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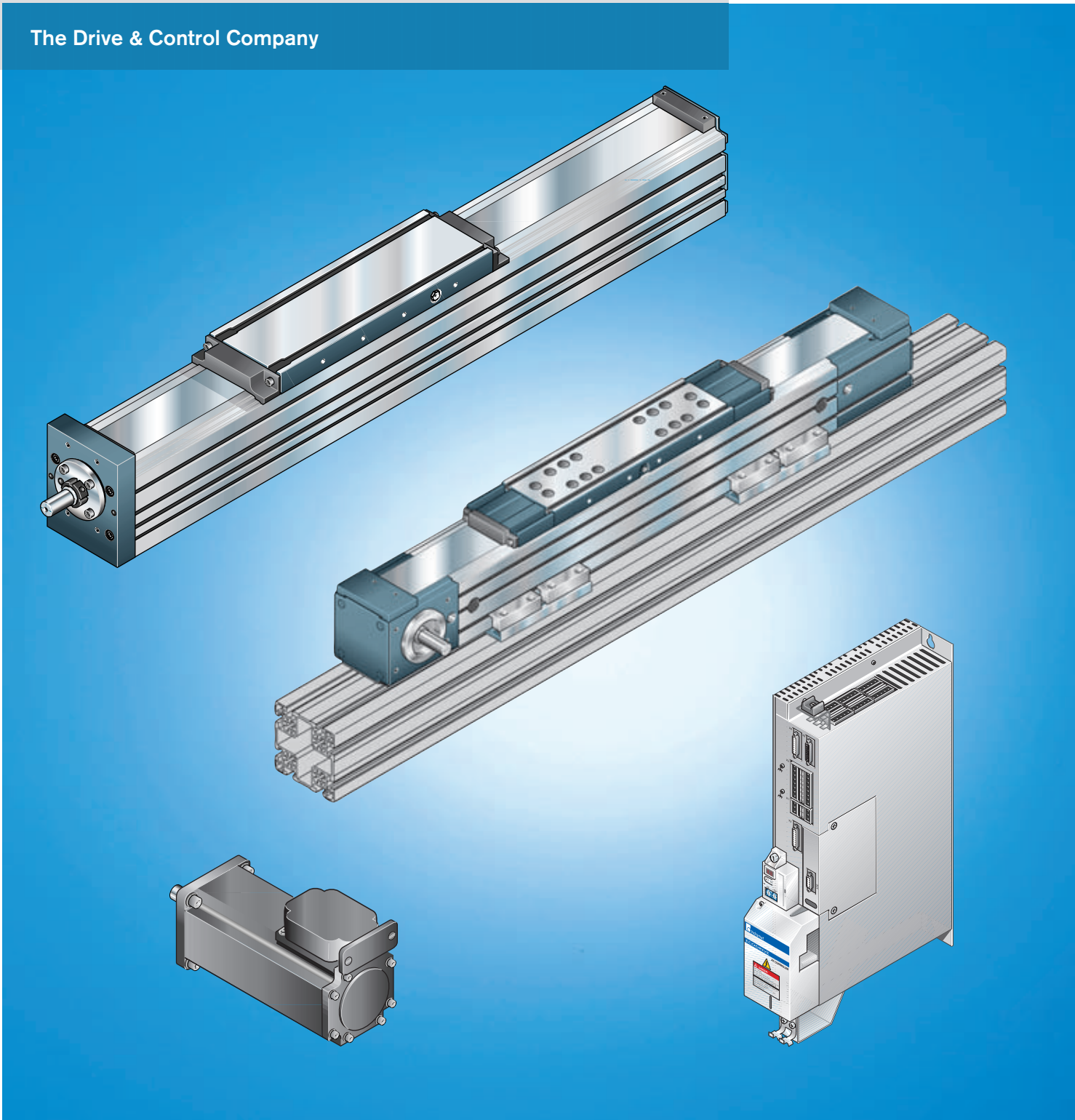
Linear Modules

Robotic Erector System for Linear Modules

RE 82 402/2003-10

The Drive & Control Company



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Rexroth Linear Motion Technology

Ball Rail Systems	Standard Ball Rail Systems Super Ball Rail Systems Ball Rail Systems with Aluminum Runner Blocks High Speed Ball Rail Systems Corrosion-resistant Ball Rail Systems Wide Ball Rail Systems	
	Ball Rail Systems with Integrated Measuring System Braking and Clamping Units for Ball Rail Systems Rack and Pinion for Ball Rail Systems Miniature Ball Rail Systems Cam Roller Guides	
Roller Rail Systems	Standard Roller Rail Systems Wide Roller Rail Systems Heavy Duty Roller Rail Systems	
	Roller Rail Systems with Integrated Measuring System Braking and Clamping Units for Roller Rail Systems Rack and Pinion for Roller Rail Systems	
Linear Bushings and Shafts	Linear Bushings, Linear Sets Shafts, Shaft Support Rails, Shaft Support Blocks	
	Ball Transfer Units Traditional Engineering Components	
Screw Drives		
Linear Motion Systems	Linear Motion Slides	– Ball Screw Drive – Toothed Belt Drive
	Linear Modules	– Ball Screw Drive – Toothed Belt Drive – Rack and Pinion Drive – Pneumatic Drive – Linear Motor
	Compact Modules	– Ball Screw Drive – Toothed Belt Drive – Linear Motor
	Precision Modules	– Ball Screw Drive
	Ball Rail Tables	– Ball Screw Drive – Linear Motor
	Controllers, Motors, Electrical Accessories	
	Linear Actuators	

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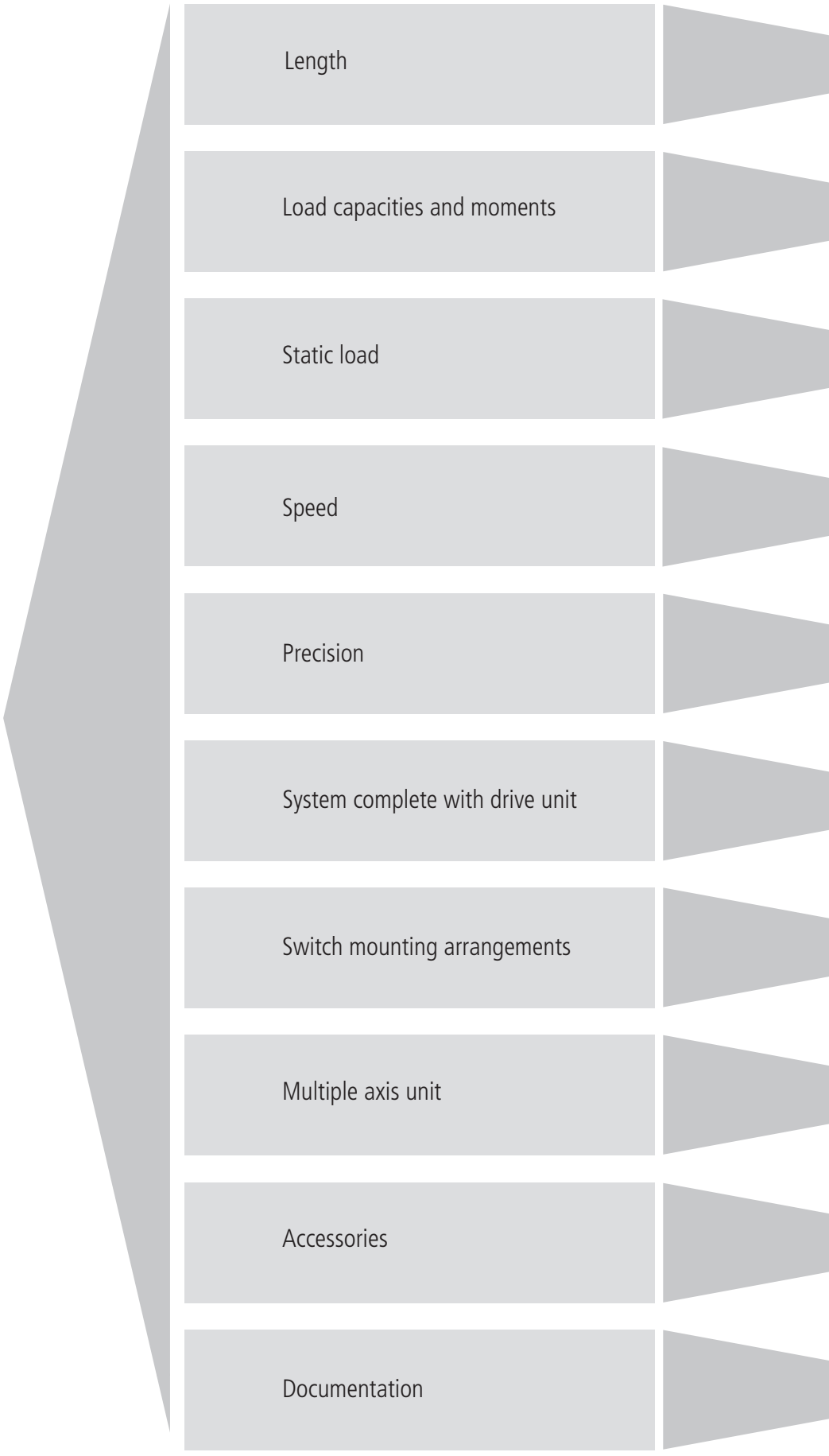
Rexroth Linear Modules
A Solution to Many Problems

The problems

- Driving
- Transporting
- Positioning



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Up to 12 meters

Load capacity C up to 49700 N
Longitudinal moment M_L up to 2900 Nm
Torsional moment M_t up to 1040 Nm

Up to 1000 kg

Up to 10 m/s

Repeatability up to 0.005 mm
Positioning accuracy up to 0.01 mm

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

Mechanical and proximity switches

Combination option
provided by connectors

Clamping fixtures, motor mounts,
T-nuts, etc.

Moment of friction measurement
Lead deviation
Positioning accuracy

The solution

Rexroth

Linear Modules

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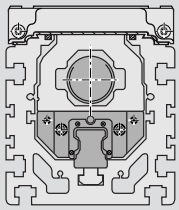
Rexroth Linear Modules
Product Overview MKK

Rexroth Linear Modules are precise, ready-to-mount linear motion systems that combine high performance with compact dimensions.
Excellent price/performance ratio. Short delivery times.

Structural design
- Ready-to-mount linear modules in any specified length
- Extremely compact aluminum profile with integral Rexroth Ball Rail Systems
- Driven by Rexroth Precision Ball Screw Assembly

Attachments
- AC servo motor or stepping motor with control units
- Gear reducer with various gearing reductions
- Switches (proximity and mechanical)
- Socket and plug
- Aluminum profile cable duct

Linear Modules with Ball Rail System and Precision Ball Screw Assembly
For high load capacities, high positioning accuracy and repeatability.

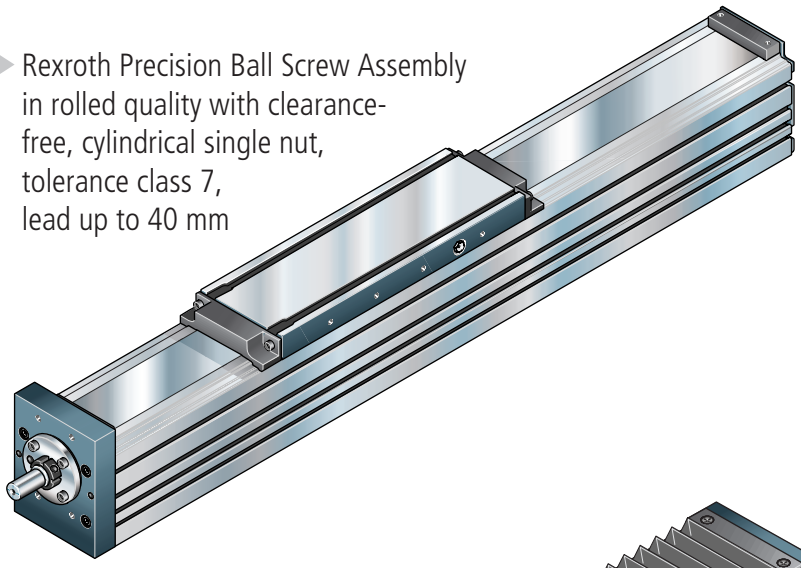


MKK

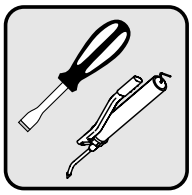
▶ For MKK 15-65: Sealing by means of a special plastic strip

For MKK 20-80 and MKK 25-110: Sealing by means of a corrosion-resistant steel strip

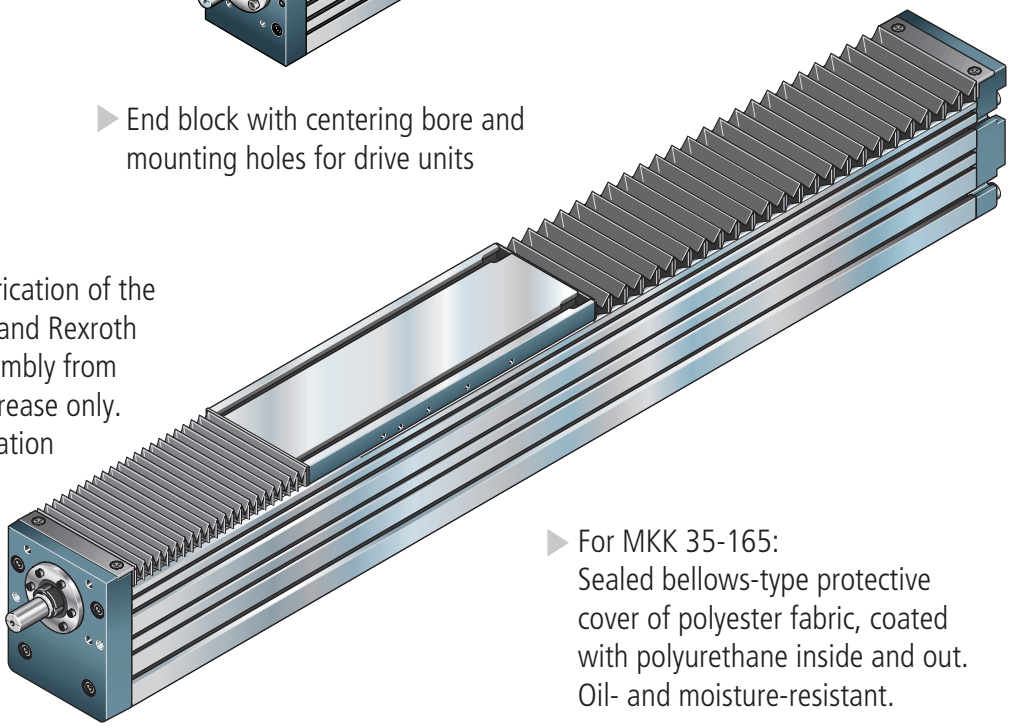
▶ Rexroth Precision Ball Screw Assembly in rolled quality with clearance-free, cylindrical single nut, tolerance class 7, lead up to 40 mm



▶ For mounting and maintenance, see MKK Instructions.



▶ End block with centering bore and mounting holes for drive units



▶ One-point, in-service lubrication of the Rexroth Ball Rail System and Rexroth Precision Ball Screw Assembly from either side; suitable for grease only. MLR: one-point oil lubrication

▶ For MKK 35-165:
Sealed bellows-type protective cover of polyester fabric, coated with polyurethane inside and out. Oil- and moisture-resistant.

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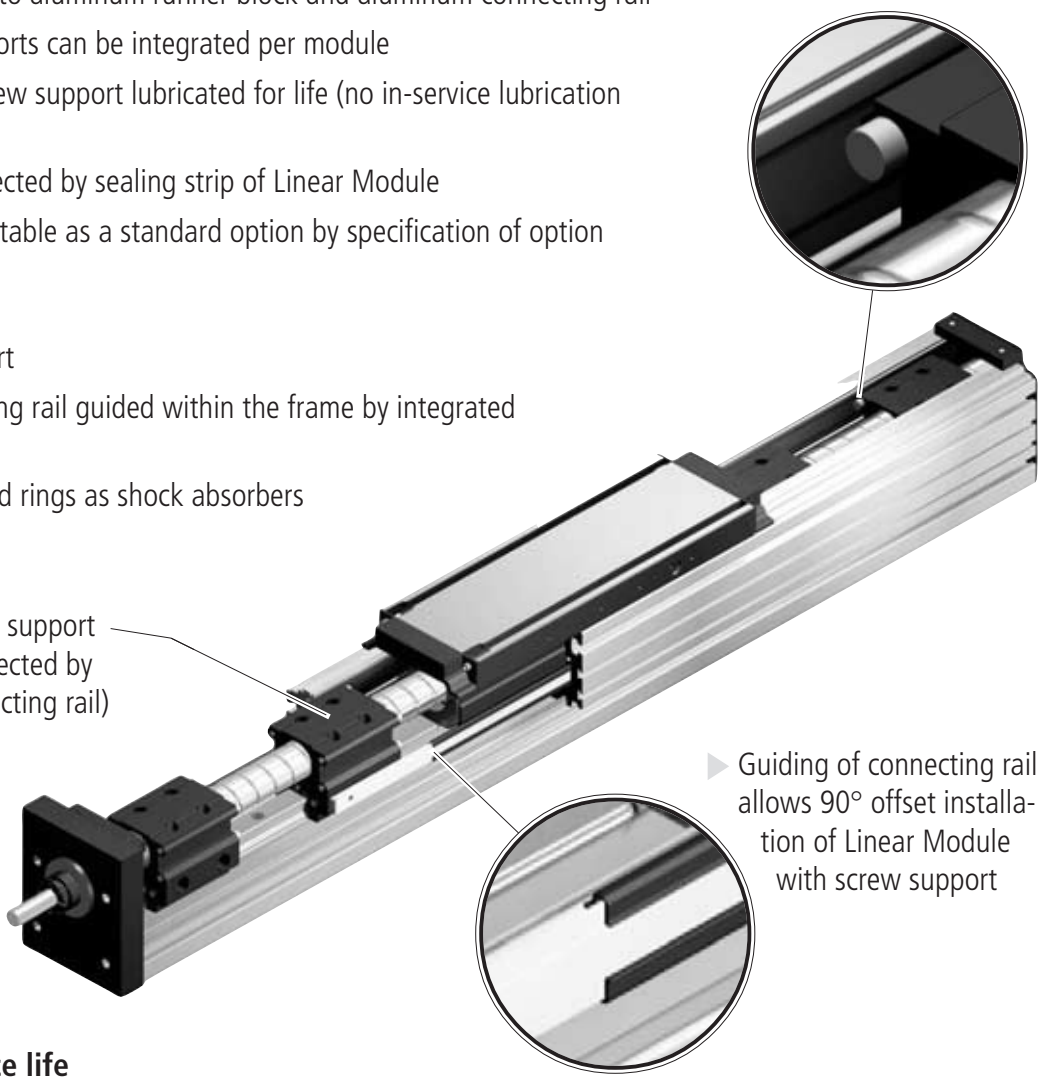
Screw Support for MKK 25-110

The new screw support SPU offers the following benefits:

– Screw lengths up to 4,900 mm; for special applications, lengths up to 10,000 mm
– Low weight thanks to aluminum runner block and aluminum connecting rail
– Up to 2 screw supports can be integrated per module
– Runner block of screw support lubricated for life (no in-service lubrication required)
– Screw support protected by sealing strip of Linear Module
– Screw support selectable as a standard option by specification of option number

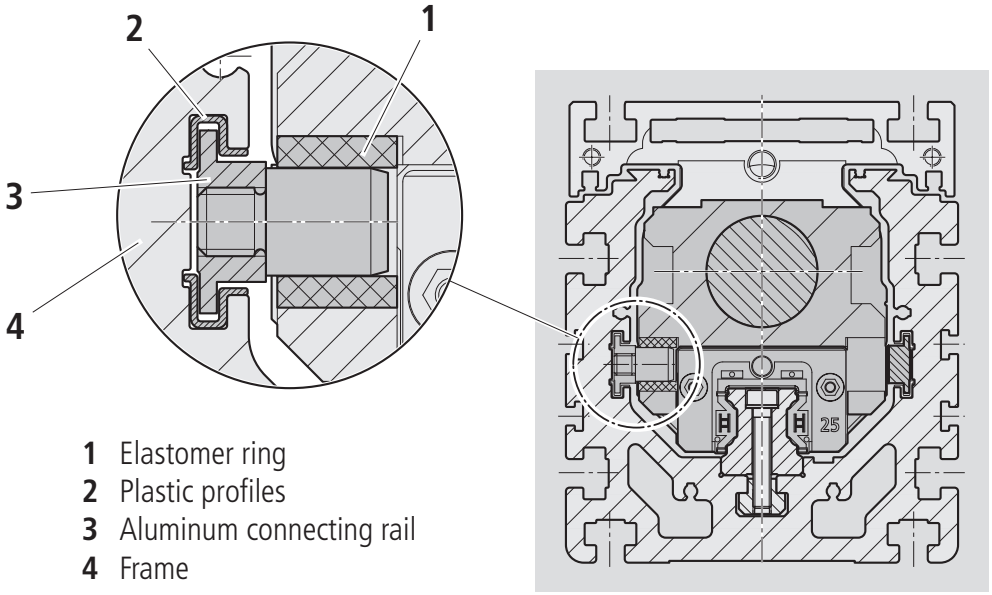
Structural design

– Plastic screw support
– Aluminum connecting rail guided within the frame by integrated plastic profiles
– Elastomer buffer and rings as shock absorbers



Longer service life

Maximum drive torque for all lengths



High speed over long travel distances

1 Elastomer ring
2 Plastic profiles
3 Aluminum connecting rail
4 Frame

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Rexroth Linear Modules
Product Overview MKR

Rexroth Linear Modules are precise, ready-to-mount linear motion systems that combine high performance with compact dimensions. Excellent price/performance ratio. Short delivery times.

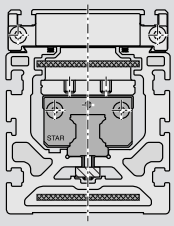
Structural design

- Ready-to-mount linear modules in any specified length
- Extremely compact aluminum profile with integral Rexroth Ball Rail Systems
- Driven by toothed belt drive for travel speeds up to 5 m/s

Attachments

- AC servo motor or stepping motor with control units
- Gear reducer with various gearing reductions
- Switches (proximity and mechanical)
- Socket and plug
- Aluminum profile cable duct

Linear Modules with Ball Rail System and Toothed Belt Drive
High load capacities and optimum running enable the integral, clearance-free Rexroth Ball Rail System to move large loads at high speed.



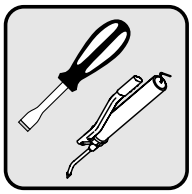
MKR

▶ Gap-type sealing and guiding of the belt by the aluminum frame. This sealing system is maintenance-free.

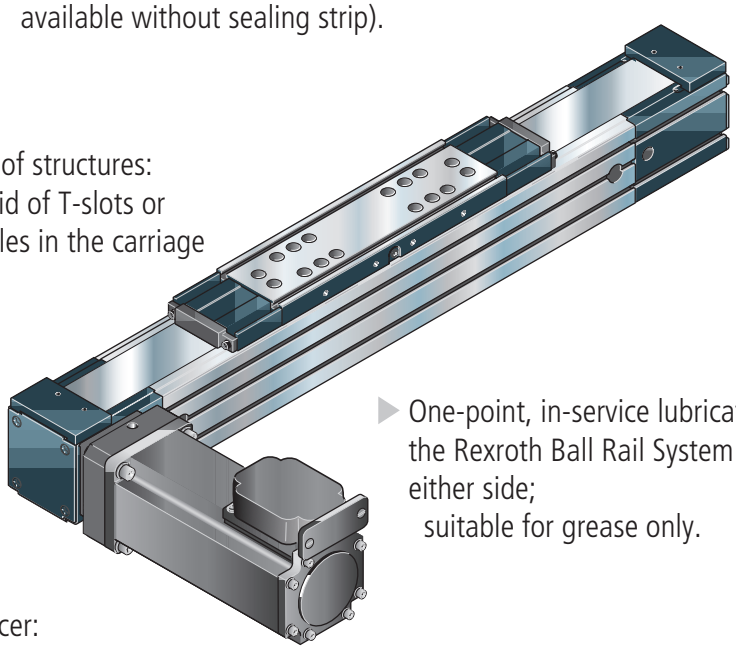
▶ Tension end enclosure with integral belt tensioning system. Belt pulley system with ball bearings lubricated for life.

▶ New type of sealing for MKR 20-80 and MKR 25-110 by means of a corrosion-resistant steel strip (also available without sealing strip).

▶ For mounting, startup and maintenance, see MKR/MLR Instructions.



▶ Mounting of structures: with the aid of T-slots or tapped holes in the carriage



▶ One-point, in-service lubrication of the Rexroth Ball Rail System from either side;
suitable for grease only.

▶ Gear unit or integral gear reducer: Variable gearing ratios to optimally match the carried mass to the drive motor inertia.

▶ Variable gearing ratios to optimally match the carried mass to the drive motor inertia constant.
Planetary gearing can be integrated in the belt drive sprocket or mounted as a separate gear unit for high-dynamic drive performance.

▶ Maintenance-free digital AC servo motor with integral brake and attached feedback

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Product Overview MLR

Rexroth Linear Modules are precise, ready-to-mount linear motion systems that combine high performance with compact dimensions. Excellent price/performance ratio. Short delivery times.

Structural design

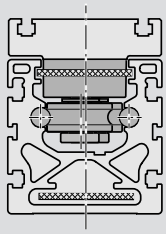
- Ready-to-mount linear modules in any specified length
- Extremely compact aluminum profile with integral Rexroth Cam Roller Guides
- Driven by toothed belt drive for travel speeds up to 10 m/s

Attachments

- AC servo motor or stepping motor with control units
- Gear reducer with various gearing reductions
- Switches (proximity and mechanical)
- Socket and plug
- Aluminum profile cable duct

Linear Modules with Cam Roller Guide and Toothed Belt Drive

The special design of the integral, clearance-free Rexroth Cam Roller Guide makes it ideal for very high speeds (up to 10 m/s).



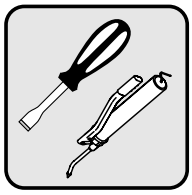
MLR

▶ Gap-type sealing and guiding of the belt by the aluminum frame. This sealing system is maintenance-free.

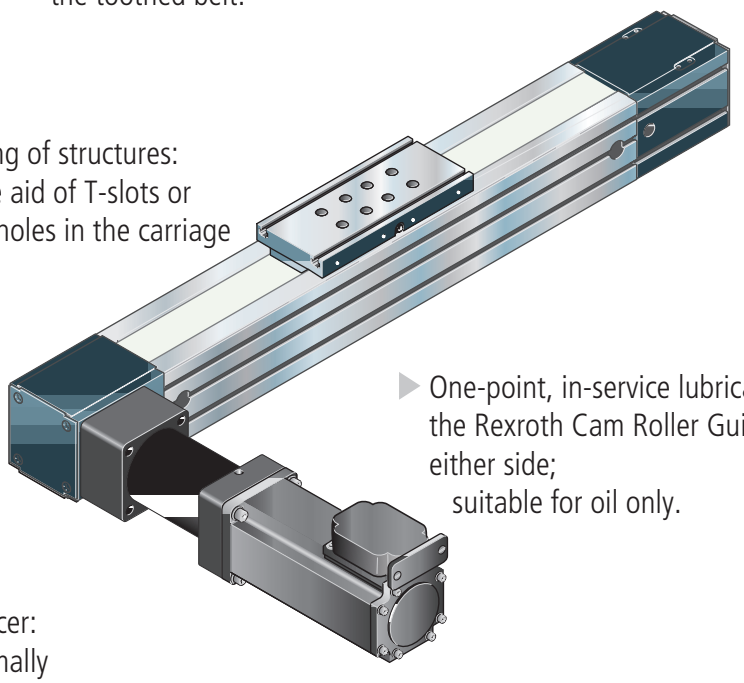
▶ Tension end enclosure with integral belt tensioning system. Belt pulley system with ball bearings lubricated for life.

▶ Sealed by means of the toothed belt.

▶ For mounting, startup and maintenance, see MKR/MLR Instructions.



▶ Mounting of structures: with the aid of T-slots or tapped holes in the carriage



▶ One-point, in-service lubrication of the Rexroth Cam Roller Guide from either side; suitable for oil only.

▶ Gear unit or integral gear reducer: Variable gearing ratios to optimally match the carried mass to the drive motor inertia.

▶ Variable gearing ratios to optimally match the carried mass to the drive motor inertia constant.
Planetary gearing can be integrated in the belt drive sprocket or mounted as a separate gear unit for high-dynamic drive performance.

▶ Maintenance-free digital AC servo motor with integral brake and attached feedback

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Rexroth Linear Modules
Product Overview MKR 25-145

Rexroth Linear Modules are precise, ready-to-mount linear motion systems that combine high performance with compact dimensions. Excellent price/performance ratio. Short delivery times.

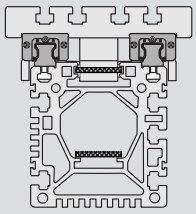
Structural design

- Anodized aluminum frame of high inherent rigidity
- Two Rexroth Ball Rail Systems with sealing strips and two long runner blocks each
- Profiled aluminum carriage
- Pre-tensioned toothed belt
- Integral planetary gearing in the drive sprocket

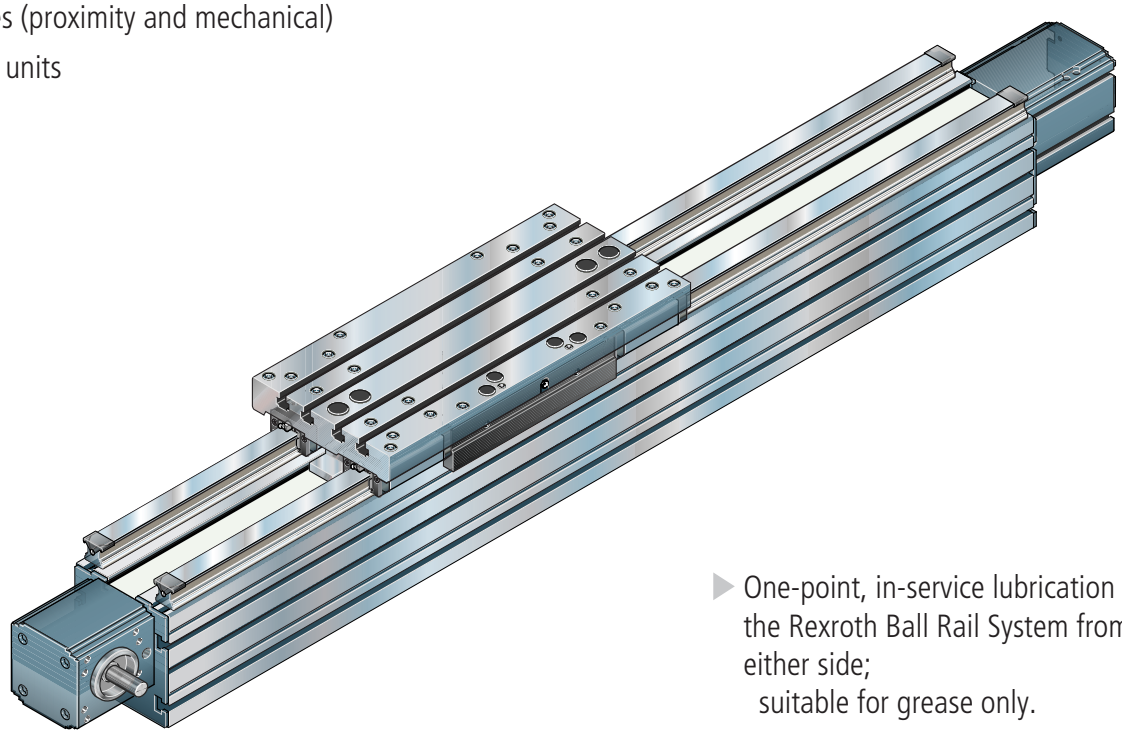
Attachments

- Motor mount, coupling with or without gear reducer for attachment of the motor
- AC servo motor (other motor types on request)
- Switches (proximity and mechanical)
- Control units

MKR 25-145: Linear Module with two Ball Rail Systems and Toothed Belt Drive
For high moment capacity and high speeds.



MKR 25-145



▶ One-point, in-service lubrication of the Rexroth Ball Rail System from either side;
suitable for grease only.

▶ For maintenance, see Maintenance Instructions Linear Module MKR 25-145.

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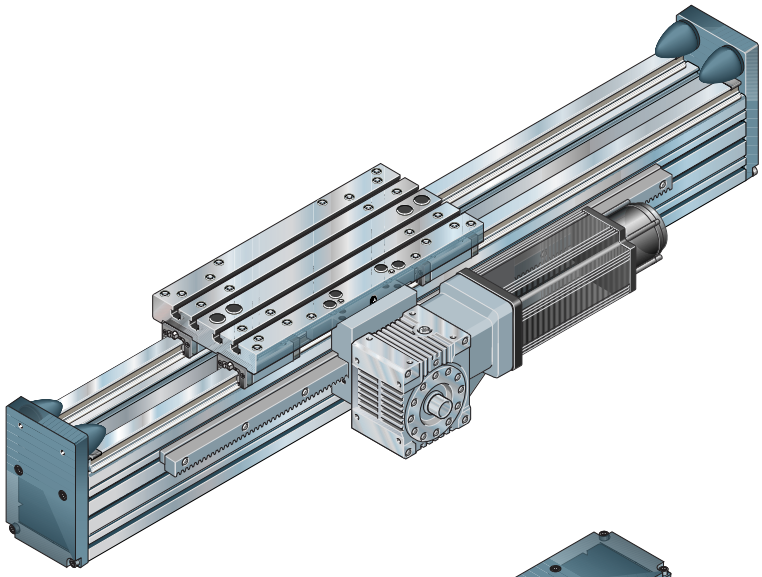
Product Overview MKZ 25-145 H/V

Structural design

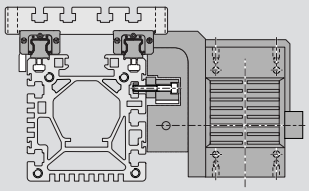
– Anodized aluminum frame of high inherent rigidity
– Two Rexroth Ball Rail Systems with sealing strips and two long runner blocks each
– Profiled aluminum carriage
– Rack and pinion drive (hardened and ground), with helical gearing ensuring low operating noise levels
– Low-backlash worm gear with motor mount and coupling for attachment of the motor

Attachments

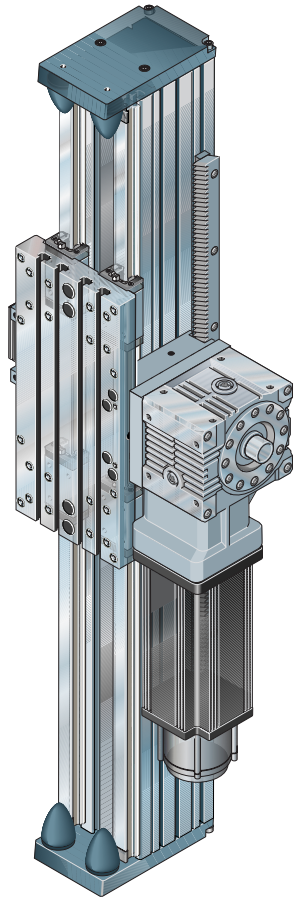
– AC servo motor
– Switches (proximity and mechanical)
– Control units



MKZ 25-145 H for horizontal operation: Linear Module with 2 Ball Rail Systems and Rack and Pinion Drive
For high moment capacity and for carrying large loads at high speed over long travel ranges.

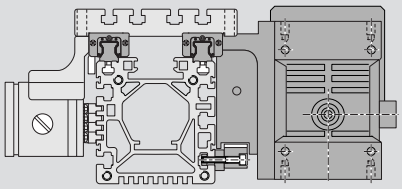


MKZ 25-145 H



▶ For maintenance, see Maintenance Instructions Linear Module MKZ 25-145.

MKZ 25-145 V for vertical operation: Linear Module with 2 Ball Rail Systems and Rack and Pinion Drive
For high moment capacity and safe lifting of heavy weights with moving frame (stationary carriage with gear reducer, motor and multi-position switch).



MKZ 25-145 V

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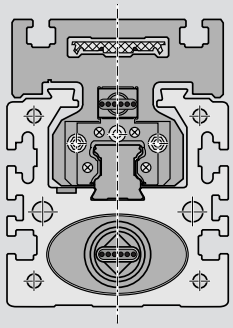
Rexroth Linear Modules
Product Overview MKP

Rexroth Linear Modules are precise, ready-to-mount linear motion systems that combine high performance with compact dimensions. Excellent price/performance ratio. Short delivery times.

Structural design
- Extremely compact precision aluminum frame with integral Rexroth Ball Rail System
- Pneumatic drive by means of integral belt cylinder
- End closure blocks with belt guide pulleys running on ball bearings
- Aluminum carriage with two integral runner blocks

Attachments
- Shock absorbers
- Switches
- Socket and plug for switches
- Sealing hose for T-slots

Linear Modules with integral Ball Rail System and Pneumatic Drive
Optimum running, high load capacities and high stiffness due to integral, clearance-free Rexroth Ball Rail System and sealed cylinder chamber.



MKP

▶ Compact height due to oval piston design, highly flexible patented tension belt (EP 0384 032 B1)

▶ Connection of compressed air supply at one or both linear module ends is possible due to internal air ducts

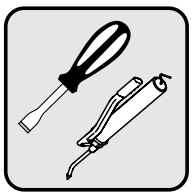
▶ Low leakage due to sealed cylinder chamber

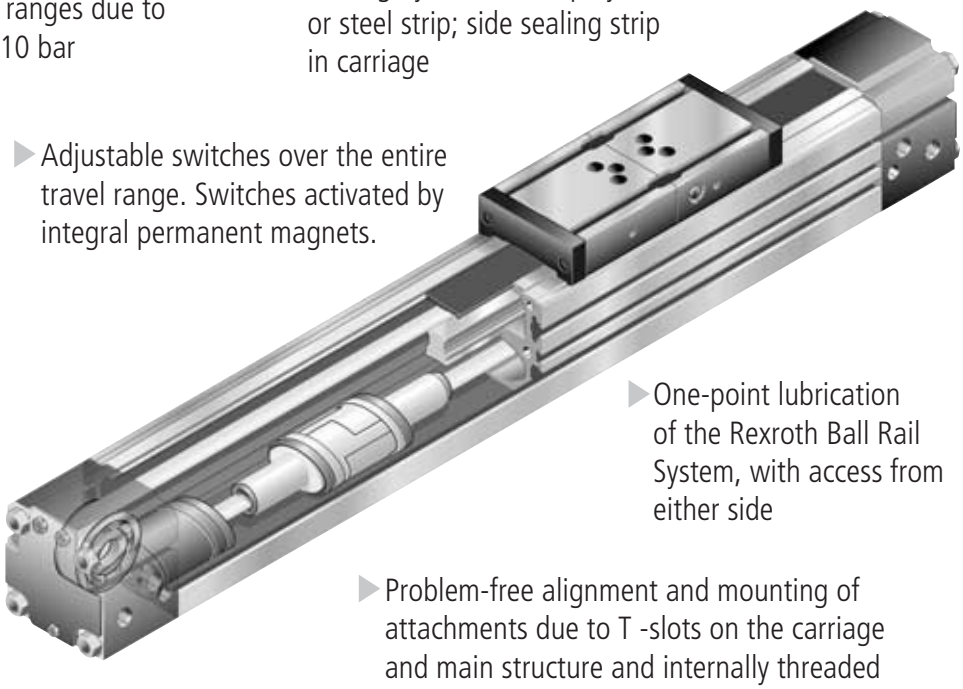
▶ High travel speeds combined with high precision over long travel ranges due to operating pressure up to 10 bar

▶ Sealing by means of a polyurethane or steel strip; side sealing strip in carriage

▶ Adjustable switches over the entire travel range. Switches activated by integral permanent magnets.

▶ For mounting, startup and maintenance, see MKP Instructions.

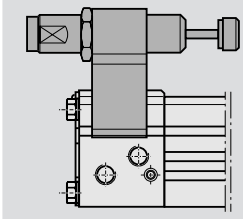




▶ One-point lubrication of the Rexroth Ball Rail System, with access from either side

▶ Problem-free alignment and mounting of attachments due to T -slots on the carriage and main structure and internally threaded screws in the end enclosure blocks

▶ High durability and low friction due to:
- belt pulleys with maintenance-free precision ball bearings
- centered belt guiding system
- highly wear-resistant materials for the tension belt, belt seal and piston seal



▶ Jolt-free braking even at high speeds due to adjustable, pneumatic end-damping or externally mounted shock absorbers

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Product Overview LKL, MKL

Rexroth Linear Modules LKL

For constant thrust over the entire speed range. Extremely simple mechanical design without conventional motors and gears.

Structural design

- Ready-to-mount linear modules in any specified length
- Extremely compact aluminum frame with integral Rexroth Ball Rail System
- Carriage with one-point lubrication
- Linear motor drive
- Integral position sensing
- Bellows as option

Controller

- Standard servo controller DKC**.3

See catalog
Linear Modules LKL

Rapid implementation

Convenient DriveTop start-up software

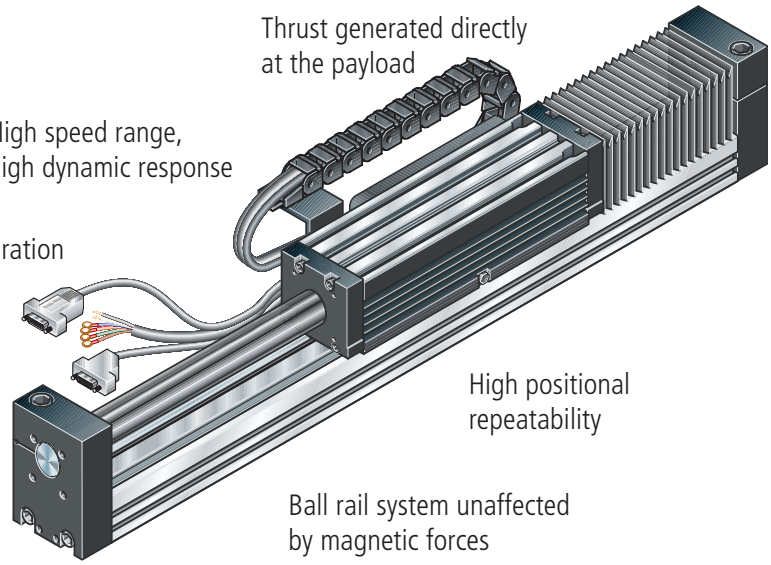
Thrust generated directly at the payload

High speed range, high dynamic response

Silent operation

Cost savings through shorter cycle times

Supplied as a complete "plug in and go" linear module with matching servo amplifier



High positional repeatability

Ball rail system unaffected by magnetic forces

Rexroth Linear Modules MKL

For constant thrust over the entire speed range. Simple mechanical design without conventional motors and gears.

Structural design

- Ready-to-mount linear modules in any specified length
- Extremely compact aluminum frame with integral Rexroth Ball Rail System
- Carriage with one-point lubrication
- Linear motor drive
- Integral position sensing
- Sealing strip
- Fan for motor cooling

Controller

- Standard servo controller DKC**.3

See catalog
Linear Modules MKL

Rapid implementation

Convenient DriveTop start-up software

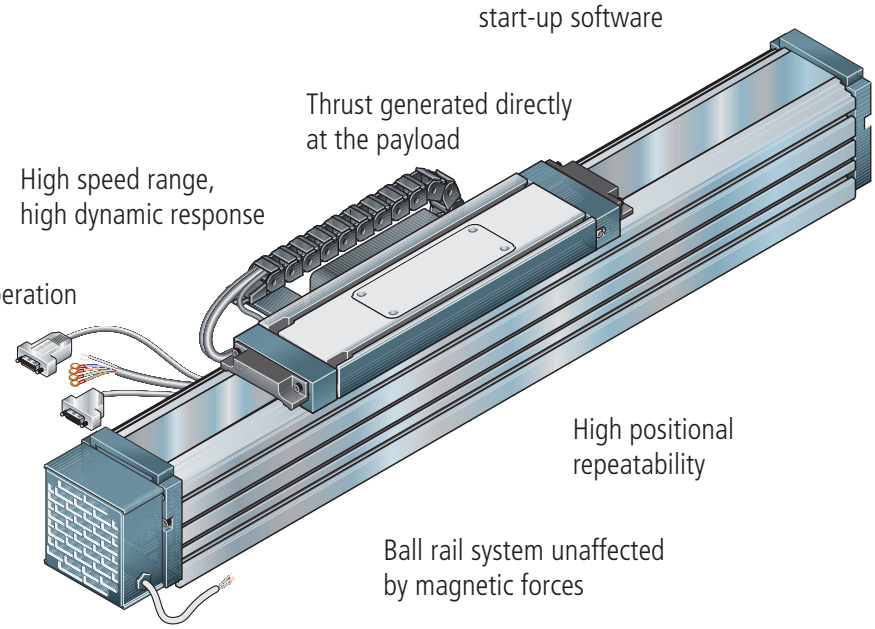
Thrust generated directly at the payload

High speed range, high dynamic response

Silent operation

Cost savings through shorter cycle times

Supplied as a complete "plug in and go" linear module with matching servo amplifier



High positional repeatability

Ball rail system unaffected by magnetic forces

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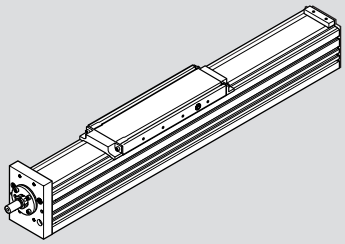
Rexroth Linear Modules
Product Overview Motors and Control Systems

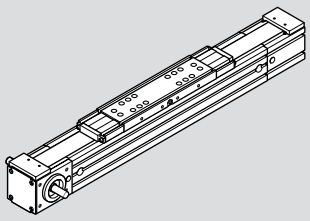
Motor Selection
in accordance with controllers and control systems

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

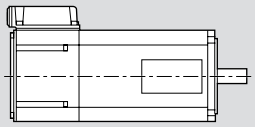
The motor / controller combination must always be taken into account when sizing the drive.

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

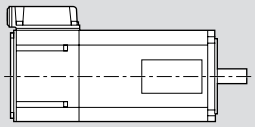




Digital AC servo motor*

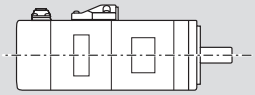


MKD
MHD



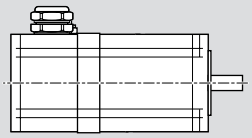
MKD

Servo motor MSM



MSM

3-phase stepping motor



VRDM

* Analog AC servo motor type MAC and analog controllers type TDM are also available.

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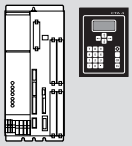
DKC

Digital controller

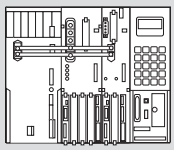
The low-cost solution for single- and multi-axis systems



DKS

Digital positioning module and DLC controls

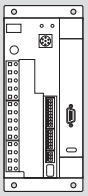
The universal solution for one axis



DDS

Digital controllers and CLM analog positioning module

The convenient solution for multi-axis systems



DKC

Digital controller ECODRIVE Cs

WD3

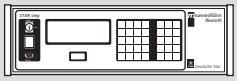
Power output section

for control cabinet installation

PC

PC controller board

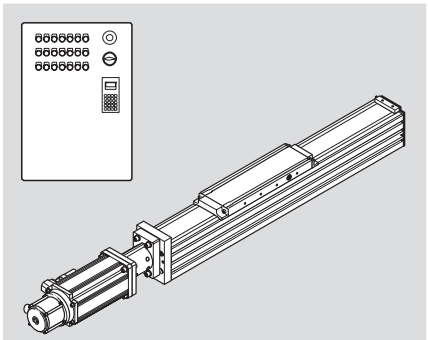
Stepping motor controller

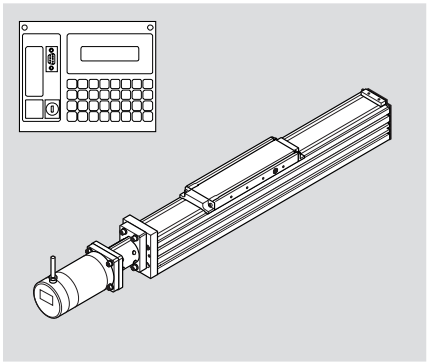


ECO step

Single- and multiple-axis positioning controls with power output section

The complete solution





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

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Rexroth Linear Modules
Types Available

Type designation (size)

The linear modules are designated according to **type** and **size**.

Types also cover the equivalent designs without drive units.

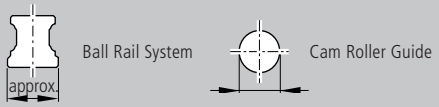
Linear Module (example) =	Type			Size	
	M	**K**	**R**	**20**	**-80**

System = Linear Module, closed type **(M)**
Linear Module, open type **(L)**

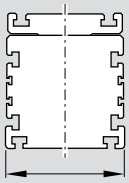
Guideway = Ball Rail System **(K)**
Cam Roller Guide **(L)**

Drive unit = Toothed Belt **(R)**
Precision Ball Screw Assembly **(K)**
Linear Motor **(L)**
Pneumatic Drive **(P)**
Rack and Pinion Drive **(Z)**

Dimensions of guideway =

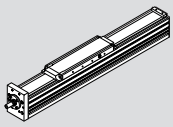
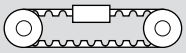
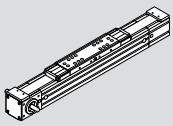
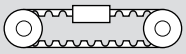
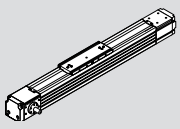
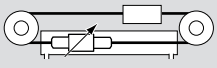
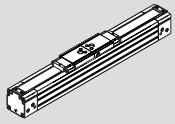
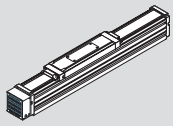
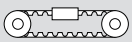
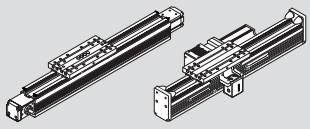
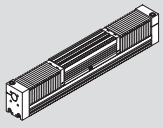


Frame dimensions =



Note: All linear modules are also available without drive unit.

Rexroth Linear Modules

Type	Guideway	Drive unit	Linear Module
MKK	 Ball Rail System	 Precision Ball Screw Assembly	
MKR	 Ball Rail System	 Toothed Belt Drive	
MLR	 Cam Roller Guide	 Toothed Belt Drive	
MKP	 Ball Rail System	 Pneumatic Drive	
MKL	 Ball Rail System	 Linear Motor	
MKR MKZ	 two Ball Rail Systems	 Toothed Belt Drive  Rack and Pinion Drive	
LKL	 Ball Rail System	 Linear Motor	

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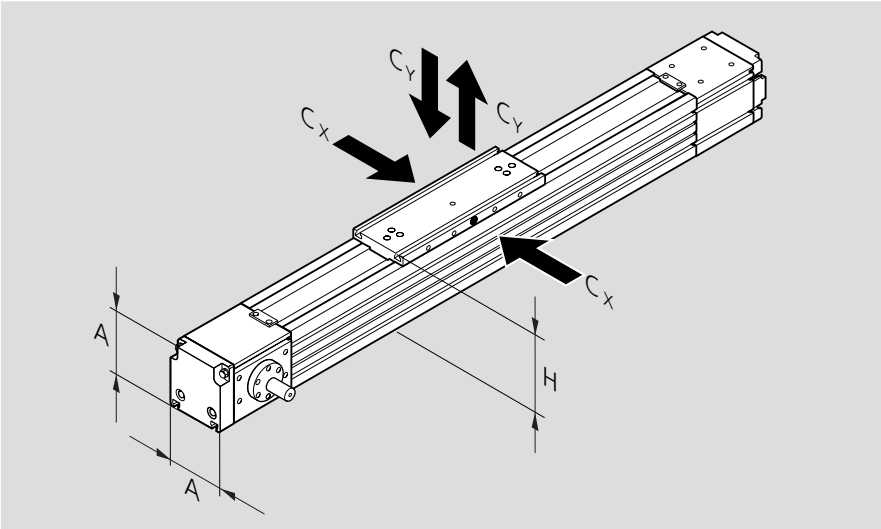
Overview of Linear Modules with Permissible Loads

Suitable load
(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**, $\mathbf{M_t}$, $\mathbf{M_L}$) have proved acceptable.

The following values may not be exceeded:

– the maximum permissible deflection
– the permissible drive torque
– the maximum permissible forces for type MLR
– the permissible speed.



Dimensions A x H (mm)								
65 x 85		**80 x 100**			**110 x 129**		**165 x 195**	
Linear Module	**Dynamic load capacity C_x (N) C_y (N)**	**Linear Module**	**Maximum dyn. load capacity C_x (N)**	**C_y (N)**	**Linear Module**	**Maximum dyn. load capacity C_x (N) C_y (N)**	**Linear Module**	**Dynamic load capacity C_x (N) C_y (N)**
MKK 15-65	12 670	MKK 20-80	30 620		MKK 25-110	37 160	MKK 35-165	68 200
MKR 15-65	11 820	MKR 20-80	28 300		MKR 25-110	44 770	MKR 35-165	68 200
		MLR 10-80	17 150	10 050	MLR 10-110	31 000 18 200		
MKP 15-65	16 250	MKP 20-80	30 540					
					MKL 20-110	23 550		
70 x 90		**85 x 110**			**145 x 215**			
					MKR 25-145	98 700		
					MKZ 25-145 H	98 700		
					MKZ 25-145 V	98 700		
LKL 15-70	6 820	LKL 20-85	23 550					

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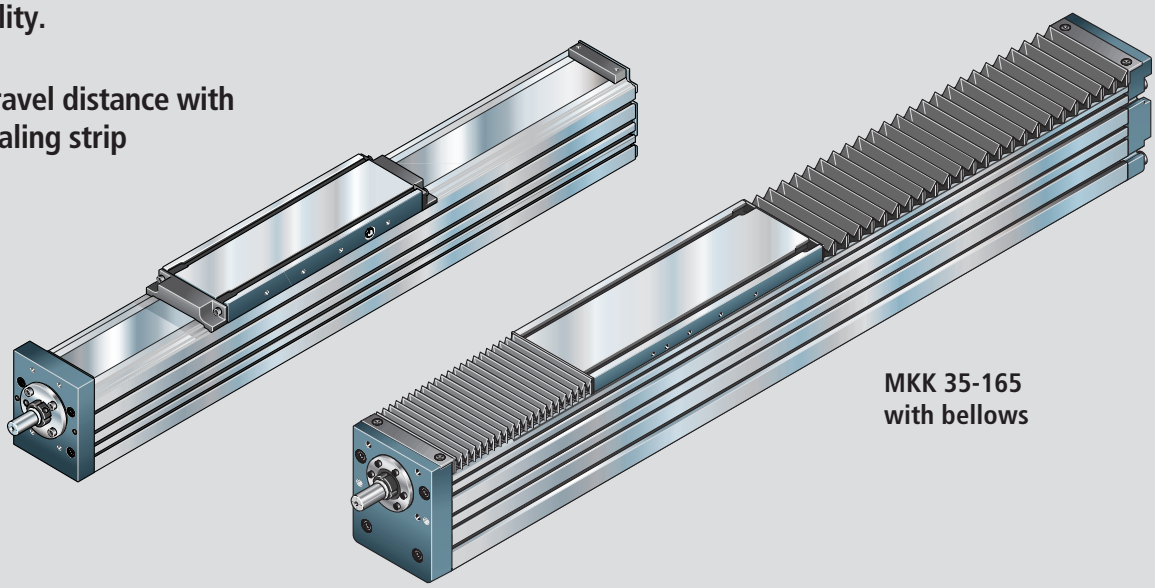
Rexroth Linear Modules MKK
Structure and Technical Data

MKK...: Linear Modules with Ball Rail System and Precision Ball Screw Assembly for high feed forces, accurate positioning and repeatability.

Greater travel distance with special sealing strip

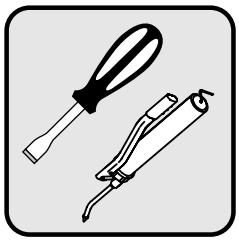


MKK 35-165 with bellows

The MKK... Linear Modules comprise:

- a compact, anodized aluminum frame
- the integral Rexroth Ball Rail System
- a carriage with one-point lubrication
- the clearance-free adjusted Rexroth Ball Screw Assembly (also available in MKK... design without drive unit)
- mountable switches
- an AC servo drive or a stepping motor (other motor types on request)
- motor mount, coupling or side drive with timing belt for attachment of the motor
- cover provided by
  - plastic strip on MKK 15-65
  - corrosion-resistant steel strip to DIN EN 10088 on MKK 20-80 and MKK 25-110
  - bellows on MKK 35-165
- a screw support for MKK 25-110
- control units

For mounting and maintenance, see MKK Instructions.



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General technical data

All the carriages are fitted with two runner blocks.

Linear Module	Ball screw d_0 x P	Carriage length (mm)	Dynamic load capacity C: Guide-way (N)	Dynamic load capacity C: Ball screw (N)	Dynamic load capacity C: Fixed bearing (N)	Dynamic moment M_t (Nm)	Dynamic moment M_L (Nm)	Moved mass (kg)	Minimum length L_{min} 1) (mm)	Maximum length L_{max} (mm)	Planar moment of inertia I_x (cm⁴)	Planar moment of inertia I_y (cm⁴)
MKK 15-65	without	190	12 670	–	–	120	449	1.8	380	6 000	79.2	90.2
	16 x 5			12 300	17 000				400	2 500		
	16 x 10			9 600					420			
	16 x 16			9 300					450			
MKK 20-80	without	260	30 620	–	–	389	1 527	2.2	480	6 000	169	211
	16 x 10	260		9 600	17 000			2.6	520	2 500		
	16 x 16			9 300					550			
	20 x 5			14 300					500			
	20 x 20			13 300					560			
MKK 25-110	without	310	37 160	–	–	519	1 721	3.8	550	10 000	515	664
	32 x 5	310		21 500	26 000			4.9	570	4 900		
	32 x 10			31 700					590			
	32 x 20			19 700					630			
	32 x 32			19 500					680			
MKK 35-165	without	400	68 200	–	–	1 445	9 690	14.0	570	12 000	2 574	3 527
	40 x 5	400		29 100	29 000		3 980	16.0	590	4 000		
	40 x 10			50 000					620			
	40 x 20			37 800					660			
	40 x 40			37 000					760			

Modulus of elasticity E

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

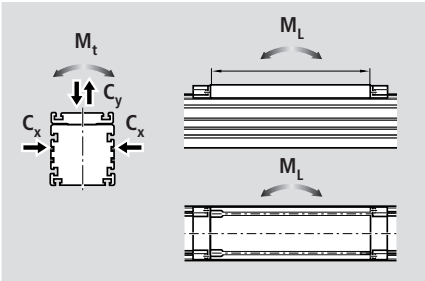
1) with sealing strip, for a theoretical stroke of 100 mm

Lengths in excess of L_{max}

Lengths in excess of L_{max} are available upon request.

Note 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 values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the table by 1.26.
Load capacities for the ball screw comply with DIN 69 051.



Mass

Mass calculation does not include motor, switches or side drive with timing belt.

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

Linear Module	Ball screw	Carriage length (mm)	Mass (kg)
MKK 15-65	without	190	0.0063 · L + 2.0
	with	190	0.0077 · L + 3.0
MKK 20-80	without	260	0.0100 · L + 2.3
	with	260	0.0120 · L + 3.8
MKK 25-110	without	310	0.0160 · L + 4.0
	with	310	0.0217 · L + 7.2
MKK 35-165	without	400	0.0368 · L + 18.5
	with	400	0.0448 · L + 23.5

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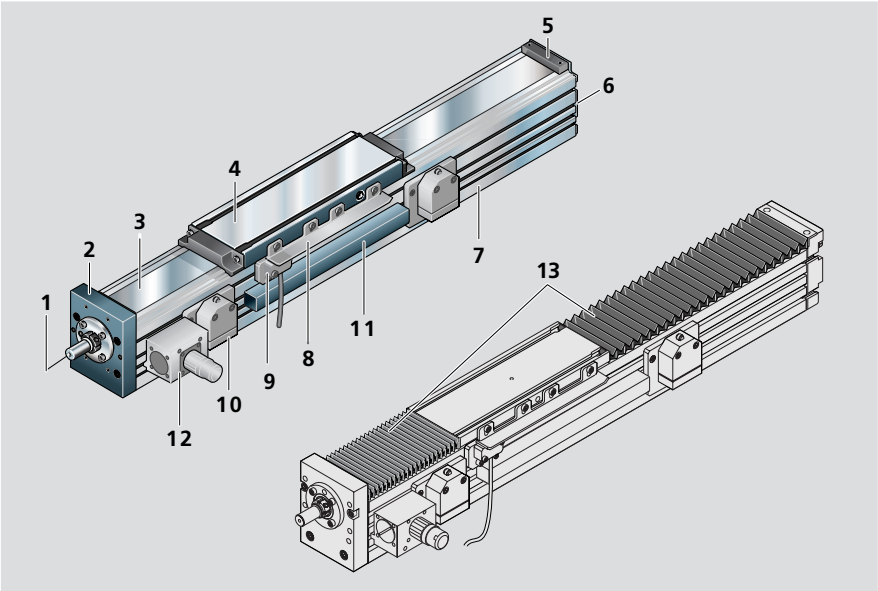
Rexroth Linear Modules MKK

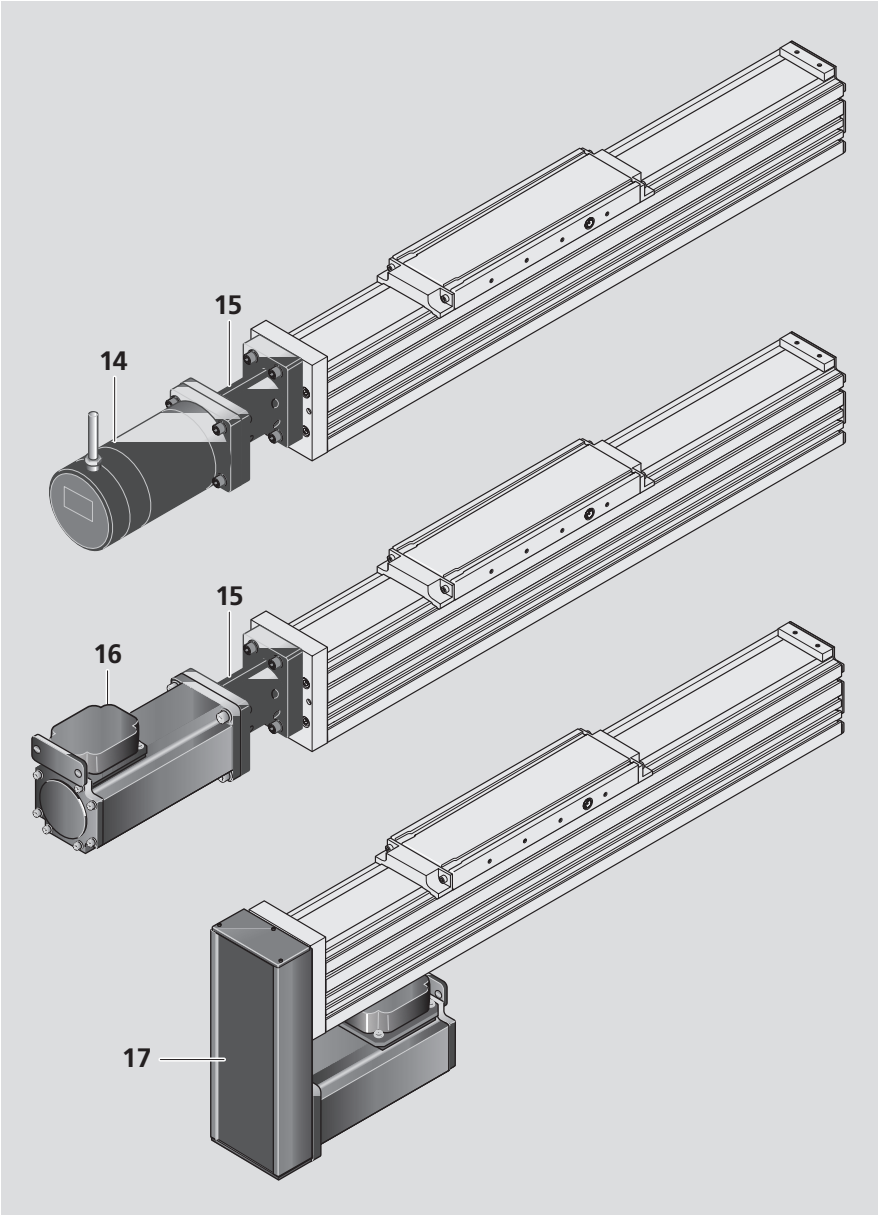
Structure

Structural design

1 Precision ball screw assembly with clearance-free cylindrical single nut
2 End block fixed bearing
3 Sealing strip on MKK 15-65, MKK 20-80, MKK 25-110
4 Carriage with runner block
5 Strip fixing
6 End plate
7 Frame
13 Bellows cover on MKK 35-165

Attachments:
8 Switching cam
9 Proximity switch
10 Mechanical switch
11 Cable duct
12 Socket / plug





14 Stepping motor
15 Motor mount
16 Servo motor
17 Side drive with timing belt

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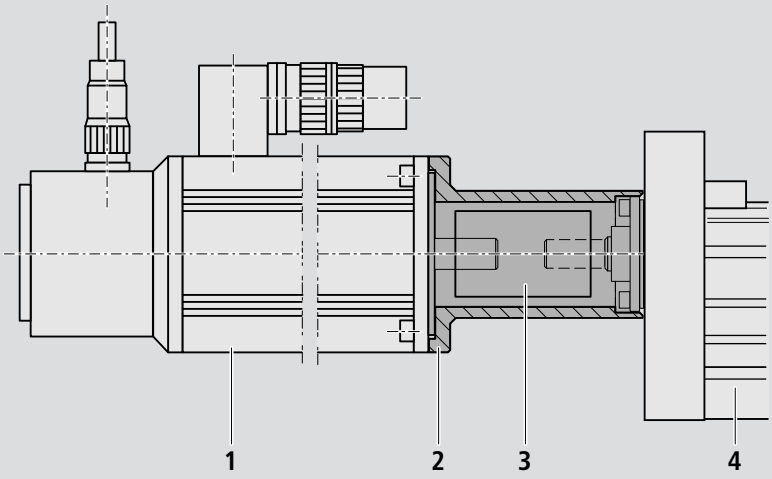
Motor attachment with mount and coupling

A motor can be attached via a mount and coupling to all Linear Modules equipped with a ball screw drive.
The motor mount serves both to attach the motor to the Linear Module and as an enclosed housing for the coupling.
The coupling transmits the motor drive torque free of stresses to the Linear Module drive shaft.

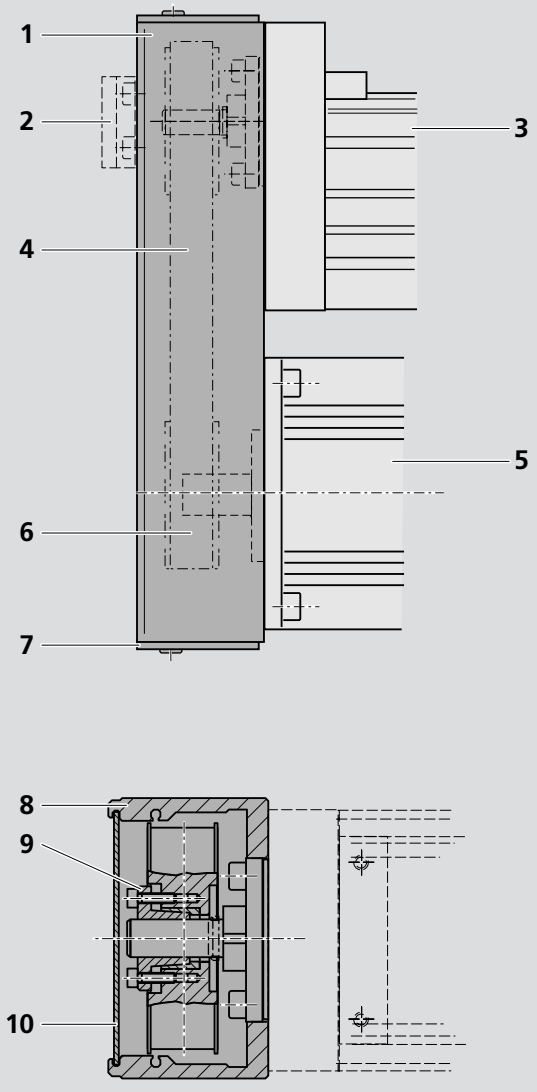


1 Motor
2 Motor mount
3 Coupling
4 Linear Module

Motor attachment via side drive with timing belt

On all Linear Modules with ball screw drive 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. In addition, different gear ratios are available (4).
The side drive with timing belt can be mounted in four directions:

– bottom (RV01)
– top (RV02)
– left, right (RV03 and RV04)



1 Compact enclosed housing provides belt protection and secures motor
2 On MKK 15-65 and MKK 20-80 with i = 1.5 or i = 2:
Ball screw journal with support bearing.
3 Linear Module
4 Timing belt drive with reduction:
i = 1 : 1
i = 1 : 1.5
i = 1 : 2
5 AC servo motor
6 Pre-tensioning of the toothed belt:
Apply pre-tensioning force F_V to motor. F_V is marked in the housing.
7 Cover
8 Drawn, anodized aluminum frame
9 Attachment of belt pulleys with clamping fixtures
10 Cover plate

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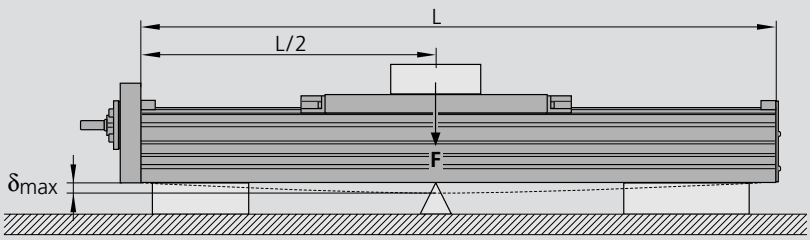
Rexroth Linear Modules MKK
Technical Data

Deflection

A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.



Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F.

⚠ δ_{max} may not be exceeded!

For applications requiring high system dynamics, support should be provided at every 300 to 600 mm.

Example

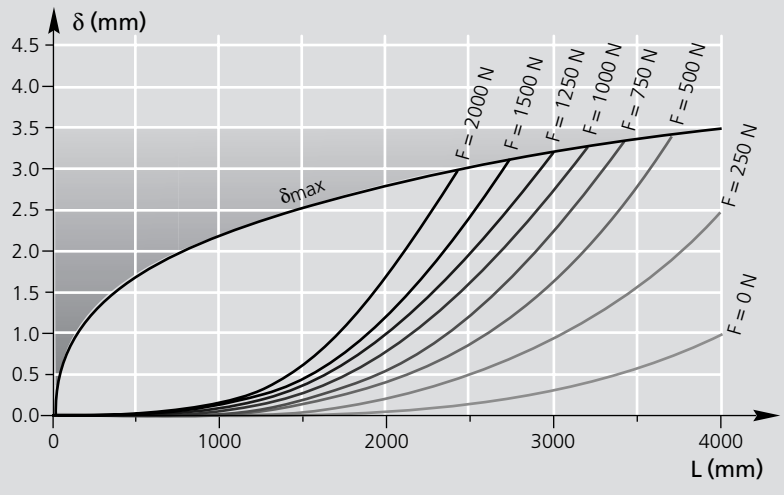
Linear Module MKK 20-80: L = 2500 mm
F = 1500 N
From graph MKK 20-80: δ = 1.1 mm
δ_{max} = 3.1 mm

The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.

The graph applies in the following conditions:

– ends firmly clamped
(200 to 250 mm on each side)
– 6 to 8 screws on each side
– fixed base

MKK 15-65



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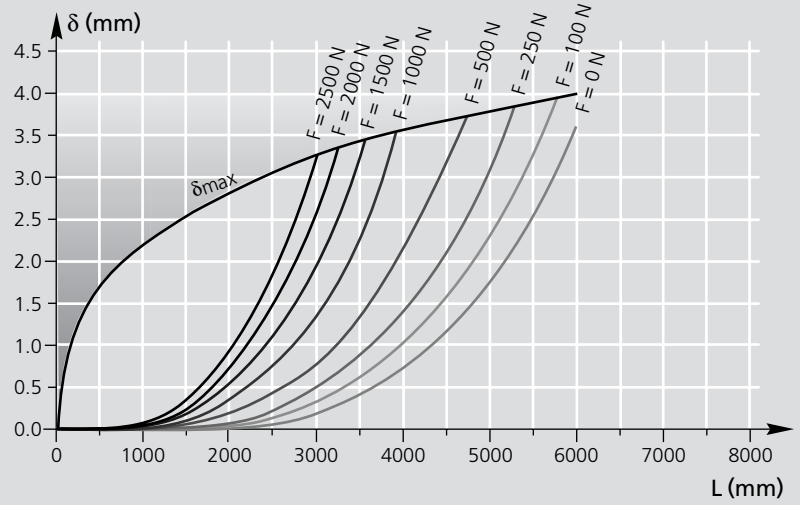
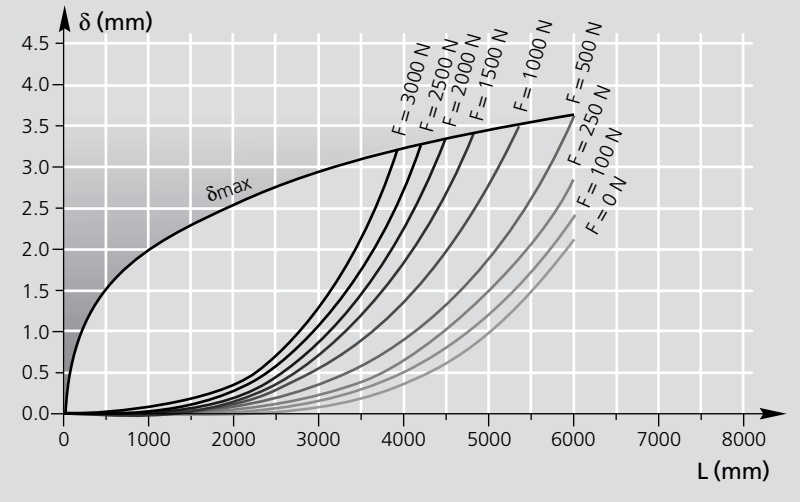
The graphs apply in the following conditions:

– ends firmly clamped
  (200 to 250 mm on each side)
– 6 to 8 screws on each side
– fixed base

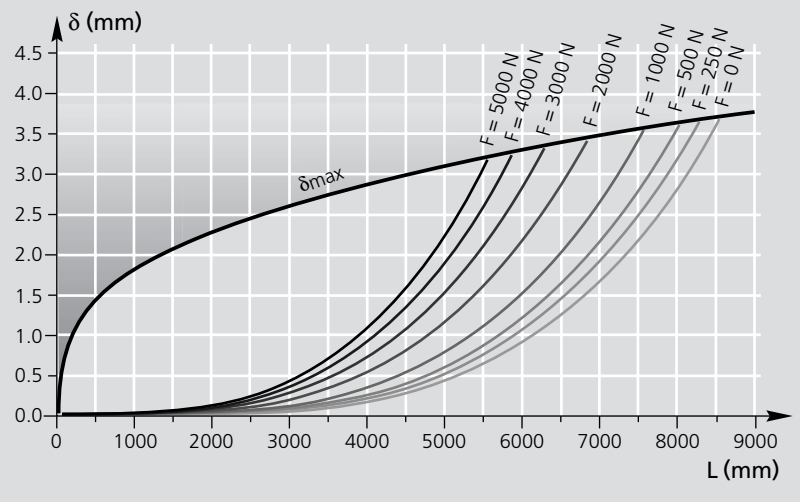
MKK 20-80



MKK 25-110



MKK 35-165



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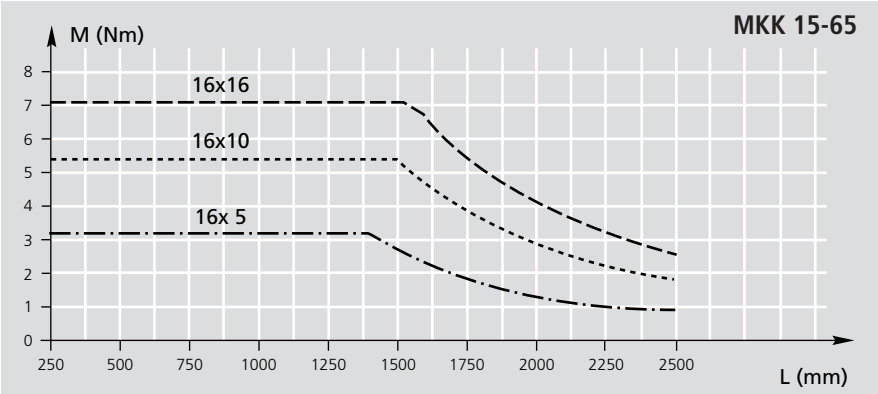
Rexroth Linear Modules MKK
Technical Data

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

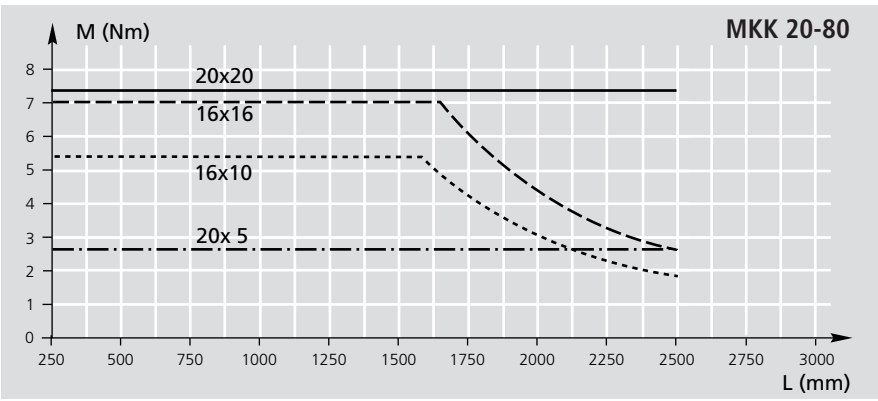
Observe rated torque of coupling used!



Ball screw journal with keyway

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

Linear Module	$M_{per\ max}$ (Nm)
MKK 15-65	4.5
MKK 20-80	4.5
MKK 25-110	18
MKK 35-165	74



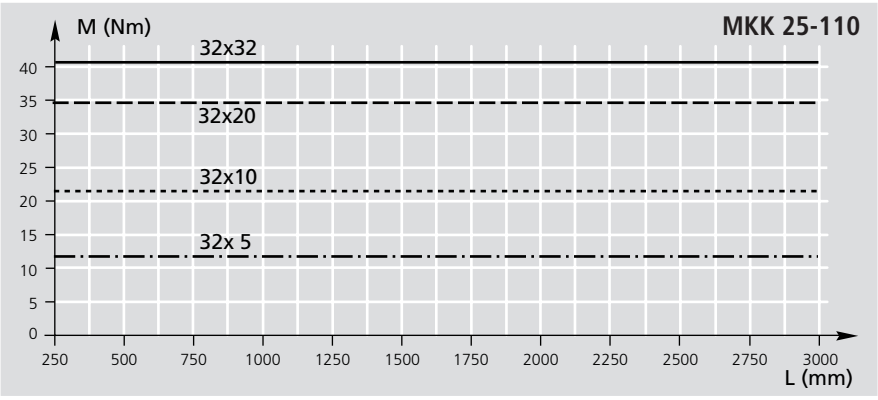
⚠ When comparing the graph and table, the lower value applies in each case!

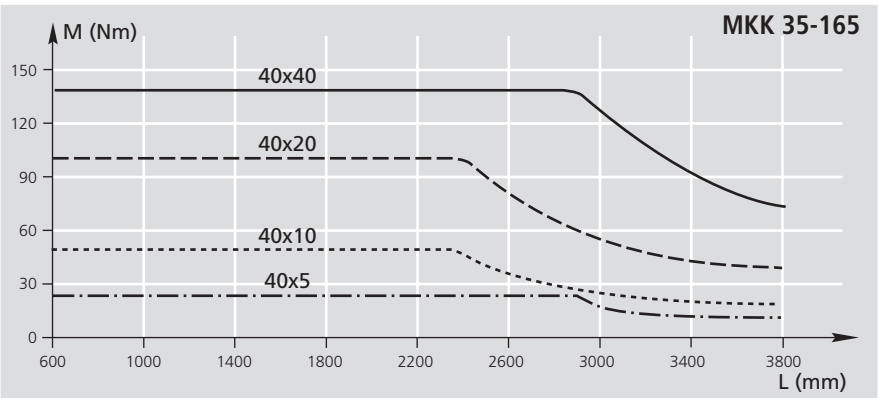
Example:
MKK 15-65, ball screw drive 16x5, length 1000 mm.

Drive torque M_{per} from graph:
≈ 3.2 Nm

Maximum permissible drive torque according to table: 4.5 Nm

Drive torque for sizing: 3.2 Nm





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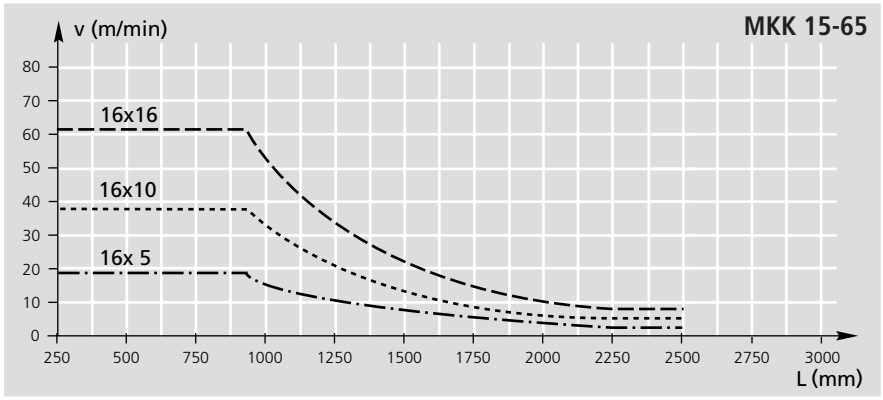
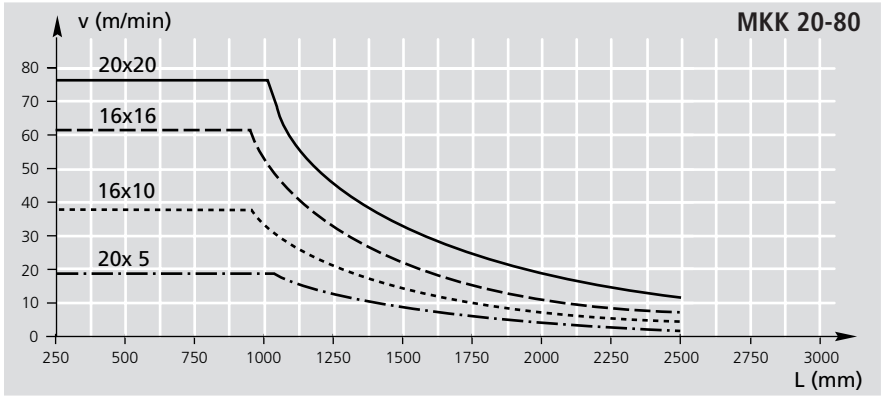
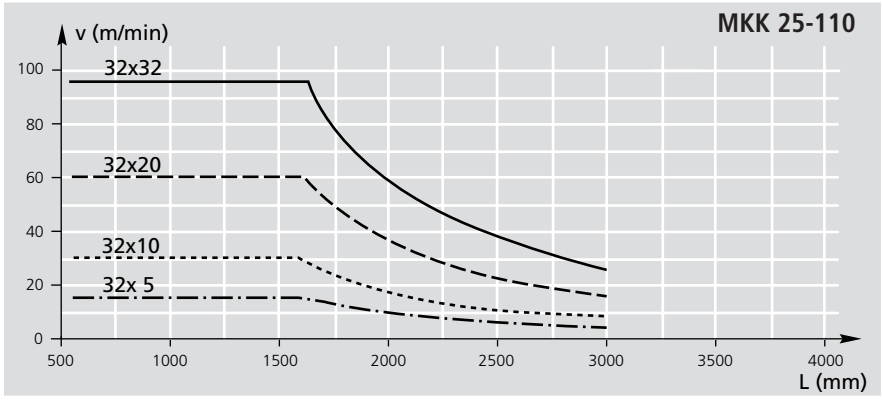
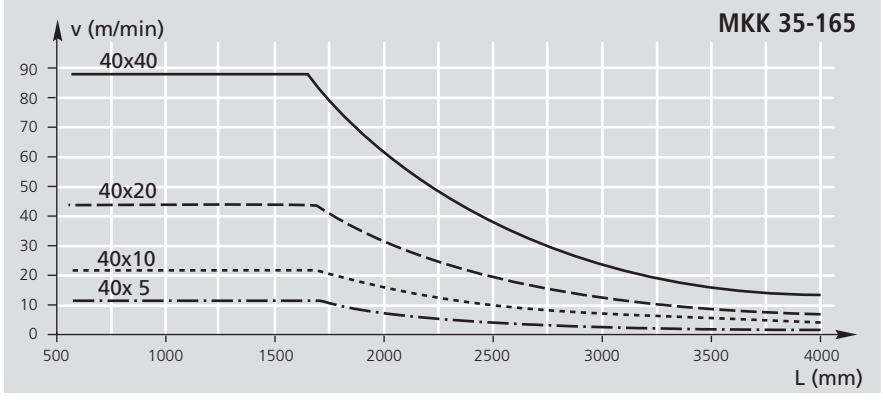
Permissible speed v

Observe motor speed!









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Rexroth Linear Modules MKK
Technical Data

Drive data of the timing belt side drive, Fixed bearing end for motor attachment via timing belt side drive

Motor type		MKD 41B / MHD 41B					MKD 71B / MHD 71B				
Overall dimensions (mm)		51 x 88					66 x 116				
Friction moment M_{RRv} (Nm)		0.4					0.5				
		Permissible torque up to length L = … at [1]			Reduced mass moment of inertia at		Permissible torque up to length L = … at [1]			Reduced mass moment of inertia at	
Reduction i = …			i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 2	i = 1	i = 2
Belt type			16 AT5	16 AT5	16 AT5	16 AT5		25 AT5	25 AT5 32 AT5	25 AT5	25 AT5 32 AT5
Linear 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)
MKK 15-65	16 x 5	1500	2.2	2.0	240	82	1500	2.4	1.4	1420	230
	16 x 10	1600	3.2	3.2			1600	3.5	2.4		
	16 x 16	1600	3.7	4.2			1600	4.3	3.0		
MKK 20-80	20 x 5	2500	2.1	1.9	240	82	2500	2.3	1.4	1420	230
	20 x 20	2500	3.6	4.9			2500	4.3	3.5		
	16 x 10	1600	2.9	3.5			1600	3.3	2.5		
	16 x 16	1600	3.4	4.4			1700	4.0	3.2		
MKK 25-110	32 x 5						3000	12.0	6.0	1400	260
	32 x 10						3000	19.0	11.0		
	32 x 20						3000	19.0	13.0		
	32 x 32						3000	19.0	13.0		
MKK 35-165	40 x 5						2600	26.0	13.0	1590	270
	40 x 10						3000	26.0	13.0		
	40 x 20						4000	26.0	13.0		
	40 x 40						4000	26.0	13.0		

M_{Rv} … Permissible system torque with timing belt side drive on the motor journal
M_{RRv} … Friction moment, timing belt side drive on the motor journal
J_{Rv} … Reduced mass moment of inertia, timing belt side drive
i … Reduction, timing belt side drive
[1] … Please ask if you wish to know the permissible torque for longer lengths.

Technical data AC servo motors

Motor type		MKD 41B-144-KG1	MHD 41B-144-NG1	MKD 71B-061-KG1	MHD 71B-061-NG1
Maximum effective rotary speed n_M	**(1/rpm)**	↯	↯	↯	↯
Rated torque M_{MN}	**(Nm)**	2.7	2.7	8	8
Maximum torque M_{Mmax}	**(Nm)**	↯	↯	↯	↯
Mass moment of inertia $J_M + J_{Br}$	**(10^{-6} kgm²)**	170 + 16	170 + 16	870 + 38	870 + 72
Braking torque M_{Br}	**(Nm)**	2.2	2.2	5	5
Load with brake m_{Br}	**(kg)**	4.65	4.75	9.17	9.4

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	MKD 90B / MHD 90B					MSM 040B					
	90 x 160					51 x 88					
	0.6					0.4					
	Permissible torque up to length L = … at [1]			Reduced mass moment of inertia at		Permissible torque up to length L = … at [1]			Reduced mass moment of inertia at		
		i = 1	i = 2	i = 1	i = 2		i = 1	i = 1.5	i = 1	i = 1.5	
		50 AT10	50 AT10	50 AT10	50 AT10		16 AT5	16 AT5	16 AT5	16 AT5	
	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)	
						1500	2.2	2.0	250	85	
						1600	3.2	3.2			
						1600	3.7	4.2			
						2500	2.1	1.9	250	85	
						2500	3.6	4.9			
						1600	2.9	3.5			
						1600	3.4	4.4			
	2500	26.0	13.0	7780	1260						
	2250	52.0	26.0								
	2500	67.0	33.5								
	3250	67.0	33.5								

See catalogs "Controllers, Motors, Electrical Accessories"
For data on stepping motors, see "Motors"

	MKD 90B-047-KG1	MHD 90B-047-NG1	MSM 040B	
	⚡	⚡	3000	
	12	12	2.4	
	⚡	⚡	7.1	
	4150 + 110	4300 + 110	67 + 8	
	11	11	2.45	
	14.65	14.6	3.1 + 0.7	

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Rexroth Linear Modules MKK
Technical Data, Calculations

Formulas

Nominal service life

Nominal service life in meters:

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

Nominal service life in hours:

$$L_{10h} = \frac{L_{10}}{60 \cdot v_m}$$

L_{10} = Nominal service life in meters (m)
L_{10h} = Nominal service life in hours (h)
C = Dynamic load capacity (N)
F_m = Mean equivalent dynamic load (N)
v_m = middle speed (m/min)

Friction moment

for motor attachment via motor mount and coupling:

$$M_R = M_{RS}$$

for motor attachment via timing belt side drive:

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

M_R = Friction moment at the drive journal (Nm)
M_{RS} = Friction moment, system (Nm)
M_{RRv} = Friction moment, timing belt side drive at motor journal (Nm)
i = Reduction

Constants k_1, k_2, k_3
Friction moment M_R at motor journal

Linear Module	Ball screw	Constant			Friction moment
	d_0 x P	k_1	k_2	k_3	M_R (Nm)
MKK 15-65	16 x 5	3.714	0.0390	0.633	0.4
	16 x 10	7.134	0.0390	2.533	0.4
	16 x 16	14.247	0.0390	6.484	0.4
MKK 20-80	16 x 10	9.161	0.0390	2.533	0.4
	16 x 16	19.435	0.0390	6.485	0.4
	20 x 5	8.274	0.1004	0.633	0.5
	20 x 20	32.971	0.1004	10.132	0.5
MKK 25-110	32 x 5	61.459	0.7117	0.633	1.0
	32 x 10	70.767	0.7117	2.533	1.1
	32 x 20	104.328	0.6668	10.132	1.1
	32 x 32	181.778	0.6668	25.938	1.2
MKK 35-165	40 x 5	92.215	1.783	0.633	1.0
	40 x 10	119.269	1.607	2.533	2.4
	40 x 20	240.854	1.607	10.132	2.2
	40 x 40	727.196	1.607	40.528	2.6

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Mass moment of inertia

for handling:

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

for processing:

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

J_{fr} = External mass moment of inertia (kgm²)
J_M = Mass moment of inertia of motor (kgm²)

for motor attachment via motor 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 timing belt side drive:

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

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

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

J_{tot} = Total mass moment of inertia (kgm²)
J_{fr} = External mass moment of inertia (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, motor brake (kgm²)
J_M = Mass moment of inertia of motor (kgm²)
J_{Rv} = Reduced mass moment of inertia, timing belt side drive at motor journal (kgm²)
m_{fr} = External load (kg)
L = Length of linear module (mm)
i = Reduction
k_1, k_2, k_3 = Constants. See "Calculation constants"

Rotary speed

If a geared motor is fitted, the moment of inertia of the gear and the gear transmission ratios must additionally be taken into account in the calculation.

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

$$n_1 < n_{Mmax}$$

$v <$ See graph for permissible speed

v = Permissible speed (m/min)
n_1 = Rotary speed (1/min)
n_{Mmax} = Maximum effective rotary speed of motor (1/min)
P = Ball screw lead (mm)
i = Reduction

Coupling data

Couplings according to the table are used for linear modules MKK... with standard servo motors.

Linear Module	Rated torque of coupling M_K (Nm)	Mass moment of inertia J_K (kgm²)	Coupling mass (kg)
MKK 15-65	19	$57 \cdot 10^{-6}$	0.26
MKK 20-80	19	$57 \cdot 10^{-6}$	0.26
MKK 25-110	50	$200 \cdot 10^{-6}$	0.70
MKK 35-165	98	$390 \cdot 10^{-6}$	0.90

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Rexroth Linear Modules MKK
Calculation Example

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

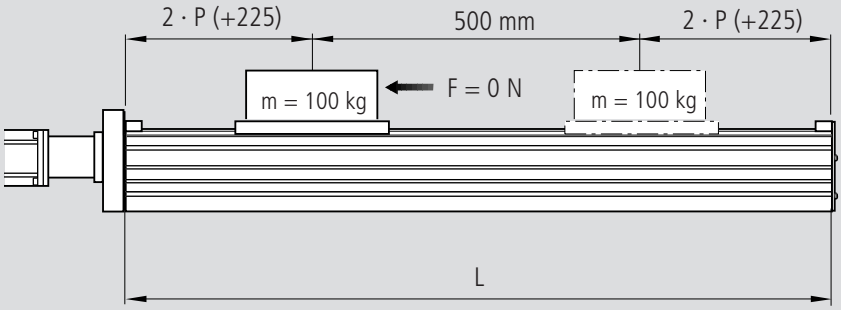
Starting data

A mass of 100 kg is to be moved 500 mm at a maximum velocity of 40 m/min.

The following unit is selected on the basis of its technical data and mounting connection dimensions:

Linear Module MKK 25-110

- Carriage length L_T = 310 mm
- 2% preload
- with sealing strip
- with size 71 AC servo motor, connected via motor mount and coupling



Estimation of the Linear Module length L

Excess travel	= 2 · P = 2 · 32 mm = 64 mm
Max. travel	= $Stroke_{effective}$ + 2 · excess travel
	= 500 mm + 2 · 64
	= 628 mm
Length L of the Linear Module	= 628 mm + 450 mm (to formula in "Components and Ordering" for MKK 25-110)
	= 1078 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 graph for "permissible speed", the permissible ball screw drives for v = 40 m/min and L = 1078 mm are:

ball screw 32 x 20 and ball screw 32 x 32

Selected ball screw drive (smaller lead) for L = 1078 mm:

ball screw 32 x 20
with a maximum permissible drive torque of 35 Nm
as per "permissible drive torque" graph

Calculating the Linear Module length L

Excess travel	= 2 · P = 2 · 20 mm = 40 mm
Max. travel	= $Stroke_{effective}$ + 2 · excess travel
	= 500 mm + 2 · 40 mm
	= 580 mm
Length L of the Linear Module	= 580 mm + 450 mm
	= 1030 mm

Friction moment M_R

M_R	= M_{RS} (see "Technical Data")
M_R	= 1.1 Nm

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Mass moment of inertia J

$J_S = (k_1 + k_2 \cdot L + k_3 \cdot m_{fr}) \cdot 10^{-6}\ kgm^2$
$= (104.33 + 0.667 \cdot 1030\ mm + 10.13 \cdot 100) \cdot 10^{-6}\ kgm^2$
$= 1804 \cdot 10^{-6}\ kgm^2$ (k_1, k_2, k_3 see table "Constants")
$J_K = 200 \cdot 10^{-6}\ kgm^2$ (see "Technical Data")
$J_{Br} = 38 \cdot 10^{-6}\ kgm^2$
$J_{fr} = J_S + J_K + J_{Br}$
$= 2042 \cdot 10^{-6}\ kgm^2$

for handling:

$$J_M > \frac{J_{fr}}{6} = \frac{2042 \cdot 10^{-6}\ kgm^2}{6}$$

$J_M > 340 \cdot 10^{-6}\ kgm^2$

Rotary speed n

at v = 40 m/min

$$n_1 = \frac{i \cdot v \cdot 1000}{P} = \frac{1 \cdot 40\ m/min \cdot 1000}{20\ mm} = 2000\ min^{-1} < n_{Mmax}$$

$v = 40\ m/min$

Result

Linear Module MKK 25-110

Length	L = 1030 mm
Ball screw drive:	
Diameter	32 mm
Lead	20 mm
Carriage length:	L_T = 310 mm
Preload:	2%

Motor attached via motor mount and coupling

Motor with:
- maximum effective speed $n_{Mmax} > 2000\ min^{-1}$
- mass moment of inertia $J_M > 340 \cdot 10^{-6}\ kgm^2$
- maximum permissible drive torque $M_{per} < 35$ Nm
  Take account of rated coupling torque M_k and friction moment M_R (M_K = 50 Nm; R_R = 1.21 Nm)

These conditions are satisfied by all the permissible AC servo motors listed in the "Components and Ordering" table for MKK 25-110.

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 catalogs "Controllers, Motors, Electrical Accessories".

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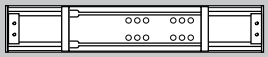
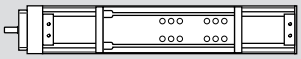
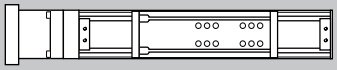
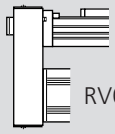
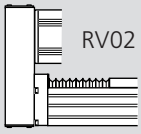
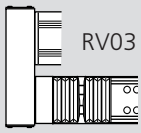
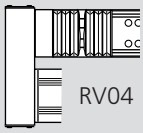
Rexroth Linear Modules MKK 15-65 with Sealing Strip
Components and Ordering

Part number, length 1160-060-00 , (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)					Carriage = (..)	
									
			Journal for motor	Ball screw size 16 x 5	16 x 10	16 x 16		L_T = 190 mm	
without drive unit (OA) 	OA01 (11.06.01)	02		00				11	
with ball screw without motor mount (OF) 	OF01 (11.06.00)	01	dia. 10	01	02	03		01	
			dia. 10 with keyway	11	12	13			
with ball screw and motor mount (MF) 	MF01 (11.06.11 11.06.20)	01	dia. 10	01	02	03		01	
with ball screw and side drive with timing belt (RV)  RV01  RV02  RV03  RV04	RV01 to RV04 (11.06.30 11.06.31)	01	i = 1 dia. 10	01	02	03		01	
			i = 1.5* dia. 10	31	32	33			
			i = 2* dia. 10	21	22	23			

* with support bearing

Order example

Ordering data		Description
Linear Module (Part number): 1160-060-00 , 1320 mm		Linear Module MKK 15-65, length = 1320 mm
Type	= MF01	with motor mount, mounted as in diagram MF01
Guideway	= 01	ball rail system
Drive unit	= 02	ball screw 16 x 10 (d_0 x P)
Carriage	= 01	carriage with length L_T = 190 mm
Motor attachment	= 02	with mount for motor MKD 41B
Motor	= 10	motor MKD 41B
Cover	= 02	plastic strip with side sealing
1st switch	= 15 - R + 500 mm	mechanical switch, switch activation point: right + 500 mm
2nd switch	= 11 - R – 400 mm	PNP NC, switch activation point: right – 400 mm
3rd switch	= 15 - R – 500 mm	mechanical switch, switch activation point: right – 500 mm
Cable duct	= 20, 1500 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug supplied loose
Switching cam	= 16	with switching cam for switch activation
Documentation	= 03	lead deviation chart for ball screw

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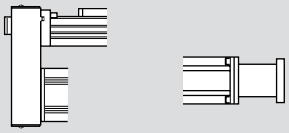
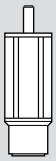
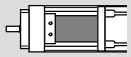
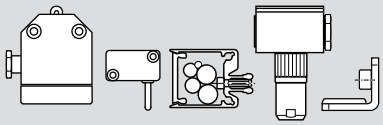
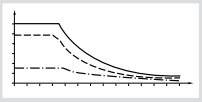
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = ..	Motor = ..	Cover = ..	1st, 2nd + 3rd switch = ..– . ± .... mm	Documentation = ..
				

Reduction (i)	Mount[1]	for motor		w/o sealing strip	with sealing strip	Cable duct = .., ... mm Socket-plug = .. Switching cam = ..	Standard report	Measurement report
	00		00			without switch, without cable duct 00		
	00		00		01 without side sealing	External switch: PNP NC 11 – . ±.... mm PNP NO 13 – . ±.... mm Mechanical 15 – . ±.... mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance		02 Friction moment
	02	MKD 41B	10	00				03 Lead deviation
	06	MSM 040B	75 74 [2]					
	04	VRDM 397	28					
		VRDM 3910	29		02 with side sealing		01	
	05	VRDM 3913	30					05 Positioning accuracy
i = 1	23	MKD 71B	11			Cable duct (loose) 20,.... mm Length		
	30	MKD 41B	10					
	32	MSM 040B	75 74 [2]					
i = 1.5	31	MKD 41B	10			External socket-plug (loose) 17		
	33	MSM 040B	75 74 [2]					
i = 2	24	MKD 71B	11			External switching cam 16		
		MHD 71B	62					

[1] Attachment can also be supplied without motor (enter "00" for motor on order). [2] Motor without brake

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

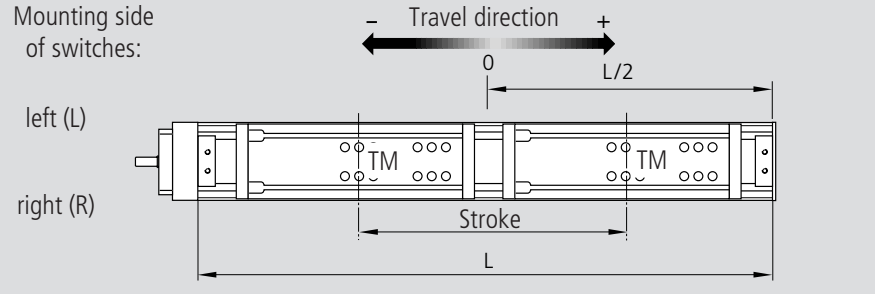
L = (stroke + 2 x excess travel) + 280 mm

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

Example:
Switch activation point 1st switch = +500 mm
Switch activation point 3rd switch = –500 mm
Stroke = 1000 mm

In most cases the recommended limit for excess travel (braking path) is:
excess travel = 2 x screw lead P

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



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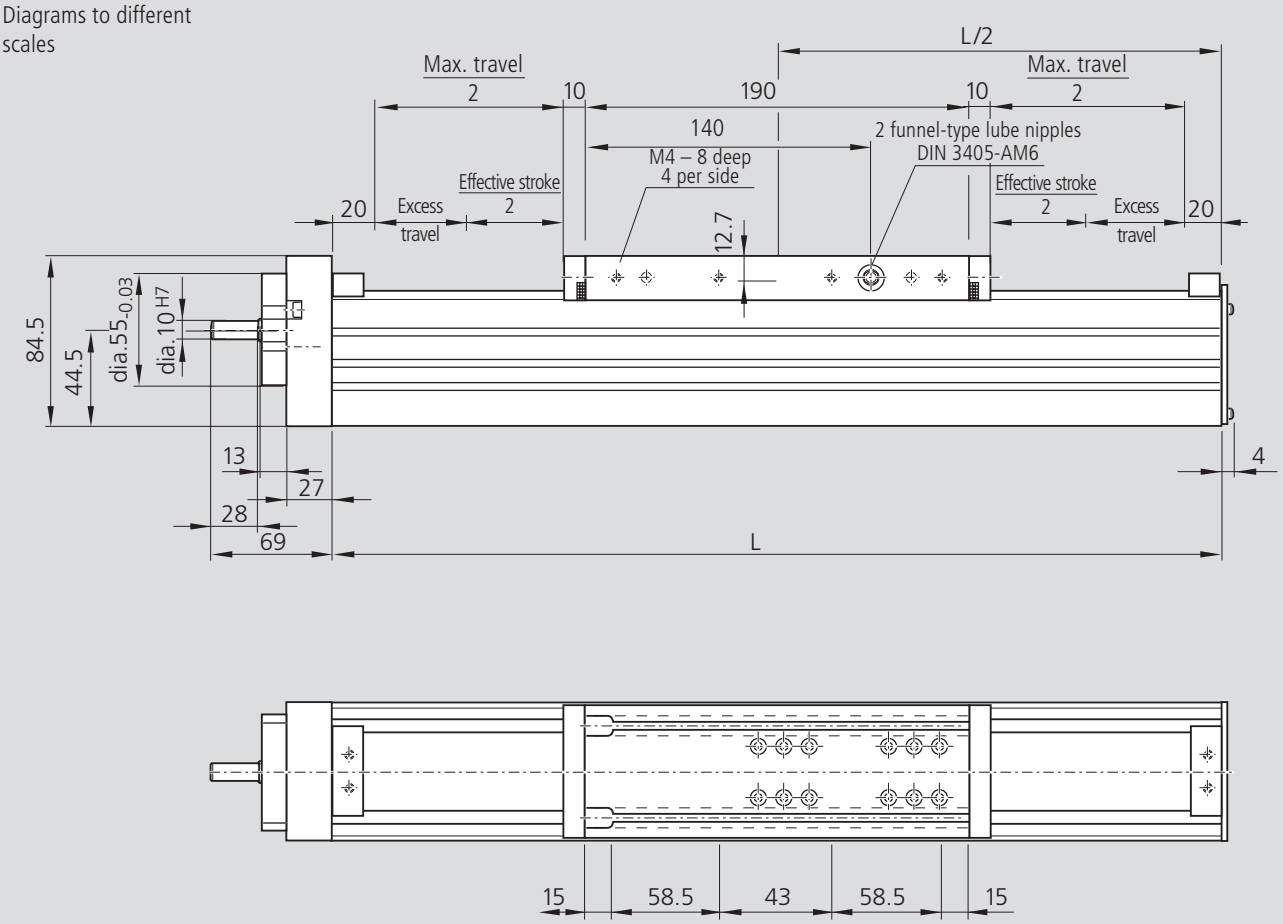
Rexroth Linear Modules MKK 15-65 with Sealing Strip
Dimension Drawings

All dimensions in mm

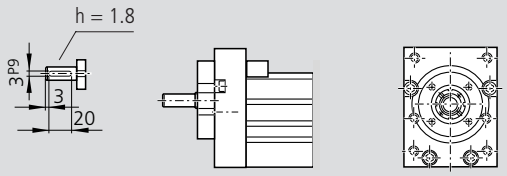
Diagrams to different scales



1) without brake 2) with brake

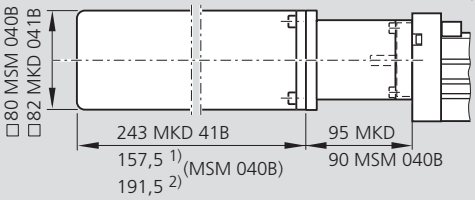
11.06.00

Type OF01



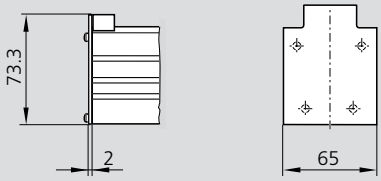
11.06.11

Type MF01
Motor MKD 41B or MSM 040B with mount and coupling



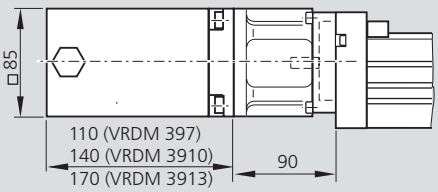
11.06.01

Type OA01



11.06.20

Type MF01
Motors VRDM 39- with mount and coupling



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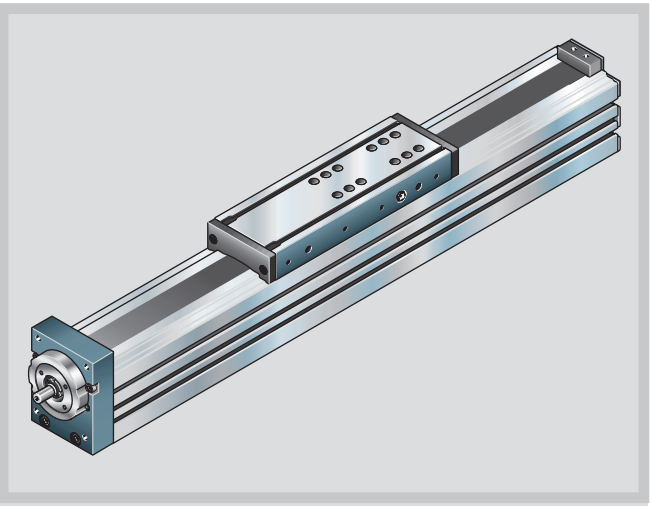
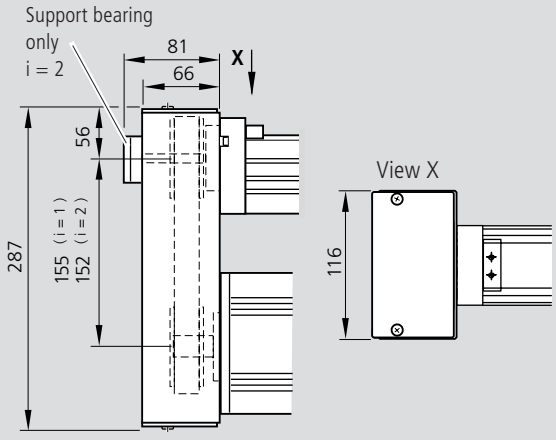


For more information, see section on “Motors”.

11.06.30

Type RV01

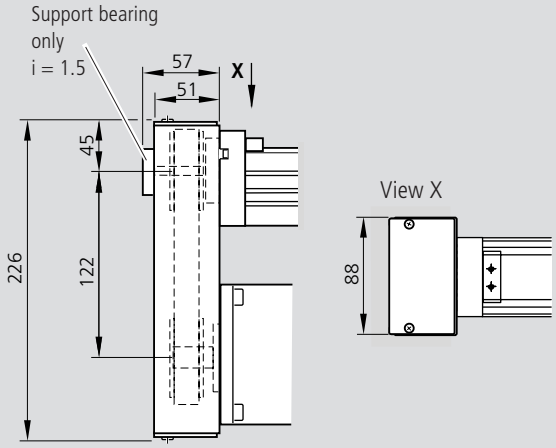
Motors M.. 71. side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



11.06.31

Type RV01

Motor MKD 41B or MSM 040B side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



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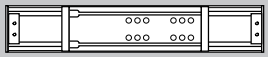
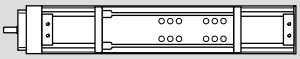
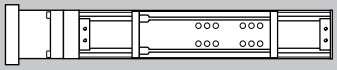
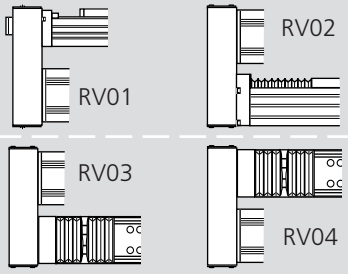
Rexroth Linear Modules MKK 20-80 with Sealing Strip
Components and Ordering

Part number 1160-160-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)					Carriage = (..)	
									
			Journal for motor	Ball screw size				L_T = 260 mm	
				16 x 10	16 x 16	20 x 5	20 x 20		
without drive unit (OA) 	OA01 (11.16.03)	02		00				12	
with ball screw without motor mount (OF) 	OF01 (11.16.02)	01	dia. 10	01	02	03	04	01	
			dia. 10 with keyway	11	12	13	14		
with ball screw and motor mount (MF) 	MF01 (11.16.12 11.16.21)	01	dia. 10	01	02	03	04	01	
with ball screw and side drive with timing belt (RV) 	RV01 to RV04 (11.16.31 11.16.32)	01	i = 1 dia. 10	01	02	03	04	01	
			i = 1.5* dia. 10	31	32	33	34		
			i = 2* dia. 10	21	22	23	24		

* with support bearing

Order example

Ordering data		Description
Linear Module (Part number): 1160-160-10, 1400 mm		Linear Module MKK 20-80, length = 1400 mm
Type	= RV04	side drive with timing belt, mounted as in diagram RV04
Guideway	= 01	ball rail system
Drive unit	= 03	ball screw 20 x 5 (d_0 x P), i = 1
Carriage	= 01	carriage with length L_T = 260 mm
Motor attachment	= 23	with side drive with timing belt for motor MDD 71A, i = 1
Motor	= 61	motor MHD 71A
Cover	= 20	with corrosion-resistant steel sealing strip
1st switch	= 15-R + 500 mm	mechanical switch, switch activation point: right + 500 mm
2nd switch	= 11-R – 400 mm	PNP NC, switch activation point: right – 400 mm
3rd switch	= 15-R – 500 mm	mechanical switch, switch activation point: right – 500 mm
Cable duct	= 20, 1300 mm	cable duct 1300 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 03	lead deviation chart for ball screw

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

Reduction (i)	Mount[1]	for motor	Motor = ..	Cover = .. w/o sealing strip[2]	Cover = .. with	1st, 2nd + 3rd switch = ..– . ± .... mm	Standard report	Measurement report
	00		00			without switch, without cable duct 00		
	00		00	00	20 without side sealing	External switch: PNP NC 11 – . ±.... mm; PNP NO 13 – . ±.... mm; Mechanical 15 – . ±.... mm		02 Friction moment
	02	MKD 41B	10					03 Lead deviation
	04	VRDM 397	28					
		VRDM 3910	29		21 with side sealing		01	
	05	VRDM 3913	30					05 Positioning accuracy
i = 1	23	MKD 71B	11			Cable duct (loose) 20,.... mm		
i = 1	30	MKD 41B	10					
i = 1	32	MSM 040B	75 74[3]			External socket-plug (loose) 17		
i = 1.5	31	MKD 41B	10					
i = 1.5	33	MSM 040B	75 74[3]			External switching cam 16		
i = 2	24	MKD 71B	11					
		MHD 71B	62					

Switch activation point: Switch type, Mounting side, Travel direction, Switching distance

Length

[1] Attachment can also be supplied without motor (enter "00" for motor on order).
[2] Sealing strip permissible up to L = 3500 mm
[3] Motor without brake

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

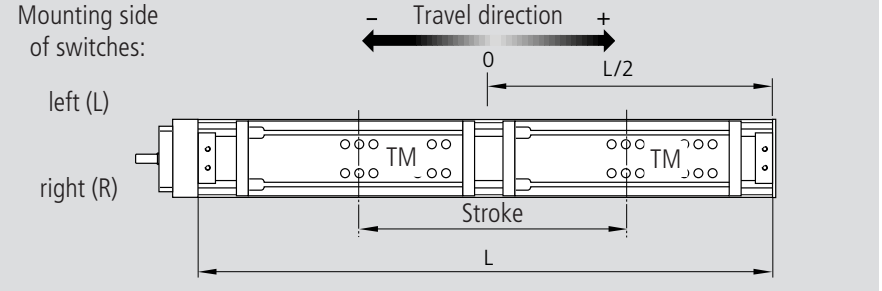
L = (stroke + 2 x excess travel) + 380 mm

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

Example:
Switch activation point 1st switch = +500 mm
Switch activation point 3rd switch = –500 mm
Stroke = 1000 mm

In most cases the recommended limit for excess travel (braking path) is:
excess travel = 2 x screw lead P

Example:
Ball screw 20 x 5 (d_0 x P),
Excess travel = 2 · 5 = 10 mm



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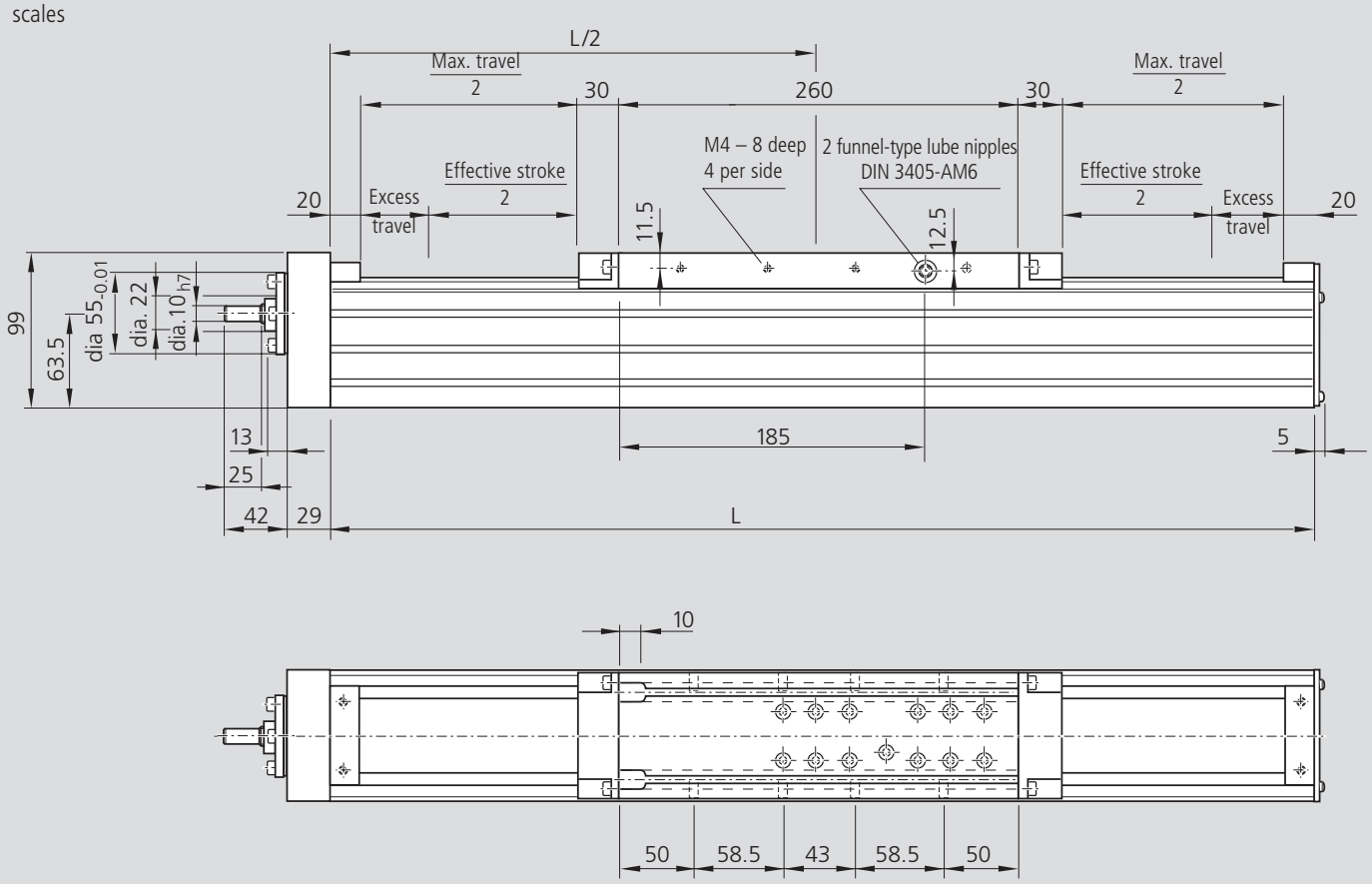
Rexroth Linear Modules MKK 20-80 with Sealing Strip
Dimension Drawings

All dimensions in mm

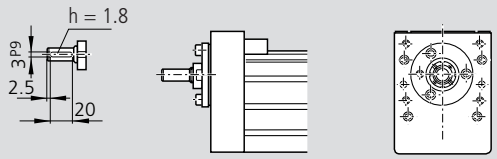
Diagrams to different scales



1) without brake 2) with brake

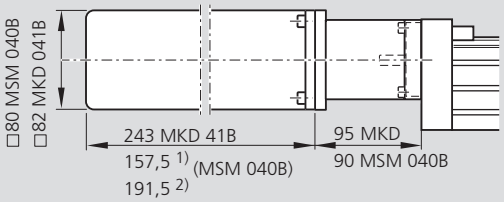
11.16.02

Type OF01



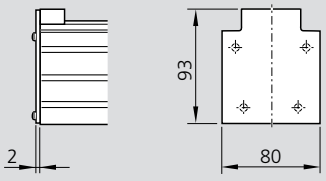
11.16.12

Type MF01
Motor MKD 41B or MSM 040B with mount and coupling



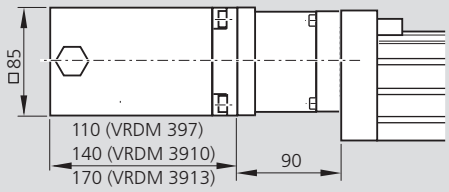
11.16.03

Type OA01



11.16.21

Type MF01
Motors VRDM 39- with mount and coupling



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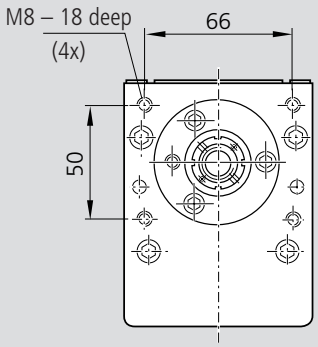
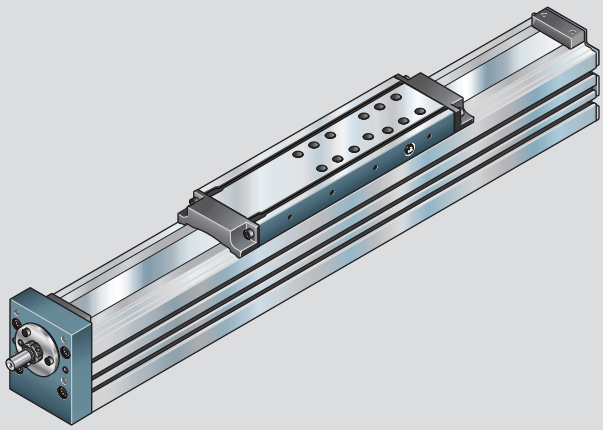
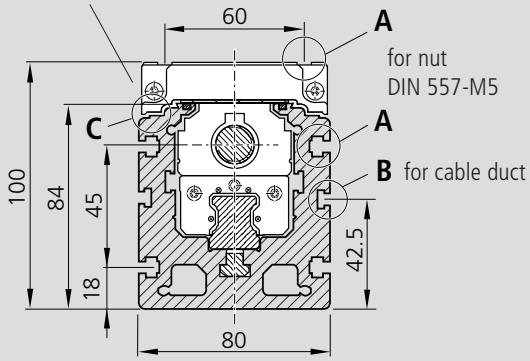
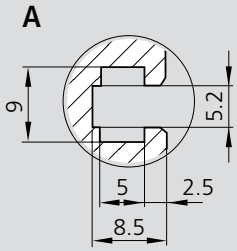
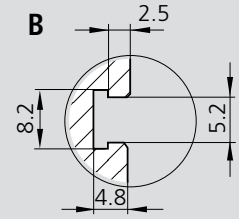


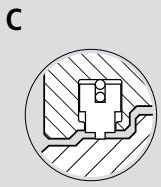


One-point lubrication:
at either of the two
funnel-type lube nipples
DIN 3405-AM6







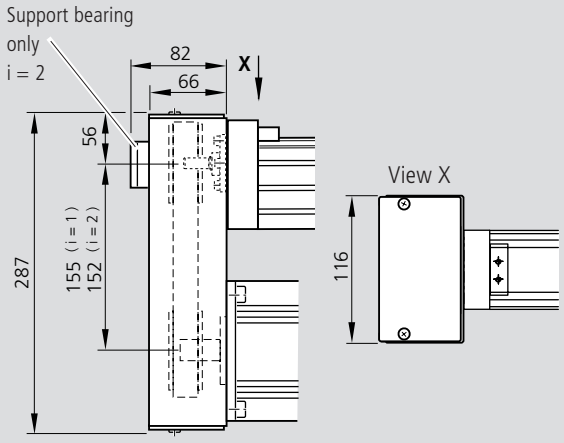


For more information, see section on "Motors".

11.16.31

Type RV01

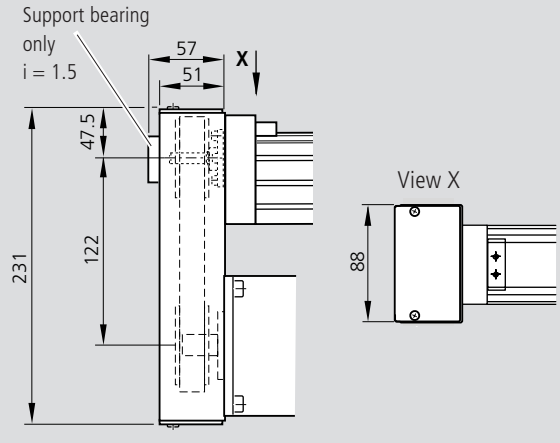
Motors M.. 71. side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



11.16.32

Type RV01

Motor MKD 41B or MSM 040B side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



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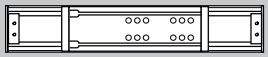
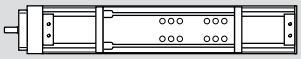
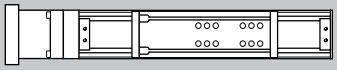
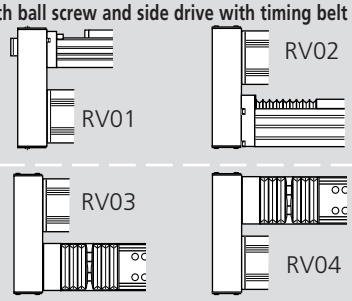
Rexroth Linear Modules MKK 25-110 with Sealing Strip
Components and Ordering

Part number 1160-260-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)			
			Journal for motor	Ball screw size 32 x 5 / 32 x 10 / 32 x 20 / 32 x 32	L_T = 310 mm without SPU [1]	with 1 SPU [1]	with 2 SPU [1]
without drive unit (OA) 	**OA01** (11.26.03)	02		00	12		
with ball screw without motor mount (OF) 	**OF01** (11.26.02)	01	dia. 16	01 / 02 / 03 / 04	01	03	04
			dia. 16 with keyway	11 / 12 / 13 / 14			
with ball screw and motor mount (MF) 	**MF01** (11.26.11)	01	dia. 16	01 / 02 / 03 / 04	01	03	04
with ball screw and side drive with timing belt (RV) 	**RV01** to **RV04** (11.26.31)	01	dia. 16	01 / 02 / 03 / 04	01	03	04

[1] SPU = screw support

Order example

Ordering data		Description
Linear Module (Part number): 1160-260-10, 1310 mm		Linear Module MKK 25-110, length = 1310 mm
Type	= MF01	with mount and motor, mounted as in diagram MF01
Guideway	= 01	ball rail system
Drive unit	= 03	ball screw 32 x 20 (d_0 x P)
Carriage	= 01	carriage with length L_T = 310 mm
Motor attachment	= 01	with mount for motor MKD 71B
Motor	= 11	motor MKD 71B - 061
Cover	= 20	with corrosion-resistant steel sealing strip
1st switch	= 15-R + 390 mm	mechanical switch, switch activation point: right + 390 mm
2nd switch	= 11-R – 290 mm	PNP NC, switch activation point: right – 290 mm
3rd switch	= 15-R – 390 mm	mechanical switch, switch activation point: right– 390 mm
Cable duct	= 20, 1200 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 03	lead deviation chart for ball screw

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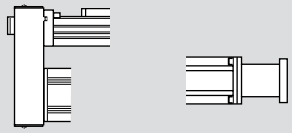
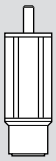
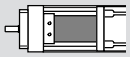
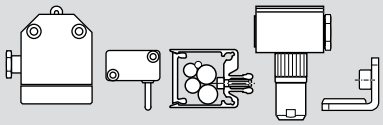
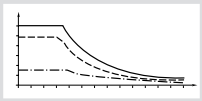
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = ..			Motor = ..	Cover = ..		1st, 2nd + 3rd switch = ..– . ± .... mm	Documentation = ..	
								
Reduction (i)	**Mount[2]**	**for motor**		**w/o sealing strip[3]**	**with**	**Cable duct = .., ... mm Socket-plug = .. Switching cam = ..**	**Standard report**	**Measure-ment report**
	00		00	00		**without switch without cable duct** 00	01	02 Friction moment
	00		00		20 without side sealing	**External switch: PNP NC** 11 – . ±.... mm **PNP NO** 13 – . ±.... mm **Mechanical** 15 – . ±.... mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance		03 Lead deviation
	01	**MKD 71B**	11					
		MHD 71B	62					
	02	**MKD 90B**	13					
		MHD 90B	63		21 with side sealing	**Cable duct (loose)** 20,.... mm Length		05 Positioning accuracy
i = 1	21	**MKD 71B**	11					
		MHD 71B	62			**External socket-plug (loose)** 17		
i = 2	22	**MKD 71B**	11			**External switching cam** 16		
		MHD 71B	62					

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

[3] Sealing strip permissible up to L = 3500 mm

MKK

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length (without screw support)

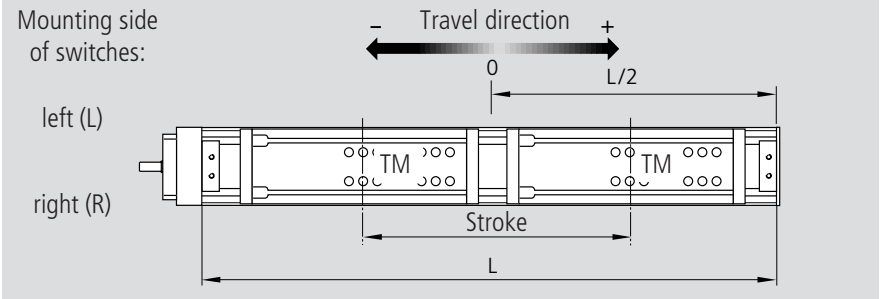
L = (stroke + 2 x excess travel) + 450 mm

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

Example:
Switch activation point 1st switch = +390 mm
Switch activation point 3rd switch = –390 mm
Stroke = 780 mm

In most cases the recommended limit for excess travel (braking path) is:
excess travel = 2 x screw lead P

Example:
Ball screw 32 x 20 (d_0 x P),
Excess travel = 2 · 20 = 40 mm



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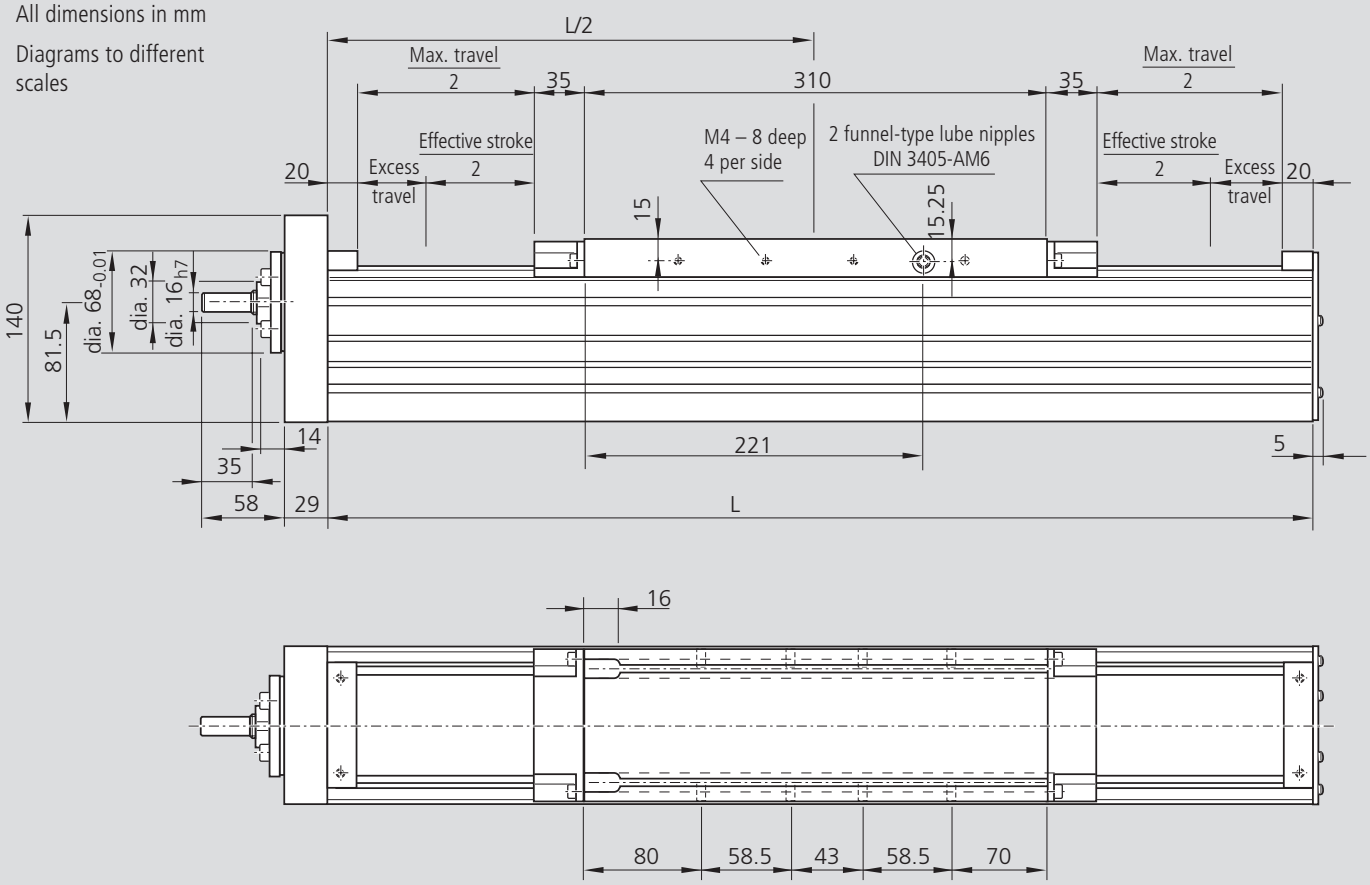
Rexroth Linear Modules MKK 25-110 with Sealing Strip
Dimension Drawings

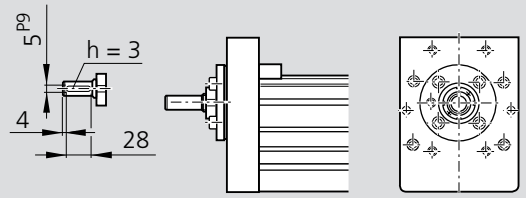
All dimensions in mm

Diagrams to different scales



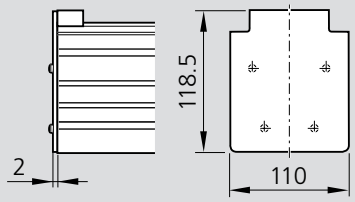
11.26.02

Type OF01



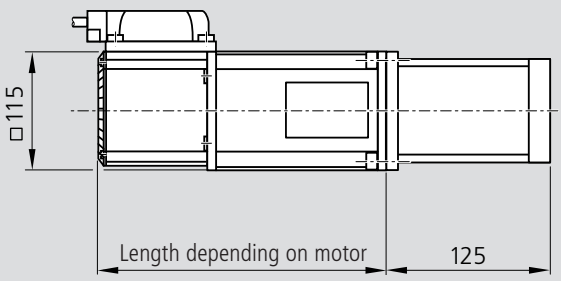
11.26.03

Type OA01



11.26.11

Type MF01
Motor M.. 71. with mount and coupling



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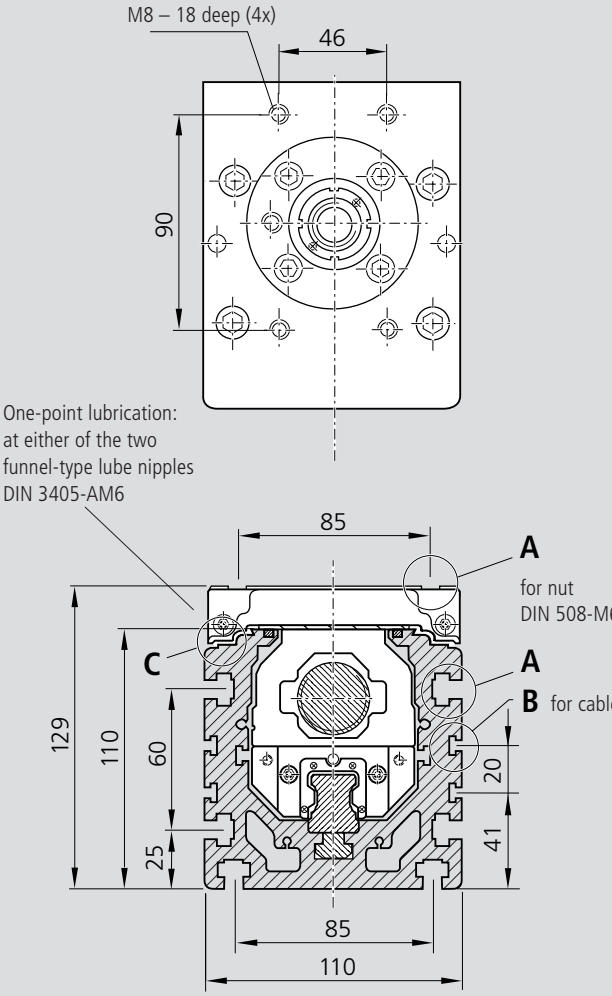
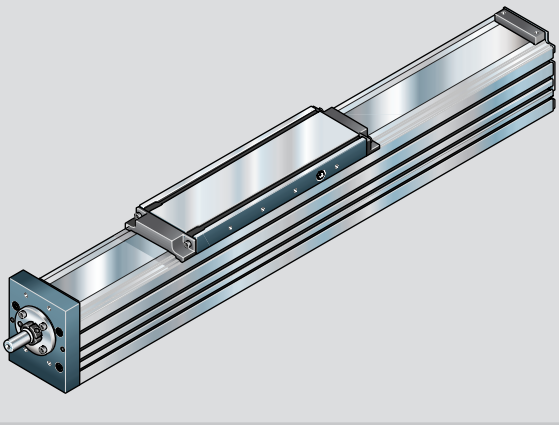
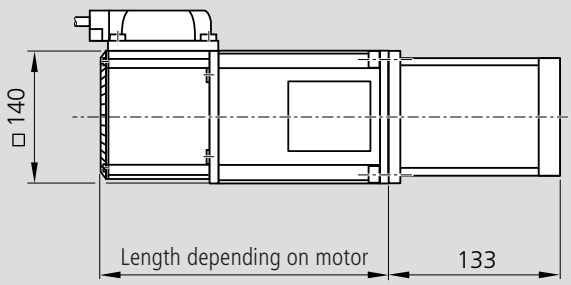




For more information, see section on "Motors".

11.26.12

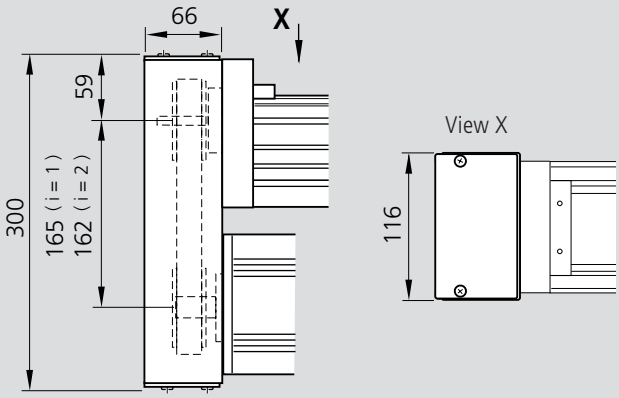
Type MF01
Motors M.. 90. with mount and coupling



11.26.31

Type RV01

Motors M.. 71. side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



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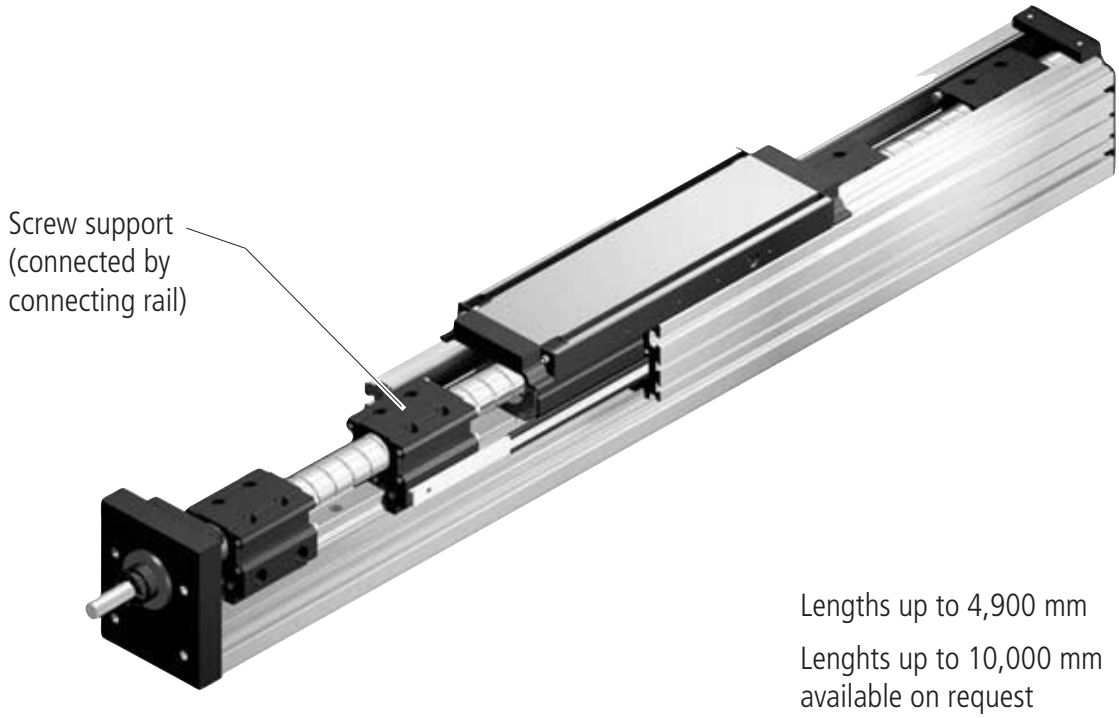
Screw Support for Rexroth Linear Modules MKK 25-110

Product Overview

The new screw support SPU offers the following benefits:

- Low weight thanks to aluminum runner block and aluminum connecting rail
- Connecting rail guided within the frame. Integrated plastic profiles ensure optimal sliding of the connecting rail in the frame.
- Elastomer buffer as shock absorber between carriage and screw support. Additional damping provided by elastomer ring between connecting rail and screw support.
- Up to 2 screw supports can be integrated per module on either side of the carriage.
- Runner block of screw support lubricated for life (no in-service lubrication required)
- Screw support protected by sealing strip of Linear Module
- Screw support selectable as a standard option by specification of option number



Lengths up to 4,900 mm

Lenghts up to 10,000 mm
available on request

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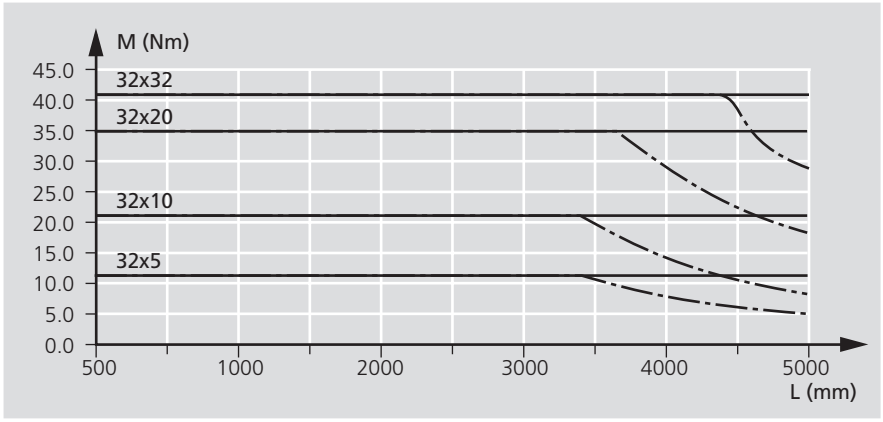
Technical Data

Ball screw d_0 x P	Friction moment M_R (Nm) without SPU	with 1 SPU	with 2 SPU
32 x 5	0.8	0.9	0.9
32 x 10	0.9	1.1	1.2
32 x 20	0.9	1.2	1.4
32 x 32	1.0	1.5	1.9

Permissible drive torque M_{per}

with screw support (SPU)
without screw support (SPU)

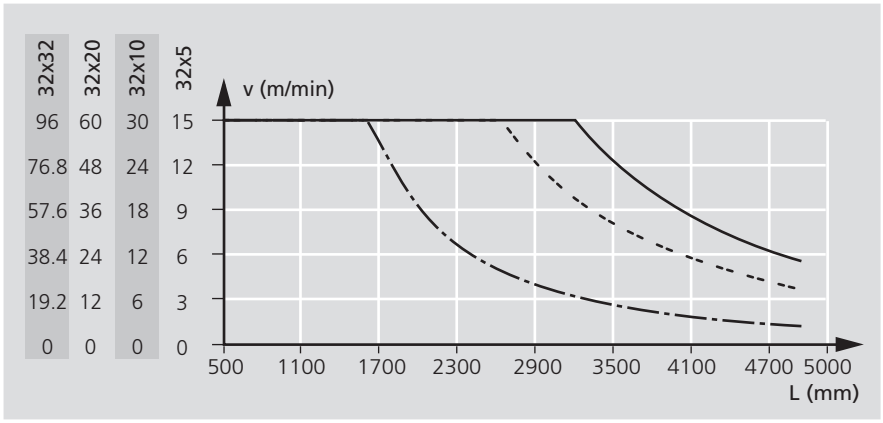


MKK

Permissible speed v

Observe motor speed!

with 2 SPU
with 1 SPU
without SPU
in front of or behind the carriage



Type	Mass (kg)	Length $_{max}$ (mm)	Length calculation
without screw support	0.0217 x L + 7.2	3000	L = stroke + 2 x excess travel + 450
with one screw support	0.0217 x L + 8.5	4900	L = stroke + 2 x excess travel + 626
with two screw supports	0.0217 x L + 9.8	4900	L = stroke + 2 x excess travel + 802

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Rexroth Linear Modules MKK 35-165
Components and Ordering

Part number 1160-360-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)					Carriage = (..)
								L_T
			Journal for motor	Ball screw size 40 x 5	40 x 10	40 x 20	40 x 40	L_T = 400 mm
without drive unit (OA)	OA01 (11.36.01)	01				00		10
with ball screw without motor mount (OF)	OF01 (11.36.00)	01	dia. 25	01	02	03	04	01
			dia. 25 with keyway	11	12	13	14	
with ball screw and motor mount (MF)	MF01 (11.36.10)	01	dia. 25	01	02	03	04	01
with ball screw and side drive with timing belt (RV)	RV01 to RV04 (11.36.22 11.36.31)	01	dia. 25	01	02	03	04	01

RV01 RV02 RV03 RV04

Order example

Ordering data		Description
Linear Module (Part number): 1160-360-00, 2420 mm		Linear Module MKK 35-165, length = 2420 mm
Type	= MF01	with mount, mounted as in diagram MF01
Guideway	= 01	ball rail system
Drive unit	= 03	ball screw 40 x 20 (d_0 x P)
Carriage	= 01	carriage with length L_T = 400 mm
Motor attachment	= 02	with mount for motor MHD 90B
Motor	= 63	motor MHD 90B
Cover	= 01	polyurethane bellows
1st switch	= 15-R + 800 mm	mechanical switch, switch activation point: right + 800 mm
2nd switch	= 11-R – 700 mm	PNP NC, switch activation point: right – 700 mm
3rd switch	= 15-R – 800 mm	mechanical switch, switch activation point: right – 800 mm
Cable duct		without cable duct
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 02	measurement report: friction moment

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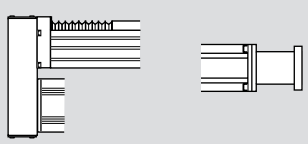
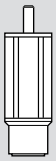
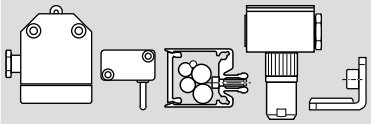
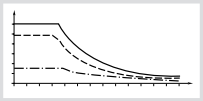
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

	Motor attachment = ..		Motor = ..	Cover = ..		1st, 2nd + 3rd switch = ..– . ± .... mm	Documentation = ..	
								
	Reduction (i)	**Mount***	**for motor**		**w/o**	**PU bellows**	**Cable duct = .., ... mm** **Socket-plug = ..** **Switching cam = ..**	**Standard report**	**Measure-ment report**
		(00)		(00)	(00)	(01)	**without switch without cable duct** (00)	(01)	(02) Friction moment (03) Lead deviation (05) Positioning accuracy
		(00)		(00)			**External switch:** **PNP NC** (11 – . ±....) mm **PNP NO** (13 – . ±....) mm **Mechanical** (15 – . ±....) mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance **Cable duct (loose)** (20,....) mm Length **External socket-plug (loose)** (17) **External switching cam** (16)		
		(02)	**MKD 90B**	(13)					
			MHD 90B	(63)					
	i = 1	(21)	**MKD 71B**	(11)					
	i = 2	(22)	**MHD 71B**	(62)					
	i = 1	(23)	**MKD 90B**	(13)					
	i = 2	(24)	**MHD 90B**	(63)					

* Attachment can also be supplied without motor (enter "00" for motor on order).

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

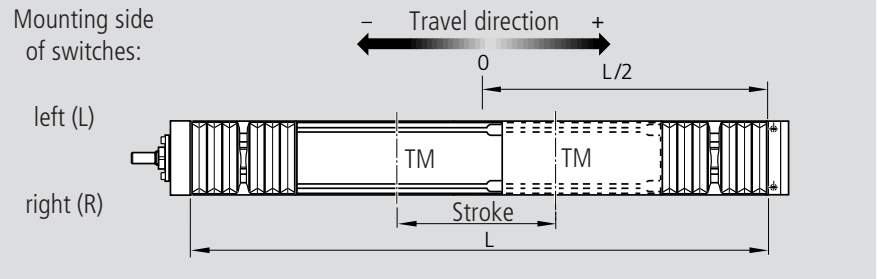
L = (stroke + 2 x excess travel) x 1.17 + 450 mm

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

Example:
Switch activation point 1st switch = +800 mm
Switch activation point 3rd switch = –800 mm
Stroke = 1600 mm

In most cases the recommended limit for excess travel (braking path) is:
excess travel = 2 x screw lead P

Example:
Ball screw 40 x 20 (d_0 x P),
Excess travel = 2 · 20 = 40 mm



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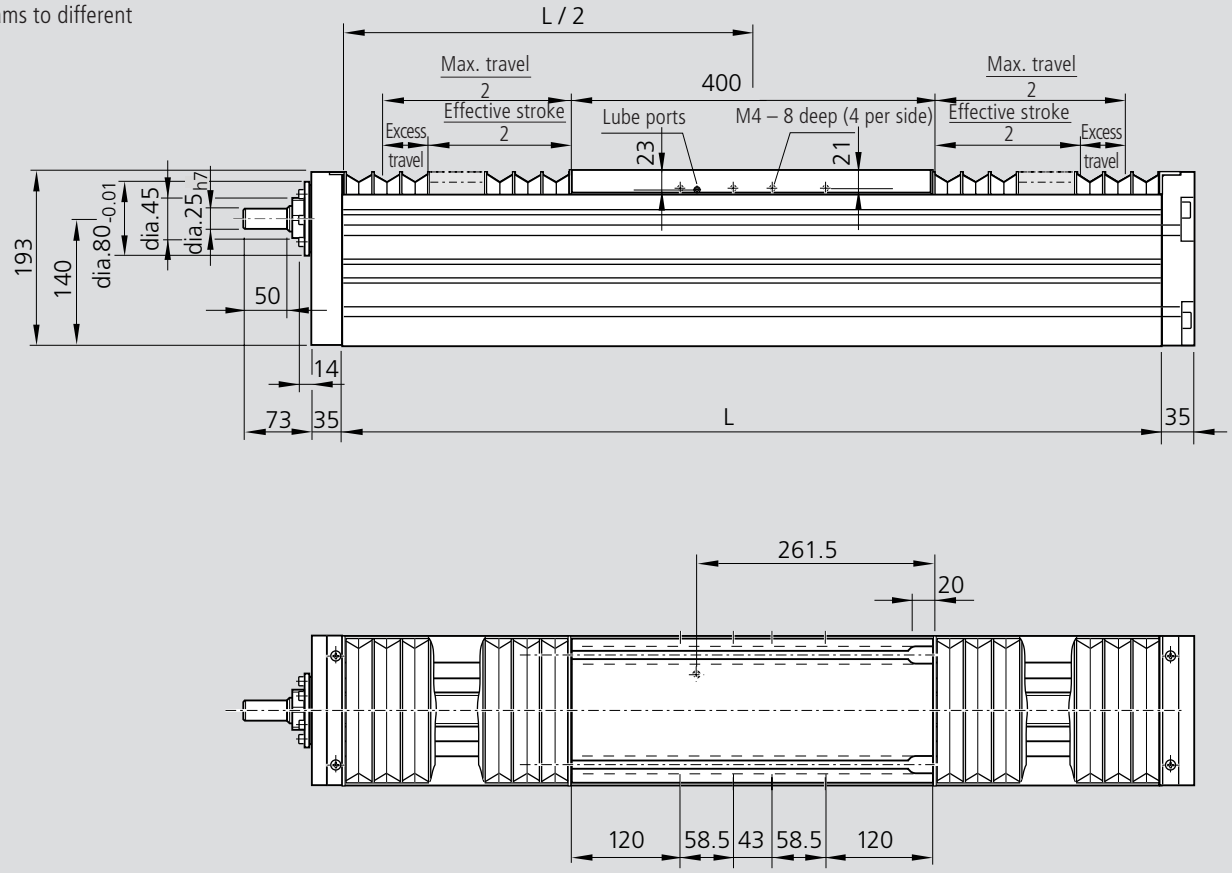
Rexroth Linear Modules MKK 35-165
Dimension Drawings

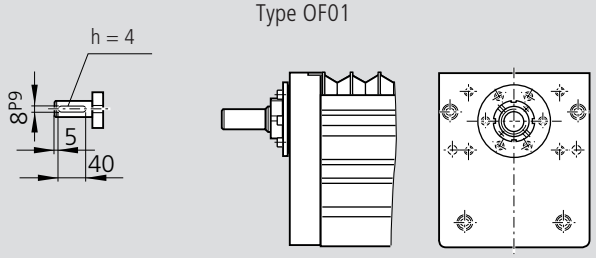
All dimensions in mm

Diagrams to different scales



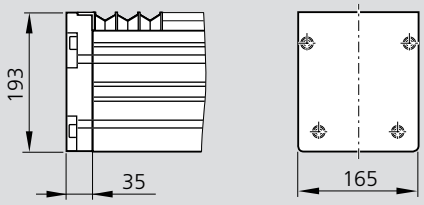
11.36.00

Type OF01



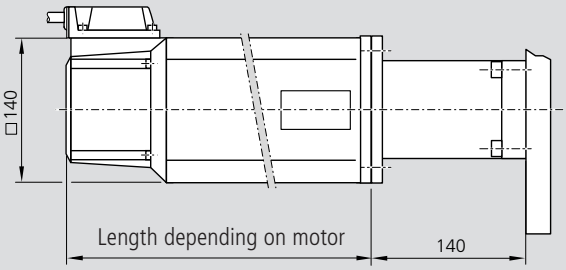
11.36.01

Type OA01



11.36.10

Type MF01
Motors M.. 90. with mount and coupling



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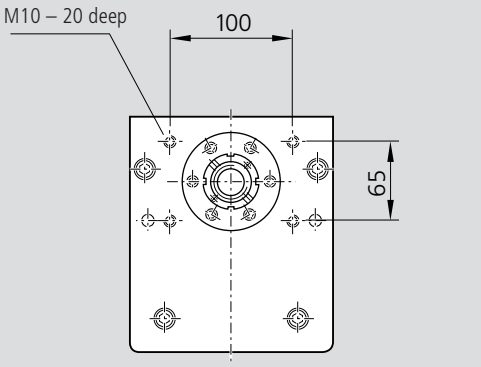
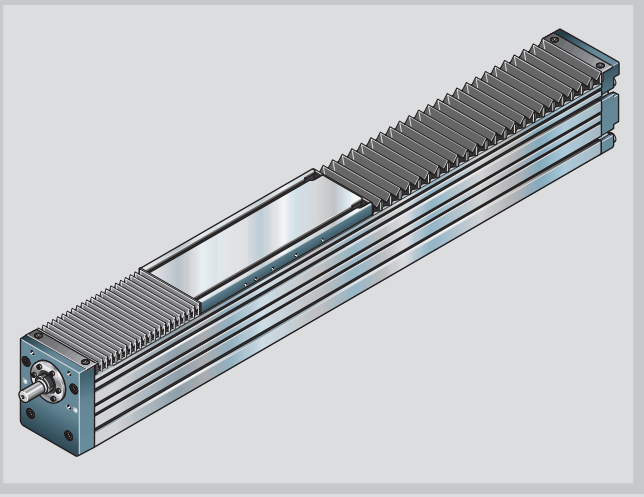
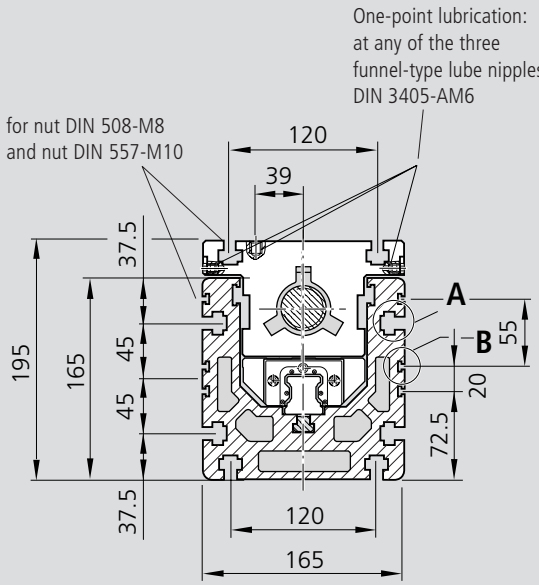
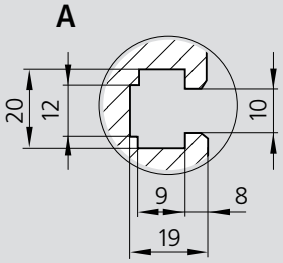
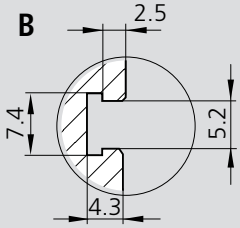








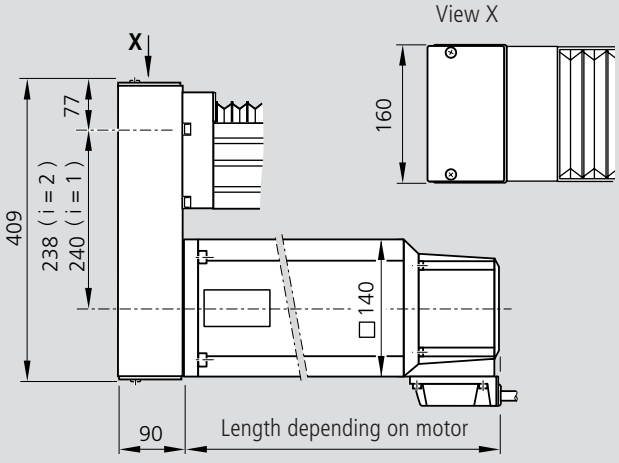


For more information, see section on “Motors”.

11.36.22

Type RV01

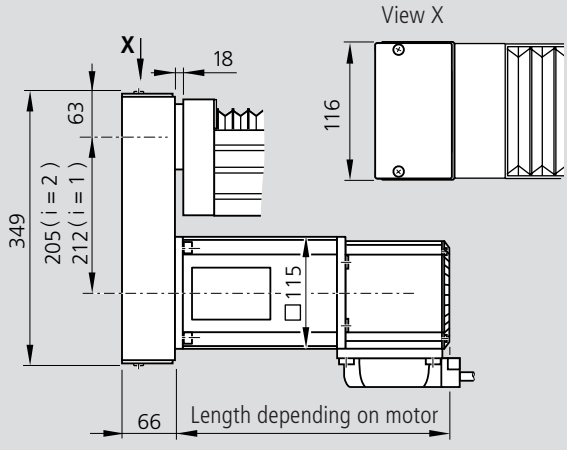
Motors M.. 90. side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



11.36.31

Type RV01

Motors M.. 71. side drive with timing belt
(dimensions also apply to
RV02 = top, RV03 = left, RV04 = right)



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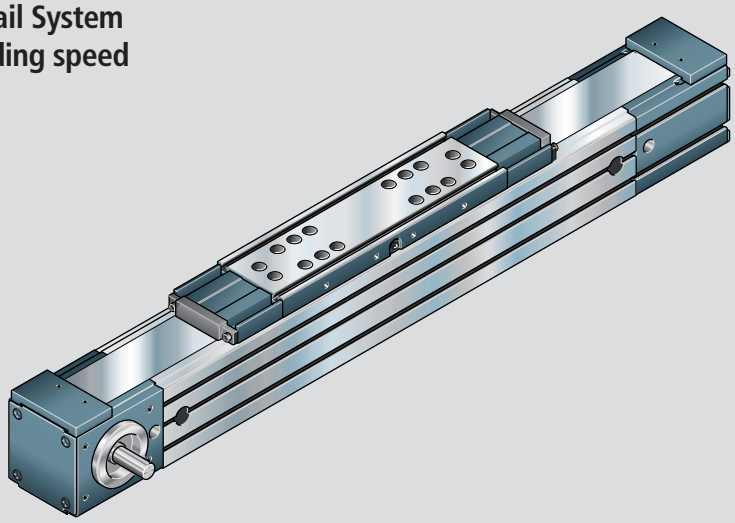
Rexroth Linear Modules MKR
Structure and Technical Data

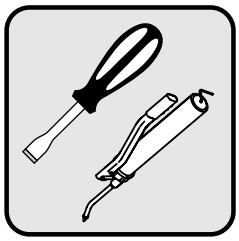
MKR...: Linear Modules with Ball Rail System and Toothed Belt Drive for demanding speed and load requirements



The MKR... Linear Modules comprise:

- a compact, anodized aluminum frame
- the integral Rexroth Ball Rail System
- a carriage with one-point lubrication
- the pre-tensioned toothed belt (also available without drive unit)
- cover provided by
  - plastic strip on MKR 15-65
  - corrosion-resistant steel strip to DIN EN 10088 on MKR 20-80 and MKR 25-110
  - the toothed belt on MKR 35-165
- mountable switches
- an AC servo motor
- a gear unit for attachment of the motor
- control units

For mounting, startup and maintenance, see MKR / MLR Instructions.



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General technical data

Linear Module	Carriage length (mm)	Dynamic load capacity C (N)	Dynamic moment M_t (Nm)	Dynamic moment M_L (Nm)	Moved mass (kg)	Minimum length L_{min} [1] (mm)	Maximum length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	Planar moment of inertia I_y (cm^4)
MKR 15-65	190	11820	120	416	1.0	390	6000	81.5	98.8
MKR 20-80	190	17420	240	128	1.4	370	6000	141.4	184.0
	260	28300	390	1840	2.2	430			
MKR 25-110	210	21320	320	179	2.5	390	10000	444.1	608.4
	305	44670	698	2574	5.7	458			
MKR 35-165	400	68200	1445	4160	11.5	600	12000	2574.0	3527.0

[1] for a theoretical stroke of 100 mm and an excess travel of 30 mm per end

Modulus of elasticity E

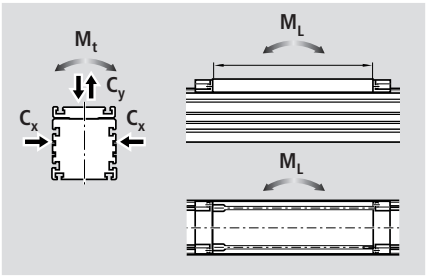
$E = 70{,}000\ N/mm^2$

Lengths in excess of L_{max}

Lengths in excess of L_{max} are available upon request.

Note 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 values **C, M_t** and **M_L** from the table by 1.26.



Drive data

Extension of the toothed belt

$\Delta l = (F \cdot L)/c_{spec}$

Linear Module	Gearing reduction i	Maximum drive torque M_a (Nm)	Lead constant (mm/rev)	Belt data: Belt type	Belt data: Width (mm)	Belt data: Tooth pitch (mm)	Belt data: Maximum force transmitted by belt (N)	Belt data: Limit of belt elasticity (N)	Belt data: Specific spring constant c_{spec} (N)
MKR 15-65	1	9.1	110.00	AT 5	32	5	520	2740	$0.56 \cdot 10^6$
	1 with keyway	9.1	110.00						
	3	2.6	36.67						
	7	1.1	15.72						
MKR 20-80	1	32.0	205.05	ATL 5	50	5	980	4200	$1.05 \cdot 10^6$
	1 with keyway	27.0	205.05						
	3	10.7	68.35						
	5	6.4	41.01						
	10	3.2	20.51						
MKR 25-110	1	80.0	289.60	AT 10	50	10	1740	7500	$2.12 \cdot 10^6$
	1 with keyway	27.0	289.60						
	3	26.6	96.53						
	5	16.0	57.92						
	10	8.0	28.96						
MKR 35-165	1	367.0	439.90	AT 20	75	20	5250	18000	$4.20 \cdot 10^6$
	1 with keyway	200.0	439.90						
	6	60.0	73.30						
	12	30.0	36.70						

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Rexroth Linear Modules MKR
Structure and Technical Data

Mass

Mass calculation does not include motor or switch attachments.

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

Linear Module	Carriage length (mm)	Drive units	Mass (kg)
MKR 15-65	190	without drive unit	0.0074 · L + 3.0
		drive i = 1	0.0074 · L + 4.0
		with gear reducer	0.0074 · L + 6.0
MKR 20-80	190	without drive unit	0.0093 · L + 4.1
		drive i = 1	0.0093 · L + 4.6
		with LP gear reducer	0.0093 · L + 8.0
		with LPB gear reducer	0.0093 · L + 6.0
	260	without drive unit	0.0093 · L + 4.9
		drive i = 1	0.0093 · L + 5.4
		with LP 70 gear reducer	0.0093 · L + 8.8
		with LPB gear reducer	0.0093 · L + 6.8
MKR 25-110	210	without drive unit	0.0158 · L + 8.9
		drive i = 1	0.0158 · L + 9.2
		with LP 90 gear reducer	0.0158 · L + 16.1
		with LPB gear reducer	0.0158 · L + 13.0
	305	without drive unit	0.0158 · L + 12.1
		drive i = 1	0.0158 · L + 12.5
		with LP 90 gear reducer	0.0158 · L + 19.3
		with LPB gear reducer	0.0158 · L + 17.3
MKR 35-165	400	drive i = 1	0.0384 · L + 41.0
		with gear reducer	0.0384 · L + 53.0

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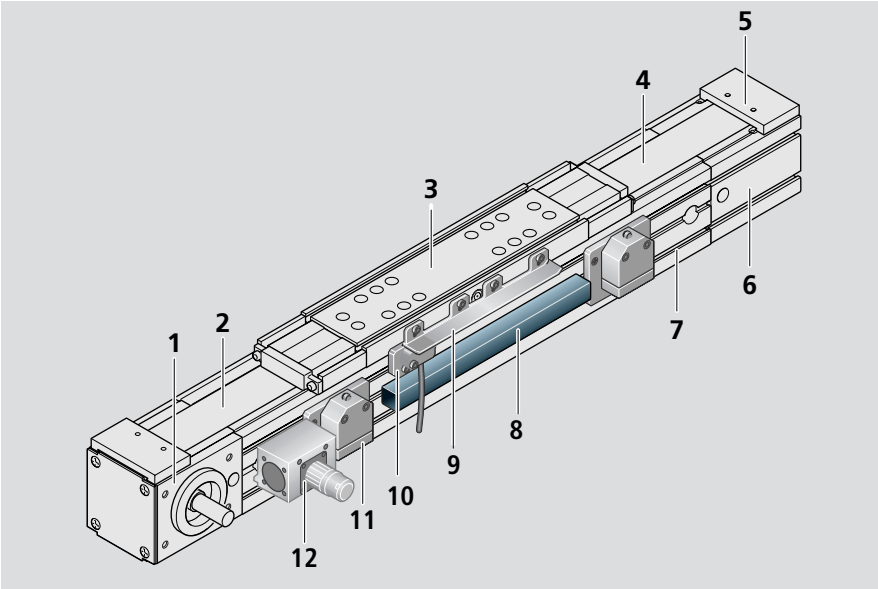
Structural design

1 End block, drive side
2 Toothed belt (under sealing strip)
3 Carriage with runner block
4 Sealing strip
5 Strip clamp
6 Tension end enclosure
7 Frame

Attachments:
8 Cable duct
9 Switching cam
10 Proximity switch
11 Mechanical switch
12 Socket / plug



Versions

MA01 and **MA02**

With drive unit (MA), without gear reducer, i = 1, journal for motor attachment right or left.

MA03

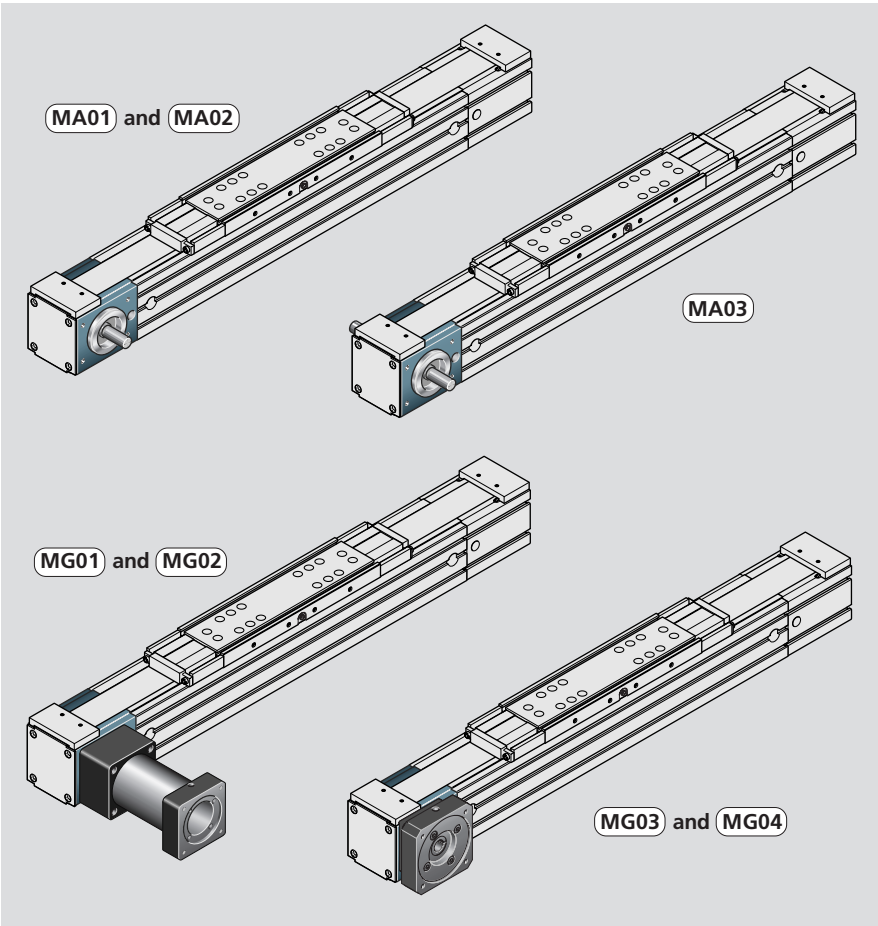
As MA01 and MA02, journal for motor attachment on both sides.

MG01 and **MG02**

With gear reducer, motor attachment via motor mount and socket.

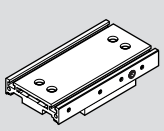
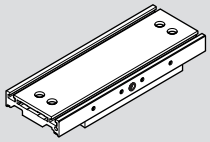
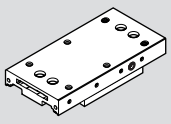
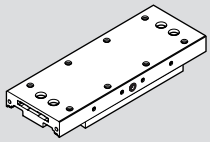
MG03 and **MG04**

With integral gear reducer, motor attachment via motor mount and socket.



Carriage variants

For MKR 20-80 and MKR 25-110

Carriage			
with T-slots		with tapped holes	
short	long	short	long
			

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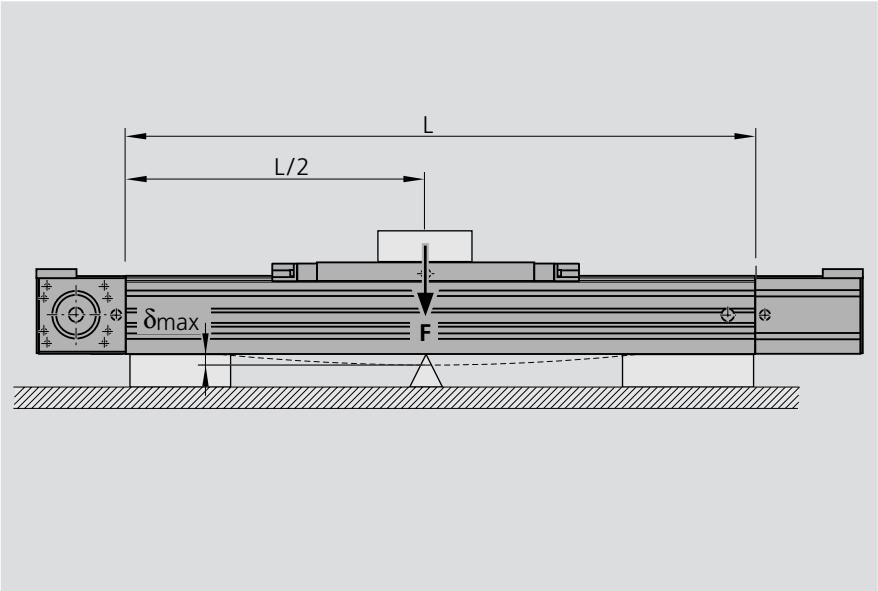
Rexroth Linear Modules MKR
Technical Data

Deflection

A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.



Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F.

⚠ δ_{max} may not be exceeded!

For applications requiring high system dynamics, support should be provided at every 300 to 600 mm.

Example

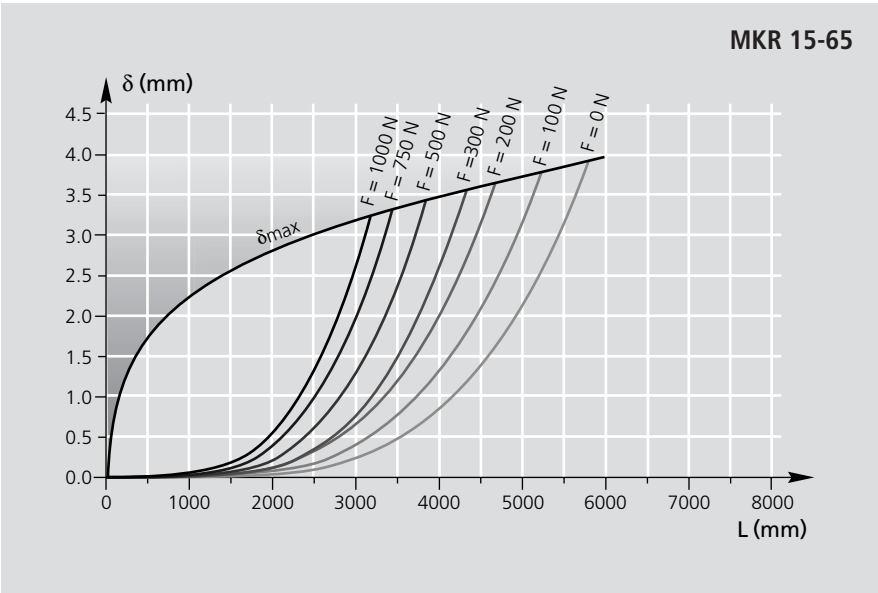
Linear Module MKR 20-80: L = 3000 mm
F = 500 N

From graph 20-80: δ = 0.9 mm
δ_{max} = 3.4 mm

The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.

The graphs applies in the following conditions:

- ends firmly clamped (200 to 250 mm on each side)
- 6 to 8 screws on each side
- fixed base



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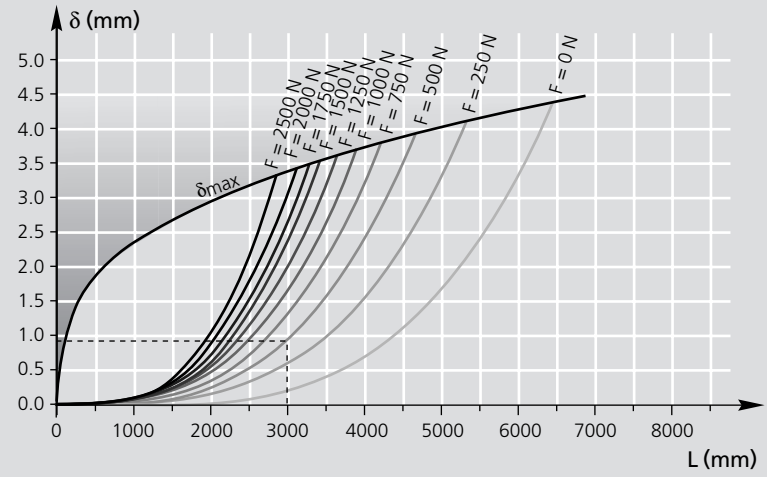
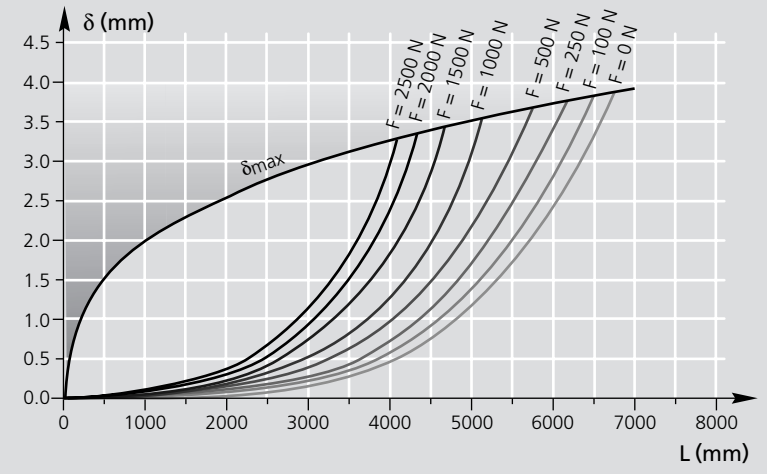
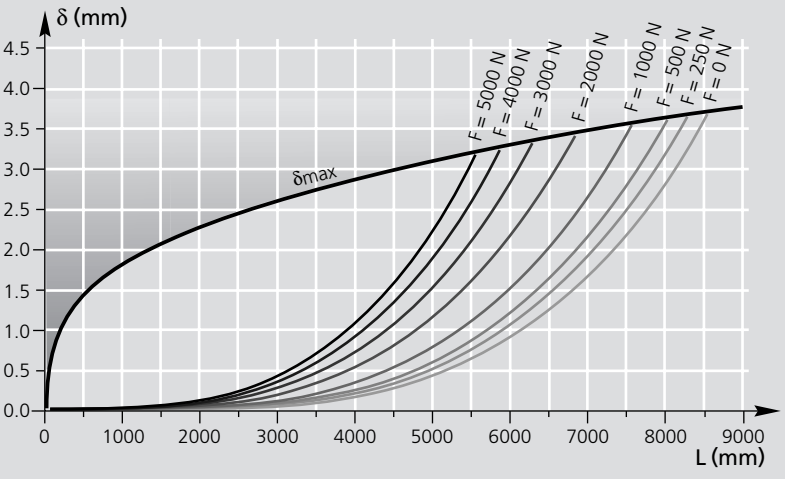
MKR 20-80



MKR 25-110



MKR 35-165



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Rexroth Linear Modules MKR 15-65 with Sealing Strip
Components and Ordering

Part number 1140-060-00, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)					Carriage = (..)		
			Journal for motor	Reduction i = 1 [1]	Reduction i = 1 [2]	Reduction i = 3	Reduction i = 7	Reduction i = 3 MSM 040B	L_T = 190 mm	
without drive unit (OA)	OA01 (11.04.00)	02				00			01	
with drive unit (MA), w/o gear reducer i = 1	MA01 (11.04.10)	01	right	01	03					
	MA02 (11.04.10)	01	left	01	03				01	
	MA03 (11.04.60)	01	both sides	02	04					
with gear reducer (MG) MG01	MG01 and MG02 (11.04.20) (11.04.30) (11.04.40) (11.04.50) (11.04.70)	01	Gear reducer with socket			10	11	15	01	
MG02										

[1]: without keyway
[2]: with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1140-060-00, 1330 mm		Linear Module MKR 15-65, length = 1650 mm
Type	= MG01	with gear reducer, mounted as in diagram MG01 (gear reducer right)
Guideway	= 01	ball rail system
Drive unit	= 10	gear reducer with reduction i = 3
Carriage	= 01	carriage with length L_T = 190 mm
Motor attachment	= 01	for motor MKD 41B
Motor	= 10	motor MKD 41B
Cover	= 01	with plastic sealing strip
1st switch	= 15-R + 400 mm	mechanical switch, switch activation point: right + 400 mm
2nd switch	= 11-R – 300 mm	PNP NC, switch activation point: right – 300 mm
3rd switch	= 15-R – 400 mm	mechanical switch, switch activation point: right – 400 mm
Cable duct	= 20, 1200 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 01	standard report

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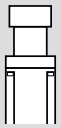
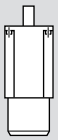
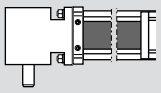
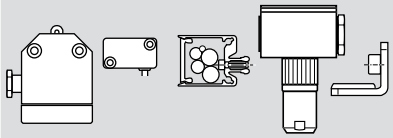
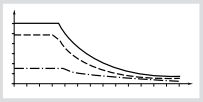
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

	Motor attachment = (..)		Motor = (..)	Cover = (..)		1st, 2nd + 3rd switch = (..– . ± ....) mm	Documentation = (..)	
								
	Reduction (i)	**Mount**[3]	**for motor**		**w/o sealing strip**	**with**	**Cable duct = (.., ...) mm** **Socket-plug = (..)** **Switching cam = (..)**	**Standard report**	**Measure-ment report**
		(00)		(00)			**without switch without cable duct** (00)		
		(00)		(00)	(00)	(01) without side sealing	**External switch:** **PNP NC** (11 – . ±....) mm **PNP NO** (13 – . ±....) mm **Mechanical** (15 – . ±....) mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance	(01)	(02) Friction moment
	i = 3 **i = 7**	(01)	**MKD 41B**	(10)		(02) with side sealing	**Cable duct (loose)** (20,....) mm Length		(05) Positioning accuracy
	i = 3	(04)	**MSM 040B**	(75) (74)[4]			**External socket-plug (loose)** (17)		
	i = 7	(05)	**MSM 030C**	(73) (72)[4]					
	i = 3 **i = 7**	(03)	**VRDM 397**	(28)			**Switching cam on one side** (16) **Switching cam on both sides** (26)		
			VRDM 3910	(29)					

[3] Attachment can also be supplied without motor (enter "00" for motor on order). [4] Motor without brake

MKR

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

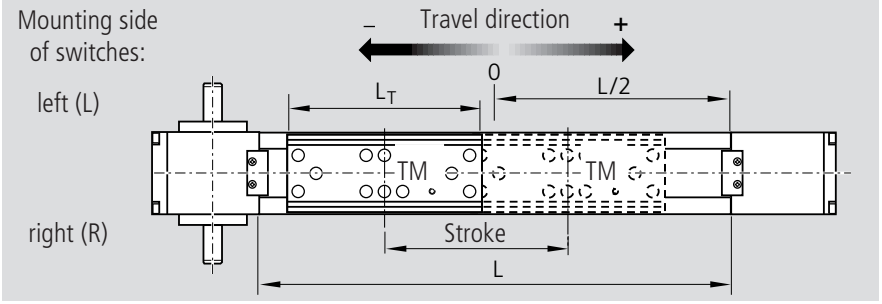
L = (stroke + 2 x excess travel) + L_T + 40 mm

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

Example:
Switch activation point 1st switch = +400 mm
Switch activation point 3rd switch = –400 mm
Stroke = 800 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.

Example:
Horizontal operation with motor MKD 41B, i = 3, m = 6 kg: s_h = 309 mm
Excess travel > 309 (310 mm assumed)



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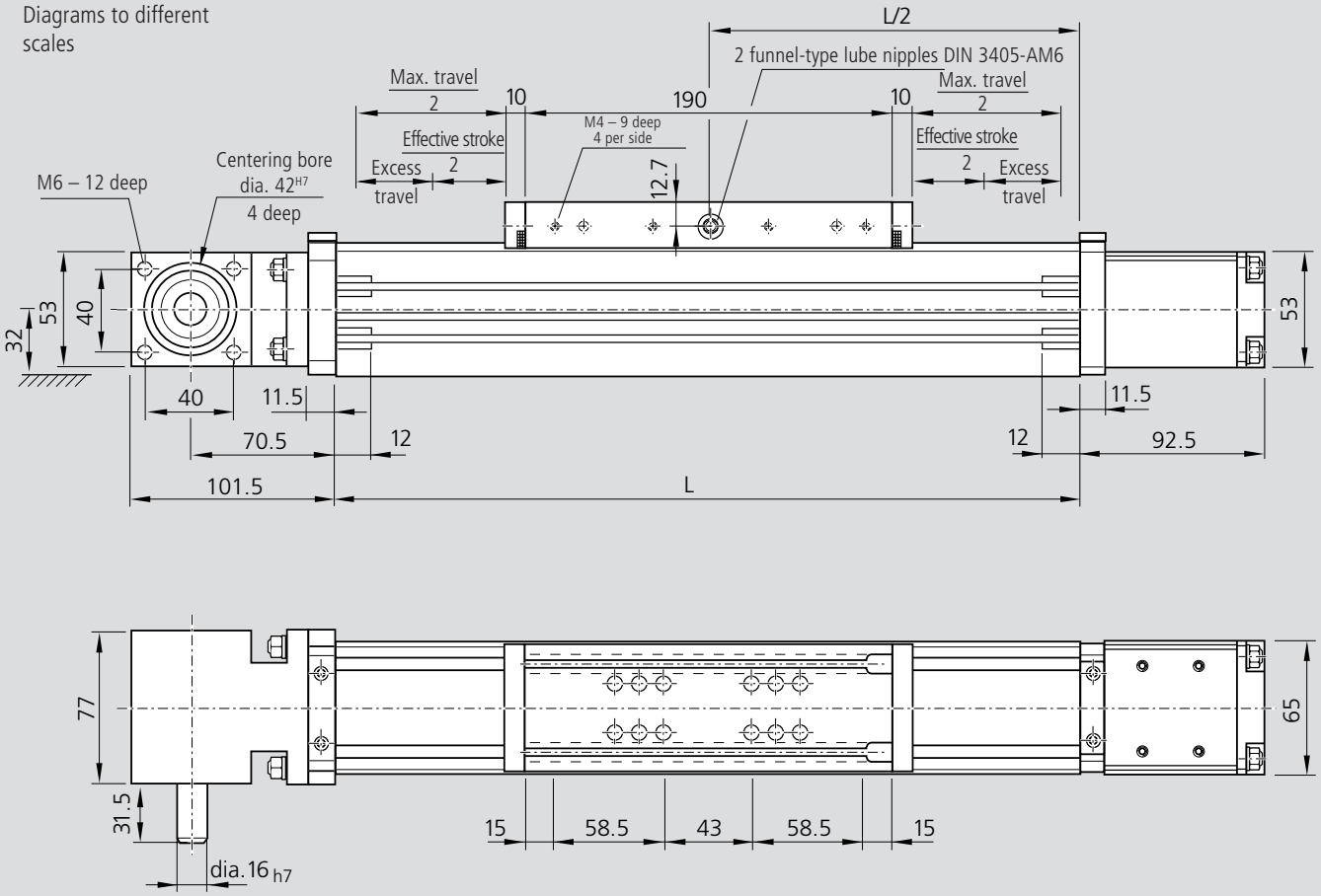
Rexroth Linear Modules MKR 15-65 with Sealing Strip
Dimension Drawings

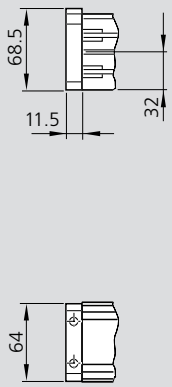
All dimensions in mm

Diagrams to different scales



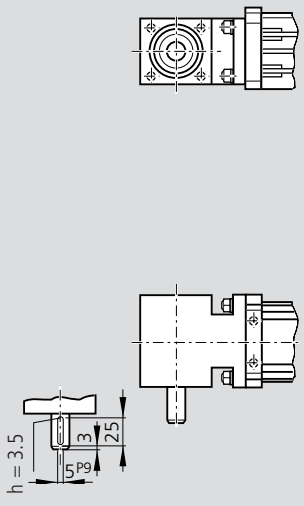
11.04.00

Type OA01



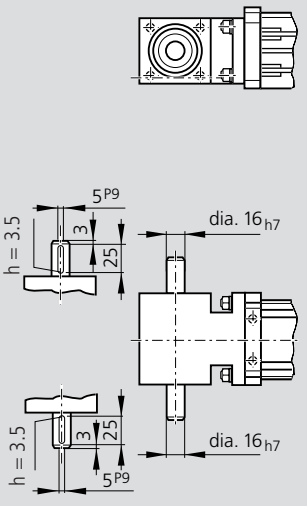
11.04.10

Type MA01 and MA02



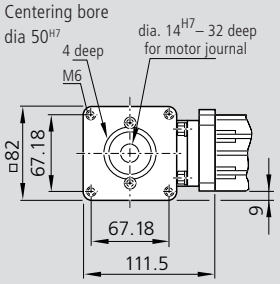
11.04.60

Type MA03

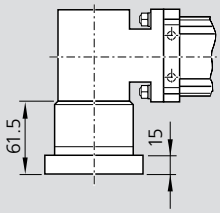


11.04.20

Type MG01 and MG02



Mount geometry and mounting thread altered on request.



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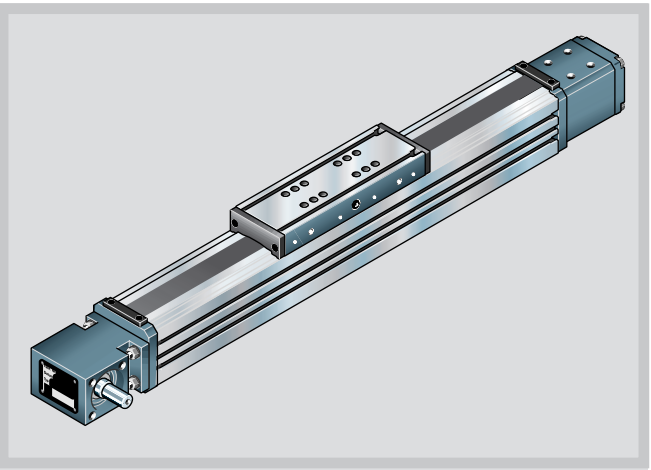
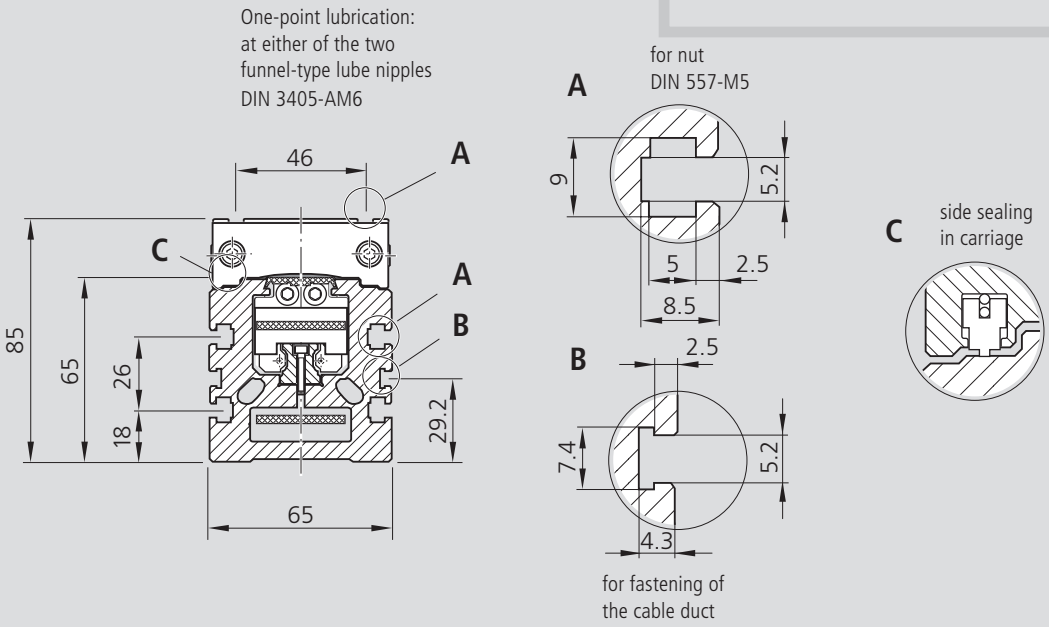


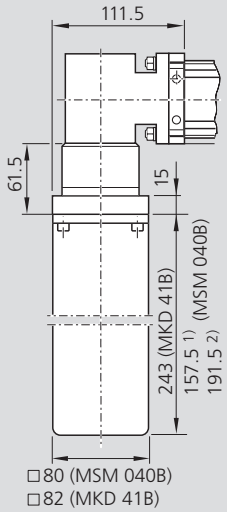


For more information, see section on "Motors".

1) without brake 2) with brake

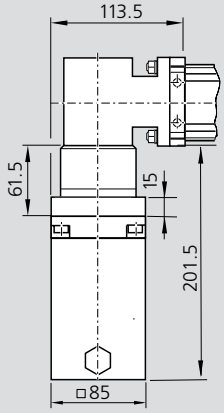
11.04.30

Type MG01 and MG02
Motors MKD 41B, MSM 040B



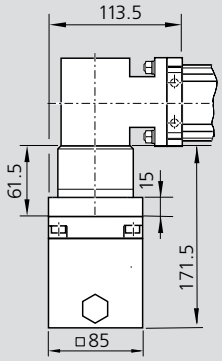
11.04.40

Type MG01 and MG02
Stepping motor VRDM 3910



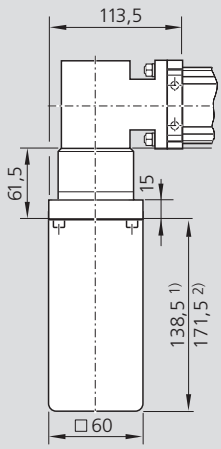
11.04.50

Type MG01 and MG02
Stepping motor VRDM 397



11.04.70

Type MG01 and MG02
Motor MSM 030C



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Rexroth Linear Modules MKR 15-65 with Sealing Strip
Performance Data

Horizontal operation, performance data

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]

Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 3					
Masse	**(kg)**	2	6	10	14	18	22
Acceleration time t_h	**(ms)**	121	166	211	256	300	345
Acceleration distance s_h	**(mm)**	183	249	317	385	450	518
Acceleration a	**(m/s^2)**	24.7	18.1	14.2	11.7	10.0	8.7
Speed v	**(m/s)**	3					
Reproducibility ±	**(mm)**	0.1					

with servo motor MSM 040B and servo controller DKCxx.3-018[1)]
Supply voltage: 1 x 230 V

Gearing reduction		i = 3				
Masse	**(kg)**	2	4	8	12	16
Acceleration time t_h	**(ms)**	49	62	89	116	144
Acceleration distance s_h	**(mm)**	45	56	81	105	130
Acceleration a	**(m/s^2)**	36.5	29	20.2	15.5	12.5
Speed v	**(m/s)**	1.8				
Reproducibility ±	**(mm)**	0.1				

with servo motor MSM 030C and servo controller DKCxx.3-012[1)]
Supply voltage: 1 x 230 V

Gearing reduction		i = 7					
Mass	**(kg)**	6	8	10	12	14	16
Acceleration time t_h	**(ms)**	55	62	68	75	82	88
Acceleration distance s_h	**(mm)**	21	24	26	29	31	34
Acceleration a	**(m/s^2)**	13.6	12.1	11	10	9.2	8.5
Speed v	**(m/s)**	0.75					
Reproducibility ±	**(mm)**	0.1					

Vertical operation, performance data

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					
Mass	**(kg)**	1	2	4	6	8	10
Acceleration time t_h	**(ms)**	135	156	204	263	341	435
Acceleration distance s_h	**(mm)**	202	235	306	395	512	659
Acceleration a	**(m/s^2)**	22.2	19.2	14.7	11.4	8.8	6.9
Speed v	**(m/s)**	3					
Reproducibility ±	**(mm)**	0.1					

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories". The data given here does not include any assessment of the effective moments for the motor and controller.

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Horizontal operation, performance data

with stepping motor VRDM 3910/50 LWB or VRDM 397/50 LWB and power output stage D 901*

Gearing reduction		i = 3 (VRDM 3910)**				i = 7 (VRDM 397)		
Mass	**(kg)**	1	6	12	20	7	20	50
Acceleration time t_h	**(ms)**	54	81	113	158	41	59	97
Acceleration distance s_h	**(mm)**	16	24	34	47	6	9	15
Acceleration a	**(m/s²)**	11.1	7.4	5.3	3.8	7.3	5.1	3.1
Speed v	**(m/s)**	0.6				0.3		

* For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".

** Values for the VRDM 3910 apply to short time operation

Drive data without motor (i = 1)

Drive wheel diameter	35.02 mm
Lead constant	110 mm/rev.
Speed	up to 5 m/s
Mass moment of inertia	$(3.66 + L \cdot 0.000748) \cdot 10^{-4}$ kgm²

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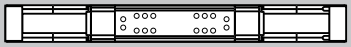
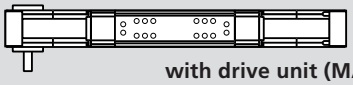
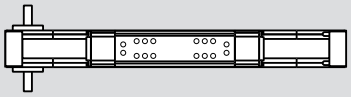
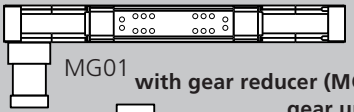
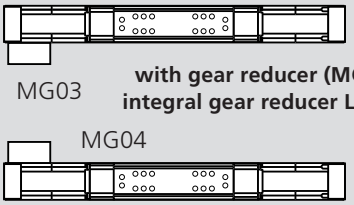
Rexroth Linear Modules MKR 20-80 with Sealing Strip

Components and Ordering

Part number 1140-160-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)						
				Reduction				L_T = 190 mm		L_T = 260 mm	
				i = 1 [1]	i = 1 [2]	i = 3	i = 5 i = 10	with T-slot	with thread	with T-slot	with thread
 without drive unit (OA)	(OA01) (11.14.00)	(01)	without	(50)				(01)	(02)	(11)	(12)
 with drive unit (MA), w/o gear reducer, i = 1	(MA01) (11.14.10)	(01)	Journal right	(01)	(03)						
	(MA02) (11.14.10)	(01)	Journal left	(01)	(03)						
	(MA03) (11.14.12)	(01)	Journal on both sides	(02)	(04)						
 MG01 with gear reducer (MG), gear unit MG02	(MG01) and (MG02) (11.14.20) (11.14.22) (11.14.24)	(01)	Gear reducer right / Gear reducer left				(10) (11) Gear reducer with 2nd journal				
 MG03 with gear reducer (MG), integral gear reducer LPB MG04	(MG03) and (MG04) (11.14.50)	(01)	Gear reducer right / Gear reducer left				(20)				

[1] without keyway
[2] with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1140-160-10, 2250 mm		Linear Module MKR 20-80, length 2250 mm
Type	= MG01	with gear reducer, mounted as in diagram MG01 (gear reducer right)
Guideway	= 01	ball rail system
Drive unit	= 10	end block for attachment of gear unit
Carriage	= 11	carriage with length L_T = 260 mm, with T-slots
Motor attachment	= 10	for motor MKD 41B, i = 5
Motor	= 10	motor MKD 41B
Cover	= 15	sealing strip with side sealing lips
1st switch	= 15-R + 750 mm	mechanical switch, switch activation point: right + 750 mm
2nd switch	= 11-R – 650 mm	PNP NC, switch activation point: right – 650 mm
3rd switch	= 15-R – 750 mm	mechanical switch, switch activation point: right – 750 mm
Cable duct	= 20, 1500 mm	cable duct 1500 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation on right side
Documentation	= 02	measurement report: friction moment

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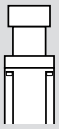
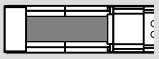
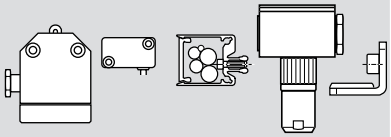
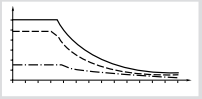
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = (..)	Motor = (..) [4]	Cover = (..) [5]	1st, 2nd + 3rd switch = (..– .± ....) mm	Documentation = (..)
				

Mount [3] for motor	Gear reducer i = 3	Gear reducer i = 5	Gear reducer i = 10			w/o sealing	with sealing strip	Cable duct = (.., ...) mm; Socket-plug = (..); Switching cam = (..)	Standard report	Measurement report
(00)					(00)	(00)	(10) without sealing lip	without switch without cable duct (00)	(01)	(02) Friction moment
(00)					(00)			External switch: PNP NC (11 – . ±....) mm; PNP NO (13 – . ±....) mm; Mechanical (15 – . ±....) mm		
M.D 41B	(01)	(10)	(20)	without	(00)			Switch activation point: Switch type, Mounting side, Travel direction, Switching distance		(05) Positioning accuracy
				MKD 41B	(10)		(15) with sealing lip	Cable duct (loose) (20,....) mm; Length		
MSM 040B	(02)	(11)	(21)	without	(00)			External socket-plug (loose) (17)		
				MSM 040B	(75) (74) [6]			Switching cam on one side (16)		
M.D 71B	(03)	(12)	(22)	MKD 71B	(11)			Switching cam on both sides (26)		
				MHD 71B	(62)					
M.D 41B	(50)	(55)	(60)	without	(00)					
				MKD 41B	(10)					
MSM 040B	(51)	(56)	(61)	without	(00)					
				MSM 040B	(75) (74) [6]					
M.D 71B	(52)	(57)	(62)	MKD 71B	(11)					
				MHD 71B	(62)					

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

[4] Stepping motors on request

[5] Sealing strip permissible up to L = 3500 mm, v = 2.5 m/s

[6] Motor without brake

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

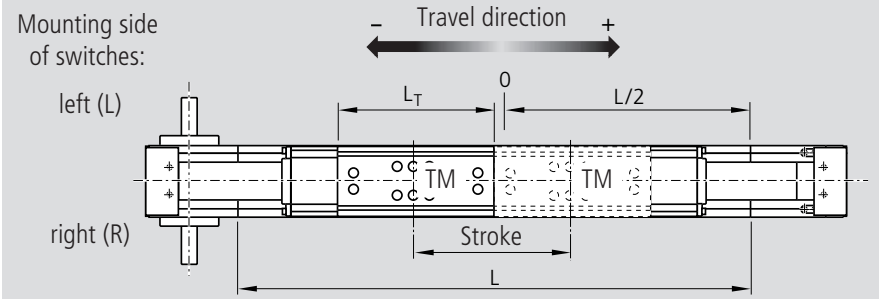
Calculating the Linear Module length

L = (stroke + 2 x excess travel) + L_T + 20 mm

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

Example:
Switch activation point 1st switch = +750 mm
Switch activation point 3rd switch = –750 mm
Stroke = 1500 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.
Example:
Horizontal operation with motor MKD 71B, i = 5, m = 20 kg: s_h = 267 mm
Excess travel > 267 (270 mm assumed)



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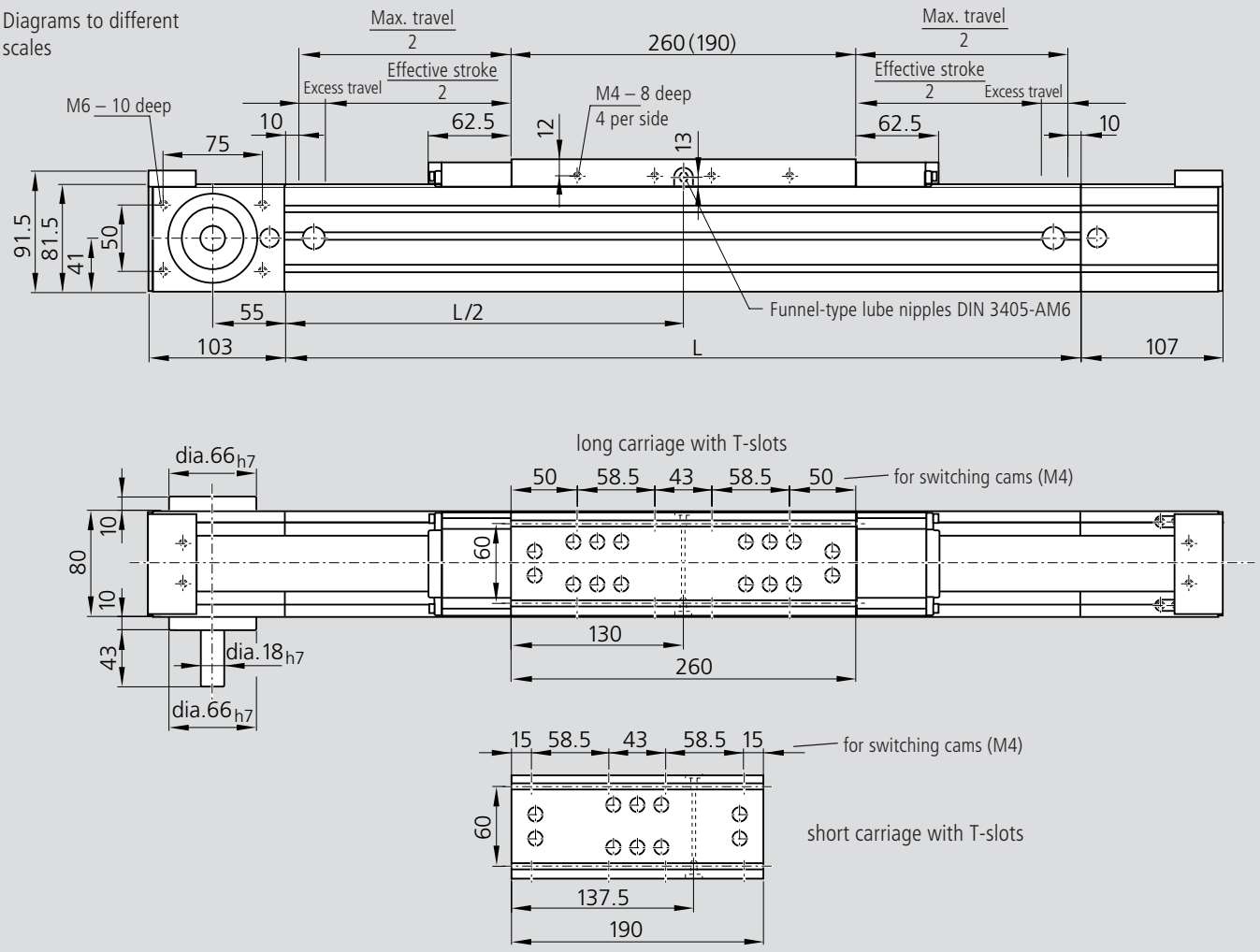
Rexroth Linear Modules MKR 20-80 with Sealing Strip
Dimension Drawings

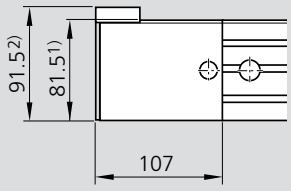
All dimensions in mm

Diagrams to different scales

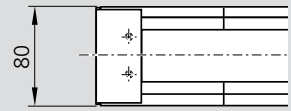


11.14.00

Type OA01

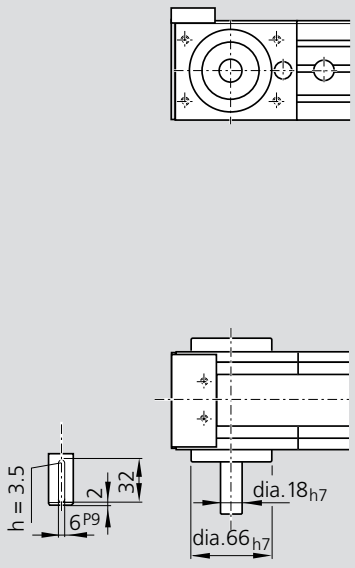


1) without sealing strip
2) with sealing strip



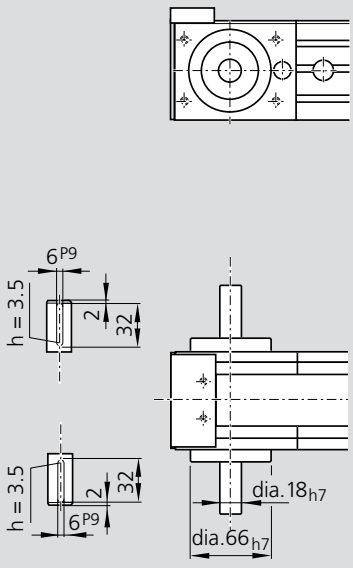
11.14.10

Type MA01 and MA02



11.14.12

Type MA03



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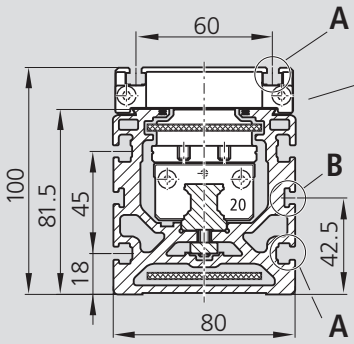
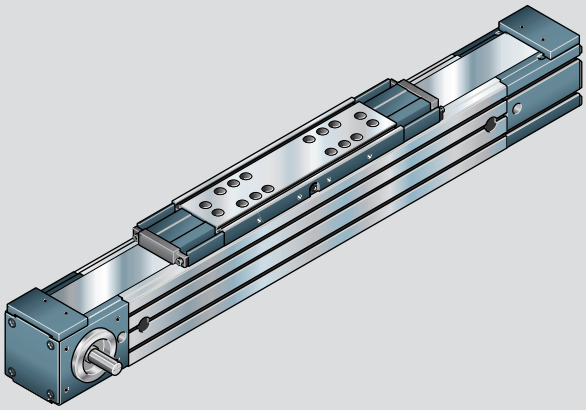
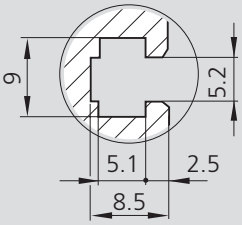
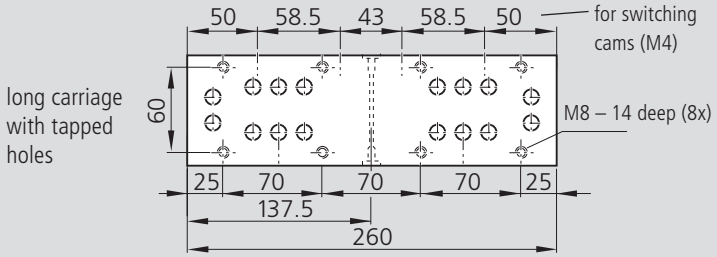


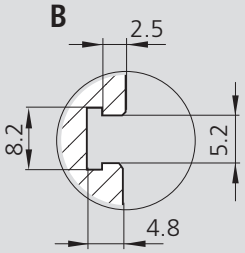
One-point lubrication:
at either of the two
funnel-type lube nipples
DIN 3405-AM6



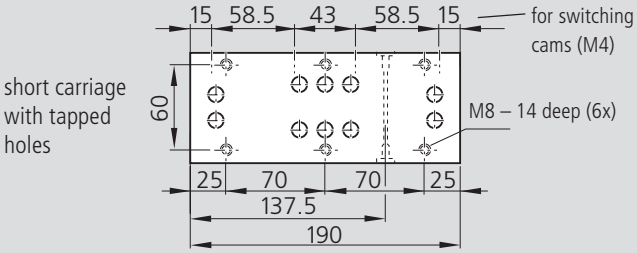


sealing lip
in carriage





for fastening of
the cable duct

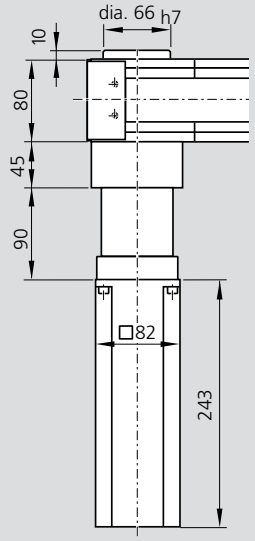


MKR

For more information, see section on "Motors".

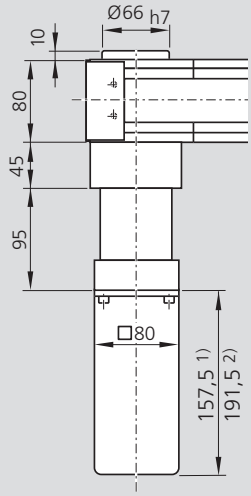
11.14.20

Type MG01 and MG02
Servo motor MKD 41B



11.14.22

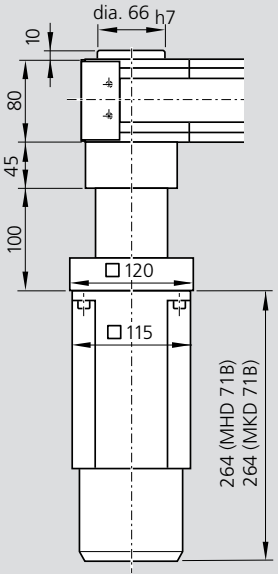
Type MG01 and MG02
MiniDrive motor MSM 040B



1) without brake
2) with brake

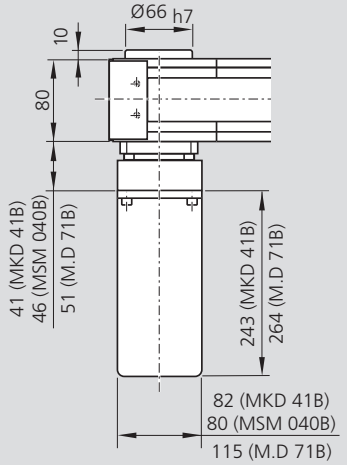
11.14.24

Type MG01 and MG02
Servo motors M.D 71B



11.14.50

Type MG03 and MG04
Motors MKD 41B,
MSM 040B, MKD 71B, MHD 71B



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Rexroth Linear Modules MKR 20-80 with Sealing Strip
Performance Data

Horizontal operation, performance data

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	4	8	12	16	20	10	20	30	50	70	25	50	75	100	125
Acceleration time t_h	**(ms)**	110	142	174	205	237	145	191	237	329	421	251	314	376	438	501
Acceleration distance s_h	**(mm)**	273	352	430	509	587	203	267	332	461	589	187	233	280	326	372
Acceleration a	**(m/s^2)**	44.9	34.9	28.5	24.1	20.9	19.4	14.7	11.8	8.5	6.7	5.9	4.7	4.0	3.4	3.0
Speed v	**(m/s)**	4.96					2.80					1.49				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	1	2	3	4		4	6	10	14	18	10	20	40	60	80
Acceleration time t_h	**(ms)**	50	58	66	74		93	108	137	167	196	143	185	270	354	438
Acceleration distance s_h	**(mm)**	125	145	165	185		209	243	309	376	442	172	222	323	423	524
Acceleration a	**(m/s^2)**	99.8	86.0	75.6	67.5		48.5	41.8	32.8	27.0	22.9	16.7	12.9	8.9	6.8	5.5
Speed v	**(m/s)**	5.00					4.50					2.40				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MSM 040B und servo controller DKCxx.3-018[1)]
Supply voltage: 1 x 230 V

Gearing reduction		i = 5					i = 10							
Masse	**(kg)**	2	4	6	8	10	10	15	20	25	30	35	40	
Acceleration time t_h	**(ms)**	29	35	43	49	55	42	49	58	67	75	85	93	
Acceleration distance s_h	**(mm)**	30	36	43	49	55	21	25	30	34	38	43	47	
Acceleration a	**(m/s^2)**	68	57	47	40.8	36.2	24	20.4	17.2	14.9	13.3	11.8	10.8	
Speed v	**(m/s)**	2					1							
Reproducibility ±	**(mm)**	0.1					0.1							

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

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Vertical operation, performance data (frame stationary, traveling carriage)

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	2	4	6	8	10	4	8	12	16	20	4	8	16	24	32
Acceleration time t_h	**(ms)**	101	122	145	169	195	138	172	212	259	315	222	251	327	438	615
Acceleration distance s_h	**(mm)**	250	303	359	419	483	205	256	315	384	468	165	187	243	325	457
Acceleration a	**(m/s^2)**	49.0	40.6	34.2	29.3	25.4	21.5	17.3	14.0	11.5	9.4	6.7	5.9	4.5	3.4	2.4
Speed v	**(m/s)**	4.96					2.97					1.49				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	1	2	3	4		2	6	10	14	18	5	10	15	20	25
Acceleration time t_h	**(ms)**	53	62	72	82		76	113	156	205	265	140	182	234	301	389
Acceleration distance s_h	**(mm)**	132	156	180	205		156	232	319	421	543	167	217	280	360	466
Acceleration a	**(m/s^2)**	94.8	80.4	69.5	60.9		53.8	36.3	26.4	20.0	15.5	17.1	13.2	10.2	8.0	6.1
Speed v	**(m/s)**	5.00					4.10					2.39				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

Drive data without motor (i = 1)

Drive wheel diameter	65.27 mm
Speed with sealing strip	up to 5 m/s
Mass moment of inertia (short carriage)	$(21.1 + L\,(mm) \cdot 0.00379) \cdot 10^{-4}\ kgm^2$
Mass moment of inertia (long carriage	$(29.7 + L\,(mm) \cdot 0.00379) \cdot 10^{-4}\ kgm^2$

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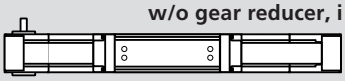
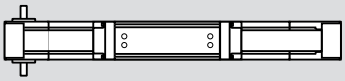
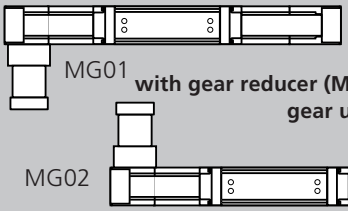
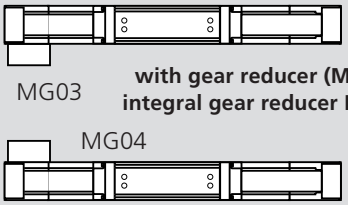
Rexroth Linear Modules MKR 25-110 with Sealing Strip
Components and Ordering

Part number 1140-260-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)					
				Reduction				L_T = 210 mm		L_T = 305 mm	
				i = 1 [1]	i = 1 [2]	i = 3	i = 5 i = 10	with T-slot	with thread	with T-slot	with thread
 without drive unit (OA)	(OA01) (11.24.00)	(01)	without	(50)				(01)	(02)	(11)	(12)
 with drive unit (MA), w/o gear reducer, i = 1	(MA01) (11.24.10)	(01)	Journal right	(01)	(03)						
	(MA02) (11.24.10)	(01)	Journal left	(01)	(03)						
	(MA03) (11.24.12)	(01)	Journal on both sides	(02)	(04)						
 MG01 with gear reducer (MG), gear unit MG02	(MG01) and (MG02) (11.24.20) (11.24.22)	(01)	Gear reducer right Gear reducer left				(10) (11) Gear reducer with 2nd journal				
 MG03 with gear reducer (MG), integral gear reducer LPB MG04	(MG03) and (MG04) (11.24.50)	(01)	Gear reducer right Gear reducer left				(20)				

[1]: without keyway
[2]: with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1140-260-10, 1525 mm		Linear Module MKR 25-110, length 1525 mm
Type	= MG01	with gear unit, mounted as in diagram MG01
Guideway	= 01	ball rail system
Drive unit	= 10	end block for attachment of gear unit
Carriage	= 12	carriage with length L_T = 305 mm, with tapped holes
Motor attachment	= 01	for motor M . D 71., i = 3
Motor	= 11	motor MKD 71B-061
Cover	= 15	sealing strip with side sealing lips
1st switch	= 15-R + 400 mm	mechanical switch, switch activation point: right + 400 mm
2nd switch	= 11-R – 300 mm	PNP NC, switch activation point: right – 300 mm
3rd switch	= 15-R – 400 mm	mechanical switch, switch activation point: right – 400 mm
Cable duct	= 20, 1200 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation on right side
Documentation	= 02	measurement report: friction moment

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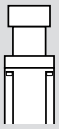
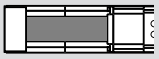
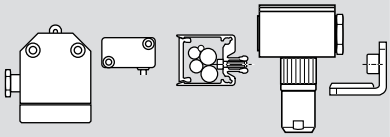
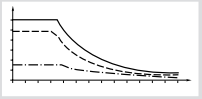
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = (..)	Motor = (..) [4]	Cover = (..) [5]	1st, 2nd + 3rd switch = (..– .± ....) mm	Documentation = (..)
				

Mount [3] for motor	Gear reducer i = 3	Gear reducer i = 5	Gear reducer i = 10			w/o sealing strip	with sealing strip
(00)					(00)	(00)	(10) without sealing lip
(00)					(00)		
M.D 71B	(01)	(10)	(20)	without	(00)		
				MKD 71B	(11)		
				MHD 71B	(62)		(15) with sealing lip
M.D 90B	(02)	(11)	(21)	without	(00)		
				MKD 90B	(13)		
				MHD 90B	(63)		
M.D 71B	(03)	(13)	(23)	without	(00)		
				MKD 71B	(11)		
				MHD 71B	(62)		
M.D 90B	(04)	(14)	(24)	without	(00)		
				MKD 90B	(13)		
				MHD 90B	(63)		

Cable duct = (.., ...) mm
Socket-plug = (..)
Switching cam = (..)

without switch without cable duct (00)

External switch:

PNP NC	(11 – . ±...)	mm
NPN NC	(12 – . ±...)	mm
PNP NO	(13 – . ±...)	mm
NPN NO	(14 – . ±...)	mm
Mechanical	(15 – . ±...)	mm

Switch activation point: Switch type, Mounting side, Travel direction, Switching distance

Cable duct (loose) (20,....) mm
Length

External socket-plug (loose) (17)

Switching cam on one side (16)

Switching cam on both sides (26)

Standard report	Measurement report
(01)	(02) Friction moment
	(05) Positioning accuracy

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

[4] Stepping motors on request

[5] Sealing strip permissible up to L = 3500 mm, v = 2.5 m/s

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

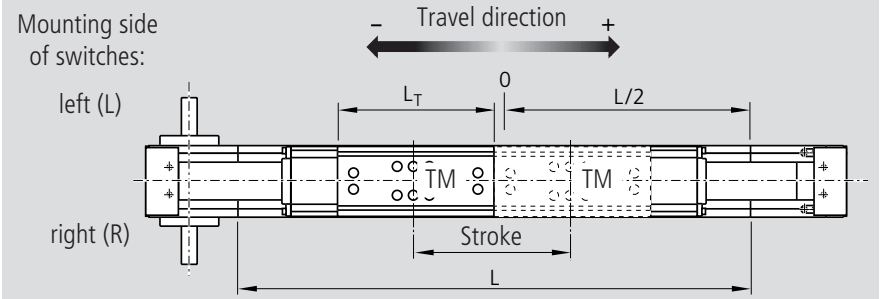
Calculating the Linear Module length

L = (stroke + 2 x excess travel) + L_T + 20 mm

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

Example:
Switch activation point 1st switch = +400 mm
Switch activation point 3rd switch = –400 mm
Stroke = 800 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.
Example:
Horizontal operation with motor MKD 71B-061, i = 5, m = 24 kg: s_h = 336 mm
Excess travel > 336 (340 mm assumed)



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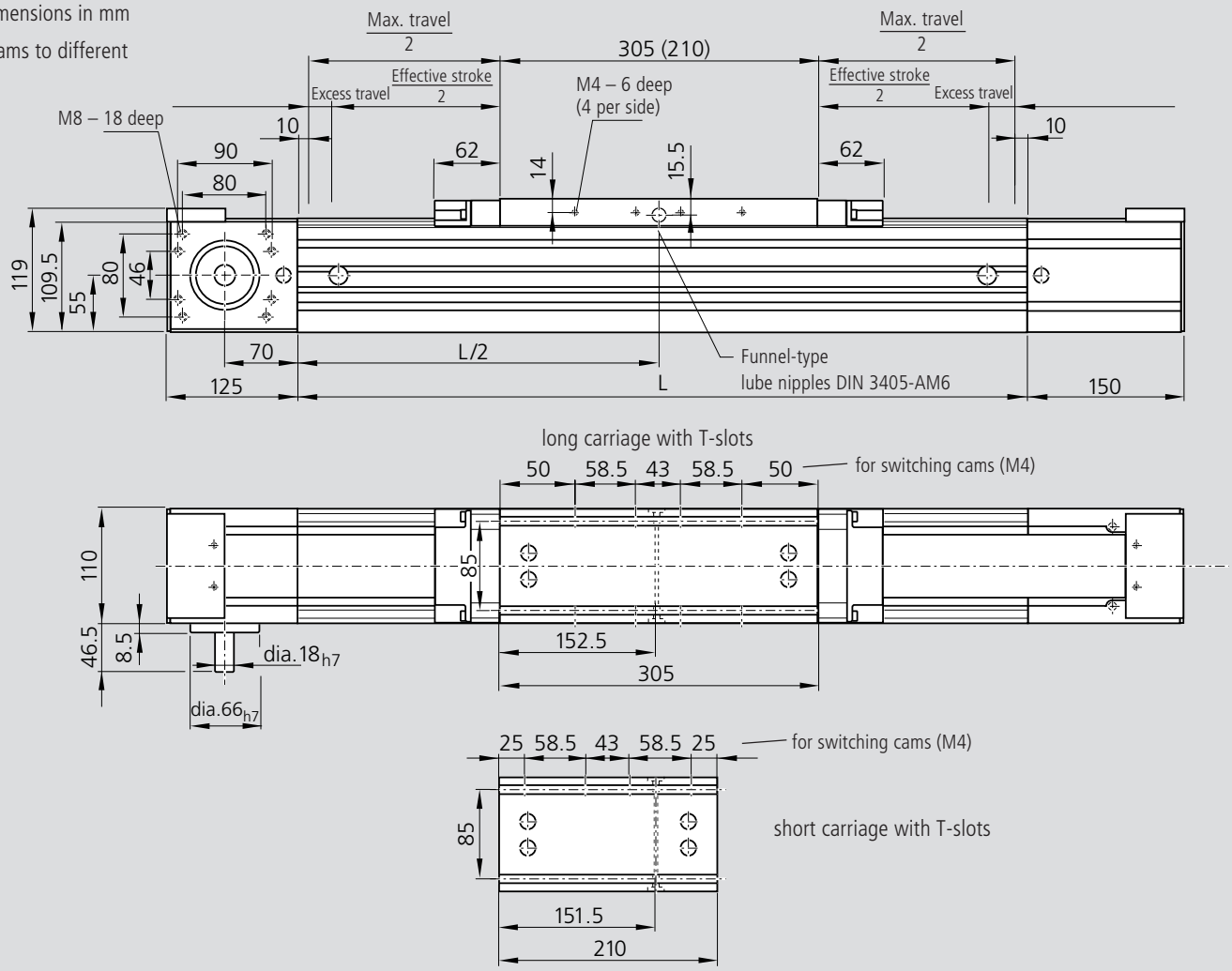
Rexroth Linear Modules MKR 25-110 with Sealing Strip
Dimension Drawings

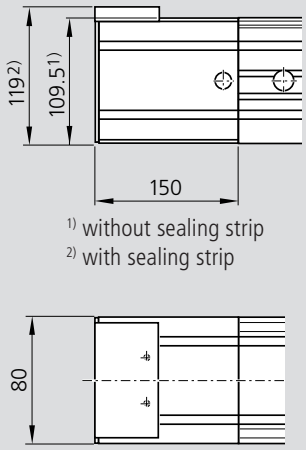
All dimensions in mm

Diagrams to different scales



11.24.00

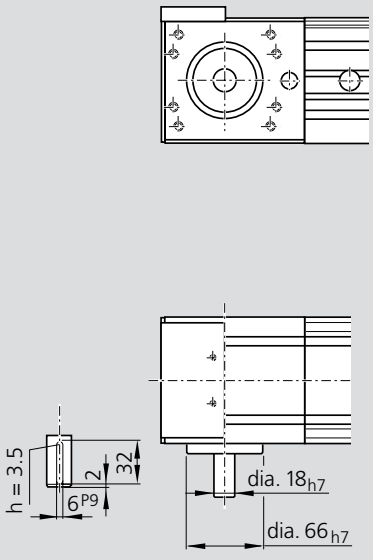
Type OA01



1) without sealing strip
2) with sealing strip

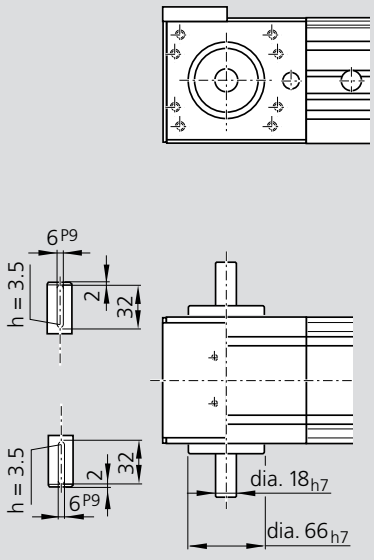
11.24.10

Type MA01 and MA02



11.24.12

Type MA03



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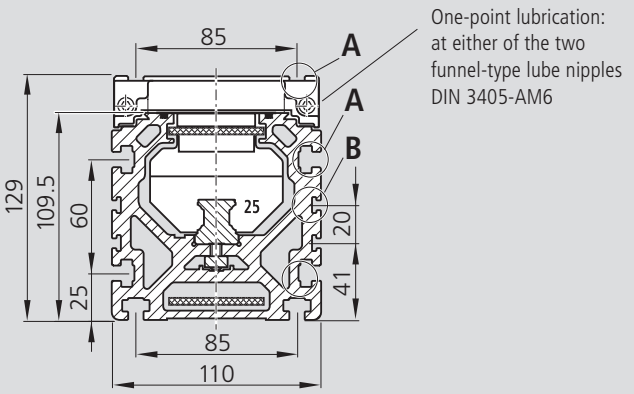
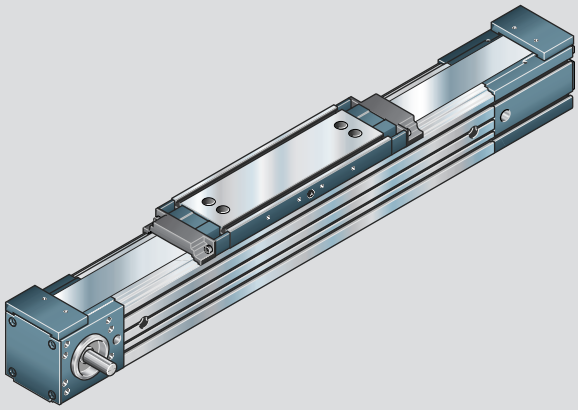
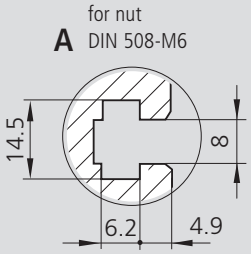
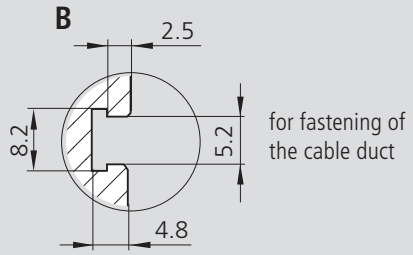
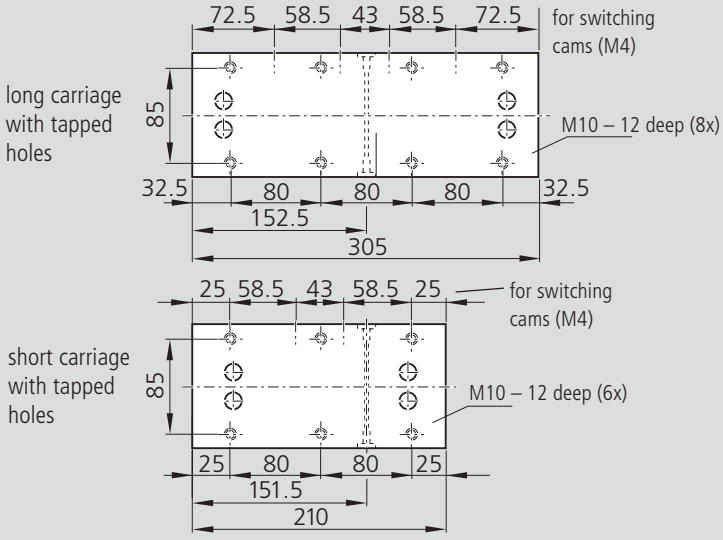








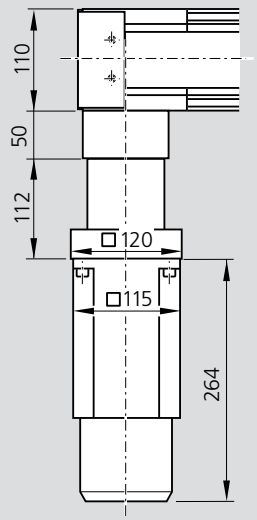


MKR

For more information, see section on "Motors".

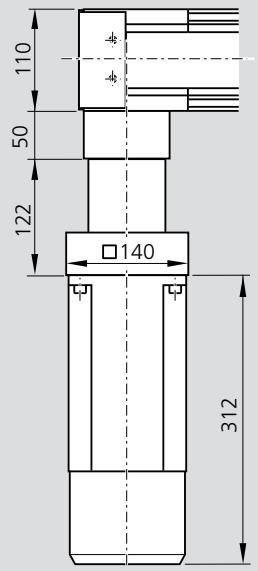
11.24.20

Type MG01 and MG02
Servo motors M.D 71B



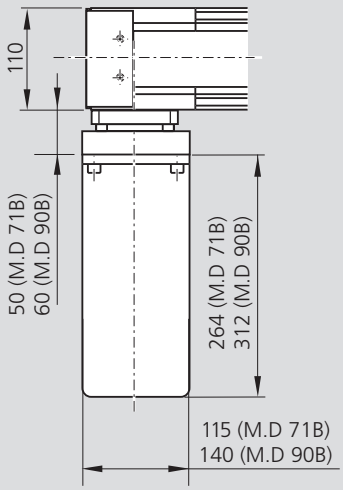
11.24.22

Type MG01 and MG02
Servo motors M.D 90B



11.24.50

Type MG03 and MG04
Servo motors M.D 71B, M.D 90B



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Rexroth Linear Modules MKR 25-110 with Sealing Strip
Performance Data

Horizontal operation, performance data

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	5	7	9		8	16	24	32	40	20	60	100	140	180
Acceleration time t_h	**(ms)**	90	102	113	125		100	130	160	190	220	140	220	300	379	459
Acceleration distance s_h	**(mm)**	224	254	284	314		211	274	336	399	462	147	231	315	399	483
Acceleration a	**(m/s²)**	55.8	49.3	44.1	39.9		42.0	32.3	26.3	22.1	19.1	15.0	9.6	7.0	5.5	4.6
Speed v	**(m/s)**	5.00					4.20					2.10				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	10	20	30	40	50	10	30	50	90	130	50	100	150	200	250
Acceleration time t_h	**(ms)**	131	166	200	235	270	161	205	250	339	428	388	459	530	601	672
Acceleration distance s_h	**(mm)**	261	331	401	470	540	201	257	313	424	536	291	344	397	451	504
Acceleration a	**(m/s²)**	30.5	24.1	19.9	17.0	14.8	15.6	12.2	10.0	7.4	5.9	3.9	3.3	2.8	2.5	2.2
Speed v	**(m/s)**	4.00					2.50					1.50				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

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Vertical operation, performance data (frame stationary, traveling carriage)

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	5	7	9		6	10	18	26	34	20	30	40	50	60
Acceleration time t_h	**(ms)**	100	116	133	152		98	119	165	220	288	175	228	298	395	538
Acceleration distance s_h	**(mm)**	250	290	333	379		196	237	330	440	575	175	227	297	394	537
Acceleration a	**(m/s^2)**	50.1	43.1	37.5	33.0		40.7	33.7	24.2	18.1	13.9	11.4	8.8	6.7	5.1	3.7
Speed v	**(m/s)**			5.00					4.00					2.00		
Reproducibility ±	**(mm)**			0.1					0.1					0.1		

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	6	12	18	24	5	10	20	30	40	20	30	40	50	60
Acceleration time t_h	**(ms)**	115	130	162	199	241	179	202	259	332	429	364	432	521	646	830
Acceleration distance s_h	**(mm)**	230	260	325	398	481	223	253	324	415	536	218	259	312	387	498
Acceleration a	**(m/s^2)**	34.7	30.7	24.6	20.1	16.6	14.0	12.4	9.7	7.5	5.8	3.3	2.8	2.3	1.9	1.4
Speed v	**(m/s)**			4.00					2.50					1.20		
Reproducibility ±	**(mm)**			0.1					0.1					0.1		

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

Drive data without motor (i = 1)

Drive wheel diameter	92.2 mm
Speed with sealing strip	up to 5 m/s
Mass moment of inertia (short carriage)	(77.05 + L (mm) · 0.0123) · 10^{-4} kgm^2
Mass moment of inertia (long carriage)	(146.35 + L (mm) · 0.0123) · 10^{-4} kgm^2

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Rexroth Linear Modules MKR 35-165
Components and Ordering

Part number 1140-360-00, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)	
				L_T	
			Journal for motor	Reduction i = 1 [1] | i = 1 [2] | i = 6 | i = 12	L_T = 400 mm
without drive unit (OA)	OA01 (11.34.00)	01		50	
with drive unit (MA), w/o gear reducer, i = 1	MA01 (11.34.10)	01	right	01 03	
	MA02 (11.34.10)	01	left	01 03	05
	MA03 (11.34.60)	01	both sides	02 04	
with gear reducer (MG) MG01 MG02	MG01 and MG02 (11.34.50)	01	Gear reducer with socket	10 11	

[1] without keyway
[2] with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1140-360-00, 2360 mm		Linear Module MKR 35-165, length = 2360 mm
Type	= MG01	with gear reducer, mounted as in diagram MG01 (gear reducer right)
Guideway	= 01	ball rail system
Drive unit	= 11	gear reducer with reduction i = 12
Carriage	= 05	carriage with length L_T = 400 mm
Motor attachment	= 02	for motor MKD 90B-047, i = 12
Motor	= 13	motor MKD 90B-047
1st switch	= 15-R + 800 mm	mechanical switch, switch activation point: right + 800 mm
2nd switch	= 11-R – 700 mm	PNP NC, switch activation point: right – 700 mm
3rd switch	= 15-R – 800 mm	mechanical switch, switch activation point: right – 800 mm
Cable duct	= 20, 1500 mm	cable duct 1500 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 01	standard report

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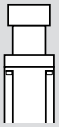
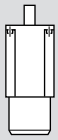
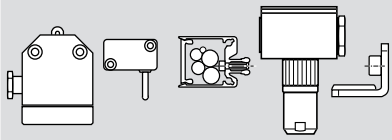
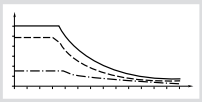
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = (..)			Motor = (..)		1st, 2nd + 3rd switch = (..– .± ....) mm	Documentation = (..)	
							
Reduction (i)	**Mount[3)]**	**for motor**			**Cable duct = (.., ...) mm** **Socket-plug = (..)** **Switching cam = (..)**	**Standard report**	**Measure-ment report**
	(00)		(00)		**without switch without cable duct** (00)		
	(00)		(00)		**External switch:** **PNP NC** (11 – . ±....) mm **PNP NO** (13 – . ±....) mm **Mechanical** (15 – . ±....) mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance	(01)	(02) Friction moment
i = 6	(01)	**MKD 90B**	(13)		**Cable duct (loose)** (20,....) mm Length		(05) Positioning accuracy
		MHD 90B	(63)		**External socket-plug (loose)** (17)		
i = 12	(02)	**MKD 90B**	(13)		**Switching cam on one side** (16) **Switching cam on both sides** (26)		
		MHD 90B	(63)				

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

MKR

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

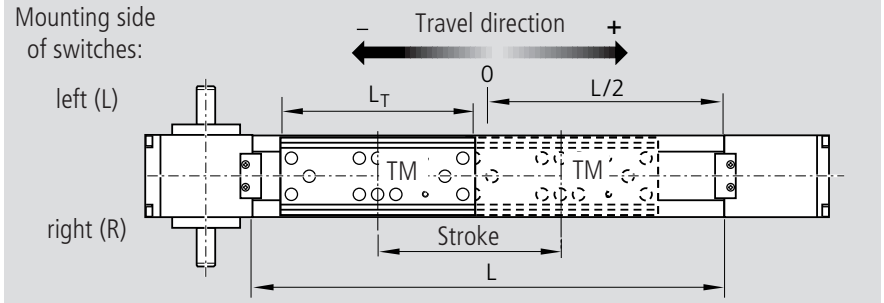
L = (stroke + 2 x excess travel) + L_T + 40 mm

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

Example:
Switch activation point 1st switch = +800 mm
Switch activation point 3rd switch = –800 mm
Stroke = 1600 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.

Example:
Horizontal operation with motor MKD 90B, i = 12, m = 300 kg: s_h = 248 mm
Excess travel > 248 (250 mm assumed)



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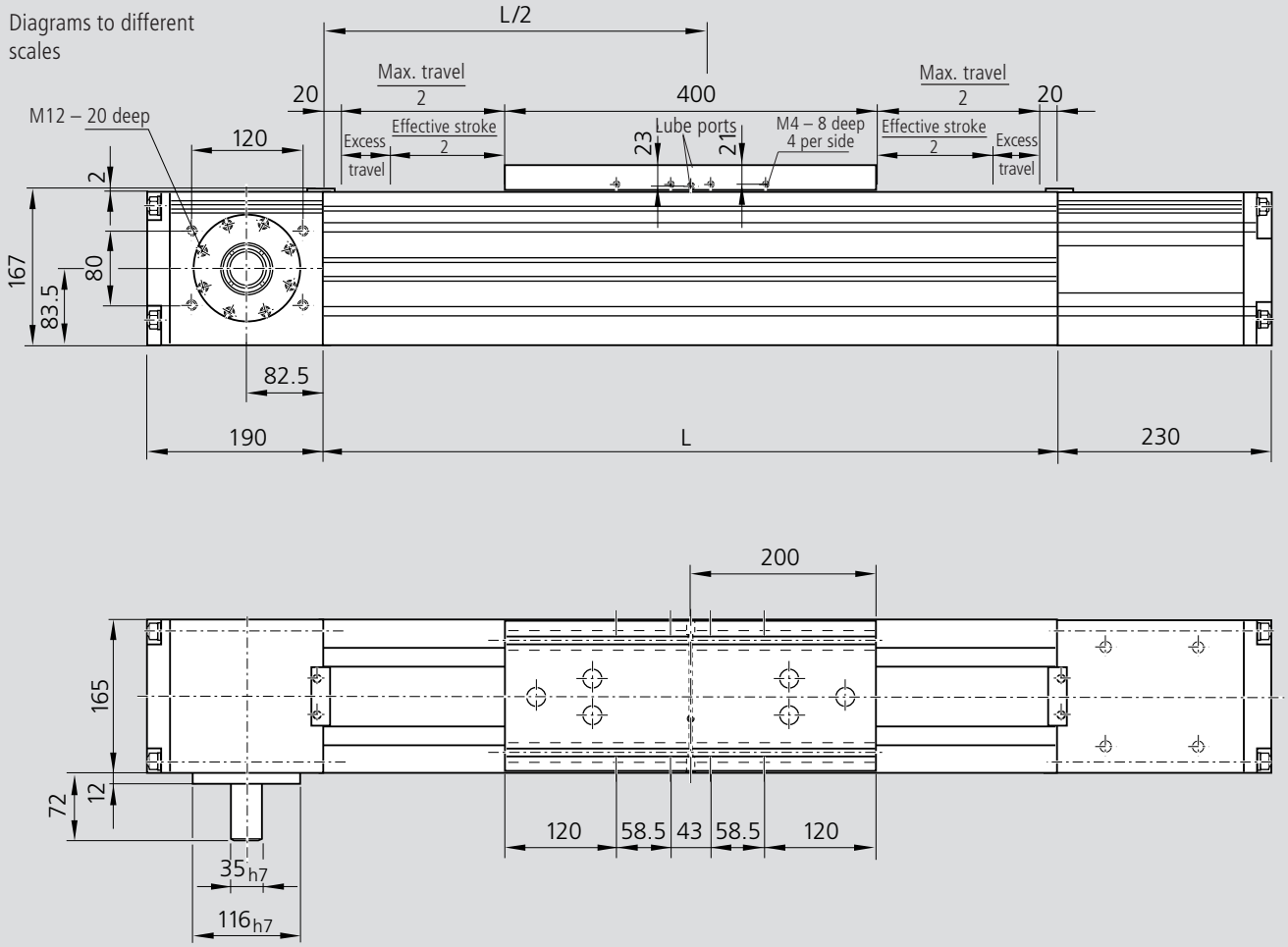
Rexroth Linear Modules MKR 35-165
Dimension Drawings

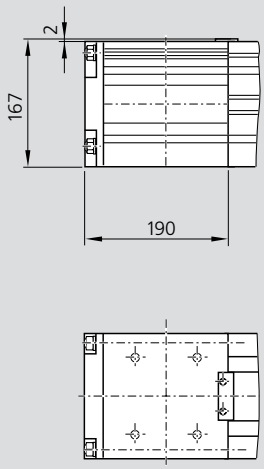
All dimensions in mm

Diagrams to different scales



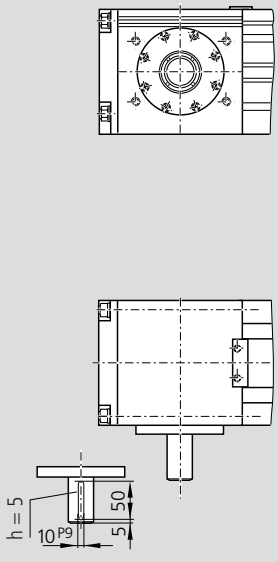
11.34.00

Type OA01



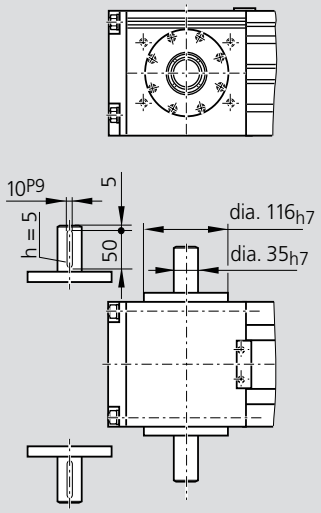
11.34.10

Type MA01 and MA02



11.34.60

Type MA03



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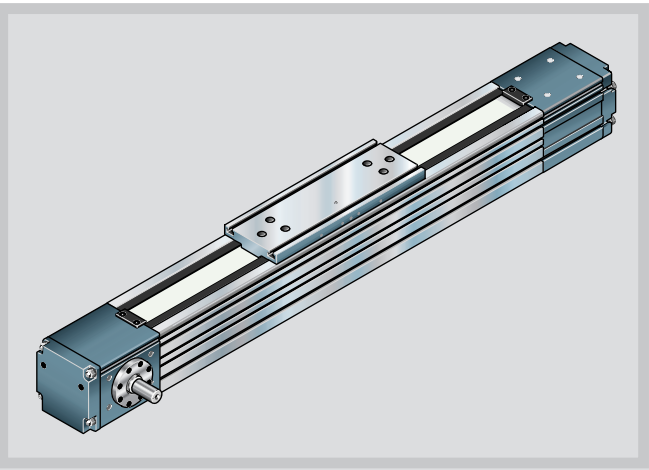
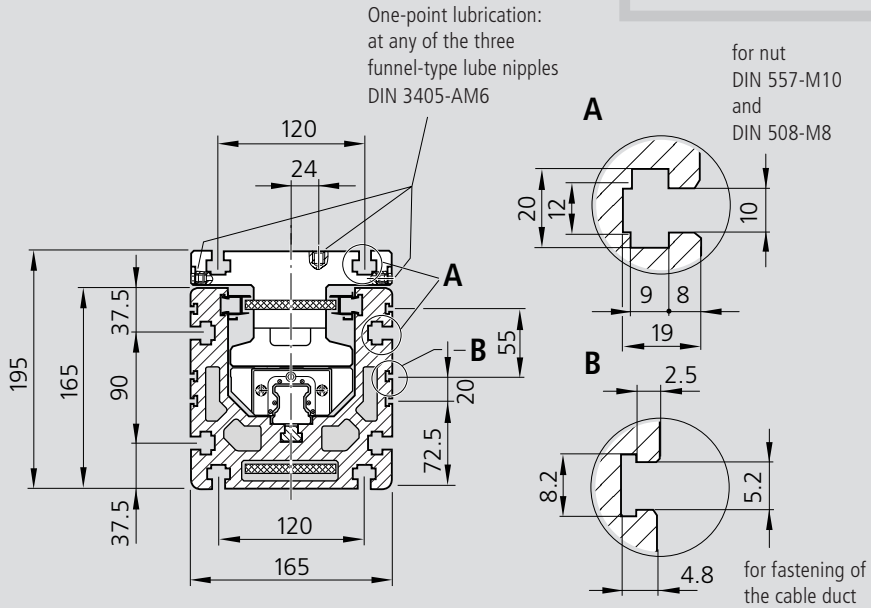
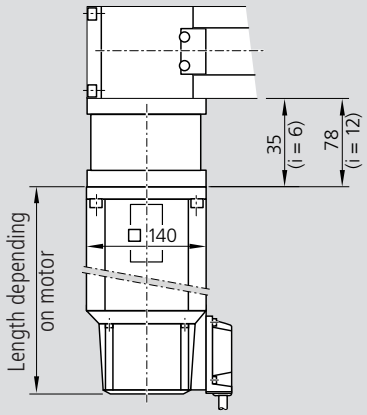




For more information, see section on “Motors”.

11.34.50

Type MG01 and MG02 with servo motors M.. 90.



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Rexroth Linear Modules MKR 35-165

Performance Data

Horizontal operation, performance data

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 6							i = 12						
Mass	**(kg)**	20	40	60	80	100	140	180	120	200	280	360	440	600	800
Acceleration time t_h	**(ms)**	256	322	388	454	520	652	784	195	250	305	359	414	524	660
Acceleration distance s_h	**(mm)**	391	492	593	694	795	997	1198	149	191	233	275	316	400	504
Acceleration a	**(m/s^2)**	11.9	9.5	7.9	6.7	5.9	4.7	3.9	7.8	6.1	5	4.3	3.7	2.9	2.3
Speed v	**(m/s)**	3.06							1.53						
Reproducibility ±	**(mm)**	0.1							0.1						

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories". The data given here does not include any assessment of the effective moments for the motor and controller.

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Vertical operation, performance data

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 12								
Mass	**(kg)**	5	10	15	20	25	30	35	40	45
Acceleration time t_h	**(ms)**	130	137	145	152	161	170	179	189	199
Acceleration distance s_h	**(mm)**	99	105	110	117	123	130	137	144	152
Acceleration a	**(m/s^2)**	11.8	11.1	10.6	10	9.5	9	8.5	8.1	7.7
Speed v	**(m/s)**	1.53								
Reproducibility ±	**(mm)**	0.1								

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

Drive data without motor (i = 1)

Drive wheel diameter	140.05 mm
Speed	up to 5 m/s
Mass moment of inertia	$(743 + L \cdot 0.07797) \cdot 10^{-4}$ kgm^2

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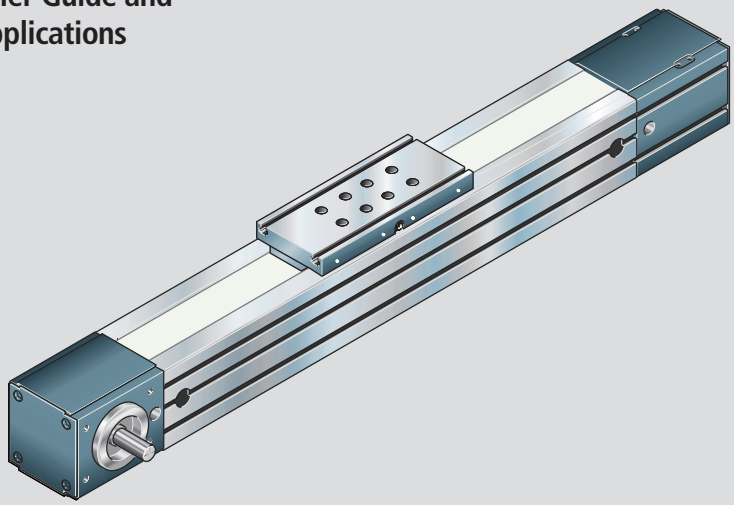
Rexroth Linear Modules MLR
Structure and Technical Data

MLR...: Linear Modules with Cam Roller Guide and Toothed Belt Drive for high speed applications (up to 10 m/s)

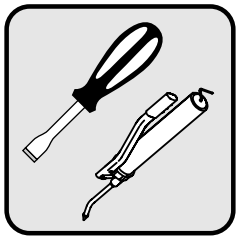
⚠ Linear Modules with Cam Roller Guide to be lubricated with **oil only**!



The MLR... Linear Modules comprise:

- a compact, anodized aluminum frame
- the integral Rexroth Cam Roller Guide system with internal cam rollers
- cam rollers, clearance-free adjusted via eccentric shafts
- a carriage with one-point oil lubrication for all cam rollers
- the pre-tensioned toothed belt
- mountable switches
- an AC servo motor with control units
- gear unit
- a cover provided by the toothed belt

For mounting, startup and maintenance, see MKR / MLR Instructions.



General technical data

Linear Module	Carriage length (mm)	Dynamic load capacities* C_x (N)	C_y (N)	Dynamic moments* M_t (Nm)	M_L (Nm)	Maximum permissible loads Forces $F_{x.max}$ (N)	$F_{y.max}$ (N)	Moments $M_{t.max}$ (Nm)	$M_{l.max}$ (Nm)	Moved mass (kg)	Minimum length L_{min} (mm)	Maximum length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	I_y (cm^4)
MLR 10-80	190	17 150	10 050	226	316	2500	1500	35	158	1.7	480	10000	128	201
MLR 10-110	305	31 000	18 200	629	1121	8000	4800	49	302	3.3	605	10000	479	692

* Dynamic load capacities and moments for calculating the service life

Modulus of elasticity E

E = 70,000 N/mm²

Lengths in excess of L_{max}

Lengths in excess of L_{max} are available upon request.

Mass

Mass calculation does not include motor or switch attachments.

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

Linear Module	Carriage length (mm)	Drive units	Mass (kg)
MLR 10-80	190	without drive unit	0.0089 · L + 4.4
		drive i = 1	0.0089 · L + 4.9
		with LP gear reducer	0.0089 · L + 8.3
MLR 10-110	305	without drive unit	0.0141 · L + 9.7
		drive i = 1	0.0141 · L + 10.1
		with LP gear reducer	0.0141 · L + 16.9

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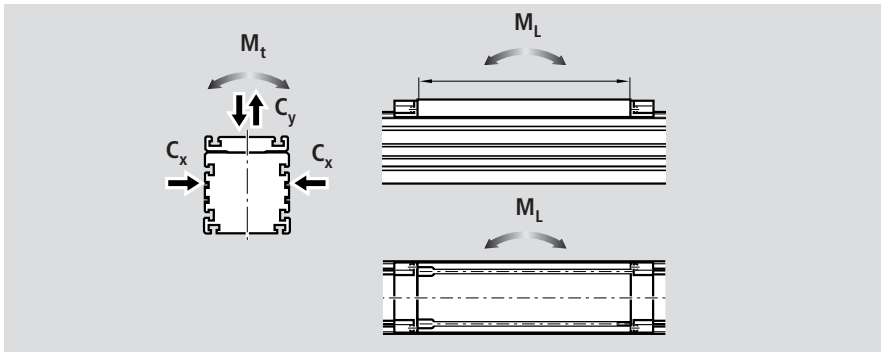
Drive data

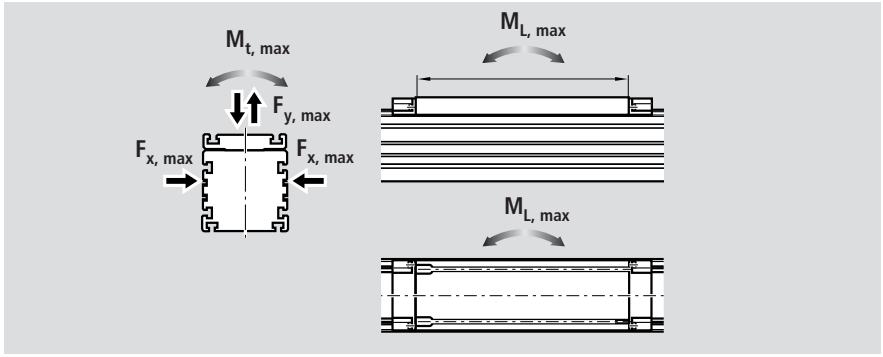
Linear Module	Gearing reduction i	Maximum drive torque M_a (Nm)	Lead constant (mm/rev)	Belt data					
				Belt type	Width (mm)	Tooth pitch (mm)	Max. force transmitted by belt (N)	Limit of belt elasticity (N)	Specific spring constant (N)
MLR 10-80	1	32.0	205.05	ATL 5	50	5	980	4200	$1.05 \cdot 10^6$
	1 with keyway	27.0	205.05						
	3	10.7	68.35						
	5	6.4	41.01						
	10	3.2	20.51						
MLR 10-110	1	80.0	289.60	AT 10	50	10	1740	7500	$2.12 \cdot 10^6$
	1 with keyway	27.0	289.60						
	3	26.7	96.53						
	5	16.0	57.92						
	10	8.0	28.96						

Note 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 values **C, M_t** and **M_L** from the table by 1.26.



Maximum permissible loads



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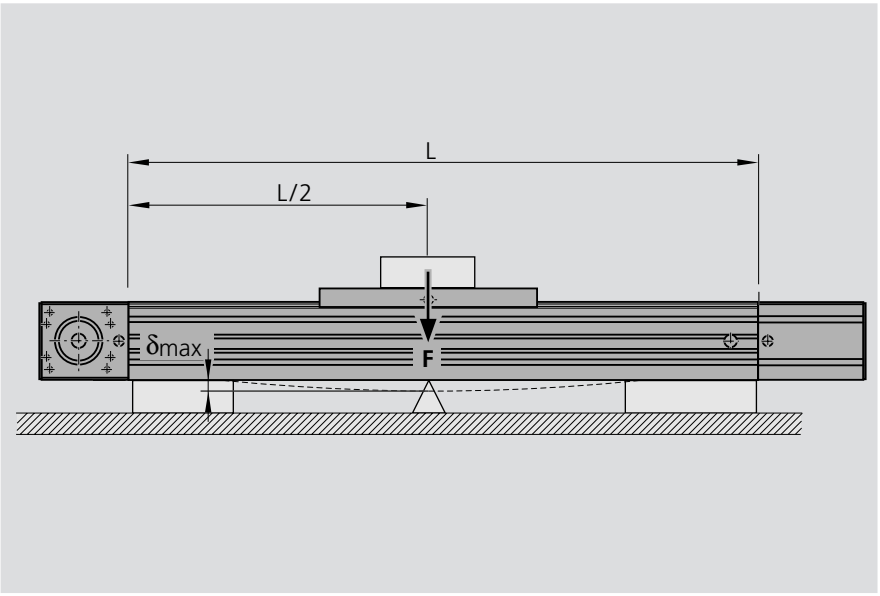
Rexroth Linear Modules MLR
Technical Data

Deflection

A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.



Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F.

⚠ δ_{max} may not be exceeded!

For applications requiring high system dynamics, support should be provided at every 300 to 600 mm.

Example

Linear Module MLR 10-80:	L = 3000 mm
	F = 500 N
From graph 10-80:	δ = 0.9 mm
	δ_{max} = 3.4 mm

The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.

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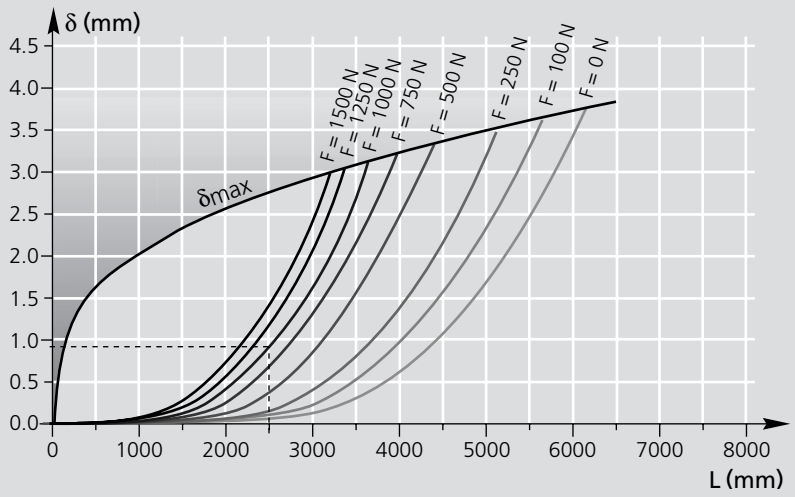
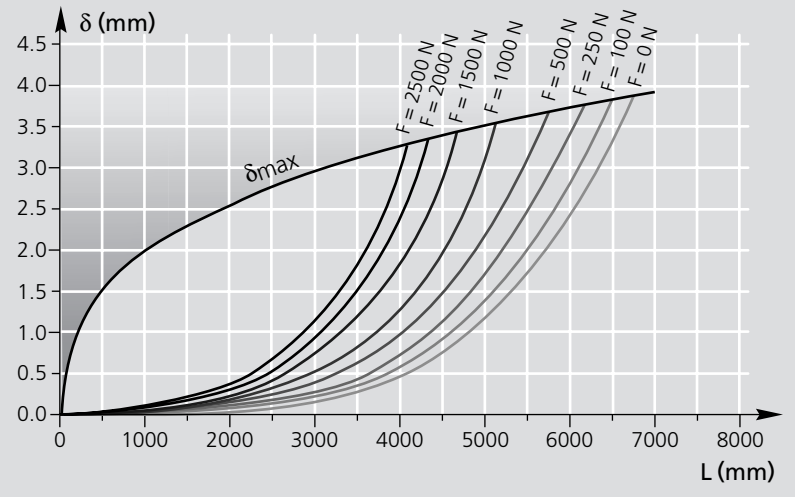
The graph applies in the following conditions:

- ends firmly clamped (200 to 250 mm on each side)
- 6 to 8 screws on each side
- fixed base

MLR 10-80



MLR 10-110



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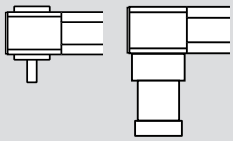
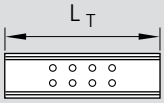
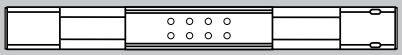
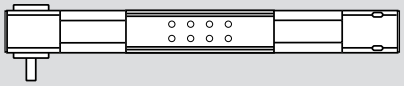
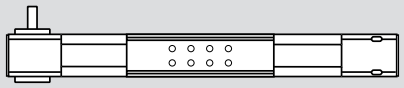
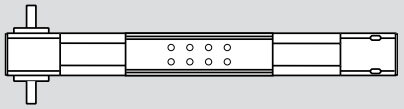
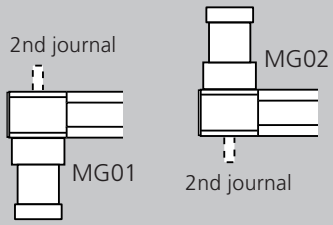
Rexroth Linear Modules MLR 10-80
Components and Ordering

Part number 1148-160-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)
				

			Journal for motor	Reduction i = 1 [1]	Reduction i = 1 [2]	Reduction i = 3	Reduction i = 5	Reduction i = 10	L_T = 190 mm
without drive unit (OA) 	OA01 (11.14.00)	01	without				50		01
with drive unit (MA), w/o gear reducer, i = 1 	MA01 (11.14.10)	01	right	01	03				01
	MA02 (11.14.10)	01	left	01	03				
	MA03 (11.14.12)	01	both sides	02	04				
with gear unit (MG) 	MG01 and MG02 (11.14.20) (11.14.22) (11.14.24)	01	Gear unit w/o 2nd journal					10	01
			Gear unit with 2nd journal					11	

[1] without keyway
[2] with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1148-160-10, 2250 mm		Linear Module MLR 10-80, length 2250 mm
Type	= MG01	with gear reducer, mounted as in diagram MG01 (gear reducer right)
Guideway	= 01	cam roller guide
Drive unit	= 10	end block for attachment of gear unit, without 2nd journal
Carriage	= 01	carriage with length L_T = 190 mm
Motor attachment	= 10	for motor MKD 41B, i = 5
Motor	= 10	motor MKD 41B
1st switch	= 15-R + 750 mm	mechanical switch, switch activation point: right + 750 mm
2nd switch	= 11-R – 650 mm	PNP NC, switch activation point: right – 650 mm
3rd switch	= 15-R – 750 mm	mechanical switch, switch activation point: right – 750 mm
Cable duct	= 20, 1500 mm	cable duct 1500 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation on right side
Documentation	= 02	measurement report: friction moment

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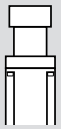
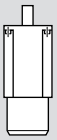
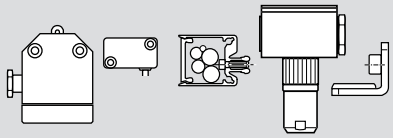
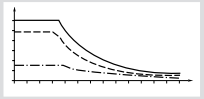
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = (..)				Motor = (..) [4]		1st, 2nd + 3rd switch = (..– .± ....) mm	Documentation = (..)	
								
Mount [3] for motor	Gear unit i = 3	i = 5	i = 10			Cable duct = .., ... mm Socket-plug = .. Switching cam = ..	Standard report	Measurement report
(00)					(00)	without switch without cable duct (00)	(01)	(02) Friction moment
(00)					(00)	External switch: PNP NC (11 – . ±....) mm PNP NO (13 – . ±....) mm Mechanical (15 – . ±....) mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance		
MKD 41B (01)	(10)	(20)	without	(00)	Cable duct (loose) (20,....) mm Length		(05) Positioning accuracy	
			MKD 41B	(10)				
MSM 040B (02)	(11)	(21)	without	(00)	External socket-plug (loose) (17)			
			MSM 040B	(75) (74) [5]				
M.D 71B (03)	(12)	(22)	without	(00)	Switching cam on one side (16) Switching cam on both sides (26)			
			MKD 71B	(11)				
			MHD 71B	(62)				

[3] Attachment can also be supplied without motor (enter "00" for motor on order).
[4] Stepping motors on request
[5] Motor without brake

MLR

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

Calculating the Linear Module length

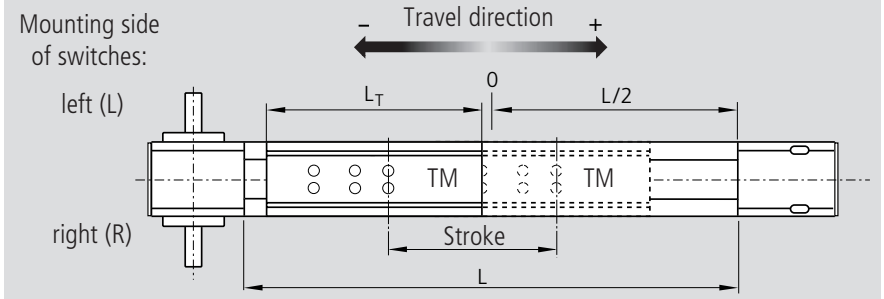
L = (stroke + 2 x excess travel) + L_T + 100 mm

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

Example:
Switch activation point 1st switch = +750 mm
Switch activation point 3rd switch = –750 mm
Stroke = 1500 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.

Example:
Horizontal operation with motor MKD 71B, i = 3, m = 12 kg: s_h = 430 mm
Excess travel > 430 (440 mm assumed)



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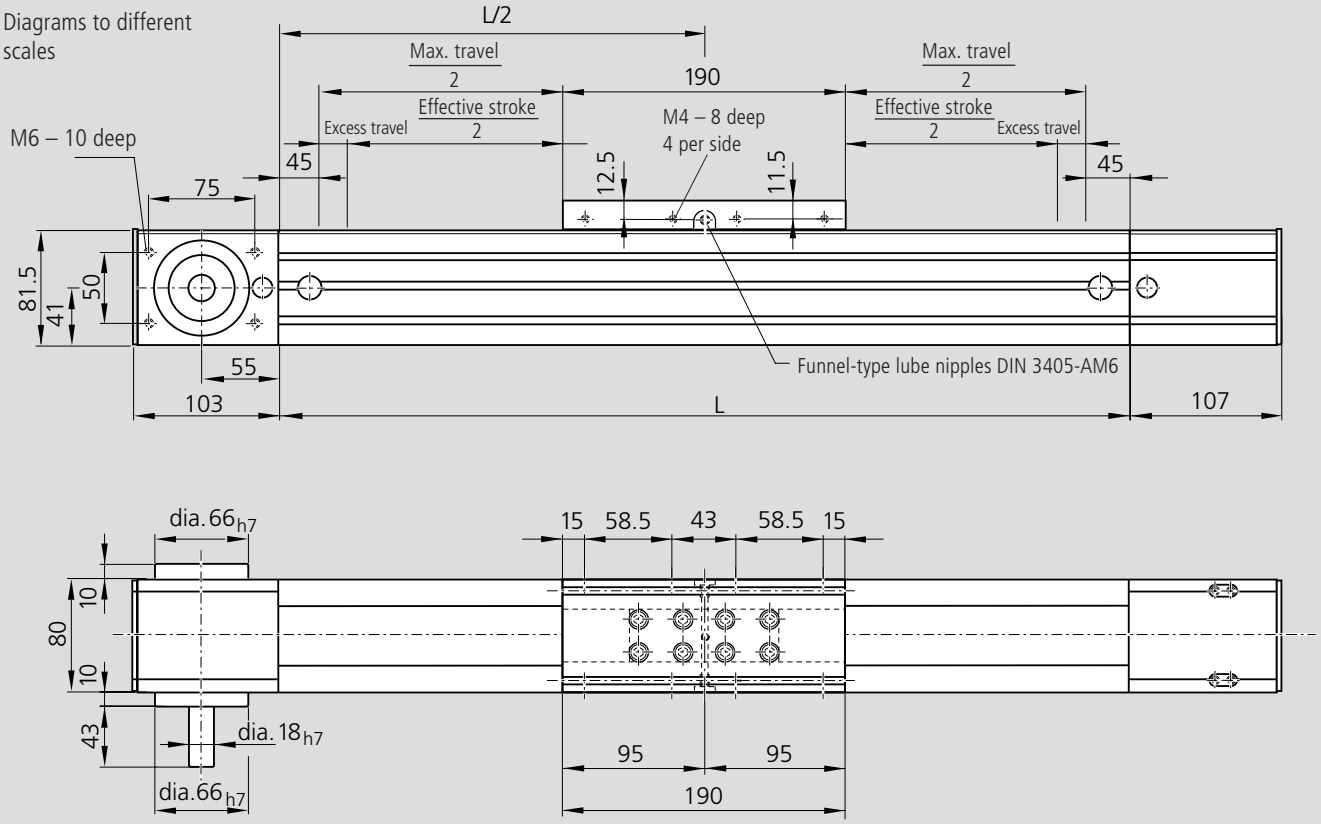
Rexroth Linear Modules MLR 10-80
Dimension Drawings

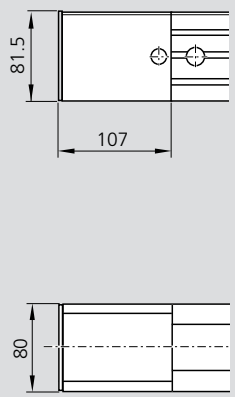
All dimensions in mm

Diagrams to different scales



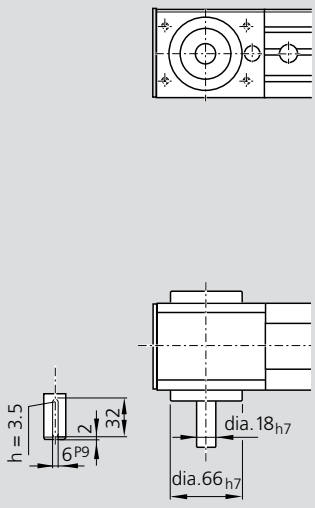
11.14.00

Type OA01



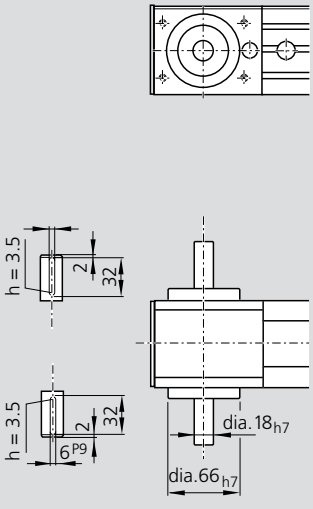
11.14.10

Type MA01 and MA02



11.14.12

Type MA03



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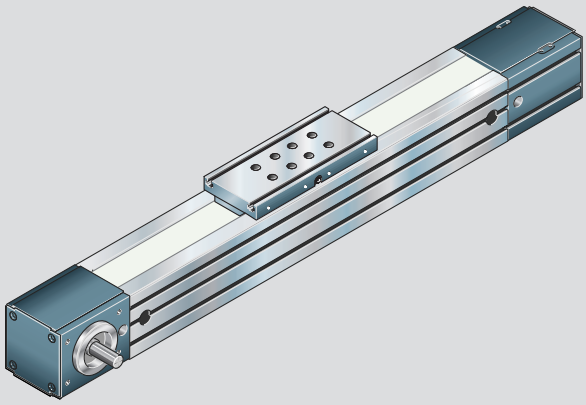
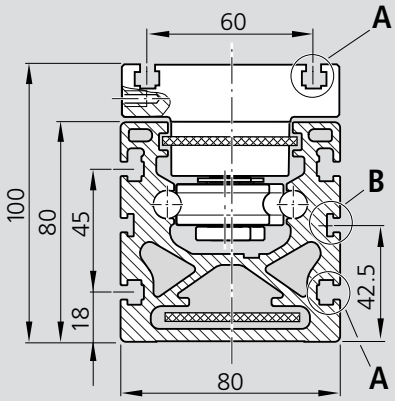
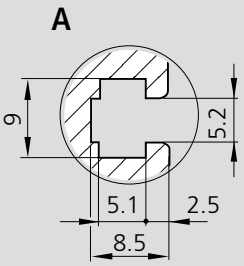
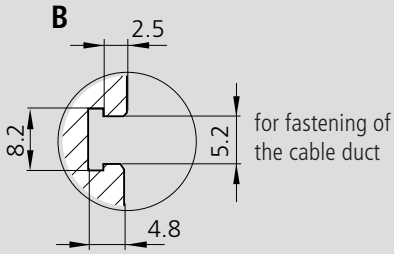


One-point lubrication at one of the two funnel-type lube nipples DV1-M6, use oil with a viscosity of 500 mm²/s at 40°C!





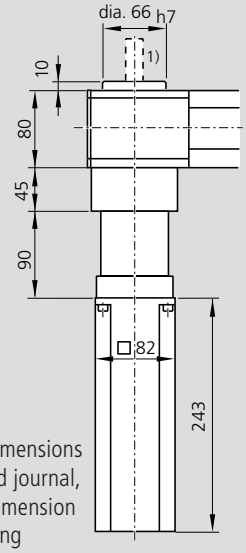


MLR

For more information, see section on "Motors".

11.14.20

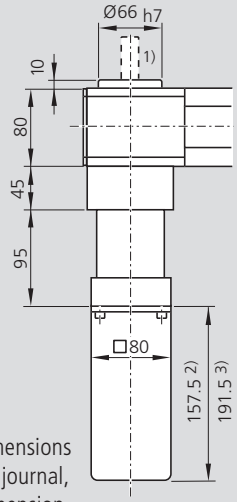
Type MG01 and MG02
Servo motor MKD 41



1) For dimensions of 2nd journal, see dimension drawing **11.14.12**

11.14.22

Type MG01 and MG02
Motor MSM 040B

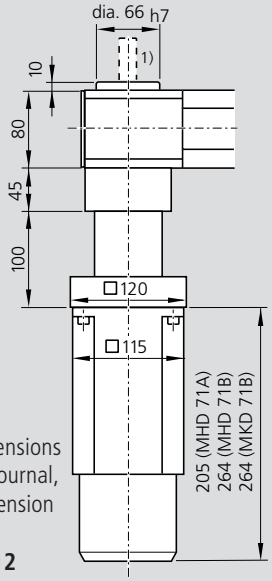


1) For dimensions of 2nd journal, see dimension drawing **11.14.12**

2) without brake
3) with brake

11.14.24

Type MG01 and MG02
Servo motors M.. 71.



1) For dimensions of 2nd journal, see dimension drawing **11.14.12**

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Rexroth Linear Modules MLR 10-80
Performance Data

Horizontal operation, performance data

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	4	8	12	16	20	10	20	30	50	70	25	50	75	100	125
Acceleration time t_h	**(ms)**	110	142	174	205	237	145	191	237	329	421	251	314	376	438	501
Acceleration distance s_h	**(mm)**	273	352	430	509	587	203	267	332	461	589	187	233	280	326	372
Acceleration a	**(m/s²)**	44.9	34.9	28.5	24.1	20.9	19.4	14.7	11.8	8.5	6.7	5.9	4.7	4.0	3.4	3.0
Speed v	**(m/s)**	4.96					2.80					1.49				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	1	2	3	4		4	6	10	14	18	10	20	40	60	80
Acceleration time t_h	**(ms)**	50	58	66	74		93	108	137	167	196	143	185	270	354	438
Acceleration distance s_h	**(mm)**	125	145	165	185		209	243	309	376	442	172	222	323	423	524
Acceleration a	**(m/s²)**	99.8	86.0	75.6	67.5		48.5	41.8	32.8	27.0	22.9	16.7	12.9	8.9	6.8	5.5
Speed v	**(m/s)**	5.00					4.50					2.40				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MSM 040B and servo controller DKC xx.3-018[1)]
Supply voltage: 1 x 230 V

Gearing reduction		i = 5					i = 10							
Mass	**(kg)**	2	4	6	8	10	10	15	20	25	30	35	40	
Acceleration time t_h	**(ms)**	29	35	43	49	55	42	49	58	67	75	85	93	
Acceleration distance s_h	**(mm)**	30	36	43	49	55	21	25	30	34	38	43	47	
Acceleration a	**(m/s²)**	68	57	47	40.8	36.2	24	20.4	17.2	14.9	13.3	11.8	10.8	
Speed v	**(m/s)**	2					1							
Reproducibility ±	**(mm)**	0.1					0.1							

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

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Vertical operation, performance data (frame stationary, traveling carriage)

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	2	4	6	8	10	4	8	12	16	20	4	8	16	24	32
Acceleration time t_h	**(ms)**	101	122	145	169	195	138	172	212	259	315	222	251	327	438	615
Acceleration distance s_h	**(mm)**	250	303	359	419	483	205	256	315	384	468	165	187	243	325	457
Acceleration a	**(m/s^2)**	49.0	40.6	34.2	29.3	25.4	21.5	17.3	14.0	11.5	9.4	6.7	5.9	4.5	3.4	2.4
Speed v	**(m/s)**	4.96					2.97					1.49				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 41B-144 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	1	2	3	4		2	6	10	14	18	5	10	15	20	25
Acceleration time t_h	**(ms)**	53	62	72	82		76	113	156	205	265	140	182	234	301	389
Acceleration distance s_h	**(mm)**	132	156	180	205		156	232	319	421	543	167	217	280	360	466
Acceleration a	**(m/s^2)**	94.8	80.4	69.5	60.9		53.8	36.3	26.4	20.0	15.5	17.1	13.2	10.2	8.0	6.1
Speed v	**(m/s)**	5.00					4.10					2.39				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

Drive data without motor (i = 1)

Drive wheel diameter	65.27 mm
Max. speed	up to 10 m/s
Belt type	ATL 5, 50 mm wide, steel reinforced
Mass moment of inertia (carriage)	(21.1 + L (mm) · 0.00379) · 10^{-4} kgm^2

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Rexroth Linear Modules MLR 10-110
Components and Ordering

Part number 1148-260-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)					Carriage = (..)
			Journal for motor	Reduction i = 1 [1]	Reduction i = 1 [2]	Reduction i = 3	Reduction i = 5	Reduction i = 10	L_T = 305 mm
without drive unit (OA)	**OA01** (11.24.00)	01	without			50			05
with drive unit (MA), w/o gear reducer, i = 1	**MA01** (11.24.10)	01	right	01	03				05
	MA02 (11.24.10)	01	left	01	03				
	MA03 (11.24.12)	01	both sides	02	04				
with gear unit (MG)	**MG01** and **MG02** (11.24.20) (11.24.22)	01	Gear unit w/o 2nd journal				10		05
			Gear unit with 2nd journal				11		

2nd journal MG02 MG01 2nd journal

[1] without keyway
[2] with keyway

Order example

Ordering data		Description
Linear Module (Part number): 1148-260-10, 1525 mm		Linear Module MLR 10-110, length 1525 mm
Type	= MG01	with gear unit, mounted as in diagram MG01
Guideway	= 01	cam roller guide
Drive unit	= 10	end block for attachment of gear unit, without 2nd journal
Carriage	= 05	carriage with length L_T = 305 mm
Motor attachment	= 01	for motor M . D 71., i = 3
Motor	= 11	motor MKD 71B-061
1st switch	= 15-R + 400 mm	mechanical switch, switch activation point: right + 400 mm
2nd switch	= 11-R – 300 mm	PNP NC, switch activation point: right – 300 mm
3rd switch	= 15-R – 400 mm	mechanical switch, switch activation point: right – 400 mm
Cable duct	= 20, 1200 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation on right side
Documentation	= 02	measurement report: friction moment

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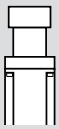
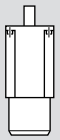
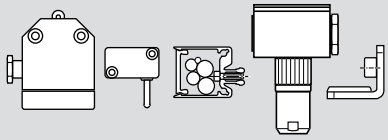
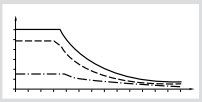
Please check whether the selected combination is a permissible one (load capacities, moments, maximum speeds, motor data, etc.)!

Motor attachment = (..)				Motor = (..) [4]		1st, 2nd + 3rd switch = (..– .± ....) mm	Documentation = (..)	
								
Mount [3] for motor	Gear unit i = 3	i = 5	i = 10			Cable duct = .., ... mm Socket-plug = .. Switching cam = ..	Standard report	Measurement report
(00)					(00)	without switch without cable duct (00)		
(00)					(00)	External switch: PNP NC (11 – . ±....) mm PNP NO (13 – . ±....) mm Mechanical (15 – . ±....) mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance	(01)	(02) Friction moment
						Cable duct (loose) (20,....) mm Length		(05) Positioning accuracy
M.D 71B	(01)	(10)	(20)	without	(00)	External socket-plug (loose) (17)		
				MKD 71B	(11)			
				MHD 71B	(62)			
M.D 90B	(02)	(11)	(21)	without	(00)	Switching cam on one side (16) Switching cam on both sides (26)		
				MKD 90B	(13)			
				MHD 90B	(63)			

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

[4] Stepping motors on request

Determining the switch activation point

The switch activation point is to be taken from the data given on mounting side, travel direction and switching distance (see table above and order example on left).

Mounting side: The switches can be fitted on the left (L) or right (R) side of the module.

Travel direction: The switches can be fitted on the minus (–) or plus (+) side of zero.

Switching distance: The switching distance is the distance between the carriage center (TM) and the zero point (0) when a switch is activated (given in mm).

For more details on switch mounting and switch types, see "Switch Mounting Arrangements".

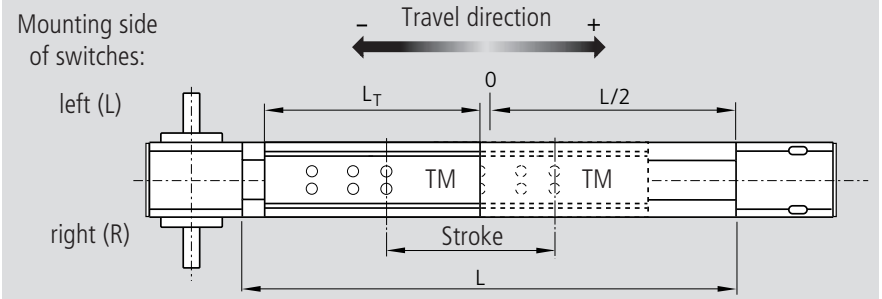
Calculating the Linear Module length

L = (stroke + 2 x excess travel) + L_T + 70 mm
Stroke = maximum distance from carriage center to the outermost switch activation points.

Example:
Switch activation point 1st switch = +400 mm
Switch activation point 3rd switch = –400 mm
Stroke = 800 mm

The excess travel must be greater than the braking distance. The acceleration distance s_h (see "Performance Data" tables) may be taken as a guideline for the braking distance.

Example:
Horizontal operation with motor MKD 71B, i = 3, m = 7 kg: s_h = 284 mm
Excess travel > 284 (290 mm assumed)



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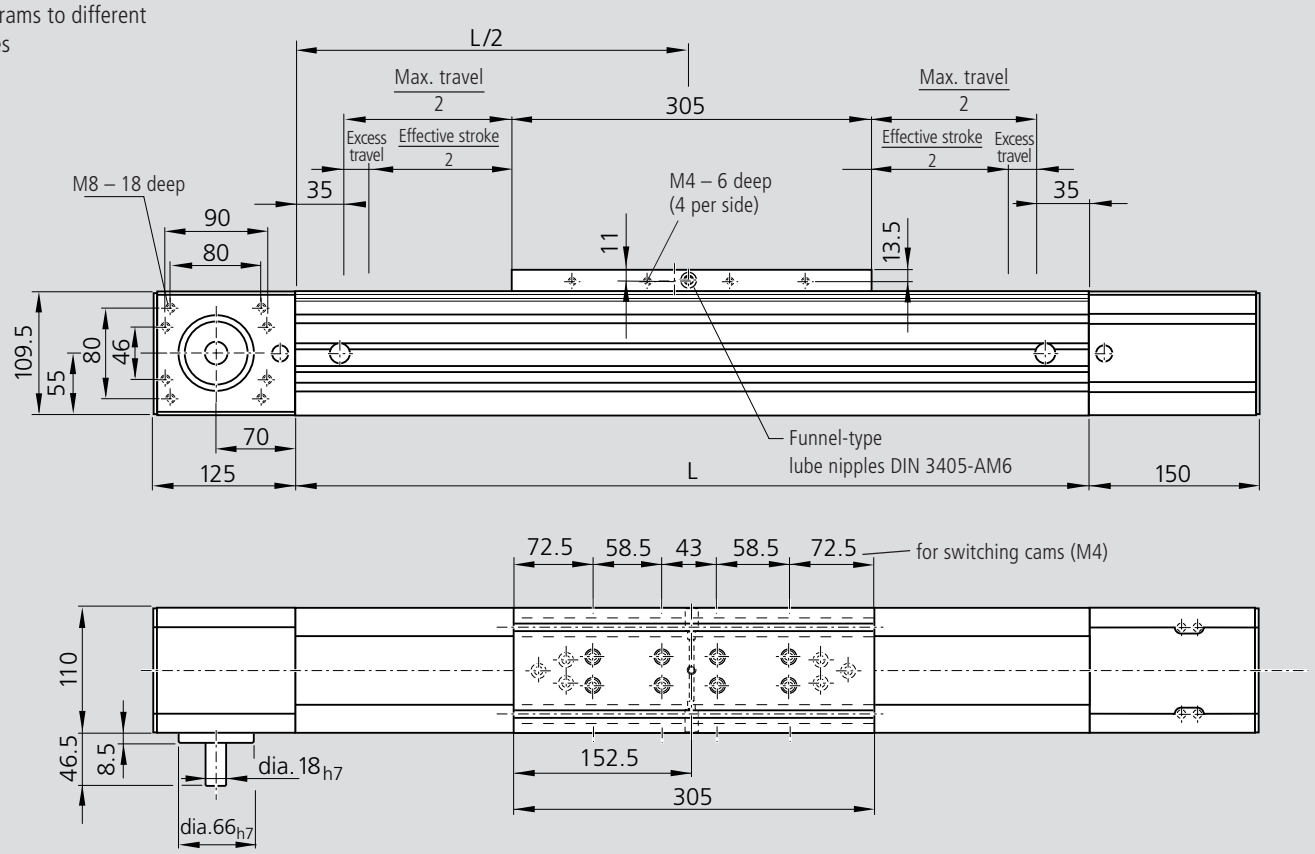
Rexroth Linear Modules MLR 10-110

Dimension Drawings

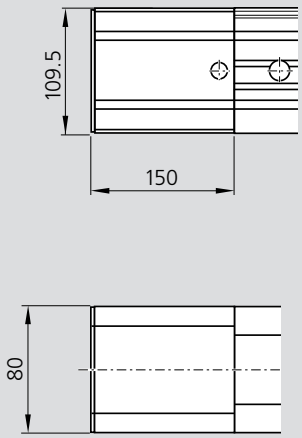
All dimensions in mm

Diagrams to different scales



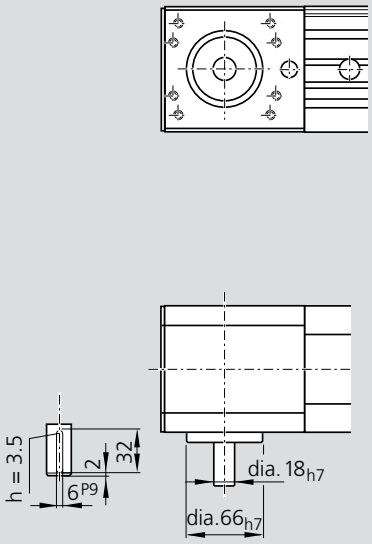
11.24.00

Type OA01



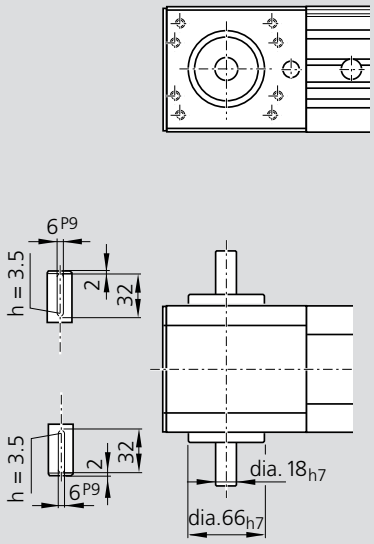
11.24.10

Type MA01 and MA02



11.24.12

Type MA03



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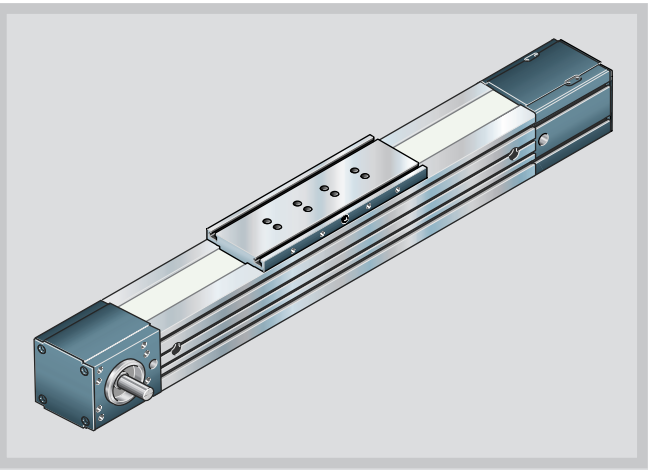
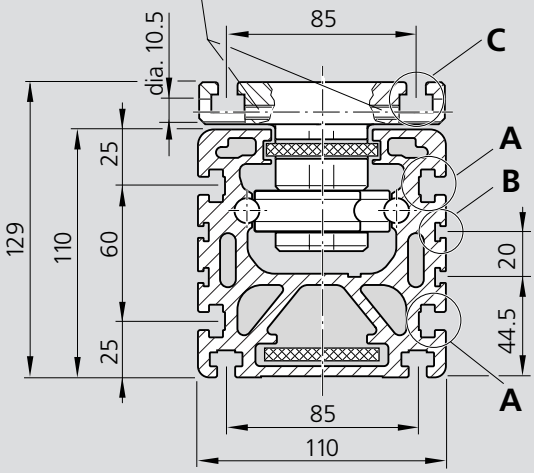
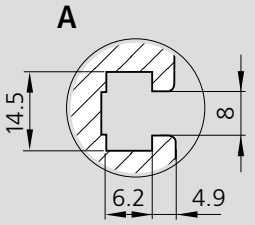
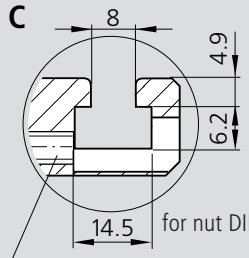


One-point lubrication at one of the two funnel-type lube nipples DV1-M6 (behind T-slots), use oil with a viscosity of 500 mm²/s at 40°C!



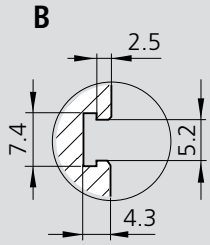


for nut DIN 508-M6



for nut DIN 508-M6

Funnel-type lube nipples DV1-M6

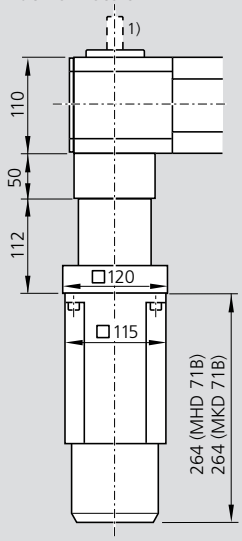


for fastening of the cable duct

For more information, see section on "Motors".

11.24.20

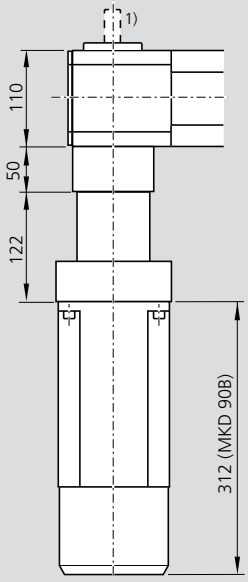
Type MG01 and MG02
Servo motors M.. 71.



1) For dimensions of 2nd journal, see dimension drawing **11.24.12**

11.24.22

Type MG03 and MG04
Servo motor MKD 90



1) For dimensions of 2nd journal, see dimension drawing **11.24.12**

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Rexroth Linear Modules MLR 10-110
Performance Data

Horizontal operation, performance data

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	5	7	9		8	16	24	32	40	20	60	100	140	180
Acceleration time t_h	**(ms)**	90	102	113	125		100	130	160	190	220	140	220	300	379	459
Acceleration distance s_h	**(mm)**	224	254	284	314		211	274	336	399	462	147	231	315	399	483
Acceleration a	**(m/s²)**	55.8	49.3	44.1	39.9		42.0	32.3	26.3	22.1	19.1	15.0	9.6	7.0	5.5	4.6
Speed v	**(m/s)**	5.00					4.20					2.10				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	10	20	30	40	50	10	30	50	90	130	50	100	150	200	250
Acceleration time t_h	**(ms)**	131	166	200	235	270	161	205	250	339	428	388	459	530	601	672
Acceleration distance s_h	**(mm)**	261	331	401	470	540	201	257	313	424	536	291	344	397	451	504
Acceleration a	**(m/s²)**	30.5	24.1	19.9	17.0	14.8	15.6	12.2	10.0	7.4	5.9	3.9	3.3	2.8	2.5	2.2
Speed v	**(m/s)**	4.00					2.50					1.50				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

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Vertical operation, performance data (frame stationary, traveling carriage)

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	5	7	9		6	10	18	26	34	20	30	40	50	60
Acceleration time t_h	**(ms)**	100	116	133	152		98	119	165	220	288	175	228	298	395	538
Acceleration distance s_h	**(mm)**	250	290	333	379		196	237	330	440	575	175	227	297	394	537
Acceleration a	**(m/s²)**	50.1	43.1	37.5	33.0		40.7	33.7	24.2	18.1	13.9	11.4	8.8	6.7	5.1	3.7
Speed v	**(m/s)**	5.00					4.00					2.00				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

Note limited running time where v > 3 m/s.

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	**(kg)**	3	6	12	18	24	5	10	20	30	40	20	30	40	50	60
Acceleration time t_h	**(ms)**	115	130	162	199	241	179	202	259	332	429	364	432	521	646	830
Acceleration distance s_h	**(mm)**	230	260	325	398	481	223	253	324	415	536	218	259	312	387	498
Acceleration a	**(m/s²)**	34.7	30.7	24.6	20.1	16.6	14.0	12.4	9.7	7.5	5.8	3.3	2.8	2.3	1.9	1.4
Speed v	**(m/s)**	4.00					2.50					1.20				
Reproducibility ±	**(mm)**	0.1					0.1					0.1				

Note limited running time where v > 3 m/s.

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".
The data given here does not include any assessment of the effective moments for the motor and controller.

Drive data without motor (i = 1)

Drive wheel diameter	92.2 mm
Max. speed	up to 10 m/s
Belt type	AT 10, 50 mm wide, steel reinforced
Mass moment of inertia (carriage)	(146.35 + L (mm) · 0.0123) · 10^{-4} kgm²

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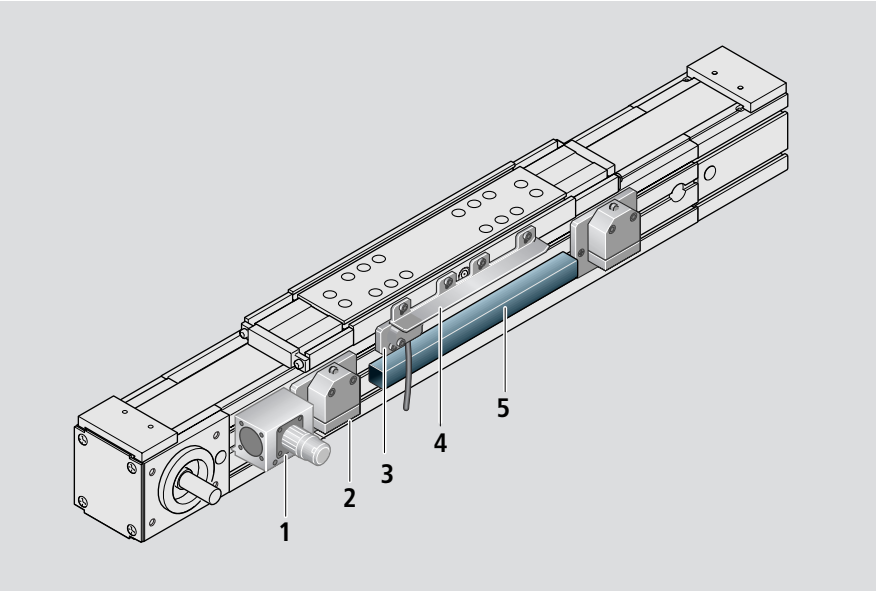
Rexroth Linear Modules

Switch Mounting Arrangements MKK, MKR, MLR

Overview of the switching system

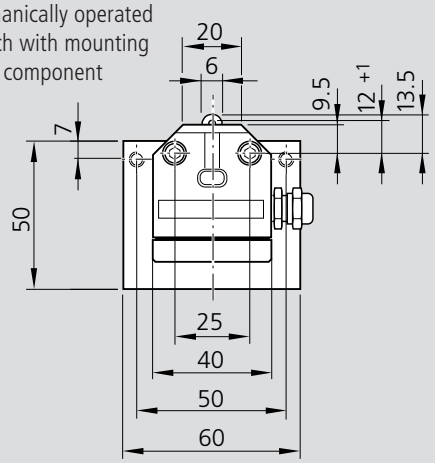
1 Socket and plug
2 Mechanical switch
(with mounting components)
3 Proximity switch
(with mounting components)
4 Switching cam
5 Cable duct (aluminum alloy)



Mechanical switch (technical data)

Reproducibility	= ± 0.05 mm
Permissible ambient temperature	= –5°C to +80°C
Enclosure	= DIN 40050 IP 67
Contact time	= < 2 ms
Insulation	= group C to VDE 0110
Rated voltage	= 250 V AC
Continuous current	= 5 A
Switching capacity at 220 V, 40–60 Hz	= cosφ = 0.8 at 2 A
Contact resistance when new	= < 240 mΩ
Connection	= screw connection
Contact system	= single-pole changeover
Switch system	= snap action

Mechanically operated switch with mounting component



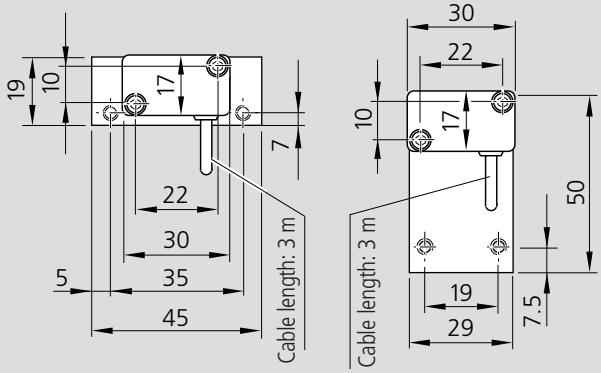
See following pages for more mounting dimensions

Proximity switch (technical data)

Miniature circuit breakers with potted cable (3 x 0.14 mm² Unitronic)	
Housing form	= NO
Minisensor	= form A DIN 41635
Voltage	= 10 to 30 V DC
Residual ripple	= ≤ 10%
Load	= 200 mA
No-load current	= ≤ 20 mA
Switching frequency	= max. 1500 Hz
Temperature-related shift in make point	= ≤ 4 µm/K
Output signal steepness	= ≥ 1 V/µs
Reproducibility of make point to EN 50008	= ≤ 0.1 mm

Proximity switch with mounting component for frame dimensions -65, -80, -165

Proximity switch with mounting component for frame dimension -110



See following pages for more mounting dimensions

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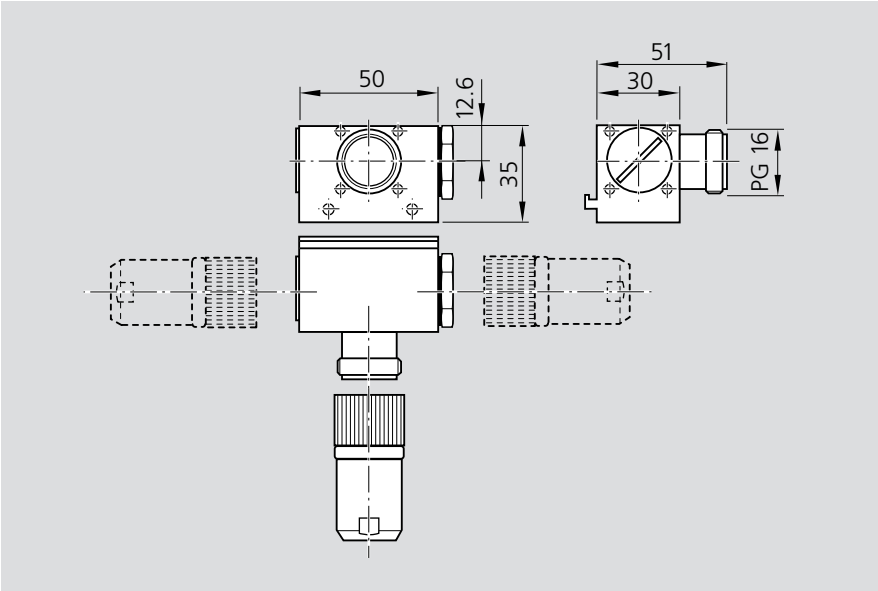
Socket and plug

- Fit the socket to the side with the most switches (see example on next page).

Socket and switch are not wired. The switch activation points can thus be optimized during start-up. A plug is provided.

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



Ordering the switches and mounting components

The part numbers are listed in the table below.
Mounting components can also be ordered individually.

Item		Frame dimension			
		-65	-80	-110	-165
1	Socket-plug	1175-001-53			
2	Mech. switch with mounting components	1175-001-51			
	Mech. switch without mounting components	8453-040-16			
3	Proximity switch				
	– Mounting components without switch	1175-001-52	1175-001-52	1175-201-52	1175-001-52
	– PNP NC	8453-040-01			
	– NPN NC	8453-040-02			
	– PNP NO	8453-040-03			
	– NPN NO	8453-040-04			
4	Switching cam	1175-001-50			
5	Cable duct	0399-800-06			

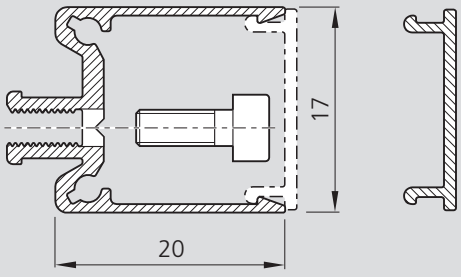
Cable duct

- The cable ducts are mounted in the lateral slots of the frame. Mounting screws widen the profile and secure the cable duct.

For the location of the slot side, see "Components and Ordering" table and "Dimension Drawings".

The cable duct takes a maximum of two cables for mechanical switches and three cables for proximity switches.

Mounting screws and grommets are provided.



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Rexroth Linear Modules
Switch Mounting Arrangements MKK, MKR, MLR

Mounting example

Switching distance: The switching distance is the distance between the table plate center (TM) and the zero point (0) when a switch is activated (given in mm).

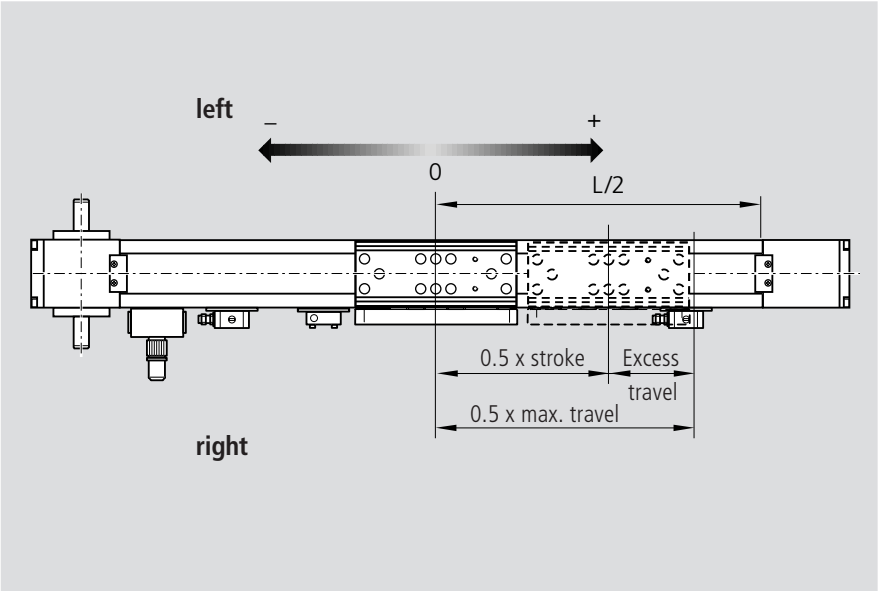
Example for a mechanical limit switch (given that zero point is L/2):

Maximum switching distance
= 0.5 x (travel max.) – excess travel
= 0.5 x stroke

For safe operation of the linear module the excess travel must be longer than the braking distance.

For MKR... and MLR...:
The acceleration distance s_h may be taken as a guideline for the braking distance.

For MKK...:
In most cases the guideline value for excess travel (braking distance) can be taken to be:
Excess travel = 2 x screw lead P.



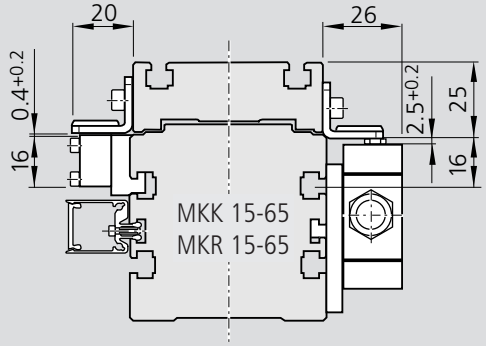
Recommended standard switch fittings:

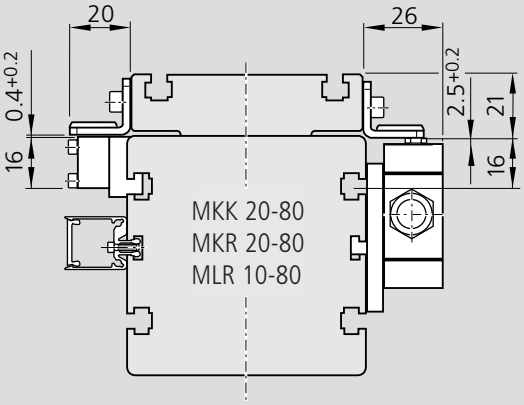
– 2 mechanical switches
– 1 proximity switch

Slide mounting plates with switches into slot and secure with two set screws.

Observe the minimum possible distance between switches (determined by mounting components:

mechanical-mechanical	=	60 mm
mechanical-proximity	=	45 mm
proximity-proximity	=	28 mm





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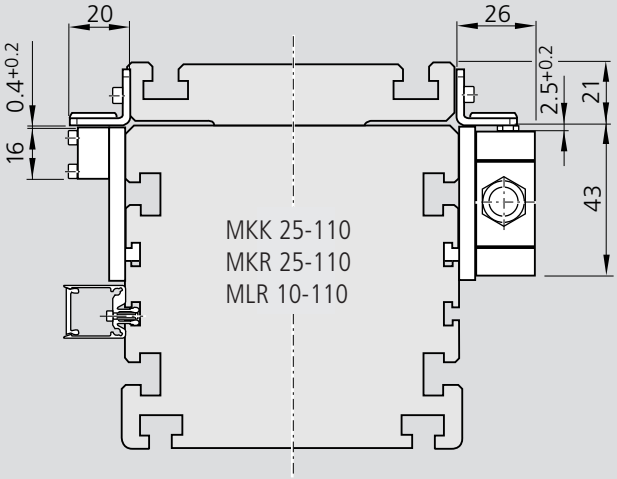

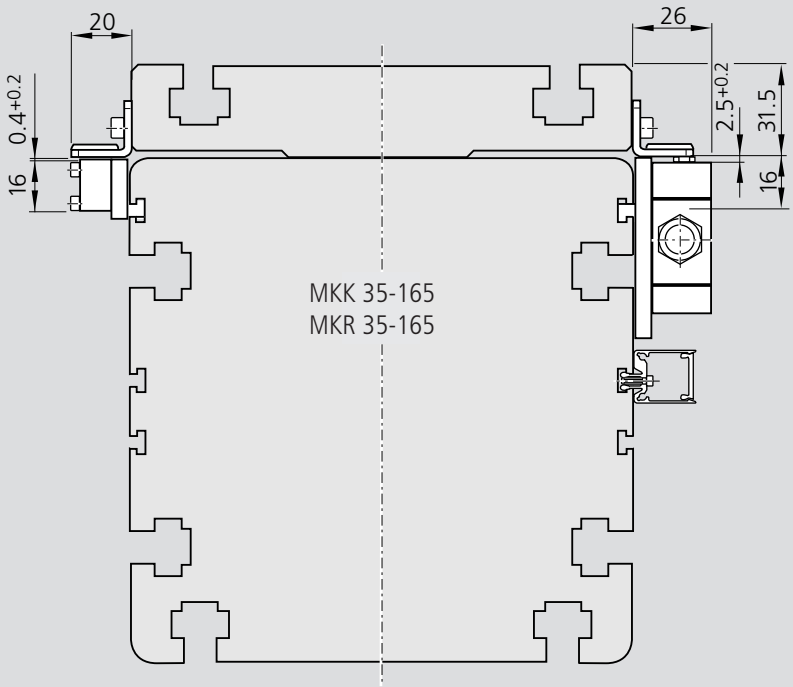

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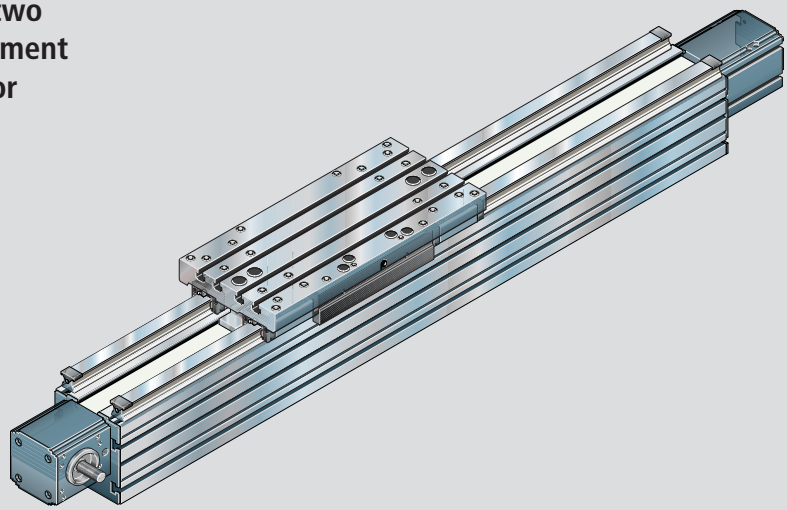
Rexroth Linear Modules MKR 25-145
Structure and Technical Data

MKR 25-145: Linear Module with two Ball Rail Systems for high load moment capacity and Toothed Belt Drive for high speeds



The Linear Module MKR 25-145 comprises:

- an anodized aluminum frame of high inherent rigidity
- two Rexroth Ball Rail Systems with sealing strips and two long runner blocks each
- a profiled aluminum carriage
- a pre-tensioned toothed belt
- integral planetary gearing in the drive sprocket
- motor mount, coupling with or without gear reducer for attachment of the motor
- an AC servo motor (other motor types on request)
- mountable switches
- control units

For maintenance, see Maintenance Instructions Linear Module MKR 25-145.

General technical data

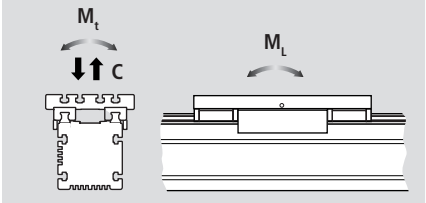
Linear Module	Carriage length (mm)	Dynamic load capacity C (N)	Dynamic moment M_t (Nm)	Dynamic moment M_L (Nm)	Moved mass (kg)	Min. length L_{min} (mm)	Max. length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	Planar moment of inertia I_y (cm^4)
MKR 25-145	400	98 700	5 700	14 600	10.6	760 *	6 000	2 790	1 955

* for a theoretical stroke of 100 mm

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

Note 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 values **C**, $\mathbf{M_t}$ and $\mathbf{M_L}$ from the table by 1.26.



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Drive data

Linear Module	Gearing reduction i	Maximum drive torque M_a (Nm)	Lead constant (mm/rev)	Drive wheel diameter (mm)	Belt data: Belt type	Width (mm)	Tooth pitch (mm)	Max. force transmitted by belt (N)	Limit of belt elasticity (N)	Specific spring constant (N)
MKR 25-145	1	80.0	289.60	92.2	AT 10	50	10	1740	7500	$2.12 \cdot 10^6$
	1*	27.0	205.05							
	3	26.6	96.60							
	5	16.0	57.92							
	10	8.0	28.96							

* with keyway

Nominal service life of the ball rail systems

Nominal service life in meters:

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

Nominal service life in hours:

$$L_{10h} = \frac{L_{10}}{60 \cdot v}$$

L_{10} = Nominal service life in meters (m)
L_{10h} = Nominal service life in hours (h)
C = Dynamic load capacity (N)
F_m = Mean equivalent dynamic load (N)
v = Speed (from graph "Permissible speed") (m/min)

Mass moment of inertia at i = 1

$$J_S = (250 + L \cdot 0.0123 + 21.25 \cdot m_{fr}) \cdot 10^{-4}$$

J_s = Mass moment of inertia System with external load (kgm^2)
m_{fr} = External load (kg)
L = Linear module length (mm)

Mass

Mass calculation does not include motor or switch attachments.

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

Linear Module	Carriage length (mm)	Drive unit	Mass (kg)
MKR 25-145	400	without drive unit	0.0306 · L + 17.4
		drive i=1	0.0306 · L + 17.7
		with gear reducer	0.0306 · L + 24.6

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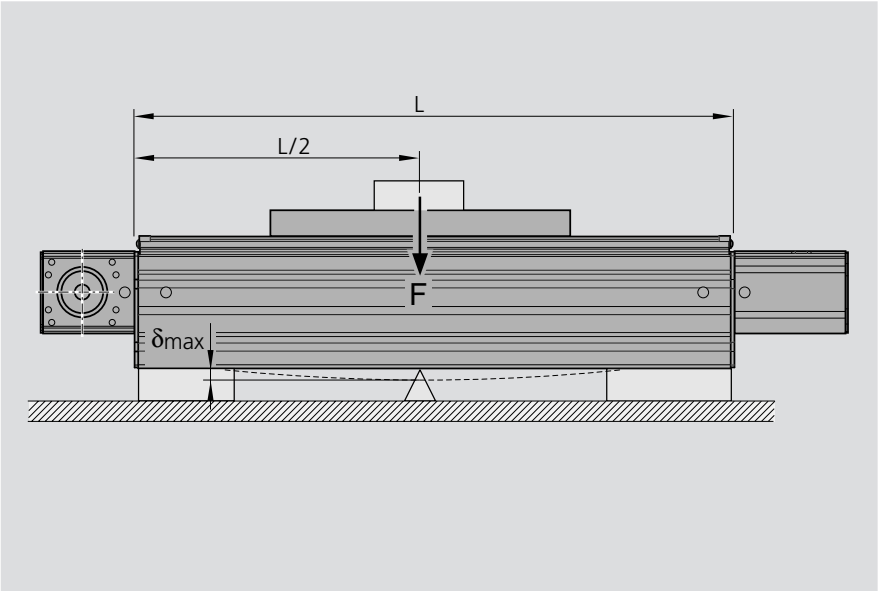
Rexroth Linear Modules MKR 25-145
Technical Data

Deflection

A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.



Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F. The load F is based on the total moved mass.

⚠ δ_{max} may not be exceeded!

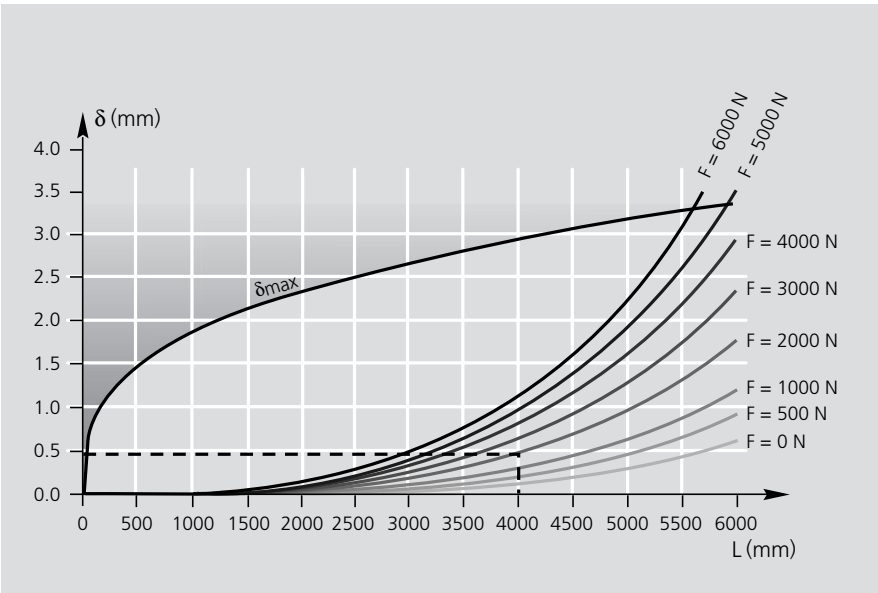
Example

Linear Module MKR 25-145: L = 4000 mm
F = 2000 N
From graph: δ = 0.47 mm
δ_{max} = 2.9 mm

The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.

The graph applies in the following conditions:

- ends firmly clamped (approx. 350 mm on each side)
- 6 to 8 screws on each side
- fixed base



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Performance Data

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Horizontal operation, performance data

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 5					i = 10				
Mass	(kg)	4	8	16	24	32	20	60	100	140	180
Acceleration time t_h	(ms)	106	122	152	183	214	156	239	321	404	487
Acceleration distance s_h	(mm)	223	256	320	385	450	164	251	338	425	512
Acceleration a	(m/s^2)	39.6	34.6	27.6	23.0	19.7	13.5	8.8	6.5	5.2	4.3
Speed v	(m/s)	4.20					2.10				
Reproducibility ±	(mm)	0.1					0.1				

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	(kg)	10	20	30	40	50	10	30	50	90	130	50	100	150	200	250
Acceleration time t_h	(ms)	155	191	228	264	301	176	222	268	359	451	411	484	558	632	705
Acceleration distance s_h	(mm)	310	382	455	528	601	220	278	335	449	564	308	363	418	473	529
Acceleration a	(m/s^2)	25.8	20.9	17.5	15.1	13.3	14.2	11.3	9.4	7.0	5.6	3.6	3.1	2.7	2.4	2.1
Speed v	(m/s)	4.00					2.50					1.50				
Reproducibility ±	(mm)	0.1					0.1					0.1				

Vertical operation, performance data
(frame stationary, traveling carriage)

with servo motor MKD 71B-061 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 5					i = 10				
Mass	(kg)	4	10	18	26	34	20	30	40	50	60
Acceleration time t_h	(ms)	127	151	205	270	351	210	276	367	500	715
Acceleration distance s_h	(mm)	254	301	409	540	702	210	275	366	499	713
Acceleration a	(m/s^2)	31.4	26.5	19.5	14.8	11.4	9.5	7.2	5.4	4.0	2.8
Speed v	(m/s)	4.00					2.00				
Reproducibility ±	(mm)	0.1					0.1				

with servo motor MKD 90B-047 and controller DKC *.3-040[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 3					i = 5					i = 10				
Mass	(kg)	3	6	9	12	15	5	10	20	30	40	20	30	40	50	60
Acceleration time t_h	(ms)	147	165	184	204	225	209	237	304	393	516	416	502	620	794	1073
Acceleration distance s_h	(mm)	295	330	367	407	449	761	296	381	492	646	249	301	372	476	643
Acceleration a	(m/s^2)	27.1	24.2	21.8	19.6	17.8	12.0	10.6	8.2	6.4	4.9	2.9	2.4	1.9	1.5	1.1
Speed v	(m/s)	4.00					2.50					1.20				
Reproducibility ±	(mm)	0.1					0.1					0.1				

[1)] For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories".

Drive data without motor (i = 1)

Drive wheel diameter	92.2 mm
Max. speed	up to 5 m/s
Belt type	AT 10, 50 mm wide, steel reinforced
Mass moment of inertia	(250 + L (mm) · 0.0123) · 10^{-4} kgm^2

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Rexroth Linear Modules MKR 25-145
Components and Ordering

Part number, length 1146-200-10, (....) mm	Type = (....) (and dimension drawing)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)
				L_T

Slots for cable duct, left (L) / Slots for cable duct, right (R)			Journal for motor	Reduction i = 1 1)	Reduction i = 1 2)	Reduction i = 3	Reduction i = 5	Reduction i = 10	L_T = 400 mm
OA01 **without drive unit (OA)**	**OA01**	01	without 50						10
with drive unit (MA), w/o gear reducer, i = 1 MA01 MA04	**MA01 / MA04** **(11.24.70)**	01	right	01	03				05
MA02 MA05	**MA02 / MA05** **(11.24.70)**	01	left	01	03				
MA03 MA06	**MA03 / MA06** **(11.24.71)**	01	both sides	02	04				
with gear unit (MG) MG01 MG02 MG03 MG04	**MG01 / MG02** **MG03 / MG04** **(11.24.77)** **(11.24.79)**	01	gear unit				10		
			with 2nd journal				11		
with integrated gear unit LPB (MG) MG05 MG06 MG07 MG08	**MG05 / MG06** **MG07 / MG08** **(11.24.81)**	01	integrated gear unit				20		

Order example

1) without keyway 2) with keyway

Ordering data		Description
Linear Module (Part number): 1146-200-10, 2450 mm		Linear Module MKR 25-145, length 2450 mm
Type	= MG01	with gear unit, mounted as in diagram MG01
Guideway	= 01	two ball rail systems
Drive unit	= 10	gear reducer with gear unit
Carriage	= 05	carriage with length L_T = 400 mm
Motor attachment	= 11	for motor series ...M.D 90, reduction i = 5
Motor	= 13	motor MKD 90 B-047
1st switch	= 15-R + 900 mm	mechanical switch, switch activation point: right + 900 mm
2nd switch	= 11-R – 300 mm	PNP NC, switch activation point: right – 300 mm
3rd switch	= 15-R – 900 mm	mechanical switch, switch activation point: right – 900 mm
Cable duct	= 20, 2200 mm	cable duct 2200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 02	measurement report: friction moment

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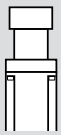
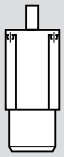
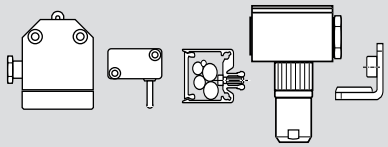
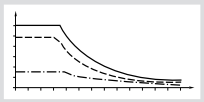
Motor attachment = ..					Motor = ..		1st, 2nd + 3rd switch = ..– .± .... mm	Documentation = ..	
									
Mount Gear unit for motor	i = 3	i = 5	i = 10				Cable duct = .., ... mm Socket-plug = .. Switching cam = ..	Standard report	Measure-ment report
00					00				
00					00		without switch without cable duct 00 External switch: PNP NC 11 – . ±.... mm PNP NO 13 – . ±.... mm Mechanical 15 – . ±.... mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance Cable duct (loose) 20,.... mm Length External socket-plug (loose) 17 External switching cam 16	01	02 Friction moment 05 Positioning accuracy
M.D 71B	01	10	20	without	00				
				MKD 71B	11				
				MHD 71B	62				
M.D 90B	02	11	21	without	00				
				MKD 90B	13				
				MHD 90B	63				
M.D 71B	03	13	23	without	00				
				MKD 71B	11				
				MHD 71B	62				
M.D 90B	04	14	24	without	00				
				MKD 90B	13				
				MHD 90B	63				

The technically permissible combination (load capacities, moments, max. speeds, motor data, etc.) must be established in each individual case.

Calculating the Linear Module length

$L = (\text{eff. stroke} + 2 \times \text{excess travel}) + L_T + 40 \text{ mm}$

For effective stroke, excess travel, carriage length L_T, see dimension drawings.

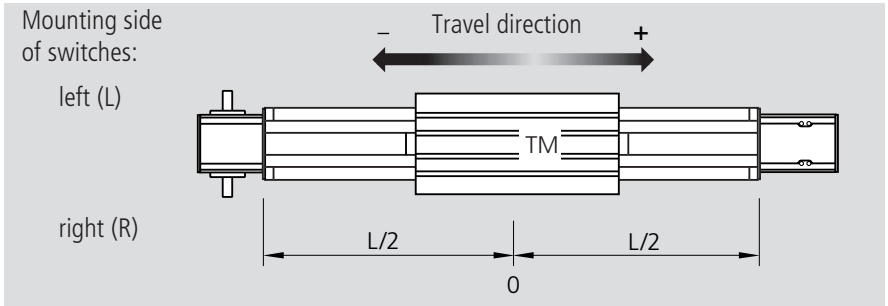
The excess travel must be greater than the braking distance. The acceleration distance may be taken as a guideline for the braking distance.

Switch mounting

The switches and socket-plug are mounted in the upper T-slots of the frame and activated by a switching cam on the carriage.

Switching distance: The switching distance is the distance between the carriage center (TM) and zero point (0) when a switch is activated (given in mm).

For more information on switch type, switching distances and dimensions, see "Switch Mounting Arrangements".



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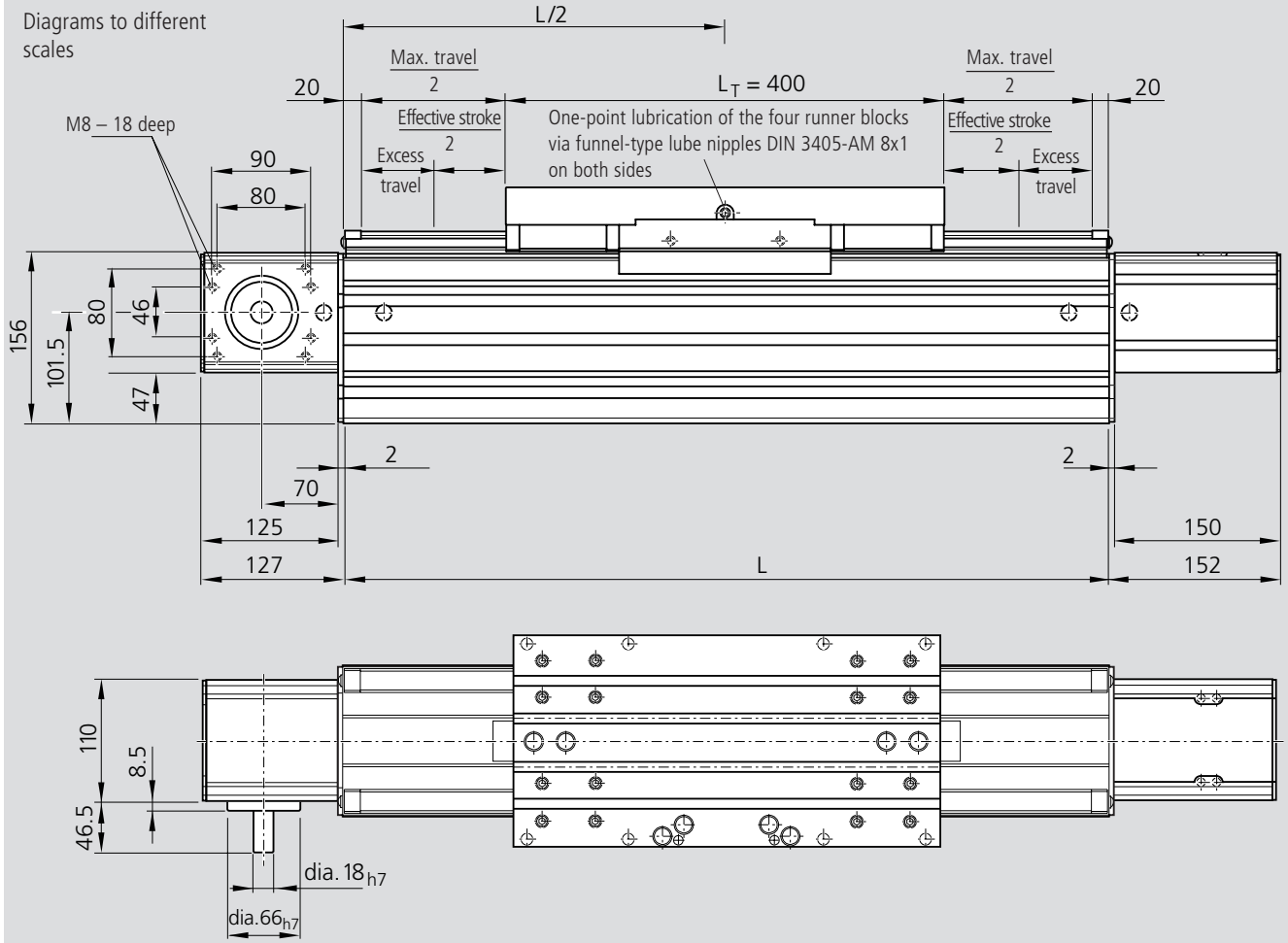
Rexroth Linear Modules MKR 25-145
Dimension Drawings

All dimensions in mm

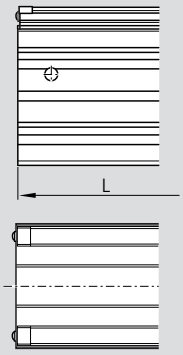
Diagrams to different scales



* Mounting hole pattern 80 x 80: only on the end block side shown here. For the opposite side, only 90 x 90 is permissible.

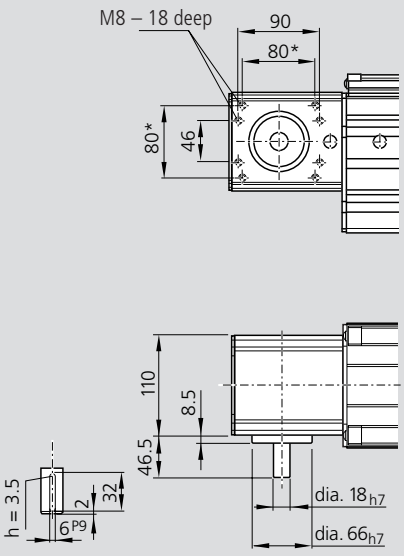
11.24.00

Type OA01
(without end block)



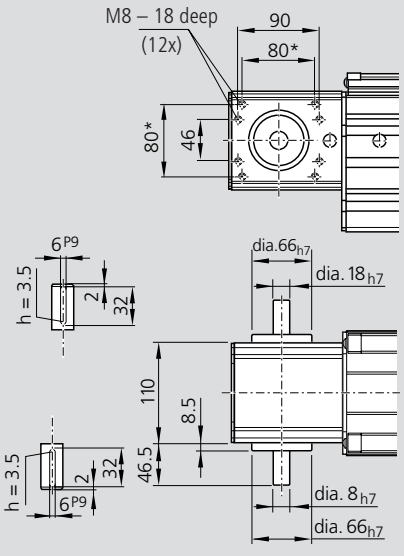
11.24.70

Type MA01 and MA02
MA04 and MA05



11.24.71

Type MA03 and MA06



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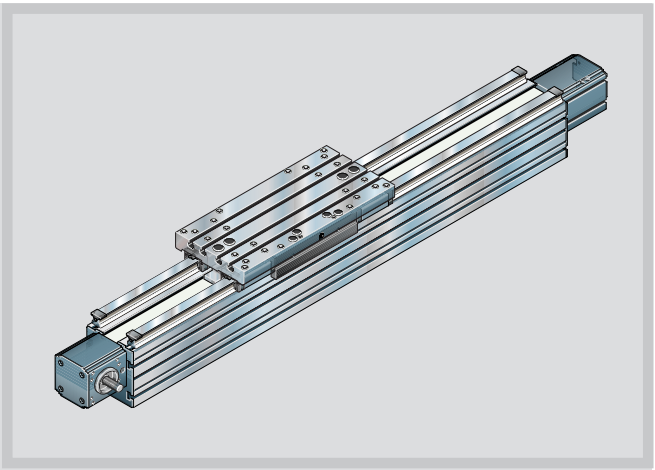
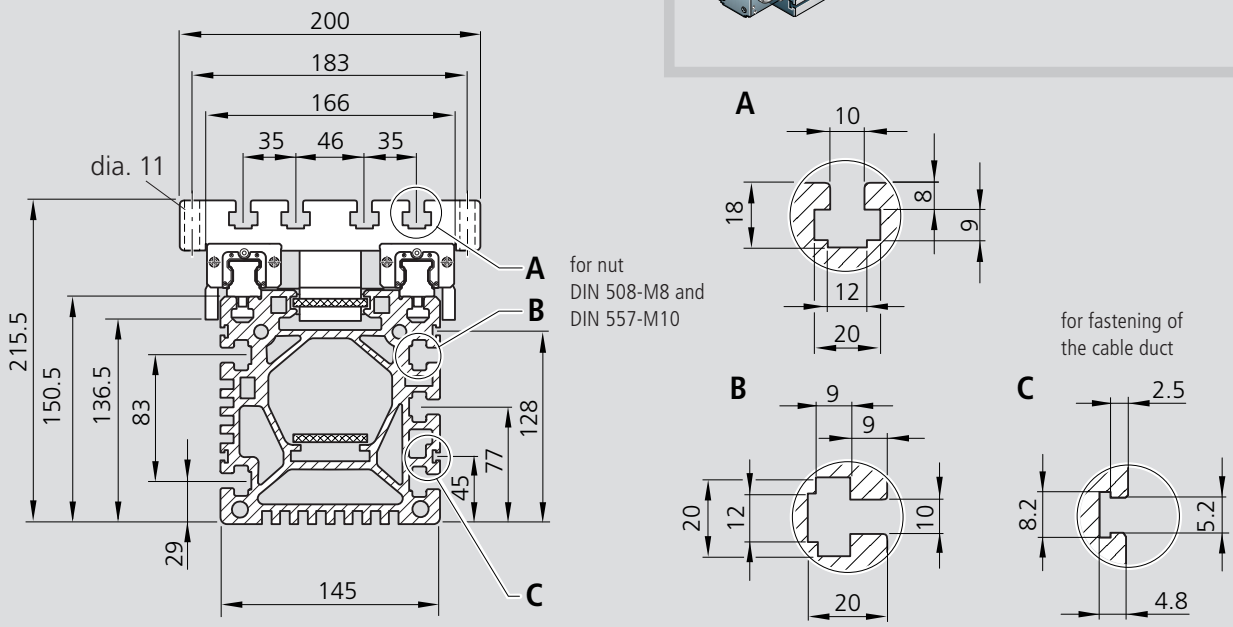
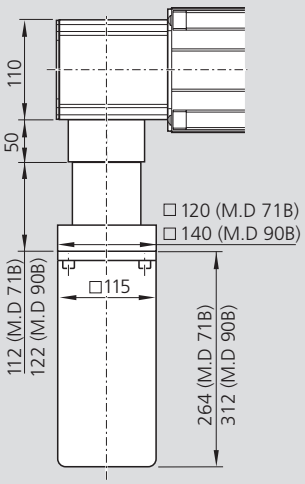




MKR
MKZ

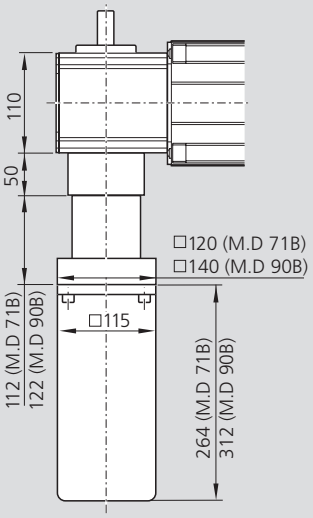
11.24.77

Type MG01 to MG04
Servo motors M.. 71./M.. 90.



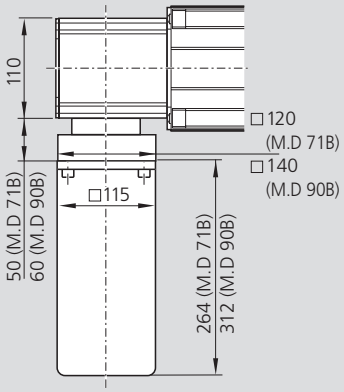
11.24.79

Type MG01 to MG04
Servo motors M.. 71./M.. 90
(with 2nd journal)



11.14.81

Type MG05 to MG08
Servo motors M.. 71./M.. 90.
(with integrated gear unit LPG)



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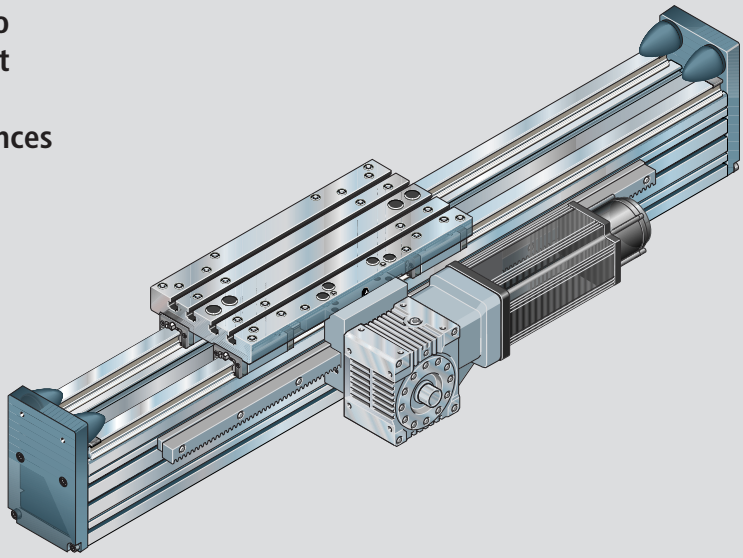
Rexroth Linear Modules MKZ 25-145 H for Horizontal Operation
Structure and Technical Data

MKZ 25-145 H: Linear Module with two Ball Rail Systems for high load moment capacity and Rack and Pinion Drive for moving heavy weights over long distances at demanding speeds



The MKZ 25-145 H Linear Module comprises:

- an anodized aluminum frame of high inherent rigidity
- two Rexroth Ball Rail Systems with sealing strips and two long runner blocks each
- a profiled aluminum carriage
- rack and pinion drive (hardened and ground), with helical gearing ensuring low operating noise levels
- low-backlash worm gear with motor mount and coupling for attachment of the motor
- an AC servo motor with control units
- mountable switches (proximity and mechanical)

For maintenance, see Maintenance Instructions Linear Module MKZ 25-145.

General technical data

Linear Module	Carriage length (mm)	Dynamic load capacity C (N)	Dynamic moment M_t (Nm)	Dynamic moment M_L (Nm)	Min. length L_{min} (mm)	Max. length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	Planar moment of inertia I_y (cm^4)
MKZ 25-145 H	400	98 700	5 700	14 600	860*	6 000	2 790	1 970

* for a theoretical stroke of 100 mm

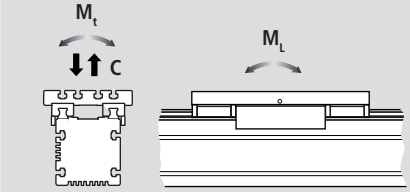
Modulus of elasticity E

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

Note on dynamic load capacities and moments

Note the maximum side load for standard installation of the ball rail systems.

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



Mass

Mass calculation does not include motor or switch attachments.

Linear Module	Mass (kg)
MKZ 25-145 H	0.0384 kg/mm · linear module length L (mm) + 28.5 kg

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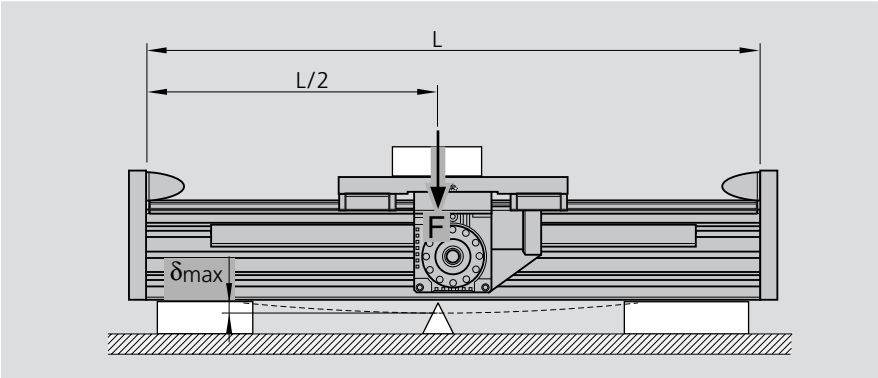
Deflection

A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.



Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F. The load F is based on the total moved mass.

⚠ δ_{max} may not be exceeded!

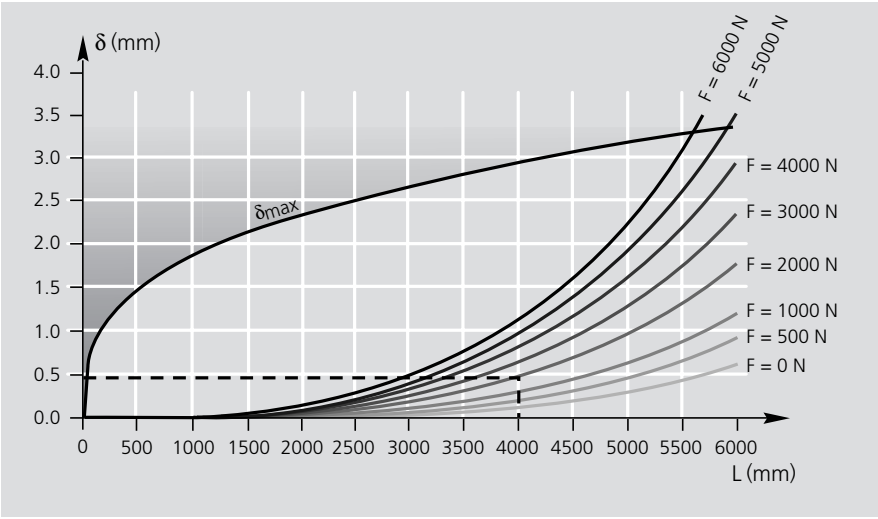
The graph applies in the following conditions:

- ends firmly clamped (approx. 350 mm on each side)
- 6 to 8 screws on each side
- fixed base

Example

Linear Module MKZ 25-145 H: L = 4000 mm
F = 2000 N
From graph: δ = 0.47 mm
δ_{max} = 2.9 mm

The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.



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Characteristic data, rack and pinion

Linear Module	Reciprocal diametral pitch	Pinion diameter	Number of teeth on pinion	Permissible input torque on pinion*	Lead constant for reduction i (mm/rev)					
	m (mm)	d (mm)		M_{2per} (Nm)	i = 4.75	i = 6.75	i = 9.25	i = 14.5		
MKZ 25-145 H	2	53.05	25	55	35.08	24.69	18.02	11.49		

* The permissible input torque on the pinion is based on the tooth breakage and flank stress with lubrication at two-week intervals, low impacts and a speed v = 1.5 m/s in servo operation.
For calculation, see "Output torque of gearing M_2" under "Performance Data".

Mass moment of inertia, gear unit with pinion and shrink disc

Gearing reduction	Mass moment of inertia J_{gear} (10^{-4} kgm²)
i = 4.75	0.6272
i = 6.75	0.4854
i = 9.25	0.3870
i = 14.5	0.2955

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Rexroth Linear Modules MKZ 25-145 H for Horizontal Operation
Technical Data, Performance Data

Mass moment of inertia, motor coupling

for motor series M.. 71

$$J_K = 0.849 \cdot 10^{-4}\ kgm^2$$

Motor data

A number of motor-controller combinations are available in order to ensure the most cost-efficient solution for each customer's application.

The motor-controller combination concerned must always be taken into account when dimensioning the drive unit.

For more information, see catalogs "Controllers, Motors, Electrical Accessories".

Motor		MKD 71B-061	MHD 71B-061
Maximum eff. rotary speed	(min^{-1})	see catalogs "Controllers, Motors, Electrical Accessories"	
Rated torque	(Nm)	8	8
Maximum torque	(Nm)	see catalogs "Controllers, Motors, Electrical Accessories"	
Mass moment of inertia	J_M / J_{Br} (10^{-4} kgm^2)	8.7 / 0.38	8.7 / 0.72
Braking torque	(Nm)	5	5
Mass with brake	(kg)	9.2	9.4

Value base

The values are based on the wear or flank limit performance for 12,000 h at full load, with minor impacts as additional external forces in 8-hour servo operation.

The temperature limit performance of the gearing may also have to be taken into account for continuous duty at full load. The maximum oil sump temperature of 80°C must not be exceeded.

Nominal service life of the ball rail systems

Nominal service life in meters:

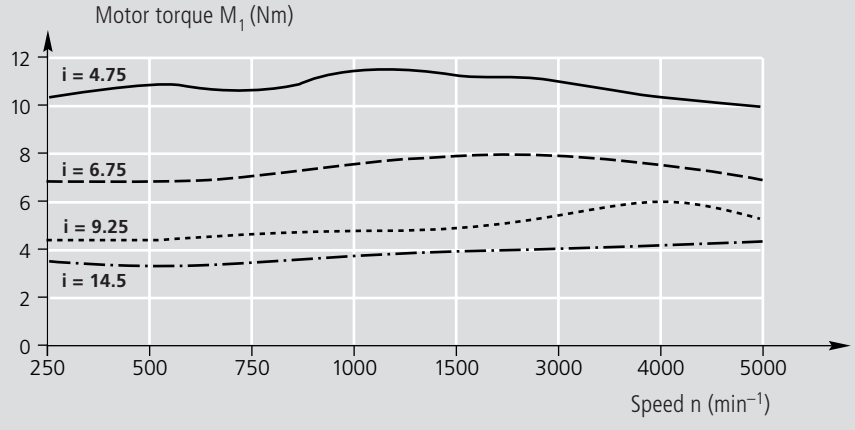
$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

Nominal service life in hours:

$$L_{10h} = \frac{L_{10}}{60 \cdot v}$$

L_{10} = Nominal service life in meters (m)
L_{10h} = Nominal service life in hours (h)
C = Dynamic load capacity (N)
F_m = Mean equivalent dynamic load (N)
v = Speed (from graph "Permissible speed") (m/min)

Permissible torque M_{1per} on the motor journal



Output torque of gearing M_2

$$M_2 = M_1 \cdot \eta \cdot i$$

Conditions: $M_1 \leq M_{1per}$, $M_2 \leq M_{2per}$

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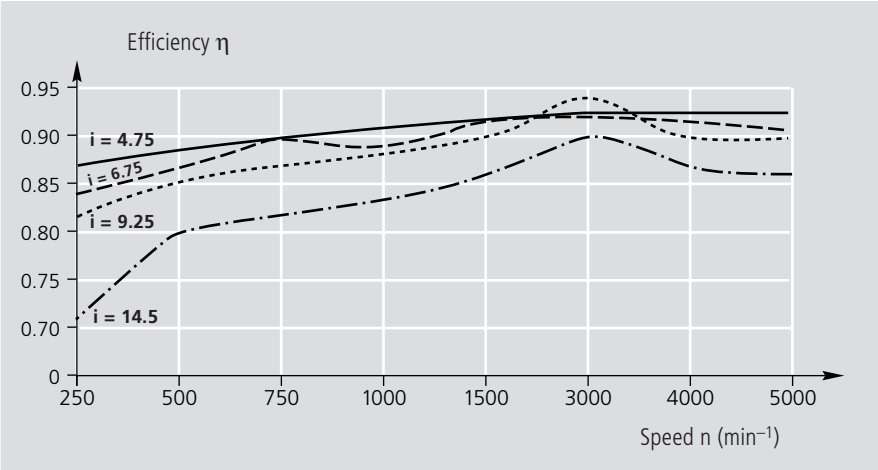
Gear efficiency η



Mass moment of inertia

for handling:

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

$$J_{fr} = \left(\frac{m_B \cdot 7.0357}{i^2} + J_{gear} + J_K \right) \cdot 10^{-4}$$

J_{fr}	=	External mass moment of inertia	(kgm^2)
J_M	=	Mass moment of inertia of motor	(kgm^2)
J_{gear}	=	Mass moment of inertia of gear reducer with pinion and shrink disc, reduced	(kgm^2)
J_K	=	Mass moment of inertia of coupling	(kgm^2)
J_S	=	Mass moment of inertia of system with additional load	(kgm^2)
i	=	Reduction	

Calculation of moved mass m_B

Moved mass (kg) = 24.5 kg + motor (kg) + trailing cables (kg) + payload (kg)

Linear module is stationary, carriage travels horizontally.

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Performance data for gear reducer, motor and controller combinations (examples)

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Performance data for horizontal operation

with servo motor MKD 71B-061 and controller DKC *.3-040-7[1)]
Supply voltage: 3 x 400 V

Gearing reduction		i = 4.75					i = 6.75				
Moved mass	**(kg)**	62	80	104	128	152	70	120	170	210	250
Acceleration time t_h	**(ms)**	237	282	344	405	466	242	334	426	499	573
Acceleration distance s_h	**(mm)**	263	314	382	450	517	189	261	333	390	448
Acceleration a	**(m/s^2)**	9.4	7.9	6.5	5.5	4.8	6.5	4.7	3.7	3.1	2.7
Speed v	**(m/s)**	2.22					1.56				

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories". The data given here does not include any assessment of the effective moments for the motor and controller.

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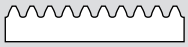
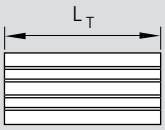
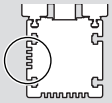
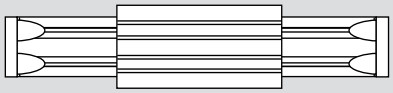
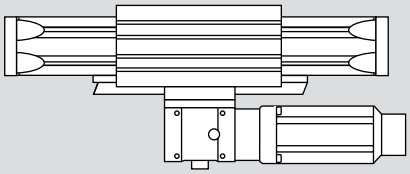
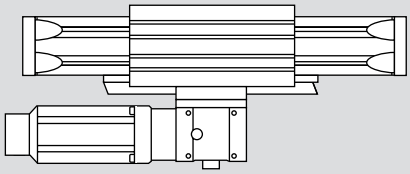
Rexroth Linear Modules MKZ 25-145 H for Horizontal Operation
Components and Ordering

Part number, length 1156-220-00,(....) mm	Type = (....)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)	
					
Slots for cable duct 			with rack	L_T = 400 mm	
without drive unit (OA) 	OA01	01	00	10	
	MA01	01	01	05	
	MA02				

Order example

Ordering data		Description
Linear Module (Part number):	1156-220-00, 2450 mm	Linear Module MKZ 25-145 H, length 2450 mm
Type	= MA01	with gear reducer, mounted as in diagram MA01
Guideway	= 01	two ball rail systems
Drive unit	= 01	with rack
Carriage	= 05	carriage with length L_T = 400 mm
Motor attachment	= 03	with gear reducer i = 4.75 and mount for motor series M.. 71
Motor	= 11	motor MKD 71B-061
End dampers	= 02	end block and rubber buffer at both ends
1st switch	= 15-A + 900 mm	mechanical switch, switch activation point: external + 900 mm
2nd switch	= 11-A – 300 mm	PNP NC, switch activation point: external – 300 mm
3rd switch	= 15-A – 900 mm	mechanical switch, switch activation point: external – 900 mm
Cable duct	= 20, 2200 mm	cable duct 2200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 02	measurement report: friction moment

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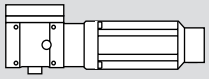
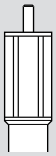
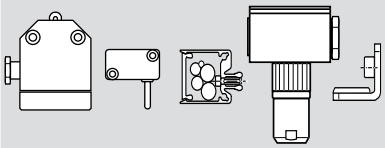
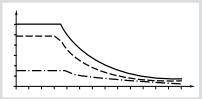
	Motor attachment = ..	Motor = ..	End dampers = .. (end block with rubber buffers)	1st, 2nd + 3rd switch = ..– . ± .... mm	Documentation = ..
					

Reduction (i)	Mount		for motor		on motor side only	at both ends	Cable duct = .., ... mm Socket-plug = .. Switching cam = ..	Standard report	Measurement report
	00		without motor	00	01	02	without switch without cable duct 00	01	02 Friction moment 05 Positioning accuracy
i = 4.75	for motor series M.. 71	03	without motor	00			External switch: PNP NC 11 – . ±.... mm PNP NO 13 – . ±.... mm Mechanical 15 – . ±.... mm Switch activation point: Switch type, Mounting side, Travel direction, Switching distance		
i = 6.75		04							
i = 9.25		05	MKD 71B	11			Cable duct (loose) 20,.... mm Length		
i = 14.5		06	MHD 71B	62			External socket-plug (loose) 17 External switching cam 16		

The technically permissible combination (load capacities, moments, max. speeds, motor data, etc.) must be established in each individual case.

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Calculating the Linear Module length

$L = (\text{eff. stroke} + 2 \times \text{excess travel}) + L_T + 136 \text{ mm}$

For effective stroke, excess travel, carriage length L_T, see dimension drawings.

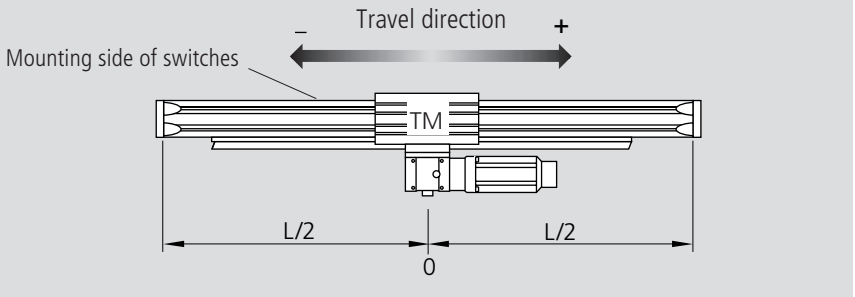
The excess travel must be greater than the braking distance. The acceleration distance may be taken as a guideline for the braking distance.

Switch mounting

The switches and socket-plug are mounted in the upper T-slots of the frame and activated by a switching cam on the carriage.

Switching distance: The switching distance is the distance between the carriage center (TM) and zero point (0) when a switch is activated (given in mm).

For more information on switch type, switching distances and dimensions, see "Switch Mounting Arrangements".



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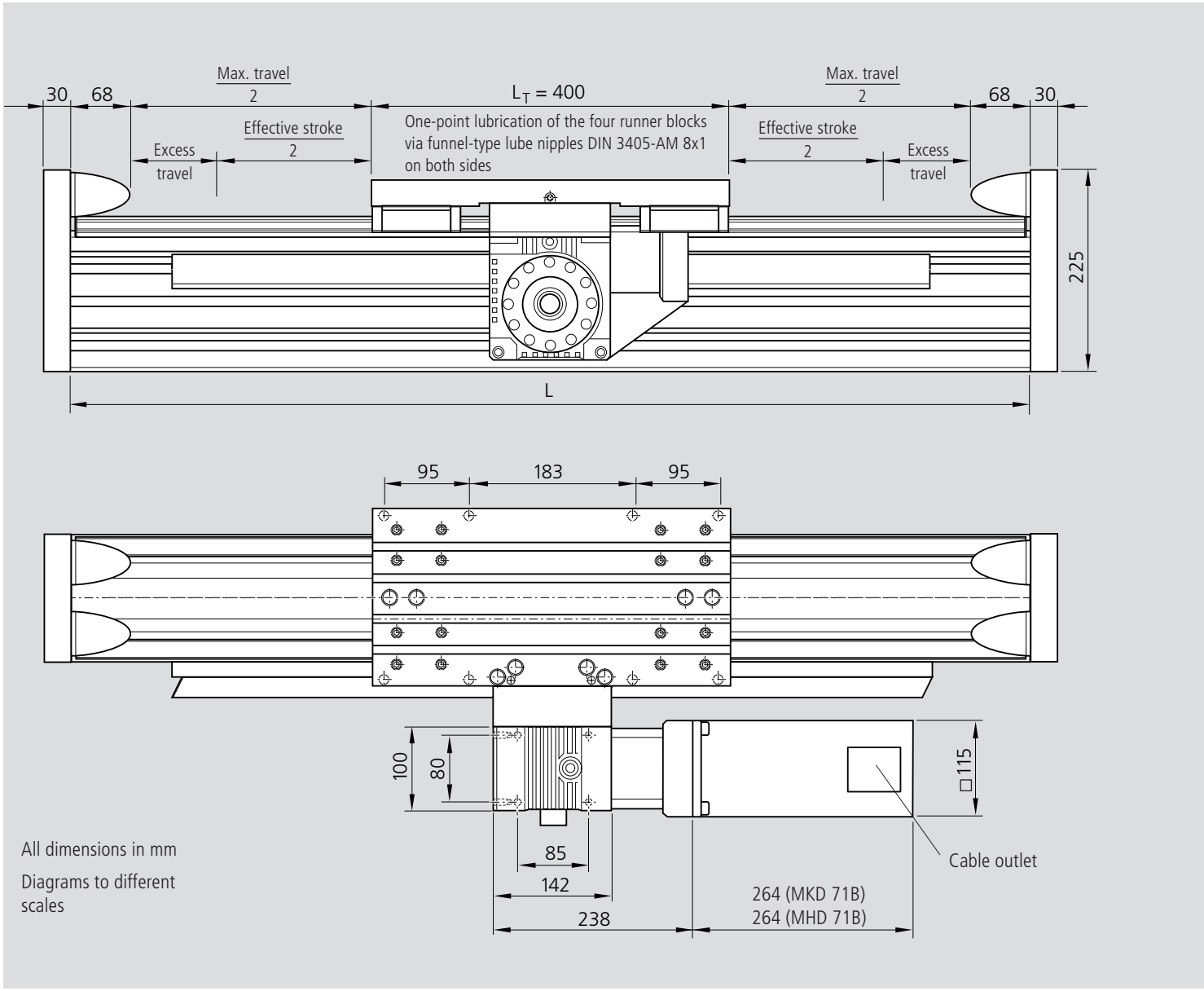
Rexroth Linear Modules MKZ 25-145 H for Horizontal Operation
Dimension Drawings



One-point lubrication: For grease lubrication only!

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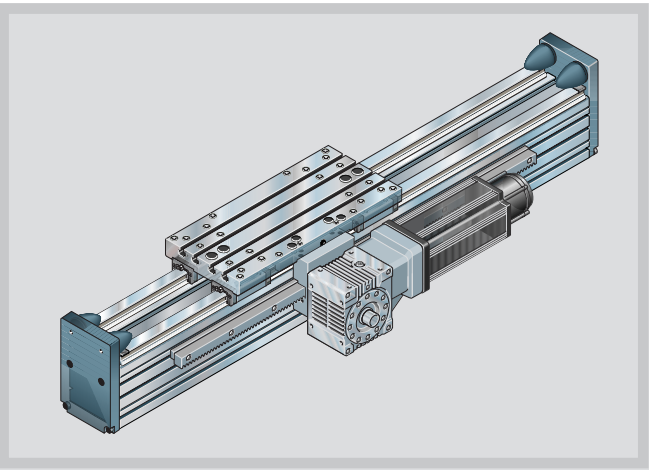

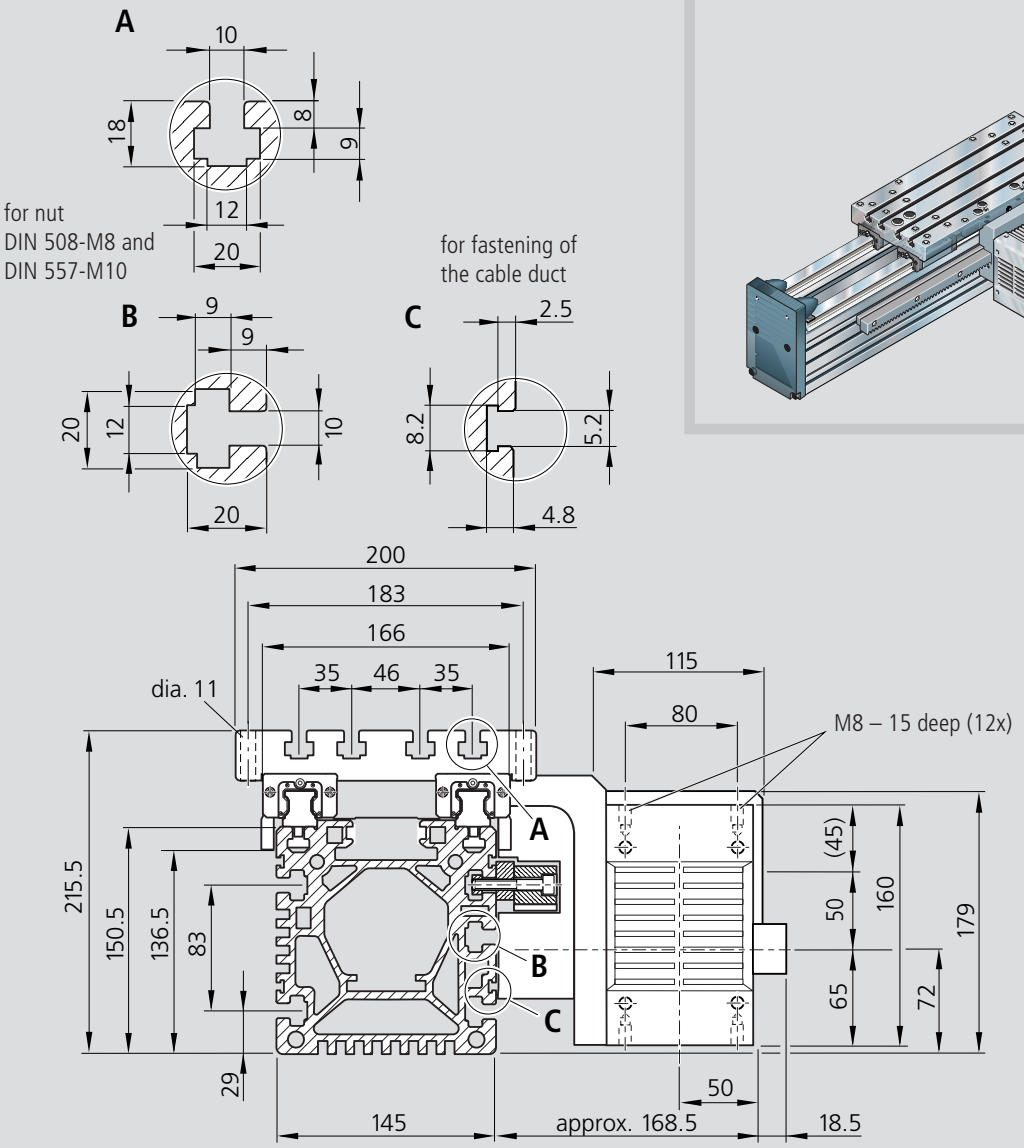

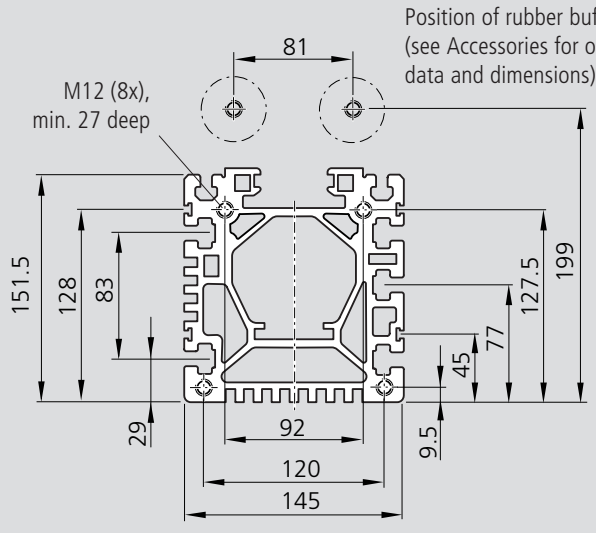

Face-end mounting hole pattern at both ends of the frame for customer's attachments if end dampers are not fitted.

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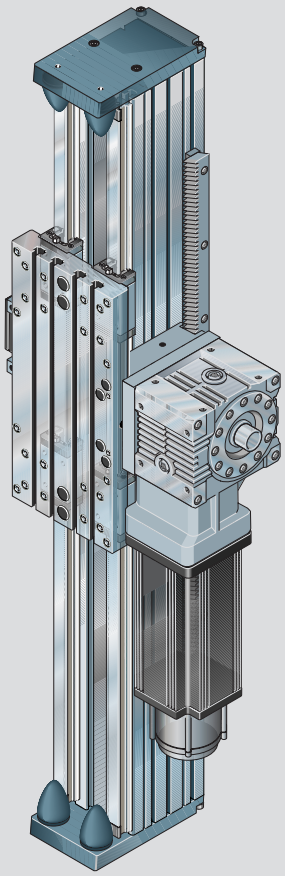
Rexroth Linear Modules MKZ 25-145 V for Vertical Operation
Structure and Technical Data

MKZ 25-145 V: Linear Module with two Ball Rail Systems for high load moment capacity and Rack and Pinion Drive for safe lifting of heavy weights with moving supporting profile (stationary carriage with gear reducer, motor and multi-position switch).



The MKZ 25-145 V Linear Module comprises:

- an anodized aluminum frame of high inherent rigidity
- two Rexroth Ball Rail Systems with sealing strips and two long runner blocks each
- a profiled aluminum carriage
- rack and pinion drive (hardened and ground), with helical gearing ensuring low operating noise levels
- low-backlash worm gear with motor mount and coupling for attachment of the motor
- an AC servo motor
- mountable multi-position switch (to DIN 43697 and VDE 0113)
- control units

For maintenance, see Maintenance Instructions Linear Modules MKZ 25-145.

General technical data

Linear Module	Carriage length (mm)	Dynamic load capacity C (N)	Dynamic moment M_t (Nm)	Dynamic moment M_L (Nm)	Min. length L_{min} (mm)	Max. length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	Planar moment of inertia I_y (cm^4)
MKZ 25-145 V	400	98 700	5 700	14 600	800*	6 000	2 790	1 970

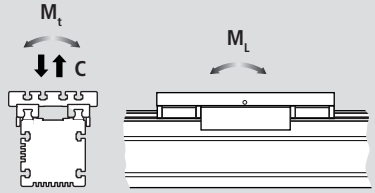
Modulus of elasticity E $E = 70{,}000\ N/mm^2$

* for a theoretical stroke of 100 mm

Note on dynamic load capacities and moments

Note the maximum side load for standard installation of the ball rail systems.

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



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Mass

Mass calculation does not include motor or switch attachments.
(Switch attachment approx. 2 kg)

Linear Module	Mass (kg)
MKZ 25-145 V	0.0402 kg/mm · linear module length L (mm) + 35.0 kg

Characteristic data, rack and pinion

Linear Module	Reciprocal diametral pitch	Pinion diameter	Number of teeth on pinion	Permissible input torque on pinion *	Lead constant for reduction i (mm/rev)				
	m (mm)	d (mm)		M_{2per} (Nm)		i = 6.75	i = 9.25	i = 14.5	i = 19.5
MKZ 25-145 V	3	79.57	25	150		37.03	27.02	17.24	12.82

* The permissible input torque on the pinion is based on the tooth breakage and flank stress with lubrication at two-week intervals, low impacts and a speed v = 1.5 m/s in servo operation.
For calculation, see "Output torque of gearing M_2" under "Performance Data".

Mass moment of inertia, gear unit with pinion and shrink disc

Gearing reduction	Mass moment of inertia J_{gear} (10^{-4} kgm²)
i = 6.75	1.6924
i = 9.25	1.1480
i = 14.5	1.0263
i = 19.5	0.73123

Mass moment of inertia, motor coupling

for motor series M.. 71

$J_K = 1.598 \cdot 10^{-4}$ kgm²

for motor series M.. 90/93

$J_K = 2.628 \cdot 10^{-4}$ kgm²

Motor data

A number of motor-controller combinations are available in order to ensure the most cost-efficient solution for each customer's application.

The motor-controller combination concerned must always be taken into account when dimensioning the drive unit.
For more information, see catalogs "Controllers, Motors, Electrical Accessories".

Motor		MKD 71B-061	MHD 71B-061	MKD 90B-047	MHD 90B-047	MHD 93C-058		
Maximum eff. rotary speed	(min^{-1})	see catalogs "Controllers, Motors, Electrical Accessories"						
Rated torque	(Nm)	8	8	12	12	23		
Maximum torque	(Nm)	see catalogs "Controllers, Motors, Electrical Accessories"						
Mass moment of inertia	J_M / J_{Br} (10^{-4} kgm²)	8.7 / 0.38	8.7 / 0.72	41.5 / 2.11	43 / 1.1	30 / 3.6		
Braking torque	(Nm)	5	5	11	11	22		
Mass with brake	(kg)	9.2	9.4	14.5	14.6	24.6		

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Rexroth Linear Modules MKZ 25-145 V for Vertical Operation
Technical Data, Performance Data

Value base

The values are based on the wear or flank limit performance for 12,000 h at full load, with minor impacts as additional external forces in 8-hour servo operation.

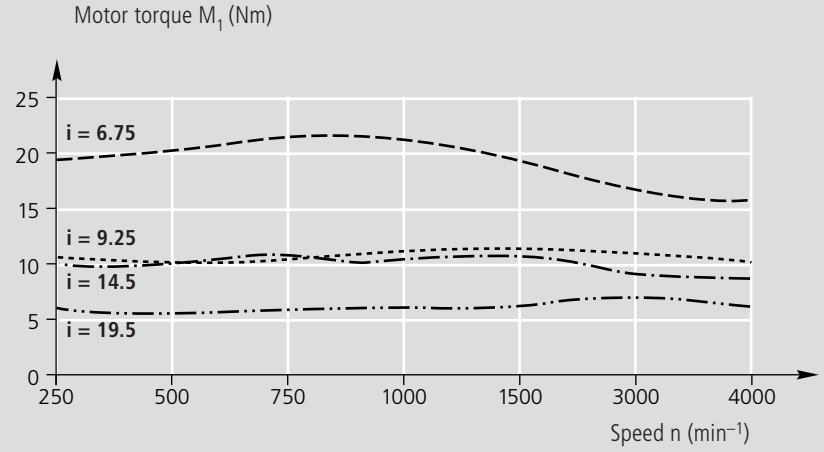
The temperature limit performance of the gearing may also have to be taken into account for continuous duty at full load.

The maximum oil sump temperature of 80°C must not be exceeded.

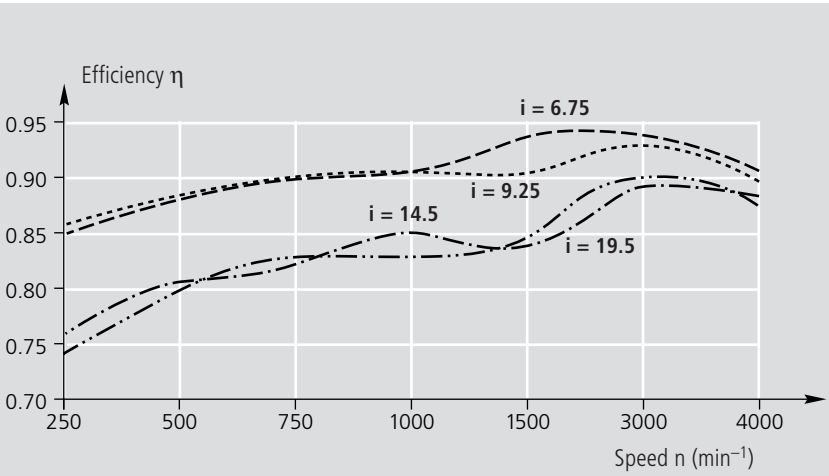
Nominal service life of the ball rail systems

See "Structure and Technical Data" MKR 25-145.

Permissible torque M_{1per} on the motor journal



Gear efficiency η



Output torque of gearing M_2

$$M_2 = M_1 \cdot \eta \cdot i$$

Conditions: $M_1 \leq M_{1per}$, $M_2 \leq M_{2per}$

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Mass moment of inertia

for handling:

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

$$J_{fr} = \left(\frac{m_B \cdot 15.8285}{i^2} + J_{gear} + J_K \right) \cdot 10^{-4}$$

J_{fr} = External mass moment of inertia (kgm²)
J_M = Mass moment of inertia of motor (kgm²)
J_{gear} = Mass moment of inertia of gear reducer with pinion and shrink disc, reduced (kgm²)
J_K = Mass moment of inertia of coupling (kgm²)
J_S = Mass moment of inertia of system with additional load (kgm²)
i = Reduction
L = Linear module length (mm)

Calculation of moved mass m_B

Moved mass (kg) = 0.0402 kg/mm · L (mm) + 6.4 kg + payload (kg)

Carriage is stationary, linear module travels vertically.

Performance data for gear reducer, motor and controller combinations (examples)

⚠ The tables contain performance data examples for gear-motor-controller combinations. They are intended as a rough guide for selection. The precise performance data must be calculated for each application case.

Performance data for vertical operation

with gear reducer i = 14.5, servo motor MKD 71B-061 and controller DKC *.3-040-7[1)]
Supply voltage: 3 x 380–480 V

Gearing reduction		i = 14.5									
Moved mass	**(kg)**	44	52	60	68	76	84	92	100	108	
Acceleration time t_h	**(ms)**	135	148	162	177	194	214	236	261	290	
Acceleration distance s_h	**(mm)**	74	81	88	97	106	117	129	143	159	
Acceleration a	**(m/s²)**	8.1	7.4	6.8	6.2	5.6	5.1	4.6	4.2	3.8	
Speed v	**(m/s)**	1.1									

1) For more information on the control systems, see catalogs "Controllers, Motors, Electrical Accessories". The data given here does not include any assessment of the effective moments for the motor and controller.

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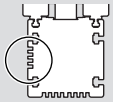
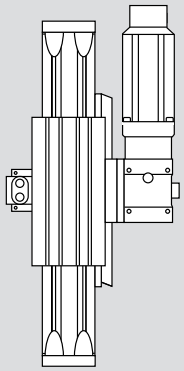
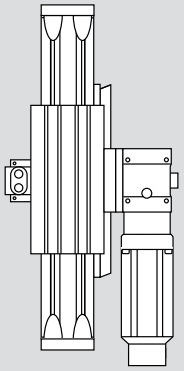
Rexroth Linear Modules MKZ 25-145 V for Vertical Operation
Components and Ordering

Part number, length 1156-230-00,(....) mm	Type = (....)	Guide-way = (..)	Drive unit = (..)	Carriage = (..)	
Slots for cable duct and switching cams 			with rack	L_T = 400 mm	
	MA01	01	01	05	
	MA02				

Order example

Ordering data			Description
Linear Module (Part number): 1156-230-00, 2450 mm			Linear Module MKZ 25-145 V, length 2450 mm
Type	=	MA01	with gear reducer, mounted as in diagram MA01
Guideway	=	01	two ball rail systems
Drive unit	=	01	with rack
Carriage	=	05	carriage with length L_T = 400 mm
Motor attachment	=	04	with gear reducer i = 6.75 and mount for motor series M.. 90/93
Motor	=	64	motor MHD 93C-058
End dampers	=	01	end block and rubber buffers on motor side only
1st switch	=	30-A	four-tier multi-position switch to DIN 43697
Documentation	=	02	measurement report: friction moment

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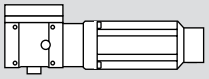
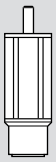
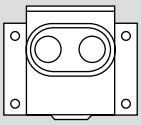
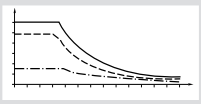
Motor attachment = ..				Motor = ..	End dampers = .. (end block with rubber buffers)		1st, 2nd + 3rd switch = ..– . ± ....mm	Documentation = ..	
									
Reduction (i)		**Mount**		**for motor**		**on motor side only**	**at both ends**		**Standard report**	**Measurement report**
i = 6.75	for motor series M.. 90/93	04		**without motor**	00	01	02	**without switch without cable duct** 00	01	02 Friction moment
				MKD 90B	13					
i = 9.25		05		**MHD 90B**	63			**Multi-position switch with four-tiers, external:** Emergency OFF Changeover contact Changeover contact Changeover contact 30-A		
				MHD 93C	64					
i = 14.5	for motor series M.. 71	16		**without motor**	00			**Switching cams:** see Accessories		05 Positioning accuracy
				MKD 71B	11					
i = 19.5		17		**MHD 71B**	62					

The technically permissible combination (load capacities, moments, max. speeds, motor data, etc.) must be established in each individual case.

Calculating the Linear Module length

$L = (\text{eff. stroke} + 2 \times \text{excess travel}) + L_T + 136\ \text{mm}$

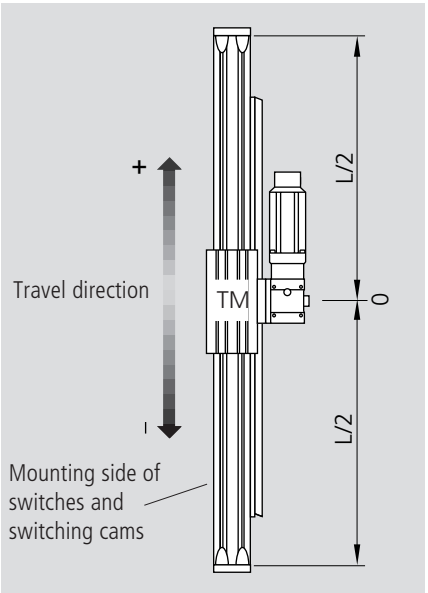
For effective stroke, excess travel, carriage length L_T, see dimension drawings.
The excess travel must be greater than the braking distance.

⚠ The braking distance and braking torque must be carefully dimensioned!

Switch mounting

The multi-position switch is supplied already mounted on the carriage side without motor.

For mounting and adjustment of the switching cams, see "Switch Mounting Arrangements".



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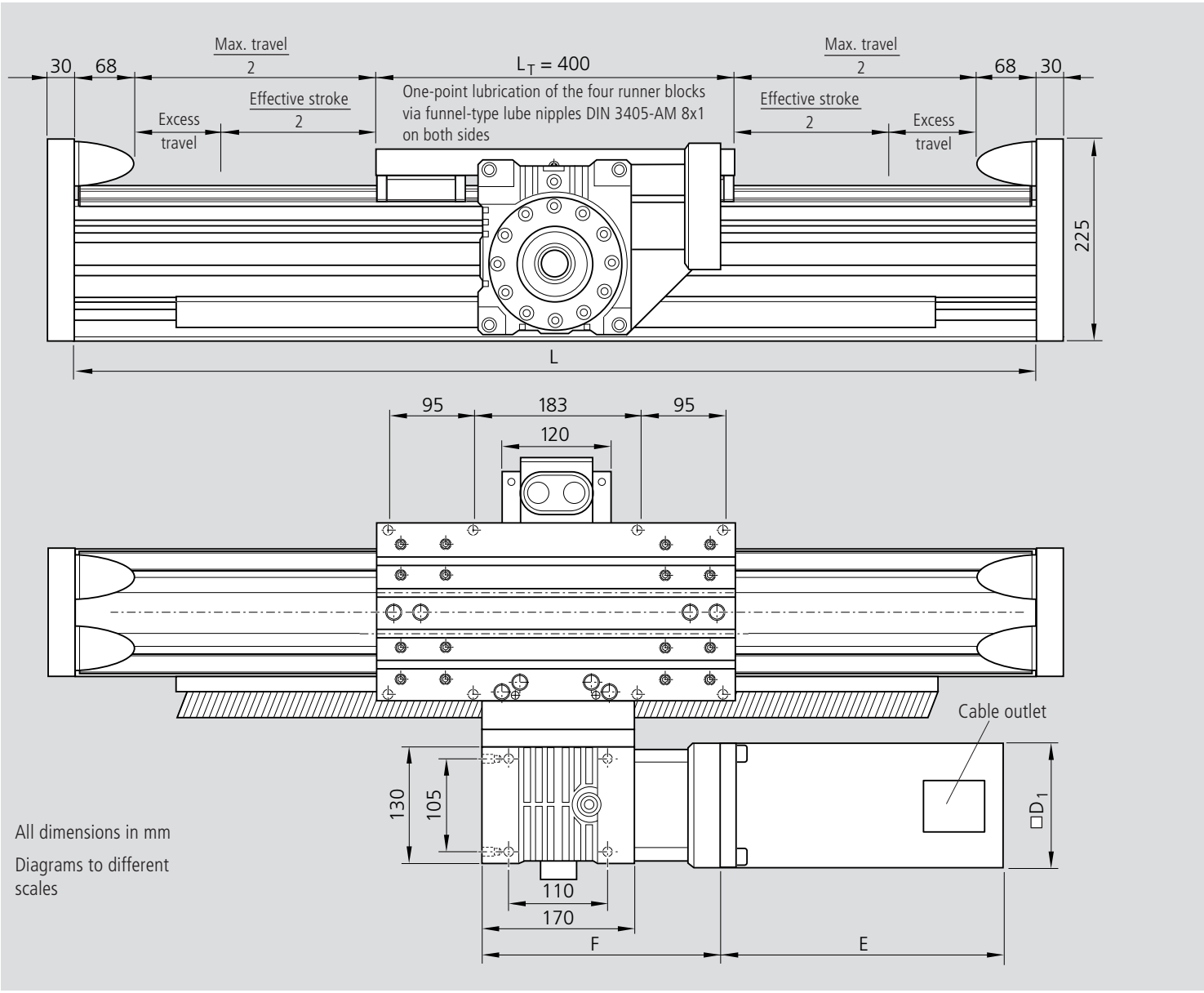
Rexroth Linear Modules MKZ 25-145 V for Vertical Operation
Dimension Drawings



One-point lubrication: For grease lubrication only!

Motor	Motor dimensions (mm)			
	□ D_1/D_2	E	F	G
MKD 71B	115	264	265	206.5
MHD 71B	115	264	265	206.5
MKD 90B	140	310	270	219.0
MHD 90B	140	312	270	219.0
MHD 93C	140	396	270	219.0

For more information, see section on "Motors".

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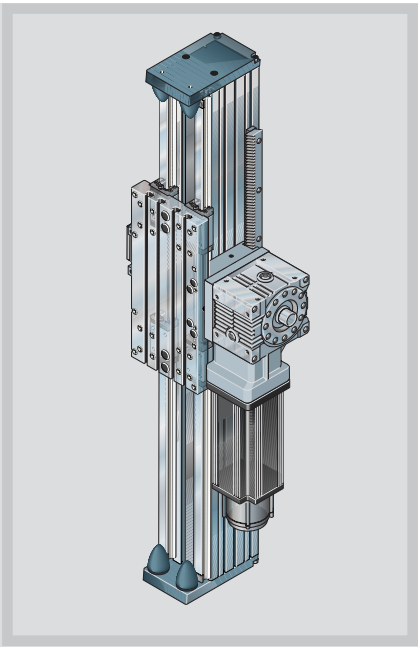

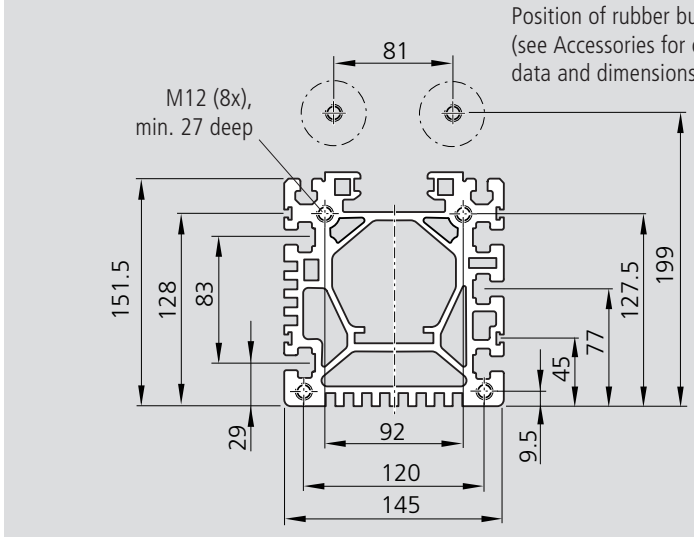

Face-end mounting hole pattern at both ends of the frame for customer's attachments if end dampers are not fitted.

MKR
MKZ

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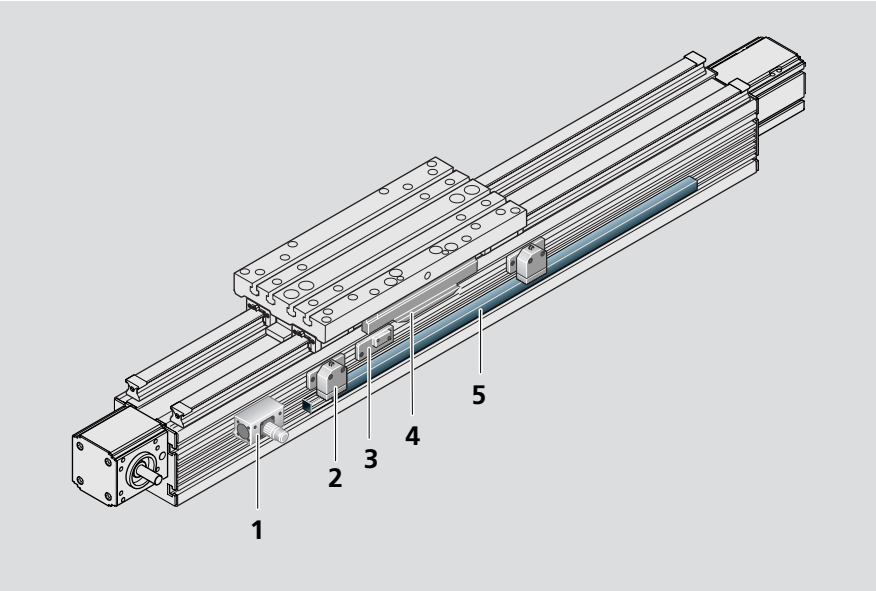
Rexroth Linear Modules MKR 25-145 and MKZ 25-145 H
Switch Mounting Arrangements

Overview of the switching system MKR 25-145, MKZ 25-145 H

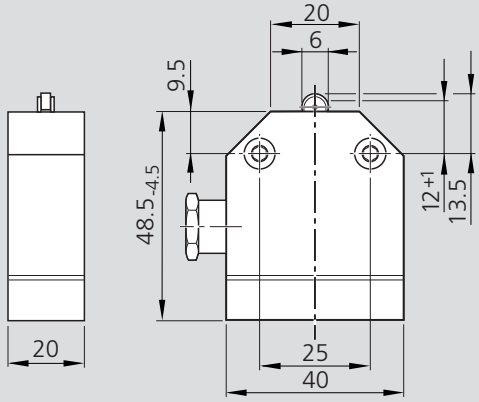
1 Socket and plug
2 Mechanical switch (with mounting components)
3 Proximity switch (with mounting components)
4 Switching cam
5 Cable duct (aluminum alloy)



Mechanical switch (technical data)

Reproducibility	= ± 0.05 mm
Permissible ambient temperature	= –5°C to +80°C
Enclosure	= DIN 40050 IP 67
Contact time	= < 2 ms
Insulation	= group C to VDE 0110
Rated voltage	= 250 V AC
Continuous current	= 5 A
Switching capacity at 220 V, 40–60 Hz	= cosφ = 0.8 at 2 A
Contact resistance when new	= < 240 mΩ
Connection	= screw connection
Contact system	= single-pole changeover
Switch system	= snap-action

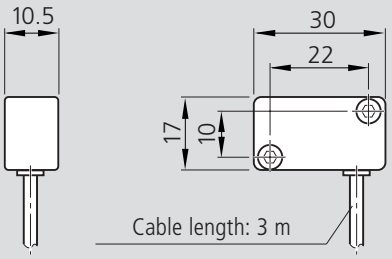
Mechanical switch
for MKR 25-145 and MKZ 25-145 H



Proximity switch (technical data)

Miniature circuit breakers with potted cable (3 x 0.14 mm² Unitronic)	
Housing form	= NO
Minisensor	= form A DIN 41635
Voltage	= 10 to 30 V DC
Residual ripple	= ≤ 10%
Load	= 200 mA
No-load current	= ≤ 20 mA
Switching frequency	= max. 1500 Hz
Temperature-related shift in make point	= ≤ 4 µm/K
Output signal steepness	= ≥ 1 V/µs
Reproducibility of make point to EN 50008	= ≤ 0.1 mm

Proximity switch
for MKR 25-145 and MKZ 25-145 H



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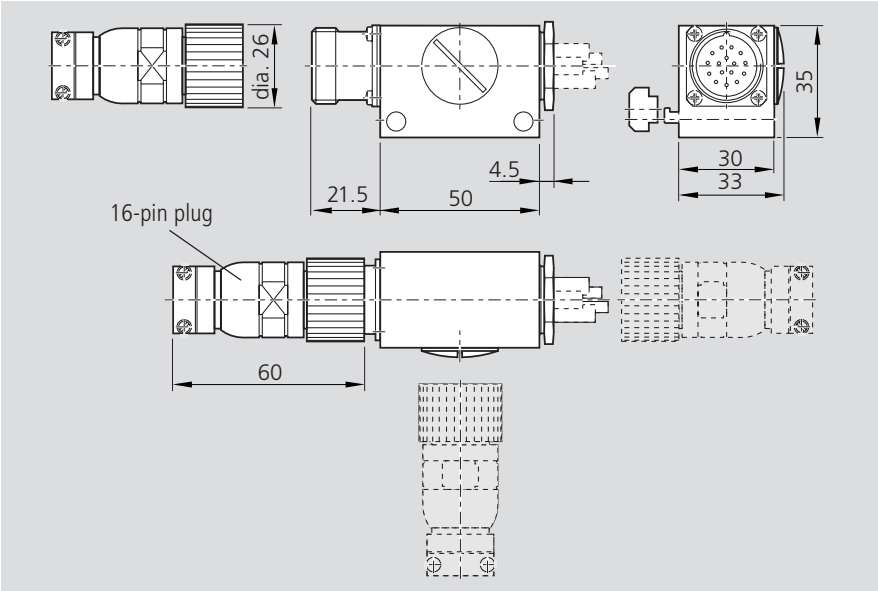
Socket and plug

- Fit the socket to the side with the most switches.

The socket and plug are of the 16-pin type. Socket and switch are not wired. The switch activation points can thus be optimized during start-up.
A plug is provided.

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



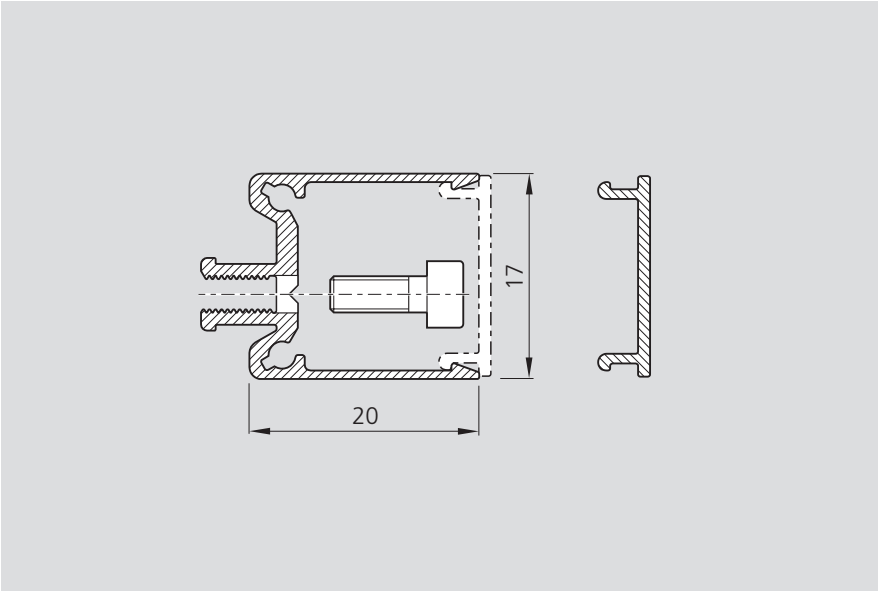
Cable duct

- The cable ducts are mounted in the lateral slots of the frame. Mounting screws widen the profile and secure the cable duct.

For the location of the slot side, see "Components and Ordering" table and "Dimension Drawings".

The cable duct takes a maximum of two cables for mechanical switches and three cables for proximity switches.

Mounting screws and grommets are provided.



Ordering the switches and mounting components

The part numbers are listed in the table below.
Mounting components can also be ordered individually.

Item		Frame dimension -145
1	**Socket-plug**	0399-800-55
2	**Mech. switch with mounting components**	1175-201-51
	Mech. switch without mounting components	8453-040-16
3	**Proximity switch**	
	– Mounting components without switch	1175-201-50
	– PNP NC	8453-040-01
	– NPN NC	8453-040-02
	– PNP NO	8453-040-03
	– NPN NO	8453-040-04
4	**Switching cam**	0399-800-61
5	**Cable duct**	0399-800-06

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Rexroth Linear Modules MKR 25-145 and MKZ 25-145 H
Switch Mounting Arrangements

Switch mounting for MKR 25-145 and MKZ 25-145 H

Mechanical and proximity switches

Switching distance: The switching distance is the distance between the carriage center (TM) and zero point (0) when a switch is activated (given in mm).

Mounting example

Example for a mechanical limit switch (given that zero point is L/2):

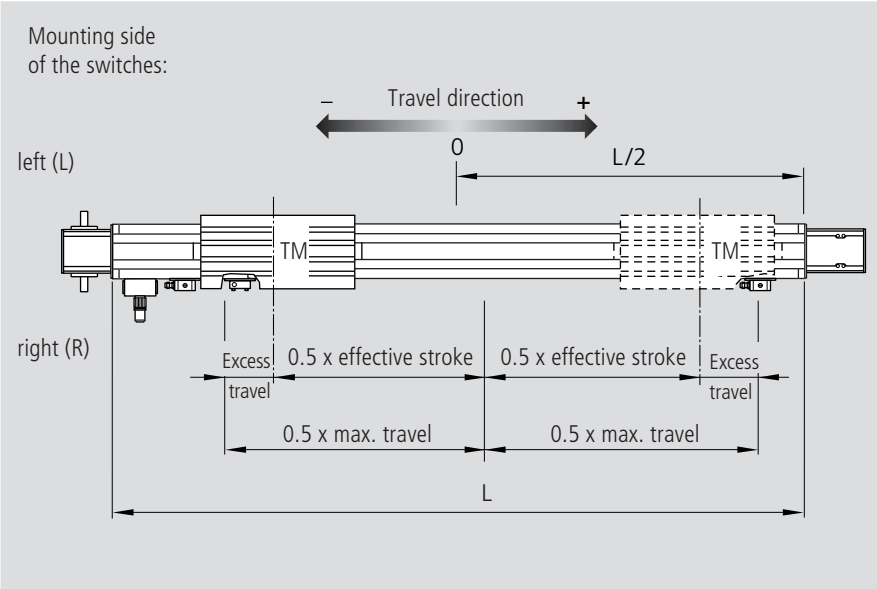
Maximum switching distance
= 0.5 x (max. travel) – excess travel
= 0.5 x effective stroke

For safe operation of the linear module the excess travel must be longer than the braking distance.

Recommended standard switch fittings:

– 2 mechanical switches
– 1 proximity switch

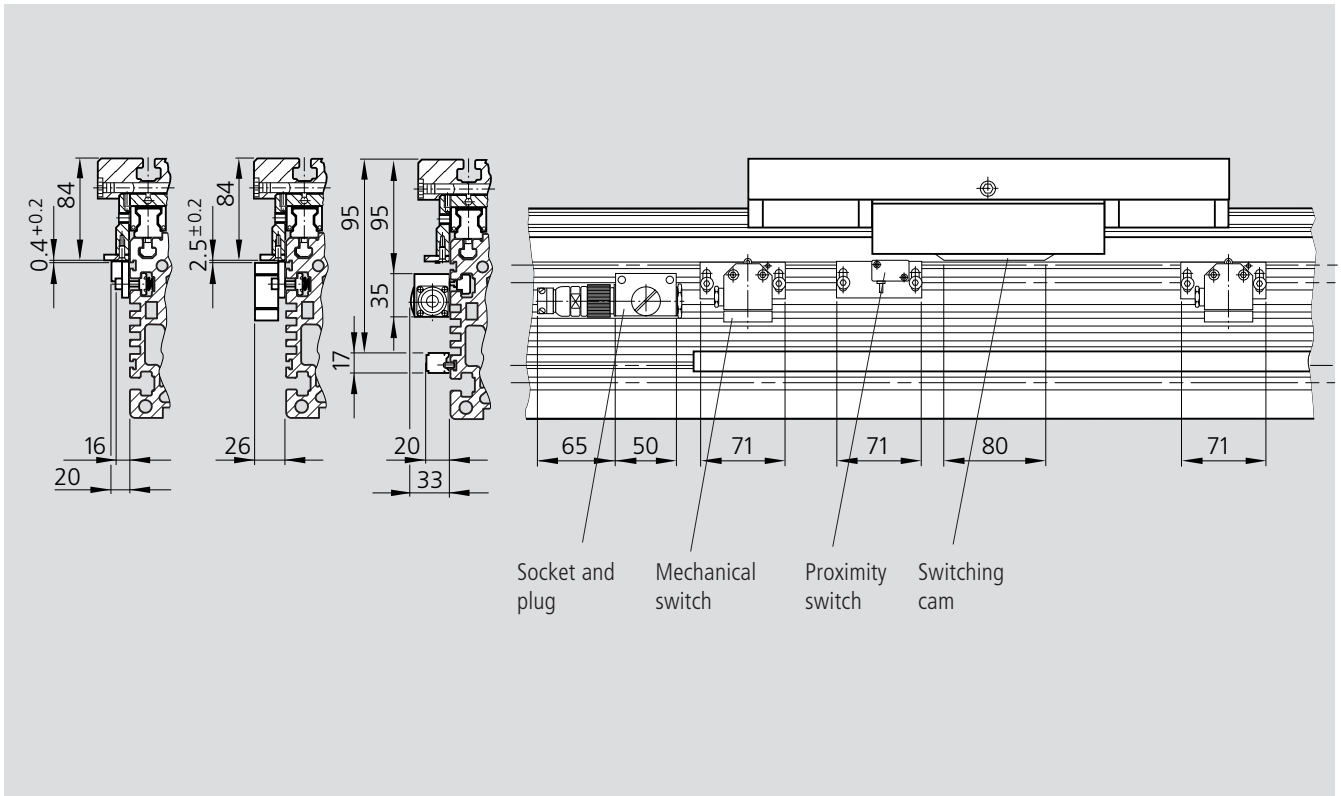
Slide mounting plates with switches into slot and fasten with two hexagon socket head cap screws.



Observe minimum possible distance between switches (determined by mounting plates):

mechanical-mechanical	=	62 mm
mechanical-proximity	=	49 mm
proximity-proximity	=	35 mm

The switches and socket-plug are fastened in the upper T-slots of the frame and activated by means of a switching cam on the carriage.



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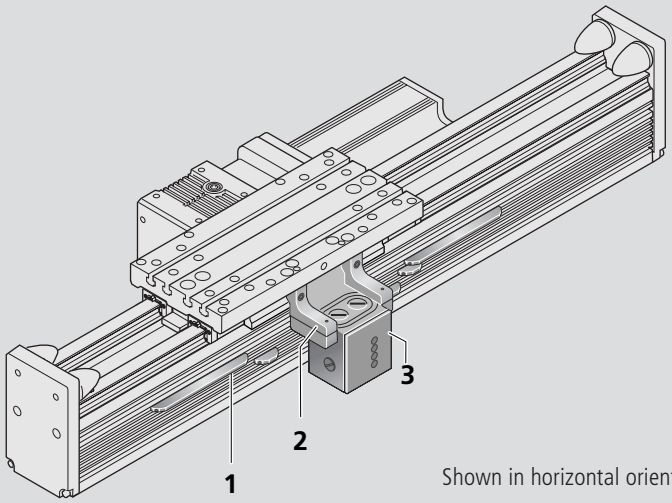
Rexroth Linear Modules MKZ 25-145 V
Switch Mounting Arrangements

Overview of the switching system MKZ 25-145 V

1 Switching cams
2 Switch mounting bracket
3 Multi-position switch



Shown in horizontal orientation

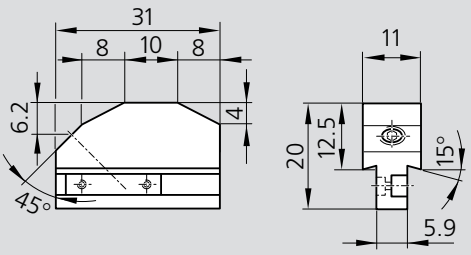
Switching cam

For activation of the multi-position switch to DIN 69 639

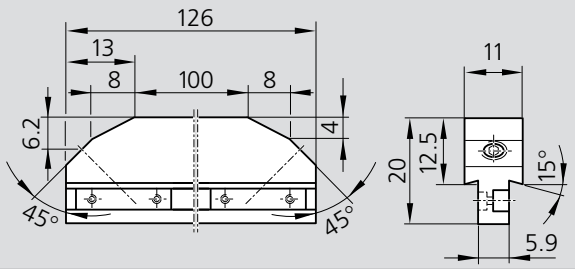
Material:

– Steel, hardened with black oxide finish

Note for mounting:
When the clamping screws are tightened, the switching cam is wedged firmly in place in the slot of the frame.



Part number 8454-030-48



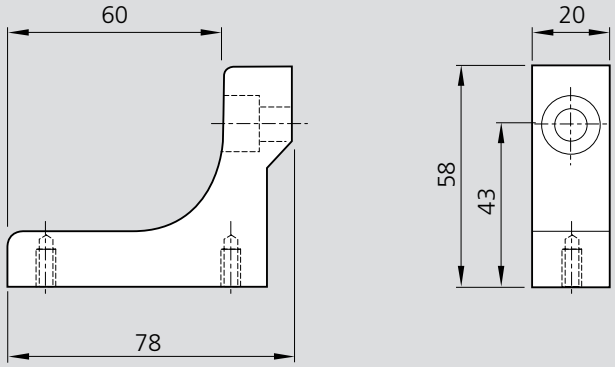
Part number 8454-030-47

Switch mounting bracket

For mounting of the multi-position switch

Material:

– Anodized aluminum



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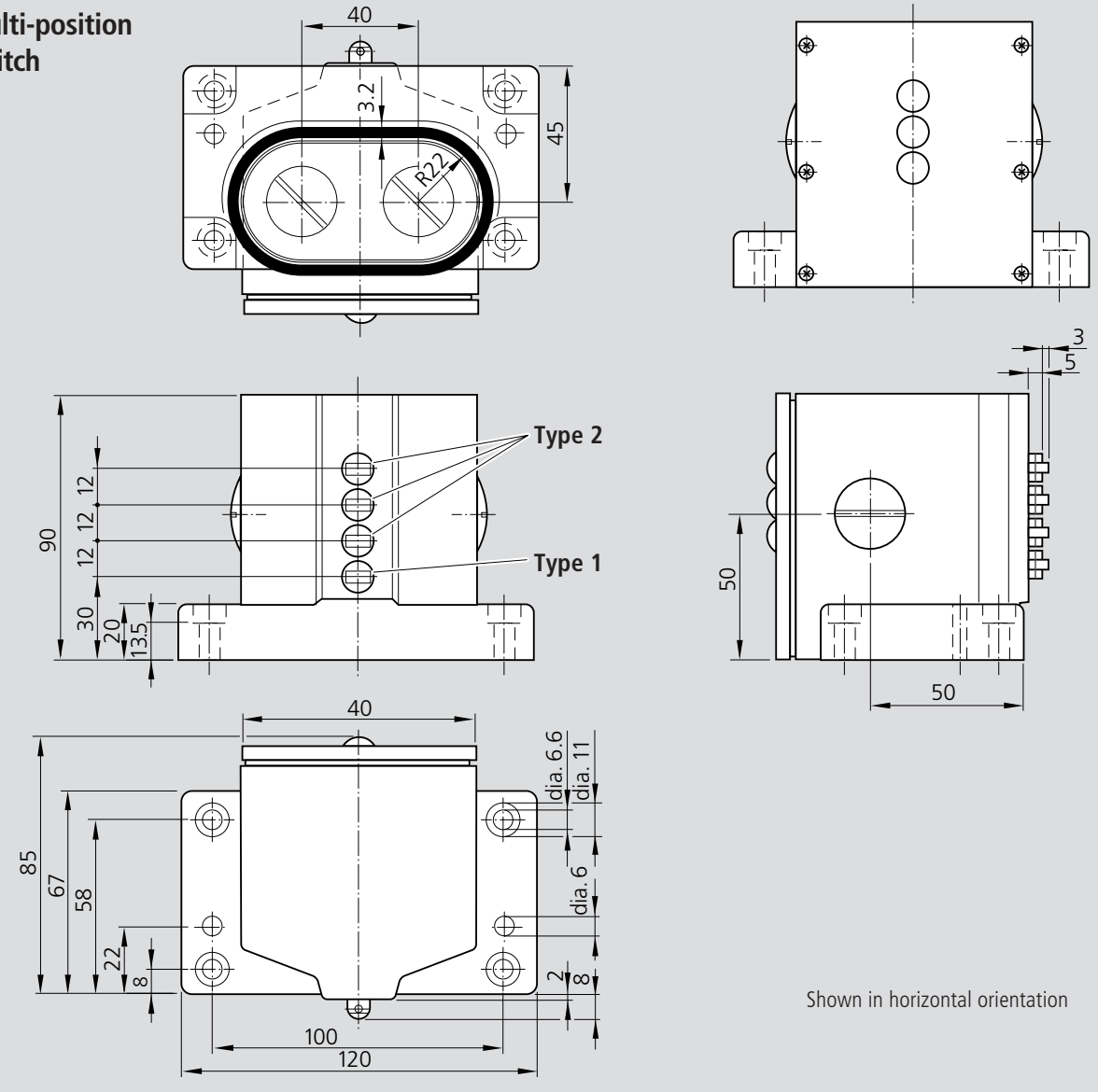
Rexroth Linear Modules MKZ 25-145 V
Switch Mounting Arrangements

Multi-position switch



Part number 8616-005-05

Technical data
Multi-position switch

Switches	Type 1	Type 2
Reproducibility	± 0.01 mm	
Permissible ambient temperature	–5°C to +80°C	
Enclosure	DIN 40050 IP 67	
Contact time	–	≤ 1.5 ms at 10 m/min
Insulation	group C to VDE 0110	
Rated voltage	250 V AC	
Continuous current	6 A	
Contact resistance when new	–	< 40 mΩ
Connection	screw connection M3	
Contact system	NC, double-gap break contact	dual-circuit changeover contact
Switch system	slow-action with positive opening to VDE 0113	snap-action
Function display	without	LED 6 to 60 V

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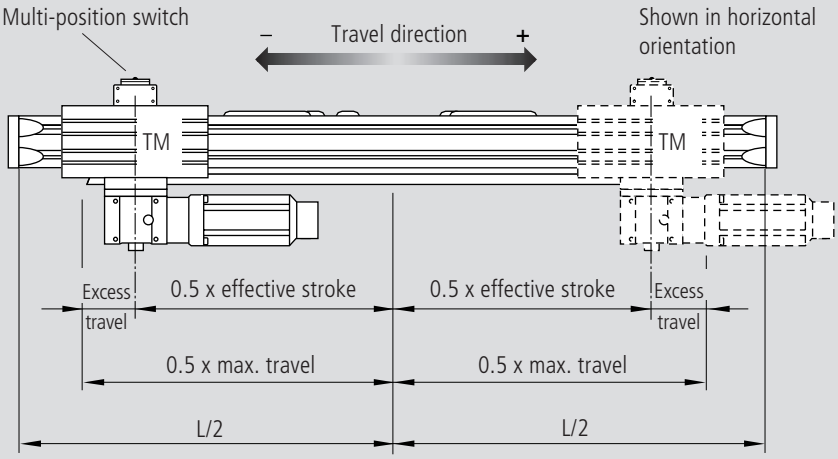
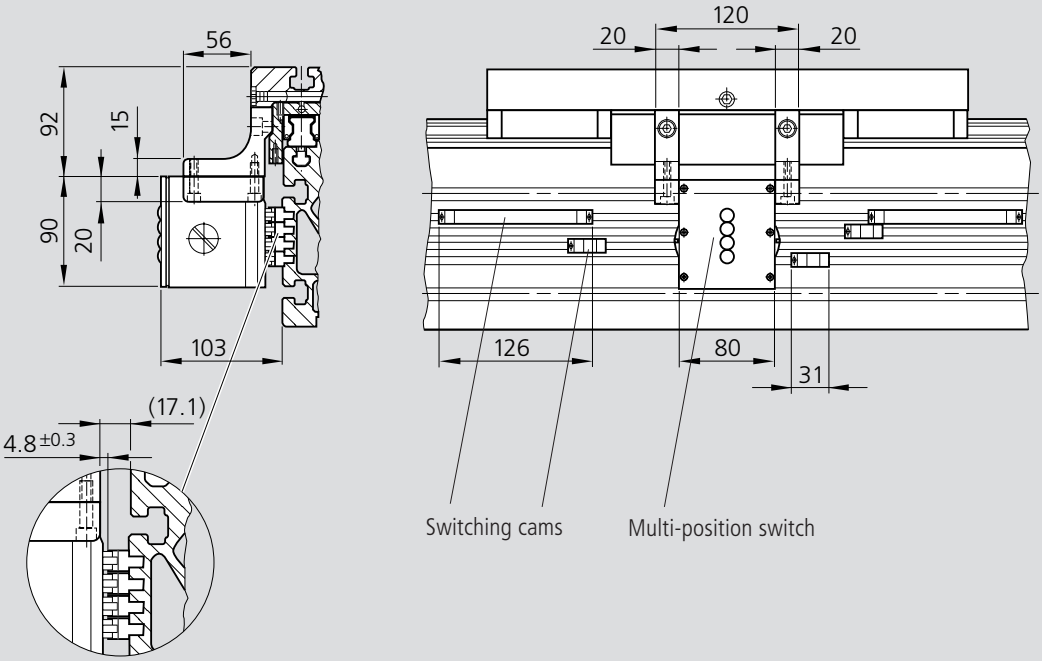
Switch mounting for MKZ 25-145 V

Multi-position switch

The multi-position switch is supplied ready-mounted. The switching cams are available as accessories and have to be fitted and positioned by the customer.





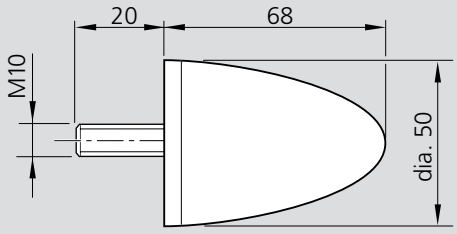
MKR 25-145, MKZ 25-145 H and MKZ 25-145 V: Accessories

Rubber buffers

Use:

As end dampers in customers' systems if no end block with rubber buffers is mounted.

Note for mounting:
To mount the rubber buffers it is necessary to tap holes with the dimensions as shown in the drawing.



Part number
8454-030-46

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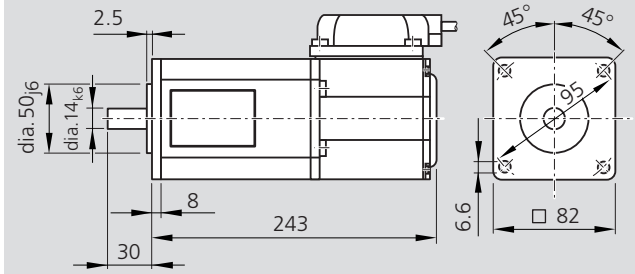
Rexroth Linear Modules
Motors for MKK, MKR, MLR, MKZ

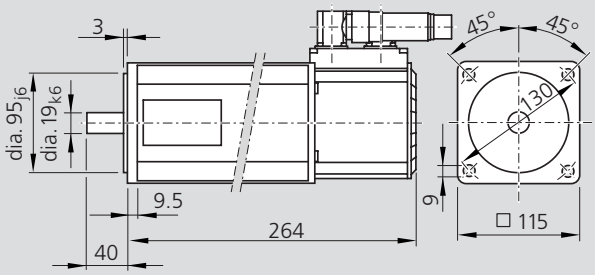
AC servo motor dimensions

For the data of the AC servo motors, see "Technical Data MKK" and catalog "Controllers, Motors, Electrical Accessories".

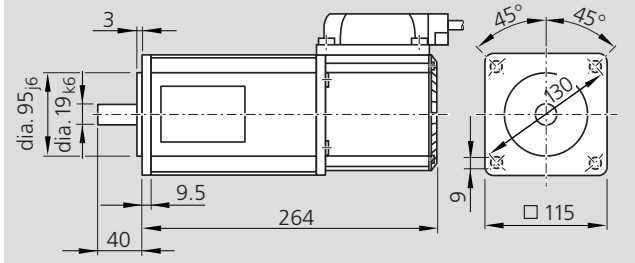
MKD 41B-144 KG1 Part number 8611-010-03



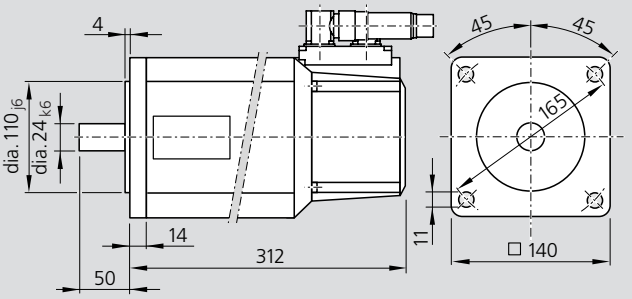
MHD 71B-061-NG1-UN Part number 8611-062-03



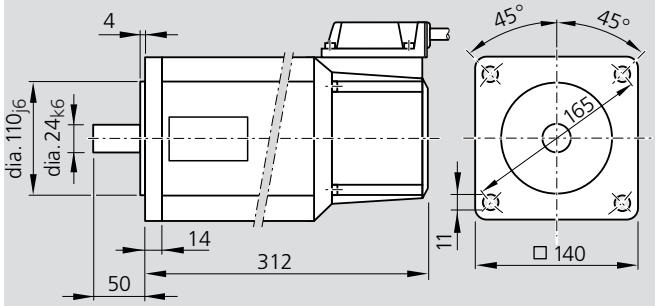
MKD 71B-N-061 KG1 Part number 8611-011-03



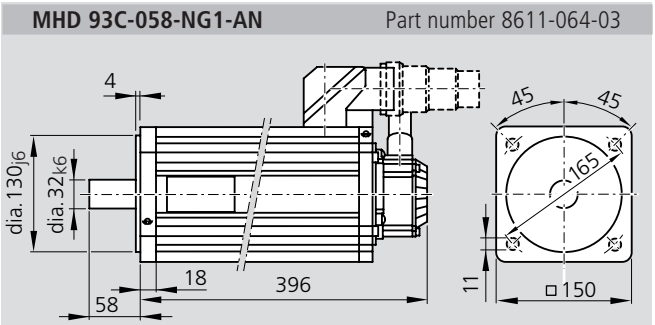
MHD 90B-047-NG1-UN Part number 8611-063-03



MKD 90B-047 KG1 Part number 8611-013-03

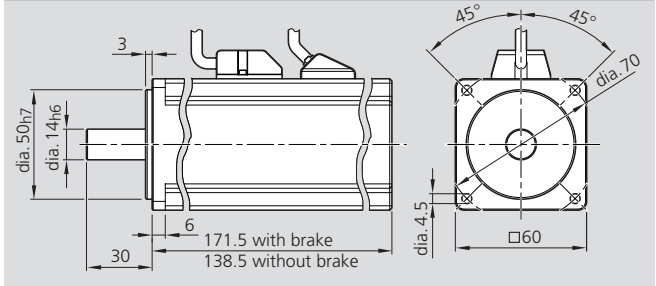


MHD 93C-058-NG1-AN Part number 8611-064-03

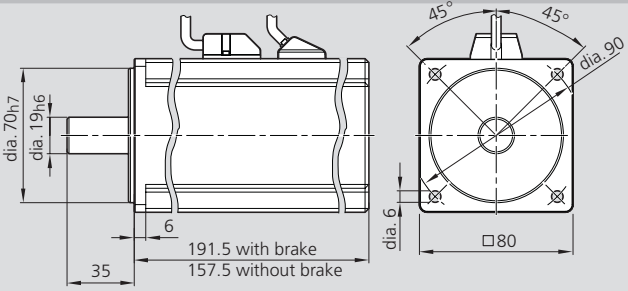


MSM servo motor dimensions

MSM 030C-0300-NN-M0-CG1 with holding brake
Part number 8611-073-03
MSM 030C-0300-NN-M0-CG0 without holding brake
Part number 8611-072-03



MSM 040B-0300-NN-M0-CG1 with holding brake
Part number 8611-075-03
MSM 040B-0300-NN-M0-CG0 without holding brake
Part number 8611-074-03



Motor		MSM 030C	MSM 040B	
Maximum effective rotary speed n_{max}	(min^{-1})	3000	3000	
Rated torque M_N	(Nm)	1.3	2.4	
Maximum torque M_{max}	(Nm)	3.8	7.1	
Mass moment of inertia $J_M + J_{Br}$	(10^{-6} kgm^2)	17 + 3	67 + 8	
Braking torque M_{Br}	(Nm)	1.27	2.45	
Mass with brake m	(kg)	1.5 (1.9)	3.1 (3.8)	

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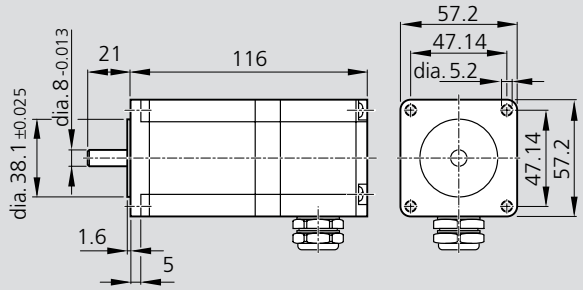
Three-phase stepping motor dimensions

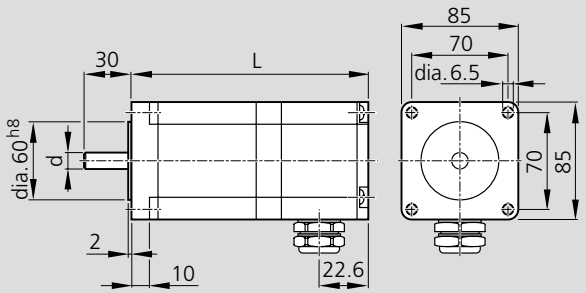
VRDM 368/50 LWB, VRDM 368/50 LNB



VRDM 397/50 LWB, VRDM 397/50 LNB

VRDM 3910/50 LWB, VRDM 3910/50 LNB

VRDM 3913/50 LWB, VRDM 3913/50 LNB



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

Ordering data

Part number	Motor	for use with power output controls
8611-027-06	VRDM 368/50 LWB	Twin Line
8611-028-06	VRDM 397/50 LWB	
8611-029-06	VRDM 3910/50 LWB	
8611-030-06	VRDM 3913/50 LWB	
8611-031-06	VRDM 368/50 LNB	STAR step
8611-032-06	VRDM 397/50 LNB	
8611-033-06	VRDM 3910/50 LNB	
8611-034-06	VRDM 3913/50 LNB	

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			
Step 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.

For more information on motors and control systems, see catalogs "Controllers, Motors, Electrical Accessories".

Diagrams to different scales.

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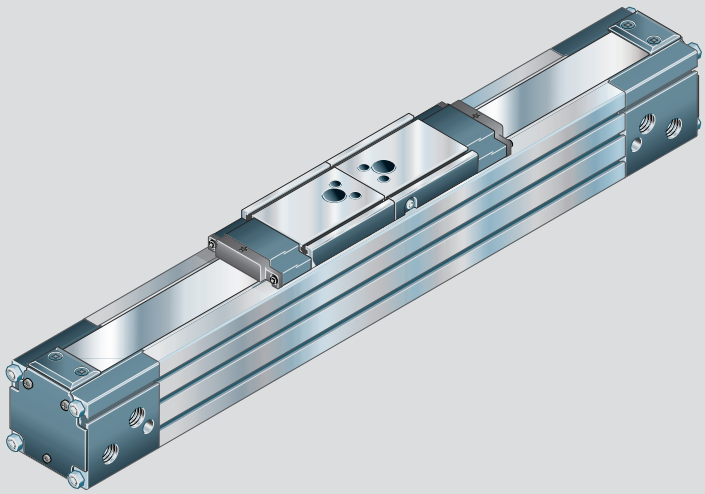
Rexroth Linear Modules MKP
Structure and Technical Data

MKP...: Linear Modules with integral Ball Rail System and integral Pneumatic Drive for motorless operation with compressed air.



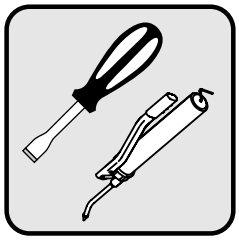
Structural design

- Extremely compact precision aluminum frame (main structure) with integral Rexroth Ball Rail System
- Pneumatic drive by means of integral belt cylinder
- End blocks with belt guide pulleys running on ball bearings
- Aluminum carriage with two integral runner blocks

Attachments

- Shock absorbers
- Switches
- Socket and plug for switches
- Sealing hose for T-slots

For mounting, start-up and maintenance, see MKP Instructions.



General technical data

Linear Module	Carriage length (mm)	Dynamic load capacity [1] C (N)	Dynamic moment [1] M_t (Nm)	M_L (Nm)	Maximum permissible load Forces $F_{x.max}$ (N)	$F_{y.max}$ (N)	Moments $M_{t.max}$ (Nm)	$M_{l.max}$ (Nm)	Moved mass (kg)	Min. length L_{min} (mm)	Max. length L_{max} (mm)	Planar moment of inertia I_x (cm^4)	I_y (cm^4)
MKP 15-65	115	16250	200	560	8120	8120	81	280	0.75	300	3000	63	84
MKP 20-80	175	39640	500	1720	15270	15270	195	665	1.45	363	5600	156	207

[1] The dynamic load capacity ratings and dynamic moments are required in order to calculate the service life.

Modulus of elasticity E

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

Lengths in excess of L_{max}

Lengths in excess of L_{max} are available upon request.

Mass

MKP 15-65:
Mass (kg) = 0.00630 · L + 2.0

MKP 20-80:
Mass (kg) = 0.01056 · L + 4.5

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Drive data

Linear Module	Maximum permissible speed [2]	Piston dia.	Piston surface area A	Piston force (theoretical [3]) at operating pressure of 6 bar	10 bar	Damping distance	Damping energy E_{max} at 6 bar	Operating pressure range
	(m/s)	(mm)	(cm^2)	(N)	(N)	(mm)	(Nm)	(bar)
MKP 15-65	2	32	7.9	470	790	35	7.3	2 – 10
MKP 20-80	2	40	12.0	720	1200	46	15.8	2 – 10

[2] Higher speeds available on request.
[3] Force that can reasonably be used in practice: approx. 70% of the theoretical piston force (with 30% reserve for variable friction of the system).

Configuration and calculation

The following parameters must be taken into account when determining the dimensions of pneumatic modules:

1. Load on the ball rail system
2. End damping of the mass to be braked
3. Maximum centroid distance
4. Deflection of the linear module

1. Load on the ball rail system

Nominal service life

Please refer to the Ball Rail Systems catalog for further calculations.

Nominal service life in meters:

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^5$$

Nominal service life in hours:

$$L_{10h} = \frac{L_{10}}{60 \cdot v}$$

L_{10}	=	Nominal service life in meters	(m)
L_{10h}	=	Nominal service life in hours	(h)
C	=	Dynamic load capacity	(N)
F_m	=	Mean equivalent dynamic load	(N)
v	=	Speed	(m/min)

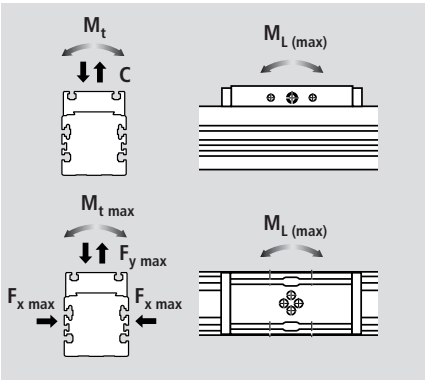
Note on dynamic load capacities and moments

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 values **C, M_t** and **M_L** from the table by 1.26.

Suitable load

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 to be acceptable estimates.
The following values may not be exceeded:

- the maximum permissible forces,
- the maximum permissible deflection,
- the permissible speed.



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2. End damping of the mass to be braked

Approximate configuration of the end damping based on graphs

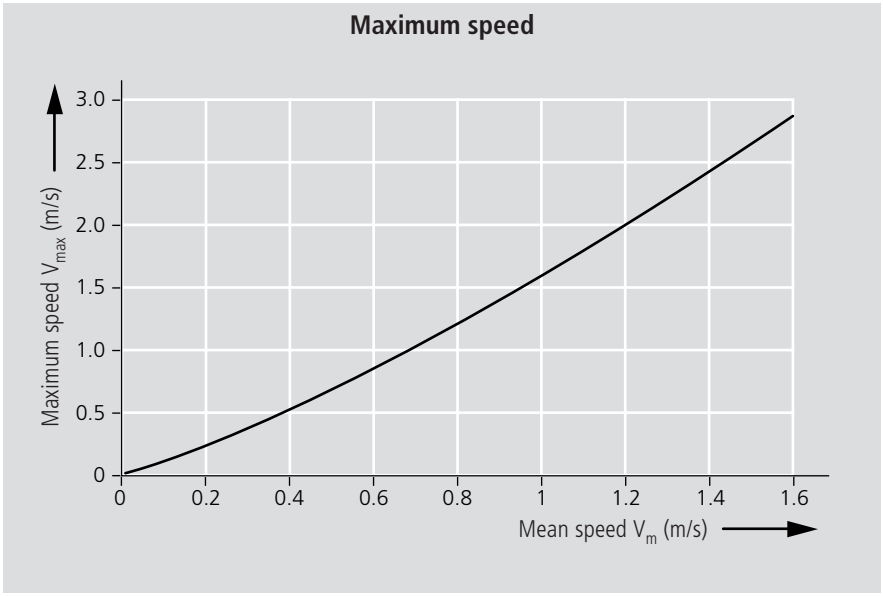
Damping selection depends greatly on the moved mass and its speed when approaching the end position. If the maximum speed is unknown, it can be determined approximately from the graph given alongside.

Maximum speed

The graph applies to:

- horizontal operation
- operating pressure of 6 bar
- operation without any additional external forces

To approximately determine the maximum speed, it is necessary to calculate the mean speed from the stroke and cycle time.



V_m (m/s) = stroke (m) / cycle time (s)

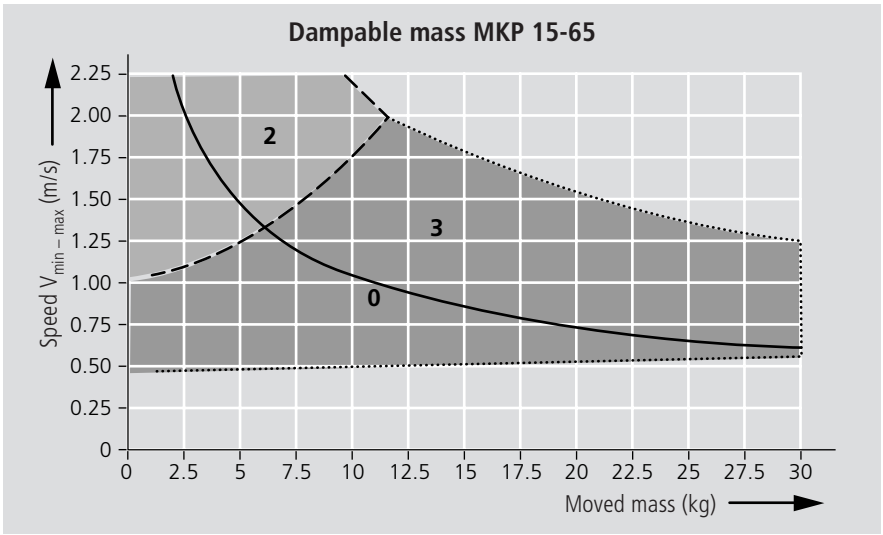
Dampable mass MKP 15-65

0 Integral damping
2 Shock absorber type 2
3 Shock absorber type 3

The graph applies to:

- horizontal operation
- operating pressure of 6 bar
- feed force of 470 N (without any additional external forces)

Note:
For any other operating pressure, additional external force or vertical operation, the mass to be braked should be verified by calculation.



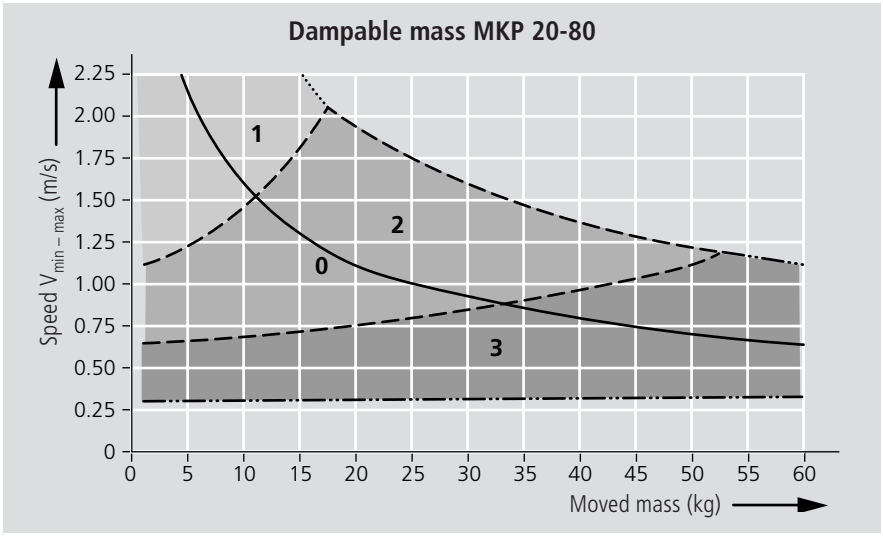
Dampable mass MKP 20-80

0 Integral damping
1 Shock absorber type 1
2 Shock absorber type 2
3 Shock absorber type 3

The graph applies to:

- horizontal operation
- operating pressure of 6 bar
- feed force of 720 N (without any additional external forces)

Note:
For any other operating pressure, additional external force or vertical operation, the mass to be braked should be verified by calculation.



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Calculation of the integral end damping

Even at high speeds, it must be possible to bring the carriage and moved mass to a smooth stop in the end positions.

The damping pressure $\mathbf{p_x}$ and the speed **v** are of particular importance in this respect.

(1)

$$E = \frac{m \cdot v^2}{2} \leq f_x \cdot E_{per}$$

E	=	Kinetic energy	(Nm)
m	=	Mass to be braked	(kg)
v	=	Speed	(m/s)
f_x	=	Pressure coefficient	
E_{per}	=	Per. damping energy	(Nm)

Note: For approximate configuration based on graphs, see previous page.

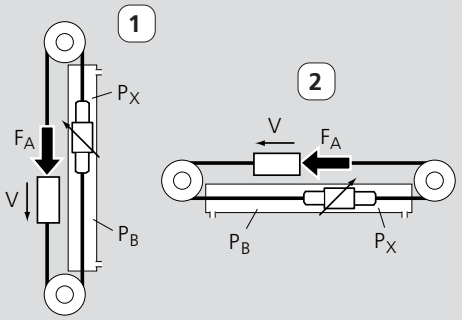
	E_{per} (Nm)
15-65	4.0
20-80	8.7

Conditions for damping pressure p_x

To stop mass m smoothly, the damping pressure must conform to the following conditions:

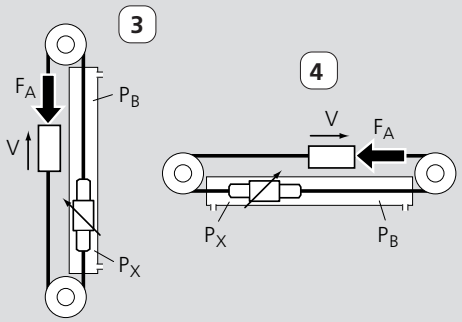
(2)

$$p_x = p_B + 0.1 \frac{F_A}{A} \leq 12 \text{ bar}$$



(3)

$$p_x = p_B - 0.1 \frac{F_A}{A} \leq 12 \text{ bar}$$

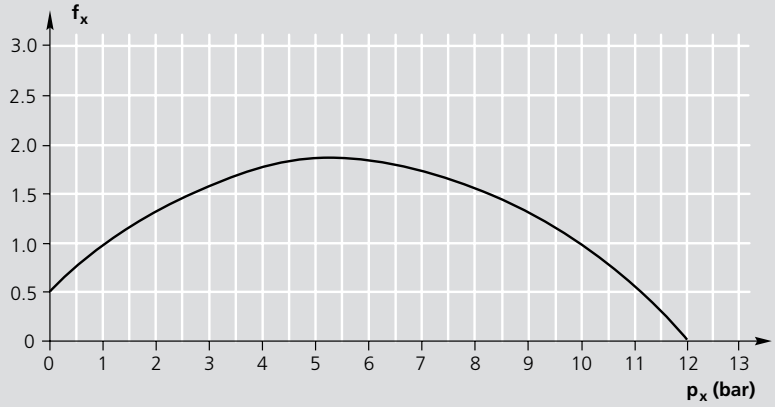


p_x	=	Damping pressure at the start of damping	(bar)
p_B	=	Operating pressure	(bar)
F_A	=	External force	(N)
A	=	Piston surface area (see table)	(cm^2)
0.1	=	Conversion factor $\left(\frac{cm^2 \cdot bar}{N}\right)$	

Note:
In the load examples illustrated in Figures (2) and (4), if inertia is the only active force, then $F_A = 0$ and therefore $p_x = p_B$

Pressure coefficient f_x for equation (1)

Damping pressure p_x at the start of damping from equation (2) or (3)



Result

If the damping pressure is less than 12 bar and the conditions of equation (1) are satisfied, the cylinder can brake mass **m** smoothly with its integral damping system.

If the maximum permissible damping pressure is exceeded, there are several possible solutions:

a Select a larger cylinder, or
b Change the operating pressure, or
c Provide external damping, or
– sensible combination of a, b and/or c.

MKP

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Rexroth Linear Modules MKP
Technical Data, Configuration, Calculations

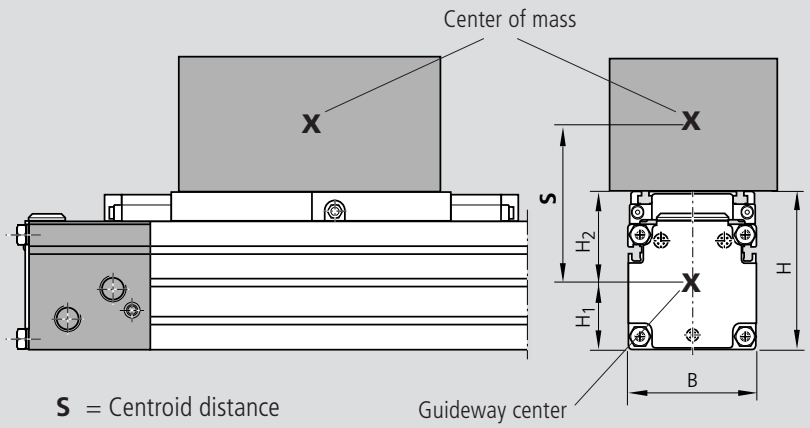
3. Maximum centroid distance

Maximum centroid distances from the carriage surface are derived from the permissible moment load of the ball rail system as a function of the:

– moved mass,
– maximum speed

for the approach to the end position.

Maximum centroid distance with integral damping



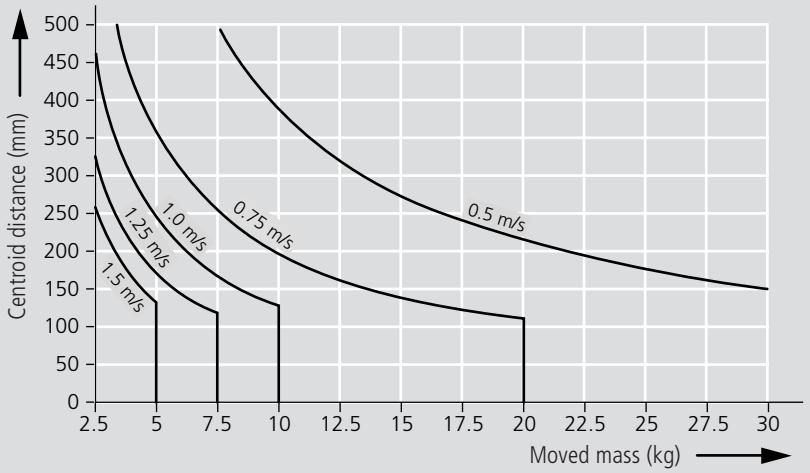
Size	B	H	H_1	H_2
MKP 15-65	65	85	41.3	43.7
MKP 20-80	80	100	54.4	45.6

Maximum centroid distance MKP 15-65

The graph applies to:

– horizontal operation
– operating pressure of 6 bar
– feed force of 470 N (without any additional external forces)
– optimum damping adjustment
– centric mass arrangement on the carriage

Maximum centroid distance MKP 15-65 with integral damping

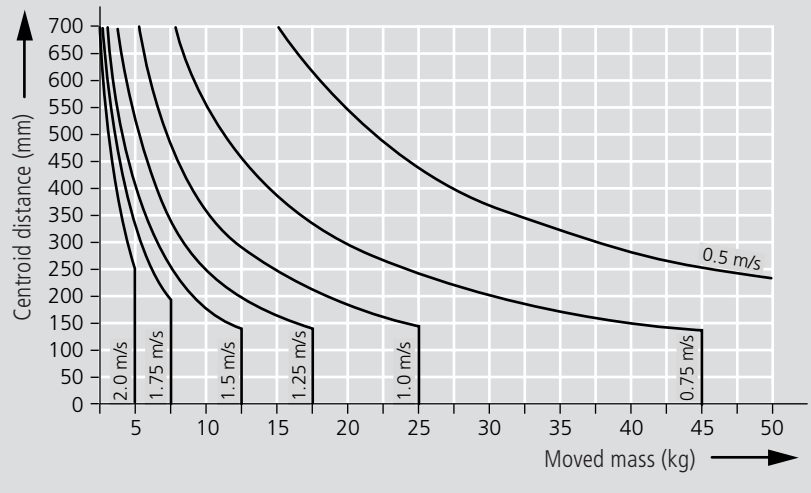


Maximum centroid distance MKP 20-80

The graph applies to:

– horizontal operation
– operating pressure of 6 bar
– feed force of 720 N (without any additional external forces)
– optimum damping adjustment
– centric mass arrangement on the carriage

Maximum centroid distance MKP 20-80 with integral damping



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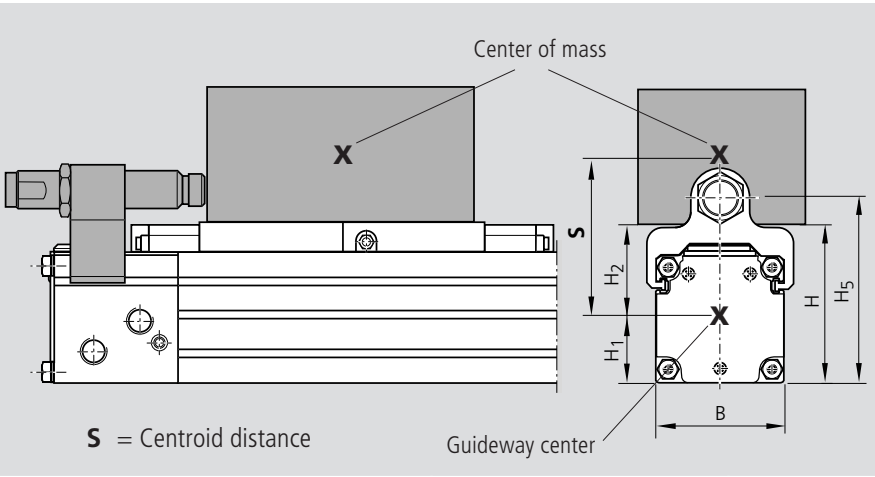
Maximum centroid distance with external shock absorbers



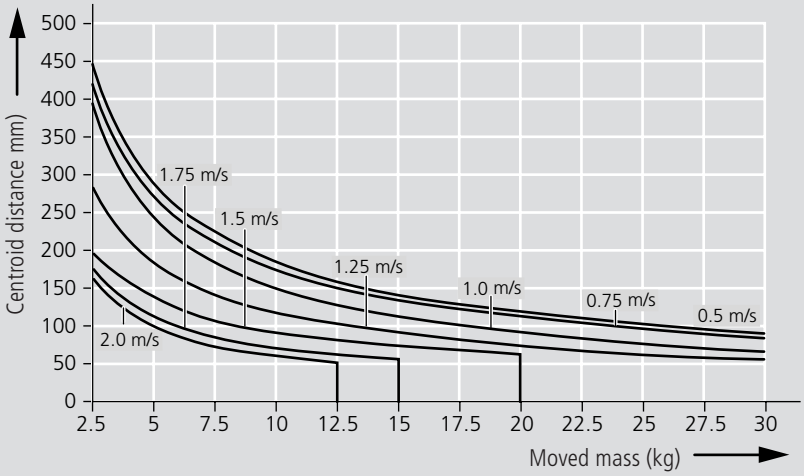
Size	B	H	H_1	H_2	H_5
MKP 15-65	65	85	41.3	43.7	98.5
MKP 20-80	80	100	54.4	45.6	118.5

Maximum centroid distance MKP 15-65

The graph applies to:

- horizontal operation
- operating pressure of 6 bar
- feed force of 470 N (without any additional external forces)
- optimum damping adjustment
- centric mass arrangement on the carriage

Maximum centroid distance MKP 15-65 with external shock absorbers

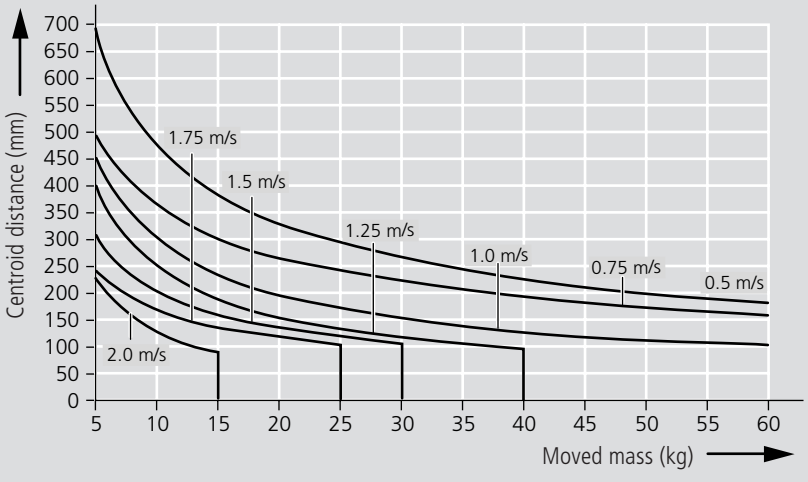


Maximum centroid distance MKP 20-80

The graph applies to:

- horizontal operation
- operating pressure of 6 bar
- feed force of 720 N (without any additional external forces)
- optimum damping adjustment
- centric mass arrangement on the carriage

Maximum centroid distance MKP 20-80 with external shock absorbers



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Rexroth Linear Modules MKP
Technical Data, Configuration, Calculations

4. Deflection of the Linear Modules

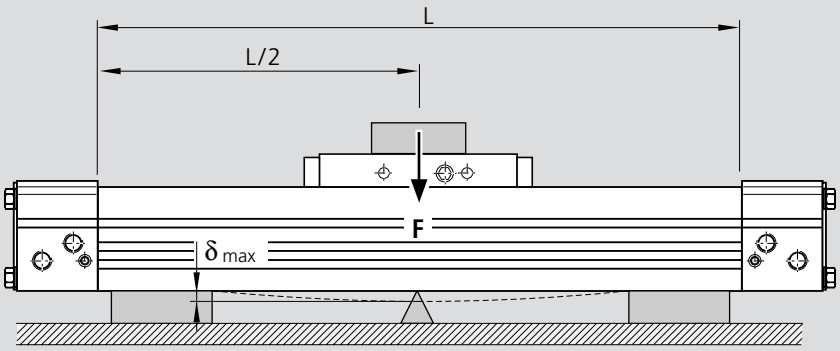
A special feature of linear modules is their suitability for cantilever installation.
If the modules are installed in this manner, however, the deflection must be observed. The deflection restricts the possible load.

If the maximum permissible deflection is exceeded, additional support must be provided.

Maximum permissible deflection δ_{max}

The maximum permissible deflection δ_{max} is dependent on the length L and the load F.

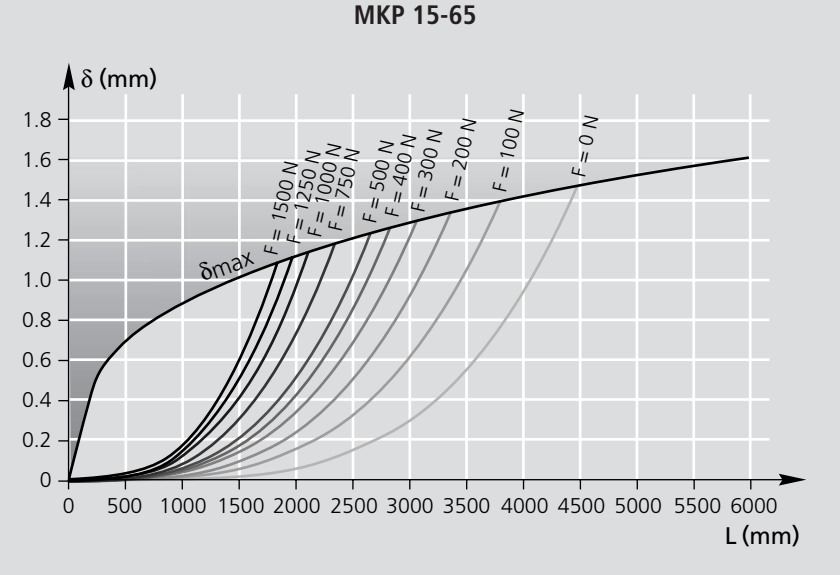
⚠ δ_{max} may not be exceeded!



The graph applies to:

- ends firmly clamped (approx. 200 mm on each side)
- 6 to 8 screws on each side
- fixed base

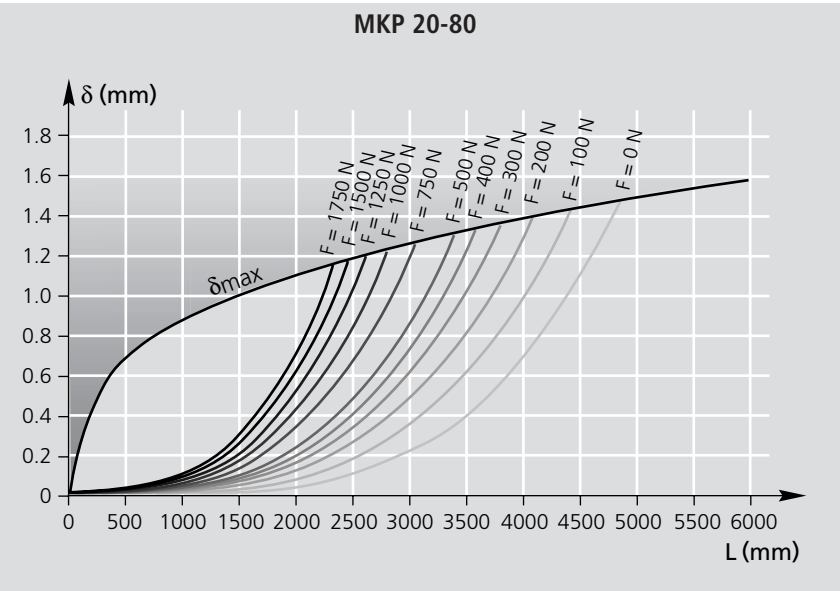
Example:
Linear Module MKP 15-65:
L = 2500 mm
F = 250 N
From graph:
δ = 0.6 mm
δ_{max} = 1.2 mm
The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.



The graph applies to:

- ends firmly clamped (approx. 200 mm on each side)
- 6 to 8 screws on each side
- fixed base

Example:
Linear Module MKP 20-80:
L = 3000 mm
F = 500 N
From graph:
δ = 0.87 mm
δ_{max} = 1.25 mm
The deflection δ is clearly below the maximum permissible deflection δ_{max}, therefore no additional support is necessary.



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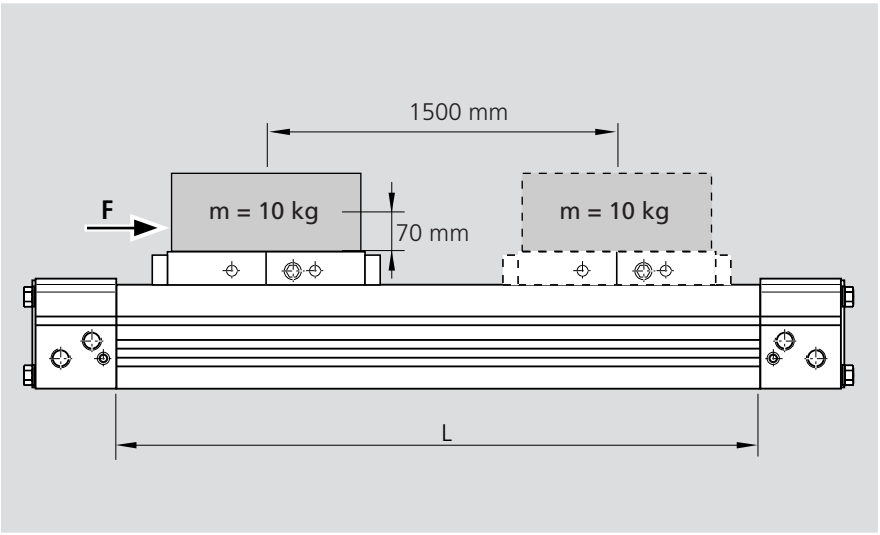
Selection example

A useful payload of 10 kg is to be moved horizontally over a distance of 1,500 mm in 2 seconds.

The centroid of the moved mass is some 70 mm above the top edge of the carriage.



Calculating the mean speed

v_m = travel (m) / cycle time (s)
= 1.5 m / 2 s = 0.75 m/s

Maximum speed

For graphs, see "2. End damping of the mass to be braked".

v_{max} = 1.2 m/s ("Maximum speed" graph)

Moved mass

m_{mov} = useful payload (kg) + carriage (kg)
= 10 kg + 0.75 kg (MKP 15-65) = 10.75 kg

Size and type of damping

For graphs, see "2. End damping of the mass to be braked".

Possible combinations from "Dampable mass" graphs:

- MKP 15-65 with shock absorber type 3
- MKP 20-80 with integral damping (external shock absorbers unnecessary)

Maximum centroid distance

MKP 15-65 with shock absorber type 3:
- Centroid distance S = 70 mm + 43.7 mm (H_2) = 113.7 mm
- Approx. 120 mm permissible (from graph "Maximum centroid distance MKP 15-65 with external shock absorbers")

MKP 20-80 with integral damping:
- Centroid distance S = 70 mm + 45.6 mm (H_2) = 115.6 mm
- Approx. 230 mm permissible (from graph "Maximum centroid distance MKP 20-80 with integral damping")

Verifying the deflection

MKP 15-65 at L = 1650 mm:
δ = 0.08 mm δ_{max} = 1.05 mm

MKP 20-80 at L = 1688 mm:
δ = 0.05 mm δ_{max} = 1.07 mm

Both sizes can be applied in regard to the maximum permissible deflection.

Result

Selected: MKP 20-80 with integral damping

Reason: Both module sizes are able to meet the requirements. MKP 15-65, however, requires the attachment of shock absorbers, which MKP 20-80 does not need. MKP 20-80, moreover, has much higher reserves in terms of feed force, load capacities and moments.

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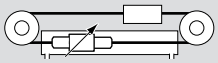
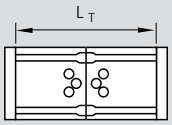
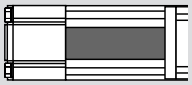
Rexroth Linear Modules MKP 15-65
Components and Ordering

Part number, length	Guideway = (..)	Drive unit = (..)	Carriage = (..)	Cover = (..)	
					
			L_T = 115 mm	with PU strip	with extra side sealing
1153-000-00, (....) mm	(01)	(01)	(05)	(01)	(02)

Order example

Ordering data		Description
Linear Module (Part number): 1153-000-00, 2450 mm		Linear Module MKP 15-65, length 2450 mm
Guideway	= 01	ball rail system
Drive unit	= 01	pneumatic drive
Carriage	= 05	carriage with two runner blocks, length L_T = 115 mm
Cover	= 01	PU sealing strip
End damping	= 22	with 2 shock absorbers, type 2
1st switch	= 21	Reed contact with 2.5 m cable
2nd switch	= 23	Reed contact with 10 m cable
3rd switch	= 22	PNP NO with 2.5 m cable
Socket-plug	= 17	socket-plug supplied loose
Documentation	= 01	standard report

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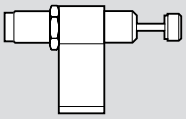
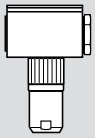
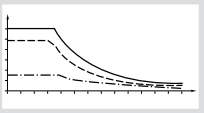
	End damping = ..		1st, 2nd, 3rd switch = ..			Socket-plug = ..		Documentation = ..
								
	with integral pneumatic end damping	with 2 shock absorbers Type 2[1]	with 2 shock absorbers Type 3[2]	without switch	Reed contact	PNP NO	without	with	Standard report
	(00)	(22)	(23)	(00)	(21) 2.5 m cable	(22) 2.5 m cable	(00)	(17)	(01)
					(23) 10 m cable	(24) 10 m cable			

1) Type 2 for smaller moved masses (see graphs in "Technical Data, Configuration, Calculations")
2) Type 3 for larger moved masses (see graphs in "Technical Data, Configuration, Calculations")

Note

Switches and shock absorbers are supplied loose.

Calculating the linear module length

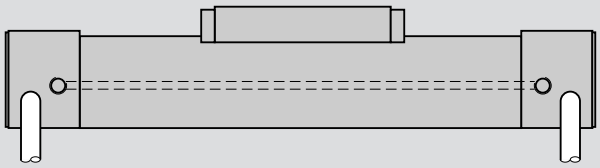
L = travel + 150 mm

The linear module MKP 15-65 is normally supplied in multiples of 5 mm.

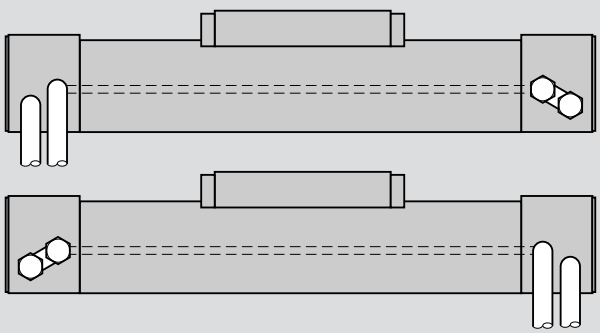
Minimum length: 300 mm
Maximum length: 3000 mm

Possibilities for compressed air connection

At both end blocks



At one end block only with duct adapter
(see "Mounting/Duct Adapter")



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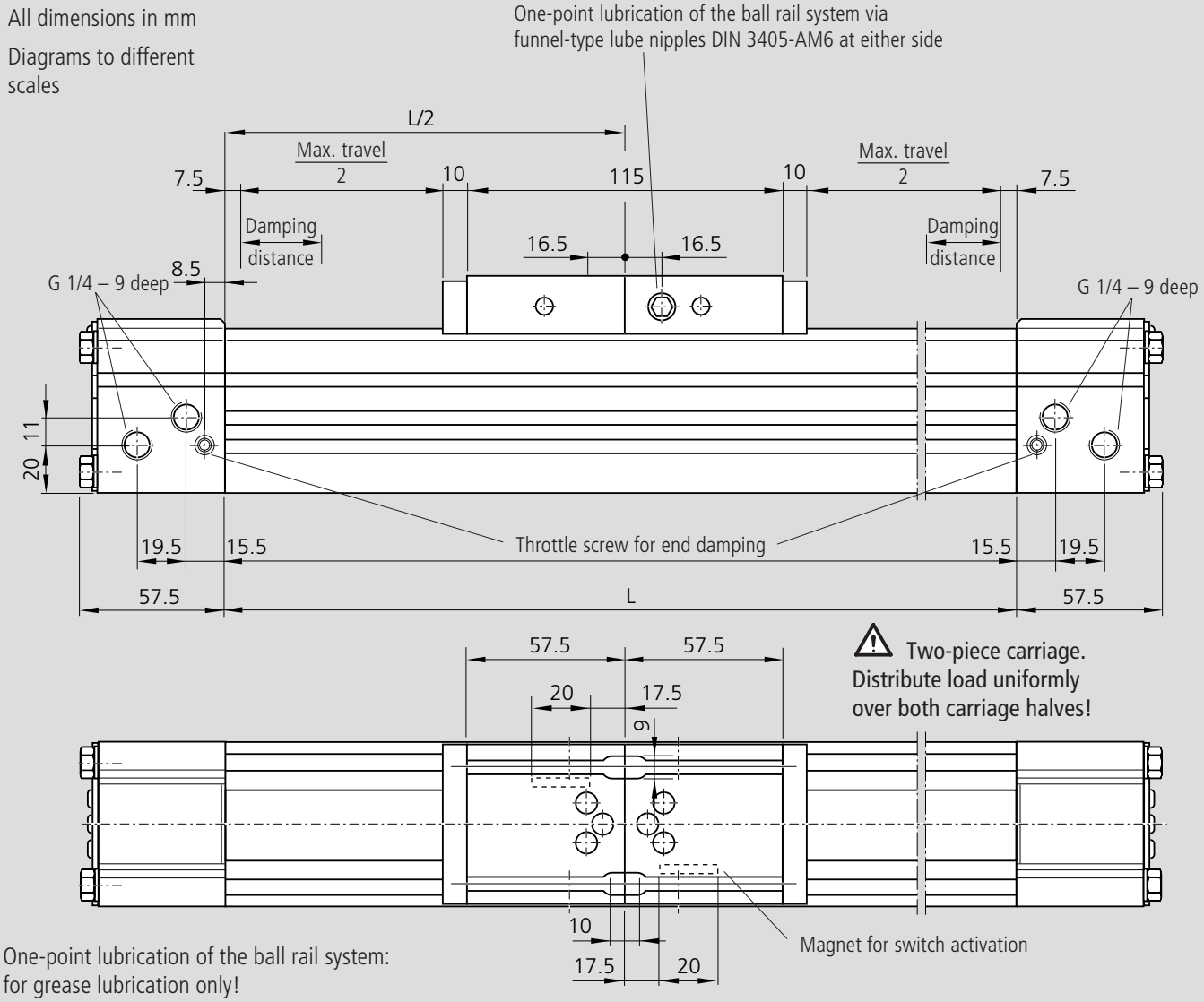
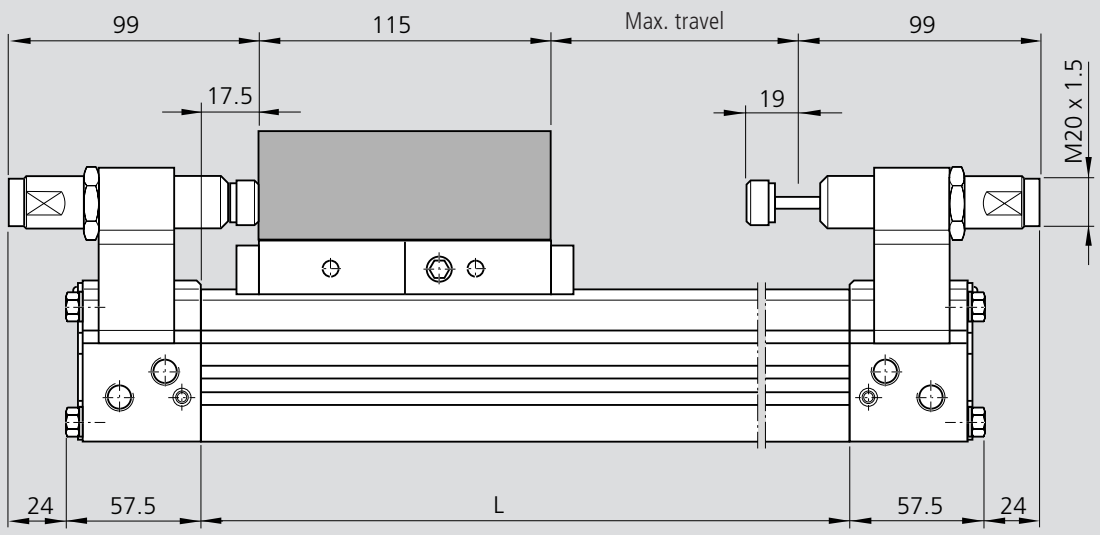
Rexroth Linear Modules MKP 15-65
Dimension Drawings

All dimensions in mm

Diagrams to different scales



MKP 15-65 with shock absorbers (example of mounting on end block)



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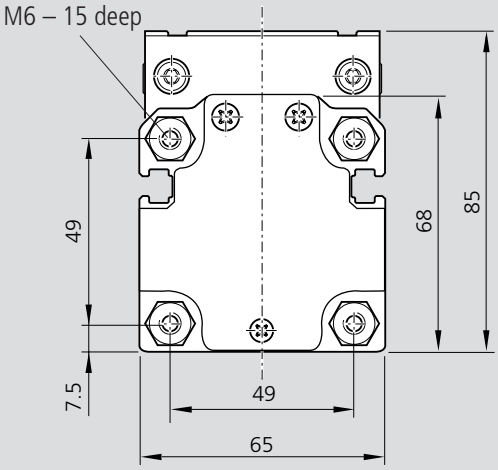

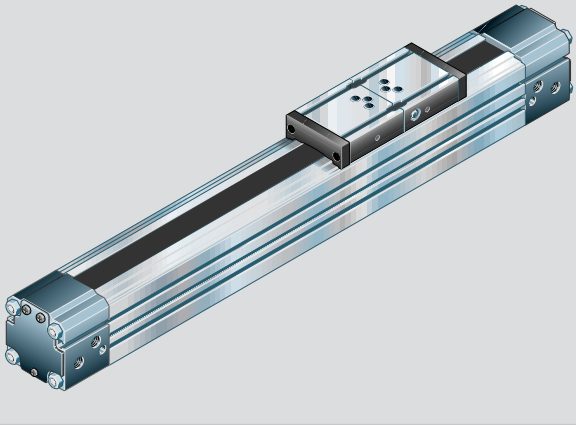

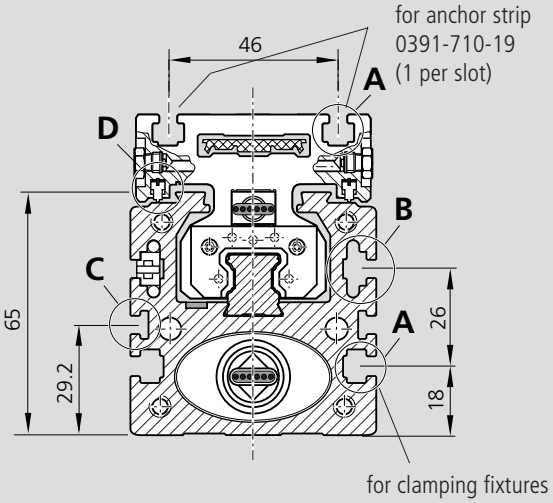

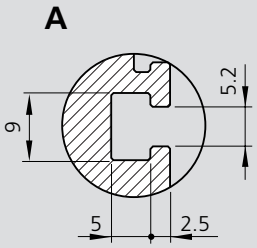

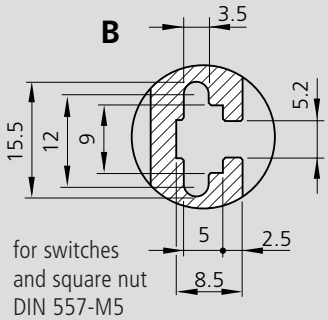

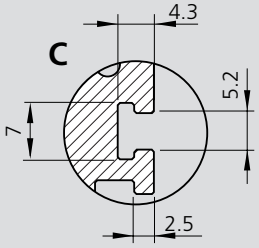

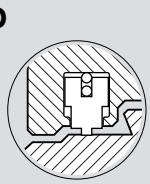

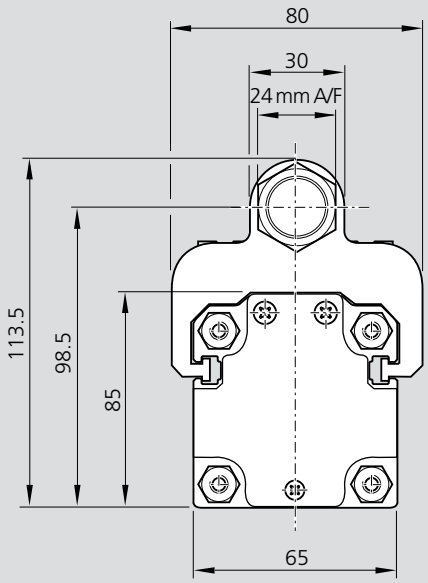

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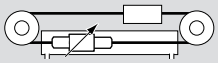
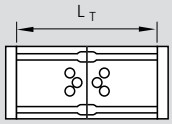
Rexroth Linear Modules MKP 20-80
Components and Ordering

Part number, length	Guideway = (..)	Drive unit = (..)	Carriage = (..)	Cover = (..)		
						
			L_T = 175 mm	with sealing strip	with extra side sealing	
1153-100-00, (....) mm	(01)	(01)	(05)	(01)	(02)	

Order example

Ordering data		Description
Linear Module (Part number): 1153-100-00, 2488 mm		Linear Module MKP 20-80, length 2488 mm
Guideway	= 01	ball rail system
Drive unit	= 01	pneumatic drive
Carriage	= 05	carriage with two runner blocks, length L_T = 175 mm
Cover	= 02	steel sealing strip with side sealing
End damping	= 22	with 2 shock absorbers, type 2
1st switch	= 21	Reed contact with 2.5 m cable
2nd switch	= 23	Reed contact with 10 m cable
3rd switch	= 22	PNP NO with 2.5 m cable
Socket-plug	= 17	socket-plug supplied loose
Documentation	= 01	standard report

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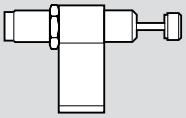
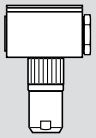
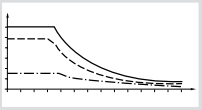
	End damping = ..			1st, 2nd, 3rd switch = ..		Socket-plug = ..		Documentation = ..
								
	with integral pneumatic end damping	with 2 shock absorbers		without switch	Reed contact	PNP NO	without	with	Standard report
		Type 1*	Type 2*	Type 3*					
	00	21	22	23	00	21 2.5 m cable	22 2.5 m cable	00	17	01
						23 10 m cable	24 10 m cable			

* For differences between shock absorber type 1, 2 and 3, see graphs in "Technical Data, Configuration, Calculations".

Note

Switches and shock absorbers are supplied loose.

Calculating the linear module length

L = travel + 188 mm

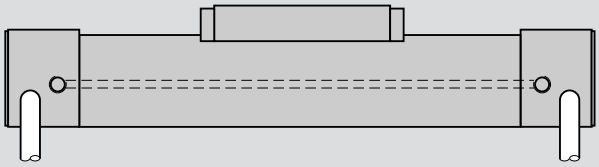
The linear module MKP 20-80 is normally supplied in multiples of 5 mm.

Minimum length: 363 mm
Maximum length: 5600 mm

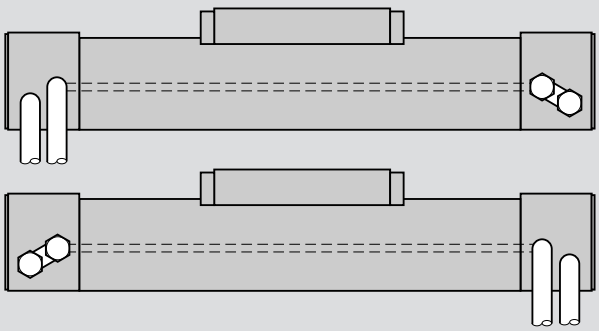
MKP

Possibilities for compressed air connection

At both end blocks



At one end block only with duct adapter
(see "Mounting/Duct Adapter")



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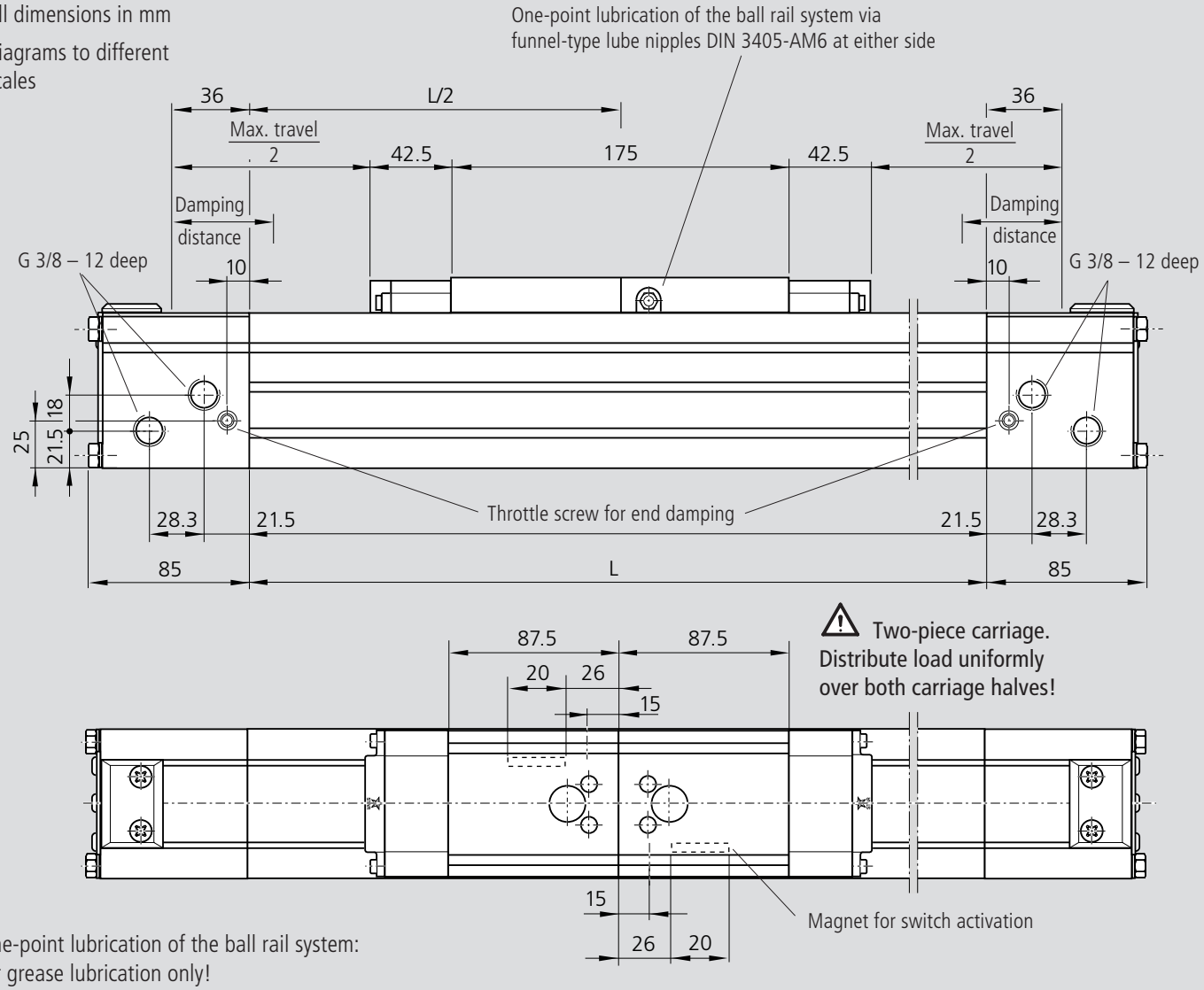
Rexroth Linear Modules MKP 20-80
Dimension Drawings

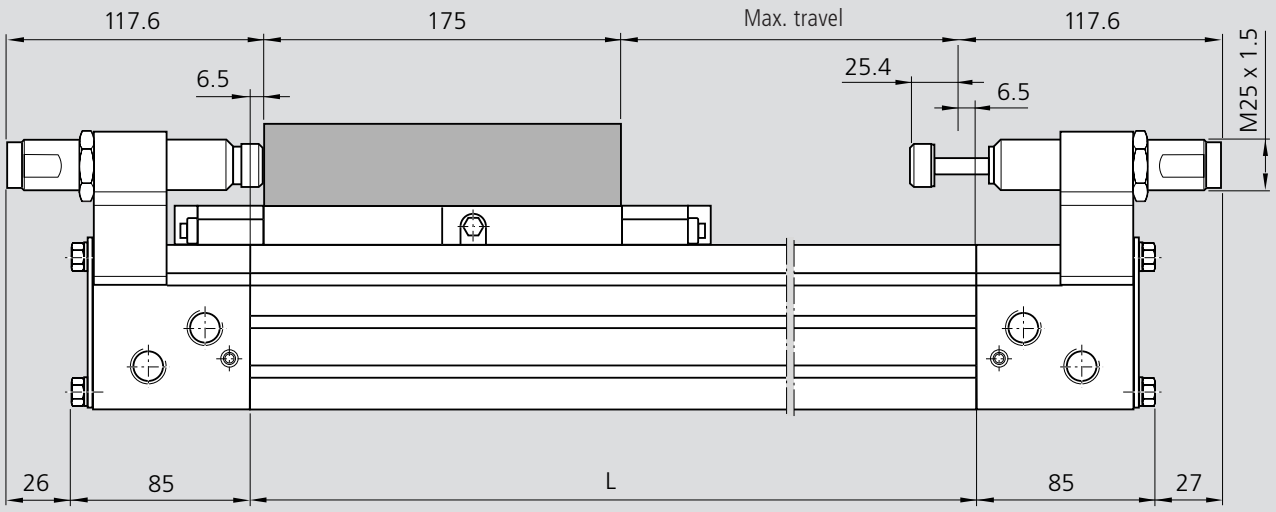
All dimensions in mm

Diagrams to different scales



One-point lubrication of the ball rail system: for grease lubrication only!

MKP 20-80 with shock absorbers (example of mounting on end block)



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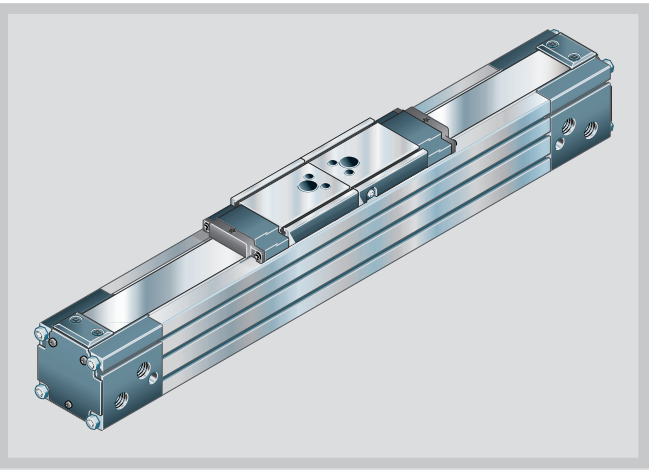

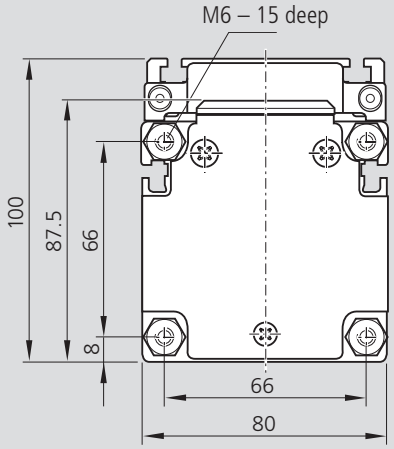

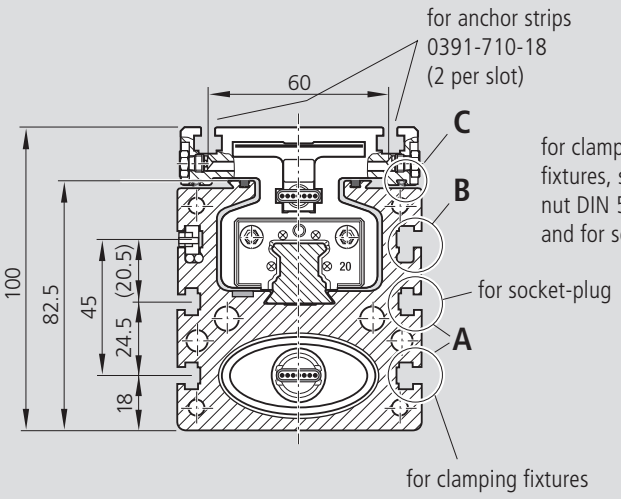

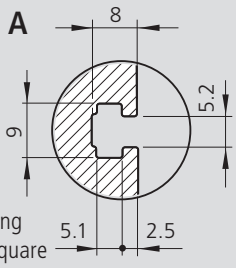

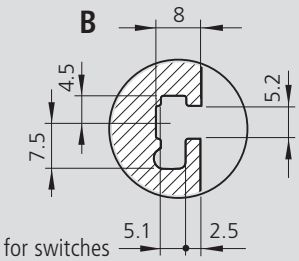

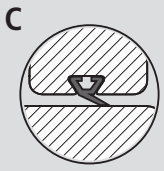

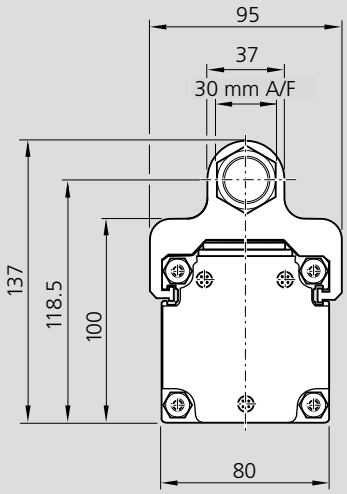

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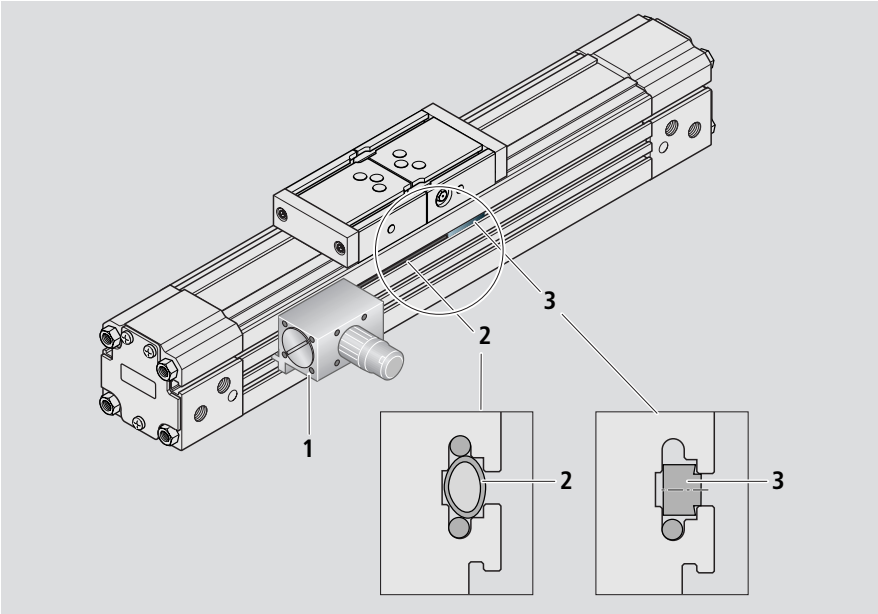
Rexroth Linear Modules MKP
Switch Mounting Arrangements

Overview of the switching system

1 Socket and plug
2 Sealing hose for T-slots
3 Switches



Socket and plug

- Fit the socket to the side with the most switches.

Socket and switch are not wired. The switch activation points can thus be optimized during start-up.

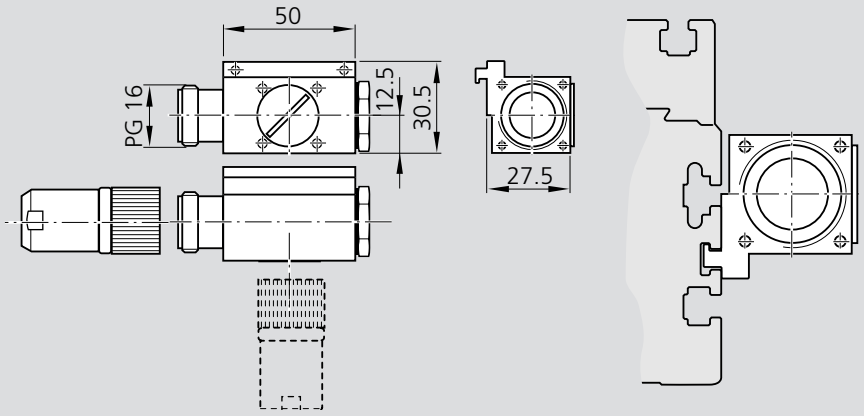
A plug is provided.

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

Mounting the socket and plug:

- Insert the socket into the T-slot provided in the frame and fasten it with two set screws.

Part number: 1414-000-61

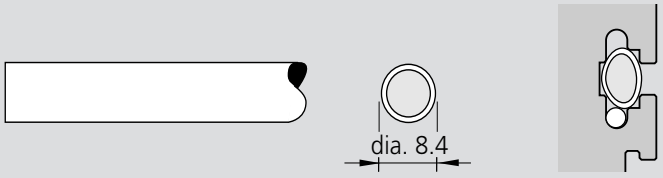


Sealing hose for T-slots

Plastic hose sold by the meter.

Sealing the T-slots protects the slots against dirt and prevents the switch cable from falling out.

Part number: 1175-090-71, ... mm



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Switches

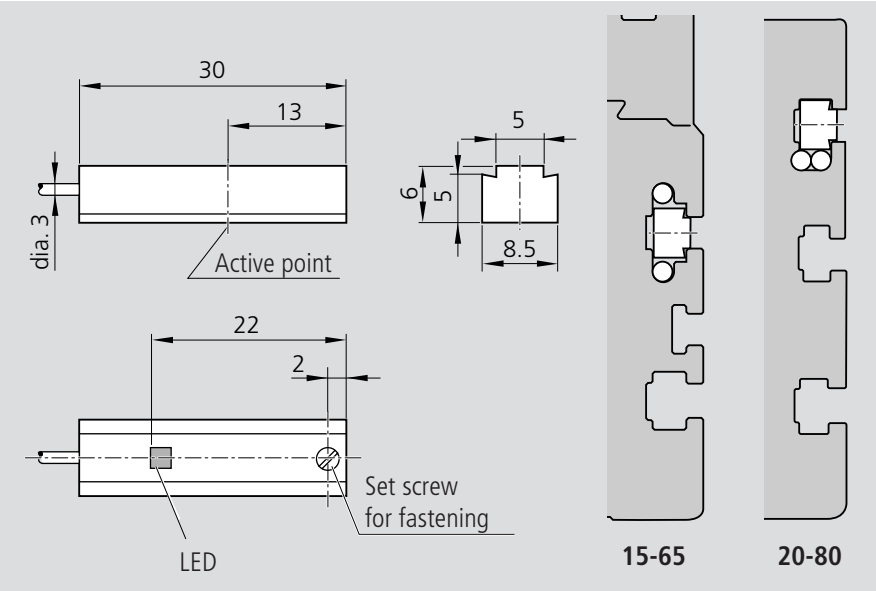
Miniature switches with potted cable.

Type:
– Reed contact
– Magnetic field proximity switch

Installation instructions:
The switches are supplied loose.

Switch positions can be chosen by customers themselves to suit their own requirements.

Insert the switches into the T-slots of the frame and fasten them with set screws.



Part numbers, switches	
Cable length	**Part number**
2.5 m	8616-011-03
10 m	8616-015-03

Reed Contact (technical data)

Designation	=	magnetic field switch
Contact type	=	normally open (“make”)
Housing material	=	plastic
Connecting cable	=	2 x 0.14 mm^2
Cable length	=	2.5 m / 10 m
Installation position	=	any
Ambient temperature	=	–25 to +75°C
Operating voltage	=	3 – 30 V DC/ – 220 V AC
Continuous current rating	=	max. 100 mA
Switched current	=	up to 24 V DC: max. 40 mA
	=	up to 220 V AC: max. 25 mA
Enclosure protection class	=	IP 67

Part numbers, switches	
Cable length	**Part number**
2.5 m	8616-016-03
10 m	8616-017-03

Magnetic field proximity switch (technical data)

Designation	=	magnetic field proximity switch
Contact type	=	PNP normally open (“make”)
Housing material	=	plastic
Connecting cable	=	3 x 0.14 mm^2
Cable length	=	2.5 m / 10 m
Installation position	=	any
Ambient temperature	=	–25 to +75°C
Operating voltage	=	3 – 30 V DC
Continuous current rating	=	max. 150 mA
Enclosure protection class	=	IP 67

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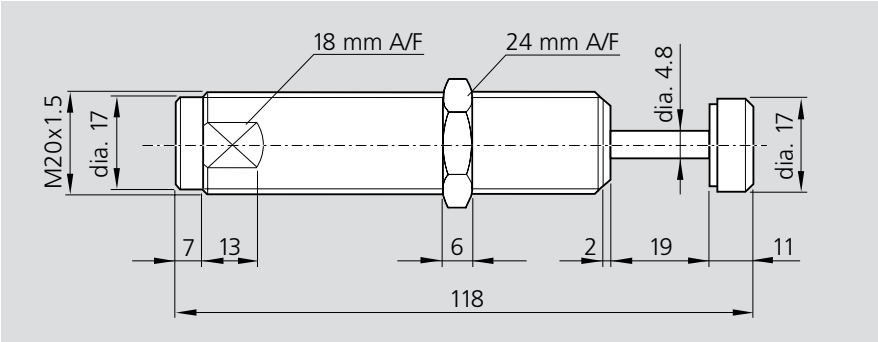
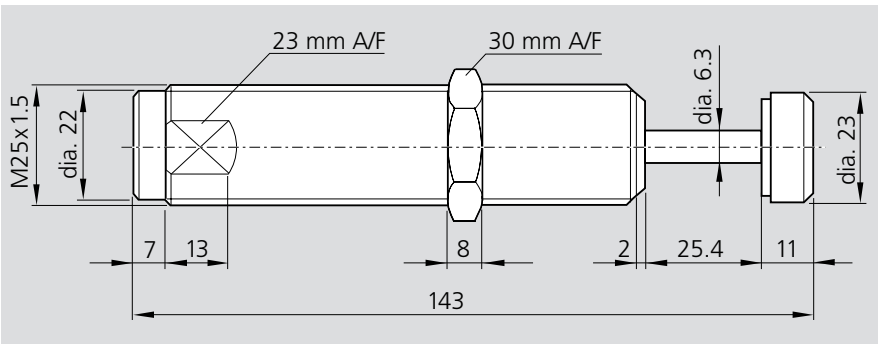
Rexroth Linear Modules MKP
Shock absorbers

Shock absorbers for MKP 15-65



	Part number	
Size	**Type 2**	**Type 3**
15-65	**8455-030-57**	**8455-030-58**
Eff. mass soft contact (kg)	7.0 – 23	23 – 68
Eff. mass self-compensating (kg)	4.5 – 27	14 – 82
Total energy/stroke (Nm)	33	33
Total energy/hour (Nm/h)	45 000	45 000
Spring force (N)	5 – 10	5 – 10
Piston return time (s)	0.1	0.1
Max. axial deviation (°)	5	5

Shock absorbers for MKP 20-80



	Part number		
Size	**Type 1**	**Type 2**	**Type 3**
20-80	**8455-030-59**	**8455-030-60**	**8455-030-61**
Eff. mass soft contact (kg)	11 – 36	34 – 113	109 – 363
Eff. mass self-compensating (kg)	8 – 45	23 – 136	68 – 408
Total energy/stroke (Nm)	73	73	73
Total energy/hour (Nm/h)	68 000	68 000	68 000
Spring force (N)	11 – 32	11 – 32	11 – 32
Piston return time (s)	0.2	0.2	0.2
Max. axial deviation (°)	5	5	5

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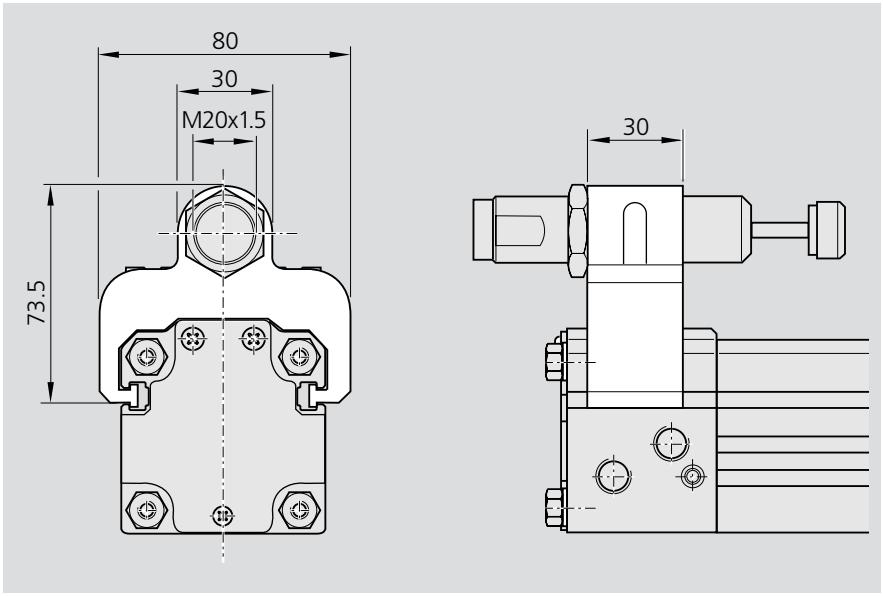
Shock Absorber Holder, Duct Adapter

Shock absorber holder for MKP 15-65

Part number: 1175-001-28

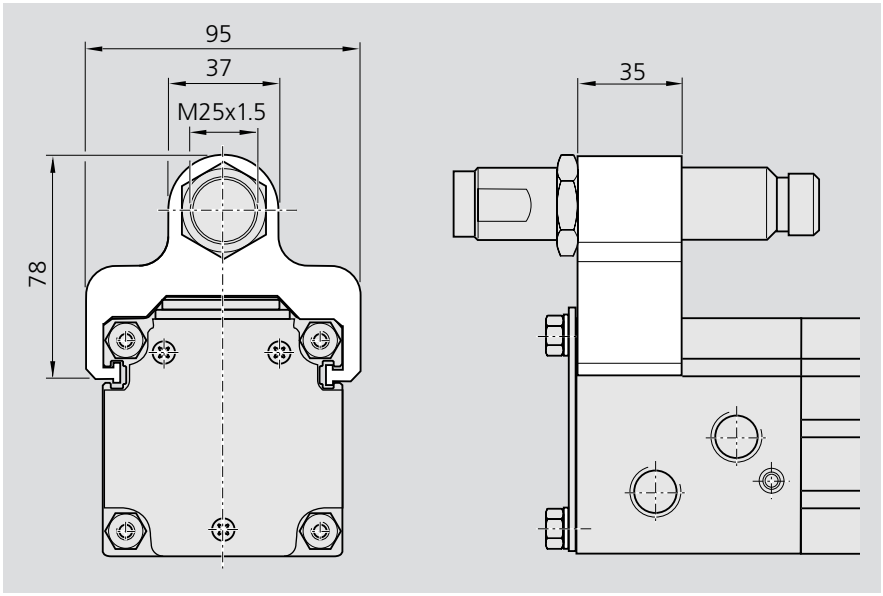
Set screws and cylindrical pins are provided.



Shock absorber holder for MKP 20-80

Part number: 1175-101-28

Set screws and cylindrical pins are provided.

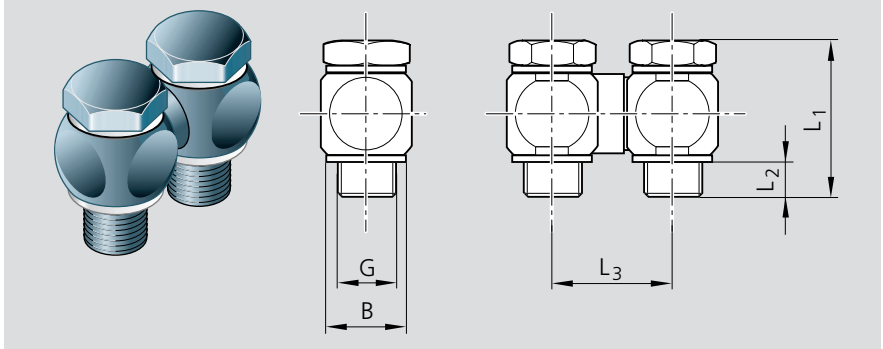


Duct adapter

For completion of the compressed air circuit at the other end block of the linear module if the compressed air supply is connected to one end block only.

For connection possibilities, see "Components and Ordering".

MKP 15-65 / MKP 20-80



Size	Part number	G	Dimensions (mm) A/F	L_1	L_2	L_3	B
15-65	8455-030-45	1/4"	17	29.5	8.0	22.5	20
20-80	8455-030-62	3/8"	22	37.5	7.5	33.6	24

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Rexroth Robotic Erector System for Linear Modules / Profiles

Connectors for Linear Modules have been designed for easy and rapid adaption of the modules to profiles and frames from Rexroth's Basic Mechanical Elements range.

The connectors are supplied as complete kits with all parts required to mount the Linear Modules to the Profile System structures. These light-weight connectors made from high-strength aluminum alloys constitute only a slight additional load on the structure.

Linear Modules are available with toothed belt drive, screw drive, pneumatic drive, and rack and pinion drive.

There is also a series of connectors available for mounting Linear Modules to each other.

For more information, see the "Basic Mechanical Elements" catalog.

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

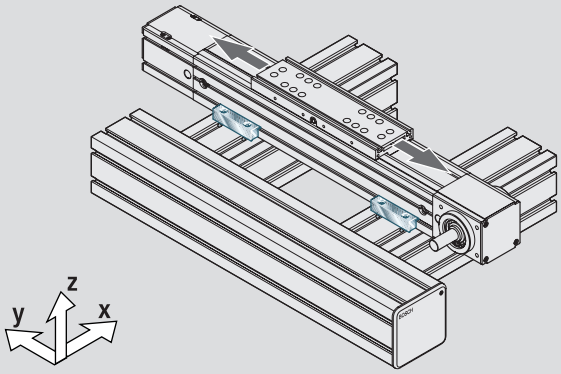
⚠ With motor attachments the motor may possibly extend into the work zone of adjacent axes.

Make sure it will not obstruct any motion!

Connection using clamping fixtures

Linear Module
– mounted transversally on profile (Y axis)
– fixed by the frame

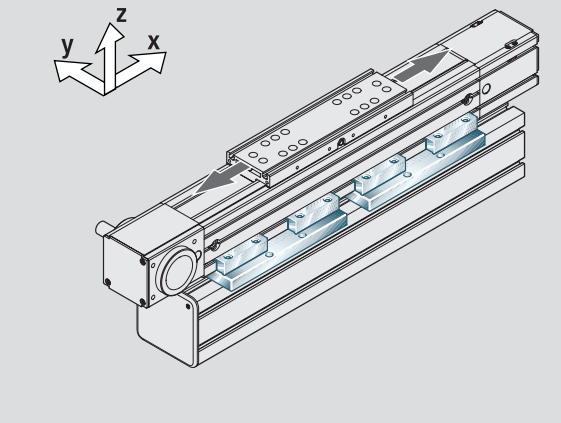
Carriage travels



Connection using connection plates

Linear Module
– mounted longitudinally on profile (X axis)
– fixed by the frame

Carriage travels



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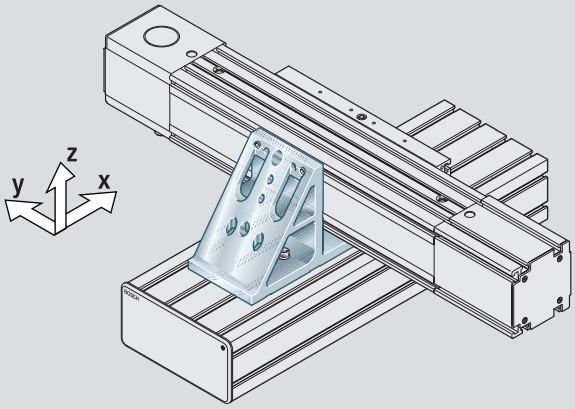
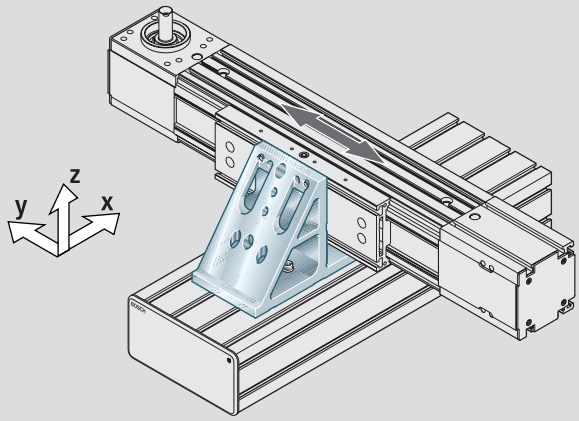
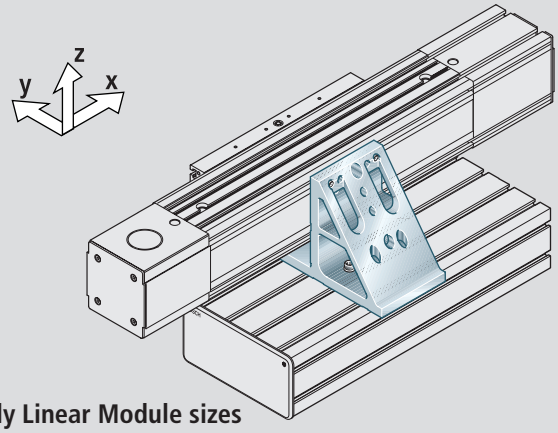
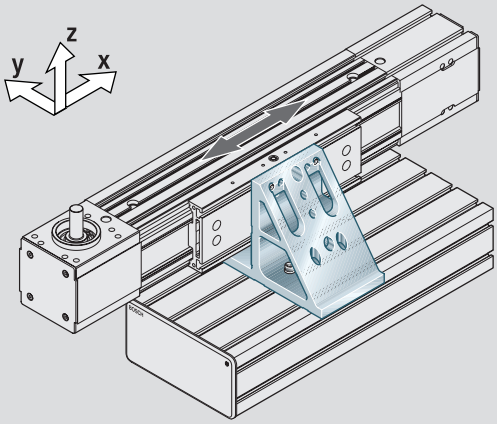
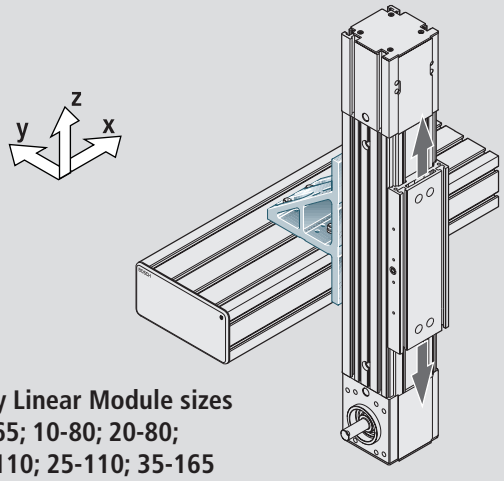
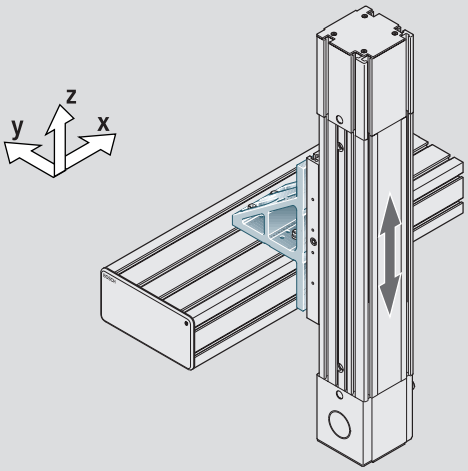
Connection using angle brackets

Carriage travels / frame stationary	Carriage stationary / frame travels
Linear module mounted transversally on profile (Y axis)	Linear module mounted transversally on profile (Y axis)
	
Only Linear Module sizes 10-110; 25-110; 35-165	
Linear module mounted longitudinally on profile (X axis)	Linear module mounted longitudinally on profile (X axis)
	
Only Linear Module sizes 10-110; 25-110; 35-165	
Linear module mounted perpendicular to profile (Z axis)	Linear module mounted perpendicular to profile (Z axis)
	
Only Linear Module sizes 15-65; 10-80; 20-80; 10-110; 25-110; 35-165	

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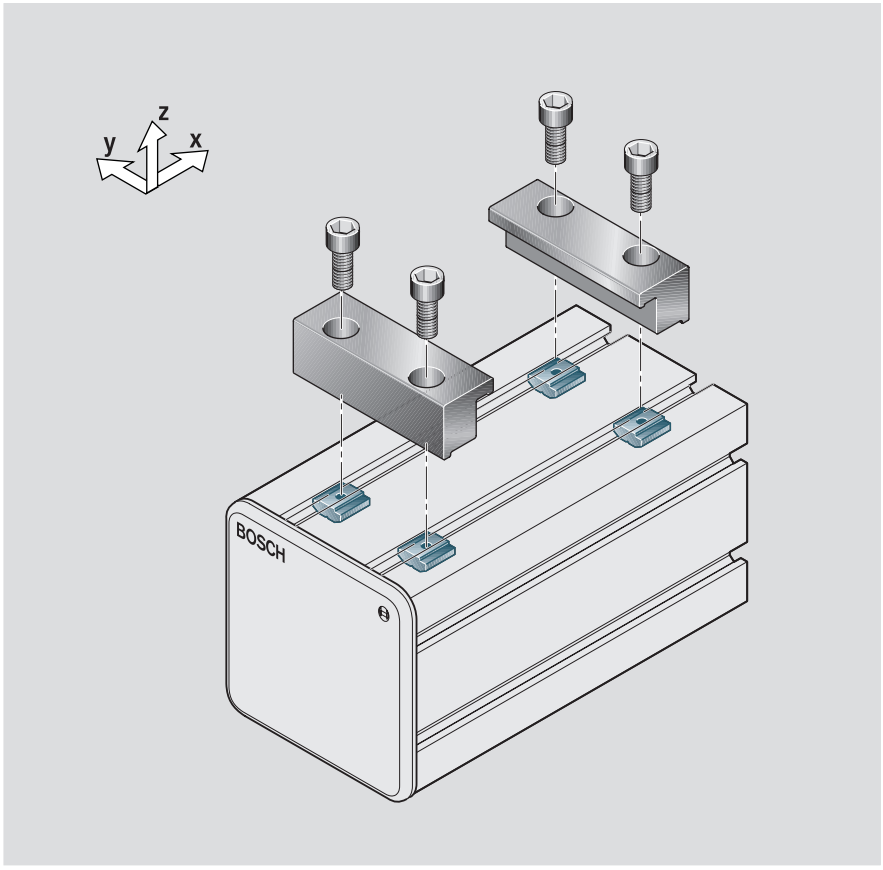
Rexroth Robotic Erector System for Linear Modules / Profiles

Clamping Fixture Kits

Linear Module – in the Y axis
– carriage travels

Material	
Clamping fixture	aluminum alloy
T-nut	steel
Finish / color	
Clamping fixture	black, anodized
Screw	black, Tuflok coated
T-nut	galvanized

Clamping fixture kits have been designed to fit basic profile section sizes 50 and 40. The Linear Module must be mounted by the frame.

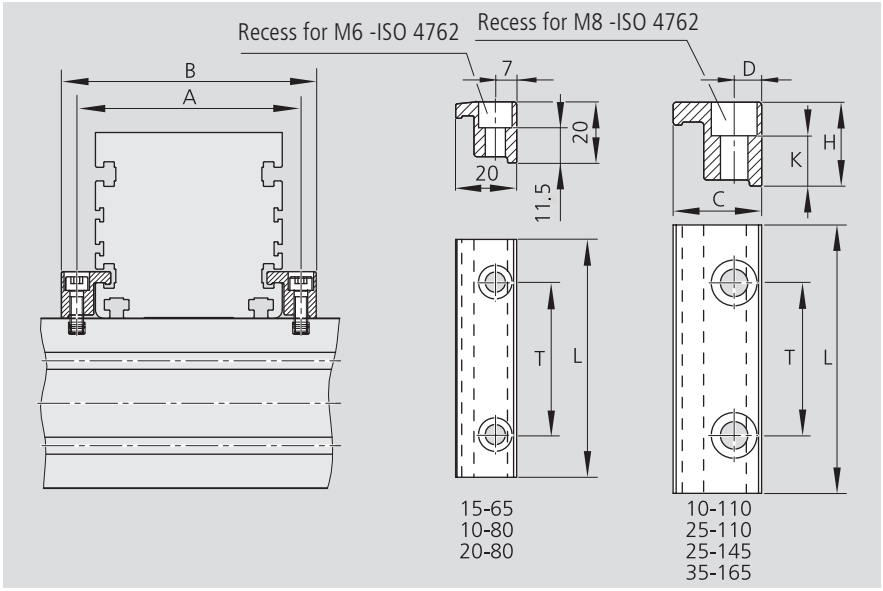


Mounting instructions

- Align the supporting structure.
- Preassemble the mounting kits.
- Position the Linear Module.
- When mounting the Linear Modules, observe the maximum tightening torques as indicated in the table.

– Recommended number of clamping fixtures: 3 per meter and side – Take account of this when designing the supporting structure!

Linear Module	Dimensions in mm A	B
15-65	81	95
10-80; 20-80	96	110
10-110; 25-110	132	150
25-145	172	198
35-165	192	218



Tightening torques of the mounting screws

with friction factor 0.125

8.8	M4	M6	M8
(Nm)	2.7	9.5	23

Scope of supply

Clamping fixture mounting kit

– 2 pcs. clamping fixture
– 4 pcs. socket head screw
– 4 pcs. T-nut

Linear Module	Section size	Dimensions (mm) C	D	K	H	T	L	Mass (kg)	Part number mounting kit
15-65, 10-80	50	-	-	-	-	50	78	0.17	0391-200-86
and 20-80	40	-	-	-	-	40	68	0.15	0391-200-87
10-110	50	29	9	15	27.5	50	88	0.33	0391-200-88
and 25-110	40	29	9	15	27.5	40	78	0.30	0391-200-89
25-145	50	41	13	20	32	50	98	0.54	0391-200-90
35-165	50	41	13	25	40.5	50	98	0.65	0391-200-91

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Connection Plate Mounting Kits

Linear Module – in the X axis
– carriage travels
– frame travels
(only possible with size 35-165)

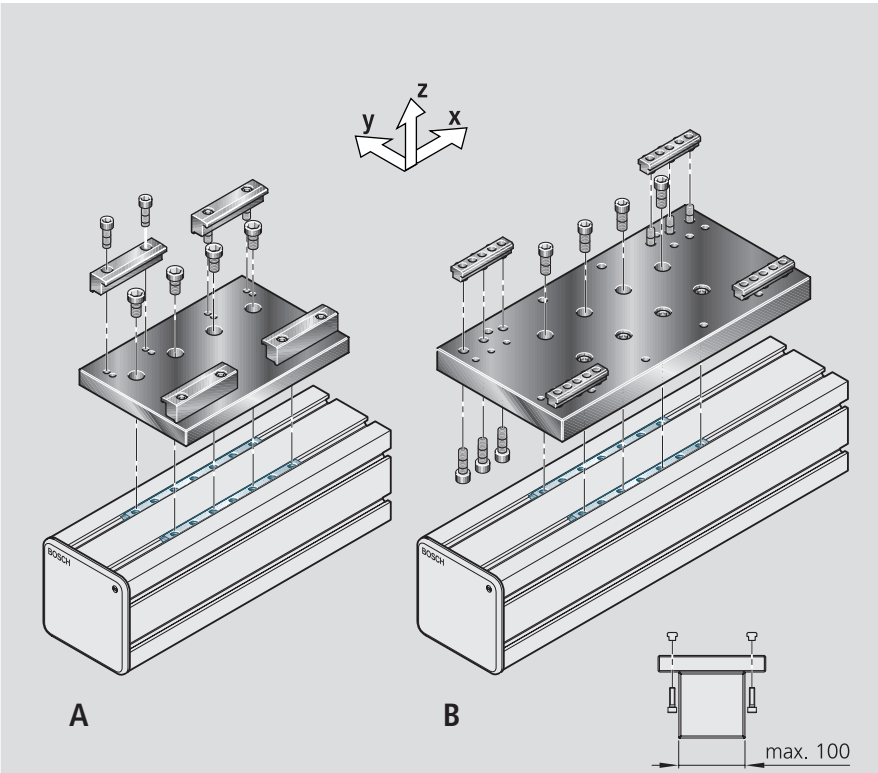
Material

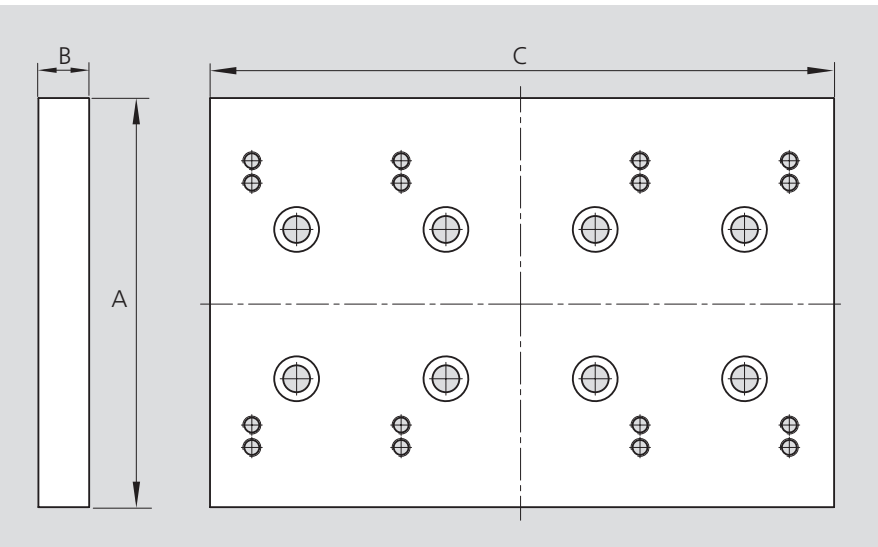
Connection plate	aluminum alloy
Clamping fixture	aluminum alloy
T-nut	steel

Finish / color

Connection plate	black, anodized
Clamping fixture	black, anodized
Screws	black, Tuflok coated
Anchor strip	galvanized or oxide finish

Connection plate kits have been designed to fit basic profile section sizes 50 and 40. The Linear Module is usually mounted by the frame using clamping fixtures. With the size 35-165 module it is also possible to fix the frame or the carriage to the connection plate using strips (fig. B). In this case, make sure before mounting that the supporting profile has a maximum width of 100 mm (see sketch).





Mounting instructions

- Align the supporting structure.
- Mount the connection plates to the supporting structure.
- Position the Linear Module.
- Observe the maximum tightening torques as indicated in the table.

Tightening torques of the mounting screws

with friction factor 0.125

	8.8	M4	M6	M8
	(Nm)	2.7	9.5	23

Scope of supply

Connection plate mounting kit

– Connection plate complete with accessories for mounting the Linear Module to the aluminum profile

Fig.	Linear Module	Section size	Dimensions (mm) A	B	C	Mass (kg)	Part number mounting kit
A	15-65, 10-80	50	138	18	210	2.0	0391-200-75
	and 20-80	40				1.8	0391-200-76
A	10-110	50	163	25	320	4.4	0391-200-77
	and 25-110	40				4.2	0391-200-78
A	25-145	50	240	25	410	8.6	0391-200-79
A	35-165	50	240	25	410	9.0	0391-200-81
B	35-165	50	163	25	320	4.1	0391-200-80

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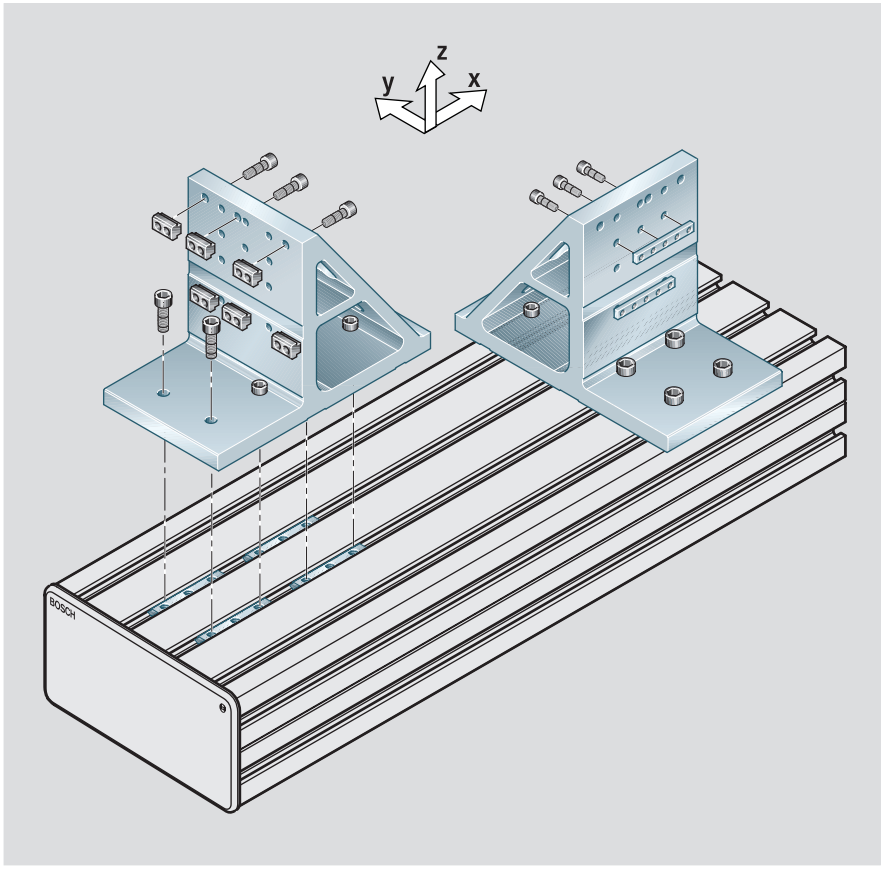
Angle Bracket Kits

Linear Module
- **in the X or Y axis**
- **carriage travels** (only possible with sizes 10-110 / 25-110 / 35-165)
- **frame travels**

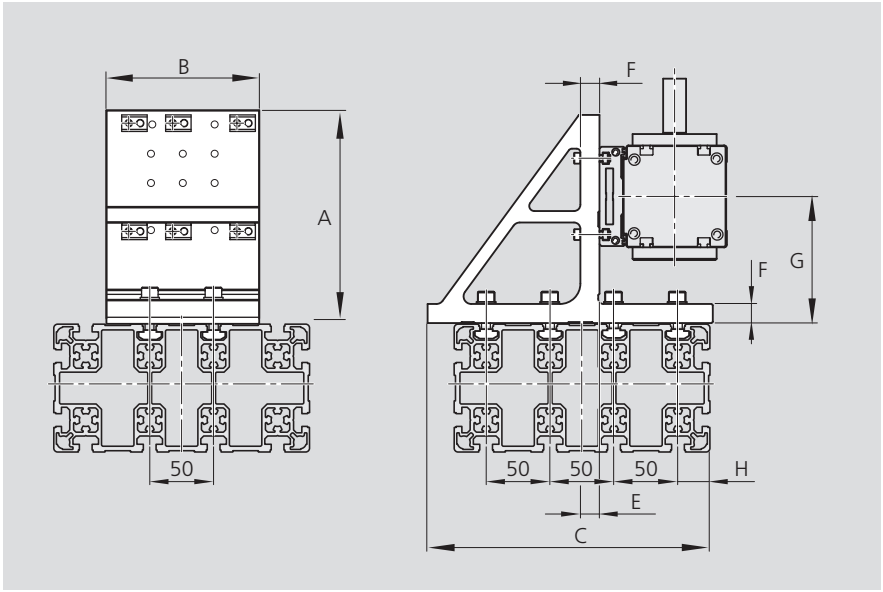
Material	
Bracket	AlMgSi 0.5 F25
T-nut	steel
Anchor strip	steel
Finish / color	
Bracket	anodized, neutral
Screws	black, Tuflok coated
T-nut	oxide finish
Anchor strip	galvanized or oxide finish

Angle bracket kits have been designed to fit basic profile section size 50.
The Linear Module must be mounted by the carriage using strips or T-nuts. With sizes 10-110, 25-110 and 35-165 it is also possible to mount the Linear Module by the frame using the same mounting kit.



Mounting instructions

- Align the supporting structure.
- Mount the bracket to the supporting structure.
- Mount the Linear Module to the bracket.
- Observe the maximum tightening torques as indicated in the table.



Tightening torques of the mounting screws

with friction factor 0.125

	8.8	M5	M6	M8
	(Nm)	5.5	9.5	23

Scope of supply

Angle bracket mounting kit

– Bracket complete with accessories for mounting the Linear Module to the aluminum profile

Linear Module	Dimensions (mm) A	B	C	E	F	G	H	Mass (kg)	Part number mounting kit
15-65	163.5	120	224	14	15	129.5	28	2.8	0391-100-87
10-80, 20-80	163.5	120	224	14	15	99.5	28	2.8	0391-100-87
10-110, 25-110	163.5	120	224	14	15	111	28	2.9	0391-100-88
25-145	224	150	234	15	21	141	23	5.5	0391-100-89
35-165	224	150	234	15	21	143	23	5.5	0391-100-89

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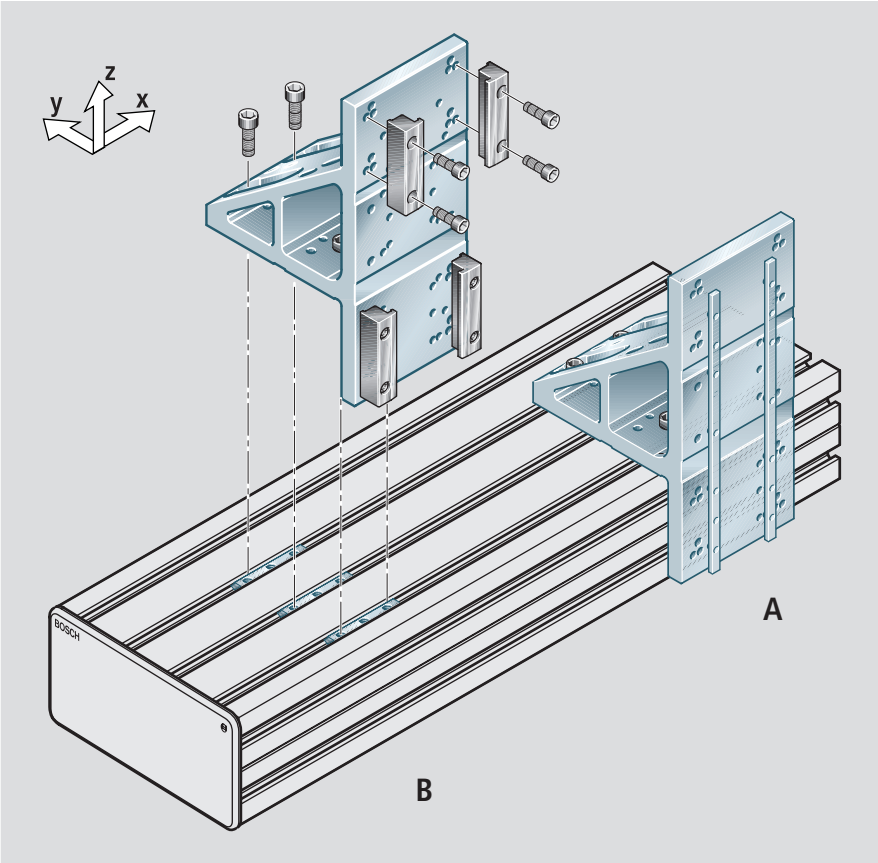
Angle Bracket Kits

Linear Module
– in the Z axis
– frame travels
– carriage travels
(not possible with size 25-145)

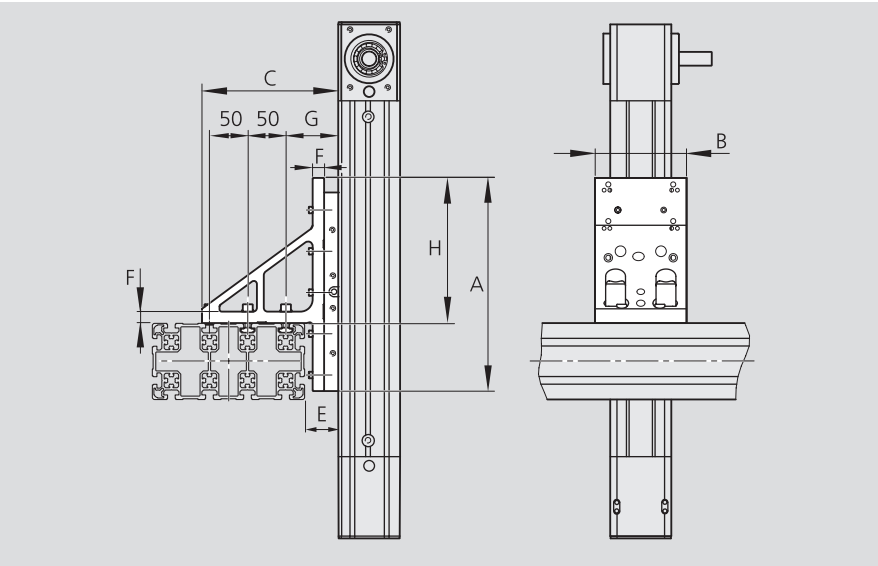
Material	
Bracket	AlMgSi 0.5 F25
Clamping fixture	aluminum alloy
T-nut	steel
Anchor strip	steel
Finish / color	
Bracket	anodized, neutral
Clamping fixture	anodized, black
Screws	black, Tuflok coated
T-nut	oxide finish
Anchor strip	galvanized or oxide finish

Angle bracket kits have been designed to fit basic profile section size 50.
The Linear Module can be mounted by the carriage or the frame.
Size 25-145 can only be mounted by the carriage.



Mounting instructions

- Align the supporting structure.
- Mount the bracket to the Linear Module.
- Mount the bracket with the Linear Module to the supporting structure.
- Observe the maximum tightening torques as indicated in the table.



Tightening torques of the mounting screws

with friction factor 0.125

8.8	M4	M5	M6	M8
(Nm)	2.7	5.5	9.5	23

Scope of supply

Angle bracket mounting kit

– Bracket complete with accessories for mounting the Linear Module to the aluminum profile

Fig.	Linear Module	Mounted by	Dimensions (mm) A	B	C	E	F	G	H	Mass (kg)	Part number mounting kit
A	15-65	carriage	279	120	180	45	15	70	190	3.0	0391-100-90
A	10-80 20-80	carriage	279	120	180	45	15	70	190	3.0	0391-100-91
A	10-110 25-110	carriage or frame	279	120	179	44	15	69	190	3.4	0391-100-92
A	25-145	carriage	327.5	165	264	102	21	127	221.5	6.6	0391-100-93
A	35-165	carriage or frame	327.5	165	254	92	21	117	221.5	7.2	0391-100-94
B	15-65/10-80 20-80	frame	279	120	160	25	15	50	190	3.1	0391-100-95

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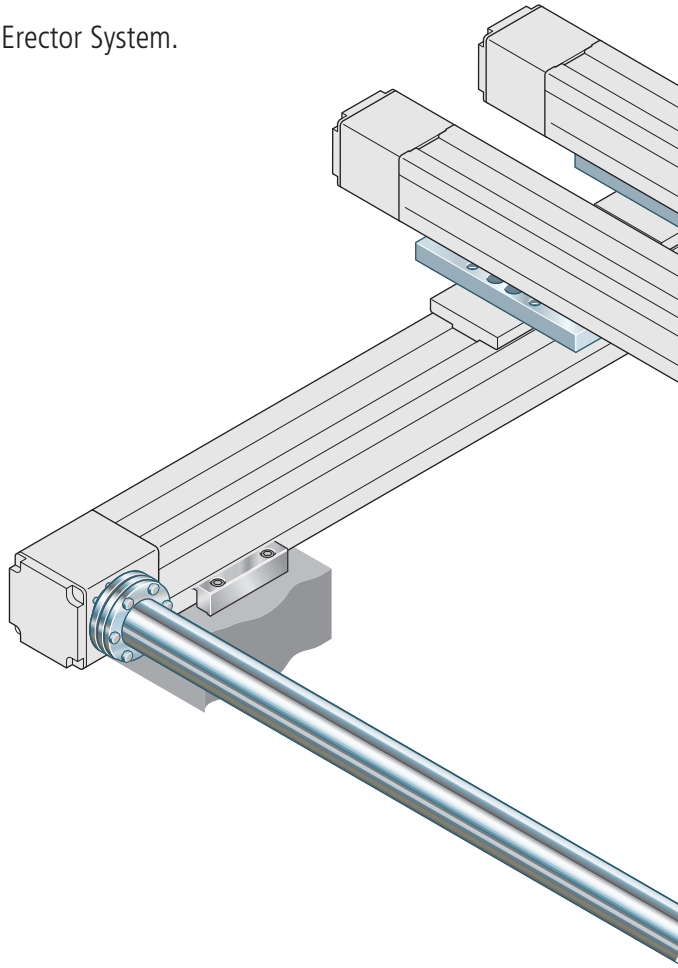
Rexroth Robotic Erector System for Linear Modules / Linear Modules

In the past, machine manufacturers themselves have had to devise, design and fabricate systems to install or mount and connect linear modules with precision ball screw assemblies or toothed belt drives.

The Robotic Erector System for linear modules facilitates these tasks and brings savings for the user, since the system comprises mass-produced standardized components.
As a result, the manufacturer can react flexibly to the varied requirements and uses of linear motion technology.

The system presents various possibilities to construct two or three axes from linear modules and connectors.
The basic elements (plates and connection brackets) are designed to enable linear modules of the same and the next larger or smaller size to be connected to one another.
Connecting shafts meet the high requirements for parallel operation of two linear modules with toothed belt drive.

The system also includes purpose-designed mounting accessories.
The linear modules and the connectors combine to form the Robotic Erector System.



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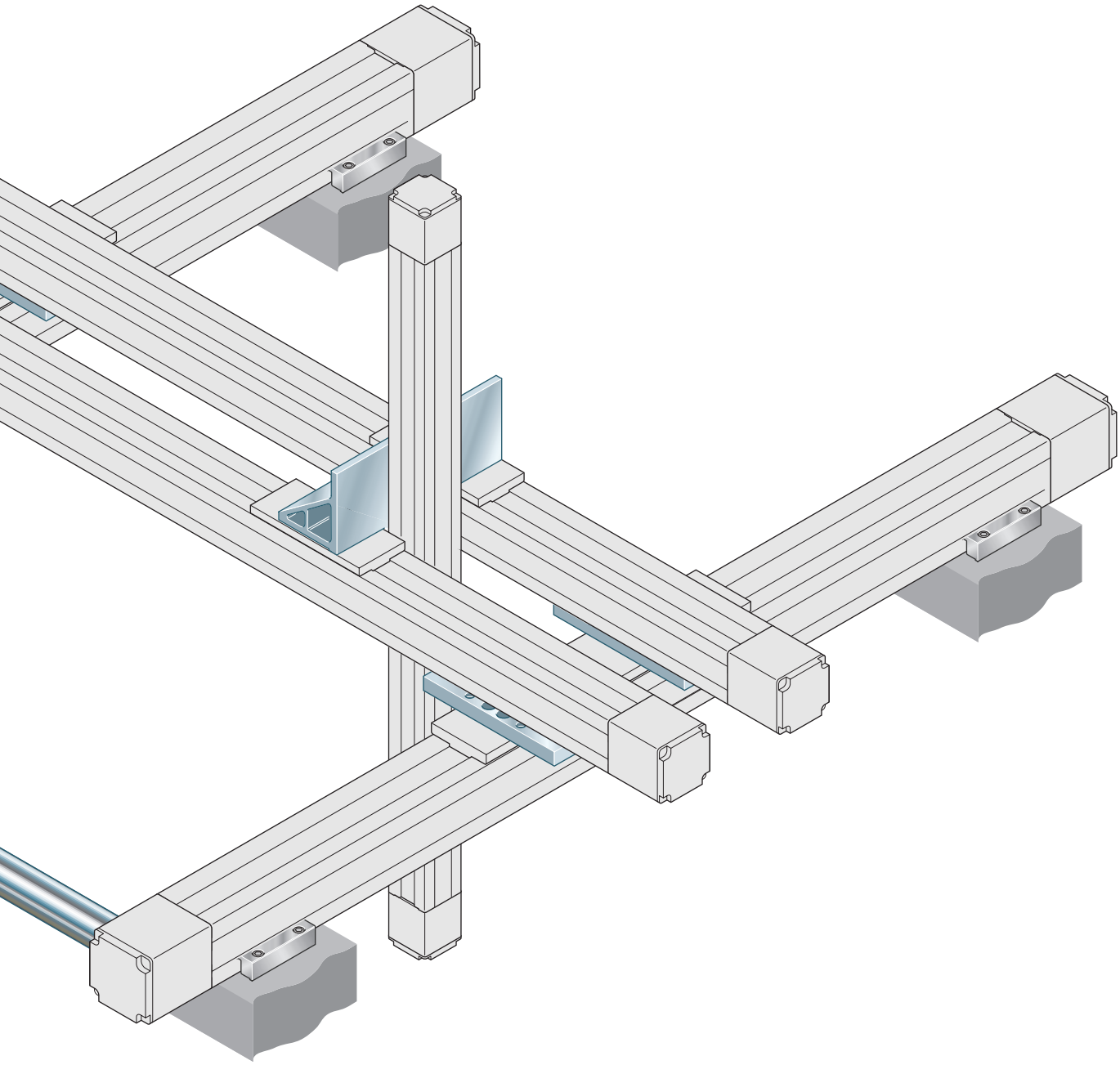

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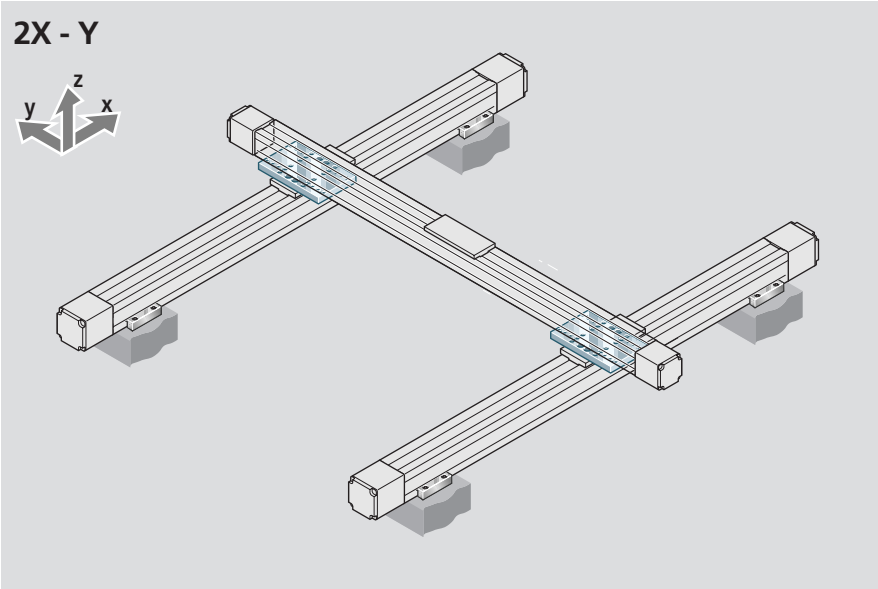
Rexroth Robotic Erector System for Linear Modules / Linear Modules
Configuration Options

2 axes

Connectors:

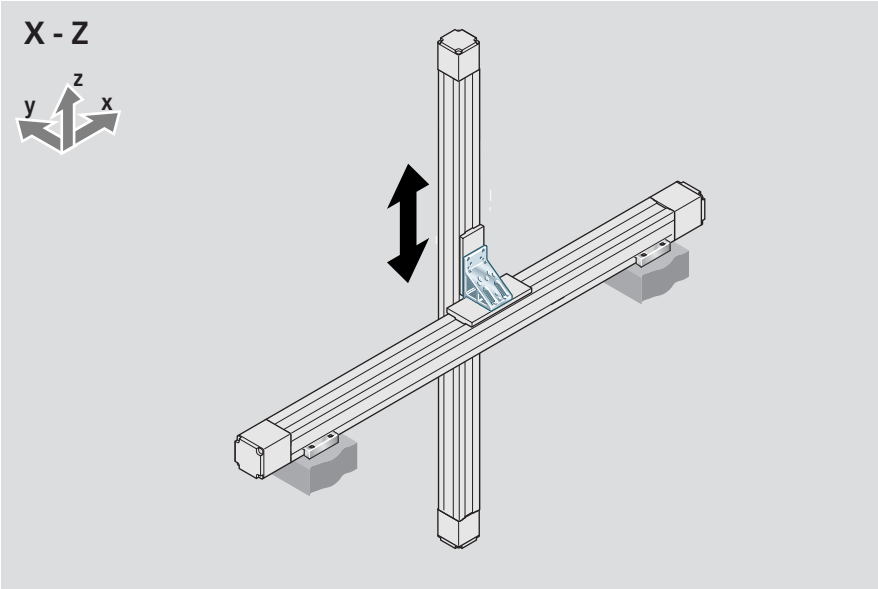
2 connection plates



Linear module traverses in the Z axis.

Connectors:

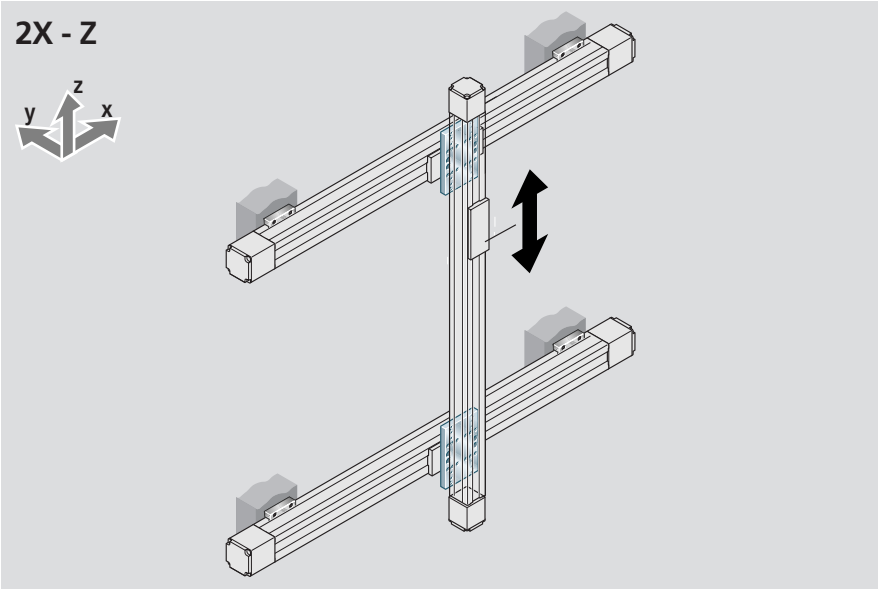
1 angle bracket



Carriage traverses in the Z axis.

Connectors:

2 connection plates



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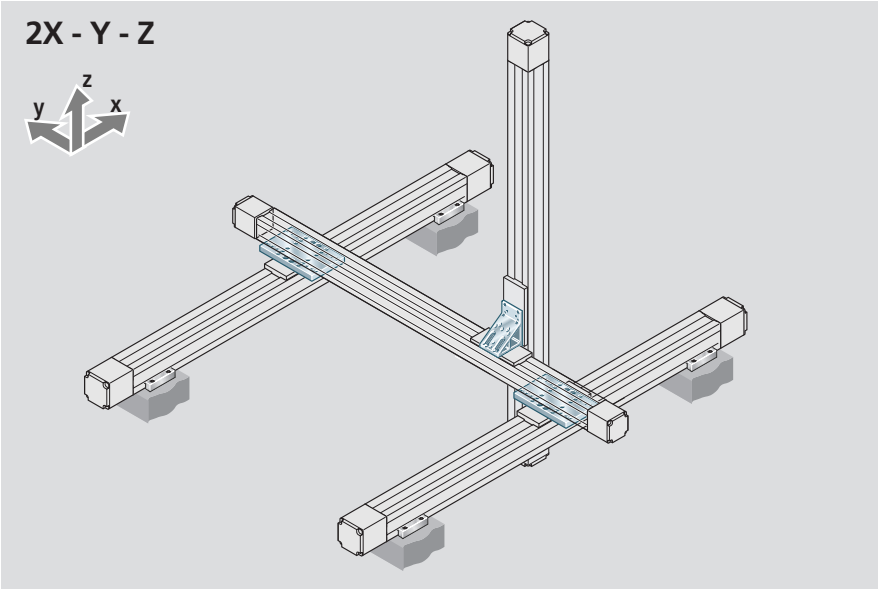
3 axes

Connectors:

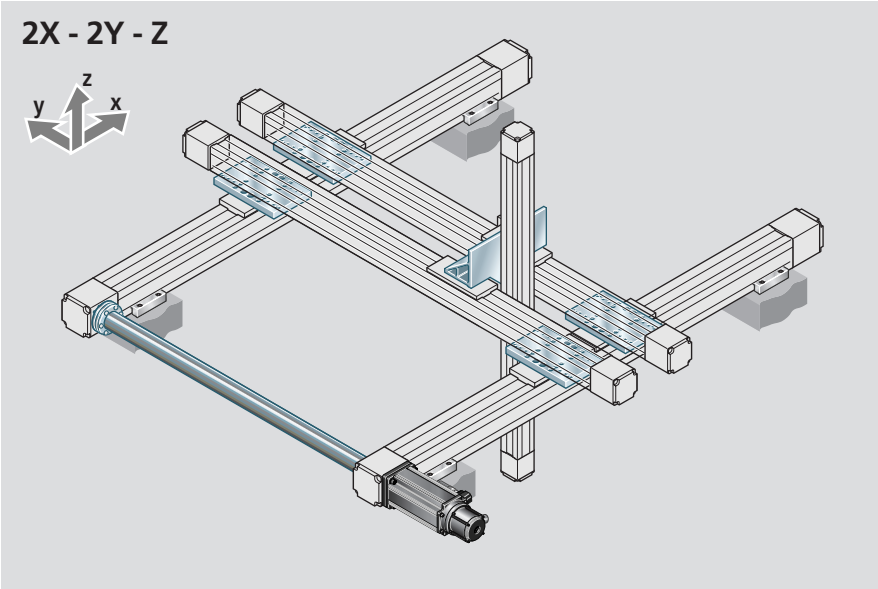
– 2 connection plates
– 1 angle bracket



– Torque support for the Y axis
– Parallel drive, external motor

Connectors:

4 connection plates
1 angle bracket for 3 linear modules
1 connecting shaft



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Rexroth Robotic Erector System for Linear Modules / Linear Modules

Connectors

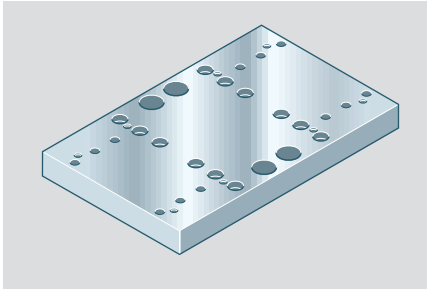
The connectors are mass-produced from a high-strength but light weight aluminum alloy material that minimizes additional weight and the cost of a system. The connecting shafts are made of steel.

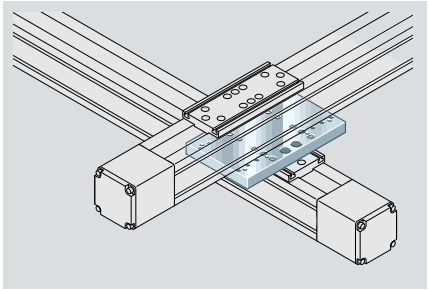
Carriages with T-slots are required to mount the plates and connection brackets.

Plates

Connection plate

– right-angled joint between two linear modules
– frame to carriage mounting
– aluminum alloy

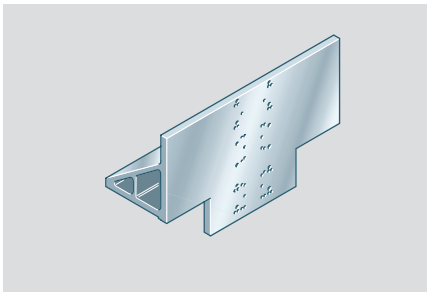


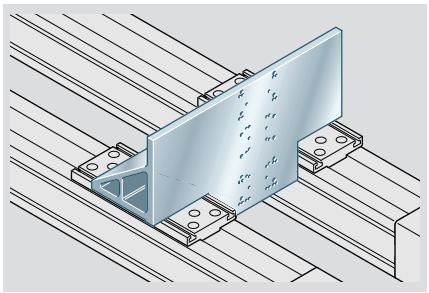


Connection brackets

Angle bracket to connect 3 linear modules

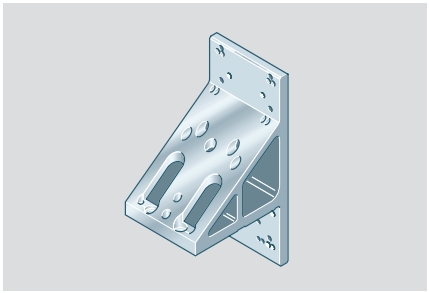
– parallel connection between two linear modules
– mounting to carriages
– mounting of Z axes possible
– strengthened by additional ribs

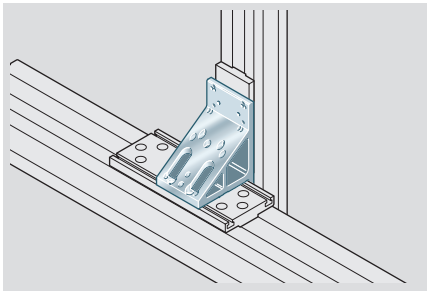




Angle bracket to connect 2 linear modules

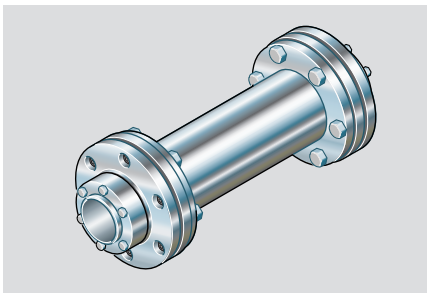
– right-angled joint between two linear modules
– carriage to carriage mounting
– carriage to frame mounting
– mounts directly to carriages

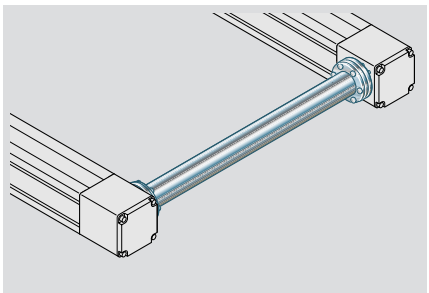




Connecting shafts

– parallel drive for linear modules
– connecting shafts
  – high stiffness
  – high precision





For dimension drawings of the individual connectors, see "Dimension Drawings…".

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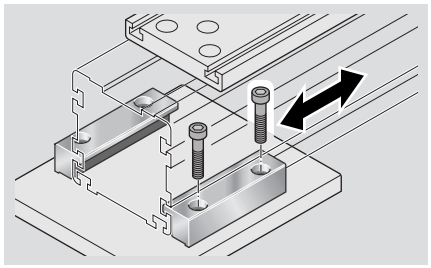
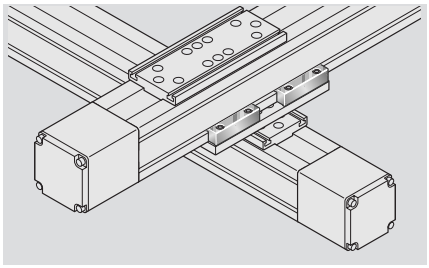
System Features

Easy mounting to adjacent structures or connection plate by means of clamping fixtures

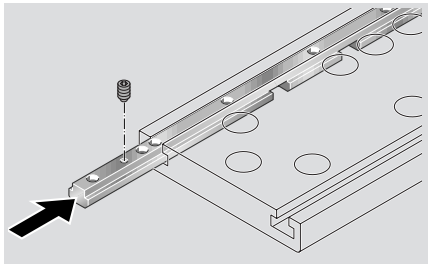
- Simply screw down linear modules.
- Clamping fixtures engage in the T-slots of the frame.
- Equalizes tolerances in longitudinal and transverse direction.

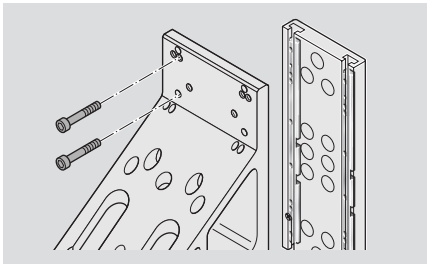




Anchor strips permit rapid and easy assembly using T-slots

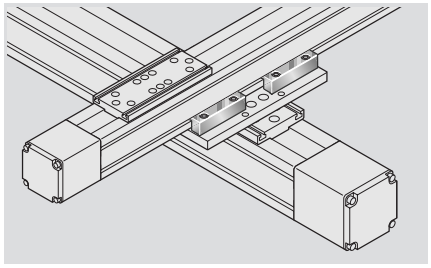
- Insert and adjust the anchor strip.
- Fix in place with set screws, if necessary (i.e., if in vertical position).
- Assemble structure.

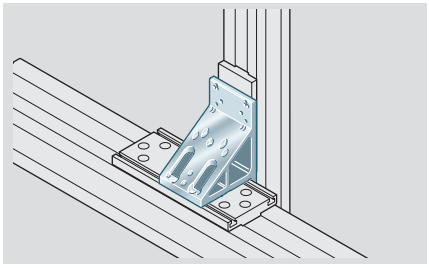


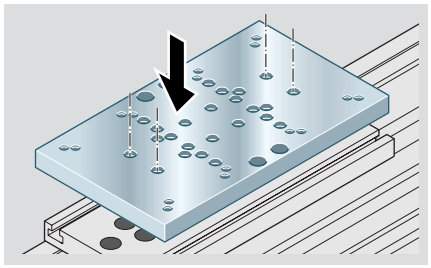


Connection of identical / different module sizes

- MK . 35-165 < MK. 35-165, MK. 25-110, MLR 10-110, MK. 25-145
- MK . 25-110 / MLR 10-110 < MK. 25-110, MLR 10-110, MK. 20-80, MLR 10-80, MK. 25-145
- MK . 15-65 < MK. 15-65, MK. 20-80, MLR 10-80



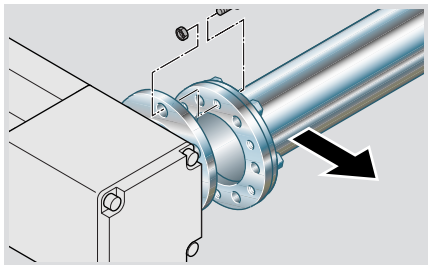




With types MKR and MLR, allows removal of the toothed belt without dismantling the plates or angle brackets.

Mounting / removal of connecting shafts to / from installed linear modules

- Easy adjustment for synchronous parallel operation, as connecting shafts can be turned steplessly into any position.



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Rexroth Robotic Erector System for Linear Modules / Linear Modules
Mounting of Linear Modules using Rexroth Mounting Components

Identification system for part numbers

Example:

Connection plate **0391-210-03**

Part number of individual component

Complete assembly: **0391-200-00**

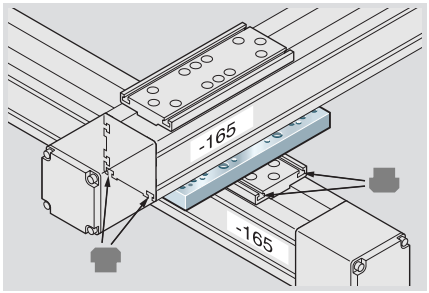
Part number of the complete assembly including mounting accessories (in this case: including anchor strips and screws to DIN)

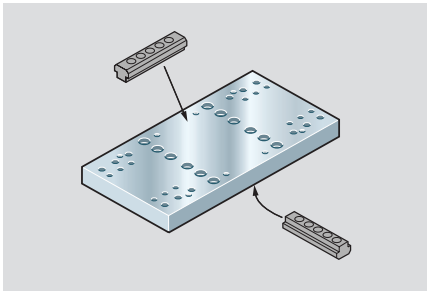
Connection from linear module	to linear module
MKK 35-165	MKK 35-165
MKR 35-165	MKR 35-165

Connection plate **0391-210-03**

Complete assembly: **0391-200-00**

- Mounting using anchor strips.

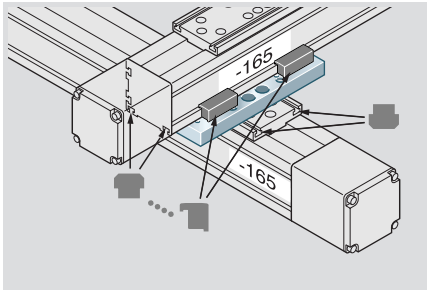


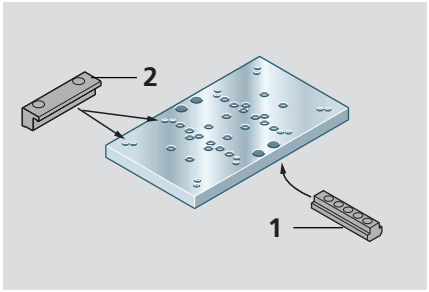


Connection plate **0391-210-62**

Complete assembly: **0391-200-50**

- Anchor strips (1) fixable with set screws.
- Mounting using clamping fixtures (2).





In preparation:

Angle bracket **0391-150-02**

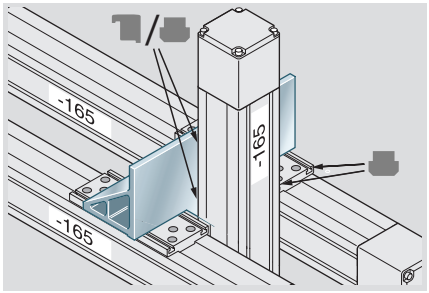
– on carriage with anchor strips

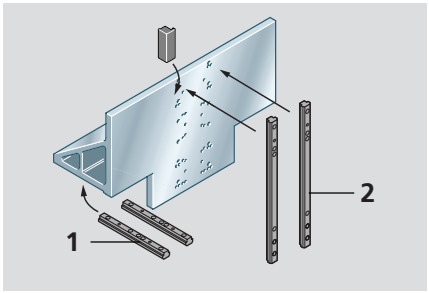
Complete assembly: **0391-100-65**

- Anchor strips (1) + (2) fixable with set screws.

– on frame with clamping fixtures

Complete assembly: **0391-100-66**

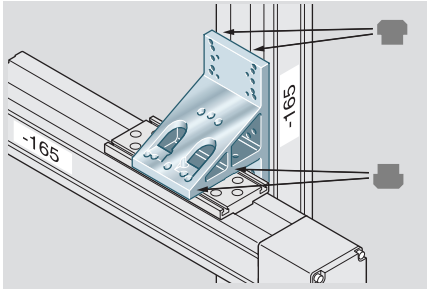


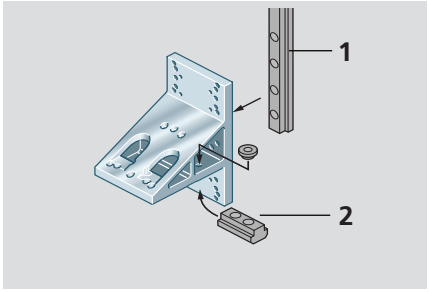


Angle bracket **0391-150-01**

Complete assembly: **0391-100-50**

- Anchor strips (1) + T-nuts (2) fixable with set screws.





Symbols

- Anchor strip or T-nut
- Clamping fixture

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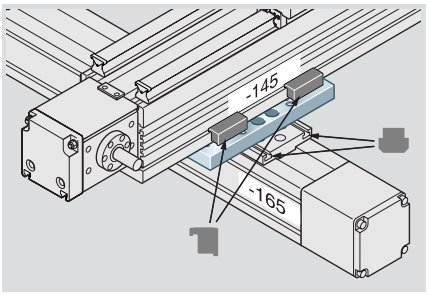
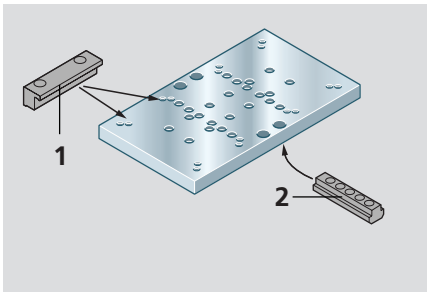
Connection	
from linear module	to linear module
MKK 35-165	MKR 25-145
MKR 35-165	MKZ 25-145

Connection plate 0391-210-62

Complete assembly: 0391-200-51

- Mounting using clamping fixtures (1).
- Mounting using anchor strips (2).

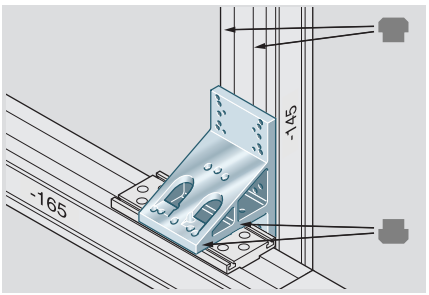


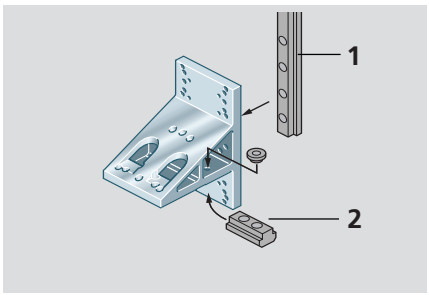


Angle bracket 0391-150-01

Complete assembly: 0391-100-51

- Anchor strips (1) + T-nuts (2) fixable with set screws.





Note

For precise details of the Rexroth mounting accessories, see "Mounting Accessories" and "Mounting".

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Rexroth Robotic Erector System for Linear Modules / Linear Modules
Mounting of Linear Modules using Rexroth Mounting Components

Connection from linear module	Connection to linear module
MKK 35-165 MKR 35-165	MKK 25-110 MKR 25-110 MLR 10-110

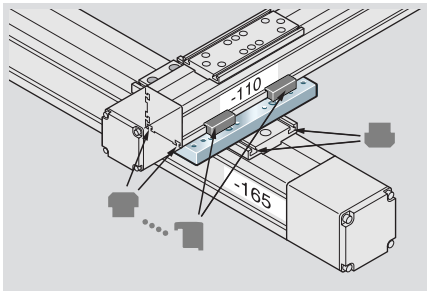
Connection plate **0391-210-03**

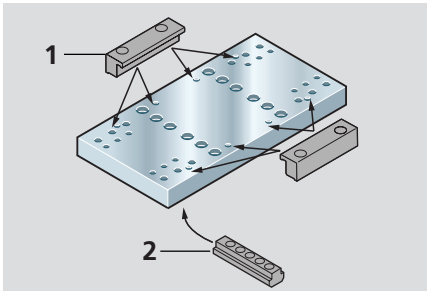
Complete assembly: **0391-200-01**

Mounting using clamping fixtures (1).

Complete assembly: **0391-200-02**

Mounting using anchor strips (2).





In preparation:

Angle bracket **0391-150-02**

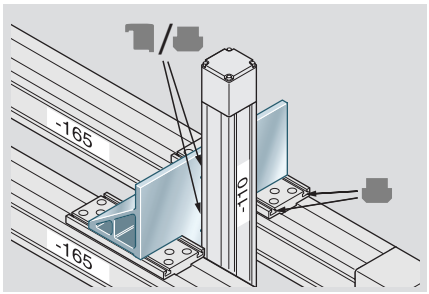
– on carriage with anchor strips

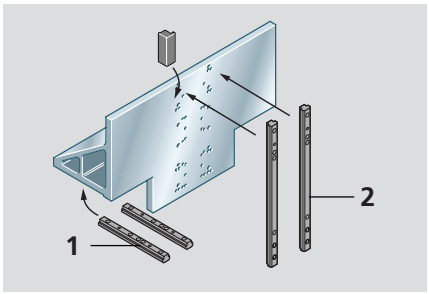
Complete assembly: **0391-100-67**

Anchor strips (1) + (2) fixable.

– on frame with clamping fixtures

Complete assembly: **0391-100-68**

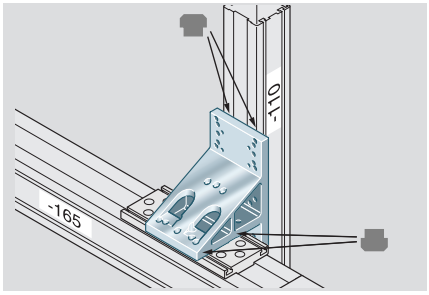


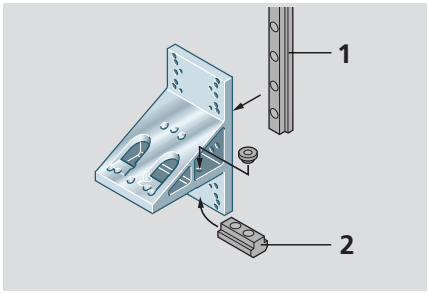


Angle bracket **0391-150-01**

Complete assembly: **0391-100-52**

Anchor strips (1) + T-nuts (2) fixable with set screws.





Symbols

Anchor strip or T-nut

Clamping fixture

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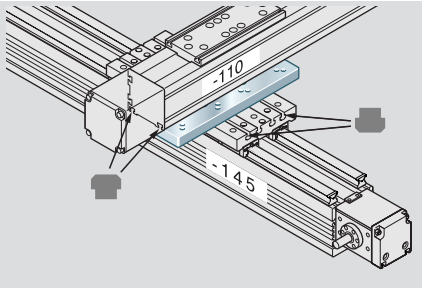
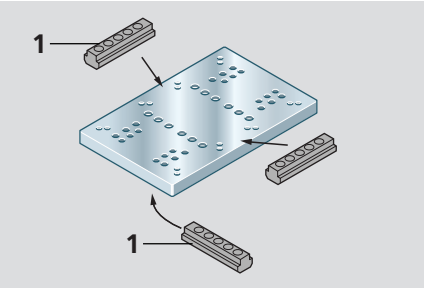
Connection	
from linear module	to linear module
MKR 25-145 MKZ 25-145	MKK 25-110 MKR 25-110 MLR 10-110

Connection plate 0391-210-61

Complete assembly: 0391-200-55

- Mounting using anchor strips (1).

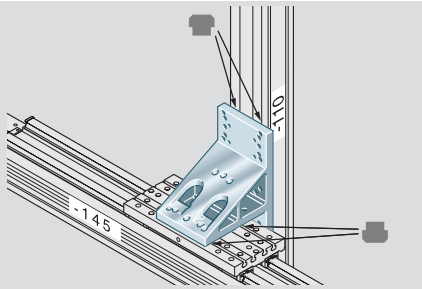


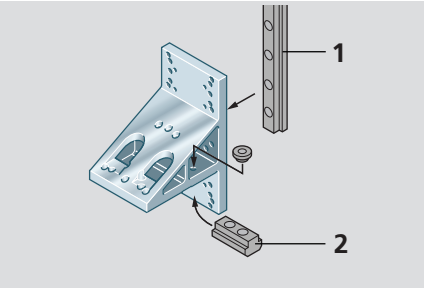


Angle bracket 0391-150-01

– on carriage with anchor strips
Complete assembly: 0391-100-52

- Anchor strips (1) + T-nuts (2) fixable with set screws.





Note

For precise details of the Rexroth mounting accessories, see "Mounting Accessories" and "Mounting".

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Rexroth Robotic Erector System for Linear Modules / Linear Modules
Mounting of Linear Modules using Rexroth Mounting Components

Identification system for part numbers

Example:

Connection plate **0391-210-03**

Part number of individual component

Complete assembly: **0391-200-00**

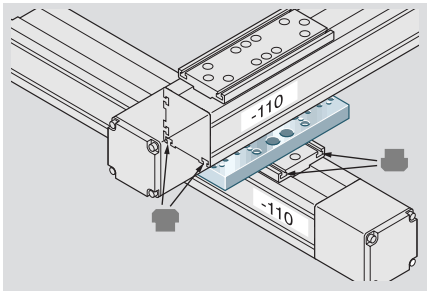
Part number of the complete assembly including mounting accessories (in this case: including anchor strips and screws to DIN)

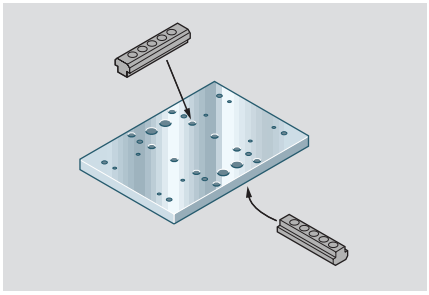
Connection	
from linear module	to linear module
MKK 25-110 MKR 25-110 MLR 10-110	MKK 25-110 MKR 25-110 MLR 10-110

Connection plate **0391-210-02**

Complete assembly: **0391-200-03**

Mounting using anchor strips.





In preparation:

Angle bracket **0391-140-11**

– on carriage with anchor strips

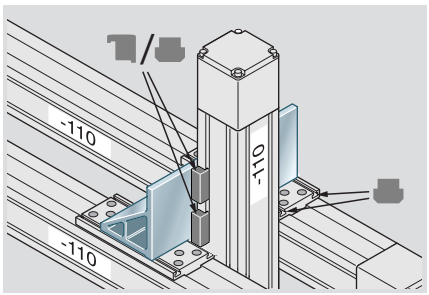
Complete assembly: **0391-100-69**

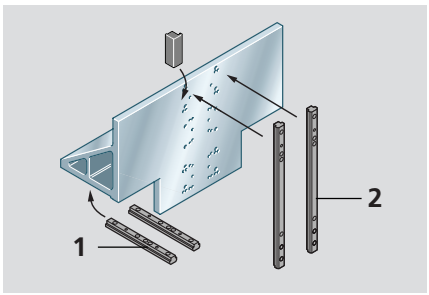
Anchor strips (1) + (2) fixable.

– on frame with clamping fixtures

Complete assembly: **0391-100-70**

Anchor strips (1) fixable.



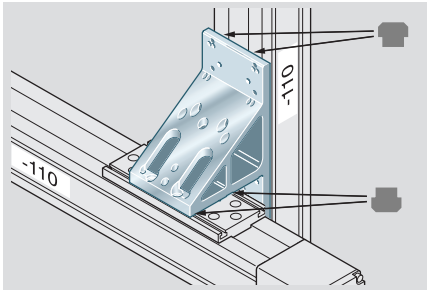


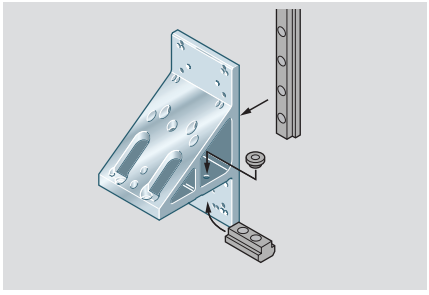
Angle bracket **0391-140-08**

– on carriage with anchor strips

Complete assembly: **0391-100-53**

Anchor strips (1) + T-nuts (2) fixable with set screws.





Symbols

Anchor strip or T-nut

Clamping fixture

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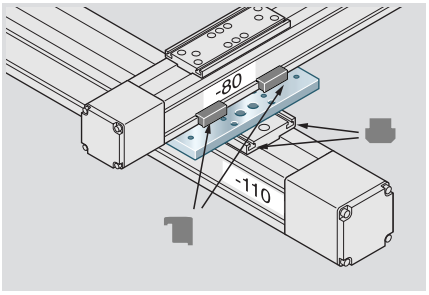
Connection	
from linear module	to linear module
MKK 25-110 MKR 25-110 MLR 10-110	MKK 20-80 MKR 25-80 MLR 10-80

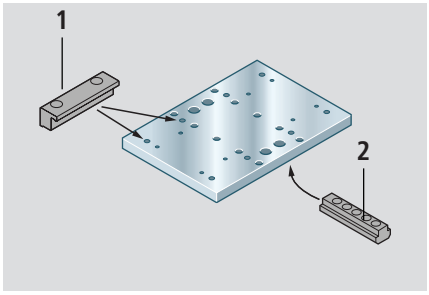
Connection plate 0391-210-02

Complete assembly: 0391-200-04

Mounting using clamping fixtures (1).

Mounting using anchor strips (2).





In preparation:

Angle bracket 0391-140-11

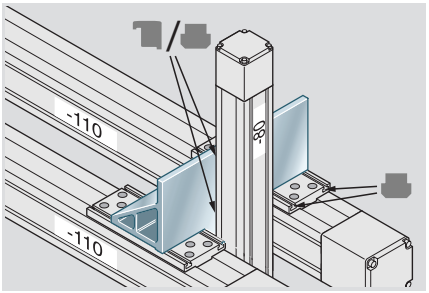
Mounting for frame dimension -80:

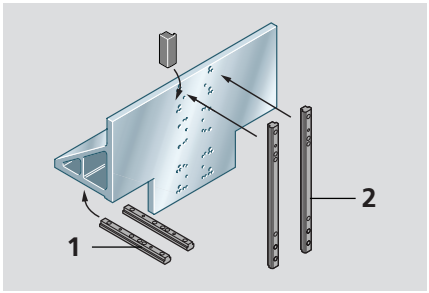
– on carriage with anchor strips
Complete assembly: 0391-100-71

Anchor strips (1) + (2) fixable.

– on frame with clamping fixtures
Complete assembly: 0391-100-72

Anchor strips (2) fixable.





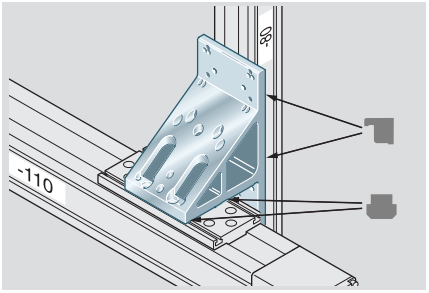
Angle bracket 0391-140-08

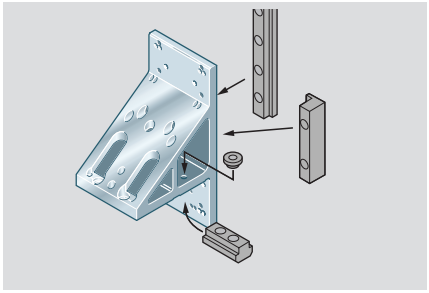
Mounting for frame dimension -80:

– on carriage with anchor strips
Complete assembly: 0391-100-54

Anchor strips (1) fixable.

– on frame with clamping fixtures
Complete assembly: 0391-100-55





Note

For precise details of the Rexroth mounting accessories, see "Mounting Accessories" and "Mounting".

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Rexroth Robotic Erector System for Linear Modules / Linear Modules
Mounting of Linear Modules using Rexroth Mounting Components

Identification system for part numbers

Example:

Connection plate 0391-210-03

Part number of individual component

Complete assembly: 0391-200-00

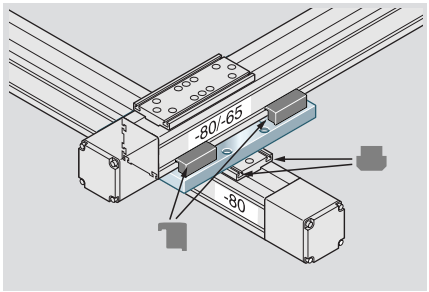
Part number of the complete assembly including mounting accessories (in this case: including anchor strips and screws to DIN)

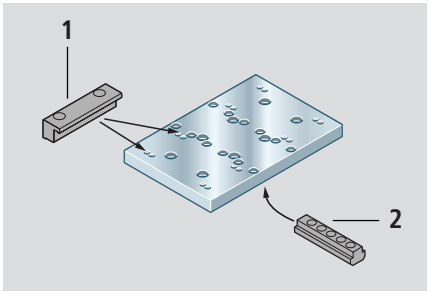
Connection	
from linear module	to linear module
MKK 20-80 MKR 20-80 MLR 10-80	MKK 20-80 MKR 20-80 MLR 10-80 MKK 15-65 MKR 15-65 MKP 15-65

Connection plate 0391-210-58

Complete assembly: 0391-200-56

- Mounting using clamping fixtures (1).
- Mounting using anchor strips (2).





Angle bracket 0391-140-08

– Z axis (size -65) with anchor strips on carriage

Complete assembly: 0391-100-58

- Anchor strips (1) + T-nuts (2) fixable with set screws.

– Z axis (size -80) with anchor strips on carriage

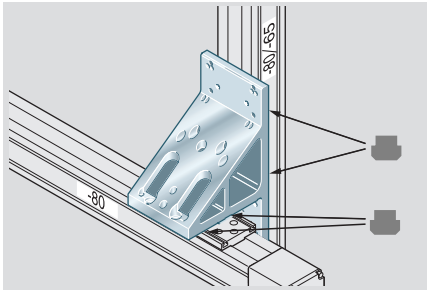
Complete assembly: 0391-100-59

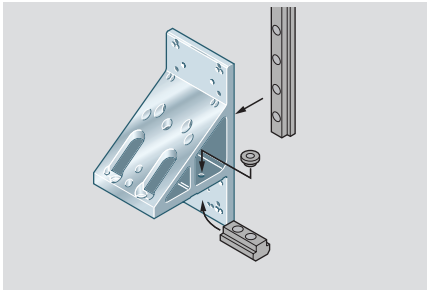
- Anchor strips (1) + T-nuts (2) fixable with set screws.

– Z axis on frame with clamping fixtures (size -65 and -80)

Complete assembly: 0391-100-60

- Z axis mounted using anchor strips (1) and fixable with set screws.





Connection plate 0391-210-57

Complete assembly: 0391-200-57

- Mounting using clamping fixtures (1).
- Mounting using anchor strips (2).

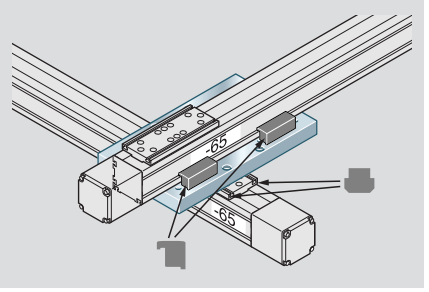
Connection	
from linear module	to linear module
MKK 15-65 MKR 15-65 MKP 15-65	MKK 15-65 MKR 15-65 MKP 15-65

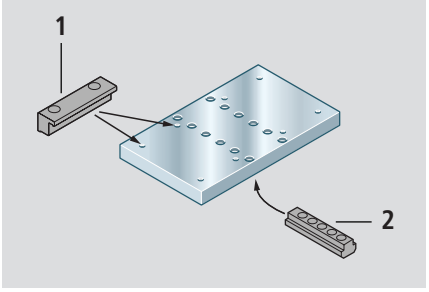
Symbols

- Anchor strip or T-nut
- Clamping fixture

Note

For precise details of the Rexroth mounting accessories, see "Mounting Accessories" and "Mounting".





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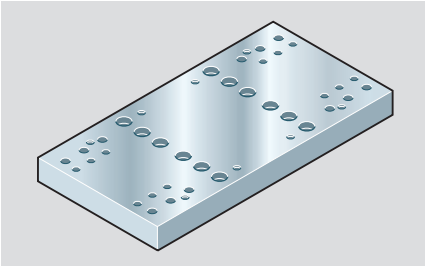
Dimension Drawings of Connection Plates

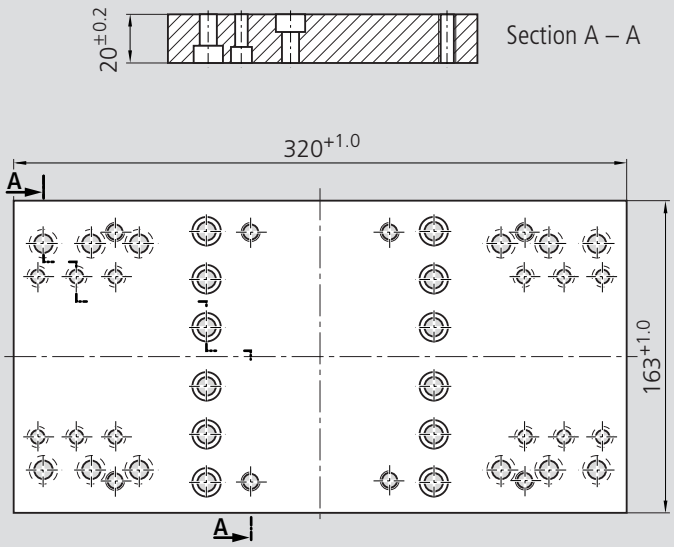
Connection plate 0391-210-03

for connection of linear modules with frame dimensions -110 and -165

Aluminum alloy, anodized

Weight: approx. 3.5 kg



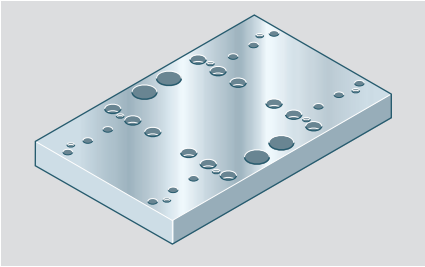


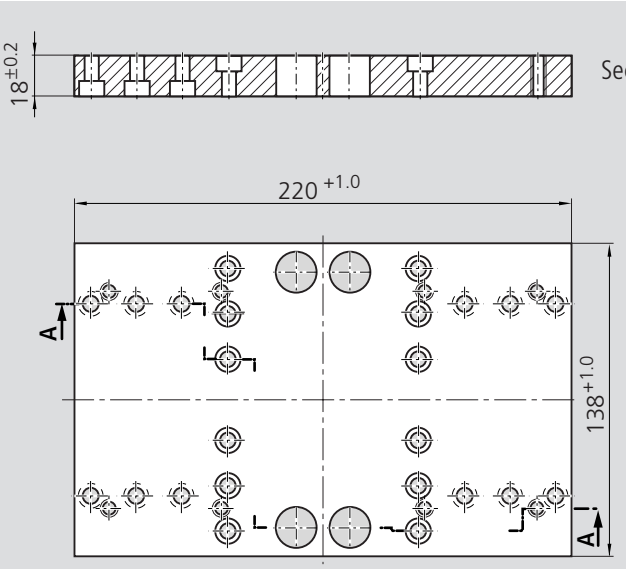
Connection plate 0391-210-02

for connection of linear modules with frame dimensions -110 and -80

Aluminum alloy, anodized

Weight: approx. 1.5 kg





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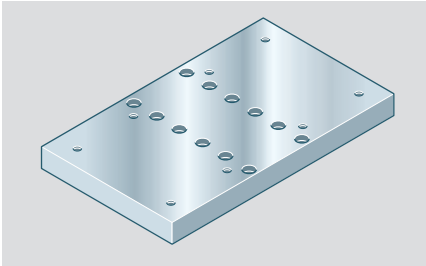
Rexroth Robotic Erector System for Linear Modules / Linear Modules
Dimension Drawings of Connection Plates

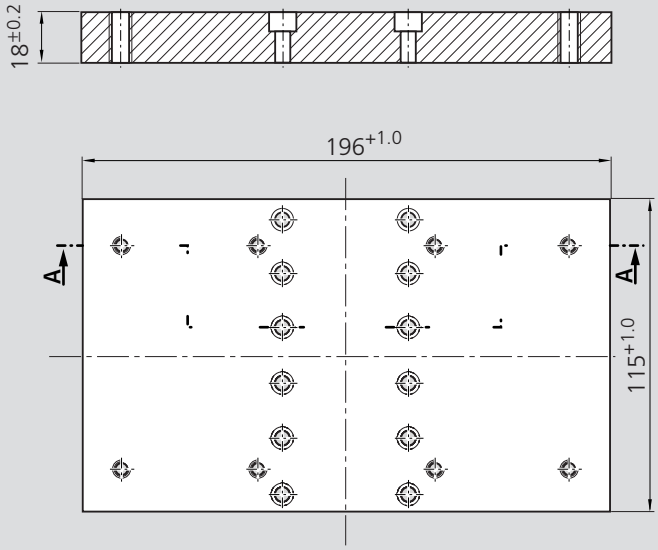
Connection plate 0391-210-57

for connection of linear modules with frame dimension -65

Aluminum alloy, anodized

Weight: approx. 1.2 kg



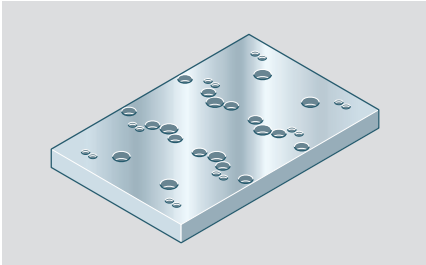


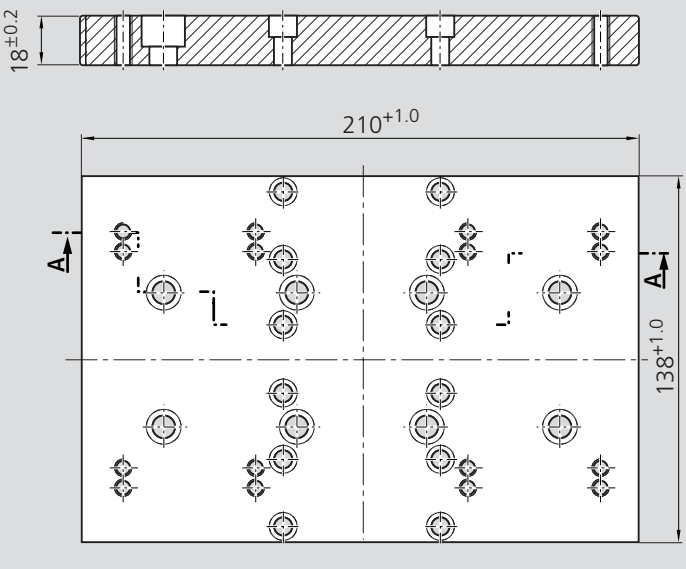
Connection plate 0391-210-58

for connection of linear modules with frame dimensions -80 and -65

Aluminum alloy, anodized

Weight: approx. 1.45 kg





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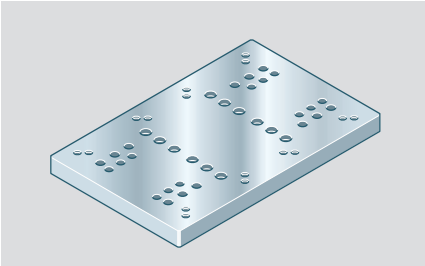
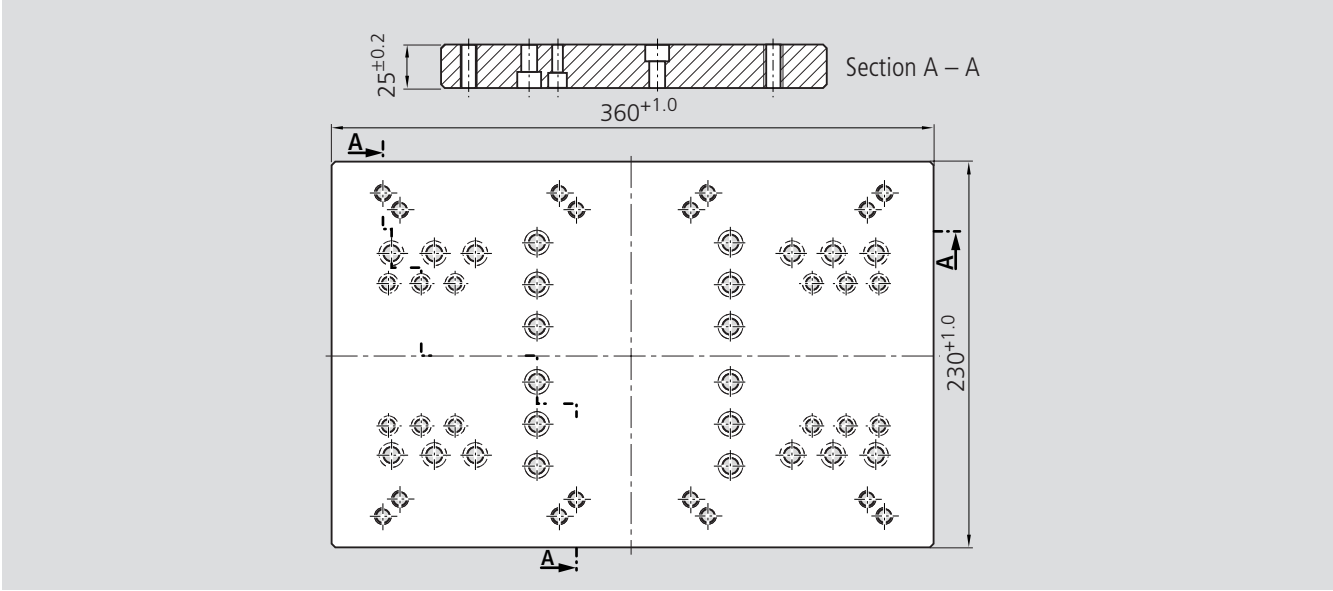
Connection plate 0391-210-61

for connection of linear modules with frame dimensions -145 and -110

Aluminum alloy, anodized

Weight: approx. 5.6 kg



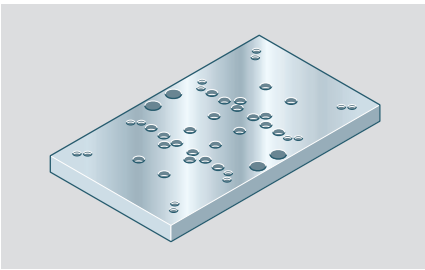


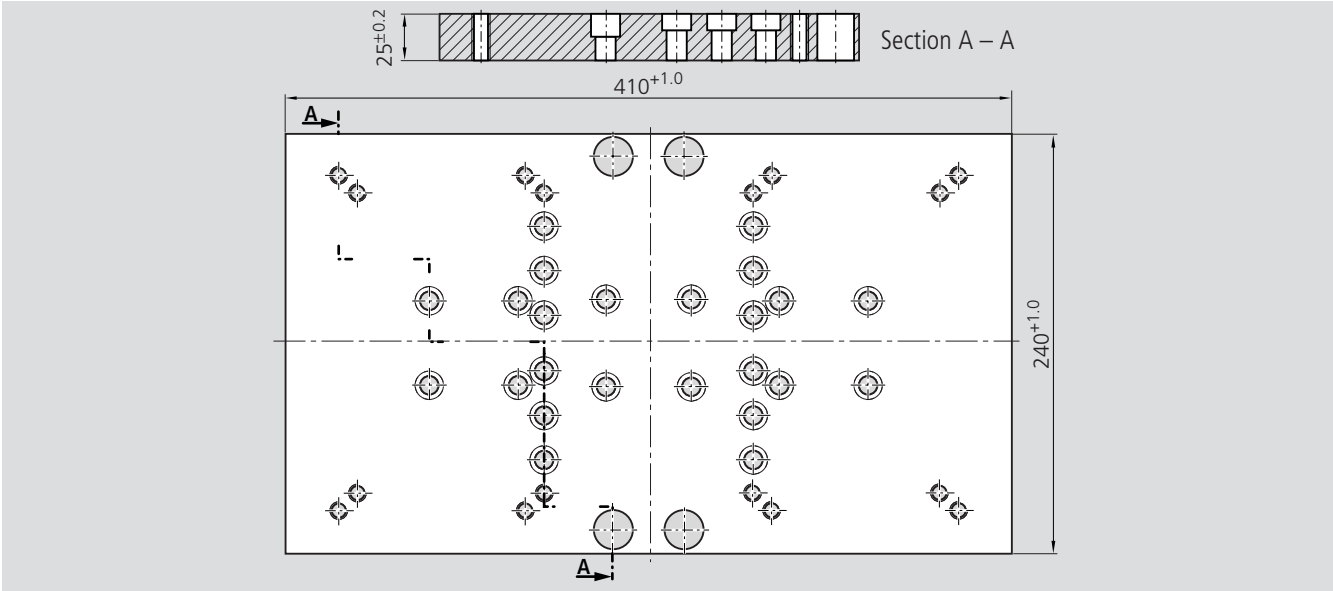
Connection plate 0391-210-62

for connection of linear modules with frame dimensions -145 and -165

Aluminum alloy, anodized

Weight: approx. 6.7 kg





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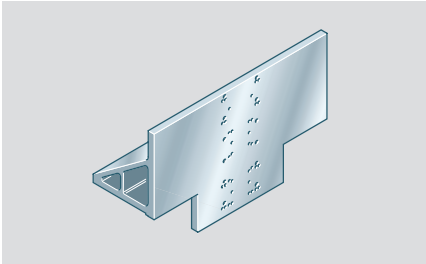
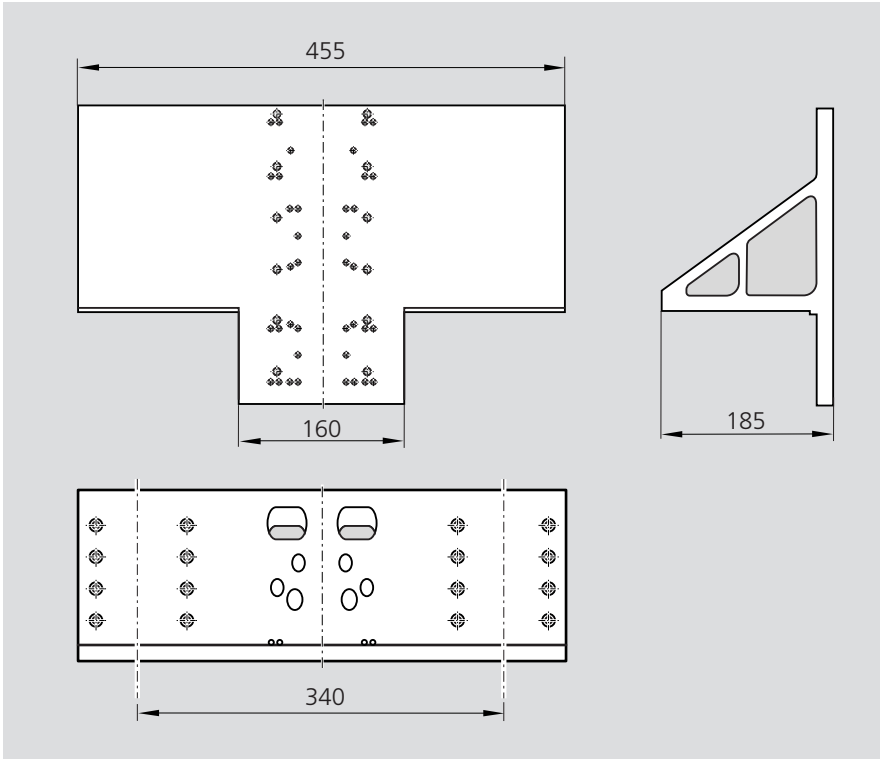
Rexroth Robotic Erector System for Linear Modules / Linear Modules
Dimension Drawings of Angle Brackets



Angle bracket 0391-140-11

for connecting 3 linear modules with frame dimensions -110 and -80

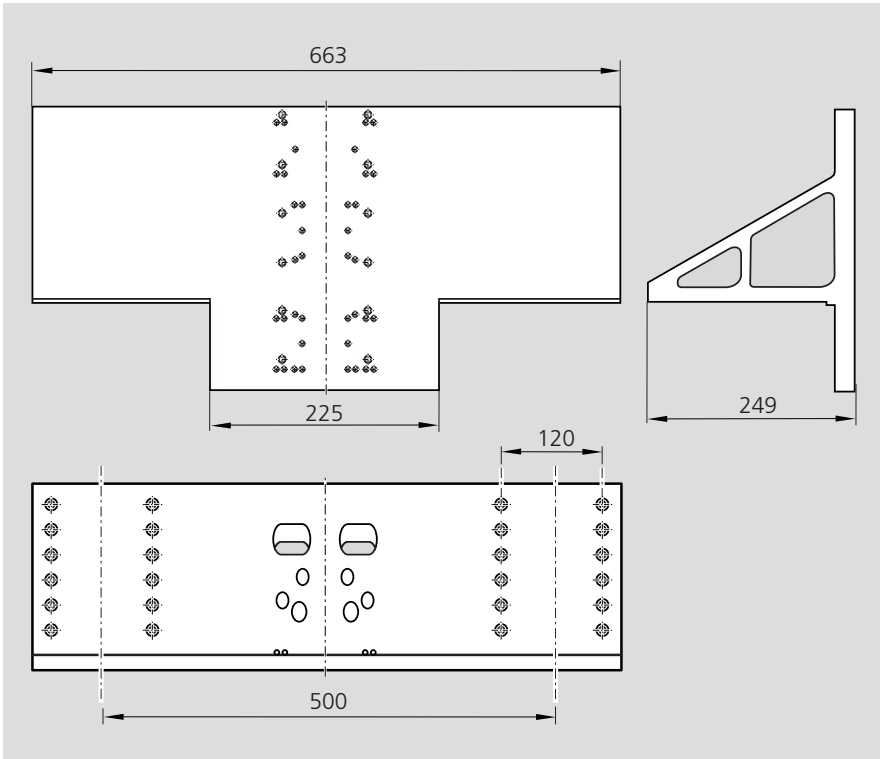
Fabricated aluminum alloy



Angle bracket 0391-150-02

for connecting 3 linear modules with frame dimensions 2x -165 and 1x -110 or 2x -165 and 1x -165

Fabricated aluminum alloy



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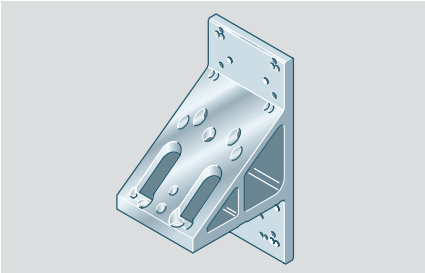
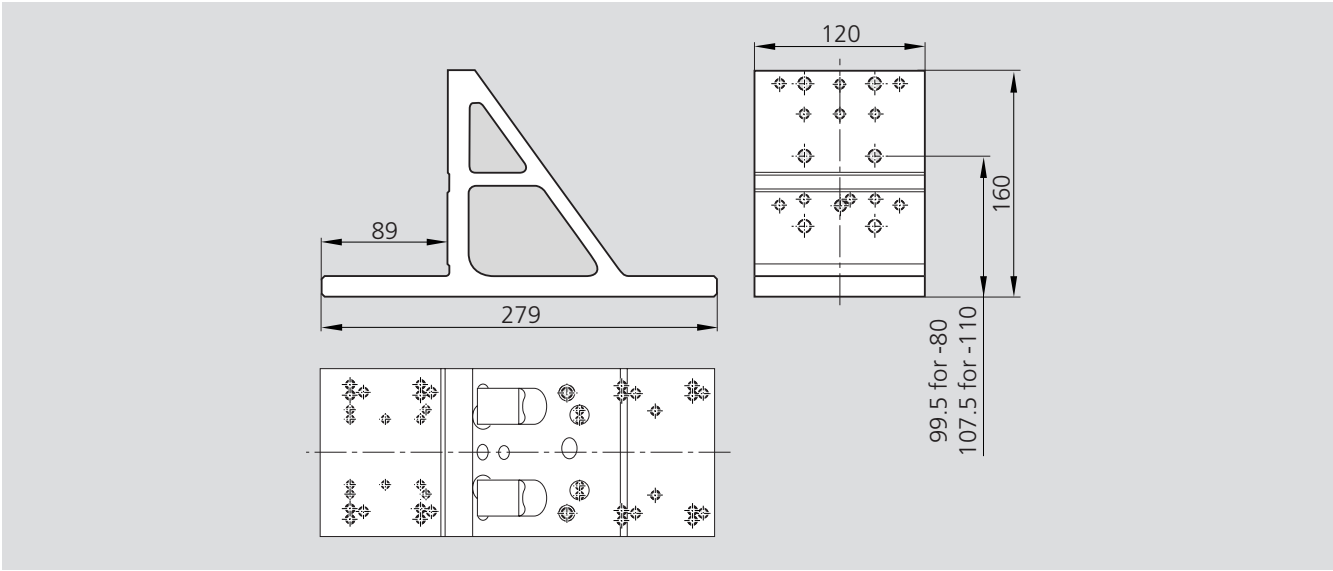
Angle bracket 0391-140-08

for all linear modules with
frame dimensions -110, -80 and -65

Fabricated aluminum alloy, anodized

Weight: approx. 2.5 kg



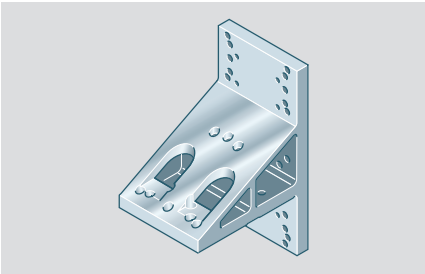


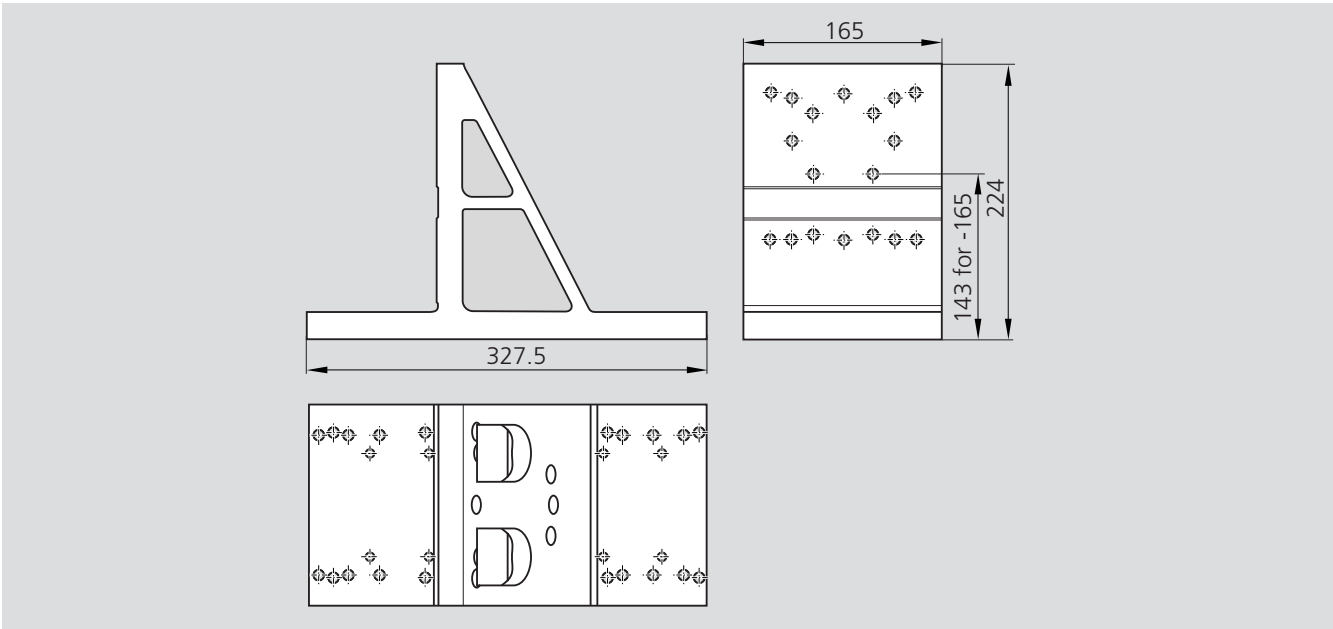
Angle bracket 0391-150-01

for all linear modules with
frame dimensions -165, -145 and -110

Fabricated aluminum alloy, anodized

Weight: approx. 5.8 kg





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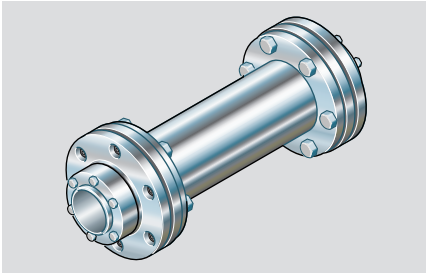
Rexroth Robotic Erector System for Linear Modules / Linear Modules
Dimension Drawings

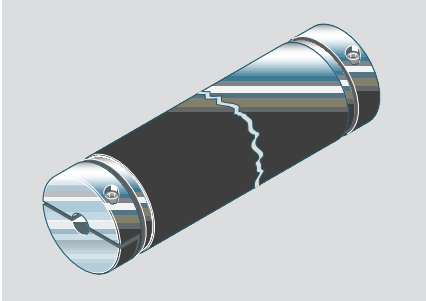
Steel connecting shafts (disk-pack coupling)

for linear modules with frame dimension -165: **type 1, 2**
for linear modules with frame dimensions -80 and -110: **type 3**



Connecting shafts (flexible membrane coupling)

for linear modules with frame dimension -110: **type 4**
for linear modules with frame dimension -80: **type 5**
for linear modules with frame dimension -65: **type 6**



Notes on horizontal installation (version for vertical installation on request)

Maximum length:
Type 1, 2, 3, 4 = 4000 mm
Type 5, 6 = 3000 mm
Dynamically balanced to VDI 2060.
Please quote part number and length L_W when ordering.
Alternative design subject to same technical data.

⚠ Rotating parts should be protected against accidental contact during operation!
Observe the equipment safety rules and machine safety regulations at all times!

Calculation of length L_W for i = 1:

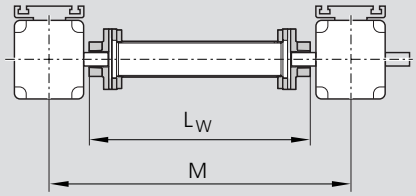
Frame dimension -165
Type 1, 2: $L_W = M - 205$ mm

Frame dimension -110:
Type 3: $L_W = M - 140$ mm
Type 4: $L_W = M - 145$ mm

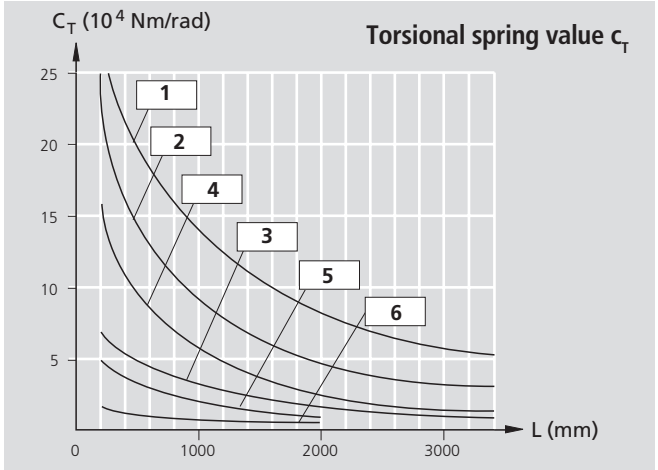
Frame dimension -80:
Type 3: $L_W = M - 120$ mm
Type 5: $L_W = M - 140$ mm

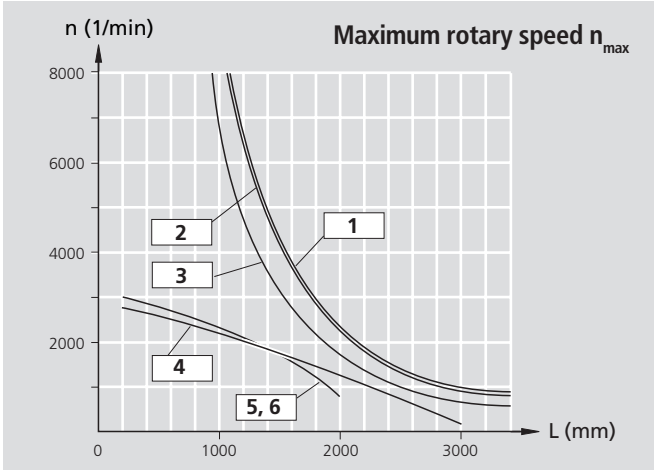
Frame dimension -65:
Type 6: $L_W = M - 97$ mm

L_W =	Total length of connecting shaft	(mm)
M =	Center to center distance between the linear modules	(mm)
i =	Reduction	(–)



Torsional spring value C_T and maximum rotary speed n_{max}





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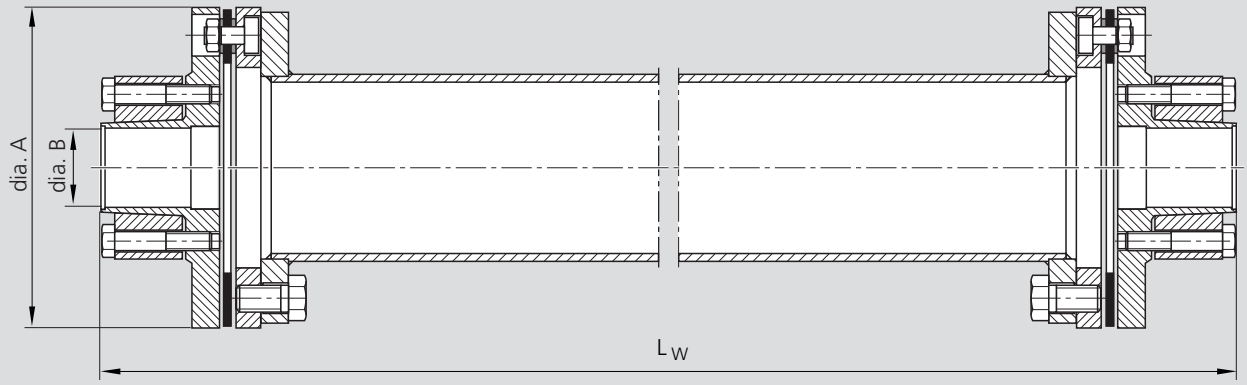
Steel connecting shafts (disk-pack coupling)

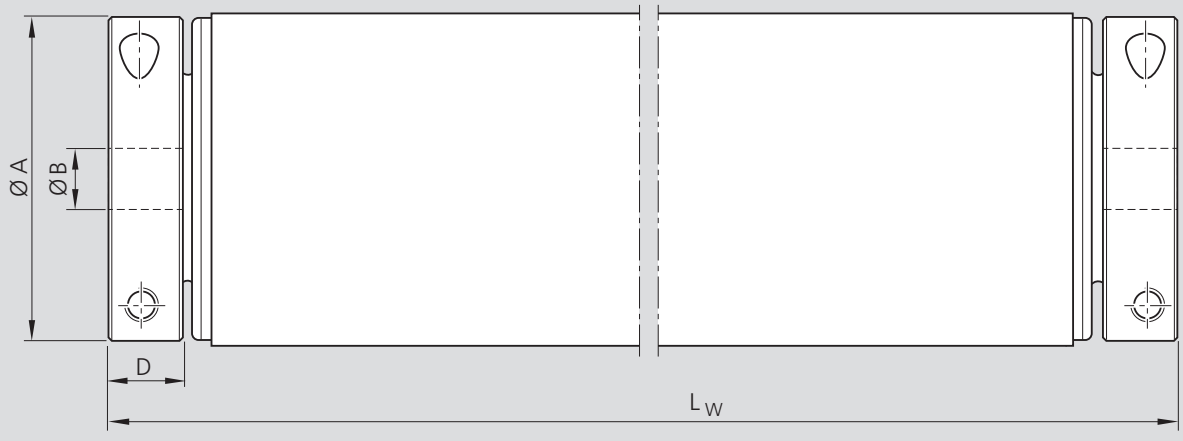


Part numbers and dimensions

Shaft type	Part number	Dimensions dia. A (mm)	dia. B (mm)	Torque (Nm)	Mass (kg)	Flexibility Δk_a (mm)	Δk_w (degree)	Moment of inertia ($\cdot 10^{-5}$ kgm²)
1	0391-510-00	147	35 H7	400	7 + 13.5 / m	2.6	1	2334 + 2.06 · L_W
2	0391-510-01	147	35 H7	400	8 + 6 / m	2.6	1	2487 + 1.02 · L_W
3	0391-510-02	110	18 H7	100	3 + 4.6 / m	1.8	1	330.3 + 0.44 · L_W

Δk_a = axial flexibility (mm)
Δk_w = angular flexibility (degree)

Connecting shafts (flexible membrane coupling)



Part numbers and dimensions

Shaft type	Part number	Dimensions dia. A (mm)	dia. B (mm)	D (mm)	Torque (Nm)	Mass (kg)			Moment of inertia ($\cdot 10^{-5}$ kgm²)
4	0391-510-03	99	18 H7	30.0	160	3.7 + 5 kg/m			500+ 1.20 · L_W
5	0391-510-04	69	18 H7	23.0	40	1.4 + 3.3 kg/m			90 + 0.37 · L_W
6	0391-510-05	60	16 H7	21.0	25	1 + 2.2 kg/m			40 + 0.19 · L_W

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Rexroth Robotic Erector System for Linear Modules / Linear Modules
Mounting Accessories

General information

When mounting and securing connection components, observe the maximum tightening torques for screws as indicated in the following table.

Tightening torques for mounting screws

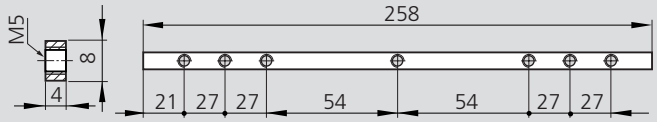
	8.8	M4	M5	M6	M8	M10	M12
	Nm	2.7	5.5	9.5	23	46	80

Anchor strips

Steel, oxide finish

All anchor strips can be fixed in place for vertical installation.

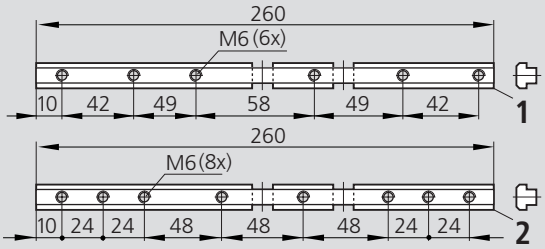
Frame dimension -80



Part number

0391-710-03

Frame dimension -110



Part number

(1): 0391-710-01
(2): 0391-710-00
Profiles to DIN 508

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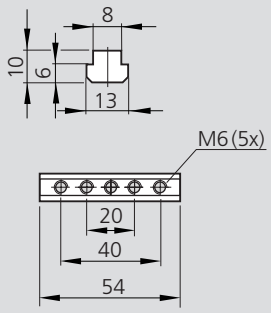
Frame dimension -110

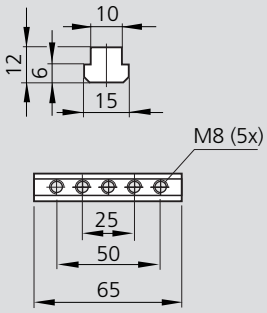


Part number

0391-710-06

Profile to DIN 508

Frame dimensions -145 and -165

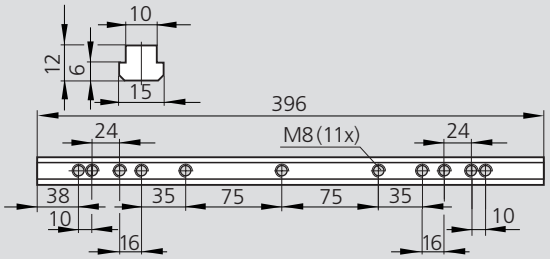


Part number

0391-710-05

Profile to DIN 508

Frame dimension -165



Part number

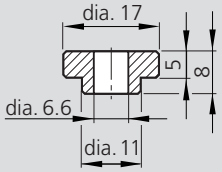
0391-710-04

Profile to DIN 508

Reducers

Aluminum alloy, black anodized

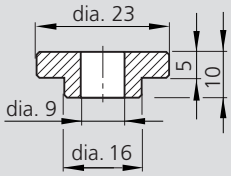
Frame dimension -110



Part number

0391-750-14

Frame dimension -165



Part number

0391-750-15

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Rexroth Linear Modules

Mounting

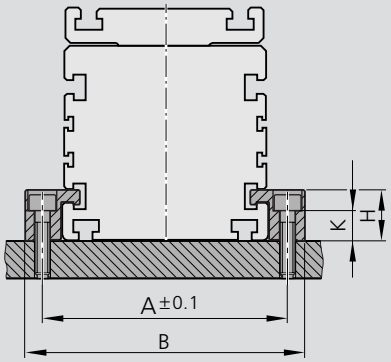
See "Robotic Erector System for Linear Modules" for additional mounting accessories for connecting linear modules.

General information

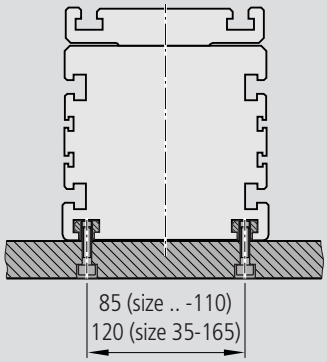
The linear modules are mounted using various mounting components:

- clamping fixtures
- T-nuts for frame dimension above -110
- square nuts
- spring nuts
- screws for T-slots to DIN 787 (no diagram)
  Length dependent on base.
  When mounting the linear modules, observe the maximum tightening torques as indicated in the table.

Mounting with clamping fixtures

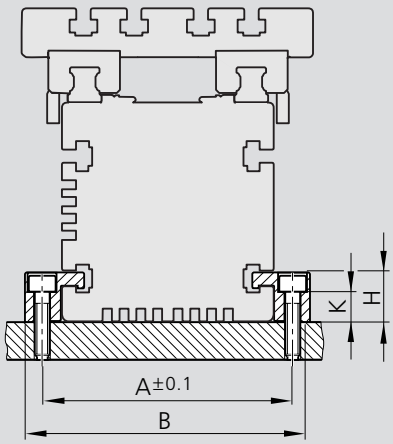


Mounting with T-nuts

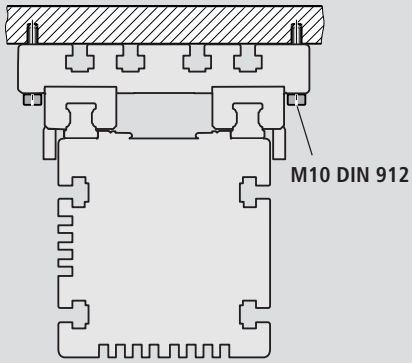


MKR/MKZ 25-145

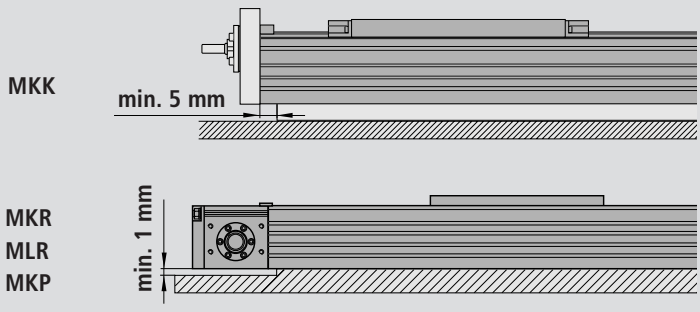
Mounting by the frame for horizontal operation



Mounting by the carriage for vertical operation



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



Tightening torques of the mounting screws

for friction factor 0.125
strength class 8.8

	8.8	M4	M5	M6	M8	M10	M12
	Nm	2.7	5.5	9.5	23	46	80

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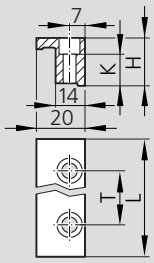
Clamping fixtures

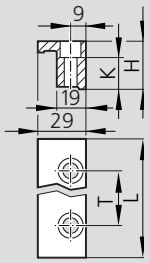
Recommended number of clamping fixtures: 3 per meter

Size 15-65
Size 20-80
Size 10-80



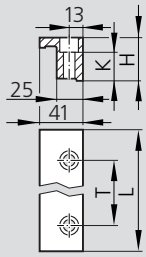
Part number
1175-190-24

Size 25-110
Size 10-110



Part number
1175-290-26

Size 35-165
MKR / MKZ 25-145



Part number
1175-390-14

MKR / MKZ 25-145:
1175-290-44

Size	Part number Clamping fixture	A (mm)	B (mm)	H (mm)	K (mm)	L (mm)	T (mm)	Counterbore for	Tightening torque (Nm)	Mass (kg)
15-65	1175-190-24	81	95	20	11.5	78	50	M6 DIN 912	9.5	0.053
20-80 10-80	1175-190-24	96	110	20	11.5	78	50	M6 DIN 912	9.5	0.053
25-110 10-110	1175-290-26	132	150	27.5	16.5	108	70	M8 DIN 912	23	0.147
35-165	1175-390-14	192	218	40.5	27	163	105	M10 DIN 912	46	0.456
MKR / MKZ 25-145	1175-290-44	172	198	32	18.5	163	105	M10 DIN 912	46	0.36

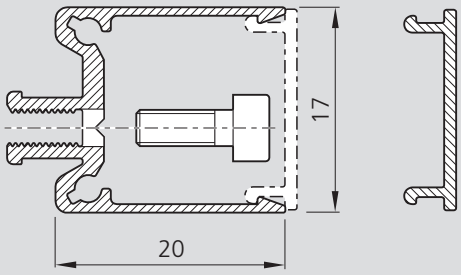
Cable duct

- The cable ducts are mounted in the lateral slots of the frame. Mounting screws widen the profile and secure the cable duct.

For the location of the slot side, see "Components and Ordering" table and "Dimension Drawings".

The cable duct takes a maximum of two cables for mechanical switches and three cables for proximity switches.

Mounting screws and grommets are provided.



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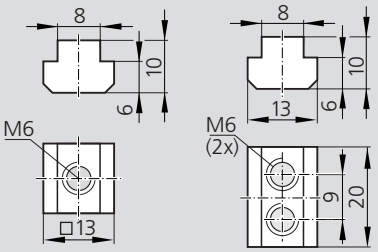
Rexroth Linear Modules

Mounting

See "Robotic Erector System for Linear Modules" for additional mounting accessories for connecting linear modules.

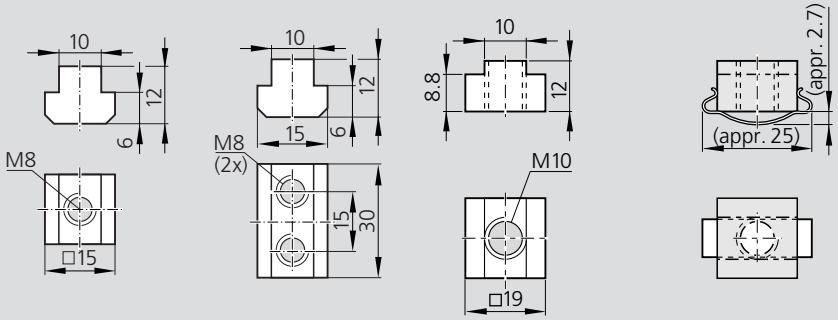
T-nuts

Size 25-110
Size 10-110



Part number	Part number
8447-001-01	0391-750-03
	Profile to DIN 508

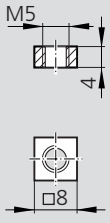
Size 35-165
MKR / MKZ 25-145



Part number	Part number	Part number	Part number
M6: 8447-003-01	0391-750-04	8447-006-01	8454-030-49
M8: 8447-002-01	Profile to DIN 508	T-nut	Fixing spring for T-nut 8447-006-01

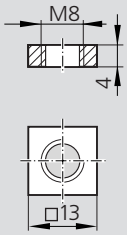
Square nuts

Size 15-65;
20-80; 10-80



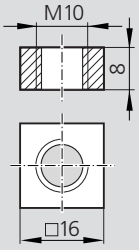
Part number
8442-001-00
to DIN 557

Size 25-110
Size 10-110



Part number
8442-003-01
to DIN 562

Size 35-165



Part number
8442-002-00
to DIN 557

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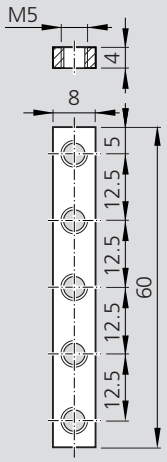
Anchor strips

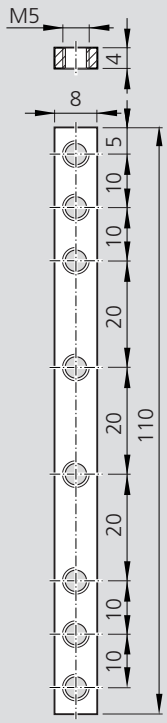
For linear modules MKP

MKP 15-65



Part number
0391-710-18

MKP 20-80

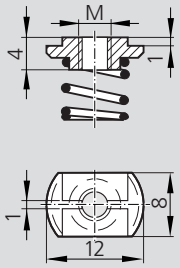


Part number
0391-710-19

Spring nuts

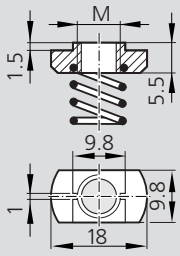
For low loads only

Size 25-110
Size 10-110



Part number
M4: 8447-005-02
M5: 8447-006-02
M6: 8447-007-02

Size 35-165
MKR / MKZ 25-145



Part number
M4: 8447-001-02
M5: 8447-002-02
M6: 8447-003-02

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Rexroth Linear Modules
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.

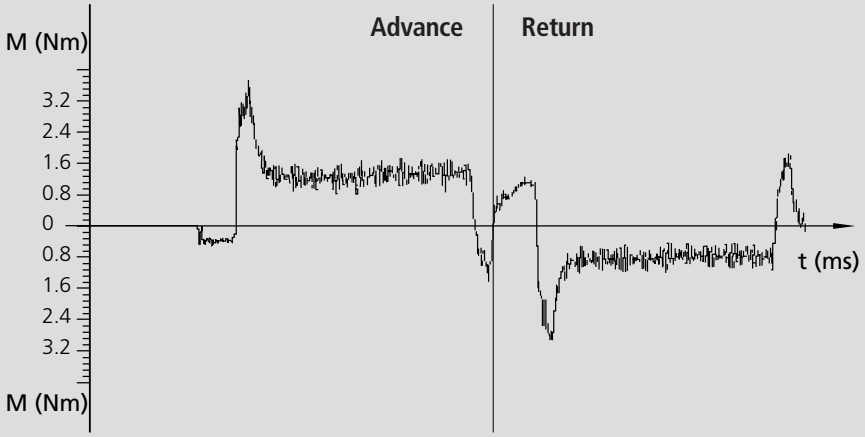
Checks listed in the standard report:

- functional checks of mechanical components
- functional checks of electrical components
- design is in accordance with order confirmation

Moment of friction measurement of the complete system

Option 02

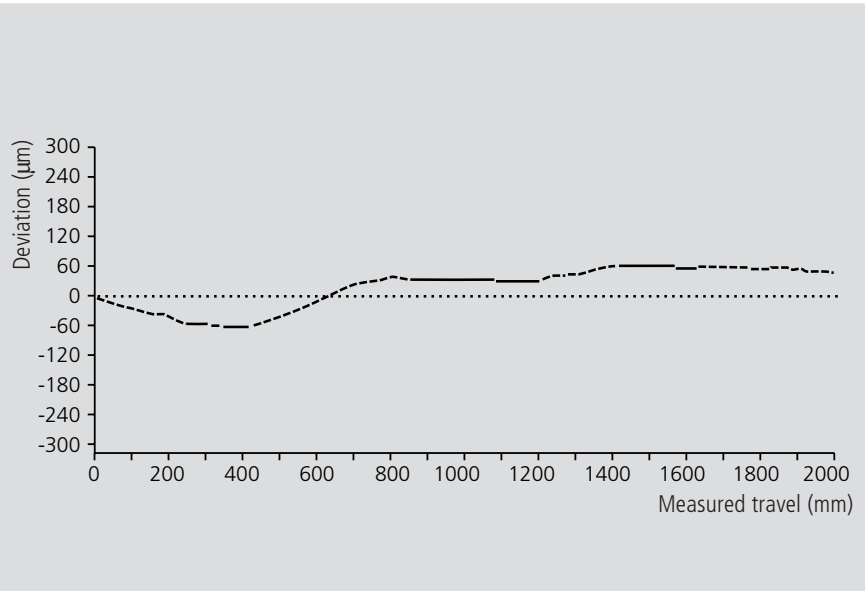
The moment of friction is measured along the entire travel range.



Lead deviation of ball screw for MKK modules

Option 03

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



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Positioning accuracy

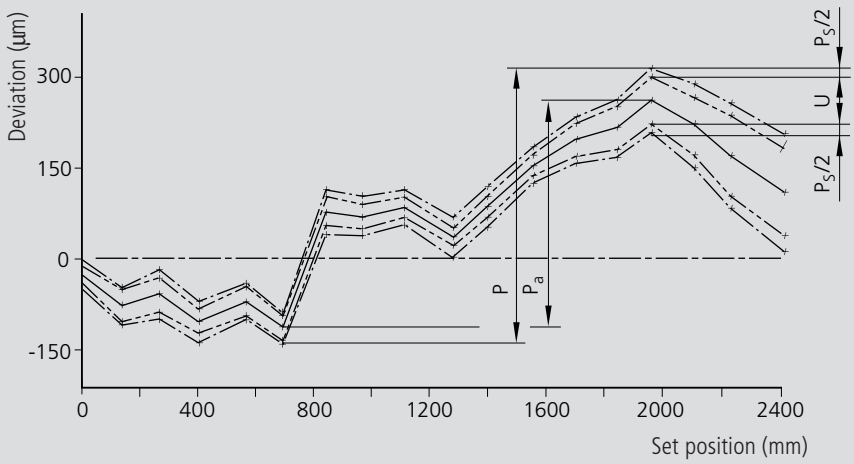
to VDI/DGQ 3441
Option 05

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

Each measurement point is approached several times from both sides.

This will give 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.

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Inquiry / Order Form

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

Rexroth Linear Modules

Ordering example: Linear Module with ball rail system MKK 25-110

Ordering data		Description
Linear Module MKK 25-110		Linear module designation
(Part number): 1160-260-10, 1310 mm		MKK 25-110, length = 1310 mm
Type	= MF01	with mount and motor, mounted as in diagram MF01
Guideway	= 01	ball rail system
Drive unit	= 03	ball screw 32 x 20
Carriage	= 01	carriage with length L_T = 310 mm
Motor attachment	= 01	with mount for motor MKD 71B-061
Motor	= 11	motor MKD 71B-061
Cover	= 20	with corrosion-resistant steel sealing strip
1st switch	= 15-R + 390 mm	mechanical switch, switch activation point: right + 390 mm
2nd switch	= 11-R – 290 mm	PNP NC, switch activation point: right – 290 mm
3rd switch	= 15-R – 390 mm	mechanical switch, switch activation point: right – 390 mm
Cable duct	= 20, 1200 mm	cable duct 1200 mm long (loose)
Socket-plug	= 17	socket-plug on switch side
Switching cam	= 16	with switching cam for switch activation
Documentation	= 03	lead deviation chart for ball screw

To be completed by customer: Inquiry ☐ / Order ☐

Linear 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 = ☐☐
Switching cam = ☐☐
Documentation = ☐☐

Components:

Robotic erector system
(Part number): _____-_____-_____
_____-_____-_____
_____-_____-_____
_____-_____-_____

Quantity _____ pcs., _____ per month, _____ per year, per order, or _____

Remarks:

Sender

Company: _____ **Name:** _____
Address: _____ **Department:** _____
_____ **Phone:** _____
_____ **Fax:** _____

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Linear Modules

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