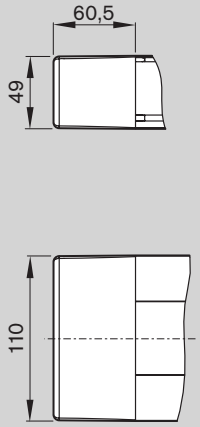
All dimensions in mm
Drawings not to scale



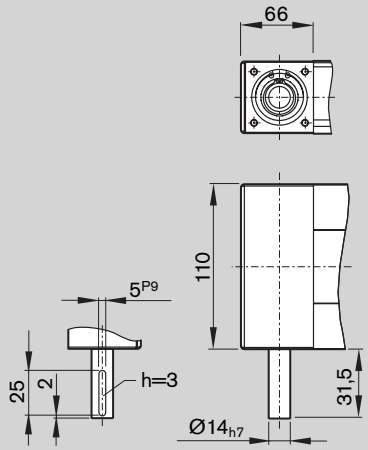
Long carriage



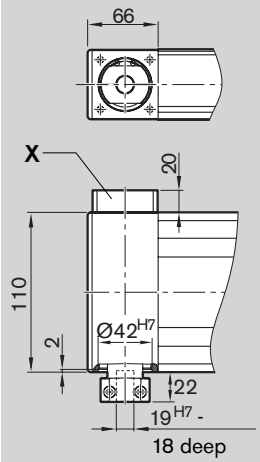
Type OA01



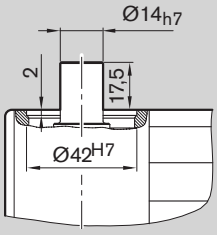
Types MA01 and MA02

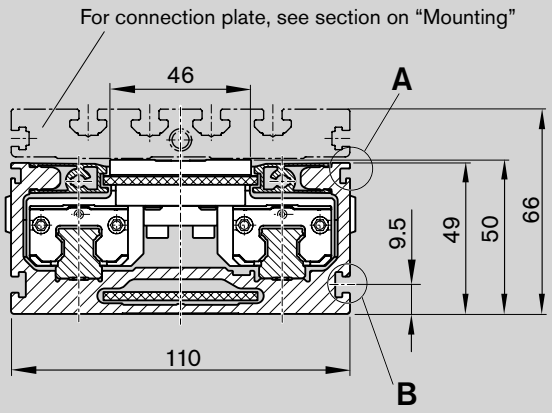


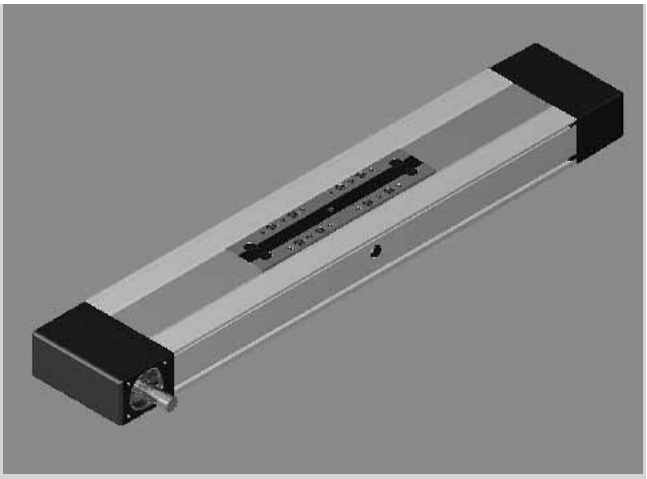
Types MA05 and MA06



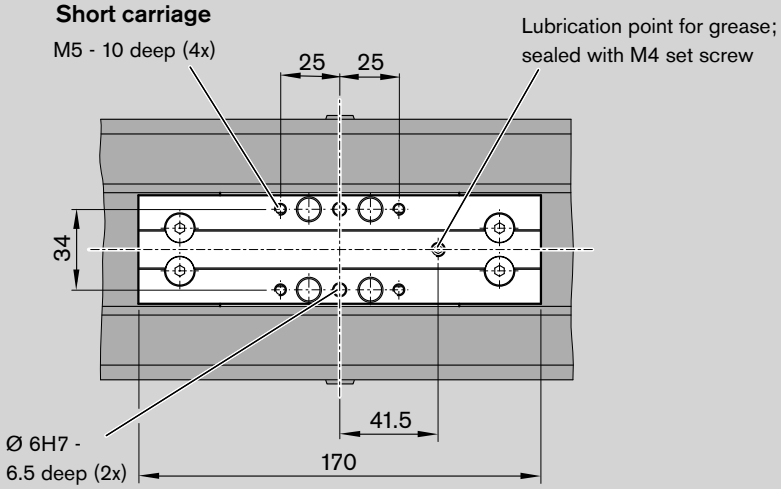
X

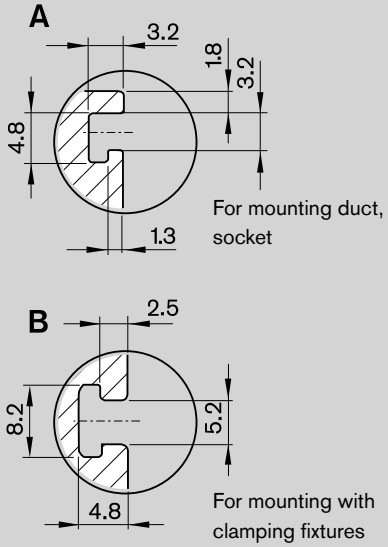




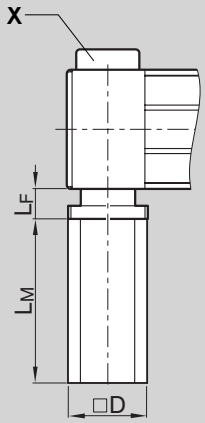


Short carriage

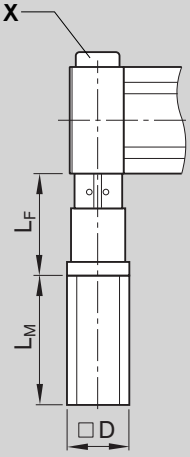




Types MA10 and MA11



Types MG10 and MG11



Type	Motor	Dimensions (mm)			
		D	L_F	L_M without brake	L_M with brake
MA10 MA11	MSK 050C	98	46.0	203.0	233.0
MG10	MSK 030C	54	93.5	188.0	213.0
MG11	MSM 030C	60	93.5	138.5	171.5

Compact Modules CKR

CKR 20-145 components

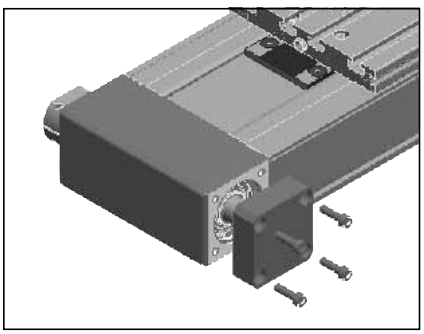
Part number, length R0364 500 00, ... mm	Type	Guideway	Drive unit Shaft for motor	without keyway i = 1	with keyway i = 1	Gear reducer i = 3, 5, 10	Carriage Length 180 mm Connection plate without	with	Length 240 mm Connection plate without	with
without drive	OA01	01	without	50			01	40	02	41
with drive	MA01		right	01	03					
	MA02		left							
	MA05		right	06						
	MA06		left	06						
with direct drive, i=1 MA10 MA11	MA10 MA11	01	right	06			01	40	02	41
			left	06						
with gear reducer MG10 MG11	MG10 MG11	01	with gear reducer			08	01	40	02	41

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories

Note: For gear unit performance data, see “Performance data” section.

CKR with second shaft end

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 [1]				Motor			Switch Socket, plug Mounting duct	Documentation	
	Direct drive	i = 3	i = 5	i = 10		without brake	with brake		Standard report	Measure-ment report
	00	00	00	00		00		without switch, without mounting duct: 00 Magnetic field sensor: Reed sensor 21; Hall sensor PNP - NC contact 22; Mounting duct 25 Length = L; Socket Plug 17	01	02 Frictional torque
	01				MSK 060C	90	91	Magnetic field sensor with plug [2]: Reed sensor 58; Hall sensor PNP - NC contact 59		05 Positioning accuracy
		10	11	12	MSK 040C	86	87			
		30	31	32	MSM 040B	74	75			

Length of the Compact Module

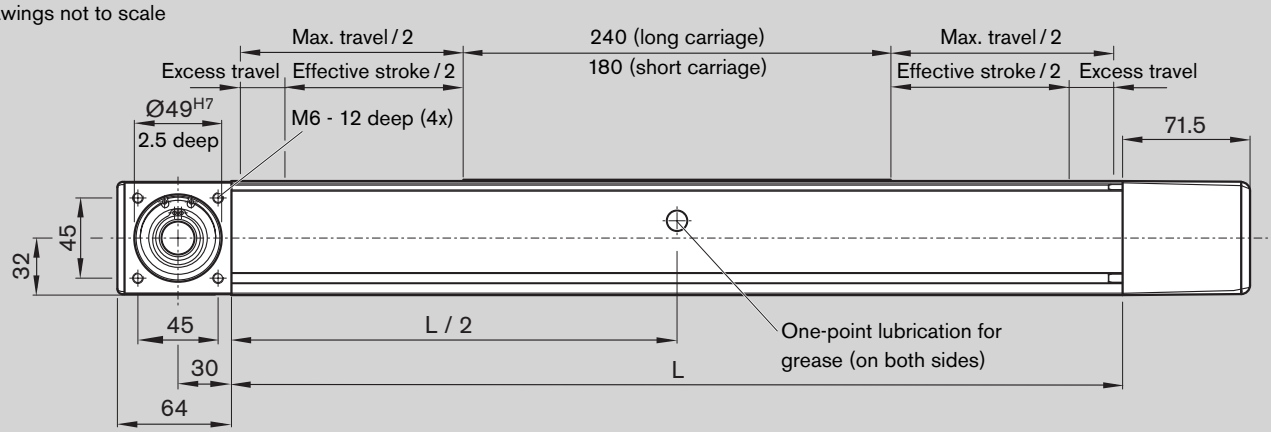
$L = (\text{stroke} + 2 \cdot \text{excess travel}) + L_T + 25$ mm

See order example on p. 102 for example of how to calculate length.

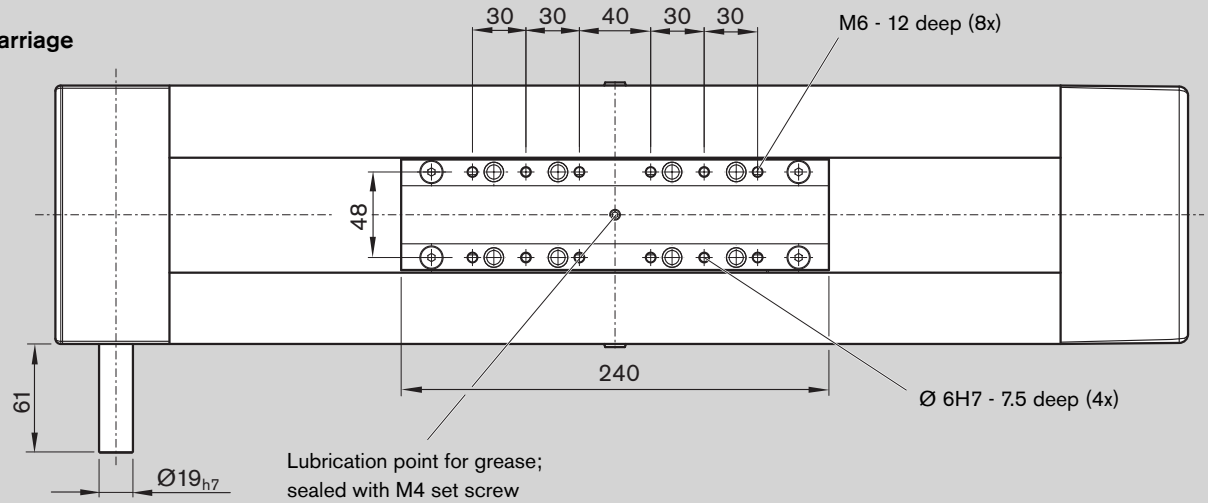
Compact Modules CKR

CKR 20-145 dimensions

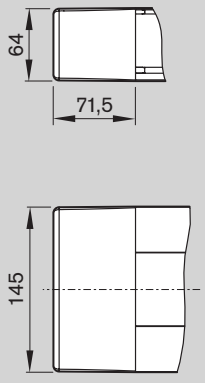
All dimensions in mm
Drawings not to scale



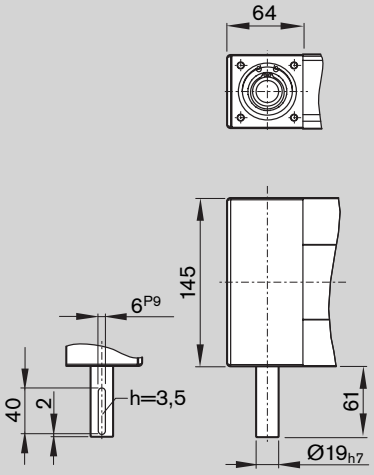
Long carriage



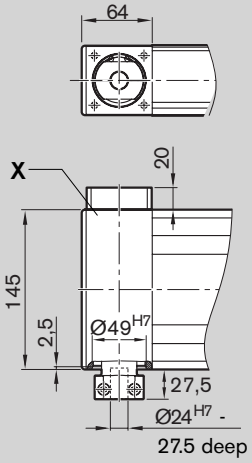
Type OA01



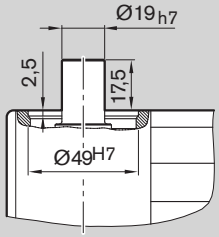
Types MA01 and MA02

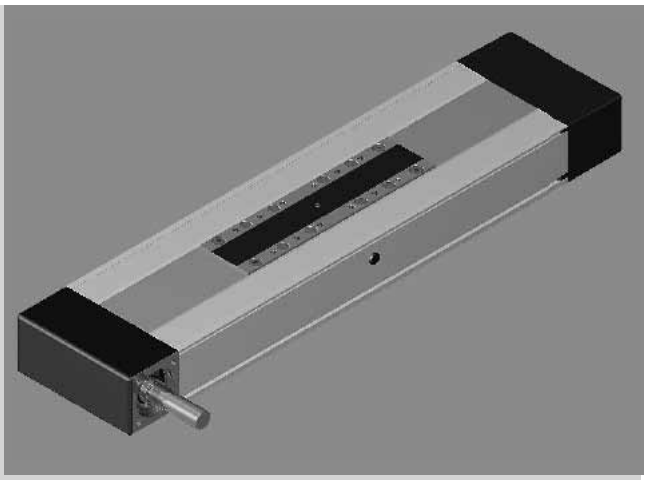


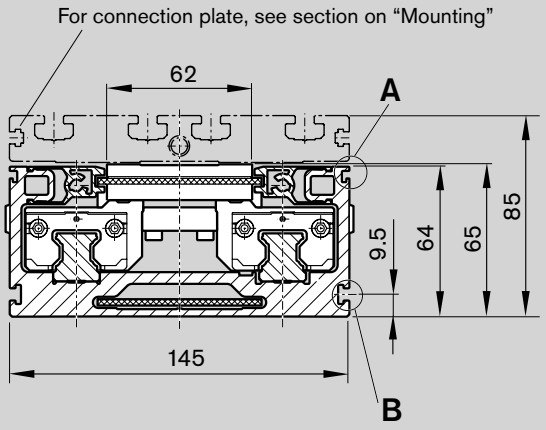
Types MA05 and MA06



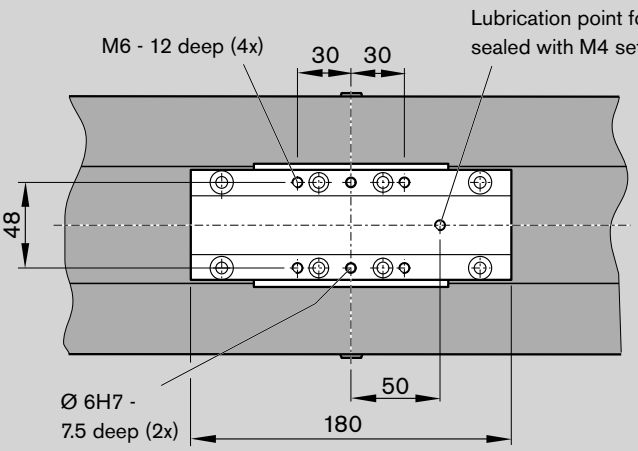
X

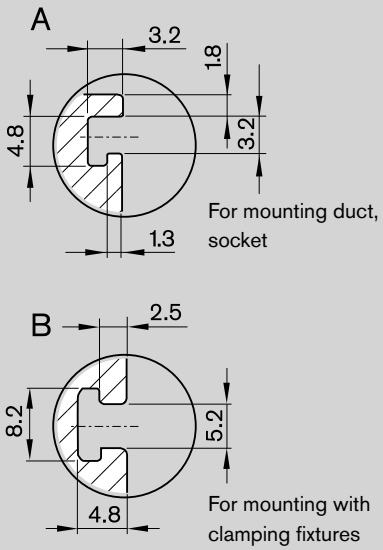




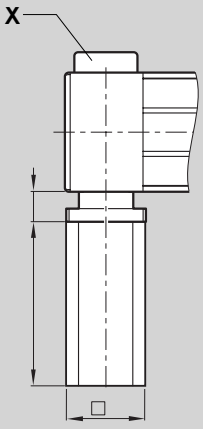


Short carriage

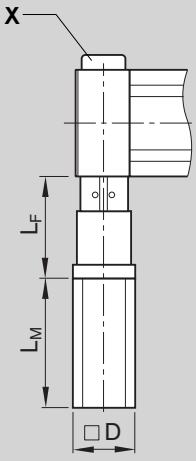




Types MA10 and MA11



Types MG10 and MG11



Motor	Dimensions (mm)			
	D	L_F	L_M without brake	L_M with brake
MSK 040C	82	127	185.5	215.5
MSM 040B	80	132	157.5	191.5
MSK 060C	116	52	226.0	259.0

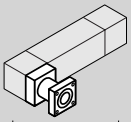
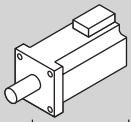
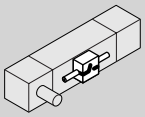
Compact Modules CKR

CKR 25-200 components

Part number, length R0364 600 00, ... mm	Type	Guideway	Drive unit				Carriage			
			Shaft for motor		without keyway i = 1	with keyway i = 1	Gear reducer i = 3, 5, 10	Length 265 mm Connection plate without	Length 265 mm Connection plate with	Length 405 mm Connection plate without	Length 405 mm Connection plate with
without drive	OA01	01	without		50			01	40	02	41
with drive	MA01		right		01	03					
	MA02		left								
	MA03		both sides		02	04					
with gear reducer MG01 MG02	MG01 MG02	01	for gear reducer	1 shaft		LP090	10	01	40	02	41
						LP120	12				
MG03 MG04	MG03 MG04			2 shafts		LP090	11				
						LP120	13				

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories
3) Switch configuration with magnetic field sensor and mechanical/proximity switches together on one side is not possible.
4) Switching cam can be attached only in conjunction with connection plate.

Note: For gear unit performance data, see “Performance data” section.

	Motor attachment[1]			Motor			Switch Socket, plug Mounting duct	Documentation	
									
	i = 3	i = 5	i = 10		without brake	with brake		Standard report	Measure-ment report
					00		without switch without mounting duct **00** **Magnetic field sensor** Reed sensor 21 Hall sensor PNP - NC contact 22 **Mounting duct** 25 Length = L **Socket Plug** 27 **Magnetic field sensor with plug[2]** Reed sensor 58 Hall sensor PNP - NC contact 59 **Proximity / mechanical switches[3]** Mechanical 15 Proximity PNP - NC contact 11 Proximity PNP - NO contact 13 **1 switching cam**[4] 16 **2 switching cams**[4] 26 **Socket Plug** 17 **Cable duct** length = L **20**		02 Frictional torque
	40	41	42	MSK 060C	90	91		01	
	30	31	32	MSK 076C	92	93			05 Positioning accuracy
	40	41	42	MSK 060C	90	91			
	30	31	32	MSK 076C	92	93			

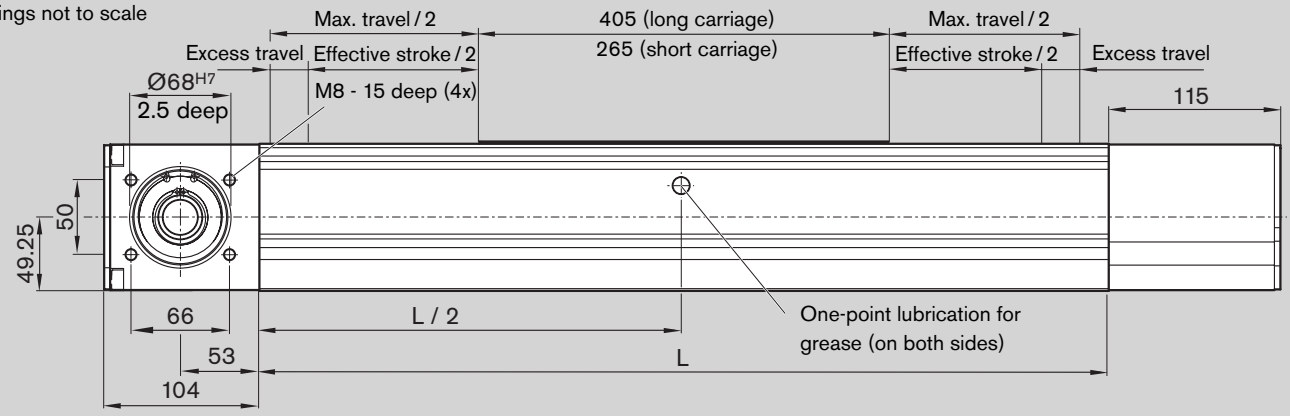
Length of the Compact Module

L = (stroke + 2 · excess travel) + L_T + 25 mm
See order example on p. 102 for example of how to calculate length.

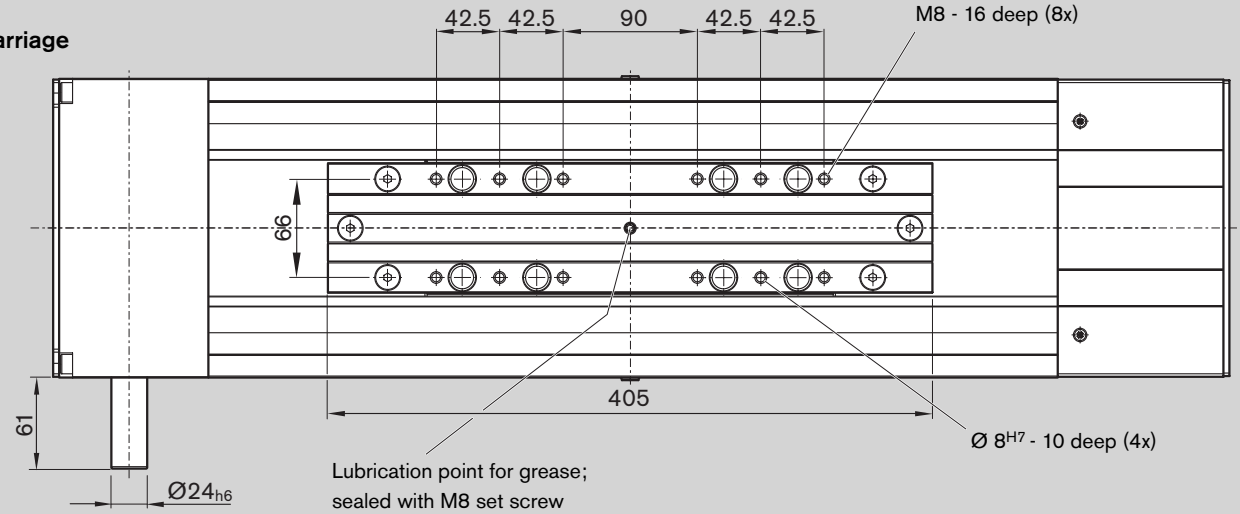
Compact Modules CKR

CKR 25-200 dimensions

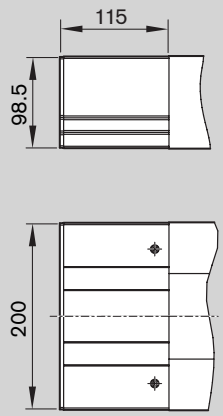
All dimensions in mm
Drawings not to scale



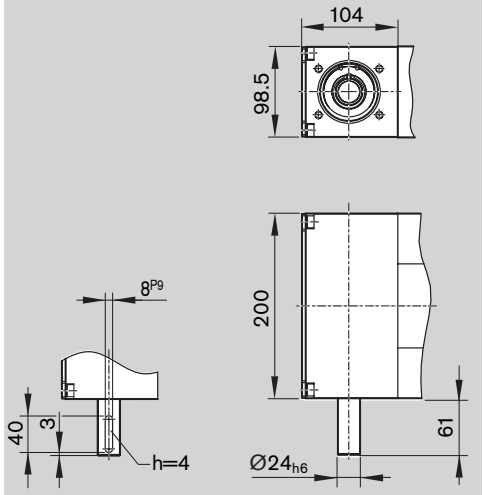
Long carriage



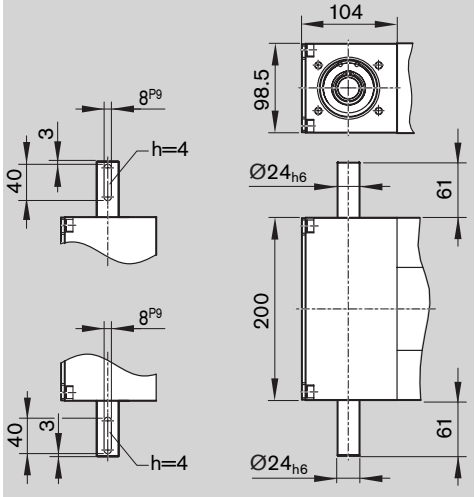
Type OA01

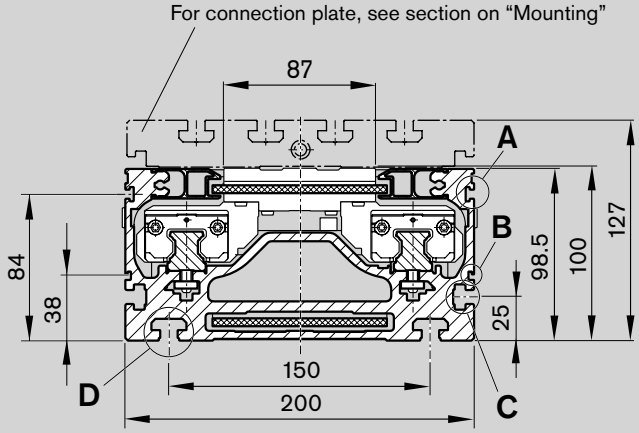


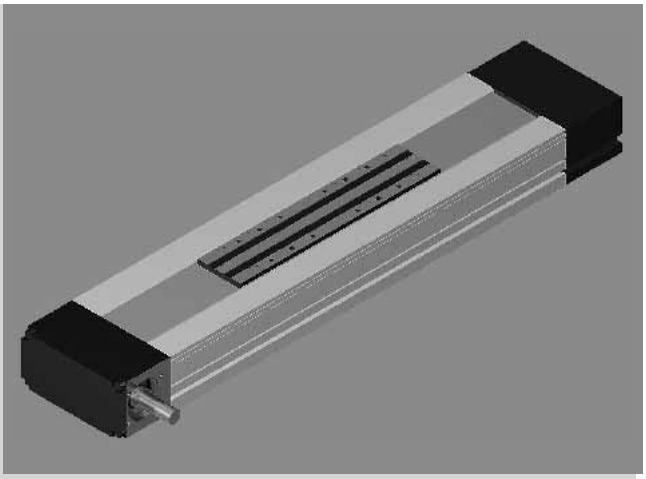
Types MA01 and MA02



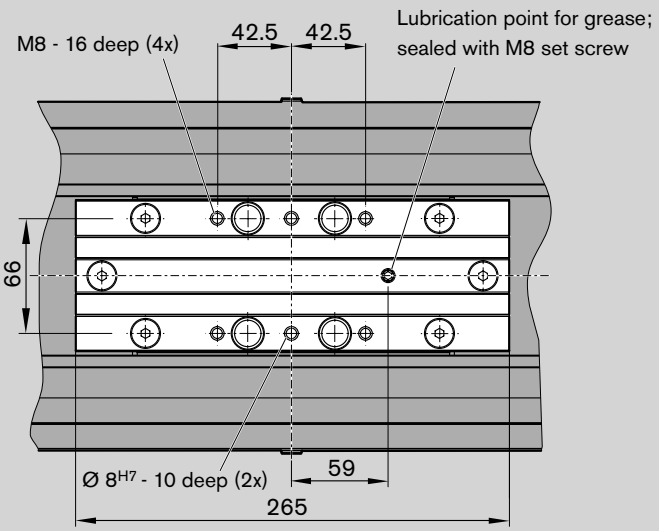
Type MA03

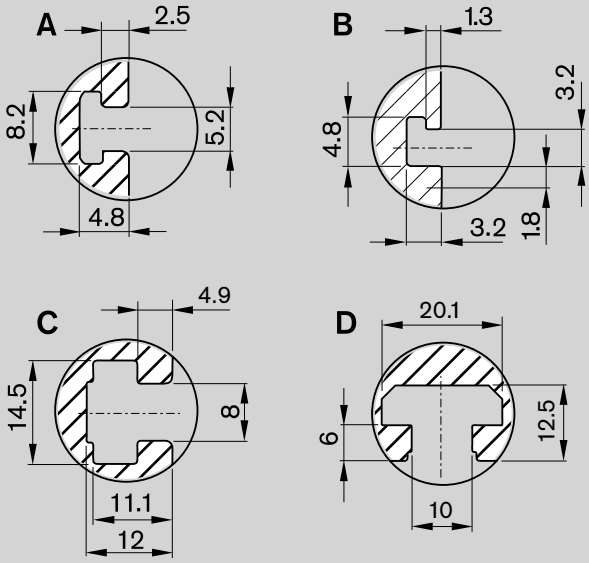




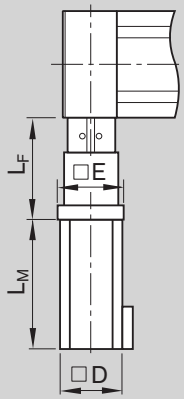


Short carriage

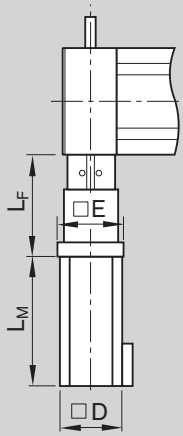




Types MG01 to MG02



Types MG03 to MG04



Motor	Gear reducer	Dimensions (mm) D	E	L_F	L_M without brake	L_M with brake
MSK 060C	LP090	116	120	157	226.0	259.0
MSK 076C	LP120	140	140	215	292.5	292.5

Compact Modules

Performance data

All data for motors with brake

CKR 12-90

Performance data of gear reducer
Performance values for horizontal operation with servo motor MSK 030C and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Gear reducer ratio		i = 5					i = 10				
Mass	(kg)	2	4	6	8	10	2	4	6	8	10
Acceleration time t	(ms)	50	63	75	87	100	77	84	90	97	103
Acceleration distance s	(mm)	60	75	90	105	120	46	501	54	58	62
Acceleration a	(m/s^2)	47.7	38.3	32.0	27.4	24.0	15.6	14.3	13.3	12.4	11.6
Speed v	(m/s)	2.4					1.2				
Repeatability	(mm)	0.1					0.1				

Performance values for horizontal operation with servo motor MSM 030C and EcoDrive Cs controller[1)]
Connection voltage: 1 x 230 V

Gear reducer ratio		i = 5					i = 10				
Mass	(kg)	2	4	6	8	10	2	4	6	8	10
Acceleration time t	(ms)	18	19	23	28	33	19	21	24	26	29
Acceleration distance s	(mm)	8	8	10	13	15	4	5	5	6	6
Acceleration a	(m/s^2)	50.0	48.2	38.6	32.2	27.6	23.9	21.1	19.0	17.2	15.7
Speed v	(m/s)	0.90					0.45				
Repeatability	(mm)	0.1					0.1				

CKR 15-110

Performance data of gear reducer
Performance values for horizontal operation with servo motor MSK 030C and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Gear reducer ratio		i = 5					i = 10				
Mass	(kg)	1	3	5	7	9	4	8	12	16	20
Acceleration time t	(ms)	48	48	60	72	84	64	78	93	107	120
Acceleration distance s	(mm)	58	58	72	87	101	38	47	56	64	72
Acceleration a	(m/s^2)	50.0	50.0	39.9	33.2	28.5	18.8	15.3	13.0	11.2	10.0
Speed v	(m/s)	2.4					1.2				
Repeatability	(mm)	0.1					0.1				

Performance values for horizontal operation with servo motor MSM 030C and EcoDrive Cs controller[1)]
Connection voltage: 1 x 230 V

Gear reducer ratio		i = 5				i = 10						
Mass	(kg)	3	5	7	9	3	6	9	12	15	18	21
Acceleration time t	(ms)	24	26	32	38	21	27	32	37	43	48	54
Acceleration distance s	(mm)	14	16	19	23	6	8	10	11	13	14	16
Acceleration a	(m/s^2)	50.0	45.7	37.1	31.2	28.1	22.5	18.7	16.0	14.0	12.5	11.2
Speed v	(m/s)	1.20				0.60						
Repeatability	(mm)	0.1				0.1						

1) For additional information, refer to the catalogs “Controllers, Motors, Electrical Accessories, Servo motors” and “DSC, ECODRIVE Cs”.

CKR 20-145

Performance data of gear reducer

Performance values for horizontal operation with servo motor MSK 030C and IndraDrive controller[1)]

Connection voltage: 3 x 400 V

Gear reducer ratio		i = 3								
Mass	(kg)	3	5	7	3	5	7	3	5	7
Acceleration time t	(ms)	20	20	20	60	60	60	100	100	117
Acceleration distance s	(mm)	10	10	10	90	90	90	250	250	292
Acceleration a	(m/s^2)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	42.8
Speed v	(m/s)	1.0			3.0			5.0		
Repeatability	(mm)	0.1								

Gear reducer ratio		i = 5							
Mass	(kg)	4	7	10	13	16	19	22	25
Acceleration time t	(ms)	66	66	77	88	100	111	122	134
Acceleration distance s	(mm)	109	109	127	146	164	183	202	221
Acceleration a	(m/s^2)	50.0	50.0	42.9	37.4	33.1	29.7	26.9	24.7
Speed v	(m/s)	3.3							
Repeatability	(mm)	0.1							

Gear reducer ratio		i = 10									
Mass	(kg)	3	6	9	12	15	18	21	24	27	30
Acceleration time t	(ms)	75	82	88	95	102	108	115	122	128	135
Acceleration distance s	(mm)	62	67	73	78	84	89	95	100	106	111
Acceleration a	(m/s^2)	22.0	20.2	18.7	17.4	16.2	15.2	14.4	13.6	12.9	12.2
Speed v	(m/s)	1.65									
Repeatability	(mm)	0.1									

Performance values for horizontal operation with servo motor MSM 040B and EcoDrive Cs controller[1)]

Connection voltage: 1 x 230 V

Gear reducer ratio		i = 5									
Mass	(kg)	6	9	12	15	18	6	9	12	15	18
Acceleration time t	(ms)	16	16	18	20	23	33	33	36	42	48
Acceleration distance s	(mm)	6	6	7	8	9	27	27	30	35	39
Acceleration a	(m/s^2)	50.0	50.0	45.6	39.4	34.7	50.0	50.0	45.6	39.4	34.7
Speed v	(m/s)	0.80					1.65				
Repeatability	(mm)	0.1									

Gear reducer ratio		i = 10									
Mass	(kg)	3	6	9	12	15	18	21	24	27	30
Acceleration time t	(ms)	23	27	30	33	37	40	43	47	50	53
Acceleration distance s	(mm)	10	11	12	14	15	17	18	19	21	22
Acceleration a	(m/s^2)	35.1	30.8	27.4	24.7	22.5	20.6	19.0	17.7	16.5	15.5
Speed v	(m/s)	0.80									
Repeatability	(mm)	0.1									

1) For additional information, refer to the catalogs “Controllers, Motors, Electrical Accessories, Servo motors” and “DSC, ECODRIVE Cs”.

Compact Modules

Performance data

CKR 25-200

Performance data LP gear reducer LP090
Performance values for horizontal operation with servo motor MSK 060C – 0600 and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Gear reducer ratio		i = 3									
Mass	(kg)	5	8	11	14	17	5	8	11	14	17
Acceleration time t	(ms)	60	60	61	69	76	100	100	102	115	127
Acceleration distance s	(mm)	90	90	92	103	114	250	250	256	286	317
Acceleration a	(m/s^2)	50.0	50.0	48.8	43.6	39.5	50.0	50.0	48.8	43.6	39.5
Speed v	(m/s)	3.00					5.00				
Repeatability	(mm)	0.1									

Gear reducer ratio		i = 5									
Mass	(kg)	10	20	30	40	50	10	20	30	40	50
Acceleration time t	(ms)	46	59	72	85	98	95	123	150	178	205
Acceleration distance s	(mm)	41	53	65	77	89	179	230	282	333	385
Acceleration a	(m/s^2)	39.3	30.5	25.0	21.1	18.3	39.3	30.5	25.0	21.1	18.3
Speed v	(m/s)	1.80					3.75				
Repeatability	(mm)	0.1									

Gear reducer ratio		i = 10									
Mass	(kg)	10	20	30	40	50	10	20	30	40	50
Acceleration time t	(ms)	90	101	112	122	133	180	202	223	245	266
Acceleration distance s	(mm)	56	63	70	76	83	225	252	279	306	333
Acceleration a	(m/s^2)	13.9	12.4	11.2	10.2	9.4	13.9	12.4	11.2	10.2	9.4
Speed v	(m/s)	1.25					2.50				
Repeatability	(mm)	0.1									

1) For additional information, refer to the catalogs “Controllers, Motors, Electrical Accessories, Servo motors” and “DSC, ECODRIVE Cs”.

Performance data LP gear reducer LP120
Performance values for horizontal operation with servo motor MSK 076 and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Gear reducer ratio		i = 3									
Mass	(kg)	20	30	40	50	60	20	30	40	50	60
Acceleration time t	(ms)	59	69	76	90	100	118	138	159	179	199
Acceleration distance s	(mm)	59	69	79	90	100	236	277	317	358	399
Acceleration a	(m/s^2)	33.9	28.9	25.2	22.3	20.1	33.9	28.9	25.2	22.3	20.1
Speed v	(m/s)	2.0					4.0				
Repeatability	(mm)	0.1									

Gear reducer ratio		i = 5									
Mass	(kg)	20	30	40	50	60	20	30	40	50	60
Acceleration time t	(ms)	92	101	109	117	126	184	201	218	234	251
Acceleration distance s	(mm)	74	80	87	94	100	295	322	348	375	402
Acceleration a	(m/s^2)	17.4	15.9	14.7	13.6	12.7	17.4	15.9	14.7	13.6	12.7
Speed v	(m/s)	1.6					3.2				
Repeatability	(mm)	0.1									

Gear reducer ratio		i = 10									
Mass	(kg)	20	30	40	50	60	20	30	40	50	60
Acceleration time t	(ms)	177	182	187	192	197	344	353	363	373	382
Acceleration distance s	(mm)	80	82	84	86	88	301	309	318	326	334
Acceleration a	(m/s^2)	5.1	5.0	4.8	4.7	4.6	5.1	5.0	4.8	4.7	4.6
Speed v	(m/s)	0.90					1.75				
Repeatability	(mm)	0.1									

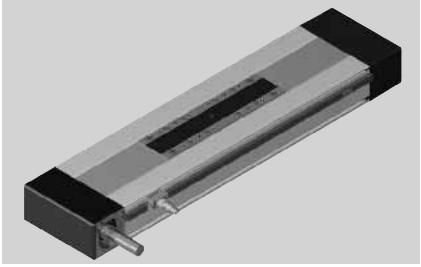
1) For additional information, refer to the catalogs “Controllers, Motors, Electrical Accessories, Servo motors” and “DSC, ECODRIVE Cs”.

The tables contain performance data examples for different gearbox-motor-controller combinations. They are intended to serve as a guide for selection; exact values must be calculated based on individual cases.
Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

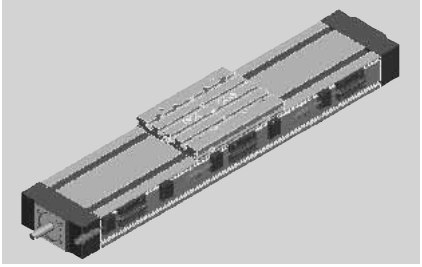
Switch mounting arrangements

Overview of switching systems

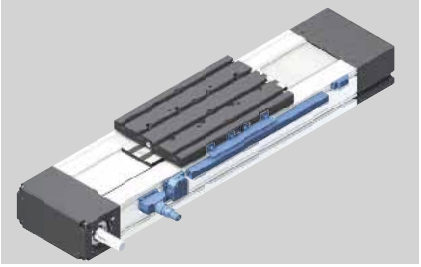
Magnetic field sensor



Magnetic field sensor with plug



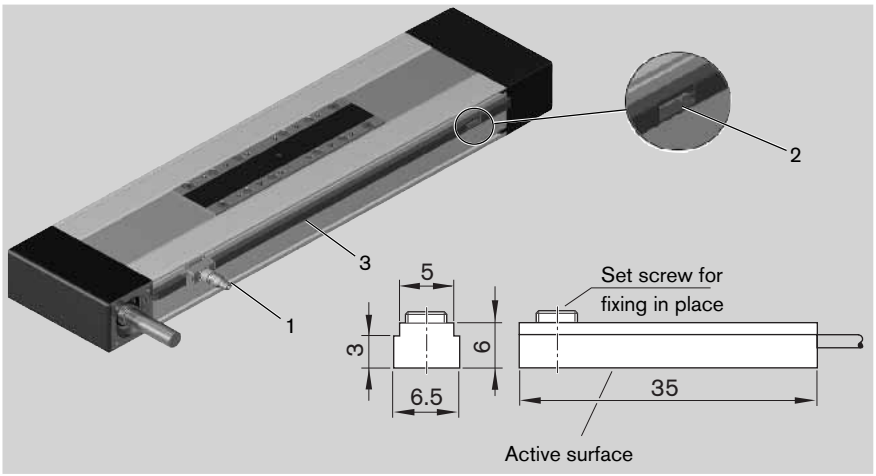
Mechanical and proximity switches



The following switch categories can be used with the Compact Module:
– Magnetic field sensor (Hall and Reed sensors)
– With CKR 25-200 mechanical and proximity switches can be used as well
The entire switching system must be mounted on one side of the Compact Module!
However, switches of different categories cannot be mounted together on the same side.

Magnetic field sensor

Hall and Reed sensor
1 Socket and plug
2 Switch
3 Mounting duct
(aluminum alloy, black anodized)



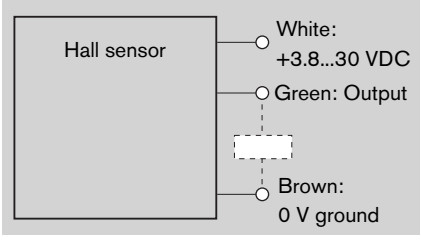
⚠ The magnetic field sensors are suitable for travel speeds up to 2 m/s. At higher travel speeds use mechanical/proximity switches for safety reasons (please inquire)!
Short stroke: Take the length of the switch and socket into consideration!

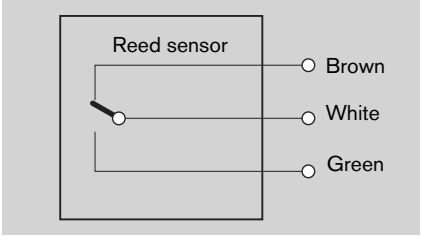
Magnetic field sensors with potted cable.
Version:
– Hall sensor (normally closed) or
– Reed sensor (change-over)
Mounting instructions:
Switches may be mounted only on one side of the Compact Module (left or right) and only after installing the Compact Module to the mounting base. A mounting duct is needed to fasten the switches.

Hall sensor	
Contact type	PNP - NC / NO
Operating voltage	3.8–30 V DC
Power consumption	max. 10 mA
Output current	max. 20 mA
Cable length	2 m (10 m upon request)
Housing protection class	IP 66
Short-circuit protection	No
Maximum travel speed	2 m/s

Reed sensor	
Contact type	Change-over
Switching voltage	max. 100 V DC
Switching current	max. 0.5 mA
Cable length	2 m (10 m upon request)
Housing protection class	IP 66
Maximum travel speed	2 m/s

Pin assignment
Important: 2 switching points!

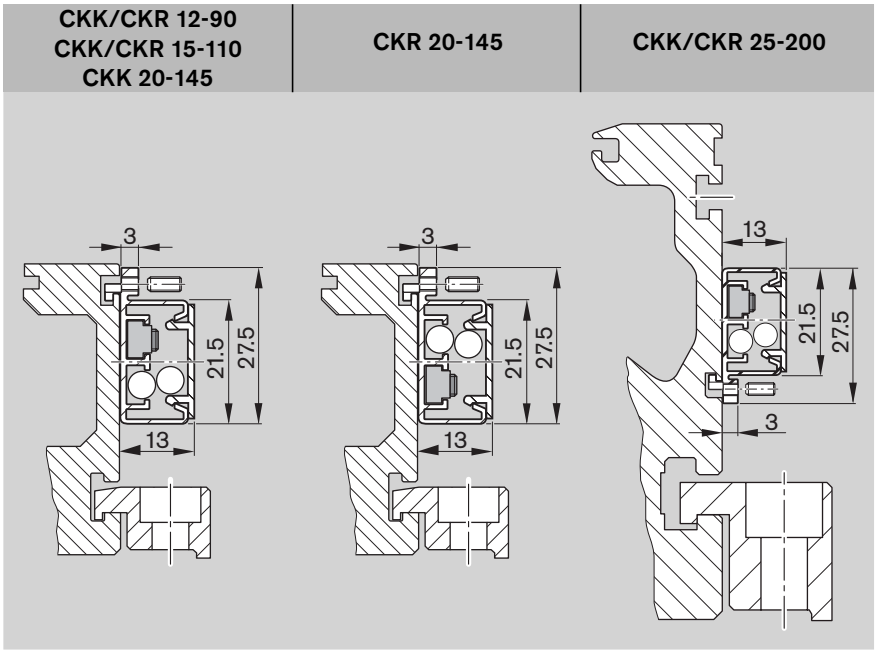




Mounting duct
Function:
– To attach and secure magnetic field sensors
– Cable routing

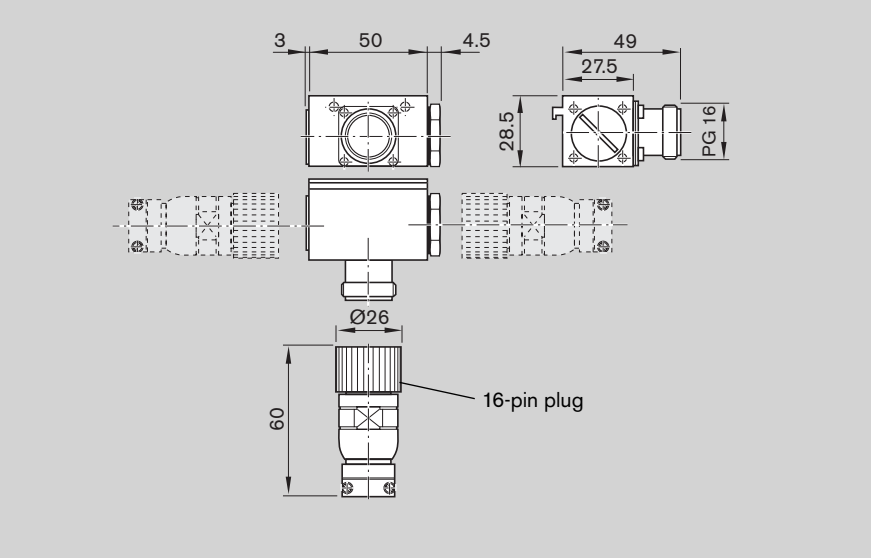
Mounting instructions:
The mounting duct is hooked into the T-slots of the module frame and secured with set screws.
Set screws are included.

The switches are slid into the upper T-slot (CKK/CKR 12-90, 15-110 and CKK 20-145) or into the lower T-slot (CKR 20-145, CKK/CKR 25-200) of the mounting duct and secured with set screws.



Socket and plug
Attach the socket on the side with the magnetic field sensor.

The socket and plug have 16 pins.
Socket and plug are not wired.
This allows optimal assignment of switch positions during start-up.
One plug is included.
The plug can be installed in three directions.



Ordering the magnetic field sensors and accessories

Refer to the following table for part numbers.
Accessories can also be ordered separately.

Item		Part numbers installation on: CKK/CKR all sizes
1	**Socket-plug**	R0375 400 00
2	**Magnetic field sensor**	
	– Reed sensor	R987 146 948
	– Hall sensor (PNP - NC)	R987 146 123
3	**Mounting duct**	R021CKDUCT

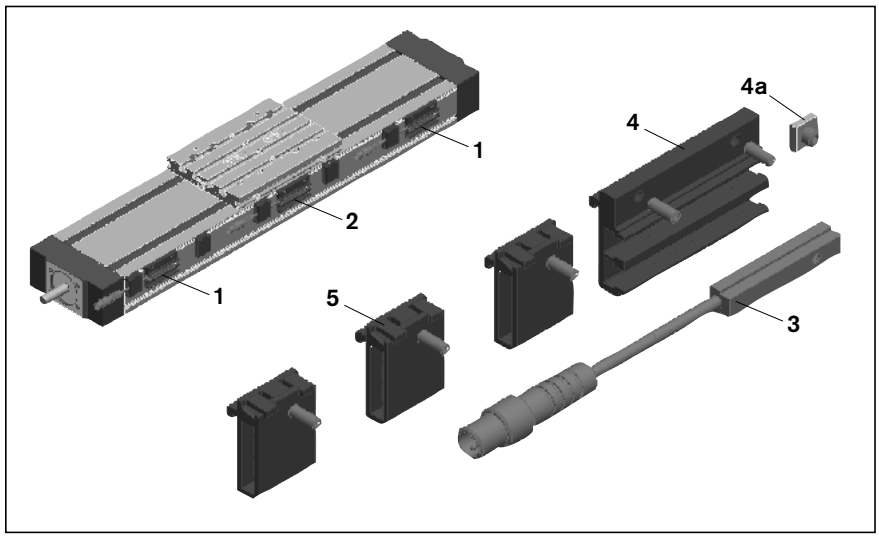
Switch mounting arrangements

Magnetic field sensor with plug

With magnetic field sensors, switch activation is direct (without switching cam). The switch positions can be adjusted freely over the entire travel range. Sensors may be mounted only on one side of the Compact Module (left or right) and only after installing the Compact Module to the mounting base.

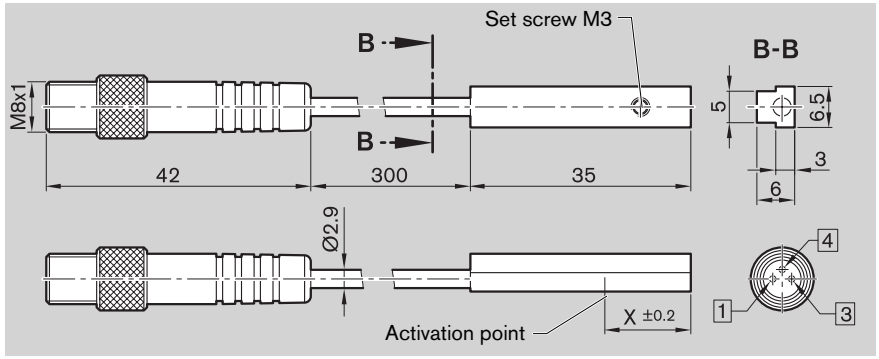
Switch positions:
1 Limitation at end of stroke (recommendation: Reed or Hall sensor)
2 Reference point in middle of stroke (recommendation: Hall sensor)

Sensor mounting assembly
consists of:
3 Sensor (Hall or Reed)
4 Sensor mount incl. set screws (loose) and square nut **4a**
5 Cable holder (3 units) incl. set screw (loose)



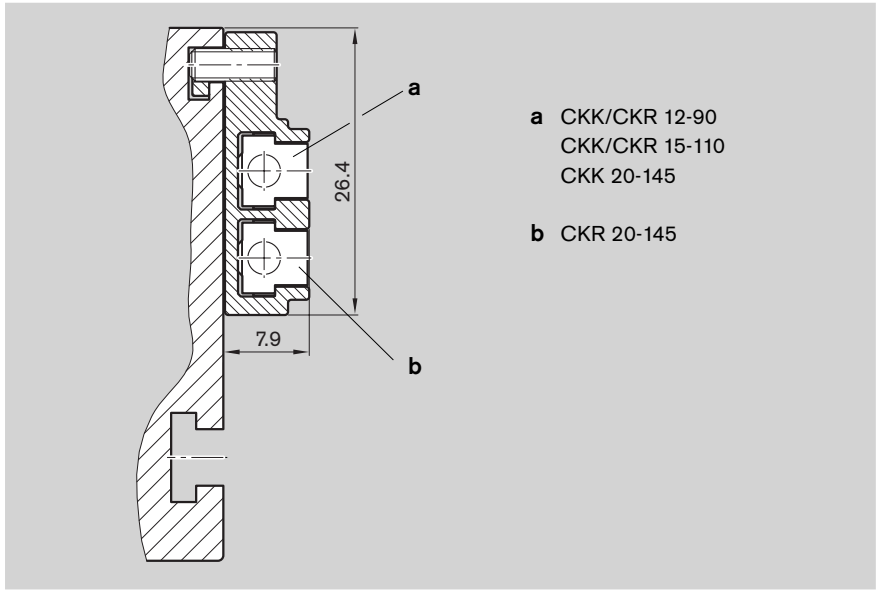
Version	Part number
Sensor mounting assembly with Reed sensor	R0375 300 07
Sensor mounting assembly with Hall sensor	R0375 300 08

Sensor configuration:



Sensor mount

A sensor mount (1) is required to attach the sensors. It is hooked into the upper slot on the Compact Module and secured with set screws (2).
The sensors are slid into the respective slot on the sensor mount and secured with set screws.
The square nut with set screw (3) serves as a positive stop for the sensor (switch position when changing sensors).
Parts are included with the sensor mounting assembly.

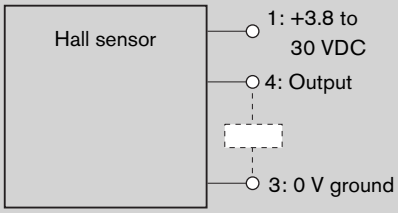


Technical data and ordering

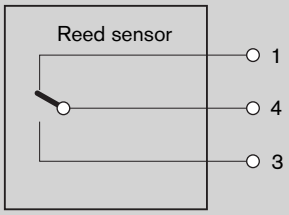
Part number	Hall sensor R3476 024 03
Dimension X	13.65 mm
Contact type	PNP - NC
Operating voltage	3.8 to 30 V DC
Power consumption	max. 10 mA
Output current	max. 20 mA
Housing protection class	IP 66
Short-circuit protection	No
Permissible travel speed	2 m/s
Housing material	Ultramid

Part number	Reed sensor R3476 023 03
Dimension X	9 mm
Contact type	Change-over
Switching voltage	max. 100 V DC
Switching current	max. 500 mA
Housing protection class	IP 66
Permissible travel speed	2 m/s
Housing material	Ultramid
Important: 2 switching points	

Pin assignment



– Hall sensor (PNP - NC contact)



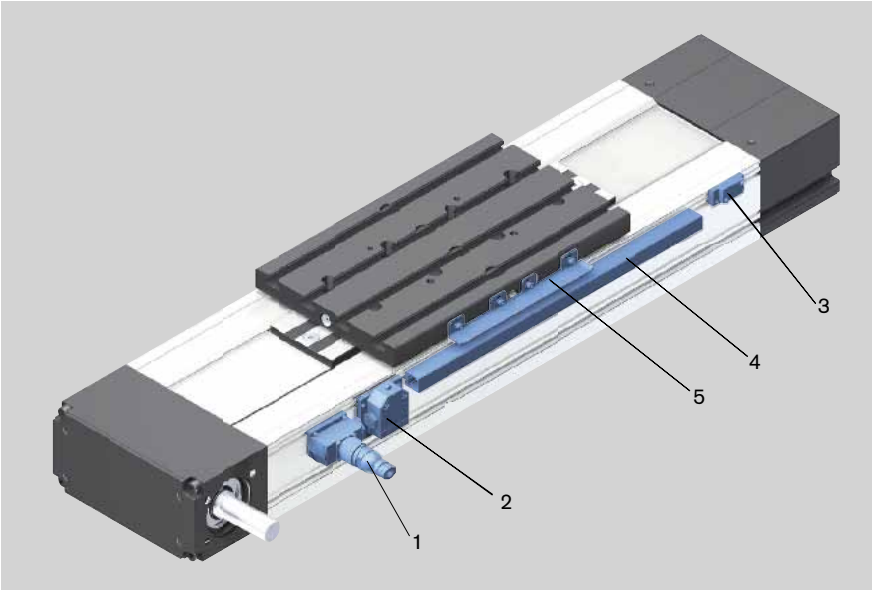
– Reed sensor (change-over)

Switch mounting arrangements

Mechanical and proximity switches

Mechanical and proximity switches on CKK/CKR 25-200

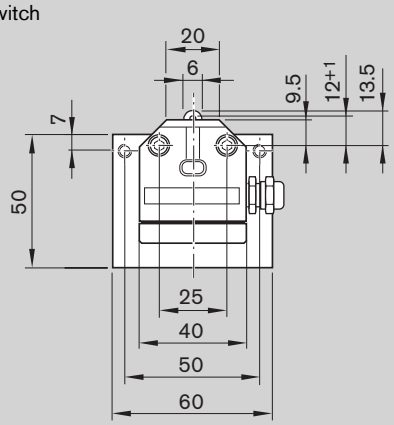
1 Socket and plug
2 Mechanical switch (with accessories)
3 Proximity switch (with accessories)
4 Cable duct (aluminum alloy)
5 Switching cam (for installation on connection plate only or with customer-designed solution)



⚠ **Short stroke: Take the length of the switch and socket into consid-**

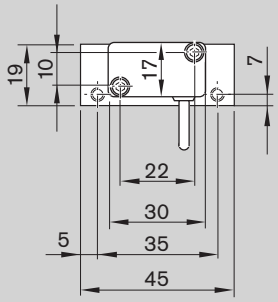
Mechanical switch (technical data)	
Repeatability	± 0.05 mm
Permissible ambient temperature	–5°C to +80°C
Enclosure	DIN 40050 IP 67
Duration of bounce	< 2 ms
Insulation	Group C according to VDE 0110
Rated voltage	250 V AC
Continuous current	5 A
Switching capacity at 220 V, 40-60 Hz	cosφ = 0.8 at 2 A
Contact resistance when new	< 240 mΩ
Connector	Screw connector
Contact system	Single-pole change-over
Switching system	Snap-action

Mechanical switch with mount

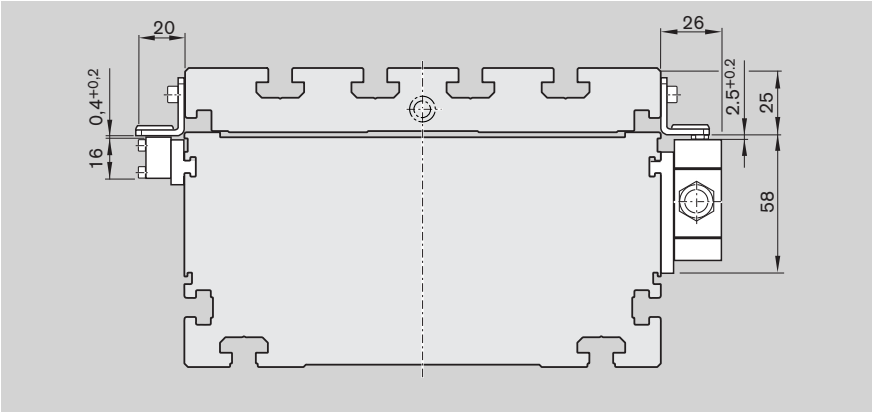


Proximity switch (technical data) Proximity switch with potted cable (3 x 0.14 mm² Unitronic)	
Housing form	NO
Minisensor	Form A DIN 41635
Operating voltage	10 ... 30 V DC
Residual ripple	≤ 10%
Load	200 mA
No-load current	≤ 20 mA
Switching frequency	max. 1,500 Hz
Temperature-related shift in make point	≤ 4 µm/K
Output signal steepness	≥ 1 V/µs
Repeatability of make point per EN 50008	≤ 0.1 mm
Cable length	3 m (10 m upon request)

Proximity switch with mount



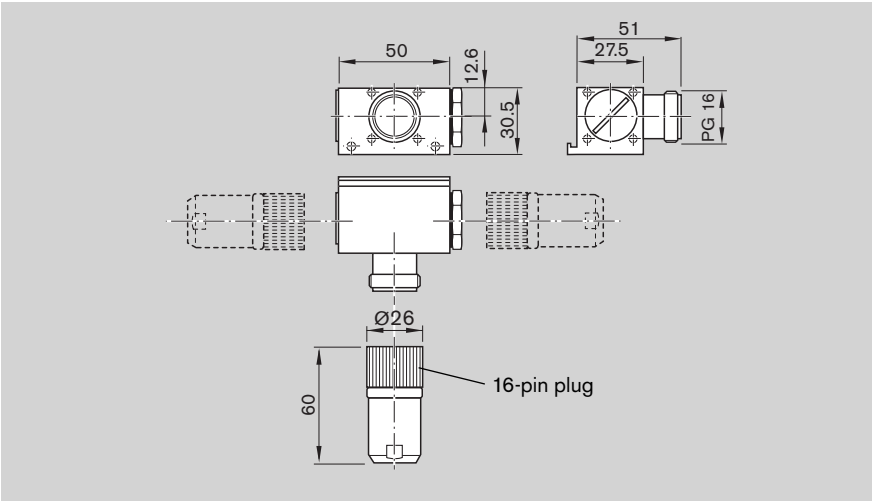
Switch mounting example



Socket and plug

- Attach the socket on the side with the most switches.

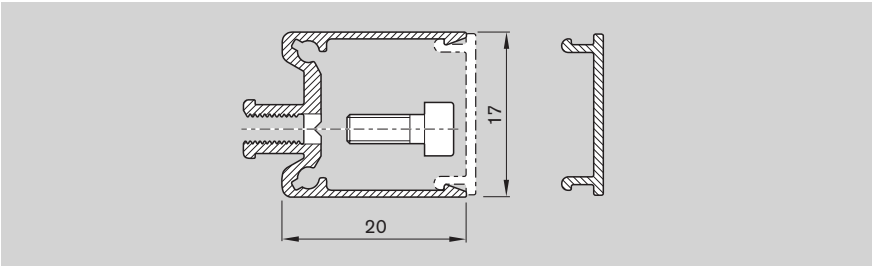
The socket and plug have 16 pins.
Socket and switch are not wired.
This allows optimal assignment of switch positions during start-up.
One plug is included.
The plug can be installed in three directions.



Cable duct

- The cable duct is fastened in the T-slots on the side 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 or three cables for proximity switches.
Fastening screws and cable grommets are included.



Ordering the switches and accessories

Refer to the following table for part numbers.
Accessories can also be ordered separately.

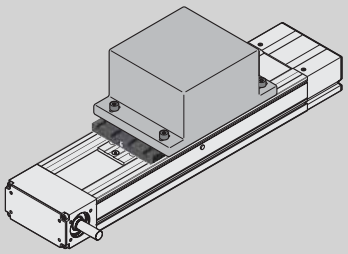
Item		Part numbers for installation on CKK/CKR 25-200 Version with mechanical and proximity switches*
1	**Socket-plug**	R1175 001 53
2	**Mechanical switch with accessories**	R1175 001 51
	Mechanical switch alone	R3453 040 16
3	**Proximity switch**	
	– Mounting accessories	R1175 001 52
	– PNP - NC	R3453 040 01
	– PNP - NO	R3453 040 03
4	**Switching cam**	R1175 001 50
5	**Cable duct**	R021JDUCTL

*) Switching cam installation on connection plate only or with customer-designed solution

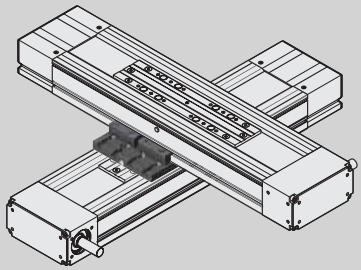
Mounting

Overview of fastening and attachment options

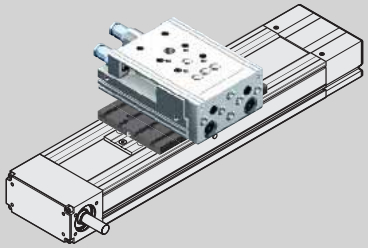
Fastening a customer attachment onto the Compact Module via connection plate



Connection of Compact Modules via connection plate and clamping fixtures



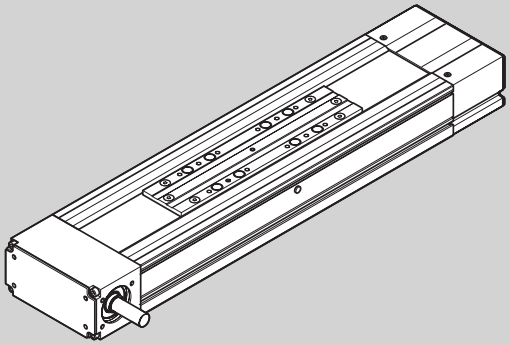
Fastening of camoLINE automation system [1] to Compact Modules via connection plate (example: Mini Slide MSC)



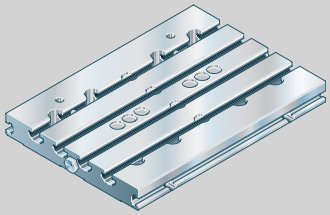
Fastening to carriage

Clamping fixtures

Compact Modules CKR or CKK

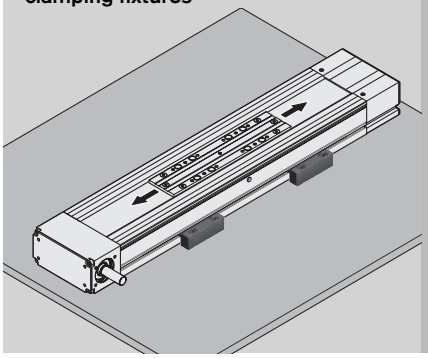


Connection plate

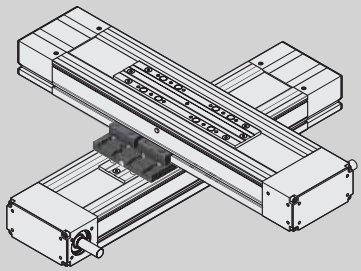


Fastening to frame

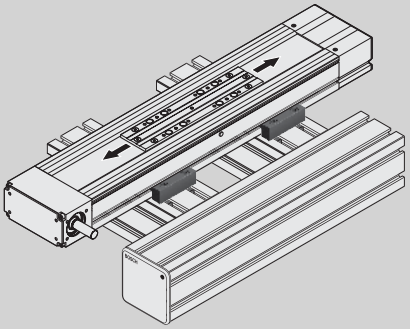
Fastening of Compact Modules to customer-built mounting base via clamping fixtures



Connection of Compact Modules via connection plate and clamping fixtures



Fastening of Compact Modules on BME[2] profile construction via connection plates and clamping fixtures



1) see camoLINE catalong R310A 2605
2) BME: Basic mechanical elements from Bosch Rexroth Linear Motion and Assembly Technologies

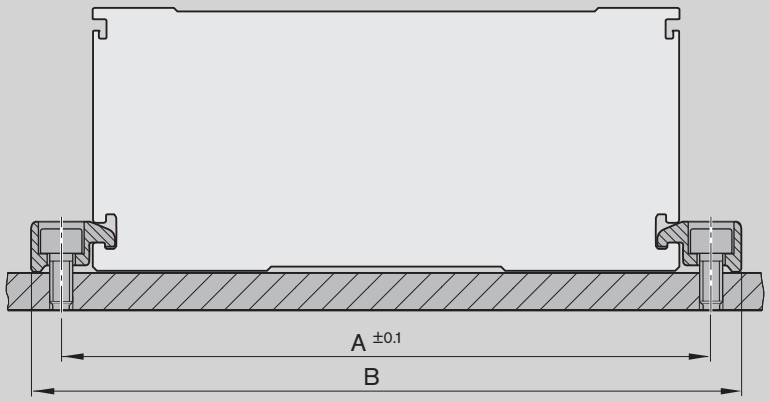
General notes

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.

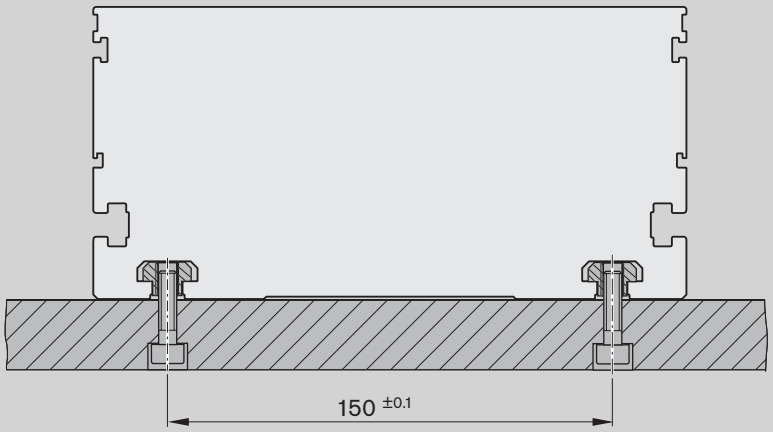
Frame size	A (mm)	B (mm)
90	102	112
110	126	140
145	161	175
200	222	240

Mounting with clamping fixtures



Alternative mounting option with sliding blocks for frame size 200

Mounting with sliding blocks (frame size 200)

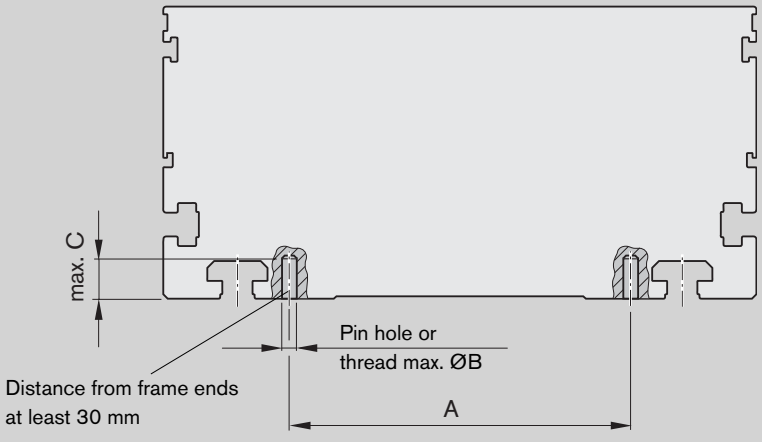


Mounting by means of special modification in the base surface of the frame is possible.

Frame size	A (mm)	B (mm)	C[1)] (mm)
90	76	4	7.5
110	92	5	9.0
145	124	6	13.0
200	119	8	16.0

1) Pin-hole and thread depth

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



Mounting

Connection plates

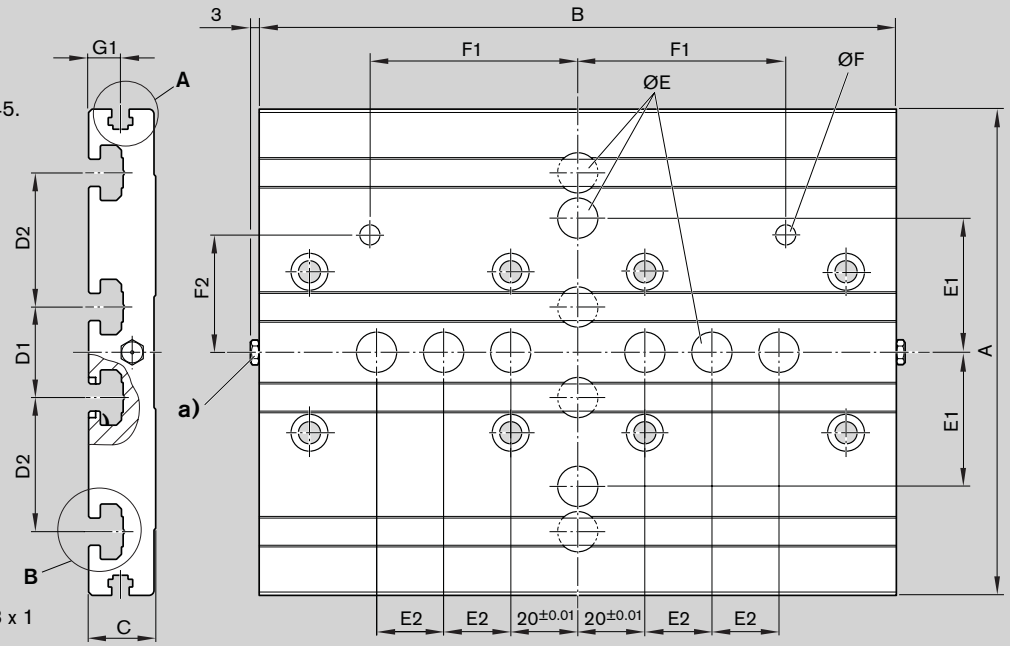
Connection plate
– for CKK with two carriages
– for CKR with long carriage

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

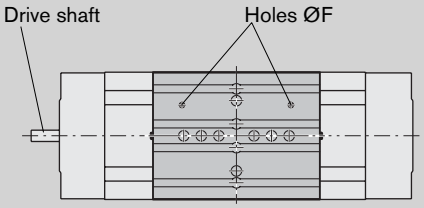
Sliding blocks are not included with delivery.

The connection plates differ in appearance. Shown here is the connection plate for CKR 20-145.

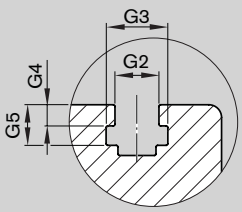


a) Funnel-type lube nipple AM8 x 1

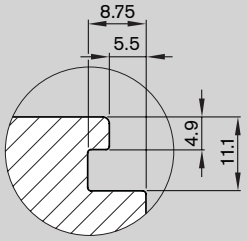
Mounting direction



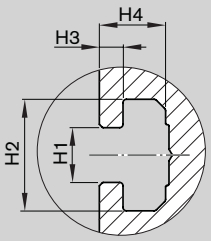
Detail A
Frame size 90, 110 and 145



Detail A
Frame size 200



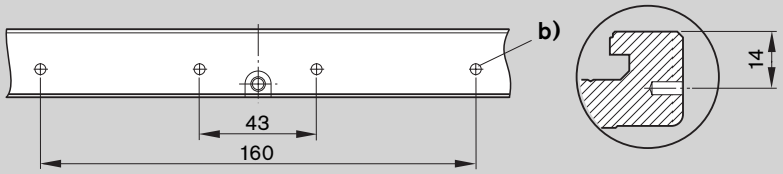
Detail B



Frame size	Dimensions (mm)																		
	A	B	C	D1	D2	ØE^{H7}	E1 ±0.01	E2 ±0.01	ØF^{H7}	F1 ±0.01	F2 ±0.01	G1	G2	G3	G4	G5	H1	H2	H3	H4
90	90	125	16	20	20	9 - 2.1 deep	–	10	4 - 10 deep	38.0	20	7.6	4.2	7.3	2.0	4.3	6	12.0	3.5	7.7
110	110	155	16	20	20	9 - 2.1 deep	–	10	5 - 10 deep	46.0	42	9.5	5.2	7.3	2.5	4.8	6	12.0	3.5	7.7
145	145	190	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	200	305	27	40	40	16 - 3.1 deep	–	20	8 - 16 deep	59.5	41	–	–	–	–	–	10	20.1	6.0	12.5

Frame size	Part number for assembly	
	CKK	CKR
90	R0375 300 10	R0375 300 11
110	R0375 400 10	R0375 400 11
145	R0375 500 10	R0375 500 11
200	R0375 600 10	R0375 600 11

Connection dimensions for switching cam (frame size 200)



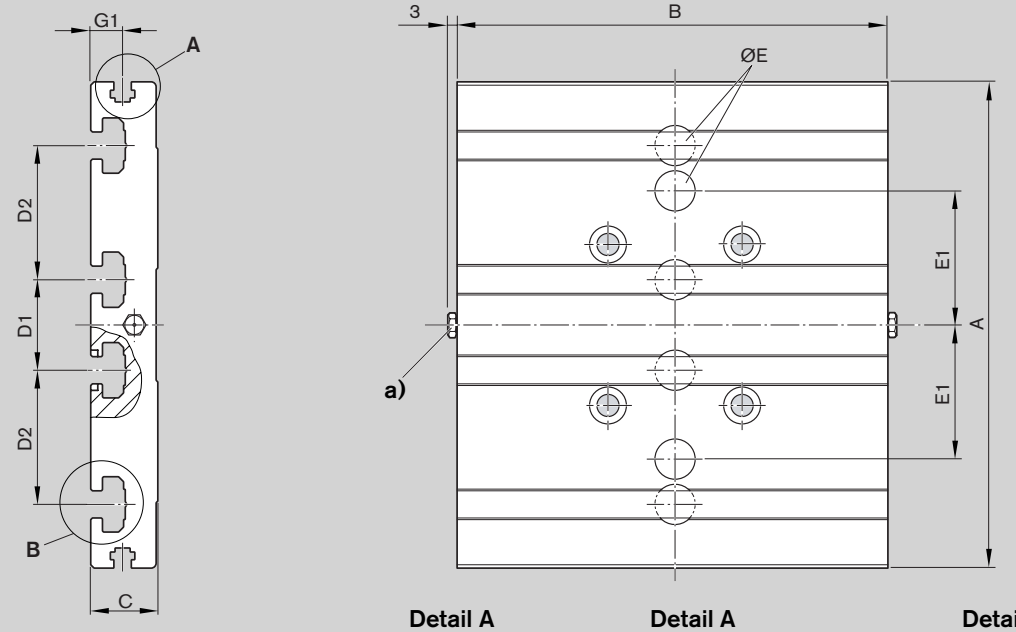
b) M4 - 6 deep

Connection plate
– for CKK with one carriage
– for CKR with short carriage

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



a) Funnel-type lube nipple AM8 x 1

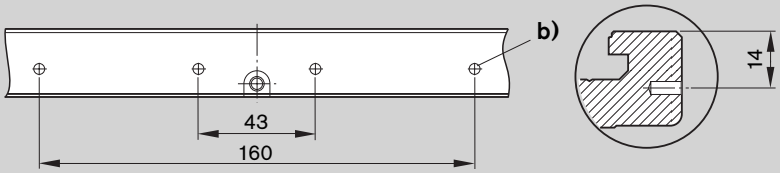
The connection plates differ in appearance. Shown here is the connection plate for CKK 20-145.

Frame size	Dimensions (mm)															
	A	B	C	D1	D2	ØE^{H7}	E1 ±0.01	G1	G2	G3	G4	G5	H1	H2	H3	H4
90	90	60	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	110	60	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	145	80[1)]	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	200	190	27	40	40	16 - 3.1 deep	–	–	–	–	–	–	10	20.1	6.0	12.5

Frame size	Part number for assembly	
	CKK	CKR
90	R0375 300 15	R0375 300 16
110	R0375 400 15	R0375 400 16
145	R0375 500 15	R0375 500 16
200	R0375 600 15	R0375 600 16

1) CKR 20-145: 125

Connection dimensions for switching cam (frame size 200)



b) M4 - 6 deep

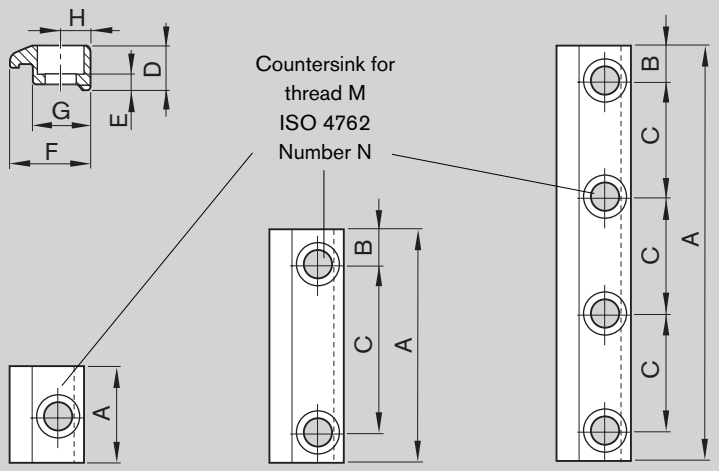
Mounting

Mounting accessories

Clamping fixtures

Recommended number of clamping fixtures:
- Type 1: 6 pieces per meter and side
- Type 2: 4 pieces per meter and side
- Type 3: 3 pieces per meter and side

Clamping fixtures



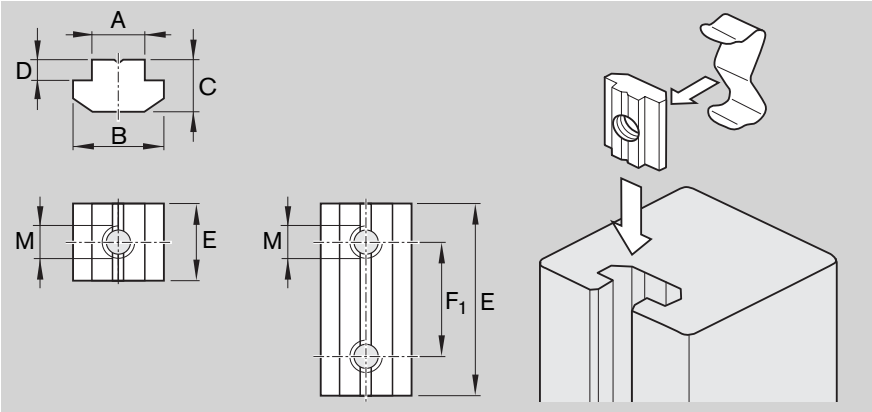
Type 1 **Type 2** **Type 3**

Frame size	For thread	Type	Number of holes N	Dimensions (mm)								Part number
				A	B	C	D	E	F	G	H	
90	M4	1	1	25	–	–	9	4.6	14.5	10.5	5	R0375 310 00
		3	4	87	6.0	25		4.6				R0375 310 02
		3	4	107	8.5	30		4.6				R0375 310 03
		2	2	72	11.0	50		3.2				R0375 310 13
		2	2	62	11.0	40		3.2				R0375 310 15
		3	4	77	8.5	20		4.6				R0375 310 26
110 and 145	M5	3	4	107	8.5	30	11.5	4.8	19.3	14.0	7	R0375 410 02
		3	4	77	8.5	20		4.8				R0375 410 26
	M6	1	1	25	–	–	11.5	5.3	19.3	14.0	7	R0375 510 00
		3	4	142	11.0	40		5.3				R0375 510 02
		2	2	72	11.0	50		3.2				R0375 510 09
		2	2	62	11.0	40		3.2				R0375 510 11
		2	2	47	8.5	30		5.3				R0375 510 23
200	M8	2	2	108	19.0	70	27.5	16.3	29	19.0	9	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.



Frame size	For thread	Dimensions (mm) A	B	C	D	E	F_1	Part number of sliding block	Part number of spring
90 and 110	M4	6	11.5	4	1	12	–	3 842 523 140	3 842 523 145
	M5					45	30	R0391 710 09	–
	M5					12	–	3 842 523 142	3 842 523 145
145	M4	8	16.0	6	2	16	–	3 842 514 928	3 842 516 685
	M5					16	–	3 842 514 929	3 842 516 685
	M6					16	–	3 842 514 930	3 842 516 685
	M6					50	36	R0391 710 08	–
	M8					16	–	3 842 514 931	3 842 516 685
200	M4	10	19.5	10.5	5	20	–	R3447 012 01	3 842 516 669
	M5					20	–	3 842 528 741	3 842 516 669
	M6					20	–	3 842 528 738	3 842 516 669
	M8					20	–	3 842 528 735	3 842 516 669
	M8					90	70	R0391 710 07	–

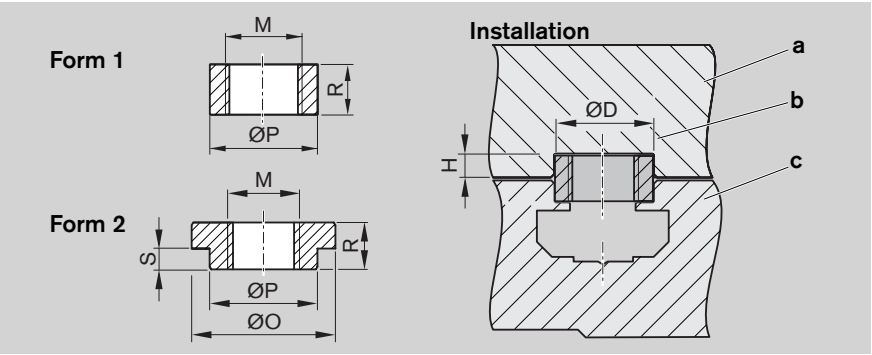
Tightening torques of fastening screws
with friction factor 0.125
strength class 8.8

8.8	M4	M5	M6	M8
Nm	2.7	5.5	9.5	23

Centering ring

The centering ring serves as a positioning aid and positive lock for the customer-built attachments on the connection plate.

a) Customer-built attachment
b) Centering ring
c) Connection plate



Frame size	Form	Part number	Dimensions (mm) D^{H7}	$H^{+0,2}$	M	O_{k6}	P_{k6}	R	S
90 and 110	1	R0396 605 00	9	2.1	M6	–	9	4	–
	2	R0396 605 03	12	2.1	M6	12	9	4	2.1
145	1	R0396 605 01	12	2.1	M8	–	12	4	–
	2	R0396 605 04	16	2.1	M8	16	12	5	2.1
200	1	R0396 605 02	16	3.1	M10	–	16	6	–

Mounting

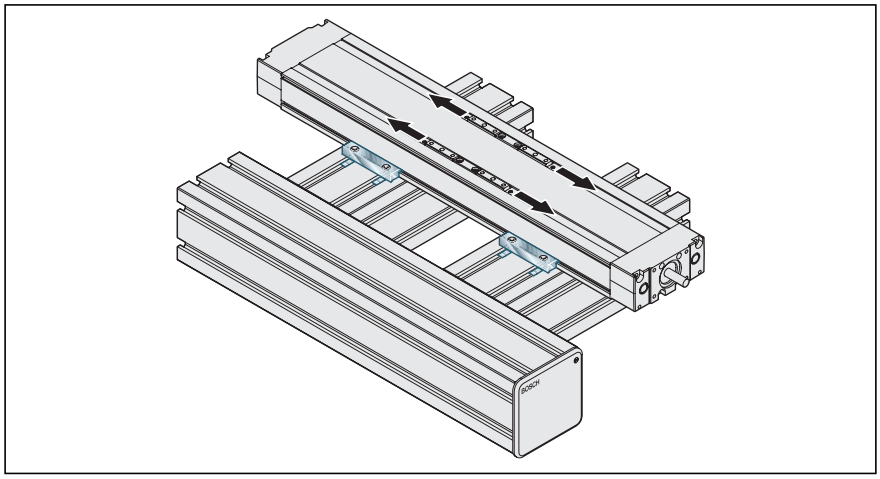
Mounting Compact Modules to BME[1)] profile system

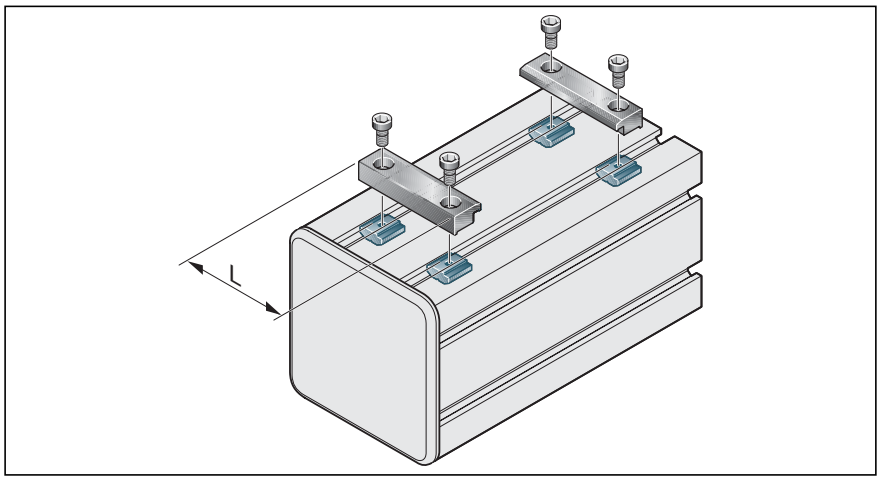
Clamping fixture kits

Clamping fixture kits serve to rapidly install the Compact Modules on suitable substructures. The screw spacing is designed for profiles with modular dimensions 40 and 50.
The clamping fixtures are fastened to the module frame.
The Compact Module can be equipped with 1 or 2, short or long carriages.

Clamping fixture kit consisting of
- Clamping fixtures
- Socket head cap screws
- Sliding blocks

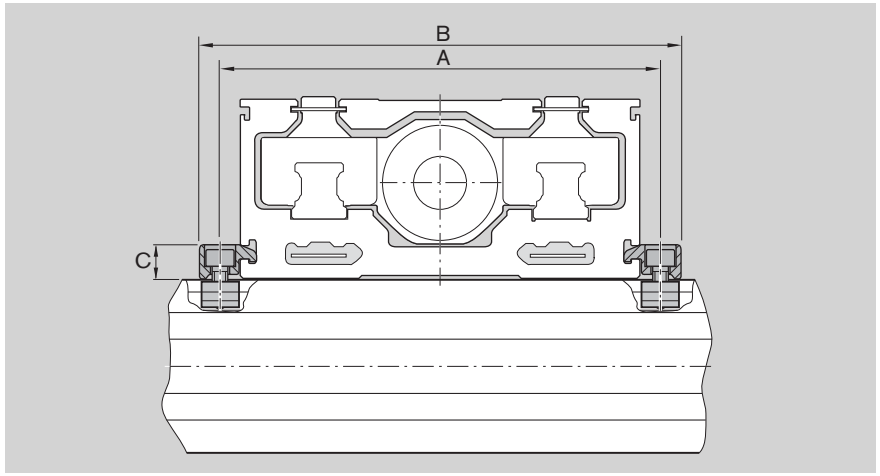
1) BME: Basic mechanical elements from Bosch Rexroth





Frame size	Thread	Modular dimension	L (mm)	Part number
90	M4	50	72	R0391 200 82
		40	62	R0391 200 83
110 and 145	M6	50	72	R0391 200 84
		40	62	R0391 200 85
200	M8	50	88	R0391 200 88
		40	78	R0391 200 89

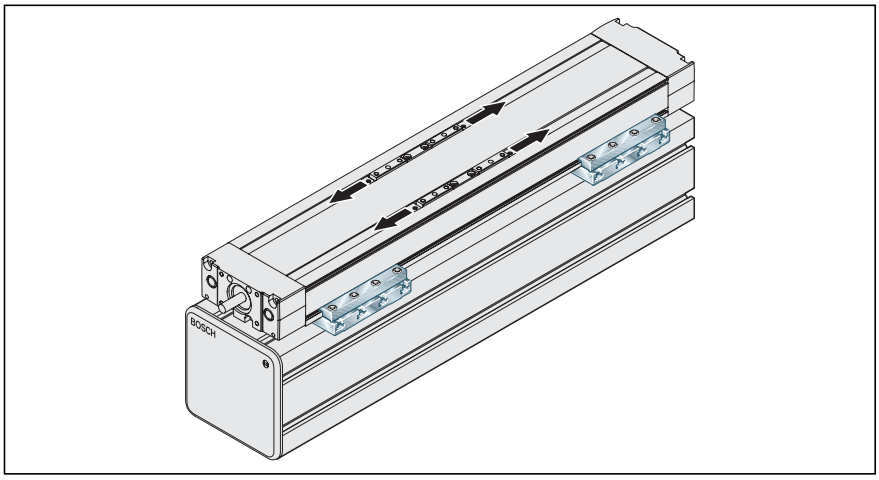
Frame size	Dimensions (mm)		
	A	B	C
90	102	112	9.0
110	126	140	11.5
145	161	175	11.5
200	240	222	27.5

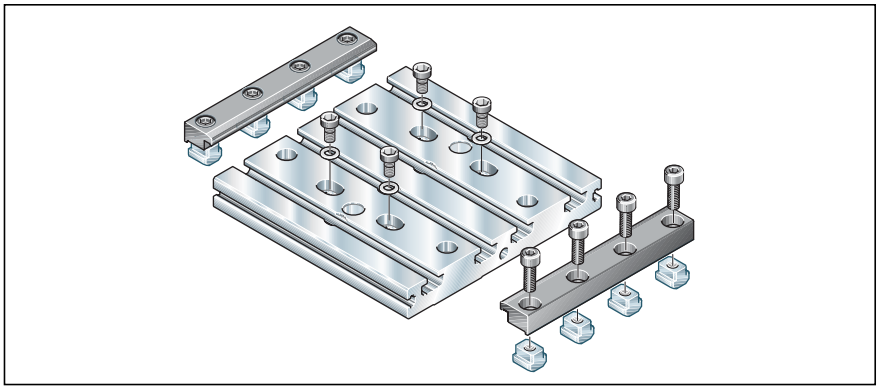


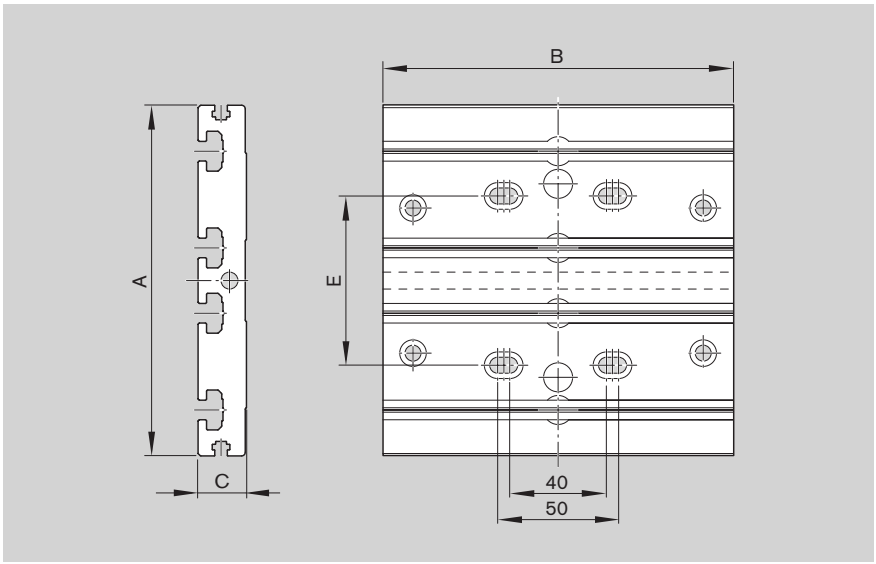
Connection plate kits

Connection plate kits are designed for profiles with modular dimensions 40, 45, and 50. The connection plates are fastened to the module frame. The Compact Module can be equipped with 1 or 2, short or long carriages.

Connection plate kit consisting of
- Connection plate
- Clamping fixtures
- Socket head cap screws
- Nuts for T-slot
- Washers
- Sliding blocks







Frame size	Dimensions (mm)				Weight (kg)	Part number
	A	B	C	E		
90	145	145	20	70	1.1	R0391 201 91
110	145	145	20	70	1.2	R0391 201 92
145	145	180	20	70	1.4	R0391 201 93

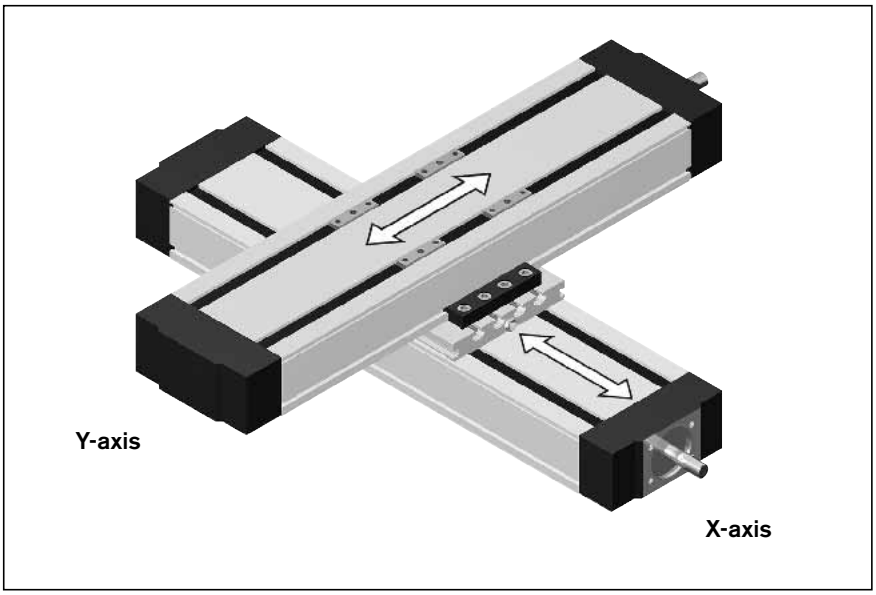
Mounting

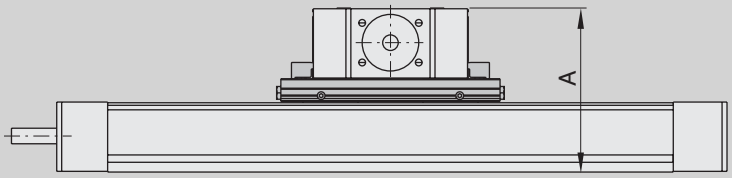
Connection of Compact Modules via cross-plate

Y-axis connected by the frame (carriage travels)

Connection kit consisting of:
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Versions:
X-axis
Select carriages and long connection plate according to table “Components and ordering” (option number 41).
Y-axis
The number of carriages and the connection plate can be freely selected according to table “Components and ordering”.



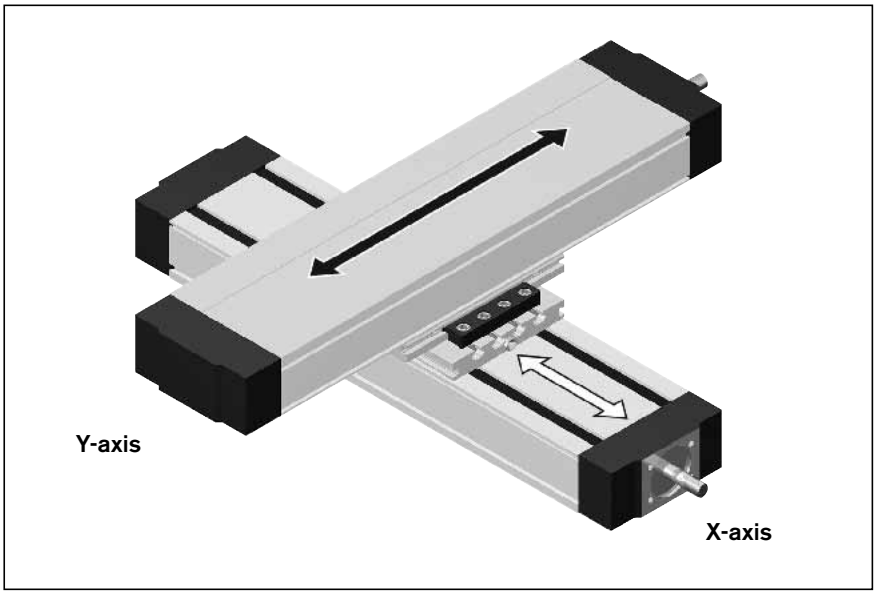


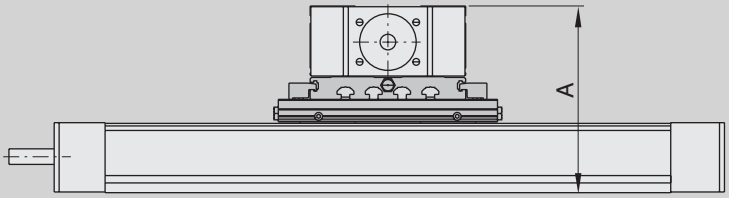
	Frame size	Y-axis (any carriage version) 90		110		145		200	
X-axis (Compact Module with connection plate – option no. 41)	90	R0391 200 45							
		A (mm)	**96**						
		Weight (kg)	**0.2**						
	110	R0391 200 45		R0391 200 46					
		A (mm)	**106**	**A** (mm)	**116**				
		Weight (kg)	**0.2**	**Weight** (kg)	**0.3**				
	145			R0391 200 47		R0391 200 48			
				A (mm)	**135**	**A** (mm)	**150**		
				Weight (kg)	**0.3**	**Weight** (kg)	**0.4**		
	200					R0391 200 49		R0391 201 45	
						A (mm)	**192**	**A** (mm)	**227**
						Weight (kg)	**0.4**	**Weight** (kg)	**0.8**

Y-axis connected by the carriage (frame travels)

Connection kit consisting of:
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Version:
Select X-axis and Y-axis with long connection plate according to table “Components and ordering” (option number 41).





		Y-axis (Compact Module with connection plate – option number 41)							
	Frame size	**90**		**110**		**145**		**200**	
X-axis (Compact Module with connection plate – option no. 41)	**90**	R0391 200 45							
		A (mm)	**112**						
		Weight (kg)	**0.2**						
	110	R0391 200 45		R0391 200 46					
		A (mm)	**122**	**A** (mm)	**132**				
		Weight (kg)	**0.2**	**Weight** (kg)	**0.3**				
	145			R0391 200 47		R0391 200 48			
				A (mm)	**151**	**A** (mm)	**170**		
				Weight (kg)	**0.3**	**Weight** (kg)	**0.4**		
	200					R0391 200 49		R0391 201 45	
						A (mm)	**212**	**A** (mm)	**254**
						Weight (kg)	**0.4**	**Weight** (kg)	**0.8**

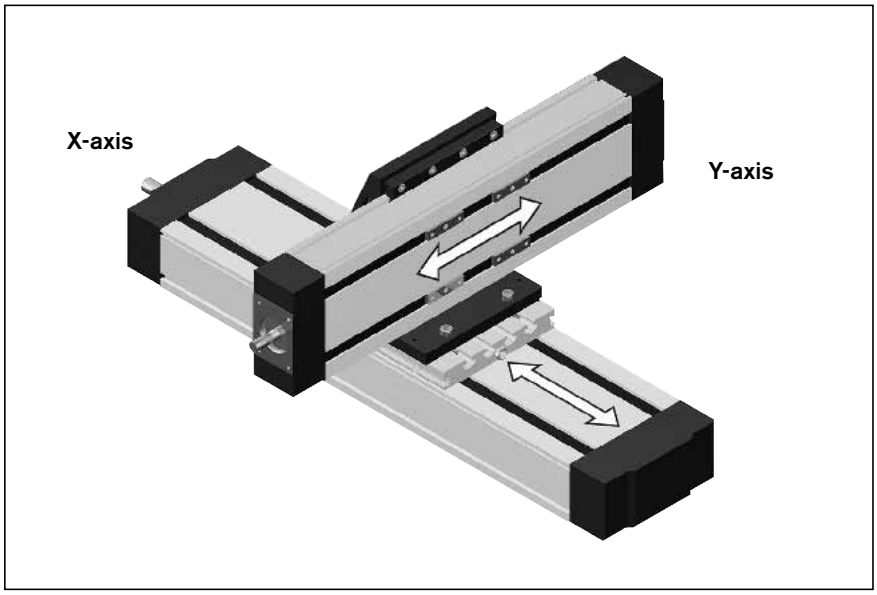
Mounting

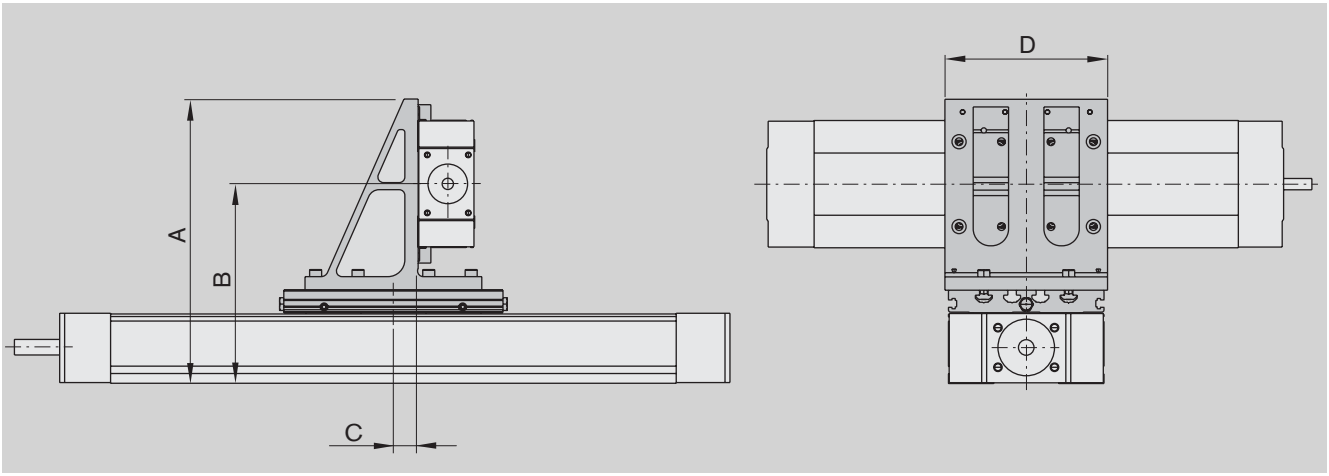
Connection of Compact Modules via angle brackets

Y-axis connected by the frame (carriage travels)

Connection kit consisting of:
- Angle brackets
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Versions:
X-axis
Select carriages and long connection plate according to table “Components and ordering” (option number 41).
Y-axis
The number of carriages and the connection plate can be freely selected according to table “Components and ordering”.



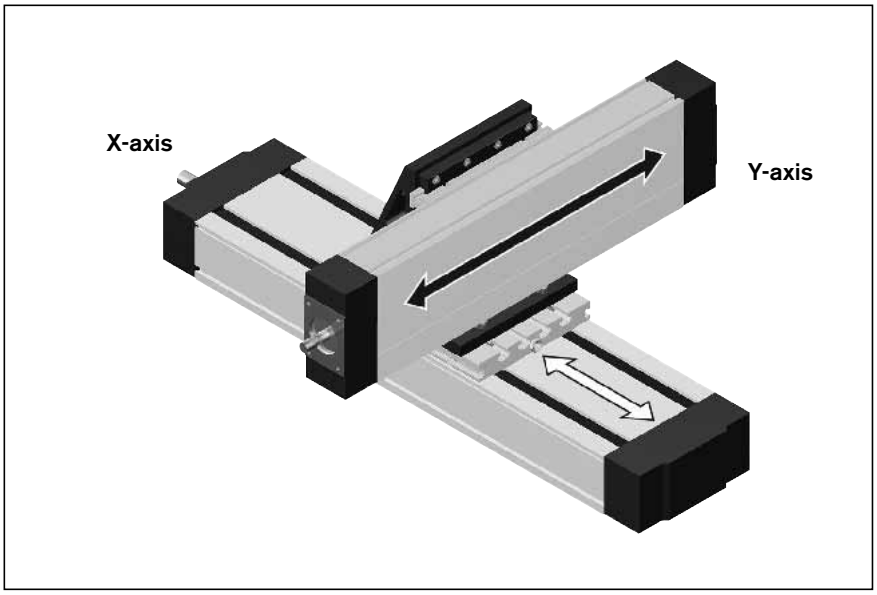


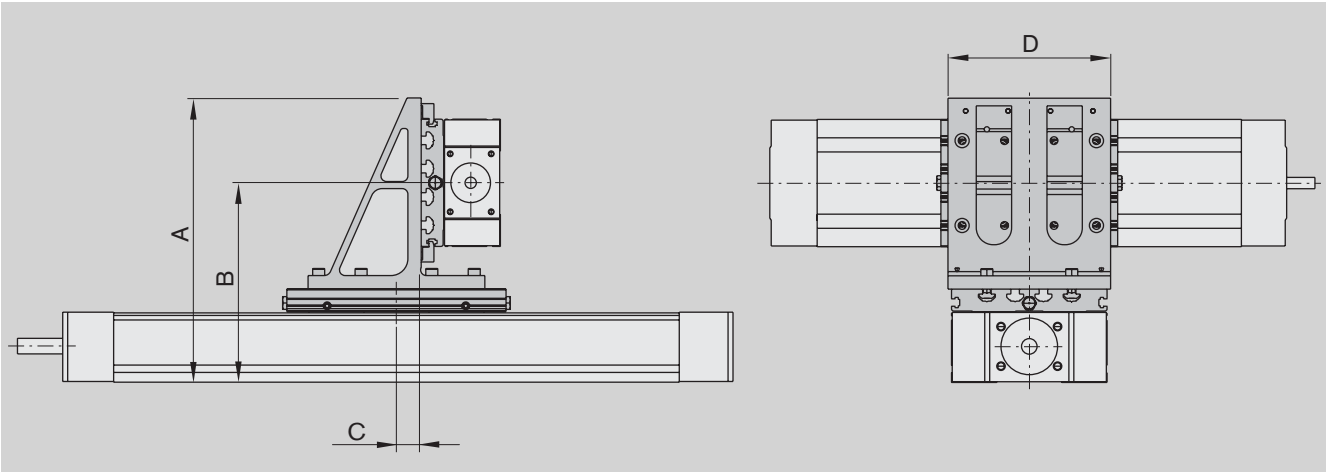
X-axis (Compact Module with connection plate – option number 41)	Frame size	Y-axis (any carriage version)																			
		90					110					145					200				
	90	R0391 101 26																			
		Dimensions (mm)				(kg)															
		A	B	C	D																
		191	131	17.5	115	1.1															
	110	R0391 101 26					R0391 101 27														
		Dimensions (mm)				(kg)	Dimensions (mm)				(kg)										
		A	B	C	D		A	B	C	D											
		201	141	17.5	115	1.1	226.5	152	18.5	145	1.5										
	145						R0391 101 28					R0391 101 29									
							Dimensions (mm)				(kg)	Dimensions (mm)				(kg)					
							A	B	C	D		A	B	C	D						
							248	176	21	145	2.1	286	193.5	21	175	2.8					
	200											R0391 101 30					R0391 101 31				
												Dimensions (mm)				(kg)	Dimensions (mm)				(kg)
												A	B	C	D		A	B	C	D	
												337	244.5	28	190	6.0	375	283	28	245	7.7

Y-axis connected by the carriage (frame travels)

Connection kit consisting of:
- Angle brackets
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Version:
Select X-axis and Y-axis with long connection plate according to table "Components and ordering" (option number 41).





X-axis (Compact Module with connection plate – option number 41)	Y-axis (Compact Module with connection plate – option number 41)																			
Frame size	**90**						**110**						**145**						**200**					
90	R0391 101 26																							
	Dimensions (mm)					(kg)																		
	A	**B**	**C**	**D**																				
	191	131	17.5	115	1.1																			
110	R0391 101 26						R0391 101 27																	
	Dimensions (mm)					(kg)	**Dimensions** (mm)					(kg)												
	A	**B**	**C**	**D**			**A**	**B**	**C**	**D**														
	201	141	17.5	115	1.1		226.5	152	18.5	145	1.5													
145							R0391 101 28						R0391 101 29											
							Dimensions (mm)					(kg)	**Dimensions** (mm)					(kg)						
							A	**B**	**C**	**D**			**A**	**B**	**C**	**D**								
							248	176	21	145	2.1		286	193.5	21	175	2.8							
200													R0391 101 30						R0391 101 31					
													Dimensions (mm)					(kg)	**Dimensions** (mm)					(kg)
													A	**B**	**C**	**D**			**A**	**B**	**C**	**D**		
													337	244.5	28	190	6.0		375	283	28	245	7.7	

Mounting

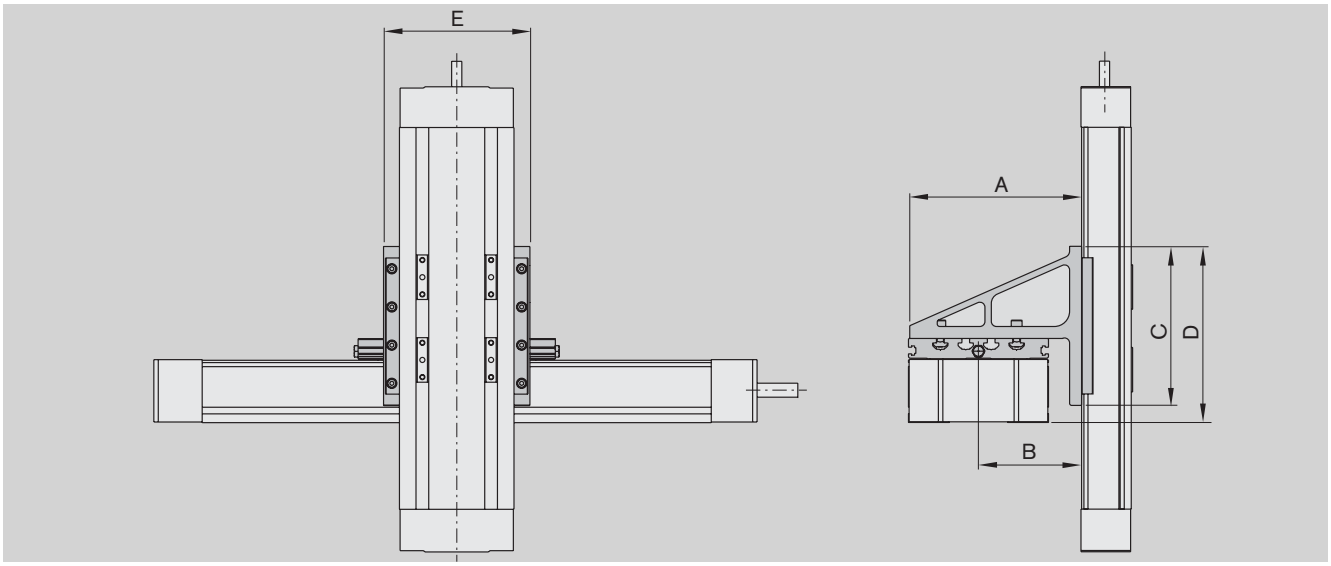
Connection of Compact Modules via angle brackets

Z-axis connected by the frame (carriage travels)

Connection kit consisting of:

- Angle brackets
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Versions:
X-axis
Select carriages and long connection plate according to table “Components and ordering” (option number 41).
Z-axis
The number of carriages and the connection plate can be freely selected according to table “Components and



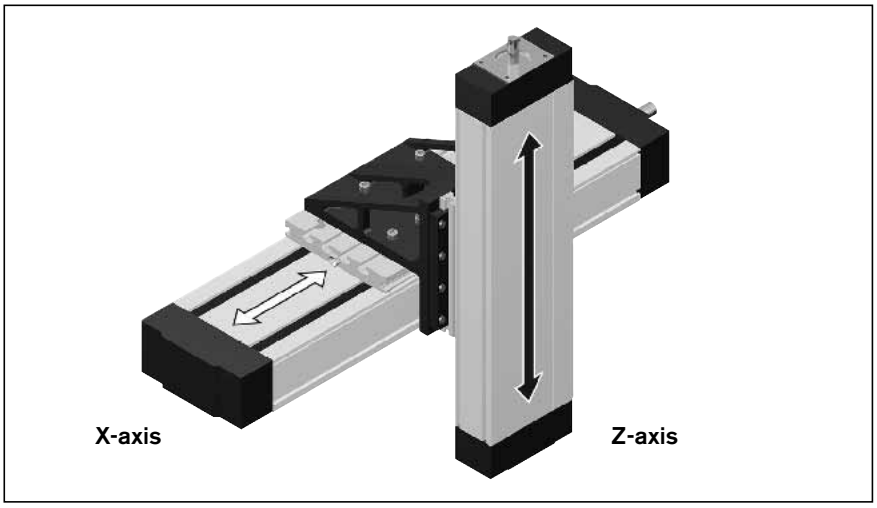
Z-axis (any carriage version)

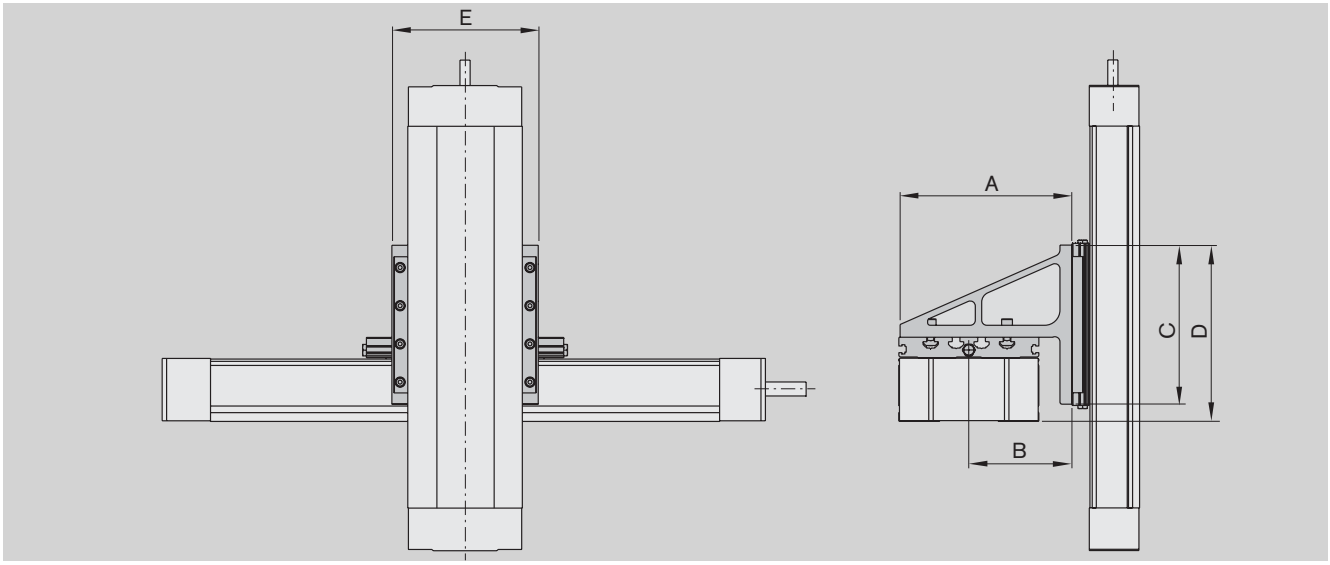
X-axis (Compact Module with connection plate – option number 41)	Frame size	90						110						145						200					
	90	R0391 101 26																							
		Dimensions (mm)					(kg)																		
		A	B	C	D	E																			
		135	75	125	136	115	1.1																		
	110	R0391 101 32						R0391 101 27																	
		Dimensions (mm)					(kg)	Dimensions (mm)					(kg)												
		A	B	C	D	E		A	B	C	D	E													
		135	81	125	138.5	115	1.1	160	86	142	155	145	1.5												
	145							R0391 101 33						R0391 101 29											
								Dimensions (mm)					(kg)	Dimensions (mm)					(kg)						
								A	B	C	D	E		A	B	C	D	E							
								175	102.5	155	183.5	145	2.1	201	108.5	155	183.5	175	2.8						
	200													R0391 101 34						R0391 101 35					
														Dimensions (mm)					(kg)	Dimensions (mm)					(kg)
														A	B	C	D	E		A	B	C	D	E	
														248	148	190	230	185	5.6	248	156	270	290	245	7.7

Z-axis connected by the carriage (frame travels)

Connection kit consisting of:
- Angle brackets
- Clamping fixtures
- Sliding blocks
- Screws
- Centering rings

Version:
Select X-axis and Z-axis with long connection plate according to table "Components and ordering" (option number 41).





Z-axis (Compact Module with connection plate – option number 41)

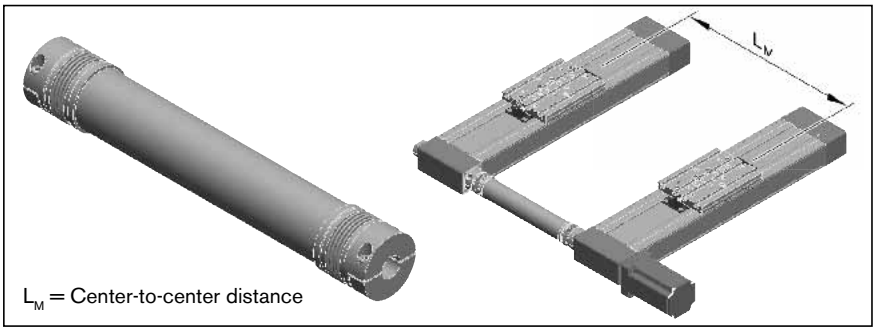
X-axis (Compact Module with connection plate – option number 41)	Frame size	90						110						145						200					
	90	R0391 101 26																							
		Dimensions (mm)					(kg)																		
		A	B	C	D	E																			
		135	75	125	136	115	1.1																		
	110	R0391 101 32						R0391 101 27																	
		Dimensions (mm)					(kg)	Dimensions (mm)					(kg)												
		A	B	C	D	E		A	B	C	D	E													
		135	81	125	138.5	115	1.1	160	86	142	155	145	1.5												
	145							R0391 101 33						R0391 101 29											
								Dimensions (mm)					(kg)	Dimensions (mm)					(kg)						
								A	B	C	D	E		A	B	C	D	E							
								175	102.5	155	183.5	145	2.1	201	108.5	155	183.5	175	2.8						
	200													R0391 101 34						R0391 101 35					
														Dimensions (mm)					(kg)	Dimensions (mm)					(kg)
														A	B	C	D	E		A	B	C	D	E	
														248	148	190	230	185	5.6	248	156	270	290	245	7.7

Accessories

Connecting shafts for Compact Modules CKR

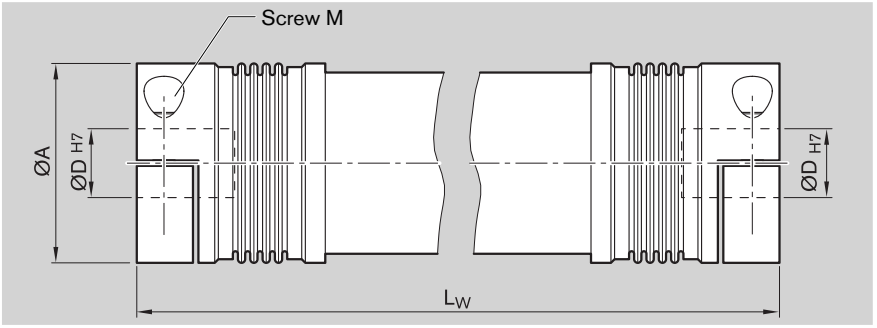
Connecting shafts

- Compensate for misalignments
- Are backlash-free and torsionally stiff
- Bridge large distances between axes
- Can be mounted radially using split clamping hubs (installation and removal without shifting pre-aligned axes)
- Dynamically balanced



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

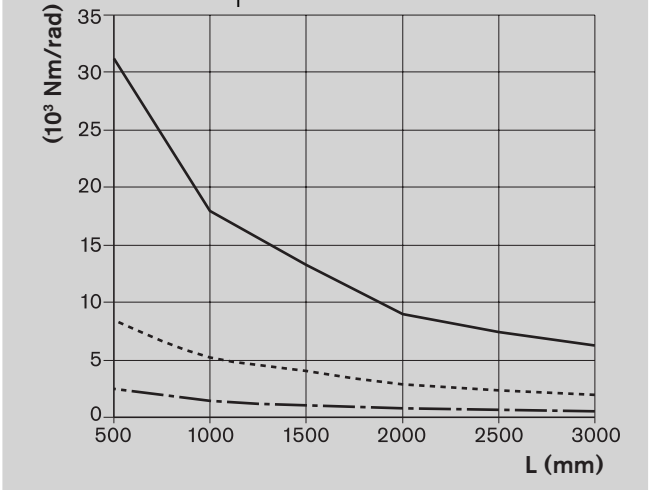
Ordering data
Please state the part number and length L_W.
For example: R0391 510 07,
L_W = 550 mm



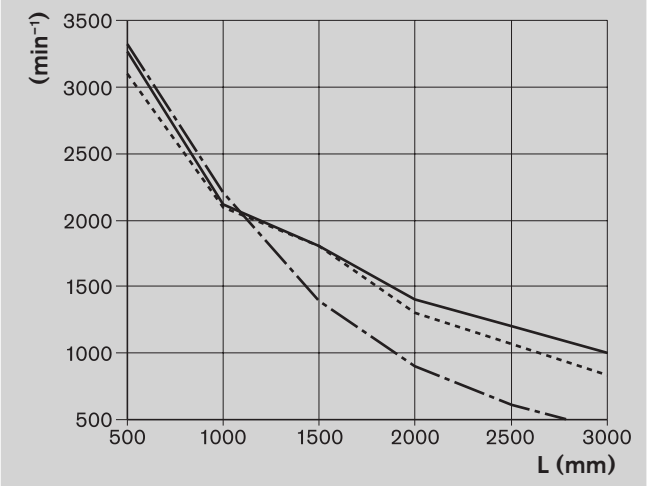
Size	Part number	Dimensions (mm)						M_A (Nm)
		A	D	M	L_{Wmin}	L_{Wmax}	L_W	
CKR 12-90	R021E 00139	40	10	M4	100	3000	L_M – 95	5
CKR 15-110	R021E 00140	55	14	M6	140	3000	L_M – 113	15
CKR 20-145	R021E 00141	55	19	M6	140	3000	L_M – 148	15
CKR 25-200	R021E 00142	81	24	M10	190	3000	L_M – 205	70

Size	Part number	M_S (Nm)	M_N (Nm)	Mass moment of inertia (10^{-6} kgm²)	Weight (kg)
CKR 12-90	R021E 00139	17	10	0.028 • L_W(mm) + 80	0.0007 • (L_W(mm) – 100) + 0.34
CKR 15-110	R021E 00140	45	30	0.7 • L_W(mm) + 250	0.0013 • (L_W(mm) – 140) + 1.2
CKR 20-145	R021E 00141	45	30	0.7 • L_W(mm) + 250	0.0013 • (L_W(mm) – 140) + 1.2
CKR 25-200	R021E 00142	225	150	2.7 • L_W(mm) + 1300	0.0019 • (L_W(mm) – 190) + 3.3

Torsional stiffness c_T



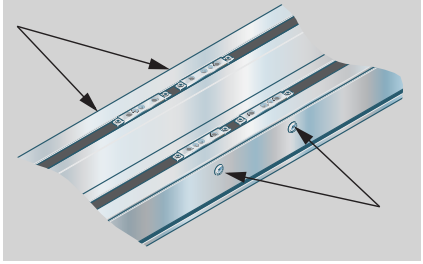
Maximum rotary speed n



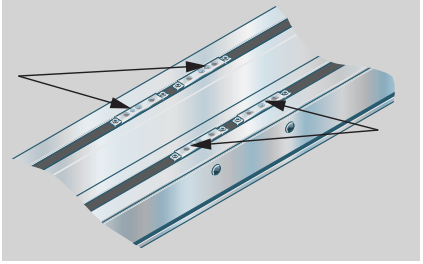
CKR 25-200
CKR 15-110/CKR 20-145
CKR 12-90

Lubrication

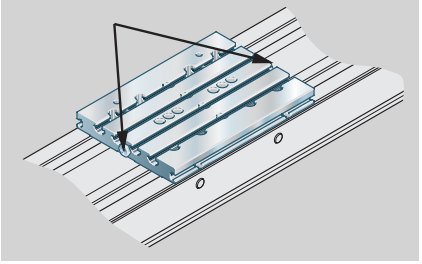
Lube nipples in frame



Lube ports in carriage



Lube nipples in connection plate



Compact Module CKK

Lube nipple in frame

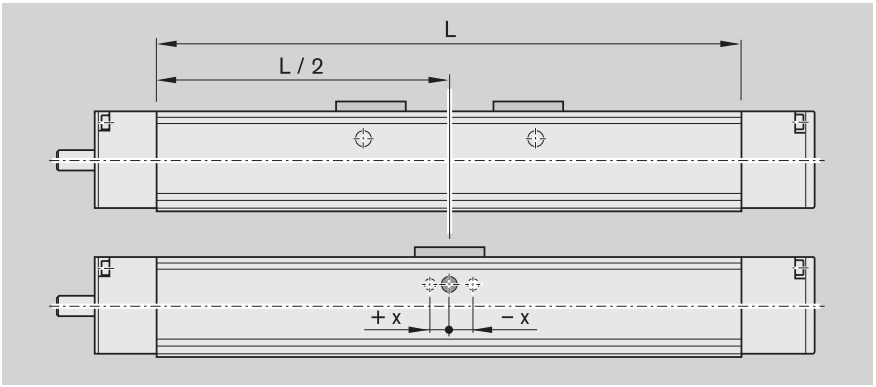
On each side of the frame of the CKK Compact Modules there are holes through which the lube nipples in the carriage can be accessed. Lubrication from one side only is sufficient.

With two carriages:

– Carriage to the center – move to position L/2, then all lube nipples will be accessible.

With one carriage:

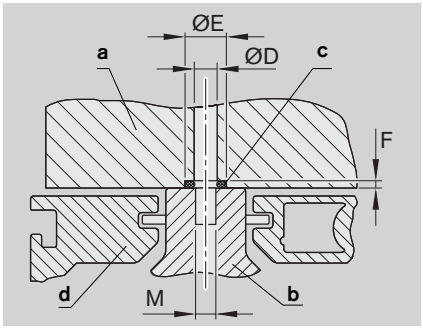
– The lube nipples are not always located at the middle of the carriage. Move carriage to position indicated in table.



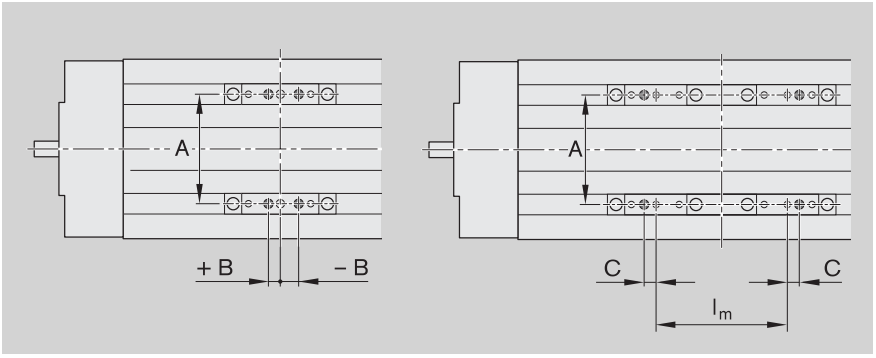
Size	x (mm)	Lube nipples
12-90	0	DIN 3405-D3
15-110	7	DIN 3405-D3
20-145	7	DIN 3405-D3
25-200	–15	DIN 3405-AM6

Lube ports for carriage attachments

The lube ports are sealed with a set screw in the factory before shipment. To use, install according to the specified connection dimensions and use O-rings to seal the interface.



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

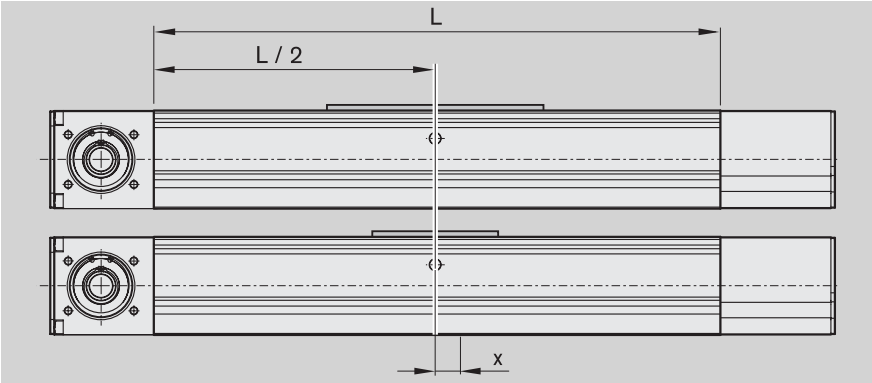


Size	Dimensions (mm)								O-ring for DIN 3771	
	A	B	C	D	E +0.2	F –0.1	M	l_m		Part number
12-90	54	6.0	6.0	Ø3	Ø5	0.6	M 3	65	3 x 1.5	R3411 001 01
15-110	66	6.5	6.5	Ø3	Ø5	0.6	M 3	85	3 x 1.5	R3411 001 01
20-145	88	7.0	7.0	Ø3	Ø5	0.6	M 3	100	3 x 1.5	R3411 001 01
25-200	130	–15.0	15.0	Ø5	Ø9	1.0	M 4	175	5 x 1.5	R3411 108 01

Compact Modules CKR

Lube nipple in frame

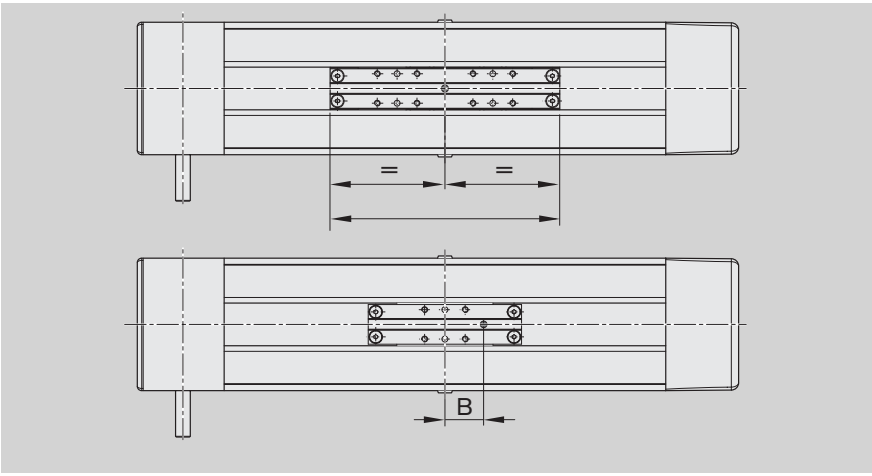
On each side of the frame of the CKR Compact Modules there are holes through which the lube nipples in the carriage can be accessed. Lubrication from one side only is sufficient.
With long carriage:
– Carriage to the center – move to position L/2, then all lube nipples will be accessible.
With short carriage:
– The lube nipples are not always located at the middle of the carriage. Move carriage to position indicated in table.

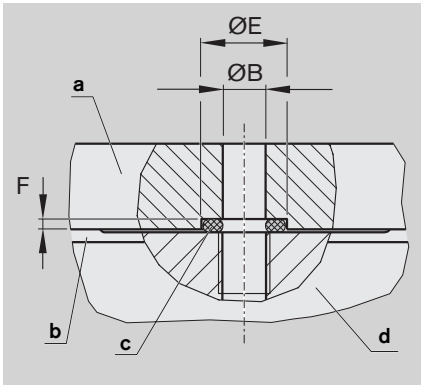


Size	x (mm)	Lube nipples
12-90	0	DIN 3405-D4
15-110	41.5	DIN 3405-AM6
20-145	50.0	DIN 3405-AM6
25-200	59.0	DIN 3405-AM8x1

Lube ports for carriage attachments

The lube ports are sealed with a set screw in the factory before shipment. To use, install according to the specified connection dimensions and use O-rings to seal the interface.



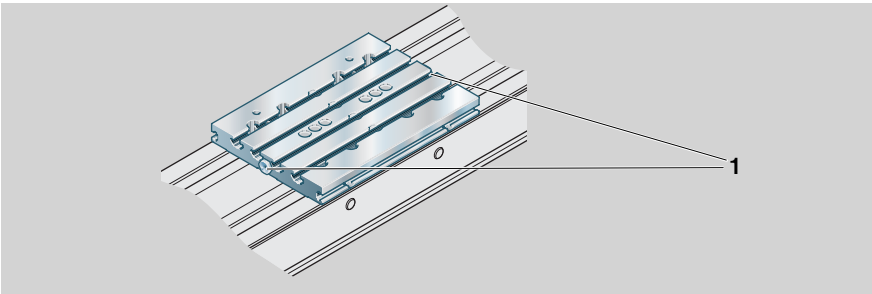


a) Customer-built attachment
b) Carriage
c) O-ring
d) Frame

Size	Dimensions (mm)					O-ring for DIN 3771	
	B	D	E +0.2	F −0.1	M		Part number
12-90	0	Ø3	Ø5	0.6	M 3	4 x 2.5	R3411 019 01
15-110	41.5	Ø3	Ø5	0.6	M 3	5 x 2	R3411 109 01
20-145	50.0	Ø3	Ø5	0.6	M 3	5 x 2	R3411 109 01
25-200	59.0	Ø5	Ø9	1.0	M 4	8 x 2	R3411 008 01

Lube nipples in connection plates for CKK/CKR

Each connection plate has two funnel-type lube nipples (1) according to DIN 3405-AM8 located on its end faces.
Lubrication through only one of the two lube nipples is sufficient.



Short stroke for CKK/CKR

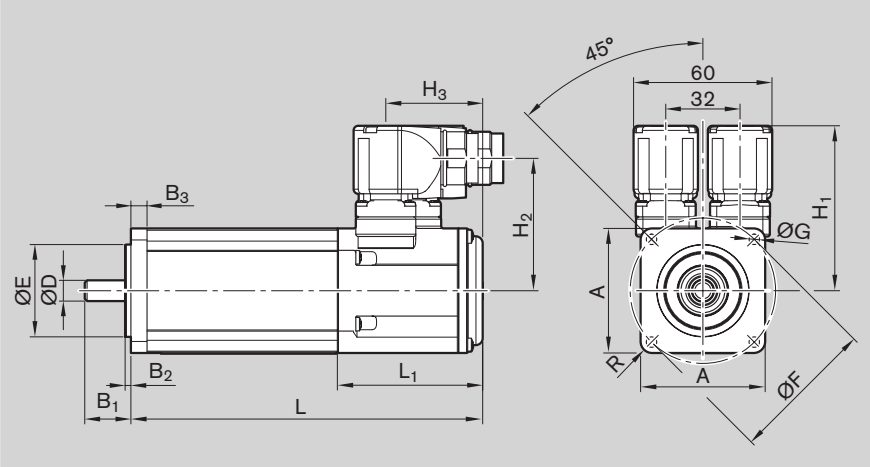
For short-stroke applications, please consult with us about lubrication:
Frame size 90: Stroke < 40 mm
Frame size 110: Stroke < 50 mm
Frame size 145: Stroke < 60 mm
Frame size 200: Stroke < 80 mm

Motors

Servo motors

AC servo motors MSK

Dimensions



	Dimensions (mm)														
	A	B_1	B_2	B_3	ØD k6	ØE j6	ØF	ØG	H_1	H_2	H_3	L without brake	L with brake	L_1	R
MSK 030C	54	20	2.5	7.0	9	40	63	4.5	71.5	57.4	42.0	188	213.0	–	R5
MSK 040C	82	30	2.5	8.0	14	50	95	6.6	83.5	69.0	31.0	185.5	215.5	42.5	R8
MSK 050C	98	40	3.0	9.0	19	95	115	9	85.5	71.0	43.5	203	233	55.5	R8
MSK 060C	116	50	3.0	9.5	24	95	130	9	98.0	84.0	37.0	226	259	48.0	R9
MSK 076C	140	50	4.0	10.0	24	110	165	11	110.0	95.6	57.5	292.5	292.5	79.0	R12

Motor data

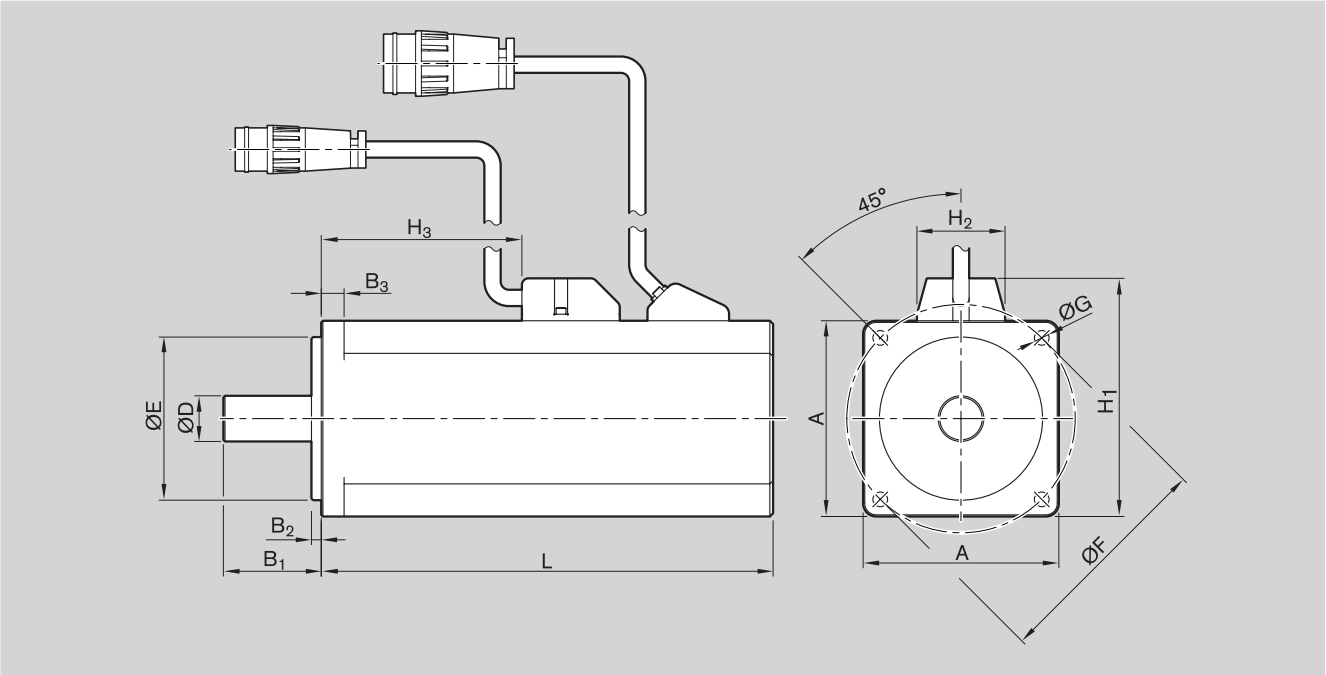
Description	Symbol	Unit	MSK030C-0900	MSK040C-0600	MSK050C-0600	MSK060C-0600	MSK076C-0450
Maximum usable speed	n_{max}	(min^{-1})	9000	5600	5700	5200	5000
Maximum torque	M_{max}	(Nm)	4	8.1	15	24	43.5
Rated torque	M_N	(Nm)	0.8	2.7	5.0	8.0	12.0
Rotor moment of inertia	J_{rot}	($10^{-6}kgm^2$)	30	140	330	800	4300
Mass without brake	m	(kg)	2.1	3.6	5.4	8.4	13.8
Holding brake							
Holding torque	M_{Br}	(Nm)	1.0	4.0	5.0	10.0	11.0
Brake moment of inertia	J_{Br}	($10^{-6}kgm^2$)	7	23	107	55	360
Mass of brake	m_{Br}	(kg)	0.25	0.32	0.7	0.45	1.1

Notes

The motors are available complete with control system.
Please refer to the catalogs for more information about motors and control systems.

Servo motors MSM

Dimensions



	Dimensions (mm)												
	A	B_1	B_2	B_3	ØD h6	ØE h7	ØF	ØG	H_1	H_2	H_3	L without brake	L with brake
MSM 030C	60	30	3	7	14	50	70	4.5	73	27	61.5	138.5	171.5
MSM 040B	80	35	3	8	19	70	90	6.0	93	27	76.0	157.5	191.5

Motor data

Description	Symbol	Unit	MSM 030C with absolute encoder	MSM 040B with absolute encoder
Maximum usable speed	n_{max}	(min^{-1})	3000	3000
Maximum torque	M_{max}	(Nm)	3.8	7.1
Rated torque	M_N	(Nm)	1.2	2.4
Rotor moment of inertia without brake	J_{rot}	($10^{-6}kgm^2$)	17	67
Mass without brake	m	(kg)	1.5	3.1
Holding brake				
Holding torque	M_{Br}	(Nm)	1.27	2.45
Brake moment of inertia	J_{Br}	($10^{-6}kgm^2$)	3	8
Mass of brake	m_{Br}	(kg)	0.4	0.7

Notes

The motors are available complete with control system.
Please refer to the catalogs for more information about motors and control systems.

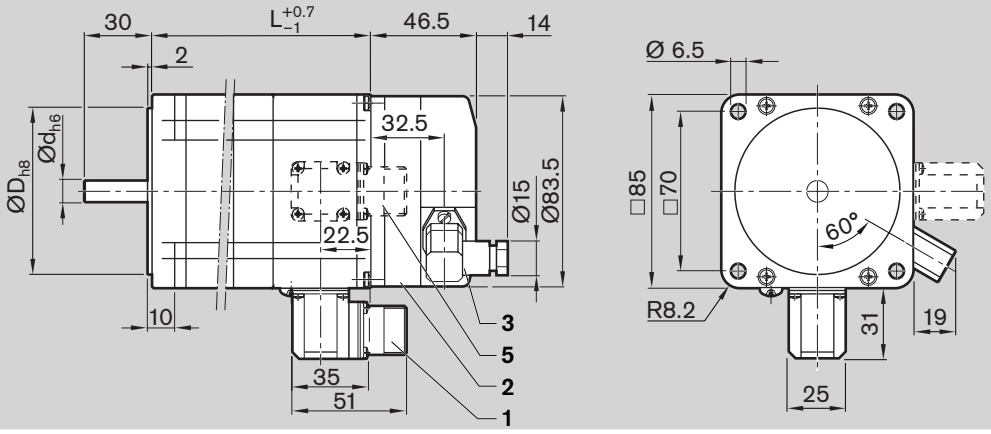
Motors

Three-phase stepping motors

Dimensions

VRDM 397, 3910, 3913

1) Motor connector
2) Brake
3) Brake connector
4) Key
5) Encoder connector



Motor type	Part number	Version		Type designation	Shaft diameter d (mm)	Overall length L (mm)	Centering collar D (mm)
		Holding brake without	Holding brake with				
VRDM 397	R3471 037 06	X		VRDM 397 L W C O E	12	110	60
	R3471 038 06		X	VRDM 397 L W C B E			
VRDM 3910	R3471 039 06	X		VRDM 3910 L W C O E	12	140	60
	R3471 040 06		X	VRDM 3910 L W C B E			
VRDM 3913	R3471 041 06	X		VRDM 3913 L W C O E	14	170	60
	R3471 042 06		X	VRDM 3913 L W C B E			

Motor data

Description	Symbol	Unit	VRDM 397	VRDM 3910	VRDM 3913
Rated torque	M_N	(Nm)	2.0	4.0	6.0
Holding torque	M_H	(Nm)	2.26	4.52	6.78
Rotor moment of inertia without brake	J_{rot}	(kgm^2)	1.1×10^{-4}	2.2×10^{-4}	3.3×10^{-4}
Step count	z		200/400/500/1000/2000/4000/5000/10000		
Stepping angle per step	a	(°)	1.8/0.9/0.72/0.36/0.18/0.09/0.072/0.036		
Encoder resolution			1,000 increments/revolutions		
Mass without brake	m	(kg)	2.5	3.1	4.2
Holding brake					
Holding torque	M_{Br}	(Nm)			6.0
Brake moment of inertia	J_{Br}	(kgm^2)			0.2×10^{-4}
Mass of brake	m_{Br}	(kg)			1.5

Notes

The motors are available complete with control system.
Please refer to the catalogs for more information about motors and control systems.

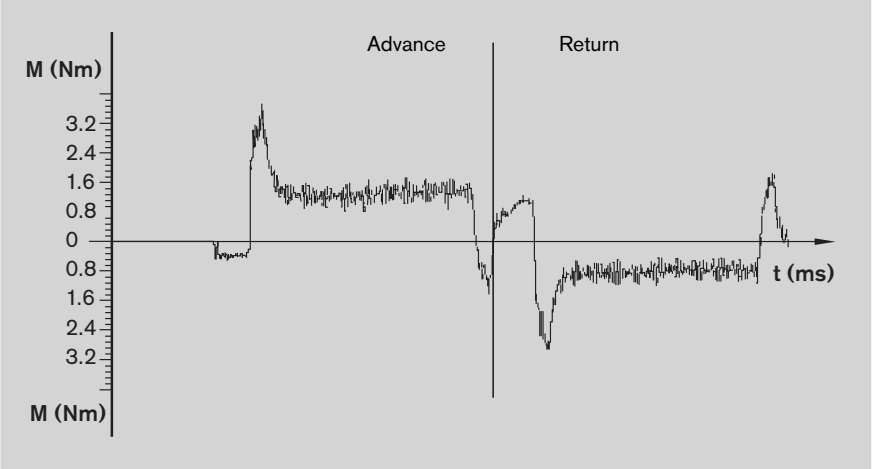
Documentation

Standard report
Option no. 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.

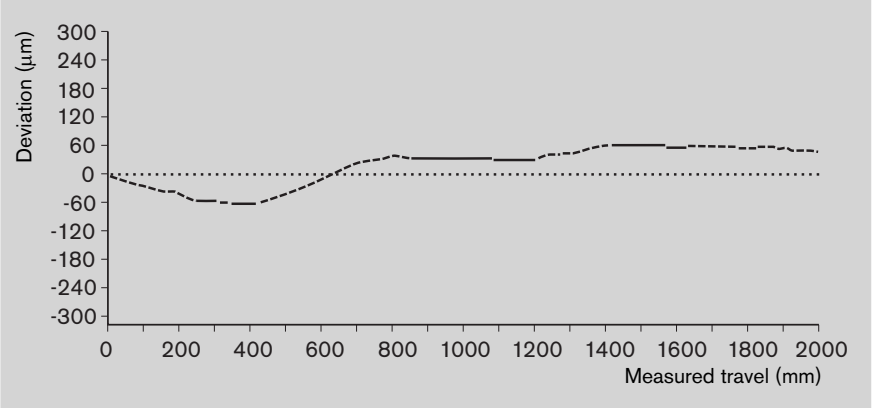
Frictional torque of complete system
Option no. 02

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



Lead deviation of ball screw drive for Compact Module CKK
Option no. 03

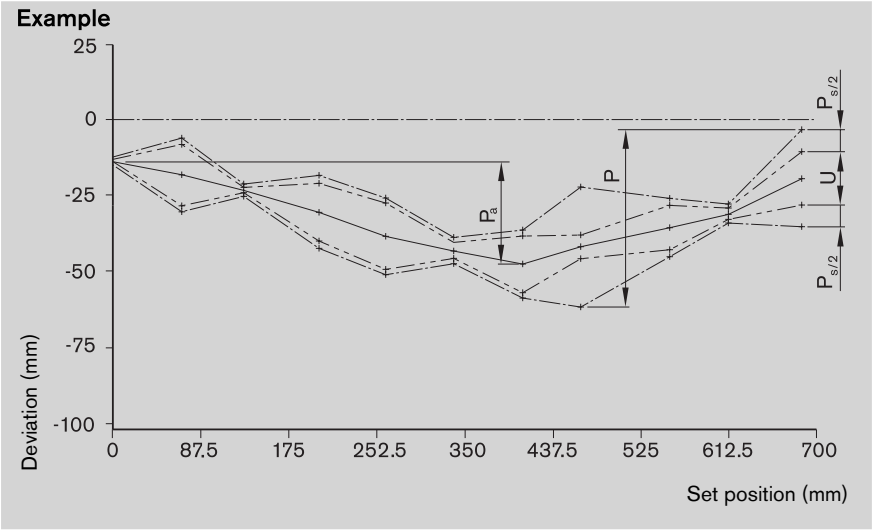
A measurement report in table form is provided in addition to the graph (see illustration).



Positioning accuracy to VDI/DGQ 3441

Option no. 05

Measurement points are selected at irregular intervals along the travel range. This allows even periodical deviations to be detected during positioning.
Each measurement point is approached several times from both sides.
This gives the following parameters:



Positioning accuracy P

The positioning accuracy corresponds to the total deviation. It encompasses all the systematic and random deviations during positioning.

The positioning accuracy takes the following characteristic values into consideration:
- Position deviation
- Reversal range
- Position variation range

Position deviation P_a

The position deviation corresponds to the maximum difference arising in the mean values of all the measurement points. It describes systematic deviations.

Reversal range U

The reversal range corresponds to the difference in mean values of the two approach directions. The reversal range is determined at every measurement point. It describes systematic deviations.

Position variation range P_S

The position variation range describes the effects of random deviations. It is determined at every measurement point.

Order example

Order data			Explanation
Compact Module (part number): R0364 300 00, 1,861 mm			Compact Module CKR 12-90, length = 1,861 mm
Type	=	MG10	With gear reducer according to illustration MG10
Guideway	=	01	Ball Rail System
Drive unit	=	06	Drive end enclosure for attaching gear reducer
Carriage	=	41	Carriage with length L_T = 156 mm with connection plate
Motor attachment	=	16	for motor MSK 030C, i = 5
Motor	=	85	Motor MSK 030C with brake
1st switch	=	22	Hall sensor, PNP - NC
2nd switch	=	21	Reed sensor
3rd switch	=	22	Hall sensor, PNP - NC
Mounting duct / cable duct	=	25	Mounting duct, delivered as separate part
Socket-plug	=	17	Socket-plug, delivered as separate part
Documentation	=	02	Measurement report: Frictional torque

Please make sure that the selected combination is a permissible one (load capacities, moments, max. speeds, motor data, etc.)!

Length of the Compact Module

L = (stroke + 2 · excess travel) + L_T + 25 mm
Stroke = Maximum distance from carriage center to the outermost switch activation points.
Stroke = 1,500 mm
L_T = 156 mm
L = ((1,500 + 2 · 90) + 156 + 25) mm
L = 1,861 mm

The excess travel must be greater than the braking distance. You can use acceleration travel s as a recommended value for the braking distance (see tables “Performance data”).
Example CKR 12-90:
Horizontal operation with motor MSK 030C, i = 5, m = 4 kg, s = 82 mm
Excess travel > 82 mm (90 mm assumed)

Switch mounting arrangements

A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).
Refer to “Switch mounting arrangements” for more information on switch types and switch mounting.

Inquiry / Order form

Bosch Rexroth Corporation
14001 South Lakes Drive
Charlotte, NC 28273

Phone: (704) 583-4338 / 800-438- 5983
Fax: (704)583-0523

www.boschrexroth-us.com

Rexroth Compact Modules

To be completed by customer: Inquiry ☐ / Order ☐

Compact Module _____

(Part number): R_____ _____ _____, Length _____mm

Type	= ☐☐☐☐
Guideway	= ☐☐
Drive unit	= ☐☐
Carriage	= ☐☐
Motor attachment	= ☐☐
Motor	= ☐☐
1st switch	= ☐☐
2nd switch	= ☐☐
3rd switch	= ☐☐
Mounting duct / cable duct	= ☐☐ , ☐☐☐☐ mm
Socket-plug	= ☐☐
Documentation	= ☐☐

Individual parts:
(Part number): R_____ _____ _____
R_____ _____ _____
R_____ _____ _____
R_____ _____ _____

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

Comments:

Sender

Company: _____ **Name:** _____

Address: _____ **Department:** _____

_____ **Telephone:** _____

_____ **Fax:** _____

Rexroth
Bosch Group

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