

Precision Modules PSK



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Precision Modules PSK

Product overview	Product Description		4
	Motor selection		6
	Load capacities and sizes	Overview of types with load capacities	8
		Dimensions	9
	Structural Design	PSK without cover	10
		PSK with cover plate	10
		PSK with sealing strip	11
		Attachments for all PSK modules	11
Technical Data	General technical data		14
Calculations	Calculation principles		20
	Calculation example		23
	Accuracy		25
Configuration and ordering, Dimension Drawings			26
	Precision Module PSK-040	Configuration and ordering	26
		Lengths and Hole Spacing	28
		Dimension Drawings without Cover	29
		Dimension Drawings with Cover Plate	30
		Dimension Drawings, Motor Attachment	31
	Precision Module PSK-050	Configuration and ordering	32
		Lengths and Hole Spacing	34
		Dimension Drawings without Cover	35
		Dimension Drawings with Cover Plate	36
		Dimension Drawings with Sealing Strip	37
	Precision Module PSK-060	Dimension Drawings, Motor Attachment	38
		Configuration and ordering	40
		Lengths and Hole Spacing	42
		Dimension Drawings without Cover	43
		Dimension Drawings with Cover Plate	44
	Precision Module PSK-090	Dimension Drawings with Sealing Strip	45
		Dimension Drawings, Motor Attachment	46
		Components and Ordering Data	48
		Lengths and Hole Spacing	50
		Dimension Drawings without Cover	51
		Dimension Drawings with Cover Plate	52
		Dimension Drawings with Sealing Strip	53
		Dimension Drawings, Motor Attachment	54
Attachments and Accessories		Switch Mounting Arrangements	Overview of switching system
	IndraDyn S Servo Motor MSK		60
	IndraDyn S Servo Motor MSM		62
	Motor mounting kits according to customer specification		64
	Mounting		66
Services and Information	Lube Ports		67
	Documentation		68
	Operating conditions and usage	70	
		Normal operating conditions	70
		Required and supplementary documentation	70
	Further Information		71
Inquiry/Order Form		72	

Product overview

Product Description

Outstanding features

Rexroth Precision Modules are precise, ready-to-install linear motion systems that combine high performance with compact dimensions.

Rexroth offers favorable price/performance ratios and fast delivery.

Structural design

- Extremely compact and rigid precision steel profile (frame) with reference edge and integrated Rexroth guideway geometry
- Precision ball screw drive in tolerance grade 7 with zero-backlash nut system
- Aluminum fixed bearing end block with preloaded ball bearings and ball screw journal
- Floating bearing end block with double ball bearings
- One or two steel carriages, standard length or long, for PSK without cover or with cover plate
- One aluminum carriage, standard length or long, for PSK with sealing strip

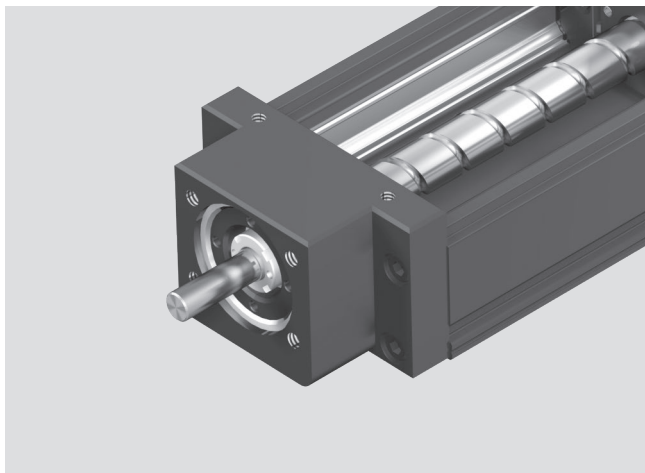
Attachments

- Maintenance-free digital AC servo drives with integrated brake and attached feedback, or stepping motors
- Motor mount and coupling or timing belt side drive for motor attachment
- Adjustable switches over the entire travel range
- Aluminum profile mounting duct

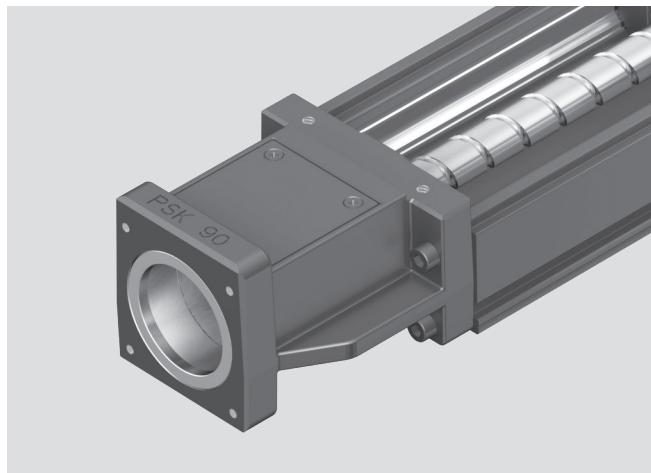
Drive controllers and control systems

Further highlights

- Extremely stiff and precise miniature drive unit
- Optimal travel performance, high load capacities, high precision and high rigidity due to integrated Rexroth Ball Rail System
- High positioning accuracy and repeatability due to Precision Ball Screw Assembly with zero-backlash nut system
- Repeatability up to 0.005 mm
Positioning accuracy up to 0.01 mm
Guidance accuracy up to 0.005 mm
- High travel speeds combined with high precision due to Ball Rail Systems, large screw diameters and leads, and double floating bearing
- Rapid mounting and easy axis alignment thanks to machined reference edge on the frame
- Precise alignment and secure mounting of attachments thanks to tapped bores and pin holes in the carriage
- Easy motor attachment via locating feature and fastening threads
- Low-cost maintenance provided by one-point lubrication (grease) for Ball Rail System and Precision Ball Screw Assembly
- Precision Modules in standard lengths for fast delivery



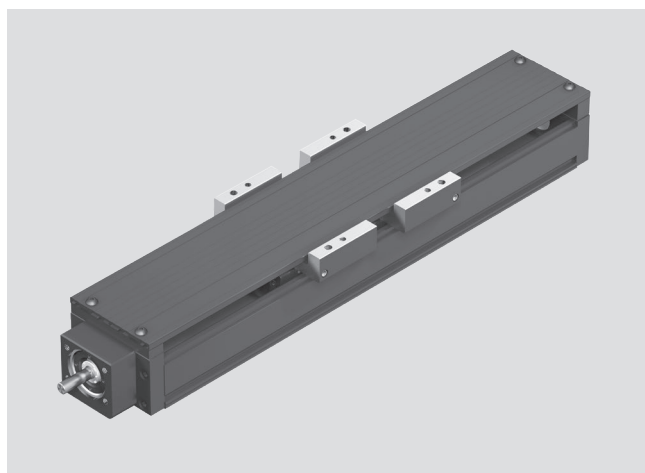
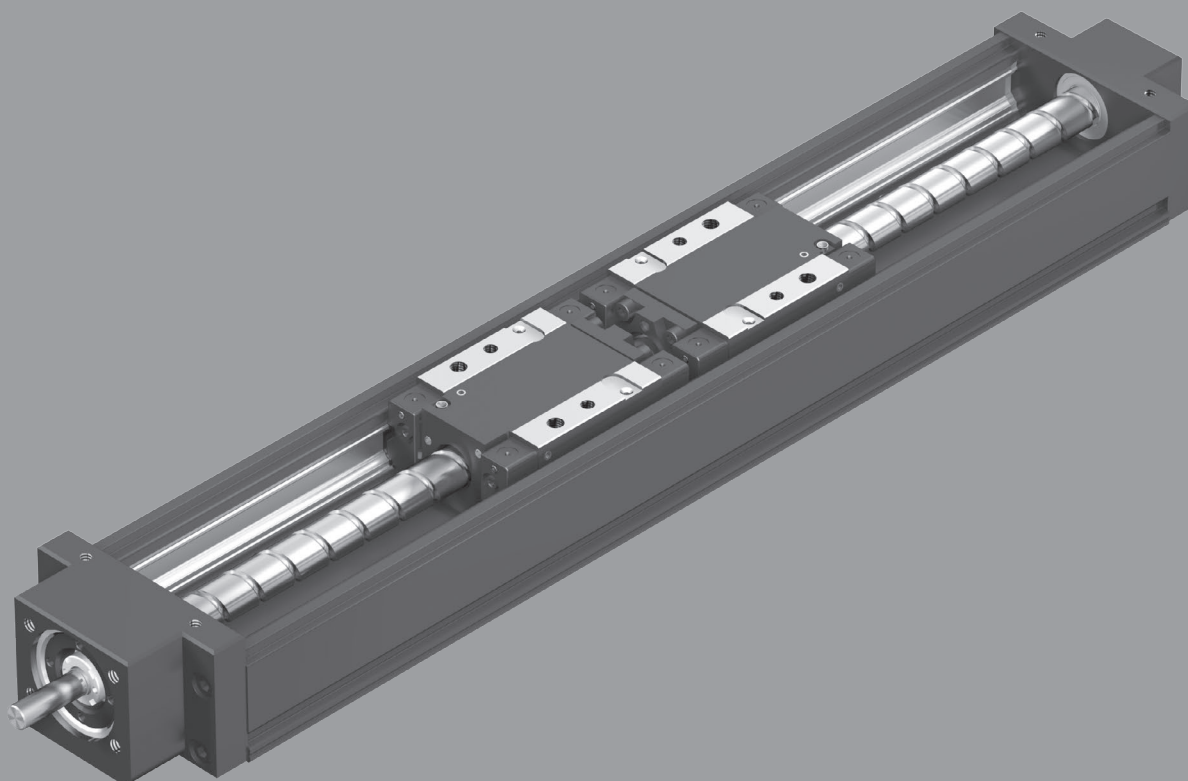
Fixed bearing end block with ball screw journal



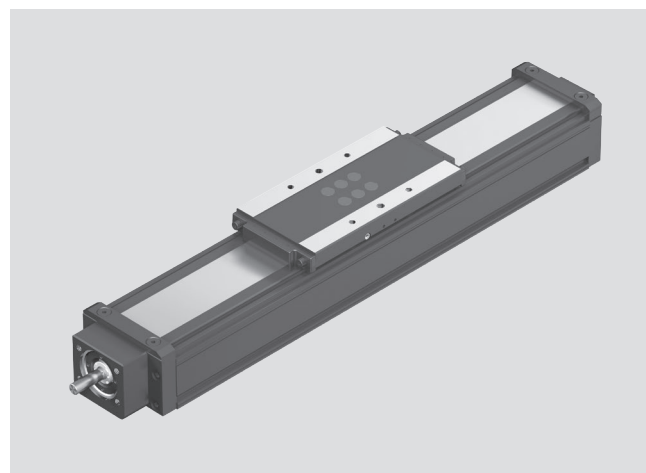
Fixed bearing end block with integrated motor mount

For mounting, maintenance and start-up, see
"Instructions for Precision Modules PSK."

PSK without cover



Internal elements protected by cover plate
One or two steel carriages, standard length or long



Internal elements protected by stainless steel sealing strip
Aluminum carriage, standard length or long

Product overview

Motor selection

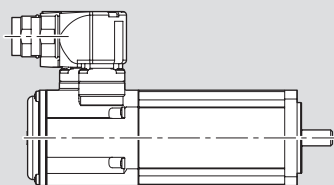
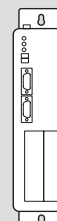
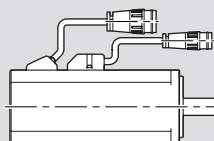
Based on drive controllers and control system

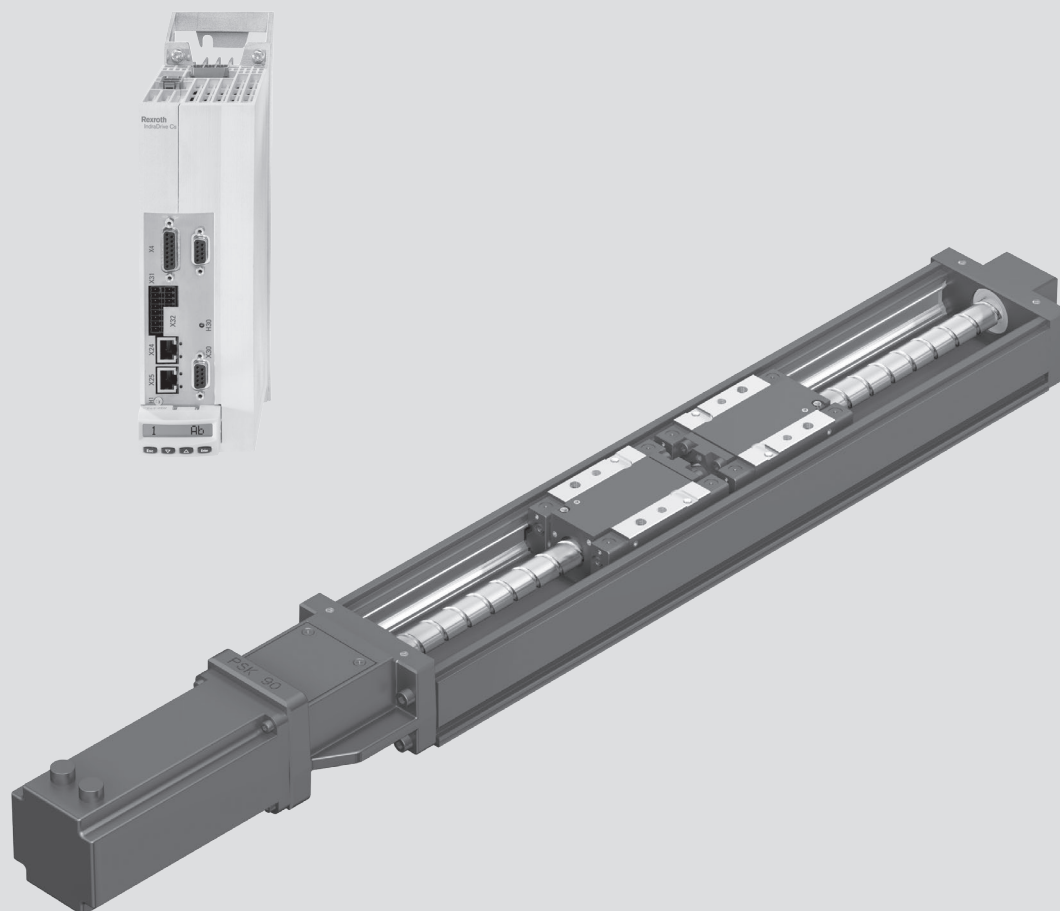
A choice can be made between several different motor/controller combinations to achieve the most cost-efficient solution for each customer application.

When sizing the drive, always consider the motor-controller combination.

For more information about motors and control systems, see the following Rexroth catalog:

- IndraDrive for Linear Motion Systems

**Digital AC servo motors MSK****Digital controllers
IndraDrive****SAFETY
ON
BOARD****Digital AC servo motors MSM****Digital controllers
IndraDrive Cs**

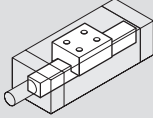
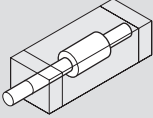
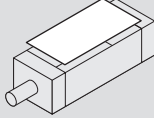
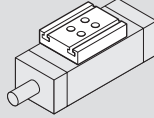
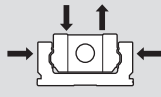


Precision Modules PSK can be supplied complete with motor, controller and control unit.

Product overview

Load capacities and sizes

Overview of types with load capacities

Type	System	Guideway	Drive unit ¹⁾	Size	Cover	Carriage (carr.)		Load capacities
							Number	
								
PSK	Precision Module	Rail System	Precision Ball Screw Assembly	PSK-040	Without / cover plate	Standard	1 carr.	3 065
							2 carr.	4 980
				PSK-050	Without / cover plate	Standard	1 carr.	7 300
							2 carr.	11 850
					Sealing strip	Standard	1 carr.	7 300
						Long	1 carr.	11 850
				PSK-060	Without / cover plate	Standard	1 carr.	7 300
							2 carr.	11 850
						Long	1 carr.	9 000
							2 carr.	14 620
					Sealing strip	Standard	1 carr.	9 000
						Long	1 carr.	14 620
				PSK-090	Without / cover plate	Standard	1 carr.	21 300
							2 carr.	34 600
						Long	1 carr.	27 500
							2 carr.	44 670
					Sealing strip	Standard	1 carr.	21 300
						Long	1 carr.	34 600

1) All Precision Modules can also be supplied without drive unit.

Permissible loads

Suitable loads (recommended values)

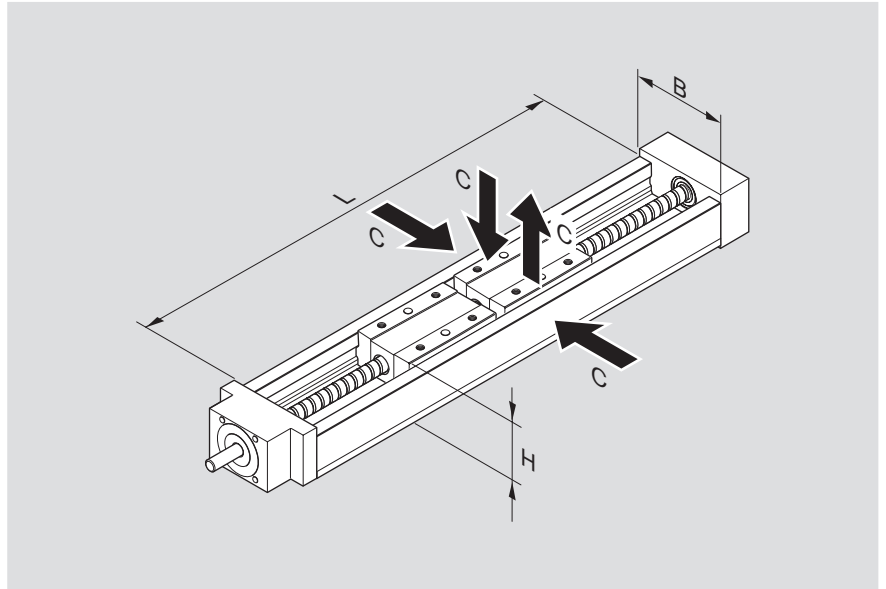
With respect to the desired service life, loads up to about 20% of the characteristic dynamic values (**C**, **M_b**, **M_L**) have proved acceptable.

At the same time, the following may not be exceeded:

- maximum permissible loads
- permissible drive torque
- permissible travel speed

For permissible values, see the "Technical Data" section.

Dimensions



Standard lengths L

Precision Module	PSK-040	PSK-050	PSK-060	PSK-090
B (mm)	40	50	60	86
H (mm)	20	26	33	46
L (mm)	100	100	150	340
	150	150	200	440
	200	200	250	540
	250	250	300	640
	300	300	400	740
	350	350	500	840
		400	600	940
		450	700	
		500	800	
		550	900	
		600	940	

Product overview

Structural Design

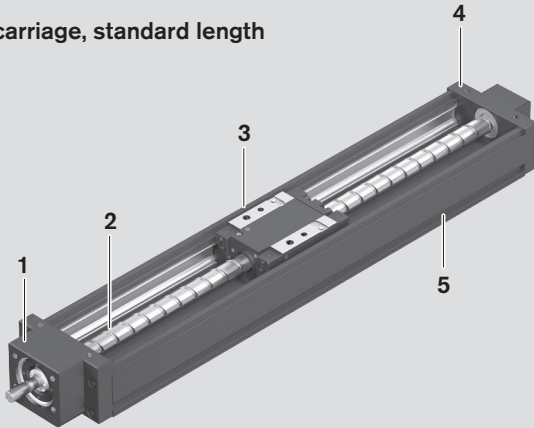
PSK without cover

- 1 Fixed bearing end block
- 2 Ball screw with zero-backlash cylindrical single nut
- 3 One or two steel carriages, standard length or long
- 4 Floating bearing end block
- 5 Frame with reference edge and integrated guideway geometry

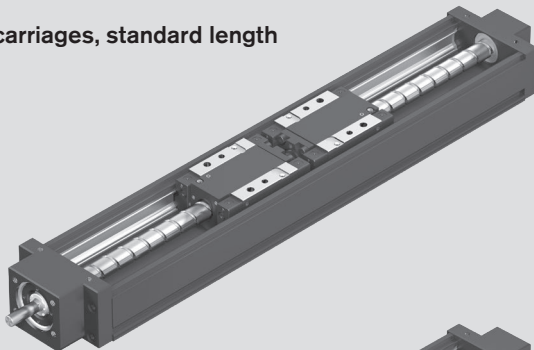
PSK with cover plate

- 6 Cover plate
- 7 One or two carriages, standard length or long
- 8 Carriage plate, aluminum
- 9 Carriage plate guide unit, steel

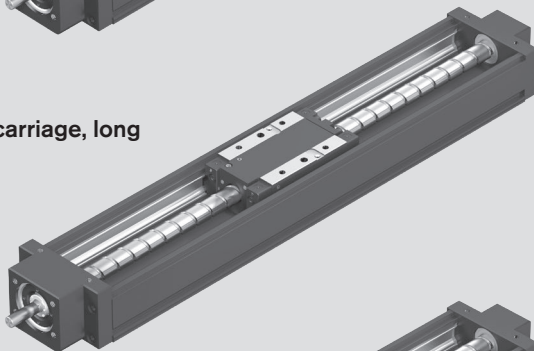
1 carriage, standard length



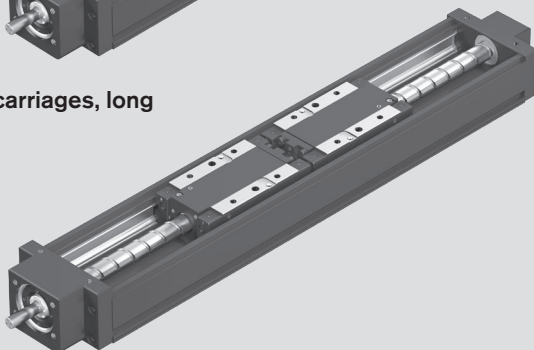
2 carriages, standard length



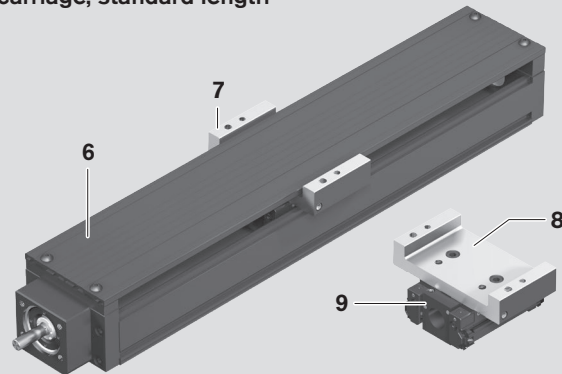
1 carriage, long



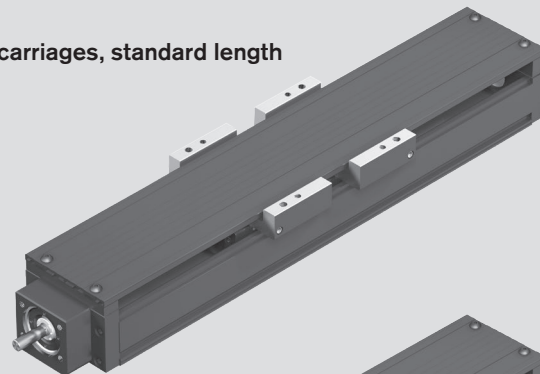
2 carriages, long



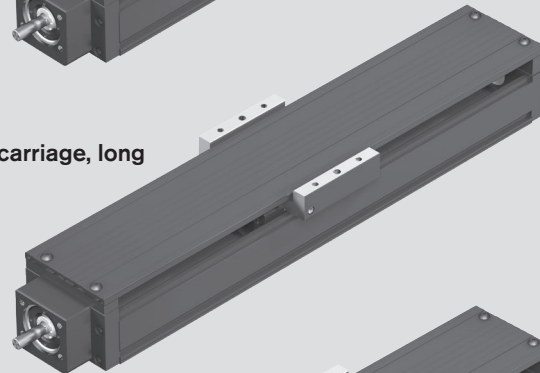
1 carriage, standard length



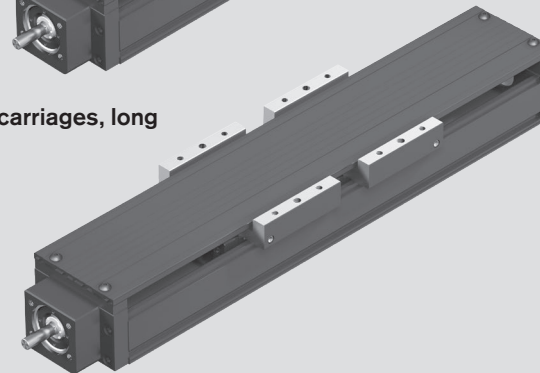
2 carriages, standard length



1 carriage, long

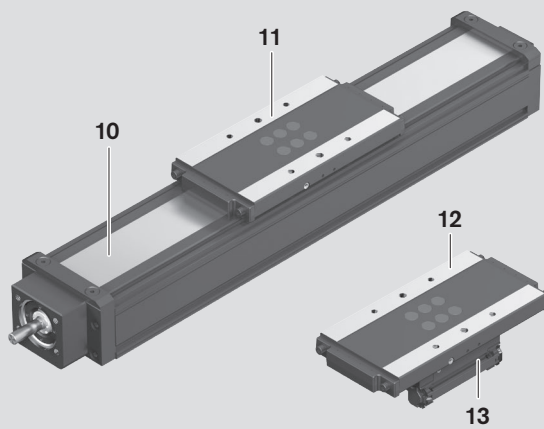
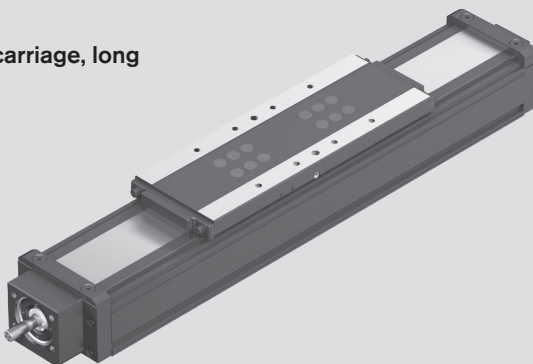


2 carriages, long

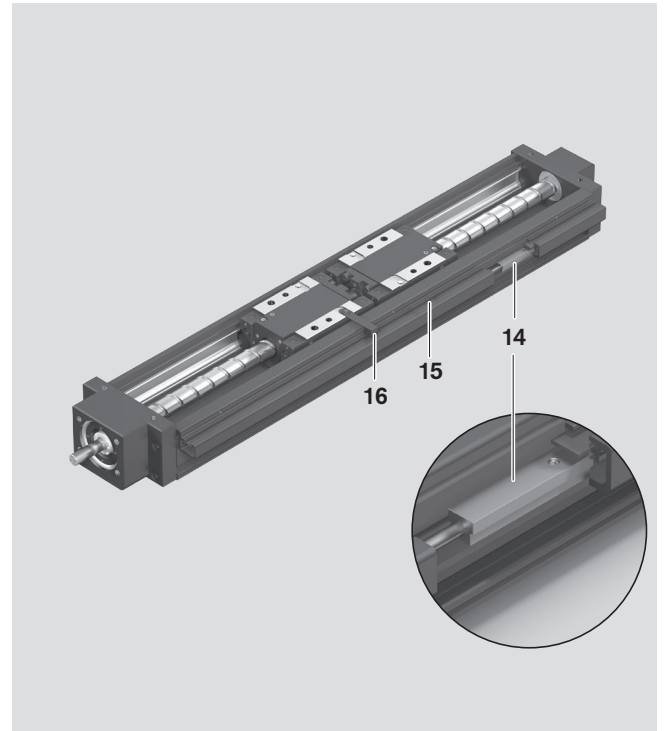


PSK with sealing strip

- 10 Sealing strip, stainless steel
- 11 One carriage, standard length or long
- 12 Carriage plate, aluminum
- 13 Carriage plate guide unit, aluminum

1 carriage, standard length**1 carriage, long****Attachments for all PSK modules**

- 14 Switches
- 15 Mounting duct
- 16 Switching cam



Product overview

Structural Design

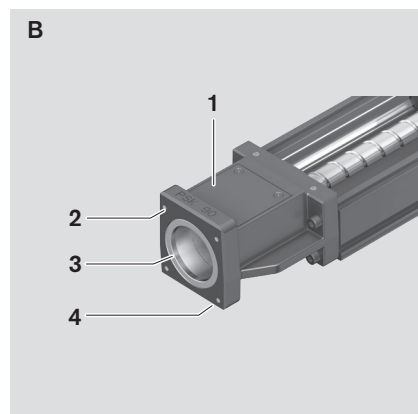
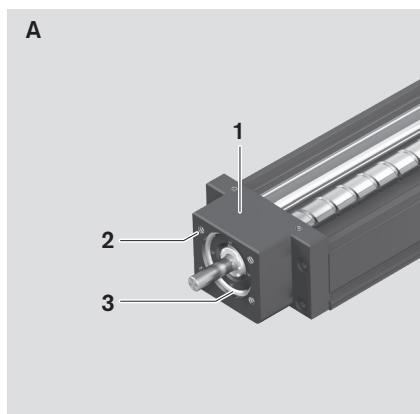
Fixed bearing end block

Version with ball screw journal (A)

- 1 End block with preloaded bearing
- 2 Tapped mounting hole
- 3 Centering feature

Version with integrated motor mount (B)

- 1 End block with integrated motor mount and preloaded bearing
- 2 Tapped mounting hole
- 3 Centering feature
- 4 Flange form suitable for motor attachment

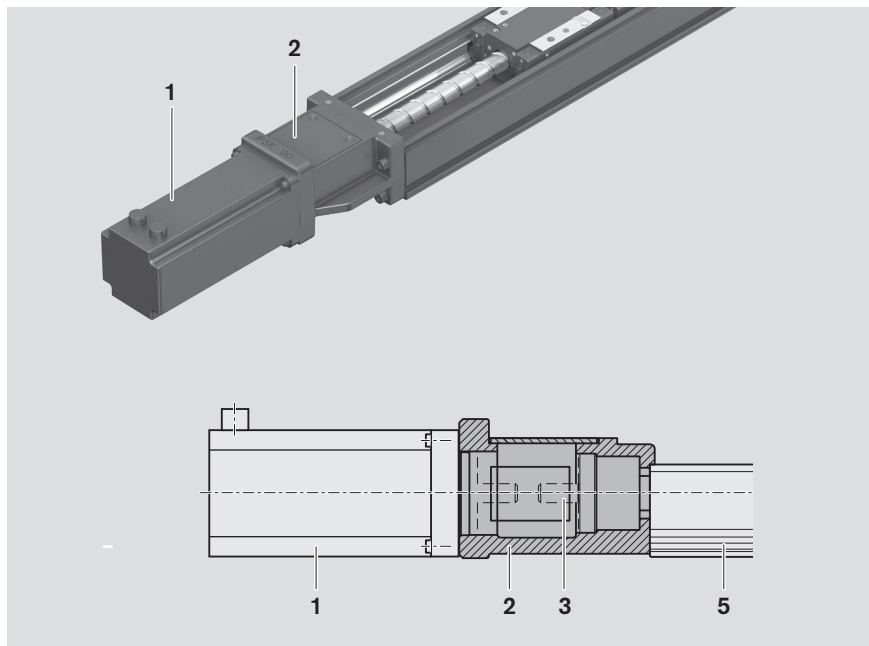


Motor attachment

Motor attachment with motor mount and coupling

A motor can be attached to all Precision Modules by means of a motor mount and coupling.

The motor mount serves to fasten the motor to the Precision Module and acts as a closed housing for the coupling. The coupling transmits the motor drive torque free of distortive stresses to the Precision Module's ball screw journal.

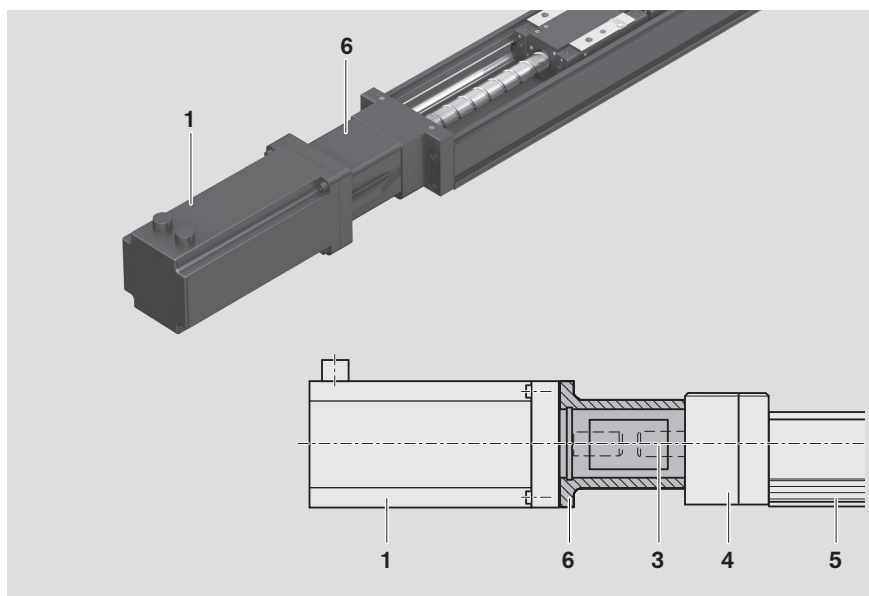


Fixed bearing end block with integrated motor mount and coupling

- 1 Motor
- 2 Fixed bearing end block with integrated motor mount
- 3 Coupling
- 5 Precision module

Fixed bearing end block with attached motor mount and coupling

- 1 Motor
- 3 Coupling
- 4 Fixed bearing end block
- 5 Precision module
- 6 Motor mount



Motor attachment with timing belt side drive

On Precision Modules PSK-050 and PSK-090 the motor (9) can be attached via a side drive with timing belt. This makes the overall length shorter than when attaching the motor with a motor mount and coupling. The compact, closed housing protects the belt and secures the motor.

The following gear ratios are available:

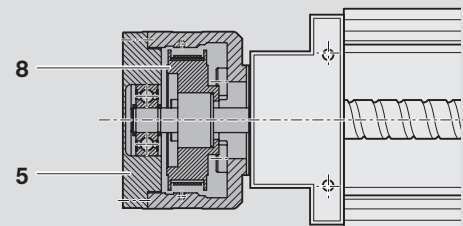
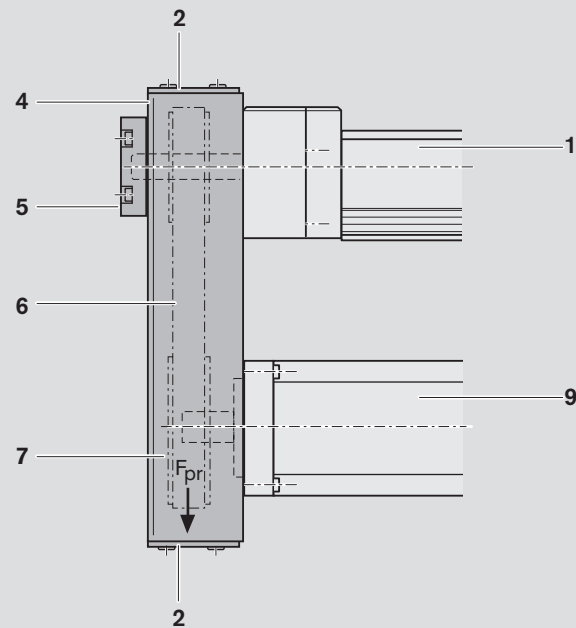
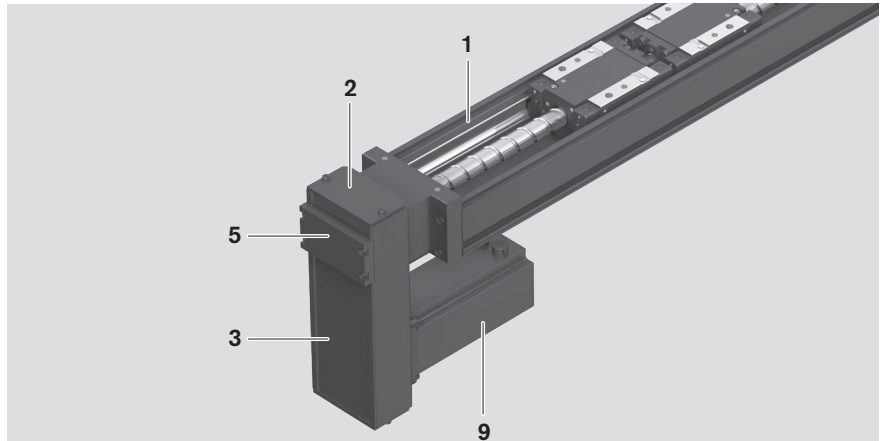
$i = 1 : 1$

$i = 1 : 1.5$

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

- top, bottom
- left, right

- 1 Precision module
- 2 End cover
- 3 Cover plate
- 4 Drawn, anodized aluminum profile
- 5 Ball screw journal with support bearing
- 6 Toothed belt
- 7 Pre-tensioning of the toothed belt:
Apply pretensioning force F_{pr} to motor (F_{pr} will be indicated on delivery)
- 8 Belt pulleys
- 9 AC servo motor



Technical Data

General technical data

Precision Module	Planar moment of inertia		Minimum center-to-center distance $l_{m \min}$		Mass of the linear motion system m_s (kg)			
	I_y (cm ⁴)	I_z (cm ⁴)	Standard carr. (mm)	Long carr. (mm)	Without cover, without drive	Without cover, with drive	With cover plate	With sealing strip
PSK-040	0.892	6.65	50	–	$0.0026 \cdot L + m_{ca}$	$0.0028 \cdot L + 0.075 + m_{ca}$	$0.0030 \cdot L + 0.089 + m_{ca}$	–
PSK-050	1.690	13.50	60	–	$0.0035 \cdot L + m_{ca}$	$0.0038 \cdot L + 0.179 + m_{ca}$	$0.0041 \cdot L + 0.204 + m_{ca}$	$0.0042 \cdot L + 0.208 + m_{ca}$
PSK-060	5.380	34.48	60	75	$0.0062 \cdot L + m_{ca}$	$0.0069 \cdot L + 0.254 + m_{ca}$	$0.0072 \cdot L + 0.281 + m_{ca}$	$0.0073 \cdot L + 0.272 + m_{ca}$
PSK-090	22.340	145.80	90	110	$0.0125 \cdot L + m_{ca}$	$0.0138 \cdot L + 0.638 + m_{ca}$	$0.0146 \cdot L + 0.726 + m_{ca}$	$0.0147 \cdot L + 0.736 + m_{ca}$

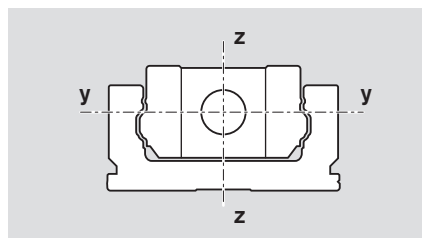
Dynamic characteristics

Precision Module	Type of cover	Carriage (carr.)		Guideway		Ball screw		Fixed bearing
		Number		Dynamic load capacity	Dynamic load moments	Size	Dynamic load capacity	
				C (N)	M_t (Nm)	M_L (Nm)	$d_0 \times P$	C (N)
PSK-040	W/o and w/plate	Standard	1 carr.	3 065	43.1	14.8	6 x 1	900
			2 carr.	4 980	70.0	$2.49 \times l_m$	6 x 2	890
PSK-050	W/o and w/plate	Standard	1 carr.	7 300	150.0	35	8 x 2.5	2 200
			2 carr.	11 850	244.0	$5.93 \times l_m$	8 x 2.5	2 200
	Strip	Standard	1 carr.	7 300	150.0	35	8 x 2.5	2 200
		Long	1 carr.	11 850	244.0	356	8 x 2.5	2 200
PSK-060	W/o and w/plate	Standard	1 carr.	7 300	170.0	35	12 x 2	2 240
			2 carr.	11 850	276.0	$5.93 \times l_m$	12 x 2	2 240
		Long	1 carr.	9 000	210.0	60	12 x 5	3 800
			2 carr.	14 620	341.0	$7.31 \times l_m$	12 x 5	3 800
	Strip	Standard	1 carr.	9 000	210.0	60	12 x 10	2 500
		Long	1 carr.	14 620	341.0	541	12 x 10	2 500
PSK-090	W/o and w/plate	Standard	1 carr.	21 300	710.0	150	16 x 5	12 300
			2 carr.	34 600	1153.0	$17.3 \times l_m$	16 x 5	12 300
		Long	1 carr.	27 500	910.0	270	16 x 10	9 600
			2 carr.	44 670	1478.0	$22.34 \times l_m$	16 x 10	9 600
	Strip	Standard	1 carr.	21 300	710.0	150	16 x 16	6 300
		Long	1 carr.	34 600	1153.0	1557	16 x 16	6 300

Maximum acceleration: $a_{\max} = 27 \text{ m/s}^2$ l_m = center-to-center distance between carriages (mm) d_0 = screw diameter (mm)

P = screw lead (mm)

carr. = carriage(s) (mm)

 m_{ca} = moved mass of system (kg)

Mass

Mass calculation without motor and switches.

Mass formula:

Mass factor (kg/mm) · length L (mm)
 + mass of all parts of fixed length (kg) +
 moved mass of system m_{ca} (kg)

Modulus of elasticity E

E = 210,000 N/mm²

Ambient temperature

0 °C ... 40 °C

Note on dynamic load capacities and moments

Determination of the dynamic load capacities and moments is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated.

For comparison: Multiply values **C**, **M_t** and **M_L** from the table by 1.26.

Maximum permissible loads

The maximum permissible forces ($F_{y \max}$, $F_{z \max}$) and moments ($M_{x \max}$, $M_{y \max}$, $M_{z \max}$) are equal to half the dynamic characteristics (**C**, **M_t**, **M_L**).

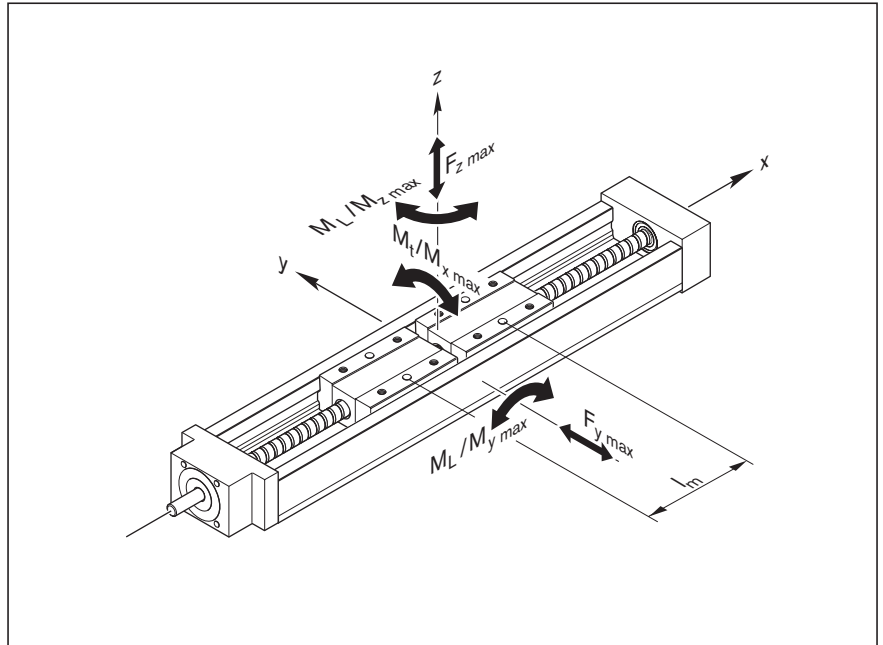
Suitable loads

(recommended values)

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

At the same time, the following may not be exceeded:

- maximum permissible loads
- permissible drive torque
- permissible travel speed
- maximum permissible acceleration



l_m = center-to-center distance between carriages (mm)

Moved mass of system m_{ca}

Precision Module	Carriage	Moved mass of system m _{ca} (kg)						
		Without cover, without drive		Without cover, with drive		With cover plate		With sealing strip
		1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	2 carr.	1 carr.
PSK-040	Standard	0.08	0.17	0.09	0.18	0.14	0.28	–
PSK-050	Standard	0.20	0.40	0.22	0.42	0.29	0.56	0.20
	Long	–	–	–	–	–	–	0.37
PSK-060	Standard	0.25	0.49	0.27	0.52	0.38	0.73	0.33
	Long	0.34	0.69	0.37	0.71	0.51	1.00	0.58
PSK-090	Standard	0.77	1.54	0.85	1.62	1.09	2.10	0.80
	Long	1.04	2.08	1.11	2.15	1.43	2.79	1.40

carr. = carriage(s) (mm)

Technical Data

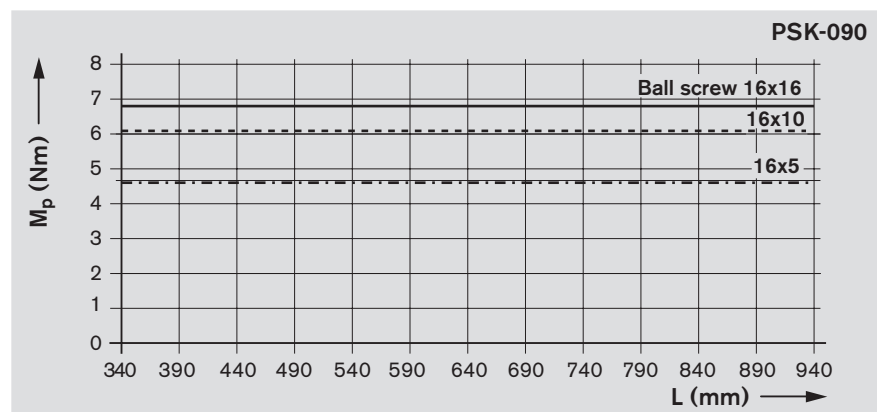
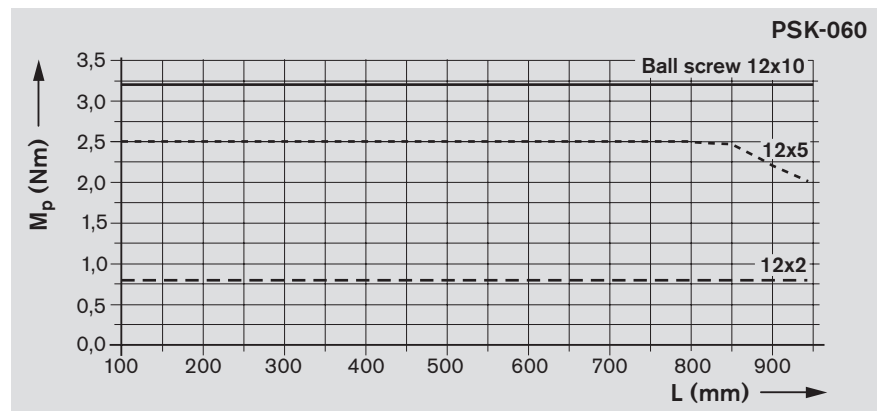
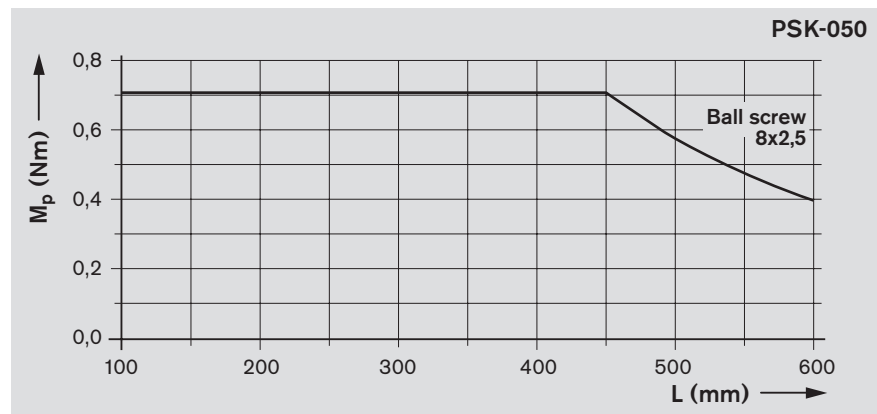
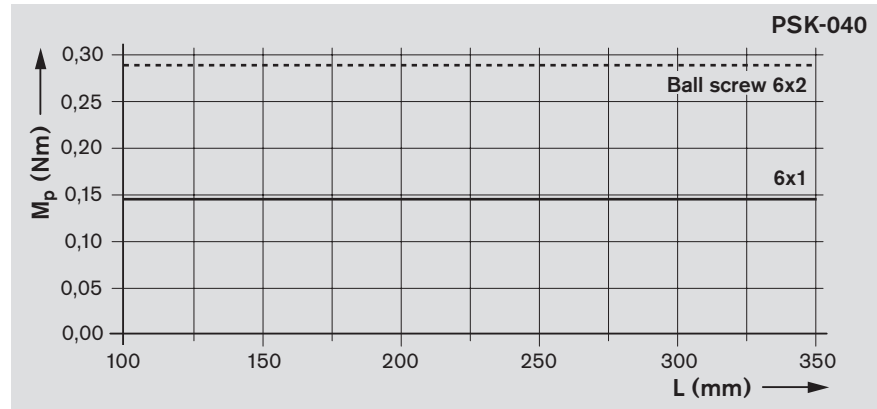
General technical data

Maximum permissible drive torque at the screw journal M_p

The values shown for M_p are applicable under the following conditions:

- Horizontal operation
- Ball screw journal without keyway
- No radial load on ball screw shaft

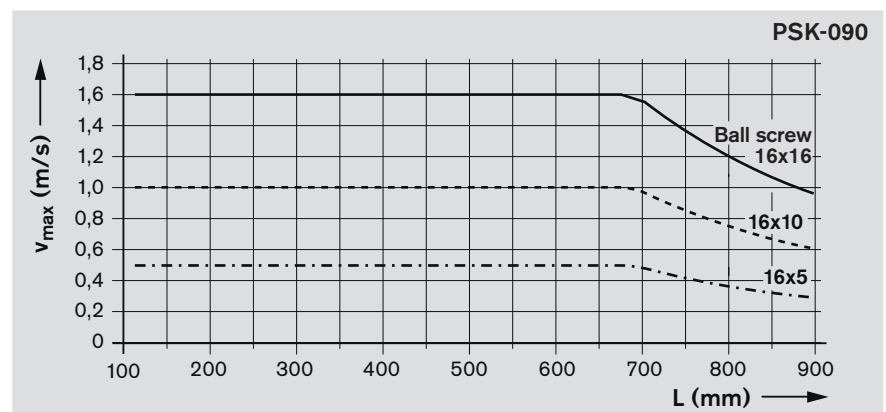
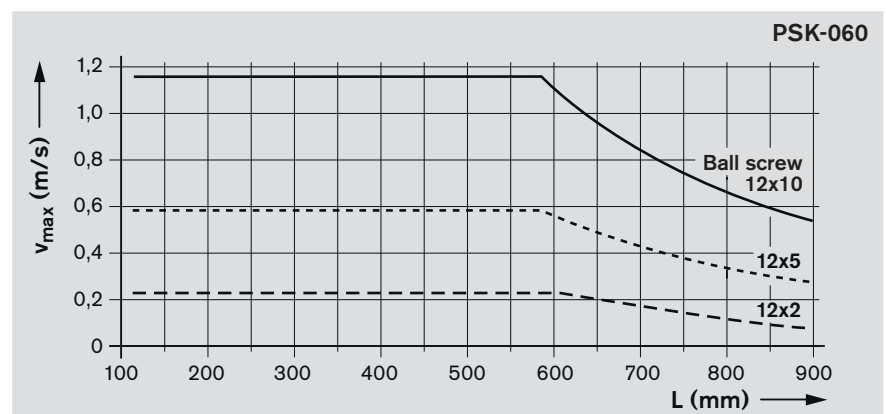
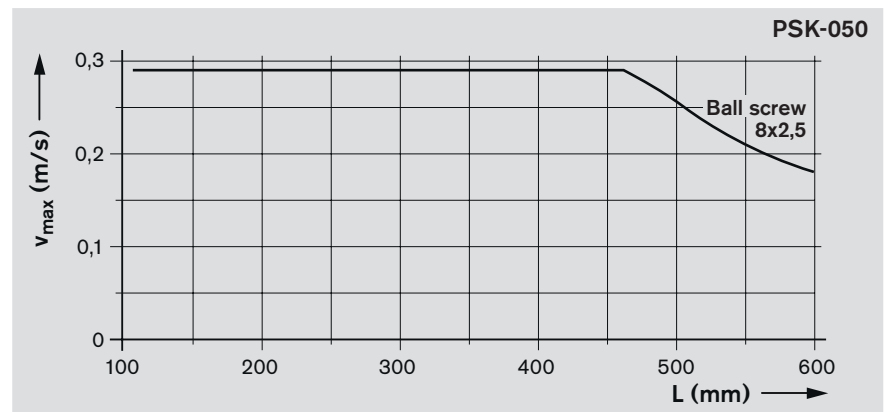
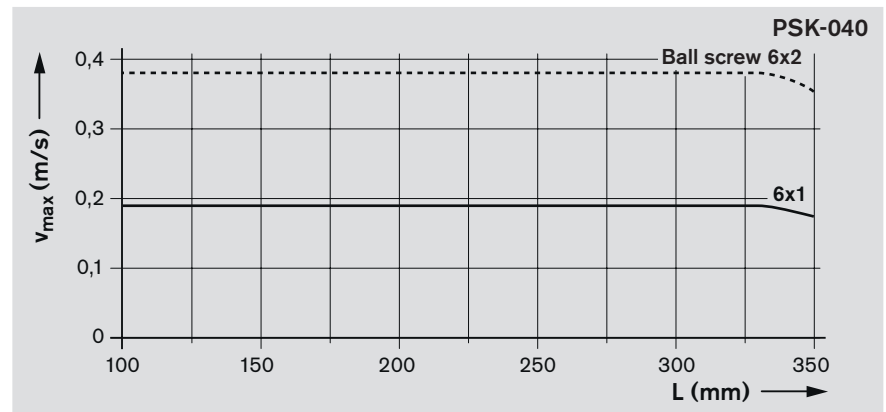
Consider the rated torque of the coupling used!



L = PSK length (mm)
 Ball screw = ball screw size: $d_0 \times P$
 d_0 = screw diameter (mm)
 P = lead (mm)

Maximum permissible linear speed $v_{\max}$

Consider the motor speed!



L = PSK length (mm)
 Ball screw = ball screw size: $d_0 \times P$
 d_0 = screw diameter (mm)
 P = lead (mm)

Technical Data

General technical data

Motor attachment via timing belt side drive

Motor type		MSM 019B					MSM 031B / MSM 031C / MSK 030				
F (mm)		48					64.5				
M _{Rsd} (Nm)		0.10					0.15				
m _{sd} (kg)		0.28					0.65				
		M _{sd} ²⁾		J _{sd}			M _{sd} ²⁾		J _{sd}		
Gear ratio i		i = 1	i = 1.5	i = 1	i = 1.5		i = 1	i = 1.5	i = 1	i = 1.5	
Belt type		6 AT3	6 AT3	6 AT3	6 AT3		10 AT3	10 AT3	10 AT3	10 AT3	
Size	BS	up to L ¹⁾					up to L ¹⁾				
	d ₀ x P	(mm)	(Nm)	(Nm)	(10 ⁻⁶ kgm ²)	(10 ⁻⁶ kgm ²)	(mm)	(Nm)	(Nm)	(10 ⁻⁶ kgm ²)	(10 ⁻⁶ kgm ²)
PSK-050	8 x 2.5	450	0.61	0.41	10.7	4.1	—	—	—	—	—
PSK-060	12 x 2	940	0.79	0.53	10.7	4.1	940	0.79	0.53	34.8	13.1
	12 x 5	940	1.31	0.87			800	2.48	1.65		
	12 x 10	940	1.31	0.87			940	2.70	1.80		
PSK-090	16 x 5	—	—	—	—	—	940	2.87	1.91	41.5	13.4
	16 x 10	—	—	—			940	2.87	1.91		
	16 x 16	—	—	—			940	2.87	1.91		

Motor type		MSM 041B / MSK 040				
F (mm)		88				
M _{Rsd} (Nm)		0.40				
m _{sd} (kg)		1.45				
		M _{sd} ²⁾		J _{sd}		
Gear ratio i		i = 1	i = 1.5	i = 1	i = 1.5	
Belt type		16 AT5	16 AT5	16 AT5	16 AT5	
Size	BS	up to L ¹⁾				
	d ₀ x P	(mm)	(Nm)	(Nm)	(10 ⁻⁶ kgm ²)	(10 ⁻⁶ kgm ²)
PSK-090	16 x 5	940	4.31	2.87	234.4	83.6
	16 x 10	940	5.85	3.90		
	16 x 16	940	6.42	4.28		

1) For longer lengths, the permitted drive torque is determined by the length-dependent value M_p of the linear system as given in the graphs ➔ section "Technical Data"

2) Values for M_{sd} do not take motor torque into account.

- i = timing belt side drive reduction
 BS = ball Screw Assembly
 d₀ = screw diameter (mm)
 P = screw lead (mm)
 J_{sd} = mass moment of inertia of timing belt side drive
 M_{Rsd} = frictional torque of timing belt side drive at motor journal
 M_{sd} = maximum permissible drive torque of the timing belt side drive
 m_{sd} = mass of timing belt side drive

Frictional torque of the linear motion system M_{Rs}

Precision Module	Ball screw size d ₀ x P	Frictional torque of the linear motion system M _{Rs} (Nm) for carriage version			
		Without cover or with cover plate		With sealing strip	
		Standard carr.	Long carr.	Standard carr.	Long carr.
PSK-040	6 x 1	0.033	—	—	—
	6 x 2	0.034	—	—	—
PSK-050	8 x 2.5	0.06	—	0.06	0.07
PSK-060	12 x 2	0.10	0.10	0.10	0.11
	12 x 5	0.11	0.11	0.11	0.12
	12 x 10	0.12	0.13	0.13	0.15
PSK-090	16 x 5	0.30	0.30	0.29	0.31
	16 x 10	0.32	0.32	0.30	0.34
	16 x 16	0.34	0.36	0.32	0.37

- carr. = carriage(s) (mm)
 d₀ = screw diameter (mm)
 P = screw lead (mm)

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

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

- J_s = mass moment of inertia of linear motion system (without external load) (kgm²)
 $k_{J \text{ fix}}$ = constant for fixed-length portion of mass moment of inertia (10⁶ kgm²)
 $k_{J \text{ m}}$ = constant for mass-specific portion of mass moment of inertia (10⁶ kgm²)
 $k_{J \text{ var}}$ = constant for variable-length portion of mass moment of inertia (10⁹ kgm)
 L = length (mm)

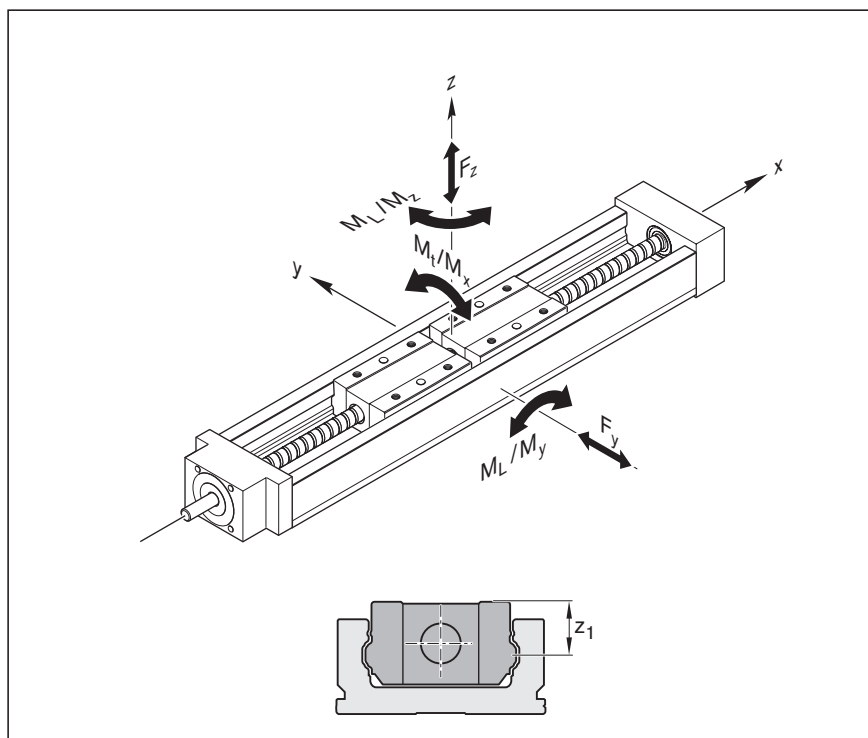
Precision Module	Ball screw size $d_0 \times P$	Carriage	$k_{J \text{ fix}}$		Without cover		Cover plate		Sealing strip 1 carr.	$k_{J \text{ var}}$	$k_{J \text{ m}}$
			1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	2 carr.			
PSK-040	6 x 1	Standard	0.115	0.117	0.116	0.120	–	–	–	0.002	0.025
	6 x 2	Standard	0.122	0.131	0.127	0.141	–	–	–	0.002	0.101
PSK-050	8 x 2,5	Standard	0.533	0.565	0.544	0.587	0.530	–	–	0.004	0.158
		Long	–	–	–	–	–	–	0.557	–	–
PSK-060	12 x 2	Standard	0.999	1.024	1.010	1.045	1.005	–	–	0.013	0.101
		Long	1.009	1.043	1.023	1.073	1.030	–	–	–	–
	12 x 5	Standard	1.130	1.289	1.200	1.422	1.168	–	–	0.011	0.633
		Long	1.194	1.409	1.282	1.593	1.327	–	–	–	–
	12 x 10	Standard	1.643	2.277	1.922	2.808	1.795	–	–	0.011	2.533
		Long	1.897	2.758	2.251	3.492	2.492	–	–	–	–
PSK-090	16 x 5	Standard	4.216	4.703	4.368	5.007	4.184	–	–	0.031	0.633
		Long	4.380	5.039	4.583	5.444	4.564	–	–	–	–
	16 x 10	Standard	5.831	7.781	6.439	8.997	5.704	–	–	0.031	2.533
		Long	6.489	9.124	7.300	10.745	7.224	–	–	–	–
	16 x 16	Standard	9.213	14.207	10.770	17.319	8.889	–	–	0.034	6.485
		Long	10.899	17.643	12.974	21.793	12.780	–	–	–	–

Motor attachment via motor mount and coupling

Precision Module	for motor attachment	Coupling data		Mass moment of inertia J_c (10 ⁻⁶ kgm ²)	Mass Assembly kit Motor mount m_c (kg)
		Rated torque M_{cN} (Nm)			
PSK-040	MSM 019B	0.70		0.12	0.09
PSK-050	MSM 019B	1.90		2.10	0.09
	MSM 031B	3.70		7.00	0.28
	MSK 030C	3.70		7.00	0.25
PSK-060	MSM 031B	3.70		7.00	0.30
	MSK 030C	1.90		2.10	0.15
PSK-090	MSM 031C	10.00		35.00	0.41
	MSM 041B	9.00		60.00	0.77
	MSK 030C	10.00		35.00	0.43
	MSK 040C	9.00		60.00	0.73

Calculations

Calculation principles



Combined equivalent load on bearing of the linear guide

$$(1) \quad F_{\text{comb}} = |F_y| + |F_z| + C \cdot \frac{|M_x|}{M_t} + C \cdot \frac{|M_y|}{M_L} + C \cdot \frac{|M_z|}{M_L}$$

F_{comb}	= combined equivalent load on bearing	(N)
F_y	= force in y-direction	(N)
F_z	= force in z-direction	(N)
M_x	= torsional moment (about the x-axis)	(Nm)
M_y	= torsional moment (about the y-axis)	(Nm)
M_z	= torsional moment (about the z-axis)	(Nm)
C	= dynamic load capacity	(N)
M_t	= dynamic torsional moment load capacity	(Nm)
M_L	= dynamic longitudinal moment load capacity	(Nm)

	z_1 (mm)		
	Without cover	Cover plate	Sealing strip
PSK-040	11	23	–
PSK-050	13	27	27
PSK-060	17	32	32
PSK-090	22	44	44

z_1 = distance between guideway centerline and top edge of carriage (mm)

Nominal life

Nominal life of the guideway in meters:

$$(2) \quad L = \left(\frac{C}{F_{\text{comb}}} \right)^3 \cdot 10^5 \text{ m}$$

Nominal life of the guideway in hours:

$$(3) \quad L_h = \frac{L}{3600 \cdot v_m}$$

Frictional torque

Frictional torque for motor attachment via motor mount and coupling:

$$(4) \quad M_R = M_{R_s}$$

Frictional torque for motor attachment via timing belt side drive:

$$(5) \quad M_R = \frac{M_{R_s}}{i} + M_{R_{sd}}$$

Mass moment of inertia

for motor attachment via motor mount and coupling:

$$(6) \quad J_{\text{ex}} = J_s + J_t + J_c$$

for motor attachment via timing belt side drive:

$$(7) \quad J_{\text{ex}} = \frac{J_s + J_t}{i^2} + J_{sd}$$

Determination of mass moment of inertia of Linear Motion System components:

$$(8) \quad J_s = (k_{J_{\text{fix}}} + k_{J_{\text{var}}} \cdot L) \cdot 10^{-6}$$

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

$$(9) \quad J_t = m_{\text{ex}} \cdot k_{J_m} \cdot 10^{-6}$$

C	=	dynamic load capacity	(N)
F_{comb}	=	combined equivalent load on bearing	(N)
i	=	timing belt side drive reduction	(–)
J_c	=	mass moment of inertia, coupling	(kgm ²)
J_{ex}	=	mass moment of inertia of mechanical system	(kgm ²)
J_s	=	mass moment of inertia of linear motion system (without external load)	(kgm ²)
J_{sd}	=	mass moment of inertia of belt timing belt side drive at the motor journal	(kgm ²)
J_t	=	translatory mass moment of inertia of external load referred to the drive journal	(kgm ²)
k_{J_m}	=	constant for mass-specific portion of mass moment of inertia	(10 ⁶ m ²)
L	=	nominal life	(m)
L_h	=	nominal life	(h)
m_{ex}	=	moved external load	(kg)
M_R	=	frictional torque at motor journal	(Nm)
$M_{R_{sd}}$	=	frictional torque of timing belt side drive	(Nm)
M_{R_s}	=	frictional torque of linear motion system	(Nm)
v_m	=	average speed	(m/s)

Calculations

Calculation principles

Mass moment of inertia of the drive train referred to the motor journal

$$(10) \quad V = \frac{J_{ex}}{J_m + J_{br}}$$

i = timing belt side drive reduction (–)

J_{br} = mass moment of inertia, motor brake (kgm²)

J_{ex} = mass moment of inertia of mechanical system (kgm²)

J_m = mass moment of inertia, motor (kgm²)

$n_{m \max}$ = maximum permissible rotary speed of motor with controller (min⁻¹)

n_{mech} = maximum permissible rotary speed of mechanical system (min⁻¹)

P = screw lead (mm)

V = ratio of mass moments of inertia of drive train and motor (–)

$v_{\max}$ = maximum permissible linear speed of mechanical system (m/s)

Mass moment of inertia ratio

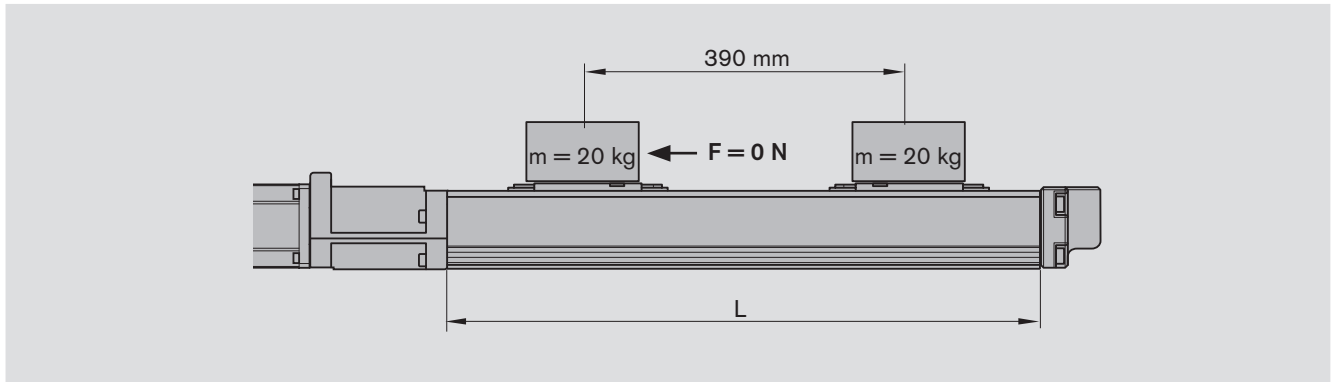
$$(11) \quad n_{mech} = \frac{v_{\max} \cdot i \cdot 1\,000 \cdot 60}{P}$$

Application area	V
Handling	≤ 6.0
Machining	≤ 1.5

Condition:

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

Calculation example



Given data

A mass of 20 kg is to be moved 390 mm at a maximum travel speed of 0.6 m/s.

Module selected based on the technical data and the connection dimensions:

- PSK-090 without cover and with a standard length steel carriage; motor attachment via integrated motor mount and coupling
- Motor type MSK 030C

When sizing the drive, the motor-controller combination must always be considered, as the motor type and performance data (e.g. maximum useful speed and maximum torque) will depend on the controller or control system used.

Estimation of the PSK module length L

$$\begin{aligned} \text{Excess travel} &= 2 \cdot P = 2 \cdot 16 \text{ mm} = 32 \text{ mm} \\ &\text{(in accordance with the formula given in} \\ &\text{“PSK-090 Components and Ordering Data”)} \end{aligned}$$

Selection of ball screw:

As a general rule:
Always choose the lowest lead
(resolution, braking distance, length).

Permissible ball screws according to the “Permissible travel speed” chart at $v_{\max} = 0.6 \text{ m/s}$: Ball screw 16x10 and 16x16;
Ball screw selected:
Ball screw 16x10 with $v_{\max} = 1 \text{ m/s}$
 $M_p = 4.1 \text{ Nm}$ with ball screw 16x10
(according to the chart “Maximum permissible drive torque”)

Calculation of PSK length L

$$\begin{aligned} \text{Excess travel} &= 2 \cdot P = 2 \cdot 10 \text{ mm} = 20 \text{ mm} \\ \text{Length } L &= (\text{effective stroke} + 2 \cdot \text{excess travel}) + 100 \text{ mm} = \\ &= (390 \text{ mm} + 2 \cdot 20 \text{ mm}) + 100 \text{ mm} = 530 \text{ mm} \\ \text{Selected:} &\text{Standard length } L = 540 \text{ mm;} \\ &\text{hole spacing in frame: } 70 \text{ mm} / 4 \cdot 100 \text{ mm} / 70 \text{ mm} \end{aligned}$$

Frictional torque M_R

$$\begin{aligned} M_R &= M_{Rs} \\ M_R &= 0.30 \text{ Nm (see “Technical Data”)} \end{aligned}$$

Calculations

Calculation example (continued)

**Mass moment of inertia
of mechanical system:**

$$\begin{aligned}
 J_{\text{ex}} &= J_s + J_t + J_c \\
 J_s &= (k_{J \text{ fix}} + k_{J \text{ var}} \cdot L) \\
 &= (5.831 + 0.031 \cdot 540 \text{ mm}) \cdot 10^{-6} \\
 &= 22.57 \cdot 10^{-6} \text{ kgm}^2 \text{ (see "Technical Data")} \\
 J_t &= m_{\text{ex}} \cdot k_{J \text{ m}} \cdot 10^{-6} \\
 &= 20 \text{ kg} \cdot 2.533 \cdot 10^{-6} \text{ kgm}^2 \\
 &= 50.66 \cdot 10^{-6} \text{ kgm}^2 \text{ (see "Technical Data")} \\
 J_c &= 60 \cdot 10^{-6} \text{ kgm}^2 \text{ (see "Technical Data")} \\
 J_{\text{ex}} &= (22.57 + 50.66 + 60) \cdot 10^{-6} \text{ kgm}^2 \\
 &= 133.23 \cdot 10^{-6} \text{ kgm}^2
 \end{aligned}$$

**Mass moment of inertia
for handling ($V \leq 6$):**

$$\begin{aligned}
 V &= \frac{J_{\text{ex}}}{J_m + J_{\text{br}}} \leq 6 \\
 J_m &= 30 \cdot 10^{-6} \text{ kgm}^2 \\
 J_{\text{br}} &= 7.0 \cdot 10^{-6} \text{ kgm}^2 \text{ (see „motors“)} \\
 V &= \frac{133.23 \cdot 10^{-6} \text{ kgm}^2}{(30 + 7.0) \cdot 10^{-6} \text{ kgm}^2} = 3.6 < 6
 \end{aligned}$$

Rotary speed n:

$$n_{\text{mech}} = \frac{v \cdot i \cdot 1\,000 \cdot 60}{10} = \frac{0.6 \text{ m/s} \cdot 1 \cdot 1\,000 \cdot 60}{10 \text{ mm}} = 3\,600 \text{ min}^{-1}$$

Result

Precision Module PSK-090 without cover and with one standard-length steel carriage; Motor MSK 030C, attached via integrated mount and coupling:
 Standard length $L = 540 \text{ mm}$;
 Hole spacing in frame: $70 \text{ mm} / 40 \cdot 100 \text{ mm} / 70 \text{ mm}$

Ball screw 16 x 10 with $v_{\text{max}} = 1 \text{ m/s} > 0.6 \text{ m/s}$
 $M_p = 4.1 \text{ Nm}$
 Frictional torque $M_R = 0.30 \text{ Nm}$

Mass moment of inertia $J_{\text{ex}} = 133.23 \cdot 10^{-6} \text{ kgm}^2$
 Rotary speed $n_{\text{m max}} = 9\,000 \text{ min}^{-1} > 3\,600 \text{ min}^{-1}$
 Torque $M_{\text{max}} = 4.0 \text{ Nm} < 4.1 \text{ Nm}$

For final motor selection, the drive and performance data must be recalculated as specified in the Rexroth catalog "Control Systems, Electrical Accessories, ..."

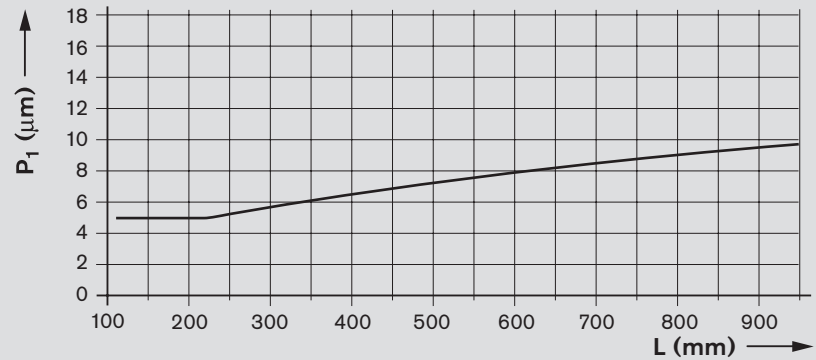
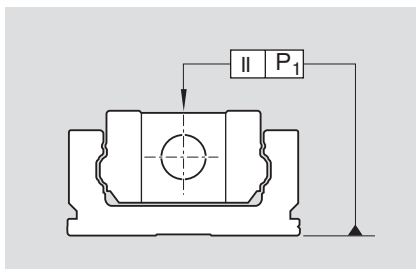
Accuracy

General note

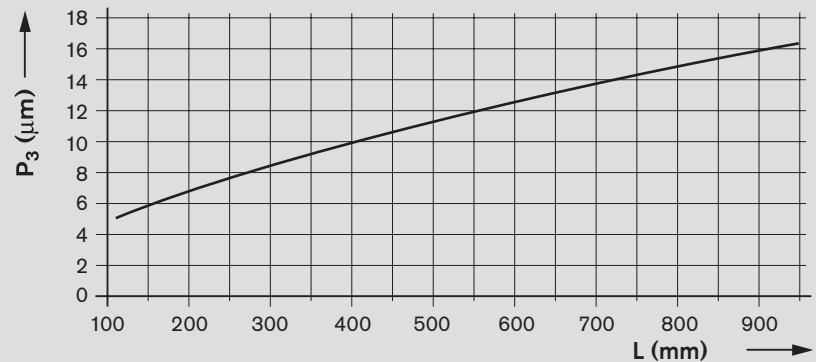
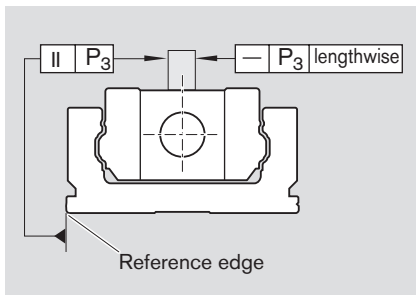
All accuracy figures apply to the module when screwed down and assume an ideally flat mounting base. The values given do not take account of any shape deviations in the mounting base surface.

Accuracy P_1

Measured at the carriage center



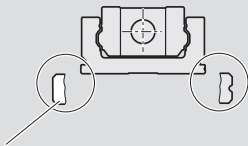
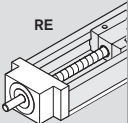
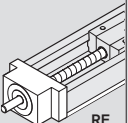
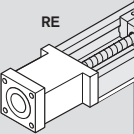
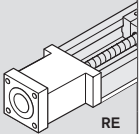
Accuracy P_3



Configuration and ordering, Dimension Drawings

Precision Module PSK-040

Configuration and ordering

Short product name, length PSK-040-NN-1, mm			Guideway	Drive unit		Carriage version Steel					
				Screw journal	Ball screw size d ₀ x P		Without cover		Cover plate		
Version					Standard		Standard				
	RE left	RE right		6 x 1	6 x 2	1 carr.	2 carr.	1 carr.	2 carr.		
Without drive	OA01		OA01	L = 100 mm 10	without	50	01	02	–	–	
With ball screw, w/o motor mount	OF01	OF02	OF01 OF02	L = 150 mm 12	Ø4	01	02	01	02	21	22
				L = 200 mm 14							
With ball screw and inte- grated mount	MF10	MF11	MF10 MF11	L = 250 mm 16	Ø4	30	31	01	02	21	22
				L = 300 mm 18							
				L = 350 mm 20							

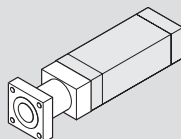
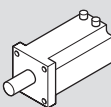
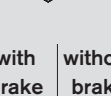
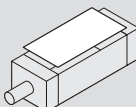
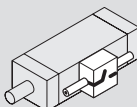
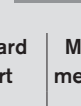
Ordering example: See "Inquiry/Order" form

d₀ = screw diameter (mm)

P = screw lead (mm)

carr. = carriage(s)

L = length

	Motor attachment		Motor		Type of cover		Switches / Mounting duct / Socket-plug	Documentation	
	 Attachment kit ¹⁾	for motor	 with brake	 without brake	 without	 cover plate		 Standard report	 Measurement report
	00	–	00		00	–	Without switch and Mounting duct00	01	02 Friction moment
	00	–	00		00	01	Switches: – Reed sensor21 – Hall sensor22		03 Lead deviation
	30	NEMA 14-C ²⁾	00				Mounting duct27		04 Travel accuracy
	31	NEMA 17-C ²⁾	00				Switching cam for PSK: – Without cover or with cover plate35		05 Positioning accuracy
	32	NEMA 17-D ²⁾	00						
	35	MSM 019A	133	132					
		MSM 019B	135	134					

- 1) Attachment kit also available without motor (when ordering: enter "00" for motor). For motor mounting kit for customer motor see "Motor mounting" section
- 2) Use motors complying with the appropriate NEMA specification. Because of the varying shaft dimensions for NEMA-specification motors, the attachment kit does not include a coupling.

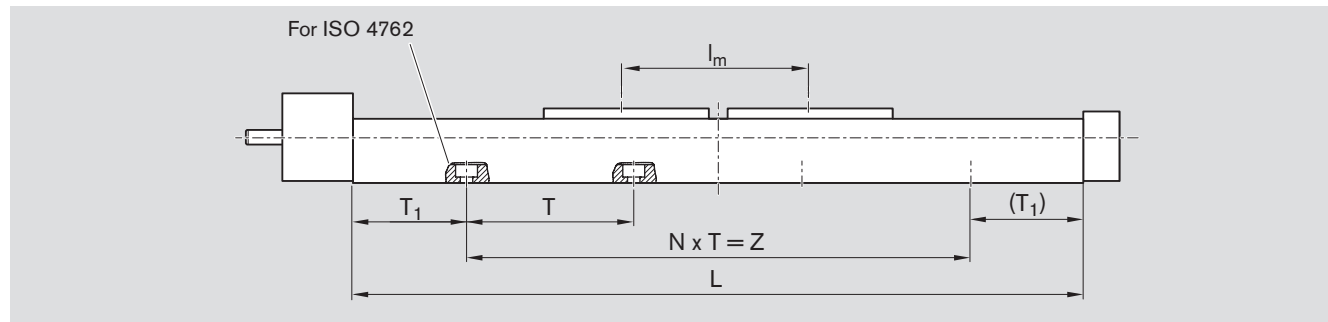
Switch mounting arrangements

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

Configuration and ordering, Dimension Drawings

Precision Module PSK-040

Lengths and Hole Spacing



Length L

Type of cover	Number of carriages (carr.)	Carriage version Standard length
Without cover or with cover plate	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 55 \text{ mm}$
	2 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_m + 55 \text{ mm}$
		$l_{m \min} = 50 \text{ mm}$

l_m = center-to-center distance
between carriages (consider
 $l_{m \min}$)

Stroke = maximum travel of carriage
center between the outermost
switch activation points

In most cases the recommended limit
for excess travel (braking path) is:
Excess travel = $2 \cdot \text{screw lead } P$

Example

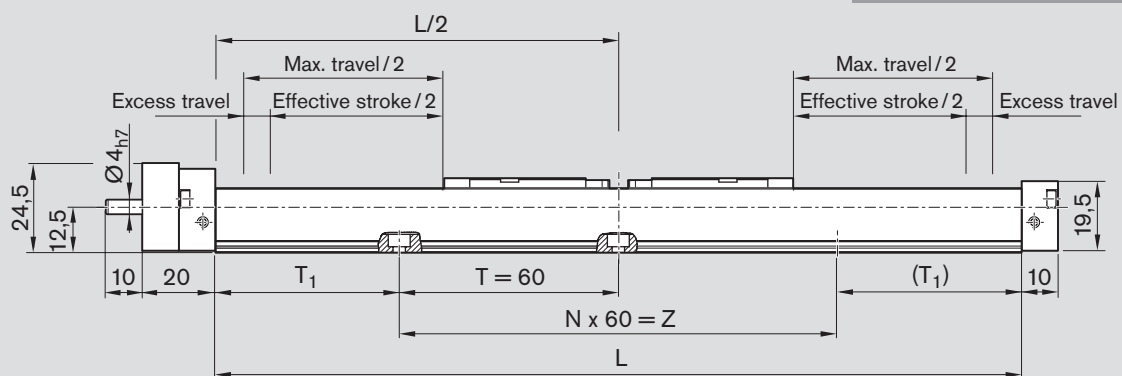
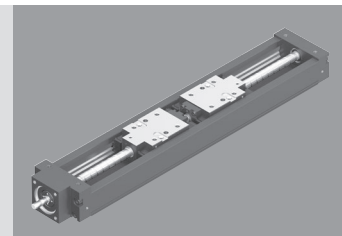
Ball screw 6 x 2
(Ball screw size = $d_o \times P$):
Excess travel = $2 \cdot 2 = 4 \text{ mm}$

Standard lengths of frame

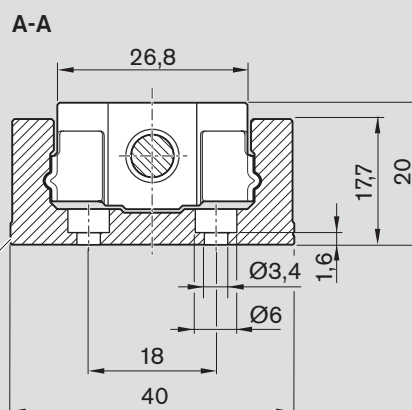
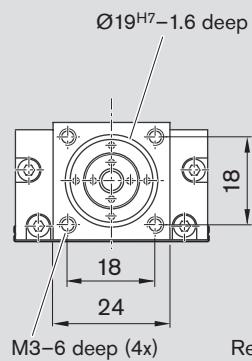
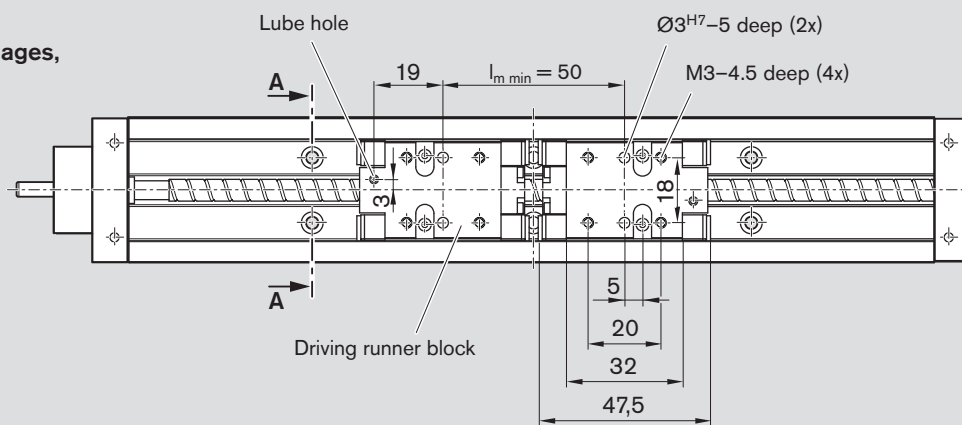
Length L (mm)	T (mm)	T ₁ (mm)	N	Z (mm)	Mounting holes for ISO 4762 screws
100	60	20	1	60	M3
150	60	15	2	120	
200	60	40	2	120	
250	60	35	3	180	
300	60	30	4	240	
350	60	25	5	300	

Dimension Drawings without Cover

All dimensions in mm
Drawings not to scale



Version:
One or two carriages,
standard length

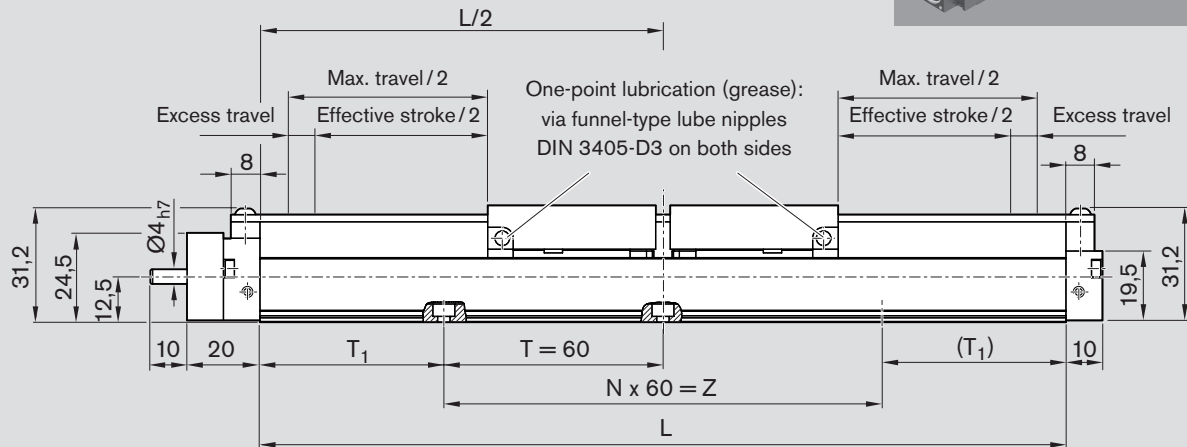
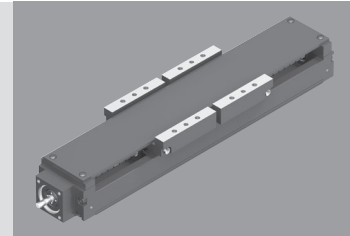


Configuration and ordering, Dimension Drawings

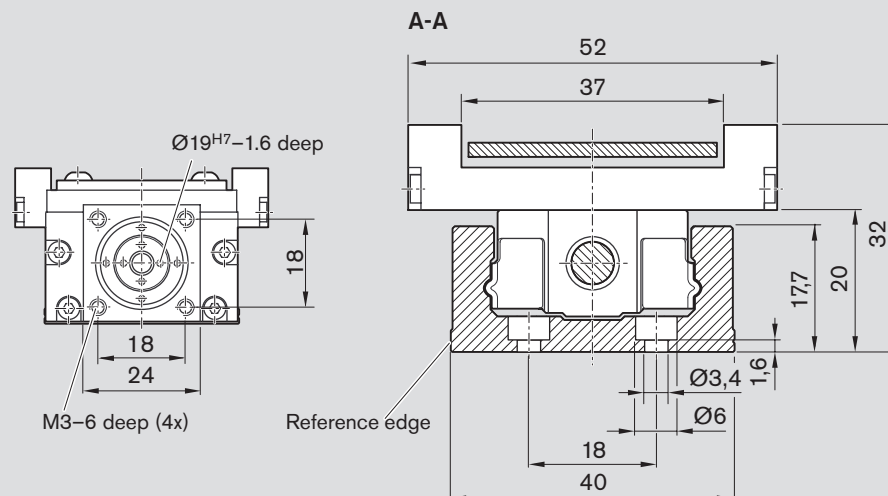
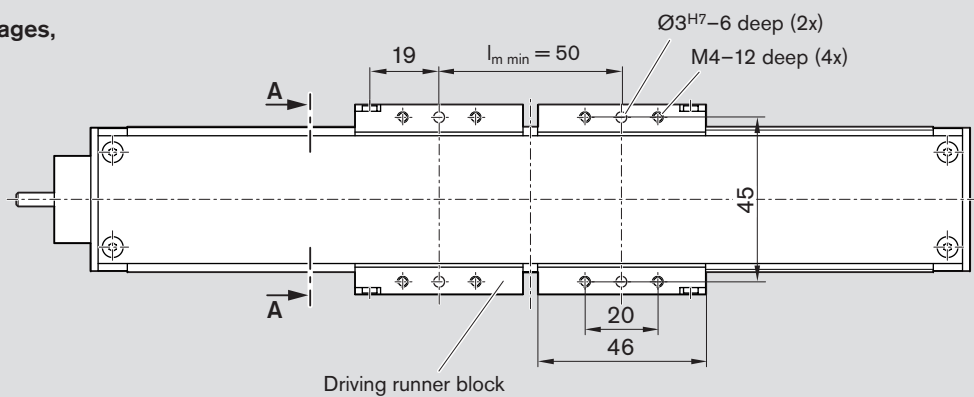
Precision Module PSK-040

Dimension Drawings with Cover Plate

All dimensions in mm
Drawings not to scale

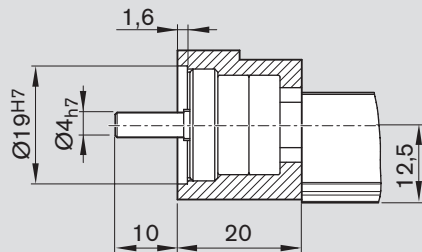


Version:
One or two carriages,
standard length



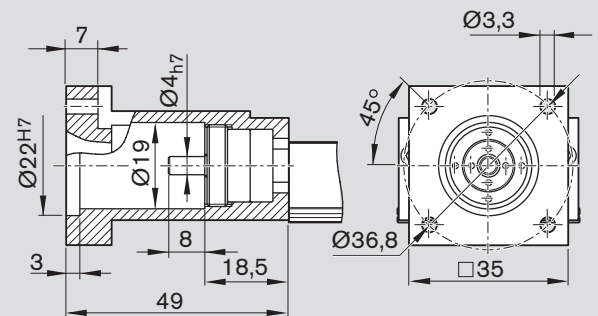
Dimension Drawings, Motor Attachment

OF01, OF02



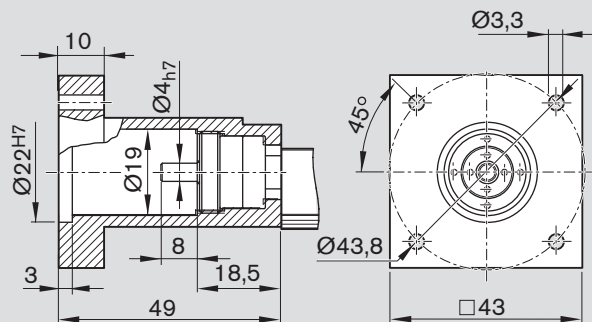
MF10, MF11

Integrated motor mount (NEMA 14 – Form C)



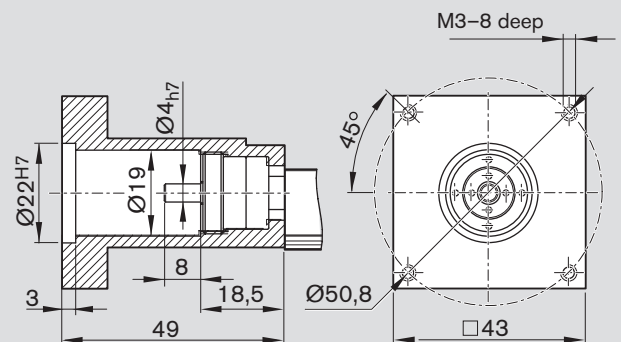
MF10, MF11

Integrated motor mount (NEMA 17 – Form C)



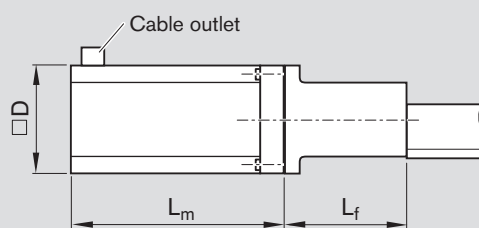
MF10, MF11

Integrated motor mount (NEMA 17 – Form D)



MF10, MF11

Motor with integrated motor mount and coupling



Motor type	Dimensions (mm)		without brake	L _m with brake
	D	L _f		
MSM 019A	38	54	72	102
MSM 019B	38	54	92	122

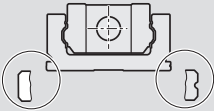
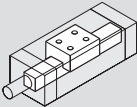
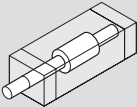
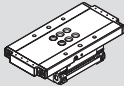
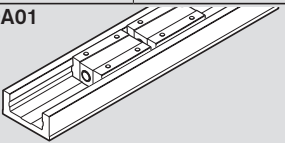
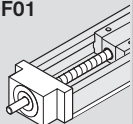
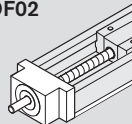
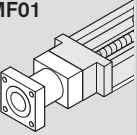
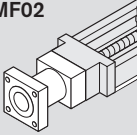
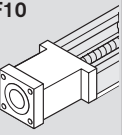
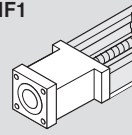
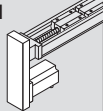
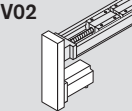
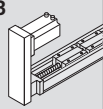
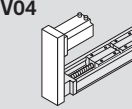
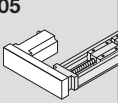
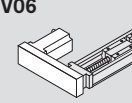
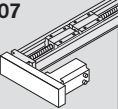
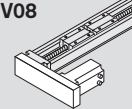
Drawings not to scale!

For further information and dimensions, see "Motors."

Configuration and ordering, Dimension Drawings

Precision Module PSK-050

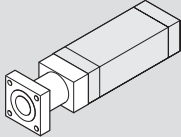
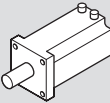
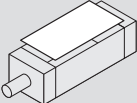
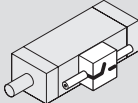
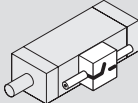
Configuration and ordering

Short product name, length PSK-050-NN-1, mm				Guideway	Drive unit		Carriage version Steel				Aluminum		
													
Reference edge (RE)										Screw journal	Ball screw size d ₀ x P	Without cover	
Version							Standard		Standard		Stan- dard 1 carr.	Long 1 carr.	
	RE left	RE right				8 x 2.5	1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	1 carr.	
Without drive	OA01 		OA01	L = 100 mm 09	Ohne	50	01	02	–	–	–	–	
With ball screw, w/o motor mount	OF01 	OF02 	OF01 OF02	L = 150 mm 10	Ø5	01	01	02	21	22	40	41	
				L = 200 mm 11									
With ball screw and motor mount	MF01 	MF02 	MF01 MF02	L = 250 mm 12	Ø5	01	01	02	21	22	40	41	
				L = 300 mm 13									
With ball screw and integrated mount	MF10 	MF1 	MF10 MF11	L = 350 mm 14	Ø5	30	01	02	21	22	40	41	
				L = 400 mm 15									
With ball screw and timing belt side drive	RV01 	RV02 	RV01 to RV08	L = 450 mm 16	for MSM 019B	01	01	02	21	22	40	41	
	RV03 	RV04 		L = 500 mm 17									
	RV05 	RV06 		L = 550 mm 18									
	RV07 	RV08 		L = 600 mm 19									

Ordering example: See "Inquiry/Order" form

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

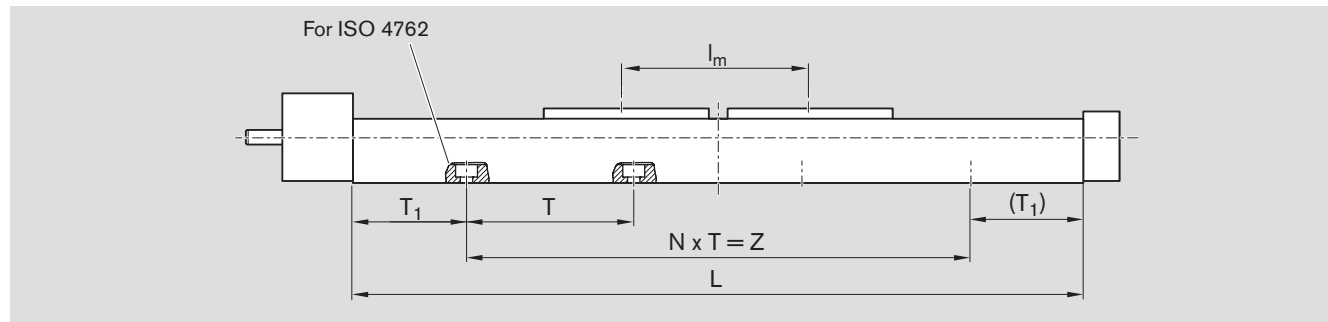
d_0 = screw diameter (mm)
 P = screw lead (mm)
 carr. = carriage(s)
 L = length

	Motor attachment			Motor		Type of cover			Switches / Mounting duct / Socket-plug	Documentation	
											
	Gear ratio i =	Attachment kit ¹⁾	for motor	with brake	without brake	with-out	cover plate	strip		Standard report	Measure-ment report
	—	00	—	00		00	—	—			02 Friction mo- ment
	—	00	—	00							
	—	01	MSM 031B	137	136						
		03	MSK 030C	85	84						
	—	31	NEMA 17-D ²⁾	00							
		35	NEMA 17-C ²⁾	00							
		36	MSM 019B	135	134						
	1	13	MSM 019B	135	134	00	01	02		01	03 Lead deviation
	1,5	14									
									04 Travel accuracy		
										05 Positioning accuracy	

Configuration and ordering, Dimension Drawings

Precision Module PSK-050

Lengths and Hole Spacing



Length L

Type of cover	Number of carriages (carr.)	Carriage version Standard length	Long
Without cover or with cover plate	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 70 \text{ mm}$	–
	2 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_{m \min} + 70 \text{ mm}$ $l_{m \min} = 60 \text{ mm}$	–
With sealing strip	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 127 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 187 \text{ mm}$

l_m = center-to-center distance
between carriages (consider
 $l_{m \min}$)

Stroke = maximum travel of carriage
center between the outermost
switch activation points

In most cases the recommended limit
for excess travel (braking path) is:
Excess travel = $2 \cdot \text{screw lead } P$

Example

Ball screw 8 x 2.5

(Ball screw size = $d_o \times P$):

Excess travel = $2 \cdot 2.5 = 5 \text{ mm}$

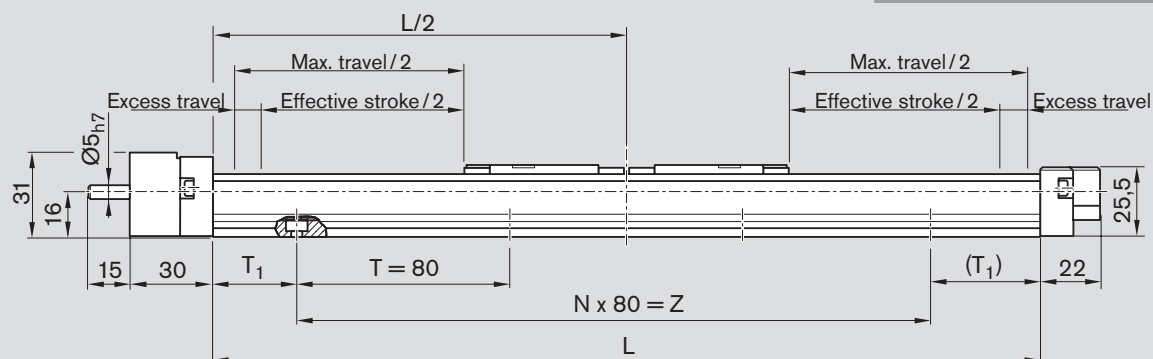
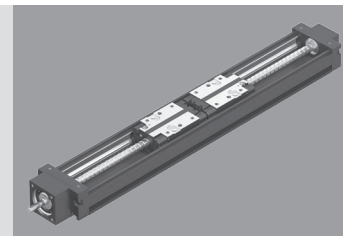
Standard lengths of frame

Length L (mm)	T (mm)	T ₁ (mm)	N	Z (mm)	Mounting holes for ISO 4762 screws
100	80	10	1	80	M4
150	80	35	1	80	
200	80	20	2	160	
250	80	45	2	160	
300	80	30	3	240	
350	80	15	4	320	
400	80	40	4	320	
450	80	25	5	400	
500	80	50	5	400	
550	80	35	6	480	
600	80	20	7	560	

Dimension Drawings without Cover

All dimensions in mm

Drawings not to scale



Version:
One or two carriages

Lube port for customer-built attachments

Funnel-type lube nipple

Ø4^{H7}-5 deep (2x)

~~M4-6 deep (4x)~~

$$I_{m \min} = 60$$

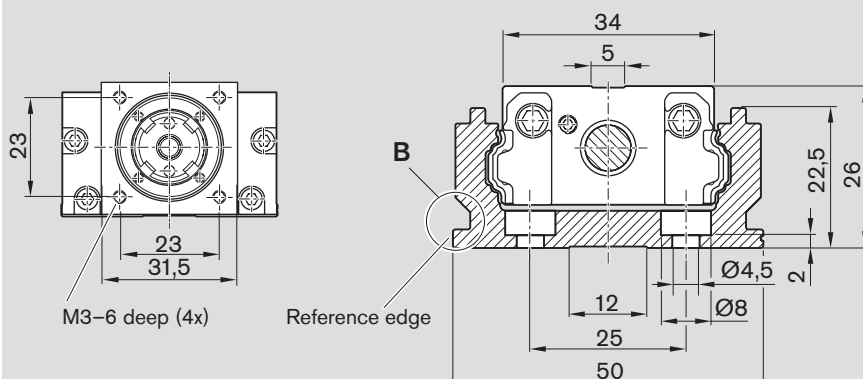
A

DIN 3405-D

A

Driving runner block

A-A



For fastening with
clamping fixtures

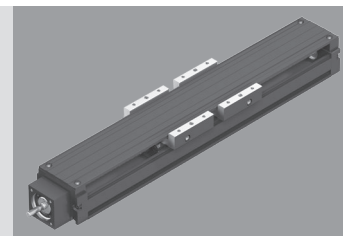
Configuration and ordering, Dimension Drawings

Precision Module PSK-050

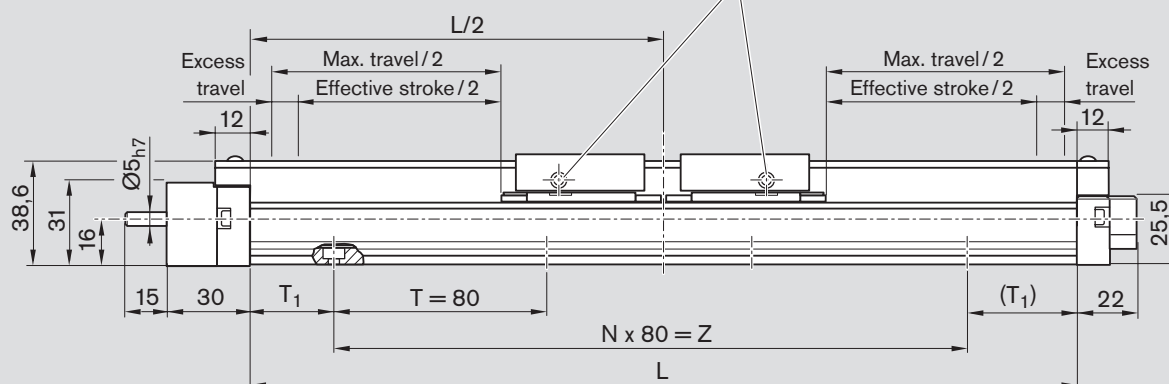
Dimension Drawings with Cover Plate

All dimensions in mm

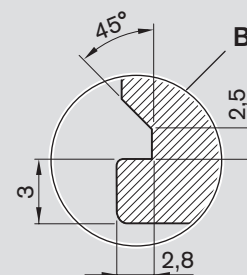
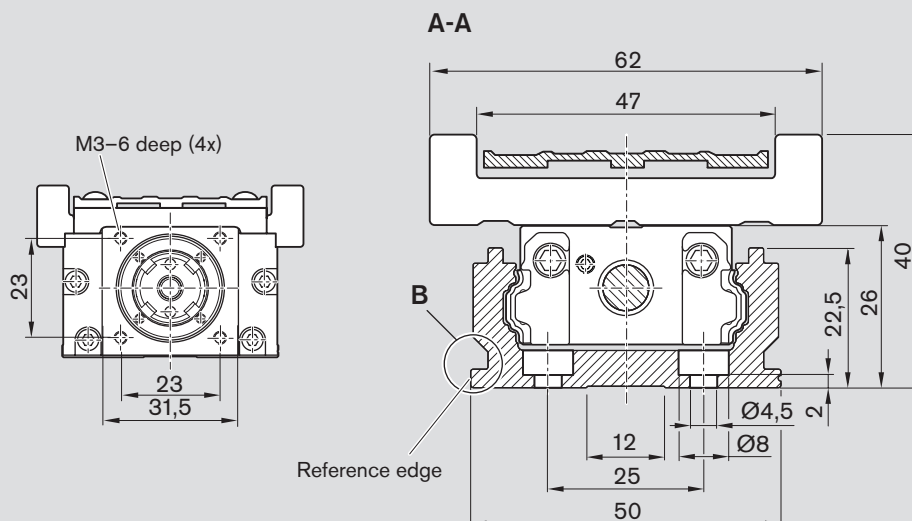
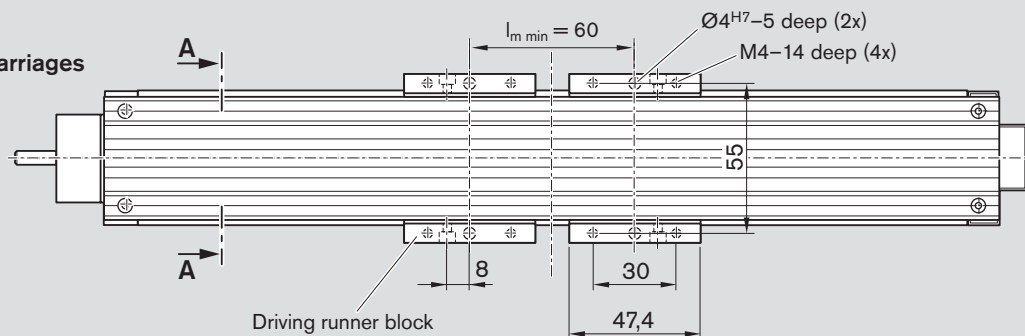
Drawings not to scale



One-point lubrication (grease):
via funnel-type lube nipples DIN 3405-D3
on both sides



Version:
One or two carriages

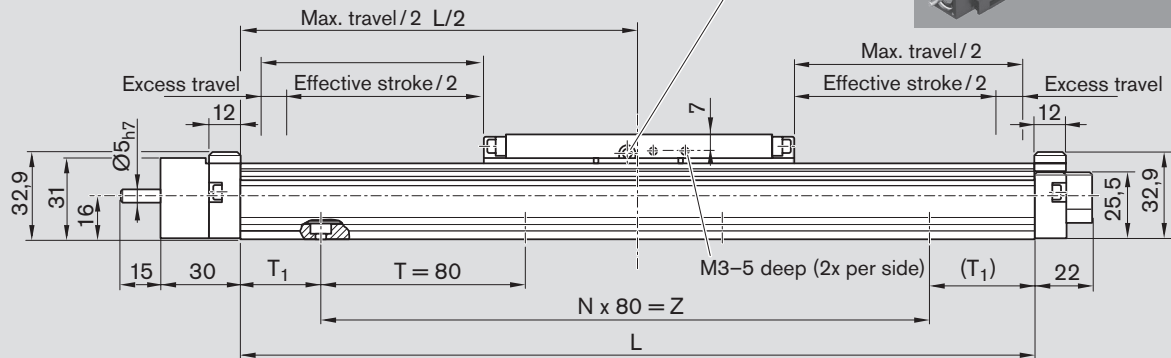
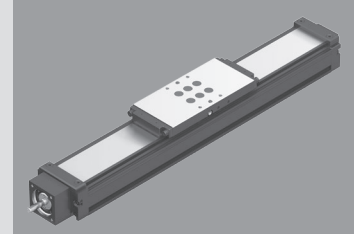


For fastening with
clamping fixtures

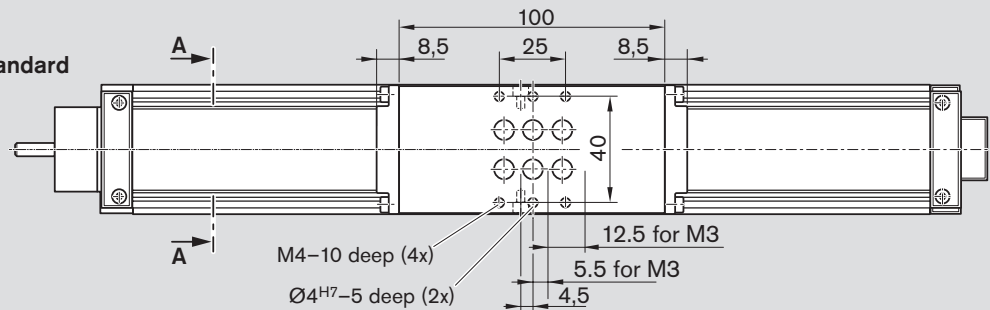
Dimension Drawings with Sealing Strip

All dimensions in mm
Drawings not to scale

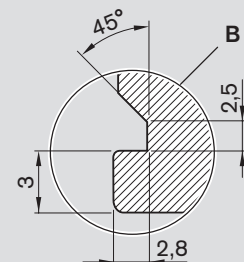
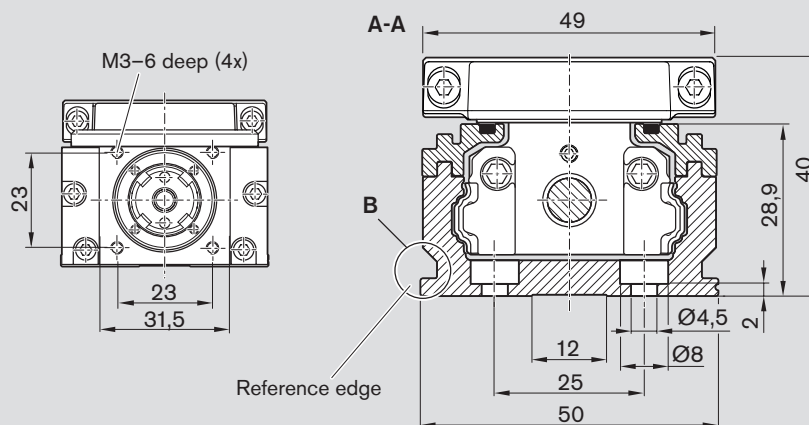
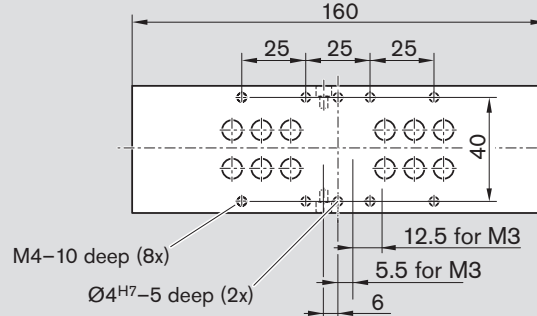
One-point lubrication (grease):
via funnel-type lube nipples DIN 3405-D3
on both sides



Version:
Carriage, standard
length



Version:
Carriage, long

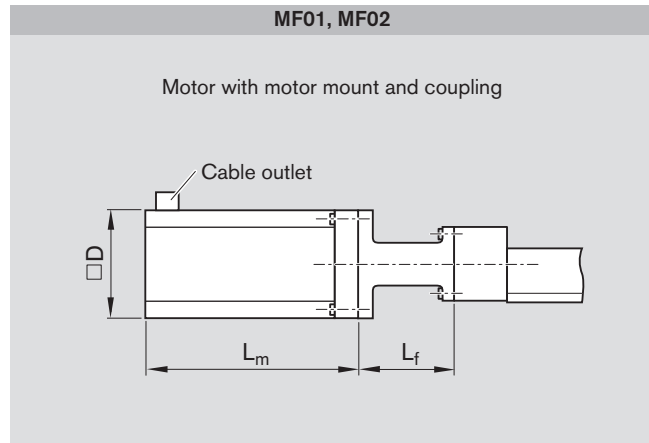
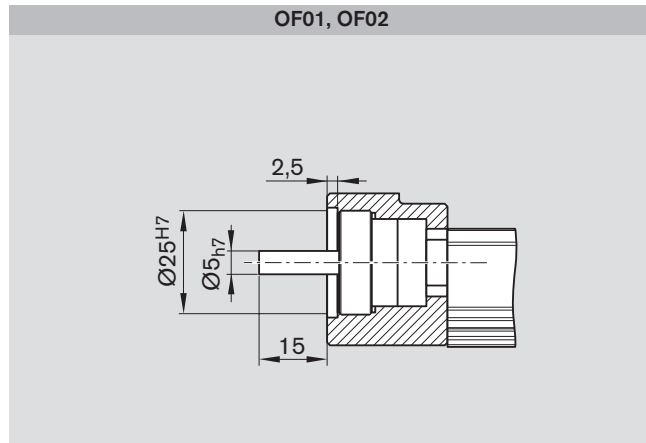


For fastening with
clamping fixtures

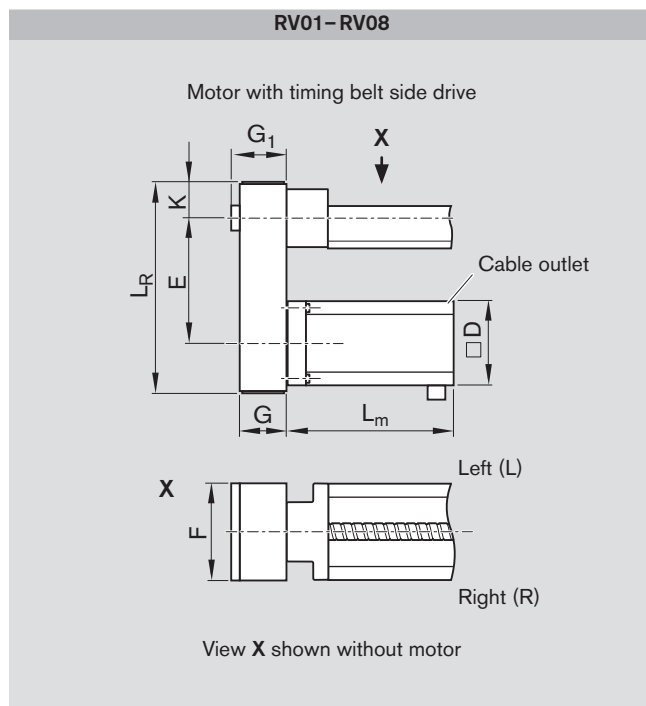
Configuration and ordering, Dimension Drawings

Precision Module PSK-050

Dimension Drawings, Motor Attachment



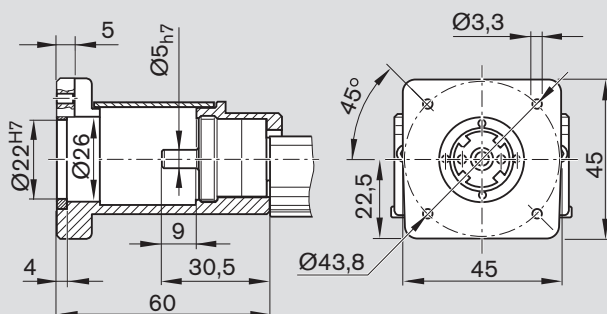
Motor type	Dimensions (mm)			
	D	L _f	without brake	L _m with brake
MSM 031B	60,0	53,0	79	115.5
MSK 030C	54,0	53,0	188	213.0



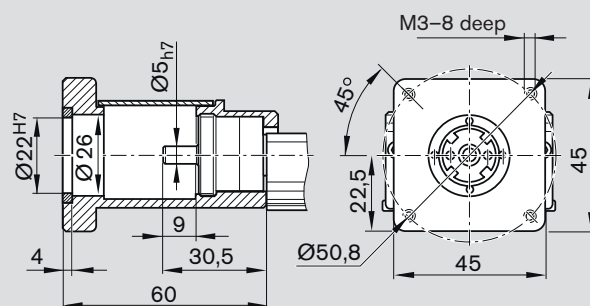
Version	Motor type	Dimensions (mm)									
		D	E		F	G	G ₁	K	without brake	L _m with brake	L _R
			i = 1	i = 1.5							
RV01 to RV08	MSM 019B	38	76.5	76.5	48	27.5	29	27.5	92	122	139

MF10, MF11

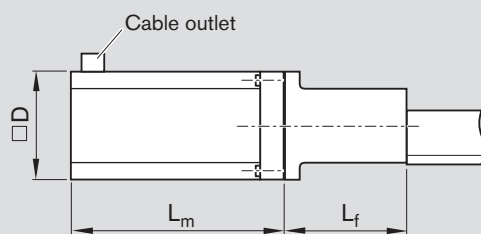
Integrated motor mount (NEMA 17 – Form C)


MF10, MF11

Integrated motor mount (NEMA 17 – Form D)


MF10, MF11

Motor with integrated motor mount and coupling



Motor type	Dimensions (mm)		without brake	L _m with brake
	D	L _f		
MSM 019B	38	60	92	122

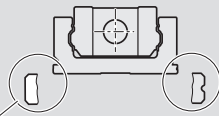
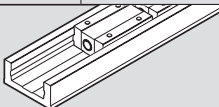
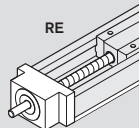
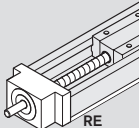
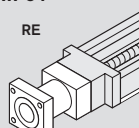
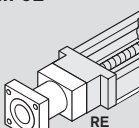
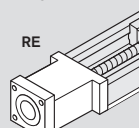
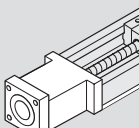
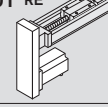
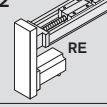
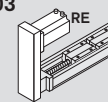
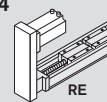
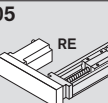
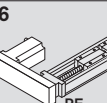
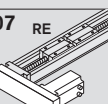
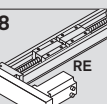
Drawings not to scale!

For further information and dimensions, see "Motors."

Configuration and ordering, Dimension Drawings

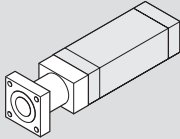
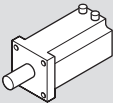
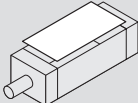
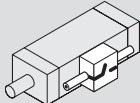
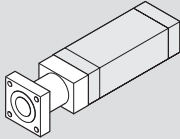
Precision Module PSK-060

Configuration and ordering

Short product name, length PSK-060-NN-1, mm			Guideway	Drive unit			Carriage version								Aluminum																		
				Screw journal	Ball screw size d ₀ x P			Steel				Cover plate				Sealing strip																	
Reference edge (RE)								Without cover		Long		Standard		Long		Standard		Long															
Version			RE left	RE right		12x2	12x5	12x10	1carr.	2carr.	1carr.	2carr.	1carr.	2carr.	1carr.	2carr.	1carr.	2carr.															
Without drive	OA01			OA01	L = 150 mm 10	without	50			01	02	03	04	-	-	-	-	-															
With ball screw, w/o motor mount	OF01	OF02			OF01 OF02	L = 200 mm 11	Ø6	03	01	02	01	02	03	04	21	22	23	24	40	41													
With ball screw and motor mount	MF01	MF02			MF01 MF02	L = 250 mm 12	Ø6	03	01	02	01	02	03	04	21	22	23	24	40	41													
W/ball screw and integrated mount	MF10	MF11			MF10 MF11	L = 300 mm 13	Ø6	30	31	32	01	02	03	04	21	22	23	24	40	41													
With ball screw and timing belt side drive	RV01	RV02			RV01 to RV08	L = 400 mm 15	Ø6	30	31	32	01	02	03	04	21	22	23	24	40	41													
	RV03	RV04				L = 500 mm 17	Ø6	30	31	32	01	02	03	04	21	22	23	24	40	41													
	RV05	RV06				L = 600 mm 19	Ø6	30	31	32	01	02	03	04	21	22	23	24	40	41													
	RV07	RV08				L = 700 mm 21	Ø6	30	31	32	01	02	03	04	21	22	23	24	40	41													

Ordering example: See "Inquiry/Order" form

d_0 = screw diameter (mm)
 P = screw lead (mm)
 carr. = carriage(s)
 L = length

	Motor attachment			Motor		Type of cover			Switches / Mounting duct / Socket-plug	Documentation												
																						
	Gear ratio i =	Attach- ment kit ¹⁾	for motor	with brake	without brake	with- out	cover plate	strip		Standard report	Measure- ment report											
	–	00	–	00		00	–	–														
	–	00	–	00		00	01	02														
	–	03	MSM 031B	137	136																	
		05	MSM 019B	135	134																	
	–	31	NEMA 23-D ²⁾	00																		
		34	NEMA 23-C ²⁾	00																		
		32	MSK 030C	85	84																	
	i = 1	11	MSK 030C	85	84																	
		13	MSM 031B	137	136																	
		17	MSM 019B	135	134																	
	i = 1,5	12	MSK 030C	85	84																	
		14	MSM 031B	137	136																	
		18	MSM 019B	135	134																	
									00	01	02 Friction moment											
												03 Lead deviation										
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1) Attachment kit also available without motor (when ordering: enter "00" for motor). For motor mounting kit for customer motor see "Motor mounting" section.

2) Use motors complying with the appropriate NEMA specification. Because of the varying shaft dimensions for NEMA-specification motors, the attachment kit does not include a coupling.

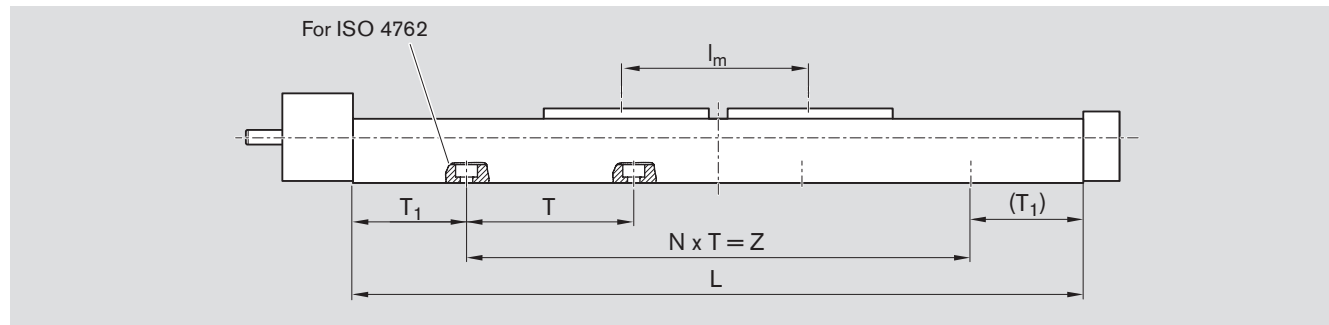
Switch mounting arrangements

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

Configuration and ordering, Dimension Drawings

Precision Module PSK-060

Lengths and Hole Spacing



Length L

Type of cover	Number of carriages (carr.)	Carriage version	
		Standard length	Long
Without cover or with cover plate	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 70 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 85 \text{ mm}$
	2 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_m + 70 \text{ mm}$ $l_{m \min} = 60 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_m + 85 \text{ mm}$ $l_{m \min} = 75 \text{ mm}$
With sealing strip	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 160 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 215 \text{ mm}$

l_m = center-to-center distance between carriages (consider $l_{m \min}$)

Stroke = maximum travel of carriage center between the outermost switch activation points

In most cases the recommended limit for excess travel (braking path) is:
Excess travel = $2 \cdot \text{screw lead } P$

Example

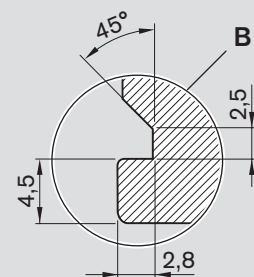
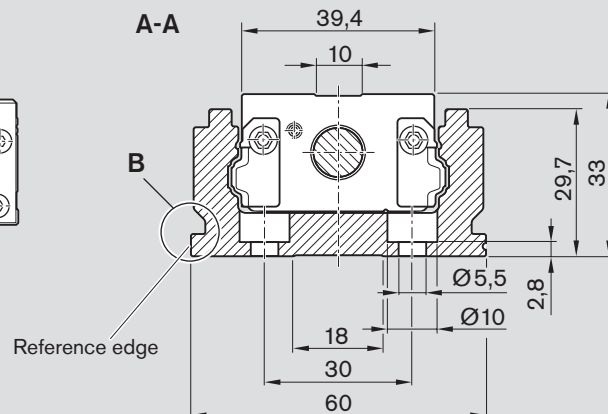
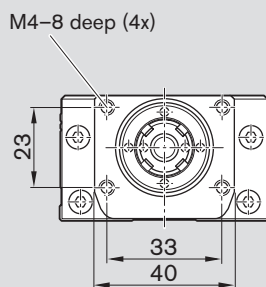
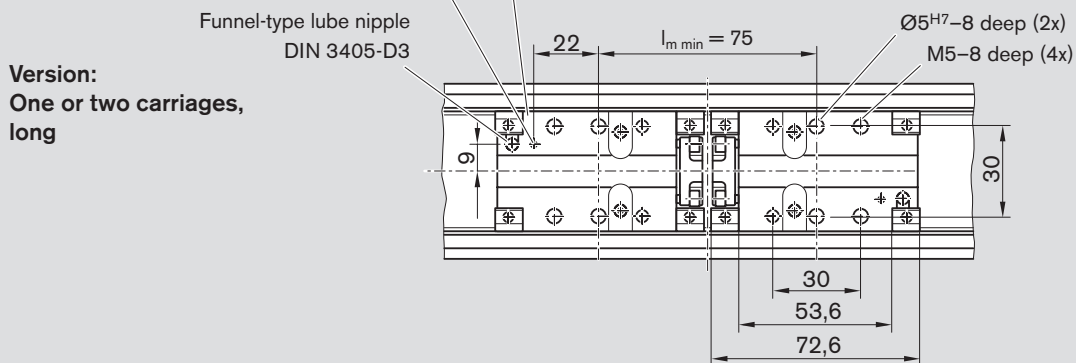
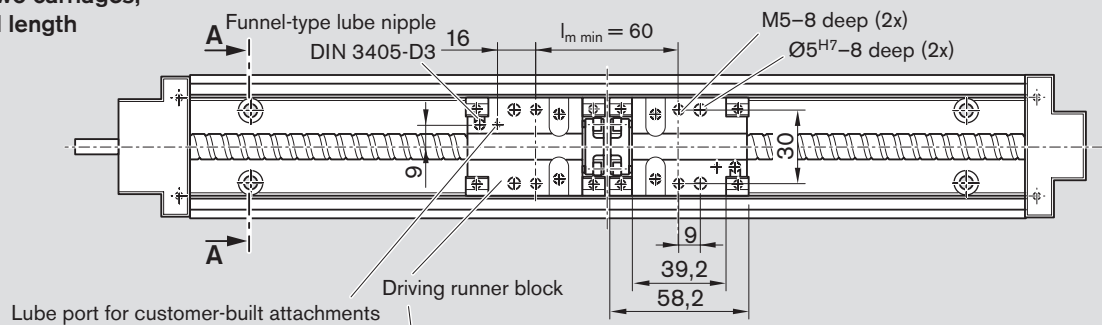
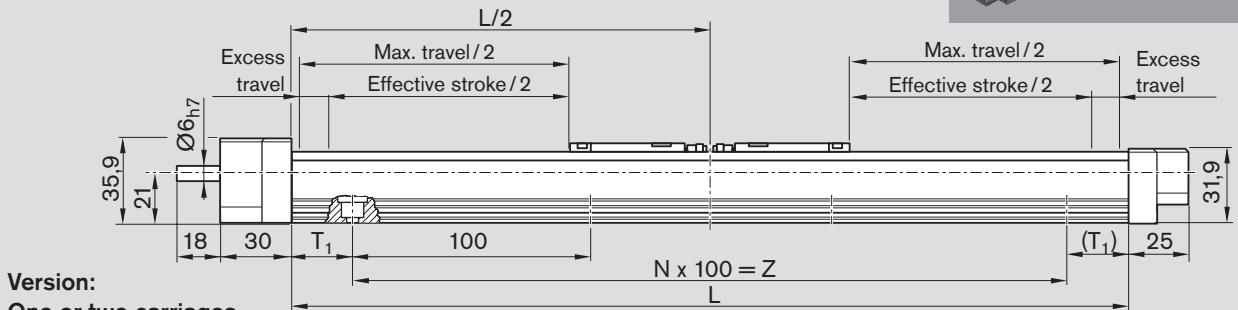
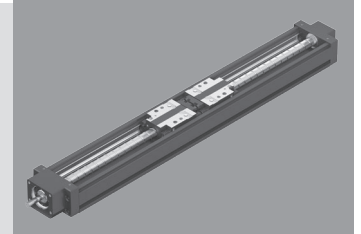
Ball screw 12 x 10
(Ball screw size = $d_o \times P$):
Excess travel = $2 \cdot 10 = 20 \text{ mm}$

Standard lengths of frame

Length L (mm)	T (mm)	T ₁ (mm)	N	Z (mm)	Mounting holes for ISO 4762 screws
150	100	25	1	100	M5
200	100	50	1	100	
250	100	25	2	200	
300	100	50	2	200	
400	100	50	3	300	
500	100	50	4	400	
600	100	50	5	500	
700	100	50	6	600	
800	100	50	7	700	
900	100	50	8	800	
940	100	20	9	900	

Dimension Drawings without Cover

All dimensions in mm
Drawings not to scale

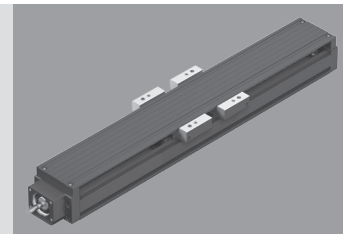
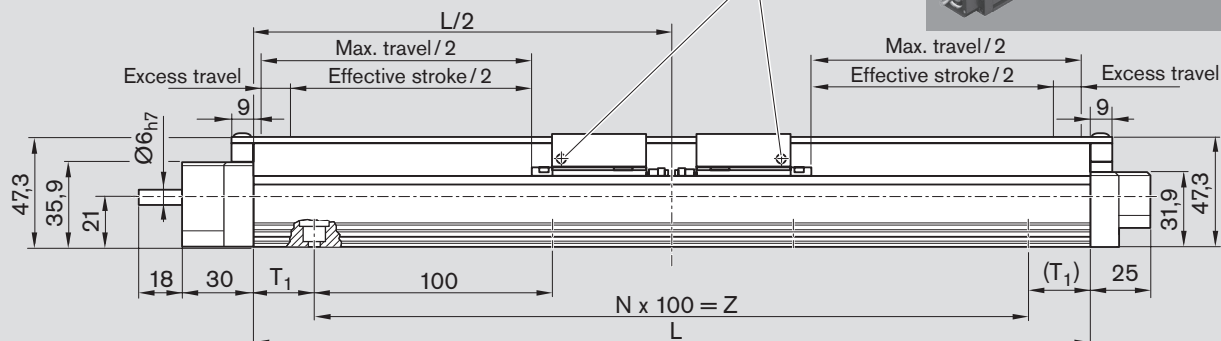
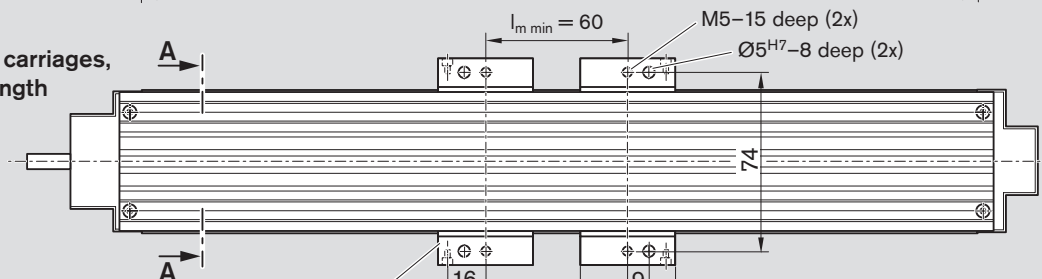
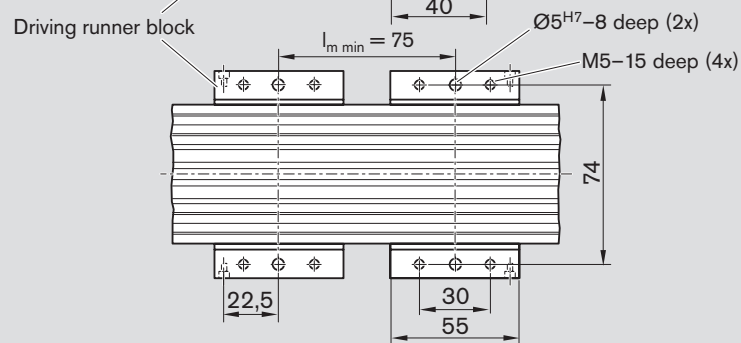


For fastening with
clamping fixtures

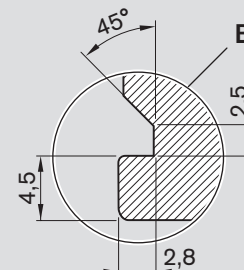
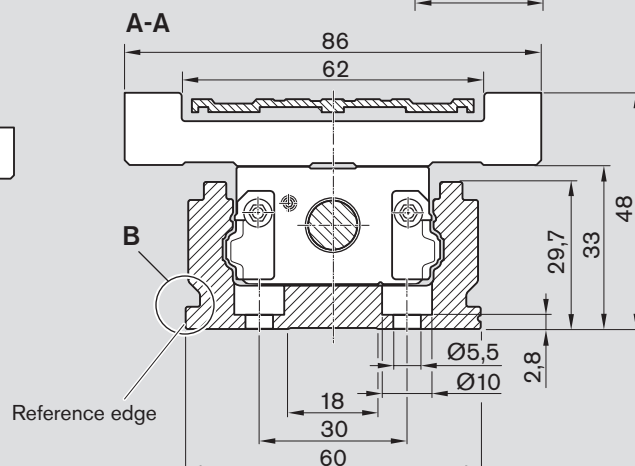
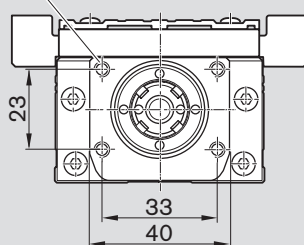
Configuration and ordering, Dimension Drawings

Precision Module PSK-060

Dimension Drawings with Cover Plate

 All dimensions in mm
 Drawings not to scale

 One-point lubrication (grease):
 via funnel-type lube nipples DIN 3405-D3
 on both sides

Version:
 One or two carriages,
 standard length

Version:
 One or two carriages,
 long


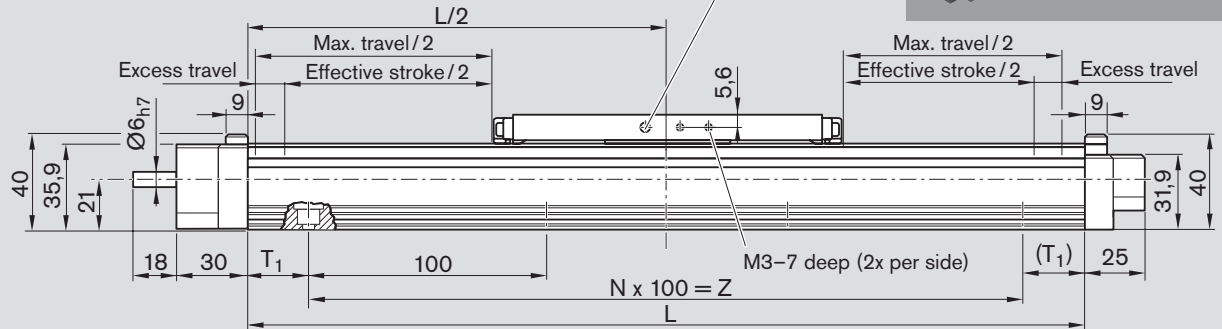
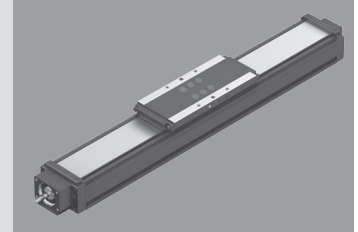
M4-8 deep (4x)


 For fastening with
 clamping fixtures

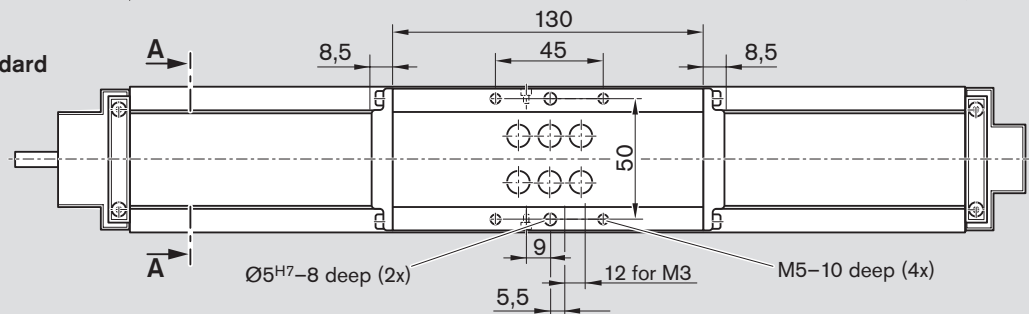
Dimension Drawings with Sealing Strip

All dimensions in mm
Drawings not to scale

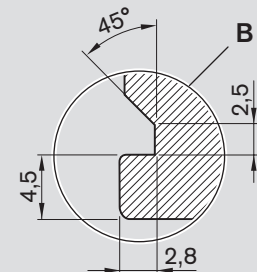
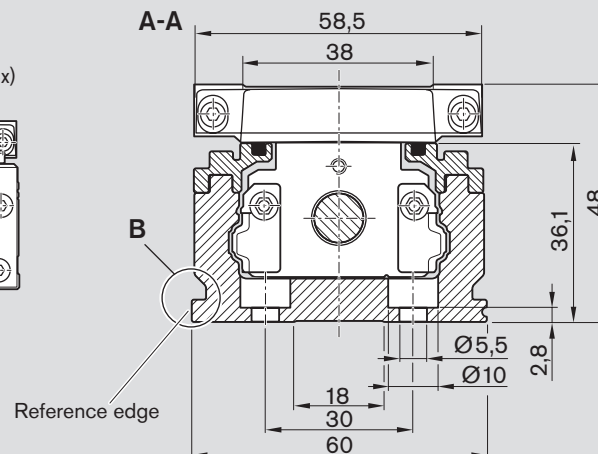
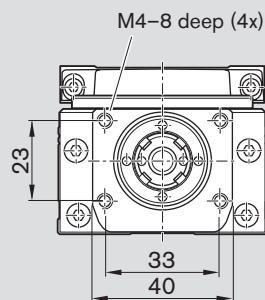
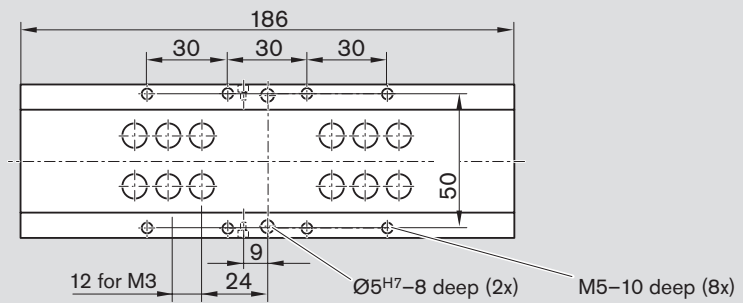
One-point lubrication (grease):
via funnel-type lube nipples DIN 3405-D3
on both sides



Version:
Carriage, standard
length



Version:
Carriage, long



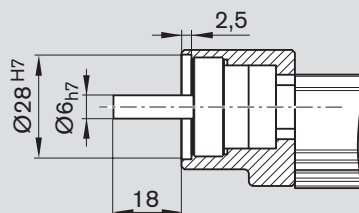
For fastening with
clamping fixtures

Configuration and ordering, Dimension Drawings

Precision Module PSK-060

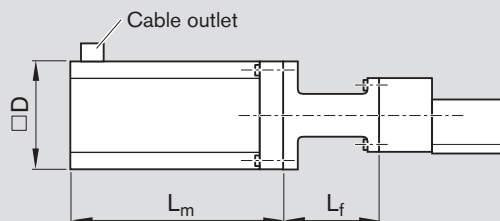
Dimension Drawings, Motor Attachment

OF01, OF02



MF01, MF02

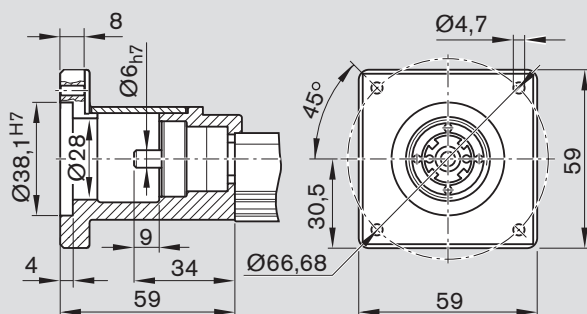
Motor with motor mount and coupling



Motor type	Dimensions (mm)			
	D	L _f	without brake	L _m with brake
MSM 019B	38	45	92	122.0
MSK 030C	54	50	188	213.0
MSM 031B	60	50	79	115.5

MF10, MF11

Integrated motor mount (NEMA 23 – Form C)

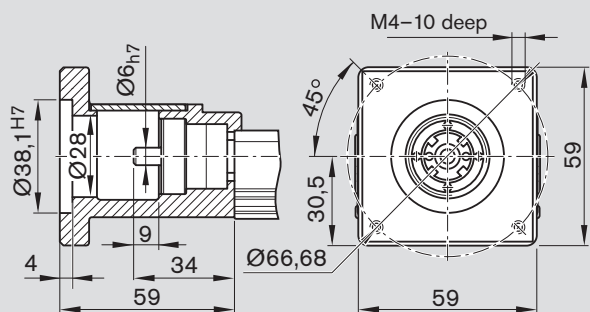


Drawings not to scale!

For further information and dimensions, see "Motors."

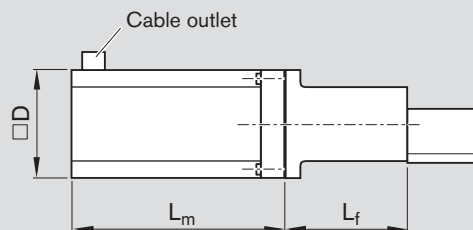
MF10, MF11

Integrated motor mount (NEMA 23 – Form D)

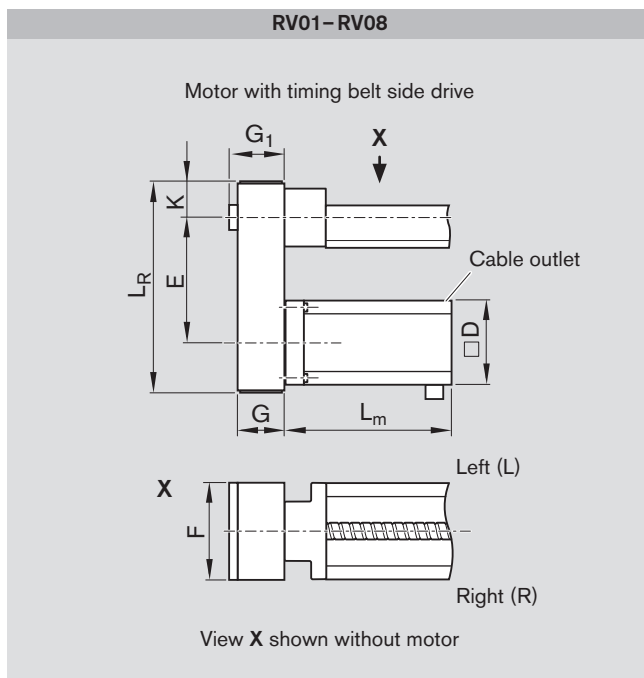


MF10, MF11

Motor with integrated motor mount and coupling



Motor type	Dimensions (mm)			
	D	L _f	without brake	L _m with brake
MSK 030C	54	59	188	213

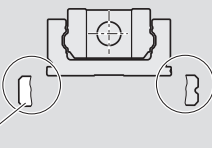
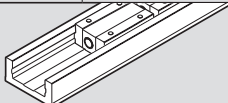
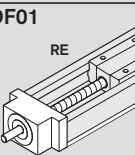
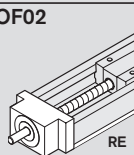
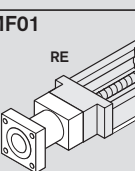
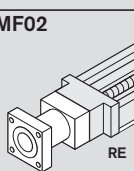
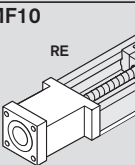
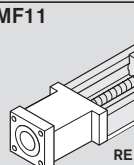
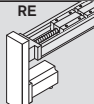
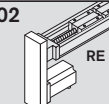
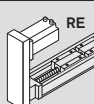
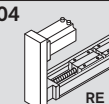
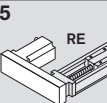
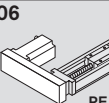
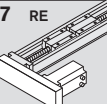
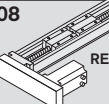


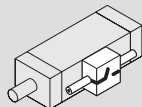
Version	Motor type	Dimensions (mm)									
		D	E		F	G	G ₁	K	without brake	L _m with brake	L _R
			i = 1	i = 1.5							
RV01 to RV08	MSM 019B	38	76,5	76,5	48,0	27,5	29,0	27,5	92	122,0	139
	MSK 030C	54	78,0	75,0	64,5	37,0	43,5	33,5	188	213,0	154
	MSM 031B	60	78,0	75,0	64,5	37,0	43,5	33,5	79	115,5	157

Configuration and ordering, Dimension Drawings

Precision Module PSK-090

Components and Ordering Data

Short product name, length PSK-090-NN-1, mm				Guideway	Drive unit		Carriage version								Steel		Aluminum			
					Screw journal		Ball screw size d ₀ x P		Without cover				Cover plate				Sealing strip			
Version									Stan- dard		Long		Stan- dard		Long		Stan- dard		Long	
	RE left	RE right					16x5	16x10	16x16	1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	2 carr.	1 carr.	2 carr.	
Without drive	OA01 			OA01	L = 340 mm 10 L = 440 mm 12 L = 540 mm 14 L = 640 mm 16 L = 740 mm 18 L = 840 mm 20 L = 940 mm 22	without		50		01	02	03	04	–	–	–	–	–	–	
	With ball screw, w/o motor mount	OF01 	OF02 	OF01 OF02		Ø9	01	02	03	01	02	03	04	21	22	23	24	40	41	
With ball screw and motor mount		MF01 	MF02 	MF01 MF02		Ø9 with keyway	11	12	13											
	W/ball screw and integrated mount	MF10 	MF11 	MF10 MF11		Ø9	01	02	03	01	02	03	04	21	22	23	24	40	41	
With ball screw and timing belt side drive		RV01 	RV02 	RV01 to RV08																
	RV03 	RV04 	for MSK 030C MSM 031C			01	02	03	01	02	03	04	21	22	23	24	40	41		
	RV05 	RV06 																		
	RV07 	RV08 	for MSK 040C MSM 041B			01	02	03	01	02	03	04	21	22	23	24	40	41		

	Motor attachment			Motor		Type of cover			Switches / Mounting duct / Socket-plug	Documentation	
	Gear ratio i =	Attach- ment kit ¹⁾	for motor	with brake	without brake	with- out	cover plate	strip		Standard report	Measure- ment report
	–	00	–	00		00	–	–	 Without switch and Mounting duct00 Switches: – Reed sensor21 – Hall sensor22 Mounting duct25 Switching cam for PSK: – Without cover or with cover plate30 – With sealing strip31	01	02 Friction moment
	–	00	–	00		00	01	02			
	–	03	MSK 040C	87	86						
		06	MSM 041B	141	140						
	–	31	NEMA 23-D ²⁾	00							
		32	MSK 030C	85	84						
		33	MSM 031C	139	138						
	i = 1	40	MSK 030C	85	84						
	i = 1,5	41									
	i = 1	42	MSM 031C	139	138						
	i = 1,5	43									
	i = 1	44	MSK 040C	87	86						
	i = 1,5	45									
	i = 1	46	MSM 041B	141	140						
	i = 1,5	47									

1) Attachment kit also available without motor (when ordering: enter "00" for motor).
For motor mounting kit for customer motor see "Motor mounting" section.

2) Use motors complying with the appropriate NEMA specification.
Because of the varying shaft dimensions for NEMA-specification motors, the attachment kit does not include a coupling.

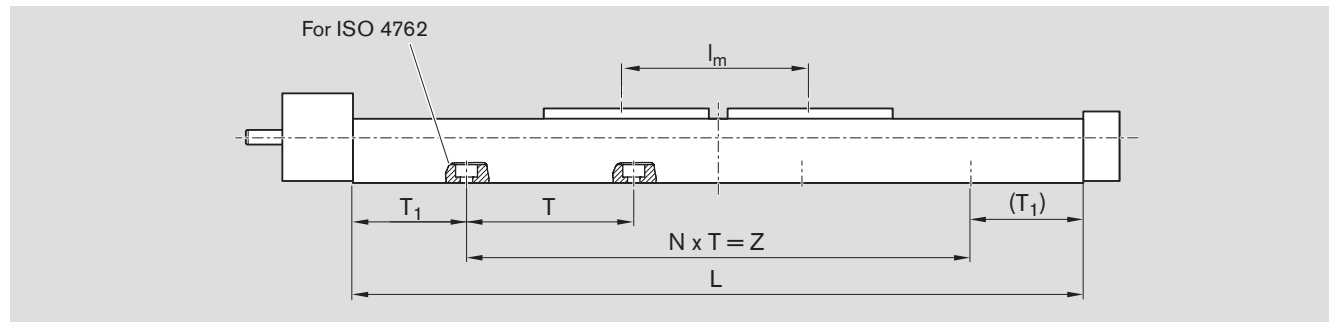
Switch mounting arrangements

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

Configuration and ordering, Dimension Drawings

Precision Module PSK-090

Lengths and Hole Spacing



Length L

Type of cover	Number of carriages (carr.)	Carriage version Standard length	Long
Without cover or with cover plate	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 100 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 120 \text{ mm}$
	2 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_m + 100 \text{ mm}$ $l_{m \min} = 90 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + l_m + 120 \text{ mm}$ $l_{m \min} = 110 \text{ mm}$
With sealing strip	1 carr.	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 190 \text{ mm}$	$L = (\text{stroke} + 2 \cdot \text{excess travel}) + 265 \text{ mm}$

l_m = center-to-center distance
between carriages (consider
 $l_{m \min}$)

Stroke = maximum travel of carriage
center between the outermost
switch activation points

In most cases the recommended limit
for excess travel (braking path) is:
Excess travel = $2 \cdot \text{screw lead } P$

Example

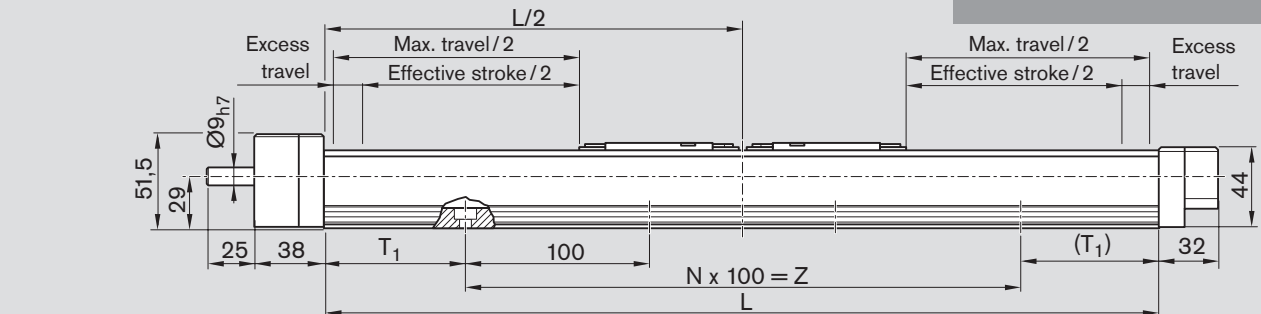
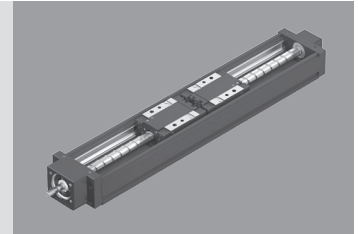
Ball screw 16 x 10
(Ball screw size = $d_o \times P$):
Excess travel = $2 \cdot 10 = 20 \text{ mm}$

Standard lengths of frame

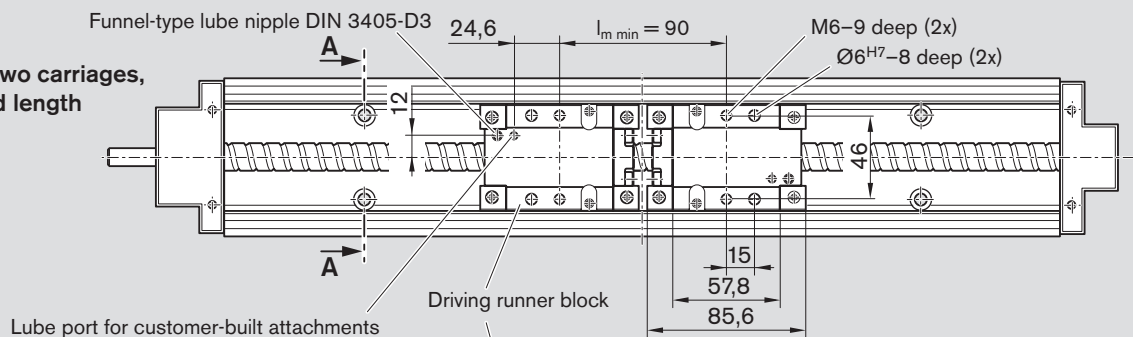
Length L (mm)	T (mm)	T ₁ (mm)	N	Z (mm)	Mounting holes for ISO 4762 screws
340	100	70	2	200	M6
440	100	70	3	300	
540	100	70	4	400	
640	100	70	5	500	
740	100	70	6	600	
840	100	70	7	700	
940	100	70	8	800	

Dimension Drawings without Cover

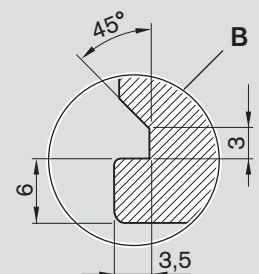
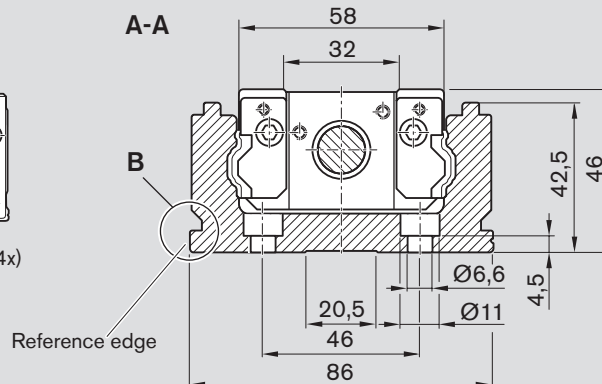
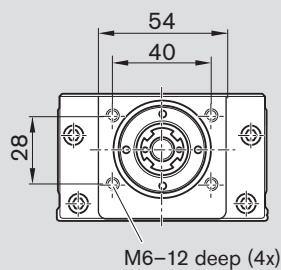
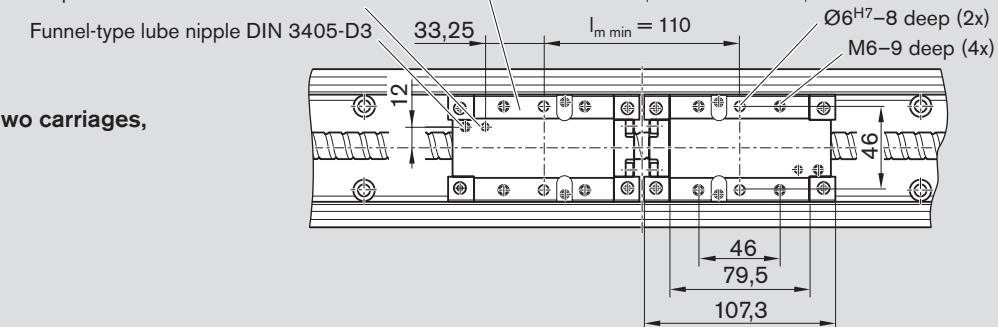
All dimensions in mm
Drawings not to scale



Version:
One or two carriages,
standard length



Version:
One or two carriages,
long



For fastening with
clamping fixtures

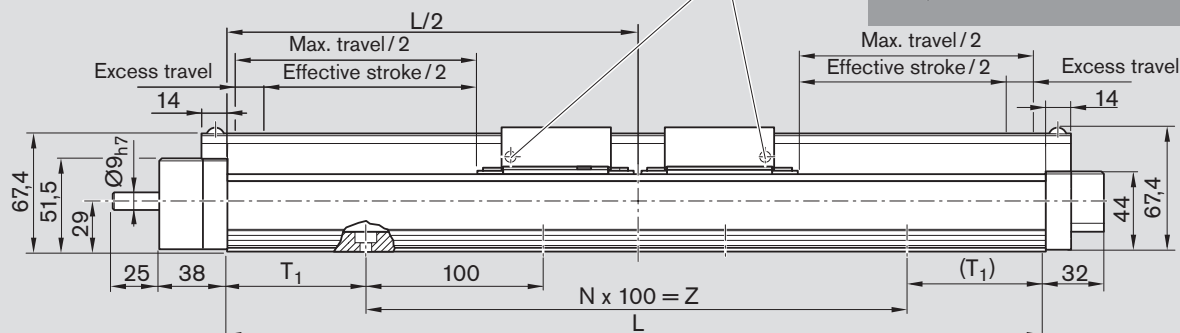
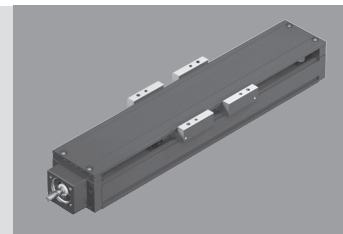
Configuration and ordering, Dimension Drawings

Precision Module PSK-090

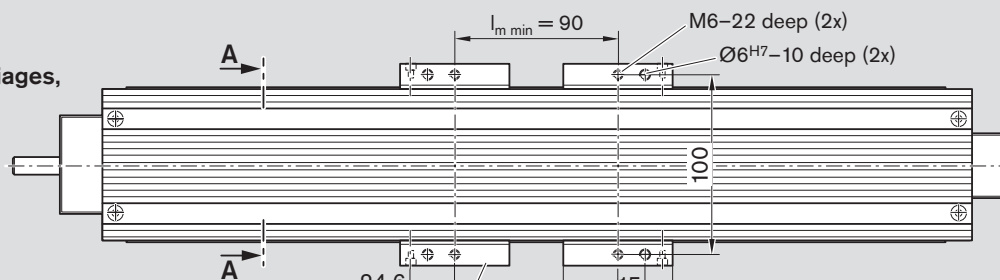
Dimension Drawings with Cover Plate

All dimensions in mm
Drawings not to scale

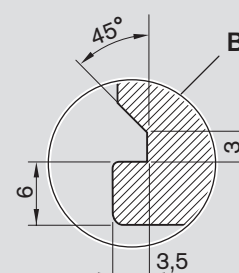
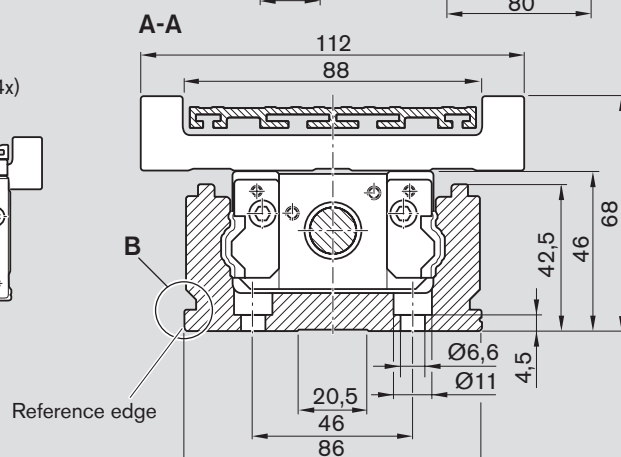
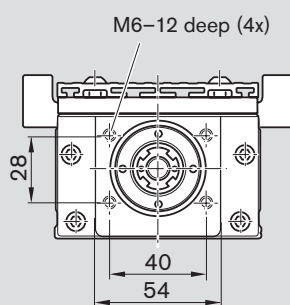
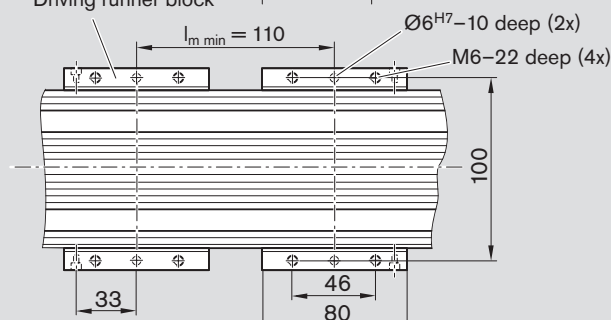
One-point lubrication (grease):
via funnel-type lube nipples DIN 3405-D3
on both sides



Version:
One or two carriages,
standard length



Version:
One or two carriages,
long

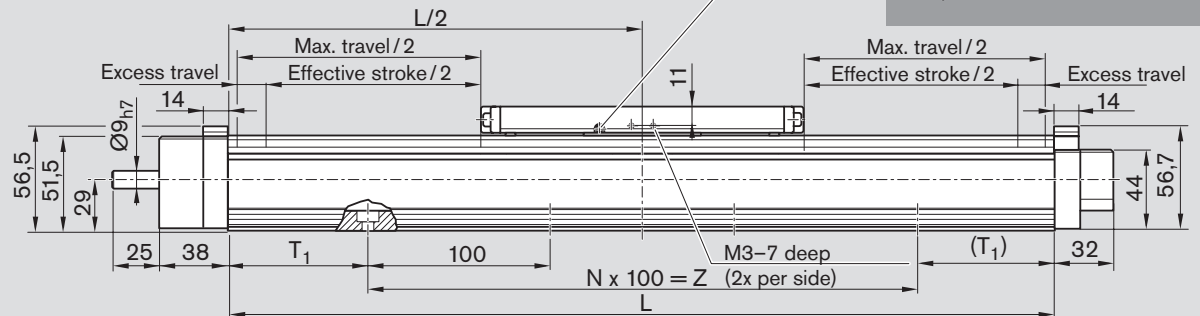
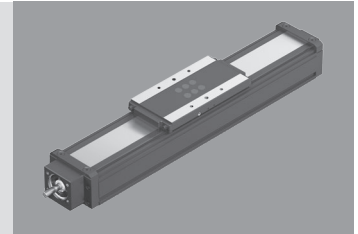


For fastening with
clamping fixtures

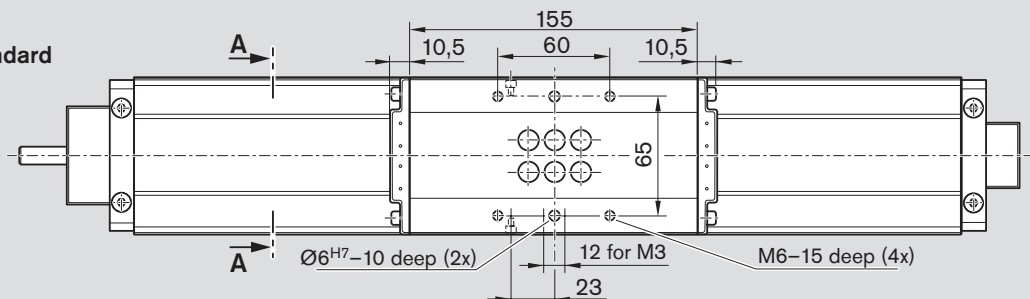
Dimension Drawings with Sealing Strip

All dimensions in mm
Drawings not to scale

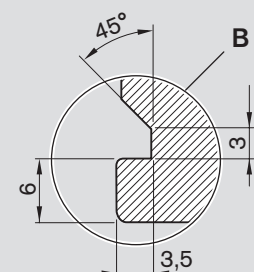
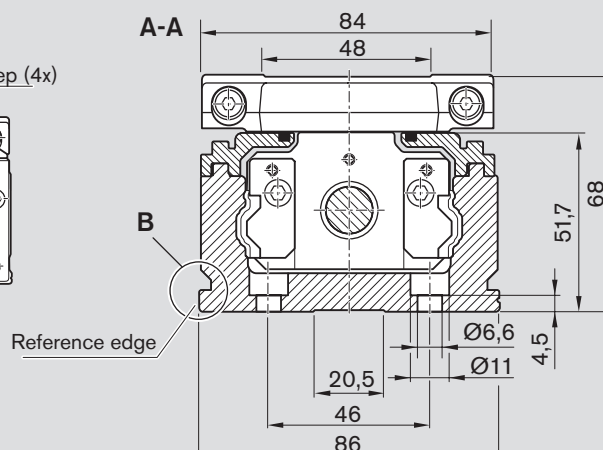
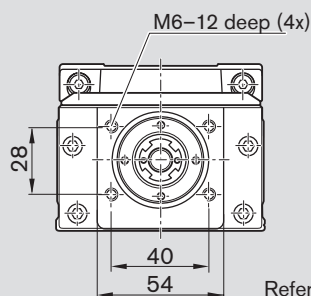
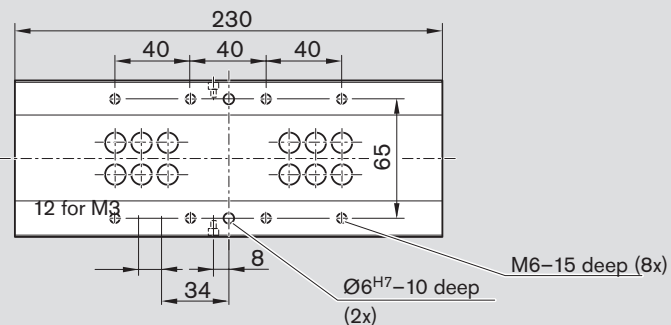
One-point lubrication (grease):
via funnel-type lube nipples DIN 3405-D3
on both sides



Version:
Carriage, standard length



Version:
Carriage, long



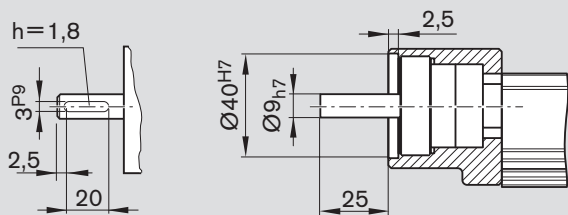
For fastening with
clamping fixtures

Configuration and ordering, Dimension Drawings

Precision Module PSK-090

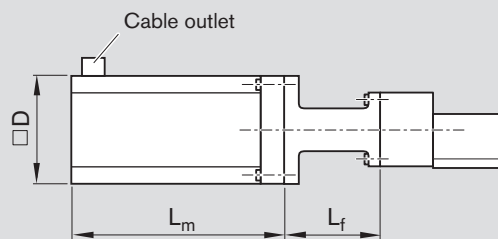
Dimension Drawings, Motor Attachment

OF01, OF02



MF01, MF02

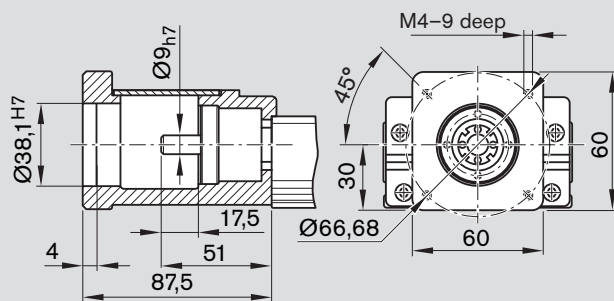
Motor with motor mount and coupling



Motor type	Dimensions (mm)		without brake	L _m with brake
	D	L _f		
MSM 031C	60.0	72.0	98.5	135.0
MSM 041B	80.0	81.0	112.0	149.0
MSK 030C	54.0	75.0	188.0	213.0
MSK 040C	82.0	77.5	185.5	215.5

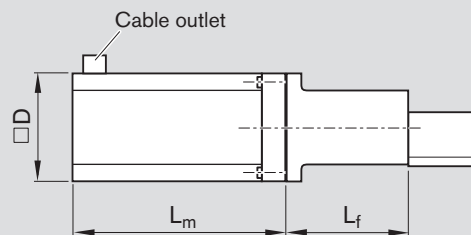
MF10, MF11

Integrated motor mount (NEMA 23 – Form D)



MF10, MF11

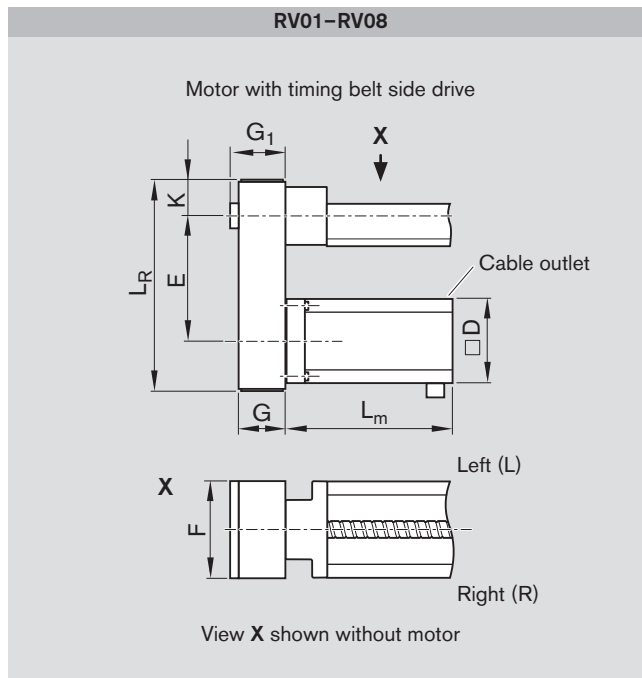
Motor with integrated motor mount and coupling



Motor type	Dimensions (mm)		without brake	L _m with brake
	D	L _f		
MSM 031C	60	87.5	98.5	135.0
MSK 030C	54	87.5	188.0	213.0

Drawings not to scale!

For further information and dimensions, see "Motors."



Version	Motor type	Dimensions (mm)										
		D	E		F	G	G ₁	K	without brake	L _m with brake	L _R	
			i = 1	i = 1.5							i = 1	i = 1.5
RV01 to RV08	MSM 031C	60	103.5	115.0	64.5	37	43.5	33.5	98.5	135.0	180.0	191.5
	MSM 041B	80	122.0	122.0	88.0	51	57.0	45.5	112.0	149.0	231.0	231.0
	MSK 030C	54	103.5	115.0	64.5	37	43.5	33.5	188.0	213.0	180.0	191.5
	MSK 040C	80	122.0	122.0	88.0	51	57.0	45.5	185.5	215.5	231.0	231.0

Attachments and Accessories

Switch Mounting Arrangements

Overview of switching system

- 1 Switch
- 2 Switching cam
- 3 Mounting duct (aluminum alloy, black anodized)
- 4 Socket head cap screw with washer

Notes for mounting

A mounting duct is required for installation of the switches.

⚠ Short stroke:
Consider the length of the switch!

Mounting side:

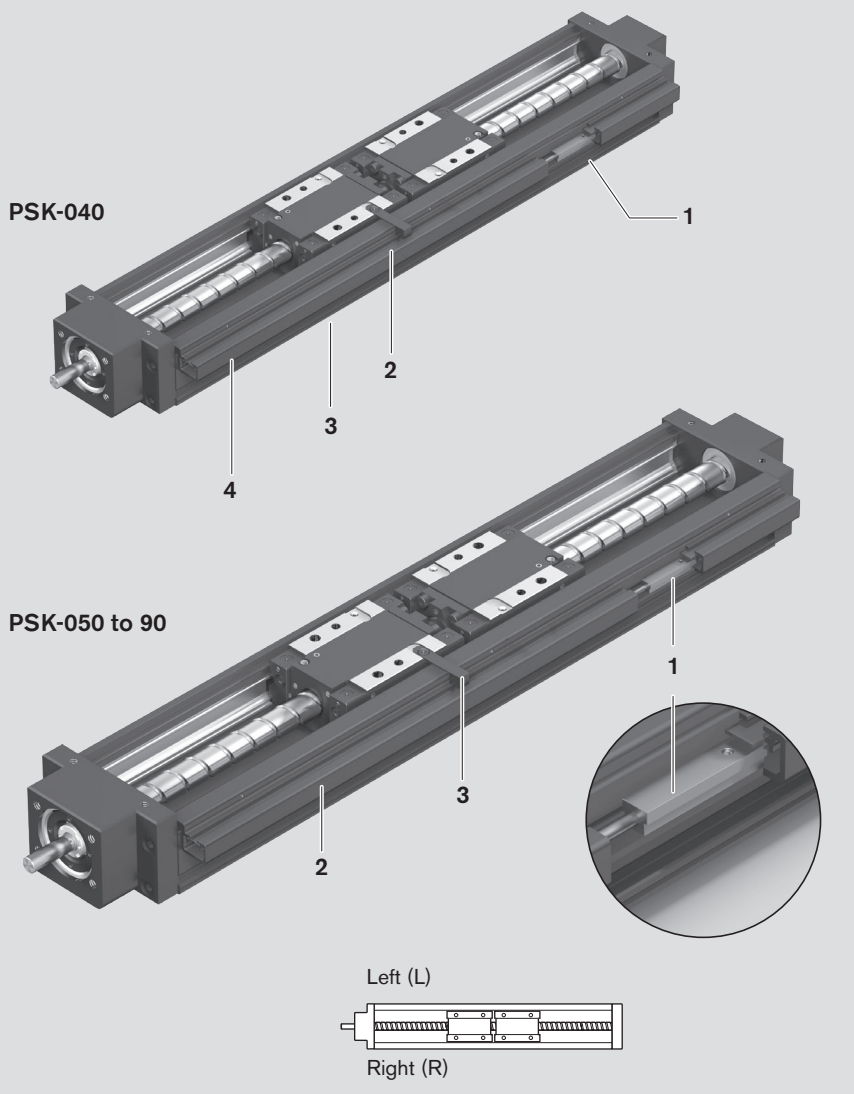
Switches may be mounted on the left (L) or right (R) side of the module.

For two-carriage versions:

Switch actuation by the driving runner block (on the motor side).

The switching system (switch, switching cam, mounting duct, standard parts) is supplied loose.

Switching system



Ordering the switches and accessories

Refer to the following table for part numbers.
Accessories can also be ordered separately.

Item		Part numbers PSK-040	PSK-050	PSK-060 and PSK-090
1	Switches			
	– Reed sensor	R3476 018 03	R3476 018 03	R3476 018 03
	– Hall sensor	R3476 019 03	R3476 019 03	R3476 019 03
2	Mounting duct	R0399 800 97	R0396 620 20	R0396 620 19
3	Switching cam			
	– For PSK without cover or with cover plate	R1419 000 12	R1419 000 10	R1419 000 04
	– For PSK with sealing strip	–	R1419 000 11	R1419 000 05

Length calculation mounting duct :

PSK40: L + 15 mm
PSK-050 to PSK-090: L – 2 mm

Mounting duct

Function

- To accommodate and secure switches
- To house cables

Mounting instructions for PSK-040

The mounting duct is fastened to the same side as the switches and fixed to the end blocks of the Precision Module with socket head cap screws and washers (included in delivery).

Mounting instructions for PSK-050 to PSK-090

The Mounting duct is mounted to the same side as the switches by snapping it into the T-slots on the frame of the Precision Module and securing it with set screws. The set screws (M) are supplied along with the duct.

Dimensions for mounting duct

Dimensions	PSK-050	PSK-060	PSK-090
A (mm)	21.7	25.2	25.2
B (mm)	15.0	15.0	15.0
C (mm)	11.5	11.5	11.5
D (mm)	16.5	16.5	16.5
M (mm)	M2.0	M2.5	M2.5

Installation dimensions for versions without cover or with cover plate

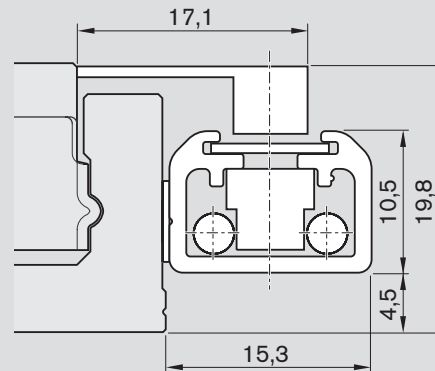
Dimensions	PSK-050	PSK-060	PSK-090
E (mm)	15.2	15.8	15.4
F (mm)	25.8	32.8	45.8
G (mm)	19.7	22.6	25.8
H (mm)	6.0	6.0	6.0

Installation dimensions for version with sealing strip

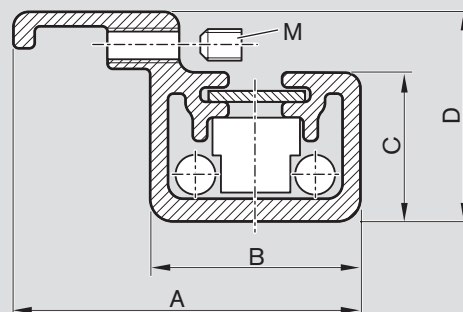
Dimensions	PSK-050	PSK-060	PSK-090
E (mm)	15.2	15.8	15.2
F (mm)	28.2	35.7	50.2
G (mm)	12.2	13.0	13.0
H (mm)	12.5	14.0	14.0
I (mm)	3.3	1.9	7.4

Mounting duct PSK-040

Arrangement of switching cam and mounting duct

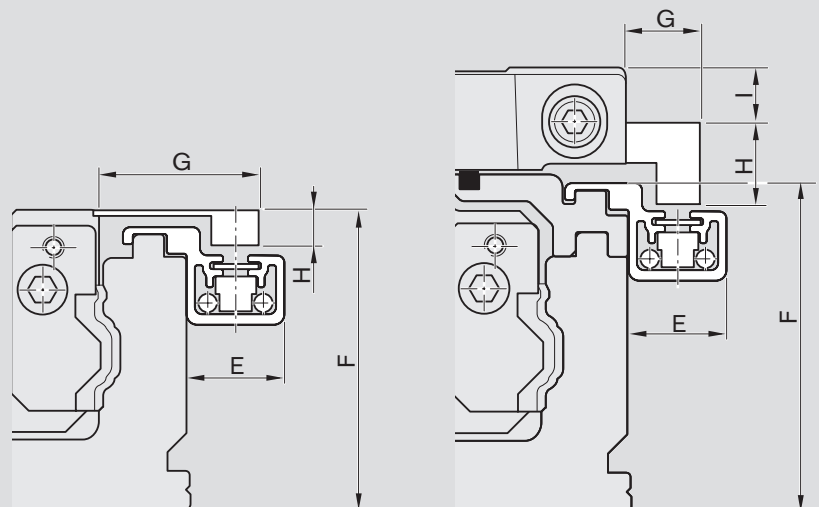


Mounting duct PSK 50 to PSK 90



Arrangement of switching cam and mounting duct

- PSK without cover or with cover plate
- PSK with sealing strip



Attachments and Accessories

Switch Mounting Arrangements

Switches

The switches for Precision Modules PSK are magnetic field sensors with potted cable.

Versions

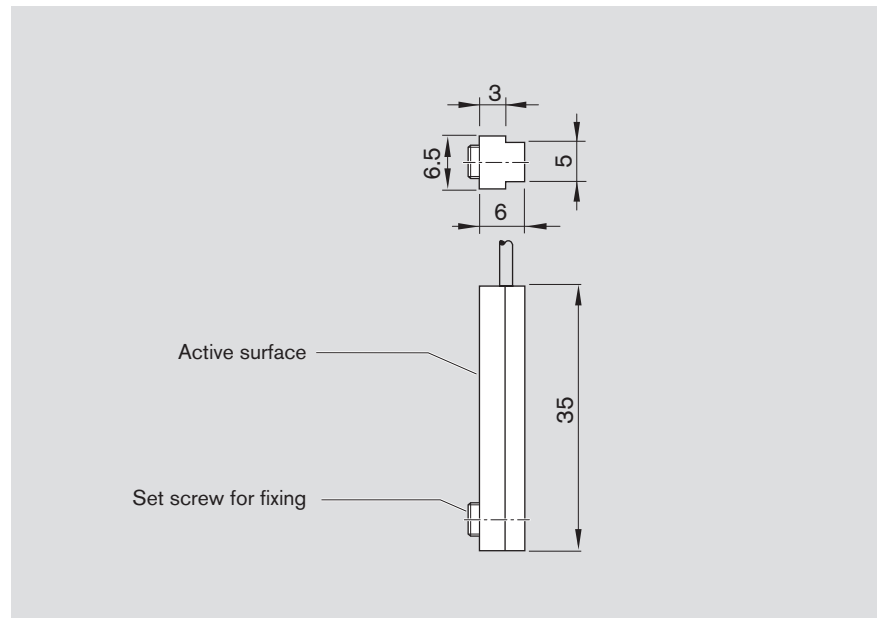
- Hall sensor, PNP NC
- Reed sensor (changeover)

Notes for mounting

Switches may only be mounted to one side of the Precision Module (left or right).

A mounting duct is required for installation of the switches.

The switches are pushed into the slots of the mounting duct and fixed with set screws.

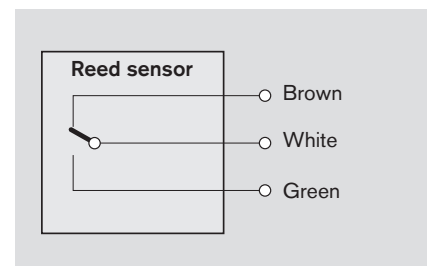
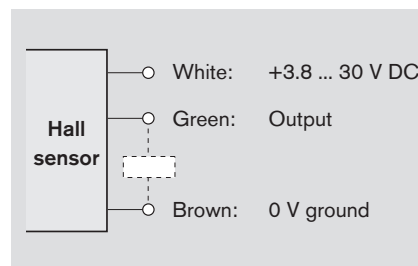


Technical data

Hall sensor	
Contact type	PNP NC
Operating voltage	3.8–30 V DC
Current consumption	max. 10 mA
Output current	max. 20 mA
Cable length	2000 mm
Protection class	IP 66
Short-circuit protection	No

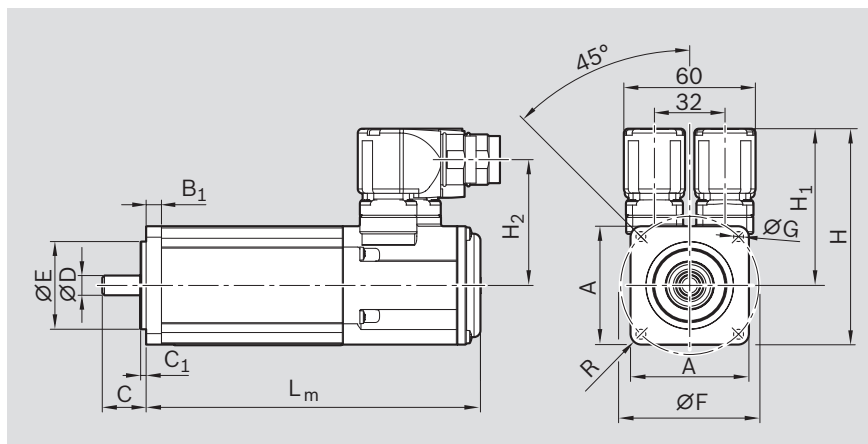
Reed sensor	
Contact type	Changeover
Switching voltage	max. 100 V DC
Switching current	max. 500 mA
Cable length	2000 mm
Protection class	IP 66
Caution: 2 switching points	

Pin assignment



Attachments and Accessories

IndraDyn S Servo Motor MSK



Motor type	Dimensions (mm)											
	A	B_1	C	C_1	$\varnothing D$ k6	$\varnothing E$ j6	$\varnothing F$	$\varnothing G$	H	L_m	without brake	with brake
MSK 030C-0900	54	7	20	2,5	9	40	63	4,5	98,5		180,0	213,0
MSK 040C-0600	82	8	30	2,5	14	50	95	6,6	124,5		185,5	215,5

Motor data

Motor type	n_{max} (min^{-1})	M_0 (Nm)	M_{max} (Nm)	M_{br} (Nm)	J_m (kgm^2)	J_{br} (kgm^2)	m_m (kg)	m_{br} (kg)
MSK 030C-0900	9 000	0,8	4,0	1	0,000030	0,000007	1,9	0,2
MSK 040C-0600	7 500	2,7	8,1	4	0,000140	0,000023	3,6	0,3

J_{br} = mass moment of inertia of the holding brake

J_m = mass moment of inertia, motor

L_m = length of the motor

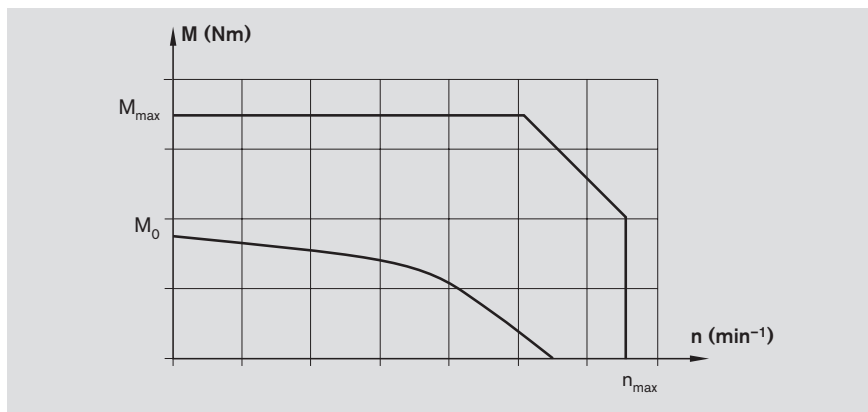
M_0 = standstill torque

M_{br} = holding torque of holding brake when switched off

M_{max} = maximum possible motor torque

n_{max} = maximum motor speed

Motor torque speed curve (schematic)



Option number ¹⁾	Motor	Part number	Version		Type designation
			Holding brake without	with	
84	MSK 030C-0900	R911308683	X		MSK030C-0900-NN-M1-UG0-NNNN
85		R911308684		X	MSK030C-0900-NN-M1-UG1-NNNN
86	MSK 040C-0600	R911306060	X		MSK040C-0600-NN-M1-UG0-NNNN
87		R911306061		X	MSK040C-0600-NN-M1-UG1-NNNN

¹⁾ From the "Configuration and Ordering" table"

Specification:

- Plain shaft with shaft seal ring
- Multiturn absolute encoder M1 (Hiperface)
- Cooling system: natural convection
- Protection class IP65 (casing)
- With or without holding brake

Note

The motors can be supplied complete with controllers and control units. For further motor types and more information on motors, controllers and control systems, please refer to the Rexroth catalogs on drive technology.

Rexroth Media Directory

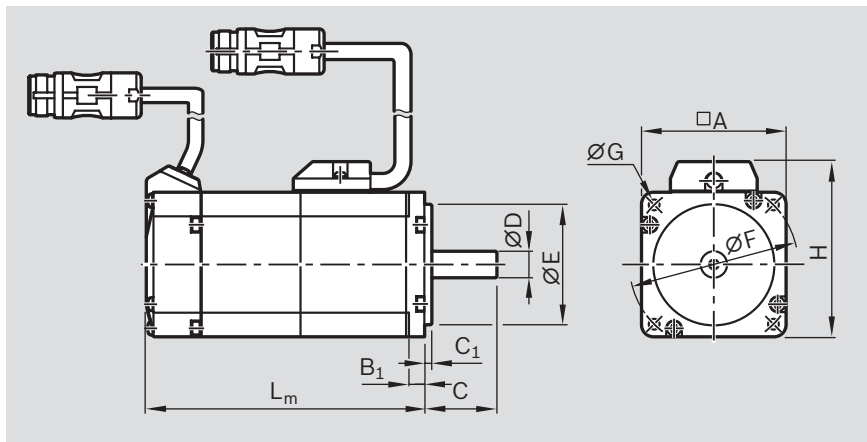
Categories		
▶ Electric Drives and Controls	▶ General	▶ IndraDrive
▶ Industrial Hydraulics	▶ Drive Technology	▶ IndraDrive Cs
▶ Mobile Hydraulics	▶ Automation Systems	▶ IndraDrive Mi
▶ Linear Motion and Assembly Technologies	▶ Press-fit systems	▶ IndraDrive ML
▶ Systems	▶ Engineering	▶ IndraDrive Fc
▶ Training	▶ Tightening Systems	▶ Frequency Converter EFC 3600
▶ Company	▶ Control units	▶ Frequency Converter EFC 3610/5610
▶ Industries	▶ Resistance Welding	▶ Frequency Converter VFC 3610/5610
▶ Cast		▶ Frequency Converter Fe
▶ Service		▶ Frequency Converter Fv
▶ Countries		

Recommended motor controller combinations

Motor	Controller
MSK 030C-0900	HCS 01.1E-W0005
MSK 030C-0900	HCS 01.1E-W0008
MSK 040C-0600	
MSK 040C-0600	HCS 01.1E-W0018

Attachments and Accessories

IndraDyn S Servo Motor MSM



Motor type	Dimensions (mm)											
	A	B ₁	C	C ₁	ØD h6	ØE h7	ØF	ØG	H	L _m	without brake	with brake
MSM 019A-0300	38	6,0	25	3	8	30	45	3,4	51		72,0	102,0
MSM 019B-0300	38	6,0	25	3	8	30	45	3,4	51		92,0	122,0
MSM 031B-0300	60	6,5	30	3	11	50	70	4,5	73		79,0	115,5
MSM 031C-0300	60	6,5	30	3	14	50	70	4,5	73		98,5	135,0
MSM 041B-0300	80	6,0	35	3	19	70	90	6,0	93		112,0	149,0

Motor data

Motor type	n _{max} (min ⁻¹)	M ₀ (Nm)	M _{max} (Nm)	M _{br} (Nm)	J _m (kgm ²)	J _{br} (kgm ²)	m _m (kg)	m _{br} (kg)
MSM 019A-0300	5 000	0.16	0.48	0.29	0.0000025	0.0000002	0.32	0.21
MSM 019B-0300	5 000	0.32	0.95	0.29	0.0000051	0.0000002	0.47	0.21
MSM 031B-0300	5 000	0.64	1.91	1.27	0.0000140	0.0000018	0.82	0.48
MSM 031C-0300	5 000	1.30	3.80	1.27	0.0000260	0.0000018	1.20	0.50
MSM 041B-0300	4 500	2.40	7.10	2.45	0.0000870	0.0000075	2.30	0.80

J_{br} = mass moment of inertia of the holding brake

J_m = mass moment of inertia, motor

L_m = length of the motor

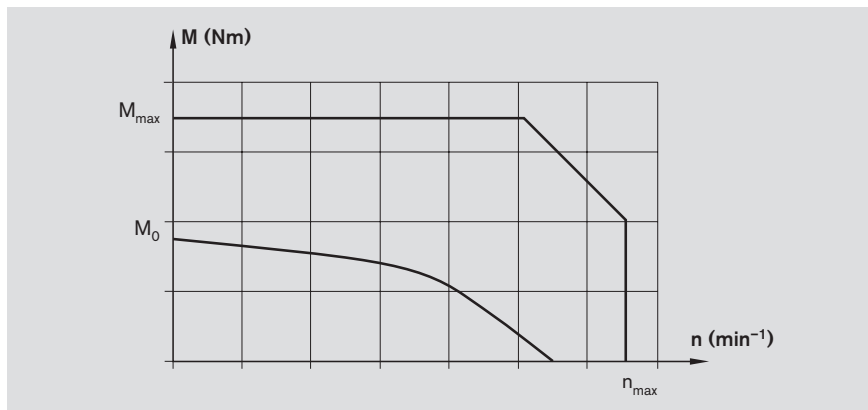
M₀ = standstill torque

M_{br} = holding torque of holding brake when switched off

M_{max} = maximum possible motor torque

n_{max} = maximum motor speed

Motor torque speed curve (schematic)



Option number ¹⁾	Motor	Part number	Version		Type designation
			Holding brake without	with	
132	MSM 019A-0300	R911344209	X		MSM 019A-0300-NN-M5-MH0
133		R911344210		X	MSM 019A-0300-NN-M5-MH1
134	MSM019B-0300	R911344211	X		MSM 019B-0300-NN-M5-MH0
135		R911344212		X	MSM 019B-0300-NN-M5-MH1
136	MSM 031B-0300	R911344213	X		MSM 031B-0300-NN-M5-MH0
137		R911344214		X	MSM 031B-0300-NN-M5-MH1
138	MSM 031C-0300	R911344215	X		MSM 031C-0300-NN-M5-MH0
139		R911344216		X	MSM 031C-0300-NN-M5-MH1
140	MSM 041B-0300	R911344217	X		MSM 041B-0300-NN-M5-MH0
141		R911344218		X	MSM 041B-0300-NN-M5-MH1

¹⁾ From the "Configuration and Ordering" table"

Specification:

- Plain shaft without shaft seal ring
- Multiturn absolute encoder M5 (20 Bit, absolute encoder functionality only possible with back-up battery)
- Cooling system: natural convection
- Protection class IP54 (shaft IP40)
- With or without holding brake
- Metal round plug M17

Note

The motors can be supplied complete with controllers and control units. For further motor types and more information on motors, controllers and control systems, please refer to the Rexroth catalogs on drive technology.

Rexroth Media Directory

Categories		
▶ Electric Drives and Controls	▶ General	▶ IndraDrive
▶ Industrial Hydraulics	▶ Drive Technology	▶ IndraDrive Cs
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▶ Linear Motion and Assembly Technologies	▶ Press-fit systems	▶ IndraDrive ML
▶ Systems	▶ Engineering	▶ IndraDrive Fc
▶ Training	▶ Tightening Systems	▶ Frequency Converter EFC 3600
▶ Company	▶ Control units	▶ Frequency Converter EFC 3610/5610
▶ Industries	▶ Resistance Welding	▶ Frequency Converter VFC 3610/5610
▶ Cast		▶ Frequency Converter Fe
▶ Service		▶ Frequency Converter Fv
▶ Countries		

Recommended motor controller combinations

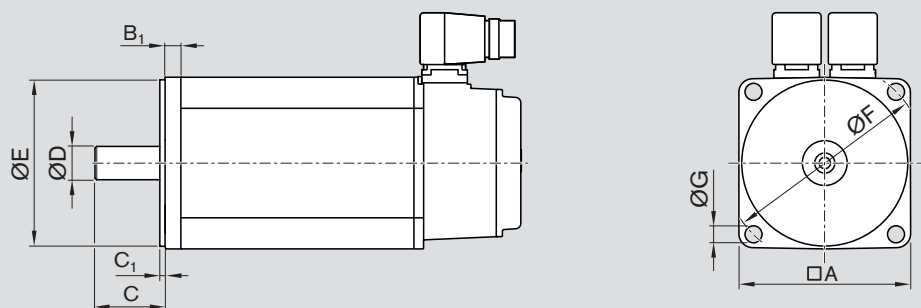
Motor	Controller
MSM 019A-0300	HCS 01.1E-W0003
MSM 019B-0300	
MSM 031B-0300	HCS 01.1E-W0006
MSM 031C-0300	HCS 01.1E-W0009
MSM 041B-0300	HCS 01.1E-W0013

Motor mounting kits according to customer specification

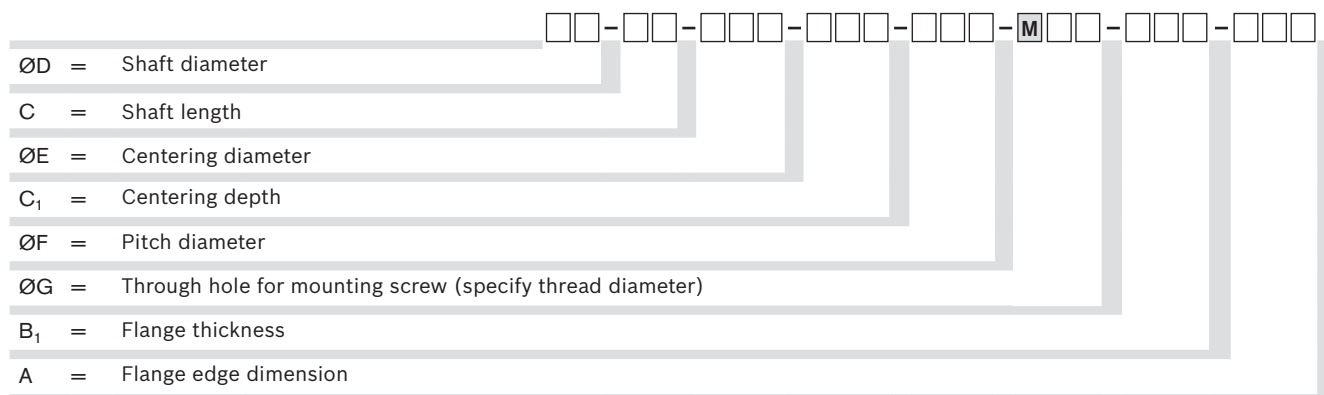
The motor mounting for linear systems with ball screw drive consists of either a mounting kit with flange and coupling (MF) or a timing belt side drive (SD). The available combinations are shown in the “Components and ordering” selection tables for the respective size.

In addition to motor options for Rexroth motors, kits for motors can also be ordered according to customer specifications. In order to establish the appropriate mounting set, the connection geometry of the motor is crucial.

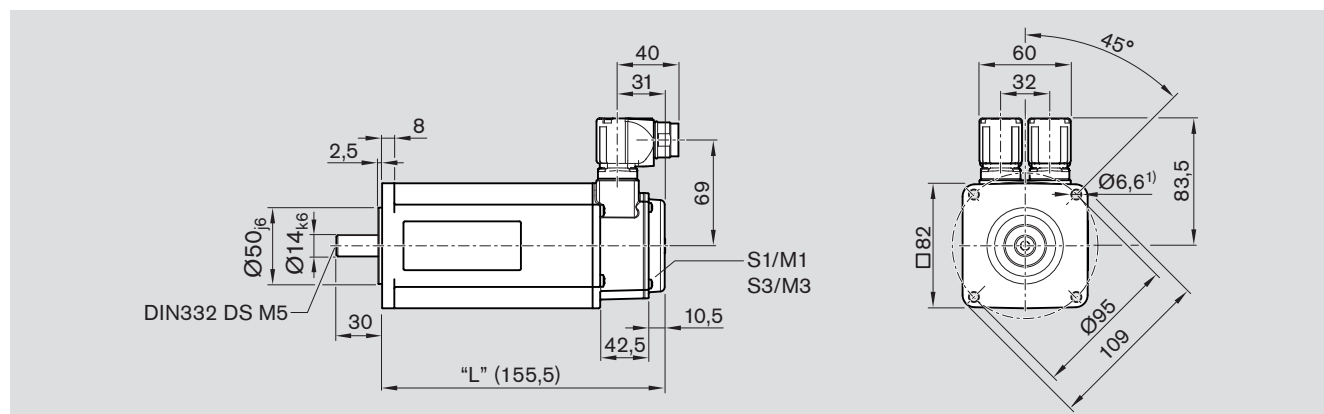
Characteristics required to uniquely determine the motor geometry are shown below.



The dimensions queried result in a unique “motor geometry code”:



Example representation of servo motor IndraDyn S Type MSK040C

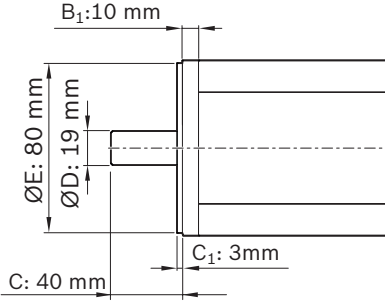


1 4 - 3 0 - 0 5 0 - 2 . 5 - 0 9 5 - M 0 6 - 0 0 8 - 0 8 2

- 1) The through hole $\varnothing 6.6$ mm results in the type designation M06 for the geometry motor code (nominal thread diameter mounting screw M6).

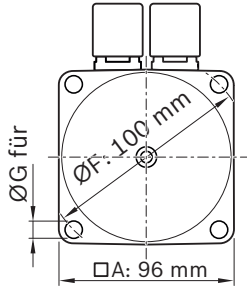
Motor mounting kits for motors according to customer specification can be configured using the online configurator in the eShop. The option "Motor mounting kits according to customer specification" needs to be selected for this.

The motor geometry is entered via the input dialog box. The dimensions can either be entered by being input directly or via a drop-down menu.



Ø G für: ▼

M3
M4
M5
M6
M8
M10
M12
M16
M20



Attachments and Accessories

Mounting

General notes

⚠ Do not mount or support the Precision Module by the end blocks! The frame is the main load-bearing part!

Precision Modules can be mounted either with screw-fasteners in the frame itself or with external clamping fixtures. When mounting Precision Modules, please note the maximum tightening torques listed in the table.

Mounting with screws in the frame

The reference edge on the frame facilitates alignment of the Precision Module.

Suitable for cover options:

- Without cover
- With cover plate (remove cover plate before mounting the module). For installation dimensions, see the relevant dimension drawings.

Mounting with clamping fixtures, PSK 50 to PSK 90

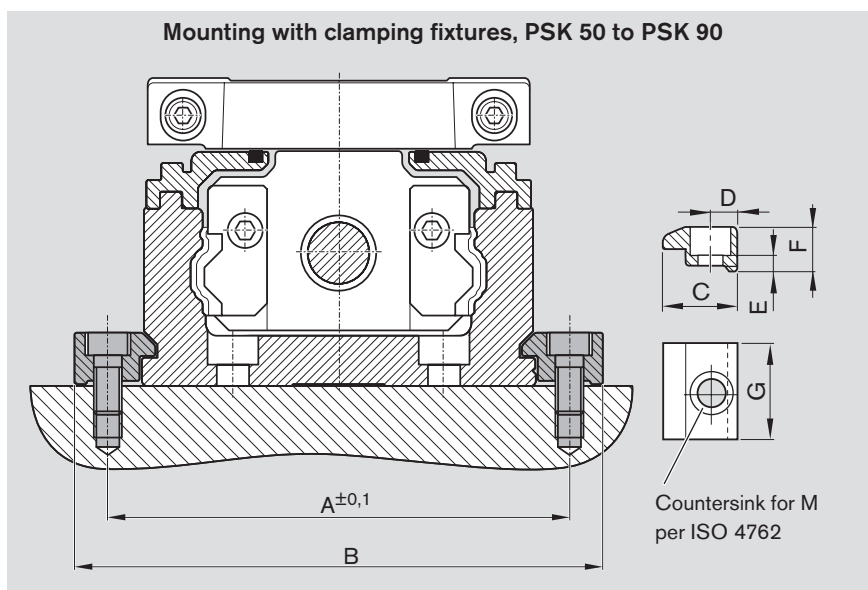
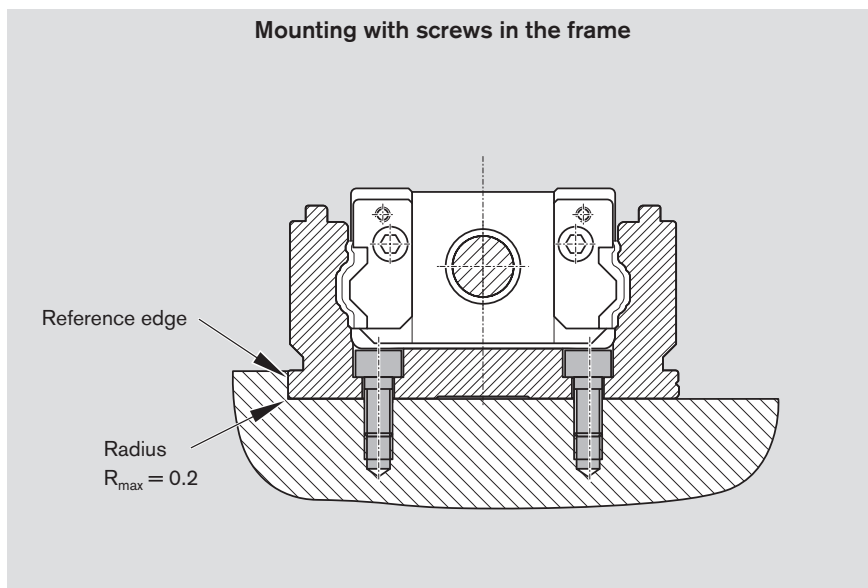
The reference edge cannot be used in the region of the clamping fixtures.

Suitable for all cover options.

Clamping fixtures

Recommended number:

- 3 per 500 mm and side



Precision Module	Part numbers Clamping fixtures	Dimensions (mm)							
		A	B	C	D	E	F	G	M
PSK-050	R1419 010 02	60	70	12.5	5.0	4.0	8.5	20	M4
PSK-060	R1419 010 01	72	85	15.0	6.5	4.8	10.0	22	M5
PSK-090	R1419 010 00	100	115	17.5	7.5	5.8	12.0	25	M6

Tightening torques for the mounting screws

- At friction factor 0.125
- Strength class 8.8

		M3	M4	M5	M6
8.8	(Nm) max.	1.3	2.7	5.5	9.5

Services and Information

Lube Ports

General notes

The lubrication system on Precision Modules has been designed for grease lubricants (grease gun). The lube port supplies lubricant to both the Rail System guideway and the Precision Ball Screw Assembly. If the module has two carriages, **both** of these must be lubricated.

Lubricant

Lithium soap grease	PSK-040	PSK-050 to PSK-090
	Consistency class NGLI 00 as per DIN 51818	Consistency class NLGI 2 as per DIN 51818
Recommended	Dynalub 520	Dynalub 510
Part numbers	R3416 043 00	R3416 037 00
May also be used		
	Elkalub GLS 135 / N00	Elkalub GLS 135 / N2
	Castrol Longtime PD 00, (Castrol)	Castrol Longtime PD 2, (Castrol)

PSK without cover

- PSK-040: One-point lubrication is possible via the lube port for grease gun on each carriage. Remove the set screw from the lube hole, apply lubricant, then drive the set screw in again.
- PSK-050 to PSK-090: One-point lubrication at either of the two funnel-type lube nipples DIN 3405-D3 per carriage.
- One-point lubrication through customer-built attachment: This can be achieved in all PSK types by using the lube port in the carriage. The lube ports are closed with set screws for shipment. Before using the lube ports, the set screws must be removed and O-rings inserted to seal off the customer-built attachment.

Precision Module	O-ring DIN 3771	Part numbers
PSK-040 to PSK-060	3 x 1	R3411 118 01
PSK-090	5 x 1.5	R3411 108 01

PSK with cover plate or sealing strip

One-point lubrication at either of the two funnel-type lube nipples (1) DIN 3405-D3 per carriage.

For short-stroke applications, please contact us regarding the lubrication arrangements:

PSK-040:	stroke < 50 mm
PSK-050:	stroke < 70 mm
PSK-060:	stroke < 95 mm
PSK-090:	stroke < 135 mm

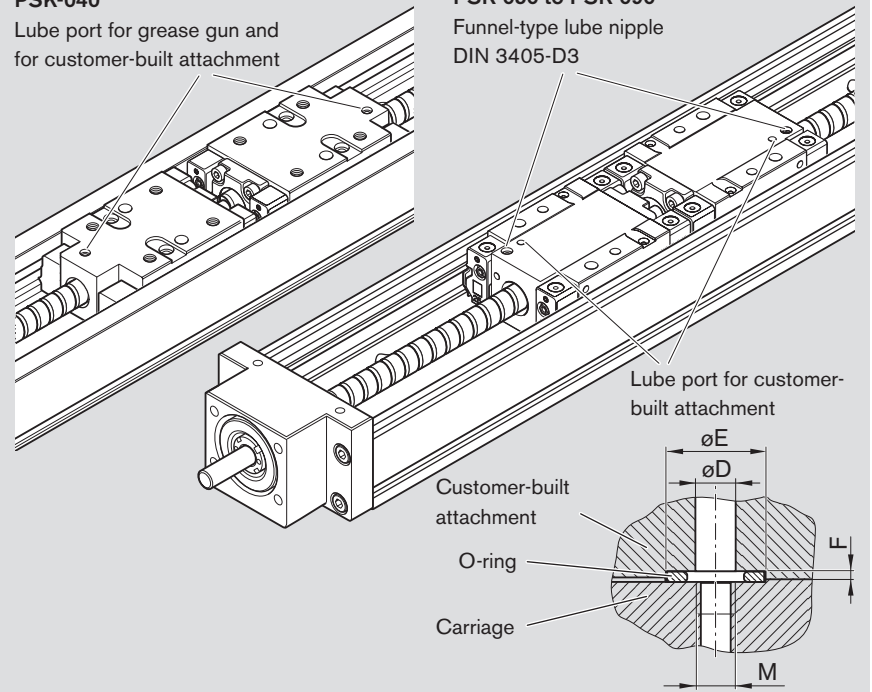
Without cover

PSK-040

Lube port for grease gun and for customer-built attachment

PSK-050 to PSK-090

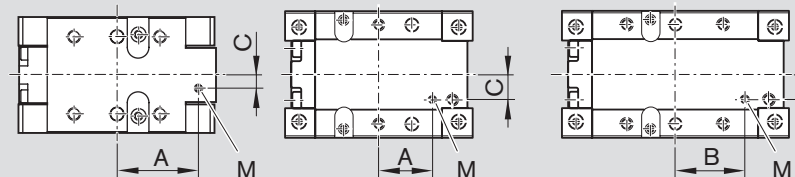
Funnel-type lube nipple DIN 3405-D3



Carriage: standard length

PSK-040

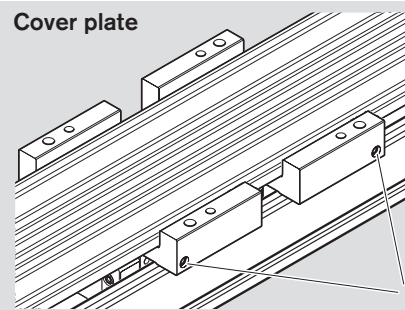
PSK-050 to PSK-090



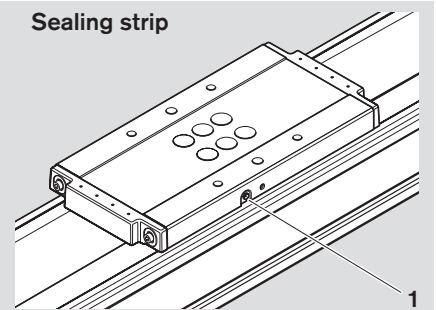
Carriage: long

Precision Module	PSK-040	PSK-050	PSK-060	PSK-090
A (mm)	19.0	18.2	16.0	24.6
B (mm)	—	—	22.0	33.3
C (mm)	3.0	6.5	9.0	12.0
D (mm)	2.5	2.5	2.5	4.0
E (mm)	5.0	5.0	5.0	8.0
F (mm)	0.6 +0.1	0.6 +0.1	0.7 +0.1	0.5 +0.1
M (mm)	M2	M2.5	M3	M4

Cover plate



Sealing strip



Services and Information

Documentation

Standard report

Option no. 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:

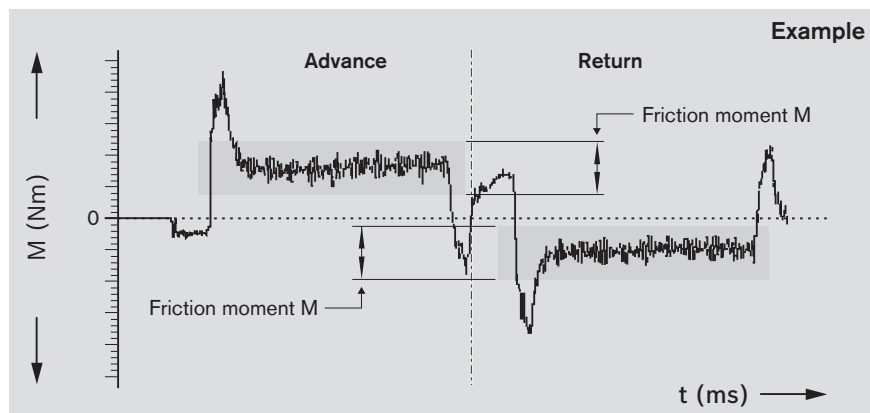
- Functional checks of mechanical components
- Functional checks of electrical components
- Design is in accordance with order confirmation

Frictional moment of complete system

Option no. 02

The moment of friction M is measured over the entire travel range.

M = friction moment (N)
 t = travel time (ms)

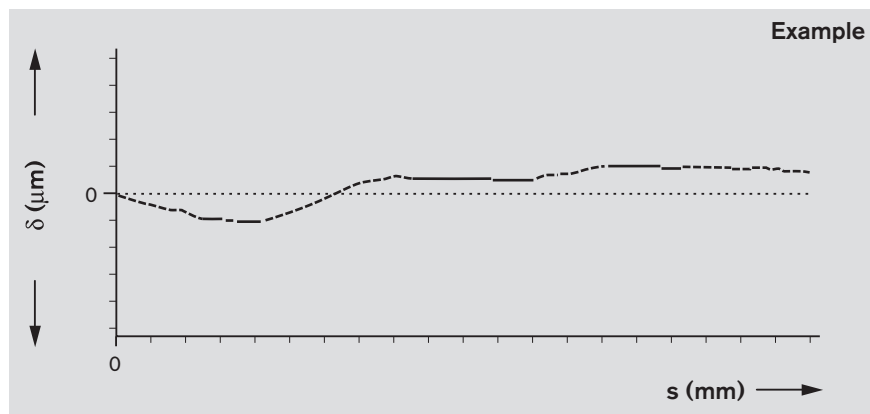


Lead deviation of ball screw

Option no. 03

A measurement report of the lead deviation δ over the measured travel s (see illustration) is provided in table form in addition to the graph.

δ = deviation (μm)
 s = measured travel (mm)

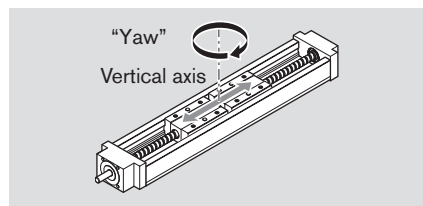


Travel accuracy

Option no. 04

Yawing

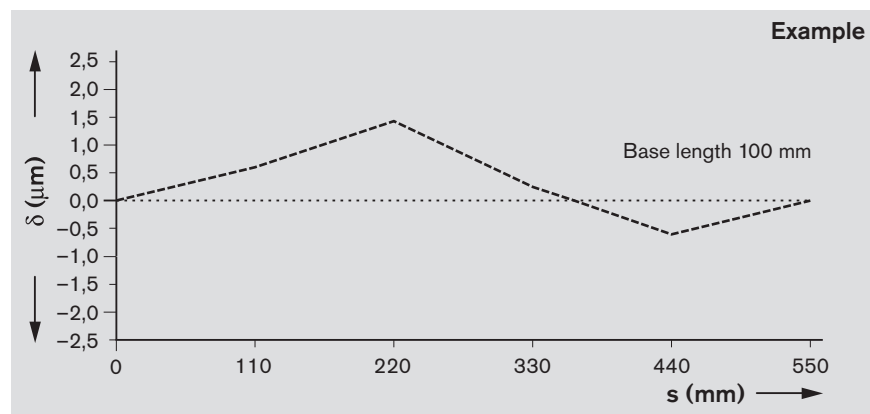
Yawing is angular deviation about the vertical axis. This angular deviation is converted to a linear deviation δ in μm on the basis of a standard length and is plotted on the graph. The base length is given in the graph.



Several measuring points are passed during the total travel. The yawing and pitching deviations are measured at these points.

Note

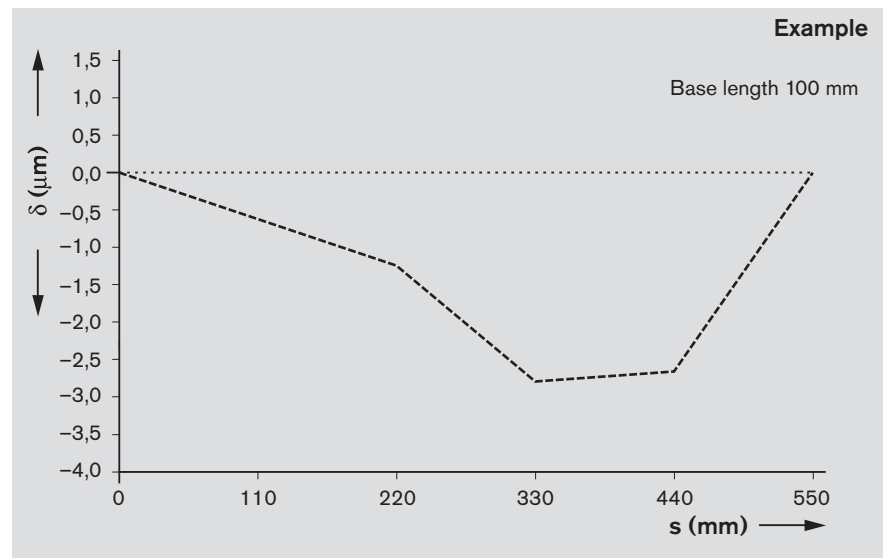
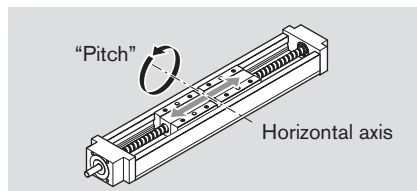
The measurements are taken with the module screwed down and assuming an ideally flat mounting base surface.



Pitching

Pitching means angular deviation about the horizontal axis. This angular deviation is converted to a linear deviation δ in μm on the basis of a standard length and is plotted on the graph. The base length is given in the graph.

In addition to graphical representation (see illustrations), a measurement report is supplied in table form.

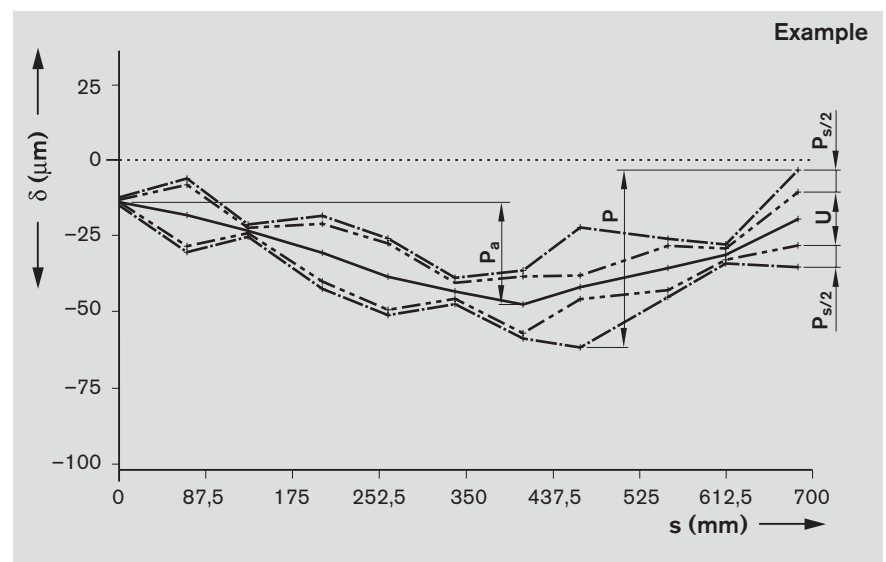


Positioning accuracy per VDI/DGQ 3441

Option no. 05

Measurement points are selected at irregular intervals along the travel range. This allows even periodical deviations δ in μm to be detected during positioning. Each measurement point is approached several times from both sides. This gives the following parameters.

δ = deviation (μm)
 s = measured travel (mm)



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.

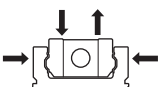
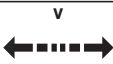
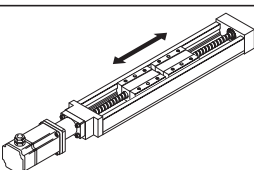
Position variation range P_s

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

Services and Information

Operating conditions and usage

Normal operating conditions

Ambient temperature (Temperature must not fall below dew point)		0 °C ... 40 °C	
Load		$\leq 0,2 \text{ C}$	
Travel speed		$\leq 1,0 \text{ m/s}$	
Travel distance $s_{\min}$	PSK-040	$> 65 \text{ mm}$	
	PSK-050	$> 70 \text{ mm}$	
	PSK-060	$> 95 \text{ mm}$	
	PSK-090	$> 135 \text{ mm}$	
Contamination		Not permitted	

Required and supplementary documentation

For more information about Intended use and safety, see "Safety Instructions for Linear Motion Systems R320103152".

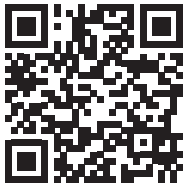
For more information on installation / initial operation see "Instructions PSK R320103187".

PDF files of these documents can be found on the Internet at:
www.boschrexroth.com/mediadirectory

Further Information

Homepage Bosch Rexroth:

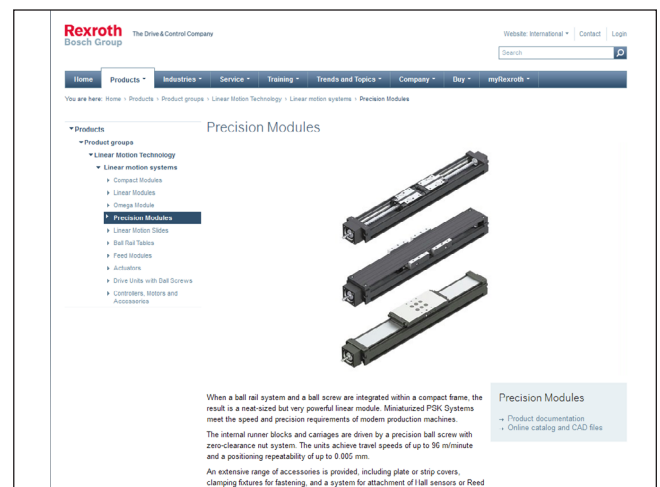
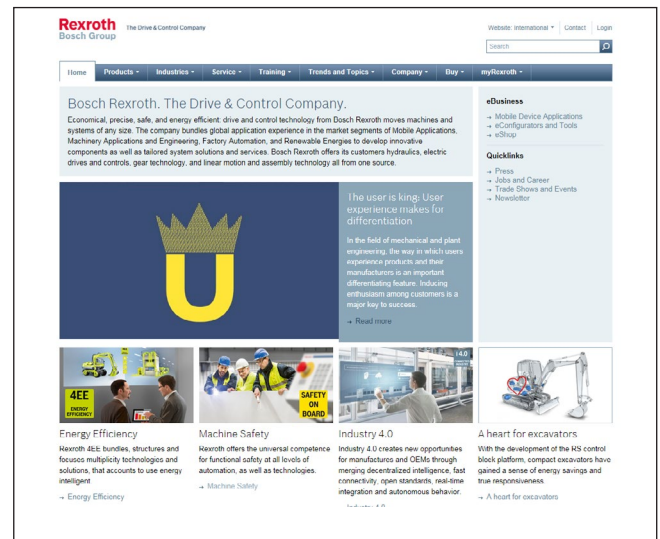
<http://www.boschrexroth.com>



Product informations

Precision Modules:

<http://www.boschrexroth.com/en/xc/products/product-groups/linear-motion-technology/linear-motion-systems/precision-modules/index>



Services and Information

Inquiry/Order Form

Bosch Rexroth AG
Linear Motion and Assembly Technologies
D-97419 Schweinfurt
Germany

Telephone +49 9721 937-0
Telefax +49 9721 937-350 (direct)

Ordering example Rexroth Precision Module PSK

Ordering data			Description
Precision Module PSK-090			Designation
Part number: PSK-090-NN-1, 740 mm			PSK-090, length = 740 mm
Version	=	MF01	With motor mount and motor, as shown in diagram MF01
Guideway	=	18	Rail system, 740 mm long
Drive unit	=	03	Ball screw 16 x 16
Carriage	=	24	Two carriages, long, steel version for cover plate
Motor attachment	=	03	With motor mount for motor MSK 040C
Motor	=	87	Motor MSK 040C with brake
Cover	=	01	With cover plate
1st switch	=	21	Reed sensor supplied loose
2nd switch	=	22	Hall sensor supplied loose
3rd switch	=	21	Reed sensor supplied loose
Mounting duct	=	25	Mounting duct supplied loose
Switching cam	=	30	Switching cam for version without cover or with cover plate
Documentation	=	01	Standard report

To be completed by customer: Inquiry ☐ / Order ☐

Precision Module

Part number: PSK-_____ -NN-1, length _____ mm

Version =
 Guideway =
 Drive unit =
 Carriage =
 └─ Carriage with center-to-center distance
 Motor attachment =
 └─ Motor geometry code¹⁾ -------
 Motor =
 Cover =
 1st switch =
 2nd switch =
 3rd switch =
 Mounting duct =
 Switching cam =
 Documentation =

1) Only required for „kits for motors according to customer specifications“.

Quantity Order of: ____ pcs, ____ per month, ____ per year, per order, or _____
 Comments:

From _____
 Company: _____ Name: _____
 Address: _____ Department: _____
 _____ Telephone: _____
 _____ Telefax: _____

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Find your local contact person here:

www.boschrexroth.com/contact