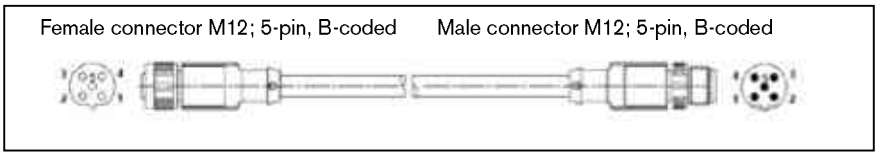
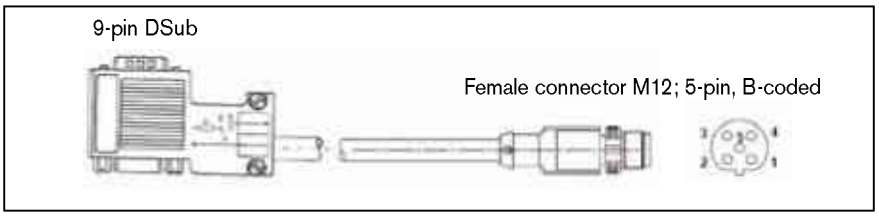
Profibus connection cable
Between two bus subscribers

Length	Part number
1 m	R1130 695 79
2 m	R1130 695 80
5 m	R1130 695 81



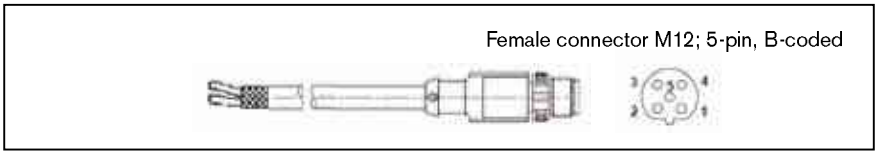
Profibus connection cable
From control system with 9-pin DSub (e.g. IndraControl) to first bus subscriber.

Length	Part number
5 m	R1130 695 96



Profibus connection cable
To first bus subscriber, with flying leads at one end (for assembly by customer).

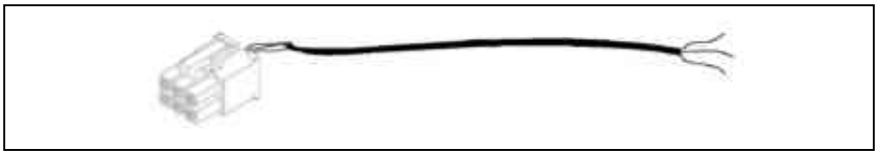
Length	Part number
5 m	R1130 695 77



Programming cable
Serves to set the drive parameters. (Optional – for use with RS-485 (EIA-485) adapter on USB).

Note:
This programming cable should only be connected to the drive for initial start-up purposes. When using it, the drive housing cover must remain open.

Length	Part number
5 m	R1130 695 82

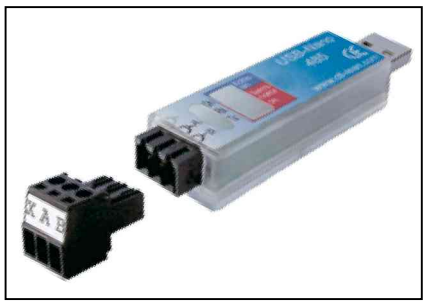


USB adapter RS-485 (EIA-485)

For optional drive parameter setting by the customer, an adapter is required.

Part number: R1130 896 97

The adapter is supplied together with a USB connection cable (1.8 m long) and the driver software.



eLINE Compact Modules – Freely Configurable

Product Overview, Version 2

eLINE Compact Modules are inexpensive, ready-to-install linear motion systems with compact design and are available in variable lengths.
Good price performance ratio – fast delivery.

The freely configurable eLINE Compact Modules have the same basic design as the eLINE Compact Modules with integrated positioning drive.

Differences versus eLINE Compact Modules with integrated positioning drive
- Variable lengths up to L_{max}
- Choice of motors
- Choice of gear ratios

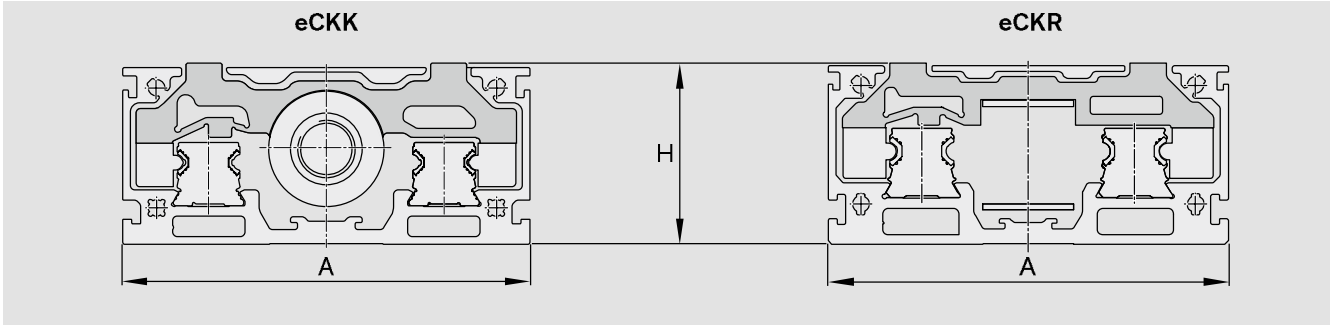
Structural design
- Extremely compact extruded aluminum profile (frame) with two integrated zero-clearance eLINE Ball Rail Systems
- Aluminum carriage in two different lengths

Attachments
- Maintenance-free servo or stepping motors with or without brake
- Switches
- Socket with mating plug for the switches
- Mounting duct made of profiled aluminum

For mounting and maintenance, see
“Instructions for eLINE Compact Modules eCKK”

eLINE Compact Modules eCKK with ball rail system and ball screw drive

eLINE Compact Modules eCKR with ball rail system and toothed belt drive
Motor attachment on either side



The frame size relates to the width of frame.

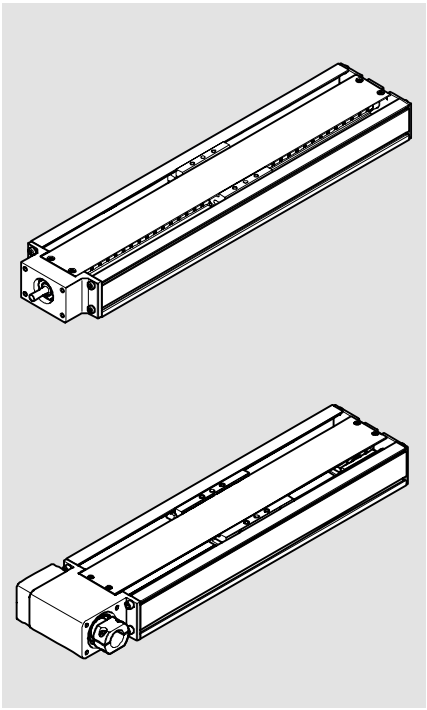
Size	Frame size (mm) A	(mm) H
eCKK / eCKR 90	90	40
eCKK / eCKR 110	110	50

eLINE Compact Modules – Freely Configurable

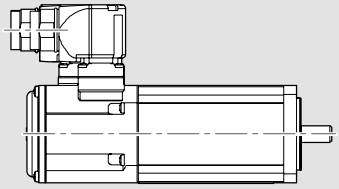
Product Overview of Motors and Controllers

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 sizing the drive, always consider the motor-controller combination.
For more detailed information on motors and control systems, please refer to the catalogs “ECODRIVE Cs” and “IndraDrive for Linear Motion Systems.”

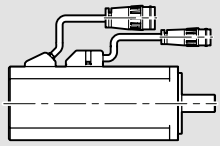


Digital AC servo motor



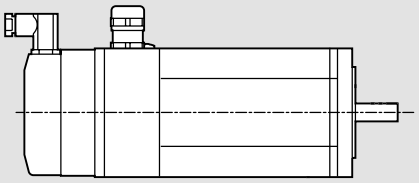
MSK

Digital AC servo motor

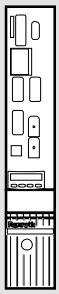


MSM

Three-phase stepping motor



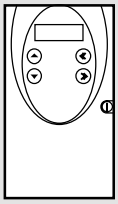
VRDM



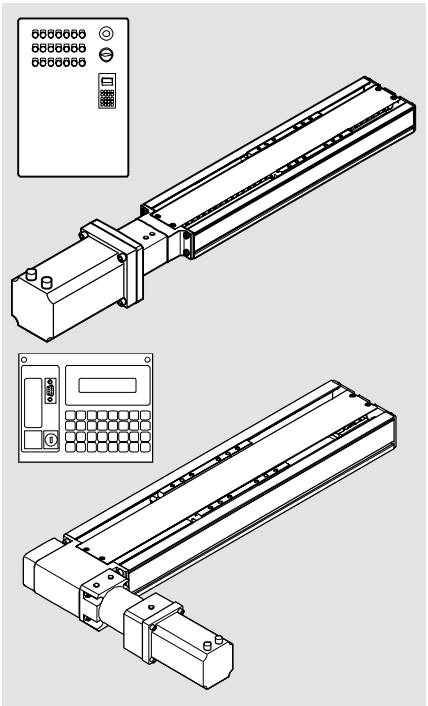
IndraDrive

ECODRIVE Cs

SD326
SD328



A complete solution

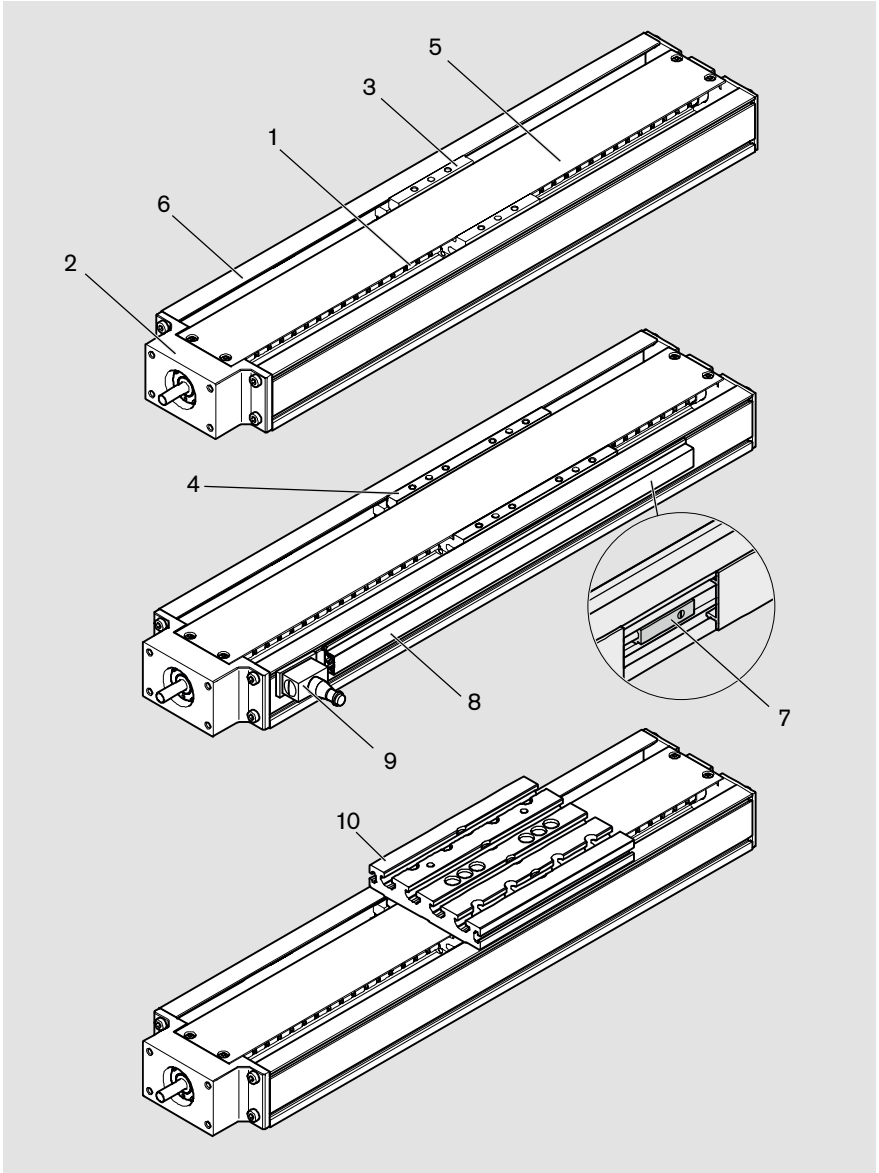


eLINE Compact Modules are available as complete solutions with motor, controller, and control system.

eLINE Compact Modules eCKK – Freely Configurable

Structural Design

- eLINE ball screw drive
- Fixed bearing enclosure made of aluminum
- Motor mount and coupling or
- Timing belt side drive for motor attachment



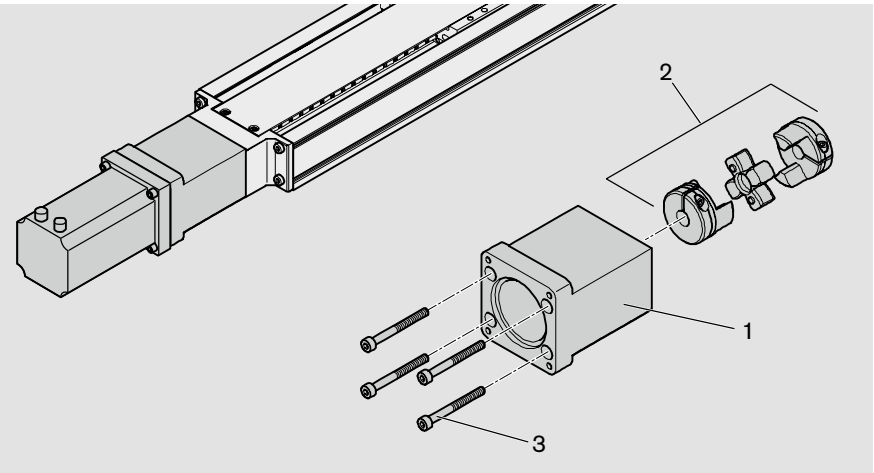
1 eLINE ball screw with cylindrical screw-in nut
2 Fixed bearing enclosure
3 Short carriage version
4 Long carriage version
5 Aluminum cover
6 Frame

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

Motor attachment with motor mount and coupling

The motor mount serves to fasten the motor to the eCKK and acts as a closed housing for the coupling.
The motor's drive torque is transmitted stress-free through the coupling to the eLINE Compact Module's drive shaft.

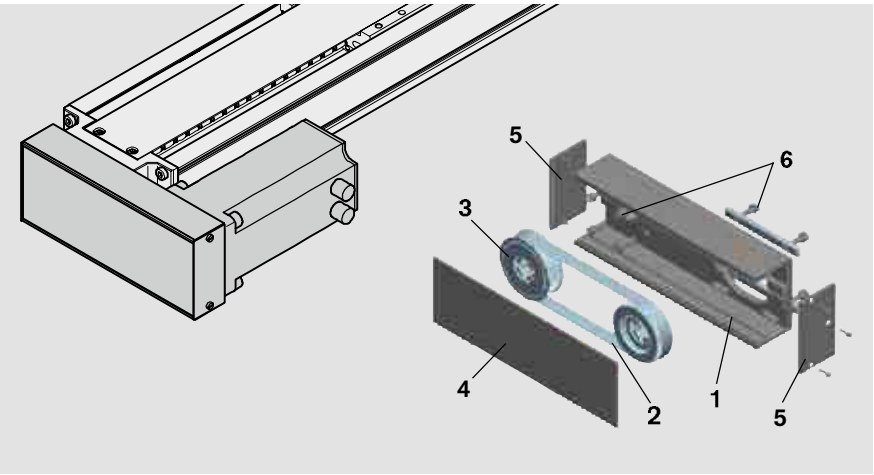
Motor mount assembly (kit)
consisting of:
1 Motor mount
2 Coupling
3 Mounting screws



Motor attachment with timing belt side drive

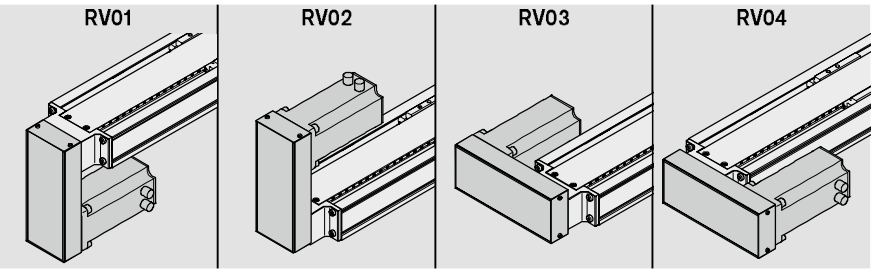
On Compact Modules eCKK the motor can be attached via a side drive with timing belt. This makes the overall length shorter than when attaching the motor with a motor mount and coupling. The compact, closed housing serves as protection for the belt and as a motor bracket.

Timing belt side drive assembly (kit)
consisting of:
1 Pulley housing (aluminum)
2 Toothed belt
3 Belt pulleys with tensioning units
4 Cover plate
5 End covers with screws
6 Mounting screws



Available gear ratios:
i = 1:1
i = 1:1.5

The timing belt side drive can be installed in four directions:
- below: RV01
- above: RV02
- left: RV03
- right: RV04



eLINE Compact Modules eCKK – Freely Configurable

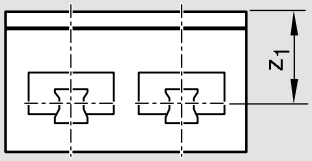
Technical Data

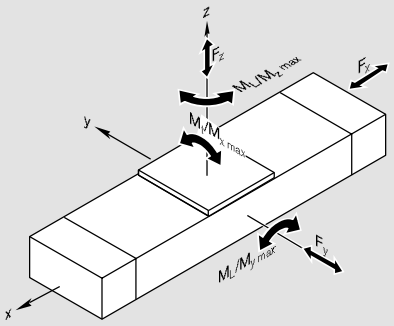
Size	Carriage length (mm) L_{ca}	Ball screw (mm) d_0 x P	Dynamic load capacity C (N) Guide-way	Ball screw	Fixed bearing	Dynamic load moments (Nm) Torsional load moment M_t	Longitudinal load moment M_L	Planar moment of inertia (cm⁴) I_y	I_z	Maximum length (mm) L_{max} 1)
eCKK 90	60	12 x 10	5000	1500	2550	166	29	12	97	680
	125		8100			270	200			
eCKK 110	82	16 x 10	11000	5800	3000	420	89	31	238	1200
	165		17800			682	700			

1) Length > 1200 mm: Option "with cover plate" not selectable beyond this length. See Components and Ordering Data

Size	Carriage length (mm) L_{ca}	Maximum permissible forces (N) $F_{x\,max}$	$F_{y\,max}$, $F_{z\,max}$	Maximum permissible moments (Nm) $M_{x\,max}$	$M_{y\,max}$, $M_{z\,max}$	Mass of linear system without connection plate (kg) m_s 2)	Moved mass of system (kg) m_{ca}	Maximum payload (kg) $m_{ex\,max}$	Repeatability (mm)	Dimensions (mm) z_1
eCKK 90	60	200	250	16.6	2.9 3)	0.00408 · L + 0.745	0.15	15	± 0.05	22.0
	125		405	27.0	20.0	0.00408 · L + 0.915	0.32	30		
eCKK 110	82	400	550	42.0	8.9 3)	0.00674 · L + 1.405	0.27	30	± 0.05	24.5
	165		890	68.2	70.0	0.00674 · L + 1.745	0.61	60		

2) Without motor
3) ⚠ Consider the moment load capacity!
Elasticity modulus E = 70,000 N/mm²



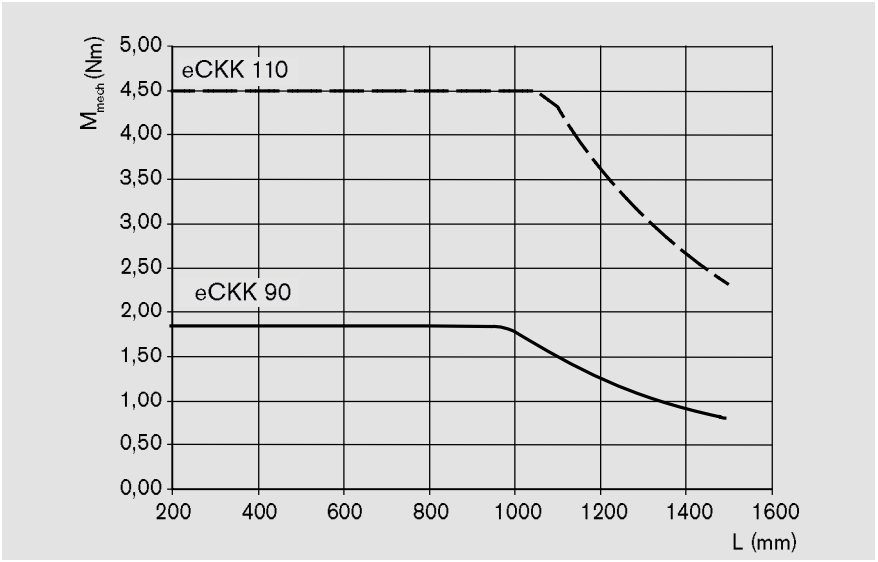


Note on dynamic load capacities and moments (see table)

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.

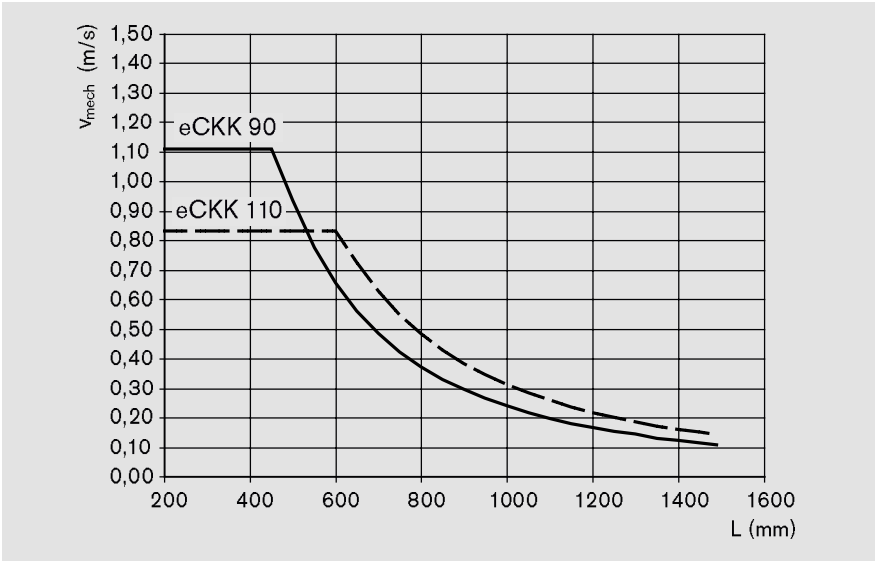
Permissible drive torque M_{mech}

The values shown for M_{mech} are applicable under the following conditions:
- Horizontal operation
- No radial loads on ball screw journal



Permissible speed v_{mech}

Consider the motor speed!



Drive data eCKK with belt side drive

Motor	MSM 030C / MSK 030C / VRDM 3910 / VRDM 3913					
Frictional torque $M_{R\,sd}$ (Nm)	0.35					
		Permissible torque up to L[1] = ... at			Reduced mass moment of inertia at	
Gear ratio i			i = 1	i = 1.5	i = 1	i = 1.5
Size	Ball screw (mm) d_0 x P	L (mm)	M_{sd} (Nm)	M_{sd} (Nm)	J_{sd} (10^{-6} kgm)	J_{sd} (10^{-6} kgm)
eCKK 90	12 x 10	680	1.85	1.25	38	14
eCKK 110	16 x 10	1200	2.50	1.70	41	16

1) Permissible torque for greater lengths available upon request

M_{sd} = permissible torque at motor journal for system with side drive (take max. torque of motor M_{max} into account)
$M_{R\,sd}$ = frictional torque of timing belt side drive at motor journal
J_{sd} = reduced mass moment of inertia of timing belt side drive
i = timing belt side drive reduction

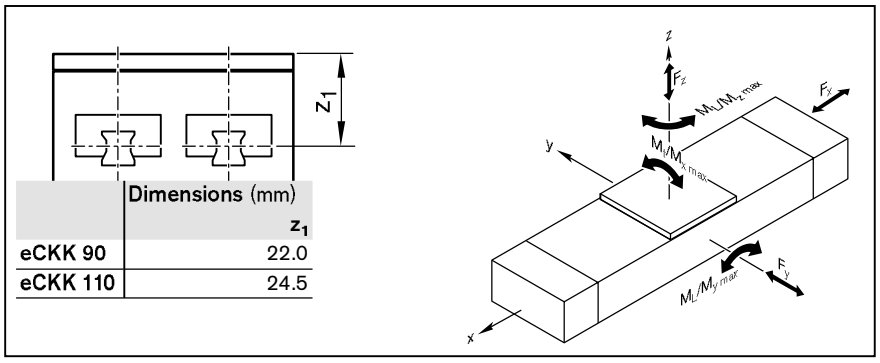
eLINE Compact Modules eCKK – Freely Configurable

Calculations

Calculation principles

Combined equivalent load on bearing of the linear guide

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



	Dimensions (mm)
	z_1
eCKK 90	22.0
eCKK 110	24.5

C = dynamic load capacity (N)
F_{comb} = combined equivalent load on bearing (N)
F_y = force in y-direction (N)
F_z = force in z-direction (N)
i = gear ratio of timing belt side drive
J_{br} = mass moment of inertia of motor brake (kgm²)
J_c = mass moment of inertia, coupling (kgm²)
J_{dc} = mass moment of inertia, drive train (kgm²)
J_{ex} = mass moment of inertia of mechanical system (kgm²)
J_m = mass moment of inertia, motor (kgm²)
J_s = mass moment of inertia of linear motion system (without external load) (kgm²)
J_{sd} = mass moment of inertia of timing belt side drive at motor journal (kgm²)
J_t = translatory mass moment of inertia of external load referred to the drive journal (kgm²)
J_{tot} = total mass moment of inertia (kgm²)
$k_{J\,fix}$ = constant for fixed-length portion of mass moment of inertia (kgm²)
$k_{J\,var}$ = constant for variable-length portion of mass moment of inertia (kgm²/mm)
k_{Jm} = constant for mass-specific portion of mass moment of inertia (10^6 m²)
L = length of the linear system (mm)
L_{10} = nominal life in meters (m)
L_h = nominal life in hours (h)

Nominal life

Nominal life of the guideway in meters:

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

Nominal life of the guideway in hours:

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

Frictional torque M_R

for motor attachment via motor mount and coupling:

$$M_R = M_{Rs}$$

for motor attachment via timing belt side drive:

$$M_R = \frac{M_{Rs}}{i} + M_{R\,sd}$$

Mass moment of inertia of the linear motion system J_s referred to the drive journal

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

Constants k_{Jfix}, k_{Jvar}, k_{Jm} Frictional torque M_{Rs}

Size	Ball screw	Constants				Frictional torque
		k_{Jfix}		k_{Jvar}	k_{Jm}	M_{Rs}
	d_0 x P	Short carriage version	Long carriage version			(Nm)
eCKK 90	12 x 10	3.630	4.056	0.011	2.533	0.08
eCKK 110	16 x 10	13.354	14.178	0.031	2.533	0.11

Mass moment of inertia of the mechanical system J_{ex} referred to the motor journal

Motor attachment via motor mount and coupling

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

Motor attachment via timing belt side drive

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

Translatory mass moment of inertia of external load J_t referred to the drive journal

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

Mass moment of inertia of the drive train J_{dc} referred to the motor journal

$$J_{dc} = J_{ex} + J_{br}$$

Mass moment of inertia ratio

$$V = \frac{J_{dc}}{J_m}$$

Application area	V
Handling	≤ 6.0
Processing	≤ 1.5

m_{ex} = moved external load (kg)
M_L = dynamic longitudinal moment load capacity (Nm)
M_R = frictional torque at motor journal (Nm)
M_{Rs} = frictional torque of the system (Nm)
$M_{R\,sd}$ = frictional torque of timing belt side drive at motor journal (Nm)
M_t = dynamic torsional moment load capacity (Nm)
M_x = torsional moment about the x-axis (Nm)
M_y = torsional moment about the y-axis (Nm)
M_z = torsional moment about the z-axis (Nm)
$n_{m\,max}$ = maximum permissible rotary speed of motor with controller (min^{-1})
n_{mech} = maximum permissible rotary speed of mechanical system (min^{-1})
P = screw lead (mm)
V = ratio of mass moments of inertia of drive train and motor (–)
v_m = average speed (m/s)
v_{mech} = maximum permissible rotary speed of mechanical system (m/s)
z_1 = application point of the effective force (mm)

Total mass moment of inertia J_{tot} referred to the motor journal

$$J_{tot} = J_{dc} + J_m$$

Maximum permissible rotary speed n_{mech} for mechanical system

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

$$n_{mech} < n_{m\,max}$$

Coupling data

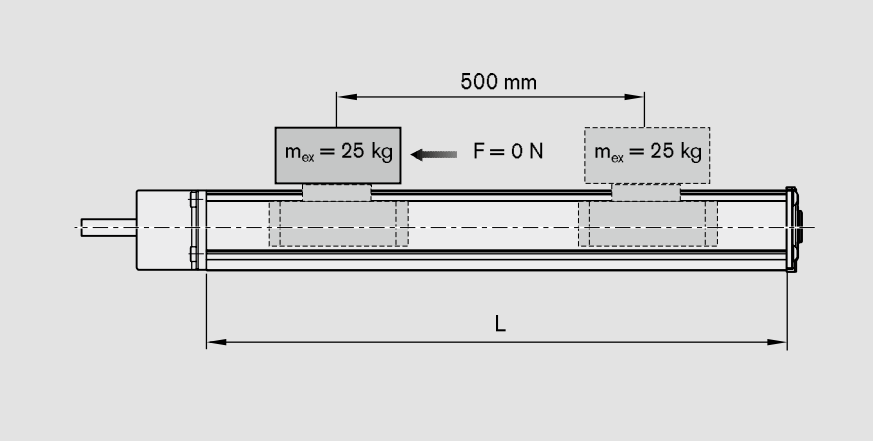
Size	Rated torque of coupling M_{cN} (Nm)	Mass moment of inertia J_C (10^{-6} kgm²)	Coupling mass m_C (kg)
eCKK 90	14	12.13	0.092
eCKK 110	14	12.13	0.092

eLINE Compact Modules eCKK – Freely Configurable

Calculations

Calculation example

When dimensioning 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.



Given data

A mass of 25 kg is to be moved 500 mm at a maximum travel speed of 0.67 m/s. Based on the technical data and connection dimensions, the following module is selected:

eCKK 110
- One long carriage
- With a size MSK 030C AC servo motor attached via motor mount and coupling

Calculation of eCKK length L

s_e = excess travel
s_{eff} = effective stroke
L_{ca} = carriage length
P = screw lead
M_{Rs} = frictional torque of the system
m_{ex} = moved external load

Excess travel	= $2 \cdot P = 2 \cdot 10$ mm = 20 mm
Max. travel	= $s_{eff} + 2 \cdot s_e$
	= 500 mm + 2 · 20
	= 540 mm
eCKK length L	= $(s_{eff} + 2 \cdot s_e) + L_{ca} + 15$ (according to formula given under "Components and Ordering Data" for eCKK 110)
	= 540 + 165 + 15
	= 720 mm

Frictional torque M_R

M_R	= M_{Rs} (see "Technical Data")
M_R	= 0.11 Nm

Mass moment of inertia, drive train

$J_{ex} = J_s + J_t + J_C$
$J_s = (k_{Jfix} + k_{Jvar} \cdot L) \cdot 10^{-6}\ kgm^2$
$= (14.178 + 0.031 \cdot 720\ mm) \cdot 10^{-6}\ kgm^2$
$= 36.498 \cdot 10^{-6}\ kgm^2$

$J_t = k_{Jm} \cdot m_{ex} \cdot 10^{-6}\ kgm^2$ (k_{Jfix}, k_{Jvar}, k_{Jm} see "Constants" table)
$J_t = 2.533 \cdot 25\ kg \cdot 10^{-6}\ kgm^2$
$J_t = 63.325 \cdot 10^{-6}\ kgm^2$

$J_c = 12.130 \cdot 10^{-6}\ kgm^2$ (see "Coupling data")
$J_{ex} = (36.498 + 63.325 + 12.130) \cdot 10^{-6}\ kgm^2$
$J_{ex} = 111.953 \cdot 10^{-6}\ kgm^2$

$J_{br} = 7 \cdot 10^{-6}\ kgm^2$ (see "Motors")
$J_{dc} = J_{ex} + J_{br}$
$J_{dc} = 118.953 \cdot 10^{-6}\ kgm^2$

$$V = \frac{J_{dc}}{J_m} \leq 6$$

$J_m = 30 \cdot 10^{-6}\ kgm^2$ (see "Motors")

$$V = \frac{118.953 \cdot 10^{-6}\ kgm^2}{30 \cdot 10^{-6}\ kgm^2}$$

$V = 3.97 \leq 6$

The selected motor MSK 030C is therefore suitable.

Rotary speed n
at v = 0.67 m/s

$$n_{mech} = \frac{v \cdot i \cdot 1000}{P} = \frac{0.67\ m/s \cdot 1 \cdot 1000 \cdot 60}{10\ mm} = 4000\ min^{-1} < n_{m\,max}$$

$v = 0.67\ m/s$

Result

eCKK 110
Length: L = 720 mm

Ball screw drive:

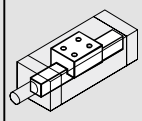
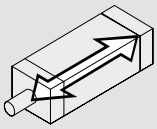
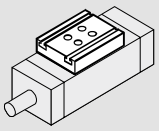
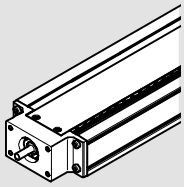
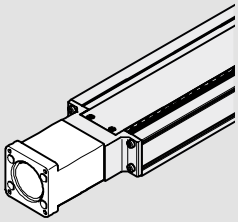
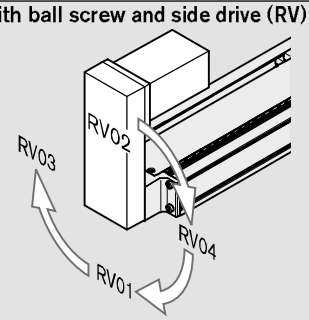
Diameter: 16 mm
Lead: 10 mm
Carriage version: Long
Motor attachment via motor mount and coupling

Motor with:
- a maximum usable speed $n_{m\,max} > 4000\ min^{-1}$
- mass moment of inertia $J_m > 19.83 \cdot 10^{-6}\ kgm^2$
- maximum permissible drive torque $M_{max} < 4.5$ Nm
  Consider rated torque of coupling M_{cN} and frictional torque M_R
  ($M_{cN} = 14$ Nm; $M_R = 0.11$ Nm)

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 "ECODRIVE Cs" and "IndraDrive for Linear Motion Systems" catalogs.

eLINE Compact Modules eCKK – Freely Configurable

eCKK 90 Components and Ordering Data

Part number, length R0361 300 00, ... mm	Type	Guideway 	Drive unit  Screw journal	Drive unit Ball screw size d_0 x P 12 x 10	Carriage  Without connection plate Short carriage L_{ca} = 60 mm	Carriage Without connection plate Long carriage L_{ca} = 125 mm	Carriage With connection plate Short carriage L_{ca} = 60 mm	Carriage With connection plate Long carriage L_{ca} = 125 mm	
With ball screw without motor mount (OF) 	OF01	01	Ø8	02	01	02	05	06	
With ball screw and motor mount (MF) 	MF01		Ø8	02	–	02	–	06	
With ball screw and side drive (RV) 	RV01 RV02 RV03 RV04		Ø8	02	–	02	–	06	

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

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

Motor attachment				Motor = ...		Cover = ...		1st, 2nd, 3rd switch = ...	Documentation
Gear ratio	Attachment kit [1]	for motor		without brake	with brake	without cover plate	with cover plate [3]	Mounting duct = ...	Standard report
i = 1	00	–		00		00	01	Without switches: Without switch, Without mounting duct → 00	10
i = 1	01	MSK 030C		84	85	00	01	With switches: Magnetic field sensor: Reed sensor 21, Hall sensor, PNP NC 22; Mounting duct 25; Socket/plug 17	
	03	VRDM 368		35	36				
	05	MSM 030C		72	73				
	06	VRDM 397		37	38				
		VRDM 3910		39	40				
i = 1	11	MSK 030C		84	85	00	01	Magnetic field sensor with connector [2]: Reed sensor 58, Hall sensor, PNP NC 59	
	13	MSM 030C		72	73				
	14	VRDM 3910		39	40				
i = 1.5	21	MSK 030C		84	85				
	23	MSM 030C		72	73				

1) Attachment kit also available without motor (when ordering: enter "00" for motor)
2) Including mounting accessories
3) Length > 1200 mm: The option "with cover plate" is not selectable.

Calculating the length of the eCKK 90

Short carriage version:	$L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 10\ \text{mm}$
Long carriage version:	$L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 10\ \text{mm}$

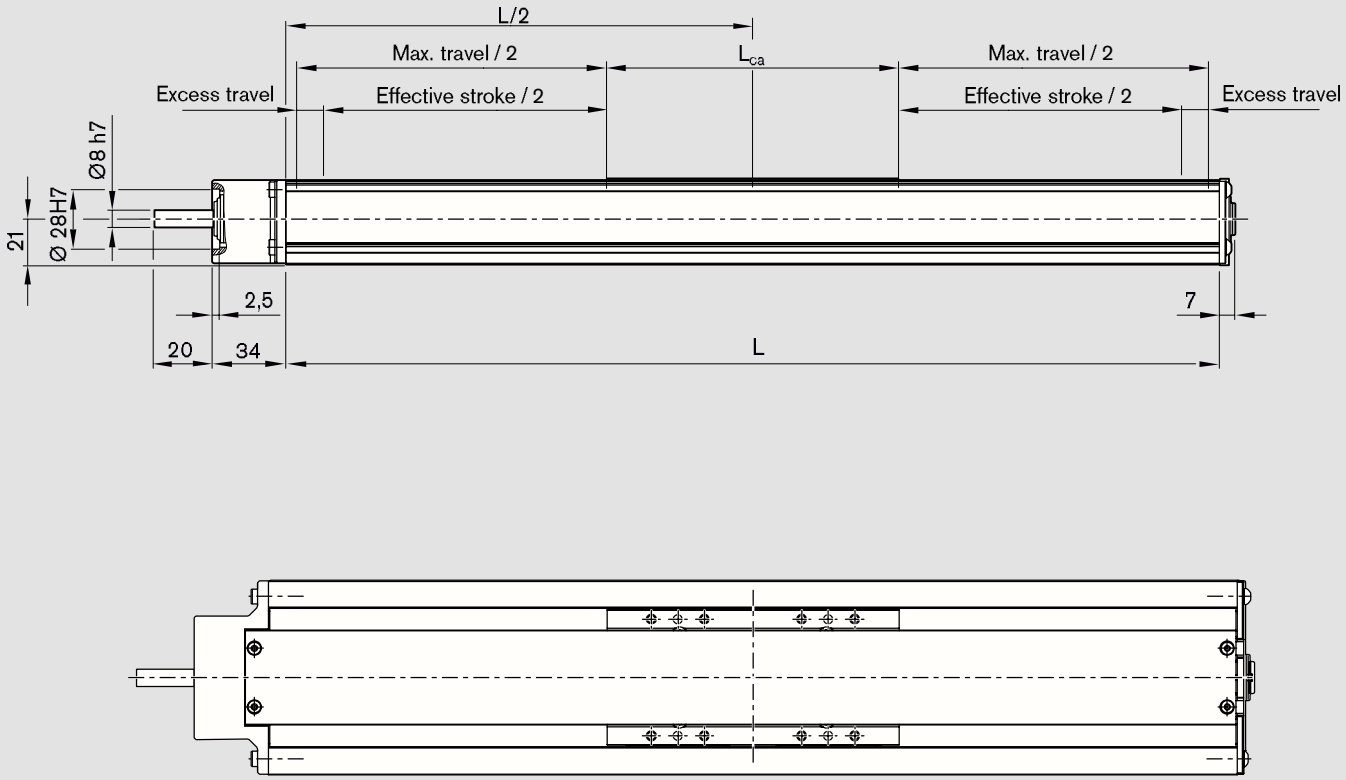
In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P

Example:
Ball screw 12 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

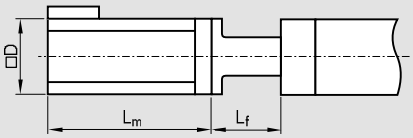
eLINE Compact Modules eCKK – Freely Configurable

eCKK 90 Dimensions

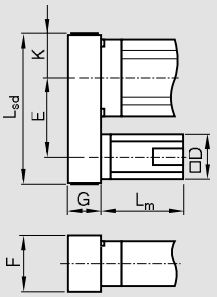
All dimensions in mm. Diagrams to different scales.

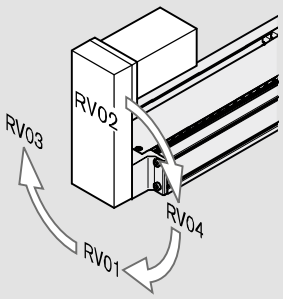


MF01

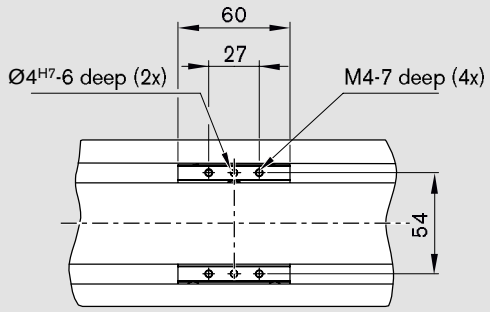


RV01 – RV04

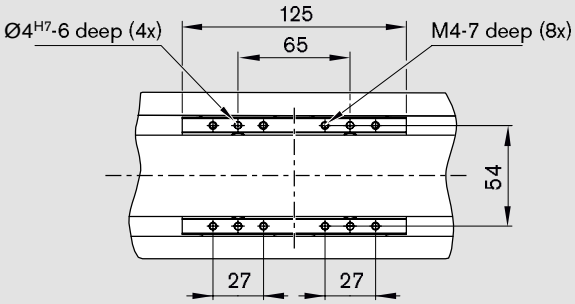


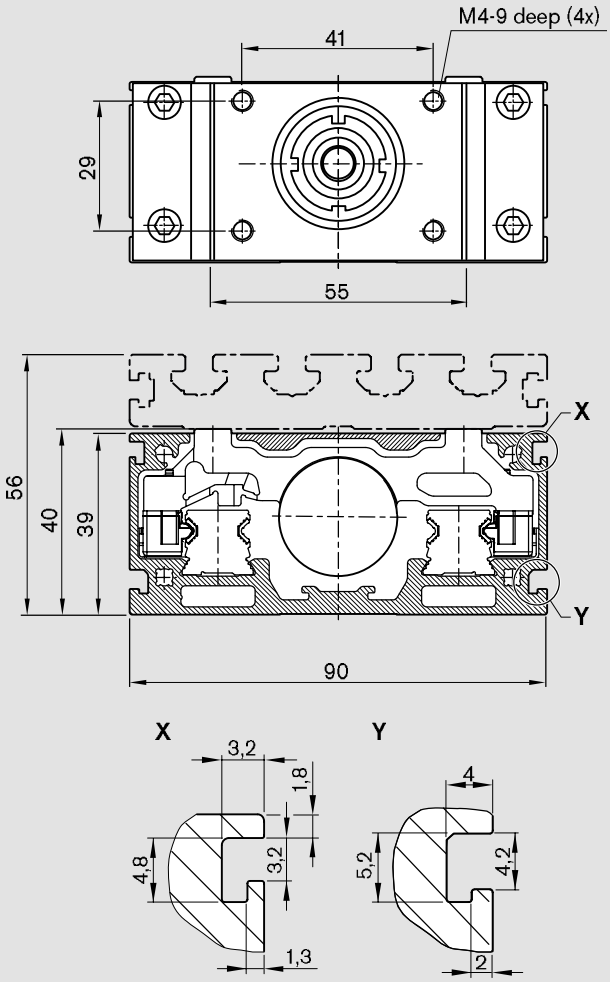


Short carriage version



Long carriage version

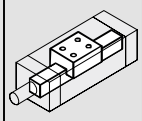
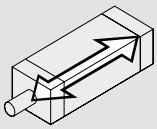
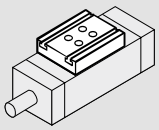
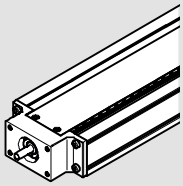
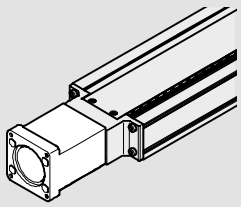
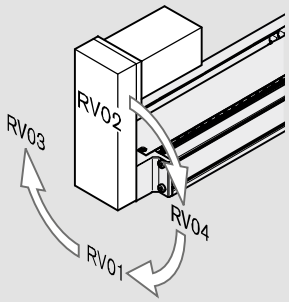




Type	Motor	Dimensions (mm)									
		D	L_f	without brake	L_m with brake	F	G	K	E i = 1	E i =1.5	L_{sd}
MF01	MSK 030C	54	70.0	188.0	213.0	–	–	–	–	–	–
	MSM 030C	60	72.0	138.5	171.5	–	–	–	–	–	–
	VRDM 368	57	50.0	116.0	157.0	–	–	–	–	–	–
	VRDM 397	85	71.5	110.0	156.5	–	–	–	–	–	–
	VRDM 3910	–	–	140.0	186.5	–	–	–	–	–	–
RV01 – RV04	MSK 030C	54	–	188.0	213.0	64.5	37	33.0	89.5	–	179
	MSM 030C	60	–	138.5	171.5	64.5	37	33.0	89.5	–	179
	VRDM 3910	85	–	140.0	186.5	88.0	51	35.5	105	–	200
	MSK 030C	54	–	188.0	213.0	64.5	37	33.0	–	115	191
	MSM 030C	60	–	138.5	171.5	64.5	37	33.0	–	115	191

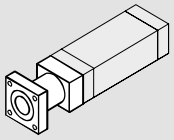
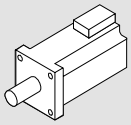
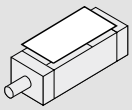
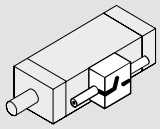
eLINE Compact Modules eCKK – Freely Configurable

eCKK 110 Components and Ordering Data

Part number, length R0361 400 00, ... mm	Type	Guideway 	Drive unit  Screw journal	Drive unit Ball screw size d_0 x P 16 x 10	Carriage  Without connection plate Short carriage L_{ca} = 82 mm	Carriage Without connection plate Long carriage L_{ca} = 165 mm	Carriage With connection plate Short carriage L_{ca} = 82 mm	Carriage With connection plate Long carriage L_{ca} = 165 mm	
With ball screw without motor mount (OF) 	OF01	01	Ø11	02	01	02	05	06	
With ball screw and motor mount (MF) 	MF01		Ø11	02	–	02	–	06	
With ball screw and side drive (RV) 	RV01 RV02 RV03 RV04		Ø11	02	–	02	–	06	

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

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

Motor attachment				Motor = ...		Cover = ...		1st, 2nd, 3rd switch = ...	Documentation
								 Mounting duct = ...	
Gear ratio	Attachment kit[1]	for motor	without brake	with brake	without cover plate	with cover plate[3]			Standard report
i = 1	00	–	00		00	01		Without switches Without switch, Without mounting duct: 00	
i = 1	01	MSK 030C	84	85	00	01		With switches Magnetic field sensor Reed sensor: 21; Hall sensor, PNP NC: 22 Mounting duct: 25 Socket/plug: 17	10
	04	VRDM 397	37	38					
		VRDM 3910	39	40					
	05	MSM 030C	72	73					
i = 1	11	MSK 030C	84	85	00	01		Magnetic field sensor with connector[2] Reed sensor: 58 Hall sensor, PNP NC: 59	
	15	MSM 030C	72	73					
	19	VRDM 3913	41	42					
i = 1.5	21	MSK 030C	84	85					
	25	MSM 030C	72	73					

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories
3) Length > 1200 mm: The option “with cover plate” is not selectable.

Calculating the length of the eCKK 110

Short carriage version:	$L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 13\ \text{mm}$
Long carriage version:	$L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 15\ \text{mm}$

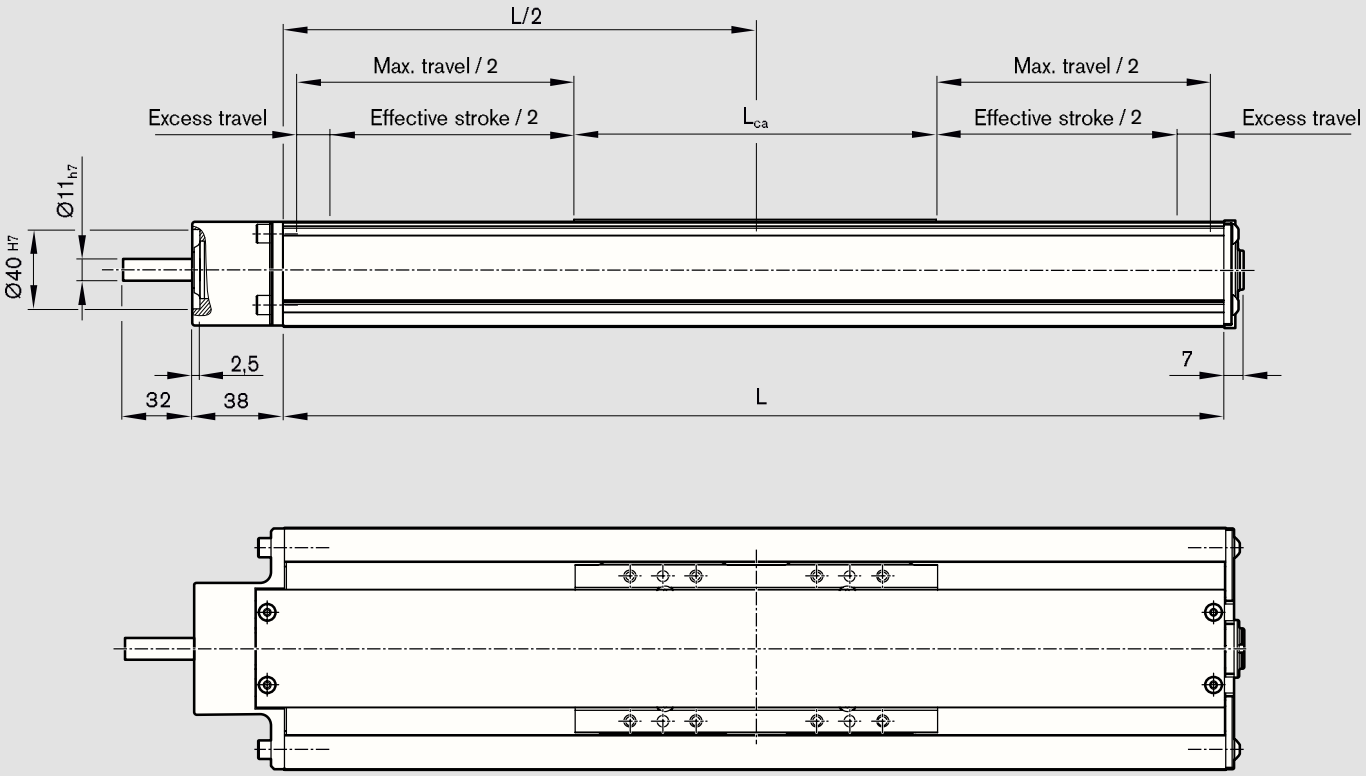
In most cases, the recommended limit for excess travel (braking distance) is:
Excess travel = 2 · screw lead P

Example:
Ball screw 16 x 10 (d_0 x P),
Excess travel = 2 · 10 = 20 mm

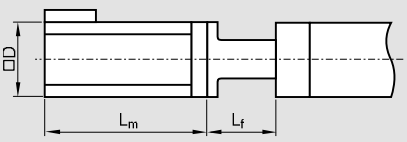
eLINE Compact Modules eCKK – Freely Configurable

eCKK 110 Dimensions

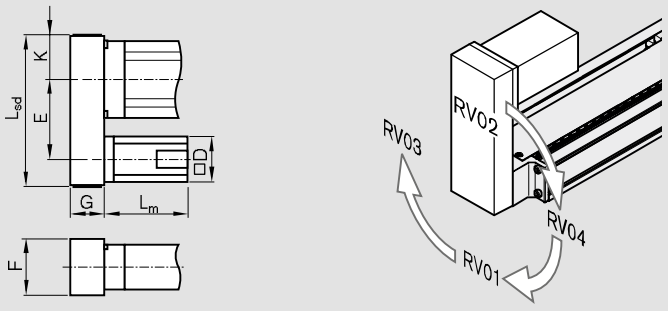
All dimensions in mm. Diagrams to different scales.



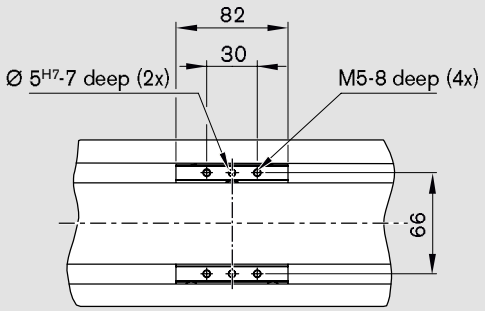
MF01

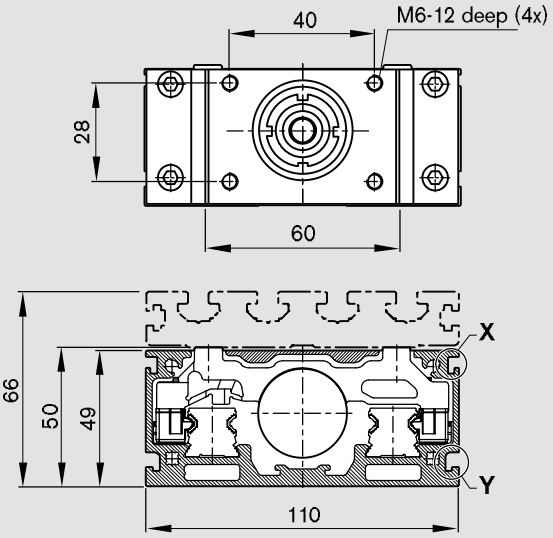


RV01 – RV04

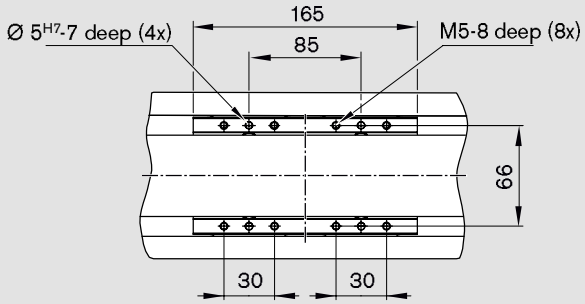


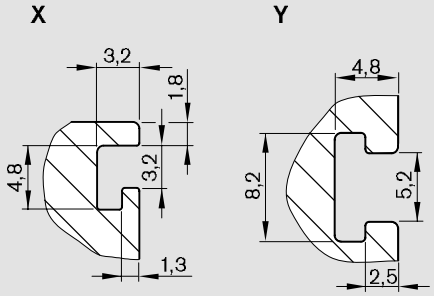
Short carriage version





Long carriage version





Type	Motor	Dimensions (mm) D	L_f	L_m without brake	L_m with brake	F	G	K	E i = 1	E i =1.5	L_{sd}
MF01	MSK 030C	54	75.0	188.0	213.0	–	–	–	–	–	–
	MSM 030C	60	72.0	138.5	171.5	–	–	–	–	–	–
	VRDM 397	85	77.5	110.0	156.5	–	–	–	–	–	–
	VRDM 3910			140.0	186.5	–	–	–	–	–	–
RV01 – RV04	MSK 030C	54	–	188.0	213.0	64.5	37	33.0	103.5	–	179
	MSM 030C	60	–	138.5	171.5	64.5	37	33.0	103.5	–	179
	MSK 030C	54	–	188.0	213.0	64.5	37	33.0	–	115	191
	MSM 030C	60	–	138.5	171.5	64.5	37	33.0	–	115	191
	VRDM 3913	85	–	170.0	216.5	88.0	51	43.5	122.5	–	226

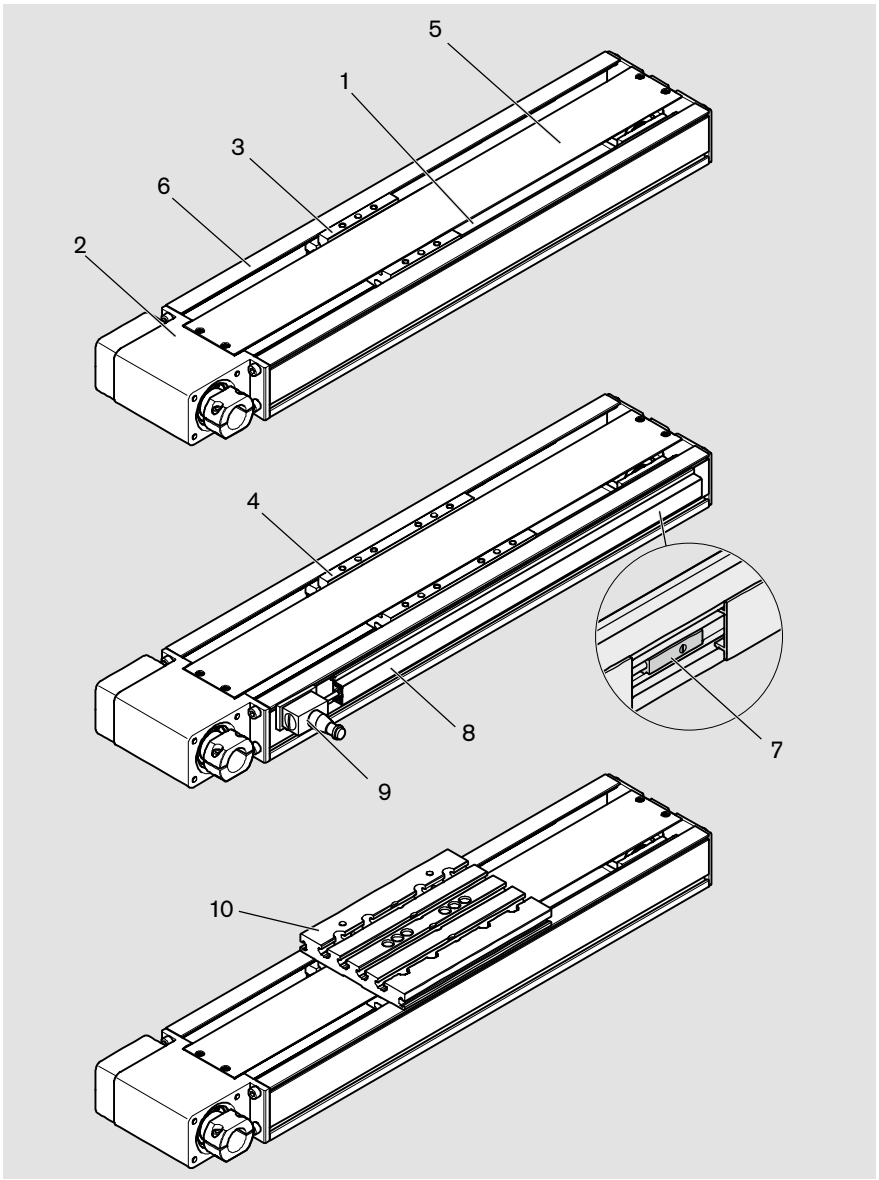
eLINE Compact Modules eCKR – Freely Configurable

Structural Design

- Toothed belt 25HTD3
- Motor mount
  or
- Gear reducer for motor attachment

1 Toothed belt
2 Drive end enclosure
3 Short carriage version
4 Long carriage version
5 Aluminum cover
6 Frame

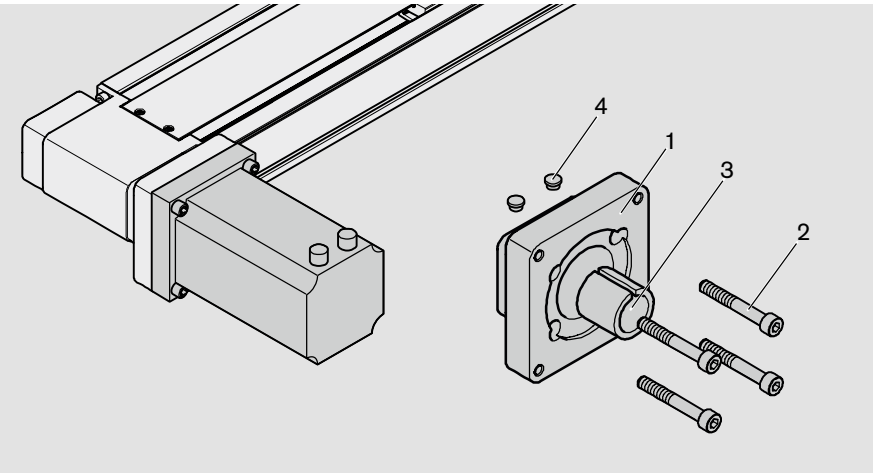
Attachments:
7 Magnetic field sensor
8 Mounting duct
9 Socket/plug
10 Connection plate



Direct motor attachment with i = 1

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

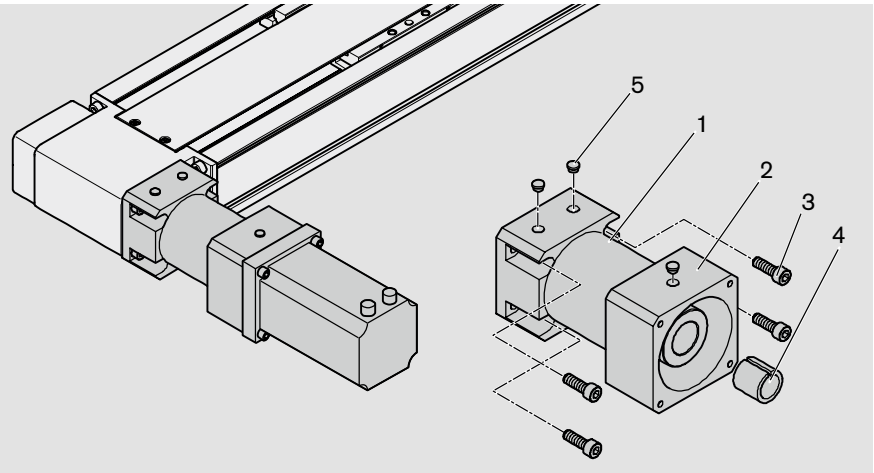
Motor mount assembly (kit)
consisting of:
1 Flange
2 Fastening screws
3 Reducer sleeve (if required)
4 Mounting hole plugs



Motor attachment via gear reducer

For all eLINE Compact Modules eCKR a planetary gear can be installed via a flange. The flange serves as a mounting point for the gearbox to the eCKR. This direct connection eliminates the need for a coupling, thereby minimizing torsional deflection.
Different gear ratios are available:
i = 5
i = 8

Motor mount assembly (kit)
consisting of:
1 Gear reducer
2 Adapter plate
3 Mounting screws for attachment to the eCKR
4 Reducer sleeve (if required)
5 Mounting hole plugs



eLINE Compact Modules eCKR – Freely Configurable

Technical Data

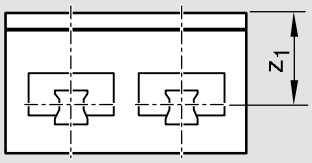
Size	Carriage length (mm)	Dynamic load capacity Guideway (N)	Dynamic load moments (Nm)		Planar moment of inertia (cm^4)		Maximum length (mm)	Specific spring rate of toothed belt (25HTD3) (N/mm · m)
			Torsional load moment	Longitudinal load moment				
	L_{ca}	C	M_t	M_L	I_y	I_z	L_{max} [1]	c_{spec}
eCKR 90	90	5000	166	29	12	97	2500	187.5
	125	8100	270	200				
eCKR 110	100	11000	420	89	31	238		
	165	17800	682	700				

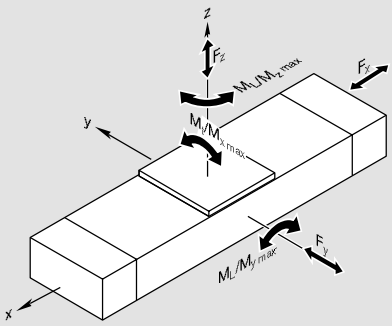
1) Length > 1200 mm: Option "with cover plate" not selectable beyond this length. See Components and Ordering Data

Size	Carriage length (mm)	Maximum permissible forces (N)	Maximum permissible moments (Nm)		Mass of linear system without connection plate (kg)	Moved mass of system (kg)	Maximum payload (kg)	Repeat-ability (mm)	Dimen-sions (mm)	Additional mass of gear reducer (kg)
	L_{ca}	$F_{y\,max}$, $F_{z\,max}$	$M_{x\,max}$	$M_{y\,max}$, $M_{z\,max}$	m_s [2]	m_{ca}	$m_{ex\,max}$		z_1	m_{ge}
eCKR 90	90	250	16.6	2.9 [3]	0.00346 · L + 1.073	0.19	15	± 0.2	22.0	0.35
	125	405	27.0	20.0	0.00346 · L + 1.163	0.28	30			
eCKR 110	100	550	42.0	8.9 [3]	0.00563 · L + 1.710	0.31	30	± 0.2	24.5	0.35
	165	890	68.2	70.0	0.00563 · L + 1.960	0.56	60			

2) Without motor
3) ⚠ Consider the moment load capacity!
Elasticity modulus E = 70,000 N/mm²

Elasticity modulus E = 70,000 N/mm²





Note on dynamic load capacities and moments (see table)

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.

Calculation of belt elongation ΔL_{tb}

The belt elongation/position offset resulting from external loading of the toothed belt can be approximately determined with the help of the following formula:

$$\Delta L_{tb} = \frac{(F_x \cdot L_{tb})}{c_{spec}}$$

c_{spec} = specific spring rate of toothed belt (N/mm · m)
F_x = external load (N)
L_{tb} = length of elongated toothed belt section (m)
ΔL_{tb} = elongation of the toothed belt as a result of external loads (mm)

Drive data without motor

Size	Gear ratio i	Maximum drive torque [1] M_{mech} (Nm)	Lead constant u (mm)	Belt drive transmission force F at maximum drive torque (N)
eCKR 90	1	3.00	66.00	290
	5	0.60	13.20	
	8	0.37	8.25	
eCKR 110	1	4.90	90.00	340
	5	1.00	18.00	
	8	0.60	11.25	

1) Maximum 1,000 cycles/hour (only when using the gear reducer)

Drive data without motor (i = 1)

Size	Drive unit diameter d_3 (mm)	Lead constant u (mm)	Travel speed v_{mech} (m/s)	Reduced mass moment of inertia J_s (kgm²) Short carriage version	Long carriage version
eCKR 90	21.01	66	2	$(0.34 + 0.00017 \cdot L) \cdot 10^{-4}$	$(0.43 + 0.00017 \cdot L) \cdot 10^{-4}$
eCKR 110	28.65	90	2	$(0.97 + 0.00032 \cdot L) \cdot 10^{-4}$	$(1.45 + 0.00032 \cdot L) \cdot 10^{-4}$

Calculations

Combined equivalent load on bearing of the linear guide

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

Nominal life

Nominal life of the guideway in meters:

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

Nominal life of the guideway in hours:

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

Frictional torque

for motor attachment via motor mount:

$$M_R = M_{Rs}$$

for motor attachment via gear reducer:

$$M_R = \frac{M_{Rs}}{i} + M_{R\,ge}$$

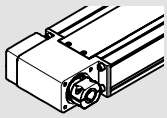
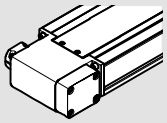
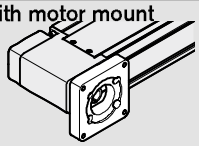
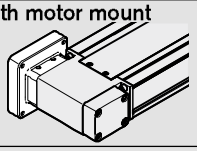
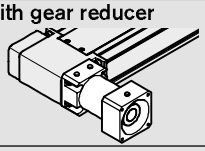
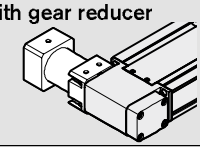
C = dynamic load capacity (N)
F_{comb} = combined equivalent load on bearing (N)
F_y = force in y-direction (N)
F_z = force in z-direction (N)
i = gear ratio
L = length of the linear system (mm)
L_{10} = nominal life in meters (m)
L_h = nominal life in hours (h)
M_L = dynamic longitudinal moment load capacity (Nm)
M_R = frictional torque at motor journal (Nm)
M_{RS} = frictional torque of the system (Nm)
$M_{R\,ge}$ = frictional torque of gear reducer (Nm)
M_t = dynamic torsional moment load capacity (Nm)
M_x = torsional moment about the x-axis (Nm)
M_y = torsional moment about the y-axis (Nm)
M_z = torsional moment about the z-axis (Nm)
v_m = average linear speed (m/s)
z_1 = application point of the effective force (mm)

Frictional torque, mass moments of inertia

Size	Gear reducer type	Gear ratio i	Mass moment of inertia of gear unit referred to the drive J_{ge} (kgm²) · 10^{-4}	Frictional torque M_{Rs} (Nm)	M_{Rge} (Nm)
eCKR 90	PLE 40	5	0.019	0.35	0.05
		8	0.017		
eCKR 110	PLE 40	5	0.019	0.33	0.05
		8	0.017		

eLINE Compact Modules eCKR – Freely Configurable

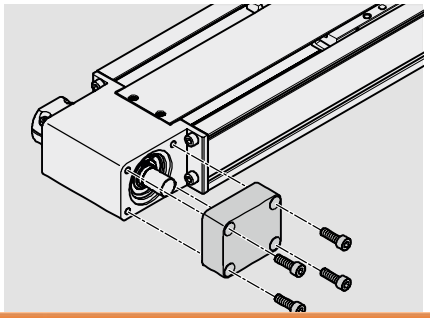
eCKR 90 Components and Ordering Data

Part number, length R0363 300 00, ... mm	Type	Guideway	Drive unit			Carriage				
			drive side	with clamping hub	with gear reducer	Without connection plate, Short carriage L_{ca} = 90 mm	Without connection plate, Long carriage L_{ca} = 125 mm	With connection plate, Short carriage L_{ca} = 90 mm	With connection plate, Long carriage L_{ca} = 125 mm	
Without motor mount 	MA05	01	right	06	–	01	02	05	06	
Without motor mount 	MA06		left							
With motor mount 	MA10		right	06	–	–	02	–	06	
With motor mount 	MA11		left							
With gear reducer 	MG10		right	–	08	–	02	–	06	
With gear reducer 	MG11		left							

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

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

Note: Data on the performance of the eCKR with gear reducer can be found in the section “Performance Data.”
On all versions, a second drive shaft end can be made available by removing the cover.



Motor attachment				Motor = ...		Cover = ...		1st, 2nd, 3rd switch = ...				Documentation
								Mounting duct = ...				
Gear ratio		Attachment kit[1]	for motor	without brake	with brake	without cover plate	with cover plate[3]					Standard report
i = 1		00	–	00		00	01	Without switches				
								Without switch Without mounting duct			00	
i = 1		05	VRDM 3910	39	40	00	01	With switches				10
		06	VRDM 3913	41	42			Magnetic field sensor				
		01	MSK 040C	86	87			Reed sensor	21	Mounting duct	Socket/ plug	
								Hall sensor, PNP NC	22	25	17	
i = 5		11	MSK 030C	84	85	00	01	Magnetic field sensor with connector[2]				
								Reed sensor	58			
i = 10								Hall sensor, PNP NC	59			

1) Attachment kit also available without motor (when ordering: enter "00" for motor)
2) Including mounting accessories
3) Length > 1200 mm: The option "with cover plate" is not selectable.

Calculating the length of the eCKR 90

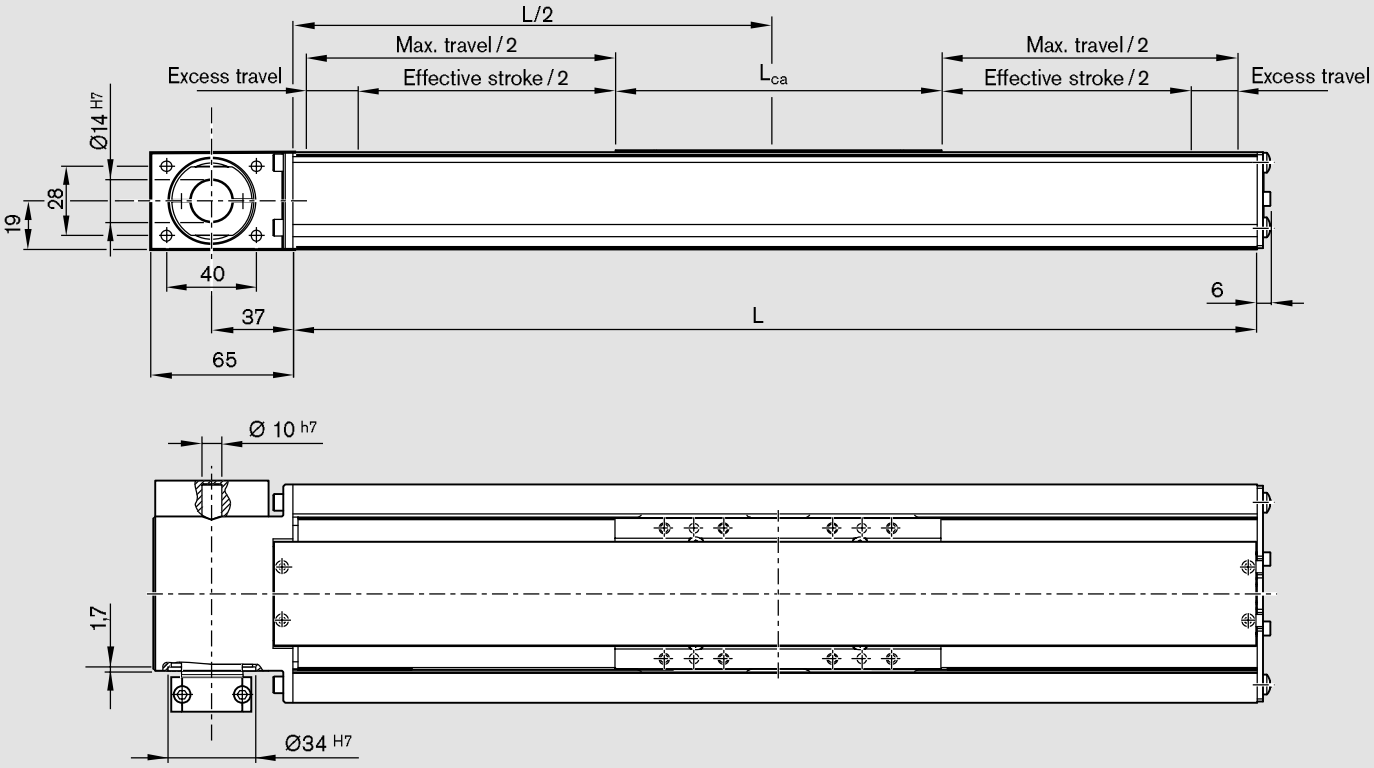
Short carriage version: $L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 25\ \text{mm}$

Long carriage version: $L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 25\ \text{mm}$

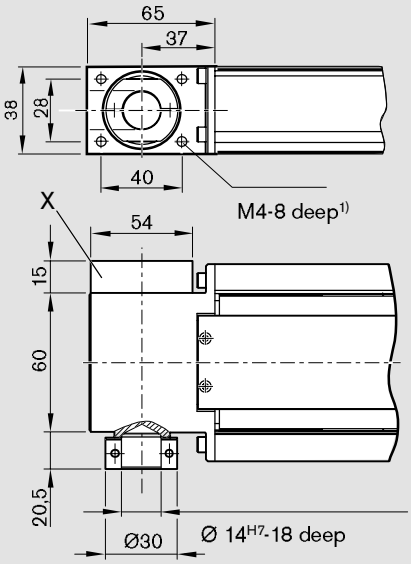
eLINE Compact Modules eCKR – Freely Configurable

eCKR 90 Dimensions

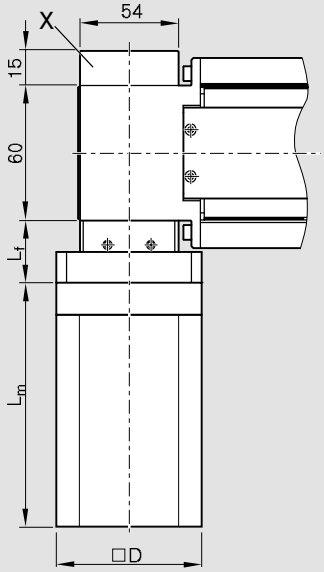
All dimensions in mm. Diagrams to different scales.



MA05, MA06

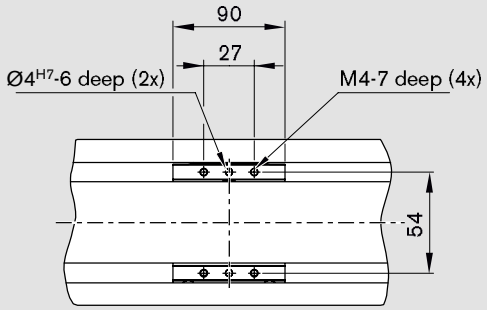


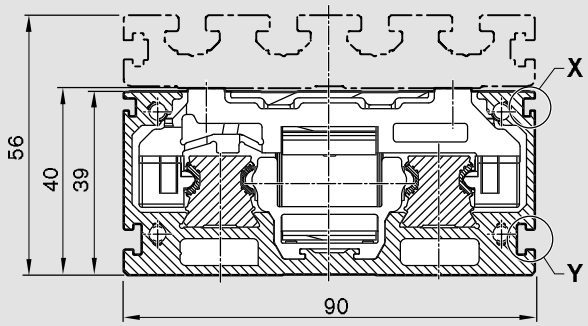
MA10, MA11



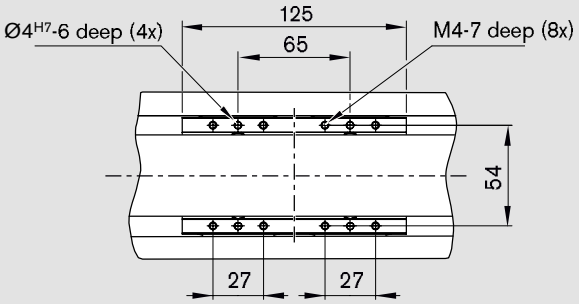
1) On both sides (also on second drive side, second shaft end)

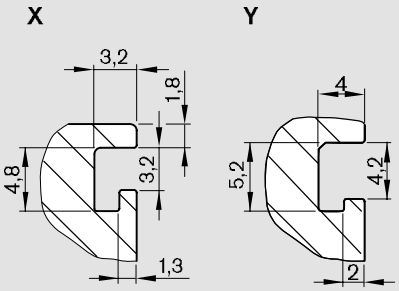
Short carriage version



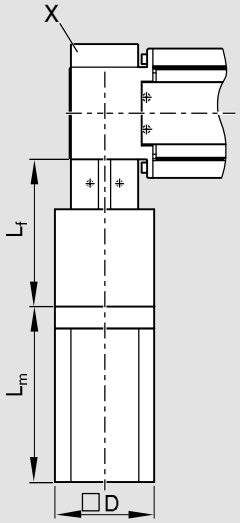


Long carriage version



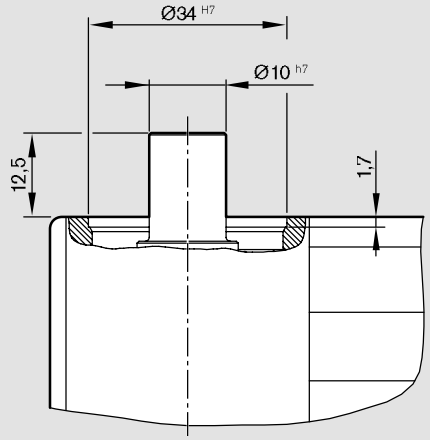


MG10, MG11



X

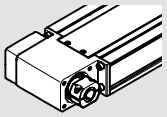
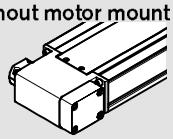
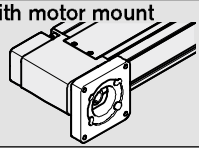
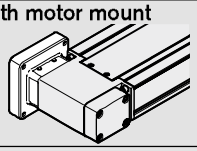
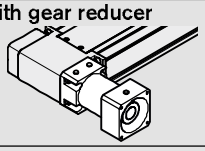
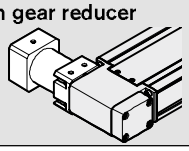
Second shaft end (with cover removed)



Type	Motor	Dimensions (mm)			
		D	L_f	L_m with brake	L_m w/o brake
MA10, MA11	VRDM 3910	85	34.5	186.5	140.0
	VRDM 3913	85		216.5	170.0
	MSK 040C	82		215.5	185.5
MG10, MG11	MSM 020B	42	98.5	140.5	109.0
	MSM 030B	60	104.5	144.0	111.0
	MSK 030C	54	98.5	213.0	188.0

eLINE Compact Modules eCKR – Freely Configurable

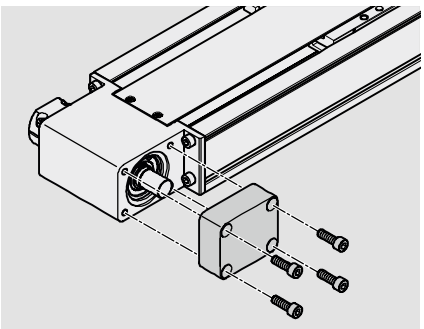
eCKR 110 Components and Ordering Data

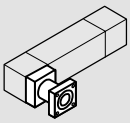
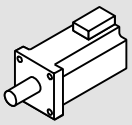
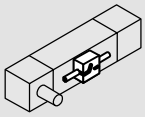
Part number, length R0363 400 00, ... mm	Type	Guideway	Drive unit			Carriage				
								Without connection plate		With connection plate
			drive side	with clamping hub	with gear reducer	Short carriage L_{ca} = 100 mm	Long carriage L_{ca} = 165 mm	Short carriage L_{ca} = 100 mm	Long carriage L_{ca} = 165 mm	
Without motor mount 	MA05	01	right	06	–	01	02	05	06	
Without motor mount 	MA06		left							
With motor mount 	MA10		right	06	–	–	02	–	06	
With motor mount 	MA11		left							
With gear reducer 	MG10		right	–	08	–	02	–	06	
With gear reducer 	MG11		left							

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

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

Note: Data on the performance of the eCKR with gear reducer can be found in the section “Performance Data.”
On all versions, a second drive shaft end can be made available by removing the cover.



Motor attachment			Motor = ...		Cover = ...		1st, 2nd, 3rd switch = ...				Documentation
											
Gear ratio	Attachment kit[1]	for motor	without brake	with brake	without cover plate	with cover plate[3]	Mounting duct = ...				Standard report
i = 1	00	–	00		00	01	Without switches				
							Without switch Without mounting duct	00			
i = 1	05	VRDM 3913	41	42	00	01	With switches				10
							Magnetic field sensor				
	01	MSK 050C	88	89			Reed sensor	21	Mounting duct	Socket/ plug	
							Hall sensor, PNP NC	22	25	17	
i = 5	11	MSK 030C	84	85	00	01	Magnetic field sensor with connector[2]				
	31	MSM 030C	72	73			Reed sensor	58			
							Hall sensor, PNP NC	59			
i = 10	12	MSK 030C	84	85							

1) Attachment kit also available without motor (when ordering: enter “00” for motor)
2) Including mounting accessories
3) Length > 1200 mm: The option “with cover plate” is not selectable.

Calculating the length of the eCKR 110

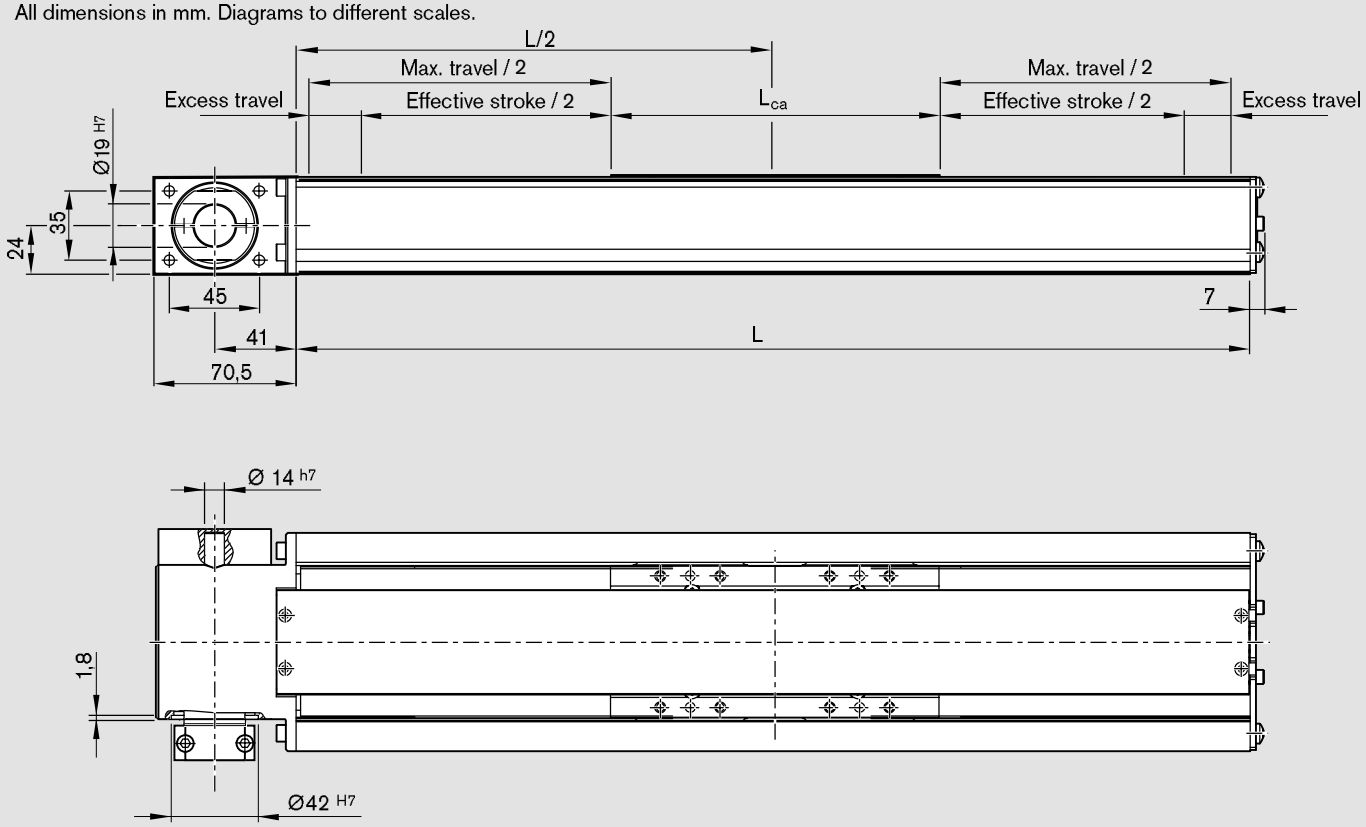
Short carriage version: $L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 25\ \text{mm}$

Long carriage version: $L = (\text{Effective stroke} + 2 \cdot \text{excess travel}) + L_{ca} + 25\ \text{mm}$

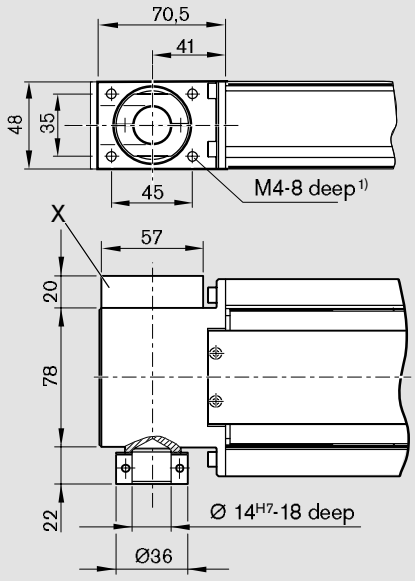
eLINE Compact Modules eCKR – Freely Configurable

eCKR 110 Dimensions

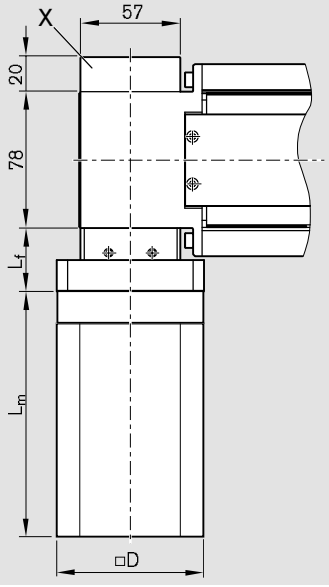
All dimensions in mm. Diagrams to different scales.



MA05, MA06

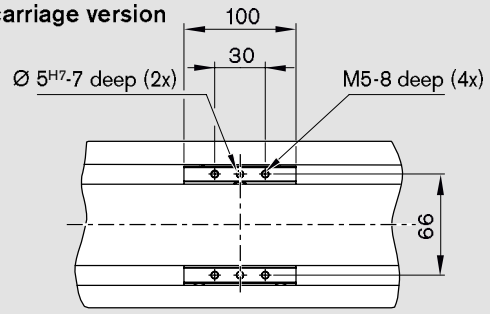


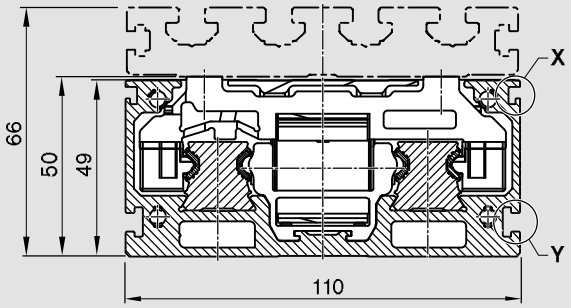
MA10, MA11



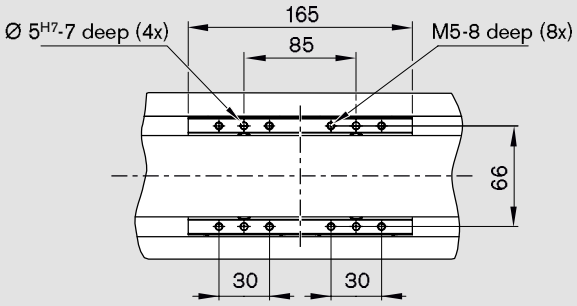
1) On both sides (also on second drive side, second shaft end)

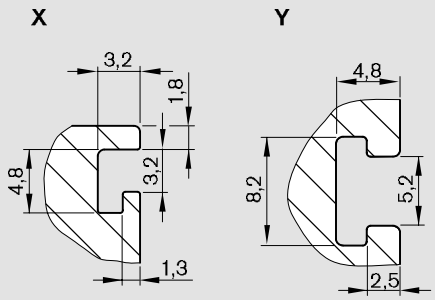
Short carriage version



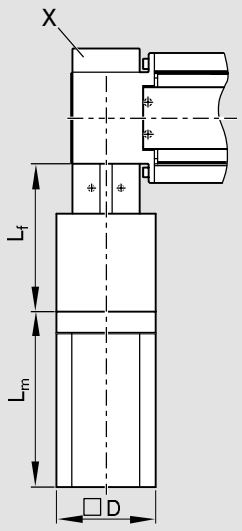


Long carriage version



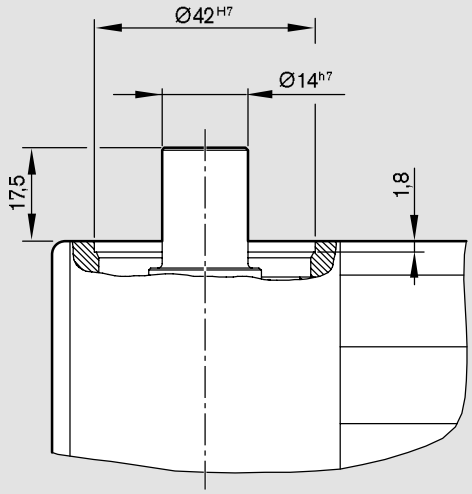


MG10, MG11



X

Second shaft end (with cover removed)



Type	Motor	Dimensions (mm)			
		D	L_f	L_m with brake	L_m without brake
MA10, MA11	VRDM 3913	85	36	216.5	170.0
	MSK 050C	98	46	233.0	203.0
MG10, MG11	MSM 030B	60	106	144.0	111.0
	MSK 030C	54	100	213.0	188.5

eLINE Compact Modules eCKR – Freely Configurable

Performance data for horizontal operation

⚠ **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.**

eCKR 90, i = 8, MSM 020B
Servo motor with brake and ECODRIVE Cs controller[1)]
Connection voltage: 1 x 230 V

Mass	(kg)	1	2	3	4	5
Acceleration time t_a	(ms)	13	16	19	21	24
Acceleration distance s_a	(mm)	4	5	6	7	8
Acceleration a	(m/s^2)	53	44	37	32	29
Speed v	(m/s)	0.69				
Repeatability	(mm)	± 0.2				

eCKR 90, i = 5, MSM 030B
Servo motor with brake and ECODRIVE Cs controller[1)]
Connection voltage: 1 x 230 V

Mass	(kg)	1	2	3	4	5
Acceleration time t_a	(ms)	22	27	31	35	40
Acceleration distance s_a	(mm)	12	15	17	19	22
Acceleration a	(m/s^2)	50	41	36	31	28
Speed v	(m/s)	1.1				
Repeatability	(mm)	± 0.2				

eCKR 90, i = 8, MSM 030B
Servo motor with brake and ECODRIVE Cs controller[1)]
Connection voltage: 1 x 230 V

Mass	(kg)	1	2	3	4	5	6	7	8	9	10
Acceleration time t_a	(ms)	28	31	34	36	39	42	45	48	50	53
Acceleration distance s_a	(mm)	10	11	12	13	14	14	15	16	17	18
Acceleration a	(m/s^2)	24	22	20	19	18	16	15	14	14	13
Speed v	(m/s)	0.69									
Repeatability	(mm)	± 0.2									

eCKR 90, i = 5, MSK 030C
Servo motor with brake and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Mass	(kg)	1	2	3	4	5	6	7	8	9	10
Acceleration time t_a	(ms)	83	91	99	107	115	123	131	140	148	156
Acceleration distance s_a	(mm)	82	90	98	106	114	122	130	138	146	154
Acceleration a	(m/s^2)	24	22	20	18	17	16	15	14	13	13
Speed v	(m/s)	1.98									
Repeatability	(mm)	± 0.2									

eCKR 110, i = 5, MSM 030B
Servo motor with brake and ECODRIVE Cs controller[1)]
Connection voltage: 1 x 230 V

Mass	(kg)	1	2	3	4	5
Acceleration time t_a	(ms)	19	24	29	34	39
Acceleration distance s_a	(mm)	14	18	22	26	30
Acceleration a	(m/s^2)	79	62	51	44	38
Speed v	(m/s)	1.50				
Repeatability	(mm)	± 0.2				

eCKR 110, i = 8, MSM 030B
Servo motor with brake and ECODRIVE Cs controller[1)]
Connection voltage: 1 x 230 V

Mass	(kg)	1	2	3	4	5	6	7	8	9	10
Acceleration time t_a	(ms)	21	24	27	30	33	37	40	43	46	49
Acceleration distance s_a	(mm)	10	11	13	14	16	17	19	20	22	23
Acceleration a	(m/s^2)	45	39	35	31	28	26	24	22	20	19
Speed v	(m/s)	0.94									
Repeatability	(mm)	± 0.2									

eCKR 110, i = 5, MSK 030C
Servo motor with brake and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

Masse	(kg)	1	2	3	4	5	6	7	8	9	10
Beschleunigungszeit t_a	(ms)	45	52	59	66	73	80	87	93	100	107
Beschleunigungsweg s_a	(mm)	46	53	59	66	73	80	87	94	101	108
Beschleunigung a	(m/s^2)	44	38	34	30	28	25	23	22	20	19
Geschwindigkeit v	(m/s)	2.00									
Reproduzierbarkeit	(mm)	± 0.2									

eCKR 110, i = 8, MSK 030C
Servo motor with brake and IndraDrive controller[1)]
Connection voltage: 3 x 400 V

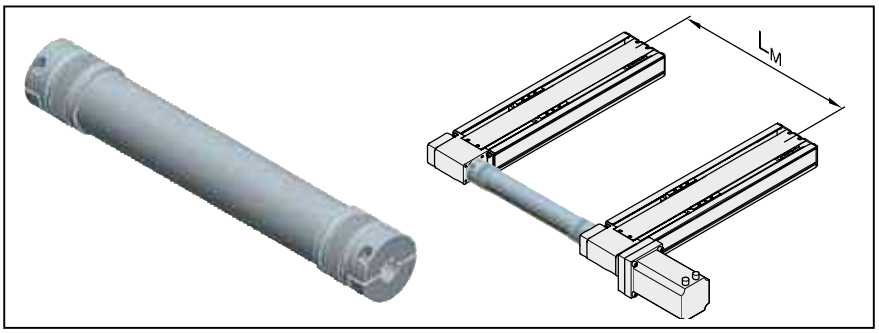
Masse	(kg)	1	2	3	4	5	6	7	8	9	10
Beschleunigungszeit t_a	(ms)	80	86	92	98	103	109	115	121	126	132
Beschleunigungsweg s_a	(mm)	68	73	77	82	87	92	97	102	107	111
Beschleunigung a	(m/s^2)	21	20	18	17	16	15	15	14	13	13
Geschwindigkeit v	(m/s)	1.69									
Reproduzierbarkeit	(mm)	± 0.2									

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

Accessories

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

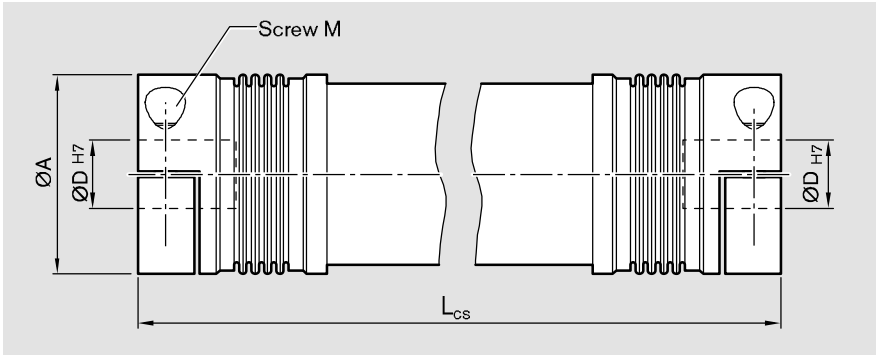


Material

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

Ordering data

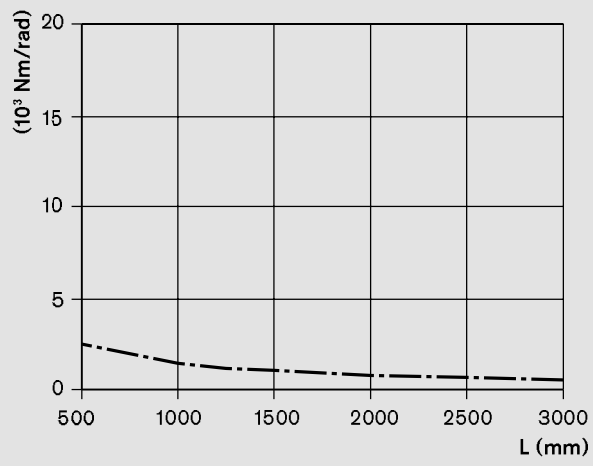
Please state the part number and length L_{cs}.
For example: R0391 510 16,
L_{cs} = 550 mm



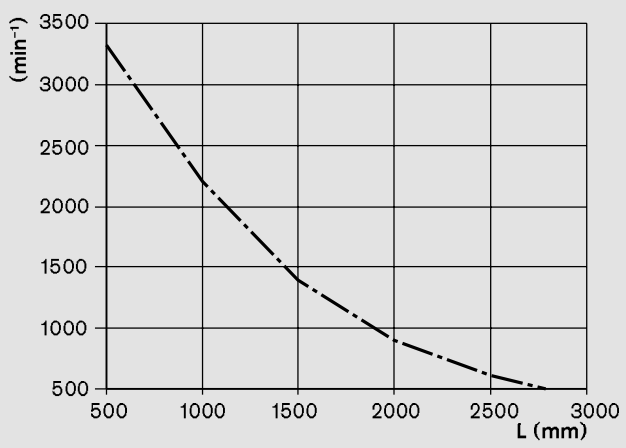
	Part number	Dimensions (mm)						M_A (Nm)	M_S (Nm)	M_{cs} (Nm)	Mass moment of inertia (10^{-6} kgm²)	Weight (kg)
		A	D	M	$L_{cs\ min}$	$L_{cs\ max}$	L_{cs}					
eCKR 90	R0391 510 16	40	10	M4	100	3000	L_M – 65	5	17	10	0.028 · L_{cs}(mm) + 80	0.0007 · (L_{cs}(mm) – 100) + 0.34
eCKR 110	R0391 510 20	40	14	M4	100	3000	L_M – 93	5	17	10		

M_A = tightening torque of screws
L_M = center-to-center distance between eLINE Compact Modules
M_S = peak torque of connecting shaft
M_{cs} = rated torque of connecting shaft

Torsional stiffness c_T



Maximum rotary speed n



—·— eCKR 90 / eCKR 110