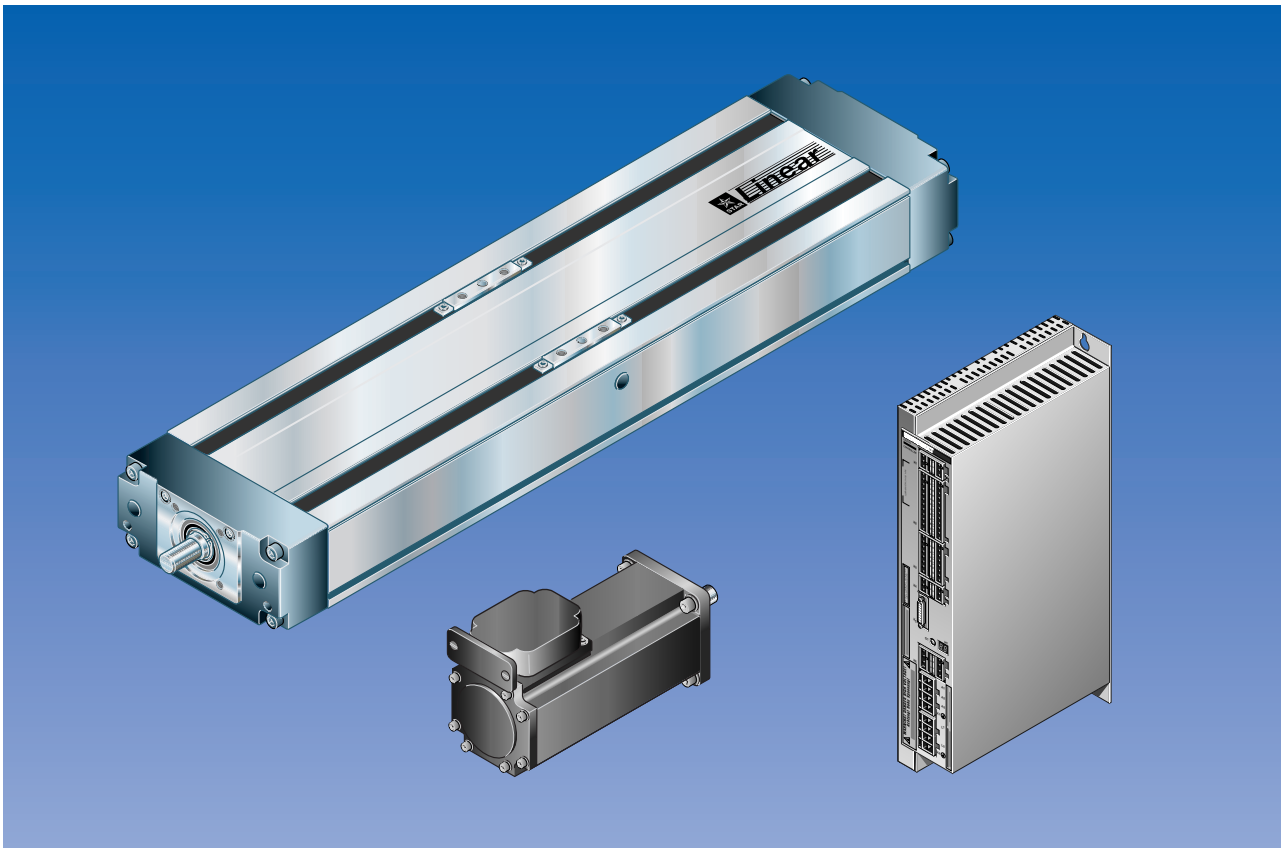
engineering
mannesmann
Rexroth



STAR – Compact Modules

Back to Overview

RE 82 601/04.99

Rexroth
STAR Star

STAR Linear Motion Technology

Ball Rail Systems	Standard Ball Rail Systems
	Ball Rail Systems with Aluminum Runner Blocks
	Super Ball Rail Systems
	Wide Ball Rail Systems
	Miniature Ball Rail Systems
	Cam Roller Guides
	Accessories
Roller Rail Systems	
Linear Bushings and Shafts	Linear Bushings
	Linear Sets
	Shafts
	Shaft Support Rails
	Shaft Support Blocks
	Ball Transfer Units
Screw Drives	Precision Ball Screw Assemblies
	End Bearings and Housings
Linear Motion Systems	Linear Motion Slides
	Linear Modules
	Compact Modules
	Ball Rail Tables
	Linear Actuators
	ALU-STAR Profile System
	Controllers, Motors, Electrical Accessories

Deutsche Star GmbH
D-97419 Schweinfurt

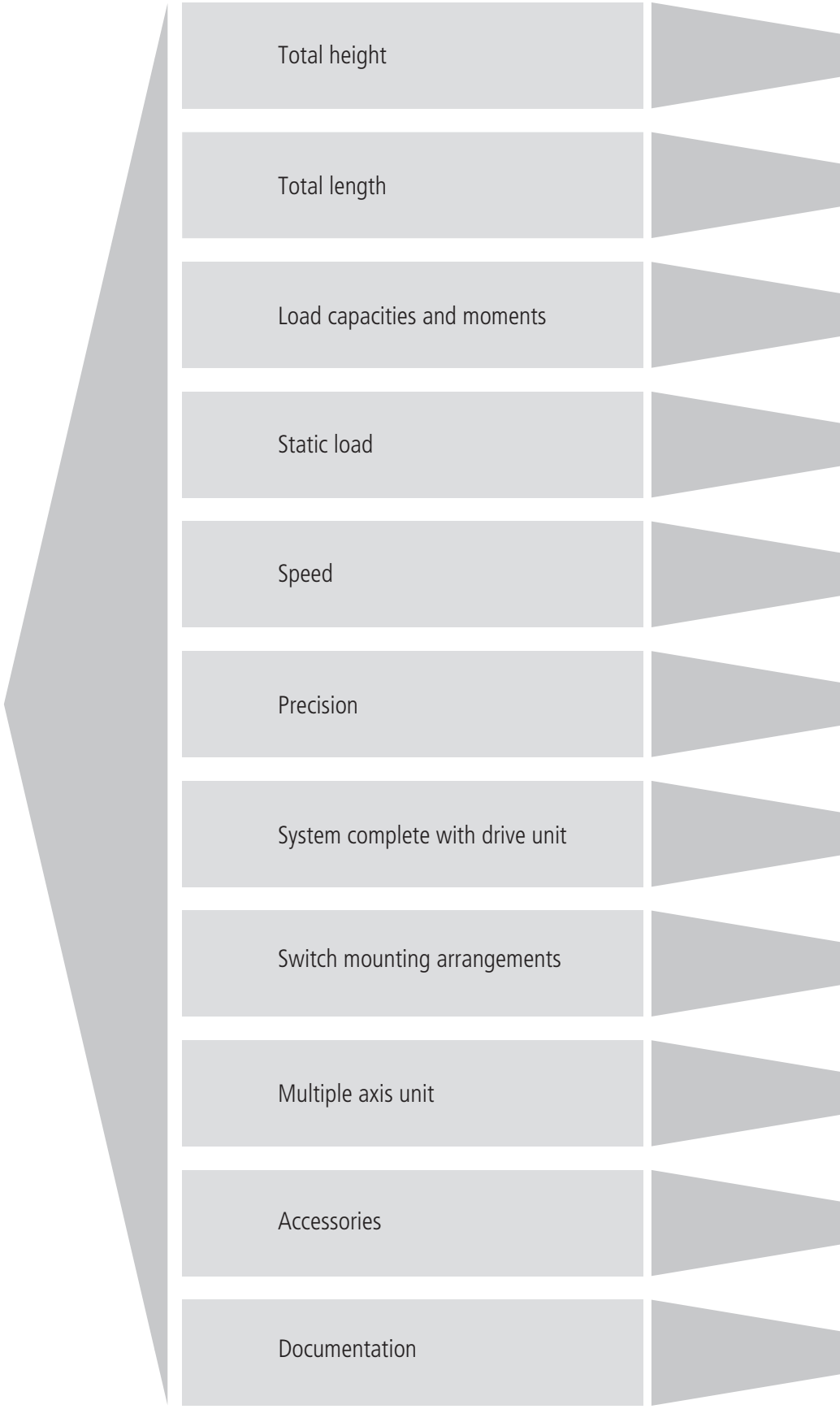
REG. No. 1617 - 03

Compact Modules

STAR – Compact Modules CKK
A Solution to Many Problems

The tasks

- Driving
- Transporting
- Positioning



40 mm to 65 mm

Up to 1800 mm

Load capacity C up to 61080 N
Longitudinal moment M_L up to 3050 Nm
Torsional moment M_t up to 2685 Nm

Up to 200 kg

Up to 76 m/min

Repeatability up to 0.005 mm
Positioning accuracy up to 0.01 mm

AC servo motor, MiniDrive or stepping motor
with mount, coupling or side drive
with timing belt (plus control unit)

Switch without switching cam
over total travel range

Combination option
provided by connectors

Clamping fixtures, motor mounts,
connecting plate, connectors

Moment of friction measurement
Lead deviation
Positioning accuracy

The solution

STAR
Compact Modules

STAR – Compact Modules CKK
Product Overview

STAR – Compact Modules are ready-to-mount precision guide systems offering outstanding performance within a compact envelope. Excellent price/performance ratio. Available at short notice.

Structure

- Low profile precision aluminium frame (main structure) with two integrated STAR Ball Rail Systems
- STAR Precision Ball Screw Assemblies to tolerance grade 7 with zero-clearance nut systems
- Aluminum fixed bearing end block with two-row preloaded angular contact bearing
- Floating bearing end block with double bearings
- One or two aluminum carriages with integrated runner blocks

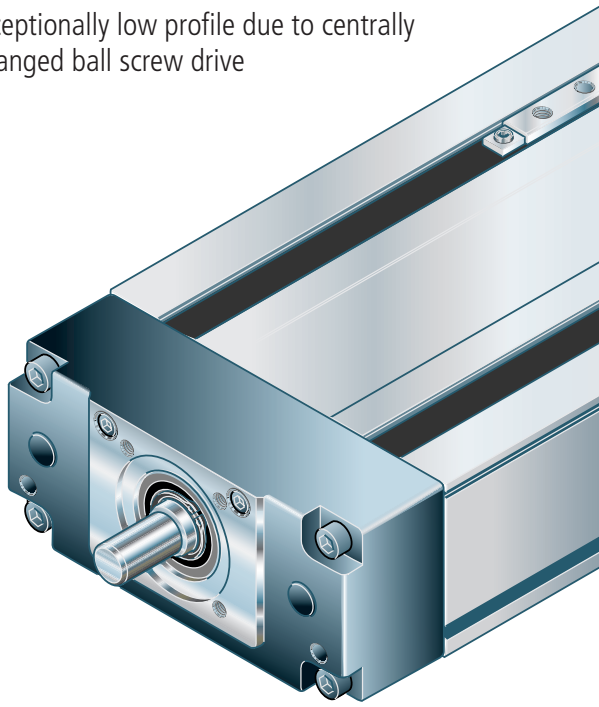
Attachments

- Maintenance-free digital AC servo drives with integrated brake and attached feedback, or stepping motors
- Motor mount and coupling or side drive with timing belt
- Switches
- Socket and plug for switches
- Aluminum profile cable duct

Drive Controllers and Control Systems

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

▶ Exceptionally low profile due to centrally arranged ball screw drive



▶ High positioning accuracy and repeatability due to Precision Ball Screw Assembly with zero-clearance nut system

▶ High travel speeds combined with high precision over long travel ranges due to Ball Rail Systems, large screw diameters and leads, and double floating bearing

▶ Simple motor attachment due to locating feature and tapped mounting hole

▶ Optimum running properties, high load capacities, high rigidity due to two integrated, zero-clearance Ball Rail Systems

▶ Internal elements protected by aluminum cover strip mounted for optimum resistance to deflection and by polyurethane side strips with integrated steel cords providing gap-type sealing

▶ Precise alignment and secure mounting of attachments thanks to threaded bores and pin holes and to one or two carriages

▶ Low-cost maintenance provided by one-point lubrication (grease) in Ball Rail Systems and lubrication points accessible from both sides on Precision Ball Screw Assembly

▶ Adjustable switches over the entire travel range; switch activation without switching cam

STAR – Compact Modules CKK
Product Overview

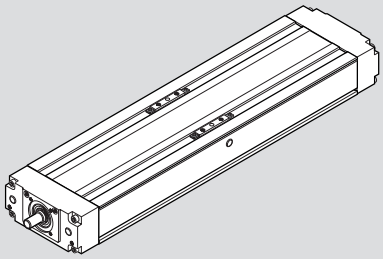
Motor Selection

in accordance with controllers and control systems

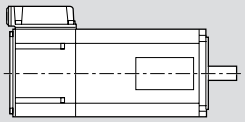
A choice can be made between several different motor/controller combinations to achieve the most cost-efficient solution for each customer application.

The motor/controller combination must always be taken into account when sizing the drive.

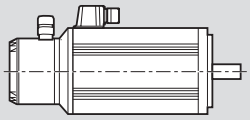
For more detailed information on motors and control systems, please refer to catalog RE 82 701 "Controllers, Motors, Electrical Accessories".



Digital AC servo motor*

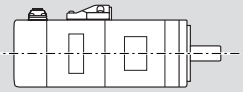


MKD 25B-144-KG1
MKD 41B-144 KG1



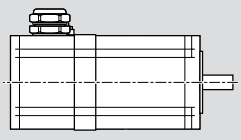
MDD 71A-N-060

MiniDrive



MMD 042A
MMD 082A

3-phase stepping motor



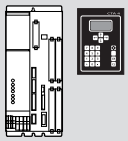
VRDM 368
VRDM 397
VRDM 3910
VRDM 3913

* Analog AC servo motor Type MAC and analog controllers Type TDM are still available.

DKC

Digital Controller

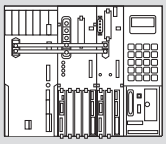
The low-cost solution for single-axis and multi-axis systems



DKS

Digital positioning module and DLC controls

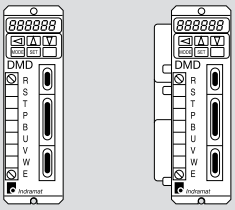
The universal solution for one axis



DDS

Digital controllers and CLM analog positioning module

The convenient solution for multi-axis systems



DMD

Digital controller

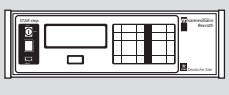
WD3

Power output section
for control cabinet installation

PC

PC controller board

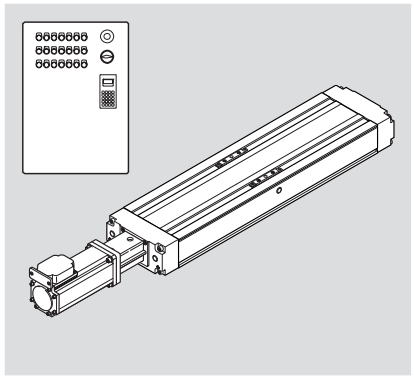
Stepping motor controller

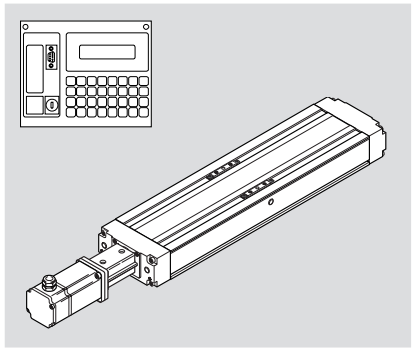


STAR step

Single and multi-axis positioning controls with power output section

The complete solution





Compact Modules can be supplied complete with motor, controller and control system.

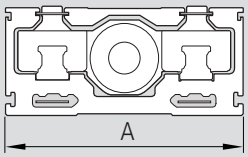
STAR – Compact Modules CKK
Types Available, Load Capacities

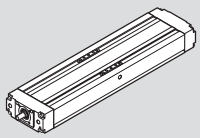
Type designation (size)

Compact Modules are designated according to **type** and **size**.

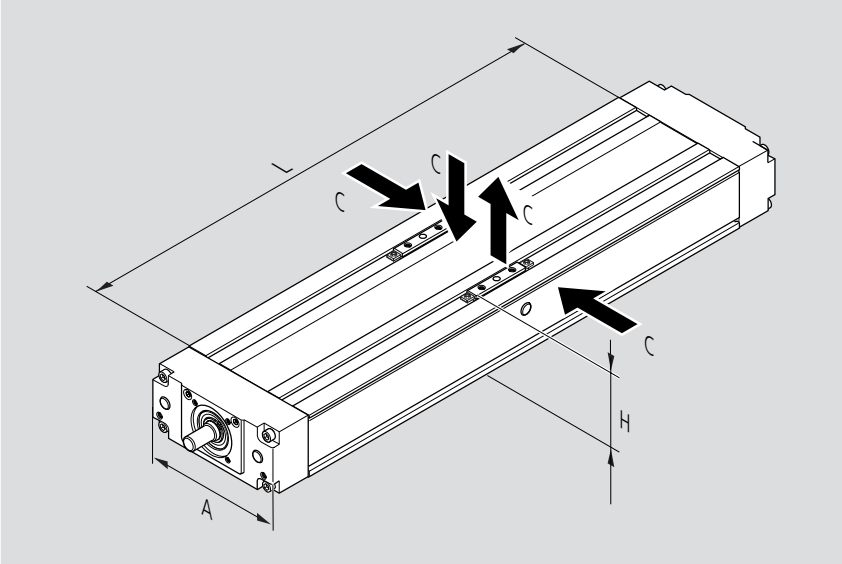
Types also cover the equivalent designs without drive systems.

Compact Module (example) =	Type			Size	
	C	K	K	20	-145

System	=	Compact Module **(C)**
Guideway	=	Ball Rail System **(K)**
Drive unit	=	Precision Ball Screw Assembly **(K)**
Dimensions of guideway	=	
Frame dimensions	=	

	Type	Guideway	Drive Unit	Compact Module	
STAR – Compact Modules	**CKK**	 **Ball Rail System**	 **Precision Ball Screw Assembly**		

Overview of Compact Modules with permissible loads



Suitable Loads

(recommended value on the basis of past experience)

As far as the desired service life is concerned, loads of up to approximately 20% of the dynamic load and moment values (C, M_t, M_L) have proved acceptable.

The following values may not be exceeded:

- the maximum permissible loads
- the maximum permissible drive torque
- the maximum permissible speed.

	Compact Module	Dimensions A x H (mm)	Dyn. load capacity C (N)	
			one carriage	two carriages
	CKK 12-90	90 x 40	4 620	7 500
	CKK 15-110	110 x 50	15 600	25 340
	CKK 20-145	145 x 65	37 600	61 080

Note: All modules are also available without drive unit.

STAR – Compact Modules CKK
Structure

Structure

1 Precision ball screw assembly with zero-clearance cylindrical single nut

2 Floating bearing end block

3 Carriage with two integrated runner blocks

3a Two carriages, each with two integrated runner blocks

4 Aluminum cover strip

5 Polyurethane gap-type sealing strip (moving)

6 Fixed bearing end block

7 Main structure

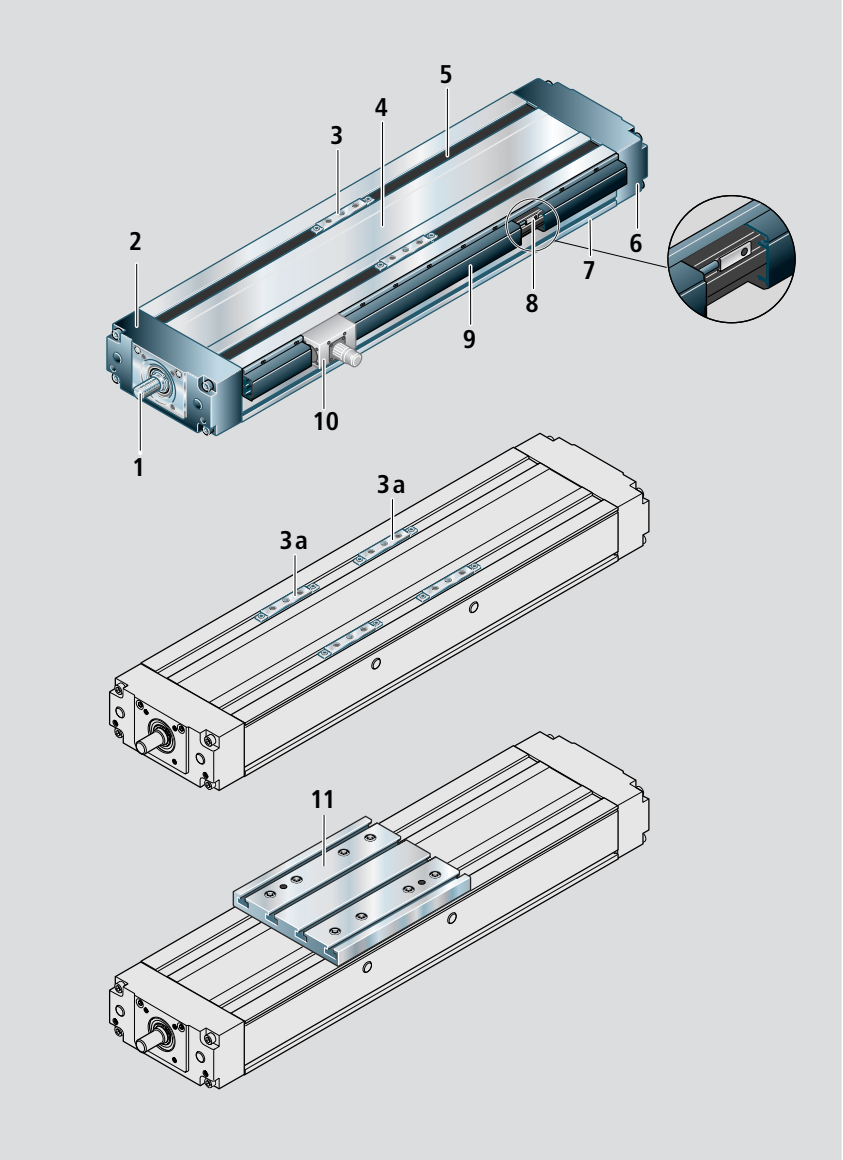
Accessories

8 Switches

9 Cable duct

10 Socket/plug

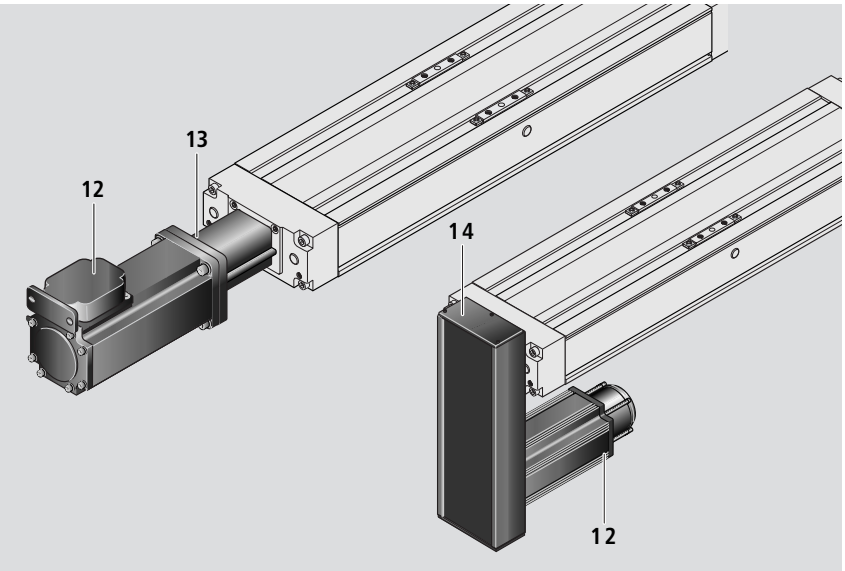
11 Connecting plate



12 Motor

13 Motor mount and coupling

14 Side drive with timing belt



Motor attachment with mount and coupling

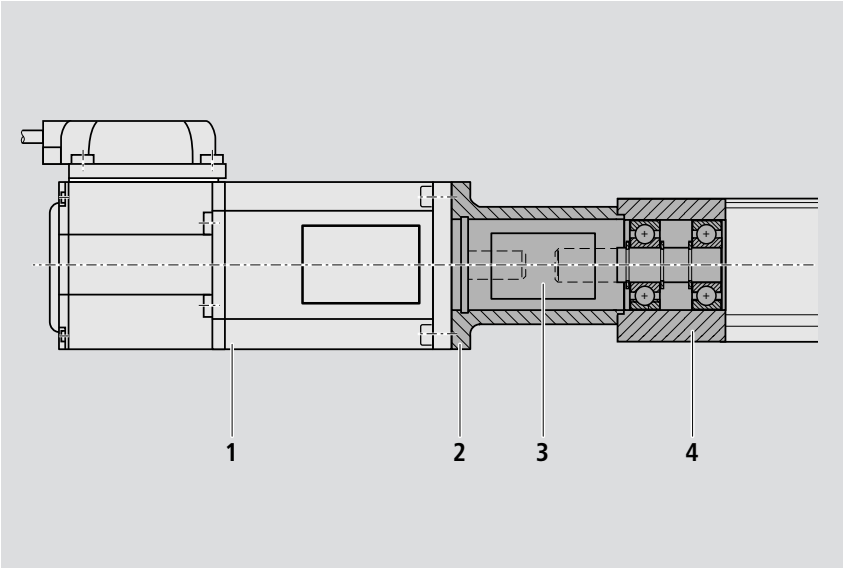
A motor can be attached via a mount and coupling to all Compact Modules equipped with Precision Ball Screw Assemblies.

The motor mount serves both to attach the motor to the Compact Module and as an enclosed housing for the coupling.

The coupling transmits the motor drive torque free of stresses to the Compact Module drive shaft.

Our standard couplings compensate for the thermal expansion of the system.

If other makes of couplings are used, thermal expansion must be taken into account.



1 Motor

2 Motor mount

3 Coupling

4 Compact Module

Motor attachment via side drive with timing belt

On all Compact Modules the motor can be attached via a side drive with timing belt.

This results in a shorter overall length compared to a motor attachment with motor mount and coupling.

The compact, enclosed housing provides belt protection and secures the motor.

Different gear ratios are available:

i = 1 : 1

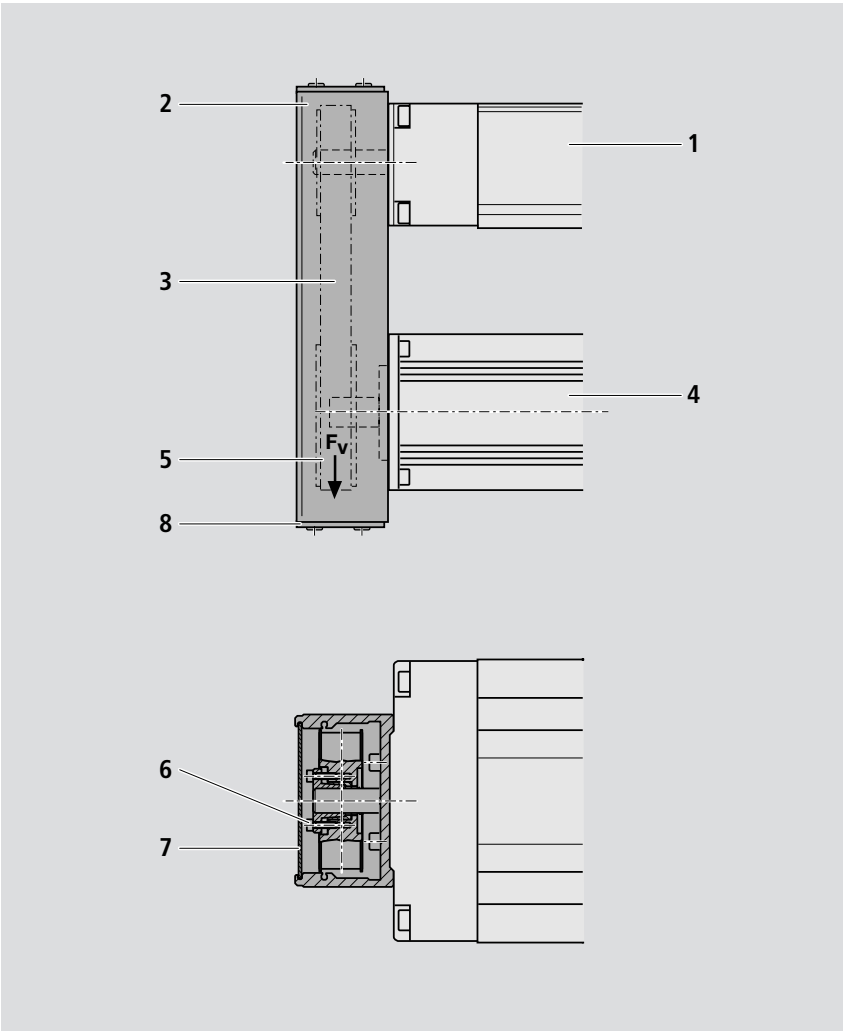
i = 1 : 1.5

i = 1 : 2

The side drive with timing belt can be mounted in four different directions:

– bottom, top (RV01 and RV02)

– left, right (RV03 and RV04)



1 Compact Module

2 Drawn, anodized aluminum frame

3 Toothed belt

4 AC servo motor

5 Pre-tensioning of the toothed belt: Apply pre-tensioning force F_v to the motor (F_v will be indicated on delivery)

6 Attachment of belt pulleys with clamping assemblies

7 Cover plate

8 End cover

STAR – Compact Modules CKK
Technical Data

General technical data

Load capacities and moments

Compact Module	No. of carriages	Ball screw	Dynamic load capacity C			Dynamic moments		Planar moment of inertia		Maximum length	Moved mass
		d_0 x P	Guideway (N)	Ball screw (N)	Fixed bearing (N)	M_t (Nm)	M_L (Nm)	I_x (cm^4)	I_y (cm^4)	L_{max} (mm)	m_b (kg)
CKK 12-90	1	12 x 5	4 620	3 800	6 900	125	16	14.32	124.4	750	0.36
		12 x 10		2 500							
	2 (l_m = 65 mm)	12 x 5	7 500	3 800	6 900	200	240	14.32	124.4	750	0.59
		12 x 10		2 500							
CKK 15-110	1	16 x 5	15 600	12 300	13 400	515	80	37.74	318.7	1 500	0.52
		16 x 10		9 600							
		16 x 16		6 300							
	2 (l_m = 85 mm)	16 x 5	25 340	12 300	13 400	835	1 075	37.74	318.7	1 500	0.86
		16 x 10		9 600							
		16 x 16		6 300							
CKK 20-145	1	20 x 5	37 600	14 300	17 000	1 650	255	114.10	986.4	1 800	1.21
		20 x 20		9 100							
		25 x 10		15 700							
	2 (l_m = 100 mm)	20 x 5	61 080	14 300	17 000	2 685	3 050	114.10	986.4	1 800	2.06
		20 x 20		9 100							
		25 x 10		15 700							

l_m = center-to-center distance between carriages.

Maximum permissible loads

Compact Module	No. of carriages	Maximum permissible forces			Maximum permissible moments	
		F_{y1} (N)	F_{y2} (N)	F_X (N)	M_t (Nm)	M_L (Nm)
CKK 12-90	1	4 620	4 620	2 490	125	16
	2	7 500	7 500	4 050	203	244
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

Modulus of elasticity E $E = 70\,000\ N/mm^2$

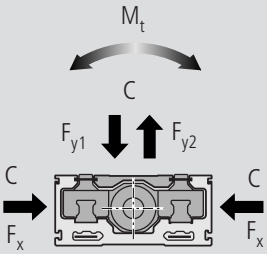
Mass

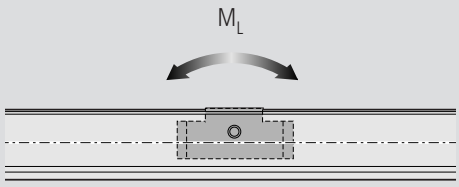
Mass calculation does not include motor or switches.

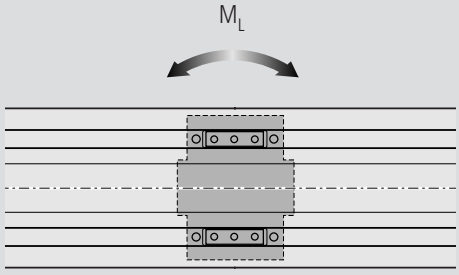
Mass formula:

Mass (kg/mm) · length L (mm) + mass of all parts of fixed length (carriage, end blocks, etc.) (kg)

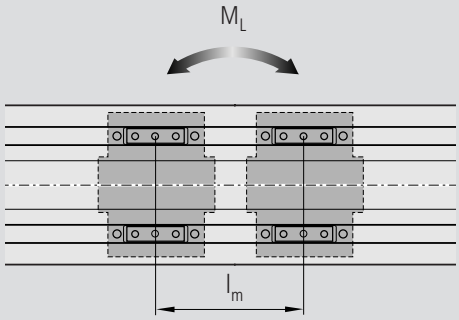
Compact Module	Ball screw	No. of carriages	Mass (kg)
CKK 12-90	with	1	0.0055 · L + 0.9
		2	0.0055 · L + 1.2
CKK 15-110	with	1	0.0092 · L + 1.6
		2	0.0092 · L + 2.0
CKK 20-145	with	1	0.0178 · L + 3.0
		2	0.0178 · L + 3.9







Compact Module with one carriage



Compact Module with two carriages

l_m = center-to-center distance between carriages

Notes on dynamic load capacities and moments

The dynamic load capacities and moments are based on 100 000 m travel.

However, a travel of just 50 000 m is often taken as a basis.

If this is the case, for comparison purposes:

Multiply value **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the STAR table by 1.26.

STAR – Compact Modules CKK
Technical Data

Maximum permissible drive torque M_{per}

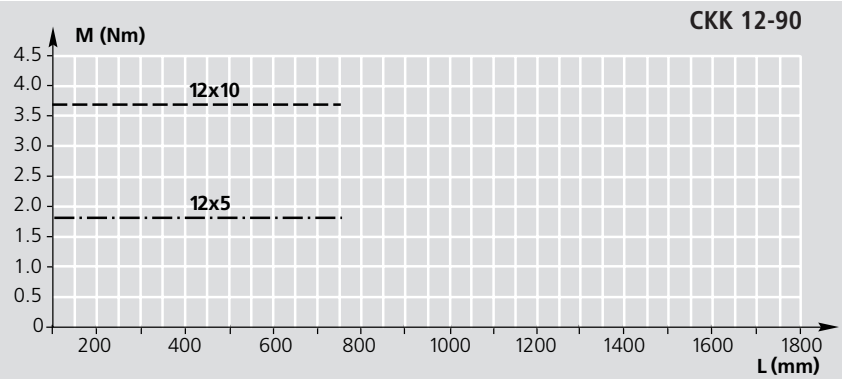
The M_{per} values shown apply in the following conditions:

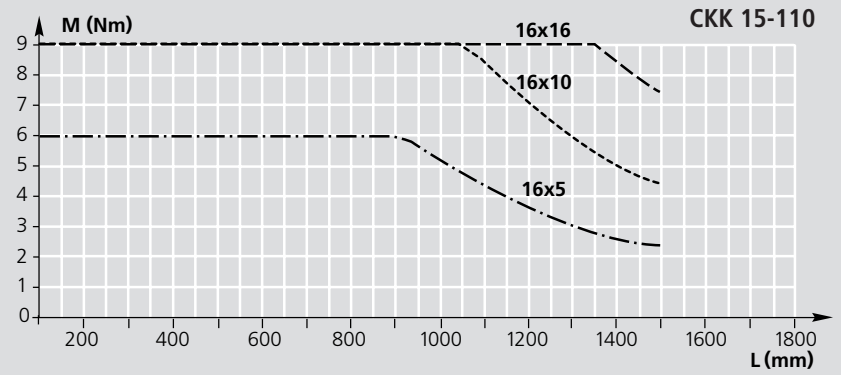
– horizontal operation

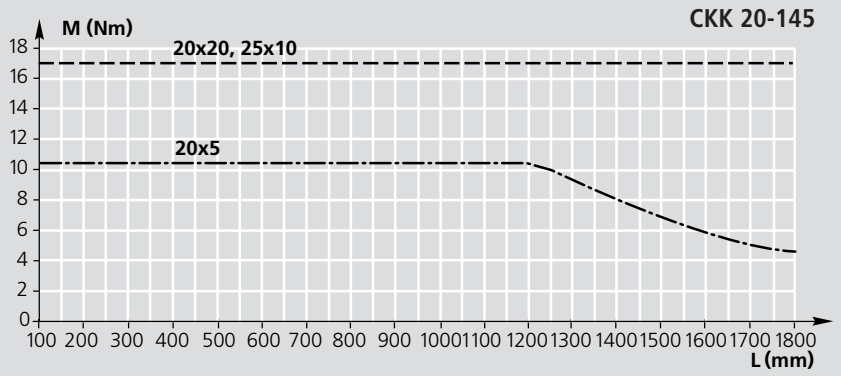
– ball screw journal without keyway

– no radial load on ball screw journal

Observe the rated torque of coupling used!







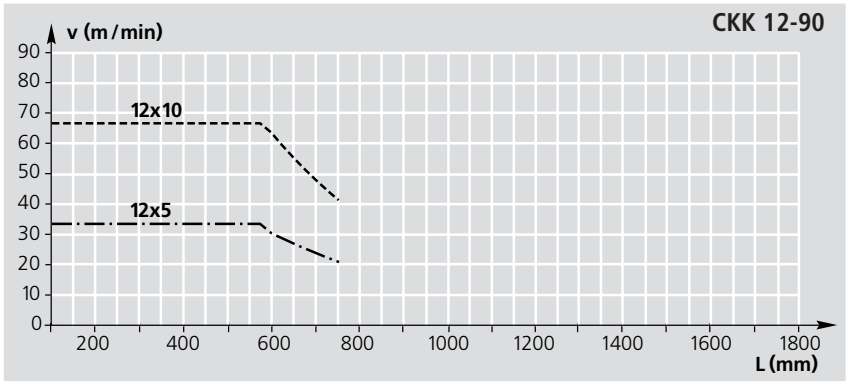
Ball screw journal with keyway

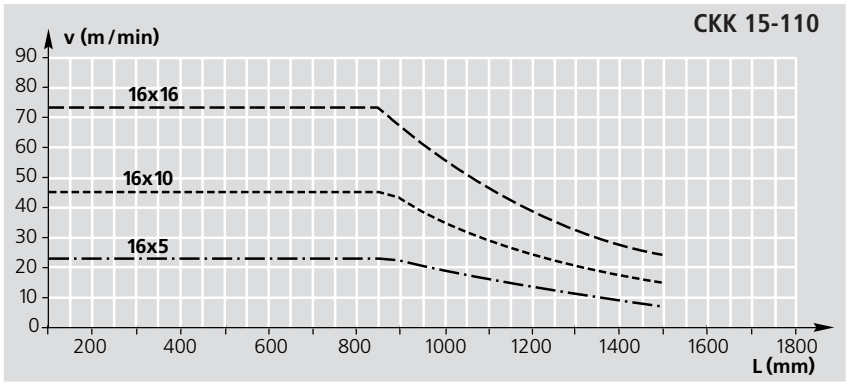
Due to the notch effect and the reduction of the effective diameter, observe the following maximum values for the drive torque!

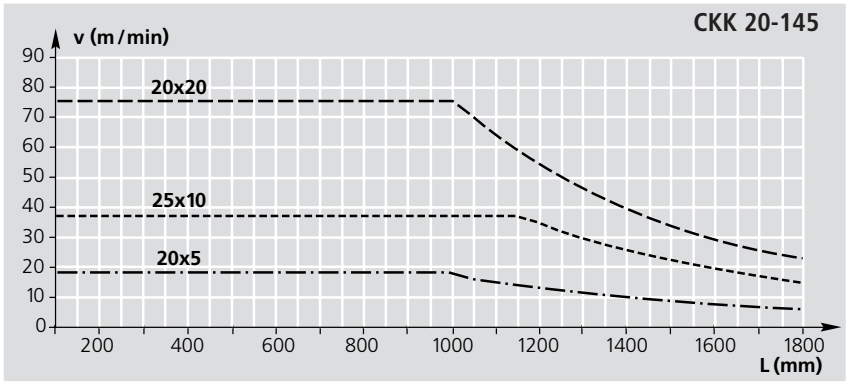
Compact Module	M_{per} (Nm)
CKK 12-90	–
CKK 15-110	5.0
CKK 20-145	11.5

Maximum velocity v

Observe the motor speed!







STAR – Compact Modules CKK
Technical Data

Data for side drive with timing belt, floating bearing side for motor attachment via side drive with timing belt

Motor type		MKD 25B / MMD 042A					MKD 41B / MMD 082A				
Moment of friction M_{RRv} (Nm)		0.35					0.4				
		permissible torque for lengths up to L[(1)] = ... for			reduced mass moment of inertia for		permissible torque for lengths up to L[(1)] = ... for			reduced mass moment of inertia for	
gear ratio i = ...			i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 1.5	i = 1	i = 1.5
Compact Module	ball screw d_0 x P	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)
CKK 12-90	12 x 5	750	1.8	1.2	38	14					
	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		
	20 x 20						1800	7.5	5.0	250	85
	25 x 10						1800	7.5	5.0		

M_{Rv} = permissible torque of system with side drive with timing belt at motor journal (observe max. motor torque of M_{max})

M_{RRv} = moment of friction of side drive with timing belt at motor journal

J_{Rv} = reduced mass moment of inertia of side drive with timing belt

i = gear ratio of side drive with timing belt

(1) permissible torques for other lengths available upon request

AC servo motor data

see "Controllers, Motors, Electrical Accessories" catalog RE 82 701

Motor type		MKD 25B-144 KG1	MKD 41B-144 KG1	MDD 71A-N-060-N2S-095 GB1
Maximum effective speed n_{max}	(min^{-1})			
Rated torque M_N	(Nm)	0.9	2.7	2.2
Maximum torque M_{max}	(Nm)			
Mass moment of inertia $J_M + J_{Br}$	(10^{-6} kgm²)	30 + 8	170 + 16	440 + 38
Braking torque M_{BR}	(Nm)	1.0	2.2	3
Mass with brake m_{Br}	(kg)	2.25	4.65	6.88

	MDD 71A				
	0.45				
	permissible torque for lengths up to L(1) = … for			reduced mass moment of inertia for	
		i = 1	i = 2	i = 1	i = 2
	L (mm)	M_{Rv} (Nm)	M_{Rv} (Nm)	J_{Rv} (10^{-6} kgm²)	J_{Rv} (10^{-6} kgm²)
	1200	10.5	5.2		
	1800	16.0	8.0	1310	217
	1800	16.0	8.0		

MiniDrive motor data

Motor type		MMD 042A	MMD 082A	
Maximum effective speed n_{max}	(min^{-1})	3000	3000	
Rated torque M_N	(Nm)	1.3	2.4	
Maximum torque M_{max}	(Nm)	3.36	6.9	
Mass moment of inertia $J_M + J_{Br}$	(10^{-6} kgm²)	37 + 3	133 + 8	
Braking torque M_{BR}	(Nm)	1.3	2.4	
Mass with brake m_{Br}	(kg)	2.0	3.7	

STAR – Compact Modules CKK
Technical Data, 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 = velocity (from "permissible velocity" chart) (m/min)

Moment of friction

for motor attachment via mount and coupling:

$$M_R = M_{RS}$$

for motor attachment via side drive with timing belt:

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

M_R = moment of friction at motor journal (Nm)
M_R = moment of friction of system (Nm)
M_{RRV} = moment of friction of side drive with timing belt at motor journal (Nm)
i = gear ratio

Constants k_1, k_2, k_3
Moment of friction M_R

Compact Module	Ball screw d_0 x P	Constants k_1 1 carriage	k_1 2 carriages	k_2	k_3	Moment of friction M_R (Nm)
CKK 12-90	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
	25 x 10	26.278	28.431	0.233	2.533	0.78

Mass moment of inertia

For handling:

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

For machining:

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

J_{fr} = mass moment of inertia of additional load (kgm²)
J_M = mass moment of inertia of motor (kgm²)

For motor attachment via mount and coupling

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

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

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

for motor attachment via side drive with timing belt

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

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

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

J_{tot} = total mass moment of inertia (kgm²)
J_{fr} = mass moment of inertia of additional load (kgm²)
J_S = mass moment of inertia of system with additional 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 side drive with timing belt at motor journal (kgm²)
m_{fr} = additional load (kg)
L = length of Compact Module (mm)
i = gear ratio
k_1, k_2, k_3 = constants, see "Constants" table

Speed

When a gear motor is attached the mass moment of inertia of the gear and the gear ratio also have to be included in the calculation.

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

$$n_1 < n_{max}$$

v < permissible velocity from chart

v = permissible velocity (m/min)
n_1 = speed (1/min)
n_{max} = maximum effective motor speed (1/min)
P = screw lead (mm)
i = gear ratio

Coupling data

Couplings with data as indicated in the table opposite are used to connect standard servo motors to Compact Modules CKK... .

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

STAR – Compact Modules CKK
Calculation Example

When dimensioning the drive, always take the motor/controller combination into consideration as the motor type and performance data (e.g. effective speed and maximum torque) depend on the controller or control system used.

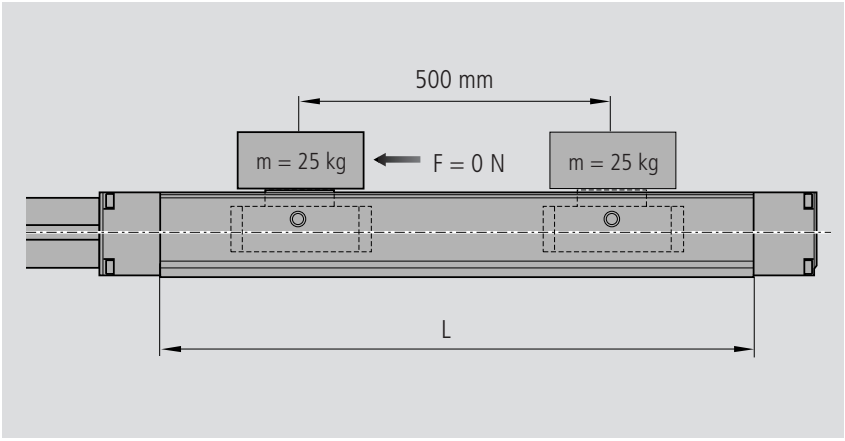
Starting data

A mass of 25 kg is to be moved 500 mm at a maximum velocity of 40 m/min.

Based on its technical data and its installation dimensions, the following unit was selected:

Compact Module CKK 15-110

- one carriage
- 2% preload
- with gap-type polyurethane sealing strip
- with size 41 AC servo motor attachment via motor mount and coupling



Estimation of Compact Module length L

Excess travel	=	$2 \cdot P = 2 \cdot 16$ mm = 32 mm
Max. travel	=	$\text{stroke}_{\text{effective}} + 2 \cdot$ excess travel
	=	500 mm + 2 · 32
	=	564 mm
Compact Module length L	=	(stroke + 2 · excess travel) + 90 (according to formula under "Components and Ordering Data" for CKK 15-110)
	=	564 + 90
	=	654 mm

Selection of the ball screw drive

See "Technical Data" section for graphs.

General recommendation:
Wherever possible, always select the smallest lead (resolution, braking path, length).

According to the chart for "maximum permissible velocity", the permissible screw drives for v = 40 m/min and L = 654 mm are:

KGT 16 x 10 and KGT 16 x 16

Selected ball screw drive (smaller lead):

KGT 16 x 10

with a maximum permissible drive torque of 9 Nm as per "permissible drive torque" chart

Calculating the Compact Module length L

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

Moment of friction M_R

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

Mass moment of inertia J

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

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

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

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

$= 115.8 \cdot 10^{-6}\ kgm^2$

For handling:

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

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

Speed n

at v = 40 m/min

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

$v = 40\ m/min$

Result

Compact Module CKK 15-110

Length	L = 630 mm
Ball screw drive:	
Diameter	16 mm
Lead	10 mm
No. of carriages:	1
Preload:	2%

Motor attachment via motor mount and coupling

Motor with:
– a maximum effective speed $n_{max} > 4000\ min^{-1}$
– a mass moment of inertia $J_M > 19.3 \cdot 10^{-6}\ kgm^2$
– a maximum permissible drive torque $M_{per} < 9$ Nm

Observe coupling torque M_k and moment of friction M_R

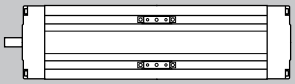
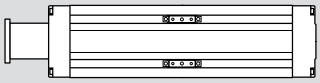
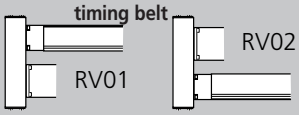
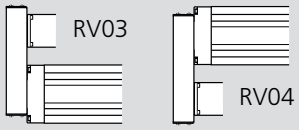
($M_K = 14$ Nm; $R_R = 0.47$ Nm)

These conditions are satisfied by all the permissible AC servo motors listed in the "Components and Ordering Data" tables for CKK 15-110.

The specific motor is selected:

– according to the selection criteria in the "AC servo motor data" table
– and by cross checking the drive unit calculation using the performance data given in the "Controllers, Motors, Electrical Accessories", catalog RE 82 701.

STAR – Compact Module CKK 12-90
Components and Ordering Data

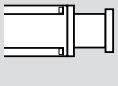
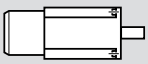
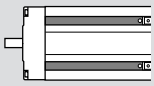
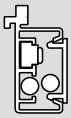
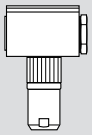
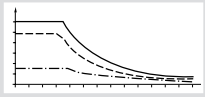
Part number, length 0360-300-00 , (....) mm	Type = (....) (and dimension drawing)	Guideway = (..)	Drive unit = (..)				Carriage = (..)		
			Screw journal	Ball screw size d_0 x P 12 x 5	 12 x 10		one carriage	two carriages l_m = 65 mm	
with ball screw, without motor mount (OF) 	OF01 (03.36.00)	01	Ø 8	01	02		01	02	
with ball screw and motor mount (MF) 	MF01 (03.36.11) (03.36.12) (03.36.13)	01	Ø 8	01	02		01	02	
with ball screw and side drive with timing belt 	RV01 RV02 (03.36.21)	01	Ø 8	01	02		01	02	
	RV03 RV04 (03.36.23)	01	Ø 8	01	02		01	02	

For order example see "Inquiry/Order Form" section.

Calculating the Compact Module length

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

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

	Motor attachment= (..)			Motor = (..)	Cover = (..)		1st, 2nd, 3rd switch = (..)		Documentation = (..)	
										
	Gear ratio i =	Attachment kit[1]	for motor		without polyurethane gap-type seal	with polyurethane gap-type seal	Cable duct = (..) Socket/plug = (..)		Standard report	Measure-ment report
		(00)		(00)						
		(01)	MKD 25B	(50)			without switch and cable duct	(00)		(02) Friction moment
		(05)	MMD 042A	(59)			Switch:			(03) Lead deviation
		(03)	VRDM 368	(27)	(01)	(02)	Reed contact	(21)	(01)	
	1	(10)	MKD 25B	(50)			Hall sensor	(22)		(05) Positioning accuracy
		(12)	MMD 042A	(59)			Cable duct	(25)		
	1.5	(20)	MKD 25B	(50)			External socket/plug, loose	(17)		
		(22)	MMD 042A	(59)						
	1	(11)	MKD 25B	(50)						
		(13)	MMD 042A	(59)						
	1.5	(21)	MKD 25B	(50)						
		(23)	MMD 042A	(59)						

[1] Attachment kit can also be supplied without motor (enter "00" for motor on order form).

Please check whether the selected combination is a permissible one (load capacities, moments, maximum speed, motor data, etc.)!

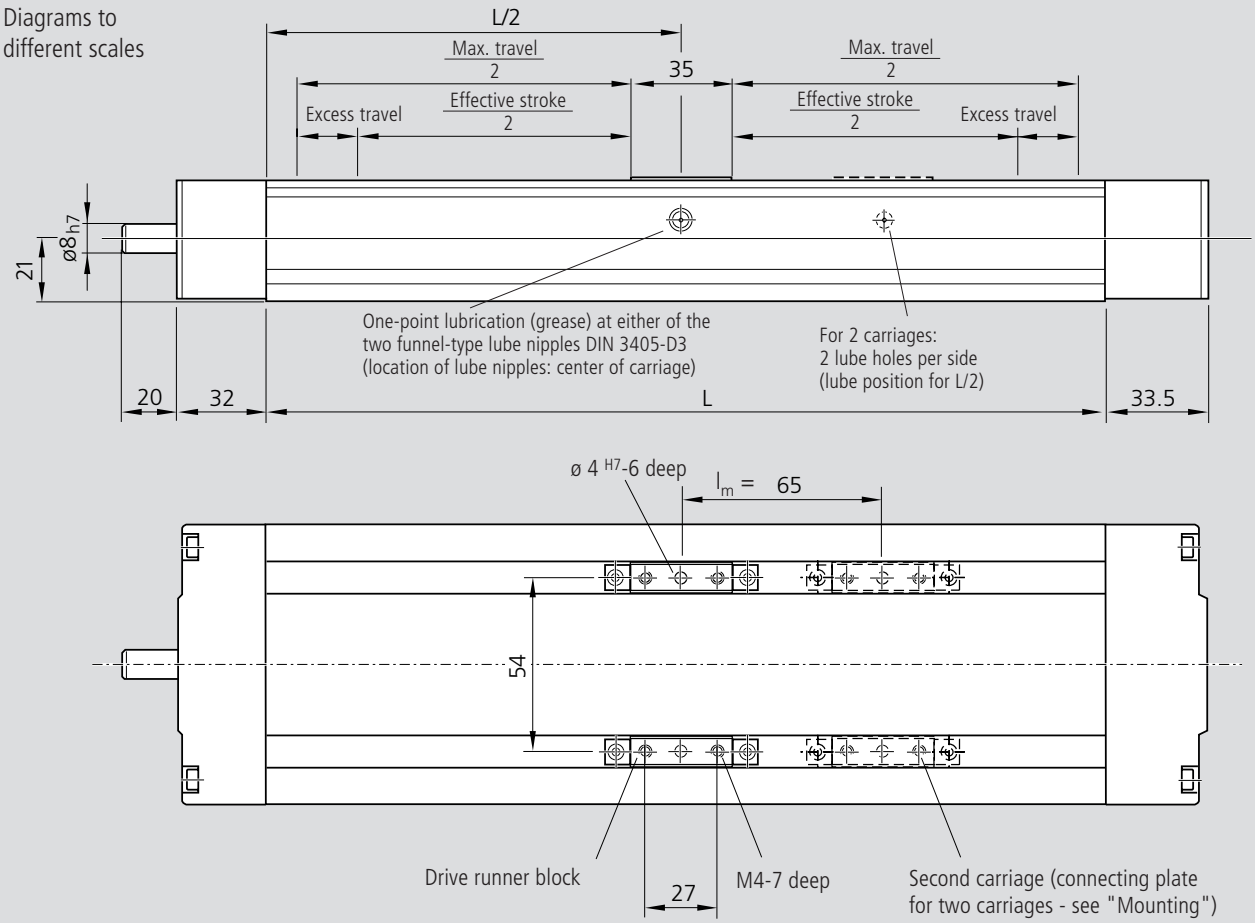
Switch mounting arrangements

A cable duct is required to mount the switches.
Switches may only be mounted on one side (left or right) of the Compact Module.
For more information on switch mounting and switch types, see the section on "Switch Mounting Arrangements".

STAR – Compact Module CKK 12-90
Dimension Drawings

All dimensions in mm

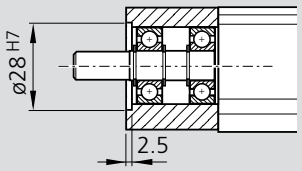
Diagrams to different scales



For further information and dimensions, see "Motors"

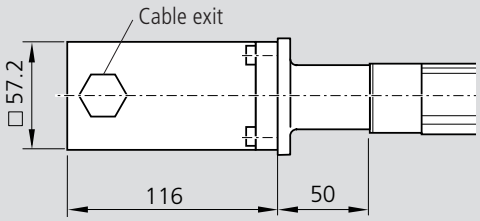
03.36.00

Type OF01



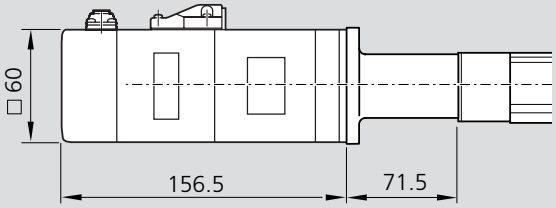
03.36.11

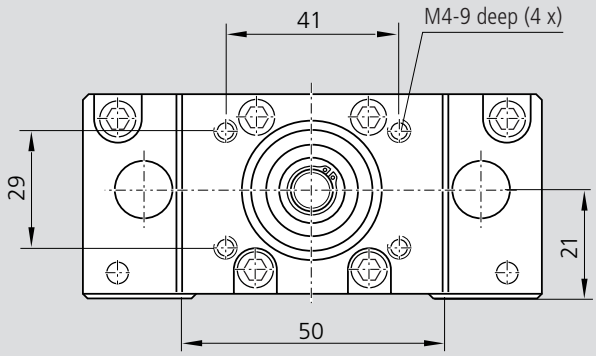
Type MF01
Motor VRDM 368 with mount and coupling

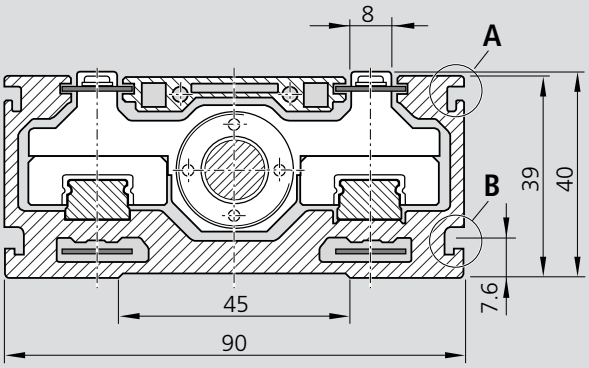


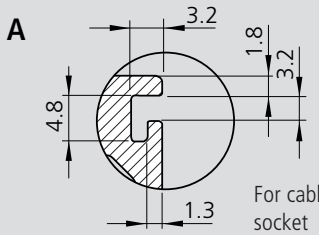
03.36.13

Type MF01
Motor MMD 042A with mount and coupling

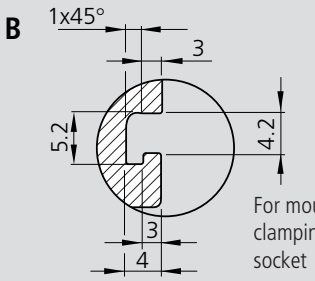








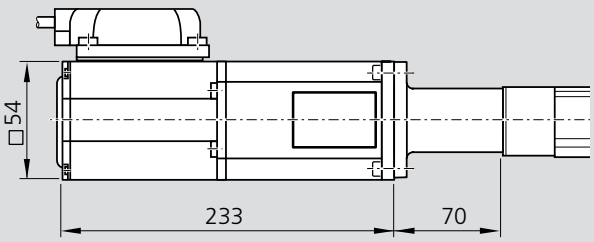
For cable duct, socket



For mounting with clamping fixtures, socket

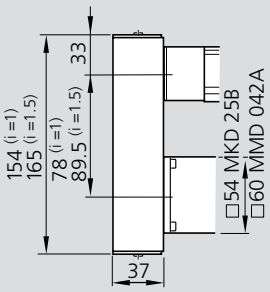
03.36.12

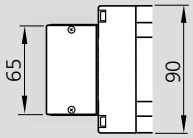
Type MF01
Motor MKD 25B with mount and coupling



03.36.21

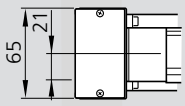
Type RV01, RV02
Motor MKD 25B and MMD 042A with side drive with timing belt

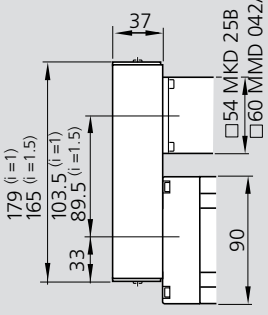




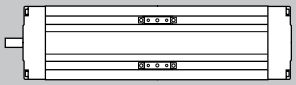
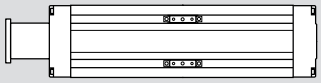
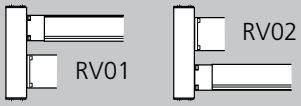
03.36.23

Type RV03, RV04
Motor MKD 25B and MMD 042A with side drive with timing belt





STAR – Compact Module CKK 15-110
Components and Ordering Data

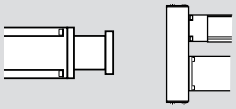
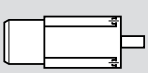
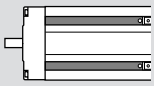
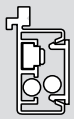
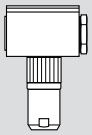
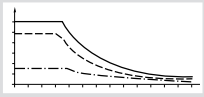
Part number, length 0360-400-00, (....) mm	Type = (....) (and dimension drawing)	Guideway = (..)	Drive unit = (..)					Carriage = (..)		
			Screw journal	Ball screw size d_0 x P 16 x 5	16 x 10	16 x 16		one carriage	two carriages l_m = 85 mm	
with ball screw, without motor mount (OF) 	OF01 (03.46.00)	(01)	Ø 11	(01)	(02)	(03)		(01)	(02)	
			Ø 11 with keyway	(11)	(12)	(13)				
with ball screw and motor mount (MF) 	MF01 (03.46.11) (03.46.12) (03.46.13)	(01)	Ø 11	(01)	(02)	(03)		(01)	(02)	
with ball screw and side drive with timing belt 	RV01 RV02 (03.46.21) (03.46.22)	(01)	Ø 11 Ø 11	(01)	(02)	(03)		(01)	(02)	
	RV03 RV04 (03.46.23) (03.46.24)	(01)		(01)	(02)	(03)		(01)	(02)	

For order example see "Inquiry/Order Form" section.

Calculating the Compact Module length

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

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

	Motor attachment = ..		Motor = ..	Cover = ..		1st, 2nd, 3rd switch = ..	Documentation = ..	
						 		
	Gear ratio i =	Attachment kit[1]	for motor		without polyurethane gap-type seal	with polyurethane gap-type seal	Cable duct = .. Socket/plug = ..	Standard report	Measurement report
		00		00					
		01	MKD 25B	50			witout switch and cable duct 00		02 Friction moment
		03	MKD 41B	10					
		04	VRDM 397	28			Switch:		
			VRDM 3910	29			Reed contact 21		03 Lead deviation
		05	MMD 042A	59	01	02	Hall sensor 22	01	
		06	MMD 082A	60					
	1	10	MKD 25B	50			Cable duct 25		05 Positioning accuracy
		14	MMD 042A	59					
		12	MKD 41B	10			External socket/plug, loose 17		
		16	MMD 082A	60					
	1.5	20	MKD 25B	50					
		24	MMD 042A	59					
		22	MKD 41B	10					
		26	MMD 082A	60					
	1	11	MKD 25B	50					
		15	MMD 042A	59					
		13	MKD 41B	10					
		17	MMD 082A	60					
	1.5	21	MKD 25B	50					
		25	MMD 042A	59					
		23	MKD 41B	10					
		27	MMD 082A	60					

[1] Attachment kit can also be supplied without motor (enter "00" for motor on order form).

Please check whether the selected combination is a permissible one (load capacities, moments, maximum speed, motor data, etc.)!

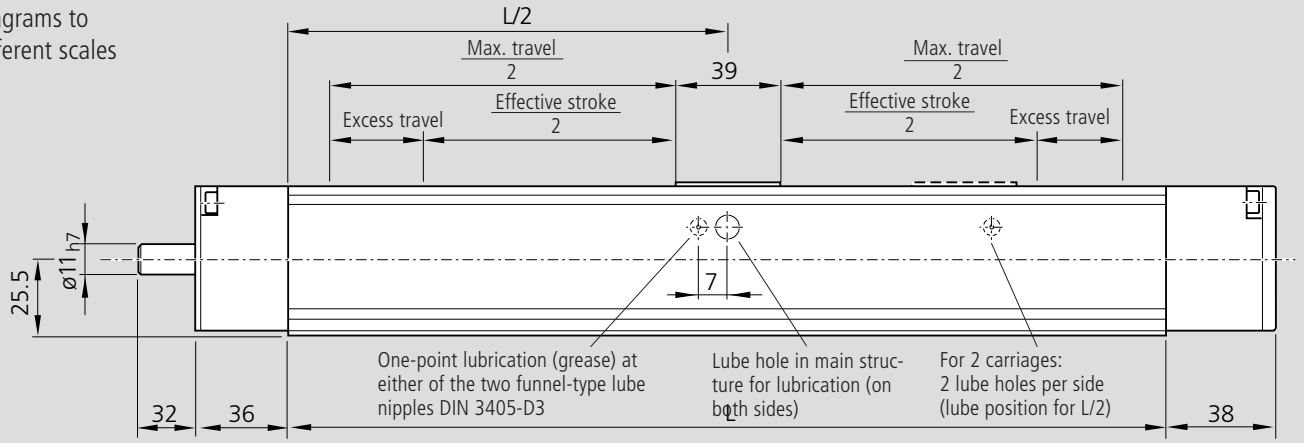
Switch mounting arrangements

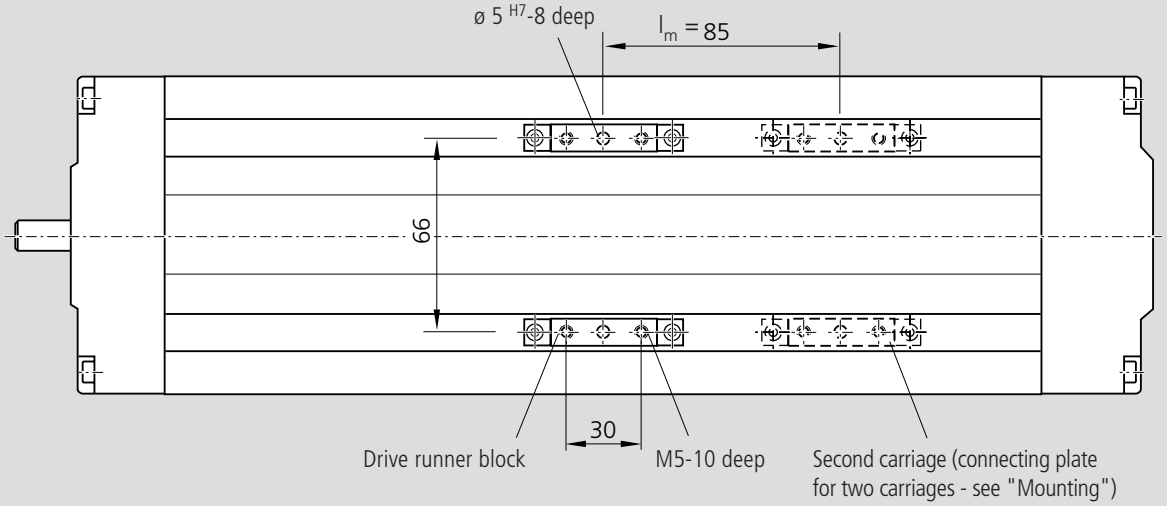
A cable duct is required to mount the switches.
Switches may only be mounted on one side (left or right) of the Compact Module.
For more information on switch mounting and switch types, see the section on "Switch Mounting Arrangements".

STAR – Compact Module CKK 15-110
Dimension Drawings

All dimensions in mm

Diagrams to different scales

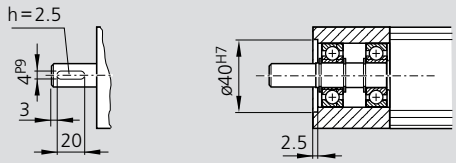




For further information and dimensions, see "Motors"

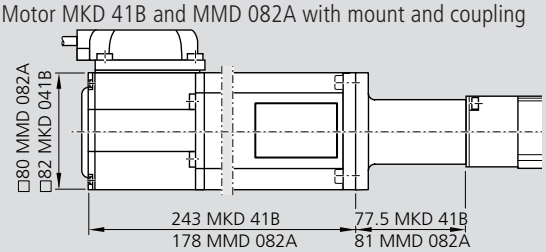
03.46.00

Type OF01



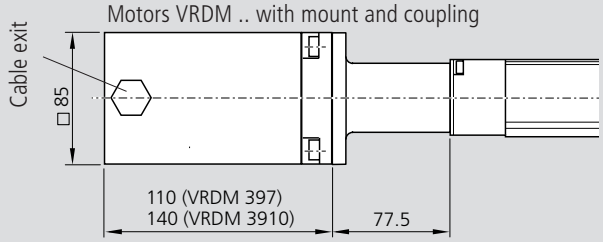
03.46.12

Type MF01
Motor MKD 41B and MMD 082A with mount and coupling



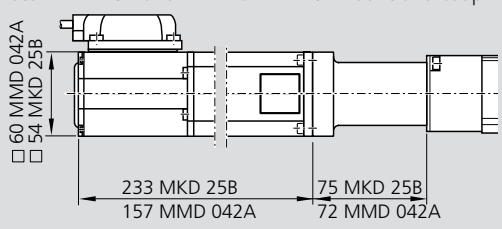
03.46.11

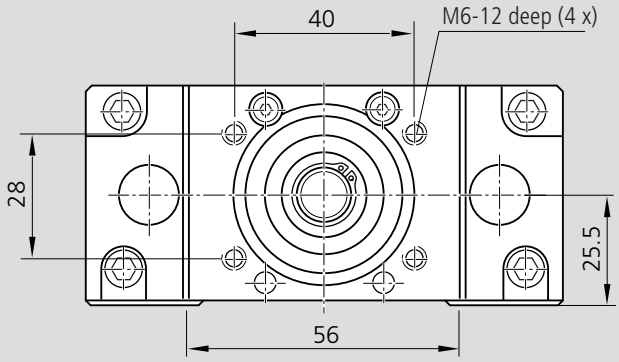
Type MF01
Motors VRDM .. with mount and coupling

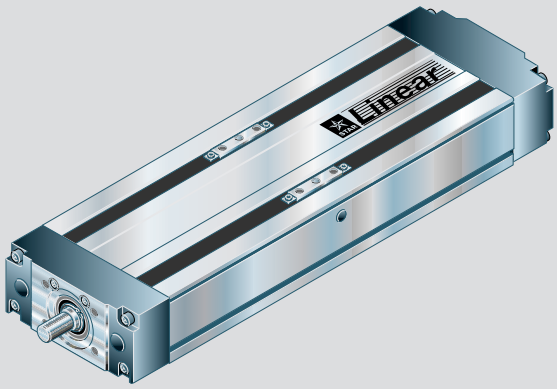


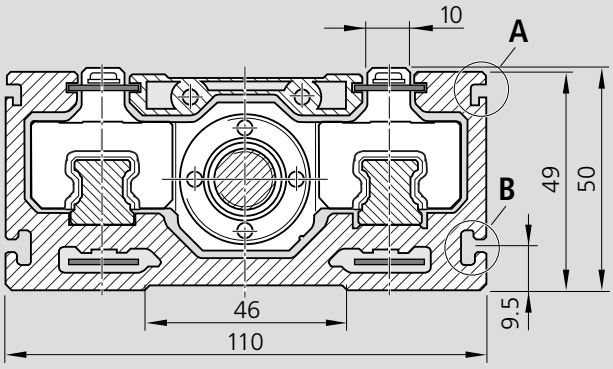
03.46.13

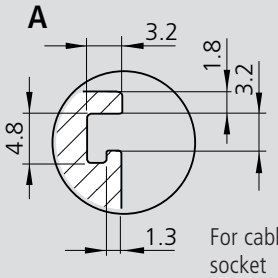
Type MF01
Motor MKD 25B and MMD 042A with mount and coupling



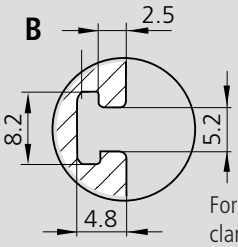








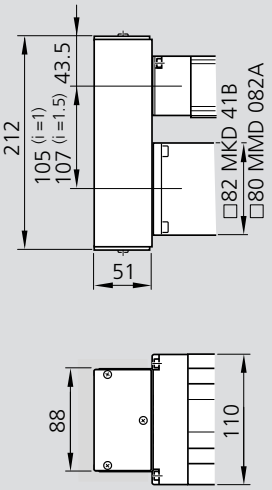
For cable duct, socket



For mounting with clamping fixtures

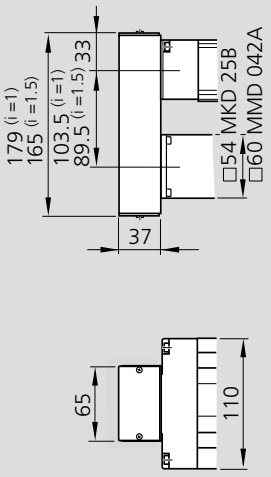
03.46.21

Type RV01, RV02
Motor MKD 41B and MMD 082A
with side drive with timing beltt



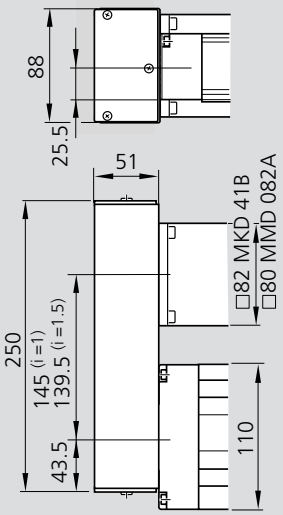
03.46.22

Type RV01, RV02
Motor MKD 25B and MMD 042A
with side drive with timing belt



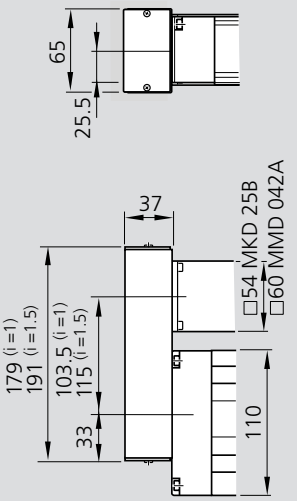
03.46.23

Type RV03, RV04
Motor MKD 41B and MMD 082A
with side drive with timing belt

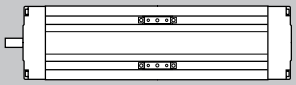
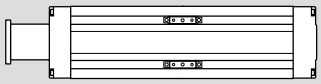
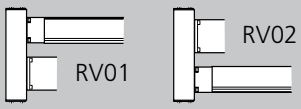
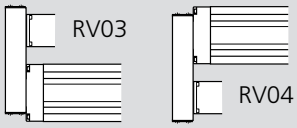


03.46.24

Type RV03, RV04
Motor MKD 25B and MMD 042A
with side drive with timing belt



STAR – Compact Module CKK 20-145
Components and Ordering Data

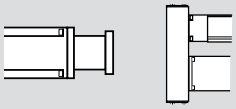
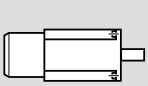
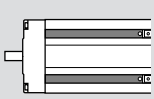
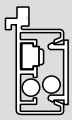
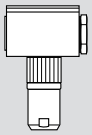
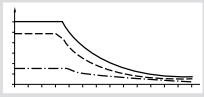
Part number 0360-500-00, (....) mm	Type = (....) (and dimension drawing)	Guideway = (..)	Drive unit = (..)					Carriage = (..)		
			Screw journal	Ball screw size d_0 x P				one carriage	two carriages l_m = 100 mm	
				20 x 5	20 x 20	25 x 10				
with ball screw, without motor mount (OF) 	(OF01) (03.56.00)	(01)	Ø 14	(01)	(02)	(03)		(01)	(02)	
			Ø 14 with keyway	(11)	(12)	(13)				
with ball screw and motor mount (MF) 	(MF01) (03.56.11) (03.56.12)	(01)	Ø 14	(01)	(02)	(03)		(01)	(02)	
with ball screw and side drive with timing belt 	(RV01) (RV02) (03.56.21) (03.56.24)	(01)	Ø 14	(21)	(22)	(23)		(01)	(02)	
	(RV03) (RV04) (03.56.23) (03.56.24)	(01)	Ø 14	(21)	(22)	(23)		(01)	(02)	

For order example see "Inquiry/Order Form" section.

Calculating the Compact Module length

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

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

	Motor attachment = (..)			Motor = (..)	Cover = (..)		1st, 2nd, 3rd switch = (..)		Documentation = (..)	
										
	Gear ratio i =	Attachment kit[1)]	for motor		without polyurethane gap-type seal	with polyurethane gap-type seal	Cable duct = (..) Socket/plug = (..)		Standard report	Measurement report
		(00)		(00)						
		(03)	MKD 41B	(10)			without switch and cable duct (00)			(02) Friction moment
		(06)	MMD 082A	(60)						
		(04)	VRDM 397	(28)			Switch: Reed contact (21)			(03) Lead deviation
			VRDM 3910	(29)	(01)	(02)	Hall sensor (22)		(01)	
		(05)	VRDM 3913	(30)						
	1	(10)	MKD 41B	(10)			Cable duct (25)			(05) Positioning accuracy
		(16)	MMD 082A	(60)						
		(14)	MDD 71A	(15)			External socket/plug, loose (17)			
	1.5	(20)	MKD 41B	(10)						
		(26)	MMD 082A	(60)						
	2	(24)	MDD 71A	(15)						
	1	(11)	MKD 41B	(10)						
		(17)	MMD 082A	(60)						
		(15)	MDD 71A	(15)						
	1.5	(21)	MKD 41B	(10)						
		(27)	MMD 082A	(60)						
	2	(25)	MDD 71A	(15)						

1) Attachment kit can also be supplied without motor (enter "00" for motor on order form)

Please check whether the selected combination is a permissible one (load capacities, moments, maximum speed, motor data, etc.)!

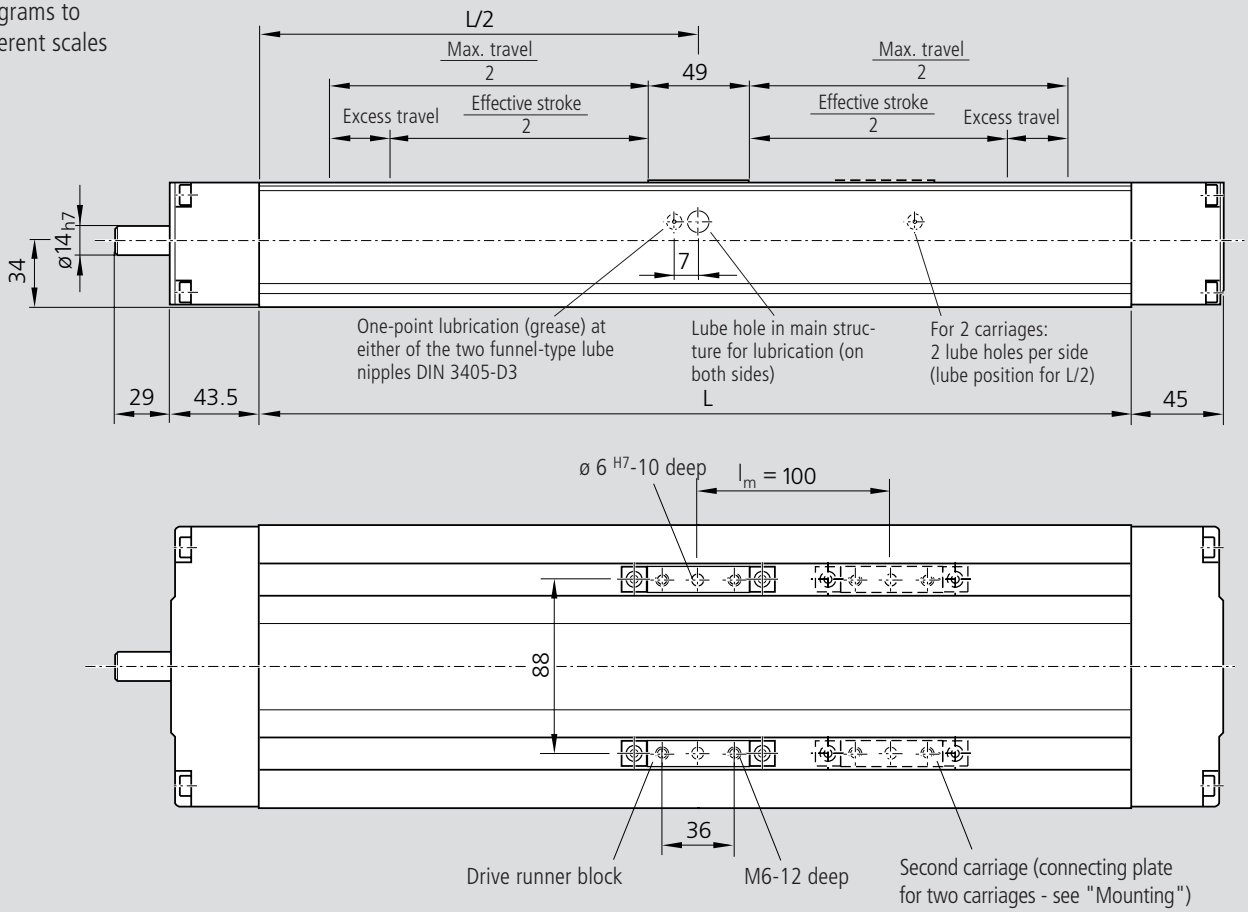
Switch mounting arrangements

A cable duct is required to mount the switches.
Switches may only be mounted on one side (left or right) of the Compact Module.
For more information on switch mounting and switch types, see the section on "Switch Mounting Arrangements".

STAR – Compact Module CKK 20-145
Dimension Drawings

All dimensions in mm

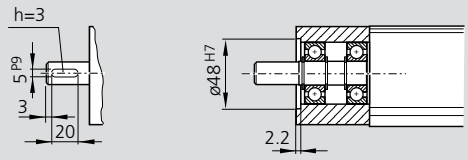
Diagrams to different scales



For further information and dimensions, see "Motors"

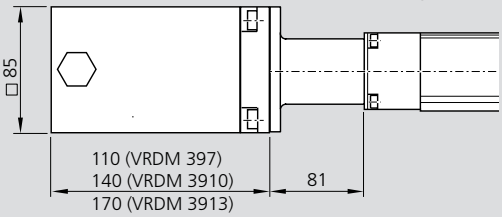
03.56.00

Type OF01



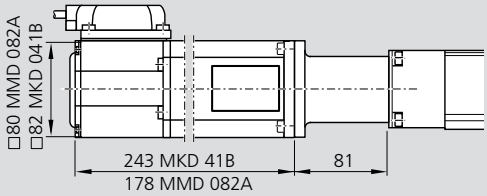
03.56.11

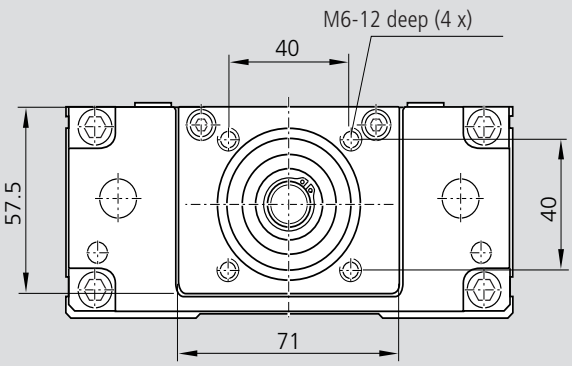
Type MF01
Motors VRDM .. with mount and coupling

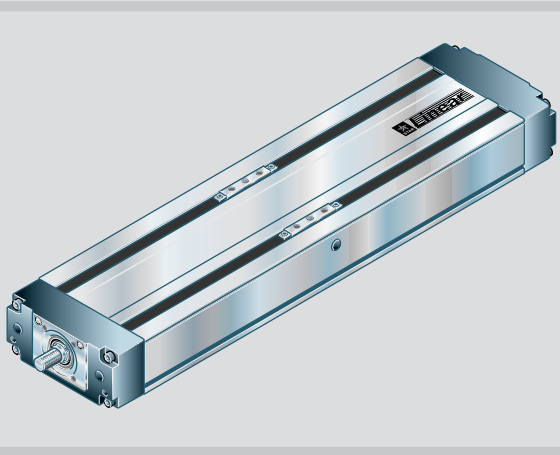


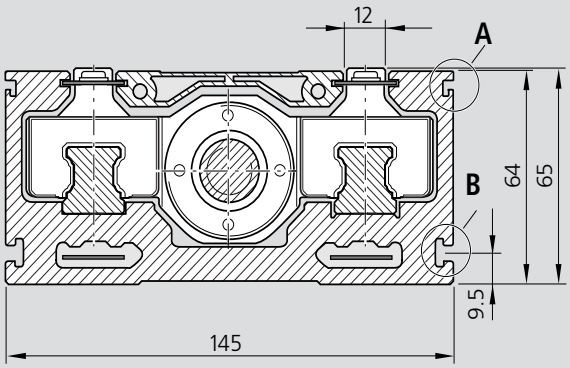
03.56.12

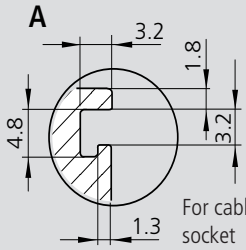
Type MF01
Motor MKD 41B and MMD 082A with mount and coupling



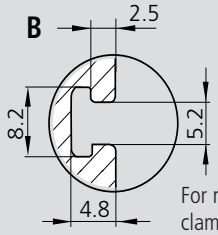








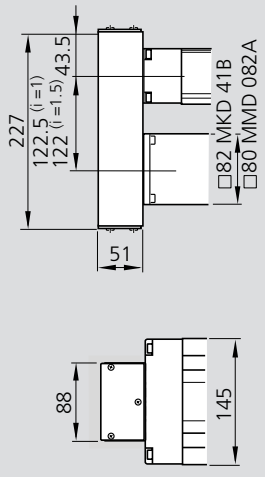
For cable duct, socket



For mounting with clamping fixtures

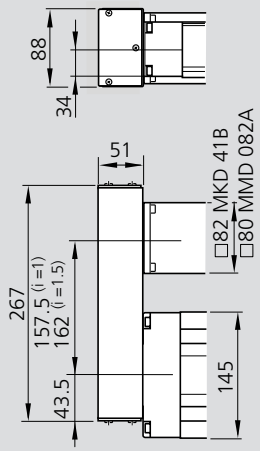
03.56.21

Type RV01, RV02
Motor MKD 41B and MMD 082A
with side drive with timing belt



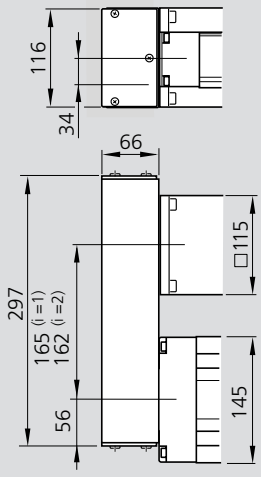
03.56.23

Type RV03, RV04
Motor MKD 41B and MMD 082A
with side drive with timing belt



03.56.24

Type RV01, RV02, RV03, RV04
Motor MDD 71A
with side drive with timing belt



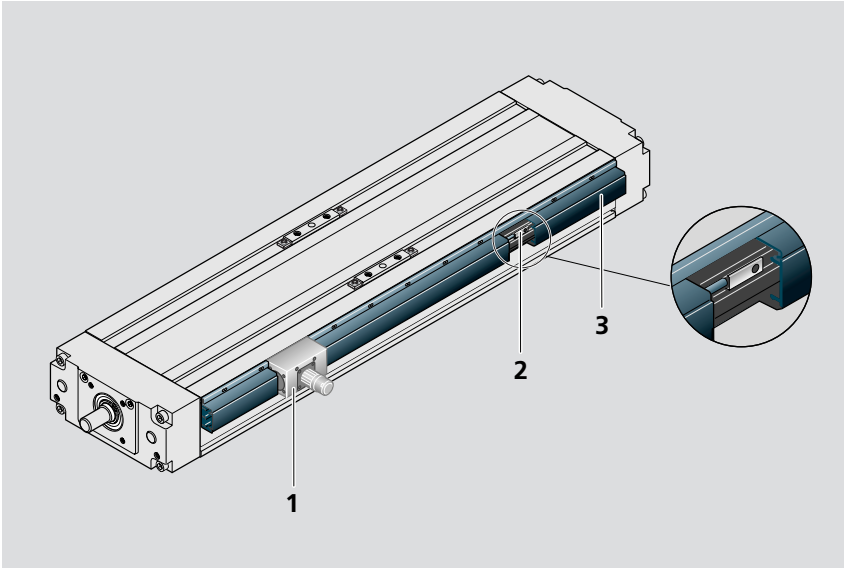
STAR – Compact Modules CKK
Switch Mounting Arrangements

Overview of the switching system

1 Socket and plug
2 Switch
3 Cable duct
(aluminum alloy, black anodized)

⚠ Short stroke: take the length of switch and socket into consideration!

For two-carriages versions:
switch actuation by the carriage on the motor side.



Switches

Miniature switches with potted cable.

Type:

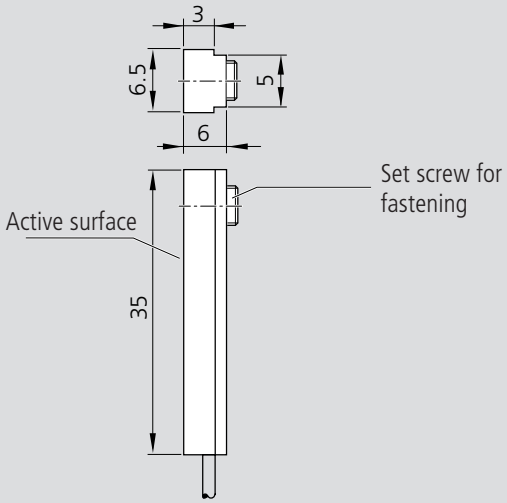
– Hall sensor (NC) or
– Reed contact (changeover)

Mounting instructions:

Switches may only be mounted on one side (left or right) of the Compact Module and should not be installed until the Compact Module has been mounted on its base.

A cable duct is required to mount the switches.

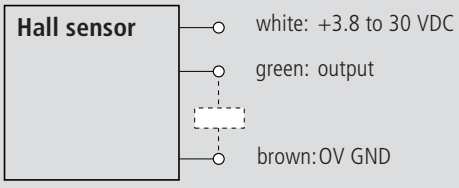
Insert the switches into the *upper* T-slot in the cable duct and fix them in place using set screws.

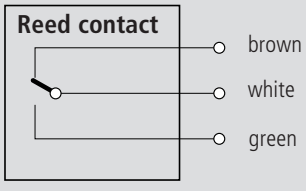


Hall sensor	
Type of contact	PNP NC
Service voltage	3.8–30 V DC
Power consumption	max. 10 mA
Output current	max. 20 mA
Cable length	2000 mm
Housing protection	IP 66
Short-circuit protection	no

Reed contact	
Type of contact	changeover
Switching voltage	max. 100 V DC
Switching current	max. 0.5 A
Cable length	2000 mm
Housing protection	IP 66

Pin allocation



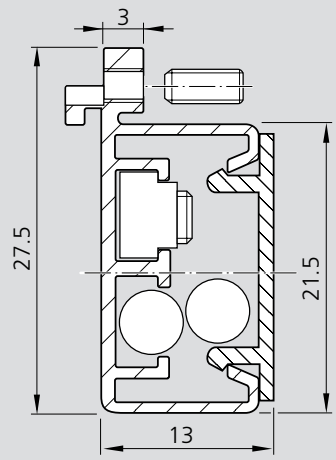


Cable duct

Function:

– to secure switches
– to house cables

Mounting instructions:
Snap the cable duct into the T-slots on the main structure and fix it in place using set screws (supplied along with the duct).



Socket and plug

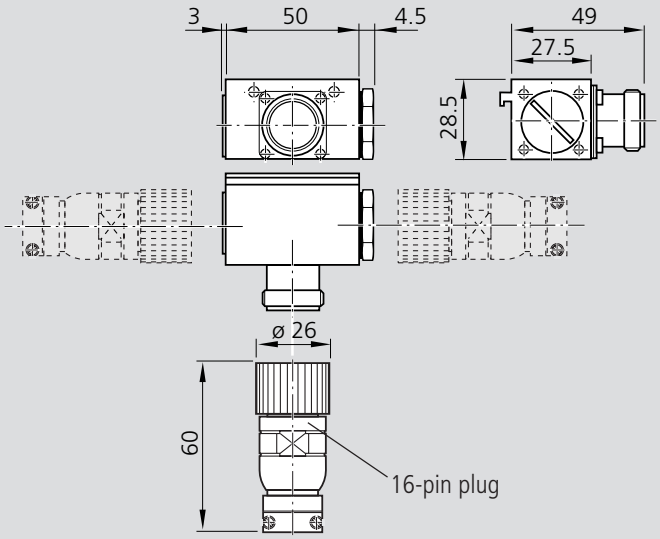
- Fit the socket to the side with the switches.

The socket and plug have 16 pins each.

They are not prewired, thus allowing the switch activation points to be optimized during start-up.

A plug is provided.

The plug can be mounted in three directions (see illustration).



Ordering data for switches and mounting components

The part numbers are listed in the table below.

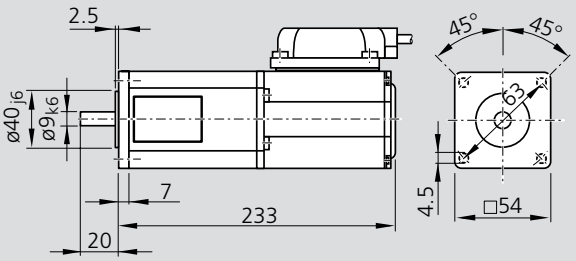
Mounting components can also be ordered individually.

Item		Part numbers for mounting to: CKK 12-90, CKK 15-110, CKK 20-145
1	**Socket/plug**	0375-400-00
2	**Switch**	
	– Reed contact	8616-009-03
	– Hall sensor	8616-010-03
3	**Cable duct**	0396-620-18

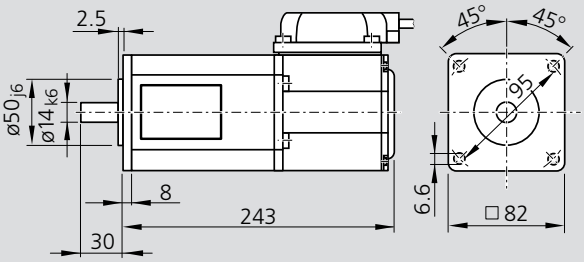
STAR – Compact Modules CKK
Motors

AC servo motor dimensions

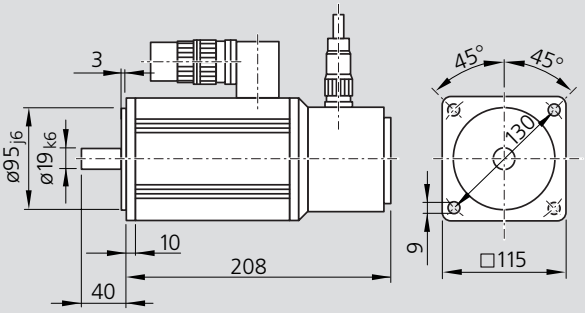
MKD 25B-144 KG1
Part number 8611-050-03



MKD 41B-144 KG1
Part number 8611-010-03



MDD 71A-N-060-N2S-095 GB1
Part number 8611-015-03



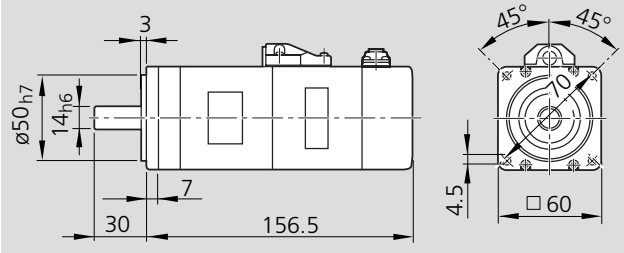
AC servo motor data

Motor		MKD 25B	MKD 41B	MDD 71A
Maximum effective speed n_{max}	(min^{-1})	ϟ	ϟ	ϟ
Rated torque M_N	(Nm)	0.9	2.7	2.2
Maximum torque M_{max}	(Nm)	ϟ	ϟ	ϟ
Mass moment of inertia $J_M + J_{Br}$	(10^{-6} kgm²)	30 + 8	170 + 16	440 + 38
Braking torque M_{Br}	(Nm)	1.0	2.2	3.0
Mass with brake m_{Br}	(kg)	2.25	4.65	6.88

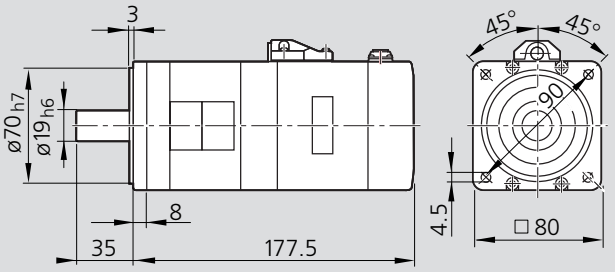
ϟ see "Controllers, Motors, Electrical Accessories" catalog RE 82 701

MiniDrive dimensions

MMD 042A-030-EG1-KN
Part number 8611-059-03

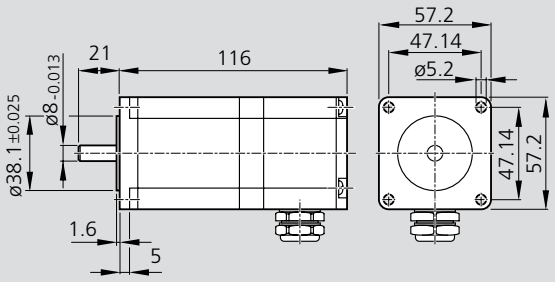


MMD 082A-030-EG1-KN
Part number 8611-060-03



Three-phase stepping motor dimensions

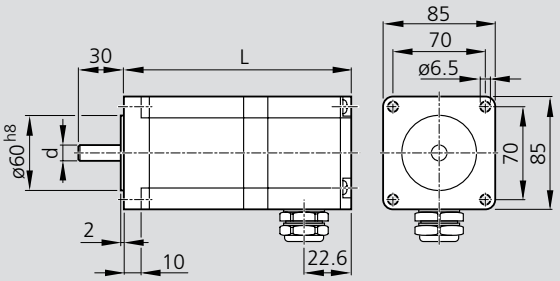
VRDM 368/50 LWB
Part number 8611-027-06



VRDM 397/50 LWB
Part number 8611-028-06

VRDM 3910/50 LWB
Part number 8611-029-06

VRDM 3913/50 LWB
Part number 8611-030-06



Motor	L	d_{h6}
VRDM 397	110	12
VRDM 3910	140	12
VRDM 3913	170	14

Three-phase stepping motor data

Motor		VRDM 368 50 LWB	VRDM 397 50 LWB	VRDM 3910 50 LWB	VRDM 3913 50 LWB
Number of steps		200 / 400 / 500 / 1000			
Stepping angle	(°)	1.8 / 0.9 / 0.72 / 0.36			
Maximum torque	(Nm)	1.5	2.0	4.0	6.0
Mass moment of inertia	($kgcm^2$)	0.38	1.1	2.2	3.3
Braking torque	(Nm)	1.74	2.26	4.52	6.78
Mass	(kg)	1.1	2.05	3.1	4.2

Note

The motors can be supplied as complete units with control system.

Additional information on motors and control systems can be found in catalog **RE 82 701.**

Drawings to different scales.

MiniDrive motor data

Motor type		MMD 042A	MMD 082A	
Maximum effective speed n_{max}	(min^{-1})	3000	3000	
Rated torque M_N	(Nm)	1.3	2.4	
Maximum torque M_{max}	(Nm)	3.36	6.9	
Mass moment of inertia $J_M + J_{Br}$	(10^{-6} kgm^2)	37 + 3	133 + 8	
Braking torque M_{Br}	(Nm)	1.3	2.4	
Mass with brake m_{Br}	(kg)	2.0	3.7	

STAR – Compact Modules CKK
Mounting

General information

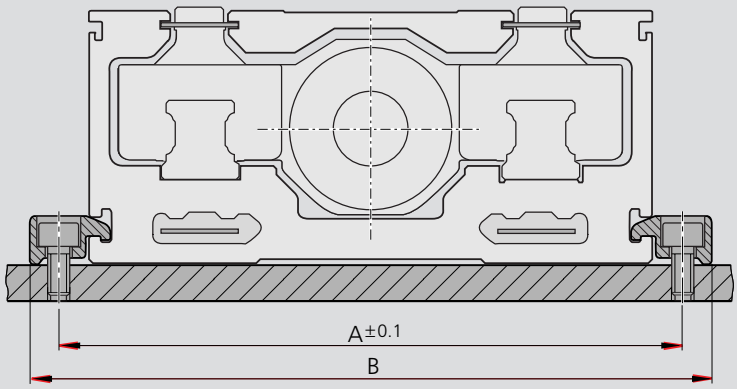
The Compact Modules are mounted using clamping fixtures.

⚠ Do not mount the Compact Module by the end blocks!
The frame is the main stress-bearing structure!

When mounting the Compact Modules, observe the maximum tightening torque values as indicated in the table.

Size	A (mm)	B (mm)
12-90	102	112
15-110	126	140
20-145	161	175

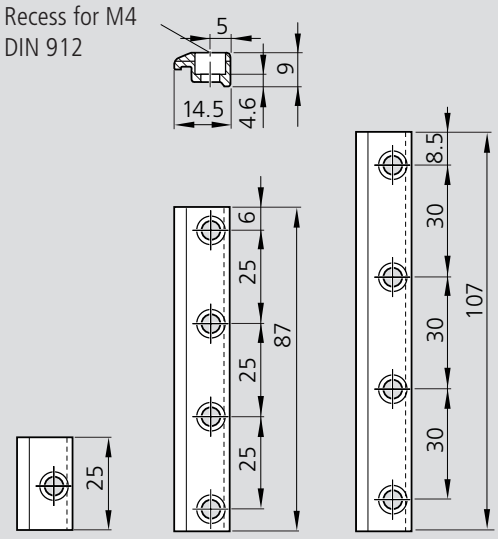
Mounting with clamping fixtures



Clamping fixtures

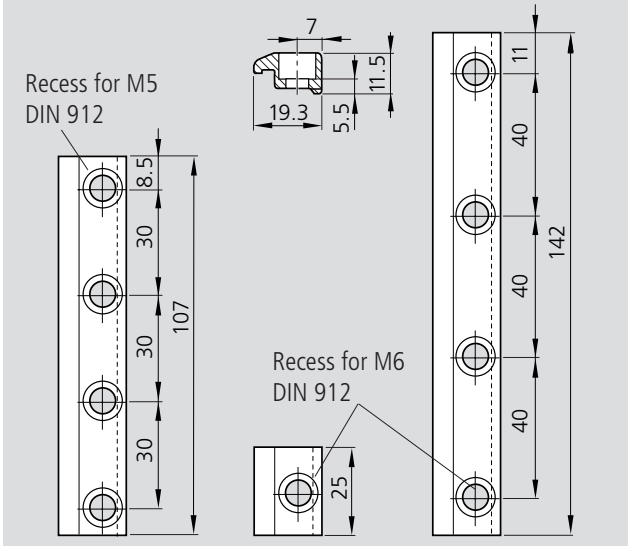
Recommended number of clamping fixtures: with 1 hole, 6 per meter and side
with 4 holes, 3 per meter and side

Size 12-90



Part numbers		
0375-310-00	0375-310-02	0375-310-03

Size 15-110
Size 20-145



Part numbers		
0375-410-02	0375-510-00	0375-510-02

Tightening torques of the mounting screws

with friction factor 0.125
Tensile class 8.8

8.8	M4	M5	M6
Nm	2.7	5.5	9.5

Connection plate

Connection plate

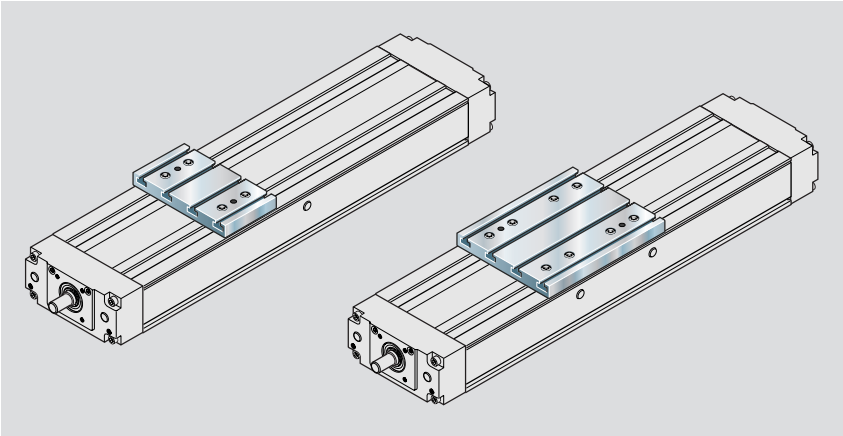
Function:

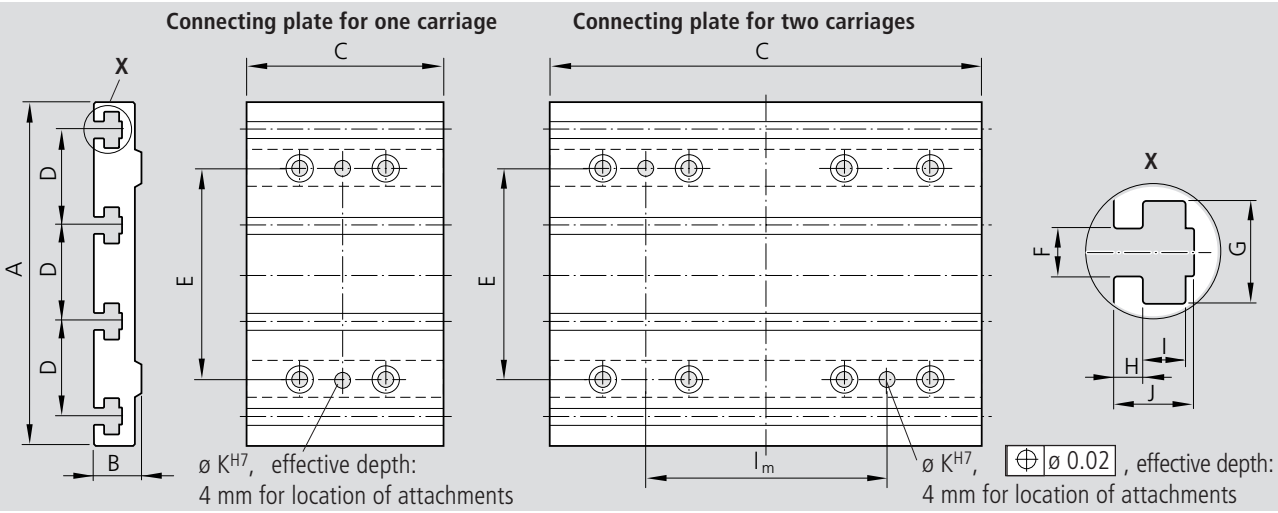
– Mounting base (with T nuts) for attachments
– Connects two carriages on one Compact Module.

The kit consists of:

– Connecting plate
– Fasteners for mounting to carriages.

T nuts are not provided.



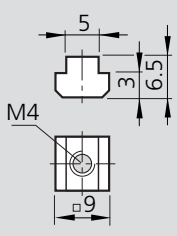
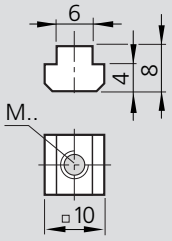
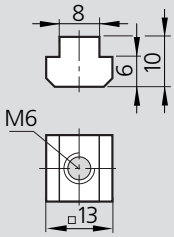


Size	Car-riages	Part number Kit	Dimensions (mm) l_m	A	B	C	D	E	F	G	H	I	J	K^{H7}	Mass (kg)
12-90	1	0375-300-02	–	89	12	50	25	54	5	9.6	4.5	3.3	8.3	4	0.13
	2	0375-300-01	65			120									0.30
15-110	1	0375-400-02	–	109	15	60	30	66	6	11.0	5.0	4.3	9.9	5	0.24
	2	0375-400-01	85			145									0.60
20-145	1	0375-500-02	–	144	18	80	40	88	8	14.5	4.9	6.2	11.8	6	0.50
	2	0375-500-01	100			180									1.10

T nuts

(DIN 508)

For fastening attachments to the connecting plate.

Size 12-90	Size 15-110	Size 20-145
		
Part number	**Part number**	**Part number**
8447-007-01	M4: 8447-004-01 M5: 8447-005-01	8447-001-01

STAR – Compact Modules CKK
Connectors

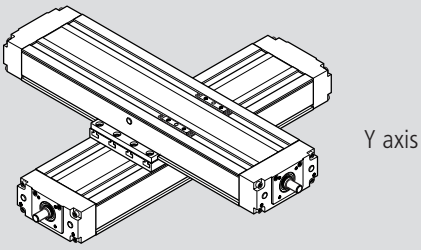
Overview

STAR connectors facilitate the assembly of multi-axis systems (X-Y axes, X-Z axes)
The connection system allows a Compact Module to be combined with another of the same size or one size smaller.

The connectors are supplied as complete kits (connection plate, angle bracket, clamping fixture, screws, pins) required to connect two axes.

Connection of 2 Compact Modules using a connection plate

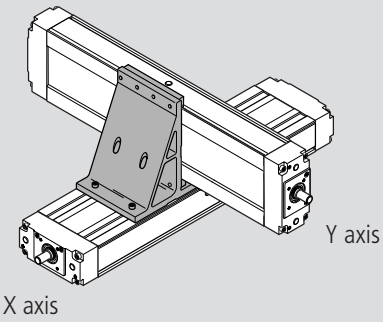
X-Y axes



Y axis attached to the main structure
(carriage travels along the Y axis)

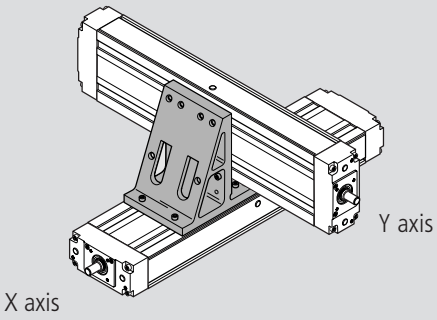
Connection of 2 Compact Modules using angle brackets

X-Y axes



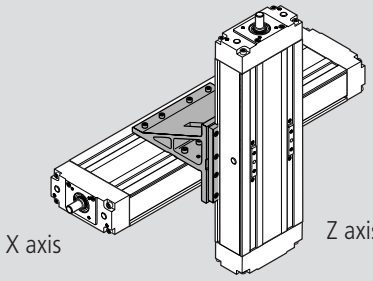
Y axis attached to the main structure
(carriage travels along the Y axis)

X-Y axes



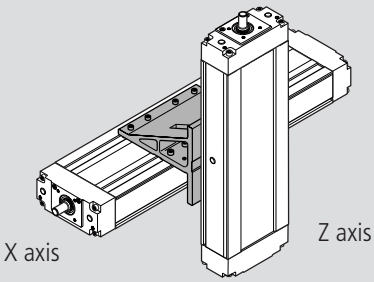
Y axis attached to the carriage
(main structure travels along the Y axis)

X-Z axes



Z axis attached to the main structure
(carriage travels along the Z axis)

X-Z axes

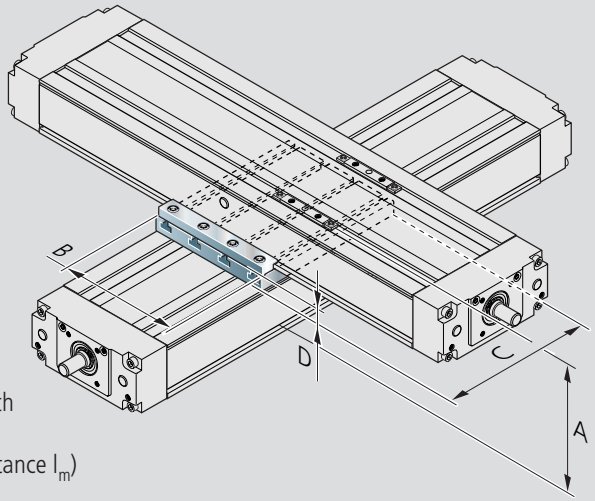


Z axis attached to the carriage
(main structure travels along the Z axis)

Connection of 2 Compact Modules using a connection plate (X-Y axes)

Y axis attached to the main structure (carriage travels along the Y axis)

A = total height
B = connection plate width
C = connection plate length



X axis
Type:
Compact Module with
2 carriages
(center-to-center distance l_m)

Y axis
Type:
Compact Module with
1 or 2 carriages,
carriage travels

Part number of connection plate kits (consisting of connection plate, clamping fixture, screws, pins)

X axis 2 carriages	Y axis 1 or 2 carriages		
	CKK 12-90	CKK 15-110	CKK 20-145
CKK 12-90 l_m = 65 mm	0391-200-28		
CKK 15-110 l_m = 85 mm	0391-200-29	0391-200-30	
CKK 20-145 l_m = 100 mm		0391-200-31	0391-200-33

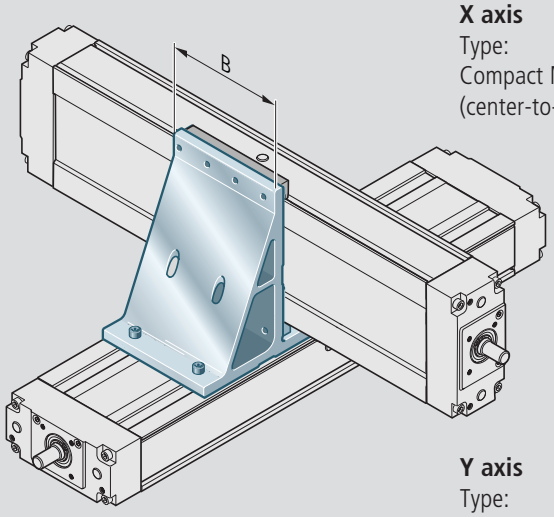
Note:
In motor attachments via side drive with timing belt, the motor may possibly extend into the work zone of adjacent axes.
Make sure it will not obstruct any motion!

Part number Kit	Dimensions (mm)							Mass (kg)
	A	B	C	D				
0391-200-28	92	89	120	12				0.37
0391-200-29	105	109	145	15				0.65
0391-200-30	115	109	145	15				0.70
0391-200-31	133	144	180	18				1.26
0391-200-33	148	144	180	18				1.26

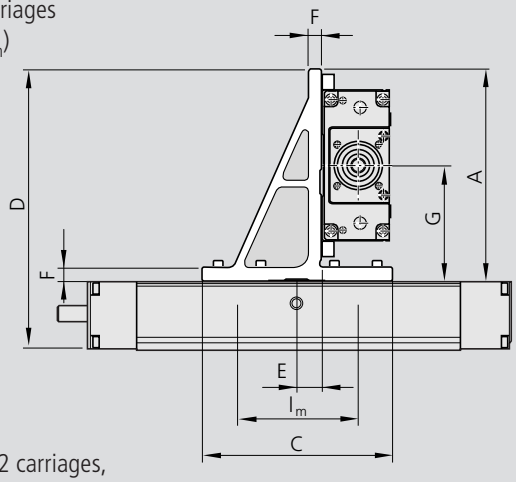
STAR – Compact Modules CKK
Connectors

Connection of 2 Compact Modules using angle brackets (X-Y axes)

Y axis attached to the main structure (carriage travels along the Y axis)



X axis
Type:
Compact Module with 2 carriages
(center-to-center distance l_m)



Y axis
Type:
Compact Module with 1 or 2 carriages,
carriage travels

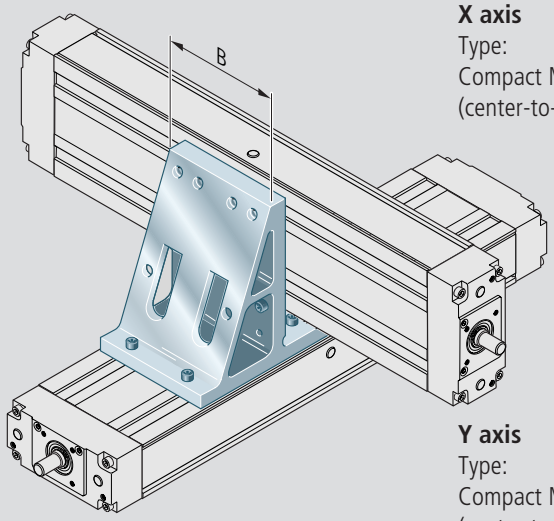
Part number of angle bracket kits (consisting of angle bracket, clamping fixtures, screws, pins)

X axis 2 carriages	Y axis 1 or 2 carriages		
	CKK 12-90	CKK 15-110	CKK 20-145
CKK 12-90 l_m = 65 mm	0391-100-21		
CKK 15-110 l_m = 85 mm	0391-100-25	0391-100-23	
CKK 20-145 l_m = 100 mm		0391-100-29	0391-100-27

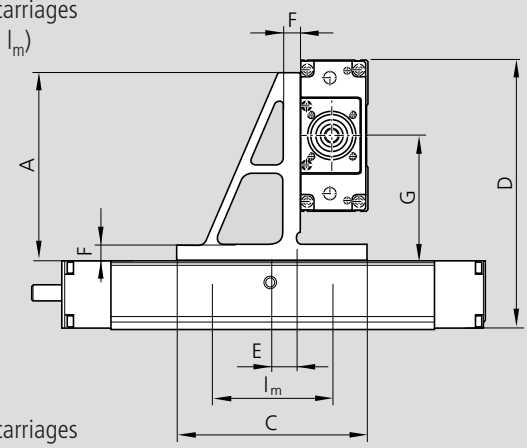
Part number Kit	Dimensions (mm)							Mass (kg)
	A	B	C	D	E	F	G	
0391-100-21	130	110	110	170	11.5	8	72	0.81
0391-100-23	161	155	142	211	19	10	89	1.80
0391-100-25	135	143	142	185	19	10	75	1.51
0391-100-27	202	145	155	267	22	14	111.5	2.71
0391-100-29	168	180	155	232	22	14	96	3.10

Connection of 2 Compact Modules using angle brackets (X-Y axes)

Y axis attached to the carriage (main structure travels along the Y axis)



X axis
Type:
Compact Module with 2 carriages
(center-to-center distance l_m)



Y axis
Type:
Compact Module with 2 carriages
(center-to-center distance l_m),
main structure travels

Part number of angle bracket kits (consisting of angle bracket, clamping fixtures, screws, pins)

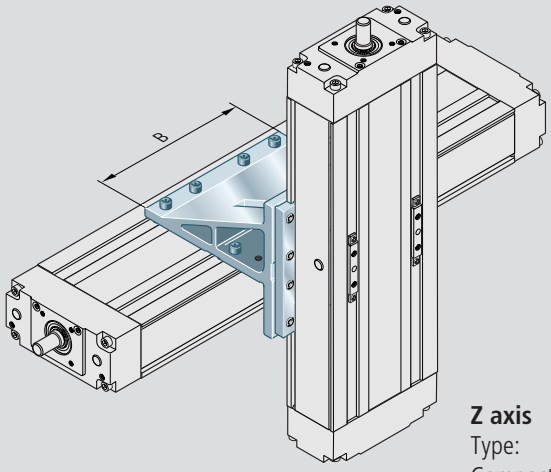
X axis 2 carriages	Y axis 2 carriages		
	CKK 12-90 l_m = 65 mm	**CKK 15-110** l_m = 85 mm	**CKK 20-145** l_m = 100 mm
CKK 12-90 l_m = 65 mm	0391-100-22		
CKK 15-110 l_m = 85 mm	0391-100-26	0391-100-24	
CKK 20-145 l_m = 100 mm		0391-100-30	0391-100-28

Part number Kit	Dimensions (mm)							Mass (kg)
	A	B	C	D	E	F	G	
0391-100-22	110	115	110	157	11.5	8	72	0.74
0391-100-24	135	143	142	194	19	10	89	1.50
0391-100-26	120	110	142	170	19	10	75	1.00
0391-100-28	168	180	155	249	22	14	111.5	2.95
0391-100-30	150	145	155	216	22	14	96	2.11

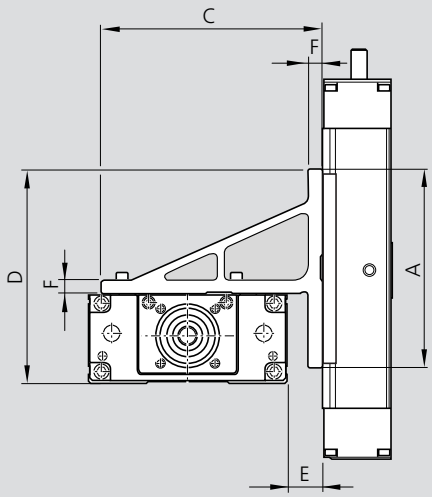
STAR – Compact Modules CKK
Connectors

Connection of 2 Compact Modules using angle brackets (X-Z axes)

Z axis attached to the main structure (carriage travels along the Z axis)



X axis
Type:
Compact Module with 2 carriages (center-to-center distance l_m)



Z axis
Type:
Compact Module with 1 or 2 carriages, carriage travels

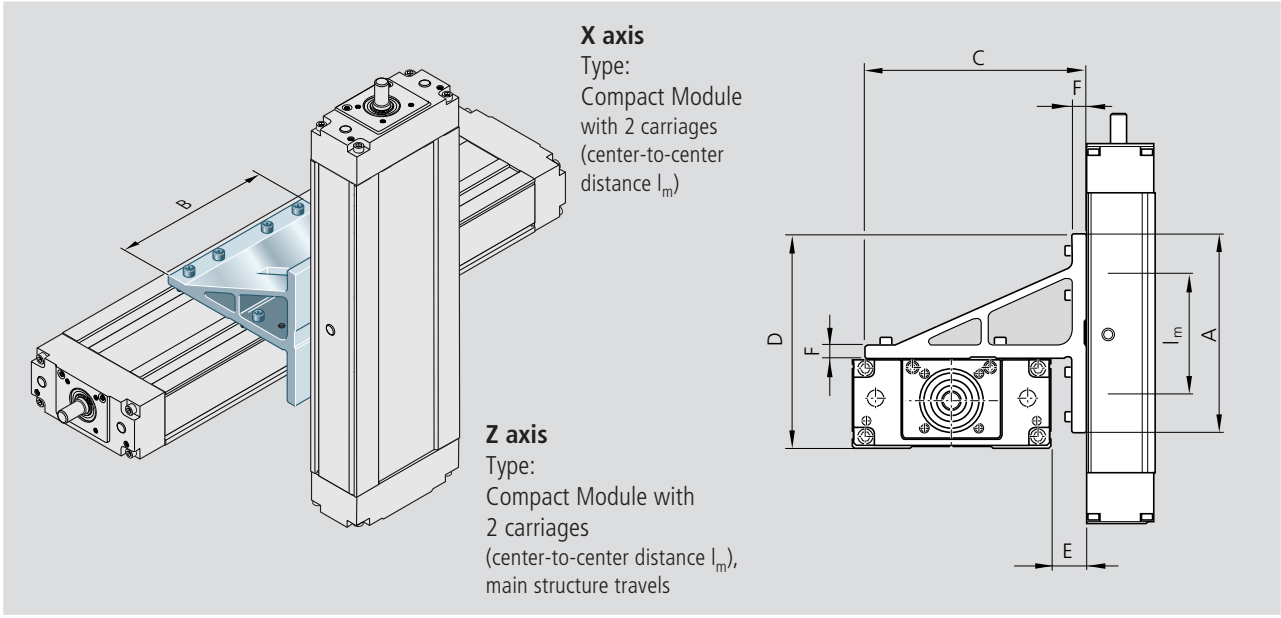
Part number of angle bracket kits (consisting of angle bracket, clamping fixtures, screws, pins)

X axis 2 carriages	Z axis 1 or 2 carriages		
	CKK 12-90	**CKK 15-110**	**CKK 20-145**
CKK 12-90 l_m = 65 mm	0391-100-31		
CKK 15-110 l_m = 85 mm	0391-100-33	0391-100-34	
CKK 20-145 l_m = 100 mm		0391-100-36	0391-100-37

Part number Kit	Dimensions (mm)							Mass (kg)
	A	B	C	D	E	F		
0391-100-31	110	115	110	106.5	27	8		0.80
0391-100-33	110	130	130	116.5	30	8		0.95
0391-100-34	142	143	135	140	34	10		1.62
0391-100-36	142	155	161	155	31	10		1.80
0391-100-37	155	180	168	164.5	35	14		3.10

Connection of 2 Compact Modules using angle brackets (X-Z axes)

Z axis attached to the carriage (main structure travels along the Z axis)



X axis
Type:
Compact Module
with 2 carriages
(center-to-center
distance l_m)

Z axis
Type:
Compact Module with
2 carriages
(center-to-center distance l_m),
main structure travels

Part number of angle bracket kits (consisting of angle bracket, clamping fixtures, screws, pins)

X axis 2 carriages	Y axis 2 carriages		
	CKK 12-90 l_m = 65 mm	**CKK 15-110** l_m = 85 mm	**CKK 20-145** l_m = 100 mm
CKK 12-90 l_m = 65 mm		0391-100-22	
CKK 15-110 l_m = 85 mm	0391-100-32	0391-100-24	
CKK 20-145 l_m = 100 mm		0391-100-35	0391-100-28

Part number Kit	Dimensions (mm)							Mass (kg)
	A	B	C	D	E	F		
0391-100-22	110	115	110	106.5	27	8		0.75
0391-100-24	142	143	135	140	34	10		1.50
0391-100-28	155	180	168	164.5	39	14		2.95
0391-100-32	110	130	130	116.5	30	8		0.90
0391-100-35	142	155	161	155	31	10		1.66

STAR – Compact Modules CKK
Documentation

Standard report

Option 01

The standard report serves to confirm that the checks listed in the report have been carried out and that the measured values lie within the permissible tolerances.

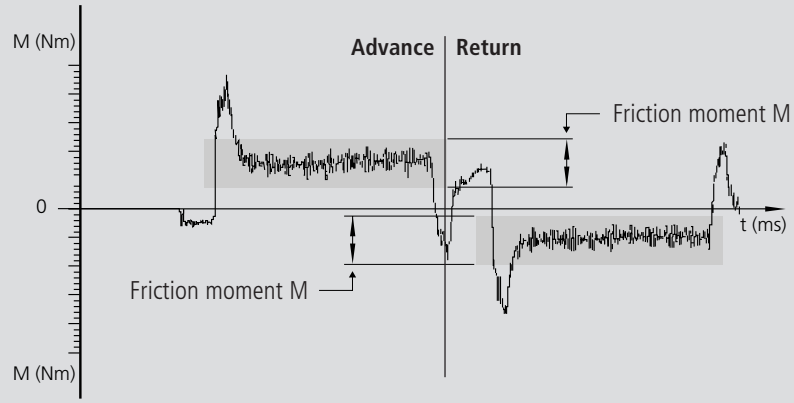
Checks listed in the standard report:

- Functional checks of mechanical components
- Functional checks of electrical components
- Design is in accordance with order confirmation.

Moment of friction measurement of complete system

Option 02

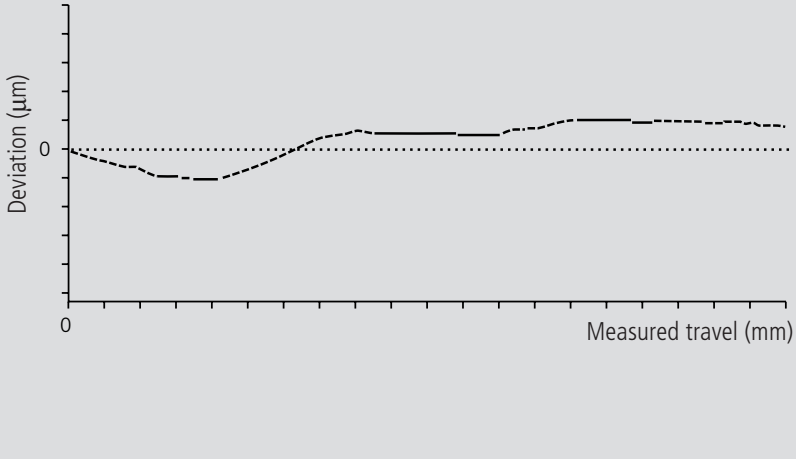
The moment of friction is measured along the entire travel range.



Lead deviation of ball screw

Option 03

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



Documentation

Positioning accuracy

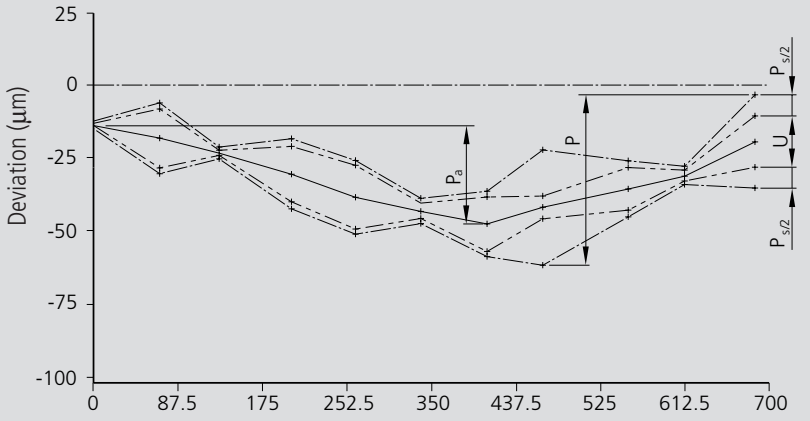
to VDI/DGQ 3441
Option 05

Measurement points are selected at irregular intervals along the travel. This allows even periodical deviations to be detected during positioning.

Each measurement point is approached several times from both sides.

This gives the following parameters:

Example



Positioning accuracy P

The positioning accuracy corresponds to the total deviation.

It encompasses all the systematic and random deviations during positioning.

The positioning accuracy takes the following characteristic values into consideration:

- Position deviation
- Reversal range
- Position variation range

Position deviation P_a

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

Reversal range U

The reversal range corresponds to the difference in mean values of the two approach directions.

The reversal range is determined at every measurement point.

It describes systematic deviations.

Position variation range P_s

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

Notes

Inquiry/Order Form

Deutsche Star GmbH

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Telefax +49-9721-937-350
(direct)

STAR-Compact Modules

Ordering example: Compact Module with Ball Rail System CKK 20-145

Ordering Data			Description
Compact Module CKK 20-145 (Part number): 0360-500-00, 1400 mm			Designation CKK 20-145, length = 1400 mm
Type	=	MF01	with motor mount, assembled per diagram MF01
Guideway	=	01	Ball Rail System
Drive unit	=	03	ball screw 25 x 10
Carriage	=	01	one carriage
Motor attachment	=	03	with motor mount for motor MKD 41B
Motor	=	10	motor MKD 41B
Cover	=	02	aluminum cover and polyurethane gap-type sealing strip
1st switch	=	22	Hall sensor
2nd switch	=	21	Reed contact
3rd switch	=	22	Hall sensor
Cable duct	=	25	cable duct supplied loose
Socket/plug	=	17	socket/plug supplied loose
Documentation	=	03	measurement report: lead deviation of ball screw

To be completed by customer: Inquiry ☐ / Order ☐

Compact Module _____

(Part number): _____-_____-_____, length _____mm

Type = ☐☐☐☐

Guideway = ☐☐

Drive unit = ☐☐

Carriage = ☐☐

Motor attachment = ☐☐

Motor = ☐☐

Cover = ☐☐

1st switch = ☐☐ - + ☐☐☐☐ **mm**

2nd switch = ☐☐ - ± ☐☐☐☐ **mm**

3rd switch = ☐☐ - – ☐☐☐☐ **mm**

Cable duct = ☐☐ , ☐☐☐☐ **mm**

Socket/plug = ☐☐

Documentation = ☐☐

Single parts:

(part number): _____-_____-_____

_____-_____-_____

_____-_____-_____

_____-_____-_____

Quantity: ____ **pcs.,** _____ **per month,** _____ **per year, per order, or** _____

Remarks:

Sender

Company: _____ **Name:** _____

Address: _____ **Department:** _____

_____ **Phone:** _____

_____ **Fax:** _____

engineering
mannesmann
Rexroth

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