Series MSC

AVENTICS™

AVENTICS Series MSC Guide cylinders

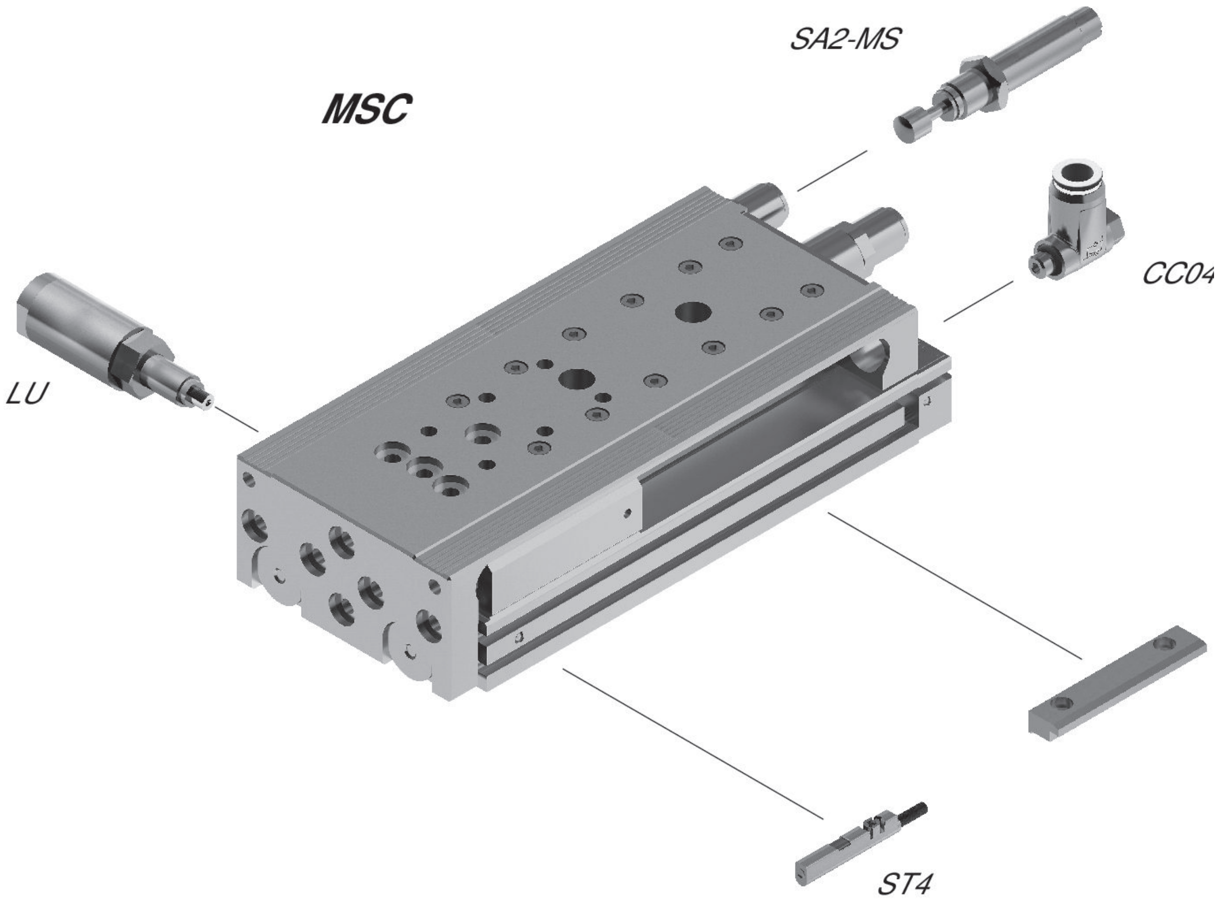
EMERSON™

Series MSC

The AVENTICS Series MSC mini slides have a compact design, require minimal installation space and can be optimally configured for virtually any automated handling task. A wide range of configuration options make the mini slide a truly universal handling component. Precise and reliable operation, coupled with a custom configuration and tailored to the specific application – these attributes allow the mini slides to assume the actuator role in efficient handling. The Series MSC offers high torque absorption and maximum stability. In addition, it provides technical features that guarantee optimally adjusted functions and maintenance-friendly processes. Fast, secure and efficiently connected with the special Easy-2-Combine Interface, the mini slides can be combined with the other components of a handling system without additional mounting plates.

- High torque and load absorption with maximum stability
- Compact design
- Easy-2-Combine Interface

Overview drawing

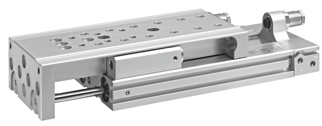


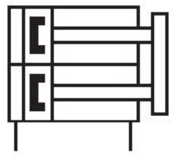
Product overview

Product overview

Mini slide, Series MSC-HG-EE

Functional principle: Double-acting
Cushioning: elastic
Easy2Combine: capable
: with magnetic piston
: with double piston
: With integrated “High Performance” ball rail system
Ambient temperature min./max.: 0 °C ... 60 °C

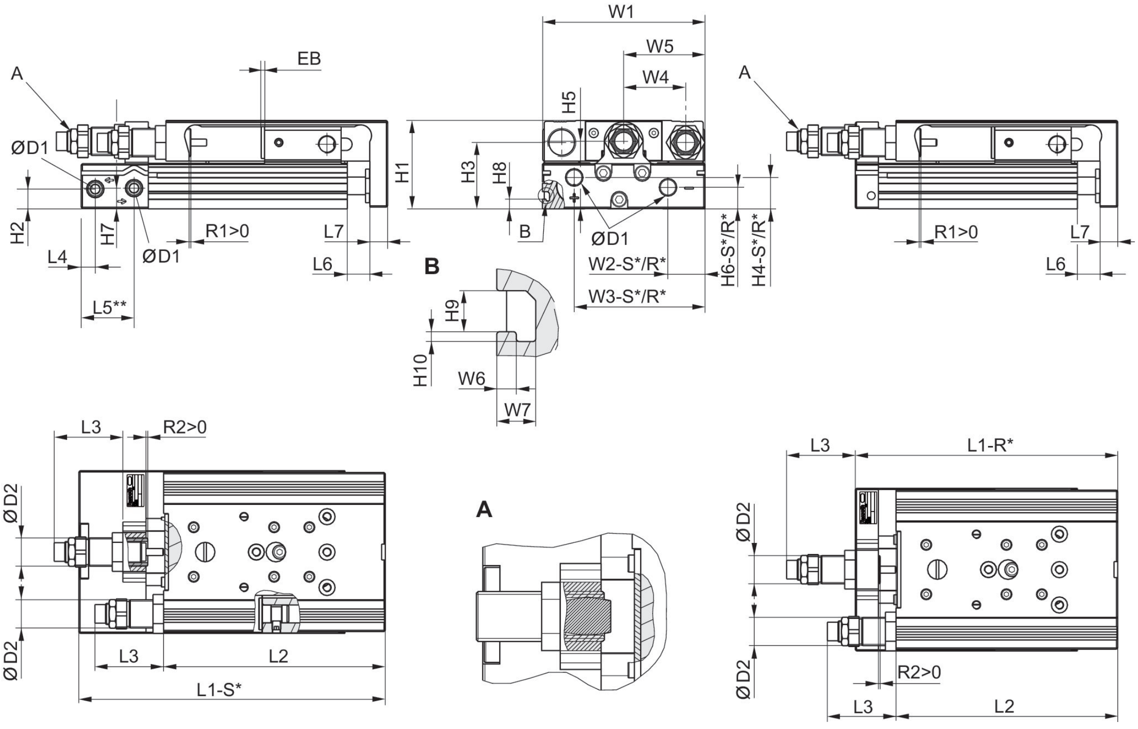




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 10	R412019204	R412019190	R412019168	R412018910	R412019023
20	R412019205	R412019191	R412019169	R412018911	R412019024
30	R412019206	R412019192	R412019170	R412018912	R412019025
40	R412019207	R412019193	R412019171	R412018913	R412019026
50	R412019208	R412019194	R412019172	R412018914	R412019027
80	R412019209	R412019195	R412019173	R412018915	R412019028
100	-	R412019196	R412019174	R412018916	R412019029
125	-	-	R412019175	R412018917	R412019030
150	-	-	R412019176	R412018918	R412019031
200	-	-	-	R412018919	R412019032

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.06 J	0.3 J	0.3 J	0.4 J	0.5 J
Cushioning length	0.3 mm	0.75 mm	1 mm	1.2 mm	1.6 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	1.5 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Dimensions

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	16	9.8	–	1.9
12	5.7	8.3	-	-	-	20.2	7.2	22.5	2
16	7.7	11.2	-	-	-	18.4	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	27.9	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	29.2	9	31	2.1

Piston Ø	L7	R2 max.	W1	W2-R	W2-S	W3-R	W3-S	W4	W5
8	6	9.1	50.2	–	19.3	–	30.5	18	W1/2
12	8	14	66	28.8	28.8	53	53	24.5	W1/2
16	10	12.4	76	31	31	60.5	60.5	30	W1/2
20	10	19.9	92	10	21	74	74	35	W1/2
25	12	22.2	112	11	14	92	92	44	W1/2

Piston Ø	W6	W7
8	–	–
12	–	–
16	–	–
20	2	4
25	2.5	4.8

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=125 EB	S=150 EB
8	12	2	2	2	2	2	–	–	–
12	22	12	2	2	2	2	2	–	–
16	22	12	2	2	2	2	2	2	2
20	22	12	2	2	2	2	2	2	2
25	22	12	2	2	2	2	2	2	2

Piston Ø	S=200 EB	S=10 L1-R	S=20 L1-R	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=125 L1-R
8	–	–	–	–	–	–	–	–	–
12	–	101	101	101	111	126	172	192	–
16	–	103.5	103.5	103.5	113.5	128.5	174.5	194.5	283
20	2	115	115	115	125	140	185	205	289.5
25	2	128.5	128.5	128.5	138.5	151.5	197.5	217.5	294.5

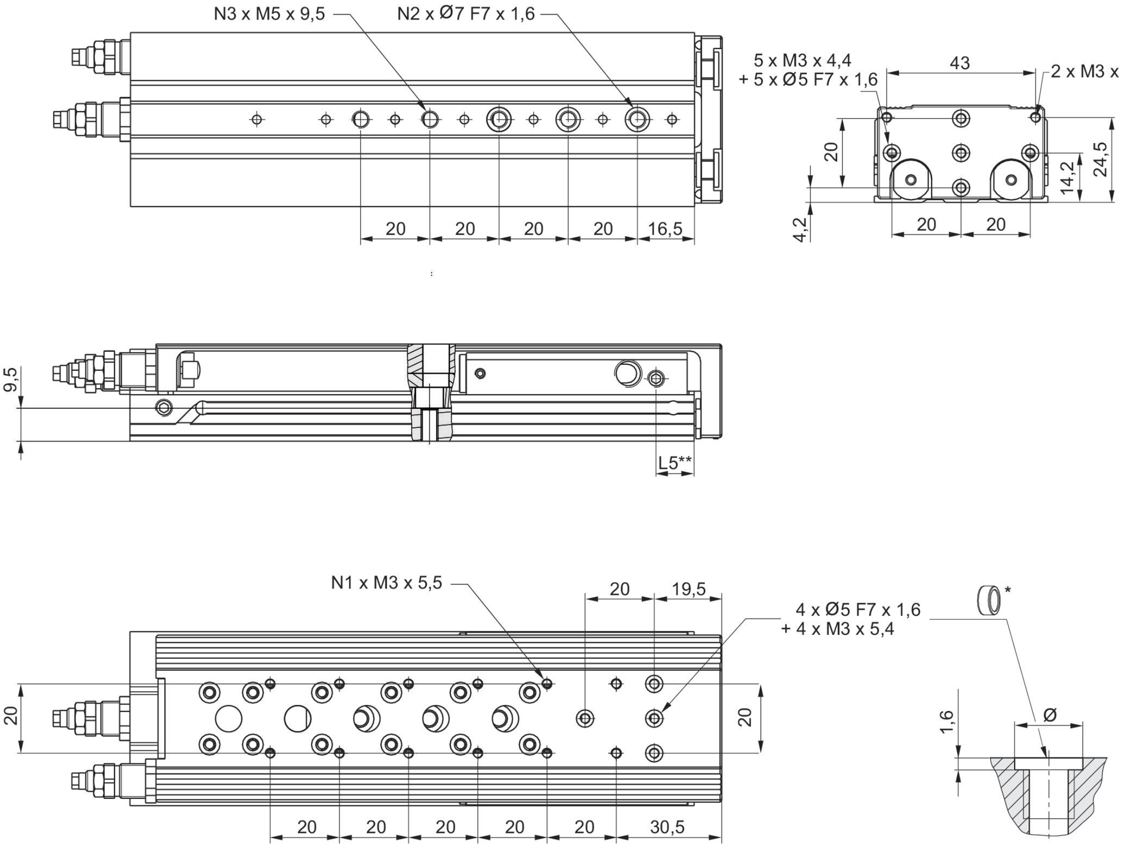
Piston Ø	S=150 L1-R	S=200 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S	S=50 L1-S	S=80 L1-S	S=100 L1-S
8	–	–	81.7	81.7	91.7	101.7	121.7	171.7	–
12	–	–	117.9	117.9	117.9	127.9	142.9	188.9	208.9
16	308	–	114.4	114.4	114.4	124.4	139.4	185.4	205.4
20	329.5	404.5	139.9	139.9	139.9	149.9	164.9	209.9	229.9
25	334.5	409.5	152.2	152.2	152.2	162.2	175.2	221.2	241.2

Piston Ø	S=125 L1-S	S=150 L1-S	S=200 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	–	–	–	73.5	73.5	83.5	93.5	113.5	163.5
12			–	88.8	88.8	88.8	98.8	113.8	159.8
16	293.9	318.9	–	90.4	90.4	90.4	100.4	115.4	161.4
20	314.4	354.4	429.4	100.5	100.5	100.5	110.5	125.5	170.5
25	318.2	358.2	433.2	111.5	111.5	111.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=125 L2	S=150 L2	S=200 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.
8	–	–	–	–	9.2	9.2	9.2	9.2	9.2
12	179.8			–	7.7	7.7	7.7	7.7	7.7
16	181.4	269.9	294.9	–	10.7	10.7	10.7	10.7	10.7
20	190.5	275	315	390	18.4	18.4	18.4	18.4	18.4
25	200.5	277.5	317.5	392.5	17.5	17.5	17.5	17.5	16.5

Piston Ø	S=80 R1 max.	S=100 R1 max.	S=125 R1 max.	S=150 R1 max.	S=200 R1 max.
8	9.2	–	–	–	–
12	7.7	7.7	–	–	–
16	10.7	10.7	10.7	10.7	–
20	18.4	18.4	18.4	18.4	18.4
25	17.5	17.5	17.5	17.5	17.5

Dimensions
MSC-08

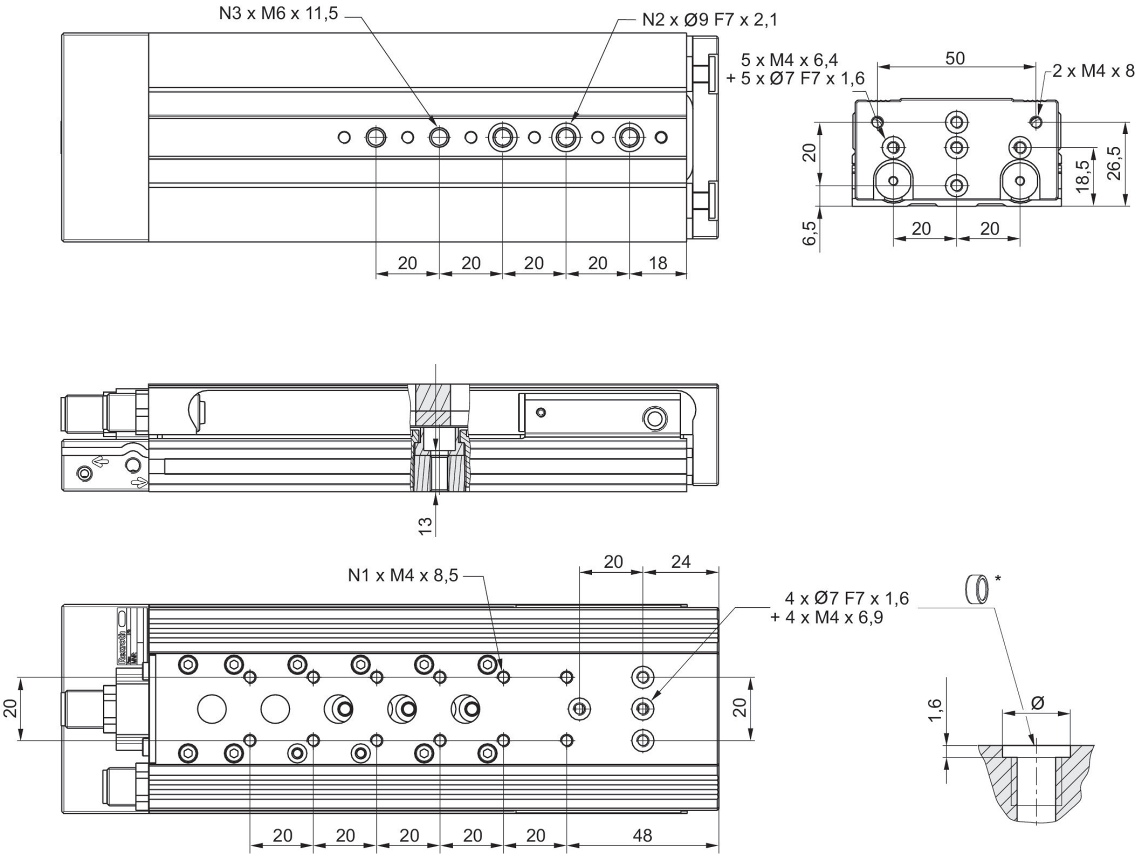


* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	Stroke	N1	N2	N3	L5
R480643788	8	10	4	2	2	11
R480643789	8	20	4	2	2	11
R480643790	8	30	4	2	2	11
R480643791	8	40	6	2	2	11
R480643792	8	50	8	3	3	11
R480643793	8	80	12	3	5	11

Part No.	Piston Ø	Stroke	N1	N2	N3	L5
R412019204	8	10	4	2	2	11
R412019205	8	20	4	2	2	11
R412019206	8	30	4	2	2	11
R412019207	8	40	6	2	2	11
R412019208	8	50	8	3	3	11
R412019209	8	80	12	3	5	11

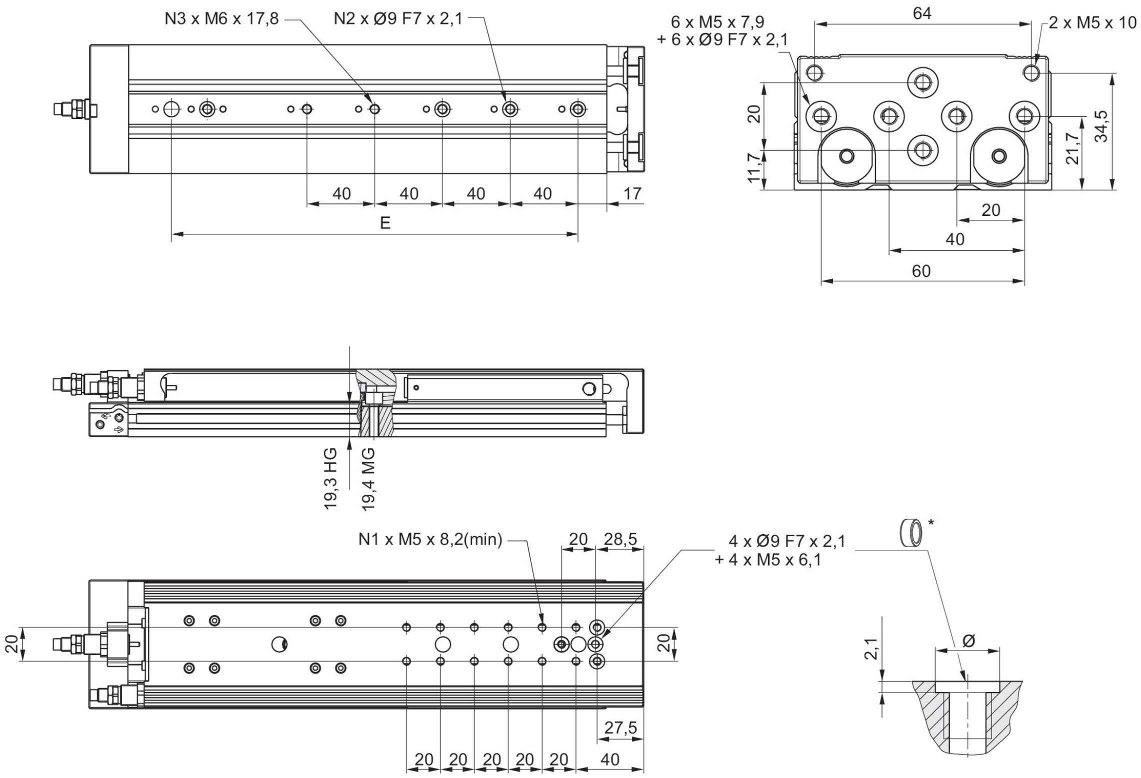
Dimensions
MSC-12



* = centering rings

Part No.	Piston Ø	Stroke	N1	N2	N3
R412019190	12	10	4	2	2
R412019191	12	20	4	2	2
R412019192	12	30	4	2	2
R412019193	12	40	4	2	2
R412019194	12	50	6	3	3
R412019195	12	80	10	3	5
R412019196	12	100	12	3	5

Dimensions
MSC-16

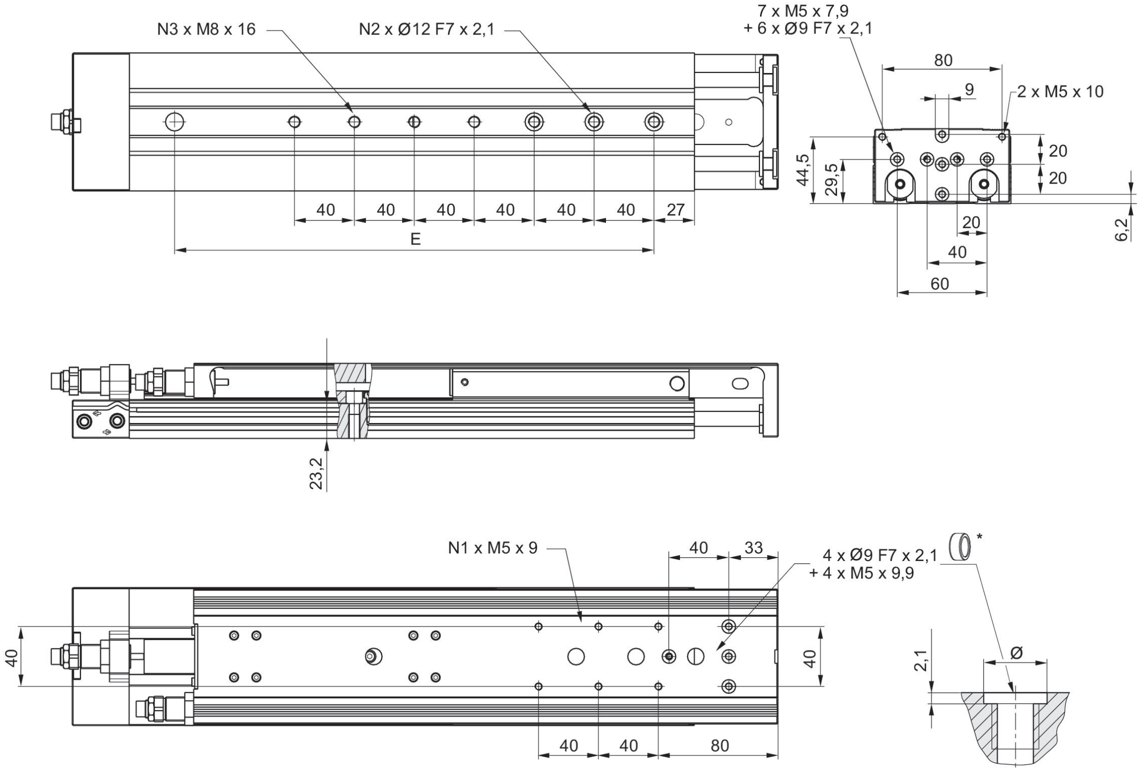


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019175	16	125	200	12	4	5
R480643808	16	125	200	12	4	5
R412019188	16	125	200	12	4	5
R480640200	16	125	200	12	4	5
R412019176	16	150	240	12	4	5
R480643809	16	150	240	12	4	5
R412019189	16	150	240	12	4	5
R480640201	16	150	240	12	4	5

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019168	16	10	–	4	2	2
R412019169	16	20	–	4	2	2
R412019170	16	30	–	4	2	2
R412019171	16	40	–	4	2	2
R412019172	16	50	–	6	2	2
R412019173	16	80	–	6	3	3
R412019174	16	100	–	8	3	3

Dimensions
MSC-20

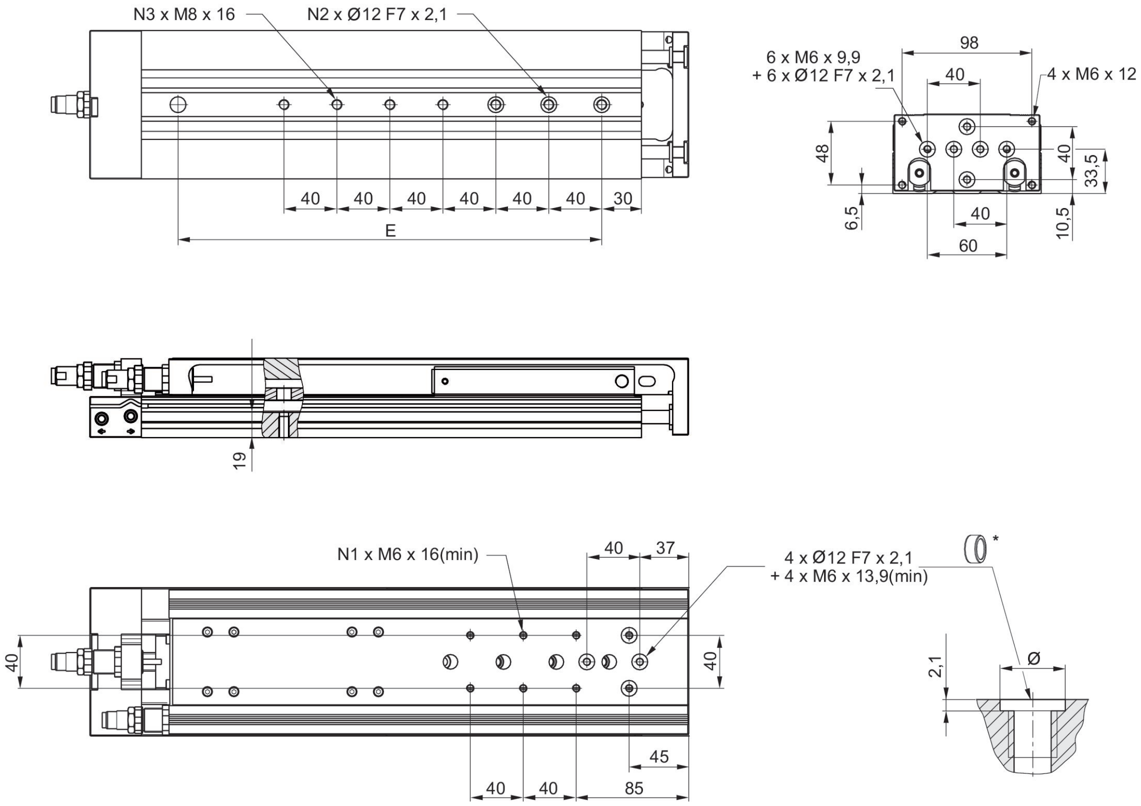


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018910	20	10	–	2	2	2
R412018911	20	20	–	2	2	2
R412018912	20	30	–	2	2	2
R412018913	20	40	–	2	2	2
R412018914	20	50	–	2	2	2
R412018915	20	80	–	4	3	3
R412018916	20	100	–	4	3	3

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018917	20	125	200	6	4	5
R480643817	20	125	200	6	4	5
R412019005	20	125	200	6	4	5
R480640205	20	125	200	6	4	5
R412018918	20	150	240	6	4	5
R480643818	20	150	240	6	4	5
R412019006	20	150	240	6	4	5
R480640206	20	150	240	6	4	5
R412018919	20	200	320	6	4	7
R480643819	20	200	320	6	4	7
R412019007	20	200	320	6	4	7
R480640207	20	200	320	6	4	7

Dimensions
MSC-25

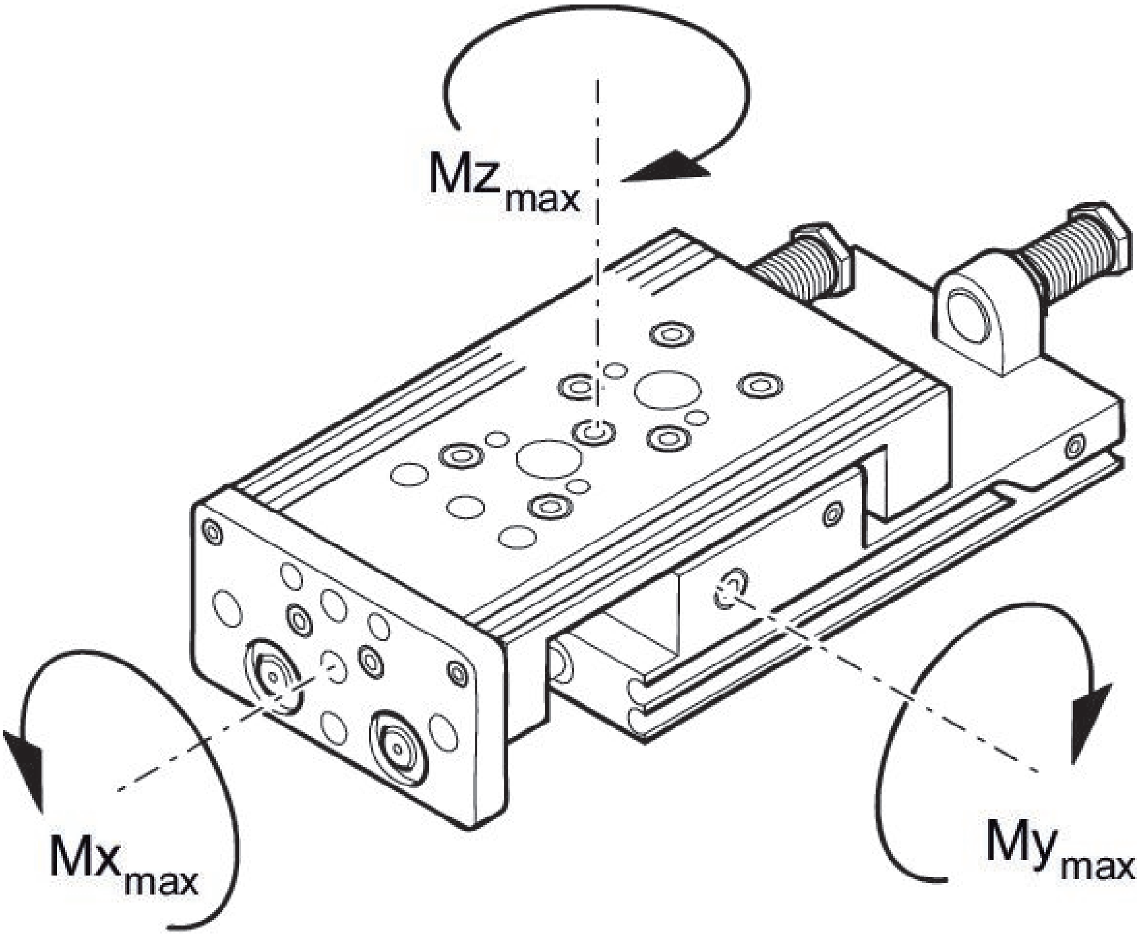


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R480643820	25	10	–	2	2	2
R480643821	25	20	–	2	2	2
R480643822	25	30	–	2	2	2
R480643823	25	40	–	2	2	2
R480643824	25	50	–	4	2	2
R480643825	25	80	–	4	3	3
R480643826	25	100	–	4	3	3

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019030	25	125	200	4	4	5
R480643827	25	125	200	4	4	5
R412019041	25	125	200	4	4	5
R480640211	25	125	200	4	4	5
R412019031	25	150	240	6	4	5
R480643828	25	150	240	6	4	5
R412019042	25	150	240	6	4	5
R480640212	25	150	240	6	4	5
R412019032	25	200	320	6	4	7
R480643829	25	200	320	6	4	7
R412019043	25	200	320	6	4	7
R480640213	25	200	320	6	4	7

Load capacity



M = max. permissible torque

Correction factor (a)

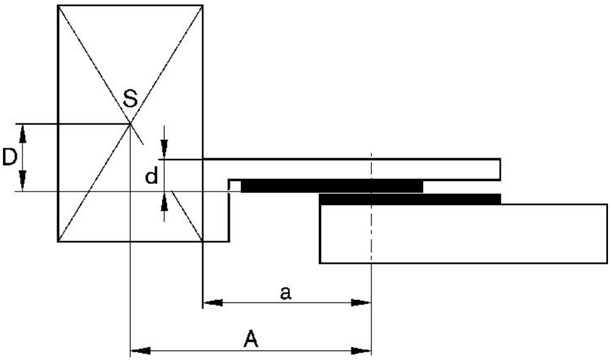
Part No.	Piston Ø	Stroke	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R412019204	8	10	45	14	7	7	7
R412019205	8	20	50	14	7	7	7
R412019206	8	30	60	14	7	7	7
R412019207	8	40	70	14	7	7	7
R412019208	8	50	80	14	9	13	13
R412019209	8	80	125	14	13	25	25
R412019190	12	10	54.5	16	20	14	14
R412019191	12	20	59.5	16	20	14	14
R412019192	12	30	64.5	16	20	14	14
R412019193	12	40	74.5	16	20	14	14
R412019194	12	50	84.5	16	23	19	19
R412019195	12	80	125	16	33	32	32
R412019196	12	100	145	16	33	32	32
R412019168	16	10	55.5	15	35	25	25
R412019169	16	20	60.5	15	35	25	25
R412019170	16	30	65.5	15	35	25	25
R412019171	16	40	75.5	15	35	25	25
R412019172	16	50	85.5	15	38	29	29
R412019173	16	80	126	15	74	58	58
R412019174	16	100	146	15	74	58	58
R412019175	16	125	198.5	15	88	118	118
R412019176	16	150	223.5	15	88	119	119
R412018910	20	10	60.5	20	87	57	57
R412018911	20	20	65.5	20	87	57	57
R412018912	20	30	70.5	20	87	57	57
R412018913	20	40	80.5	20	87	57	57
R412018914	20	50	90.5	20	93	65	65
R412018915	20	80	130.5	20	116	99	99
R412018916	20	100	150.5	20	116	99	99
R412018917	20	125	201	20	126	136	136
R412018918	20	150	233.5	20	126	152	152
R412018919	20	200	296	20	126	179	179
R412019023	25	10	67.5	24	100	90	90
R412019024	25	20	72.5	24	100	90	90
R412019025	25	30	77.5	24	100	90	90
R412019026	25	40	87.5	24	100	90	90
R412019027	25	50	96.5	24	100	90	90
R412019028	25	80	137	24	110	129	129
R412019029	25	100	157	24	110	129	129
R412019030	25	125	201	24	145	180	180
R412019031	25	150	236.5	24	145	201	201
R412019032	25	200	299	24	145	236	236

Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.14	0.14	0.155	0.165	0.195	0.265	–	–	–
12	0.255	0.255	0.26	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1	1	1	1.1	1.225	1.45	1.625	1.885	2.085

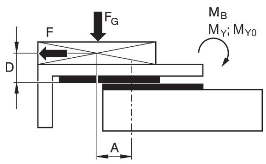
Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

Correction factor (a, d)

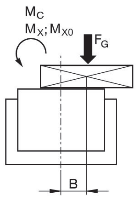


Correction factor (a, d)

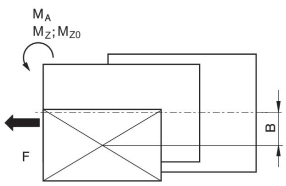
horizontal



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



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



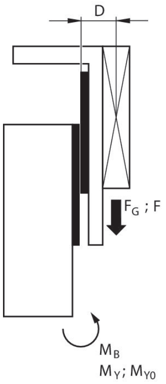
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

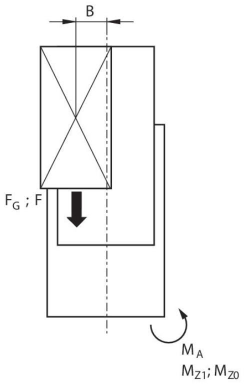
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

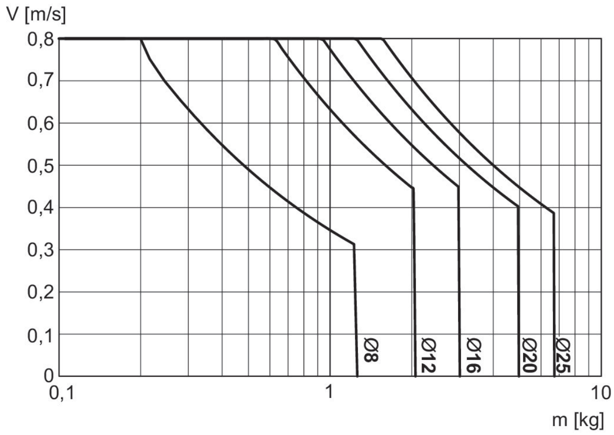


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

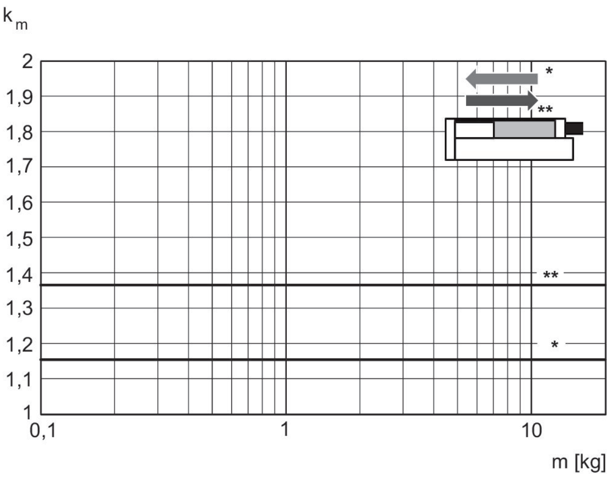
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



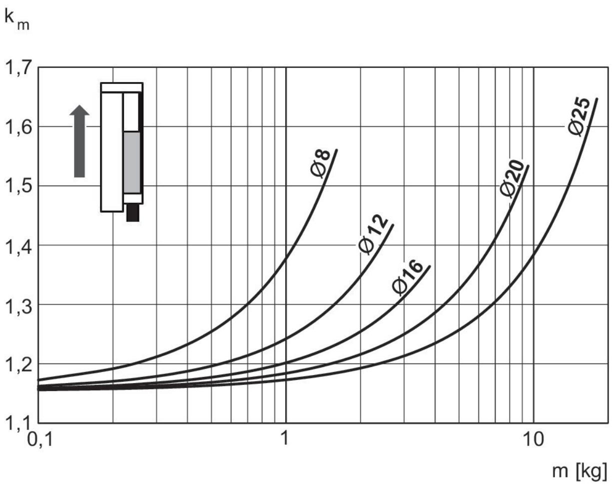
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



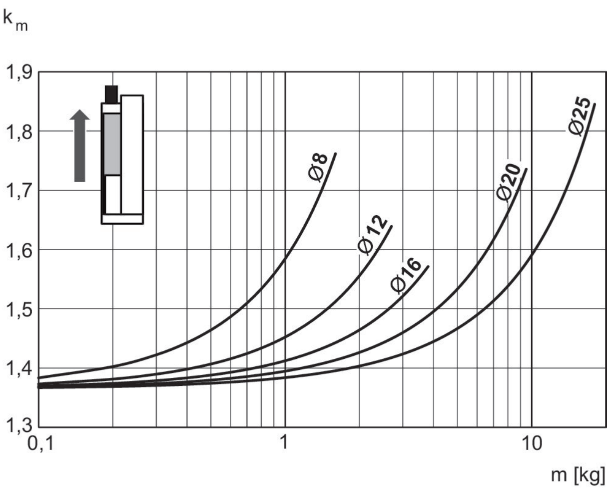
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



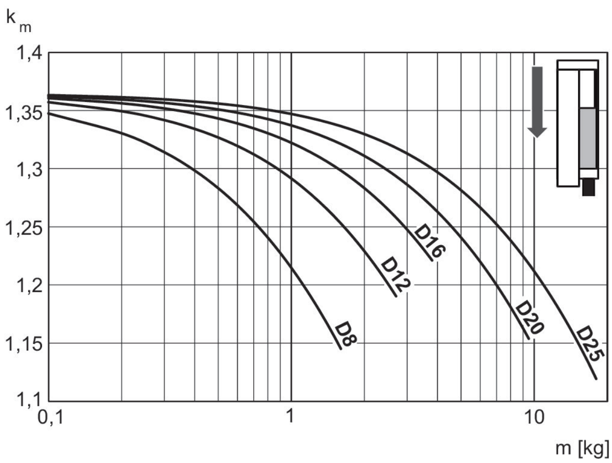
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

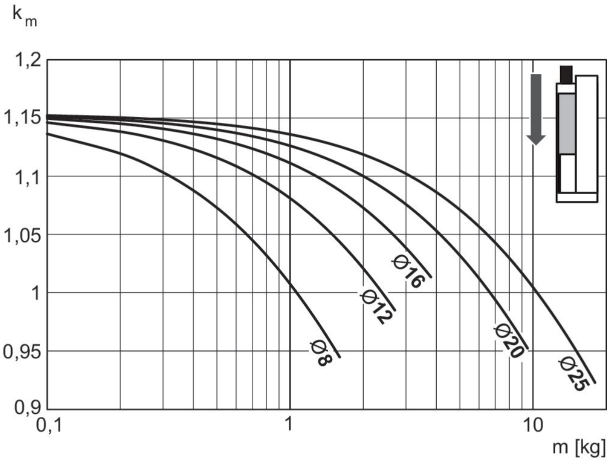
Correction factor for required speed: retracting, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

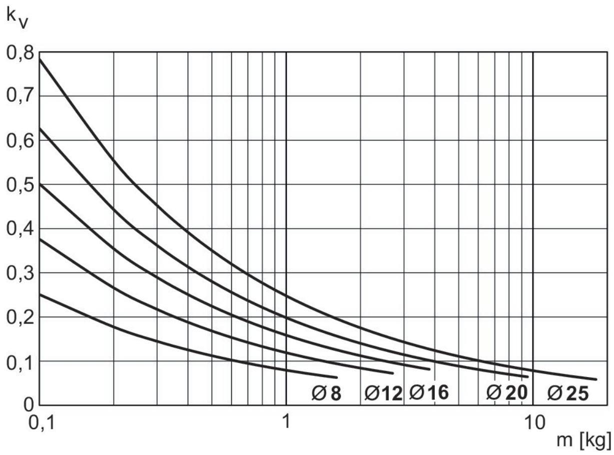
EMERSON

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

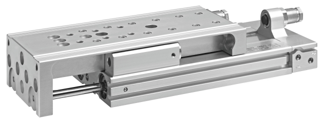
Max. extracting speed

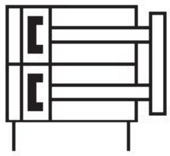


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-HG-EM

Functional principle: Double-acting
Cushioning: Elastic with metal end stop
Easy2Combine: capable
: with magnetic piston
: with double piston
: With integrated “High Performance” ball rail system
Ambient temperature min./max.: 0 °C ... 60 °C

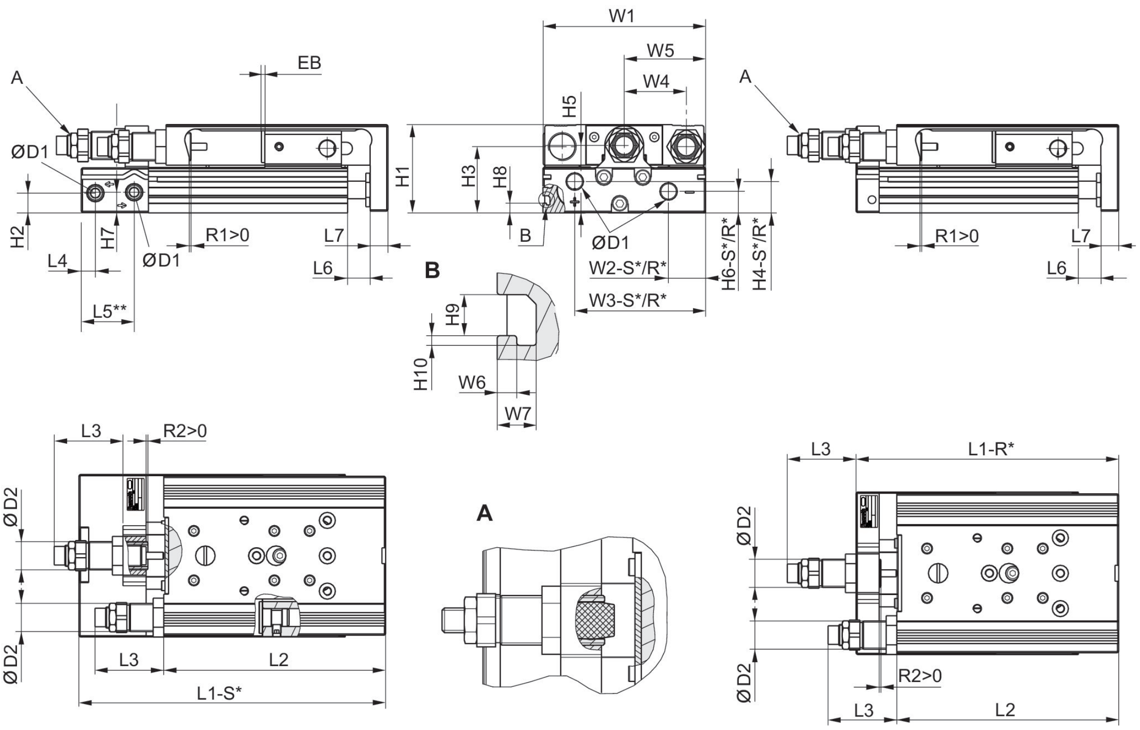




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 10	R480643788	R480643794	R480643801	R480643810	R480643820
20	R480643789	R480643795	R480643802	R480643811	R480643821
30	R480643790	R480643796	R480643803	R480643812	R480643822
40	R480643791	R480643797	R480643804	R480643813	R480643823
50	R480643792	R480643798	R480643805	R480643814	R480643824
80	R480643793	R480643799	R480643806	R480643815	R480643825
100	-	R480643800	R480643807	R480643816	R480643826
125	-	-	R480643808	R480643817	R480643827
150	-	-	R480643809	R480643818	R480643828
200	-	-	-	R480643819	R480643829

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.03 J	0.06 J	0.12 J	0.3 J	0.4 J
Cushioning length	0.65 mm	1.9 mm	1.9 mm	3.05 mm	2.5 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	27.8	9.8	–	1.9
12	5.7	8.3	-	-	-	31.8	7.2	22.5	2
16	7.7	11.2	-	-	-	30	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	43.7	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	41.9	9	31	2.1

Piston Ø	L7	R2 max.	W1	W2-R	W2-S	W3-R	W3-S	W4	W5
8	6	4.1	50.2	–	19.3	–	30.5	18	W1/2
12	8	12	66	28.8	28.8	53	53	24.5	W1/2
16	10	10.4	76	31	31	60.5	60.5	30	W1/2
20	10	14	92	10	21	74	74	35	W1/2
25	12	16.2	112	11	14	92	92	44	W1/2

Piston Ø	W6	W7
8	–	–
12	–	–
16	–	–
20	2	4
25	2.5	4.8

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=125 EB	S=150 EB
8	12	2	2	2	2	2	–	–	–
12	22	12	2	2	2	2	2	–	–
16	22	12	2	2	2	2	2	2	2
20	22	12	2	2	2	2	2	2	2
25	22	12	2	2	2	2	2	2	2

Piston Ø	S=200 EB	S=10 L1-R	S=20 L1-R	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=125 L1-R
8	–	–	–	–	–	–	–	–	–
12	–	101	101	101	111	126	172	192	–
16	–	103.5	103.5	103.5	113.5	128.5	174.5	194.5	283
20	2	115	115	115	125	140	185	205	289.5
25	2	128.5	128.5	128.5	138.5	151.5	197.5	217.5	294.5

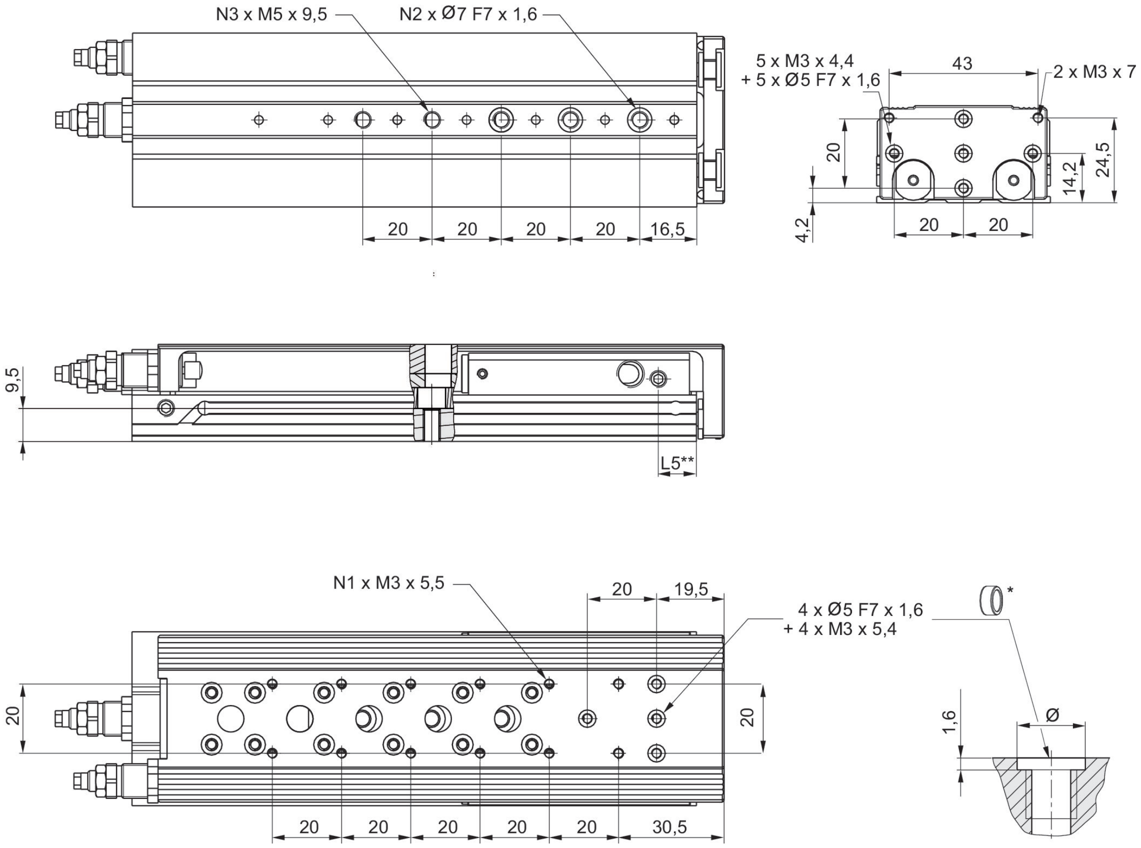
Piston Ø	S=150 L1-R	S=200 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S	S=50 L1-S	S=80 L1-S	S=100 L1-S
8	–	–	81.7	81.7	91.7	101.7	121.7	171.7	–
12	–	–	117.9	117.9	117.9	127.9	142.9	188.9	208.9
16	308	–	114.4	114.4	114.4	124.4	139.4	185.4	205.4
20	329.5	404.5	139.9	139.9	139.9	149.9	164.9	209.9	229.9
25	334.5	409.5	152.2	152.2	152.2	162.2	175.2	221.2	241.2

Piston Ø	S=125 L1-S	S=150 L1-S	S=200 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	–	–	–	73.5	73.5	83.5	93.5	113.5	163.5
12			–	88.8	88.8	88.8	98.8	113.8	159.8
16	293.9	318.9	–	90.4	90.4	90.4	100.4	115.4	161.4
20	314.4	354.4	429.4	100.5	100.5	100.5	110.5	125.5	170.5
25	318.2	358.2	433.2	111.5	111.5	111.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=125 L2	S=150 L2	S=200 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.
8	–	–	–	–	4.2	4.2	4.2	4.2	4.2
12	179.8	–	–	–	5.7	5.7	5.7	5.7	5.7
16	181.4	269.9	294.9	–	8.7	8.7	8.7	8.7	8.7
20	190.5	275	315	390	12.4	12.4	12.4	12.4	12.4
25	200.5	277.5	317.5	392.5	11.5	11.5	11.5	11.5	10.5

Piston Ø	S=80 R1 max.	S=100 R1 max.	S=125 R1 max.	S=150 R1 max.	S=200 R1 max.
8	4.2	–	–	–	–
12	5.7	5.7	–	–	–
16	8.7	8.7	8.7	8.7	–
20	12.4	12.4	12.4	12.4	12.4
25	11.5	11.5	11.5	11.5	11.5

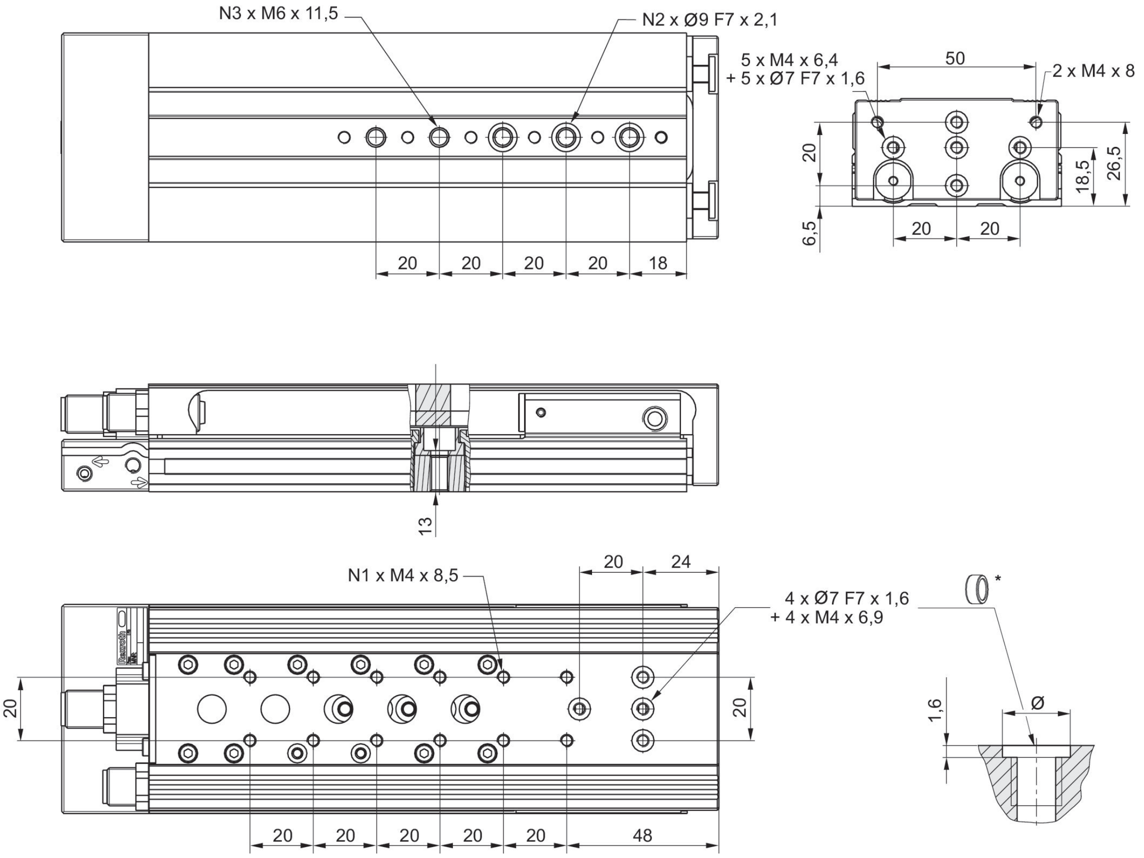
Dimensions
MSC-08



* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	Stroke	N1	N2	N3	L5
R412019204	8	10	4	2	2	11
R412019205	8	20	4	2	2	11
R412019206	8	30	4	2	2	11
R412019207	8	40	6	2	2	11
R412019208	8	50	8	3	3	11
R412019209	8	80	12	3	5	11

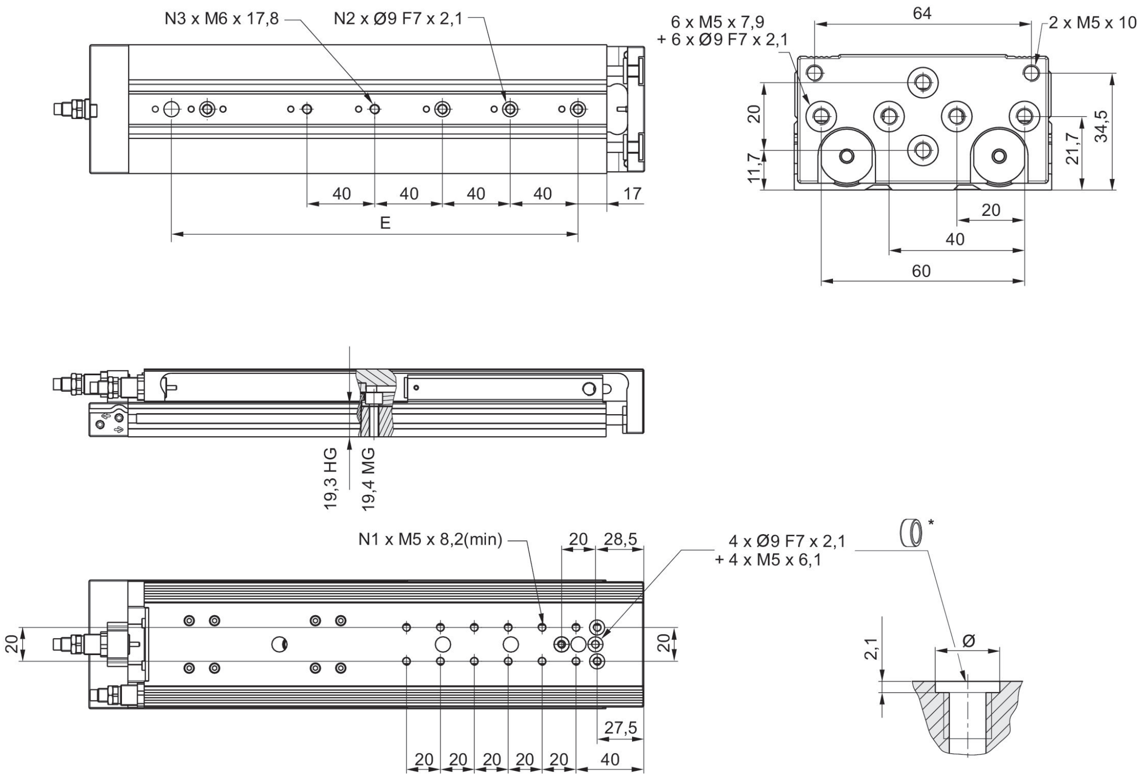
Dimensions
MSC-12



* = centering rings

Part No.	Piston Ø	Stroke	N1	N2	N3
R412019190	12	10	4	2	2
R412019191	12	20	4	2	2
R412019192	12	30	4	2	2
R412019193	12	40	4	2	2
R412019194	12	50	6	3	3
R412019195	12	80	10	3	5
R412019196	12	100	12	3	5

Dimensions
MSC-16

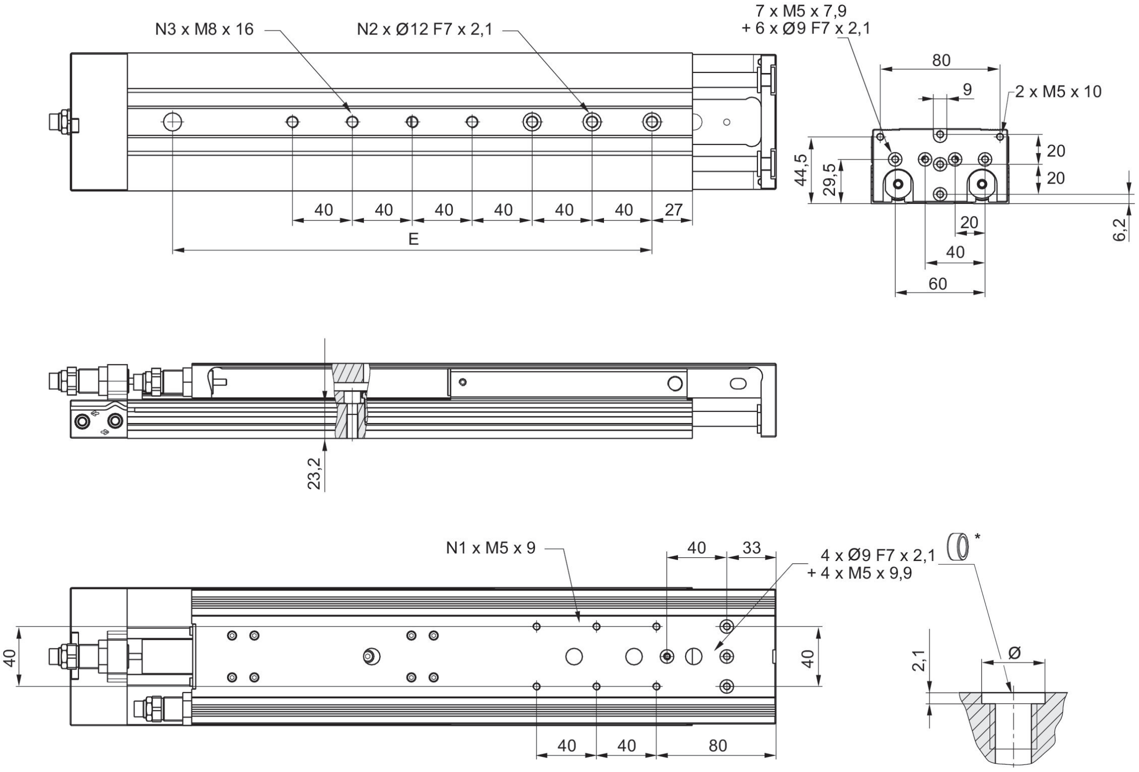


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R480643801	16	10	–	4	2	2
R480643802	16	20	–	4	2	2
R480643803	16	30	–	4	2	2
R480643804	16	40	–	4	2	2
R480643805	16	50	–	6	2	2
R480643806	16	80	–	6	3	3
R480643807	16	100	–	8	3	3

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019175	16	125	200	12	4	5
R480643808	16	125	200	12	4	5
R412019188	16	125	200	12	4	5
R480640200	16	125	200	12	4	5
R412019176	16	150	240	12	4	5
R480643809	16	150	240	12	4	5
R412019189	16	150	240	12	4	5
R480640201	16	150	240	12	4	5

Dimensions
MSC-20

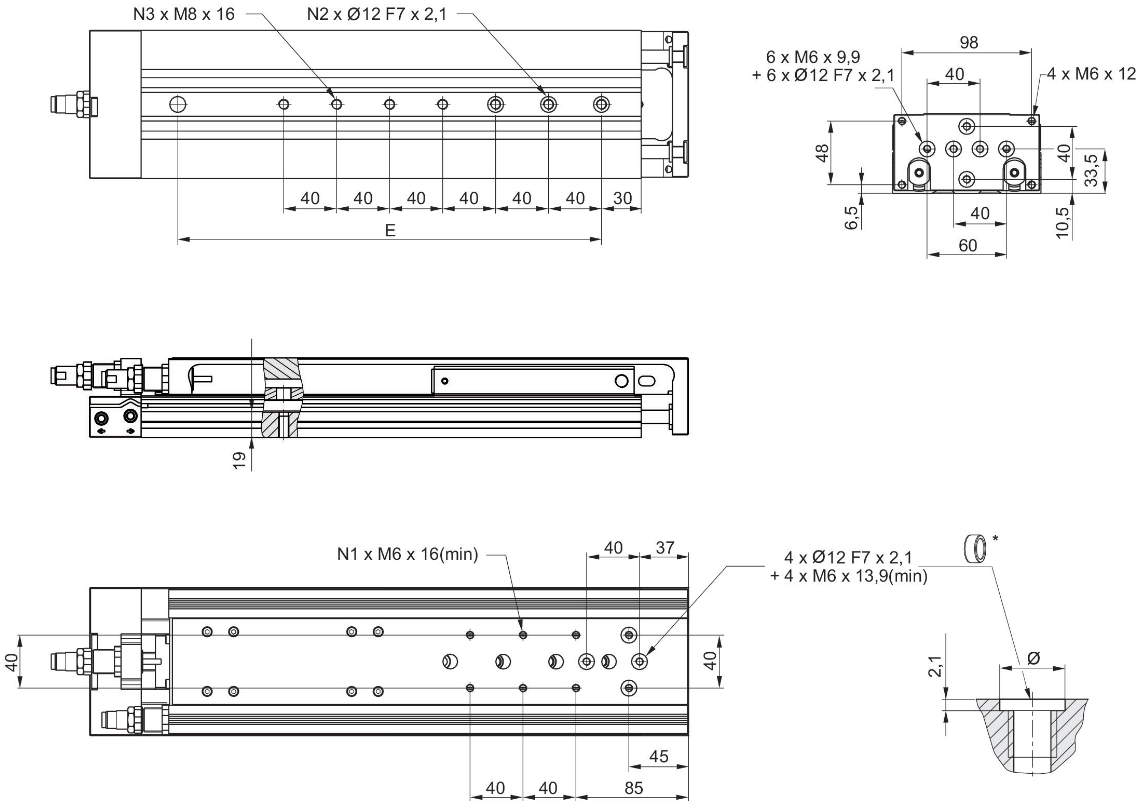


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018910	20	10	–	2	2	2
R412018911	20	20	–	2	2	2
R412018912	20	30	–	2	2	2
R412018913	20	40	–	2	2	2
R412018914	20	50	–	2	2	2
R412018915	20	80	–	4	3	3
R412018916	20	100	–	4	3	3

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018917	20	125	200	6	4	5
R480643817	20	125	200	6	4	5
R412019005	20	125	200	6	4	5
R480640205	20	125	200	6	4	5
R412018918	20	150	240	6	4	5
R480643818	20	150	240	6	4	5
R412019006	20	150	240	6	4	5
R480640206	20	150	240	6	4	5
R412018919	20	200	320	6	4	7
R480643819	20	200	320	6	4	7
R412019007	20	200	320	6	4	7
R480640207	20	200	320	6	4	7

Dimensions
MSC-25

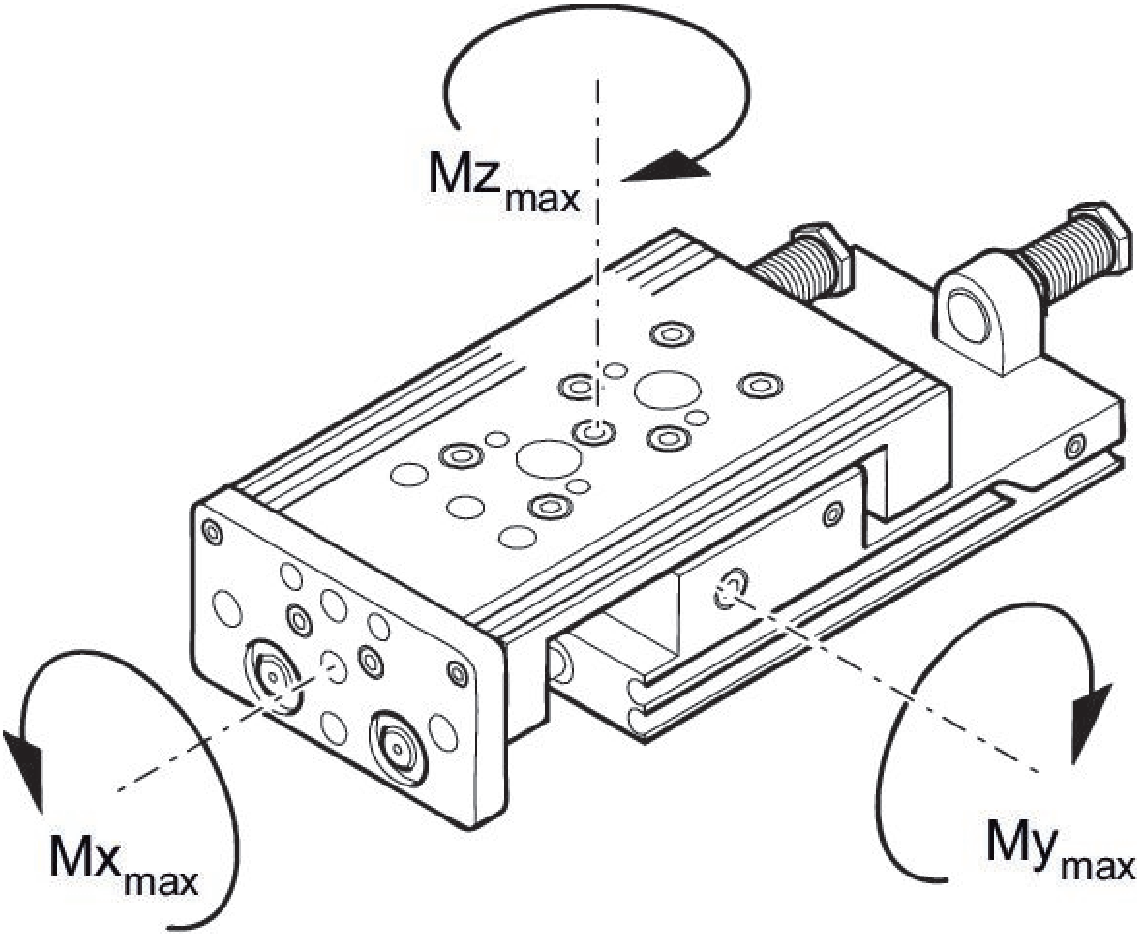


* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R480643820	25	10	–	2	2	2
R480643821	25	20	–	2	2	2
R480643822	25	30	–	2	2	2
R480643823	25	40	–	2	2	2
R480643824	25	50	–	4	2	2
R480643825	25	80	–	4	3	3
R480643826	25	100	–	4	3	3

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019030	25	125	200	4	4	5
R480643827	25	125	200	4	4	5
R412019041	25	125	200	4	4	5
R480640211	25	125	200	4	4	5
R412019031	25	150	240	6	4	5
R480643828	25	150	240	6	4	5
R412019042	25	150	240	6	4	5
R480640212	25	150	240	6	4	5
R412019032	25	200	320	6	4	7
R480643829	25	200	320	6	4	7
R412019043	25	200	320	6	4	7
R480640213	25	200	320	6	4	7

Load capacity



M = max. permissible torque

Correction factor (a)

Part No.	Piston Ø	S	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R480643788	8	10	45	14	7	7	7
R480643789	8	20	50	14	7	7	7
R480643790	8	30	60	14	7	7	7
R480643791	8	40	70	14	7	7	7
R480643792	8	50	80	14	9	13	13
R480643793	8	80	125	14	13	25	25
R480643794	12	10	54.5	16	20	14	14
R480643795	12	20	59.5	16	20	14	14
R480643796	12	30	64.5	16	20	14	14
R480643797	12	40	74.5	16	20	14	14
R480643798	12	50	84.5	16	23	19	19
R480643799	12	80	125	16	33	32	32
R480643800	12	100	145	16	33	32	32
R480643801	16	10	55.5	15	35	25	25
R480643802	16	20	60.5	15	35	25	25
R480643803	16	30	65.5	15	35	25	25
R480643804	16	40	75.5	15	35	25	25
R480643805	16	50	85.5	15	38	29	29
R480643806	16	80	126	15	74	58	58
R480643807	16	100	146	15	74	58	58
R480643808	16	125	198.5	15	88	118	118
R480643809	16	150	223.5	15	88	119	119
R480643810	20	10	60.5	20	87	57	57
R480643811	20	20	65.5	20	87	57	57
R480643812	20	30	70.5	20	87	57	57
R480643813	20	40	80.5	20	87	57	57
R480643814	20	50	90.5	20	93	65	65
R480643815	20	80	130.5	20	116	99	99
R480643816	20	100	150.5	20	116	99	99
R480643817	20	125	201	20	126	136	136
R480643818	20	150	233.5	20	126	152	152
R480643819	20	200	296	20	126	179	179
R480643820	25	10	67.5	24	100	90	90
R480643821	25	20	72.5	24	100	90	90
R480643822	25	30	77.5	24	100	90	90
R480643823	25	40	87.5	24	100	90	90
R480643824	25	50	96.5	24	100	90	90
R480643825	25	80	137	24	110	129	129
R480643826	25	100	157	24	110	129	129
R480643827	25	125	201	24	145	180	180
R480643828	25	150	236.5	24	145	201	201
R480643829	25	200	299	24	145	236	236

S = stroke

1) Correction factor (a)
2) Correction factor (b)

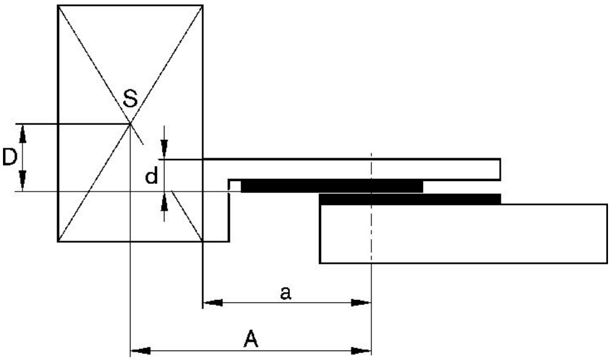
Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.14	0.14	0.155	0.165	0.195	0.265	–	–	–
12	0.255	0.255	0.26	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.7655
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1	1	1	1.1	1.225	1.45	1.625	1.885	2.085

Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

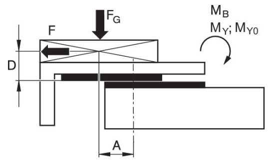
S = stroke

Correction factor (a, d)

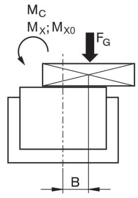


Correction factor (a, d)

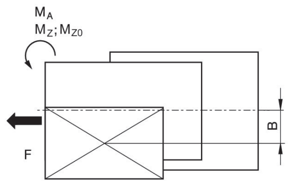
horizontal



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



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



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

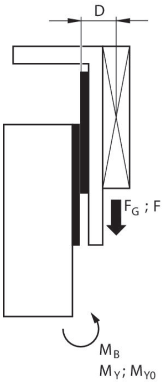
dyn.	$\frac{M_A}{M_1} + \frac{M_B}{M_2} + \frac{M_C}{M_3} \leq 1$
stat.	$\frac{M_{A0}}{M_{Z0}} + \frac{M_{B0}}{M_{Y0}} + \frac{M_{C0}}{M_{X0}} \leq 1$

F = m • a FG = m • g a = 1250•V²/H
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] H = stroke length of shock absorber [mm]

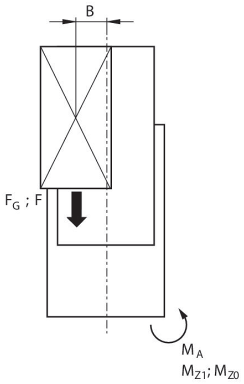
EMERSON

Correction factor (a, d)

vertical



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

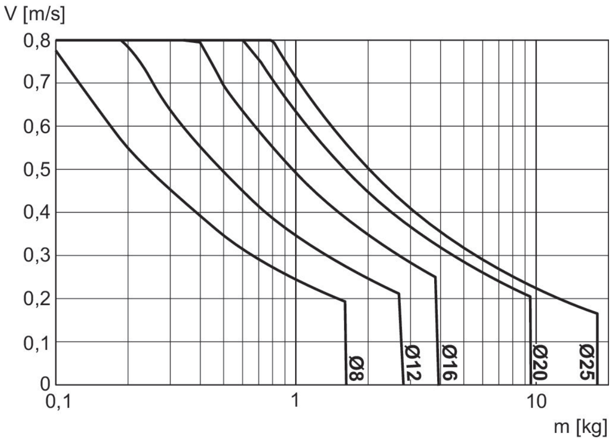


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

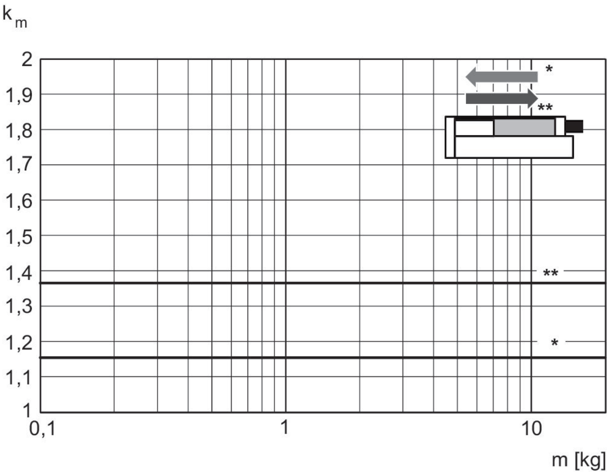
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



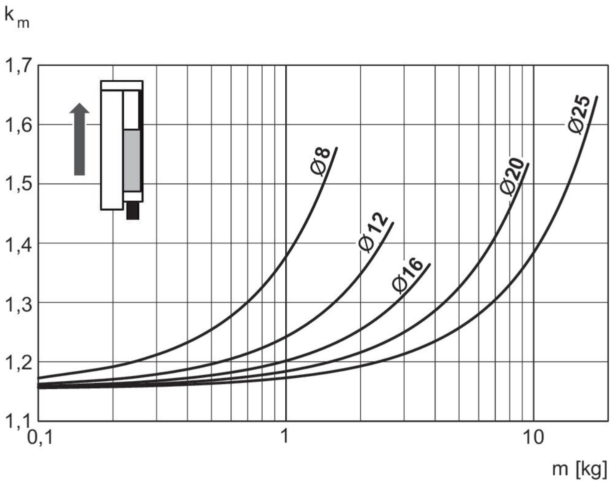
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



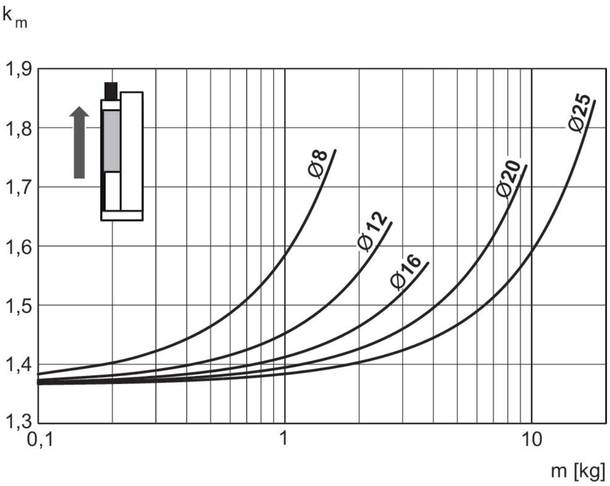
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



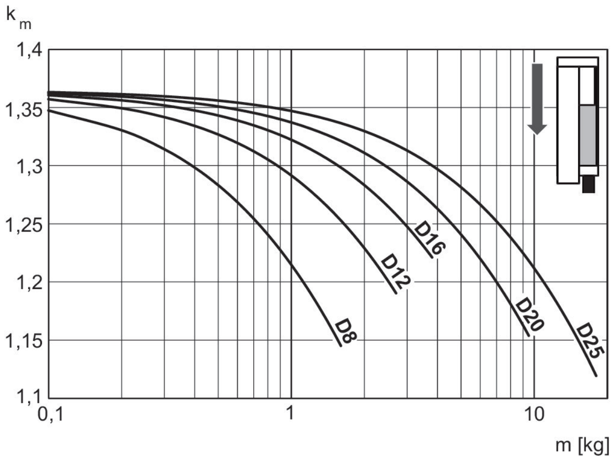
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



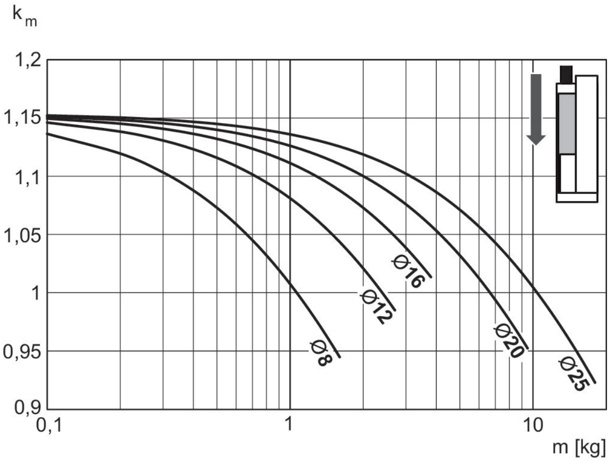
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



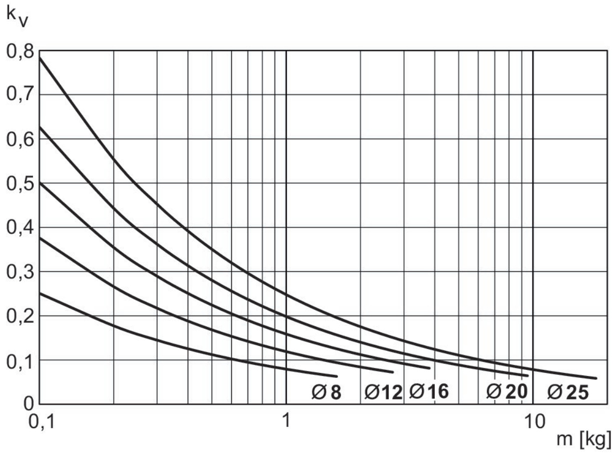
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

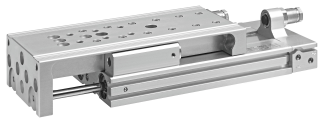
Max. extracting speed

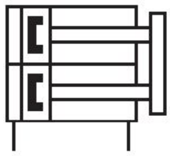


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-HG-HM

Functional principle: Double-acting
Cushioning: hydraulic
Easy2Combine: capable
: with magnetic piston
: with double piston
: With integrated “High Performance” ball rail system
Ambient temperature min./max.: 0 °C ... 60 °C

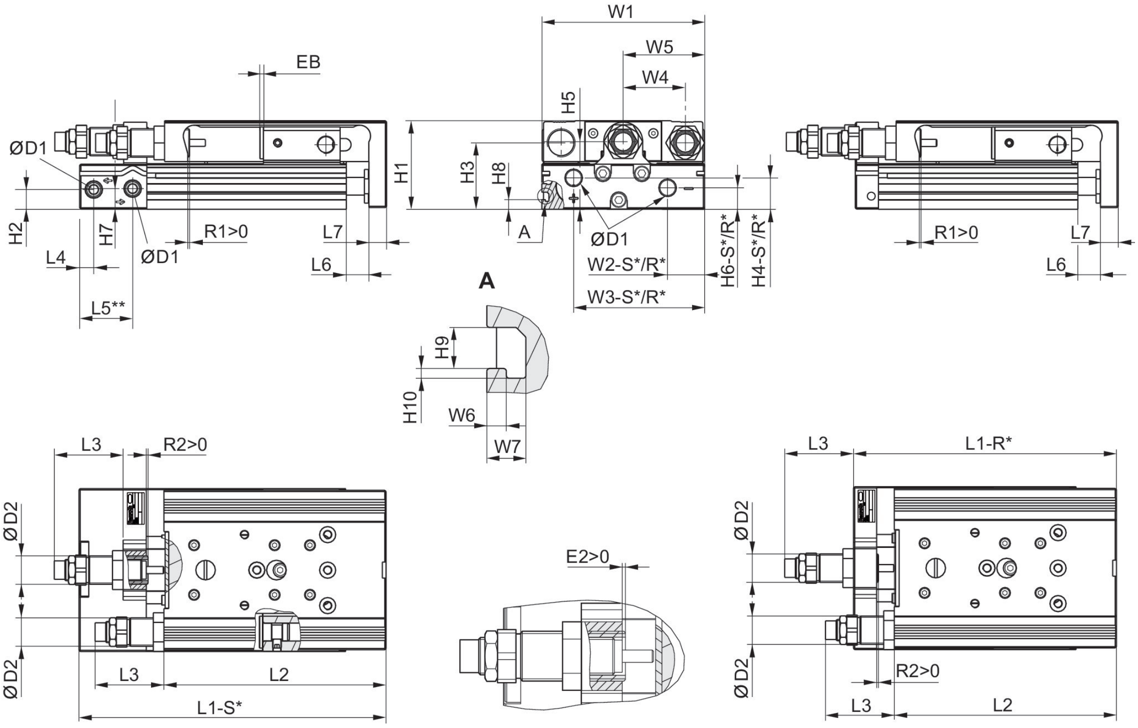




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 20	R412019211	-	-	-	-
30	R412019212	R412019199	R412019183	R412019000	R412019036
40	R412019213	R412019200	R412019184	R412019001	R412019037
50	R412019214	R412019201	R412019185	R412019002	R412019038
80	R412019215	R412019202	R412019186	R412019003	R412019039
100	-	R412019203	R412019187	R412019004	R412019040
125	-	-	R412019188	R412019005	R412019041
150	-	-	R412019189	R412019006	R412019042
200	-	-	-	R412019007	R412019043

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.6 J	1 J	1.2 J	3.1 J	5.8 J
Cushioning length	5 mm	7 mm	7 mm	10 mm	14 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	1.5 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	31	9.8	–	1.9
12	5.7	8.3	-	-	-	46.7	7.2	22.5	2
16	7.7	11.2	-	-	-	44.9	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	48.9	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	67.7	9	31	2.1

Piston Ø	L7	R2	W1	W2-R	W2-S	W3-R	W3-S	W4	W5
8	6	4.1	50.2	–	19.3	–	30.5	18	W1/2
12	8	12	66	28.8	28.8	53	53	24.5	W1/2
16	10	10.4	76	31	31	60.5	60.5	30	W1/2
20	10	14	92	10	21	74	74	35	W1/2
25	12	16.2	112	11	14	92	92	44	W1/2

Piston Ø	W6	W7
8	–	–
12	–	–
16	–	–
20	2	4
25	2.5	4.8

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=125 EB	S=150 EB
8	12	2	2	2	2	2	–	–	–
12	22	12	2	2	2	2	2	–	–
6	22	12	2	2	2	2	2	2	2
20	22	12	2	2	2	2	2	2	2
25	22	12	2	2	2	2	2	2	2

Piston Ø	S=200 EB	S=10 L1-R	S=20 L1-R	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=125 L1-R
8	–	–	–	–	–	–	–	–	–
12	–	99.3	99.3	99.3	109.3	124.3	170.3	190.3	–
6	–	101.8	101.8	101.8	111.8	126.8	172.8	192.8	281.3
20	2	112.9	112.9	112.9	122.9	137.9	182.9	202.9	287.4
25	2	126.1	126.1	126.1	136.1	149.1	195.1	215.1	292.1

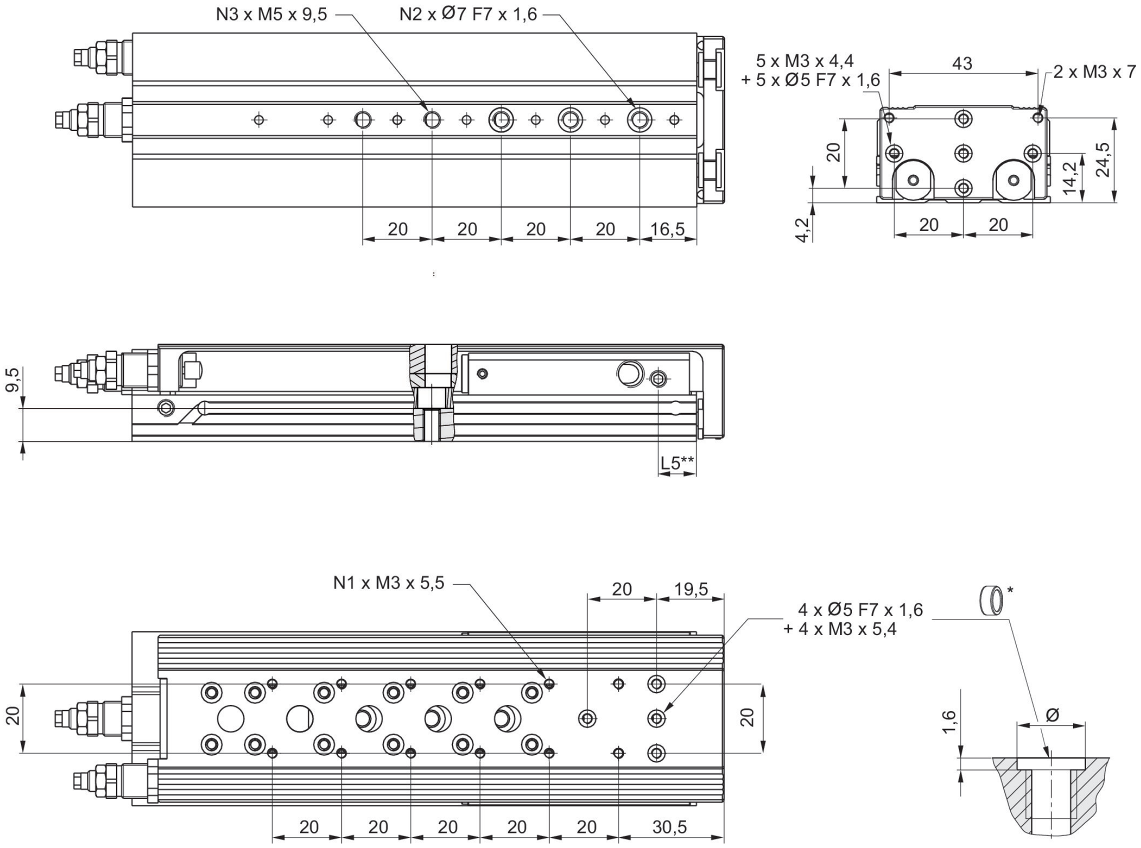
Piston Ø	S=150 L1-R	S=200 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S	S=50 L1-S	S=80 L1-S	S=100 L1-S
8	–	–	80.7	80.7	90.7	100.7	120.7	170.7	–
12	–	–	116.2	116.2	116.2	126.2	141.2	187.2	207.2
6	306.3	–	112.7	112.7	112.7	122.7	137.7	183.7	203.7
20	327.4	402.4	137.8	137.8	137.8	147.8	162.8	207.8	227.8
25	332.1	407.1	149.8	149.8	149.8	159.8	172.8	218.8	238.8

Piston Ø	S=125 L1-S	S=150 L1-S	S=200 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	–	–	–	73.5	73.5	83.5	93.5	113.5	163.5
12			–	88.8	88.8	88.8	98.8	113.8	159.8
6	292.2	317.2	–	90.4	90.4	90.4	100.4	115.4	161.4
20	312.3	352.3	427.3	100.5	100.5	100.5	110.5	125.5	170.5
25	315.8	355.8	430.8	111.5	111.5	111.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=125 L2	S=150 L2	S=200 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.
8	–	–	–	–	4.2	4.2	4.2	4.2	4.2
12	179.8			–	5.7	5.7	5.7	5.7	5.7
6	181.4	269.9	294.9	–	8.7	8.7	8.7	8.7	8.7
20	190.5	275	315	390	12.4	12.4	12.4	12.4	12.4
25	200.5	277.5	317.5	392.5	11.5	11.5	11.5	11.5	10.5

Piston Ø	S=80 R1 max.	S=100 R1 max.	S=125 R1 max.	S=150 R1 max.	S=200 R1 max.
8	4.2	–	–	–	–
12	5.7	5.7	–	–	–
6	8.7	8.7	8.7	8.7	–
20	12.4	12.4	12.4	12.4	12.4
25	11.5	11.5	11.5	11.5	11.5

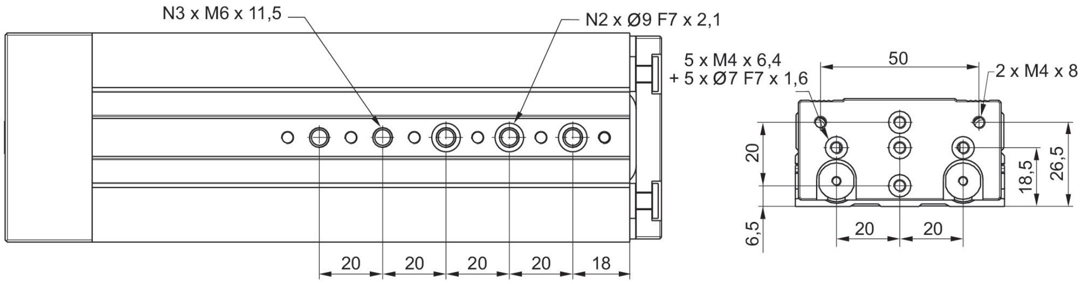
Dimensions
MSC-08

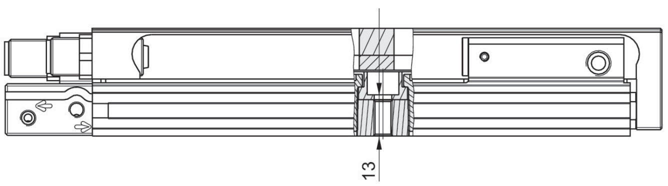


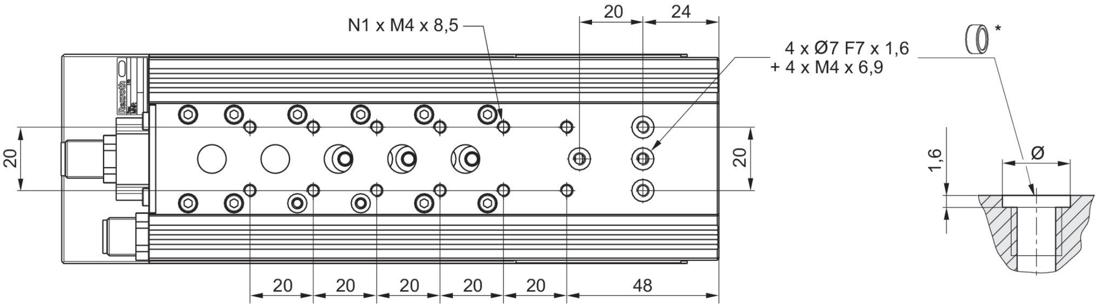
* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	Stroke	N1	N2	N3	L5
R412019204	8	10	4	2	2	11
R412019205	8	20	4	2	2	11
R412019206	8	30	4	2	2	11
R412019207	8	40	6	2	2	11
R412019208	8	50	8	3	3	11
R412019209	8	80	12	3	5	11

Dimensions
MSC-12







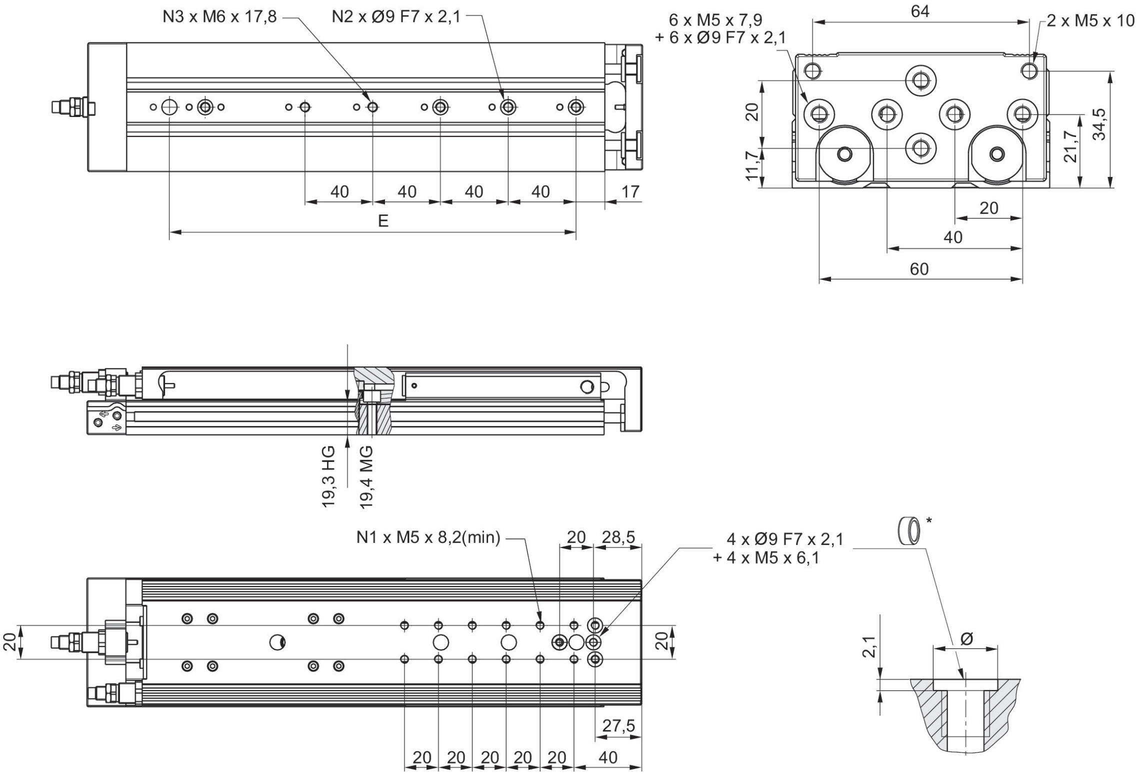
* = centering rings

Part No.	Piston Ø	Stroke	N1	N2	N3
R412019190	12	10	4	2	2
R412019191	12	20	4	2	2
R412019192	12	30	4	2	2
R412019193	12	40	4	2	2
R412019194	12	50	6	3	3
R412019195	12	80	10	3	5
R412019196	12	100	12	3	5

Part No.	Piston Ø	Stroke	N1	N2	N3
R480643794	12	10	4	2	2
R480643795	12	20	4	2	2
R480643796	12	30	4	2	2
R480643797	12	40	4	2	2
R480643798	12	50	6	3	3
R480643799	12	80	10	3	5
R480643800	12	100	12	3	5

Part No.	Piston Ø	Stroke	N1	N2	N3
R412019190	12	10	4	2	2
R412019191	12	20	4	2	2
R412019192	12	30	4	2	2
R412019193	12	40	4	2	2
R412019194	12	50	6	3	3
R412019195	12	80	10	3	5
R412019196	12	100	12	3	5

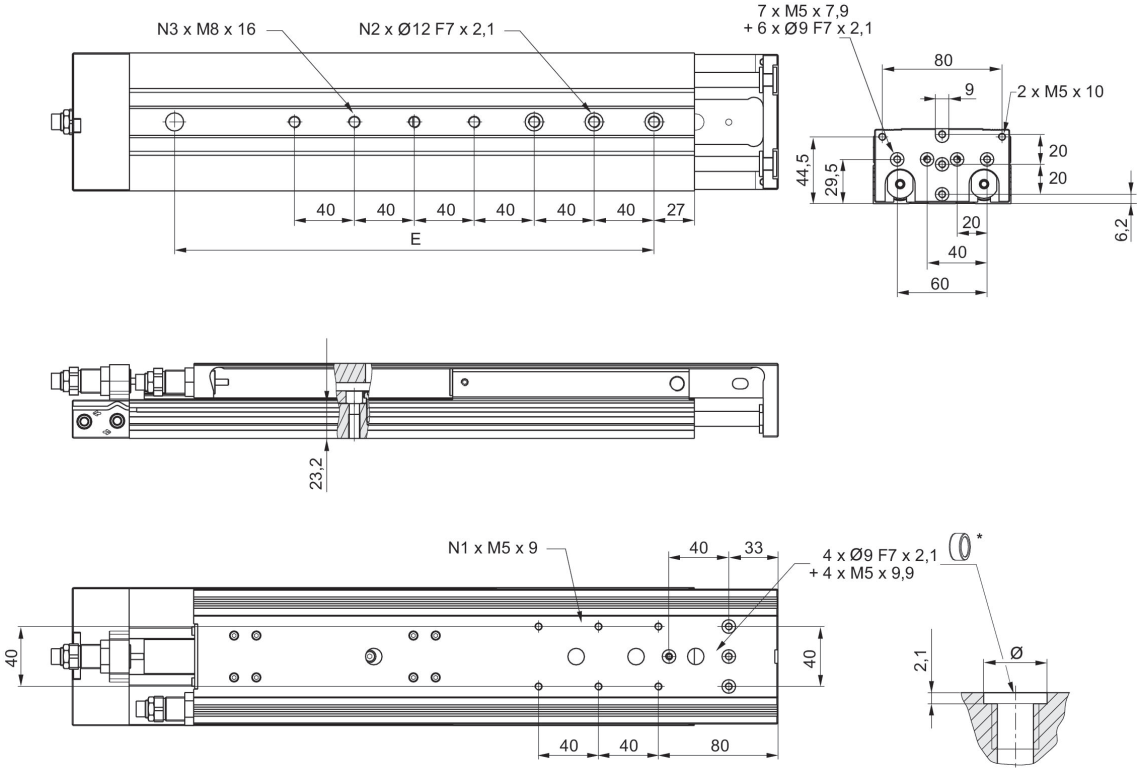
Dimensions
MSC-16



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019175	16	125	200	12	4	5
R480643808	16	125	200	12	4	5
R412019188	16	125	200	12	4	5
R480640200	16	125	200	12	4	5
R412019176	16	150	240	12	4	5
R480643809	16	150	240	12	4	5
R412019189	16	150	240	12	4	5
R480640201	16	150	240	12	4	5

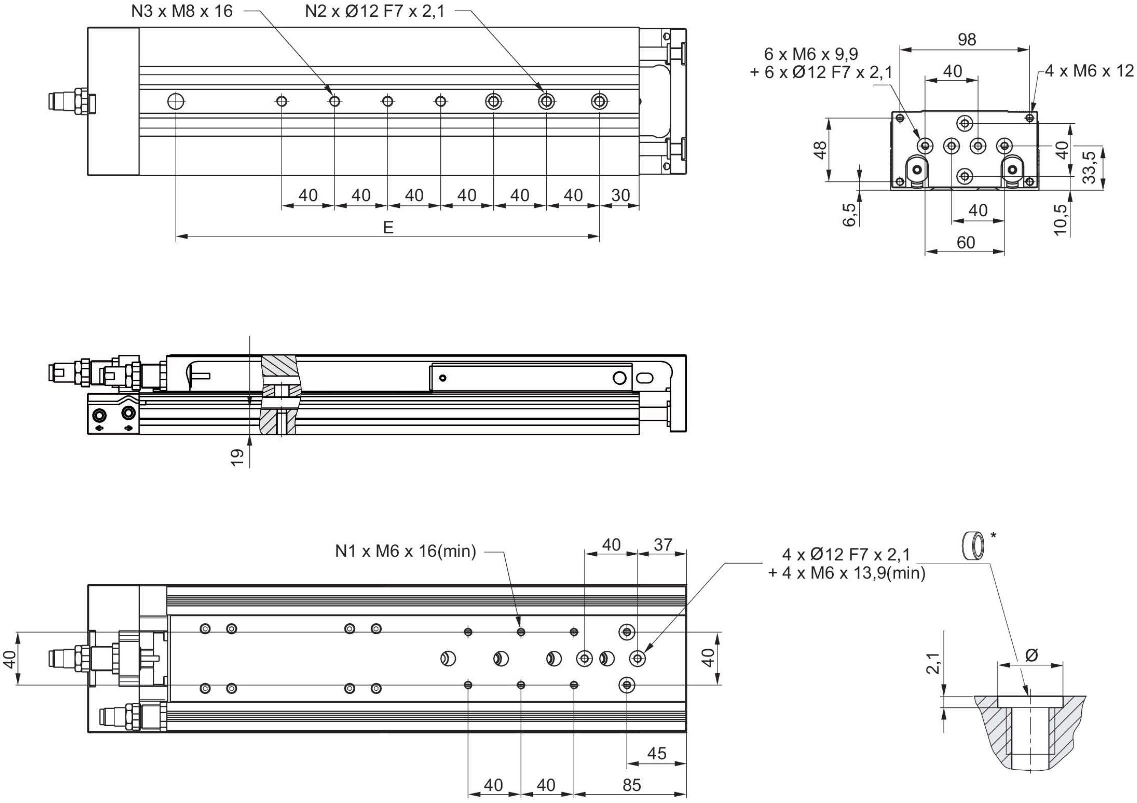
Dimensions
MSC-20



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018917	20	125	200	6	4	5
R480643817	20	125	200	6	4	5
R412019005	20	125	200	6	4	5
R480640205	20	125	200	6	4	5
R412018918	20	150	240	6	4	5
R480643818	20	150	240	6	4	5
R412019006	20	150	240	6	4	5
R480640206	20	150	240	6	4	5
R412018919	20	200	320	6	4	7
R480643819	20	200	320	6	4	7
R412019007	20	200	320	6	4	7
R480640207	20	200	320	6	4	7

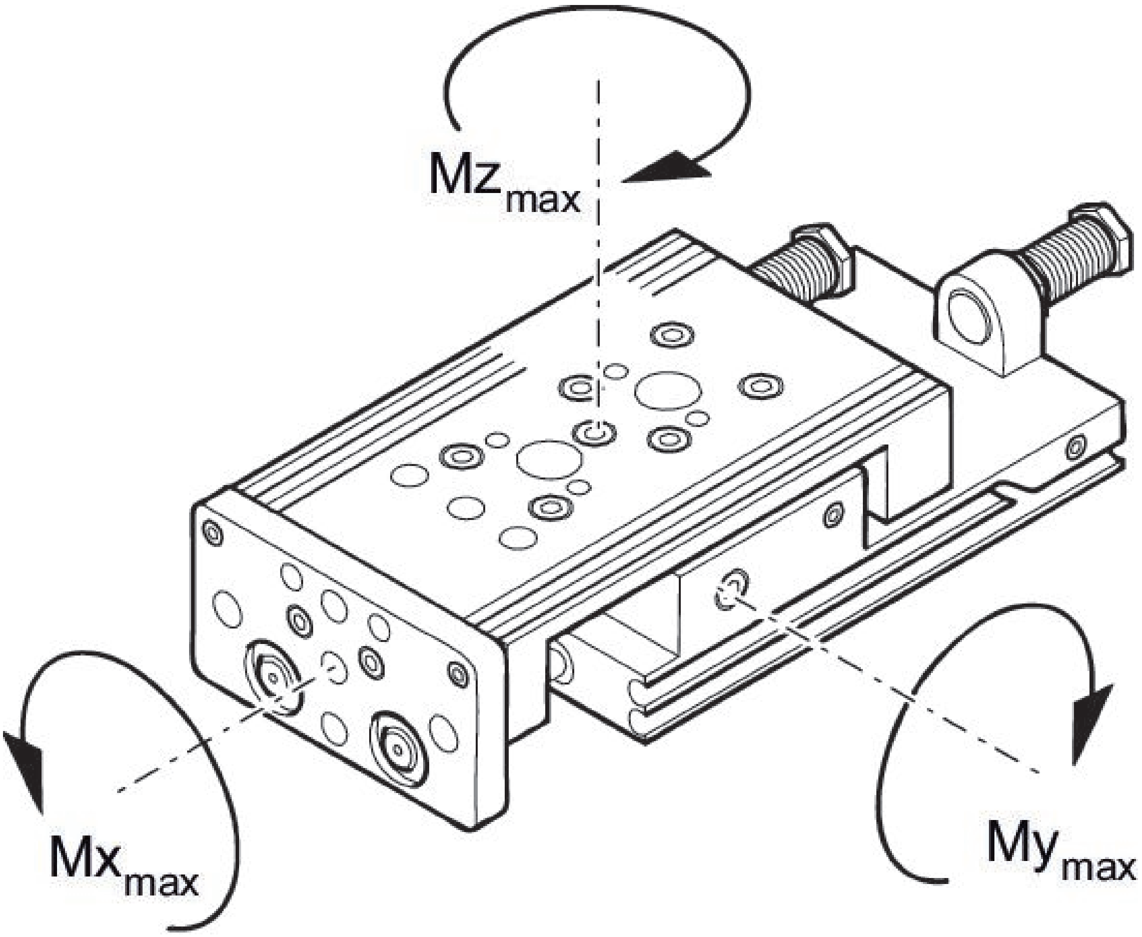
Dimensions
MSC-25



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019030	25	125	200	4	4	5
R480643827	25	125	200	4	4	5
R412019041	25	125	200	4	4	5
R480640211	25	125	200	4	4	5
R412019031	25	150	240	6	4	5
R480643828	25	150	240	6	4	5
R412019042	25	150	240	6	4	5
R480640212	25	150	240	6	4	5
R412019032	25	200	320	6	4	7
R480643829	25	200	320	6	4	7
R412019043	25	200	320	6	4	7
R480640213	25	200	320	6	4	7

Load capacity



M = max. permissible torque

Correction factor (a)

Part No.	Piston Ø	S	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R412019211	8	20	50	14	7	7	7
R412019212	8	30	60	14	7	7	7
R412019213	8	40	70	14	7	7	7
R412019214	8	50	80	14	9	13	13
R412019215	8	80	125	14	13	25	25
R412019199	12	30	64.5	16	20	14	14
R412019200	12	40	74.5	16	20	14	14
R412019201	12	50	84.5	16	23	19	19
R412019202	12	80	125	16	33	32	32
R412019203	12	100	145	16	33	32	32
R412019183	16	30	65.5	15	35	25	25
R412019184	16	40	75.5	15	35	25	25
R412019185	16	50	85.5	15	38	29	29
R412019186	16	80	126	15	74	58	58
R412019187	16	100	146	15	74	58	58
R412019188	16	125	198.5	15	88	118	118
R412019189	16	150	223.5	15	88	119	119
R412019000	20	30	70.5	20	87	57	57
R412019001	20	40	80.5	20	87	57	57
R412019002	20	50	90.5	20	93	65	65
R412019003	20	80	130.5	20	116	99	99
R412019004	20	100	150.5	20	116	99	99
R412019006	20	150	233.5	20	126	152	152
R412019007	20	200	296	20	126	179	179
R412019036	25	30	77.5	24	100	90	90
R412019037	25	40	87.5	24	100	90	90
R412019038	25	50	96.5	24	100	90	90
R412019039	25	80	137	24	110	129	129
R412019040	25	100	157	24	110	129	129
R412019041	25	125	201	24	145	180	180
R412019042	25	150	236.5	24	145	201	201
R412019043	25	200	299	24	145	236	236

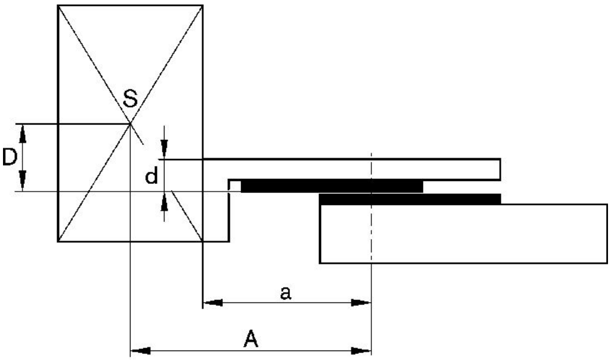
S = stroke

Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.14	0.14	0.155	0.165	0.195	0.265	–	–	–
12	0.255	0.255	0.26	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1	1	1	1.1	1.225	1.45	1.625	1.885	2.085

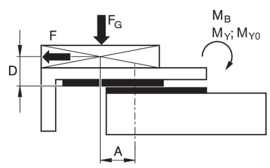
Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

Correction factor (a, d)

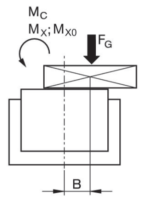


Correction factor (a, d)

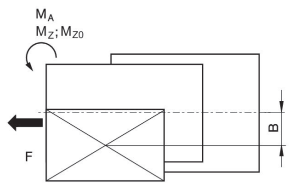
horizontal



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



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



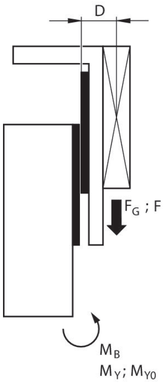
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

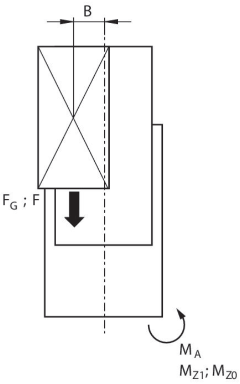
$F = m \cdot a$ $FG = m \cdot g$ $a = 1250 \cdot V^2/H$
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

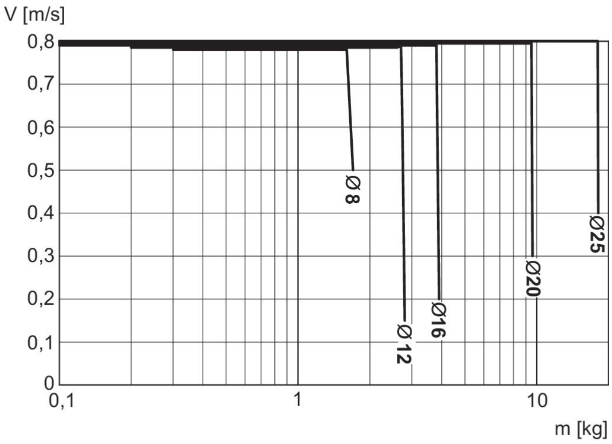


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

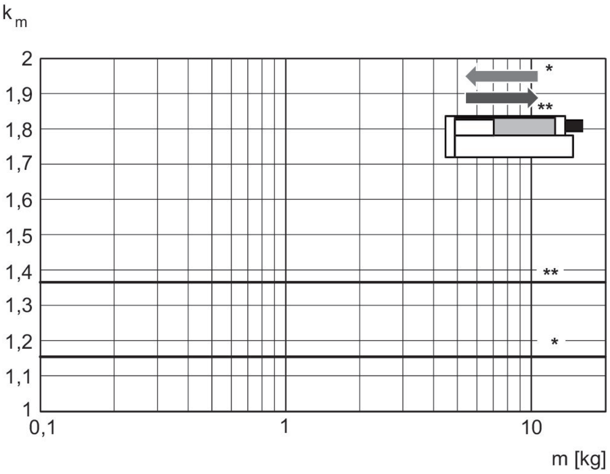
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Minimum and maximum moving mass



V = velocity [m/s]
m = mass

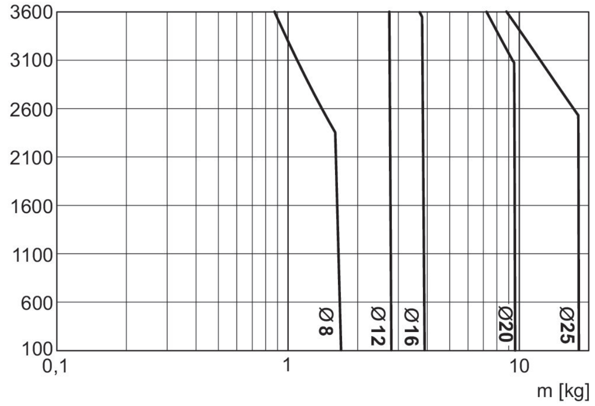
Correction factor for required speed: retracting and extending, horizontal



* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Max. additional moving mass, horizontal

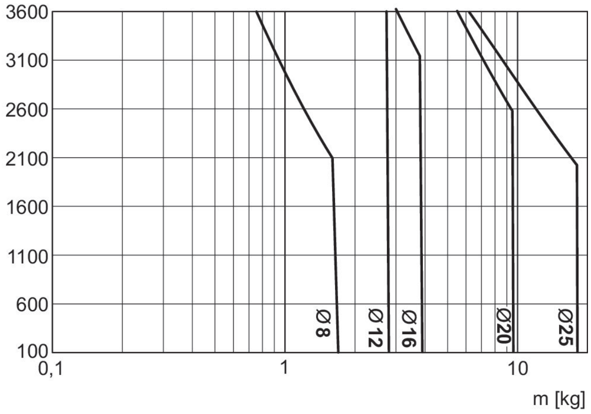
[2 S/h] (V=0,8 m/s)



S = stroke [mm]
2 x S = 1 cycle
V = velocity [m/s]
m = mass

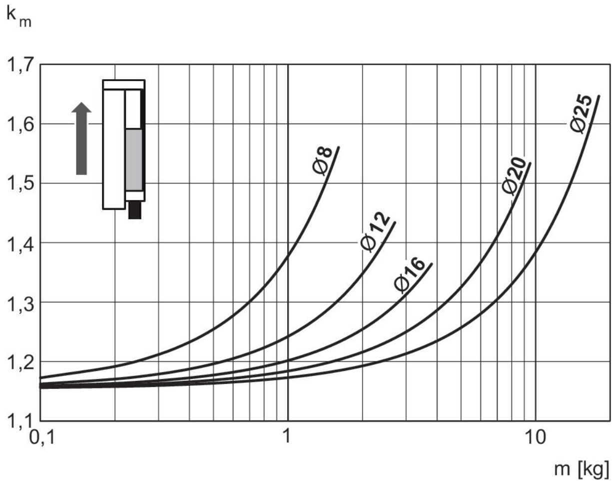
Max. additional moving mass, vertical

[2 S/h] (V=0,8 m/s)



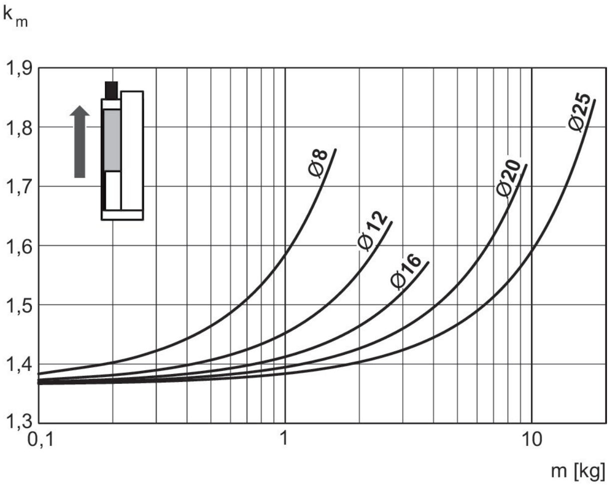
S = stroke [mm]
2 x S = 1 cycle
V = velocity [m/s]
m = mass

Correction factor for required speed: extending, vertical, upwards



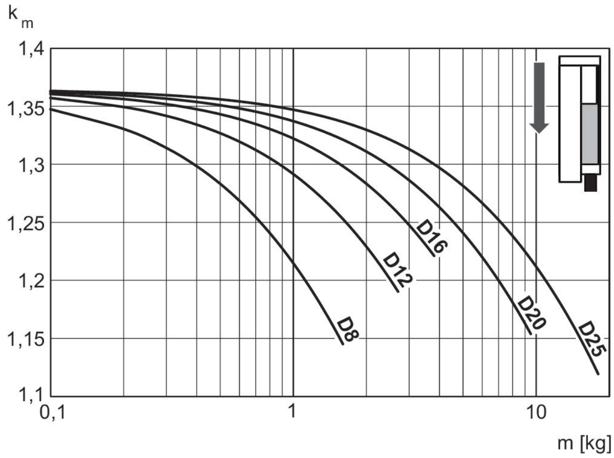
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



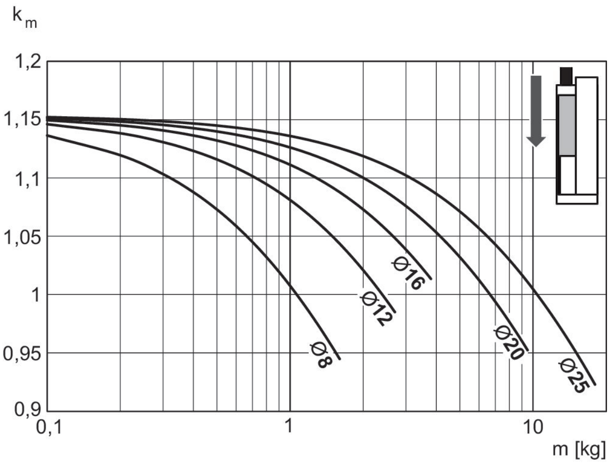
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



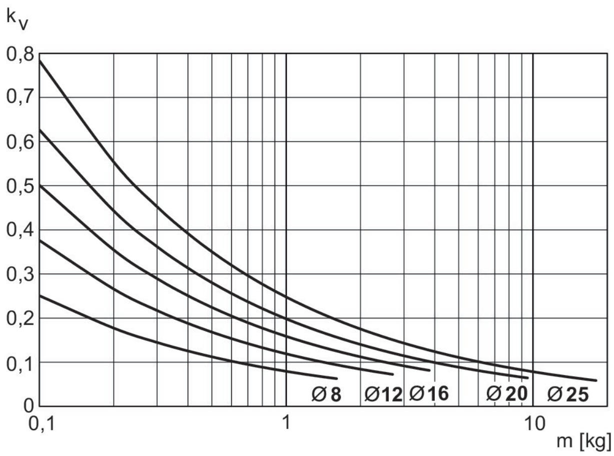
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Max. extracting speed

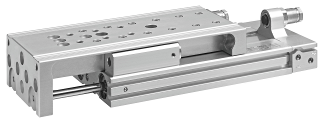


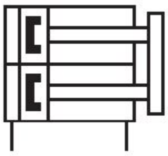
V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

EMERSON

Mini slide, Series MSC-HG-PM/PE

Functional principle: Double-acting
Cushioning: Pneumatically
Easy2Combine: capable
: with magnetic piston
: with double piston
: With integrated “High Performance” ball rail system
Ambient temperature min./max.: 0 °C ... 60 °C

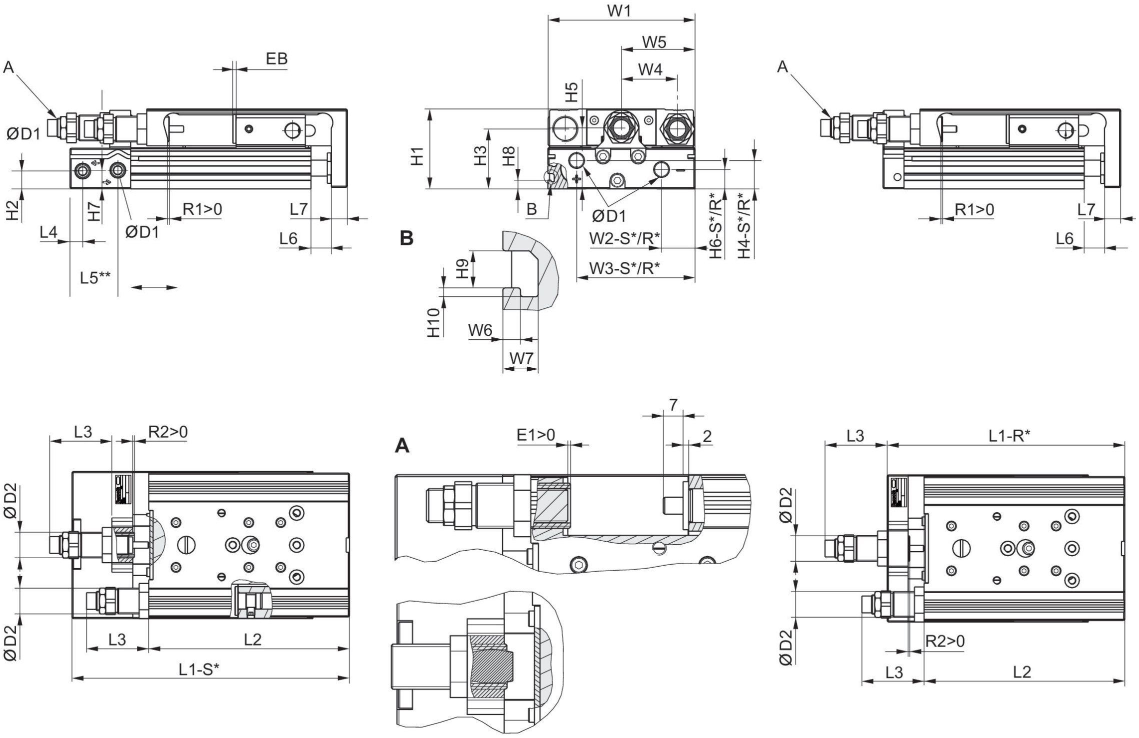




Piston Ø	16 mm	20 mm	25 mm
Ports	M5	G 1/8	G 1/8
Stroke 50	R480640197	R480640202	R480640208
80	R480640198	R480640203	R480640209
100	R480640199	R480640204	R480640210
125	R480640200	R480640205	R480640211
150	R480640201	R480640206	R480640212
200	-	R480640207	R480640213

Piston Ø	16 mm	20 mm	25 mm
Retracting piston force, theoretical	218 N	297 N	520 N
Extracting piston force, theoretical	182 N	269 N	421 N
Cushion-ing energy	0.06 J	1.2 J	1.6 J
Cushioning length	7 mm	7 mm	7 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	3 bar ... 10 bar	3 bar ... 10 bar	2 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides

Dimensions

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 1) max.	L3 2) max.	L4	L5 3)
16	7.7	11.2	-	-	-	12	47	6.5	17.7
20	12.2	11.7	5.5	4.2	1	15	57	8	30
25	21.7	16.2	6.9	5.2	1.5	15	62	9	31

Piston Ø	L6	L7	R2	W1	W2-R	W2-S	W3-R	W3-S	W4
16	2	10	3	76	31	31	60.5	60.5	30
20	2.1	10	3	92	10	21	74	74	35
25	2.1	12	3	112	11	14	92	92	44

Piston Ø	W5	W6	W7
16	W1/2	–	–
20	W1/2	2	4
25	W1/2	2.5	4.8

Stroke-dependent dimensions

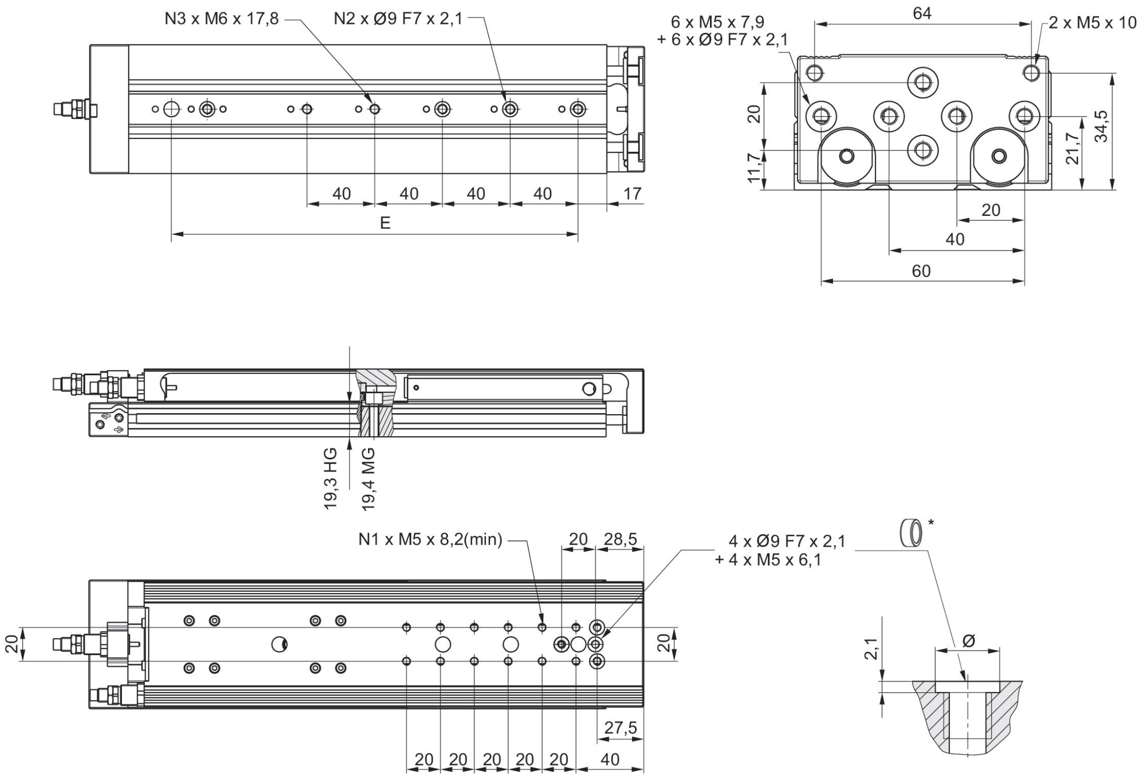
Piston Ø	S=50 EB	S=80 EB	S=100 EB	S=125 EB	S=150 EB	S=200 EB	S=50 L1-R	S=80 L1-R	S=100 L1-R
16	2	2	2	2	2	–	126.8	172.8	192.8
20	2	2	2	2	2	2	137.9	182.9	202.9
25	2	2	2	2	2	2	149.1	195.1	215.1

Piston Ø	S=125 L1-R	S=150 L1-R	S=200 L1-R	S=50 L1-S	S=80 L1-S	S=100 L1-S	S=125 L1-S	S=150 L1-S	S=200 L1-S
16	281.3	306.3	–	137.7	183.7	203.7	292.2	317.2	–
20	287.4	327.4	402.4	162.8	207.8	227.8	312.3	352.3	427.3
25	292.1	332.1	407.1	172.8	218.8	238.8	315.8	355.8	430.8

Piston Ø	S=50 L2	S=80 L2	S=100 L2	S=125 L2	S=150 L2	S=200 L2	S=50 R1	S=80 R1	S=100 R1
16	115.4	161.4	181.4	269.9	294.9	–	8.7	8.7	8.7
20	125.5	170.5	190.5	275	315	390	12.4	12.4	12.4
25	134.5	180.5	200.5	277.5	317.5	392.5	10.5	11.5	11.5

Piston Ø	S=125 R1	S=150 R1	S=200 R1
16	8.7	8.7	–
20	12.4	12.4	12.4
25	11.5	11.5	11.5

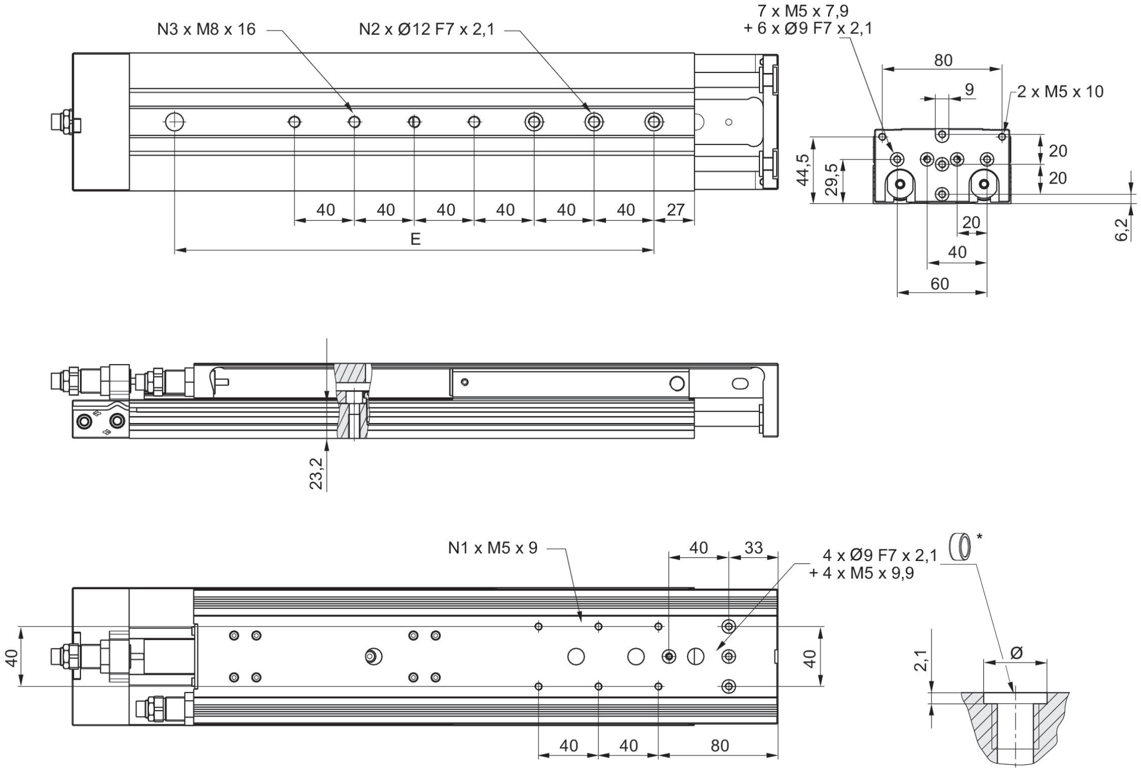
Dimensions
MSC-16



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019175	16	125	200	12	4	5
R480643808	16	125	200	12	4	5
R412019188	16	125	200	12	4	5
R480640200	16	125	200	12	4	5
R412019176	16	150	240	12	4	5
R480643809	16	150	240	12	4	5
R412019189	16	150	240	12	4	5
R480640201	16	150	240	12	4	5

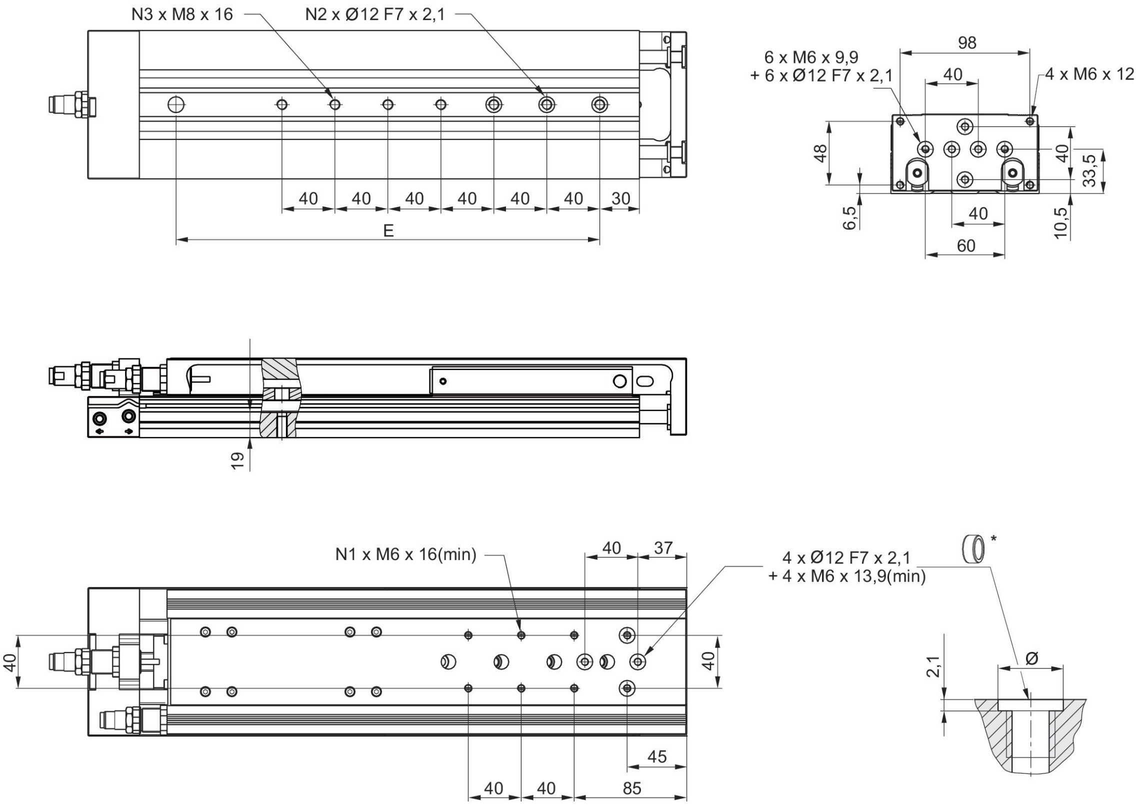
Dimensions
MSC-20



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412018917	20	125	200	6	4	5
R480643817	20	125	200	6	4	5
R412019005	20	125	200	6	4	5
R480640205	20	125	200	6	4	5
R412018918	20	150	240	6	4	5
R480643818	20	150	240	6	4	5
R412019006	20	150	240	6	4	5
R480640206	20	150	240	6	4	5
R412018919	20	200	320	6	4	7
R480643819	20	200	320	6	4	7
R412019007	20	200	320	6	4	7
R480640207	20	200	320	6	4	7

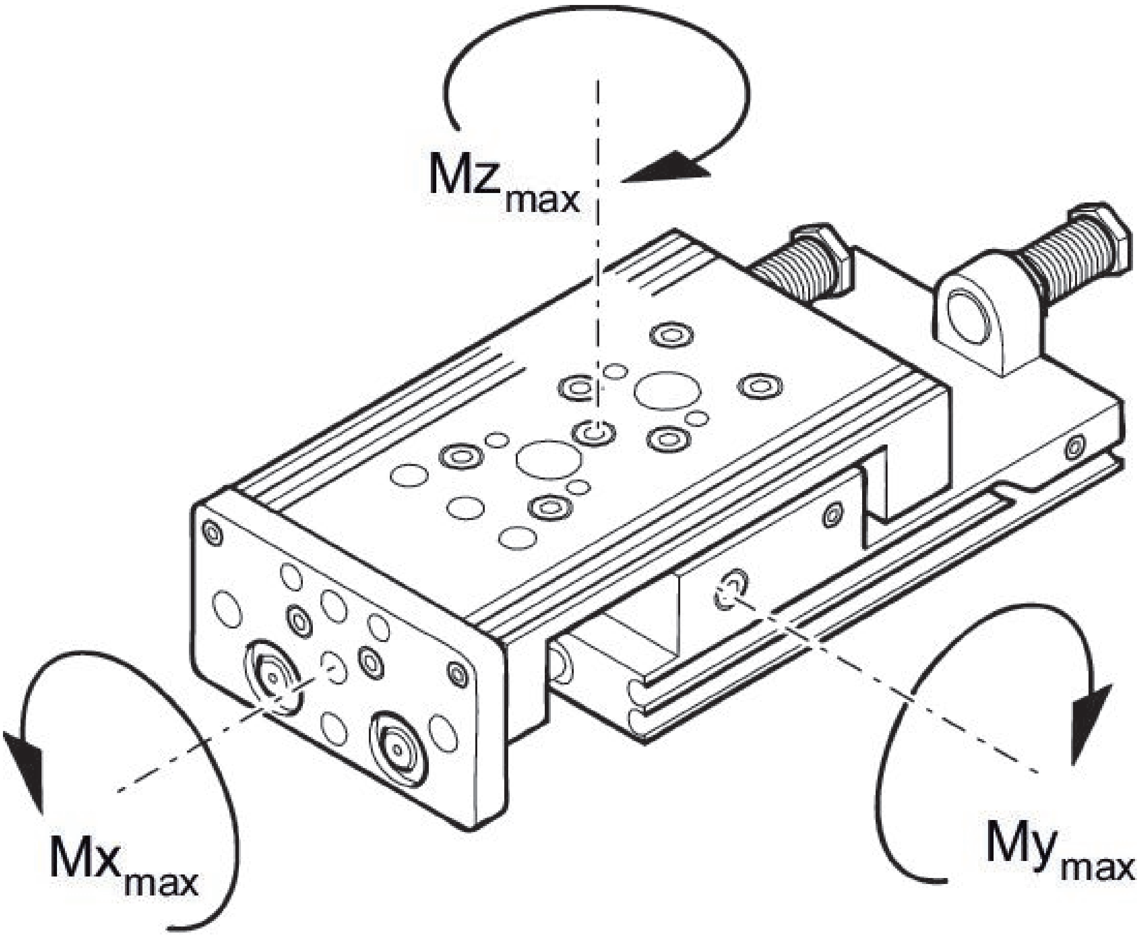
Dimensions
MSC-25



* = centering rings

Part No.	Piston Ø	Stroke	E	N1	N2	N3
R412019030	25	125	200	4	4	5
R480643827	25	125	200	4	4	5
R412019041	25	125	200	4	4	5
R480640211	25	125	200	4	4	5
R412019031	25	150	240	6	4	5
R480643828	25	150	240	6	4	5
R412019042	25	150	240	6	4	5
R480640212	25	150	240	6	4	5
R412019032	25	200	320	6	4	7
R480643829	25	200	320	6	4	7
R412019043	25	200	320	6	4	7
R480640213	25	200	320	6	4	7

Load capacity



M = max. permissible torque

Correction factor (a)

Piston Ø	S	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
16	50	85,5	15	38	29	29
20	50	90.5	20	93	65	65
25	50	96.5	24	100	90	90

S = stroke

Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1	1	1	1.1	1.225	1.45	1.625	1.885	2.085

Piston Ø	S=200
16	–
20	1.54
25	2.445

S = stroke

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=10 L1-R	S=20 L1-R
8	32	22	12	2	2	2	–	–	–
12	32	22	12	2	2	2	2	111	111
16	22	12	2	2	2	2	2	103.5	103.5
20	22	12	2	2	2	2	2	115	115
25	32	22	12	2	2	2	2	138.5	138.5

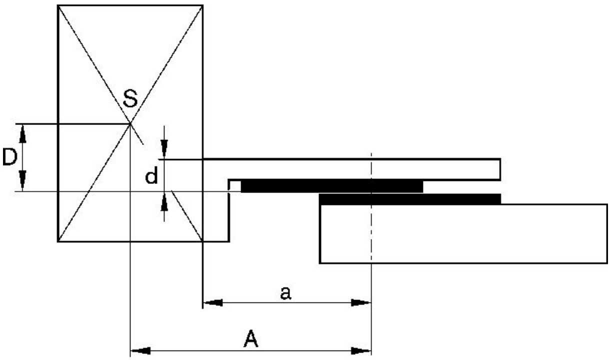
Piston Ø	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S
8	–	–	–	–	–	101.7	101.7	101.7	101.7
12	111	111	126	172	192	127.9	127.9	127.9	127.9
16	103.5	113.5	128.5	174.5	194.5	114.4	114.4	114.4	124.4
20	115	125	140	185	205	139.9	139.9	139.9	149.9
25	138.5	138.5	151.5	197.5	217.5	162.2	162.2	162.2	162.2

Piston Ø	S=50 L1-S	S=80 L1-S	S=100 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	121.7	171.7	–	93.5	93.5	93.5	93.5	113.5	163.5
12	142.9	188.9	208.9	98.8	98.8	98.8	98.8	113.8	159.8
16	139.4	185.4	205.4	90.4	90.4	90.4	100.4	115.4	161.4
20	164.9	209.9	229.9	100.5	100.5	100.5	110.5	125.5	170.5
25	175.2	221.2	241.2	121.5	121.5	121.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.	S=80 R1 max.	S=100 R1 max.	S=10 R2 max.
8	–	4.2	4.2	4.2	4.2	4.2	4.2	–	4.1
12	179.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2
16	181.4	8.7	8.7	8.7	8.7	8.7	8.7	8.7	1.5
20	190.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	1.5
25	200.5	11.5	11.5	11.5	11.5	10.5	11.5	11.5	7.5

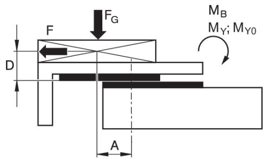
Piston Ø	S=20 R2 max.	S=30 R2 max.	S=40 R2 max.	S=50 R2 max.	S=80 R2 max.	S=100 R2 max.
8	4.1	4.1	4.1	4.1	4.1	–
12	2	2	2	10	12	12
16	1.5	1.5	1.5	6	7	5.7
20	1.5	1.5	11.5	9.5	14	14
25	7.5	7.5	7.5	3.3	7.5	9.2

Correction factor (a, d)

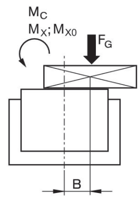


Correction factor (a, d)

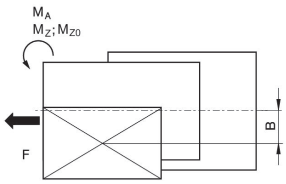
horizontal



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



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



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

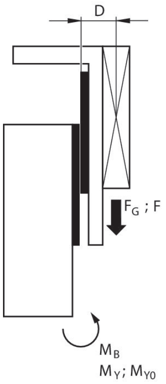
dyn.	$\frac{M_A}{M_1} + \frac{M_B}{M_2} + \frac{M_C}{M_3} \leq 1$
stat.	$\frac{M_{A0}}{M_{Z0}} + \frac{M_{B0}}{M_{Y0}} + \frac{M_{C0}}{M_{X0}} \leq 1$

F = m • a FG = m • g a = 1250•V²/H
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] H = stroke length of shock absorber [mm]

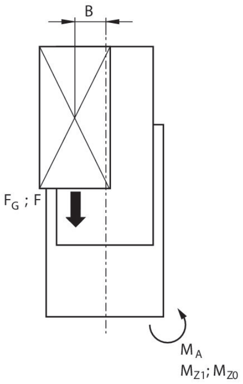
EMERSON

Correction factor (a, d)

vertical



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

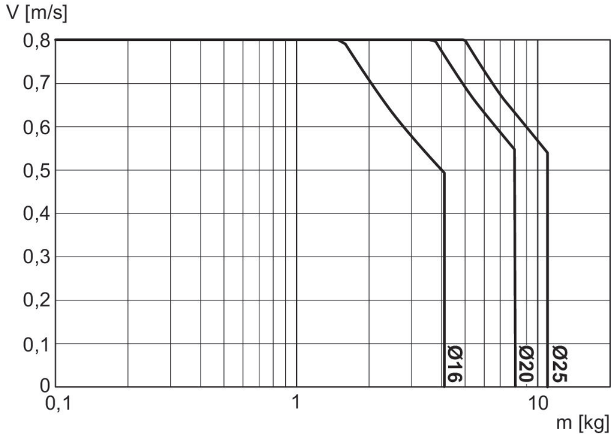


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

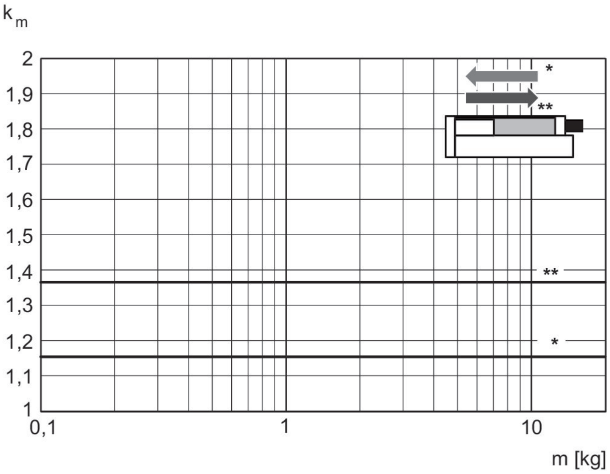
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



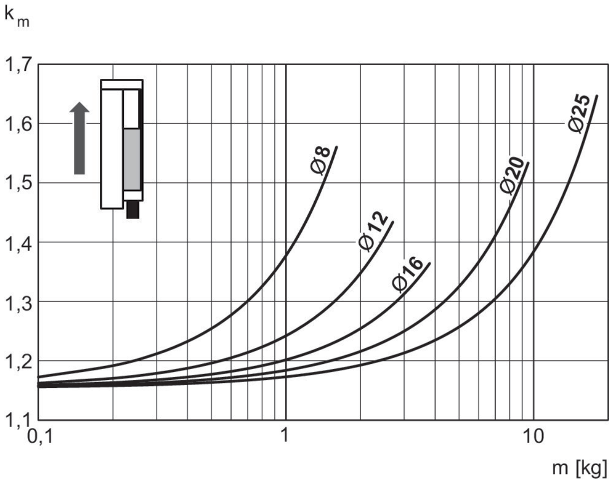
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



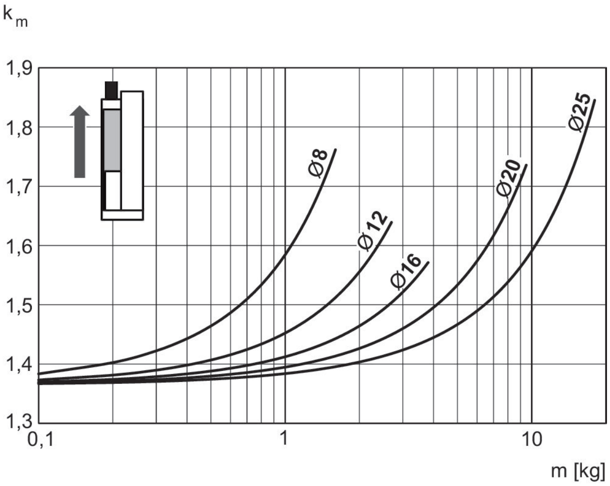
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



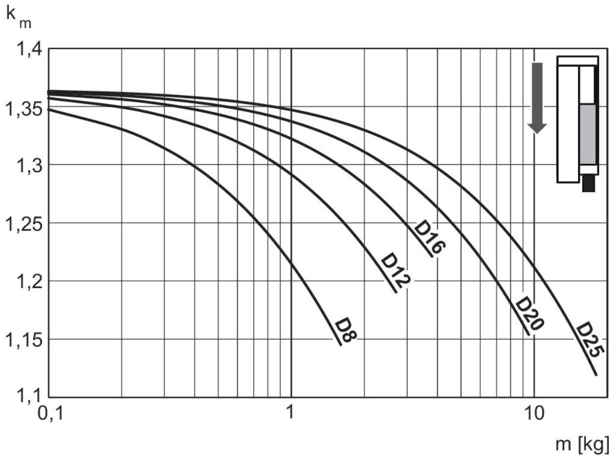
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



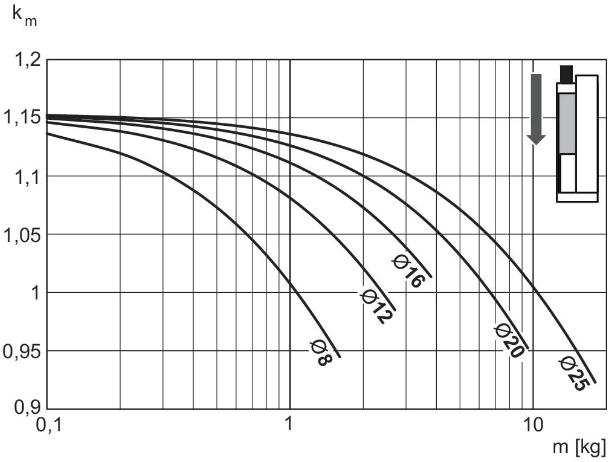
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



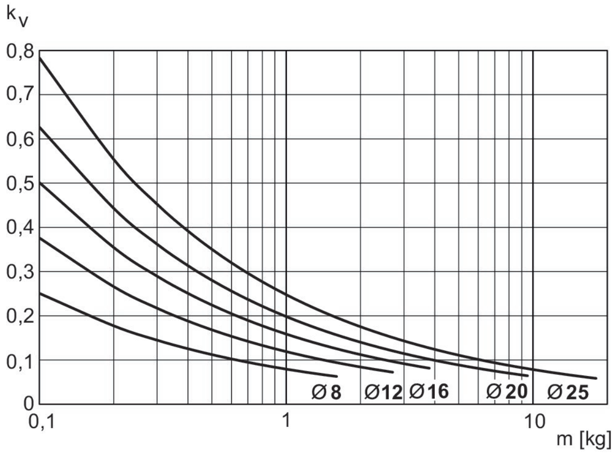
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

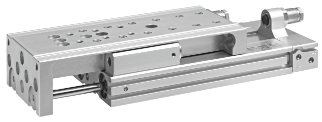
Max. extracting speed

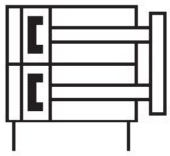


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-MG-EE

Functional principle: Double-acting
Cushioning: elastic
Easy2Combine: capable
: with magnetic piston
: with double piston
: with integrated ball rail guide
Ambient temperature min./max.: 0 °C ... 60 °C

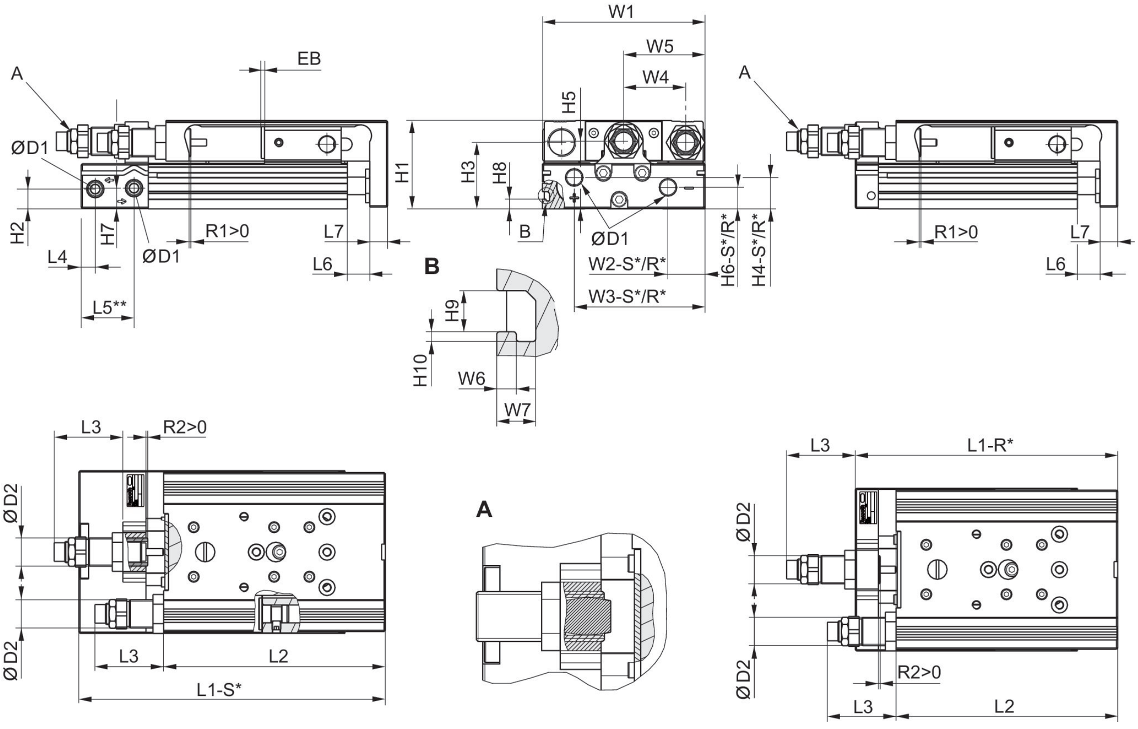




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 10	R480640120	R480640126	R480640133	R480640140	R480640147
20	R480640121	R480640127	R480640134	R480640141	R480640148
30	R480640122	R480640128	R480640135	R480640142	R480640149
40	R480640123	R480640129	R480640136	R480640143	R480640150
50	R480640124	R480640130	R480640137	R480640144	R480640151
80	R480640125	R480640131	R480640138	R480640145	R480640152
100	-	R480640132	R480640139	R480640146	R480640153

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.06 J	0.06 J	0.3 J	0.4 J	0.5 J
Cushioning length	0.3 mm	0.75 mm	1 mm	1.2 mm	1.6 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	1.5 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=10 L1-R	S=20 L1-R
8	32	22	12	2	2	2	–	–	–

Piston Ø	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S
8	–	–	–	–	–	101.7	101.7	101.7	101.7

Piston Ø	S=50 L1-S	S=80 L1-S	S=100 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	121.7	171.7	–	93.5	93.5	93.5	93.5	113.5	163.5

Piston Ø	S=100 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.	S=80 R1 max.	S=100 R1 max.	S=10 R2 max.
8	–	9.2	9.2	9.2	9.2	9.2	9.2	–	4.5

Piston Ø	S=20 R2 max.	S=30 R2 max.	S=40 R2 max.	S=50 R2 max.	S=80 R2 max.	S=100 R2 max.
8	4.5	4.5	4.5	4.5	4.5	–

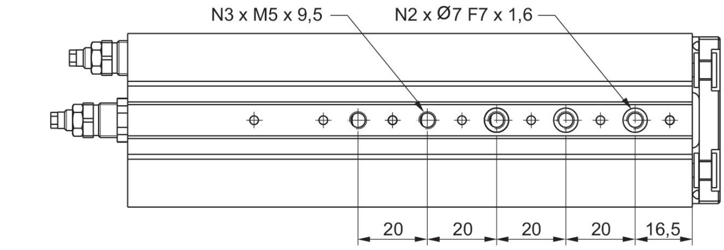
Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

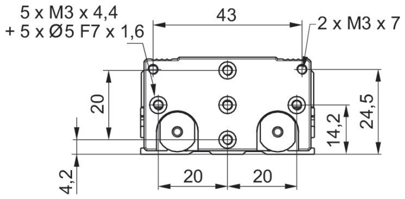
Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	16	9.8	–	1.9
12	5.7	8.3	-	-	-	20.2	7.2	22.5	2
16	7.7	11.2	-	-	-	18.4	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	27.9	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	29.2	9	31	2.1

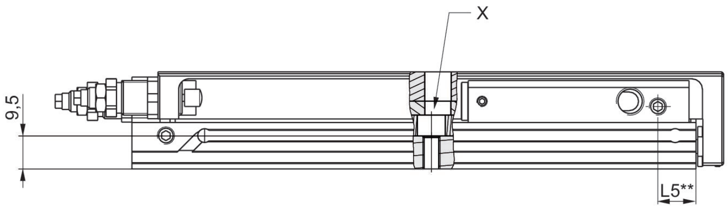
Piston Ø	L7	W1	W2-R	W2-S	W3-R	W3-S	W4	W5	W6
8	6	50.2	–	19.3	–	30.5	18	W1/2	–
12	8	66	28.8	28.8	53	53	24.5	W1/2	–
16	10	76	31	31	60.5	60.5	30	W1/2	–
20	10	92	10	21	74	74	35	W1/2	2
25	12	112	11	14	92	92	44	W1/2	2.5

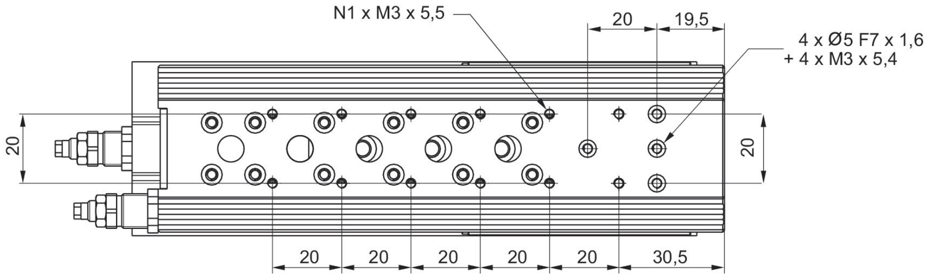
Piston Ø	W7
8	–
12	–
16	–
20	4
25	4.8

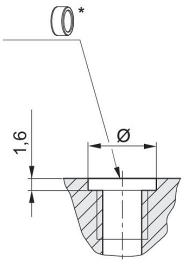
MSC-08









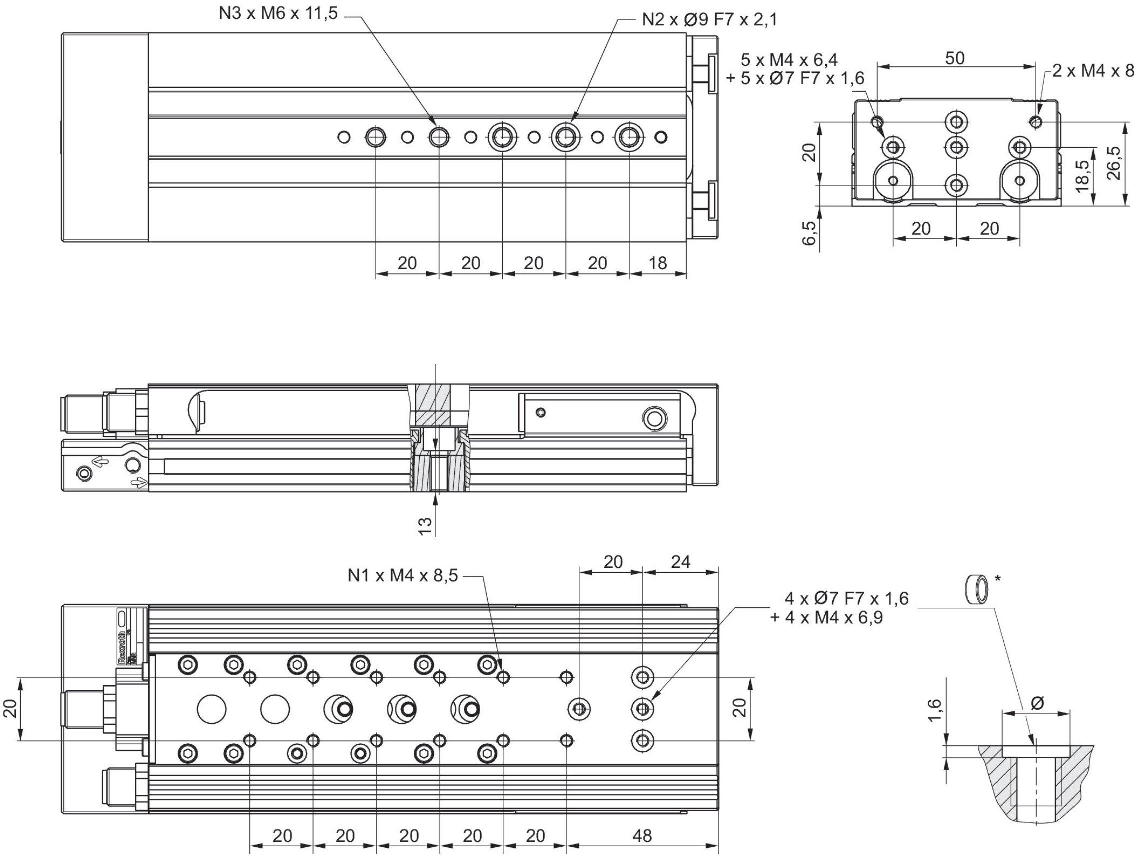


* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	S	N1	N2	N3	L5	X
R480640120	8	10	4	2	2	11	
R480640121	8	20	4	2	2	11	
R480640122	8	30	4	2	2	11	
R480640123	8	40	4	2	2	11	
R480640124	8	50	4	3	3	11	1)
R480640125	8	80	8	3	5	11	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Dimensions
MSC-12

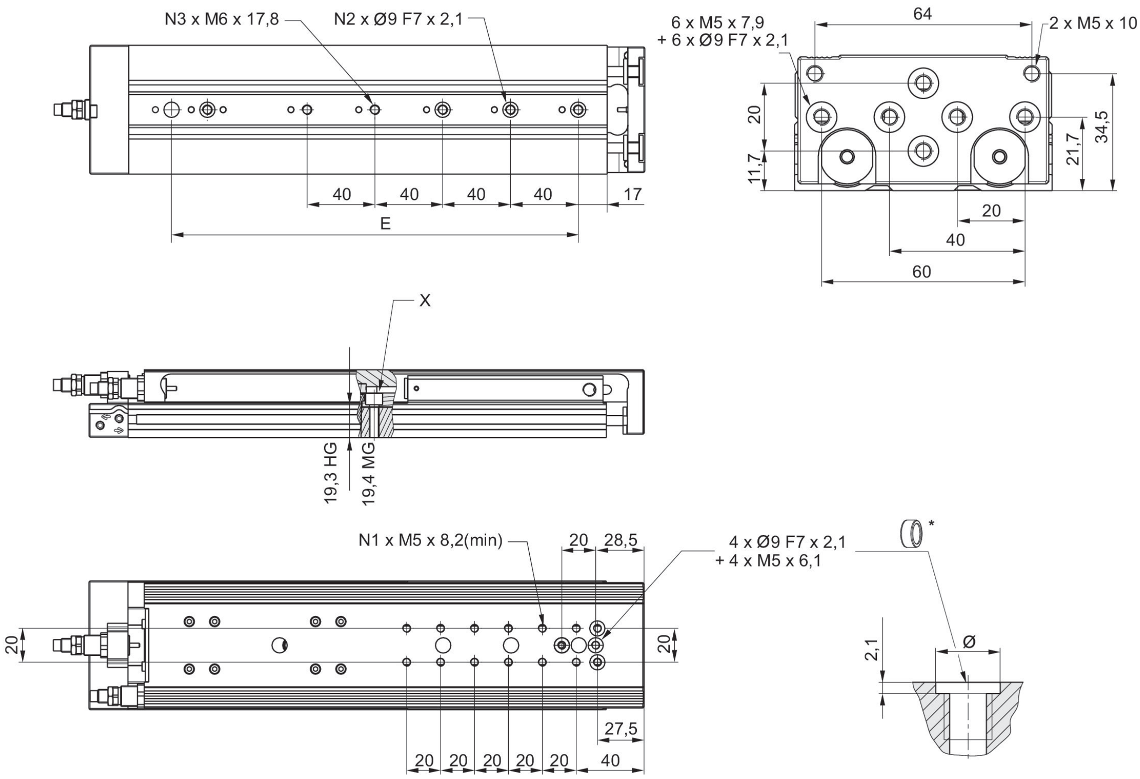


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3
R480640126	12	10	2	2	2
R480640127	12	20	2	2	2
R480640128	12	30	2	2	2
R480640129	12	40	2	2	2
R480640130	12	50	4	3	3
R480640131	12	80	6	3	5
R480640132	12	100	8	3	5

S = stroke

MSC-16



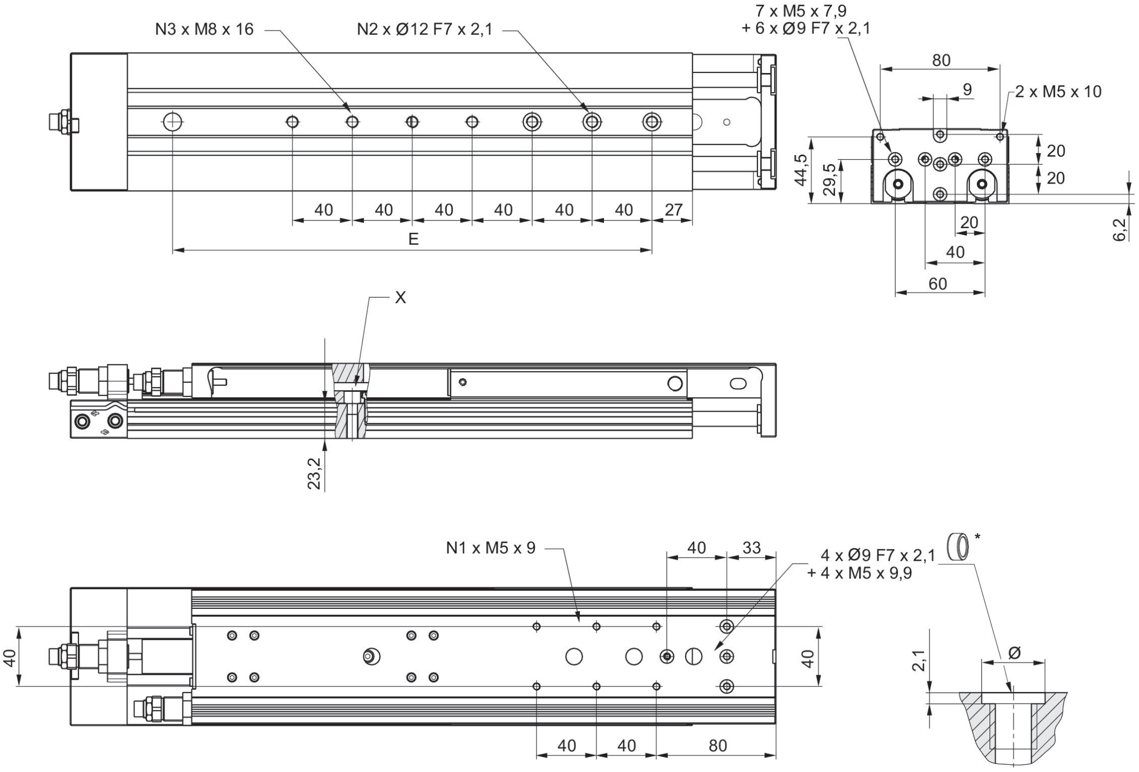
* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480640133	16	10	2	2	2	1)
R480640134	16	20	2	2	2	1)
R480640135	16	30	2	2	2	
R480640136	16	40	4	2	2	
R480640137	16	50	4	2	2	
R480640138	16	80	6	3	3	
R480640139	16	100	8	3	3	

S = stroke

1) Access to the through hole only after removal of the stroke limitation bolts

MSC-20

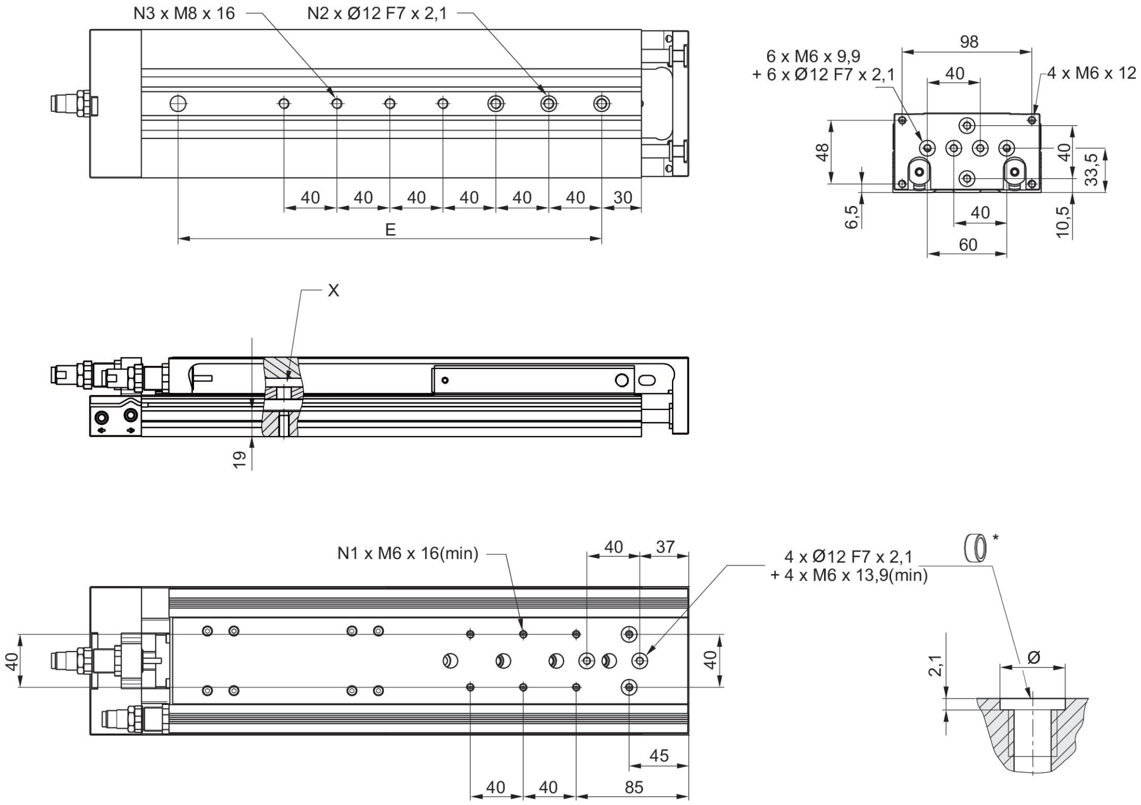


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480640140	20	10	2	2	2	1)
R480640141	20	20	2	2	2	1)
R480640142	20	30	2	2	2	
R480640143	20	40	2	2	2	
R480640144	20	50	2	2	2	
R480640145	20	80	4	3	3	
R480640146	20	100	4	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

MSC-25

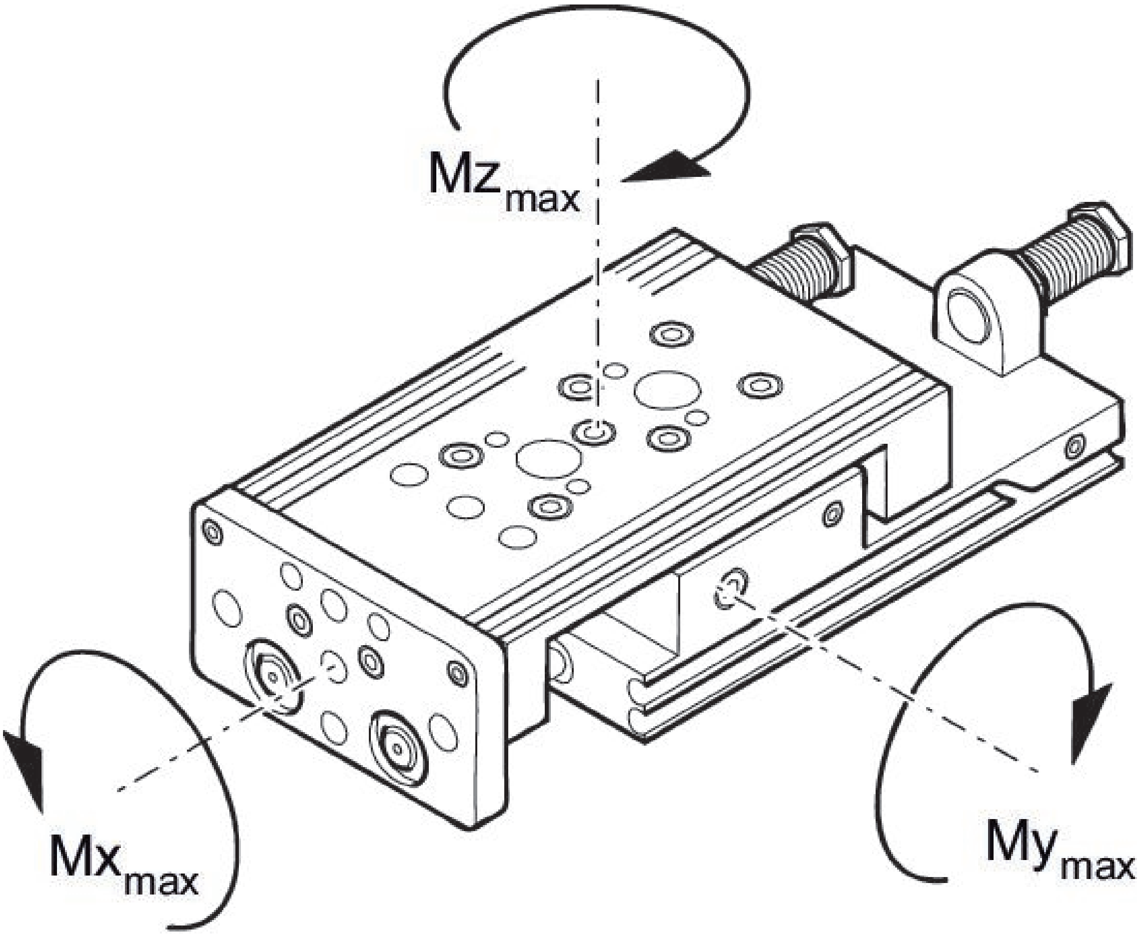


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480640147	25	10	2	2	2	1)
R480640148	25	20	2	2	2	1)
R480640149	25	30	2	2	2	1)
R480640150	25	40	2	2	2	
R480640151	25	50	4	2	2	
R480640152	25	80	4	3	3	
R480640153	25	100	4	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Load capacity



M = max. permissible torque

Correction factor (a)

Part No.	Piston Ø	Stroke	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R480640120	8	10	69.5	12	5.8	5.9	5.9
R480640121	8	20	69.5	12	5.8	5.9	5.9
R480640122	8	30	69.5	12	5.8	5.9	5.9
R480640123	8	40	69.5	12	5.8	5.9	5.9
R480640124	8	50	83	12	5.8	5.9	5.9
R480640125	8	80	121	12	8	14.6	14.6
R480640126	12	10	77	15	13.8	6.45	6.45
R480640127	12	20	77	15	13.8	6.45	6.45
R480640128	12	30	77	15	13.8	6.45	6.45
R480640129	12	40	77	15	13.8	6.45	6.45
R480640130	12	50	81	15	13.8	6.45	6.45
R480640131	12	80	117	15	17.3	15.6	15.6
R480640132	12	100	137	15	17.3	15.6	15.6
R480640133	16	10	65	15	31.6	11.95	11.95
R480640134	16	20	65	15	31.6	11.95	11.95
R480640135	16	30	65	15	31.6	11.95	11.95
R480640136	16	40	75	15	31.6	11.95	11.95
R480640137	16	50	86	15	31.6	11.95	11.95
R480640138	16	80	123	15	45	27.3	27.3
R480640139	16	100	144	15	45	27.3	27.3
R480640140	20	10	75	20	31.6	11.95	11.95
R480640141	20	20	75	20	31.6	11.95	11.95
R480640142	20	30	75	20	31.6	11.95	11.95
R480640143	20	40	75	20	31.6	11.95	11.95
R480640144	20	50	92	20	31.6	11.95	11.95
R480640145	20	80	125	20	45	27.3	27.3
R480640146	20	100	143	20	45	27.3	27.3
R480640147	25	10	85	24	87	24.5	24.5
R480640148	25	20	85	24	87	24.5	24.5
R480640149	25	30	85	24	87	24.5	24.5
R480640150	25	40	85	24	87	24.5	24.5
R480640151	25	50	102	24	87	24.5	24.5
R480640152	25	80	134	24	110	62.5	62.5
R480640153	25	100	152	24	110	62.5	62.5

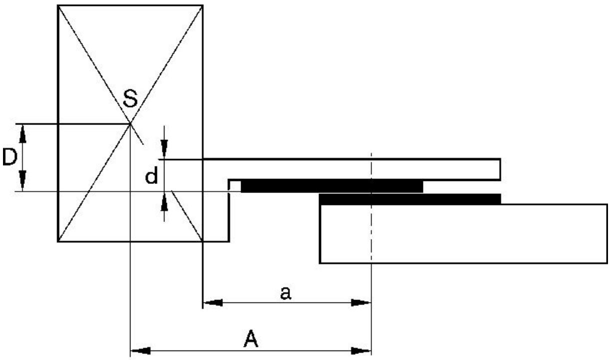
Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.165	0.165	0.165	0.165	0.195	0.265	–	–	–
12	0.28	0.28	0.28	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885	2.085

Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

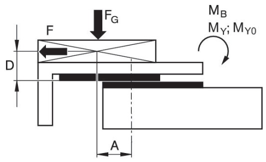
S = stroke

Correction factor (a, d)

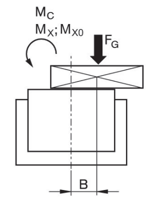


Correction factor (a, d)

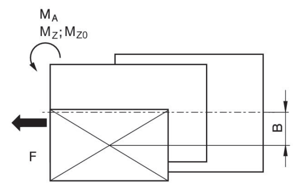
horizontal



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



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



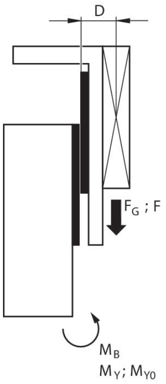
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

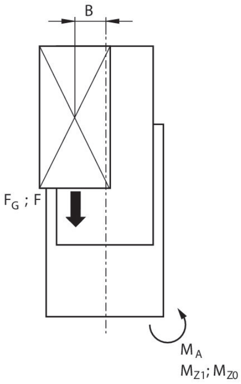
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

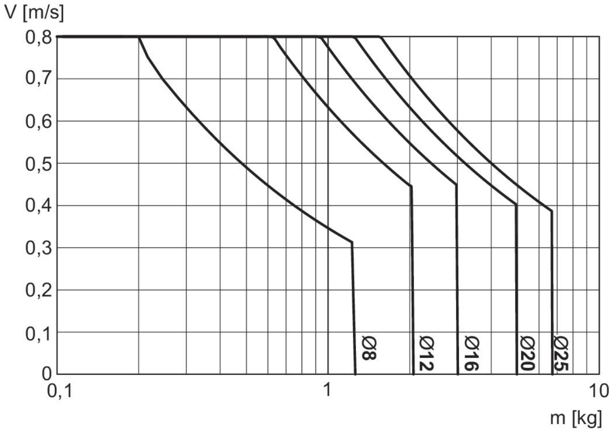


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

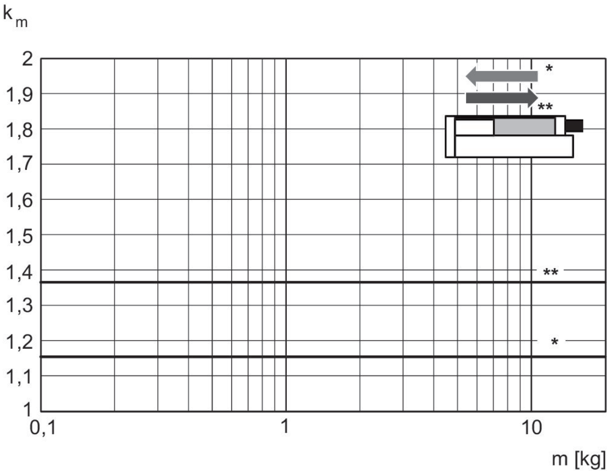
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



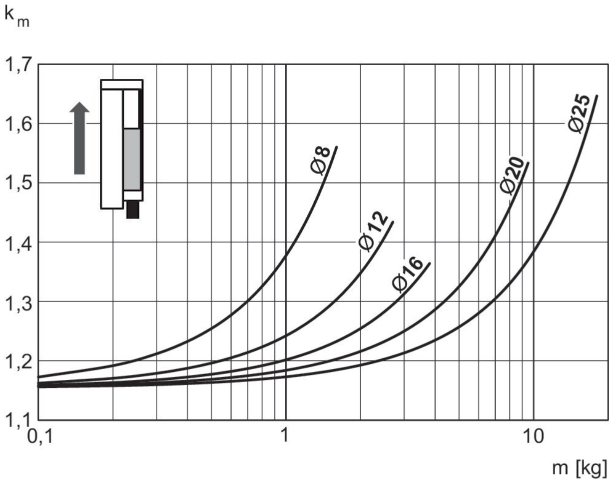
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



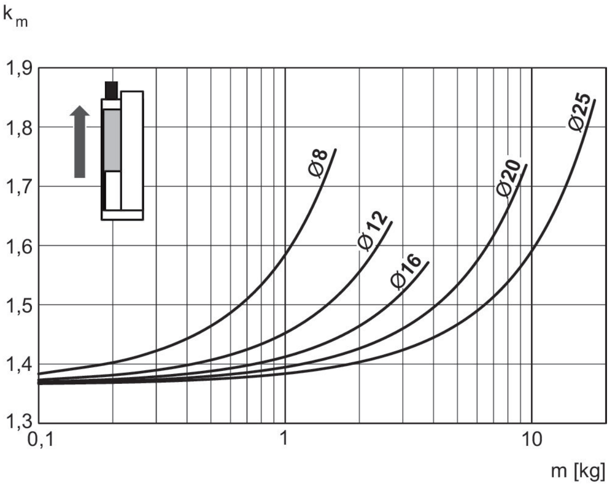
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



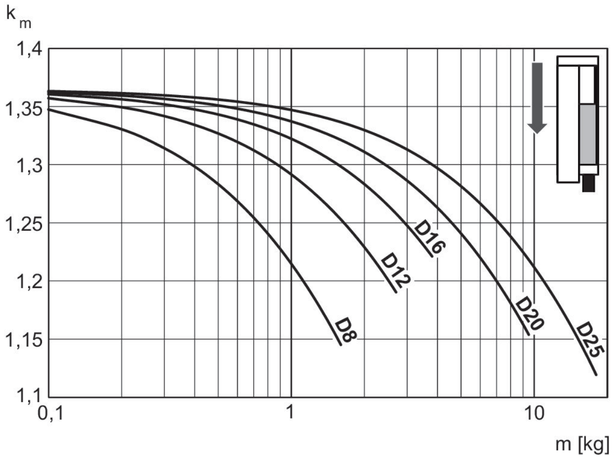
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



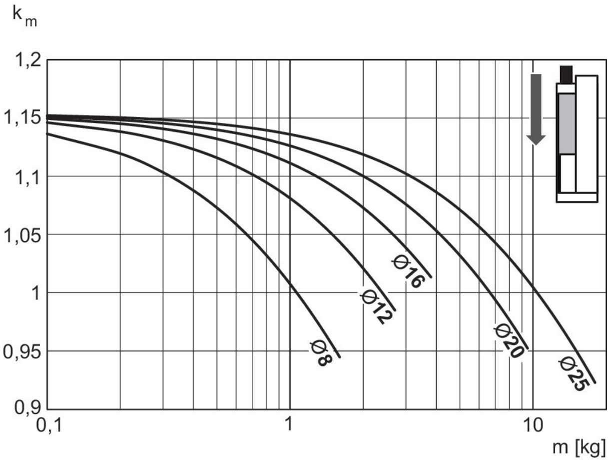
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



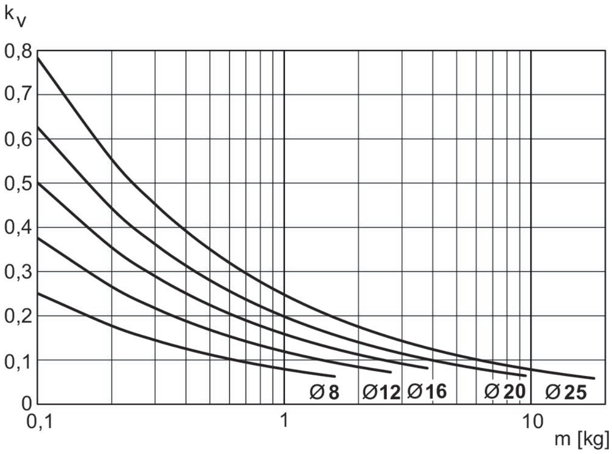
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

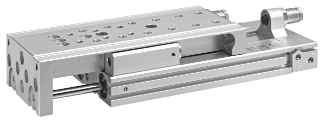
Max. extracting speed

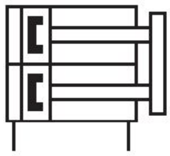


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-MG-EM

Functional principle: Double-acting
Cushioning: Elastic with metal end stop
Easy2Combine: capable
: with magnetic piston
: with double piston
: with integrated ball rail guide
Ambient temperature min./max.: 0 °C ... 60 °C

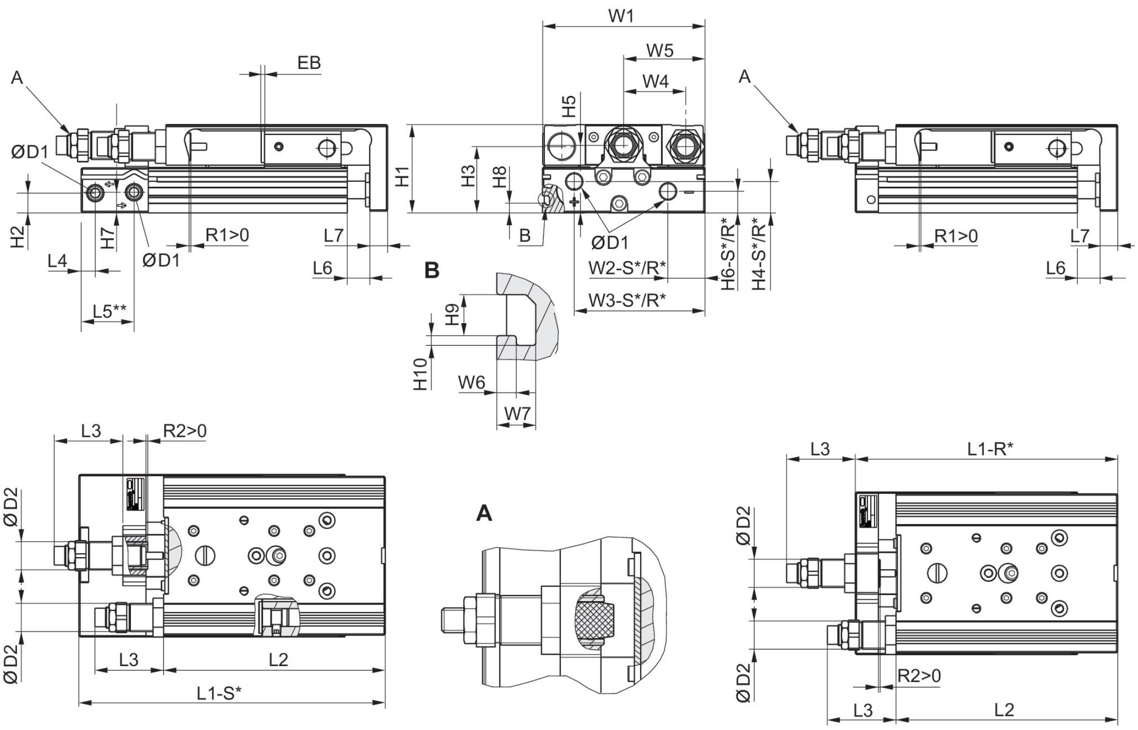




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 10	R480643754	R480643760	R480643767	R480643774	R480643781
20	R480643755	R480643761	R480643768	R480643775	R480643782
30	R480643756	R480643762	R480643769	R480643776	R480643783
40	R480643757	R480643763	R480643770	R480643777	R480643784
50	R480643758	R480643764	R480643771	R480643778	R480643785
80	R480643759	R480643765	R480643772	R480643779	R480643786
100	-	R480643766	R480643773	R480643780	R480643787

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.03 J	0.06 J	0.12 J	0.3 J	0.4 J
Cushioning length	0.65 mm	1.9 mm	1.9 mm	3.05 mm	2.5 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar	3 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Dimensions

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	27.8	9.8	–	1.9
12	5.7	8.3	-	-	-	31.8	7.2	22.5	2
16	7.7	11.2	-	-	-	30	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	43.7	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	41.9	9	31	2.1

Piston Ø	L7	W1	W2-R	W2-S	W3-R	W3-S	W4	W5	W6
8	6	50.2	–	19.3	–	30.5	18	W1/2	–
12	8	66	28.8	28.8	53	53	24.5	W1/2	–
16	10	76	31	31	60.5	60.5	30	W1/2	–
20	10	92	10	21	74	74	35	W1/2	2
25	12	112	11	14	92	92	44	W1/2	2.5

Piston Ø	W7
8	–
12	–
16	–
20	4
25	4.8

Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.165	0.165	0.165	0.165	0.195	0.265	–	–	–
12	0.28	0.28	0.28	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885	2.085

Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=10 L1-R	S=20 L1-R
8	32	22	12	2	2	2	–	–	–
12	32	22	12	2	2	2	2	111	111
16	22	12	2	2	2	2	2	103.5	103.5
20	22	12	2	2	2	2	2	115	115
25	32	22	12	2	2	2	2	138.5	138.5

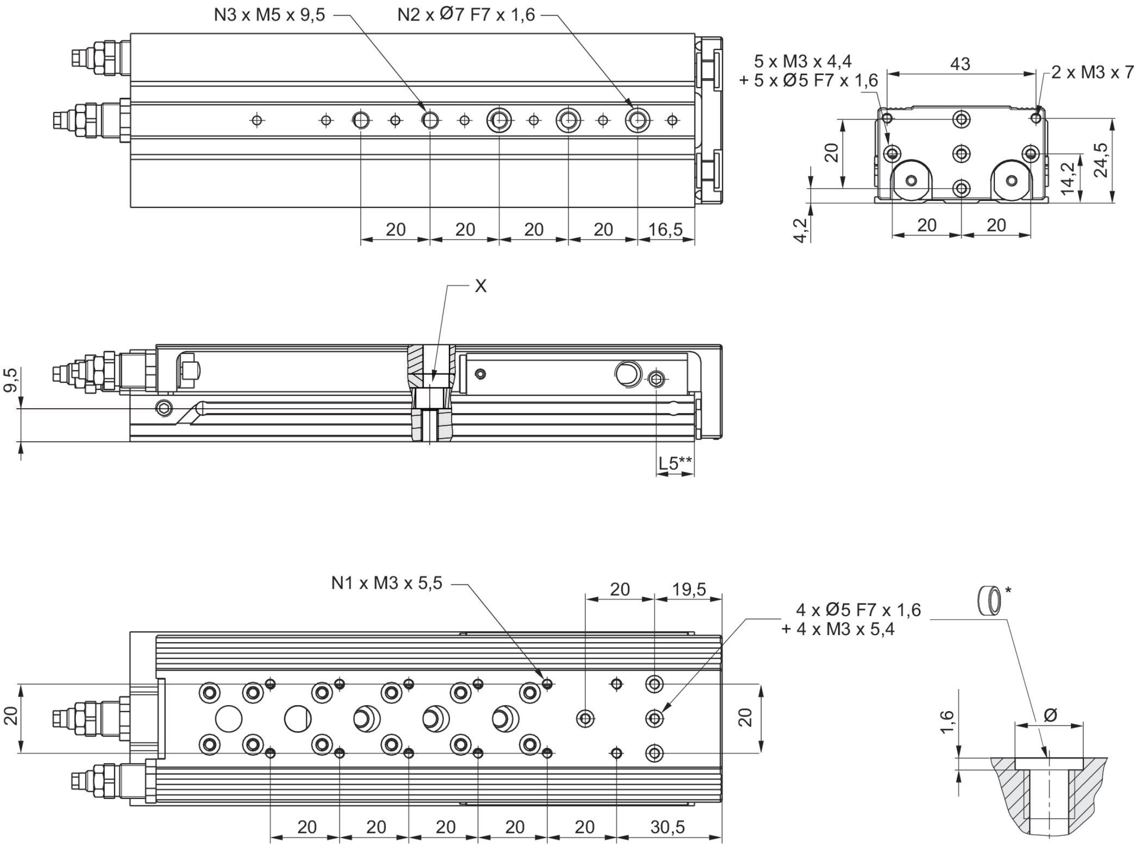
Piston Ø	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S
8	–	–	–	–	–	101.7	101.7	101.7	101.7
12	111	111	126	172	192	127.9	127.9	127.9	127.9
16	103.5	113.5	128.5	174.5	194.5	114.4	114.4	114.4	124.4
20	115	125	140	185	205	139.9	139.9	139.9	149.9
25	138.5	138.5	151.5	197.5	217.5	162.2	162.2	162.2	162.2

Piston Ø	S=50 L1-S	S=80 L1-S	S=100 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	121.7	171.7	–	93.5	93.5	93.5	93.5	113.5	163.5
12	142.9	188.9	208.9	98.8	98.8	98.8	98.8	113.8	159.8
16	139.4	185.4	205.4	90.4	90.4	90.4	100.4	115.4	161.4
20	164.9	209.9	229.9	100.5	100.5	100.5	110.5	125.5	170.5
25	175.2	221.2	241.2	121.5	121.5	121.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.	S=80 R1 max.	S=100 R1 max.	S=10 R2 max.
8	–	4.2	4.2	4.2	4.2	4.2	4.2	–	4.1
12	179.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2
16	181.4	8.7	8.7	8.7	8.7	8.7	8.7	8.7	1.5
20	190.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	1.5
25	200.5	11.5	11.5	11.5	11.5	10.5	11.5	11.5	7.5

Piston Ø	S=20 R2 max.	S=30 R2 max.	S=40 R2 max.	S=50 R2 max.	S=80 R2 max.	S=100 R2 max.
8	4.1	4.1	4.1	4.1	4.1	–
12	2	2	2	10	12	12
16	1.5	1.5	1.5	6	7	5.7
20	1.5	1.5	11.5	9.5	14	14
25	7.5	7.5	7.5	3.3	7.5	9.2

MSC-08

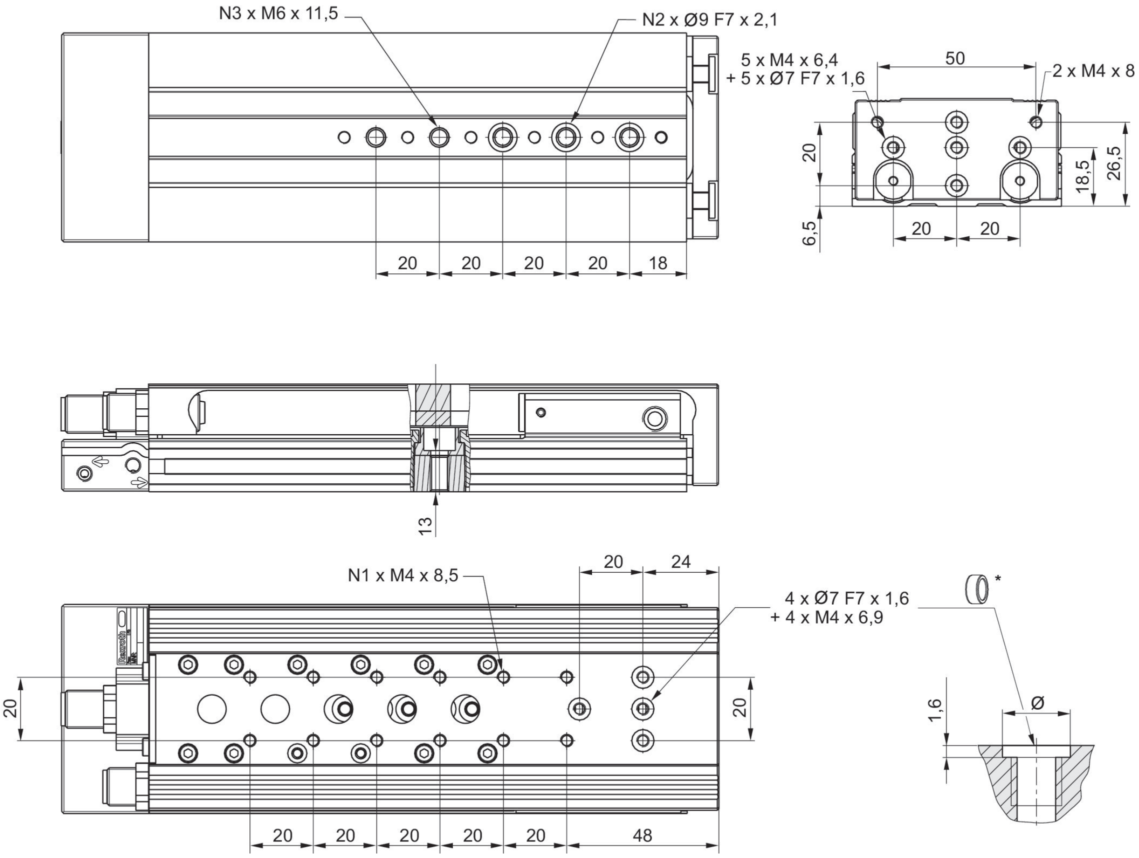


* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	S	N1	N2	N3	L5	X
R480643754	8	10	4	2	2	11	
R480643755	8	20	4	2	2	11	
R480643756	8	30	4	2	2	11	
R480643757	8	40	4	2	2	11	
R480643758	8	50	4	3	3	11	1)
R480643759	8	80	8	3	5	11	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Dimensions
MSC-12

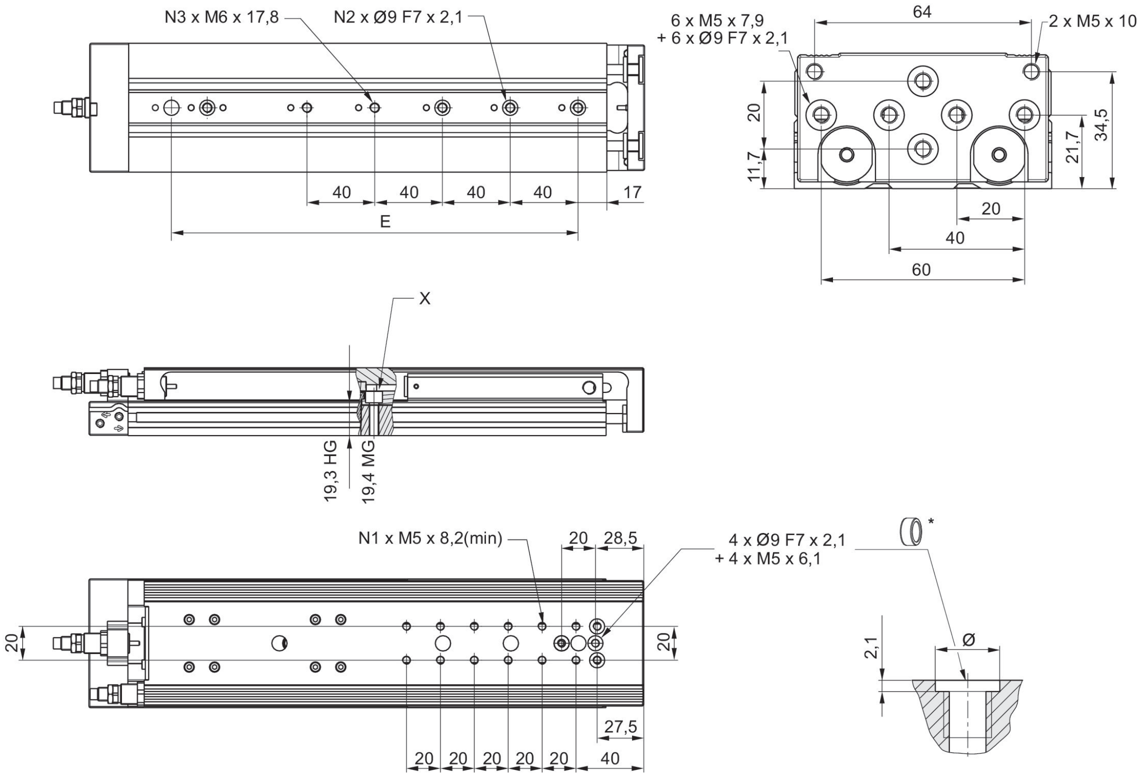


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3
R480643760	12	10	2	2	2
R480643761	12	20	2	2	2
R480643762	12	30	2	2	2
R480643763	12	40	2	2	2
R480643764	12	50	4	3	3
R480643765	12	80	6	3	5
R480643766	12	100	8	3	5

S = stroke

MSC-16

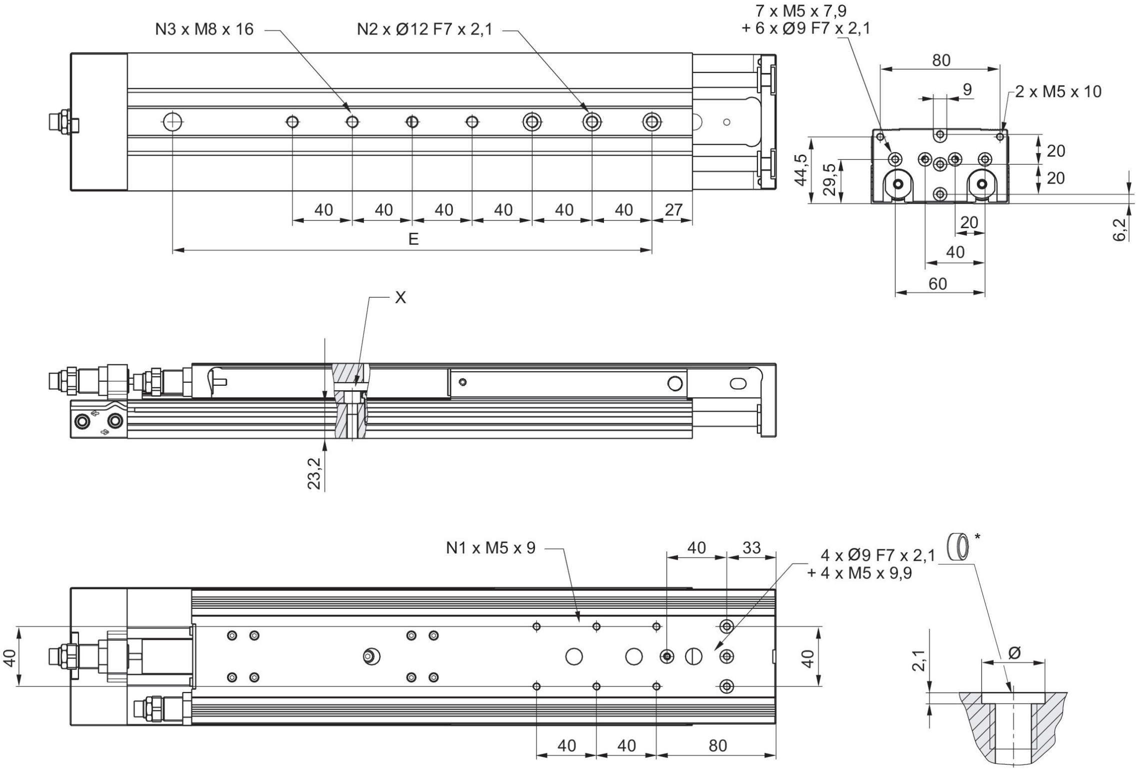


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480643767	16	10	2	2	2	1)
R480643768	16	20	2	2	2	1)
R480643769	16	30	2	2	2	
R480643770	16	40	4	2	2	
R480643771	16	50	4	2	2	
R480643772	16	80	6	3	3	
R480643773	16	100	8	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

MSC-20

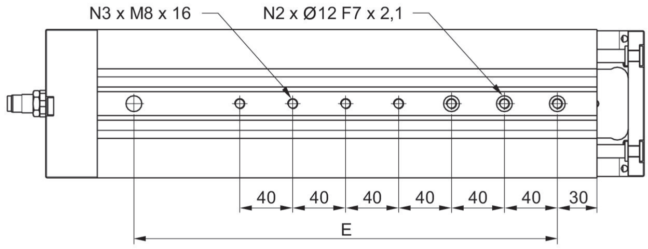


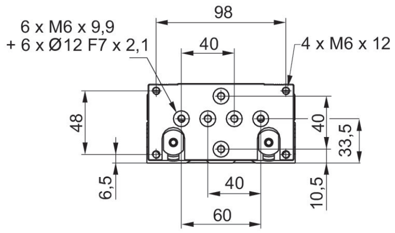
* = centering rings

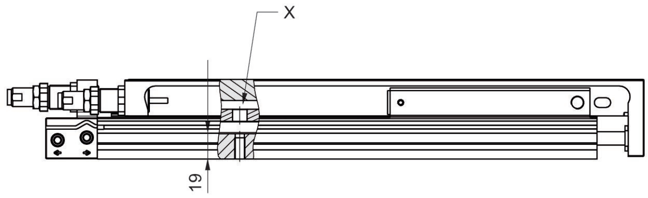
Part No.	Piston Ø	S	N1	N2	N3	X
R480643774	20	10	2	2	2	1)
R480643775	20	20	2	2	2	1)
R480643776	20	30	2	2	2	
R480643777	20	40	2	2	2	
R480643778	20	50	2	2	2	
R480643779	20	80	4	3	3	
R480643780	20	100	4	3	3	

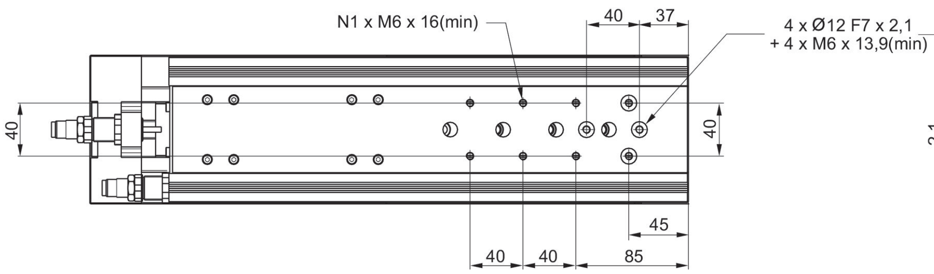
S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

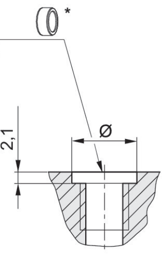
MSC-25









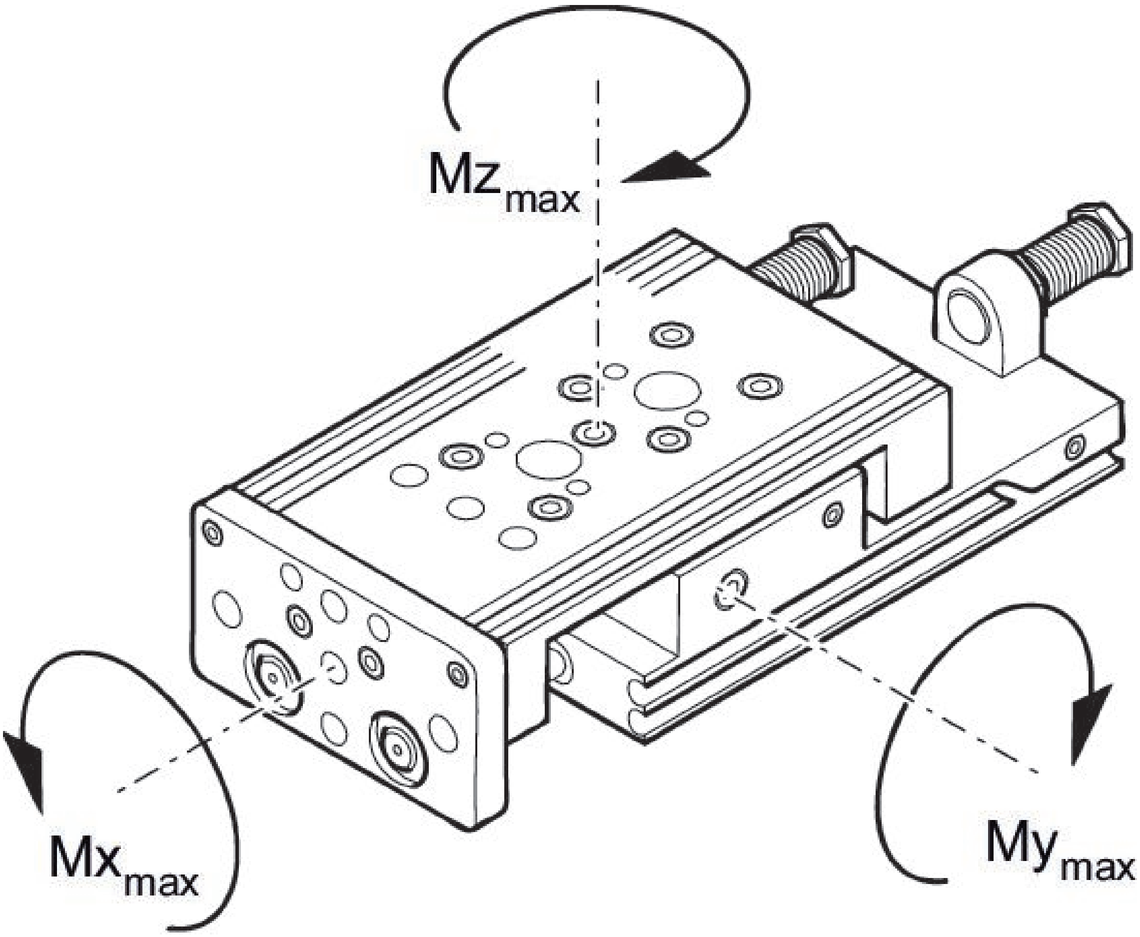


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480643781	25	10	2	2	2	1)
R480643782	25	20	2	2	2	1)
R480643783	25	30	2	2	2	1)
R480643784	25	40	2	2	2	
R480643785	25	50	4	2	2	
R480643786	25	80	4	3	3	
R480643787	25	100	4	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Load capacity

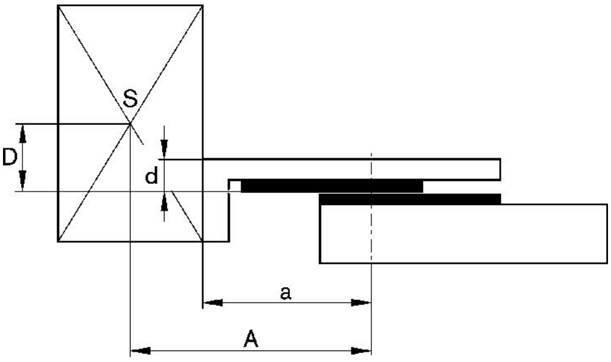


M = max. permissible torque

Correction factor (a)

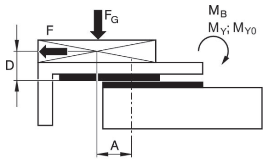
Part No.	Piston Ø	Stroke	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R480643754	8	10	69.5	12	5.8	5.9	5.9
R480643755	8	20	69.5	12	5.8	5.9	5.9
R480643756	8	30	69.5	12	5.8	5.9	5.9
R480643757	8	40	69.5	12	5.8	5.9	5.9
R480643758	8	50	83	12	5.8	5.9	5.9
R480643759	8	80	121	12	8	14.6	14.6
R480643760	12	10	77	15	13.8	6.45	6.45
R480643761	12	20	77	15	13.8	6.45	6.45
R480643762	12	30	77	15	13.8	6.45	6.45
R480643763	12	40	77	15	13.8	6.45	6.45
R480643764	12	50	81	15	13.8	6.45	6.45
R480643765	12	80	117	15	17.3	15.6	15.6
R480643766	12	100	137	15	17.3	15.6	15.6
R480643767	16	10	65	15	31.6	11.95	11.95
R480643768	16	20	65	15	31.6	11.95	11.95
R480643769	16	30	65	15	31.6	11.95	11.95
R480643770	16	40	75	15	31.6	11.95	11.95
R480643771	16	50	86	15	31.6	11.95	11.95
R480643772	16	80	123	15	45	27.3	27.3
R480643773	16	100	144	15	45	27.3	27.3
R480643774	20	10	75	20	31.6	11.95	11.95
R480643775	20	20	75	20	31.6	11.95	11.95
R480643776	20	30	75	20	31.6	11.95	11.95
R480643777	20	40	75	20	31.6	11.95	11.95
R480643778	20	50	92	20	31.6	11.95	11.95
R480643779	20 20	80	125	20	45	27.3	27.3
R480643780	20	100	143	20	45	27.3	27.3
R480643781	25	10	85	24	87	24.5	24.5
R480643782	25	20	85	24	87	24.5	24.5
R480643783	25	30	85	24	87	24.5	24.5
R480643784	25	40	85	24	87	24.5	24.5
R480643785	25	50	102	24	87	24.5	24.5
R480643786	25	80	134	24	110	62.5	62.5
R480643787	25	100	152	24	110	62.5	62.5

Correction factor (a, d)

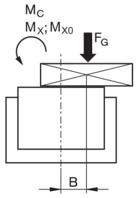


Correction factor (a, d)

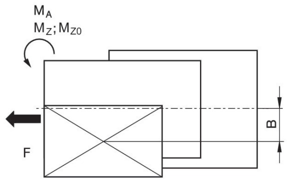
horizontal



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



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



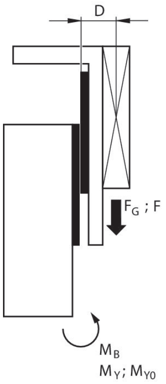
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

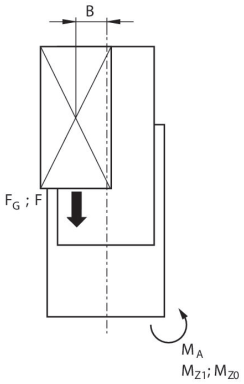
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

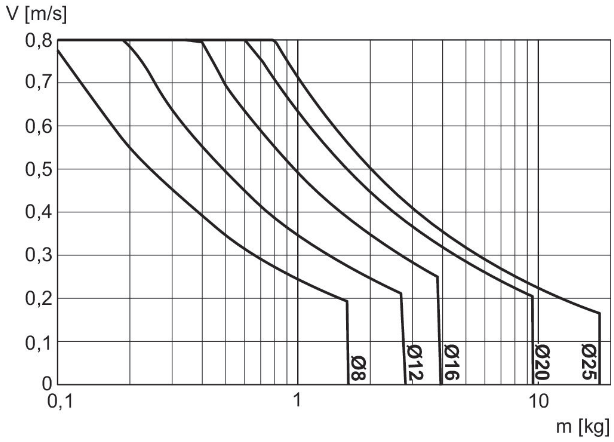


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

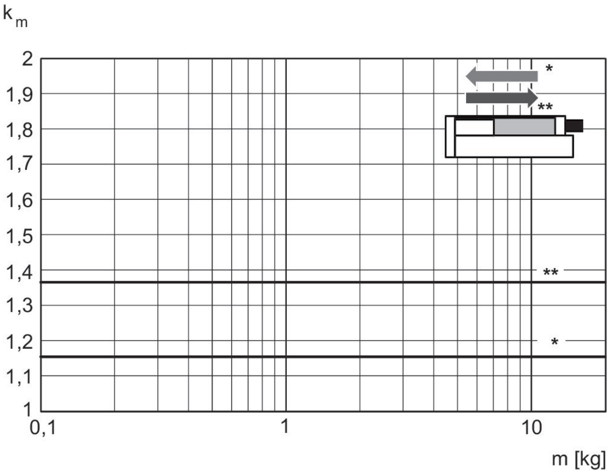
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



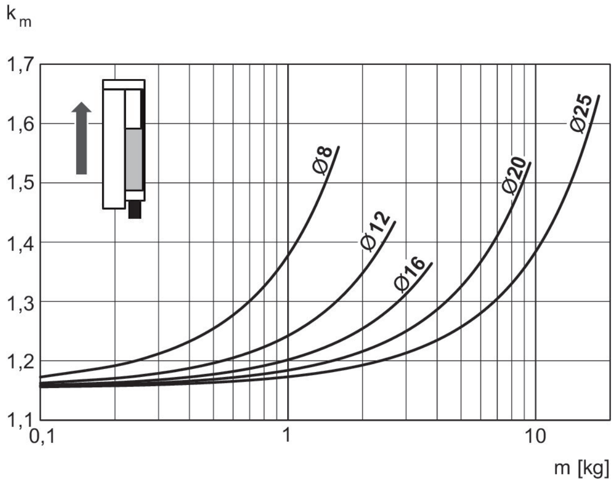
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



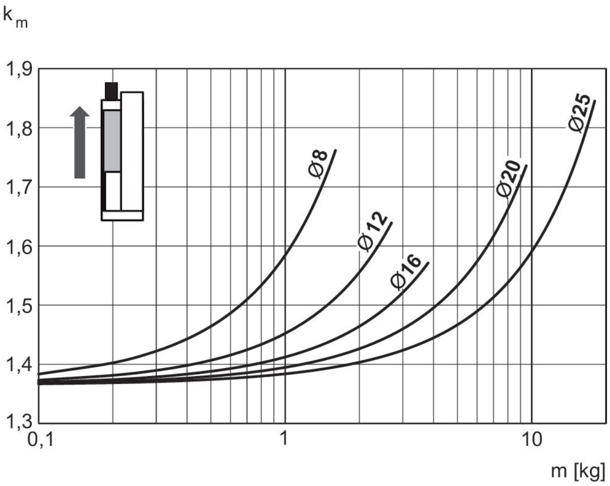
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



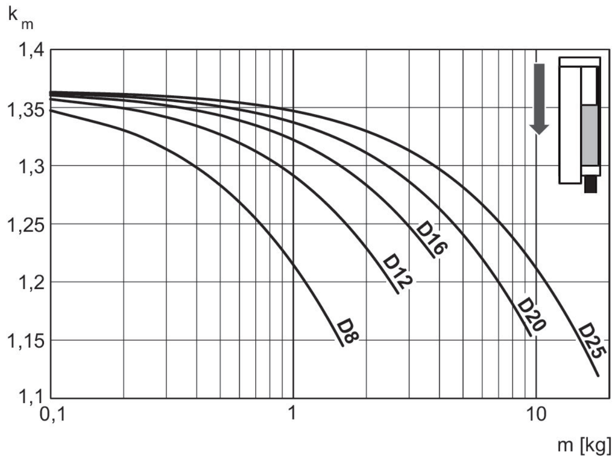
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

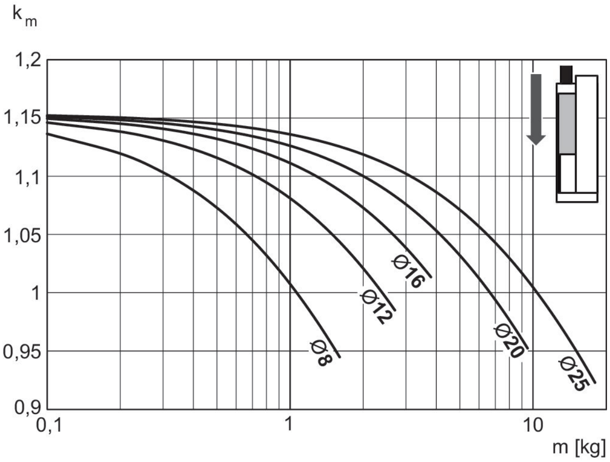
Correction factor for required speed: retracting, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

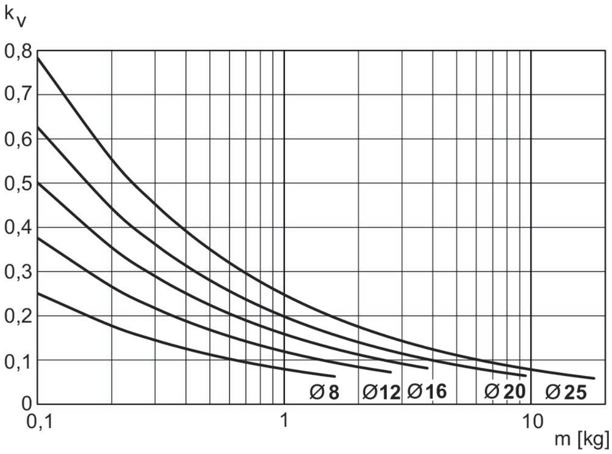
EMERSON

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

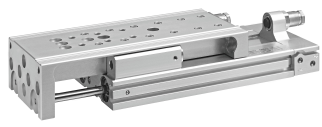
Max. extracting speed

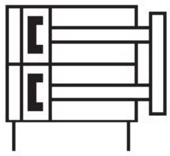


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-MG-PM/PE

Functional principle: Double-acting
Cushioning: Pneumatically
Easy2Combine: capable
: with magnetic piston
: with double piston
: with integrated ball rail guide
Ambient temperature min./max.: 0 °C ... 60 °C

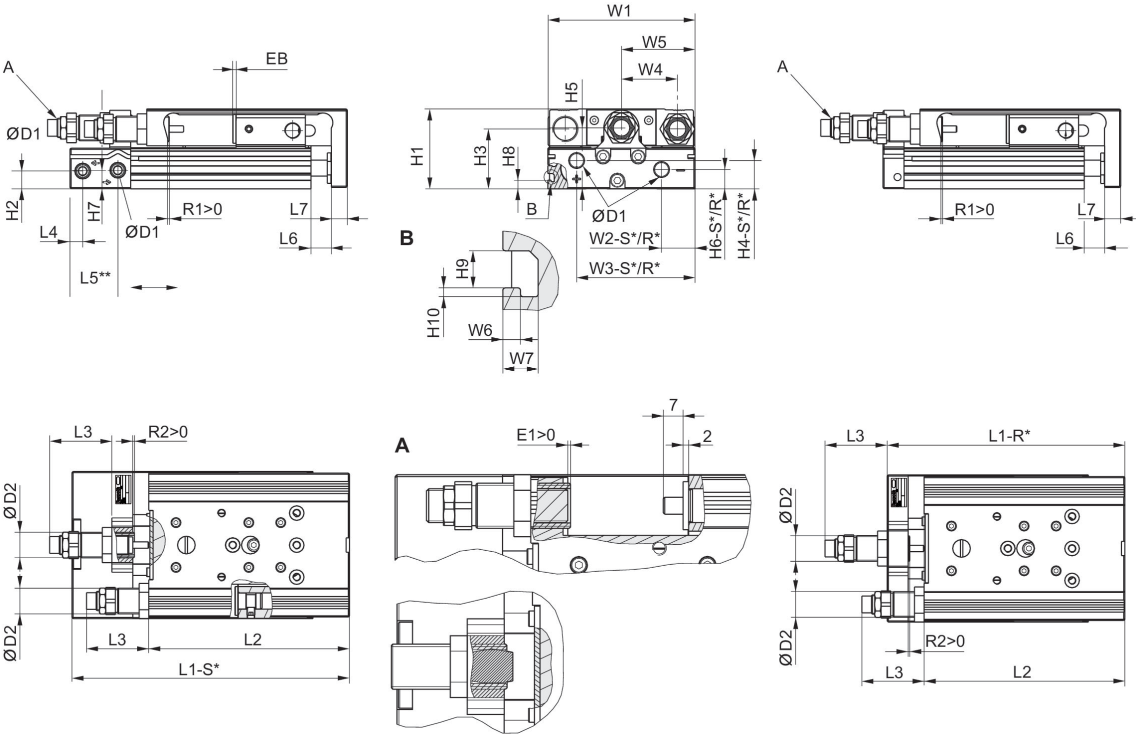




Piston Ø	16 mm	20 mm	25 mm
Ports	M5	G 1/8	G 1/8
Stroke 50	R480640154	R480640157	R480640160
80	R480640155	R480640158	R480640161
100	R480640156	R480640159	R480640162

Piston Ø	16 mm	20 mm	25 mm
Retracting piston force, theoretical	218 N	297 N	520 N
Extracting piston force, theoretical	182 N	269 N	421 N
Cushion-ing energy	0.5 J	1.2 J	1.6 J
Cushioning length	7 mm	7 mm	7 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	3 bar ... 10 bar	3 bar ... 10 bar	2 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 1) max.	L3 2) max.	L4	L5 3)
16	7.7	11.2	-	-	-	12	47	6.5	17.7
20	12.2	11.7	5.5	4.2	1	15	57	8	30
25	21.7	16.2	6.9	5.2	1.5	15	62	9	31

Piston Ø	L6	L7	R2	W1	W2-R	W2-S	W3-R	W3-S	W4
16	2	10	3	76	31	31	60.5	60.5	30
20	2.1	10	3	92	10	21	74	74	35
25	2.1	12	3	112	11	14	92	92	44

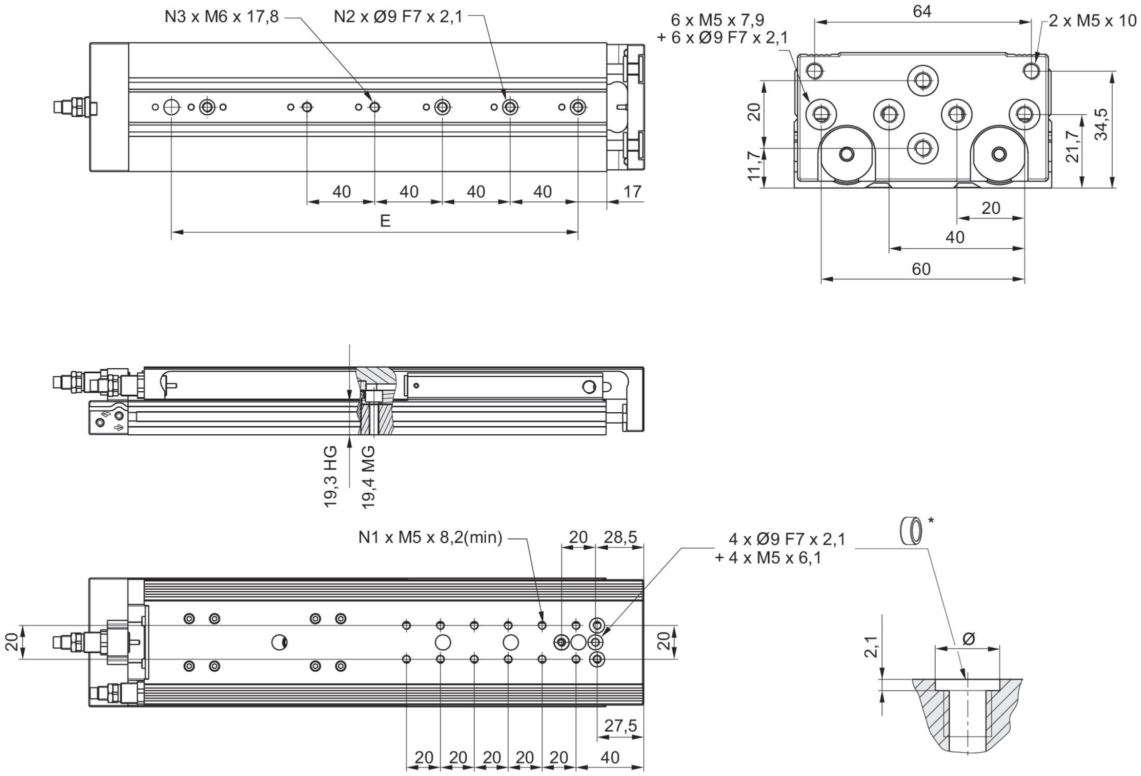
Piston Ø	W5	W6	W7
16	W1/2	–	–
20	W1/2	2	4
25	W1/2	2.5	4.8

Stroke-dependent dimensions

Piston Ø	S=50 EB	S=80 EB	S=100 EB	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=50 L1-S	S=80 L1-S	S=100 L1-S
16	2	2	2	126.8	172.8	192.8	137.7	183.7	203.7
20	2	2	2	137.9	182.9	202.9	162.8	207.8	227.8
25	2	2	2	149.1	195.1	215.1	172.8	218.8	238.8

Piston Ø	S=50 L2	S=80 L2	S=100 L2	S=50 R1 max.	S=80 R1 max.	S=100 R1 max.
16	115.4	161.4	181.4	8.7	8.7	8.7
20	125.5	170.5	190.5	12.4	12.4	12.4
25	134.5	180.5	200.5	10.5	11.5	11.5

Dimensions
MSC-16

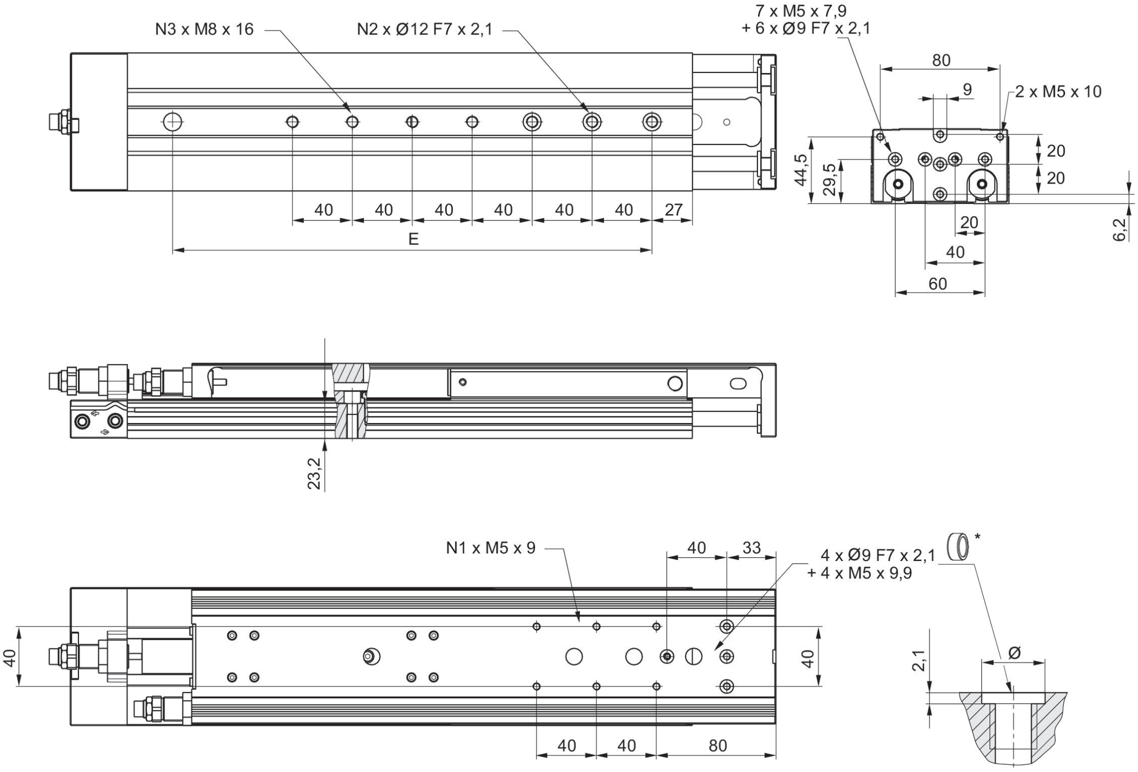


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3
R480640154	16	50	4	2	2
R480640155	16	80	6	3	3
R480640156	16	100	8	3	3

S = stroke

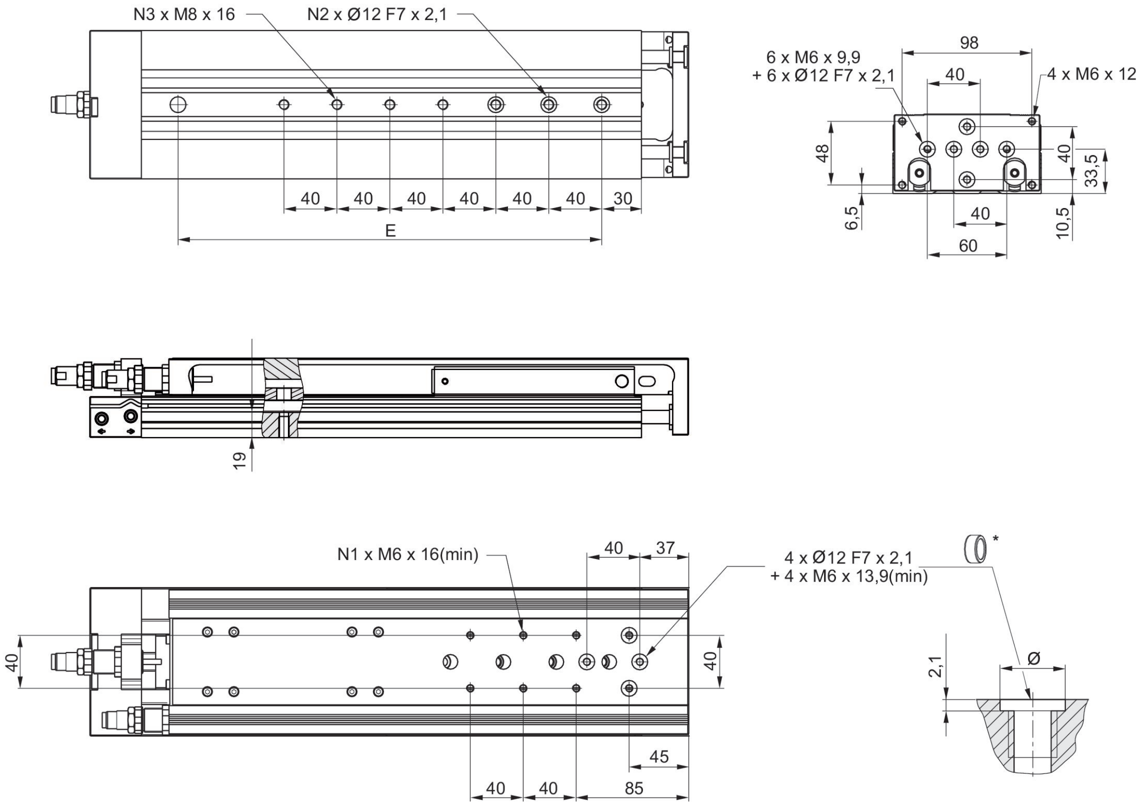
Dimensions
MSC-20



* = centering rings

Part No.	Piston Ø	Stroke	N1	N2	N3
R480640157	20	50	2	2	2
R480640158	20	80	4	3	3
R480640159	20	100	4	3	3

Dimensions
MSC-25

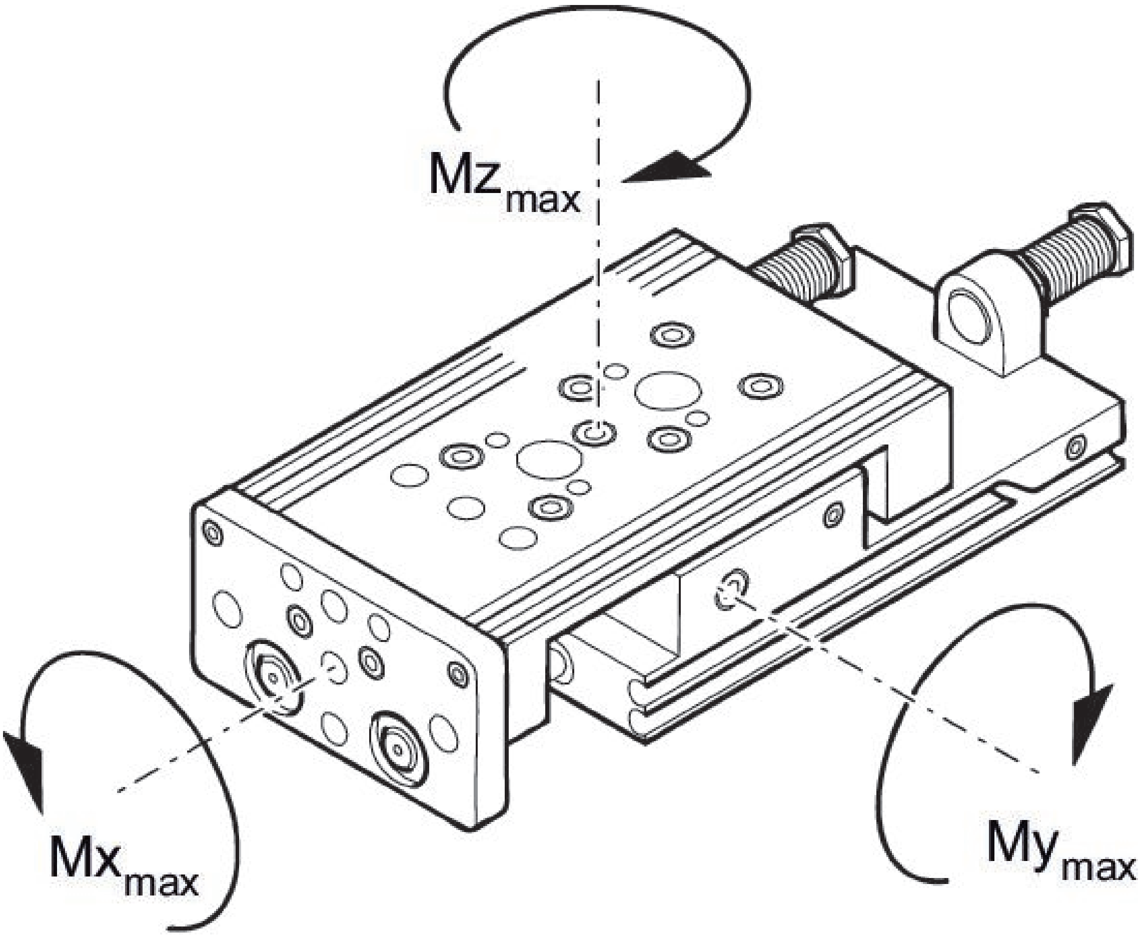


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3
R480640160	25	50	4	2	2
R480640161	25	80	4	3	3
R480640162	25	100	4	3	3

S = stroke

Load capacity



M = max. permissible torque

Correction factor (a)

Piston Ø	Stroke	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
16	50	86	15	31,6	11,95	11,95
20	50	92	20	31,6	11,95	11,95
25	50	102	24	87	24,5	24,5

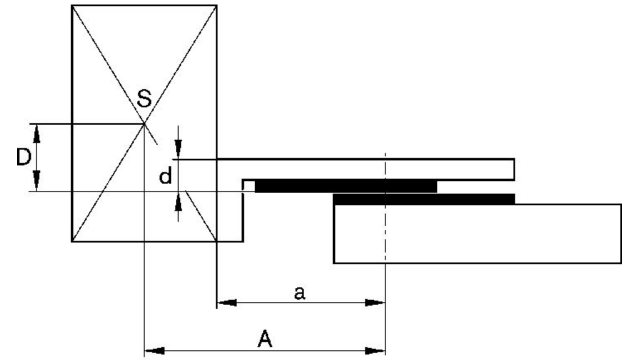
Weight of moving parts [kg]

Part No.	Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125
R480640154	16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725
R480640155	16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725
R480640156	16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725
R480640157	20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2
R480640158	20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2
R480640159	20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2
R480640160	25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885
R480640161	25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885
R480640162	25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885

Part No.	S=150	S=200
R480640154	0.765	–
R480640155	0.765	–
R480640156	0.765	–
R480640157	1.29	1.54
R480640158	1.29	1.54
R480640159	1.29	1.54
R480640160	2.085	2.445
R480640161	2.085	2.445
R480640162	2.085	2.445

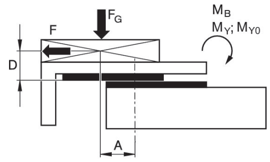
S = stroke

Correction factor (a, d)

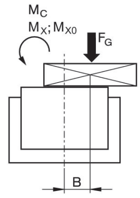


Correction factor (a, d)

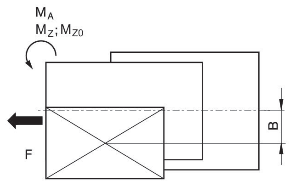
horizontal



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



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



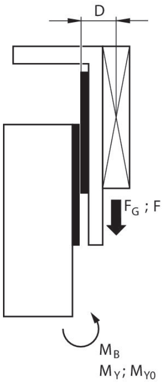
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

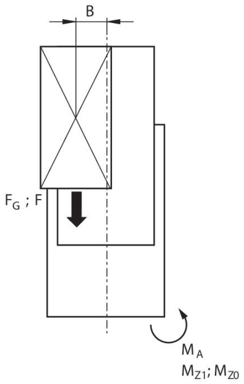
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

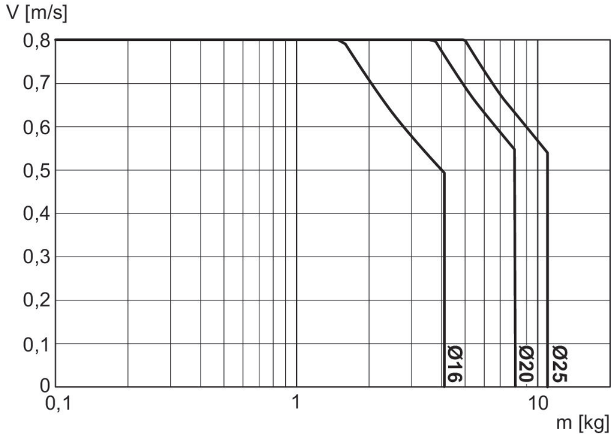


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

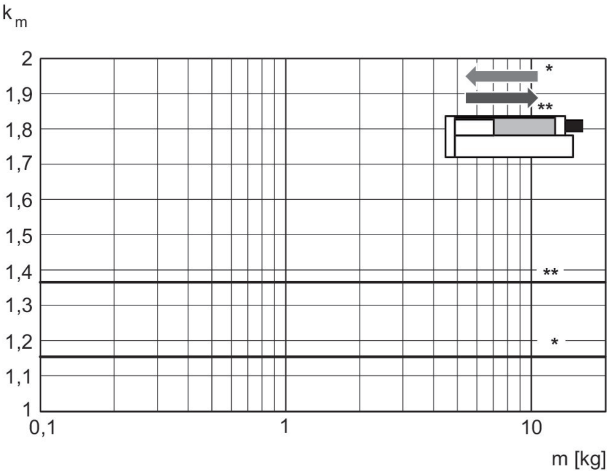
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Maximum moving mass



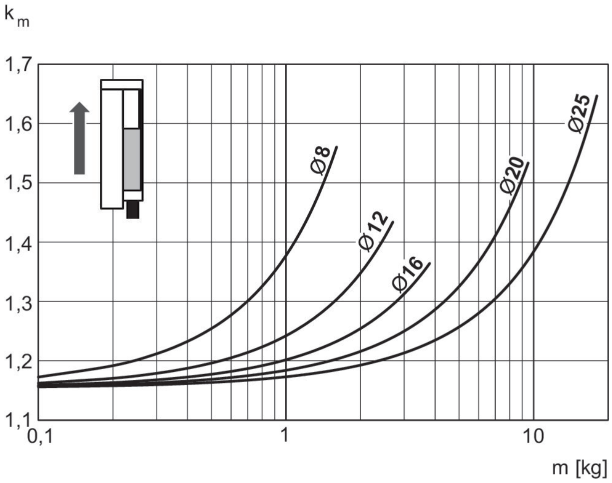
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



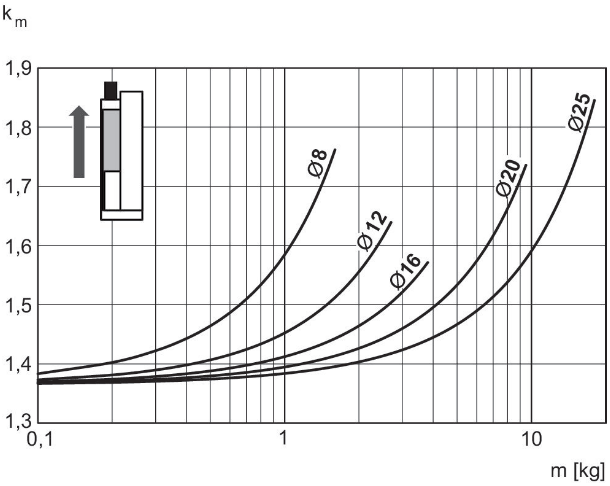
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Correction factor for required speed: extending, vertical, upwards



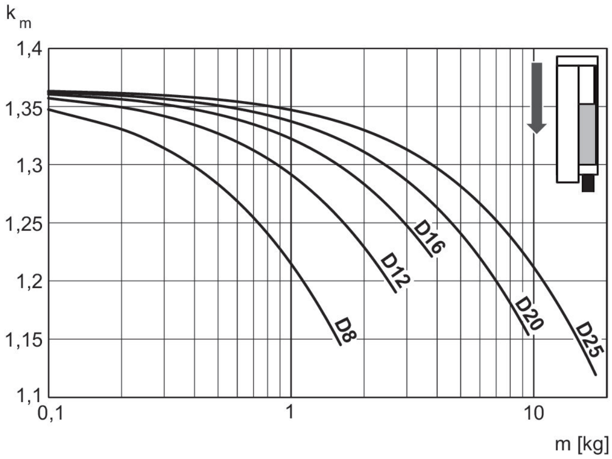
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



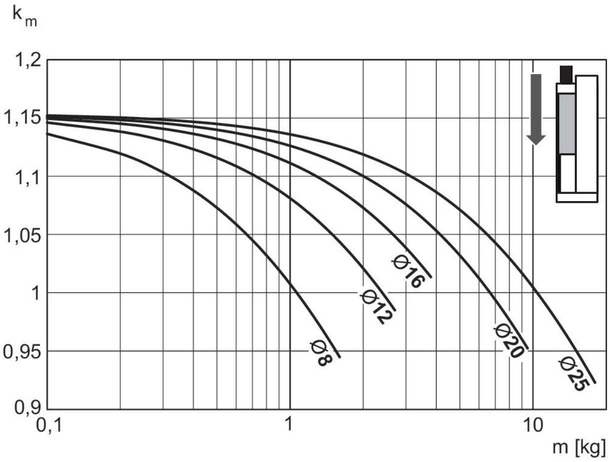
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



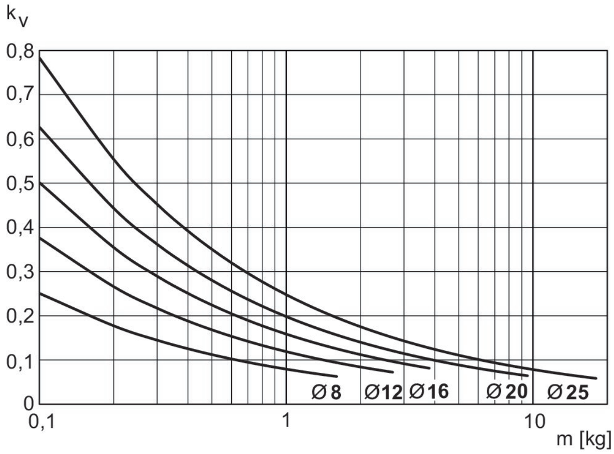
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

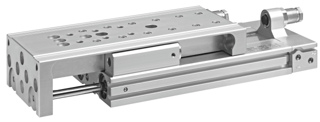
Max. extracting speed

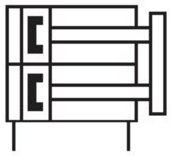


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Mini slide, Series MSC-MG-HM

Functional principle: Double-acting
Cushioning: hydraulic
Easy2Combine: capable
: with magnetic piston
: with double piston
: with integrated ball rail guide
Ambient temperature min./max.: 0 °C ... 60 °C

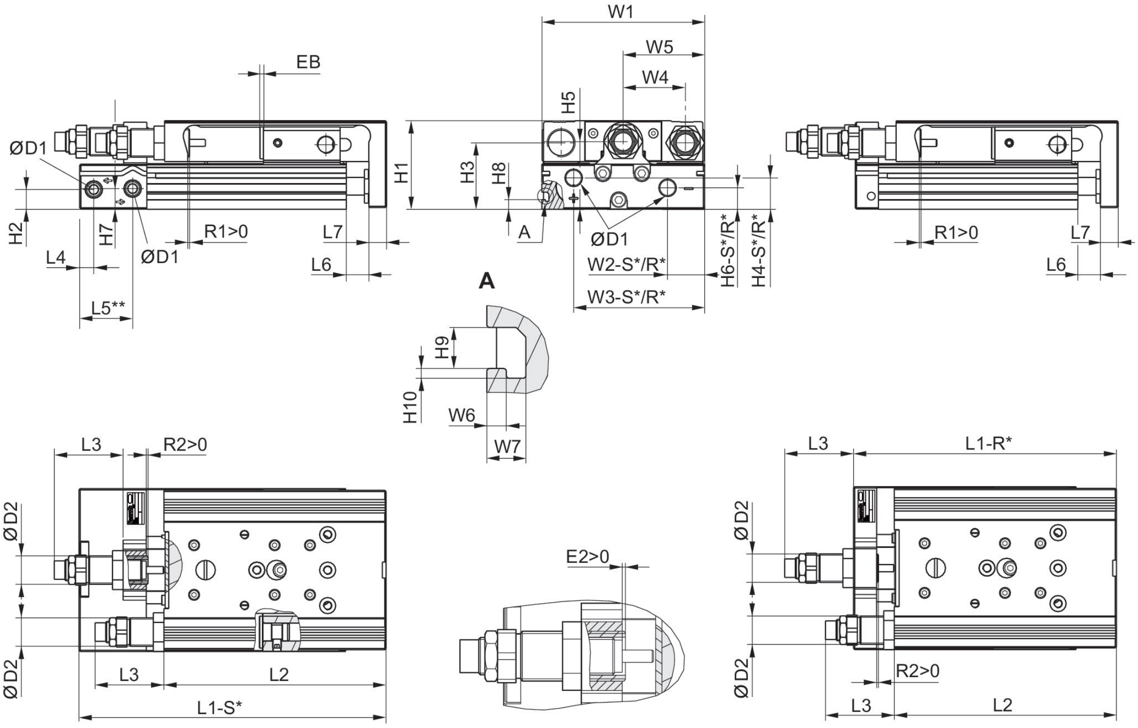




Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Ports	M5	M5	M5	G 1/8	G 1/8
Stroke 20	R480640164	-	-	-	-
30	R480640165	R480640171	R480640178	R480640185	R480640192
40	R480640166	R480640172	R480640179	R480640186	R480640193
50	R480640167	R480640173	R480640180	R480640187	R480640194
80	R480640168	R480640174	R480640181	R480640188	R480640195
100	-	R480640175	R480640182	R480640189	R480640196

Piston Ø	8 mm	12 mm	16 mm	20 mm	25 mm
Retracting piston force, theoretical	48 N	107 N	218 N	297 N	520 N
Extracting piston force, theoretical	63 N	143 N	253 N	396 N	619 N
Cushion-ing energy	0.6 J	1 J	1.2 J	3.1 J	5.8 J
Cushioning length	5 mm	7 mm	7 mm	10 mm	14 mm
Max. speed	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s	0.8 m/s
Working pres-sure min./max.	1.5 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar	1 bar ... 10 bar

Dimensions



R*: base with air connections only at the back
S*: base with air connections at the back and sides
** Ø 8 has a different reference plane.

Dimensions

Piston Ø	Ø D1	Ø D2	H1	H2	H3	H4-R	H4-S	H5	H6-R
8	M5	M10x1	28	9.6	20.5	-	7.5	19.5	-
12	M5	M12x1	34	5.7	25	11.2	11.2	24.5	5.7
16	M5	M12x1	40	7.2	29	12.2	12.2	31	7.7
20	G 1/8	M16x1,5	50	11.2	37.5	17.3	17.3	38.2	11.7
25	G 1/8	M18x1,5	60	14.2	44	15.5	22.9	46.5	13.2

Piston Ø	H6-S	H7	H8	H9	H10	L3 max.	L4	L5 2)	L6
8	5.5	18	-	-	-	31	9.8	–	1.9
12	5.7	8.3	-	-	-	46.7	7.2	22.5	2
16	7.7	11.2	-	-	-	44.9	6.5	17.7	2
20	12.2	11.7	5.5	4.2	1	48.9	8	30	2.1
25	21.7	16.2	6.9	5.2	1.5	67.7	9	31	2.1

Piston Ø	L7	R2	W1	W2-R	W2-S	W3-R	W3-S	W4	W5
8	6	1.9	50.2	–	19.3	–	30.5	18	W1/2
12	8	2	66	28.8	28.8	53	53	24.5	W1/2
16	10	2	76	31	31	60.5	60.5	30	W1/2
20	10	2.1	92	10	21	74	74	35	W1/2
25	12	2.1	112	11	14	92	92	44	W1/2

Piston Ø	W6	W7
8	–	–
12	–	–
16	–	–
20	2	4
25	2.5	4.8

Stroke-dependent dimensions

Piston Ø	S=10 EB	S=20 EB	S=30 EB	S=40 EB	S=50 EB	S=80 EB	S=100 EB	S=10 L1-R	S=20 L1-R
8	32	22	12	2	2	2	–	–	–
12									
16	22	12	2	2	2	2	2	101.8	101.8
20	22	12	2	2	2	2	2	112.9	112.9
25	32	22	12	2	2	2	2	136.1	136.1

Piston Ø	S=30 L1-R	S=40 L1-R	S=50 L1-R	S=80 L1-R	S=100 L1-R	S=10 L1-S	S=20 L1-S	S=30 L1-S	S=40 L1-S
8	–	–	–	–	–	100.7	100.7	100.7	100.7
12									
16	101.8	111.8	126.8	172.8	192.8	112.7	112.7	112.7	122.7
20	112.9	122.9	137.9	182.9	202.9	137.8	137.8	137.8	147.8
25	136.1	136.1	149.1	195.1	215.1	159.8	159.8	159.8	159.8

Piston Ø	S=50 L1-S	S=80 L1-S	S=100 L1-S	S=10 L2	S=20 L2	S=30 L2	S=40 L2	S=50 L2	S=80 L2
8	120.7	170.7	–	93.5	93.5	93.5	93.5	113.5	163.5
12									
16	137.7	183.7	203.7	90.4	90.4	90.4	100.4	115.4	161.4
20	162.8	207.8	227.8	100.5	100.5	100.5	110.5	125.5	170.5
25	172.8	218.8	238.8	121.5	121.5	121.5	121.5	134.5	180.5

Piston Ø	S=100 L2	S=10 R1 max.	S=20 R1 max.	S=30 R1 max.	S=40 R1 max.	S=50 R1 max.	S=80 R1 max.	S=100 R1 max.	S=10 R2 max.
8	–	4.2	4.2	4.2	4.2	4.2	4.2	–	4.1
12									
16	181.4	8.7	8.7	8.7	8.7	8.7	8.7	8.7	1.5
20	190.5	12.4	12.4	12.4	12.4	12.4	12.4	12.4	1.5
25	200.5	11.5	11.5	11.5	11.5	10.5	11.5	11.5	7.5

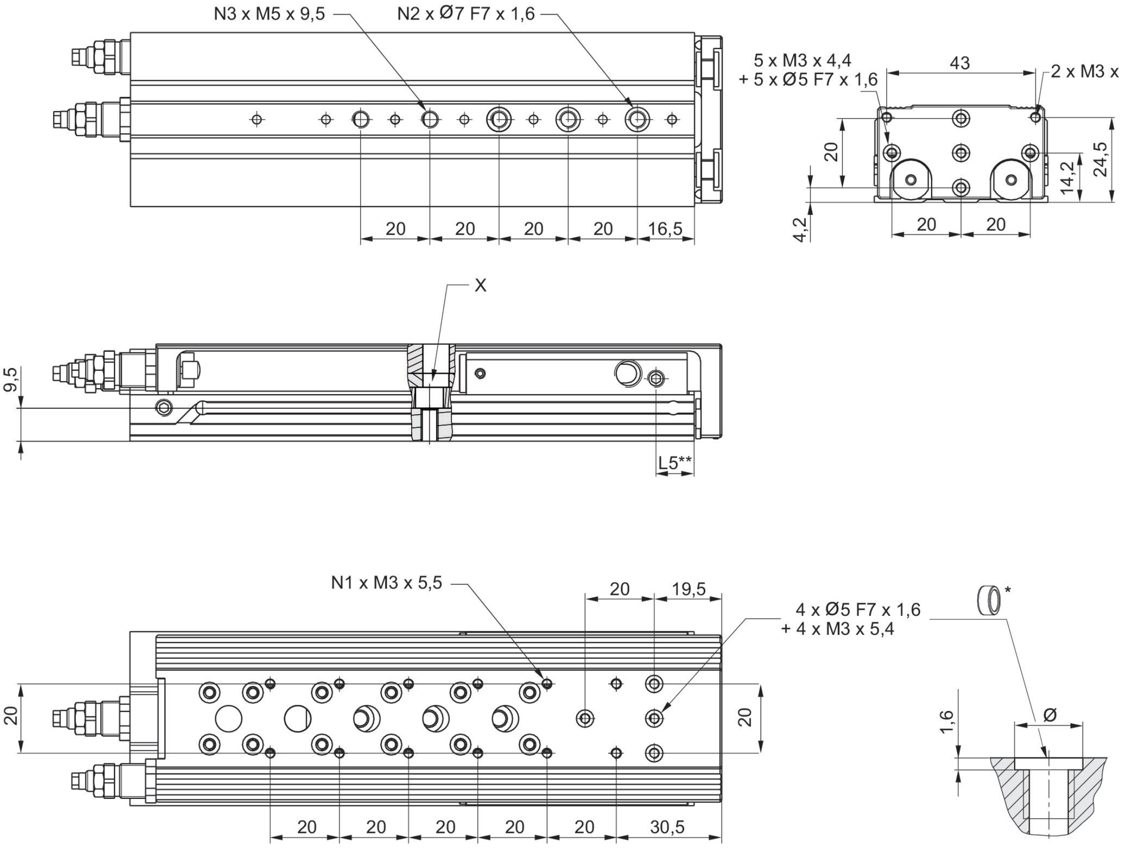
Piston Ø	S=20 R2 max.	S=30 R2 max.	S=40 R2 max.	S=50 R2 max.	S=80 R2 max.	S=100 R2 max.
8	4.1	4.1	4.1	4.1	4.1	–
12						
16	1.5	1.5	1.5	6	7	5.7
20	1.5	1.5	11.5	9.5	14	14
25	7.5	7.5	7.5	3.3	7.5	9.2

Weight of moving parts [kg]

Piston Ø	S=10	S=20	S=30	S=40	S=50	S=80	S=100	S=125	S=150
8	0.165	0.165	0.165	0.165	0.195	0.265	–	–	–
12	0.28	0.28	0.28	0.28	0.315	0.403	0.46	–	–
16	0.375	0.375	0.375	0.4	0.45	0.615	0.65	0.725	0.765
20	0.655	0.655	0.655	0.69	0.765	0.985	1.035	1.2	1.29
25	1.1	1.1	1.1	1.1	1.225	1.45	1.625	1.885	2.085

Piston Ø	S=200
8	–
12	–
16	–
20	1.54
25	2.445

MSC-08

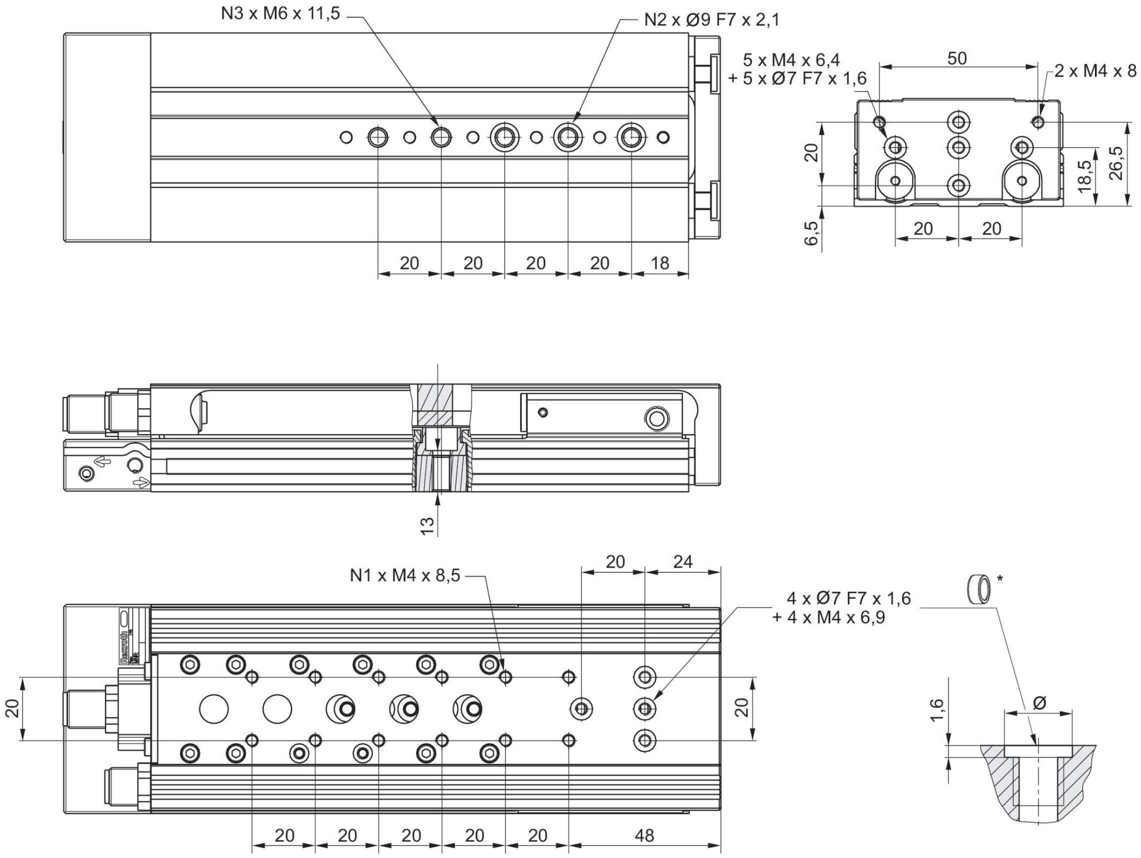


* = centering rings
** Ø 8 has a different reference plane.

Part No.	Piston Ø	S	N1	N2	N3	L5	X
R480640164	8	20	4	2	2	11	
R480640165	8	30	4	2	2	11	
R480640166	8	40	6	2	2	11	
R480640167	8	50	8	3	3	11	1)
R480640168	8	80	12	3	5	11	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Dimensions
MSC-12

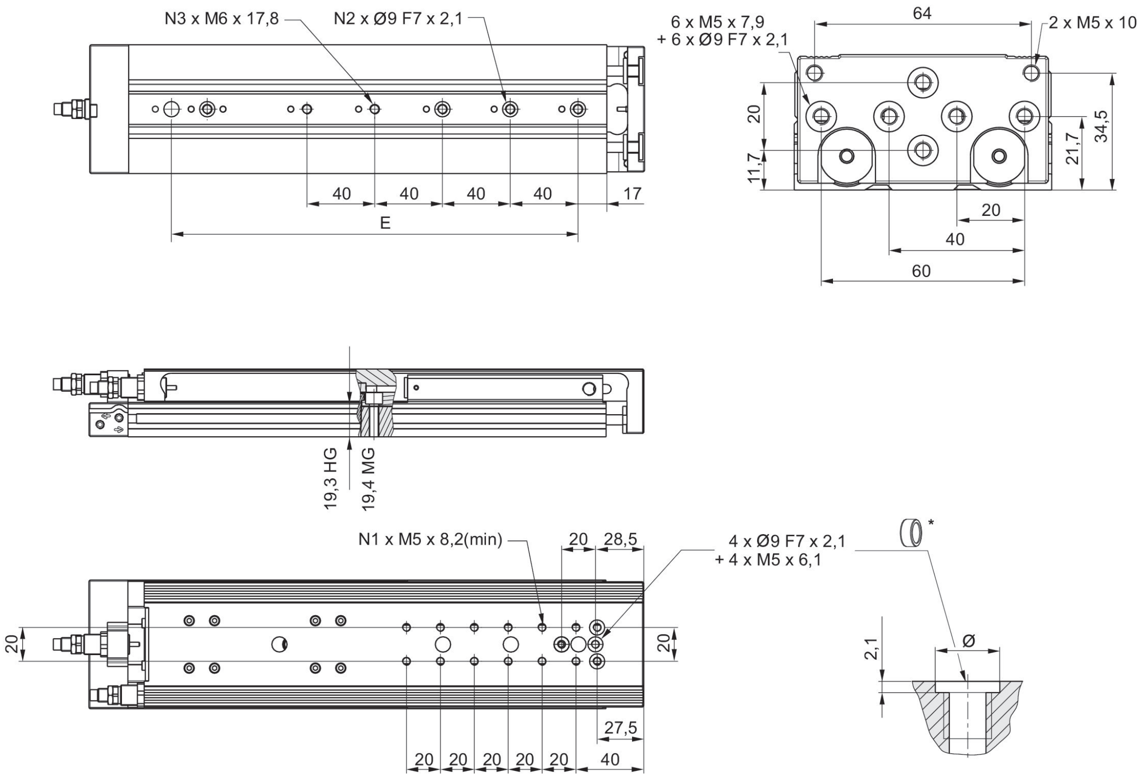


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3
R480640171	12	30	2	2	2
R480640172	12	40	2	2	2
R480640173	12	50	4	3	3
R480640174	12	80	6	3	5
R480640175	12	100	8	3	5

S = stroke

Dimensions
MSC-16

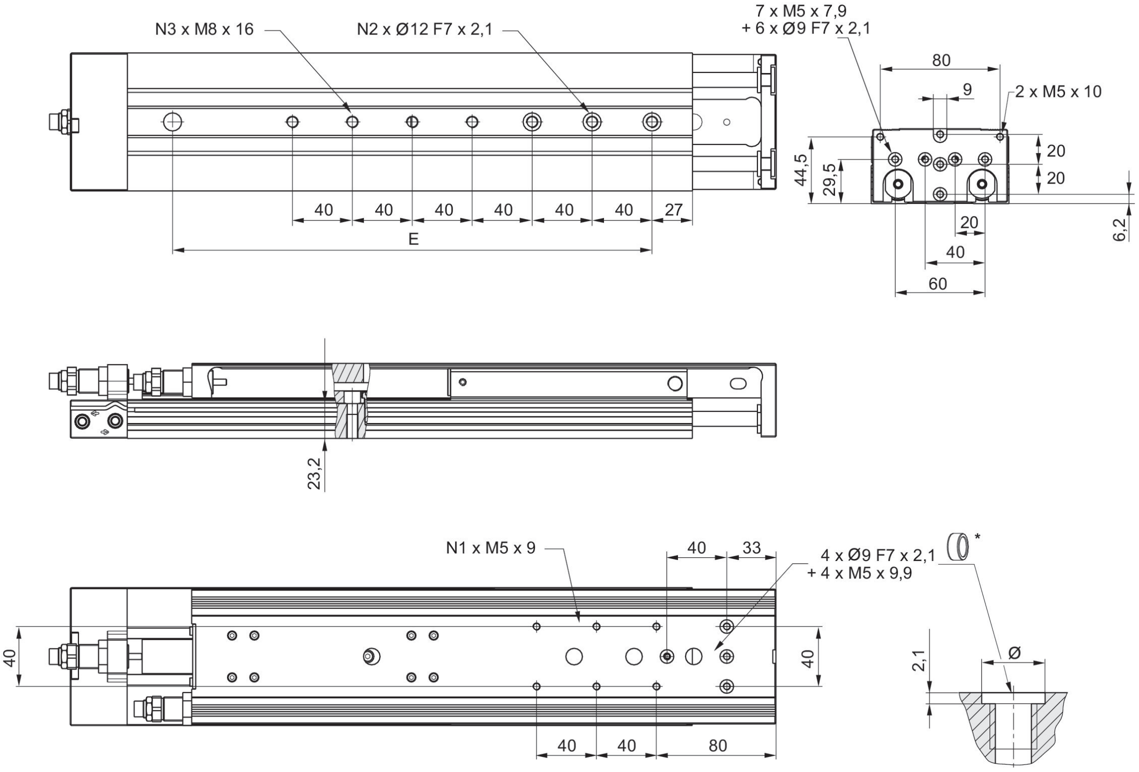


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480640178	16	30	2	2	2	
R480640179	16	40	4	2	2	
R480640180	16	50	4	2	2	
R480640181	16	80	6	3	3	
R480640182	16	100	8	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

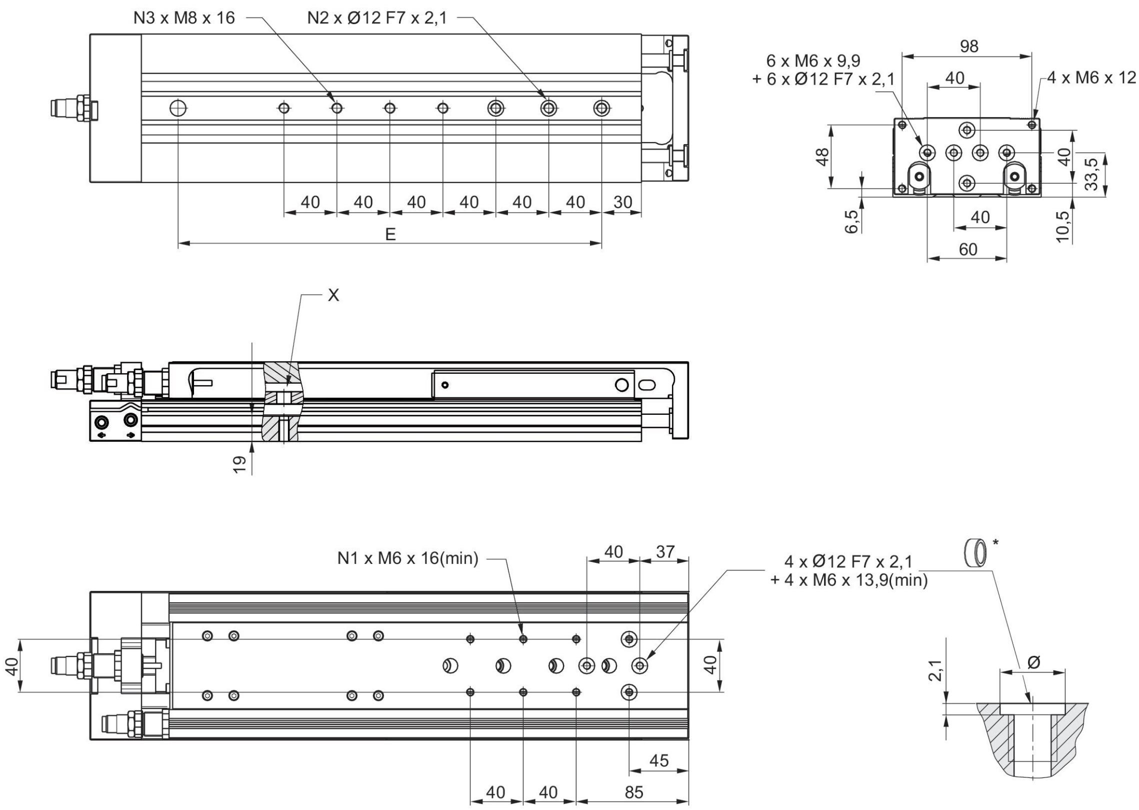
Dimensions
MSC-20



* = centering rings

Part No.	Piston Ø	Stroke	N1	N2	N3
R480640185	20	30	2	2	2
R480640186	20	40	2	2	2
R480640187	20	50	2	2	2
R480640188	20	80	4	3	3
R480640189	20	100	4	3	3

MSC-25

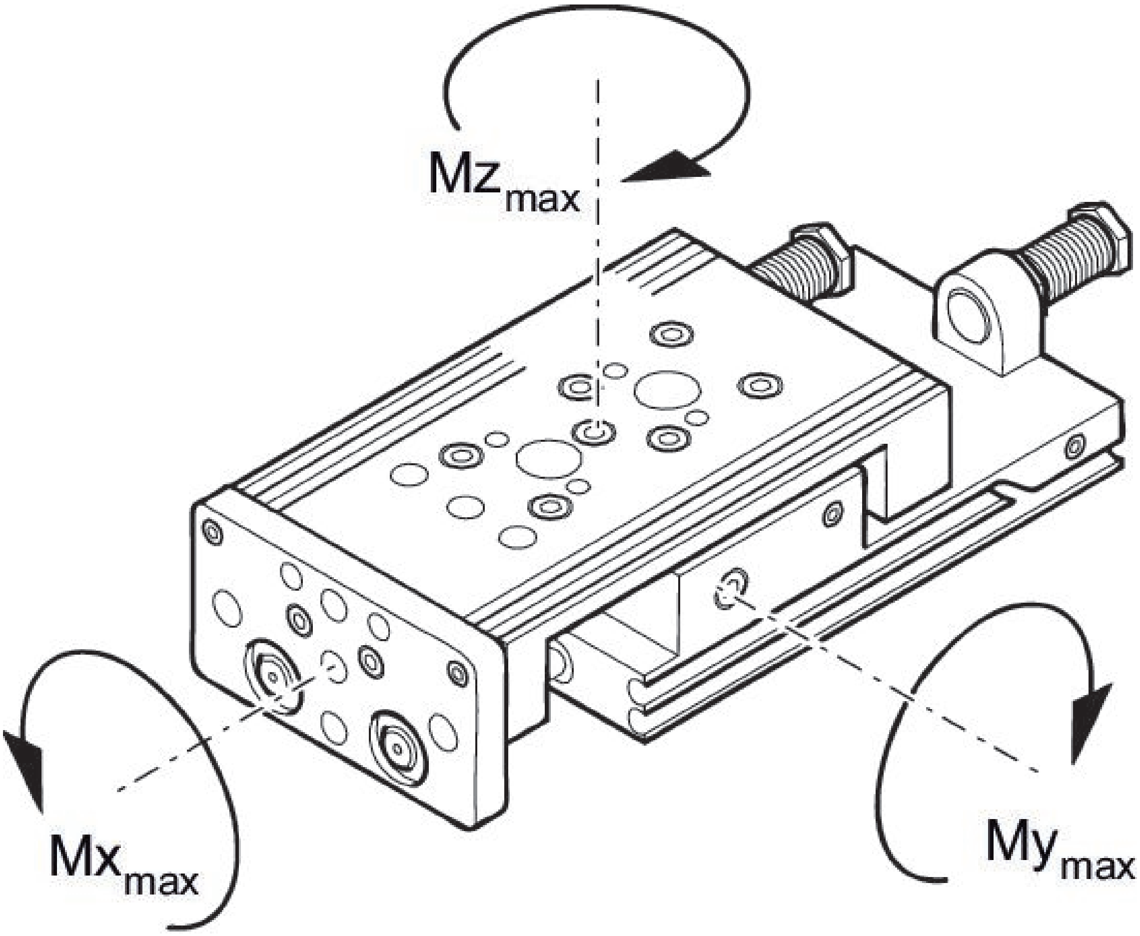


* = centering rings

Part No.	Piston Ø	S	N1	N2	N3	X
R480640192	25	30	2	2	2	1)
R480640193	25	40	2	2	2	
R480640194	25	50	4	2	2	
R480640195	25	80	4	3	3	
R480640196	25	100	4	3	3	

S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Load capacity



M = max. permissible torque

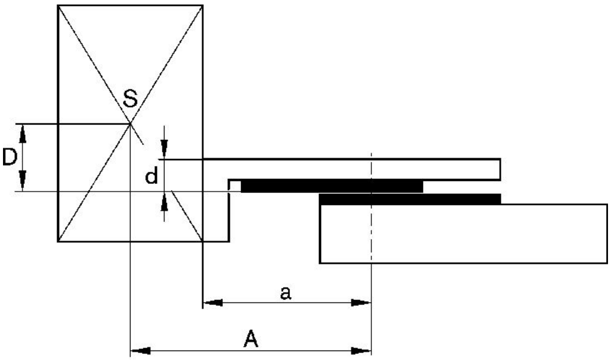
Correction factor (a)

Part No.	Piston Ø	Stroke	a [mm]	d [mm]	Mx_{max} [Nm]	My_{max} [Nm]	Mz_{max} [Nm]
R480640164	8	20	69.5	12	5.8	5.9	5.9
R480640165	8	30	69.5	12	5.8	5.9	5.9
R480640166	8	40	69.5	12	5.8	5.9	5.9
R480640167	8	50	83	12	5.8	5.9	5.9
R480640168	8	80	121	12	8	14.6	14.6
R480640171	12	30	77	15	13.8	6.45	6.45
R480640172	12	40	77	15	13.8	6.45	6.45
R480640173	12	50	81	15	13.8	6.45	6.45
R480640174	12	80	117	15	17.3	15.6	15.6
R480640175	12	100	137	15	17.3	15.6	15.6
R480640178	16	30	65	15	31.6	11.95	11.95
R480640179	16	40	75	15	31.6	11.95	11.95
R480640180	16	50	86	15	31.6	11.95	11.95
R480640181	16	80	123	15	45	27.3	27.3
R480640182	16	100	144	15	45	27.3	27.3
R480640185	20	30	75	20	31.6	11.95	11.95
R480640186	20	40	75	20	31.6	11.95	11.95
R480640187	20	50	92	20	31.6	11.95	11.95
R480640188	20	80	125	20	45	27.3	27.3
R480640189	20	100	143	20	45	27.3	27.3
R480640192	25	30	85	24	87	24.5	24.5
R480640193	25	40	85	24	87	24.5	24.5
R480640194	25	50	102	24	87	24.5	24.5
R480640195	25	80	134	24	110	62.5	62.5
R480640196	25	100	152	24	110	62.5	62.5

Part No.	Piston Ø	S	N1	N2	N3	X
R480640185	20	30	2	2	2	
R480640186	20	40	2	2	2	
R480640187	20	50	2	2	2	
R480640188	20	80	4	3	3	
R480640189	20	100	4	3	3	

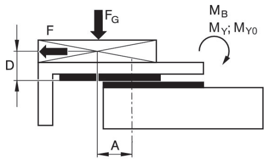
S = stroke
1) Access to the through hole only after removal of the stroke limitation bolts

Correction factor (a, d)

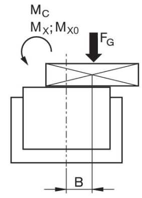


Correction factor (a, d)

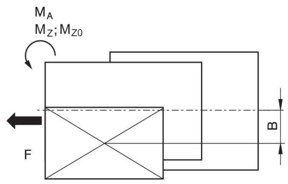
horizontal



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



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



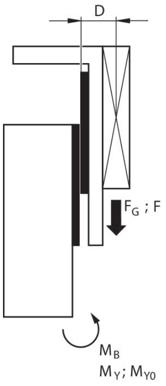
stat.	$M_{A0} = F \cdot B$
dyn.	$M_A = 0$

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

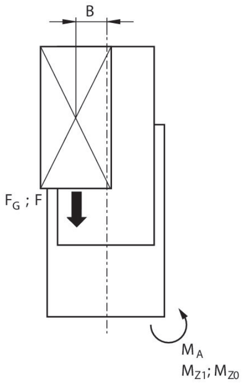
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Correction factor (a, d)

vertical



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

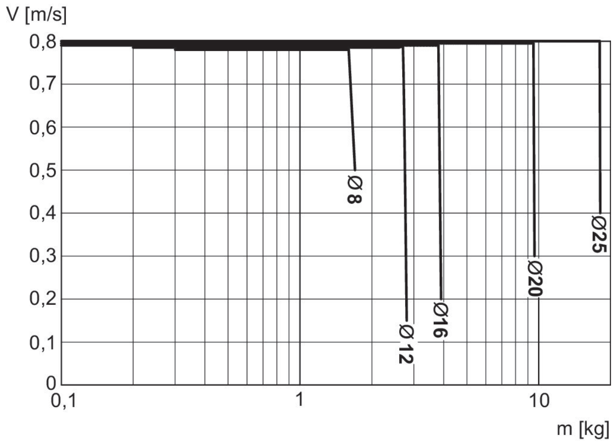


stat.	$M_{AO} = (F_G + F) \cdot B$
dyn.	$M_A = F_G \cdot B$

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

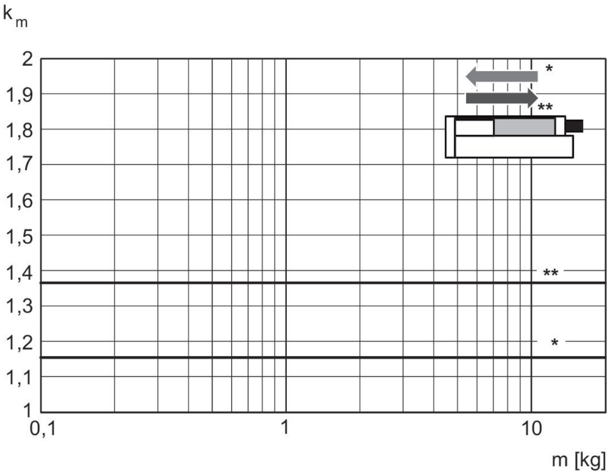
F = m • a FG = m • g a = 1250•V²/H
F = deceleration force [N] F_G = force due to weight [N] m = load mass [kg] a = deceleration [m/s²] g = gravitational acceleration 9,81 [m/s²] V = velocity [m/s] H = stroke length of shock absorber [mm]

Minimum and maximum moving mass



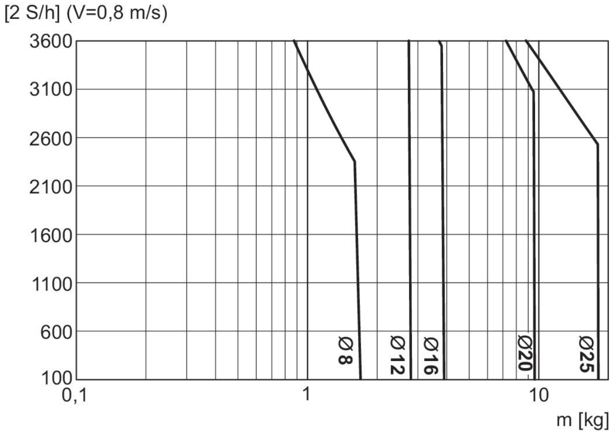
V = velocity [m/s]
m = mass

Correction factor for required speed: retracting and extending, horizontal



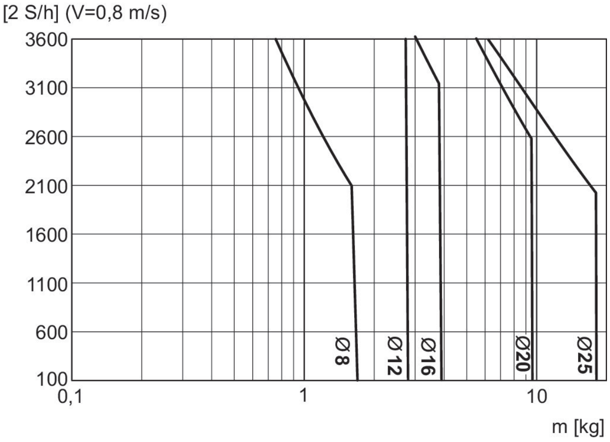
* retracting
** extracting
V = s/1000 • t • km
V = velocity [m/s]
S = stroke

Max. additional moving mass, horizontal



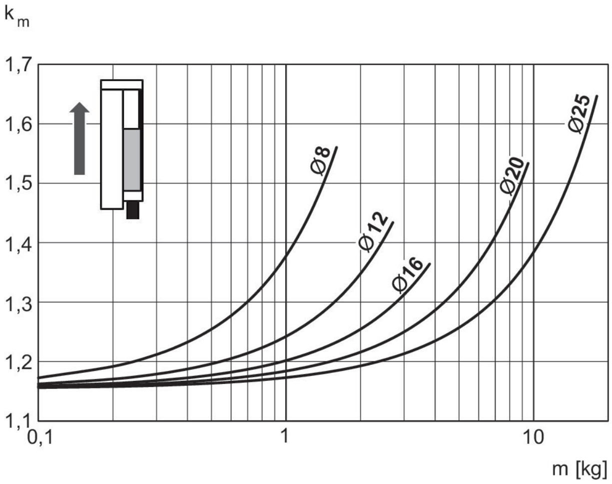
S = stroke [mm]
2 x S = 1 cycle
V = velocity [m/s]
m = mass

Max. additional moving mass, vertical



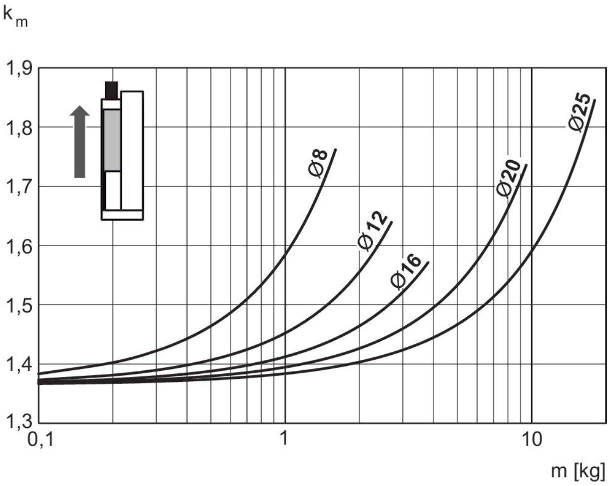
S = stroke [mm]
2 x S = 1 cycle
V = velocity [m/s]
m = mass

Correction factor for required speed: extending, vertical, upwards



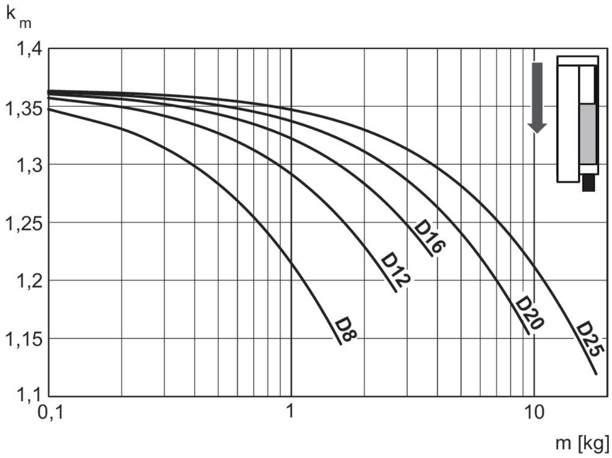
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, upwards



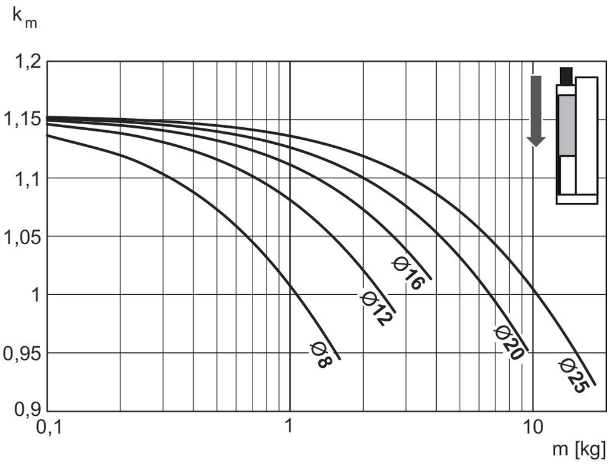
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: retracting, vertical, downwards



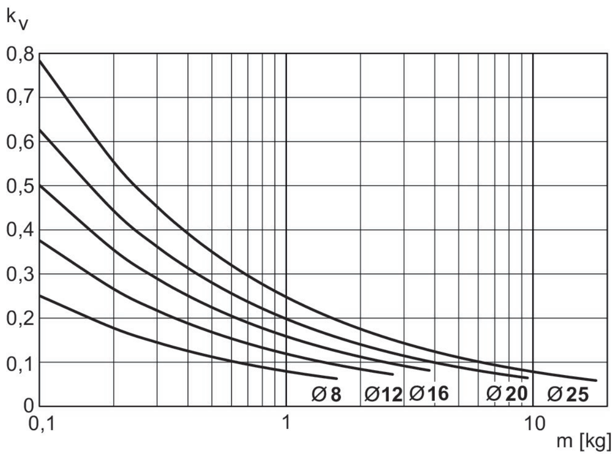
V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Correction factor for required speed: extending, vertical, downwards



V = s/1000 • t • km
V = velocity [m/s]
S = stroke [mm]
t = time [s] for one stroke
m = mass

Max. extracting speed

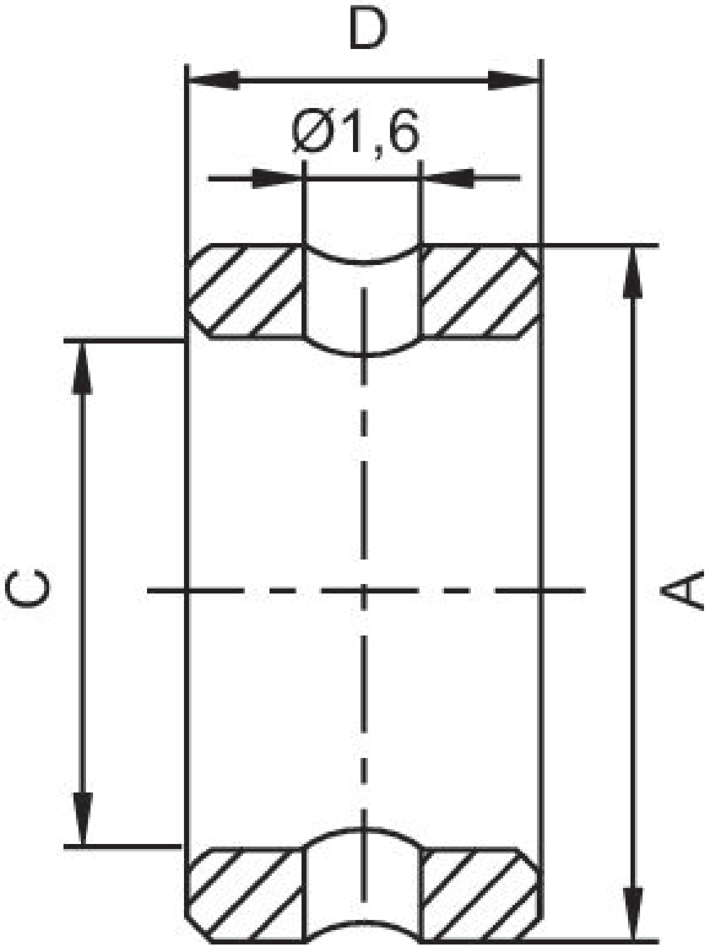


V = √s • kv
V = velocity [m/s]
S = stroke [mm]
m = mass

Centering rings

External Ø [mm]	Scope of delivery [piece]	Material	Part No.
5, 5	6	Stainless Steel	R412000669
7	6	Stainless Steel	R412000668
9	6	Stainless Steel	R412000670
12	6	Stainless Steel	R412000671
16	6	Stainless Steel	R402003731

Dimensions

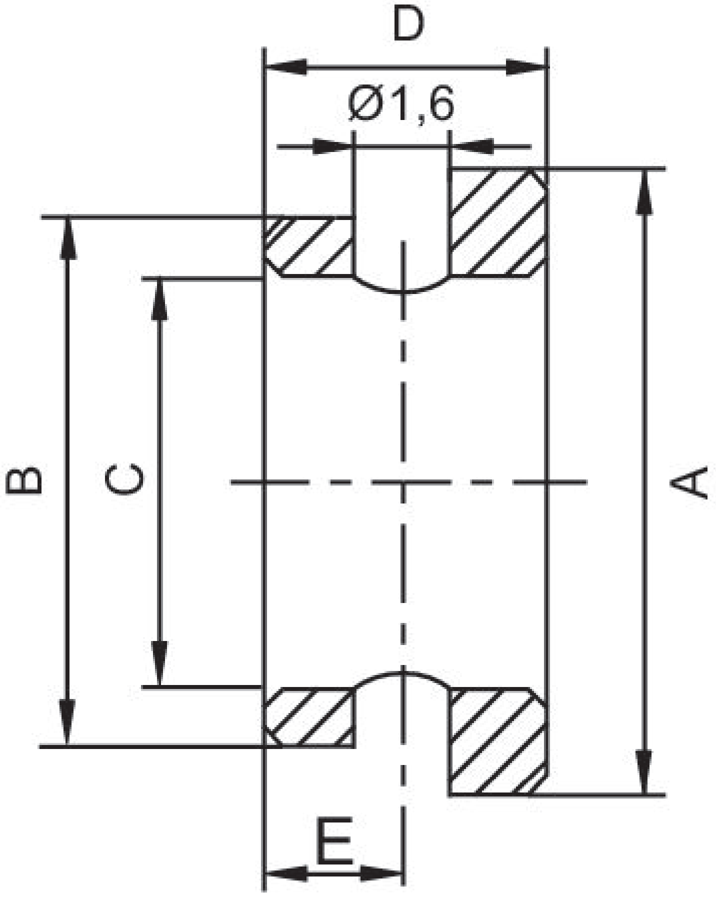


Part No.	Ø	A k6	B k6	C ±0,1	D –0,2	E +0,2
R412000669	5	5	–	3,4	3	–
R412000668	7	7	–	5,5	3	–
R412000670	9	9	–	6,6	4	–
R412000671	12	12	–	9,0	4	–
R402003731	16	16	–	11	6	–

Centering rings

External Ø [mm]	Scope of delivery [piece]	Material	Part No.
7, 5	6	Stainless Steel	R412004030
9, 5	6	Stainless Steel	R412004032
9, 7	6	Stainless Steel	R412004033
12, 9	6	Stainless Steel	R412004034
16, 12	6	Stainless Steel	R402003736

Dimensions

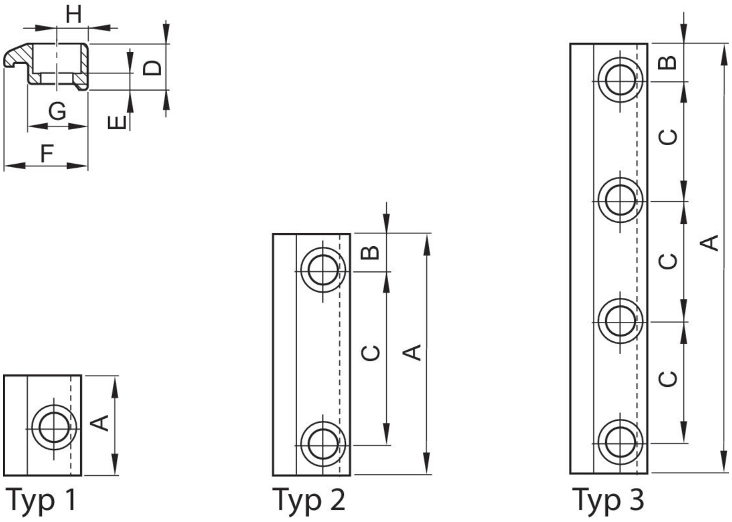


Part No.	Ø	A k6	B k6	C ±0,1	D –0,2	E +0,2
R412004030	5-7	7	5	3,4	3	1,5
R412004032	5-9	9	5	3,4	3,5	1,5
R412004033	7-9	9	7	5,5	3,5	1,5
R412004034	9-12	12	9	6,6	4,0	2
R402003736	12-16	16	12	9	5	2

Clamping fixtures for rodless cylinder Series CKP

Material	Part No.
Aluminum	R037531000
Aluminum	R037531032
Aluminum	R037531033
Aluminum	R037531026
Aluminum	R037541026
Aluminum	R037551000
Aluminum	R037551033
Aluminum	R037551034

Clamping fixtures



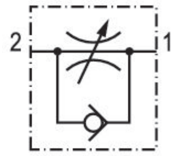
Part No.	1)	Typ	A	B	C	D	E	F	G
R037531000	M4	1	25	–	–	9	4.6	14.5	10.5
R037531002	M4	3	87	6	25	9	4.6	14.5	10.5
R037531003	M4	3	107	8.5	30	9	4.6	14.5	10.5
R037531032	M4	2	72	11	50	9	4.6	14.5	10.5
R037531033	M4	2	62	11	40	9	4.6	14.5	10.5
R037531026	M4	3	77	8.5	20	9	4.6	14.5	10.5
R037541002	M5	3	107	8.5	30	11.5	4.8	19.3	14
R037541026	M5	3	77	8.5	20	11.5	4.8	19.3	14
R037551000	M6	1	25	–	–	11.5	5.3	19.3	14
R037551002	M6	3	142	11	40	11.5	5.3	19.3	14
R037551033	M6	2	72	11	50	11.5	5.3	19.3	14
R037551034	M6	2	62	11	40	11.5	5.3	19.3	14
R037551023	M6	2	47	8.5	30	11.5	5.3	19.3	14

Part No.	H
R037531000	5
R037531002	5
R037531003	5
R037531032	5
R037531033	5
R037531026	5
R037541002	7
R037541026	7
R037551000	7
R037551002	7
R037551033	7
R037551034	7
R037551023	7

1) countersink for screw

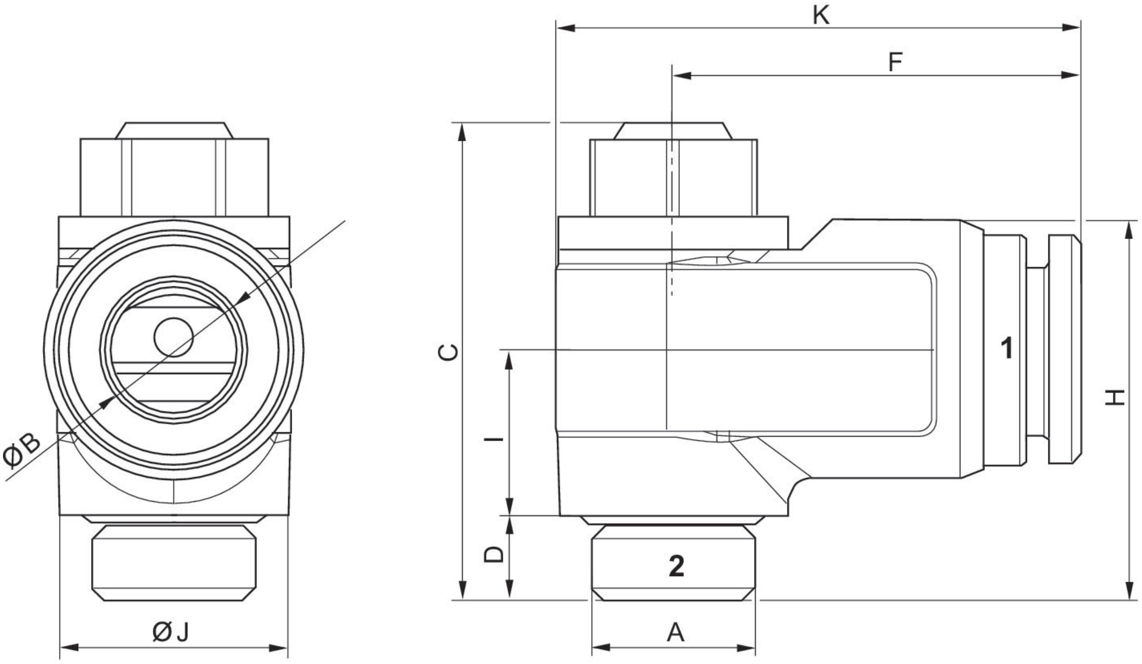
Check-choke valve, Series CC04

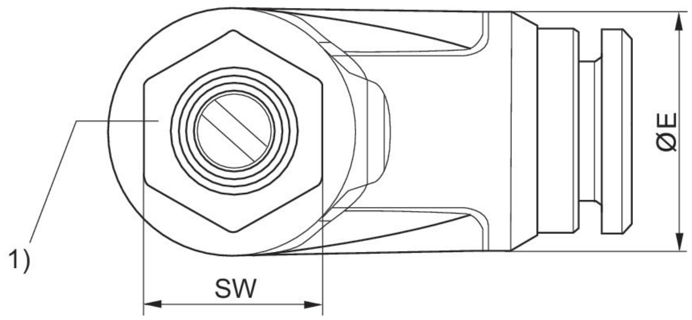
: 2 > 1
Type: Exhaust Air Throttling
Compressed air connection type 1: Push-in fitting
Ambient temperature min./max.: -10 °C ... 60 °C
Working pressure min./max.: 0.5 bar ... 10 bar



Compressed air connection 1	Compressed air connection type 1	Compressed air connection 2	Compressed air connection type 2	Throttle bore [mm]	Nominal flow Qn 2 to 1 [l/min]	Part No.
Ø 4	Push-in fitting	M5	External thread	2	70	R412010564
Ø 6	Push-in fitting	M5	External thread	2	110	R412010565
Ø 4	Push-in fitting	G 1/8	External thread	3.5	150	R412010568
Ø 6	Push-in fitting	G 1/8	External thread	3.5	390	R412010569
Ø 8	Push-in fitting	G 1/8	External thread	3.5	470	R412010570

Dimensions





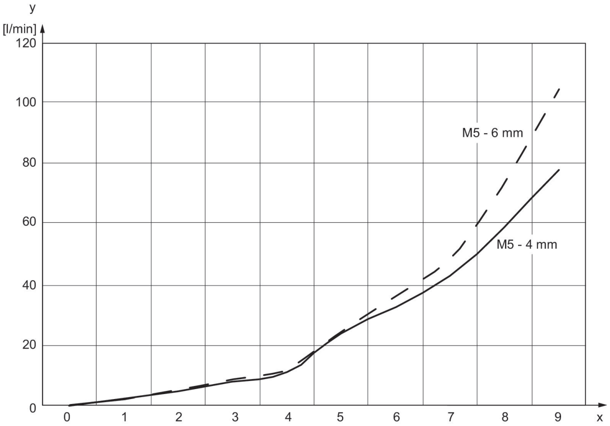
1) Recommended tightening torque M_A: M 5: 1.1 Nm -0.2 G 1/8: 3.0 Nm -0.3 G 1/4: 6.0 Nm -0.6 G 3/8: 8.0 Nm -1.0 G 1/2: 10.0 Nm -1.0

Part No.	Port 1	Port 2	Ø B	C	D	Ø E	F	K	H
R412010564	Ø 4	M5	4	21.8	4	9	15.9	20.4	12
R412010565	Ø 4	G 1/8	6	21.8	4	11.1	17.2	21.8	13
R412010568	Ø 6	M5	4	28.5	5.5	11.5	21.9	28.8	21
R412010569	Ø 6	G 1/8	6	28.5	5.5	13.5	22.4	29.3	21.7
R412010570	Ø 6	G 1/4	8	28.5	5.5	15.5	24.2	31.1	22.7
R412010571	Ø 8	G 1/8	6	33.6	6.5	13	24.3	33.5	25.3
R412010572	Ø 8	G 1/4	8	33.6	6.5	15.5	26.6	35.5	25.3
R412010573	Ø 8	G 1/4	10	33.6	6.5	18.1	29.2	38.1	26.7
R412010574	Ø 10	G 3/8	8	40.8	7	15.6	28.2	40.6	23.6
R412010575	Ø 10	G 3/8	10	40.8	7	19	32	43.3	33.5
R412010576	Ø 10	G 3/8	12	40.8	7	22.1	34.2	45.4	35.6
R412010577	Ø 12	G 1/2	10	47.8	8.3	19.2	34	47.7	41.1
R412010578	Ø 12	G 1/2	12	47.8	8.3	22	36.1	49.8	43.9

Part No.	I	Ø J	SW
R412010564	7.5	8.7	7
R412010565	7.5	8.7	7
R412010568	9.8	13.6	10
R412010569	9.8	13.6	10
R412010570	9.8	13.6	10
R412010571	12.8	17.6	13
R412010572	11.5	17.6	13
R412010573	11.5	17.6	13
R412010574	15.8	22.2	16
R412010575	16.4	22.2	16
R412010576	17.8	22.2	16
R412010577	20.3	26.6	18
R412010578	21.5	26.6	18

Flow diagram

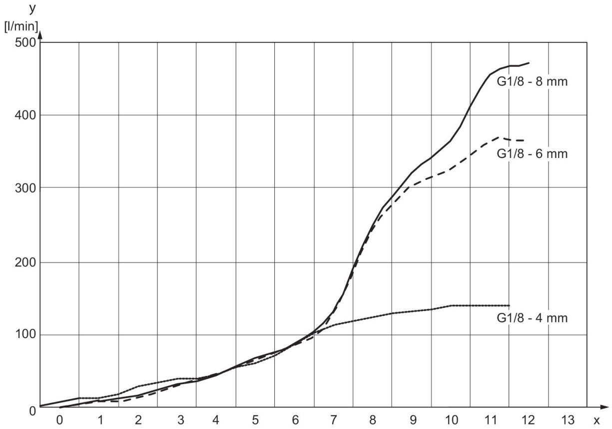
M5



x = rotations of the throttle screw y = flow rate Qn

Flow diagram

G 1/8

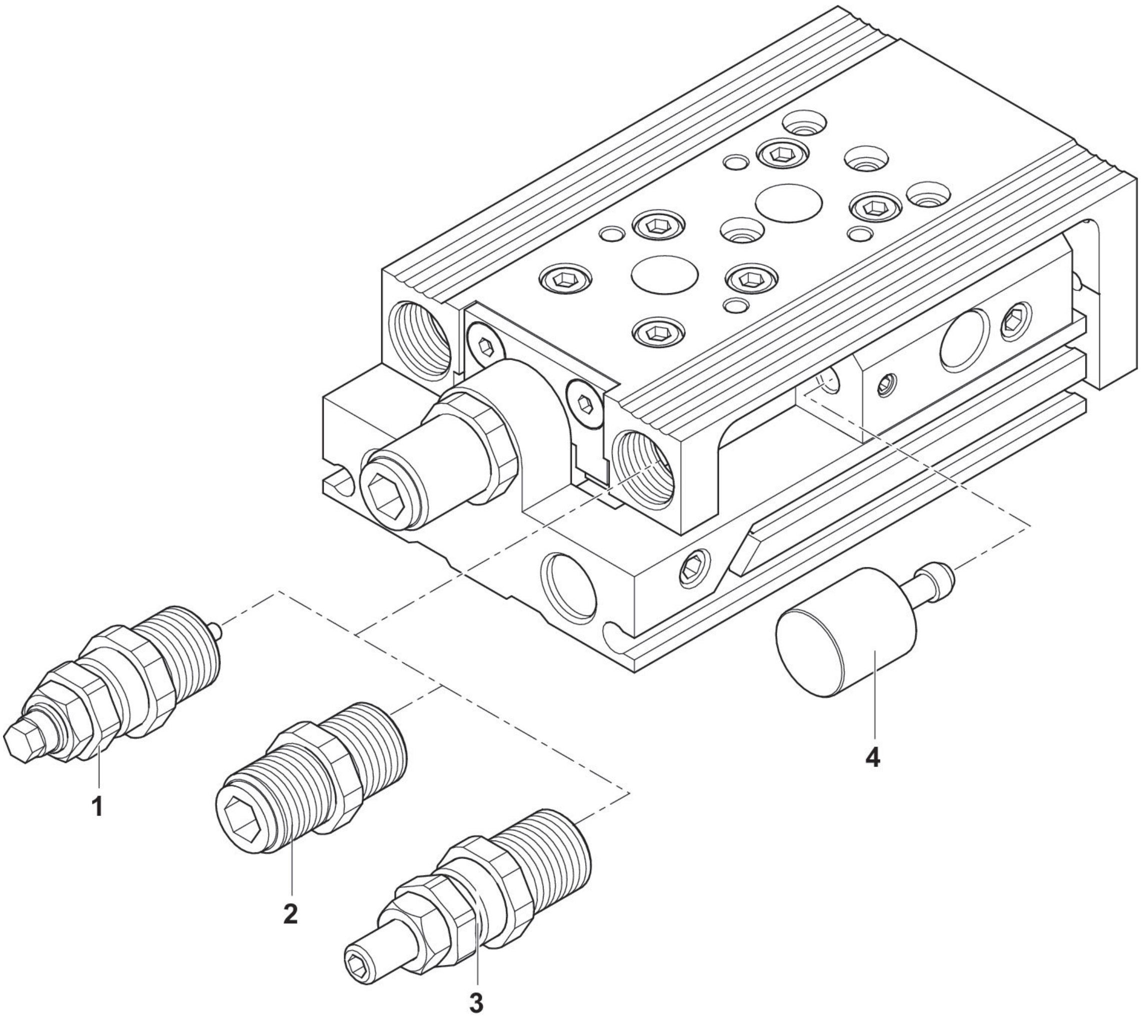


x = rotations of the throttle screw y = flow rate Qn

Stroke setting accessories

Type	Part No.
MSC-08-HM	R422100795
MSC-12-HM	R422100797
MSC-20-HM	R422100799
MSC-25-HM	R422100801
MSC-08-EE	R422100796
MSC-12-EE	R422100798
MSC-20-EE	R422100800
MSC-25-EE	R422100802
MSC-08-EM	R412021913
MSC-12-EM	R412021914
MSC-20-EM	R412021915
MSC-25-EM	R412021916
MSC-08	R412021836
MSC-08	7472D00616
MSC-08	7472D00626
MSC-12 / 16	R412022650
MSC-12 / 16	7472D00620
MSC-12 / 16	7472D00619
MSC-20 / 25	7472D00623
MSC-20 / 25	7472D00622
MSC-20 / 25	7472D00625

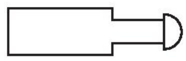
Dimensions



Part No.	Type	Single parts	Stroke	Additional stroke limitation in mm	Ø8	Ø12	Ø16	Ø20	Ø25
R422100795	MSC-08-HM	1)	–	–	–	MSC-HM	–	–	–
R422100796	MSC-08-EE	2)	–	–	–	MSC-EE	–	–	–
R422100797	MSC-12-HM	1)	–	–	–	–	MSC-HM	MSC-HM	–
R422100798	MSC-12-EE	2)	–	–	–	–	MSC-EE	MSC-EE	–
R422100799	MSC-20-HM	1)	–	–	–	–	–	–	MSC-HM
R422100800	MSC-20-EE	2)	–	–	–	–	–	–	MSC-EE
R422100801	MSC-25-HM	1)	–	–	–	–	–	–	MSC-HM
R422100802	MSC-25-EE	2)	–	–	–	–	–	–	MSC-EE
R412021913	MSC-08-EM	3)	–	–	MSC-EM	–	–	–	–
R412021914	MSC-12-EM	3)	–	–	–	MSC-EM	MSC-EM	–	–
R412021915	MSC-20-EM	3)	–	–	–	–	–	MSC-EM	–
R412021916	MSC-25-EM	3)	–	–	–	–	–	–	MSC-EM
7472D00616	MSC-08	4)	30-80	10	–	–	–	–	–
7472D00626	MSC-08	4)	30-80	20	–	–	–	–	–
R412021836	MSC-08	4)	40-80	30	–	–	–	–	–
7472D00620	MSC-12 / 16	4)	30-100 / 30-150	10	–	–	–	–	–
7472D00619	MSC-12 / 16	4)	30-100 / 30-150	20	–	–	–	–	–
R412022650	MSC-12 / 16	4)	30-100 / 30-150	30	–	–	–	–	–
7472D00623	MSC-20 / 25	4)	30-200	10	–	–	–	–	–
7472D00622	MSC-20 / 25	4)	30-200	20	–	–	–	–	–
7472D00625	MSC-20 / 25	4)	40-200	30	–	–	–	–	–

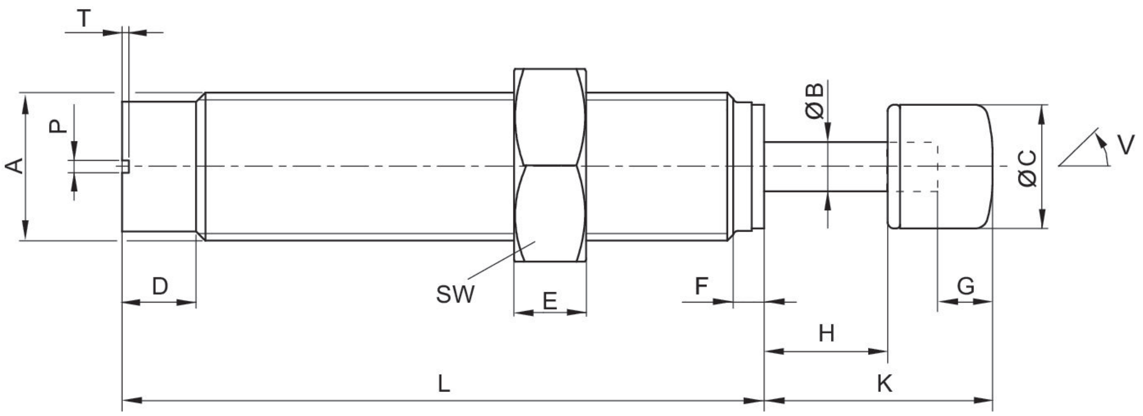
Industrial shock absorber, Series SA1-MC

Ambient temperature min./max.: -20 °C ... 80 °C



Mounting thread	Stroke [mm]	Max. energy absorption/stroke [Nm]	Max. energy absorption/hour [Nm]	Effective mass m_e min. [kg]	Effective mass m_e max. [kg]	Min. return spring force [N]	Max. return spring force [N]	Part No.
M6x0,5	5	1	3000	0.8	2.8	2	5	R412010284

Dimensions



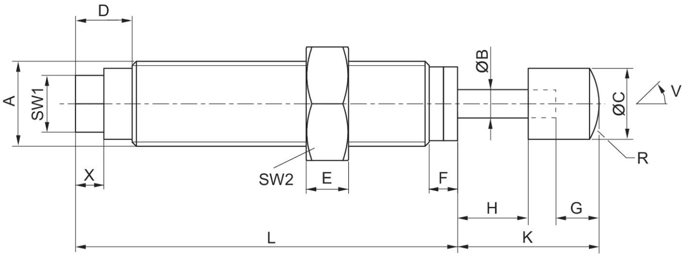
A = mounting thread
V = tilt

Part No.	Type	Mounting thread	ØB	ØC	D	E	F	G	H
R412010291	SA1-MC	M12x1	4	10	6	4	2.5	4	10
R412010292	SA1-MC	M12x1	4	10	6	4	2.5	4	10
R412010293	SA1-MC	M12x1	4	10	6	4	2.5	4	10

Part No.	K	L	P	T	SW	W [°]
R412010291	18.5	52	1	0.6	14	2
R412010292	18.5	52	1	0.6	14	2
R412010293	18.5	52	1	0.6	14	2

R412010284

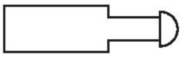
Dimensions



A = mounting thread
V = tilt

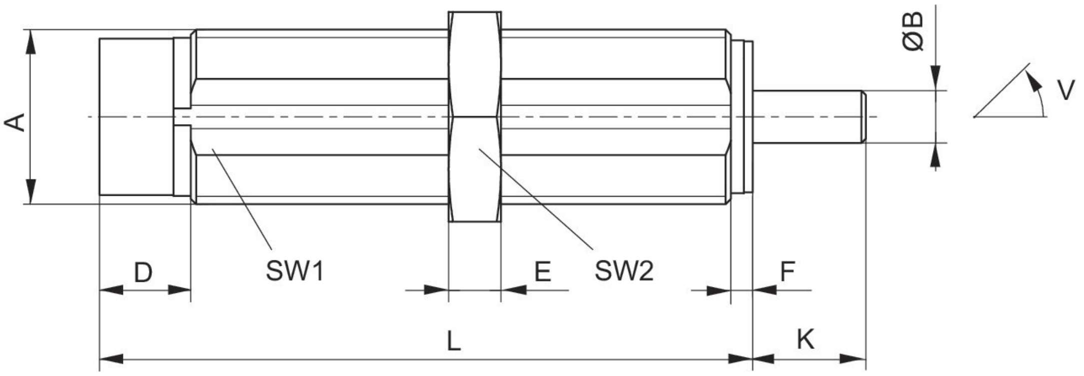
Industrial shock absorber, Series SA1-MC

Ambient temperature min./max.: -20 °C ... 80 °C



Mounting thread	Stroke [mm]	Max. energy absorption/stroke [Nm]	Max. energy absorption/hour [Nm]	Effective mass m_e min. [kg]	Effective mass m_e max. [kg]	Min. return spring force [N]	Max. return spring force [N]	Part No.
M14x1,5	14	30	50000	9.9	76	13	23	R412010305

Dimensions



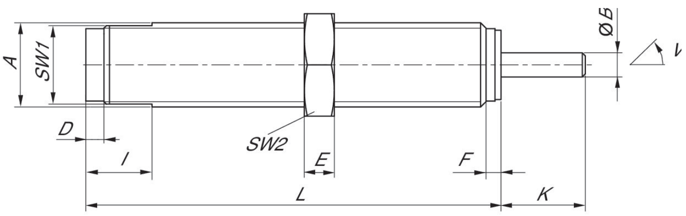
A = mounting thread
V = tilt

Part No.	Type	Mounting thread	ØB	D	E	F	K	L	SW1
R412010307	SA1-MC	M20x1,5	6	10.5	6	2.5	13	75	18
R412010308	SA1-MC	M20x1,5	6	10.5	6	2.5	13	75	18
R412010309	SA1-MC	M20x1,5	6	10.5	6	2.5	13	75	18
R412010310	SA1-MC	M25x1,5	8	9.5	8	3.5	25	108	23
R412010311	SA1-MC	M25x1,5	8	9.5	8	3.5	25	108	23
R412010312	SA1-MC	M25x1,5	8	9.5	8	3.5	25	108	23

Part No.	SW2	W [°]
R412010307	24	4
R412010308	24	4
R412010309	24	4
R412010310	30	2
R412010311	30	2
R412010312	30	2

R412010305

Dimensions

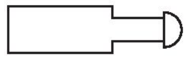


A = mounting thread
V = tilt

EMERSON

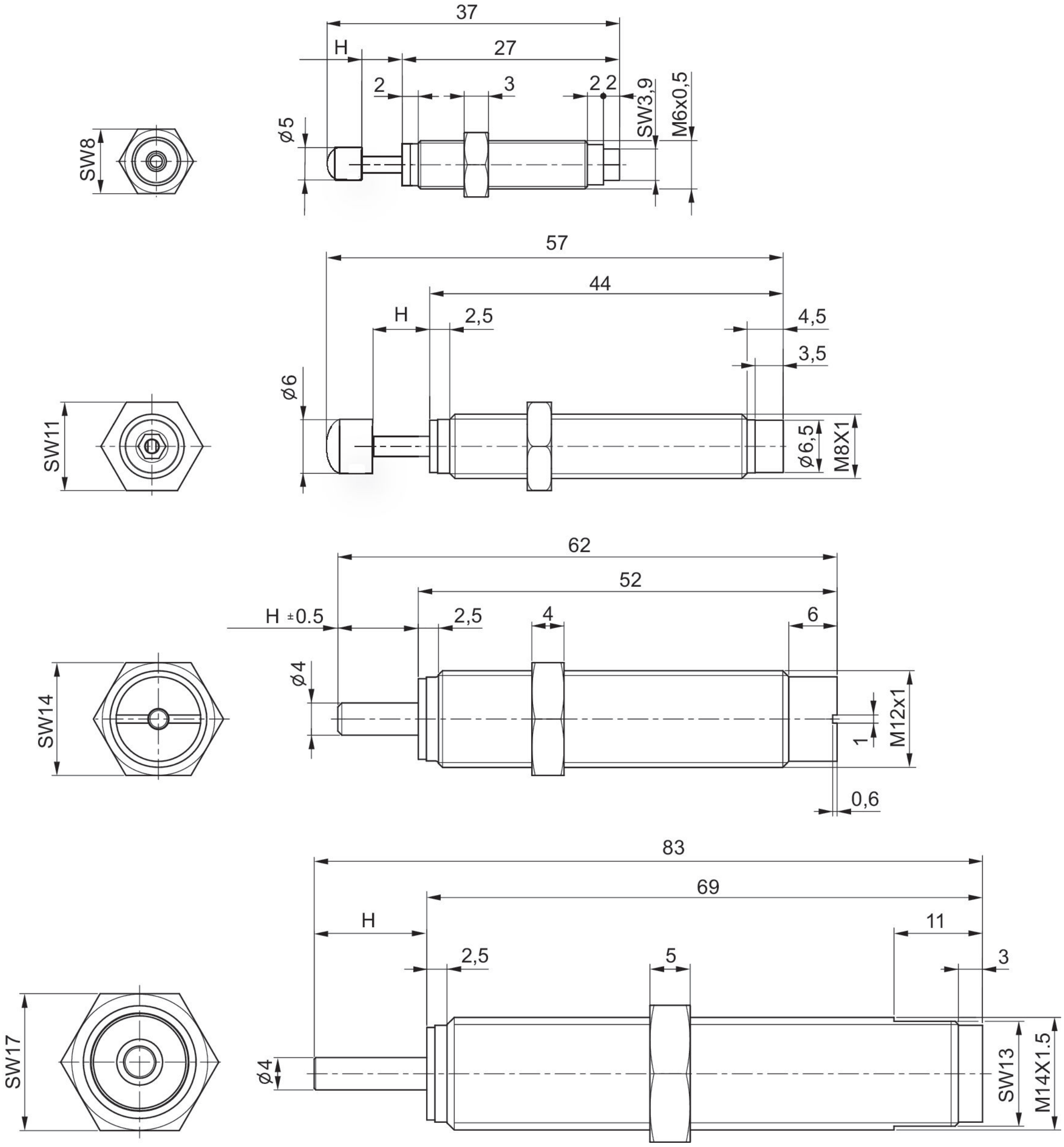
Industrial shock absorber, Series SA2-RC for Mini slide, Series MSC

Ambient temperature min./max.: -20 °C ... 80 °C



Mounting thread	Stroke [mm]	Max. energy absorption/stroke [Nm]	Max. energy absorption/hour [Nm]	Effective mass m_e min. [kg]	Effective mass m_e max. [kg]	Min. return spring force [N]	Max. return spring force [N]	Part No.
M8x1	7	3	14100	1.7	50	2.5	6	R412010370
M12x1	10	8	26000	5	57	3.5	7	R412010371

Dimensions

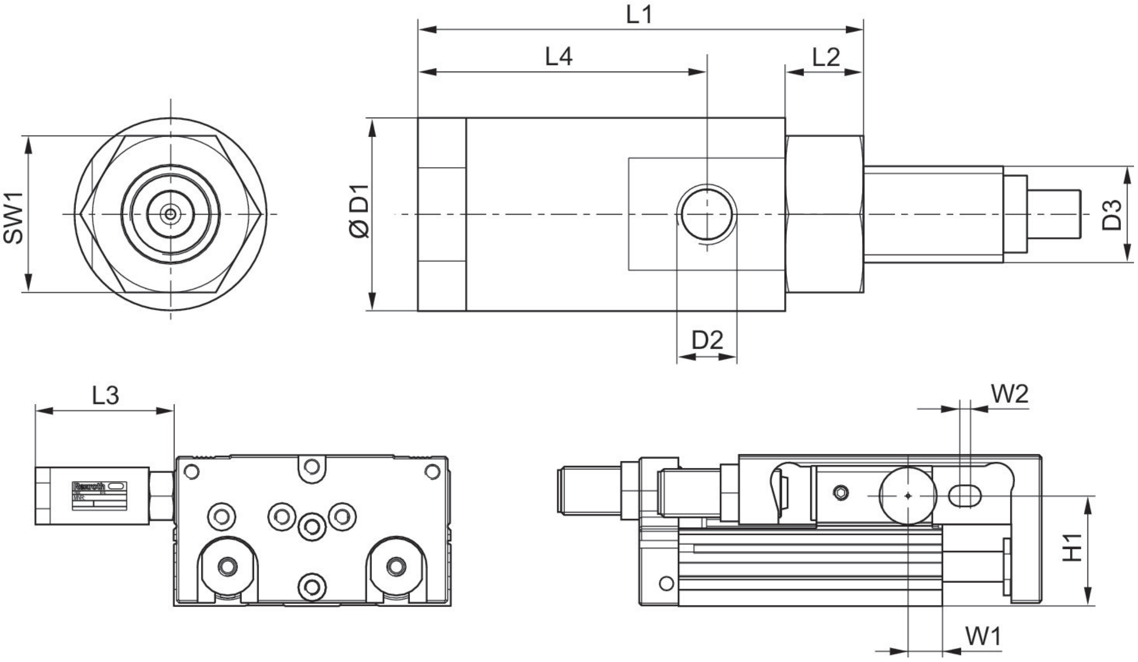


H = stroke

End position lock, Series LU

Ambient temperature min./max.: 0 °C ... 60 °C
Medium temperature min./max.: 0 °C ... 60 °C

Dimensions



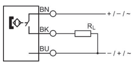
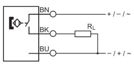
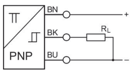
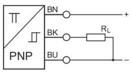
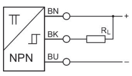
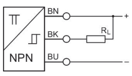
Materialnummer	MSC Ø	Ø D1	D2	D3	H1	L1	L2	L3	L4
R402006023	8 / 12 / 16	16	M5	M8x1	19,5 / 23 / 28,2	37	6.5	38,3 / 35,3 / 34,5	24
R402006027	20 / 25	19	M5	M10x1	36,5 / 42,5	46.2	8.4	42.8	30.3

Materialnummer	SW1	W1	W2
R402006023	13	19,3 / 10 / 10	5
R402006027	16	11,5 / 14,8	3,5 / 5

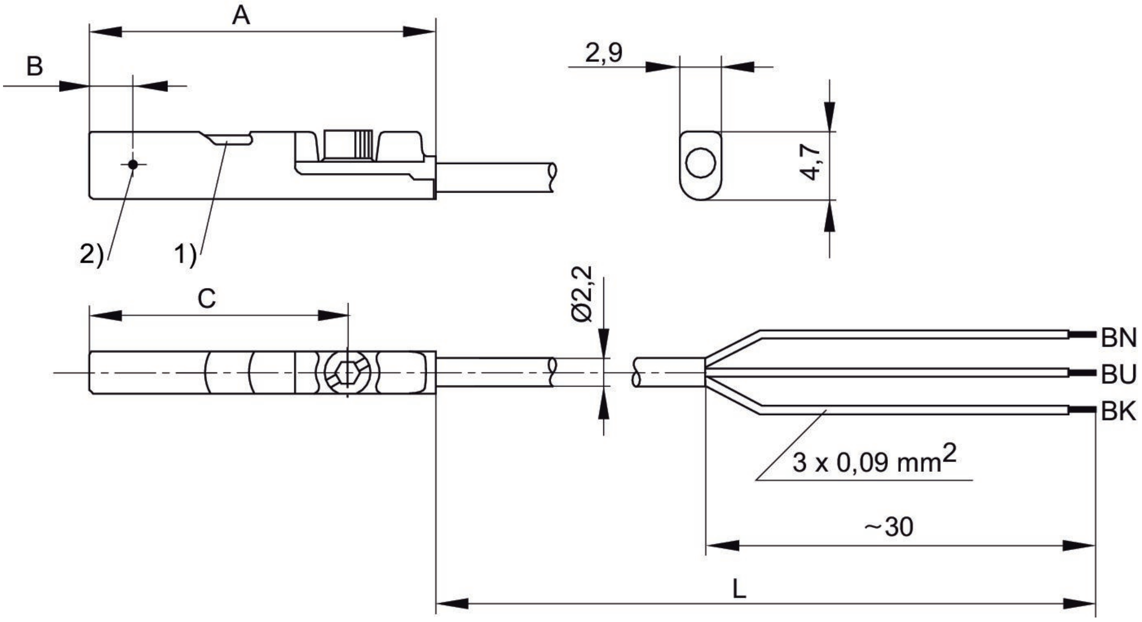
Stroke setting range for return stroke max. [[5] mm]

Sensors, Series ST4

Direct mounting for series: PRA, SSI, GSU, RTC, CKP, GPC, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: open cable ends
Certificates: UL (Underwriters Laboratories), cULus, RoHS
Ambient temperature min./max.: -30 °C ... 80 °C

	Switch descr.	Cable length L [m]	Max. DC switching current [A]	Max. AC switching current [A]	Min. operating voltage DC [V DC]	Max. operating voltage DC [V DC]	Version	Part No.
	Reed	3	0.13	0.13	5	30	Protected against polarity reversal	R412019488
	Reed	5	0.13	0.13	5	30	Protected against polarity reversal	R412019489
	electronic PNP	3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019680
	electronic PNP	5	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019681
	NPN	3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019684
	NPN	5	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019685

Dimensions

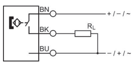
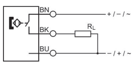
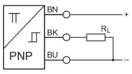
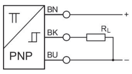


1) LED 2) Switching point
L = cable length BN = brown, BK = black, BU = blue

Part No.	A	B	C
R412019488	26.3	6.3	20.3
R412019489	26.3	6.3	20.3
R412019680	23.7	2.8	17.7
R412019681	23.7	2.8	17.7
R412019684	23.7	2.8	17.7
R412019685	23.7	2.8	17.7

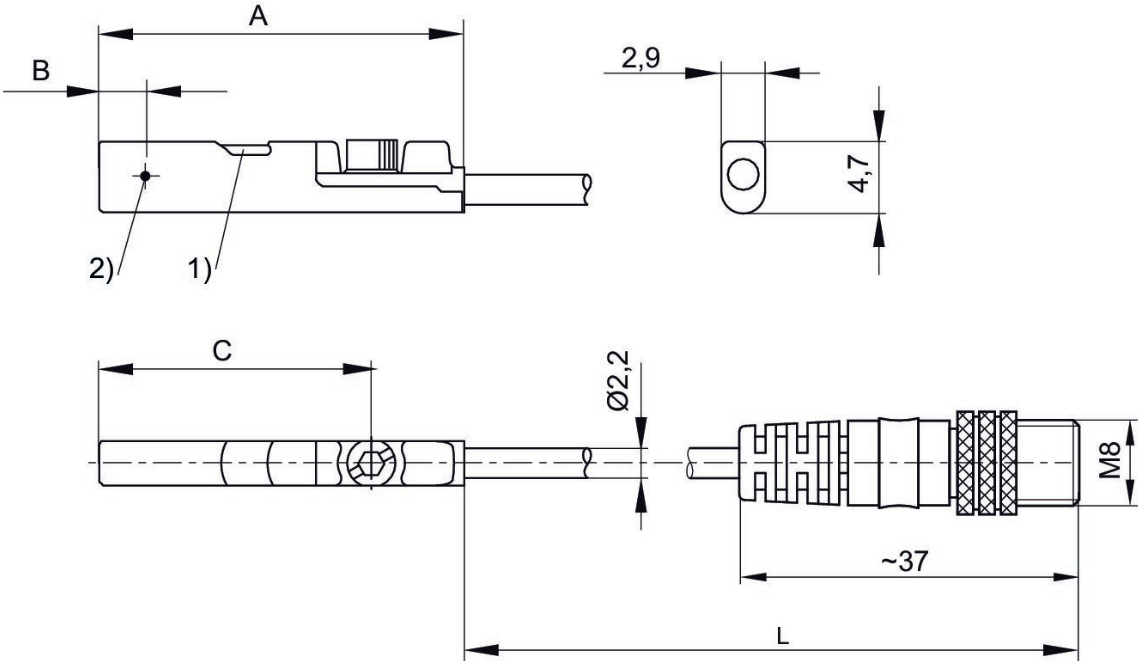
Sensors, Series ST4

Direct mounting for series: PRA, SSI, GSU, RTC, CKP, GPC, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: Plug
Certificates: UL (Underwriters Laboratories), cULus, RoHS
Electrical connection 2, number of poles: 3-pin
Ambient temperature min./max.: -30 °C ... 80 °C

	Switch descr.	Cable length L [m]	Max. DC switching current [A]	Max. AC switching current [A]	Min. operating voltage DC [V DC]	Max. operating voltage DC [V DC]	Version	Part No.
	Reed	0.3	0.13	0.13	5	30	Protected against polarity reversal	R412019490
	Reed	0.5	0.13	0.13	5	30	Protected against polarity reversal	R412019686
	electronic PNP	0.3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019493
	electronic PNP	0.5	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019687

EMERSON

Dimensions

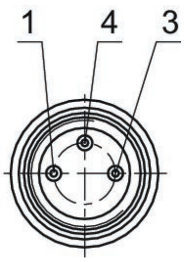


1) LED 2) Switching point
L = cable length

Part No.	A	B	C
R412019490	26.3	6.3	20.3
R412019686	26.3	6.3	20.3
R412019493	23.7	2.8	17.7
R412019687	23.7	2.8	17.7

R412019490, R412019686, R412019493, R412019687

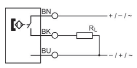
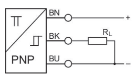
Pin assignment M8x1 (3-pin)



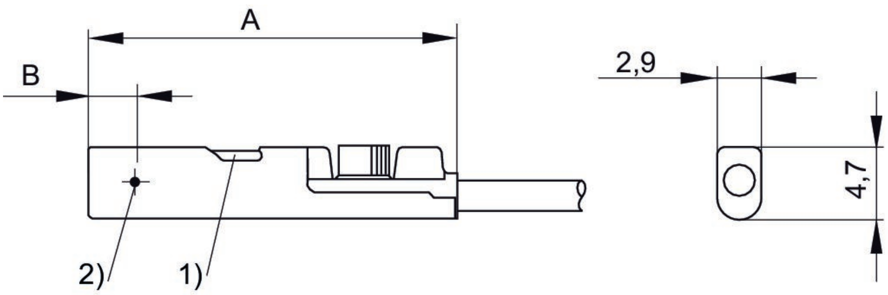
Pin	Allocation
1	(+)
3	(-)
4	(OUT)

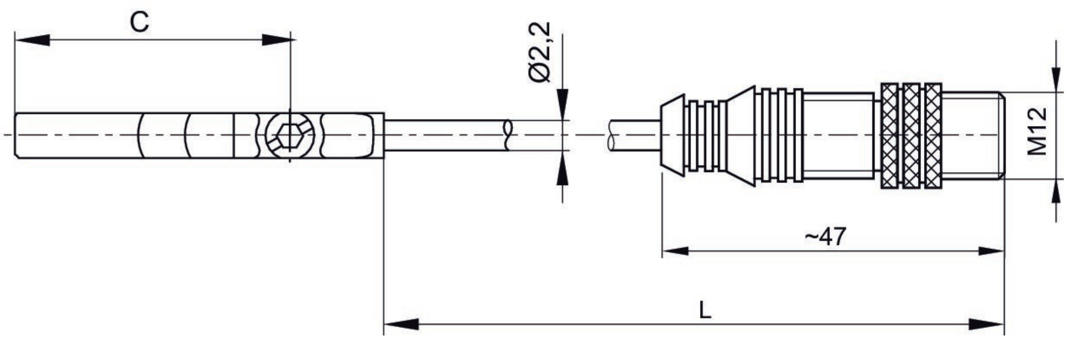
Sensors, Series ST4

Direct mounting for series: PRA, SSI, GSU, RTC, CKP, GPC, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: Plug
Certificates: UL (Underwriters Laboratories), cULus, RoHS
Electrical connection 2, number of poles: 3-pin
Ambient temperature min./max.: -30 °C ... 80 °C

	Switch descr.	Cable length L [m]	Max. DC switching current [A]	Max. AC switching current [A]	Min. operating voltage DC [V DC]	Max. operating voltage DC [V DC]	Version	Part No.
	Reed	0.3	0.13	0.13	5	30	Protected against polarity reversal	R412019688
	electronic PNP	0.3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019689

Dimensions

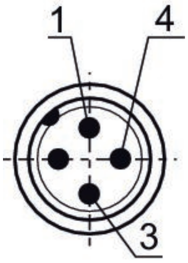




1) LED 2) Switching point
L = cable length

Part No.	A	B	C
R412019688	26.3	6.3	20.3
R412019689	23.7	2.8	17.7

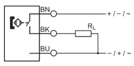
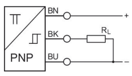
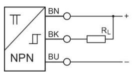
R412019688, R412019689



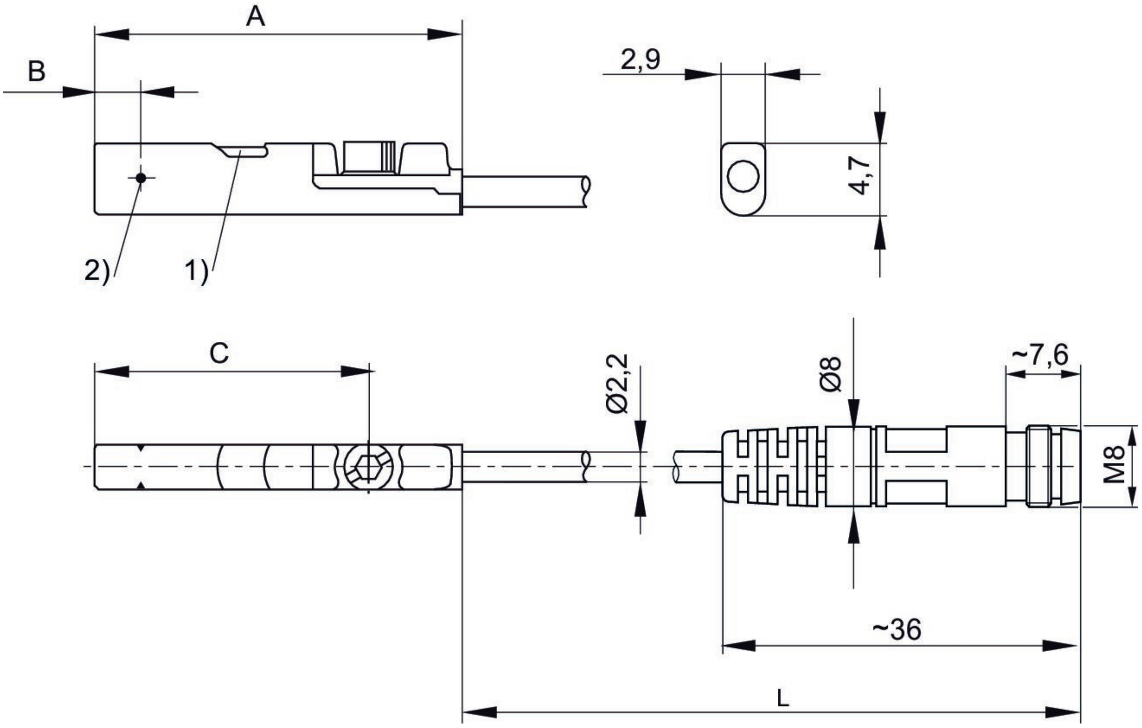
Pin	Allocation
1	(+)
3	(-)
4	(OUT)

Sensors, Series ST4

Direct mounting for series: PRA, SSI, GSU, RTC, CKP, GSP, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: Plug
Certificates: UL (Underwriters Laboratories), cULus, RoHS
Electrical connection 2, number of poles: 3-pin
Ambient temperature min./max.: -30 °C ... 80 °C

	Switch descr.	Cable length L [m]	Max. DC switching current [A]	Max. AC switching current [A]	Min. operating voltage DC [V DC]	Max. operating voltage DC [V DC]	Version	Part No.
	Reed	0.3	0.13	0.13	5	30	Protected against polarity reversal	R412019682
	electronic PNP	0.3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019683
	NPN	0.3	0.1		10	30	short circuit resistant, Protected against polarity reversal	R412019694

Dimensions

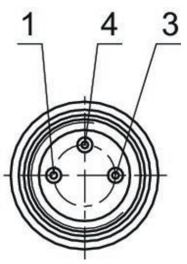


1) LED 2) Switching point
L = cable length

Part No.	A	B	C
R412019682	26.3	6.3	20.3
R412019683	23.7	2.8	17.7
R412019694	23.7	2.8	17.7

R412019682, R412019683, R412019694

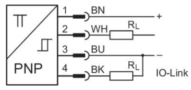
Pin assignment M8x1 (3-pin)



Pin	Allocation
1	(+)
3	(-)
4	(OUT)

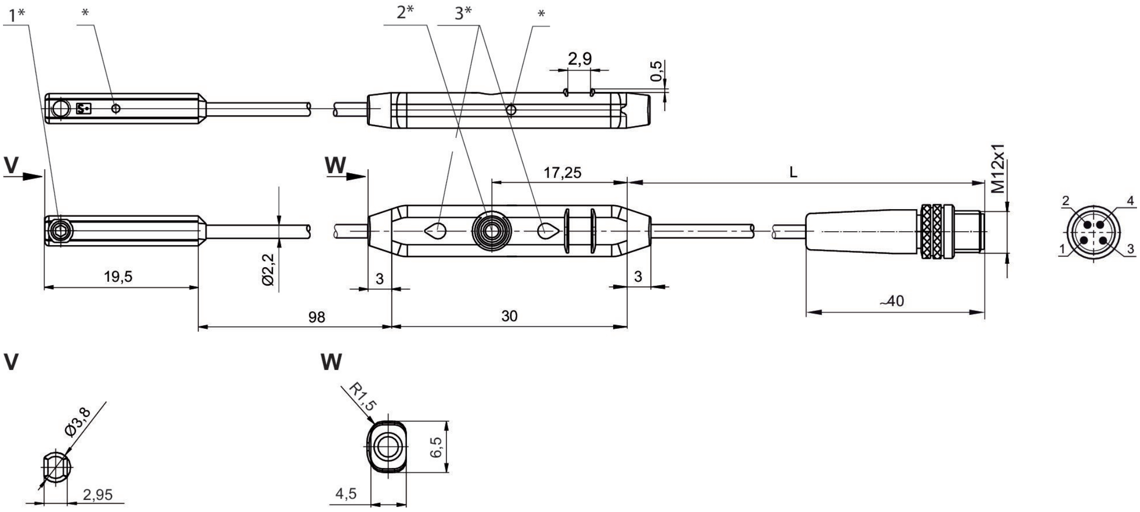
Sensors, Series ST4-2P

Direct mounting for series: PRA, SSI, RTC, GPC, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: Plug
Certificates: RoHS
Electrical connection 2, number of poles: 4-pin
Ambient temperature min./max.: -20 °C ... 75 °C



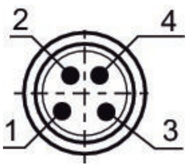
Slot width	Switch descr.	Electrical connection size	Electrical connection number of poles	Part No.
4 mm C-slot	electronic PNP	M8x1	4-pin	R412025689

Dimensions



1* = mounting screw 2* = teach button 3* = LED
L = cable length
PIN assignment: 1 = (+), 2 = (OUT), 3 = (-), 4 = (OUT) IO-Link
* Switching point

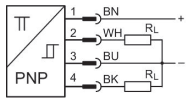
R412025689



Pin	Allocation
1	(+)
2	(OUT)
3	(-)
4	(OUT) IO-Link

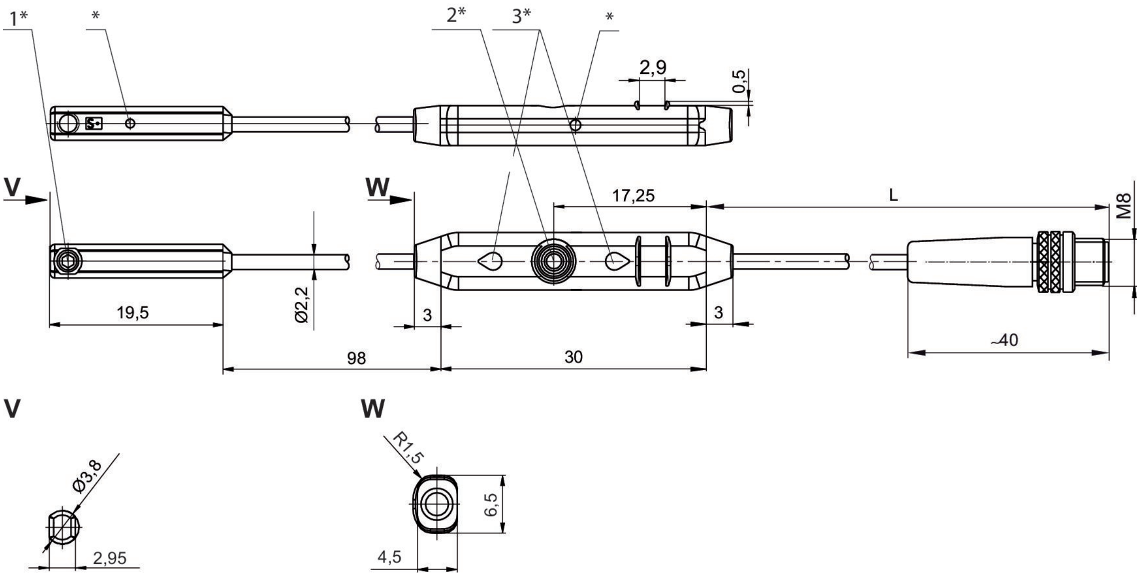
Sensors, Series ST4-2P

Direct mounting for series: PRA, SSI, RTC, GPC, MSC, MSN, RCM, CVI
Indirect mounting for series: MNI, CSL-RD, ICM
Electrical connection 2, type: Plug
Certificates: RoHS
Electrical connection 2, number of poles: 4-pin
Ambient temperature min./max.: -20 °C ... 75 °C



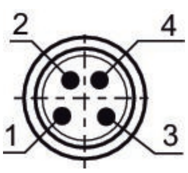
Slot width	Switch descr.	Electrical connec-tion size	Electrical connec-tion num-ber of poles	Part No.
4 mm C-slot	electronic PNP	M8x1	4-pin	R412010140

Dimensions



1* = mounting screw 2* = teach button 3* = LED
L = cable length
* Switching point

R412010140



Pin	Allocation
1	(+)
2	(OUT)
3	(-)
4	(OUT)

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