## **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 (frame) with two integrated ball rail systems
- Precision ball screw drive according to tolerance grade 7 with backlashfree 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
- Short or long carriage 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



For mounting and maintenance, see "Instructions for Compact Modules CKK" R310D4 2671

#### 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 through threads and pin holes and through short or long carriage
- Internal components protected by rigid aluminum cover and two gap-type seals made of PU 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 with simultaneous high precision over great lengths through ball rail systems, large screw diameters and screw leads, and double floating bearings

#### Drive controllers and control systems





Connection plate for easy installation

## Structural design

#### Structural design CKK

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

#### 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

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 Drawn, anodized aluminum profile
- 3 Toothed belt
- 4 AC servo motor
- 5 Pre-tensioning the toothed belt: Apply pretensioning force F<sub>pr</sub> to motor (F<sub>pr</sub> is provided upon delivery)
- 6 Fastening of belt pulleys with tensioning units
- 7 Cover plate
- 8 Cover





## Technical data

#### General technical data

Size	Carriage	Ball screw	Dynamic load capacity C (N)			Dyna mom	Dynamic moments		Planar moment of inertia		Moved mass of system m <sub>ca</sub> (kg)	
								y J I I Z			Connection plate	
			Guide-	Ball	Fixed	Mt	ML	l <sub>y</sub>	l <sub>z</sub>	L <sub>max</sub>	without	with
		d <sub>o</sub> x P	way	screw	bearing	(Nm)	(Nm)	(cm⁴)	(cm4)	(mm)		
CKK 9-70	short	8 x 2.5	2360	2200	1600	47	7	12.1	63.3	650	0.15	0.26
	long		3830			76	111				0.25	0.42

Size	Carriage	Maximum	permissible f	orces (N)	Maximum perm	issible moments (Nm)	Weight with ball screw (kg)		
		F <sub>z1 max</sub>	F <sub>z2 max</sub>	F <sub>y max</sub>	M <sub>x max</sub>	M <sub>y max</sub> , M <sub>z max</sub>			
CKK 9-70	short	1180	1180	590	23	7	3.16 ·10 <sup>·3</sup> · L + 0.39		
	long	2360	2360	1180	47	34	3.16 ·10 <sup>·3</sup> · L + 0.49		

#### 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

#### Weight

moments

stipulated.

Weight calculation without motor and

Note on dynamic load capacities and

Determination of the dynamic load capacities and moments is based on a

Often only 50,000 m are actually

and  $\mathbf{M}_{L}$  from the table by 1.26.

For comparison: Multiply values C, M<sub>t</sub>

travel life of 100,000 m.

### Weight formula:

switches.

E = 70,000 N/mm<sup>2</sup>

Weight factor (kg/mm)  $\cdot$  length L (mm) + weight of all parts of fixed length (carriage, end blocks, etc.) (kg)



# Maximum permissible drive torque for mechanical system $M_{\rm mech}$

The values shown for  $M_{\rm mech}$  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!



Consider motor speed!

Maximum permissible

system v<sub>mech</sub>

linear speed of mechanical

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

Motor		MSM 030B/MSK 030C							
Frictional torque N	I <sub>Rsd</sub> (Nm)	0.15							
		Per	missible	torque up to length $L^{1} = \dots$ at	Reduced mass moment of inertia at				
Gear ratio i =		i = 1	i = 1.5	i = 1	i = 1.5				
Size	Ball screw	L	M <sub>sd</sub>	M <sub>sd</sub>	J <sub>sd</sub>	J <sub>sd</sub>			
	d <sub>o</sub> x P	(mm)	(Nm)	(Nm)	(10 <sup>-6</sup> kgm²)	(10 <sup>-6</sup> kgm²)			
CKK 9-70	8 x 2.5	450	0.7	0.45	45.6	17.7			

M<sub>sd</sub> = maximum permissible drive torque of the timing belt side drive (consider the maximum torque of the motor M<sub>max</sub>)

 $M_{Rsd}$  = frictional torque of timing belt side drive at motor journal

 $J_{sd}$  = Mass moment of inertia of timing belt side drive

i = timing belt side drive reduction

1) Permissible torque for greater lengths available upon request

Constants k <sub>j fix</sub> , k <sub>j var</sub> , k <sub>j m</sub> Frictional torgue M <sub>Ped</sub>	Size	Ball screw	k	Constar fix	nts k <sub>j var</sub>	k <sub>j m</sub>	Frictional torque M <sub>Rs</sub> (Nm)
nsu nsu			short	long			
		d₀ x P	carriage	carriage			short carriage/long carriage
	CKK 9-70	8 x 2.5	0.871	0.891	0.004	0.158	0.07

Coupling data	Size	Motor attachment	Coupling data				
			Rated torque	Rated torque Mass moment of inertia			
			M <sub>cN</sub> (Nm)	<b>J<sub>c</sub></b> (10 <sup>−6</sup> kgm²)	m <sub>c</sub> (kg)		
For a local time and a cloud time around to	CKK 9-70	MSM 020B	1.9	2.1	0.039		
For calculation and calculation example,		MSM 030B	3.7	7.0	0.075		
See catalog Compact Modules		MSK 030C	3.7	7.0	0.075		
K310A 2002		VRDM 368	5.5	20.0	0.040		

## CKK 9-70

Part number, length	Туре	Guideway	Drive unit		Carriage				
R0360 200 00, mm									
			Screw journal	Ball screw size d <sub>0</sub> x P 8 x 2.5	Short car Connection without	riage (32 mm) on plate   with	Long car Connecti without	riage (73 mm) ion plate   with	
Without motor mount	OF01	01	Ø6	01	01	40	02	41	
With motor mount	MF01	01	Ø6	01	01	40	02	41	
With timing belt side drive	RV01- RV04	01	Ø6	01	01	40	02	41	

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

#### 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 a	Attach- ment kit <sup>1)</sup>	for motor	Motor Motor typ without brake	be with brake	Cover Gap-type made of I without	seals PU strip with	Switch Socket, plug Mounting duct	A LONG		Standard report	Measurement report
	00						Without switch				
	01	MSK 030C	84	85			Without mount	ting duct	00		02
	02	VRDM 368	35	36			Magnetic field	sensor			Frictional torque
	03	MSM 030B	70	71			Reed sensor	21 Mountin	Socket		
	04	MSM 020B	68	69	01	02	Hall sensor	duct	Plug 17	01	03
	11	MSK 030C	84	85			PNP - NC contact	22 Length =	L		Lead deviation
I	13	MSM 030B	70	71			Magnetic field sensor with plug <sup>2)</sup>				05 Positioning
	12	MSK 030C	84	85			Reed sensor Hall sensor	58			
1.5	14	MSM 030B	70	71	Contact						

Calculating the length of the Compact Module (example)

 $\begin{array}{lll} L &= (stroke + 2 \cdot excess \ travel) \\ &+ L_{ca} + 30 \ mm \end{array}$  Stroke = Maximum distance from carriage center to the outermost switch activation points. Stroke = 200 mm  $L_{ca} &= 73 \ mm \\ L &= ((200+2\cdot 2.5)+73+30) \ mm \end{array}$  In most cases, the recommended limit for excess travel (braking distance) is: Excess travel =  $2 \cdot \text{screw} \text{ lead P}$ Example: Ball screw 8 x 2.5 (d<sub>0</sub> x P), Excess travel =  $2 \cdot 2.5 = 5 \text{ mm}$ 

## CKK 9-70 Dimensions









For faster	nina witl	h clampin	a fixtures

For mounting duct, socket

Туре	Motor		Dimensions (mm)									
		D	E		F	G	н	K	L <sub>f</sub>	L	m	$L_{sd}$
			i=1	i=1.5						without	with	
										brake	brake	
RV01/RV02	MSM 030B	60	78	75	64.5	37	16	33.5	-	111	144	157
RV03/RV04	MSK 030C	54							-	188	213	154
MF01	MSM 020B	42	-	-	-	-	-	-	44	109	140	-
	MSM 030B	60	-	-	-	-	-	-	50	111	144	-
	MSK 030C	54	-	-	-	-	-	-	50	110	157	-
	VRDM 368	57.2	-	-	-	-	-	-	50	188	213	-