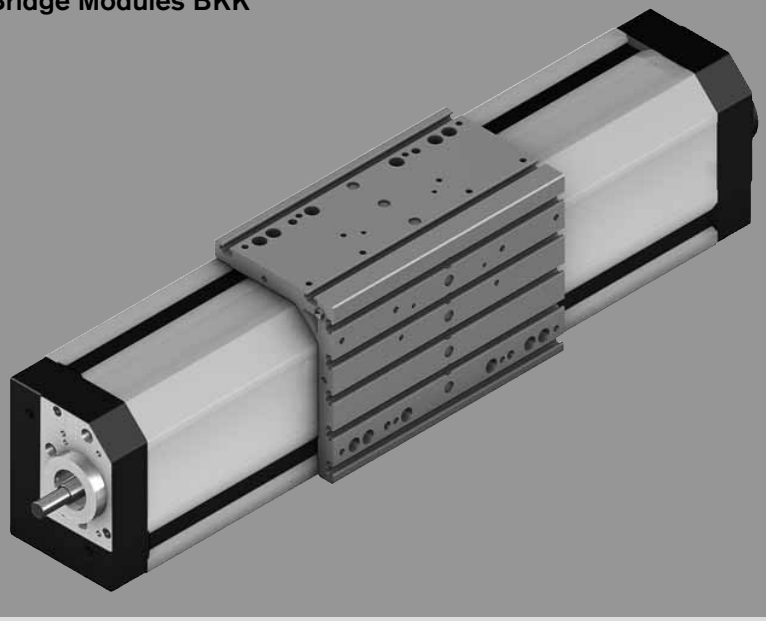
Bridge Modules with Ball Screw Drive BKK

Product Overview

Bridge Modules are ready-to-install precision linear motion systems for high-performance applications. They can be supplied in any desired length. Excellent price/performance ratio and fast delivery.

Bridge Modules BKK



Structural design

- Highly rigid precision-extruded aluminum profile with two integrated ball rail systems
- Precision ball screw drive in tolerance grade 7 with zero-backlash nut system
- Fixed bearing end block made of aluminum with two-row, preloaded angular-contact thrust ball bearing
- Floating bearing end block with double ball bearings
- Torsionally stiff angled aluminum carriage with T-slots and threaded holes offering multiple mounting possibilities

Attachments

- Maintenance-free digital AC servo drives with integrated brake and feedback
- Motor mount and coupling or timing belt side drive for motor attachment
- Switches
- Socket with mating plug for switches
- Cable duct made of profiled aluminum

Other distinguishing features

- Optimal travel performance, high load capacities and high rigidity due to two zero-clearance Ball Rail Systems arranged at a 90° angle to each other
- Screw supports allow high travel speeds to be achieved for long strokes
- High positioning accuracy and repeatability due to ball screw assembly with zero-backlash nut system
- Internal components protected by an aluminum cover and two polyurethane sealing strips
- Precise alignment and secure mounting (positive-locking) of attachments thanks to camoLINE technology in the carriage
- Adjustable switches over the entire travel range.
- Easy motor attachment via locating feature and fastening threads
- Low-cost maintenance provided by one-point lubrication (grease) of the ball rail systems and the ball screw drive from either side of the carriage

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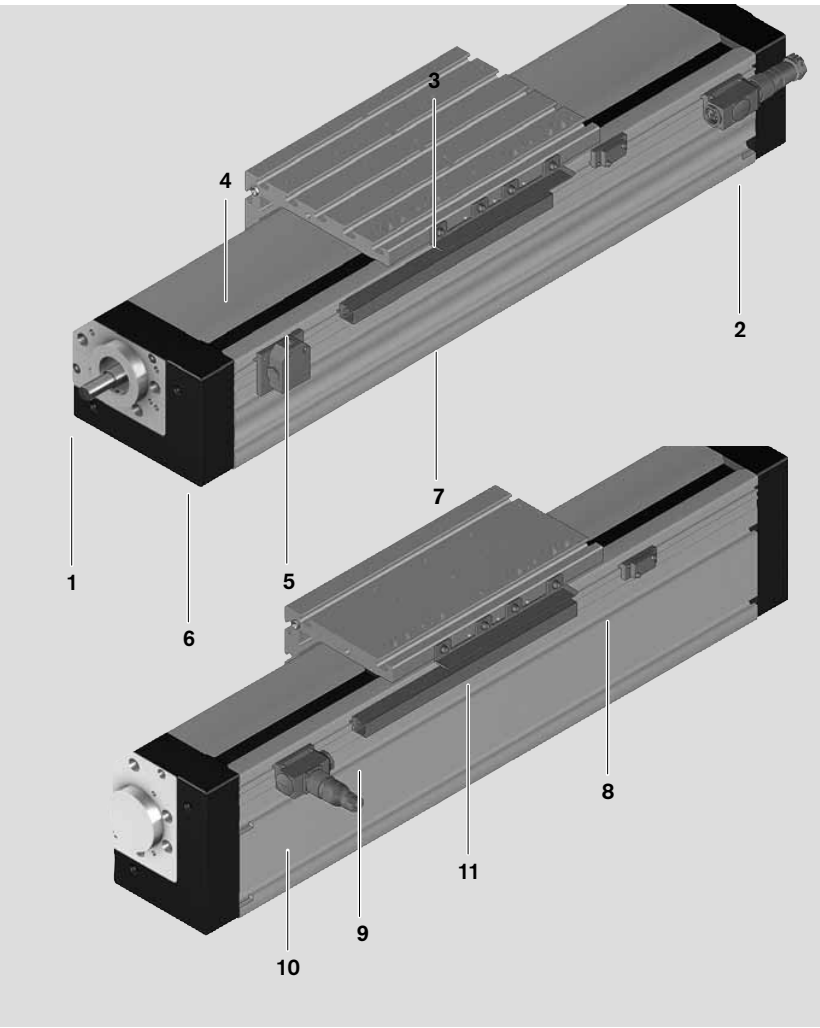
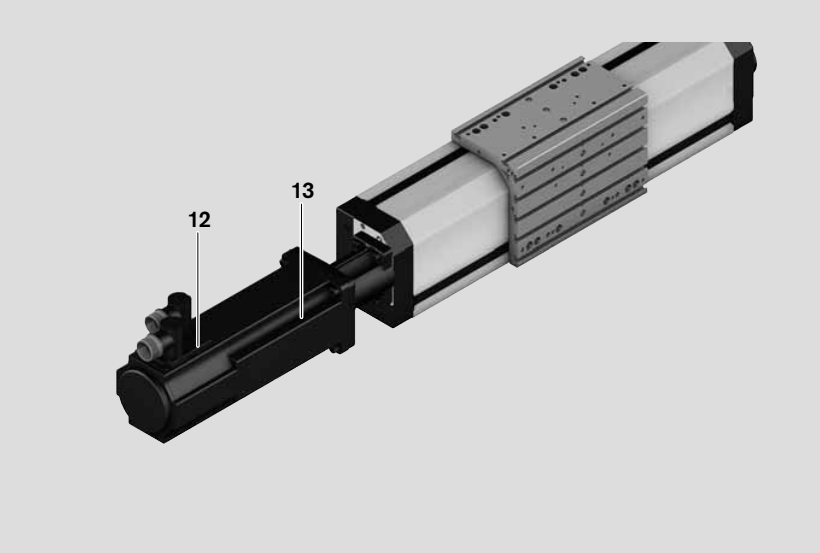
Structural Design

1 Ball screw with zero-backlash cylindrical single nut
2 Floating bearing end block
3 Carriage with runner blocks
4 Aluminum cover
5 Recirculating polyurethane sealing strips
6 Aluminum extrusion

Attachments:
8 Switch
9 Mounting duct
10 Socket/plug
11 Switching cam



12 Motor
13 Motor mount and coupling



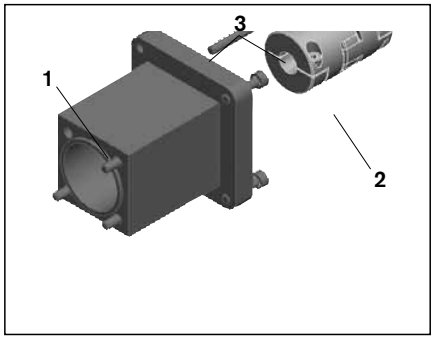
Motor Attachment

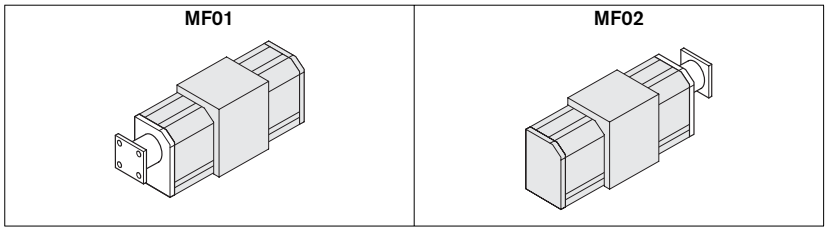
Motor attachment with motor mount and coupling

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

The motor's drive torque is transmitted stress-free through the coupling to the Bridge Module's drive shaft.

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

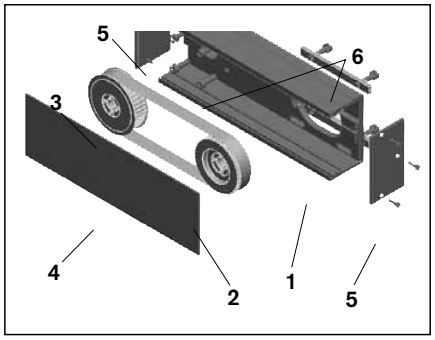




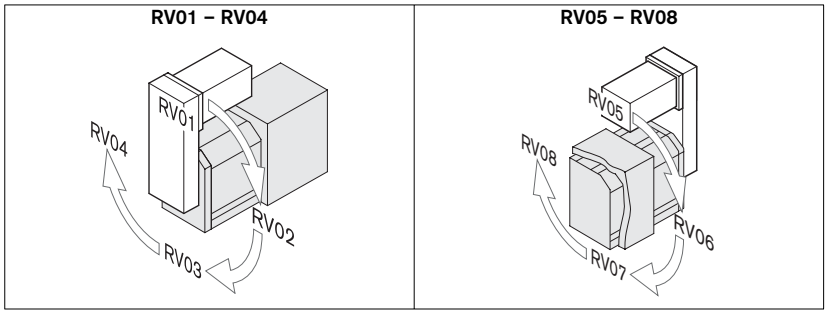
Motor attachment with timing belt side drive

On Bridge Modules BKK 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



The timing belt side drive can be installed in four directions at either end: Please specify the mounting orientation when ordering.



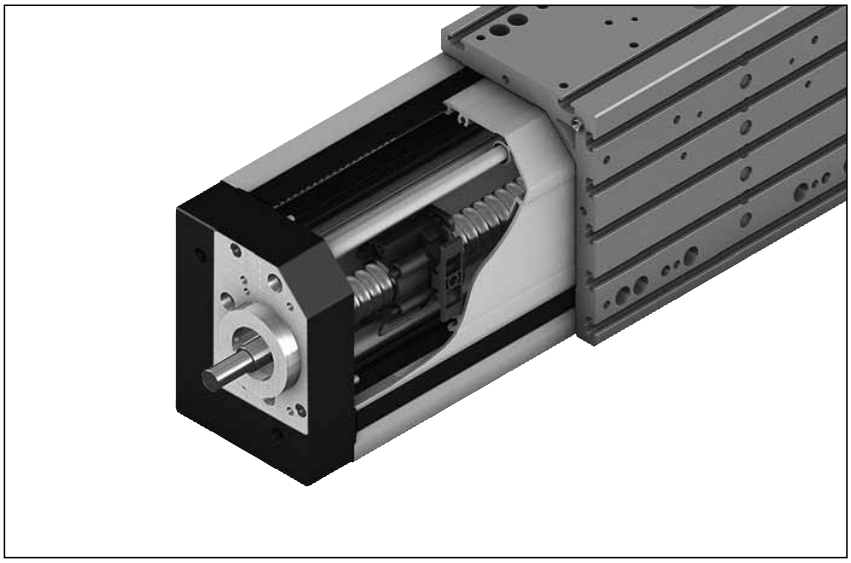
Bridge Modules with Ball Screw Drive BKK

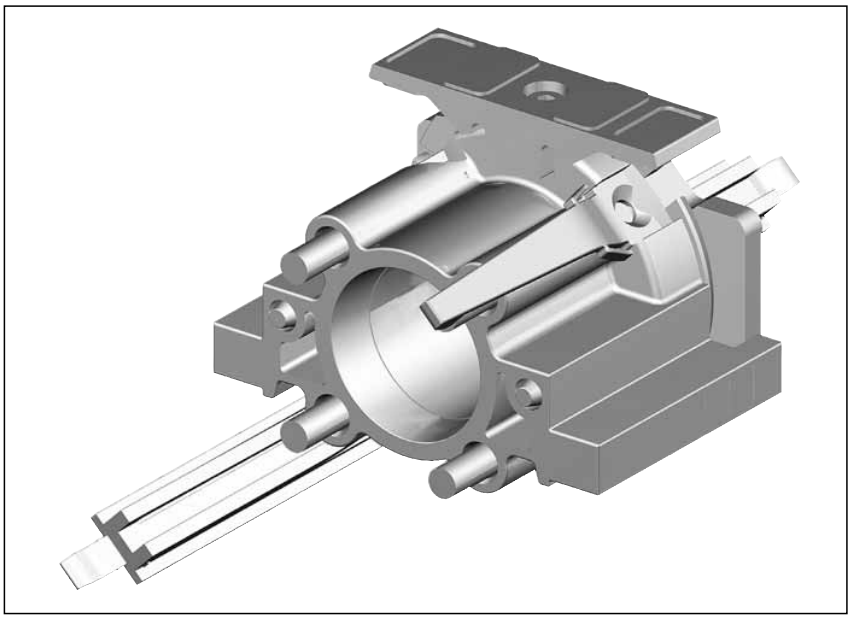
Screw Support for Bridge Module BKK

⚠ **For horizontal operation only**

The Screw Support (SPU) offers the following advantages:

- Screw Support selectable as a standard option
- High travel speeds over long lengths up to 5000 mm
- Screw Supports are guided within the module frame
- Elastomer buffers provide cushioning between the carriage and the Screw Supports
- Integration of up to 5 Screw Supports
- Screw Supports are maintenance-free
- Screw Supports protected by aluminum cover and polyurethane sealing strips
- The Screw Supports prevent any sagging of the aluminum cover in all directions





Technical Data

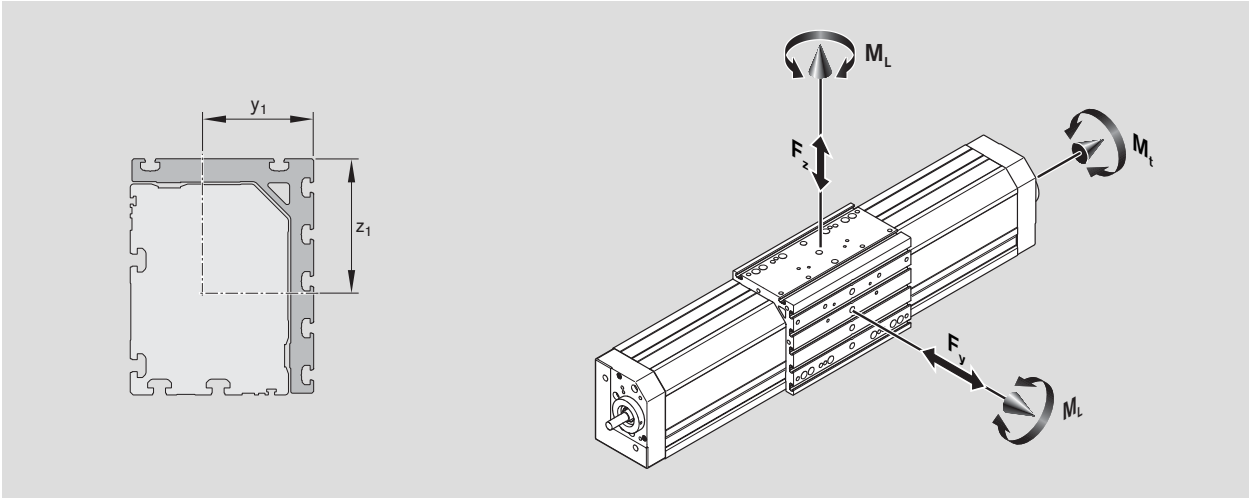
Load capacities and moments

Size	Ball screw	Dynamic load capacity C (N)			Dynamic load moments (Nm)		Planar moment of inertia (cm^4)		Maximum length[1]	Moved mass of system	Dimensions (mm)	
					Torsional load moment	Longitudinal load moment						
	d_0 x P	Guide-way	Ball screw	Fixed bearing	M_t	M_L	I_y	I_z	L_{max} (mm)	m_{ac} (kg)	y_1	z_1
BKK 15-115	25 x 5	21900	15900	18800	890	1460	approx. 1080	approx. 500	5000	6.35	91.5	99.2
	25 x 10		15700									
	25 x 25		14700									
BKK 20-135	32 x 5	56200	21600	26000	3040	4570	approx. 1570	approx. 720	5000	10.10	109.3	130.6
	32 x 10		31700									
	32 x 20		19700									
	32 x 32		19500									

1) The maximum length will vary when one or more Screw Supports are used. See page 14.

Maximum permissible loads

Size	Maximum permissible forces (N)		Maximum permissible moments (Nm)	
	$F_{y\,max}$	$F_{z\,max}$	$M_{t\,max}$	$M_{L\,max}$
BKK 15-115	15700	15700	640	880
BKK 20-135	26100	26100	1410	1830



Note on dynamic load capacities and moments

Determination of the dynamic load capacities and moments is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated.
For comparison: Multiply values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the table by 1.26.

Acceptable loads
(recommended from experience)

With respect to the desired service life, loads up to about 20% of the characteristic dynamic values (C, M_t, M_L) have proved acceptable.

At the same time, the following may not be exceeded:
- maximum permissible loads,
- permissible drive torque,
- permissible travel speed.

The nominal life and the combined equivalent load on the bearing must be checked.

Modulus of elasticity E = 70,000 N/mm²

Bridge Modules with Ball Screw Drive BKK

Mass of the linear motion system m_s

Weight calculation without motor and switches.

Weight formula:

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

Size	m_s (kg)
BKK 15-115	0.02027 · L + 9.088
BKK 20-135	0.028758 · L + 14.229

☞ The weight increases by 0.2 kg for each Screw Support used.

Length

☞ When using Bridge Modules with SPUs, the following values will apply for horizontal operation only.

L = stroke + 2 · excess travel + X

X = per table

Size	Option	Option number	Max. length (mm)	X (mm)
BKK 15-115	without SPU	01	2200	300
	1 SPU	02	3500	340
	2 SPU	03	4600	465
	3 SPU	04	5000	590
	4 SPU	05	5000	715
	5 SPU	06	5000	840
BKK 20-135	without SPU	01	2200	340
	1 SPU	02	3500	380
	2 SPU	03	4600	505
	3 SPU	04	5000	630
	4 SPU	05	5000	755
	5 SPU	06	5000	880

Frictional torque of the linear motion system M_{Rs}

Size	Ball screw d_0 x P	M_{Rs} (Nm) without SPU	with 1 SPU	with 2 SPU	with 3 SPU	with 4 SPU	with 5 SPU
BKK 15-115	25 x 5	0.7	0.9	1.1	1.4	1.6	1.8
	25 x 10	0.8	1.0	1.3	1.5	1.7	2.0
	25 x 25	1.2	1.5	1.7	2.0	2.2	2.5
BKK 20-135	32 x 5	0.9	1.1	1.3	1.6	1.8	2.0
	32 x 10	1.1	1.3	1.6	1.8	2.0	2.3
	32 x 20	1.2	1.5	1.7	2.0	2.2	2.5
	32 x 32	1.5	1.8	2.1	2.3	2.6	2.9

Coupling data

Size	for motor	Coupling M_{cN} (Nm)	Coupling J_c (10^{-6} kgm²)	Weight m_c (kg)
BKK 15-115	MSK 40C	19	60	0.26
	MSK 60C	50	200	0.70
BKK 20-135	MSK 60C	50	200	0.70
	MSK 76C	98	390	0.90

M_{cN} = rated torque of coupling
J_c = mass moment of inertia of coupling

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

Size	Ball screw d_0 x P	Constants $k_{J\,fix}$	$k_{J\,var}$	$k_{J\,m}$
BKK 15-115	25 x 5	43.145	0.222	0.633
	25 x 10	55.495	0.239	2.533
	25 x 25	139.375	0.215	15.831
BKK 20-135	32 x 5	73.846	0.605	0.633
	32 x 10	93.960	0.640	2.533
	32 x 20	170.607	0.639	10.132
	32 x 32	329.497	0.617	25.938

Accuracy

The accuracy of the extrusion profile used for the frame is 0.7 mm per meter.

Specifications of timing belt side drive for motor attachment via timing belt side drive

Motor		MSK 040C					MSK 060C				
Frictional torque M_{Rsd} (Nm)		0.4					0.4				
		M_{sd} up to length $L^{1)}$ = … at i (Nm)			J_{sd} (10^{-6} kgm²)		M_{sd} up to length $L^{1)}$ = … at i (Nm)			J_{sd} (10^{-6} kgm²)	
			i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 2	i = 1	i = 2
BKK	Ball screw d_0 x P	L (mm)					L (mm)				
15-115	25 x 5	2320	9.6	6.4	260	89	1960	14	7	1420	230
	25 x 10	2860					2320	19.6	9.8		
	25 x 25	2860					2860	19.6	9.8		
20-135	32 x 5						3000	12	6	1450	280
	32 x 10							19	11		
	32 x 20							19	13		
	32 x 32							19	13		

1) Permissible torque for greater lengths available upon request.

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

M_{sd} = maximum permissible drive torque of the timing belt side drive

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

i = timing belt side drive reduction

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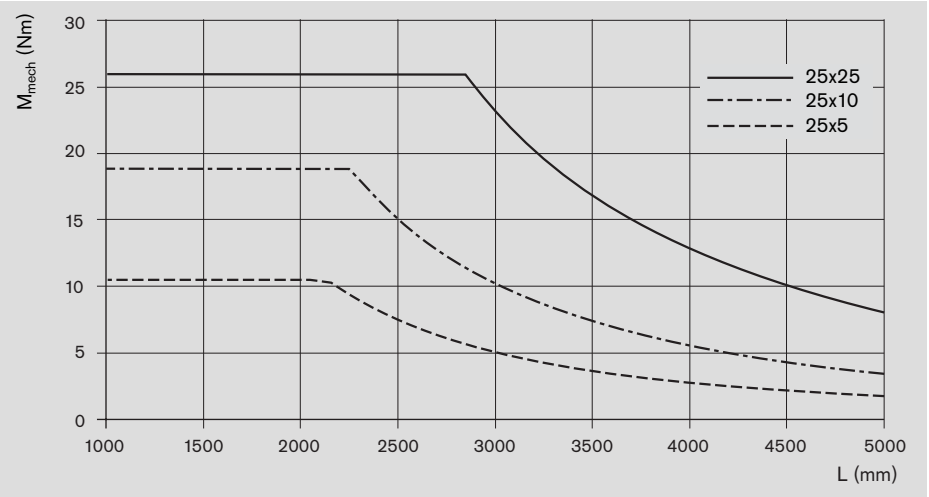
Technical Data

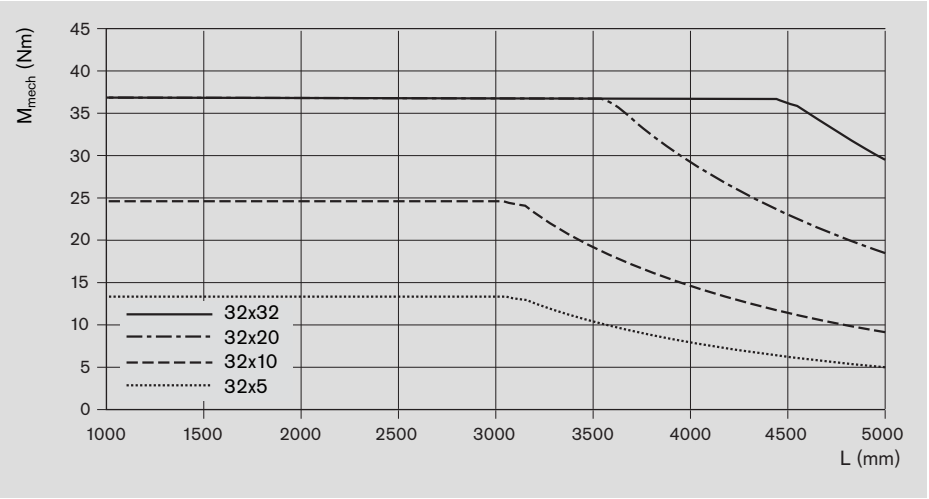
Maximum permissible drive torque for mechanical system M_{mech}

Bridge Module	d_0 x P	Max. permissible drive torque M_{mech} (Nm)	
		without key	with key
BKK 15-115	25 x 5	10.5	10.5
	25 x 10	18.8	11.5
	25 x 25	25.9	11.5
BKK 20-135	32 x 5	13.2	13.2
	32 x 10	24.6	18.0
	32 x 20	36.7	18.0
	32 x 32	36.7	18.0

BKK 15-115



BKK 20-135



⚠ **When comparing the chart against the maximum value, the lower of the two values will always apply.**

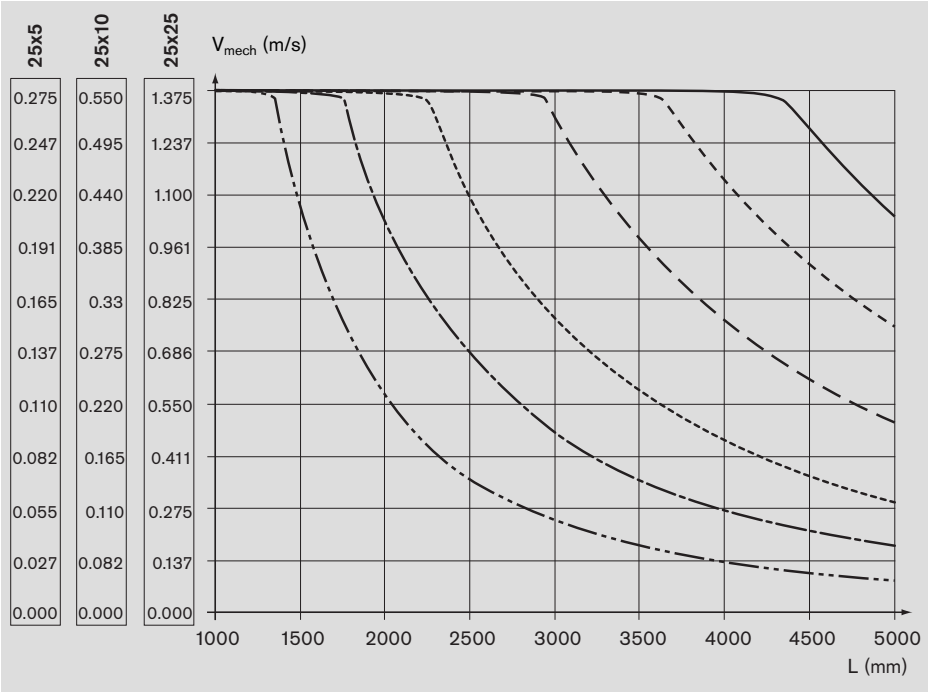
The values shown for M_{mech} are applicable under the following conditions:
- Horizontal operation
- Ball screw journal without keyway
- No radial load on ball screw shaft

Consider the rated torque of the coupling used!

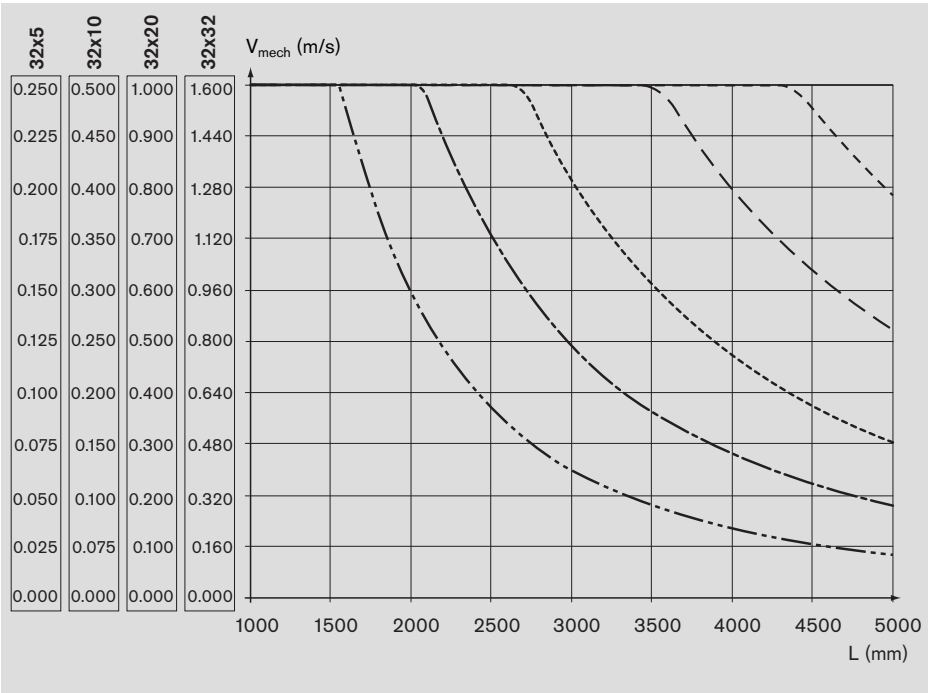
Ball screw journal with keyway
For reasons of stress concentration and a reduction of the effective diameter, consider the maximum values for drive torque!

Maximum permissible travel speed for mechanical system v_{mech} (consider the motor speed)

BKK 15-115



BKK 20-135

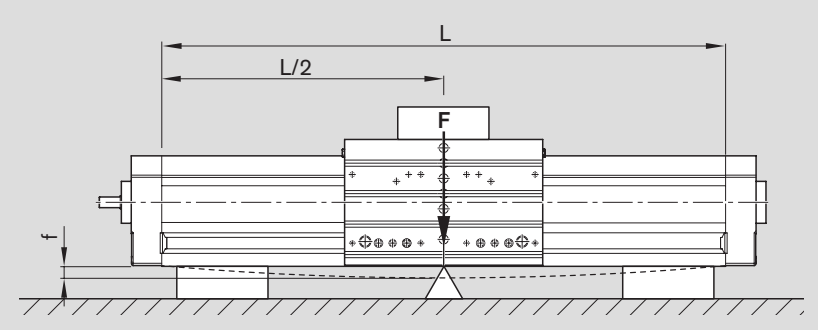


without SPU
with 1 SPU
with 2 SPU
with 3 SPU
with 4 SPU
with 5 SPU

Bridge Modules with Ball Screw Drive BKK

Technical Data

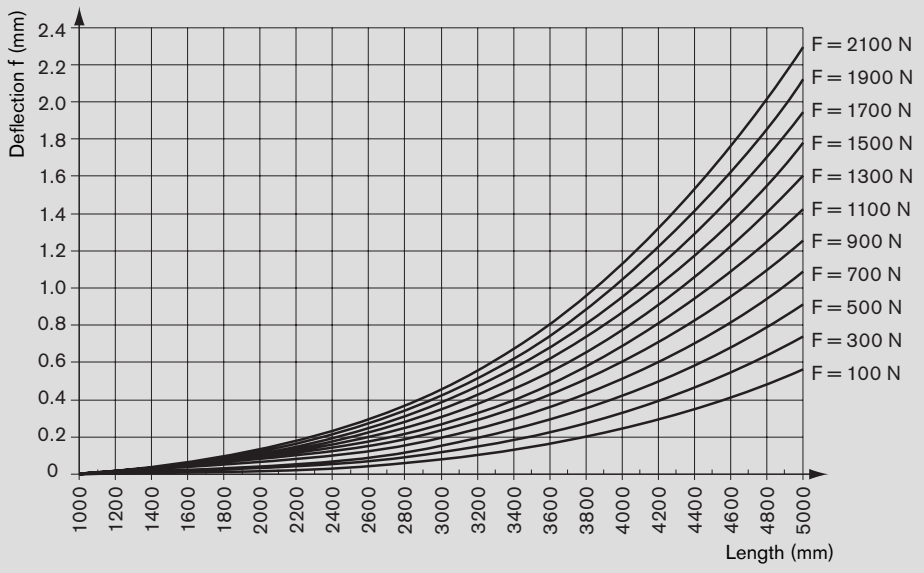
Deflection



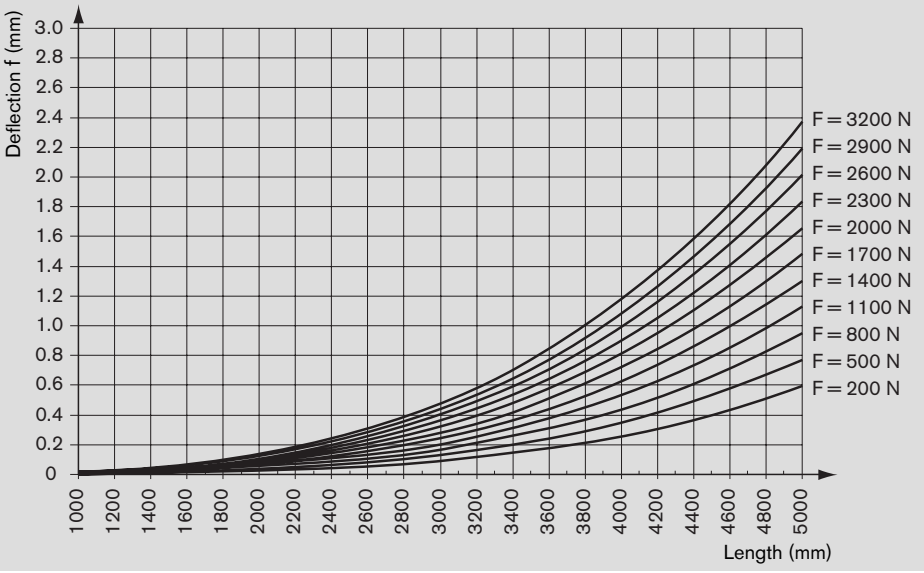
A particular feature of Bridge Modules is that they can be installed as cantilevered axes.
Deflection must, however, be taken into consideration, because it limits the possible load.

If high system dynamics are required, supports must be provided every 300 to 600 mm.
The charts are applicable under the following conditions:
- Both ends firmly fixed (200 to 250 mm per end)
- 8 screws per side
- Solid mounting base

BKK 15-115



BKK 20-135



Calculations

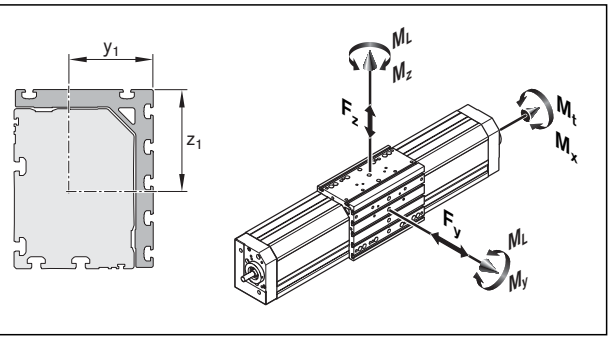
Calculation principles

Combined equivalent load on bearing

of the linear guide

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

BKK size	Dimensions (mm)	
	y_1	z_1
15-115	91.5	99.2
20-135	109.3	130.6



Nominal life

Nominal life of the guideway in meters:

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

Nominal life of the guideway in hours:

$$L_h = \frac{L}{3600 \cdot v_m}$$

Frictional torque

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

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

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	
J_s	=	mass moment of inertia of the linear motion system (without external load)	(kgm^2)
$k_{J\,fix}$	=	constant for fixed-length portion of mass moment of inertia	(10^6 kgm^2)
$k_{J\,var}$	=	constant for variable-length portion of mass moment of inertia	(10^6 kgm^2)
L	=	nominal life in meters	(m)
L	=	length of Bridge Module	(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)
$M_{R\,sd}$	=	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)
v_m	=	average speed	(m/s)
y_1, z_1	=	application point of the effective force	(mm)

Bridge Modules with Ball Screw Drive BKK

Calculations

Mass moment of inertia of the mechanical system referred to the drive 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 referred to the drive journal

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

Mass moment of inertia of the drive train 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
Machining	≤ 1.5

Total mass moment of inertia referred to the motor journal

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

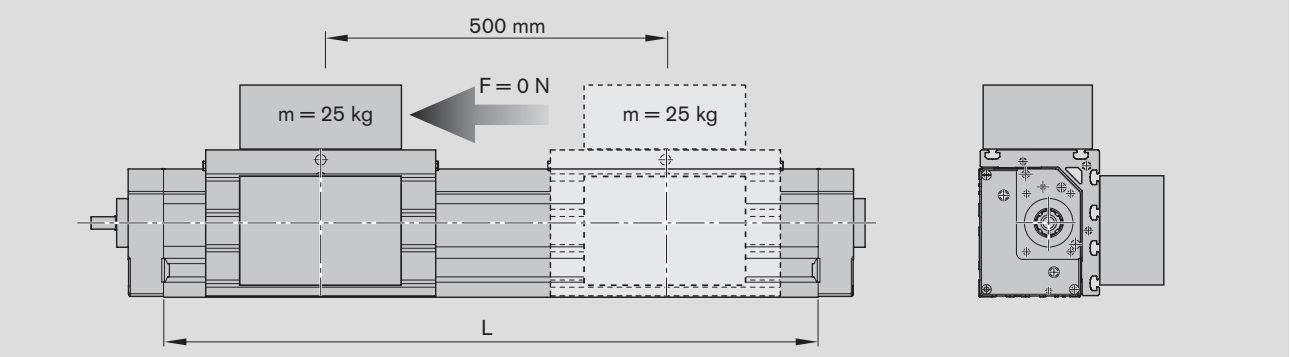
Maximum permissible rotary speed for mechanical system

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

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

J_{br} = mass moment of inertia, 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} = reduced 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)
i = gear ratio of timing belt side drive (-)
$k_{J\,m}$ = constant for mass-specific portion of mass moment of inertia (10^6 m²)
m_{ex} = moved external load (kgm)
$n_{m\,max}$ = maximum permissible rotary speed of motors 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_{mech} = maximum permissible rotary speed of mechanical system (m/s)

When sizing the drive, the motor-controller combination must always be considered, as the motor type and performance data (e.g. maximum useful speed and maximum torque) will depend 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 0.66 m/s. The following was selected based on the technical data and the connection dimensions:

Bridge Module BKK 15-115
- Carriage length 260 mm
- 2% preload
- With polyurethane sealing strips
- With AC servomotor type MSK mounted via motor mount and coupling

Estimation of the Bridge Module length L

Excess travel	=	$2 \cdot P = 2 \cdot 25 \text{ mm} = 50 \text{ mm}$
Max. travel	=	$\text{stroke}_{\text{eff}} + 2 \cdot \text{excess travel}$
	=	$500 \text{ mm} + 2 \cdot 50$
	=	600 mm
Bridge Module length L	=	(stroke + 2 · excess travel) + 300 (according to values given under “Components and Ordering Data” for BKK 15-115)
	=	600 + 300
	=	900 mm

Selection of ball screw
See charts in “Technical Data” section.
As a general rule:
Always choose the lowest lead (resolution, braking distance, length).

Permissible ball screws according to the “Permissible travel speed” chart at $v_{mech} = 0.66$ m/s and L = 900 mm:
Ball screw 25 x 10 (0.55 m/s) and ball screw 25 x 25 (1.375 m/s)
Ball screw selected (lower lead), since v_{mech} still sufficient:
Ball screw 25 x 10
With M_{mech} of 18.8 Nm
according to the chart “Maximum permissible drive torque for mechanical system”

Calculation of the Bridge Module length L

Excess travel	=	$2 \cdot P = 2 \cdot 10 \text{ mm} = 20 \text{ mm}$
Max. travel	=	$\text{stroke}_{\text{eff}} + 2 \cdot \text{excess travel}$
	=	$500 \text{ mm} + 2 \cdot 20 \text{ mm}$
	=	540 mm
Bridge Module length L	=	(stroke + 2 · excess travel) + 300 mm
	=	540 mm + 300 mm
	=	840 mm

Frictional torque M_R

$M_R = M_{RS}$ (see “Technical Data”)
$M_R = 0.8$ Nm

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Calculation Example

Mass moment of inertia of mechanical system

$J_{ex} = J_S + J_t + J_C$

$J_S = (k_{J\,fix} + k_{J\,var} \cdot L) \cdot 10^{-6}\ kgm^2$
$= (55.495 + 0.239 \cdot 840\ mm) \cdot 10^{-6}\ kgm^2$
$= 256.255 \cdot 10^{-6}\ kgm^2$ (see “Technical Data”)

$J_t = m_{ex} \cdot k_{J\,m} \cdot 10^{-6}\ kgm^2$
$= 25 \cdot 2.533 \cdot 10^{-6}\ kgm^2$
$= 63.325 \cdot 10^{-6}\ kgm^2$ (see “Technical Data”)

$J_C = 60 \cdot 10^{-6}\ kgm^2$ (see “Technical Data”)

$J_{ex} = (256.255 + 63.325 + 60) \cdot 10^{-6}\ kgm^2$
$= 379.58 \cdot 10^{-6}\ kgm^2$

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

$J_{br} = 23 \cdot 10^{-6}\ kgm^2$ (see “Motors”)

$J_{dc} = (379.58 + 23) \cdot 10^{-6}\ kgm^2$
$= 402.58 \cdot 10^{-6}\ kgm^2$

Mass moment of inertia for handling (V ≤6)

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

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

$= \frac{402.58}{6} \cdot 10^{-6}\ kgm^2$
$= 67.096 \cdot 10^{-6}\ kgm^2$

Rotary speed n

$n_{mech} = \frac{v_{mech} \cdot i \cdot 1000 \cdot 60}{P} = \frac{0.55\ m/s \cdot 1 \cdot 1000 \cdot 60}{10\ mm} = 3300\ min^{-1}$

$v_{mech} = 0.55\ m/s$

If the permissible travel speed of 0.55 m/s is not sufficient, switch to size 25 x 25 and

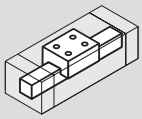
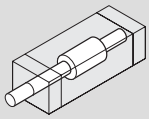
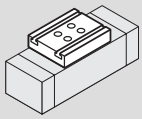
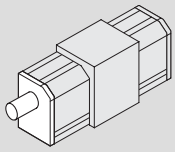
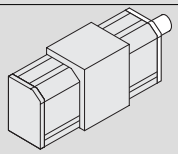
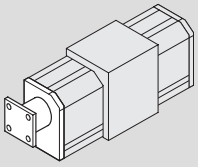
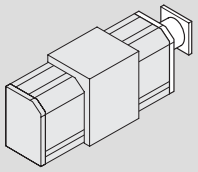
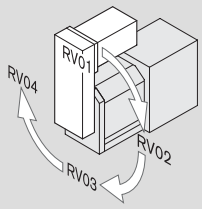
Result

Bridge Module BKK 15-115
Length: L = 840 mm
Ball screw:
Diameter: 25 mm
Lead: 10 mm
Number of carriages: 1
Preload: 2%
Motor attachment via motor mount and coupling
Motor with:
– a maximum usable speed $n_{m\ max} = 3300\ min^{-1}$
– mass moment of inertia $J_m > 67.09 \cdot 10^{-6}\ kgm^2$
– maximum permissible drive torque $M_{max} < 18.8$ Nm
Consider the rated coupling torque M_{cN} and the frictional torque M_R ($M_{cN} = 50$ Nm; $M_R = 0.8$ Nm)

These requirements are fulfilled by all AC servo motors approved for BKK 15-115 in the “Components and Ordering Data” table.
The specific motor is selected:
– according to criteria from the “AC servo motor data” table
– by recalculating the drive unit with performance data from the “Control Systems, Electrical Accessories” catalog.

Bridge Modules with Ball Screw Drive BKK

BKK 15-115 Components and Ordering Data

Part number, length R0320 400 00, ... mm		Type	Guideway 	Drive unit  Screw journal	Ball screw size d_0 x P 25 x 5	25 x 10	25 x 25	Carriage  One carriage w/o SPU	with 1 SPU	with 2 SPU	with 3 SPU	with 4 SPU	with 5 SPU
with ball screw, without motor mount		**OF01**	01	Ø14	01	02	03	01	02	03	04	05	06
				Ø14 with keyway	11	12	13						
		**OF02**	01	Ø14	06	07	08						
				Ø14 with keyway	16	17	18						
with ball screw and motor mount		**MF01**	01	Ø14	01	02	03	01	02	03	04	05	06
		**MF02**	01	Ø14	06	07	08						
with ball screw and timing belt side drive		**RV01 to RV04**	01	Ø14	01	02	03	01	02	03	04	05	06
		RV05 to RV08	01	Ø14	06	07	08						

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

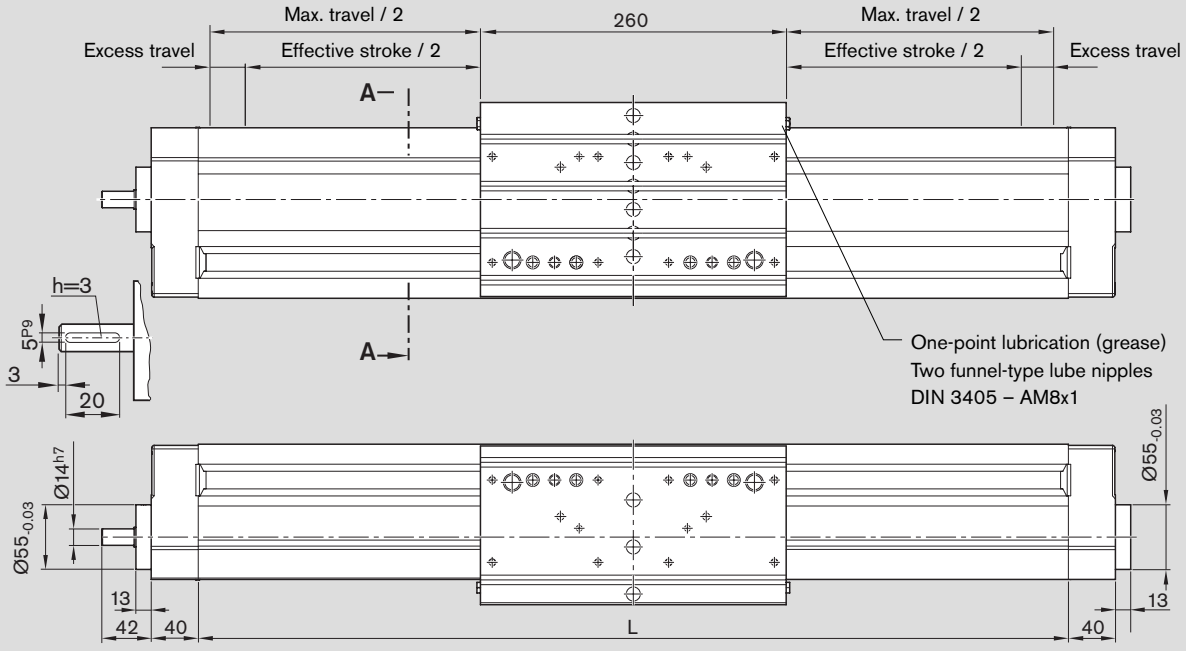
	Motor attachment			Motor		Cover		Switches Switching cam, socket, plug, cable duct	Documentation	
	Gear ratio i =	Attachment kit [1]	for motor	Motor type without brake	with brake	Sealing strips without	with		Standard report	Measurement report
		00		00		01	02		01	02 Frictional torque 03 Lead deviation 05 Positioning accuracy
		02	MSK 040C	86	87					
		03	MSK 060C	90	91					
	1	21	MSK 040C	86	87					
		23	MSK 060C	90	91					
	1.5	22	MSK 040C	86	87					
	2	24	MSK 060C	90	91					

Without switch Without cable duct			**00**
Proximity/mechanical switches			
PNP NC	11	**One switching cam** 16	**Socket/ plug** 17
PNP NO	13	**Two switching cams** 26	
Mechanical switch	15		
Cable duct Length = L	20		

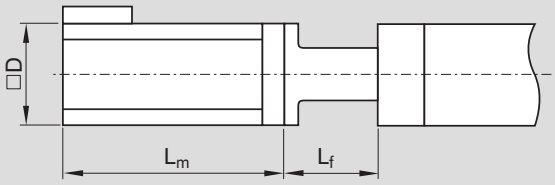
Bridge Modules with Ball Screw Drive BKK

BKK 15 -115 Dimensions

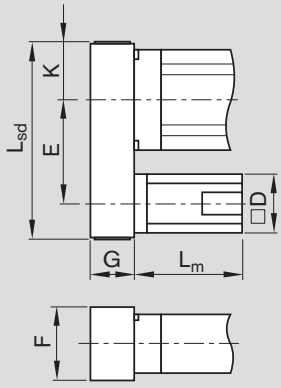
All dimensions in mm
Drawings not to scale



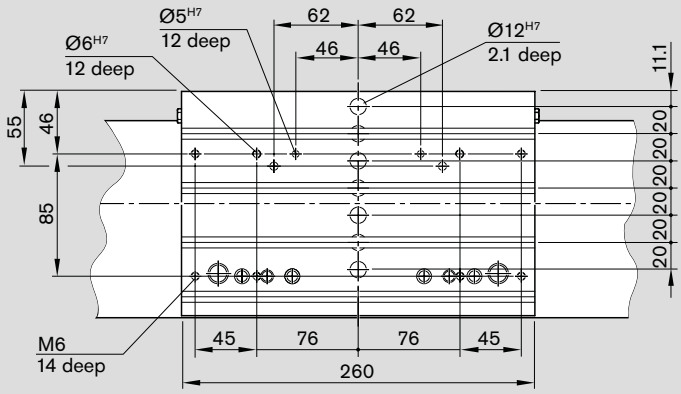
Type MF01, MF02

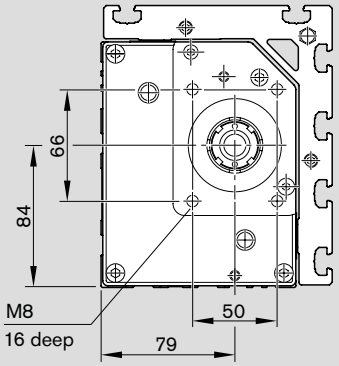


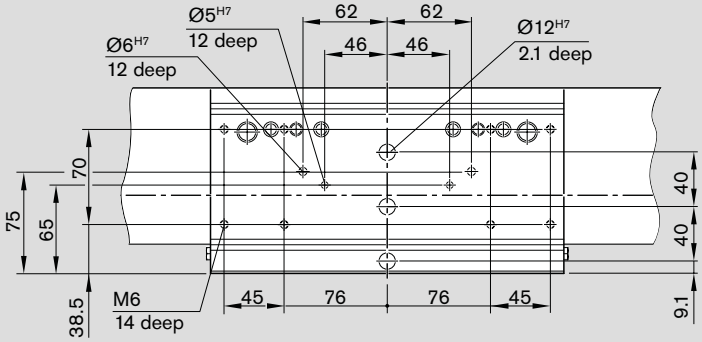
Type RV01 - RV08

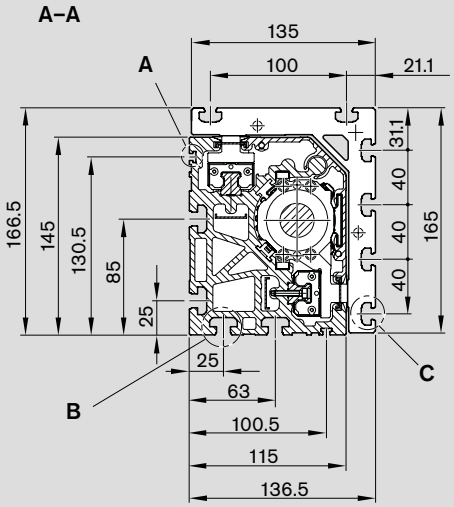


Type	Motor	Dimensions (mm)												
		D	E			F	G	K	L_f	L_m		L_{sd}		
			i = 1	i = 1.5	i = 2					without brake	with brake	i = 1	i =1.5	i = 2
RV01 - RV08	MSK 040C	82	210	213.5	–	88	51	47.5		185.5	215.5	322	322	–
	MSK 060C	116	230	–	235	116	66	56.0		226.0	259.0	367	–	367
MF01. MF02	MSK 040C	82	–	–	–	–	–	–	90	185.5	215.5	–	–	–
	MSK 060C	116	–	–	–	–	–	–	115	226.0	259.0	–	–	–

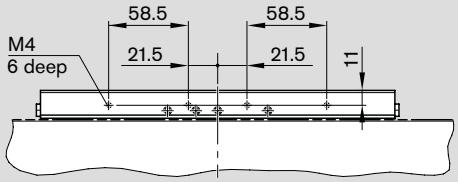


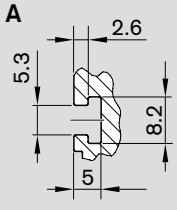


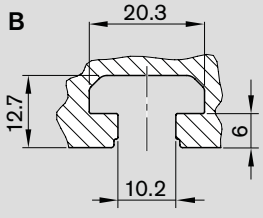


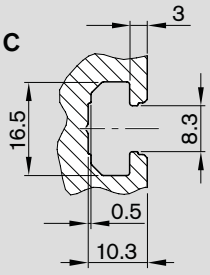


Mounting hole pattern for switching cam



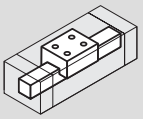
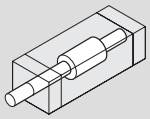
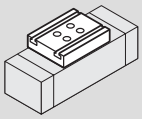
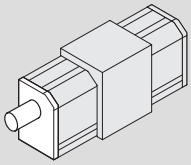
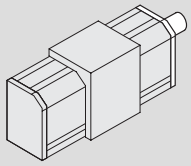
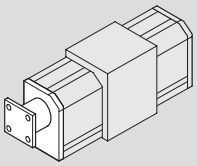
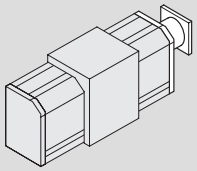
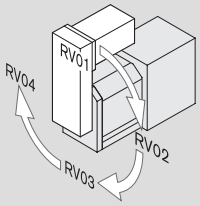
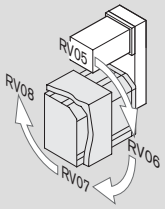




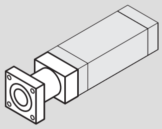
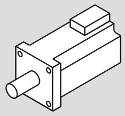
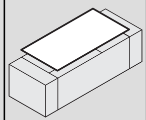
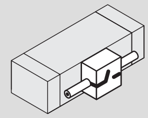


Bridge Modules with Ball Screw Drive BKK

BKK 20-135 Components and Ordering Data

Part number, length R0320 500 00, ... mm		Type	Guideway 	Drive unit  Screw journal	Ball screw size d_0 x P 32 x 5	32 x 10	32 x 20	32 x 32	Carriage  One carriage w/o SPU	with 1 SPU	with 2 SPU	with 3 SPU	with 4 SPU	with 5 SPU	
with ball screw, without motor mount		**OF01**	01	Ø16	01	02	03	04	01	02	03	04	05	06	
				Ø16 with key-way	11	12	13	14							
		**OF02**	01	Ø16	06	07	08	09							
				Ø16 with key-way	16	17	18	19							
with ball screw and motor mount		**MF01**	01	Ø16	01	02	03	04	01	02	03	04	05	06	
		**MF02**	01	Ø16	06	07	08	09							
with ball screw and timing belt side drive		**RV01 to RV04**	01	Ø16	01	02	03	04	01	02	03	04	05	06	
		**RV05 to RV08**	01	Ø16	06	07	08	09							

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

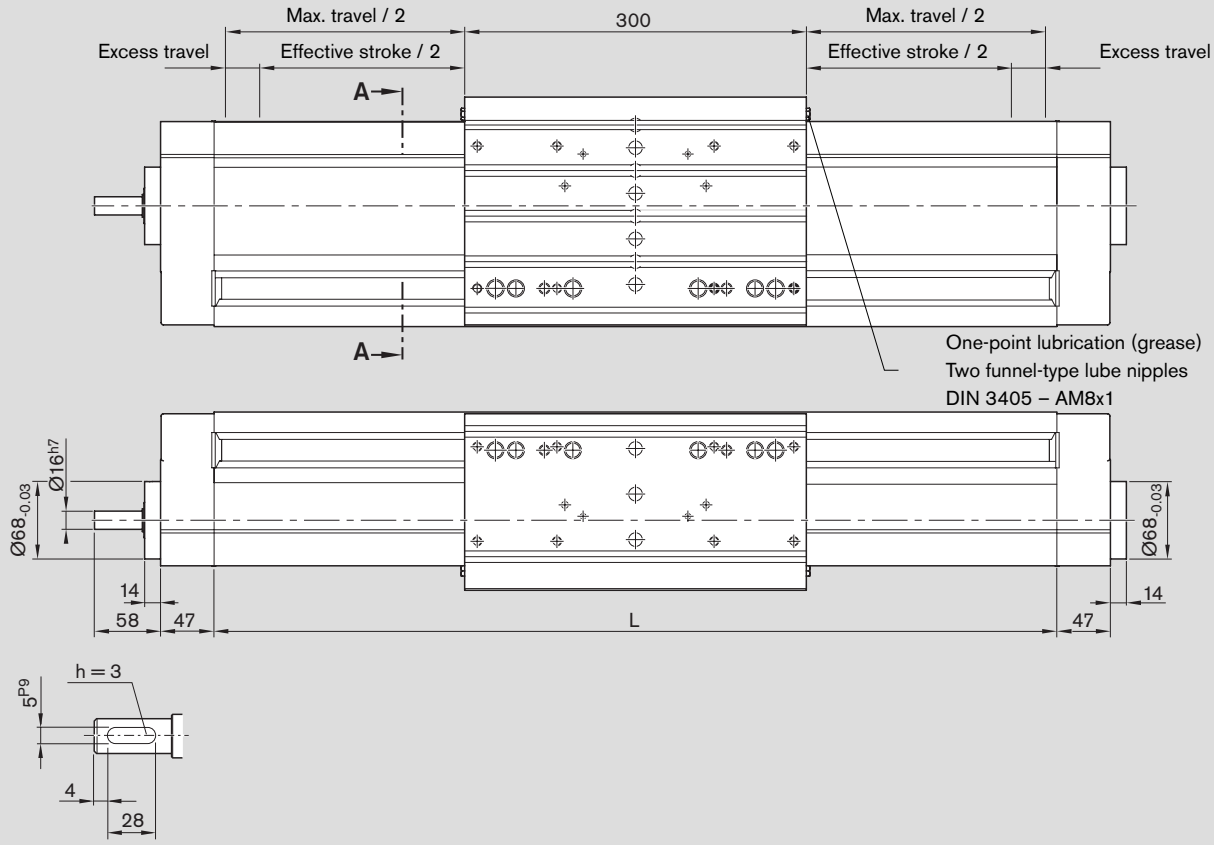
	Motor attachment 			Motor 		Cover 		Switches Switching cam, socket, plug, cable duct 	Documentation 	
	Gear ratio i =	Attach-ment kit[1)]	for motor	Motor type without brake	with brake	Sealing strips with-out	with		Standard report	Measurement report
		00		00		01	02		01	02 Frictional torque 03 Lead deviation 05 Positioning accuracy
		03	MSK 060C	90	91					
		02	MSK 076C	92	93					
	1	23	MSK 060C	90	91					
	2	24	MSK 060C	90	91					

Switches			
Without switch **Without cable duct**	**00**		
Proximity/mechanical switches			
PNP NC	11	**One switching cam** 16	**Socket/ plug** 17
PNP NO	13	**Two switching cams** 26	
Mechanical switch	15		
Cable duct Length = L	20		

Bridge Modules with Ball Screw Drive BKK

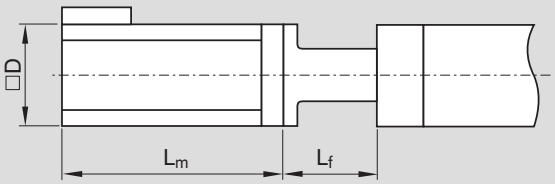
BKK 20-135 Dimensions

All dimensions in mm
Drawings not to scale

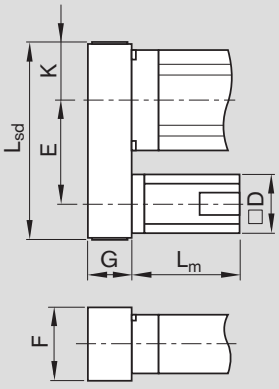


Refer to “Motors” for more information and dimensions.

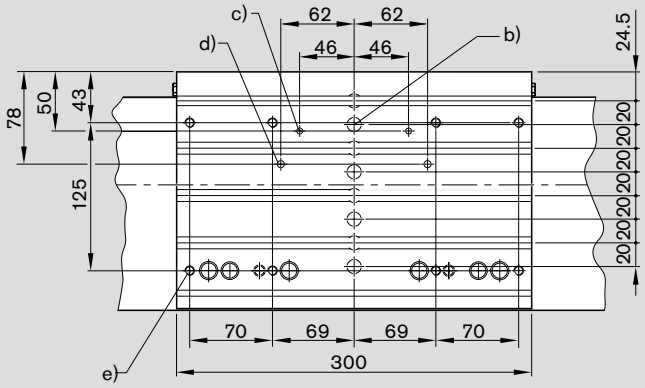
Type MF01, MF02

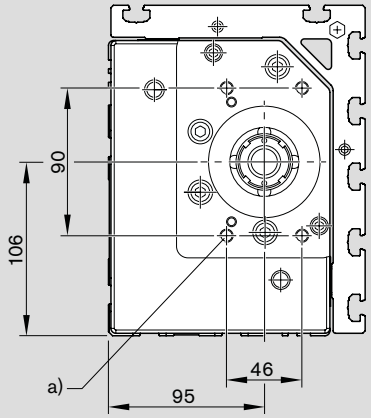


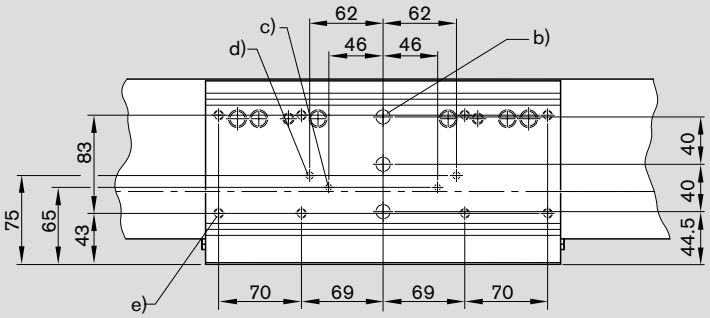
Type RV01 - RV08

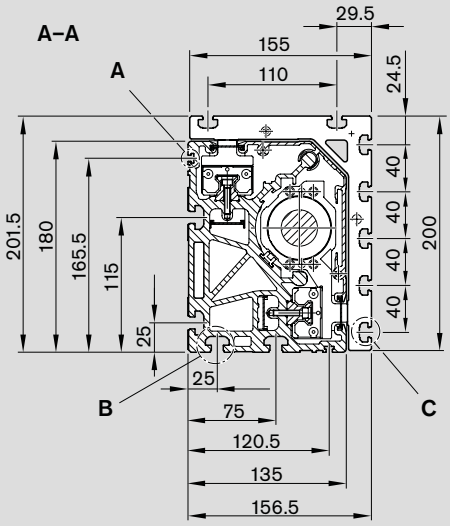


Type	Motor	Dimensions (mm)										
		D	E		F	G	K	L_f	L_m		L_{sd}	
			i=1	i=2					without brake	with brake	i=1	i=2
RV01 - RV08	**MSK 060C**	116	267.5	265	116	66	59	–	226.0	259.0	403	403
MF01, MF02	**MSK 060C**	116	–	–	–	–	–	125	226.0	259.0	–	–
	MSK 076C	140	–	–	–	–	–	133	292.5	292.5	–	–

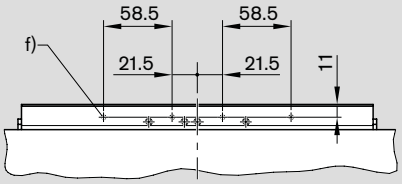


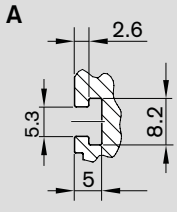


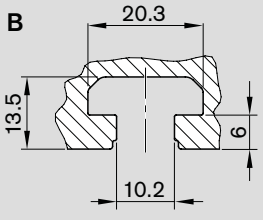


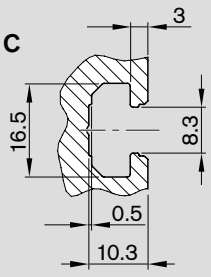


Mounting hole pattern for switching cam









a) M8 – 16 deep
b) Ø12^{H7} – 2.1 deep
c) Ø5^{H7} – 12 deep
d) Ø6^{H7} – 12 deep
e) M8 – 14 deep
f) M4 – 6 deep