

Compact Module CKR

## Product Overview

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

### Structural design

- Extremely compact precision aluminum profile with two integrated ball rail systems for optimal travel performance and movement of heavy loads at high travel speeds
- Ready-to-install Compact Modules in selectable lengths up to  $L_{\max}$
- Short or long carriage made of aluminum with integrated runner blocks
- Driven by a pre-tensioned toothed belt

### Attachments

- Maintenance-free digital servo drives with integrated brake and attached feedback
- Gear reducer
- 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 and through short or long 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 long lengths
- Gap-type sealings and side-mounted aluminum rails for guiding the toothed belt
- Adjustable switches over the entire travel range, switch activation without switching cam



Connection plate for easy installation



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

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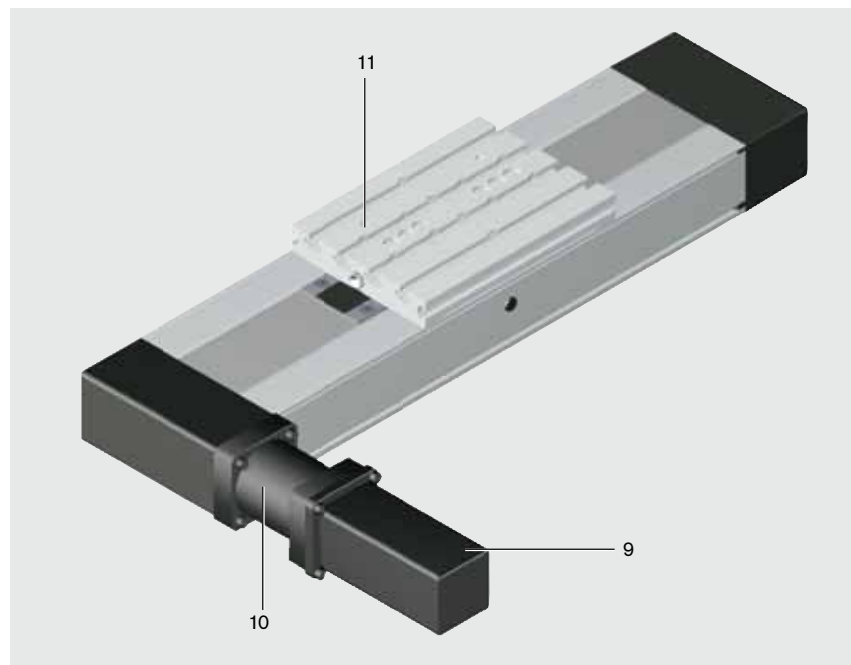
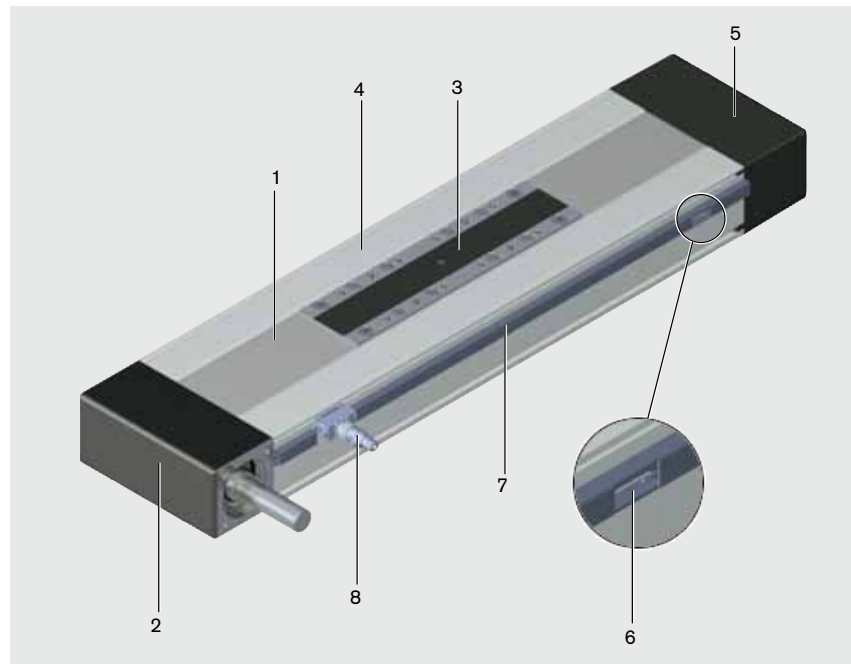
## Structural design

### 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
- 11 Connection plate



### Structural design of gear reducer

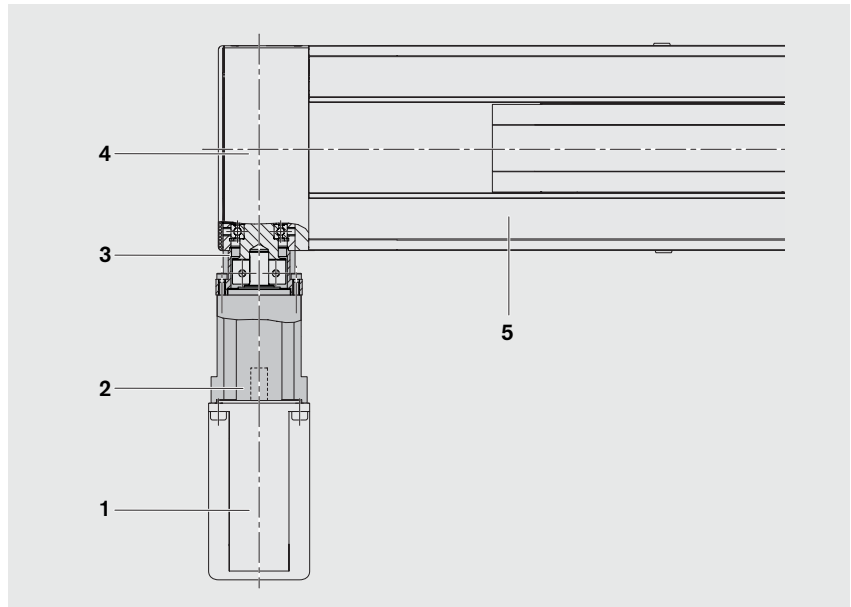
For all Compact Modules CKR, a planetary gearbox can be installed via a flange. The flange serves as a mounting point for the gearbox to the Compact Module. This direct connection eliminates the need for a coupling, thereby minimizing torsional deflection.

Several different gear ratios are available:

$i = 5$

$i = 10$

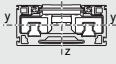
- 1 Motor
- 2 Gear reducer
- 3 Flange
- 4 Drive end enclosure
- 5 Compact Module



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# Technical data

## General technical data

Size	Carriage	Belt type	Dynamic load capacity of guideway  C (N)	Dynamic moments		Planar moment of inertia 		Moved mass m <sub>B</sub> (kg)  Connection plate		Maximum length  L <sub>max</sub> (mm)	Specific spring rate  C <sub>spec</sub> (N/mm · m)
				M <sub>t</sub> (Nm)	M <sub>L</sub> (Nm)	I <sub>y</sub> (cm <sup>4</sup> )	I <sub>z</sub> (cm <sup>4</sup> )	without	with		
CKR 9-70	short	AT 3	2360	47	7	8.5	55.1	0.12	0.23	1500	275
	long	AT 3	3830	76	94			0.28	0.45		

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

## Maximum permissible loads

Size	Carriage	Maximum permissible forces (N)			Maximum permissible moments (Nm)	
		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>
CKR 9-70	short	1180	1180	1590	23	7
	long	2360	2360	1180	47	28

## Modulus of elasticity E

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

Size	Carriage (mm)	Drive type	Weight (kg)	Additional weight of gear reducer
				(kg)
CKR 9-70	short	Without drive	0.0028 · L + 0.585	–
		Drive i = 1	0.0028 · L + 0.575	0.435
	long	Without drive	0.0028 · L + 0.74	–
		Drive i = 1	0.0028 · L + 0.73	0.435

### Weight

Weight calculation without motor, switches and sensors.

Weight formula:

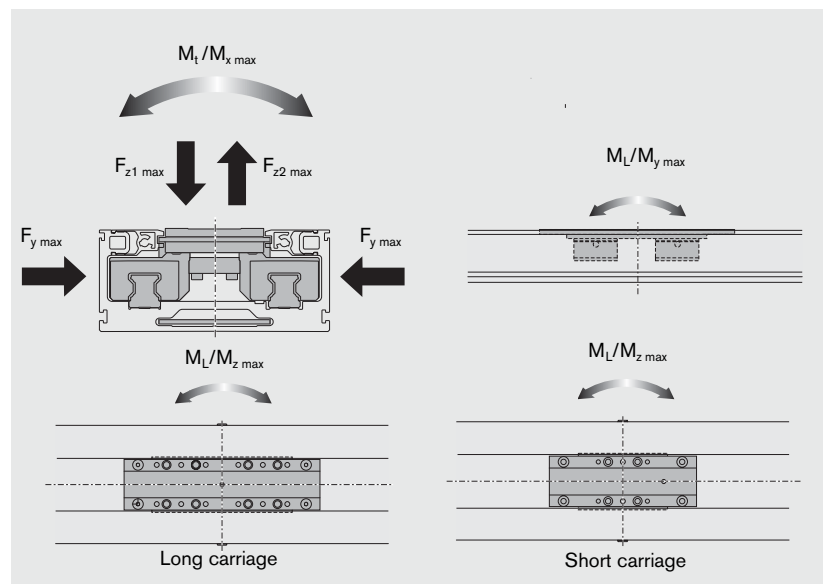
Weight factor (kg/mm) · length L (mm) + weight of all parts of fixed length (carriage, drive and idler end enclosures, etc.) (kg) + additional mass (kg)

### 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<sub>t</sub> and M<sub>L</sub> from the table by 1.26.



**Drive data**

Size	Drive type	Gear reducer ratio i	Max. drive torque <sup>1)</sup> M <sub>a</sub> (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 <sub>perm</sub> (N)
CKR 9-70	i = 1	1	3.0	72.0	AT 3	25	3	260	1100
	Gear reducer	5	0.6	14.4					
		10	0.3	7.2					

1) Maximum 1,000 cycles/hour

**Drive data without motor (i = 1)**

Size	Drive unit diameter (mm)	Lead constant u (mm/rev)	Travel speed v <sub>mech</sub> (m/s)	Belt type	Reduced mass moment of inertia at motor journal	
					short carriage (kgm <sup>2</sup> )	long carriage (kgm <sup>2</sup> )
CKR 9-70	22.92	72.0	up to 3	AT 3 Width 25 mm	3.01 · 10 <sup>-5</sup>	3.9 · 10 <sup>-5</sup>

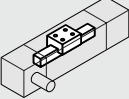
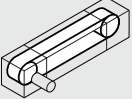
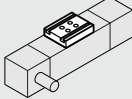
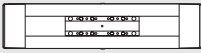




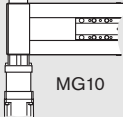
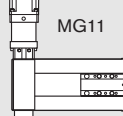
**Frictional torque data**

Size	Motor	Gear unit type	i	M <sub>RS</sub> (Nm)	M <sub>RLP</sub> (Nm)
CKR 9-70	MSM020B MSK030C	Gear reducer	5, 10	0.25	0.03

For calculation and calculation example, see catalog Compact Modules R310A 2602

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# CKR 9-70 Components and Ordering

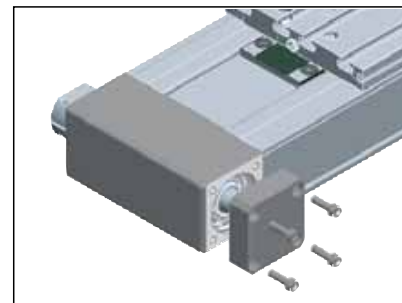
Part number, length R0364 200 00, ... mm	Type	Guideway 	Drive unit 			Carriage 			
			Shaft for motor	Without keyway i = 1	Gear reducer i = 5, 10	Short (80 mm) Connection plate		Long (108 mm) Connection plate	
						without	with	without	with
<b>Without drive</b> 	OA01		without	50					
<b>With drive</b> 	MA01		right	01					
	MA02	01	left	02		01	40	02	41
	MA05		right	06					
	MA06		left	07					
<b>With gear reducer MG 10</b> 	MG10		01	with gear reducer, right					
<b>With gear reducer MG 11</b> 	MG11	01	with gear reducer, left		09	01	40	02	41

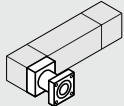
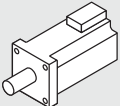
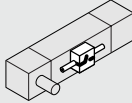

- 1) Attachment kit also available without motor (when ordering: enter "00" for motor)
- 2) Including mounting accessories

**Note:** For gear unit performance data, see "Performance data" section.

### CKR with second shaft end

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



Motor attachment <sup>1)</sup>			Motor		Switch		Documentation																															
Direct drive																																						
	i = 5	i = 10	without brake	with brake			Standard report	Measurement report																														
00	00	00	00		<table border="1"> <tr> <td colspan="2">Without switch</td> <td colspan="2">00</td> </tr> <tr> <td colspan="4">Without mounting duct</td> </tr> <tr> <td colspan="4"><b>Magnetic field sensor</b></td> </tr> <tr> <td>Reed sensor</td> <td>21</td> <td rowspan="2">Mounting duct 25 Length = L</td> <td rowspan="2">Socket Plug 17</td> </tr> <tr> <td>Hall sensor PNP - NC contact</td> <td>22</td> </tr> <tr> <td colspan="4"><b>Magnetic field sensor with plug<sup>2)</sup></b></td> </tr> <tr> <td>Reed sensor</td> <td>58</td> <td></td> <td></td> </tr> <tr> <td>Hall sensor PNP - NC contact</td> <td>59</td> <td></td> <td></td> </tr> </table>		Without switch		00		Without mounting duct				<b>Magnetic field sensor</b>				Reed sensor	21	Mounting duct 25 Length = L	Socket Plug 17	Hall sensor PNP - NC contact	22	<b>Magnetic field sensor with plug<sup>2)</sup></b>				Reed sensor	58			Hall sensor PNP - NC contact	59			01	02 Frictional torque
Without switch		00																																				
Without mounting duct																																						
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Reed sensor	58																																					
Hall sensor PNP - NC contact	59																																					
	11	12	MSK 030C	84	85		05 Positioning accuracy																															
	21	22	MSM 020B	68	69																																	

**Length of the Compact Module**

$$L = (\text{stroke} + 2 \cdot \text{excess travel}) + L_T + 10 \text{ mm}$$

Stroke = Maximum distance from carriage center to the outermost switch activation points.

Stroke = 400 mm

$L_T = 108 \text{ mm}$

$$L = ((400 + 2 \cdot 110) + 108 + 10) \text{ mm}$$

$$L = 738 \text{ mm}$$

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 "Performance data" tables).  
Example CKR 9-70:

Horizontal operation with motor MSK 030C,  $i = 5$ ,  $m = 2 \text{ kg}$ ,  $s = 105 \text{ mm}$

Excess travel > 105 mm (110 mm assumed)

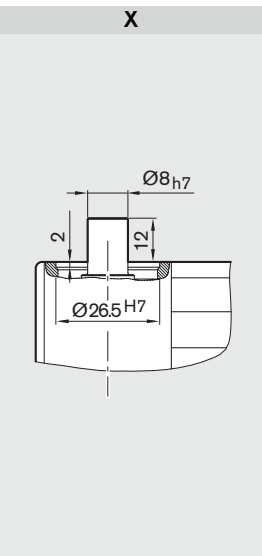
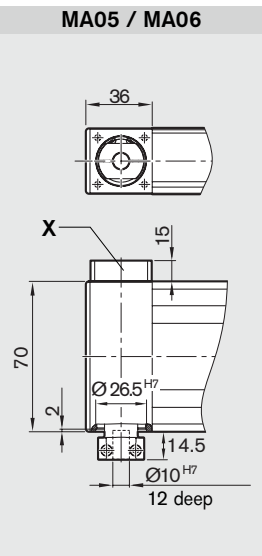
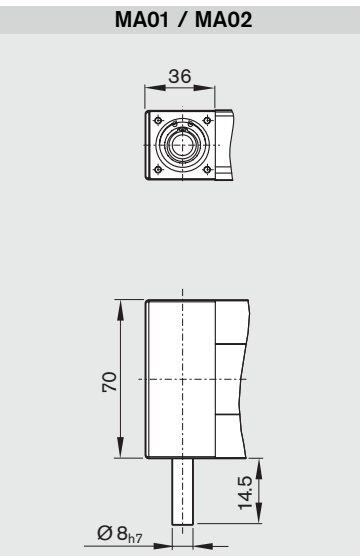
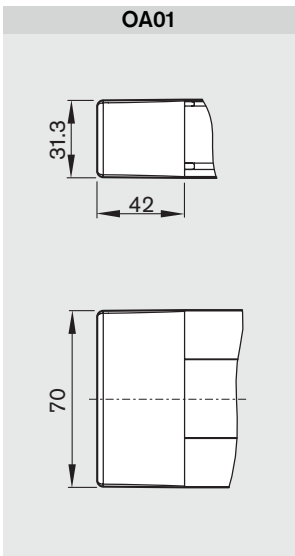
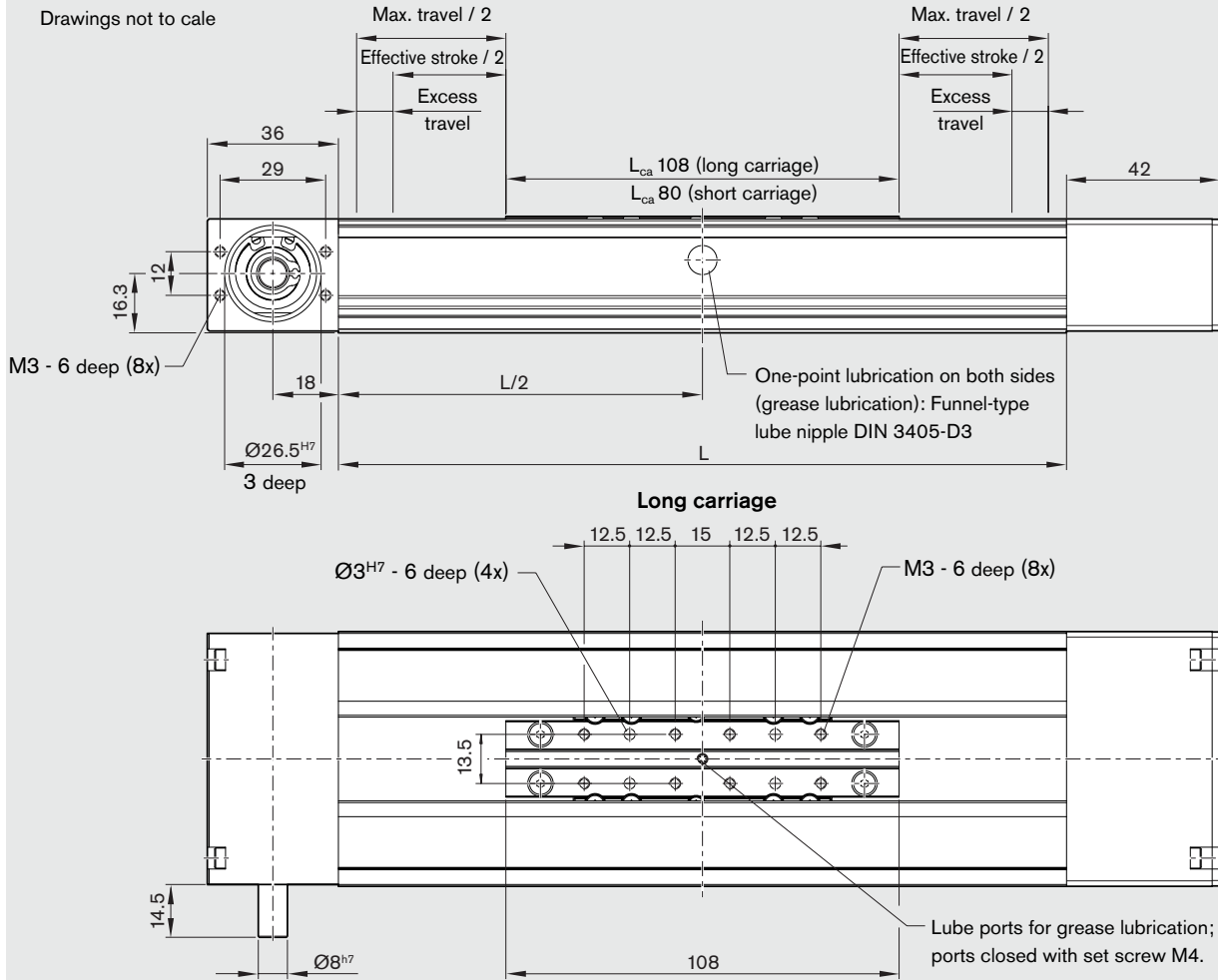
A mounting duct is needed to fasten the switches. Switches may be mounted only on one side of the Compact Module (left or right).

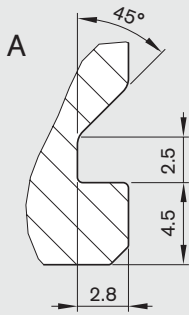
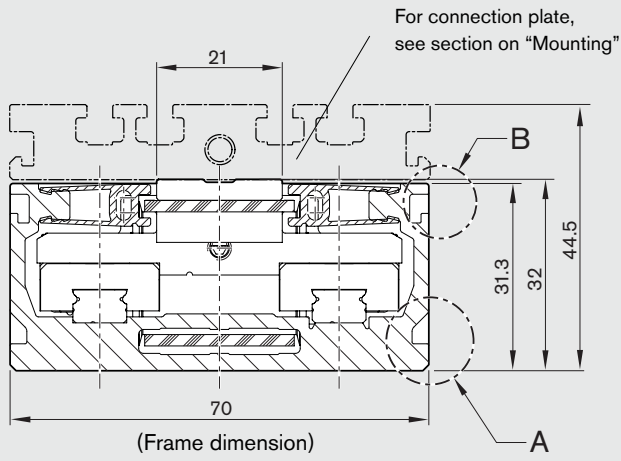
Refer to "Switch mounting arrangements" for more information on switch types and switch mounting.

Compact Modules CKR

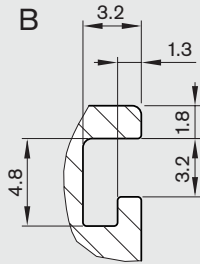
# CKR 9-70 Dimensions

All dimensions in mm  
Drawings not to scale



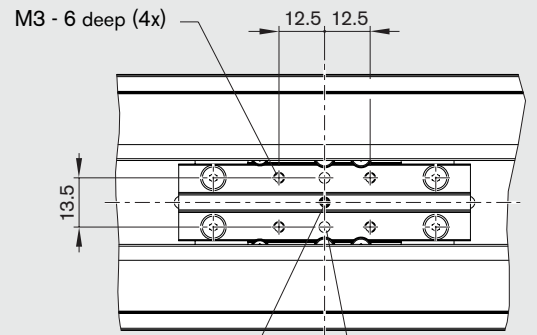


For fastening with clamping fixtures



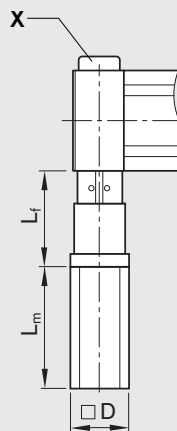
For mounting duct, socket

Short carriage



Lube ports for grease lubrication; ports closed with set screw M4.


MG10 / MG11



Motor	Dimensions (mm)			
	D	L <sub>1</sub>	L <sub>m</sub> without brake	L <sub>m</sub> with brake
MSM 020B	42	91.0	109	140.0
MSK 030C	54	91.0	188	213.0

Compact Modules

## Performance data for motors with brake in horizontal operation

 The data below apply only to the combination described here.  
For other combinations the performance data must be recalculated.

### CKR 9-70:

- with long carriage
- without connection plate
- with gear reducer

### Servomotor MSK 030C and IndraDrive controller<sup>1)</sup>

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)	109	131	152	174	196	210	221	233	245	256
Acceleration distance s	(mm)	105	126	146	167	188	101	106	112	118	123
Acceleration a	(m/s <sup>2</sup> )	17.6	14.7	12.6	11.8	9.8	4.6	4.3	4.1	3.9	3.7
Speed v	(m/s)	1.92					0.96				
Repeatability	(mm)	0.1					0.1				

### Servomotor MSM 020B and Regler ECODRIVE Cs controller<sup>1)</sup>

Connection voltage: 1 x 230 V

Gear reducer ratio		i = 5					i = 10				
Mass	(kg)	0.5	1	1.5	2	2.5	1.5	2	2.5	3	3.5
Acceleration time t	(ms)	9	11	13	15	17	33	34	35	36	37
Acceleration distance s	(mm)	3	4	5	6	6	6	6	6	7	7
Acceleration a	(m/s <sup>2</sup> )	78.1	64.1	54.3	47.1	41.6	10.9	10.5	10.2	9.9	9.6
Speed v	(m/s)	0.72					0.36				
Repeatability	(mm)	0.1					0.1				

1) For additional information, refer to the "ECODRIVE Cs" and "IndraDrive for Linear Motion Systems" catalogs.

# Notes