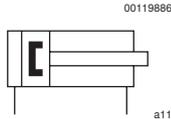**Piston rod cylinders → Guide cylinders**

Mini slide flat, Series MSF
► Ø 8 - 16 mm ► double-acting ► with magnetic piston ► cushioning: elastic ► Easy-2-Combine-capable ► with integrated ball rail guide

Ambient temperature min./max.	+0°C / +60°C
Medium	Compressed air
Max. particle size	5 µm
Oil content of compressed air	0 mg/m³ - 1 mg/m³
Pressure for determining piston forces	6,3 bar

Materials:

Housing	Aluminum, anodized
Piston rod	Stainless steel
Front plate	Aluminum, anodized
Ball rail table	Aluminum, anodized
Guide rail	Steel, hardened

00119886

a11

Technical Remarks
■ The pressure dew point must be at least 15 °C under ambient and medium temperature and may not exceed 3 °C.
■ The oil content of air pressure must remain constant during the life cycle.
■ Use only the approved oils from Bosch Rexroth, see chapter „Technical information".

Piston Ø	[mm]	8	12	16		
Port		**M5**	**M5**	**M5**		
Working pressure min./max.	[bar]	1.5 / 10	1 / 10	1 / 10		
Retracted piston force, theoretical	[N]	24	53	95		
Extended piston force, theoretical	[N]	32	71	127		
Speed max.	[m/s]	0.8	0.8	0.8		
Cushioning energy	[Nm]	0.04	0.07	0.15		
Moving mass, internal	[kg]	0.06	0.07	0.162		
Max. moving mass, external	[kg]	0.3	0.5	0.9		
Stroke setting range from 0 to 100 mm	[mm]	10	10	10		
Note		1)	2)	2)		

1) Seals: Hydrogenated acrylonitrile butadiene rubber
2) Seals: Polyurethane

	Piston Ø	8	12	16		
	Stroke 10	0821406400	0821406403	0821406408		
	20	0821406401	0821406404	0821406409		
	30	0821406402	0821406405	0821406410		
	40	-	0821406406	0821406411		
	50	-	0821406407	0821406412		
	80	-	-	0821406413		

Weight [kg]	Piston Ø	8	12	16		
	Stroke 10	0.12	0.19	0.37		
	20	0.13	0.22	0.38		
	30	0.15	0.24	0.41		
	40	-	0.29	0.43		
	50	-	0.31	0.49		
	80	-	-	0.7		

Part numbers marked in bold are available from the central warehouse in Germany, see the shopping basket for detailed information
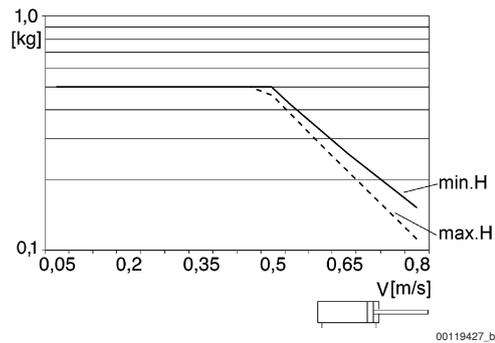
Piston rod cylinders → Guide cylinders

Mini slide flat, Series MSF
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Max. additionally moving mass (MSF-8)

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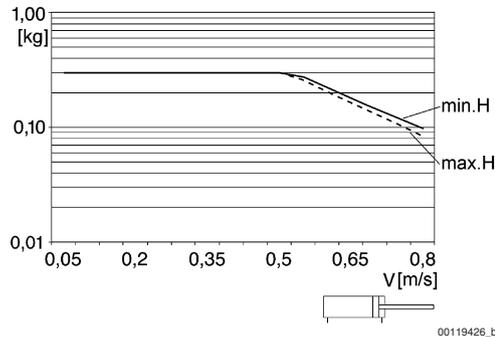
H = stroke

Max. additionally moving mass (MSF-12)

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H = stroke

Max. additionally moving mass (MSF-16)

00119428_b

H = stroke

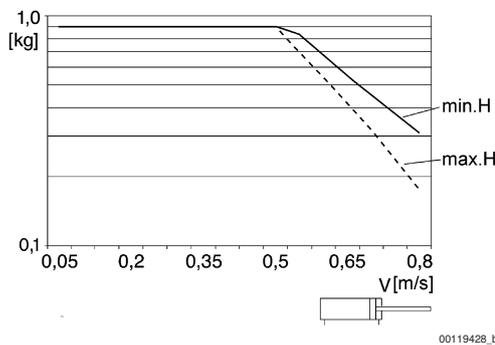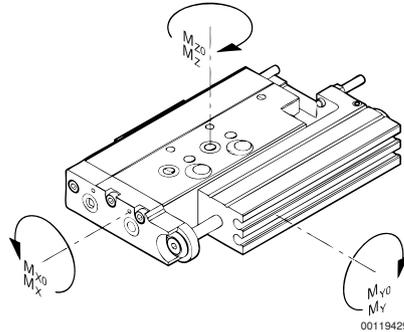**Piston rod cylinders → Guide cylinders**

Mini slide flat, Series MSF
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M = max. permissible torque

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Correction factor (a, d, b)
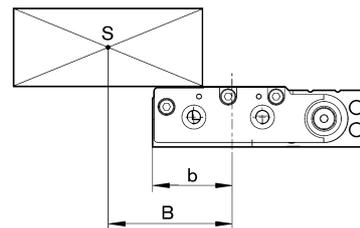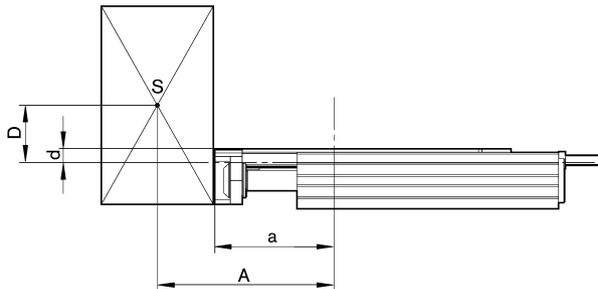
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Piston Ø	S	a [mm] 1)	d [mm] 2)	b [mm] 3)	Mx0 4)	My0 4)	Mz0 4)	Mx 5)	My 5)	Mz 5)		
8	10	36	8	15	2.3	2.4	2.4	0.6	0.8	0.8		
8	20	48	8	15	3.2	3.3	3.3	0.7	1.2	1.2		
8	30	56	8	15	3.2	3.3	3.3	0.7	1.2	1.2		
12	10	43	9.6	17.5	7	7	7	1.1	1.9	1.9		
12	20	53	9.6	17.5	7	7	7	1.1	1.9	1.9		
12	30	63	9.6	17.5	7	7	7	1.1	1.9	1.9		
12	40	78	9.6	17.5	9	13	13	1.3	2.9	2.9		
12	50	87	9.6	17.5	9	13	13	1.3	2.9	2.9		
16	10	50	12.5	23.5	20	14	14	4.2	4.4	4.4		
16	20	56	12.5	23.5	20	14	14	4.2	4.4	4.4		
16	30	66	12.5	23.5	20	14	14	4.2	4.4	4.4		
16	40	76	12.5	23.5	20	14	14	4.2	4.4	4.4		
16	50	88	12.5	23.5	13	19	19	4.6	5.6	5.6		
16	80	127	12.5	23.5	33	32	32	5.2	8.2	8.2		

S = stroke
1) correction factor (a)
2) correction factor (d)
3) Correction factor (b)
4) Static moment M [Nm]
5) Dynamic moment M [Nm]

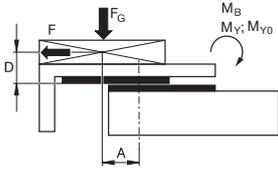**Piston rod cylinders → Guide cylinders**

Mini slide flat, Series MSF
► Ø 8 - 16 mm ► double-acting ► with magnetic piston ► cushioning: elastic ► Easy-2-Combine-capable ► with integrated ball rail guide

horizontal	**vertical**

horizontal

M_B
M_Y; M_{Y0}
F_G
F
D
A

stat.	$M_{B0} = F_G \cdot A + F \cdot D$
dyn.	$M_B = F_G \cdot A$

M_C
M_X; M_{X0}
F_G
B

stat.	$M_{CO} = F_G \cdot B$
dyn.	$M_C = F_G \cdot B$

M_A
M_Z; M_{Z0}
F
B

stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

dyn.	$\dfrac{M_A}{M_1} + \dfrac{M_B}{M_2} + \dfrac{M_C}{M_3} \leq 1$
stat.	$\dfrac{M_{A0}}{M_{Z0}} + \dfrac{M_{B0}}{M_{Y0}} + \dfrac{M_{C0}}{M_{X0}} \leq 1$

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vertical

D
F_G ; F
M_B
M_Y; M_{Y0}
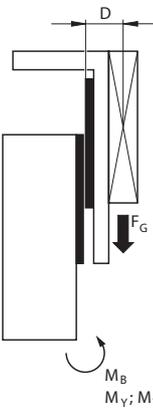
stat.	$M_{B0} = (F_G + F) \cdot D$
dyn.	$M_B = F_G \cdot D$

B
F_G ; F
M_A
M_{Z1}; M_{Z0}
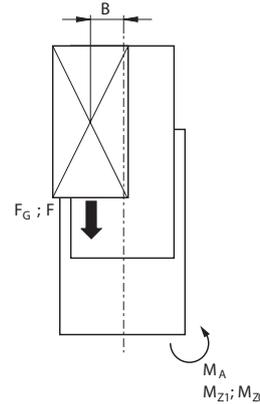
stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

dyn.	$\dfrac{M_A}{M_1} + \dfrac{M_B}{M_2} \leq 1$
stat.	$\dfrac{M_{A0}}{M_{Z0}} + \dfrac{M_{B0}}{M_{Y0}} \leq 1$

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$F = m \cdot a$
$F_G = m \cdot g$
$a = 1600 \cdot V^2$

F = deceleration force [N]
F_G = force due to weight [N]
m = load mass [kg]
a = deceleration [m/s²]
g = gravitational acceleration 9,81 [m/s²]
V = velocity [m/s]
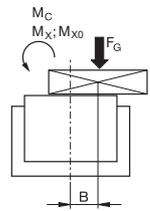
Piston rod cylinders → Guide cylinders

Mini slide flat, Series MSF
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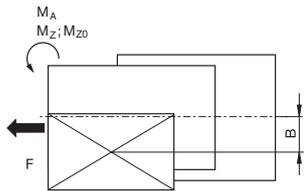
MSF - 8 / - 12 / - 16

00119430

* = centering rings

Piston Ø	d1	Ø d2	Ø d3 H7	d4	d5 H7	Ø d6	EE	H1	H2	H3	H4	H5 1)	H6 +0,2
8	M4	3.7	5	M3	5	6	M5	14	5.1	6.5	7.5	7.5	1.6
12	M5	4.7	7	M3	5	8	M5	17.5	5.5	8.3	8.8	9	1.6
16	M6	5.6	9	M4	7	9.5	M5	21	5.5	10	12.2	10.5	2.1

Piston Ø	H7	H8 1)	H9 +0,2	H10	L1	L2	L3	L4	L5 ±0,02	L6	L7	L8	L9
8	4.3	5	1.6	4	2	6	12.5	12	20	4.5	20	30	20
12	6.9	6.1	1.6	5	2	8	12.5	18.5	20	8.5	20	34	20
16	6.9	7.6	1.6	5	2	10	12	21.5	20	11.5	20	36	20

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Piston rod cylinders → Guide cylinders

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Piston Ø	L10 ±0,1	L11 ±0,02	L12	W1	W2	W3	W4	W5	W6	W7	W8 ±0,02	W9	
8	20	20	0–10	53	32.5	43	3.8	28	12.7	6.8	20	19.5	
12	24	20	0–10	62	38	50	5	33.5	14.2	7.3	20	21.5	
16	25.5	20	0–10	76.5	48.7	62.5	5.5	44	19.5	8	20	27.5	

1) max.

MSF - 08

Piston Ø	S	Lv1	Lv2	n1	n2	n3	n4						
8	10	59	50.5	1	1	0	1						
8	20	69	60.5	1	2	1	1						
8	30	79	70.5	1	2	1	1						

S = stroke

MSF - 12

Piston Ø	S	Lv1	Lv2	n1	n2	n3	n4						
12	10	67	56.5	1	1	0	1						
12	20	77	66.5	1	1	1	1						
12	30	87	76.5	1	2	1	1						
12	40	106	95.5	2	2	1	1						
12	50	115	104.5	2	2	1	1						

S = stroke

MSF - 16

Piston Ø	S	Lv1	Lv2	n1	n2	n3	n4						
16	10	78	65.5	1	1	1	1						
16	20	81	68.5	1	1	1	1						
16	30	91	78.5	2	2	1	1						
16	40	100	87.5	2	2	1	1						
16	50	115	102.5	2	2	1	1						
16	80	162	149.5	3	3	1	1						

S = stroke