

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

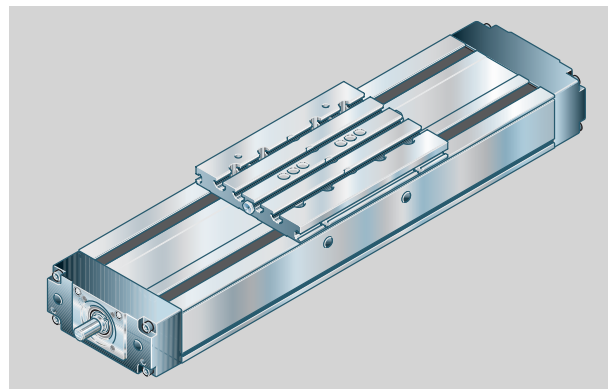
Other distinguishing features

- 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

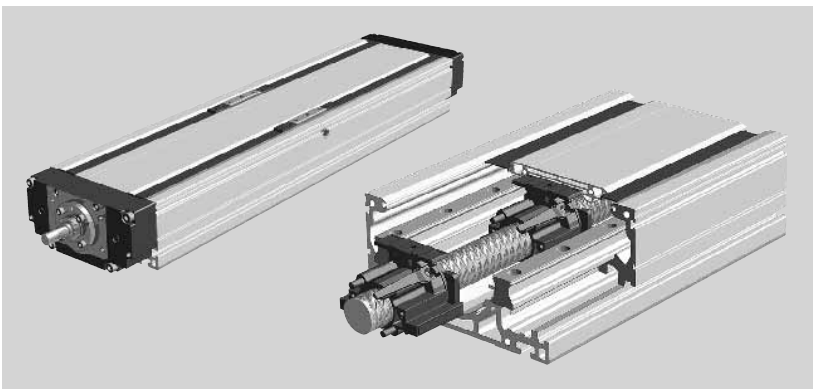
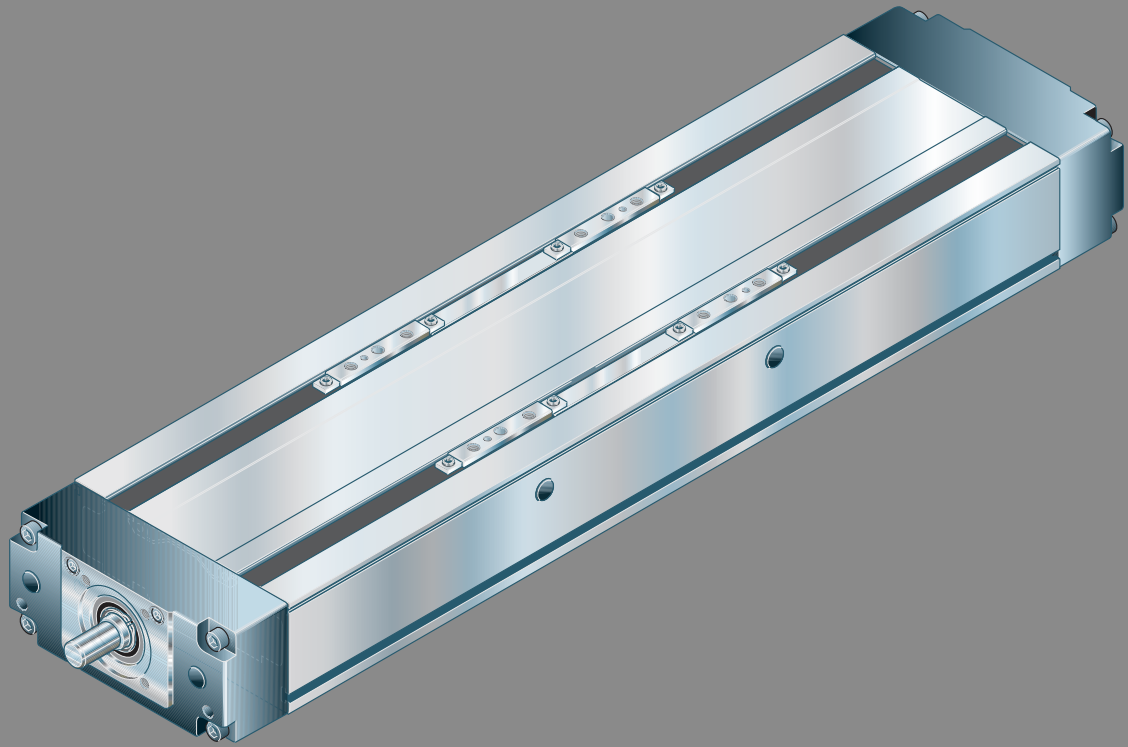
Drive controllers and control systems



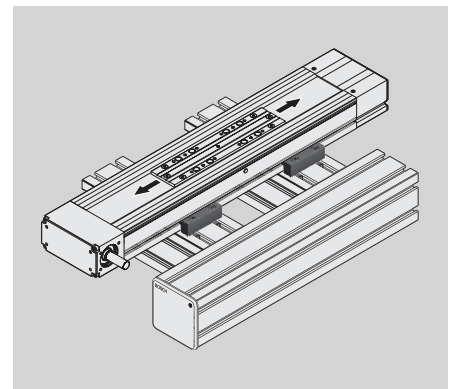
For mounting and maintenance, see "Instructions for Compact Modules CKK" RE 82 671



Connection plate for easy installation



Screw support for CKK 25-200



Connection elements for fastening Compact Modules

Compact Modules CKK

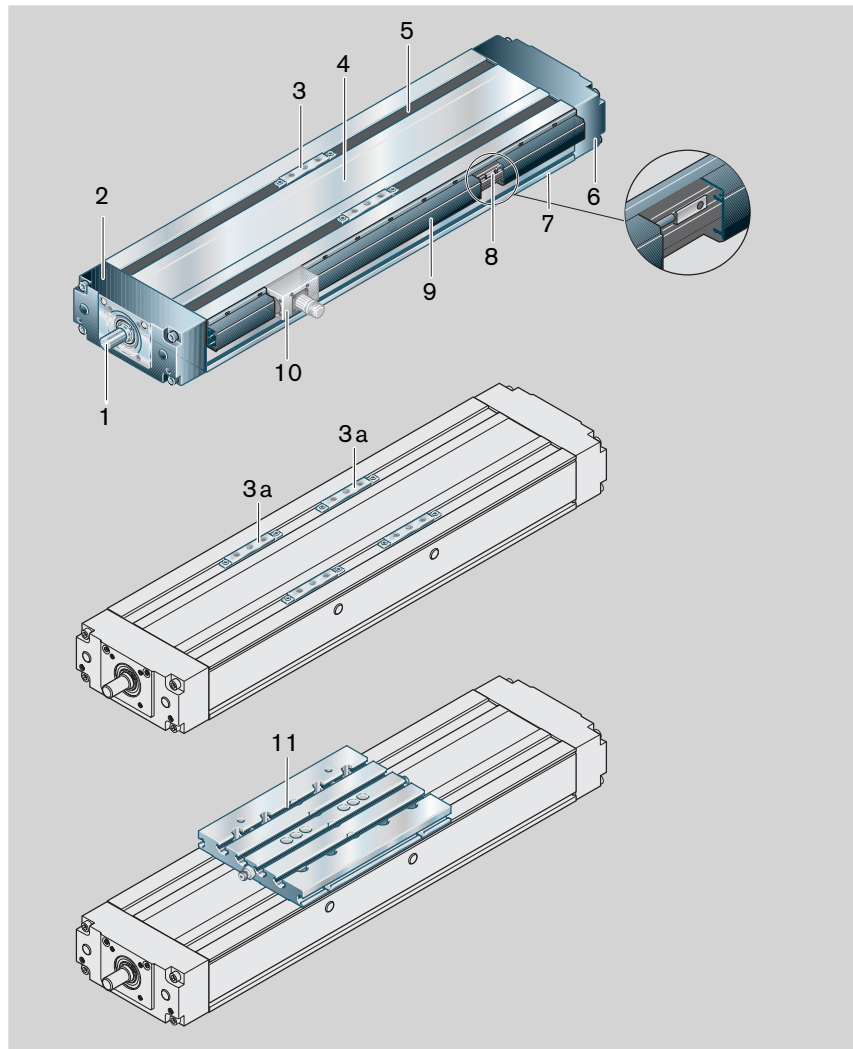
Structural design

Structural design CKK

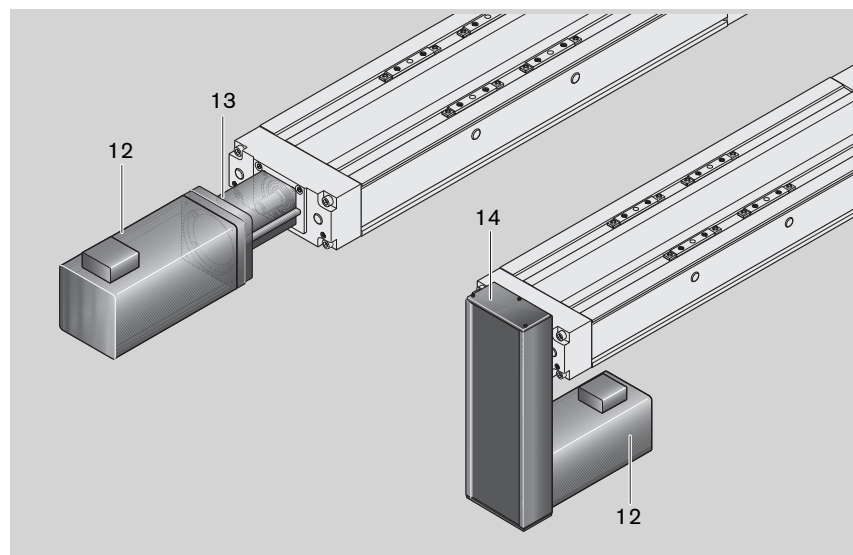
- 1 Ball screw drive with zero-backlash, cylindrical single nut
- 2 Floating bearing end block
- 3 Carriage with integrated runner blocks
- 3a Two carriages with two integrated runner blocks each
- 4 Aluminum cover
- 5 Gap-type seal made of PU strip (recirculating)
- 6 Fixed bearing end block
- 7 Frame

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.

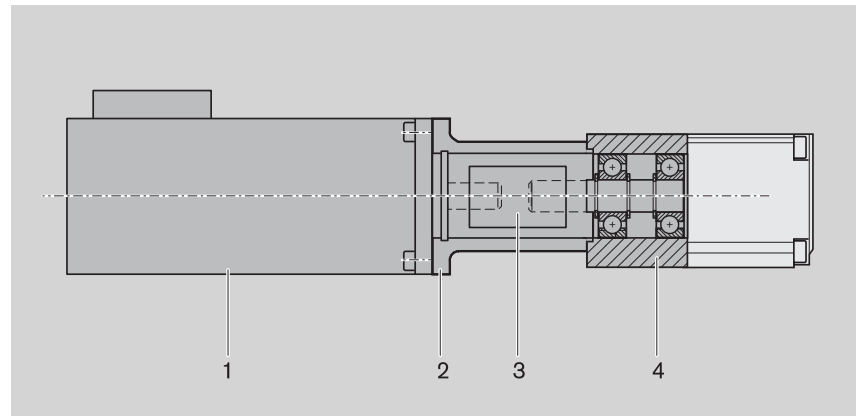
The motor mount serves to fasten the motor to the Compact Module and acts as a closed housing for the coupling.

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.

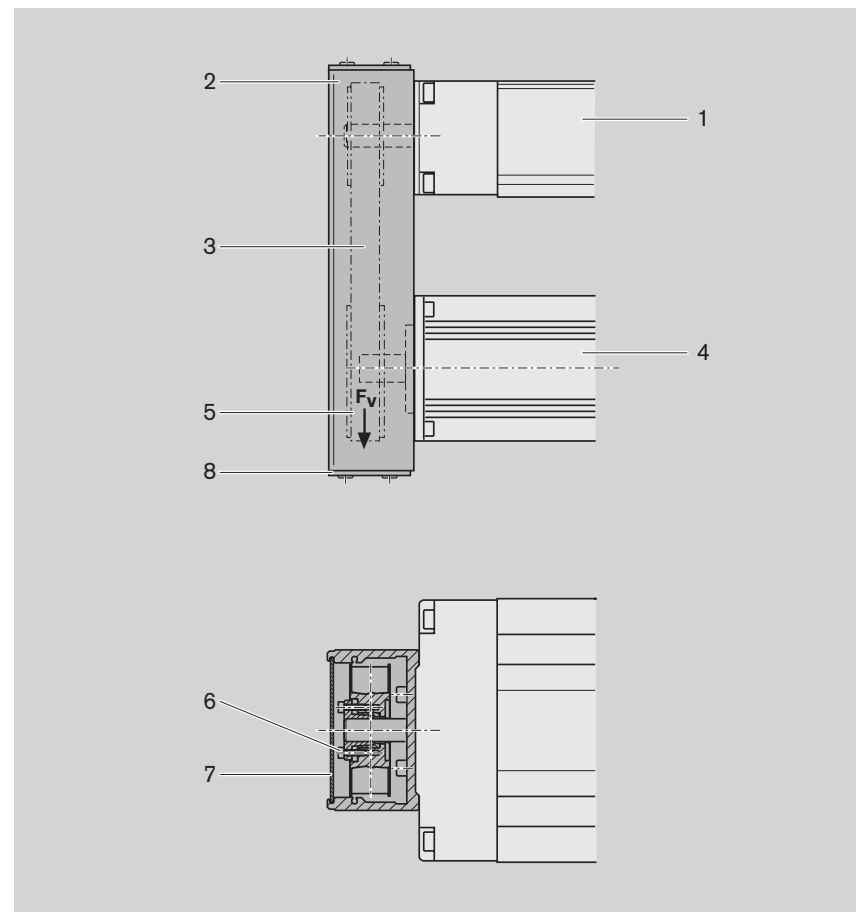
Various gear ratios are also available:

- $i = 1 : 1$
- $i = 1 : 1.5$
- $i = 1 : 2$

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 $d_o \times P$	Dynamic load capacity C (N)			Dynamic moments		Planar moment of inertia		Maximum length L_{max} (mm)	Moved mass m_b (kg)
			Guideway	Ball screw	Fixed bearing	M_t (Nm)	M_L (Nm)	I_y (cm ⁴)	I_z (cm ⁴)		
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

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

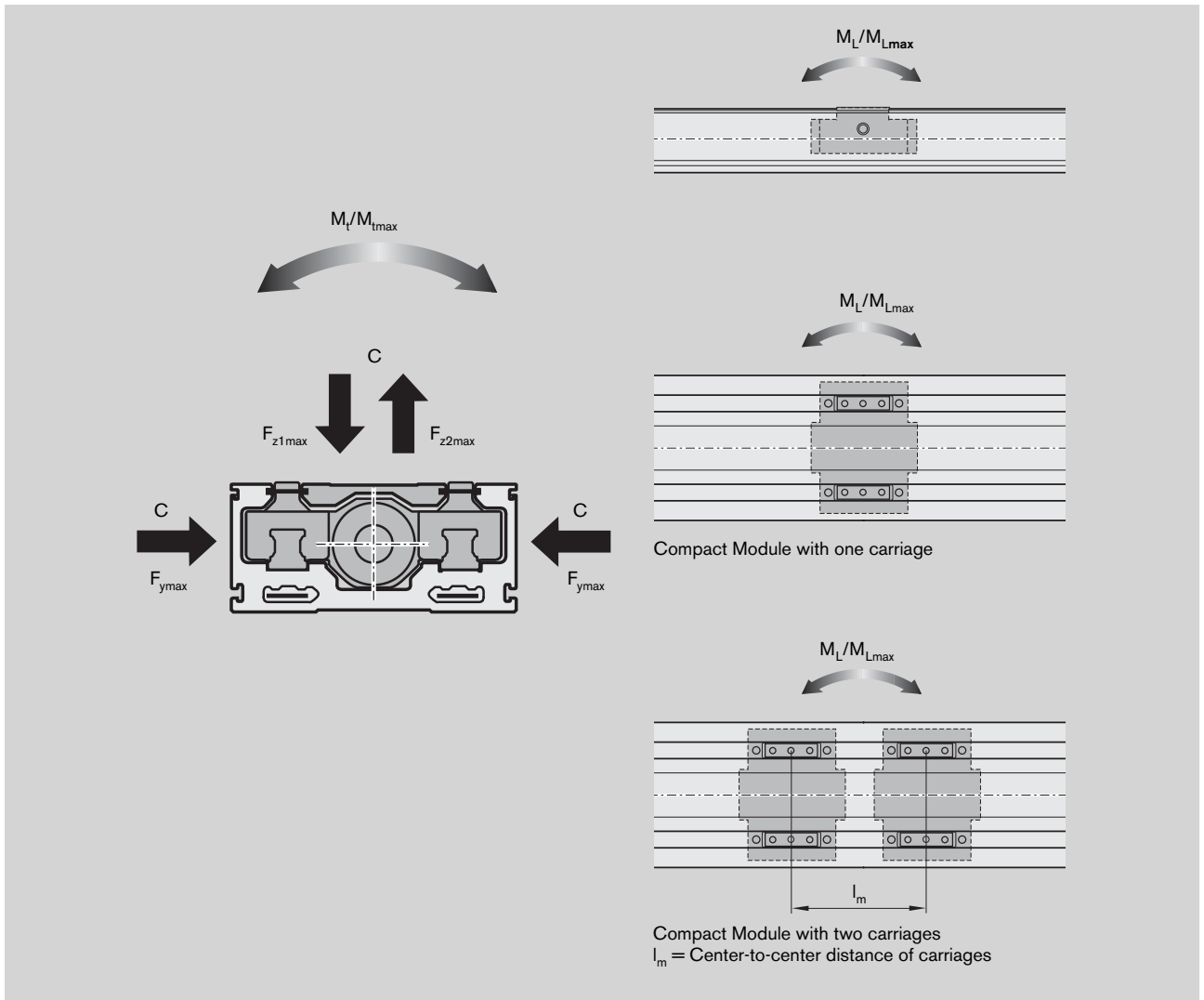
Weight

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	$0.0055 \cdot L + 0.9$
		2	$0.0055 \cdot L + 1.2$
CKK 15-110	with	1	$0.0092 \cdot L + 1.6$
		2	$0.0092 \cdot L + 2.0$
CKK 20-145	with	1	$0.0178 \cdot L + 3.0$
		2	$0.0178 \cdot L + 3.9$
CKK 25-200	with	1	$0.0299 \cdot L + 6.7$
		2	$0.0299 \cdot L + 8.7$



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**, **M_t** and **M_L** from the table by 1.26.

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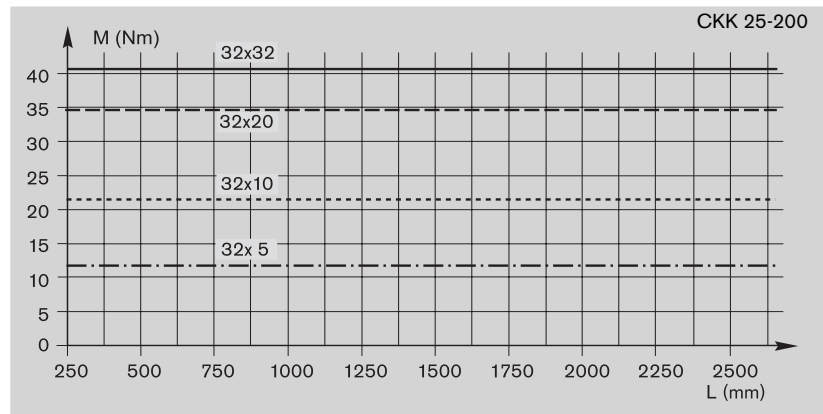
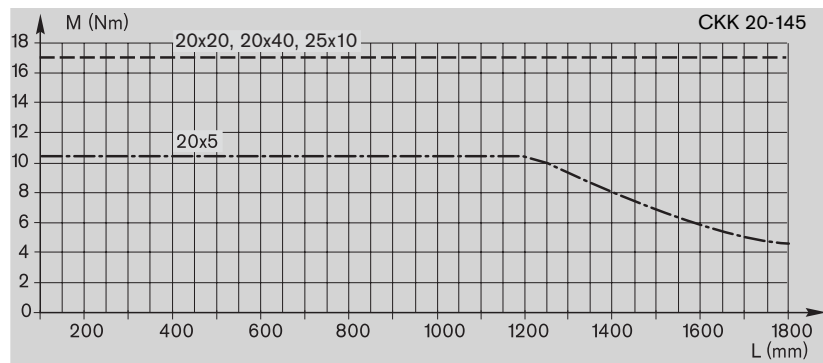
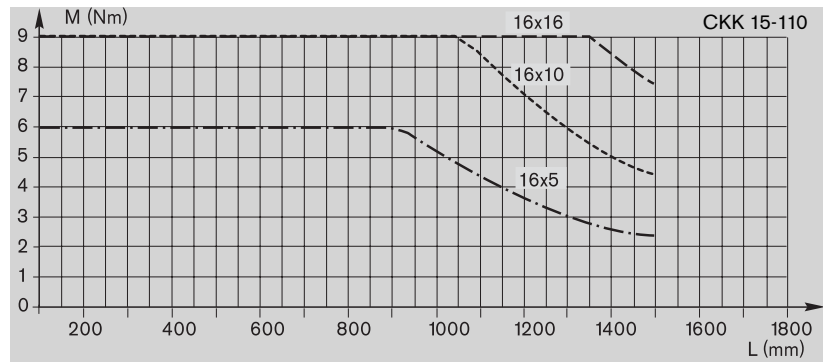
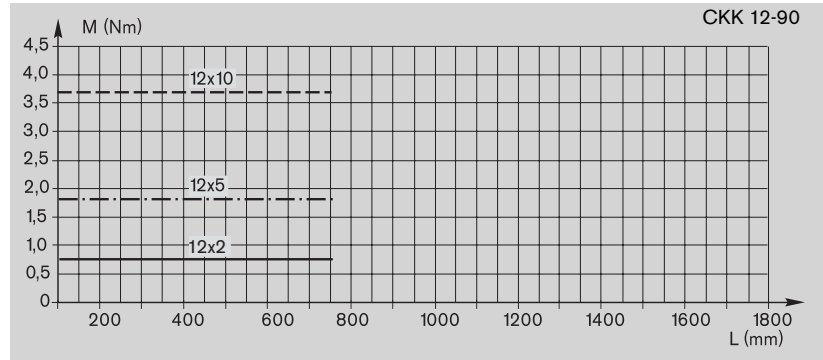
Technical data

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!



Ball screw journal with keyway

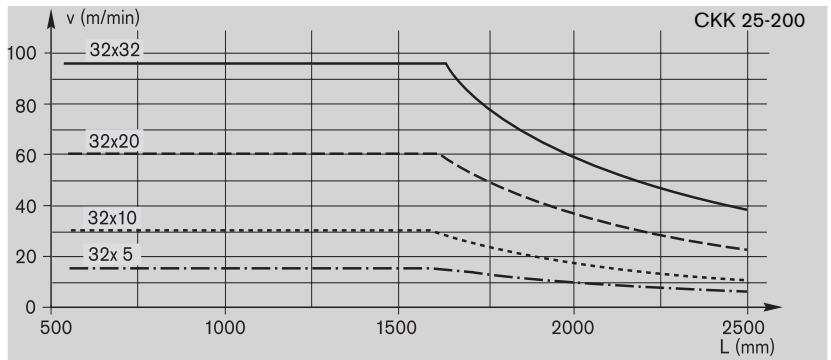
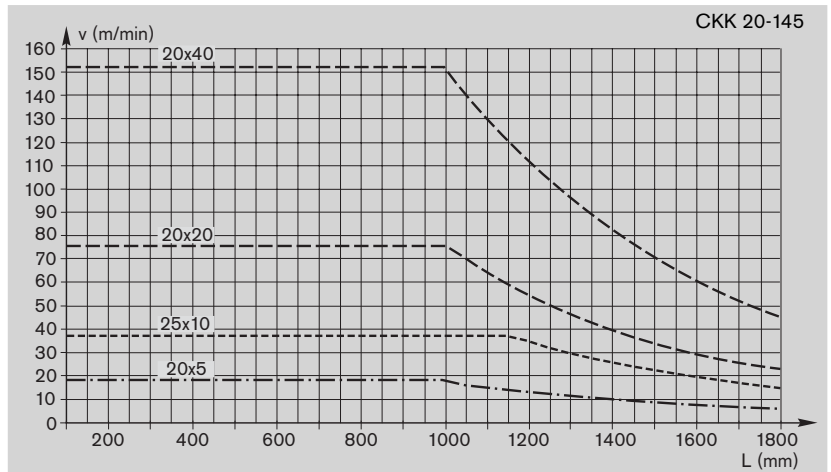
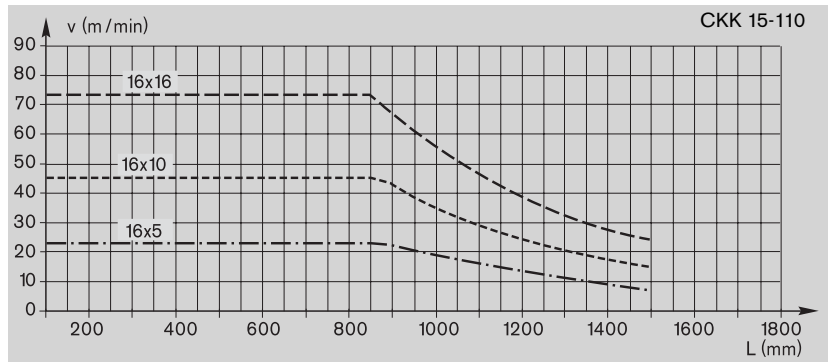
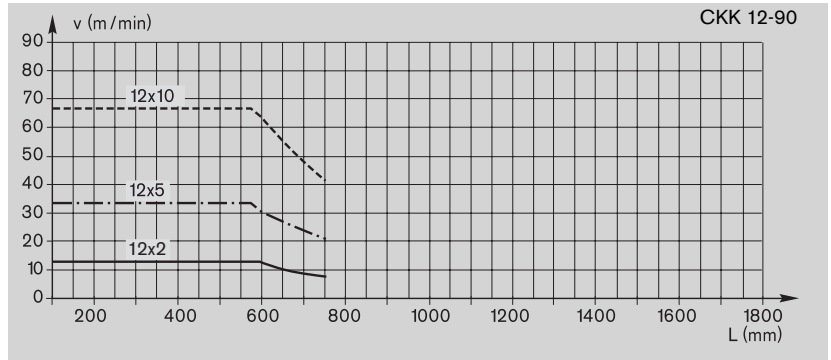
For reasons of stress concentration and a reduction of the effective diameter, observe the following maximum values for drive torque!

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

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

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 $L^{1)} = \dots$ at		Reduced mass moment of inertia at			Permissible torque up to length $L^{1)} = \dots$ at		Reduced mass moment of inertia at					
Gear ratio $i = \dots$		$i = 1$		$i = 1.5$		$i = 1$		$i = 1.5$		$i = 1$		$i = 1.5$		
Size	Ball screw $d_0 \times P$	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm^2)	J_{Rv} (10^{-6} kgm^2)	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm^2)	J_{Rv} (10^{-6} kgm^2)			
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

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 $d_0 \times P$	Constants				Frictional torque M_{RS} (Nm)
		k_1 1 carriage	k_2 2 carriages	k_3		
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

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

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

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

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

for motor attachment via timing belt side drive

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

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

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

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

Rotary speed

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

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

$$n_1 < n_{max}$$

$$v < \text{Permissible speed from chart}$$

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 kgm ²)	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

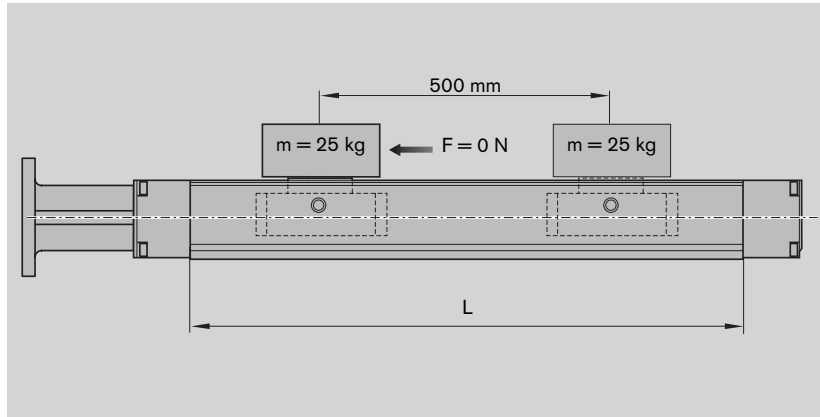
When sizing the drive unit, always consider the motor-controller combination because the motor type and performance data (such as maximum usable speed and maximum torque) are dependent on the controller or control system used.

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	=	$2 \cdot P = 2 \cdot 16 \text{ mm} = 32 \text{ mm}$
Max. travel distance	=	$\text{stroke}_{\text{eff}} + 2 \cdot \text{excess travel}$
	=	$500 \text{ mm} + 2 \cdot 32$
	=	564 mm
Compact Module length L	=	$(\text{stroke} + 2 \cdot \text{excess travel}) + 90$ (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 $v = 40 \text{ m/min}$ and $L = 654 \text{ mm}$:
 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	=	$2 \cdot P = 2 \cdot 10 \text{ mm} = 20 \text{ mm}$
Max. travel distance	=	$\text{stroke}_{\text{eff}} + 2 \cdot \text{excess travel}$
	=	$500 \text{ mm} + 2 \cdot 20 \text{ mm}$
	=	540 mm
Compact Module length L	=	$(\text{stroke} + 2 \cdot \text{excess travel}) + 90 \text{ mm}$
	=	$540 \text{ mm} + 90 \text{ mm}$
	=	630 mm

Frictional torque M_R

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

Mass moment of inertia J

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

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

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

$$\begin{aligned}
 J_{fr} &= J_S + J_K + J_{Br} \\
 &= 115.8 \cdot 10^{-6} \text{ kgm}^2
 \end{aligned}$$

For handling:

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

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

Rotary speed n
at v = 40 m/min

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

$$v = 40 \text{ m/min}$$

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 $n_{max} > 4,000 \text{ min}^{-1}$

– mass moment of inertia $J_M > 19.3 \cdot 10^{-6} \text{ kgm}^2$

– maximum permissible drive torque $M_{perm} < 9 \text{ Nm}$

Consider rated torque of coupling M_K and frictional torque M_R
($M_K = 14 \text{ Nm}$; $M_R = 0.47 \text{ Nm}$)

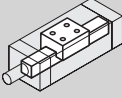
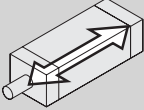
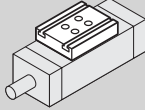
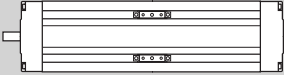
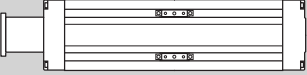
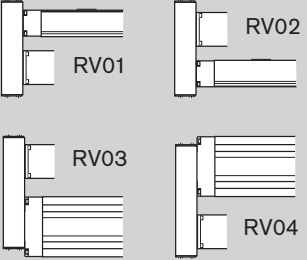
These requirements are fulfilled by all AC servo motors approved for CKK 15-110 in the table "Components and ordering".

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 $d_0 \times P$			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 =	Attach-ment kit ¹⁾	for motor	Motor type		Gap-type seals made of PU strip with-		without switch without mounting duct	without	with	Standard report	Measure-ment report					
			without brake	with brake	with-	with out										
	00		00													
	01	MSK 030C	84	85	01	02	00		01	02	03					
	05	MSM 030C	72	73			Magnetic field sensor					21	Mounting duct 25 Length = L	Socket Plug 17	05	
	06	VRDM 397	37	38			Reed sensor	22								Hall sensor PNP - NC contact
		VRDM 3910	39	40			Magnetic field sensor with plug ²⁾					58				
1	11	MSK 030C	84	85			Reed sensor	59								
	13	MSM 030C	72	73			Hall sensor PNP - NC contact									
	1.5	21	MSK 030C	84			85									
		23	MSM 030C	72			73									

Calculating the length of the Compact Module

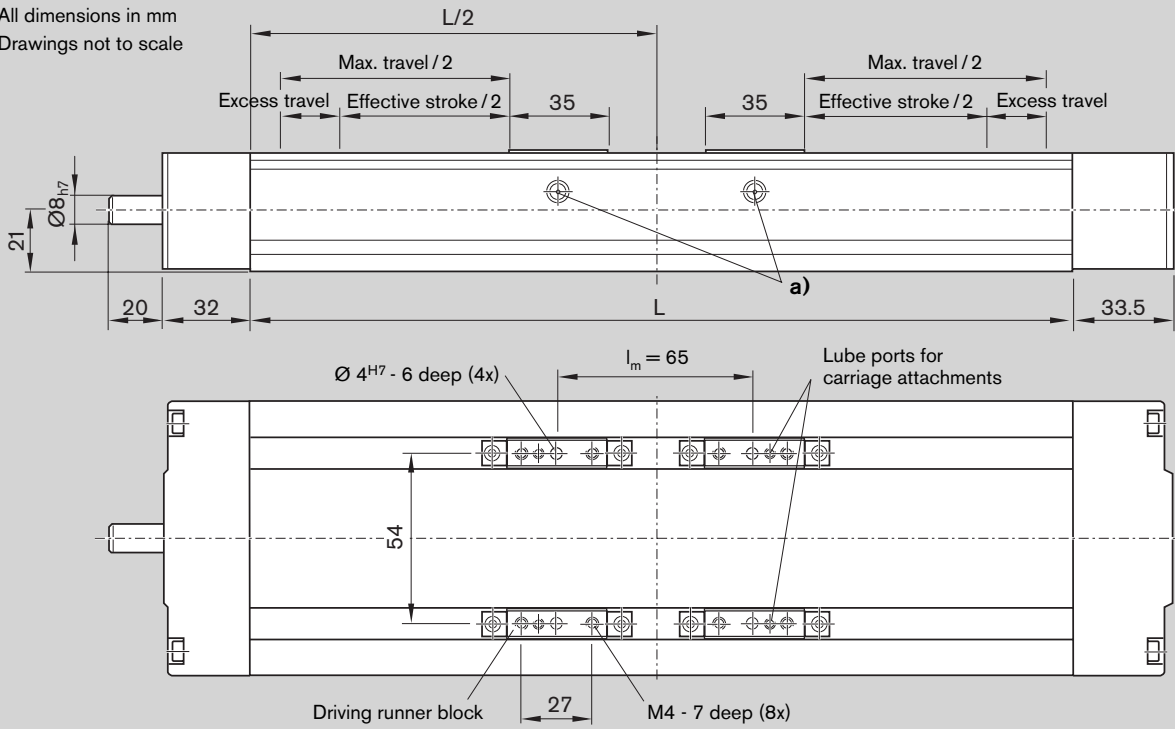
With one carriage:
 $L = (\text{stroke} + 2 \cdot \text{excess travel}) + 85 \text{ mm}$
 With two carriages ($l_m = 65 \text{ mm}$):
 $L = (\text{stroke} + 2 \cdot \text{excess travel}) + 150 \text{ mm}$
 Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
 Excess travel = $2 \cdot \text{screw lead } P$
 Example:
 Ball screw 12 x 10 ($d_0 \times P$),
 Excess travel = $2 \cdot 10 = 20 \text{ mm}$

Compact Modules CKK

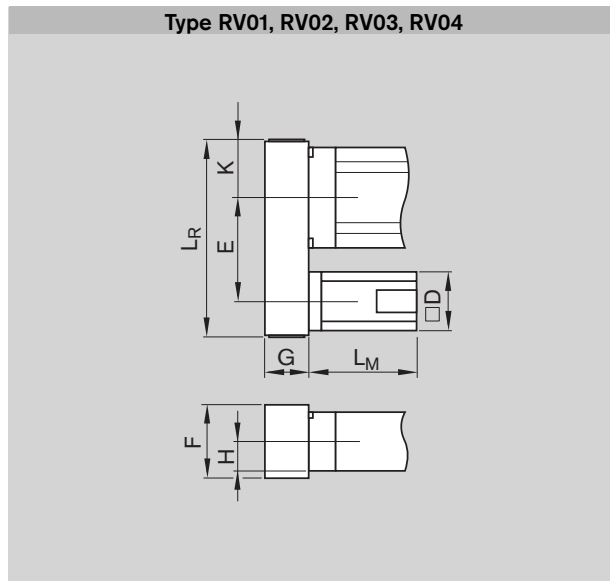
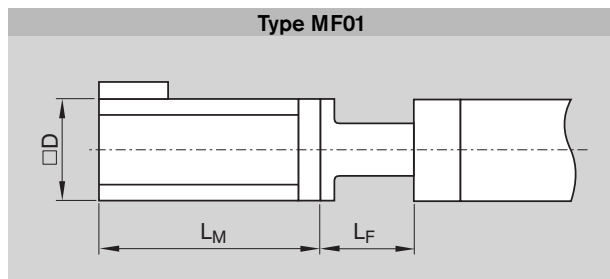
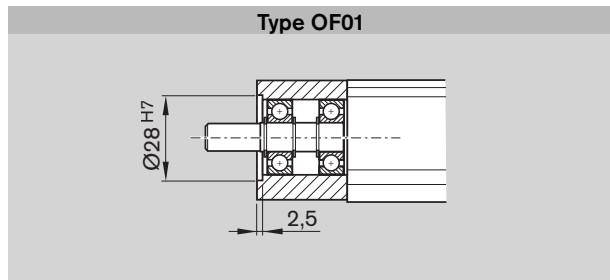
CKK 12-90 dimensions

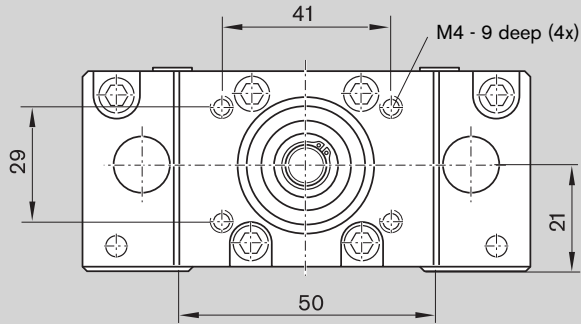
All dimensions in mm
Drawings not to scale



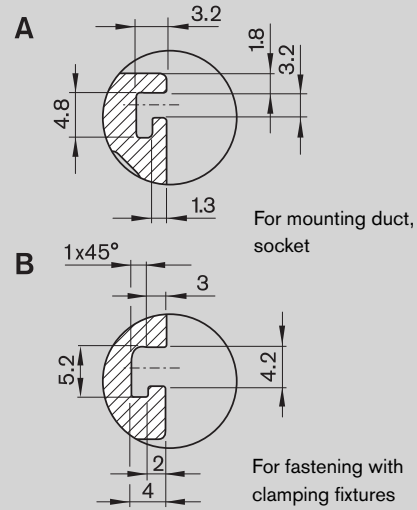
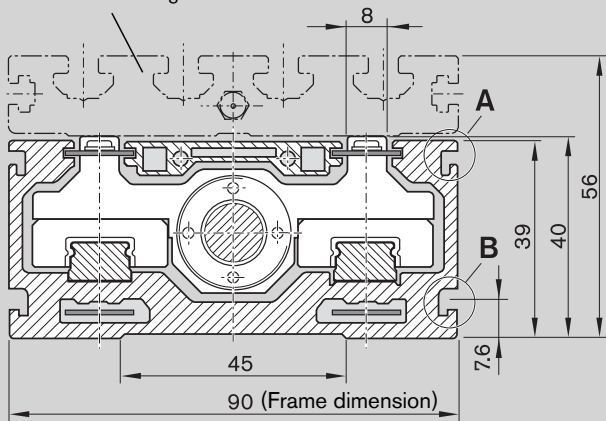
- a) One-point lubrication (grease lubrication):**
 Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at $L/2$)
 Module with one carriage: 1 lube port per side at $L/2$

Refer to "Motors" for more information and dimensions.





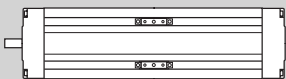
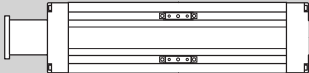
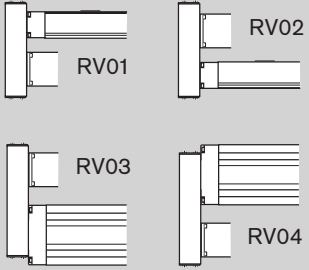
For connection plate, see section on "Mounting"



Type	Motor	Dimensions (mm)											
		D	E i=1	E i=1.5	F	G	H	K	L _F	L _M without brake	L _M with brake	L _R i=1	L _R 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 $d_0 \times P$			One carriage		Two carriages $l_m=85$	
				16 x 5	16 x 10	16 x 16	Connection plate with-out	with	Connection plate with-out	with
	OF01	01	Ø11	01	02	03	01	40	02	41
			Ø11 with keyway	11	12	13				
	MF01	01	Ø11	01	02	03	01	40	02	41
	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.)!

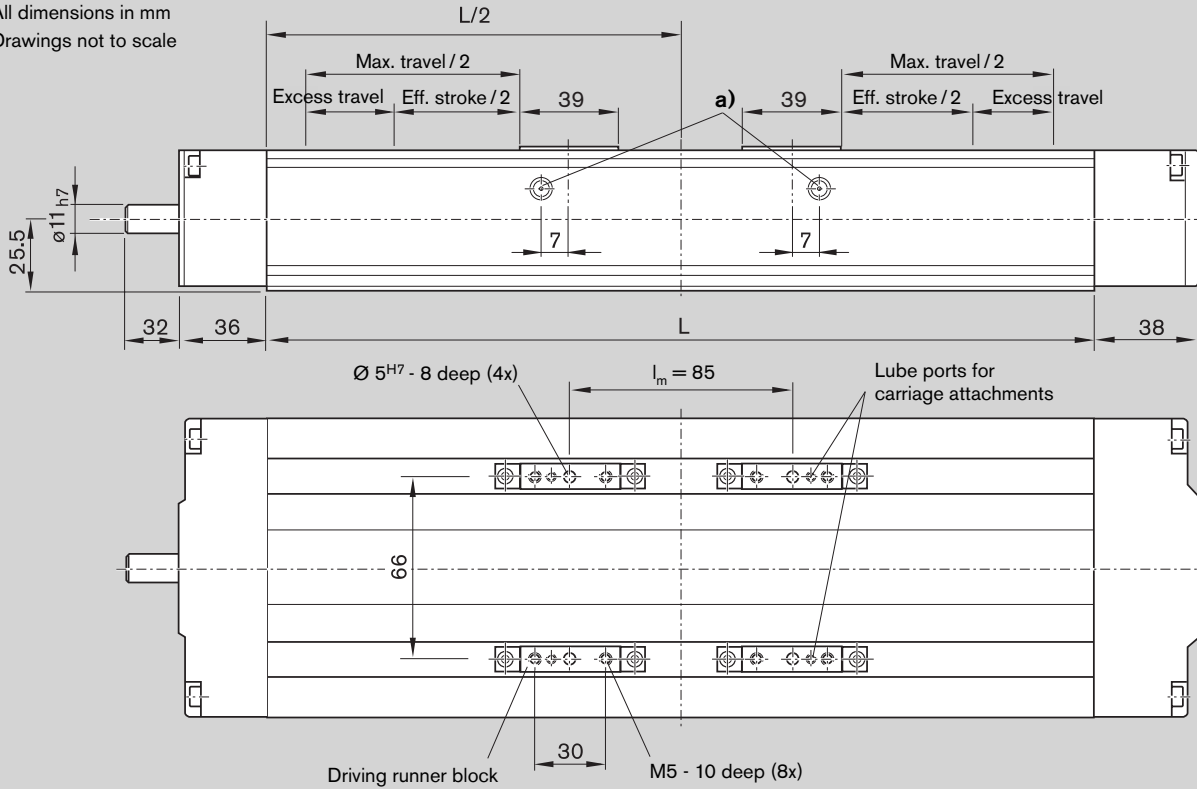
Switch mounting arrangements

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.

Compact Modules CKK

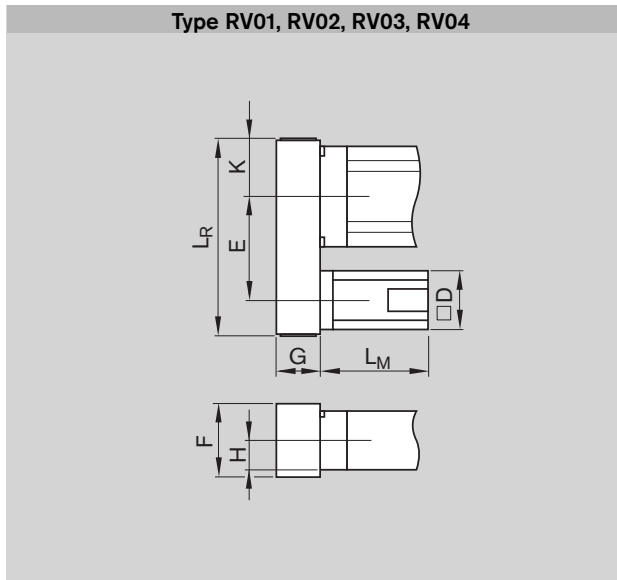
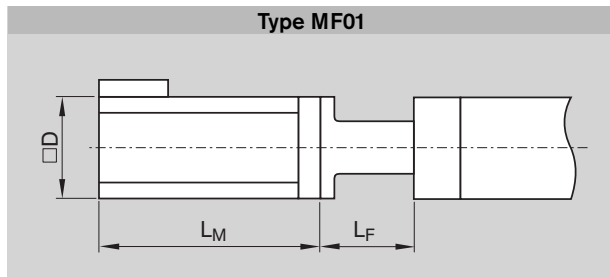
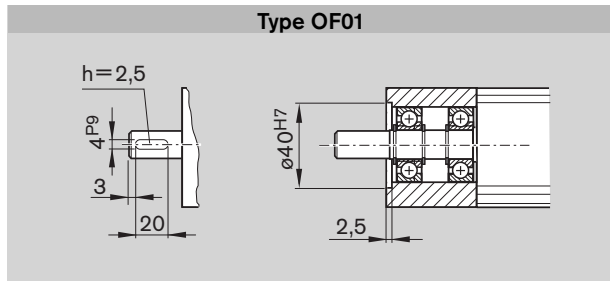
CKK 15-110 dimensions

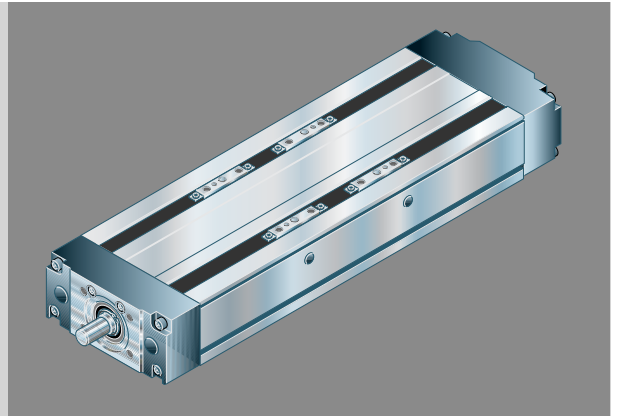
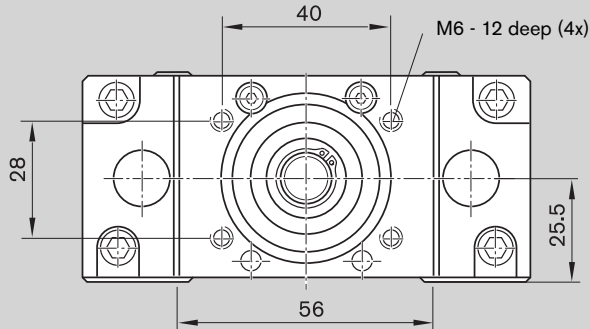
All dimensions in mm
Drawings not to scale



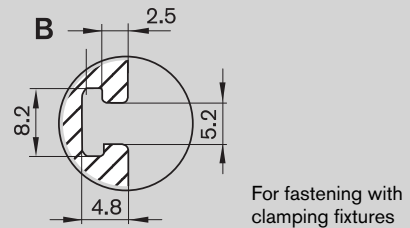
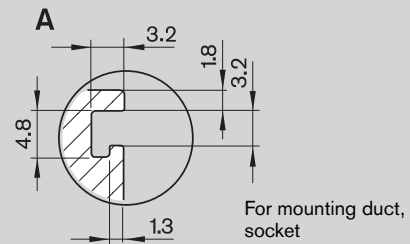
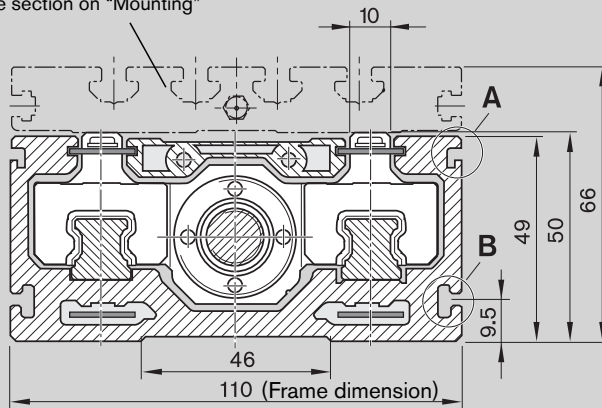
- a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at L/2)
Module with one carriage: 1 lube port per side at L/2

Refer to "Motors" for more information and dimensions.





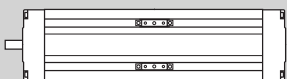
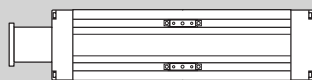
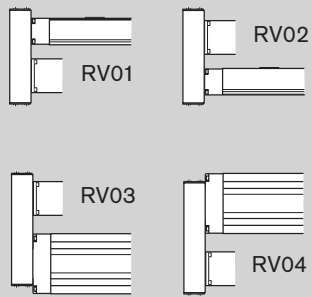
For connection plate, see section on "Mounting"



Type	Motor	Dimensions (mm)											
		D	E		F	G	H	K	L _F	without brake	L _M with brake	L _R	
			i=1	i=1.5								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				Carriage				
			Screw journal	Ball screw size $d_0 \times P$				One carriage		Two carriages $l_m = 100 \text{ mm}$	
				20 x 5	20 x 20	25 x 10	20 x 40	Connection plate without with		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

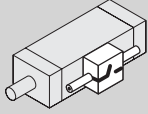
- 1) Attachment kit also available without motor (when ordering: enter "00" for motor)
- 2) Including mounting accessories

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 $i =$	Attach-ment kit ¹⁾	for motor	Motor type		Gap-type seals made of PU strip					Standard report	Measure-ment report	
			without brake	with brake	without	with						
	00		00								02 Frictional torque	
	30	MSK 040C	86	87	01	02	without switch		00	01	03 Lead deviation	
	31	VRDM 3913	41	42			without mounting duct					
	32	MSM 040B	74	75			Magnetic field sensor					
	33	MSK 050C	88	89			Reed sensor	21	Mounting duct 25 Length = L			Socket Plug 17
							Hall sensor PNP - NC contact	22				
	11	MSK 040C	86	87			Magnetic field sensor with plug ²⁾					
	35	MSK 050C	88	89			Reed sensor	58				
	17	MSM 040B	74	75			Hall sensor PNP - NC contact	59				
	21	MSK 040C	86	87								
	27	MSM 040B	74	75								
	36	MSK 050C	88	89					05 Positioning accuracy			

Calculating the length of the Compact Module

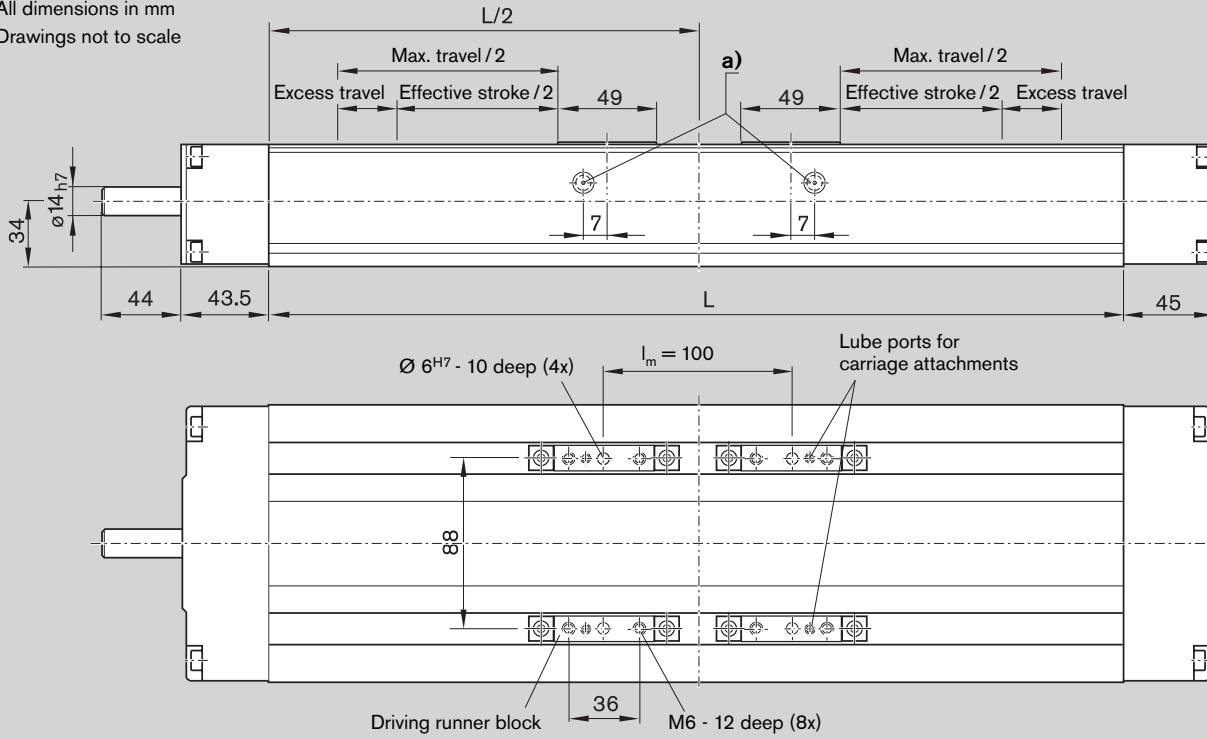
With one carriage:
 $L = (\text{stroke} + 2 \cdot \text{excess travel}) + 110 \text{ mm}$
 With two carriages ($l_m = 100 \text{ mm}$):
 $L = (\text{stroke} + 2 \cdot \text{excess travel}) + 210 \text{ mm}$
 Stroke = Maximum distance from carriage center to the outermost switch activation points.

In most cases, the recommended limit for excess travel (braking distance) is:
 Excess travel = $2 \cdot \text{screw lead } P$
 Example:
 Ball screw 25×10 ($d_0 \times P$),
 Excess travel = $2 \cdot 10 = 20 \text{ mm}$

Compact Modules CKK

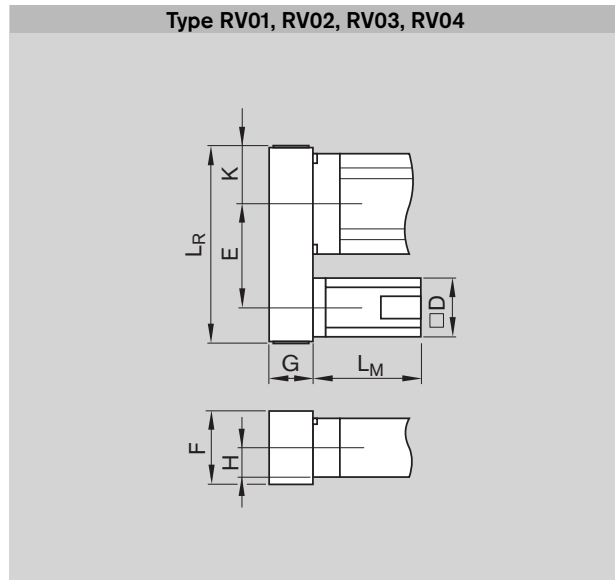
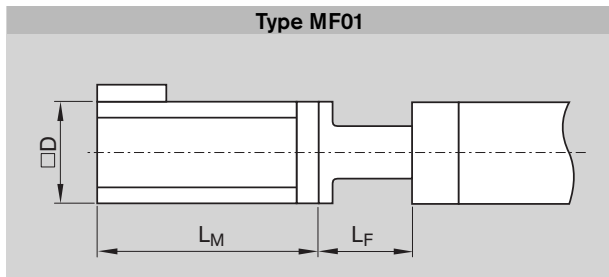
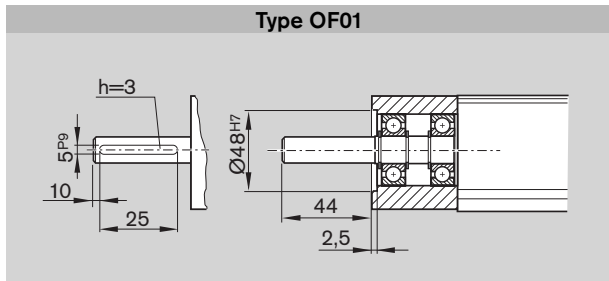
CKK 20-145 dimensions

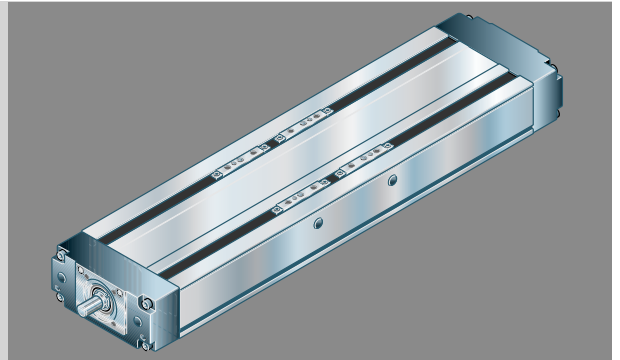
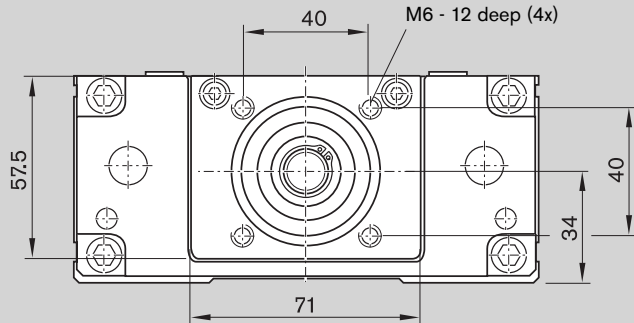
All dimensions in mm
Drawings not to scale



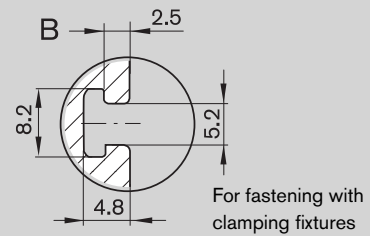
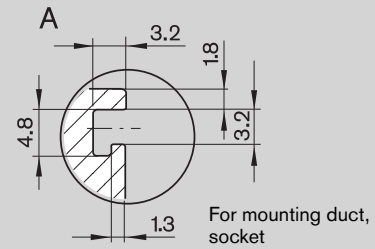
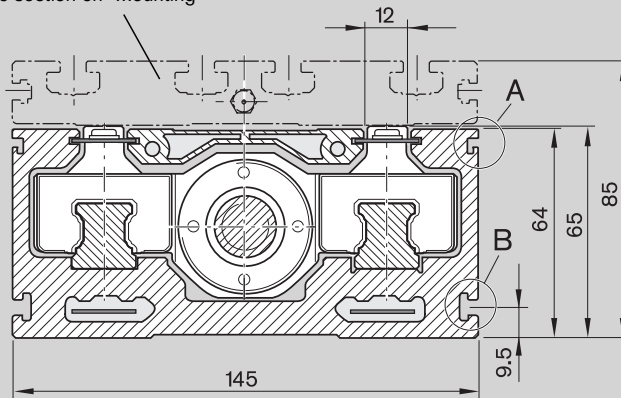
- a) One-point lubrication (grease lubrication):
Each carriage can be lubed at either of the two funnel-type lube nipples DIN 3405-D3 (lubricating position at $L/2$)
Module with one carriage: 1 lube port per side at $L/2$

Refer to "Motors" for more information and dimensions.





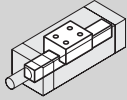
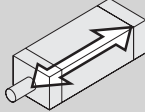
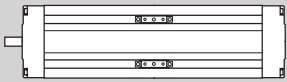
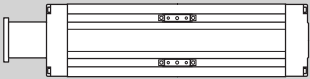
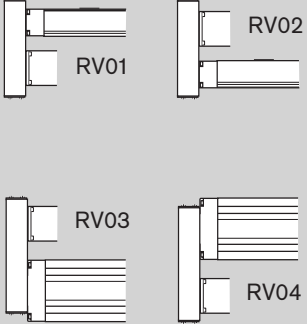
For connection plate, see section on "Mounting"



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 	Ball screw size d ₀ x P				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	Connection plate with	Connection plate without	Connection plate with
without motor mount 	OF01	01	Ø16	01	02	03	04					
			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	01	40	11	41	

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

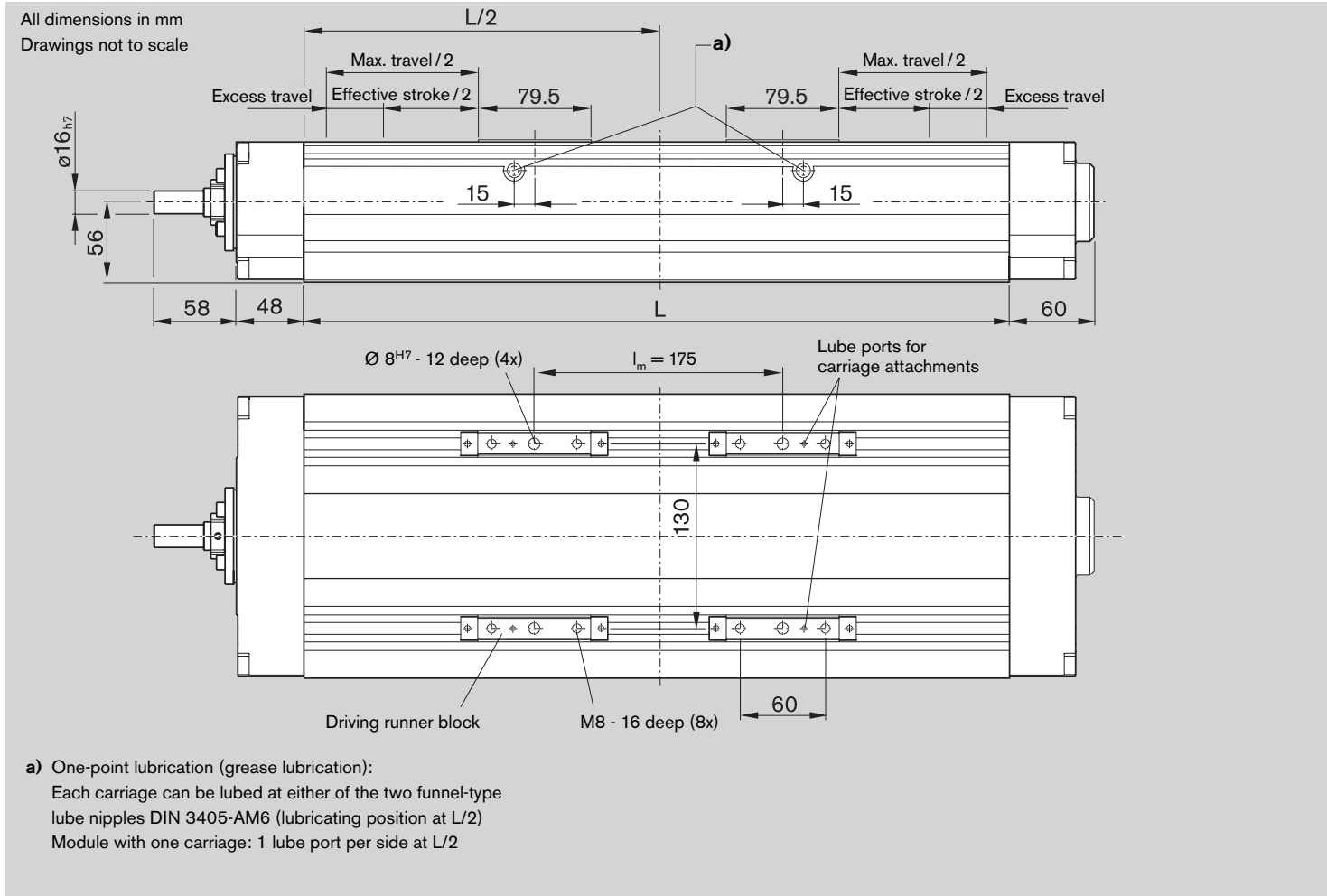
Calculating the length of the Compact Module

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

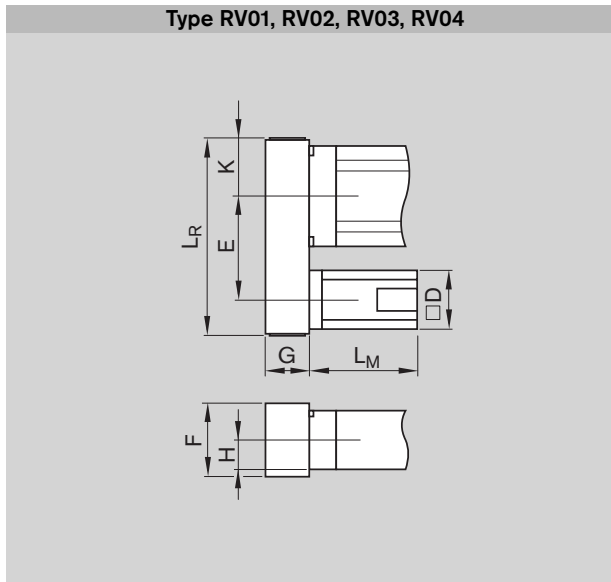
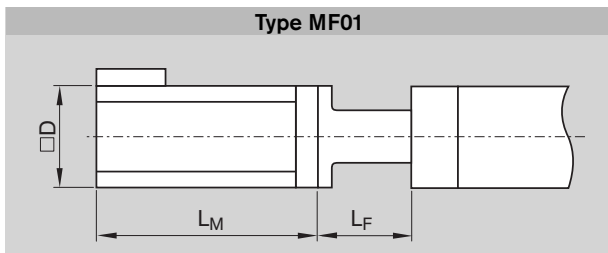
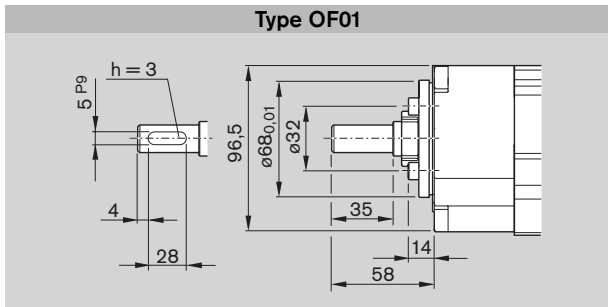
In most cases, the recommended limit for excess travel (braking distance) is:
 Excess travel = $2 \cdot \text{screw lead P}$
 Example:
 Ball screw 32 x 10 ($d_0 \times P$),
 Excess travel = $2 \cdot 10 = 20 \text{ mm}$

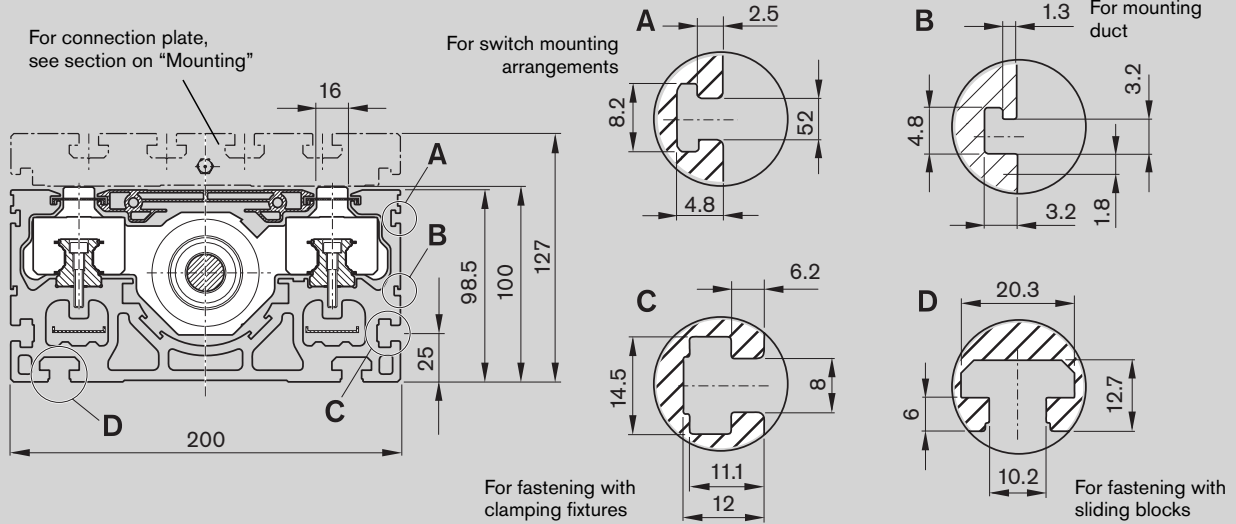
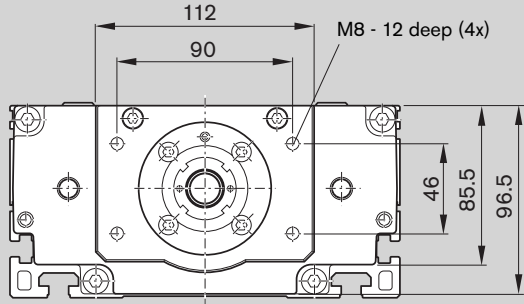
Compact Modules CKK

CKK 25-200 dimensions



Refer to "Motors" for more information and dimensions.





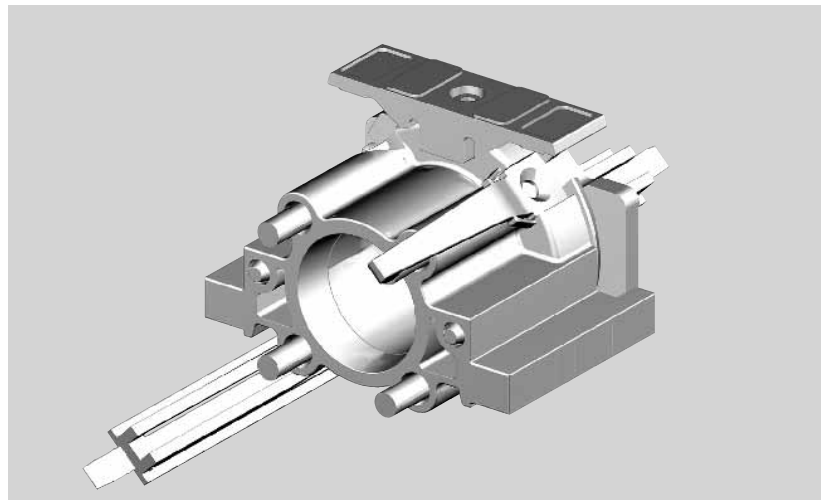
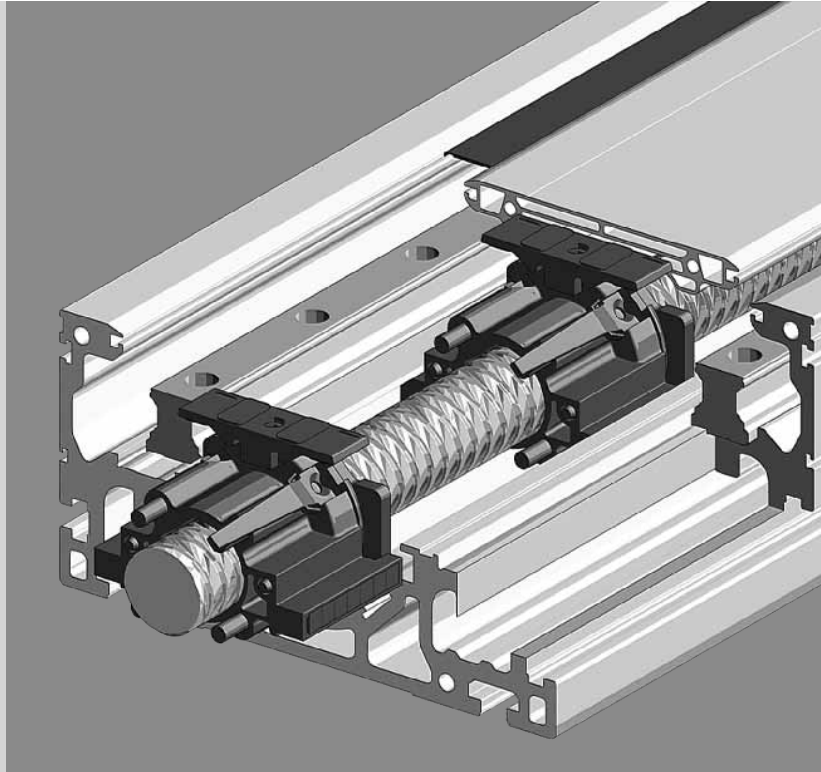
Type	Motor	Dimensions (mm)											
		D	i=1	i=2	F	G	H	K	L _F	without brake	L _M with brake	i=1	L _R i=2
RV01/RV02 RV03/RV04	MSK 060C	116	267.5	265	116	66	56	59	-	-	-	403	403
MF01	MSK 060C	116	-	-	-	-	-	-	125	226	259	-	-
	MSK 076C	140	-	-	-	-	-	-	133	-	292.5	-	-

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	$0.0299 \times L + 6.7$	2200	$L = \text{stroke} + 2 \cdot \text{excess travel} + 200$
	1 SPU	02	$0.0299 \times L + 6.7$ plus 0.2 kg/SPU	3500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 315$
	2 SPU	03		4600	$L = \text{stroke} + 2 \cdot \text{excess travel} + 440$
	3 SPU	04		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 565$
	4 SPU	05		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 690$
	5 SPU	06		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 815$
2 carriages	without SPU	11	$0.0299 \times L + 8.7$	2200	$L = \text{stroke} + 2 \cdot \text{excess travel} + 375$
	1 SPU	12	$0.0299 \times L + 8.7$ plus 0.2 kg/SPU	3600	$L = \text{stroke} + 2 \cdot \text{excess travel} + 490$
	2 SPU	13		4700	$L = \text{stroke} + 2 \cdot \text{excess travel} + 615$
	3 SPU	14		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 740$
	4 SPU	15		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 865$
	5 SPU	16		5500	$L = \text{stroke} + 2 \cdot \text{excess travel} + 990$

Frictional torque M_R with one carriage¹⁾

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.

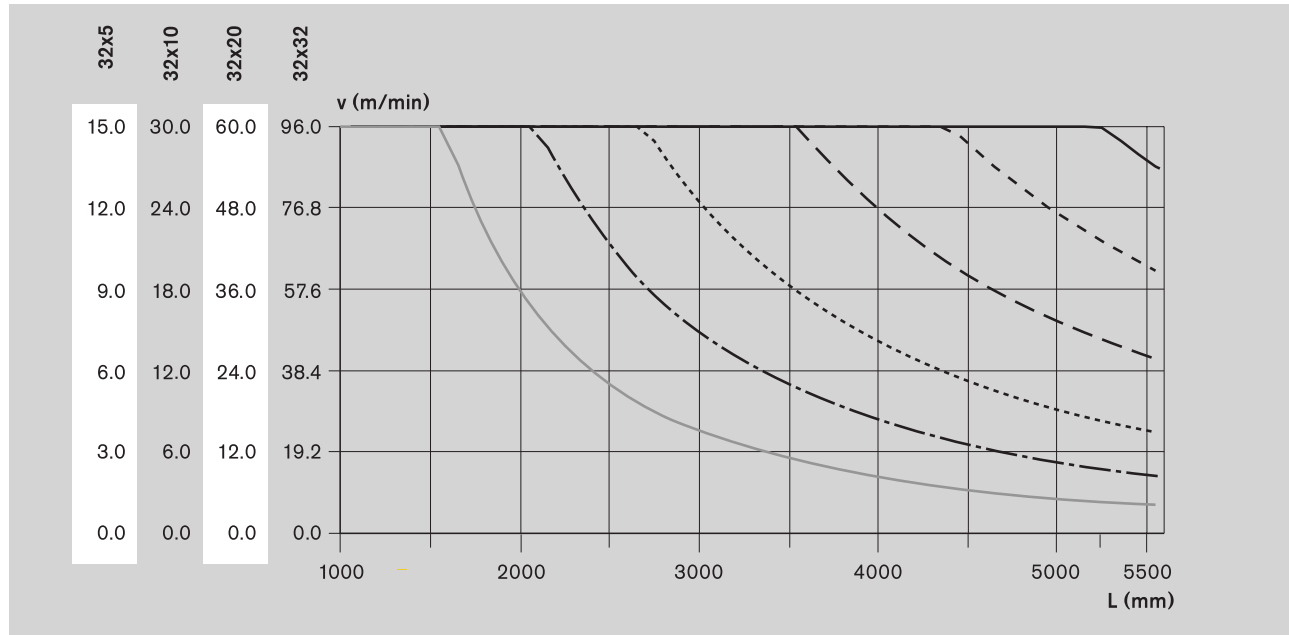
Compact Modules CKK

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:

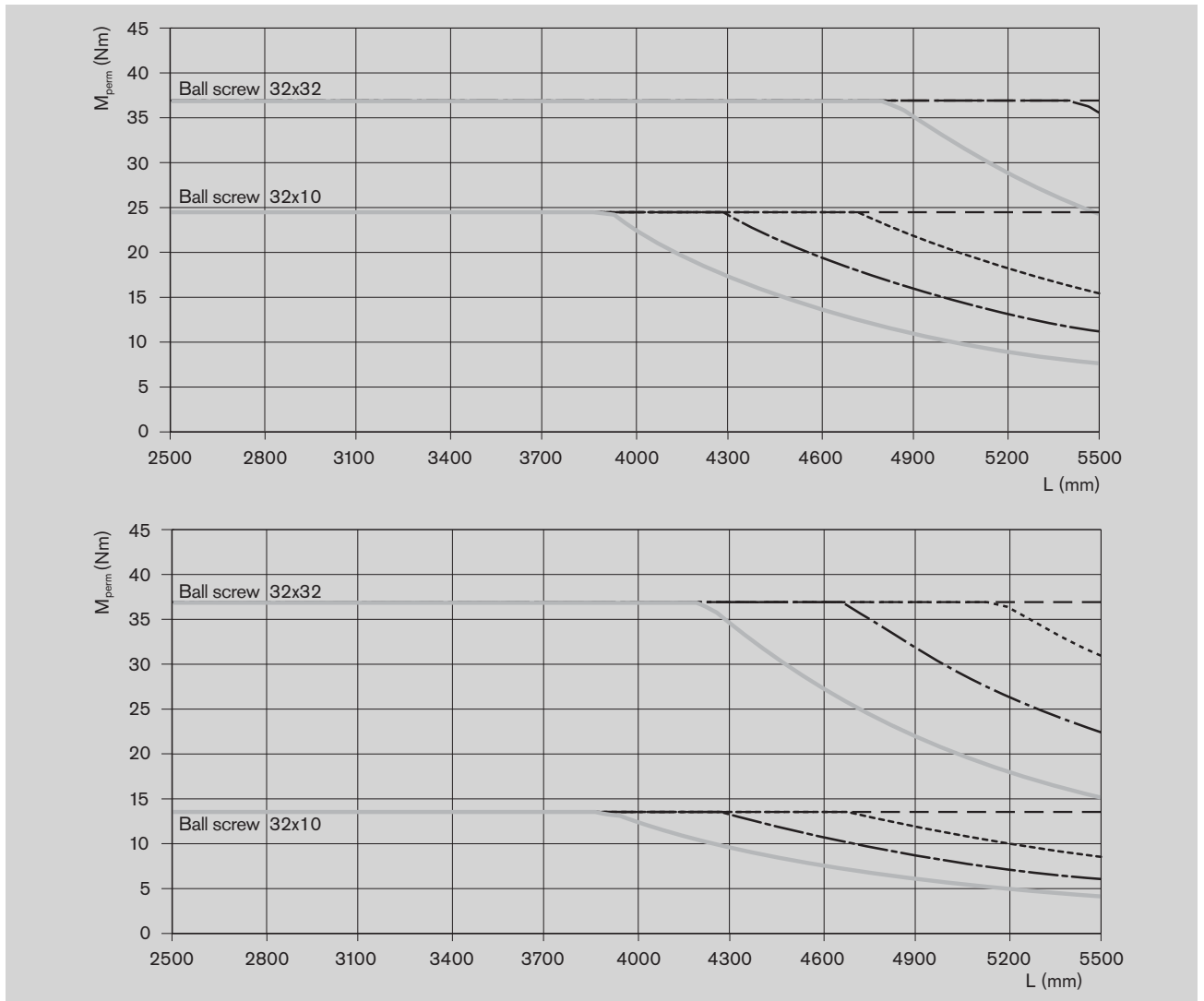
- Horizontal operation
 - Ball screw journal without keyway
 - No radial loads on ball screw journal
- Consider the coupling's rated torque!

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 ($M_{perm} = 18 \text{ Nm}$) the smaller value will always apply.



— without SPU